



Capacitors for Power Electronics



**Aluminum
Electrolytic
Capacitors**

**Film
Capacitors**

**AC Film
Capacitors**

**Mica
Capacitors**

**Aluminum
Electrolytic
Application
Guide**

**Film
Application
Guide**

**AC
Application
Guide**

**Mica
Application
Guide**

Introduction

Capacitor Solutions for Power Electronics

A leading manufacturer of capacitors for the power electronics market, Cornell Dubilier has been dedicated to advancing capacitor technology for new applications since its founding in 1909, and today serves more than 35,000 customers with capacitor solutions that combine quality products, unsurpassed performance and superior customer service.

This catalog details Cornell Dubilier's comprehensive capacitor offering for power electronics:

- Flatpack, snap-in, board-mount and screw-terminal aluminum electrolytic capacitors to 550 V
- DC-link polypropylene film capacitors to 100 amps.
- AC power supply, PFC and motor capacitors to 900 Vac
- IGBT snubber capacitor and diode modules to 4 μF
- Mica snubber capacitors with dV/dt capability 275 kV/ μs

See Cornell Dubilier's website for leading capacitors for HID lighting, high voltage to 30 kV, photoflash and strobe, RF mica, and surface mount applications. Also see the website for more capacitor ratings than would fit in this printed catalog.

Cornell Dubilier combines these innovative product technologies with engineering expertise to provide reliable solutions for renewable energy, power supplies, motor drives, HVAC, motors, welding, aerospace, telecom, and UPS systems; as well as solar power, wind power and fuel cell inverter applications and DC link capacitors for electric vehicles. Cornell Dubilier continues to develop and produce unique capacitor solutions for next-generation applications in these emerging markets.

A global company, Cornell Dubilier has ISO-9001 certified manufacturing and distribution facilities in Liberty, SC; New Bedford, MA; Mexicali, Mexico; and Shenzhen, China to serve customers worldwide. Cornell Dubilier offers products recognized by DESC, as well as safety agencies UL and CSA.



Contents

Please click on page number to go to page.

General Information

Index	4
-------------	---

Aluminum Electrolytic

Aluminum Electrolytic Selector Chart	8
--	---

Aluminum Electrolytic Selector Guide	9
--	---

Application Guide	10
-------------------------	----

Snap-in Types

Type SLPX - 85 °C, Best Value, Snap-In Aluminum	32
---	----

Type 380LX/382LX - 85 °C, High Capacitance, Snap-In Aluminum	40
--	----

Type 380LQ - 85 °C, Compact, High Capacitance, Snap-in Aluminum ...	47
---	----

Type SLP - 105 °C, Best Value, Snap-In Aluminum	53
---	----

Type 381LX/383LX - 105 °C, High Ripple, Snap-In Aluminum	61
--	----

Type 381LQ - 105 °C, Compact, High Ripple, Snap-In Aluminum	67
---	----

Type 381LR - 105 °C, Highest Ripple, Snap-In Aluminum	73
---	----

Large Radial Leaded Board-Mount Types

Type 4CMC - 85 °C, High Capacitance, Plug-in, Radial Leaded Aluminim	77
--	----

Type 400C - 95 °C, Long Life, Plug-in, Radial Leaded Aluminum	82
---	----

Type 420C - 85 °C, Long Life, Inverter Grade, Plug-in, Aluminum	87
---	----

Type 450C - 105 °C, Highest Ripple, Inverter Grade, Plug-in, Aluminum	92
---	----

Type MLP "Flat pack" - Ultra Long Life, Aluminum	98
--	----

Type MLS "Flat pack" - 125 °C Flatpack, Ultra Long Life, Aluminum	103
---	-----

Screw Terminal Types

Type 3186 - 85 °C, Best Value, Screw Terminal, Aluminum	107
---	-----

Type DCMC - 85 °C, High Capacitance, Screw Terminal, Aluminum	113
---	-----

Type 3188 - 85 °C, Best Value, Long Life, Screw Terminal, Aluminum	121
--	-----

Type 500C - 95 °C, Long Life, Screw Terminal, Aluminum	127
--	-----

Type 520C - 85 °C, Long Life, Inverter Grade, Aluminum	133
--	-----

Type 550C - 105 °C, Ultra-Ripple, Inverter Grade, Aluminum	139
--	-----

Type 500R - 85 °C, High Ripple, Long Life, Inverter Grade, Aluminum ...	145
---	-----

Film

Film Selector Guide	152
---------------------------	-----

Application Guide	153
-------------------------	-----

Axial Leaded, High Frequency Filtering

Type 930C - Axial, Round, MPP for High Frequency Filter	156
---	-----

Type 935C - Axial, Round, MPP for High Frequency Filter	161
---	-----

Type DCF - Axial, High Capacitance, MPP for High Frequency Filter	165
---	-----

Snubber

Type 940C - High dV/dt, Round, Axial	168
--	-----

Film

Snubber, continued

Type 941C - High dV/dt, Oval, Axial	172
---	-----

Type 942C - Very High dV/dt, Round, Axial	176
---	-----

Type 943C - Very High dV/dt, Oval, Axial	180
--	-----

Type SCD - IGBT Snubber - Diode, Dual/Single	184
--	-----

Type SCM - Dual IGBT Clamp - Snubber Module	187
---	-----

Type SCC - IGBT Snubber - Direct Mount	190
--	-----

DC Link

Type UNL - DC Link, Board Mount, Cylindrical	192
--	-----

Type 944U - DC Link, Filtering, High Current "Hockey Puck"	195
--	-----

Type 945U - DC Link, High Capacitance, Screw Terminal	198
---	-----

Type 947C - DC Link, High Capacitance, High Current	201
---	-----

AC Film

AC Selector Guide	210
-------------------------	-----

Application Guide	211
-------------------------	-----

Type ACF - Axial, Cylindrical, Vac Filtering, Metallized Polypropylene	214
--	-----

Type HV - Rectangular, Round and Oval, Oil Filled, Vac, Metallized	216
--	-----

Type PFC - 3-Phase Power Factor Correction, Δ Connected, Metallized	218
---	-----

Type SCR - Commuting Capacitors, Film-Paper/Extended Foil, Vac	221
---	-----

Type SF - Motor Run and Power Supply, Round and Oval, Oil Filled	224
--	-----

Mica

Mica Selector Guide	228
---------------------------	-----

Application Guide	229
-------------------------	-----

Standard Dipped

Types CD10, CD15, CD19, CD30, CD42 - Standard Dipped, Radial	231
--	-----

Snubber

Types CD16, CDV16 - RF Dipped, Radial Mica	237
--	-----

Metal Clad

MCM - RF Clad Mica	241
--------------------------	-----

Product Index

Type	Description	Page
057	105 °C, MIL, axial alum	*
066	85 °C, axial alum	*
066R	105 °C, axial alum	*
101C	105 °C, MIL, screw-term	*
125	125 °C, MIL, screw-term	*
150	met PE, axial film	*
158X	met PE, radial X2 suppressor	*
160	met PE, radial film	*
167/184	met PE, radial film 7.5 mm LS	*
168/185	met PE, radial film 5 mm LS	*
170	met PP, axial film	*
171	met PP, radial film	*
271	HV, large rectangular mica	*
272	HV, large rectangular mica	*
273	HV, large rectangular mica	*
291	HV, large cylindrical mica	*
292	HV, large cylindrical mica	*
293	HV, large cylindrical mica	*
294	HV, large cylindrical mica	*
300	105 °C, 3 pin, plug-in alum	*
300R	105 °C, 3 pin, lower ESR, plug-in alum	*
301	105 °C, 2 pin, plug-in alum	*
301R	105 °C, 2 pin, lower ESR, plug-in alum	*
3186	85 °C, std, screw-term alum	107
3188	105 °C, screw-term alum	121
3191	85 °C, switching output, screw-term alum	*
3198	–55 to 105 °C screw term alum	*
3199	–55 to 85 °C std, screw term alum	*
325	125 °C, 2 kh, 3 pin plug-in alum	*
326	125 °C, 2 kh, 2 pin plug-in alum	*
330	105 °C, 10 kh, 3 pin plug-in alum	*
330R	105 °C, 10 kh, 3 pin, low R, plug-in alum	*
331	105 °C, 10 kh, 2 pin plug-in alum	*
331R	105 °C, 10 kh, 2 pin, low R, plug-in alum	*
3410	85 °C, multi pin, snap-in alum	*
350	105 °C, 3 pin, lo-L, plug-in alum	*
361R	105 °C, 2 Pin, mini, plug-in alum	*
366R	105 °C, 3 Pin, mini, plug-in alum	*
380L	85 °C, hi C, snap-in alum	40
380LQ	85 °C, compact snap-in alum	47
380LX	85 °C, smaller hi C, snap-in alum	40
381EL	105 °C, 7 kh, snap-in alum	*
381L	105 °C, snap-in alum	61
381LQ	105 °C, compact, snap-in alum	67
381LR	105 °C, hi-ripple, snap-in alum	73
381LX	105 °C, smaller, snap-in alum	61

Type	Description	Page
382L	85 °C, 4 or 5 pin, hi C, snap-in alum	40
382LX	85 °C, 4 or 5 pin, small, snap-in alum	40
383L	105 °C, 4 or 5 pin, hi C, snap-in alum	61
383LX	105 °C, 4 or 5 pin, small, snap-in alum	61
400C	95 °C, 3 pin, large, plug-in alum	82
401C	105 °C, 3 pin, large, plug-in alum	*
420C	85 °C, 3 pin, large, inverter grade, plug-in alum	87
450C	105 °C, 3 pin, large, inverter grade, plug-in alum	92
4CMC	85 °C, 3 pin, large, plug-in alum	77
500C	95 °C, long life, screw-term alum	127
500R	85 °C, inverter grade, screw-term alum	145
520C	85 °C, inverter, screw-term alum	133
550C	105 °C, inverter, screw-term alum	139
556	105 °C, mini, axial alum	*
7P	photoflash, snap-in/lug alum	*
930C	met PP, axial film	156
932C	met PP, axial film	*
935C	met PP, axial/lugs film	161
936C	met PP, axial film	*
940C	met PP, axial film	168
941C	double-met, PP, axial film	172
942C	foil-met/hybrid, PP, oval film	176
943C	foil-met/hybrid, PP, oval film	180
944U	met PP, DC filter	195
945U	met PP, DC link	198
946C	double met, PP, axial leads	*
947C	met PP, DC link	201
950	met PP, axial, axial AC motor run	*
ACF	met PP, AC filter	214
AEB	105 °C, high volt, long-life, alum SMT	*
AFC	105 °C, low Z, long-life, alum SMT	*
AHA	105 °C, long life, alum SMT	*
AFK	105 °C, low Z, ESR long-life, alum SMT	*
AFK-KIT2	SMT alum acitor kit 84 pcs	*
AHD	105 °C, low-cap, long-life, alum SMT	*
AVS	85 °C, gen purpose, alum SMT	*
CD4	HF, dipped, radial mica	*
CD5	min dipped, radial mica	*
CD6	min dipped, radial mica	*
CD7	min dipped, radial mica	*
CD10	std dipped, radial mica	231
CD15	std dipped, radial mica	231
CD16	snubber/RF, dipped, radial mica	237
CD17	HF, dipped, radial mica	*
CD18	HF, dipped, radial mica	*
CD19	std dipped, radial, mica	231
CD30	std dipped, radial, mica	231

* For up to date specifications , products not listed in catalog and new product information please visit our website: www.cde.com

Product Index

Type	Description	Page	Type	Description	Page
CD42	std dipped, radial mica	231	FCN-KIT3	PEN film chip kit, 250 V, 120 pcs	*
CDS5	min dipped, radial mica	*	FCP	SMT PPS film chip	*
CDS10	min dipped, radial mica	*	FCP-KIT1	PPS film chip kit, 50 V, 204 pcs	*
CDS15	min dipped, radial mica	*	HES	high energy, screw-term alum	*
CDS19	min dipped, radial mica	*	KV^x	HV & pulse, mica-paper/polymer	*
CDS30	min dipped, radial mica	*	LP	105 °C , long life, snap-in alum	*
CDA15	reel packed, dipped, radial mica	*	LPW	85 °C, low voltage, snap-in alum	*
CDV16	snubber/RF, dipped, radial mica	237	LPX	85 °C, high voltage, snap-in alum	*
CDV18	HF, dipped, radial mica	*	MC	SMT mica chip	*
CDV19	std dipped, radial mica	231	MCN	Lead-free mica chip	*
CDV30	std dipped, radial, mica	231	MCSK1	CATV mica chip kit, 100 V, 136 pcs	*
CG	long-life, screw-term alum	*	MCSK14	HV mica chip kit, 1000 V, 80 pcs	*
CGO	SMPS output, screw-term alum	*	M15-M50	Resin Dipped, NPO,X7R, radial leaded	*
CGR	high ripple, screw-term alum	*	MCSK2	CATV mica chip kit, 500 V, 136 pcs	*
CGS	gen purpose, screw-term alum	*	MCM	RF clad mica	241
CMR03	hi-rel, dipped, radial mica	*	MCSK3	RF & snub mica chip kit, 100 V, 144 pcs	*
CMR04	hi-rel, dipped, radial mica	*	MCSK4	RF & snub mica chip kit, 500 V, 144 pcs	*
CMR05	hi-rel, dipped, radial mica	*	MICA-KIT1	Leaded mica acitor kit, popular	*
CMR06	hi-rel, dipped, radial mica	*	MICA-KIT2	Leaded mica acitor kit,CD5	*
CMR07	hi-rel, dipped, radial mica	*	MICA-KIT3	Leaded mica acitor kit, CD6/CD7	*
CMR08	hi-rel, dipped, radial mica	*	MICA-KIT4	Leaded mica acitor kit, CD15/19	*
CS	CapStick met polymer network	*	MICA-KIT5A	Leaded mica acitor kit, snubber	*
CK	resin Molded Case-X7R and Z5U, radial leaded	*	MICA-KIT6	Leaded mica acitor kit, CD4, HF	*
CKR	resin Molded Case-X7R and Z5U, axial leaded	*	MIN	RF clad mica	241
D10	std dipped, radial mica	231	MLP	85 °C, flatpack alum	98
D7	mini dipped, radial mica	*	MLS	125 °C, stainless flatpack alum	103
DCF	met PP, DC filter	*	MMA	met PE, AC, axial, oval film	*
DCMC	85 °C, high C, screw-term alum	113	MMP	met PE, axial, oval film	*
DL	dry, AC, lighting ballast	*	MMWA	met PE, HV, axial, oval film	*
DLR	film/foil PE, inductive, radial	*	MPX	met PP, boxed radial, X2	*
DME	met PE, compact, radial film	*	NLW	105 °C, mini, axial alum	*
DMM	met PE, radial film	*	OTB	paper-fim/foil, dc/ac rated	*
DMMA	met PE, AC, radial film	*	PC	power conversion	*
DMT	film/foil PE, hi-freq, radial	*	PF	photoflash, 500 V, screw term alum	*
DPFF	film/foil PP, HV, radial film	*	PFC	power factor correction	218
DPM	met PP, hi-freq, radial film	*	PSU	AC motor start	*
DPP	film/foil PP, radial	*	Q/QRL	RC snubber network	*
DPPM	film/foil PP, HV, radial	*	SCC	2 IGBT clamp-snubber mods, w/diodes	190
DSF	stacked met PE, mini, radial film	*	SCD	IGBT snubber modules	184
ESRD	SMT polymer, alum chip	*	SCM	1 or 2 IGBT snubber modules, w/diodes	187
ESRD-KIT6	polymer/alum chip kit, 1.8mm, 30 pcs	*	SCR	paper/film/foil, commutating	221
ESRD-KIT9	polymer/alum chip kit, 3.1mm, 30 pcs	*	SEK	105 °C, long life, radial alum	*
ESRE	SMT polymer alum chip	*	SF	AC motor-run power supply	224
ESRE-KIT2	polymer/alum chip kit, 4.2mm, 42 pcs	*	SF DUALS	dual, AC motor-run	*
ESRH	125 °C, SMT polymer, alum chip	*	SF LIGHTING	AC lighting ballast	*
FCA	SMT acrylic film chip	*	SH	105 °C, very long life, plug-in alum	*
FCA-KIT1	acrylic film chip kit, 16 V, 168 pcs	*	SK	85 °C, radial alum	*
FCN	SMT PEN film chip	*	SKA	85 °C, axial alum	*

* For up to date specifications , products not listed in catalog and new product information please visit our website: www.cde.com

Product Index

Type	Description	Page
SLP	105 °C, snap-in alum	53
SLPX	85 °C, snap-in alum	32
SN	85 °C, nonpolar, mini, radial alum	*
SNU	oil filled, oval snubber	*
SS	85 °C, radial alum	*
SPCX	SMT polymer/alum chip	*
SPSX	SMT polymer/alum chip	*
ST	strobe-flash, 360/450 V, alum	*
SXR	105 °C, low impedance, radial alum	*
T	paper/film/foil HV, DC filter	*
T491	SMT Tantalum chip	*
T495	SMT Tantalum chip	*
TAC	axial solid tantalum	*
TAS	metal case, axial solid tantalum	*

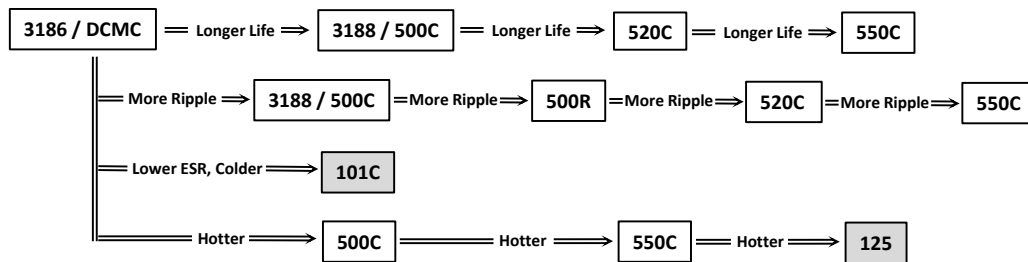
Type	Description	Page
TC	85 °C, axial alum	*
TCG	85 °C, axial alum	*
TCX	105 °C, hi ripple, long life, axial alum	*
TDC	resin dipped, radial solid tantalum	*
TDL	resin dipped, radial solid tantalum	*
THF	metal case, high freq, axial solid tantalum	*
TIM	axial solid tantalum	*
TXA	metal case, extended range, axial solid tantalum	*
UNL	met PP, high current electrofilm	192
VPR	105 °C, low impedance, radial alum	*
WBR	85 °C, std, axial alum	*
WMC	film/foil PE, mini axial	*
WMF	film/foil PE, axial	*
WPP	film/foil PP, axial	*

* For up to date specifications , products not listed in catalog and new product information please visit our website: www.cde.com

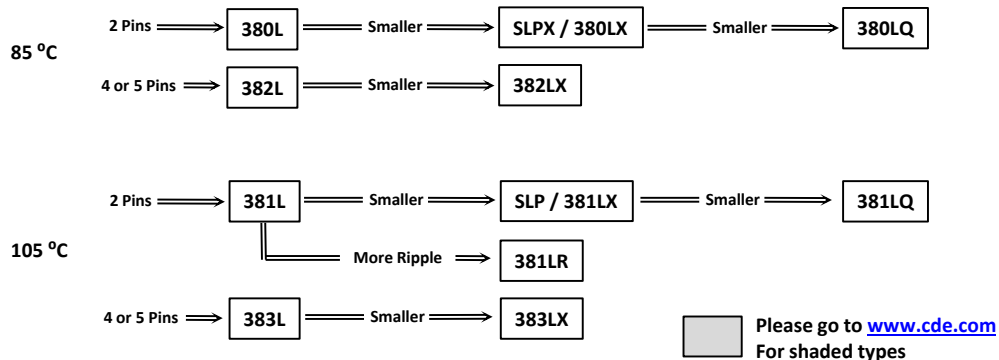
Aluminum Electrolytic Capacitors

Aluminum Electrolytic Capacitor Selector Chart

Large Screw Terminal Capacitors

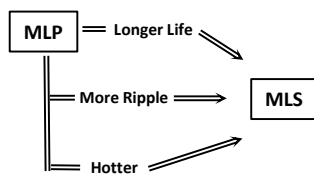


Snap-in Capacitors

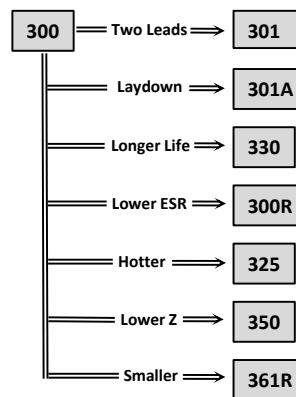


Radial Leaded Capacitors

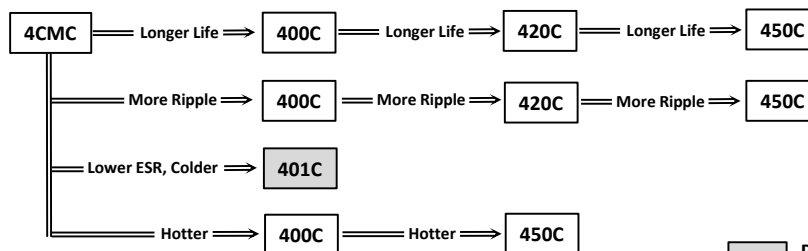
Flatpack Capacitors



Switching Power Output Capacitors



Plug-in Type Capacitors



Please go to www.cde.com For shaded types

Aluminum Electrolytic Selector Guide

Type	Max Cap (µF)	Volts (Vdc)	Max Temp (°C)	Load Life (h)	Case Size (Inches)	Case Size (mm)	Application	Hi Value	Best Bus Caps	Highlights	Page
Snap-In Types 											
SLPX	82,000	10 to 450	85 °C	3000	0.87x0.98 to 1.38x1.97	22x25 to 35x50	DC Filtering, Power Supply General Purpose	•		High Value Package	32
380LX/382LX	100,000	16 to 500	85 °C	3000	0.87x0.98 to 1.98x4.14	22x25 to 50x105	DC Filtering, Power Supply General Purpose			Widest Selection, 45 case sizes	40
380LQ	3,900	160 to 450	85 °C	2000	0.87x0.98 to 1.38x1.97	22x25 to 35x50	DC Filtering, Power Supply General Purpose			Compact, 27% Smaller than 380LX	47
SLP	56,000	10 to 450	105 °C	3000	0.87x0.98 to 1.38x1.97	22x25 to 35x50	DC Filtering, Power Supply Inverter	•		High Value with High Ripple, Long Life	53
381LX/383LX	120,000	10 to 450	105 °C	3000	0.87x0.98 to 1.98x4.14	22x25 to 50x105	DC Filtering, Power Supply Inverter		•	4 x Life of 380L/LX	61
381LQ	46,000	160 to 450	105 °C	2000	0.87x0.98 to 1.38x1.97	22x25 to 35x50	DC Filtering, Power Supply Inverter		•	24% Smaller than 381LX	67
381LR	2,200	200 to 450	105 °C	3000	0.87x0.98 to 1.38x1.97	22x25 to 35x50	DC Filtering, Power Supply Inverter Power Supply		•	25% Higher Ripple than 382L/LX	73
Large Radial Leaded Board-Mount Types 											
4CMC	560,000	16 to 500	85 °C	2000	1.375x1.75 to 2x5.75	35x44 to 51x146	UPS, Power Supply input/output			High Capacitance 3 Leads	77
400C	530,000	100 to 500	95 °C	3000	1.375x1.75 to 2x5.75	35x44 to 51x146	UPS, Power Supply Long Life			Highest Capacitance 3 Leads	82
420C	27,000	100 to 500	85 °C	4000	1.375x1.75 to 2x5.75	35x44 to 51x146	Inverters, High Ripple, Long Life			High Ripple 3 Leads	87
450C	24,000	100 to 500	105 °C	5000	1.375x1.75 to 2x5.75	35x44 to 51x146	Inverters			High Ripple Long Life	92
MLP	47,000	6.3 to 450	85 °C	2000	1.5x1.75x0.5 to 3x1.75x.5	38x44x13 to 51x44x13	Voltage Holdup, Filtering, Military			50 year life, Flatpack, Heatsinkable	98
MLS	47,000	5.0 to 250	125 °C	2000	1.5x1.75x0.5 to 3x1.75x.5	38x44x13 to 51x44x13	Voltage Holdup, Filtering, Military			100 year Life, Flatpack, Heatsinkable	103
Screw Terminal Types 											
3186	1,000,000	16 to 500	85 °C	2000	1.375x2.125 to 3.00x8.625	35x54 to 76x220	Shock Resistant Military or Transportation	•	•	High Cap Rilled Construction	107
DCMC	2,700,000	6.3 to 550	85 °C	2000	1.38x1.63 to 3.5x8.63	35x41 to 89x220	UPS, Power Supply input/output		•	Highest Cap, ThermalPak™	113
3188	1,000,000	16 to 450	85 °C	4000	1.375x2.125 to 3.00x8.625	35x54 to 76x220	Long Life Military or Transportation			Rilled Construction High Ripple Current	121
500C	2,600,000	6.3 to 550	95 °C	5000	1.38x1.63 to 3.5x8.63	35x41 to 89x220	UPS, Power Supply Long Life, input/output		•	Long Life, ThermalPak™	127
520C	39,000	200 to 500	85 °C	8000	1.38x1.63 to 3.5x8.63	35x41 to 89x220	Inverters, High Ripple, Long Life		•	Inverter-Grade ThermalPak™	133
550C	35,000	200 to 450	105 °C	10,000	1.38x1.63 to 3.5x8.63	35x41 to 89x220	Inverters, Higher Ripple, Longer Life		•	Inverter-Grade ThermalPak™	139
500R	18,000	350 to 500	85 °C	5000	1.38x1.63 to 3.5x8.63	35x41 to 89x220	High Endurance Inverter	•	•	Very High Ripple, Long Life	145

Aluminum Electrolytic Capacitor Application Guide

This guide is a full handbook on aluminum electrolytic capacitors, of course with emphasis on Cornell Dubilier’s types. It covers construction in depth and discloses the latest information on performance and application for the major aluminum electrolytic types made worldwide. We encourage you to tell us what more you’d like to know, so we can improve this guide.

CONTENTS	PAGE		
Capacitor Construction	11		
Other Types of Capacitors Comparison	13		
Characterization and Circuit Model	14	TABLES	PAGE
Temperature Range	15	Capacitor Parameter Formulas	15
Capacitance	16	Base Lives and Max Core Temperatures	23
Dissipation Factor (DF)	16	Thermal Resistance Screw Terminal Capacitors	26
Equivalent Series Resistance (ESR)	17	Thermal Resistance for Snap-in Capacitors	28
Impedance (Z)	17	Pressure Relief Devise Clearance	30
Low-Temperature Impedance	17	Screw Tightening Torque for Screw Terminals	30
DC Leakage Current (DCL)	17	Maximum Currents for Screw Terminals	30
Voltage Withstanding	18	Tightening Torque for Nylon Mounting Nuts	31
Ripple Current	19		
Inductance	19		
Self-Resonant Frequency	19		
Dielectric Absorption	20		
Insulation and Grounding	20		
Elevation & External Pressure	20		
Vibration Withstanding Capability	20		
Safety Considerations	20		
Capacitor Bank Configurations	21		
Non-Polar and Motor Start Capacitors	22		
Reliability and Lifetime	22		
Cooling and Thermal Resistance	25		
Process Considerations	28		
Mounting	29		
Disposal of Capacitors	31		

ALUMINUM ELECTROLYTIC CAPACITOR OVERVIEW

Except for a few surface-mount technology (SMT) aluminum electrolytic capacitor types with solid electrolyte systems, an aluminum electrolytic capacitor consists of a wound capacitor element, impregnated with liquid electrolyte, connected to terminals and sealed in a can. The element is comprised of an anode foil, paper separators saturated with electrolyte and a cathode foil. The foils are high-purity aluminum and are etched with billions of microscopic tunnels to increase the surface area in contact with the electrolyte.

While it may appear that the capacitance is between the two foils, actually the capacitance is between the anode foil and the

electrolyte. The positive plate is the anode foil; the dielectric is the insulating aluminum oxide on the anode foil; the true negative plate is the conductive, liquid electrolyte, and the cathode foil connects to the electrolyte. However, just as the anodic-oxide dielectric insulates the anode foil from the electrolyte, so too the cathode is insulated from the electrolyte by the low voltage air oxide on the cathode foil and the double-layer ionic barrier. This makes the cathode a capacitor in series with the anode. In high voltage capacitors the cathode capacitance is hundreds of times the anode capacitance and does not measurably affect the overall capacitance, but in capacitors of less than about 50 V the anode capacitance begins to approach the value of the cathode capacitance and requires use of higher capacitance cathode to avoid needing to increase the anode length to achieve the rated

capacitance. Aluminum electrolytic capacitor construction delivers colossal capacitance because etching the foils can increase surface area more than 100 times and the aluminum-oxide dielectric is less than a micrometer thick. Thus the resulting capacitor has very large plate area and the plates are intensely close together.

These capacitors routinely offer capacitance values from 0.1 μF to 3 F and voltage ratings from 5 V to 550 V. Up to 700 V are commercially available. They are polar devices, having distinct positive and negative terminals, and are offered in an enormous variety of styles which include molded and can-style SMT devices, axial- and radial-leaded can styles, snap-in terminals styles and large-can, screw-terminal styles. Representative capacitance-voltage combinations include:

330 μF at 100 V and 6,800 μF at 10 V for SMT devices,

100 μF at 450 V, 6,800 μF at 50 V and 10,000 μF at 10 V

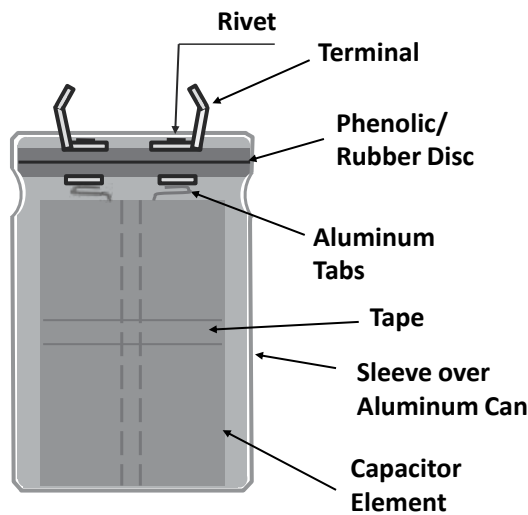
for miniature-can styles,

1200 μF at 450 V and 39,000 μF at 50 V for snap-in can styles and

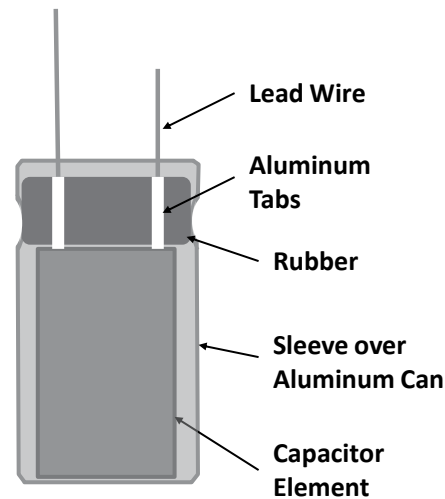
9000 μF at 450 V and 390,000 μF at 50 V for large-can, screw-terminal styles.

If two, same-value, aluminum electrolytic capacitors are connected in series with the positive terminals or the negative terminals connected together, the resulting single capacitor is a non-polar capacitor with half the capacitance. The two capacitors rectify the applied voltage and act as if they had been bypassed by diodes. When voltage is applied, the correct-polarity capacitor gets the full voltage. In non-polar aluminum electrolytic capacitors and motor-start aluminum electrolyte capacitors a second anode foil substitutes for the cathode foil to achieve a non-polar capacitor in a single case.

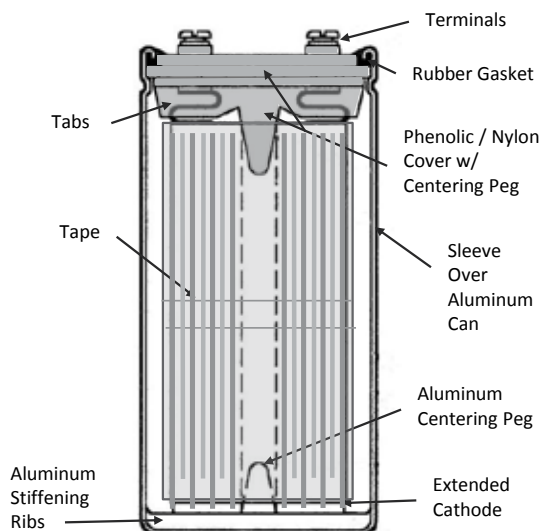
CAPACITOR CONSTRUCTION



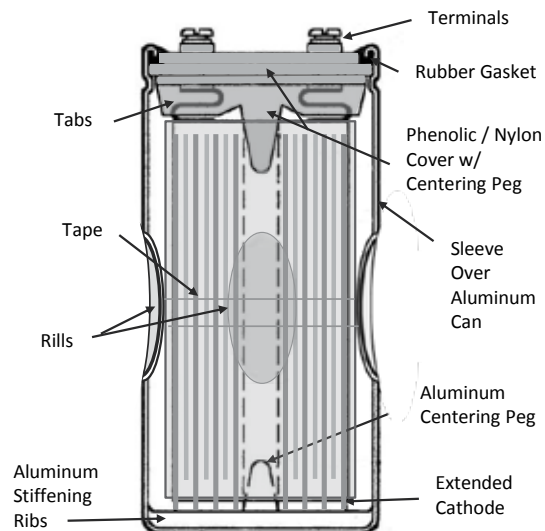
Snap-in Type



Miniature, Radial-Leaded Type



Thermal Pak Construction



Rilled Construction

These figures show typical constructions of the non-surface-mount aluminum electrolytic capacitors. All Cornell Dubilier capacitors use compression-fit construction so there is no thermoplastic potting compound to interfere with safety-vent operation. Thermal Pak™ and Rilled are Cornell Dubilier's exceptional constructions for screw terminal capacitors. Compared to conventional, potted construction, Thermal Pak operates cooler, provides longer life, withstands higher shock and vibration, delivers more reliable safety vent operation and is lighter weight. Rilled offers superior shock and vibration withstanding, typically withstanding more than 15 g acceleration forces.

ETCHING

The anode and cathode foils are made of high purity, thin aluminum foil, 0.02 to 0.1 mm thick. To increase the plate area and the capacitance, the surface area in contact with the electrolyte is increased by etching the foils to dissolve aluminum and create a dense network of billions of microscopic tunnels penetrating through the foil. For maximum increase in surface area in higher voltage capacitors the anode foil is 99.99% high purity, high cubicity aluminum that allows the billions of microscopic etch tunnels to be parallel and mostly perpendicular to the foil surface.

Etching involves pulling the aluminum foil on rollers through a chloride solution while applying an AC, DC or AC-and-DC voltage between the etch solution and the aluminum foil. Surface area can increase as much as 200 times for foil in low-voltage capacitors and up to 60 times for high-voltage capacitors.

FORMING

The anode foil carries the capacitor's dielectric. The dielectric is a thin layer of aluminum oxide, Al_2O_3 , which is chemically grown on the anode foil during a process called "formation." Formation is accomplished by pulling the anode foil on rollers through an electrolyte bath and continuously applying a DC voltage between the bath and the foil. The voltage is 135% to 200% of the final capacitor's rated voltage. The thickness of the aluminum oxide is about 1.4 to 1.5 nm for each volt of the formation voltage, e.g., the anode foil in a 450 V capacitor may get a formation voltage in excess of 600 V and have an oxide thickness of about 900 nm. That's about a hundredth of the thickness of a human hair.

Formation reduces the effective foil surface area because the microscopic tunnels are partially occluded by the oxide. The tunnel etch pattern is adjusted by choice of foil and etching process so that low-voltage anodes have dense tunnel patterns compatible with thin oxide and high-voltage anodes have coarse tunnel patterns compatible with thick oxide. The cathode foil is not formed and it retains its high surface area and dense etch pattern.

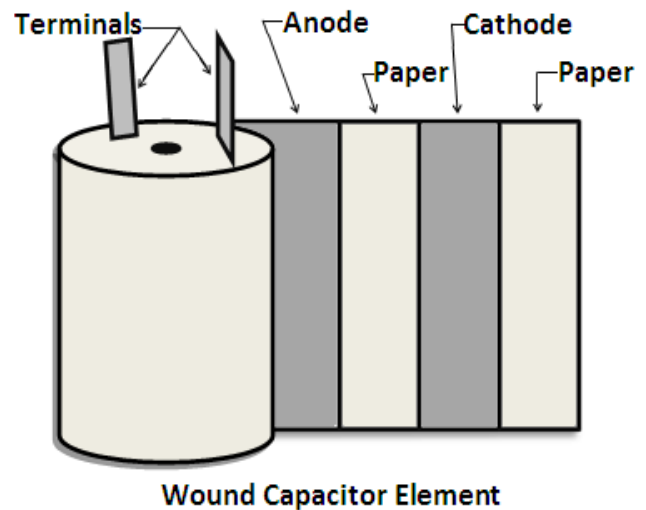
SLITTING

Foil is etched and formed in jumbo rolls of 40 to 50 cm wide and then slit into various widths according to the lengths of the final capacitors.

WINDING

The capacitor element is wound on a winding machine with spindles for one-to-four separator papers, the anode foil, another set of one-to-four separator papers and the cathode foil. These are wound into a cylinder and wrapped with a strip of pressure-sensitive tape to prevent unwinding. The separators prevent the foils from touching and shorting, and the separators later hold the reservoir of electrolyte.

Before or during winding aluminum tabs are attached to the foils for later connection to the capacitor terminals. The best method is by cold-welding of the tabs to the foils with tab locations microprocessor controlled during winding so that the capacitor element's inductance can be less than 2 nH. The older method of attachment is by staking, a process of punching the tab through the foil and folding down the punched metal. Cold welding reduces short-circuit failures and performs better in high-ripple current and discharge applications in which the individual stakes may fail from high current like buttons popping off one at a time from a fat-man's vest.



CONNECTING TERMINALS

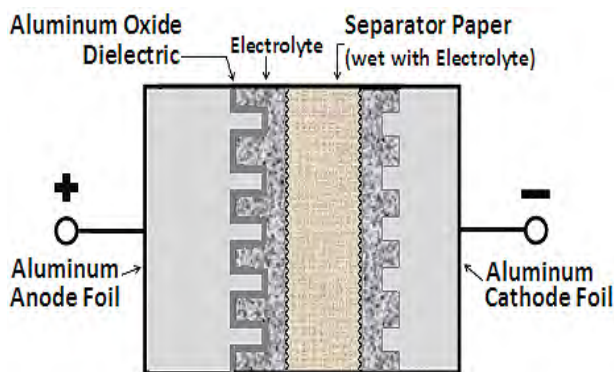
In SMT capacitors and miniature capacitors with rubber-bungs, extensions of the tabs are the capacitor terminals. But in large-can capacitors like snap-ins and screw-terminal styles, the tabs are riveted or welded on the underside of the capacitor tops to terminal inserts. Welding produces the lowest contact resistance and highest current handling. Both resistive welding and ultrasonic welding are used. The up to 12 tab pairs that may be used in large screw-terminal capacitors often require more mechanical support during assembly so the tabs in such capacitors may be both riveted to post extensions on the terminals and then welded. In an axial-leaded capacitor the cathode tab is welded to the can before sealing.

IMPREGNATION

The capacitor element is impregnated with electrolyte to saturate the paper separators and penetrate the etch tunnels.

The method of impregnation may involve immersion of the elements and application of vacuum-pressure cycles with or without heat or, in the case of small units, just simple absorption. The electrolyte is a complex blend of ingredients with different formulations according to voltage and operating temperature range. The principal ingredients are a solvent and a conductive salt – a solute – to produce electrical conduction. The common solvent is ethylene glycol (EG) and is typically used for capacitors rated -20°C or -40°C . Dimethylformamide (DMF) and gammabutyrolactone (GBL) are often used for capacitors rated -55°C . Common solutes are ammonium borate and other ammonium salts.

Water in the electrolyte plays a big role. It increases conductivity thereby reducing the capacitor's resistance, but it reduces the boiling point so it interferes with high temperature performance, and it reduces shelf life. A few percent of water is necessary because the electrolyte maintains the integrity of the aluminum oxide dielectric. When leakage current flows, water is broken into hydrogen and oxygen by hydrolysis, and the oxygen is bonded to the anode foil to heal leakage sites by growing more oxide. The hydrogen escapes by passing through the capacitor's rubber seal.



Capacitor-Element Materials

SEALING

The capacitor element is sealed into a can. While most cans are aluminum, phenolic cans are often used for motor-start capacitors. In order to release the hydrogen the seal is not hermetic and it is usually a pressure closure made by rolling the can edge into a rubber gasket, a rubber end-plug or into rubber laminated to a phenolic board. In small capacitors molded phenolic resin or polyphenylene sulfide may replace the rubber. Too tight a seal causes pressure build up, and too loose a seal shortens the life by permitting drying out, loss of electrolyte.

AGING

Here the capacitor assembly comes full circle. The last manufacturing step is "aging" during which a DC voltage greater than the rated voltage but less than the formation voltage is applied to the capacitor. Usually the voltage is applied at the capacitor's rated temperature, but other temperatures and even room temperature may be used. This step reforms the cut edges and any damaged spots on the anode foil and covers any bare aluminum with aluminum oxide dielectric. Aging acts as burn-in and reduces or eliminates early life failures (infant mortals). Low, initial DC leakage current is a sign of effective aging.

COMPARISON TO OTHER TYPES OF CAPACITORS

CERAMIC CAPACITORS

Ceramic capacitors have become the preeminent, general-purpose capacitor, especially in SMT chip devices where their low cost makes them especially attractive. With the emergence of thinner-dielectric, multilayer units with rated voltages of less than 10 V capacitance values in the hundreds of microfarads have become available. This intrudes on the traditional, high-capacitance province of aluminum electrolytic capacitors.

Ceramic capacitors are available in three classes according to dielectric constant and temperature performance. Class 1 (NPO, COG) is suitable for low capacitance, tight tolerance applications in the range of 1 pF to a few mF. Class 2 (X7R, X5R, Y5V) has 20 to 70 times as much capacitance per case size, but capacitance typically varies about $\pm 10\%$ over its -55 to 125°C temperature range. The maximum change is $+15\%$ to -25% . Class 3 (Z5U) with about 5 times the capacitance of Class 3 has wild swings of capacitance with voltage and temperature. The temperature range is -25°C to 85°C , and capacitance varies about $+20\%$ -65% over the range. All classes of ceramic capacitors are available in a variety of physical forms, ranging from round disc or rectangular single layer to multilayer types as well as tubular and feed-through types. Ceramic chip capacitors are brittle and sensitive to thermal shock, so precautions need to be taken to avoid cracking during mounting, especially for high-capacitance large sizes.

The typical temperature range for aluminum electrolytic capacitors is -40°C to 85°C or 105°C . Capacitance varies about $+5\%$ -40% over the range with the capacitance loss all at cold temperatures. Capacitors rated -55°C generally only have -10% to -20% capacitance loss at -40°C . Cold temperature performance for rated voltages of 300 V and higher is often worse, and temperature performance varies by manufacturer. Thus Class 1 and 2 ceramic capacitors perform better than aluminum electrolytic capacitors at cold temperatures, and Class 3 ceramic capacitors perform worse at all temperatures.

Aluminum electrolytic capacitors readily deliver much more capacitance. Aluminum electrolytic capacitors give more capacitance and energy storage per unit volume than ceramic capacitors for all types except for low-voltage, Class 3 ceramic SMT chip capacitors. While tolerances of $\pm 5\%$ and $\pm 10\%$ are routine for ceramic capacitors, $\pm 20\%$ and -10% $+50\%$ are the norms for aluminum electrolytic. This makes aluminum electrolytics the choice for high-capacitance applications like rectification filters and power hold up where more capacitance is a bonus.

Ceramic capacitors are not polarized and therefore can be used in AC applications. The low DF and high capacitance stability of Class 1 and 2 are especially suited to AC and RF applications. By comparison, aluminum electrolytic capacitors are polarized and cannot withstand voltage reversal in excess of 1.5 V. While non-polar aluminum electrolytics are available for momentary-duty

AC applications like motor starting and voltage-reversing applications, the high DF of aluminum electrolytic capacitors – from 2% to 150% – causes excess heating and short life in most AC applications.

Ceramic capacitors are generally no more reliable than aluminum electrolytic capacitors because aluminum electrolytics self heal. Since high-capacitance ceramic capacitors may develop micro-cracks, aluminum electrolytic capacitors are preferred for high capacitance values. However, small sizes of aluminum electrolytic capacitors may have limited life due to dry out, and so consider reliability in your choice for applications operating at high temperatures, over 65 °C.

FILM CAPACITORS

Film capacitors offer tight capacitance tolerances, very low leakage currents and small capacitance change with temperature. They are especially suited to AC applications through their combination of high capacitance and low DF that permits high AC currents. However, they have relatively large sizes and weights.

The popular polymers used for plastic-film dielectric capacitors are polyester and polypropylene. The popular polymer for SMT devices is polyphenylene sulfide (PPS). While film/foil construction is often used for small capacitance values – less than 0.01 µF – and for high-current applications, metallized-film is usually preferred because it gives smaller size, lower cost and is self healing. Film capacitors are general-purpose capacitors for through-hole applications and have special uses for tight-tolerance, AC voltage, high voltage and snubbing.

Polyester film capacitors operate from –55 °C to 85 °C at rated voltage; 85 °C to 125 °C with linear voltage derating to 50% rated voltage. The typical capacitance change over the entire range is less than –5% +15% with ±1% from 0 °C to 50 °C. Capacitance values are readily available up to 10 µF with special large sections to 100 µF. Generally available voltages are 50 to 1000 Vdc and 35 to 600 Vac. AC current handling is limited by polyester's high-temperature DF of about 1%.

Polypropylene film capacitors operate from is –55 °C to 85 °C at rated voltage; 85 °C to 105 °C with linear voltage derating to 50% rated voltage. The typical capacitance change over the entire range is less than +2% –4% with ±1% from –20 °C to 60 °C. Capacitance values are readily available up to 65 µF with special large sections to 1000 µF. Generally available voltages are 100 to 3000 Vdc and 70 to 500 Vac. AC current handling permits use in motor-run and other continuous duty AC applications.

Compared to aluminum electrolytic capacitors, film capacitors take the lead in high voltage, AC voltage and tight tolerance applications. Aluminum electrolytics excel in capacitance and energy storage. However, there is growing use of power film capacitors as replacements for aluminum electrolytic capacitors as dc-link, bus capacitors in high-voltage inverter power systems. While generally power film capacitors are more than four times the price for capacitance as aluminum electrolytic capacitors, film capacitors are perceived as more reliable because failures are relatively benign and without the incidence of explosion and

ignition that can accompany aluminum electrolytic capacitor failures in large high-voltage banks of 10 or more capacitors. Cornell Dubilier now provides special aluminum electrolytic capacitors with improved self-healing to deliver the needed reliability for these applications.

SOLID TANTALUM CAPACITORS

Like aluminum electrolytic capacitors solid tantalum capacitors are polar devices (1 V maximum reverse voltage), having distinct positive and negative terminals and are offered in a variety of styles. Case styles include both molded and conformal-coated versions of radial, axial and surface mount configurations. Typical capacitance values are from 0.1 µF to 1000 µF in voltage ratings from 2 V to 50 V. Typical maximum capacitance-voltage combinations are approximately 22 µF at 50 V for leaded styles and 22 µF at 35 V for surface mount. Strengths are temperature stability, volumetric efficiency and compatibility with all automated assembly systems. Weaknesses are the limited voltage and capacitance ranges and a short-circuit failure mode accompanied by catching fire.

The operating temperature range is –55 °C to 85 °C at rated voltage; +85°C to 125 °C with linear voltage derating to 2/3 rated voltage. The typical capacitance change over the entire range is less than ±5%. Thus aluminum electrolytic capacitors have a much broader voltage and capacitance ranges than solid tantalum capacitors but perform worse at cold temperature.

Solid tantalum capacitors are generally considered more reliable than aluminum electrolytic capacitors because solid tantalum capacitors do not wear out. Their failure rate decreases with time, while aluminum electrolytic capacitors wear out by drying out. As a practical matter, dry-out only affects the smallest capacitors operating in high-temperature environments. Larger aluminum electrolytics do not dry out in the 10 to 20 years expected of most applications, and the open-circuit, dry-out failure is benign compared to solid-tantalum's short circuit failure mode.

PARAMETRIC CHARACTERIZATION

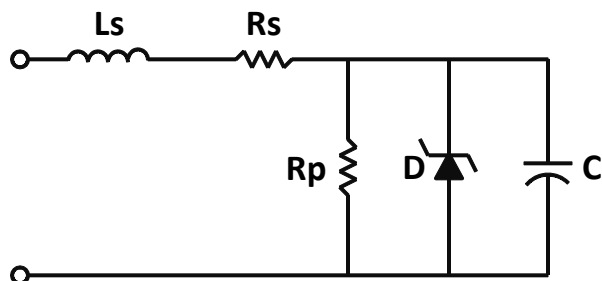
CIRCUIT MODEL

Capacitance occurs when two electrical conductors are separated by an insulator, the dielectric. A capacitor is an electronic component optimized to deliver capacitance. The capacitance in µF is:

$$C = 8.855(10^{-8})(n-1)\epsilon A/d$$

Where n is the number of plates or electrodes, ϵ is the dielectric constant, A is the plate surface area in cm² and d is the thickness of the dielectric between the plates in cm. Dielectric constant is the multiplier increase in capacitance that the dielectric delivers compared to a vacuum. The dielectric constant for aluminum oxide is about 8.

The equivalent circuit on the next page models the aluminum electrolytic capacitor's normal operation as well as overvoltage and reverse-voltage behavior.



Equivalent Circuit

Capacitance C is the equivalent capacitance and it decreases with increasing frequency. Common values range from $1\ \mu\text{F}$ to $1\ \text{F}$, a six-decade range.

Resistance R_s is the equivalent series resistance, and it decreases with increasing frequency and temperature. It increases with rated voltage. Typical values range from $10\ \text{m}\Omega$ to $1\ \Omega$, and R_s is inversely proportional to capacitance for a given rated voltage.

Inductance L_s is the equivalent series inductance, and it is relatively independent of both frequency and temperature. Typical values range from $10\ \text{nH}$ to $30\ \text{nH}$ for radial-leaded types,

20 to $50\ \text{nH}$ for screw-terminal types, and up to $200\ \text{nH}$ for axial-leaded types. It increases with terminal spacing.

Resistance R_p is the equivalent parallel resistance and accounts for leakage current in the capacitor. It decreases with increasing capacitance, temperature and voltage, and it increases while voltage is applied. Typical values are on the order of $100/C\ \text{M}\Omega$ with C in μF , e.g. a $100\ \mu\text{F}$ capacitor would have an R_p of about $1\ \text{M}\Omega$.

Zener diode D models overvoltage and reverse voltage behavior. Application of overvoltage on the order of $50\ \text{V}$ beyond the capacitor's surge voltage rating causes high leakage current and a constant-voltage operating mode quite like the reverse conduction of a zener diode. Application of reverse voltage much beyond $1.5\ \text{V}$ causes high leakage current quite like the forward conduction of a diode. Neither of these operating modes can be maintained for long because hydrogen gas is produced by the capacitor, and the pressure build up will cause failure.

The table below expresses capacitor parameters for the series equivalent-circuit model shown schematically on the left. From this table Capacitance C , Dissipation Factor DF , Equivalent Series Resistance R_s , Impedance Z , Inductance L_s , Self-Resonant Frequency f_o and Voltage are explored more fully in the next section.

Parameter	Unit	Symbol	Formula	Approximately
Capacitance	farads (F)	C		
Capacitive Reactance	ohms (Ω)	X_c	$1/(2\pi fC)$	Z
Current	amperes (A)	I	$C(dV/dt)$, V_z/Z	
Dissipation Factor	none	DF	R_s/X_c , $2\pi fCR_s$, $\tan(\delta)$, $\cot(\Theta)$	PF
Energy	Joules (J)	E	$\frac{1}{2}CV^2$	
Equivalent Series Resistance	ohms (Ω)	R_s	$DF/(2\pi fC)$	
Frequency	hertz (Hz)	f		
Impedance	ohms (Ω)	Z	$[R_s^2 + (X_c - X_L)^2]^{1/2}$	X_c
Inductance	henries (H)	L_s		
Inductive Reactance	ohms (Ω)	X_L	$2\pi fL_s$	
Loss Angle	degrees ($^\circ$)	δ	$\tan^{-1}(DF)$	
Phase Angle	degrees ($^\circ$)	Θ	$\cot^{-1}(DF)$	
Power	watts (W)	P	I^2R_s	
Power Factor	none	PF	R_s/Z , $\sin(\delta)$, $\cos(\Theta)$	DF
Quality Factor	none	Q	X_c/R_s , $1/DF$, $\cot(\delta)$, $\tan(\Theta)$	$1/PF$
Self-Resonant Frequency	hertz (Hz)	f_o	$1/[2\pi(LC)^{1/2}]$	
Voltage	volts (V)	V	$V_c = IX_c$, $V_z = IZ$	
Volt-Amperes	V-A	VA	IV_z , I^2Z	

PARAMETERS

TEMPERATURE RANGE

Operating temperature range

The Operating Temperature Range is the temperature range over which the part will function, when electrified, within the

limits given in the specification. It is the range of ambient temperatures for which the capacitor has been designed to operate continuously. Largely the formation voltage sets the high-temperature limit. Higher formation voltages permit higher operating temperatures but reduce the capacitance. The low-temperature limit is set largely by the cold resistivity of the electrolyte. The higher cold resistivity increases the capacitor's ESR 10 to 100 fold and reduces the available capacitance.

Typical temperature ranges are –20 °C to 55 °C, –25 °C to 85 °C, –40 °C to 85 °C, –55 °C to 85 °C, –40 °C to 105 °C, –55 °C to 105 °C and –55 °C to 125 °C.

Storage Temperature Range

The Storage Temperature Range is the temperature range to which the part can be subjected unbiased, and retain conformance to specified electrical limits. It is the range of ambient temperatures over which the capacitor may be stored without damage for short periods. For long periods of storage keep capacitors at cool room temperatures and in an atmosphere free of halogen gases like chlorine and fluorine that can corrode aluminum. Storage temperature ranges are from –55 °C to the upper limit of the operating-temperature ranges.

CAPACITANCE

Rated Capacitance

The rated capacitance is the nominal capacitance and it is specified at 120 Hz and a temperature of 25 °C. The rated capacitance is also the capacitance marked on the unit.

Capacitance Tolerances

Capacitance tolerance is the permitted minimum and maximum capacitance values expressed as the percentage decrease and increase from the rated capacitance, $\Delta C/C$. Typical capacitance tolerances are $\pm 20\%$, -10% $+50\%$, and -10% $+75\%$. Tighter tolerances are more readily available in high voltage capacitors, e.g., above 150 V, but tolerances tighter than $\pm 10\%$ are generally not available. Note that tighter tolerance parts may meet other tolerance requirements and are readily substitutable.

The capacitance varies with temperature and frequency. This variation itself is also dependent on the rated voltage and capacitor size.

Capacitance Measurement

For aluminum electrolytic capacitors, capacitance is measured as the capacitance of the equivalent series circuit at 25 °C in a measuring bridge supplied by a 120 Hz source free of harmonics with maximum AC signal voltage of 1 Vac and no bias voltage.

Capacitance Temperature Characteristics

The capacitance varies with temperature. This variation itself is dependent to a small extent on the rated voltage and capacitor size. Capacitance increases less than 5% from 25 °C to the high-temperature limit. For devices rated –40 °C capacitance declines up to 20% at –40 °C for low-voltage units and up to 40% for high-voltage units. Most of the decline is between –20 °C and –40 °C. For devices rated –55 °C capacitance typically declines less than 10% at –40 °C and less than 20% at –55 °C.

Capacitance Frequency Characteristics

The effective capacitance decreases as frequency increases. Self-resonance is reached typically below 100 kHz depending on capacitance. At self-resonance the device is resistive and beyond it is inductive. The termination style (i.e., axial, radial, screw-terminal) will influence the inductive characteristics.

Small radial-lead capacitors have inductance of less than 20 nH. Larger capacitors have more inductance according to terminal spacing. See INDUCTANCE.

DISSIPATION FACTOR (DF)

Dissipation factor is the measurement of the tangent of the loss angle ($\tan \delta$) expressed as a percentage. It is also the ratio of the ESR to the capacitive reactance and is thus related to ESR by this equation:

$$DF = 2\pi fC(ESR)/10,000$$

Where DF is a unit-less number expressed in percent, test frequency f is in Hz, capacitance C is in μF and ESR is in Ω .

DF Measurement

The measurement of DF is carried out at +25 °C, 120 Hz, and no voltage bias, with a maximum 1 Vac signal voltage free of harmonics. The value of DF is temperature and frequency dependent.

DF Temperature Characteristics

The dissipation factor decreases with increasing temperature. DF declines about 50% from 25 °C to the high-temperature limit, but increases more than 10 fold at the low-temperature limit. The DF of the better devices rated –55 °C increases less than 5 times at –40 °C.

DF_{lf} , defined in the next paragraph, varies little with temperature and ESR_{hf} , also in the next paragraph, increases 10 to 100 times from 25 °C to the low-temperature limit. The increase in DF at cold temperatures is set by the ESR_{hf} .

DF Frequency Characteristics

The dissipation factor varies with frequency at high frequencies. DF can be modeled as below:

$$DF = DF_{lf} + 2\pi fC(ESR_{hf})/10,000$$

Where DF is the total dissipation factor in percent, DF_{lf} is the low-frequency dissipation factor in percent, ESR_{hf} is the high-frequency ESR in Ω , f is the test frequency in Hz and C is the capacitance in μF at the test frequency. DF_{lf} results from the power lost by the applied electric field in orienting the molecules of the aluminum oxide dielectric. ESR_{hf} results from the resistive losses in the foils, connections and the electrolyte/separator pad. The electrolyte/separator pad resistance usually dominates and its resistance varies little with frequency. DF_{lf} ranges from about 1.5% to 3%. ESR_{hf} ranges from 0.002 to 10 Ω and decreases with increasing temperature.

The DF equation above shows that DF is constant for low frequencies and crosses over to increasing-DF, constant-ESR, at a crossover frequency inversely proportional to capacitance. Since high-capacitance capacitors have low crossover frequencies, DF increases more with increasing frequency than for lower-capacitance capacitors.

EQUIVALENT SERIES RESISTANCE (ESR)

The equivalent series resistance (ESR) is a single resistance representing all of the ohmic losses of the capacitor and connected in series with the capacitance.

ESR Measurement

For aluminum electrolytic capacitors, ESR is measured as the resistance of the equivalent series circuit at 25 °C in a measuring bridge supplied by a 120 Hz source free of harmonics with maximum AC signal voltage of 1 Vac and no bias voltage.

ESR Temperature Characteristics

The high-frequency ESR declines with increasing temperature. It declines about 35% to 70% from 25 °C to the high-temperature limit, but increases more than 10 fold at the low-temperature limit. The ESR of devices rated –20 °C or –40 °C can increase more than 100 times at –40 °C.

DF_{lf} has a positive temperature coefficient of 0.4 %/°C; so, it varies little with temperature, but ESR_{hf} increases 10 to 100 times from 25 °C to the low-temperature limit. The increase in ESR at cold temperatures is set by the ESR_{hf} .

ESR Frequency Characteristics

Like DF , the ESR varies with frequency. Rewriting the DF equation above, ESR can be modeled as below:

$$ESR = 10,000(DF_{lf})/(2\pi fC) + ESR_{hf}$$

Expressing the ideas in ESR terms, at low frequencies the ESR declines steadily with increasing frequency and crosses over to constant ESR at a frequency inversely proportional to capacitance. This crossover is typically below 10 kHz. The ESR of high-capacitance capacitors changes little with increasing frequency because high-capacitance causes them to have low crossover frequencies. The ESR_{hf} ranges from 0.002 Ω for large, screw-terminal capacitors to 10 Ω for miniature devices.

IMPEDANCE (Z)

For aluminum electrolytic capacitors impedance is actually impedance magnitude. It is the ratio of voltage to current at a given frequency and is related to the capacitor's capacitance, ESR and series inductance as follows:

$$Z = [(ESR)^2 + (1/(2\pi fC) - 2\pi fL_s)^2]^{1/2}$$

Where Z is impedance in Ω , ESR is equivalent series resistance in Ω , f is frequency in Hz, C is capacitance in F and L_s is equivalent series inductance in H.

Z Measurement

For aluminum electrolytic capacitors, Z is measured as the impedance magnitude of the equivalent series circuit at 25 °C in a measuring bridge supplied by a variable frequency source capable of delivering an AC signal voltage of 1 Vac free of harmonics from 10 Hz to 100 kHz. Impedance measurements are mostly for typical performance curves and for low-temperature limit measurements.

Low-Temperature Impedance

Low-temperature impedance is the capacitor's 120 Hz impedance measured at the low-temperature limit. It is usually expressed as a multiple of the device's 25 °C impedance.

Z Low-Temperature Measurement

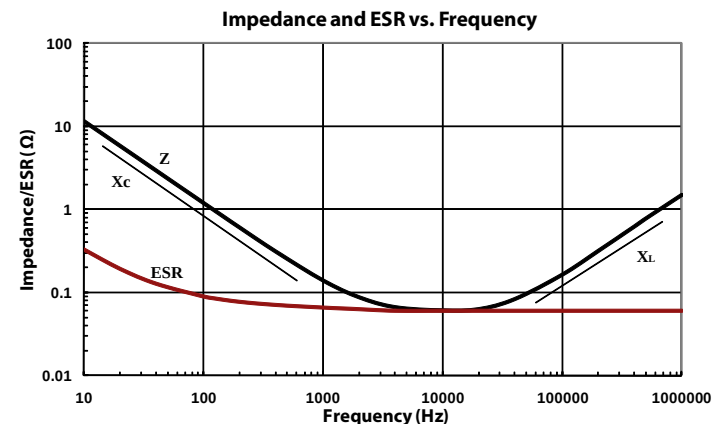
For low-temperature impedance measurement, place the capacitors in a chamber set to the low-temperature limit ± 2 °C. Measure impedance at 120 ± 5 Hz using any suitable method providing an accuracy of $\pm 2 \frac{1}{2}$ %. After temperature stabilization, make the measurements quickly using as small as practical an AC measuring voltage in order that it will not cause heating of the capacitors. Assure that the capacitors have reached thermal stability by demonstrating that two successive measurements taken at 15 minute intervals show no change.

Z Temperature Characteristics

Impedance typically decreases less than 5% from 25 °C to the high-temperature limit but increases up to 10 times to the low-temperature limit.

Z Frequency Characteristics

The frequency characteristics of impedance are dictated by the contributions from capacitive reactance ($1/(2\pi fC)$), inductive reactance ($2\pi fL$) and from resistive losses in the electrolyte. A typical impedance-versus-frequency curve is below. The low point is at the self-resonant frequency, and the impedance is equal to the ESR at that frequency.



DC LEAKAGE CURRENT (DCL)

DC Leakage Current is the DC current flowing through the capacitor with the rated voltage applied. The value of leakage current depends on the voltage applied, the charging period and capacitor temperature.

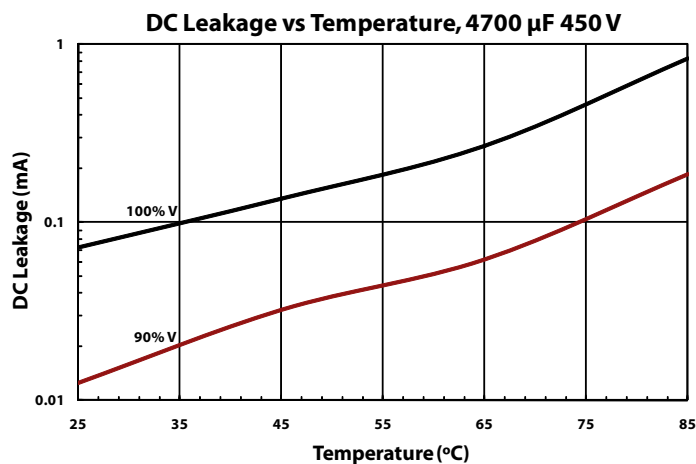
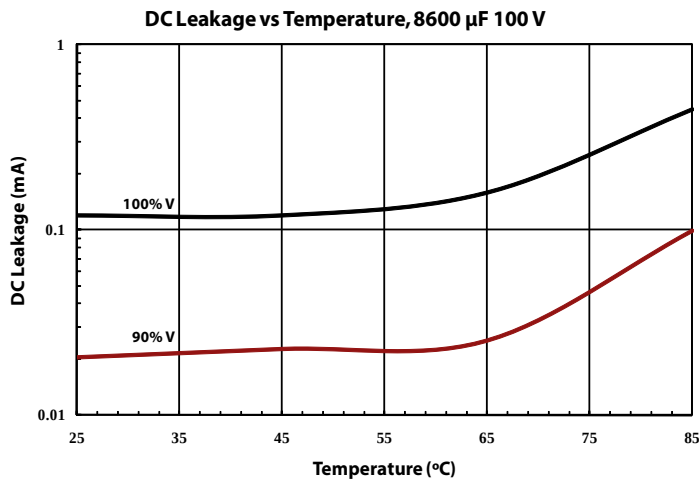
DCL Method of Measurement

Measure leakage current at 25 °C with the rated voltage applied through a protective resistance of 1000 Ω in series with the capacitor in the measuring circuit. Five minutes after the

application of voltage, the leakage current is not to exceed the maximum value indicated in the specification.

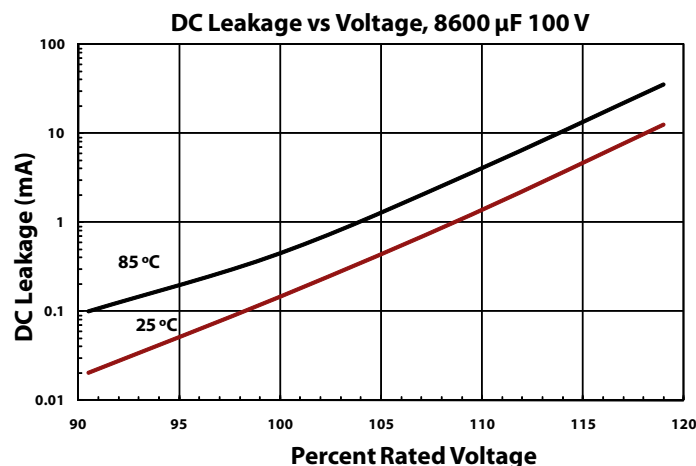
DCL Temperature Characteristics

Typical temperature characteristics are shown below:

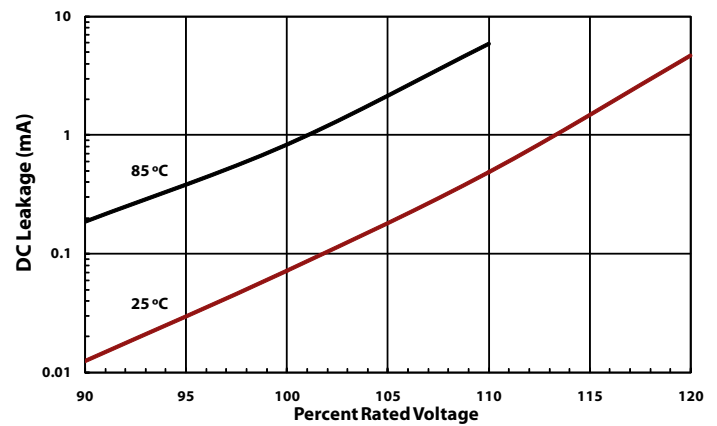


DCL Voltage Characteristics

The leakage current value drops rapidly as the applied voltage decreases below the capacitor's rated voltage. The effect of voltage derating on the leakage current is shown next.



DC Leakage vs Voltage, 4700 μ F 450 V



VOLTAGE WITHSTANDING

Rated DC Voltage

Rated DC voltage is the nominal voltage marked on the capacitor, and it is the maximum peak voltage including ripple voltage that may be applied continuously between the terminals and over the rated temperature range. Higher rated voltage capacitors may be substituted for lower rated voltage capacitors as long as case size, DF, and ESR ratings are also compatible.

Rated Surge Voltage

Rated surge voltage is the maximum DC overvoltage to which the capacitor may be subjected at 25 °C for short periods not exceeding approximately 30 s at infrequent intervals of not less than 5 min.

Surge voltage Measurement

Subject the capacitors to their rated surge voltage at normal room temperature and through a $1000 \Omega \pm 10\%$ resistor (except for capacitances of 2500 μ F and up, use a higher value resistor calculated as $2,500,000/C \pm 10\%$ where C is the capacitance in μ F). Cycle the voltage $\frac{1}{2}$ minute on followed by $4\frac{1}{2}$ minutes off during which each capacitor is discharged through the charging resistor or equal resistor. Repeat the cycles for 120 h. Post test requirements are for DCL, ESR and DF to meet initial requirements and for there to be no evidence of mechanical damage or electrolyte leakage. Electrolyte residue with no droplets or visible flow is permitted.

Reverse Voltage

Aluminum electrolytic capacitors are polarized and must be connected in the correct polarity. They can withstand reverse voltages up to 1.5 V. Higher reverse voltage can cause failure by pressure build up and rupture of the capacitor's safety vent structure. Non-polar and semi-polar devices are available that can withstand reverse voltage.

Transient Overvoltage

Aluminum electrolytic capacitors can generally withstand extreme overvoltage transients of limited energy. Application of overvoltage more than about 50 V beyond the capacitor's surge voltage rating causes high leakage current and a constant-voltage operating mode quite like the reverse conduction of

a zener diode. The capacitor may fail short if the electrolyte cannot take the voltage stress, but even if it can, this operating mode cannot be maintained for long because hydrogen gas is produced by the capacitor, and the pressure build up will cause failure. However, special designs are available that use the overvoltage, zener-clamping effect to successfully protect equipment from overvoltage transients such as lightning strikes.

Capacitors used as bus capacitors in large, high-voltage capacitor banks are less capable of withstanding overvoltage transients because the high energy and low source impedance of the capacitor bank can prevent a momentary partial discharge from self healing and cause it to become a runaway short-circuit failure. For high-voltage capacitor-bank applications use capacitors proven for that use.

RIPPLE CURRENT

Ripple current is the AC current flowing in the capacitor. It's called ripple current because the associated AC voltage rides like ripple on water on the capacitor's DC bias voltage. The ripple current heats the capacitor and the maximum permitted ripple current is set by how much can be permitted and still meet the capacitor's load life specification. Too much temperature rise will cause the capacitor to exceed its maximum permitted core temperature and fail quickly, but operation close to the maximum permitted core temperature dramatically shortens expected life. The load life specifications for aluminum electrolytic capacitors operating at maximum permitted core temperature are typically 1000 to 10000 hours. That's a load life of six weeks to a year and a seventh and not long enough time for most applications.

Ripple current ratings usually assume that the capacitor is convection cooled and that the entire can is in contact with air. A convection coefficient of $0.006 \text{ W/}^\circ\text{C/in}^2$ predicts the temperature rise from air to the case, and the core temperature is assumed to be the same as the case temperature. The power dissipated is the ripple current squared times the ESR. Often the 25°C , 120 Hz maximum ESR is used, but since ESR decreases at elevated temperatures, less than maximum ESR may be used to calculate power dissipated.

Here's an example. Suppose you wanted the ripple-current rating for a $4700 \mu\text{F}$, 450 V capacitor in a 3 inch (76 mm) diameter and 5 5/8 inches (143 mm) long can and the maximum ESR at 25°C and 120 Hz is $30 \text{ m}\Omega$. The can area – not including the terminal end – is 60.1 in^2 (388 cm^2). The thermal conductance is $(0.006)(60.1) = 0.36 \text{ W/}^\circ\text{C}$. For a 10°C temperature rise the case may dissipate 3.6 W. So the permitted ripple current with an ESR of $30 \text{ m}\Omega$ is 11 A. If you assume that the ESR would decrease 35% by 85°C , then the maximum ripple current can be 13.6 A.

With large-can capacitors, like the one in this example, neglecting the temperature rise from the case to the core can seriously overstate the ripple current capability. With some constructions the core is 3 to 5°C per watt of ripple power hotter than the case. So the total temperature rise would be more than double the intended 10°C with rated ripple current and maximum ESR. It is generally safe to assume that the core temperature is the same as the case temperature for capacitors smaller than 25 mm

diameter. For larger cases with high ripple current, verify the temperature rise by requesting samples with thermocouples imbedded in the cores.

Cornell Dubilier Thermal Pak, screw-terminal capacitors have controlled, low thermal resistance from core to case. You can predict temperature rise using the **Thermal Resistance Chart** later in this section or by using the thermal-resistance/expected-life model available on the website, <http://www.cde.com>.

Ripple Current Temperature Characteristics

Rated ripple current can be increased for operating temperatures less than rated temperature. Multipliers are shown in the specifications. Generally the multipliers are derived based on maximum core temperature (T_c), rated temperature (T_r) and ambient temperature (T_a) as

$$\text{Ripple Temperature Multiplier} = [(T_c - T_a)/(T_c - T_r)]^{1/2}$$

Counting on multipliers for temperatures below 60°C and for more than $1\frac{1}{2}$ times rated ripple current is risky. High ripple currents can cause shorter operating lives than expected because as the capacitor ages its ESR increases and causes more heating for the same ripple current. This accelerates wearout.

Ripple Current Frequency Characteristics

Rated ripple current can be adjusted for operation at frequencies other than 120 Hz. Multipliers are shown in the specifications. Generally the multipliers are derived based on expected ESR change with frequency; however, as discussed above, ESR is a complex function of temperature, capacitance and rated voltage as well as frequency. So it is difficult to create ripple-frequency multiplier tables that accurately model the frequency dependence. For high-ripple current applications verify ESR at frequencies of interest and calculate total power dissipated.

INDUCTANCE

Inductance is the equivalent series inductance, and it is relatively independent of both frequency and temperature. Typical values range from 2 to 8 nH for SMT types, 10 nH to 30 nH for radial-leaded types, 20 to 50 nH for screw-terminal types, and up to 200 nH for axial-leaded types. These low values are achieved by tab location and the intrinsic, low inductance of the dielectric contact geometry. The capacitor element has typical inductance of less than 2 nH.

SELF RESONANT FREQUENCY

The self-resonant frequency is the frequency at which the capacitive reactance ($1/(2\pi fC)$) equals the inductive reactance ($2\pi fL$). Because the capacitive reactance is 180 degrees out of phase with the inductive reactance, the two reactances subtract out, and the remaining impedance is purely resistive and is equal to the ESR at that frequency. Above self resonance the device is inductive. In aluminum electrolytic capacitors the self-resonant frequency typically occurs at less than 100 kHz. The self-resonant frequency is equal to $1/[2\pi(LC)^{1/2}]$. It occurs at a frequency higher than expected based on 120 Hz capacitance because capacitance decreases with increasing frequency.

The self resonant frequency can decrease with increasing temperature from capacitance increase.

DIELECTRIC ABSORPTION

Dielectric absorption may be observed as the reappearance of a voltage across a capacitor after the terminals have been shorted for a brief period and the short removed. This characteristic is important in RC timing circuits, triggering systems and phase shift networks. For aluminum electrolytic capacitors dielectric absorption will allow up to 10% recovery of the charging voltage between 100 s and 1000 s at 25 °C, and is more pronounced at higher temperatures. Maximum dielectric absorption can be obtained by charging capacitors for 1 hour at rated voltage and discharging through a dead short for 1 minute. Subsequent measurements over time can be made with a high impedance micrometer.

With high-voltage aluminum electrolytic capacitors rebound voltages of 40 to 50 V are possible. While such voltages are not a safety hazard, they can certainly cause sparking and create a frightening distraction if the terminals are shorted by a tool during installation. Conductive tape and wire shorting straps can be supplied for the faint of heart. The tradeoff is extra cost and the labor to remove them.

INSULATION AND GROUNDING

With non-solid electrolyte aluminum electrolytic capacitors the aluminum cases connect to the negative terminals by contact with electrolyte. The resulting isolation resistance may vary from a few ohms to a few thousand ohms. For axial leaded capacitors and flatpacks the case is connected to the negative lead. If objects contacting the cases are to be at a potential other than the negative terminal's potential, use capacitors with insulating sleeves.

The plastic insulation can withstand 3000 Vdc or 2500 Vac, 60 Hz for 1 minute applied between the case and a ¼ inch wide metal foil placed around the sleeve. For stud-mounting, apply the voltage between the mounting plate and the case, and mount the capacitor with an approved nylon nut and clearance hole.

Insulation resistance is no less than 100 MΩ after 2 minutes electrification with 100 volts applied between the foil and the capacitor case.

ELEVATION AND EXTERNAL PRESSURE

Not relevant for capacitors with solid electrolyte. Aluminum electrolytic capacitors can operate to 80,000 feet and pressures as low as 3 kPa. Maximum air pressure depends on the size and style of the capacitor. Exceeding the maximum value can damage the capacitor by crushing the case, opening the pressure-relief vent or causing a short circuit.

VIBRATION WITHSTANDING CAPABILITY

Aluminum electrolytic capacitors can generally withstand 10 g vibration forces. Limits are shown in the specifications. Adjust the procedure below as required by the individual type specifications.

To test vibration resistance, clamp the capacitors to a vibrating platform and subject them to a simple harmonic motion having maximum peak-to-peak amplitude of 0.06 inches and maximum acceleration of 10 g or 15 g as specified. Vary the frequency of vibration linearly between 10 and 55 Hz. Traverse the entire frequency range in 1 minute. Unless specified otherwise, vibrate the capacitors for 1½ hours with the direction of motion being parallel to the axis of the capacitor, then place the capacitors so that the direction of motion is perpendicular to the axis and continue vibration for 1½ hours. During the last ½ hour of test connect the capacitor to a capacitance meter and observe for a 3-minute period.

There will be no evidence of loosening of the capacitor element within the container when shaken by hand following the test. Also there will be no indication of intermittent contact, open or shorting during the 3-minute observation period.

SAFETY CONSIDERATIONS

Pressure-Relief Vent

During operation of an aluminum electrolytic capacitor with non-solid electrolyte, gas pressure normally increases. This gas is mostly hydrogen and excess pressure is avoided by permeation of the gas through the capacitor's seal. But in cases like application of overvoltage, reverse voltage, AC voltage or capacitor failure, excess pressure can cause the capacitor to explode. To reduce the risk of explosion aluminum electrolytic capacitors are usually equipped with pressure-relief vent structures. These safety vents are intended to rupture and release the gas pressure. After rupture the capacitor has limited life because it loses electrolyte and dries out.

Be careful not to interfere with the operation of the vent, for instance by mounting measures such as clamps, glue or potting compounds. In the case of large capacitors with the capacitor elements secured by thermoplastic potting, don't mount them with the safety vents down as the potting may flow when the capacitors overheat and block the vents.

In rare cases for capacitors mounted alone and more often for capacitors in multiple-unit parallel capacitor banks a fully functioning pressure relief device may not react in time. This could be from extreme overload or ignition of gas inside the capacitor through sparking caused by breakdown. Protect personnel from possible rupture of high-energy capacitors with shielding, and be sure to use substantial shielding when testing the pressure-relief vent. Examples of appropriate shielding for testing are ¼-inch thick steel or ½-inch polycarbonate enclosures with one end open to redirect the explosion rather than contain it.

Test the capacitor's pressure-relief capability by applying voltage or current using one of the following three methods:

A. Subject the capacitor to AC current according to the rated capacitance as below:

Rated Capacitance μF	Test Current I_{ac} , 60 Hz
up to 3000	1 to 100
3,000 to 20,000	85 to 150
above 20,000	100 to 175

B. For a capacitor rated 150 Vdc and above, apply 110 to 125 Vac, 60 Hz through a $5\ \Omega \pm 10\%$ series, current-limiting resistor.

C. Subject the capacitor to reverse polarity, DC voltage sufficient to allow a current from 1 to 10 A to flow.

The excess internal pressure will be relieved without violent expulsion of the capacitor element or cover or ignition of surrounding material. To demonstrate non-ignition, wrap the case loosely with two layers of cheese cloth which must not ignite during test. A short or open circuit is not a failure of the test.

Contact with Electrolyte

The electrolyte in non-solid electrolytic capacitors is a biodegradable liquid based on a stable solvent with a high boiling point as the main ingredient. The most common solvent is ethylene glycol (EG). Dimethylformamide (DMF) and gammabutyrolactone (GBL) may be used in capacitors rated $-55\ ^\circ\text{C}$. The electrolyte includes an acid base system and other chemicals. The electrolyte is chemically neutral and contains no PCBs or halogenated compounds. It has low toxicity but you should avoid contact with the skin or eyes and avoid prolonged inhalation. A Material Safety Data Sheet is available for the electrolyte solvent base material.

Immediately treat contact with electrolyte by rinsing exposed area with water. If electrolyte contacts eyes, flush for 10 minutes with running water. Seek medical attention if any symptoms persist. Avoid inhalation of electrolyte vapors or dust particles. If vapors are present, ventilate the room. Smoke from burning electrolyte is irritating but does not contain dioxins or similar toxic substances. If electrolyte gets on clothing, wash it off with water.

Charge-Discharge

Frequent, rapid charge and discharge of aluminum electrolytic capacitors not designed for such service can damage the capacitors by overheating and overpressure or breakdown with consequent failure by open or short circuit. For charge-discharge applications use capacitors designed for that use.

Polarity – Reverse Voltage

Check the polarity of each capacitor both in circuit design and in mounting. Polarity is marked on the capacitor. While the capacitors can withstand continuous application of 1.5 V reverse voltage, exceeding that can damage the capacitor by

overheating, overpressure, and dielectric breakdown. This can result in associated open-circuit or short-circuit failures and rupture of the capacitor's pressure-relief vent.

Flammability

Aluminum electrolytic capacitors contain materials which can catch fire and support combustion when contacted by flames. Flammable parts include plastic parts, insulating sleeves, paper, and the electrolytes. Most capacitors will pass the needle-flame test requirements of UL 94V-O and not support combustion to the requirements of Category B or C.

In rare cases the capacitor may self-ignite from heavy overload or capacitor defect. Hydrogen in the capacitor can ignite if sparking occurs during capacitor failure. In critical applications such as mining applications consider providing fire-resistant shields.

CAPACITOR BANK CONFIGURATIONS

PARALLEL

Capacitors may be connected in parallel for increased capacitance and ripple-current capability.

Bus Structure

When connecting capacitors in parallel, design the connecting bus with these features in mind. For minimum series inductance use a laminated-bus or strip-line structure. For example, have one plane of the circuit board as the plus connection and another plane as the minus connection to all capacitors. Path resistance to each capacitor should be equal to assure equal current sharing. While ripple current divides among the capacitors in proportion to capacitance values for low-frequency ripple, high-frequency ripple current divides in inverse proportion to ESR values and path resistance.

Fusing

In order to fuse the individual capacitors, include a slow-start circuit at equipment turn-on, and fuse each capacitor at twice its expected, maximum ripple current. The slow-start circuit can be a resistor in series with the capacitors that is shorted after initial charging.

SERIES

Capacitors may be connected in series for increased voltage withstanding.

Voltage Sharing

During charging the voltage on each capacitor connected in series is proportional to the inverse of the actual capacitance, but upon reaching final voltage, the voltage on each capacitor is proportional to the inverse of the capacitor's leakage current. Of course in a series string there is only one leakage current and the capacitors with a propensity for higher leakage current will get less voltage. Since leakage current increases with applied voltage, less voltage results in higher leakage resistance, and the voltages tend to equalize. However, voltage distribution will not be uniform, and to assure that no capacitor is subjected to more

than its rated voltage, use higher rated voltage capacitors or a balancing scheme such as balancing resistors, discussed next. Assist voltage sharing stability by using capacitors from the same manufacturing lot and mounting them to operate at the same temperature.

Balancing Resistors

The difference in leakage currents in μA for two capacitors in series at rated temperature can be estimated as $0.0015CV_b$ where C in μF is rated capacitance of each capacitor and V_b in V_{dc} is the bus voltage across the two series capacitors. Using this estimation enables selecting a value of balancing resistance for each capacitor as follows:

$$R = (2V_m - V_b) / (0.0015CV_b)$$

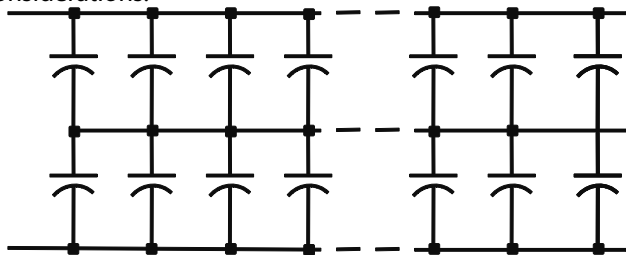
Where R in $M\Omega$ is the balancing resistance, V_m is the maximum voltage you'll permit on either capacitor, and V_b is the maximum bus voltage across the two capacitors.

For three or more capacitors in series use the following where n is the number of capacitors in series:

$$R = (nV_m - V_b) / (0.0015CV_b)$$

PARALLEL/SERIES

Capacitors connected as shown below with a common connection between multiple series combinations have these considerations.



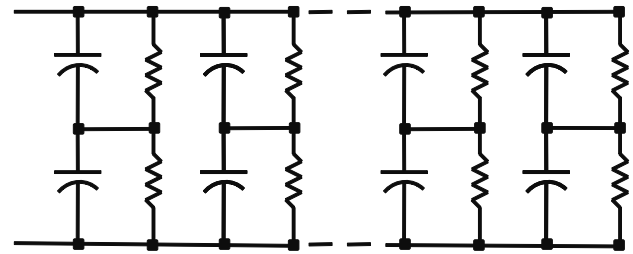
Parallel-series array with common center connection

Advantages: As the number of capacitors in parallel increases the capacitance at the top tends to equal the capacitance at the bottom. This improves voltage balance during transients. Also the leakage current at the top tends to equal the leakage current at the bottom, so voltage balance improves during steady-state conditions. Finally, only two balancing resistors need be considered, and the top and bottom may be so well matched as to eliminate the need for balancing resistors.

Disadvantage: If one capacitor fails short, the other half of the bank gets the entire bus voltage, so other capacitors will fail too unless the shorted capacitor blows open. Thus one capacitor failure can cause failure of the entire bank.

SERIES/PARALLEL

Capacitors connected as shown below with multiple series combinations in parallel have these considerations. This configuration is the clear choice when balancing resistors are not used.



Series - parallel array, no center connection

Advantages: If one capacitor fails short then the capacitor in series with it also fails, but other capacitors in the bank are unaffected. If balancing resistors are not used, high leakage current of one capacitor affects only a single pair of capacitors. The independent, series pairs permit fusing.

Disadvantages: With balancing resistors the construction is more complex; many resistors need to be fitted, and the additional resistors cost more.

NON-POLAR AND MOTOR START CAPACITORS

If two, same-value, aluminum electrolytic capacitors are connected in series with the positive terminals or the negative terminals connected together, the resulting single capacitor is a non-polar capacitor equal in capacitance to half of the rated capacitance of either of the original pair. The two capacitors rectify the applied voltage and act as if they had been partially bypassed by diodes. However, at all levels of AC voltage the apparent capacitance is half of the rated capacitance as you would expect for capacitors connected in series. The nonlinear performance produces distortion where non-polar aluminum electrolytic capacitors are used in audio AC applications.

In non-polar aluminum electrolytic capacitors and motor-start aluminum electrolytic capacitors a second anode foil substitutes for the cathode foil to achieve a non-polar capacitor in a single case. These are available for momentary-duty AC applications like motor starting and voltage-reversing applications, but the high DF of aluminum electrolytic capacitors – from 2% to 150% – causes excess heating and short life in most AC applications.

Aluminum electrolytic, motor-start capacitors are non-polar and designed for intermittent operation in starting single-phase induction motors or for other brief AC applications such as motor-run capacitors in electric door openers.

RELIABILITY AND LIFETIME

Aluminum electrolytic capacitors are quite reliable largely because of their effective, self-healing mechanism. While wear-out is the most common failure mode, most such failures are gradual conversions to open circuits as the units become more and more resistive.

Failure Modes

Early-Life Failures

Early-life failures, infant mortals are mostly short-circuit failures from weaknesses in the aluminum oxide dielectric. Incidence can be reduced with extended aging or burn-in.

Wear-Out

Wear-out failures are mostly open-circuit failures from loss of electrolyte or ESR increase from other causes. In the case of large capacitors enduring high levels of ripple current, the increasing ESR can cause overheating and short-circuit failures as wear-out failures.

Operating Life

Onset of wear-out is determined mainly by the capacitor's size and average operating temperature. Operating voltage has some effect. For capacitors operating at moderate temperatures the operating life doubles for each 10 °C that operating temperature is reduced. Operating life can be expressed as

$$Lop = MvLb2^{[(Tm - Ta)/10]}$$

Where

Lop is the expected operating life in h,

Mv is a unitless voltage multiplier for voltage derating,
Lb is the expected operating life in h for full rated voltage and temperature,

Tm is the maximum permitted internal operating temperature in °C, and

Ta is the actual capacitor internal operating temperature in °C.

Most manufacturers use this model to predict operating life; however, values for Mv, Lb and Tm vary both by capacitor type and by manufacturer. For case diameters larger than 25 mm with significant ripple current, take into account the temperature rise of the capacitor element over its case.

Some makers appear to calculate operating life saying that expected lifetime doubles with less than a 10 °C drop in temperature. The expectation that life doubles for each 10 °C reduction is well demonstrated by life tests and is consistent with the Arrhenius equation of chemical activation and the activation energy for aluminum electrolytic capacitors. However, there is another school of thought that says the reaction rate at cooler temperatures slows more than predicted by the Arrhenius equation because only a growingly smaller portion of the molecules have the activation energy needed to break existing chemical bonds and form new ones. This collision theory puts a prefactor in the Arrhenius equation that enables much longer calculated service-life capability at temperatures near room temperature. Use these predictions with caution because it is not validated by life test results.

Often Mv is neglected, and values for the other variables change by case size. Typical values for Lb are 1000 to 2000 h for miniature types, 2000 to 10,000 h for snap-in types and 2000 to 20,000 h for large-can screw terminal types. Lb can be greater than the rated load life because no ripple is applied and because it's typical life rather than minimum. Often Tm is 95 °C when rated temperature is 85 °C and is 108 to 110 °C when it's 105 °C.

Mv based on life tests for Cornell Dubilier capacitor types is:

$$Mv = 4.3 - 3.3Va/Vr$$

where Va is applied voltage and Vr is rated voltage. Values for Lb and Tm are:

Type	Lb	Tm
330	12000 h	108 °C
401C/101C	8000 h	108 °C
300/301	6000 h	108 °C
380L/LX	5000 h	90 °C
381L/LX	5000 h	110 °C
400C/500C/500R	7500 h	98 °C
420C/520C	12000 h	103 °C
450C/550C	15000 h	108 °C
DCMC	5000 h	95 °C
MLP up to 250V	12000 h	88 °C
MLP 300V & up	5000 h	88 °C
MLS	4000 h	125 °C
SLP	4500 h	110 °C
SLPX	4500 h	90 °C

Determining Operating Life

Determine expected operating life by calculating the capacitor's expected operating temperature, Ta, and then use the operating-life formula. The operating temperature is the expected average ambient temperature plus temperature rise from ripple current and leakage current. Leakage-current power is small compared to ripple-current power and can be neglected. Measure temperature rise from ripple current using sample capacitors with thermocouples installed at the core hotspot, or calculate temperature rise from dissipated power. If you calculate the power, do so at each significant ripple frequency and add the powers together for total power. Use the **Thermal Resistance Chart** to determine temperature rise. It's equal to power multiplied by thermal resistance.

Calculating power at a frequency other than 120 Hz requires knowing the ESR at the new frequency. You may infer the ESR value from the ripple-current frequency multipliers for each type.

$$ESR_f = ESR_{120} / Mf^2$$

Where ESR_f = ESR at a frequency f, ESR_{120} = ESR at 120 Hz and Mf = Frequency multiplier for frequency f.

Or you may calculate the new ESR using the equation in **ESR Frequency Characteristics**. Using that equation to solve for ESR_{hf} and including 3% for DF_{if} ,

$$ESR_f = ESR_{120} - 39800(f - 120)/fC$$

Where ESR is in mΩ, f is in Hz and C is in μF. Although 3% is at the high end for DF_{if} it fits with ESR_{120} which is a maximum limit for the ESR at 120 Hz.

Besides knowing ESR at the new frequency you also need to know the ESR at a new temperature, the expected operating

temperature. For Cornell Dubilier capacitors with electrolytes rated to -40 °C this table shows representative ratios of ESR at elevated temperatures to ESR at 25 °C.

Rated	Capacitor Temperature		
Voltage	45 °C	65 °C	85 °C
Vdc	Ratio to ESR at 25 °C		
Up to 150	82%	77%	77%
200 to 300	75%	70%	70%
350 & 450	70%	60%	60%
500	61%	49%	45%

Here's an illustration to unify this information: Consider the earlier example, a 4700 µF, 450 V capacitor in a 3 inch (76 mm) diameter and 5 5/8 inches (143 mm) long can with a maximum ESR at 25 °C and 120 Hz of 30 mΩ. Suppose that the capacitor is used as a bus capacitor in a motor-drive inverter, and the ripple current consists of 11 A at 360 Hz and 6.5 A at 8000 Hz. And the average applied voltage, the bus voltage, is 390 Vdc.

First calculate the ESRs at the two frequencies. While you would use one or the other of the methods above to calculate ESR, here we'll use both to illustrate. If the capacitor is a Type DCMC, the frequency multiplier for 360 Hz is 1.13. Thus the 360 Hz ESR is $30/1.13^2$ or 23.5 mΩ. Or using the **ESR Frequency Characteristics** equation, the 360 Hz ESR is $[30 - 39800(360-120)/360/4700]$ or 24.4 mΩ. Similarly at 8000 Hz the ESRs calculate to be 19.5 and 21.6 mΩ.

Next calculate the total power. At 360 Hz it's $(11^2)(0.0244)$ or 2.9 W. At 8000 Hz it's $(6.5^2)(0.0216)$ or 0.9 W. That's a total power of 3.8 W.

Then calculate the core hot-spot temperature. From the **Thermal Resistance Chart** the thermal resistance for free convection cooling is 3.07 °C/W. So the temperature rise is $(3.8)(3.07)$ or 14 °C. If the ambient temperature were 50 °C, the core temperature would be 64 °C.

Now predict operating life capability using the **Operating Life** equation. The voltage multiplier, Mv is $[4.3 - 3.3(390/450)]$ or 1.44. Operating life is

$$\begin{aligned} \text{Lop} &= (1.44)(5000)2^{[(95 - 64)/10]} \\ &= 61,700 \text{ h} \end{aligned}$$

But if the core temperature is 64 °C, the ESR would have decreased about 40%. The new total power would be $0.6(3.8)$ or 2.3 W. The new temperature rise would be $(3.07)(2.3)$ or 7 °C, and the core temperature would be 57 °C. Recalculating operating life with the lower core temperature gives.

$$\begin{aligned} \text{Lop} &= (1.44)(5000)2^{[(95 - 57)/10]} \\ &= 100,300 \text{ h} \end{aligned}$$

And actual ESRs are typically 70% of limit so you could argue that the total power is 1.6 W. Thus the temperature rise would be 5 °C, the core temperature, 55 °C, and the operating life, 115,000 h. However, it is more accurate to use the maximum limit because

that takes into account the ESR increase over life.

The example lower left shows the iterative approach. If a higher core temperature gives the operating life you require, you are done.

If the math needed to calculate operating life seems burdensome, take cheer. You can shortcut the calculations and consider more mounting and cooling options by using our Java applet on our website, <http://www.cde.com>.

Transient Over-Temperature

As said, life of aluminum electrolytic capacitors generally doubles for each 10 °C that the core temperature is reduced. The core is the hottest spot at about the center of the capacitor. However, as a capacitor heats up toward its maximum permitted core temperature, the rules change. At temperatures above the maximum core temperature and by 125 °C for most types the electrolyte can be driven from capacitor element and the ESR can increase as much as 10 times. By this mechanism, transient over-temperature or over-current can permanently increase the ESR and make the capacitor unusable. Be alert to this possibility in high-temperature and high-ripple applications, and pay extra attention to system cooling.

Load Life Test

Place the capacitors in a circulating air oven set to the upper temperature limit, 85 °C, 105°C or 125 °C, ± 3 °C. Apply a DC voltage and an AC ripple voltage. Adjust the AC voltage to cause current equal to the rated ripple current to flow and adjust the DC voltage such that the peak voltage equals the capacitors' rated voltage. Apply the voltage for the rated load-life period -0 +6 h. Upon completion allow the capacitors to stabilize at 25 °C for 24 h or more. The capacitors will meet the specified post-test limits for capacitance, ESR and DCL.

EIA Ripple Life Test, EIA IS-479

Conduct the wear-out lifetime test per EIA Interim Standard 479. The highlights of that test are as follows:

Apply ripple current at 120 Hz or adjust to maintain the same power dissipation if performed at another frequency. Set DC bias voltage equal to rated voltage minus peak applied AC voltage. Set ambient temperature to 85 ± 2 °C with airflow less than 0.5 m/s. Periodic test interval ≤ 1000 h. Sample size is 10 or more. Mount capacitors horizontally and spaced 25 mm or more. Choose any temperature ≤ 85 °C for measurements, and make all measurements at that temperature. End of Lifetime is $\leq$ the time when 10% or more of the sample have

capacitance < 80% initial value or
ESR > 200% initial requirement or
DCL > initial value or
there is evidence of mechanical damage or
leakage of electrolyte.

10% of sample may fail short or open and not be counted.

Voltage Derating

Voltage derating is expressed as the percentage that the applied voltage is less than rated voltage, e.g., a 450 V capacitor operating at 400 V would have 11% voltage derating.

Aluminum electrolytic capacitors made with formation voltages at least 35% higher than rated voltage and with rated temperatures of 85 °C or higher, don't require much voltage derating. In applications operating at less than 45 °C no derating is needed, and with up to 75 °C, 10% is sufficient. For higher temperatures and with high ripple current, 15% or 20% is appropriate. Since operating life continues to increase for further derating, military and space applications use 50% voltage derating.

Photoflash capacitors may be used at full rated voltage at normal room temperatures because they are designed for such duty. Strobe capacitors benefit from at least 10% voltage derating because their continuous operation makes them run hot.

SHELF LIFE

Aluminum electrolytic capacitors stored for more than 5 to 10 years may have increased levels of DC leakage current. Check if DCL meets application requirements before placing in service. Recondition high DCL units by applying rated voltage through 1,000 Ω resistor for 30 minutes.

Shelf life is a measure of how the capacitors will withstand storage for long times especially at high temperature. To test shelf life place the capacitors in an oven set to the shelf-life test temperature -0 ± 3 °C for the shelf-life test period. Upon completion of the test stabilize the capacitors at 25 °C for 24 h or more. Apply the rated voltage for 30 minutes, then verify the post test limits. Unless otherwise specified the capacitance, DCL and ESR will meet initial requirements.

COOLING AND THERMAL RESISTANCE

Cooling Strategies

Cornell Dubilier screw-terminal capacitors conduct heat from

the core to the bottom much more effectively than out the sides. You can take advantage of this heat path by mounting the capacitors directly to a metal chassis. In many case sizes this can double the permitted ripple current for the same temperature rise.

Mounting can be by using capacitors with mounting studs and screwing the capacitors directly to the plate or it can be by pressing the capacitors against a plate using the interconnecting bus structure. Cornell Dubilier furnishes silpad inserts at the bottom of the capacitors for this application. The silpads create smooth bottoms by eliminating the steps at the sleeve rollovers. The thermal resistance between the can and the underlying plate for capacitors merely sitting on the plate is about 2.5 °C/W. This decreases to less than 1 °C/W if the capacitors are pressed in place. Recommended vertical mounting force is 100 pounds. A Java applet is available on the Cornell Dubilier website which permits you to explore cooling options and directly see the affect on operating life. Go to <http://www.cde.com>.

Thermal Resistance

In large-can capacitors there can be significant temperature rise from the case to the core, the hottest spot at the center of the capacitor. For Cornell Dubilier Thermal Pak screw-terminal capacitors use the following thermal resistance data to determine temperature rise from power dissipated. As an illustration, consider 20 amps of ripple current at 120 Hz in a 3 x 5 5/8 case with a maximum ESR of 20 m Ω . The hot, typical ESR would be about half that or 10 m Ω , and the power dissipated would be I^2R_s , $20^2 \times 0.01$ or 4 W. For the DF case code the table shows that the thermal resistance from core to bottom of the can is about 0.41 °C/W. That varies a little depending on how the capacitor is cooled, but 0.41 °C/W predicts a temperature rise of 1.6 °C for 4 W. The free-convection cooling column shows a total thermal resistance of 3.07 °C/W for air on all sides and 1.02 °C/W for the capacitor pressed against a large metal plate or chassis. The 3.07 °C/W predicts a temperature rise of 12.3 °C, and 1.02 °C/W predicts 4.1 °C.

Thermal Resistance °C/W Thermal Pak Screw Terminal Aluminum Electrolytic Capacitors

		Free Convection						200 lfm Airflow					
Case Code	Case Size D x L (in)	Air on Side & End			Air & Metal Chassis			Air on Side & End			Air & Metal Chassis		
		Core to bottom	Case to air	Total	Core to bottom	Case to air	Total	Core to bottom	Case to air	Total	Core to bottom	Case to air	Total
AK	1 3/8 X 1 5/8	1.67	17.12	18.78	1.68	3.29	4.97	1.66	12.19	13.86	1.68	3.08	4.76
AA	1 3/8 X 2 1/8	1.70	13.72	15.42	1.74	3.13	4.87	1.70	9.80	11.50	1.74	2.90	4.64
AH	1 3/8 X 2 5/8	1.72	11.49	13.21	1.78	2.99	4.77	1.72	8.23	9.94	1.77	2.73	4.51
AB	1 3/8 X 3 1/8	1.72	9.91	11.63	1.80	2.86	4.66	1.71	7.12	8.83	1.79	2.59	4.38
AJ	1 3/8 X 3 5/8	1.69	8.73	10.43	1.81	2.74	4.55	1.69	6.29	7.99	1.80	2.46	4.25
AC	1 3/8 X 4 1/8	1.66	7.82	9.48	1.81	2.63	4.44	1.66	5.65	7.32	1.79	2.33	4.13
AD	1 3/8 X 4 5/8	1.62	7.09	8.71	1.80	2.52	4.32	1.62	5.14	6.76	1.78	2.22	4.00
AE	1 3/8 X 5 1/8	1.58	6.49	8.07	1.79	2.42	4.21	1.58	4.72	6.30	1.76	2.12	3.88
AF	1 3/8 X 5 5/8	1.53	5.99	7.52	1.77	2.33	4.10	1.53	4.37	5.90	1.74	2.02	3.76
EA	1 3/4 X 2 1/8	1.03	10.40	11.43	1.05	1.90	2.96	1.03	7.43	8.46	1.05	1.79	2.84
EH	1 3/4 X 2 5/8	1.06	8.77	9.83	1.09	1.84	2.93	1.06	6.28	7.34	1.09	1.71	2.80
EB	1 3/4 X 3 1/8	1.08	7.61	8.68	1.13	1.77	2.90	1.08	5.47	6.55	1.12	1.64	2.76
EJ	1 3/4 X 3 5/8	1.08	6.73	7.82	1.15	1.72	2.87	1.08	4.86	5.94	1.15	1.57	2.72
EC	1 3/4 X 4 1/8	1.08	6.06	7.13	1.17	1.66	2.83	1.08	4.39	5.47	1.16	1.51	2.67
ED	1 3/4 X 4 5/8	1.07	5.51	6.58	1.19	1.61	2.79	1.07	4.01	5.08	1.17	1.45	2.62
EE	1 3/4 X 5 1/8	1.05	5.07	6.12	1.19	1.55	2.75	1.05	3.70	4.75	1.18	1.39	2.57
EF	1 3/4 X 5 5/8	1.03	4.69	5.72	1.20	1.50	2.70	1.03	3.43	4.47	1.18	1.34	2.52
BA	2 X 2 1/8	0.78	8.89	9.67	0.80	1.45	2.24	0.78	6.35	7.14	0.80	1.37	2.17
BH	2 X 2 5/8	0.81	7.53	8.34	0.84	1.40	2.24	0.81	5.40	6.21	0.83	1.32	2.15
BB	2 X 3 1/8	0.83	6.55	7.38	0.87	1.36	2.23	0.83	4.71	5.54	0.87	1.27	2.13
BJ	2 X 3 5/8	0.84	5.82	6.66	0.90	1.32	2.22	0.84	4.20	5.04	0.89	1.22	2.11
BC	2 X 4 1/8	0.85	5.24	6.09	0.92	1.28	2.20	0.85	3.80	4.65	0.91	1.18	2.09
BD	2 X 4 5/8	0.84	4.78	5.63	0.93	1.25	2.18	0.84	3.48	4.33	0.93	1.14	2.07
BE	2 X 5 1/8	0.84	4.40	5.24	0.95	1.21	2.16	0.84	3.22	4.06	0.94	1.10	2.04
BF	2 X 5 5/8	0.83	4.09	4.92	0.96	1.18	2.14	0.83	3.00	3.83	0.94	1.06	2.01
CH	2 1/2 X 2 5/8	0.52	5.80	6.32	0.53	0.89	1.42	0.52	4.16	4.68	0.53	0.85	1.38
CB	2 1/2 X 3 1/8	0.54	5.07	5.61	0.56	0.87	1.43	0.54	3.65	4.19	0.56	0.82	1.38
CJ	2 1/2 X 3 5/8	0.55	4.53	5.08	0.58	0.85	1.43	0.55	3.27	3.82	0.58	0.80	1.38
CC	2 1/2 X 4 1/8	0.56	4.10	4.66	0.60	0.83	1.43	0.56	2.98	3.54	0.60	0.78	1.38
CD	2 1/2 X 4 5/8	0.57	3.47	4.04	0.64	0.79	1.43	0.57	2.55	3.11	0.63	0.74	1.37
CD	2 1/2 X 5 1/8	0.57	3.47	4.04	0.64	0.79	1.43	0.57	2.55	3.11	0.63	0.74	1.37
CF	2 1/2 X 5 5/8	0.57	3.23	3.80	0.65	0.78	1.43	0.57	2.38	2.95	0.64	0.72	1.36
DB	3 X 3 1/8	0.37	4.10	4.47	0.39	0.61	0.99	0.37	2.95	3.33	0.39	0.58	0.97
DJ	3 X 3 5/8	0.39	3.67	4.06	0.41	0.59	1.00	0.39	2.66	3.04	0.41	0.56	0.97
DC	3 X 4 1/8	0.40	3.34	3.73	0.43	0.58	1.01	0.40	2.43	2.82	0.42	0.55	0.97
DC	3 X 4 5/8	0.40	3.34	3.73	0.43	0.58	1.01	0.40	2.43	2.82	0.42	0.55	0.97
DE	3 X 5 1/8	0.41	2.85	3.26	0.46	0.56	1.02	0.41	2.09	2.50	0.45	0.53	0.98
DF	3 X 5 5/8	0.41	2.66	3.07	0.47	0.55	1.02	0.41	1.96	2.37	0.46	0.51	0.98
DP	3 X 5 7/8	0.41	2.58	2.99	0.47	0.55	1.02	0.41	1.91	2.32	0.47	0.51	0.98
DG	3 X 8 5/8	0.40	1.95	2.35	0.52	0.49	1.01	0.40	1.47	1.87	0.51	0.45	0.96
FC	3 1/2 X 4 1/8	0.30	2.79	3.09	0.32	0.43	0.75	0.30	2.03	2.33	0.31	0.41	0.72
FD	3 1/2 X 4 5/8	0.30	2.58	2.88	0.33	0.42	0.75	0.30	1.88	2.19	0.33	0.40	0.73
FE	3 1/2 X 5 1/8	0.31	2.40	2.71	0.34	0.42	0.76	0.31	1.76	2.07	0.34	0.39	0.73
FF	3 1/2 X 5 5/8	0.31	2.24	2.56	0.35	0.41	0.76	0.31	1.66	1.97	0.35	0.39	0.74
FP	3 1/2 X 5 7/8	0.31	2.18	2.49	0.36	0.41	0.77	0.32	1.61	1.93	0.36	0.38	0.74
FG	3 1/2 X 8 5/8	0.31	1.67	1.98	0.40	0.37	0.78	0.31	1.26	1.58	0.40	0.34	0.74

Thermal Resistance °C/W Thermal Pak Screw Terminal Aluminum Electrolytic Capacitors

Case Code	Case Size D x L (in)	500 lfm Airflow						1000 lfm Airflow					
		Air on Side & End			Air & Metal Chassis			Air on Side & End			Air & Metal Chassis		
		Core to bottom	Case to air	Total	Core to bottom	Case to air	Total	Core to bottom	Case to air	Total	Core to bottom	Case to air	Total
AK	1 3/8 X 1 5/8	1.66	7.83	9.49	1.68	2.75	4.43	1.66	5.62	7.29	1.68	2.46	4.14
AA	1 3/8 X 2 1/8	1.70	6.31	8.02	1.73	2.53	4.26	1.70	4.56	6.26	1.73	2.22	3.95
AH	1 3/8 X 2 5/8	1.72	5.33	7.05	1.76	2.35	4.11	1.72	3.87	5.59	1.76	2.04	3.79
AB	1 3/8 X 3 1/8	1.71	4.64	6.35	1.78	2.19	3.97	1.71	3.39	5.11	1.77	1.88	3.65
AJ	1 3/8 X 3 5/8	1.69	4.13	5.82	1.78	2.05	3.83	1.69	3.04	4.73	1.76	1.75	3.52
AC	1 3/8 X 4 1/8	1.66	3.73	5.39	1.77	1.93	3.70	1.66	2.76	4.42	1.75	1.64	3.39
AD	1 3/8 X 4 5/8	1.62	3.41	5.03	1.75	1.82	3.57	1.62	2.54	4.16	1.72	1.54	3.27
AE	1 3/8 X 5 1/8	1.58	3.15	4.73	1.72	1.73	3.45	1.58	2.36	3.93	1.70	1.46	3.15
AF	1 3/8 X 5 5/8	1.53	2.93	4.46	1.69	1.64	3.33	1.53	2.20	3.73	1.66	1.38	3.04
EA	1 3/4 X 2 1/8	1.03	4.79	5.83	1.05	1.61	2.66	1.03	3.46	4.50	1.05	1.45	2.49
EH	1 3/4 X 2 5/8	1.06	4.08	5.14	1.09	1.51	2.60	1.06	2.97	4.03	1.08	1.35	2.43
EB	1 3/4 X 3 1/8	1.08	3.57	4.65	1.12	1.43	2.55	1.08	2.62	3.69	1.11	1.26	2.37
EJ	1 3/4 X 3 5/8	1.08	3.20	4.28	1.14	1.36	2.50	1.08	2.36	3.44	1.13	1.19	2.32
EC	1 3/4 X 4 1/8	1.08	2.91	3.99	1.15	1.29	2.44	1.08	2.16	3.24	1.14	1.13	2.27
ED	1 3/4 X 4 5/8	1.07	2.67	3.74	1.16	1.23	2.39	1.07	2.00	3.07	1.14	1.07	2.21
EE	1 3/4 X 5 1/8	1.05	2.48	3.54	1.16	1.18	2.33	1.05	1.87	2.92	1.14	1.02	2.16
EF	1 3/4 X 5 5/8	1.03	2.32	3.35	1.15	1.13	2.28	1.03	1.76	2.79	1.13	0.97	2.11
BA	2 X 2 1/8	0.78	4.10	4.88	0.79	1.25	2.04	0.78	2.97	3.75	0.79	1.14	1.93
BH	2 X 2 5/8	0.81	3.50	4.32	0.83	1.18	2.01	0.81	2.55	3.36	0.83	1.07	1.89
BB	2 X 3 1/8	0.83	3.08	3.91	0.86	1.13	1.99	0.83	2.26	3.09	0.86	1.01	1.86
BJ	2 X 3 5/8	0.84	2.77	3.61	0.88	1.07	1.96	0.84	2.05	2.89	0.88	0.95	1.83
BC	2 X 4 1/8	0.85	2.52	3.37	0.90	1.03	1.93	0.85	1.88	2.73	0.89	0.91	1.80
BD	2 X 4 5/8	0.84	2.33	3.17	0.91	0.99	1.90	0.84	1.75	2.59	0.90	0.87	1.77
BE	2 X 5 1/8	0.84	2.17	3.01	0.92	0.95	1.87	0.84	1.64	2.48	0.91	0.83	1.74
BF	2 X 5 5/8	0.83	2.03	2.86	0.93	0.91	1.84	0.83	1.55	2.38	0.91	0.80	1.71
CH	2 1/2 X 2 5/8	0.52	2.70	3.22	0.53	0.78	1.31	0.52	1.97	2.49	0.53	0.71	1.24
CB	2 1/2 X 3 1/8	0.54	2.39	2.93	0.55	0.75	1.30	0.54	1.76	2.29	0.55	0.68	1.23
CJ	2 1/2 X 3 5/8	0.55	2.16	2.71	0.58	0.72	1.30	0.55	1.60	2.15	0.57	0.65	1.23
CC	2 1/2 X 4 1/8	0.56	1.98	2.54	0.59	0.70	1.29	0.56	1.48	2.04	0.59	0.63	1.22
CD	2 1/2 X 4 5/8	0.57	1.72	2.29	0.62	0.65	1.27	0.57	1.31	1.88	0.62	0.58	1.20
CD	2 1/2 X 5 1/8	0.57	1.72	2.29	0.62	0.65	1.27	0.57	1.31	1.88	0.62	0.58	1.20
CF	2 1/2 X 5 5/8	0.57	1.62	2.19	0.63	0.63	1.26	0.57	1.24	1.81	0.62	0.56	1.19
DB	3 X 3 1/8	0.37	1.94	2.31	0.39	0.53	0.92	0.37	1.42	1.80	0.38	0.49	0.88
DJ	3 X 3 5/8	0.39	1.76	2.14	0.40	0.52	0.92	0.39	1.30	1.69	0.40	0.47	0.88
DC	3 X 4 1/8	0.40	1.62	2.02	0.42	0.50	0.92	0.40	1.21	1.61	0.42	0.46	0.88
DC	3 X 4 5/8	0.40	1.62	2.02	0.42	0.50	0.92	0.40	1.21	1.61	0.42	0.46	0.88
DE	3 X 5 1/8	0.41	1.42	1.83	0.45	0.47	0.92	0.41	1.08	1.49	0.44	0.43	0.88
DF	3 X 5 5/8	0.41	1.34	1.76	0.46	0.46	0.92	0.41	1.03	1.44	0.45	0.42	0.87
DP	3 X 5 7/8	0.41	1.31	1.72	0.46	0.46	0.92	0.41	1.01	1.42	0.46	0.41	0.87
DG	3 X 8 5/8	0.40	1.05	1.45	0.50	0.39	0.89	0.40	0.83	1.23	0.48	0.36	0.84
FC	3 1/2 X 4 1/8	0.30	1.36	1.65	0.31	0.38	0.69	0.30	1.02	1.31	0.31	0.35	0.66
FD	3 1/2 X 4 5/8	0.30	1.27	1.57	0.32	0.37	0.69	0.30	0.96	1.26	0.32	0.34	0.66
FE	3 1/2 X 5 1/8	0.31	1.20	1.51	0.34	0.36	0.70	0.31	0.91	1.22	0.33	0.33	0.67
FF	3 1/2 X 5 5/8	0.31	1.14	1.45	0.35	0.35	0.70	0.31	0.87	1.19	0.34	0.33	0.67
FP	3 1/2 X 5 7/8	0.32	1.11	1.43	0.35	0.35	0.70	0.32	0.86	1.17	0.35	0.32	0.67
FG	3 1/2 X 8 5/8	0.32	0.91	1.22	0.39	0.31	0.70	0.32	0.72	1.04	0.38	0.28	0.66

Thermal Resistance Chart °C/W Snap-in Aluminum Electrolytic Capacitors

		Free Convection			200 lfm Airflow			500 lfm Airflow			1000 lfm Airflow		
Case Code	Case Size DxL(mm)	core to case	case to air	total	core to case	case to air	total	core to case	case to air	total	core to case	case to air	total
H01	22 x 25	7.92	22.46	30.38	7.90	13.05	20.96	7.89	8.31	16.20	7.87	5.78	13.64
H02	22 x 30	8.13	20.02	28.15	8.11	11.75	19.87	8.09	7.58	15.67	8.06	5.34	13.41
H03	22 x 35	8.33	18.15	26.48	8.31	10.78	19.08	8.28	7.05	15.32	8.24	5.04	13.28
H04	22 x 40	8.51	16.69	25.20	8.48	10.03	18.51	8.44	6.65	15.09	8.39	4.83	13.22
H05	22 x 50	8.83	14.56	23.39	8.79	8.97	17.75	8.73	6.12	14.85	8.66	4.56	13.22
J01	25 x 25	6.11	18.99	25.10	6.10	11.04	17.14	6.08	7.03	13.11	6.06	4.89	10.95
J02	25 x 30	6.32	17.01	23.33	6.30	9.99	16.29	6.28	6.44	12.72	6.25	4.54	10.79
J03	25 x 35	6.52	15.49	22.00	6.49	9.20	15.69	6.46	6.01	12.47	6.42	4.30	10.72
J04	25 x 40	6.70	14.29	20.99	6.67	8.59	15.26	6.63	5.70	12.32	6.58	4.13	10.71
J45	25 x 45	6.87	13.32	20.19	6.83	8.11	14.94	6.78	5.46	12.24	6.72	4.02	10.73
J05	25 x 50	7.03	12.54	19.57	6.98	7.73	14.71	6.92	5.27	12.20	6.85	3.93	10.78
K01	30 x 25	4.28	14.84	19.12	4.26	8.63	12.89	4.25	5.50	9.74	4.22	3.82	8.04
K02	30 x 30	4.46	13.40	17.86	4.44	7.87	12.31	4.41	5.08	9.49	4.38	3.58	7.96
K03	30 x 35	4.63	12.27	16.91	4.61	7.29	11.90	4.57	4.77	9.34	4.53	3.41	7.94
K04	30 x 40	4.80	11.38	16.18	4.77	6.84	11.61	4.73	4.54	9.26	4.67	3.29	7.96
K45	30 x 45	4.96	10.66	15.62	4.92	6.49	11.41	4.87	4.37	9.23	4.80	3.21	8.01
K05	30 x 50	5.12	10.07	15.19	5.07	6.21	11.28	5.00	4.23	9.24	4.92	3.15	8.07
A01	35 x 25	3.19	11.98	15.18	3.18	6.97	10.15	3.16	4.44	7.60	3.14	3.09	6.22
A02	35 x 30	3.35	10.89	14.24	3.33	6.40	9.73	3.31	4.13	7.43	3.28	2.91	6.18
A03	35 x 35	3.51	10.03	13.53	3.48	5.96	9.44	3.45	3.89	7.34	3.40	2.78	6.18
A04	35 x 40	3.66	9.34	13.00	3.62	5.62	9.24	3.58	3.72	7.30	3.52	2.69	6.22
A45	35 x 45	3.80	8.78	12.58	3.76	5.35	9.10	3.70	3.59	7.29	3.64	2.63	6.27
A05	35 x 50	3.94	8.32	12.26	3.89	5.13	9.02	3.82	3.49	7.31	3.74	2.59	6.33
A06	35 x 63	4.26	7.46	11.72	4.19	4.75	8.94	4.09	3.34	7.43	3.98	2.54	6.53
A08	35 x 80	4.63	6.76	11.39	4.52	4.48	9.00	4.38	3.26	7.64	4.23	2.54	6.78
A10	35 x 105	5.03	6.19	11.21	4.87	4.30	9.17	4.69	3.24	7.93	4.49	2.59	7.08
N04	40 x 40	2.90	7.84	10.74	2.87	4.71	7.58	2.82	3.12	5.94	2.77	2.25	5.02
N05	40 x 50	3.15	7.03	10.18	3.10	4.33	7.43	3.04	2.94	5.98	2.96	2.18	5.14
N06	40 x 63	3.45	6.34	9.79	3.37	4.03	7.41	3.28	2.83	6.11	3.17	2.14	5.31
N08	40 x 80	3.79	5.78	9.57	3.68	3.83	7.50	3.54	2.77	6.31	3.39	2.15	5.54
N10	40 x 105	4.18	5.33	9.51	4.02	3.70	7.71	3.83	2.77	6.60	3.63	2.19	5.83
B05	50 x 50	2.20	5.25	7.45	2.15	3.23	5.38	2.09	2.19	4.27	2.01	1.61	3.62
B06	50 x 63	2.44	4.79	7.23	2.37	3.04	5.40	2.27	2.11	4.39	2.17	1.59	3.76
B08	50 x 80	2.72	4.41	7.14	2.61	2.90	5.52	2.48	2.08	4.56	2.34	1.60	3.94
B09	50 x 92	2.90	4.24	7.14	2.76	2.86	5.62	2.60	2.09	4.69	2.44	1.61	4.06
B10	50 x 105	3.07	4.12	7.18	2.90	2.83	5.74	2.72	2.10	4.81	2.53	1.63	4.17

PROCESS CONSIDERATIONS

SOLDERING

Preheat

Don't exceed the maximum storage temperature while preheating the capacitors. If this cannot be avoided, contact the supplier first.

Temperature and Duration

Strictly adhere to soldering conditions for temperature, duration and minimum distance of solder from body. Don't contact insulating sleeve or other plastic parts with a soldering iron or molten solder. Reflow solder only SMT types, and then only one reflow cycle. Contact the supplier if more than one reflow is necessary.

Care after Soldering

Do not exert any mechanical force like bending, straightening, twisting or tilting of capacitors after soldering into a printed circuit board.

Handling Assembled Devices

During transport and handling of assembled devices do not misuse capacitors as a handle. Ensure that capacitors are protected from physical damage during mounting of printed circuit boards into assemblies or during stacking.

Halogenated-Solvent Cleaning

Halogenated hydrocarbon solvents (CFC) are ozone depleting chemicals harmful to the environment. Such solvents can penetrate the capacitors' seals and cause corrosion and failure when voltage is applied, and so use them to clean aluminum electrolytic capacitors only to the limited conditions given by the component supplier and then only as a last resort. Solvent-proof miniature capacitors and capacitors with epoxy endseals are available for limited use with halogenated solvents.

Aqueous Cleaning

Water with a mild detergent may be used to clean aluminum electrolytic capacitors. However, immediately dry the capacitors in hot air at about 85 °C for 5 or more minutes but not hotter than the capacitors' maximum storage temperature. Water can become trapped beneath the sleeve which may not be dispelled by evaporation at room temperature. Water can be trapped under the sleeve and cause hydration and discoloration of the aluminum cases; although this does not affect capacitor operation.

Alcohol Cleaning

Alcohol solvents like isopropanol, methanol, ethanol and propanol have no harmful affects on aluminum electrolytic capacitors. While they are fine for cleaning, they are not very effective in removal of commercial soldering fluxes.

Cleaning Precautions

The capacitor's insulating sleeve may re-shrink or crack if rapidly heated to above 100 °C just after cleaning. If the solder flux contains chlorine as many active flux types do, frequently regenerate or replace the cleaning solvent to avoid damaging the capacitors. Cleaning solvents may swell the insulating sleeves and affect the legibility of marking if applied too long or with too high mechanical forces or temperatures.

Potting and Gluing

Be certain that varnishing, coating, lacquering, embedding and gluing near the capacitors' seals are halogen free. And be sure all constituent parts including base material, thinners, binders, reacting agents, propellants and additives are halogen free. If the printed circuit board has been cleaned with halogenated solvent, be sure it's fully dry before installation of capacitors. When gluing, don't apply glue to the full capacitor circumference, and don't cover the capacitors' pressure-relief vent with potting or glue.

Fumigation Warning

International shipments of electronic equipment are often in wooden crates, and these crates may be fumigated with methyl bromide gas during shipment to control insect infestation. Also, some factories such as flourmills are routinely fumigated with this gas. Methyl bromide can penetrate cardboard boxes, vinyl bags and other packaging materials used to protect the equipment. Methyl bromide can also penetrate the seals of aluminum electrolytic capacitors; cause corrosion and cause open-circuit capacitor failure after the equipment is put into service.

Beginning in 2005 methyl bromide use has been limited to applications with EPA Critical Use Exemptions for specific agricultural and food-processing use.

To protect aluminum electrolytic capacitors against such failures use capacitors proven to be able to withstand fumigation or individually sealed to prevent penetration of the methyl bromide gas. Screw terminal capacitors with rubber vent plugs are the most susceptible type.

MOUNTING

Mounting Position

Aluminum electrolytic capacitors have longer operating lives at lower ambient temperatures; so, put the capacitors at the coolest place on the board. Ensure that aluminum electrolytic capacitors are away from hot components like power resistors, power transistors or diodes and transformers. Adequately space components apart for cooling air to circulate. Ensure that aluminum electrolytic capacitors are away from hot components like power resistors, power transistors or diodes and transformers. Adequately space components apart for cooling air to circulate. This is especially important when high ripple current or charge/discharge loads are applied.

Mount screw-terminal capacitors upright with terminals up or horizontally with pressure-relief vent plug at the 12-O'clock position; so, the least amount of electrolyte will be expelled if the vent operates. Do not mount upside down with terminals down as this may reduce the operating life and could impair the operation of the pressure-relief vent.

Place the capacitors so that a person working on the equipment would be protected from the hot vapor in the event that a vent was to operate.

Horizontal Mounting

One maker of high voltage screw terminal aluminum electrolytic capacitors reports that if mounted horizontally, the positive terminal should be above the negative terminal to avoid corrosion. This is not needed with Cornell Dubilier capacitors, but if you advocate better safe than sorry, you can mount the capacitor with the vent plug at the 11-O'clock position, so the positive terminal would be higher.

For high-ripple-current applications of screw terminal aluminum electrolytic capacitors with extended paper, horizontal moun-

ting shortens the lifetime. With heating from ripple current the electrolyte in such capacitors may bleed from the winding, and puddle along the side of the can where there is no paper to wick it back into the winding. If the ripple current is low (less than half of rated 85 °C current), this is not an issue. But if the ripple current is high, the effect is accelerated due both to the increasing temperature driving the electrolyte out faster and to the drying of the wet paper where it is crushed into the can bottom. The drying of the paper can thermally insulate the element causing it to get hotter and the can bottom to get cooler. This can actually turn into a thermal runaway condition that can greatly reduce the capacitor lifetime, sometimes by as much as 90%.

The possible solutions are 1) to mount such capacitors upright, 2) use Thermal Pak construction with extended cathode foil, 3) use rilled construction with the element secured by dimples in the can wall, or use potted construction where the element is anchored with pitch. If the capacitor is upright, the electrolyte is able to readily wick back into the winding, and the thermal contact and ESR do not degrade significantly. Thermal runaway does not occur, and the expected lifetime is achieved.

If a Thermal Pak extended-cathode capacitor is mounted horizontally, the thermal insulation does not occur because the thermal contact never degrades. However, the lifetime may still be somewhat shortened because of electrolyte loss. Life reduction may be more than 10% with rated 85 °C ripple. Because the thermal contact does not degrade, there is no thermal runaway.

If a potted construction capacitor is mounted horizontally, increased heating does not occur because the electrolyte does not readily escape the winding, and the thermal contact never degrades. Potted construction has limited availability because of environmental issues and is currently not available in Cornell Dubilier capacitors.

Position of the Pressure-Relief Vent

Aluminum electrolytic capacitors with liquid electrolyte have pressure-relief vents. The vents are scored lines or patterns on the end or side of the cans or rubber plugs in the molded tops. Vents are designed to rupture, release gas and electrolyte vapor, and prevent possible explosion from pressure build up during capacitor abuse, e.g. overvoltage, reverse voltage or application of AC voltage.

Provide adequate clearance for proper operation of the pressure-relief vent. The following distances are a guide.

Nominal Case Diameter	Space around pressure relief device
< 16 mm	> 2 mm
> 16 mm to < 40 mm	> 3 mm
> 40 mm	> 5 mm

Mount the capacitors with the vents up to reduce the amount of electrolyte expelled if a vent operates.

Polarity indication

Aluminum electrolytic capacitors are normally polarized and

require correct-polarity installation in the circuitry. To ensure correct mounting and identification of the polarity, put a clear + and/or – on the board layout marking. If the circuit voltage can reverse polarity or is unknown, consider using non-polar capacitors. Disadvantages are that non-polar capacitors are larger and more expensive.

Printed-Circuit Board Precautions

Avoid positioning holes in places where parts of a capacitor could be on the other side and be touched by molten solder. Because the can and sometimes extra terminals of an aluminum electrolytic capacitor have resistive connections to the negative terminal through the electrolyte, don't locate tracks or lands under upright capacitors, don't permit metal capacitor parts other than active terminals to contact conductive tracks or other components, and leave dummy pins voltage free.

Handling Terminals

Before handling a capacitor be sure it is sufficiently discharged. To avoid damaging the capacitor, don't bend rigid terminals, and be sure to clamp the terminals during cutting or bending to avoid excess stress on terminations, welds and capacitor seals. Don't use extra force to insert capacitors. If they cannot be inserted easily, correct the problem. Discard capacitors showing signs of mechanical damage.

Screw-Terminal Torque

Excess torque during tightening screws into terminals may affect the performance of the capacitor or damage the terminal. The following torque settings are recommended. Be certain that at least six screw threads are engaged.

Terminal	Recommended Torque
10–32, Low Post	25 in-lb, 2.8 N-m
10–32, High Post	25 in-lb, 2.8 N-m
¼–28, Low Post	50 in-lb, 5.6 N-m
¼–28, High Post	60 in-lb, 6.8 N-m
Small M5 Post	25 in-lb, 2.8 N-m
M5 Post	30 in-lb, 3.4 N-m
M6 Low Post	50 in-lb, 6.8 N-m
M6 High Post	60 in-lb, 6.8 N-m

Screw-Terminal Current Rating

For normal operation the maximum recommended continuous AC currents for screw terminals are as tabulated below.

Terminal	Maximum Current
10–32, Low Post	30 Aac
10–32, High Post	30 Aac
¼–28, Low Post	50 Aac
¼–28, High Post	50 Aac
Small M5 Post	30 Aac
M5 Post	35 Aac
M6 Low Post	50 Aac
M6 High Post	60 Aac

The ripple current ratings may exceed the currents listed here. Terminals can withstand continuous currents of more than double the maximum currents listed if you assure gas-tight connections to avoid formation of aluminum oxide. Use Belleville washers and a commercial electrical joint compound, e.g. Penetrox A, and tighten the terminals to the recommended torque for the washers.

Mounting-Stud Torque

Screw-terminal, capacitors are available with threaded mounting studs on the can bottoms, and nylon nuts are available for insulated mounting. The following torque settings are recommended.

Nylon Nut Thread	Recommended Torque
M8	25 in-lb, 2.8 N-m
M12	75 in-lb, 8.5 N-m

DISPOSAL OF CAPACITORS

Aluminum electrolytic capacitors with non-solid electrolyte principally include high-purity aluminum foils, capacitor paper, electrolyte, aluminum case, cover and sealing parts (phenolic, thermoplastic, rubber and phenolic board), insulating sleeve (polypropylene, polyester or polyvinylchloride) and, perhaps, safety-vent plugs made of synthetic rubber. If incinerated, be certain that the temperature is more than 1200 °C. Disposal is permitted in appropriate landfills.

Type SLPX 85 °C Snap-In Aluminum Electrolytic

Best Value 85 °C Snap-In Type



Type SLPX is the best value package snap-in series for 85 °C, 3000 h operation. This series is the most cost-effective choice for DC filtering and power supply applications where long life and high ripple capability are needed.

Highlights

- 3000 h ripple load life at rated voltage
- 85 °C rated
- Small case size with high capacitance
- Best for switching power supplies
- 22 mm to 35 mm diameter, 10 mm lead spacing
- Great value snap-in type
- High ripple current

Specifications

Temperature Range	-40 °C to +85 °C ≤ 250 Vdc -25 °C to +85 °C ≥ 315 Vdc				
Rated Voltage Range	10 Vdc to 450 Vdc				
Capacitance Range	68 µF to 82,000 µF				
Capacitance Tolerance	±20%				
Leakage Current	≤ 3 √CV µA at 5 minutes				
Ripple Current Multipliers	Ambient Temperature				
	20 °C - 45 °C	55 °C	65 °C - 75 °C	85 °C	
	1.58	1.41	1.22	1.00	
	Frequency				
	Voltage	60 Hz	120 Hz	1 kHz	10 kHz & Up
	10 - 100 Vdc	0.90	1.00	1.15	1.25
160 - 450 Vdc	0.80	1.00	1.15	1.47	
To apply multipliers, see ratings tables for ripple current values					
Low Temperature Characteristics	Impedance ratio: Z _{-20°C} /Z _{+25°C} ≤ 10 (10 Vdc) ≤ 8 (16–50 Vdc) ≤ 4 (63–100 Vdc) ≤ 3 (150–450 Vdc)				
Endurance Life	3,000 h @ full load @ 85 °C Δ Capacitance ±20% ESR ≤200% of limit DCL 100 % of limit				
Shelf Life	1,000 h @ 85 °C Δ Capacitance ±15% ESR ≤150% of limit DCL 100 % of limit				
Vibration	10 Hz to 55 Hz 0.06” and 10g max 2 h in each plane				
RoHS Compliant					

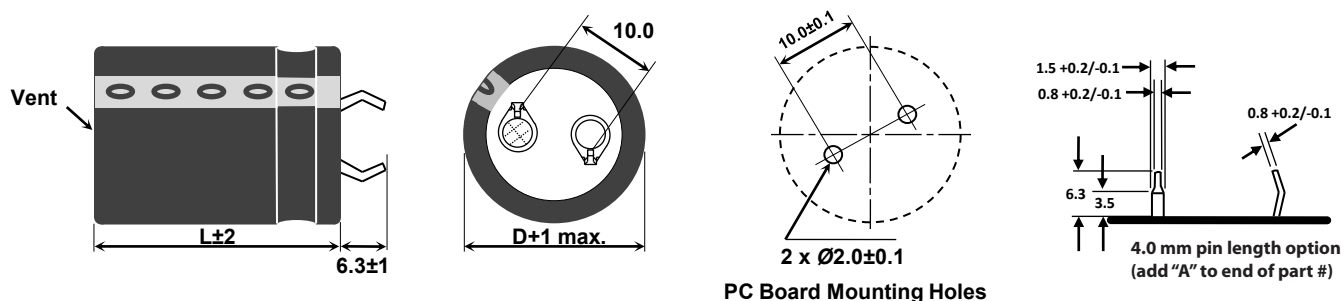
Type SLPX 85 °C Snap-In Aluminum Electrolytic

Best Value 85 °C Snap-In Type Part Numbering System

SLPX	562	M	025	A1	P	3	A
Type	Cap	Tolerance	Voltage	Case Code	Polarity	Insulating Sleeve	Pin Style
SLPX	821 = 820 μ F 332 = 3300 μ F 103 = 10,000 μ F	M = $\pm$ 20%	025 = 25 Vdc 250 = 250 Vdc		P = Polarized	3 = PVC	Blank = 2 pins snap-in 6.3 mm L A = 2 pins snap-in 4.0 mm L

Diameter		Length					
		mm (in)					
		25	30	35	40	45	50
		(1.00)	(1.18)	(1.38)	(1.57)	(1.77)	(2.00)
mm	(in)						
22	(0.87)	A1	A3	A5	A7	A4	A9
25	(1.00)	C1	C3	C5	C7	C4	C9
30	(1.18)	E1	E3	E5	E7	E4	E9
35	(1.38)	H1	H3	H5	H7	H4	H9

Outline Drawing



PC Board Mounting Holes

Ratings

Cap (μ F)	3000 h @ 85 °C Catalog Part Number	Max 25 °C ESR (Ω) 120 Hz 20kHz	Max 85 °C Ripple (A _{rms}) 120 Hz 20kHz	Nominal Size (DxL) (mm)
10 Vdc (13 Vdc Surge)				
12000	SLPX123M010A1P3	0.061	0.046	2.41 3.01 22 x 25
15000	SLPX153M010A3P3	0.049	0.037	2.88 3.60 22 x 30
15000	SLPX153M010C1P3	0.049	0.037	2.88 3.60 25 x 25
18000	SLPX183M010A5P3	0.041	0.031	3.22 4.03 22 x 35
18000	SLPX183M010C3P3	0.041	0.031	3.08 3.85 25 x 30
22000	SLPX223M010A7P3	0.033	0.025	3.79 4.74 22 x 40
22000	SLPX223M010C3P3	0.033	0.025	3.66 4.58 25 x 30
22000	SLPX223M010E1P3	0.033	0.025	3.53 4.41 30 x 25
27000	SLPX273M010A4P3	0.027	0.020	4.04 5.05 22 x 45
27000	SLPX273M010C5P3	0.027	0.020	4.04 5.05 25 x 35
27000	SLPX273M010E3P3	0.027	0.020	3.99 4.99 30 x 30
33000	SLPX333M010A9P3	0.022	0.017	4.58 5.73 22 x 50
33000	SLPX333M010C7P3	0.022	0.017	4.56 5.70 25 x 40
33000	SLPX333M010E3P3	0.022	0.017	4.58 5.73 30 x 30
39000	SLPX393M010C4P3	0.019	0.014	5.29 6.61 25 x 45
39000	SLPX393M010E5P3	0.019	0.014	5.21 6.51 30 x 35
39000	SLPX393M010H3P3	0.019	0.014	5.50 6.88 35 x 30
47000	SLPX473M010C9P3	0.016	0.012	5.78 7.23 25 x 50
47000	SLPX473M010E7P3	0.016	0.012	5.78 7.23 30 x 40
47000	SLPX473M010H5P3	0.016	0.012	5.55 6.94 35 x 35
56000	SLPX563M010E4P3	0.013	0.010	6.59 8.24 30 x 45
56000	SLPX563M010H5P3	0.013	0.010	6.40 8.00 35 x 35

Additional Voltages and Sizes available at www.cde.com/catalogs/SLPX.pdf

Cap (μ F)	3000 h @ 85 °C Catalog Part Number	Max 25 °C ESR (Ω) 120 Hz 20kHz	Max 85 °C Ripple (A _{rms}) 120 Hz 20kHz	Nominal Size (DxL) (mm)
10 Vdc (13 Vdc Surge)				
68000	SLPX683M010E9P3	0.011	0.008	7.50 9.38 30 x 50
68000	SLPX683M010H7P3	0.011	0.008	7.48 9.35 35 x 40
82000	SLPX823M010H9P3	0.009	0.007	8.50 10.63 35 x 50
16 Vdc (20 Vdc Surge)				
8200	SLPX822M016A1P3	0.081	0.061	2.56 3.20 22 x 25
10000	SLPX103M016A3P3	0.066	0.050	2.89 3.61 22 x 30
12000	SLPX123M016A3P3	0.055	0.041	3.13 3.91 22 x 30
12000	SLPX123M016C1P3	0.055	0.041	3.01 3.76 25 x 25
15000	SLPX153M016A5P3	0.044	0.033	3.69 4.61 22 x 35
15000	SLPX153M016C3P3	0.044	0.033	3.64 4.55 25 x 30
15000	SLPX153M016E1P3	0.044	0.033	3.73 4.66 30 x 25
18000	SLPX183M016A7P3	0.037	0.028	3.98 4.98 22 x 40
18000	SLPX183M016C5P3	0.037	0.028	3.98 4.98 25 x 35
18000	SLPX183M016E3P3	0.037	0.028	3.88 4.85 30 x 30
22000	SLPX223M016A9P3	0.030	0.023	4.52 5.65 22 x 50
22000	SLPX223M016C7P3	0.030	0.023	4.44 5.55 25 x 40
22000	SLPX223M016E3P3	0.030	0.023	4.38 5.48 30 x 30
27000	SLPX273M016C4P3	0.025	0.019	4.98 6.23 25 x 45
27000	SLPX273M016E5P3	0.025	0.019	4.95 6.19 30 x 35
27000	SLPX273M016H3P3	0.025	0.019	4.82 6.03 35 x 30
33000	SLPX333M016C9P3	0.020	0.015	5.49 6.86 25 x 50
33000	SLPX333M016E7P3	0.020	0.015	5.60 7.00 30 x 40

Type SLPX 85 °C Snap-In Aluminum Electrolytic

Best Value 85 °C Snap-In Type

Additional Voltages and Sizes available at www.cde.com/catalogs/SLPX.pdf

Cap	3000 h @ 85 °C	Max 25 °C ESR		Max 85 °C Ripple		Nominal
Cap	Catalog	(Ω)		(A _{rms})		Size (DxL)
(μF)	Part Number	120 Hz	20kHz	120 Hz	20kHz	(mm)
16 Vdc (20 Vdc Surge)						
33000	SLPX333M016H3P3	0.020	0.015	5.46	6.83	35 x 30
39000	SLPX393M016E4P3	0.017	0.013	6.21	7.76	30 x 45
39000	SLPX393M016H5P3	0.017	0.013	6.12	7.65	35 x 35
47000	SLPX473M016E9P3	0.014	0.011	6.93	8.66	30 x 50
47000	SLPX473M016H7P3	0.014	0.011	6.89	8.61	35 x 40
56000	SLPX563M016H4P3	0.012	0.009	7.69	9.61	35 x 45
25 Vdc (32 Vdc Surge)						
5600	SLPX562M025A1P3	0.107	0.080	2.31	2.89	22 x 25
6800	SLPX682M025A3P3	0.088	0.066	2.56	3.20	22 x 30
8200	SLPX822M025A5P3	0.073	0.055	2.86	3.58	22 x 35
8200	SLPX822M025C1P3	0.073	0.055	2.78	3.48	25 x 25
10000	SLPX103M025A5P3	0.060	0.045	3.31	4.14	22 x 35
10000	SLPX103M025C3P3	0.060	0.045	3.16	3.95	25 x 30
10000	SLPX103M025E1P3	0.060	0.045	3.28	4.10	30 x 25
12000	SLPX123M025A7P3	0.050	0.038	3.77	4.71	22 x 40
12000	SLPX123M025C5P3	0.050	0.038	3.63	4.54	25 x 35
12000	SLPX123M025E1P3	0.050	0.038	3.80	4.75	30 x 25
15000	SLPX153M025A9P3	0.040	0.030	4.21	5.26	22 x 50
15000	SLPX153M025C7P3	0.040	0.030	4.10	5.13	25 x 40
15000	SLPX153M025E3P3	0.040	0.030	4.00	5.00	30 x 30
18000	SLPX183M025C4P3	0.033	0.025	4.68	5.85	25 x 45
18000	SLPX183M025E5P3	0.033	0.025	4.66	5.83	30 x 35
18000	SLPX183M025H3P3	0.033	0.025	4.68	5.85	35 x 30
22000	SLPX223M025C9P3	0.027	0.020	5.29	6.61	25 x 50
22000	SLPX223M025E7P3	0.027	0.020	5.33	6.66	30 x 40
22000	SLPX223M025H5P3	0.027	0.020	5.26	6.58	35 x 35
27000	SLPX273M025E4P3	0.022	0.017	6.02	7.53	30 x 45
27000	SLPX273M025H7P3	0.022	0.017	6.02	7.53	35 x 40
33000	SLPX333M025E9P3	0.018	0.014	5.29	6.61	30 x 50
33000	SLPX333M025H4P3	0.018	0.014	6.75	8.44	35 x 45
39000	SLPX393M025H9P3	0.015	0.011	7.56	9.45	35 x 50
35 Vdc (44 Vdc Surge)						
3900	SLPX392M035A1P3	0.136	0.102	2.22	2.78	22 x 25
4700	SLPX472M035A3P3	0.113	0.085	2.46	3.08	22 x 30
4700	SLPX472M035C1P3	0.113	0.085	2.43	3.04	25 x 25
5600	SLPX562M035A3P3	0.095	0.071	2.61	3.26	22 x 30
5600	SLPX562M035A5P3	0.095	0.071	2.79	3.49	22 x 35
5600	SLPX562M035C3P3	0.095	0.071	2.75	3.44	25 x 30
6800	SLPX682M035A7P3	0.078	0.059	2.97	3.71	22 x 40
6800	SLPX682M035C3P3	0.078	0.059	2.89	3.61	25 x 30
6800	SLPX682M035E1P3	0.078	0.059	3.09	3.86	30 x 25
8200	SLPX822M035A4P3	0.065	0.049	3.47	4.34	22 x 45
8200	SLPX822M035C5P3	0.065	0.049	3.33	4.16	25 x 35
8200	SLPX822M035E3P3	0.065	0.049	3.29	4.11	30 x 30
10000	SLPX103M035A9P3	0.053	0.040	3.75	4.69	22 x 50
35 Vdc (44 Vdc Surge)						
10000	SLPX103M035C7P3	0.053	0.040	3.65	4.56	25 x 40
10000	SLPX103M035E3P3	0.053	0.040	3.61	4.51	30 x 30
12000	SLPX123M035C4P3	0.044	0.033	4.15	5.19	25 x 45
12000	SLPX123M035E5P3	0.044	0.033	4.14	5.18	30 x 35
12000	SLPX123M035H3P3	0.044	0.033	4.27	5.34	35 x 30
15000	SLPX153M035C9P3	0.035	0.026	4.77	5.96	25 x 50
15000	SLPX153M035E7P3	0.035	0.026	4.80	6.00	30 x 40
15000	SLPX153M035H5P3	0.035	0.026	4.95	6.19	35 x 35
18000	SLPX183M035E4P3	0.029	0.022	5.30	6.63	30 x 45
18000	SLPX183M035H7P3	0.029	0.022	5.71	7.14	35 x 40
22000	SLPX223M035H4P3	0.024	0.018	6.38	7.98	35 x 45
27000	SLPX273M035H9P3	0.020	0.015	6.90	8.63	35 x 50
50 Vdc (63 Vdc Surge)						
2200	SLPX222M050A1P3	0.211	0.158	1.93	2.41	22 x 25
2700	SLPX272M050A3P3	0.172	0.129	2.21	2.76	22 x 30
3300	SLPX332M050A3P3	0.141	0.106	2.41	3.01	22 x 30
3300	SLPX332M050C1P3	0.141	0.106	2.38	2.98	25 x 25
3900	SLPX392M050A5P3	0.119	0.089	2.72	3.40	22 x 35
3900	SLPX392M050C3P3	0.119	0.089	2.68	3.35	25 x 30
4700	SLPX472M050A7P3	0.099	0.074	3.02	3.78	22 x 40
4700	SLPX472M050C3P3	0.099	0.074	3.07	3.84	25 x 30
4700	SLPX472M050E1P3	0.099	0.074	3.01	3.76	30 x 25
5600	SLPX562M050A7P3	0.083	0.062	3.26	4.08	22 x 40
5600	SLPX562M050A4P3	0.083	0.062	3.43	4.29	22 x 45
5600	SLPX562M050C5P3	0.083	0.062	3.47	4.34	25 x 35
5600	SLPX562M050E3P3	0.083	0.062	3.43	4.29	30 x 30
6800	SLPX682M050A9P3	0.068	0.051	3.94	4.93	22 x 50
6800	SLPX682M050C7P3	0.068	0.051	3.87	4.84	25 x 40
6800	SLPX682M050E5P3	0.068	0.051	3.93	4.91	30 x 35
8200	SLPX822M050C4P3	0.057	0.043	4.44	5.55	25 x 45
8200	SLPX822M050E5P3	0.057	0.043	4.47	5.59	30 x 35
8200	SLPX822M050H3P3	0.057	0.043	4.41	5.51	35 x 30
10000	SLPX103M050E7P3	0.046	0.035	5.08	6.35	30 x 40
10000	SLPX103M050H5P3	0.046	0.035	4.92	6.15	35 x 35
12000	SLPX123M050E9P3	0.039	0.029	5.72	7.15	30 x 50
12000	SLPX123M050H7P3	0.039	0.029	5.69	7.11	35 x 40
15000	SLPX153M050H4P3	0.031	0.023	6.56	8.20	35 x 45
18000	SLPX183M050H9P3	0.026	0.020	7.14	8.93	35 x 50
22000	SLPX223M050H9P3	0.021	0.016	7.89	9.86	35 x 50
63 Vdc (79 Vdc Surge)						
1800	SLPX182M063A1P3	0.221	0.166	1.90	2.38	22 x 25
2200	SLPX222M063A3P3	0.181	0.136	2.35	2.94	22 x 30
2200	SLPX222M063C1P3	0.181	0.136	2.30	2.88	25 x 25
2700	SLPX272M063A5P3	0.147	0.110	2.50	3.13	22 x 35
2700	SLPX272M063C3P3	0.147	0.110	2.52	3.15	25 x 30

Type SLPX 85 °C Snap-In Aluminum Electrolytic

Best Value 85 °C Snap-In Type

Additional Voltages and Sizes available at www.cde.com/catalogs/SLPX.pdf

Cap	3000 h @ 85 °C	Max 25 °C ESR		Max 85 °C Ripple		Nominal	Cap	3000 h @ 85 °C	Max 25 °C ESR		Max 85 °C Ripple		Nominal
Cap (µF)	Catalog Part Number	(Ω)		(A _{rms})		Size (DxL) (mm)	Cap (µF)	Catalog Part Number	(Ω)		(A _{rms})		Size (DxL) (mm)
63 Vdc (79 Vdc Surge)							80 Vdc (100 Vdc Surge)						
3300	SLPX332M063A7P3	0.121	0.091	2.72	3.40	22 x 40	8200	SLPX822M080H4P3	0.040	0.030	5.89	7.36	35 x 45
3300	SLPX332M063C3P3	0.121	0.091	2.74	3.43	25 x 30	10000	SLPX103M080E9P3	0.033	0.025	6.63	8.29	35 x 50
3300	SLPX332M063E1P3	0.121	0.091	2.78	3.48	30 x 25	100 Vdc (125 Vdc Surge)						
3900	SLPX392M063A4P3	0.102	0.077	3.09	3.86	22 x 45	820	SLPX821M100A1P3	0.324	0.243	1.86	2.33	22 x 25
3900	SLPX392M063C5P3	0.102	0.077	3.13	3.91	25 x 35	1000	SLPX102M100A3P3	0.265	0.199	2.02	2.53	22 x 30
3900	SLPX392M063E3P3	0.102	0.077	3.09	3.86	30 x 30	1200	SLPX122M100A3P3	0.221	0.166	2.12	2.65	22 x 30
4700	SLPX472M063A9P3	0.085	0.064	3.69	4.61	22 x 50	1200	SLPX122M100C1P3	0.221	0.166	2.11	2.64	25 x 25
4700	SLPX472M063C7P3	0.085	0.064	3.59	4.49	25 x 40	1500	SLPX152M100A5P3	0.177	0.133	2.45	3.06	22 x 35
4700	SLPX472M063E3P3	0.085	0.064	3.54	4.43	30 x 30	1500	SLPX152M100C3P3	0.177	0.133	2.47	3.09	25 x 30
5600	SLPX562M063C4P3	0.071	0.053	4.01	5.01	25 x 45	1800	SLPX182M100A7P3	0.147	0.110	2.77	3.46	22 x 40
5600	SLPX562M063E5P3	0.071	0.053	4.00	5.00	30 x 35	1800	SLPX182M100C5P3	0.147	0.110	2.81	3.51	25 x 35
5600	SLPX562M063H3P3	0.071	0.053	3.75	4.69	35 x 30	1800	SLPX182M100E1P3	0.147	0.110	2.65	3.31	30 x 25
6800	SLPX682M063C9P3	0.059	0.044	4.52	5.65	25 x 50	2200	SLPX222M100A4P3	0.121	0.091	3.15	3.94	22 x 45
6800	SLPX682M063E7P3	0.059	0.044	4.55	5.69	30 x 40	2200	SLPX222M100C7P3	0.121	0.091	3.21	4.01	25 x 40
6800	SLPX682M063H3P3	0.059	0.044	4.44	5.55	35 x 30	2200	SLPX222M100E3P3	0.121	0.091	3.17	3.96	30 x 30
8200	SLPX822M063E4P3	0.049	0.037	5.12	6.40	30 x 45	2700	SLPX272M100C4P3	0.098	0.074	3.66	4.58	25 x 45
8200	SLPX822M063H5P3	0.049	0.037	5.05	6.31	35 x 35	2700	SLPX272M100E5P3	0.098	0.074	3.65	4.56	30 x 35
10000	SLPX103M063E9P3	0.040	0.030	5.78	7.23	30 x 50	2700	SLPX272M100H3P3	0.098	0.074	3.77	4.71	35 x 30
10000	SLPX103M063H7P3	0.040	0.030	5.75	7.19	35 x 40	3300	SLPX332M100C9P3	0.080	0.060	4.15	5.19	25 x 50
12000	SLPX123M063E9P3	0.033	0.025	6.20	7.75	30 x 50	3300	SLPX332M100E7P3	0.080	0.060	4.18	5.23	30 x 40
12000	SLPX123M063H4P3	0.033	0.025	6.47	8.09	35 x 45	3300	SLPX332M100H5P3	0.080	0.060	4.07	5.09	35 x 35
12000	SLPX123M063H9P3	0.033	0.025	6.76	8.45	35 x 50	3900	SLPX392M100E4P3	0.068	0.051	4.67	5.84	30 x 45
80 Vdc (100 Vdc Surge)							3900	SLPX392M100H5P3	0.068	0.051	4.61	5.76	35 x 35
1200	SLPX122M080A1P3	0.276	0.207	1.77	2.21	22 x 25	4700	SLPX472M100H7P3	0.056	0.042	5.23	6.54	35 x 40
1500	SLPX152M080A3P3	0.221	0.166	2.01	2.51	22 x 30	4700	SLPX472M100E9P3	0.056	0.042	5.26	6.58	30 x 50
1800	SLPX182M080A3P3	0.184	0.138	2.11	2.64	22 x 30	5600	SLPX562M100H4P3	0.047	0.035	5.88	7.35	35 x 45
1800	SLPX182M080C1P3	0.184	0.138	2.26	2.83	25 x 25	6800	SLPX682M100H9P3	0.039	0.029	6.01	7.51	35 x 50
2200	SLPX222M080A7P3	0.151	0.113	2.53	3.16	22 x 40	160 Vdc (200 Vdc Surge)						
2200	SLPX222M080C3P3	0.151	0.113	2.53	3.16	25 x 30	390	SLPX391M160A1P3	0.510	0.383	1.63	2.40	22 x 25
2200	SLPX222M080E1P3	0.151	0.113	2.56	3.20	30 x 25	470	SLPX471M160A3P3	0.423	0.317	1.86	2.73	22 x 30
2700	SLPX272M080A4P3	0.123	0.092	2.93	3.66	22 x 45	470	SLPX471M160C1P3	0.423	0.317	1.86	2.73	25 x 25
2700	SLPX272M080C5P3	0.123	0.092	2.93	3.66	25 x 35	560	SLPX561M160A3P3	0.355	0.266	2.15	3.16	22 x 30
2700	SLPX272M080E3P3	0.123	0.092	2.91	3.64	30 x 30	560	SLPX561M160C3P3	0.355	0.266	2.15	3.16	25 x 30
3300	SLPX332M080A9P3	0.101	0.076	3.23	4.04	22 x 50	680	SLPX681M160A7P3	0.293	0.220	2.35	3.45	22 x 40
3300	SLPX332M080C7P3	0.101	0.076	3.29	4.11	25 x 40	680	SLPX681M160C3P3	0.293	0.220	2.33	3.43	25 x 30
3300	SLPX332M080E3P3	0.101	0.076	3.25	4.06	30 x 30	680	SLPX681M160E1P3	0.293	0.220	2.33	3.43	30 x 25
3900	SLPX392M080C4P3	0.085	0.064	3.62	4.53	25 x 45	820	SLPX821M160A4P3	0.243	0.182	2.68	3.94	22 x 45
3900	SLPX392M080E5P3	0.085	0.064	3.70	4.63	30 x 35	820	SLPX821M160C5P3	0.243	0.182	2.65	3.90	25 x 35
4700	SLPX472M080C9P3	0.071	0.053	4.28	5.35	25 x 50	820	SLPX821M160E3P3	0.243	0.182	2.64	3.88	30 x 30
4700	SLPX472M080E7P3	0.071	0.053	4.23	5.29	30 x 40	1000	SLPX102M160A9P3	0.199	0.149	3.02	4.44	22 x 50
4700	SLPX472M080H3P3	0.071	0.053	4.12	5.15	35 x 30	1000	SLPX102M160C7P3	0.199	0.149	3.00	4.41	25 x 40
5600	SLPX562M080E4P3	0.059	0.044	4.70	5.88	30 x 45	1000	SLPX102M160E3P3	0.199	0.149	2.96	4.35	30 x 30
5600	SLPX562M080H5P3	0.059	0.044	4.64	5.80	35 x 35	1200	SLPX122M160C4P3	0.166	0.125	3.43	5.04	25 x 45
6800	SLPX682M080E9P3	0.049	0.037	5.27	6.59	30 x 50	1200	SLPX122M160E5P3	0.166	0.125	3.41	5.01	30 x 35
6800	SLPX682M080H7P3	0.049	0.037	5.24	6.55	35 x 40	1200	SLPX122M160H3P3	0.166	0.125	3.40	5.00	35 x 30

Type SLPX 85 °C Snap-In Aluminum Electrolytic

Best Value 85 °C Snap-In Type

Additional Voltages and Sizes available at www.cde.com/catalogs/SLPX.pdf

Cap	3000 h @ 85 °C	Max 25 °C ESR		Max 85 °C Ripple		Nominal
Catalog		(Ω)		(A _{rms})		Size (DxL)
(µF)	Part Number	120 Hz	20kHz	120 Hz	20kHz	(mm)
160 Vdc (200 Vdc Surge)						
1500	SLPX152M160E7P3	0.133	0.100	3.96	5.82	30 x 40
1500	SLPX152M160H5P3	0.133	0.100	3.94	5.79	35 x 35
1800	SLPX182M160E4P3	0.111	0.083	4.31	6.34	30 x 45
1800	SLPX182M160H5P3	0.111	0.083	4.28	6.29	35 x 35
2200	SLPX222M160H7P3	0.090	0.068	4.96	7.29	35 x 40
2700	SLPX272M160H9P3	0.074	0.056	5.57	8.19	35 x 50
180 Vdc (225 Vdc Surge)						
330	SLPX331M180A1P3	0.603	0.452	1.49	2.19	22 x 25
390	SLPX391M180A1P3	0.510	0.383	1.84	2.70	22 x 25
470	SLPX471M180A3P3	0.423	0.317	1.91	2.81	22 x 30
470	SLPX471M180C1P3	0.423	0.317	2.08	3.06	25 x 25
560	SLPX561M180A5P3	0.355	0.266	2.25	3.31	22 x 35
560	SLPX561M180C1P3	0.355	0.266	2.25	3.31	25 x 25
680	SLPX681M180A5P3	0.293	0.220	2.48	3.65	22 x 35
680	SLPX681M180C3P3	0.293	0.220	2.50	3.68	25 x 30
680	SLPX681M180E1P3	0.293	0.220	2.46	3.62	30 x 25
820	SLPX821M180A7P3	0.243	0.182	2.86	4.20	22 x 40
820	SLPX821M180C5P3	0.243	0.182	2.75	4.04	25 x 35
820	SLPX821M180E1P3	0.243	0.182	2.69	3.95	30 x 25
1000	SLPX102M180C7P3	0.199	0.149	3.06	4.50	25 x 40
1000	SLPX102M180E3P3	0.199	0.149	3.10	4.56	30 x 30
1200	SLPX122M180C4P3	0.166	0.125	3.63	5.34	25 x 45
1200	SLPX122M180E5P3	0.166	0.125	3.55	5.22	30 x 35
1200	SLPX122M180H3P3	0.166	0.125	3.49	5.13	35 x 30
1500	SLPX152M180E7P3	0.133	0.100	4.10	6.03	30 x 40
1500	SLPX152M180H5P3	0.133	0.100	4.02	5.91	35 x 35
1800	SLPX182M180E4P3	0.111	0.083	4.55	6.69	30 x 45
1800	SLPX182M180H5P3	0.111	0.083	4.54	6.67	35 x 35
2200	SLPX222M180H7P3	0.090	0.068	4.83	6.04	35 x 40
2700	SLPX272M180H9P3	0.074	0.056	5.30	6.63	35 x 50
200 Vdc (250 Vdc Surge)						
270	SLPX271M200A1P3	0.737	0.553	1.37	2.01	22 x 25
330	SLPX331M200A3P3	0.603	0.452	1.63	2.40	22 x 30
330	SLPX331M200A1P3	0.603	0.452	1.51	2.22	22 x 25
390	SLPX391M200A3P3	0.510	0.383	1.73	2.54	22 x 30
390	SLPX391M200C1P3	0.510	0.383	1.71	2.51	25 x 25
470	SLPX471M200A3P3	0.423	0.317	1.97	2.90	22 x 30
470	SLPX471M200C3P3	0.423	0.317	1.95	2.87	25 x 30
560	SLPX561M200A7P3	0.355	0.266	2.18	3.20	22 x 40
560	SLPX561M200C3P3	0.355	0.266	2.15	3.16	25 x 30
560	SLPX561M200E1P3	0.355	0.266	2.15	3.16	30 x 25
680	SLPX681M200A4P3	0.293	0.220	2.48	3.65	22 x 45
680	SLPX681M200C5P3	0.293	0.220	2.48	3.65	25 x 35
680	SLPX681M200E3P3	0.293	0.220	2.48	3.65	30 x 30
820	SLPX821M200A9P3	0.243	0.182	2.81	4.13	22 x 50
200 Vdc (250 Vdc Surge)						
820	SLPX821M200C7P3	0.243	0.182	2.79	4.10	25 x 40
820	SLPX821M200E3P3	0.243	0.182	2.75	4.04	30 x 30
1000	SLPX102M200C4P3	0.199	0.149	3.28	4.82	25 x 45
1000	SLPX102M200E5P3	0.199	0.149	3.15	4.63	30 x 35
1000	SLPX102M200H3P3	0.199	0.149	3.25	4.78	35 x 30
1200	SLPX122M200C9P3	0.166	0.125	3.61	5.31	25 x 50
1200	SLPX122M200E7P3	0.166	0.125	3.61	5.31	30 x 40
1200	SLPX122M200E4P3	0.166	0.125	3.80	5.59	30 x 45
1200	SLPX122M200H5P3	0.166	0.125	3.57	5.25	35 x 35
1500	SLPX152M200E4P3	0.133	0.100	4.13	6.07	30 x 45
1500	SLPX152M200H5P3	0.133	0.100	3.85	5.66	35 x 35
1500	SLPX152M200H7P3	0.133	0.100	4.06	5.97	35 x 40
1500	SLPX152M200H4P3	0.133	0.100	4.26	6.26	35 x 45
1800	SLPX182M200H4P3	0.111	0.083	4.59	6.75	35 x 45
2200	SLPX222M200H9P3	0.090	0.068	5.25	7.72	35 x 50
220 Vdc (270 Vdc Surge)						
220	SLPX221M220A1P3	0.905	0.679	1.30	1.91	22 x 25
270	SLPX271M220A1P3	0.737	0.553	1.42	2.09	22 x 25
330	SLPX331M220A3P3	0.603	0.452	1.59	2.34	22 x 30
330	SLPX331M220C1P3	0.603	0.452	1.59	2.34	25 x 25
390	SLPX391M220A5P3	0.510	0.383	1.80	2.65	22 x 35
390	SLPX391M220C1P3	0.510	0.383	1.75	2.57	25 x 25
470	SLPX471M220A5P3	0.423	0.317	2.06	3.03	22 x 35
470	SLPX471M220C3P3	0.423	0.317	2.08	3.06	25 x 30
470	SLPX471M220E1P3	0.423	0.317	2.16	3.18	30 x 25
560	SLPX561M220A7P3	0.355	0.266	2.22	3.26	22 x 40
560	SLPX561M220C5P3	0.355	0.266	2.38	3.50	25 x 35
560	SLPX561M220E1P3	0.355	0.266	2.18	3.20	30 x 25
680	SLPX681M220A4P3	0.293	0.220	2.62	3.85	22 x 45
680	SLPX681M220C7P3	0.293	0.220	2.56	3.76	25 x 40
680	SLPX681M220E3P3	0.293	0.220	2.52	3.70	30 x 30
820	SLPX821M220C4P3	0.243	0.182	2.91	4.28	25 x 45
820	SLPX821M220E5P3	0.243	0.182	2.84	4.17	30 x 35
820	SLPX821M220H3P3	0.243	0.182	2.79	4.10	35 x 35
1000	SLPX102M220C9P3	0.199	0.149	3.53	5.19	25 x 50
1000	SLPX102M220E7P3	0.199	0.149	3.36	4.94	30 x 40
1000	SLPX102M220H3P3	0.199	0.149	3.29	4.84	35 x 30
1200	SLPX122M220E7P3	0.166	0.125	3.54	5.20	30 x 40
1200	SLPX122M220E4P3	0.166	0.125	3.72	5.47	30 x 45
1200	SLPX122M220H5P3	0.166	0.125	3.68	5.41	35 x 35
1500	SLPX152M220H7P3	0.133	0.100	4.10	5.13	35 x 40
1800	SLPX182M220H4P3	0.111	0.083	4.52	5.65	35 x 45
250 Vdc (300 Vdc Surge)						
220	SLPX221M250A1P3	0.905	0.679	1.24	1.82	22 x 25
270	SLPX271M250A3P3	0.737	0.553	1.50	2.21	22 x 30

CDE Cornell Dubilier • 1605 E. Rodney French Blvd. • New Bedford, MA 02744 • Phone: (508)996-8561 • Fax: (508)996-3830

Type SLPX 85 °C Snap-In Aluminum Electrolytic

Best Value 85 °C Snap-In Type

Additional Voltages and Sizes available at www.cde.com/catalogs/SLPX.pdf

Additional voltages and sizes available at www.cde.com/catalogs/SLPX.pdf													
Cap	3000 h @ 85 °C	Max 25 °C ESR		Max 85 °C Ripple		Nominal	Cap	3000 h @ 85 °C	Max 25 °C ESR		Max 85 °C Ripple		Nominal
Catalog		(Ω)		(A _{rms})		Size (DxL)	Catalog		(Ω)		(A _{rms})		Size (DxL)
(µF)	Part Number	120 Hz	20kHz	120 Hz	20kHz	(mm)	(µF)	Part Number	120 Hz	20kHz	120 Hz	20kHz	(mm)
250 Vdc (300 Vdc Surge)							315 Vdc (365 Vdc Surge)						
330	SLPX331M250A3P3	0.603	0.452	1.66	2.44	22 x 30	1000	SLPX102M315H9P3	0.199	0.149	3.57	4.46	35 x 50
330	SLPX331M250C1P3	0.603	0.452	1.61	2.37	25 x 25	350 Vdc (400 Vdc Surge)						
390	SLPX391M250A5P3	0.510	0.383	1.88	2.76	22 x 35	120	SLPX121M350A1P3	1.659	1.244	1.04	1.53	22 x 25
390	SLPX391M250C3P3	0.510	0.383	1.88	2.76	25 x 30	150	SLPX151M350A3P3	1.327	0.995	1.20	1.76	22 x 30
470	SLPX471M250A7P3	0.423	0.317	2.15	3.16	22 x 40	150	SLPX151M350C1P3	1.327	0.995	1.22	1.79	25 x 25
470	SLPX471M250C5P3	0.423	0.317	2.15	3.16	25 x 35	180	SLPX181M350A3P3	1.106	0.830	1.34	1.97	22 x 30
470	SLPX471M250E1P3	0.423	0.317	2.04	3.00	30 x 25	180	SLPX181M350C1P3	1.106	0.830	1.37	2.01	25 x 25
560	SLPX561M250A4P3	0.355	0.266	2.48	3.65	22 x 45	220	SLPX221M350A5P3	0.905	0.679	1.47	2.16	22 x 35
560	SLPX561M250C5P3	0.355	0.266	2.35	3.45	25 x 35	220	SLPX221M350C3P3	0.905	0.679	1.53	2.25	25 x 30
560	SLPX561M250E3P3	0.355	0.266	2.35	3.45	30 x 30	220	SLPX221M350E1P3	0.905	0.679	1.54	2.26	30 x 25
680	SLPX681M250C7P3	0.293	0.220	2.67	3.92	25 x 40	270	SLPX271M350A7P3	0.737	0.553	1.70	2.50	22 x 40
680	SLPX681M250E5P3	0.293	0.220	2.71	3.98	30 x 35	270	SLPX271M350C5P3	0.737	0.553	1.73	2.54	25 x 35
820	SLPX821M250C9P3	0.243	0.182	3.01	4.42	25 x 50	270	SLPX271M350E1P3	0.737	0.553	1.80	2.65	30 x 25
820	SLPX681M250E5P3	0.243	0.182	2.98	4.38	30 x 35	330	SLPX331M350A4P3	0.603	0.452	1.87	2.75	22 x 45
820	SLPX821M250H3P3	0.243	0.182	2.96	4.35	35 x 30	330	SLPX331M350C7P3	0.603	0.452	1.97	2.90	25 x 40
1000	SLPX102M250E5P3	0.199	0.149	3.20	4.70	30 x 35	330	SLPX331M350E3P3	0.603	0.452	2.03	2.98	30 x 30
1000	SLPX102M250E4P3	0.199	0.149	3.56	5.23	30 x 45	390	SLPX391M350C7P3	0.510	0.383	2.14	3.15	25 x 40
1000	SLPX102M250E9P3	0.199	0.149	3.73	5.48	30 x 50	390	SLPX391M350E5P3	0.510	0.383	2.23	3.28	30 x 35
1000	SLPX102M250H5P3	0.199	0.149	3.48	5.12	35 x 35	390	SLPX391M350H3P3	0.510	0.383	2.30	3.38	35 x 30
1200	SLPX122M250E9P3	0.166	0.125	3.99	5.87	30 x 50	470	SLPX471M350E5P3	0.423	0.317	2.53	3.72	30 x 35
1200	SLPX122M250H7P3	0.166	0.125	3.84	5.64	35 x 40	470	SLPX471M350H3P3	0.423	0.317	2.55	3.75	35 x 30
1500	SLPX152M250H4P3	0.133	0.100	4.33	6.37	35 x 45	560	SLPX561M350E7P3	0.355	0.266	2.73	4.01	30 x 40
1800	SLPX182M250H9P3	0.111	0.083	4.54	6.67	35 x 50	560	SLPX561M350H5P3	0.355	0.266	2.75	4.04	35 x 35
315 Vdc (365 Vdc Surge)							680	SLPX681M350H7P3	0.293	0.220	3.15	4.63	35 x 40
180	SLPX181M315A3P3	1.106	0.830	1.29	1.90	22 x 30	820	SLPX821M350H4P3	0.243	0.182	3.47	5.10	35 x 45
180	SLPX181M315C1P3	1.106	0.830	1.38	2.03	25 x 25	1000	SLPX102M350H9P3	0.199	0.149	3.60	5.29	35 x 50
220	SLPX221M315A5P3	0.905	0.679	1.41	2.07	22 x 35	385 Vdc (435 Vdc Surge)						
220	SLPX221M315C3P3	0.905	0.679	1.47	2.16	25 x 30	82	SLPX820M385A1P3	2.427	1.820	0.76	1.12	22 x 25
270	SLPX271M315A7P3	0.737	0.553	1.70	2.50	22 x 40	100	SLPX101M385A3P3	1.990	1.493	0.89	1.31	22 x 30
270	SLPX271M315C3P3	0.737	0.553	1.70	2.50	25 x 30	120	SLPX121M385A3P3	1.659	1.244	0.98	1.44	22 x 30
330	SLPX331M315A4P3	0.603	0.452	1.91	2.81	22 x 45	120	SLPX121M385C1P3	1.659	1.244	1.02	1.50	25 x 25
330	SLPX331M315C5P3	0.603	0.452	1.94	2.85	25 x 35	150	SLPX151M385A5P3	1.327	0.995	1.12	1.65	22 x 35
330	SLPX331M315E3P3	0.603	0.452	1.98	2.91	30 x 30	150	SLPX151M385C3P3	1.327	0.995	1.14	1.68	25 x 30
390	SLPX391M315A9P3	0.510	0.383	2.07	3.04	22 x 50	180	SLPX181M385A7P3	1.106	0.830	1.27	1.87	22 x 40
390	SLPX391M315C7P3	0.510	0.383	2.11	3.10	25 x 40	180	SLPX181M385C5P3	1.106	0.830	1.30	1.91	25 x 35
390	SLPX391M315E3P3	0.510	0.383	2.15	3.16	30 x 30	180	SLPX181M385E1P3	1.106	0.830	1.37	2.01	30 x 25
470	SLPX471M315C4P3	0.423	0.317	2.39	3.51	25 x 45	220	SLPX221M385A4P3	0.905	0.679	1.42	2.09	22 x 45
470	SLPX471M315E5P3	0.423	0.317	2.38	3.50	30 x 35	220	SLPX221M385C5P3	0.905	0.679	1.48	2.18	25 x 35
470	SLPX471M315H3P3	0.423	0.317	2.36	3.47	35 x 30	220	SLPX221M385E3P3	0.905	0.679	1.49	2.19	30 x 30
560	SLPX561M315E7P3	0.355	0.266	2.63	3.87	30 x 40	270	SLPX271M385C7P3	0.737	0.553	1.61	2.37	25 x 40
560	SLPX561M315H5P3	0.355	0.266	2.69	3.95	35 x 35	270	SLPX271M385E5P3	0.737	0.553	1.64	2.41	30 x 35
680	SLPX681M315E4P3	0.293	0.220	2.80	4.12	30 x 45	330	SLPX331M385C9P3	0.603	0.452	1.80	2.65	25 x 50
680	SLPX681M315H7P3	0.293	0.220	3.05	4.48	35 x 40	330	SLPX331M385E7P3	0.603	0.452	1.85	2.72	30 x 40
820	SLPX821M315E9P3	0.243	0.182	3.28	4.82	30 x 50	330	SLPX331M385H3P3	0.603	0.452	1.87	2.75	35 x 30
820	SLPX821M315H4P3	0.243	0.182	3.45	5.07	35 x 45	390	SLPX391M385E7P3	0.510	0.383	2.05	3.01	30 x 40

Type SLPX 85 °C Snap-In Aluminum Electrolytic

Best Value 85 °C Snap-In Type

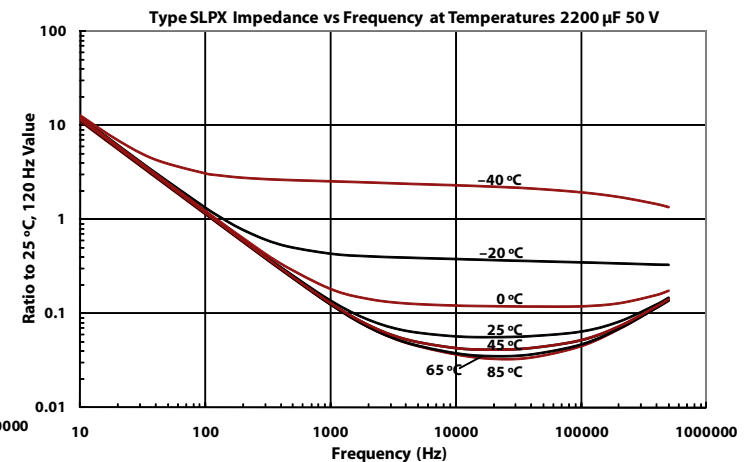
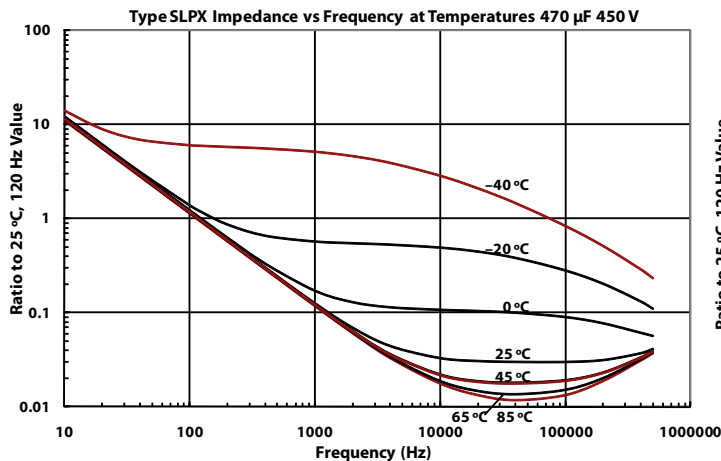
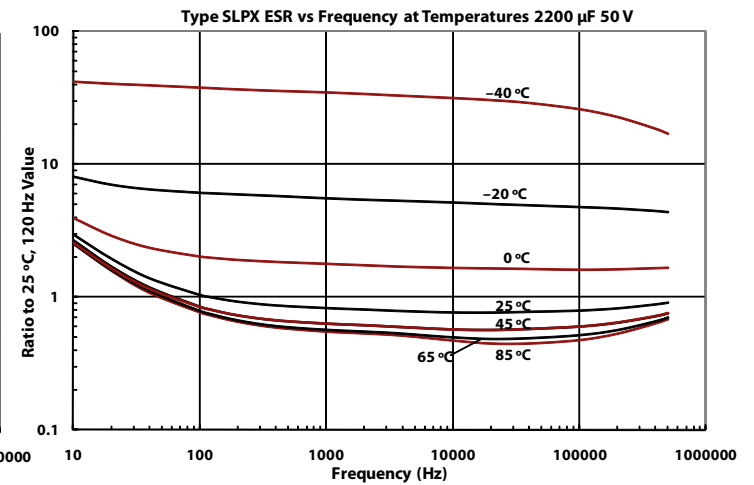
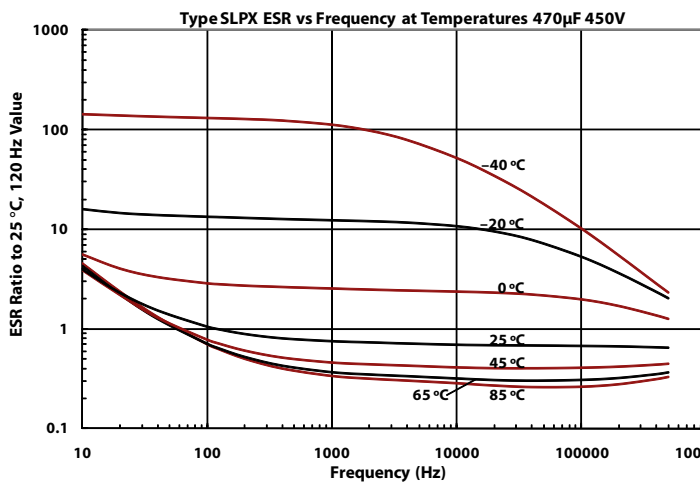
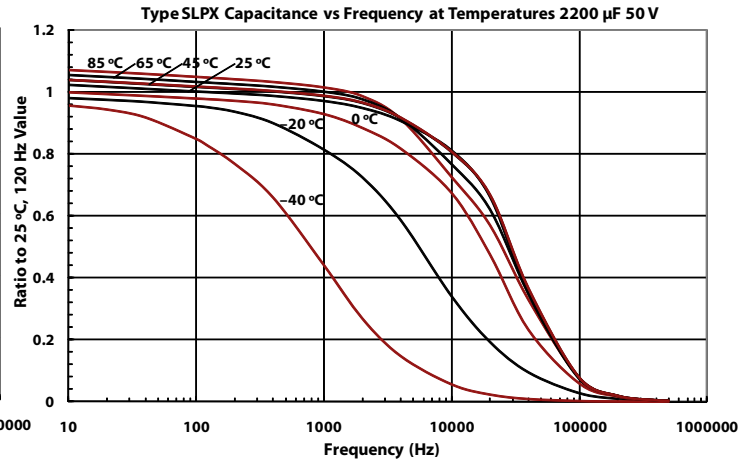
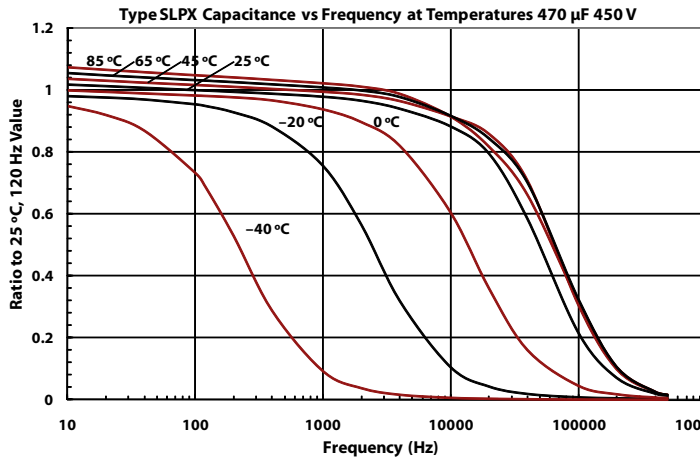
Additional Voltages and Sizes available at www.cde.com/catalogs/SLPX.pdf

Additional Voltages and Sizes available at www.cde.com/catalogs/SLP_X.pdf													
Cap	3000 h @ 85 °C	Max 25 °C ESR		Max 85 °C Ripple		Nominal	Cap	3000 h @ 85 °C	Max 25 °C ESR		Max 85 °C Ripple		Nominal
Catalog		(Ω)		(A _{rms})		Size (DxL)	Catalog		(Ω)		(A _{rms})		Size (DxL)
Part Number		120 Hz	20kHz	120 Hz	20kHz	(mm)	Part Number		120 Hz	20kHz	120 Hz	20kHz	(mm)
385 Vdc (435 Vdc Surge)						420 Vdc (470 Vdc Surge)							
390	SLPX391M385H5P3	0.510	0.383	2.07	3.04	35 x 35	180	SLPX181M420C5P3	1.106	0.830	1.42	2.09	25 x 35
470	SLPX471M385E9P3	0.423	0.317	2.26	3.32	30 x 50	180	SLPX181M420E1P3	1.106	0.830	1.48	2.18	30 x 25
470	SLPX471M385H7P3	0.423	0.317	2.26	3.32	35 x 40	220	SLPX221M420A4P3	0.905	0.679	1.55	2.28	22 x 45
560	SLPX561M385H4P3	0.355	0.266	2.59	3.81	35 x 45	220	SLPX221M420C5P3	0.905	0.679	1.58	2.32	25 x 35
680	SLPX681M385H9P3	0.293	0.220	2.80	4.12	35 x 50	220	SLPX221M420E3P3	0.905	0.679	1.65	2.43	30 x 30
400 Vdc (450 Vdc Surge)						270	SLPX271M420C7P3	0.737	0.553	1.74	2.56	25 x 40	
82	SLPX820M400A1P3	2.427	1.820	0.84	1.23	22 x 25	270	SLPX271M420E5P3	0.737	0.553	1.90	2.79	30 x 35
100	SLPX101M400A3P3	1.990	1.493	0.99	1.46	22 x 30	270	SLPX271M420H3P3	0.737	0.553	1.94	2.85	35 x 30
120	SLPX121M400C1P3	1.659	1.244	1.13	1.66	25 x 25	330	SLPX331M420C9P3	0.603	0.452	2.20	3.23	25 x 50
120	SLPX121M400A3P3	1.659	1.244	1.09	1.60	22 x 30	330	SLPX331M420E5P3	0.603	0.452	1.98	2.91	30 x 35
150	SLPX151M400A5P3	1.327	0.995	1.24	1.82	22 x 35	330	SLPX331M420H5P3	0.603	0.452	2.17	3.19	35 x 35
150	SLPX151M400C3P3	1.327	0.995	1.27	1.87	25 x 30	390	SLPX391M420E7P3	0.510	0.383	2.22	3.26	30 x 40
180	SLPX181M400A7P3	1.106	0.830	1.41	2.07	22 x 40	390	SLPX391M420H5P3	0.510	0.383	2.27	3.34	35 x 35
180	SLPX181M400C3P3	1.106	0.830	1.44	2.12	25 x 30	470	SLPX471M420E4P3	0.423	0.317	2.50	3.68	30 x 45
180	SLPX181M400E1P3	1.106	0.830	1.52	2.23	30 x 25	470	SLPX471M420H7P3	0.423	0.317	2.61	3.84	35 x 40
220	SLPX221M400A4P3	0.905	0.679	1.58	2.32	22 x 45	560	SLPX561M420H4P3	0.355	0.266	2.95	4.34	35 x 45
220	SLPX221M400C3P3	0.900	0.675	1.54	2.26	25 x 30	450 Vdc (500 Vdc Surge)						
220	SLPX221M400C5P3	0.905	0.679	1.64	2.41	25 x 35	68	SLPX680M450A1P3	3.903	2.927	0.71	1.04	22 x 25
220	SLPX221M400E3P3	0.905	0.679	1.66	2.44	30 x 30	82	SLPX820M450A1P3	3.236	2.427	0.86	1.26	22 x 25
270	SLPX271M400C7P3	0.737	0.553	1.79	2.63	25 x 40	100	SLPX101M450A3P3	2.654	1.991	0.95	1.40	22 x 30
330	SLPX331M400C4P3	0.603	0.452	2.00	2.94	25 x 45	120	SLPX121M450A5P3	2.212	1.659	1.07	1.57	22 x 35
330	SLPX331M400E5P3	0.603	0.452	2.05	3.01	30 x 35	120	SLPX121M450C3P3	2.212	1.659	1.09	1.60	25 x 30
330	SLPX331M400H3P3	0.603	0.452	2.05	3.01	35 x 30	120	SLPX121M450C3P3	2.212	1.659	1.09	1.60	25 x 30
330	SLPX331M400C4P3	0.603	0.452	2.00	2.94	25 x 45	120	SLPX121M450E1P3	2.212	1.659	1.12	1.65	30 x 25
390	SLPX391M400E7P3	0.510	0.383	2.26	3.32	30 x 40	150	SLPX151M450A7P3	1.769	1.327	1.18	1.73	22 x 40
390	SLPX391M400H5P3	0.510	0.383	2.28	3.35	35 x 35	150	SLPX151M450C3P3	1.769	1.327	1.25	1.84	25 x 30
470	SLPX471M400E4P3	0.423	0.317	2.51	3.69	30 x 45	150	SLPX151M450E1P3	1.769	1.327	1.29	1.90	30 x 25
470	SLPX471M400H7P3	0.423	0.317	2.54	3.73	35 x 40	180	SLPX181M450A4P3	1.474	1.106	1.32	1.94	22 x 45
560	SLPX561M400H9P3	0.355	0.266	3.13	4.60	35 x 50	180	SLPX181M450C5P3	1.474	1.106	1.40	2.06	25 x 35
560	SLPX561M400H7P3	0.355	0.266	2.85	4.19	35 x 40	180	SLPX181M450E3P3	1.474	1.106	1.45	2.13	30 x 30
680	SLPX681M400H9P3	0.293	0.220	3.10	3.88	35 x 50	220	SLPX221M450C7P3	1.206	0.905	1.59	2.34	25 x 40
820	SLPX821M400H9P3	0.240	0.180	3.40	4.25	35 x 50	220	SLPX221M450E3P3	1.206	0.905	1.64	2.41	30 x 30
420 Vdc (470 Vdc Surge)						220	SLPX221M450H3P3	1.206	0.905	1.66	2.44	35 x 30	
82	SLPX820M420A1P3	2.427	1.820	0.85	1.25	22 x 25	270	SLPX271M450C4P3	0.983	0.737	1.73	2.54	25 x 45
100	SLPX101M420A3P3	1.990	1.493	0.97	1.43	22 x 30	270	SLPX271M450E3P3	0.983	0.737	1.78	2.62	30 x 30
100	SLPX101M420C1P3	1.990	1.493	0.98	1.44	25 x 25	270	SLPX271M450E5P3	0.983	0.737	1.89	2.78	30 x 35
100	SLPX101M450C3P3	1.990	1.493	0.90	1.32	25 x 30	270	SLPX271M450H3P3	0.983	0.737	1.90	2.79	35 x 30
120	SLPX121M420A3P3	1.659	1.244	1.07	1.57	22 x 30	330	SLPX331M450H5P3	0.804	0.603	2.15	3.16	35 x 35
120	SLPX121M420C1P3	1.659	1.244	1.08	1.59	25 x 25	330	SLPX331M450E7P3	0.804	0.603	2.12	3.12	30 x 40
150	SLPX151M420A5P3	1.327	0.995	1.21	1.78	22 x 35	390	SLPX391M450E4P3	0.680	0.510	2.35	3.45	30 x 45
150	SLPX151M420C3P3	1.327	0.995	1.26	1.85	25 x 30	390	SLPX391M450H7P3	0.680	0.510	2.38	3.50	35 x 40
150	SLPX151M420E1P3	1.327	0.995	1.30	1.91	30 x 25	470	SLPX471M450H9P3	0.565	0.424	2.80	4.12	35 x 50
180	SLPX181M420A7P3	1.106	0.830	1.33	1.96	22 x 40	470	SLPX471M450H4P3	0.565	0.424	2.68	3.94	35 x 45

Type SLPX 85 °C Snap-In Aluminum Electrolytic

Best Value 85 °C Snap-In Type

Typical Performance Curves



Type 380LX / 382LX 85 °C High Capacitance, Snap-In Aluminum

2, 4 and 5 pin styles available



The excellent value of Type 380L/LX capacitors finds application in switching power supply input and output circuits and even motor drives where the high surface area of multiple units in parallel approaches the ripple capability of our Type 520C computer-grade capacitor. Type 380LX delivers more capacitance per can size while Type 380L available in the largest case sizes gives lower ESR for the same capacitance. Types 382L and 382LX give the choice of 4 or 5 leads for stable, reverse proof mounting.

Highlights

- Latest available ratings, worldwide
- Top performance in power supplies and motor drives
- Big selection of 46 case sizes
- 2, 4 and 5 leads available

Specifications

Temperature Range	-40 °C to +85 °C ≤ 250 Vdc -25 °C to +85 °C ≥ 315 Vdc						
Rated Voltage Range	16 Vdc to 500 Vdc						
Capacitance Range	33 µF to 270,000 µF						
Capacitance Tolerance	± 20%						
Leakage Current	≤3√CV µA at 5 min						
Ripple Current Multipliers	Ambient Temperature						
	45 °C	60 °C	70 °C	85 °C			
	1.5	1.4	1.3	1.0			
	Frequency						
		50 Hz	60 Hz	120 Hz	500 kHz	1 kHz	10 kHz & Up
	16 - 100 WV	0.93	0.95	1.00	1.05	1.08	1.15
160 - 450 WV	0.75	0.80	1.00	1.20	1.25	1.40	
Low Temperature Characteristics	Impedance ratio: Z _{-20°C} /Z _{+25°C} ≤ 8 (16–50 Vdc) ≤ 4 (63–100 Vdc) ≤ 3 (150–500 Vdc)						
Endurance Life Test	3,000 h @ full load at +85 °C Δ Capacitance ±20% ESR 200% of limit DCL 100% of limit						
Shelf Life Test	1,000 h @ 85 °C Δ Capacitance ±20% ESR 200% of limit DCL 100% of limit						
Vibration	10 to 55 Hz, 0.06" and 10 g max, 2 h in each plane						
RoHS Compliant							

Type 380LX / 382LX 85 °C High Capacitance, Snap-In Aluminum

2, 4 and 5 pin styles available

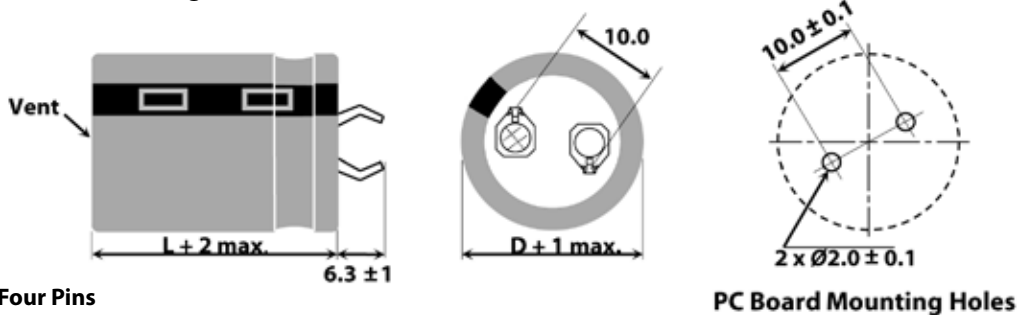
Part Numbering System

382LX	272	M	200	N05	2	V
Type	Cap	Tolerance	Voltage	Case Code	Insulation	# of pins
380L / LX (2 pins)	272 = 2700 µF	M = ±20%	200 = 200 Vdc		2 = PVC	Blank = 2 pins / 4 pins snap-in 6.3mm L
382L / LX (4 or 5 pins)	333 = 33000 µF					A = 2 pins / 4 pins snap-in 4.0mm L
						VS = 5 pins snap-in 6.3mm L
						V = 5 pins standoff

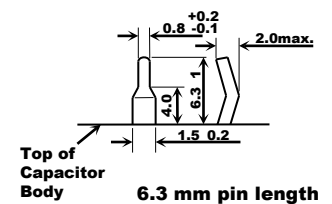
Outline Drawings

Two Pins

380L/LX (22 through 40 mm diameter)

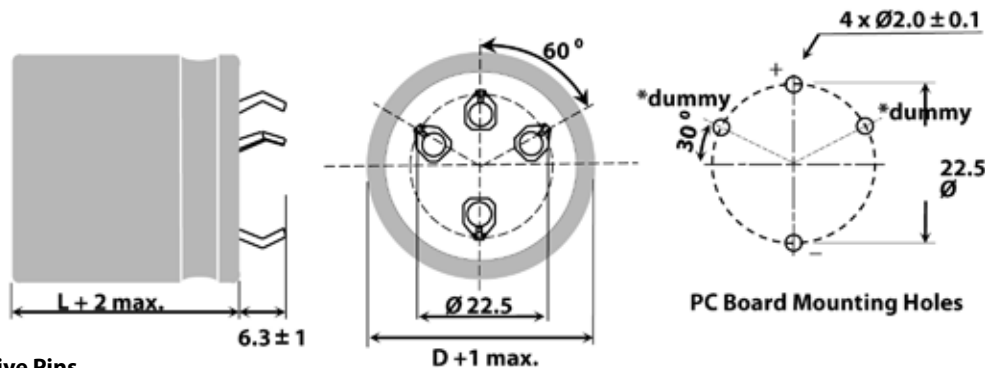


Available in 2, 4 and 5 pins

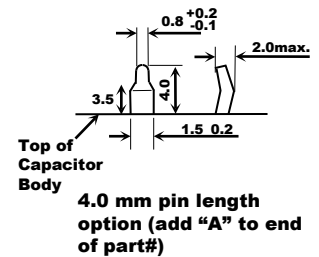


Four Pins

382L/LX (35 and 40mm diameter)

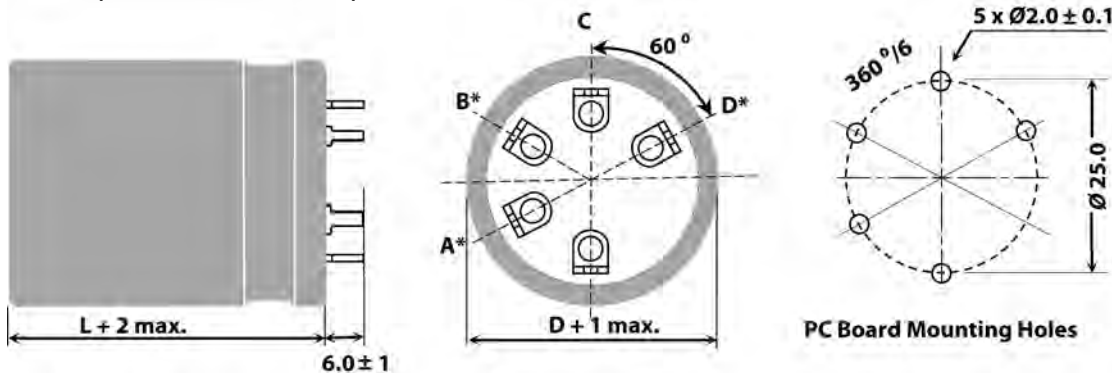


Available in 2 and 4 pins

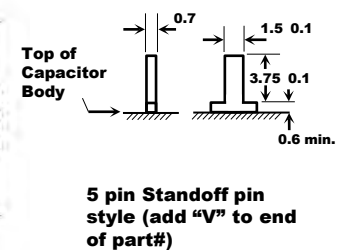


Five Pins

382L/LX (40 and 50mm diameter)



Available in 5 pins



Connection		
Terminal	40 mm Dia.	50 mm Dia.
A	dummy	negative (-)
B	dummy	dummy
C	positive (+)	positive (+)
D	dummy	positive (+)
-	negative (-)	negative (-)

Notes:

* Use dummy terminals for mechanical support only. Make no electrical connection because they resistively connect through the electrolyte to the negative terminal.

** Safety Vent may be on the bottom or on the side of the can.

Type 380LX / 382LX 85 °C High Capacitance, Snap-In Aluminum

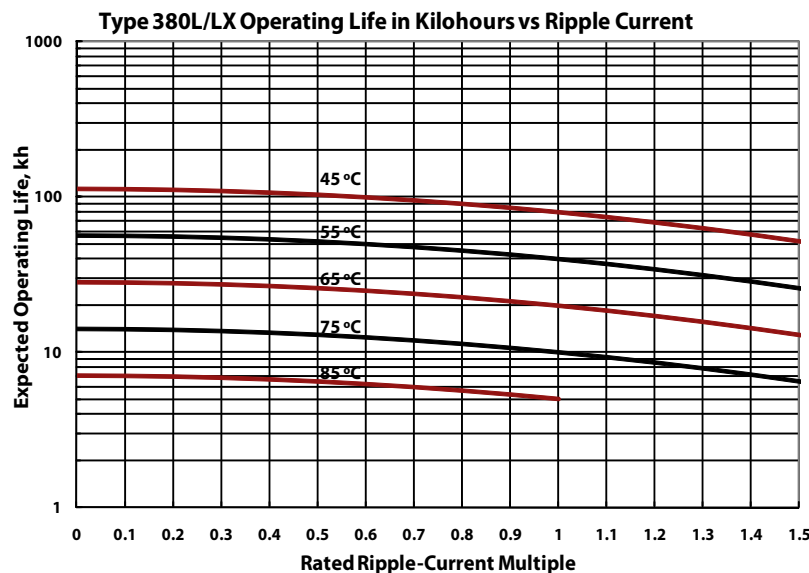
2, 4 and 5 pin styles available

Insulated Case Dimensions

Case Code	DIAMETER "D"		LENGTH "L"		Typical Weight (grams)
	mm	inches	mm	inches	
H20	22	0.87	20	0.79	14
H01	22	0.87	25	0.98	16
H02	22	0.87	30	1.18	19
H03	22	0.87	35	1.38	22
H04	22	0.87	40	1.57	24
H45	22	0.87	45	1.77	28
H05	22	0.87	50	1.97	31
J20	25	0.98	20	0.79	16
J01	25	0.98	25	0.98	20
J02	25	0.98	30	1.18	24
J03	25	0.98	35	1.38	27
J04	25	0.98	40	1.57	31
J45	25	0.98	45	1.77	35
J05	25	0.98	50	1.97	38
K20	30	1.18	20	0.79	25
K01	30	1.18	25	0.98	30
K02	30	1.18	30	1.18	35
K03	30	1.18	35	1.38	40
K04	30	1.18	40	1.57	44
K45	30	1.18	45	1.77	48
K05	30	1.18	50	1.97	53

Case Code	DIAMETER "D"		LENGTH "L"		Typical Weight (grams)
	mm	inches	mm	inches	
A20	35	1.38	20	0.79	35
A01	35	1.38	25	0.98	42
A02	35	1.38	30	1.18	48
A03	35	1.38	35	1.38	54
A04	35	1.38	40	1.57	62
A45	35	1.38	45	1.77	67
A05	35	1.38	50	1.97	74
A06	35	1.38	63	2.48	88
A07	35	1.38	70	2.76	98
A08	35	1.38	80	3.15	112
A10	35	1.38	105	4.13	144
N04	40	1.57	40	1.57	82
N05	40	1.57	50	1.97	105
N06	40	1.57	63	2.48	130
N08	40	1.57	80	3.15	185
N10	40	1.57	105	4.13	265
B05	50	1.97	50	1.97	136
B06	50	1.97	63	2.48	168
B08	50	1.97	80	3.15	239
B09	50	1.97	92	3.62	241
B10	50	1.97	105	4.13	325

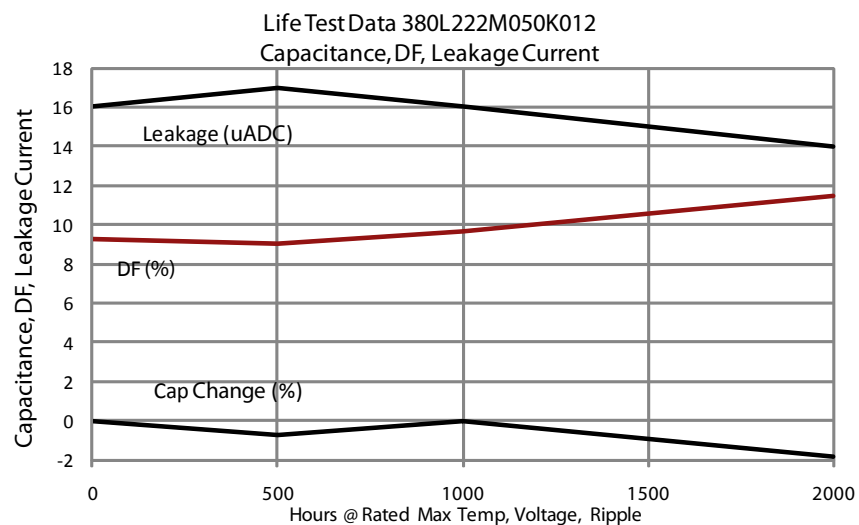
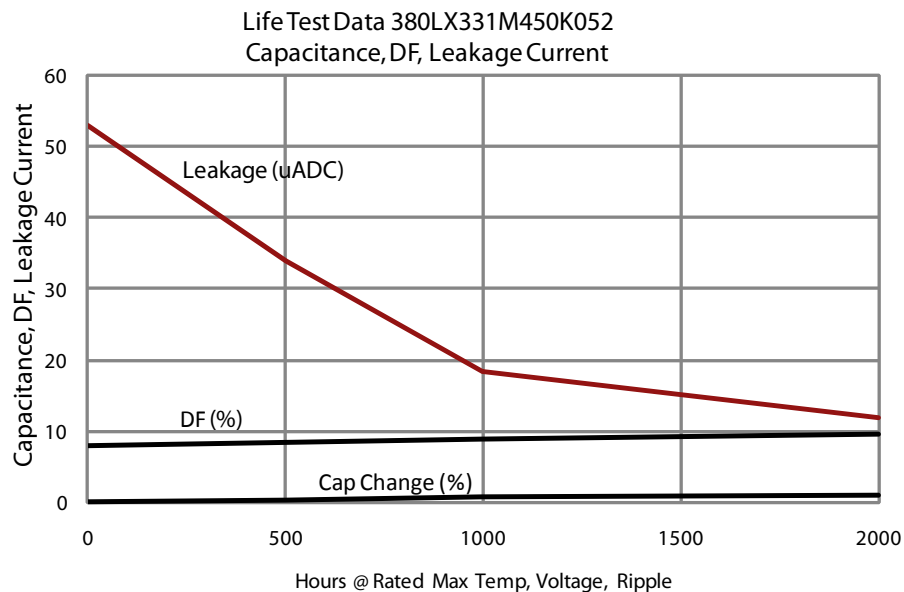
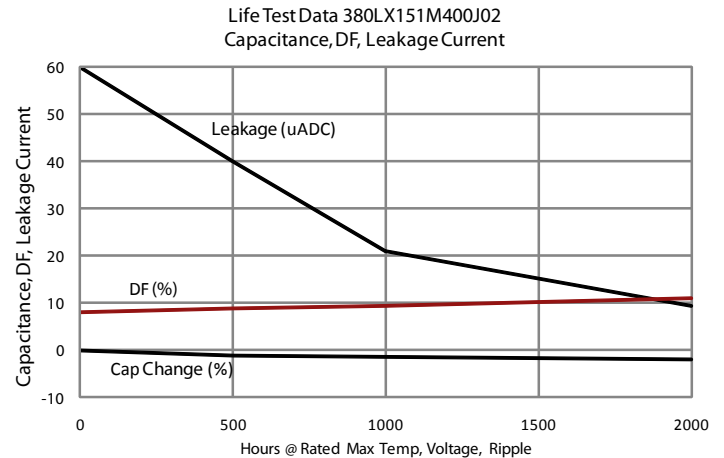
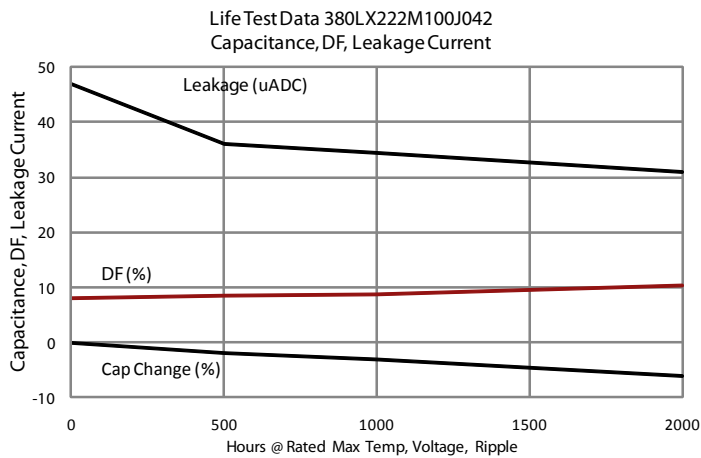
Typical Performance Curves



Type 380LX / 382LX 85 °C High Capacitance, Snap-In Aluminum

2, 4 and 5 pin styles available

Typical Performance Curves



Type 380LX / 382LX 85 °C High Capacitance, Snap-In Aluminum

2, 4 and 5 pin styles available

Ratings

Additional Voltages and Smaller Sizes available at <http://www.cde.com/catalogs/380-382.pdf>

Cap.		Max. ESR		Ripple Amps		Nominal
		Ω @ 25 °C		Max. @ 85 °C		Size D x L
(μ F)	Catalog Part Number	120 Hz	20 kHz	120 Hz	20 kHz	(mm)
16 Vdc (20 Vdc Surge)						
33000	380LX333M016A022	0.025	0.021	6.80	7.90	35 x 30
39000	380LX393M016A032	0.022	0.018	6.95	8.00	35 x 35
47000	380LX473M016A042	0.022	0.020	7.50	8.60	35 x 40
56000	380LX563M016A452	0.020	0.018	8.70	10.00	35 x 45
56000	382LX563M016N042	0.022	0.021	9.00	10.40	40 x 40
68000	380LX683M016A052	0.018	0.017	9.00	10.40	35 x 50
82000	380LX823M016A062	0.016	0.015	10.00	11.50	35 x 63
82000	382LX823M016N052	0.016	0.015	10.30	11.80	40 x 50
100000	380LX104M016A082	0.015	0.014	11.00	12.70	35 x 80
100000	382LX104M016N062	0.018	0.017	11.40	13.00	40 x 63
120000	380LX124M016A102	0.014	0.013	12.81	14.73	35 x 105
120000	382LX124M016N082	0.017	0.016	12.40	14.30	40 x 80
120000	382LX124M016B052V	0.014	0.013	13.17	15.15	50 x 50
150000	382LX154M016B062V	0.012	0.011	14.40	16.56	50 x 63
180000	382LX184M016N102	0.013	0.012	14.85	17.08	40 x 105
180000	382LX184M016B082V	0.011	0.010	15.69	18.04	50 x 80
220000	382LX224M016B092V	0.010	0.009	16.73	19.24	50 x 92
270000	382LX274M016B102V	0.009	0.008	17.79	20.46	50 x 105
35 Vdc (44 Vdc Surge)						
10000	380LX103M035A012	0.050	0.037	4.40	5.10	35 x 25
12000	380LX123M035A022	0.044	0.033	5.10	5.80	35 x 30
15000	380LX153M035A022	0.036	0.027	5.60	6.40	35 x 30
18000	380LX183M035A032	0.030	0.023	5.70	6.50	35 x 35
22000	380LX223M035A042	0.026	0.020	6.10	7.00	35 x 40
27000	380LX273M035A452	0.021	0.017	6.80	7.90	35 x 45
27000	382LX273M035N042	0.021	0.017	6.80	7.90	40 x 40
33000	380LX333M035A052	0.018	0.014	7.15	8.22	35 x 50
33000	380L333M035A062	0.018	0.009	7.80	8.70	35 x 63
39000	380LX393M035A062	0.015	0.012	7.90	9.10	35 x 63
39000	380L393M035A072	0.015	0.008	8.60	9.50	35 x 70
39000	382LX393M035N052	0.017	0.014	8.00	9.20	40 x 50
47000	380LX473M035A082	0.015	0.011	9.50	10.90	35 x 80
47000	382LX473M035N062	0.016	0.013	9.60	11.00	40 x 63
56000	382LX563M035N082	0.015	0.012	10.30	11.90	40 x 80
56000	382LX563M035B052V	0.015	0.012	10.94	12.58	50 x 50
68000	380LX683M035A102	0.010	0.008	10.62	12.21	35 x 105
68000	382LX683M035B062V	0.013	0.011	11.93	13.72	50 x 63
82000	382LX823M035N102	0.012	0.009	12.02	13.82	40 x 105
82000	382LX823M035B082V	0.012	0.010	13.06	15.02	50 x 80
100000	382LX104M035B092V	0.011	0.009	13.97	16.07	50 x 92
120000	382LX124M035B102V	0.010	0.008	14.86	17.09	50 x 105
63 Vdc (79 Vdc Surge)						
4700	380LX472M063A012	0.080	0.060	4.90	5.60	35 x 25
5600	380LX562M063A022	0.070	0.050	5.40	6.20	35 x 30
6800	380LX682M063A022	0.060	0.045	5.80	6.70	35 x 30
8200	380LX822M063A032	0.050	0.040	6.00	6.90	35 x 35
10000	380LX103M063A042	0.033	0.025	6.50	7.50	35 x 40
10000	382L103M063N042	0.028	0.017	6.60	7.20	40 x 40
12000	380LX123M063A052	0.028	0.021	7.20	8.30	35 x 50
12000	380L123M063A062	0.019	0.010	7.70	8.60	35 x 63
12000	382LX123M063N042	0.035	0.028	7.15	8.22	40 x 40
15000	380LX153M063A062	0.028	0.021	7.70	8.90	35 x 63
15000	380L153M063A072	0.016	0.009	8.50	9.40	35 x 70
18000	380LX183M063A082	0.023	0.012	9.40	10.80	35 x 80
18000	382LX183M063N062	0.028	0.022	9.25	10.60	40 x 63
27000	380LX273M063A102	0.015	0.012	10.38	11.94	35 x 105
27000	382LX273M063N082	0.018	0.015	10.00	11.50	40 x 80
27000	382LX273M063B052V	0.018	0.015	10.86	12.49	50 x 50
33000	382LX333M063N102	0.015	0.012	11.76	13.52	40 x 105
33000	382LX333M063B062V	0.017	0.013	11.57	13.42	50 x 63
47000	382LX473M063B082V	0.013	0.010	12.78	14.70	50 x 80
51000	382LX513M063B092V	0.012	0.010	13.34	15.34	50 x 92
56000	382LX563M063B102V	0.012	0.009	13.93	16.02	50 x 105
80 Vdc (100 Vdc Surge)						
5600	380LX562M080A032	0.055	0.040	4.60	5.20	35 x 35
6800	380LX682M080A042	0.045	0.035	5.20	5.90	35 x 40
8200	380LX822M080A052	0.040	0.030	5.80	6.70	35 x 50
8200	382LX822M080N042	0.040	0.030	5.83	6.70	40 x 40
10000	380LX103M080A062	0.033	0.025	6.40	7.34	35 x 63
12000	380L123M080A072	0.020	0.012	8.10	9.00	35 x 70
12000	382L123M080N052	0.025	0.016	7.50	8.00	40 x 50
15000	380L153M080A082	0.017	0.010	8.80	9.60	35 x 80
15000	382L153M080N062	0.020	0.013	8.50	9.20	40 x 63
18000	382L183M080N082	0.014	0.009	10.30	10.80	40 x 80
18000	382LX183M080B052V	0.023	0.017	10.00	11.50	50 x 50
22000	380LX223M080A102	0.015	0.011	9.86	11.34	35 x 105
22000	382LX223M080B062V	0.019	0.014	11.08	12.74	50 x 63
27000	382LX273M080N102	0.015	0.012	11.35	13.05	40 x 105
27000	382LX273M080B082V	0.015	0.012	12.33	14.18	50 x 80
33000	382LX333M080B092V	0.014	0.010	13.37	15.38	50 x 92
39000	382LX393M080B102V	0.013	0.010	14.34	16.49	50 x 105
100 Vdc (125 Vdc Surge)						
2200	380LX222M100A012	0.121	0.078	3.14	3.61	35 x 25

CDM Cornell Dubilier • 140 Technology Place • Liberty, SC 29657 • Phone: (864)843-2277 • Fax: (864)843-3800

Type 380LX / 382LX 85 °C High Capacitance, Snap-In Aluminum

2, 4 and 5 pin styles available

Additional Voltages and Smaller Sizes available at <http://www.cde.com/catalogs/380-382.pdf>

		Max. ESR		Ripple Amps		Nominal
Cap.		Ω@ 25 °C		Max. @ 85 °C		Size D x L
(µF)	Catalog Part Number	120 Hz	20 kHz	120 Hz	20 kHz	(mm)
100 Vdc (125 Vdc Surge)						
2700	380LX272M100A022	0.104	0.068	3.70	4.30	35 x 30
3900	380LX392M100A032	0.080	0.050	4.50	5.20	35 x 35
4700	380LX472M100A042	0.070	0.050	5.10	5.90	35 x 40
5600	380LX562M100A452	0.060	0.040	5.80	6.60	35 x 45
5600	382LX562M100N042	0.060	0.045	5.80	6.60	40 x 40
6800	380LX682M100A052	0.050	0.040	6.60	7.60	35 x 50
6800	380L682M100A062	0.024	0.014	7.20	8.10	35 x 63
6800	382L682M100N052	0.026	0.017	7.40	7.90	40 x 50
8200	380LX822M100A062	0.040	0.030	7.00	8.10	35 x 63
8200	380L822M100A072	0.021	0.012	8.00	8.90	35 x 70
8200	382LX822M100N052	0.040	0.030	7.30	8.40	40 x 50
8200	382L822M100N062	0.021	0.013	8.40	9.10	40 x 63
10000	380LX103M100A082	0.033	0.025	8.70	9.60	35 x 80
10000	382LX103M100N062	0.033	0.025	8.00	9.20	40 x 63
10000	382LX103M100B052V	0.033	0.025	8.82	10.14	50 x 50
12000	380LX123M100A102	0.028	0.021	8.57	9.86	35 x 105
12000	382LX123M100N082	0.028	0.021	8.65	10.00	40 x 80
15000	382LX153M100N102	0.022	0.017	10.12	11.64	40 x 105
15000	382LX153M100B062V	0.022	0.017	10.07	11.58	50 x 63
18000	382LX183M100B082V	0.018	0.014	11.00	12.65	50 x 80
22000	382LX223M100B092V	0.015	0.011	11.76	13.52	50 x 92
27000	382LX273M100B102V	0.014	0.010	12.53	14.41	50 x 105
200 Vdc (250 Vdc Surge)						
820	380LX821M200A012	0.243	0.124	2.90	4.10	35 x 25
1000	380LX102M200A022	0.199	0.102	3.30	4.60	35 x 30
1200	380LX122M200A022	0.166	0.075	3.50	4.90	35 x 30
1500	380LX152M200A032	0.144	0.072	3.87	5.42	35 x 35
1800	380LX182M200A042	0.120	0.060	4.32	6.05	35 x 40
2200	380LX222M200A452	0.098	0.054	4.92	6.89	35 x 45
2200	382LX222M200N042	0.098	0.054	4.92	6.89	40 x 40
2700	380LX272M200A062	0.080	0.045	5.50	7.70	35 x 63
2700	382LX272M200N052	0.080	0.045	5.40	7.60	40 x 50
3300	382LX332M200N062	0.065	0.037	6.30	8.90	40 x 63
3300	380LX332M200A082	0.065	0.037	6.40	9.00	35 x 80
3900	380LX392M200A082	0.055	0.030	6.60	9.25	35 x 80
3900	382LX392M200N062	0.055	0.030	6.80	9.50	40 x63
3900	382LX392M200B052V	0.055	0.030	8.22	9.45	50 x 50
4700	382LX472M200N082	0.046	0.025	8.38	11.73	40 x 80
4700	382LX472M200B062V	0.046	0.025	9.32	13.05	50 x 63
5600	380LX562M200A102	0.038	0.021	8.90	12.46	35 x 105
6800	382LX682M200N102	0.032	0.017	8.65	12.11	40 x 105
6800	382LX682M200B082V	0.032	0.017	11.41	15.97	50 x 80
7500	382LX752M200B092V	0.029	0.016	12.28	17.19	50 x 92

		Max. ESR		Ripple Amps		Nominal
Cap.		Ω@ 25 °C		Max. @ 85 °C		Size D x L
(µF)	Catalog Part Number	120 Hz	20 kHz	120 Hz	20 kHz	(mm)
200 Vdc (250 Vdc Surge)						
8200	382LX822M200B102V	0.026	0.014	13.16	18.42	50 x 105
250 Vdc (300 Vdc Surge)						
560	380LX561M250A012	0.326	0.130	2.30	3.20	35 x 25
680	380LX681M250A022	0.293	0.149	2.50	3.50	35 x 30
820	380LX821M250A022	0.222	0.089	2.80	3.90	35 x 30
1000	380LX102M250A032	0.182	0.073	3.32	4.65	35 x 35
1200	380LX122M250A042	0.166	0.083	3.53	4.94	35 x 40
1500	380LX152M250A052	0.133	0.068	4.00	5.70	35 x 50
1500	382LX152M250N042	0.133	0.066	4.04	5.66	40 x 40
1800	380LX182M250A062	0.110	0.055	4.50	6.30	35 x 63
1800	382LX182M250N052	0.110	0.055	4.50	6.30	40 x 50
1800	382L182M250N062	0.062	0.030	4.80	6.40	40 x 63
2200	380LX222M250A062	0.090	0.045	4.70	6.60	35 x 63
2200	380LX222M250A082	0.090	0.045	4.90	6.90	35 x 80
2200	382LX222M250N062	0.090	0.045	4.90	6.90	40 x 63
2700	380LX272M250A082	0.074	0.037	5.60	7.90	35 x 80
2700	382LX272M250N062	0.074	0.037	5.80	8.10	40 x 63
2700	382L272M250N082	0.043	0.021	6.30	8.40	40 x 80
2700	382LX272M250B052V	0.074	0.037	6.77	7.79	50 x 50
3300	382LX332M250N082	0.060	0.030	7.00	9.80	40 x 80
3300	382LX332M250B062V	0.060	0.030	7.79	10.91	50 x 63
3900	380LX392M250A102	0.051	0.026	7.47	10.46	35 x 105
3900	382LX392M250N082	0.051	0.026	7.35	10.30	40 x 80
4700	382LX472M250N102	0.042	0.021	8.88	12.43	40 x 105
4700	382LX472M250B082V	0.042	0.021	9.65	13.51	50 x 80
5600	382LX562M250B092V	0.036	0.018	10.80	15.12	50 x 92
6800	382LX682M250B102V	0.029	0.015	12.16	17.02	50 x 105
400 Vdc (450 Vdc Surge)						
270	380LX271M400A022	0.680	0.240	1.70	2.30	35 x 30
330	380LX331M400A022	0.550	0.200	1.90	2.70	35 x 30
390	380LX391M400A032	0.470	0.160	2.10	3.00	35 x 35
470	380LX471M400A042	0.388	0.136	2.39	3.35	35 x 40
560	380LX561M400A452	0.326	0.114	2.69	3.77	35 x 45
560	382LX561M400N042	0.326	0.114	2.70	3.80	40 x 40
680	380LX681M400A052	0.270	0.095	3.00	4.20	35 x 50
680	382LX681M400N052	0.270	0.095	3.40	4.70	40 x 50
820	380LX821M400A062	0.222	0.078	3.55	4.97	35 x 63
820	382LX821M400N052	0.222	0.078	3.40	4.70	40 x 50
1000	380L102M400A082	0.179	0.099	3.60	4.80	35 x 80
1000	382LX102M400N062	0.199	0.127	4.20	5.80	40 x 63
1000	382LX102M400B052V	0.199	0.080	4.76	5.47	50 x 50
1200	380LX122M400A082	0.152	0.053	4.52	6.33	35 x 80
1200	382LX122M400N062	0.152	0.053	4.52	6.33	40 x 63

Type 380LX / 382LX 85 °C High Capacitance, Snap-In Aluminum

2, 4 and 5 pin styles available

Additional Voltages and Smaller Sizes available at <http://www.cde.com/catalogs/380-382.pdf>

Cap.		Max. ESR		Ripple Amps		Nominal	
		Ω @ 25 °C		Max. @ 85 °C		Size D x L	
(μ F)	Catalog Part Number	120 Hz	20 kHz	120 Hz	20 kHz	(mm)	
400 Vdc (450 Vdc Surge)							
1200	382LX122M400B062V	0.166	0.066	5.47	7.66	50 x 63	
1500	380LX152M400A102	0.122	0.043	5.44	7.62	35 x 105	
1500	382LX152M400N082	0.122	0.043	5.50	7.70	40 x 80	
1500	382LX152M400B082V	0.133	0.053	6.47	9.06	50 x 80	
1800	382LX182M400N102	0.101	0.035	6.53	9.14	40 x 105	
1800	382LX182M400B092V	0.111	0.044	7.35	10.29	50 x 92	
2200	382LX222M400B102V	0.090	0.036	8.43	11.80	50 x 105	
420 Vdc (470 Vdc Surge)							
220	380LX221M420A012	0.900	0.320	1.50	2.10	35 x 25	
270	380LX271M420A022	0.740	0.260	1.70	1.93	35 x 30	
330	380LX331M420A032	0.600	0.210	1.90	2.68	35 x 35	
390	380LX391M420A042	0.500	0.180	2.10	3.00	35 x 40	
470	380LX471M420A452	0.420	0.150	2.40	3.35	35 x 45	
560	380LX561M420A052	0.355	0.125	2.70	3.80	35 x 50	
450 Vdc (500 Vdc Surge)							
180	380LX181M450A012	0.921	0.368	1.40	1.90	35 x 25	
220	380LX221M450A022	0.904	0.461	1.60	2.20	35 x 30	
270	380LX271M450A022	0.680	0.270	1.80	2.50	35 x 30	
330	380LX331M450A032	0.553	0.221	2.01	2.81	35 x 35	
390	380LX391M450A452	0.510	0.260	2.20	3.10	35 x 45	
470	380LX471M450A452	0.423	0.233	2.53	3.54	35 x 45	
470	382LX471M450N042	0.423	0.233	2.53	3.54	40 x 40	
560	380LX561M450A052	0.355	0.171	2.50	3.50	35 x 50	
560	380LX561M450A062	0.355	0.195	2.90	4.10	35 x 63	
680	380L681M450A072	0.226	0.120	3.20	4.20	35 x 70	
680	382LX681M450N052	0.290	0.160	3.15	4.40	40 x 50	
680	382L681M450N062	0.201	0.109	3.40	4.50	40 x 63	
820	382LX821M450N062	0.243	0.133	3.70	5.20	40 x 63	
820	382LX821M450B052V	0.263	0.145	4.31	4.96	50 x 50	
820	380LX821M450A082	0.243	0.133	3.80	5.30	35 x 80	
1000	382LX102M450N082	0.216	0.119	4.20	5.90	40 x 80	
1000	382LX102M450B062V	0.216	0.119	4.96	6.94	50 x 63	
1200	380LX122M450A102	0.166	0.091	4.80	6.72	35 x 105	
1200	382LX122M450N082	0.166	0.091	4.85	6.80	40 x 80	
1200	382LX122M450B082V	0.180	0.099	5.71	7.99	50 x 80	
450 Vdc (500 Vdc Surge)							
1500	382LX152M450N102	0.133	0.073	5.81	8.13	40 x 105	
1500	382LX152M450B092V	0.144	0.079	6.55	9.17	50 x 92	
1800	382LX182M450B102V	0.120	0.066	7.38	10.30	50 x 105	
500 Vdc (550 Vdc Surge)							
100	380LX101M500A012	1.580	0.962	1.10	1.50	35 x 25	
120	380LX121M500A022	1.160	0.707	1.40	1.90	35 x 30	
150	380LX151M500A012	1.105	0.442	1.29	1.80	35 x 25	
180	380LX181M500A022	0.921	0.388	1.38	1.93	35 x 30	
180	380LX181M500A032	0.920	0.555	1.60	2.20	35 x 35	
220	380LX221M500A032	0.754	0.339	1.50	2.10	35 x 35	
220	380LX221M500A042	0.749	0.456	1.90	2.50	35 x 40	
270	380LX271M500A042	0.614	0.278	1.76	2.46	35 x 40	
270	380LX271M500A052	0.529	0.322	2.30	3.10	35 x 50	
270	382L271M500N042	0.549	0.342	2.40	3.20	40 x 40	
330	380LX331M500A452	0.502	0.251	1.99	2.79	35 x 45	
330	382LX331M500N042	0.502	0.276	2.16	3.00	40 x 40	
390	380LX391M500A052	0.425	0.234	2.22	3.11	35 x 50	
390	380LX391M500A062	0.423	0.257	2.70	3.60	35 x 63	
390	382L391M500N052	0.388	0.242	2.90	3.90	40 x 50	
470	380LX471M500A062	0.353	0.194	2.58	3.61	35 x 63	
470	380LX471M500A072	0.353	0.215	3.20	4.20	35 x 70	
470	382LX471M500N052	0.353	0.194	2.70	3.78	40 x 50	
470	382L471M500N062	0.311	0.194	3.40	4.50	40 x 63	
560	380LX561M500A082	0.295	0.179	3.60	4.80	35 x 80	
560	382LX561M500N062	0.326	0.179	3.11	4.35	40 x 63	
560	382LX561M500B052V	0.355	0.195	3.52	4.05	50 x 50	
680	380LX681M500A082	0.244	0.134	3.21	4.49	35 x 80	
680	382L681M500N082	0.218	0.135	4.50	6.00	40 x 80	
680	382LX681M500B062V	0.293	0.161	4.07	5.70	50 x 63	
820	380LX821M500A102	0.202	0.111	3.97	5.56	35 x 105	
820	382LX821M500N082	0.222	0.122	3.88	5.43	40 x 80	
1000	382LX102M500B082V	0.199	0.109	5.05	7.07	50 x 80	
1200	382LX122M500N102	0.152	0.084	5.90	8.26	40 x 105	
1200	382LX122M500B092V	0.166	0.091	5.74	8.04	50 x 92	
1500	382LX152M500B102V	0.144	0.079	6.65	9.31	50 x 105	

Type 380LQ 85 °C Compact, High Capacitance, Snap-In Aluminum

Higher Capacitance per Case Size



Type 380LQ is on average 27% smaller and more than 10 mm shorter than Type 380LX. This is achieved with a new can-closure method that permits installing capacitor elements into smaller cans. Approaching the capability of the 380LX, the new 380LQ enables you to shrink equipment size and retain the original performance.

Highlights

- New, more capacitance per case
- Compare to Type 380LX
- New, lower voltages down to 16 V

Specifications

Temperature Range	-40 °C to + 85 °C ≤ 315 Vdc -25 °C to + 85 °C ≥ 350 Vdc						
Rated Voltage Range	16 Vdc to 450 Vdc						
Capacitance Range	82 μF to 100,000 μF						
Capacitance Tolerance	±20%						
Leakage Current	≤ 3 √CV μA, 4 mA max, 5 minutes						
Ripple Current Multipliers	Ambient Temperature						
	45 °C		60 °C		70 °C		85 °C
	1.50		1.40		1.30		1.00
	Frequency						
	Voltage	50 Hz	60 Hz	120 Hz	500 kHz	1 kHz	10 kHz & Up
	16–100 WV	0.93	0.95	1.00	1.05	1.08	1.15
Low Temperature Characteristics	Impedance ratio: Z _{-20°C} /Z _{+25°C} ≤ 8 (16–50 Vdc) ≤ 4 (63–100 Vdc) ≤ 3 (150–450 Vdc)						
Endurance Life Test	2000 h at full load at 85 °C Δ Capacitance ±20% ESR 200% of limit DCL 100% of limit						
Shelf Life Test	1000 h at 85 °C Δ Capacitance ±20% ESR 200% of limit DCL 100% of limit						
Vibration	10 to 55 Hz, 0.06" and 10 g max, 2 h each plane						
RoHS Compliant							

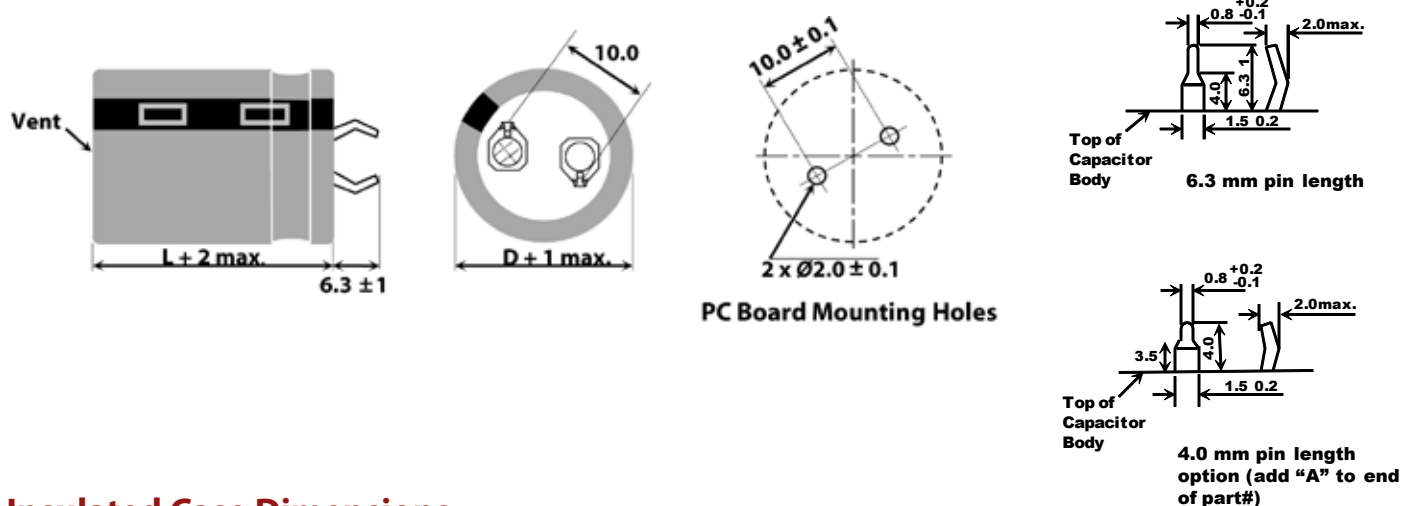
Type 380LQ 85 °C Compact, High Capacitance Snap-in Capacitors

Higher Capacitance per Case Size

Part Numbering System

380LQ	272	M	200	A05	2	A
Type	Cap	Tolerance	Voltage	Case Code	Insulation	Pin Styles
380LQ	561 = 560 μ F 272 = 2700 μ F 392 = 3900 μ F	M = $\pm$ 20%	016 = 16 Vdc 200 = 2000 Vdc 450 = 450 Vdc		2 = PVC	Blank = 2 pins snap-in 6.3 mm L A = 2 pins snap-in 4.0 mm L

Outline Drawing



Insulated Case Dimensions

Case Code	DIAMETER D		LENGTH L		Typical Weight (grams)	Case Code	DIAMETER D		LENGTH L		Typical Weight (grams)
	mm	inches	mm	inches			mm	inches	mm	inches	
H01	22	0.87	25	0.98	16	K01	30	1.18	25	0.98	30
H02	22	0.87	30	1.18	19	K02	30	1.18	30	1.18	35
H03	22	0.87	35	1.38	22	K03	30	1.18	35	1.38	40
H04	22	0.87	40	1.57	24	K04	30	1.18	40	1.57	44
H45	22	0.87	45	1.77	28	K45	30	1.18	45	1.77	49
H05	22	0.87	50	1.97	31	K05	30	1.18	50	1.97	53
J01	25	0.98	25	0.98	20	A01	35	1.38	25	0.98	42
J02	25	0.98	30	1.18	24	A02	35	1.38	30	1.18	48
J03	25	0.98	35	1.38	27	A03	35	1.38	35	1.38	54
J04	25	0.98	40	1.57	31	A04	35	1.38	40	1.57	60
J45	25	0.98	45	1.77	35	A45	35	1.38	45	1.77	67
J05	25	0.98	50	1.97	38	A05	35	1.38	50	1.97	74

Type 380LQ 85 °C Compact, High Capacitance Snap-in Capacitors

Higher Capacitance per Case Size

Ratings

Additional Voltages available at www.cde.com/catalogs/380LQ.pdf

Cap. (µF)	Catalog Part Number	ESR Max		Ripple Amps		Nominal
		@ 25° C		@ 85 °C		Size
		120 Hz (Ω)	20 kHz (Ω)	120 Hz (A)	20 kHz (A)	D x L (mm)
16 Vdc (20 Vdc Surge)						
12000	380LQ123M016H012	0.069	0.059	4.52	5.20	22 x 25
15000	380LQ153M016H022	0.055	0.047	5.26	6.05	22 x 30
18000	380LQ183M016H032	0.046	0.039	5.57	6.41	22 x 35
18000	380LQ183M016J012	0.046	0.039	5.57	6.41	25 x 25
22000	380LQ223M016H042	0.038	0.032	6.10	7.02	22 x 40
22000	380LQ223M016J022	0.038	0.032	6.10	7.02	25 x 30
27000	380LQ273M016H452	0.031	0.026	6.31	7.26	22 x 45
27000	380LQ273M016J032	0.031	0.026	6.31	7.26	25 x 25
27000	380LQ273M016K012	0.031	0.026	6.31	7.26	30 x 25
33000	380LQ333M016H052	0.025	0.021	6.84	7.87	22 x 50
33000	380LQ333M016J042	0.025	0.021	6.84	7.87	25 x 40
33000	380LQ333M016K022	0.025	0.021	6.84	7.87	30 x 30
33000	380LQ333M016A012	0.025	0.021	6.84	7.87	35 x 25
39000	380LQ393M016J452	0.024	0.020	6.94	7.98	25 x 45
39000	380LQ393M016K032	0.024	0.020	6.94	7.98	30 x 35
47000	380LQ473M016J052	0.023	0.019	7.47	8.59	25 x 50
47000	380LQ473M016K042	0.023	0.019	7.47	8.59	30 x 40
47000	380LQ473M016A022	0.023	0.019	7.47	8.59	35 x 30
56000	380LQ563M016K452	0.022	0.019	8.73	10.04	30 x 45
56000	380LQ563M016A032	0.022	0.018	8.73	10.04	35 x 35
68000	380LQ683M016K052	0.021	0.018	9.05	10.41	30 x 50
68000	380LQ683M016A042	0.021	0.018	9.05	10.41	35 x 40
82000	380LQ823M016A452	0.020	0.018	9.49	10.91	35 x 45
100000	380LQ104M016A052	0.019	0.018	10.18	11.71	35 x 50
35 Vdc (44 Vdc Surge)						
5600	380LQ562M035H012	0.104	0.078	3.36	3.86	22 x 25
8200	380LQ822M035H022	0.071	0.053	4.00	4.60	22 x 30
8200	380LQ822M035J012	0.071	0.053	4.00	4.60	25 x 25
10000	380LQ103M035H032	0.058	0.044	4.42	5.08	22 x 35
10000	380LQ103M035J022	0.058	0.044	4.42	5.08	25 x 30
12000	380LQ123M035H042	0.048	0.036	5.05	5.81	22 x 40
12000	380LQ123M035J032	0.048	0.036	5.05	5.81	25 x 35
12000	380LQ123M035K012	0.048	0.036	5.05	5.81	30 x 25
15000	380LQ153M035H452	0.039	0.029	5.57	6.41	22 x 45
15000	380LQ153M035J042	0.039	0.029	5.57	6.41	25 x 40
18000	380LQ183M035J452	0.032	0.024	5.68	6.53	25 x 45
18000	380LQ183M035K022	0.032	0.024	5.68	6.53	30 x 30
18000	380LQ183M035A012	0.032	0.024	5.68	6.53	35 x 25
22000	380LQ223M035J052	0.026	0.02	6.10	7.02	25 x 50
22000	380LQ223M035K032	0.026	0.02	6.10	7.02	30 x 35
22000	380LQ223M035A022	0.026	0.02	6.10	7.02	35 x 30
27000	380LQ273M035K452	0.021	0.016	6.84	7.87	30 x 45

Cap. (µF)	Catalog Part Number	ESR Max		Ripple Amps		Nominal
		@ 25° C		@ 85 °C		Size
		120 Hz (Ω)	20 kHz (Ω)	120 Hz (A)	20 kHz (A)	D x L (mm)
35 Vdc (44 Vdc Surge)						
27000	380LQ273M035A032	0.021	0.016	6.84	7.87	35 x 35
33000	380LQ333M035K052	0.018	0.013	7.15	8.22	30 x 50
33000	380LQ333M035A042	0.018	0.014	7.15	8.22	35 x 40
39000	380LQ393M035A452	0.017	0.014	7.91	9.10	35 x 45
47000	380LQ473M035A052	0.017	0.014	8.56	9.84	35 x 50
63 Vdc (79 Vdc Surge)						
2200	380LQ222M063H012	0.188	0.141	2.52	2.90	22 x 25
3300	380LQ332M063H022	0.126	0.094	4.10	4.72	22 x 30
3300	380LQ332M063J012	0.126	0.094	4.10	4.72	25 x 25
3900	380LQ392M063H032	0.106	0.080	4.44	5.11	22 x 35
3900	380LQ392M063J022	0.106	0.080	4.44	5.11	25 x 30
4700	380LQ472M063H042	0.088	0.066	4.86	5.59	22 x 40
5600	380LQ562M063H452	0.074	0.056	5.36	6.16	22 x 45
5600	380LQ562M063J042	0.074	0.056	5.36	6.16	25 x 40
6800	380LQ682M063J452	0.061	0.046	5.84	6.72	25 x 45
6800	380LQ682M063K022	0.061	0.046	5.84	6.72	30 x 30
6800	380LQ682M063A012	0.061	0.046	5.84	6.72	35 x 25
8200	380LQ822M063J052	0.051	0.038	6.00	6.90	25 x 50
8200	380LQ822M063K032	0.051	0.038	6.00	6.90	30 x 35
8200	380LQ822M063A022	0.051	0.038	6.00	6.90	35 x 30
10000	380LQ103M063K042	0.041	0.031	6.52	7.50	30 x 40
10000	380LQ103M063A032	0.041	0.031	6.52	7.50	35 x 35
12000	380LQ123M063K452	0.035	0.026	7.15	8.22	30 x 45
12000	380LQ123M063A042	0.035	0.026	7.15	8.22	35 x 40
15000	380LQ153M063A452	0.028	0.021	7.91	9.10	35 x 45
18000	380LQ183M063A052	0.023	0.018	8.55	9.83	35 x 50
18000	380LQ183M063A052	0.023	0.018	8.55	9.83	35 x 50
80 Vdc (100 Vdc Surge)						
1500	380LQ152M080H012	0.221	0.166	2.26	2.60	22 x 25
1800	380LQ182M080H022	0.184	0.138	2.52	2.90	22 x 30
2200	380LQ222M080H032	0.151	0.113	2.73	3.14	22 x 35
2200	380LQ222M080J012	0.151	0.113	2.73	3.14	25 x 25
2700	380LQ272M080H042	0.123	0.092	2.78	3.20	22 x 40
2700	380LQ272M080J022	0.123	0.092	2.78	3.20	25 x 30
3300	380LQ332M080H452	0.100	0.075	3.21	3.69	22 x 45
3300	380LQ332M080J032	0.100	0.075	3.21	3.69	25 x 35
3300	380LQ332M080K012	0.100	0.075	3.21	3.69	30 x 25
3900	380LQ392M080H052	0.085	0.064	3.59	4.13	22 x 50
3900	380LQ392M080J042	0.085	0.064	3.59	4.13	25 x 40
3900	380LQ392M080A012	0.085	0.064	3.59	4.13	35 x 25
4700	380LQ472M080H452	0.071	0.053	4.09	4.70	25 x 45
4700	380LQ472M080K022	0.071	0.053	4.09	4.70	30 x 30

Type 380LQ 85 °C Compact, High Capacitance Snap-in Capacitors

Higher Capacitance per Case Size

Additional Voltages available at www.cde.com/catalogs/380LQ.pdf

Cap. (μF)	Catalog Part Number	ESR Max		Ripple Amps		Nominal
		@ 25° C		@ 85 °C		Size
		120 Hz (Ω)	20 kHz (Ω)	120 Hz (A)	20 kHz (A)	D x L (mm)
80 Vdc (100 Vdc Surge)						
5600	380LQ562M080J052	0.059	0.044	4.55	5.23	25 x 50
5600	380LQ562M080K032	0.059	0.044	4.55	5.23	30 x 35
5600	380LQ562M080A022	0.059	0.044	4.55	5.23	35 x 30
6800	380LQ682M080K452	0.049	0.037	5.16	5.93	30 x 45
6800	380LQ682M080A032	0.049	0.037	5.16	5.93	35 x 35
8200	380LQ822M080K052	0.040	0.030	5.83	6.70	30 x 50
8200	380LQ822M080A042	0.040	0.030	5.83	6.70	35 x 40
10000	380LQ103M080A452	0.033	0.025	6.51	7.49	35 x 45
12000	380LQ122M080A052	0.028	0.021	7.28	8.37	35 x 50
100 Vdc (125 Vdc Surge)						
1000	380LQ102M100H012	0.332	0.216	1.96	2.25	22 x 25
1200	380LQ122M100J012	0.276	0.180	2.31	2.66	25 x 25
1500	380LQ152M100H022	0.221	0.144	2.57	2.96	22 x 30
1800	380LQ182M100H032	0.184	0.120	2.84	3.27	22 x 35
1800	380LQ182M100J022	0.184	0.120	2.84	3.27	25 x 30
2200	380LQ222M100H452	0.151	0.098	3.14	3.61	22 x 45
2200	380LQ222M100J032	0.151	0.098	3.14	3.61	25 x 35
2200	380LQ222M100K012	0.151	0.098	3.14	3.61	30 x 25
2700	380LQ272M100H052	0.123	0.080	3.71	4.27	22 x 50
2700	380LQ272M100J042	0.123	0.080	3.71	4.27	25 x 40
2700	380LQ272M100K022	0.123	0.080	3.71	4.27	30 x 30
2700	380LQ272M100A012	0.123	0.080	3.71	4.27	35 x 25
3300	380LQ332M100J452	0.100	0.065	4.06	4.67	25 x 45
3300	380LQ332M100K032	0.100	0.065	4.06	4.67	30 x 35
3900	380LQ392M100J052	0.085	0.055	4.54	5.22	25 x 50
3900	380LQ392M100K042	0.085	0.055	4.54	5.22	30 x 40
3900	380LQ392M100A022	0.085	0.055	4.54	5.22	35 x 30
4700	380LQ472M100K452	0.071	0.046	5.13	5.90	30 x 45
4700	380LQ472M100A032	0.071	0.046	5.13	5.90	35 x 35
5600	380LQ562M100K052	0.059	0.041	5.75	6.61	30 x 50
5600	380LQ562M100A042	0.059	0.038	5.75	6.61	35 x 40
6800	380LQ682M100A452	0.049	0.034	6.60	7.59	35 x 45
8200	380LQ822M100A052	0.040	0.030	7.29	8.38	35 x 50
200 Vdc (250 Vdc Surge)						
390	380LQ391M200H012	0.510	0.230	1.68	2.35	22 x 25
470	380LQ471M200H022	0.423	0.190	1.85	2.59	22 x 30
560	380LQ561M200H022	0.355	0.160	2.43	3.40	22 x 30
560	380LQ561M200J012	0.355	0.160	2.43	3.40	25 x 25
680	380LQ681M200H032	0.293	0.132	2.68	3.75	22 x 35
680	380LQ681M200J022	0.293	0.132	2.68	3.75	25 x 30
820	380LQ821M200H042	0.243	0.109	2.93	4.10	22 x 40
820	380LQ821M200J022	0.243	0.109	2.93	4.10	25 x 30

Additional Voltages available at www.fdc.com/catalogs/300VdcCap.pdf						
Cap. (µF)	Catalog Part Number	ESR Max @ 25° C		Ripple Amps @ 85 °C		Nominal Size
		120 Hz	20 kHz	120 Hz	20 kHz	D x L
		(Ω)	(Ω)	(A)	(A)	(mm)
200 Vdc (250 Vdc Surge)						
820	380LQ821M200K012	0.243	0.109	2.93	4.10	30 x 25
1000	380LQ102M200H452	0.199	0.090	3.25	4.55	22 x 45
1000	380LQ102M200J032	0.199	0.090	3.25	4.55	25 x 35
1000	380LQ102M200K022	0.199	0.090	3.25	4.55	30 x 30
1000	380LQ102M200A012	0.232	0.116	3.25	4.55	35 x 25
1200	380LQ122M200H052	0.166	0.075	3.50	4.90	22 x 50
1200	380LQ122M200J042	0.166	0.075	3.50	4.90	25 x 40
1200	380LQ122M200K022	0.166	0.075	3.50	4.90	30 x 30
1500	380LQ152M200J052	0.133	0.060	3.87	5.42	25 x 50
1500	380LQ152M200K032	0.144	0.065	3.87	5.42	30 x 35
1500	380LQ152M200A022	0.144	0.065	3.87	5.42	35 x 30
1800	380LQ182M200K452	0.160	0.080	4.32	6.05	30 x 45
1800	380LQ182M200A032	0.120	0.060	4.32	6.05	35 x 35
2200	380LQ222M200K052	0.098	0.049	4.92	6.89	30 x 50
2200	380LQ222M200A042	0.105	0.053	4.92	6.89	35 x 40
2700	380LQ272M200A052	0.086	0.043	5.45	7.63	35 x 50
250 Vdc (300 Vdc Surge)						
270	380LQ271M250H012	0.737	0.332	1.31	1.83	22 x 25
330	380LQ331M250H022	0.603	0.271	1.75	2.45	22 x 30
390	380LQ391M250H022	0.510	0.230	1.91	2.67	22 x 30
390	380LQ391M250J012	0.510	0.230	1.91	2.67	25 x 25
470	380LQ471M250H032	0.423	0.190	2.11	2.95	22 x 35
470	380LQ471M250J022	0.423	0.190	2.11	2.95	25 x 30
560	380LQ561M250H042	0.355	0.160	2.25	3.15	22 x 40
560	380LQ561M250J022	0.355	0.160	2.25	3.15	25 x 30
560	380LQ561M250K012	0.355	0.160	2.25	3.15	30 x 25
680	380LQ681M250H452	0.293	0.132	2.50	3.50	22 x 45
680	380LQ681M250J032	0.293	0.132	2.50	3.50	25 x 35
680	380LQ681M250K012	0.293	0.132	2.30	3.20	30 x 25
680	380LQ681M250K022	0.293	0.132	2.50	3.50	30 x 30
820	380LQ821M250H052	0.243	0.109	2.77	3.88	22 x 50
820	380LQ821M250J042	0.243	0.109	2.77	3.88	25 x 40
820	380LQ821M250K022	0.243	0.109	2.77	3.88	30 x 30
820	380LQ821M250A012	0.243	0.121	2.77	3.88	35 x 25
1000	380LQ102M250J452	0.199	0.090	3.32	4.65	25 x 45
1000	380LQ102M250K032	0.199	0.090	3.32	4.65	30 x 35
1000	380LQ102M250A022	0.199	0.090	3.32	4.65	35 x 30
1200	380LQ122M250K042	0.166	0.075	3.53	4.94	30 x 40
1200	380LQ122M250A032	0.166	0.083	3.53	4.94	35 x 35
1500	380LQ152M250K052	0.133	0.066	4.04	5.66	30 x 50
1500	380LQ152M250A042	0.133	0.066	4.04	5.66	35 x 40
1800	380LQ182M250A452	0.111	0.055	4.55	6.37	35 x 45

Type 380LQ 85 °C Compact, High Capacitance Snap-in Capacitors

Higher Capacitance per Case Size

Additional Voltages available at www.cde.com/catalogs/380LQ.pdf

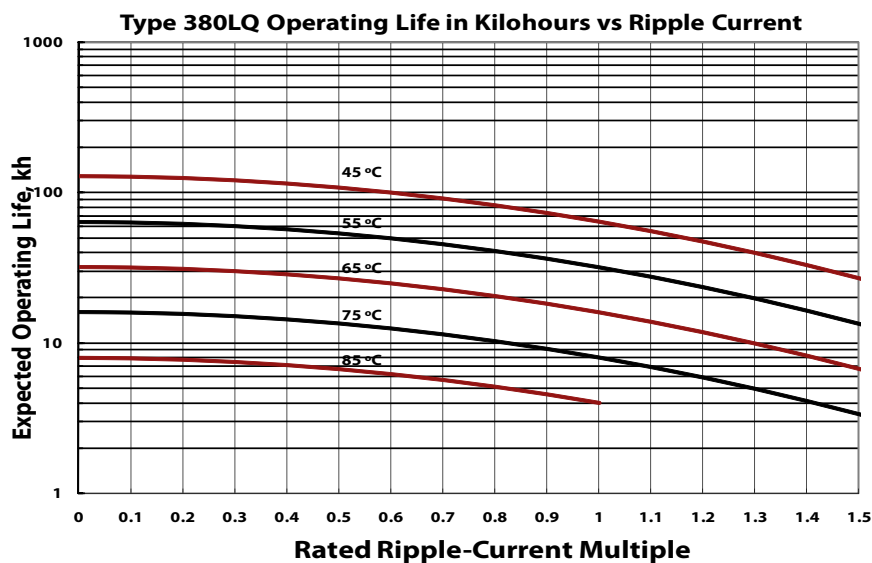
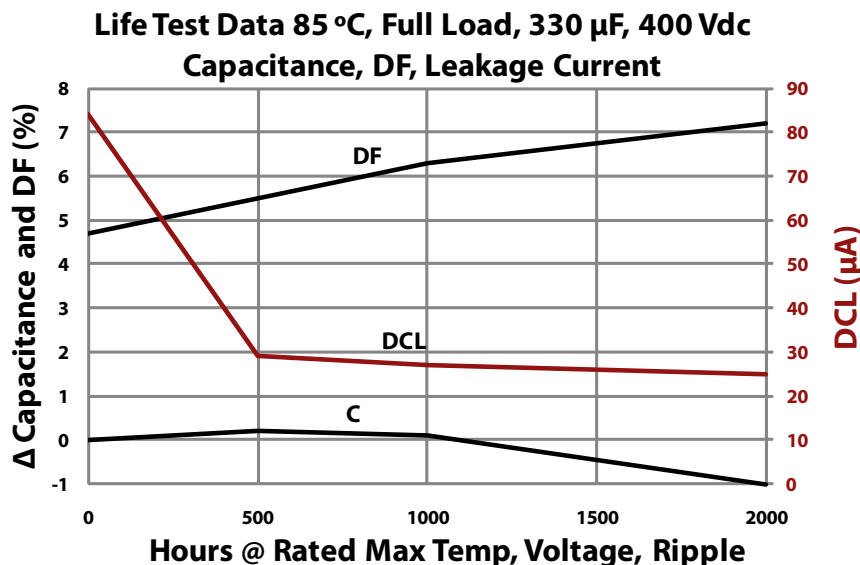
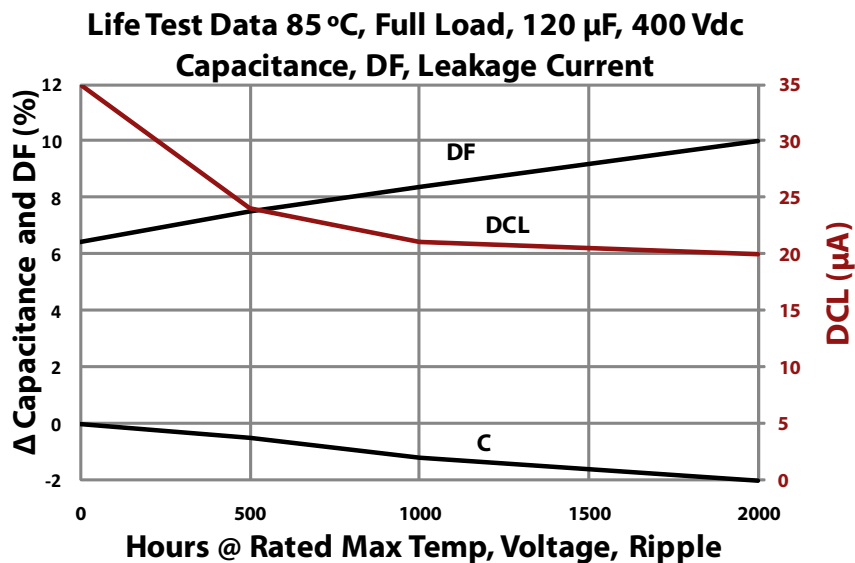
Cap.	Catalog	ESR Max		Ripple Amps		Nominal
		@ 25° C		@ 85 °C		Size
		120 Hz	20 kHz	120 Hz	20 kHz	D x L
(µF)	Part Number	(Ω)	(Ω)	(A)	(A)	(mm)
250 Vdc (300 Vdc Surge)						
2200	380LQ222M250A052	0.105	0.052	5.00	7.00	35 x 50
400 Vdc (450 Vdc Surge)						
120	380LQ121M400H012	1.658	0.830	1.02	1.43	22 x 25
150	380LQ151M400H022	1.326	0.660	1.16	1.62	22 x 30
180	380LQ181M400H022	1.105	0.552	1.30	1.80	22 x 30
180	380LQ181M400H032	1.105	0.552	1.44	2.02	22 x 35
220	380LQ221M400H032	0.904	0.452	1.40	1.90	22 x 35
220	380LQ221M400H042	0.904	0.452	1.49	2.09	22 x 40
220	380LQ221M400J022	0.904	0.452	1.49	2.09	25 x 30
270	380LQ271M400H452	0.737	0.368	1.67	2.34	22 x 45
270	380LQ271M400J032	0.737	0.368	1.67	2.34	25 x 35
270	380LQ271M400K022	0.737	0.368	1.67	2.34	30 x 30
330	380LQ331M400H052	0.603	0.301	1.90	2.66	22 x 50
330	380LQ331M400J042	0.603	0.301	1.90	2.66	25 x 40
330	380LQ331M400K022	0.603	0.301	1.90	2.66	30 x 30
330	380LQ331M400A012	0.603	0.301	1.90	2.66	35 x 25
390	380LQ391M400J452	0.510	0.255	2.13	2.98	25 x 45
390	380LQ391M400K032	0.510	0.255	2.13	2.98	30 x 35
390	380LQ391M400A022	0.510	0.255	2.13	2.98	35 x 30
470	380LQ471M400J052	0.423	0.212	2.39	3.35	25 x 50
470	380LQ471M400K042	0.423	0.212	2.39	3.35	30 x 40
470	380LQ471M400A022	0.423	0.212	2.39	3.35	35 x 30
560	380LQ561M400K452	0.355	0.178	2.69	3.77	30 x 45
560	380LQ561M400A032	0.355	0.178	2.69	3.77	35 x 35
680	380LQ681M400K052	0.293	0.148	2.96	4.14	30 x 50
680	380LQ681M400A042	0.293	0.148	2.70	3.80	35 x 40
680	380LQ681M400A452	0.293	0.148	2.96	4.14	35 x 45
820	380LQ821M400A452	0.243	0.122	2.95	4.15	35 x 45
820	380LQ821M400A052	0.243	0.122	3.25	4.55	35 x 50
420 Vdc (470 Vdc Surge)						
150	380LQ151M420H022	1.330	0.660	1.20	1.65	22 x 30
150	380LQ151M420J012	1.330	0.660	1.20	1.65	25 x 25
180	380LQ181M420H032	1.100	0.550	1.40	1.95	22 x 35
220	380LQ221M420H042	0.904	0.452	1.50	2.10	22 x 40
220	380LQ221M420J032	0.904	0.452	1.50	2.10	25 x 35
220	380LQ221M420K012	0.904	0.452	1.50	2.10	30 x 25
270	380LQ271M420H452	0.737	0.368	1.75	2.40	22 x 45
270	380LQ271M420J042	0.737	0.368	1.75	2.40	25 x 40

Cap. (μF)	Catalog Part Number	ESR Max		Ripple Amps		Nominal
		@ 25° C		@ 85 °C		Size
		120 Hz	20 kHz	120 Hz	20 kHz	D x L
		(Ω)	(Ω)	(A)	(A)	(mm)
420 Vdc (470 Vdc Surge)						
330	380LQ331M420J452	0.603	0.302	1.95	2.75	25 x 45
330	380LQ331M420K022	0.603	0.302	1.95	2.75	30 x 30
390	380LQ391M420J052	0.510	0.255	2.15	3.05	25 x 50
390	380LQ391M420K032	0.510	0.255	2.15	3.05	30 x 35
390	380LQ391M420A022	0.510	0.255	2.15	3.05	35 x 30
470	380LQ471M420K042	0.423	0.212	2.45	3.40	30 x 40
470	380LQ471M420A032	0.423	0.212	2.45	3.40	35 x 35
560	380LQ561M420K452	0.355	0.178	2.75	3.85	30 x 45
560	380LQ561M420A042	0.355	0.178	2.75	3.85	35 x 40
680	380LQ681M420A452	0.293	0.146	3.10	4.35	35 x 45
450 Vdc (500 Vdc Surge)						
82	380LQ820M450H012	2.426	1.213	0.83	1.16	22 x 25
100	380LQ101M450H012	1.990	0.995	0.93	1.30	22 x 25
120	380LQ121M450H022	1.656	0.829	1.04	1.46	22 x 30
150	380LQ151M450H032	1.326	0.663	1.19	1.67	22 x 35
150	380LQ151M450J022	1.326	0.663	1.19	1.67	25 x 30
180	380LQ181M450H042	1.105	0.553	1.35	1.89	22 x 40
180	380LQ181M450J022	1.105	0.553	1.35	1.89	25 x 30
220	380LQ221M450H452	0.904	0.452	1.55	2.17	22 x 45
220	380LQ221M450J032	0.904	0.452	1.45	2.00	25 x 35
220	380LQ221M450J042	0.904	0.452	1.55	2.17	25 x 40
220	380LQ221M450K022	0.904	0.452	1.55	2.17	30 x 30
220	380LQ221M450A012	0.904	0.452	1.55	2.17	35 x 25
270	380LQ271M450H052	0.737	0.368	1.78	2.49	22 x 50
270	380LQ271M450J042	0.737	0.368	1.78	2.49	25 x 40
270	380LQ271M450K022	0.737	0.368	1.78	2.49	30 x 30
330	380LQ331M450J052	0.603	0.302	2.01	2.81	25 x 50
330	380LQ331M450K032	0.603	0.302	1.90	2.60	30 x 35
330	380LQ331M450K042	0.603	0.302	2.01	2.81	30 x 40
330	380LQ331M450A022	0.603	0.302	2.01	2.81	35 x 30
390	380LQ391M450K042	0.510	0.255	2.24	3.14	30 x 40
390	380LQ391M450A032	0.510	0.255	2.24	3.14	35 x 35
470	380LQ471M450K452	0.423	0.212	2.53	3.54	30 x 45
470	380LQ471M450A042	0.423	0.212	2.53	3.54	35 x 40
560	380LQ561M450K052	0.355	0.178	2.82	3.95	30 x 50
560	380LQ561M450A452	0.355	0.178	2.82	3.95	35 x 45
680	380LQ681M450A052	0.293	0.146	3.00	4.25	35 x 50

Type 380LQ 85 °C Compact, High Capacitance Snap-in Capacitors

Higher Capacitance per Case Size

Typical Performance Curves



Type SLP 105 °C Snap-In Aluminum Electrolytic

Best Value 105 °C Snap-In Type



Type SLP is the best value package snap-in series for 105 °C, 3000 h operation. This series is the most cost-effective choice for DC filtering and power supply applications where high temperature, long life and high ripple capability are needed.

Highlights

- 3000 h ripple load life at rated voltage
- 105 °C rated
- Small case size with high capacitance
- Best for switching power supplies
- 22 mm to 35 mm diameter, 10 mm lead spacing
- Best value snap-in type
- High ripple current

Specifications

Temperature Range	-40 °C to +105 °C ≤ 100 Vdc -25 °C to +105 °C ≥ 160 Vdc				
Rated Voltage Range	10 Vdc to 450 Vdc				
Capacitance Range	47 μF to 56,000 μF				
Capacitance Tolerance	±20%				
Leakage Current	≤ 3 √CV μA at 5 minutes				
Ripple Current Multipliers	Ambient Temperature				
	20 °C - 45 °C	65 °C	85 °C	105 °C	
	2.00	1.89	1.52	1.00	
	Frequency				
	Voltage	60 Hz	120 Hz	1 kHz	10 kHz & Up
	10 - 100 Vdc	0.90	1.00	1.15	1.25
160 - 450 Vdc	0.80	1.00	1.25	1.47	
To apply multipliers, see ratings tables for ripple current values					
Low Temperature Characteristics	Impedance ratio: Z _{-20°C} /Z _{+25°C} ≤ 10 (10 Vdc) ≤ 8 (16-50 Vdc) ≤ 4 (63-100 Vdc) ≤ 3 (150-450 Vdc)				
Endurance Life	3,000 h @ full load @105 °C Δ Capacitance ±20% ESR ≤200% of limit DCL 100 % of limit				
Shelf Life	1,000 h @ 105 °C Δ Capacitance ±20% ESR ≤150% of limit DCL 100 % of limit				
Vibration	10 Hz to 55 Hz , 0.06" and 10g max 2 h for each plane				
RoHS Compliant					

Type SLP 105 °C Snap-In Aluminum Electrolytic

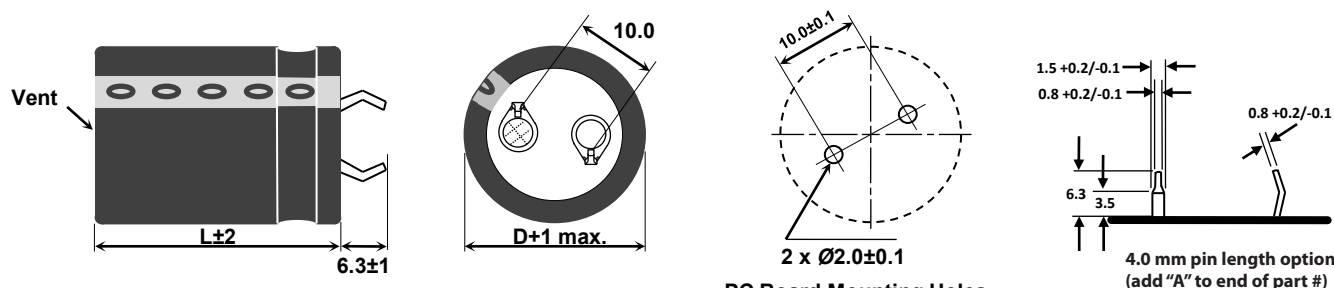
Best Value 105 °C Snap-In Type

Part Numbering System

SLP	562	M	025	A3	P	3	A
Type	Cap	Tolerance	Voltage	Case Code	Polarity	Insulating Sleeve	Pin Style
SLP	821 = 820 μ F 332 = 3300 μ F 103 = 10,000 μ F	M = $\pm$ 20%	025 = 25 Vdc 250 = 250 Vdc		P = Polarized	3 = PVC	Blank = 2 pins snap-in 6.3 mm L A = 2 pins snap-in 4.0 mm L

Diameter		Length					
		25	30	35	40	45	50
mm	(in)	(1.00)	(1.18)	(1.38)	(1.57)	(1.77)	(2.00)
22	(0.87)	A1	A3	A5	A7	A4	A9
25	(1.00)	C1	C3	C5	C7	C4	C9
30	(1.18)	E1	E3	E5	E7	E4	E9
35	(1.38)	H1	H3	H5	H7	H4	H9

Outline Drawing



PC Board Mounting Holes

Ratings

Cap (μ F)	3000 h @ 105 °C Catalog Part Number	Max 25 °C ESR (Ω) 120 Hz 20kHz	Max 105 °C Ripple (A _{rms}) 120 Hz 20kHz	Nominal Size (DxL) (mm)
10 Vdc (13 Vdc Surge)				
10000	SLP103M010A1P3	0.073	0.055	1.80 2.25 22 x 25
12000	SLP123M010A3P3	0.061	0.046	2.20 2.75 22 x 30
12000	SLP123M010C1P3	0.061	0.046	2.20 2.75 25 x 25
15000	SLP153M010A5P3	0.049	0.037	2.30 2.88 22 x 35
15000	SLP153M010C1P3	0.049	0.037	2.30 2.88 25 x 25
18000	SLP183M010A7P3	0.041	0.031	2.52 3.15 22 x 40
18000	SLP183M010C3P3	0.041	0.031	2.40 3.00 25 x 30
22000	SLP223M010A4P3	0.033	0.025	2.60 3.25 22 x 45
22000	SLP223M010C5P3	0.033	0.025	2.60 3.25 25 x 35
27000	SLP273M010A9P3	0.027	0.020	3.19 3.99 22 x 50
27000	SLP273M010C7P3	0.027	0.020	3.10 3.88 25 x 40
33000	SLP333M010C4P3	0.022	0.017	3.40 4.25 25 x 45
33000	SLP333M010H3P3	0.022	0.017	3.40 4.25 35 x 30
39000	SLP393M010E7P3	0.019	0.014	3.79 4.74 30 x 40
39000	SLP393M010H3P3	0.019	0.014	3.70 4.63 35 x 30
47000	SLP473M010E4P3	0.016	0.012	4.26 5.33 30 x 45
47000	SLP473M010H5P3	0.016	0.012	4.20 5.25 35 x 35
56000	SLP563M010H7P3	0.013	0.010	5.00 6.25 35 x 40
16 Vdc (20 Vdc Surge)				
6800	SLP682M016A1P3	0.098	0.074	2.20 2.75 22 x 25
8200	SLP822M016A3P3	0.081	0.061	2.40 3.00 22 x 30
10000	SLP103M016A3P3	0.066	0.050	2.60 3.25 22 x 30

Additional Voltages and Sizes available at www.cde.com/catalogs/SLP.pdf

Cap (μ F)	3000 h @ 105 °C Catalog Part Number	Max 25 °C ESR (Ω) 120 Hz 20kHz	Max 105 °C Ripple (A _{rms}) 120 Hz 20kHz	Nominal Size (DxL) (mm)
16 Vdc (20 Vdc Surge)				
10000	SLP103M016C1P3	0.066	0.050	2.60 3.25 25 x 25
12000	SLP123M016A5P3	0.055	0.041	2.90 3.63 22 x 35
12000	SLP123M016C3P3	0.055	0.041	2.90 3.63 25 x 30
15000	SLP153M016A7P3	0.044	0.033	3.20 4.00 22 x 40
15000	SLP153M016C5P3	0.044	0.033	3.25 4.06 25 x 35
15000	SLP153M016E1P3	0.044	0.033	3.11 3.89 30 x 25
18000	SLP183M016A4P3	0.037	0.028	3.50 4.38 22 x 45
18000	SLP183M016C7P3	0.037	0.028	3.50 4.38 25 x 40
18000	SLP183M016E3P3	0.037	0.028	3.50 4.38 30 x 30
22000	SLP223M016C4P3	0.030	0.023	3.80 4.75 25 x 45
22000	SLP223M016E3P3	0.030	0.023	3.80 4.75 30 x 30
22000	SLP223M016H3P3	0.030	0.023	3.80 4.75 35 x 30
27000	SLP273M016C9P3	0.025	0.019	4.20 5.25 25 x 50
27000	SLP273M016E5P3	0.025	0.019	4.20 5.25 30 x 35
27000	SLP273M016H3P3	0.025	0.019	4.20 5.25 35 x 30
33000	SLP333M016E7P3	0.020	0.015	4.70 5.88 30 x 40
33000	SLP333M016H5P3	0.020	0.015	4.70 5.88 35 x 35
39000	SLP393M016E4P3	0.017	0.013	4.90 6.13 30 x 45
39000	SLP393M016H7P3	0.017	0.013	5.10 6.38 35 x 40
47000	SLP473M016E9P3	0.014	0.011	5.27 6.59 30 x 50
47000	SLP473M016H4P3	0.014	0.011	5.50 6.88 35 x 45

Type SLP 105 °C Snap-In Aluminum Electrolytic

Best Value 105 °C Snap-In Type

Additional Voltages and Sizes available at www.cde.com/catalogs/SLP.pdf

Cap	3000 h @ 105 °C	Max 25 °C ESR		Max 105 °C Ripple		Nominal
Catalog		(Ω)		(A _{rms})		Size (DxL)
Part Number		120 Hz	20kHz	120 Hz	20kHz	(mm)
25 Vdc (32 Vdc Surge)						
3300	SLP332M025A1P3	0.181	0.136	1.70	2.13	22 x 25
4700	SLP472M025A1P3	0.127	0.095	2.00	2.50	22 x 25
5600	SLP562M025A3P3	0.107	0.080	2.20	2.75	22 x 30
6800	SLP682M025A3P3	0.088	0.066	2.40	3.00	22 x 30
6800	SLP682M025C1P3	0.088	0.066	2.40	3.00	25 x 25
8200	SLP822M025A5P3	0.073	0.055	2.70	3.38	22 x 35
8200	SLP822M025C3P3	0.073	0.055	2.70	3.38	25 x 30
8200	SLP822M025E1P3	0.073	0.055	2.70	3.38	30 x 25
10000	SLP103M025A7P3	0.060	0.045	3.00	3.75	22 x 40
10000	SLP103M025C5P3	0.060	0.045	3.00	3.75	25 x 35
10000	SLP103M025E3P3	0.060	0.045	3.00	3.75	30 x 30
12000	SLP123M025A9P3	0.050	0.038	3.20	4.00	22 x 50
12000	SLP123M025C7P3	0.050	0.038	3.20	4.00	25 x 40
15000	SLP153M025C4P3	0.040	0.030	3.60	4.50	25 x 45
15000	SLP153M025E5P3	0.040	0.030	3.60	4.50	30 x 35
15000	SLP153M025H3P3	0.040	0.030	3.60	4.50	35 x 30
18000	SLP183M025E7P3	0.033	0.025	3.90	4.88	30 x 40
18000	SLP183M025H5P3	0.033	0.025	3.90	4.88	35 x 35
22000	SLP223M025E4P3	0.027	0.020	4.30	5.38	30 x 45
22000	SLP223M025H5P3	0.027	0.020	4.30	5.38	35 x 35
27000	SLP273M025H4P3	0.022	0.017	4.80	6.00	35 x 45
33000	SLP333M025H9P3	0.018	0.014	5.55	6.94	35 x 50
35 Vdc (44 Vdc Surge)						
3900	SLP392M035A3P3	0.136	0.102	2.00	2.50	22 x 30
4700	SLP472M035A5P3	0.113	0.085	2.20	2.75	22 x 35
4700	SLP472M035C1P3	0.113	0.085	2.20	2.75	25 x 25
4700	SLP472M035C5P3	0.113	0.085	2.53	3.16	25 x 35
5600	SLP562M035A5P3	0.095	0.071	2.40	3.00	22 x 35
5600	SLP562M035C3P3	0.095	0.071	2.40	3.00	25 x 30
6800	SLP682M035A7P3	0.078	0.059	2.60	3.25	22 x 40
6800	SLP682M035C5P3	0.078	0.059	2.60	3.25	25 x 35
6800	SLP682M035E1P3	0.078	0.059	2.78	3.48	30 x 25
8200	SLP822M035A9P3	0.065	0.049	2.90	3.63	22 x 50
8200	SLP822M035C7P3	0.065	0.049	2.90	3.63	25 x 40
8200	SLP822M035E3P3	0.065	0.049	2.90	3.63	30 x 30
10000	SLP103M035C4P3	0.053	0.040	3.20	4.00	25 x 45
10000	SLP103M035E5P3	0.053	0.040	3.20	4.00	30 x 35
10000	SLP103M035C7P3	0.053	0.040	3.04	3.80	25 x 40
12000	SLP123M035C9P3	0.044	0.033	3.50	4.38	25 x 50
12000	SLP123M035E7P3	0.044	0.033	3.50	4.38	30 x 40
12000	SLP123M035H3P3	0.044	0.033	3.50	4.38	35 x 30
15000	SLP153M035E4P3	0.035	0.026	3.90	4.88	30 x 45
15000	SLP153M035H5P3	0.035	0.026	3.90	4.88	35 x 35

Additional Voltages and Sizes available at www.kdc.com/catalogs/SLP.pdf						
Cap (µF)	3000 h @ 105 °C Catalog Part Number	Max 25 °C ESR (Ω) 120 Hz 20kHz		Max 105 °C Ripple (A _{rms}) 120 Hz 20kHz		Nominal Size (DxL) (mm)
35 Vdc (44 Vdc Surge)						
18000	SLP183M035H7P3	0.029	0.022	4.51	5.64	35 x 40
22000	SLP223M035H4P3	0.024	0.018	5.24	6.55	35 x 45
22000	SLP223M035H9P3	0.024	0.018	5.48	6.85	35 x 50
50 Vdc (63 Vdc Surge)						
1800	SLP182M050A1P3	0.258	0.194	1.50	1.88	22 x 25
2200	SLP222M050A3P3	0.211	0.158	1.70	2.13	22 x 30
2700	SLP272M050A3P3	0.172	0.129	1.80	2.25	22 x 30
2700	SLP272M050C1P3	0.172	0.129	1.80	2.25	25 x 25
3300	SLP332M050A5P3	0.141	0.106	2.00	2.50	22 x 35
3300	SLP332M050C3P3	0.141	0.106	2.00	2.50	25 x 30
3900	SLP392M050A7P3	0.119	0.089	2.23	2.79	22 x 40
3900	SLP392M050C3P3	0.119	0.089	2.20	2.75	25 x 30
3900	SLP392M050E1P3	0.119	0.089	2.20	2.75	30 x 25
4700	SLP472M050A4P3	0.099	0.074	2.50	3.13	22 x 45
4700	SLP472M050C5P3	0.099	0.074	2.43	3.04	25 x 35
4700	SLP472M050E3P3	0.099	0.074	2.50	3.13	30 x 30
5600	SLP562M050A9P3	0.083	0.062	2.80	3.50	22 x 50
5600	SLP562M050C7P3	0.083	0.062	2.80	3.50	25 x 40
5600	SLP562M050E3P3	0.083	0.062	2.76	3.45	30 x 30
6800	SLP682M050C4P3	0.068	0.051	3.30	4.13	25 x 45
6800	SLP682M050E5P3	0.068	0.051	3.30	4.13	30 x 35
6800	SLP682M050H3P3	0.068	0.051	3.30	4.13	35 x 30
8200	SLP822M050E7P3	0.057	0.043	3.71	4.64	30 x 40
8200	SLP822M050H5P3	0.057	0.043	3.85	4.81	35 x 35
10000	SLP103M050E9P3	0.046	0.035	4.51	5.64	30 x 50
10000	SLP103M050H7P3	0.046	0.035	4.49	5.61	35 x 40
12000	SLP123M050H4P3	0.039	0.029	4.56	5.70	35 x 45
15000	SLP153M050H9P3	0.031	0.023	4.80	6.00	35 x 50
63 Vdc (79 Vdc Surge)						
1200	SLP122M063A1P3	0.332	0.249	1.40	1.75	22 x 25
1500	SLP152M063A3P3	0.265	0.199	1.50	1.88	22 x 30
1800	SLP182M063A3P3	0.221	0.166	1.70	2.13	22 x 30
1800	SLP182M063C1P3	0.221	0.166	1.70	2.13	25 x 25
2200	SLP222M063A5P3	0.181	0.136	2.00	2.50	22 x 35
2200	SLP222M063C3P3	0.181	0.136	2.00	2.50	25 x 30
2700	SLP272M063A7P3	0.147	0.110	2.20	2.75	22 x 40
2700	SLP272M063C5P3	0.147	0.110	2.20	2.75	25 x 35
2700	SLP272M063E1P3	0.147	0.110	2.20	2.75	30 x 25
3300	SLP332M063A4P3	0.121	0.091	2.60	3.25	22 x 45
3300	SLP332M063C5P3	0.121	0.091	2.39	2.99	25 x 35
3300	SLP332M063E3P3	0.121	0.091	2.50	3.13	30 x 30
3900	SLP392M063C7P3	0.102	0.077	2.57	3.21	25 x 40
3900	SLP392M063E5P3	0.102	0.077	2.70	3.38	30 x 35

Type SLP 105 °C Snap-In Aluminum Electrolytic

Best Value 105 °C Snap-In Type

Additional Voltages and Sizes available at www.cde.com/catalogs/SLP.pdf

Cap (µF)	3000 h @ 105 °C Catalog Part Number	Max 25 °C ESR (Ω) 120 Hz 20kHz	Max 105 °C Ripple (A _{rms}) 120 Hz 20kHz	Nominal Size (DxL) (mm)
63 Vdc (79 Vdc Surge)				
4700	SLP472M063C9P3	0.085	0.064	3.00 3.75 25 x 50
4700	SLP472M063E7P3	0.085	0.064	3.00 3.75 30 x 40
4700	SLP472M063H3P3	0.085	0.064	3.00 3.75 35 x 30
5600	SLP562M063E7P3	0.071	0.053	3.22 4.03 30 x 40
5600	SLP562M063H5P3	0.071	0.053	3.30 4.13 35 x 35
6800	SLP682M063E9P3	0.059	0.044	3.86 4.83 30 x 50
6800	SLP682M063H7P3	0.059	0.044	3.84 4.80 35 x 40
8200	SLP822M063H4P3	0.049	0.037	4.43 5.54 35 x 45
10000	SLP103M063H9P3	0.040	0.030	5.11 6.39 35 x 50
10000	SLP103M063H4P3	0.040	0.030	4.89 6.11 35 x 45
80 Vdc (100 Vdc Surge)				
1000	SLP102M080A1P3	0.332	0.249	1.19 1.49 22 x 25
1200	SLP122M080A3P3	0.276	0.207	1.50 1.88 22 x 30
1500	SLP152M080A3P3	0.221	0.166	1.59 1.99 22 x 30
1500	SLP152M080C1P3	0.221	0.166	1.59 1.99 25 x 25
1800	SLP182M080A5P3	0.184	0.138	1.79 2.24 22 x 35
1800	SLP182M080C3P3	0.184	0.138	1.71 2.14 25 x 30
2200	SLP222M080A7P3	0.151	0.113	2.03 2.54 22 x 40
2200	SLP222M080C5P3	0.151	0.113	2.10 2.63 25 x 35
2200	SLP222M080E1P3	0.151	0.113	1.98 2.48 30 x 25
2700	SLP272M080A4P3	0.123	0.092	2.39 2.99 22 x 45
2700	SLP272M080C7P3	0.123	0.092	2.35 2.94 25 x 40
2700	SLP272M080E3P3	0.123	0.092	2.35 2.94 30 x 30
3300	SLP332M080C4P3	0.101	0.076	2.64 3.30 25 x 45
3300	SLP332M080E5P3	0.101	0.076	2.61 3.26 30 x 35
3300	SLP332M080H3P3	0.101	0.076	2.60 3.25 35 x 30
3900	SLP392M080C9P3	0.085	0.064	2.92 3.65 25 x 50
3900	SLP392M080E7P3	0.085	0.064	2.82 3.53 30 x 40
3900	SLP392M080H3P3	0.085	0.064	2.97 3.71 35 x 30
4700	SLP472M080E4P3	0.071	0.053	3.34 4.18 30 x 45
4700	SLP472M080H5P3	0.071	0.053	3.38 4.23 35 x 35
5600	SLP562M080E9P3	0.059	0.044	3.80 4.75 30 x 50
5600	SLP562M080H7P3	0.059	0.044	3.80 4.75 35 x 40
6800	SLP682M080H4P3	0.049	0.037	3.90 4.88 35 x 45
8200	SLP822M080H9P3	0.040	0.030	4.20 5.25 35 x 50
100 Vdc (125 Vdc Surge)				
680	SLP681M100A1P3	0.390	0.293	1.09 1.36 22 x 25
820	SLP821M100A3P3	0.324	0.243	1.40 1.75 22 x 30
1000	SLP102M100A3P3	0.265	0.199	1.47 1.84 22 x 30
1000	SLP102M100C1P3	0.265	0.199	1.45 1.81 25 x 25
1200	SLP122M100A5P3	0.221	0.166	1.69 2.11 22 x 35
1200	SLP122M100C3P3	0.221	0.166	1.68 2.10 25 x 30
1500	SLP152M100A7P3	0.177	0.133	1.97 2.46 22 x 40

Cap (µF)	3000 h @ 105 °C Catalog Part Number	Max 25 °C ESR (Ω) 120 Hz 20kHz	Max 105 °C Ripple (A _{rms}) 120 Hz 20kHz	Nominal Size (DxL) (mm)
100 Vdc (125 Vdc Surge)				
1500	SLP152M100C5P3	0.177	0.133	1.98 2.48 25 x 35
1500	SLP152M100E1P3	0.177	0.133	1.95 2.44 30 x 25
1500	SLP152M100E3P3	0.177	0.133	2.09 2.61 30 x 30
1800	SLP182M100A4P3	0.147	0.110	2.23 2.79 22 x 45
1800	SLP182M100C7P3	0.147	0.110	2.20 2.75 25 x 40
1800	SLP182M100E3P3	0.147	0.110	2.20 2.75 30 x 30
2200	SLP222M100C4P3	0.121	0.091	2.53 3.16 25 x 45
2200	SLP222M100E5P3	0.121	0.091	2.55 3.19 30 x 35
2200	SLP222M100H3P3	0.121	0.091	2.60 3.25 35 x 30
2700	SLP272M100C9P3	0.098	0.074	2.82 3.53 25 x 50
2700	SLP272M100E7P3	0.098	0.074	2.86 3.58 30 x 40
2700	SLP272M100H5P3	0.098	0.074	2.90 3.63 35 x 35
3300	SLP332M100E4P3	0.080	0.060	3.30 4.13 30 x 45
3300	SLP332M100H5P3	0.080	0.060	3.25 4.06 35 x 35
3900	SLP392M100E9P3	0.068	0.051	3.60 4.50 30 x 50
3900	SLP392M100H7P3	0.068	0.051	3.67 4.59 35 x 40
4700	SLP472M100H4P3	0.056	0.042	3.80 4.75 35 x 45
5600	SLP562M100H9P3	0.047	0.035	4.05 5.06 35 x 50
160 Vdc (200Vdc Surge)				
330	SLP331M160A1P3	0.603	0.452	1.20 1.76 22 x 25
390	SLP391M160A3P3	0.510	0.383	1.30 1.91 22 x 30
470	SLP471M160A3P3	0.423	0.317	1.55 2.28 22 x 30
470	SLP471M160C1P3	0.423	0.317	1.55 2.28 25 x 25
560	SLP561M160A5P3	0.355	0.266	1.67 2.45 22 x 35
560	SLP561M160C3P3	0.355	0.266	1.67 2.45 25 x 30
680	SLP681M160A7P3	0.293	0.220	1.82 2.68 22 x 40
680	SLP681M160C5P3	0.293	0.220	1.85 2.72 25 x 35
680	SLP681M160E1P3	0.293	0.220	1.82 2.68 30 x 25
820	SLP821M160A4P3	0.243	0.182	2.04 3.00 22 x 45
820	SLP821M160C7P3	0.243	0.182	2.04 3.00 25 x 40
820	SLP821M160E3P3	0.243	0.182	2.04 3.00 30 x 30
1000	SLP102M160C4P3	0.199	0.149	2.40 3.53 25 x 45
1000	SLP102M160E5P3	0.199	0.149	2.25 3.31 30 x 35
1200	SLP122M160C9P3	0.166	0.125	2.62 3.85 25 x 50
1200	SLP122M160E7P3	0.166	0.125	2.49 3.66 30 x 40
1200	SLP122M160H3P3	0.166	0.125	2.49 3.66 35 x 30
1500	SLP152M160E4P3	0.133	0.100	2.84 4.17 30 x 45
1500	SLP152M160H5P3	0.133	0.100	2.84 4.17 35 x 35
1800	SLP182M160E9P3	0.111	0.083	3.32 4.88 30 x 50
1800	SLP182M160H7P3	0.111	0.083	3.00 4.41 35 x 40
2200	SLP222M160H4P3	0.090	0.068	3.50 5.15 35 x 45
180 Vdc (225Vdc Surge)				
270	SLP271M180A1P3	0.737	0.553	1.00 1.47 22 x 25

Type SLP 105 °C Snap-In Aluminum Electrolytic

Best Value 105 °C Snap-In Type

Additional Voltages and Sizes available at www.cde.com/catalogs/SLP.pdf

Cap (µF)	3000 h @ 105 °C Catalog Part Number	Max 25 °C ESR (Ω) 120 Hz 20kHz	Max 105 °C Ripple (A _{rms}) 120 Hz 20kHz	Nominal Size (DxL) (mm)
180 Vdc (225Vdc Surge)				
330	SLP331M180A3P3	0.603	0.452	1.20 1.76 22 x 30
390	SLP391M180A3P3	0.510	0.383	1.35 1.98 22 x 30
390	SLP391M180C1P3	0.510	0.383	1.35 1.98 25 x 25
470	SLP471M180A5P3	0.423	0.317	1.50 2.21 22 x 35
470	SLP471M180C3P3	0.423	0.317	1.50 2.21 25 x 30
560	SLP561M180A7P3	0.355	0.266	1.67 2.45 22 x 40
560	SLP561M180C3P3	0.355	0.266	1.67 2.45 25 x 30
560	SLP561M180E1P3	0.355	0.266	1.67 2.45 30 x 25
680	SLP681M180A4P3	0.293	0.220	1.78 2.62 22 x 45
680	SLP681M180C5P3	0.293	0.220	1.78 2.62 25 x 35
680	SLP681M180E3P3	0.293	0.220	1.78 2.62 30 x 30
820	SLP821M180A9P3	0.243	0.182	2.04 3.00 22 x 50
820	SLP821M180C7P3	0.243	0.182	2.04 3.00 25 x 40
820	SLP821M180E3P3	0.243	0.182	2.04 3.00 30 x 30
1000	SLP102M180C4P3	0.199	0.149	2.30 3.38 25 x 45
1000	SLP102M180E5P3	0.199	0.149	2.30 3.38 30 x 35
1000	SLP102M180H3P3	0.199	0.149	2.30 3.38 35 x 30
1200	SLP122M180E7P3	0.166	0.125	2.55 3.75 30 x 40
1200	SLP122M180H5P3	0.166	0.125	2.55 3.75 35 x 35
1500	SLP152M180E4P3	0.133	0.100	2.90 4.26 30 x 45
1500	SLP152M180H7P3	0.133	0.100	2.90 4.26 35 x 40
1800	SLP182M180H4P3	0.111	0.083	3.30 4.85 35 x 45
2200	SLP222M180H9P3	0.090	0.068	3.65 5.37 35 x 50
200 Vdc (250 Vdc Surge)				
220	SLP221M200A1P3	0.905	0.679	0.99 1.46 22 x 25
220	SLP221M200A3P3	0.905	0.679	1.07 1.57 22 x 30
270	SLP271M200A1P3	0.737	0.553	1.10 1.62 22 x 25
330	SLP331M200A3P3	0.603	0.452	1.25 1.84 22 x 30
330	SLP331M200C1P3	0.603	0.452	1.25 1.84 25 x 25
330	SLP331M200C3P3	0.603	0.452	1.35 1.98 25 x 30
390	SLP391M200A5P3	0.510	0.383	1.35 1.98 22 x 35
390	SLP391M200C3P3	0.510	0.383	1.35 1.98 25 x 30
470	SLP471M200A7P3	0.423	0.317	1.50 2.21 22 x 40
470	SLP471M200C3P3	0.423	0.317	1.50 2.21 25 x 30
470	SLP471M200C5P3	0.423	0.317	1.60 2.35 25 x 35
470	SLP471M200E1P3	0.423	0.317	1.50 2.21 30 x 25
560	SLP561M200A4P3	0.355	0.266	1.67 2.45 22 x 45
560	SLP561M200C5P3	0.355	0.266	1.70 2.50 25 x 35
560	SLP561M200E1P3	0.355	0.266	1.67 2.45 30 x 25
680	SLP681M200A9P3	0.293	0.220	1.78 2.62 22 x 50
680	SLP681M200C5P3	0.293	0.220	1.72 2.53 25 x 35
680	SLP681M200C7P3	0.293	0.220	1.82 2.68 25 x 40
680	SLP681M200E3P3	0.293	0.220	1.78 2.62 30 x 30

Cap (µF)	3000 h @ 105 °C Catalog Part Number	Max 25 °C ESR (Ω) 120 Hz 20kHz	Max 105 °C Ripple (A _{rms}) 120 Hz 20kHz	Nominal Size (DxL) (mm)
200 Vdc (250 Vdc Surge)				
820	SLP821M200C4P3	0.243	0.182	2.10 3.09 25 x 45
820	SLP821M200E5P3	0.243	0.182	2.04 3.00 30 x 35
820	SLP821M200H3P3	0.243	0.182	2.04 3.00 35 x 30
1000	SLP102M200C9P3	0.199	0.149	2.42 3.56 25 x 50
1000	SLP102M200E7P3	0.199	0.149	2.30 3.38 30 x 40
1000	SLP102M200H5P3	0.199	0.149	2.30 3.38 35 x 35
1200	SLP122M200E4P3	0.166	0.125	2.65 3.90 30 x 45
1200	SLP122M200H5P3	0.166	0.125	2.65 3.90 35 x 35
1200	SLP122M200H3P3	0.166	0.125	2.49 3.66 35 x 30
1500	SLP152M200H7P3	0.133	0.100	3.08 4.53 35 x 40
1800	SLP182M200H4P3	0.111	0.083	3.48 5.12 35 x 45
1800	SLP182M200H7P3	0.111	0.083	3.31 4.87 35 x 40
220 Vdc (270 Vdc Surge)				
220	SLP221M220A1P3	0.905	0.679	1.00 1.47 22 x 25
270	SLP271M220A3P3	0.737	0.553	1.15 1.69 22 x 30
330	SLP331M220A5P3	0.603	0.452	1.25 1.84 22 x 35
330	SLP331M220C1P3	0.603	0.452	1.25 1.84 25 x 25
390	SLP391M220A5P3	0.510	0.383	1.40 2.06 22 x 35
390	SLP391M220C3P3	0.510	0.383	1.40 2.06 25 x 30
470	SLP471M220A7P3	0.423	0.317	1.51 2.22 22 x 40
470	SLP471M220C3P3	0.423	0.317	1.44 2.12 25 x 30
470	SLP471M220E1P3	0.423	0.317	1.50 2.21 30 x 25
560	SLP561M220A4P3	0.355	0.266	1.70 2.50 22 x 45
560	SLP561M220C5P3	0.355	0.266	1.64 2.41 25 x 35
560	SLP561M220E3P3	0.355	0.266	1.70 2.50 30 x 30
560	SLP561M220H1P3	0.355	0.266	1.71 2.51 35 x 25
680	SLP681M220C7P3	0.293	0.220	1.84 2.70 25 x 40
680	SLP681M220E5P3	0.293	0.220	1.93 2.84 30 x 35
680	SLP681M220H3P3	0.293	0.220	1.89 2.78 35 x 30
820	SLP821M220C4P3	0.243	0.182	2.08 3.06 25 x 45
820	SLP821M220E7P3	0.243	0.182	2.19 3.22 30 x 40
820	SLP821M220H3P3	0.243	0.182	2.16 3.18 35 x 30
1000	SLP102M220E4P3	0.199	0.149	2.50 3.68 30 x 45
1000	SLP102M220H5P3	0.199	0.149	2.44 3.59 35 x 35
1200	SLP122M220H7P3	0.166	0.125	2.79 4.10 35 x 40
1500	SLP152M220H4P3	0.133	0.100	3.22 4.73 35 x 45
250 Vdc (300 Vdc Surge)				
180	SLP181M250A1P3	1.106	0.830	0.88 1.29 22 x 25
180	SLP181M250C1P3	1.106	0.830	0.95 1.40 25 x 25
220	SLP221M250A3P3	0.905	0.679	1.00 1.47 22 x 30
220	SLP221M250C1P3	0.905	0.679	1.08 1.59 25 x 25
270	SLP271M250A5P3	0.737	0.553	1.18 1.73 22 x 35
270	SLP271M250C3P3	0.737	0.553	1.27 1.87 25 x 30

Type SLP 105 °C Snap-In Aluminum Electrolytic

Best Value 105 °C Snap-In Type

Additional Voltages and Sizes available at www.cde.com/catalogs/SLP.pdf

Cap (µF)	3000 h @ 105 °C Catalog Part Number	Max 25 °C ESR (Ω) 120 Hz 20kHz	Max 105 °C Ripple (A _{rms}) 120 Hz 20kHz	Nominal Size (DxL) (mm)
250 Vdc (300 Vdc Surge)				
330	SLP331M250A7P3	0.603	0.452	1.30 1.91 22 x 40
330	SLP331M250C3P3	0.603	0.452	1.30 1.91 25 x 30
330	SLP331M250E1P3	0.603	0.452	1.35 1.98 30 x 25
330	SLP331M250A3P3	0.603	0.452	1.15 1.69 22 x 30
390	SLP391M250A4P3	0.510	0.383	1.49 2.19 22 x 45
390	SLP391M250C5P3	0.510	0.383	1.49 2.19 25 x 35
390	SLP391M250E3P3	0.510	0.383	1.49 2.19 30 x 30
470	SLP471M250A9P3	0.423	0.317	1.65 2.43 22 x 50
470	SLP471M250C7P3	0.423	0.317	1.65 2.43 25 x 40
470	SLP471M250E3P3	0.423	0.317	1.65 2.43 30 x 30
560	SLP561M250C4P3	0.355	0.266	1.80 2.65 25 x 45
560	SLP561M250E5P3	0.355	0.266	1.80 2.65 30 x 35
680	SLP681M250C9P3	0.293	0.220	2.03 2.98 25 x 50
680	SLP681M250E7P3	0.293	0.220	2.00 2.94 30 x 40
680	SLP681M250H3P3	0.293	0.220	2.00 2.94 35 x 30
820	SLP821M250E4P3	0.243	0.182	2.30 3.38 30 x 45
820	SLP821M250H5P3	0.243	0.182	2.30 3.38 35 x 35
1000	SLP102M250E9P3	0.199	0.149	2.70 3.97 30 x 50
1000	SLP102M250H7P3	0.199	0.149	2.69 3.95 35 x 40
1200	SLP122M250H4P3	0.166	0.125	3.09 4.54 35 x 45
1500	SLP152M250H9P3	0.133	0.100	3.61 5.31 35 x 50
315 Vdc (365 Vdc Surge)				
120	SLP121M315A1P3	2.765	2.074	0.75 1.10 22 x 25
150	SLP151M315A3P3	2.212	1.659	0.82 1.21 22 x 30
150	SLP151M315C1P3	2.212	1.659	0.82 1.21 25 x 25
180	SLP181M315A5P3	1.843	1.382	0.92 1.35 22 x 35
180	SLP181M315C3P3	1.843	1.382	0.93 1.37 25 x 30
220	SLP221M315A7P3	1.508	1.131	1.04 1.53 22 x 40
220	SLP221M315C3P3	1.508	1.131	1.04 1.53 25 x 30
220	SLP221M315E1P3	1.508	1.131	1.04 1.53 30 x 25
270	SLP271M315A4P3	1.229	0.922	1.16 1.71 22 x 45
270	SLP271M315C5P3	1.229	0.922	1.16 1.71 25 x 35
270	SLP271M315E1P3	1.229	0.922	1.16 1.71 30 x 25
330	SLP331M315A9P3	1.005	0.754	1.33 1.96 22 x 50
330	SLP331M315C7P3	1.005	0.754	1.33 1.96 25 x 40
330	SLP331M315E3P3	1.005	0.754	1.33 1.96 30 x 30
390	SLP391M315C4P3	0.851	0.638	1.47 2.16 25 x 45
390	SLP391M315E5P3	0.851	0.638	1.47 2.16 30 x 35
390	SLP391M315H3P3	0.851	0.638	1.47 2.16 35 x 30
470	SLP471M315E7P3	0.706	0.530	1.70 2.50 30 x 40
470	SLP471M315H3P3	0.706	0.530	1.70 2.50 35 x 30
560	SLP561M315E4P3	0.592	0.444	2.05 3.01 30 x 45
560	SLP561M315H5P3	0.592	0.444	2.05 3.01 35 x 35
680	SLP681M315H7P3	0.488	0.366	2.17 3.19 35 x 40

Cap (µF)	3000 h @ 105 °C Catalog Part Number	Max 25 °C ESR (Ω) 120 Hz 20kHz	Max 105 °C Ripple (A _{rms}) 120 Hz 20kHz	Nominal Size (DxL) (mm)
820	SLP821M315H4P3	0.405	0.304	2.20 3.23 35 x 45
350 Vdc (400 Vdc Surge)				
100	SLP101M350A1P3	3.317	2.488	0.69 1.01 22 x 25
120	SLP121M350A3P3	2.765	2.074	0.75 1.10 22 x 30
120	SLP121M350C1P3	2.765	2.074	0.75 1.10 25 x 25
150	SLP151M350A5P3	2.212	1.659	0.82 1.21 22 x 35
150	SLP151M350C3P3	2.212	1.659	0.83 1.22 25 x 30
180	SLP181M350A7P3	1.843	1.382	0.92 1.35 22 x 40
180	SLP181M350C3P3	1.843	1.382	0.92 1.35 25 x 30
180	SLP181M350E1P3	1.843	1.382	0.90 1.32 30 x 25
220	SLP221M350A4P3	1.508	1.131	1.05 1.54 22 x 45
220	SLP221M350C5P3	1.508	1.131	1.04 1.53 25 x 35
220	SLP221M350E3P3	1.508	1.131	1.02 1.50 30 x 30
270	SLP271M350A9P3	1.229	0.922	1.16 1.71 22 x 50
270	SLP271M350C7P3	1.229	0.922	1.18 1.73 25 x 40
270	SLP271M350E3P3	1.229	0.922	1.17 1.72 30 x 30
330	SLP331M350C4P3	1.005	0.754	1.29 1.90 25 x 45
330	SLP331M350E5P3	1.005	0.754	1.34 1.97 30 x 35
330	SLP331M350H3P3	1.005	0.754	1.22 1.79 35 x 30
390	SLP391M350C9P3	0.851	0.638	1.51 2.22 25 x 50
390	SLP391M350E7P3	0.851	0.638	1.51 2.22 30 x 40
390	SLP391M350H5P3	0.851	0.638	1.47 2.16 35 x 35
470	SLP471M350E4P3	0.706	0.530	1.65 2.43 30 x 45
470	SLP471M350H5P3	0.706	0.530	1.69 2.48 35 x 35
560	SLP561M350E9P3	0.592	0.444	1.85 2.72 30 x 50
560	SLP561M350H7P3	0.592	0.444	1.90 2.79 35 x 40
680	SLP681M350H4P3	0.488	0.366	2.20 3.23 35 x 45
385 Vdc (435 Vdc Surge)				
68	SLP680M385A1P3	4.879	3.659	0.45 0.66 22 x 25
82	SLP820M385A3P3	4.046	3.035	0.52 0.76 22 x 30
100	SLP101M385A3P3	3.317	2.488	0.58 0.85 22 x 30
120	SLP121M385A5P3	2.765	2.074	0.68 1.00 22 x 35
150	SLP151M385A7P3	2.212	1.659	0.79 1.16 22 x 40
150	SLP151M385E1P3	2.212	1.659	0.75 1.10 30 x 25
180	SLP181M385A4P3	1.843	1.382	0.94 1.38 25 x 45
180	SLP181M385E3P3	1.843	1.382	0.88 1.29 30 x 30
220	SLP221M385E3P3	1.508	1.131	1.00 1.47 30 x 30
270	SLP271M385E7P3	1.229	0.922	1.14 1.68 30 x 40
270	SLP271M385H3P3	1.229	0.922	1.10 1.62 35 x 30
330	SLP331M385E4P3	1.005	0.754	1.31 1.93 30 x 45
330	SLP331M385H5P3	1.005	0.754	1.32 1.94 35 x 35
390	SLP391M385E9P3	0.851	0.638	1.48 2.18 30 x 50
390	SLP391M385H7P3	0.851	0.638	1.48 2.18 35 x 40
470	SLP471M385H4P3	0.706	0.530	1.76 2.59 35 x 45
560	SLP561M385H9P3	0.592	0.444	1.95 2.87 35 x 50

CDE Cornell Dubilier • 1605 E. Rodney French Blvd. • New Bedford, MA 02744 • Phone: (508)996-8561 • Fax: (508)996-3830

Type SLP 105 °C Snap-In Aluminum Electrolytic

Best Value 105 °C Snap-In Type

Additional Voltages and Sizes available at www.cde.com/catalogs/SLP.pdf

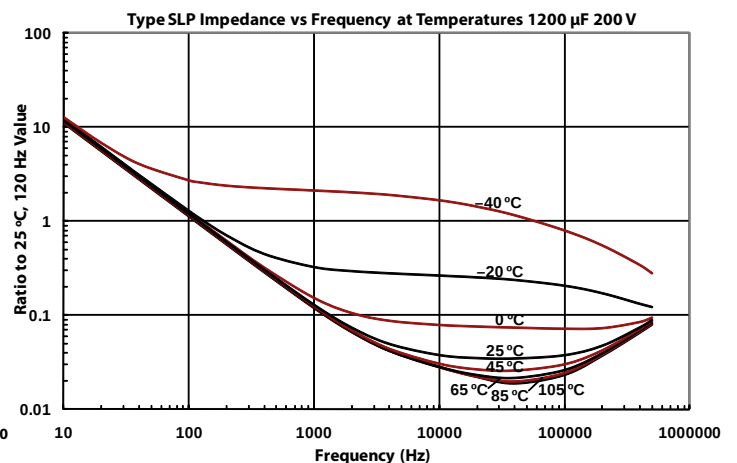
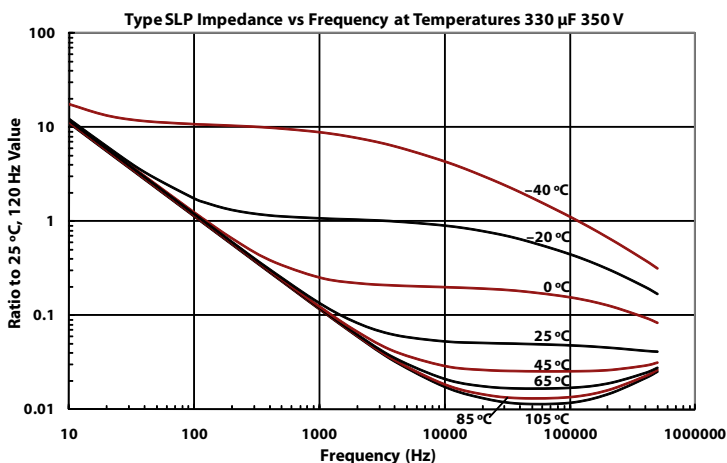
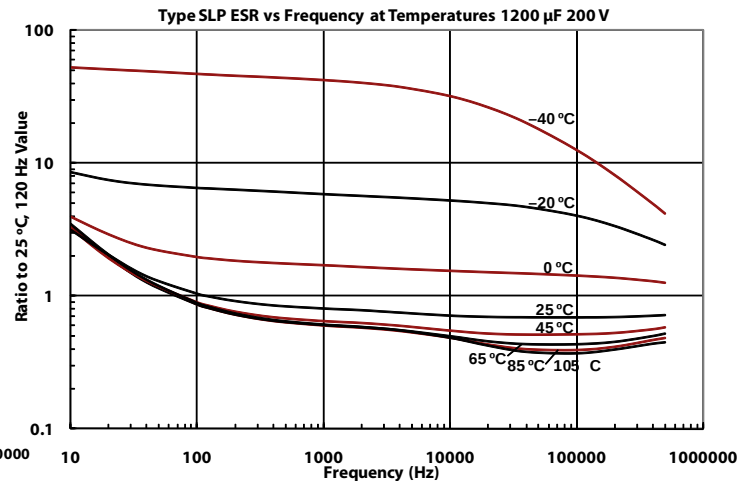
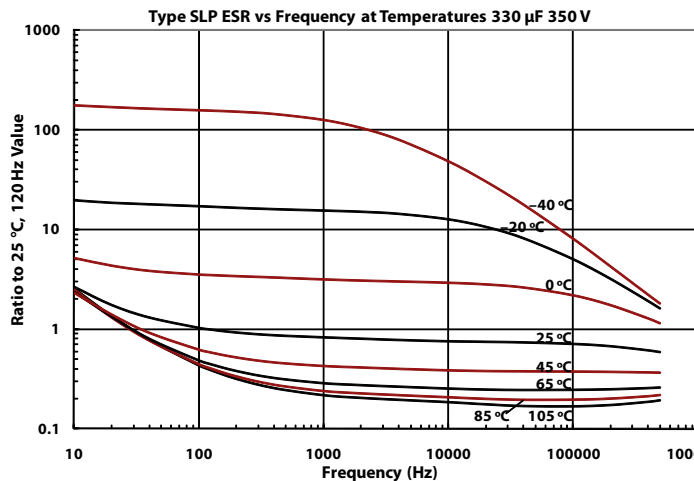
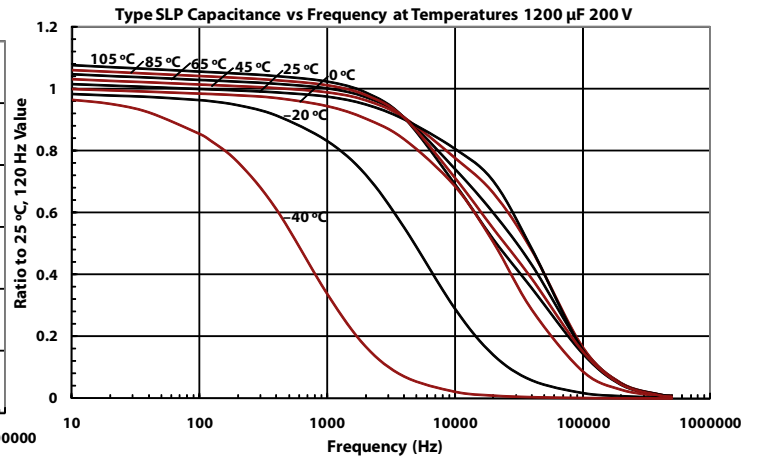
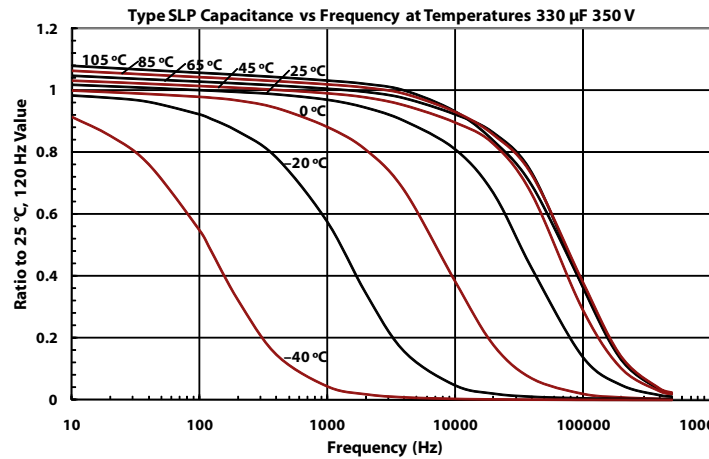
Cap (µF)	3000 h @ 105 °C Catalog Part Number	Max 25 °C ESR (Ω) 120 Hz 20kHz	Max 105 °C Ripple (A _{rms}) 120 Hz 20kHz	Nominal Size (DxL) (mm)
400 Vdc (450 Vdc Surge)				
47	SLP470M400A1P3	7.058	5.294	0.42 0.62 22 x 25
68	SLP680M400A1P3	4.879	3.659	0.50 0.74 22 x 25
82	SLP820M400A1P3	4.046	3.035	0.64 0.94 22 x 25
100	SLP101M400A3P3	3.317	2.488	0.70 1.03 22 x 30
100	SLP101M400C1P3	3.317	2.488	0.70 1.03 25 x 25
120	SLP121M400A5P3	2.765	2.074	0.75 1.10 22 x 35
120	SLP121M400C3P3	2.765	2.074	0.75 1.10 25 x 30
150	SLP151M400A7P3	2.212	1.659	0.88 1.29 22 x 40
150	SLP151M400C5P3	2.212	1.659	0.89 1.31 25 x 35
150	SLP151M400E1P3	2.212	1.659	0.88 1.29 30 x 25
150	SLP151M400C3P3	2.212	1.659	0.83 1.22 25 x 30
180	SLP181M400A4P3	1.843	1.382	0.98 1.44 22 x 45
180	SLP181M400E3P3	1.843	1.382	0.98 1.44 30 x 30
220	SLP221M400A9P3	1.508	1.131	1.10 1.62 22 x 50
220	SLP221M400C5P3	1.508	1.131	1.04 1.53 25 x 35
220	SLP221M400C7P3	1.508	1.131	1.10 1.62 25 x 40
220	SLP221M400E3P3	1.508	1.131	1.10 1.62 30 x 30
220	SLP221M400E5P3	1.508	1.131	1.28 1.88 35 x 35
270	SLP271M400C9P3	1.229	0.922	1.29 1.90 25 x 50
270	SLP271M400E5P3	1.229	0.922	1.22 1.79 30 x 35
270	SLP271M400H3P3	1.229	0.922	1.22 1.79 35 x 30
330	SLP331M400E4P3	1.005	0.754	1.55 2.28 30 x 45
330	SLP331M400H3P3	1.005	0.754	1.44 2.12 35 x 30
330	SLP331M400E5P3	1.005	0.754	1.39 2.04 30 x 35
390	SLP391M400E4P3	0.851	0.638	1.60 2.35 30 x 45
390	SLP391M400H5P3	0.851	0.638	1.60 2.35 35 x 35
470	SLP471M400H7P3	0.706	0.530	1.90 2.79 35 x 40
560	SLP561M400H4P3	0.592	0.444	2.12 3.12 35 x 45
680	SLP681M400H4P3	0.488	0.366	2.34 3.44 35 x 45
420 Vdc (470 Vdc Surge)				
68	SLP680M420A1P3	4.879	3.659	0.55 0.81 22 x 25
82	SLP820M420A1P3	4.046	3.035	0.64 0.94 22 x 25
82	SLP820M420C1P3	4.046	3.035	0.58 0.85 25 x 25
100	SLP101M420A3P3	3.317	2.488	0.70 1.03 22 x 30
100	SLP101M420C1P3	3.317	2.488	0.70 1.03 25 x 25
120	SLP121M420A5P3	2.765	2.074	0.75 1.10 22 x 35
120	SLP121M420C3P3	2.765	2.074	0.75 1.10 25 x 30
120	SLP121M420E1P3	2.765	2.074	0.78 1.15 30 x 25
150	SLP151M420A7P3	2.212	1.659	0.88 1.29 22 x 40
150	SLP151M420C5P3	2.212	1.659	0.88 1.29 25 x 35
150	SLP151M420E1P3	2.212	1.659	0.88 1.29 30 x 25
180	SLP181M420A4P3	1.843	1.382	0.95 1.40 22 x 45
180	SLP181M420C7P3	1.843	1.382	0.97 1.43 25 x 40
180	SLP181M420E3P3	1.843	1.382	0.96 1.41 30 x 30
180	SLP181M420H1P3	1.843	1.382	0.94 1.38 35 x 25

Cap (µF)	3000 h @ 105 °C Catalog Part Number	Max 25 °C ESR (Ω) 120 Hz 20kHz	Max 105 °C Ripple (A _{rms}) 120 Hz 20kHz	Nominal Size (DxL) (mm)
420 Vdc (470 Vdc Surge)				
220	SLP221M420C4P3	1.508	1.131	1.13 1.66 25 x 45
220	SLP221M420E5P3	1.508	1.131	1.10 1.62 30 x 35
220	SLP221M420H1P3	1.508	1.131	1.10 1.62 35 x 25
270	SLP271M420C9P3	1.229	0.922	1.37 2.01 25 x 50
270	SLP271M420E7P3	1.229	0.922	1.25 1.84 30 x 40
270	SLP271M420H3P3	1.229	0.922	1.22 1.79 35 x 30
330	SLP331M420E4P3	1.005	0.754	1.49 2.19 30 x 45
330	SLP331M420H5P3	1.005	0.754	1.45 2.13 35 x 35
390	SLP391M420E9P3	0.851	0.638	1.67 2.45 30 x 50
390	SLP391M420H7P3	0.851	0.638	1.66 2.44 35 x 40
470	SLP471M420H4P3	0.706	0.530	1.90 2.79 35 x 45
450 Vdc (500 Vdc Surge)				
47	SLP470M450A1P3	7.060	5.295	0.40 0.59 22 x 25
56	SLP560M450A1P3	5.924	4.443	0.50 0.74 22 x 25
68	SLP680M450A3P3	4.879	3.659	0.53 0.78 22 x 30
68	SLP680M450C1P3	4.879	3.659	0.53 0.78 25 x 25
82	SLP820M450A3P3	4.046	3.035	0.64 0.94 22 x 30
82	SLP820M450C1P3	4.046	3.035	0.64 0.94 25 x 25
100	SLP101M450A5P3	3.317	2.488	0.69 1.01 22 x 35
100	SLP101M450C3P3	3.317	2.488	0.69 1.01 25 x 30
100	SLP101M450E1P3	3.317	2.488	0.72 1.06 30 x 25
100	SLP101M450C7P3	3.317	2.488	0.78 1.15 25 x 40
100	SLP101M450A3P3	3.317	2.488	0.65 0.96 22 x 30
120	SLP121M450A7P3	2.765	2.074	0.80 1.18 22 x 40
120	SLP121M450C3P3	2.765	2.074	0.80 1.18 25 x 30
120	SLP121M450E1P3	2.765	2.074	0.80 1.18 30 x 25
150	SLP151M450A4P3	2.212	1.659	0.88 1.29 22 x 45
150	SLP151M450C5P3	2.212	1.659	0.88 1.29 25 x 35
150	SLP151M450E3P3	2.212	1.659	0.88 1.29 30 x 30
150	SLP151M450C3P3	2.121	1.591	0.82 1.21 25 x 30
180	SLP181M450C7P3	1.843	1.382	1.00 1.47 25 x 40
180	SLP181M450E3P3	1.843	1.382	1.00 1.47 30 x 30
220	SLP221M450C4P3	1.508	1.131	1.12 1.65 25 x 45
220	SLP221M450E5P3	1.508	1.131	1.12 1.65 30 x 35
220	SLP221M450H3P3	1.508	1.131	1.12 1.65 35 x 30
220	SLP221M450E3P3	1.508	1.131	1.05 1.54 30 x 30
270	SLP271M450E7P3	1.229	0.922	1.28 1.88 30 x 40
270	SLP271M450H5P3	1.229	0.922	1.28 1.88 35 x 35
330	SLP331M450E9P3	1.005	0.754	1.45 2.13 30 x 50
330	SLP331M450H5P3	1.005	0.754	1.37 2.01 35 x 35
330	SLP331M450H7P3	1.005	0.754	1.45 2.13 35 x 40
390	SLP391M450H7P3	0.851	0.638	1.55 2.28 35 x 40
470	SLP471M450H4P3	0.706	0.530	1.77 2.60 35 x 45
470	SLP471M450H9P3	0.706	0.530	1.85 2.72 35 x 50
560	SLP561M450H9P3	0.590	0.443	2.00 2.94 35 x 50

Type SLP 105 °C Snap-In Aluminum Electrolytic

Best Value 105 °C Snap-In Type

Typical Performance Curves



Type 381LX / 383LX 105 °C High Ripple, Snap-In Aluminum

High Ripple, Long Life, 2, 4 and 5 pin styles available



Adding longer-life and more ripple capability to the excellent value of Type 380L/LX capacitors, the 381L/LX readily handles tough switching power supply input and output circuits and motor-drive bus capacitor applications where the high surface area of multiple units in parallel equals the ripple capability of our Type 520C inverter-grade capacitor. Type 381LX delivers more capacitance per can size while Type 381L gives lower ESR for the same capacitance rating. Type 383L/LX has 4 or 5 leads for stable, reverse-proof mounting.

Highlights

- Top performance in power supplies and motor drives
- 4 times the life of Type 380L/LX
- 2, 4 and 5 leads available
- Big selection of 42 case sizes

Specifications

Temperature Range	-40 °C to + 105 °C ≤ 315 Vdc -25 °C to + 105 °C ≥ 350 Vdc						
Rated Voltage Range	10 Vdc to 450 Vdc						
Capacitance Range	33 μF to 150,000 μF						
Capacitance Tolerance	± 20%						
Leakage Current	≤3 √CV μA, 4 mA max, 5 minutes						
Ripple Current Multipliers	Ambient Temperature						
		45 °C	60 °C	70 °C	85 °C	105°C	
	381L 383L	2.70	2.60	2.50	2.10	1.00	
	381LX, 383 LX	2.35	2.20	2.00	1.70	1.00	
	Frequency						
		50 Hz	60 Hz	120 Hz	500 Hz	1 kHz 5 kHz & up	
	10-100 Vdc	0.93	0.95	1.00	1.05	1.08	1.15
	160-450 Vdc	0.75	0.80	1.00	1.20	1.25	1.40
Low Temperature Characteristics	Impedance ratio: Z _{-20°C} /Z _{+25°C} ≤ 10 (10 Vdc) ≤ 8 (16–50 Vdc) ≤ 4 (63–100 Vdc) ≤ 3 (150–450 Vdc)						
Endurance Life Test	3000 h at full load at 105 °C Δ Capacitance ±20% ESR 200% of limit DCL 100% of limit						
Shelf Life Test	1000 h at 105 °C Δ Capacitance ±20% ESR 200% of limit DCL 100% of limit						
Vibration	10 to 55 Hz, 0.06” and 10 g max, 2 h each plane						
RoHS Compliant							

Type 381LX / 383LX 105 °C High Ripple, Snap-In Aluminum

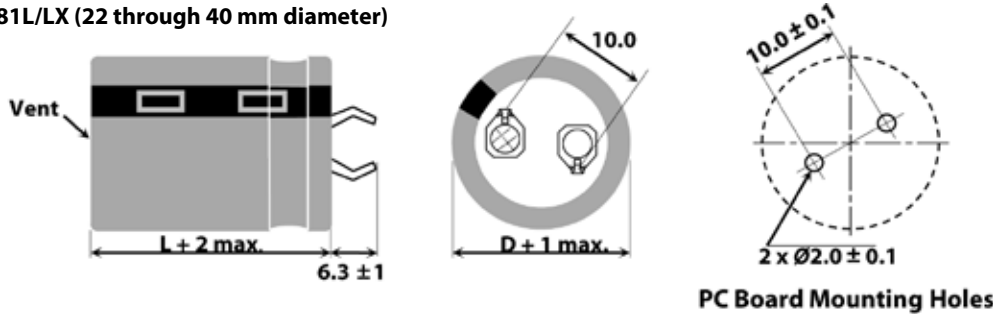
High Ripple, Long Life, 2,4 and 5 pin styles available

383LX	272	M	200	N08	2	V
Type	Cap	Tolerance	Voltage	Case Code	Insulation	# of pins
381L / LX (2 pins)	100 = 10 μ F	M = $\pm$ 20%	200 = 200 Vdc		2 = PVC	Blank = 2 pins / 4 pins snap-in 6.3mm L
383L / LX (4 or 5 pins)	101 = 100 μ F					A = 2 pins / 4 pins snap-in 4.0mm L
	272 = 2700 μ F					VS = 5 pins snap-in 6.3mm L
						V = 5 pins standoff

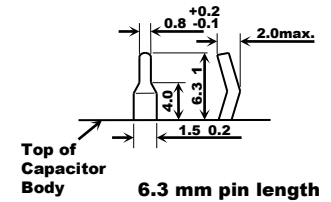
Outline Drawings

Two Pins

381L/LX (22 through 40 mm diameter)

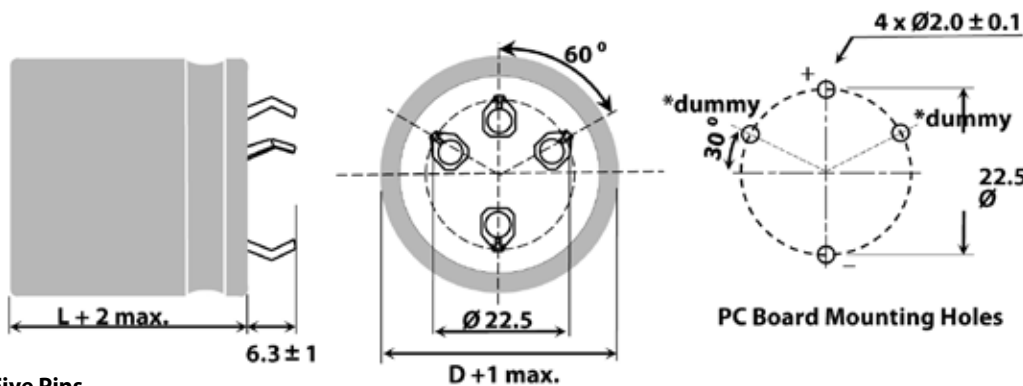


Available in 2, 4 and 5 pins

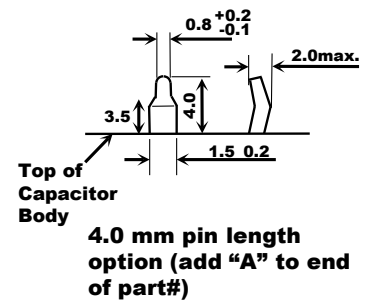


Four Pins

383L/LX (35 and 40 mm diameter)

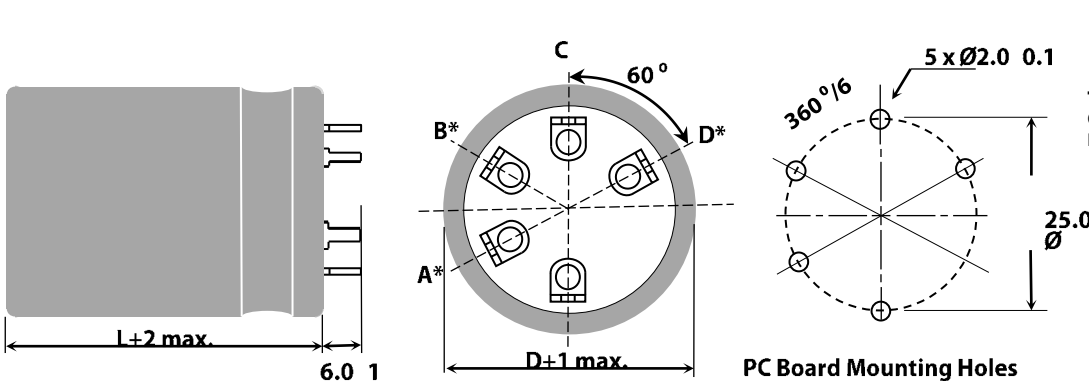


Available in 2 and 4 pins

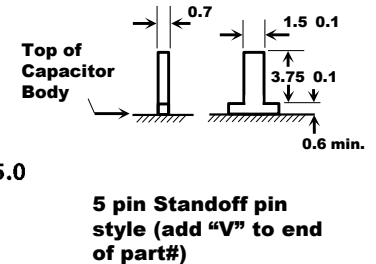


Five Pins

383L/LX (40 and 50 mm diameter)



Available in 5 pins



Terminal	Connection	
	40 mm Dia.	50 mm Dia.
A	dummy	negative (-)
B	dummy	dummy
C	positive (+)	positive (+)
D	dummy	positive (+)
-	negative (-)	negative (-)

Notes:

* Use dummy terminals for mechanical support only. Make no electrical connection because they resistively connect through the electrolyte to the negative terminal.

** Safety Vent may be on the bottom or on the side of the can.

Type 381LX / 383LX 105 °C High Ripple, Snap-In Aluminum

High Ripple, Long Life, 2,4 and 5 pin styles available

Case Code	DIAMETER "D"		LENGTH "L"		Typical Weight (grams)
	mm	inches	mm	inches	
H20	22	0.87	20	0.79	14
H01	22	0.87	25	0.98	16
H02	22	0.87	30	1.18	19
H03	22	0.87	35	1.38	22
H04	22	0.87	40	1.57	24
H45	22	0.87	45	1.77	28
H05	22	0.87	50	1.97	31
J20	25	0.98	20	0.79	16
J01	25	0.98	25	0.98	20
J02	25	0.98	30	1.18	24
J03	25	0.98	35	1.38	27
J04	25	0.98	40	1.57	31
J045	25	0.98	45	1.77	35
J05	25	0.98	50	1.97	38
K20	30	1.18	20	0.79	25
K01	30	1.18	25	0.98	30
K02	30	1.18	30	1.18	35
K03	30	1.18	35	1.38	40
K04	30	1.18	40	1.57	44
K45	30	1.18	45	1.77	48
K05	30	1.18	50	1.97	53

Case Code	DIAMETER "D"		LENGTH "L"		Typical Weight (grams)
	mm	inches	mm	inches	
A20	35	1.38	20	0.79	35
A01	35	1.38	25	0.98	42
A02	35	1.38	30	1.18	48
A03	35	1.38	35	1.38	54
A04	35	1.38	40	1.57	62
A45	35	1.38	45	1.77	67
A05	35	1.38	50	1.97	74
A06	35	1.38	63	2.48	88
A07	35	1.38	70	2.76	98
A08	35	1.38	80	3.15	112
A10	35	1.38	105	4.13	144
N04	40	1.57	40	1.57	82
N05	40	1.57	50	1.97	105
N06	40	1.57	63	2.48	130
N08	40	1.57	80	3.15	185
N10	40	1.57	105	4.13	265
B05	50	1.97	50	1.97	136
B06	50	1.97	63	2.48	168
B08	50	1.97	80	3.15	239
B09	50	1.97	92	3.62	241
B10	50	1.97	105	4.13	325

Ratings

Additional Voltages and Smaller Sizes available at <http://www.cde.com/catalogs/381-383.pdf>

Cap (μF)	Catalog Part Number	Max ESR Ω @ 25 °C		Ripple Amps Max @ 105 °C		Nominal Size
		120 Hz	20 kHz	120 Hz	20 kHz	D x L (mm)
10 Vdc (13 Vdc Surge)						
27000	381LX273M010A012	0.033	0.028	3.10	3.60	35 x 25
33000	381LX333M010A022	0.030	0.023	3.40	3.90	35 x 30
39000	381LX393M010A022	0.025	0.020	3.70	4.30	35 x 30
47000	381LX473M010A032	0.023	0.020	4.20	4.80	35 x 35
56000	381LX563M010A042	0.022	0.019	5.00	5.80	35 x 40
68000	381LX683M010A052	0.021	0.020	5.50	6.30	35 x 50
68000	383LX683M010N042	0.023	0.022	5.40	6.20	40 x 40
82000	381L823M010A062	0.013	0.008	6.30	7.90	35 x 63
82000	383LX823M010N052	0.018	0.017	7.40	8.50	40 x 50
100000	381L104M010A072	0.011	0.007	7.30	9.00	35 x 70
120000	381L124M010A082	0.010	0.006	8.20	10.00	35 x 80
120000	383L124M010N062	0.012	0.008	7.10	8.60	40 x 63
150000	383L154M010N082	0.009	0.006	8.90	10.60	40 x 80
16 Vdc (20 Vdc Surge)						
18000	381LX183M016A012	0.040	0.034	3.50	4.00	35 x 25
22000	381LX223M016A022	0.033	0.028	3.80	4.40	35 x 30
27000	381LX273M016A022	0.030	0.025	4.20	4.80	35 x 30
33000	381LX333M016A032	0.023	0.020	4.70	5.40	35 x 35
39000	381LX393M016A042	0.022	0.020	5.10	5.90	35 x 40
47000	381LX473M016A452	0.020	0.018	5.50	6.30	35 x 45

Cap (μF)	Catalog Part Number	Max ESR Ω @ 25 °C		Ripple Amps Max @ 105 °C		Nominal Size
		120 Hz	20 kHz	120 Hz	20 kHz	D x L (mm)
16 Vdc (20 Vdc Surge)						
47000	383LX473M016N042	0.020	0.018	5.50	6.33	40 x 40
56000	381LX563M016A052	0.019	0.017	6.00	6.90	35 x 50
68000	381LX683M016A062	0.017	0.015	6.60	7.60	35 x 63
68000	381L683M016A072	0.012	0.007	7.10	9.00	35 x 70
68000	383LX683M016N052	0.015	0.014	7.30	8.40	40 x 50
82000	381L823M016A082	0.010	0.007	8.00	10.00	35 x 80
82000	383LX823M016N062	0.017	0.013	7.70	8.80	40 x 63
100000	381LX104M016A082	0.015	0.013	8.00	9.20	35 x 80
120000	381LX124M016A102	0.014	0.012	8.71	10.02	35 x 105
120000	383LX124M016N082	0.014	0.012	8.80	10.10	40 x 80
120000	383LX124M016B052V	0.015	0.014	9.02	10.37	50 x 50
150000	383LX154M016N102	0.013	0.012	9.88	11.36	40 x 105
150000	383LX154M016B062V	0.014	0.013	10.15	11.67	50 x 63
180000	383LX184M016B082V	0.013	0.012	11.02	12.67	50 x 80
220000	383LX224M016B092V	0.012	0.011	11.71	13.47	50 x 92
250000	383LX254M016B102V	0.011	0.010	12.31	14.16	50 x 105
35 Vdc (44 Vdc Surge)						
8200	381LX822M035A012	0.049	0.037	2.90	3.30	35 x 25
10000	381LX103M035A022	0.040	0.030	3.20	3.70	35 x 30
12000	381LX123M035A022	0.033	0.025	3.50	4.00	35 x 30

Type 381LX / 383LX 105 °C High Ripple, Snap-In Aluminum

High Ripple, Long Life, 2,4 and 5 pin styles available

Additional Voltages and Smaller Sizes available at <http://www.cde.com/catalogs/381-383.pdf>

Cap (µF)	Catalog Part Number	Max ESR Ω @ 25 °C	Ripple Amps Max @ 105 °C	Nominal Size	120 Hz 20 kHz	120 Hz 20 kHz	D x L (mm)
35 Vdc (44 Vdc Surge)							
15000	381LX153M035A032	0.030	0.020	3.90	4.50	35 x 35	
18000	381LX183M035A042	0.030	0.021	4.30	4.90	35 x 40	
22000	381LX223M035A052	0.023	0.017	5.00	5.80	35 x 50	
22000	383LX223M035N042	0.023	0.017	5.00	5.75	40 x 40	
27000	381LX273M035A062	0.025	0.018	5.50	6.40	35 x 63	
27000	383LX273M035N052	0.020	0.015	5.45	6.25	40 x 50	
33000	381L333M035A072	0.014	0.009	6.40	8.10	35 x 70	
33000	383L333M035N062	0.019	0.014	6.60	7.60	40 x 63	
39000	381LX393M035A082	0.019	0.014	6.50	7.50	35 x 80	
47000	381LX473M035A102	0.017	0.013	8.07	9.28	35 x 105	
47000	383L473M035N082	0.018	0.013	7.80	9.00	40 x 80	
47000	383LX473M035B052V	0.021	0.016	8.25	9.49	50 x 50	
56000	383LX563M035B062V	0.019	0.014	9.07	10.43	50 x 63	
68000	383LX683M035N102	0.016	0.012	9.27	10.66	40 x 105	
68000	383LX683M035B082V	0.017	0.013	10.07	11.58	50 x 80	
82000	383LX823M035B092V	0.015	0.011	10.89	12.52	50 x 92	
100000	383LX104M035B102V	0.013	0.010	11.75	13.51	50 x 105	
63 Vdc (79 Vdc Surge)							
3300	381LX332M063A012	0.090	0.070	2.50	2.90	35 x 25	
3900	381LX392M063A022	0.080	0.060	2.70	3.10	35 x 30	
4700	381LX472M063A022	0.063	0.048	3.00	3.50	35 x 30	
5600	381LX562M063A032	0.055	0.040	3.30	3.80	35 x 35	
6800	381LX682M063A042	0.050	0.040	3.60	4.10	35 x 40	
8200	381LX822M063A452	0.040	0.030	3.90	4.50	35 x 45	
8200	383L822M063N042	0.031	0.018	3.70	4.80	40 x 40	
10000	381LX103M063A052	0.033	0.028	4.40	5.10	35 x 50	
12000	381LX123M063A052	0.030	0.025	4.40	5.10	35 x 50	
12000	381L123M063A062	0.029	0.012	4.20	6.50	35 x 63	
12000	383LX123M063N042	0.030	0.028	4.52	5.20	40 x 40	
12000	383L123M063N052	0.022	0.013	4.70	6.10	40 x 50	
15000	381LX153M063A062	0.024	0.021	4.90	5.70	35 x 63	
15000	383LX153M063N052	0.027	0.023	4.80	5.50	40 x 50	
15000	383L153M063N062	0.018	0.011	5.70	7.20	40 x 63	
18000	381LX183M063A082	0.022	0.019	5.80	6.70	35 x 80	
18000	383LX153M063N062	0.023	0.020	5.40	6.20	40 x 63	
22000	383L223M063N082	0.013	0.009	7.20	9.00	40 x 80	
22000	383LX223M063B052V	0.019	0.016	6.76	7.77	50 x 50	
27000	381LX273M063A102	0.017	0.014	6.53	7.51	35 x 105	
27000	383LX273M063N082	0.017	0.014	6.60	7.60	40 x 80	
27000	383LX273M063B062V	0.017	0.014	7.34	8.44	50 x 63	
33000	383LX333M063B082V	0.015	0.013	8.00	9.20	50 x 80	
39000	383LX393M063N102	0.014	0.012	7.53	8.66	40 x 105	
39000	383LX393M063B092V	0.014	0.012	8.48	9.75	50 x 92	
47000	383LX473M063B102V	0.012	0.010	8.99	10.34	50 x 105	
80 Vdc (100 Vdc Surge)							
2200	381LX222M080A012	0.090	0.063	2.10	2.40	35 x 25	
2700	381LX272M080A022	0.074	0.055	2.40	2.80	35 x 30	
3300	381LX332M080A022	0.065	0.049	2.60	3.00	35 x 30	
3900	381LX392M080A032	0.060	0.044	3.00	3.50	35 x 35	
4700	381LX472M080A042	0.048	0.036	3.30	3.80	35 x 40	
5600	381LX562M080A452	0.050	0.038	3.70	4.30	35 x 45	
5600	383L562M080N042	0.035	0.022	3.50	4.40	40 x 40	
6800	381LX682M080A052	0.041	0.031	3.90	4.50	35 x 50	
6800	383LX682M080N042	0.041	0.031	3.90	4.49	40 x 40	
8200	381L822M080A062	0.024	0.014	4.60	5.90	35 x 63	
8200	383L822M080N052	0.025	0.016	4.40	5.60	40 x 50	
10000	381L103M080A072	0.020	0.012	5.40	6.90	35 x 70	
10000	383L103M080N062	0.021	0.013	5.30	6.70	40 x 63	
12000	381L123M080A082	0.017	0.011	6.10	7.70	35 x 80	
12000	383LX123M080B052V	0.035	0.026	6.03	6.93	50 x 50	
15000	381LX153M080A102	0.024	0.018	6.13	7.05	35 x 105	
15000	383L153M080N082	0.015	0.010	6.80	8.40	40 x 80	
15000	383LX153M080B062V	0.028	0.021	6.65	7.65	50 x 63	
18000	383LX183M080B082V	0.026	0.019	7.29	8.38	50 x 80	
22000	383LX223M080N102	0.019	0.014	6.95	7.99	40 x 105	
22000	383LX223M080B092V	0.022	0.016	7.83	9.00	50 x 92	
27000	383LX273M080B102V	0.018	0.014	8.38	9.64	50 x 105	
100 Vdc (125 Vdc Surge)							
1500	381LX152M100A012	0.122	0.073	2.10	3.15	35 x 25	
1800	381LX182M100A022	0.111	0.072	2.30	3.45	35 x 30	
2200	381LX222M100A022	0.090	0.060	2.60	3.90	35 x 30	
2700	381LX272M100A032	0.080	0.052	2.90	4.35	35 x 35	
3300	381LX332M100A042	0.075	0.053	3.20	4.80	35 x 40	
3900	381LX392M100A452	0.064	0.045	3.60	5.40	35 x 45	
4700	381LX472M100A052	0.053	0.040	3.80	5.70	35 x 50	
4700	381L472M100A062	0.032	0.013	4.00	5.80	35 x 63	
4700	383LX472M100N042	0.053	0.040	3.80	5.70	40 x 40	
5600	381LX562M100A062	0.044	0.033	4.10	4.70	35 x 63	
5600	381L562M100A072	0.027	0.011	4.70	6.70	35 x 70	
5600	383L562M100N062	0.027	0.012	4.60	6.50	40 x 63	
6800	381L682M100A082	0.023	0.010	5.30	7.50	35 x 80	
6800	383LX682M100N052	0.037	0.027	4.60	5.30	40 x 50	
8200	381LX822M100A082	0.030	0.023	5.15	5.90	35 x 80	
8200	383LX822M100N062	0.030	0.023	5.00	5.77	40 x 63	
8200	383L822M100N082	0.020	0.009	6.00	8.20	40 x 80	
8200	383LX822M100B052V	0.030	0.023	6.14	7.06	50 x 50	
10000	381LX103M100A102	0.025	0.019	6.38	7.34	35 x 105	
12000	383LX123M100N082	0.021	0.016	6.44	7.40	40 x 80	
12000	383LX123M100B062V	0.022	0.017	7.17	8.25	50 x 63	

Type 381LX / 383LX 105 °C High Ripple, Snap-In Aluminum

High Ripple, Long Life, 2,4 and 5 pin styles available

Additional Voltages and Smaller Sizes available at <http://www.cde.com/catalogs/381-383.pdf>

Cap (µF)	Catalog Part Number	Max ESR Ω @ 25 °C	Ripple Amps Max @ 105 °C	Nominal Size
100 Vdc (125 Vdc Surge)				
15000	383LX153M100N102	0.017	0.012	7.37 8.48 40 x 105
15000	383LX153M100B082V	0.019	0.014	8.01 9.21 50 x 80
18000	383LX183M100B092V	0.017	0.012	8.64 9.94 50 x 92
22000	383LX223M100B102V	0.015	0.011	9.32 10.72 50 x 105
200 Vdc (250 Vdc Surge)				
820	381LX821M200A012	0.263	0.118	2.00 2.80 35 x 25
1000	381LX102M200A022	0.216	0.108	2.20 3.10 35 x 30
1200	381LX122M200A032	0.193	0.097	2.30 3.20 35 x 35
1500	381LX152M200A042	0.155	0.077	2.50 3.50 35 x 40
1800	381LX182M200A452	0.129	0.077	2.70 3.80 35 x 45
1800	381L182M200A062	0.055	0.028	3.20 4.50 35 x 63
1800	383LX182M200N042	0.129	0.077	2.70 3.78 40 x 40
1800	383L182M200N052	0.063	0.033	3.00 4.10 40 x 50
2200	381LX222M200A052	0.105	0.063	2.90 4.00 35 x 50
2200	381L222M200A082	0.042	0.021	4.10 5.80 35 x 80
2200	383L222M200N062	0.051	0.027	3.60 4.90 40 x 63
2700	381LX272M200A062	0.080	0.047	3.65 5.11 35 x 63
2700	383LX272M200N052	0.086	0.052	3.55 4.97 40 x 50
2700	383L272M200N082	0.032	0.018	4.60 6.20 40 x 80
3300	381LX332M200A082	0.065	0.039	4.50 6.33 35 x 80
3300	383LX332M200N062	0.700	0.040	4.40 6.20 40 x 63
3300	383LX332M200B052V	0.075	0.045	5.20 7.28 50 x 50
3900	383LX392M200B062V	0.064	0.038	5.90 8.26 50 x 63
4700	381LX472M200A102	0.046	0.028	5.70 7.98 35 x 105
4700	383LX472M200N082	0.050	0.030	5.75 8.10 40 x 80
4700	383LX472M200B082V	0.053	0.032	6.82 9.55 50 x 80
5600	383LX562M200N102	0.041	0.025	6.76 9.46 40 x 105
5600	383LX562M200B092V	0.044	0.027	7.68 10.75 50 x 92
6800	383LX682M200B102V	0.034	0.020	8.71 12.19 50 x 105
250 Vdc (300 Vdc Surge)				
560	381LX561M250A012	0.296	0.148	1.50 2.10 35 x 25
680	381LX681M250A022	0.244	0.134	1.70 2.38 35 x 30
680	381L681M250A052	0.293	0.149	1.80 2.50 35 x 50
820	381LX821M250A032	0.202	0.111	2.00 2.80 35 x 35
1000	381LX102M250A042	0.199	0.109	2.20 3.10 35 x 40
1200	381LX122M250A452	0.166	0.099	2.30 3.20 35 x 45
1200	383LX122M250N042	0.180	0.117	2.66 3.72 40 x 40
1200	383L122M250N052	0.081	0.031	2.60 4.30 40 x 50
1500	381LX152M250A052	0.144	0.093	2.50 3.50 35 x 50
1500	381L152M250A072	0.066	0.021	3.10 5.50 35 x 70
1800	381L182M250A082	0.057	0.018	3.60 6.30 35 x 80
1800	383LX182M250N052	0.120	0.078	3.25 4.55 40 x 50
250 Vdc (300 Vdc Surge)				
1800	383L182M250N062	0.066	0.025	3.10 5.10 40 x 63
2200	381LX222M250A082	0.096	0.064	3.75 5.25 35 x 80
2200	383LX222M250N062	0.098	0.064	3.70 5.15 40 x 63
2200	383L222M250N082	0.043	0.017	4.00 6.40 40 x 80
2200	383LX222M250B052V	0.098	0.064	4.35 6.09 50 x 50
2700	381LX272M250A102	0.080	0.052	4.80 6.72 35 x 105
2700	383LX272M250N082	0.092	0.047	3.10 4.30 40 x 80
2700	383LX272M250B062V	0.080	0.052	4.98 6.97 50 x 63
3300	383LX332M250N082	0.065	0.042	4.86 6.80 40 x 80
3900	383LX392M250N102	0.055	0.036	5.61 7.85 40 x 105
3900	383LX392M250B082V	0.055	0.036	6.10 8.54 50 x 80
4300	383LX432M250B092V	0.050	0.033	6.67 9.34 50 x 92
4700	383LX472M250B102V	0.046	0.030	7.03 9.84 50 x 105
400 Vdc (450 Vdc Surge)				
180	381LX181M400A012	0.737	0.258	0.90 1.30 35 x 25
220	381LX221M400A012	0.754	0.264	1.10 1.50 35 x 25
270	381LX271M400A022	0.614	0.215	1.20 1.70 35 x 30
330	381LX331M400A032	0.502	0.201	1.40 1.90 35 x 35
390	381LX391M400A042	0.425	0.170	1.55 2.20 35 x 40
470	381LX471M400A452	0.353	0.141	1.80 2.50 35 x 45
470	383LX471M400N042	0.353	0.141	1.80 2.50 40 x 40
560	381LX561M400A052	0.296	0.118	1.80 2.50 35 x 50
680	383LX681M400N052	0.244	0.098	2.20 3.00 40 x 50
820	381LX821M400A062	0.202	0.081	2.44 3.42 35 x 63
820	383LX821M400N052	0.202	0.081	2.58 3.61 40 x 50
820	383LX821M400B052V	0.202	0.081	3.20 4.40 50 x 50
1000	381LX102M400A082	0.202	0.081	3.00 4.20 35 x 80
1000	383LX102M400N062	0.202	0.081	3.00 4.20 40 x 63
1200	381LX122M400A102	0.138	0.055	3.80 5.30 35 x 105
1200	383LX122M400N082	0.138	0.055	3.80 5.30 40 x 80
1200	383LX122M400B062V	0.152	0.061	4.20 5.90 50 x 63
1500	383LX152M400N102	0.111	0.044	4.80 6.70 40 x 105
1500	383LX152M400B082V	0.122	0.049	5.20 7.30 50 x 80
1600	383LX162M400B092V	0.114	0.046	5.60 8.00 50 x 92
1800	383LX182M400N102	0.101	0.041	5.10 7.10 40 x 105
1800	383LX182M400B102V	0.101	0.041	6.48 9.10 50 x 105
180	381LX181M400A012	0.737	0.258	0.90 1.30 35 x 25
220	381LX221M400A012	0.754	0.264	1.10 1.50 35 x 25
270	381LX271M400A022	0.614	0.215	1.20 1.70 35 x 30
330	381LX331M400A032	0.502	0.201	1.40 1.90 35 x 35
390	381LX391M400A042	0.425	0.170	1.55 2.20 35 x 40
470	381LX471M400A452	0.353	0.141	1.80 2.50 35 x 45

Type 381LX / 383LX 105 °C High Ripple, Snap-In Aluminum

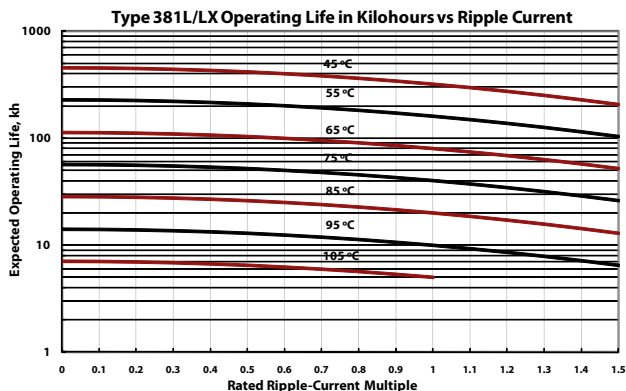
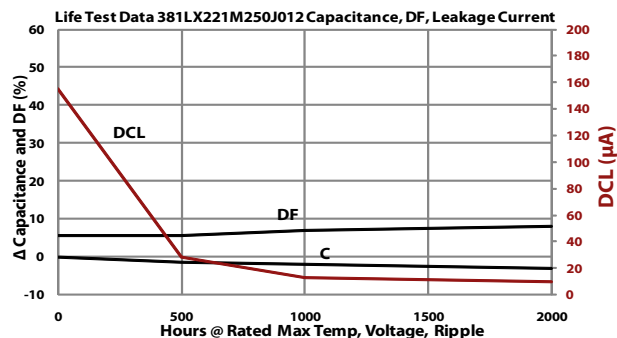
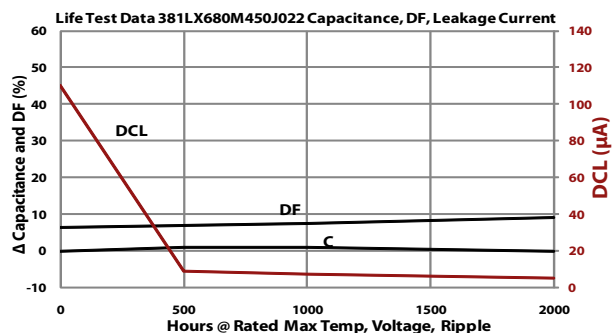
High Ripple, Long Life, 2,4 and 5 pin styles available

Additional Voltages and Smaller Sizes available at <http://www.cde.com/catalogs/381-383.pdf>

Cap (μF)	Catalog Part Number	Max ESR Ω @ 25 °C	Ripple Amps Max @ 105 °C	Nominal Size
400 Vdc (450 Vdc Surge)				
470	383LX471M400N042	0.353	0.141	1.80 2.50 40 x 40
560	381LX561M400A052	0.296	0.118	1.80 2.50 35 x 50
680	383LX681M400N052	0.244	0.098	2.20 3.00 40 x 50
820	381LX821M400A062	0.202	0.081	2.44 3.42 35 x 63
820	383LX821M400N052	0.202	0.081	2.58 3.61 40 x 50
820	383LX821M400B052V	0.202	0.081	3.20 4.40 50 x 50
1000	381LX102M400A082	0.202	0.081	3.00 4.20 35 x 80
1000	383LX102M400N062	0.202	0.081	3.00 4.20 40 x 63
1200	381LX122M400A102	0.138	0.055	3.80 5.30 35 x 105
1200	383LX122M400N082	0.138	0.055	3.80 5.30 40 x 80
1200	383LX122M400B062V	0.152	0.061	4.20 5.90 50 x 63
1500	383LX152M400N102	0.111	0.044	4.80 6.70 40 x 105
1500	383LX152M400B082V	0.122	0.049	5.20 7.30 50 x 80
1600	383LX162M400B092V	0.114	0.046	5.60 8.00 50 x 92
1800	383LX182M400N102	0.101	0.041	5.10 7.10 40 x 105
1800	383LX182M400B102V	0.101	0.041	6.48 9.10 50 x 105
420 Vdc (470 Vdc Surge)				
220	381LX221M420A012	0.750	0.260	1.10 1.50 35 x 25
270	381LX271M420A022	0.610	0.210	1.20 1.70 35 x 30
330	381LX331M420A032	0.502	0.200	1.35 1.90 35 x 35
390	381LX391M420A042	0.420	0.170	1.55 2.18 35 x 40
470	381LX471M420A452	0.350	0.141	1.75 2.45 35 x 45
470	383LX471M420N042	0.350	0.141	1.78 2.45 40 x 40

Cap (μF)	Catalog Part Number	Max ESR Ω @ 25 °C	Ripple Amps Max @ 105 °C	Nominal Size
450 Vdc (500 Vdc Surge)				
560	381LX561M420A052	0.300	0.120	1.80 2.50 35 x 50
680	383LX681M420N052	0.250	0.100	2.10 2.95 40 x 50
450 Vdc (500 Vdc Surge)				
150	381LX151M450A012	1.100	0.390	0.80 1.10 35 x 25
220	381LX221M450A022	0.750	0.260	1.00 1.40 35 x 30
270	381LX271M450A032	0.614	0.246	1.20 1.70 35 x 35
330	381LX331M450A042	0.502	0.176	1.40 1.90 35 x 40
390	381LX391M450A452	0.425	0.150	1.60 2.20 35 x 45
390	383LX391M450N042	0.425	0.170	1.68 2.35 40 x 40
470	381LX471M450A052	0.353	0.123	1.70 2.40 35 x 50
470	383LX471M450N042	0.350	0.140	1.75 2.45 40 x 40
560	381LX561M450A062	0.296	0.104	2.20 3.00 35 x 70
560	383LX561M450N052	0.296	0.104	2.20 3.00 40 x 50
680	383LX681M450A082	0.188	0.124	2.00 2.50 35 x 80
680	383LX681M450N062	0.244	0.085	2.50 3.50 40 x 63
680	383LX681M450B052V	0.244	0.085	2.90 4.06 50 x 50
820	383LX821M450A082	0.202	0.071	2.70 3.80 35 x 80
820	383LX821M450B062V	0.222	0.078	3.42 4.79 50 x 63
1000	381LX102M450A102	0.166	0.058	3.47 4.86 35 x 105
1000	383LX102M450N082	0.166	0.058	3.50 4.90 40 x 80
1200	383LX122M450N102	0.138	0.048	4.33 6.06 40 x 105
1200	383LX122M450B082V	0.152	0.053	4.70 6.58 50 x 80
1300	383LX132M450B092V	0.140	0.049	5.16 7.25 50 x 92
1500	383LX152M450B102V	0.122	0.043	6.03 8.44 50 x 105

Typical Performance Curves



Type 381LQ 105 °C Compact, High Ripple, Snap-In Aluminum

Higher Capacitance per Case Size



Type 381LQ is on average 23% smaller and more than 5 mm shorter than Type 381LX. This is achieved with a new can closure method that permits installing capacitor elements into smaller cans. Approaching the robust capability of the 381L the new 381LQ enables you to shrink equipment size and retain the original performance.

Highlights

- More capacitance per case
- Compares to the 381L

Specifications

Temperature Range	-40 °C to + 105 °C ≤ 315 Vdc -25 °C to + 105 °C ≥ 350 Vdc						
Rated Voltage Range	10 Vdc to 450 Vdc						
Capacitance Range	100 µF to 100,000 µF						
Capacitance Tolerance	± 20%						
Leakage Current	≤3 √CV µA, 4 mA max, 5 minutes						
Ripple Current Multipliers	Ambient Temperature						
	45 °C	60 °C	70 °C	85 °C	105 °C		
	2.35	2.20	2.00	1.70	1.00		
	Frequency						
	Voltage	50 Hz	60 Hz	120 Hz	500 kHz	1 kHz	10 kHz & Up
	10 - 100 WV	0.93	0.95	1.00	1.05	1.08	1.15
	160 - 450 WV	0.75	0.80	1.00	1.20	1.25	1.40
Low Temperature Characteristics	Impedance ratio: Z _{-20°C} /Z _{+25°C} ≤ 10 (10 Vdc) ≤ 8 (16–50 Vdc) ≤ 4 (63–100 Vdc) ≤ 3 (150–450 Vdc)						
Endurance Life Test	2000 h at full load at 105 °C Δ Capacitance ±20% ESR 200% of limit DCL 100% of limit						
Shelf Life Test	1000 h at 105 °C Δ Capacitance ±20% ESR 200% of limit DCL 100% of limit						
Vibration	10 to 55 Hz, 0.06” and 10 g max, 2 h each plane						
RoHS Compliant							

Type 381LQ 105 °C Compact, High Ripple, Snap-In Aluminum

Higher Capacitance per Case Size

Part Numbering System

381LQ

Type

381LQ

821

Cap

471 = 470 μ F

332 = 3300 μ F

103 = 10,000 μ F

M

Tolerance

M = $\pm 20\%$

400

Voltage

160 = 160 Vdc

450 = 450 Vdc

A05

Case

Code

2

Insulating

Sleeve

2 = PVC

A

Pin Style

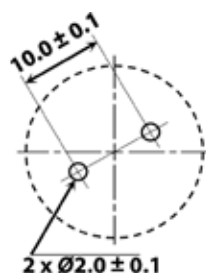
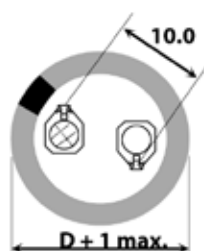
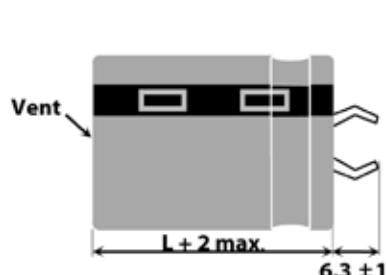
Blank = 2 pins

snap-in 6.3 mm L

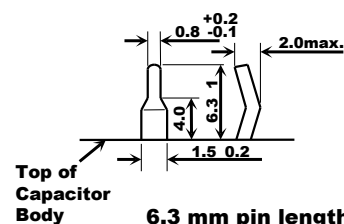
A = 2 pins snap-in

4.0 mm L

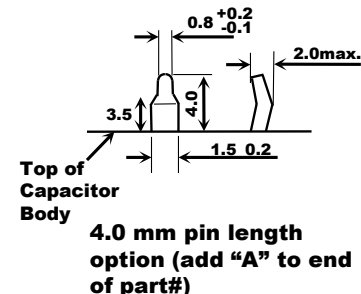
Outline Drawing



PC Board Mounting Holes



6.3 mm pin length



4.0 mm pin length
option (add "A" to end
of part#)

Insulated Case Dimensions

	DIAMETER		LENGTH		Typical
Case	D		L		Weight
Code	mm	inches	mm	inches	(grams)
H01	22	0.87	25	0.98	16
H02	22	0.87	30	1.18	19
H03	22	0.87	35	1.38	22
H04	22	0.87	40	1.57	24
H45	22	0.87	45	1.77	28
H05	22	0.87	50	1.97	31
J01	25	0.98	25	0.98	20
J02	25	0.98	30	1.18	24
J03	25	0.98	35	1.38	27
J04	25	0.98	40	1.57	31
J45	25	0.98	45	1.77	35
J05	25	0.98	50	1.97	38

	DIAMETER		LENGTH		Typical
Case	D		L		Weight
Code	mm	inches	mm	inches	(grams)
K01	30	1.18	25	0.98	30
K02	30	1.18	30	1.18	35
K03	30	1.18	35	1.38	40
K04	30	1.18	40	1.57	44
K45	30	1.18	45	1.77	49
K05	30	1.18	50	1.97	53
A01	35	1.38	25	0.98	42
A02	35	1.38	30	1.18	48
A03	35	1.38	35	1.38	54
A04	35	1.38	40	1.57	60
A45	35	1.38	45	1.77	67
A05	35	1.38	50	1.97	74

Type 381LQ 105 °C Compact, High Ripple, Snap-In Aluminum

Higher Capacitance per Case Size

Ratings

Additional Voltages available at <http://www.cde.com/catalogs/381LQ.pdf>

		ESR Max		Ripple Amps		Nominal			ESR Max		Ripple Amps		Nominal		
		@ 25 °C		@ 105 °C		Size			@ 25 °C		@ 105 °C		Size		
Cap.	Catalog	120 Hz 20 kHz		120 Hz	20 kHz	D x L			Cap.	Catalog	120 Hz	20 kHz	120 Hz	20 kHz	D x L
(µF)	Part Number	(Ω)	(Ω)	(A)	(A)	(mm)			(µF)	Part Number	(Ω)	(Ω)	(A)	(A)	(mm)
10 Vdc (13 Vdc Surge)									16 Vdc (20 Vdc Surge)						
12000	381LQ123M010H012	0.076	0.065	2.20	2.53	22 x 25			47000	381LQ473M016A042	0.021	0.019	5.50	6.33	35 x 40
18000	381LQ183M010H022	0.051	0.043	2.40	2.76	22 x 30			56000	381LQ563M016K052	0.020	0.018	6.00	6.90	30 x 50
18000	381LQ183M010H012	0.051	0.043	2.40	2.76	25 x 25			56000	381LQ563M016A452	0.020	0.018	6.00	6.90	35 x 45
22000	381LQ223M010H032	0.041	0.035	2.60	2.99	22 x 35			35 Vdc (44 Vdc Surge)						
22000	381LQ223M010J022	0.041	0.035	2.60	2.99	25 x 30			4700	381LQ472M035H012	0.106	0.079	2.20	2.53	22 x 25
27000	381LQ273M010H042	0.034	0.029	3.10	3.57	22 x 40			5600	381LQ562M035H022	0.089	0.067	2.40	2.76	22 x 30
27000	381LQ273M010J032	0.034	0.029	3.10	3.57	25 x 35			5600	381LQ562M035J012	0.089	0.067	2.40	2.76	25 x 25
27000	381LQ273M010K012	0.034	0.029	3.10	3.57	30 x 25			6800	381LQ682M035H032	0.073	0.055	2.60	2.99	22 x 35
33000	381LQ333M010H452	0.028	0.023	3.40	3.91	22 x 45			8200	381LQ822M035H042	0.061	0.045	2.90	3.34	22 x 40
33000	381LQ333M010J042	0.028	0.023	3.40	3.91	25 x 40			8200	381LQ822M035J022	0.061	0.045	2.90	3.34	25 x 30
39000	381LQ393M010J452	0.026	0.022	3.70	4.26	25 x 45			10000	381LQ103M035H452	0.050	0.037	3.20	3.68	22 x 45
39000	381LQ393M010K022	0.026	0.023	3.70	4.26	30 x 30			10000	381LQ103M035J032	0.050	0.037	3.20	3.68	25 x 35
39000	381LQ393M010A012	0.026	0.022	3.70	4.26	35 x 25			10000	381LQ103M035K012	0.050	0.037	3.20	3.68	30 x 25
47000	381LQ473M010J052	0.024	0.021	4.20	4.83	25 x 50			12000	381LQ123M035J042	0.041	0.031	3.50	4.03	25 x 40
47000	381LQ473M010K032	0.024	0.022	4.20	4.83	30 x 35			12000	381LQ123M035K022	0.041	0.031	3.50	4.03	30 x 30
47000	381LQ473M010A022	0.024	0.021	4.20	4.83	35 x 30			12000	381LQ123M035A012	0.041	0.031	3.50	4.03	35 x 25
56000	381LQ563M010K042	0.023	0.021	5.00	5.75	30 x 40			15000	381LQ153M035J452	0.033	0.025	3.90	4.49	25 x 45
56000	381LQ563M010A032	0.023	0.020	5.00	5.75	35 x 35			15000	381LQ153M035K032	0.033	0.025	3.90	4.49	30 x 35
68000	381LQ683M010K452	0.022	0.020	5.40	6.21	30 x 45			15000	381LQ153M035A022	0.033	0.025	3.90	4.49	35 x 30
68000	381LQ683M010A042	0.022	0.019	5.40	6.21	35 x 40			18000	381LQ183M035K042	0.028	0.021	4.30	4.95	30 x 40
82000	381LQ823M010A452	0.021	0.019	6.10	7.02	35 x 45			18000	381LQ183M035A032	0.028	0.021	4.30	4.95	35 x 35
100000	381LQ104M010A052	0.020	0.019	6.90	7.94	35 x 50			22000	381LQ223M035K452	0.023	0.017	5.00	5.75	30 x 45
16 Vdc (20 Vdc Surge)									22000	381LQ223M035A042	0.023	0.017	5.00	5.75	35 x 40
10000	381LQ103M016H012	0.075	0.063	2.60	2.99	22 x 25			27000	381LQ273M035K052	0.018	0.014	5.30	6.10	30 x 50
12000	381LQ123M016H022	0.062	0.053	2.90	3.34	22 x 30			27000	381LQ273M035A452	0.018	0.014	5.30	6.10	35 x 45
12000	381LQ123M016J012	0.062	0.053	2.90	3.34	25 x 25			33000	381LQ333M035A052	0.015	0.012	5.90	6.79	35 x 50
15000	381LQ153M016H032	0.050	0.042	3.20	3.68	22 x 35			63 Vdc (79 Vdc Surge)						
18000	381LQ183M016H042	0.041	0.035	3.50	4.03	22 x 40			2200	381LQ222M063H012	0.151	0.113	2.00	2.30	22 x 25
18000	381LQ183M016J022	0.041	0.035	3.50	4.03	25 x 30			2700	381LQ272M063H022	0.123	0.092	2.20	2.53	22 x 30
22000	381LQ223M016H452	0.034	0.029	3.80	4.37	22 x 45			2700	381LQ272M063J012	0.123	0.092	2.20	2.53	25 x 25
22000	381LQ223M016J032	0.034	0.029	3.80	4.37	25 x 35			3300	381LQ332M063H032	0.100	0.075	2.50	2.88	22 x 35
22000	381LQ223M016H012	0.034	0.029	3.80	4.37	30 x 25			3900	381LQ392M063H042	0.085	0.064	2.70	3.11	22 x 40
27000	381LQ273M016H052	0.028	0.023	4.20	4.83	22 x 50			3900	381LQ392M063J022	0.085	0.064	2.70	3.11	25 x 30
27000	381LQ273M016J042	0.028	0.023	4.20	4.83	25 x 40			3900	381LQ392M063K012	0.085	0.064	2.70	3.11	30 x 25
27000	381LQ273M016K022	0.028	0.023	4.20	4.83	30 x 30			4700	381LQ472M063H452	0.071	0.053	3.00	3.45	22 x 45
27000	381LQ273M016A012	0.028	0.023	4.20	4.83	35 x 25			4700	381LQ472M063J032	0.071	0.053	3.00	3.45	25 x 35
33000	381LQ333M016J452	0.023	0.019	4.70	5.41	25 x 45			5600	381LQ562M063H052	0.059	0.044	3.30	3.80	22 x 50
33000	381LQ333M016K032	0.023	0.019	4.70	5.41	30 x 35			5600	381LQ562M063J042	0.059	0.044	3.30	3.80	25 x 40
33000	381LQ333M016A022	0.023	0.020	4.70	5.41	35 x 30			5600	381LQ562M063K022	0.059	0.044	3.30	3.80	30 x 30
39000	381LQ393M016K042	0.022	0.018	5.10	5.87	30 x 40			5600	381LQ562M063A012	0.059	0.044	3.30	3.80	35 x 25
39000	381LQ393M016A032	0.022	0.020	5.10	5.87	35 x 35			6800	381LQ682M063J452	0.049	0.037	3.60	4.14	25 x 45
47000	381LQ473M016K452	0.016	0.014	5.50	6.33	30 x 45			6800	381LQ682M063K032	0.049	0.037	3.60	4.14	30 x 35

Type 381LQ 105 °C Compact, High Ripple, Snap-In Aluminum

Higher Capacitance per Case Size

Additional Voltages available at <http://www.cde.com/catalogs/381LQ.pdf>

ESR Max @ 25 °C							Ripple Amps @ 105 °C	Nominal Size
Cap. (µF)	Catalog Part Number	120 Hz (Ω)	20 kHz (Ω)	120 Hz (A)	20 kHz (A)	D x L (mm)		
63 Vdc (79 Vdc Surge)								
6800	381LQ682M063A022	0.049	0.037	3.60	4.14	35 x 30		
8200	381LQ822M063K042	0.040	0.030	3.90	4.49	30 x 40		
8200	381LQ822M063A032	0.040	0.030	3.90	4.49	35 x 35		
10000	381LQ103M063K452	0.033	0.025	4.40	5.06	30 x 45		
10000	381LQ103M063A042	0.033	0.025	4.40	5.06	35 x 40		
12000	381LQ123M063K052	0.028	0.021	4.80	5.52	30 x 50		
12000	381LQ123M063A452	0.028	0.022	4.80	5.52	35 x 45		
15000	381LQ153M063A052	0.022	0.018	5.40	6.21	35 x 50		
80 Vdc (100 Vdc Surge)								
1200	381LQ122M080H012	0.235	0.176	1.50	1.73	22 x 25		
1500	381LQ152M080H022	0.188	0.141	1.70	1.96	22 x 30		
1500	381LQ152M080J012	0.188	0.141	1.70	1.96	25 x 25		
1800	381LQ182M080H032	0.157	0.117	1.80	2.07	22 x 35		
2200	381LQ222M080H042	0.128	0.096	2.10	2.42	22 x 40		
2200	381LQ222M080J022	0.128	0.096	2.10	2.42	25 x 30		
2700	381LQ272M080H452	0.104	0.078	2.40	2.76	22 x 45		
2700	381LQ272M080J032	0.104	0.078	2.40	2.76	25 x 35		
2700	381LQ272M080K012	0.104	0.078	2.40	2.76	30 x 25		
3300	381LQ332M080H052	0.085	0.064	2.60	2.99	22 x 50		
3300	381LQ332M080J042	0.085	0.064	2.60	2.99	25 x 40		
3300	381LQ332M080K022	0.085	0.064	2.60	2.99	30 x 30		
3300	381LQ332M080A012	0.085	0.064	2.60	2.99	35 x 25		
3900	381LQ392M080J452	0.072	0.054	3.00	3.45	25 x 45		
3900	381LQ392M080K032	0.072	0.054	3.00	3.45	30 x 35		
4700	381LQ472M080J052	0.060	0.045	3.30	3.80	25 x 50		
4700	381LQ472M080K042	0.060	0.045	3.30	3.80	30 x 40		
4700	381LQ472M080A022	0.060	0.045	3.30	3.80	35 x 30		
5600	381LQ562M080K452	0.050	0.038	3.70	4.26	30 x 45		
5600	381LQ562M080A032	0.050	0.038	3.70	4.26	35 x 35		
6800	381LQ682M080K052	0.041	0.031	3.90	4.49	30 x 50		
6800	381LQ682M080A042	0.041	0.032	3.90	4.49	35 x 40		
8200	381LQ822M080A452	0.034	0.027	4.50	5.18	35 x 45		
100 Vdc (125 Vdc Surge)								
820	381LQ821M100H012	0.303	0.197	1.40	1.61	22 x 25		
1200	381LQ122M100H022	0.207	0.135	1.80	2.07	22 x 30		
1200	381LQ122M100J012	0.207	0.135	1.80	2.07	25 x 25		
1500	381LQ152M100H032	0.166	0.108	2.10	2.42	22 x 35		
1500	381LQ152M100J022	0.166	0.108	2.10	2.42	25 x 30		
1800	381LQ182M100H042	0.138	0.090	2.30	2.65	22 x 40		
1800	381LQ182M100J032	0.138	0.090	2.30	2.65	25 x 35		
1800	381LQ182M100K012	0.138	0.090	2.30	2.65	30 x 25		
2200	381LQ222M100H452	0.113	0.073	2.60	2.99	22 x 45		
100 Vdc (125 Vdc Surge)								
2200	381LQ222M100J042	0.113	0.073	2.60	2.99	25 x 40		
2200	381LQ222M100A012	0.113	0.073	2.60	2.99	35 x 25		
2700	381LQ272M100J452	0.092	0.060	2.90	3.34	25 x 45		
2700	381LQ272M100K032	0.092	0.060	2.90	3.34	30 x 35		
3300	381LQ332M100J052	0.075	0.049	3.20	3.68	25 x 50		
3300	381LQ332M100K042	0.075	0.049	3.20	3.68	30 x 40		
3300	381LQ332M100A022	0.075	0.049	3.20	3.68	35 x 30		
3900	381LQ392M100K452	0.064	0.043	3.60	4.14	30 x 45		
3900	381LQ392M100A032	0.064	0.043	3.60	4.14	35 x 35		
4700	381LQ472M100K052	0.053	0.038	3.80	4.37	30 x 50		
4700	381LQ472M100A042	0.053	0.037	3.80	4.37	35 x 40		
5600	381LQ562M100A452	0.044	0.031	4.20	4.83	35 x 45		
6800	381LQ682M100A052	0.037	0.027	4.70	5.41	35 x 50		
200 Vdc (250 Vdc Surge)								
390	381LQ391M200H012	0.510	0.230	1.31	1.83	22 x 25		
470	381LQ471M200H022	0.423	0.190	1.45	2.03	22 x 30		
560	381LQ561M200H022	0.355	0.160	1.67	2.34	22 x 30		
680	381LQ681M200H042	0.293	0.132	1.75	2.45	22 x 40		
680	381LQ681M200J022	0.293	0.132	1.75	2.45	25 x 30		
820	381LQ821M200H452	0.243	0.109	2.04	2.86	22 x 45		
820	381LQ821M200J032	0.243	0.109	2.04	2.86	25 x 35		
820	381LQ821M200K012	0.243	0.109	2.04	2.86	30 x 25		
1000	381LQ102M200H052	0.199	0.090	2.30	3.22	22 x 50		
1000	381LQ102M200J042	0.199	0.090	2.10	2.90	25 x 40		
1000	381LQ102M200J452	0.199	0.090	2.30	3.22	25 x 45		
1000	381LQ102M200K022	0.199	0.090	2.30	3.22	30 x 30		
1000	381LQ102M200A012	0.216	0.097	2.30	3.22	35 x 25		
1200	381LQ122M200J452	0.166	0.075	2.40	3.30	25 x 45		
1200	381LQ122M200J052	0.166	0.075	2.65	3.71	25 x 50		
1200	381LQ122M200K032	0.166	0.075	2.65	3.71	30 x 35		
1200	381LQ122M200A022	0.180	0.090	2.65	3.71	35 x 30		
1500	381LQ152M200K042	0.133	0.060	2.80	3.92	30 x 40		
1500	381LQ152M200A022	0.114	0.072	2.80	3.92	35 x 30		
1800	381LQ182M200K452	0.110	0.050	3.08	4.31	30 x 45		
1800	381LQ182M200A042	0.129	0.084	3.08	4.31	35 x 40		
2200	381LQ222M200K052	0.090	0.041	3.48	4.87	30 x 50		
2200	381LQ222M200A452	0.096	0.044	3.48	4.87	35 x 45		
250 Vdc (300 Vdc Surge)								
270	381LQ271M250H012	0.614	0.276	1.10	1.54	22 x 25		
330	381LQ331M250H022	0.502	0.226	1.20	1.68	22 x 30		
330	381LQ331M250J012	0.502	0.226	1.20	1.68	25 x 25		

Type 381LQ 105 °C Compact, High Ripple, Snap-In Aluminum

Higher Capacitance per Case Size

Additional Voltages available at <http://www.cde.com/catalogs/381LQ.pdf>

ESR Max							ESR Max						
Ripple Amps							Ripple Amps						
Nominal							Nominal						
@ 25 °C							@ 25 °C						
@ 105 °C							@ 105 °C						
Size							Size						
Cap.	Catalog	120 Hz	20 kHz	120 Hz	20 kHz	D x L	Cap.	Catalog	120 Hz	20 kHz	120 Hz	20 kHz	D x L
(µF)	Part Number	(Ω)	(Ω)	(A)	(A)	(mm)	(µF)	Part Number	(Ω)	(Ω)	(A)	(A)	(mm)
250 Vdc (300 Vdc Surge)							400 Vdc (450 Vdc Surge)						
390	381LQ391M250H022	0.425	0.191	1.20	1.70	22 x 30	330	381LQ331M400J452	0.553	0.249	1.44	2.02	25 x 45
390	381LQ391M250H032	0.425	0.191	1.30	1.82	22 x 35	330	381LQ331M400K032	0.553	0.249	1.44	2.02	30 x 35
390	381LQ391M250J012	0.425	0.191	1.30	1.82	25 x 25	330	381LQ331M400A022	0.553	0.249	1.44	2.02	35 x 30
470	381LQ471M250H032	0.353	0.159	1.30	1.82	22 x 35	390	381LQ391M400J052	0.468	0.210	1.55	2.17	25 x 50
470	381LQ471M250H042	0.353	0.159	1.40	1.96	22 x 40	390	381LQ391M400K032	0.468	0.210	1.40	1.95	30 x 35
470	381LQ471M250J022	0.353	0.159	1.40	1.96	25 x 30	390	381LQ391M400K042	0.468	0.210	1.55	2.17	30 x 40
470	381LQ471M250K012	0.353	0.159	1.40	1.96	30 x 25	390	381LQ391M400A022	0.468	0.210	1.55	2.17	35 x 30
560	381LQ561M250H042	0.296	0.133	1.40	1.96	22 x 40	470	381LQ471M400K452	0.388	0.175	1.68	2.35	30 x 45
560	381LQ561M250H452	0.296	0.133	1.50	2.10	22 x 45	470	381LQ471M400A032	0.388	0.175	1.68	2.35	35 x 35
560	381LQ561M250J032	0.296	0.133	1.50	2.10	25 x 35	560	381LQ561M400K052	0.326	0.147	1.90	2.66	30 x 50
560	381LQ561M250K012	0.296	0.133	1.50	2.10	30 x 25	560	381LQ561M400A042	0.326	0.147	1.90	2.66	35 x 40
680	381LQ681M250H452	0.244	0.110	1.50	2.10	22 x 45	680	381LQ681M400A452	0.268	0.121	2.12	2.97	35 x 45
680	381LQ681M250H052	0.244	0.110	1.70	2.38	22 x 50	820	381LQ821M400A052	0.200	0.090	2.30	3.20	35 x 50
680	381LQ681M250J042	0.244	0.110	1.70	2.38	25 x 40	420 Vdc (470 Vdc Surge)						
680	381LQ681M250K022	0.244	0.110	1.70	2.38	30 x 30	120	381LQ121M420H022	1.520	0.684	0.75	1.05	22 x 30
680	381LQ681M250A012	0.244	0.110	1.70	2.38	35 x 25	120	381LQ121M420J012	1.520	0.684	0.75	1.05	25 x 25
820	381LQ821M250J452	0.202	0.091	2.00	2.80	25 x 45	150	381LQ151M420H032	1.220	0.550	0.85	1.20	22 x 35
820	381LQ821M250K032	0.202	0.091	2.00	2.80	30 x 35	180	381LQ181M420H042	1.100	0.460	0.90	1.30	22 x 40
820	381LQ821M250A022	0.202	0.091	2.00	2.80	35 x 30	180	381LQ181M420J022	1.100	0.460	0.90	1.30	25 x 30
1000	381LQ102M250J052	0.166	0.075	2.20	3.08	25 x 50	220	381LQ221M420H452	0.830	0.370	1.05	1.50	22 x 45
1000	381LQ102M250K042	0.166	0.075	2.20	3.08	30 x 40	220	381LQ221M420J032	0.830	0.370	1.05	1.50	25 x 35
1000	381LQ102M250A022	0.166	0.075	2.20	3.08	35 x 30	220	381LQ221M420K012	0.830	0.370	1.05	1.50	30 x 25
1200	381LQ122M250K452	0.138	0.062	2.30	3.22	30 x 45	270	381LQ271M420H052	0.675	0.305	1.20	1.70	22 x 50
1200	381LQ122M250A032	0.138	0.062	2.30	3.22	35 x 35	270	381LQ271M420J042	0.675	0.305	1.20	1.70	25 x 40
1500	381LQ152M250A452	0.110	0.050	2.50	3.50	35 x 45	270	381LQ271M420K022	0.675	0.305	1.20	1.70	30 x 30
1800	381LQ182M250A452	0.092	0.041	2.50	3.50	35 x 45	270	381LQ271M420A012	0.675	0.305	1.20	1.70	35 x 25
1800	381LQ182M250A052	0.092	0.041	2.70	3.78	35 x 50	330	381LQ331M420J052	0.550	0.250	1.40	2.00	25 x 50
400 Vdc (450 Vdc Surge)							330	381LQ331M420K032	0.550	0.250	1.40	2.00	30 x 35
100	381LQ101M400H012	1.824	0.821	0.70	0.98	22 x 25	330	381LQ331M420A032	0.550	0.250	1.40	2.00	35 x 35
120	381LQ121M400H022	1.520	0.684	0.75	1.05	22 x 30	390	381LQ391M420K042	0.470	0.210	1.55	2.15	30 x 40
150	381LQ151M400H022	1.216	0.547	0.88	1.23	22 x 30	390	381LQ391M420A032	0.470	0.210	1.55	2.15	35 x 35
180	381LQ181M400H032	1.013	0.458	0.95	1.33	22 x 35	470	381LQ471M420K452	0.390	0.175	1.70	2.40	30 x 45
180	381LQ181M400J022	1.013	0.458	0.95	1.33	25 x 30	470	381LQ471M420A032	0.390	0.175	1.70	2.40	35 x 35
220	381LQ221M400H042	0.829	0.373	1.00	1.40	22 x 45	560	381LQ561M420K052	0.330	0.150	1.90	2.65	30 x 50
220	381LQ221M400H452	0.829	0.373	1.10	1.54	22 x 45	560	381LQ561M420A452	0.330	0.150	1.90	2.65	35 x 45
220	381LQ221M400J032	0.829	0.373	1.10	1.54	25 x 35	680	381LQ681M420A052	0.270	0.120	2.10	2.95	35 x 50
220	381LQ221M400K012	0.829	0.373	1.10	1.54	30 x 25	450 Vdc (500 Vdc Surge)						
270	381LQ271M400H452	0.675	0.304	1.10	1.54	22 x 45	100	381LQ101M450H022	1.824	0.821	0.64	0.90	22 x 30
270	381LQ271M400H052	0.675	0.304	1.22	1.71	22 x 50	100	381LQ101M450J012	1.824	0.821	0.64	0.90	25 x 25
270	381LQ271M400J042	0.675	0.304	1.22	1.71	25 x 40	120	381LQ121M450H032	1.520	0.684	0.72	1.01	22 x 35
270	381LQ271M400K022	0.675	0.304	1.22	1.71	30 x 30	120	381LQ121M450J022	1.520	0.684	0.72	1.01	25 x 30
270	381LQ271M400A012	0.675	0.304	1.22	1.71	35 x 25	150	381LQ151M450H042	1.216	0.547	0.79	1.11	22 x 40

Type 381LQ 105 °C Compact, High Ripple, Snap-In Aluminum

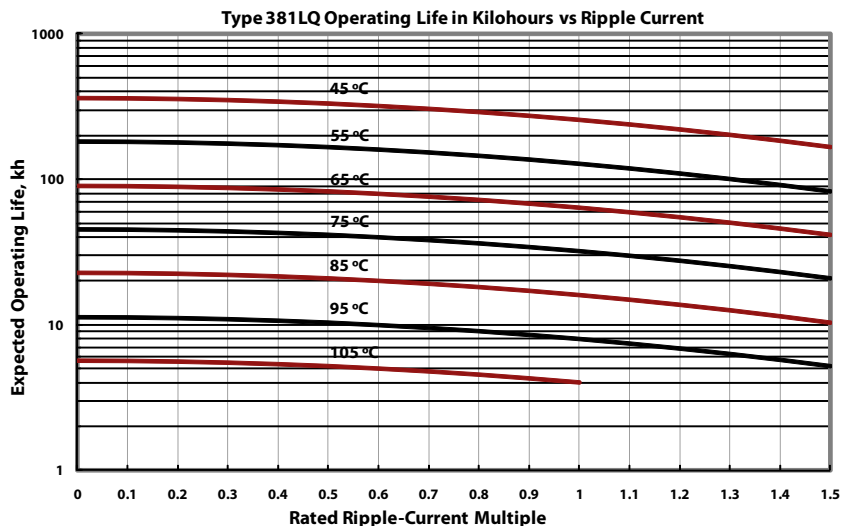
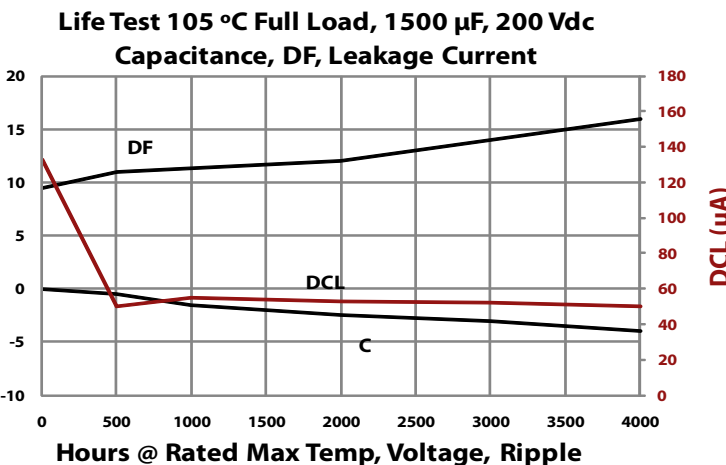
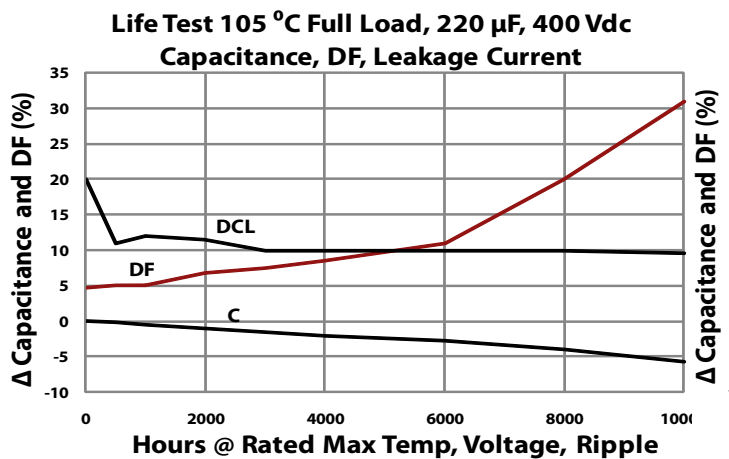
Higher Capacitance per Case Size

Cap. (µF)	Catalog Part Number	ESR Max @ 25 °C		Ripple Amps @ 105 °C		Nominal Size
		120 Hz	20 kHz	120 Hz	20 kHz	D x L
		(Ω)	(Ω)	(A)	(A)	(mm)
450 Vdc (500 Vdc Surge)						
150	381LQ151M450K012	1.216	0.547	0.79	1.11	30 x 25
180	381LQ181M450H452	1.013	0.456	0.87	1.22	22 x 45
180	381LQ181M450J032	1.013	0.456	0.80	1.10	25 x 35
180	381LQ181M450J042	1.013	0.456	0.87	1.22	25 x 40
180	381LQ181M450K022	1.013	0.456	0.87	1.22	30 x 30
220	381LQ221M450H052	0.829	0.373	0.90	1.25	22 x 50
220	381LQ221M450J452	0.829	0.373	1.00	1.40	25 x 45
220	381LQ221M450K022	0.829	0.373	1.00	1.40	30 x 30
220	381LQ221M450A012	0.829	0.373	1.00	1.40	35 x 25
270	381LQ271M450J052	0.675	0.304	1.19	1.67	25 x 50
270	381LQ271M450K032	0.675	0.304	1.10	1.50	30 x 35
270	381LQ271M450K042	0.675	0.304	1.19	1.67	30 x 40

Additional Voltages available at <http://www.cde.com/catalogs/381LQ.pdf>

Cap. (μF)	Catalog Part Number	ESR Max @ 25 °C		Ripple Amps @ 105 °C		Nominal Size
		120 Hz	20 kHz	120 Hz	20 kHz	D x L
		(Ω)	(Ω)	(A)	(A)	(mm)
450 Vdc (500 Vdc Surge)						
270	381LQ271M450A022	0.675	0.304	1.19	1.67	35 x 30
330	381LQ331M450K042	0.553	0.249	1.25	1.75	30 x 40
330	381LQ331M450K452	0.553	0.249	1.38	1.93	30 x 45
330	381LQ331M450A032	0.553	0.249	1.38	1.93	35 x 35
390	381LQ391M450K452	0.468	0.210	1.40	1.95	30 x 45
390	381LQ391M450A042	0.468	0.210	1.55	2.17	35 x 40
470	381LQ471M450A452	0.388	0.175	1.74	2.44	35 x 45
560	381LQ561M450A052	0.326	0.147	1.90	2.66	35 x 50
390	381LQ391M450K052	0.680	0.210	1.55	2.17	30 x 50
390	381LQ391M450A042	0.468	0.210	1.55	2.17	35 x 40
470	381LQ471M450A452	0.388	0.175	1.74	2.44	35 x 45
560	381LQ561M450A052	0.326	0.147	1.90	2.66	35 x 50

Typical Performance Curves



Type 381LR 105 °C Highest Ripple, Snap-In Aluminum

Ultra-High Ripple Capabilities



Compared to standard 105 °C snap-ins like the Type 381L/LX Type 381LR can handle an extra 25% ripple current or more. This remarkable capability stems from advances in electrolyte that give extremely low ESR values. In high ripple current applications like motor drives you can save by using fewer capacitors.

Highlights

- The right choice for motor drive bus capacitors
- The right choice for UPS bus capacitors
- Compare to Type 381L
- Up to 2 times the ripple current

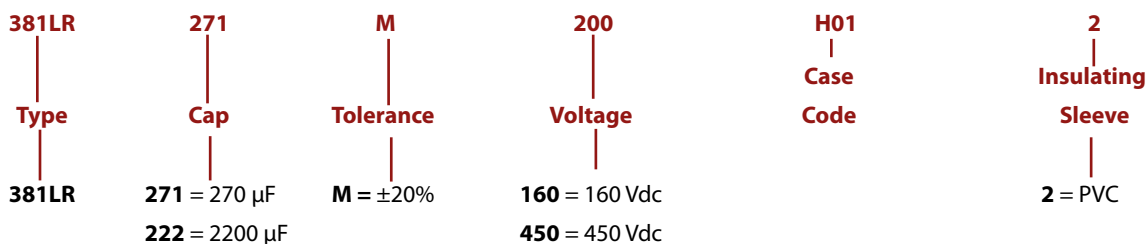
Specifications

Temperature Range	-40 °C to + 105 °C ≤ 315 Vdc -25 °C to + 105 °C ≥ 350 Vdc					
Rated Voltage Range	200 Vdc to 450 Vdc					
Capacitance Range	56 μF to 2,200 μF					
Capacitance Tolerance	± 20%					
Leakage Current	≤3 √CV μA, 4 mA max, 5 minutes					
Ripple Current Multipliers	Ambient Temperature					
	45 °C	60 °C	70 °C	85 °C	105 °C	
	2.35	2.20	2.00	1.70	1.00	
	Frequency					
	50 Hz	60 Hz	120 Hz	500 kHz	1 kHz	10 kHz & Up
	0.75	0.80	1.00	1.20	1.25	1.40
Low Temperature Characteristics	Impedance ratio: Z _{-20°C} /Z _{+25°C} ≤ 3 (200–450Vdc)					
Endurance Life Test	3000 h at full load at 105 °C Δ Capacitance ±20% ESR 200% of limit DCL 100% of limit					
Shelf Life Test	1000 h at 105 °C Δ Capacitance ±20% ESR 200% of limit DCL 100% of limit					
Vibration	10 to 55 Hz, 0.06" and 10 g max, 2 h each plane					
RoHS Compliant						

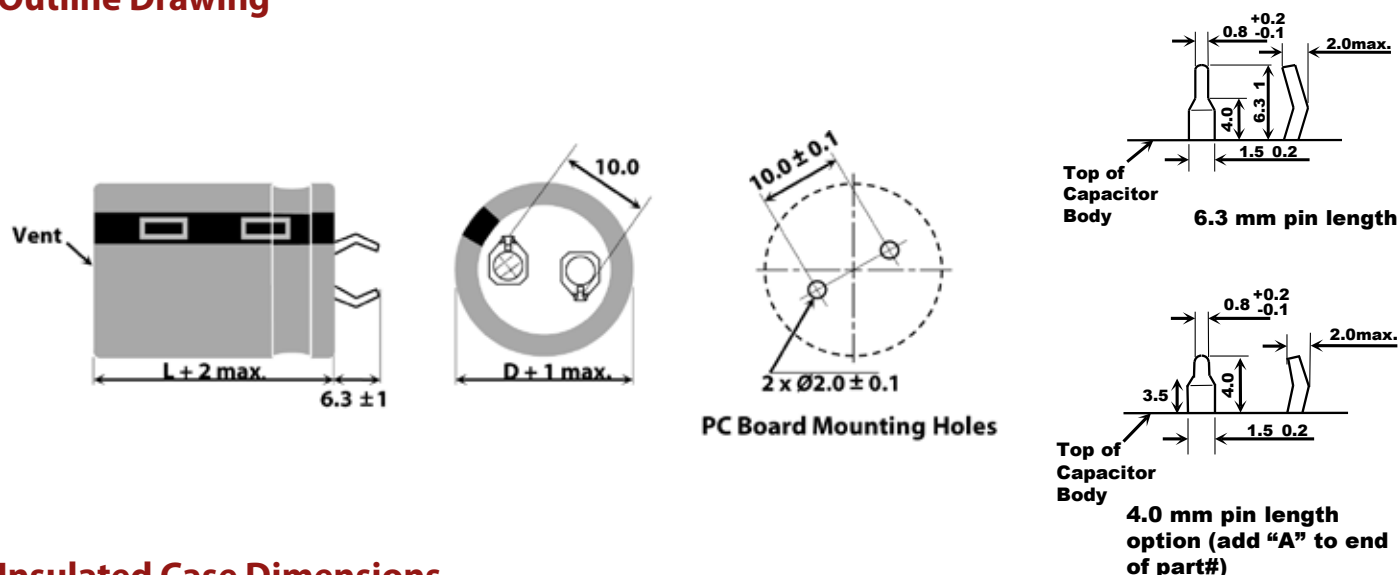
Type 381LR 105 °C Highest Ripple, Snap-In Aluminum

Ultra-High Ripple Capabilities

Part Numbering System



Outline Drawing



Insulated Case Dimensions

Case Code	DIAMETER D		LENGTH L		Typical Weight (grams)	Case Code	DIAMETER D		LENGTH L		Typical Weight (grams)
	mm	inches	mm	inches			mm	inches	mm	inches	
H01	22	0.87	25	0.98	16	K01	30	1.18	25	0.98	30
H02	22	0.87	30	1.18	19	K02	30	1.18	30	1.18	35
H03	22	0.87	35	1.38	22	K03	30	1.18	35	1.38	40
H04	22	0.87	40	1.57	24	K04	30	1.18	40	1.57	44
H45	22	0.87	45	1.77	28	K45	30	1.18	45	1.77	49
H05	22	0.87	50	1.97	31	K05	30	1.18	50	1.97	53
J01	25	0.98	25	0.98	20	A01	35	1.38	25	0.98	42
J02	25	0.98	30	1.18	24	A02	35	1.38	30	1.18	48
J03	25	0.98	35	1.38	27	A03	35	1.38	35	1.38	54
J04	25	0.98	40	1.57	31	A04	35	1.38	40	1.57	60
J45	25	0.98	45	1.77	35	A45	35	1.38	45	1.77	67
J05	25	0.98	50	1.97	38	A05	35	1.38	50	1.97	74

Type 381LR 105 °C Highest Ripple, Snap-In Aluminum

Ultra-High Ripple Capabilities

Ratings

		ESR Max		Ripple Amps		Nominal
		@ 25° C		@ 105 °C		Size
Cap.	Catalog	120 Hz	20 kHz	120 Hz	20 kHz	D x L
(µF)	Part Number	(Ω)	(Ω)	(A)	(A)	(mm)
200 Vdc (250 Vdc Surge)						
270	381LR271M200H012	0.553	0.249	1.42	2.03	22 X 25
330	381LR331M200H022	0.452	0.203	1.56	2.23	22 X 30
390	381LR391M200H022	0.383	0.172	1.71	2.44	22 X 30
390	381LR391M200J012	0.383	0.172	1.71	2.44	25 X 25
470	381LR471M200H032	0.317	0.143	1.85	2.64	22 X 35
470	381LR471M200J022	0.317	0.143	1.85	2.64	25 X 30
560	381LR561M200H042	0.266	0.120	2.14	3.05	22 X 40
560	381LR561M200J022	0.266	0.120	2.14	3.05	25 X 30
560	381LR561M200K012	0.266	0.120	2.14	3.05	30 X 25
680	381LR681M200H452	0.219	0.099	2.42	3.45	22 X 45
680	381LR681M200J032	0.219	0.099	2.42	3.45	25 X 35
680	381LR681M200K022	0.219	0.099	2.42	3.45	30 X 30
820	381LR821M200H052	0.182	0.082	2.63	3.76	22 X 50
820	381LR821M200J042	0.182	0.082	2.63	3.76	25 X 40
820	381LR821M200K022	0.182	0.082	2.63	3.76	30 X 30
820	381LR821M200A012	0.182	0.082	2.63	3.76	35 X 25
1000	381LR102M200J452	0.149	0.067	2.84	4.06	25 X 45
1000	381LR102M200K032	0.149	0.067	2.84	4.06	30 X 35
1000	381LR102M200A022	0.149	0.067	2.84	4.06	35 X 30
1200	381LR122M200K042	0.124	0.062	3.13	4.47	30 X 40
1200	381LR122M200A032	0.124	0.062	3.13	4.47	35 X 35
1500	381LR152M200K052	0.099	0.050	3.56	5.06	30 X 50
1500	381LR152M200A042	0.099	0.050	3.56	5.06	35 X 40
1800	381LR182M200A452	0.083	0.041	3.84	5.48	35 X 45
2200	381LR222M200A052	0.066	0.040	4.12	5.89	35 X 50
250 Vdc (300 Vdc Surge)						
220	381LR221M250H022	0.678	0.305	1.28	1.83	22 X 30
270	381LR271M250H022	0.553	0.249	1.42	2.03	22 X 30
270	381LR271M250J012	0.553	0.249	1.42	2.03	25 X 25
330	381LR331M250H032	0.452	0.203	1.64	2.34	22 X 35
330	381LR331M250J022	0.452	0.203	1.64	2.34	25 X 30
390	381LR391M250H042	0.383	0.172	1.72	2.45	22 X 40
390	381LR391M250J022	0.383	0.172	1.72	2.45	25 X 30
390	381LR391M250K012	0.383	0.172	1.72	2.45	30 X 25
470	381LR471M250H452	0.317	0.143	1.85	2.64	22 X 45
470	381LR471M250J032	0.317	0.143	1.85	2.64	25 X 35
470	381LR471M250K022	0.317	0.143	1.85	2.64	30 X 30
560	381LR561M250J042	0.266	0.120	2.14	3.05	25 X 40
560	381LR561M250K022	0.266	0.120	2.14	3.05	30 X 30
560	381LR561M250A012	0.266	0.120	2.14	3.05	35 X 25
680	381LR681M250J452	0.219	0.099	2.42	3.45	25 X 45

		ESR Max		Ripple Amps		Nominal
		@ 25° C		@ 105 °C		Size
Cap.	Catalog	120 Hz	20 kHz	120 Hz	20 kHz	D x L
(µF)	Part Number	(Ω)	(Ω)	(A)	(A)	(mm)
250 Vdc (300 Vdc Surge)						
680	381LR681M250K032	0.219	0.099	2.42	3.45	30 X 35
680	381LR681M250A022	0.219	0.099	2.42	3.45	35 X 30
820	381LR821M250K042	0.182	0.082	2.63	3.76	30 X 40
820	381LR821M250A032	0.182	0.082	2.63	3.76	35 X 35
1000	381LR102M250K052	0.149	0.067	2.84	4.06	30 X 50
1000	381LR102M250A042	0.149	0.067	2.84	4.06	35 X 40
1200	381LR122M250A452	0.124	0.062	3.13	4.47	35 X 45
1500	381LR152M250A052	0.099	0.050	3.56	5.06	35 X 50
400 Vdc (450 Vdc Surge)						
82	381LR820M400H012	1.617	0.728	0.8	1.14	22 X 25
100	381LR101M400H022	1.326	0.597	0.91	1.3	22 X 30
100	381LR101M400J012	1.326	0.597	0.91	1.3	25 X 25
120	381LR121M400H032	1.105	0.497	1.02	1.46	22 X 35
120	381LR121M400J022	1.105	0.497	1.02	1.46	25 X 30
150	381LR151M400H042	1.105	0.387	1.07	1.53	22 X 40
150	381LR151M400J022	1.105	0.387	1.07	1.53	25 X 30
150	381LR151M400K012	1.105	0.387	1.07	1.53	30 X 25
180	381LR181M400H452	0.737	0.322	1.12	1.6	22 X 45
180	381LR181M400J032	0.737	0.322	1.12	1.6	25 X 35
180	381LR181M400K022	0.737	0.322	1.12	1.6	30 X 30
220	381LR221M400H052	0.603	0.271	1.42	2.03	22 X 50
220	381LR221M400J042	0.603	0.271	1.42	2.03	25 X 40
220	381LR221M400K022	0.603	0.271	1.42	2.03	30 X 30
220	381LR221M400A012	0.603	0.271	1.42	2.03	35 X 25
270	381LR271M400J452	0.491	0.221	1.56	2.23	25 X 45
270	381LR271M400K032	0.491	0.221	1.56	2.23	30 X 35
270	381LR271M400A022	0.491	0.221	1.56	2.23	35 X 30
330	381LR331M400K042	0.402	0.181	1.71	2.44	30 X 40
330	381LR331M400A022	0.402	0.181	1.71	2.44	35 X 30
390	381LR391M400K452	0.34	0.153	1.85	2.64	30 X 45
390	381LR391M400A032	0.34	0.153	1.85	2.64	35 X 35
470	381LR471M400A042	0.282	0.127	2.01	2.87	35 X 40
560	381LR561M400A452	0.237	0.107	2.35	3.36	35 X 45
420 Vdc (470 Vdc Surge)						
68	381LR680M420H012	1.95	0.878	0.76	1.08	22 X 25
82	381LR820M420H022	1.617	0.728	0.8	1.14	22 X 30
82	381LR820M420J012	1.617	0.728	0.8	1.14	25 X 25
100	381LR101M420H022	1.326	0.597	0.91	1.3	22 X 30
100	381LR101M420J012	1.326	0.597	0.91	1.3	25 X 25
120	381LR121M420H032	1.105	0.497	1.02	1.46	22 X 35
120	381LR121M420J022	1.105	0.497	1.02	1.46	25 X 30

Type 381LR 105 °C Highest Ripple, Snap-In Aluminum

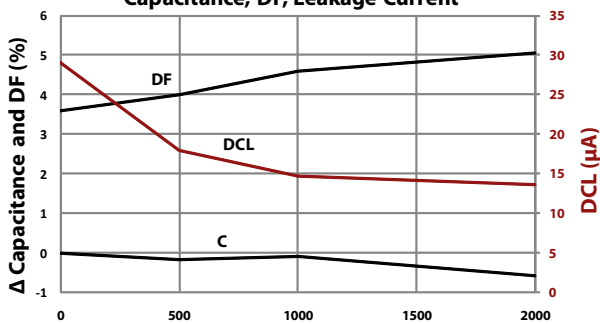
Ultra-High Ripple Capabilities

Cap. (μF)	Catalog Part Number	ESR Max		Ripple Amps		Nominal
		@ 25° C		@ 105 °C		Size
		120 Hz (Ω)	20 kHz (Ω)	120 Hz (A)	20 kHz (A)	D x L (mm)
420 Vdc (470 Vdc Surge)						
150	381LR151M420K012	0.884	0.398	1.07	1.53	30 X 25
180	381LR181M420H452	0.737	0.332	1.12	1.6	22 X 45
180	381LR181M420J042	0.737	0.332	1.12	1.6	25 X 40
180	381LR181M420K022	0.737	0.332	1.12	1.6	30 X 30
180	381LR181M420A012	0.737	0.332	1.12	1.6	35 X 25
220	381LR221M420J452	0.603	0.271	1.42	2.03	25 X 45
220	381LR221M420K032	0.603	0.271	1.42	2.03	30 X 35
220	381LR221M420A022	0.603	0.271	1.42	2.03	35 X 30
270	381LR271M420J052	0.491	0.221	1.68	2.4	25 X 50
270	381LR271M420K042	0.491	0.221	1.68	2.4	30 X 40
270	381LR271M420A022	0.491	0.221	1.68	2.4	35 X 30
330	381LR331M420K452	0.402	0.181	1.78	2.54	30 X 45
330	381LR331M420A032	0.402	0.181	1.78	2.54	35 X 35
390	381LR391M420K052	0.34	0.153	1.91	2.73	30 X 50
390	381LR391M420A042	0.34	0.153	1.91	2.73	35 X 40
470	381LR471M420A452	0.282	0.127	2.23	3.18	35 X 45
450 Vdc (500 Vdc Surge)						
56	381LR560M450H012	2.368	1.066	0.67	0.95	22 X 25
68	381LR680M450H022	1.95	0.878	0.76	1.08	22 X 30
68	381LR680M450J012	1.95	0.878	0.76	1.08	25 X 25
82	381LR820M450H022	1.617	0.728	0.8	1.14	22 X 30
82	381LR820M450J012	1.617	0.728	0.8	1.14	25 X 25

Cap. (μF)	Catalog Part Number	ESR Max		Ripple Amps		Nominal
		@ 25° C		@ 105 °C		Size
		120 Hz (Ω)	20 kHz (Ω)	120 Hz (A)	20 kHz (A)	D x L (mm)
450 Vdc (500 Vdc Surge)						
100	381LR101M450H032	1.326	0.597	0.91	1.3	22 X 35
100	381LR101M450J022	1.326	0.597	0.91	1.3	25 X 30
120	381LR121M450H042	1.105	0.497	1.02	1.46	22 X 40
120	381LR121M450J032	1.105	0.497	1.02	1.46	25 X 35
120	381LR121M450K012	1.105	0.497	1.02	1.46	30 X 25
150	381LR151M450H452	0.884	0.396	1.07	1.53	22 X 45
150	381LR151M450J042	0.884	0.396	1.07	1.53	25 X 40
150	381LR151M450K022	0.884	0.396	1.07	1.53	30 X 30
150	381LR151M450A012	0.884	0.396	1.07	1.53	35 X 25
180	381LR181M450H052	0.737	0.332	1.12	1.6	22 X 50
180	381LR181M450J042	0.737	0.332	1.12	1.6	25 X 40
180	381LR181M450K022	0.737	0.332	1.12	1.6	30 X 30
180	381LR181M450A012	0.737	0.332	1.12	1.6	35 X 25
220	381LR221M450J452	0.603	0.271	1.42	2.03	25 X 45
220	381LR221M450K032	0.603	0.271	1.42	2.03	30 X 35
220	381LR221M450A022	0.603	0.271	1.42	2.03	35 X 30
270	381LR271M450K042	0.491	0.221	1.72	2.45	30 X 40
270	381LR271M450A032	0.491	0.221	1.72	2.45	35 X 35
330	381LR331M450K052	0.402	0.181	1.85	2.64	30 X 50
330	381LR331M450A042	0.402	0.181	1.85	2.64	35 X 40
390	381LR391M450A042	0.34	0.153	1.97	2.82	35 X 40
470	381LR471M450A052	0.282	0.127	2.47	3.53	35 X 50

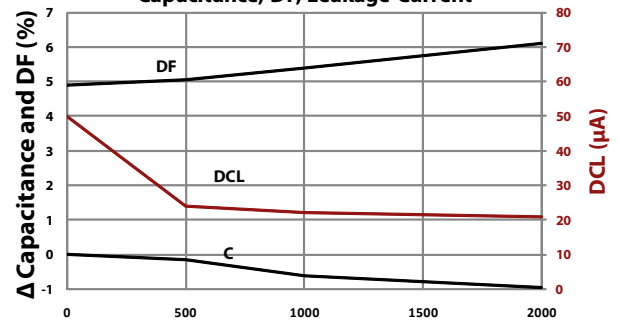
Typical Performance Curves

Life Test 105 °C, Full Load, 220 μF, 400 Vdc
Capacitance, DF, Leakage Current

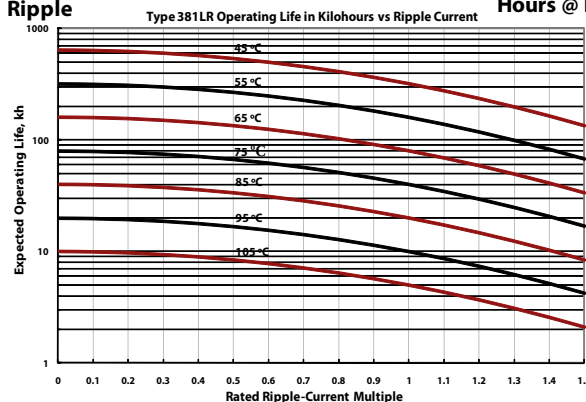


Hours @ Rated Max Temp, Voltage, Ripple

Life Test 105 °C, Full Load, 330 μF, 400 Vdc
Capacitance, DF, Leakage Current



Hours @ Rated Max Temp, Voltage, Ripple



Type 4CMC 85 °C, High Cap, Plug-in, Radial Leaded Aluminum

Rugged Value, High-Capacitance 85 °C Board-Mount Type



Type 4CMC is the PC-mount version of the high-capacitance Type DCMC screw-terminal capacitor and has about 50% more capacitance per can size through 250 V. It's for bus filtering applications where more capacitance or smaller can size is important like welders and energy storage. It delivers higher capacitance than the largest snap-ins and its heavy gauge can, molded high purity top and 14-gauge reverse proof 3 copper pins provide better performance.

Highlights

- Much better value than large snap-in capacitor
- Ripple Currents to > 50 amps at 55 °C
- 3-leads for reverse proof, strong mounting
- Printed-circuit mounting version of DCMC
- Thermal-Pak™ extended cathode construction

Specifications

Temperature Range	−40 °C to +85 °C							
Rated Voltage Range	16 Vdc to 500 Vdc							
Capacitance Range	210 μF to 420,000 μF							
Capacitance Tolerance	± 20%							
Leakage Current	≤6 √CV μA, 4 mA max, 5 minutes							
Ripple Current Multipliers	Ambient Temperature							
	45 °C	55 °C	65 °C	75 °C	85 °C			
	2.00	2.00	1.73	1.41	1.00			
	Frequency							
		50 Hz	60 Hz	120 Hz	360 Hz	1 kHz	5 kHz	10 kHz & Up
	16 to 50 V	0.80	0.85	1.00	1.05	1.08	1.08	1.08
63 to 250 V	0.80	0.83	1.00	1.15	1.20	1.20	1.20	
300 to 500 V	0.78	0.80	1.00	1.30	1.40	1.40	1.40	
Low Temperature Characteristics	Impedance ratio: Z _{−20°C} /Z _{+25°C} ≤ 8 (16–50 Vdc) ≤ 4 (63–100 Vdc) ≤ 3 (150–500 Vdc)							
Endurance Life Test	2000 h at full load at 85 °C Δ Capacitance ±20% ESR 200% of limit DCL 100% of limit							
DC Life Test	3000 h at rated voltage, 85 °C Δ Capacitance ±10% ESR 200% of limit DCL 100% of limit							
Shelf Life Test	500 h at 85 °C Capacitance 100% of limit ESR 100% of limit DCL 100% of limit							
Vibration	10 to 55 Hz, 0.06” and 10 g max, 2 h each plane							
RoHS Compliant								

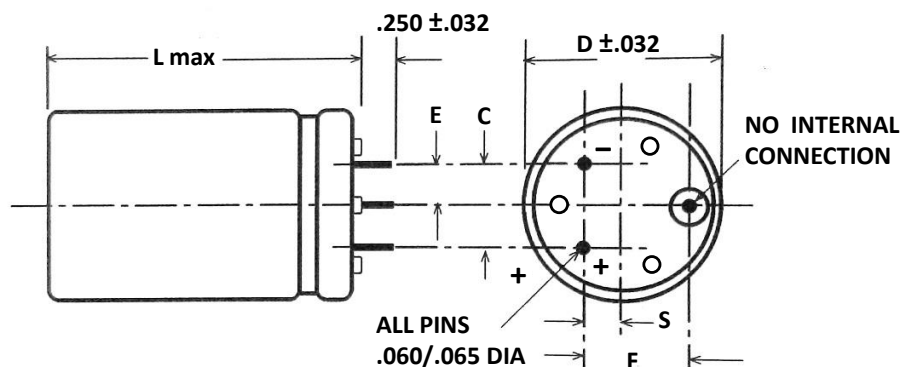
Type 4CMC 85 °C, High Cap, Plug-in, Radial Leaded Aluminum

Rugged Value, High-Capacitance 85 °C Board-Mount Type

Part Numbering System

4CMC	382	M	250	BH	8
Type	Capacitance	Tolerance	Voltage	Case Code	Insulation
	382 = 3800 μ F 212 = 2100 μ F	M = $\pm$ 20% T = -10% +50% U = -10 +75%	6R3 = 6.3 V 063 = 63 V 250 = 250 V	see table	0 = Bare can 8 = PVC 9 = Polyester

Outline Drawing



Insulated Case Dimensions

Case Code	Inches						Millimeters					
	D $\pm$.031	L MAX	C $\pm$.015	S $\pm$.031	E $\pm$.031	F $\pm$.015	D $\pm$.78	L MAX	C $\pm$.78	S $\pm$.78	E $\pm$.78	F $\pm$.38
AK	1.375	1.75	0.50	0.175	0.25	0.55	34.93	44.45	12.70	4.45	6.35	13.97
AA	1.375	2.25	0.50	0.175	0.25	0.55	34.93	57.15	12.70	4.45	6.35	13.97
AH	1.375	2.75	0.50	0.175	0.25	0.55	34.98	69.85	12.70	4.45	6.35	13.97
AB	1.375	3.25	0.50	0.175	0.25	0.55	34.93	82.55	12.70	4.45	6.35	13.97
AJ	1.375	3.75	0.50	0.175	0.25	0.55	34.93	95.25	12.70	4.45	6.35	13.97
AC	1.375	4.25	0.50	0.175	0.25	0.55	34.93	107.95	12.70	4.45	6.35	13.97
AD	1.375	4.75	0.50	0.175	0.25	0.55	34.93	120.65	12.70	4.45	6.35	13.97
AE	1.375	5.25	0.50	0.175	0.25	0.55	34.93	133.35	12.70	4.45	6.35	13.97
AF	1.375	5.75	0.50	0.175	0.25	0.55	34.93	146.05	12.70	4.45	6.35	13.97
EA	1.75	2.25	0.70	0.375	0.35	0.90	44.45	57.15	17.78	9.53	8.89	22.86
EH	1.75	2.75	0.70	0.375	0.35	0.90	44.45	69.85	17.78	9.53	8.89	22.86
EB	1.75	3.25	0.70	0.375	0.35	0.90	44.45	82.55	17.78	9.53	8.89	22.86
EJ	1.75	3.75	0.70	0.375	0.35	0.90	44.45	95.25	17.78	9.53	8.89	22.86
EC	1.75	4.25	0.70	0.375	0.35	0.90	44.45	107.95	17.78	9.53	8.89	22.86
ED	1.75	4.75	0.70	0.375	0.35	0.90	44.45	120.65	17.78	9.53	8.89	22.86
EE	1.75	5.25	0.70	0.375	0.35	0.90	44.45	133.35	17.78	9.53	8.89	22.86
EF	1.75	5.75	0.70	0.375	0.35	0.90	44.45	146.05	17.78	9.53	8.89	22.86
BA	2.00	2.25	0.80	0.425	0.40	1.00	50.80	57.15	20.32	10.80	10.16	25.40
BH	2.00	2.75	0.80	0.425	0.40	1.00	50.80	69.85	20.32	10.80	10.16	25.40
BB	2.00	3.25	0.80	0.425	0.40	1.00	50.80	82.55	20.32	10.80	10.16	25.40
BJ	2.00	3.75	0.80	0.425	0.40	1.00	50.80	95.25	20.32	10.80	10.16	25.40
BC	2.00	4.25	0.80	0.425	0.40	1.00	50.80	107.95	20.32	10.80	10.16	25.40
BD	2.00	4.75	0.80	0.425	0.40	1.00	50.80	120.65	20.32	10.80	10.16	25.40
BE	2.00	5.25	0.80	0.425	0.40	1.00	50.80	133.25	20.32	10.80	10.16	25.40
BF	2.00	5.75	0.80	0.425	0.40	1.00	50.80	146.05	20.32	10.80	10.16	25.40

Type 4CMC 85 °C, High Cap, Plug-in, Radial Leaded Aluminum

Rugged Value, High-Capacitance 85 °C Board-Mount Type

Ratings

Additional Low Voltages Available at <http://www.cde.com/catalogs/4CMC.pdf>

Cap. (μF)	Catalog Part Number	ESR Max. 25 °C		Ripple Amps, 85 °C		Nom Size D X L (in)
		120 Hz 20 kHz		120 Hz	20 kHz	
		(mΩ)	(mΩ)	(A)	(A)	
200 Vdc (250 Vdc Surge)						
1200	4CMC122M200AK8	105.2	60.4	3.1	4.1	1 3/8 X 1 3/4
1900	4CMC192M200AA8	66.6	38.2	4.5	5.9	1 3/8 X 2 1/4
2700	4CMC272M200AH8	48.0	27.6	5.4	7.2	1 3/8 X 2 3/4
2700	4CMC272M200EA8	60.0	34.4	5.3	7.0	1 3/4 X 2 1/4
3500	4CMC352M200AB8	37.8	21.7	6.6	8.7	1 3/8 X 3 1/4
3500	4CMC352M200BA8	44.2	30.7	6.6	7.9	2 X 2 1/4
3700	4CMC372M200EH8	38.1	21.9	6.9	9.1	1 3/4 X 2 3/4
4300	4CMC432M200AJ8	29.9	17.2	7.8	10.2	1 3/8 X 3 3/4
4800	4CMC482M200EB8	29.4	16.9	8.5	11.2	1 3/4 X 3 1/4
5000	4CMC502M200BH8	33.1	23.0	8.2	9.8	2 X 2 3/4
5100	4CMC512M200AC8	25.7	14.7	8.8	11.7	1 3/8 X 4 1/4
5800	4CMC582M200AD8	22.6	13.0	9.8	12.9	1 3/8 X 4 3/4
5900	4CMC592M200EJ8	24.1	13.8	9.7	12.7	1 3/4 X 3 3/4
6600	4CMC662M200AE8	20.3	11.6	10.9	14.4	1 3/8 X 5 1/4
6800	4CMC682M200BB8	25.6	17.8	9.8	11.8	2 X 3 1/4
7100	4CMC712M200EC8	20.5	11.8	10.8	14.3	1 3/4 X 4 1/4
7400	4CMC742M200AF8	23.1	13.3	10.7	14.2	1 3/8 X 5 3/4
8100	4CMC812M200BJ8	21.0	14.6	12.2	14.6	2 X 3 3/4
8200	4CMC822M200ED8	17.9	10.3	12.2	16.1	1 3/4 X 4 3/4
9300	4CMC932M200EE8	16.0	9.2	13.7	18.1	1 3/4 X 5 1/4
9500	4CMC952M200BC8	19.1	13.3	12.8	15.4	2 X 4 1/4
10000	4CMC103M200EF8	14.5	8.3	15.4	20.3	1 3/4 X 5 3/4
11000	4CMC113M200BD8	15.7	10.9	14.6	17.5	2 X 4 3/4
12000	4CMC123M200BE8	14.1	9.8	16.0	19.2	2 X 5 1/4
14000	4CMC143M200BF8	12.8	8.9	17.3	20.8	2 X 5 3/4
250 Vdc (300 Vdc Surge)						
890	4CMC891M250AK8	137.0	78.6	2.6	3.4	1 3/8 X 1 3/4
1500	4CMC152M250AA8	86.5	49.7	3.7	4.9	1 3/8 X 2 1/4
1900	4CMC192M250EA8	68.7	39.4	4.8	6.3	1 3/4 X 2 1/4
2100	4CMC212M250AH8	62.3	35.7	4.5	6.0	1 3/8 X 2 3/4
2700	4CMC272M250BA8	54.2	37.6	5.8	7.0	2 X 2 1/4
2700	4CMC272M250AB8	48.8	28.0	5.5	7.2	1 3/8 X 3 1/4
2800	4CMC282M250EH8	47.8	27.4	6.1	8.1	1 3/4 X 2 3/4
3200	4CMC322M250AJ8	38.6	22.1	6.5	8.5	1 3/8 X 3 3/4
3700	4CMC372M250EB8	36.8	21.1	7.6	10.0	1 3/4 X 3 1/4
3800	4CMC382M250BH8	40.5	28.1	7.2	8.7	2 X 2 3/4
3900	4CMC392M250AC8	33.0	18.9	7.4	9.7	1 3/8 X 4 1/4
4400	4CMC442M250AD8	29.0	16.6	8.2	10.8	1 3/8 X 4 3/4
4500	4CMC452M250EJ8	30.1	17.3	8.6	11.4	1 3/4 X 3 3/4
5000	4CMC502M250AE8	25.9	14.9	9.1	12.0	1 3/8 X 5 1/4
5000	4CMC502M250BB8	31.2	21.7	8.7	10.4	2 X 3 1/4
5400	4CMC542M250EC8	25.5	14.7	9.7	12.8	1 3/4 X 4 1/4

Cap. (μF)	Catalog Part Number	ESR Max. 25 °C		Ripple Amps, 85 °C		Nom Size
		120 Hz	20 kHz	120 Hz	20 kHz	D X L
		(mΩ)	(mΩ)	(A)	(A)	(in)
250 Vdc (300 Vdc Surge)						
5600	4CMC562M250AF8	29.4	16.9	9.0	11.9	1 3/8 X 5 3/4
6200	4CMC622M250BJ8	25.5	17.7	10.7	12.9	2 X 3 3/4
6300	4CMC632M250ED8	22.3	12.8	11.0	14.5	1 3/4 X 4 3/4
7200	4CMC722M250EE8	19.8	11.4	12.3	16.3	1 3/4 X 5 1/4
7300	4CMC732M250BC8	21.7	15.1	11.7	14.0	2 X 4 1/4
8100	4CMC812M250EF8	18.0	10.3	13.8	18.3	1 3/4 X 5 3/4
8500	4CMC852M250BD8	19.0	13.2	12.9	15.5	2 X 4 3/4
9700	4CMC972M250BE8	17.0	11.8	14.2	17.0	2 X 5 1/4
11000	4CMC113M250BF8	15.4	10.7	15.4	18.4	2 X 5 3/4
300 Vdc (350 Vdc Surge)						
520	4CMC521M300AK8	245.0	141.0	2.2	2.9	1 3/8 X 1 3/4
870	4CMC871M300AA8	148.0	84.7	3.1	4.1	1 3/8 X 2 1/4
1200	4CMC122M300AH8	106.0	60.7	4.0	5.3	1 3/8 X 2 3/4
1300	4CMC132M300EA8	111.0	63.8	4.2	5.5	1 3/4 X 2 1/4
1600	4CMC162M300BA8	93.2	51.9	5.0	6.7	2 X 2 1/4
1600	4CMC162M300AB8	82.7	47.5	4.8	6.3	1 3/8 X 3 1/4
1800	4CMC182M300EH8	99.2	56.9	4.8	6.3	1 3/4 X 2 3/4
1900	4CMC192M300AJ8	68.0	39.0	5.6	7.4	1 3/8 X 3 3/4
2200	4CMC222M300BH8	67.1	37.4	6.3	8.4	2 X 2 3/4
2300	4CMC232M300AC8	57.9	33.2	6.4	8.4	1 3/8 X 4 1/4
2300	4CMC232M300EB8	76.1	43.7	5.8	7.7	1 3/4 X 3 1/4
2600	4CMC262M300AD8	50.6	29.0	7.1	9.4	1 3/8 X 4 3/4
2900	4CMC292M300AE8	45.0	25.8	7.8	10.3	1 3/8 X 5 1/4
2900	4CMC292M300BB8	51.6	28.7	7.6	10.2	2 X 3 1/4
2900	4CMC292M300EJ8	61.9	35.5	6.8	8.9	1 3/4 X 3 3/4
3300	4CMC332M300AF8	50.7	29.1	7.6	10.1	1 3/8 X 5 3/4
3500	4CMC352M300EC8	52.2	30.0	7.7	10.2	1 3/4 X 4 1/4
3600	4CMC362M300BJ8	51.2	28.5	8.1	10.8	2 X 3 3/4
4000	4CMC402M300ED8	45.3	26.0	8.6	11.4	1 3/4 X 4 3/4
4300	4CMC432M300BC8	43.3	24.1	9.2	12.3	2 X 4 1/4
4600	4CMC462M300EE8	40.1	23.0	9.5	12.6	1 3/4 X 5 1/4
4900	4CMC492M300BD8	38.0	21.2	10.2	13.7	2 X 4 3/4
5100	4CMC512M300EF8	36.0	20.6	10.4	13.7	1 3/4 X 5 3/4
5700	4CMC572M300BE8	33.3	18.5	11.3	15.1	2 X 5 1/4
6400	4CMC642M300BF8	29.9	16.7	12.3	16.5	2 X 5 3/4
350 Vdc (400 Vdc Surge)						
430	4CMC431M350AK8	264.1	151.6	2.1	2.8	1 3/8 X 1 3/4
710	4CMC711M350AA8	158.9	91.2	3.1	4.0	1 3/8 X 2 1/4
1000	4CMC102M350EA8	119.2	68.4	4.1	5.4	1 3/4 X 2 1/4
1000	4CMC102M350AH8	113.9	65.4	3.7	4.9	1 3/8 X 2 3/4
1200	4CMC122M350BA8	98.1	54.6	4.8	6.4	2 X 2 1/4
1300	4CMC132M350EH8	105.1	60.3	4.6	6.1	1 3/4 X 2 3/4

Type 4CMC 85 °C, High Cap, Plug-in, Radial Leaded Aluminum

Rugged Value, High-Capacitance 85 °C Board-Mount Type

Additional Low Voltages Available at <http://www.cde.com/catalogs/4CMC.pdf>

		ESR Max. 25 °C		Ripple Amps, 85 °C		Nom Size
Cap. (µF)	Catalog Part Number	120 Hz (mΩ)	20 kHz (mΩ)	120 Hz (A)	20 kHz (A)	D X L (in)
350 Vdc (400 Vdc Surge)						
1300	4CMC132M350AB8	89.0	51.1	4.5	6.0	1 3/8 X 3 1/4
1600	4CMC162M350BH8	71.8	40.0	6.0	8.1	2 X 2 3/4
1600	4CMC162M350AJ8	73.2	42.0	5.2	6.9	1 3/8 X 3 3/4
1700	4CMC172M350EB8	80.6	46.3	5.7	7.5	1 3/4 X 3 1/4
1800	4CMC182M350AC8	62.3	35.8	6.0	7.9	1 3/8 X 4 1/4
2100	4CMC212M350BB8	55.1	30.7	7.3	9.7	2 X 3 1/4
2100	4CMC212M350AD8	54.4	31.2	6.7	8.8	1 3/8 X 4 3/4
2100	4CMC212M350EJ8	65.5	37.6	6.5	8.6	1 3/4 X 3 3/4
2400	4CMC242M350AE8	48.3	27.7	7.4	9.8	1 3/8 X 5 1/4
2500	4CMC252M350EC8	55.3	31.7	7.4	9.7	1 3/4 X 4 1/4
2600	4CMC262M350BJ8	47.9	26.7	8.7	11.7	2 X 3 3/4
2700	4CMC272M350AF8	54.5	31.3	7.4	9.7	1 3/8 X 5 3/4
2900	4CMC292M350ED8	47.9	27.5	8.3	11.0	1 3/4 X 4 3/4
3100	4CMC312M350BC8	45.7	25.5	9.0	12.1	2 X 4 1/4
3300	4CMC332M350EE8	42.4	24.3	9.4	12.4	1 3/4 X 5 1/4
3600	4CMC362M350BD8	40.1	22.4	9.9	13.3	2 X 4 3/4
3700	4CMC372M350EF8	38.0	21.8	10.6	14.0	1 3/4 X 5 3/4
4200	4CMC422M350BE8	35.1	19.6	11.0	14.7	2 X 5 1/4
4700	4CMC472M350BF8	31.6	17.6	12.0	16.0	2 X 5 3/4
400 Vdc (450 Vdc Surge)						
320	4CMC321M400AK28	382.0	195.0	1.7	2.4	1 3/8 X 1 3/4
590	4CMC591M400AA28	212.0	108.0	2.6	3.7	1 3/8 X 2 1/4
800	4CMC801M400AH28	156.0	79.4	3.2	4.5	1 3/8 X 2 3/4
840	4CMC841M400EA8	154.0	78.8	3.6	5.0	1 3/4 X 2 1/4
1000	4CMC102M400BA8	130.0	72.2	4.2	5.6	2 X 2 1/4
1000	4CMC102M400AB28	119.0	60.9	3.9	5.5	1 3/8 X 3 1/4
1200	4CMC122M400EH8	107.0	54.6	4.6	6.4	1 3/4 X 2 3/4
1300	4CMC132M400AJ28	96.9	49.5	4.5	6.4	1 3/8 X 3 3/4
1400	4CMC142M400BH8	93.6	52.1	5.3	7.1	2 X 2 3/4
1500	4CMC152M400EB8	87.4	44.6	5.5	7.7	1 3/4 X 3 1/4
1500	4CMC152M400AC28	81.8	41.7	0.5	0.8	1 3/8 X 4 1/4
1600	4CMC162M400AD28	78.6	40.1	5.5	7.8	1 3/8 X 4 3/4
1800	4CMC182M400EJ8	71.0	36.2	6.3	8.8	1 3/4 X 3 3/4
1800	4CMC182M400AE28	69.5	35.4	6.2	8.7	1 3/8 X 5 1/4
1900	4CMC192M400BB8	71.9	40.0	6.4	8.5	2 X 3 1/4
2000	4CMC202M400AF28	77.9	39.7	6.2	8.6	1 3/8 X 5 3/4
2100	4CMC212M400EC8	59.9	30.5	7.1	9.9	1 3/4 X 4 1/4
2300	4CMC232M400BJ8	58.4	32.5	7.9	10.6	2 X 3 3/4
2500	4CMC252M400ED8	51.9	26.5	8.0	11.2	1 3/4 X 4 3/4
2700	4CMC272M400BC8	49.3	27.5	8.7	11.6	2 X 4 1/4
2900	4CMC292M400EE8	45.8	23.4	9.0	12.7	1 3/4 X 5 1/4
3200	4CMC322M400EF8	41.1	21.0	10.2	14.3	1 3/4 X 5 3/4

		ESR Max. 25 °C		Ripple Amps, 85 °C		Nom Size
Cap. (µF)	Catalog Part Number	120 Hz (mΩ)	20 kHz (mΩ)	120 Hz (A)	20 kHz (A)	D X L (in)
400 Vdc (450 Vdc Surge)						
3200	4CMC322M400BD8	42.8	23.8	9.6	12.9	2 X 4 3/4
3600	4CMC362M400BE8	37.9	21.1	10.6	14.2	2 X 5 1/4
4100	4CMC412M400BF8	34.0	18.9	11.5	15.4	2 X 5 3/4
450 Vdc (500 Vdc Surge)						
330	4CMC331M450AK8	281.0	143.0	1.8	2.5	1 3/8 X 1 3/4
490	4CMC491M450AA8	188.0	95.7	2.5	3.4	1 3/8 X 2 1/4
600	4CMC601M450AH8	138.0	70.4	3.0	4.1	1 3/8 X 2 3/4
690	4CMC691M450EA8	163.0	83.3	3.3	4.6	1 3/4 X 2 1/4
860	4CMC861M450BA8	116.0	64.8	4.1	5.6	2 X 2 1/4
860	4CMC861M450AB8	106.0	54.0	3.6	5.1	1 3/8 X 3 1/4
930	4CMC931M450EH8	121.0	61.5	4.1	5.7	1 3/4 X 2 3/4
1000	4CMC102M450AJ8	86.1	43.9	4.2	5.9	1 3/8 X 3 3/4
1100	4CMC112M450BH8	98.9	55.1	4.8	6.5	2 X 2 3/4
1200	4CMC122M450EB8	92.4	47.1	5.0	7.0	1 3/4 X 3 1/4
1200	4CMC122M450AC8	72.7	37.1	4.8	6.8	1 3/8 X 4 1/4
1300	4CMC132M450AD8	69.9	35.7	5.1	7.2	1 3/8 X 4 3/4
1500	4CMC152M450BB8	75.9	42.2	5.8	7.8	2 X 3 1/4
1500	4CMC152M450AE8	61.8	31.5	5.7	8.0	1 3/8 X 5 1/4
1500	4CMC152M450EJ8	75.1	38.3	5.7	8.0	1 3/4 X 3 3/4
1600	4CMC162M450AF8	69.3	35.4	5.7	8.0	1 3/8 X 5 3/4
1800	4CMC182M450EC8	63.3	32.3	6.5	9.1	1 3/4 X 4 1/4
1900	4CMC192M450BJ8	61.7	34.3	7.2	9.7	2 X 3 3/4
2100	4CMC212M450ED8	54.8	28.0	7.3	10.3	1 3/4 X 4 3/4
2200	4CMC222M450BC8	52.1	29.0	7.9	10.6	2 X 4 1/4
2300	4CMC232M450EE8	48.4	24.7	8.3	11.6	1 3/4 X 5 1/4
2600	4CMC262M450EF8	43.5	22.2	9.3	13.0	1 3/4 X 5 3/4
2600	4CMC262M450BD8	45.7	25.4	8.7	11.7	2 X 4 3/4
3100	4CMC312M450BE8	38.8	21.6	9.8	13.1	2 X 5 1/4
3400	4CMC342M450BF8	35.0	19.5	10.7	14.3	2 X 5 3/4
500 Vdc (550 Vdc Surge)						
210	4CMC211M500AK8	487.0	287.0	1.5	2.1	1 3/8 X 1 3/4
310	4CMC311M500AA8	325.0	191.0	2.1	3.0	1 3/8 X 2 1/4
440	4CMC441M500EA8	238.0	140.0	2.9	4.0	1 3/4 X 2 1/4
450	4CMC451M500AH8	225.0	133.0	2.6	3.7	1 3/8 X 2 3/4
560	4CMC561M500BA8	193.0	114.0	3.4	4.6	2 X 2 1/4
590	4CMC591M500AB8	173.0	102.0	3.2	4.5	1 3/8 X 3 1/4
630	4CMC631M500EH8	165.0	97.2	3.7	5.2	1 3/4 X 2 3/4
730	4CMC731M500AJ8	140.0	82.6	3.8	5.3	1 3/8 X 3 3/4
780	4CMC781M500BH8	134.0	78.7	4.4	5.9	2 X 2 3/4
820	4CMC821M500EB8	126.0	74.4	4.5	6.4	1 3/4 X 3 1/4
820	4CMC821M500AC8	125.0	73.6	4.2	5.9	1 3/8 X 4 1/4
900	4CMC901M500AD8	113.0	66.4	4.6	6.5	1 3/8 X 4 3/4

Type 4CMC 85 °C, High Cap, Plug-in, Radial Leaded Aluminum

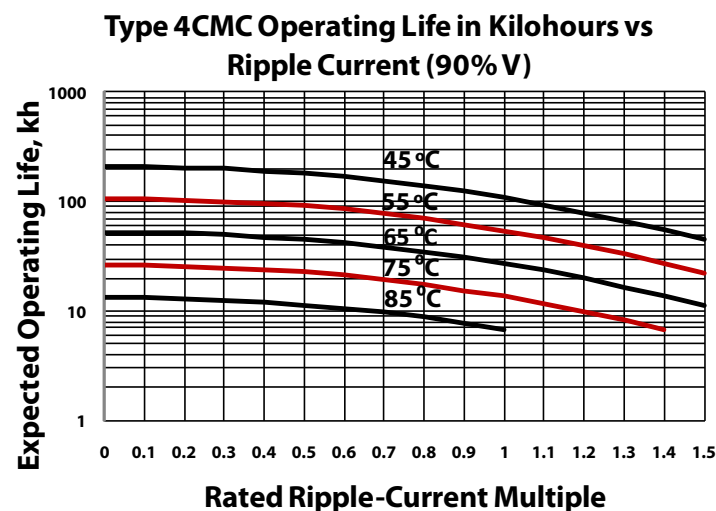
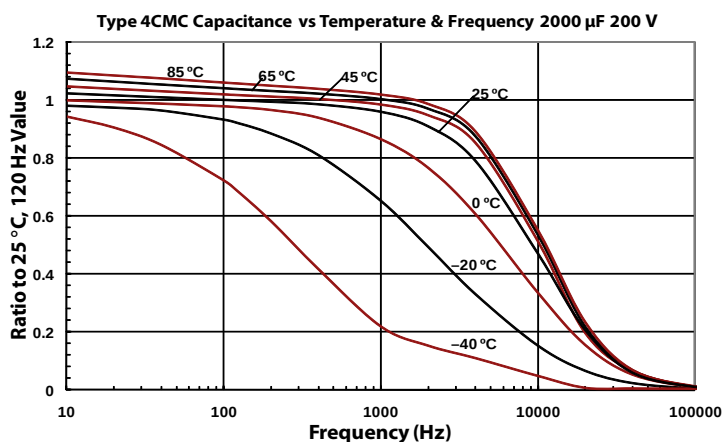
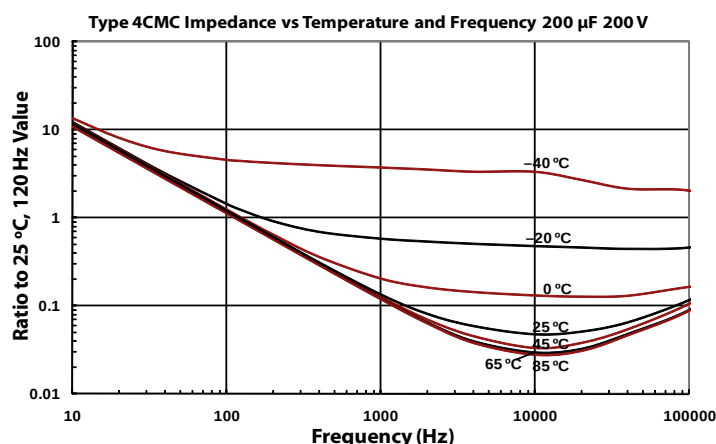
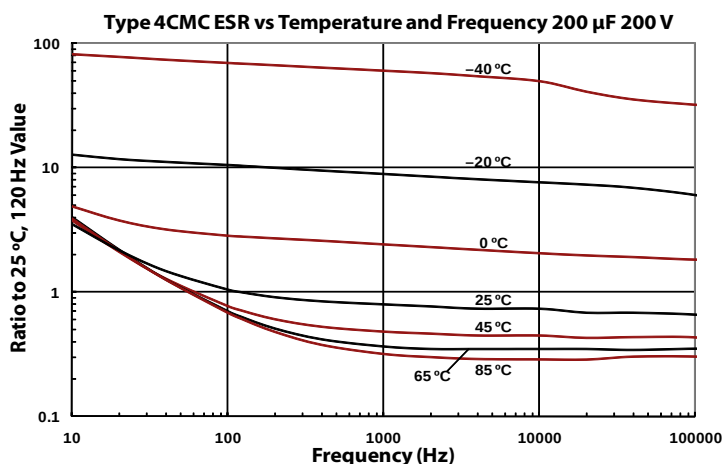
Rugged Value, High-Capacitance 85 °C Board-Mount Type

Additional Low Voltages Available at <http://www.cde.com/catalogs/4CMC.pdf>

Cap. (μF)	Catalog Part Number	ESR Max. 25 °C		Ripple Amps, 85 °C		Nom Size
		120 Hz	20 kHz	120 Hz	20 kHz	
		(mΩ)	(mΩ)	(A)	(A)	
500 Vdc (550 Vdc Surge)						
1000	4CMC102M500BB8	103.0	60.3	5.3	7.1	2 X 3 1/4
1000	4CMC102M500AE8	99.0	58.5	5.2	7.3	1 3/8 X 5 1/4
1000	4CMC102M500EJ8	103.0	60.4	5.2	7.3	1 3/4 X 3 3/4
1100	4CMC112M500AF8	114.0	67.3	5.1	7.1	1 3/8 X 5 3/4
1200	4CMC122M500EC8	86.4	50.9	5.9	8.3	1 3/4 X 4 1/4
1300	4CMC132M500BJ8	83.2	49.0	6.6	8.9	2 X 3 3/4

Cap. (μF)	Catalog Part Number	ESR Max. 25 °C		Ripple Amps, 85 °C		Nom Size
		120 Hz	20 kHz	120 Hz	20 kHz	D X L
		(mΩ)	(mΩ)	(A)	(A)	(in)
500 Vdc (550 Vdc Surge)						
1400	4CMC142M500ED8	74.8	44.0	6.7	9.4	1 3/4 X 4 3/4
1500	4CMC152M500BC8	70.2	41.3	7.3	9.7	2 X 4 1/4
1600	4CMC162M500EE8	66.0	38.8	7.5	10.6	1 3/4 X 5 1/4
1800	4CMC182M500EF8	59.1	34.8	8.5	11.9	1 3/4 X 5 3/4
1800	4CMC182M500BD8	60.7	35.8	8.1	10.8	2 X 4 3/4
2100	4CMC212M500BE8	52.1	30.7	9.0	12.1	2 X 5 1/4
2300	4CMC232M500BF8	46.9	27.6	9.8	13.2	2 X 5 3/4

Typical Performance Curves



Type 400C 95 °C Long Life, Plug-in, Radial Leaded Aluminum

Very Long Life Board-Mount Type



The Type 400C is the PC-mount equivalent for Type 500C screw-terminal long life grade capacitor. It's for bus filtering applications where long life is critical like telecom systems and industrial power supplies. Type 400C delivers 2 to 3 times the life of Type 4CMC, and above 250 V it has nearly the same capacitance. Its extended cathode foil assures cool operation with heatflow from the capacitor element to the can in all mounting orientations.

Highlights

- More than 10 years life in most applications
- Ripple Currents to > 50 amps at 55 °C
- 3-leads
- Printed-circuit mounting
- Thermal-Pak™ extended cathode construction

Specifications

Temperature Range	−40 °C to +95 °C						
Rated Voltage Range	100 Vdc to 500 Vdc						
Capacitance Range	170 μF to 29,000 μF						
Capacitance Tolerance	± 20%						
Leakage Current	≤3 $\sqrt{CV}$ μA, 4 mA max, 5 minutes						
Ripple Current Multipliers	Ambient Temperature						
	45 °C	55 °C	65 °C	75 °C	85 °C	95 °C	
	2.00	1.82	1.59	1.33	1.00	0.48	
	Frequency	50 Hz	60 Hz	120 Hz	360 Hz	1 kHz	5 kHz & up
	100 to 160 V	0.80	0.85	1.00	1.05	1.08	1.08
	200 to 350 V	0.80	0.83	1.00	1.15	1.20	1.20
	400 to 500 V	0.78	0.80	1.00	1.30	1.40	1.40
Low Temperature Characteristics	Impedance ratio: Z _{−20°C} /Z _{+25°C} ≤ 4 (100 Vdc) ≤ 3 (150–500 Vdc)						
Endurance Life Test	3000 h at full load at 85 °C Δ Capacitance ±20% ESR 200% of limit DCL 100% of limit						
Shelf Life Test	500 h at 95 °C Δ Capacitance 100% of limit ESR 100% of limit DCL 100% of limit						
Vibration	10 to 55 Hz, 0.06” and 10 g max, 2 h each plane						
RoHS Compliant							

Type 400C 95 °C Long Life, Plug-in, Radial Leaded Aluminum

Very Long Life Board-Mount Type

Part Numbering System

400C
Type

242
Capacitance
242 = 2400 μ F
171 = 170 μ F

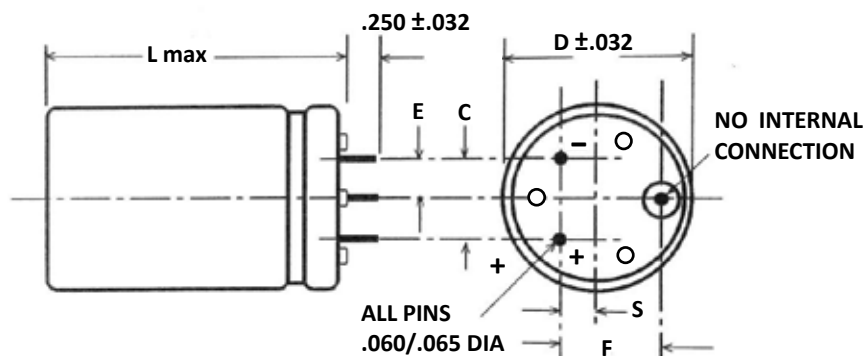
M
Tolerance
M = $\pm 20\%$
T = $-10\% +50\%$
U = $-10\% +75\%$

450
Voltage
100 = 100 V
450 = 450 V

BD
Case Code
see table

8
Insulation
0 = bare can
8 = PVC
9 = Polyester

Outline Drawing



Insulated Case Dimensions

Case Code	Inches						Millimeters					
	D $\pm$.031	L MAX	C $\pm$.015	S $\pm$.031	E $\pm$.031	F $\pm$.015	D $\pm$.78	L MAX	C $\pm$.78	S $\pm$.78	E $\pm$.78	F $\pm$.38
AK	1.375	1.75	0.50	0.175	0.25	0.55	34.93	44.45	12.70	4.45	6.35	13.97
AA	1.375	2.25	0.50	0.175	0.25	0.55	34.93	57.15	12.70	4.45	6.35	13.97
AH	1.375	2.75	0.50	0.175	0.25	0.55	34.98	69.85	12.70	4.45	6.35	13.97
AB	1.375	3.25	0.50	0.175	0.25	0.55	34.93	82.55	12.70	4.45	6.35	13.97
AJ	1.375	3.75	0.50	0.175	0.25	0.55	34.93	95.25	12.70	4.45	6.35	13.97
AC	1.375	4.25	0.50	0.175	0.25	0.55	34.93	107.95	12.70	4.45	6.35	13.97
AD	1.375	4.75	0.50	0.175	0.25	0.55	34.93	120.65	12.70	4.45	6.35	13.97
AE	1.375	5.25	0.50	0.175	0.25	0.55	34.93	133.35	12.70	4.45	6.35	13.97
AF	1.375	5.75	0.50	0.175	0.25	0.55	34.93	146.05	12.70	4.45	6.35	13.97
EA	1.75	2.25	0.70	0.375	0.35	0.90	44.45	57.15	17.78	9.53	8.89	22.86
EH	1.75	2.75	0.70	0.375	0.35	0.90	44.45	69.85	17.78	9.53	8.89	22.86
EB	1.75	3.25	0.70	0.375	0.35	0.90	44.45	82.55	17.78	9.53	8.89	22.86
EJ	1.75	3.75	0.70	0.375	0.35	0.90	44.45	95.25	17.78	9.53	8.89	22.86
EC	1.75	4.25	0.70	0.375	0.35	0.90	44.45	107.95	17.78	9.53	8.89	22.86
ED	1.75	4.75	0.70	0.375	0.35	0.90	44.45	120.65	17.78	9.53	8.89	22.86
EE	1.75	5.25	0.70	0.375	0.35	0.90	44.45	133.35	17.78	9.53	8.89	22.86
EF	1.75	5.75	0.70	0.375	0.35	0.90	44.45	146.05	17.78	9.53	8.89	22.86
BA	2.00	2.25	0.80	0.425	0.40	1.00	50.80	57.15	20.32	10.80	10.16	25.40
BH	2.00	2.75	0.80	0.425	0.40	1.00	50.80	69.85	20.32	10.80	10.16	25.40
BB	2.00	3.25	0.80	0.425	0.40	1.00	50.80	82.55	20.32	10.80	10.16	25.40
BJ	2.00	3.75	0.80	0.425	0.40	1.00	50.80	95.25	20.32	10.80	10.16	25.40
BC	2.00	4.25	0.80	0.425	0.40	1.00	50.80	107.95	20.32	10.80	10.16	25.40
BD	2.00	4.75	0.80	0.425	0.40	1.00	50.80	120.65	20.32	10.80	10.16	25.40
BE	2.00	5.25	0.80	0.425	0.40	1.00	50.80	133.25	20.32	10.80	10.16	25.40
BF	2.00	5.75	0.80	0.425	0.40	1.00	50.80	146.05	20.32	10.80	10.16	25.40

Type 400C 95 °C Long Life, Plug-in, Radial Leaded Aluminum

Very Long Life Board-Mount Type

Ratings

Additional Low Voltages available at <http://www.cde.com/catalogs/400C.pdf>

		ESR Max. 25 °C		Ripple Amps. 85 °C		Nominal Size
Cap.	Catalog Part	120 Hz	20 kHz	120 Hz	20 kHz	D X L
(µF)	Number	(mΩ)	(mΩ)	(A)	(A)	(in)
200 Vdc (250 Vdc Surge)						
920	400C921M200AK8	126.00	71.30	3.40	4.50	1 3/8 X 1 3/4
1400	400C142M200AA8	84.50	48.20	4.70	6.30	1 3/8 X 2 1/4
2000	400C202M200EA8	61.70	39.30	6.10	7.60	1 3/4 X 2 1/4
2000	400C202M200AH8	59.30	34.20	5.80	7.70	1 3/8 X 2 3/4
2600	400C262M200AB8	46.10	26.80	7.10	9.30	1 3/8 X 3 1/4
2600	400C262M200BA8	51.80	35.90	6.80	8.20	2 X 2 1/4
2800	400C282M200EH8	44.10	27.90	7.70	9.70	1 3/4 X 2 3/4
3200	400C322M200AJ8	38.00	22.40	8.20	10.70	1 3/8 X 3 3/4
3500	400C352M200BH8	36.70	25.10	8.70	10.50	2 X 2 3/4
3700	400C372M200EB8	34.20	21.80	9.50	11.90	1 3/4 X 3 1/4
3800	400C382M200AC8	32.50	19.50	9.40	12.10	1 3/8 X 4 1/4
4200	400C422M200AD8	29.80	17.80	10.20	13.20	1 3/8 X 4 3/4
4500	400C452M200EJ8	28.10	18.10	10.80	13.50	1 3/4 X 3 3/4
4700	400C472M200BB8	28.50	19.60	10.40	12.50	2 X 3 1/4
4800	400C482M200AE8	26.80	16.30	11.30	14.50	1 3/8 X 5 1/4
5300	400C532M200AF8	24.50	15.10	12.40	15.80	1 3/8 X 5 3/4
5400	400C542M200EC8	24.10	15.60	12.10	15.00	1 3/4 X 4 1/4
5700	400C572M200BJ8	23.50	16.30	12.80	15.40	2 X 3 3/4
6300	400C632M200ED8	21.20	13.90	13.60	16.80	1 3/4 X 4 3/4
6800	400C682M200BC8	20.10	14.10	14.00	16.70	2 X 4 1/4
7100	400C712M200EE8	19.00	12.60	15.20	18.60	1 3/4 X 5 1/4
7800	400C782M200BD8	17.80	12.50	15.30	18.30	2 X 4 3/4
8000	400C802M200EF8	17.40	11.70	17.00	20.70	1 3/4 X 5 3/4
9300	400C932M200BE8	15.60	11.20	16.90	20.00	2 X 5 1/4
10000	400C103M200BF8	14.30	10.40	18.30	21.50	2 X 5 3/4
250 Vdc (300 Vdc Surge)						
670	400C671M250AK8	160.00	87.20	3.00	4.10	1 3/8 X 1 3/4
1000	400C102M250AH8	75.10	41.50	5.20	7.00	1 3/8 X 2 3/4
1000	400C102M250AA8	107.00	58.80	4.20	5.70	1 3/8 X 2 1/4
1500	400C152M250EA8	75.70	45.90	5.50	7.10	1 3/4 X 2 1/4
1900	400C192M250AB8	58.20	32.50	6.30	8.50	1 3/8 X 3 1/4
1900	400C192M250BA8	61.90	40.50	6.20	7.70	2 X 2 1/4
2000	400C202M250EH8	54.30	32.60	7.00	9.00	1 3/4 X 2 3/4
2300	400C232M250AJ8	47.80	26.90	7.30	9.80	1 3/8 X 3 3/4
2500	400C252M250BH8	44.10	28.50	7.90	9.90	2 X 2 3/4
2700	400C272M250EB8	42.00	25.40	8.50	11.00	1 3/4 X 3 1/4
2700	400C272M250AC8	40.80	23.30	8.40	11.10	1 3/8 X 4 1/4
3000	400C302M250AD8	37.30	21.30	9.20	12.10	1 3/8 X 4 3/4
3300	400C332M250EJ8	34.50	21.00	9.70	12.50	1 3/4 X 3 3/4
3400	400C342M250BB8	34.10	22.20	9.50	11.80	2 X 3 1/4
3500	400C352M250AE8	33.40	19.30	10.10	13.30	1 3/8 X 5 1/4
3800	400C382M250AF8	30.40	17.90	11.20	14.60	1 3/8 X 5 3/4

		ESR Max. 25 °C		Ripple Amps. 85 °C		Nominal Size
Cap.	Catalog Part	120 Hz	20 kHz	120 Hz	20 kHz	D X L
(µF)	Number	(mΩ)	(mΩ)	(A)	(A)	(in)
250 Vdc (300 Vdc Surge)						
3900	400C392M250EC8	29.40	18.10	10.90	13.90	1 3/4 X 4 1/4
4200	400C422M250BJ8	28.00	18.40	11.80	14.50	2 X 3 3/4
4600	400C462M250ED8	25.70	16.00	12.30	15.60	1 3/4 X 4 3/4
4900	400C492M250BC8	23.90	15.90	12.80	15.70	2 X 4 1/4
5100	400C512M250EE8	23.00	14.50	13.80	17.40	1 3/4 X 5 1/4
5700	400C572M250BD8	21.10	14.10	14.10	17.20	2 X 4 3/4
5800	400C582M250EF8	21.00	13.30	15.40	19.40	1 3/4 X 5 3/4
6800	400C682M250BE8	18.40	12.50	15.60	19.00	2 X 5 1/4
7500	400C752M250BF8	16.80	11.50	16.90	20.40	2 X 5 3/4
300 Vdc (350 Vdc Surge)						
490	400C491M300AK8	240.00	118.00	2.20	3.10	1 3/8 X 1 3/4
740	400C741M300AA8	161.00	79.40	3.10	4.40	1 3/8 X 2 1/4
1000	400C102M300AH8	112.00	55.80	3.80	5.40	1 3/8 X 2 3/4
1200	400C122M300EA8	102.00	51.50	4.40	6.20	1 3/4 X 2 1/4
1400	400C142M300AB8	86.20	43.40	4.70	6.60	1 3/8 X 3 1/4
1500	400C152M300BA8	92.10	47.20	5.00	7.00	2 X 2 1/4
1700	400C172M300EH8	75.00	36.90	5.50	7.80	1 3/4 X 2 3/4
1700	400C172M300AJ8	70.30	35.90	5.40	7.60	1 3/8 X 3 3/4
2000	400C202M300AC8	59.60	30.80	6.20	8.60	1 3/8 X 4 1/4
2100	400C212M300BH8	66.10	33.30	6.40	9.00	2 X 2 3/4
2200	400C222M300EB8	57.70	28.70	6.70	9.50	1 3/4 X 3 1/4
2400	400C242M300AD8	51.90	27.30	6.90	9.50	1 3/8 X 4 3/4
2700	400C272M300AE8	46.10	24.60	7.70	10.50	1 3/8 X 5 1/4
2700	400C272M300EJ8	47.10	23.70	7.70	10.80	1 3/4 X 3 3/4
2800	400C282M300BB8	50.90	25.90	7.70	10.70	2 X 3 1/4
3000	400C302M300AF8	41.60	22.60	8.50	11.60	1 3/8 X 5 3/4
3200	400C322M300EC8	41.60	21.20	8.60	12.10	1 3/4 X 4 1/4
3400	400C342M300BJ8	41.60	21.40	9.50	13.20	2 X 3 3/4
3800	400C382M300ED8	36.20	18.70	9.80	13.60	1 3/4 X 4 3/4
4100	400C412M300BC8	35.90	18.40	10.30	14.30	2 X 4 1/4
4200	400C422M300EE8	32.20	16.90	11.00	15.20	1 3/4 X 5 1/4
4700	400C472M300BD8	31.10	16.30	11.40	15.70	2 X 4 3/4
4800	400C482M300EF8	29.10	15.50	12.30	16.90	1 3/4 X 5 3/4
5600	400C562M300BE8	26.70	14.40	12.70	17.30	2 X 5 1/4
6200	400C622M300BF8	24.30	13.20	13.80	18.70	2 X 5 3/4
350 Vdc (400 Vdc Surge)						
360	400C361M350AK8	295.00	138.00	2.00	2.90	1 3/8 X 1 3/4
540	400C541M350AA8	197.00	92.90	2.80	4.00	1 3/8 X 2 1/4
800	400C801M350AH8	137.00	65.10	3.40	5.00	1 3/8 X 2 3/4
920	400C921M350EA8	123.00	58.20	4.00	5.80	1 3/4 X 2 1/4
1000	400C102M350AB8	105.00	50.60	4.20	6.10	1 3/8 X 3 1/4
1100	400C112M350BA8	109.00	52.40	4.60	6.60	2 X 2 1/4

Type 400C 95 °C Long Life, Plug-in, Radial Leaded Aluminum

Very Long Life Board-Mount Type

Additional Low Voltages available at <http://www.cde.com/catalogs/400C.pdf>

		ESR Max. 25 °C		Ripple Amps. 85 °C		Nominal Size
Cap.	Catalog Part	120 Hz	20 kHz	120 Hz	20 kHz	
(µF)	Number	(mΩ)	(mΩ)	(A)	(A)	D X L (in)
350 Vdc (400 Vdc Surge)						
1200	400C122M350EH8	90.50	41.90	5.00	7.30	1 3/4 X 2 3/4
1200	400C122M350AJ8	85.80	41.70	4.90	7.00	1 3/8 X 3 3/4
1500	400C152M350BH8	78.60	37.10	5.80	8.50	2 X 2 3/4
1500	400C152M350AC8	72.60	35.70	5.60	8.00	1 3/8 X 4 1/4
1600	400C162M350EB8	69.50	32.50	6.10	8.90	1 3/4 X 3 1/4
1700	400C172M350AD8	63.10	31.40	6.30	8.90	1 3/8 X 4 3/4
2000	400C202M350EJ8	56.70	26.80	7.00	10.20	1 3/4 X 3 3/4
2000	400C202M350BB8	60.50	28.80	7.00	10.20	2 X 3 1/4
2000	400C202M350AE8	55.90	28.30	7.00	9.80	1 3/8 X 5 1/4
2200	400C222M350AF8	50.40	25.90	7.70	10.80	1 3/8 X 5 3/4
2400	400C242M350EC8	49.90	23.90	7.90	11.40	1 3/4 X 4 1/4
2500	400C252M350BJ8	49.40	23.80	8.70	12.60	2 X 3 3/4
2800	400C282M350ED8	43.40	21.00	8.90	12.80	1 3/4 X 4 3/4
3000	400C302M350BC8	42.50	20.40	9.40	13.60	2 X 4 1/4
3100	400C312M350EE8	38.50	18.90	10.00	14.30	1 3/4 X 5 1/4
3400	400C342M350BD8	36.80	18.00	10.50	15.00	2 X 4 3/4
3500	400C352M350EF8	34.70	17.30	11.30	16.00	1 3/4 X 5 3/4
4100	400C412M350BE8	31.50	15.80	11.70	16.50	2 X 5 1/4
4500	400C452M350BF8	28.60	14.50	12.70	17.90	2 X 5 3/4
400 Vdc (450 Vdc Surge)						
300	400C301M400AK8	341.00	116.00	1.80	3.20	1 3/8 X 1 3/4
450	400C451M400AA8	228.00	77.70	2.60	4.40	1 3/8 X 2 1/4
600	400C601M400AH8	158.00	54.40	3.20	5.40	1 3/8 X 2 3/4
750	400C751M400EA8	141.00	54.80	3.70	6.00	1 3/4 X 2 1/4
840	400C841M400AB8	122.00	42.20	3.90	6.60	1 3/8 X 3 1/4
930	400C931M400BA8	124.00	52.50	4.30	6.60	2 X 2 1/4
1000	400C102M400AJ8	99.00	34.70	4.60	7.70	1 3/8 X 3 3/4
1000	400C102M400EH8	104.00	39.60	4.60	7.50	1 3/4 X 2 3/4
1200	400C122M400AC8	83.60	29.70	5.20	8.80	1 3/8 X 4 1/4
1300	400C132M400EB8	79.50	30.70	5.70	9.20	1 3/4 X 3 1/4
1300	400C132M400BH8	89.30	37.20	5.50	8.50	2 X 2 3/4
1400	400C142M400AD8	72.60	26.10	5.80	9.80	1 3/8 X 4 3/4
1600	400C162M400AE8	64.30	23.40	6.50	10.80	1 3/8 X 5 1/4
1600	400C162M400EJ8	64.70	25.20	6.60	10.50	1 3/4 X 3 3/4
1700	400C172M400BB8	68.60	28.90	6.60	10.20	2 X 3 1/4
1800	400C182M400AF8	57.80	21.40	7.20	11.90	1 3/8 X 5 3/4
2000	400C202M400EC8	57.00	22.40	7.40	11.80	1 3/4 X 4 1/4
2100	400C212M400BJ8	55.90	23.80	8.20	12.60	2 X 3 3/4
2300	400C232M400ED8	49.50	19.70	8.40	13.20	1 3/4 X 4 3/4
2400	400C242M400BC8	48.20	20.30	8.90	13.70	2 X 4 1/4
2600	400C262M400EE8	43.90	17.70	9.40	14.80	1 3/4 X 5 1/4
2800	400C282M400BD8	41.60	18.00	9.90	15.00	2 X 4 3/4

		ESR Max. 25 °C		Ripple Amps. 85 °C		Nominal Size
Cap.	Catalog Part	120 Hz	20 kHz	120 Hz	20 kHz	
(µF)	Number	(mΩ)	(mΩ)	(A)	(A)	D X L (in)
400 Vdc (450 Vdc Surge)						
2900	400C292M400EF8	39.50	16.10	10.60	16.60	1 3/4 X 5 3/4
3400	400C342M400BE8	35.60	15.70	11.00	16.60	2 X 5 1/4
3700	400C372M400BF8	32.20	14.40	12.00	17.90	2 X 5 3/4
450 Vdc (500 Vdc Surge)						
250	400C251M450AK8	367.00	123.00	1.80	3.10	1 3/8 X 1 3/4
370	400C371M450AA8	245.00	82.60	2.50	4.30	1 3/8 X 2 1/4
500	400C501M450AH8	170.00	57.80	3.10	5.30	1 3/8 X 2 3/4
630	400C631M450EA8	151.00	57.60	3.60	5.80	1 3/4 X 2 1/4
700	400C701M450AB8	131.00	44.80	3.80	6.50	1 3/8 X 3 1/4
780	400C781M450BA8	132.00	54.80	4.20	6.50	2 X 2 1/4
850	400C851M450AJ8	107.00	36.80	4.40	7.50	1 3/8 X 3 3/4
850	400C851M450EH8	111.00	41.70	4.50	7.30	1 3/4 X 2 3/4
1000	400C102M450AC8	89.90	31.40	5.00	8.50	1 3/8 X 4 1/4
1000	400C102M450BH8	95.40	38.90	5.30	8.30	2 X 2 3/4
1100	400C112M450EB8	85.30	32.20	5.50	9.00	1 3/4 X 3 1/4
1200	400C122M450AD8	78.00	27.60	5.60	9.50	1 3/8 X 4 3/4
1400	400C142M450AE8	69.10	24.70	6.30	10.50	1 3/8 X 5 1/4
1400	400C142M450EJ8	69.40	26.50	6.30	10.20	1 3/4 X 3 3/4
1400	400C142M450BB8	73.30	30.20	6.40	9.90	2 X 3 1/4
1500	400C152M450AF8	62.10	22.50	7.00	11.60	1 3/8 X 5 3/4
1600	400C162M450EC8	61.10	23.50	7.10	11.50	1 3/4 X 4 1/4
1700	400C172M450BJ8	59.70	24.80	7.90	12.30	2 X 3 3/4
1900	400C192M450ED8	53.00	20.70	8.10	12.90	1 3/4 X 4 3/4
2000	400C202M450BC8	51.40	21.20	8.60	13.40	2 X 4 1/4
2100	400C212M450EE8	46.90	18.50	9.10	14.50	1 3/4 X 5 1/4
2400	400C242M450EF8	42.20	16.90	10.20	16.20	1 3/4 X 5 3/4
2400	400C242M450BD8	44.40	18.80	9.50	14.70	2 X 4 3/4
2800	400C282M450BE8	37.90	16.40	10.70	16.30	2 X 5 1/4
3100	400C312M450BF8	34.30	15.00	11.60	17.60	2 X 5 3/4
500 Vdc (550 Vdc Surge)						
170	400C171M500AK8	403.00	147.00	1.70	2.80	1 3/8 X 1 3/4
260	400C261M500AA8	269.00	98.60	2.40	3.90	1 3/8 X 2 1/4
380	400C381M500AH8	187.00	68.90	2.90	4.80	1 3/8 X 2 3/4
400	400C401M500EA8	241.00	137.00	3.30	5.30	1 3/4 X 2 1/4
490	400C491M500AB8	144.00	53.20	3.60	5.90	1 3/8 X 3 1/4
510	400C511M500BA8	192.00	116.00	3.90	6.10	2 X 2 1/4
580	400C581M500EH8	167.00	95.80	4.20	6.80	1 3/4 X 2 3/4
610	400C611M500AJ8	117.00	43.60	4.20	6.90	1 3/8 X 3 3/4
710	400C711M500BH8	133.00	80.80	5.10	7.80	2 X 2 3/4
720	400C721M500AC8	133.00	77.50	4.80	7.80	1 3/8 X 4 1/4
760	400C761M500EB8	129.00	74.00	5.20	8.30	1 3/4 X 3 1/4
800	400C801M500AD8	85.80	32.60	5.40	8.70	1 3/8 X 4 3/4

Type 400C 95 °C Long Life, Plug-in, Radial Leaded Aluminum

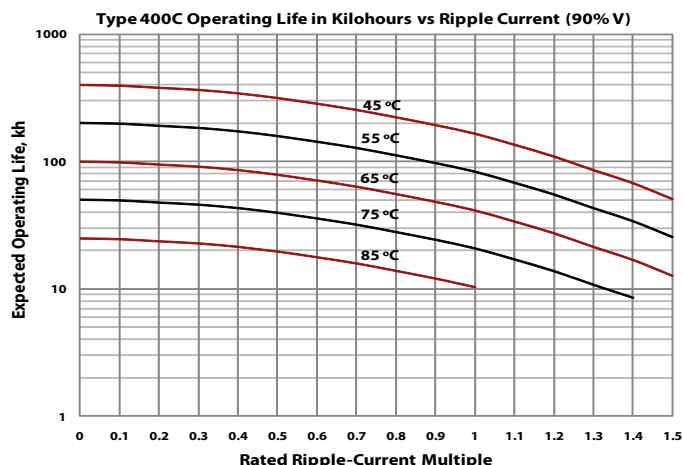
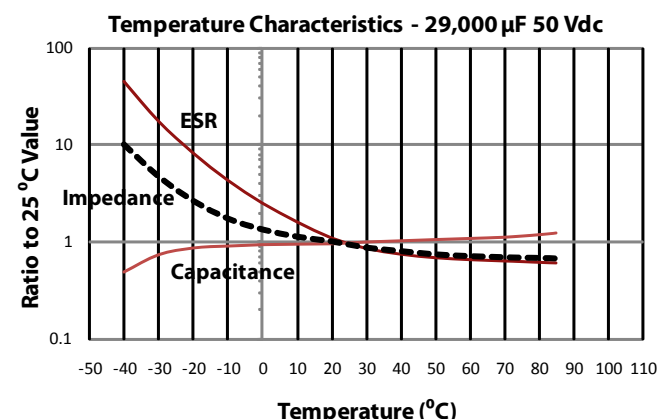
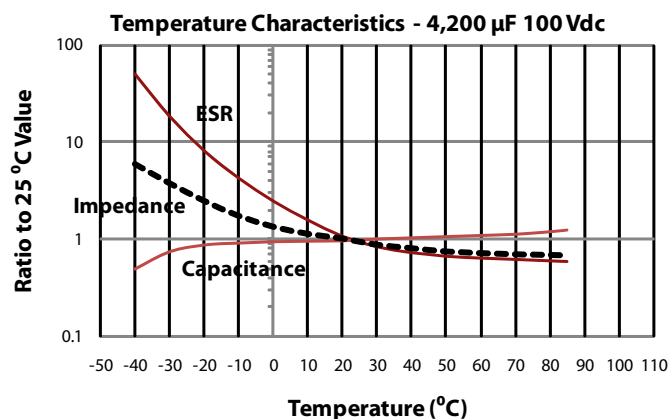
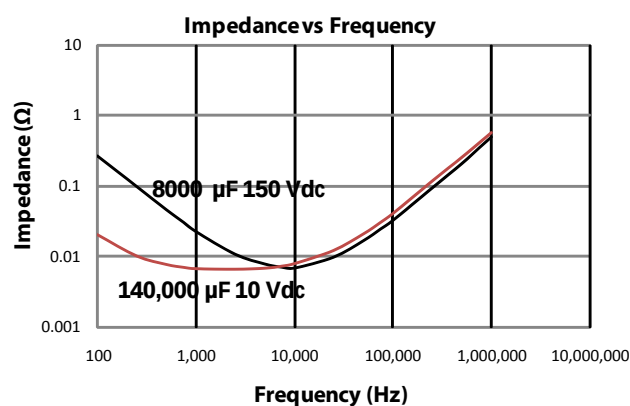
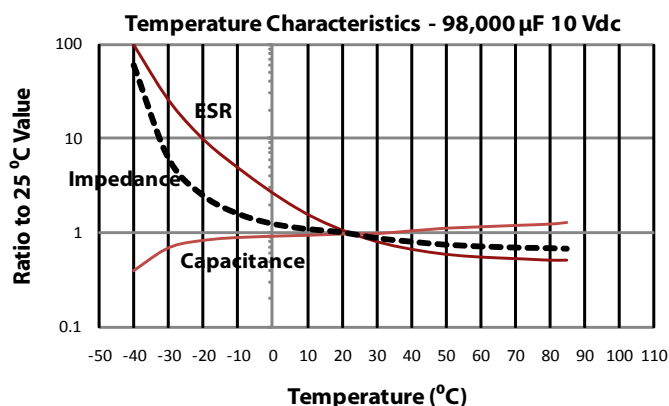
Very Long Life Board-Mount Type

Additional Low Voltages available at <http://www.cde.com/catalogs/400C.pdf>

Cap. (μ F)	Catalog Part Number	ESR Max. 25 °C		Ripple Amps. 85 °C		Nominal Size D X L (in)
		120 Hz	20 kHz	120 Hz	20 kHz	
		(m Ω)	(m Ω)	(A)	(A)	
500 Volts (550 Vdc Surge)						
940	400C941M500EJ8	105.00	60.60	6.00	9.50	1 3/4 X 3 3/4
950	400C951M500AE8	75.90	29.10	6.00	9.70	1 3/8 X 5 1/4
960	400C961M500BB8	103.00	62.50	6.10	9.40	2 X 3 1/4
1100	400C112M500AF8	68.30	26.40	6.60	10.70	1 3/8 X 5 3/4
1100	400C112M500EC8	88.40	51.70	6.80	10.70	1 3/4 X 4 1/4
1200	400C122M500BJ8	83.50	51.30	7.50	11.60	2 X 3 3/4

		ESR Max. 25 °C		Ripple Amps. 85 °C		Nominal Size
Cap.	Catalog Part	120 Hz	20 kHz	120 Hz	20 kHz	D X L
(μF)	Number	(mΩ)	(mΩ)	(A)	(A)	(in)
500 Volts (550 Vdc Surge)						
1300	400C132M500ED8	76.70	45.20	7.60	12.00	1 3/4 X 4 3/4
1400	400C142M500BC8	70.70	43.80	8.20	12.60	2 X 4 1/4
1500	400C152M500EE8	68.00	40.50	8.60	13.50	1 3/4 X 5 1/4
1600	400C162M500BD8	61.50	38.40	9.10	13.90	2 X 4 3/4
1700	400C172M500EF8	61.20	36.80	9.70	15.10	1 3/4 X 5 3/4
1900	400C192M500BE8	53.10	33.60	10.20	15.40	2 X 5 1/4
2100	400C212M500BF8	48.00	30.70	11.10	16.70	2 X 5 3/4

Typical Performance Curves



Type 420C 85 °C Long Life, Inverter Grade, Plug-in, Aluminum

Best Value, High Ripple, Board-Mount Type



Type 420C is the PC-mount version of the Type 520C screw terminal, computer grade capacitor and the 85 °C version of the Type 450C Inverter Grade capacitor. It delivers the ripple current capability and exceptional life needed for motor-drive bus capacitors and approaches the performance of the 450C at a lower cost. The extended cathode foil of the 420C assures cool operation and heat flow from the capacitor element to the can in all orientations.

Highlights

- For motor drives and UPS systems
- ESRs to 6.9 mΩ
- Printed-circuit mounting
- Thermal-Pak™ extended cathode construction

Specifications

Temperature Range	-40 °C to +85 °C							
Rated Voltage Range	100 Vdc to 500 Vdc							
Capacitance Range	160 μF to 27,000 μF							
Capacitance Tolerance	± 20%							
Leakage Current	≤3 √CV μA, 4 mA max, 5 minutes							
Ripple Current Multipliers	Ambient Temperature							
	45 °C	55 °C	65 °C	75 °C	85 °C			
	1.80	1.63	1.45	1.25	1.00			
	Frequency							
	50 Hz	60 Hz	120 Hz	360 Hz	1 kHz	5 kHz	10 kHz	
	1 3/8" & 1 3/4" Diameters							
	100 to 350 V	0.91	0.93	1.00	1.06	1.08	1.09	1.09
	400 to 500 V	0.82	0.86	1.00	1.14	1.20	1.23	1.23
	2" Diameters							
	100 to 350 V	0.92	0.94	1.00	1.05	1.07	1.08	1.08
400 to 500 V	0.82	0.86	1.00	1.14	1.20	1.23	1.27	
Low Temperature Characteristics	Impedance ratio: Z _{-20 °C} /Z _{+25 °C} ≤ 3 (100-500 Vdc)							
Endurance Life Test	4000 h at full load at 85 °C Δ Capacitance ±20% ESR 200% of limit DCL 100% of limit							
Shelf Life Test	500 h at 85 °C Δ Capacitance 100% of limit ESR 100% of limit DCL 100% of limit							
Vibration	10 to 55 Hz, 0.06" and 10 g max, 2 h each plane							
RoHS Compliant								

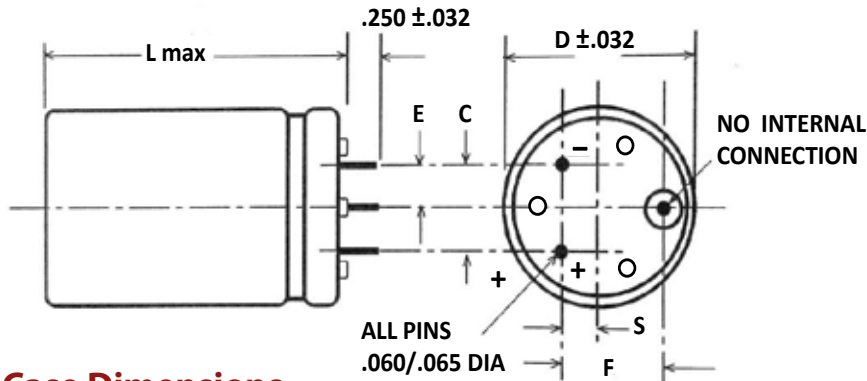
Type 420C 85 °C Long Life, Inverter Grade, Plug-in, Aluminum

Best Value, High Ripple, Board-Mount Type

Part Numbering System

420C Type	242 Capacitance 242 = 2400 μ F 221 = 220 μ F	M Tolerance M = $\pm 20\%$ T = $-10\% +50\%$ U = $-10 +75\%$	250 Voltage 100 = 100 V 250 = 250 V	EB Case Code see table	8 Insulation 0 = Bare can 8 = PVC 9 = Polyester
---------------------	--	---	---	-------------------------------------	--

Outline Drawing



Insulated Case Dimensions

Case	Inches						Millimeters					
Code	D $\pm$.031	L MAX	C $\pm$.015	S $\pm$.031	E $\pm$.031	F $\pm$.015	D $\pm$.78	L MAX	C $\pm$.78	S $\pm$.78	E $\pm$.78	F $\pm$.38
AK	1.375	1.75	0.50	0.175	0.25	0.55	34.93	44.45	12.70	4.45	6.35	13.97
AA	1.375	2.25	0.50	0.175	0.25	0.55	34.93	57.15	12.70	4.45	6.35	13.97
AH	1.375	2.75	0.50	0.175	0.25	0.55	34.98	69.85	12.70	4.45	6.35	13.97
AB	1.375	3.25	0.50	0.175	0.25	0.55	34.93	82.55	12.70	4.45	6.35	13.97
AJ	1.375	3.75	0.50	0.175	0.25	0.55	34.93	95.25	12.70	4.45	6.35	13.97
AC	1.375	4.25	0.50	0.175	0.25	0.55	34.93	107.95	12.70	4.45	6.35	13.97
AD	1.375	4.75	0.50	0.175	0.25	0.55	34.93	120.65	12.70	4.45	6.35	13.97
AE	1.375	5.25	0.50	0.175	0.25	0.55	34.93	133.35	12.70	4.45	6.35	13.97
AF	1.375	5.75	0.50	0.175	0.25	0.55	34.93	146.05	12.70	4.45	6.35	13.97
EA	1.75	2.25	0.70	0.375	0.35	0.90	44.45	57.15	17.78	9.53	8.89	22.86
EH	1.75	2.75	0.70	0.375	0.35	0.90	44.45	69.85	17.78	9.53	8.89	22.86
EB	1.75	3.25	0.70	0.375	0.35	0.90	44.45	82.55	17.78	9.53	8.89	22.86
EJ	1.75	3.75	0.70	0.375	0.35	0.90	44.45	95.25	17.78	9.53	8.89	22.86
EC	1.75	4.25	0.70	0.375	0.35	0.90	44.45	107.95	17.78	9.53	8.89	22.86
ED	1.75	4.75	0.70	0.375	0.35	0.90	44.45	120.65	17.78	9.53	8.89	22.86
EE	1.75	5.25	0.70	0.375	0.35	0.90	44.45	133.35	17.78	9.53	8.89	22.86
EF	1.75	5.75	0.70	0.375	0.35	0.90	44.45	146.05	17.78	9.53	8.89	22.86
BA	2.00	2.25	0.80	0.425	0.40	1.00	50.80	57.15	20.32	10.80	10.16	25.40
BH	2.00	2.75	0.80	0.425	0.40	1.00	50.80	69.85	20.32	10.80	10.16	25.40
BB	2.00	3.25	0.80	0.425	0.40	1.00	50.80	82.55	20.32	10.80	10.16	25.40
BJ	2.00	3.75	0.80	0.425	0.40	1.00	50.80	95.25	20.32	10.80	10.16	25.40
BC	2.00	4.25	0.80	0.425	0.40	1.00	50.80	107.95	20.32	10.80	10.16	25.40
BD	2.00	4.75	0.80	0.425	0.40	1.00	50.80	120.65	20.32	10.80	10.16	25.40
BE	2.00	5.25	0.80	0.425	0.40	1.00	50.80	133.25	20.32	10.80	10.16	25.40
BF	2.00	5.75	0.80	0.425	0.40	1.00	50.80	146.05	20.32	10.80	10.16	25.40

Type 420C 85 °C Long Life, Inverter Grade, Plug-in, Aluminum

Best Value, High Ripple, Board-Mount Type

Ratings

Additional Low Voltages Available at <http://www.cde.com/catalogs/420C.pdf>

Cap.	Catalog Part	ESR Max. 25 °C		Ripple Amps. 85 °C		Nominal Size
(μF)	Number	120 Hz (mΩ)	20 kHz (mΩ)	120 Hz (A)	20 kHz (A)	D X L (in)
200 Vdc (250 Vdc Surge)						
900	420C901M200AK8	130.00	73.40	3.60	4.80	1 3/8 X 1 3/4
1300	420C132M200AA8	87.60	49.60	5.00	6.70	1 3/8 X 2 1/4
2000	420C202M200EA8	63.50	40.20	6.50	8.10	1 3/4 X 2 1/4
2000	420C202M200AH8	61.40	35.10	6.20	8.20	1 3/8 X 2 3/4
2500	420C252M200AB8	47.70	27.60	7.50	9.90	1 3/8 X 3 1/4
2500	420C252M200BA8	53.20	36.50	7.20	8.70	2 X 2 1/4
2700	420C272M200EH8	45.50	28.50	8.20	10.30	1 3/4 X 2 3/4
3100	420C312M200AJ8	39.30	23.00	8.70	11.40	1 3/8 X 3 3/4
3400	420C342M200BH8	37.70	25.60	9.20	11.20	2 X 2 3/4
3600	420C362M200EB8	35.20	22.30	10.00	12.60	1 3/4 X 3 1/4
3700	420C372M200AC8	33.60	20.00	9.90	12.90	1 3/8 X 4 1/4
4100	420C412M200AD8	30.80	18.30	10.80	14.00	1 3/8 X 4 3/4
4400	420C442M200EJ8	29.00	18.50	11.40	14.30	1 3/4 X 3 3/4
4500	420C452M200BB8	29.30	20.00	11.00	13.40	2 X 3 1/4
4700	420C472M200AE8	27.70	16.70	12.00	15.40	1 3/8 X 5 1/4
5100	420C512M200AF8	25.30	15.50	13.20	16.80	1 3/8 X 5 3/4
5300	420C532M200EC8	24.80	16.00	12.80	15.90	1 3/4 X 4 1/4
5600	420C562M200BJ8	24.10	16.60	13.60	16.40	2 X 3 3/4
6100	420C612M200ED8	21.80	14.20	14.40	17.80	1 3/4 X 4 3/4
6600	420C662M200BC8	20.60	14.30	14.80	17.80	2 X 4 1/4
6900	420C692M200EE8	19.60	12.90	16.10	19.80	1 3/4 X 5 1/4
7600	420C762M200BD8	18.20	12.70	16.30	19.50	2 X 4 3/4
7800	420C782M200EF8	17.90	11.90	18.00	22.00	1 3/4 X 5 3/4
9100	420C912M200BE8	16.00	11.30	18.00	21.30	2 X 5 1/4
10000	420C103M200BF8	14.70	10.50	19.40	23.00	2 X 5 3/4
250 Vdc (300 Vdc Surge)						
600	420C601M250AK8	176.00	75.90	3.10	4.70	1 3/8 X 1 3/4
900	420C901M250AA8	118.00	51.30	4.30	6.60	1 3/8 X 2 1/4
1000	420C102M250AH8	82.60	36.30	5.30	8.00	1 3/8 X 2 3/4
1300	420C132M250EA8	82.30	41.20	5.70	8.00	1 3/4 X 2 1/4
1700	420C172M250AB8	63.80	28.40	6.50	9.80	1 3/8 X 3 1/4
1700	420C172M250BA8	66.60	37.20	6.40	8.60	2 X 2 1/4
1800	420C182M250EH8	59.10	29.20	7.20	10.20	1 3/4 X 2 3/4
2000	420C202M250AJ8	52.40	23.70	7.50	11.20	1 3/8 X 3 3/4
2300	420C232M250BH8	47.50	26.10	8.20	11.10	2 X 2 3/4
2400	420C242M250EB8	45.70	22.80	8.80	12.40	1 3/4 X 3 1/4
2400	420C242M250AC8	44.60	20.60	8.60	12.70	1 3/8 X 4 1/4
2700	420C272M250AD8	40.80	18.80	9.40	13.80	1 3/8 X 4 3/4
2900	420C292M250EJ8	37.40	18.90	10.00	14.10	1 3/4 X 3 3/4
3000	420C302M250BB8	36.70	20.40	9.80	13.20	2 X 3 1/4
3100	420C312M250AE8	36.50	17.20	10.40	15.20	1 3/8 X 5 1/4
3400	420C342M250AF8	33.2	15.9	11.5	16.6	1 3/8 X 5 3/4

Cap.	Catalog Part	ESR Max. 25 °C		Ripple Amps. 85 °C		Nominal Size
(μF)	Number	120 Hz (mΩ)	20 kHz (mΩ)	120 Hz (A)	20 kHz (A)	D X L (in)
250 Vdc (300 Vdc Surge)						
3500	420C352M250EC8	31.9	16.3	11.3	15.8	1 3/4 X 4 1/4
3700	420C372M250BJ8	30.1	16.9	12.2	16.3	2 X 3 3/4
4100	420C412M250ED8	27.9	14.5	12.7	17.6	1 3/4 X 4 3/4
4400	420C442M250BC8	25.7	14.6	13.3	17.6	2 X 4 1/4
4600	420C462M250EE8	24.9	13.2	14.2	19.6	1 3/4 X 5 1/4
5100	420C512M250BD8	22.7	13.0	14.6	19.3	2 X 4 3/4
5200	420C522M250EF8	22.6	12.2	16.0	21.8	1 3/4 X 5 3/4
6000	420C602M250BE8	19.7	11.5	16.2	21.2	2 X 5 1/4
6700	420C672M250BF8	18.0	10.7	17.5	22.8	2 X 5 3/4
450	420C451M300AK8	262.00	126.00	2.30	3.30	1 3/8 X 1 3/4
680	420C681M300AA8	175.00	84.70	3.20	4.50	1 3/8 X 2 1/4
1000	420C102M300AH8	122.00	59.50	3.90	5.60	1 3/8 X 2 3/4
1100	420C112M300EA8	111.00	54.10	4.50	6.50	1 3/4 X 2 1/4
1300	420C132M300AB8	93.70	46.20	4.80	6.80	1 3/8 X 3 1/4
1400	420C142M300BA8	98.90	49.30	5.20	7.40	2 X 2 1/4
1500	420C152M300AJ8	76.40	38.20	5.60	7.90	1 3/8 X 3 3/4
1500	420C152M300EH8	81.10	38.90	5.60	8.10	1 3/4 X 2 3/4
1800	420C182M300AC8	64.70	32.70	6.40	9.00	1 3/8 X 4 1/4
1900	420C192M300BH8	71.00	34.80	6.60	9.40	2 X 2 3/4
2000	420C202M300EB8	62.40	30.20	6.90	10.00	1 3/4 X 3 1/4
2200	420C222M300AD8	56.30	28.90	7.10	10.00	1 3/8 X 4 3/4
2500	420C252M300AE8	49.90	26.10	7.90	11.00	1 3/8 X 5 1/4
2500	420C252M300EJ8	50.90	24.90	7.90	11.30	1 3/4 X 3 3/4
2600	420C262M300BB8	54.70	27.10	7.90	11.30	2 X 3 1/4
2700	420C272M300AF8	45.00	23.90	8.80	12.10	1 3/8 X 5 3/4
3000	420C302M300EC8	44.90	22.20	8.90	12.70	1 3/4 X 4 1/4
3200	420C322M300BJ8	44.70	22.30	9.80	13.90	2 X 3 3/4
3400	420C342M300ED8	39.00	19.60	10.10	14.30	1 3/4 X 4 3/4
3700	420C372M300BC8	38.50	19.20	10.70	15.10	2 X 4 1/4
3900	420C392M300EE8	34.70	17.70	11.40	15.90	1 3/4 X 5 1/4
4300	420C432M300BD8	33.30	17.00	11.80	16.60	2 X 4 3/4
4400	420C442M300EF8	31.30	16.20	12.80	17.80	1 3/4 X 5 3/4
5100	420C512M300BE8	28.60	14.90	13.20	18.30	2 X 5 1/4
5700	420C572M300BF8	26.00	13.80	14.40	19.70	2 X 5 3/4
350 Vdc (400 Vdc Surge)						
350	420C351M350AK8	301.00	141.00	2.10	3.10	1 3/8 X 1 3/4
520	420C521M350AA8	201.00	94.40	3.00	4.30	1 3/8 X 2 1/4
700	420C701M350AH8	140.00	66.20	3.60	5.30	1 3/8 X 2 3/4
880	420C881M350EA8	126.00	58.90	4.20	6.20	1 3/4 X 2 1/4
980	420C981M350AB8	107.00	51.40	4.50	6.50	1 3/8 X 3 1/4
1100	420C112M350BA8	111.00	53.00	4.90	7.10	2 X 2 1/4
1200	420C122M350EH8	92.20	42.50	5.30	7.80	1 3/4 X 2 3/4

Type 420C 85 °C Long Life, Inverter Grade, Plug-in, Aluminum

Best Value, High Ripple, Board-Mount Type

Additional Low Voltages Available at <http://www.cde.com/catalogs/420C.pdf>

		ESR Max. 25 °C		Ripple Amps. 85 °C		Nominal Size
Cap.	Catalog Part	120 Hz	20 kHz	120 Hz	20 kHz	D X L
(μF)	Number	(mΩ)	(mΩ)	(A)	(A)	(in)
350 Vdc (400 Vdc Surge)						
1200	420C122M350AJ8	87.50	42.30	5.20	7.50	1 3/8 X 3 3/4
1400	420C142M350AC8	74.00	36.20	6.00	8.50	1 3/8 X 4 1/4
1500	420C152M350EB8	70.90	33.00	6.50	9.50	1 3/4 X 3 1/4
1500	420C152M350BH8	80.0	37.5	6.2	9.1	2 X 2 3/4
1700	420C172M350AD8	64.3	31.9	6.7	9.5	1 3/8 X 4 3/4
1900	420C192M350EJ8	57.7	27.1	7.5	10.9	1 3/4 X 3 3/4
1900	420C192M350AE8	57.0	28.7	7.4	10.5	1 3/8 X 5 1/4
2000	420C202M350BB8	61.6	29.1	7.5	10.9	2 X 3 1/4
2100	420C212M350AF8	51.3	26.2	8.2	11.5	1 3/8 X 5 3/4
2300	420C232M350EC8	50.9	24.2	8.4	12.2	1 3/4 X 4 1/4
2400	420C242M350BJ8	50.2	24.0	9.3	13.4	2 X 3 3/4
2600	420C262M350ED8	44.2	21.3	9.5	13.7	1 3/4 X 4 3/4
2800	420C282M350BC8	43.3	20.6	10.1	14.6	2 X 4 1/4
3000	420C302M350EE8	39.2	19.1	10.7	15.3	1 3/4 X 5 1/4
3300	420C332M350BD8	37.4	18.2	11.2	16.0	2 X 4 3/4
3400	420C342M350EF8	35.3	17.5	12.0	17.1	1 3/4 X 5 3/4
3900	420C392M350BE8	32.1	16.0	12.5	17.7	2 X 5 1/4
4300	420C432M350BF8	29.0	14.7	13.6	19.1	2 X 5 3/4
400 Vdc (450 Vdc Surge)						
290	420C291M400AK8	341.00	155.00	2.00	2.90	1 3/8 X 1 3/4
440	420C441M400AA8	228.00	104.00	2.80	4.10	1 3/8 X 2 1/4
600	420C601M400AH8	158.00	73.00	3.40	5.00	1 3/8 X 2 3/4
740	420C741M400EA8	141.00	63.90	4.00	5.90	1 3/4 X 2 1/4
830	420C831M400AB8	122.00	56.60	4.20	6.20	1 3/8 X 3 1/4
920	420C921M400BA8	124.00	56.80	4.60	6.90	2 X 2 1/4
1000	420C102M400EH8	104.00	46.20	5.00	7.50	1 3/4 X 2 3/4
1000	420C102M400AJ8	98.90	46.50	4.90	7.10	1 3/8 X 3 3/4
1200	420C122M400BH8	89.30	40.30	5.90	8.80	2 X 2 3/4
1200	420C122M400AC8	83.60	39.80	5.60	8.10	1 3/8 X 4 1/4
1300	420C132M400EB8	79.50	35.80	6.10	9.20	1 3/4 X 3 1/4
1400	420C142M400AD8	72.60	35.00	6.30	9.10	1 3/8 X 4 3/4
1600	420C162M400AE8	64.30	31.40	7.00	10.00	1 3/8 X 5 1/4
1600	420C162M400EJ8	64.70	29.40	7.00	10.40	1 3/4 X 3 3/4
1700	420C172M400BB8	68.60	31.30	7.10	10.50	2 X 3 1/4
1800	420C182M400AF8	57.80	28.70	7.80	11.00	1 3/8 X 5 3/4
1900	420C192M400EC8	57.00	26.20	7.90	11.70	1 3/4 X 4 1/4
2000	420C202M400BJ8	55.90	25.70	8.80	13.00	2 X 3 3/4
2200	420C222M400ED8	49.50	23.00	9.00	13.20	1 3/4 X 4 3/4
2400	420C242M400BC8	48.20	22.00	9.50	14.10	2 X 4 1/4
2500	420C252M400EE8	43.90	20.60	10.10	14.70	1 3/4 X 5 1/4
2800	420C282M400EF8	39.50	18.80	11.40	16.50	1 3/4 X 5 3/4
2800	420C282M400BD8	41.60	19.50	10.60	15.50	2 X 4 3/4

		ESR Max. 25 °C		Ripple Amps. 85 °C		Nominal Size
Cap.	Catalog Part	120 Hz	20 kHz	120 Hz	20 kHz	D X L
(μF)	Number	(mΩ)	(mΩ)	(A)	(A)	(in)
400 Vdc (450 Vdc Surge)						
3300	420C332M400BE8	35.60	17.00	11.80	17.10	2 X 5 1/4
3700	420C372M400BF8	32.20	15.60	12.90	18.50	2 X 5 3/4
450 Vdc (500 Vdc Surge)						
220	420C221M450AK8	383.00	171.00	1.90	2.80	1 3/8 X 1 3/4
330	420C331M450AA8	256.00	115.00	2.60	3.90	1 3/8 X 2 1/4
500	420C501M450AH8	178.00	80.30	3.20	4.80	1 3/8 X 2 3/4
570	420C571M450EA8	157.00	69.10	3.80	5.70	1 3/4 X 2 1/4
630	420C631M450AB8	137.00	62.20	4.00	5.90	1 3/8 X 3 1/4
700	420C701M450BA8	138.00	60.90	4.40	6.60	2 X 2 1/4
760	420C761M450EH8	116.00	50.10	4.70	7.20	1 3/4 X 2 3/4
760	420C761M450AJ8	111.00	51.10	4.60	6.80	1 3/8 X 3 3/4
910	420C911M450AC8	93.80	43.60	5.30	7.80	1 3/8 X 4 1/4
940	420C941M450BH8	99.10	43.30	5.60	8.50	2 X 2 3/4
1000	420C102M450EB8	88.80	38.80	5.80	8.80	1 3/4 X 3 1/4
1100	420C112M450AD8	81.40	38.20	5.90	8.70	1 3/8 X 4 3/4
1200	420C122M450EJ8	72.20	31.80	6.70	10.00	1 3/4 X 3 3/4
1200	420C122M450AE8	72.00	34.30	6.60	9.60	1 3/8 X 5 1/4
1300	420C132M450AF8	64.70	31.20	7.30	10.60	1 3/8 X 5 3/4
1300	420C132M450BB8	76.10	33.50	6.70	10.10	2 X 3 1/4
1500	420C152M450EC8	63.50	28.30	7.50	11.30	1 3/4 X 4 1/4
1600	420C162M450BJ8	62.00	27.60	8.30	12.50	2 X 3 3/4
1700	420C172M450ED8	55.10	24.80	8.50	12.70	1 3/4 X 4 3/4
1800	420C182M450BC8	53.30	23.60	9.10	13.60	2 X 4 1/4
1900	420C192M450EE8	48.80	22.20	9.60	14.20	1 3/4 X 5 1/4
2100	420C212M450BD8	46.10	20.80	10.10	15.00	2 X 4 3/4
2200	420C222M450EF8	43.90	20.30	10.80	15.90	1 3/4 X 5 3/4
2500	420C252M450BE8	39.30	18.20	11.30	16.60	2 X 5 1/4
2800	420C282M450BF8	35.50	16.60	12.30	17.90	2 X 5 3/4
500 Vdc (550 Vdc Surge)						
160	420C161M500AK8	416.00	151.00	1.80	3.00	1 3/8 X 1 3/4
240	420C241M500AA8	278.00	101.00	2.50	4.20	1 3/8 X 2 1/4
350	420C351M500AH8	193.00	70.50	3.10	5.10	1 3/8 X 2 3/4
370	420C371M500EA8	248.00	140.00	3.50	5.60	1 3/4 X 2 1/4
460	420C461M500AB8	148.00	54.50	3.80	6.30	1 3/8 X 3 1/4
480	420C481M500BA8	197.00	118.00	4.10	6.50	2 X 2 1/4
540	420C541M500EH8	172.00	97.80	4.50	7.20	1 3/4 X 2 3/4
570	420C571M500AJ8	121.00	44.60	4.40	7.30	1 3/8 X 3 3/4
670	420C671M500BH8	137.00	82.30	5.40	8.30	2 X 2 3/4
670	420C671M500AC8	137.00	79.30	5.10	8.30	1 3/8 X 4 1/4
710	420C711M500EB8	132.00	75.50	5.50	8.80	1 3/4 X 3 1/4
750	420C751M500AD8	88.40	33.30	5.70	9.30	1 3/8 X 4 3/4
880	420C881M500EJ8	108.00	61.90	6.40	10.10	1 3/4 X 3 3/4

Type 420C 85 °C Long Life, Inverter Grade, Plug-in, Aluminum

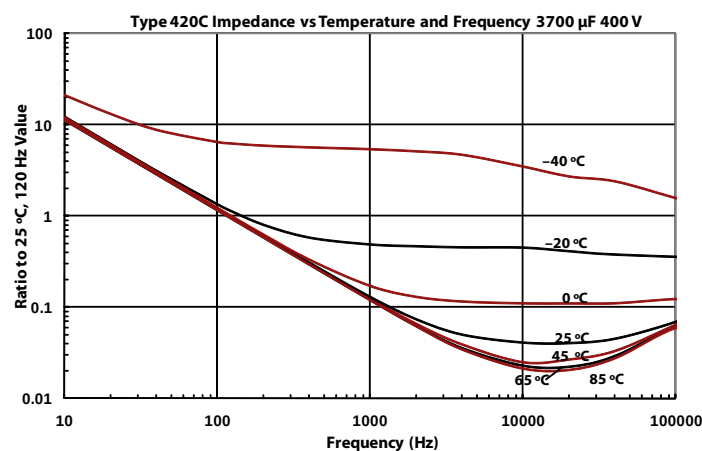
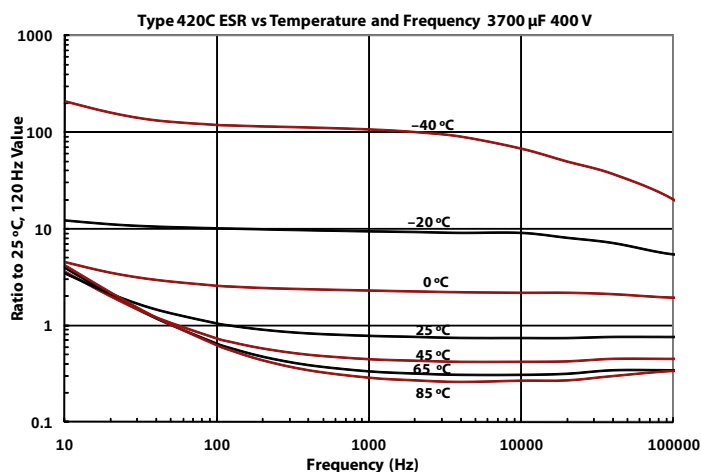
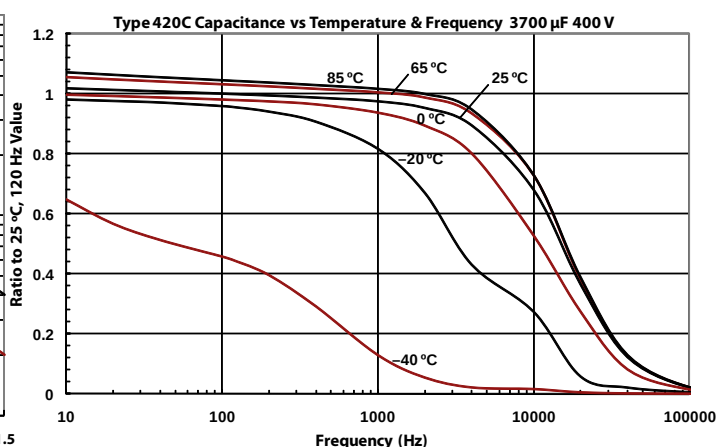
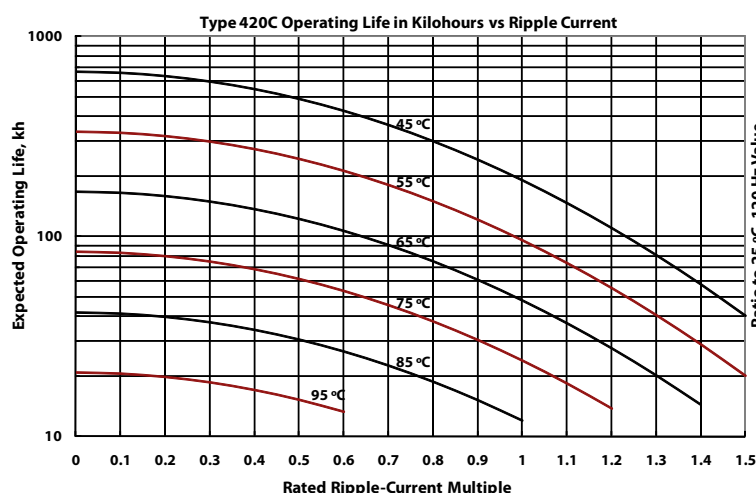
Best Value, High Ripple, Board-Mount Type

Additional Low Voltages Available at <http://www.cde.com/catalogs/420C.pdf>

Cap. (μF)	Catalog Part Number	ESR Max. 25 °C		Ripple Amps. 85 °C		Nominal Size
		120 Hz (mΩ)	20 kHz (mΩ)	120 Hz (A)	20 kHz (A)	
500 Vdc (550 Vdc Surge)						
890	420C891M500BB8	105.00	63.70	6.40	10.00	2 X 3 1/4
890	420C891M500AE8	78.20	29.70	6.30	10.30	1 3/8 X 5 1/4
1000	420C102M500EC8	90.90	52.70	7.20	11.40	1 3/4 X 4 1/4
1000	420C102M500AF8	70.30	27.00	7.00	11.40	1 3/8 X 5 3/4
1100	420C112M500BJ8	85.80	52.20	8.00	12.30	2 X 3 3/4
1200	420C122M500ED8	78.90	46.10	8.10	12.80	1 3/4 X 4 3/4

500 Vdc (550 Vdc Surge)						
Cap. (μF)	Catalog Part Number	ESR Max. 25 °C 120 Hz (mΩ)	20 kHz (mΩ)	Ripple Amps. 85 °C 120 Hz (A)	20 kHz (A)	Nominal Size D X L (in)
1300	420C132M500BC8	72.60	44.60	8.70	13.40	2 X 4 1/4
1400	420C142M500EE8	69.90	41.30	9.10	14.30	1 3/4 X 5 1/4
1500	420C152M500EF8	62.90	37.50	10.30	16.10	1 3/4 X 5 3/4
1500	420C152M500BD8	63.10	39.10	9.70	14.80	2 X 4 3/4
1800	420C182M500BE8	54.50	34.20	10.80	16.40	2 X 5 1/4
2000	420C202M500BF8	49.20	31.30	11.70	17.80	2 X 5 3/4

Typical Performance Curves



Type 450C 105 °C Highest Ripple, Inverter Grade, Plug-in, Aluminum

Ultra-High Ripple Capabilities in a Plug-In Configuration



Type 450C is the 105 °C version of the Type 420C Inverter Grade capacitor, and it is the PC-mount version of the Type 550C. It delivers the ripple-current capability and exceptional life needed for motor-drive and inverter bus capacitors. It is a significantly better value than comparable 105 °C snap-in capacitors. The extended cathode foil of the 450C assures cool operation and heat flow from the capacitor element to the can in all orientations.

Highlights

- Better value than large 105 °C snap-in capacitors
- Especially for motor drives and UPS systems
- ESRs to 6.9 mΩ
- Printed-circuit mounting
- Thermal-Pak™ extended cathode construction

Specifications

Temperature Range	-40 °C to +105 °C							
Rated Voltage Range	100 Vdc to 500 Vdc							
Capacitance Range	150 μF to 24,000 μF							
Capacitance Tolerance	± 20%							
Leakage Current	≤3 √CV μA, 4 mA max, 5 minutes							
Ripple Current Multipliers	Ambient Temperature							
	45 °C	55 °C	65 °C	75 °C	85 °C	95 °C	105 °C	
	1.66	1.52	1.37	1.20	1.00	0.75	0.36	
	Frequency							
		50 Hz	60 Hz	120 Hz	360 Hz	1 kHz	5 kHz	10 kHz
	1 3/8" & 1 3/4" Diameters							
	100 to 350 V	0.91	0.93	1.00	1.06	1.08	1.09	1.09
	400 to 500 V	0.82	0.86	1.00	1.14	1.20	1.23	1.23
	2" Diameters							
	100 to 350 V	0.92	0.94	1.00	1.05	1.07	1.08	1.08
400 to 500 V	0.82	0.86	1.00	1.14	1.20	1.23	1.27	
Low Temperature Characteristics	Impedance ratio: Z _{-20°C} /Z _{+25°C} ≤ 3 (100-500 Vdc)							
Endurance Life Test	5000 h at full load at 85 °C Δ Capacitance ±20% ESR 200% of limit DCL 100% of limit							
Shelf Life Test	500 h at 105 °C Capacitance 100% of limit ESR 100% of limit DCL 100% of limit							
Vibration	10 to 55 Hz, 0.06" and 10 g max, 2 h each plane							
RoHS Compliant								

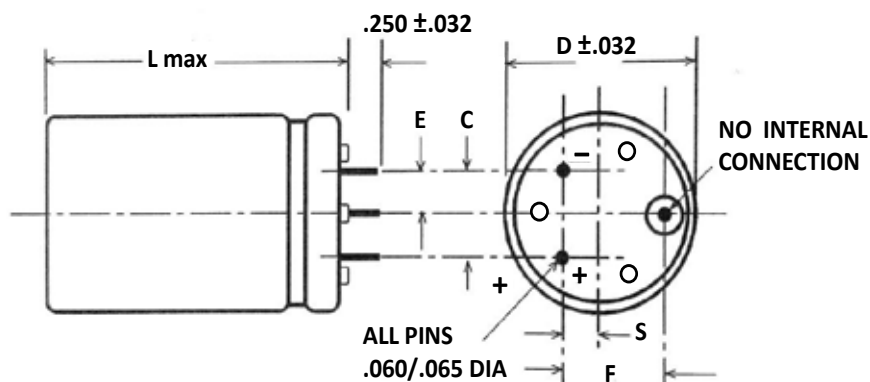
Type 450C 105 °C Highest Ripple, Inverter Grade, Plug-in, Aluminum

Ultra-High Ripple Capabilities in a Plug-In Configuration

Part Numbering System

450C	222	M	100	AK	8
Type	Capacitance	Tolerance	Voltage	Case Code	Insulation
	222 = 2200 µF 151 = 150 µF	M = ±20% T = -10% +50% U = -10% +75%	100 = 100 V 450 = 450 V		0 = Bare can 8 = PVC 9 = Polyester

Outline Drawing



Insulated Case Dimensions

Case Code	Inches						Millimeters					
	D ±.031	L MAX	C ±.015	S ±.031	E ±.031	F ±.015	D ±.78	L MAX	C ±.78	S ±.78	E ±.78	F ±.38
AK	1.375	1.75	0.50	0.175	0.25	0.55	34.93	44.45	12.70	4.45	6.35	13.97
AA	1.375	2.25	0.50	0.175	0.25	0.55	34.93	57.15	12.70	4.45	6.35	13.97
AH	1.375	2.75	0.50	0.175	0.25	0.55	34.98	69.85	12.70	4.45	6.35	13.97
AB	1.375	3.25	0.50	0.175	0.25	0.55	34.93	82.55	12.70	4.45	6.35	13.97
AJ	1.375	3.75	0.50	0.175	0.25	0.55	34.93	95.25	12.70	4.45	6.35	13.97
AC	1.375	4.25	0.50	0.175	0.25	0.55	34.93	107.95	12.70	4.45	6.35	13.97
AD	1.375	4.75	0.50	0.175	0.25	0.55	34.93	120.65	12.70	4.45	6.35	13.97
AE	1.375	5.25	0.50	0.175	0.25	0.55	34.93	133.35	12.70	4.45	6.35	13.97
AF	1.375	5.75	0.50	0.175	0.25	0.55	34.93	146.05	12.70	4.45	6.35	13.97
EA	1.75	2.25	0.70	0.375	0.35	0.90	44.45	57.15	17.78	9.53	8.89	22.86
EH	1.75	2.75	0.70	0.375	0.35	0.90	44.45	69.85	17.78	9.53	8.89	22.86
EB	1.75	3.25	0.70	0.375	0.35	0.90	44.45	82.55	17.78	9.53	8.89	22.86
EJ	1.75	3.75	0.70	0.375	0.35	0.90	44.45	95.25	17.78	9.53	8.89	22.86
EC	1.75	4.25	0.70	0.375	0.35	0.90	44.45	107.95	17.78	9.53	8.89	22.86
ED	1.75	4.75	0.70	0.375	0.35	0.90	44.45	120.65	17.78	9.53	8.89	22.86
EE	1.75	5.25	0.70	0.375	0.35	0.90	44.45	133.35	17.78	9.53	8.89	22.86
EF	1.75	5.75	0.70	0.375	0.35	0.90	44.45	146.05	17.78	9.53	8.89	22.86
BA	2.00	2.25	0.80	0.425	0.40	1.00	50.80	57.15	20.32	10.80	10.16	25.40
BH	2.00	2.75	0.80	0.425	0.40	1.00	50.80	69.85	20.32	10.80	10.16	25.40
BB	2.00	3.25	0.80	0.425	0.40	1.00	50.80	82.55	20.32	10.80	10.16	25.40
BJ	2.00	3.75	0.80	0.425	0.40	1.00	50.80	95.25	20.32	10.80	10.16	25.40
BC	2.00	4.25	0.80	0.425	0.40	1.00	50.80	107.95	20.32	10.80	10.16	25.40
BD	2.00	4.75	0.80	0.425	0.40	1.00	50.80	120.65	20.32	10.80	10.16	25.40
BE	2.00	5.25	0.80	0.425	0.40	1.00	50.80	133.25	20.32	10.80	10.16	25.40
BF	2.00	5.75	0.80	0.425	0.40	1.00	50.80	146.05	20.32	10.80	10.16	25.40

Type 450C 105 °C Highest Ripple, Inverter Grade, Plug-in, Aluminum

Ultra-High Ripple Capabilities in a Plug-In Configuration

Ratings

Additional Low Voltages Available at <http://www.cde.com/catalogs/450C.pdf>

		ESR Max. 25 °C		Ripple Amps, 85 °C		Nom Size
Cap. (µF)	Catalog Part Number	120 Hz (mΩ)	20 kHz (mΩ)	120 Hz (A)	20 kHz (A)	D X L (in)
100 Vdc (125 Vdc Surge)						
2200	450C222M100AK8	74.9	50.9	4.2	5.2	1 3/8 X 1 3/4
3300	450C332M100AA8	50.3	34.2	5.8	7.3	1 3/8 X 2 1/4
4000	450C402M100AH8	36.8	24.9	7.0	8.8	1 3/8 X 2 3/4
4800	450C482M100EA8	40.1	27.2	7.5	9.4	1 3/4 X 2 1/4
5800	450C582M100AB8	28.5	19.4	8.6	10.7	1 3/8 X 3 1/4
6100	450C612M100BA8	37.0	25.1	8.4	10.5	2 X 2 1/4
6600	450C662M100EH8	28.7	19.5	9.5	11.9	1 3/4 X 2 3/4
7100	450C712M100AJ8	23.5	15.9	9.9	12.4	1 3/8 X 3 3/4
8200	450C822M100BH8	26.3	17.8	10.7	13.4	2 X 2 3/4
8400	450C842M100AC8	20.1	13.6	11.3	14.1	1 3/8 X 4 1/4
8700	450C872M100EB8	22.2	15.1	11.7	14.6	1 3/4 X 3 1/4
9800	450C982M100AD8	17.7	12.0	12.6	15.8	1 3/8 X 4 3/4
11000	450C113M100AE8	15.9	10.8	13.9	17.4	1 3/8 X 5 1/4
11000	450C113M100EJ8	18.3	12.4	13.3	16.6	1 3/4 X 3 3/4
11000	450C113M100BB8	20.4	13.8	12.9	16.1	2 X 3 1/4
12000	450C123M100AF8	18.1	12.3	13.7	17.1	1 3/8 X 5 3/4
13000	450C133M100EC8	15.6	10.6	14.9	18.6	1 3/4 X 4 1/4
14000	450C143M100BJ8	16.8	11.4	15.9	19.9	2 X 3 3/4
15000	450C153M100ED8	13.7	9.3	16.8	21.0	1 3/4 X 4 3/4
16000	450C163M100BC8	14.4	9.8	17.3	21.6	2 X 4 1/4
17000	450C173M100EE8	12.3	8.4	18.8	23.4	1 3/4 X 5 1/4
18000	450C183M100BD8	12.7	8.6	19.0	23.7	2 X 4 3/4
19000	450C193M100EF8	11.3	7.6	21.0	26.2	1 3/4 X 5 3/4
22000	450C223M100BE8	11.1	7.5	21.0	26.2	2 X 5 1/4
24000	450C243M100BF8	10.2	6.9	22.7	28.4	2 X 5 3/4
160 Vdc (200 Vdc Surge)						
1200	450C122M160AK8	113.0	65.2	4.2	5.6	1 3/8 X 1 3/4
1800	450C182M160AA8	75.7	44.1	5.9	7.7	1 3/8 X 2 1/4
2600	450C262M160EA8	56.2	36.8	7.5	9.3	1 3/4 X 2 1/4
3000	450C302M160AH8	53.2	31.3	7.3	9.5	1 3/8 X 2 3/4
3300	450C332M160AB8	41.4	24.7	8.9	11.5	1 3/8 X 3 1/4
3300	450C332M160BA8	47.9	34.1	8.3	9.9	2 X 2 1/4
3600	450C362M160EH8	40.2	26.0	9.5	11.8	1 3/4 X 2 3/4
4000	450C402M160AJ8	34.2	20.6	10.2	13.1	1 3/8 X 3 3/4
4500	450C452M160BH8	33.9	23.8	10.7	12.7	2 X 2 3/4
4700	450C472M160EB8	31.2	20.4	11.7	14.4	1 3/4 X 3 1/4
4800	450C482M160AC8	29.4	18.0	11.6	14.8	1 3/8 X 4 1/4
5300	450C532M160AD8	26.9	16.5	12.7	16.2	1 3/8 X 4 3/4
5800	450C582M160EJ8	25.7	16.9	13.3	16.3	1 3/4 X 3 3/4
6000	450C602M160BB8	26.4	18.6	12.7	15.1	2 X 3 1/4
6100	450C612M160AE8	24.2	15.1	14.0	17.8	1 3/8 X 5 1/4
6700	450C672M160AF8	22.2	14.1	15.4	19.3	1 3/8 X 5 3/4

		ESR Max. 25 °C		Ripple Amps, 85 °C		Nom Size
Cap. (µF)	Catalog Part Number	120 Hz (mΩ)	20 kHz (mΩ)	120 Hz (A)	20 kHz (A)	D X L (in)
160 Vdc (200 Vdc Surge)						
6900	450C692M160EC8	22.0	14.7	14.9	18.2	1 3/4 X 4 1/4
7400	450C742M160BJ8	21.7	15.5	15.7	18.6	2 X 3 3/4
8000	450C802M160ED8	19.4	13.1	16.7	20.3	1 3/4 X 4 3/4
8700	450C872M160BC8	18.7	13.4	17.1	20.1	2 X 4 1/4
9100	450C912M160EE8	17.5	11.9	18.6	22.6	1 3/4 X 5 1/4
10000	450C103M160EF8	16.0	11.0	20.8	25.1	1 3/4 X 5 3/4
10000	450C103M160BD8	16.5	11.9	18.7	22.0	2 X 4 3/4
12000	450C123M160BE8	14.5	10.7	20.7	24.1	2 X 5 1/4
13000	450C133M160BF8	13.4	9.9	22.3	25.9	2 X 5 3/4
200 Vdc (250 Vdc Surge)						
880	450C881M200AK8	142.0	78.9	3.8	5.0	1 3/8 X 1 3/4
1300	450C132M200AA8	95.5	53.3	5.3	7.0	1 3/8 X 2 1/4
1900	450C192M200EA8	68.4	42.5	6.8	8.7	1 3/4 X 2 1/4
2000	450C202M200AH8	66.9	37.7	6.5	8.6	1 3/8 X 2 3/4
2500	450C252M200AB8	51.9	29.5	7.9	10.5	1 3/8 X 3 1/4
2500	450C252M200BA8	56.7	38.1	7.7	9.3	2 X 2 1/4
2700	450C272M200EH8	49.0	30.1	8.6	11.0	1 3/4 X 2 3/4
3000	450C302M200AJ8	42.7	24.6	9.1	12.0	1 3/8 X 3 3/4
3300	450C332M200BH8	40.3	26.7	9.8	12.0	2 X 2 3/4
3500	450C352M200EB8	37.9	23.5	10.6	13.4	1 3/4 X 3 1/4
3600	450C362M200AC8	36.5	21.3	10.4	13.6	1 3/8 X 4 1/4
4000	450C402M200AD8	33.4	19.5	11.4	14.9	1 3/8 X 4 3/4
4300	450C432M200EJ8	31.2	19.5	12.1	15.2	1 3/4 X 3 3/4
4400	450C442M200BB8	31.2	20.9	11.7	14.3	2 X 3 1/4
4500	450C452M200AE8	29.9	17.7	12.6	16.4	1 3/8 X 5 1/4
5000	450C502M200AF8	27.3	16.4	13.9	17.9	1 3/8 X 5 3/4
5100	450C512M200EC8	26.6	16.8	13.5	17.0	1 3/4 X 4 1/4
5500	450C552M200BJ8	25.7	17.3	14.5	17.6	2 X 3 3/4
6000	450C602M200ED8	23.4	14.9	15.2	19.0	1 3/4 X 4 3/4
6400	450C642M200BC8	22.0	14.9	15.7	19.1	2 X 4 1/4
6700	450C672M200EE8	21.0	13.5	17.0	21.2	1 3/4 X 5 1/4
7400	450C742M200BD8	19.4	13.3	17.3	20.9	2 X 4 3/4
7600	450C762M200EF8	19.1	12.5	19.0	23.6	1 3/4 X 5 3/4
8900	450C892M200BE8	16.9	11.8	19.1	22.9	2 X 5 1/4
9800	450C982M200BF8	15.5	10.9	20.7	24.7	2 X 5 3/4
250 Vdc (300 Vdc Surge)						
550	450C551M250AK8	210.0	87.3	3.1	4.8	1 3/8 X 1 3/4
830	450C831M250AA8	141.0	58.9	4.3	6.7	1 3/8 X 2 1/4
1000	450C102M250AH8	98.1	41.6	5.4	8.2	1 3/8 X 2 3/4
1200	450C122M250EA8	96.1	45.9	5.8	8.3	1 3/4 X 2 1/4
1500	450C152M250BA8	76.5	40.6	6.6	9.0	2 X 2 1/4
1600	450C162M250AB8	75.7	32.5	6.5	10.0	1 3/8 X 3 1/4
1700	450C172M250EH8	69.2	32.6	7.2	10.6	1 3/4 X 2 3/4

Type 450C 105 °C Highest Ripple, Inverter Grade, Plug-in, Aluminum

Ultra-High Ripple Capabilities in a Plug-In Configuration

Additional Low Voltages Available at <http://www.cde.com/catalogs/450C.pdf>

Cap. (μF)	Catalog Part Number	ESR Max. 25 °C		Ripple Amps, 85 °C		Nom Size D X L (in)
		120 Hz	20 kHz	120 Hz	20 kHz	
		(mΩ)	(mΩ)	(A)	(A)	
250 Vdc (300 Vdc Surge)						
1900	450C192M250AJ8	62.0	27.0	7.6	11.5	1 3/8 X 3 3/4
2100	450C212M250BH8	54.7	28.5	8.4	11.6	2 X 2 3/4
2200	450C222M250EB8	53.4	25.4	8.9	12.9	1 3/4 X 3 1/4
2300	450C232M250AC8	52.7	23.3	8.7	13.0	1 3/8 X 4 1/4
2500	450C252M250AD8	48.2	21.3	9.5	14.2	1 3/8 X 4 3/4
2700	450C272M250EJ8	43.6	21.0	10.2	14.7	1 3/4 X 3 3/4
2800	450C282M250BB8	42.2	22.2	10.1	13.9	2 X 3 1/4
2900	450C292M250AE8	43.0	19.4	10.5	15.7	1 3/8 X 5 1/4
3100	450C312M250AF8	38.9	17.9	11.6	17.1	1 3/8 X 5 3/4
3200	450C322M250EC8	37.1	18.1	11.5	16.4	1 3/4 X 4 1/4
3400	450C342M250BJ8	34.6	18.4	12.5	17.1	2 X 3 3/4
3800	450C382M250ED8	32.4	16.0	12.9	18.4	1 3/4 X 4 3/4
4100	450C412M250BC8	29.4	15.9	13.6	18.5	2 X 4 1/4
4200	450C422M250EE8	28.9	14.5	14.5	20.5	1 3/4 X 5 1/4
4700	450C472M250BD8	26.0	14.1	14.9	20.3	2 X 4 3/4
4800	450C482M250EF8	26.2	13.4	16.3	22.8	1 3/4 X 5 3/4
5600	450C562M250BE8	22.4	12.5	16.6	22.3	2 X 5 1/4
6200	450C622M250BF8	20.4	11.5	18.0	24.0	2 X 5 3/4
300 Vdc (350 Vdc Surge)						
380	450C381M300AK8	283.0	134.0	2.4	3.5	1 3/8 X 1 3/4
570	450C571M300AA8	189.0	89.9	3.3	4.8	1 3/8 X 2 1/4
800	450C801M300AH8	131.0	63.1	4.1	6.0	1 3/8 X 2 3/4
960	450C961M300EA8	119.0	56.7	4.8	6.9	1 3/4 X 2 1/4
1100	450C112M300AB8	101.0	49.0	5.1	7.3	1 3/8 X 3 1/4
1200	450C122M300BA8	106.0	53.2	5.5	7.8	2 X 2 1/4
1300	450C132M300EH8	87.0	40.8	6.0	8.7	1 3/4 X 2 3/4
1300	450C132M300AJ8	82.4	40.4	5.9	8.4	1 3/8 X 3 3/4
1500	450C152M300AC8	69.7	34.6	6.7	9.5	1 3/8 X 4 1/4
1600	450C162M300BH8	75.8	37.7	7.0	9.9	2 X 2 3/4
1700	450C172M300EB8	66.9	31.7	7.3	10.7	1 3/4 X 3 1/4
1800	450C182M300AD8	60.6	30.5	7.5	10.6	1 3/8 X 4 3/4
2100	450C212M300AE8	53.7	27.5	8.4	11.7	1 3/8 X 5 1/4
2100	450C212M300EJ8	54.5	26.1	8.4	12.1	1 3/4 X 3 3/4
2100	450C212M300BB8	58.4	29.3	8.4	11.9	2 X 3 1/4
2300	450C232M300AF8	48.4	25.1	9.3	12.9	1 3/8 X 5 3/4
2500	450C252M300EC8	48.1	23.3	9.5	13.6	1 3/4 X 4 1/4
2600	450C262M300BJ8	47.6	24.1	10.4	14.7	2 X 3 3/4
2900	450C292M300ED8	41.8	20.5	10.7	15.3	1 3/4 X 4 3/4
3100	450C312M300BC8	41.1	21.5	11.3	15.6	2 X 4 1/4
3300	450C332M300EE8	37.1	18.4	12.0	17.1	1 3/4 X 5 1/4
3600	450C362M300BD8	35.5	18.3	12.5	17.5	2 X 4 3/4
3700	450C372M300EF8	33.5	16.9	13.5	19.1	1 3/4 X 5 3/4

Cap. (μF)	Catalog Part Number	ESR Max. 25 °C		Ripple Amps, 85 °C		Nom Size D X L (in)
		120 Hz	20 kHz	120 Hz	20 kHz	
		(mΩ)	(mΩ)	(A)	(A)	
300 Vdc (350 Vdc Surge)						
4300	450C432M300BE8	30.5	16.1	14.0	19.3	2 X 5 1/4
4700	450C472M300BF8	27.6	14.8	15.3	20.8	2 X 5 3/4
350 Vdc (400 Vdc Surge)						
300	450C301M350AK8	325.0	150.0	2.2	3.3	1 3/8 X 1 3/4
460	450C461M350AA8	217.0	100.0	3.1	4.6	1 3/8 X 2 1/4
600	450C601M350AH8	151.0	70.3	3.8	5.6	1 3/8 X 2 3/4
770	450C771M350EA8	135.0	61.9	4.5	6.6	1 3/4 X 2 1/4
860	450C861M350AB8	116.0	54.5	4.7	6.9	1 3/8 X 3 1/4
960	450C961M350BA8	119.0	57.4	5.2	7.5	2 X 2 1/4
1000	450C102M350EH8	99.0	44.7	5.6	8.3	1 3/4 X 2 3/4
1000	450C102M350AJ8	94.4	44.9	5.5	8.0	1 3/8 X 3 3/4
1200	450C122M350AC8	79.8	38.4	6.3	9.1	1 3/8 X 4 1/4
1300	450C132M350BH8	85.6	40.7	6.6	9.6	2 X 2 3/4
1400	450C142M350EB8	76.1	34.7	6.9	10.2	1 3/4 X 3 1/4
1500	450C152M350AD8	69.3	33.8	7.0	10.1	1 3/8 X 4 3/4
1700	450C172M350EJ8	62.0	28.5	7.9	11.6	1 3/4 X 3 3/4
1700	450C172M350BB8	65.8	31.6	7.9	11.4	2 X 3 1/4
1700	450C172M350AE8	61.4	30.3	7.8	11.2	1 3/8 X 5 1/4
1800	450C182M350AF8	55.2	27.7	8.7	12.3	1 3/8 X 5 3/4
2000	450C202M350EC8	54.6	25.4	8.9	13.0	1 3/4 X 4 1/4
2100	450C212M350BJ8	53.7	26.0	9.8	14.1	2 X 3 3/4
2300	450C232M350ED8	47.4	22.3	10.0	14.6	1 3/4 X 4 3/4
2500	450C252M350BC8	46.2	23.1	10.7	15.1	2 X 4 1/4
2600	450C262M350EE8	42.0	20.0	11.3	16.4	1 3/4 X 5 1/4
2900	450C292M350BD8	40.0	19.7	11.8	16.8	2 X 4 3/4
3000	450C302M350EF8	37.8	18.3	12.7	18.3	1 3/4 X 5 3/4
3500	450C352M350BE8	34.2	17.3	13.2	18.6	2 X 5 1/4
3800	450C382M350BF8	30.9	15.8	14.4	20.1	2 X 5 3/4
400 Vdc (450 Vdc Surge)						
270	450C271M400AK8	356.0	161.0	2.1	3.1	1 3/8 X 1 3/4
410	450C411M400AA8	238.0	108.0	3.0	4.4	1 3/8 X 2 1/4
600	450C601M400AH8	166.0	75.7	3.7	5.4	1 3/8 X 2 3/4
690	450C691M400EA8	147.0	65.8	4.3	6.4	1 3/4 X 2 1/4
770	450C771M400AB8	127.0	58.7	4.5	6.6	1 3/8 X 3 1/4
860	450C861M400BA8	129.0	60.6	5.0	7.3	2 X 2 1/4
930	450C931M400EH8	108.0	47.6	5.3	8.1	1 3/4 X 2 3/4
930	450C931M400AJ8	103.4	48.2	5.2	7.7	1 3/8 X 3 3/4
1100	450C112M400AC8	87.4	41.2	6.0	8.7	1 3/8 X 4 1/4
1200	450C122M400EB8	83.0	36.9	6.6	9.9	1 3/4 X 3 1/4
1200	450C122M400BH8	92.9	43.0	6.3	9.3	2 X 2 3/4
1300	450C132M400AD8	75.9	36.2	6.7	9.7	1 3/8 X 4 3/4
1500	450C152M400BB8	71.4	33.3	7.6	11.1	2 X 3 1/4

Type 450C 105 °C Highest Ripple, Inverter Grade, Plug-in, Aluminum

Ultra-High Ripple Capabilities in a Plug-In Configuration

Additional Low Voltages Available at <http://www.cde.com/catalogs/450C.pdf>

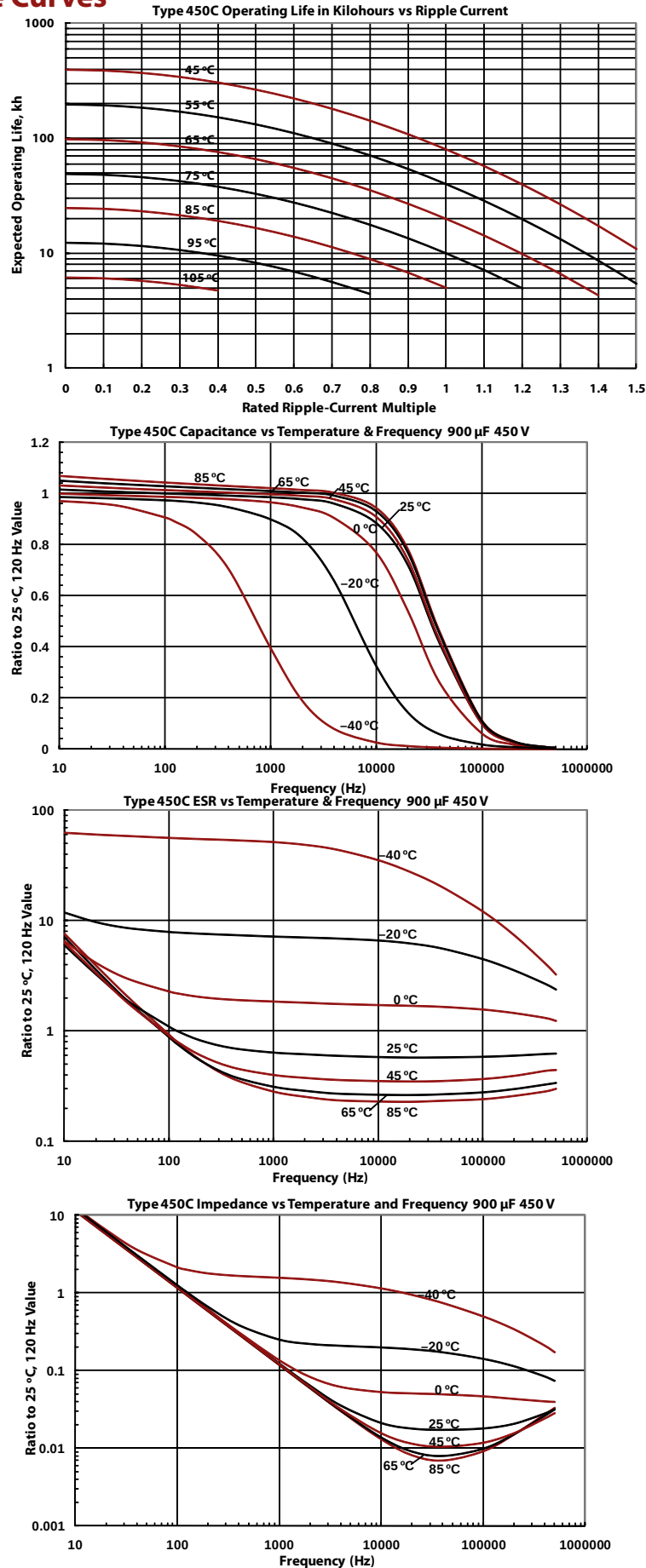
		ESR Max. 25 °C		Ripple Amps, 85 °C		Nom Size
Cap. (μF)	Catalog Part Number	120 Hz (mΩ)	20 kHz (mΩ)	120 Hz (A)	20 kHz (A)	D X L (in)
400 Vdc (450 Vdc Surge)						
1500	450C152M400AE8	67.2	32.5	7.5	10.8	1 3/8 X 5 1/4
1500	450C152M400EJ8	67.5	30.3	7.5	11.3	1 3/4 X 3 3/4
1600	450C162M400AF8	60.4	29.6	8.3	11.9	1 3/8 X 5 3/4
1800	450C182M400EC8	59.4	26.9	8.5	12.6	1 3/4 X 4 1/4
1900	450C192M400BJ8	58.2	27.4	9.4	13.7	2 X 3 3/4
2100	450C212M400ED8	51.6	23.7	9.6	14.2	1 3/4 X 4 3/4
2200	450C222M400BC8	50.1	24.3	10.2	14.7	2 X 4 1/4
2300	450C232M400EE8	45.7	21.2	10.8	15.9	1 3/4 X 5 1/4
2600	450C262M400EF8	41.1	19.4	12.2	17.8	1 3/4 X 5 3/4
2600	450C262M400BD8	43.3	20.7	11.4	16.4	2 X 4 3/4
3100	450C312M400BE8	37.0	18.1	12.7	18.2	2 X 5 1/4
3400	450C342M400BF8	33.4	16.6	13.9	19.7	2 X 5 3/4
450 Vdc (500 Vdc Surge)						
210	450C211M450AK8	384.0	171.0	2.0	3.1	1 3/8 X 1 3/4
310	450C311M450AA8	256.0	115.0	2.9	4.3	1 3/8 X 2 1/4
400	450C401M450AH8	178.0	80.4	3.5	5.3	1 3/8 X 2 3/4
520	450C521M450EA8	157.0	69.2	4.1	6.3	1 3/4 X 2 1/4
580	450C581M450AB8	137.0	62.3	4.3	6.4	1 3/8 X 3 1/4
650	450C651M450BA8	138.0	63.3	4.8	7.1	2 X 2 1/4
700	450C701M450EH8	116.0	50.1	5.2	7.9	1 3/4 X 2 3/4
710	450C711M450AJ8	111.0	51.1	5.1	7.5	1 3/8 X 3 3/4
840	450C841M450AC8	93.9	43.6	5.8	8.5	1 3/8 X 4 1/4
870	450C871M450BH8	99.2	45.0	6.1	9.1	2 X 2 3/4
920	450C921M450EB8	88.9	38.8	6.4	9.6	1 3/4 X 3 1/4
990	450C991M450AD8	81.5	38.3	6.5	9.5	1 3/8 X 4 3/4
1100	450C112M450EJ8	72.3	31.8	7.3	11.0	1 3/4 X 3 3/4
1100	450C112M450AE8	72.1	34.3	7.2	10.5	1 3/8 X 5 1/4
1200	450C122M450AF8	64.8	31.2	8.0	11.6	1 3/8 X 5 3/4
1200	450C122M450BB8	76.3	34.9	7.4	10.9	2 X 3 1/4
1400	450C142M450BJ8	62.1	28.7	9.1	13.5	2 X 3 3/4
1400	450C142M450EC8	63.6	28.3	8.2	12.3	1 3/4 X 4 1/4
1600	450C162M450ED8	55.2	24.8	9.3	13.9	1 3/4 X 4 3/4

		ESR Max. 25 °C		Ripple Amps, 85 °C		Nom Size
Cap. (μF)	Catalog Part Number	120 Hz (mΩ)	20 kHz (mΩ)	120 Hz (A)	20 kHz (A)	D X L (in)
450 Vdc (500 Vdc Surge)						
1700	450C172M450BC8	53.4	25.4	9.9	14.4	2 X 4 1/4
1800	450C182M450EE8	48.9	22.3	10.5	15.5	1 3/4 X 5 1/4
2000	450C202M450EF8	44.0	20.3	11.8	17.4	1 3/4 X 5 3/4
2000	450C202M450BD8	46.2	21.6	11.0	16.1	2 X 4 3/4
2300	450C232M450BE8	39.4	18.9	12.3	17.8	2 X 5 1/4
2600	450C262M450BF8	35.6	17.3	13.4	19.3	2 X 5 3/4
500 Volts (550 Vdc Surge)						
150	450C151M500AK8	440.0	158.0	1.9	3.2	1 3/8 X 1 3/4
230	450C231M500AA8	294.0	106.0	2.7	4.5	1 3/8 X 2 1/4
330	450C331M500AH8	204.0	73.8	3.3	5.5	1 3/8 X 2 3/4
350	450C351M500EA8	262.0	146.0	3.7	6.0	1 3/4 X 2 1/4
430	450C431M500AB8	157.0	57.0	4.1	6.7	1 3/8 X 3 1/4
440	450C441M500BA8	208.0	122.0	4.4	6.9	2 X 2 1/4
500	450C501M500EH8	182.0	102.0	4.8	7.7	1 3/4 X 2 3/4
530	450C531M500AJ8	128.0	46.7	4.7	7.8	1 3/8 X 3 3/4
620	450C621M500BH8	144.0	85.3	5.7	9.0	2 X 2 3/4
630	450C631M500AC8	145.0	82.8	5.4	8.9	1 3/8 X 4 1/4
660	450C661M500EB8	140.0	78.6	5.9	9.5	1 3/4 X 3 1/4
700	450C701M500AD8	93.5	34.7	6.1	9.9	1 3/8 X 4 3/4
820	450C821M500EJ8	114.0	64.4	6.8	10.9	1 3/4 X 3 3/4
830	450C831M500BB8	111.0	66.0	6.9	10.7	2 X 3 1/4
830	450C831M500AE8	82.7	31.0	6.8	11.0	1 3/8 X 5 1/4
930	450C931M500AF8	74.3	28.2	7.5	12.2	1 3/8 X 5 3/4
970	450C971M500EC8	96.0	54.8	7.6	12.2	1 3/4 X 4 1/4
1000	450C102M500BJ8	90.4	54.1	8.5	13.3	2 X 3 3/4
1100	450C112M500ED8	83.3	48.0	8.6	13.7	1 3/4 X 4 3/4
1200	450C122M500BC8	76.4	46.2	9.3	14.5	2 X 4 1/4
1300	450C132M500EE8	73.7	42.8	9.7	15.4	1 3/4 X 5 1/4
1400	450C142M500EF8	66.3	38.9	11.0	17.3	1 3/4 X 5 3/4
1400	450C142M500BD8	66.4	40.5	10.3	15.9	2 X 4 3/4
1700	450C172M500BE8	57.3	35.4	11.5	17.7	2 X 5 1/4
1900	450C192M500BF8	51.8	32.3	12.6	19.1	2 X 5 3/4

Type 450C 105 °C Highest Ripple, Inverter Grade, Plug-in, Aluminum

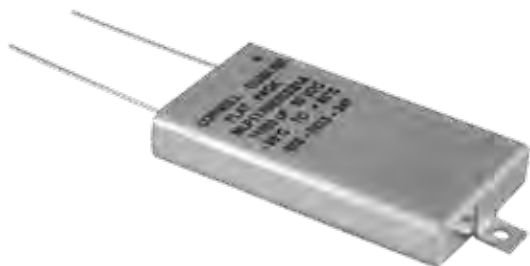
Ultra-High Ripple Capabilities in a Plug-In Configuration

Typical Performance Curves



Type MLP 85 °C Flatpack, Ultra Long Life, Aluminum Electrolytic

Very Low Profile



The MLP's high-energy storage and box-shape make it perfect for voltage holdup or filtering in military SEM-E modules, telecom circuit packs and computer cards. The MLP delivers up to 20 joules of energy storage in a 1/2" height with 50 year's life at +45 °C. You can readily heatsink it to double the ripple-current capability. The MLP is the square-peg component that fits the square-holes in electronic assemblies.

Highlights

- Low-profile replacement for snap-ins
- Double the ripple capability with a heatsink
- Nearly hermetic welded seal assures 50-year life
- Withstands more than 80,000 feet altitude

Specifications

Temperature Range	–55°C to +85°C ≤250 Vdc –40°C to +85°C ≥300 Vdc							
Rated Voltage Range	7.5 Vdc to 450 Vdc							
Capacitance Range	110 μF to 47,000 μF							
Capacitance Tolerance	±20%							
Leakage Current	≤ 0.002 CV μA, @ 25 °C and 5 min.							
Ripple Current Multipliers	Ambient Temperature, No Heatsink							
	45 °C	55 °C	65 °C	75 °C	85 °C			
	1.00	0.90	0.75	0.56	0.27			
	Case Temperature							
	45 °C	55 °C	65 °C	75 °C	85 °C			
	3.79	3.32	2.77	2.08	1.00			
Ripple Current Multipliers	Frequency							
		50 Hz	60 Hz	120 Hz	360 Hz	1 kHz	5 kHz	10 kHz & up
	7.5 to 63 V	0.94	0.95	1.00	1.04	1.05	1.06	1.06
	80 to 450 V	0.80	0.85	1.00	1.17	1.24	1.28	1.29
Low Temperature Characteristics	Impedance ratio: Z _{–55°C} /Z _{+25°C} ≤ 10 (7.5 - 20 Vdc) ≤ 2 (25 – 250 Vdc) Impedance ratio: Z _{–20°C} /Z _{+25°C} ≤ 4 (300–450Vdc)							
Endurance Life Test	2000 h @ full load at +85 °C Δ Capacitance ±10% ESR 200% of limit DCL 100% of limit							
Shelf Life Test	500 h at 85 °C Capacitance 100% of limit ESR 100% of limit DCL 100% of limit							
Vibration	10 Hz to 2 kHz, 0.06" pp max and 10g. MIL-STD-202, Meth. 204							

Type MLP 85 °C Flatpack, Ultra Long Life, Aluminum Electrolytic

Very Low Profile

Thermal Resistance	Large Sides Heatsinked	Case Length	1.5"	2.0"	3.0"
		Insulation	°C/W	°C/W	°C/W
	one	None	3.0	1.8	1.2
		Polyester	4.3	2.6	1.7
	both	None	2.8	1.7	1.1
		Polyester	4.0	2.4	1.6
ESL	<30 nH measured 1/4" from case at 1 MHz				
Weight	Case EK 30 g typical Case EA 42 g typical Case EB 66 g typical				
Terminals	18 AWG copper wire with 60/40 tin-lead electroplate, 20 amps max				
Double the Ripple Current	Attach the MLP to an external heatsink and you can easily double the ripple current capability and assure long life through cooler operation. The broad, flat top and bottom on the MLP are ideal for cooling the capacitor and removing the heat caused by ripple current.				
Ripple Current Capability	The ripple current capability is set by the maximum permissible internal core temperature, 88 °C. This assures that the case does not inflate beyond 0.5 inch height.				
Air Cooled	The ripple currents in the ratings tables are for 85 °C case temperatures. For air temperatures without a heatsink use the multipliers Ambient Temperature, No Heatsink.				
Heatsink Cooled	Temperature rise from the internal hottest spot, the core, to ambient air is $\Delta T = I^2(ESR)(\theta_{cc} + \theta_{ca})$ where θ_{cc} is the thermal resistance from core to case and θ_{ca} from case to ambient. To calculate maximum ripple capability with the MLP attached to a heatsink use the maximum core temperature and the values for θ_{cc} .				
Example	As an illustration, suppose you operate an insulated MLP332M080EB1C in 65 °C air and attach it to a commercial heatsink with a free-air thermal resistance of 2.7 °C/W. Use a good thermal grease between the MLP and the heatsink, and the total thermal resistance is 2.7 + 1.7 or 4.4 °C/W. The power which would heat the core to 88 °C is (88-65)/4.4 or 4.75 W. For an ESR of 31 mΩ, 4.7 W equates to a ripple current of 12.3 A.				

Part Numbering System

MLP	102	M	200	EB	0	A
Type	Capacitance	Tolerance	Rated Voltage	Case Code	Insulation	Mounting Style
MLP	821=820 µF 102 = 1000 µF	M=±20%	Vdc	EK, L=1.5 in. EA, L=2.0 in. EB, L=3.0 in.	0 = bare can 1 = polyester	A = mounting tabs B = four leads C = two leads/no tabs D = hook leads/tabs E = hook leads/no tabs

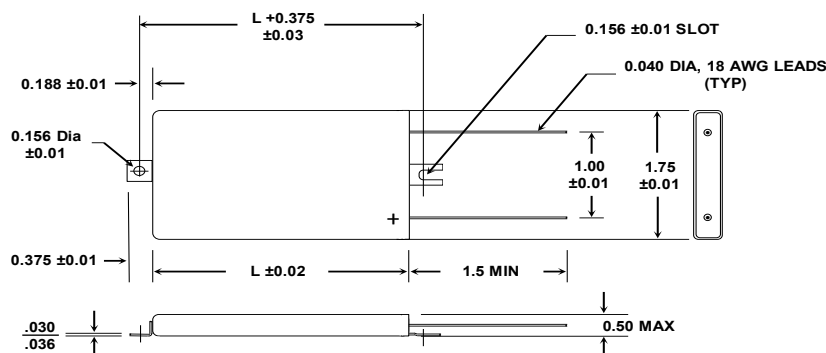
Type MLP 85 °C Flatpack, Ultra Long Life, Aluminum Electrolytic

Very Low Profile

Outline Drawings

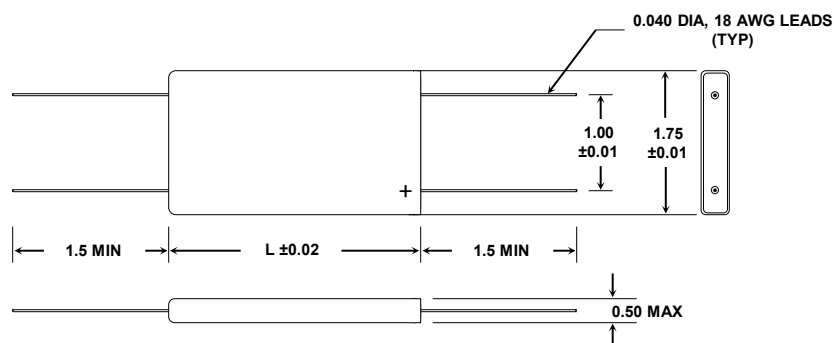
Style A: Mounting Tabs

Mounting tabs and negative lead are welded to the case.



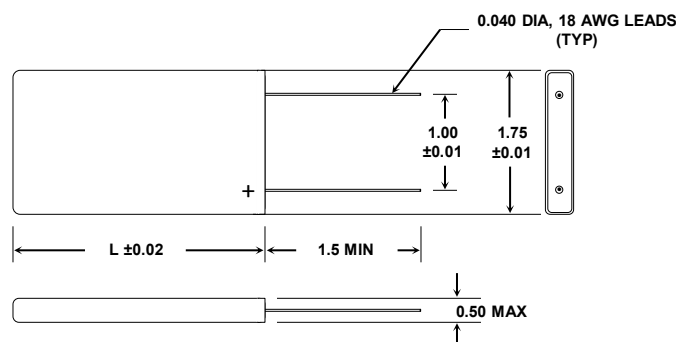
Style B: Four Leads

Three negative leads are welded to the case.



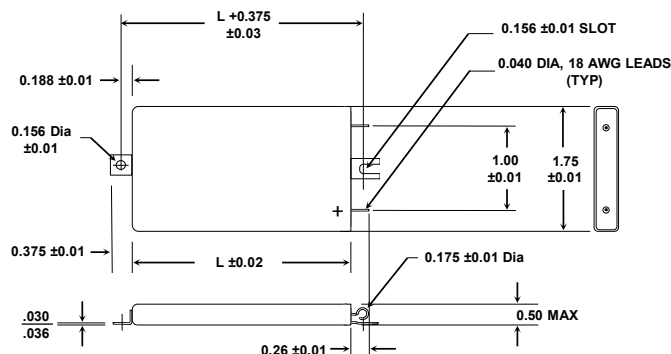
Style C: No Tabs

The negative lead is welded to the case.



Style D: Hook Leads

Mounting tabs and negative lead are welded to the case.



Case Code	Length L (in)	Weight (g)
EK	1.5	30
EA	2.0	42
EB	3.0	66

Type MLP 85 °C Flatpack, Ultra Long Life, Aluminum Electrolytic

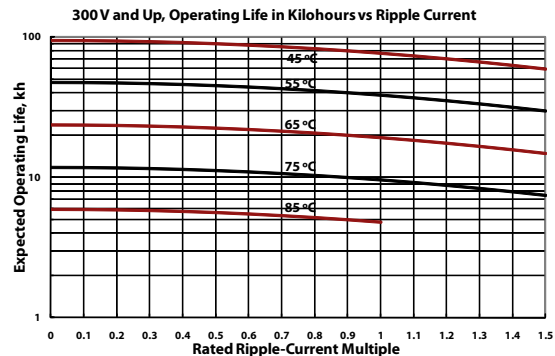
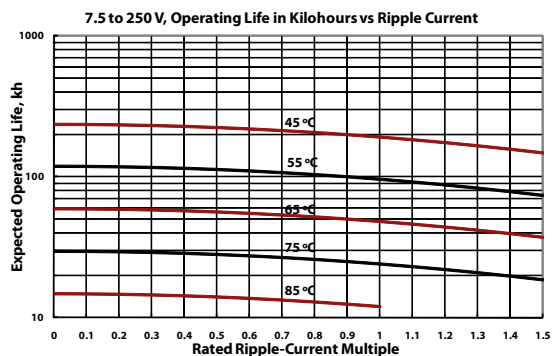
Very Low Profile

Ratings

Cap. (μF)	Catalog Part Number	ESR max 25 °C (mΩ)		Ripple (A) Case @ 85 °C		Length (Inches)
		120 Hz	20 kHz	120 Hz	20 kHz	
7.5 Vdc (10 Vdc Surge)						
19,000	MLP193M7R5EK0A	76	66	4.2	4.5	1.5
28,000	MLP283M7R5EA0A	50	44	5.8	6.2	2.0
47,000	MLP473M7R5EB0A	30	26	9.1	9.8	3.0
10 Vdc (13 Vdc Surge)						
17000	MLP173M010EK0A	77	67	4.2	4.5	1.5
26000	MLP263M010EA0A	51	45	5.8	6.1	2.0
43000	MLP433M010EB0A	30	27	9.0	9.6	3.0
16 Vdc (20 Vdc Surge)						
13000	MLP133M016EK0A	81	69	4.1	4.4	1.5
21000	MLP213M016EA0A	53	46	5.7	6.1	2.0
38000	MLP383M016EB0A	31	27	9.0	9.6	3.0
20 Vdc (25 Vdc Surge)						
9600	MLP962M020EK0A	84	69	4.0	4.4	1.5
14000	MLP143M020EA0A	56	46	5.5	6.1	2.0
24000	MLP243M020EB0A	33	27	8.7	9.6	3.0
25 Vdc (30 Vdc Surge)						
8000	MLP802M025EK0A	87	69	3.9	4.4	1.5
12000	MLP123M025EA0A	57	46	5.5	6.1	2.0
20000	MLP203M025EB0A	34	27	8.6	9.6	3.0
35 Vdc (50 Vdc Surge)						
5600	MLP562M035EK0A	90	70	3.4	4.4	1.5
8400	MLP842M035EA0A	59	46	5.4	6.1	2.0
14000	MLP143M035EB0A	35	27	8.4	9.6	3.0
50 Vdc (63 Vdc Surge)						
4400	MLP442M050EK0A	97	70	3.7	4.4	1.5
6600	MLP662M050EA0A	62	46	5.2	6.1	2.0
11000	MLP113M050EB0A	36	27	8.3	9.6	3.0
63 Vdc (75 Vdc Surge)						
2200	MLP222M063EK0A	101	76	3.7	4.2	1.5
3300	MLP332M063EA0A	64	50	5.2	5.8	2.0
5600	MLP562M063EB0A	36	29	8.3	9.3	3.0
80 Vdc (100 Vdc Surge)						
1500	MLP152M080EK0A	106	77	3.6	4.2	1.5
2100	MLP212M080EA0A	72	52	4.9	5.7	2.0
3300	MLP332M080EB0A	44	31	7.5	9.0	3.0

Cap. (μF)	Catalog Part Number	ESR max 25 °C (mΩ)		Ripple (A) Case @ 85 °C		Length (Inches)
		120 Hz	20 kHz	120 Hz	20 kHz	
100 Vdc (125 Vdc Surge)						
1100	MLP112M100EK0A	112	78	3.5	4.2	1.5
1600	MLP162M100EA0A	76	54	4.7	5.6	2.0
2700	MLP272M100EB0A	46	33	7.4	8.7	3.0
150 Vdc (180 Vdc Surge)						
500	MLP501M150EK0A	355	248	1.9	2.3	1.5
770	MLP771M150EA0A	238	166	2.7	3.2	2.0
1300	MLP132M150EB0A	143	100	4.2	5.0	3.0
200 Vdc (250 Vdc Surge)						
400	MLP401M200EK0A	388	253	1.9	2.3	1.5
600	MLP601M200EA0A	261	168	2.6	3.2	2.0
1000	MLP102M200EB0A	158	100	3.8	5.0	3.0
250 Vdc (300 Vdc Surge)						
330	MLP331M250EK0A	426	258	1.8	2.3	1.5
490	MLP491M250EA0A	285	172	2.4	3.1	2.0
820	MLP821M250EB0A	172	103	3.8	4.9	3.0
300 Vdc (350 Vdc Surge)						
220	MLP221M300EK0A	597	393	1.5	1.9	1.5
330	MLP331M300EA0A	399	262	2.1	2.5	2.0
560	MLP561M300EB0A	240	157	3.2	4.0	3.0
350 Vdc (400 Vdc Surge)						
150	MLP151M350EK0A	1000	734	1.2	1.4	1.5
220	MLP221M350EA0A	683	503	1.6	1.8	2.0
370	MLP371M350EB0A	420	310	2.3	2.8	3.0
400 Vdc (450 Vdc Surge)						
130	MLP131M400EK0A	1320	970	1.0	1.2	1.5
200	MLP201M400EA0A	882	648	1.4	1.6	2.0
330	MLP331M400EB0A	530	390	2.1	2.5	3.0
420 Vdc (475 Vdc Surge)						
130	MLP131M420EK0A	1320	970	1.0	1.2	1.5
200	MLP201M420EA0A	882	648	1.4	1.6	2.0
330	MLP331M420EB0A	530	390	2.1	2.5	3.0
450 Vdc (500 Vdc Surge)						
110	MLP111M450EK0A	1456	1190	0.96	1.1	1.5
170	MLP171M450EA0A	973	797	1.3	1.5	2.0
280	MLP281M450EB0A	585	480	2.0	2.3	3.0

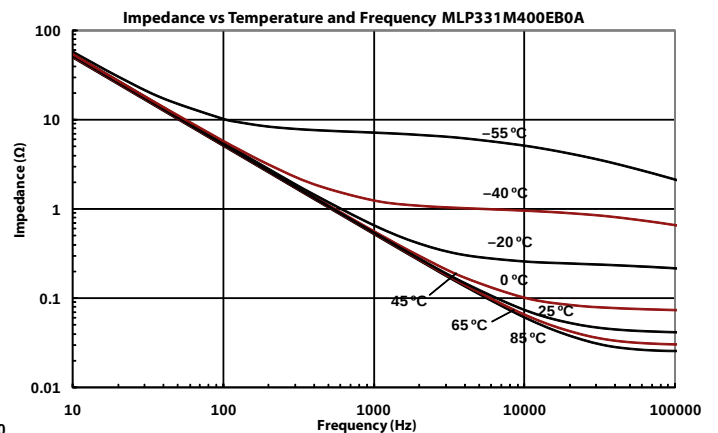
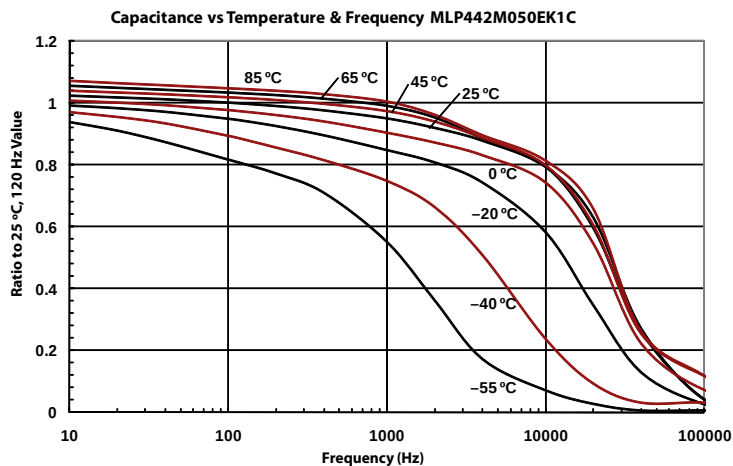
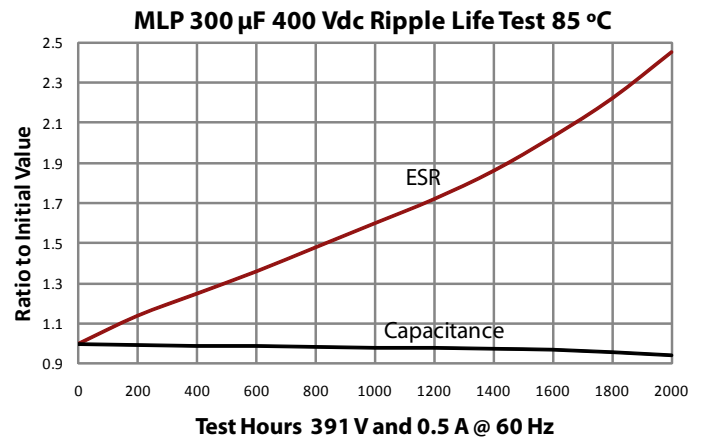
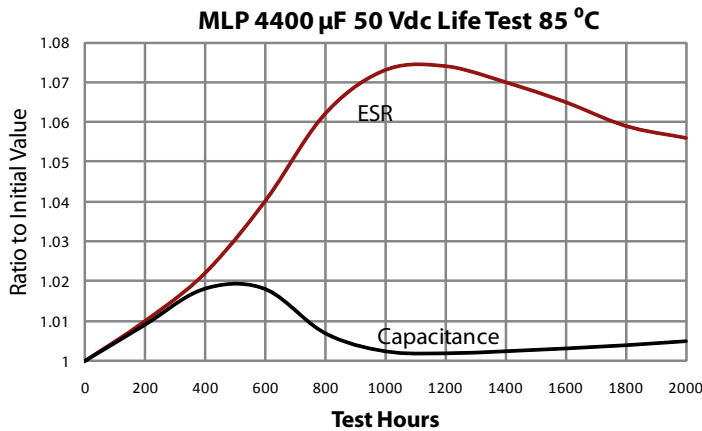
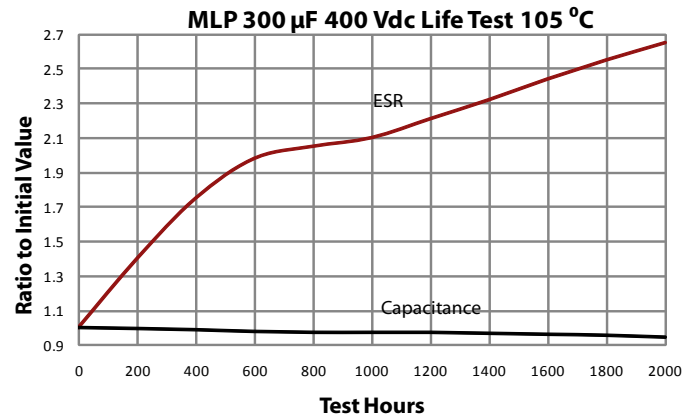
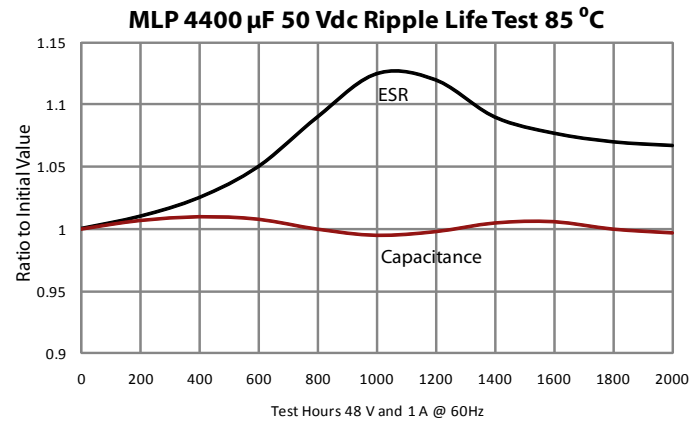
Typical Performance Curves



Type MLP 85 °C Flatpack, Ultra Long Life, Aluminum Electrolytic

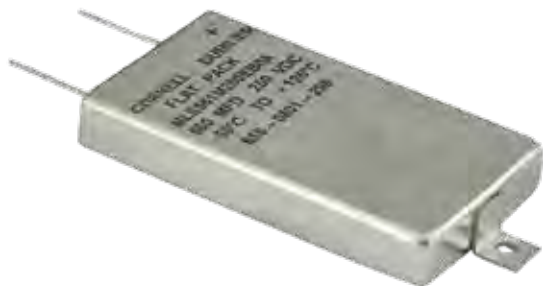
Very Low Profile

Typical Performance Curves



Type MLS 125 °C Flatpack, Ultra Long Life, Aluminum Electrolytic

Rugged Stainless-Steel Case



The Type MLS extends the super performance of the MLP from a maximum operating temperature of 85 °C to 125 °C. While the MLP is inherently capable of operation at 125 °C, its flat aluminum case can't withstand the higher temperature without inflating from internal pressure. The MLS incorporates a rugged, stainless steel case which assures flatness to beyond 125 °C. The MLS is perfect for hi-rel military systems and applications operating above 85 °C.

Highlights

- Near-hermetic welded seal
- Stainless-steel case
- 100 years expected operating life
- Withstands more than 80,000 feet altitude

Specifications

Temperature Range	-55 °C to +125 °C								
Rated Voltage Range	5.0 Vdc to 250 Vdc								
Capacitance Range	220 µF to 47,000 µF								
Capacitance Tolerance	±20%								
Leakage Current	≤ 0.002 CV µA, @ 25 °C and 5 mins.								
Ripple Current Multipliers	Case Temperature								
	45 °C	55 °C	65 °C	75 °C	85 °C	95 °C	105 °C	115 °C	125 °C
	1.41	1.32	1.22	1.12	1.00	0.87	0.71	0.50	0.00
	Ambient Temperature, No Heatsink								
	45 °C	55 °C	65 °C	75 °C	85 °C	95 °C	105 °C	115 °C	125 °C
	0.63	0.58	0.54	0.49	0.44	0.38	0.31	0.22	0.00
Frequency									
		50 Hz	60 Hz	120 Hz	360 Hz	1 kHz	5 kHz	10 kHz & up	
	5 to 40 V	0.95	0.96	1.00	1.03	1.04	1.04	1.04	
	60 to 250 V	0.80	0.84	1.00	1.18	1.25	1.30	1.30	
Low Temperature Characteristics	Impedance ratio: Z _{-55 °C} /Z _{+25 °C} ≤ 10 (5 - 20 Vdc) ≤ 2 (25 - 250 Vdc)								
Endurance Life Test	10,000 h @ full load at 85 °C Δ Capacitance ±10% ESR 200% of limit DCL 100% of limit								
DC Life Test	2000 h at rated voltage & 125 °C Δ Capacitance ±10% ESR 200% of limit DCL 100% of limit								
Shelf Life Test	500 h at 125 °C Capacitance 100% of limit ESR 100% of limit DCL 100% of limit								
Vibration	10 Hz to 2 kHz, 0.06" pp max and 10g. MIL-STD-202, Meth. 204								

Type MLS 125 °C Flatpack, Ultra Long Life, Aluminum Electrolytic

Rugged Stainless-Steel Case

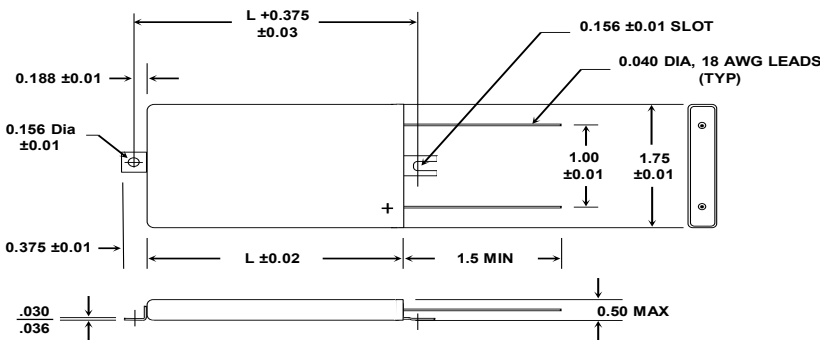
Thermal Resistance	Large Sides Heatsinked	Case Length	1.5"	2.0"	3.0"
		Insulation	°C/W	°C/W	°C/W
	one	None	3.3	1.8	1.3
		Polyester	4.5	2.6	1.6
	both	None	2.8	2.2	1.1
		Polyester	4.0	3.2	1.6
ESL	≤30 nH measured 1/4" from case at 1 MHz				
Weight	Case EK 43 g typical Case EA 76 g typical Case EB 92 g typical				
Terminals	18 AWG copper wire with 60/40 tin-lead electroplate, 20 amps max				
Ripple Current Capability	The ripple current capability is set by the maximum permissible internal core temperature, 125 °C.				
Air Cooled	The ripple currents in the ratings tables are for 85 °C case temperatures. For air temperatures without a heatsink use the multipliers Ambient Temperature, No Heatsink.				
Heatsink Cooled	Temperature rise from the internal hottest spot, the core, to ambient air is $\Delta T = I^2(ESR)(\theta_{cc} + \theta_{ca})$ where θ_{cc} is the thermal resistance from core to case and θ_{ca} from case to ambient. To calculate maximum ripple capability with the MLS attached to a heatsink use the maximum core temperature and the values for θ_{cc} .				
Example	As an illustration, suppose you operate an insulated MLS332M060EB1C in 65 °C air and attach it to a commercial heatsink with a free-air thermal resistance of 2.7 °C/W. Use a good thermal grease between the MLS and the heatsink, and the total thermal resistance is 2.7 +1.8 or 4.5 °C/W. The power which would heat the core to 125 °C is (125 - 65)/4.5 or 13.3 W. For an ESR of 31 mΩ, 13.3 W equates to a ripple current of 20.7 A, however, the wire leads are rated for only 20 A.				

Part Numbering System

MLS	821	M	200	EB	0	A
Type	Capacitance	Tolerance	Rated Voltage	Case Code	Insulation	Mounting Style
MLS	821=820 μF 102 = 1000 μF	M=±20%	Vdc	EK, L=1.5 in. EA, L=2.0 in EB, L=3.0 in.	0 = bare can 1 = polyester	A = mounting tabs C = two leads/no tabs D = hook leads/tabs

Outline Drawings

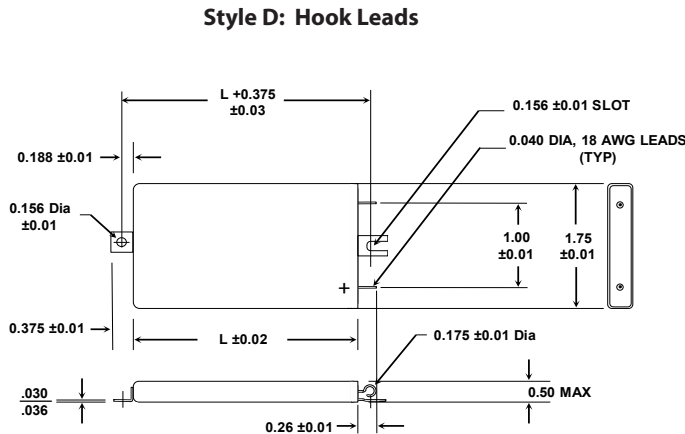
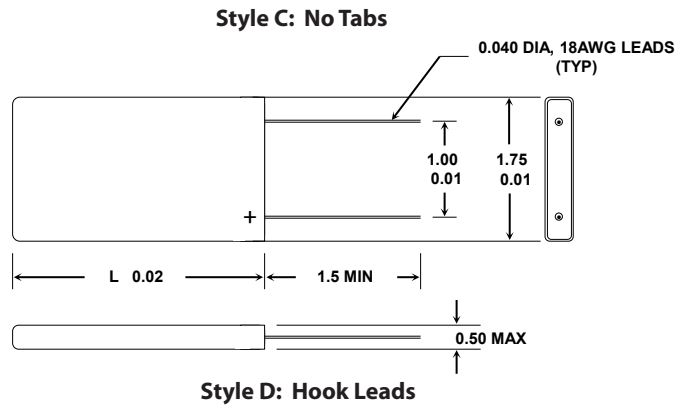
Style A: Mounting Tabs



Type MLS 125 °C Flatpack, Ultra Long Life, Aluminum Electrolytic

Rugged Stainless-Steel Case

Outline Drawings



Case Code	Length L (in)	Weight (g)
EK	1.5	43
EA	2.0	76
EB	3.0	92

Ratings

Mounting tabs are welded to the case.

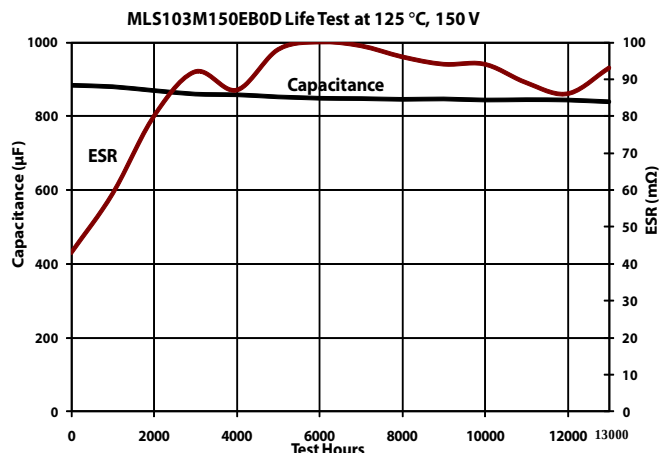
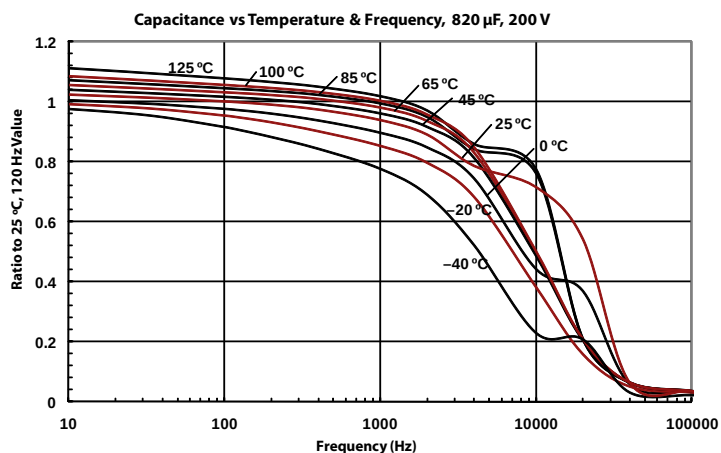
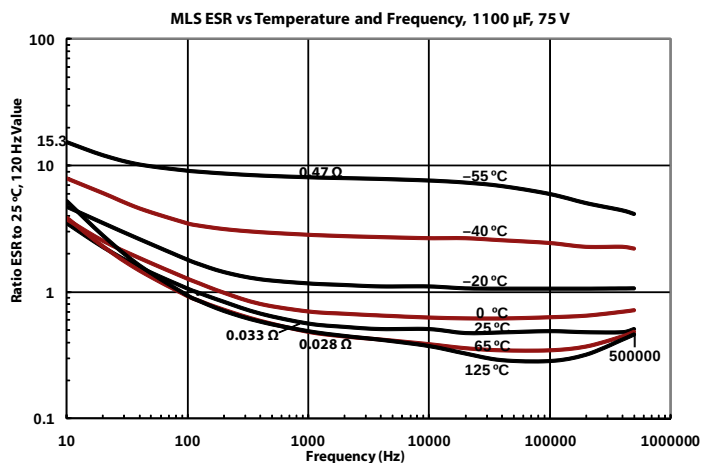
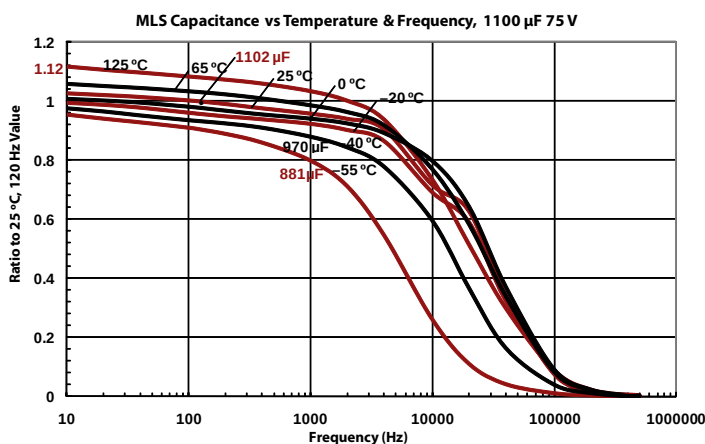
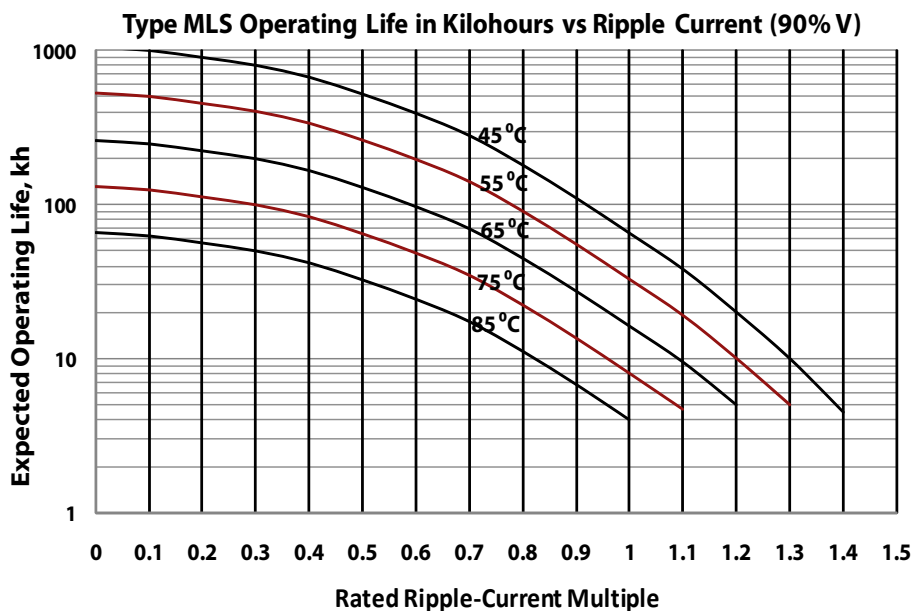
		ESR max		Ripple (A)		
Cap		25 °C (mΩ)		Case @ 85°C		Length
(μF)	Catalog Part Number	120 Hz	20 kHz	120 Hz	20 kHz	(inches)
5 Vdc (7.5 Vdc Surge) [105 °C: 7.5 Vdc (10 Vdc Surge)]						
19,000	MLS193M5R0EK0C	76	66	12.6	13.6	1.5
28,000	MLS283M5R0EA0c	50	44	19.9	21.4	2.0
47,000	MLS473M5R0EB0C	30	26	32.0	34.4	3.0
7.5 Vdc (10 Vdc Surge) [105 °C: 10 Vdc (13 Vdc Surge)]						
17,000	MLS173M7R5EK0C	77	67	12.5	13.5	1.5
26,000	MLS263M7R5EA0c	51	45	19.8	21.1	2.0
43,000	MLS433M7R5EB0C	31	27	31.5	33.8	3.0
10 Vdc (15 Vdc Surge) [105 °C: 16 Vdc (20 Vdc Surge)]						
13,000	MLS133M010EK0C	81	69	12.2	13.3	1.5
23,000	MLS233M010EA0C	51	45	19.8	21.1	2.0
38,000	MLS383M010EB0C	31	27	31.5	33.8	3.0
20 Vdc (30 Vdc Surge) [105 °C: 30 Vdc (40 Vdc Surge)]						
6,800	MLS682M020EK0C	84	69	11.0	12.2	1.5
10,000	MLS103M020EA0C	56	46	13.6	15.0	2.0
17,000	MLS173M020EB0C	33	27	17.6	19.5	3.0
40 Vdc (50 Vdc Surge) [105 °C: 50 Vdc (63 Vdc Surge)]						
4,400	MLS442M040EK0C	97	70	10.3	12.1	1.5
6,600	MLS662M040EA0C	62	46	12.9	15.0	2.0
11,000	MLS113M040EB0C	36	27	16.9	19.5	3.0
60 Vdc (75 Vdc Surge) [105 °C: 80 Vdc (100 Vdc Surge)]						
1,500	MLS152M060EK0C	106	77	9.8	11.5	1.5

Cap (μF)	Catalog Part Number	ESR max 25 °C (mΩ)		Ripple (A) Case @ 85 °C		Length (inches)
		120 Hz	20 kHz	120 Hz	20 kHz	
2,100	MLS212M060EA0C	72	52	11.9	14.1	2.0
3,300	MLS332M060EB0C	44	31	15.3	18.2	3.0
75 Vdc (100 Vdc Surge) [105 °C: 100 Vdc (125 Vdc Surge)]						
1,100	MLS112M075EK0C	112	78	9.6	11.5	1.5
1,600	MLS162M075EA0C	76	54	11.6	13.8	2.0
2,700	MLS272M075EB0C	46	33	14.9	17.6	3.0
100 Vdc (125 Vdc Surge) [105 °C: 150 Vdc (180 Vdc Surge)]						
500	MLS501M100EK0C	355	248	5.4	6.4	1.5
770	MLS771M100EA0C	238	166	6.6	7.8	2.0
1,300	MLS132M100EB0C	143	100	8.5	10.1	3.0
150 Vdc (175 Vdc Surge) [105 °C: 200 Vdc (250 Vdc Surge)]						
400	MLS401M150EK0C	388	253	5.1	6.4	1.5
600	MLS601M150EA0C	261	168	6.3	7.8	2.0
1,000	MLS102M150EB0C	158	100	8.1	10.1	3.0
200 Vdc (225 Vdc Surge) [105 °C: 250 Vdc (300 Vdc Surge)]						
330	MLS331M200EK0C	426	258	4.9	6.2	1.5
490	MLS491M200EA0C	285	172	6.0	7.7	2.0
820	MLS821M200EB0C	172	103	7.7	10.0	3.0
250 Vdc (275 Vdc Surge) [105 °C: 250 Vdc (300 Vdc Surge)]						
220	MLS221M250EK0C	597	393	4.1	5.1	1.5
330	MLS331M250EA0C	399	262	5.0	6.3	2.0
560	MLS561M250EB0C	240	157	6.5	8.1	3.0

Type MLS 125 °C Flatpack, Ultra Long Life, Aluminum Electrolytic

Rugged Stainless-Steel Case

Typical Performance Curves



Type 3186 85 °C Aluminum Electrolytic, Screw Terminal

Best Value 85 °C High Capacitance Screw Terminal Type



While Type 3186's standard encasement is by compression with the capacitor element captured on an aluminum peg in the can bottom and a phenolic peg in the top, rilled construction is available. With rilled construction the element is secured by rills, spoon shaped dimples in the side of the can. Rilled construction offers the industry's highest vibration and shock withstanding and excellent heat transfer. Besides increasing ripple current handling, the rilled construction extends the great value of the Type 3186 into military and transportation applications that require rugged mechanical capability.

Highlights

- Rilled cans withstand high shock and vibration
- High ripple current capability
- High capacitance per can

Specifications

Temperature Range	−40 °C to +85 °C															
Rated Voltage Range	16 Vdc to 500 Vdc															
Capacitance Range	220 uF to 1.0 F															
Capacitance Tolerance	−10% +75% ≤ 160 Vdc −10% +50% ≥ 200 Vdc															
Leakage Current	≤6√CV μA (6 mA max.) at 5 minutes															
Ripple Current Multipliers	Ambient Temperature															
	<table><tr><td>45 °C</td><td>55 °C</td><td>65 °C</td><td>75 °C</td><td>85 °C</td></tr><tr><td>2.24</td><td>2.00</td><td>1.73</td><td>1.41</td><td>1.00</td></tr></table>						45 °C	55 °C	65 °C	75 °C	85 °C	2.24	2.00	1.73	1.41	1.00
	45 °C	55 °C	65 °C	75 °C	85 °C											
	2.24	2.00	1.73	1.41	1.00											
	Frequency															
		60 Hz	120 Hz	300 Hz	1000 Hz	≥10 kHz										
16 – 100 V	0.90	1.00	1.15	1.25	1.30											
200 – 500 V	0.90	1.00	1.25	1.40	1.50											
Low Temperature Characteristics	Impedance ratio: Z _{−20 °C} /Z _{+25 °C} ≤ 8 (16–50 Vdc) ≤ 4 (63–100 Vdc) ≤ 3 (150–500 Vdc)															
Endurance Life Test	2,000 h @ full load at 85 °C ΔCapacitance ±10% ESR 200% of limit DCL 100% of limit															
Shelf Life Test	500 h @ 85 °C ΔCapacitance ±10% ESR 175% of limit DCL 100% of limit															
Vibration	10 to 55 Hz, 0.06" & 10 g max for compression, 15 g max for rilled, 1.5 h each of 2 axes															
RoHS Compliant																

Type 3186 85 °C Aluminum Electrolytic, Screw Terminal

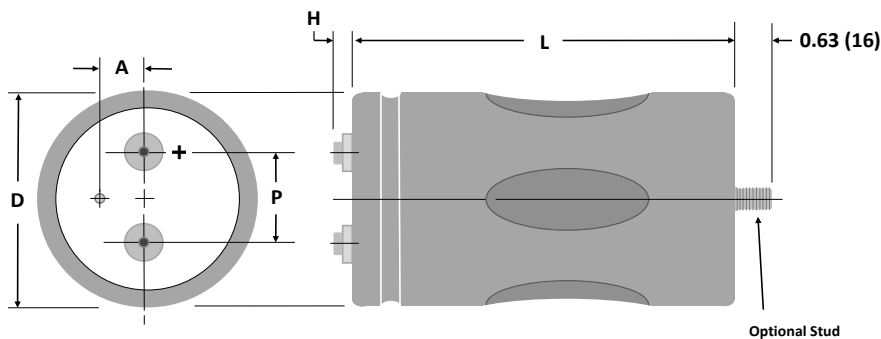
Best Value 85 °C High Capacitance Screw Terminal Type

Part Numbering System

3186	GH	562	T	400	M	P	A1
Type	Case Code	Capacitance	Tolerance	Voltage	Terminal	Insulation	Construction*
		562=5600 µF 223=22000 µF 821=820 µF	M= ±20% S= -10 +30% T= -10 +50% U= -10 +75%	016=16 Vdc 450=450 Vdc	A=high post B=low post D=high current low post K=high current high post M=M5 high post J=M6 low post	P=0.008" PVC N=none with mounting clamp/bracket R=0.008" PVC X=none	A1=compression R1=rilled S1=stud & compression** T1=stud & rilled**

Outline Drawing

* Construction code is also a sequence number, e.g., A1, A2,---,A9, B1,B2,---, for customer specifications. Sequence number 1 in A1, R1, S1 and T1 denotes the standard catalog capacitor with no special requirements.



Stud Dimensions

Case	Stud	P ± 0.039"
Diam.	Thread	(±1.0 mm)
1.375	M8	0.470" (12.0)
1.750	M8	0.470" (12.0)
2.000	M12	0.630" (16.0)
2.500	M12	0.630" (16.0)
3.000	M12	0.630" (16.0)

Can Dimensions Insulation Adders

	Diameter (D)		Length (L)		Standing Height (H)	
	(in)	(mm)	(in)	(mm)	(in)	(mm)
0.008" PVC	0.02	0.51	0.032	0.81	0.024	0.61

Terminal Dimensions

Terminal Style	For Case Diameters	Code	Post Diameter		H max		Thread	min Full Thread		Torque	
			in	mm	in	mm		in	mm	in-lb	N-m
Low Post	1 3/8 to 3	B	0.314	8.0	0.094	2.4	10-32	0.218	5.5	25	2.82
High Post	1 3/8 to 3	A	0.314	8.0	0.281	7.1	10-32	0.375	9.5	25	2.82
High Current, Low	2 1/2 & 3	D	0.684	17.4	0.125	3.2	¼-28	0.344	8.7	60	6.78
High Current, High	2 1/2 & 3	K	0.684	17.4	0.281	7.1	¼-28	0.469	11.9	60	6.78
M5 Post, Small	1 3/8 to 2	M	0.314	8.0	0.281	7.1	M5	0.375	9.5	25	2.82
M6 Low Post	3	J	0.684	17.4	0.125	3.2	M6	0.344	8.7	60	6.78

Type 3186 85 °C Aluminum Electrolytic, Screw Terminal

Best Value 85 °C High Capacitance Screw Terminal Type

Case Dimensions, Uninsulated Bare Can

Case Code	Diam. (D)		Length (L)		Terminal Space(P)		Vent Plug (A)		Typical Weight		Optional Bracket Part No.
	±0.031	±0.8	±0.062	±1.6	±0.014	±0.4					
	(in)	(mm)	(in)	(mm)	(in)	(mm)	(in)	(mm)	(oz)	(g)	
BA	1.375	34.9	2.125	54.0	0.5	12.7	0.39	8.0	2.5	72	115058-06
BB	1.375	34.9	2.625	66.7	0.5	12.7	0.39	8.0	3.2	90	115058-06
BC	1.375	34.9	3.125	79.4	0.5	12.7	0.39	8.0	3.7	105	115058-06
BD	1.375	34.9	3.625	92.1	0.5	12.7	0.39	8.0	4.2	120	115058-06
BE	1.375	34.9	4.125	104.8	0.5	12.7	0.39	8.0	4.7	135	115058-06
BF	1.375	34.9	4.625	117.5	0.5	12.7	0.39	8.0	6.0	170	115058-06
BG	1.375	34.9	5.125	130.2	0.5	12.7	0.39	8.0	7.7	220	115058-06
BH	1.375	34.9	5.625	142.9	0.5	12.7	0.39	8.0	9.5	270	115058-06
DA	1.750	44.5	2.125	54.0	0.75	19.1	0.453	11.5	5.6	160	115058-15
DB	1.750	44.5	2.625	66.7	0.75	19.1	0.453	11.5	6.1	175	115058-15
DC	1.750	44.5	3.125	79.4	0.75	19.1	0.453	11.5	6.3	180	115058-15
DD	1.750	44.5	3.625	92.1	0.75	19.1	0.453	11.5	7.2	205	115058-15
DE	1.750	44.5	4.125	104.8	0.75	19.1	0.453	11.5	7.7	220	115058-15
DF	1.750	44.5	4.625	117.5	0.75	19.1	0.453	11.5	8.2	235	115058-15
DG	1.750	44.5	5.125	130.2	0.75	19.1	0.453	11.5	8.8	250	115058-15
DH	1.750	44.5	5.625	142.9	0.75	19.1	0.453	11.5	9.5	270	115058-15
EA	2.000	50.8	2.125	54.0	0.875	22.2	0.5	12.7	6.0	170	115058-09
EB	2.000	50.8	2.625	66.7	0.875	22.2	0.5	12.7	6.3	180	115058-09
EC	2.000	50.8	3.125	79.4	0.875	22.2	0.5	12.7	6.7	190	115058-09
ED	2.000	50.8	3.625	92.1	0.875	22.2	0.5	12.7	7.7	220	115058-09
EE	2.000	50.8	4.125	104.8	0.875	22.2	0.5	12.7	8.9	255	115058-09
EF	2.000	50.8	4.625	117.5	0.875	22.2	0.5	12.7	10.2	290	115058-09
EG	2.000	50.8	5.125	130.2	0.875	22.2	0.5	12.7	11.2	320	115058-09
EH	2.000	50.8	5.625	142.9	0.875	22.2	0.5	12.7	12.3	350	115058-09
FB	2.500	63.5	2.625	66.7	1.125	28.6	0.625	15.9	10.5	300	115058-14
FC	2.500	63.5	3.125	79.4	1.125	28.6	0.625	15.9	13.0	370	115058-14
FD	2.500	63.5	3.625	92.1	1.125	28.6	0.625	15.9	14.0	400	115058-14
FE	2.500	63.5	4.125	104.8	1.125	28.6	0.625	15.9	15.6	445	115058-14
FF	2.500	63.5	4.625	117.5	1.125	28.6	0.625	15.9	21.0	600	115058-14
FG	2.500	63.5	5.125	130.2	1.125	28.6	0.625	15.9	22.8	650	115058-14
FH	2.500	63.5	5.625	142.9	1.125	28.6	0.625	15.9	21.0	600	115058-14
GC	3.000	76.2	3.125	79.4	1.25	31.8	0.75	19.0	18.2	520	115058-11
GD	3.000	76.2	3.625	92.1	1.25	31.8	0.75	19.0	20.0	570	115058-11
GE	3.000	76.2	4.125	104.8	1.25	31.8	0.75	19.0	21.0	600	115058-11
GF	3.000	76.2	4.625	117.5	1.25	31.8	0.75	19.0	25.2	720	115058-11
GG	3.000	76.2	5.125	130.2	1.25	31.8	0.75	19.0	29.8	850	115058-11
GH	3.000	76.2	5.625	142.9	1.25	31.8	0.75	19.0	34.0	970	115058-11
GJ	3.000	76.2	5.875	149.2	1.25	31.8	0.75	19.0	36.8	1050	115058-11
GN	3.000	76.2	8.625	219.1	1.25	31.8	0.75	19.0	51.1	1460	115058-11

Type 3186 85 °C Aluminum Electrolytic, Screw Terminal

Best Value 85 °C High Capacitance Screw Terminal Type

Ratings

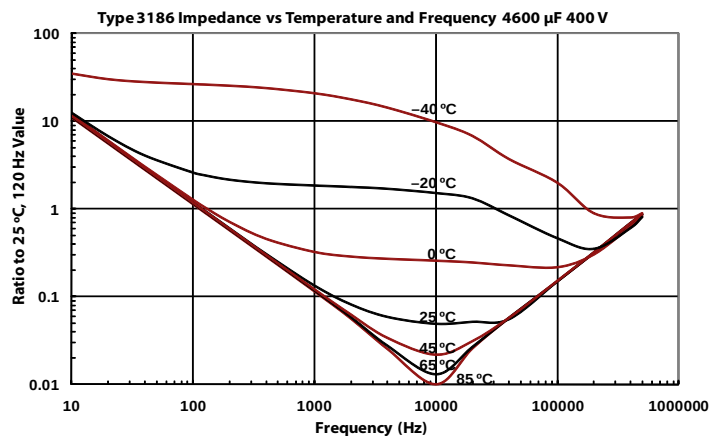
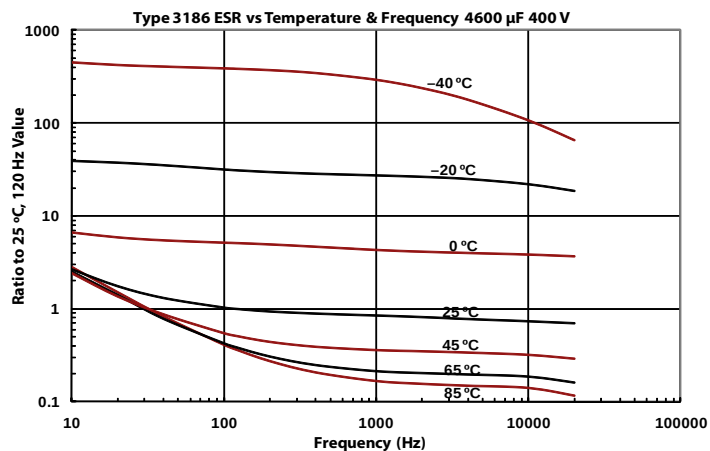
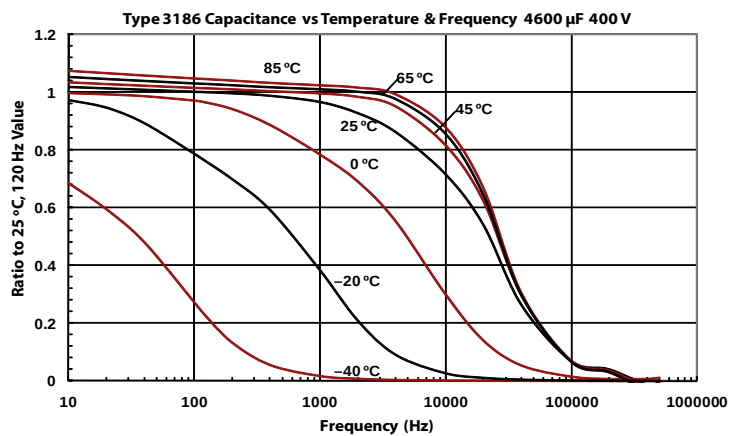
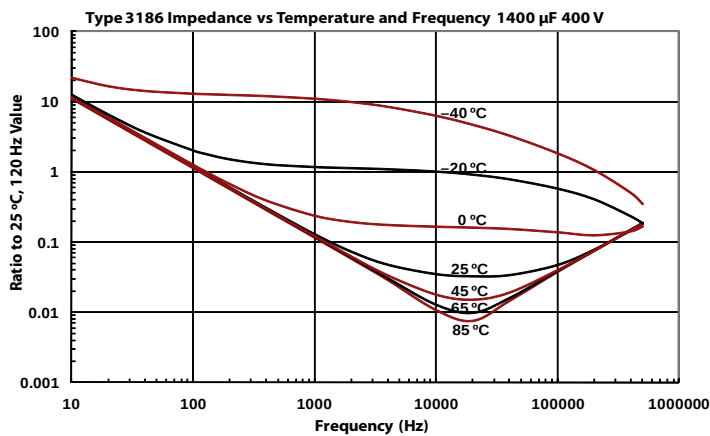
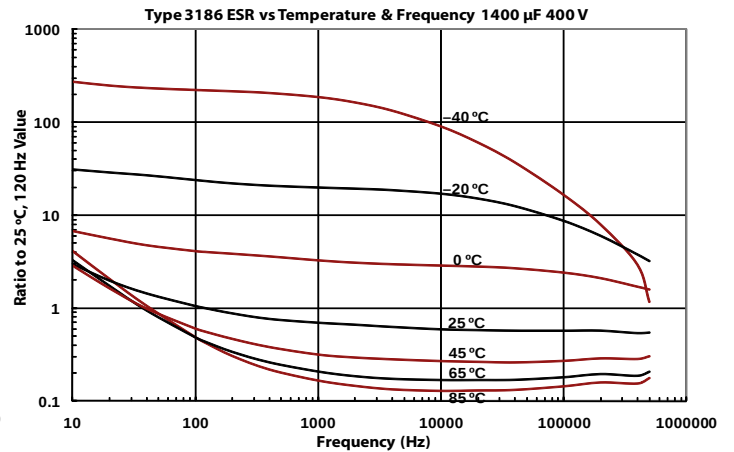
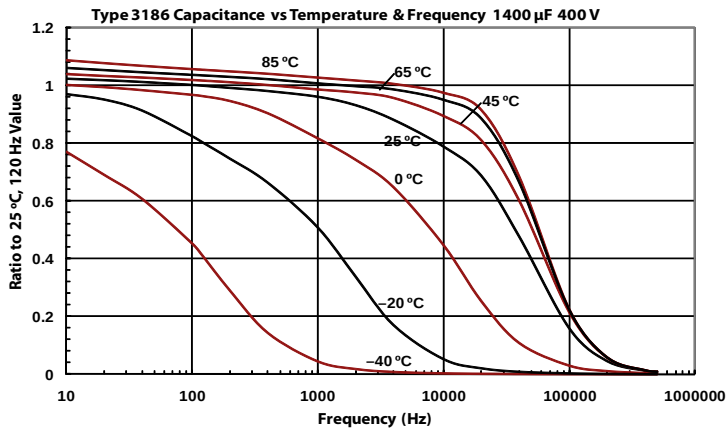
Additional Low Voltages and Smaller Sizes available at <http://www.cde.com/catalogs/3186.pdf>

Capacitance (μF)	Catalog Part Number	ESR max 120 Hz, 25 °C (mΩ)	Ripple max 120 Hz, 85 °C rilled(A)	Case Size DxL (in)
200 Volts (250 Volts Surge)				
10000	3186FE103T200APA1	22.0	11.0	2.50 X 4.125
12000	3186FF123T200APA1	17.0	12.0	2.50 X 4.625
12000	3186GE123T200APA1	26.0	11.0	3.00 X 4.125
15000	3186FH153T200APA1	16.0	14.0	2.50 X 5.625
15000	3186GF153T200APA1	23.0	12.0	3.00 X 4.625
22000	3186GH223T200APA1	17.0	15.0	3.00 X 5.625
33000	3186GN333T200APA1	15.0	17.0	3.00 X 8.625
250 Volts (300 Volts Surge)				
6800	3186FE682T250APA1	24.0	10.0	2.50 X 4.125
8200	3186FF822T250APA1	19.0	11.0	2.50 X 4.625
10000	3186FH103T250APA1	17.0	14.0	2.50 X 5.625
10000	3186GE103T250APA1	25.0	11.0	3.00 X 4.125
12000	3186GF123T250APA1	22.0	12.0	3.00 X 4.625
15000	3186GH153T250APA1	19.0	14.0	3.00 X 5.625
22000	3186GN223T250APA1	16.0	17.0	3.00 X 8.625
350 Volts (400 Volts Surge)				
2700	3186FE272T350APA1	54.0	6.6	2.50 X 4.125
3900	3186FF392T350APA1	37.0	8.7	2.50 X 4.625
4700	3186FH472T350APA1	33.0	9.6	2.50 X 5.625
4700	3186GE472T350APA1	33.0	9.6	3.00 X 4.125
5600	3186GF562T350APA1	33.0	10.0	3.00 X 4.625
6800	3186GH682T350APA1	28.0	11.0	3.00 X 5.625
12000	3186GN123T350APA1	18.0	18.0	3.00 X 8.625
400 Volts (450 Volts Surge)				
2700	3186FE272T400APA1	48.0	7.3	2.50 X 4.125
3300	3186FF332T400APA1	39.0	8.5	2.50 X 4.625
3900	3186FH392T400APA1	37.0	9.4	2.50 X 5.625
3900	3186GE392T400APA1	37.0	9.4	3.00 X 4.125
4700	3186GF472T400APA1	34.0	10.0	3.00 X 4.625
5600	3186GH562T400APA1	28.0	11.0	3.00 X 5.625
10000	3186GN103T400APA1	18.0	18.0	3.00 X 8.625
450 Volts (525 Volts Surge)				
2200	3186FE222T450APA1	53.0	6.7	2.50 X 4.125
2700	3186FF272T450APA1	45.0	7.7	2.50 X 4.625
3300	3186FH332T450APA1	35.0	9.5	2.50 X 5.625
3300	3186GE332T450APA1	35.0	9.5	3.00 X 4.125
3900	3186GF392T450APA1	36.0	9.8	3.00 X 4.625
4700	3186GH472T450APA1	31.0	11.0	3.00 X 5.625
8200	3186GN822T450APA1	23.0	14.0	3.00 X 8.625
500 Volts (550 Volts Surge)				
820	3186EE821T500APA1	132.0	3.4	2.00 X 4.125
1200	3186EG122T500APA1	90.0	4.6	2.00 X 5.125
2200	3186FG222T500APA1	59.0	6.6	2.50 X 5.125
3300	3186GH332T500APA1	43.0	8.6	3.00 X 5.625

Type 3186 85 °C Aluminum Electrolytic, Screw Terminal

Best Value 85 °C High Capacitance Screw Terminal Type

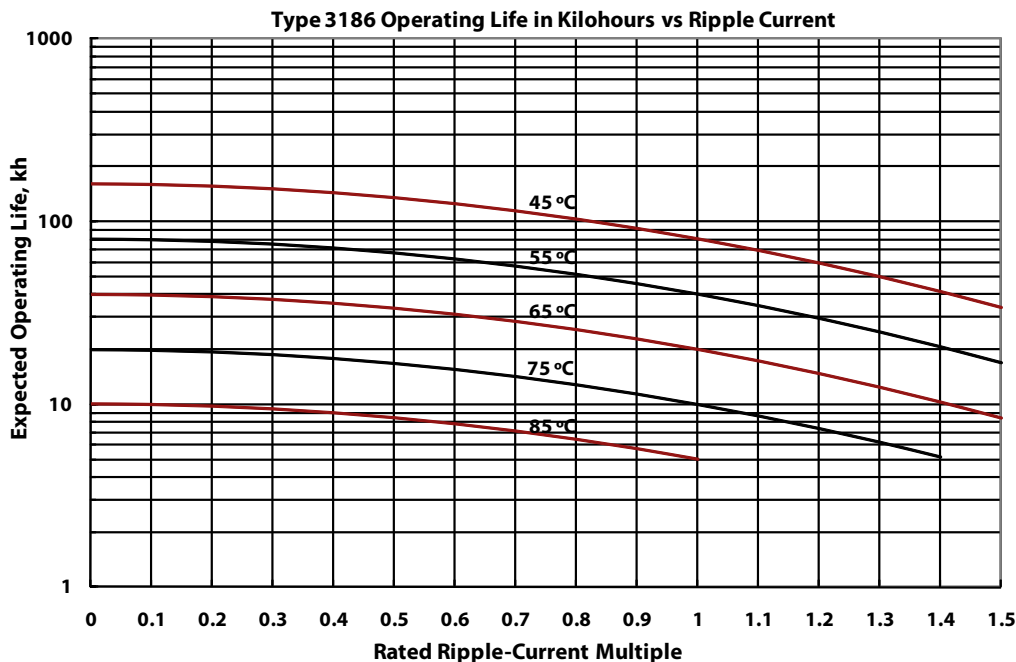
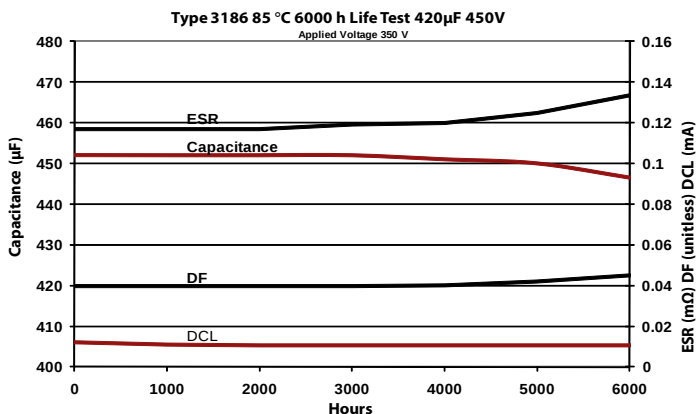
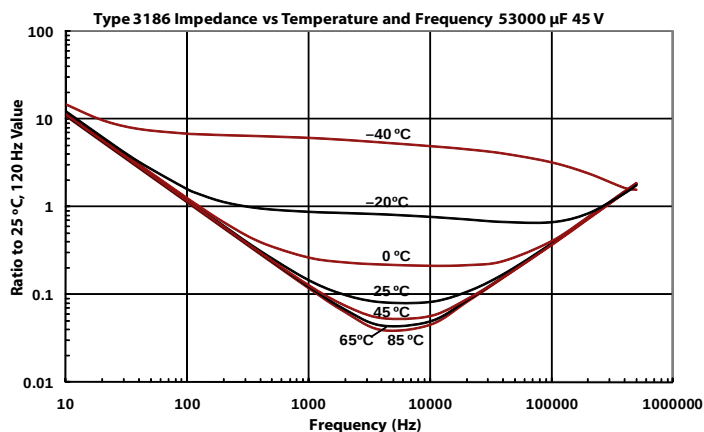
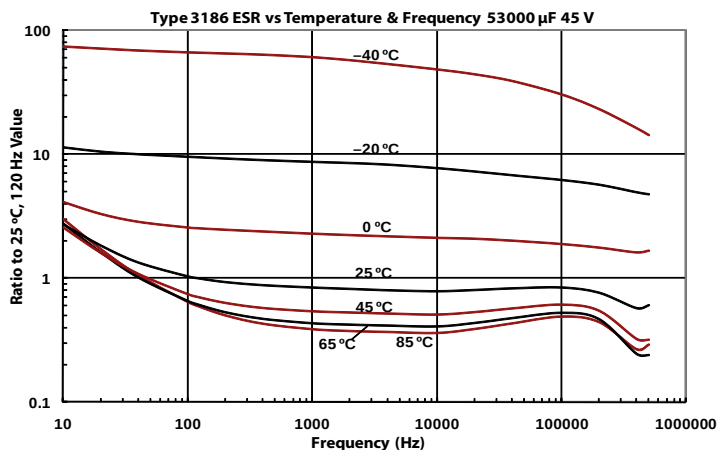
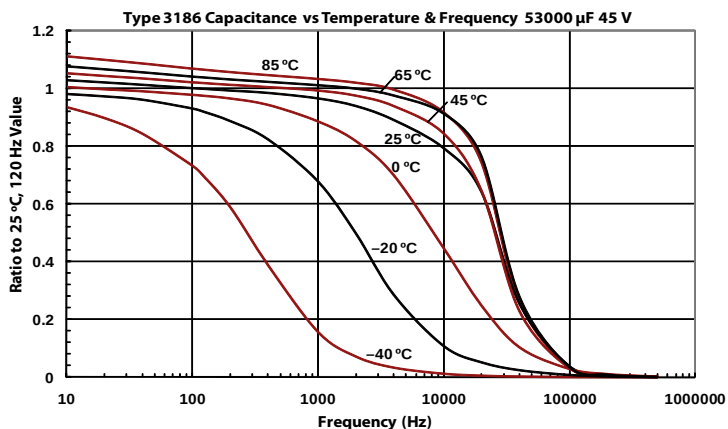
Typical Performance Curves



Type 3186 85 °C Aluminum Electrolytic, Screw Terminal

Best Value 85 °C High Capacitance Screw Terminal Type

Typical Performance Curves



Type DCMC 85 °C High Capacitance, Screw Terminal, Aluminum

Highest Capacitance Screw Terminal Type



With more capacitance and often more ripple-current capability than the best-value Type 3186 capacitor, the Type DCMC capacitor is the better choice for high-capacitance, power supply filters and energy storage applications such as welding equipment, UPS systems and computer hold-up power. The extended cathode foil of the DCMC assures cool operation with heatflow from the capacitor element to the can.

Highlights

- Highest capacitance value
- Right for Power Supply and UPS systems
- Thermal-Pak™ extended cathode construction

Specifications

Temperature Range	−40 °C to +85 °C									
Rated Voltage Range	6.3 Vdc to 550 Vdc									
Capacitance Range	110 μF to 2.7 F									
Capacitance Tolerance	−10% +75% ≤ 100 Vdc −10% +50% ≥ 160 Vdc									
Leakage Current	≤ 6 $\sqrt{CV}$ μA, 6 mA max, at 5 min									
Ripple Current Multipliers	Ambient Temperature									
	45 °C		55 °C		65 °C		75 °C		85 °C	
	2.24		2.00		1.73		1.41		1.00	
	Frequency									
			50 Hz	60 Hz	120 Hz	360 Hz	1 kHz	5 kHz	10 kHz & up	
	1 3/8" & 1 3/4" Diameters 6.3 to 160 V 200 to 350 V 400 to 550 V									
			0.92	0.94	1.00	1.05	1.10	1.10	1.12	
			0.80	0.85	1.00	1.17	1.30	1.30	1.32	
			0.78	0.83	1.00	1.20	1.35	1.36	1.40	
	2" & 2 1/2" Diameters 6.3 to 160 V 200 to 350 V 400 to 550 V									
			0.93	0.95	1.00	1.04	1.07	1.11	1.12	
			0.81	0.87	1.00	1.13	1.20	1.24	1.26	
		0.79	0.83	1.00	1.17	1.26	1.30	1.34		
3" & 3 1/2" Diameters 6.3 to 160 V 200 to 350 V 400 to 550 V										
		0.95	0.96	1.00	1.02	1.04	1.05	1.05		
		0.85	0.88	1.00	1.08	1.12	1.14	1.17		
		0.82	0.84	1.00	1.13	1.20	1.24	1.27		
Low Temperature Characteristics	Impedance ratio: Z _{−20°C} /Z _{+25°C} ≤ 20 (6.3–10 Vdc) ≤ 8 (16–50 Vdc) ≤ 4 (63–100 Vdc) ≤ 3 (150–550 Vdc)									
Endurance Life Test	2000 h @ full load at 85 °C Δ Capacitance ±20% ESR 200% of limit DCL 100% of limit									
Shelf Life Test	500 h @ 85 °C Capacitance 100% of limit ESR 100% of limit DCL 100% of limit									
Vibration	5 to 55 Hz, 0.06" and 10 g max, 1.5 h each of 2 axes									
RoHS Compliant										

Type DCMC 85 °C High Capacitance, Screw Terminal, Aluminum

Highest Capacitance Screw Terminal Type

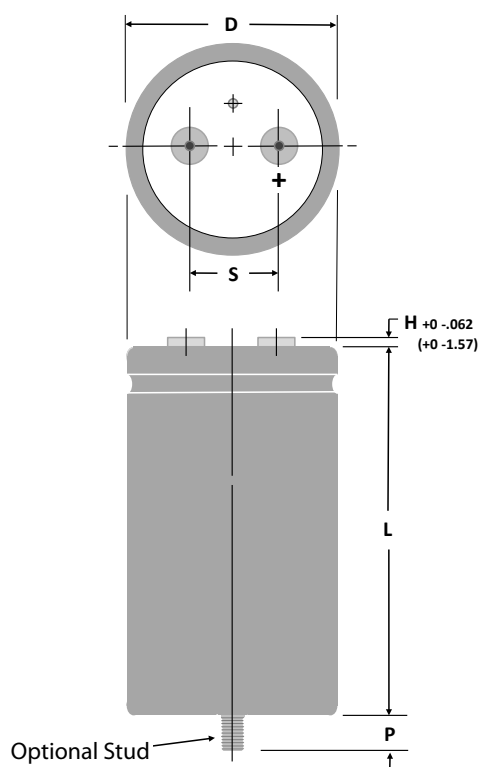
Part Numbering System

DCMC	472	U	400	DC	2	B	S
Type	Capacitance	Tolerance	Voltage	Case Code	Insulation	Terminal	Can Style
100 = 10 μ F		M = $\pm 20\%$	6R3 = 6.3 Vdc		0 = None	A = Low Post	Blank =
101 = 100 μ F		U = $-10\%+75\%$	063 = 63 Vdc		1 = Polyester	B = High Post	Standard
492 = 4900 μ F		T = $10\%+50\%$	400 = 400 Vdc		2 = PVC	D = High Current, Low Post	Can
433 = 43,000 μ F						E = High Current, High Post	S = Stud
						F or M = M5 Post	Bottom
						G = M6 Low Post	P = Stud
						H = M6 High Post	with Thermal Pad

Polyester insulation is not available for 3.5-inch diameter units.

Standard insulation is 0.008-in PVC sleeve with 0.01-in polypropylene end disk.

Outline Drawing



NOTE: With the stud-mount feature, a thermally-conductive disk can be inserted in the bottom flush with the outer insulating sleeve. This reduces the thermal resistance through the can bottom by 0.3 °C/W. Can Style P.

Stud Dimensions

Case Diam.	Stud Thread	P $\pm 0.039"$ (± 1.0 mm)
1.375	M8	0.470" (12.0)
1.750	M8	0.470" (12.0)
2.000	M12	0.630" (16.0)
2.500	M12	0.630" (16.0)
3.000	M12	0.630" (16.0)
3.500	M12	0.630" (16.0)

Terminal Dimensions

Terminal Style	For Case Diameters	Code	Post Diameter in mm	H max in mm	Thread	min Full Thread in mm	Torque in-lb N-m
Low Post	1 $\frac{3}{8}$ to 3	A	0.314 8.0	0.094 2.4	10-32	0.218 5.5	25 2.82
High Post	1 $\frac{3}{8}$ to 3	B	0.314 8.0	0.281 7.1	10-32	0.375 9.5	25 2.82
High Current, Low	2 $\frac{1}{2}$ to 3 $\frac{1}{2}$	D	0.684 17.4	0.125 3.2	$\frac{1}{4}$ -28	0.344 8.7	60 6.78
High Current, High	2 $\frac{1}{2}$ to 3 $\frac{1}{2}$	E	0.684 17.4	0.281 7.1	$\frac{1}{4}$ -28	0.469 11.9	60 6.78
M5 Post, Small	1 $\frac{3}{8}$ to 2	M	0.314 8.0	0.281 7.1	M5	0.375 9.5	25 2.82
M5 Post	2 $\frac{1}{2}$ & 3	F	0.512 13.0	0.230 5.8	M5	0.344 8.7	25 2.82
M6 Low Post	2 $\frac{1}{2}$ to 3 $\frac{1}{2}$	G	0.684 17.4	0.125 3.2	M6	0.344 8.7	60 6.78
M6 High Post	2 $\frac{1}{2}$ to 3 $\frac{1}{2}$	H	0.684 17.4	0.281 7.1	M6	0.469 11.9	60 6.78

NOTE: Only high post and M5 post terminals are available at 550 Vdc as they meet the required creepage distance.

CDM Cornell Dubilier • 140 Technology Place • Liberty, SC 29657 • Phone: (864)843-2277 • Fax: (864)843-3800

Type DCMC 85 °C High Capacitance, Screw Terminal, Aluminum

Highest Capacitance Screw Terminal Type

Uninsulated Case Dimensions

For insulated case, add 0.024"(0.610 mm) to "D" and 0.030"(0.762 mm) to height.

Case Code	Diam. (D)		Length (L)		Terminals (S)		Typical Weight	
	±.031 Inches	±.78 mm	±.062 Inches	±1.57 mm	±0.015 Inches	±.38 mm	oz	g
AK	1.375	34.93	1.625	41.28	0.50	12.70	1.9	54
AA	1.375	34.93	2.125	53.98	0.50	12.70	2.0	57
AH	1.375	34.93	2.625	66.68	0.50	12.70	2.7	77
AB	1.375	34.93	3.125	79.38	0.50	12.70	3.3	94
AJ	1.375	34.93	3.625	92.08	0.50	12.70	3.8	108
AC	1.375	34.93	4.125	104.78	0.50	12.70	4.4	125
AD	1.375	34.93	4.625	117.48	0.50	12.70	5.1	145
AE	1.375	34.93	5.125	130.18	0.50	12.70	6.8	193
AF	1.375	34.93	5.625	142.88	0.50	12.70	8.1	230
EA	1.750	44.45	2.125	53.98	0.75	19.05	2.7	76
EH	1.750	44.45	2.625	66.68	0.75	19.05	3.8	108
EB	1.750	44.45	3.125	79.38	0.75	19.05	5.1	145
EJ	1.750	44.45	3.625	92.08	0.75	19.05	6.8	193
EC	1.750	44.45	4.125	104.78	0.75	19.05	8.1	230
ED	1.750	44.45	4.625	117.48	0.75	19.05	9.0	255
EE	1.750	44.45	5.125	130.18	0.75	19.05	9.5	269
EF	1.750	44.45	5.625	142.88	0.75	19.05	10.5	298
BA	2.000	50.80	2.125	53.98	0.88	22.23	5.4	153
BH	2.000	50.80	2.625	66.68	0.88	22.23	6.1	173
BB	2.000	50.80	3.125	79.38	0.88	22.23	6.8	193
BJ	2.000	50.80	3.625	92.08	0.88	22.23	8.2	232
BC	2.000	50.80	4.125	104.78	0.88	22.23	9.5	269
BD	2.000	50.80	4.625	117.48	0.88	22.23	10.3	292
BE	2.000	50.80	5.125	130.18	0.88	22.23	10.7	303
BF	2.000	50.80	5.625	142.88	0.88	22.23	13.0	369
CH	2.500	63.50	2.625	66.68	1.13	28.58	9.2	261
CB	2.500	63.50	3.125	79.38	1.13	28.58	10.4	295
CJ	2.500	63.50	3.625	92.08	1.13	28.58	12.7	361
CC	2.500	63.50	4.125	104.78	1.13	28.58	15.0	425
CD	2.500	63.50	4.625	117.48	1.13	28.58	17.2	488
CE	2.500	63.50	5.125	130.18	1.13	28.58	19.3	547
CF	2.500	63.50	5.625	142.88	1.13	28.58	21.4	607
DB	3.000	76.20	3.125	79.38	1.25	31.75	16.7	473
DJ	3.000	76.20	3.625	92.08	1.25	31.75	20.0	567
DC	3.000	76.20	4.125	104.78	1.25	31.75	22.2	629
DD	3.000	76.20	4.625	117.48	1.25	31.75	25.5	723
DE	3.000	76.20	5.125	130.18	1.25	31.75	30.0	850
DF	3.000	76.20	5.625	142.88	1.25	31.75	31.9	904
DP	3.000	76.20	5.875	149.23	1.25	31.75	32.8	931
DN	3.000	76.20	7.625	193.68	1.25	31.75	39.5	1119
DG	3.000	76.20	8.625	219.08	1.25	31.75	43.3	1227
FC	3.500	88.90	4.125	104.78	1.25	31.75	30.0	850
FD	3.500	88.90	4.625	117.48	1.25	31.75	34.4	976
FE	3.500	88.90	5.125	130.18	1.25	31.75	40.5	1148
FF	3.500	88.90	5.625	142.88	1.25	31.75	43.1	1221
FP	3.500	88.90	5.875	149.23	1.25	31.75	44.3	1257
FN	3.500	88.90	7.625	193.68	1.25	31.75	53.3	1512
FG	3.500	88.90	8.625	219.08	1.25	31.75	58.5	1658

Type DCMC 85 °C High Capacitance, Screw Terminal, Aluminum

Highest Capacitance Screw Terminal Type

Ratings

Additional Low Voltages and Smaller Sizes available at www.cde.com/catalogs/DCMC.pdf

Cap. (µF)	Catalog Part Number	ESR Max. @ 25 °C 120 H (mΩ)	Ripple Max. @ 85 °C 120 Hz (A)	Nominal Size D x L (inches)
200 Vdc (250 Vdc Surge)				
5500	DCMC552T200CH2B	42.2	6.6	2 1/2 x 2 5/8
7100	DCMC712T200CB2B	31.2	9.6	2 1/2 x 3 1/8
10000	DCMC103T200CJ2B	22.3	11.6	2 1/2 x 3 5/8
11000	DCMC113T200CC2B	20.3	12.7	2 1/2 x 4 1/8
11000	DCMC113T200DB2B	30.3	10.8	3 x 3 1/8
12000	DCMC123T200CD2B	17.3	14.7	2 1/2 x 4 5/8
13000	DCMC133T200CE2B	15.8	15.9	2 1/2 x 5 1/8
13000	DCMC133T200DJ2B	23.7	12.0	3 x 3 5/8
15000	DCMC153T200CF2B	13.7	16.5	2 1/2 x 5 5/8
15000	DCMC153T200DC2B	19.7	14.3	3 x 4 1/8
18000	DCMC183T200DD2B	16.9	16.1	3 x 4 5/8
21000	DCMC213T200FC2B	17.1	16.5	3 1/2 x 4 1/8
22000	DCMC223T200DE2B	14.8	18.2	3 x 5 1/8
24000	DCMC243T200DF2B	13.3	19.5	3 x 5 5/8
25000	DCMC253T200FD2B	15.3	20.5	3 1/2 x 4 5/8
26000	DCMC263T200DP2B	12.7	19.7	3 x 5 7/8
28000	DCMC283T200FE2B	13.4	19.8	3 1/2 x 5 1/8
31000	DCMC313T200FF2B	12.0	21.6	3 1/2 x 5 5/8
33000	DCMC333T200DN2B	10.8	23.7	3 x 7 5/8
33000	DCMC333T200FP2D	11.5	22.7	3 1/2 x 5 7/8
37000	DCMC373T200DG2B	9.6	25.2	3 x 8 5/8
44000	DCMC443T200FN2D	9.3	28.2	3 1/2 x 7 5/8
51000	DCMC513T200FG2D	7.9	31.1	3 1/2 x 8 5/8
250 Vdc (300 Vdc Surge)				
4100	DCMC412T250CH2B	51.8	6.3	2 1/2 x 2 5/8
5200	DCMC522T250CB2B	32.1	9.5	2 1/2 x 3 1/8
6400	DCMC642T250CJ2B	25.1	10.4	2 1/2 x 3 5/8
7800	DCMC782T250DB2B	27.6	10.9	3 x 3 1/8
8200	DCMC822T250CC2B	20.8	13.0	2 1/2 x 4 1/8
10000	DCMC103T250CD2B	17.8	14.5	2 1/2 x 4 5/8
10000	DCMC103T250DJ2B	21.6	13.6	3 x 3 5/8
11000	DCMC113T250CE2B	15.5	14.8	2 1/2 x 5 1/8
12000	DCMC123T250CF2B	13.8	16.5	2 1/2 x 5 5/8
12000	DCMC123T250DC2B	17.6	15.2	3 x 4 1/8
13000	DCMC133T250DD2B	16.3	16.4	3 x 4 5/8
15000	DCMC153T250DE2B	14.3	18.0	3 x 5 1/8
16000	DCMC163T250FC2D	19.5	15.9	3 1/2 x 4 1/8
18000	DCMC183T250DF2B	12.0	20.6	3 x 5 5/8
18000	DCMC183T250FD2D	17.1	19.4	3 1/2 x 4 5/8
19000	DCMC193T250DP2B	11.5	20.6	3 x 5 7/8
21000	DCMC213T250FE2D	15.1	18.7	3 1/2 x 5 1/8
23000	DCMC233T250FF2D	13.4	20.4	3 1/2 x 5 5/8
24000	DCMC243T250FP2D	12.9	21.4	3 1/2 x 5 7/8
27000	DCMC273T250DN2D	9.5	27.2	3 x 7 5/8
30000	DCMC303T250DG2B	7.0	29.6	3 x 8 5/8

Cap. (µF)	Catalog Part Number	ESR Max. @ 25 °C 120 H (mΩ)	Ripple Max. @ 85 °C 120 Hz (A)	Nominal Size D x L (inches)
250 Vdc (300 Vdc Surge)				
33000	DCMC333T250FN2D	10.6	26.2	3 1/2 x 7 5/8
38000	DCMC383T250FG2D	9.2	28.8	3 1/2 x 8 5/8
27000	DCMC273T250DN2D	9.5	27.2	3 x 7 5/8
30000	DCMC303T250DG2B	7.0	29.6	3 x 8 5/8
33000	DCMC333T250FN2D	10.6	26.2	3 1/2 x 7 5/8
38000	DCMC383T250FG2D	9.2	28.8	3 1/2 x 8 5/8
300 Vdc (350 Vdc Surge)				
2600	DCMC262T300CH2B	60.5	5.1	2 1/2 x 2 5/8
3300	DCMC332T300CB2B	46.5	7.0	2 1/2 x 3 1/8
4200	DCMC422T300CJ2B	38.1	7.9	2 1/2 x 3 5/8
4800	DCMC482T300DB2B	42.8	8.4	3 x 3 1/8
5200	DCMC522T300CC2B	29.9	10.4	2 1/2 x 4 1/8
6000	DCMC602T300DJ2B	34.0	10.5	3 x 3 5/8
6100	DCMC612T300CD2B	25.5	12.5	2 1/2 x 4 5/8
7100	DCMC712T300CE2B	22.2	12.3	2 1/2 x 5 1/8
7400	DCMC742T300DC2B	26.2	11.9	3 x 4 1/8
8000	DCMC802T300CF2B	19.8	14.3	2 1/2 x 5 5/8
8700	DCMC872T300DD2B	23.6	13.6	3 x 4 5/8
10000	DCMC103T300DE2B	20.5	15.1	3 x 5 1/8
10000	DCMC103T300FC2D	21.0	15.3	3 1/2 x 4 1/8
11000	DCMC113T300DF2B	18.0	16.8	3 x 5 5/8
12000	DCMC123T300DP2B	17.0	19.5	3 x 5 7/8
12000	DCMC123T300FD2D	18.2	16.4	3 1/2 x 4 5/8
13000	DCMC133T300FE2D	16.0	18.1	3 1/2 x 5 1/8
15000	DCMC153T300FF2D	14.3	19.8	3 1/2 x 5 5/8
16000	DCMC163T300DN2B	13.2	21.8	3 x 7 5/8
16000	DCMC163T300FP2D	13.5	20.9	3 1/2 x 5 7/8
19000	DCMC193T300DG2B	10.8	23.7	3 x 8 5/8
22000	DCMC223T300FN2D	11.0	25.9	3 1/2 x 7 5/8
26000	DCMC263T300FG2D	9.3	28.6	3 1/2 x 8 5/8
350 Vdc (400 Vdc Surge)				
2000	DCMC202T350CH2B	86.9	4.6	2 1/2 x 2 5/8
2500	DCMC252T350CB2B	61.0	6.6	2 1/2 x 3 1/8
3100	DCMC312T350CJ2B	48.5	7.5	2 1/2 x 3 5/8
3700	DCMC372T350CC2B	39.9	9.0	2 1/2 x 4 1/8
3800	DCMC382T350DB2B	54.0	8.1	3 x 3 1/8
4200	DCMC422T350CD2B	34.0	10.5	2 1/2 x 4 5/8
4600	DCMC462T350DJ2B	41.7	9.8	3 x 3 5/8
4800	DCMC482T350CE2B	29.6	10.7	2 1/2 x 5 1/8
5400	DCMC542T350CF2B	26.2	11.9	2 1/2 x 5 5/8
5500	DCMC552T350DC2B	34.7	10.8	3 x 4 1/8
6300	DCMC632T350DD2B	29.6	12.2	3 x 4 5/8
7200	DCMC722T350DE2B	25.8	13.4	3 x 5 1/8
7700	DCMC772T350FC2D	29.9	12.8	3 1/2 x 4 1/8
8200	DCMC822T350DF2B	22.9	14.9	3 x 5 5/8

Type DCMC 85 °C High Capacitance, Screw Terminal, Aluminum

Highest Capacitance Screw Terminal Type

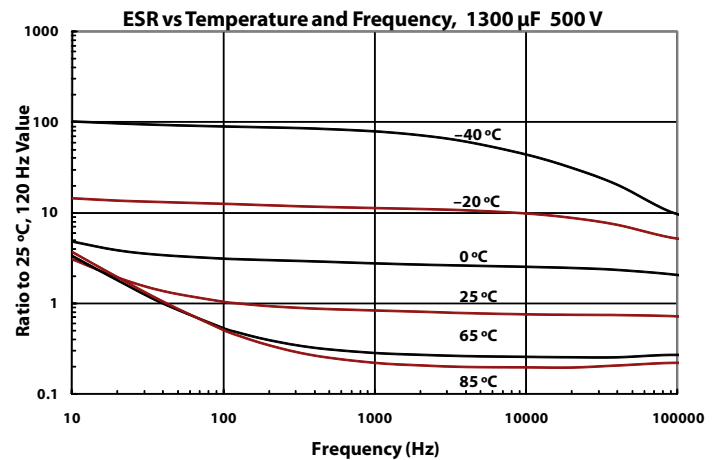
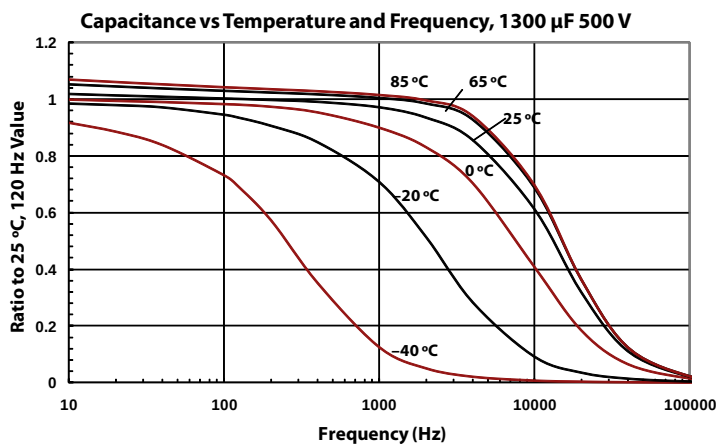
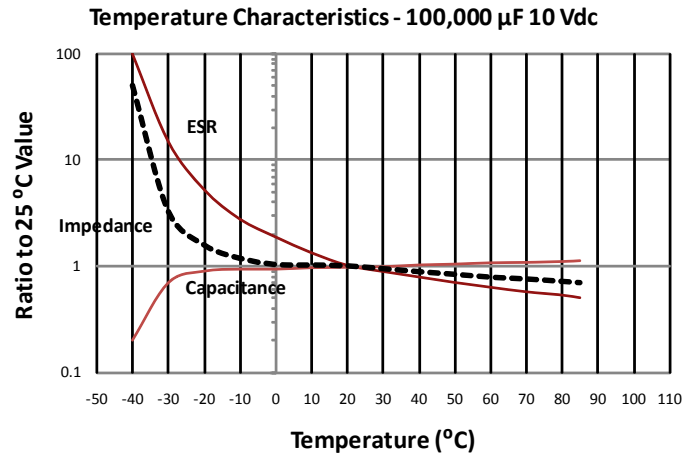
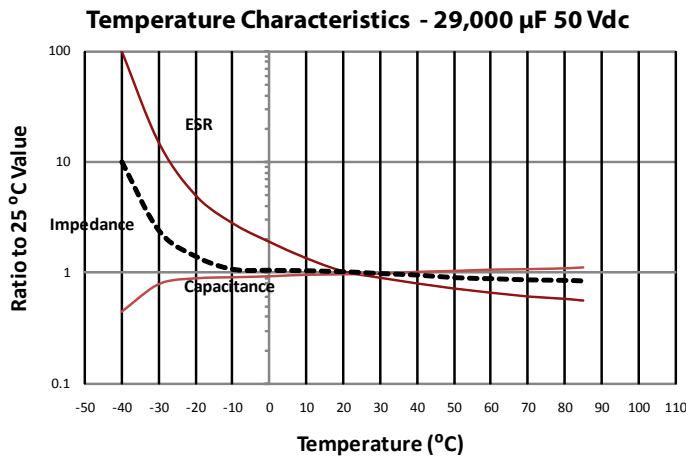
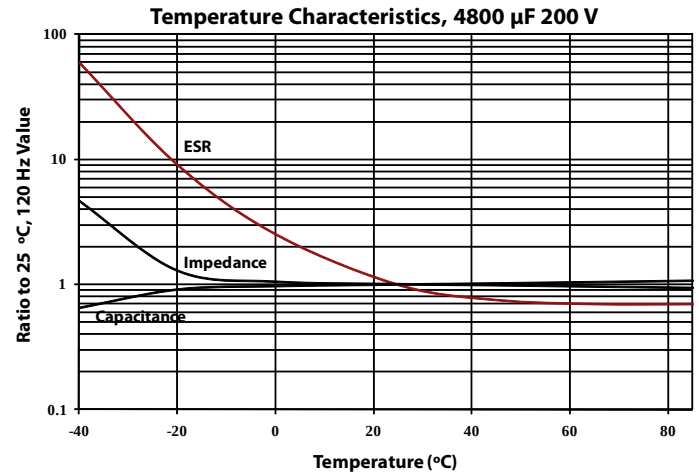
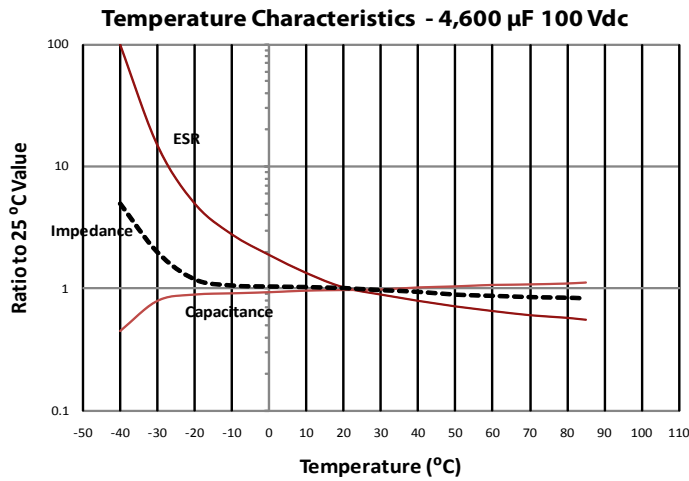
Additional Low Voltages and Smaller Sizes available at www.cde.com/catalogs/DCMC.pdf

Cap. (μF)	Catalog Part Number	ESR Max. @ 25 °C 120 H (mΩ)	Ripple Max. @ 85 °C 120 Hz (A)	Nominal Size D x L (inches)	Cap. (μF)	Catalog Part Number	ESR Max. @ 25 °C 120 H (mΩ)	Ripple Max. @ 85 °C 120 Hz (A)	Nominal Size D x L (inches)
350 Vdc (400 Vdc Surge)					450 Vdc (500 Vdc Surge)				
8400	DCMC842T350DP2B	21.7	17.2	3 x 5 7/8	5000	DCMC502T450FC2D	31.8	12.5	3 1/2 x 4 1/8
8800	DCMC882T350FD2D	25.7	13.8	3 1/2 x 4 5/8	5600	DCMC562T450DF2B	28.8	13.3	3 x 5 5/8
10000	DCMC103T350FE2D	22.5	15.3	3 1/2 x 5 1/8	5800	DCMC582T450DP2B	27.3	15.4	3 x 5 7/8
11000	DCMC113T350DN2B	17.1	19.1	3 x 7 5/8	5800	DCMC582T450FD2D	27.0	13.5	3 1/2 x 4 5/8
11000	DCMC113T350FF2D	20.0	16.7	3 1/2 x 5 5/8	6800	DCMC682T450FE2D	23.5	15.0	3 1/2 x 5 1/8
12000	DCMC123T350FP2D	18.9	17.7	3 1/2 x 5 7/8	7300	DCMC732T450FF2D	21.1	16.3	3 1/2 x 5 5/8
13000	DCMC133T350DG2B	14.2	20.7	3 x 8 5/8	7700	DCMC772T450FP2D	20.0	17.2	3 1/2 x 5 7/8
16000	DCMC163T350FN2D	14.9	22.3	3 1/2 x 7 5/8	7900	DCMC792T450DN2B	21.3	17.1	3 x 7 5/8
18000	DCMC183T350FG2D	12.4	24.8	3 1/2 x 8 5/8	9000	DCMC902T450DG2B	17.6	18.6	3 x 8 5/8
400 Vdc (450 Vdc Surge)					10000	DCMC103T450FN2D	15.9	21.6	3 1/2 x 7 5/8
1700	DCMC172T400CH2B	93.1	4.7	2 1/2 x 2 5/8	12000	DCMC123T450FG2D	13.3	24.0	3 1/2 x 8 5/8
2100	DCMC212T400CB2B	65.3	6.4	2 1/2 x 3 1/8	500 Vdc (550 Vdc Surge)				
2600	DCMC262T400CJ2B	52.0	7.2	2 1/2 x 3 5/8	800	DCMC801T500CH2B	170.6	3.0	2 1/2 x 2 5/8
3100	DCMC312T400CC2B	42.8	8.7	2 1/2 x 4 1/8	1100	DCMC112T500CB2B	122.0	4.7	2 1/2 x 3 1/8
3200	DCMC322T400DB2B	57.5	7.8	3 x 3 1/8	1400	DCMC142T500CJ2B	95.1	5.3	2 1/2 x 3 5/8
3900	DCMC392T400CD2B	35.6	10.3	2 1/2 x 4 5/8	1700	DCMC172T500CC2B	79.7	6.4	2 1/2 x 4 1/8
3900	DCMC392T400DJ2B	44.9	9.4	3 x 3 5/8	1700	DCMC172T500DB2B	86.4	6.4	3 x 3 1/8
4000	DCMC402T400CE2B	31.7	10.3	2 1/2 x 5 1/8	2100	DCMC212T500CE2B	61.1	7.8	2 1/2 x 5 1/8
4700	DCMC472T400CF2B	28.1	11.5	2 1/2 x 5 5/8	2200	DCMC222T500CD2B	68.3	7.6	2 1/2 x 4 5/8
4700	DCMC472T400DC2B	37.0	10.5	3 x 4 1/8	2200	DCMC222T500DJ2B	67.4	7.1	3 x 3 5/8
5300	DCMC532T400DD2B	31.5	11.8	3 x 4 5/8	2500	DCMC252T500CF2B	54.7	8.3	2 1/2 x 5 5/8
6000	DCMC602T400DE2B	27.4	13.0	3 x 5 1/8	2500	DCMC252T500DC2B	55.4	8.6	3 x 4 1/8
6400	DCMC642T400FC2D	31.9	12.4	3 1/2 x 4 1/8	3000	DCMC302T500DD2B	48.1	9.5	3 x 4 5/8
6800	DCMC682T400DF2B	24.4	14.4	3 x 5 5/8	3400	DCMC342T500DE2B	43.1	10.4	3 x 5 1/8
7100	DCMC712T400DP2B	23.1	16.7	3 x 5 7/8	3500	DCMC352T500FC2D	40.1	11.1	3 1/2 x 4 1/8
7400	DCMC742T400FD2D	27.4	13.4	3 1/2 x 4 5/8	3900	DCMC392T500DF2B	37.5	11.6	3 x 5 5/8
8400	DCMC842T400FE2D	23.9	14.8	3 1/2 x 5 1/8	4100	DCMC412T500DP2B	35.5	13.5	3 x 5 7/8
9400	DCMC942T400FF2D	21.2	16.2	3 1/2 x 5 5/8	4100	DCMC412T500FD2D	34.1	12.0	3 1/2 x 4 5/8
9600	DCMC962T400DN2B	18.2	18.6	3 x 7 5/8	4800	DCMC482T500FE2D	30.0	13.2	3 1/2 x 5 1/8
9900	DCMC992T400FP2D	20.1	17.2	3 1/2 x 5 7/8	5400	DCMC542T500FF2D	28.0	14.2	3 1/2 x 5 5/8
11000	DCMC113T400DG2B	15.1	20.1	3 x 8 5/8	5700	DCMC572T500FP2D	26.0	15.1	3 1/2 x 5 7/8
13000	DCMC133T400FN2D	15.8	21.7	3 1/2 x 7 5/8	5700	DCMC572T500DN2B	27.9	15.0	3 x 7 5/8
15000	DCMC153T400FG2D	13.1	24.1	3 1/2 x 8 5/8	6600	DCMC662T500DG2B	23.1	16.2	3 x 8 5/8
450 Vdc (500 Vdc Surge)					7900	DCMC792T500FN2D	20.5	19.1	3 1/2 x 7 5/8
1200	DCMC122T450CH2B	115.8	4.0	2 1/2 x 2 5/8	9200	DCMC922T500FG2D	16.7	21.4	3 1/2 x 8 5/8
1700	DCMC172T450CB2B	81.1	6.0	2 1/2 x 3 1/8	550 Vdc (600 Vdc Surge)				
2000	DCMC202T450CJ2B	66.5	6.4	2 1/2 x 3 5/8	1400	DCMC142T550CC2B	170.5	4.9	2 1/2 x 4 1/8
2400	DCMC242T450CC2B	54.7	7.7	2 1/2 x 4 1/8	1700	DCMC172T550CD2B	132.6	5.9	2 1/2 x 4 5/8
2500	DCMC252T450DB2B	65.7	7.3	3 x 3 1/8	1900	DCMC192T550CE2B	111.7	6.8	2 1/2 x 5 1/8
2800	DCMC282T450CD2B	46.4	9.0	2 1/2 x 4 5/8	2200	DCMC222T550DC2B	90.4	7.8	3 x 4 1/8
3000	DCMC302T450DJ2B	52.2	8.7	3 x 3 5/8	2300	DCMC232T550CF2B	86.5	7.8	2 1/2 x 5 5/8
3300	DCMC332T450CE2B	40.4	9.2	2 1/2 x 5 1/8	2500	DCMC252T550DD2B	79.6	8.4	3 x 4 5/8
3900	DCMC392T450CF2B	35.4	10.3	2 1/2 x 5 5/8	2900	DCMC292T550DE2B	64.0	9.7	3 x 5 1/8
3900	DCMC392T450DC2B	40.1	10.1	3 x 4 1/8	3400	DCMC342T550DF2B	54.6	10.9	3 x 5 5/8
4100	DCMC412T450DD2B	37.5	10.8	3 x 4 5/8	3700	DCMC372T550DP2B	50.2	12.2	3 x 5 7/8
4700	DCMC472T450DE2B	32.5	12.0	3 x 5 1/8	5100	DCMC512T550DN2B	36.4	16.2	3 x 7 5/8

Type DCMC 85 °C High Capacitance, Screw Terminal, Aluminum

Highest Capacitance Screw Terminal Type

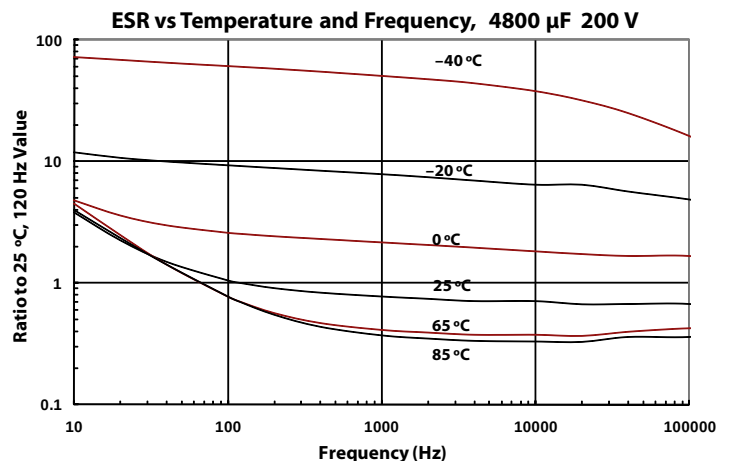
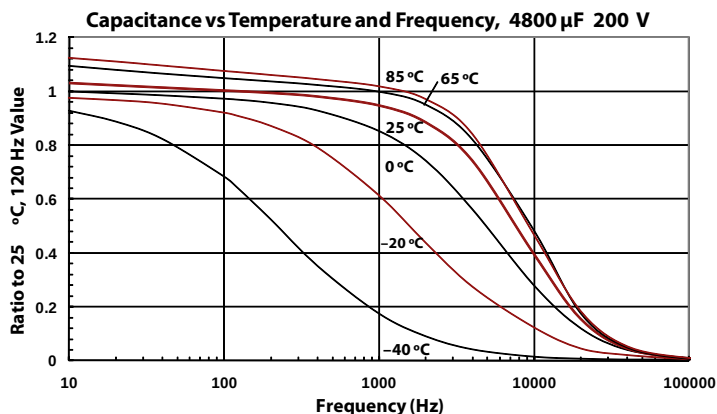
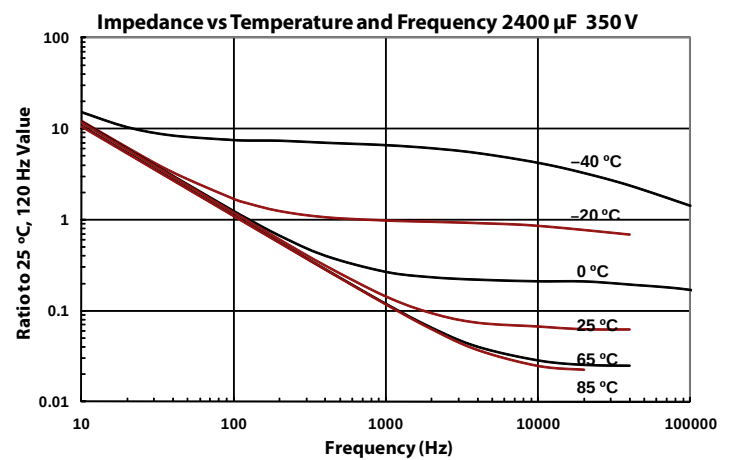
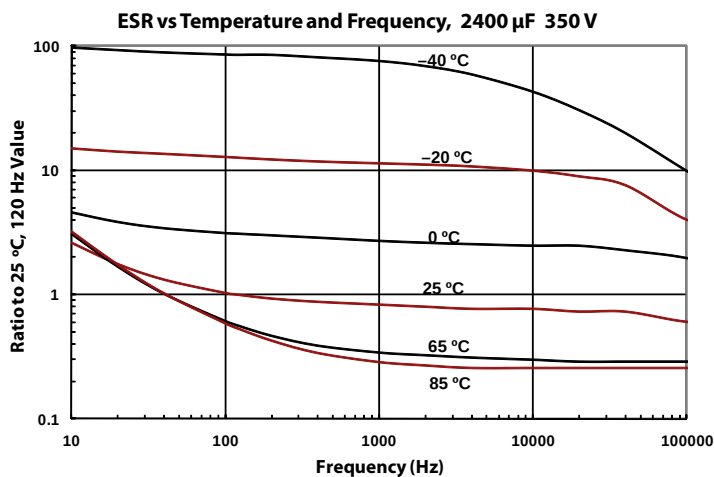
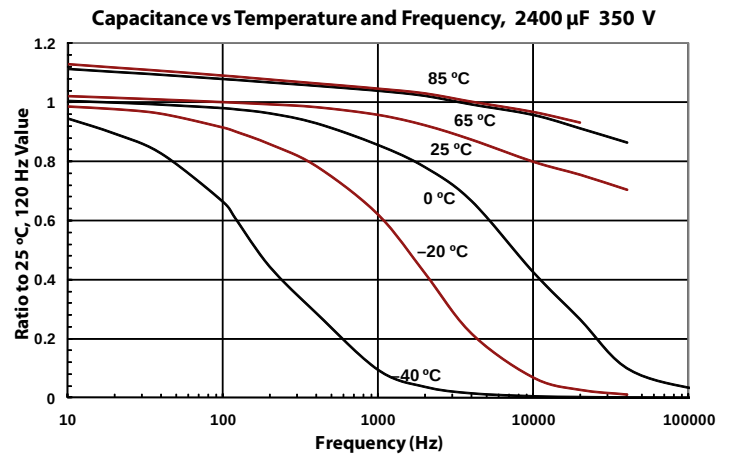
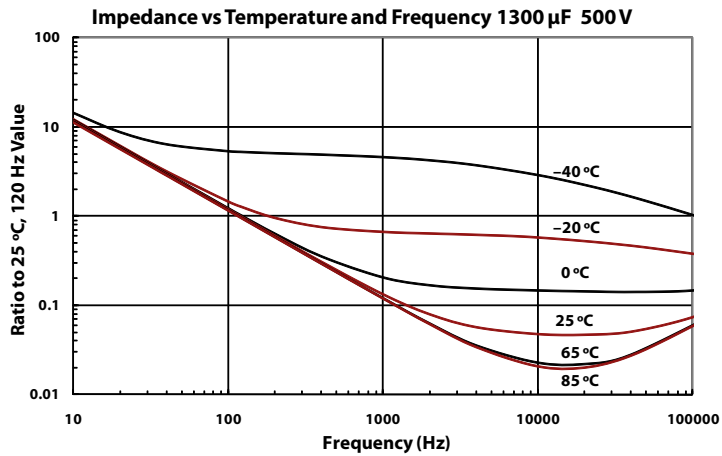
Typical Performance Curves



Type DCMC 85 °C High Capacitance, Screw Terminal, Aluminum

Highest Capacitance Screw Terminal Type

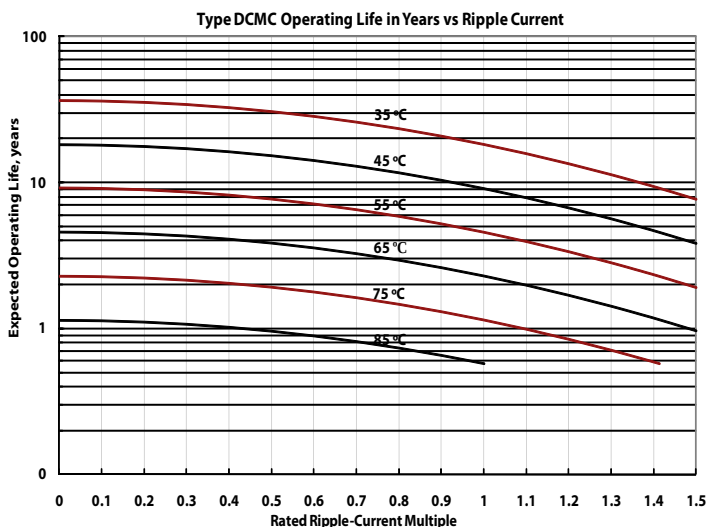
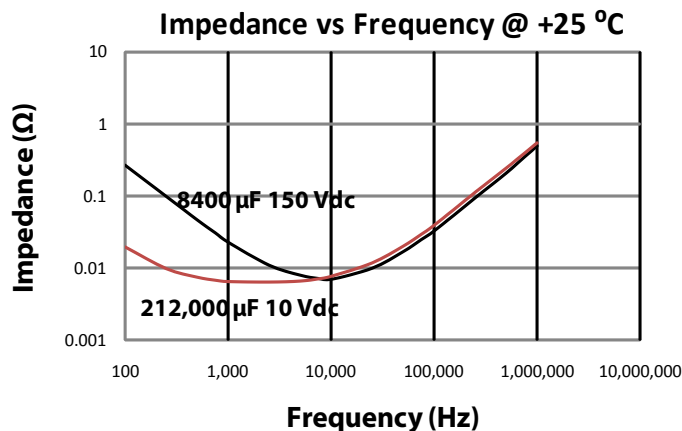
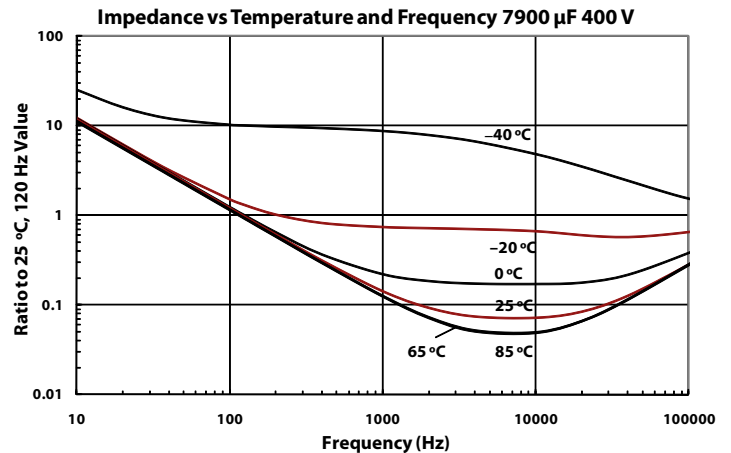
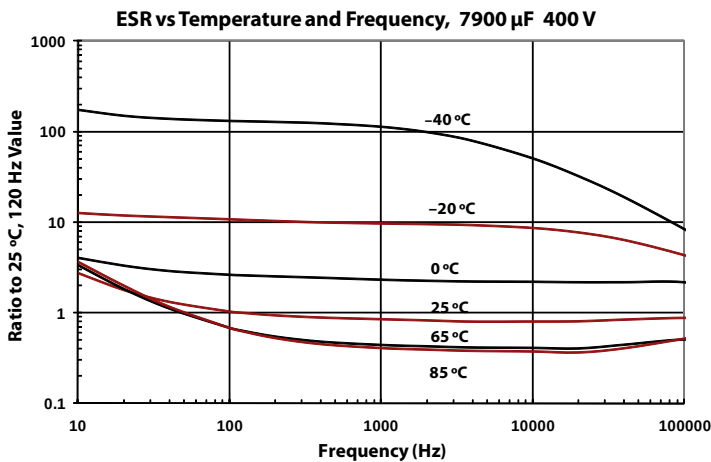
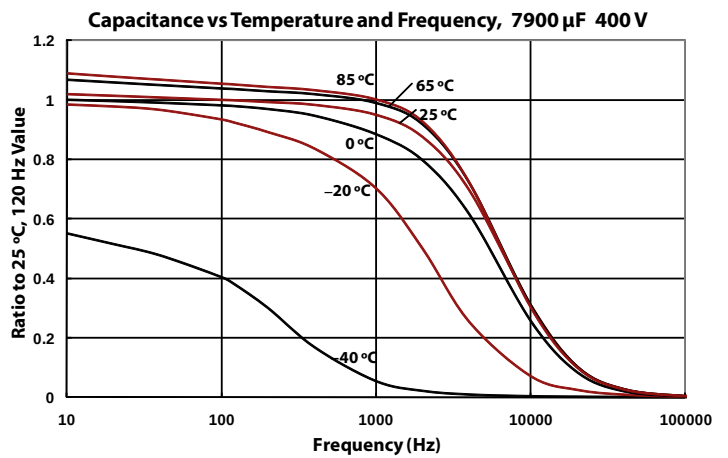
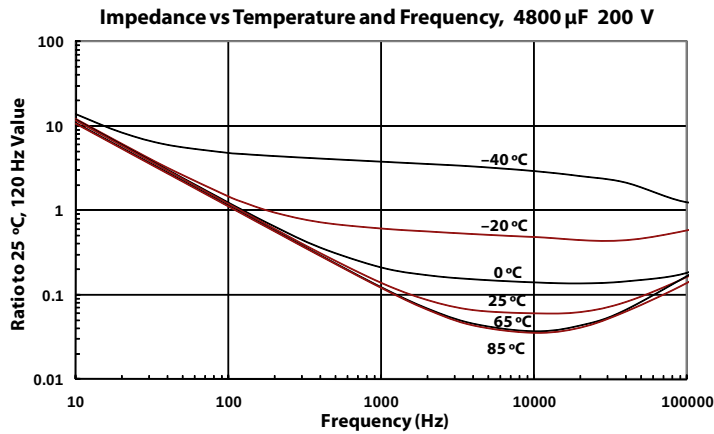
Typical Performance Curves



Type DCMC 85 °C High Capacitance, Screw Terminal, Aluminum

Highest Capacitance Screw Terminal Type

Typical Performance Curves



Type 3188 85 °C Best Value, Screw Terminal, Aluminum

85 °C Long Life Screw Terminal Type



Type 3188 has twice the life of the 3186 and twice the ripple-current capability. While the standard encasement is by compression with the capacitor element captured on an aluminum peg in the can bottom and a phenolic peg in the top, rilled construction is available. With rilled construction the element is secured by rills, spoon shaped dimples in the side of the can. Rilled construction offers the industry's highest vibration and shock withstanding and excellent heat transfer. Besides increasing ripple-current handling, the rilled construction facilitates use in military and transportation applications.

Highlights

- Rilled cans withstand high shock and vibration.
- 2 times the ripple-current capability
- High capacitance per can

Specifications

Temperature Range	−40 °C to +85 °C					
Rated Voltage Range	16 Vdc to 450 Vdc					
Capacitance Range	270 μF to 1.0 F					
Capacitance Tolerance	−10% +75% ≤ 100 Vdc −10% +50% ≥ 200 Vdc					
Leakage Current	≤6√CV μA (6 mA max.) at 5 minutes					
Ripple Current Multipliers	Ambient Temperature					
	45 °C	55 °C	65 °C	75 °C	85 °C	
	2.24	2.00	1.73	1.41	1.00	
	Frequency					
		60 Hz	120 Hz	300 Hz	1000 Hz	≥10 kHz
	16 – 100 V	0.90	1.00	1.15	1.25	1.30
	200 – 450 V	0.90	1.00	1.25	1.40	1.50
Low Temperature Characteristics	Impedance ratio: Z _{−20°C} /Z _{+25°C} ≤ 8 (16–50 Vdc) ≤ 4 (63–100 Vdc) ≤ 3 (150–450 Vdc)					
Endurance Life Test	4,000 h @ full load at 85 °C ΔCapacitance ±10% ESR 200% of limit DCL 100% of limit					
Shelf Life Test	500 h @ 85 °C ΔCapacitance ±10% ESR 175% of limit DCL 100% of limit					
Vibration	10 to 55 Hz, 0.06" & 10 g max for compression, 15 g max for rilled, 1.5 h ea. of 2 axes					
RoHS Compliant						

Type 3188 85 °C Best Value, Screw Terminal, Aluminum

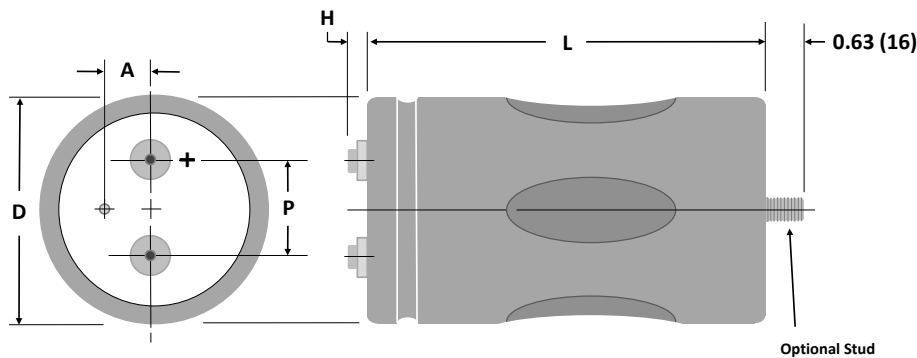
85 °C Long Life Screw Terminal Type

Part Numbering System

3188	GH	562	T	400	M	P	A1
Type	Case Code	Capacitance	Tolerance	Voltage	Terminal	Insulation	Construction*
		562=5600 µF 223=22000 µF 821=820 µF	M= ±20% S= -10 +30% T= -10 +50% U= -10 +75%	016=16 Vdc 450=450 Vdc	A=high post B=low post D=high current low post K=high current high post M=M5 high post J=M6 low post	P=0.008" PVC with mounting clamp/bracket R=0.008" PVC	A1=compression R1=rilled S1=stud & compression** T1=stud & rilled**

* Construction code is also a sequence number, e.g., A1, A2,---,A9, B1,B2,---, for customer specifications. Sequence number 1 in A1, R1, S1 and T1 denotes the standard catalog capacitor with no special requirements.

Outline Drawing



Stud Dimensions

Case	Stud	P ± 0.039"
Diam.	Thread	(±1.0 mm)
1.375	M8	0.470" (12.0)
1.750	M8	0.470" (12.0)
2.000	M12	0.630" (16.0)
2.500	M12	0.630" (16.0)
3.000	M12	0.630" (16.0)

Can Dimensions Insulation Adders

	Diameter (D)		Length (L)		Standing Height (H)	
	(in)	(mm)	(in)	(mm)	(in)	(mm)
0.008" PVC	0.02	0.51	0.032	0.81	0.024	0.61

Terminal Dimensions

Terminal Style	For Case	Code	Post Diameter		H max		Thread	min Full Thread		Torque	
	Diameters		in	mm	in	mm		in	mm	in-lb	N-m
Low Post	1 3/8 to 3	B	0.314	8.0	0.094	2.4	10-32	0.218	5.5	25	2.82
High Post	1 3/8 to 3	A	0.314	8.0	0.281	7.1	10-32	0.375	9.5	25	2.82
High Current, Low	2 1/2 & 3	D	0.684	17.4	0.125	3.2	¼-28	0.344	8.7	60	6.78
High Current, High	2 1/2 & 3	K	0.684	17.4	0.281	7.1	¼-28	0.469	11.9	60	6.78
M5 Post, Small	1 3/8 to 2	M	0.314	8.0	0.281	7.1	M5	0.375	9.5	25	2.82
M6 Low Post	3	J	0.684	17.4	0.125	3.2	M6	0.344	8.7	60	6.78

Type 3188 85 °C Best Value, Screw Terminal, Aluminum

85 °C Long Life Screw Terminal Type

Case Dimensions, Uninsulated Bare Can

Case Code	Diameter (D)		Length (L)		Pitch (P)		Plug (A)		Typical		Optional Bracket Part No.
	±0.031 (Inches)	±0.79 (mm)	±0.062 (Inches)	±1.157 (mm)	±0.014 (Inches)	±0.356 (mm)	A (Inches)	A (mm)	Weight (oz)	Weight (g)	
BA	1.375	34.9	2.125	54.0	0.500	12.7	0.390	9.9	2.53	72	115058-06
BB	1.375	34.9	2.625	66.7	0.500	12.7	0.390	9.9	3.17	90	115058-06
BC	1.375	34.9	3.125	79.4	0.500	12.7	0.390	9.9	3.70	105	115058-06
BD	1.375	34.9	3.625	92.1	0.500	12.7	0.390	9.9	4.22	120	115058-06
BE	1.375	34.9	4.125	104.8	0.500	12.7	0.390	9.9	4.75	135	115058-06
BF	1.375	34.9	4.625	117.5	0.500	12.7	0.390	9.9	5.98	170	115058-06
BG	1.375	34.9	5.125	130.2	0.500	12.7	0.390	9.9	7.74	220	115058-06
BH	1.375	34.9	5.625	142.9	0.500	12.7	0.390	9.9	9.50	270	115058-06
DA	1.75	44.5	2.125	54.0	0.750	19.1	0.453	11.5	5.63	160	115058-15
DB	1.75	44.5	2.625	66.7	0.750	19.1	0.453	11.5	6.16	175	115058-15
DC	1.75	44.5	3.125	79.4	0.750	19.1	0.453	11.5	6.34	180	115058-15
DD	1.75	44.5	3.625	92.1	0.750	19.1	0.453	11.5	7.22	205	115058-15
DE	1.75	44.5	4.125	104.8	0.750	19.1	0.453	11.5	7.74	220	115058-15
DF	1.75	44.5	4.625	117.5	0.750	19.1	0.453	11.5	8.27	235	115058-15
DG	1.75	44.5	5.125	130.2	0.750	19.1	0.453	11.5	8.80	250	115058-15
DH	1.75	44.5	5.625	142.9	0.750	19.1	0.453	11.5	9.50	270	115058-15
EA	2	50.8	2.125	54.0	0.875	22.2	0.500	12.7	5.98	170	115058-09
EB	2	50.8	2.625	66.7	0.875	22.2	0.500	12.7	6.34	180	115058-09
EC	2	50.8	3.125	79.4	0.875	22.2	0.500	12.7	6.69	190	115058-09
ED	2	50.8	3.625	92.1	0.875	22.2	0.500	12.7	7.74	220	115058-09
EE	2	50.8	4.125	104.8	0.875	22.2	0.500	12.7	8.98	255	115058-09
EF	2	50.8	4.625	117.5	0.875	22.2	0.500	12.7	10.21	290	115058-09
EG	2	50.8	5.125	130.2	0.875	22.2	0.500	12.7	11.26	320	115058-09
EH	2	50.8	5.625	142.9	0.875	22.2	0.500	12.7	8.80	250	115058-09
FB	2.5	63.5	2.625	66.7	1.125	28.6	0.625	15.9	10.56	300	115058-14
FC	2.5	63.5	3.125	79.4	1.125	28.6	0.625	15.9	13.02	370	115058-14
FD	2.5	63.5	3.625	92.1	1.125	28.6	0.625	15.9	14.08	400	115058-14
FE	2.5	63.5	4.125	104.8	1.125	28.6	0.625	15.9	15.66	445	115058-14
FF	2.5	63.5	4.625	117.5	1.125	28.6	0.625	15.9	21.12	600	115058-14
FG	2.5	63.5	5.125	130.2	1.125	28.6	0.625	15.9	22.88	650	115058-14
FH	2.5	63.5	5.625	142.9	1.125	28.6	0.625	15.9	21.12	600	115058-14
GC	3	76.2	3.125	79.4	1.250	31.8	0.750	19.1	18.30	520	115058-11
GD	3	76.2	3.625	92.1	1.250	31.8	0.750	19.1	20.06	570	115058-11
GE	3	76.2	4.125	104.8	1.250	31.8	0.750	19.1	21.12	600	115058-11
GF	3	76.2	4.625	117.5	1.250	31.8	0.750	19.1	25.34	720	115058-11
GG	3	76.2	5.125	130.2	1.250	31.8	0.750	19.1	29.92	850	115058-11
GH	3	76.2	5.625	142.9	1.250	31.8	0.750	19.1	34.14	970	115058-11
GJ	3	76.2	5.875	149.2	1.250	31.8	0.750	19.1	36.96	1050	115058-11
GN	3	76.2	8.625	219.1	1.250	31.8	0.750	19.1	51.39	1460	115058-11

Type 3188 85 °C Best Value, Screw Terminal, Aluminum

85 °C Long Life Screw Terminal Type

Ratings

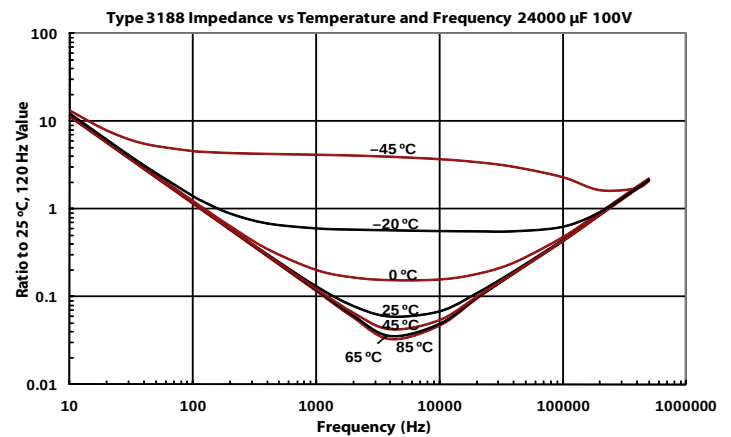
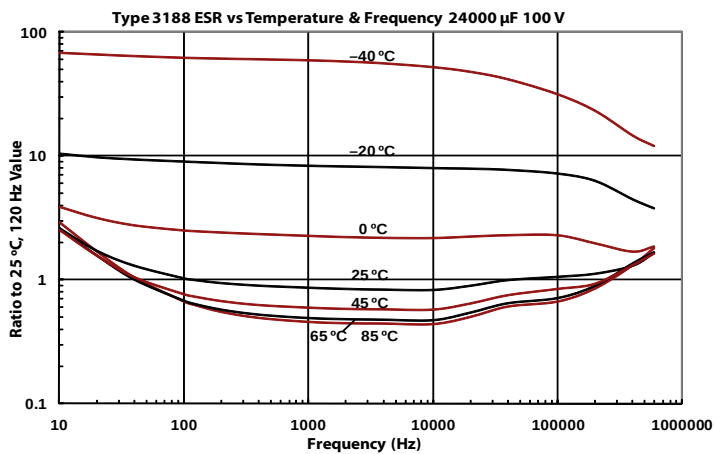
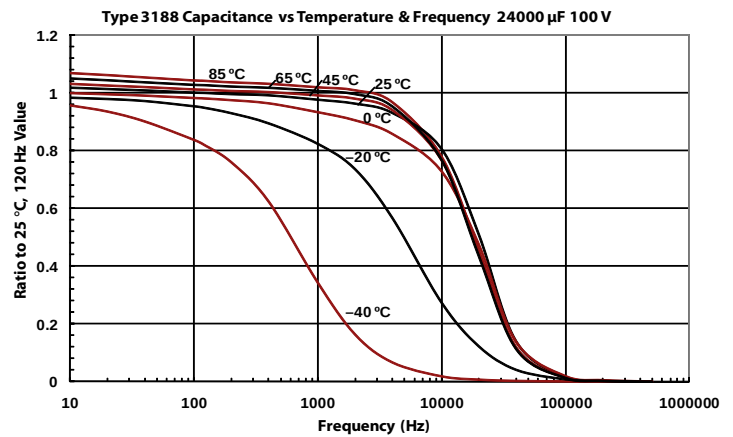
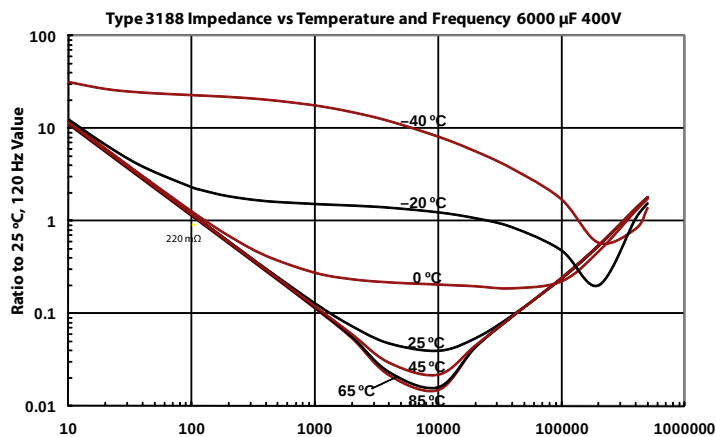
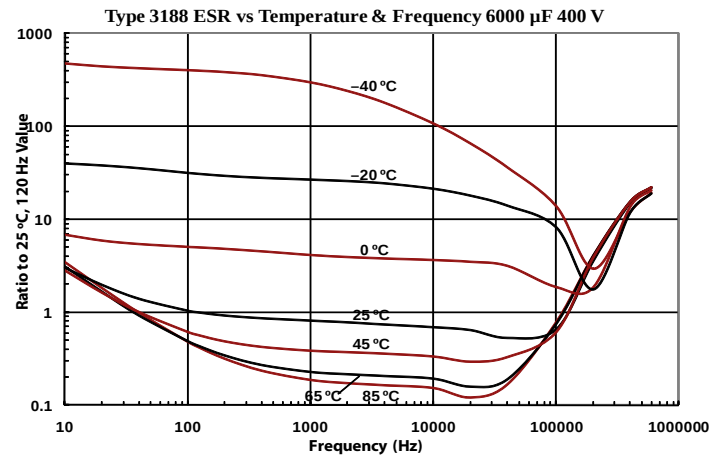
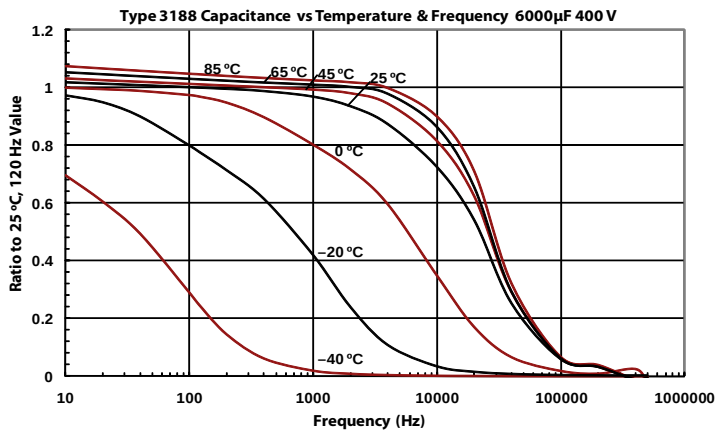
Additional Low Voltages and Smaller Sizes available at <http://www.cde.com/catalogs/3188.pdf>

Capacitance (μF)	Catalog Part Number	ESR max 120 Hz, 25°C (mΩ)	Ripple max 120 Hz, 85 °C (A)	Case Size DxL (in)
200 Volts (250 Volts Surge)				
6800	3188FE682T200APA1	24.0	14.00	2.50 X 4.125
8200	3188FF822T200APA1	21.0	16.00	2.50 X 4.625
10000	3188FH103T200APA1	17.0	20.00	2.50 X 5.625
10000	3188GE103T200APA1	25.0	16.00	3.00 X 4.125
12000	3188GF123T200APA1	22.0	18.00	3.00 X 4.625
15000	3188GH153T200APA1	19.0	21.00	3.00 X 5.625
22000	3188GN223T200APA1	15.0	25.00	3.00 X 8.625
250 Volts (300 Volts Surge)				
4700	3188FE472T250APA1	25.0	14.00	2.50 X 4.125
5600	3188FF562T250APA1	20.0	16.00	2.50 X 4.625
6800	3188FH682T250APA1	17.0	18.00	2.50 X 5.625
6800	3188GE682T250APA1	17.0	18.00	3.00 X 4.125
8200	3188GF822T250APA1	24.0	16.00	3.00 X 4.625
10000	3188GH103T250APA1	18.0	21.00	3.00 X 5.625
12000	3188GN123T250APA1	16.0	25.00	3.00 X 8.625
350 Volts (400 Volts Surge)				
2700	3188FE272T350APA1	47.0	10.00	2.50 X 4.125
3300	3188FF332T350APA1	39.0	12.00	2.50 X 4.625
3900	3188FH392T350APA1	34.0	13.00	2.50 X 5.625
3900	3188GE392T350APA1	34.0	13.00	3.00 X 4.125
4700	3188GF472T350APA1	34.0	14.00	3.00 X 4.625
5600	3188GH562T350APA1	28.0	16.00	3.00 X 5.625
10000	3188GN103T350APA1	18.0	25.00	3.00 X 8.625
400 Volts (450 Volts Surge)				
2200	3188FE222T400APA1	45.0	9.80	2.50 X 4.125
2700	3188FF272T400APA1	47.0	10.70	2.50 X 4.625
3300	3188FH332T400APA1	35.0	13.00	2.50 X 5.625
3300	3188GE332T400APA1	35.0	13.00	3.00 X 4.125
3900	3188GF392T400APA1	37.0	13.00	3.00 X 4.625
4700	3188GH472T400APA1	31.0	15.00	3.00 X 5.625
8200	3188GN822T400APA1	24.0	22.00	3.00 X 8.625
450 Volts (525 Volts Surge)				
2200	3188FF222T450APA1	46.0	10.50	2.50 X 4.625
3300	3188GF332T450APA1	34.0	13.80	3.00 X 4.625
3900	3188GH392T450APA1	22.0	19.10	3.00 X 5.625

Type 3188 85 °C Best Value, Screw Terminal, Aluminum

85 °C Long Life Screw Terminal Type

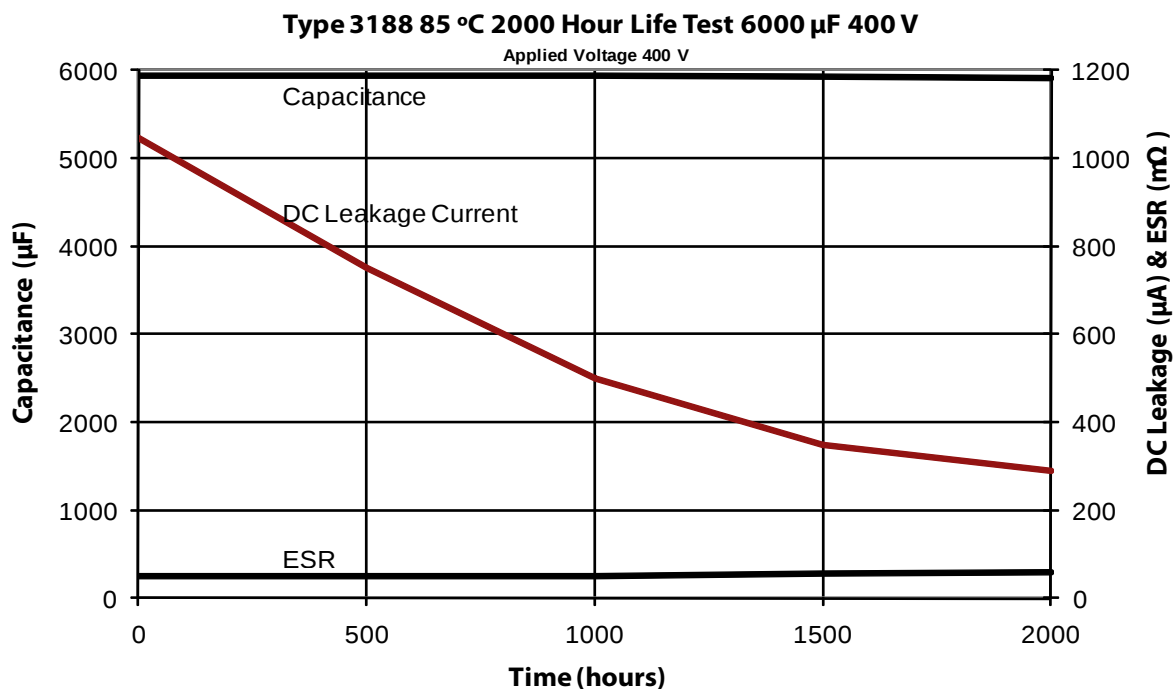
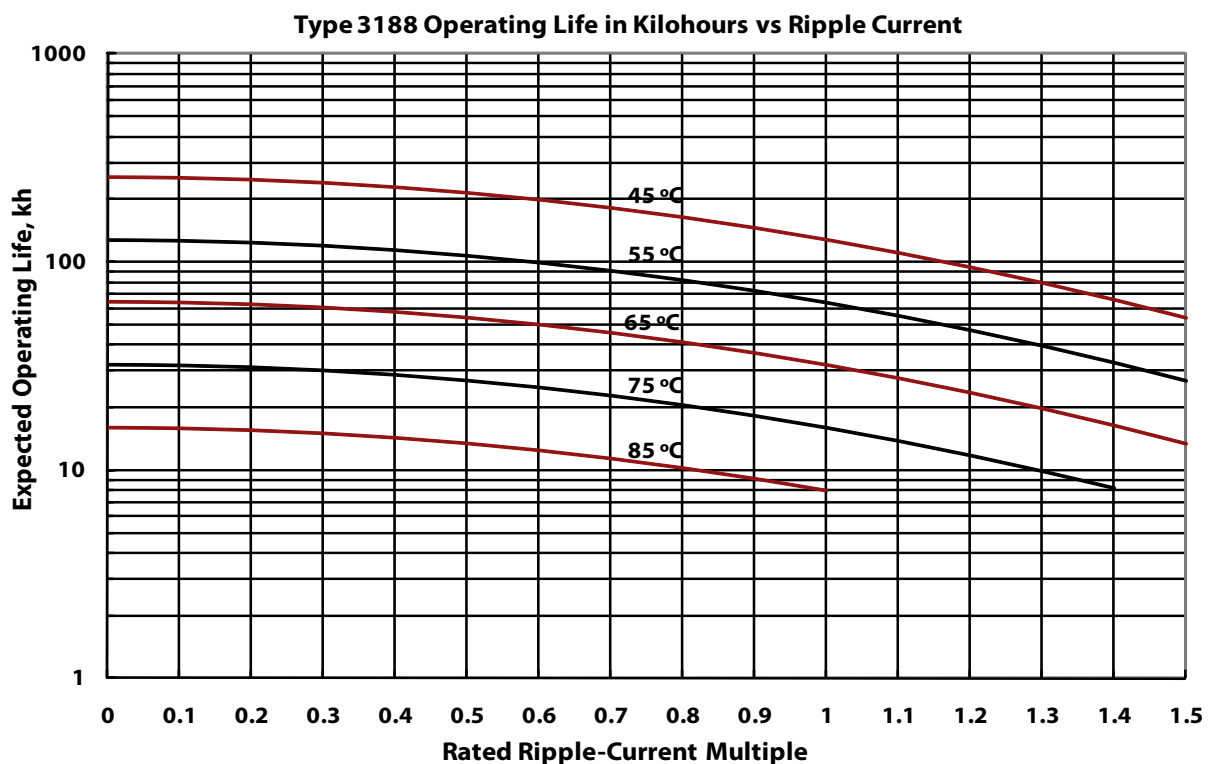
Typical Performance Curves



Type 3188 85 °C Best Value, Screw Terminal, Aluminum

85 °C Long Life Screw Terminal Type

Typical Performance Curves



Type 500C 95 °C Long Life, Screw Terminal, Aluminum

Long Life, High Capacitance Screw Terminal Type



Type 500C capacitors are designed for mainframe computers and other long life UPS and power supply filter applications. They deliver nearly as much capacitance as the Type DCMC capacitors, but with two times the life expectancy. They are an excellent choice for high ripple applications. The extended cathode foil of the 500C assures cool operation with heat flow from the capacitor element to the can.

Highlights

- Long-life, High-Capacitance
- Better for Power-supply and UPS systems
- Thermal-Pak™ extended cathode construction

Specifications

Temperature Range	−40 °C to +95 °C							
Rated Voltage Range	6.3 Vdc to 500 Vdc							
Capacitance Range	100 μF to 2.6 F							
Capacitance Tolerance	−10% +75% ≤ 160 Vdc −10% +50% ≥ 200 Vdc							
Leakage Current	≤3 √CV μA, 4 mA max, 5 minutes							
Ripple Current Multipliers	Ambient Temperature							
	45 °C	55 °C	65 °C	75 °C	85 °C			
	2.00	1.82	1.59	1.33	1.00			
	Frequency	50 Hz	60 Hz	120 Hz	360 Hz	1 kHz	5 kHz	10 kHz & up
	1 3/8" & 1 3/4" Diameters							
	6.3 to 160 V	0.91	0.93	1.00	1.06	1.08	1.10	1.10
	200 to 350 V	0.76	0.81	1.00	1.24	1.36	1.43	1.44
	400 to 500 Vx	0.76	0.81	1.00	1.24	1.37	1.44	1.45
	2" & 2 1/2" Diameters							
	6.3 to 160 V	0.93	0.95	1.00	1.04	1.06	1.06	1.07
	200 to 350 V	0.78	0.83	1.00	1.20	1.29	1.34	1.35
	400 to 500 V	0.77	0.82	1.00	1.22	1.33	1.39	1.40
	3" & 3 1/2" Diameters							
	6.3 to 160 V	0.95	0.97	1.00	1.03	1.04	1.04	1.04
	200 to 350 V	0.84	0.88	1.00	1.12	1.17	1.20	1.20
	400 to 500 V	0.79	0.84	1.00	1.18	1.26	1.31	1.32
	Low Temperature Characteristics	Impedance ratio: Z _{−20°C} /Z _{+25°C} ≤ 20 (6.3–10 Vdc) ≤ 8 (16–50 Vdc) ≤ 4 (63–100 Vdc) ≤ 3 (150–550 Vdc)						
Endurance Life Test	5000 h at full load at 85 °C Δ Capacitance ±20% ESR 200% of limit DCL 100% of limit							
Shelf Life Test	500 h at 95 °C Capacitance 100% of limit ESR 100% of limit DCL 100% of limit							
Vibration	10 to 55 Hz, 0.06" and 10 g max, 1.5 h each of 2 axes							
RoHS Compliant								

Type 500C 95 °C Long Life, Screw Terminal, Aluminum

Long Life, High Capacitance Screw Terminal Type

Part Numbering System

500C	492	T	200	CB	2	B	S
Type	Capacitance	Tolerance	Voltage	Case Code	Insulation	Terminal	Can Style
100 = 10 μF 101 = 100 μF 492 = 4900 μF 433 = 43,000 μF	M = ±20% U = -10%+75% T = 10%+50%	6R3 = 6.3 Vdc 063 = 63 Vdc 200 = 200 Vdc	0 = None 1 = Polyester 2 = PVC	A = Low Post B = High Post D = High Current, Low Post E = High Current, High Post F or M = M5 Post G = M6 Low Post H = M6 High Post	Blank = Standard Can S = Stud Bottom P = Stud with Thermal Pad		

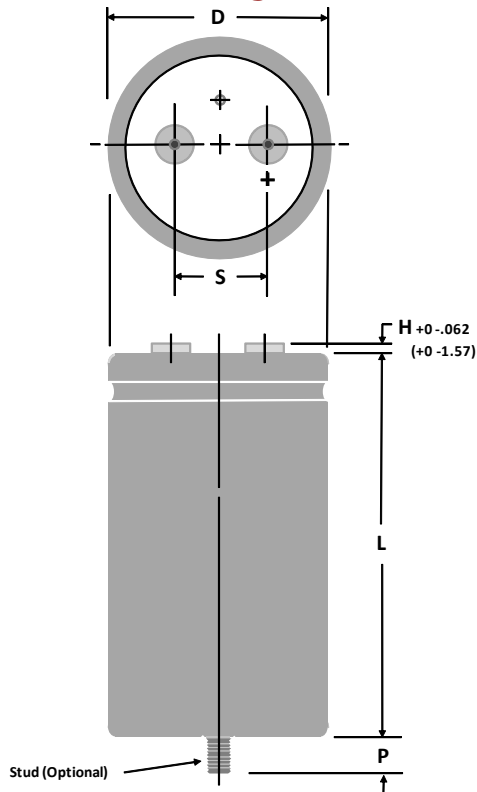
Standard insulation is 0.008-in PVC sleeve with 0.01-in polypropylene end disk.
Polyester insulation is not available for 3.5 inch diameter units.

Outline Drawing

Diagram showing a dimension line labeled **D** across the width of the component.

Standard insulation is 0.008-in PVC sleeve with 0.01-in polypropylene end disk.
Polyester insulation is not available for 3.5 inch diameter units.

Outline Drawing



NOTE: With the stud-mount feature, a thermally-conductive disk can be inserted in the bottom flush with the outer insulating sleeve. This reduces the thermal resistance through the can bottom by 0.3 °C/W. Can Style P.

Stud Dimensions

Case	Stud	P ± 0.039"
Diam.	Thread	(±1.0 mm)
1.375	M8	0.470" (12.0)
1.750	M8	0.470" (12.0)
2.000	M12	0.630" (16.0)
2.500	M12	0.630" (16.0)
3.000	M12	0.630" (16.0)
3.500	M12	0.630" (16.0)

Terminal Dimensions

Terminal Style	For Case	Code	Post Diameter	H max	min Full Thread	Torque
	Diameters		in mm	in mm	Thread	in-lb N-m
Low Post	1 3/8 to 3	A	0.314 8.0	0.094 2.4	10-32	25 2.82
High Post	1 3/8 to 3	B	0.314 8.0	0.281 7.1	10-32	25 2.82
High Current, Low	2 1/2 to 3 1/2	D	0.684 17.4	0.125 3.2	1/4-28	60 6.78
High Current, High	2 1/2 to 3 1/2	E	0.684 17.4	0.281 7.1	1/4-28	60 6.78
M5 Post, Small	1 3/8 to 2	M	0.314 8.0	0.281 7.1	M5	25 2.82
M5 Post	2 1/2 & 3	F	0.512 13.0	0.230 5.8	M5	25 2.82
M6 Low Post	2 1/2 to 3 1/2	G	0.684 17.4	0.125 3.2	M6	60 6.78
M6 High Post	2 1/2 to 3 1/2	H	0.684 17.4	0.281 7.1	M6	60 6.78

NOTE: Only high post and M5 post terminals are available at 550 Vdc as they meet the required creepage distance.

Type 500C 95 °C Long Life, Screw Terminal, Aluminum

Long Life, High Capacitance Screw Terminal Type

Uninsulated Case Dimensions

For insulated case, add 0.024"(0.610 mm) to "D" and 0.030"(0.762 mm) to length.

Case Code	Diam. (D)		Length (L)		Terminals (S)		Typical Weight	
	±.031 Inches	±.78 mm	±.062 Inches	±1.57 mm	±0.015 Inches	±.38 mm	oz	g
AK	1.375	34.93	1.625	41.28	0.50	12.70	1.9	54
AA	1.375	34.93	2.125	53.98	0.50	12.70	2.0	57
AH	1.375	34.93	2.625	66.68	0.50	12.70	2.7	77
AB	1.375	34.93	3.125	79.38	0.50	12.70	3.3	94
AJ	1.375	34.93	3.625	92.08	0.50	12.70	3.8	108
AC	1.375	34.93	4.125	104.78	0.50	12.70	4.4	125
AD	1.375	34.93	4.625	117.48	0.50	12.70	5.1	145
AE	1.375	34.93	5.125	130.18	0.50	12.70	6.8	193
AF	1.375	34.93	5.625	142.88	0.50	12.70	8.1	230
EA	1.750	44.45	2.125	53.98	0.75	19.05	2.7	76
EH	1.750	44.45	2.625	66.68	0.75	19.05	3.8	108
EB	1.750	44.45	3.125	79.38	0.75	19.05	5.1	145
EJ	1.750	44.45	3.625	92.08	0.75	19.05	6.8	193
EC	1.750	44.45	4.125	104.78	0.75	19.05	8.1	230
ED	1.750	44.45	4.625	117.48	0.75	19.05	9.0	255
EE	1.750	44.45	5.125	130.18	0.75	19.05	9.5	269
EF	1.750	44.45	5.625	142.88	0.75	19.05	10.5	298
BA	2.000	50.80	2.125	53.98	0.88	22.23	5.4	153
BH	2.000	50.80	2.625	66.68	0.88	22.23	6.1	173
BB	2.000	50.80	3.125	79.38	0.88	22.23	6.8	193
BJ	2.000	50.80	3.625	92.08	0.88	22.23	8.2	232
BC	2.000	50.80	4.125	104.78	0.88	22.23	9.5	269
BD	2.000	50.80	4.625	117.48	0.88	22.23	10.3	292
BE	2.000	50.80	5.125	130.18	0.88	22.23	10.7	303
BF	2.000	50.80	5.625	142.88	0.88	22.23	13.0	369
CH	2.500	63.50	2.625	66.68	1.13	28.58	9.2	261
CB	2.500	63.50	3.125	79.38	1.13	28.58	10.4	295
CJ	2.500	63.50	3.625	92.08	1.13	28.58	12.7	361
CC	2.500	63.50	4.125	104.78	1.13	28.58	15.0	425
CD	2.500	63.50	4.625	117.48	1.13	28.58	17.2	488
CE	2.500	63.50	5.125	130.18	1.13	28.58	19.3	547
CF	2.500	63.50	5.625	142.88	1.13	28.58	21.4	607
DB	3.000	76.20	3.125	79.38	1.25	31.75	16.7	473
DJ	3.000	76.20	3.625	92.08	1.25	31.75	20.0	567
DC	3.000	76.20	4.125	104.78	1.25	31.75	22.2	629
DD	3.000	76.20	4.625	117.48	1.25	31.75	25.5	723
DE	3.000	76.20	5.125	130.18	1.25	31.75	30.0	850
DF	3.000	76.20	5.625	142.88	1.25	31.75	31.9	904
DP	3.000	76.20	5.875	149.23	1.25	31.75	32.8	931
DN	3.000	76.20	7.625	193.68	1.25	31.75	39.5	1119
DG	3.000	76.20	8.625	219.08	1.25	31.75	43.3	1227
FC	3.500	88.90	4.125	104.78	1.25	31.75	30.0	850
FD	3.500	88.90	4.625	117.48	1.25	31.75	34.4	976
FE	3.500	88.90	5.125	130.18	1.25	31.75	40.5	1148
FF	3.500	88.90	5.625	142.88	1.25	31.75	43.1	1221
FP	3.500	88.90	5.875	149.23	1.25	31.75	44.3	1257
FN	3.500	88.90	7.625	193.68	1.25	31.75	53.3	1512
FG	3.500	88.90	8.625	219.08	1.25	31.75	58.5	1658

Type 500C 95 °C Long Life, Screw Terminal, Aluminum

Long Life, High Capacitance Screw Terminal Type Ratings

Additional Smaller Sizes available at www.cde.com/catalogs/500C.pdf

Cap. (μF)	Catalog Part Number	ESR Max. @ 25 °C 120 Hz (mΩ)	Ripple Max. @ 85 °C 120 Hz (A)	Nominal Size D x L (inches)
200 Vdc (250 Vdc Surge)				
3500	500C352T200CH2B	42.2	8.60	2 1/2 x 2 5/8
4900	500C492T200CB2B	31.2	10.60	2 1/2 x 3 1/8
6200	500C622T200CJ2B	22.3	13.20	2 1/2 x 3 5/8
7600	500C762T200CC2B	20.3	14.40	2 1/2 x 4 1/8
7600	500C762T200DB2B	30.3	12.10	3 x 3 1/8
9000	500C902T200CD2B	17.3	16.20	2 1/2 x 4 5/8
9800	500C982T200DJ2B	23.7	14.30	3 x 3 5/8
10000	500C103T200CE2B	15.8	17.60	2 1/2 x 5 1/8
12000	500C123T200CF2B	13.7	19.40	2 1/2 x 5 5/8
12000	500C123T200DC2B	19.7	16.30	3 x 4 1/8
14000	500C143T200DD2B	16.9	18.30	3 x 4 5/8
15000	500C153T200FC2B	17.1	19.30	3 1/2 x 4 1/8
16000	500C163T200FG2B	14.8	20.20	3 x 5 1/8
18000	500C183T200DF2B	13.3	22.00	3 x 5 5/8
19000	500C193T200DP2B	15.3	20.70	3 x 5 7/8
20000	500C203T200FD2B	12.7	23.30	3 1/2 x 4 5/8
21000	500C213T200FE2D	13.4	23.30	3 1/2 x 5 1/8
24000	500C243T200FF2D	12.0	25.30	3 1/2 x 5 5/8
25000	500C253T200FP2D	11.5	26.30	3 1/2 x 5 7/8
26000	500C263T200DN2B	11.7	26.40	3 x 7 5/8
31000	500C313T200DG2B	9.6	29.60	3 x 8 5/8
35000	500C353T200FN2D	9.3	32.10	3 1/2 x 7 5/8
40000	500C403T200FG2D	7.9	35.50	3 1/2 x 8 5/8
250 Vdc (300 Vdc Surge)				
2600	500C262T250CH2B	51.6	7.80	2 1/2 x 2 5/8
3700	500C372T250CB2B	32.0	10.50	2 1/2 x 3 1/8
4700	500C472T250CJ2B	25.0	12.40	2 1/2 x 3 5/8
5600	500C562T250DB2B	27.6	12.60	3 x 3 1/8
5800	500C582T250CC2B	20.7	14.30	2 1/2 x 4 1/8
6900	500C692T250CD2B	17.7	16.10	2 1/2 x 4 5/8
7200	500C722T250DJ2B	21.6	15.00	3 x 3 5/8
7900	500C792T250CE2B	15.5	17.70	2 1/2 x 5 1/8
8800	500C882T250DC2B	17.6	17.30	3 x 4 1/8
9000	500C902T250CF2B	13.8	19.40	2 1/2 x 5 5/8
10000	500C103T250DD2B	16.3	18.60	3 x 4 5/8
11000	500C113T250FC2D	19.5	18.10	3 1/2 x 4 1/8
12000	500C123T250DE2B	14.3	20.60	3 x 5 1/8
13000	500C133T250FD2D	17.2	19.90	3 1/2 x 4 5/8
14000	500C143T250DF2B	12.0	23.20	3 x 5 5/8
15000	500C153T250DP2B	11.5	23.90	3 x 5 7/8
15000	500C153T250FE2D	15.1	22.00	3 1/2 x 5 1/8
17000	500C173T250FF2D	13.2	24.20	3 1/2 x 5 5/8
18000	500C183T250FP2D	12.8	24.80	3 1/2 x 5 7/8
21000	500C213T250DN2D	9.6	30.90	3 x 7 5/8
24000	500C243T250DG2D	7.0	34.60	3 x 8 5/8

Cap. (μF)	Catalog Part Number	ESR Max. @ 25 °C 120 Hz (mΩ)	Ripple Max. @ 85 °C 120 Hz (A)	Nominal Size D x L (inches)
250 Vdc (300 Vdc Surge)				
25000	500C253T250FN2D	10.5	30.00	3 1/2 x 7 5/8
29000	500C293T250FG2D	9.2	33.00	3 1/2 x 8 5/8
300 Vdc (350 Vdc Surge)				
2200	500C222T300CH2B	60.5	7.20	2 1/2 x 2 5/8
2900	500C292T300CB2B	46.5	8.70	2 1/2 x 3 1/8
3700	500C372T300CJ2B	38.1	10.10	2 1/2 x 3 5/8
4100	500C412T300DB2B	42.8	10.10	3 x 3 1/8
4500	500C452T300CC2B	29.9	11.90	2 1/2 x 4 1/8
5200	500C522T300DJ2B	34.0	11.90	3 x 3 5/8
5300	500C532T300CD2B	25.5	13.40	2 1/2 x 4 5/8
6100	500C612T300CE2B	22.2	14.80	2 1/2 x 5 1/8
6400	500C642T300DC2B	26.2	14.20	3 x 4 1/8
6900	500C692T300CF2B	19.8	16.20	2 1/2 x 5 5/8
7500	500C752T300DD2B	23.6	15.50	3 x 4 5/8
8700	500C872T300DE2B	20.5	17.20	3 x 5 1/8
8900	500C892T300FC2D	21.0	17.40	3 1/2 x 4 1/8
9800	500C982T300DF2B	18.0	18.90	3 x 5 5/8
10000	500C103T300DP2B	17.0	19.70	3 x 5 7/8
10000	500C103T300FD2D	18.2	19.40	3 1/2 x 4 5/8
12000	500C123T300FE2D	16.0	21.30	3 1/2 x 5 1/8
13000	500C133T300FF2D	14.3	23.20	3 1/2 x 5 5/8
14000	500C143T300FP2D	13.5	24.20	3 1/2 x 5 7/8
15000	500C153T300DN2B	13.2	24.90	3 x 7 5/8
17000	500C173T300DG2B	10.8	27.90	3 x 8 5/8
19000	500C193T300FN2D	11.0	29.50	3 1/2 x 7 5/8
22000	500C223T300FG2D	9.3	32.60	3 1/2 x 8 5/8
350 Vdc (400 Vdc Surge)				
1500	500C152T350CH2B	86.9	6.00	2 1/2 x 2 5/8
2100	500C212T350CB2B	61.0	7.60	2 1/2 x 3 1/8
2700	500C272T350CJ2B	48.5	8.90	2 1/2 x 3 5/8
2900	500C292T350DB2B	54.0	9.00	3 x 3 1/8
3300	500C332T350CC2B	39.9	10.30	2 1/2 x 4 1/8
3700	500C372T350DJ2B	41.7	10.80	3 x 3 5/8
3900	500C392T350CD2B	34.0	11.60	2 1/2 x 4 5/8
4500	500C452T350CE2B	29.6	12.80	2 1/2 x 5 1/8
4600	500C462T350DC2B	34.7	12.30	3 x 4 1/8
5100	500C512T350CF2B	26.2	14.10	2 1/2 x 5 5/8
5400	500C542T350DD2B	29.6	13.90	3 x 4 5/8
6200	500C622T350DE2B	25.8	15.30	3 x 5 1/8
6400	500C642T350FC2D	29.9	14.60	3 1/2 x 4 1/8
7000	500C702T350DF2B	22.9	16.70	3 x 5 5/8
7500	500C752T350DP2B	21.7	17.40	3 x 5 7/8
7500	500C752T350FD2D	25.7	16.30	3 1/2 x 4 5/8
8700	500C872T350FE2D	22.5	18.00	3 1/2 x 5 1/8
9800	500C982T350FF2D	20.0	19.60	3 1/2 x 5 5/8

Type 500C 95 °C Long Life, Screw Terminal, Aluminum

Long Life, High Capacitance Screw Terminal Type

Additional Smaller Sizes available at www.cde.com/catalogs/500C.pdf

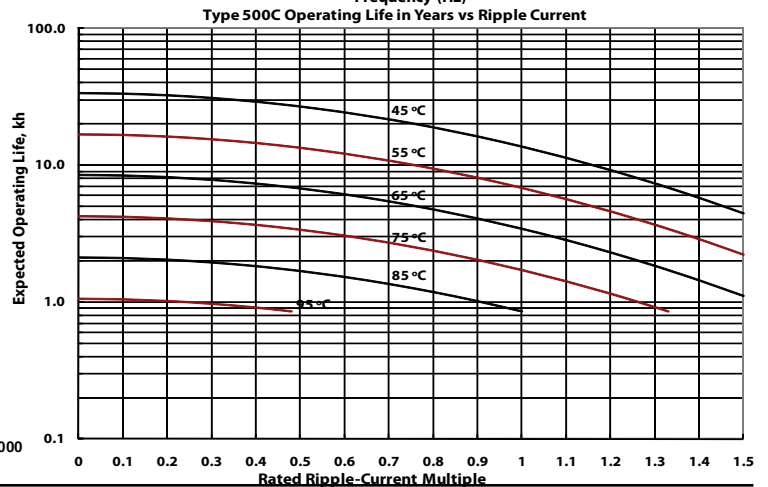
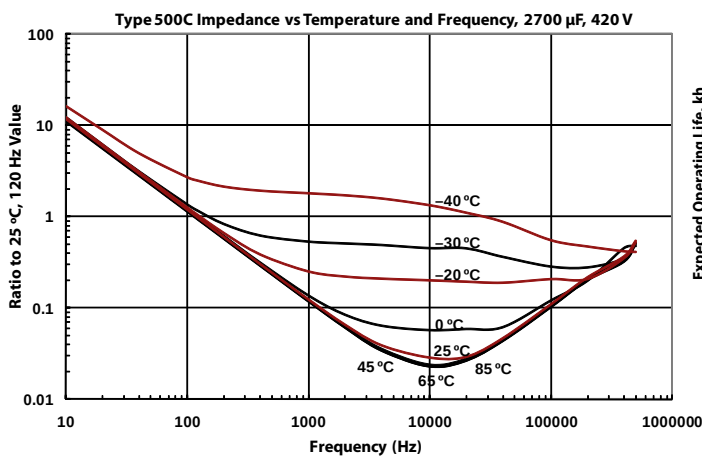
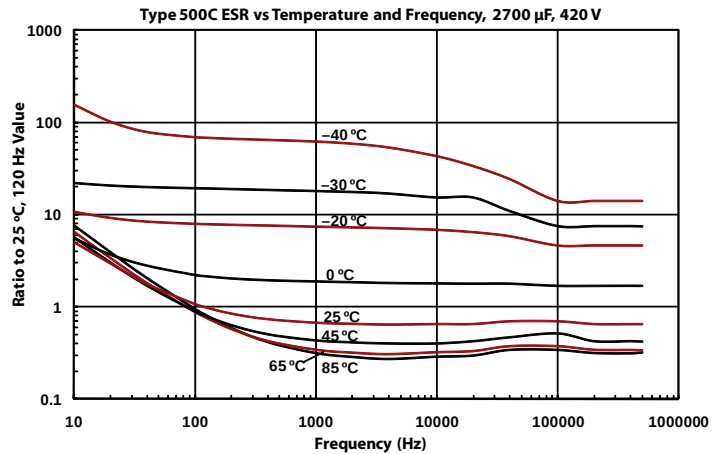
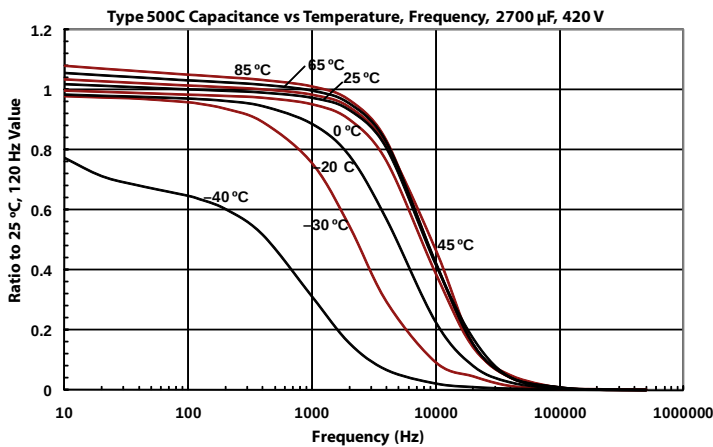
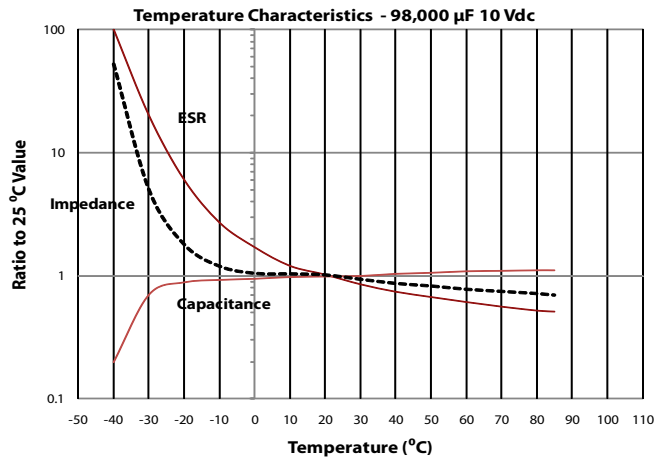
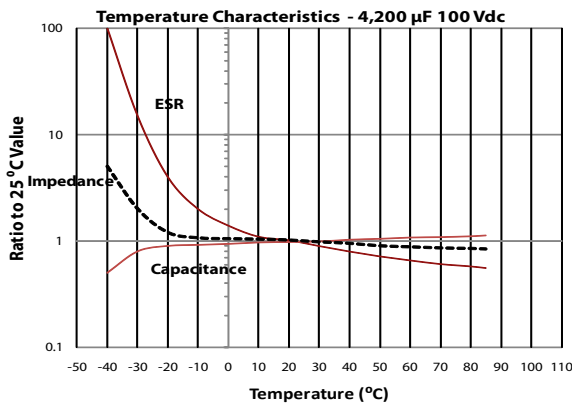
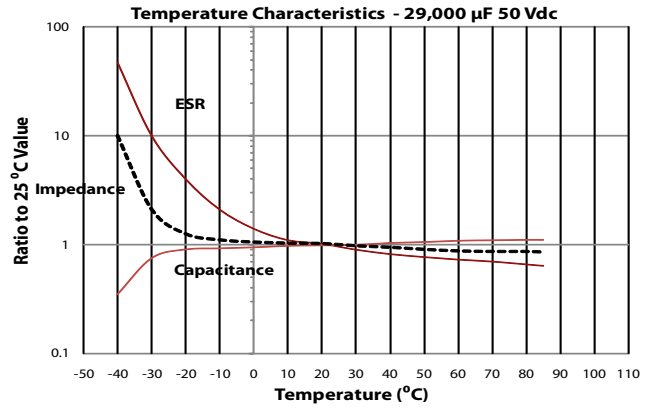
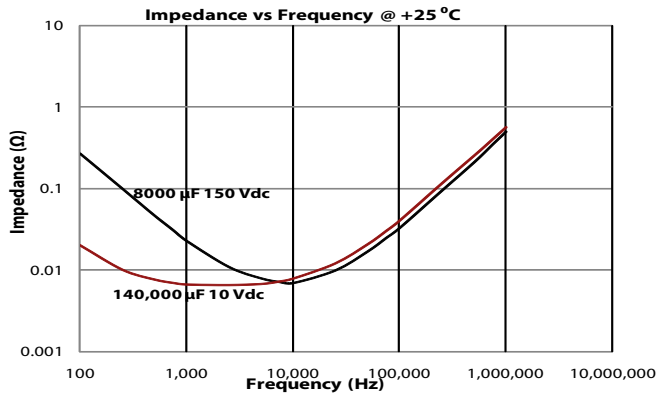
Cap. (µF)	Catalog Part Number	ESR Max. @ 25 °C 120 Hz (mΩ)	Ripple Max. @ 85 °C 120 Hz (A)	Nominal Size D x L (inches)
350 Vdc (400 Vdc Surge)				
10000	500C103T350DN2B	17.1	21.80	3 x 7 5/8
10000	500C103T350FP2D	18.9	20.40	3 1/2 x 5 7/8
12000	500C123T350DG2B	14.2	24.30	3 x 8 5/8
15000	500C153T350FN2D	14.9	25.40	3 1/2 x 7 5/8
17000	500C173T350FG2D	12.4	28.30	3 1/2 x 8 5/8
400 Vdc (450 Vdc Surge)				
1200	500C122T400CH2B	93.1	5.80	2 1/2 x 2 5/8
1700	500C172T400CB2B	65.3	7.30	2 1/2 x 3 1/8
2100	500C212T400CJ2B	52.0	8.60	2 1/2 x 3 5/8
2300	500C232T400DB2B	57.5	8.80	3 x 3 1/8
2600	500C262T400CC2B	42.8	9.90	2 1/2 x 4 1/8
3000	500C302T400DJ2B	44.9	10.40	3 x 3 5/8
3100	500C312T400CD2B	35.6	11.30	2 1/2 x 4 5/8
3500	500C352T400CE2B	31.7	12.40	2 1/2 x 5 1/8
3600	500C362T400DC2B	37.0	11.90	3 x 4 1/8
4000	500C402T400CF2B	31.5	12.80	2 1/2 x 5 5/8
4300	500C432T400DD2B	28.1	14.20	3 x 4 5/8
4900	500C492T400DE2B	27.4	14.80	3 x 5 1/8
5100	500C512T400FC2D	31.9	14.10	3 1/2 x 4 1/8
5600	500C562T400DF2B	24.4	16.20	3 x 5 5/8
5900	500C592T400DP2B	23.1	16.90	3 x 5 7/8
6000	500C602T400FD2D	27.4	15.80	3 1/2 x 4 5/8
6900	500C692T400FE2D	23.9	17.50	3 1/2 x 5 1/8
7800	500C782T400FF2D	21.2	19.00	3 1/2 x 5 5/8
8200	500C822T400DN2B	18.2	21.20	3 x 7 5/8
8300	500C832T400FP2D	20.1	19.80	3 1/2 x 5 7/8
9500	500C952T400DG2B	15.1	23.60	3 x 8 5/8
11000	500C113T400FN2D	15.8	24.70	3 1/2 x 7 5/8
13000	500C133T400FG2D	13.1	27.50	3 1/2 x 8 5/8
450 Vdc (500 Vdc Surge)				
1100	500C112T450CH2B	116.0	5.20	2 1/2 x 2 5/8
1500	500C152T450CB2B	81.1	6.60	2 1/2 x 3 1/8
1900	500C192T450CJ2B	66.5	7.60	2 1/2 x 3 5/8
2100	500C212T450DB2B	63.8	8.30	3 x 3 1/8
2400	500C242T450CC2B	54.7	8.80	2 1/2 x 4 1/8
2700	500C272T450DJ2B	49.8	9.90	3 x 3 5/8
2800	500C282T450CD2B	46.4	9.90	2 1/2 x 4 5/8
3200	500C322T450CE2B	40.4	11.00	2 1/2 x 5 1/8
3300	500C332T450DC2B	38.2	11.80	3 x 4 1/8
3600	500C362T450CF2B	35.4	12.10	2 1/2 x 5 5/8
3900	500C392T450DD2B	35.7	12.60	3 x 4 5/8
4500	500C452T450DE2B	30.9	14.00	3 x 5 1/8
4600	500C462T450FC2D	30.3	14.50	3 1/2 x 4 1/8
5100	500C512T450DF2B	27.4	15.30	3 x 5 5/8

Cap. (µF)	Catalog Part Number	ESR Max. @ 25 °C 120 Hz (mΩ)	Ripple Max. @ 85 °C 120 Hz (A)	Nominal Size D x L (inches)
450 Vdc (500 Vdc Surge)				
5400	500C542T450DP2B	26.0	15.90	3 x 5 7/8
5400	500C542T450FD2D	25.7	16.30	3 1/2 x 4 5/8
6300	500C632T450FE2D	22.4	18.00	3 1/2 x 5 1/8
7100	500C712T450FF2D	19.9	19.70	3 1/2 x 5 5/8
7500	500C752T450FP2D	18.8	20.50	3 1/2 x 5 7/8
7500	500C752T450DN2B	20.3	20.00	3 x 7 5/8
8700	500C872T450DG2B	16.8	22.40	3 x 8 5/8
9700	500C972T450FN2D	15.1	25.20	3 1/2 x 7 5/8
11000	500C113T450FG2D	12.7	28.00	3 1/2 x 8 5/8
500 Vdc (550 Vdc Surge)				
770	500C771T500CH2B	171.0	4.30	2 1/2 x 2 5/8
1100	500C112T500CB2B	122.0	5.40	2 1/2 x 3 1/8
1400	500C142T500CJ2B	95.1	6.40	2 1/2 x 3 5/8
1600	500C162T500DB2B	86.4	7.10	3 x 3 1/8
1700	500C172T500CC2B	78.1	7.40	2 1/2 x 4 1/8
2000	500C202T500CD2B	66.3	8.30	2 1/2 x 4 5/8
2100	500C212T500DJ2B	67.4	8.50	3 x 3 5/8
2200	500C222T500CE2B	61.1	8.90	2 1/2 x 5 1/8
2400	500C242T500CF2B	54.7	9.70	2 1/2 x 5 5/8
2400	500C242T500DC2B	55.4	9.80	3 x 4 1/8
2800	500C282T500DD2B	48.1	10.90	3 x 4 5/8
3300	500C332T500DE2B	43.1	11.80	3 x 5 1/8
3400	500C342T500FC2D	40.1	12.60	3 1/2 x 4 1/8
3700	500C372T500DF2B	37.5	13.10	3 x 5 5/8
3900	500C392T500DP2B	35.5	13.60	3 x 5 7/8
4000	500C402T500FD2D	34.1	14.20	3 1/2 x 4 5/8
4600	500C462T500FE2D	30.0	15.60	3 1/2 x 5 1/8
5200	500C522T500FF2D	28.0	16.60	3 1/2 x 5 5/8
5400	500C542T500DN2B	27.9	17.10	3 x 7 5/8
5500	500C552T500FP2D	26.0	17.40	3 1/2 x 5 7/8
6300	500C632T500DG2B	23.1	19.10	3 x 8 5/8
7600	500C762T500FN2D	20.5	21.80	3 1/2 x 7 5/8
8800	500C882T500FG2D	16.7	24.40	3 1/2 x 8 5/8
550 Vdc (600 Vdc Surge)				
1400	500C142T550CC2B	170.5	4.90	2 1/2 x 4 1/8
1700	500C172T550CD2B	132.6	5.90	2 1/2 x 4 5/8
1900	500C192T550CE2B	111.7	6.80	2 1/2 x 5 1/8
2200	500C222T550DC2B	90.4	7.80	3 x 4 1/8
2300	500C232T550CF2B	86.5	7.80	2 1/2 x 5 5/8
2500	500C252T550DD2B	79.6	8.40	3 x 4 5/8
2900	500C292T550DE2B	64.0	9.70	3 x 5 1/8
3400	500C342T550DF2F	54.6	10.90	3 x 5 5/8
3700	500C372T550DP2B	50.2	12.24	3 x 5 7/8
5100	500C512T550DN2B	36.4	16.22	3 x 7 5/8

Type 500C 95 °C Long Life, Screw Terminal, Aluminum

Long Life, High Capacitance Screw Terminal Type

Typical Performance Curves



Type 520C 85 °C Long Life, Inverter Grade, Aluminum

High Ripple, Long Life Screw Terminal Type



Type 520C is the 85 °C version of the Type 550C Inverter-Grade capacitor. It delivers the ripple-current capability and exceptional life needed for motor-drive bus capacitors and approaches the performance of the 550C at lower cost. It is rated for 8000 h life with full ripple current, rated voltage, 85 °C and 100 lfm airflow while mounted horizontally. Horizontal mounting is more severe than vertical mounting. The extended cathode foil of the 520C assures heat flow from the capacitor element to the can in all orientations.

Highlights

- 8,000 hour load life
- Ripple current to 55 amps
- ESRs to 8 mΩ
- Best value high ripple current
- Thermal-Pak™ extended cathode construction

Specifications

Temperature Range	−40 °C to +85 °C							
Rated Voltage Range	200 Vdc to 500 Vdc							
Capacitance Range	84 μF to 39,000 μF							
Capacitance Tolerance	−10% +50%							
Leakage Current	≤3 √CV μA, 5 mA max, 5 minutes							
Ripple Current Multipliers	Ambient Temperature							
	45 °C	55 °C	65 °C	75 °C	85 °C			
	1.80	1.63	1.45	1.25	1.00			
	Frequency							
	50 Hz	60 Hz	120 Hz	360 Hz	1 kHz	5 kHz	10 kHz & up	
	1 3/8" & 1 3/4" Diameters							
	200 to 350 V	0.76	0.81	1.00	1.24	1.36	1.43	1.44
	400 to 500 V	0.76	0.81	1.00	1.24	1.37	1.44	1.45
	2" & 2 1/2" Diameters							
	200 to 350 V	0.78	0.83	1.00	1.20	1.29	1.34	1.35
	400 to 500 V	0.77	0.82	1.00	1.22	1.33	1.39	1.40
	3" & 3 1/2" Diameters							
	200 to 350 V	0.84	0.88	1.00	1.12	1.17	1.20	1.20
	400 to 500 V	0.79	0.84	1.00	1.18	1.26	1.31	1.32
Low Temperature Characteristics	Impedance ratio: Z _{−20°C} /Z _{+25°C} ≤ 3 (200–500 Vdc)							
Endurance Life Test	8000 h at full load at 85 °C Δ Capacitance ±20% ESR 200% of limit DCL 100% of limit							
Shelf Life Test	500 h at 85 °C Capacitance 100% of limit ESR 100% of limit DCL 100% of limit							
Vibration	10 to 55 Hz, 0.06" and 10 g max, 1.5 h each of 2 axes							
RoHS Compliant								

Type 520C 85 °C Long Life, Inverter Grade, Aluminum

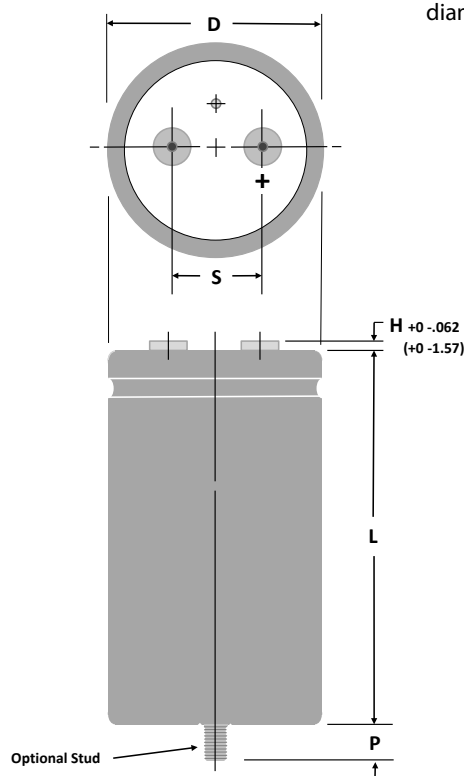
High Ripple, Long Life Screw Terminal Type

Part Numbering System

520C	572	T	400	DF	2	B	S
Type	Capacitance	Tolerance	Voltage	Case Code	Insulation	Terminal	Can Style
	572 = 5700 µF	M = ±20% U = -10%+75% T = 10%+50%	200 = 200 Vdc 400 = 400 Vdc		0 = None 1 = Polyester 2 = PVC	A = Low Post B = High Post D = High Current, Low Post E = High Current, High Post F or M = M5 Post G = M6 Low Post H = M6 High Post	Blank = Standard Can S = Stud Bottom P = Stud with Thermal Pad

Standard insulation is 0.008-in PVC sleeve with 0.01-in polypropylene end disk.
Polyester insulation is not available for 3.5 inch diameter units.

Outline Drawing



Stud Dimensions

Case Diam.	Stud Thread	P ± 0.039" (±1.0 mm)
1.375	M8	0.470" (12.0)
1.750	M8	0.470" (12.0)
2.000	M12	0.630" (16.0)
2.500	M12	0.630" (16.0)
3.000	M12	0.630" (16.0)
3.500	M12	0.630" (16.0)

NOTE: With the stud-mount feature, a thermally-conductive disk can be inserted in the bottom flush with the outer insulating sleeve. This reduces the thermal resistance through the can bottom by 0.3 °C/W. Can Style P.

Terminal Dimensions

Terminal Style	For Case Diameters	Code	Post Diameter in mm	H max in mm	Thread	min Full Thread in mm	Torque in-lb N-m
Low Post	1 3/8 to 3	A	0.314 8.0	0.094 2.4	10-32	0.218 5.5	25 2.82
High Post	1 3/8 to 3	B	0.314 8.0	0.281 7.1	10-32	0.375 9.5	25 2.82
High Current, Low	2 1/2 to 3 1/2	D	0.684 17.4	0.125 3.2	1/4-28	0.344 8.7	60 6.78
High Current, High	2 1/2 to 3 1/2	E	0.684 17.4	0.281 7.1	1/4-28	0.469 11.9	60 6.78
M5 Post, Small	1 3/8 to 2	M	0.314 8.0	0.281 7.1	M5	0.375 9.5	25 2.82
M5 Post	2 1/2 & 3	F	0.512 13.0	0.230 5.8	M5	0.344 8.7	25 2.82
M6 Low Post	2 1/2 to 3 1/2	G	0.684 17.4	0.125 3.2	M6	0.344 8.7	60 6.78
M6 High Post	2 1/2 to 3 1/2	H	0.684 17.4	0.281 7.1	M6	0.469 11.9	60 6.78

Type 520C 85 °C Long Life, Inverter Grade, Aluminum

High Ripple, Long Life Screw Terminal Type

Uninsulated Case Dimensions

For insulated case, add 0.024"(0.610 mm) to "D" and 0.030"(0.762 mm) to length.

Case Code	Diam. (D)		Length (L)		Terminals (S)		Typical Weight	
	±.031 Inches	±.78 mm	±.062 Inches	±1.57 mm	±0.015 Inches	±.38 mm	oz	g
AK	1.375	34.93	1.625	41.28	0.50	12.70	1.9	54
AA	1.375	34.93	2.125	53.98	0.50	12.70	2.0	57
AH	1.375	34.93	2.625	66.68	0.50	12.70	2.7	77
AB	1.375	34.93	3.125	79.38	0.50	12.70	3.3	94
AJ	1.375	34.93	3.625	92.08	0.50	12.70	3.8	108
AC	1.375	34.93	4.125	104.78	0.50	12.70	4.4	125
AD	1.375	34.93	4.625	117.48	0.50	12.70	5.1	145
AE	1.375	34.93	5.125	130.18	0.50	12.70	6.8	193
AF	1.375	34.93	5.625	142.88	0.50	12.70	8.1	230
EA	1.750	44.45	2.125	53.98	0.75	19.05	2.7	76
EH	1.750	44.45	2.625	66.68	0.75	19.05	3.8	108
EB	1.750	44.45	3.125	79.38	0.75	19.05	5.1	145
EJ	1.750	44.45	3.625	92.08	0.75	19.05	6.8	193
EC	1.750	44.45	4.125	104.78	0.75	19.05	8.1	230
ED	1.750	44.45	4.625	117.48	0.75	19.05	9.0	255
EE	1.750	44.45	5.125	130.18	0.75	19.05	9.5	269
EF	1.750	44.45	5.625	142.88	0.75	19.05	10.5	298
BA	2.000	50.80	2.125	53.98	0.88	22.23	5.4	153
BH	2.000	50.80	2.625	66.68	0.88	22.23	6.1	173
BB	2.000	50.80	3.125	79.38	0.88	22.23	6.8	193
BJ	2.000	50.80	3.625	92.08	0.88	22.23	8.2	232
BC	2.000	50.80	4.125	104.78	0.88	22.23	9.5	269
BD	2.000	50.80	4.625	117.48	0.88	22.23	10.3	292
BE	2.000	50.80	5.125	130.18	0.88	22.23	10.7	303
BF	2.000	50.80	5.625	142.88	0.88	22.23	13.0	369
CH	2.500	63.50	2.625	66.68	1.13	28.58	9.2	261
CB	2.500	63.50	3.125	79.38	1.13	28.58	10.4	295
CJ	2.500	63.50	3.625	92.08	1.13	28.58	12.7	361
CC	2.500	63.50	4.125	104.78	1.13	28.58	15.0	425
CD	2.500	63.50	4.625	117.48	1.13	28.58	17.2	488
CE	2.500	63.50	5.125	130.18	1.13	28.58	19.3	547
CF	2.500	63.50	5.625	142.88	1.13	28.58	21.4	607
DB	3.000	76.20	3.125	79.38	1.25	31.75	16.7	473
DJ	3.000	76.20	3.625	92.08	1.25	31.75	20.0	567
DC	3.000	76.20	4.125	104.78	1.25	31.75	22.2	629
DD	3.000	76.20	4.625	117.48	1.25	31.75	25.5	723
DE	3.000	76.20	5.125	130.18	1.25	31.75	30.0	850
DF	3.000	76.20	5.625	142.88	1.25	31.75	31.9	904
DP	3.000	76.20	5.875	149.23	1.25	31.75	32.8	931
DN	3.000	76.20	7.625	193.68	1.25	31.75	39.5	1119
DG	3.000	76.20	8.625	219.08	1.25	31.75	43.3	1227
FC	3.500	88.90	4.125	104.78	1.25	31.75	30.0	850
FD	3.500	88.90	4.625	117.48	1.25	31.75	34.4	976
FE	3.500	88.90	5.125	130.18	1.25	31.75	40.5	1148
FF	3.500	88.90	5.625	142.88	1.25	31.75	43.1	1221
FP	3.500	88.90	5.875	149.23	1.25	31.75	44.3	1257
FN	3.500	88.90	7.625	193.68	1.25	31.75	53.3	1512
FG	3.500	88.90	8.625	219.08	1.25	31.75	58.5	1658

Type 520C 85 °C Long Life, Inverter Grade, Aluminum

High Ripple, Long Life Screw Terminal Type

Ratings

Additional Smaller Sizes available at www.cde.com/catalogs/520C.pdf

Cap. (µF)	Catalog Part Number	ESR Max. @ 25 °C 120 Hz (mΩ)	Ripple Max. @ 85 °C 120 Hz (A)	Nominal Size D x L (inches)
200 Vdc (250 Vdc Surge)				
3200	520C322T200CH2B	44.3	9.0	2 1/2 x 2 5/8
4400	520C442T200CB2B	32.8	11.1	2 1/2 x 3 1/8
5700	520C572T200CJ2B	23.4	13.8	2 1/2 x 3 5/8
6400	520C642T200DB2B	31.8	12.6	3 x 3 1/8
7000	520C702T200CC2B	21.3	15.1	2 1/2 x 4 1/8
8200	520C822T200CD2B	18.2	17.0	2 1/2 x 4 5/8
8200	520C822T200DJ2B	24.9	15.0	3 x 3 5/8
9500	520C952T200CD2B	16.6	18.4	2 1/2 x 5 1/8
10000	520C103T200DC2B	20.7	17.1	3 x 4 1/8
11000	520C113T200CF2B	14.4	20.4	2 1/2 x 5 5/8
12000	520C123T200DD2B	17.7	19.2	3 x 4 5/8
14000	520C143T200DE2B	18.0	19.7	3 x 5 1/8
15000	520C153T200FC2D	15.6	21.7	3 1/2 x 4 1/8
16000	520C163T200DF2B	14.0	23.0	3 x 5 5/8
16000	520C163T200DP2B	16.1	21.7	3 x 5 7/8
17000	520C173T200FD2D	13.3	24.4	3 1/2 x 4 5/8
20000	520C203T200FE2D	14.1	24.4	3 1/2 x 5 1/8
22000	520C223T200DN2D	12.3	27.6	3 x 7 5/8
23000	520C233T200FF2D	12.6	26.5	3 1/2 x 5 5/8
24000	520C243T200FP2D	12.0	27.5	3 1/2 x 5 7/8
26000	520C263T200DG2D	10.1	31.0	3 x 8 5/8
34000	520C343T200FN2D	9.7	33.6	3 1/2 x 7 5/8
39000	520C393T200FG2D	8.3	37.2	3.5 x 8 5/8
250 Vdc (300 Vdc Surge)				
2100	520C212T250CH2B	54.2	8.2	2 1/2 x 2 5/8
3000	520C302T250CB2B	33.6	11.0	2 1/2 x 3 1/8
3900	520C392T250CJ2B	26.3	13.0	2 1/2 x 3 5/8
4300	520C432T250DB2B	29.0	13.2	3 x 3 1/8
4700	520C472T250CC2B	21.8	15.0	2 1/2 x 4 1/8
5600	520C562T250CD2B	18.6	16.8	2 1/2 x 4 5/8
5600	520C562T250DJ2B	22.7	15.7	3 x 3 5/8
6400	520C642T250CD2B	16.3	18.6	2 1/2 x 5 1/8
6800	520C682T250DC2B	18.5	18.2	3 x 4 1/8
7300	520C732T250CF2B	14.5	20.3	2 1/2 x 5 5/8
8000	520C802T250DD2B	17.1	19.5	3 x 4 5/8
9300	520C932T250DE2B	15.0	21.6	3 x 5 1/8
10000	520C103T250FC2D	20.4	19.0	3 1/2 x 4 1/8
11000	520C113T250DF2B	12.6	24.3	3 x 5 5/8
11000	520C113T250DP2B	12.1	25.1	3 x 5 7/8
12000	520C123T250FD2D	18.1	20.9	3 1/2 x 4 5/8
14000	520C143T250FE2D	15.8	23.0	3 1/2 x 5 1/8
15000	520C153T250FF2D	13.9	25.3	3 1/2 x 5 5/8
16000	520C163T250DN2B	9.1	32.2	3 x 7 5/8

Cap. (µF)	Catalog Part Number	ESR Max. @ 25 °C 120 Hz (mΩ)	Ripple Max. @ 85 °C 120 Hz (A)	Nominal Size D x L (inches)
250 Vdc (300 Vdc Surge)				
16000	520C163T250FP2D	13.5	26.0	3 1/2 x 5 7/8
18000	520C183T250DG2D	7.4	36.2	3 x 8 5/8
22000	520C223T250FN2D	11.0	31.5	3 1/2 x 7 5/8
26000	520C263T250FG2D	9.6	34.6	3 1/2 x 8 5/8
300 Vdc (350 Vdc Surge)				
1600	520C162T300CH2B	59.5	7.8	2 1/2 x 2 5/8
2200	520C222T300CB2B	48.8	9.1	2 1/2 x 3 1/8
2900	520C292T300CJ2B	40.0	10.6	2 1/2 x 3 5/8
3400	520C342T300DB2B	44.9	10.6	3 x 3 1/8
3500	520C352T300CC2B	31.4	12.5	2 1/2 x 4 1/8
4100	520C412T300CD2B	26.8	14.0	2 1/2 x 4 5/8
4300	520C432T300DJ2B	35.7	12.5	3 x 3 5/8
4800	520C482T300CD2B	23.3	15.5	2 1/2 x 5 1/8
5300	520C532T300DC2B	27.5	14.9	3 x 4 1/8
5400	520C542T300CF2B	20.7	17.0	2 1/2 x 5 5/8
6300	520C632T300DD2B	24.8	16.3	3 x 4 5/8
7200	520C722T300DE2B	21.5	18.0	3 x 5 1/8
7400	520C742T300FC2D	22.1	18.2	3 1/2 x 4 1/8
8200	520C822T300DF2B	18.9	19.8	3 x 5 5/8
8700	520C872T300DP2B	17.9	20.6	3 x 5 7/8
8800	520C882T300FD2D	19.1	20.3	3 1/2 x 4 5/8
10000	520C103T300FE2D	16.8	22.3	3 1/2 x 5 1/8
11000	520C113T300FF2D	15.0	24.4	3 1/2 x 5 5/8
12000	520C123T300DN2B	13.8	26.1	3 x 7 5/8
12000	520C123T300FP2D	14.2	25.3	3 1/2 x 5 7/8
14000	520C143T300DG2B	11.3	29.3	3 x 8 5/8
17000	520C173T300FN2D	11.5	30.9	3 1/2 x 7 5/8
20000	520C203T300FG2D	9.8	34.2	3 1/2 x 8 5/8
350 Vdc (400 Vdc Surge)				
1500	520C152T350CH2B	91.3	6.3	2 1/2 x 2 5/8
2000	520C202T350CB2B	64.0	8.0	2 1/2 x 3 1/8
2600	520C262T350CJ2B	51.0	9.4	2 1/2 x 3 5/8
3100	520C312T350DB2B	56.6	9.5	3 x 3 1/8
3200	520C322T350CC2B	41.9	10.8	2 1/2 x 4 1/8
3800	520C382T350CD2B	35.7	12.1	2 1/2 x 4 5/8
4000	520C402T350DJ2B	43.8	11.3	3 x 3 5/8
4400	520C442T350CD2B	31.1	13.5	2 1/2 x 5 1/8
4800	520C482T350DC2B	36.5	12.9	3 x 4 1/8
4900	520C492T350CF2B	27.6	14.7	2 1/2 x 5 5/8
5700	520C572T350DD2B	31.0	14.5	3 x 4 5/8
6600	520C662T350DE2B	27.1	16.1	3 x 5 1/8
6800	520C682T350FC2D	31.4	15.3	3 1/2 x 4 1/8
7500	520C752T350DF2B	24.1	17.5	3 x 5 5/8

Type 520C 85 °C Long Life, Inverter Grade, Aluminum

High Ripple, Long Life Screw Terminal Type

Additional Smaller Sizes available at www.cde.com/catalogs/520C.pdf

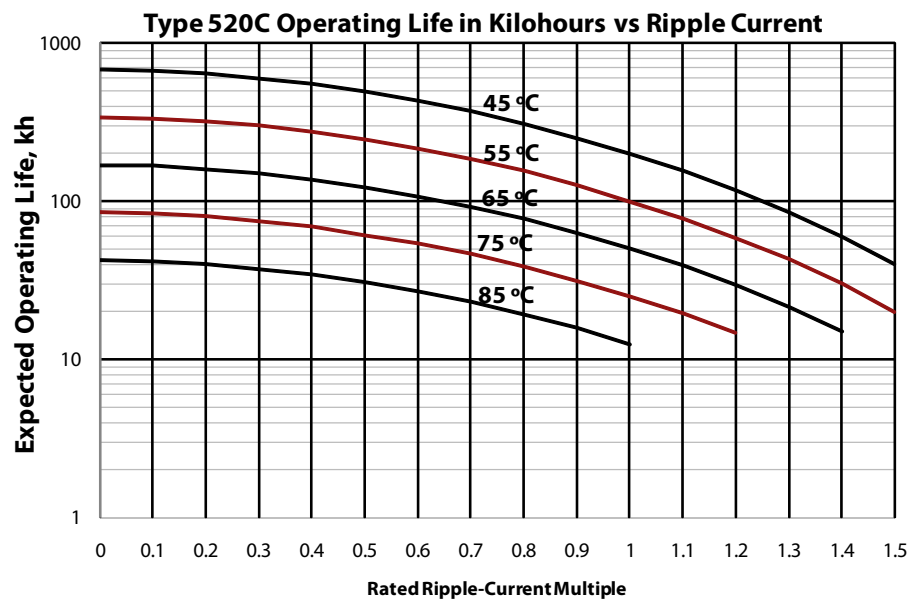
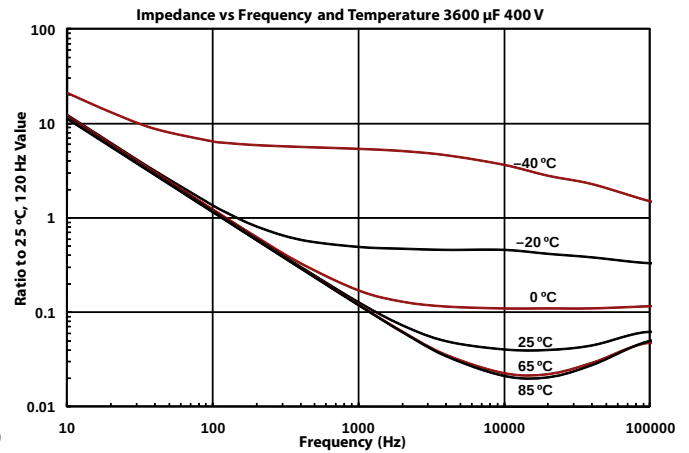
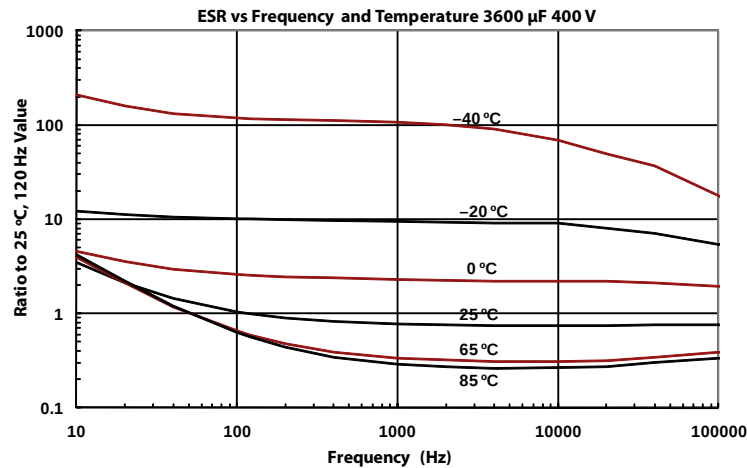
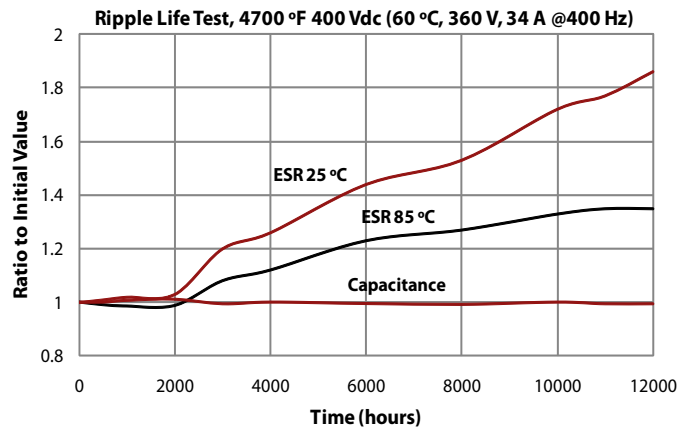
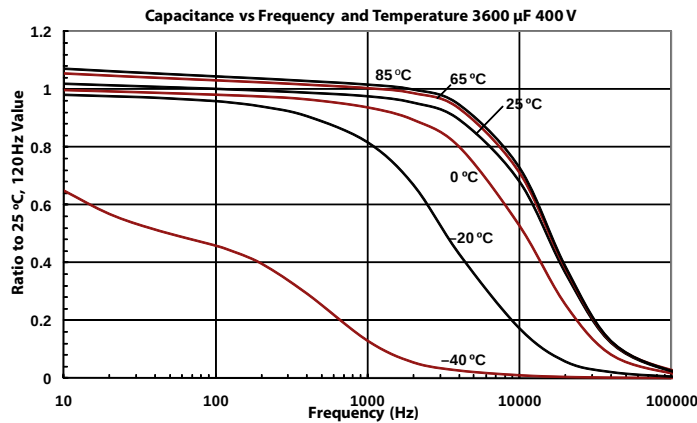
Cap. (μF)	Catalog Part Number	ESR Max. @ 25 °C 120 Hz (mΩ)	Ripple Max. @ 85 °C 120 Hz (A)	Nominal Size D x L (inches)
350 Vdc (400 Vdc Surge)				
7900	520C792T350DP2B	22.8	18.3	3 x 5 7/8
8000	520C802T350FD2D	27.0	17.1	3 1/2 x 4 5/8
9200	520C922T350FE2D	23.6	18.9	3 1/2 x 5 1/8
10000	520C103T350FF2D	21.0	20.6	3 1/2 x 5 5/8
10000	520C103T350FF2D	21.0	20.6	3 1/2 x 5 5/8
11000	520C113T350FP2D	19.9	21.4	3 1/2 x 5 7/8
13000	520C133T350DG2B	14.9	25.5	3 x 8 5/8
15000	520C153T350FN2D	15.7	26.7	3 1/2 x 7 5/8
18000	520C183T350FG2D	13.0	29.7	3 1/2 x 8 5/8
400 Vdc (450 Vdc Surge)				
1100	520C112T400CH2B	97.8	6.1	2 1/2 x 2 5/8
1600	520C162T400CB2B	68.6	7.7	2 1/2 x 3 1/8
2000	520C202T400CJ2B	54.6	9.1	2 1/2 x 3 5/8
2400	520C242T400CC2B	44.9	10.4	2 1/2 x 4 1/8
2400	520C242T400DB2B	60.4	9.2	3 x 3 1/8
2900	520C292T400CD2B	47.1	10.6	2 1/2 x 4 5/8
3000	520C302T400DJ2B	47.1	10.9	3 x 3 5/8
3300	520C332T400CD2B	33.0	13.0	2 1/2 x 5 1/8
3700	520C372T400DC2B	38.8	12.5	3 x 4 1/8
3800	520C382T400CF2B	33.0	13.5	2 1/2 x 5 5/8
4400	520C442T400DD2B	29.5	14.9	3 x 4 5/8
5000	520C502T400DE2B	28.8	15.6	3 x 5 1/8
5200	520C522T400FC2D	33.5	14.8	3 1/2 x 4 1/8
5700	520C572T400DF2B	25.6	17.0	3 x 5 5/8
6100	520C612T400DP2B	24.3	17.7	3 x 5 7/8
6100	520C612T400FD2D	28.8	16.6	3 1/2 x 4 5/8
7000	520C702T400FE2D	25.1	18.3	3 1/2 x 5 1/8
8000	520C802T400FF2D	22.3	20.0	3 1/2 x 5 5/8
8400	520C842T400DN2B	19.1	22.2	3 x 7 5/8
8500	520C852T400FP2D	21.1	20.8	3 1/2 x 5 7/8
9800	520C982T400DG2B	15.8	24.8	3 x 8 5/8
12000	520C123T400FN2D	16.6	25.9	3 1/2 x 7 5/8
14000	520C143T400FG2D	13.8	28.8	3 1/2 x 8 5/8
450 Vdc (500 Vdc Surge)				
920	520C921T450CH2B	114.0	5.6	2 1/2 x 2 5/8
1300	520C132T450CB2B	81.9	7.0	2 1/2 x 3 1/8
1600	520C162T450CJ2B	63.5	8.4	2 1/2 x 3 5/8
1900	520C192T450DB2B	52.6	9.8	3 x 3 1/8
2000	520C202T450CC2B	49.8	9.9	2 1/2 x 4 1/8
2400	520C242T450CD2B	42.3	11.1	2 1/2 x 4 5/8

Cap. (μF)	Catalog Part Number	ESR Max. @ 25 °C 120 Hz (mΩ)	Ripple Max. @ 85 °C 120 Hz (A)	Nominal Size D x L (inches)
450 Vdc (500 Vdc Surge)				
2500	520C252T450DJ2B	40.3	11.8	3 x 3 5/8
2700	520C272T450CE2B	38.9	12.0	2 1/2 x 5 1/8
3100	520C312T450CF2B	32.7	13.5	2 1/2 x 5 5/8
3100	520C312T450DC2B	33.0	13.6	3 x 4 1/8
3600	520C362T450DD2B	27.8	15.3	3 x 4 5/8
4200	520C422T450DE2B	23.9	17.1	3 x 5 1/8
4300	520C432T450FC2D	23.9	17.5	3 1/2 x 4 1/8
4700	520C472T450DF2B	21.3	18.7	3 x 5 5/8
5000	520C502T450DP2B	20.0	19.5	3 x 5 7/8
5000	520C502T450FD2D	20.0	19.9	3 1/2 x 4 5/8
5800	520C582T450FE2D	17.6	21.8	3 1/2 x 5 1/8
6600	520C662T450FF2D	15.1	24.2	3 1/2 x 5 5/8
7000	520C702T450FP2D	14.3	25.2	3 1/2 x 5 7/8
7000	520C702T450DN2B	15.0	25.0	3 x 7 5/8
8100	520C812T450DG2B	12.5	27.9	3 x 8 5/8
9500	520C952T450FN2D	11.0	32.0	3 1/2 x 7 5/8
11000	520C113T450FG2D	9.1	35.5	3 1/2 x 8 5/8
500 Vdc (550 Vdc Surge)				
630	520C631T500CH2B	165.0	4.7	2 1/2 x 2 5/8
890	520C891T500CB2B	118.0	5.9	2 1/2 x 3 1/8
1100	520C112T500CJ2B	91.9	7.0	2 1/2 x 3 5/8
1300	520C132T500DB2B	77.1	8.1	3 x 3 1/8
1400	520C142T500CC2B	73.1	8.2	2 1/2 x 4 1/8
1600	520C162T500CD2B	63.2	9.1	2 1/2 x 4 5/8
1700	520C172T500DJ2B	60.1	9.7	3 x 3 5/8
1900	520C192T500CD2B	54.9	10.1	2 1/2 x 5 1/8
2100	520C212T500DC2B	49.4	11.1	3 x 4 1/8
2200	520C222T500CF2B	46.2	11.4	2 1/2 x 5 5/8
2500	520C252T500DD2B	42.0	12.5	3 x 4 5/8
2900	520C292T500DE2B	36.5	13.8	3 x 5 1/8
3000	520C302T500FC2D	35.7	14.4	3 1/2 x 4 1/8
3300	520C332T500DF2B	32.4	15.1	3 x 5 5/8
3500	520C352T500DP2B	30.6	15.8	3 x 5 7/8
3500	520C352T500FD2D	30.3	16.1	3 1/2 x 4 5/8
4000	520C402T500FE2D	26.4	17.8	3 1/2 x 5 1/8
4600	520C462T500FF2D	23.4	19.5	3 1/2 x 5 5/8
4800	520C482T500FP2D	22.2	20.3	3 1/2 x 5 7/8
4800	520C482T500DN2B	23.9	19.8	3 x 7 5/8
5600	520C562T500DG2B	19.7	22.2	3 x 8 5/8
6700	520C672T500FN2D	17.3	25.4	3 1/2 x 7 5/8

Type 520C 85 °C Long Life, Inverter Grade, Aluminum

High Ripple, Long Life Screw Terminal Type

Typical Performance Curves



Type 550C 105 °C High Ripple, Inverter Grade, Aluminum

Ultra-Ripple, Long Life Screw Terminal Type



Type 550C is the standard for motor drive and other high-ripple, long-life applications. It boasts more than 25% extra ripple capability per can size, but less capacitance than Type 520C. Expected operating life is more than 100,000 hours in typical applications. Type 550C is rated for 10,000 h life with full ripple current, rated voltage, 85 °C and 100 lfm airflow while mounted horizontally. Horizontal mounting is more severe than vertical mounting. The extended cathode foil of the 550C assures heat flow from the capacitor element to the can in all orientations.

Highlights

- 10,000 hour load life
- Ripple current to 105 amps
- ESRs to 7 mΩ

Specifications

Temperature Range	–40 °C to +105 °C									
Rated Voltage Range	200 Vdc to 500 Vdc									
Capacitance Range	91 μF to 35,000 μF									
Capacitance Tolerance	–10% +50%									
Leakage Current	≤3 √CV μA, 4 mA max, 5 minutes									
Ripple Current Multipliers	Ambient Temperature									
	45 °C	55 °C	65 °C	75 °C	85 °C	95 °C	105 °C			
	1.66	1.52	1.37	1.20	1.00	0.75	0.36			
	Frequency			50 Hz	60 Hz	120 Hz	360 Hz	1 kHz	5 kHz	10 kHz & up
	1 3/8" & 2 1/2" Diameters									
	200 to 350 V	0.77	0.82	1.00	1.21	1.32	1.37	1.38		
	400 to 500 V	0.73	0.78	1.00	1.33	1.53	1.66	1.68		
	3" & 3 1/2" Diameters									
	200 to 350 V	0.80	0.85	1.00	1.17	1.24	1.28	1.29		
	400 to 500 V	0.73	0.79	1.00	1.31	1.51	1.63	1.65		
	Low Temperature Characteristics	Impedance ratio: Z _{–20°C} /Z _{+25°C} ≤ 3 (200–500 Vdc)								
	Endurance Life Test	10,000 h at full load at 105 °C Δ Capacitance ±20% ESR 200% of limit DCL 100% of limit								
Shelf Life Test	500 h at 105 °C Capacitance 100% of limit ESR 100% of limit DCL 100% of limit									
Vibration	10 to 55 Hz, 0.06" and 10 g max, 1.5 h each of two axis									
RoHS Compliant										

Type 550C 105 °C High Ripple, Inverter Grade, Aluminum

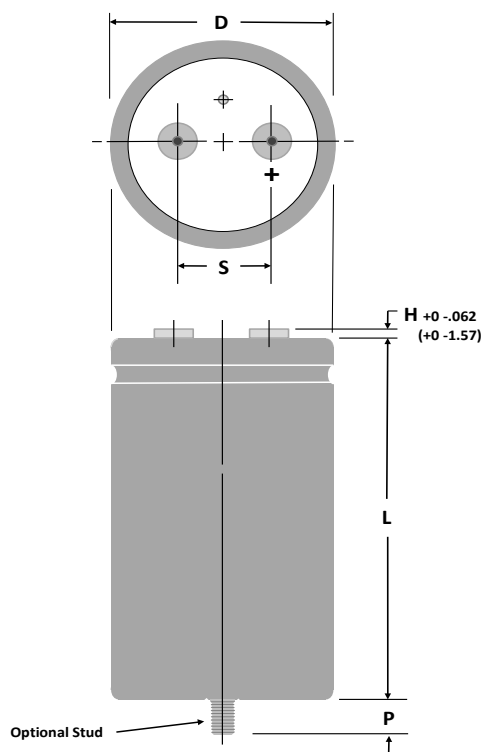
Ultra-Ripple, Long Life Screw Terminal Type

Part Numbering System

550C	812	T	450	FG	2	D	S
Type	Capacitance	Tolerance	Voltage	Case Code	Insulation	Terminal	Can Style
	812 = 8100 µF	M = ±20% U = -10%+75% T = 10%+50%	200 = 200 Vdc		0 = None 1 = Polyester 2 = PVC	A = Low Post B = High Post D = High Current, Low Post E = High Current, High Post F = M5 Post M = M5 Post, Small G = M6 Low Post H = M6 High Post	Blank = Standard Can S = Stud Bottom P = Stud with Thermal Pad

Standard insulation is 0.008-in PVC sleeve with 0.01-in polypropylene end disk.
Polyester insulation is not available for 3.5 inch diameter units.

Outline Drawing



Stud Dimensions

Case Diam.	Stud Thread	P ± 0.039" (±1.0 mm)
1.375	M8	0.470" (12.0)
1.750	M8	0.470" (12.0)
2.000	M12	0.630" (16.0)
2.500	M12	0.630" (16.0)
3.000	M12	0.630" (16.0)
3.500	M12	0.630" (16.0)

NOTE: With the stud-mount feature, a thermally-conductive disk can be inserted in the bottom flush with the outer insulating sleeve. This reduces the thermal resistance through the can bottom by 0.3 °C/W. Can Style P.

Terminal Dimensions

Terminal Style	For Case Diameters	Code	Post Diameter		H max		Thread	min Full Thread		Torque	
			in	mm	in	mm		in	mm	in-lb	N-m
Low Post	1 3/8 to 3	A	0.314	8.0	0.094	2.4	10-32	0.218	5.5	25	2.82
High Post	1 3/8 to 3	B	0.314	8.0	0.281	7.1	10-32	0.375	9.5	25	2.82
High Current, Low	2 1/2 to 3 1/2	D	0.684	17.4	0.125	3.2	1/4-28	0.344	8.7	60	6.78
High Current, High	2 1/2 to 3 1/2	E	0.684	17.4	0.281	7.1	1/4-28	0.469	11.9	60	6.78
M5 Post, Small	1 3/8 to 2	M	0.314	8.0	0.281	7.1	M5	0.375	9.5	25	2.82
M5 Post	2 1/2 & 3	F	0.512	13.0	0.230	5.8	M5	0.344	8.7	25	2.82
M6 Low Post	2 1/2 to 3 1/2	G	0.684	17.4	0.125	3.2	M6	0.344	8.7	60	6.78
M6 High Post	2 1/2 to 3 1/2	H	0.684	17.4	0.281	7.1	M6	0.469	11.9	60	6.78

NOTE: Only high post and M5 post terminals are available at 550 Vdc as they meet the required creepage distance.

Type 550C 105 °C High Ripple, Inverter Grade, Aluminum

Ultra-Ripple, Long Life Screw Terminal Type

Uninsulated Case Dimensions

For insulated case, add 0.024"(0.610 mm) to "D" and 0.030"(0.762 mm) to length.

Case Code	Diam. (D)		Length (L)		Terminals (S)		Typical Weight	
	±.031 Inches	±.78 mm	±.062 Inches	±1.57 mm	±0.015 Inches	±.38 mm	oz	g
AK	1.375	34.93	1.625	41.28	0.50	12.70	1.9	54
AA	1.375	34.93	2.125	53.98	0.50	12.70	2.0	57
AH	1.375	34.93	2.625	66.68	0.50	12.70	2.7	77
AB	1.375	34.93	3.125	79.38	0.50	12.70	3.3	94
AJ	1.375	34.93	3.625	92.08	0.50	12.70	3.8	108
AC	1.375	34.93	4.125	104.78	0.50	12.70	4.4	125
AD	1.375	34.93	4.625	117.48	0.50	12.70	5.1	145
AE	1.375	34.93	5.125	130.18	0.50	12.70	6.8	193
AF	1.375	34.93	5.625	142.88	0.50	12.70	8.1	230
EA	1.750	44.45	2.125	53.98	0.75	19.05	2.7	76
EH	1.750	44.45	2.625	66.68	0.75	19.05	3.8	108
EB	1.750	44.45	3.125	79.38	0.75	19.05	5.1	145
EJ	1.750	44.45	3.625	92.08	0.75	19.05	6.8	193
EC	1.750	44.45	4.125	104.78	0.75	19.05	8.1	230
ED	1.750	44.45	4.625	117.48	0.75	19.05	9.0	255
EE	1.750	44.45	5.125	130.18	0.75	19.05	9.5	269
EF	1.750	44.45	5.625	142.88	0.75	19.05	10.5	298
BA	2.000	50.80	2.125	53.98	0.88	22.23	5.4	153
BH	2.000	50.80	2.625	66.68	0.88	22.23	6.1	173
BB	2.000	50.80	3.125	79.38	0.88	22.23	6.8	193
BJ	2.000	50.80	3.625	92.08	0.88	22.23	8.2	232
BC	2.000	50.80	4.125	104.78	0.88	22.23	9.5	269
BD	2.000	50.80	4.625	117.48	0.88	22.23	10.3	292
BE	2.000	50.80	5.125	130.18	0.88	22.23	10.7	303
BF	2.000	50.80	5.625	142.88	0.88	22.23	13.0	369
CH	2.500	63.50	2.625	66.68	1.13	28.58	9.2	261
CB	2.500	63.50	3.125	79.38	1.13	28.58	10.4	295
CJ	2.500	63.50	3.625	92.08	1.13	28.58	12.7	361
CC	2.500	63.50	4.125	104.78	1.13	28.58	15.0	425
CD	2.500	63.50	4.625	117.48	1.13	28.58	17.2	488
CE	2.500	63.50	5.125	130.18	1.13	28.58	19.3	547
CF	2.500	63.50	5.625	142.88	1.13	28.58	21.4	607
DB	3.000	76.20	3.125	79.38	1.25	31.75	16.7	473
DJ	3.000	76.20	3.625	92.08	1.25	31.75	20.0	567
DC	3.000	76.20	4.125	104.78	1.25	31.75	22.2	629
DD	3.000	76.20	4.625	117.48	1.25	31.75	25.5	723
DE	3.000	76.20	5.125	130.18	1.25	31.75	30.0	850
DF	3.000	76.20	5.625	142.88	1.25	31.75	31.9	904
DP	3.000	76.20	5.875	149.23	1.25	31.75	32.8	931
DN	3.000	76.20	7.625	193.68	1.25	31.75	39.5	1119
DG	3.000	76.20	8.625	219.08	1.25	31.75	43.3	1227
FC	3.500	88.90	4.125	104.78	1.25	31.75	30.0	850
FD	3.500	88.90	4.625	117.48	1.25	31.75	34.4	976
FE	3.500	88.90	5.125	130.18	1.25	31.75	40.5	1148
FF	3.500	88.90	5.625	142.88	1.25	31.75	43.1	1221
FP	3.500	88.90	5.875	149.23	1.25	31.75	44.3	1257
FN	3.500	88.90	7.625	193.68	1.25	31.75	53.3	1512
FG	3.500	88.90	8.625	219.08	1.25	31.75	58.5	1658

Type 550C 105 °C High Ripple, Inverter Grade, Aluminum

Ultra-Ripple, Long Life Screw Terminal Type

Ratings

Additional Smaller Sizes available at www.cde.com/catalogs/550C.pdf

Cap. (μF)	Catalog Part Number	ESR Max	Ripple Current Max		Nominal Size D x L (in)
		@ 25 °C	@ 85 °C	@ 105 °C	
		120 Hz (mΩ)	120 Hz (A)	120 Hz (A)	
200 Vdc (250 Vdc Surge)					
2,800	550C282T200CH2B	39.1	10.5	3.8	2 1/2 x 2 5/8
4,000	550C402T200CB2B	28.1	13.2	4.7	2 1/2 x 3 1/8
5,100	550C512T200CJ2B	22.0	15.6	5.6	2 1/2 x 3 5/8
6,200	550C622T200CC2B	17.8	18.1	6.5	2 1/2 x 4 1/8
7,300	550C732T200CD2B	15.2	20.3	7.3	2 1/2 x 4 5/8
7,300	550C732T200DJ2B	18.3	19.1	6.9	3 x 3 5/8
8,500	550C852T200CE2B	13.4	22.5	8.1	2 1/2 x 5 1/8
9,000	550C902T200DC2B	15.2	21.9	7.9	3 x 4 1/8
9,600	550C962T200CF2B	11.9	24.5	8.8	2 1/2 x 5 5/8
11,000	550C113T200DD2B	13.0	24.5	8.8	3 x 4 5/8
12,000	550C123T200DE2B	11.5	27.0	9.7	3 x 5 1/8
13,000	550C133T200FC2B	15.5	23.8	8.6	3 1/2 x 4 1/8
14,000	550C143T200DF2B	10.3	29.4	10.6	3 x 5 5/8
15,000	550C153T200DP2D	9.8	30.6	11.0	3 x 5 7/8
16,000	550C163T200FD2B	13.2	26.8	9.6	3 1/2 x 4 5/8
18,000	550C183T200FE2B	11.7	29.4	10.6	3 1/2 x 5 1/8
20,000	550C203T200FF2D	10.5	31.9	11.5	3 1/2 x 5 5/8
21,000	550C213T200DN2D	8.2	36.8	13.2	3 x 7 5/8
22,000	550C223T200FP2D	10.0	33.2	11.9	3 1/2 x 5 7/8
24,000	550C243T200DG2D	7.1	40.4	14.6	3 x 8 5/8
30,000	550C303T200FN2D	8.0	40.6	14.6	3 1/2 x 7 5/8
35,000	550C353T200FG2D	6.8	44.9	16.2	3 1/2x 8 5/8
250 Vdc (300 Vdc Surge)					
2,100	550C212T250CH2B	50.5	9.3	3.3	2 1/2 x 2 5/8
4,200	550C422T250DB2B	28.9	14.5	5.2	3 X 3 1/8
4,600	550C462T250CC2B	23.4	15.8	5.7	2 1/2 X 4 1/8
5,400	550C542T250CD2B	19.9	17.8	6.4	2 1/2 X 4 5/8
5,400	550C542T250DJ2B	22.3	17.3	6.2	3 X 3 5/8
6,200	550C622T250CE2B	17.1	19.9	7.2	2 1/2 X 5 1/8
6,600	550C662T250DC2B	18.5	19.9	7.1	3 X 4 1/8
7,100	550C712T250CF2B	15.2	21.7	7.8	2 1/2 X 5 5/8
7,800	550C782T250DD2B	15.8	22.3	8.0	3 X 4 5/8
9,000	550C902T250DE2B	13.9	24.6	8.9	3 X 5 1/8
9,700	550C972T250FC2D	16.5	23.1	8.3	3 1/2 X 4 1/8
10,000	550C103T250DF2B	12.4	26.8	9.6	3 X 5 5/8
11,000	550C113T250DP2B	11.4	28.2	10.2	3 X 5 7/8
11,000	550C113T250FD2D	14.3	25.8	9.3	3 1/2 X 4 5/8
13,000	550C133T250FE2D	12.5	28.4	10.2	3 1/2 X 5 1/8
15,000	550C153T250DN2D	9.4	34.4	12.4	3 X 7 5/8
15,000	550C153T250FF2D	11.0	31.2	11.2	3 1/2 X 5 5/8
16,000	550C163T250FP2D	10.5	32.3	11.6	3 1/2 X 5 7/8

		ESR Max	Ripple Current Max		Nominal Size
		@ 25 °C	@ 85 °C	@ 105 °C	
Cap.	Catalog	120 Hz	120 Hz	120 Hz	D x L
(µF)	Part Number	(mΩ)	(A)	(A)	(in)
250 Vdc (300 Vdc Surge)					
17,000	550C173T250DG2D	7.9	38.3	13.8	3 X 8 5/8
22,000	550C223T250FN2D	8.5	39.5	14.2	3 1/2 X 7 5/8
25,000	550C253T250FG2D	7.2	43.7	15.7	3 1/2X 8 5/8
300 Vdc (350 Vdc Surge)					
1,600	550C162T300CH2B	78.2	7.4	2.7	2 1/2 X 2 5/8
2,200	550C222T300CB2B	56.1	9.3	3.4	2 1/2 X 3 1/8
2,800	550C282T300CJ2B	43.8	11.1	4.0	2 1/2 X 3 5/8
3,400	550C342T300DB2B	37.7	12.7	4.6	3 X 3 1/8
3,500	550C352T300CC2B	35.9	12.8	4.6	2 1/2 X 4 1/8
4,100	550C412T300CD2B	30.6	14.4	5.2	2 1/2 X 4 5/8
4,400	550C442T300DJ2B	29.5	15.1	5.4	3 X 3 5/8
4,700	550C472T300CE2B	26.7	15.9	5.7	2 1/2 X 5 1/8
5,300	550C532T300CF2B	23.4	17.5	6.3	2 1/2 X 5 5/8
5,400	550C542T300DC2B	24.4	17.3	6.2	3 X 4 1/8
6,400	550C642T300DD2B	20.8	19.4	7.0	3 X 4 5/8
7,200	550C722T300FC2D	18.8	21.7	7.8	3 1/2 X 4 1/8
7,400	550C742T300DE2B	18.2	21.5	7.7	3 X 5 1/8
8,300	550C832T300DF2B	16.2	23.4	8.4	3 X 5 5/8
8,600	550C862T300FD2D	16.0	24.3	8.8	3 1/2 X 4 5/8
8,800	550C882T300DP2B	15.4	24.3	8.8	3 X 5 7/8
9,900	550C992T300FE2D	14.0	26.8	9.7	3 1/2 X 5 1/8
11,000	550C113T300FF2D	12.1	29.6	10.7	3 1/2 X 5 5/8
12,000	550C123T300FP2D	11.5	30.8	11.1	3 1/2 X 5 7/8
12,000	550C123T300DN2B	12.4	30.0	10.8	3 X 7 5/8
14,000	550C143T300DG2D	10.5	33.3	12.0	3 X 8 5/8
16,000	550C163T300FN2D	9.2	38.1	13.7	3 1/2 X 7 5/8
18,000	550C183T300FG2D	7.7	42.3	15.2	3 1/2X 8 5/8
350 Vdc (400 Vdc Surge)					
1,300	550C132T350CH2B	86.7	7.1	2.5	2 1/2 X 2 5/8
1,800	550C182T350CB2B	62.1	8.8	3.2	2 1/2 X 3 1/8
2,300	550C232T350CJ2B	48.5	10.5	3.8	2 1/2 X 3 5/8
2,800	550C282T350CC2B	40.0	12.1	4.4	2 1/2 X 4 1/8
2,800	550C282T350DB2B	41.2	12.2	4.4	3 X 3 1/8
3,300	550C332T350CD2B	34.0	13.6	4.9	2 1/2 X 4 5/8
3,600	550C362T350DJ2B	32.2	14.5	5.2	3 X 3 5/8
3,800	550C382T350CE2B	29.7	15.1	5.4	2 1/2 X 5 1/8
4,300	550C432T350CF2B	25.8	16.7	6.0	2 1/2 X 5 5/8
4,400	550C442T350DC2B	26.6	16.6	6.0	3 X 4 1/8
5,100	550C512T350DD2B	22.7	18.6	6.7	3 X 4 5/8
5,800	550C582T350FC2D	20.5	20.8	7.5	3 1/2 X 4 1/8
5,900	550C592T350DE2B	19.8	20.6	7.4	3 X 5 1/8

Type 550C 105 °C High Ripple, Inverter Grade, Aluminum

Ultra-Ripple, Long Life Screw Terminal Type

Additional Smaller Sizes available at www.cde.com/catalogs/550C.pdf

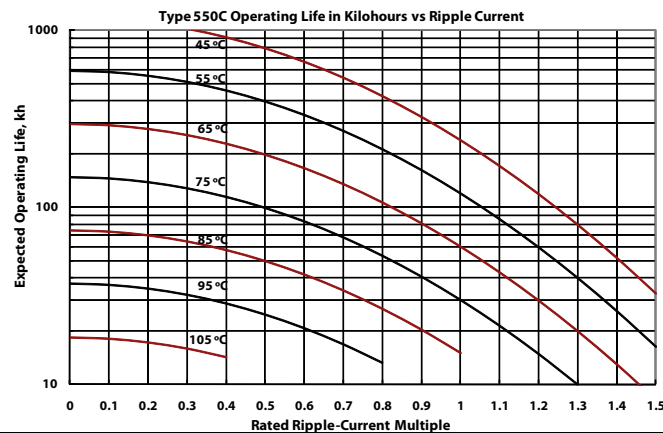
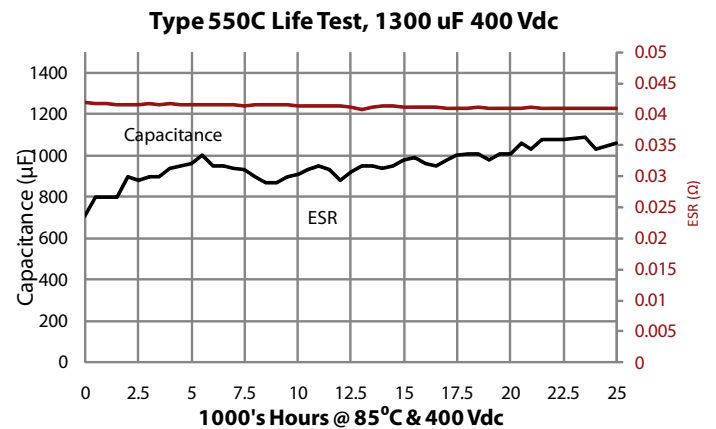
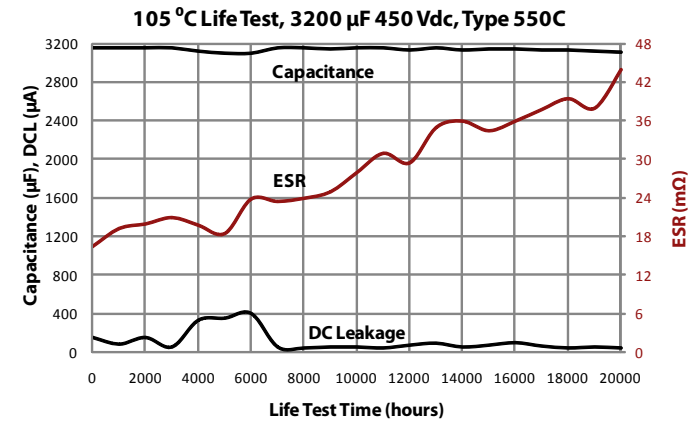
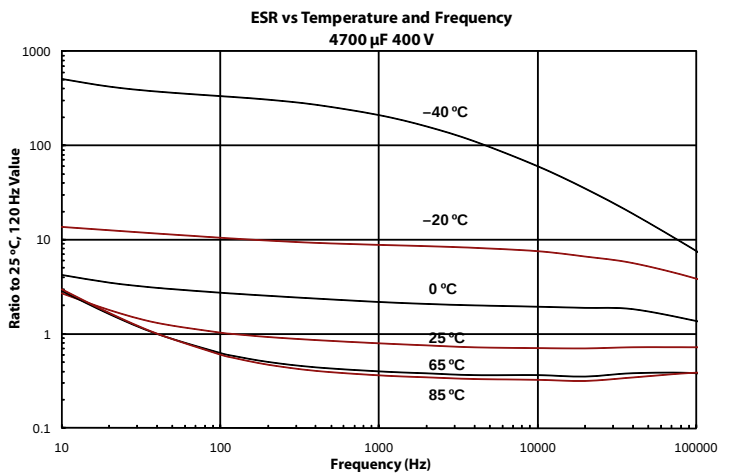
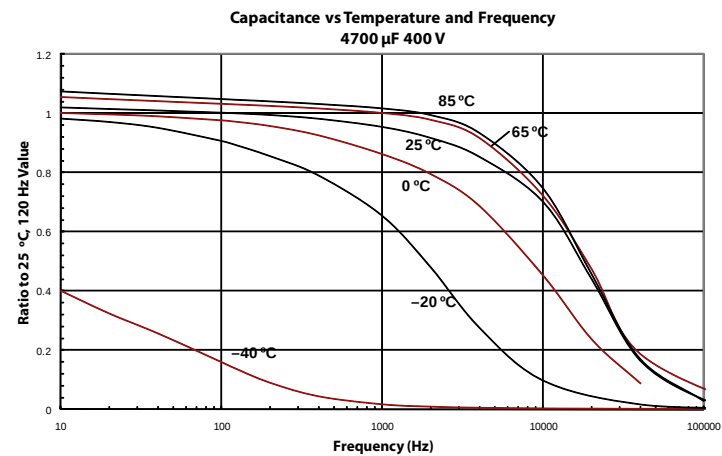
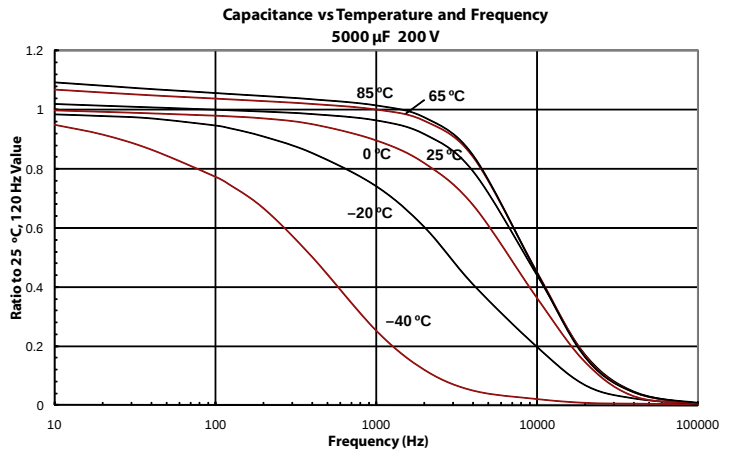
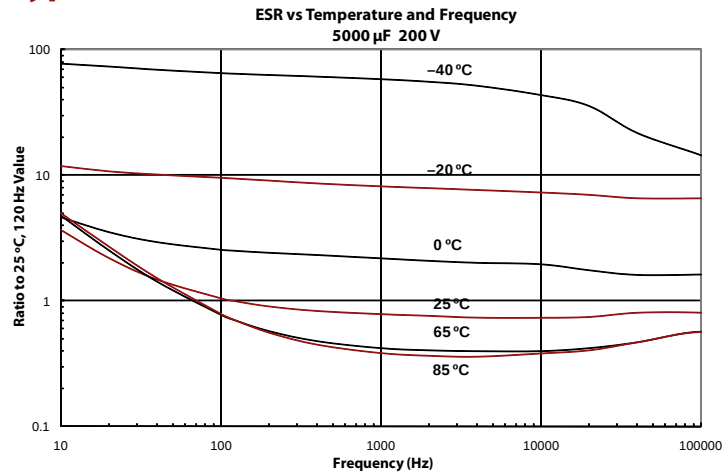
		ESR Max	Ripple Current Max		Nominal Size
		@ 25 °C	@ 85 °C	@ 105 °C	
Cap.	Catalog	120 Hz	120 Hz	120 Hz	D x L
(µF)	Part Number	(mΩ)	(A)	(A)	(in)
350 Vdc (400 Vdc Surge)					
6,700	550C672T350DF2B	17.7	22.4	8.1	3 X 5 5/8
6,900	550C692T350FD2D	17.5	23.3	8.4	3 1/2 X 4 5/8
7,100	550C712T350DP2B	16.8	23.3	8.4	3 X 5 7/8
8,000	550C802T350FE2D	15.3	25.7	9.3	3 1/2 X 5 1/8
9,000	550C902T350FF2D	13.2	28.4	10.2	3 1/2 X 5 5/8
9,500	550C952T350FP2D	12.5	29.6	10.6	3 1/2 X 5 7/8
9,600	550C962T350DN2B	13.3	29.0	10.4	3 X 7 5/8
11,000	550C113T350DG2D	11.1	32.3	11.6	3 X 8 5/8
13,000	550C133T350FN2D	9.9	36.6	13.2	3 1/2 X 7 5/8
15,000	550C153T350FG2D	8.3	40.7	14.6	3 1/2 X 8 5/8
400 Vdc (450 Vdc Surge)					
990	550C991T400CH2B	95.2	6.7	2.4	2 1/2 X 2 5/8
1,400	550C142T400CB2B	68.2	8.4	3.0	2 1/2 X 3 1/8
1,800	550C182T400CJ2B	53.2	10.0	3.6	2 1/2 X 3 5/8
2,200	550C222T400CC2B	43.8	11.6	4.2	2 1/2 X 4 1/8
2,200	550C222T400DB2B	45.7	11.6	4.2	3 X 3 1/8
2,600	550C262T400CD2B	37.3	13.0	4.7	2 1/2 X 4 5/8
2,800	550C282T400DJ2B	35.7	13.7	4.9	3 X 3 5/8
3,000	550C302T400CE2B	32.5	14.4	5.2	2 1/2 X 5 1/8
3,400	550C342T400CF2B	28.9	15.8	5.7	2 1/2 X 5 5/8
3,400	550C342T400DC2B	29.3	15.8	5.7	3 X 4 1/8
4,000	550C402T400DD2B	25.0	17.7	6.4	3 X 4 5/8
4,600	550C462T400BF2D	22.2	20.0	7.2	3 1/2 X 4 1/8
4,700	550C472T400DE2B	21.4	19.8	7.1	3 X 5 1/8
5,300	550C532T400DF2B	19.0	21.6	7.8	3 X 5 5/8
5,400	550C542T400FD2D	18.9	22.4	8.1	3 1/2 X 4 5/8
5,600	550C562T400DP2B	18.1	22.4	8.1	3 X 5 7/8
6,200	550C622T400FE2D	16.5	24.7	8.9	3 1/2 X 5 1/8
7,100	550C712T400FF2D	14.3	27.3	9.8	3 1/2 X 5 5/8
7,500	550C752T400FP2D	13.5	28.4	10.2	3 1/2 X 5 7/8
7,800	550C782T400DN2B	14.6	27.6	9.9	3 X 7 5/8
9,000	550C902T400DG2D	12.4	30.6	11.0	3 X 8 5/8
9,700	550C972T400FN2D	10.9	34.9	12.6	3 1/2 X 7 5/8
11,000	550C113T400FG2D	9.2	38.7	13.9	3 1/2 X 8 5/8
450 Vdc (500 Vdc Surge)					
700	550C701T450CH2B	108.0	6.3	2.3	2 1/2 X 2 5/8
980	550C981T450CB2B	77.3	7.9	2.9	2 1/2 X 3 1/8
1,300	550C132T450CJ2B	57.3	9.7	3.5	2 1/2 X 3 5/8
1,500	550C152T450CC2B	49.6	10.9	3.9	2 1/2 X 4 1/8
1,500	550C152T450DB2B	47.4	11.3	4.1	3 X 3 1/8
1,800	550C182T450CD2B	42.2	12.2	4.4	2 1/2 X 4 5/8

Additional Smaller Sizes available at www.cde.com/catalogs/550C.pdf					
Cap. (µF)	Catalog Part Number	ESR Max	Ripple Current Max		Nominal Size
		@ 25 °C	@ 85 °C	@ 105 °C	
		120 Hz (mΩ)	120 Hz (A)	120 Hz (A)	D x L (in)
450 Vdc (500 Vdc Surge)					
2,000	550C202T450DJ2B	37.0	13.5	4.8	3 X 3 5/8
2,100	550C212T450CE2B	34.9	13.9	5.0	2 1/2 X 5 1/8
2,400	550C242T450CF2B	30.5	15.3	5.5	2 1/2 X 5 5/8
2,400	550C242T450DC2B	30.6	15.5	5.6	3 X 4 1/8
2,900	550C292T450DD2B	26.1	17.4	6.3	3 X 4 5/8
3,200	550C322T450FC2D	22.9	19.6	7.1	3 1/2 X 4 1/8
3,300	550C332T450DE2B	22.7	19.2	6.9	3 X 5 1/8
3,700	550C372T450DF2B	20.2	20.9	7.5	3 X 5 5/8
3,800	550C382T450FD2D	19.5	22.1	7.9	3 1/2 X 4 5/8
4,000	550C402T450DP2B	19.2	21.8	7.8	3 X 5 7/8
4,400	550C442T450FE2D	17.0	24.3	8.8	3 1/2 X 5 1/8
5,000	550C502T450FF2D	15.1	26.5	9.6	3 1/2 X 5 5/8
5,300	550C532T450FP2D	14.3	27.6	9.9	3 1/2 X 5 7/8
5,500	550C552T450DN2B	15.5	26.8	9.6	3 X 7 5/8
6,400	550C642T450DG2B	13.1	29.8	10.7	3 X 8 5/8
7,100	550C712T450FN2D	11.3	34.3	12.3	3 1/2 X 7 5/8
8,100	550C812T450FG2D	9.5	38.2	13.7	3 1/2 X 8 5/8
500 Vdc (550 Vdc Surge)					
680	550C681T500CH2B	197.0	4.7	1.7	2 1/2 X 2 5/8
960	550C961T500CB2B	141.0	5.9	2.1	2 1/2 X 3 1/8
1,200	550C122T500CJ2B	109.0	7.0	2.5	2 1/2 X 3 5/8
1,400	550C142T500DB2B	86.2	8.4	3.0	3 X 3 1/8
1,500	550C152T500CC2B	85.3	8.3	3.0	2 1/2 X 4 1/8
1,800	550C182T500CD2B	72.4	9.3	3.4	2 1/2 X 4 5/8
1,900	550C192T500DJ2B	66.0	10.1	3.6	3 X 3 5/8
2,000	550C202T500CE2B	66.4	10.1	3.6	2 1/2 X 5 1/8
2,300	550C232T500DC2B	53.9	11.6	4.2	3 X 4 1/8
2,300	550C232T500CF2B	55.7	11.4	4.1	2 1/2 X 5 5/8
2,700	550C272T500DD2B	45.2	13.2	4.7	3 X 4 5/8
3,100	550C312T500DE2B	38.9	14.7	5.3	3 X 5 1/8
3,200	550C322T500FC2D	38.8	15.1	5.4	3 1/2 X 4 1/8
3,500	550C352T500DF2B	34.5	16.1	5.8	3 X 5 5/8
3,700	550C372T500DP2B	32.4	16.8	6.0	3 X 5 7/8
3,800	550C382T500FD2D	32.3	17.1	6.2	3 1/2 X 4 5/8
4,300	550C432T500FE2D	28.4	18.8	6.8	3 1/2 X 5 1/8
4,900	550C492T500FF2D	24.3	20.9	7.5	3 1/2 X 5 5/8
5,200	550C522T500FP2D	23.0	21.8	7.9	3 1/2 X 5 7/8
5,400	550C542T500DN2B	26.1	20.9	7.5	3 X 7 5/8
6,000	550C602T500DG2B	19.7	24.2	8.7	3 X 8 5/8
7,000	550C702T500FN2D	17.0	27.9	10.1	3 1/2 X 7 5/8
8,400	550C842T500DG2D	14.3	31.0	11.2	3.5 X 8 5/8

Type 550C 105 °C High Ripple, Inverter Grade, Aluminum

Ultra-Ripple, Long Life Screw Terminal Type

Typical Performance Curves



Type 500R 85 °C High Ripple Current, Inverter Grade, Aluminum

New Higher Ripple Current than Type 500C Screw Terminal Type



The Type 500R is a higher ripple-current version of CDE's long-life Type 500C specifically designed to provide the ripple current capability and long life required for high reliability inverter applications. Like the 500C, the 500R has an endurance rating of 5,000 hours at +85 °C with the rated ripple current applied, and it is offered in the 350 V to 500 V ratings appropriate for use as dc-link bus capacitors in inverter applications.

Highlights

- Large can sizes
- Screw terminals, english and metric
- 5000 hour rated ripple current life
- Higher ripple current than 500C
- 350 to 500 Vdc ratings
- RoHS compliant

Specifications

Temperature Range	−40 °C to +85 °C							
Rated Voltage Range	350 Vdc to 500 Vdc							
Capacitance Range	1,100 uF to 18,000 μF							
Capacitance Tolerance	±20%							
Leakage Current	≤3 √CV μA,5 mA max, 5 minutes							
Ripple Current Multipliers	Ambient Temperature							
	45 °C	55 °C	65 °C	75 °C	85 °C			
	2.00	1.82	1.59	1.33	1.00			
	Frequency							
	50 Hz	60 Hz	120 Hz	360 Hz	1 kHz	5 kHz	10 kHz & up	
	2 & 2½" diameters							
	350 V	0.78	0.83	1.00	1.20	1.29	1.34	1.35
	400–500 V	0.77	0.82	1.00	1.22	1.33	1.39	1.40
	3 & 3½" diameters							
	350 V	0.84	0.88	1.00	1.12	1.17	1.20	1.20
400–500 V	0.79	0.84	1.00	1.18	1.26	1.31	1.32	
Low Temperature Characteristics	Impedance ratio: Z _{−20°C} /Z _{+25°C} ≤ 3 (350–500 Vdc)							
Endurance Life Test	5000 h at full load at 85 °C Δ Capacitance ±20% ESR 200% of limit DCL 100% of limit							
Shelf Life Test	500 h at 85 °C Capacitance 100% of limit ESR 100% of limit DCL 100% of limit							
Vibration	10 to 55 Hz, 0.06" and 10 g max, 1.5 h each of 2 axes							
RoHS Compliant								

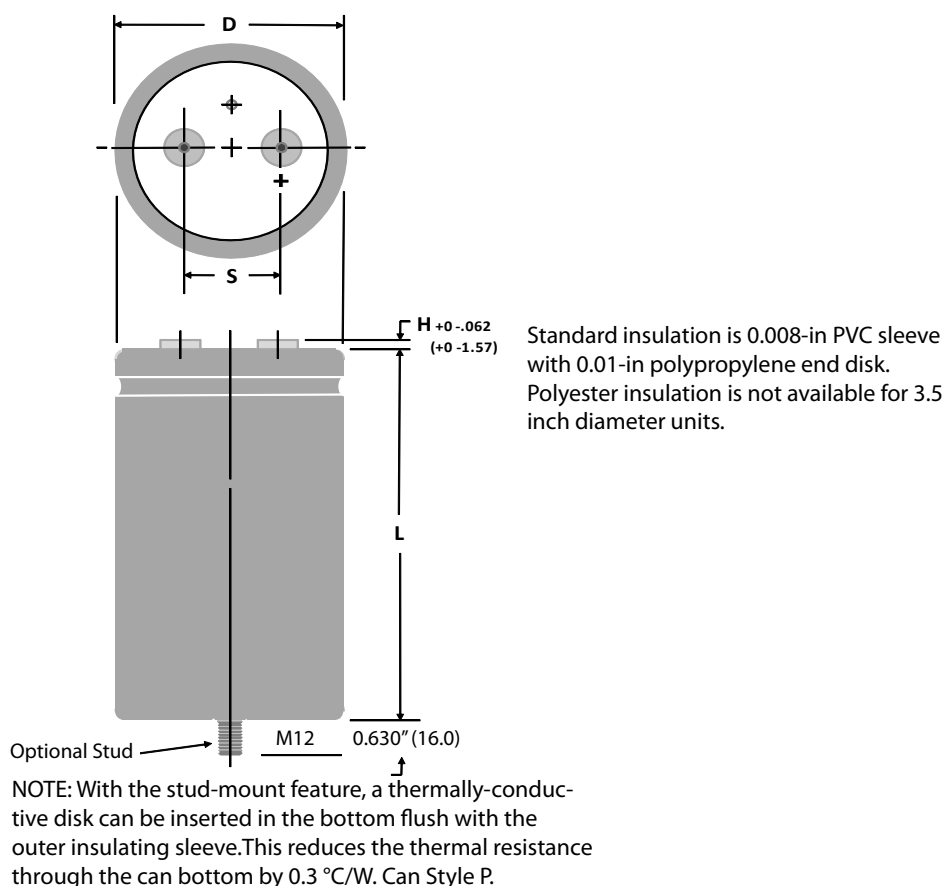
Type 500R 85 °C High Ripple Current, Inverter Grade, Aluminum

New Higher Ripple Current than Type 500C Screw Terminal Type

Part Numbering System

500R	103	M	350	DN	2	E	S
Type	Capacitance	Tolerance	Voltage	Case Code	Insulation	Terminal	Can Style
472 = 4700 μ F	103 = 10,000 μ F	M = $\pm 20\%$ U = $-10\%+75\%$ T = $10\%+50\%$	350 = 350 Vdc 500 = 500 Vdc		0 = None 1 = Polyester 2 = PVC	A = Low Post B = High Post D = High Current, Low Post E = High Current, High Post F or M = M5 Post G = M6 Low Post H = M6 High Post	Blank = Standard Can S = Stud Bottom P = Stud with Thermal Pad

Outline Drawing



Terminal Dimensions

Terminal Style	For Case Diameters	Code	Post Diameter		H max		Thread	min Full Thread		Torque	
			in	mm	in	mm		in	mm	in-lb	N-m
Low Post	2 to 3	A	0.314	8.0	0.094	2.4	10-32	0.218	5.5	25	2.82
High Post	2 to 3	B	0.314	8.0	0.281	7.1	10-32	0.375	9.5	25	2.82
High Current, Low	2½ to 3½	D	0.684	17.4	0.125	3.2	¼-28	0.344	8.7	60	6.78
High Current, High	2½ to 3½	E	0.684	17.4	0.281	7.1	¼-28	0.469	11.9	60	6.78
M5 Post, Small	1¾ to 2	M	0.314	8.0	0.281	7.1	M5	0.375	9.5	25	2.82
M5 Post	2½ & 3	F	0.512	13.0	0.230	5.8	M5	0.344	8.7	25	2.82
M6 Low Post	2½ to 3½	G	0.684	17.4	0.125	3.2	M6	0.344	8.7	60	6.78
M6 High Post	2½ to 3½	H	0.684	17.4	0.281	7.1	M6	0.469	11.9	60	6.78

Type 500R 85 °C High Ripple Current, Inverter Grade, Aluminum

New Higher Ripple Current than Type 500C Screw Terminal Type

Uninsulated Case Dimensions

For insulated case, add 0.024"(0.610 mm) to "D" and 0.030"(0.762 mm) to length.

Case Code	Diameter (D)		Length (L)		Terminals (S)		Typical Weight	
	±0.031 in	±0.78 mm	±0.062 in	±1.57 mm	±0.015 in	±0.38 mm	oz	g
BC	2.000	50.80	4.125	104.78	0.88	22.23	9.5	269
BD	2.000	50.80	4.625	117.48	0.88	22.23	10.3	292
BE	2.000	50.80	5.125	130.18	0.88	22.23	10.7	303
BF	2.000	50.80	5.625	142.88	0.88	22.23	13.0	369
CH	2.500	63.50	2.625	66.68	1.13	28.58	9.2	261
CJ	2.500	63.50	3.625	92.08	1.13	28.58	12.7	361
CC	2.500	63.50	4.125	104.78	1.13	28.58	15.0	425
CD	2.500	63.50	4.625	117.48	1.13	28.58	17.2	488
CE	2.500	63.50	5.125	130.18	1.13	28.58	19.3	547
CF	2.500	63.50	5.625	142.88	1.13	28.58	21.4	607
DB	3.000	76.20	3.125	79.38	1.25	31.75	16.7	473
DJ	3.000	76.20	3.625	92.08	1.25	31.75	20.0	567
DC	3.000	76.20	4.125	104.78	1.25	31.75	22.2	629
DD	3.000	76.20	4.625	117.48	1.25	31.75	25.5	723
DE	3.000	76.20	5.125	130.18	1.25	31.75	30.0	850
DF	3.000	76.20	5.625	142.88	1.25	31.75	31.9	904
DP	3.000	76.20	5.875	149.23	1.25	31.75	32.8	931
DN	3.000	76.20	7.625	193.68	1.25	31.75	39.5	1119
DG	3.000	76.20	8.625	219.08	1.25	31.75	43.3	1227
FC	3.500	88.90	4.125	104.78	1.25	31.75	30.0	850
FD	3.500	88.90	4.625	117.48	1.25	31.75	34.4	976
FE	3.500	88.90	5.125	130.18	1.25	31.75	40.5	1148
FF	3.500	88.90	5.625	142.88	1.25	31.75	43.1	1221
FP	3.500	88.90	5.875	149.23	1.25	31.75	44.3	1257
FN	3.500	88.90	7.625	193.68	1.25	31.75	53.3	1512
FG	3.500	88.90	8.625	219.08	1.25	31.75	58.5	1658

Type 500R 85 °C High Ripple Current, Inverter Grade, Aluminum

New Higher Ripple Current than Type 500C Screw Terminal Type Ratings

Cap (μF)	Catalog Part Number	ESR Max. 25 °C		Ripple Amps. 85 °C		Nominal Size D x L (in)
		120 Hz	10kHz	120 Hz	>3 kHz	
		(mΩ)	(mΩ)	(A)	(A)	
350 Vdc (400 Vdc Surge)						
2200	500R222M350BC2B	47	37.6	8.0	11.3	2 X 4 1/8
2200	500R222M350BD2B	43	34.4	9.0	12.6	2 X 4 5/8
2700	500R272M350BE2B	38	30.4	10.0	14.0	2 X 5 1/8
2800	500R282M350CJ2E	36	28.8	10.0	14.0	2 1/2 X 3 5/8
3100	500R312M350BF2B	33	26.4	11.0	15.4	2 X 5 5/8
3300	500R332M350CC2E	30	24.0	12.0	16.8	2 1/2 X 4 1/8
3600	500R362M350CD2E	24	19.2	14.0	19.6	2 1/2 X 4 5/8
3900	500R392M350CE2E	23	18.4	15.0	21.0	2 1/2 X 5 1/8
3900	500R392M350DJ2E	23	18.4	14.0	19.6	3 X 3 5/8
4700	500R472M350CF2E	19	15.2	16.0	22.4	2 1/2 X 5 5/8
4700	500R472M350DC2E	19	15.2	16.0	22.4	3 X 4 1/8
5000	500R502M350CP2E	18	14.4	18.0	25.2	2 1/2 X 5 7/8
5600	500R562M350DD2E	16	12.8	18.0	25.2	3 X 4 5/8
6200	500R622M350DE2E	15	12.0	19.0	26.6	3 X 5 1/8
6800	500R682M350DF2E	14	11.2	21.0	29.4	3 X 5 5/8
6800	500R682M350FC2E	16	12.8	20.2	28.3	3 1/2 X 4 1/8
7000	500R702M350CN2E	13	10.4	23.0	32.2	2 1/2 X 7 5/8
7200	500R722M350DP2E	13	10.4	22.0	30.8	3 X 5 7/8
7700	500R772M350FD2E	14	11.2	21.6	30.2	3 1/2 X 4 5/8
8200	500R822M350CG2E	12	9.6	24.0	33.6	2 1/2 X 8 5/8
8200	500R822M350FE2E	12	9.6	24.0	33.6	3 1/2 X 5 1/8
10000	500R103M350DN2E	9	7.2	28.0	39.2	3 X 7 5/8
10000	500R103M350FF2E	10	8.0	27.7	38.8	3 1/2 X 5 5/8
10800	5051082M350FP2E	9	7.2	28.4	39.8	3 1/2 X 5 7/8
12000	500R123M350DG2E	8	6.4	32.5	45.5	3 X 8 5/8
15000	500R153M350FN2E	6	4.8	38.1	53.4	3 1/2 X 7 5/8
18000	500R183M350FG2E	6	4.8	44.6	62.5	3 1/2 X 8 5/8
400 Vdc (450 Vdc Surge)						
2,200	500R222M400BC2B	44.0	35.2	8.3	11.7	2 X 4 1/8
2,200	500R222M400BD2B	40.0	32.0	9.7	13.5	2 X 4 5/8
2,700	500R272M400BE2B	37.0	29.6	10.5	14.7	2 X 5 1/8
2,700	500R272M400CJ2E	37.0	29.6	10.1	14.2	2 1/2 X 3 5/8
3,000	500R302M400BF2B	35.0	28.0	11.0	15.4	2 X 5 5/8
3,300	500R332M400CC2E	31.0	24.8	11.8	16.5	2 1/2 X 4 1/8
3,600	500R362M400CD2E	27.0	21.6	13.1	18.3	2 1/2 X 4 5/8
3,900	500R392M400CE2E	25.0	20.0	13.8	19.3	2 1/2 X 5 1/8
3,900	500R392M400DJ2E	26.0	20.8	13.7	19.1	3 X 3 5/8
4,700	500R472M400CF2E	22.0	17.6	15.4	21.5	2 1/2 X 5 5/8
4,800	500R482M400DC2E	22.0	17.6	15.2	21.3	3 X 4 1/8
5,000	500R502M400CP2E	20.0	16.0	17.1	24.0	2 1/2 X 5 7/8
5,600	500R562M400DD2E	19.0	15.2	16.8	23.6	3 X 4 5/8
6,300	500R632M400DE2E	17.0	13.6	18.6	26.0	3 X 5 1/8

Cap (μF)	Catalog Part Number	ESR Max. 25 °C		Ripple Amps. 85 °C		Nominal Size D x L (in)
		120 Hz (mΩ)	10kHz (mΩ)	120 Hz (A)	>3 kHz (A)	
400 Vdc (450 Vdc Surge)						
6,700	500R672M400FC2E	16.0	12.8	20.0	28.1	3 1/2 X 4 1/8
6,800	500R682M400DF2E	16.0	12.8	19.9	27.9	3 X 5 5/8
6,900	500R692M400CN2E	15.0	12.0	21.2	29.7	2 1/2 X 7 5/8
7,200	500R722M400DP2E	15.0	12.0	20.7	29.0	3 X 5 7/8
7,300	500R732M400FD2E	14.0	11.2	21.6	30.2	3 1/2 X 4 5/8
8,200	500R822M400CG2E	13.0	10.4	24.1	33.7	2 1/2 X 8 5/8
8,200	500R822M400FE2E	13.0	10.4	24.0	33.6	3 1/2 X 5 1/8
9,200	500R922M400DN2E	12.0	9.6	24.4	34.2	3 X 7 5/8
10,000	500R103M400DG2E	10.0	8.0	27.6	38.6	3 X 8 5/8
10,000	500R103M400FF2E	10.0	8.0	27.3	38.2	3 1/2 X 5 5/8
11,000	5051102M400FP2E	10.0	8.0	28.3	39.7	3 1/2 X 5 7/8
13,000	500R133M400FN2E	8.0	6.4	32.9	46.0	3 1/2 X 7 5/8
15,000	500R153M400FG2E	7.0	5.6	38.4	53.7	3 1/2 X 8 5/8
420 Vdc (470 Vdc Surge)						
1,600	500R162M420BC2B	81.0	64.8	6.7	9.4	2 X 4 1/8
1,700	500R172M420BD2B	75.0	60.0	7.7	10.7	2 X 4 5/8
1,900	500R192M420CJ2E	71.0	56.8	7.2	10.1	2 1/2 X 3 5/8
2,100	500R212M420BE2B	62.0	49.6	8.7	12.2	2 X 5 1/8
2,200	500R222M420BF2B	58.0	46.4	9.2	12.9	2 X 5 5/8
2,400	500R242M420CC2E	58.0	46.4	8.6	12.0	2 1/2 X 4 1/8
2,600	500R262M420CD2E	50.0	40.0	9.6	13.5	2 1/2 X 4 5/8
2,800	500R282M420CE2E	46.0	36.8	10.2	14.3	2 1/2 X 5 1/8
2,800	500R282M420DJ2E	49.0	39.2	10.7	14.9	3 X 3 5/8
3,400	500R342M420CF2E	39.0	31.2	11.5	16.1	2 1/2 X 5 5/8
3,400	500R342M420DC2E	40.0	32.0	12.2	17.1	3 X 4 1/8
3,600	500R362M420CP2E	37.0	29.6	12.8	18.0	2 1/2 X 5 7/8
4,000	500R402M420DD2E	35.0	28.0	13.4	18.7	3 X 4 5/8
4,500	500R452M420DE2E	29.0	23.2	15.2	21.3	3 X 5 1/8
4,900	500R492M420CN2E	27.0	21.6	16.3	22.8	2 1/2 X 7 5/8
4,900	500R492M420DF2E	26.0	20.8	16.7	23.4	3 X 5 5/8
5,000	500R502M420FC2E	28.0	22.4	15.3	21.4	3 1/2 X 4 1/8
5,200	500R522M420DP2E	26.0	20.8	17.1	23.9	3 X 5 7/8
5,500	500R552M420FD2E	26.0	20.8	16.8	23.5	3 1/2 X 4 5/8
5,900	500R592M420CG2E	23.0	18.4	18.6	26.1	2 1/2 X 8 5/8
6,400	500R642M420FE2E	22.0	17.6	19.9	27.9	3 1/2 X 5 1/8
6,600	500R662M420DN2E	20.0	16.0	20.3	28.4	3 X 7 5/8
7,400	500R742M420FF2E	18.0	14.4	23.0	32.2	3 1/2 X 5 5/8
7,800	500R782M420DG2E	17.0	13.6	22.8	31.9	3 X 8 5/8
8,000	5050C83M420FP2E	17.0	13.6	24.5	34.3	3 1/2 X 5 7/8
8,600	500R862M420FN2E	16.0	12.8	27.4	38.4	3 1/2 X 7 5/8
11,000	500R113M420FG2E	13.0	10.4	32.8	46.0	3 1/2 X 8 5/8

Type 500R 85 °C High Ripple Current, Inverter Grade, Aluminum

New Higher Ripple Current than Type 500C Screw Terminal Type

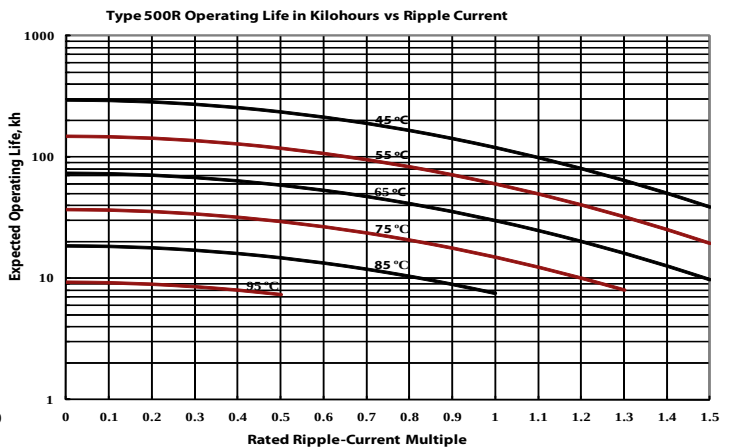
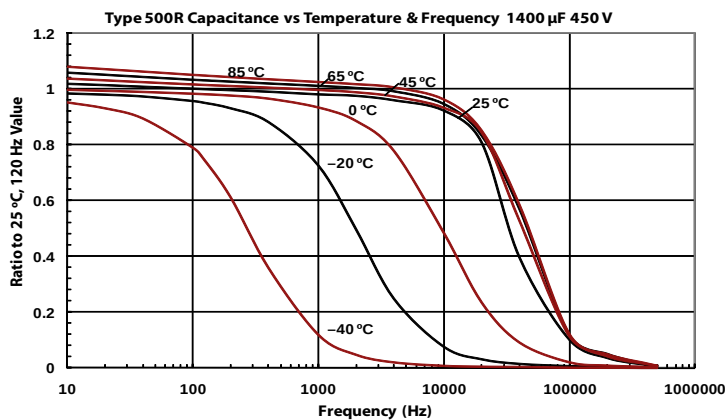
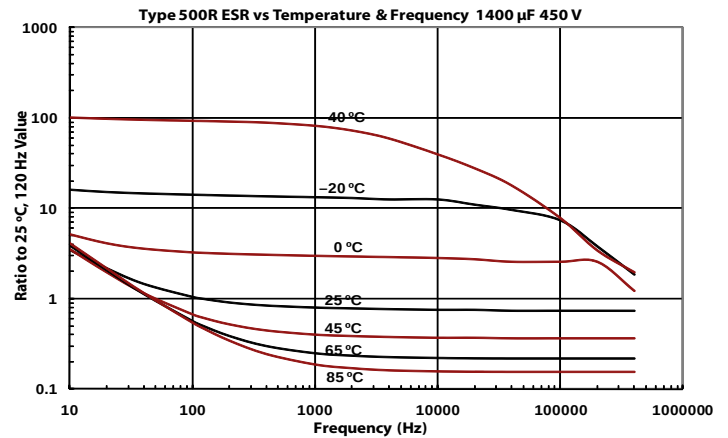
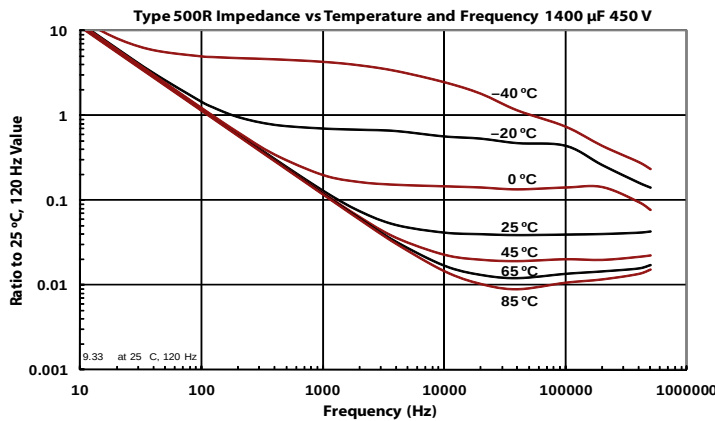
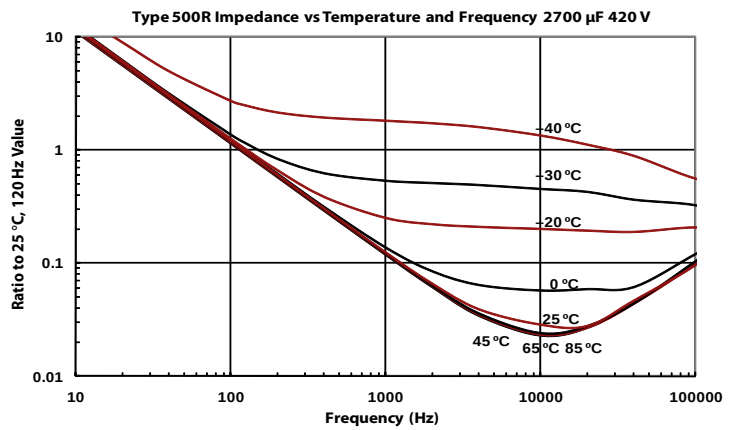
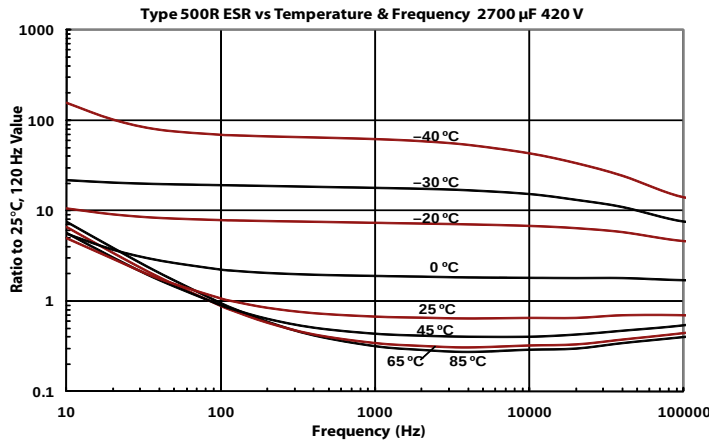
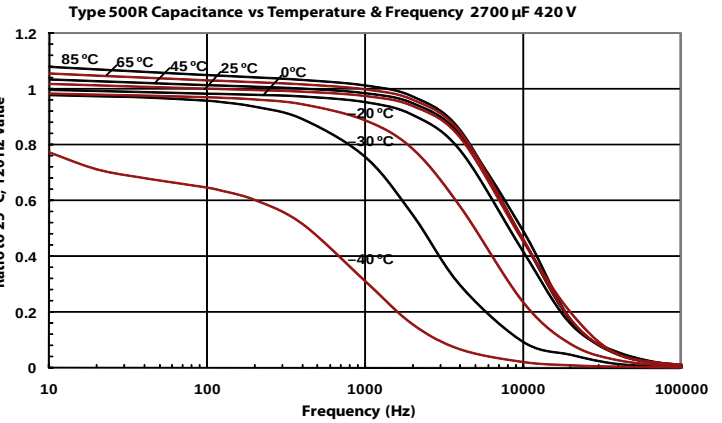
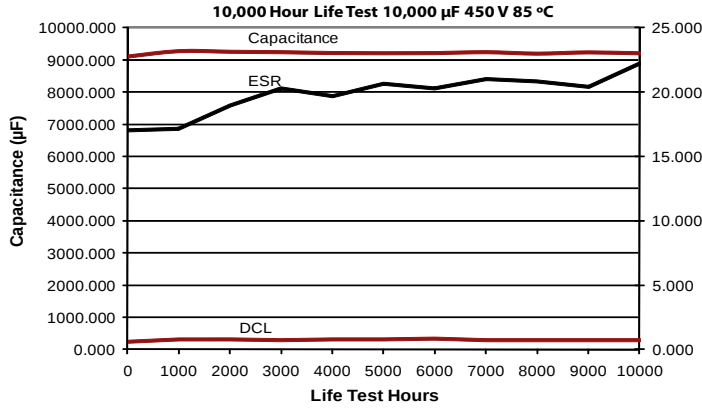
Cap (µF)	Catalog Part Number	ESR Max. 25 °C		Ripple Amps. 85 °C		Nominal Size
		120 Hz (mΩ)	10kHz (mΩ)	120 Hz (A)	>3 kHz (A)	D x L (in)
450 Vdc (500 Vdc Surge)						
1400	500R142M450BC2B	104	83.2	6.0	8.4	2 X 4 1/8
1600	500R162M450BD2B	89	71.2	7.0	9.8	2 X 4 5/8
1900	500R192M450BE2B	73	58.4	8.1	11.4	2 X 5 1/8
2000	500R202M450BF2B	71	56.8	8.4	11.8	2 X 5 5/8
2000	500R202M450CJ2E	72	57.6	7.9	11.0	2 1/2 X 3 5/8
2500	500R252M450CC2E	55	44.0	9.6	13.5	2 1/2 X 4 1/8
2700	500R272M450CD2E	51	40.8	10.2	14.3	2 1/2 X 4 5/8
2900	500R292M450DJ2E	50	40.0	10.5	14.8	3 X 3 5/8
3100	500R312M450CE2E	45	36.0	11.1	15.5	2 1/2 X 5 1/8
3500	500R352M450CF2E	40	32.0	12.0	16.8	2 1/2 X 5 5/8
3600	500R362M450DC2E	41	32.8	12.1	16.9	3 X 4 1/8
3700	500R372M450CP2E	38	30.4	13.4	18.7	2 1/2 X 5 7/8
4200	500R422M450DD2E	35	28.0	13.4	18.7	3 X 4 5/8
4700	500R472M450DE2E	30	24.0	14.9	20.9	3 X 5 1/8
5200	500R522M450CN2E	27	21.6	17.0	23.8	2 1/2 X 7 5/8
5200	500R522M450DF2E	26	20.8	17.0	23.8	3 X 5 5/8
5500	500R552M450FC2E	29	23.2	15.0	21.0	3 1/2 X 4 1/8
5600	500R562M450DP2E	26	20.8	18.0	25.2	3 X 5 7/8
5900	500R592M450FD2E	25	20.0	17.1	24.0	3 1/2 X 4 5/8
6200	500R622M450CG2E	23	18.4	19.3	27.0	2 1/2 X 8 5/8
6900	500R692M450DN2E	21	16.8	21.0	29.4	3 X 7 5/8
6900	500R692M450FE2E	22	17.6	19.9	27.9	3 1/2 X 5 1/8
7800	500R782M450FF2E	21	16.8	21.3	29.8	3 1/2 X 5 5/8
8000	5050C83M450FP2E	19	15.2	23.2	32.5	3 1/2 X 5 7/8
8200	500R822M450DG2E	17	13.6	23.0	32.2	3 X 8 5/8
9400	500R942M450FN2E	17	13.6	26.1	36.6	3 1/2 X 7 5/8
11000	500R113M450FG2E	13	10.4	32.4	45.3	3 1/2 X 8 5/8

Cap (µF)	Catalog Part Number	ESR Max. 25 °C		Ripple Amps. 85 °C		Nominal Size D x L (in)
		120 Hz	10kHz	120 Hz	>3 kHz	
		(mΩ)	(mΩ)	(A)	(A)	
500 Vdc (550 Vdc Surge)						
1100	500R112M500BC2B	136	108.8	5.3	7.4	2 X 4 1/8
1300	500R132M500BD2B	115	92.0	6.0	8.3	2 X 4 5/8
1500	500R152M500BE2B	98	78.4	6.7	9.4	2 X 5 1/8
1600	500R162M500CJ2E	93	74.4	6.8	9.5	2 1/2 X 3 5/8
1800	500R182M500BF2B	79	63.2	7.7	10.8	2 X 5 5/8
2000	500R202M500CC2E	76	60.8	8.1	11.4	2 1/2 X 4 1/8
2200	500R222M500CD2E	70	56.0	8.5	11.9	2 1/2 X 4 5/8
2300	500R232M500DJ2E	68	54.4	9.0	12.6	3 X 3 5/8
2400	500R242M500CE2E	62	49.6	9.3	13.0	2 1/2 X 5 1/8
2800	500R282M500CF2E	55	44.0	10.5	14.7	2 1/2 X 5 5/8
2800	500R282M500DC2E	54	43.2	10.5	14.7	3 X 4 1/8
2900	500R292M500CP2E	52	41.6	10.9	15.3	2 1/2 X 5 7/8
3300	500R332M500DD2E	48	38.4	11.2	15.7	3 X 4 5/8
3700	500R372M500DE2E	41	32.8	12.6	17.6	3 X 5 1/8
3700	500R372M500FC2E	42	33.6	13.0	18.1	3 1/2 X 4 1/8
4100	500R412M500CN2E	38	30.4	14.3	20.1	2 1/2 X 7 5/8
4100	500R412M500DF2E	37	29.6	13.9	19.4	3 X 5 5/8
4200	500R422M500FD2E	37	29.6	14.5	20.3	3 1/2 X 4 5/8
4400	500R442M500DP2E	35	28.0	14.3	20.0	3 X 5 7/8
4900	500R492M500CG2E	32	25.6	16.4	22.9	2 1/2 X 8 5/8
5400	500R542M500FE2E	29	23.2	17.2	24.0	3 1/2 X 5 1/8
5600	500R562M500FF2E	26	20.8	19.1	26.7	3 1/2 X 5 5/8
5700	500R572M500DN2E	25.971	20.8	19.2	26.9	3 X 7 5/8
6000	5050C63M500FP2E	26	20.8	20.0	27.9	3 1/2 X 5 7/8
6800	500R682M500DG2E	23	18.4	23.0	32.2	3 X 8 5/8
8200	500R822M500FN2E	18	14.4	25.7	35.9	3 1/2 X 7 5/8
8800	500R882M500FG2E	17	13.6	26.8	37.6	3 1/2 X 8 5/8

Type 500R 85 °C High Ripple Current, Inverter Grade, Aluminum

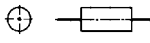
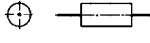
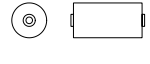
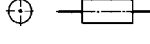
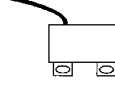
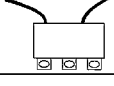
New Higher Ripple Current than Type 500C Screw Terminal Type

Typical Performance Curves



A collection of various Cornell Dubilier electronic components is displayed on a reflective surface. The components include several large electrolytic capacitors in cylindrical and rectangular forms, some with multiple terminals. There are also smaller capacitors, some in cylindrical cases and others in rectangular cases. A few integrated circuits or small modules are visible, some with multiple pins. The components are arranged in a way that showcases their different shapes and sizes. The background is a solid dark color, and the reflective surface creates clear reflections of the components.

Film Capacitor Selector Guide

Type	Form Factor		Cap. Range (μF)	Voltage Range	Temperature Range	Applications	Highlights	Page
High Frequency, DC Filter, Polypropylene								
930	Axial Round		0.022 - 10.0	100 - 630 Vdc	−55 °C to 105 °C	DC Filtering	Small Sizes	156
935	Axial Round		1.0 - 30.0	100 - 400 Vdc	−55°C to 105 °C	DC Filtering	High Frequency Applications	161
DCF	Screw and Lug Terminals		5.0 - 100	630 Vdc	−55 °C to 105 °C	DC Filtering	High Current High Capacitance	165
Snubber, Polypropylene								
940C	Axial Round		0.1 - 4.7	600 - 3000 Vdc	−55 °C to 105 °C	Snubber	High dV/dt	168
941C	Axial Oval		0.1 - 4.7	600 - 3000 Vdc	−55 °C to 105 °C	Snubber	High dV/dt	172
942C	Axial Round		0.01 - 2.5	600 -2000 Vdc	−55 °C to 105 °C	Snubber	Very High dV/dt	176
943C	Axial Oval		0.01 - 2.5	600 - 3000 Vdc	−55 °C to 105 °C	Snubber	Very High dV/dt	180
SCD	Module		0.47 - 2.0	100 - 1200 Vdc	−40 °C to 85 °C	IGBT Snubber	Low Inductance Mount directly to the IGBT module	184
SCM	Module		0.47 - 2.0	600 - 2000 Vdc	−40 °C to 85 °C	Clamp, IGBT Snubber	Low Inductance Hyperfast Diode	187
SCC	Module		0.47 - 2.0	600 - 1200 Vdc	−40 °C to 85 °C	Dual IGBT Snubber module with diode	Low Inductance Hyperfast Diode	190
DC Link, Polypropylene								
UNL	Snap-in Cylindrical		4.7 - 35	400 -1500 Vdc	−55 °C to 85 °C	DC Link	Exceptionally low ESR High Ripple	192
944	Screw Terminal		33 - 220	800 - 1400 Vdc	−40 °C to 85 °C	DC Link	Low Inductance Low Profile	195
945	Screw Terminal		65 - 500	600 - 1000 Vdc	−55 °C to 85 °C	DC Link	Exceptionally Low ESR High Ripple Current	198
947C	Screw Terminal		110 - 1500	800 -1300 Vdc	−40 °C to 85 °C	DC Link	Non-polar Dielectric Dry, Resin Filled	201

Power Film Capacitor Application Guide

CONTENTS

DC Capacitor Overview	153
Construction	153
Metallized Capacitors	153
Film/Foil Capacitors	153
Hybrid Capacitors	153
Custom Designed Film Capacitors	154
Applications for Power Film Capacitors	154
DC Link for Inverter Applications	154
Advantages of Film vs. Aluminum Electrolytics for DC Link Apps	154
DC Output Filtering	154
IGBT Snubber	154
Definitions	154

DC FILM CAPACITORS FOR POWER ELECTRONICS AN OVERVIEW

Film capacitors are widely used in power electronics applications including but not limited to DC Link, DC output filtering, and as IGBT snubbers. The dielectric most often used is polypropylene because it has low dissipation factor (DF) that permits high AC currents with low self heating, and it performs well over the temperature range and frequencies in power electronics applications. Other materials such as polyester (PET) may be used for light duty filtering but its high dissipation factor makes it a poor selection where high AC current or high peak current at high rep rates are encountered. Materials such as polycarbonate and PPS have desirable characteristics for power electronics applications but they are in scarce supply and are therefore relatively expensive and exotic materials.

This catalog features only polypropylene types which cover the vast majority of power electronics applications.

CONSTRUCTION

The capacitor's electrode system is an important design consideration. There are three basic options for electrodes used with polypropylene capacitors. A description of each follows:

Metallized Capacitors



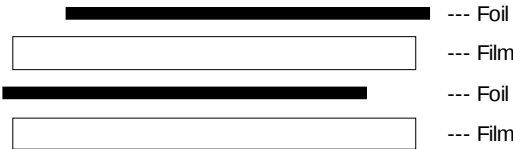
Metallized capacitors use a thin layer of vapor deposited aluminum, zinc or alloy (aluminum/zinc) blend as the electrode system. The metallized layer is only hundreds of angstroms thick, so it takes up little space in the capacitor winding relative to the dielectric thickness, measured in microns. Metallized capacitors offer the highest energy density of all of the available film constructions. Metallized capacitors also self heal. A fault in

PAGE

the dielectric system vaporizes the metal deposit in the area of the fault, a process known as clearing. The result of "clearing" is a tiny amount of capacitance loss while allowing the capacitor to continue to operate without any adverse effects. If a condition arises that causes multiple clearings, such as overvoltage, or dielectric aging at end of life, the capacitor will continue to self heal and lose capacitance. The capacitor is considered to have failed when it loses 3% or more of its capacitance.

Changing the metallized electrode thickness alters the properties of the capacitor. Lighter metallization, higher ohms per square, result in higher energy density designs. While light metallization improves the voltage capabilities, it compromises the rms and peak current carrying capabilities of the capacitor. Patterned metallized layers add another dimension to the mix of options. Metallized patterns have built in fuses that further enhance the self healing capabilities and dielectric voltage withstanding properties of the system.

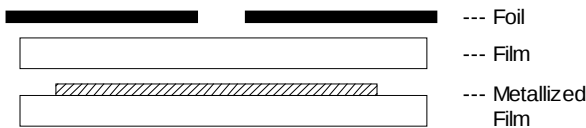
Film / Foil Capacitors



Aluminum foil electrodes are used where very high peak and rms currents are required. IGBT snubbers, for example, are designed to handle the high peak currents encountered during IGBT switching. Typical IGBT applications, such as those encountered in high power inverters, have voltage rise times exceeding 1000 V/ μ s with switching rates of 10 kHz or more. The end connections of a capacitor employing a simple metallized electrode system would deteriorate with repeated exposure to these conditions. Foil capacitors use electrodes that are about 5 microns thick to handle the high current pulses.

Foil electrodes are also used where the capacitor will see high rms current, especially where the capacitor size is small. As an example, tank circuits for induction heating devices typically require capacitors less than 100 μ F that must handle hundreds of amperes. The main benefit of the foil electrodes is to reduce the heat rise by reducing ESR. Cooler operation prevents thermal runaway and dielectric failure from self heating. The main disadvantages of foil electrode capacitors are their inability to self heal and low energy density relative to metallized types.

Hybrid Capacitors



One scheme that combines the benefits of metallized and foil electrode types, is the hybrid series capacitor. It has foil electrodes that connect to the external leads of the capacitor and a free-floating metallized electrode wound in a series configuration. The result is a self healing capacitor that handles high current pulses.

With all of these variables at play, the choice of dielectric, electrode metals, electrode thickness and metallized pattern must be considered to optimize the capacitor's performance for a specific application.

CUSTOM DESIGNED FILM CAPACITORS

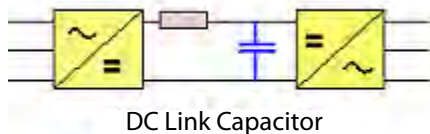
This catalog offers standard capacitor products for use in common power electronics applications. Inverter design engineers are often challenged with finding a capacitor that takes them out of the realm of standard catalog items. Packaging a capacitor to accommodate a physical bus structure is a common design challenge. Designing for a specific ripple current rating and life expectancy at a given ambient temperature is another consideration that usually requires custom solution. CDE is highly experienced in custom capacitor design and manufacturing. Where possible, we "repackage" standard materials to meet specific customer requirements.

APPLICATIONS for POWER FILM CAPACITORS

The most common applications for DC film capacitors in power electronics are DC Link, DC Filtering and snubbers for IGBT modules. A brief description of each application follows:

DC Link for Inverter Applications

Large value capacitors are used as the energy storage element or DC-Link at the DC input to the inverter. The size of the DC Link depends on the amount of AC energy it must absorb to maintain required ripple current at the DC line and the level of rms current it can handle because of ESR heating.



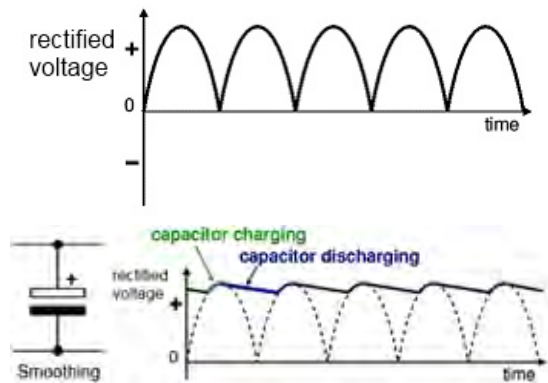
Aluminum Electrolytic capacitors offer greater capacitance per unit volume and higher energy densities compared with film. The trade-off is that the much higher ESR of aluminum electrolytic capacitors often results in capacitor banks that are oversized to handle the ripple current requirements. Polypropylene film capacitors have much lower ESR to handle the AC ripple without overheating. Film technology advantages over electrolytics are listed below.

Advantages of Film Capacitors versus Aluminum Electrolytics for DC Link Applications

- Two times the voltage capability frees you from series capacitors and voltage balancing resistors.
- Three times the ripple current capability frees you from needing excess cap to handle ripple.
- Dry construction frees you from the explosive failures with liquid electrolyte.
- Solid encapsulation delivers higher shock and vibration withstanding.
- Non-polar dielectric delivers reverse-proof mounting and AC withstanding.

DC Output Filtering

Film capacitors are widely used for DC filtering in power supplies. Their function is to smooth out the DC voltage waveform after rectification.



IGBT Snubber

As with all switching devices, IGBTs are subjected to voltage transients during turn-off operation. Voltage transients result from energy trapped in the circuit's stray inductance. The amount of voltage overshoot is dependent on the amount of stray inductance and the switching speed (dV/dt) of the IGBT. Fortunately, there are ways to protect IGBTs and other switching devices from over voltage; the most common is to use a snubber capacitor across the switch to divert the inductive current. IGBT snubbers may be terminated with lugs for direct mount across the IGBT to minimize added inductance.

DEFINITIONS

Capacitance (C)

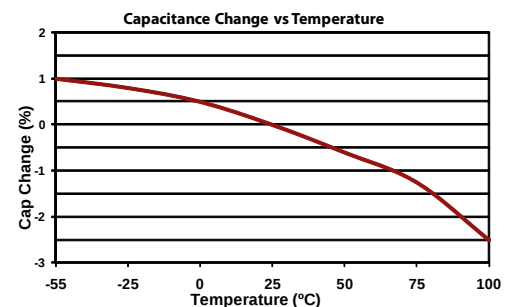
Nominal capacitance typically given at 25 °C and 1 kHz in units of microfarad (μF)

Capacitance Tolerance

Range in percent for which the capacitance may differ from rated capacitance as measured at 25 °C and 1 kHz. This range results from variances in materials and manufacturing processes rather than from temperature and or frequency characteristics. The standard manufacturing tolerance for polypropylene capacitors is ± 10% or "K" tolerance. Tighter tolerance of ± 5%, "J" tolerance, can be achieved for polypropylene, usually at a slightly higher cost.

Temperature Coefficient

The temperature coefficient is the average capacitance change per °C over a specified temperature range.



Capacitive Reactance (X_c)

The reactance is the capacitor's opposition to passing AC current. It is inversely proportional to frequency and capacitance.

$$X_c = \frac{1}{2\pi fC}$$

Equivalent Series Resistance (ESR)

The total ohmic resistance that contributes to power loss, represented by a single resistance in series with the ideal capacitor. Typically given at 25 °C at 10 kHz and 100 kHz in units of milliohms (mΩ)

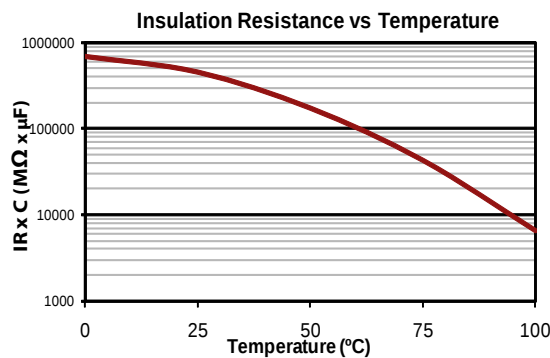
Equivalent Series Inductance (ESL)

The total series inductance of the capacitor winding including any internal connections, typically low and given at 25 °C in units of nanohenries (nH)

Insulation Resistance (IR)

The ratio of the applied voltage to leakage current (DCL), typically given in megohms (MΩ) or in the discharge time constant format MΩ x μF. The formula for insulation resistance:

$$IR = \frac{V_{dc}}{DCL}$$

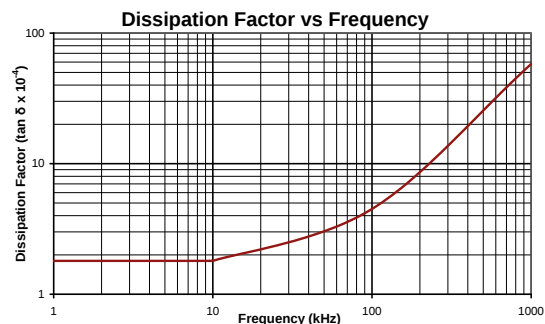
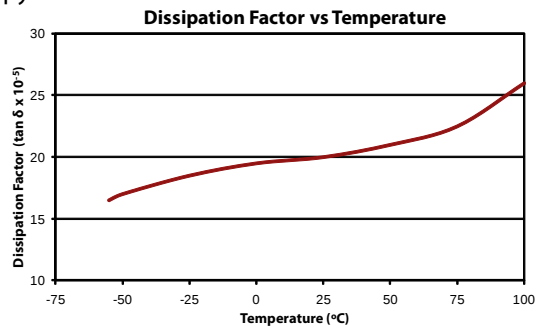


Dissipation Factor (DF, tanδ)

The ratio of the capacitor's ESR to capacitive reactance X_c , the DF of a capacitor is frequency and temperature dependent and is usually specified at 25 °C and 1 kHz.

$$DF = \frac{ESR}{X_c}$$

DF change with temperature and frequency are given for polypropylene in the curves below.



Rated DC Voltage (V_{dc})

The maximum operating peak voltage for which the capacitor has been designed for continuous operation at rated temperature.

Rated AC Voltage (V_{RMS})

The maximum operating AC rms voltage for which the capacitor has been designed for continuous operating at rated temperature, typically given at 60 Hz.

Peak Current (I_{pk})

The peak current amplitude for which the capacitor is designed, given in units of amperes (A). The Peak Current is related to dV/dt by the formula:

$$I_{pk} = C \cdot dV / dt$$

Where C is rated capacitance.

RMS Current / Ripple Current (I_{RMS})

The maximum operating rms current, typically given at a specific reference frequency and temperature in units of amperes rms (A_{RMS})

Thermal Resistance (θ_{cc}, θ_{ca})

The total thermal resistance from core to case (θ_{cc}) and case to ambient (θ_{ca}) defined as the temperature change per dissipated power (°C/W)

The formula for thermal resistance:

$$\theta_{ca} + \theta_{cc} = \frac{\Delta T}{I_{rms}^2 \cdot ESR}$$

Where ΔT is temperature rise in °C.

Life Expectancy

The life expectancy formula for the power film capacitors in this catalog* is given in terms of applied voltage and temperature.

$$Life_S = Life_R \left(\frac{V_R \cdot F}{V_A} \right)^8 \cdot 2^{\frac{T_R - T_A}{10}}$$

$Life_S$ = Service Life

$Life_R$ = Rated Life

V_R = Rated Voltage

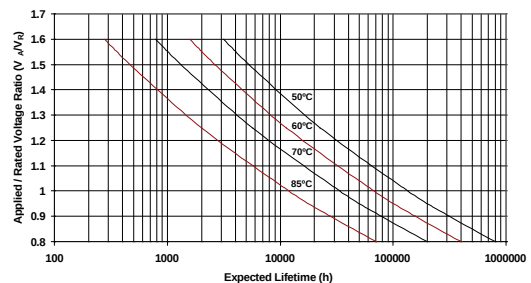
V_A = Applied Voltage

F = Voltage Acceleration Factor

T_R = Rated Temperature

T_A = Ambient Temperature

Expected Lifetime vs Core Temperature and Applied DC Voltage



* Life Expectancy curves for the DC Link types 944U and 947C are given on their datasheets.

Type 930C, Metallized Polypropylene Capacitors for DC Filtering

Low Dissipation, General Purpose



Type 930C metallized polypropylene capacitors are designed for general purpose filtering applications. Their stability and low loss characteristics make them an excellent choice for blocking, filtering, bypassing, coupling and decoupling applications. This Series is UL recognized for construction only under UL File Number E128034(N).

Highlights

- Low dissipation factor
- Self healing
- UL recognized

Specifications

Capacitance Range	0.22 to 10.0 μ F
Capacitance Tolerance	$\pm 10\%$ (K) Standard; $\pm 5\%$ (J) Optional
Rated Voltage	100 to 630 Vdc (70 to 250 Vac, 60 Hz)
Operating Temperature Range with Ripple	-55 °C to 105 °C* *Full rated voltage at 85 °C - derated linearly to 50% rated at 105 °C
Maximum rms Current	Check tables for values
Insulation Resistance	200,000 M Ω x μ F
Test Voltage between Terminals @ 25 °C	200% rated DC voltage for 60 s
Test Voltage between Terminals & Case @ 25 °C	3 kVac @ 50/60 Hz for 60 s
Life Test	1,000 h @ 85 °C, 125% rated DC voltage
Life Expectancy	60,000 h @ rated Vdc, 70 °C 30,000 h @ rated Vac, 70 °C
RoHS Compliant	

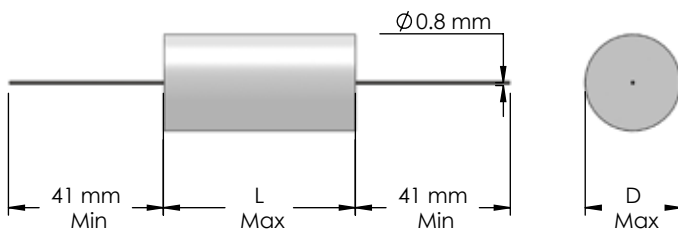
Dimensions

Construction Diagram



Construction Details

Case Material	UL510 Polyester Tape Wrap
Resin Material	UL94V-0 Epoxy Fill
Terminal Material	Tin Plated Copper



Type 930C, Metallized Polypropylene Capacitors for DC Filtering

Low Dissipation, General Purpose

Part Numbering System

930	C	1	P	22	K	-F
Series	Termination Code	Voltage Code	Capacitance Decimal Point	Capacitance Significant Figures (μF)	Tolerance Code	RoHS Compliant Indicator
930	C = Bare Copper Wire	1 = 100 Vdc 2 = 250 Vdc 4 = 400 Vdc 6 = 630 Vdc	S = 0.0 P = 0. W = No decimal point		K = ±10% J = ±5%	

Ratings

NOTE: Other ratings, sizes and performance specifications are available. Contact us.

Cap. (μF)	Catalog Part Number	D mm	L mm	ESR 20-100 kHz (mΩ)	dV/dt (V/μs)	Max. Ripple Current (A) 20 kHz						
						25 °C	35 °C	Case Temperature				
								45 °C	55 °C	65 °C	75 °C	85 °C
100 Vdc (70 Vac)												
.22	930C1P22K-F	7.0	19.0	---	25	2.3	2.3	2.3	2.3	2.3	1.8	1.0
.27	930C1P27K-F	7.6	19.0	---	25	2.6	2.6	2.6	2.6	2.4	1.9	1.1
.33	930C1P33K-F	8.2	19.0	---	25	2.8	2.8	2.8	2.8	2.6	2.2	1.2
.39	930C1P39K-F	8.8	19.0	---	25	3.1	3.1	3.1	3.1	2.9	2.3	1.3
.47	930C1P47K-F	9.5	19.0	37	25	3.7	3.4	3.1	2.8	2.5	2.0	1.4
.56	930C1P56K-F	8.2	25.4	35	14	3.9	3.6	3.3	2.9	2.6	2.1	1.5
.68	930C1P68K-F	8.8	25.4	33	14	4.1	3.8	3.5	3.1	2.8	2.2	1.6
.82	930C1P82K-F	9.6	25.4	31	14	4.3	4.0	3.6	3.2	2.9	2.3	1.7
1.00	930C1W1K-F	10.7	25.4	26	14	5.5	5.1	4.7	4.2	3.6	2.8	2.6
1.20	930C1W1P2K-F	11.5	25.4	24	14	5.7	5.3	4.9	4.4	3.8	3.0	2.8
1.50	930C1W1P5K-F	12.7	25.4	20	14	6.1	5.5	5.1	4.6	4.0	3.2	3.1
1.80	930C1W1P8K-F	13.7	25.4	19	14	6.3	5.7	5.3	4.8	4.1	3.4	3.0
2.00	930C1W2K-F	12.3	31.7	18	10	6.5	6.0	5.5	4.9	4.2	3.5	3.2
2.20	930C1W2P2K-F	12.9	31.7	18	10	6.8	6.3	5.7	2.1	4.4	3.6	3.3
2.70	930C1W2P7K-F	14.1	31.7	17	10	7.1	6.5	6.0	5.3	4.6	3.7	3.4
3.00	930C1W3K-F	14.8	31.7	16	10	7.3	6.7	6.2	5.5	4.8	3.9	3.5
3.30	930C1W3P3K-F	15.4	31.7	16	10	7.4	6.8	6.4	5.6	4.9	4.0	3.6
3.90	930C1W3P9K-F	16.6	31.7	15	10	7.6	6.9	6.6	5.8	5.1	4.1	3.7
4.00	930C1W4K-F	13.6	44.4	15	6	7.8	7.0	6.7	5.9	5.2	4.2	3.8
4.70	930C1W4P7K-F	14.7	44.4	15	6	8.1	7.4	6.8	6.0	5.3	4.3	3.9
5.00	930C1W5K-F	15.1	44.4	14	6	8.3	7.6	7.0	6.2	5.4	4.4	4.0
5.60	930C1W5P6K-F	15.8	44.4	14	6	8.4	7.7	7.1	6.4	5.5	4.5	4.1
6.00	930C1W6K-F	16.4	44.4	14	6	8.5	7.8	7.2	6.5	5.6	4.6	4.2
6.80	930C1W6P8K-F	17.3	44.4	13	6	8.5	8.0	7.4	6.7	5.7	4.7	4.3
8.00	930C1W8K-F	18.7	44.4	13	6	8.6	8.3	7.7	6.8	6.0	4.8	4.4
8.20	930C1W8P2K-F	18.9	44.4	13	6	8.8	8.6	8.0	7.0	6.1	4.9	4.5
10.00	930C1W10K-F	20.7	44.4	12	6	9.0	9.0	8.5	7.6	6.6	5.4	4.9
250 Vdc (175 Vac)												
.10	930C2P1K-F	8.0	19.0	---	37	1.5	1.5	1.5	1.5	1.5	1.5	.09
.12	930C2P12K-F	8.0	19.0	---	37	1.9	1.9	1.9	1.9	1.9	1.7	1.0
.15	930C2P15K-F	8.5	19.0	---	37	2.3	2.3	2.3	2.3	2.3	1.9	1.1
.18	930C2P18K-F	9.0	19.0	---	37	2.7	2.7	2.7	2.7	2.5	2.0	1.2

Type 930C, Metallized Polypropylene Capacitors for DC Filtering

Low Dissipation, General Purpose

Cap. (μF)	Catalog Part Number	D mm	L mm	ESR 20-100 kHz (mΩ)	dV/dt (V/μs)	Max. Ripple Current (A) 20 kHz						
						25 °C	35 °C	Case Temperature				
								45 °C	55 °C	65 °C	75 °C	85 °C
250 Vdc (175 Vac)												
.22	930C2P22K-F	8.5	25.4	---	21	1.9	1.9	1.9	1.9	1.9	1.9	1.3
.27	930C2P27K-F	8.5	25.4	---	21	2.4	2.4	2.4	2.4	2.4	2.2	1.4
.33	930C2P33K-F	9.2	25.4	---	21	2.9	2.9	2.9	2.9	2.9	2.3	1.5
.39	930C2P39K-F	9.9	25.4	---	21	3.4	3.4	3.4	3.2	2.9	2.3	1.6
.47	930C2P47K-F	10.7	25.4	35	21	3.8	3.7	3.6	3.4	2.9	2.4	1.7
.56	930C2P56K-F	11.8	25.4	33	21	3.9	3.8	3.7	3.5	3.1	2.5	1.8
.68	930C2P68K-F	12.0	31.7	32	15	4.0	3.9	3.8	3.7	3.2	2.6	1.9
.82	930C2P82K-F	12.0	31.7	31	15	4.2	4.1	4.0	3.9	3.4	2.8	2.0
1.00	930C2W1K-F	13.0	32.0	28	15	4.4	4.4	4.4	4.4	4.3	3.5	3.2
1.20	930C2W1P2K-F	14.1	32.0	27	15	4.7	4.6	4.5	5.0	4.5	3.7	3.3
1.50	930C2W1P5K-F	15.6	32.0	26	15	5.1	5.0	4.9	4.4	4.7	3.9	3.5
1.80	930C2W1P8K-F	16.9	31.7	25	15	5.9	5.8	5.7	5.7	5.0	4.1	3.7
2.00	930C2W2K-F	17.8	31.7	21	15	7.2	7.2	6.8	6.0	5.2	4.3	3.9
2.20	930C2W2P2K-F	16.5	44.4	20	9.0	8.4	7.5	7.0	6.3	5.4	4.5	4.1
2.70	930C2W2P7K-F	17.0	44.4	19	9.0	8.6	7.8	7.3	6.6	5.7	4.7	4.3
3.00	930C2W3K-F	17.8	44.4	18	9.0	9.0	8.3	7.6	6.8	5.9	4.8	4.4
3.30	930C2W3P3K-F	18.6	44.4	18	9.0	9.0	8.4	7.8	7.0	6.0	4.9	4.5
3.90	930C2W3P9K-F	20.2	44.4	17	9.0	9.0	8.5	8.0	7.2	6.2	5	4.6
4.00	930C2W4K-F	20.4	44.4	16	9.0	9.0	8.5	8.2	7.4	6.3	5.1	4.7
4.70	930C2W4P7K-F	22.0	44.4	16	9.0	9.0	8.8	8.5	7.7	6.6	5.3	4.9
5.00	930C2W5K-F	22.6	44.4	15	9.0	9.0	9.0	8.8	7.9	6.8	5.6	5.1
5.60	930C2W5P6K-F	23.9	44.4	15	9.0	9.0	9.0	8.9	8.0	7.0	5.8	5.3
6.00	930C2W6K-F	24.7	44.4	15	9.0	9.0	9.0	9.0	8.2	7.2	5.9	5.5
6.80	930C2W6P8K-F	22.4	57.1	15	9.0	9.0	9.0	9.0	8.4	7.4	6.0	5.6
8.00	930C2W8K-F	24.2	57.1	14	9.0	9.0	9.0	9.0	8.7	7.8	6.3	5.8
8.20	930C2W8P2K-F	24.5	57.1	14	9.0	9.0	9.0	9.0	8.8	7.9	6.4	5.9
10.00	930C2W10K-F	26.9	57.1	13	9.0	9.0	9.0	9.0	9.0	8.3	6.8	6.2
400 Vdc (250 Vac)												
.047	930C4S47K-F	8.0	19.0	---	49	1.0	1.0	1.0	1.0	1.0	1.0	0.9
.056	930C4S56K-F	8.0	19.0	---	49	1.1	1.1	1.1	1.1	1.1	1.1	0.9
.068	930C4S68K-F	8.0	19.0	---	49	1.4	1.4	1.4	1.4	1.4	1.4	1.0
.082	930C4S82K-F	8.1	19.0	---	49	1.7	1.7	1.7	1.7	1.7	1.6	1.1
.10	930C4P1K-F	8.8	19.0	---	49	2.0	2.0	2.0	2.0	2.0	1.9	1.3
.12	930C4P12K-F	7.6	25.4	---	28	1.4	1.4	1.4	1.4	1.4	1.4	1.4
.15	930C4P15K-F	8.5	25.4	---	28	1.7	1.7	1.7	1.7	1.7	1.7	1.6
.18	930C4P18K-F	9.0	25.4	---	28	2.1	2.1	2.1	2.1	2.1	2.1	1.7
.22	930C4P22K-F	9.8	25.4	---	28	2.6	2.6	2.6	2.6	2.6	2.5	1.8
.27	930C4P27K-F	10.7	25.4	---	28	3.1	3.1	3.1	3.1	3.1	2.7	1.9
.33	930C4P33K-F	11.9	25.4	---	28	3.8	3.8	3.8	3.8	3.5	2.9	2.0
.39	930C4P39K-F	12.8	25.4	---	28	4.1	4.1	4.1	4.1	3.7	3.1	2.1
.47	930C4P47K-F	13.8	25.4	32	20	5.7	5.5	5.0	4.4	3.8	3.2	2.2
.56	930C4P56K-F	12.8	32.0	31	20	5.7	5.7	5.3	4.4	4.1	3.3	2.3

Type 930C, Metallized Polypropylene Capacitors for DC Filtering

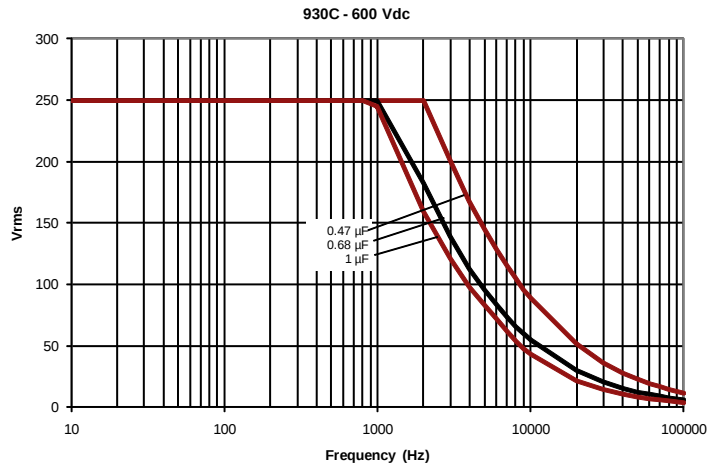
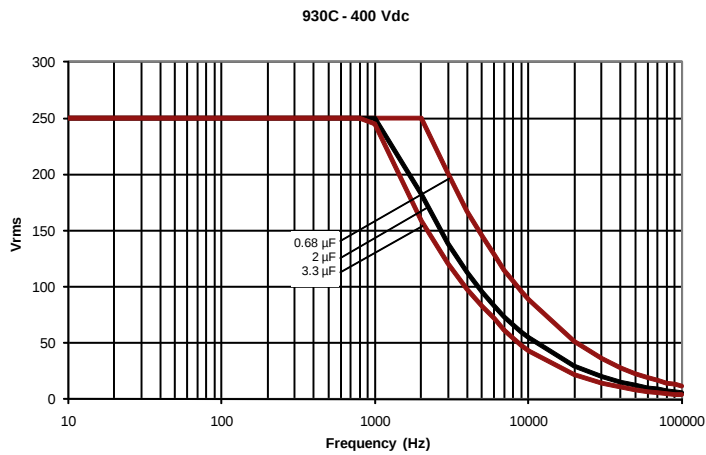
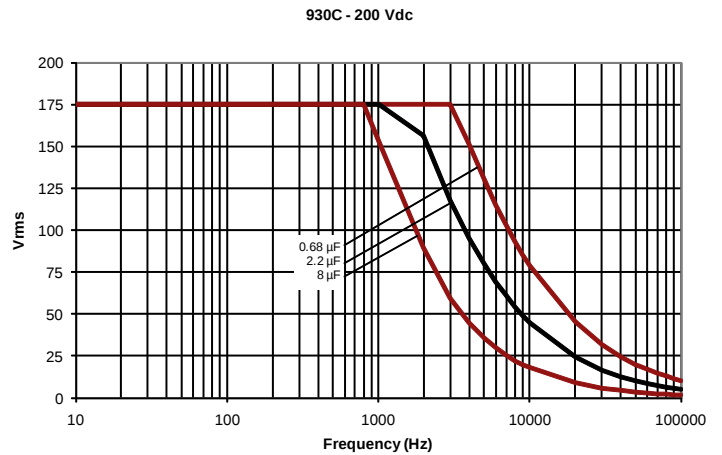
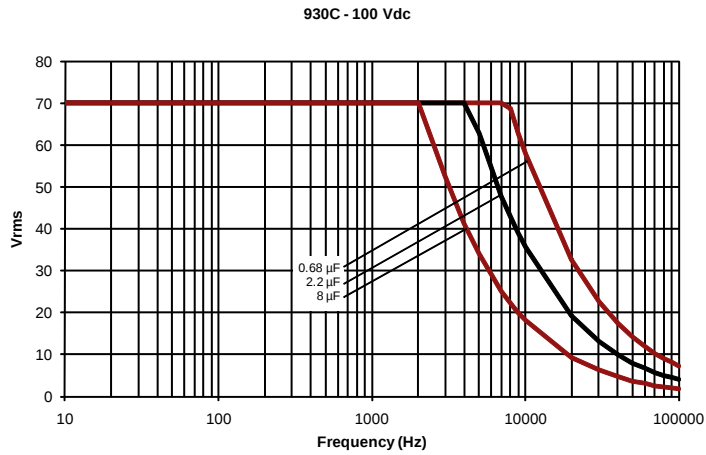
Low Dissipation, General Purpose

Cap. (μ F)	Catalog Part Number	D mm	L mm	ESR 20-100 kHz (m Ω)	dV/dt (V/ μ s)	Max. Ripple Current (A) 20 kHz						
						Case Temperature						
						25 °C	35 °C	45 °C	55 °C	65 °C	75 °C	85 °C
400 Vdc (250 Vac)												
.68	930C4P68K-F	14.0	32.0	30	20	5.7	5.7	5.5	4.8	4.3	3.5	2.4
.82	930C4P82K-F	15.2	32.0	28	20	5.7	5.7	5.6	5.3	4.5	3.7	2.6
1.00	930C4W1K-F	16.6	32.0	27	20	5.7	5.7	5.7	5.7	5.7	4.7	4.3
1.20	930C4W1P2K-F	18.1	32.0	26	20	6.3	6.2	6.0	5.9	5.8	4.9	4.5
1.50	930C4W1P5K-F	18.0	44.4	25	13	7.0	6.9	6.7	6.6	6.5	5.2	4.7
1.80	930C4W1P8K-F	18.2	44.4	23	13	8.0	7.9	7.8	7.7	6.8	5.5	5.0
2.00	930C4W2K-F	19.1	44.4	21	13	9.0	9.0	9.0	8.0	7.0	5.7	5.2
2.20	930C4W2P2K-F	21.0	44.4	20	13	9.0	9.0	9.0	8.3	7.4	5.9	5.4
2.70	930C4W2P7K-F	22.0	44.4	19	13	9.0	9.0	9.0	8.6	7.6	6.0	5.6
3.00	930C4W3K-F	23.1	44.4	17	13	9.0	9.0	9.0	9.0	7.9	6.4	5.9
3.30	930C4W3P3K-F	24.1	44.4	16	13	9.0	9.0	9.0	9.0	8.1	6.6	6.3
3.90	930C4W3P9K-F	26.2	44.4	15	13	9.0	9.0	9.0	9.0	8.3	6.8	6.5
630 Vdc (250 Vac)												
.022	930C6S22K-F	8.0	19.0	---	74	0.8	0.8	0.8	0.8	0.8	0.8	0.8
.027	930C6S27K-F	8.0	19.0	---	74	1.0	1.0	1.0	1.0	1.0	1.0	0.9
.033	930C6S33K-F	8.5	19.0	---	74	1.2	1.2	1.2	1.2	1.2	1.2	1.0
.039	930C6S39K-F	9.1	19.0	---	74	1.4	1.4	1.4	1.4	1.4	1.4	1.0
.047	930C6S47K-F	9.9	19.0	---	74	1.7	1.7	1.7	1.7	1.7	1.6	1.1
.056	930C6S56K-F	10.6	19.0	---	74	2.1	2.1	2.1	2.1	2.1	1.7	1.2
.068	930C6S68K-F	9.0	25.4	---	43	1.3	1.3	1.3	1.3	1.3	1.3	1.3
.082	930C6S82K-F	9.5	25.4	---	43	1.6	1.6	1.6	1.6	1.6	1.6	1.4
.10	930C6P1K-F	11.0	25.4	---	43	1.9	1.9	1.9	1.9	1.9	1.9	1.6
.12	930C6P12K-F	11.2	25.4	---	43	2.3	2.3	2.3	2.3	2.3	2.3	1.8
.15	930C6P15K-F	13.0	32.0	---	30	2.9	2.9	2.9	2.9	2.9	2.6	1.9
.18	930C6P18K-F	13.7	32.0	---	30	3.5	3.5	3.5	3.5	3.5	2.7	1.9
.22	930C6P22K-F	12.6	32.0	---	30	2.8	2.8	2.8	2.8	2.8	2.8	2.3
.27	930C6P27K-F	13.8	32.0	---	30	3.5	3.5	3.5	3.5	3.5	3.3	2.3
.33	930C6P33K-F	15.1	32.0	---	30	4.3	4.3	4.3	4.3	4.3	3.5	2.4
.39	930C6P39K-F	16.2	32.0	---	30	5.0	5.0	5.0	5.0	4.6	3.7	2.5
.47	930C6P47K-F	17.7	37.0	28	20	6.8	6.3	5.8	5.2	4.5	3.6	2.6
.56	930C6P56K-F	15.4	44.4	26	19	7.4	6.9	6.3	5.6	4.8	4.0	2.8
.68	930C6P68K-F	18.0	44.4	25	19	7.8	7.2	6.6	5.9	5.1	4.2	2.9
.82	930C6P82K-F	18.4	44.4	22	19	8.1	7.5	6.9	6.2	5.3	4.3	3.1
1.00	930C6W1K-F	20.2	47.0	18	19	8.6	7.9	7.3	6.5	5.6	4.6	3.6

Type 930C, Metallized Polypropylene Capacitors for DC Filtering

Low Dissipation, General Purpose

RMS Voltage vs Frequency @ 25 °C



Type 935C, Polypropylene Capacitors for High Frequency Filtering

High Current Capacitors for Switching Power Supplies



Type 935 metallized polypropylene capacitors are designed for filtering applications in switching power supplies that operate in the 20-100 kHz range. Their low ESR, high current and high capacitance gives them an advantage over general purpose types. This series is UL recognized for construction only under UL File Number E128034(N).

Highlights

- Low ESR
- High current
- High capacitance
- Self healing
- UL recognized
- Available with lugs

Specifications

Capacitance Range	1.0 to 30.0 μ F
Capacitance Tolerance	± 10 % (K) Standard; ± 5 % (J) Optional
Rated Voltage	100 to 400 Vdc (70 to 250 Vac, 60 Hz)
Operating Temperature Range with Ripple	-55 $^{\circ}$ C to 105 $^{\circ}$ C* *Full rated voltage at 85 $^{\circ}$ C - derated linearly to 50% rated at 105 $^{\circ}$ C
Maximum rms Current	Check tables for values
Insulation Resistance	200,000 M Ω x μ F
Test Voltage between Terminals @ 25 $^{\circ}$ C	200% rated DC voltage for 60 s
Test Voltage between Terminals & Case @ 25 $^{\circ}$ C	3 kVac @ 50/60 Hz for 60 s
Life Test	1,000 h @ 85 $^{\circ}$ C, 125% rated DC voltage
Life Expectancy	60,000 h @ rated Vdc, 70 $^{\circ}$ C 30,000 h @ rated Vac, 70 $^{\circ}$ C
RoHS Compliant	

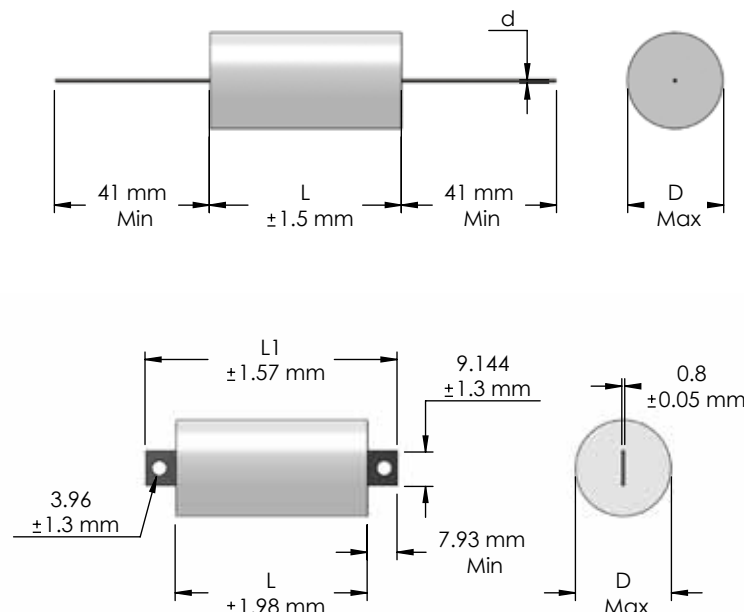
Dimensions

Construction Diagram



Construction Details

Case Material	UL510 Polyester Tape Wrap
Resin Material	UL94V-0 Epoxy Fill
Terminal Material	Tin Plated Copper



Type 935C, Metallized Polypropylene Capacitors for High Frequency Filtering

High Current Capacitors for Switching Power Supplies

Part Numbering System

935	C	1	P	22	K	-F
Series	Termination Code	Voltage Code	Capacitance Decimal Point	Capacitance Significant Figures (μF)	Tolerance Code	RoHS Compliant Indicator
935	C = Bare Copper Wire H = Copper Lugs	1 = 100 Vdc 2 = 250 Vdc 4 = 400 Vdc	W = No decimal point		K = ±10% J = ± 5%	

Ratings

Wire Leads

NOTE: Other ratings, sizes and performance specifications are available. Contact us.

Cap. (μF)	Catalog Part Number	D mm	L mm	d mm	Max. ESR		Max. Ripple Current Amps RMS 20-100 kHz							
					20-100 kHz	dV/dt	Case Temperature							
					(mΩ)	(V/μs)	25 °C	35 °C	45 °C	55 °C	65 °C	75 °C	85 °C	
100 Vdc (70 Vac)														
1	935C1W1K-F	11.9 ± 1.6	19.0	0.8	15	25	9.2	8.5	7.8	7.0	6.0	4.9	4.5	
2	935C1W2K-F	13.6 ± 1.6	23.8	0.8	12	16	10.8	10.0	9.1	8.2	7.0	5.8	5.3	
3	935C1W3K-F	15.8 ± 2.4	23.8	1.0	11	16	12.1	11.2	10.3	9.2	8.0	6.5	5.9	
5	935C1W5K-F	16.3 ± 2.4	31.7	1.0	10	10	13.8	12.7	11.6	10.4	9.0	7.4	6.7	
10	935C1W10K-F	20.4 ± 2.4	38.1	1.0	9	8	15.0	15.0	14.2	12.7	11.0	9.0	8.2	
20	935C1W20K-F	22.2 ± 3.2	57.1	1.0	8	5	15.0	15.0	15.0	15.0	13.6	11.1	10.0	
30	935C1W30K-F	27.3 ± 3.2	57.1	1.0	6	5	15.0	15.0	15.0	15.0	15.0	12.4	11.4	
200 Vdc (140 Vac)														
1	935C2W1K-F	11.4 ± 1.6	31.7	0.8	20	15	7.3	7.3	7.3	7.3	7.2	5.9	5.4	
2	935C2W2K-F	15.4 ± 2.4	31.7	0.8	15	15	12.0	12.0	11.3	10.1	8.7	7.1	6.5	
3	935C2W3K-F	16.6 ± 2.4	38.1	1.0	13	12	15.0	13.8	12.6	11.3	9.8	8.0	7.3	
5	935C2W5K-F	19.5 ± 2.4	44.4	1.0	11	9	15.0	15.0	14.7	13.1	11.4	9.3	8.5	
10	935C2W10K-F	23.0 ± 3.2	57.1	1.0	9	7	15.0	15.0	15.0	15.0	13.8	11.3	10.3	
20	935C2W20K-F	33.4 ± 3.2	57.1	1.0	6	7	15.0	15.0	15.0	15.0	15.0	14.1	12.8	
400 Vdc (250 Vac)														
1	935C4W1K-F	15.7 ± 2.4	38.1	0.8	19	19	9.5	9.5	9.5	9.5	9.5	7.8	7.1	
2	935C4W2K-F	20.4 ± 2.4	44.4	1.0	15	16	15.0	15.0	15.0	13.4	11.6	9.5	8.7	
3	935C4W3K-F	24.4 ± 3.2	44.4	1.0	12	16	15.0	15.0	15.0	15.0	13.1	10.7	9.8	
5	935C4W5K-F	27.1 ± 3.2	57.1	1.0	10	11	15.0	15.0	15.0	15.0	15.0	12.5	11.4	
10	935C4W10K-F	39.2 ± 3.2	57.1	1.0	6	11	15.0	15.0	15.0	15.0	15.0	15.0	14.1	

Type 935C, Metallized Polypropylene Capacitors for High Frequency Filtering

High Current Capacitors for Switching Power Supplies

Lug Leads

NOTE: Other ratings, sizes and performance specifications are available. Contact us.

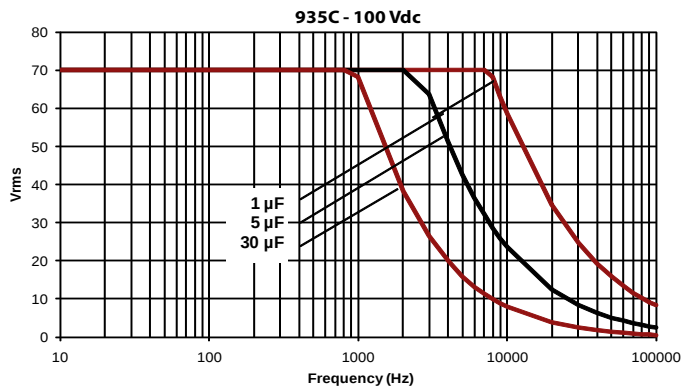
Cap. (μ F)	Catalog Part Number	D mm	L mm	L1 mm	Max. ESR		Max. Ripple Current Amps RMS 20-100 kHz							
					20-100 kHz	dV/dt	Case Temperature							
					(m Ω)	(V/ μ s)	25 °C	35 °C	45 °C	55 °C	65 °C	75 °C	85 °C	
100 Vdc (70 Vac)														
1	935H1W1K-F	11.9 $\pm$ 1.6	19.0	41.6	15	25	10.3	9.5	8.7	7.8	6.7	5.5	5.0	
2	935H1W2K-F	13.6 $\pm$ 1.6	23.8	46.4	12	16	12.0	11.0	10.0	8.9	7.8	6.3	5.8	
3	935H1W3K-F	15.8 $\pm$ 2.4	23.8	46.4	11	16	13.3	12.3	11.2	10.0	8.7	7.1	6.5	
5	935H1W5K-F	16.3 $\pm$ 2.4	31.7	53.3	10	10	14.8	13.7	12.5	11.2	9.7	7.9	7.2	
10	935H1W10K-F	20.4 $\pm$ 2.4	38.1	57.2	9	8	17.8	16.5	15.0	13.5	11.7	9.5	8.7	
20	935H1W20K-F	22.2 $\pm$ 3.2	57.1	77.6	8	5	21.6	20.0	18.3	16.4	14.2	11.6	10.6	
30	935H1W30K-F	27.3 $\pm$ 3.2	57.1	77.6	6	5	24.3	22.5	20.5	18.4	15.9	13.0	11.9	
200 Vdc (140 Vac)														
1	935H2W1K-F	11.4 $\pm$ 1.6	31.7	53.3	20	15	7.3	7.3	7.3	7.3	7.3	6.4	5.8	
2	935H2W2K-F	15.4 $\pm$ 2.4	31.7	53.3	15	15	14.3	13.3	12.1	10.8	9.4	7.7	7.0	
3	935H2W3K-F	16.6 $\pm$ 2.4	38.1	57.2	13	12	15.9	14.7	13.5	12.0	10.4	8.5	7.8	
5	935H2W5K-F	19.5 $\pm$ 2.4	44.4	65.3	11	9	18.3	17.0	15.5	13.9	12.0	9.8	8.9	
10	935H2W10K-F	23.0 $\pm$ 3.2	57.1	77.6	9	7	22.4	20.7	18.9	16.9	14.6	12.0	10.9	
20	935H2W20K-F	33.4 $\pm$ 3.2	57.1	77.6	6	7	27.4	25.4	23.2	20.7	17.9	14.7	13.4	
400 Vdc (250 Vac)														
1	935H4W1K-F	15.7 $\pm$ 2.4	38.1	57.2	19	19	9.5	9.5	9.5	9.5	9.5	8.3	7.5	
2	935H4W2K-F	20.4 $\pm$ 2.4	44.4	65.3	15	16	15.0	15.0	15.0	14.2	12.3	10.0	9.1	
3	935H4W3K-F	24.4 $\pm$ 3.2	44.4	65.3	12	16	21.1	19.5	17.8	15.9	13.8	11.3	10.3	
5	935H4W5K-F	27.1 $\pm$ 3.2	57.1	77.6	10	11	24.4	22.6	20.6	18.5	16.0	13.1	11.9	
10	935H4W10K-F	39.2 $\pm$ 3.2	57.1	77.6	6	11	30.0	27.8	25.4	22.7	19.7	16.1	14.7	

Type 935C, Metallized Polypropylene Capacitors for High Frequency Filtering

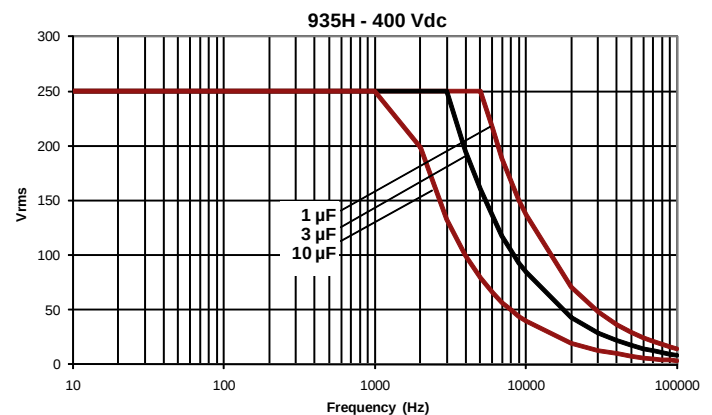
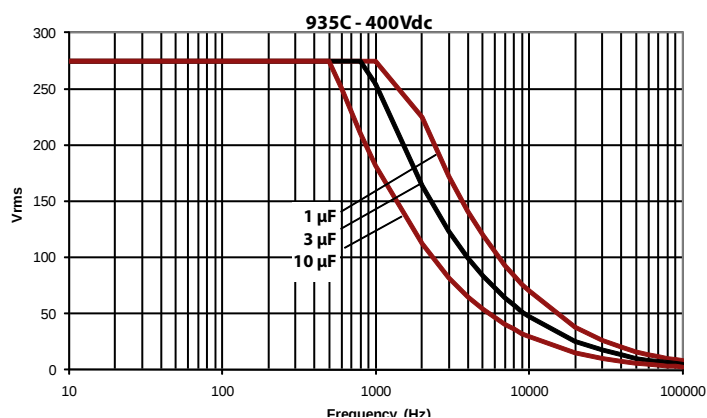
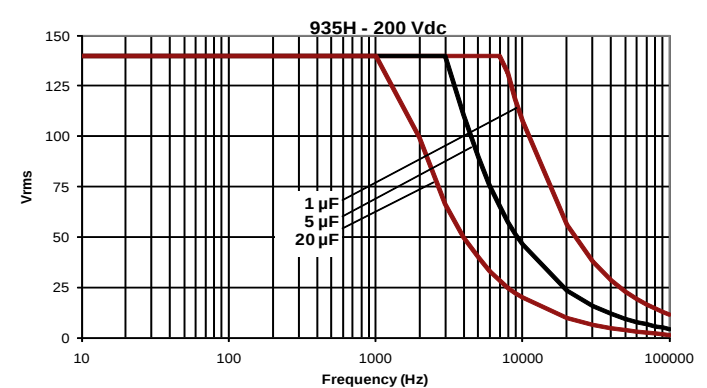
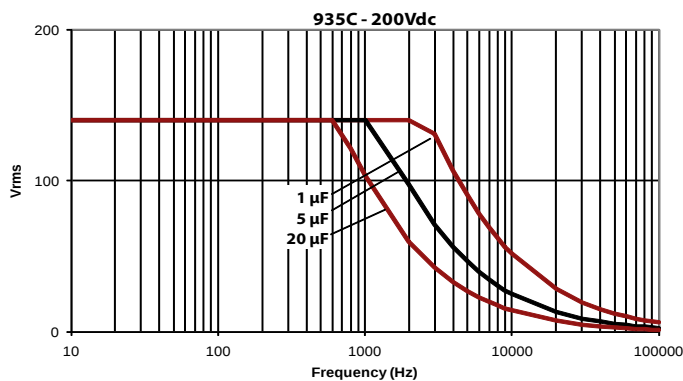
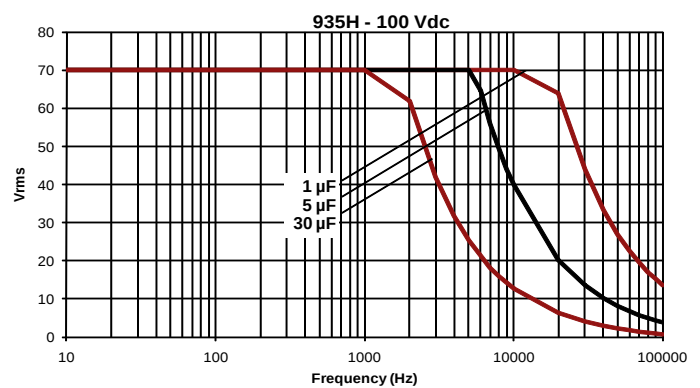
High Current Capacitors for Switching Power Supplies

RMS Voltage vs Frequency @ 25 °C

Wire Leads



Lug Leads



Type DCF, Polypropylene Capacitors for High Current Filtering

Large Capacitance Values, High Current Ratings for DC Filtering



Type DCF metallized polypropylene capacitors are designed for high current DC filtering and DC link applications. Low ESR and high capacitance, combined with a wide selection of robust terminals, allow this series to handle high ripple current.

Highlights

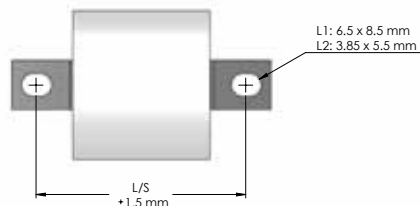
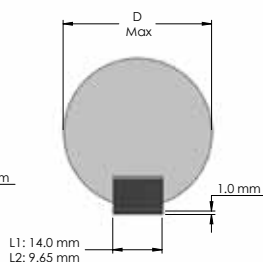
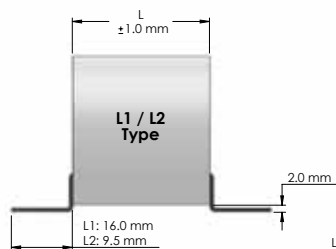
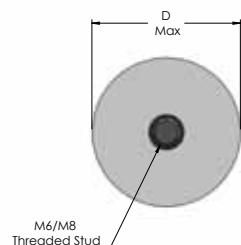
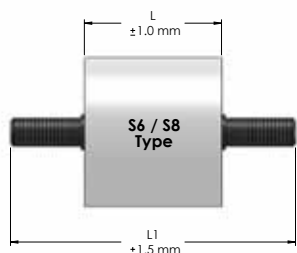
- High capacitance
- Low ESR
- Robust terminal/mounting options
- High current
- Self healing

Specifications

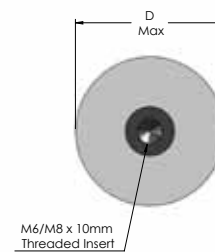
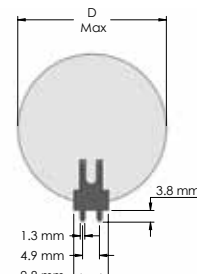
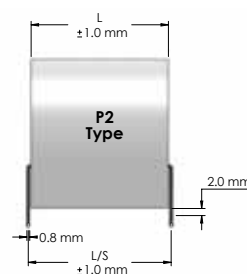
Capacitance Range	5.0 to 100 μ F
Capacitance Tolerance	$\pm 10\%$ (K) standard, $\pm 5\%$ (J) optional
Rated Voltage	630 Vdc (250 Vac, 50/60 Hz)
Operating Temperature Range with Ripple	-55 $^{\circ}$ C to 105 $^{\circ}$ C Full rated voltage @ 85 $^{\circ}$ C, derate linearly to 50% rated voltage at 105 $^{\circ}$ C
Maximum rms Current	Check tables for values
Insulation Resistance	30,000 $\mu\Omega \times \mu$ F after 120 s and 500 V charge
Test Voltage between Terminals @ 25 $^{\circ}$ C	800 Vdc for 60 s
Test Voltage between Terminals & Case @ 25 $^{\circ}$ C	3 kVac @ 50/60 Hz for 60 s
Life Test	2000 h @ 85 $^{\circ}$ C, 125% rated DC voltage
Life Expectancy	60,000 h @ rated Vdc, 70 $^{\circ}$ C 30,000 h @ rated Vac, 70 $^{\circ}$ C
RoHS Compliant	

Dimensions

Construction Diagram



Construction Details	
Case Material	UL510 Polyester Tape Wrap
Resin Material	UL94V-0 Epoxy Fill
Terminal Material	Tin Plated Copper or Brass



Type DCF, Polypropylene Capacitors for High Current Filtering

Large Capacitance Values, High Current Ratings for DC Filtering

Part Numbering System

DCF	6	W	22	K	B/S/P/L	-F
Type	Voltage	Capacitance	Capacitance	Tolerance	Terminal	RoHS
	Code	Decimal Point	Significant figures in μF	Code	Style	Compliance Indicator
	6 = 630 Vdc	W = No decimal point		K = $\pm 10\%$ J = $\pm 5\%$	B6 = M6 Insert B8 = M8 Insert S6 = M6 studs S8 = M8 studs P2 = 2 pins Lug L1 = type 1 Lug L2 = type 2 Lug	

Ratings

NOTE: Other ratings, sizes and performance specifications are available. Contact us.

Cap (μ F)	Catalog Part Number	D Max. mm	L $\pm$ 1.0 mm	L1/LS	Ripple Current					Reson. Freq. (kHz)	Peak Current (Ipeak)	dv/dt (V/ μ s)
				$\pm$ 1.5 mm Or As Specified mm	ESR Typical (m Ω)	@ 25 kHz						
						25°C	55°C	85°C				
									(Amps rms)			
630 Vdc (250 Vac, 50/60 Hz)												
5.0	DCF6W5KP2-F	33.4	29.0	29.8 $\pm$ 1.0	3.42	25.0	18.7	7.0	410.0	660	132	
5.0	DCF6W5KL2-F	33.4	30.0	40.0	3.42	25.0	18.7	7.0	410.0	660	132	
10.0	DCF6W10KP2-F	34.8	39.0	38.8 $\pm$ 1.0	3.00	25.0	23.0	8.5	248.0	760	76	
10.0	DCF6W10KL2-F	34.8	41.0	49.0	3.00	31.0	23.0	8.7	248.0	760	76	
15.0	DCF6W15KB*-F	42.2	49.0	57.0	2.40	38.7	28.7	10.8	203.0	1140	76	
15.0	DCF6W15KS*-F	42.2	39.0	81.0	2.40	38.7	28.7	10.8	203.0	1140	76	
15.0	DCF6W15KL1-F	42.2	41.0	58.0	2.40	38.7	28.7	10.8	203.0	1140	76	
20.0	DCF6W20KB*-F	41.3	57.5	66.5	2.23	42.3	31.4	11.8	152.0	1040	52	
20.0	DCF6W20KS*-F	41.3	47.5	90.5	2.23	42.3	31.4	11.8	152.0	1040	52	
20.0	DCF6W20KL1-F	41.3	49.5	67.5	2.23	42.3	31.4	11.8	152.0	1040	52	
25.0	DCF6W25KB*-F	46.0	57.5	66.5	2.30	44.7	33.0	12.6	136.0	1300	52	
25.0	DCF6W25KS*-F	46.0	47.5	90.5	2.30	44.7	33.0	12.6	136.0	1300	52	
25.0	DCF6W25KL1-F	46.0	49.5	67.5	2.30	44.7	33.0	12.6	136.0	1300	52	
30.0	DCF6W30KB*-F	50.3	57.5	66.5	2.63	44.4	33.0	12.5	124.0	1560	52	
30.0	DCF6W30KS*-F	50.3	47.5	90.5	2.63	44.4	33.0	12.5	124.0	1560	52	
30.0	DCF6W30KL1-F	50.3	49.5	67.5	2.63	44.4	33.0	12.5	124.0	1560	52	
35.0	DCF6W35KB*-F	54.2	57.5	66.5	2.43	48.5	36.0	13.6	115.0	1820	52	
35.0	DCF6W35KS*-F	54.2	47.5	90.5	2.43	48.5	36.0	13.6	115.0	1820	52	
35.0	DCF6W35KL1-F	54.2	49.5	67.5	2.43	48.5	36.0	13.6	115.0	1820	52	
40.0	DCF6W40KB*-F	57.7	57.5	66.5	2.30	52.1	38.7	14.6	108.0	2080	52	
40.0	DCF6W40KS*-F	57.7	47.5	90.5	2.30	52.1	38.7	14.6	108.0	2080	52	
40.0	DCF6W40KL1-F	57.7	49.5	67.5	2.30	52.1	38.7	14.6	108.0	2080	52	
45.0	DCF6W45KB*-F	53.3	68.0	77.0	2.20	53.9	40.9	15.6	90.0	1710	38	

* Replace with 6 for M6 inserts or studs

* Replace with 8 for M8 inserts or studs

ESR measured at Resonant Frequency for capacitance values above 15 μF or 6 m Ω Max. at 20 kHz

Type DCF, Polypropylene Capacitors for High Current Filtering

Large Capacitance Values, High Current Ratings for DC Filtering

Cap (μF)	Catalog Part Number	D Max. mm	L ± 1.0 mm	L1/LS	Ripple Current					Reson. Freq. (kHz)	Peak Current (Ipeak)	dv/dt (V/μs)
				±1.5 mm	@ 25 kHz							
				Or As Specified	ESR Typical	25°C	55°C	85°C				
				mm	(mΩ)	(Amps rms)						
630 Vdc (250 Vac, 50/60 Hz)												
45.0	DCF6W45KS*-F	53.3	58.0	101.0	2.20	53.9	40.9	15.6	90.0	1710	38	
45.0	DCF6W45KL1-F	53.3	60.0	78.0	2.20	53.9	40.9	15.6	90.0	1710	38	
50.0	DCF6W50KB*-F	56.1	68.0	77.0	2.60	51.3	38.1	14.4	85.0	1900	38	
50.0	DCF6W50KS*-F	56.1	58.0	101.0	2.60	51.3	38.1	14.4	85.0	1900	38	
50.0	DCF6W50KL1-F	56.1	60.0	78.0	2.60	51.3	38.1	14.4	85.0	1900	38	
55.0	DCF6W55KB*-F	58.6	68.0	77.0	2.50	53.9	40.0	15.1	80.0	2090	38	
55.0	DCF6W55KS*-F	58.6	58.0	101.0	2.50	53.9	40.0	15.1	80.0	2090	38	
55.0	DCF6W55KL1-F	58.6	60.0	78.0	2.50	53.9	40.0	15.1	80.0	2090	38	
60.0	DCF6W60KB*-F	61.2	68.0	77.0	2.30	55.5	41.2	15.6	77.0	2280	38	
60.0	DCF6W60KS*-F	61.2	58.0	101.0	2.30	55.5	41.2	15.6	77.0	2280	38	
60.0	DCF6W60KL1-F	61.2	60.0	78.0	2.30	55.5	41.2	15.6	77.0	2280	38	
70.0	DCF6W70KB*-F	57.4	83.0	92.0	2.85	53.9	40.0	15.1	63.0	1960	28	
70.0	DCF6W70KS*-F	57.4	73.0	116.0	2.85	53.9	40.0	15.1	63.0	1960	28	
70.0	DCF6W70KL1-F	57.4	75.0	93.0	2.85	53.9	40.0	15.1	63.0	1960	28	
80.0	DCF6W80KB*-F	60.3	83.0	92.0	2.67	57.5	42.7	16.1	59.0	2240	28	
80.0	DCF6W80KS*-F	60.3	73.0	116.0	2.67	57.5	42.7	16.1	59.0	2240	28	
80.0	DCF6W80KL1-F	60.3	75.0	93.0	2.67	57.5	42.7	16.1	59.0	2240	28	
90.0	DCF6W90KB*-F	57.5	96.0	105.0	3.07	55.2	41.0	15.5	51.0	2520	28	
90.0	DCF6W90KS*-F	57.5	86.0	129.0	3.07	55.2	41.0	15.5	51.0	2520	28	
90.0	DCF6W90KL1-F	57.5	88.0	106.0	3.07	55.2	41.0	15.5	51.0	2520	28	
100.0	DCF6W100KB*-F	60.7	96.0	105.0	2.90	60.0	43.6	16.5	48.0	2300	23	
100.0	DCF6W100KS*-F	60.7	86.0	129.0	2.90	60.0	43.6	16.5	48.0	2300	23	
100.0	DCF6W100KL1-F	60.7	88.0	106.0	2.90	60.0	43.6	16.5	48.0	2300	23	

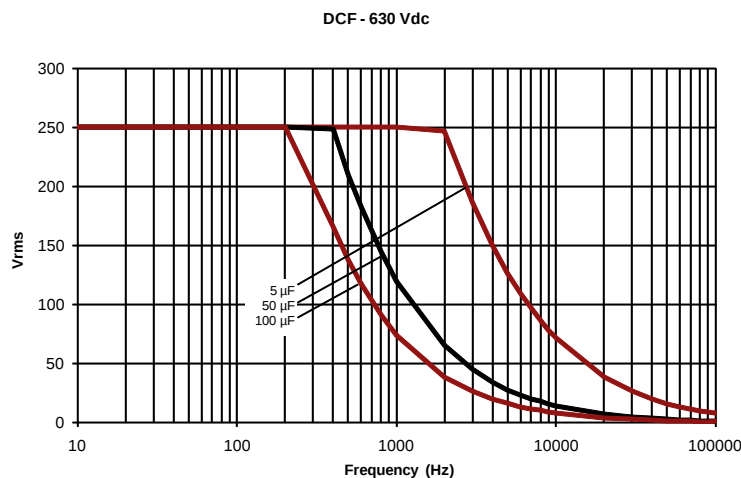
* Replace with 6 for M6 inserts or studs

* Replace with 8 for M8 inserts or studs

ESR measured at Resonant Frequency for capacitance values above 15 μ F or 6 m Ω Max. at 20 kHz

Note: Additional voltage and capacitance values are available upon request.

RMS Voltage vs Frequency @ 25 °C



Type 940C, Polypropylene Capacitors, for Pulse, Snubber

High dV/dt for Snubber Applications



Type 940 round, axial leaded film capacitors have polypropylene film and dual metallized electrodes for both self healing properties and high peak current carrying capability (dV/dt). This series features low ESR characteristics, excellent high frequency and high voltage capabilities.

Highlights

- High dV/dt
- High pulse current
- Low inductance
- Self healing

Specifications

Capacitance Range	0.01 to 4.7 μ F
Capacitance Tolerance	$\pm$ 10% Standard Tolerance
Rated Voltage	600 to 3000 Vdc (275 to 500 Vac, 60 Hz)
Operating Temperature Range with Ripple	-55 $^{\circ}$ C to 105 $^{\circ}$ C* *Full rated voltage at 85 $^{\circ}$ C - derated linearly to 50% rated at 105 $^{\circ}$ C
Maximum rms Current	Check tables for values
Insulation Resistance	> 100,000 M Ω x μ F
Test Voltage between Terminals @ 25 $^{\circ}$ C	160% rated DC voltage for 60 s
Test Voltage between Terminals & Case @ 25 $^{\circ}$ C	3 kVac @ 50/60 Hz for 60 s
Life Test	2,000 h @ 85 $^{\circ}$ C, 125% rated DC voltage
Life Expectancy	60,000 h @ rated Vdc, 70 $^{\circ}$ C 30,000 h @ rated Vac, 70 $^{\circ}$ C
RoHS Compliant	

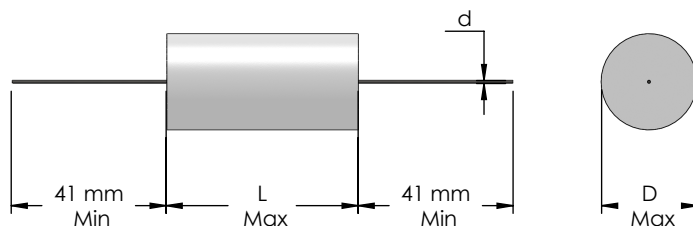
Dimensions

Construction Diagram



Construction Details

Case Material	UL510 Polyester Tape Wrap
Resin Material	UL94V-0 Epoxy Fill
Terminal Material	Tin Plated Copper



Type 940C, Polypropylene Capacitors, for Pulse, Snubber

High dV/dt for Snubber Applications

Part Numbering System

940	C	6	P	22	K	-F
Series	Termination Code	Voltage Code	Capacitance Decimal Point	Capacitance Significant figures in μF	Tolerance Code	RoHS Compliant Indicator
940	C = Bare Copper Wire F = Insulated Stranded Wire H = Tinned Lugs	6 = 600 Vdc 8 = 800 Vdc 10 = 1000 Vdc 12 = 1200 Vdc	16 = 1600 Vdc 20 = 2000 Vdc 30 = 3000 Vdc S = 0.0 P = 0. W = No decimal point		K = $\pm 10\%$	

Ratings

NOTE: Other ratings, sizes and performance specifications are available. Contact us.

Cap.	Catalog Part Number	D	L	d	Typical ESR	Typical ESL	dV/dt	I peak	I _{RMS} 70 °C
(μF)		mm	mm	mm	(m Ω)	(nH)	V/ μs	(A)	100 kHz (A)
600 Vdc (275 Vac)									
.10	940C6P1K-F	9.0	34.0	0.8	28	19	196	20	2.5
.15	940C6P15K-F	10.5	34.0	0.8	13	20	196	29	4.0
.22	940C6P22K-F	11.5	34.0	0.8	12	20	196	43	4.4
.33	940C6P33K-F	13.5	34.0	0.8	9	21	196	65	5.6
.47	940C6P47K-F	15.5	34.0	1.0	7	22	196	92	6.9
.68	940C6P68K-F	18.0	34.0	1.0	6	23	196	134	8.1
1.00	940C6W1K-F	21.0	34.0	1.0	6	24	196	196	8.9
1.50	940C6W1P5K-F	25.0	34.0	1.2	5	26	196	295	10.9
2.00	940C6W2K-F	23.5	46.0	1.2	5	31	128	255	11.8
3.30	940C6W3P3K-F	27.0	54.0	1.2	4	36	105	346	15.3
4.70	940C6W4P7K-F	31.5	54.0	1.2	4	38	105	492	16.8
850 Vdc (450 Vac)									
.15	940C8P15K-F	13.0	34.0	0.8	8	21	713	107	5.8
.22	940C8P22K-F	15.5	34.0	1.0	8	22	713	157	6.4
.33	940C8P33K-F	18.0	34.0	1.0	7	23	713	235	7.5
.47	940C8P47K-F	21.0	34.0	1.0	5	24	713	335	9.8
.68	940C8P68K-F	24.5	34.0	1.2	4	26	713	485	12.0
1.00	940C8W1K-F	22.5	46.0	1.2	5	30	400	400	11.5
1.50	940C8W1P5K-F	27.0	46.0	1.2	4	32	400	600	14.3
2.00	940C8W2K-F	30.5	46.0	1.2	3	34	400	800	17.9
2.20	940C8W2P2K-F	32.0	46.0	1.2	3	34	400	880	18.4
2.50	940C8W2P5K-F	34.0	46.0	1.2	3	35	400	1000	19.1
1000 Vdc (500 Vac)									
.15	940C10P15K-F	15.0	34.0	1.0	7	22	856	128	6.7
.22	940C10P22K-F	17.5	34.0	1.0	7	23	856	188	7.4
.33	940C10P33K-F	20.5	34.0	1.0	6	24	856	283	8.8
.47	940C10P47K-F	24.0	34.0	1.2	5	26	856	402	10.6
.68	940C10P68K-F	28.0	34.0	1.2	5	27	856	582	11.7
1.00	940C10W1K-F	26.0	46.0	1.2	5	32	480	480	12.5
1.50	940C10W1P5K-F	31.0	46.0	1.2	4	34	480	720	15.6
2.00	940C10W2K-F	35.5	46.0	1.2	3	36	480	960	19.6

Type 940C, Polypropylene Capacitors, for Pulse, Snubber

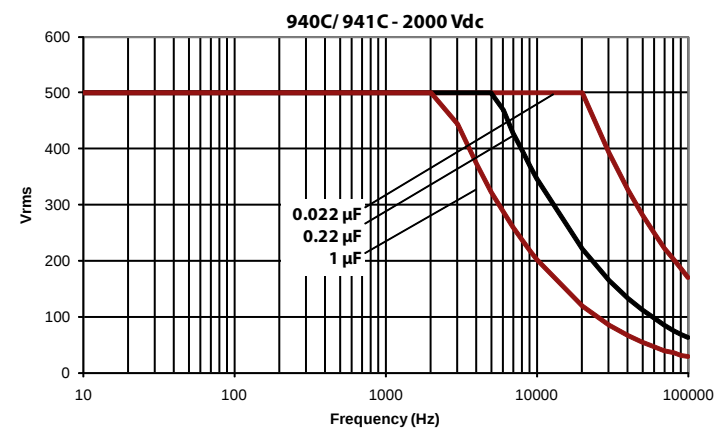
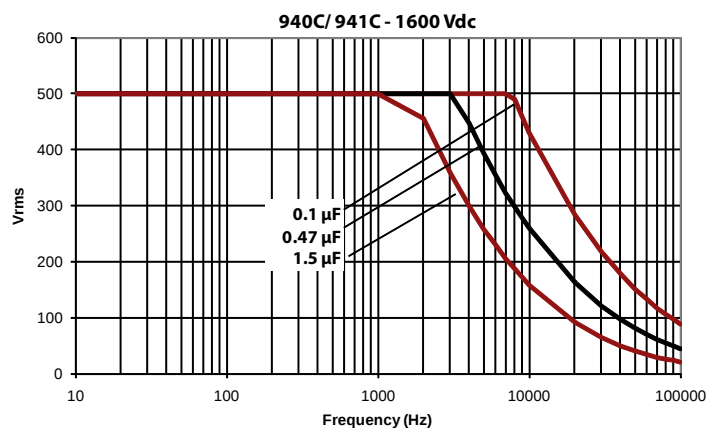
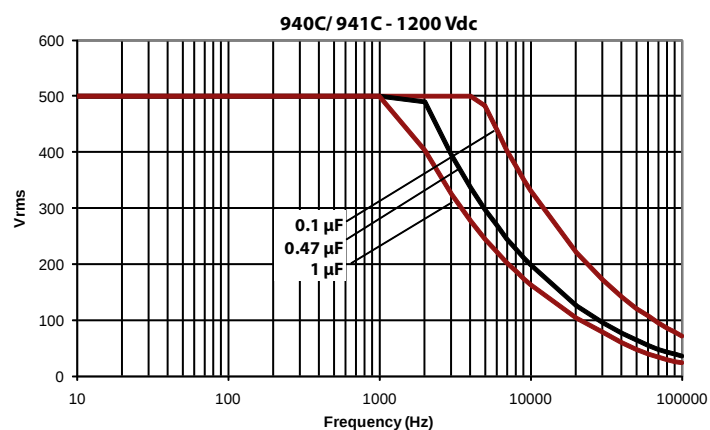
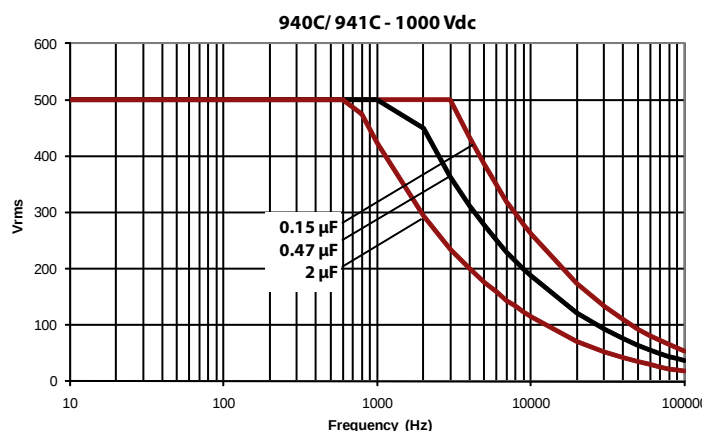
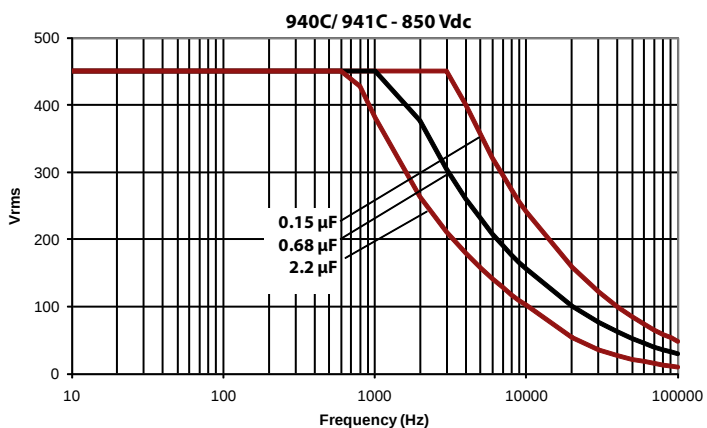
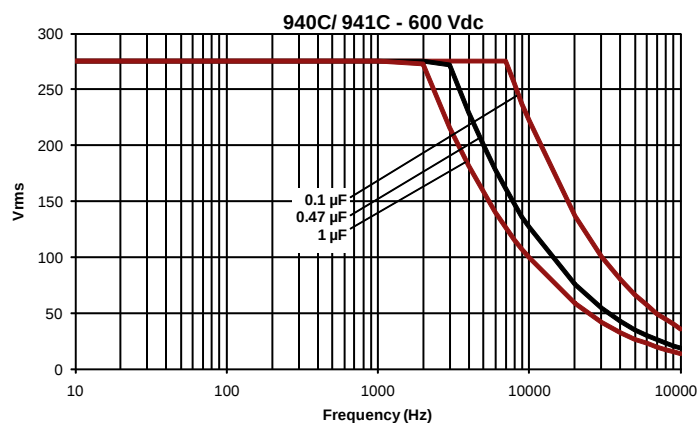
High dV/dt for Snubber Applications

Cap. (μF)	Catalog Part Number	D mm	L mm	d mm	Typical ESR (mΩ)	Typical ESL (nH)	dV/dt V/μs	I peak (A)	I _{RMS} 70 °C 100 kHz (A)
1200 Vdc (500 Vac)									
.10	940C12P1K-F	15.5	34.0	1.0	9	22	1142	114	6.1
.15	940C12P15K-F	18.5	34.0	1.0	7	23	1142	171	7.6
.22	940C12P22K-F	21.5	34.0	1.0	7	24	1142	251	8.4
.33	940C12P33K-F	20.0	46.0	1.0	7	29	640	211	9.0
.47	940C12P47K-F	23.0	46.0	1.2	7	30	640	301	9.8
.68	940C12P68K-F	27.0	46.0	1.2	6	32	640	435	11.7
1.00	940C12W1K-F	33.0	46.0	1.2	5	35	640	640	14.5
1.50	940C12W1P5K-F	35.0	54.0	1.2	4	39	502	754	17.9
1600 Vdc (500 Vac)									
.10	940C16P1K-F	18.0	34.0	1.0	7	23	1427	143	7.5
.15	940C16P15K-F	21.5	34.0	1.0	5	24	1427	214	9.9
.22	940C16P22K-F	25.5	34.0	1.2	7	26	1427	314	9.3
.33	940C16P33K-F	23.5	46.0	1.2	7	31	800	264	10.0
.47	940C16P47K-F	27.5	46.0	1.2	6	32	800	376	11.8
.68	940C16P68K-F	32.5	46.0	1.2	6	35	800	544	13.1
1.00	940C16W1K-F	39.0	46.0	1.2	5	37	800	800	16.2
1.50	940C16W1P5K-F	42.0	54.0	1.2	4	42	628	942	20.1
2000 Vdc (500 Vac)									
.022	940C20S22K-F	11.5	34.0	0.8	35	6	1712	38	2.6
.033	940C20S33K-F	13.5	34.0	0.8	20	21	1712	57	3.8
.047	940C20S47K-F	15.0	34.0	1.0	12	22	1712	80	5.2
.068	940C20S68K-F	17.5	34.0	1.0	8	23	1712	116	6.9
.100	940C20P1K-F	21.0	34.0	1.0	7	24	1712	171	8.3
.150	940C20P15K-F	19.5	46.0	1.0	7	29	960	144	8.9
.220	940C20P22K-F	22.0	46.0	1.0	8	30	960	211	9.0
.330	940C20P33K-F	27.0	46.0	1.2	8	32	960	317	10.1
.470	940C20P47K-F	32.0	46.0	1.2	6	34	960	451	13.0
.560	940C20P56K-F	31.0	54.0	1.2	7	37	754	422	12.6
.680	940C20P68K-F	34.0	54.0	1.2	6	39	754	513	14.3
1.00	940C20W1K-F	41.0	54.0	1.2	5	42	754	754	17.7
3000 Vdc (500 Vac)									
.010	940C30S1K-F	11.5	34.0	0.8	60	20	2568	26	2.0
.015	940C30S15K-F	13.5	34.0	0.8	40	21	2568	39	2.7
.022	940C30S22K-F	15.5	34.0	1.0	25	22	2568	57	3.6
.033	940C30S33K-F	18.0	34.0	1.0	14	23	2568	85	5.3
.047	940C30S47K-F	16.5	46.0	1.0	14	28	1440	68	5.7
.068	940C30S68K-F	19.0	46.0	1.0	12	29	1440	98	6.7
.100	940C30P1K-F	22.5	46.0	1.2	10	30	1440	144	8.1
.150	940C30P15K-F	27.0	46.0	1.2	8	32	1440	216	10.1

Type 940C, Polypropylene Capacitors, for Pulse, Snubber

High dV/dt for Snubber Applications

RMS Voltage vs Frequency @ 25 °C



Type 941C, Polypropylene Capacitors, for Pulse, Snubber

High dV/dt for Snubber Applications



Type 941C flat, oval film capacitors are constructed with polypropylene film and dual metallized electrodes for both self healing properties and high peak current carrying capability (dV/dt). This series features low ESR characteristics, excellent high frequency and high voltage capabilities.

Highlights

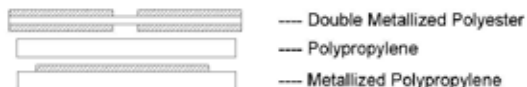
- High dV/dt
- High ripple current
- Low inductance
- Self healing

Specifications

Capacitance Range	0.01 to 4.7 μ F
Capacitance Tolerance	$\pm$ 10% Standard Tolerance
Rated Voltage	600 to 3000 Vdc (275 to 500 Vac, 60 Hz)
Operating Temperature Range with Ripple	-55 °C to 105 °C* *Full rated voltage at 85 °C - derated linearly to 50% rated at 105 °C
Maximum rms Current	Check tables for values
Insulation Resistance	> 100,000 M Ω x μ F
Test Voltage between Terminals @ 25 °C	160% rated DC voltage for 60 s
Test Voltage between Terminals & Case @ 25 °C	3 kVac @ 50/60 Hz for 60 s
Life Test	2,000 h @ 85 °C, 125% rated DC voltage
Life Expectancy	60,000 h @ rated Vdc, 70 °C 30,000 h @ rated Vac, 70 °C
RoHS Compliant	

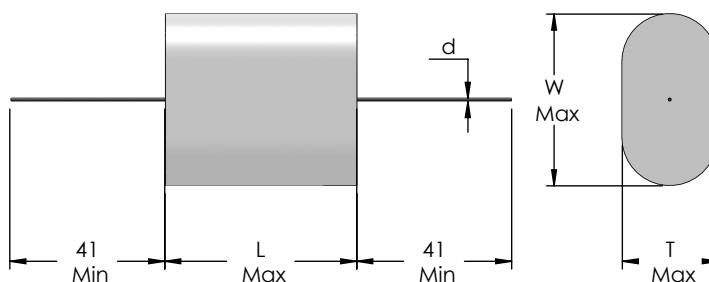
Dimensions

Construction Diagram



Construction Details

Case Material	UL510 Polyester Tape Wrap
Resin Material	UL94V-0 Epoxy Fill
Terminal Material	Tin Plated Copper



Type 941C, Polypropylene Capacitors, for Pulse, Snubber

High dV/dt for Snubber Applications

Part Numbering System

941	C	6	P	22	K	-F
Series	Termination Code	Voltage Code	Capacitance Decimal Point	Capacitance Significant Figures (μF)	Tolerance Code	RoHS Compliant Indicator
941	C = Bare Copper Wire F = Insulated Stranded Wire H = Tinned Lugs	6 = 600 Vdc 8 = 850 Vdc 10 = 1000 Vdc 12 = 1200 Vdc	16 = 1600 Vdc 20 = 2000 Vdc 30 = 3000 Vdc	S = 0.0 P = 0. W = No decimal point	K = ±10%	

Ratings

NOTE: Other ratings, sizes and performance specifications are available. Contact us.

Cap. (μF)	Catalog Part Number	T mm	W mm	L mm	d mm	Typical ESR (mΩ)	Typical ESL (nH)	dV/dt (V/μs)	I peak (A)	I _{RMS} 70 °C 100 kHz (A)
600 Vdc (275 Vac)										
.10	941C6P1K-F	5.7	11.9	34.0	0.8	28	17	196	20	2.8
.15	941C6P15K-F	6.8	13.0	34.0	0.8	13	18	196	29	4.4
.22	941C6P22K-F	8.1	14.3	34.0	0.8	12	19	196	43	4.9
.33	941C6P33K-F	9.8	16.1	34.0	0.8	9	19	196	65	6.1
.47	941C6P47K-F	11.7	18.0	34.0	0.8	7	20	196	92	7.6
.68	941C6P68K-F	14.2	20.4	34.0	1.0	6	21	196	134	8.9
1.0	941C6W1K-F	17.3	23.5	34.0	1.0	6	23	196	196	9.9
1.5	941C6W1P5K-F	21.3	27.5	34.0	1.2	5	24	196	295	12.1
2.0	941C6W2K-F	18.2	27.6	46.0	1.2	5	28	128	255	13.1
3.3	941C6W3P3K-F	22.5	31.8	54.0	1.2	4	34	105	346	17.3
4.7	941C6W4P7K-F	28.6	33.3	54.0	1.2	4	36	105	492	18.7
850 Vdc (450 Vac)										
.15	941C8P15K-F	9.6	15.9	34.0	0.8	8	19	713	107	6.4
.22	941C8P22K-F	11.6	17.9	34.0	0.8	8	20	713	157	7.0
.33	941C8P33K-F	14.3	20.6	34.0	1.0	7	21	713	235	8.3
.47	941C8P47K-F	17.1	23.4	34.0	1.0	5	22	713	335	10.8
.68	941C8P68K-F	20.7	27.0	34.0	1.2	4	24	713	485	13.3
1.0	941C8W1K-F	17.2	26.7	46.0	1.2	5	28	400	400	12.7
1.5	941C8W1P5K-F	21.5	30.9	46.0	1.2	4	30	400	600	15.8
2.0	941C8W2K-F	25.1	34.6	46.0	1.2	3	31	400	800	19.8
2.2	941C8W2P2K-F	26.5	35.9	46.0	1.2	3	32	400	880	20.4
2.5	941C8W2P5K-F	28.4	37.8	46.0	1.2	3	33	400	1000	21.2
1000 Vdc (500 Vac)										
.15	941C10P15K-F	11.2	17.5	34.0	0.8	7	20	856	128	7.4
.22	941C10P22K-F	13.6	19.9	34.0	1.0	7	21	856	188	8.1
.33	941C10P33K-F	16.7	23.0	34.0	1.0	6	22	856	283	9.7
.47	941C10P47K-F	20.1	26.3	34.0	1.2	5	24	856	402	11.7
.68	941C10P68K-F	24.2	30.5	34.0	1.2	5	26	856	582	13.0
1.0	941C10W1K-F	20.4	29.8	46.0	1.2	5	24	480	480	13.8
1.5	941C10W1P5K-F	25.4	34.8	46.0	1.2	4	31	480	720	17.3
2.0	941C10W2K-F	29.7	39.1	46.0	1.2	3	33	480	960	21.7

Type 941C, Polypropylene Capacitors, for Pulse, Snubber

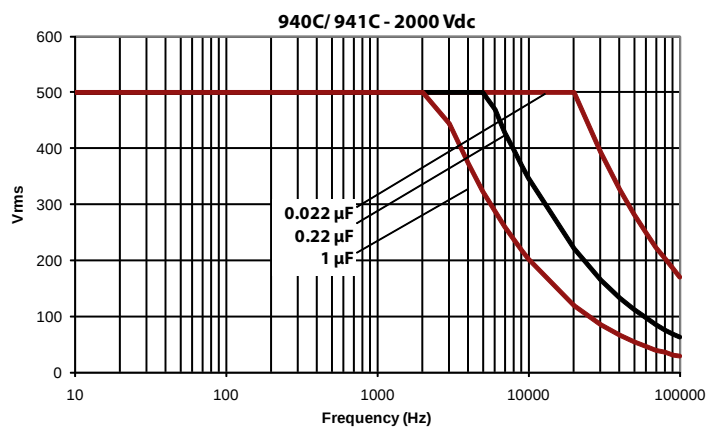
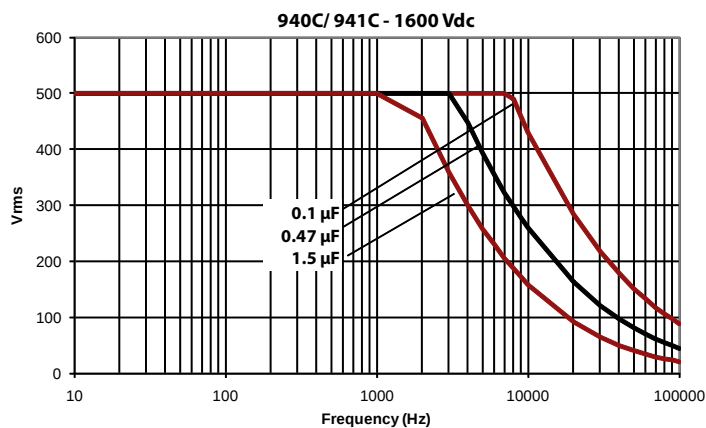
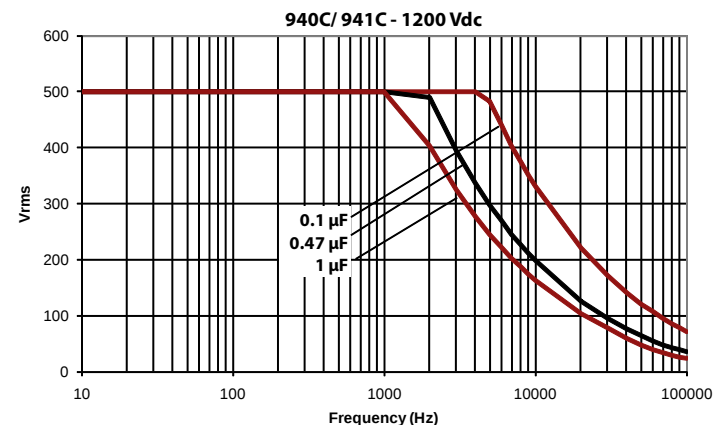
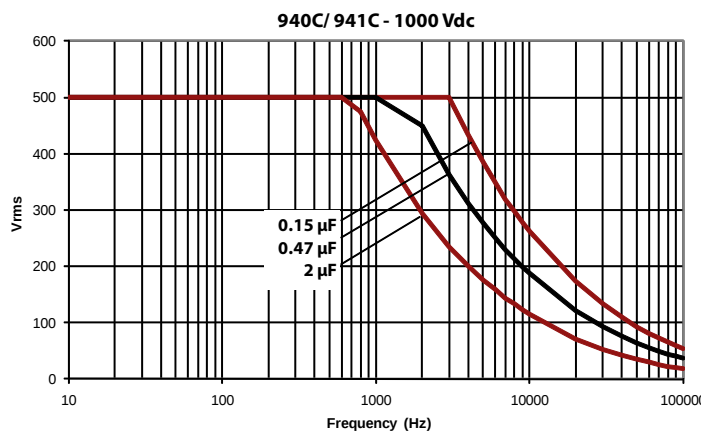
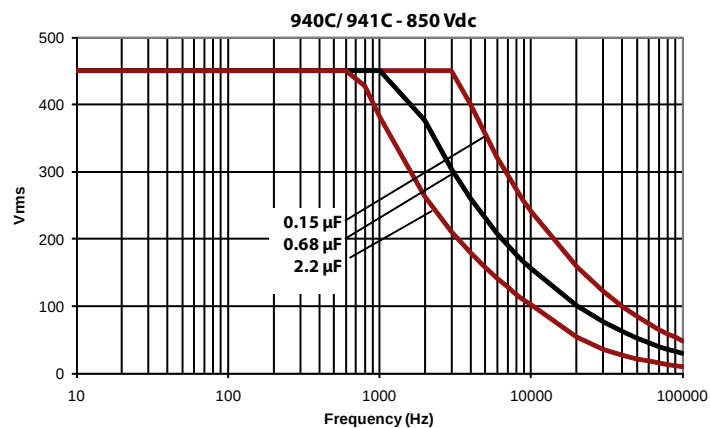
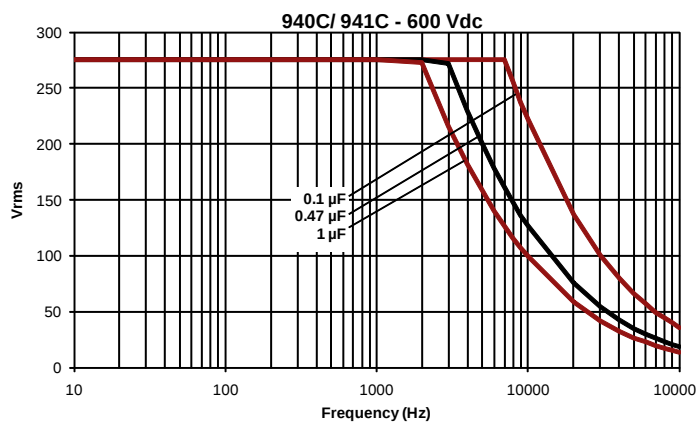
High dV/dt for Snubber Applications

Cap. (μ F)	Catalog Part Number	T mm	W mm	L mm	d mm	Typical ESR (m Ω)	Typical ESL (nH)	dV/dt (V/ μ s)	I peak (A)	I _{RMS} 70 °C 100 kHz (A)
1200 Vdc (500 Vac)										
.10	941C12P1K-F	11.7	18.0	34.0	0.8	9	20	1142	114	6.7
.15	941C12P15K-F	14.4	20.7	34.0	1.0	7	21	1142	171	8.3
.22	941C12P22K-F	17.5	23.8	34.0	1.0	7	23	1142	251	9.2
.33	941C12P33K-F	14.6	24.0	46.0	1.0	7	21	640	211	10.0
.47	941C12P47K-F	17.7	27.1	46.0	1.2	7	28	640	301	10.9
.68	941C12P68K-F	21.7	31.1	46.0	1.2	6	30	640	435	13.0
1.0	941C12W1K-F	26.7	36.1	46.0	1.2	5	32	640	640	15.9
1.5	941C12W1P5K-F	27.6	40.2	54.0	1.2	4	36	502	754	19.7
1600 Vdc (500 Vac)										
.10	941C16P1K-F	14.3	20.6	34.0	1.0	7	21	1427	143	8.3
.15	941C16P15K-F	17.7	23.9	34.0	1.0	5	23	1427	214	11.0
.22	941C16P22K-F	21.5	27.8	34.0	1.2	7	24	1427	314	10.3
.33	941C16P33K-F	18.2	27.6	46.0	1.2	7	23	800	264	11.0
.47	941C16P47K-F	22.0	31.4	46.0	1.2	6	30	800	376	13.1
.68	941C16P68K-F	26.9	36.3	46.0	1.2	6	32	800	544	14.5
1.0	941C16W1K-F	33.1	42.5	46.0	1.2	5	35	800	800	17.9
1.5	941C16W1P5K-F	34.5	47.0	54.0	1.2	4	39	628	942	22.2
2000 Vdc (500 Vac)										
.022	941C20S22K-F	7.9	14.2	34.0	0.8	35	18	1712	38	2.8
.033	941C20S33K-F	9.7	16.0	34.0	0.8	20	19	1712	57	4.1
.047	941C20S47K-F	11.6	17.8	34.0	0.8	12	20	1712	80	5.7
.068	941C20S68K-F	14.0	20.2	34.0	1.0	8	21	1712	116	7.7
.10	941C20P1K-F	17.0	23.3	34.0	1.0	7	22	1712	171	9.1
.15	941C20P15K-F	14.1	23.6	46.0	1.0	7	21	960	144	9.8
.22	941C20P22K-F	17.4	26.8	46.0	1.0	8	28	960	211	10.1
.33	941C20P33K-F	21.7	31.2	46.0	1.2	8	30	960	317	11.3
.47	941C20P47K-F	26.3	35.8	46.0	1.2	6	32	960	451	14.4
.56	941C20P56K-F	23.9	36.5	54.0	1.2	7	31	754	422	13.9
.68	941C20P68K-F	26.7	39.2	54.0	1.2	6	35	754	513	15.8
1.0	941C20W1K-F	33.1	45.6	54.0	1.2	5	38	754	754	19.4
3000 Vdc (500 Vac)										
.010	941C30S1K-F	7.8	14.1	34.0	0.8	60	18	2568	26	2.2
.015	941C30S15K-F	9.5	15.8	34.0	0.8	40	19	2568	39	2.9
.022	941C30S22K-F	11.5	17.8	34.0	0.8	25	20	2568	57	4.0
.033	941C30S33K-F	14.2	20.4	34.0	1.0	14	21	2568	85	5.8
.047	941C30S47K-F	11.3	20.7	46.0	1.0	14	20	1440	68	6.3
.068	941C30S68K-F	13.8	23.3	46.0	1.0	12	26	1440	98	7.4
.10	941C30P1K-F	17.1	26.5	46.0	1.2	10	28	1440	144	9.0
.15	941C30P15K-F	21.3	30.7	46.0	1.2	8	30	1440	216	11.2

Type 941C, Polypropylene Capacitors, for Pulse, Snubber

High dV/dt for Snubber Applications

RMS Voltage vs Frequency @ 25 °C



Type 942C, Polypropylene Capacitors, for High Pulse, Snubber

Very High dV/dt for Snubber Applications



Type 942 round, axial film capacitors utilize a hybrid section design of polypropylene film, metal foils and metallized polypropylene dielectric to achieve both high peak current as well as superior rms current ratings. This series is ideal for high pulse operation and high peak current circuits.

Highlights

- Very high dV/dt
- Very high pulse current
- Low inductance
- Self Healing

Specifications

Capacitance Range	0.01 to 2.5 μ F
Capacitance Tolerance	$\pm 10\%$ Standard Tolerance
Rated Voltage	600 to 2000 Vdc (300 to 500 Vac, 60 Hz)
Operating Temperature Range with Ripple	-55 °C to 105 °C* *Full rated voltage at 85 °C - derated linearly to 50% rated at 105 °C
Maximum rms Current	Check tables for values
Insulation Resistance	> 100,000 M Ω x μ F
Test Voltage between Terminals @ 25°C	150% rated DC voltage for 60 s
Test Voltage between Terminals & Case @ 25 °C	3 kVac @ 50/60 Hz for 60 s
Life Test	2,000 h @ 85 °C, 125% rated DC voltage
Life Expectancy	60,000 h @ rated Vdc, 70 °C 30,000 h @ rated Vac, 70 °C
RoHS Compliant	

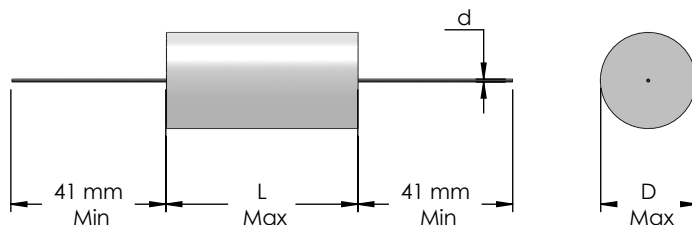
Dimensions

Construction Diagram



Construction Details

Case Material	UL510 Polyester Tape Wrap
Resin Material	UL94V-0 Epoxy Fill
Terminal Material	Tin Plated Copper



Type 942C, Polypropylene Capacitors, for High Pulse, Snubber

Very High dV/dt for Snubber Applications

Part Numbering System

942	C	6	P	22	K	-F
Series	Termination Code	Voltage Code		Capacitance Significant Figures μF	Tolerance Code	RoHS Compliant Indicator
942	C = Bare Copper Wire	6 = 600 Vdc	12 = 1200 Vdc	S = 0.0	K = $\pm 10\%$	
	F = Insulated Stranded Wire	8 = 850 Vdc	16 = 1600 Vdc	P = 0.		
		10 = 1000 Vdc	20 = 2000 Vdc	W = No decimal point		
	H = Copper Lugs					

Ratings

NOTE: Other ratings, sizes and performance specifications are available. Contact us.

Cap. (μF)	Catalog Part Number	D mm	L mm	d mm	Typical ESR ($\text{m}\Omega$)	Typical ESL (nH)	dV/dt ($\text{V}/\mu\text{s}$)	I_{PEAK} (A)	I_{RMS} 70 °C 100 kHz (A)
600 Vdc (300 Vac)									
.15	942C6P15K-F	14.0	34.0	1.0	5	21	1427	214	7.7
.22	942C6P22K-F	16.0	34.0	1.0	7	22	1427	314	7.0
.33	942C6P33K-F	19.0	34.0	1.0	6	23	1427	471	8.4
.47	942C6P47K-F	22.0	34.0	1.0	5	24	1427	671	10.1
.68	942C6P68K-F	25.6	34.0	1.2	4	26	1427	970	12.4
1.00	942C6W1K-F	23.5	46.0	1.2	5	30	800	800	11.8
1.50	942C6W1P5K-F	28.5	46.0	1.2	4	32	800	1200	14.8
2.00	942C6W2K-F	28.5	54.0	1.2	3	36	628	1256	18.2
2.20	942C6W2P2K-F	30.0	54.0	1.2	3	36	628	1382	18.8
2.50	942C6W2P5K-F	32.0	54.0	1.2	3	37	628	1570	19.5
850 Vdc (360 Vac)									
.15	942C8P15K-F	15.5	34.0	1.0	5	22	1712	257	8.1
.22	942C8P22K-F	18.0	34.0	1.0	7	23	1712	377	7.5
.33	942C8P33K-F	21.5	34.0	1.0	6	24	1712	565	7.7
.47	942C8P47K-F	25.0	34.0	1.2	5	26	1712	805	10.9
.68	942C8P68K-F	29.5	34.0	1.2	4	27	1712	1164	13.6
1.00	942C8W1K-F	28.0	46.0	1.2	5	32	960	960	13.1
1.50	942C8W1P5K-F	29.0	54.0	1.2	4	36	754	1131	15.9
2.00	942C8W2K-F	29.5	64.0	1.2	3	41	574	1148	19.9
1000 Vdc (400 Vac)									
.10	942C10P1K-F	16.0	34.0	1.0	8	22	2283	228	6.6
.15	942C10P15K-F	19.0	34.0	1.0	7	23	2283	342	7.8
.22	942C10P22K-F	22.5	34.0	1.0	6	24	2283	502	9.3
.33	942C10P33K-F	21.0	46.0	1.0	5	29	1280	422	11.0
.47	942C10P47K-F	24.0	46.0	1.2	5	30	1280	601	11.9
.68	942C10P68K-F	28.5	46.0	1.2	5	32	1280	870	13.3
1.00	942C10W1K-F	30.0	54.0	1.2	5	37	1005	1005	14.6
1.40	942C10W1P4K-F	31.5	64.0	1.2	4	41	765	1071	17.9

Type 942C, Polypropylene Capacitors, for High Pulse, Snubber

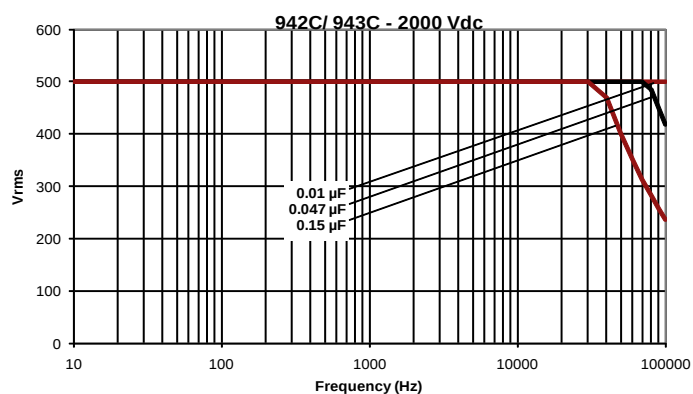
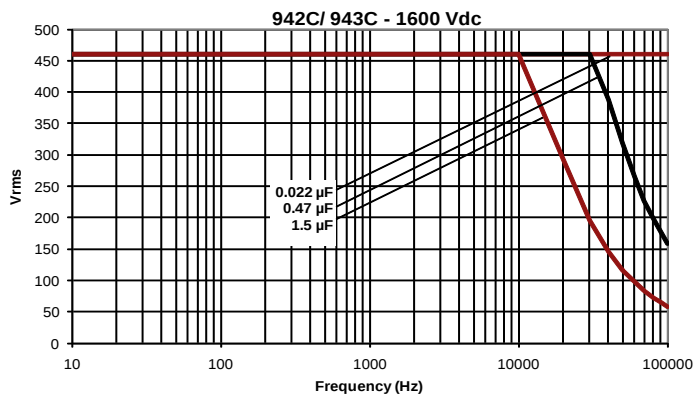
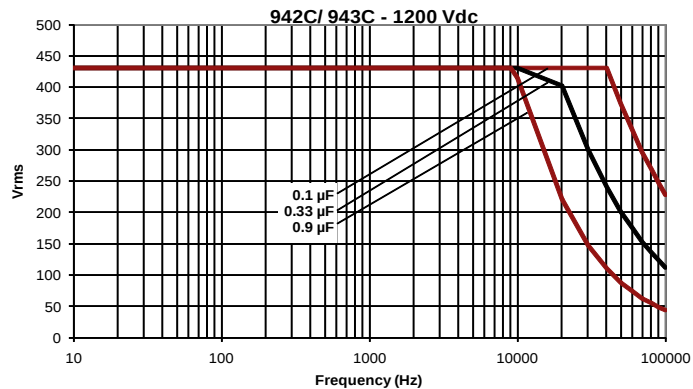
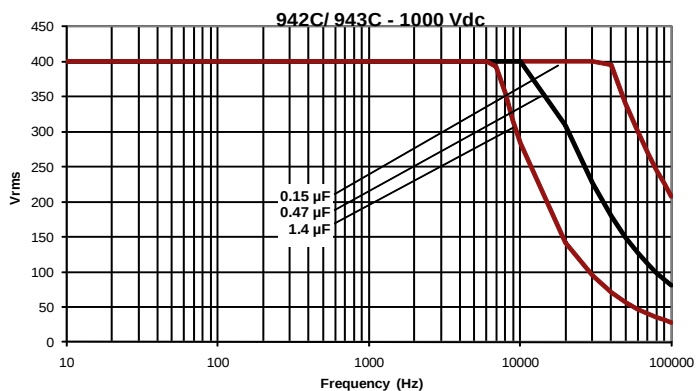
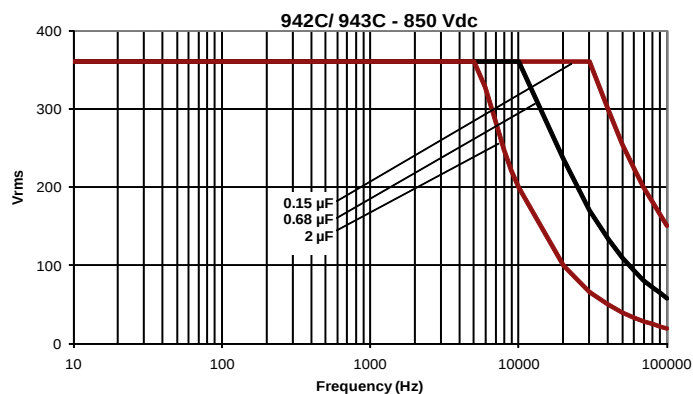
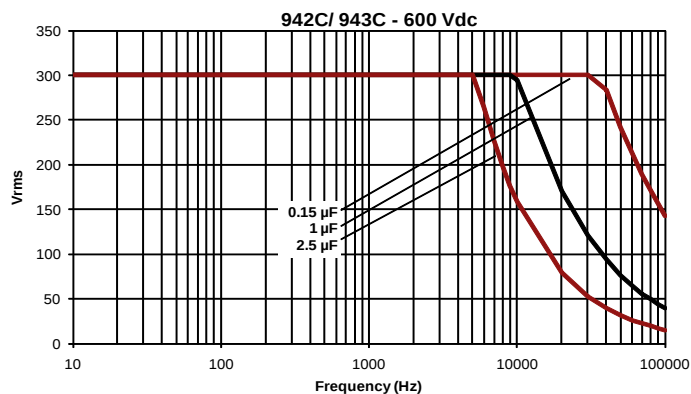
Very High dV/dt for Snubber Applications

Cap. (μ F)	Catalog Part Number	D mm	L mm	d mm	Typical ESR (m Ω)	Typical ESL (nH)	dV/dt (V/ μ s)	I _{PEAK} (A)	I _{RMS} 70 °C 100 kHz (A)
1200 Vdc (430 Vac)									
.10	942C12P1K-F	19.0	34.0	1.0	5	23	2854	285	9.2
.15	942C12P15K-F	22.5	34.0	1.0	5	24	2854	428	10.2
.22	942C12P22K-F	26.5	34.0	1.2	6	26	2854	628	10.3
.33	942C12P33K-F	24.5	46.0	1.2	6	31	1600	528	11.0
.47	942C12P47K-F	29.0	46.0	1.2	5	32	1600	752	13.4
.68	942C12P68K-F	30.5	54.0	1.2	5	37	1256	854	14.7
.90	942C12P9K-F	31.0	64.0	1.2	5	41	957	861	15.9
1600 Vdc (460 Vac)									
.022	942C16S22K-F	12.0	34.0	1.0	27	20	3425	75	3.0
.033	942C16S33K-F	14.5	34.0	1.0	14	21	3425	113	4.7
.047	942C16S47K-F	16.5	34.0	1.0	8	22	3425	161	6.7
.068	942C16S68K-F	19.0	34.0	1.0	6	23	3425	233	8.4
.10	942C16P1K-F	22.5	34.0	1.0	4	24	3425	342	11.4
.15	942C16P15K-F	20.5	46.0	1.0	5	29	1919	288	10.9
.22	942C16P22K-F	23.5	46.0	1.0	5	68	1919	422	11.8
.33	942C16P33K-F	28.5	46.0	1.2	5	32	1919	633	13.3
.47	942C16P47K-F	30.0	54.0	1.2	5	36	1507	708	14.6
.56	942C16P56K-F	28.5	64.0	1.2	5	40	1148	643	15.1
.68	942C16P68K-F	31.5	64.0	1.2	5	42	1148	781	16.0
2000 Vdc (500 Vac)									
.01	942C20S1K-F	12.0	34.0	1.0	50	20	5137	51	2.2
.015	942C20S15K-F	14.5	34.0	1.0	40	21	5137	77	2.8
.022	942C20S22K-F	16.5	34.0	1.0	20	22	5137	113	4.2
.033	942C20S33K-F	19.5	34.0	1.0	12	23	5137	170	6.0
.047	942C20S47K-F	18.0	46.0	1.0	10	28	2879	135	7.1
.068	942C20S68K-F	20.5	46.0	1.0	6	29	2879	196	9.9
.10	942C20P1K-F	24.5	46.0	1.2	5	30	2879	288	12.1
.15	942C20P15K-F	29.5	46.0	1.2	5	32	2879	432	13.5

Type 942C, Polypropylene Capacitors, for High Pulse, Snubber

Very High dV/dt for Snubber Applications

RMS Voltage vs Frequency @ 25 °C



Type 943C, Polypropylene Capacitors, for High Pulse, Snubber

Very High dV/dt for Snubber Applications



Type 943 oval, axial film capacitors utilize a hybrid section design of polypropylene film, metal foils and metallized polypropylene dielectric to achieve both high peak current as well as superior rms current ratings. This series is ideal for high pulse operation and high peak current circuits.

Highlights

- Very high dV/dt
- Very high pulse current
- Low inductance
- Self Healing

Specifications

Capacitance Range	0.01 to 2.5 μ F
Capacitance Tolerance	$\pm 10\%$ Standard Tolerance
Rated Voltage	600 to 2000 Vdc (300 to 500 Vac, 60 Hz)
Operating Temperature Range with Ripple	-55 °C to 105 °C* *Full rated voltage at 85 °C - derated linearly to 50% rated at 105 °C
Maximum rms Current	Check tables for values
Insulation Resistance	> 100,000 M Ω x μ F
Test Voltage between Terminals @ 25°C	150% rated DC voltage for 60 s
Test Voltage between Terminals & Case @ 25 °C	3 kVac @ 50/60 Hz for 60 s
Life Test	2,000 hours @ 85 °C, 125% rated DC voltage
Life Expectancy	60,000 h @ rated Vdc, 70 °C 30,000 h @ rated Vac, 70 °C
RoHS Compliant	

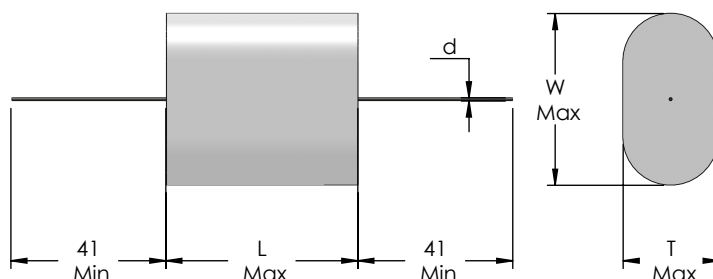
Dimensions

Construction Diagram



Construction Details

Case Material	UL510 Polyester Tape Wrap
Resin Material	UL94V-0 Epoxy Fill
Terminal Material	Tin Plated Copper



Type 943C, Polypropylene Capacitors, for High Pulse, Snubber

Very High dV/dt for Snubber Applications

Part Numbering System

943	C	6	P	22	K	-F	
				Capacitance		RoHS	
Series	Termination Code	Voltage Code		Capacitance Decimal Point	Significant Figures in μF	Tolerance Code	Compliant Indicator
943	C = Bare Copper Wire	6 = 600 Vdc	16 = 1600 Vdc	S = 0.0		J = $\pm 5\%$	
	F = Insulated Stranded Wire	8 = 850 Vdc	20 = 2000 Vdc	P = 0.		H = $\pm 6\%$	
		10 = 1000 Vdc	30 = 3000 Vdc	W = No decimal point		K = $\pm 10\%$	
	H = Tinned Lugs	12 = 1200 Vdc				M = $\pm 20\%$	

Ratings

NOTE: Other capacitance values, sizes and performance specifications are available. Contact us.

Cap. (μF)	Catalog Part Number	T mm	W mm	L mm	d mm	Typical ESR (mΩ)	Typical ESL (nH)	dV/dt (V/μs)	I peak (A)	I _{RMS} 70 °C 100 kHz (A)
600 Vdc (300 Vac)										
.15	943C6P15K-F	12.3	17.0	34.0	1.0	5	19	1427	214	8.9
.22	943C6P22K-F	14.3	19.0	34.0	1.0	7	20	1427	314	8.1
.33	943C6P33K-F	17.1	21.8	34.0	1.0	6	22	1427	471	9.6
.47	943C6P47K-F	19.9	24.6	34.0	1.0	5	23	1427	671	11.4
.68	943C6P68K-F	23.5	28.3	34.0	1.2	4	24	1427	970	14.1
1.00	943C6W1K-F	19.2	28.6	46.0	1.2	5	28	800	800	13.4
1.50	943C6W1P5K-F	23.5	32.9	46.0	1.2	4	30	800	1200	16.6
2.00	943C6W2K-F	24.0	33.5	54.0	1.2	3	33	628	1256	20.6
2.20	943C6W2P2K-F	25.2	34.6	54.0	1.2	3	34	628	1382	21.1
2.50	943C6W2P5K-F	27.0	36.5	54.0	1.2	3	35	628	1570	21.9
850 Vdc (360 Vac)										
.15	943C8P15K-F	13.9	18.6	34.0	1.0	5	20	1712	257	9.4
.22	943C8P22K-F	16.4	21.0	34.0	1.0	7	21	1712	377	8.7
.33	943C8P33K-F	19.5	24.2	34.0	1.0	6	23	1712	565	10.3
.47	943C8P47K-F	22.9	27.6	34.0	1.2	5	24	1712	805	12.4
.68	943C8P68K-F	27.1	31.8	34.0	1.2	4	26	1712	1164	15.3
1.00	943C8W1K-F	22.4	31.8	46.0	1.2	5	29	960	960	14.5
1.50	943C8W1P5K-F	24.3	33.7	54.0	1.2	4	34	754	1131	18.0
2.00	943C8W2K-F	24.7	34.2	64.0	1.2	3	38	574	1147	22.4
1000 Vdc (400 Vac)										
.10	943C10P1K-F	14.4	19.2	34.0	1.0	8	20	2283	228	7.6
.15	943C10P15K-F	17.2	21.9	34.0	1.0	7	22	2283	342	8.9
.22	943C10P22K-F	20.4	25.1	34.0	1.0	6	23	2283	502	10.6
.33	943C10P33K-F	16.6	26.0	46.0	1.0	5	27	1280	422	12.5
.47	943C10P47K-F	19.7	29.1	46.0	1.2	5	28	1280	601	13.6
.68	943C10P68K-F	23.7	33.1	46.0	1.2	5	30	1280	870	14.9
1.00	943C10W1K-F	25.4	34.9	54.0	1.2	5	34	1005	1005	16.5
1.40	943C10W1P4K-F	26.3	36.0	64.0	1.2	4	39	765	1071	20.1

Type 943C, Polypropylene Capacitors, for High Pulse, Snubber

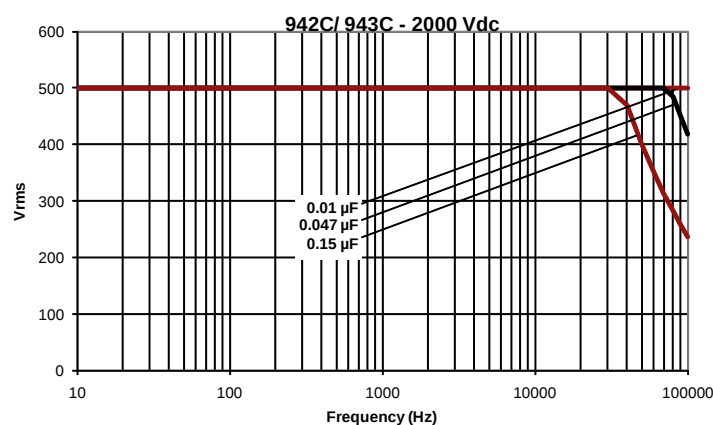
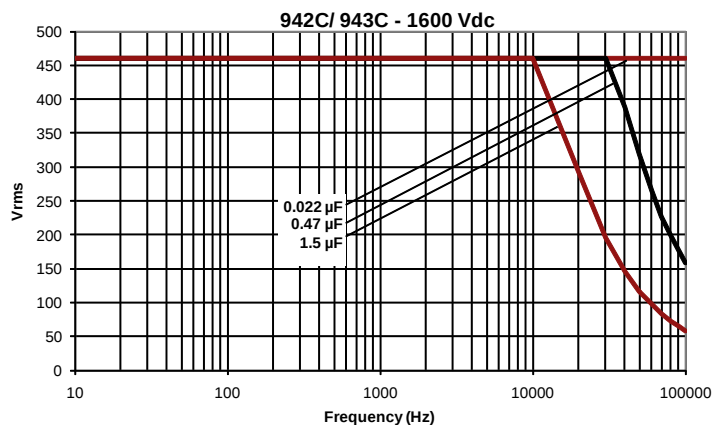
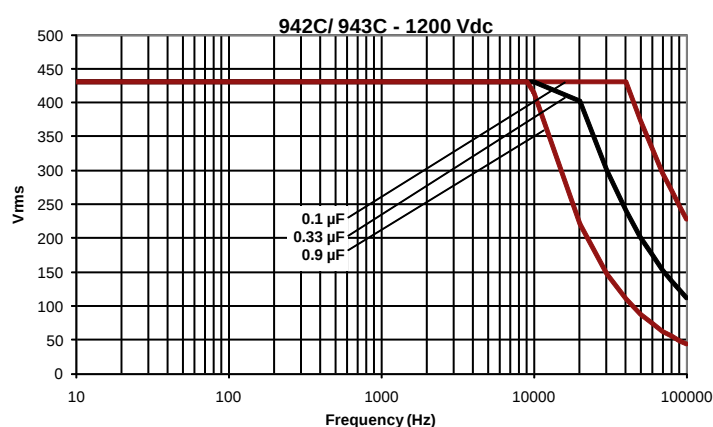
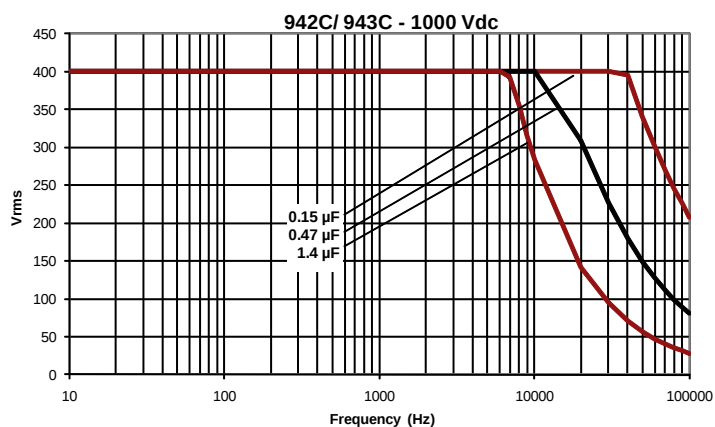
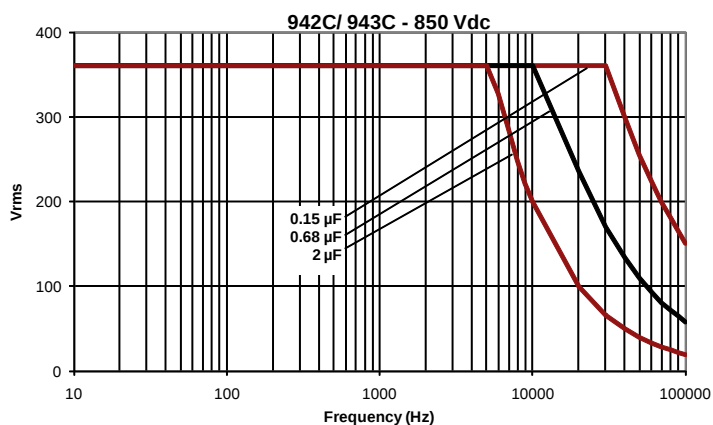
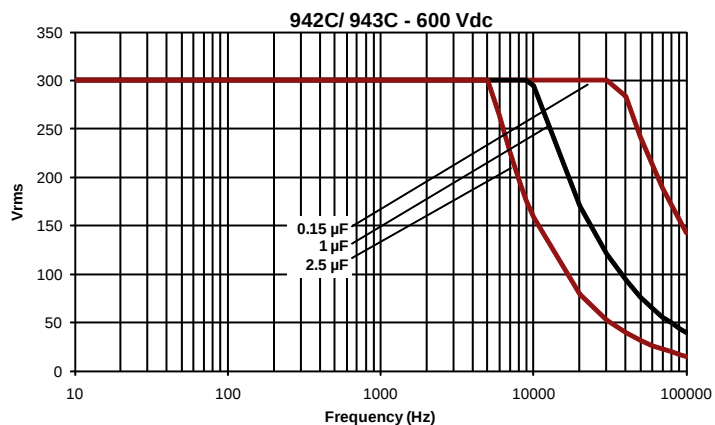
Very High dV/dt for Snubber Applications

Cap. (μ F)	Catalog Part Number	T mm	W mm	L mm	d mm	Typical ESR (m Ω)	Typical ESL (nH)	dV/dt (V/ μ s)	I peak (A)	I _{RMS} 70 °C 100 kHz (A)
1200 Vdc (430 Vac)										
.1	943C12P1K-F	17.1	21.8	34.0	1.0	5	22	2854	285	10.5
.15	943C12P15K-F	20.5	25.2	34.0	1.0	5	23	2854	428	11.6
.22	943C12P22K-F	24.4	29.1	34.0	1.2	6	25	2854	628	11.7
.33	943C12P33K-F	20.2	29.6	46.0	1.2	6	28	1600	528	12.5
.47	943C12P47K-F	24.0	33.4	46.0	1.2	5	30	1600	752	15.0
.68	943C12P68K-F	25.6	35.0	54.0	1.2	5	36	1256	854	16.5
.90	943C12P9K-F	25.7	35.1	64.0	1.2	5	39	956	860	17.7
1600 Vdc (460 Vac)										
.022	943C16S22K-F	10.6	15.3	34.0	1.0	27	19	3425	75	3.5
.033	943C16S33K-F	12.4	17.1	34.0	1.0	14	20	3425	113	5.3
.047	943C16S47K-F	14.3	19.0	34.0	1.0	8	20	3425	161	7.6
.068	943C16S68K-F	16.7	21.4	34.0	1.0	6	21	3425	233	9.5
.10	943C16P1K-F	19.8	24.5	34.0	1.0	4	23	3425	342	12.8
.15	943C16P15K-F	16.1	25.5	46.0	1.0	5	26	1919	288	12.3
.22	943C16P22K-F	19.4	28.8	46.0	1.0	5	28	1919	422	13.5
.33	943C16P33K-F	23.7	33.2	46.0	1.2	5	30	1919	633	14.9
.47	943C16P47K-F	25.1	34.5	54.0	1.2	5	34	1507	708	16.3
.56	943C16P56K-F	24.3	33.7	64.0	1.2	5	38	1147	642	17.2
.68	943C16P68K-F	26.6	36.0	64.0	1.2	5	40	1147	780	18.0
2000 Vdc (500 Vac)										
.010	943C20S1K-F	10.4	15.1	34.0	1.0	50	19	5137	51	2.6
.015	943C20S15K-F	12.2	16.9	34.0	1.0	40	19	5137	77	3.1
.022	943C20S22K-F	14.2	19.0	34.0	1.0	20	20	5137	113	4.8
.033	943C20S33K-F	16.9	21.6	34.0	1.0	12	22	5137	170	6.8
.047	943C20S47K-F	13.3	22.8	46.0	1.0	10	25	2879	135	8.0
.068	943C20S68K-F	15.8	25.3	46.0	1.0	6	26	2879	196	11.2
.10	943C20P1K-F	19.1	28.5	46.0	1.2	5	28	2879	288	14.9
.15	943C20P15K-F	23.3	32.7	46.0	1.2	5	30	2879	432	15.5

Type 943C, Polypropylene Capacitors, for High Pulse, Snubber

Very High dV/dt for Snubber Applications

RMS Voltage vs Frequency @ 25 °C



Type SCD IGBT Snubber Capacitor Modules

High dV/dt Direct Mount IGBT Snubber



Style SCD offers protection against voltage transients in low to medium current IGBT applications where high dV/dt is encountered. Connect these capacitors from C1 to E2 on a dual IGBT module or from P to N on a six-pack module to eliminate severe voltage transients. Parts ending with Z25 fit IGBTs with 23mm, 25mm and 28mm lead spacing. If you have a preferred lead spacing, please specify.

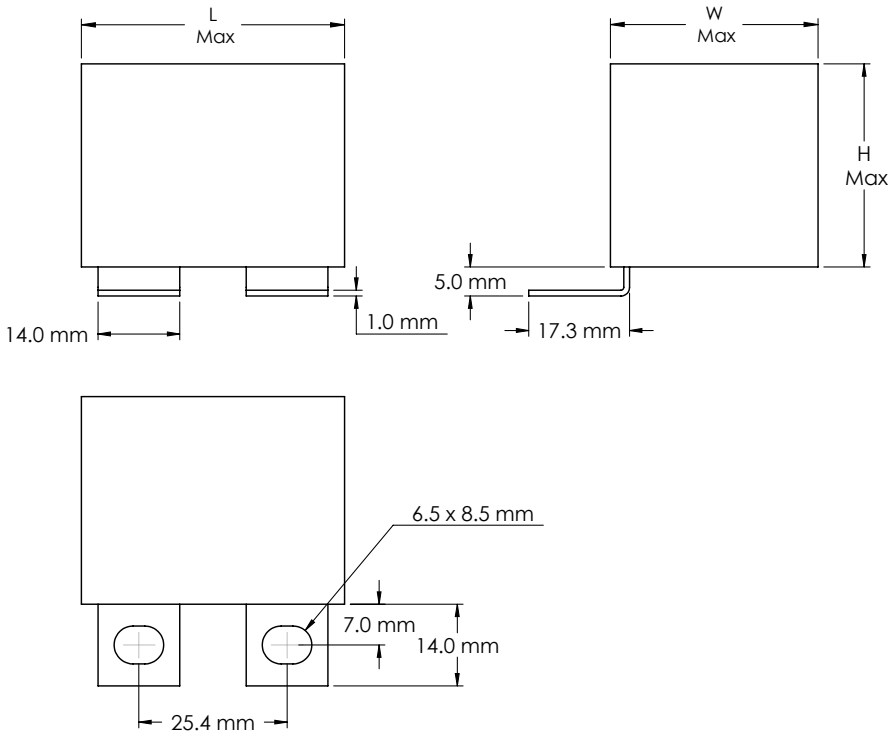
Highlights

- High peak & RMS current capability
- Mount directly to the IGBT module
- Low inductance <20nH
- Low loss polypropylene dielectric
- Self healing
- Other terminal spacing and capacitance values available.
- We can build to your specs!
- 85 °C ambient temperature

Specifications

Capacitance Range	0.22 to 4.7 μF
Capacitance Tolerance	±10% (K) standard, ±5% (J) optional
Rated Voltage	600 to 2000 Vdc
Operating Temperature Range with Ripple	-55 °C to 85 °C
Maximum rms Current	Check tables for values
Test Voltage between Terminals @ 25°C	160% rated DC voltage for 60 s
Test Voltage between Terminals & Case @ 25°C	3 kVac @ 50/60 Hz for 60 s
Life Test	2000 h @ 85 °C, 125% rated DC voltage
Life Expectancy	60,000 h @ rated Vdc, 70 °C 30,000 h @ rated Vac, 70 °C
RoHS Compliant	

Dimensions



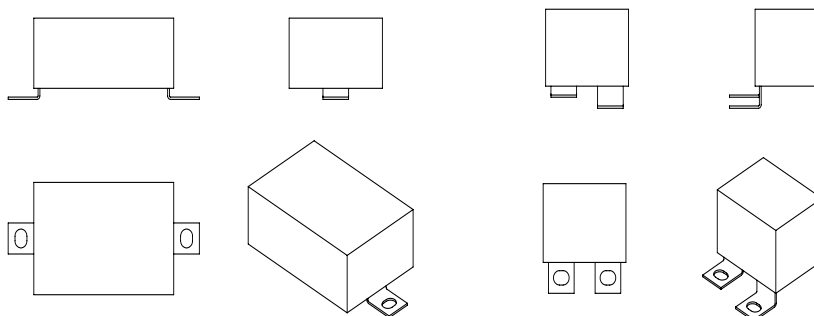
Construction Details	
Case Material	Plastic UL94V-0
Resin Material	Dry Resin UL94V-0
Terminal Material	Tin Plated Copper

Type SCD IGBT Snubber Capacitor Modules

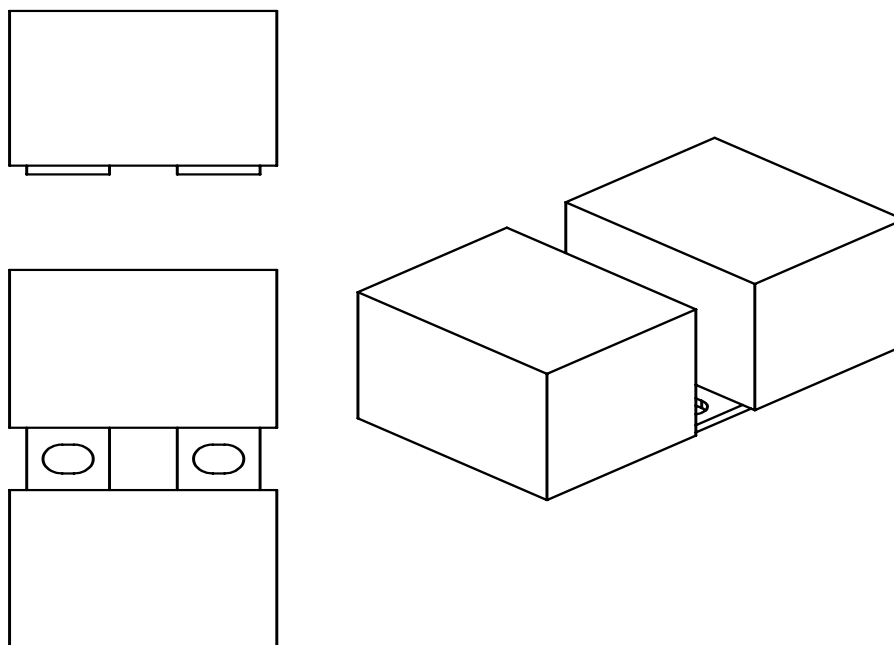
High dV/dt Direct Mount IGBT Snubber

Mounting Across the Bus?

CDE Will Accommodate Your Bus Structure



Dual Snubber Assembly Option



Part Numbering System

SCD	105	K	122	A	3	-	25	-F
Series Type Designation	Capacitance in μF	Tolerance Code	Voltage	Internal Assembly Code	Type of Section to be used	Lug Configuration	Lug Spacing	RoHS Compliant Indicator
	104 = 0.1 μF	J = $\pm 5\%$	601 = 600 Vdc			Z = Standard	22 = 22 mm	
	105 = 1 μF	K = $\pm 10\%$	122 = 1200 Vdc			25.4 mm C-C	24 = 24 mm	
	225 = 2.2 μF		202 = 2000 Vdc				25 = 25 mm	
							28 = 28 mm	
							29 = 29 mm	

Type SCD IGBT Snubber Capacitor Modules

High dV/dt Direct Mount IGBT Snubber

Ratings

Note: Other ratings, sizes and performance specification available upon request. Contact us.

Catalog Part Number	Cap. (μF)	Volts (Vdc)	Volts		Irms 100 kHz					
			60 Hz (Vac)	dV/dt (V/μs)	Ipk (A)	ESR (mΩ)	55 °C (Arms)	W (mm)	L (mm)	H (mm)
600 Vdc										
SCD474K601A3Z25-F	0.47	600	275	250	118	9	9.2	24.6	47.0	24.1
SCD684K601A3Z25-F	0.68	600	275	250	170	7	11.5	29.0	47.0	26.7
SCD105K601A3Z25-F	1.00	600	275	200	200	5	14.0	29.0	47.0	26.7
SCD155K601A3Z25-F	1.50	600	275	150	225	4	17.1	29.0	47.0	26.7
SCD205K601A3Z25-F	2.00	600	275	150	300	3	20.7	32.3	45.1	35.6
SCD335K601D3Z25-F	3.30	600	400	300	825	5	35.0	38.1	52.1	38.1
SCD475K601D3Z25-F	4.70	600	400	250	1175	4	46.2	46.4	56.5	50.2
1000 Vdc										
SCD474K102A3Z25-F	0.47	1000	275	250	118	11	9.2	24.6	47.0	24.1
SCD474K102D3Z25-F	0.47	1000	500	700	329	8	12.1	29.0	47.0	26.7
SCD684K102A3Z25-F	0.68	1000	275	200	136	7	11.5	29.0	47.0	26.7
SCD684K102D3Z25-F	0.68	1000	500	500	340	7	14.4	29.0	47.0	26.7
SCD105K102A3Z25-F	1.00	1000	275	200	200	4	14.0	29.0	47.0	26.7
SCD105K102D3Z25-F	1.00	1000	500	400	400	5	17.5	29.0	47.0	26.7
SCD155K102A3Z25-F	1.50	1000	275	160	240	4	17.9	32.3	45.1	35.6
SCD155K102D3Z25-F	1.50	1000	500	400	600	3	22.4	34.8	45.1	35.6
SCD205K102A3Z25-F	2.00	1000	275	160	320	4	20.9	34.8	45.1	35.6
SCD205K102D3Z25-F	2.00	1000	500	400	800	5	26.2	38.1	52.1	38.1
1200 Vdc										
SCD224K122A3Z25-F	0.22	1200	500	650	143	19	7.9	24.6	47.0	24.1
SCD334K122A3Z25-F	0.33	1200	500	650	215	13	10.0	29.0	47.0	26.7
SCD474K122A3Z25-F	0.47	1200	500	500	235	10	12.0	29.0	47.0	26.7
SCD684K122A3Z25-F	0.68	1200	500	500	340	7	15.1	32.3	45.1	35.6
SCD105K122A3Z25-F	1.00	1200	500	500	500	5	18.5	34.8	45.1	35.6
SCD155K122A3Z25-F	1.50	1200	500	400	600	4	23.9	38.1	52.1	38.1
SCD205K122A3Z25-F	2.00	1200	500	400	800	4	30.1	46.4	56.5	50.2
SCD305K122C3Z25-F	3.00	1200	500	400	1200	5	39.7	76.2	62.9	38.1
1600 Vdc										
SCD224K162A3Z25-F	0.22	1600	500	650	143	19	7.9	24.6	47.0	24.1
SCD334K162A3Z25-F	0.33	1600	500	650	215	12	10.0	29.0	47.0	26.7
SCD474K162A3Z25-F	0.47	1600	500	650	306	10	12.6	32.3	45.1	35.6
SCD684K162A3Z25-F	0.68	1600	500	650	442	7	15.3	34.8	45.1	35.6
SCD105K162A3Z25-F	1.00	1600	500	500	500	6	19.5	38.1	52.1	38.1
SCD155K162A3Z25-F	1.50	1600	500	400	600	5	25.6	41.9	68.6	38.1
SCD205K162A3Z25-F	2.00	1600	500	400	800	5	30.6	44.5	66.7	46.4
2000 Vdc										
SCD224K202A3Z25-F	0.22	2000	500	800	176	19	8.2	24.6	47.0	24.1
SCD334K202A3Z25-F	0.33	2000	500	800	264	13	10.5	32.3	45.1	35.6
SCD474K202A3Z25-F	0.47	2000	500	600	282	10	13.0	34.3	55.9	30.5
SCD684K202A3Z25-F	0.68	2000	500	600	408	8	16.1	38.1	52.1	38.1
SCD105K202A3Z25-F	1.00	2000	500	600	600	6	21.3	46.4	56.5	50.2

Note: Modify Catalog Part Number to specify lead spacing. Example: 44mm spacing would use -44 instead of Z25. Other capacitance values and lead orientations are available. Contact us.

CDE Cornell Dubilier • 1605 E. Rodney French Blvd. • New Bedford, MA 02744 • Phone: (508)996-8561 • Fax: (508)996-3830

Type SCM Single/Dual IGBT Snubber Capacitor Modules

High Peak Current Snubber with Integrated Hyperfast Diode



Use style SCM as a discharge restrictive de-coupling to protect dual IGBT modules from overvoltage, Figure 1. Style SCM may also be used as an "N" or "P" type snubber component for a clamp snubber where single IGBT modules are used, figure 2.

Highlights

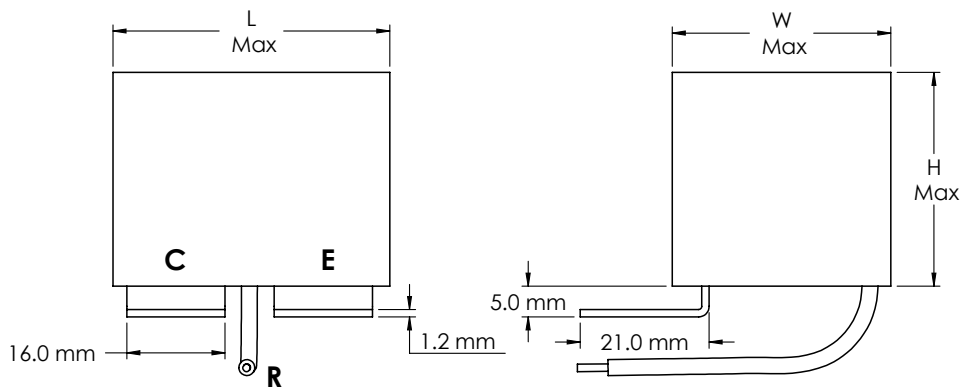
- Direct mount to the IGBT module
- Low inductance
- Low Loss
- Hyperfast diodes integrated into package
- Self healing
- Other terminal spacing, capacitance values and voltage ratings, also available upon request.

Specifications

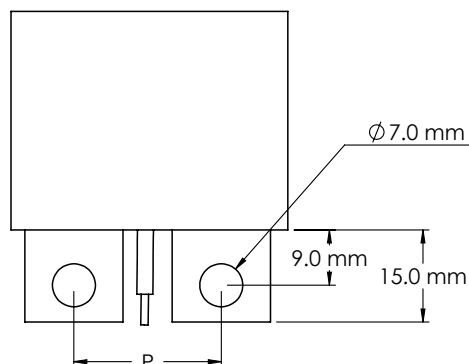
Capacitance Range	0.47 to 2.0 µF
Capacitance Tolerance	±10% (K) standard, ±5% (J) optional
Rated Voltage	600 to 1200 Vdc
Operating Temperature Range with Ripple	-55 °C to 70 °C
RoHS Compliant	

Dimensions

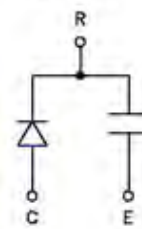
Construction Details	
Case Material	Plastic UL94V-0
Resin Material	Dry Resin UL94V-0
Terminal Material	Tin Plated Copper



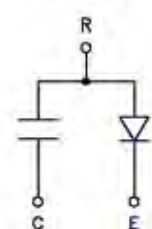
Wire: UL1015
AWG 18
200 mm Min



N Type



P Type



Type SCM Single/Dual IGBT Snubber Capacitor Modules

High Peak Current Snubber with Integrated Hyperfast Diode

Part Numbering System

SCM	105	K	122	H1	N	24	-F
Series Type Designation	Capacitance in μF	Tolerance Code	Voltage	Diode Rating	Polarity	Lug Spacing	RoHS Compliant Indicator
	104=0.1 μF	J = $\pm 5\%$	601 = 600 Vdc		N or P Type	24=24mm	
	105=1 μF	K = $\pm 10\%$	122 = 1200 Vdc			28=28mm	
	225=2.2 μF		202 = 2000 Vdc			29=29mm	

Ratings

Note: Other ratings, sizes and performance specification available upon request. Contact us.

Typical Application					Diode Characteristics									
IGBT Module										Ipk	Ipk	Dimensions		
Catalog	Cap	S=Single	Ic	Vce		Vrrm	If	Trr	surge	rep	W	L	H	P
Part Number	(μF)	D=Dual	(A)	(V)	Type	(V)	(A)	(μs)	(A)	(A)	(mm)	(mm)	(mm)	(mm)
SCM474K601H7N29-F	0.47	S	200–300	600	N	600	30	0.040	300	70	43.82	55.88	34.04	29
SCM474K601H7P29-F	0.47	S	200–300	600	P	600	30	0.040	300	70	43.82	55.88	34.04	29
SCM105K601H7N24-F	1.00	D	100–200	600	N	600	30	0.040	300	70	38.10	47.63	31.75	24
SCM105K601H7P24-F	1.00	D	100–200	600	P	600	30	0.040	300	70	38.10	47.63	31.75	24
SCM105K601H5N29-F	1.00	S	300–400	600	N	600	50	0.045	500	100	46.36	56.52	38.10	29
SCM105K601H5P29-F	1.00	S	300–400	600	P	600	50	0.045	500	100	46.36	56.52	38.10	29
SCM155K601H7N24-F	1.50	D	200–300	600	N	600	30	0.040	300	70	34.29	55.88	30.48	24
SCM155K601H7P24-F	1.50	D	200–300	600	P	600	30	0.040	300	70	38.10	47.63	31.75	24
SCM205K601H5N24-F	2.00	D	300–400	600	N	600	50	0.045	500	100	43.82	55.88	34.04	24
SCM205K601H5P24-F	2.00	D	300–400	600	P	600	50	0.045	500	100	43.82	55.88	34.04	24
SCM205K601H2N29-F	2.00	S	400–600	600	N	600	100	0.050	1000	200	46.36	56.52	38.10	29
SCM205K601H2P29-F	2.00	S	400–600	600	P	600	100	0.050	1000	200	46.36	56.52	38.10	29
SCM474K122H8N29-F	0.47	S	200–300	1200	N	1200	30	0.065	300	60	34.29	55.88	30.48	29
SCM474K122H8P29-F	0.47	S	200–300	1200	P	1200	30	0.065	300	60	38.10	47.63	31.75	29
SCM105K122H8N24-F	1.00	D	100–200	1200	N	1200	30	0.065	300	60	44.45	63.50	37.34	24
SCM105K122H8P24-F	1.00	D	100–200	1200	P	1200	30	0.065	300	60	44.45	63.50	37.34	24
SCM105K122H4N29-F	1.00	S	300–400	1200	N	1200	50	0.085	500	100	43.82	55.88	34.04	29
SCM105K122H4P29-F	1.00	S	300–400	1200	P	1200	50	0.085	500	100	46.36	56.52	38.10	29
SCM155K122H8N24-F	1.50	D	200–300	1200	N	1200	30	0.065	300	60	44.45	63.50	37.34	24
SCM155K122H8P24-F	1.50	D	200–300	1200	P	1200	30	0.065	300	60	46.36	56.52	38.10	24
SCM205K122H4N24-F	2.00	D	300–400	1200	N	1200	50	0.065	500	100	53.98	63.50	43.18	24
SCM205K122H4P24-F	2.00	D	300–400	1200	P	1200	50	0.065	500	100	53.98	63.50	43.18	24
SCM205K122H1N29-F	2.00	S	400–600	1200	N	1200	100	0.090	1000	200	53.98	63.50	43.18	29
SCM205K122H1P29-F	2.00	S	400–600	1200	P	1200	100	0.090	1000	200	53.98	63.50	43.18	29
Ipk surge at 25 °C and Ipk repetitive at 25 °C and 20 kHz.														

Type SCM Single/Dual IGBT Snubber Capacitor Modules

High Peak Current Snubber with Integrated Hyperfast Diode

Typical Applications

Discharge Restrictive De-coupling

The circuit in Figure 1 operates on the same principles as the de-coupling capacitor, but only during turn-off switching. As the IGBT turns off, energy trapped in the loop inductance is transferred to the capacitor. The diode blocks oscillations from occurring and excess charge on the capacitor is discharged through the external resistor.

- 1 or 2 wire taps for connecting external resistor
- Flame resistant case and epoxy, meets UL 94V0
- Other terminal pitches and capacitance values available.

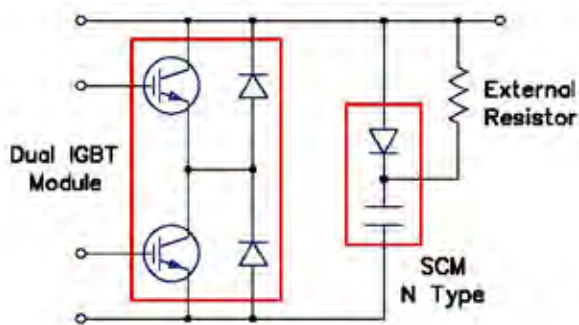


Figure 1

Style SCM Discharge restrictive decoupling used to protect dual IGBT modules

RCD Clamp

The function of this snubber is similar to a clamp, Figure 2. At turn-off, the snubber diode is forward biased and the snubber is activated. The energy trapped in the stray inductance is absorbed by the snubber capacitor. During turn-on the snubber caps that were fully charged to bus voltage have a discharge path through the forward biased free-wheel diode, the IGBT, and the snubber resistors. This reduces the reverse recovery voltage transient.

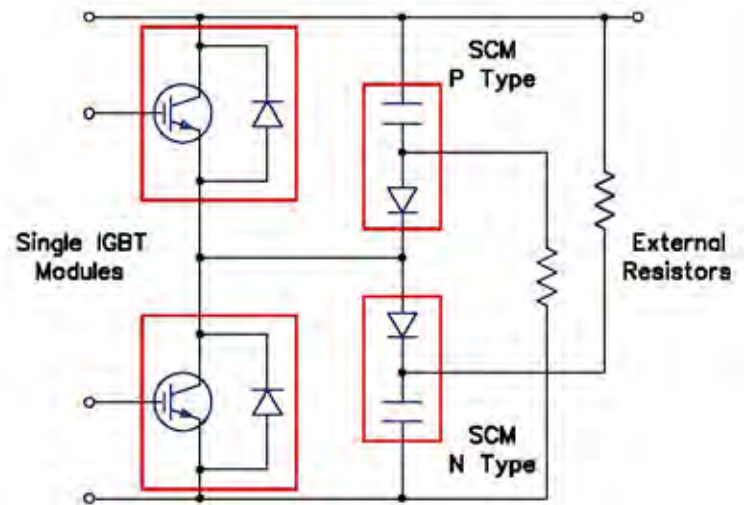


Figure 2

Style SCM "P" type and "N" type used as a clamp to protect an inverter using two "single" IGBT modules

Type SCC, Dual IGBT Clamp-Snubber Modules

High Peak Current Snubber with Integrated Hyperfast Diodes



Style SCC is ideal for use in medium to high current applications where a dual IGBT module is used. This low loss snubber directly reduces turn-off voltage overshoots and is effective in reducing turn-on voltage transients.

Highlights

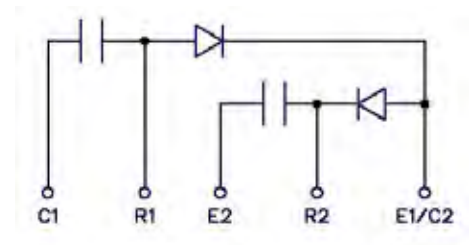
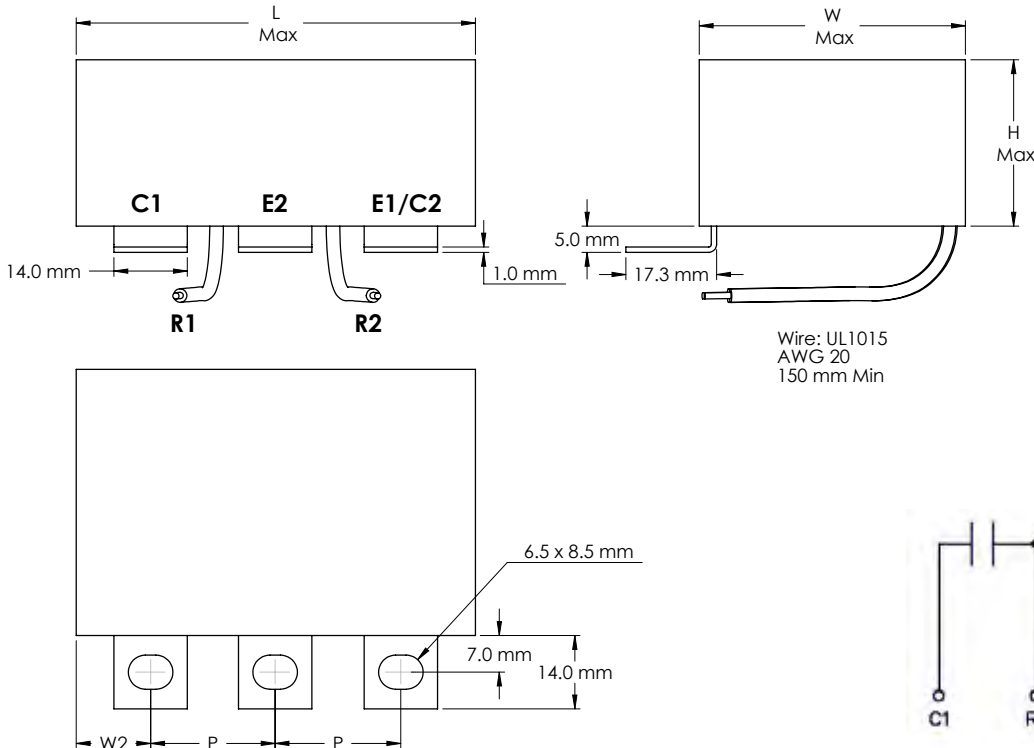
- Mount directly to the IGBT module
- Low inductance
- Low loss polypropylene dielectric
- High peak current
- Hyperfast diodes integrated into package
- Wire taps for connecting external resistors
- Flame resistant case and epoxy meet UL 94V-0

Specifications

Capacitance Range	0.47 to 2.0 μ F
Capacitance Tolerance	$\pm 10\%$ (K) standard, $\pm 5\%$ (J) optional
Rated Voltage	600 to 1200 Vdc
Operating Temperature Range with Ripple	-55 $^{\circ}$ C to 70 $^{\circ}$ C
RoHS Compliant	

Dimensions

Construction Details	
Case Material	Plastic UL94V-0
Resin Material	Dry Resin UL94V-0
Terminal Material	Tin Plated Copper



Type SCC, Dual IGBT Clamp-Snubber Modules

High Peak Current Snubber with Integrated Hyperfast Diodes

Part Numbering System

SCC	105	K	122	H1	24	-F
Series Type Designation	Capacitance in pF	Tolerance Code	Voltage	Diode Rating	Lug Spacing	RoHS Compliant Indicator
	104 = 0.1 μ F	J = $\pm$ 5%	601 = 600 Vdc	See Tables	24 = 24 mm	
	105 = 1 μ F	K = $\pm$ 10%	122 = 1200 Vdc		28 = 28 mm	

Ratings

Note: Other ratings, sizes and performance specification available upon request. Contact us.

Catalog Part Number	Typical Application		Diode		Ipk(A) Tc = 25 °C					
	Cap	DUAL IGBT	Characteristics	Ipk(A) Surge	Repetitive	W	2	H	W2	P
	(μF)	Ic/Vce	Vrrm/I _f /trr(μs)	Tc = 25 °C	20 kHz Sq Wave	(mm)	(mm)	(mm)	(mm)	(mm)
SCC105K601H7-24-F	1.00	100/600	600/30/.040	300	70	50.80	76.20	31.75	14.22	24
SCC155K601H7-24-F	1.50	200-300/600	600/30/.040	300	70	50.80	76.20	31.75	14.22	24
SCC205K601H5-24-F	2.00	400/600	600/50/.045	500	100	50.80	76.20	31.75	14.22	24
SCC205K601H5-28-F	2.00	400/600	600/50/.045	500	100	50.80	76.20	31.75	10.16	28
SCC474K122H8-24-F	0.47	100/1200	1200/30/.065	300	60	50.80	76.20	31.75	14.22	24
SCC474K122H8-28-F	0.47	100/1200	1200/30/.065	300	60	50.80	76.20	31.75	10.16	28
SCC105K122H8-24-F	1.00	150/1200	1200/30/.065	300	60	62.90	76.20	38.10	14.22	24
SCC105K122H8-28-F	1.00	150/1200	1200/30/.065	300	60	62.90	76.20	38.10	10.16	28
SCC155K122H4-24-F	1.50	200/1200	1200/50/.085	500	100	63.50	88.90	40.00	20.60	24
SCC155K122H4-28-F	1.50	200/1200	1200/50/.085	500	100	63.50	88.90	40.00	16.50	28
SCC205K122H4-24-F	2.00	300/1200	1200/50/.085	500	100	71.12	92.08	43.18	20.60	24
SCC205K122H4-28-F	2.00	300/1200	1200/50/.085	500	100	71.12	92.08	43.18	18.03	28

Type UNL, DC Link and Filter Capacitors

High Capacitance, High Current, Board Mount



Constructed using a low-loss polypropylene film, the UNL series offers high ripple current capabilities and high capacitance values making them ideal for electrolytic bank replacement and high ripple current applications.

Highlights

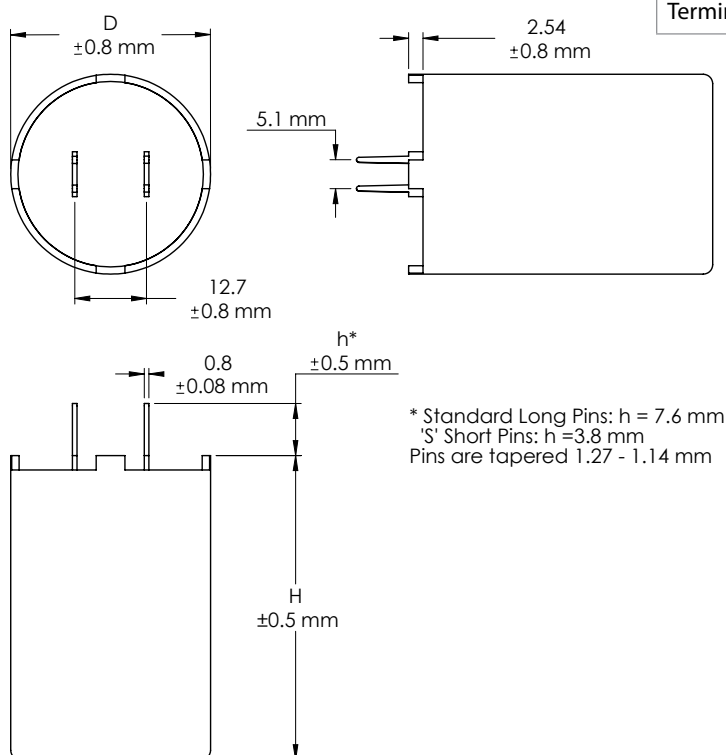
Advantages over Electrolytics

- Exceptionally low ESR
- Up to 10 times the ripple current
- Non-polar
- Higher voltage ratings
- Dry construction - no electrolyte
- Improved reliability

Specifications

Capacitance Range	4.7 to 100 μ F
Capacitance Tolerance	$\pm 10\%$ (K) standard, $\pm 5\%$ (J) optional
Rated Voltage	400 to 1500 Vdc
Operating Temperature Range	-55 °C to 105 °C* *Full rated voltage at 85 °C - derate linearly to 50% rated at 105 °C
Maximum rms Current	Check tables for values
Test Voltage between Terminals @ 25 °C	125% rated DC voltage for 60 s
Test Voltage between Terminals & Case @ 25 °C	3 kVac @ 50/60 Hz for 60 s
Life Test	2,000 h @ 85 °C, 125% rated voltage
Life Expectancy	60,000 h @ 70 °C, rated voltage
RoHS Compliant	

Dimensions



Construction Details

Case Material	Plastic UL94V-0
Resin Material	Dry Resin UL94V-0
Terminal Material	Tin Plated Brass

Type UNL, DC Link and Filter Capacitors

High Capacitance, High Current, Board Mount

Part Numbering System

UNL	7	W20	K	S	-F
Type	Voltage	Capacitance	Tolerance	Leads	RoHS
UNL	4 = 400 Vdc	W80 = 80μF	K = ±10%	S = Short Pins	Compliant
	5 = 500Vdc	W100 = 100μF	J = ±5%	Blank = Long Pins	
	6 = 600 Vdc	W30 = 30μF			
	7 = 750 Vdc	W50 = 50μF			
	8 = 800 Vdc	W40 = 40μF			
	9 = 900 Vdc	W13P5 = 13.5μF			
	10 = 1000 Vdc	W10 = 10μF			
	12 = 1200 Vdc	W7P5 = 7.5μF			
	15 = 1500 Vdc	W4P7 = 4.7μF			

Ratings

NOTE: Other ratings, sizes and performance specifications are available. Contact us.

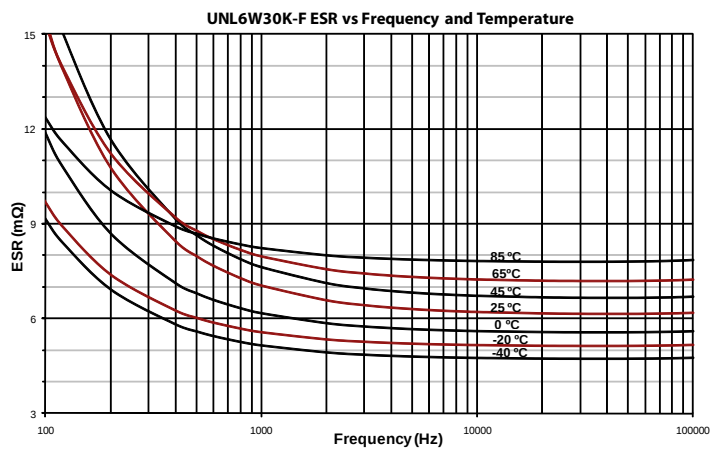
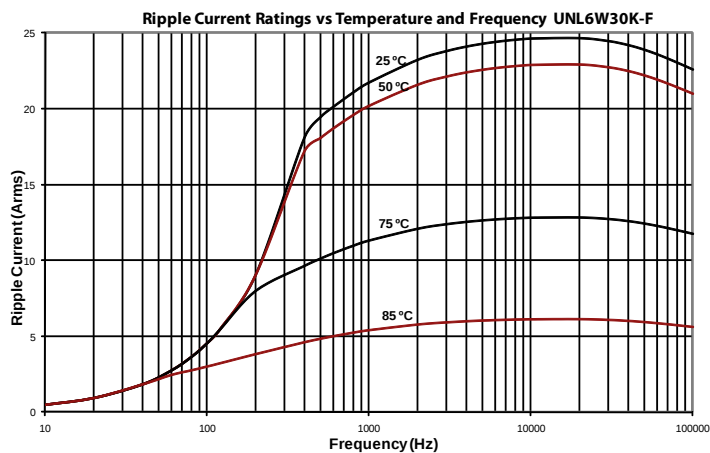
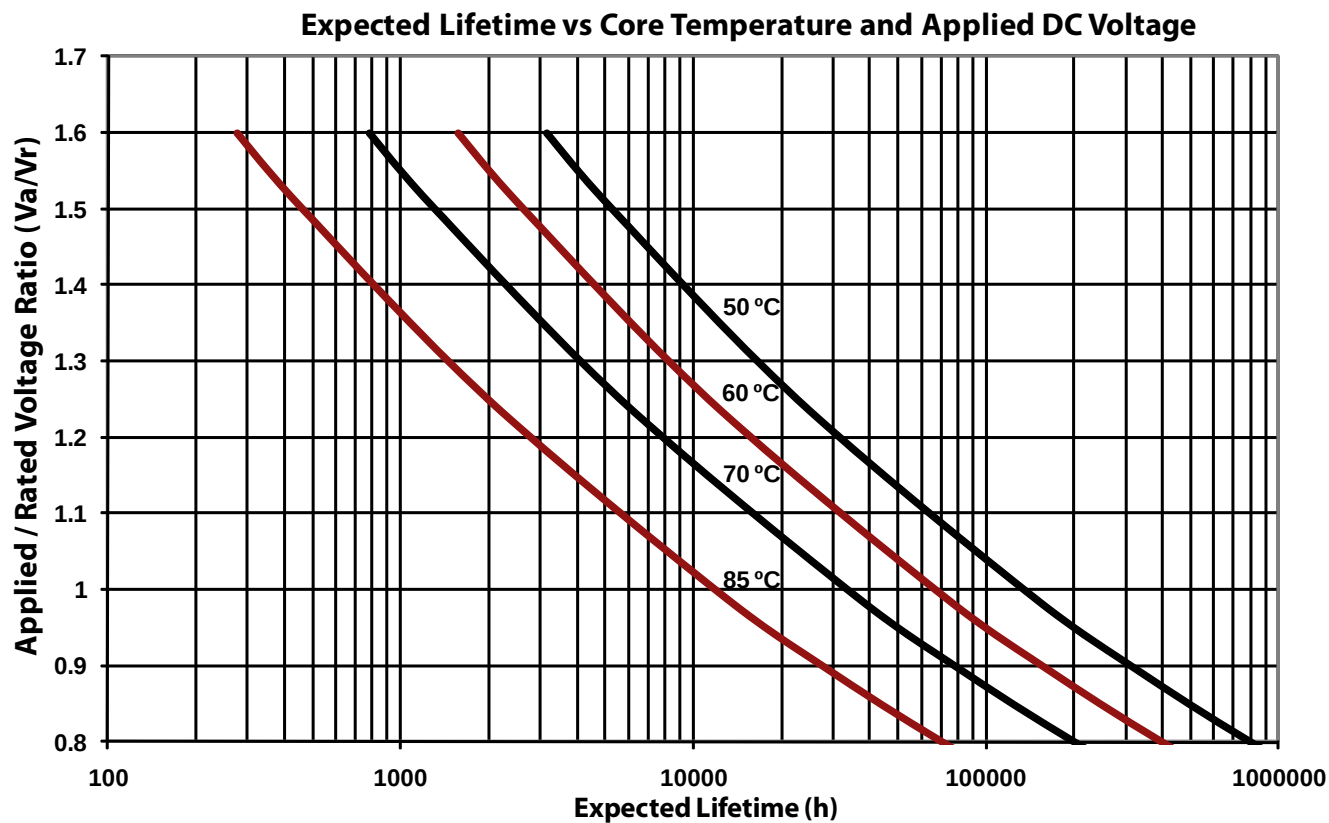
Catalog Part Number*	Cap (μF)	Rated Voltage (Vdc)	Dia. D (mm)	Height H (mm)	Typical ESR @ 100 kHz (mΩ)	dV/dt (V/μs)	Peak Current (A)	Ripple Current @ 100 kHz		
								25 °C (Arms)	50 °C (Arms)	75 °C (Arms)
UNL4W30K-F	30.0	400	35	53.7	6.0	30	900	24.2	19.4	14.6
UNL4W80K-F	80.0	400	50	63	5.0	25	2000	35.0	28.0	14.3
UNL5W35K-F	35.0	500	35	53.7	8.0	26	910	22.0	18.2	13.0
UNL5W100K-F	100.0	500	50	63	6.0	22	2200	31.8	25.4	13.2
UNL6W30K-F	30.0	600	35	53.7	9.0	30	900	20.7	17.0	12.0
UNL6W80K-F	80.0	600	50	63	6.5	25	2000	30.5	24.4	12.6
UNL7W20K-F	20.0	750	35	53.7	10.0	37	740	19.0	16.0	9.9
UNL7W50K-F	50.0	750	50	63	7.0	30	1500	29.4	23.5	12.0
UNL8W15K-F	15.0	800	35	53.7	10.0	42	630	18.8	15.0	9.8
UNL8W40K-F	40.0	800	50	63	7.5	35	1400	28.4	22.8	11.7
UNL9W13P5K-F	13.5	900	35	53.7	10.5	43	580	18.0	14.5	9.6
UNL9W35K-F	35.0	900	50	63	8.0	36	1260	27.5	22.0	11.3
UNL10W10K-F	10.0	1000	35	53.7	12.0	50	500	17.5	13.7	9.0
UNL10W25K-F	25.0	1000	50	63	8.5	40	1000	26.7	21.4	11.0
UNL12W7P5K-F	7.5	1200	35	53.7	13.5	60	450	16.0	12.0	8.4
UNL12W20K-F	20.0	1200	50	63	9.0	50	1000	26.0	20.7	10.7
UNL15W4P7K-F	4.7	1500	35	53.7	15.0	72	338	15.0	11.5	7.8
UNL15W13K-F	13.0	1500	50	63	10.0	60	780	24.6	19.7	10.1

*Add 'S' after 'K' for short pins

Type UNL, DC Link and Filter Capacitors

High Capacitance, High Current, Board Mount

Typical Performance Curves



Type 944U Polypropylene, DC Filter Capacitors

High Current, Low Profile for Inverter Applications



Type 944U is specifically designed for use in high power DC filtering applications. The low inductance internal construction utilizes low loss metallized polypropylene for high ripple current capability. Male or female terminal options offer design flexibility in a rugged UL 94V0 rated flame retardant plastic case and resin fill. High current ratings and robust mounting flanges make the 944U suited for inverter applications in electric vehicle power inverters, wind power inverters and motor drives.

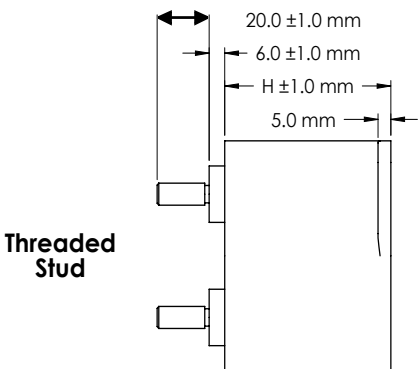
Highlights

- Low Inductance
- Low Profile
- Low ESR
- High Ripple Current
- High Voltage Ratings

Specifications

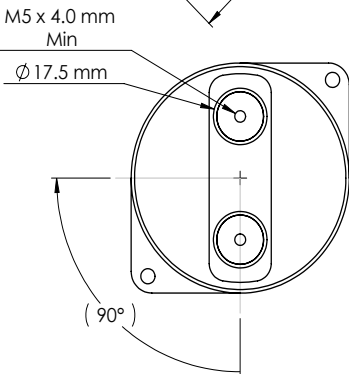
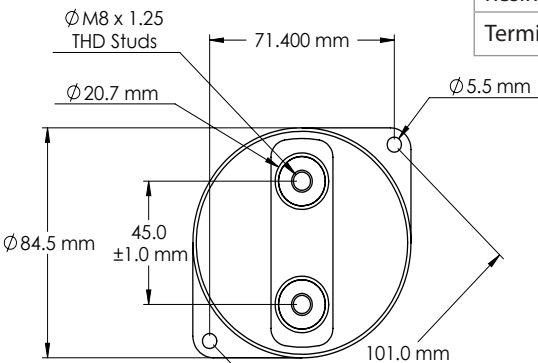
Capacitance Range	33 to 220 μ F
Capacitance Tolerance	$\pm$ 10% standard
Rated Voltage	800 to 1400 Vdc
Operating Temperature Range with Ripple	-40 $^{\circ}$ C to 85 $^{\circ}$ C
Maximum rms Current	74A @ 55 $^{\circ}$ C
Maximum rms Voltage	230 Vac
Test Voltage between Terminal @ 25 $^{\circ}$ C	150% rated DC voltage for 10 s
Test Voltage between Terminals & Case @ 25 $^{\circ}$ C	4 kVac @ 50/60 Hz for 60 s
Life Test	5000 h @ 85 $^{\circ}$ C, rated voltage
RoHS Compliant	

Dimensions



Threaded Stud

Threaded Insert



Construction Details

Case Material	Plastic UL94V-0
Resin Material	Dry Resin UL94V-0
Terminal Material	Tin Plated Brass

Type 944U Polypropylene, DC Filter Capacitors

High Current, Low Profile for Inverter Applications

Part Numbering System

944U	101	K	801	A	A	M
Type	Capacitance	Tolerance	Voltage	Diameter D (mm)	Height H (mm)	Terminal
944U	101 = 100 μ F 700 = 70 μ F 470 = 47 μ F	K = $\pm$ 10%	801 = 800 Vdc 102 = 1000 Vdc 122 = 1200 Vdc 142 = 1400 Vdc	A = 84.5	A = 40 B = 51 C = 64	M = M8 Thd Stud I = M5 Thd Insert

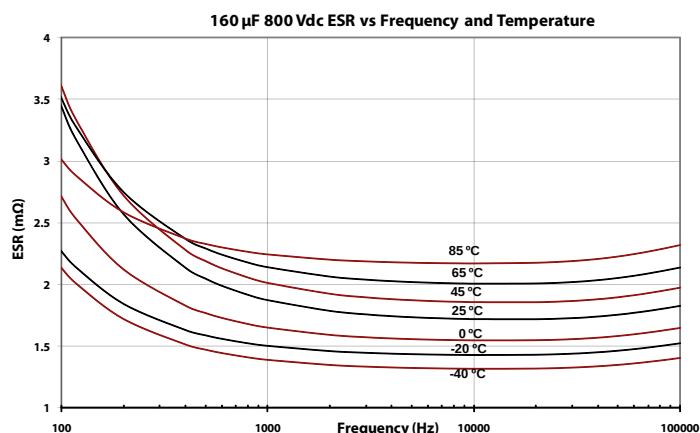
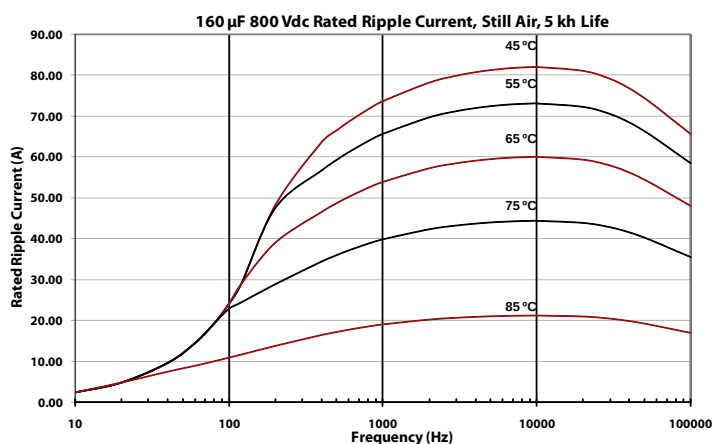
Ratings

NOTE: Other ratings, sizes and performance specifications are available. Contact us.

Catalog Part Number	Cap (μ F)	Rated Voltage (Vdc)	H Height mm	Max ESR 10kHz (m Ω)	Typical ESL (nH)	Max Irms 55°C (A)	Thermal Resistance Θ_{cc} (°C/W)	Θ_{ca} (°C/W)
944U101K801AA*	100	800	40	0.5	20	74	2.8	5.2
944U161K801AB*	160	800	51	0.8	30	73	3.0	4.5
944U221K801AC*	220	800	64	1.0	40	72	3.1	4.0
944U660K102AA*	66	1000	40	0.6	20	70	2.8	5.2
944U101K102AB*	100	1000	51	0.8	30	68	3.0	4.5
944U141K102AC*	140	1000	64	1.0	40	65	3.1	4.0
944U470K122AA*	47	1200	40	0.7	20	67	2.8	5.2
944U700K122AB*	70	1200	51	1.0	30	65	3.0	4.5
944U101K122AC*	100	1200	64	1.3	40	64	3.1	4.0
944U330K142AA*	33	1400	40	0.8	20	64	2.8	5.2
944U520K142AB*	52	1400	51	1.1	30	60	3.0	4.5
944U700K142AC*	70	1400	64	1.4	40	59	3.1	4.0

* M = M8 Stud I = M5 Insert

Typical Performance Curves



Type 944U Polypropylene, DC Filter Capacitors

High Current, Low Profile for Inverter Applications

Expected Lifetime Predictions

To use the Expected Lifetime curves calculate V_a/V_r and core temperature T . Start by estimating:

Applied dc voltage V_a
Ripple Current I
Ripple Frequency f
Ambient Temperature T_a
Airflow speed v

Units:

$A = m^2$ $T, T_a \text{ \& } T_c = ^\circ C$
 $C = \mu F$ $\theta, \theta_{ca} \text{ \& } \theta_{cc} = ^\circ C/W$
 $ESR = m\Omega$ $v = m/s$
 $f = kHz$ $V_a \text{ \& } V_r = V_{dc}$
 $I = A$

NOTE: The temperature rise in the 944U is $I^2(ESR)$ times the thermal resistance θ . The ESR is mainly the metal resistance; the metal resistance is the 10 kHz ESR. For operation below 10kHz add the dielectric resistance. It is the dielectric dissipation factor—no more than 0.0002—times the capacitive reactance, i.e., $0.0002/(2\pi fC)$. That's equal to $31.83/(fC)$.

1. Start with the 10 kHz ESR from the Ratings table. If frequency is less than 10 kHz, add $31.83/(fC)$.

2. Compute total thermal resistance θ as the sum of core-to-case thermal resistance θ_{cc} and case-to-ambient thermal resistance θ_{ca} . Both are in the Ratings table but θ_{ca} is for still air and θ_{cc} is for 10 kHz or less. For frequency > 10 kHz multiply θ_{cc} by $[1+(f-10)/100]$, e.g., for 75 kHz multiply θ_{cc} by 1.65. For moving air use the capacitor surface area A and airflow speed v to calculate $\theta_{ca} = 1/[A(5+17.5(v+0.1)^{0.66})]$.

3. Compute V_a/V_r and the core temperature T .
 $T = T_a + I^2(ESR)\theta$

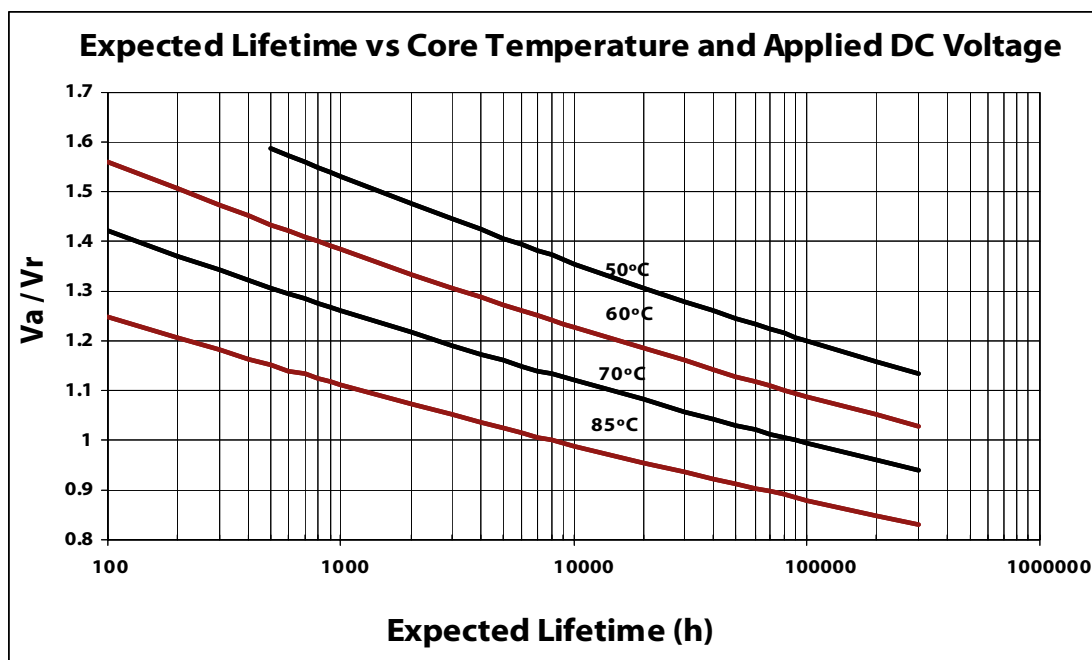
4. Look up estimated lifetime from the Expected Lifetime curves.

5. If you want a longer expected lifetime, choose a capacitor with higher voltage rating or consider using multiple capacitors in parallel to share the ripple current.

The expected lifetime predictions assume no exposure to overvoltage transients. Expected lifetime can be calculated for varying exposure to overvoltage transients. As an illustration at 50 °C the expected lifetime is 100,000 h with the 24-hour V_a/V_r profile below:

V_a / V_r	Duration
1.67	100 ms
1.50	5 minutes
1.30	2.5 hours
1.10	9.6 hours
1.00	11.9 hours

For applications with more severe 24-hour profiles, contact us.



Type 945U Polypropylene, DC Link Capacitors

High Capacitance, Screw Terminal Case for Inverter Applications



Type 945U uses advanced metalized film technology to achieve long-life, high reliability in DC link applications. High voltage and high current ratings packaged in screw-terminal cases allow for replacement of series-parallel banks of aluminum electrolytic capacitors in high ripple current application. Suited for wind and solar power inverters.

Highlights

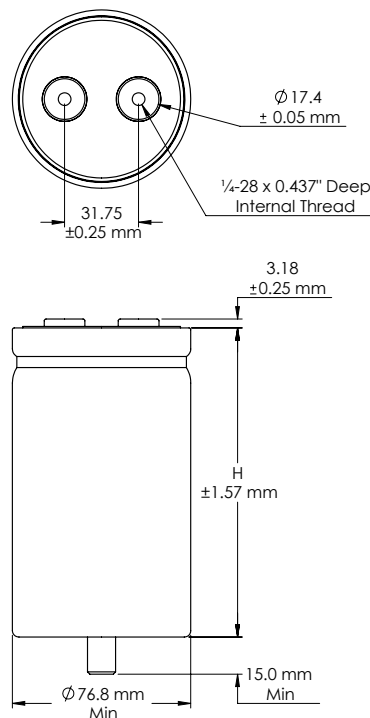
Advantages over Electrolytics

- Exceptionally Low ESR
- High Ripple Current
- Non-Polar
- High Voltage ratings
- Dry Construction - no Electrolyte

Specifications

Capacitance Range	65 to 500 μ F
Capacitance Tolerance	$\pm 10\%$ standard
Rated Voltage	600 to 1000 Vdc
Operating Temperature Range with Ripple	-55 °C to 85 °C
Maximum rms Current	47A @ 50 °C
Maximum rms Voltage	230 Vac
Test Voltage between Terminal @ 25°C	130% rated DC voltage for 60 s
Test Voltage between Terminals & Case @ 25°C	3 kVac @ 50/60 Hz for 60 s
Life Test	2000 h @ 85 °C, 125% rated voltage
RoHS Compliant	

Dimensions



Construction Details

Case Material	Aluminum with Black PVC Sleeve
Resin Material	Dry Resin UL94V-0
Terminal Material	Tin Plated Brass

1/4 - 28 x 0.50" Round Head Screws provided

Shown with optional M12 Mounting Stud
Lock Washer and Hex Nut provided

Type 945U Polypropylene, DC Link Capacitors

High Capacitance, Screw Terminal Case for Inverter Applications

Part Numbering System

945U	171	K	601	D	B	I	S
Type	Capacitance	Tolerance	Voltage	Diameter D mm	Height H mm	Terminal	Mounting
945U	171 = 170 μ F 950 = 95 μ F 900 = 90 μ F	K = $\pm$ 10%	601 = 600 Vdc 751 = 750 Vdc 901 = 900 Vdc 102 = 1000 Vdc	D = 76.8	B = 80.2 C = 105.2 E = 131.2 M = 156.2	I = ¼ - 28 Insert	blank = No Stud S = M12 Stud

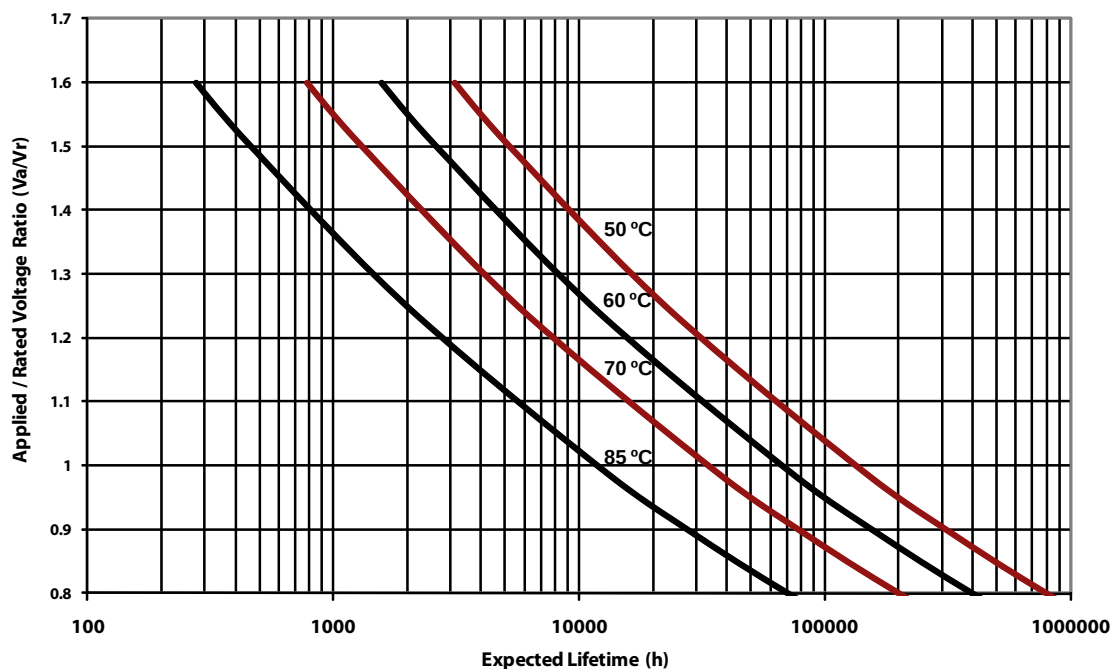
Ratings

NOTE: Other ratings, sizes and performance specifications are available. Contact us.

Catalog Part Number	Cap (μ F)	Rated Voltage (Vdc)	H Height mm	100kHz ESR (m Ω)	dV/dt (V/ μ s)	Max Irms 10 kHz 50 °C (A)
945U221K601DBI	220	600	80.2	4.0	30	47.0
945U301K601DCI	300	600	105.2	4.5	25	46.0
945U401K601DEI	400	600	131.2	5.0	26	44.0
945U501K601DMI	500	600	156.2	6.0	22	43.0
945U141K751DBI	140	750	80.2	4.5	30	44.0
945U191K751DCI	190	750	105.2	5.0	25	43.0
945U251K751DEI	250	750	131.2	6.0	37	42.0
945U321K751DMI	320	750	156.2	6.5	30	41.0
945U900K901DBI	90	900	80.2	5.0	42	42.0
945U131K901DCI	130	900	105.2	5.5	35	41.0
945U171K901DEI	170	900	131.2	6.5	43	40.0
945U221K901DMI	220	900	156.2	7.5	36	38.0
945U650K102DBI	65	1000	80.2	5.5	50	40.0
945U950K102DCI	95	1000	105.2	6.0	40	39.0
945U131K102DEI	130	1000	131.2	7.0	60	38.0
945U161K102DMI	160	1000	156.2	8.0	50	37.0

Typical Performance Curves

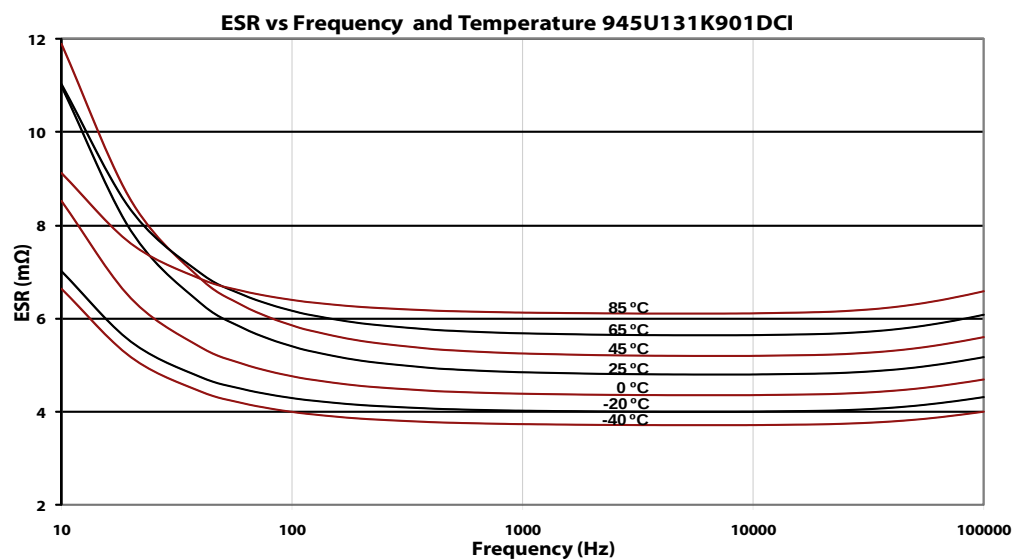
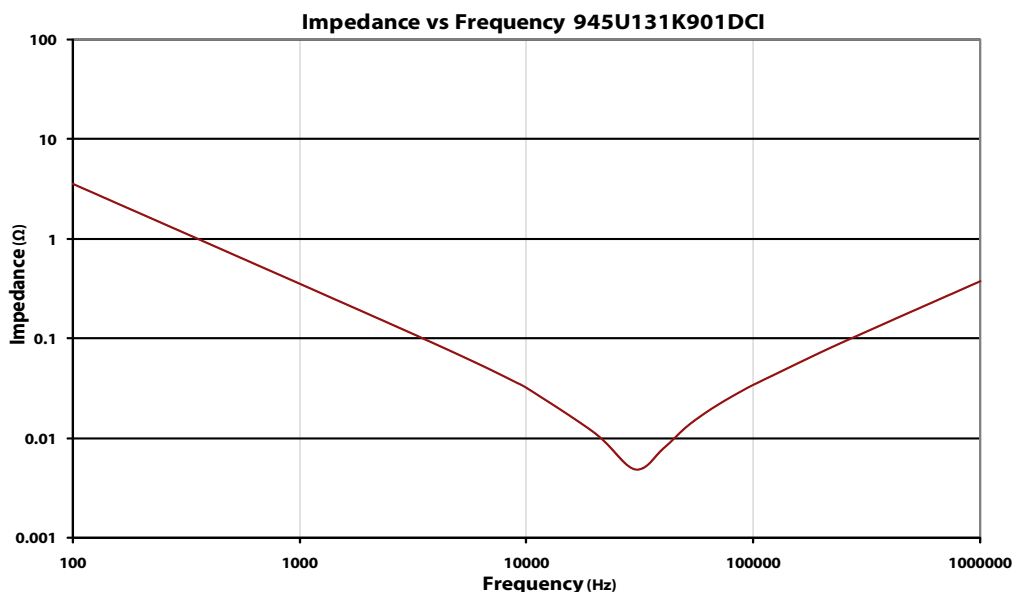
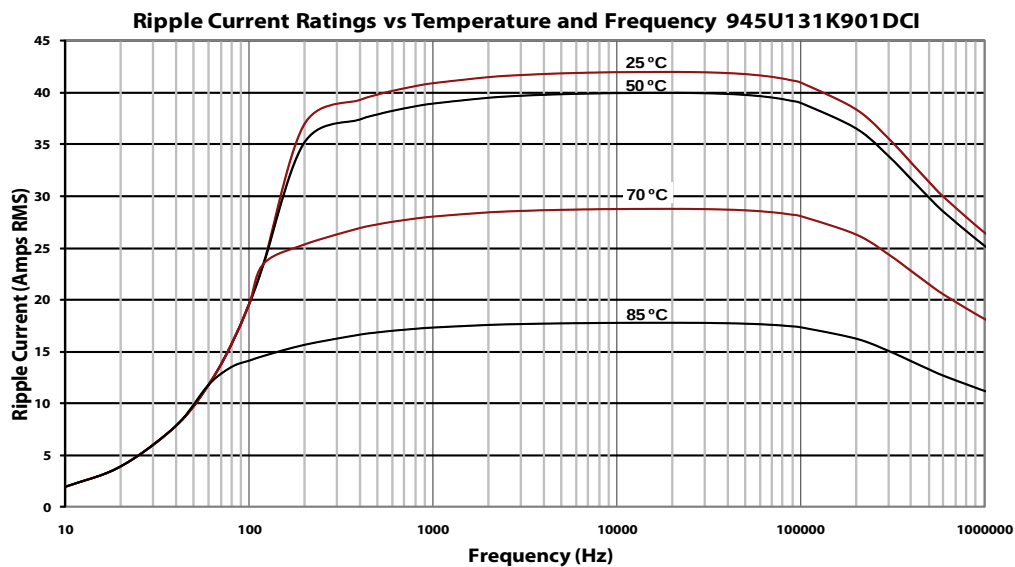
Expected Lifetime vs Core Temperature and Applied DC Voltage



Type 945U Polypropylene, DC Link Capacitors

High Capacitance, Screw Terminal Case for Inverter Applications

Typical Performance Curves



Type 947C Polypropylene, DC Link Capacitors

High Current, High Capacitance for Inverter Applications



Type 947C series uses the most advanced metallized film technology for long life, high reliability in DC Link applications. This series delivers high capacitance, high voltage and high ripple current handling capabilities required for inverters used in wind, solar, fuel cell applications and more.

Highlights

- Non-polar dielectric
- Dry, resin filled
- High reliability and life expectancy
- Replacement for aluminum electrolytic capacitors (lower capacitance, higher current)
- High current to 100 Amps
- Low ESR
- Low Inductance

Specifications

Capacitance Range	110 to 1500 μ F
Capacitance Tolerance	$\pm 10\%$ standard, $\pm 5\%$ optional
Rated Voltage	800 to 1300 Vdc
Operating Temperature Range	-40 °C to 85 °C (ambient)
Maximum rms Current	see data tables
Maximum rms Voltage	230 Vac
Test Voltage between Terminals @ 25 °C	150% rated DC voltage for 10 s
Test Voltage between Terminals & Case @ 25 °C	4 kVac @ 50/60 Hz for 60 s
Life Test	5000 h @ 85 °C, rated voltage
Life Expectancy	200,000 h @ 60 °C, rated voltage
Reliability	100 FIT typical (medium size capacitor)
Standards	IEC 61071, IEC 61881
RoHS Compliant	

Dimensions

Construction Details

Case Material	Aluminum with Black PVC Sleeve
Resin Material	Dry Resin UL94V-0
Terminal Material	Tin Plated Brass

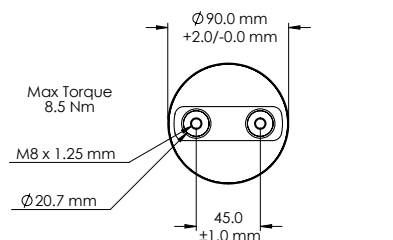


Figure 1

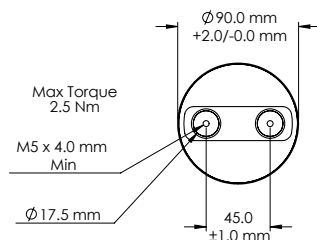


Figure 2

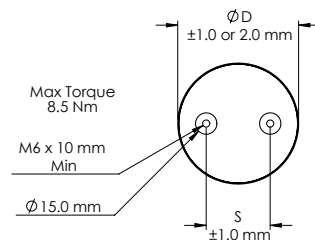
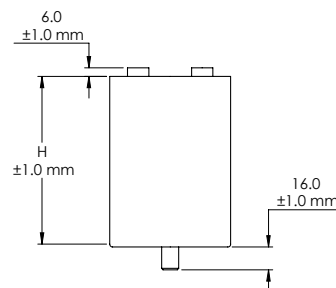
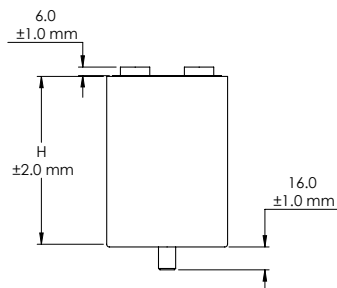
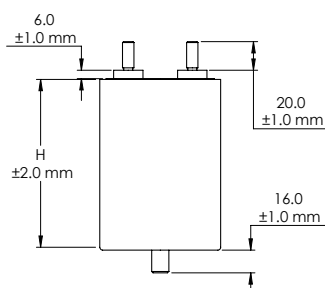


Figure 3



All Shown with Optional M12 x 1.75 THD Stud
Lock Washer and Hex Nut Provided

Type 947C Polypropylene, DC Link Capacitors

High Current, High Capacitance for Inverter Applications

Part Numbering System

947C	361	K	801	C	A	M	S	- NS
Type	Capacitance	Tolerance	Voltage	Diameter D	Height H	Terminal	Mounting	Sleeving
947C	361 = 360 μ F	K = ± 10 %	801 = 800 Vdc	C = 90 mm	T = 85 mm	I = M5 Insert	blank = no stud	Specify -NS
	731 = 730 μ F	J = ± 5 %	901 = 900 Vdc	B = 85 mm	A = 97 mm	Threaded	S = M12 Stud	for Bare Can
	152 = 1500 μ F		102 = 1000 Vdc	D = 116 mm	B = 120 mm	M = M8 Stud	Threaded	
			112 = 1100 Vdc		G = 140 mm	Threaded		
			122 = 1200 Vdc		C = 145 mm	H = M6 Insert		
			132 = 1300 Vdc		L = 165 mm	Threaded		
					D = 170 mm			

Ratings

NOTE: Other ratings, sizes and performance specifications are available. Contact us.

Part Number	Rated		Can	Can	Lead	Current							
	Cap.	Voltage	Diameter	Height	Spacing	Case	$\Delta T = 40$	Typ	Typ	Thermal Resistance		Mass	Fig
	C (μ F)	Vr (Vdc)	D (mm)	H (mm)	S (mm)	Area (mm ²)	Irms (A)	ESR (m Ω)	ESL (nH)	θ_{cc} ($^{\circ}$ C/W)	θ_{ca} ($^{\circ}$ C/W)	(kg)	
947C311K801BTHS	310	800	85	85	31.7	34000	74	1.2	41	2.9	3.4	0.6	3
947C341K801CTMS	340	800	90	85	45.0	36800	78	1.1	41	2.8	3.1	0.7	1
947C341K801CTIS	340	800	90	85	45.0	36800	78	1.1	41	2.8	3.1	0.7	2
947C361K801CAMS	360	800	90	97	45.0	40100	72	1.3	60	3.0	2.9	0.9	1
947C361K801CAIS	360	800	90	97	45.0	40100	72	1.3	60	3.0	2.9	0.9	2
947C381K801BAHS	380	800	85	97	31.7	37300	71	1.4	44	2.7	3.1	0.7	3
947C411K801CAMS	410	800	90	97	45.0	40100	74	1.3	44	2.7	2.9	0.7	1
947C411K801CAIS	410	800	90	97	45.0	40100	74	1.3	44	2.7	2.9	0.7	2
947C491K801CBMS	490	800	90	120	45.0	46700	70	1.6	75	2.6	2.5	1.0	1
947C491K801CBIS	490	800	90	120	45.0	46700	70	1.6	75	2.6	2.5	1.0	2
947C511K801BBHS	510	800	85	120	31.7	43400	66	1.8	50	2.3	2.6	0.8	3
947C561K801CBMS	560	800	90	120	45.0	46700	70	1.7	50	2.3	2.5	0.9	1
947C561K801CBIS	560	800	90	120	45.0	46700	70	1.7	50	2.3	2.5	0.9	2
947C601K801CCMS	600	800	90	145	45.0	53700	68	2.0	85	2.2	2.1	1.2	1
947C601K801CCIS	600	800	90	145	45.0	53700	68	2.0	85	2.2	2.1	1.2	2
947C621K801DTHS	620	800	116	85	50.0	52100	99	0.7	44	2.1	2.2	1.1	3
947C651K801BGHS	650	800	85	140	31.7	48700	64	2.2	55	2.0	2.4	0.9	3
947C701K801CCMS	700	800	90	145	45.0	53700	68	2.1	56	2.0	2.1	1.1	1
947C701K801CCIS	700	800	90	145	45.0	53700	68	2.1	56	2.0	2.1	1.1	2
947C731K801CDMS	730	800	90	170	45.0	60800	68	2.3	95	1.9	1.9	1.3	1
947C731K801CDIS	730	800	90	170	45.0	60800	68	2.3	95	1.9	1.9	1.3	2
947C751K801DAHS	750	800	116	97	50.0	56500	94	0.8	48	2.1	2	1.2	3
947C791K801BDHS	790	800	85	170	31.7	56700	63	2.7	63	1.7	2	1.1	3
947C851K801CDMS	850	800	90	170	45.0	60800	66	2.5	63	1.7	1.9	1.2	1
947C851K801CDIS	850	800	90	170	45.0	60800	66	2.5	63	1.7	1.9	1.2	2
947C102K801DBHS	1000	800	116	120	50.0	64900	86	1.1	54	2.0	1.8	1.4	3
947C122K801DCHS	1200	800	116	145	50.0	74000	80	1.4	61	1.9	1.6	1.7	3
947C152K801DLHS	1500	800	116	165	50.0	81300	79	1.6	67	1.7	1.4	1.9	3
947C241K901BTHS	240	900	85	85	31.7	34000	70	1.3	41	2.9	3.4	0.6	3

Type 947C Polypropylene, DC Link Capacitors

High Current, High Capacitance for Inverter Applications

Part Number	Rated		Can	Can	Lead	Current		Typ ESR (mΩ)	Typ ESL (nH)	Thermal Resistance		Mass (kg)	Fig
	Cap.	Voltage	Diameter	Height	Spacing	Case	ΔT = 40						
	C (μF)	Vr (Vdc)	D (mm)	H (mm)	S (mm)	Area (mm ²)	Irms (A)			Θcc (°C/W)	Θca (°C/W)		
947C261K901CTMS	260	900	90	85	45.0	36800	73	1.2	41	2.9	3.1	0.7	1
947C261K901CTIS	260	900	90	85	45.0	36800	73	1.2	41	2.9	3.1	0.7	2
947C291K901BAHS	290	900	85	97	31.7	37300	66	1.6	44	2.7	3.1	0.7	3
947C321K901CAMS	320	900	90	97	45.0	40100	71	1.4	44	2.7	2.9	0.7	1
947C321K901CAIS	320	900	90	97	45.0	40100	71	1.4	44	2.7	2.9	0.7	2
947C401K901BBHS	400	900	85	120	31.7	43400	63	2.0	50	2.3	2.6	0.8	3
947C431K901CBMS	430	900	90	120	45.0	46700	66	1.9	50	2.3	2.5	0.9	1
947C431K901CBIS	430	900	90	120	45.0	46700	66	1.9	50	2.3	2.5	0.9	2
947C481K901DTHS	480	900	116	85	50.0	52100	94	0.8	44	2.1	2.2	1.1	3
947C511K901BGHS	510	900	85	140	31.7	48700	61	2.5	55	2.0	2.4	0.9	3
947C551K901CCMS	550	900	90	145	45.0	53700	64	2.3	56	2.0	2.1	1.0	1
947C551K901CCIS	550	900	90	145	45.0	53700	64	2.3	56	2.0	2.1	1.0	2
947C581K901DAHS	580	900	116	97	50.0	56500	89	0.9	48	2.1	2	1.2	3
947C611K901BDHS	610	900	85	170	31.7	56700	60	3.0	63	1.7	2	1.1	3
947C661K901CDMS	660	900	90	170	45.0	60800	63	2.8	63	1.8	1.9	1.2	1
947C661K901CDIS	660	900	90	170	45.0	60800	63	2.8	63	1.8	1.9	1.2	2
947C791K901DBHS	790	900	116	120	50.0	64900	83	1.2	54	2.0	1.8	1.4	3
947C102K901DCHS	1000	900	116	145	50.0	74000	79	1.4	61	1.8	1.6	1.7	3
947C122K901DLHS	1200	900	116	165	50.0	81300	77	1.7	67	1.6	1.4	1.9	3
947C191K102BTHS	190	1000	85	85	31.7	34000	66	1.5	41	2.9	3.4	0.6	3
947C211K102CTMS	210	1000	90	85	45.0	36800	71	1.3	41	2.9	3.1	0.7	1
947C211K102CTIS	210	1000	90	85	45.0	36800	71	1.3	41	2.9	3.1	0.7	2
947C231K102CAMS	230	1000	90	97	45.0	40100	67	1.5	60	3.0	2.9	0.9	1
947C231K102CAIS	230	1000	90	97	45.0	40100	67	1.5	60	3.0	2.9	0.9	2
947C241K102BAHS	240	1000	85	97	31.7	37300	65	1.7	44	2.7	3.1	0.7	3
947C251K102CAMS	250	1000	90	97	45.0	40100	66	1.6	44	2.7	2.9	0.8	1
947C251K102CAIS	250	1000	90	97	45.0	40100	66	1.6	44	2.7	2.9	0.8	2
947C311K102CBMS	310	1000	90	120	45.0	46700	63	2.0	75	2.6	2.5	1.0	1
947C311K102CBIS	310	1000	90	120	45.0	46700	63	2.0	75	2.6	2.5	1.0	2
947C321K102BBHS	320	1000	85	120	31.7	43400	60	2.2	50	2.3	2.6	0.8	3
947C351K102CBMS	350	1000	90	120	45.0	46700	64	2.1	50	2.3	2.5	0.9	1
947C351K102CBIS	350	1000	90	120	45.0	46700	64	2.1	50	2.3	2.5	0.9	2
947C381K102DTHS	380	1000	116	85	50.0	52100	90	0.8	44	2.2	2.2	1.1	3
947C391K102CCMS	390	1000	90	145	45.0	53700	62	2.4	85	2.2	2.1	1.2	1
947C391K102CCIS	390	1000	90	145	45.0	53700	62	2.4	85	2.2	2.1	1.2	2
947C411K102BGHS	410	1000	85	140	31.7	48700	58	2.7	55	2.0	2.4	0.9	3
947C441K102CCMS	440	1000	90	145	45.0	53700	61	2.6	56	2.0	2.1	1.1	1
947C441K102CCIS	440	1000	90	145	45.0	53700	61	2.6	56	2.0	2.1	1.1	2
947C471K102DAHS	470	1000	116	97	50.0	56500	86	1.0	48	2.1	2	1.2	3
947C471K102CDMS	470	1000	90	170	45.0	60800	60	2.9	95	1.9	1.9	1.3	1
947C471K102CDIS	470	1000	90	170	45.0	60800	60	2.9	95	1.9	1.9	1.3	2
947C491K102BDHS	490	1000	85	170	31.7	56700	57	3.3	63	1.7	2	1.1	3

Type 947C Polypropylene, DC Link Capacitors

High Current, High Capacitance for Inverter Applications

Part Number	Rated	Can	Can	Lead	Current								
	Cap.	Voltage	Diameter	Height	Spacing	Case	ΔT = 40	Typ	Typ	Thermal Resistance			
	C	Vr	D	H	S	Area	Irms	ESR	ESL	Θcc	Θca	Mass	Fig
	(μF)	(Vdc)	(mm)	(mm)	(mm)	(mm²)	(A)	(mΩ)	(nH)	(°C/W)	(°C/W)	(kg)	
947C531K102CDMS	530	1000	90	170	45.0	60800	60	3.1	63	1.8	1.9	1.2	1
947C531K102CDIS	530	1000	90	170	45.0	60800	60	3.1	63	1.8	1.9	1.2	2
947C641K102DBHS	640	1000	116	120	50.0	64900	80	1.3	54	2.0	1.8	1.4	3
947C801K102DCHS	800	1000	116	145	50.0	74000	76	1.5	61	1.8	1.6	1.7	3
947C971K102DLHS	970	1000	116	165	50.0	81300	74	1.8	67	1.6	1.4	1.9	3
947C161K112BTHS	160	1100	85	85	31.7	34000	64	1.5	41	2.9	3.4	0.6	3
947C171K112CTMS	170	1100	90	85	45.0	36800	67	1.5	41	2.9	3.1	0.7	1
947C171K112CTIS	170	1100	90	85	45.0	36800	67	1.5	41	2.9	3.1	0.7	2
947C191K112BAHS	190	1100	85	97	31.7	37300	61	1.9	44	2.7	3.1	0.7	3
947C211K112CAMS	210	1100	90	97	45.0	40100	65	1.7	44	2.7	2.9	0.8	1
947C211K112CAIS	210	1100	90	97	45.0	40100	65	1.7	44	2.7	2.9	0.8	2
947C261K112BBHS	260	1100	85	120	31.7	43400	57	2.5	50	2.3	2.6	0.8	3
947C281K112CBMS	280	1100	90	120	45.0	46700	60	2.3	50	2.3	2.5	0.9	1
947C281K112CBIS	280	1100	90	120	45.0	46700	60	2.3	50	2.3	2.5	0.9	2
947C311K112DTHS	310	1100	116	85	50.0	52100	86	0.9	44	2.2	2.2	1.1	3
947C331K112BCHS	330	1100	85	145	31.7	50100	55	3.0	56	2.0	2.3	0.9	3
947C361K112CCMS	360	1100	90	145	45.0	53700	59	2.8	56	2.0	2.1	1.1	1
947C361K112CCIS	360	1100	90	145	45.0	53700	59	2.8	56	2.0	2.1	1.1	2
947C381K112DAHS	380	1100	116	97	50.0	56500	82	1.1	48	2.2	2	1.2	3
947C401K112BDHS	400	1100	85	170	31.7	56700	54	3.6	63	1.7	2	1.1	3
947C431K112CDMS	430	1100	90	170	45.0	60800	57	3.4	63	1.8	1.9	1.2	1
947C431K112CDIS	430	1100	90	170	45.0	60800	57	3.4	63	1.8	1.9	1.2	2
947C521K112DBHS	520	1100	116	120	50.0	64900	76	1.4	54	2.0	1.8	1.4	3
947C661K112DCHS	660	1100	116	145	50.0	74000	73	1.7	61	1.8	1.6	1.7	3
947C801K112DLHS	800	1100	116	165	50.0	81300	71	2.0	67	1.6	1.4	1.9	3
947C131K122BTHS	130	1200	85	85	31.7	34000	61	1.7	41	2.9	3.4	0.6	3
947C141K122CTIS	140	1200	90	85	45.0	36800	64	1.6	41	2.9	3.1	0.7	1
947C141K122CTIS	140	1200	90	85	45.0	36800	64	1.6	41	2.9	3.1	0.7	2
947C161K122BAHS	160	1200	85	97	31.7	37300	59	2.0	44	2.7	3.1	0.7	3
947C161K122CAMS	160	1200	90	97	45.0	40100	62	1.8	60	3.0	2.9	0.9	1
947C161K122CAIS	160	1200	90	97	45.0	40100	62	1.8	60	3.0	2.9	0.9	2
947C171K122CAMS	170	1200	90	97	45.0	40100	61	1.9	44	2.8	2.9	0.8	1
947C171K122CAIS	170	1200	90	97	45.0	40100	61	1.9	44	2.8	2.9	0.8	2
947C211K122CBMS	210	1200	90	120	45.0	46700	57	2.4	75	2.6	2.5	1.0	1
947C211K122CBIS	210	1200	90	120	45.0	46700	57	2.4	75	2.6	2.5	1.0	2
947C221K122BBHS	220	1200	85	120	31.7	43400	55	2.6	50	2.3	2.6	0.8	3
947C241K122CBMS	240	1200	90	120	45.0	46700	59	2.4	50	2.3	2.5	0.9	1
947C241K122CBIS	240	1200	90	120	45.0	46700	59	2.4	50	2.3	2.5	0.9	2
947C261K122DTHS	260	1200	116	85	50.0	52100	84	1.0	44	2.2	2.2	1.1	3
947C271K122CCMS	270	1200	90	145	45.0	53700	56	2.9	85	2.2	2.1	1.2	1
947C271K122CCIS	270	1200	90	145	45.0	53700	56	2.9	85	2.2	2.1	1.2	2
947C281K122BGHS	280	1200	85	140	31.7	48700	53	3.3	55	2.0	2.4	0.9	3

Type 947C Polypropylene, DC Link Capacitors

High Current, High Capacitance for Inverter Applications

Part Number	Rated	Can	Can	Lead	Current								
	Cap.	Voltage	Diameter	Height	Spacing	Case	ΔT = 40	Typ	Typ	Thermal Resistance			
	C	Vr	D	H	S	Area	Irms	ESR	ESL	Θcc	Θca	Mass	Fig
	(μF)	(Vdc)	(mm)	(mm)	(mm)	(mm²)	(A)	(mΩ)	(nH)	(°C/W)	(°C/W)	(kg)	
947C301K122CCMS	300	1200	90	145	45.0	53700	56	3.1	56	2.0	2.1	1.1	1
947C301K122CCIS	300	1200	90	145	45.0	53700	56	3.1	56	2.0	2.1	1.1	2
947C321K122DAHS	320	1200	116	97	50.0	56500	80	1.1	48	2.1	2	1.2	3
947C321K122CDMS	320	1200	90	170	45.0	60800	56	3.4	95	1.9	1.9	1.3	1
947C321K122CDIS	320	1200	90	170	45.0	60800	56	3.4	95	1.9	1.9	1.3	2
947C331K122BDHS	330	1200	85	170	31.7	56700	52	4.0	63	1.7	2	1.1	3
947C361K122CDMS	360	1200	90	170	45.0	60800	55	3.7	63	1.8	1.9	1.2	1
947C361K122CDIS	360	1200	90	170	45.0	60800	55	3.7	63	1.8	1.9	1.2	2
947C431K122DBHS	430	1200	116	120	50.0	64900	73	1.5	54	2.0	1.8	1.4	3
947C551K122DCHS	550	1200	116	145	50.0	74000	70	1.8	61	1.8	1.6	1.7	3
947C661K122DLHS	660	1200	116	165	50.0	81300	68	2.2	67	1.6	1.4	1.9	3
947C111K132BTHS	110	1300	85	85	31.7	34000	59	1.8	41	2.9	3.4	0.6	3
947C121K132CTMS	120	1300	90	85	45.0	36800	62	1.7	41	2.9	3.1	0.7	1
947C121K132CTIS	120	1300	90	85	45.0	36800	62	1.7	41	2.9	3.1	0.7	2
947C131K132BAHS	130	1300	85	97	31.7	37300	55	2.3	44	2.8	3.1	0.7	3
947C151K132CAMS	150	1300	90	97	45.0	40100	60	2.0	44	2.7	2.9	0.7	1
947C151K132CAIS	150	1300	90	97	45.0	40100	60	2.0	44	2.7	2.9	0.7	2
947C181K132BBHS	180	1300	85	120	31.7	43400	52	2.9	50	2.3	2.6	0.8	3
947C201K132CBMS	200	1300	90	120	45.0	46700	56	2.7	50	2.3	2.5	0.9	1
947C201K132CBIS	200	1300	90	120	45.0	46700	56	2.7	50	2.3	2.5	0.9	2
947C221K132DTHS	220	1300	116	85	50.0	52100	81	1.0	44	2.2	2.2	1.1	3
947C231K132BGHS	230	1300	85	140	31.7	48700	50	3.6	55	2.0	2.4	0.9	3
947C251K132CCMS	250	1300	90	145	45.0	53700	54	3.3	56	2.0	2.1	1.1	1
947C251K132CCIS	250	1300	90	145	45.0	53700	54	3.3	56	2.0	2.1	1.1	2
947C271K132DAHS	270	1300	116	97	50.0	56500	77	1.2	48	2.1	2	1.2	3
947C281K132BDHS	280	1300	85	170	31.7	56700	50	4.3	63	1.7	2	1.1	3
947C311K132CDMS	310	1300	90	170	45.0	60800	53	3.9	63	1.7	1.9	1.2	1
947C311K132CDIS	310	1300	90	170	45.0	60800	53	3.9	63	1.7	1.9	1.2	2
947C371K132DBHS	370	1300	116	120	50.0	64900	71	1.6	54	2.0	1.8	1.4	3
947C461K132DCHS	460	1300	116	145	50.0	74000	67	2.0	61	1.8	1.6	1.7	3
947C561K132DLHS	560	1300	116	165	50.0	81300	65	2.3	67	1.6	1.4	1.9	3

1. Rated Current is for temperature rise of +40 °C at 1–20 kHz.
2. θ_{cc} is core-to-case thermal resistance at 0–10 kHz. For higher frequency see [Expected Lifetime Predictions](#).
3. θ_{ca} is case-to-ambient thermal resistance for still air. For moving air see [Expected Lifetime Predictions](#).

Type 947C Polypropylene, DC Link Capacitors

High Current, High Capacitance for Inverter Applications

Expected Lifetime Predictions

To use the Expected Lifetime curves calculate V_a/V_r and core temperature T . Start by estimating:

Applied dc voltage V_a
Ripple Current I
Ripple Frequency f
Ambient Temperature T_a
Airflow speed v

Units:

$A = m^2$ $T, T_a \text{ \& } T_c = ^\circ C$
 $C = \mu F$ $\theta, \theta_{ca} \text{ \& } \theta_{cc} = ^\circ C/W$
 $ESR = m\Omega$ $v = m/s$
 $f = kHz$ $V_a \text{ \& } V_r = V_{dc}$
 $I = A$

NOTE: The temperature rise in the 947C is $I^2(ESR)$ times the thermal resistance θ . The ESR is mainly the metal resistance; the metal resistance is the 10 kHz ESR. For operation below 10 kHz add the dielectric resistance. It is the dielectric dissipation factor—no more than 0.0002—times the capacitive reactance, i.e., $0.0002/(2\pi fC)$. That's equal to $31.83/(fC)$.

1. Start with the 10 kHz ESR from the Ratings table. If frequency is less than 10 kHz, add $31.83/(fC)$.

2. Compute total thermal resistance θ as the sum of core-to-case thermal resistance θ_{cc} and case-to-ambient thermal resistance θ_{ca} . Both are in the Ratings table but θ_{ca} is for still air and θ_{cc} is for 10 kHz or less. For frequency > 10 kHz multiply θ_{cc} by $[1+(f-10)/100]$, e.g., for 75 kHz multiply θ_{cc} by 1.65. For moving air use the capacitor surface area A and airflow speed v to calculate $\theta_{ca} = 1/[A(5+17(v+0.1)^{0.66})]$.

3. Compute V_a/V_r and the core temperature T .
 $T = T_a + I^2(ESR)\theta$

4. Look up estimated lifetime from the Expected Lifetime curves.

5. If you want a longer expected lifetime, choose a capacitor with higher voltage rating or consider using multiple capacitors in parallel to share the ripple current.

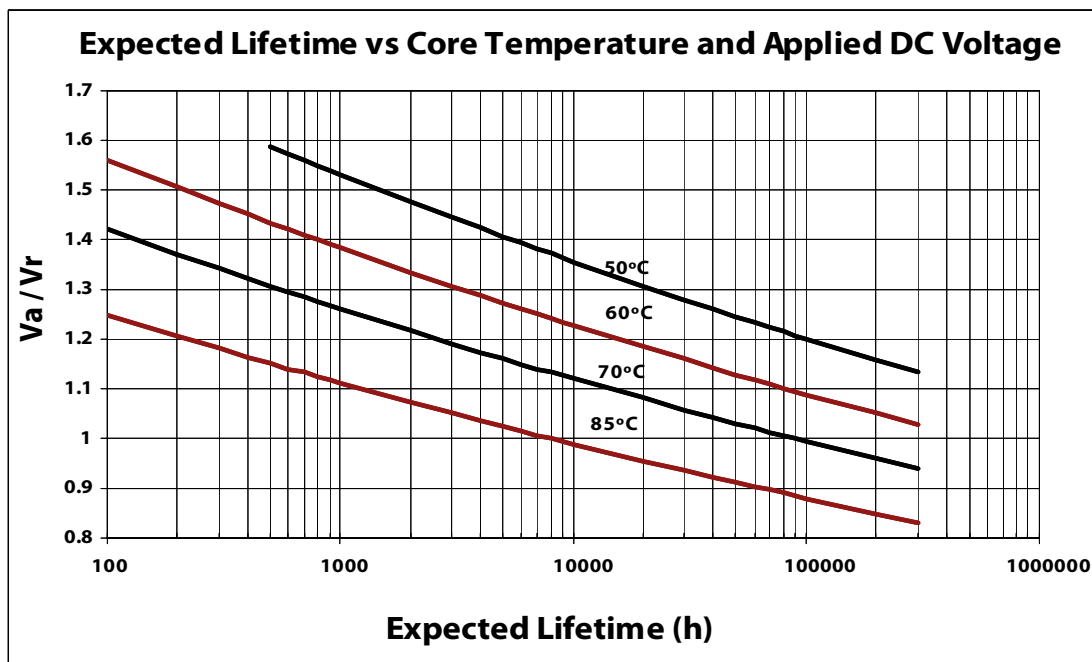
The expected lifetime predictions assume no exposure to overvoltage transients.

Expected lifetime can be calculated for varying exposure to overvoltage transients.

As an illustration at 50 °C the expected lifetime is 100,000 h with the 24-hour V_a/V_r profile below:

V_a/V_r	Duration
1.67	100 ms
1.50	5 minutes
1.30	2.5 hours
1.10	9.6 hours
1.00	11.9 hours

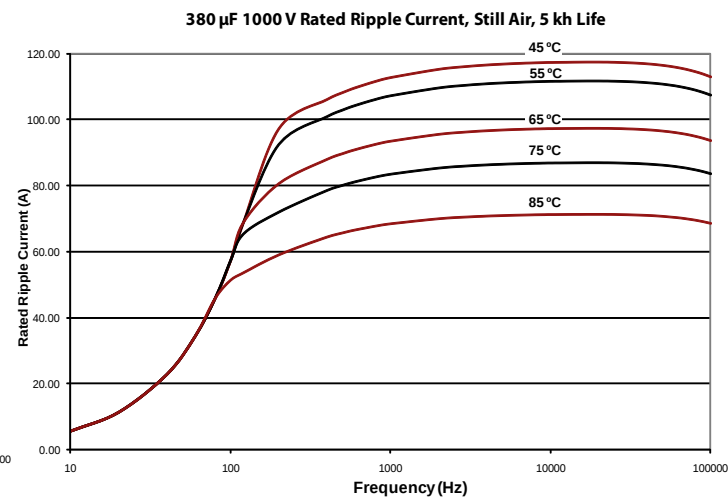
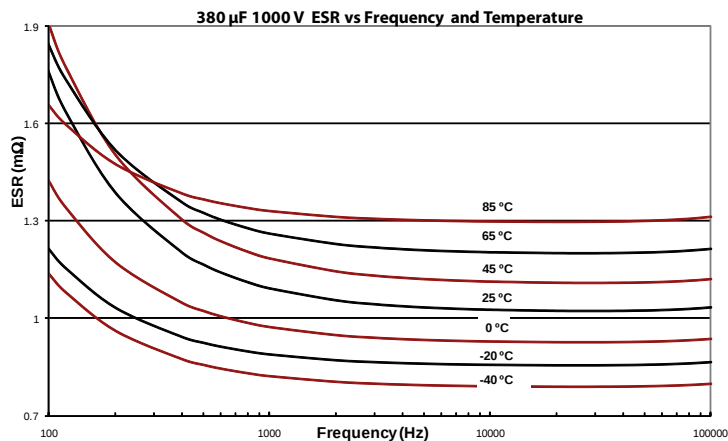
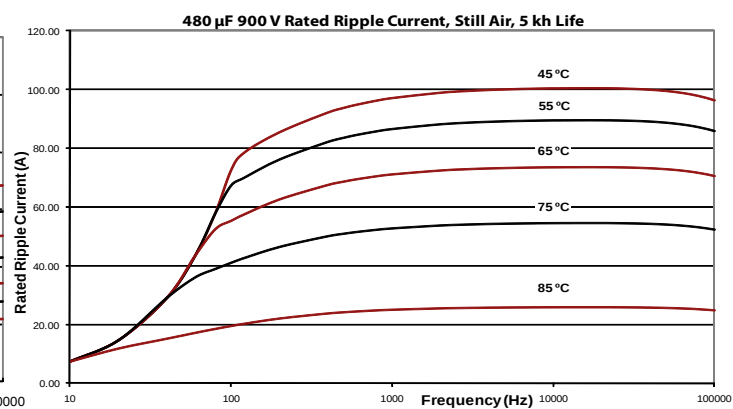
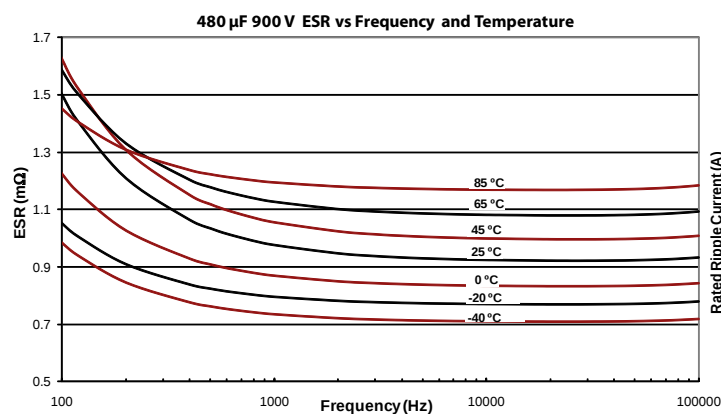
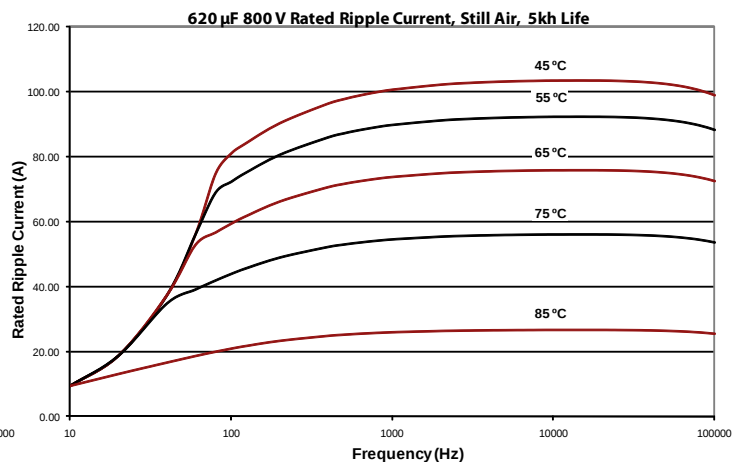
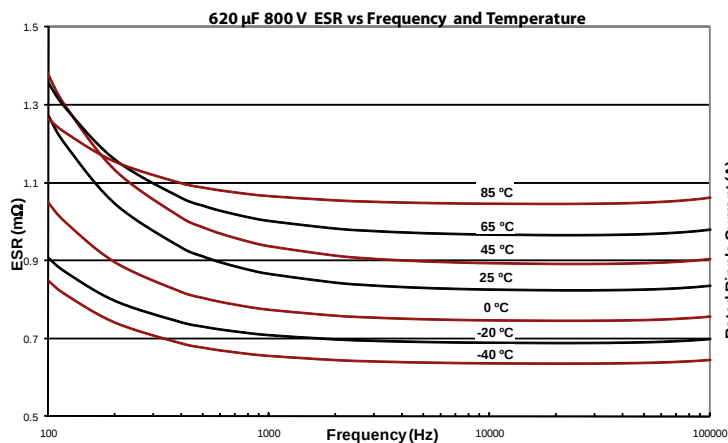
For applications with more severe 24-hour profiles, contact us.



Type 947C Polypropylene, DC Link Capacitors

High Current, High Capacitance for Inverter Applications

Typical Performance Curves

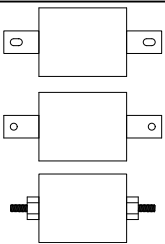
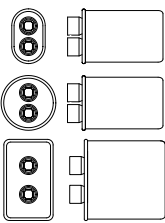
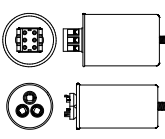
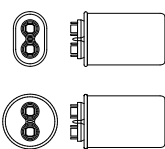
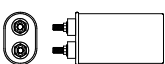


Intentionally left blank

AC Film Capacitors



AC Film Selector Guide

Type	Form Factor	Capacitance Range	Voltage Range	Temperature Range	Applications	Highlights	Service Life	Page
ACF		5.0 μ F to 250 μ F	300 Vac to 900 Vac 50/60 Hz	-55 °C to 85 °C Full rated voltage @ 85 °C, derate linearly to 50% rated voltage @ 105 °C	- Filtering - Snubber - Power Supply	- High capacitance - High current - Low ESR - Low inductance - Terminal/mounting options - Self healing	60 khrs w/94% survival rate	214
HV		1.0 μ F to 13 μ F	1000 Vac to 4000 Vac 50/60 Hz	-40 to 70 °C	- AC Filters - Power Supply Filter/Regulator - CVT Filter/Snubber	- Self Healing - High Voltage - Internally Protected	60 khrs w/94% survival rate	216
PFC		0.5 KVar to 30.2 KVar	240 Vac to 600 Vac	-40 °C to 55 °C	- Automatic PFC Equipment - Wind Turbine Applications - Individual and Group Fixed PFC - Tuned and Detuned Capacitor Banks - Power Line Conditioning	- Self Healing - Internally Protected - UL/cUL	60 khrs w/94% survival rate	218
SF		1 μ F to 100 μ F	240 Vac to 660 Vac	-40 to 70 °C (85 and 90 °C available)	- Split Phase Motor - Voltage Regulation - Power Supply Filtering - UPS - Power Line Conditioning - Variable Speed Drives - Ferro Resonant Power Supplies	- Metalized Polypropylene Film - Self Healing - Low Loss - Meet EIA-456-A - Protected - UL/cUL E71645 - CSA 23507	60 khrs w/94% survival rate	224
SCR		0.25 μ F to 50 μ F	200 Vpk to 2000 Vpk	-40 to 65 °C	- Snubber - Frequency Changers - Motor Speed Controls - Static Power Supplies - SCR Commutation - High Frequency Pulse	- High Peak Current Handling - High rms Current Handling - Conforms to EIA RS-401	40 khrs w/95% survival rate	221

AC Capacitor Application Guide

This guide covers Cornell Dubilier's AC capacitor types in depth and discloses the latest information on performance and application.

CONTENTS

Capacitor Construction	211
Characterization and Circuit Model	211
Rated Temperature	211
Rated Capacitance	212
Dissipation Factor (DF)	212
Equivalent Series Resistance (ESR)	212
RMS Current	212
Leakage Current	212
Insulation and Grounding	212
Voltage Withstand Test	212
Self-Resonant Frequency	212
Dielectric Absorption	212
Vibration Withstanding Capability	212
Safety Considerations	212
Reliability and Lifetime	212
Failure Modes	212
Early Life Failures	212
Wear-Out	212
Operating Life	212
Shelf Life	213
Mounting	213
Typical Applications	213
- Motor Run	213
- Power Supply	213
- Power Factor Correction	213

TABLES

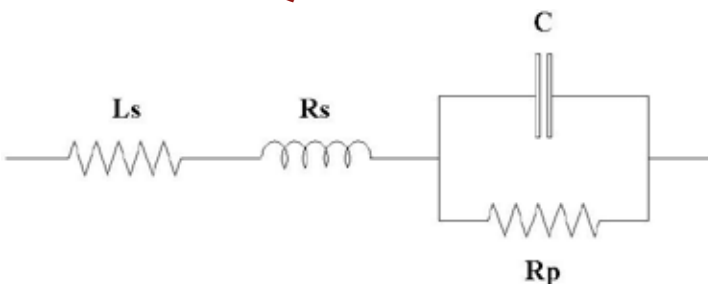
Capacitor Parameter Formula	211
Expected Life vs Applied Voltage and Case Temperature	213

AC CAPACITOR CONSTRUCTION

Cornell Dubilier's AC capacitors are constructed with biaxially oriented metallized polypropylene film wound into a cylindrical roll. End contact is formed by zinc metal spraying all of the layers on each side of the winding which assures low ESR and low inductance. Metallized polypropylene film provides a self healing mechanism in which a dielectric breakdown "clears" away the metallization and isolates that area of the capacitor

within microseconds. These capacitors boast low losses where very low Dissipation Factor and ESR allow for relatively high current density.

CAPACITOR SERIES EQUIVALENT CIRCUIT MODEL



PARAMETRIC CHARACTERIZATION

The table below shows useful capacitor parameters for the series equivalent-circuit model shown schematically in **Figure 1**.

Parameter	Unit	Symbol	Formula	Approx.
Capacitance	farads (F)	C		
Capacitive Reactance	ohms (Ω)	X_c	$1/(2\pi fC)$	Z
Current	amperes (A)	I	$C(dV/dt)$, V_z/Z	
Dissipation Factor	none	DF	R_s/X_c , $2\pi fCR_s$, $\tan(\delta)$, $\cot(\theta)$	PF
Energy	Joules (J)	E	$\frac{1}{2}CV^2$	
Equivalent Series Resistance	ohms (Ω)	R_s	$DF/(2\pi fC)$	
Frequency	hertz (Hz)	f		
Impedance	ohms (Ω)	Z	$[R_s^2 + (X_c - X_L)^2]^{1/2}$	X_c
Inductance	henries (H)	L_s		
Inductive Reactance	ohms (Ω)	X_L	$2\pi fL_s$	
Loss Angle	degrees ($^\circ$)	δ	$\tan^{-1}(DF)$	
Phase Angle	degrees ($^\circ$)	θ	$\cot^{-1}(DF)$	
Power	watts (W)	P	I^2R_s	
Power Factor	none	PF	R_s/Z , $\sin(\delta)$, $\cos(\theta)$	DF
Quality Factor	none	Q	X_c/R_s , $1/DF$, $\cot(\delta)$, $\tan(\theta)$	$1/PF$
Self-Resonant Frequency	hertz (Hz)	ω_o	$1/[2\pi(LC)^{1/2}]$	
Voltage	volts (V)	V	$V_c = IX_c$, $V_z = IZ$	
Volt-Amperes	V-A	VA	IV_z , I^2Z	

DEFINITIONS

RATED TEMPERATURE

The rated temperature is the range in temperature in which the capacitors will perform to their full rated service life objective. Typically AC capacitors will have a rated temperature of -40 to $+70$ $^\circ\text{C}$ for a motor run application and -40 to $+90$ $^\circ\text{C}$ for a power supply type application.

RATED CAPACITANCE

The rated capacitance is the nominal capacitance and it is specified between 50Hz to 120Hz and a temperature of 25 °C. The rated capacitance is also the capacitance marked on the unit.

DISSIPATION FACTOR (DF)

Dissipation factor is the measurement of the tangent of the loss angle ($\tan \delta$) expressed as a percentage. It is also the ratio of the ESR to the capacitive reactance and is thus related to ESR by this equation:

$$DF = 2\pi fC(ESR)/10,000$$

Where DF is a unit-less number expressed in percent, test frequency f is in Hz, capacitance C is in μF and ESR is in Ω .

EQUIVALENT SERIES RESISTANCE (ESR)

The equivalent series resistance (ESR) is a single resistance representing all of the ohmic losses of the capacitor and connected in series with the capacitance.

RMS CURRENT

AC capacitors with ¼" x 0.032" blade style terminals can handle a maximum RMS current of 15 Arms, including harmonics, 60Arms for the enclosed block terminals.

LEAKAGE CURRENT

When energized between their shorted terminals and the capacitor case at a potential of 115 Vac 60 Hz their leakage current shall not exceed the following:

Nominal Capacitance	Leakage Current
0 - 14 μF	60 μA
14.1 - 20 μF	70 μA
20.1 - 35 μF	100 μA
35.1 - 80 μF	150 μA

INSULATION AND GROUNDING

AC capacitors are manufactured to minimize electrical leakage from terminal to terminal and terminal to case. Due to the non ideal nature of all insulating materials a maximum allowable leakage current to the case as well as between terminals has been established.

Grounding of the metal case is recommended.

VOLTAGE WITHSTAND TESTS

AC capacitors are designed and 100% tested to withstand a potential difference equal to 1.75 X rated AC voltage between terminals and 2 X rated AC voltage plus 1,000 volts for one

second between terminals and case.

SELF RESONANT FREQUENCY

The self-resonant frequency is the frequency at which the capacitive reactance ($1/2\pi fC$) equals the inductive reactance ($2\pi fL$). At this point, where its impedance approaches zero, the capacitor can be considered to be purely resistive. At frequencies above self resonance, the capacitor is inductive.

DIELECTRIC ABSORPTION

Is a property of an imperfect dielectric material that allows the capacitor utilizing this material to absorb and accumulate a certain amount of energy even after being completely discharged. These charges will accumulate in the dielectric body and not on the capacitor plates (electrodes). Dielectric absorption can be approximated by the ratio of the voltage before discharge to the self recharged (absorbed) voltage level.

VIBRATION WITHSTANDING CAPABILITY

AC capacitors are manufactured to withstand a test outlined in the EIA 186-7E STD of (10 to 55Hz per plane) test method III with modification to the duration time which is reduced to 30 minutes from of 120 minutes equating to 5G.

SAFETY CONSIDERATIONS

The built in protection mechanism requires that there is a minimum of 0.5" of clearance above the capacitors terminals to allow for case expansion. This clearance distance should be carefully observed.

RELIABILITY AND LIFETIME

AC capacitors are rated for a full service life of 60,000 h with an estimated 94% survival rate when operated at full rated voltage, 60 Hz and rated ambient temperature.

FAILURE MODES

AC capacitors feature an internal mechanical pressure Interrupter that disconnects the capacitor winding from the voltage source in the event of failure. Failure occurs in open circuit mode.

In either event the capacitor will remain in an open circuit mode.

EARLY LIFE FAILURES

Early-life failures are mostly associated with short-circuit failures from imperfections in the dielectric system. Incidences can be reduced with extended aging or burn-in.

WEAR-OUT

Wear-out failures are mostly open-circuit failures where the integral Pressure Interrupter mechanism has been activated due to material fatigue (wear-out).

OPERATING LIFE

Onset of wear-out is determined mainly by the capacitor's rated voltage and temperature and is relative to the actual applied

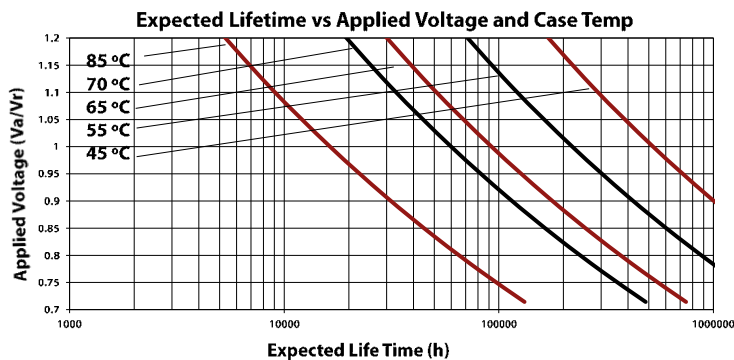
voltage (both at the fundamental frequency and any harmonic content) and ambient temperature. Operating life can be expressed as

$$L_o = L_r \times 2^{\frac{(T_r - T_o)/10}{\left(\frac{V_r}{V_o}\right)^6}}$$

Where

L_{rated} is the rated operating life in h, (60,000 h)
 $L_{operation}$ is the expected operating life in h,
 T_{rated} is the rated operating temperature in °C,
 $T_{applied}$ is the actual temperature applied to the capacitor in °C,
 V_{rated} is the capacitor's rated voltage in Vrms,
 $V_{applied}$ is the actual voltage applied to the capacitor in Vrms.

In addition the chart below can be utilized to estimate service life when AC capacitors are to operate at specific conditions outside of the rated specified conditions.



SHELF LIFE

AC capacitors are expected to perform for their full service life objective after being exposed to a maximum shelf life of 10+ years when stored in a controlled environment.

MOUNTING

AC capacitors are manufactured in round and oval metal cases which can be fastened and mounted by a variety of methods. These capacitors can be secured to a chassis or mounting plate by means of a mounting bracket (hardware) or by an optional M8 or M12 mounting stud provided at the bottom of the capacitor case. Please note that the capacitor case will be at the voltage potential of the chassis or mounting plate. A minimum of 0.5" of clearance above the capacitors terminals is required to allow for proper activation of the mechanical pressure interrupter in the event of failure, end of life or over load.

TYPICAL APPLICATIONS

Motor Run

AC capacitors are utilized to provide the necessary starting torque to split phase motors by introducing a phase shift on a secondary motor winding. Motor-run capacitors also provide the necessary power factor correction during the run stage for a more energy efficient motor operation.

Power Supply

AC capacitors are utilized in power supply circuits where noise suppression, voltage regulation and line current reduction is required. These applications typically expose the capacitor to higher order harmonics. The sum of the fundamental and all

harmonic currents must not exceed the capacitor's maximum current rating.

Power Factor Correction

AC capacitors are also utilized in power factor correction circuits where they supply leading reactive power (KVAR) to correct the lagging current caused by inductive loads. The circuit is said to be running at unity power factor if the capacitive reactance of the applied capacitors exactly matches the inductive reactance of the load.

$$PF = KW / KVA$$

$$KW = (HP \times 0.746) / \% \text{ efficiency}$$

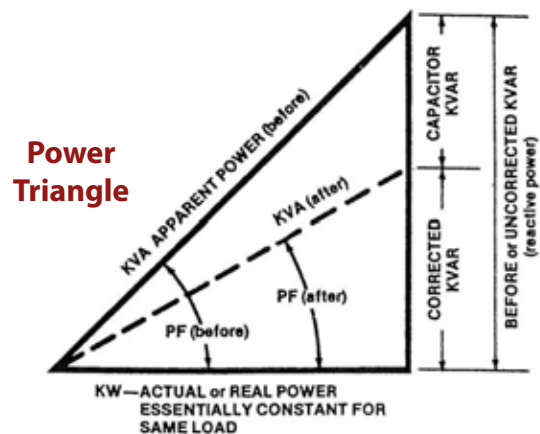
$$KVA = KW / PF = \sqrt{(KW)^2 + (KVAR)^2}$$

$$KVA = V I / 1000 \quad (\text{single phase})$$

$$KVA = V I / 577 \quad (\text{three phase})$$

$$C = (KVAR \times 10^3) / (2 \pi F (KV)^2)$$

$$KVAR = (2 F C (KV)^2) / 1000$$



Type ACF, Metallized Polypropylene Capacitors for AC Filtering

High Current, High Capacitance, Low ESR, Low Inductance



Type ACF capacitors offer several robust terminal options for AC Filtering applications. ACF is designed to give high capacitance in a small package for high current and low ESR requirements. The metallized polypropylene construction inherently gives the advantage of low DF and stable performance over the rated temperature range.

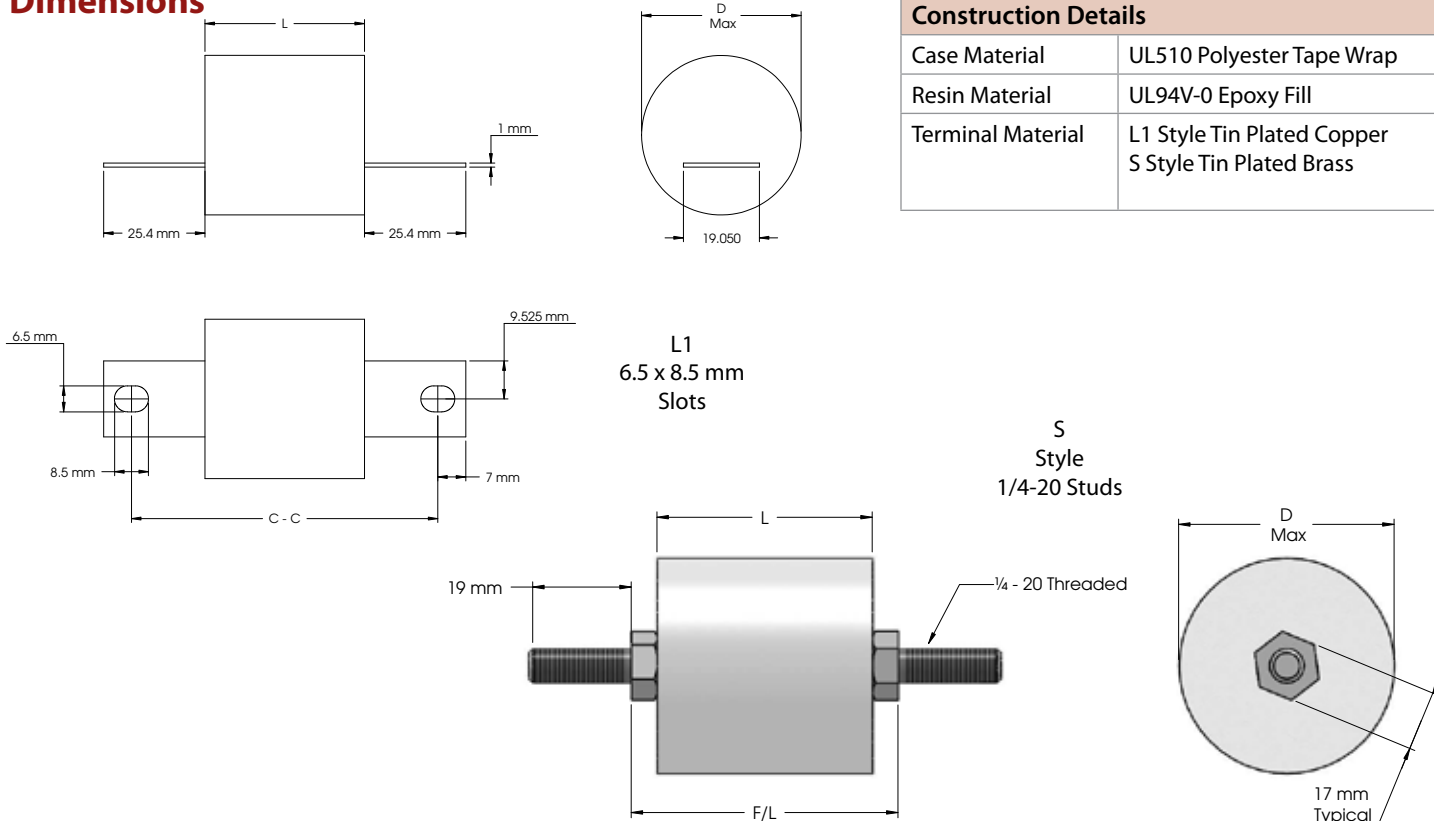
Highlights

- High capacitance
- High current
- Low ESR
- Low inductance
- Terminal/mounting options
- Self healing

Specifications

Capacitance Range	5.0 to 250 μ F
Capacitance Tolerance	$\pm$ 10% (K) standard, $\pm$ 5% (J) optional
Rated Voltage	300 to 900 Vac, 50/60 Hz
Operating Temperature Range	-55 °C to 85 °C Full rated voltage @ +85 °C, derate linearly to 50% rated voltage @ 105 °C
Maximum rms Current	Check tables for values
Insulation Resistance	25,000 M Ω x μ F @ 25 °C, after 5 minutes of charge
Test Voltage between Terminals @ 25 °C	130% rated DC voltage for 60 s
Test Voltage between Terminals & Case @ 25 °C	3 kVac 50/60Hz for 60 s
Life Expectancy	60,000 h @ rated Vac, 70 °C
RoHS Compliant	

Dimensions



Type ACF, Metallized Polypropylene Capacitors for AC Filtering

High Current, High Capacitance, Low ESR, Low Inductance

Part Numbering System

ACF	550	K	301	L1/S	-F
Type	Capacitance	Tolerance	Voltage	Terminals	RoHS
ACF	505 = 5 μ F 106 = 10 μ F 107 = 100 μ F	K = ± 10 % J = ± 5 %	301 = 300 Vdc 531 = 530 Vdc 901 = 900 Vdc	L1 = Lugs S = Studs	Compliant

Ratings

Other ratings available upon request, as well as other terminations

Catalog Number	CAP. (μF)	DIAMETER (Max) mm	LENGTH mm ±2.5	F/L and/or C-C HOLE Dimension ±1.5mm	Ripple Current (Amps rms)				Typical ESR (mΩ)	Typical ESL (nH)	f _r (KHz)	I _{pk} (Amps)	dv/dt (V/μs)
					25 °C	45 °C	65 °C	85 °C					
300 Vac50/60Hz 450 Vdc													
ACF506K301L1-F	50	63	50	86.5	64	54	43	27	1.4	40	112	2571	52
ACF756K301L1-F	75	62	68	104	61	52	40	24	1.8	59	75	2465	33
ACF107K301L1-F	100	71	68	104	72	61	47	28	1.5	59	65	3286	33
ACF157K301L1-F	150	73	88	124	72	61	46	24	1.8	79	46	3490	23
ACF207K301L1-F	200	72	112	149	68	56	41	13	2.2	105	34	3409	17
ACF257K301L1-F	250	82	112	149	75	65	46	9	1.9	105	31	5261	17
530 Vac 50/60Hz 750 Vdc													
ACF505K531S-F	5	38	63	82.5	31	27	21	13	3.6	54	306	822	164
ACF106K531S-F	10	51	63	82.5	49	42	33	21	2.1	54	216	1643	164
ACF206K531S-F	20	71	63	82.5	75	64	50	32	1.4	54	153	3286	164
ACF306K531S-F	30	68.5	87	106.5	70	59	47	29	1.9	79	103	3036	89
ACF406K531S-F	40	73.5	96	115.5	76	65	51	31	1.9	88	84	3542	89
ACF506K531S-F	50	81.3	96	115.5	77	66	55	39	1.5	88	75	3629	73
ACF606K531S-F	60	81.5	112	130.5	78	68	56	40	1.7	110	62	3811	64
ACF756K531S-F	75	82.5	137	130.5	85	71	55	31	2.2	130	50	4231	56
ACF107K531S-F	100	93.5	137	130.5	100	84	65	35	1.8	130	44	5642	56
900 Vac 50/60Hz 1300 Vdc													
ACF505K901S-F	5	34.5	137	156.5	24	20	16	10	10.2	130	197	661	132
ACF106K901S-F	10	46.5	137	156.5	39	33	26	16	5.5	130	139	1322	132
ACF206K901S-F	20	64	137	156.5	62	53	41	25	3.1	130	98	2644	132
ACF306K901S-F	30	79.5	137	156.5	82	70	54	32	2.3	130	80	3966	132
ACF406K901S-F	40	90.5	137	156.5	98	83	64	37	1.9	130	70	5288	132
ACF506K901S-F	50	100	137	156.5	100	94	73	41	1.7	130	62	6610	132

ESR measured at resonant frequency

Type HV High Voltage Capacitors

Oil Filled/Impregnated, AC Rated, Metallized Polypropylene Capacitors



Type HV capacitors are constructed with low loss self healing metallized polypropylene film. Packaged in a cylindrical, oval and rectangular metal cases. Type HV capacitors are ideal for AC filtering, CVT filtering/snubbing, line current reduction and voltage regulation in power supply applications.

Highlights

- Self healing
- Protected
- Low energy consumption
- AC filtering
- Power supply filter/regulator
- CVT filter/snubber

Specifications

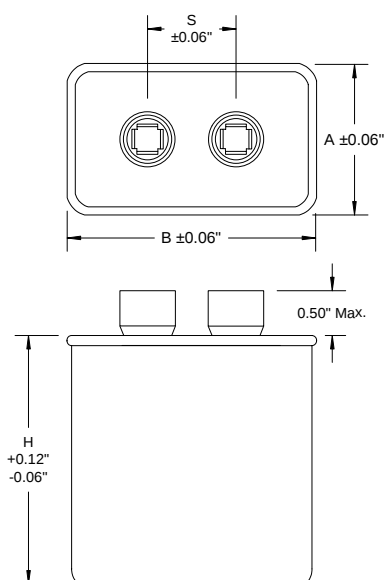
Capacitance Range	0.5 μ F to 13 μ F
Capacitance Tolerance	$\pm$ 5% standard, $\pm$ 10%, $\pm$ 6% and $\pm$ 3% available
Rated Voltage	1000 Vac, 2000 Vac, 2500 Vac and 4000 Vac
Operating Temperature Range with Ripple	-40 °C to 70 °C
Rated Frequency	50 Hz and 60 Hz
Rated Current	15 A _{rms} , fundamental plus any harmonics
Life	60,000 h with 94% survival rate
RoHS Compliant	

Dimensions

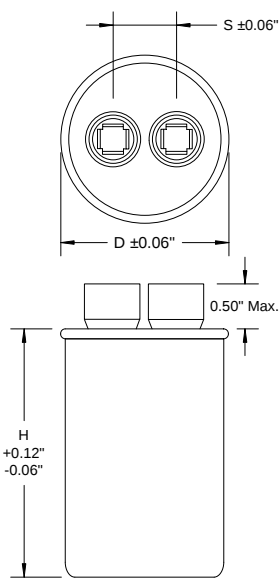
Construction Details

Case Material	Tin Plated Steel or Aluminum
Encapsulation	Environmentally Safe Dielectric Fluid
Terminal Material	Tin Plated Steel

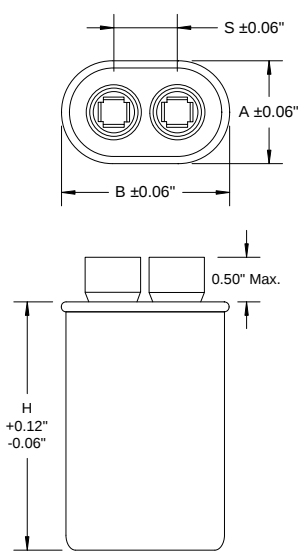
Rectangular Case Style



Round Case Style



Oval Case Style



Dimensions (Inches)				
Case Code	A	B	S	H
A	1.31	2.16	0.81	See Ratings Table
C	1.91	2.91	0.81	
D	1.97	3.66	1.624	
R	2.84	4.56	1.624	

Dimensions (inches)			
Case Code	D	S	H
P	1.87	0.81	See Ratings Table
T	2.62	0.81	

Type HV High Voltage Capacitors

Oil Filled/Impregnated, AC Rated, Metallized Polypropylene Capacitors

Part Numbering System

HV Series	C Case	KA AC Volt	S Case Material	35 Cap	J Tol. ±%	291 Can Height	B VAR
HV	A = 1 1/4" Oval C = 1 3/4" Oval D = 2.0" Oval P = 1 3/4" Round R = Rectangular T = 2 1/2" Round	KA = 1000 Vac LA = 2000 Vac LL = 2500 Vac MA = 3000 Vac NA = 4000 Vac	S = Steel T = Aluminum w/steel cover	7 = 7.0 µF 35 = 35.0 µF	J = ±5% L = ±3% H = ±6% K = ±10%	238 = 2.38" 291 = 2.91" 388 = 3.88" 475 = 4.75" 488 = 4.88"	B = 4 way 70 °C D = 4 way 90 °C Z = Other

Ratings

CDE Catalog Number	Cn (µF)	Case Code	Case Height	
			(in)	(mm)
1000 Vrms				
HVPKAS3J475B	3	P	4.75	121
HVPKAS5J475B	5	P	4.75	121
HVTKAS8J475B	8	T	4.75	121
HVTKAS10J475B	10	T	4.75	121
HVTKAS13J603B	13	T	6.03	153
HVAKAS3J288B	3	A	2.88	73
HVAKAS5J475B	5	A	4.75	121
HVCKAS8J291B	8	C	2.91	74
HVCKAS10J491B	10	C	4.91	125
HVDKAS13J491B	13	D	4.91	125
2000Vrms				
HVALAS1J475B	1	A	4.75	121
HVDLAS3J491B	3	D	4.91	125
HVDLAS5J578B	5	D	5.78	147
2500Vrms				
HVCLCS1J391B	1	C	3.91	99
HVCLCS2J491B	2	C	4.91	125
HVDLCS3J578B	3	D	5.78	147
3000Vrms				
HVCMA51J391B	1	C	3.91	99
HVDMAS2J491B	2	D	4.91	125
HVDMAS3J753B	3	D	7.53	191
4000Vrms				
HVCNAS0.5J491B	0.5	C	4.91	125
HVDNAS1J578B	1	D	5.78	147
HVRNAS1.8J603B	1.8	R	6.03	153

Options

Tinplated steel or aluminum cans, with and without studs, are available upon request.

Additional tolerances such as ±3%, ±6% and ±10% are available.

+90 °C ratings are available

Discharge resistors are available.

Type PFC Power Factor Correction Capacitors



Type PFC capacitors are constructed with low loss self healing metallized polypropylene, delta connected internally for 3-phase operation and packaged in a cylindrical metal case with an easy-access terminal with built-in-bleeder resistors. Type PFC is safety protected with an internal pressure interrupter that disengages all 3 phases in the event of capacitor overload or end of life.

Highlights

- Automatic PFC equipment
- Wind turbine applications
- Individual and group fixed PFC
- Tuned and detuned capacitor banks
- Power line conditioning

Specifications

Capacitance Tolerance	0 to +10%
Rated Voltage	240 Vac, 480 Vac, 600 Vac
Operating Temperature Range with Ripple	-40 °C to +55 °C
kvar Range	0.5 kvar to 30.2 kvar
Maximum Permissible Voltage (Vmax)	110% of rated rms voltage 120% of rated peak voltage ($1.2 \times \sqrt{2} \times V_{rms}$)
Internal Connection	Delta (Δ)
Maximum Permissible Current (Imax)	135% of nominal rms current based on rated kvar and rated voltage - (up to 150% of I_R including combined effects of harmonics, over voltages and capacitances, tolerance)
Life	60,000 h w/94% survival rate
International Standards	Meets IEEE18, Standard (ANSI/IEEE Standard 18)
FIT (Failure In Time)	$\leq 300 \times 10^9$ component h
Maximum Short Circuit Current	10 kA (according to UL 810)

Dimensions

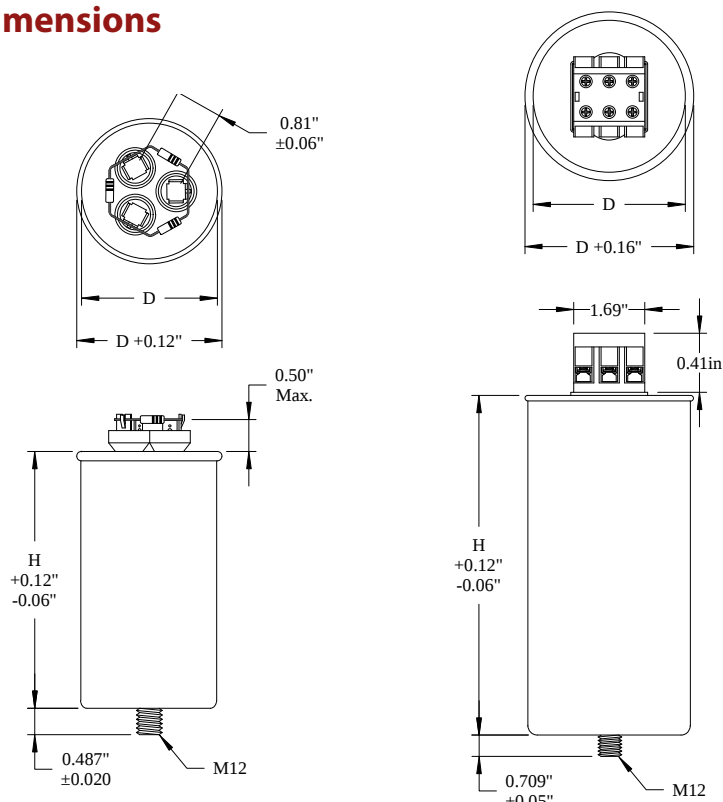


Figure 1

Figure 2

Construction Details

Case Material	Extruded aluminum with steel or aluminum cover
Encapsulation	Environmentally safe dielectric fluid
Terminal Material	Tin plated copper, brass or steel

Type PFC Power Factor Correction Capacitors

Part Numbering System

PFC Type	H	T Base Type	480 Voltage (Vac)	C Case Material	6 kvar	S Tolerance (%)	779 Can Height (inches)	T Phases
PFC	S = Std. H = Harmonic	S = 2" Round T = 2½" Round V = 3" Round X = 3.5" Round	24 = 240 48 = 480 60 = 600	C = Aluminum case w/steel cover M12 Stud D = Aluminum case w/aluminum cover M12 Stud	Full kvar value including decimals @ 60 Hz and	S = -0/+10%	Expressed as 3 digit number of the case height from base to top of lip (including seam) rounded and displayed without decimal point	T = 3-Phase

Ratings

NOTE: Other ratings, sizes and performance specifications are available. Contact us.

CDE Catalog Number	60Hz Output Kvar	50Hz Output Kvar	Capacitance (µF)	R _s (mΩ)	R _{th} (°C/W)	Max. I _R (55°C)	Diameter (in)	Case Height (in)	Style
240 Vac									Fig. 1
PFCHS24C0.5S572T	0.5	0.4	3 x 7.7	4.8	4.6	15.0	2.0	5.72	
PFCHS24C1S572T	1	0.8	3 x 15.4	3.3	4.6	15.0	2.0	5.72	
PFCHS24C1.5S572T	1.5	1.3	3 x 23.0	2.8	4.6	15.0	2.0	5.72	
PFCHT24C2S572T	2	1.7	3 x 30.7	2.5	3.6	15.0	2.5	5.72	
PFCHT24C2.5S572T	2.5	2.1	3 x 38.4	2.4	3.6	15.0	2.5	5.72	
PFCHT24C3S572T	3	2.5	3 x 46.1	2.3	3.6	15.0	2.5	5.72	
PFCHT24C4S778T	4	3.3	3 x 61.4	3.0	2.8	15.0	2.5	7.78	Fig. 2
PFCHV24D5S842T	5	4.2	3 x 76.8	2.8	2.1	57.0	3.0	8.42	
PFCHV24D6S842T	6	5.0	3 x 92.1	2.7	2.1	58.0	3.0	8.42	
PFCHV24D6.3S842T	6.3	5.3	3 x 96.7	2.6	2.1	58.0	3.0	8.42	
PFCHV24D7.5S108T	7.5	6.3	3 x 115.1	3.3	1.7	57.0	3.0	10.78	
PFCHV24D8.3S108T	8.3	6.9	3 x 127.4	3.2	1.7	57.0	3.0	10.78	
PFCHX24D10S108T	10	8.3	3 x 153.5	3.1	1.4	63.0	3.5	10.78	
PFCHX24D12.5S108T	12.5	10.4	3 x 191.9	3.0	1.4	63.0	3.5	10.78	
PFCHX24D15S137T	15	12.5	3 x 230.3	3.7	1.2	61.0	3.5	13.73	
PFCHX24D16.7S137T	16.7	13.9	3 x 256.4	3.6	1.2	60.0	3.5	13.73	
PFCHX24D17.5S137T	17.5	14.6	3 x 268.6	3.5	1.2	59.0	3.5	13.73	
480 Vac									Fig. 1
PFCHS48C0.5S572T	0.5	0.4	3 x 1.9	10.0	4.6	15.0	2.0	5.72	
PFCHS48C1S572T	1	0.8	3 x 3.8	5.9	4.6	15.0	2.0	5.72	
PFCHS48C1.5S572T	1.5	1.3	3 x 5.8	4.4	4.6	15.0	2.0	5.72	
PFCHS48C2S572T	2	1.7	3 x 7.7	3.8	4.6	15.0	2.0	5.72	
PFCHS48C2.5S572T	2.5	2.1	3 x 9.6	3.4	4.6	15.0	2.0	5.72	
PFCHS48C3S572T	3	2.5	3 x 11.5	3.1	4.6	15.0	2.0	5.72	
PFCHT48C4S572T	4	3.3	3 x 15.4	2.8	3.6	15.0	2.5	5.72	
PFCHT48C5S572T	5	4.2	3 x 19.2	2.6	3.6	15.0	2.5	5.72	
PFCHT48C6S778T	6	5.0	3 x 23.0	3.7	2.8	15.0	2.5	7.78	
PFCHT48C7.5S778T	7.5	6.3	3 x 28.8	3.3	2.8	15.0	2.5	7.78	
PFCHT48C8.3S778T	8.3	6.9	3 x 31.9	2.0	2.8	15.0	2.5	7.78	

Type PFC Power Factor Correction Capacitors

CDE Catalog Number	60Hz Output Kvar	50Hz Output Kvar	Capacitance (μF)	R _s (mΩ)	R _{th} (°C/W)	Max. I _R (55°C)	Diameter (in)	Case Height (in)	Style
480 Vac									
PFCHV48D9S842T	9	7.5	3 x 34.5	3.1	2.1	53.0	3.0	8.42	Fig. 2
PFCHV48D10S842T	10	8.3	3 x 38.4	3.0	2.1	54.0	3.0	8.42	
PFCHV48D12.5S108T	12.5	10.4	3 x 48.0	3.9	1.7	52.0	3.0	10.78	
PFCHV48D15S108T	15	12.5	3 x 57.6	3.6	1.7	53.0	3.0	10.78	
PFCHX48D16.7S108T	16.7	13.9	3 x 64.1	3.5	1.4	59.0	3.5	10.78	
PFCHX48D18S108T	18	15.0	3 x 69.1	3.4	1.4	59.0	3.5	10.78	
PFCHX48D20S108T	20	16.7	3 x 76.8	3.3	1.4	59.0	3.5	10.78	
PFCHX48D25S137T	25	20.8	3 x 95.9	4.2	1.2	57.0	3.5	13.73	
PFCHX48D30S137T	30	25.0	3 x 115.1	4.0	1.2	56.0	3.5	13.73	
600 Vac									
PFCHS60C1S572T	1	0.8	3 x 2.5	6.3	4.6	15.0	2.0	5.72	Fig. 1
PFCHS60C1.5S572T	2	1.3	3 x 3.7	4.8	4.6	15.0	2.0	5.72	
PFCHS60C2S572T	2.0	1.7	3 x 4.9	4.1	4.6	15.0	2.0	5.72	
PFCHS60C2.5S572T	3	2.1	3 x 6.1	3.6	4.6	15.0	2.0	5.72	
PFCHT60C3S572T	3.0	2.5	3 x 7.4	3.3	3.6	15.0	2.5	5.72	
PFCHT60C4S572T	4	3.3	3 x 9.8	2.9	3.6	15.0	2.5	5.72	
PFCHT60C5S778T	5	4.2	3 x 12.3	4.3	2.8	15.0	2.5	7.78	
PFCHT60C6S778T	6	5.0	3 x 14.7	3.9	2.8	15.0	2.5	7.78	
PFCHT60C6.1S778T	6	5.1	3 x 15.0	3.9	2.8	15.0	2.5	7.78	
PFCHT60C6.3S778T	6	5.3	3 x 15.5	3.8	2.8	15.0	2.5	7.78	
PFCHT60C6.9S778T	7	5.8	3 x 16.9	3.7	2.8	15.0	2.5	7.78	
PFCHV60D7.5S842T	7.5	6.3	3 x 18.4	3.5	2.1	51.0	3.0	8.42	Fig. 2
PFCHV60D8.1S842T	8	6.8	3 x 19.9	3.4	2.1	51.0	3.0	8.42	
PFCHV60D8.3S842T	8.3	6.9	3 x 20.4	3.4	2.1	52.0	3.0	8.42	
PFCHV60D10S108T	10	8.3	3 x 24.6	4.5	1.7	49.0	3.0	10.78	
PFCHV60D12.2S108T	12	10.2	3 x 30.0	4.2	1.7	51.0	3.0	10.78	
PFCHV60D12.5S108T	13	10.4	3 x 30.7	4.1	1.7	51.0	3.0	10.78	
PFCHX60D13.8S108T	14	11.5	3 x 33.9	4.0	1.4	57.0	3.5	10.78	
PFCHX60D14.6S108T	15	12.2	3 x 35.9	3.9	1.4	57.0	3.5	10.78	
PFCHX60D15S108T	15	12.5	3 x 36.8	3.8	1.4	58.0	3.5	10.78	
PFCHX60D16.7S108T	16.7	13.9	3 x 41.0	3.7	1.4	58.0	3.5	10.78	
PFCHX60D17.5S108T	18	14.6	3 x 43.0	3.6	1.4	59.0	3.5	10.78	
PFCHX60D20S137T	20.0	16.7	3 x 49.1	4.8	1.2	56.0	3.5	13.73	
PFCHX60D22.5S137T	23	18.8	3 x 55.3	4.6	1.2	57.0	3.5	13.73	
PFCHX60D25S137T	25	20.8	3 x 61.4	4.4	1.2	57.0	3.5	13.73	

Type SCR, Commutating Capacitors

Type SCRN Film-Paper/Extended Foil Commutating Capacitor



Type SCRN capacitors are for SCR (silicon controlled rectifier) commutating applications that require high peak and rms current capability. These capacitors are ideal for other high frequency and pulsed applications. The SCRN is supplied in oval or rectangular metal cases with 1/4 x 20 threaded stud and insulated terminals to withstand high current and high peak voltages.

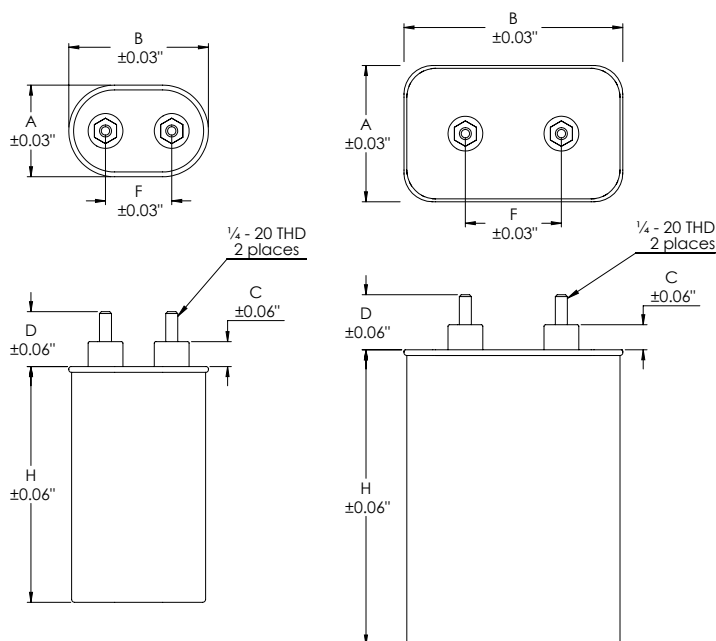
Highlights

- Conforms to EIA RS401 for power semiconductor applications
- Non ferrous covers available for high frequency applications
- 40,000 hours life at full rated voltage and temperature
- High voltage, high current and high frequency
- Custom designs available

Specifications

Capacitance Range	0.25 μ F to 50.0 μ F
Capacitance Tolerance	$\pm 10\%$
Rated Voltage	200 Vpk to 2000 Vpk
Operating Temperature Range with Ripple	-40 °C to +80 °C
Maximum rms Current	Case codes: A, B, C, D = 60 Irms max. E and F = 100 Irms max.
Maximum rms Voltage	see application guide
Test Voltage between Terminal @ 25°C	DC voltage 2 x rated peak for 60 s
Test Voltage between Terminals & Case @ 25°C	2 x reference AC voltage +1000 Vac for 60 s
Life Test	EIA RS401
Life Expectancy	40,000 h life at full rated voltage, current, case temperature and VA
Reliability	Minimum of 95% survival
Standards	EIA RS401
Rohs Compliant	

Dimensions



Construction Details

Case Material	Tin Plated Steel Aluminum Available
Encapsulation	Biodegradeable, Environmentally Compatible Fluid
Terminal Material	Electro-tin plated copper stud and molded pillar insulator

Case Code	Dimensions Inches						Figure
	A	B	C	D	F	H	
A	1.31	2.16	0.56	1.19	0.81	see table	Fig. 1
B	1.56	2.69	0.50	1.13	1.25	see table	Fig. 1
C	1.91	2.91	0.50	1.13	1.38	see table	Fig. 1
D	1.97	3.66	0.50	1.13	1.38	see table	Fig. 1
E	2.84	4.56	0.50	1.13	2.00	see table	Fig. 2
F	3.75	4.56	0.56	1.19	2.00	see table	Fig. 2

Type SCR, Commutating Capacitors

Type SCRN Film-Paper/Extended Foil Commutating Capacitor

Ratings

Cap (μF)	Catalog Part Number	Case Code	H (Inches)	Max VA (65 °C)	Max (Arms)	Cap (μF)	Catalog Part Number	Case Code	H (Inches)	Max VA (65 °C)	Max (Arms)
200 Vpk (Paper Dielectric)						600 Vpk (Film Dielectric for Low-loss)					
3	SCRN201R-F	A	2.13	400	60	1	SCRN262R-F	A	2.38	2200	60
5	SCRN202R-F	A	2.63	465	60	2	SCRN263R-F	A	2.38	2060	60
10	SCRN203R-F	A	3.88	625	60	3	SCRN264R-F	A	3.88	3190	60
15	SCRN205R-F	A	4.75	765	60	5	SCRN265R-F	A	4.25	4380	60
20	SCRN206R-F	B	4.25	875	60	10	SCRN266R-F	C	4.25	6060	60
30	SCRN208R-F	C	5.25	1200	60	1000 Vpk (Film and Paper Dielectric)					
40	SCRN209R-F	C	6.75	1500	60	1	SCRN233R-F	A	2.13	790	60
50	SCRN210R-F	D	5.75	1590	60	2	SCRN234R-F	A	3.13	1070	60
400 Vpk (Film and Paper Dielectric)						3	SCRN235R-F	A	3.88	1455	60
2	SCRN211R-F	A	2.63	790	60	5	SCRN236R-F	B	4.25	1785	60
3	SCRN212R-F	A	2.63	970	60	10	SCRN237R-F	C	5.75	2570	60
5	SCRN213R-F	A	3.88	1130	60	15	SCRN238R-F	D	5.75	3170	60
10	SCRN214R-F	B	4.75	1930	60	20	SCRN239R-F	E	5.13	5200	100
15	SCRN215R-F	C	4.75	2240	60	1500 Vpk (Film and Paper Dielectric)					
20	SCRN216R-F	C	6.25	2800	60	.5	SCRN240R-F	A	2.13	990	60
30	SCRN217R-F	D	6.75	3720	60	1	SCRN241R-F	A	2.88	1240	60
40	SCRN218R-F	D	8.00	4330	60	2	SCRN242R-F	B	3.50	1890	60
50	SCRN219R-F	E	6.25	6050	100	3	SCRN243R-F	C	4.25	2550	60
600 Vpk (Film and Paper Dielectric)						5	SCRN244R-F	C	5.75	3250	60
2	SCRN220R-F	A	2.63	815	60	10	SCRN245R-F	E	5.13	6500	100
3	SCRN221R-F	A	3.13	1200	60	2000 Vpk (Film and Paper Dielectric)					
5	SCRN222R-F	A	4.25	1420	60	.25	SCRN246R-F	A	2.13	990	60
10	SCRN224R-F	C	4.25	2040	60	.33	SCRN257R-F	A	2.13	1000	60
15	SCRN226R-F	C	5.75	2800	60	.5	SCRN247R-F	A	2.63	1180	60
20	SCRN227R-F	D	5.75	3260	60	1	SCRN248R-F	A	3.13	1300	60
25	SCRN229R-F	D	6.75	3720	60	2	SCRN249R-F	B	4.25	2230	60
30	SCRN230R-F	D	8.00	4330	60	3	SCRN251R-F	C	4.75	2800	60
40	SCRN231R-F	E	6.25	6060	100	5	SCRN253R-F	D	5.75	4020	60
50	SCRN232R-F	E	7.25	6850	100	10	SCRN256R-F	F	5.75	7600	100

Type SCR, Commutating Capacitors

Type SCRN Film-Paper/Extended Foil Commutating Capacitor

Application Guide

How to Choose a Commutating Capacitor

1. From circuit analysis or measurement, determine application values for these six parameters:

Nominal capacitance in μF
Current pulse width in μs
Current pulse period in μs
Maximum peak voltage
Continuous AC voltage in V_{rms}
Maximum volt-amps (VA)

2. Choose a capacitor from the ratings table of the desired nominal capacitance with a peak voltage rating no less than your maximum peak voltage.

3. Check that your application's rms current is no more than the capacitor's Max. Amps RMS. You can calculate the current from your V_{rms} using the equations in the following section.

4. Check that your application's volt-amperes is not more than the capacitor's VA capability. The VA capability is the max VA rating times the Volt-Ampere multiplier from Figure 2 (Current Pulse Width) and that times the Volt-Ampere Multiplier from Figure 3 (Ambient Temperature). See the following section for more on using volt-ampere multipliers.

If you need a greater VA capability, repeat these steps for a higher peak voltage capacitor or consider connecting units in parallel to divide the VA required. For up to peak voltage of 600 V, you may also consider polypropylene film dielectric units, Catalog Numbers SCRN262R through SCRN266R, with higher VA capability.

Using Volt-Ampere Ratings

The capacitor's maximum VA rating is the maximum product of the sine wave voltage and current that may be applied at 65 °C without overheating the capacitor and reducing its expected life. For other temperatures and pulsed current, use the multipliers of Figures 2 and 3 to derate the Max VA rating.

The Max Amps RMS rating is set by the capability of the capacitor terminals. Exceeding this limit can damage the terminals and cause capacitor failure.

Calculate the capacitor's actual VA load as the product of the rms voltage across the capacitor and the rms current through the capacitor. To calculate rms current for an applied sine wave or squarewave voltage, use these equations.

For a sinewave voltage the current is:

$$I_{\text{rms}} = 2\pi f C V_{\text{rms}} \times 10^{-6}$$

and for a squarewave the current is:

$$I_{\text{rms}} = C \Delta V / [0.64(t/T)^{0.5}] = I_{\text{peak}}(t/T)^{0.5}$$

where (f) is repetition frequency in Hz, C is nominal capacitance in μF , ΔV the peak-to-peak squarewave amplitude in volts, (t) is the pulse width in μs and T is the pulse period in μs .

The peak current for the square wave voltage is:

$$I_{\text{peak}} = C \Delta V / 0.64t$$

Pulse Wave Applications

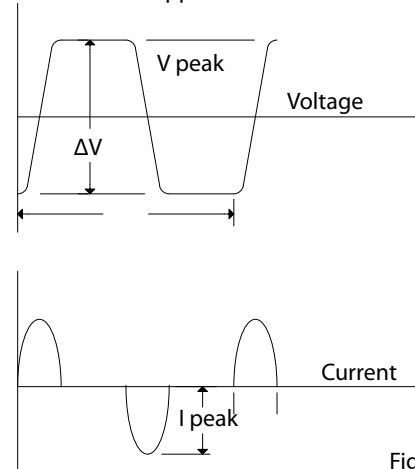


Figure 1

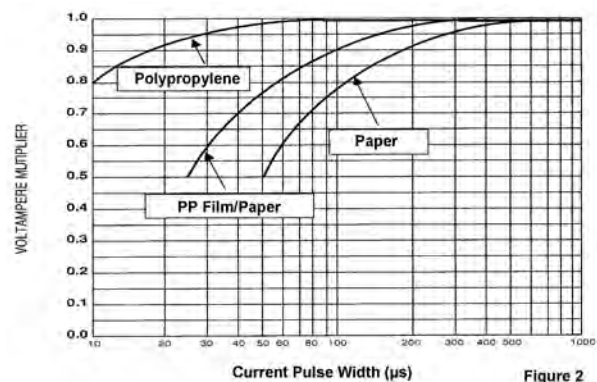


Figure 2

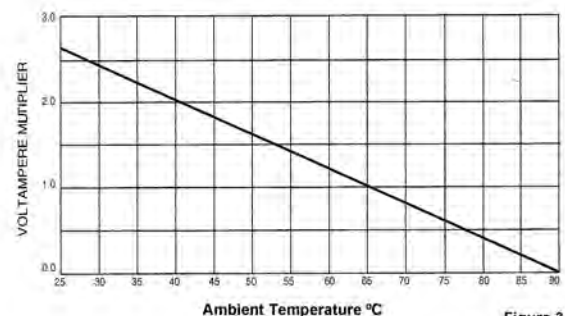


Figure 3

Type SF Motor-Run and Power Supply Capacitors

Oil Filled/Impregnated, AC Rated, Metallized Polypropylene Capacitors



Type SF, AC rated metallized polypropylene capacitors provide starting torque and power factor correction for split phase motors typically used in refrigeration and air conditioning motor-run applications. Type SF also may be used to provide noise suppression, voltage regulation and line current reduction in power supply applications.

Highlights

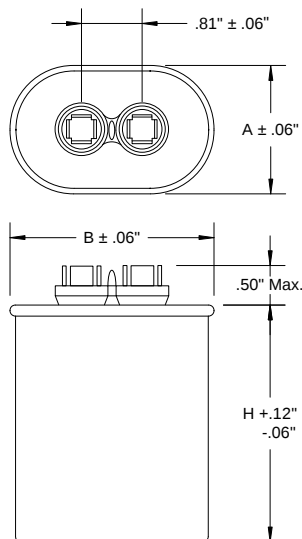
- Self healing
- Fault current protection up to 10,000 amps AFC
- Low energy consumption
- 4 - tine, 1/4" quick connect lug terminals are standard
- Meets EIA Standard EIA-456-A
- UL recognized File Number E71645
- CSA File Number 223507

Specifications

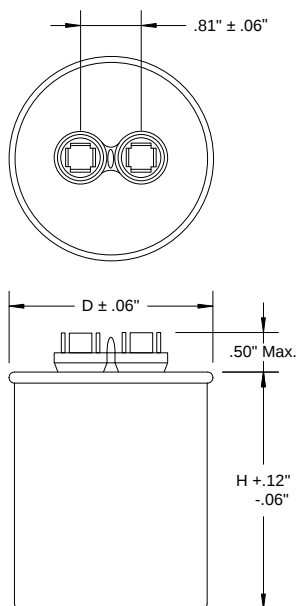
Capacitance Range	5.0 μ F to 120.0 μ F
Capacitance Tolerance	$\pm$ 10% standard, $\pm$ 6% and $\pm$ 3% available
Rated Voltage	240 Vac to 660 Vac
Operating Temperature Range with Ripple	-40 $^{\circ}$ C to 70 $^{\circ}$ C standard, 90 $^{\circ}$ C available
Dissipation Factor	<0.1%
Service Life Objective	60,000 h with 94% survival rate
RoHS Compliant	

Dimensions

Oval Case Style



Round Case Style



Construction Details

Case Material	Tin Plated Steel or Aluminum
Encapsulation	Environmentally Safe Dielectric Fluid
Terminal Material	Tin Plated Steel

Case Code	Dimensions (Inches)		
	A	B	H
A	1.31	2.16	See Ratings Table
B	1.56	2.69	
C	1.91	2.91	
D	1.97	3.66	

Case Code	D (Inches)	H
P	1.87	See Ratings Table
S	2.12	
T	2.62	

Type SF Motor-Run and Power Supply Capacitors

Oil Filled/Impregnated, AC Rated, Metallized Polypropylene Capacitors

Part Numbering System

SF	C	37	S	35	K	291	B	-F
Series	Case	AC Volt	Case Material	Cap	Tol. ±%	Can Height	VAR	RoHS
SF	A = 1 1/4" Oval	24 = 240 Vac	S = Steel	7 = 7.0 µF	L = ±3%	238 = 2.38"	A = 2 way 70°C	Compliant
	B = 1 1/2 Oval	37 = 370 Vac	T = Aluminum	35 = 35.0 µF	H = ±6%	291 = 2.91"	B = 4 way 70 °C	-F = Compliant
	C = 1 3/4" Oval	44 = 440 Vac	w/steel cover		K = ±10%	388 = 3.88"	C = 2 way 90 °C	Blank = Not
	D = 2.0" Oval	66 = 660 Vac				475 = 4.75"	D = 4 way 90 °C	Compliant
	P = 1 3/4" Round					488 = 4.88"	E = Dual 2,3,4 70 °C	
	S = 2.0" Round						F = Forks 70 °C	
	T = 2 1/2" Round						G = Forks 90 °C	
							H = Forks 100 °C	
							J = Forks, 70 °C Res.	
							K = Forks, 90 °C Res.	
							L = Forks 100 °C Res.	
							Z = Other	

Round Ratings

Cap (µF)	Stock Items	Catalog Part Number	Case Code	H (Inches)
370 Vac Round 70 °C Case Temperature				
2.0	*	SFP37S2K238B-F	P	2.38
3.0	*	SFP37S3K238B-F	P	2.38
4.0	S	SFP37S4K238B-F	P	2.38
5.0	*	SFP37S5K238B-F	P	2.38
6.0	*	SFP37S6K238B-F	P	2.38
7.5	*	SFP37S7.5K238B-F	P	2.38
10.0	S	SFP37S10K238B-F	P	2.38
12.5	S	SFP37S12.5K238B-F	P	2.38
15.0	S	SFP37S15K238B-F	P	2.38
17.5	*	SFP37S17.5K238B-F	P	2.38
20.0	S	SFP37S20K238B-F	P	2.38
25.0	S	SFP37S25K288B-F	P	2.88
30.0	S	SFP37S30K288B-F	P	2.88
35.0	S	SFS37S35K288B-F	S	2.88
40.0	S	SFS37S40K288B-F	S	2.88
45.0	S	SFS37S45K375B-F	S	3.75
50.0	S	SFS37S50K375B-F	S	3.75
55.0	S	SFS37S55K375B-F	S	3.75
60.0	S	SFT37S60K303B-F	T	3.03
65.0	*	SFT37S65K303B-F	T	3.03
70.0	*	SFT37S70K303B-F	T	3.03
75.0	*	SFT37S75K391B-F	T	3.91
80.0	S	SFT37S80K391B-F	T	3.91
90.0	*	SFT37S90K475B-F	T	4.75
100.0	*	SFT37S100K475B-F	T	4.75
440 Vac Round 70 °C Case Temperature				
2.0	*	SFP44S2K238B-F	P	2.38
3.0	*	SFP44S3K238B-F	P	2.38
4.0	*	SFP44S4K238B-F	P	2.38
5.0	*	SFP44S5K238B-F	P	2.38

Cap (µF)	Stock Items	Catalog Part Number	Case Code	H (Inches)
440 Vac Round 70 °C Case Temperature				
6.0	*	SFP44S6K238B-F	P	2.38
7.5	*	SFP44S7.5K238B-F	P	2.38
10.0	S	SFP44S10K238B-F	P	2.38
12.5	*	SFP44S12.5K238B-F	P	2.38
15.0	S	SFP44S15K288B-F	P	2.88
17.5	*	SFP44S17.5K288B-F	P	2.88
20.0	S	SFP44S20K288B-F	P	2.88
25.0	*	SFS44S25K288B-F	S	2.88
30.0	S	SFS44S30K288B-F	S	2.88
35.0	*	SFT44S35K303B-F	T	3.03
40.0	S	SFT44S40K391B-F	T	3.91
45.0	*	SFT44S45K391B-F	T	3.91
50.0	S	SFT44S50K391B-F	T	3.91
55.0	*	SFT44S55K391B-F	T	3.91
60.0	S	SFT44S60K475B-F	T	4.75
660 Vac Round 70 °C Case Temperature				
2.0	*	SFP66S2K238B-F	P	2.38
3.0	*	SFP66S3K238B-F	P	2.38
5.0	*	SFP66S5K238B-F	P	2.38
7.5	*	SFP66S7.5K288B-F	P	2.88
10.0	*	SFP66S10K288B-F	P	2.88
12.5	*	SFS66S12.5K288B-F	S	2.88
15.0	*	SFS66S15K375B-F	S	3.75
17.5	*	SFT66S17.5K391B-F	T	3.91
20.0	*	SFT66S20K391B-F	T	3.91
25.0	*	SFT66S25K491B-F	T	4.91
30.0	*	SFT66S30K491B-F	T	4.91
35.0	*	SFT66S35K491B-F	T	4.91
40.0	*	SFT66S40K491B-F	T	4.91

Options

Tinplated steel or auminum cans, with and without studs, are available upon request.

Tighter capacitance tolerances such as ±3% or ±6% are available.

+90 °C ratings are available for HID lighting and power supply applications.

Discharge resistors are available.

Special terminal lugs such as 2 tines plus 1 fork lug are available.

Dual capacitance values are available for 370 Vac and 440 Vac applications.

Type SF Motor-Run and Power Supply Capacitors

Oil Filled/Impregnated, AC Rated, Metallized Polypropylene Capacitors

Oval Ratings

Cap. (μF)	Stock Items	Catalog Part Number	Case Code	H (inches)
240 Vac Oval 70 °C Case Temperature				
4.0	*	SFA24S4K219B-F	A	2.19
5.0	*	SFA24S5K219B-F	A	2.19
6.0	*	SFA24S6K219B-F	A	2.19
7.5	*	SFA24S7.5K219B-F	A	2.19
10.0	*	SFA24S10K219B-F	A	2.19
15.0	*	SFA24S15K263B-F	A	2.63
20.0	*	SFA24S20K300B-F	A	3.00
25.0	*	SFC24S25K263B-F	C	2.63
30.0	*	SFC24S30K263B-F	C	2.63
35.0	*	SFC24S35K263B-F	C	2.63
40.0	*	SFC24S40K303B-F	C	3.03
45.0	*	SFC24S45K303B-F	C	3.03
50.0	*	SFC24S50K303B-F	C	3.03
60.0	*	SFC24S60K391B-F	C	3.91
70.0	*	SFC24S70K391B-F	C	3.91
370 Vac Oval 70 °C Case Temperature				
2.0	S	SFA37S2K219B-F	A	2.19
2.0	*	SFA37S2K156B-F	A	1.56
3.0	S	SFA37S3K219B-F	A	2.19
3.0	*	SFA37S3K156B-F	A	1.56
4.0	S	SFA37S4K219B-F	A	2.19
4.0	*	SFA37S4K156B-F	A	1.56
5.0	S	SFA37S5K219B-F	A	2.19
5.0	*	SFA37S5K156B-F	A	1.56
6.0	S	SFA37S6K219B-F	A	2.19
6.0	*	SFA37S6K156B-F	A	1.56
7.5	S	SFA37S7.5K219B-F	A	2.19
10.0	S	SFA37S10K288B-F	A	2.88
12.5	S	SFA37S12.5K288B-F	A	2.88
15.0	S	SFA37S15K288B-F	A	2.88
17.5	S	SFC37S17.5K291B-F	C	2.91
20.0	S	SFC37S20K291B-F	C	2.91
20.0	*	SFA37S20K375B-F	A	3.75
25.0	S	SFC37S25K291B-F	C	2.91
30.0	S	SFC37S30K291B-F	C	2.91
35.0	S	SFC37S35K291B-F	C	2.91
40.0	S	SFC37S40K391B-F	C	3.91
45.0	S	SFC37S45K391B-F	C	3.91
50.0	S	SFC37S50K391B-F	C	3.91
440 Vac Oval 70 °C Case Temperature				
2.0	S	SFA44S2K203B-F	A	2.03
2.0	*	SFA44S2K156B-F	A	1.56
3.0	S	SFA44S3K209B-F	A	2.09

Cap. (μF)	Stock Items	Catalog Part Number	Case Code	H (inches)
440 Vac Oval 70 °C Case Temperature				
3.0	*	SFA44S3K156B-F	A	1.56
4.0	S	SFA44S4K209B-F	A	2.09
4.0	*	SFA44S4K156B-F	A	1.56
5.0	S	SFA44S5K219B-F	A	2.19
6.0	S	SFA44S6K288B-F	A	2.88
7.5	S	SFA44S7.5K288B-F	A	2.88
10.0	S	SFA44S10K375B-F	A	3.75
12.5	*	SFA44S12.5K375B-F	A	3.75
12.5	*	SFC44S12.5K291B-F	C	2.91
15.0	S	SFA44S15K375B-F	A	3.75
15.0	*	SFC44S15K291B-F	C	2.91
17.5	*	SFC44S17.5K291B-F	C	2.91
20.0	S	SFC44S20K391B-F	C	3.91
25.0	S	SFC44S25K391B-F	C	3.91
30.0	S	SFC44S30K391B-F	C	3.91
35.0	S	SFD44S35K391B-F	D	3.91
40.0	S	SFD44S40K391B-F	D	3.91
45.0	S	SFD44S45K391B-F	D	3.91
50.0	S	SFD44S50K391B-F	D	3.91
55.0	S	SFD44S55K391B-F	D	3.91
60.0	S	SFD44S60K391B-F	D	3.91
660 Vac Oval 70 °C Case Temperature				
1.0	S	SFA66S1K156B-F	A	1.56
1.0	*	SFA66S1K219B-F	A	2.19
2.0	S	SFA66S2K156B-F	A	1.56
2.0	*	SFA66S2K219B-F	A	2.19
3.0	S	SFA66S3K288B-F	A	2.88
4.0	S	SFA66S4K288B-F	A	2.88
5.0	S	SFA66S5K375B-F	A	3.75
6.0	S	SFA66S6K375B-F	A	3.75
8.0	S	SFA66S8K475B-F	A	4.75
8.0	*	SFC66S8K291B-F	C	2.91
10.0	S	SFA66S10K475B-F	A	4.75
10.0	S	SFC66S10K291B-F	C	2.91
12.0	S	SFC66S12K391B-F	C	3.91
15.0	S	SFC66S15K391B-F	C	3.91
18.0	S	SFC66S18K391B-F	C	3.91
20.0	S	SFD66S20K391B-F	D	3.91
25.0	S	SFD66S25K391B-F	D	3.91
30.0	S	SFD66S30K391B-F	D	3.91
35.0	S	SFD66S35K491B-F	D	4.91
40.0	S	SFD66S40K491B-F	D	4.91

Options

Tinplated steel or aluminum cans, with and without studs, are available upon request.

Tighter capacitance tolerances such as ±3% or ±6% are available.

+90 °C ratings are available for HID lighting and power supply applications.

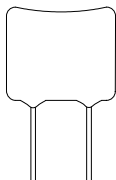
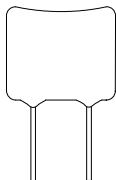
Discharge resistors are available. Special terminal lugs such as 2 tines plus 1 fork lugs are available.

Dual capacitance values are available for 370Vac and 440 Vac applications.

Mica Capacitors



Mica Selector Guide

Types	Form Factor	Capacitance Range	Voltage Range	Lead Spacing Inches (mm)	Highlights	Page
Standard Dipped						
CD10		1 - 400 pF	100 - 500 Vdc	.141 (3.6)	High Temperature – up to +150 °C 100,000 V/μs dV/dt pulse capability minimum	231
D10		251 - 1500 pF	100 - 500 Vdc	.141 (3.6)		
CD15		1 - 1500 pF	100 - 500 Vdc	.234 (5.9)		
CD19		15 - 10,000 pF	100 - 500 Vdc	.344 (8.7)		
CD30		2,000 - 40,000 pF	100 - 500 Vdc	.438 (11.1)		
CD42		20,000 - 91,000 pF	100 - 500 Vdc	1.063 (27.0)		
CDV19		5 - 4700 pF	1000 Vdc	.344 (8.7)		
CDV30		24 - 13,000 pF	1000 - 2500 Vdc	.438 (11.1)		
Snubber & RF Dipped						
CD16		100 - 7500 pF	500 Vdc	.234 (5.9)	Very low ESR	237
CDV16		100 - 3000 pF	1000 Vdc	.234 (5.9)		
RF Clad Silvered Mica						
MIN02	 	10 - 350 pF	300 Vdc	n/a	Low ESR	241
MCM01		33 - 1500 pF	300, 500, 1000 Vdc	n/a		
RF Clad Teflon®						
MIN02	 	1 - 9 pF	300 Vdc	n/a	Low ESR	241
MCM01		1 - 32 pF	300 to 1000 Vdc	n/a		

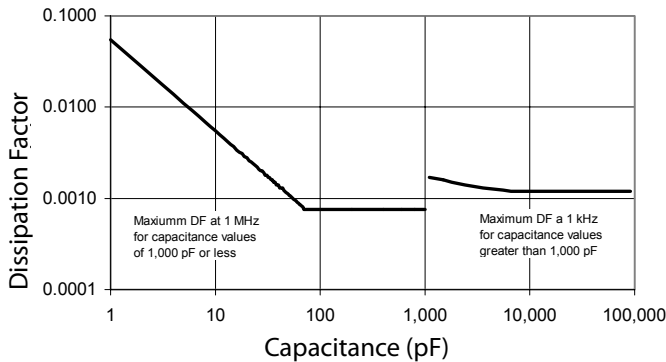
Application Guide Radial-Leaded Dipped Mica Capacitors

Capacitance is within tolerance when measured at these frequencies:

1–1000 pF @ 1 MHz
> 1000 pF @ 1 kHz

Dissipation Factor limits are below. Dissipation factor is equal to $DF=2\pi fRC$, where f is the test frequency, R is the equivalent series resistance, and C is the capacitance. For other capacitance values, see below.

DF vs. Capacitance

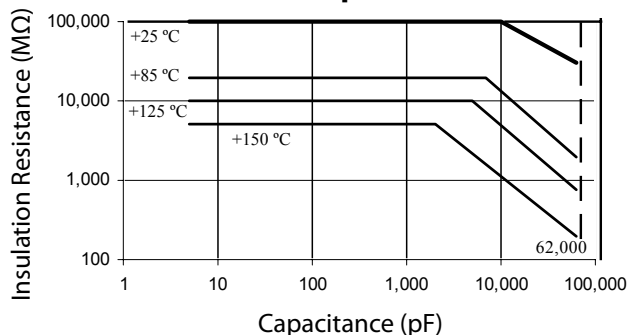


Capacitance	Dissipation Factor
75–1,000 pF	0.00075 max at 1 MHz
1,100–3,300 pF	0.0014 max at 1 kHz
3,600–9,100 pF	0.0013 max at 1 kHz
10,000 pF	0.0012 max at 1 kHz

Quality Factor (Q) is the reciprocal of dissipation factor.

Insulation Resistance for capacitances up to 10,000 pF is greater than 100 GΩ at 25 °C and greater than 10 GΩ at 125 °C. For other capacitance values and temperatures, see below.

IR vs. Capacitance



Withstanding Voltage is 2 times the rated voltage, and can be applied up to 5 seconds without damage.

Temperature Coefficient and Capacitance Drift: Measure the capacitors' capacitance at 25 °C, –55 °C, 25 °C, 125 °C (or 150 °C) and at 25 °C after stabilizing at each temperature. The capacitance will meet the limits of the Characteristic table shown in Ordering Information.

Solderability: After an eight hour steam aging, coat leads with rosin flux (R) and immerse in molten 245 °C ± 5 °C 60/40 tin/lead solder. Solder coverage will be no less than 95% when examined at 10X magnification.

Surge Voltage: Standard dipped capacitors will withstand 500 Vdc max peak transients above rated voltage. For example, in flyback regulators with less than 500 Vdc bias, you may use 500 Vdc-rated capacitors provided that the switching transient peaks are less than 1,000 V.

Voltage Coefficient: The change in capacitance from 0 volts to rated voltage is less than 0.1%.

Pulse Handling: Standard dipped capacitors will withstand an unlimited number of pulses with a dV/dt of 100,000 V/ μ s tested per IEC 384-1. Smaller capacitance ratings can withstand even faster dV/dt —ratings have been tested one million discharges at rated voltage into a 4.7 Ω resistor with no change in capacitance. For a 100 pF, 500 Vdc unit, that's a peak dV/dt in excess of 1,000,000 V/ μ s. The dV/dt is expressed by this relationship:

$$dV/dt = V / (R_d C)$$

V = rated voltage, Vdc

R_d = minimum discharge resistor, Ω

C = rated capacitance, μ F

This is the initial rate of discharge into R_d .

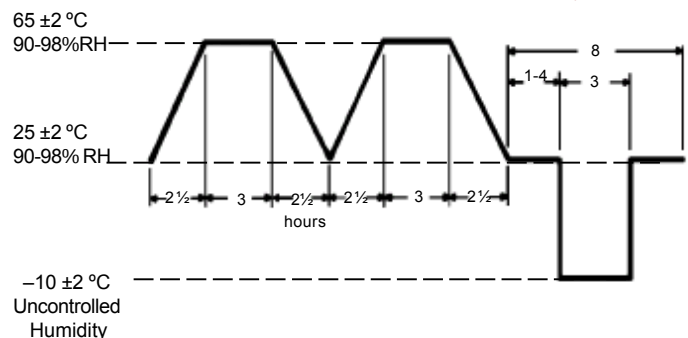
Marking is in accordance with EIA RS153B and includes "CDM" as our manufacturer's symbol, nominal capacitance in pF, capacitance tolerance, and dc working voltage followed by V, if other than 500 Vdc.

Moisture Resistance

Capacitors will meet the requirements of MIL-STD-202, Method 106F as outlined here and diagrammed below. Refer to MIL-STD-202 for details.

1. Dry capacitors for 24 hours in a 50 ± 2 °C oven and then allow to stabilize at room temperature.
2. Subject the capacitors to 10 24 - hour continuous cycles with relative humidity and temperature as shown.
3. 24 hours after completion of the last cycle, the capacitors will show no visual damage and will meet the after-test limits on the next page.

24-Hour Moisture Resistance Cycle



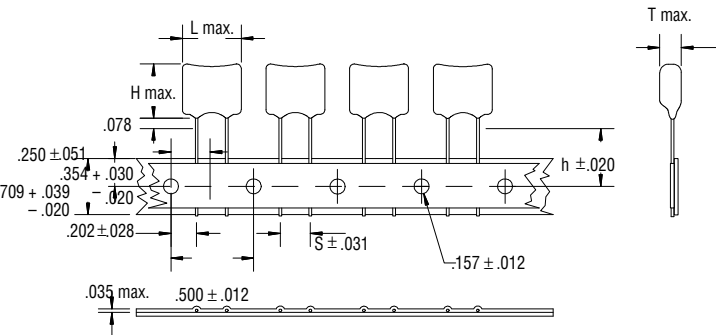
Life Test: Subject the capacitors to maximum operating temperature (+125 °C or +150 °C) with 1.5 times rated voltage applied for 2,000 hours. There will be no visual damage and the capacitors will meet the after-test limits below.

After-Test Limits

Test	Withstand Voltage	Insulation Resistance	Capacitance Change (whichever is greater)	DF	Q
Moisture Resistance	IL	30 GΩ	NV ±1% or ±1 pF	150% IL	2/3xIL
Life Test	IL	IL	NV ±1% or ±1 pF	150% IL	2/3xIL

IL = Initial Limit NV = Nominal Value

Dipped Mica Capacitors for Auto Insertion



For tape and reel or ammo-packed packaging, specify on the order.

See the table below for available reel-packed types, lead configurations, lead spacing, lead material, pieces per reel and pieces per ammo packs.

Packaging will be in accordance with EIA-468. Dimension “h” will be 16 mm for formed leads or 18 mm for straight leads. 20 mm is available on special request. Specify reel or ammo on your purchase order.

Type Number	Lead Spacing	Lead Material	Capacitance Range	Range of Pieces per Reel	Range of Pieces per Ammo Pack
D10 CD10	0.141	CCS	1 - 249 pF 251 - 470 pF 471 - 1200 pF	1000 - 2500 1000-2000 1000-1500	1000 2000 1000-1500 1000
CD15	0.234	CCS	1 - 330 pF 331 - 470 pF 471 - 1500 pF	1000-2500 1000-2000 1000-1500	1000-2000 1000-1500 1000
CD16 CDV16	0.234	CCS	1 - 330 pF 331 - 470 pF 471 - 1500 pF 1501 - 2000 pF > 2000 pF	1000-2500 1000-2000 1000-1500 800 500	1000-2000 1000-1500 1000 600 600
CD19	0.344	CCS	10-1000 pF 1001-1500 pF 1501-3000 pF 3001-5000 pF	1000 800 600 400	800 800 600 400

CCS = copper clad steel

Mica Capacitors, Standard Dipped

Types CD10, D10, CD15, CD19, CD30, CD42, CDV19, CDV30



Stability and mica go hand-in-hand when you need to count on stable capacitance over a wide temperature range. CDE's standard dipped silvered mica capacitors are the first choice for timing and close tolerance applications. These standard types are widely available through distribution.

Highlights

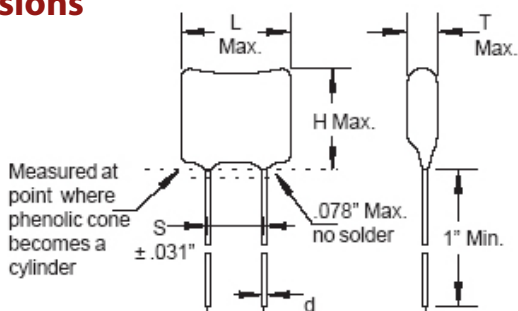
- Reel packaging available
- High temperature – up to +150 °C
- Dimensions meet EIA RS153B specification
- 100,000 V/μs dV/dt pulse capability minimum
- Non-flammable units that meet IEC 695-2-2 are available

Specifications

Capacitance Range	1 pF to 91,000 pF
Capacitance Tolerance	±1/2 pF (D), ±1 pF (C), ±1/2% (E), ±1% (F), ±2% (G), ±5% (J)
Rated Voltage	100 Vdc to 2500 Vdc
Operating Temperature Range	–55 °C to +125 °C (O) –55 °C to +150 °C (P)*
Dielectric Strength Test	200% of rated voltage
RoHS Compliant	

* P temperature range available for types CD10, CD15, CD19, CD30 and CD42

Dimensions



Construction Details

Case Material	Epoxy
Terminal Material	Copper clad steel, nickle undercoat, 100% tin finish

Ordering Information

Order by complete part number as below. For other options, write your requirements on your purchase order or request for quotation.

Part Numbering System (Radial-Leaded Silvered Mica Capacitors, except D10*)

CD15	C	D	100	J	O	3	F
Series	Characteristic Code	Voltage (Vdc)	Capacitance (pF)	Capacitance Tolerance	Temperature Range	Vibration Grade	Blank = Not Specified F = RoHS Compliant
		F = 1000 Vdc A = 100 Vdc C = 300 Vdc D = 500 Vdc	010 = 1 pF 100 = 10 pF (1.5) = 1.5 pF 361 = 360 pF 122 = 1200 pF		O = –55 °C to +125 °C P = –55 °C to +150 °C		
Characteristics			Vibration Grade				

Code	Temp. Coeff. ppm/ °C	Capacitance Drift	Standard Cap. Range
C	–200 to +200	±(0.5% +0.1 pF)	1–18 pF
E	–20 to +100	±(0.1% +0.1 pF)	20–82 pF
F	0 to +70	±(0.05% +0.1 pF)	91 pF and up

Tol. Code	Tolerance	Capacitance Range
C	±1 pF	1–9 pF
D	±1/2 pF	1–99 pF
E	±1/2 %	100 pF and up
F	±1 %	50 pF and up
G	±2 %	25 pF and up
H	±3 %	18 pF and up
J	±5 %	10 pF and up

No.	MIL-STD-202	Vibration Condition (Hz)
3	Method 204 Condition D	10 to 2,000

Options Available

- Non-flammable units per IEC 695-2-2 are available for standard dipped capacitors. Specify IEC 695-2-2 on your order.
- Tape and reeling, specify per application guide.

Standard tolerance is ±1/2 pF for less than 10 pF and ±5% for 10 pF and up

* Order type D10 using the catalog numbers shown in ratings tables.

Mica Capacitors, Standard Dipped

Types CD10, D10, CD15, CD19, CD30, CD42, CDV19, CDV30

Ratings

Cap (pF)	Volts (Vdc)	Catalog Part Number	L in (mm)	H in (mm)	T in (mm)	S in (mm)	d in (mm)
1	500	CD10CD010DO3F	0.36 (9.1)	0.33 (8.4)	0.19 (4.8)	0.141 (3.6)	0.016 (.4)
1	500	CD15CD010DO3F	0.45 (11.4)	0.36 (9.1)	0.17 (4.3)	0.234 (5.9)	0.025 (.6)
2	500	CD10CD020DO3F	0.36 (9.1)	0.33 (8.4)	0.19 (4.8)	0.141 (3.6)	0.016 (.4)
2	500	CD15CD020DO3F	0.45 (11.4)	0.36 (9.1)	0.17 (4.3)	0.234 (5.9)	0.025 (.6)
3	500	CD10CD03F0DO3F	0.36 (9.1)	0.33 (8.4)	0.19 (4.8)	0.141 (3.6)	0.016 (.4)
3	500	CD15CD03F0DO3F	0.45 (11.4)	0.36 (9.1)	0.17 (4.3)	0.234 (5.9)	0.025 (.6)
5	500	CD10CD050DO3F	0.36 (9.1)	0.33 (8.4)	0.19 (4.8)	0.141 (3.6)	0.016 (.4)
5	500	CD15CD050DO3F	0.45 (11.4)	0.36 (9.1)	0.17 (4.3)	0.234 (5.9)	0.025 (.6)
5	1000	CDV19CF050DO3F	0.64 (16.3)	0.50 (12.7)	0.19 (4.8)	0.344 (8.7)	0.032 (.8)
7	500	CD10CD070DO3F	0.36 (9.1)	0.33 (8.4)	0.19 (4.8)	0.141 (3.6)	0.016 (.4)
7	500	CD15CD070DO3F	0.45 (11.4)	0.36 (9.1)	0.17 (4.3)	0.234 (5.9)	0.025 (.6)
7	1000	CDV19CF070DO3F	0.64 (16.3)	0.50 (12.7)	0.19 (4.8)	0.344 (8.7)	0.032 (.8)
10	500	CD10CD100JO3F	0.36 (9.1)	0.33 (8.4)	0.19 (4.8)	0.141 (3.6)	0.016 (.4)
10	500	CD15CD100JO3F	0.45 (11.4)	0.36 (9.1)	0.17 (4.3)	0.234 (5.9)	0.025 (.6)
10	1000	CDV19CF100JO3F	0.64 (16.3)	0.50 (12.7)	0.19 (4.8)	0.344 (8.7)	0.032 (.8)
12	500	CD10CD120JO3F	0.36 (9.1)	0.33 (8.4)	0.19 (4.8)	0.141 (3.6)	0.016 (.4)
12	500	CD15CD120JO3F	0.45 (11.4)	0.36 (9.1)	0.17 (4.3)	0.234 (5.9)	0.025 (.6)
12	1000	CDV19CF120JO3F	0.64 (16.3)	0.50 (12.7)	0.19 (4.8)	0.344 (8.7)	0.032 (.8)
15	500	CD10CD150JO3F	0.36 (9.1)	0.33 (8.4)	0.19 (4.8)	0.141 (3.6)	0.016 (.4)
15	500	CD15CD150JO3F	0.45 (11.4)	0.36 (9.1)	0.17 (4.3)	0.234 (5.9)	0.025 (.6)
15	1000	CDV19CF150JO3F	0.64 (16.3)	0.50 (12.7)	0.19 (4.8)	0.344 (8.7)	0.032 (.8)
18	500	CD10CD180JO3F	0.36 (9.1)	0.33 (8.4)	0.19 (4.8)	0.141 (3.6)	0.016 (.4)
18	500	CD15CD180JO3F	0.45 (11.4)	0.36 (9.1)	0.17 (4.3)	0.234 (5.9)	0.025 (.6)
18	1000	CDV19CF180JO3F	0.64 (16.3)	0.50 (12.7)	0.19 (4.8)	0.344 (8.7)	0.032 (.8)
22	500	CD10ED220JO3F	0.36 (9.1)	0.33 (8.4)	0.19 (4.8)	0.141 (3.6)	0.016 (.4)
22	500	CD15ED220JO3F	0.45 (11.4)	0.36 (9.1)	0.17 (4.3)	0.234 (5.9)	0.025 (.6)
22	1000	CDV19EF220JO3F	0.64 (16.3)	0.50 (12.7)	0.19 (4.8)	0.344 (8.7)	0.032 (.8)
27	500	CD10ED270JO3F	0.37 (9.4)	0.33 (8.4)	0.19 (4.8)	0.141 (3.6)	0.016 (.4)
27	500	CD15ED270JO3F	0.45 (11.4)	0.36 (9.1)	0.17 (4.3)	0.234 (5.9)	0.025 (.6)
27	1000	CDV19EF270JO3F	0.64 (16.3)	0.50 (12.7)	0.19 (4.8)	0.344 (8.7)	0.032 (.8)
27	1500	CDV30EH270JO3F	0.77 (19.6)	0.85 (21.6)	0.25 (6.4)	0.438 (11.1)	0.040 (1.0)
27	2000	CDV30EJ270JO3F	0.77 (19.6)	0.86 (21.8)	0.25 (6.4)	0.438 (11.1)	0.040 (1.0)
27	2500	CDV30EK270JO3F	0.78 (19.8)	0.86 (21.8)	0.25 (6.4)	0.438 (11.1)	0.040 (1.0)
33	500	CD10ED330JO3F	0.37 (9.4)	0.34 (8.6)	0.19 (4.8)	0.141 (3.6)	0.016 (.4)
33	500	CD15ED330JO3F	0.45 (11.4)	0.36 (9.1)	0.17 (4.3)	0.234 (5.9)	0.025 (.6)
33	1000	CDV19EF330JO3F	0.64 (16.3)	0.50 (12.7)	0.19 (4.8)	0.344 (8.7)	0.032 (.8)
33	1500	CDV30EH330JO3F	0.77 (19.6)	0.85 (21.6)	0.25 (6.4)	0.438 (11.1)	0.040 (1.0)
33	2000	CDV30EJ330JO3F	0.77 (19.6)	0.86 (21.8)	0.25 (6.4)	0.438 (11.1)	0.040 (1.0)
33	2500	CDV30EK330JO3F	0.78 (19.8)	0.86 (21.8)	0.25 (6.4)	0.438 (11.1)	0.040 (1.0)
39	500	CD10ED390JO3F	0.37 (9.4)	0.34 (8.6)	0.19 (4.8)	0.141 (3.6)	0.016 (.4)
39	500	CD15ED390JO3F	0.45 (11.4)	0.36 (9.1)	0.17 (4.3)	0.234 (5.9)	0.025 (.6)
39	1000	CDV19EF390JO3F	0.64 (16.3)	0.50 (12.7)	0.19 (4.8)	0.344 (8.7)	0.032 (.8)
39	1500	CDV30EH390JO3F	0.77 (19.6)	0.85 (21.6)	0.25 (6.4)	0.438 (11.1)	0.040 (1.0)
39	2000	CDV30EJ390JO3F	0.77 (19.6)	0.86 (21.8)	0.25 (6.4)	0.438 (11.1)	0.040 (1.0)

Mica Capacitors, Standard Dipped

Types CD10, D10, CD15, CD19, CD30, CD42, CDV19, CDV30

Cap (pF)	Volts (Vdc)	Catalog Part Number	L in (mm)	H in (mm)	T in (mm)	S in (mm)	d in (mm)
39	2500	CDV30EK390JO3F	0.78 (19.8)	0.86 (21.8)	0.25 (6.4)	0.438 (11.1)	0.040 (1.0)
47	500	CD10ED470JO3F	0.37 (9.4)	0.34 (8.6)	0.19 (4.8)	0.141 (3.6)	0.016 (.4)
47	500	CD15ED470JO3F	0.45 (11.4)	0.36 (9.1)	0.17 (4.3)	0.234 (5.9)	0.025 (.6)
47	1000	CDV19EF470JO3F	0.64 (16.3)	0.50 (12.7)	0.19 (4.8)	0.344 (8.7)	0.032 (.8)
47	1500	CDV30EH470JO3F	0.77 (19.6)	0.85 (21.6)	0.25 (6.4)	0.438 (11.1)	0.040 (1.0)
47	2000	CDV30EJ470JO3F	0.77 (19.6)	0.86 (21.8)	0.25 (6.4)	0.438 (11.1)	0.040 (1.0)
47	2500	CDV30EK470JO3F	0.78 (19.8)	0.86 (21.8)	0.25 (6.4)	0.438 (11.1)	0.040 (1.0)
56	500	CD10ED560JO3F	0.37 (9.4)	0.34 (8.6)	0.19 (4.8)	0.141 (3.6)	0.016 (.4)
56	500	CD15ED560JO3F	0.45 (11.4)	0.36 (9.1)	0.17 (4.3)	0.234 (5.9)	0.025 (.6)
56	1000	CDV19EF560JO3F	0.64 (16.3)	0.50 (12.7)	0.19 (4.8)	0.344 (8.7)	0.032 (.8)
56	1500	CDV30EH560JO3F	0.77 (19.6)	0.85 (21.6)	0.25 (6.4)	0.438 (11.1)	0.040 (1.0)
56	2500	CDV30EK560JO3F	0.78 (19.8)	0.86 (21.8)	0.25 (6.4)	0.438 (11.1)	0.040 (1.0)
68	500	CD10ED680JO3F	0.37 (9.4)	0.34 (8.6)	0.19 (4.8)	0.141 (3.6)	0.016 (.4)
68	500	CD15ED680JO3F	0.45 (11.4)	0.36 (9.1)	0.18 (4.6)	0.234 (5.9)	0.025 (.6)
68	1000	CDV19EF680JO3F	0.64 (16.3)	0.50 (12.7)	0.19 (4.8)	0.344 (8.7)	0.032 (.8)
68	1500	CDV30EH680JO3F	0.77 (19.6)	0.85 (21.6)	0.25 (6.4)	0.438 (11.1)	0.040 (1.0)
68	2000	CDV30EJ680JO3F	0.77 (19.6)	0.86 (21.8)	0.25 (6.4)	0.438 (11.1)	0.040 (1.0)
68	2500	CDV30EK680JO3F	0.78 (19.8)	0.86 (21.8)	0.25 (6.4)	0.438 (11.1)	0.040 (1.0)
82	500	CD10ED820JO3F	0.37 (9.4)	0.35 (8.9)	0.20 (5.1)	0.141 (3.6)	0.016 (.4)
82	500	CD15ED820JO3F	0.45 (11.4)	0.36 (9.1)	0.18 (4.6)	0.234 (5.9)	0.025 (.6)
82	1000	CDV19EF820JO3F	0.64 (16.3)	0.50 (12.7)	0.19 (4.8)	0.344 (8.7)	0.032 (.8)
82	1500	CDV30EH820JO3F	0.77 (19.6)	0.85 (21.6)	0.25 (6.4)	0.438 (11.1)	0.040 (1.0)
82	2000	CDV30EJ820JO3F	0.77 (19.6)	0.86 (21.8)	0.25 (6.4)	0.438 (11.1)	0.040 (1.0)
82	2500	CDV30EK820JO3F	0.78 (19.8)	0.86 (21.8)	0.25 (6.4)	0.438 (11.1)	0.040 (1.0)
100	500	CD10FD101JO3F	0.37 (9.4)	0.35 (8.9)	0.20 (5.1)	0.141 (3.6)	0.016 (.4)
100	500	CD15FD101JO3F	0.46 (11.7)	0.36 (9.1)	0.18 (4.6)	0.234 (5.9)	0.025 (.6)
100	500	CD19FD101JO3F	0.64 (16.3)	0.50 (12.7)	0.19 (4.8)	0.344 (8.7)	0.032 (.8)
100	1000	CDV19FF101JO3F	0.64 (16.3)	0.50 (12.7)	0.19 (4.8)	0.344 (8.7)	0.032 (.8)
100	1500	CDV30FH101JO3F	0.77 (19.6)	0.85 (21.6)	0.25 (6.4)	0.438 (11.1)	0.040 (1.0)
100	2000	CDV30FJ101JO3F	0.77 (19.6)	0.86 (21.8)	0.25 (6.4)	0.438 (11.1)	0.040 (1.0)
100	2500	CDV30FK101JO3F	0.78 (19.8)	0.86 (21.8)	0.25 (6.4)	0.438 (11.1)	0.040 (1.0)
120	500	CD10FD121JO3F	0.38 (9.7)	0.35 (8.9)	0.20 (5.1)	0.141 (3.6)	0.016 (.4)
120	500	CD15FD121JO3F	0.46 (11.7)	0.37 (9.4)	0.18 (4.6)	0.234 (5.9)	0.025 (.6)
120	500	CD19FD121JO3F	0.64 (16.3)	0.50 (12.7)	0.19 (4.8)	0.344 (8.7)	0.032 (.8)
120	1000	CDV19FF121JO3F	0.64 (16.3)	0.50 (12.7)	0.19 (4.8)	0.344 (8.7)	0.032 (.8)
120	1500	CDV30FH121JO3F	0.77 (19.6)	0.85 (21.6)	0.25 (6.4)	0.438 (11.1)	0.040 (1.0)
120	2000	CDV30FJ121JO3F	0.77 (19.6)	0.86 (21.8)	0.25 (6.4)	0.438 (11.1)	0.040 (1.0)
120	2500	CDV30FK121JO3F	0.78 (19.8)	0.86 (21.8)	0.25 (6.4)	0.438 (11.1)	0.040 (1.0)
150	500	CD10FD151JO3F	0.38 (9.7)	0.36 (9.1)	0.21 (5.3)	0.141 (3.6)	0.016 (.4)
150	500	CD15FD151JO3F	0.46 (11.7)	0.37 (9.4)	0.19 (4.8)	0.234 (5.9)	0.025 (.6)
150	500	CD19FD151JO3F	0.64 (16.3)	0.50 (12.7)	0.19 (4.8)	0.344 (8.7)	0.032 (.8)
150	1000	CDV19FF151JO3F	0.64 (16.3)	0.50 (12.7)	0.19 (4.8)	0.344 (8.7)	0.032 (.8)
150	1500	CDV30FH151JO3F	0.77 (19.6)	0.85 (21.6)	0.25 (6.4)	0.438 (11.1)	0.040 (1.0)
150	2000	CDV30FJ151JO3F	0.77 (19.6)	0.86 (21.8)	0.25 (6.4)	0.438 (11.1)	0.040 (1.0)

Mica Capacitors, Standard Dipped

Types CD10, D10, CD15, CD19, CD30, CD42, CDV19, CDV30

Cap (pF)	Volts (Vdc)	Catalog Part Number	L in (mm)	H in (mm)	T in (mm)	S in (mm)	d in (mm)
180	500	CD10FD181JO3F	0.39 (9.9)	0.37 (9.4)	0.21 (5.3)	0.141 (3.6)	0.016 (.4)
180	500	CD15FD181JO3F	0.46 (11.7)	0.37 (9.4)	0.19 (4.8)	0.234 (5.9)	0.025 (.6)
180	500	CD19FD181JO3F	0.64 (16.3)	0.50 (12.7)	0.19 (4.8)	0.344 (8.7)	0.032 (.8)
180	1000	CDV19FF181JO3F	0.64 (16.3)	0.50 (12.7)	0.19 (4.8)	0.344 (8.7)	0.032 (.8)
180	1500	CDV30FH181JO3F	0.77 (19.6)	0.85 (21.6)	0.25 (6.4)	0.438 (11.1)	0.040 (1.0)
180	2000	CDV30FJ181JO3F	0.77 (19.6)	0.86 (21.8)	0.25 (6.4)	0.438 (11.1)	0.040 (1.0)
220	500	CD10FD221JO3F	0.39 (9.9)	0.38 (9.7)	0.22 (5.6)	0.141 (3.6)	0.016 (.4)
220	500	CD15FD221JO3F	0.46 (11.7)	0.38 (9.7)	0.20 (5.1)	0.234 (5.9)	0.025 (.6)
220	500	CD19FD221JO3F	0.64 (16.3)	0.50 (12.7)	0.19 (4.8)	0.344 (8.7)	0.032 (.8)
220	1000	CDV19FF221JO3F	0.64 (16.3)	0.50 (12.7)	0.19 (4.8)	0.344 (8.7)	0.032 (.8)
220	1500	CDV30FH221JO3F	0.77 (19.6)	0.85 (21.6)	0.25 (6.4)	0.438 (11.1)	0.040 (1.0)
220	2000	CDV30FJ221JO3F	0.77 (19.6)	0.86 (21.8)	0.25 (6.4)	0.438 (11.1)	0.040 (1.0)
270	300	CD10FC271JO3F	0.39 (9.9)	0.38 (9.7)	0.22 (5.6)	0.141 (3.6)	0.016 (.4)
270	500	CD19FD271JO3F	0.64 (16.3)	0.50 (12.7)	0.19 (4.8)	0.344 (8.7)	0.032 (.8)
270	500	D105F271JO3F	0.39 (9.9)	0.38 (9.7)	0.22 (5.6)	0.141 (3.6)	0.016 (.4)
270	500	CD15FD271JO3F	0.47 (11.9)	0.39 (9.9)	0.21 (5.3)	0.234 (5.9)	0.025 (.6)
270	1000	CDV19FF271JO3F	0.64 (16.3)	0.50 (12.7)	0.19 (4.8)	0.344 (8.7)	0.032 (.8)
270	1500	CDV30FH271JO3F	0.77 (19.6)	0.85 (21.6)	0.25 (6.4)	0.438 (11.1)	0.040 (1.0)
270	2000	CDV30FJ271JO3F	0.77 (19.6)	0.86 (21.8)	0.25 (6.4)	0.438 (11.1)	0.040 (1.0)
330	100	CD10FA331JO3F	0.39 (9.9)	0.37 (9.4)	0.22 (5.6)	0.141 (3.6)	0.016 (.4)
330	500	D105F331JO3F	0.39 (9.9)	0.38 (9.7)	0.22 (5.6)	0.141 (3.6)	0.016 (.4)
330	500	CD15FD331JO3F	0.47 (11.9)	0.39 (9.9)	0.21 (5.3)	0.234 (5.9)	0.025 (.6)
330	500	CD19FD331JO3F	0.64 (16.3)	0.50 (12.7)	0.19 (4.8)	0.344 (8.7)	0.032 (.8)
330	2000	CDV30FJ331JO3F	0.77 (19.6)	0.86 (21.8)	0.25 (6.4)	0.438 (11.1)	0.040 (1.0)
330	2500	CDV30FK331JO3F	0.78 (19.8)	0.87 (22.1)	0.25 (6.4)	0.438 (11.1)	0.040 (1.0)
390	100	CD10FA391JO3F	0.39 (9.9)	0.38 (9.7)	0.22 (5.6)	0.141 (3.6)	0.016 (.4)
390	500	D105F391JO3F	0.39 (9.9)	0.38 (9.7)	0.22 (5.6)	0.141 (3.6)	0.016 (.4)
390	500	CD15FD391JO3F	0.47 (11.9)	0.39 (9.9)	0.21 (5.3)	0.234 (5.9)	0.025 (.6)
390	500	CD19FD391JO3F	0.64 (16.3)	0.51 (13.0)	0.20 (5.1)	0.344 (8.7)	0.032 (.8)
390	1000	CDV19FF391JO3F	0.65 (16.5)	0.51 (13.0)	0.20 (5.1)	0.344 (8.7)	0.032 (.8)
390	1500	CDV30FH391JO3F	0.77 (19.6)	0.85 (21.6)	0.25 (6.4)	0.438 (11.1)	0.040 (1.0)
470	500	D105F471JO3F	0.39 (9.9)	0.38 (9.7)	0.22 (5.6)	0.141 (3.6)	0.016 (.4)
470	500	CD15FD471JO3F	0.47 (11.9)	0.40 (10.2)	0.22 (5.6)	0.234 (5.9)	0.025 (.6)
470	500	CD19FD471JO3F	0.64 (16.3)	0.51 (13.0)	0.20 (5.1)	0.344 (8.7)	0.032 (.8)
470	1500	CDV30FH471JO3F	0.77 (19.6)	0.85 (21.6)	0.25 (6.4)	0.438 (11.1)	0.040 (1.0)
470	2000	CDV30FJ471JO3F	0.77 (19.6)	0.87 (22.1)	0.26 (6.6)	0.438 (11.1)	0.040 (1.0)
470	2500	CDV30FK471JO3F	0.78 (19.8)	0.87 (22.1)	0.27 (6.9)	0.438 (11.1)	0.040 (1.0)
560	300	D103F561JO3F	0.39 (9.9)	0.38 (9.7)	0.22 (5.6)	0.141 (3.6)	0.016 (.4)
560	300	CD15FC561JO3F	0.46 (11.7)	0.38 (9.7)	0.21 (5.3)	0.234 (5.9)	0.025 (.6)
560	500	CD19FD561JO3F	0.65 (16.5)	0.51 (13.0)	0.20 (5.1)	0.344 (8.7)	0.032 (.8)
560	1000	CDV19FF561JO3F	0.65 (16.5)	0.51 (13.0)	0.21 (5.3)	0.344 (8.7)	0.032 (.8)
560	1500	CDV30FH561JO3F	0.77 (19.6)	0.85 (21.6)	0.25 (6.4)	0.438 (11.1)	0.040 (1.0)
560	2000	CDV30FJ561JO3F	0.77 (19.6)	0.87 (22.1)	0.26 (6.6)	0.438 (11.1)	0.040 (1.0)
560	2500	CDV30FK561JO3F	0.78 (19.8)	0.87 (22.1)	0.27 (6.9)	0.438 (11.1)	0.040 (1.0)
680	300	D103F681JO3F	0.39 (9.9)	0.38 (9.7)	0.22 (5.6)	0.141 (3.6)	0.016 (.4)

Mica Capacitors, Standard Dipped

Types CD10, D10, CD15, CD19, CD30, CD42, CDV19, CDV30

Cap (pF)	Volts (Vdc)	Catalog Part Number	L in (mm)	H in (mm)	T in (mm)	S in (mm)	d in (mm)
680	300	CD15FC681JO3F	0.47 (11.9)	0.39 (9.9)	0.21 (5.3)	0.234 (5.9)	0.025 (.6)
680	500	CD19FD681JO3F	0.65 (16.5)	0.51 (13.0)	0.21 (5.3)	0.344 (8.7)	0.032 (.8)
680	1000	CDV19FF681JO3F	0.66 (16.8)	0.52 (13.2)	0.22 (5.6)	0.344 (8.7)	0.032 (.8)
680	1500	CDV30FH681JO3F	0.77 (19.6)	0.85 (21.6)	0.25 (6.4)	0.438 (11.1)	0.040 (1.0)
680	2000	CDV30FJ681JO3F	0.77 (19.6)	0.87 (22.1)	0.26 (6.6)	0.438 (11.1)	0.040 (1.0)
680	2500	CDV30FK681JO3F	0.78 (19.8)	0.87 (22.1)	0.27 (6.9)	0.438 (11.1)	0.040 (1.0)
820	300	D103F821JO3F	0.39 (9.9)	0.38 (9.7)	0.22 (5.6)	0.141 (3.6)	0.016 (.4)
820	300	CD15FC821JO3F	0.47 (11.9)	0.39 (9.9)	0.21 (5.3)	0.234 (5.9)	0.025 (.6)
820	500	CD19FD821JO3F	0.65 (16.5)	0.51 (13.0)	0.21 (5.3)	0.344 (8.7)	0.032 (.8)
820	1000	CDV19FF821JO3F	0.66 (16.8)	0.53 (13.5)	0.23 (5.8)	0.344 (8.7)	0.032 (.8)
820	1500	CDV30FH821JO3F	0.77 (19.6)	0.85 (21.6)	0.25 (6.4)	0.438 (11.1)	0.040 (1.0)
820	2000	CDV30FJ821JO3F	0.77 (19.6)	0.87 (22.1)	0.26 (6.6)	0.438 (11.1)	0.040 (1.0)
820	2500	CDV30FK821JO3F	0.78 (19.8)	0.87 (22.1)	0.27 (6.9)	0.438 (11.1)	0.040 (1.0)
1000	100	D101F102JO3F	0.39 (9.9)	0.38 (9.7)	0.22 (5.6)	0.141 (3.6)	0.016 (.4)
1000	100	CD15FA102JO3F	0.48 (12.2)	0.40 (10.2)	0.23 (5.8)	0.234 (5.9)	0.025 (.6)
1000	500	CD19FD102JO3F	0.65 (16.5)	0.52 (13.2)	0.22 (5.6)	0.344 (8.7)	0.032 (.8)
1000	1000	CDV19FF102JO3F	0.67 (17.0)	0.53 (13.5)	0.25 (6.4)	0.344 (97)	0.032 (.8)
1000	1500	CDV30FH102JO3F	0.77 (19.6)	0.86 (21.8)	0.26 (6.6)	0.438 (11.1)	0.040 (1.0)
1000	2000	CDV30FJ102JO3F	0.78 (19.8)	0.88 (22.4)	0.28 (7.1)	0.438 (11.1)	0.040 (1.0)
1000	2500	CDV30FK102JO3F	0.79 (20.1)	0.88 (22.4)	0.31 (7.9)	0.438 (11.1)	0.040 (1.0)
1200	100	D101F122JO3F	0.39 (9.9)	0.38 (9.7)	0.22 (5.6)	0.141 (3.6)	0.016 (.4)
1200	100	CD15FA122JO3F	0.49 (12.4)	0.42 (10.7)	0.24 (6.1)	0.234 (5.9)	0.025 (.6)
1200	500	CD19FD122JO3F	0.66 (16.8)	0.52 (13.2)	0.22 (5.6)	0.344 (8.7)	0.032 (.8)
1200	1500	CDV30FH122JO3F	0.77 (19.6)	0.86 (21.8)	0.26 (6.6)	0.438 (11.1)	0.040 (1.0)
1200	2000	CDV30FJ122JO3F	0.78 (19.8)	0.88 (22.4)	0.28 (7.1)	0.438 (11.1)	0.040 (1.0)
1200	2500	CDV30FK122JO3F	0.79 (20.1)	0.88 (22.4)	0.31 (7.9)	0.438 (11.1)	0.040 (1.0)
1500	100	D101F152JO3F	0.39 (9.9)	0.38 (9.7)	0.22 (5.6)	0.141 (3.6)	0.016 (.4)
1500	100	CD15FA152JO3F	0.50 (12.7)	0.43 (10.9)	0.25 (6.4)	0.234 (5.9)	0.025 (.6)
1500	500	CD19FD152JO3F	0.66 (16.8)	0.52 (13.2)	0.23 (5.8)	0.344 (8.7)	0.032 (.8)
1500	1000	CDV19FF152JO3F	0.68 (17.3)	0.54 (13.7)	0.27 (6.9)	0.344 (8.7)	0.032 (.8)
1500	1500	CDV30FH152JO3F	0.78 (19.8)	0.87 (22.1)	0.28 (7.1)	0.438 (11.1)	0.040 (1.0)
1500	2000	CDV30FJ152JO3F	0.79 (20.1)	0.89 (22.6)	0.32 (8.1)	0.438 (11.1)	0.040 (1.0)
1500	2500	CDV30FK152JO3F	0.80 (20.3)	0.89 (22.6)	0.35 (8.9)	0.438 (11.1)	0.040 (1.0)
1800	500	CD19FD182JO3F	0.67 (17.0)	0.53 (13.5)	0.24 (6.1)	0.344 (8.7)	0.032 (.8)
1800	1000	CDV19FF182JO3F	0.68 (17.3)	0.55 (14.0)	0.29 (7.4)	0.344 (8.7)	0.032 (.8)
1800	1500	CDV30FH182JO3F	0.78 (19.8)	0.87 (22.1)	0.29 (7.4)	0.438 (11.1)	0.040 (1.0)
1800	2000	CDV30FJ182JO3F	0.79 (20.1)	0.89 (22.6)	0.34 (8.6)	0.438 (11.1)	0.040 (1.0)
1800	2500	CDV30FK182JO3F	0.81 (20.6)	0.90 (22.9)	0.37 (9.4)	0.438 (11.1)	0.040 (1.0)
2200	500	CD19FD222JO3F	0.67 (17.0)	0.53 (13.5)	0.25 (6.4)	0.344 (8.7)	0.032 (.8)
2200	500	CD30FD222JO3F	0.77 (19.6)	0.85 (21.6)	0.25 (6.4)	0.438 (11.1)	0.040 (1.0)
2200	1000	CDV19FF222JO3F	0.69 (17.5)	0.56 (14.2)	0.31 (7.9)	0.344 (8.7)	0.032 (.8)
2200	1500	CDV30FH222JO3F	0.79 (20.1)	0.88 (22.4)	0.31 (7.9)	0.438 (11.1)	0.040 (1.0)
2700	500	CD19FD272JO3F	0.68 (17.3)	0.54 (13.7)	0.27 (6.9)	0.344 (8.7)	0.032 (.8)
2700	500	CD30FD272JO3F	0.77 (19.6)	0.85 (21.6)	0.25 (6.4)	0.438 (11.1)	0.040 (1.0)
2700	1000	CDV19FF272JO3F	0.70 (17.8)	0.57 (14.5)	0.34 (8.6)	0.344 (8.7)	0.032 (.8)

Mica Capacitors, Standard Dipped

Types CD10, D10, CD15, CD19, CD30, CD42, CDV19, CDV30

Cap (pF)	Volts (Vdc)	Catalog Part Number	L in (mm)	H in (mm)	T in (mm)	S in (mm)	d in (mm)
2700	1500	CDV30FH272JO3F	0.79 (20.1)	0.88 (22.4)	0.33(8.4)	0.438 (11.1)	0.040 (1.0)
2700	2000	CDV30FJ272JO3F	0.81 (20.6)	0.91 (23.1)	0.40(10.2)	0.438 (11.1)	0.040 (1.0)
2700	2500	CDV30FK272JO3F	0.83 (21.1)	0.92 (23.4)	0.45(11.4)	0.438 (11.1)	0.040 (1.0)
3300	500	CD19FD332JO3F	0.68 (17.3)	0.55 (14.0)	0.29(7.4)	0.344 (8.7)	0.032 (.8)
3300	500	CD30FD332JO3F	0.77 (19.6)	0.86 (21.8)	0.25(6.4)	0.438 (11.1)	0.040 (1.0)
3300	1000	CDV19FF332JO3F	0.72 (18.3)	0.59 (15.0)	0.38(9.7)	0.344 (8.7)	0.032 (.8)
3300	1500	CDV30FH332JO3F	0.80 (20.3)	0.89 (22.6)	0.35(8.9)	0.438 (11.1)	0.040 (1.0)
3300	2000	CDV30FJ332JO3F	0.82 (20.8)	0.92 (23.4)	0.44(11.2)	0.438 (11.1)	0.040 (1.0)
3900	500	CD19FD392JO3F	0.69 (17.5)	0.56 (14.2)	0.31(7.9)	0.344 (8.7)	0.032 (.8)
3900	500	CD30FD392JO3F	0.77 (19.6)	0.86 (21.8)	0.26(6.6)	0.438 (11.1)	0.040 (1.0)
3900	1000	CDV19FF392JO3F	0.74 (18.8)	0.61 (15.5)	0.42(10.7)	0.344 (8.7)	0.032 (.8)
3900	1500	CDV30FH392JO3F	0.80 (20.3)	0.89 (22.6)	0.36(9.1)	0.438 (11.1)	0.040 (1.0)
3900	2000	CDV30FJ392JO3F	0.83 (21.1)	0.93 (23.6)	0.46(11.7)	0.438 (11.1)	0.040 (1.0)
4700	500	CD19FD472JO3F	0.70 (17.8)	0.58 (14.7)	0.35(8.9)	0.344 (8.7)	0.032 (.8)
4700	500	CD30FD472JO3F	0.78 (19.8)	0.86 (21.8)	0.27(6.9)	0.438 (11.1)	0.040 (1.0)
4700	1000	CDV19FF472JO3F	0.76 (19.3)	0.63 (16.0)	0.46(11.7)	0.344 (8.7)	0.032 (.8)
4700	1500	CDV30FH472JO3F	0.81 (20.6)	0.90 (22.9)	0.38(9.7)	0.438 (11.1)	0.040 (1.0)
5600	300	CD19FC562JO3F	0.68 (17.3)	0.56 (14.2)	0.31(7.9)	0.344 (8.7)	0.032 (.8)
5600	500	CD30FD562JO3F	0.78 (19.8)	0.87 (22.1)	0.29(7.4)	0.438 (11.1)	0.040 (1.0)
5600	1000	CDV30FF562JO3F	0.80 (20.3)	0.89 (22.6)	0.34(8.6)	0.438 (11.1)	0.040 (1.0)
5600	1500	CDV30FH562JO3F	0.82 (20.8)	0.91 (23.1)	0.40(10.2)	0.438 (11.1)	0.040 (1.0)
6800	300	CD19FC682JO3F	0.69 (17.5)	0.57 (14.5)	0.33(8.4)	0.344 (8.7)	0.032 (.8)
6800	500	CD30FD682JO3F	0.78 (19.8)	0.88 (22.4)	0.30(7.6)	0.438 (11.1)	0.040 (1.0)
6800	1000	CDV30FF682JO3F	0.80 (20.3)	0.89 (22.6)	0.36(9.1)	0.438 (11.1)	0.040 (1.0)
6800	1500	CDV30FH682JO3F	0.83 (21.1)	0.92 (23.4)	0.42(10.7)	0.438 (11.1)	0.040 (1.0)
8200	100	CD19FA822JO3F	0.70 (17.8)	0.58 (14.7)	0.35(8.9)	0.344 (8.7)	0.032 (.8)
8200	500	CD30FD822JO3F	0.79 (20.1)	0.88 (22.4)	0.32(8.1)	0.438 (11.1)	0.040 (1.0)
8200	1000	CDV30FF822JO3F	0.81 (20.6)	0.90 (22.9)	0.39(9.9)	0.438 (11.1)	0.040 (1.0)
8200	1500	CDV30FH822JO3F	0.84 (21.3)	0.93 (23.6)	0.46(11.7)	0.438 (11.1)	0.040 (1.0)
10000	100	CD19FA103JO3F	0.72 (18.3)	0.60 (15.2)	0.37(9.4)	0.344 (8.7)	0.032 (.8)
10000	500	CD30FD103JO3F	0.80 (20.3)	0.89 (22.6)	0.34(8.6)	0.438 (11.1)	0.040 (1.0)
10000	1000	CDV30FF103JO3F	0.82 (20.8)	0.91 (23.1)	0.42(10.7)	0.438 (11.1)	0.040 (1.0)
12000	500	CD30FD123JO3F	0.80 (20.3)	0.89 (22.6)	0.36(9.1)	0.438 (11.1)	0.040 (1.0)
12000	1000	CDV30FF123JO3F	0.83 (21.1)	0.92 (23.4)	0.46(11.7)	0.438 (11.1)	0.040 (1.0)
15000	500	CD30FD153JO3F	0.81 (20.6)	0.90 (22.9)	0.39(9.9)	0.438 (11.1)	0.040 (1.0)
18000	500	CD30FD183JO3F	0.82 (20.8)	0.91 (23.1)	0.43(10.9)	0.438 (11.1)	0.040 (1.0)
22000	500	CD30FD223JO3F	0.83 (21.1)	0.93 (23.6)	0.46(11.7)	0.438 (11.1)	0.040 (1.0)
22000	500	CD42FD223JO3F	1.42 (36.1)	0.88 (22.4)	0.31(7.9)	1.063 (27.0)	0.040 (1.0)
33000	100	CD30FA333JO3F	0.83 (21.1)	0.91 (23.1)	0.44(11.2)	0.438 (11.1)	0.040 (1.0)
33000	500	CD42FD333JO3F	1.44 (36.6)	0.89 (22.6)	0.36(9.1)	1.063 (27.0)	0.040 (1.0)
39000	500	CD42FD393JO3F	1.45 (36.8)	0.90 (22.9)	0.40(10.2)	1.063 (27.0)	0.040 (1.0)
47000	500	CD42FD473JO3F	1.47 (37.3)	0.91 (23.1)	0.45(11.4)	1.063 (27.0)	0.040 (1.0)
68000	300	CD42FC683JO3F	1.48 (37.6)	0.92 (23.4)	0.47(11.9)	1.063 (27.0)	0.040 (1.0)
82000	100	CD42FA823JO3F	1.48 (37.6)	0.92 (23.4)	0.46(11.7)	1.063 (27.0)	0.040 (1.0)
91000	100	CD42FA913JO3F	1.50 (38.1)	0.94 (23.9)	0.50(12.7)	1.063 (27.0)	0.040 (1.0)

Type CD16 & CDV16 Snubber and RF Application, Mica Capacitors

Higher dV/dt Capability and Flatter Insertion Loss



Ideal for snubber and RF applications, CDV16 mica capacitors now handle dV/dts up to 275,000 V/ μ s and they assure controlled, resonance-free performance through 1 GHz. CDV16/CD16 mica capacitors excel in both snubber applications and high-frequency applications like RF and CATV. Type CDV16's high pulse current capability make them ideal for pulse and snubber applications. CDV16 capacitors withstand an unlimited number of pulses with a dV/dt of 275,000 V/ μ s. This is a 20% increase in dV/dt capability when compared to our CDV19 mica capacitors and CDV16's are smaller too. CDV16 capacitors handle higher peak currents — up to 825 amps. They also handle high continuous RMS current at 5 MHz and up to 30 MHz. For example, a 470 pF CDV16 capacitor handles 6.2 A rms continuously at 13.56 MHz and it is 1/4 the cost of a comparable porcelain ceramic capacitor. In addition to being great for snubbers, CDV16 is a fit for your RF applications. Their compact size and closer lead spacing improves insertion loss performance — insertion loss data is flat within ± 0.2 dB, typically to beyond a gigahertz.

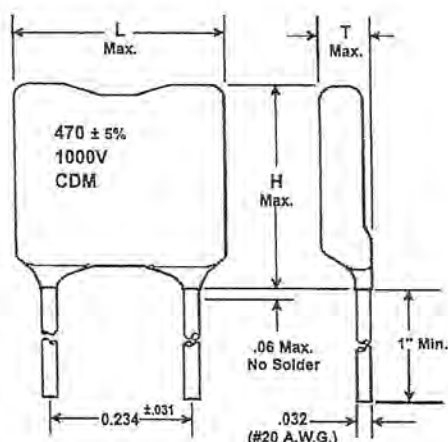
Highlights

- Handles up to 9.0 amps rms continuous current
- Very low ESR from 10 to 100 MHz
- Low, notch-free impedance to 1GHz
- Stable: no capacitance change with (V), (t), and (f)
- Very high Q at UHF/VHF frequencies
- Tape and reeling available
- dV/dt capability up to 275,000 V/ μ s
- 1,500 amps peak current capability

Specifications

Capacitance Range	100 pF to 7,500 pF
Capacitance Tolerance	$\pm 5\%$ (J) standard, $\pm 1\%$ (F) and $\pm 2\%$ (G) available
Rated Voltage	500 Vdc & 1,000 Vdc
Operating Temperature Range	-55 °C to +150 °C
RoHS Compliant	

Dimensions



Construction Details

Case Material	Epoxy
Terminal Material	Copper clad steel, nickle undercoat, 100% tin finish

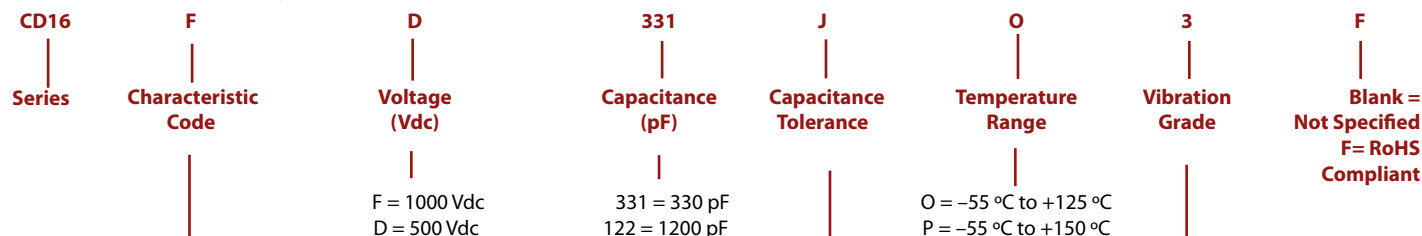
Type CD16 & CDV16 Snubber and RF Application, Mica Capacitors

Higher dV/dt Capability and Flatter Insertion Loss

Ordering Information

Order by complete part number as below. For other options, write your requirements on your purchase order or request for quotation.

Part Numbering System



Characteristics			
Code	Temp. Coeff. ppm/ °C	Capacitance Drift	Standard Cap. Range
F	0 to +70	±(0.05% +0.1 pF)	91 pF and up

Capacitance Tolerance		
Tol. Code	Tolerance	Capacitance Range
F	±1 %	100 pF and up
G	±2 %	100 pF and up
J	±5 %	100 pF and up

Standard tolerance is ±5% for 100 pF and up

Vibration Grade		
No.	MIL-STD-202	Vibration Condition (Hz)
3	Method 204 Condition D	10 to 2,000

Options Available

- Non-flammable units per IEC 695-2-2 are available for standard dipped capacitors. Specify IEC 695-2-2 on your order.
- Tape and reeling, specify per application guide.

Ratings

Cap. (pF)	Catalog Part Number	L in (mm)	H in (mm)	T in (mm)	Ipk Amps	Max Continuous Current @ 85°C, Amps					
						100kHz	250 kHz	500 kHz	1MHz	2.5MHz	5MHz
500 Vdc (300 Vac)											
100	CD16FD101J03	.43 (10.9)	.46 (11.7)	0.15 (3.8)	20	0.019	0.047	0.09	0.19	0.47	0.78
120	CD16FD121J03	.43 (10.9)	.46 (11.7)	0.15 (3.8)	24	0.023	0.057	0.11	0.23	0.57	0.86
150	CD16FD151J03	.43 (10.9)	.46 (11.7)	0.15 (3.8)	30	0.028	0.071	0.14	0.28	0.71	0.96
180	CD16FD181J03	.43 (10.9)	.46 (11.7)	0.15 (3.8)	36	0.034	0.085	0.17	0.34	0.85	1.10
220	CD16FD221J03	.43 (10.9)	.46 (11.7)	0.15 (3.8)	44	0.041	0.100	0.21	0.41	1.00	1.20
270	CD16FD271J03	.45 (11.4)	.47 (11.9)	0.16 (4.1)	54	0.051	0.130	0.25	0.51	1.30	1.30
330	CD16FD331J03	.45 (11.4)	.47 (11.9)	0.16 (4.1)	66	0.062	0.160	0.31	0.62	1.50	1.50
390	CD16FD391J03	.45 (11.4)	.47 (11.9)	0.16 (4.1)	78	0.074	0.180	0.37	0.74	1.60	1.60
470	CD16FD471J03	.45 (11.4)	.47 (11.9)	0.16 (4.1)	94	0.089	0.220	0.44	0.89	1.80	1.80
560	CD16FD561J03	.46 (11.7)	.50 (12.7)	0.18 (4.6)	110	0.110	0.260	0.53	1.10	2.00	2.00
680	CD16FD681J03	.46 (11.7)	.50 (12.7)	0.18 (4.6)	160	0.150	0.390	0.77	1.50	2.50	2.50
820	CD16FD821J03	.46 (11.7)	.50 (12.7)	0.18 (4.6)	160	0.150	0.390	0.77	1.50	2.50	2.50
1000	CD16FD102J03	.46 (11.7)	.50 (12.7)	0.18 (4.6)	200	0.190	0.470	0.94	1.90	2.70	2.70
1200	CD16FD122J03	.46 (11.7)	.50 (12.7)	0.18 (4.6)	240	0.230	0.570	1.10	2.30	3.00	3.00
1500	CD16FD152J03	.46 (11.7)	.50 (12.7)	0.18 (4.6)	300	0.280	0.710	1.40	2.70	3.30	3.30
1800*	CD16FD182J03	.47 (11.9)	.52 (13.2)	0.25 (6.4)	360	0.340	0.850	1.70	3.40	4.10	4.10
2200	CD16FD222J03	.47 (11.9)	.52 (13.2)	0.25 (6.4)	440	0.410	1.000	2.10	4.10	4.50	4.50
2700	CD16FD272J03	.47 (11.9)	.52 (13.2)	0.25 (6.4)	540	0.510	1.300	2.50	5.00	5.00	5.00
3000	CD16FD302J03	.47 (11.9)	.52 (13.2)	0.25 (6.4)	600	0.570	1.400	2.80	5.20	5.20	5.20
3300	CD16FD332J03	.48 (12.2)	.53 (13.7)	0.28 (7.1)	600	0.570	1.400	2.80	5.70	6.80	6.80
3600	CD16FD362J03	.48 (12.2)	.53 (13.7)	0.28 (7.1)	720	0.680	1.700	3.40	6.80	7.10	7.10

* Best RF performance is = to or < this cap rating

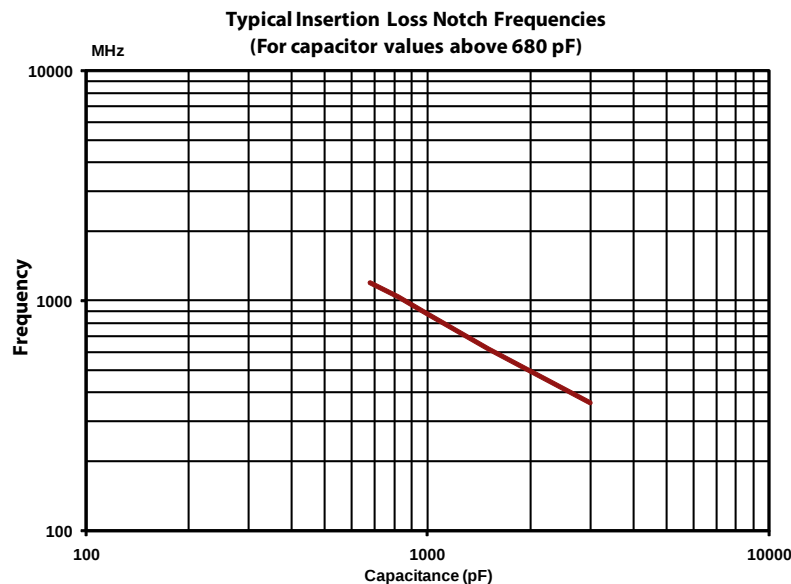
Type CD16 & CDV16 Snubber and RF Application, Mica Capacitors

Higher dV/dt Capability and Flatter Insertion Loss

Cap. (pF)	Catalog Part Number	L in (mm)	H in (mm)	T in (mm)	Ipk Amps	Max Continuous Current @ 85°C, Amps					
						100kHz	250 kHz	500 kHz	1MHz	2.5MHz	5MHz
3900	CD16FD392J03	.48 (12.2)	.54 (13.7)	0.28 (7.1)	780	0.740	1.800	3.70	7.40	7.40	7.40
4700	CD16FD472J03	.49 (12.5)	.56 (14.2)	0.31 (7.9)	940	0.890	2.200	4.40	8.50	8.50	8.50
6800	CD16FD682J03	.50 (12.7)	.57 (14.7)	0.38 (9.7)	1300	1.300	3.200	6.40	9.00	9.00	9.00
7500	CD16FD752J03	.50 (12.7)	.58 (14.7)	.40 (10.2)	1500	1.400	3.500	7.10	9.00	9.00	9.00
1000 Vdc (350 Vac)											
100	CDV16FF101J03	.43 (10.9)	.46 (11.7)	.15 (3.8)	23	0.022	0.055	0.11	0.22	0.55	0.92
120	CDV16FF121J03	.43 (10.9)	.46 (11.7)	.15 (3.8)	27	0.026	0.066	0.13	0.26	0.66	1.00
130	CDV16FF131J03	.43 (10.9)	.46 (11.7)	.15 (3.8)	29	0.029	0.071	0.14	0.29	0.71	1.10
150	CDV16FF151J03	.43 (10.9)	.46 (11.7)	.15 (3.8)	34	0.033	0.082	0.16	0.33	0.82	1.10
180	CDV16FF181J03	.43 (10.9)	.46 (11.7)	.15 (3.8)	41	0.040	0.100	0.20	0.40	1.00	1.20
220	CDV16FF221J03	.43 (10.9)	.46 (11.7)	.15 (3.8)	50	0.048	0.120	0.24	0.48	1.20	1.40
270	CDV16FF271J03	.45 (11.4)	.47 (11.9)	.16 (4.1)	61	0.059	0.150	0.30	0.59	1.50	1.60
330	CDV16FF331J03	.45 (11.4)	.47 (11.9)	.16 (4.1)	74	0.073	0.180	0.36	0.73	1.80	1.80
360	CDV16FF361J03	.45 (11.4)	.47 (11.9)	.16 (4.1)	81	0.079	0.200	0.40	0.79	1.80	1.80
390	CDV16FF391J03	.45 (11.4)	.47 (11.9)	.16 (4.1)	88	0.086	0.210	0.43	0.86	1.90	1.90
470	CDV16FF471J03	.45 (11.4)	.47 (11.9)	.16 (4.1)	106	0.100	0.260	0.52	1.00	2.10	2.10
500	CDV16FF501J03	.45 (11.4)	.47 (11.9)	.16 (4.1)	113	0.110	0.270	0.55	1.10	2.20	2.20
560	CDV16FF561J03	.46 (11.7)	.50 (12.7)	.17 (4.4)	126	0.120	0.310	0.62	1.20	2.40	2.40
680	CDV16FF681J03	.46 (11.7)	.50 (12.7)	.17 (4.4)	153	0.150	0.370	0.75	1.50	2.70	2.70
820	CDV16FF821J03	.46 (11.7)	.50 (12.7)	.17 (4.4)	185	0.180	0.450	0.90	1.80	2.90	2.90
1200	CDV16FF122J03	.46 (11.7)	.50 (12.7)	.17 (4.4)	270	0.260	0.660	1.30	2.60	3.50	3.50
1300	CDV16FF132J03	.46 (11.7)	.50 (12.7)	.17 (4.4)	293	0.290	0.710	1.40	2.90	3.70	3.70
1500	CDV16FF152J03	.46 (11.7)	.50 (12.7)	.18 (4.6)	338	0.330	0.820	1.60	3.30	3.90	3.90
1800*	CDV16FF182J03	.47 (11.9)	.52 (13.2)	.25 (6.4)	495	0.400	0.990	2.00	4.00	4.80	4.80
2200	CDV16FF222J03	.47 (11.9)	.52 (13.2)	.25 (6.4)	605	0.480	1.200	2.40	4.80	5.30	5.30
2700	CDV16FF272J03	.47 (11.9)	.52 (13.2)	.25 (6.4)	743	0.590	1.500	3.00	5.80	5.80	5.80
3000	CDV16FF302J03	.47 (11.9)	.52 (13.2)	.25 (6.4)	825	0.660	1.600	3.30	6.20	6.20	6.20

* Best RF performance is = to or < this cap rating

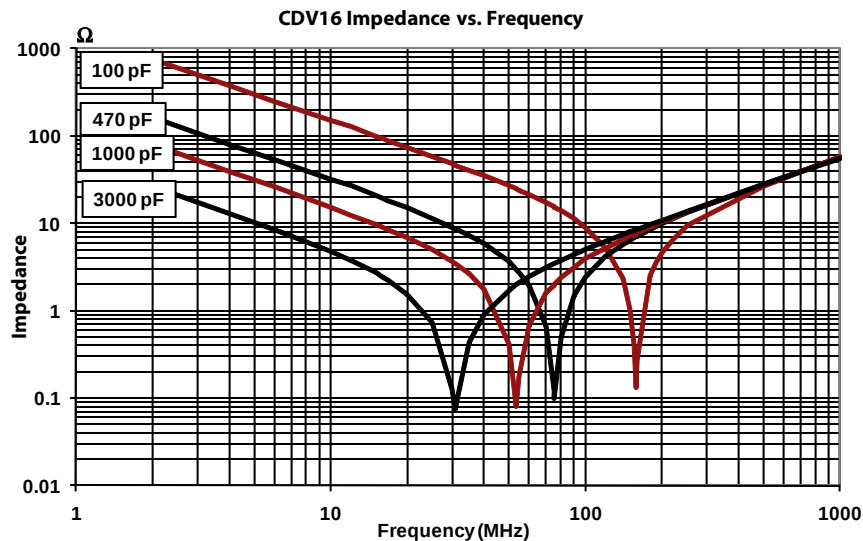
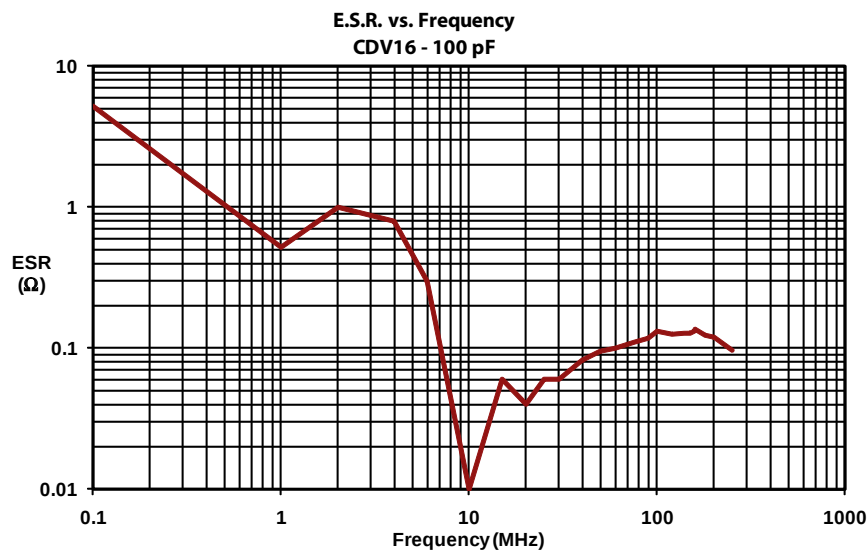
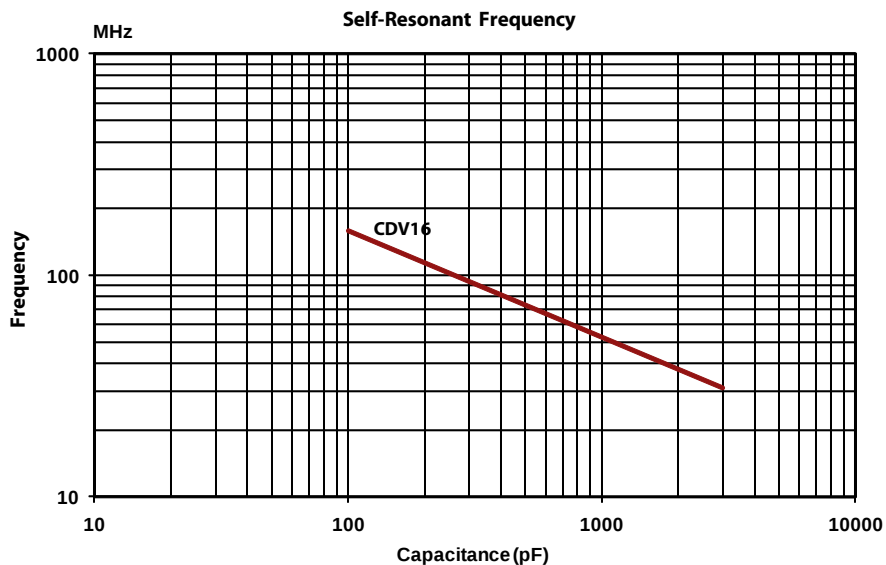
Typical Performance Curves



Type CD16 & CDV16 Snubber and RF Application, Mica Capacitors

Higher dV/dt Capability and Flatter Insertion Loss

Typical Performance Curves



Type MCM and MIN, SMT, RF Clad Mica Capacitors

Multilayer High Power, High Temperature Mica and PTFE Capacitors



Types MCM and MIN SMT clad PTFE and mica capacitors are top performers for high power applications requiring low inductance at high frequencies and can operate at temperatures up to 200 °C and voltages to 1000 Vdc. Choosing from 16 different configurations offers easy mounting with options for surface mount as well as through-hole and mechanical assembly. To assure high current capability in the smallest capacitors, low-capacitance ratings use polytetrafluorethylene (PTFE) that has ultra-low dielectric absorption - better than polypropylene, polystyrene and NPO ceramic.

Highlights

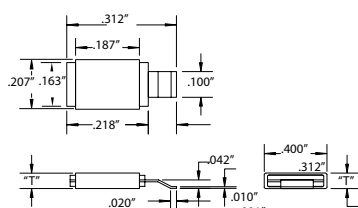
- 200 °C rated with no voltage derating
- Wave solderable
- No cracking or delaminating
- CTE $\approx$ 18 ppm/°C compatible with FR4 PCBs
- Highly thermal conductive package
- Gull-wing terminal minimizes stress
- Typical 100 pF ESR, <11 mΩ @ 100 MHz
- Nonmagnetic for minimal RF loss
- Very low ESL for excellent by-pass action
- Ultra stable: no change with (t), (V) and (f)
- Exact capacitance with tolerances from ± 0.25 pF

Specifications

Capacitance Range	1 to 1500 pF - MCM 1 to 350 pF - MIN
Capacitance Tolerance	± 0.25 pF, ± 0.5 pF, ± 1 pF, $\pm 0.5\%$, $\pm 1\%$, $\pm 2\%$, $\pm 5\%$
Rated Voltage	300 to 1000 Vdc - MCM 300 Vdc - MIN
Operating Temperature Range	-55 °C to +200 °C with no voltage derating
Insulation Resistance	1000 MΩ·μF Need not exceed 100,000 MΩ at 25 °C
Dielectric Strength	200% of rated voltage for 5 seconds
RoHS Compliant	

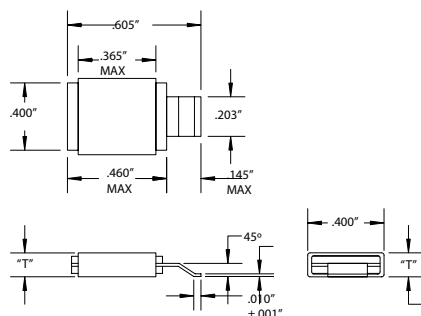
Outline Drawings

MIN02-002



"T" (thickness) depending on capacitance value = .065 to .125 $\pm$.015

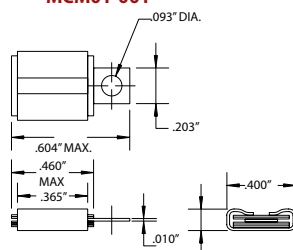
MCM01-009



"T" (thickness) depending on capacitance value = .110 to .165 $\pm$.015

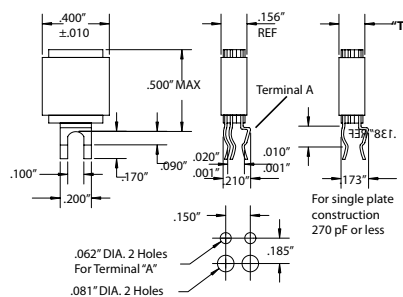
"T" varies with capacitance

MCM01-001



"T" (thickness) depending on capacitance value = .110 to .165 $\pm$.015

MCM01-010



"T" (thickness) depending on capacitance value = .110 to .165 $\pm$.015

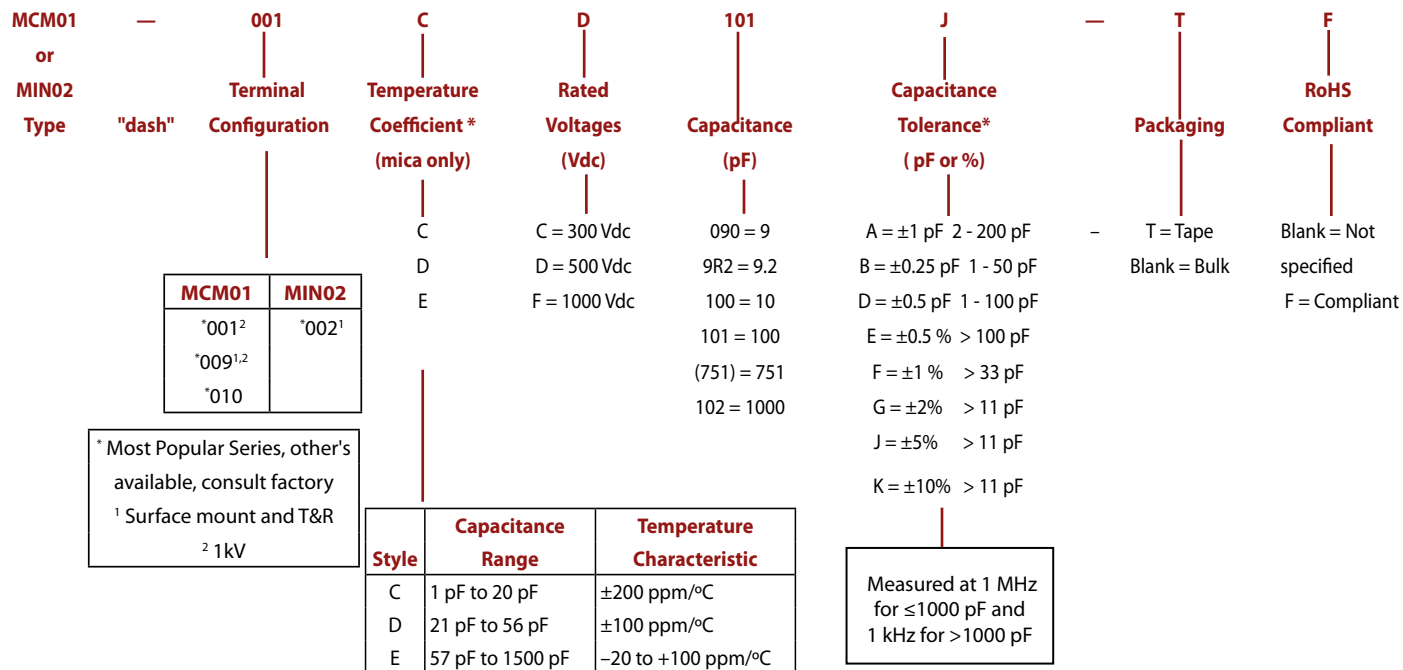
Construction Details

Case Material	Silver plated, copper flashed, brass. Lead free finish.
Terminal Material	Silver plated, copper flashed, brass.

Type MCM and MIN, SMT, RF Clad Mica Capacitors

Multilayer High Power, High Temperature Mica and PTFE Capacitors

Part Numbering System



*TC code letter is left blank for PTFE items

Ratings

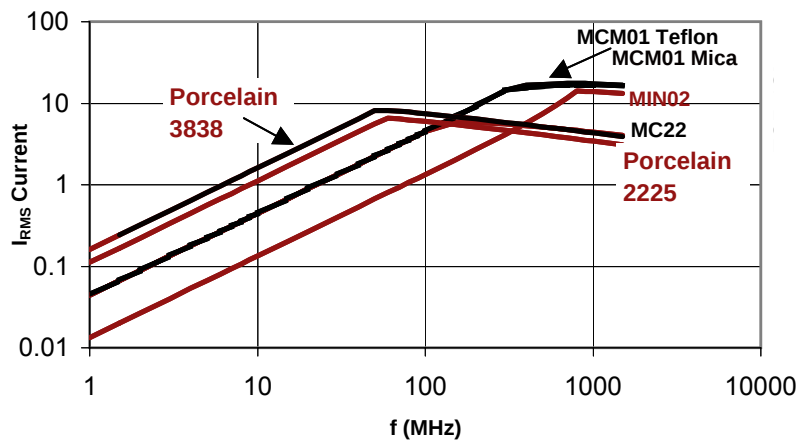
Capacitance (pF)	Voltage Ratings (Vdc)			Dielectric
	300	500	*1000	
MIN02				
1 - 9	X			PTFE
10 - 60	X			Mica
61 - 120	X			Mica
121 - 180	X			Mica
181 - 240	X			Mica
241 - 300	X			Mica
301 - 350	X			Mica
MCM01				
1 - 7		X	X	PTFE
8 - 32		X	X	PTFE or Mica
33 - 250		X	X	Mica
251 - 500		X	X	Mica
501 - 750		X	X	Mica
751 - 1000		X		Mica
1001 - 1280		X		Mica
1281 - 1500	X			Mica
*1000 V available in MCM01-001 and -009 style				

Type MCM and MIN, SMT, RF Clad Mica Capacitors

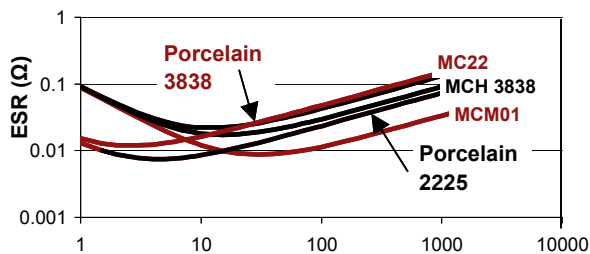
Multilayer High Power, High Temperature Mica and PTFE Capacitors

Typical Performance Curves

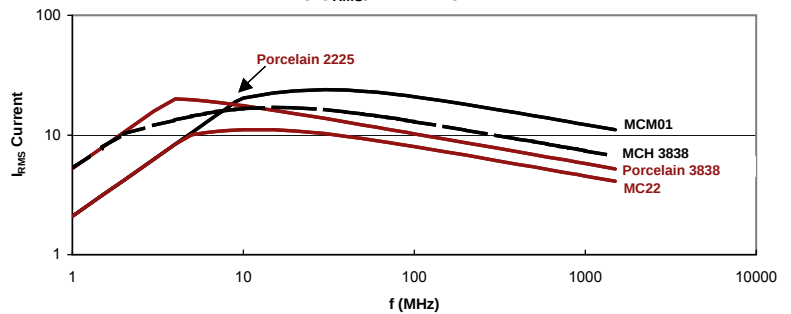
Current Rating (I_{RMS}) for 10 pF at 60 °C Rise



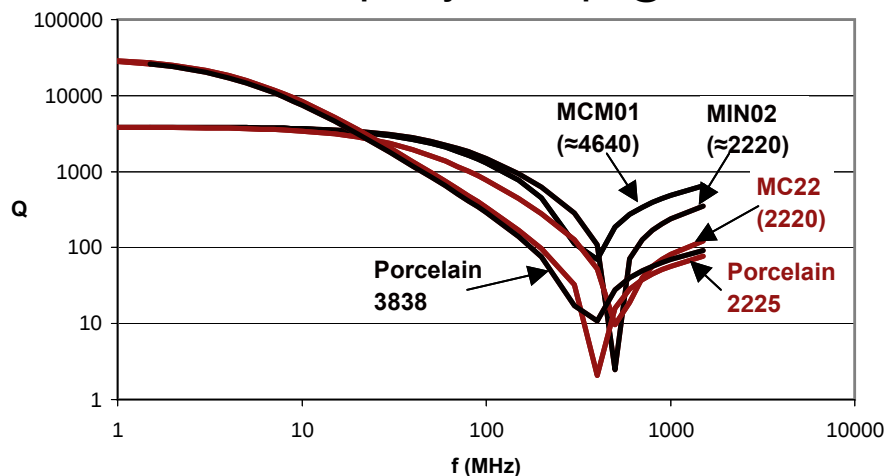
ESR vs Frequency for 470 pF



Current Rating (I_{RMS}) for 470 pF at 60 °C Rise



Q vs Frequency for 100 pF @ 25 °C



Type MCM and MIN, SMT, RF Clad Mica Capacitors

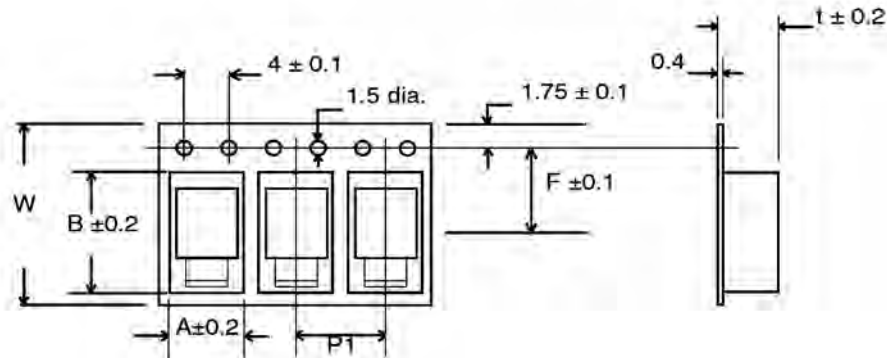
Multilayer High Power, High Temperature Mica and PTFE Capacitors

Standard Minimum Quantities

Bulk Pack: 100 pieces per bag

Reel Pack: 500 pieces per reel

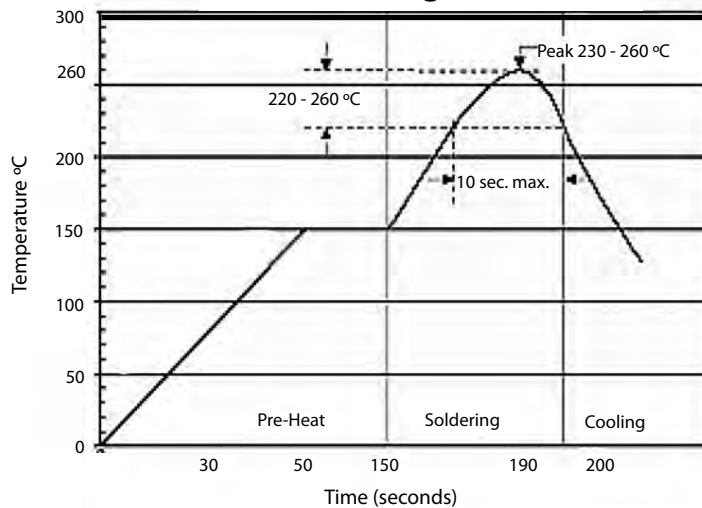
Tape Specifications



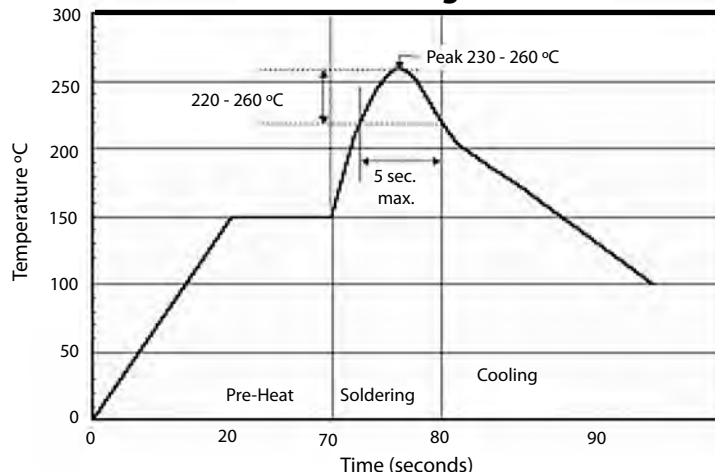
Tape Dimensions (mm)						
Case	W	A	B	P1	F	t
MIN02-002 < 150 pF	16	5.56	8.18	8	7.5	2.16
MIN02-002 ≥ 150 pF	16	5.66	8.10	8	7.5	3.20

Solder Profile

Reflow Soldering Method



Wave Soldering Method



CDE at a Glance

Capacitors for Inverter Applications

Cornell Dubilier Electronics excels with leading edge aluminum electrolytic and film dielectric capacitors designed to solve the unique demands presented within each of the electronic stages of power inverters. Among CDE's 35,000 worldwide customers are leading manufacturers of welders, UPS systems, motor drives, medical imaging, medical lasers, semiconductor processing and inverters for distributed/renewable power.

Type 947C and 944U - DC Link



Power Film capacitors are used for DC Link in wind, solar and HEV inverters. Mounted across the bus for bulk storage and filtering, they offer several advantages over screw terminal aluminum electrolytics:

- 1/3 the cost per ampere of ripple
- Voltage ratings up to 1300 Vdc eliminating the need for series connections
- Dry construction, no electrolyte

Learn more - <http://www.cde.com/catalog/947C.pdf>

Screw Terminal Capacitors



CDE is the industry's leading manufacturer of screw terminal aluminum electrolytic capacitors for inverter applications. Use our online Java applet tool to estimate capacitor lifetime based on operating conditions.

- DCMC Highest Capacitance
- 3186 Best Value
- 500C 95°C, Long Life
- 3188 85°C, Value, Long Life
- 520C 85°C, Inverter Grade
- 550C 105°C, Inverter Grade

Learn more - http://www.cde.com/catalog/alum/#screw_terminal

Film Capacitors for Power Electronics



CDE excels with the design and manufacture of polypropylene capacitors for DC filtering and snubber applications. Choose from standard package options or design a capacitor that meets exact application requirements.

Learn more - <http://www.cde.com/design/film>

IGBT Snubber Modules



Low inductance snubbers protect IGBT modules from overvoltage transients. Choice of three styles that mount directly to single and dual IGBT modules for maximum protection.

Learn more - <http://www.cde.com/catalog/film/#igbt>

Type UNL Series - DC Filter



This series of metallized polypropylene capacitors features voltage and RMS ripple ratings extending well beyond the best aluminum snap-in capacitors. One UNL can replace up to 3 snap-in aluminums.

- Voltage ratings up to 1500 Vdc eliminating the need for series connections
- Dry construction, no electrolyte

Learn more - <http://www.cde.com/UNL.pdf>

Snap-In Aluminum Electrolytics



From 22 x 20mm to 50 x 105mm and 2 to 5 pin we offer the industry's widest selection of snap-ins up to 500V.

- Type SLPX 85°C, 3000 h, low cost
- Type SLP 105°C, 3000 h, low cost
- 25% smaller Types 380LQ & 381LQ
- 25% more ripple Type 381LR, 105°C
- 4 & 5 pin Types 382LX

Learn more - <http://www.cde.com/catalog/alum/#snap-in>



**CORNELL
DUBILIER**

Capacitor Solutions for Power Electronics

www.cde.com

Contact us for your next design:

Aluminum Electrolytics -
140 Technology Place
Liberty, SC 29657
(864)843-2277, Fax (864)843-3800
Email: cdelb@cde.com

Film Capacitors-
1605 E. Rodney French Blvd.
New Bedford, MA 02744
(508)996-8561, Fax (508)995-3830
Email: cdenb@cde.com