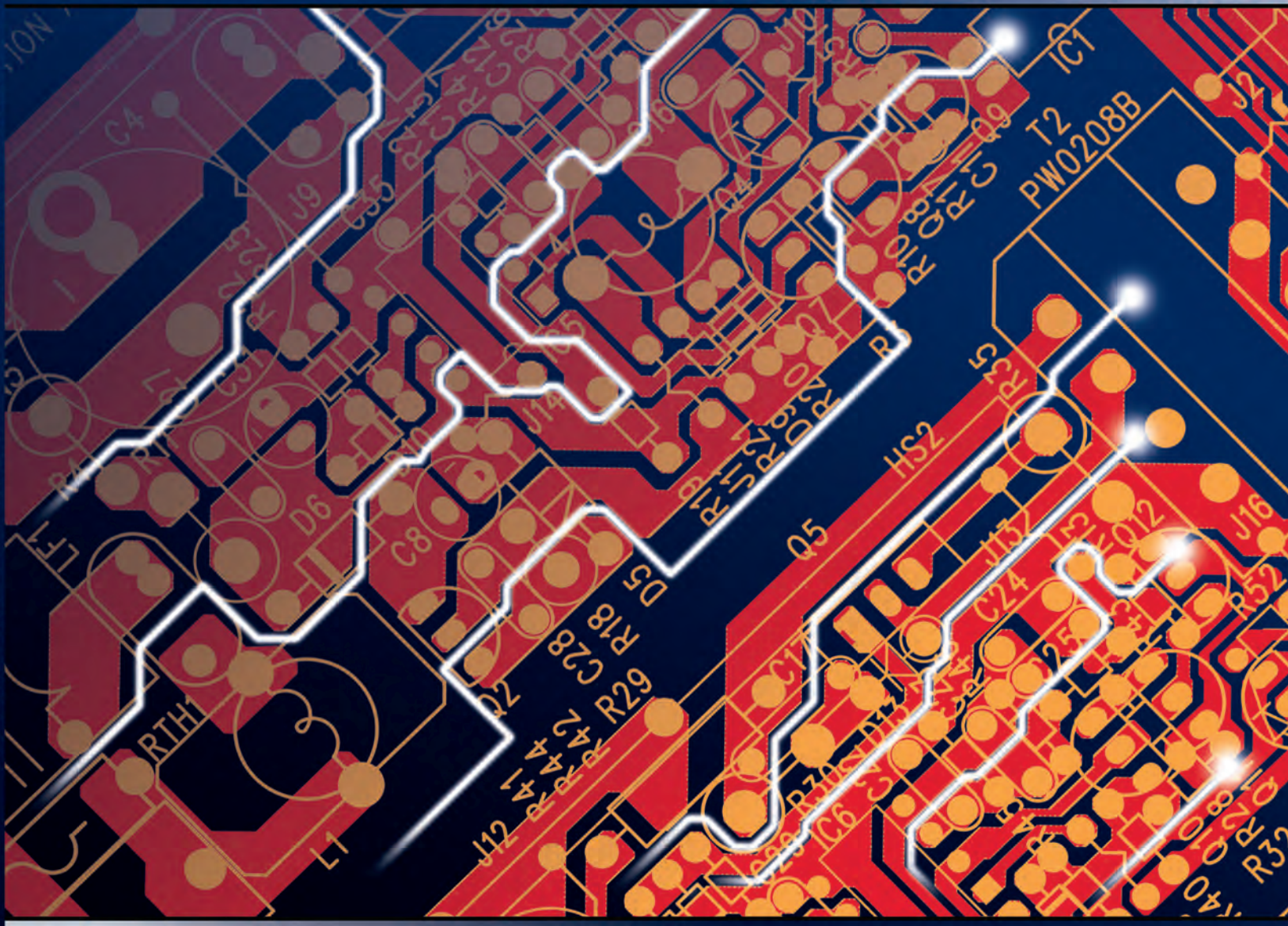
PRODUCT CATALOG



Innovating Reliable Power

2011

TDK·Lambda

Innovating Reliable Power

The choice and application of the power supply is an important one. Working with TDK-Lambda can help you save time and money, from design concept to years after your system or product is first installed.

Why TDK-Lambda?

- Over the last 60 years, TDK-Lambda has developed a worldwide reputation and heritage for high quality, robust power products.
- We at TDK-Lambda stand behind our products with industry leading warranties of up to a lifetime (limited).
- Our research and development budget is one of the largest in the industry, helping you design-in reliable, cutting edge technology, ahead of your competition.
- A broad range of product enables our customers to choose the right model for the application, and assists with their vendor reduction programs.
- Multiple manufacturing and design facilities across the globe. We can provide crucial local support when programs move between Asia, North America, and Europe. With those multiple factories we also have proven risk mitigation against natural disasters. Plus, our products are RoHS compliant and our sites are ISO9001 and ISO14001 certified.
- Our technical support can get your product to market faster. Please see overleaf for more details.

Thank you for your interest in TDK-Lambda products.

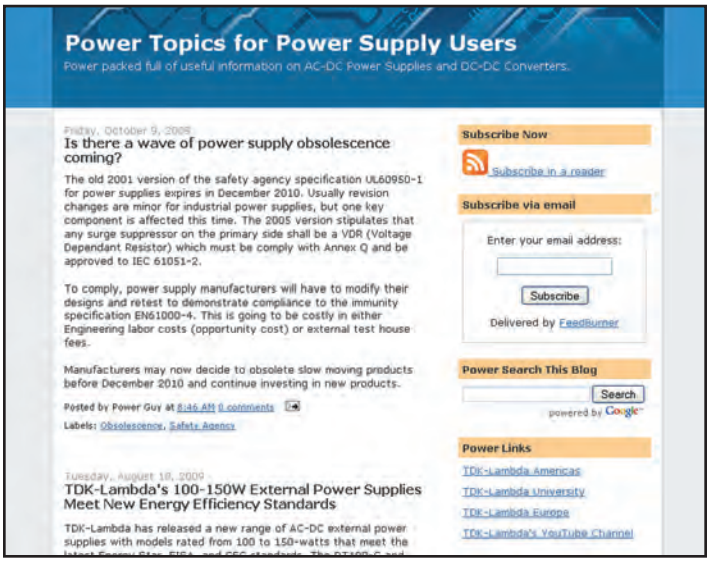
Table of Contents

Website, Blog and Social Media

At TDK-Lambda Americas, we value your time and privacy as much as we value ours. No one likes receiving unsolicited emails. That's why we let you choose how, when and in what format we contact you with valuable updates. We also don't force you to pick which social networking site to stay connected to us. You choose.

Web http://www.us.tdk-lambda.com/lp
Get the latest product, program and company information including datasheets, technical information and white papers, from TDK-Lambda America's main Internet site. See 360° rotating view of key products, find models using our parametric search engine and research specifications for legacy products.

Blog http://power-topics.blogspot.com
Learn about "Power Supply Considerations for Industrial Applications" or determine what size fan you need by reading articles, definitions and design tips on our main blog. Search through educational articles on various elements of power supply design engineering for the beginner to the seasoned expert. This is an interactive site so feel free to post comments including clarifications, additional questions and other helpful links.



Video http://www.youtube.com/user/TDKLambda
TDK-Lambda Americas' main video channel is hosted on YouTube. Our videos focus on education, innovative design strategies and product showcases. We also make these videos available in standard video formats at TDK-Lambda University on our website.

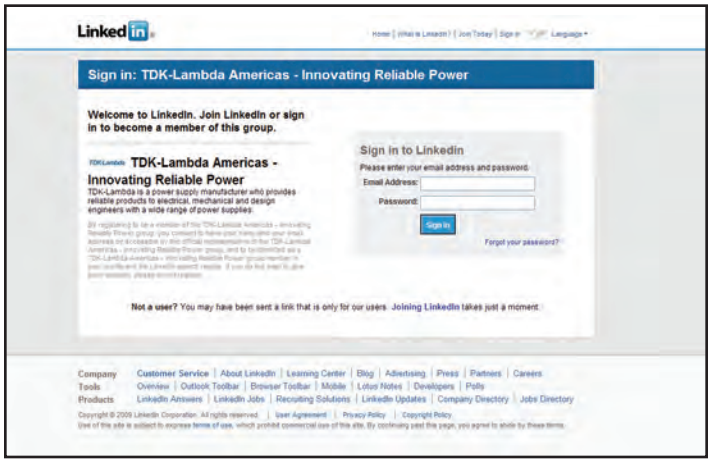
Website, Blog and Social Media

Twitter http://www.Twitter.com/tdklambda
Follow us on Twitter and find out the latest information on TDK-Lambda in 140 characters or less. Ideal for for mobile phone users and online engineers, who need information immediately, this micro-blogging site keeps loyal fans and partners updated on changes to our Web site, blog, or video channel.

Facebook http://www.facebook.com/pages/TDK-Lambda-Americas-Inc/109780051681?ref=mf
Become a fan of TDK-Lambda Americas on Facebook. Periodically, we post product highlights, press releases, web site changes and other information on the wall. Many of the videos can also be found here.

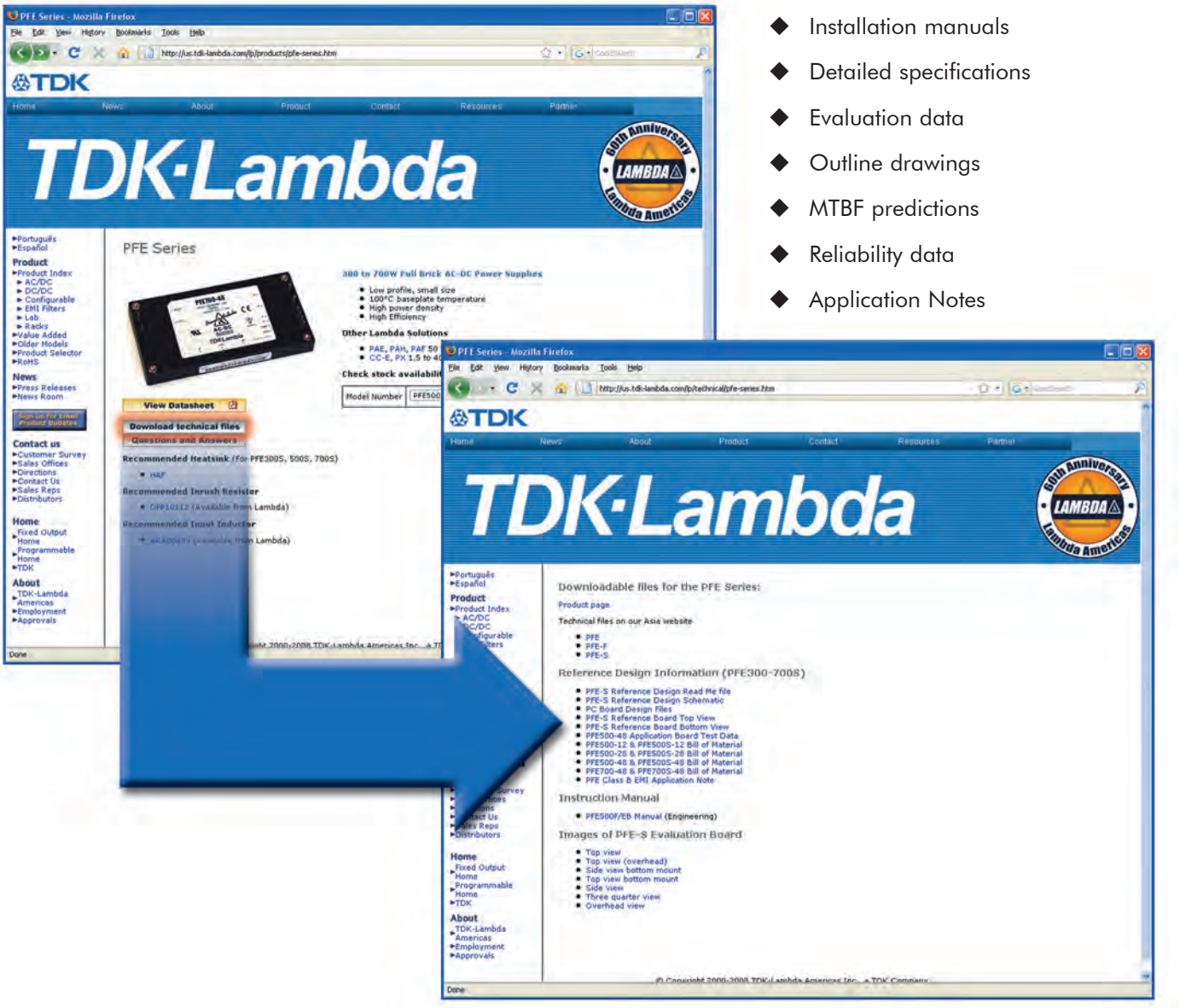
Linkedin.com
http://www.linkedin.com/e/vgh/2298571/
A professional networking site for building relationships, we have a group for keeping apprised of TDK-Lambda Americas' news, discussions and tips. Join us there and get linked in.

If we are not where you like to hang out on the Internet, let us know and we'll investigate getting involved. Our goal is to be where it's most convenient for you, our valued customer, and not the other way around. When you are designing for power, think TDK-Lambda Americas.



Need Technical Information?

The TDK-Lambda website (http://us.tdk-lambda.com/lp) has a huge library of data:



- Installation manuals
- Detailed specifications
- Evaluation data
- Outline drawings
- MTBF predictions
- Reliability data
- Application Notes

Want Engineering Support?

- Please call 1-800-LAMBDA-4 to speak to our inside technical support team, or email lambda.techsupport@us.tdk-lambda.com
- TDK-Lambda's Field Application Engineers are available for in-depth advice at your facility. Please contact your local TDK-Lambda Salesperson to schedule a visit.

TDK·Lambda

Product Notes

Date

Sales Person **Phone #**

Product Family	Notes	Pg#

Product Family	Notes	Pg#

Product Family	Notes	Pg#

Product Family	Notes	Pg#

Product Family	Notes	Pg#

Product Family	Notes	Pg#

Notes:

TDK·Lambda

Let TDK-Lambda help you specify your power supply

Input Voltage Range:

VAC

VDC

Power Factor Correction? ☐ Yes ☐ No

RoHS Compliant? ☐ Yes ☐ No

Operating Temperature Range ____ °C

Output	Volts (V)	Amps (A)	Peak Current (A)	Regulation (+/-%)
#1				
#2				
#3				
#4				
#5				
#6				

Agency/Safety Approvals: ____

Construction

☐ Enclosed (Covered) ☐ Open-Frame ☐ PCB Mount ☐ DIN Rail ☐ Surface Mount

Cooling

☐ Integral Fan ☐ System Fan ☐ Convection Cooled

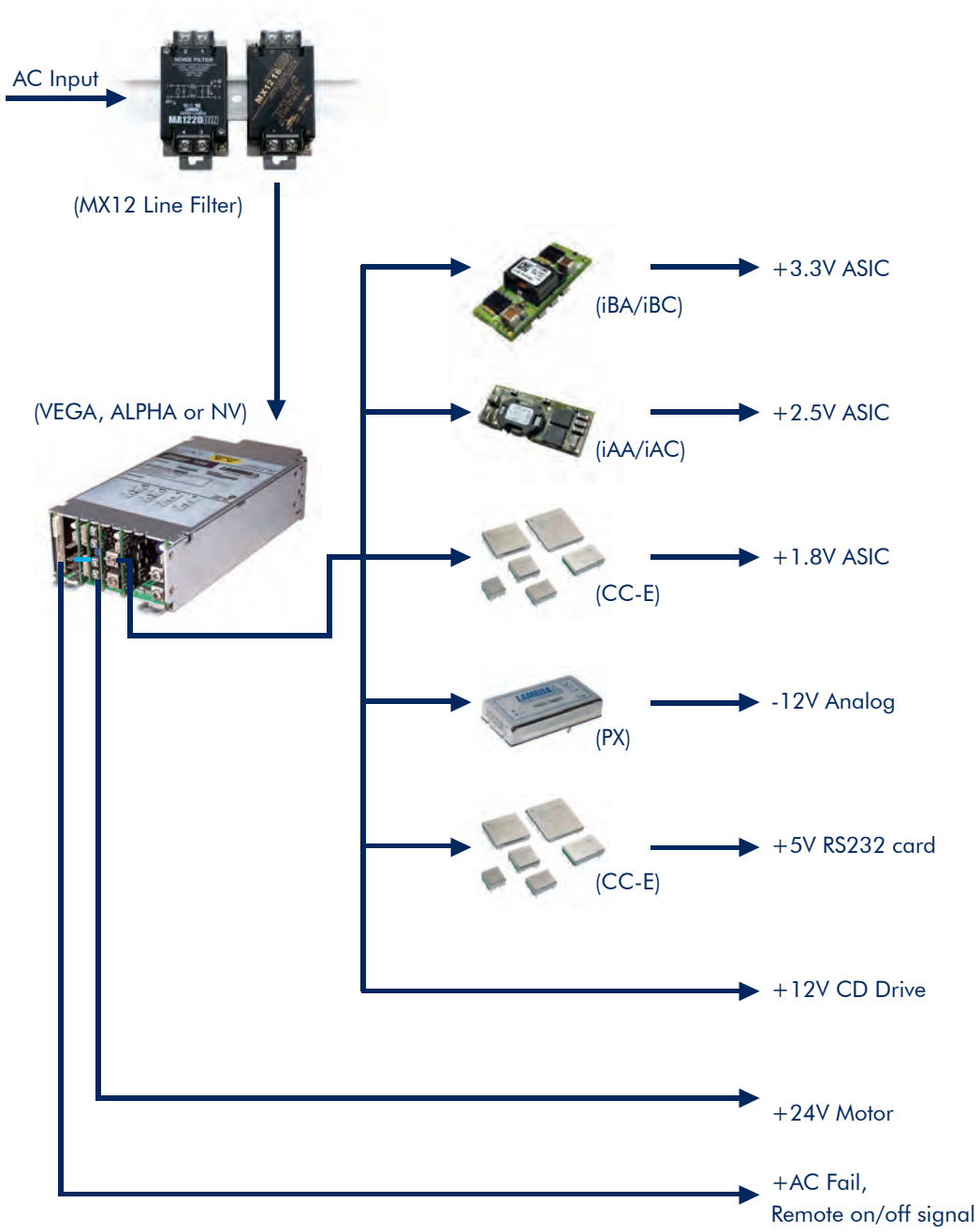
Price Target $ ____ Estimated Annual Usage ____

Notes:

TDK·Lambda

The Complete Power Solution

Configurable AC-DC Supply + DC-DC converters (isolated & non isolated)



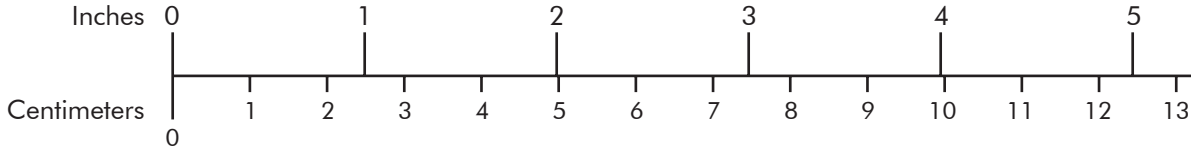
- ✓ Flexible
- ✓ Off the shelf
- ✓ No minimum loads
- ✓ No cross regulation

TDK·Lambda

Useful Conversion Factors & Equations

English & Metric Conversions	
English to Metric	Multiply English Unit by:
inch to millimeter (mm)	25.4
inch to centimeter (cm)	2.54
foot to meter (m)	0.3048
ounce (oz) to gram (gm)	28
pound (lb) to kilogram (kg)	0.45
Metric to English	Multiply Metric Unit by:
millimeter (mm) to inch	0.03937
centimeter (cm) to inch	0.3937
Meter (m) to foot (ft)	3.2808
gram (gm) to ounce (oz)	0.036
kilogram (kg) to pound (lb)	2.2

Inches to Centimeters (cm) to Millimeters (mm) Conversions



Air Flow Conversions

1m/s (meters per second)= 3.28 feet per second = 196.85 LFM (linear feet per minute)

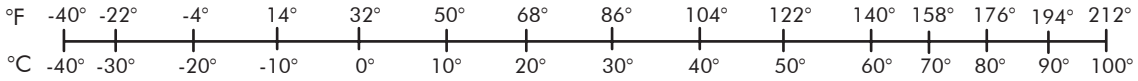
Weight Conversions

453.6 grams = 12 ounces = 1 pound

Rack Height Units

1U = 1.75 inch = 44.45mm
2U = 3.50 inch = 88.90mm

Fahrenheit - Celsius Temperature Conversions



Conversion Formulas

$$°C = \frac{°F - 32°}{1.8} \qquad °F = (1.8 \times °C) + 32°$$

DC Circuit Equations

$$E = IR \quad I = \frac{E}{R} \quad R = \frac{E}{I} \quad P = IE \quad P = \frac{E^2}{R} \quad P = I^2R$$

E = Voltage (in volts)
I = Current (in amperes)
R = Resistance (in ohms)
P = Power (in watts)

3055 Del Sol Blvd • San Diego, CA 92154 • 1-800-526-2324
Revision A2: Jan 2010

◆ AC-DC Products

DC-DC Products

Filters

Company

Linear	Desktop
Enclosed or L Bracket	Open Frame
PCB Mount	Rack Mount Hot Swap

AC-DC Selector

Applications	# of Outputs	Output Power (W) 5 10 15 30 50 100 300 500 1000 1500 2500
High Reliability Industrial (Five Year Warranty) (HWS Limited Lifetime Warranty)	Single	NNS; HWS; LZSA
	Dual	NND
	Triple	JWT*
Industrial (Three - Five Year Warranty)	Single & Multiple	EFE; NV; GWS; MTW*; AL (LED); Vega; Alpha; LS
Datacom Commercial (One - Two Year Warranty)	Single	KPS, KM; ZWS, ZWSBAF, ZWSPAF; DT; SC, SC120, ZP; SWS; PFE; FPS/RFE; CS; HFE
	Multiple	KM; SC, ZP; ZWX, ZWQ
Programmable	Single	ZUP
DIN Rail Mount	Single	DSP, DPP, DLP-PU; DLP

* See website

TDK·Lambda

AL12 Series

12W IP66 Power Supplies

- Small Size
- 115VAC or 230VAC input
- Constant Current or Constant Voltage Versions
- Splash proof
- Conservative component ratings for long life

RoHS

Key Market Segments & Applications

LED Lighting
Damp Environments

Specifications

ITEMS / MODEL		ALC12	ALV12
AC Input	VAC/Hz	90 - 264VAC, 47 - 63Hz	
Inrush Current (100/200VAC)	A	25 / 50A, 25°C ambient, cold start	
Input Current (110/200VAC)	A	0.28 / 0.18A	
Temperature Coefficient	-	<0.02%/°C (0 - 50°C)	
Overcurrent Protection	-	Automatic Recovery	> 105% of rated power
Overvoltage Protection	%	> 110%	
Turn on time	ms	< 200ms	
Hold Up Time (115/230V input)	ms	5ms typical	
Leakage Current (265VAC 60Hz)	mA	0.25mA	
Efficiency	%	82% typical at full load	
Operating Temperature	-	-10 to +60°C (Guaranteed start up at -20°C)	
Storage Temperature	-	-30 to +85°C	
Operating Humidity (1)	-	15 - 90% RH	
Storage Humidity (1)	-	15 - 90% RH	
Cooling	-	Convection	
Withstand Voltage	-	Input to Output 3kVAC	
Isolation Resistance	-	>100M at 25°C & 70%RH, Input to Output at 500VDC	
Vibration (non operating)	-	10 - 55Hz: 19.6m/s^2 constant sweep 1 min X, Y, Z for 30 mins	
Shock	-	< 196.1 m/s^2 (20G)	
Immunity	-	IEC61000-4-2, -3, -4, -5, -6, -8, -11	
Safety Agency Approvals	-	UL1310 (Class 2), CAN/CSA-C22.2 No 223-M91, IEC61347-1, IEC61347-2-13, CE Mark, PSE	
Conducted & Radiated EMI	-	EN55015, EN55022, FCC Class B	
IP Class	-	IP66	
Weight (Typ)	g	84	
Size (LxWxH)	in(mm)	3.45 x 1.36 x 0.83" (90 x 34.5 x 21mm)	
Warranty	yrs	Three Years	

(1) Non condensing

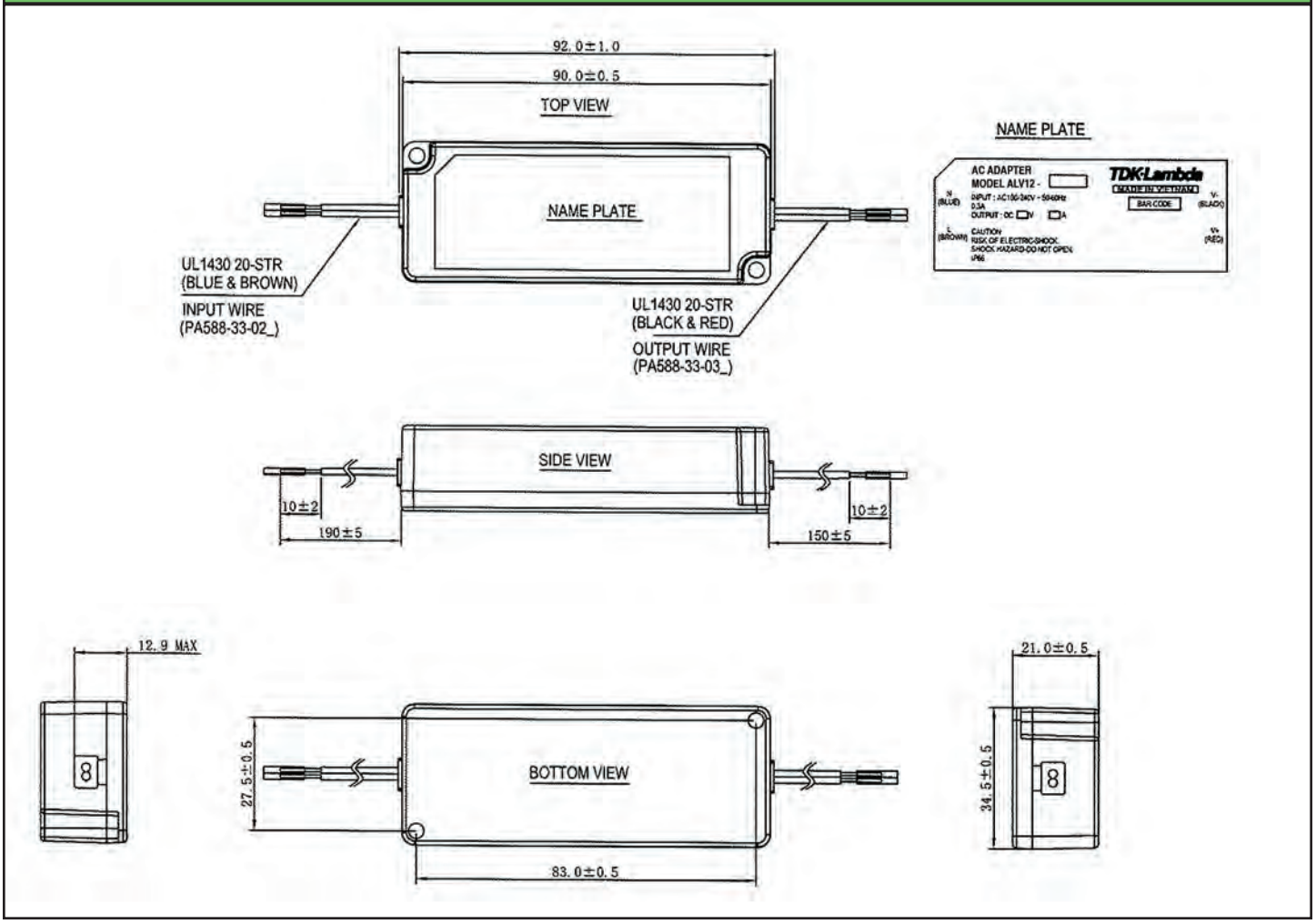
TDK·Lambda

AL12 Series

Model Selector

Model	CV/CC	Output Voltage (V)	Output Accuracy	Min. Output Current (A)	Output Current (A)	Maximum Average Power	Ripple & Noise
ALC12-36-R35	CC	3 - 36V	0.33 - 0.37A	-	0.35A	12.6W	-
ALC12-18-R70	CC	3 - 18V	0.66 - 0.735A	-	0.7A	12.6W	-
ALV12-12-1R0	CV	12	11.4 - 12.6V	0.1A	1A	12W	100mV
ALV12-15-R80	CV	15	14.25 - 15.75V	0.08A	0.8A	12W	100mV
ALV12-24-R50	CV	24	22.8 - 25.2V	0.05A	0.5A	12W	150mV

Outline Drawing



For Additional Information, please visit
us.tdk-lambda.com/products/al-series.htm

3055 Del Sol Blvd • San Diego, CA 92154 • 1-800-526-2324

Revision A4: Nov 2010

TDK·Lambda

AL60, 80 & 100

60 to 100W IP66 Power Supplies

- Small Size
- 90-305VAC input range
- Constant Current or Constant Voltage Versions
- Splash proof plastic case (non-rust)
- -40°C start up
- Conservative component ratings for long life

RoHS

Key Market Segments & Applications

LED Lighting
Damp Environments

Specifications

ITEMS \ MODEL		ALC	ALV
AC Input	VAC/Hz	90 - 305VAC, 47 - 63Hz	
Inrush Current (100/200VAC)	A	25 / 50A, 25°C ambient, cold start	
Input Current (110/200VAC)	A	Model dependant	
Power Factor (1)	-	IEC61000-3-2 Class C, (50% - 100% loading) 0.99/0.95 at 115/230VAC[1]	
Output Accuracy	%	±5%	±3%
Total Regulation	%	±5%	±3%
Overcurrent Protection	-	Automatic Recovery	> 105% of rated power
Overvoltage Protection	%	> 110% (Cycle AC to reset)	
Turn on time	ms	< 1000ms	
Leakage Current (240VAC 60Hz)	uA	< 250uA	
Operating Temperature	°C	-30 to +70°C, (Guaranteed start up at -40°C). AL60; derate linearly to 70% load from 50 to 70°C, AL80; derate linearly to 60% load from 50 to 70°C, AL100; derate linearly to 50% load from 50 to 70°C	
Storage Temperature	°C	-30 to +85°C	
Operating Humidity	-	15 - 90% RH (non condensing)	
Storage Humidity	-	15 - 90% RH (non condensing)	
Cooling	-	Convection	
Withstand Voltage	-	Input to Output 3kVAC (Class II, no ground connection needed)	
Isolation Resistance	-	>100M at 25°C & 70%RH, Input to Output at 500VDC	
Vibration (non operating)	-	10 - 55Hz: 19.6m/s^2 constant sweep 1 min X, Y, Z for 30 mins	
Shock	-	< 196.1 m/s^2 (20G)	
Immunity	-	IEC61000-4-2 (lv 3), -3 (lv 3), -4 (lv 3), -5 (lv 4), -6 (lv 3), -8 (lv 4), -11	
Safety Agency Approvals	-	UL8750 (Class 2), EN61347-1, EN61347-2-13, CSA C22.2 No. 60950-1, CE Mark	
Conducted & Radiated EMI	-	EN55015-B, EN55022-B, CISPR 22-B, FCC-B	
IP Class	-	IP66	
Weight (Typ)	g	ALx60: 380g, ALx80, 100: 500g	
Size (LxWxH)	in(mm)	9.49 x 1.7 x 1.36" (241 x 43.1 x 35mm)	
Warranty	yrs	Three Years	

Notes
(1) 0.98/0.93 for ALx60 models

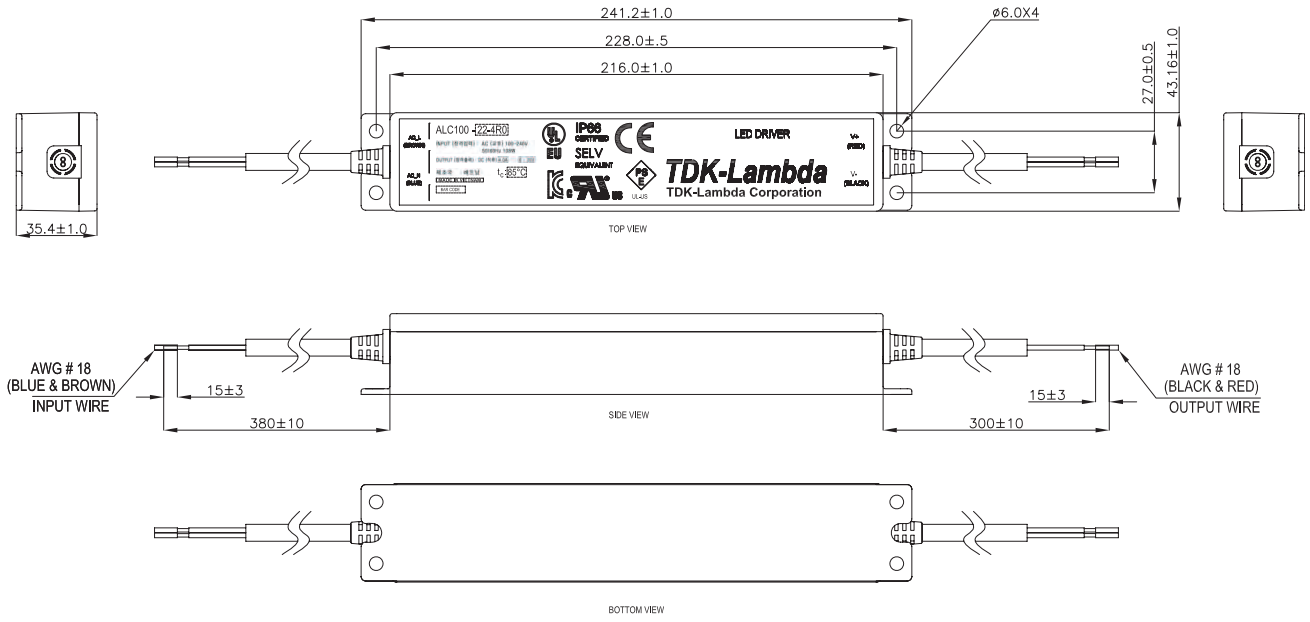
TDK·Lambda

AL60, 80 & 100

Model Selector

Model	CV/CC	Output Voltage (V)	Output Current (A)	Efficiency	Maximum Average Power	Ripple & Noise
ALC60-48-1R05	CC	6 - 48V	1.05A	85%	50.4W	-
ALC60-42-1R4	CC	6 - 42V	1.4A	86%	58.8W	-
ALC80-48-1R7	CC	6 - 48V	1.7A	87%	81.6W	-
ALC80-24-3R3	CC	6 - 24V	3.3A	86%	79.2W	-
ALC100-22-4R0	CC	6 - 22V	4A	86%	88W	-
ALV60-12-5R0	CV	12V	5A	85%	60W	180mV
ALV60-24-2R5	CV	24V	2.5A	88%	60W	240mV
ALV60-36-1R7	CV	36V	1.7A	87%	61W	360mV
ALV80-12-6R5	CV	12V	6.5A	86%	78W	180mV
ALV100-24-3R8	CV	24V	3.8A	89%	91.2W	240mV
ALV100-36-2R5	CV	36V	2.5A	88%	90W	360mV

Outline Drawing



NOTES:
1. ALL DIMENSIONS ARE IN mm.
2. DRAWINGS ARE NOT SCALE.
3. FOUR MOUNTING SLOTS FOR M4 SCREWS.
4. CASE MATERIAL IS LEXAN 920.
5. MODEL NAME, INPUT VOLTAGE RANGE, MAX INPUT POWER, NOMINAL OUTPUT CURRENT AND OUTPUT VOLTAGE RANGE ARE SHOWN ON THE NAME PLATE IN ACCORDANCE WITH THE SPECIFICATIONS.

For Additional Information, please visit
us.tdk-lambda.com/products/al-series.htm

3055 Del Sol Blvd • San Diego, CA 92154 • 1-800-526-2324
Revision B1: Jun 2011

TDK·Lambda

Alpha 1000

1000W Multiple Output Modular Power Supply

- Customized Power Supplies
- Universal AC Input
- Power factor Corrected
- Capable of up to 14 fully regulated and independent outputs
- Output Voltages from 1.8V - 48V
- Low Leakage Options
- Input Transient Protection
- Compact Package
- International Safety Agency Approvals

RoHS

Features and Benefits

Feature	Benefit
◆ PFC compliant to EN61000-3-2	◆ Supports global use
◆ Fast-on Tab Connections	◆ Quick installation
◆ No Minimum Load	◆ Eliminates the need for external components
◆ Wide Range Output Modules	◆ Capable of providing non-standard voltages, eliminates customs

Specifications

ITEMS / MODELS		
AC Input Volt. range & Freq.	-	85-264VAC, 47-63Hz
DC Input Voltage Range	-	120 - 360VDC (800W maximum output to 45C)
Input Current	A	16A maximum
Inrush Current	A	Less than 50A
Leakage Current	-	1.1mA @ 264VAC, 63Hz (see input filter options in detailed product datasheet)
Efficiency	%	75% typical (configuration and input dependent)
Power Factor Correction	-	Compliant to EN61000-3-2 (> 0.99 typical, reduced PFC > 255VAC)
Conducted EMI	-	EN55022 level A
Output Power	W	800W@85VAC (50°C max); 1000W@100VAC (50°C max); 1000W@90VAC (45°C max); 1000W for 30 seconds maximum @ 85VAC followed by 800W for 60 seconds minimum.
Output Load Regulation	-	0.2% maximum.
Output Line Regulation	-	0.5% maximum.
Ripple & Noise	-	2% pk-pk or 100mV (Whichever is greater)
No Load Operation	-	No preload is required on any output module.
Hold Up Time	ms	>15ms
Remote Sense	-	Available on single output modules only, refer to the module table.
Options (see option codes)	-	AC Fail, Global Inhibit, Module Inhibit, 5V@50mA aux., Parallel, Low Leakage.
Operating Temperature	°C	-20°C to +50°C full load, derate each output at 2.5% /°C from 50°C to 65°C.
Thermal Protection	-	Converter protected against over-temperature conditions. Recycle I/P power to restore output.
Storage Temperature	°C	-40°C to +85°C
Temperature Coefficient	-	0.02% per °C
Humidity	% RH	5% - 95% Non-condensing
Altitude	-	3,000m operating
Cooling	-	Internal fan provides forced-air cooling. Airflow intake on I/P end, exhaust on O/P end of unit.
Isolation	-	Input - Output 4.3kVDC, Input - Ground 2.3kVDC, Output - Ground 500VDC
Switching Frequency	-	100kHz on PFC, 200kHz on forward converter.
Vibration	-	1.5G, 10 - 200Hz
Shock	-	3,000 bumps, 10G, 16ms half-sine pulses.
Safety Agency Approvals	-	UL, EN/IEC60950-1, UL, EN/IEC60601-1*, IEC, EN61010-1, CE Mark
Size (WxHxD)	in.	7" x 2.5" x 11"
Warranty	-	Three Years

Notes: Consult datasheet for additional specifications
* Low leakage filter options only.

TDK·Lambda

Alpha 1000

1 Case Codes

Choose the converter which best fits your total power needs:

Code	Wattage	Max Slots	Size (H x W x L)	Input Voltage
CA1000	1000*	7	2.5" x 7" x 11"	85 - 265VAC

* Note: CA1000 derates to 800W for 85–100VAC input with a peak of 1000W for 30 seconds maximum.

2 Output Module Codes

Code	V1 Adjust	V1 Amps	V2 Adjust	V2 Amps	Slot(s)[1]
L	1.8 - 3.2	25	-	-	1
T	1.8 - 3.2	60	-	-	2
Q	2.7 - 3.9	25	-	-	1
R	2.7 - 3.9	60	-	-	2
B	4.5 - 5.5	25	-	-	1
A	4.5 - 5.5	60	-	-	2
BB	4.5 - 6.5	25	-	-	1
AA	4.5 - 6.5	60	-	-	2
S	2.5 - 5.7	85	-	-	2
M	5.0 - 16.0	8	-	-	1
C	5.0 - 16.0	16[3]	-	-	1
F	9.0 - 16.0	33	-	-	2
U	10.0 - 21.0	16	-	-	1
N	18.0 - 29.0	5	-	-	1
D	18.0 - 29.0	8	-	-	1
K	18.0 - 29.0	15	-	-	2
G	17.5 - 29.0	25[3]	-	-	2
J	30.0 - 48.0	10[3]	-	-	2
E	5.0 - 16.0	8[3]	5.0 - 16.0	8[3]	1
P	18.0 - 29.0	5	5.0 - 16.0	8[3]	1
H	18.0 - 32.0	5[3]	18.0 - 32.0	5[3]	1

Notes: 1) The total # of slots must not exceed 7 for CA1000.
2) Slot position may change upon order placement.
3) Module Deratings: C derates linearly to 12A from 12.1V–15V
E & P 8A rating derates to 6A in slots 4 & 5
H derates from 5A to 4A in slots 4 & 5
G derates to 21A above 24.5V
J derates 0.25A/V above 40V

Sample Configurations

	Output 1		Output 2		Output 3		Output 4		Output 5	
	V	A	V	A	V	A	V	A	V	A
CA1000-24G	24	16.5	-	-	-	-	-	-	-	-
CA1000-5APP-5APP *	5	120	-	-	-	-	-	-	-	-
CA1000-5A-12.7C	5	60	12.7	16	-	-	-	-	-	-
CA1000-24G-5/12E	24	25	5	8	12	8	-	-	-	-
CA1000-5A-24G-12C-12C	5	60	24	25	12	16	12	16	-	-
CA1000-5BMF-24D-6/12E	5	25	24	8	6	8	12	8	-	-
CA1000-5B-5CIN-12C-12/12E	5	25	5	16	12	16	12	8	12	8
CA1000-5S-12F-12C-5/24P	5	85	12	33	12	16	5	8	24	5

Note: Total output power must not exceed 1000W converter limits.
* Modules in parallel.

Other Modular Products

NV	350W to 700W up to 8 outputs
Vega	450W to 900W up to 10 outputs
Alpha1500	1500W up to 16 outputs

3 Option Codes

If required the following options may be added to the configuration by placing the code after the module. (i.e. Inhibiting a 5V @ 25A = 5B + Inhibit code = "5BIN")

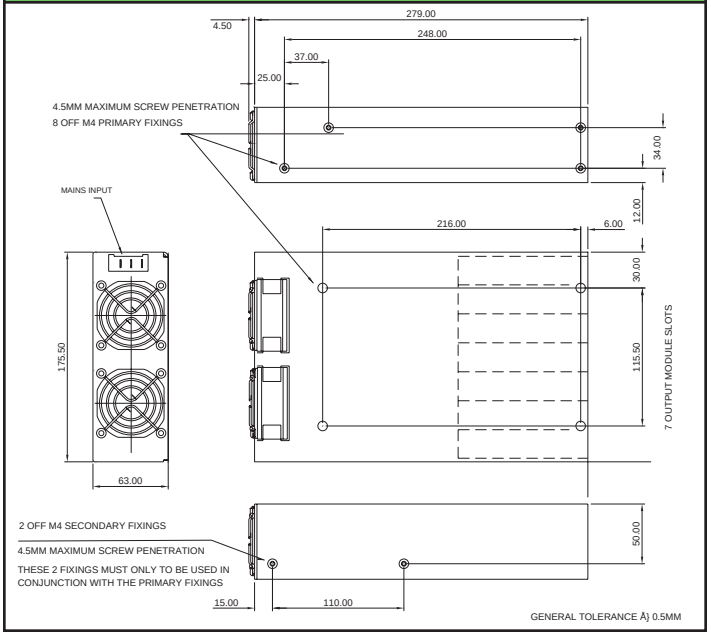
Code	Description	Available On
MF[2]	Mains Fail This option provides an AC fail signal, power supply inhibit, and 5V@50mA auxiliary supply. This is only placed in the first module slot. (TTL compatible reference to 0 volts of Aux. Supply)	All modules except Dual output (E, H, P)
PP	Parallel for Power This option allows 2 adjacent modules to be paralleled together for increased output power. Bus bars provided.	Modules: A, B, C, D, F, G, M, N, Q, R
PA	Parallel for Redundancy This option allows modules to be connected for N+1 redundancy. A DC good signal is also offered (electrically similar to AC fail.) No bus bars provided.	Modules: A, B, C, D, F, G, M, N, Q, R, S
IN[3]	Inhibit Module inhibit and DC good signal. (TTL compatible referenced to (-V) of the module)	Modules A, B, C, D, F, G, J, M, N, Q, R

Low Leakage Options (Max values stated)

	120VAC, 60Hz	240VAC, 60Hz	264VAC, 63Hz[4]	Conducted EMI
LL	88 µA	197µA	233 µA	Curve A
RL	50 µA	112 µA	132 µA	>Curve A
TL	24 µA	53 µA	63 µA	>Curve A

Notes: 1) Only one option per module may be used.
2) Mains Fail: AC Fail "AC On" = ≤ 0.8V, 50mA max.
"AC Off" = open circuit, 50V abs max.
PS Inhibit "PS On" = ≥ 2.0V or open circuit.
"PS Off" = ≤ 0.8V @ 5mA.
(TTL compatible, Referenced to 0 volts of Aux. Supply.)
3) Inhibit: DC Good Electrically similar to AC fail module.
Inhibit Electrically similar to PS inhibit.
4) Type testing result

Outline Drawing



For Additional Information, please visit
us.tdk-lambda.com/lp/products/alpha-series.htm

3055 Del Sol Blvd • San Diego, CA 92154 • 1-800-526-2324

Revision A6: Jan 2009

TDK·Lambda

Alpha 1500

1500W Multiple Output Modular Power Supply

- Customized Power Supplies
- Power factor Corrected
- Capable of up to 16 fully regulated and independent outputs
- Output Voltages from 1.8V - 48V
- Low Leakage Options
- Input Transient Protection
- Low Profile Package
- International Safety Agency Approvals

RoHS

Alpha Features and Benefits

Feature	Benefit
◆ PFC compliant to EN61000-3-2	◆ Supports global use
◆ Fast-on Tab Connections	◆ Quick installation
◆ No Minimum Load	◆ Eliminates the need for external components
◆ Wide Range Output Modules	◆ Capable of providing non-standard voltages, eliminates customs

Specifications

ITEMS / MODELS		
AC Input Volt. range & Freq.	-	150 - 264VAC, 47 - 63Hz (1500W). See power limitations for lower input ranges.
Input Current	A	16A maximum
Inrush Current	A	Less than 50A
Leakage Current	-	1.1mA @ 264VAC, 63Hz (low leakage current options available)
Efficiency	%	75% typical (configuration and input dependent)
Power Factor Correction	-	Compliant to EN61000-3-2 (> 0.99 typical, reduced PFC > 255VAC)
Conducted EMI	-	EN55022 level A
Output Power	W	800W@85VAC (50°C max); 1000W@100VAC (50°C max); 1000W@90VAC (45°C max); 1500W @ 150VAC (50°C max)
Output Load Regulation	-	2% max. without remote sensing. 0.5% max. remote sense connected
Output Line Regulation	-	0.5% maximum.
Ripple & Noise	-	2% pk-pk or 100mV (Whichever is greater)
No Load Operation	-	No preload is required on any output module
Hold Up Time	ms	>15ms
Remote Sense	-	Available on single output modules only
Options (see option codes)	-	AC Fail, Global Inhibit, Module Inhibit, 5V@50mA aux., Parallel, Low Leakage
Operating Temperature	°C	0°C to +50°C full load, derate each output at 2.5% /°C from 50°C to 65°C
Thermal Protection	-	Converter protected against over-temperature conditions. Recycle I/P power to restore output
Storage Temperature	°C	-40°C to +85°C
Temperature Coefficient	-	0.02% per °C
Humidity	% RH	5% - 95% Non-condensing
Altitude	-	3000m Operating
Cooling	-	Internal fan provides forced-air cooling. Airflow intake on I/P end, exhaust on O/P end of unit.
Isolation	-	Input - Output 4.3kVDC, Input - Ground 2.3kVDC, Output - Ground 500VDC
Switching Frequency	-	100kHz on PFC, 200kHz on forward converter.
Vibration	-	1.5G, 10 - 200Hz
Shock	-	3,000 bumps, 10G, 16ms half-sine pulses.
Safety Agency Approvals	-	UL60950-1, IEC60950-1, CSA22.2 No.60950-1, EN60950-1, IEC61010-1, EN61010-1, CE Mark
Size (WxHxD)	in.	8" x 2.5" x 11"
Weight	lbs.	8 (3.6kg) typical dependent on configuration
Warranty	-	Three Years

TDK·Lambda

Alpha 1500

1 Case Code

Code	Wattage	Max Slots	Size (H x W x L)	Input Voltage*
CA1500	1500	8	2.5" x 8" x 11"	150 - 264VAC

*Input Voltage/Power Limitations

Input Voltage	Intermittent Output Power Rating	Continuous Output Power Rating	Max. Ambient Temperature
85 - 99.9VAC	-	800W	50°C
100 - 149.9VAC	-	1000W	50°C
150 - 164.9VAC	-	1500W	50°C
165 - 179.9VAC	-	1595W	50°C
180 - 264VAC	-	1690W	50°C
90 - 264VAC	-	1000W	45°C
85 - 264VAC	1000W*	-	50°C

*- 1000W for 30 seconds maximum followed by 800W for 60 seconds min.
Note: Ratings are not affected by the use of input or output connector housings

2 Output Module Codes

Code	V1 Adjust	V1 Amps	V2 Adjust	V2 Amps	Slot(s)(1)
L	1.8 - 3.2	25	-	-	1
T	1.8 - 3.2	60	-	-	2
Q	2.7 - 3.9	25	-	-	1
R	2.7 - 3.9	60	-	-	2
B	4.5 - 5.5	25	-	-	1
A	4.5 - 5.5	60	-	-	2
BB	4.5 - 6.5	25	-	-	1
AA	4.5 - 6.5	60	-	-	2
S	2.5 - 5.7	85	-	-	2
M	5.0 - 16.0	8	-	-	1
C	5.0 - 16.0	16	-	-	1
F	9.0 - 16.0	33	-	-	2
U	10.0 - 21.0	16	-	-	1
N	18.0 - 29.0	5	-	-	1
D	18.0 - 29.0	8	-	-	1
K	18.0 - 29.0	15	-	-	2
G	17.5 - 29.0	25	-	-	2
J	30.0 - 48.0	10	-	-	2
E	5.0 - 16.0	8	5.0 - 16.0	8	1
P	18.0 - 29.0	5	5.0 - 16.0	8	1
H	18.0 - 32.0	5	18.0 - 32.0	5	1

Notes: 1) The total # of slots must not exceed 8 for CA1500.
2) Slot position may change upon order placement.

Max. Output Current Limitations

All modules can be used at their full rated current in all slot positions unless otherwise stated below

A module:	Limited to 51A in slot 7/8
B module:	Limited to 20A in slot 8
C module:	Limited to 12A if output exceeds 12V
L module:	Limited to 20A in slot 8
Q module:	Limted to 20A in slot 8
R module:	Limited to 51A in slot 7/8
S module:	Limited to 65A in slot 7/8, 66A in slot 6/7, 80A in slot 5/6, 85A in slot 4/5, 66A in slot 3/4, 68A in slot 2/3, 73A in slot 1/2
T module:	Limited to 51A in slot 7/8

Other Modular Products

NV	350W to 700W up to 8 outputs
Vega	450W to 900W up to 10 outputs
Alpha1000	1000W up to 14 outputs

For Additional Information, please visit
us.tdk-lambda.com/lp/products/alpha-series.htm

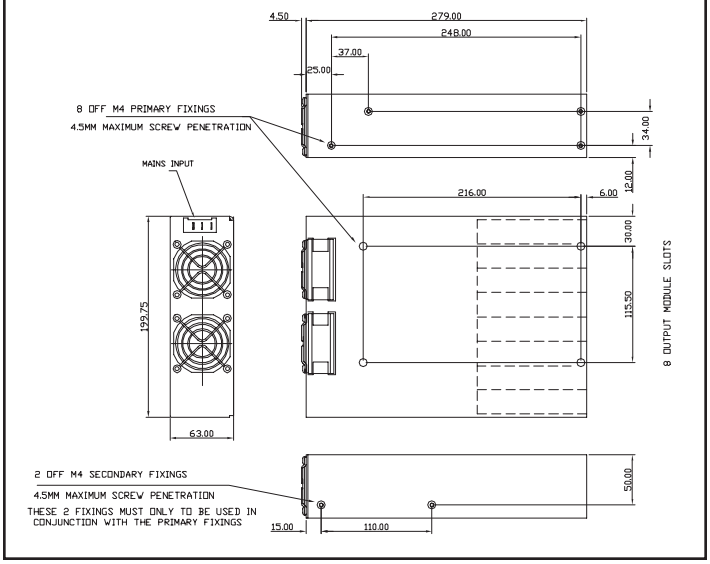
3 Option Codes

If required the following options may be added to the configuration by placing the code after the module. (i.e. Inhibiting a 5V @ 25A = 5B + Inhibit code = "5B_IN")

Code	Description	Available On
MF[2]	Mains Fail This option provides an AC fail signal, power supply inhibit, and 5V@50mA auxiliary supply. This is only placed in the first module slot. (TTL compatible reference to 0 volts of Aux. Supply)	All modules except Dual output (E, H, P)
PP	Parallel for Power This option allows 2 adjacent modules to be paralleled together for increased output power. Bus bars provided.	Modules: A, B, C, D, F, G, M, N, Q, R
PA	Parallel for Redundancy This option allows modules to be connected for N+1 redundancy. A DC good signal is also offered (electrically similar to AC fail.) No bus bars provided.	Modules: A, B, C, D, F, G, M, N, Q, R, S
IN[3]	Inhibit Module inhibit and DC good signal. (TTL compatible referenced to (-V) of the module)	Modules A, B, C, D, F, G, J, M, N, Q, R
	Low Leakage Options	All converters
	Max. Leakage Current — Conducted RFI	
LL	240 µA — Curve A	
RL	100 µA — Above Curve A	
TL	50 µA — Above Curve A	

Notes: 1) Only one option per module may be used.
2) Mains Fail: AC Fail — "AC On" = ≤ 0.8V, 50mA max.; "AC Off" = open circuit, 50V abs max.
PS Inhibit — "PS On" = ≥ 2.0V or open circuit.; "PS Off" = ≤ 0.8V @ 5mA.
(TTL compatible, Referenced to 0 volts of Aux. Supply.)
3) Inhibit: DC Good — Electrically similar to AC fail module.
Inhibit — Electrically similar to PS inhibit.

Outline Drawing



Sample Configurations

Description	O/P 1	O/P 2	O/P 3	O/P 4	O/P 5
CA1500 24G_PP* 24G_PP*	24V 50A	-	-	-	-
CA1500 5S_MF 12F_PP* 12F_PP*	5V 80A	12V 60A	-	-	-
CA1500 LL 5A 28G 36J_IN	5V 60A	28V 25A	36V 10A	-	-
CA1500 5A_PP* 5A_PP* 3.3R 12C 12C	5V 120A	3.3V 60A	12V 16A	12V 16A	-
CA1500 24G_PP* 24D_PP* 3.3S 5S 12/12E	24V 33A	3.3V 85A	5V 66A	12V 8A	12V 8A

Actual part number (format CA1500Hxxxxx) assigned on quotation.
* Outputs paralleled via bus bars. (O/P = Output)

3055 Del Sol Blvd • San Diego, CA 92154 • 1-800-526-2324
Revision A3: Dec 2006

TDK·Lambda

CPFE500F Series

500W Conduction Cooled Power Supplies

- Base plate cooled, no fan required
- High efficiency
- Protective coating option
- MIL STD 461/462D CE102 Conducted EMC

RoHS

Key Market Segments & Applications

Outdoor Electronics	LED Signage	COTS

Specifications

ITEMS		
AC Input		90 to 265VAC, 47-440Hz (Reduced PFC above 63Hz)
Input Current Model dependant (1)	A	6.8 / 3.4
Inrush Current (115 / 230VAC)	A	20 / 40 peak
Power Factor	-	Meets EN61000-3-2
Efficiency (typical)	%	85% at 75% loading (Non ORing diode versions)
Output Voltage Setpoint Accuracy	-	±2% at 50% load
Total Regulation	%	< 4%. (ORing diode option, adds 1V to load regulation)
Ripple and Noise (20MHz BW)	-	1% (1.5% below -10°C)
Over Current Protection	%	105 - 140% (Automatic Recovery)
Over Voltage Protection	-	125 - 145% (Cycle AC to reset)
Series Operation	-	Yes
Parallel Operation	-	Yes (Single wire, up to 6 units)
ORing Diodes/FETs	-	Yes (option)
Power On Signal (ENA)	-	Open collector (10mA sink current). Low (on) when output is present
Auxiliary Supply	-	10 - 14V, 20mA
Remote On/Off (Opto isolated)	-	High = On
Temperature Coefficient	-	<0.01%/°C
Overtemperature	°C	Shuts down between 90 - 130°C (Cycle AC to reset)
Hold Up Time (230VAC)	ms	10ms
Leakage Curr. (at 230VAC, 50Hz)	uA	< 1.5mA
Remote Sense	-	Yes, compensates up to 500mV cable drop
Operating Temp. (Base plate)	°C	-40 to +85°C (2)
Storage Temperature	°C	-40 to +100°C
Humidity	-	Operating: 20 - 90%RH, Non operating 10 - 95%RH (Pcb assembly protective coated)
Cooling	-	Conduction cooled through 6mm base plate
Withstand Voltage	-	Input to Output 4242VDC, Input to Ground 2121VDC, Output to ground 500VDC
Vibration (non operating)	-	MIL-STD-810E, Method 514.4, Proc 1, Category 1, 9
Shock	-	MIL-STD-810E, Method 516.5, Proc. I, IV, VI
Safety Agency Approvals	-	UL60950-1, CSA 22.2 No 60950-1, EN60950-1 (Ed 2), CE Mark
Line Dip	-	Complies with SEMI F47 (200VAC line only)
Conducted EMI	-	EN55011, EN55022 (as per CISPR, 11/22) Class B, FCC47 part 15 subpart B) MIL STD 461E/461E/462D CE102, 115V and 220V
Radiated EMI	-	EN55011, EN55022 (as per CISPR, 11/22) Class B, FCC47 part 15 subpart B) see app. note for details
Immunity	-	IEC61000-4-2 (Contact Level 2, Air discharge Lvl 3), -3 (Lvl 3), -4(Lvl 3), -5 (Lvl 4), -6 (Lvl 3), -8 (Lvl 4), -11 (Class 3), -12 (Lvl 3), -14 (Class 3)
Weight (Typ)	g	with cover 1400g, without cover 1200g
Size (L x W x D)	mm	270 x 126 x 55mm
Warranty	-	2 years

1) 100/200VAC

2) CPFE500F-12: -40 to 80°C. See instruction manuals for derating curves

TDK·Lambda

CPFE500F Series

Model Selector

Model	Output Volt (V)	Adjust Range (V)	Max Curr (A)	Max Watt (W)
CPFE500F-12-NLC	12	9.6 - 14.4	42	504
CPFE500F-24-NLC	24	22.4 - 33.6	18	504
CPFE500F-28-NLC	28	22.4 - 33.6	18	504
CPFE500F-48-NLC	48	38.4 - 57.6	10.5	504

Options

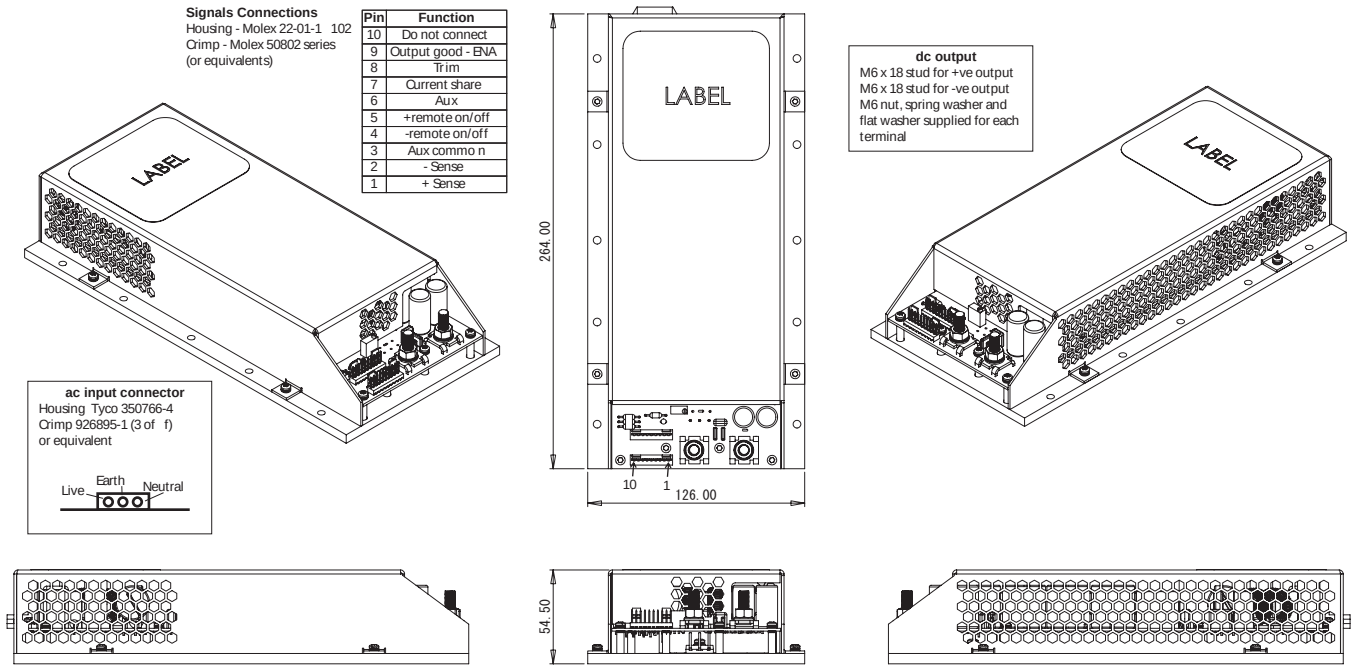
Part Number Desc. Suffix	ORing Diode (3)	Cover	Protective Coating
-DLC	Y	Y	Y
-NLC	N	Y	Y

3) Reduces maximum output adjustment range by 1V

Preferred stocking part highlighted in green.

Outline Drawing

CPFE500F



Notes 1. All customer fixings 10 x M4 clearance holes 2. All tolerances +/-0.5m m

For Additional Information, please visit
http://us.tdk-lambda.com/lp/products/cpfe-series.htm

3055 Del Sol Blvd • San Diego, CA 92154 • 1-800-526-2324

Revision A4: May 2011

TDK·Lambda

CPFE1000F Series

720 to 1000W Conduction Cooled Power Supplies

- Base plate cooled, no fan required
- High efficiency
- Protective coating
- MIL STD 461/462D CE102 EMC
- I²C Interface

RoHS

Key Market Segments: Outdoor Electronics, LED Signage, COTS

Features and Benefits

Feature	Benefit
◆ Fanless	◆ Longer Field Life
◆ Baseplate cooled	◆ Conduct heat outside of the system
◆ Wide range AC Input	◆ Supports global use

Specifications

ITEMS		
AC Input	-	90 to 265VAC, 47-440Hz (Reduced PFC above 63Hz)
Input Current (1)	A	13.6 / 6.6 (Model dependant)
Inrush Current (115 / 230VAC)	A	20 / 40 peak
Power Factor	-	Meets EN61000-3-2
Efficiency (typical)	%	79 to 86% (Model dependant)
Output Voltage Setpoint Accuracy	-	±2% at 50% load
Line Regulation	mV	12V: 48mV, 28V: 56mV, 48V: 96mV
Load Regulation	mV	12V: 48mV, 28V: 56mV, 48V: 96mV
Ripple and Noise (20MHz BW)	-	1% (2% below 0°C)
Over Current Protection	%	105 - 140% (Automatic recovery)
Over Voltage Protection	-	125 - 145% (Automatic recovery)
Parallel Operation	-	Yes (Single wire)
Power On Signal (ENA)	-	Open collector (10mA sink current). Low (on) when output is present
Auxiliary Supply	-	10 - 14V, 20mA
Remote On/Off (Opto isolated)	-	High = On
Temperature Coefficient	-	<0.02%/°C
Overtemperature	°C	Shuts down between 90 - 115°C (Auto recovery)
Hold Up Time (230VAC)	ms	25ms
Leakage Current (@230VAC,50Hz)	uA	< 1.5mA
Remote Sense	-	Yes, compensates up to 500mV cable drop
I²C Interface	-	Provides manufacturing location, date, serial number, part number, unit revision, output voltage & current read back, base plate temperature, remote on/off, IOG, DC good and over temperature warning
Operating Temperature (Base plate)	-	12V: -40 to +85°C, 28V & 48V: -40 to +70 / 85°C (See reverse side for derating)(2)
Storage Temperature	-	-40 to +100°C
Humidity	-	Operating: 20 - 90%RH, Non operating 10 - 95%RH (Pcb assembly protective coated)
Cooling	-	Conduction cooled through 6mm base plate
Withstand Voltage	-	Input to Output 4242VDC, Input to Ground 2121VDC, Output to ground 500VDC
Vibration (non operating)	-	MIL-STD-810E, Method 514.4, Proc 1, Category 1, 9
Shock	-	MIL-STD-810E, Method 516.5, Proc. I, IV, VI
Safety Agency Approvals	-	UL60950-1, CSA 22.2 No 60950-1, EN60950-1 (Ed 2), CE Mark
Line Dip	-	Complies with SEMI F47 (200VAC line only)
Conducted & Radiated EMI	-	EN55022/EN55011 Class B, MIL STD 461/462D CE102
Immunity	-	IEC61000-4-2 (Contact Level 2, Air discharge Lvl 3), -3 (Lvl 3), -4(Lvl 3), -5 (Lvl 4), -6 (Lvl 3), -8 (Lvl 4), -11 (Class 3), -12 (Lvl 3), -14 (Class 3)
Weight (Typ)	g	2,400
Size (L x W x H)	mm	270 x 190 x 61mm
Warranty	yrs	2 years

1) 100/200VAC 2) CPFE1000F-28, -48: -40 to +70°C below 170VAC input voltage

TDK·Lambda

CPFE1000F Series

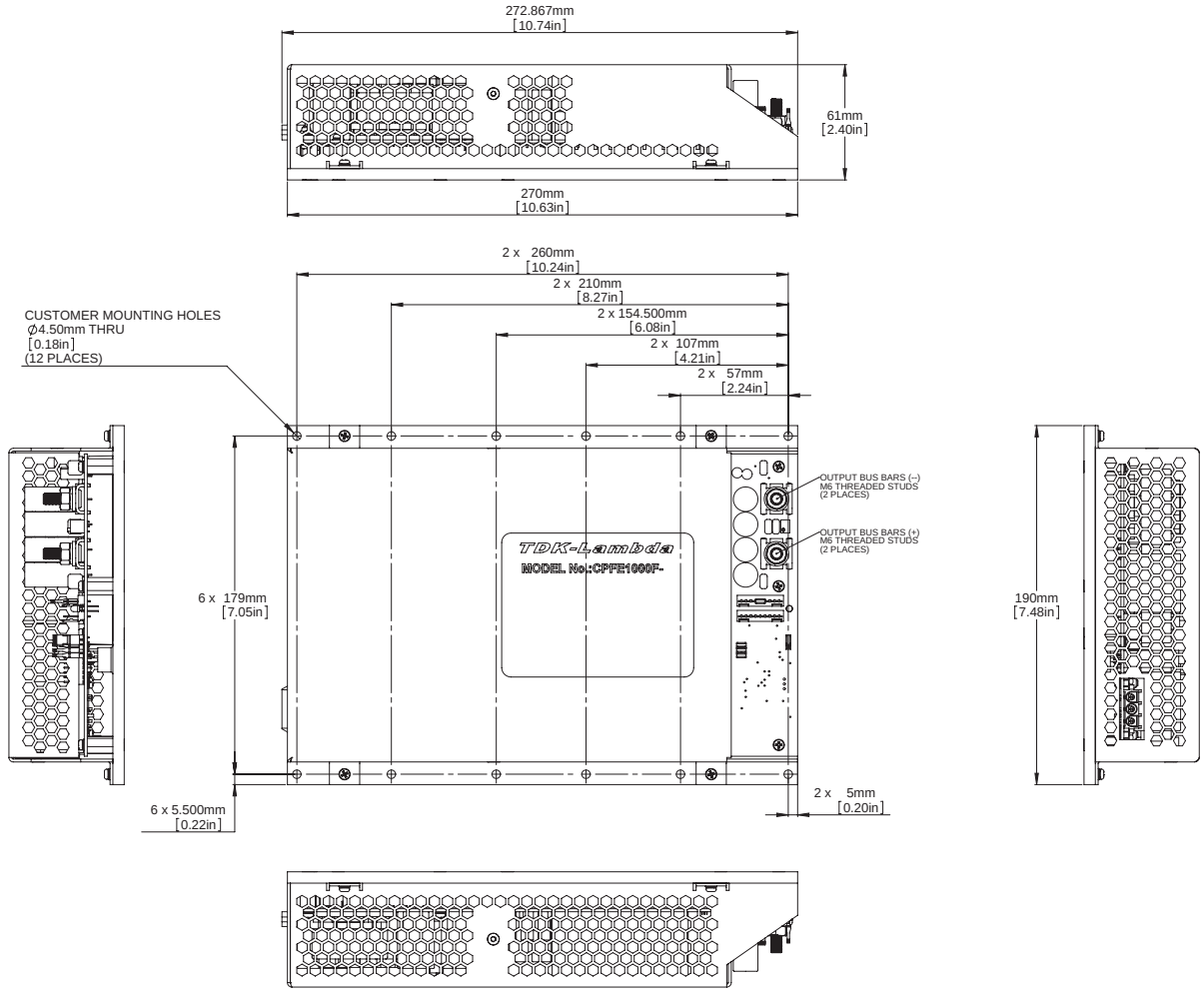
Model Selector

Model	Output Voltage (V)	Adjust. Range (V)	Maximum Current (A)	Efficiency (%) (110/220VAC)
CPFE1000F-12	12	9.6 - 14.4	60	79 / 81
CPFE1000F-28	28	22.4 - 33.6	36	83 / 86
CPFE1000F-48	48	38.4 - 57.6	21	83 / 86

Derating (Ambient Temperature)

Model	Input Voltage	Output Power (W) 50°C	60°C	70°C	85°C
CPFE1000F-12	85VAC to 170VAC	720	720	576	360
	170VAC to 265VAC	720	720	670	595
CPFE1000F-28	85VAC to 170VAC	1008	864	720	-
	170VAC to 265VAC	1008	1008	958	883
CPFE1000F-48	85VAC to 170VAC	1008	864	720	-
	170VAC to 265VAC	1008	1008	958	883

Outline Drawing (CPFE1000F)



For Additional Information, please visit
http://us.tdk-lambda.com/lp/products/cpfe-series.htm

3055 Del Sol Blvd • San Diego, CA 92154 • 1-800-526-2324

Revision A7: Jun 2011

TDK·Lambda

CSS65 Series

2 x 4" 40 to 65W AC-DC Medical Power Supplies

- Wide Range AC Input
- Low profile, Industry Standard Footprint
- Global Safety Agency Compliance
- Remote Sense

RoHS

Key Market Segments & Applications

Medical
Gaming
Test and Measurement

Features and Benefits

Feature	Benefit
◆ Industry standard footprint	◆ Availability to second source
◆ Wide Range AC Input	◆ Global Operation
◆ Dual input fuses	◆ Easier system compliance

Specifications

ITEMS		CSS65
Input Voltage range	V	90 - 264VAC (47 - 63Hz) or 120 - 370VDC
Inrush Current	A	<40A maximum at 115VAC input, 25oC ambient cold start
Input Current (115/230VAC)	A	2 / 1
Leakage Current	uA	<250uA 264VAC 63Hz
Hold Up Time (Typ)	ms	10ms at 115VAC input
Temperature Coefficient	°C	±0.05%/°C
Adjustment Range	-	None
Remote Sense	-	Yes
Minimum Load	A	None
Regulation	%	5V: ±5%, 12-24V: ±3%, 36-48V: ±2% (10 - 100% load change, 100-240VAC line change)
Ripple & Noise	%	1%
Short Circuit Protection	-	Continuous - hiccup mode
Overvoltage Protection	V	110 - 150% of nominal (Automatic Reset)
Efficiency	%	86% typical (115VAC Input)
Operating Temperature	°C	0 to +70°C derate linearly to 50% load from 50 to 70°C
Storage Temperature	°C	-10 to +70°C
Humidity (non condensing)	-	20 - 95% RH
Cooling	-	Convection
Withstand Voltage	-	Input to Ground 1.5kVAC, Input to Output 4kVAC, Output to Ground 500VDC for 1 min.
Isolation Resistance	-	>20M at 25C & 70%RH, Output to Ground 500VDC
Vibration (non operating)	-	23.52m/s^2 (10 - 55Hz: constant sweep 1 min X, Y, Z for 1 hour)
Shock	-	< 196.1 m/s^2 (20G)
Safety Agency Approvals	-	UL60601-1, EN60601-1, IEC60601-1
Conducted & Radiated EMI	-	EN55011-B, FCC Class B
Immunity	-	EN60601-1-2
Weight (Typ)	g	200g
Size (WxLxH)	in	2 x 4 x 1.18" (including underside components)
Warranty	yr	Two Years

TDK·Lambda

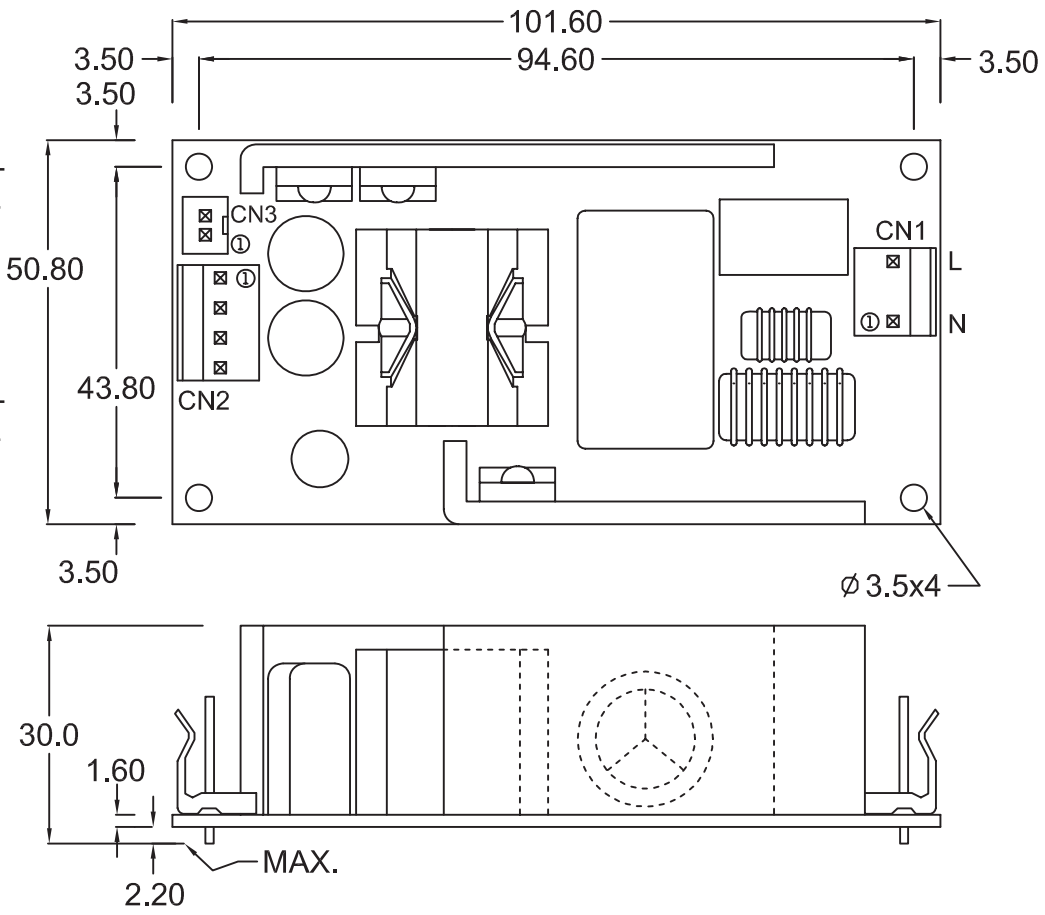
CSS65 Series

Outline Drawings

CN1 : AC INPUT

CN2 : DC OUTPUT
PIN ASSIGNMENT
PIN1 +Vo
PIN2 +Vo
PIN3 GND
PIN4 GND

CN3 : DC OUTPUT
PIN ASSIGNMENT
PIN1 GND(senser)
PIN2 +Vo(senser)



Dimension: L101.6 x W50.8 x H30mm UNIT : mm

Model Selector

Model	Output (V)	Maximum Output (A)	Maximum Power (W)
CSS65-5	5	8.0	40
CSS65-12	12	5.0	60
CSS65-15	15	4.0	60
CSS65-19	19	3.43	65
CSS65-24	24	2.71	65
CSS65-36	36	1.81	65
CSS65-48	48	1.36	65

For Additional Information, please visit
us.tdk-lambda.com/lp/products/css-series.htm

- Input Connector mates with Molex Housing 09-50-3031 or equivalent
- Output Connector mates with Molex Housing 09-50-3041 or equivalent
- Sense connector (CN3) mates with J.S.T. XHP-2

Other Medical Products

CSS150, 500	150 - 500W 1 output
KM	15 - 40W pcb mount medical
NV175	175 - 200W 1-4 outputs
NV300	300W 1-4 outputs
EFE300M	300W 3x6" 1 output

3055 Del Sol Blvd • San Diego, CA 92154 • 1-800-526-2324
Revision A9: Oct 2010

TDK·Lambda

CSS150 Series

3 x 5" 150W AC-DC Medical Power Supplies

- Wide Range AC Input
- Low profile, Industry Standard Footprint
- Global Safety Agency Compliance

RoHS

Key Market Segments & Applications

Medical
Gaming
Test and Measurement

Features and Benefits

Feature	Benefit
◆ Industry standard footprint	◆ Availability to second source
◆ Wide Range AC Input	◆ Global Operation
◆ Dual input fuses	◆ Easier system compliance

Specifications

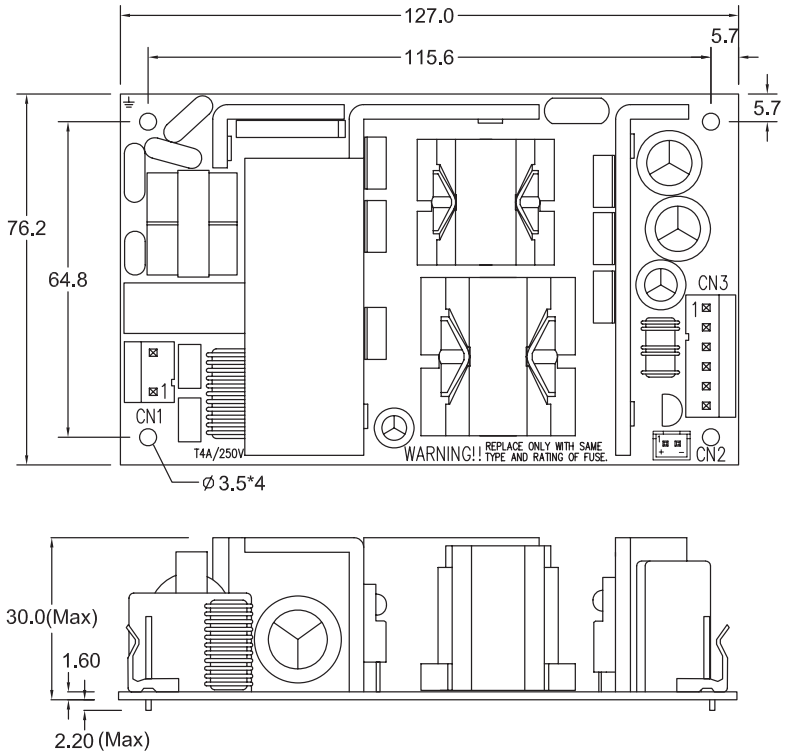
ITEMS		CSS150
Input Voltage range	V	90 - 264VAC (47 - 400Hz)(1) or 120 - 180VDC
Inrush Current	A	<60A maximum at 264VAC input, 25°C ambient cold start
Input Current (115/230VAC)	A	1.7 / 0.85
Leakage Current	μA	<250μA 264VAC 63Hz
Hold Up Time (Typ)	ms	16ms at 115VAC input
Temperature Coefficient	-	±0.05%/°C
Voltage Accuracy	%	±1%
Adjustment Range	%	±3%
Minimum Load	A	None
Total Regulation	%	±3%
Ripple & Noise	%	2% peak to peak
Overcurrent Protection	-	110 - 150%
Overvoltage Protection	V	110 - 150% of nominal (Cycle input power to reset)
Remote On/Off	-	Unit on: Floating or low <1.2V, Unit off: Apply 5V with respect to 0V
Efficiency	%	89% typical
Off load power draw	W	<0.5W
Operating Temperature	-	0 to +70°C derate linearly to 50% load from 50 to 70°C
Storage Temperature	°C	-20 to +85°C
Humidity (non condensing)	-	20 - 95% RH
Cooling	-	Convection or forced air (2.5m/s)
Withstand Voltage	-	Input to Ground 1.5kVAC, Input to Output 4kVAC, Output to Ground 500VDC for 1 min.
Isolation Resistance	-	>100M at 25C & 70%RH, Output to Ground 500VDC
Vibration (non operating)	-	19.6m/s² (10~55Hz:2G Constant, X,Y,Z 60min each.)
Shock	-	< 196.1 m/s² (20G)
Safety Agency Approvals	-	UL60601-1, EN60601-1, IEC60601-1,CE Mark, UL60950-1, EN60950-1
Conducted & Radiated EMI	-	EN55011-B, FCC Class B
Immunity	-	EN60601-1-2
MTBF	-	180,000 (MIL-217F-HDBK)
Weight (Typ)	g	340g
Size (WxLxH)	mm	3 x 5 x 1.3" (including underside components)
Warranty	yrs	Two Years

(1) Derate linearly to 90W convection rating from 90 to 100VAC input.

TDK·Lambda

CSS150 Series

Outline Drawings



Dimension :
L127(5") x W76.2(3") x H30.0(1.18")mm

Pin Assignments :

CN1	PIN1	L
	PIN2	N
CN2	PIN1	PS-ON +
	PIN2	PS-ON -
CN3	PIN1	GND
	PIN2	GND
	PIN3	GND
	PIN4	+V
	PIN5	+V
	PIN6	+V

Model Selector

Model	Output Voltage (V)	Voltage Adjust (V)	Maximum Current Convection (A)	Maximum Power Convection (W)	Maximum Current Forced Air	Maximum Power Forced Air
CSS150-12	12V	11.64 - 12.36V	8.3A	100W	12.5A	150W
CSS150-15	15V	14.55 - 15.45V	6.7A	100W	10A	150W
CSS150-24	24V	23.28 - 24.72V	4.2A	100W	6.3A	150W
CSS150-36	36V	34.92 - 37.08V	2.8A	100W	4.2A	150W
CSS150-48	48V	46.60 - 49.44V	2.1A	100W	3.1A	150W

Other Medical Products

KM	15 - 40W pcb mount medical
CSS	40 - 500W medical
NV175	175 - 200W 1-4 outputs
NV300	300W 1-4 outputs

- Input Connector mates with Molex Housing 09-50-3031 or equivalent
- Output Connector mates with Molex Housing 09-50-3061 or equivalent
- Remote On/Off (CN2) mates with J.S.T. XHP-2

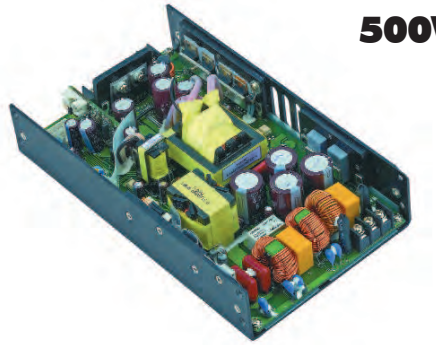
For Additional Information, please visit
us.tdk-lambda.com/lp/products/css-series.htm

3055 Del Sol Blvd • San Diego, CA 92154 • 1-800-526-2324
Revision A4: May 2011

TDK·Lambda

CSS500 Series

500W AC-DC Medical or Industrial Power Supplies



- 360W Convection rating
- High Efficiency
- IEC60601-1 or IEC60950-1 certifications
- ORing FET & Current Share

RoHS

Key Market Segments & Applications

Medical	Test and Measurement

Features and Benefits

Feature	Benefit
◆ High Efficiency	◆ Uses less energy
◆ Current Share and ORing FET	◆ Use in redundant applications
◆ Dual input fuses	◆ Easier system compliance

Specifications

ITEMS		CSS500
Input Voltage range	-	90 - 264VAC (47 - 63Hz)
Inrush Current	A	<50A maximum at 230VAC input, 25°C ambient cold start
Input Current (115/230VAC)	A	6 / 3A
Power Factor Correction	-	Meets EN61000-3-2, >0.9
Leakage Current	μA	<300μA 264VAC 63Hz
Hold Up Time (Typ)	ms	20ms at 115VAC input, 360W loading
Temperature Coefficient	-	±0.04%/°C
Voltage Accuracy	%	±1% at 60% load
Adjustment Range	%	None
Regulation	-	Load Regulation ±1%, Line Regulation ±0.5%
Ripple & Noise	%	1% peak to peak (5Vsb also)
Overcurrent Protection	-	110 - 150%
Overvoltage Protection	V	110 - 130% of nominal (Cycle input power or use remote on/off to reset)
Overtemperature Protection	-	Yes (Cycle input power or use remote on/off to reset)
Remote On/Off	-	Unit on: Floating or high 3.5 - 5.25V, Unit off: Low or <0 - 0.5V
Efficiency	%	87% to 92%, model & input dependant
Standby Voltage	-	5V 1A (5V 0.25A when convection cooled or when inhibit is activated)
Fan Output	-	12V 1A
Current Share	-	Single wire, up to 4 units can be shared within 10% accuracy at full load
DC Good & Fan Fail Signals	-	Both Low on Fail
ORing FET	-	Yes, for redundant operation
Operating Temperature	°C	Convection (U channel): 0 to +70°C, derate linearly to 35% load from 40 to 70°C Forced air (or internal fan): 0 to +70°C, derate linearly to 50% load from 50 to 70°C
Storage Temperature	°C	-10 to +85°C
Humidity (non condensing)	%	10 - 95% RH
Cooling	-	Convection or forced air (30CFM or 3.1m/s). Internal fan is temperature controlled
Withstand Voltage (1)	-	Input to Ground 1.5kVAC, Input to Output 4kVAC(1), Output to Ground 500VAC for 1 min.
Isolation Resistance	-	>20M at 25°C & 70%RH, Output to Ground 500VDC
Vibration (non operating)	-	19.6m/s² (10~55Hz:2G Constant, X,Y,Z 60min each.)
Shock	-	< 196.1 m/s² (20G)
Safety Agency Approvals	-	Medical Version: UL60601-1, IEC60601-1, Industrial Version: UL60950-1, EN60601-1, CE Mark
Conducted & Radiated EMI	-	Medical Version: EN55011-B, FCC Class B, Industrial: EN55022, FCC Class B
Immunity	-	Medical Version: EN60601-1-2, Industrial: EN55024
MTBF	-	>68,695 (MIL-217F-HDBK)
Weight (Typ)	g	340g (U channel)
Size (WxLxH)	in	U Channel: 8 x 4.7 x 1.51", End Fan (/S) 9 x 4.7 x 1.63", Top Fan (/T) 8 x 4.7 x 2.85"
Warranty	yr	Two Years

Note (1) Industrial version (I suffix): 3kVAC

TDK·Lambda

CSS500 Series

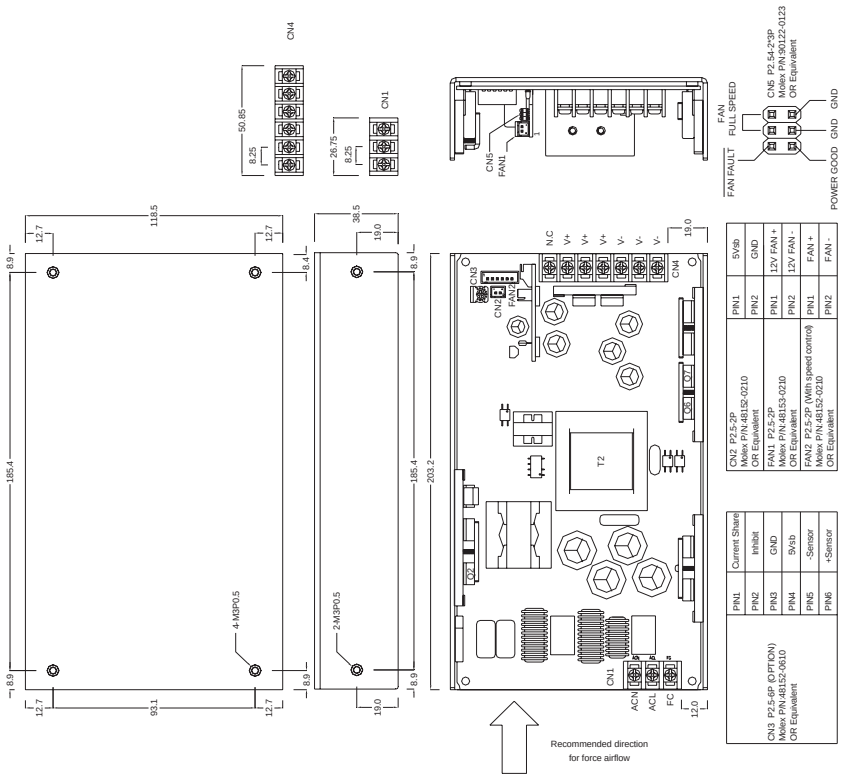
Model Selector

Model	Output Voltage (V)	Maximum Curr. Conv. (A)	Maximum Power Conv. (W)	Maximum Curr. Forced Air	Maximum Pwr Forced Air
CSS500-12	12V	30A	360W	41.67A	500W
CSS500-24	24V	15A	360W	20.84A	500W
CSS500-30	30V	12A	360W	16.67A	500W
CSS500-36	36V	10A	360W	13.89A	500W
CSS500-48	48V	7.5A	360W	10.42A	500W
CSS500-54	54V	6.67A	360W	9.26A	500W
CSS500-57	57V	6.32A	360W	8.78A	500W

Options

Suffix	Mechanical			Safety Certifications	
	U channel	End Fan	Top Fan	Medical	Industrial
Blank	Yes	-	-	Yes	-
/S	-	Yes	-	Yes	-
/T	-	-	Yes	Yes	-
I	Yes	-	-	-	Yes
/SI	-	Yes	-	-	Yes
/TI	-	-	Yes	-	Yes

Outline Drawings



Other Medical AC-DC Products

KM	15 - 40W pcb mount medical
CSS65, 150	40 - 150W open frame
NV175	175 - 200W 1-4 outputs
NV300	300W 1-4 outputs

For Additional Information, please visit
us.tdk-lambda.com/lp/products/css-series.htm

3055 Del Sol Blvd • San Diego, CA 92154 • 1-800-526-2324

Revision A4: Jun 2011

TDK·Lambda

DLP Series

75 to 240W, 24V Output DIN Rail Mount Power Supplies

- Low Cost
- 3 Year Warranty
- UL508 Listed, NEC NFPA70 Class 2[1] (/C2 Models)
- Convection Cooled
- Conforms to EN61000-3-2 (PFC)
- Conducted and Radiated EMI, Class B
- Input Transient Protection, IEC61000-4
- Semi F47 Compliant (DLP180 & 240 only)

RoHS

Specifications

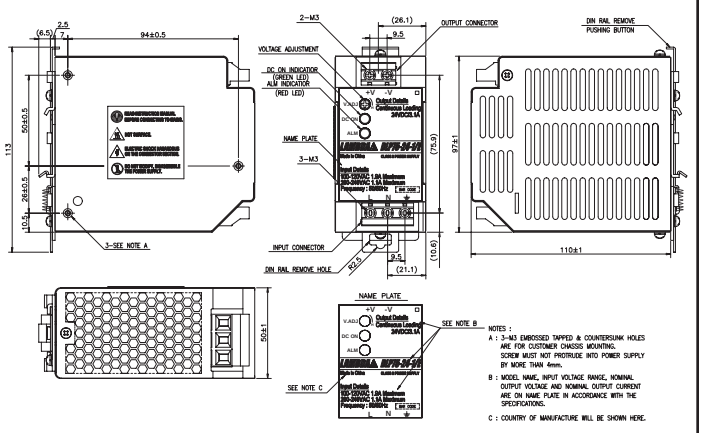
ITEMS \ MODELS		DLP75-24-1/E DLP75-24-1/C2EJ	DLP100-24-1/E DLP100-24-1/C2EJ	DLP120-24-1/E	DLP180-24-1/E	DLP240-24-1/E
Output Voltage	V	24	24	24	24	24
Output Current (/C2 models)	A	3.1 (2.5)	4.1 (3.7)	5.0	7.5	10
Output Power (/C2 models)	W	75 (60)	98.4 (88.8)	120	180	240
Output Voltage Adjustment	V	21.6 - 28 (fixed for /C2 models)				
Load Regulation	-	192mV				
Line Regulation	-	120mV				
Ripple/Noise (0-60°C)	mV	240				
AC Input Voltage & Frequency	-	85-132/170-265VAC, 47-63Hz Auto select			85-265VAC (47-63Hz) or 120-370VDC[2]	
Input Current 100/230VAC	A	1.7/0.8	2.3/1.2	2.4/1.3	2.3/1.0	3.0/1.3
/C2	A	1.4/0.7	2.0/1.0		-	
Efficiency 100/230VAC	%	81/83	82/85	83/85	84/87	82/86
Power Factor	-	Meets EN61000-3-2 (DLP180, 240: >0.95)				
Inrush Current(Typ)100/230VAC	A	20/45				
Leakage Current	mA	Less than 0.75mA				
Hold-up Time 100/230VAC	ms	20/30 (Semi F47 Compliance, DLP 180 & 240 only)				
Overcurrent Protection	-	>105%,Fold Back	>105%, Constant Current			
/C2	-	~2.6A	~3.75A	-		
Overvoltage Protection	-	30-35V, latching, cycle AC line to reset (26-30V DLP75-24-1/C2EJ)				
LED Indicators	-	Green LED = DC ok Red LED = overcurrent				
Operating Temperature (3)	-	Convection cooled, -10°C to 60°C, derate linearly to 60% load from 50 to 60°C				
Storage Temperature	-	-30°C~+85°C				
Humidity (Non-Condensing)	%RH	30-90% operating 10-95% non operating				
Withstand Voltage	-	Input - Ground 2kVAC, Input to Output 3kVAC, Output - Ground 500VAC				
Vibration	-	9.8m/s² (1.0G) at DIN rail; (10-55Hz: 9.8m/s² Constant, X,Y, Z each 1 hour)				
Shock	-	196m/s² (20G)				
Safety Agency Approvals	-	UL508, NEC Class 2[1] (/C2 models), UL60950-1, CSA60950-1, EN60950-1, CE, EN50178 Cat III (Pri)				
Conducted EMI	-	FCC-B, EN55011/EN55022-B, VCCI-B; Meets IEC61000-4-1				
Radiated EMI	-	EN55011/EN55022-B, FCC-Class B, VCCI-B				
ESD	-	IEC61000-4-2 ±10kV (Air), ±5kV (Contact)				
Radiated RFI	-	IEC61000-4-3 80-1000MHz,12V/m 80% AM 1kHz				
Fast Transient Burst	-	IEC61000-4-4 2.4kV 5kHz				
Lightning Surge	-	IEC61000-4-5 4.4kV, 1.2x50μs (Common Mode) 2.4kV 1.2x50μs (Normal)				
Conducted RFI	-	IEC61000-4-6 150kHz-80MHz, 12V, 80% AM 1kHz				
Magnetic Field	-	IEC61000-4-8 36A/m				
Voltage Dips	-	IEC61000-4-11 70% 10ms, 40% 100ms, 0% 5s				
Size	mm	50 x 97 x 110	60 x 97 x 110	60 x 97 x 110	80 x 97 x 110	120 x 97 x 110
Weight	g	470	540	540	780	1000
Warranty	-	3 Years				

(1) Evaluated to NEC NFPA70 Class 2 output per UL1310
(2) DC input is not safety approved
(3) DLP240-24-1/E, 170-265VAC: -10°C~+70°C, derated linearly to 60% load from 50° to 70°C.
DLP75-24-1/C2EJ: -10°C~+70°C, derated linearly to 75% load from 50° to 60°C.
DLP100-24-1/C2EJ: -10°C~+70°C, derated linearly to 80% load from 50° to 60°C.

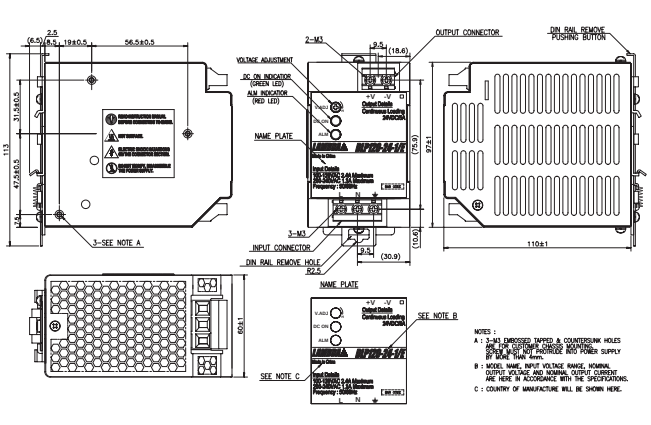
TDK·Lambda

DLP Series

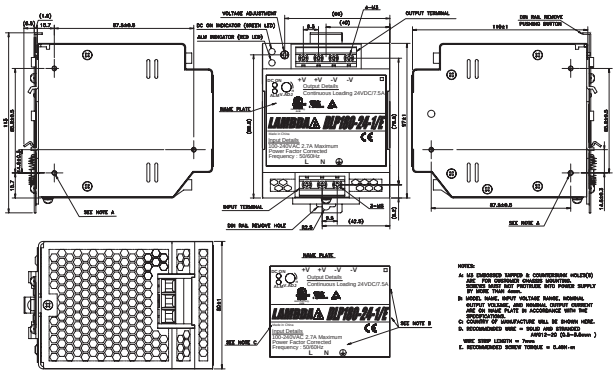
DLP75 Outline



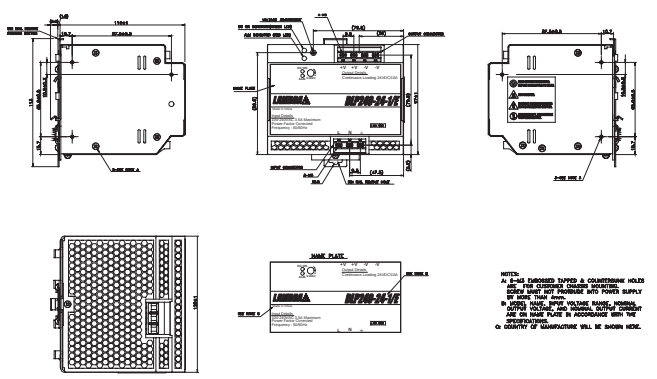
DLP 100/120 Outline



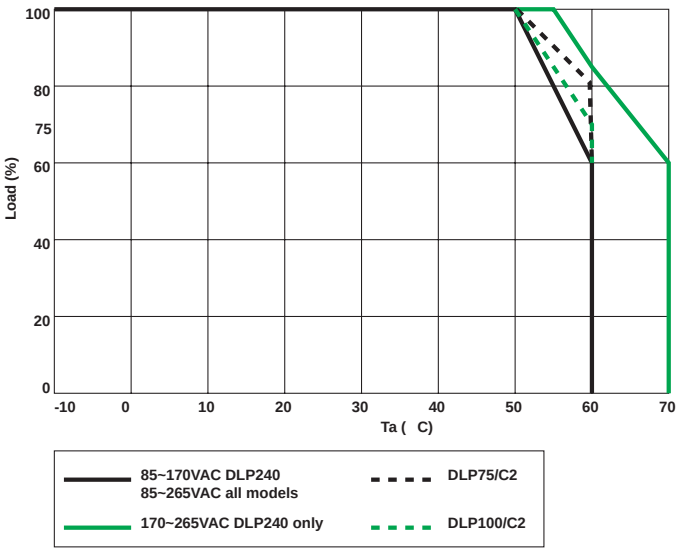
DLP 180 Outline



DLP 240 Outline



Derating Curve



Other Industrial Products

DPP/DSP	10W to 480W Single Output DIN Rail
HWS	15W to 1800W Single Output

Snap-on Mounting: snap onto DIN Rail TS35/7.5 or TS35/15. (no tools required)

For Additional Information, please visit
us.tdk-lambda.com/lp/products/dlp-series.htm

3055 Del Sol Blvd • San Diego, CA 92154 • 1-800-526-2324

Revision A9: Jan 2010

TDK·Lambda

DPP Series

15-100W, 5-48V Output DIN Rail Mount Power Supplies

- Low Cost
- 5V to 48V Outputs
- Universal Input
- Compact Size
- NEC NFPA70 Class 2(2)
- UL508 Listed
- Class 1, Division 2 (ISA 12.12)(3)
- -10 to +71°C Operation
- Convection Cooled

RoHS

Specifications

ITEMS \ MODELS		DPP15	DPP25/30	DPP50	DPP100
AC Input Voltage range	VAC	85 - 264VAC			85 - 132VAC 176 - 264VAC
Input Frequency	Hz	47 - 63Hz			
DC Input Voltage range	-	90 - 375VDC			210 - 375VDC
Inrush Current (115 / 230VAC)	A	<35A	35 / 45A	35 / 50A	35 / 55A
Power Factor	-	Meets EN61000-3-2 Class A			
Input Current (230VAC)	A	0.4	0.72	1.35	2.2
Leakage Current	mA	<0.75mA, 265VAC, 63Hz			
Output Voltage Accuracy	%	±1% (24V outputs preset at 24.5V)			
Line Regulation	%	< 0.5%			
Load Regulation	%	< 0.5%			
Ripple and Noise	mV	50mV			
Overcurrent Protection (Typ)	-	>110% (fold forward type)			
Overvoltage Protection	V	120 - 137.5%, Cycle AC line to reset			
Hold Up Time (115VAC input)	ms	> 20ms			
Parallel switch	-	No			Yes
LED Indicator	-	Green LED = On			
Operating Temperature	-	-10 to +71°C (Derate linearly 5%/°C from 61 to 71°C)			
Storage Temperature	-	-25 to +85°C			
Operating Humidity	-	20 - 90% RH (non condensing)			
Cooling (1)	-	Convection			
Withstand Voltage	-	Input to Output 3kVAC for 1 min.			
Shock	-	Half sine wave, 4G, 22ms, 3 times per face, X, Y, Z			
Vibration	-	10-500Hz (20 min sweep) 0.002G²/Hz, 1 Grms acceleration X, Y, Z, 1 hour			
Isolation Resistance	-	>100M at 25C & 70%RH, Output to Ground 500VDC			
Safety Agency Approvals	-	UL60950-1, UL508, NEC Class 2(2), EN60950-1, CE Mark, ISA 12.12(3)			
Emissions	-	EN55011, EN55022 class B Radiated & Conducted, EN61000-6-3			
Immunity	-	EN61000-6-2, EN61000-4-2 Level 4, EN61000-4-3, EN61000-4-6 Level 3, EN61000-4-4 Level 4 (I/P) Level 3 (O/P), EN61000-4-5 Level 4, EN61000-4-8, EN61000-4-11			
Weight (Typ)	g	130	260		390
Size (WxHxD)	in	0.9x2.95x3.81"	1.77x2.95x3.58"		2.86x2.95x3.81"
Case material	-	Plastic			
MTBF (MIL-HDBK-217F, GF25)	Hours	287,000	>288,000	269,000	239,000
Warranty	-	Two years			

(1) Recommend 1" clearance on all sides.
(2) See model selector. Evaluated to NEC NFPA70 Class 2 output per UL1310.
(3) See model selector.

TDK·Lambda

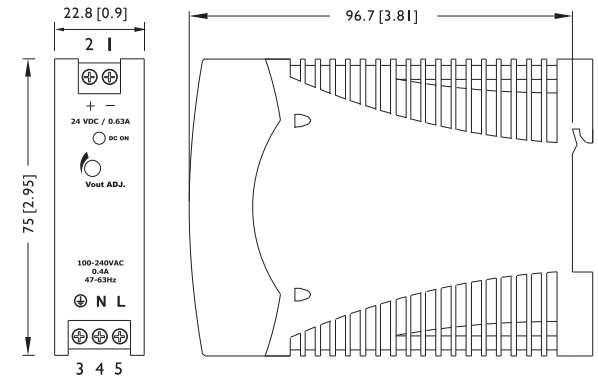
DPP Series

Model Selector

Model	Voltage (V)	Voltage Adjust (V)	Current (A)	Power (W)	Effic. (typ) %	UL1310 Class 2	ISA12.12 Class 1 Div 2
DPP25-5	5	5-6	5.0	25	78	-	Yes
DPP30-12	12	9.9-12.1	2.5	30	83	Yes	Yes
DPP50-15	15	11.9-15.1	3.4	50	85	Yes	Yes
DPP15-24	24	22.5-28.5	0.63	15	81	Yes	-
DPP30-24	24	22.5-28.5	1.3	30	84	Yes	Yes
DPP50-24	24	22.5-28.5	2.1	50	86	Yes	Yes
DPP100-24	24	22.5-28.5	4.2	100	87	-	-
DPP50-48	48	48-56	1.05	50	87	Yes	Yes

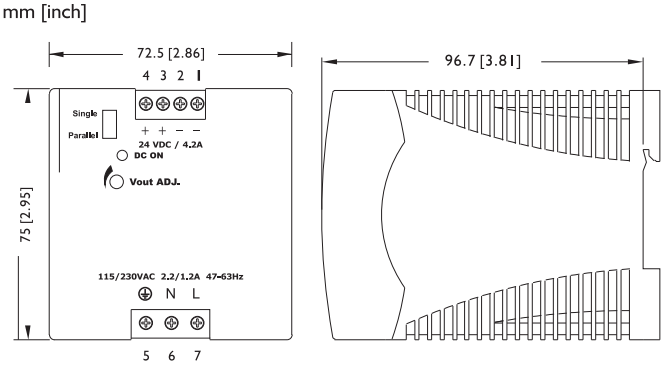
DPP15 Outline

mm [inch]



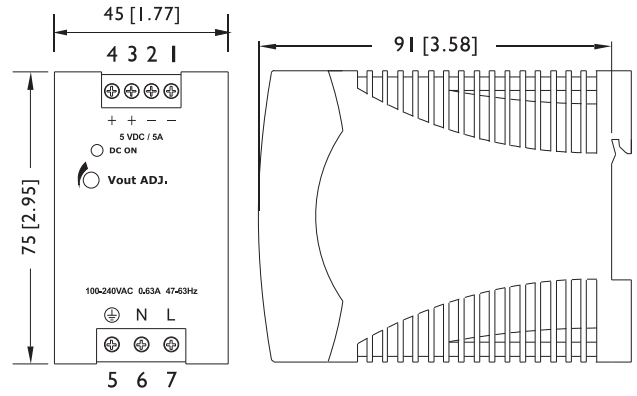
DPP100 Outline

mm [inch]



DPP25-DPP50 Outline

mm [inch]



Installation:

Snap-on Mounting - snap onto DIN Rail TS35/7.5 or TS35/15. (No tools required)
Cooling - Normal Convection
Clearance - 25mm all sides
Connection - Use copper wire 0.5-2.5mm² (AWG24-12)

Other DIN Rail Products

DSP/DPP	10W to 480W power supplies
DLP	75W to 240W power supplies
DLP-PU	Redundancy Module (20A)
R Series	3A to 30A single & three phase EMI Filters

For Additional Information, please visit
us.tdk-lambda.com/lp/products/dpp-series.htm

3055 Del Sol Blvd • San Diego, CA 92154 • 1-800-526-2324

Revision B4: Jun 2011

TDK·Lambda

DPP120-240 Series

120W & 240W DIN Rail Mount Power Supplies

RoHS

- Low Cost
- 12V, 24V or 48V Outputs
- Auto-ranging input (no manual switching)
- Parallel Function Switch
- -25 to +71°C Operation
- Convection Cooled

Specifications

ITEMS \ MODELS		DPP120-xx-1	DPP240-xx-1
AC Input Voltage range	VAC	93 - 132 / 186 - 264VAC, single phase. Auto select	
Input Frequency	Hz	47 - 63Hz	
DC Input Voltage range	VDC	210 - 370VDC	
Inrush Current (115 / 230VAC)	A	24 / 48A	30 / 60A
Power Factor	-	Meets EN61000-3-2	
Input Current (115 / 230VAC)	A	2.8 / 1.4A	5.4 / 2.2A
Output Voltage Accuracy	%	-0, +1% of Nominal	
Line Regulation	%	±0.5%	
Load Regulation	%	±1% (±5% when set in parallel mode)	
Ripple and Noise (20MHz BW)	mV	50mV	100mV
Overcurrent Protection (Typ)	-	110 - 145%	
Overvoltage Protection	V	See model selector	
Overtemperature Protection	-	-	
Hold Up Time (230VAC input)	ms	> 30ms	
Parallel operation	-	Set in parallel (droop) mode - maximum of 3 units	
LED Indicators	-	Green LED = On, Red LED = DC Output Low	
DC Good Relay (24V model only)	-	0.3A rated normally open relay contacts, closes when output is above 17.6 - 19.4V	
Operating Temperature	-	-25 to +71°C (Derate linearly 2.5%/°C from 61 to 71°C)	
Storage Temperature	°C	-25 to +85°C	
Operating Humidity	-	20 - 95% RH (non condensing)	
Cooling (1)	-	Convection	
Withstand Voltage	-	Input to Output 3kVAC for 1 min.	
Isolation Resistance	-	>100M at 25C & 70%RH, Output to Ground 500VDC	
Vibration (Operating)		IEC 60068-2-6 (Mounting by rail: Random wave, 10-500 Hz, 2G, ea. along X, Y, Z axes 10 min/cycle, 60 min)	
Shock (Operating)		IEC 60068-2-27 (Half sine wave, 4G, 22ms, 3 axes, 6 Faces, 3 times for each face)	
Safety Agency Approvals	-	UL508 Listed, UL60950-1, EN60950-1, CE	
Conducted & Radiated EMI	-	EN55022 class B	EN55022 class A
Weight (Typ)	g	920	1000
Size (WxHxD)(1)	in	2.5 x 4.92 x 4.59"	3.27 x 4.92 x 4.57"
Case material	-	Metal	
Warranty	yrs	Two years	

(1) Recommend 1" clearance on all sides

TDK·Lambda

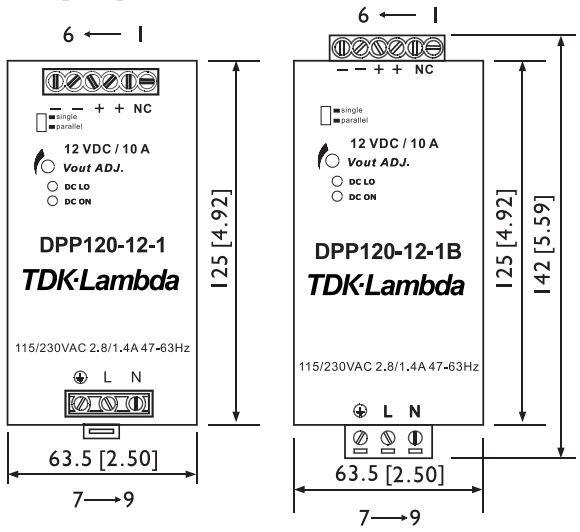
DPP120-240 Series

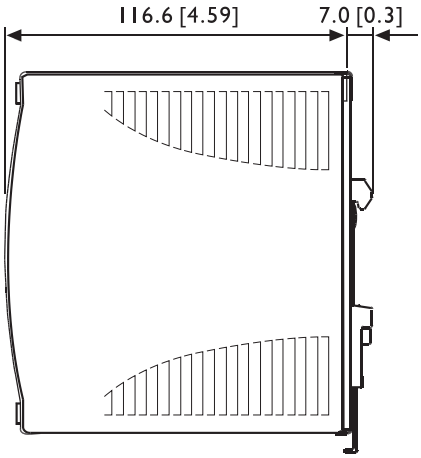
Model Selector

Model	Voltage	Adjust. Range	Output Curr.	Over-voltage	Eff.
DPP120-12-1	12V	11.4 - 14.5V	10A	15 - 17.4V	84%
DPP120-24-1	24V	22.5 - 28.5V	5A	30 - 34.8V	86%
DPP120-48-1	48V	45 - 55V	2.5A	60 - 69.6V	87%
DPP240-24-1	24V	22.5 - 28.5V	10A	30 - 34.8V	89%
DPP240-48-1	48V	47 - 56V	5A	60 - 69.6V	90%

Outline Drawing (DPP120)

mm [inch]





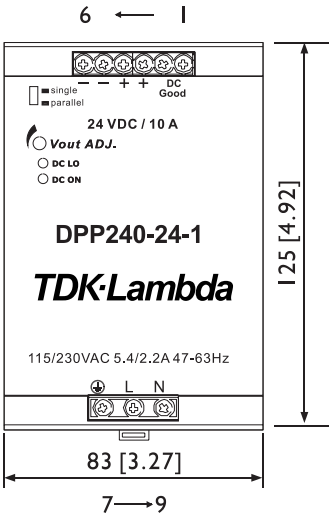
Other DIN Rail Products

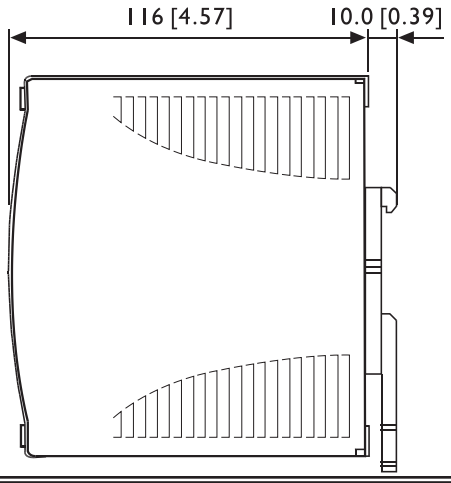
DPP	15W to 100W
DPP480	480W single and three phase
DSP	10W to 100W low profile
DLP	75W to 240W single phase

For Additional Information, please visit
us.tdk-lambda.com/lp/products/dpp-series.htm

Outline Drawing (DPP240)

mm [inch]





Terminal Assignments

#	Function
1	DC Good relay
2	DC Good relay
3	+V
4	+V
5	-V
6	-V
7	Chassis ground
8	L
9	N

Snap-on Mounting: snap onto DIN Rail TS35/7.5 or TS35/15. (no tools required)

Options

Suffix	Description
Blank	Non detachable connectors
B	Detachable input and output connectors

3055 Del Sol Blvd • San Diego, CA 92154 • 1-800-526-2324

Revision A4: Jul 2010

TDK·Lambda

DPP120-960 Series

120W, 240W, 480W & 960W 3 Phase DIN Rail Mount Power Supplies

- Low Cost
- 12V, 24V or 48V Outputs
- Wide Range 340 to 575VAC Input
- Parallel Function Switch (240 & 480W)
- Current Share (960W)
- -25 to +71°C Operation
- Convection Cooled

RoHS

Specifications

ITEMS / MODELS		DPP120-xx-3	DPP240-xx-3	DPP480-xx-3	DPP960-xx-3
AC Input Voltage range (1)	VAC	340 - 575VAC, three phase			
Input Frequency	Hz	47 - 63Hz			
DC Input Voltage range	VDC	480 - 820VDC			
Inrush Current (380-480VAC)	A	10A	20A	20A	30A
Power Factor (2)	-	0.55	0.55	0.65	0.8
Input Current (400VAC) (typ)	A	0.36A	0.65A	1.1A	1.72A
Output Voltage Accuracy	%	-0, +1% of Nominal			
Line Regulation	%	±1%			
Load Regulation	%	±1%	±1% (±5% when set in parallel mode)		
Ripple and Noise (20MHz BW)	mV	100mV	100mV	100mV	80mV
Overcurrent Protection (Typ)	-	115 - 135%	120 - 140%	110 - 135%	110 - 130%
Overvoltage Protection	V	See model selector			
Overtemperature Protection	-	Yes, auto recovery			
Hold Up Time (380-480VAC)	ms	> 20ms	> 20ms	> 20ms	> 15ms
Parallel operation (up to 90% load)	-	-	Set in parallel (droop) mode - up to 2 units		
LED Indicators	-	Green LED = On, Red LED = DC Output Low			
DC Good Relay (24V models only)	-	0.3A rated normally open relay contacts, closes when output is above 17.6 - 19.4V			
Operating Temperature	-	-25 to +71°C(Derate linearly 2.5%/°C from 61 to 71°C, 3.5%/°C for DPP960)"			
Storage Temperature	-	-25 to +85°C			
Operating Humidity (non condensing)	-	20 - 95% RH			
Cooling	-	Convection. Recommend 1" clearance on all sides			
Withstand Voltage	-	Input to Output 3kVAC, Input to Ground 1.5kVAC for 1 min.			
Isolation Resistance	-	>100M at 25°C & 70%RH, Output to Ground 500VDC			
Vibration	-	IEC 60068-2-6. 10- 500Hz, 2G on X, Y & Z axes			
Shock	-	IEC 60068-2-27. Half sinewave, 4G, 22ms, 3 times each face			
Vibration (Operating)		IEC 60068-2-6 (Mounting by rail: Random wave, 10-500 Hz, 2G, ea. along X, Y, Z axes 10 min/cycle, 60 min)			
Shock (Operating)		IEC 60068-2-27 (Half sine wave, 4G, 22ms, 3 axes, 6 Faces, 3 times for each face)			
Safety Agency Approvals	-	UL508 Listed, UL60950-1, EN60950-1, CE			
Conducted & Radiated EMI	-	EN55022 class B			
Immunity	-	IEC 61000-4-2, -3, 4, -5, -6. -8, -11			
Weight (Typ)	g	800g	1100g	1720g	3400g
Size (WxHxD)	Inches	2.92 x 4.88 x 4.68"	3.5 x 4.88 x 4.68"	5.91 x 4.88 x 4.68"	10.86 x 4.97 x 4.68"
Switching Frequency	kHz	70kHz	25kHz	80kHz	52kHz
MTBF (Bellcore Issue 6 @40°C, GB)	Hours	527,000	488,000	411,000	352,000
Case material	-	Metal			
Warranty	yrs	Two years			

(1) Single phase input is permissible, but output load must be derated to 75% load
(2) Passive, meets EN61000-3-2

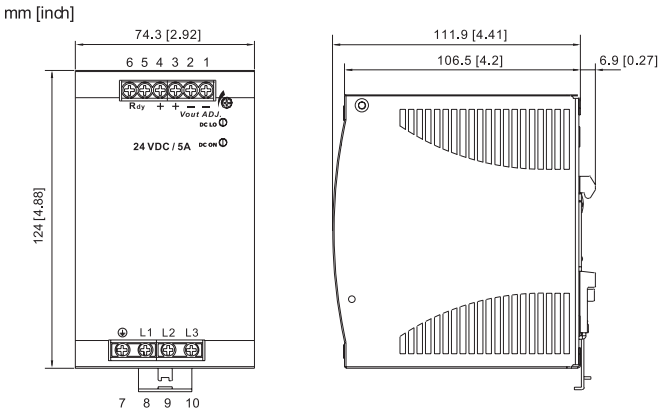
TDK·Lambda

DPP120-960 Series

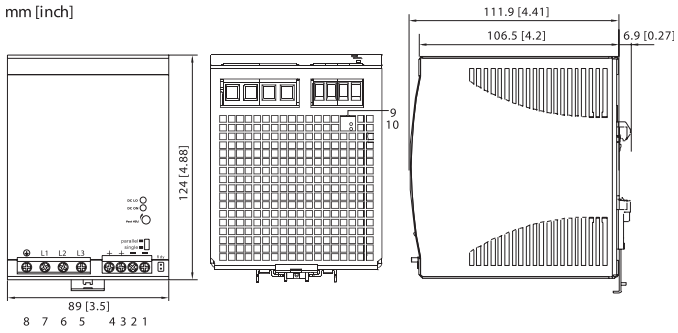
Model Selector

Model	Voltage (V)	Adjust Range (V)	Output Current (A)	Overvoltage (V)	Efficiency (%)
DPP120-12-3	12V	11.4 - 14.5V	10A	14.5 - 17.4V	87%
DPP120-24-3	24V	22.5 - 28.5V	5A	30 - 33V	89%
DPP240-24-3	24V	22.5 - 28.5V	10A	30 - 33V	90%
DPP480-24-3	24V	22.5 - 28.5V	20A	30 - 33V	90%
DPP960-24-3	24V	22.5 - 28.5V	40A	30 - 33V	92%
DPP240-48-3	48V	47 - 56V	5A	60 - 68V	91%
DPP480-48-3	48V	47 - 56V	10A	60 - 68V	91%
DPP960-48-3	48V	47 - 56V	20A	60 - 68V	93%

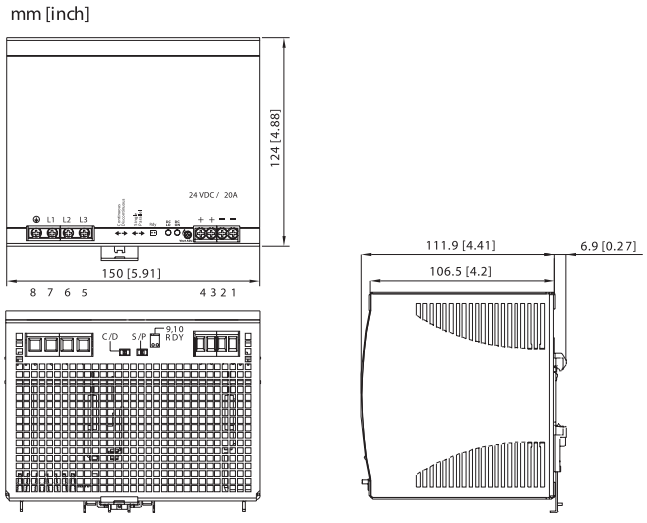
DPP120 Outline



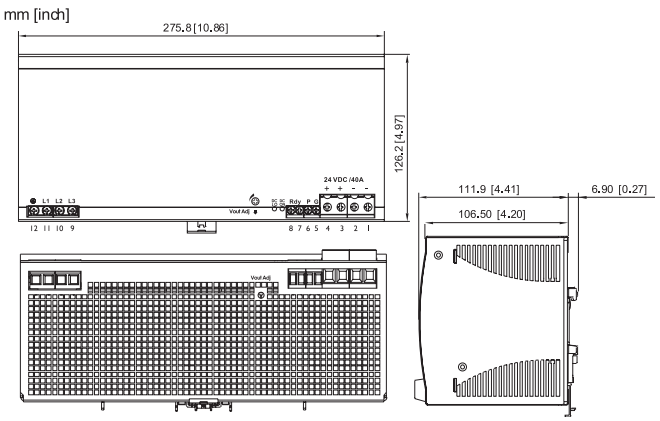
DPP240 Outline



DPP480 Outline



DPP960 Outline



Snap-on Mounting: snap onto DIN Rail TS35/7.5 or TS35/15. (no tools required)

For Additional Information, please visit us.tdk-lambda.com/lp/products/dpp-series.htm

Other DIN Rail Products

DPP	15W to 480W
DSP	10W to 100W low profile
DLP	75W to 240W single phase

3055 Del Sol Blvd • San Diego, CA 92154 • 1-800-526-2324

Revision A5: May 2010

TDK·Lambda

DPP480 Series

480W Single Output DIN Rail Mount Power Supplies

- Low Cost
- 24V or 48V Outputs
- Wide Range AC Input
- Active PFC
- Parallel Function Switch
- -25 to +71°C Operation
- Convection Cooled

RoHS

Specifications

ITEMS / MODELS		DPP480-xx-1
AC Input Voltage range	VAC	90 - 264VAC, single phase
Input Frequency	Hz	47 - 63Hz
DC Input Voltage range	VDC	120 - 370VDC
Inrush Current	A	25 / 50A (115 / 230VAC)
Power Factor	-	Meets EN61000-3-2 Class A
Input Current	A	6.9 / 3.3A (115 / 230VAC)
Output Voltage Accuracy	%	-0, +1% of Nominal
Line Regulation	%	±0.5%
Load Regulation	%	±1% (±5% when set in parallel mode)
Ripple and Noise (20MHz BW)	mV	100mV
Overcurrent Protection (Typ)	-	110 - 140%
Overvoltage Protection	V	See model selector
Overtemperature Protection	-	-
Hold Up Time (115VAC input)	ms	> 35ms
Parallel operation	-	Set in parallel (droop) mode - maximum of 3
LED Indicators	-	Green LED = On, Red LED = DC Output Low
DC Good Relay (24V model only)	-	0.3A rated normally open relay contacts, closes when output is above 17.6 - 19.4V
Operating Temperature	°C	-25 to +71°C (Derate linearly 2.5%/°C from 56 to 71°C)
Storage Temperature	°C	-25 to +85°C
Operating Humidity	-	20 - 95% RH (non condensing)
Cooling (1)	-	Convection
Withstand Voltage	-	Input to Output 3kVAC for 1 min.
Isolation Resistance	-	>100M at 25°C & 70%RH, Output to Ground 500VDC
Vibration (Operating)		IEC 60068-2-6 (Mounting by rail: Random wave, 10-500 Hz, 2G, ea. along X, Y, Z axes 10 min/cycle, 60 min)
Shock (Operating)		IEC 60068-2-27 (Half sine wave, 4G, 22ms, 3 axes, 6 Faces, 3 times for each face)
Safety Agency Approvals	-	UL508 Listed, UL60950-1, EN60950-1, CE
Conducted & Radiated EMI	-	EN55022 class B
Weight (Typ)	g	1800g
Size (WxHxD)	In	6.89 x 4.92 x 4.57
Case material	-	Metal
Warranty	yrs	Two years

(1) Recommend 1" clearance on all sides

TDK·Lambda

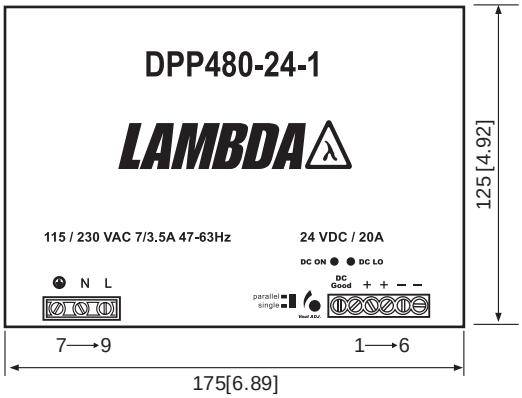
DPP480 Series

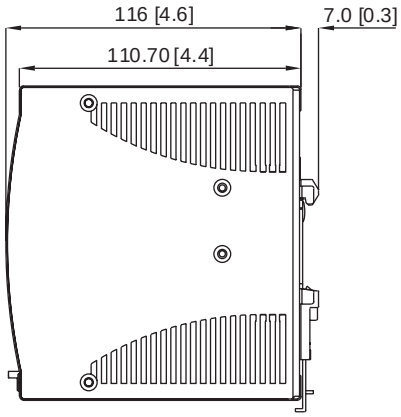
Model Selector

Model	Voltage	Adjust. Range	Output Current	Over-voltage	Eff.
DPP480-24-1	24V	22.5 - 28.5V	20A	30 - 33V	89%
DPP480-48-1	48V	47 - 56V	10A	57 - 63V	90%

Outline Drawing (DPP480-24-1)

mm [inch]





Accepts TS35/7.5 or TS35/15 DIN Rails

Terminal Assignments

#	DPP480-xx-1
1	DC Good relay
2	DC Good relay
3	+V
4	+V
5	-V
6	-V
7	Chassis ground
8	N
9	L
10	No connection

Snap-on Mounting: snap onto DIN Rail TS35/7.5 or TS35/15. (no tools required)

Options

Suffix	Description
Blank	Non detachable connectors
B	Detachable input and output connectors

Other DIN Rail Products

DPP/DSP	10W to 960W, 5V to 48V power supplies
DLP	75W to 240W power supplies
DLP-PU	Redundancy Module (20A)
R Series	6A to 1000A single & three phase EMI Filters

For Additional Information, please visit
us.tdk-lambda.com/lp/products/dpp-series.htm

3055 Del Sol Blvd • San Diego, CA 92154 • 1-800-526-2324

Revision B5: Jan 2010

TDK·Lambda

DSP Series

7.5W to 100W Low Profile DIN Rail Mount Power Supplies

RoHS

- Low Profile for Building Automation
- 5V to 24V Outputs
- Wide Range AC Input
- UL1310 Class 2[1]
- Class II Double Insulation
- -25 to +71°C Operation
- Convection Cooled
- DIN Rail or Chassis Mount

Features and Benefits

Feature	Benefit
◆ Low 2.2" Profile	◆ Fits into wall mounted cabinets
◆ Wide Range AC	◆ Global use with no input selector switches
◆ Convection cooled	◆ No system fan required

Specifications

ITEMS / MODEL		DSP10	DSP30	DSP60	DSP100
AC Input Voltage range	VAC	90 - 264VAC, Class II double insulated (No ground connection required)			
Input Frequency	Hz	47 - 63Hz			
DC Input Voltage range	VDC	120 - 370VDC			
Inrush Current (115 / 230VAC)	A	15 / 30A	25 / 50A	30 / 60A	30 / 60A
Power Factor & Flicker	-	Meets EN61000-3-2, EN61000-3-3			
Output Voltage Accuracy	%	±1% of Nominal			
Line Regulation	%	1%			
Load Regulation	%	1%			
Ripple and Noise (20MHz BW)	mV	50mV			
Overcurrent Protection (Typ)	-	110 - 160%, fold forward under short circuit (DSP100-24/C2 102-108%)			
Overvoltage Protection	V	120 - 145%			
Hold Up Time (115VAC input)	ms	See Model Selector			
LED Indicators	-	Green LED = On, Red LED = DC Output Low			
Operating Temperature	-	-25 to +71°C (Derate linearly 2.5%/°C from 55 to 71°C)			
Temperature Coefficient	%/°C	±0.02%/°C			
Storage Temperature	-	-25 to +85°C			
Operating Humidity	-	20 - 95% RH (non condensing)			
Cooling	-	Convection			
Withstand Voltage	-	Input to Output 3kVAC for 1 min.			
Isolation Resistance	-	>100M at 25°C & 70%RH, Input to Output 500VDC			
Vibration (Operating)		IEC 60068-2-6 (Mounting by rail: Random wave, 10-500 Hz, 2G, ea. along X, Y, Z axes 10 min/cycle, 60 min)			
Shock (Operating)		IEC 60068-2-27 (Half sine wave, 4G, 22ms, 3 axes, 6 Faces, 3 times for each face)			
Safety Agency Approvals	-	UL1310 Class 2[1], UL508 Listed, UL60950-1, EN60950-1, CE			
Immunity	-	EN61000-4-2, -3, -4, -5, -6, -8 & -11			
Conducted & Radiated EMI	-	DSP10: EN55022 Class B; DSP30-100: EN55022 Class A			
Weight (Typ)	g	60	200	250	320
Size (WxHxD)	in	0.71 x 3.58 x 2.19"	2.09 x 3.58 x 2.19"	2.8 x 3.58 x 2.19"	3.54 x 3.58 x 2.19"
Case material	-	Plastic			
Warranty	yrs	Two years			

(1) See model selector on page 2.

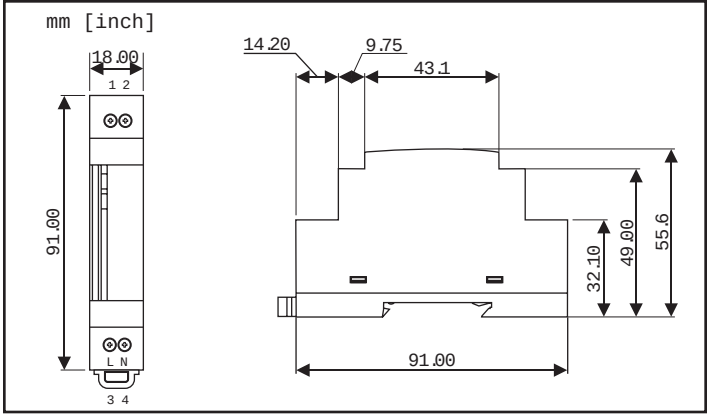
TDK·Lambda

DSP Series

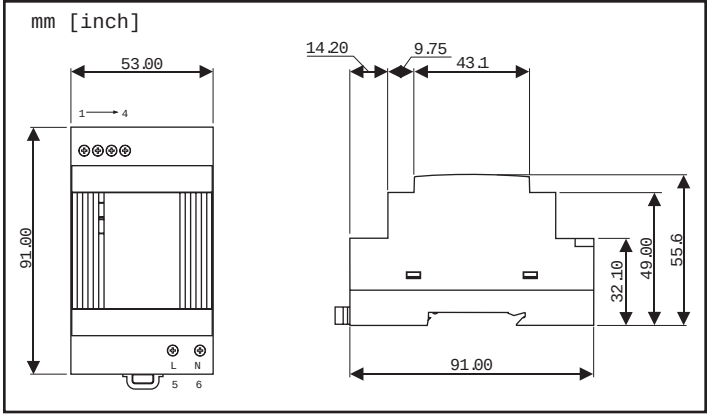
Model Selector

Model	Voltage (V)	Voltage Adjust (V)	Current (A)	Power (W)	Efficiency (Typ %)	Hold Up Time 115VAC in (ms)	UL1310 Class 2
DSP10-5	5	None	1.50	7.5	74	10	Yes
DSP30-5	5	5 - 5.5	3.00	15.0	74	25	Yes
DSP60-5	5	5 - 5.5	7.00	35.0	80	16	-
DSP10-12	12	None	0.83	10.0	78	10	Yes
DSP30-12	12	12 - 14	2.10	25.2	82	25	Yes
DSP60-12	12	12 - 14	4.50	54.0	84	16	Yes
DSP100-12	12	12 - 14	6.00	72.0	82	16	-
DSP10-15	15	None	0.67	10.1	78	60	Yes
DSP30-15	15	13.5 - 16.5	2.00	30.0	83	25	Yes
DSP60-15	15	13.5 - 16.5	4.00	60.0	85	12	Yes
DSP100-15	15	13.5 - 16.5	5.00	75.0	85	16	-
DSP10-24	24	None	0.42	10.1	80	60	Yes
DSP30-24	24	24 - 28	1.30	31.2	83	25	Yes
DSP60-24	24	24 - 28	2.50	60.0	86	12	Yes
DSP100-24/C2	24	20 - 24.2	3.80	91.2	89	10	Yes
DSP100-24	24	24 - 28	4.20	100.8	85	10	-

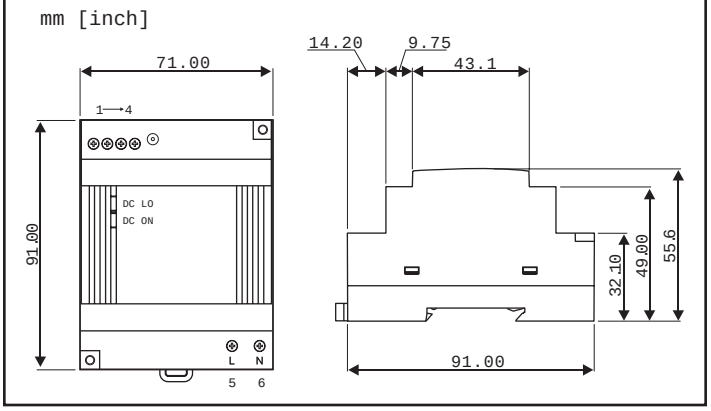
DSP10 Outline Drawing



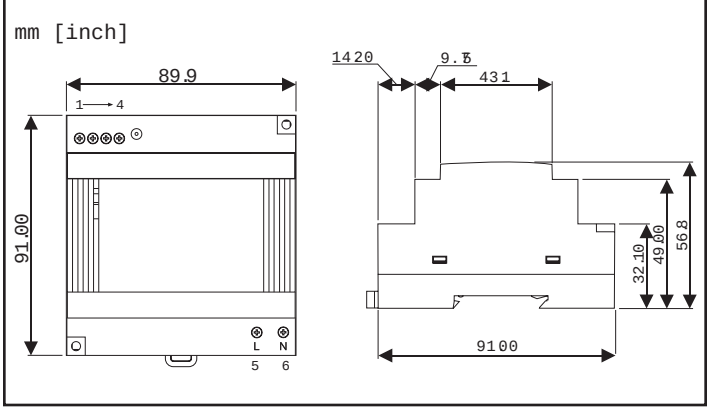
DSP30 Outline Drawing



DSP60 Outline Drawing



DSP100 Outline Drawing



Other DIN Rail Products

DSP/DPP	10W to 480W, 5V to 48V power supplies
DLP	75W to 240W power supplies
DLP-PU	Redundancy Module (20A)
R Series	3A to 30A single & three phase EMI Filters

Snap-on Mounting: snap onto DIN Rail TS35/7.5 or TS35/15. (no tools required)

For Additional Information, please visit
us.tdk-lambda.com/lp/products/dsp-series.htm

3055 Del Sol Blvd • San Diego, CA 92154 • 1-800-526-2324

Revision B3: Nov 2010

TDK·Lambda

DT62/80-C Series

62W to 80W AC-DC External Power Supplies

- CEC, & EISA(1) Compliant Models
- Wide Range AC Input
- Power Factor Correction (DT80)
- Low Profile & Lightweight

RoHS

Features and Benefits

Feature	Benefit
◆ CEC and EISA Compliant	◆ Easier system compliance
◆ Wide Range AC Input	◆ Global Operation
◆ > 85% Efficient	◆ Consumes less energy

Specifications

ITEMS / MODELS		DT62PWxxx-C	DT80PWxxx-C
Input Voltage range	VAC	90 - 264VAC (47 - 63Hz)	
Inrush Current	A	<50A at 230VAC input, 25°C ambient cold start	
Input Current (Maximum)	A	2.5A	
Power Factor	-	None	Typically 0.9 at full load(Meets EN61000-3-2)
Leakage Current (typ, 264VAC 63Hz)	mA	0.7mA	
Hold Up Time (Typ)	ms	16ms at 115VAC input	
Temperature Coefficient	°C	±0.05%/°C	
Voltage Accuracy	%	±1%	
Adjustment Range	-	None	
Minimum Load	-	None	
Total Regulation	-	±5%	
Ripple & Noise	%	1%	
Short Circuit Protection	-	Continuous - hiccup mode (110-160%)	
Overvoltage Protection	V	110 - 130% of nominal (Cycle input power to reset)	
Efficiency	%	>85% typical	
Operating Temperature	°C	0 to +40°C Full load, derate linearly to 50% load at 60°C	
Storage Temperature	°C	-10 to +70°C	
Humidity (non condensing)	-	10 - 90% RH	
Cooling	-	Convection	
Withstand Voltage	-	Input to Ground 1.5kVAC, Input to Output 3kVAC (Output is connected to Ground)	
Vibration (non operating)	-	23.52m/s² (10 - 55Hz: constant sweep 1 min X, Y, Z for 1 hour)	
Shock	-	< 196.1 m/s² (20G)	
Safety Agency Approvals	-	UL60950-1, EN609501-1, IEC60950-1	
California Energy Commission (CEC)	-	See model selector	
EISA (1)	-	See model selector	
Offload Power Consumption	W	< 0.5W	
Conducted & Radiated EMI	-	EN55022-B, FCC Class B	
Immunity	-	EN55024	
Weight (Typ)	g	410g	
Size (WxLxH)	in	2.71 x 5.2 x 1.57	
Cable Length and Thickness	mm	1050mm	
AC Input Connector	-	IEC 320-C14 (Accepts IEC 320-C13)	
Output Connector	-	Kycon KPPx-4P or equivalent. Pins 1 & 2: -Vout, Pins 3 & 4: +Vout	
MTBF (MIL-HNBK), 100% load, 25C	hours	223,933 Hours	203,109 Hours
Warranty	yrs	One Year	

(1) EISA - Energy Independence and Security Act of 2007.

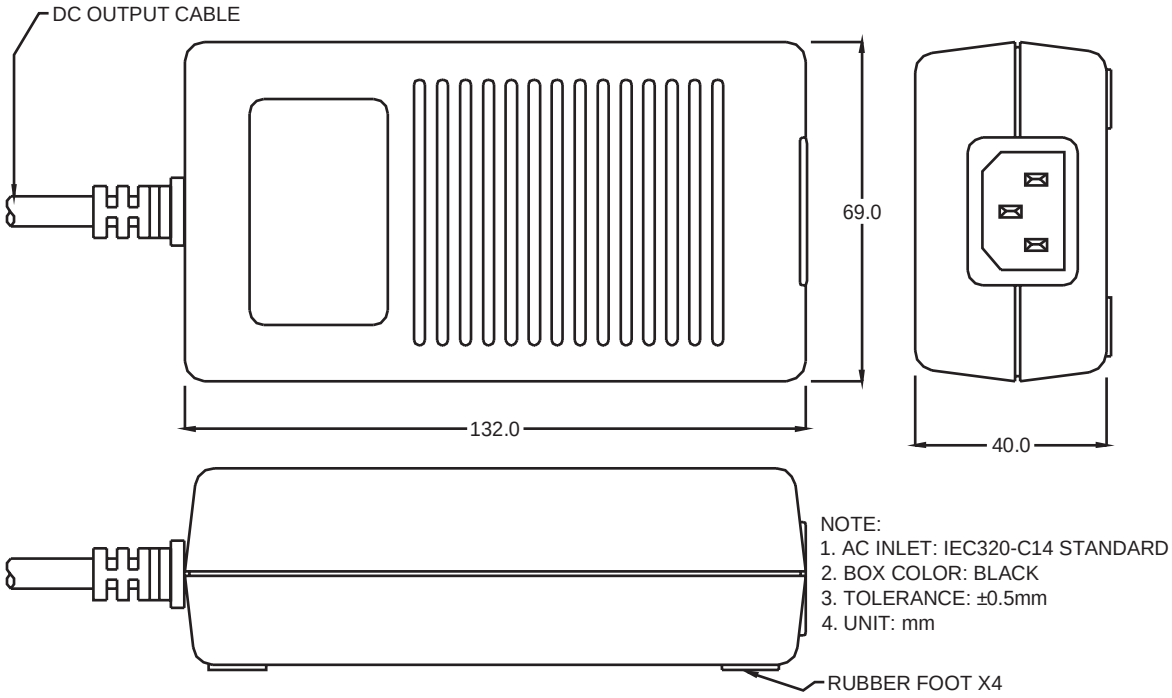
TDK·Lambda

DT62/80-C Series

Output Ratings

Model	Output (V)	Maximum Output (A)	Maximum Power (W)	CEC IV	CEC V	EISA Level IV	EISA Level V
DT62PW090C	9	5.56	50	-	-	-	-
DT62PW120C	12	5.17	62	Y	-	Y	-
DT62PW150C	15	4.14	62	-	Y	-	Y
DT62PW180C	18	3.54	64	-	Y	-	Y
DT62PW240C	24	2.59	62	-	Y	-	Y
DT80PW090C	9	8.00	72	-	-	-	-
DT80PW120C	12	6.67	80	Y	-	Y	-
DT80PW150C	15	5.33	80	Y	-	Y	-
DT80PW180C	18	4.45	80	-	Y	-	Y
DT80PW240C	24	3.34	80	-	Y	-	Y

Outline Drawings



Other AC-DC Products

DTM65-C	65W CEC Compliant Medical Adapters
DT100/150-C	100W to 150W CEC Compliant Adapters
DTM110-C	110W CEC Compliant Medical Adapters

For Additional Information, please visit
us.tdk-lambda.com/lp/products/dt-c-series.htm

3055 Del Sol Blvd • San Diego, CA 92154 • 1-800-526-2324

Revision A3: Apr 2011

TDK·Lambda

DT100/150-C

100W to 150W AC-DC External Power Supplies

- CEC and EISA[1] Compliant Models
- Wide Range AC Input
- Power Factor Correction
- Low Profile & Lightweight

RoHS

Features and Benefits

Feature	Benefit
◆ CEC and EISA Compliant	◆ Easier system compliance
◆ Wide Range AC Input	◆ Global Operation
◆ ≥ 87% Avg. Active Efficiency	◆ Consumes less energy

Specifications

ITEMS / MODELS		DT100PWxxx-C	DT150PWxxx-C
Input Voltage range	-	90 - 264VAC (47 - 63Hz)	
Inrush Current	A	<60A at 230VAC input, 25°C ambient cold start	
Input Current (Maximum)	A	2.5A	
Power Factor	-	Typically 0.9 at full load (Meets EN61000-3-2)	
Leakage Current	µA	TBA	
Hold Up Time (Typ)	ms	16ms at 115VAC input	
Temperature Coefficient	-	±0.05%/°C	
Voltage Accuracy	%	±1%	
Adjustment Range	-	None	
Minimum Load	A	None	
Total Regulation	-	+5% / -2%	
Ripple & Noise	%	See model selector	
Short Circuit Protection	-	Continuous - hiccup mode	
Overvoltage Protection	V	110 - 130% of nominal (Cycle input power to reset)	
Efficiency	%	≥ 87% Avg. Active Efficiency	
Operating Temperature	°C	0 to +40°C	
Storage Temperature	°C	-10 to +70°C	
Humidity (non condensing)	-	20 - 90% RH	
Cooling	-	Convection	
Withstand Voltage	-	Input to Ground 1.5kVAC, Input to Output 3kVAC for 1 min. (Output is connected to Ground internally).	
Isolation Resistance	-	>20M at 25°C & 70%RH, Output to Ground 500VDC	
Vibration (non operating)	-	23.52m/s² (10 - 55Hz: constant sweep 1 min X, Y, Z for 1 hour)	
Shock	-	< 196.1 m/s² (20G)	
Safety Agency Approvals	-	UL60950-1, EN609501-1, IEC60950-1	
California Energy Commission (CEC)	-	Efficiency Mark V	
EISA	-	Efficiency Mark V	
Offload Power Consumption	-	< 0.5W	
Conducted & Radiated EMI	-	EN55022-B, FCC Class B	
Immunity	-	EN55024	
Weight (Typ)	g	TBA	
Size (WxLxH)	in	3.35 x 6.7 x 1.73"	
Cable Length & Thickness	mm	1050mm; 12 to 24V Models: #14 AWG, 36 to 48V Models: #16 AWG	
AC Input Connector	-	IEC 320-C14 (Accepts IEC 320-C13)	
Output Connector	-	Kycon KPPx-4P or equivalent Pins 1 & 2: -Vout, Pins 3 & 4: +Vout	
MTBF	-	140,000 hours, 100% load, 25°C ambient, MIL-HNBK	
Warranty	yr	One Year	

(1) EISA - Energy Independence and Security Act of 2007

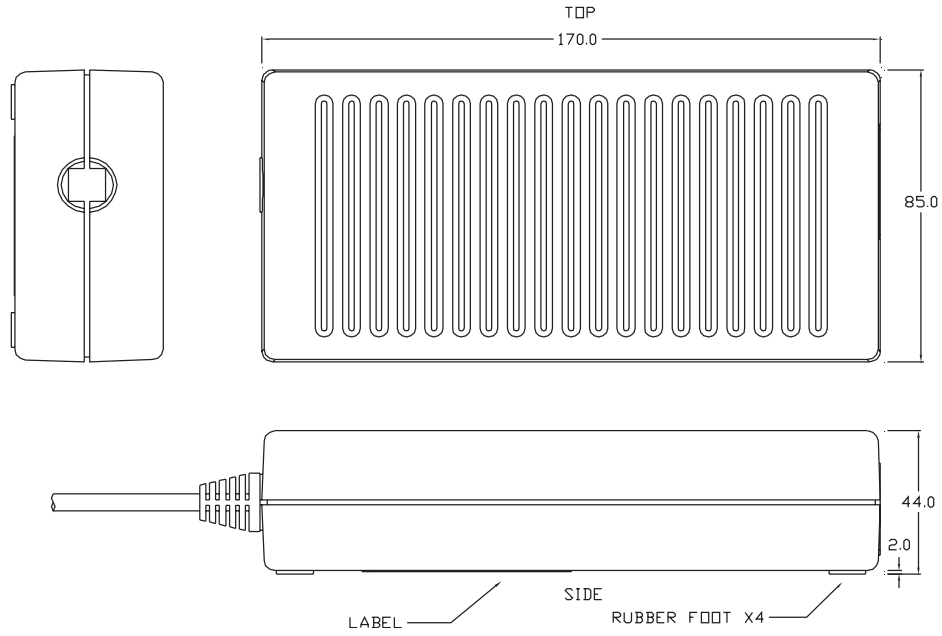
TDK·Lambda

DT100/150-C

Output Ratings

Model	Output (V)	Maximum Output (A)	Maximum Power (W)	Ripple & Noise (mV)	CEC V	EISA Efficiency Level V
DT100PW120C	12	8.34	100	240	Y	Y
DT100PW160C	16	6.25	100	320	Y	Y
DT100PW190C	19	5.27	100	380	Y	Y
DT100PW240C	24	4.17	100	480	Y	Y
DT100PW360C	36	2.78	100	480	Y	Y
DT100PW480C	48	2.09	100	480	Y	Y
DT150PW120C	12	11.67	140	240	Y	Y
DT150PW160C	16	9.38	150	320	Y	Y
DT150PW190C	19	7.90	150	380	Y	Y
DT150PW240C	24	6.25	150	480	Y	Y
DT150PW360C	36	4.17	150	480	Y	Y
DT150PW480C	48	3.13	150	480	Y	Y

Outline Drawings



Note:
1. AC INLET: IEC320-C14 STANDARD
2. CASE COLOR: BLACK
3. TOLERANCE: ±0.5mm
4. UNIT: mm

Other AC-DC Products

DT62-C	62W CEC Compliant Adapters
DTM65-C	65W CEC Compliant Medical Adapters
DT80-C	80W CEC Compliant Adapters
DTM110-C	110W CEC Compliant Medical Adapters

For Additional Information, please visit
us.tdk-lambda.com/lp/products/dt-series.htm

3055 Del Sol Blvd • San Diego, CA 92154 • 1-800-526-2324

Revision A9: Apr 2011

TDK·Lambda

EFE300 & EFE400

300W / 400W, 3 x 5" / 3 x 6" Power Supplies

- High Efficiency
- Active Power Factor Correction
- Universal Input (90 - 264VAC)
- High peak loading capability
- Suitable for 1U applications

RoHS

Key Market Segments & Applications

Broadcast
Test & Measurement
Network servers and routers

Features and Benefits

Feature	Benefit
◆ Full Digital Control	◆ Improved product performance
◆ High Efficiency	◆ Less heat dissipated in system
◆ Low Profile	◆ Fits in 1U enclosures
◆ Power Factor Corrected	◆ Supports Global Use

Specifications

ITEMS		EFE300	EFE400
Input Voltage range	-	90 - 264VAC, 120 - 350VDC	
Input Frequency	-	47 - 63Hz, 440Hz with reduced PFC	
Inrush Current (3)	A	<20A	<30A
Power Factor Harmonics	-	EN61000-3-2 Compliant (0.97 typical)	
Voltage Setting Range	-	-5% to +10% (Chosen at time of ordering)	
Voltage Setting Accuracy	-	±1% at 50% load	
Total Regulation	-	< 4% with 90 - 264VAC input change and 0-100% load change	
Ripple & Noise	mV	<1.5% pk-pk	
Efficiency	-	90% typical	
Minimum Load	A	None	
Overcurrent Protection	-	Automatic recovery upon overload removal	
Overvoltage Protection	V	Cycle AC line to reset	
Overtemperature Protection	-	Yes	
Hold Up Time (Typ)	ms	>16ms at 90VAC input, 75% load	
Leakage Current (max)	mA	1.5mA at 264VAC, 63Hz	
Fan Supply	-	12V 0.25A (Available if no fan option selected)	
Remote Sense	-	None	
Operating Temperature (2)	-	0 to +70°C. Derate linearily to 50% load from 50°C to 70°C	
Storage Temperature	-	-40 to +85°C	
Humidity (non condensing)	-	5 - 95% RH	
Cooling	-	Forced air, 2m/s from input to output (approximately 10CFM)	
Isolation	-	Input to Ground 2.3kVDC, Input to Output 4.3kVDC, Output to Ground 200VDC	
Vibration (non operating)	-	2G, 10-500Hz (sweep & endurance at resonance) in all 3 planes. MIL-STD-810E, Method 516.5, Pro I, IV, V	
Shock	-	30G per IEC68-2-27, MIL-STD-810E, Method 514.4, Pro 1, Cat 1, 9.	
Safety Agency Approvals*	-	UL60950-1, CSA22.2 No 60950-1, EN60950-1, EN61010-1, IEC61010-1, CE for LVD	
Immunity	-	EN61000-4-2, -3, -4, -5, -6, -8, -11, -12, -14	
Conducted Emissions & Flicker	-	EN55011, EN55022 Class B (per CISPR.11/22), EN61000-3-3	
Radiated Emissions	-	EN55011, EN55022 Class B (per CISPR.11/22)	
Weight (open frame or enclosed)	g	310g or 550g	430g or 650g
Size (Open frame style) (1)	in	3 x 5 x 1.34"	3 x 6 x 1.34"
Warranty	yrs	Three Years	

(1) Including underside component leads

(2) -20°C cold start
(3) At 25°C, 230VAC and cold start

TDK·Lambda

EFE300 & EFE400

Model Selector

Product Code	Part Description	Style	Output Voltage (V)	Output Current (A)	Average Output Power (W)	Peak Output Current (A)(3)	Peak Output Power (W)(3)
U2Y002G	EFE300-12-CNMDS	Open Frame	12	25.0	300	33.30	400
U2Y003H	EFE300-12-ECMDS	With Fan	12	25.0	300	33.30	400
U4Y002H	EFE400-12-CNMDS	Open Frame	12	33.3	400	44.17	530
U4Y003J	EFE400-12-ECMDS	With Fan	12	33.3	400	44.17	530
U2Y005K	EFE300-24-CNMDS	Open Frame	24	12.5	300	16.70	400
U2Y006L	EFE300-24-ECMDS	With Fan	24	12.5	300	16.70	400
U4Y005L	EFE400-24-CNMDS	Open Frame	24	16.7	400	22.08	530
U4Y006M	EFE400-24-ECMDS	With Fan	24	16.7	400	22.08	530

(3) For up to 10s without exceeding Average Output Power rating

Options

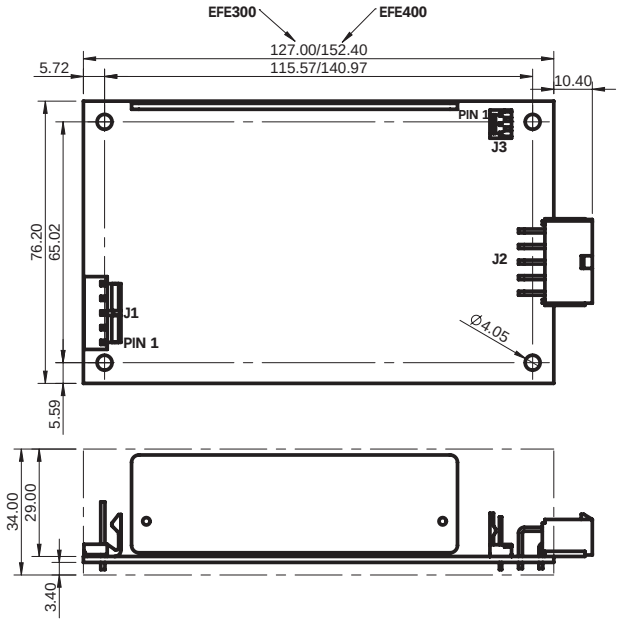
Part Description Suffix	U Chassis	Cover	Internal Fan
-CNMDS	N	N	N
-CUMDS	Y	N	N
-CCMDS	Y	Y	N
-ECMDS	Y	Y	Y

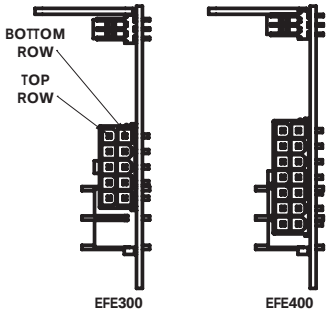
Other Industrial Products

NV Series	175 to 900W 1U power supply 1-8 outputs
ZPSA	40 to 60W 2 x 4" single output power supplies
ZWS/ZWSPAF	5 to 240W single output power supplies

For Additional Information, please visit
us.tdk-lambda.com/lp/products/efe-series.htm

Outline Drawing (EFE300 & EFE400)





OPEN FRAME

J1

PIN	CONNECTION
1	EARTH
2	NOT CONNECTED
3	LIVE
4	NOT CONNECTED
5	NEUTRAL

J2
TOP ROW; 0V
BOTTOM ROW; +V

J3

PIN	CONNECTION
1	0V
2	+V
3	TEMP CONTROL

MATING PARTS (MOLEX OR EQUIVALENT)

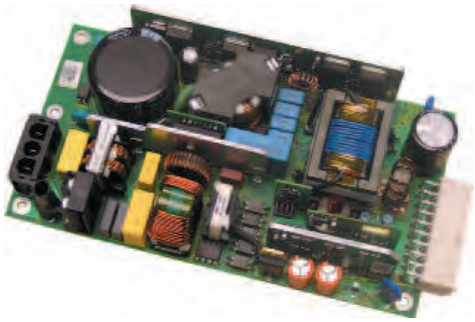
CONNECTOR	HOUSING	CRIMP PIN
J1	09-50-8051	08-52-0113
J2	(EFE300) 39-01-2105 (EFE400) 39-01-2145	44476-3112
J3	02201-3037	08-50-0032

3055 Del Sol Blvd • San Diego, CA 92154 • 1-800-526-2324
Revision A9: Jun 2011

TDK·Lambda

EFE300M & 400M

300W to 400W Medical Power Supplies



- Medical Safety Certifications (BF Rated)
- Fully Featured - including ORing Diode
- Universal Input (90 - 264VAC)
- Peak Loading (10s)
- Suitable for 1U applications

RoHS

Key Market Segments & Applications

Medical
Instrumentation
Network servers and routers

Features and Benefits

Feature	Benefit
◆ Full Digital Control	◆ Improved product performance
◆ High Efficiency	◆ Less heat dissipated in system
◆ Low Profile	◆ Fits in 1U enclosures
◆ Reinforced Isolation (4kVAC input to output)	◆ Reduces end system design and cost

Specifications

ITEMS		EFE300M	EFE400M
Input Voltage range	-	90 - 264VAC, 120 - 350VDC	
Input Frequency	-	45 - 63Hz, 440Hz with reduced PFC	
Inrush Current	A	<40A at 25C and 230VAC input, Cold Start	
Power Factor Harmonics	-	EN61000-3-2 Compliant (0.97 typical)	
Voltage Setting	-	Setting: -5% to +10% (Chosen at time of ordering), Accuracy: +/-1% at 50% Load	
Total Regulation	-	< 4% with 90 - 264VAC input change and 0-100% load change	
Ripple & Noise	mV	< 1.5% peak-peak	
Efficiency	-	90% typical. EFE400M: 1W power draw in standby mode	
Overcurrent Protection	-	Automatic recovery upon overload removal	
Overvoltage Protection	V	Cycle AC line to reset	
Overtemperature Protection	-	Yes	
Hold Up Time (Typ)	ms	>16ms at 90VAC input, 75% load	
Leakage Current (max)	µA	123µA 120VAC 60Hz, 257µA 240VAC 60Hz, <300µA 264VAC 63Hz (Type Test results)	
Fan Supply	-	12V 1A (Available if no fan option selected)	
Standby Voltage	-	5V 2A or 12V 1A (chosen at time of ordering)	
Remote Sense	-	None	
Signals & Features	-	Remote on/off - Inhibit or Enable operation (chosen at time of ordering) Power Good - High indicates supply is good. ORing FET - Allows redundant connection of supplies	
Operating Temperature (2)	-	0 to +70°C. Derate linearly to 50% load from 50°C to 70°C	
Storage Temperature	-	-40 to +85°C	
Humidity (non condensing)	-	5 - 95% RH	
Cooling	-	Forced air, 2m/s from input to output (approximately 10CFM)	
Isolation	-	Input to Ground 2.3kVDC, Input to Output 4kVAC, Output to Ground 1500VAC	
Vibration (non operating)	-	2G, 10-500Hz (sweep & endurance at resonance) in all 3 planes. MIL-STD-810E, Method 51.4, Pro I, Cat 1, 9	
Shock	-	30G per IEC68-2-27, MIL-STD-810E/F, Method 516.5, Pro I, IV, VI	
Safety Agency Approvals	-	IEC/UL/EN/CSA22.2 60601-1, IEC/EN 61010-1, IEC/UL/EN/CSA22.2 No 60950-1, CE for LVD	
Immunity	-	EN61000-4-2, -3, -4, -5, -6, -8, -11, -12, -14	
Conducted Emissions and Flicker	-	EN55011, EN55022 Class B (per CISPR.11/22), EN61000-3-3	
Radiated Emissions	-	EN55011, EN55022 Class B (per CISPR.11/22)	
Weight (open frame or enclosed)	g	350g or 600g	450g or 700g
Size (Open frame style) (1)	in	3 x 6 x 1.34"	3.5 x 6.5 x 1.34"
Warranty	yrs	Three Years	

(1) Including underside component leads

(2) -20°C cold start

TDK·Lambda

EFE300M & 400M

Model Selector

Product Code	Part Description	Style	Output Voltage (V)	Output Current (A)	Average Output Power (W)	Peak Output Current (A)(3)	Peak Output Power (W)(3)
U5Y0031	EFE300M12-5-ECMDL-YT	With Fan	12	25.0	300	33.30	400
U5Y0020	EFE300M12-5-HNMDL-YT	Open Frame	12	25.0	300	33.30	400
U6Y007P	EFE400M-12-5-ECMDL-YT	With Fan	12	33.3	400	44.17	475
U6Y001H	EFE400M-12-5-HNMDL-YT	Open Frame	12	33.3	400	44.17	475
U5Y0064	EFE300M24-5-ECMDL-YT	With Fan	24	12.5	300	16.70	400
U5Y0053	EFE300M24-5-HNMDL-YT	Open Frame	24	12.5	300	16.70	400
U6Y008Q	EFE400M-24-5-ECMDL-YT	With Fan	24	16.67	400	20.80	475
U6Y002J	EFE400M-24-5-HNMDL-YT	Open Frame	24	16.67	400	20.80	475
U5Y0166	EFE300M-48-5-ECMDL-YT	With Fan	48	6.25	300	8.33	350
U5Y0201	EFE300M-48-5-HNMDL-YT	Open Frame	48	6.25	300	8.33	350
U6Y009R	EFE400M-48-5-ECMDL-YT	With Fan	48	8.33	400	10.40	475
U6Y003K	EFE400M-48-5-HNMDL-YT	Open Frame	48	8.33	400	10.40	475

(3) For up to 10s without exceeding Average Output Power rating

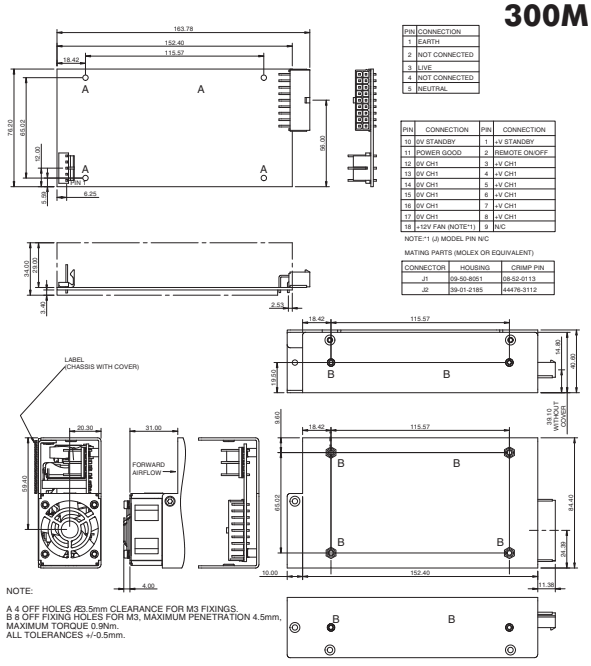
Options

Additional options available. Reference detailed product data sheet on downloadable files section of web page.

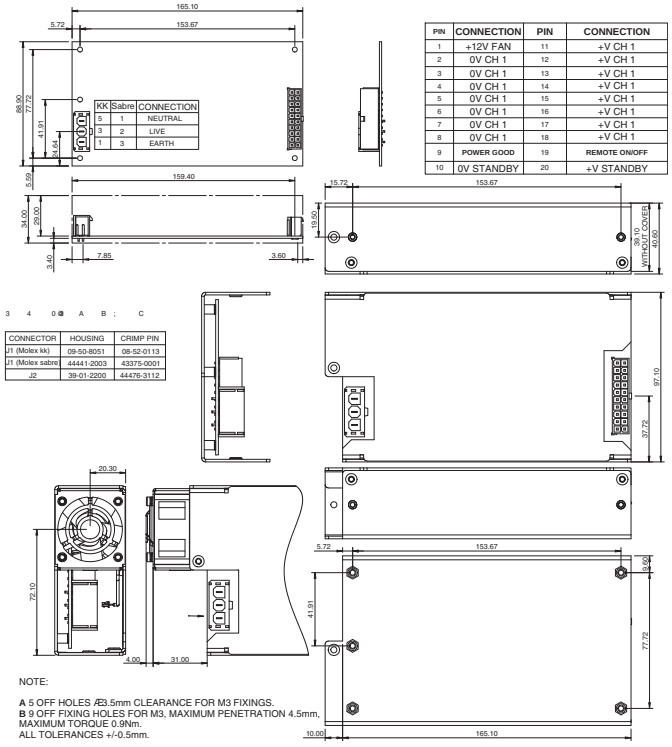
Part Description Suffix	Standby "5"or "12"	L Bracket	Cover	Internal Fan	Enable or Inhibit "E" or "T"
-5-ECMDL-YT	5V 2A	Y	Y	Y	Inhibit
-5-HNMDL-YT	5V 2A	N	N	N	Inhibit

Outline Drawing

300M



400M



Other Medical Products

Vega Series	450 to 900W up to 10 outputs
CSS	40 to 500W Single Output
NV Series	175 to 900W 1U Power Supply 1-8 Outputs

For Additional Information, please visit
us.tdk-lambda.com/lp/products/efe-series.htm

3055 Del Sol Blvd • San Diego, CA 92154 • 1-800-526-2324

Revision B1: Jun 2011

TDK·Lambda

FPS1000 Series

1000W Front End Power Supplies

RoHS

- 1U high
- Up to 3000W (3 units) in 19" rack
- Hotswap capable (ORing diodes built in)
- Low Cost
- PoE Option

Key Market Segments & Applications

Power for Distributed Power Architecture
Factory Automation
RF Amplifiers

Features and Benefits

Feature	Benefit
◆ 1U high	◆ Utilizes less cabinet space
◆ Hotswap capable	◆ Suitable for N+1 redundancy
◆ High efficiency	◆ Less heat dissipated in system
◆ Full array of signals	◆ Easier system monitoring

Specifications

ITEMS / MODELS		12V Nominal	24V Nominal	32V Nominal	48V Nominal
Output Voltage Range (1)	V	10.5 - 13.2V	21.5 - 29V	28.8 - 38.4V	43 - 58V
Output Current	A	72A	40A	31A	21A
Line Regulation	-	<0.4%			
Load Regulation	-	<0.8%			
Output Noise	mV	150mV	200mV	250mV	300mV
Overvoltage Protection	V	14.3 to 15.7V	31 to 34V	41.5V to 45.5V	62 to 66V
Overcurrent Protection	-	105 - 125%, Constant Current type			
Load Sharing	-	Single wire current sharing, up to 8 units			
Remote Sense	-	Compenstates for 1V on each output lead			
I²C Monitoring	-	Optional (Specify /S)			
Signals (opto isolated)	-	DC OK, AC Fail, and Overtemperature warning, high on fail			
Remote On/Off	-	On: 0 - 0.6V or short, Off: 2- 15V or open			
Auxiliary Output	-	11.2-12.5VDC 0.25A			
AC Input	-	85 - 265VAC, 47 - 63Hz[2], 120-360VDC. (Derate 10% < 100VAC)			
Leakage Current	mA	<1.1mA at 230VAC input			
Inrush Current	A	<40A			
Hold up time (100VAC input)	-	20ms typical (800W loading)			
Efficiency (typ) 100/200VAC	-	80 / 83%	83 / 86%	84 / 87%	85 / 88%
Power Factor Correction	-	EN61000-3-2 class A (20-100% load), >0.98 at full load			
Immunity	-	EN61000-4-2, -3, -4, -5, -6, -11			
EMC (conducted and radiated)	-	EN55022, level B, FCC Class B			
Operating Temperature	°C	0 to +70°C, derate 2%/°C from 50 to 60°C, 2.5%/°C from 60 to 70°C			
Storage Temperature	°C	-30 to +85°C			
Withstand Voltage	-	Input to Output 3kVAC, Input to Ground 2kVAC, Output to Ground 500VAC for 1 min.			
Cooling	-	Two internal fans, airflow from front to back (variable speed)			
Humidity	-	Operating: 10 - 90% RH, Storage: 10 - 95% RH (non condensing)			
Shock & Vibration	-	Meets ETS 300 019			
Safety Agency	-	UL60950-1, EN60950-1 (Ed 2), CE Mark			
Input / Output Connector	-	Positronic PCIB24W9M400A1 (Mating #PCIB24W9F400A1)			
Front panel indicators	-	AC OK, DC OK, DC Fail			
Size (LxWxH)	in	Stand alone: 1.61 x 5 x 11.4"; Rack: 1.72 x 19 x 13.8"			
Weight	g	2,000			
Warranty	yr	Two Years			

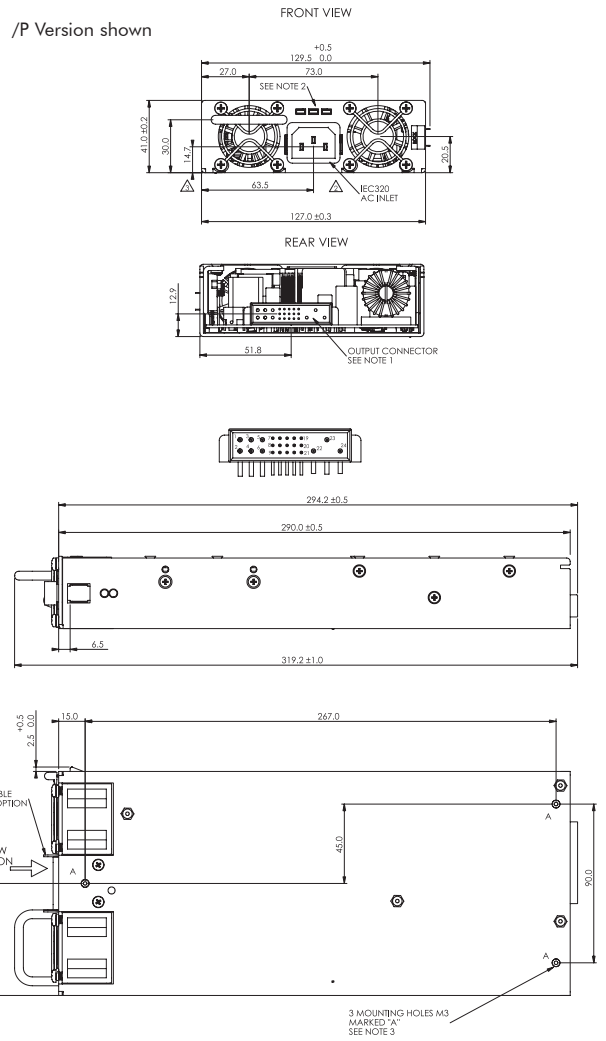
(1) Via Trim pin on output connector

(2) 47-440Hz with reduced PFC (100-265VAC input)

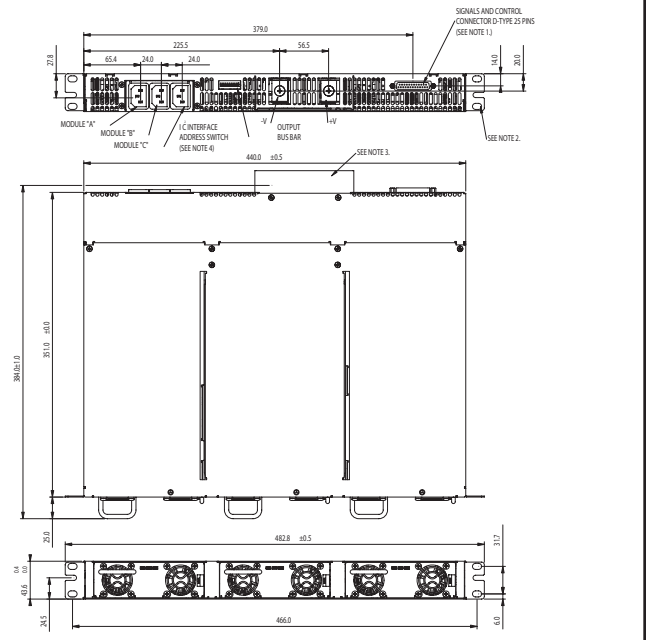
TDK·Lambda

FPS1000 Series

FPS1000 Outline Drawing



FPSS1U Outline Drawing



Model Selector

Front AC Input Configuration	Output Voltage	Output Current	Maximum Power	I²C Interface
FPS100012/P*	12V	72A	864W	No
FPS100012/PS*	12V	72A	864W	Yes
FPS100024/P	24V	40A	960W	No
FPS100024/PS	24V	40A	960W	Yes
FPS100032/P	32V	31A	992W	No
FPS100032/PS	32V	31A	992W	Yes
FPS100048/P	48V	21A	1008W	No
FPS100048/PS	48V	21A	1008W	Yes
FPSS1U/P	Rack (3 slot), contains two blanking panels			
FPST1U/P	Rack with 3 individual outputs (floating)			
Rear AC Input Configuration	**Output Voltage**	**Output Current**	**Maximum Power**	**I²C Interface**
FPS100012*	12V	72A	864W	No
FPS100012/S*	12V	72A	864W	Yes
FPS100024	24V	40A	960W	No
FPS100024/S	24V	40A	960W	Yes
FPS100032	32V	31A	992W	No
FPS100032/S	32V	31A	992W	Yes
FPS100048	48V	21A	1008W	No
FPS100048/S	48V	21A	1008W	Yes
FPSS1U	Rack (3 slot), contains two blanking panels			
FPST1U	Rack with 3 individual outputs (floating)			

Full Systems (3 units + rack)

Front AC Input Configuration	Output Voltage	Output Current	Maximum Power	I²C Interface
FPS300024/P	24V	120A	2880W	No
FPS300024/PS	24V	120A	2880W	Yes
FPS300048/P	48V	63A	3000W	No
FPS300048/PS	48V	63A	3000W	Yes

Front AC Input configuration. Remove /P suffix for Rear AC configuration.

Accessories

Part No.	Description
FPS/Z0008511	Module Mating Connector (Positronic PCIB24W9F400A1/AA-S1031)

Options

Suffix	Description
/POE*	1500VAC Output to Ground Isolation (Output noise 400mV)

* FPS100048 only.

Other Industrial Products

PX, CC-E, PAQ, PAH, PAF HFE	DC-DC Converters 1U 1600-2500W Front End AC-DC

For Additional Information, please visit us.tdk-lambda.com/lp/products/fps-series.htm

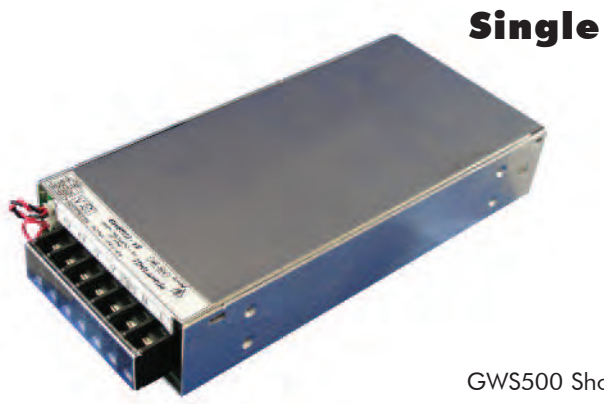
3055 Del Sol Blvd • San Diego, CA 92154 • 1-800-526-2324

Revision B7: Jul 2010

TDK·Lambda

GWS Series

Single Output 250 & 500W Power Supplies



GWS500 Shown

- High Efficiency, up to 93%
- 1.6" high (For 1U racking)
- Wide Range AC Input
- 250W Convection Cooled
- Five year warranty

RoHS

Key Market Segments & Applications	
Light Industrial	Test & Measurement
Automated Service	Kiosks

Specifications

ITEMS / MODEL		GWS250	GWS500
AC Input Voltage (300VAC for 5s)	VAC	85 - 264VAC (Derate linearly to 90% load from 100VAC to 85VAC input)	
Input Frequency	Hz	47 - 63Hz	
DC Input Voltage	VDC	120 - 373VDC	
Inrush Current (cold start)	A	20A at 115VAC, 40A at 230VAC	
Power Factor (1)	-	Meets EN61000-3-2 (Typical PF 0.98/0.95)	
Input Current (115/230VAC)	A	3.0 / 1.4	5.5 / 2.7 (4.5 / 2.3 for 5V model)
Temperature Coefficient	°C	<0.02%/°C (0 - 50°C)	
Overcurrent Protection	-	>105% of nominal or >101% of peak. 5V-12V hiccup style, 24V-48V Constant current style	
Overvoltage Protection (2)	V	5V: 5.75 - 6.75V, 7.5V: 8.6 - 10.1V, 12V: 13.8 - 16.2V24V: 30.3 - 35.5V, 36V: 41.4 - 48.6V, 48V: 60 -69.6V	
Overtemperature Protection (2)	-	Yes	
Hold Up Time (115 / 230V input)	ms	16ms	
Leakage Current (240VAC 60Hz)	mA	<0.75mA	
Remote Sense	-	No	Yes
Remote On/Off	-	Active Low	
Standby Input Power Draw	W	<0.5W	
5V Standby (always on)	-	5V 0.3A	
DC Good	-	DC Good, open collector signal, High on Fail	
LED Indicator	-	Green LED = On	
Output Remote Programming	-	See installation manual for details	
Operating Temperature	°C	-25 to +70°C. Derate linearly to 50% load from +50 to +70°C	-25 to +70°C. Derate linearly to TBD% load from +50 to +70°C
Storage Temperature	°C	-30 to +85°C	
Operating Humidity	-	30 - 90% RH (non condensing)	
Storage Humidity	-	10 - 95% RH (non condensing)	
Cooling	-	Convection	Internal fan
Withstand Voltage	-	Input to Ground 1.5kVAC, Input to Output 3kVAC, Output to Ground 500VAC for 1 min.	
Isolation Resistance	-	>100M at 25°C & 70%RH, Output to Ground 500VDC	
Vibration (non operating)	-	10 - 55Hz: 19.6m/s^2 constant sweep 1 min X, Y, Z for 1 hour	
Shock	-	< 196.1 m/s^2 (20G)	
Immunity	-	IEC61000-4-2 (lv 2, 3), -3 (lv3), -4 (lv 3), -5 (lv 4), -6 (lv 3), -8 (lv 4), -11	
Safety Agency Approvals	-	UL60950-1, CSA C22.2 No 60950-1-07 (cUL), EN60950-1 2nd Edition, IEC60950-1, CE Mark	
Conducted & Radiated EMI	-	EN55022-B, FCC-B	
Weight (Typ)	g	850	1020
Size (LxWxH	in	7.8 x 4.1 x 1.61"	8.6 x 4.1 x 1.61"
Warranty	yrs	Five Years	

(1) 115 / 230VAC input
(2) Recycle AC, or use remote on/off to reset
Note: Green shade = preliminary

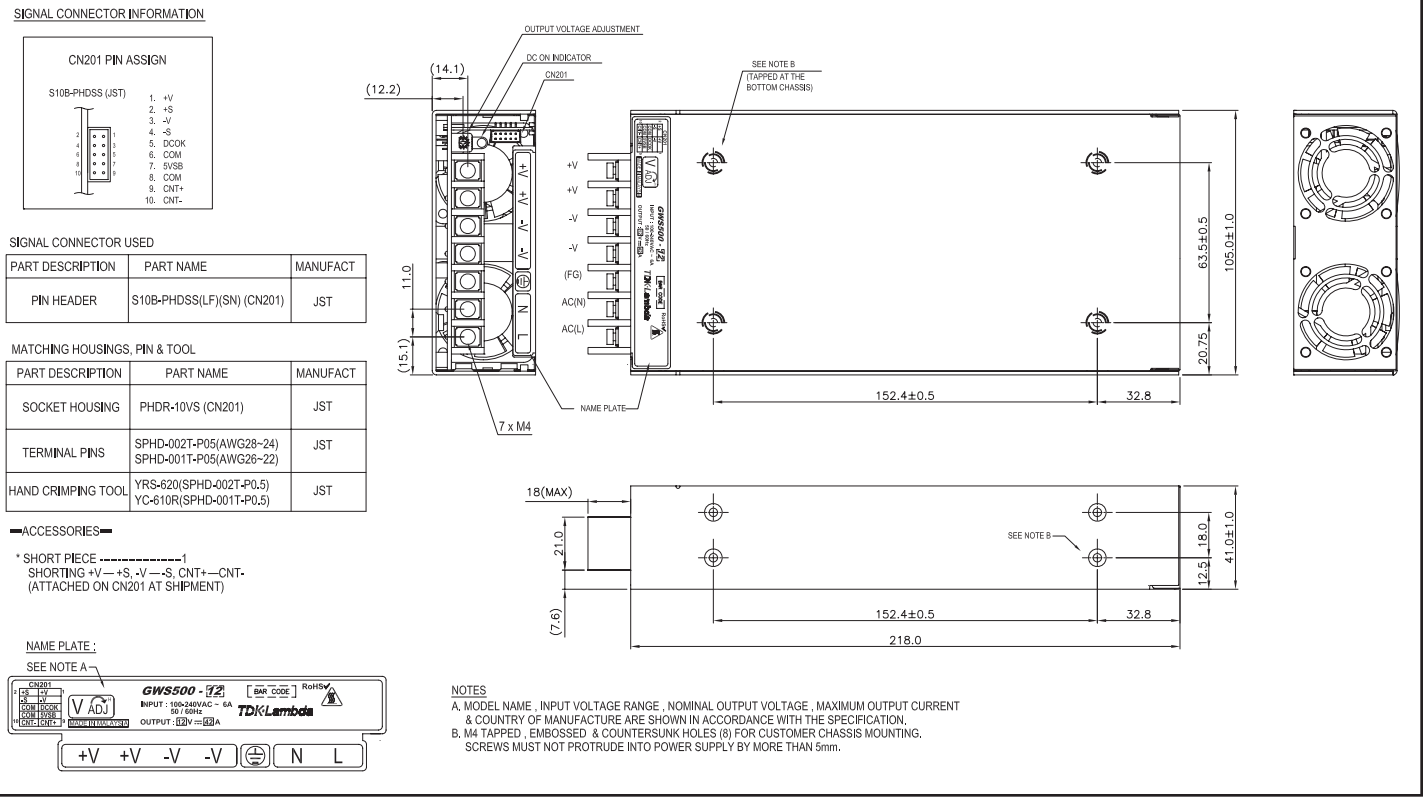
TDK·Lambda

GWS Series

Model Selector

Model	Voltage (V)	Adjust Range (V)	Max Current (A)	Peak Curr. <10s,<35% DC (A)	Load Reg. (mV)	Line Reg. (mV)	Ripple Noise (mV)	Efficiency (typ) % (230VAC)
GWS500-5	5V	4.75 - 5.5	80	-	50	25	150	85
GWS500-7.5	7.5V	6.75 - 8.25	67.2	-	70	35	150	88
GWS250-12	12V	10.8 - 13.2	21	-	96	48	150	92
GWS500-12	12V	10.8 - 13.2	42	-	96	48	150	90
GWS250-24	24V	22 - 28.8	10.5	12.5	192	96	240	92
GWS500-24	24V	22 - 28.8	21	25.0	192	96	240	91
GWS250-36	36V	32 - 40	7	8.4	288	144	360	93
GWS500-36	36V	32 - 40	14	16.7	288	144	360	91
GWS250-48	48V	42 - 57.6	5.3	-	384	192	480	93
GWS500-48	48V	42 - 57.6	10.5	-	384	192	480	91

GWS500 Outline Drawing



Other Industrial Products

LS25 - 200	25W to 200W low cost
HWS15 - 1800	15W to 1800W limited lifetime warranty
SWS300 - 1000	300W to 1000W single output
CSS500	360W to 500W medical

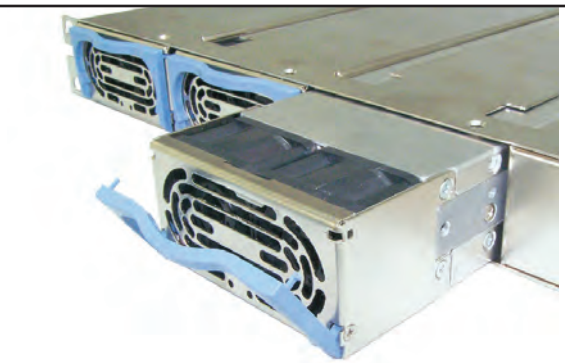
For Additional Information, please visit
us.tdk-lambda.com/lp/products/gws-series.htm

3055 Del Sol Blvd • San Diego, CA 92154 • 1-800-526-2324

Revision A3: Jun 2011

TDK·Lambda

HFE1600 Series



1600W 1U Front End Power Supplies

- 1U rackmount containing up to 5 units
- Internal ORing MOSFET & Current Share
- High Efficiency
- Up to 8000W in 1U rack

Key Market Segments & Applications

Power for Distributed Power Architecture
Industrial Automation

Features and Benefits

Feature	Benefit
◆ 1U high	◆ Utilizes less system space
◆ Internal ORing MOSFET & Current Share	◆ Suitable for N+1 redundancy
◆ Full array of signals available	◆ Easier system monitoring including PMBus

Specifications

ITEMS / MODELS		
Input Voltage Range (2)	VAC	85 - 265VAC, 47 - 63Hz. See model selector for power derating
Input Current (Max) 100/230VAC	A	14.2 / 8.1A
Inrush Current	A	<35A
Power Factor Correction	-	Meets EN61000-3-2, PF > 0.98 at full load
Temperature Coefficient	%/°C	<0.02%/°C
Overcurrent Protection	%	105 - 120%
Overvoltage Protection (1)	%	110% (Tracking). Cycle AC to reset or utilize Remote On/Off
Overtemperature Protection (1)	-	Shutdown with automatic reset. Warning signal provided
Hold up time	ms	>10ms, 100/230VAC Input, 80% loading
Leakage Current	mA	< 0.75 / 1.5mA 100/230VAC, 60Hz
Remote Sense Compensation	-	HFE1600-12: 0.5V/wire, HFE1600-24, -48: 1V/wire
Indicators	-	AC OK: Green LED, DC OK / Fail: Green / Red LED
Remote On/Off	-	Unit ON: 0 - 0.6V or short, OFF: 2 - 15V or open circuit
Parallel Operation (1)	-	Yes, single wire current share, 90% accuracy, up to 10 units
AC Fail Signal	-	Open Collector, ON when AC is within 85 - 270VAC
DC Good Signal	-	Open Collector, ON when output is above 85 to 95% of setpoint (tracking)
Remote Adjust (1)	-	By either external 0 - 5V signal or 1k potentiometer
I²C Interface (1)	-	Isolated from output, Add suffix /S, PMBus compatible
Auxiliary Output	-	11.2 - 12.5V, 0.5A, 240mV ripple and noise
Operating Temp. (-TB Rack)	°C	-10 to +70°C, derate 2%/°C from 50 to 60°C, 2.5%/°C from 60 to 70°C
Operating Temp. (-IEC320 Rack)	°C	-10 to +60°C, derate 2%/°C from 50 to 60°C
Storage Temperature	°C	-30 to +85°C
Humidity (Non condensing)	%RH	Operating: 10 - 90%RH, Storage: 10 - 95%RH
Cooling	-	Two variable speed internal fans, airflow exits across input/output connector
Withstand Voltage	-	I/P to O/P 3kVAC, I/P to GND 2kVAC, O/P to GND: HFE1600-12,-24V 500VAC, HFE1600-48 1.5kVAC
Isolation Resistance	MΩ	>100MΩ at 25°C & 70%RH, Output to Ground 500VDC
Vibration (Basic transportation)	-	Meets IEC60068-2-64
Shock (Basic transportation)	-	Meets IEC60068-2-27
Safety Agency Certifications	-	UL60950-1 (Listed), EN60950-1, CE Mark
Conducted and Radiated EMI	-	EN55022 & FCC part 15; Conducted class B, Radiated class A
Immunity	-	IEC61000-4-2 (lv 2,3), -3 (lv 2), -4 (lv2), -5 (lv3,4), -6 (lv2), -8 (lv 4), -11
Size (W x H x D)	Inch	Power Supply: 3.35 x 1.61 x 11.8", Rack: 17.5 x 1.72 x 14.4"
Weight	g	Power Supply: 1550g, Rack: 4800g
Warranty	Yrs	Three Years

(1) See installation manual for detailed specifications & test methods

(2) Derate output power linearly 1%/V from 100VAC to 85VAC input

TDK·Lambda

HFE1600 Series

Model Selector

Model	Output Voltage	Adjust Range (1)	Max Current (Vin>170VAC)	Max Power (Vin>170VAC)	Max Current (100<Vin<170VAC)(2)	Max Power (100<Vin<170VAC)(2)
HFE1600-12	12V	9.6 - 13.2V	133A	1596W	100A	1200W
HFE1600-12/S	12V	9.6 - 13.2V	133A	1596W	100A	1200W
HFE1600-24	24V	19.2 - 29V	67A	1608W	50A	1200W
HFE1600-24/S	24V	19.2 - 29V	67A	1608W	50A	1200W
HFE1600-48	48V	38.4 - 58V	33A	1584W	25A	1200W
HFE1600-48/S	48V	38.4 - 58V	33A	1584W	25A	1200W

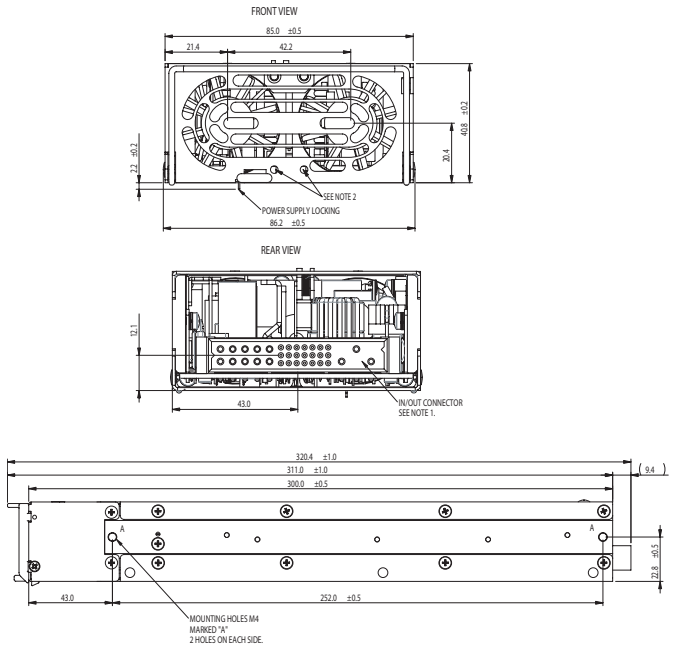
Model	Load Reg	Line Reg	Ripple & Noise (1)	Efficiency (%)(3)	I²C
HFE1600-12	60mV	30mV	240mV	87 / 90%	-
HFE1600-12/S	60mV	30mV	240mV	87 / 90%	Yes
HFE1600-24	120mV	60mV	240mV	88 / 90%	-
HFE1600-24/S	120mV	60mV	240mV	88 / 90%	Yes
HFE1600-48	240mV	120mV	480mV	89 / 92%	-
HFE1600-48/S	240mV	120mV	480mV	89 / 92%	Yes

(3) At 75% load, 100 / 230VAC input

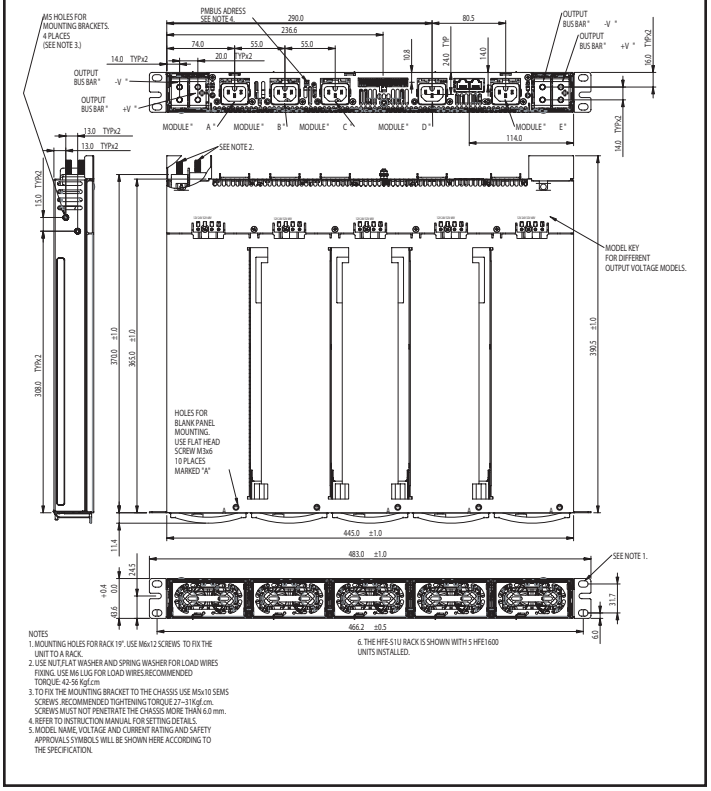
Rack Model Selector

Model	Description	Maximum Rack Current
HFE1600-S1U	Five slot 19" rack, IEC320-C16 input connectors (5)	200A each side (400A total)
HFE1600-S1U-TB	Five slot 19" rack, Terminal Block input connectors (5)	200A each side (400A total)
HFE1600/BP	One slot blanking panel, three provided with each rack	-

Outline HFE1600



Outline HFE1600S1U



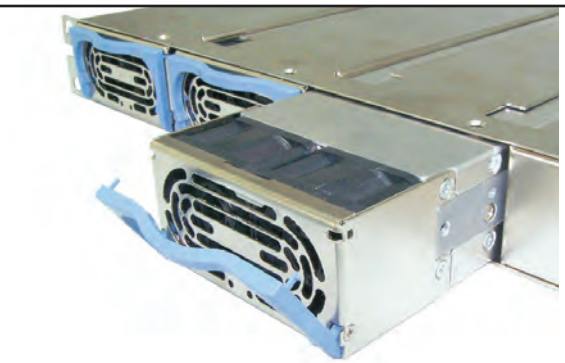
For Additional Information, please visit
us.tdk-lambda.com/lp/products/hfe-series.htm

3055 Del Sol Blvd • San Diego, CA 92154 • 1-800-526-2324

Revision A5.2: Mar 2011

TDK·Lambda

HFE2500 Series



2500W 1U Front End Power Supplies

- 1U rackmount containing up to 4 units
- Internal ORing MOSFET & Current Share
- High Efficiency
- Up to 10,000W in 1U rack

Key Market Segments & Applications

Power for Distributed Power Architecture
Industrial Automation

Features and Benefits

Feature	Benefit
◆ 1U high	◆ Utilizes less system space
◆ Internal ORing MOSFET & Current Share	◆ Suitable for N+1 redundancy
◆ Full array of signals available	◆ Easier system monitoring including PMBus

Specifications

ITEMS / MODELS		
Input Voltage Range (2)	VAC	85 - 265VAC, 47 - 63Hz. See model selector for power derating
Input Current (Max) 100/230VAC	A	17 / 12A
Inrush Current	A	<50A
Power Factor Correction	-	Meets EN61000-3-2, PF > 0.98 at full load
Temperature Coefficient	%/°C	<0.02%/°C
Overcurrent Protection	%	105 - 115%
Overvoltage Protection (1)	%	115% (Tracking). Cycle AC to reset or utilize Remote On/Off
Overtemperature Protection (1)	-	Shutdown with automatic reset. Warning signal provided
Hold-up time	ms	>10ms, 100/230VAC Input, 80% loading
Leakage Current	mA	< 0.75 / 1.5mA, 100 / 230VAC, 60Hz
Remote Sense Compensation	-	HFE2500-12: 0.5V / Wire, HFE2500-24, -48 1V / Wire
Indicators	-	AC OK: Green LED, DC OK / Fail: Green / Red LED
Remote On/Off	-	Unit ON: 0 - 0.6V or short, OFF: 2 - 15V or open circuit
Parallel Operation (1)	-	Yes, single wire current share, 90% accuracy, up to 10 units
AC Fail Signal	-	Open Collector, ON when AC is within 85 - 270VAC
DC Good Signal	-	Open Collector, ON when output is above 85 to 95% of setpoint (tracking)
Remote Adjust (1)	-	By either external 0 - 5V signal or 1k potentiometer
I^2C Interface (1)	-	Isolated from output, Add suffix /S, PMBus compatible
Auxiliary Output	-	11.2 - 12.5V, 0.5A, 240mV ripple and noise
Operating Temperature	°C	-10 to +70°C, derate 2%/°C from 50 to 60°C, 2.5%/°C from 60 to 70°C
Storage Temperature	°C	-30 to +85°C
Humidity (Non condensing)	%RH	Operating: 10 - 90%RH, Storage: 10 - 95%RH
Cooling	-	Two variable speed internal fans, airflow exits across input/output connector
Withstand Voltage	-	I/P to O/P 3kVAC, I/P to O/P 2kVAC, O/P to Grnd: HFE2500-12, -24V 500VAC, HFE2500-48 1.5kVAC
Isolation Resistance	MΩ	>100MΩ at 25°C & 70%RH, Output to Ground 500VDC
Vibration (Basic transportation)	-	Meets IEC60068-2-64
Shock (Basic transportation)	-	Meets IEC60068-2-27
Safety Agency Certifications	-	UL60950-1 (Listed), EN60950-1, CE Mark
Conducted and Radiated EMI	-	EN55022 & FCC part 15; Conducted class B, Radiated class A
Immunity	-	IEC61000-4-2 (lv 2,3), -3 (lv 2), -4 (lv 3), -5 (lv 3,4), -6 (lv 2), -8 (lv 4), -11
Size (W x H x D)	Inch	Power Supply: 4.21 x 1.61 x 12.8", Rack: 17.5 x 1.72 x 15.8"
Weight	g	Power Supply: 2100g, Rack: 5000g
Warranty	Yrs	Three Years

(1) See installation manual for detailed specifications & test methods

(2). Derate linearly 1.3%/V from 100VAC to 85VAC input

TDK·Lambda

HFE2500 Series

Unit Model Selector

Model	Output Voltage	Adjust Range (1)	Max Current (Vin>170VAC)	Max Power (Vin>170VAC)	Max Current (100<Vin<170VAC)(2)	Max Power (100<Vin<170VAC)(2)
HFE2500-12	12V	9.6 - 13.2V	200A	2400W	125A	1500W
HFE2500-12/S	12V	9.6 - 13.2V	200A	2400W	125A	1500W
HFE2500-24	24V	19.2 - 29V	104A	2496W	62A	1488W
HFE2500-24/S	24V	19.2 - 29V	104A	2496W	62A	1488W
HFE2500-48	48V	38.4 - 58V	52A	2496W	31A	1488W
HFE2500-48/S	48V	38.4 - 58V	52A	2496W	31A	1488W

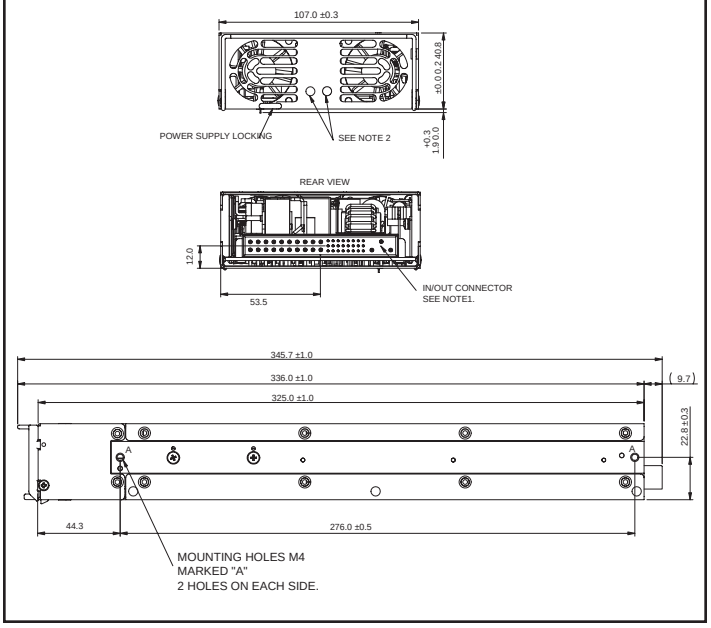
Model	Load Reg	Line Reg	Ripple & Noise (1)	Efficiency (%)(3)	I²C
HFE2500-12	60mV	30mV	240mV	90 / 92%	-
HFE2500-12/S	60mV	30mV	240mV	90 / 92%	Yes
HFE2500-24	120mV	60mV	240mV	90 / 92%	-
HFE2500-24/S	120mV	60mV	240mV	90 / 92%	Yes
HFE2500-48	240mV	120mV	480mV	90 / 92.5%	-
HFE2500-48/S	240mV	120mV	480mV	90 / 92.5%	Yes

(3) At 75% load, 100 / 230VAC input

Rack Model Selector

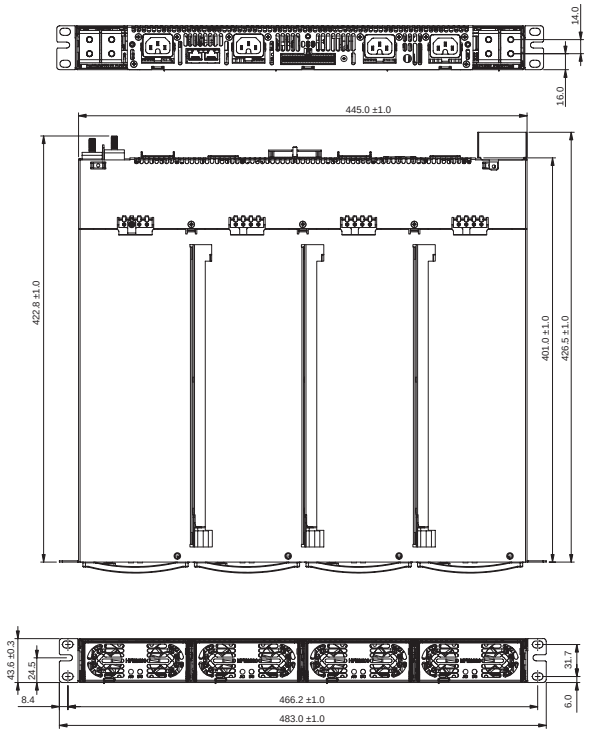
Model	Description	Maximum Rack Current
HFE2500-S1U	Four slot 19" rack, IEC320-C16 input connector	275A each side (550A total)
HFE2500-S1U-TB	Four slot 19" rack, Terminal Block input connector	275A each side (550A total)
HFE2500/BP	One slot blanking panel, two provided with each rack	-

Outline HFE2500



For Additional Information, please visit
us.tdk-lambda.com/lp/products/hfe-series.htm

Outline HFE2500S1U



3055 Del Sol Blvd • San Diego, CA 92154 • 1-800-526-2324

Revision A1.2: Mar 2011

TDK·Lambda

HWS Series

Single Output Industrial Power Supplies

- Limited Lifetime Warranty
- UL508 approved
- SEMI F47 Compliant (high line AC)
- Universal Input (85 - 265VAC)
- High Efficiency

RoHS

Key Market Segments & Applications

Factory Automation	Process Control, NC-Machining, Automotive, Packaging Equipment, Materials Handling, Chemical Processing, Robots
Test & Measurement	Burn-in & Test, Automated Test, Instrumentation, Measurement, Detection
Automated Service	

Features and Benefits

Feature	Benefit
◆ Limited Lifetime Warranty	◆ Lower Cost of Ownership
◆ High Efficiency	◆ Easier System Cooling
◆ Wide Range AC Input	◆ Supports Global Use

Specifications

ITEMS \ MODELS		HWS15	HWS30	HWS50	HWS100	HWS150
Input Voltage range	-	85 - 265VAC (47 - 63Hz) or 120 - 370VDC				
Input Current (Typ) (1)	A	0.4 / 0.2	0.8 / 0.4	0.7 / 0.35	1.3 / 0.65	1.9 / 0.95
Inrush Current (1)	A	14 / 28				
Power Factor	-	Meets EN61000-3-2				
Temperature Coefficient	-	<0.02%/°C				
Overcurrent Protection	-	>104%				
Overvoltage Protection	V	Yes (See page 2)				
Hold Up Time (Typ)	ms	20				
Leakage Current (max)	mA	<0.5mA (Typ 0.3mA at 100VAC, 0.5mA at 230VAC)				
Remote Sense	-	No			Yes	
Indicator	-	Green LED = ON				
Operating Temperature (no cover)	-	-10C to +70C, derate linearly to 20% load from 50°C to 70°C(2)				
Storage Temperature	-	-30 to +85°C				
Humidity (non condensing)	-	Operating: 30 - 90%RH, Non operating 10 - 95%RH				
Cooling	-	Convection				
Withstand Voltage	-	Input to Ground 2kVAC, Input to Output 3kVAC, Output to Ground 500VAC for 1 min.				
Isolation Resistance	-	>100M at 25°C & 70%RH, Output to Ground 500VDC				
Vibration (non operating)	-	10 - 55Hz (1 minute sweep), 19.6m/s² constant X, Y, Z 1 hour				
Shock	-	< 196.1m/s²				
Safety Agency Certifications	-	UL60950-1, CSA60950-1, EN60950-1, EN50178, UL508, CE Mark(3)				
Line Dip	-	Complies with SEMI F47 (200VAC line only)				
Conducted & Radiated EMI	-	EN55011 / EN55022-B, FCC-B, VCCI-B				
Recommended EMI Filter	-	RSEL-2001W			RSEL-2002W	RSEL-2003W
Immunity	-	IEC61000-4-2 (Level 3,2), -3, -4, -5, -6 (Level 3), -8, -11 (Level 4)				
Weight (Typ)	g	180	220	280	450	500
Size (WxHxD)	in	1.04x3.23x3.15	1.04x3.23x3.74	1.04x3.23x4.72	1.1x3.23x6.3	1.46x3.23x6.3
Size (WxHxD) /A version		1.24x3.23x3.15	1.24x3.23x3.74	1.24x3.23x4.72	1.3x3.23x6.3	1.65x3.23x6.3
Warranty	-	Limited lifetime warranty (See Lambda's terms & conditions)				

(1) 100/200VAC
(2) -40°C Start up, see options table
(3) UL60601-1, EN60601-1, see options table

TDK·Lambda

HWS Series

Output Ratings

Model	Voltage	Adjust Range	Max Curr. A	Load Reg mV	Line Reg mV	Ripple Noise mV	Over voltage V	Eff. typ % (1)
HWS15-3/A	3.3V	2.97 - 3.96	3	40	20	120	4.13-4.95	68/71
HWS30-3/A	3.3V	2.97 - 3.96	6	40	20	120	4.13-4.95	70/73
HWS50-3/A	3.3V	2.97 - 3.96	10	40	20	120	4.13-4.95	76/78
HWS100-3/A	3.3V	2.97 - 3.96	20	40	20	120	4.13-4.95	78/81
HWS150-3/A	3.3V	2.97 - 3.96	30	40	20	120	4.13-4.95	78/81
HWS15-5/A	5V	4.0 - 6.0	3	40	20	120	6.25-7.25	77/79
HWS30-5/A	5V	4.0 - 6.0	6	40	20	120	6.25-7.25	77/80
HWS50-5/A	5V	4.0 - 6.0	10	40	20	120	6.25-7.25	82/84
HWS100-5/A	5V	4.0 - 6.0	20	40	20	120	6.25-7.25	83/86
HWS150-5/A	5V	4.0 - 6.0	30	40	20	120	6.25-7.25	83/86
HWS15-12/A	12V	9.6 - 14.4	1.3	96	48	150	15-17.4	80/81
HWS30-12/A	12V	9.6 - 14.4	2.5	96	48	150	15-17.4	81/83
HWS50-12/A	12V	9.6 - 14.4	4.3	96	48	150	15-17.4	81/83
HWS100-12/A	12V	9.6 - 14.4	8.5	96	48	150	15-17.4	83/86
HWS150-12/A	12V	9.6 - 14.4	13	96	48	150	15-17.4	83/86
HWS15-15/A	15V	12.0 - 18.0	1	120	60	150	18.8-21.8	80/81
HWS30-15/A	15V	12.0 - 18.0	2	120	60	150	18.8-21.8	81/83
HWS50-15/A	15V	12.0 - 18.0	3.5	120	60	150	18.8-21.8	81/83
HWS100-15/A	15V	12.0 - 18.0	7	120	60	150	18.8-21.8	83/86
HWS150-15/A	15V	12.0 - 18.0	10	120	60	150	18.8-21.8	83/86
HWS15-24/A	24V	19.2 - 28.8	0.65	192	96	200	30-34.8	82/83
HWS30-24/A	24V	19.2 - 28.8	1.3	192	96	200	30-34.8	83/86
HWS50-24/A	24V	19.2 - 28.8	2.2	192	96	150	30-34.8	82/84
HWS100-24/A	24V	19.2 - 28.8	4.5	192	96	150	30-34.8	84/87
HWS150-24/A	24V	19.2 - 28.8	6.5	192	96	150	30-34.8	85/88
HWS15-48/A	48V	38.4 - 52.8	0.33	384	192	200	55.2-64.8	80/80
HWS30-48/A	48V	38.4 - 52.8	0.65	384	192	200	55.2-64.8	82/83
HWS50-48/A	48V	38.4 - 52.8	1.1	384	192	200	55.2-64.8	83/85
HWS100-48/A	48V	38.4 - 52.8	2.1	384	192	200	55.2-64.8	84/87
HWS150-48/A	48V	38.4 - 52.8	3.3	384	192	200	55.2-64.8	85/88

Options

Suffix	Description
Blank	Screw terminals, no cover
/A	Screw terminals, cover
/R	Remote on/off (50-150W only)
/HD	See HWS50-1500/HD Datasheet for details. -40 to +71(74)°C operation, conformally coated PCBs
/ME	See HWS30-1500/ME Datasheet for details. UL60601-1, EN60601-1 medical approvals

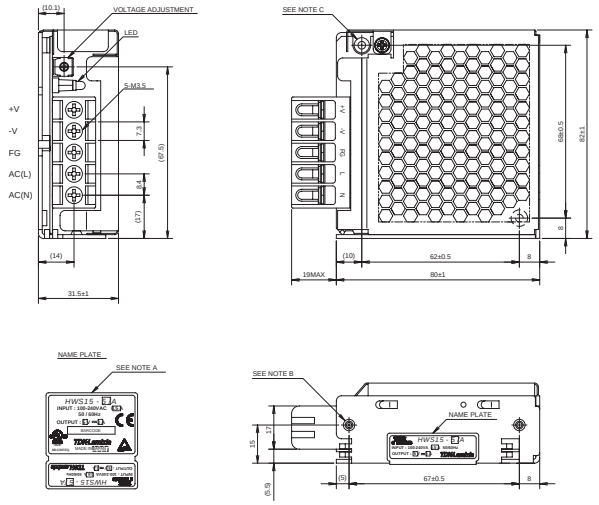
Example: HWS50-24/RA

Other Industrial Products

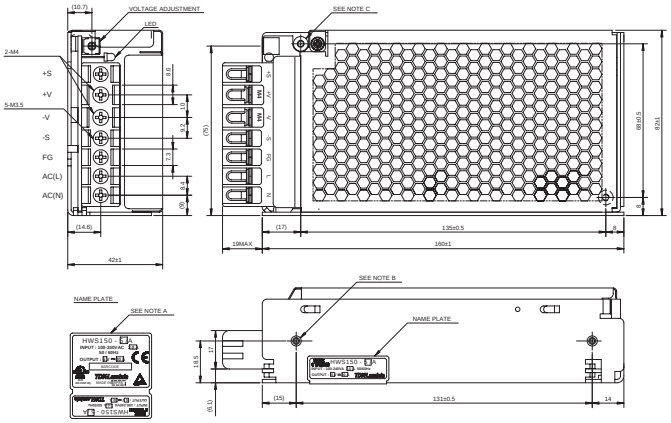
HWS300-1800	300 to 1800W
LZSA	500W to 1500W Single output
DPP, DLP & DSP	10W to 480W DIN Rail Mount

HWS Outline Drawing

HWS15



HWS150



*see website for all outline drawings

For Additional Information, please visit
us.tdk-lambda.com/lp/products/hws-series.htm

3055 Del Sol Blvd • San Diego, CA 92154 • 1-800-526-2324

Revision B1: Oct 2008

TDK·Lambda

HWS300-1500

Single Output Industrial Power Supplies

- Limited Lifetime Warranty
- UL508 approved
- SEMI F47 Compliant (high line AC)
- Universal Input (85 - 265VAC)
- High Efficiency
- Class 1 Div 2 option (/RY suffix)

RoHS

Key Market Segments & Applications

Factory Automation
Test & Measurement
Automated Service

Features and Benefits

Feature	Benefit
◆ Limited Lifetime Warranty	◆ Lower Cost of Ownership
◆ High Efficiency	◆ Easier System Cooling
◆ Wide Range AC Input	◆ Supports Global Use

Specifications

ITEMS / MODEL		HWS300	HWS600	HWS1000	HWS1500
Input Voltage range (47-63Hz)	-	85 - 265VAC or 120 - 330VDC (6)			
Input Current (Typ) (1)	A	5V: 3.8/1.9; 12-48V: 4.2/2.1	5V: 7.5/3.6; 12-48V: 8.1/3.9	3.3V: 9.6/5.0; 5-60V: 13.5/7.0	3.3V: 15.0/8.0; 5-60V: 19.5/10.0
Inrush Current (1)	A	20 / 40			
Power Factor	-	Meets EN61000-3-2			
Temperature Coefficient	-	<0.02%/°C			
Overcurrent Protection	-	>105% (>101% of peak current for peak current capable models)			
Overvoltage Protection	V	See table on page 2 (Recycle AC or remote on/off to reset)			
Hold Up Time (Typ)	ms	20			
Leakage Curr. (at 240VAC, 60Hz)	mA	<0.75mA		<1.2mA	<1.5mA
Remote Sense	-	Yes			
Indicator	-	Green LED = ON			
Remote on/off	-	Yes (Isolated from output)			
Parallel operation	-	Single wire connection (up to 5 units)			
DC Good	-	Yes			
Remote Adjust (PV)	-	External voltage adjusts output, see options table			
Operating Temperature	-	-10°C to +70°C, derate linearly to 50% load from 50C to 70C (2, 3)			
Storage Temperature	°C	-30 to +85°C			
Humidity (non condensing)	-	Operating: 10 - 90%RH, Non operating 10 - 95%RH			
Cooling	-	Internal fan			
Withstand Voltage (4)	-	Input to Ground 2.5kVAC, Input to Output 3kVAC, Output to Ground 500VAC for 1 min.			
Isolation Resistance	-	>100M at 25C & 70%RH, Output to Ground 500VDC			
Vibration (non operating)	-	10 - 55Hz (1 minute sweep), 19.6m/s^2 constant X, Y, Z 1 hour			
Shock	-	< 196.1 m/s^2			
Safety Agency Certifications (5)	-	UL60950-1, CSA60950-1, EN60950-1, EN50178, UL508, CE Mark			
Line Dip	-	Complies with SEMI F47 (200VAC line only)			
Conducted & Radiated EMI	-	EN55011 / EN55022, FCC VCCI (HWS300, 600 & 1000: Class B, HWS1500: Class A)			
Immunity	-	IEC61000-4-2, -3, -4, -6 (Level 3), -5, -8 (Level 4), -11			
Weight (Typ)	g	1,000	1,600	3,200	3.3-7.5V: 4000; 12V+: 3800
Size (WxHxD)	In	2.4 x 3.23 x 6.5"	3.94 x 3.23 x 6.5"	5 x 3.25 x 9.45"	5 x 3.25 x 11"
Warranty	yrs	Limited lifetime warranty (See TDK-Lambda's terms and conditions)			

(1) 100/200VAC
(2) HWS start up -20°C. (-40°C see options table)
(3) HWS1000/1500 with 85VAC input: See installation manual
(4) 2kVAC HWS1000/1500 Input to ground
HWS1000: -10 to +71°C. HWS1000-5, HWS1500-3, -5 derate linearly above 40°C

(5) UL60601-1, EN60601-1, see options.
UL508; HWS300/600 5V, 12V, 24V & 48V models
(6) Not on HWS1500/ME, /HD or /RY versions
(*) Class 1 Div 2 option (/RY suffix)

TDK·Lambda

HWS300-1500

Output Ratings

Model	Voltage V	Adjust Range V(3)	Max Curr. A	Peak Curr. A(2)	Max. Pwr. W	Load Reg mV	Line Reg mV	Ripple Noise mV	Over-voltage V	Eff. typ % (1)
HWS300-3	3.3V	2.64 - 3.96	60	-	198	30	20	120	4.13 - 4.95	74/77
HWS600-3	3.3V	2.64 - 3.96	120	-	396	30	20	120	4.13 - 4.95	75/78
HWS1000-3	3.3V	2.64 - 3.96	200	-	660	40	20	120	4.13 - 4.62	71/73
HWS1500-3	3.3V	2.64 - 3.96	300	-	990	60	36	150	4.12 - 4.62	72/75
HWS300-5	5V	4 - 6	60	-	120	30	20	120	6.25 -7.25	79/82
HWS600-5	5V	4 - 6	120	-	600	30	20	120	6.25 -7.25	80/83
HWS1000-5	5V	4 - 6	200	-	1000	40	20	120	6.25 - 7.0	76/78
HWS1500-5	5V	4 - 6	300	-	1500	60	36	150	6.25 - 7.0	77/81
HWS1000-6	6V	4.8 - 7.2	167	-	1002	60	36	150	7.5 - 8.4	79/81
HWS1500-6	6V	4.8 - 7.2	250	300	1500	60	36	150	7.5 - 8.4	79/82
HWS1000-7	7.5V	6 - 9V	134	160	1005	60	36	150	9.38 - 10.5	80/82
HWS1500-7	7.5V	6 - 9V	200	240	1500	60	40	150	9.37 - 10.5	81/83
HWS300-12	12V	9.6 - 14.4	27	-	324	96	48	120	15 - 17.4	80/83
HWS600-12	12V	9.6 - 14.4	53	-	648	96	48	120	15 - 17.4	80/83
HWS1000-12	12V	9.6 - 14.4	88	100	1056	100	48	150	15 - 17.4	83/85
HWS1500-12	12V	9.6 - 14.4	125	-	1500	72	48	150	15 - 17.4	82/85
HWS300-15	15V	12 - 18	22	-	330	120	60	150	18.8 - 21.8	82/85
HWS600-15	15V	12 - 18	43	-	645	120	60	150	18.8 - 21.8	82/85
HWS1000-15	15V	12 - 18	70	80	1050	120	60	150	18.8 - 21.8	83/85
HWS1500-15	15V	12 - 18	100	-	1500	90	60	150	18.7 - 21.8	83/87
HWS300-24	24V	19.2 - 28.8	14	16.5	336	192	96	150	30 - 34.8	82/85
HWS600-24	24V	19.2 - 28.8	27	31	648	192	96	150	30 - 34.8	82/85
HWS1000-24	24V	19.2 - 28.8	44	50	1056	150	96	150	30 - 34.8	85/87
HWS1500-24	24V	19.2 - 28.8	65/70 (1)	105	1560	144	96	200	30 - 34.8	84/88
HWS1000-36	36V	28.8 - 43.2	29.3	33.3	1055	150	144	200	45 - 49.7	85/88
HWS1500-36	36V	28.8 - 43.2	42/46.5 (1)	70	1512	150	144	200	45 - 49.7	84/88
HWS300-48	48V	38.4 - 52.8	7	-	336	384	192	200	55.2 - 64.8	82/85
HWS600-48	48V	38.4 - 52.8	13	-	624	384	192	200	55.2 - 64.8	82/85
HWS1000-48	48V	38.4 - 52.8	22	25	1056	300	192	200	55.2 - 64.8	86/88
HWS1500-48	48V	38.4 - 52.8	32	-	1536	288	192	200	55.2 - 64.8	86/90
HWS1000-60	60V	48 - 66	17.6	20	1056	360	240	400	69 - 75	85/88
HWS1500-60	60V	48 - 66	25.6/28 (1)	42	1536	360	240	400	69 - 75	86/90

Notes
(1) 100/200VAC
(2) 200-265VAC Input, 10s maximum on time with 35% duty cycle
(3) Use program input (PV) to adjust from 20-120% of nominal (20-110% for 48V models)

Options

Suffix	Description
Blank	HWS300-1500 the cover is fitted as standard
/A	Not Applicable HWS300-1500 the cover is fitted as standard
/PV	HWS300, 600 (Standard on HWS1000 & 1500): 1-6V program voltage input to adjust output 20-120% of nominal (20-110% for 48V) (12V-48V models only)
/HD	See HWS50-1500/HD Datasheet for details.-40 to +71(74)°C operation, conformally coated PCBs
/ME	See HWS30-1500/ME Datasheet for details. UL60601-1, EN60950-1 medical certification
/RY	ISA 12.12.01 (UL1604) - Class 1 Div 2 with dry contact relay DC Good signal (300W, 600W and 1500W 24V output models only, no UL508 certification, no remote on/off function.)

Other Industrial Products

HWS	15W to 150W single output
LZSA	500W to 1500W Single output
SWS	50W to 1000W, low cost
DPP, DLP & DSP	10W to 480W DIN Rail Mount

For Additional Information, please visit
us.tdk-lambda.com/lp/products/hws-series.htm

3055 Del Sol Blvd • San Diego, CA 92154 • 1-800-526-2324
Revision C2: May 2011

TDK·Lambda

HWS50-1500/HD

Single Output Industrial Power Supplies

- Limited Lifetime Warranty
- -10 to +71°C Operation (-40°C start up)
- Universal Input (85 - 265VAC)
- Conformally coated pcbs
- Class 1 Div 2 option (/RYHD suffix)

RoHS

Key Market Segments & Applications

Factory Automation
Test & Measurement
LED Displays

Features and Benefits

Feature	Benefit
◆ Limited Lifetime Warranty	◆ Lower Cost of Ownership
◆ Conformally coated pcbs	◆ Operation in harsh environments
◆ Wide range AC Input	◆ Supports global use

Specifications

ITEMS / MODELS			HWS50	HWS100	HWS150	HWS300	HWS600	HWS1000	HWS1500
Input Voltage range (47-63Hz)		-	85-265VAC or 120-370VDC			85-265VAC or 120-330VDC (No DC input for HWS1500)			
Input Current (Typ)	(1)	A	0.7 / 0.35	1.3 / 0.65	1.9 / 0.95	4.1 / 2.1	8.1 / 3.9	13.5 / 7	19 / 10
Inrush Current	(1)	A	14 / 28			20 / 40			
Power Factor		-	Meets EN61000-3-2						
Temperature Coefficient		-	<0.02%/°C						
Overcurrent Protection		-	>104%						
Overvoltage Protection		V	Yes (See table on page 2)						
Hold Up Time (Typ)		ms	20						
Leakage Current (60Hz)		mA	<0.5mA			<0.75mA		<1.2mA	≤1.5mA
Remote Sense		-	No	Yes					
Indicator		-	Green LED = ON						
Remote On/Off		-	No			Yes (Isolated from output)			
Parallel operation		-	No			Single wire connection (5 units max)			
DC Good		-	No			Yes			
Remote Adjust (PV)		-	No					Yes (3)	
Operating Temperature and Derating (operation to +74°C - contact factory)		-	HWS50-150: -10°C to +71°C, (-10 ~+50°C: 100%, +60°C: 60%, +71°C: 20%) HWS300-1500: -10°C to +71°C, (-10 ~+50°C: 100%, derate linearly to 50% load from +50 to +71°C) Guaranteed start up at -40°C (see specification sheets on website for details and derating)						
Storage Temperature		°C	-40 to +85°C						
Humidity (non condensing)		-	Operating: 30 - 90%RH (10 -90% on HWS300-1500), Non operating 10 - 95%RH						
Cooling		-	Convection			Internal fan			
Withstand Voltage	(2)	-	Input to Ground 2kVAC, Input to Output 3kVAC, Output to Ground 500VAC for 1 min.						
Isolation Resistance		-	>100MΩ at 25°C & 70%RH, Output to Ground 500VDC, >10M Output to remote on/off 100VDC						
Vibration (non operating)		-	MIL-STD-810F 514.5 Category 4, 10 (HWS1500 Cat 4, figure 514.5C-1)						
Shock (in packaging)		-	MIL-STD-810F 516.5 Category I, VI (HWS1500 <196.1m/s²)						
Safety Agency Approvals		-	UL60950-1, CSA60950-1, EN60950-1, EN50178, CE Mark						
Line Dip		-	Complies with SEMI F47 (200VAC line only)						
Conducted & Radiated EMI		-	EN55011 / EN55022-B, FCC-B, VCCI-B (HWS1500 Class A)						
Immunity		-	IEC61000-4-2 (Level 2,3), -3, -4, -6, (Level 3), -5, -8 (Level 4), -11						
Weight (Typ)		g	280	450	500	1000	1600	3200	3800
Size (WxHxD)		in	1.04x3.23x4.72	1.1x3.23x6.3	1.46x3.23x6.3	2.4x3.23x6.5	3.94x3.23x6.5	5x3.2x9.5	5x3.25x11
Warranty		yr	Limited lifetime warranty (See Lambda's terms & conditions)						

(1) 100/200VAC input
(2) HWS300-600 2.5kVAC Input to ground
(3) 1-6V program voltage input to adjust output 20-120% (typical) of nominal. See instruction manual for details & models with this feature.
(*) Class 1 Div 2 option (/RYHD suffix)

TDK·Lambda

HWS50-1500/HD

Output Ratings

Model	Voltage	Adjust Range	Max Curr(A)	Peak Curr(A)[4]	Max Power(W)	Load Reg(mV)	Line Reg(mV)	Ripple Noise(mV)	Overvoltage (V)	Efficiency (typ)%[1]
HWS50-3/HD	3.3V	2.97 - 3.96	10	-	33	40	20	120	4.13-4.95	76/78
HWS100-3/HD	3.3V	2.97 - 3.96	20	-	66	40	20	120	4.13-4.95	78/81
HWS150-3/HD	3.3V	2.97 - 3.96	30	-	99	40	20	120	4.13-4.95	78/81
HWS300-3/HD	3.3V	2.64 - 3.96	60	-	198	30	20	120	4.13-4.95	74/77
HWS600-3/HD	3.3V	2.64 - 3.96	120	-	396	30	20	120	4.13-4.95	75/78
HWS1000-3/HD	3.3V	2.64 - 3.96	200	-	660	40	20	120	4.12-4.62	71/73
HWS1500-3/HD	3.3V	2.64 - 3.96	300	-	990	60	36	150	4.12-4.62	72/75
HWS50-5/HD	5V	4.0 - 6.0	10	-	50	40	20	120	6.25-7.25	82/84
HWS100-5/HD	5V	4.0 - 6.0	20	-	100	40	20	120	6.25-7.25	83/86
HWS150-5/HD	5V	4.0 - 6.0	30	-	150	40	20	120	6.25-7.25	83/86
HWS300-5/HD	5V	4.0 - 6.0	60	-	300	30	20	120	6.25-7.25	79/82
HWS600-5/HD	5V	4.0 - 6.0	120	-	600	30	20	120	6.25-7.25	80/83
HWS1000-5/HD	5V	4.0 - 6.0	200	-	1000	40	20	120	6.25-7	76/78
HWS1500-5/HD	5V	4.0 - 6.0	300	-	1500	60	36	150	6.25-7	77/81
HWS1000-6/HD	6V	4.8 - 7.2	167	-	1002	60	36	150	7.5-8.4	79/81
HWS1000-7/HD	7.5V	6.0 - 9.0	134	160	1005	60	36	150	9.37-10.5	80/82
HWS50-12/HD	12V	9.6 - 14.4	4.3	-	51.6	96	48	150	15-17.4	81/83
HWS100-12/HD	12V	9.6 - 14.4	8.5	-	102	96	48	150	15-17.4	83/86
HWS150-12/HD	12V	9.6 - 14.4	13	-	156	96	48	150	15-17.4	83/86
HWS300-12/HD	12V	9.6 - 14.4	27	-	324	72	48	150	15-17.4	80/83
HWS600-12/HD	12V	9.6 - 14.4	53	-	636	72	48	150	15-17.4	80/83
HWS1000-12/HD	12V	9.6 - 14.4	88	100	1056	100	48	150	15-17.4	82/85
HWS1500-12/HD	12V	9.6 - 14.4	125	-	1500	72	48	150	15-17.4	82/85
HWS50-15/HD	15V	12.0 - 18.0	3.5	-	52.5	120	60	150	18.8-21.8	81/83
HWS100-15/HD	15V	12.0 - 18.0	7	-	105	120	60	150	18.8-21.8	83/86
HWS150-15/HD	15V	12.0 - 18.0	10	-	150	120	60	150	18.8-21.8	83/86
HWS300-15/HD	15V	12.0 - 18.0	22	-	330	90	60	150	18.8-21.8	80/83
HWS600-15/HD	15V	12.0 - 18.0	43	-	645	90	60	150	18.8-21.8	81/84
HWS1000-15/HD	15V	12.0 - 18.0	70	80	1500	120	60	150	18.7-21.8	83/85
HWS1500-15/HD	15V	12.0 - 18.0	100	-	1500	90	60	150	18.7-21.8	83/87
HWS50-24/HD	24V	19.2 - 28.8	2.2	-	52.8	192	96	150	30-34.8	82/84
HWS100-24/HD	24V	19.2 - 28.8	4.5	-	108	192	96	150	30-34.8	84/87
HWS150-24/HD	24V	19.2 - 28.8	6.5	-	156	192	96	150	30-34.8	85/88
HWS300-24/HD	24V	19.2 - 28.8	14	16.5	336	144	96	150	30-34.8	82/85
HWS600-24/HD	24V	19.2 - 28.8	27	31	648	144	96	150	30-34.8	82/85
HWS1000-24/HD	24V	19.2 - 28.8	46	58.5	1104	150	96	150	30-34.8	85/87
HWS1500-24/HD	24V	19.2 - 28.8	65/70 (1)	105	1560	144	96	200	30-34.8	84/88
HWS1000-36/HD	36V	28.8 - 43.2	30.7	39	1104	150	144	200	45-49.7	85/88
HWS1500-36/HD	36V	28.8 - 43.2	42/46.5(2)	70	1512	150	144	200	45-49.7	84/88
HWS50-48/HD	48V	38.4 - 52.8	1.1	-	52.8	384	192	200	55.2-64.8	83/85
HWS100-48/HD	48V	38.4 - 52.8	2.1	-	100.8	384	192	200	55.2-64.8	84/87
HWS150-48/HD	48V	38.4 - 52.8	3.3	-	158.4	384	192	200	55.2-64.8	85/88
HWS300-48/HD	48V	38.4 - 52.8	7	-	336	288	192	350	55.2-64.8	82/85
HWS600-48/HD	48V	38.4 - 52.8	13	-	624	288	192	350	55.2-64.8	83/86
HWS1000-48/HD	48V	38.4 - 52.8	28	29.2	1104	300	192	200	55.2-60	86/88
HWS1500-48/HD	48V	38.4 - 52.8	32	-	1536	288	192	200	55.2-64.8	86/90
HWS1000-60/HD	60V	48.0 - 66.0	18.4	23.4	1104	360	240	400	69-75	85/88

Options

Suffix	Description
Blank	No Cover (HWS50-150 Only) HWS300-1500 the cover is fitted as standard
/HDA	The cover option for HWS50-150 is special order only HWS300-1500 the cover is fitted as standard
/RYHD	ISA 12.12.01 (UL1604) - Class 1 Div 2 with dry contact relay DC Good signal (300W, 600W and 1500W 24V output models only, no remote on/off function.)

(4) 200-265VAC Input, 10s maximum on time, 35% duty cycle

Other Industrial Products

LZSA	500W to 1500W Single output
DPP, DLP, DSP	10W to 960W DIN Rail Mount
PFE	300 to 1000W AC-DC Power Models

For Additional Information, please visit
us.tdk-lambda.com/lp/products/hws-series.htm

TDK·Lambda

HWS30-1500/ME

Single Output Medical Power Supplies

- Limited Lifetime Warranty
- Medical Approvals[2]
- Universal Input (85 - 265VAC)
- High Efficiency
- Broad 30W to 1500W product range

RoHS

Features and Benefits

Feature	Benefit
◆ Limited Lifetime Warranty	◆ Lower Cost of Ownership
◆ Medical Approvals	◆ Reduces system approval times
◆ Wide range AC Input	◆ Supports global use

Specifications

ITEMS / MODELS		HWS30 HWS50	HWS100 HWS150	HWS300	HWS600	HWS1500
Input Voltage range (47-63Hz) (2)	-	85 - 265VAC or 120 - 370VDC		85 - 265VAC or 120 - 330VDC		85 - 265VAC
Input Current (Typ) (1)	A	0.8 / 0.4 0.7 / 0.35	1.3 / 0.65 1.9 / 0.95	4.1 / 2.1	8.1 / 3.9	19 / 10
Inrush Current (1)	A	14 / 28		20 / 40		
Power Factor / Flicker	-	Meets EN61000-3-2, EN61000-3-3				
Temperature Coefficient	-	<0.02%/°C				
Overcurrent Protection	-	>104%				
Overvoltage Protection	V	Yes (See table on page 2)				
Hold Up Time (Typ)	ms	20				
Leakage Current (60Hz)	mA	<0.5mA				
Remote Sense	-	No	Yes			
Indicator	-	Green LED = ON				
Remote On/Off	-	No		Yes (Isolated from output)		
Parallel operation	-	No		Single wire connection (5 units max)		
DC Good	-	No		Yes		
Voltage Programming	-	No				Yes
Operating Temperature & Derating	-	HWS30-150: -10°C to +70°C, (-10 - +50°C: 100%, +60°C: 60%, +70°C: 20%) HWS300-1500: -10°C to +70°C, (-10 - +50°C: 100%, derate linearly to 50% load from +50 to +70°C)				
Storage Temperature	-	-30 to +85°C				
Humidity (non condensing)	-	Operating: 30 - 90%RH (10 -90% on HWS300-1500), Non operating 10 - 95%RH				
Cooling	-	Convection		Internal fan		
Withstand Voltage (3)	-	I/P to Grnd 2kVAC, I/P to O/P 3kVAC, O/P to Grnd 500VAC, O/P to Remote On/Off 100VAC for 1 min.				
Isolation Resistance	-	>100M at 25C & 70%RH, Output to Ground 500VDC, >10M Output to remote on/off 100VDC				
Vibration (non operating)	-	10 - 55Hz (1 min sweep), 19.6m/s² constant, X, Y, Z axis, one hour each				
Shock (in packaging)	-	< 196.1m/s²				
Safety Agency Approvals (2)	-	UL60601-1, EN60601, CSA-C22.2 No601.1-M90 (C-UL) (basic insulation), CE Mark				
Line Dip	-	Complies with SEMI F47 (200VAC line only)				
Conducted & Radiated EMI	-	EN55011 / EN55022-B, FCC-B, VCCI-B (HWS600 & 1500 Class A)				
Immunity	-	IEC61000-4-2 (Level 2,3), -3, -4, -6, (Level 3), -5 (Level 3,4), -8 (Level 4), -11				
Weight (Typ)	g	220 280	450 500	1000	1600	3800
Size (WxHxD)	In	1.04x3.23x3.74 1.04x3.23x4.72	1.1x3.23x6.3 1.46x3.23x6.3	2.4x3.23x6.5	3.94x3.23x6.5	4.98x3.23x11.02
Warranty	yrs	Limited lifetime warranty (See Lambda's terms & conditions)				

(1) 100/200VAC input
(2) See conditions of accep[tability and clause 19.5DV.2 of UL60601 for equipment in proximity of patient
(3) HWS300-600 2.5kVAC Input to ground

TDK·Lambda

HWS30-1500/ME

Output Ratings

Model	Voltage	Adjust Range	Max Curr(A)[4]	Max Power(W)	Load Reg(mV)	Line Reg(mV)	Ripple Noise(mV)	Overvoltage (V)	Efficiency (typ)%[1]
HWS30-5/ME	5V	4.0 - 6.0	6	30	40	20	120	6.25-7.25	77/80
HWS50-5/ME	5V	4.0 - 6.0	10	50	40	20	120	6.25-7.25	82/84
HWS100-5/ME	5V	4.0 - 6.0	20	100	40	20	120	6.25-7.25	83/86
HWS150-5/ME	5V	4.0 - 6.0	30	150	40	20	120	6.25-7.25	83/86
HWS30-12/ME	12V	9.6 - 14.4	2.5	30	96	48	150	15-17.4	81/83
HWS50-12/ME	12V	9.6 - 14.4	4.3	51.6	96	48	150	15-17.4	81/83
HWS100-12/ME	12V	9.6 - 14.4	8.5	102	96	48	150	15-17.4	83/86
HWS150-12/ME	12V	9.6 - 14.4	13	156	96	48	150	15-17.4	83/86
HWS300-12/ME	12V	9.6 - 14.4	27	324	72	48	150	15-17.4	80/83
HWS30-15/ME	15V	12.0 - 18.0	2	30	120	60	150	18.8-21.8	81/83
HWS50-15/ME	15V	12.0 - 18.0	3.5	52.5	120	60	150	18.8-21.8	81/83
HWS100-15/ME	15V	12.0 - 18.0	7	105	120	60	150	18.8-21.8	83/86
HWS150-15/ME	15V	12.0 - 18.0	10	150	120	60	150	18.8-21.8	83/86
HWS300-15/ME[5]	15V	12.0 - 18.0	22	330	90	60	150	18.8-21.8	82/85
HWS30-24/ME	24V	19.2 - 28.8	1.3	31.2	192	96	200	30-34.8	83/86
HWS50-24/ME	24V	19.2 - 28.8	2.2	52.8	192	96	150	30-34.8	82/84
HWS100-24/ME	24V	19.2 - 28.8	4.5	108	192	96	150	30-34.8	84/87
HWS150-24/ME	24V	19.2 - 28.8	6.5	156	192	96	150	30-34.8	85/88
HWS300-24/ME	24V	19.2 - 28.8	14 (16.5 pk)	336	144	96	150	30-34.8	82/85
HWS600-24/ME	24V	19.2 - 28.8	27 (31 pk)	648	144	96	150	30-34.8	82/85
HWS1500-24/ME	24V	19.2 - 28.8, 4.8 - 28.8[7]	65 (105 pk)[6]	1560(2520 pk)[6]	144	96	200	30-34.8	84/88
HWS1500-36/ME	36V	28.8 - 43.2, 7.2 - 43.2[7]	42 (70 pk)[6]	1512(2520 pk)[6]	150	144	200	34-49.7	84/88
HWS30-48/ME	48V	38.4 - 52.8	0.65	31.2	384	192	200	55.2-64.8	82/83
HWS50-48/ME	48V	38.4 - 52.8	1.1	52.8	384	192	200	55.2-64.8	83/85
HWS100-48/ME	48V	38.4 - 52.8	2.1	100.8	384	192	200	55.2-64.8	84/87
HWS150-48/ME	48V	38.4 - 52.8	3.3	158.4	384	192	200	55.2-64.8	85/88
HWS300-48/ME[5]	48V	38.4 - 52.8	7	336	288	192	350	55.2-64.8	82/85
HWS1500-48/ME	48V	38.4 - 52.8, 9.6 - 52.8[7]	32	1536	288	192	200	55.2-64.8	86/90

Options

Suffix	Description
Blank	No Cover (HWS30-150/ME Only) HWS300-1500/ME the cover is always fitted
/MEA	The cover option for the HWS30-150/ME is special order only. HWS300-1500/ME the cover is always fitted

For Additional Information, please visit
us.tdk-lambda.com/lp/products/hws-series.htm

(4) Peak load for 10s maximum on time, 35% duty cycle
(5) Safety agency in progress - contact factory for status.
(6) 200-265AC Input
(7) Using voltage programming input - see installation manual for details

Other Medical Products

KM Series	15 to 40W, PCB mount
CS Series	40 to 500W
NV Series	175 to 700W single & multiple output
Vega Series	450 to 900W single & multiple output
Alpha Series	1000W single and multiple output

3055 Del Sol Blvd • San Diego, CA 92154 • 1-800-526-2324
Revision B1: Jun 2011

TDK·Lambda

HWS1800T

1800W 3ph Industrial Power Supplies

- Limited Lifetime Warranty
- 208VAC Three Phase Input
- High Efficiency
- SEMI F47 Compliant

RoHS

Key Market Segments & Applications

Factory Automation
Test & Measurement
Semiconductor Fabrication

Features and Benefits

Feature	Benefit
◆ Limited Lifetime Warranty	◆ Lower Cost of Ownership
◆ High Efficiency	◆ Easier System Cooling
◆ Compact Size	◆ Less space used in system

Specifications

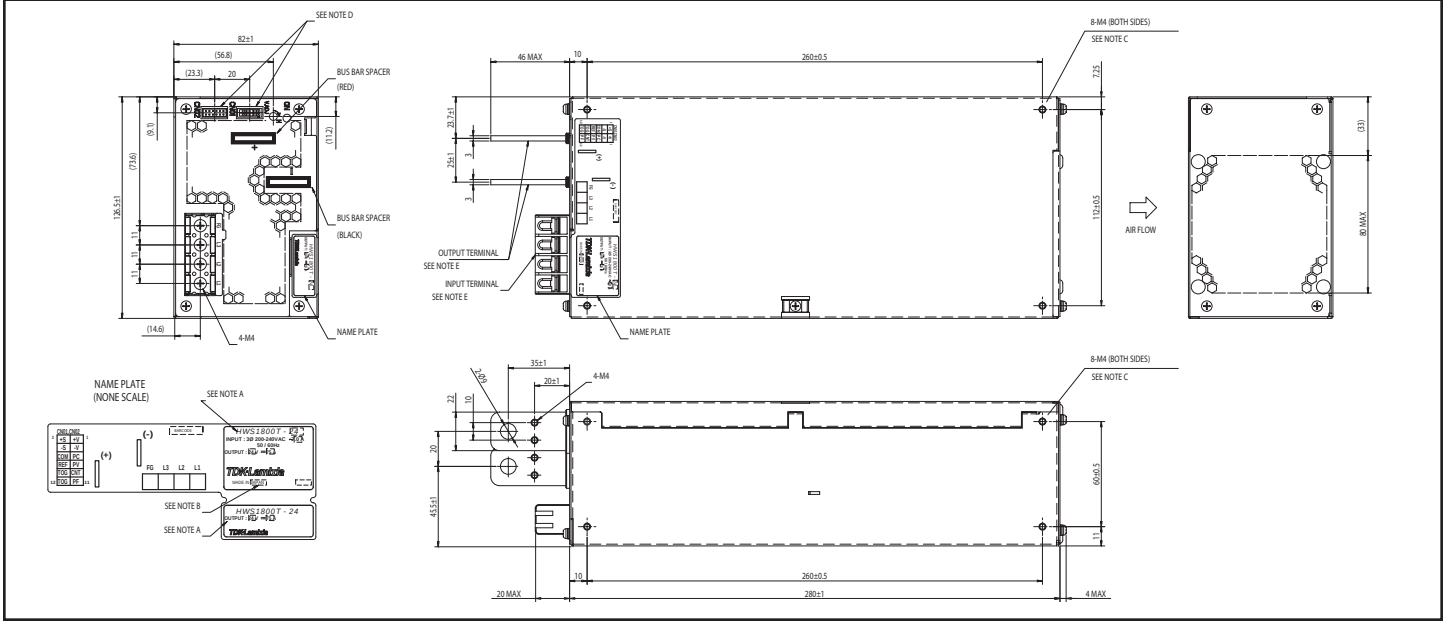
ITEMS / MODEL		HWS1800
Input Voltage Range	-	208VAC, Three phase 170 - 265VAC (47 - 63Hz)
Input Current (Typical)	A	3.3V: 4.5A, 5V to 15V: 6A, 24 to 60V: 7A
Inrush Current (200VAC)	A	40A
Power Factor	-	Typically 0.94
Temperature Coefficient	-	<0.02%/°C
Overcurrent Protection	-	>105% of maximum / peak current rating
Overvoltage Protection	V	See table on page 2. Cycle input to reset or use remote on/off function
Hold Up Time (Typ)	ms	3.3V to 15V: 20ms, 24 to 60V: 18ms at 200VAC
Leakage Current (max)	mA	<2.6mA at 240VAC 60Hz
Remote Sense	-	Yes
Indicator	-	Green LED = ON
Remote on/off	-	Yes
Parallel operation	-	Single wire connection
DC Good	-	Yes
Remote Adjust (PV)	-	External voltage adjusts output voltage. See Instruction Manual
Operating Temperature	-	-10°C to +71°C, see output derating curves, -20°C start up
Storage Temperature	-	-30 to +85°C
Humidity (non condensing)	-	Operating: 10 - 90%RH, Non operating 10 - 95%RH
Cooling	-	Internal fan
Withstand Voltage	-	I/P to Grnd 2kVAC, I/P to O/P 3kVAC, O/P to Grnd 500VAC (1), O/P to CNT 100VAC for 1 min
Isolation Resistance	-	>100M at 25C & 70%RH, Output to Ground 500VDC
Vibration (non operating)	-	10 - 55Hz (1 minute sweep), 19.6m/s^2 constant X, Y, Z 1 hour
Shock (In package)	-	< 196.1 m/s^2
Safety Agency Approvals	-	UL60950-1, CSA60950-1, EN60950-1, EN50178
Line Dip	-	Complies with SEMI F47
Conducted & Radiated EMI	-	EN55011 / EN55022-A, FCC-A, VCCI-A
Immunity	-	IEC61000-4-2, -3, -4, -5, -6, -8
Weight (Typ)	g	3800
Size (WxHxD)	in	4.98 x 3.23 x 11"
Warranty	yrs	Limited lifetime warranty (See Lambda's terms & conditions)

Notes:
(1) HWS1800T-60V: 651VAC

TDK·Lambda

HWS1800T

Outline Drawing



Output Ratings

Model	Voltage V	Adjust Range V	Max Curr. A	Peak Curr. A(2)	Max Power W	Peak Power W²	Load Reg mV	Line Reg mV(3)	Ripple Noise mV	Overvoltage V	Efficiency (typ) %
HWS1800T-3	3.3	2.64 - 3.96	300	-	990	-	60	36	120	4.12 - 4.62	75
HWS1800T-5	5	4 - 6	300	-	1500	-	60	36	120	6.25 - 7.0	81
HWS1800T-6	6	4.8 - 7.2	250	300	1500	1800	60	40	150	7.5 - 8.4	82
HWS1800T-7	7.5	6 - 9	200	240	1500	1800	60	40	150	9.37 - 10.5	84
HWS1800T-12	12	9.6 - 14.4	125	150	1500	1800	72	48	200	15 - 17.4	84
HWS1800T-15	15	12 - 18	100	120	1500	1800	90	60	200	18.7 - 21.8	84
HWS1800T-24	24	19.2 - 28.8	75	105	1800	2520	144	96	250	30 - 34.8	88
HWS1800T-36	36	28.8 - 43.2	50	70	1800	2520	216	144	250	45 - 49.7	88
HWS1800T-48	48	38.4 - 52.8	37.5	52.5	1800	2520	288	192	300	55.2 - 60	90
HWS1800T-60	60	48 - 66	30	42	1800	2520	360	240	400	69 - 75	90

Notes

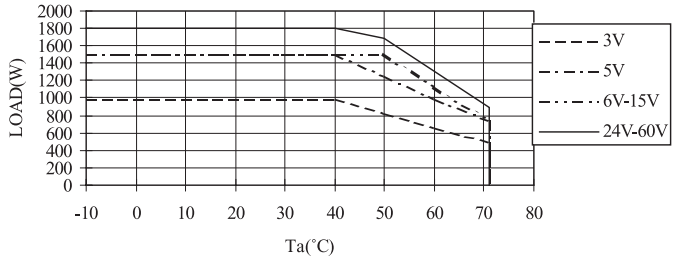
(2) 10s maximum on time with 35% duty cycle
(3) 180 - 265VAC

Other Industrial Products

HWS	15W to 1500W single output, single phase
LZSA	500W to 1500W single output
SWS	50W to 1000W, low cost
DPP, DLP & DSP	10W to 960W DIN Rail mount

For Additional Information, please visit
us.tdk-lambda.com/lp/products/hws-series.htm

Output Derating Curves



3055 Del Sol Blvd • San Diego, CA 92154 • 1-800-526-2324

Revision A4: Jan 2008

TDK·Lambda

KM Series

15-40W Medical AC-DC PCB-Mount Power Supplies

- Small size and lightweight
- PC Board Mountable
- Wide Range Input
- Medical Safety Certifications (4kVAC Input - Output)
- Class II (No ground needed)

RoHS

Features and Benefits

Feature	Benefit
◆ Small size	◆ Minimizes pcb space
◆ Wide input range	◆ Global use with no manual intervention
◆ High efficiency	◆ Lower heat dissipated in system

Specifications

ITEMS \ MODELS		KMS15	KMD15	KMT15	KMS40	KMD40	KMT40
Input Voltage Range	-	90-264VAC 47-440Hz or 100-375VDC					
Inrush Current Limiting	A	10 / 20A, cold start, 25°C ambient (115 / 230VAC)					
Input Current (115 / 230VAC)	mA	220 / 118mA			860 / 460mA		
Recommended External Fuse	-	2A slow blow type			3.15A slow blow type		
Temperature Coefficient	-	±0.01%/°C					
Ripple and Noise (pk-pk)	mV	50mV or 1%, whichever is greater					
Overcurrent Protection	-	> 105%, hiccup mode, automatic recovery					
Overvoltage Protection	%	Yes, Zener diode clamp					
Hold-up Time (typical)	ms	20ms			18ms		
Enclosure Leakage (240VAC 63Hz) (264VAC 63Hz)	mA	0.055 max 0.06 max			0.08 max 0.085 max		
Operating Temperature	-	-25°C to 70°C, derate linearly to 50%(1) load from 50°C to 70°C. Max case temperature 95°C					
Storage Temperature	-	-40°C to 100°C					
Humidity	%RH	20% to 95% RH (non-condensing)					
Cooling	-	Convection, over temperature protected ~100°C case temperature					
Withstand Voltage	VAC	Input to output: 4kVAC					
Immunity	-	EN60601-1-2					
Safety Agency Certification	-	UL60601-1, IEC60601-1, CE Mark, EN60950-1					
Conducted EMI	-	EN55011, EN55022 Class B			EN55011, EN55022 Class A		
Switching Frequency	kHz	132kHz					
Weight	g	120			280		
Size (LxWxH)	in	2.52 x 1.79 x 0.92"			3.5 x 2.5 x 1.06"		
Mounting & Case	-	PC board mountable. Plastic resin fiberglass case (UL 94V-0)					
MTBF	hrs	200,000 to 400,000 hours, model dependent					
Warranty	yrs	2 years					

(1) KM15 derates linearly to 40% load

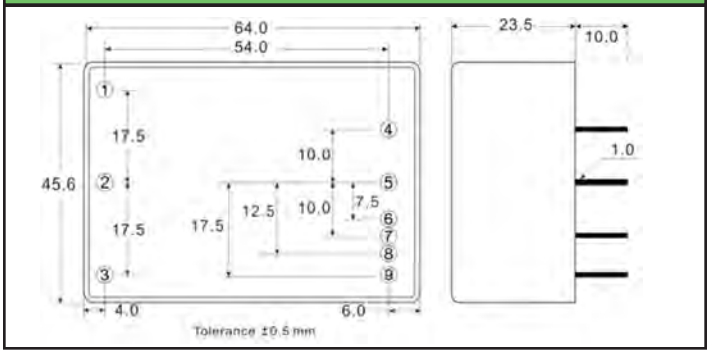
TDK·Lambda

KM Series

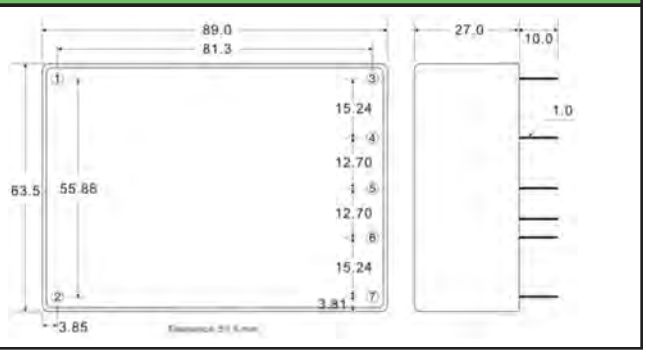
Output Ratings

Model		Output Voltage (V)	Minimum Current (A)	Maximum Current (A)	Power (W)	Output Set Accuracy (%)	Line Regulation (%)	Load Regulation (1) (%)	Cross Regulation	Efficiency (%)
Single Output										
KMS15-3P3	V1	3.3V	0A	3.00A	9.9W	±2%	0.5%	1%	-	74%
KMS40-3P3	V1	3.3V	80mA	8.00A	26.4W	±2%	0.5%	1%	-	75%
KMS15-5	V1	5V	0A	3.00A	15W	±2%	0.5%	1%	-	78%
KMS40-5	V1	5V	80mA	8.00A	40W	±2%	0.5%	1%	-	79%
KMS15-9	V1	9V	0A	1.67A	15W	±2%	0.5%	1%	-	79%
KMS40-9	V1	9V	44mA	4.44A	40W	±2%	0.5%	1%	-	82%
KMS15-12	V1	12V	0A	1.25A	15W	±2%	0.5%	1%	-	81%
KMS40-12	V1	12V	33mA	3.33A	40W	±2%	0.5%	1%	-	83%
KMS15-15	V1	15V	0A	1.00A	15W	±2%	0.5%	1%	-	81%
KMS40-15	V1	15V	26.7mA	2.67A	40W	±2%	0.5%	1%	-	83%
KMS15-24	V1	24V	0A	0.62A	15W	±2%	0.5%	1%	-	83%
KMS40-24	V1	24V	16.7mA	1.67A	40W	±2%	0.5%	1%	-	83%
Dual Output										
KMD15-55	V1	+5V	150mA	1.5A	15W	±2%	0.5%	1%	5%	78%
	V2	-5V	150mA	1.5A		±2%	0.5%	1%	5%	
KMD40-55	V1	+5V	400mA	4A	40W	±2%	0.5%	1%	5%	79%
	V2	-5V	400mA	4A		±2%	0.5%	1%	5%	
KMD40-512	V1	5V(2)	1250mA	5A	40W	±3%	0.5%	2%	1%	80%
	V2	12V(2)	312mA	1.25A		±5%	5.0%	6%	7%	
KMD40-524	V1	5V(2)	1250mA	5A	40W	±3%	0.5%	2%	1%	80%
	V2	24V(2)	156mA	0.625A		±5%	5.0%	6%	7%	
KMD15-1212	V1	+12V	62.5mA	0.625A	15W	±2%	0.5%	1%	3%	80%
	V2	-12V	62.5mA	0.625A		±2%	0.5%	1%	3%	
KMD40-1212	V1	+12V	166mA	1.66A	40W	±2%	0.5%	1%	5%	83%
	V2	-12V	166mA	1.66A		±2%	0.5%	1%	5%	
KMD15-1515	V1	+15V	50mA	0.5A	15W	±2%	0.5%	1%	3%	81%
	V2	-15V	50mA	0.5A		±2%	0.5%	1%	3%	
KMD40-1515	V1	+15V	133mA	1.33A	40W	±2%	0.5%	1%	5%	81%
	V2	-15V	133mA	1.33A		±2%	0.5%	1%	5%	
Triple Output										
KMT15-51212	V1	5V(3)	500mA	2A	15W	±2%	0.5%	1%	1%	78%
	V2	+12V	50mA	0.2A		±3%	2.0%	5%	5%	
	V3	-12V	50mA	0.2A		±3%	2.0%	5%	5%	
KMT40-51212	V1	5V(3)	1250mA	5A	40W	±3%	0.5%	3%	3%	80%
	V2	+12V	150mA	0.6A		±5%	5.0%	7%	7%	
	V3	-12V	150mA	0.6A		±5%	5.0%	7%	7%	
KMT15-51515	V1	5V(3)	500mA	2A	15W	±2%	0.5%	1%	1%	78%
	V2	+15V	37.5mA	0.15A		±3%	2.0%	5%	5%	
	V3	-15V	37.5mA	0.15A		±3%	2.0%	5%	5%	
KMT40-51515	V1	5V(3)	1250mA	5A	40W	±3%	0.5%	3%	3%	80%
	V2	+15V	125mA	0.5A		±5%	5.0%	7%	7%	
	V3	-15V	125mA	0.5A		±5%	5.0%	7%	7%	

KM15 Outline Drawings



KM40 Outline Drawings



(1) Symmetrical loading, from minimum to maximum load
(2) Output V1 is isolated from output V2
(3) Output V1 is isolated from outputs V2 & V3

For Additional Information, please visit
us.tdk-lambda.com/lp/products/km-series.htm

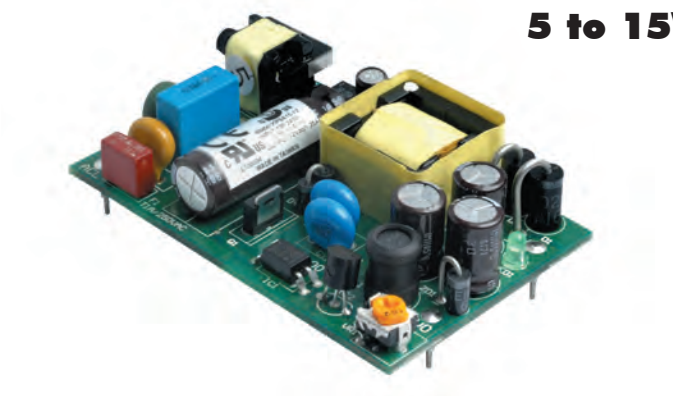
3055 Del Sol Blvd • San Diego, CA 92154 • 1-800-526-2324

Revision A7: Dec 2010

TDK·Lambda

KPSA Series

5 to 15W AC-DC Board Mount Power Supplies



- Low profile
- Smaller footprint
- PC board Mountable
- Low Cost
- UL Class II Approved

RoHS

Key Market Segments & Applications

Factory Automation
Printers and motor drives
Kiosks

Features and Benefits

Feature	Benefit
◆ Smaller footprint	◆ Minimizes pcb space
◆ Wide input range	◆ Global use with no manual intervention
◆ No external components needed	◆ Easy to use
◆ Class II UL approved	◆ No ground connection needed

Specifications

ITEMS / MODEL		KPSA-5	KPSA-10	KPSA-15
Input Voltage range		85 - 264VAC (47 - 440Hz) or 110 - 370VDC		
Inrush Current	A	30A at 240VAC, cold start at 25°C		
Input Current (115/230VAC)	A	0.13 / 0.07	0.27 / 0.13	0.4 / 0.2
Leakage Current	mA	0.25mA maximum		
Temperature Coefficient		±0.05%/°C		
Voltage Accuracy		±1%		
Minimum Load	A	None		
Load Regulation		±1% (10% to 100% load)		
Line Regulation		±0.5% (100-240VAC line change)		
Ripple & Noise (1)	mV	1% or 50mV whichever is greater		
Short Circuit Protection	-	Continuous - hiccup mode		
Overvoltage Protection	V	130-150%, Zener clamp		
Efficiency (typical)	%	72%	75%	75%
Hold Up Time (Typ@115VAC input)	ms	8ms at full load		
LED Indicator		Green LED = OK		
Operating Temperature (2)		Convection cooling: 0 to +70°C, derating linearly to 25% load from 40 to 70°C		
Storage Temperature		-20 to +85°C		
Humidity (non condensing)		10 - 95% RH		
Cooling		Convection or forced air		
Withstand Voltage		Input to Output 3kVAC		
Vibration (non operating)		23.52m/s² (10 - 55Hz: constant sweep 1 min X, Y, Z for 1 hour)		
Shock		< 196.1 m/s² (20G)		
Safety Agency Approvals	-	UL60950-1, CSA60950-1, EN60950-1, Class II, CE Mark		
Conducted & Radiated EMI		EN55022-B, FCC Class B		
Immunity		EN61000-4 -2, -3, -4, -5, -6		
Weight (Typ)	g(oz)	29g (1oz)	60g (2oz)	80g (2.8oz)
Size (WxLxH; H above pcb)	in.	1.28 x 2.17 x 0.83	1.55 x 2.40 x 0.9	1.77 x 2.75 x 0.79
Warranty		One Year		

Notes:
(1) Measured with 0.1uF ceramic & 10uF electrolytic at 20MHz BW
(2) 20CFM forced air ratings:
KPSA5: 0 - 70°C full load
KPSA10: 0 - 70°C full load (3.3V & 5V models derate linearly to 80% load from 50 to 70°C)
KPSA15: 0 - 70°C derate linearly to 80% load from 50 to 70°C

TDK·Lambda

KPSA Series

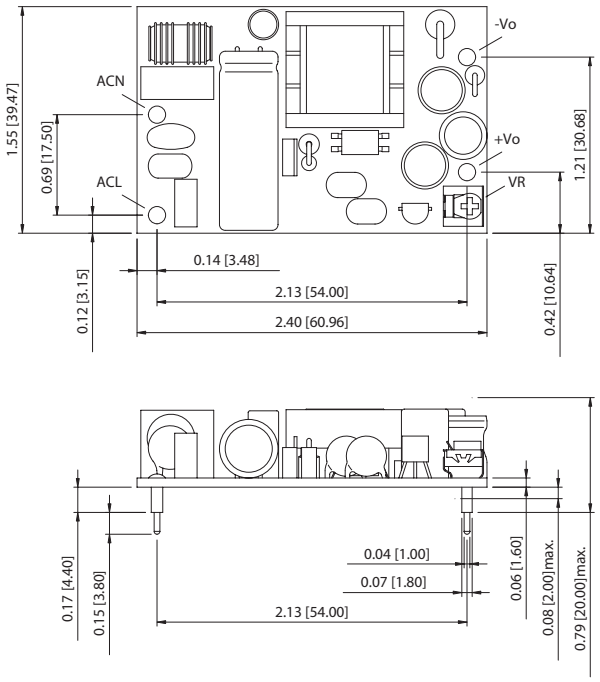
Model Selector

Model	Output Voltage (V)	Maximum Output (A)	Peak Load (A)(3)	Output Pwr (W)
KPSA5-3R3	3.3	1.25	-	4.1
KPSA5-5	5	1.0	-	5.0
KPSA5-12	12	0.42	-	5.0
KPSA5-15	15	0.33	-	5.0
KPSA5-24	24	0.23	-	5.5
KPSA10-3R3	3.3	2.5	3.8	8.3
KPSA10-5	5	2.0	2.8	10.0
KPSA10-12	12	0.84	1.2	10.1
KPSA10-15	15	0.67	1.0	10.1
KPSA10-24	24	0.42	0.65	10.1
KPSA15-3R3	3.3	3.0	4.5	9.9
KPSA15-5	5	3.0	4.5	15.0
KPSA15-12	12	1.25	1.8	15.0
KPSA15-15	15	1.0	1.5	15.0
KPSA15-24	24	0.63	0.95	15.1

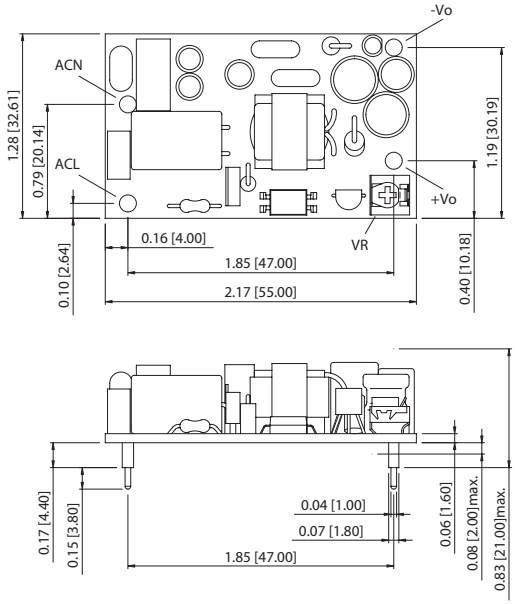
Notes

(3) Average not to exceed max power, <30s, 10% duty cycle

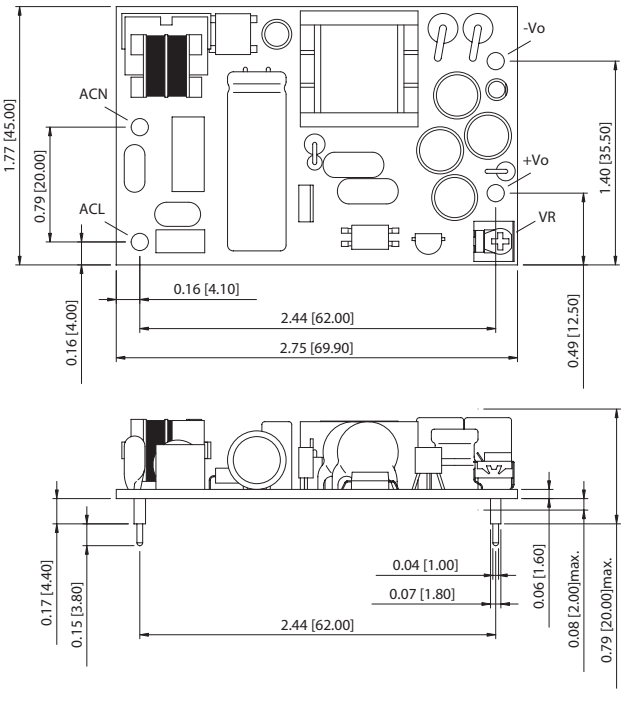
KPSA10 Outline Drawing



KPSA5 Outline Drawing



KPSA15 Outline Drawing



Other Industrial Products

ZPSA	20W to 60W
KM	15 to 40W pcb mount medical
ZWS	5 to 240W, single output

For Additional Information, please visit
us.tdk-lambda.com/products/kps-series.htm

3055 Del Sol Blvd • San Diego, CA 92154 • 1-800-526-2324

Revision A2: Jan 2010

TDK·Lambda

LS Series

Single Output General Purpose Power Supplies

- Very low cost
- Small size
- 115VAC or 230VAC input
- Withstands 300VAC surges (5s)
- Three year warranty

RoHS

Key Market Segments & Applications

Test & Measurement
Automated Service

Specifications

ITEMS		LS25	LS35	LS50	LS75	LS100	LS150
AC Input Voltage (300VAC for 5s)	VAC	88 - 264VAC (See note (2) for LS100)					88-132/176-264VAC(1)
Input Frequency	Hz	47 - 63Hz					
DC Input Voltage	VDC	125 - 373VDC					248 - 273VDC
Inrush Current (230VAC, cold start)	A	30	40	40	40	60	40
Power Factor	-	Meets EN61000-3-2, -3					
Input Current (115/230VAC)	A	0.7 / 0.4	0.8 / 0.55	1.3 / 0.8	1.6 / 1.0	2.2 / 1.2	3.5 / 2
Temperature Coefficient	-	<0.02%/°C					
Overcurrent Protection	-	> 110%					
Overvoltage Protection	V	3.3V: 3.8-4.45V, 5V: 5.75-6.75V, 12V: 13.8-16.2V, 15V: 17.25-20.25V, 24V: 27.6-32.4V, 36V: 41.4-48.6V, 48V: 55.2-64.8V					
Hold Up Time (115 / 230V input)	ms	14 / 80	12 / 80	14 / 60	14 / 60	25 / 150	20 / 28
Leakage Current (230VAC 60Hz)	mA	<1mA					
Remote Sense	-	No					
LED Indicator	-	Green LED = On					
Operating Temperature	-	-25 to +70°C. Derate linearly to 50% load from +50 to +70°C (2)					
Storage Temperature	-	-40 to +85°C					
Operating Humidity	-	20 - 90% RH (non condensing)					
Storage Humidity	-	10 - 95% RH (non condensing)					
Cooling	-	Convection					
Withstand Voltage	-	Input to Ground 1.5kVAC, Input to Output 3kVAC, Output to Ground 500VAC for 1 min.					
Isolation Resistance	-	>100M at 25C & 70%RH, Output to Ground 500VDC					
Vibration (non operating)	-	10 - 55Hz: 19.6m/s² constant sweep 1 min X, Y, Z for 1 hour					
Shock	-	< 196.1 m/s² (20G)					
Immunity	-	IEC61000-4-2, -3, -4, -5, -6, -8, -11					
Safety Agency Approvals	-	UL60950-1, EN60950-1, IEC60950-1, CE Mark					
Conducted & Radiated EMI	-	EN55011/EN55022-B, FCC-B					
MTBF (MIL-HDBK-217F)	hrs	906,997	706,464	712,890	648,786	545,375	505,393
Weight (Typ)	g	170	270	350	410	600	700
Size (LxWxH)	in	3.1 x 2.0 x 1.1	3.9 x 3.2 x 1.4	3.9 x 3.8 x 1.4	5.1 x 3.8 x 1.5	6.3 x 3.8 x 1.5	7.8 x 3.9 x 1.5
Warranty	yrs	Three Years					

(1) Switch selectable for 115 or 230VAC

(2)

LS25-3	Derate linearly to 60% load from +40 to +70°C.
LS50, LS75-3 & -5	Derate linearly to 70% load from +50 to +70°C.
LS75-12, -15, -24, -36, -48	Derate linearly to 60% load from +50 to +70°C.
LS100-3 & -5	Derate linearly to 60% load from +45 to +70°C. Derate linearly to 80% load from 115V to 88VAC input.
LS100-12, -15, -24, -36, -48	Derate linearly to 60% load from +50 to +70°C. Derate linearly to 80% load from 115V to 88VAC input.
LS150-3 & -5,	Derate linearly to 50% load from +40 to +70°C.
LS150-12, -15, -24, -36, -48	Derate linearly to 70% load from +50 to +70°C.

TDK·Lambda

LS Series

Model Selector

Model	Voltage	Adjust Range (V)	Max Current (A)	Load Reg (mV)	Line Reg (mV)	Ripple Noise (mV)	Efficiency (typ) %
LS25-3.3	3.3V	2.85 - 3.6	6.0	40	20	80	75
LS25-5	5V	4.5 - 5.5	5.0	40	20	80	79
LS25-12	12V	10.8 - 13.2	2.1	96	48	120	83
LS25-15	15V	13.5 - 16.5	1.7	120	60	120	83
LS25-24	24V	22 - 27.6	1.1	192	96	120	84
LS25-36	36V	32 - 40	0.75	288	144	150	84
LS25-48	48V	42 - 54	0.57	384	192	200	85
LS35-3.3	3.3V	2.85 - 3.6	7.0	40	20	80	75
LS35-5	5V	4.5 - 5.5	7.0	40	20	80	78
LS35-12	12V	10.8 - 13.2	3.0	96	48	120	82
LS35-15	15V	13.5 - 16.5	2.4	120	60	120	83
LS35-24	24V	22 - 27.6	1.5	192	96	120	84
LS35-36	36V	32 - 40	1.0	288	144	150	84
LS35-48	48V	42 - 54	0.8	384	192	200	84
LS50-3.3	3.3V	3.0 - 3.6	10.0	40	20	80	75
LS50-5	5V	4.75 - 5.5	10.0	40	20	80	80
LS50-12	12V	10.8 - 13.2	4.2	96	48	120	84
LS50-15	15V	13.5 - 16.5	3.4	120	60	120	85
LS50-24	24V	22 - 27.2	2.2	192	96	120	86
LS50-36	36V	32 - 40	1.4	288	144	150	86
LS50-48	48V	42 - 54	1.1	384	192	200	86
LS75-3.3	3.3V	3.0 - 3.6	15.0	40	20	80	75
LS75-5	5V	4.75 - 5.5	12.0	40	20	80	79
LS75-12	12V	10.8 - 13.2	6.0	96	48	120	84
LS75-15	15V	13.5 - 16.5	5.0	120	60	120	85
LS75-24	24V	22 - 27.2	3.2	192	96	120	86
LS75-36	36V	32 - 40	2.1	288	144	150	86
LS75-48	48V	42 - 54	1.6	384	192	200	87
LS100-3.3	3.3V	3.0 - 3.6	20.0	40	20	80	75
LS100-5	5V	4.75 - 5.5	16.0	40	25	80	79
LS100-12	12V	10.8 - 13.2	8.5	96	48	120	82
LS100-15	15V	13.5 - 16.5	7.0	120	60	120	84
LS100-24	24V	22 - 27.2	4.5	192	96	120	86
LS100-36	36V	32 - 40	3.0	288	144	150	86
LS100-48	48V	42 - 54	2.3	384	192	200	86
LS150-3.3	3.3V	3.0 - 3.6	30.0	40	20	80	75
LS150-5	5V	4.75 - 5.5	26.0	40	20	80	79
LS150-12	12V	10.8 - 13.2	12.5	96	48	120	83
LS150-15	15V	13.5 - 16.5	10.0	120	60	120	85
LS150-24	24V	22 - 27.2	6.5	192	96	120	86
LS150-36	36V	32 - 40	4.3	288	144	150	87
LS150-48	48V	42 - 54	3.3	384	192	200	87

For Additional Information, please visit
us.tdk-lambda.com/lp/products/ls-series.htm

3055 Del Sol Blvd • San Diego, CA 92154 • 1-800-526-2324

Revision A8: Jan 2009

TDK·Lambda

LS200 Series

Single Output 150 - 200W General Purpose Power Supplies

- Very low cost
- Small Size
- Wide Range AC Input
- Convection or Fan Cooled
- Three year warranty
- 1.6" high (For 1U racking)

RoHS

Key Market Segments & Applications

Light Industrial	Test & Measurement
Automated Service	Kiosks

Specifications

ITEMS \ MODEL		LS200 (Enclosed style with internal fan)	LS200/L (U channel style - no internal fan)
AC Input Voltage (300VAC for 5s)	VAC	85 - 264VAC	85 - 264VAC (3)
Input Frequency	Hz	47 - 63Hz	
DC Input Voltage	VDC	120 - 373VDC	
Inrush Current (230VAC, cold start)	A	60	
Power Factor	-	Meets EN61000-3-2, -3 (Typical PF 0.98/0.95)(1)	
Input Current (115/230VAC)	A	3.5 / 1.7 (typical)	
Temperature Coefficient	-	<0.02%/°C (0 - 50°C)	
Overcurrent Protection	-	>105% of nominal or peak. Constant current style	
Overvoltage Protection (2)	V	3.3V: 3.8 - 4.45V, 5V: 5.75 - 6.75V, 7.5V: 8.6 - 10.1V, 12V: 15.1 - 17.75V 15V: 17.25 - 20.25V, 24V: 30.25 - 35.5V, 36V: 41.4 - 48.6V, 48V: 60 - 69.6V	
Overtemperature Protection (2)	-	Yes	
Hold Up Time (115/230V input)	ms	20ms	
Leakage Current (230VAC 60Hz)	mA	<1mA	
Remote Sense	-	Yes	
Remote On/Off	-	On: 0 - 0.8V; Off: 3 - 12V	
LED Indicator	-	Green LED = On	
Operating Temperature	-	Fan or forced air rating: -25 to +70°C. Derate linearly to 60% load from +50 to +70°C	
Storage Temperature	°C	-40 to +85°C	
Operating Humidity	-	20 - 90% RH (non condensing)	
Storage Humidity	-	10 - 95% RH (non condensing)	
Cooling	-	Internal Fan (air exhausts from fan end)	Convection or customer supplied airflow
Withstand Voltage	-	Input to Ground 1.5kVAC, Input to Output 3kVAC, Output to Ground 500VAC for 1 min.	
Isolation Resistance	-	>100M at 25°C & 70%RH, Output to Ground 500VDC	
Vibration (non operating)	-	10 - 55Hz: 19.6m/s^2 constant sweep 1 min X, Y, Z for 1 hour	
Shock	-	< 196.1 m/s^2 (20G)	
Immunity	-	IEC61000-4-2, -3, -4, -5, -6, -8, -11	
Safety Agency Approvals	-	UL60950-1, CSA60950-1 (cUL), IEC60950-1 2nd Edition, CE Mark	
Conducted & Radiated EMI	-	EN55011/EN55022-B, FCC--B	
Weight (Typ)	g	700	600
Size (LxWxH)	in	7.8 x 3.9 x 1.61"	
Warranty	yrs	Three Years	

(1) 115 / 230VAC input
(2) Recycle AC to reset
(3) (Derate linearly to 65% load from 115VAC to 85VAC)

TDK·Lambda

LS200 Series

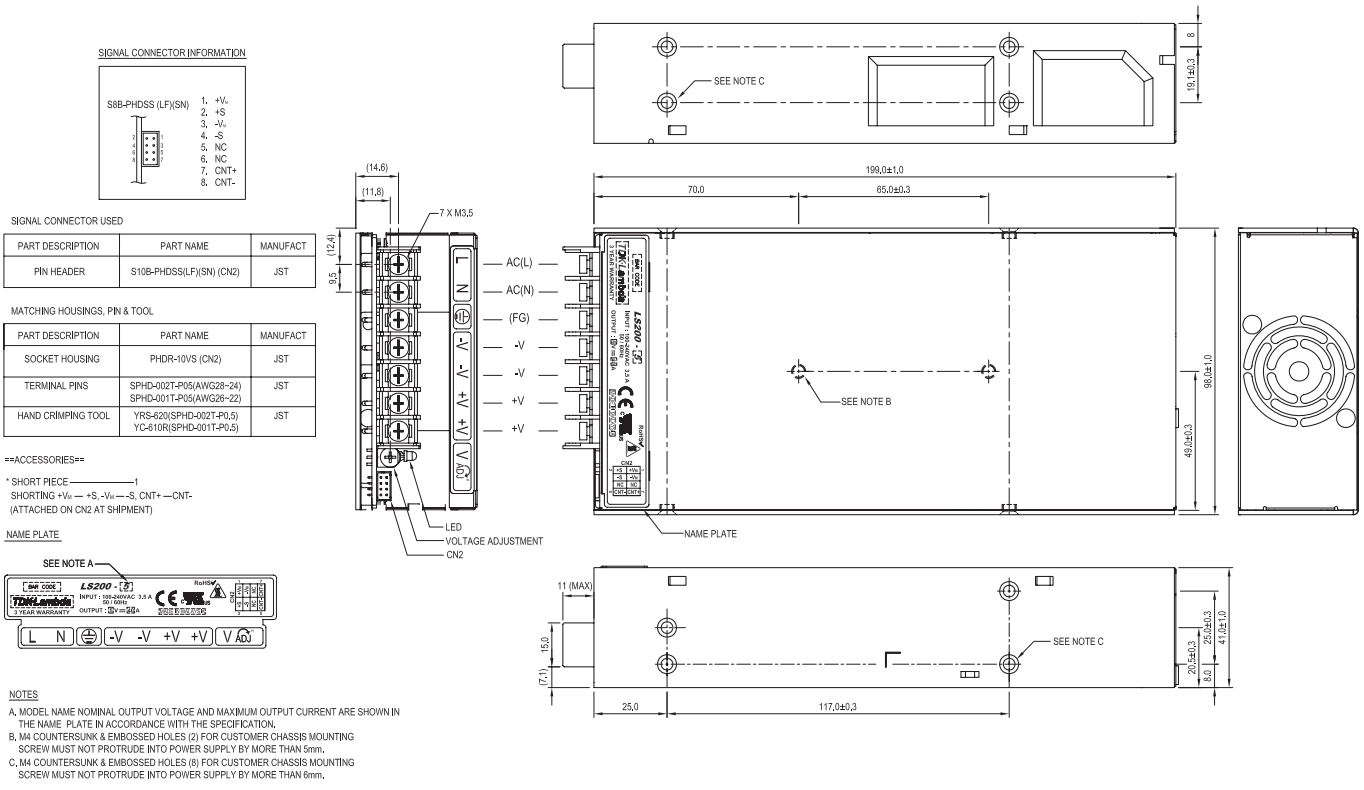
Model Selector

Model	Voltage	Adjust Range (V)	Max Current Forced Air(A)(4)	Max Current Convect.(A)(5)	Peak Current (A)	Load Reg (mV)	Line Reg (mV)	Ripple Noise (mV)	Efficiency (typ) %(1)
LS200-3.3	3.3V	3.0 - 3.6	40.0	N/A	-	40	16	80	67 / 68
LS200-5	5V	4.75 - 5.5	40.0	N/A	-	40	20	80	72 / 75
LS200-7.5	7.5V	6.8 - 8.2	26.7	N/A	-	40	20	80	74 / 77
LS200-12	12V	10.8 - 14.4	16.7	N/A	-	96	48	120	76 / 79
LS200-15	15V	13.5 - 16.5	13.4	N/A	-	120	60	120	80 / 83
LS200-24	24V	22 - 28.8	8.4	N/A	10.4	192	96	120	82 / 84
LS200-36	36V	32 - 40	5.6	N/A	6.9	288	144	150	82 / 85
LS200-48	48V	42 - 57.6	4.2	N/A	-	384	192	200	82 / 85
LS200-3.3/L	3.3V	3.0 - 3.6	40.0	32.0	-	40	16	80	67 / 68
LS200-5/L	5V	4.75 - 5.5	40.0	32.0	-	40	20	80	72 / 75
LS200-7.5/L	7.5V	6.8 - 8.2	26.7	21.36	-	40	20	80	74 / 77
LS200-12/L	12V	10.8 - 14.4	16.7	15.0	-	96	48	120	76 / 79
LS200-15/L	15V	13.5 - 16.5	13.4	12.0	-	120	60	120	80 / 83
LS200-24/L	24V	22 - 28.8	8.4	7.5	10.4	192	96	120	82 / 84
LS200-36/L	36V	32 - 40	5.6	5.0	6.9	288	144	150	82 / 85
LS200-48/L	48V	42 - 57.6	4.2	3.78	-	384	192	200	82 / 85

(4) With internal fan version LS200-xx or LS200-xx/L version with external airflow.

(5) See Installation manual for derating curve.

Outline Drawing



Other Related Products

LS25 - 150	25W to 150W low cost
HWS15 - 1800	15W to 1800W limited lifetime warranty
SWS300 - 1000	300 to 1000W single output

Options

Suffix	Description
/L	No cover or fan (U channel)
Blank	Cover and fan

For Additional Information, please visit us.tdk-lambda.com/lp/products/ls-series.htm

3055 Del Sol Blvd • San Diego, CA 92154 • 1-800-526-2324

Revision A3: Jan 2011

TDK·Lambda

LZSA Series

Single Output Industrial Power Supplies

- 5 Year Warranty
- -40°C to +71°C Operation
- MIL-STD-810E Vibration / Shock
- Input transient protected
- UL508, SEMIF47, Factory Mutual (Class 1, Division 2)

RoHS

Key Market Segments & Applications

Factory Automation	Military
Process & Controls	Harsh Environments

Features and Benefits

Feature	Benefit
◆ Rugged mechanical design with coating on pcbs	◆ High reliability in harsh conditions
◆ Superior thermal design	◆ Longer life even at 71°C operation
◆ Wide range adjustment of output	◆ Reduces need for custom outputs
◆ Input voltage transient protected	◆ Reduced system filtering

Specifications

ITEMS / MODELS		LZSA500	LZSA1000	LZSA1500
Input Voltage (47-440Hz) (*)	-	85 - 265VAC (LZSA1500 - see output derating graphs on page 2), 100-380VDC (1)		
Inrush Current (110 / 220VAC)	A	20 / 40A	40 / 80A	
Power Factor	-	EN61000-3-2 Class A		
Efficiency (typical)	%	84%		
Ripple & Noise (Pk-Pk)(max)	-	75mV	75mV	24V: 75mV; 48V: 150mV
Line Regulation	%	0.1%		
Load Regulation	%	0.1%		
Transient Response	-	±1% deviation, recovering to ±0.2% in <1.25ms (25% load change)		
Overcurrent Protection	-	110 - 130%		
Overvoltage Protection	V	User adjustable from front panel		
Thermal Protection	-	Internal thermostat. Recycle AC to reset		
Hold Up Time at 110VAC	ms	20ms Hold Up, 20ms Ride Through		
Remote Sense	-	Compensates for a total of 1V cable drop		
Remote Adjust	-	Using front panel potentiometer, Resistance (1k/V), or Voltage (1V/V)		
Remote On / Off	-	TTL compatible, active high		
Signals	-	Optocoupled transistor for AC Fail, DC Good, Inverter OK. 200kHz sync signal (Ref-sense)		
Indicators	-	Green LED indicates output good, red LED indicates overvoltage or over temperature		
Parallel Connection	-	Single wire current share		
Operating Temperature	°C	-40°to+71°C, derate linearly to 60% load from 60°C~71°C (20 min warm up period needed for <-30°C)		
Storage Temperature	°C	-40° to +85°C		
Temperature Coefficient	-	0.01%/°C		
Humidity (non condensing)	%RH	10 - 90%RH		
Cooling	-	Internal fan		
Withstand Voltage	-	Input - Ground 2,121VDC, Input - Output 4,242VDC, Output - Ground 500VDC		
Vibration	-	MIL-STD-810E, Method 514.4, Category 1, 9		
Shock	-	MIL-STD-810E, Method 516.4 Proc. I, II, IV, VI		
Safety Agency Certifications	-	UL60950-1, UL508, EN60950-1, FM 3600, 3611, 3810, & CE Mark. SEMIF47(>100VAC)		
Leakage current	uA	<500uA at 265VAC, 60Hz		
Emissions	-	EN55022/EN55011 Class B, EN61000-3-3, MIL STD 461/462D CE102		
Immunity	-	EN61000-4-2, -3, -4, -5, -6, -8, -11. IEEE C62.41 (6kV/30 Ohm, Criteria A)		
Altitude	m	3,000m operating, 12,000m non operating		
Weight	lbs	6.5	8.1	
Size (WxHxD)(w/o bus bars)	ins	4.25 x 4.75 x 10.25	5.62 x 4.75 x 10.5	
Warranty	yrs	Five Years		

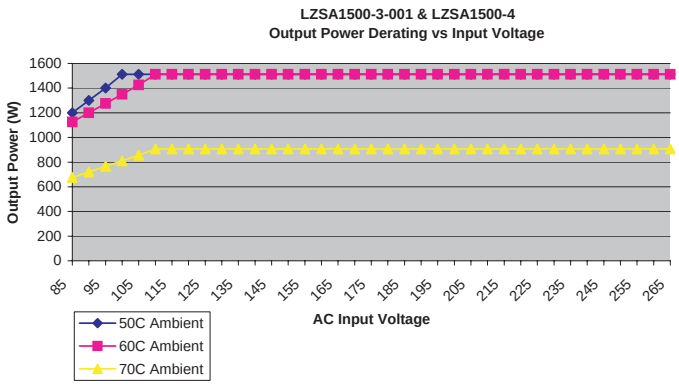
(1) Startup ≥ 110VDC

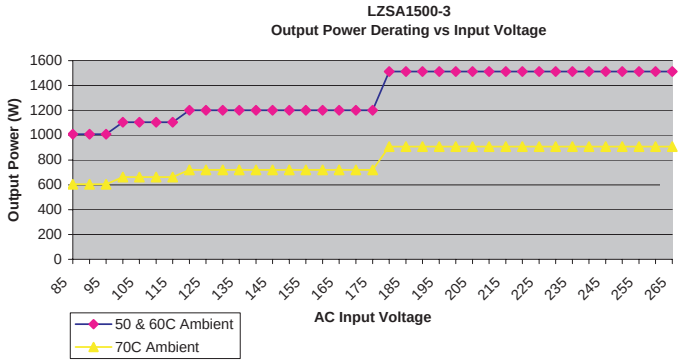
Notes: (Consult Installation Manual for detailed specifications, test methods and application notes) (*) Reduced power factor above 63Hz

TDK·Lambda

LZSA Series

Derating Charts





Output Ratings

Model	Nominal Voltage (V)	Adjustment Range (V)	Maximum Current (A)	Maximum Power (W)
LZSA1000-2	12	10 - 15.75	84	1008
LZSA500-3	24	18 - 29.4	21	504
LZSA1000-3	24	18 - 29.4	42	1008
LZSA1500-3	24	18 - 29.4	63	1512
LZSA1500-3-001	24	18 - 29.4	63	1512
LZSA1500-4	48	36 - 56	31.5	1512

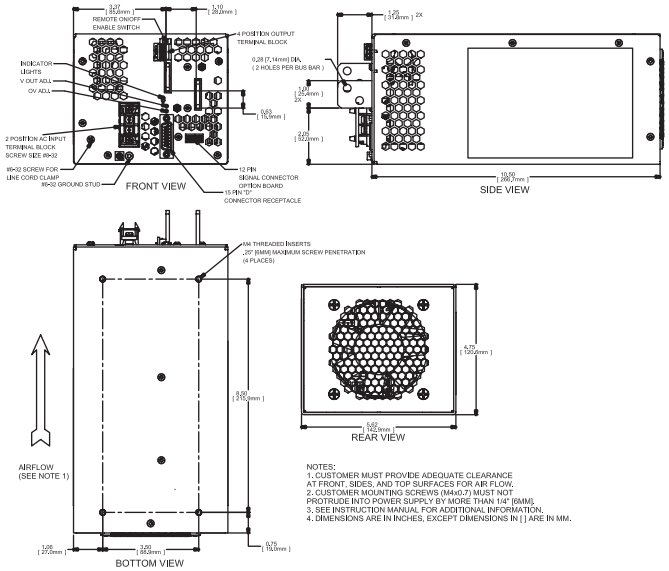
Note: Models highlighted in green are not recommended for new designs.

Other Industrial Products

HWS	15W to 1800W Single Output
DLP, DPP, DSP	15W to 960W DIN Rail
PFE	300W to 1000W Power Modules

For Additional Information, please visit
us.tdk-lambda.com/lp/products/lzsa-series.htm

Outline Drawing (LZSA1500)



3055 Del Sol Blvd • San Diego, CA 92154 • 1-800-526-2324

Revision B2: May 2011

TDK·Lambda

NN Series

High Reliability 15 to 90W Linear Power Supplies

- Single and Dual Outputs
- Excellent Line & Load Regulation
- Remote Programming and Current Share (NNS)
- Front Panel Voltage Taps
- Thermal Protection
- Five Year Warranty

RoHS

Key Market Segments & Applications

Test and Measurement
Low noise applications
Industrial

Features and Benefits

Feature	Benefit
◆ Five Year Warranty	◆ Lower Cost of Ownership
◆ Low Output Ripple	◆ Reduced system interference
◆ Fully Featured	◆ Greater System Flexibility
◆ Operation from -20 to +71C Ambient	◆ Easier system integration

Specifications

ITEMS \ MODELS		NNS15	NNS30	NNS50	NND15	NND30
AC Input	VAC	85~115, 98~132, 170~230, 195~265VAC (Front panel selectable)				
Input Frequency	Hz	47~440Hz				
EMI	-	FCC Class B, VDE0871 Level B				
Output Adjustment	-	±10%				
Remote Sense	-	Yes	Yes	Yes	None	
Remote Programming	-	1000 Ohm/Volt			None	
Parallel Operation	-	Via PC Terminal			None	
Output Indicator	-	LED = On				
Line Regulation	%	0.01%				
Load Regulation	%	0.03%				
Cross Regulation	%	Not applicable			0.03%	
Ripple and Noise	mV	1mV rms, 3mV peak to peak				
Overcurrent Protection	%	105 to 130%				
Overvoltage Protection	VDC	5V: 6 ~ 7.2V, 12V: 14.5 ~ 17.2V, 15V: 18.1 ~ 21.5V, 24V: 29 ~ 34.3V				
Cooling	-	Convection				
Operating Temp. Range	°C	-20°C: 60%, 0 to 50°C: 100%, 60°C: 60%, 71°C: 40%				
Storage Temperature	°C	-40 to +85°C				
Temperature coefficient	%	±0.02% per °C				
Humidity (non condensing)	%RH	Operating: 20 - 95% RH, Non operating: 10 - 95% RH				
Vibration	-	10-55Hz Amplitude (sweep for 1 min), <2G X, Y, Z 1 hour each				
Shock (in package)	-	<20G				
Safety Agency Approval	-	UL60950-1, CSA60950-1, EN60950-1, CE Mark				
Withstand Voltage	-	Input to Output: 3.75kVAC, Input to Chassis: 2.5kVAC for 1 minute				
Isolation Resistance	-	>100M at 500VDC @ 25C & 70%RH for 1 minute				
Weight	g	1750	2930	4200	1750	2750
Size WxHxD	mm	60x124x124	80x124x178	97x113x200	60x113.5x150	80x113.5x164
Warranty	y	Five years				

Note: See Installation Manual for full details, test methods of parameters and application notes

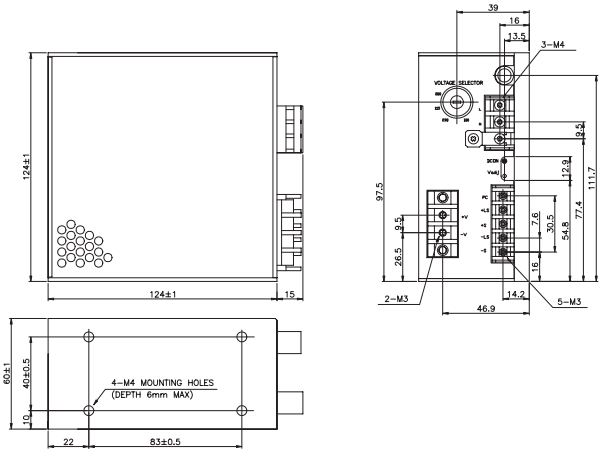
TDK·Lambda

NN Series

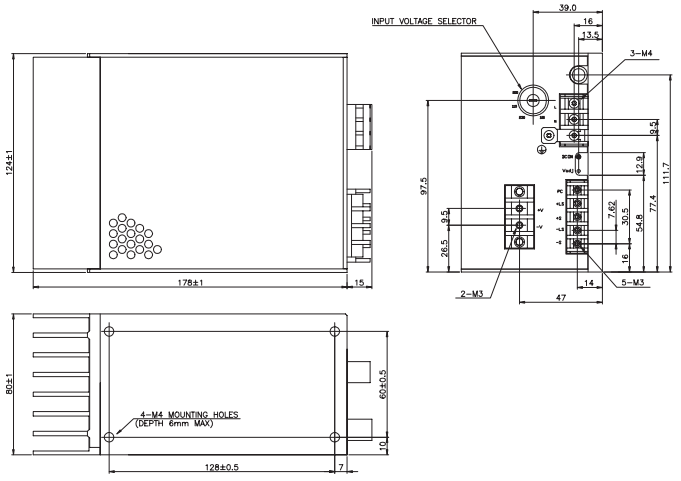
Model Selector

	Model	O/P	O/P(V)	Max Cur.(A)	Max Pwr(W)	Eff. (%)
Single Output	NNS155	V1	5	3.0	15.0	35
	NNS305	V1	5	6.0	30.0	35
	NNS505	V1	5	10.0	50.0	42
	NNS1512	V1	12	1.7	20.4	45
	NNS3012	V1	12	4.0	48.0	45
	NNS5012	V1	12	6.5	78.0	51
	NNS1515	V1	15	1.4	21.0	46
	NNS3015	V1	15	3.4	51.0	46
	NNS5015	V1	15	5.5	82.5	53
	NNS1524	V1	24	0.9	21.6	50
	NNS3024	V1	24	2.3	55.2	50
	NNS5024	V1	24	3.8	91.2	56
Dual Output	NND15-1212	V1	+12	0.75	18.0	45
		V2	-12	0.75		
	NND30-1212	V1	+12	1.6	38.4	45
		V2	-12	1.6		
	NND15-1515	V1	+15	0.6	18.0	45
		V2	-15	0.6		
	NND30-1515	V1	+15	1.3	39.0	45
		V2	-15	1.3		

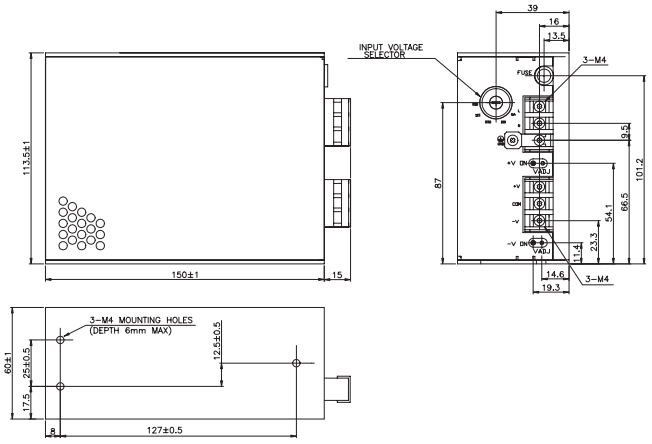
NNS15 Outline Drawing



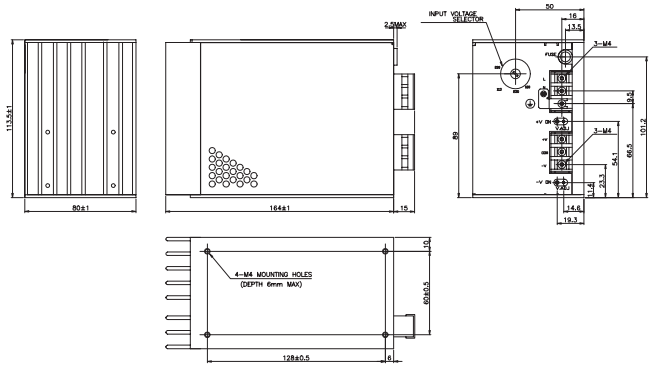
NNS30 Outline Drawing



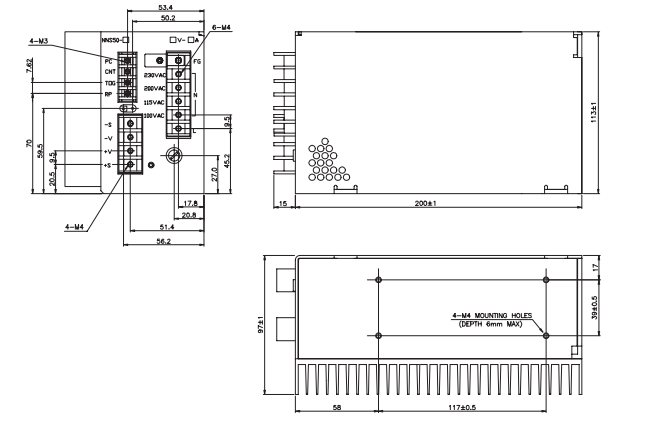
NND15 Outline Drawing



NND30 Outline Drawing



NNS50 Outline Drawing



Other Industrial Products

HWS	15 to 1500W Single output, universal input switching
ZWS	5 to150W single output, universal input (switching)
VSB & VSC	10 to150W single output, 115VAC input (switching)

For Additional Information, please visit
us.tdk-lambda.com/lp/products/nn-series.htm

3055 Del Sol Blvd • San Diego, CA 92154 • 1-800-526-2324

Revision A5: Jan 2010

TDK·Lambda

NV175 Series

3" x 5" 175-200W Power Supplies

RoHS

- 1-5 Outputs
- Up to 90% Efficient
- Active Power Factor Correction
- Universal Input (90 - 264VAC)
- No Minimum Loads
- Medical Approvals (Basic Insulation Input-Output)

Key Market Segments & Applications

Broadcast	Test & Measurement
Medical	Industrial Computing and Routers

Features and Benefits

Feature	Benefit
◆ High Efficiency	◆ Less heat dissipated in system
◆ Low Profile	◆ Fits in 1U enclosures
◆ Power Factor Corrected	◆ Supports Global Use
◆ No Minimum Loads	◆ Ease of Use

Specifications

ITEMS / MODEL		NV175
Input Voltage range	-	90 - 264VAC (47 - 63Hz, 440Hz with reduced PFC)
Inrush Current	A	<40A at 25°C and 264VAC input, Cold Start
Power Factor Harmonics	-	EN61000-3-2 Compliant (0.97 typical)
Regulation Total	-	1%; Including Line (for 90-264VAC input change), Load (for 0-100% load change) and Cross (for 0-100% load change on any other output) regulation
Ripple & Noise	mV	1% or 50mV (Which ever is greater)
Efficiency	-	Up to 90%, configuration dependant
Minimum Load	A	None
Overcurrent Protection	-	>105%
Overvoltage Protection	V	CH1 & CH2, 120-130%, Cycle AC line to reset
Overtemperature Protection	-	Yes
Hold Up Time (Typ)	ms	>16ms at 90VAC Input
Leakage Current (max)	µA	123µA 120VAC 60Hz, 257µA 240VAC 60Hz, <300µA 264VAC 63Hz (Type Test results)
Remote Sense	-	On Outputs CH1 & CH2, 0.5V compensation maximum
DC Good	-	CH1 Only, High on Fail (90% of nominal ±5%)
Remote On/Off (Specify N option)	-	-N1 or -N2 option: TTL level high = Off, -N3 or -N4 option: open circuit = Off (except standby)
Operating Temperature (1)(7)	-	0 to +70°C. Derate linearily to 50% load from 50°C to 70°C
Storage Temperature	-	-40 to +85°C
Humidity (non condensing)	-	5 - 95% RH
Cooling	-	Forced air, 2m/s from input to output
Isolation (4)	-	Input to Ground 2.3kVDC, Input to Output 4.3kVDC, Output to Ground 200VDC
Vibration (non operating)	-	Conforms to MIL-STD-810E, Method 516.5, Pro I, IV, VI; EN60068-2-6, IEC68-2-6
Shock	-	Conforms to MIL-STD-810E/F, Method 514.4, Pro I, Cat 1,9; EN60068-2-27, EN60068-2-47, IEC68-2-47, IEC68-2-47, JIS C0041-1987
Safety Agency Approvals	-	UL60950-1, CSA22.2 No 60950-1, EN60950-1, IEC60950-1, CE for LVD, UL, EN, IEC60601-1, EN61010-1, IEC61010-1
Immunity	-	EN61000-6-2:2001, EN61000-4-2, -3, -4, -5, -6, -8, -11
Conducted Emissions and Flicker	-	EN55022 Class B (per CISPR.22), EN61000-3-3
Radiated Emissions (2)	-	EN55022 Class A (per CISPR.22)
Weight (Typ)	g	250g
Size (without cover) (3)	in	3" x 5" x 1.25"; N option version 3.7" x 5" x 1.25"
Warranty	yrs	Three Years

(1) -20°C cold start
(2) See application note for Class B
See NV175-M for reinforced medical insulation
(3) Including underside component leads
(4) Input-Output: Reinforced IEC60950-1, Basic IEC 60601-1.

TDK·Lambda

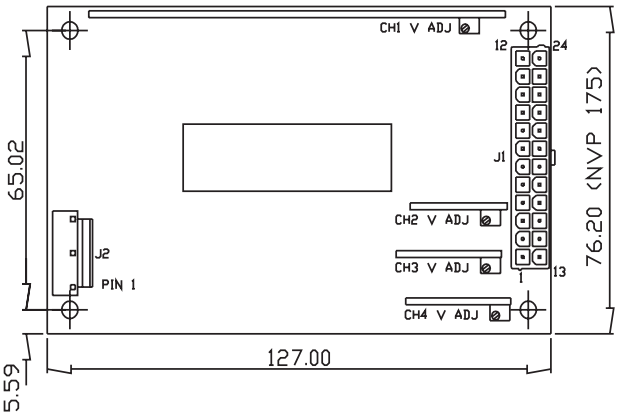
NV175 Series

Stocked Models Quick Selector

Model	CH1 (5)	CH2 (5)	CH3	CH4	CH5 Stand By (6)	Global Option Type
NV1-1T000	12V/15A	-	-	-	-	-
NV1-1G000	24V/7.5A	-	-	-	-	-
NV1-453TT	+5V/25A	+3.3V/15A	+12V/5A	-12V/1A	-	-
NV1-453FF	+5V/25A	+3.3V/15A	+15V/5A	-15V/1A	-	-
NV1-4G5TT	+24V/7.5A	+5V/8A	+12V/5A	-12V/1A	-	-
NV1-4G5FF	+24V/7.5A	+5V/8A	+15V/5A	-15V/1A	-	-
NV1-453TT-N3	+5V/25A	+3.3V/15A	+12V/5A	-12V/1A	5V/2A	N3 (ATX)
NV1-453FF-N3	+5V/25A	+3.3V/15A	+15V/5A	-15V/1A	5V/2A	N3 (ATX)
NV1-4G5TT-N3	+24V/7.5A	+5V/8A	+12V/5A	-12V/1A	5V/2A	N3 (ATX)
NV1-4G5FF-N3	+24V/7.5A	+5V/8A	+15V/5A	-15V/1A	5V/2A	N3 (ATX)

Notes:
(5) Maximum combined current from CH1 + CH2 = 25A
5V CH1 models are limited to 175W max. All others 180W, 200Wpk 5 mins
(6) CH5 is always on regardless of inhbit status. Peak rated at 2.5A, floating output
(7) Convection cooled maximum ratings: CH1: 55W, Ch2: 8.25W, Ch3: 9W, CH4: 3W, 75.25W total. 0°C - 40°C temperature range
(8) 12 - 12.5V if 24V CH3 is fitted.
(9) 14.5 - 15.5V if 24V CH3 is fitted.
(10) 24 - 24.5V if 5V CH2 is fitted.
24 - 26V if 24V CH3 is fitted

Outline Drawing



See the website for detailed datasheet and outline drawing.

Built to Order Model Selector

CH1	CH1(5) Code	Adjust. Range	CH2(5)	CH2 Code	Adjust. Range	CH3	CH3 Code	Adjust. Range	CH4	CH4 Code	Adjust. Range
+5V / 25A	5	5 - 5.5V	+1.8V / 15A	1	0.9 - 3.3V				-12V / 1A	T	Fixed
			+2.7V / 15A	2	2.5 - 3.3V				-15V / 1A	F	Fixed
			+3.3V / 15A	3	2.5 - 3.3V				-3.3V / 2A	3H	Fixed
			No output	0	-				-5V / 2A	5H	Fixed
						+12V / 5A	T	12 - 15V	-12V / 2A	TH	Fixed
						+15V / 5A	F	12 - 15V	-15V / 2A	FH	Fixed
						+24V / 2.5A	G	18 - 24V	Fan Supply only	0H	Fixed
+12V / 15A	T	12 - 15V (8)	+5V / 10A	5	3.3 - 5.5V	No output	0	-	No output	0	
+15V / 12A	F	12 - 15V (9)	No output	0	-						
									Add "P" to code for positive polarity output	Add "P" to code for positive polarity output	
+24V / 7.5A	G	24 - 28V (10)	+5V / 8A	5	3.3 - 5.5V						
			No output	0	-						

How to Create a Model Number

NV1-	Enter number of outputs	CH1 Code	CH2 Code	CH3 Code	CH4 Code	Global Option	Case Option

No Option	Blank	Blank	No Case
AC Fail, Remote On/Off, 5V/2A Standby, CH1 DC Good	N	U	U Chassis
AC Fail, Remote On/Off, 13.5V/1A Standby, CH1 DC Good	N2	C	U Chassis with Cover
ATX AC Fail+Remote On/Off, 5V/2A Standby, CH1 DC Good	N3	F	U Chassis, Cover and Fan*
ATX AC Fail+Remote On/Off, 12V/1A Standby, CH1 DC Good	N4	I	U Chassis, Cover and Fan* and IEC inlet

* A high output CH4 (3H, 5H, TH, FH) or fan supply 0H must be selected to provide fan option.

Example

NV1 3 G 5 0 3HP N C

Description: Triple output, 24V/7.5A, 5V/8A, 3.3V/2A, Global option N, U Chassis with cover.

Mating Parts (Molex)

CONN	Housing	Pins
J1	39-01-2245	44476-3112
J2	09-50-8051	08-52-0113

Other Industrial Products

NV	300 to 700W Medical, 1-6 outputs
SC40/60	40 to 80W single, dual & triple 3x5 footprint
ZWS/ZWSPAF	5 to 240W single output power supplies

For Additional Information, please visit
us.tdk-lambda.com/lp/products/nv-series.htm

3055 Del Sol Blvd • San Diego, CA 92154 • 1-800-526-2324
Revision C3: Jan 2010

TDK·Lambda

NV350/700 Series

350W to 1150W Modular Power Supplies

RoHS

- 1U Form Factor
- Up to 90% Efficient
- Active Power Factor Correction
- Universal Input (90 - 264VAC)
- Up to 8 Outputs (6 for the NV350)
- No Minimum Loads
- Medical Certifications
- Peak power rating of up to 1450W

Features and Benefits

Feature	Benefit
◆ High Efficiency	◆ Less heat dissipated in system, less electricity used
◆ Low Profile	◆ Fits in 1U enclosures
◆ Power Factor Corrected	◆ Supports Global Use
◆ No Minimum Loads	◆ Ease of Use

Specifications

ITEMS \ MODELS		NV3	NV7
Output Power	W	350W (660W >180VAC input)	700W (1150W >150VAC input)
Peak Power (Up to 10s)	W	520W (740W >180VAC input)	850W (1450W >150VAC input)
Input Voltage range	VAC	90 - 264VAC (47 - 63Hz, 440Hz with reduced PFC)	
Inrush Current (25°C, Cold Start)	A	<15	<40
Power Factor Harmonics	-	EN61000-3-2 Compliant	
Line Regulation	-	< 0.1% for 90-264VAC input change	
Load Regulation (0-100% change)	-	B, BH Modules: < 1%, DB modules output 2: <2%, DA Modules: <3%	
Cross Regulation	-	< 0.1% for 100% load change on any output, (DA module CH1<0.2%, CH2<3%)	
Ripple & Noise	mV	1% or 50mV, whichever is greater	
Efficiency	-	Up to 90%, configuration dependant	
Minimum Load	A	None	
Overcurrent Protection	-	110 - 150%, hiccup mode (Primary limited)	
Overvoltage Protection	V	Yes	
Overtemperature Protection	-	Yes, recycle AC to reset	
Hold Up Time (Typ at 90VAC Input)	ms	>16ms (12ms for NV700 with >700W output power)	
Leakage Current (1)	µA	130µA 120VAC, 60Hz, 260µA 240VAC 60Hz	
Remote Sense	-	Standard on single output modules and output 1 on DB module only	
Module Good	-	Open collector, on indicates output is good (N/A on DA modules)	
Module Inhibit	-	TTL logic level high inhibits the module (both outputs on DB outputs)(2)	
AC Fail (Specify as option)	-	High on fail	
Operating Temperature	-	0 to +70°C. Derate linearily to 50% load from 50°C to 70°C(3)	
Storage Temperature	-	-40 to +85°C	
Humidity (non condensing)	-	5 - 95% RH	
Cooling	-	Internal fan or 1m/s with system supplied air (NV3 only)	
Isolation	-	Input to Ground 2.3kVDC, Input to Output 4.3kVDC(5), Output to ground 200VDC	
Vibration (non operating)	-	2G, 10-500Hz (sweep & endurance at resonance) in all 3 planes	
Shock	-	30G per IEC68-2-27	
Safety Agency Certifications	-	UL, CSA, EN, IEC60950-1, CE for LVD, EN, IEC60601-1, UL, EN, IEC 61010-1	
Immunity	-	EN50082-2: EN61000-4-2, -3, -4, -5, -6, -8, -11	
Conducted Emissions and Flicker	-	EN55011, EN55022 Class B (per CISPR.22), EN61000-3-3	
Radiated Emissions	-	EN55011, EN55022 Class B (per CISPR.22)(4)	
Weight (Typ)	g	800	1160
Size	in	1.6 x 3.75 x 10.8"	1.6 x 4.92 x 10.8
Warranty	yr	Three Years	

(1) Worse case: <300µA 264VAC, 63Hz (normal condition, <500µA single fault condition)
(2) Output 2 remote on/off inhibits just Output 2 of DB module
(3) -20°C cold start, derate from 45C for NV7 when input voltage < 100VAC
(4) See application note for Class B
(5) C & CC Module 4kVAC

TDK·Lambda

NV350/700 Series

1. Configuration Guide

You can create your own NV350 or NV700 configuration online at www.nv-power.com. This method checks your configuration and offers the optimum solution. Alternatively, you can do this manually by using the guide below. Calculate total output power to ensure power requirements within 350W or 1150W, then select required Cooling, Connection and Controls/Signals from the following tables:

NV3	S	S	S	EN5V

Output Power	NV3	250W with reverse air
	NV7	
Cooling	S	Standard air - forward
	R	Reverse air[4]
	C	Customer air - no fan[1]
	V	Variable speed fan (Std on NV700)
Input Connection	S	Screw
	I	IEC320[2]
Primary Option[3]	ES5V	AC good, PSU enable, 5V/2A standby
	ES12V	AC good, PSU enable, 12V/1A standby
	IS5V	AC good, PSU inhibit, 5V/2A standby
	IS12V	AC good, PSU inhibit, 12V/1A standby
	EN5V	AC good, PSU enable, 5V/2A standby, global module good
	EN12V	AC good, PSU enable, 12V/1A standby, global module good
	IN5V	AC good, PSU inhibit, 5V/2A standby, global module good
	IN12V	AC good, PSU inhibit, 12V/1A standby, global module good

1 - Thermocoupled sample recommended to ensure adequate cooling - consult sales
2 - Not with customer air cooling
3 - The Primary Option uses 1 slot
4 - Not with NV7

2. Output Section

Select Output Modules from the Module Tables below ensuring that no more that 6 slots (NV-350) or 8 slots (NV-700) in total are used.

Example - if you require 5.2V 40A :-
a) Select B as closest match for voltage & current and prefix with voltage eg 5.2B
b) Repeat for other outputs.

This will create a complete product description eg **NV3SSSES5V 5.2B 12/15DB** which represents a three output NV350 with Forward air cooling, Screw input terminals, 300µA Leakage, ac good, PSU enable and 5V/2A aux supply
Output 1 = 5.2V / 40A
Output 2 = 12V / 13A with screw terminals
Output 3 = 15V / 4A with screw terminals
Max 350W continuous output power

Contact Lambda to validate configuration or visit the NV webpage to validate part number. (www.nv-power.com)

Single Output Modules

Voltage Range	Curr.	Peak Curr.	#/slots	Mod. Code
3.2 - 3.6V	40A	-	2	B
4.75 - 5.5V	40A(1)	-	2	B
7 - 9V	22.5A(6)	-	2	B
12 - 15.5V	20A(2)	-	2	BH
24 - 28V	10A(3)	-	2	BH
12 - 13.2V	37.5A(7)	50A(7)	3	C
15 - 16.5V	30A(7)	37.5A(7)	3	C
24 - 26.4V	18.75A(7)	25A(7)	3	C
24 - 26.4V	37.5A(9)	50A(9)	6	CC
30 - 33V	30A(9)	37.5A(9)	6	CC
48 - 52.8V	18.75A(9)	25A(9)	6	CC

(1) NV3: 5.2-5.5V, derate linearly from 40A to 36A
NV7: 5-5.5V, derate linearly from 40A to 36A
(2) NV3: 13.2-15.5V, derate linearly from 20A to 16.5A
NV7: 12.5-15.5V, derate linearly from 20A to 15.5A
(3) NV3: 25.7-28V, derate linearly from 10A to 8.5A
NV7: 24-28V, derate linearly from 10A to 8.5A
(4) 12.5-15.5V, derate linearly from 13A to 10A
(5) 25-28V, derate linearly from 7A to 6A
(6) 8-9V derate linearly from 22.5A to 20A
(7) NV3: 400W max (to be confirmed)
NV7: 450W average, 600W peak for 10s
(8) One DA module per power supply
(9) NV700 only

Dual Output Module (Common 0V) (1 Slot)[8]

Output 1	Output 2	Module Code
+12V 3A	-12V 1A	DA

Dual Output Modules (2 Slots each)

Module Code = DB

Output 1		Output 2		
Voltage Range	Current	Voltage Range	Current	Max Power
3.2 - 3.6V	25A	3.3 - 5.5V	10A	55W
		7 - 15V	5A	60W
		24 - 32V	2A	50W
4.75 - 5.5V	25A	3.3 - 5.5V	10A	55W
		7 - 15V	5A	60W
		24 - 32V	2A	50W
12 - 15.5V	13A[4]	3.3 - 5.5V	10A	55W
		7 - 15V	5A	60W
		24 - 32V	2A	50W
24 - 28V	7A[5]	3.3 - 5.5V	10A	55W
		7 - 15V	5A	60W
		24 - 32V	2A	50W

For Additional Information, please visit
us.tdk-lambda.com/lp/products/nv-series.htm

3055 Del Sol Blvd • San Diego, CA 92154 • 1-800-526-2324
Revision B2: Jan 2010

TDK·Lambda

PFE300-1000

300 to 1008W AC-DC Power Module

RoHS

- Low profile, small size
- 100°C baseplate temperature
- High power density
- High Efficiency
- Suitable for conduction cooling

Features and Benefits

Feature	Benefit
◆ Low profile	◆ Assists system integration
◆ High Efficiency	◆ Easier to cool
◆ Power Factor Corrected (PFC)	◆ Supports Global Use
◆ Operation up to 100°C baseplate	◆ Operates in harsh environments

Specifications

ITEMS \ MODEL		PFE300S PFE500S	PFE700S	PFE500F	PFE1000F
AC Input	VAC	85 to 265VAC, 47-440Hz (Reduced PFC above 63Hz)			
Input Current (100 / 220VAC) Model dependant	A	4.0 / 2.0 6.2 / 3.2	8.8 / 4.4	6.8 / 3.4	13.6 / 6.6
Inrush Current (100 /200VAC) (1)	A	20 / 40 peak			
Power Factor		0.95 minimum, meets EN61000-3-2			
Output Voltage Setpoint Accuracy	-	±2%	±1V	±2%	±2%
Ripple and Noise (1)	-	1%	4V	1%	1%
Over Current Protection	%	105 - 140% (Automatic Recovery)			105 - 140% Manual reset
Over Voltage Protection	-	125 - 145%	60 - 69.6V	125 - 145%	125 - 145%
Series Operation	-	Yes			
Parallel Operation	-	No	Yes (Droop mode)	Yes (Single wire)	Yes (Single wire)
Power On Signal (ENA)	-	Open collector (10mA sink current). Low (on) when output is present			
Auxiliary Supply	-	None	None	10 - 14V, 20mA	10 - 14V, 20mA
Remote On/Off (Opto isolated)	-	None	None	High = On	High = On
Overtemperature Protection		Yes			
Operating Baseplate Temp.	°C	-40 to +100°C (2)			
Storage Temperature	°C	-40 to +100°C			
Humidity (non condensing)		Operating: 20 - 95%RH, Non Operating: 10 - 95%RH			
Cooling		Conduction			
Withstand Voltage (1 min) (3)		Input to Output 3kVAC, Input to Baseplate 2.5kVAC, Output to Baseplate 1.5kVDC			
Isolation Resistance		Output to baseplate: 100M Ohm at 500VDC, 25°C ambient, 70%RH			
Vibration (non operating)		10-55Hz (1 min sweep), constant amplitude 0.825mm (max 49m/s²), X, Y, Z 1 hour each			
Shock		196.1m/s²			
Safety Certifications		UL60950-1, CSA60950-1 (cUL), EN60950-1, CE mark (LVD)			
Weight	g	250	250	300	500
Size (WxHxL)	mm in	61 x 12.7 x 116.8mm 2.4 x 0.5 x 4.6"		70 x 12.7 x 122mm 2.76 x 0.5 x 4.8"	100 x 13.4 x 160mm 3.94 x 0.53 x 6.3"
Warranty	yrs	2 years			

Notes: (Consult Installation Manual for detailed specifications, test methods and application notes)

1) External components are required, consult Application Notes
2) PFE500S-12, PFE500F-12: -40 to 85°C. See instruction manuals for derating curves
PFE1000F28 & PFE1000F48: -40 to 85°C below 170VAC input voltage.
See instruction manuals for derating curves
3) PFE500F, PFE1000F: 500VDC Output to baseplate

TDK·Lambda

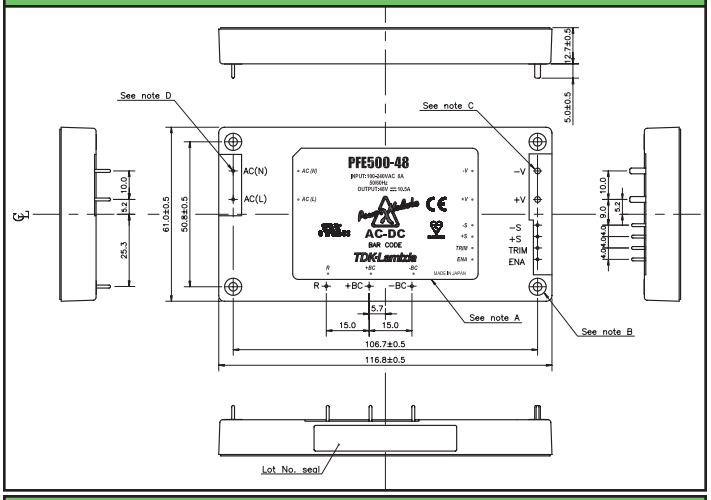
PFE300-1000

Model Selector

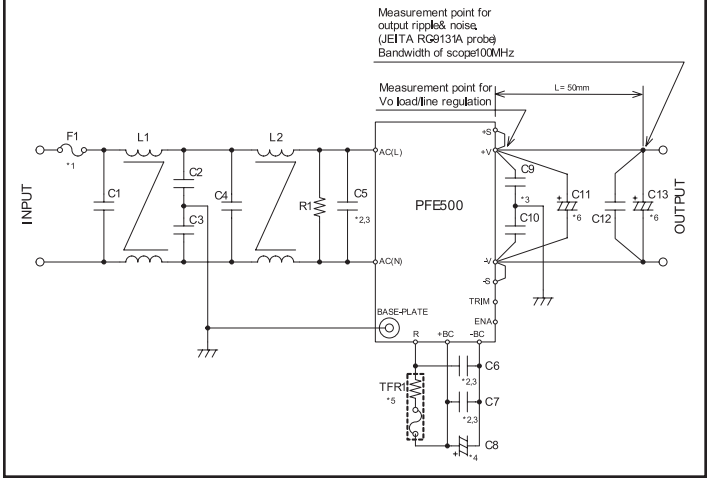
Model	Output Voltage (V)	Adjust. Range (V)	Maximum Current (A)	Maximum Wattage (W)	Load Reg. (mV)	Line Reg. (mV)	Efficiency typ (4)
PFE300S-12	12	9.6 - 14.4	25	300	48	48	81 / 83
PFE500S-12	12	9.6 - 14.4	33	396	48	48	82 / 83
PFE500F-12	12	9.6 - 14.4	42	504	48	48	81 / 83
PFE1000F-12	12	9.6 - 14.4	60	720	48	48	80 / 82
PFE300S-28	28	22.4 - 33.6	10.8	302	56	56	83 / 85
PFE500S-28	28	22.4 - 33.6	18	504	56	56	84 / 86
PFE500F-28	28	22.4 - 33.6	18	504	56	56	84 / 86
PFE1000F-28	28	22.4 - 33.6	36	1008	56	56	84 / 86
PFE300S-48	48	38.4 - 57.6	6.3	302	96	96	84 / 86
PFE500S-48	48	38.4 - 57.6	10.5	504	96	96	84 / 86
PFE500F-48	48	38.4 - 57.6	10.5	504	96	96	84 / 86
PFE1000F-48	48	38.4 - 57.6	21	1008	96	96	84 / 86
PFE700S-48	51	None	14	714	50 - 57V (5)		86 / 89

(4) 100 / 200VAC
(5) Total regulation range

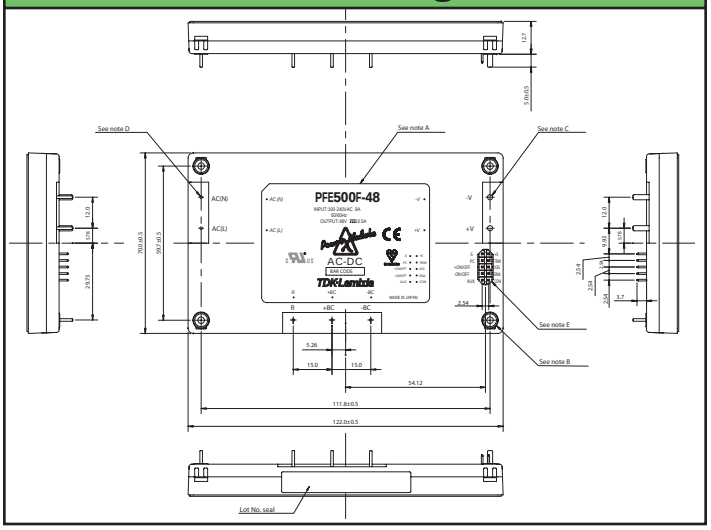
PFE500S & PFE700S Outline Drawing



PFE500S Basic connection



PFE500F Outline Drawing



Heatsink Table (PFE-S Models only)

Heatsink	Size (mm)	PFE Module
HAF-10L	116.8 x 25.4 x 61	PFE300/500S
HAF-15L	116.8 x 38.1 x 61	PFE300/500S
HAF-15T	116.8 x 38.1 x 61	PFE300/500S
HAL-F12T	122 x 35 x 69.9	PFE500F
HAL-F10T	160 x 33.4 x 100	PFE1000F

Options

Suffix	Description
Blank	M3 tapped mounting inserts (4)
/T	3.3mm non-threaded inserts (4)

For Additional Information, please visit
us.tdk-lambda.com/lp/products/pfe-series.htm

3055 Del Sol Blvd • San Diego, CA 92154 • 1-800-526-2324

Revision B9: Nov 2009

TDK·Lambda

RFE Series

1000W 1U Front End Power Supplies

- 1U high
- Internal ORing Diodes
- Current Share

RoHS

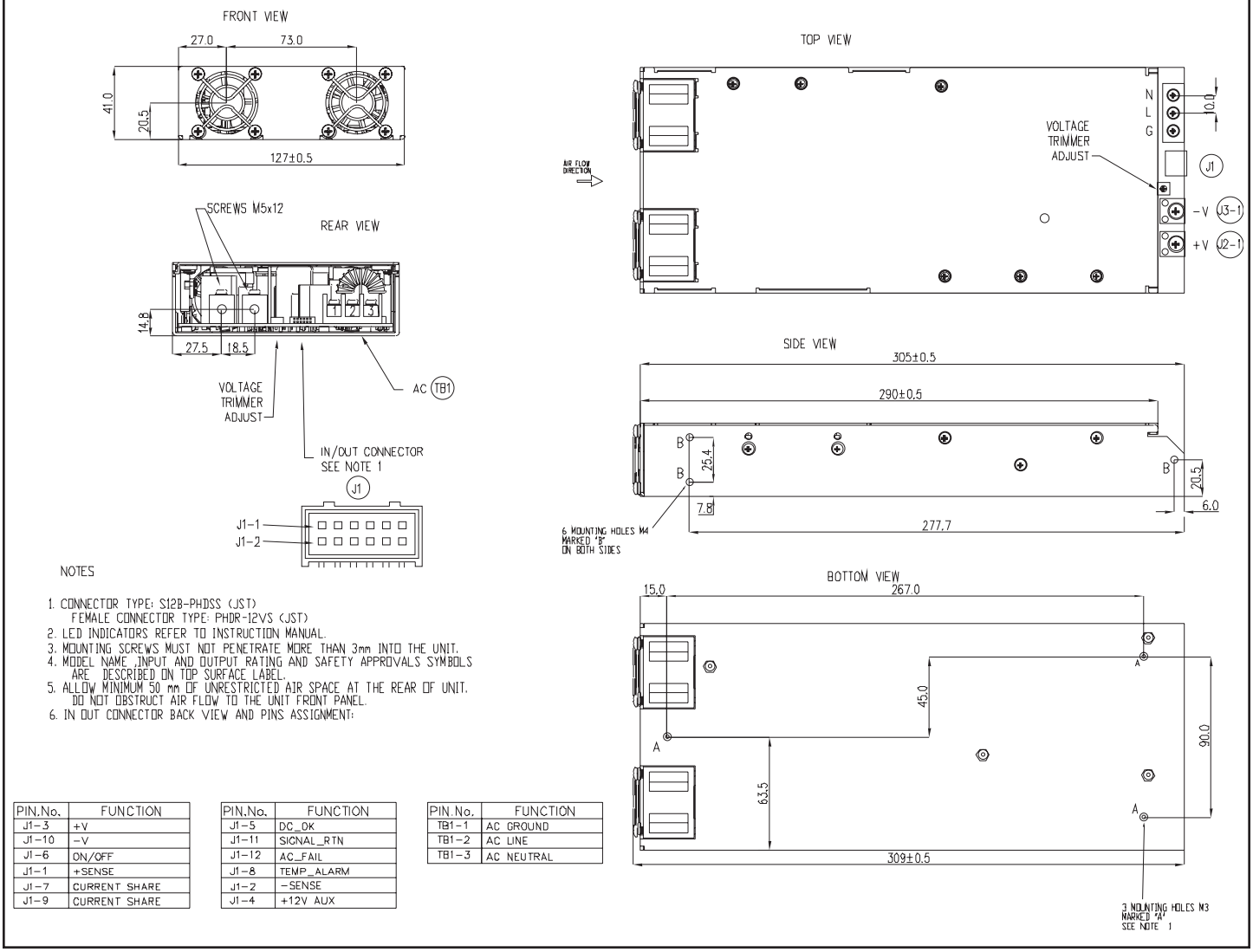
Features and Benefits

Feature	Benefit
◆ 1U high	◆ Utilizes less system space
◆ Internal ORing diodes	◆ Suitable for N+1 redundancy
◆ Current Share	◆ Can be paralleled for higher power
◆ Full array of signals	◆ Easier system monitoring

Specifications

ITEMS \ MODEL		RFE1000-24-Y	RFE1000-32-Y	RFE1000-48-Y
Nominal Output Voltage	V	24V	32V	48V
Output Voltage Range (On front panel)	V	21.5 - 29V	28.8 - 38.4V	43 - 58V
Output Current	A	40A	31A	21A
Output Power	W	960W	992W	1008W
Line Regulation	mV	96mV	128mV	192mV
Load Regulation	mV	192mV	256mV	384mV
Output Noise	mV	200mV	250mV	300mV
Overvoltage Protection (Latching)	V	31 to 34V	41.5 to 45.5V	62 to 66V
Overcurrent Protection	%	105 - 125%, Non foldback type		
Overtemperature	-	Yes, automatic reset		
Series Operation	-	Up to 3 units may be connected in series		
Current share	-	Single wire current sharing, up to 8 units		
Remote Sense	-	Compensates for up to 1V on each load wire		
Signals (opto isolated)	-	DC OK, AC Fail, and Overtemperature warning, high on fail		
Remote On/Off	-	On: 0 - 0.6V or short, Off: 2- 15V or open		
Auxiliary Output	-	12V 0.25A bias voltage, (11.2 to 12.5V). Built in ORing diode		
AC Input Range	VAC,Hz	85 - 265VAC, 47 - 63Hz		
AC Input Current (100/200VAC)	A	12 / 6A		
Leakage Current	mA	<1.1mA at 230VAC input		
Inrush Current	A	<40A		
Hold up time (100VAC input)	ms	20ms typical		
Efficiency (typical) 100/200VAC	%	84 / 86%	84 / 86%	85 / 88%
Power factor Correction	-	EN61000-3-2 class A (20-100% load), >0.98 at full load		
Immunity	-	EN61000-4-2, -3, -4, -5, -6, -11		
EMC (conducted and radiated)	-	EN55022, level B, FCC part 15J-B		
Operating Temperature	-	0 to +70°C, derate 2%/°C from 50 to 60°C, 2.5%/°C from 60 to 70°C		
Storage Temperature	°C	-30 to +85°C		
Withstand Voltage	-	Input to Output 3kVAC, Input to Output 2kVAC, Output to Ground 500VAC for 1 min.		
Isolation Resistance	-	>100M at 25°C & 70%RH, Output to Ground 500VDC		
Cooling	-	Two variable speed internal fans, airflow exits across input/output		
Humidity	-	Operating: 10 - 90% RH, Storage: 10 - 95% RH (non condensing)		
Shock & Vibration	-	Meets ETS 300 019		
Safety Agency	-	UL60950-1, EN60950-1 (Ed 2), CE Mark		
Input / Output Connector	-	Input: Screw terminals, Output: M5x12 screws, Signals: Mating connector JST PHDR-12VS		
Output indicator	-	Green LED DC OK		
Size (L x W x H)	In(mm)	12 x 5 x 1.61" (305 x 127 x 41mm)		
Weight	g	2000		
Warranty	Yrs	Two Years		

Outline Drawing



NOTES

1. CONNECTOR TYPE: S12B-PHDSS (JST)
   FEMALE CONNECTOR TYPE: PHDR-12VS (JST)
2. LED INDICATORS REFER TO INSTRUCTION MANUAL.
3. MOUNTING SCREWS MUST NOT PENETRATE MORE THAN 3mm INTO THE UNIT.
4. MODEL NAME ,INPUT AND OUTPUT RATING AND SAFETY APPROVALS SYMBOLS ARE DESCRIBED ON TOP SURFACE LABEL.
5. ALLOW MINIMUM 50 mm OF UNRESTRICTED AIR SPACE AT THE REAR OF UNIT. DO NOT OBSTRUCT AIR FLOW TO THE UNIT FRONT PANEL.
6. IN OUT CONNECTOR BACK VIEW AND PINS ASSIGNMENT:

PIN.No.	FUNCTION
J1-3	+V
J1-10	-V
J1-6	ON/OFF
J1-1	+SENSE
J1-7	CURRENT SHARE
J1-9	CURRENT SHARE

PIN.No.	FUNCTION
J1-5	DC_OK
J1-11	SIGNAL_RTN
J1-12	AC_FAIL
J1-8	TEMP_ALARM
J1-2	-SENSE
J1-4	+12V AUX

PIN.No.	FUNCTION
TB1-1	AC GROUND
TB1-2	AC LINE
TB1-3	AC NEUTRAL

Other Related Products

FPS1000	1U Hotswap 1000W Rack mount
HWS	15 - 1800W Power Supplies
SWS-L	600 - 1000W Power supplies

For Additional Information, please visit
us.tdk-lambda.com/lp/products/rfe-series.htm

TDK·Lambda

SC40/60 Series

3 x 5" 40W to 80W AC-DC Power Supplies

RoHS

- Low Cost
- Single and Multiple Outputs
- Wide Range AC Input
- Low profile
- Global Safety Agency Compliance
- Meets EN61000-4 (-2 to -6)

Key Market Segments & Applications

Computer Peripherals
Datacom
Point of Sale
Test and Measurement

Features and Benefits

Feature	Benefit
◆ Industry standard footprint	◆ Availability to second source
◆ Broad product range	◆ Optimization of power supply to system
◆ Meets EN61000-4 immunity	◆ Greater reliability

Specifications

ITEMS / MODELS		SCS40	SCT4x	SCS60	SCD60	SCT6x
Output Power Convection	W	40		60		
Output Power Forced Air	W	55		-		
Main Output Adjustment	V	-5, +10% O/P 1 only		-5, +10%		
Line and Load Regulation	%	Output 1: ±2%, Output 2: ±5% (±7% on 24V models), Output 3: ±5%				
Hold Up Time (typical)	ms	20		20		
Size (1)	in	3 x 5 x 1"		3 x 5 x 1.34"		
AC Input	-	85-265 VAC, 47-63 Hz				
Efficiency	%	Typically 70% full load at nominal AC Line				
Inrush Current Limiting	A	36A typical @230VAC cold start				
Surge Immunity	-	EN61000-4 (-2 through -6) level 3				
EMI	-	FCC Class B, EN55022 B				
Cross Regulation	%	± 2% on output 1, ±5% on outputs 2 & 3 (multiple outputs only)				
Ripple and Noise	%	1% peak to peak				
Overcurrent Protection	-	Short circuit protection, automatic recovery				
Overvoltage Protection	-	Output 1 only, <135%				
Cooling	-	When specified with forced air cooling, flow is 300 LFM (1.5m/s)				
Operating Temp. Range (2)	-	0 to +70°C (Derate linearly to 50% load from 50-70°C)				
Storage Temperature	-	-20 to +85°C				
Safety Agency Approval	-	UL60950-1, CSA60950-1, IEC/EN60950-1, CE Mark				
Warranty	-	1 year				

(1) Height is specified as maximum component height
Note: See Installation Manual for full details, test methods of parameters and application notes

(2) -40°C startup, contact factory for details.

TDK·Lambda

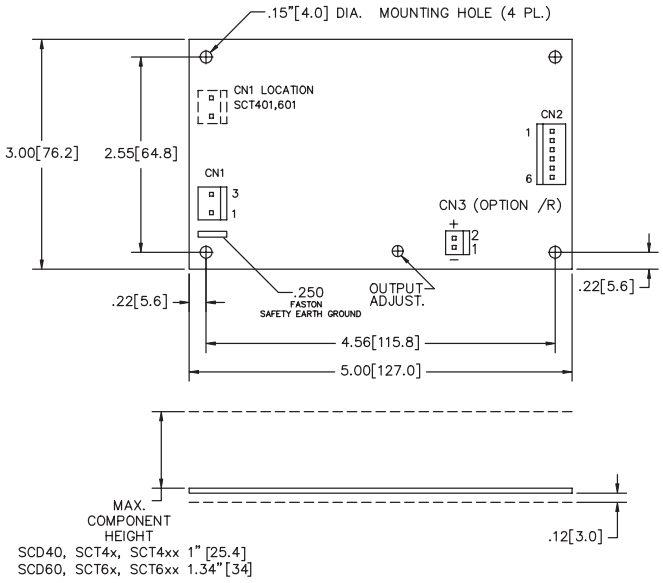
SC40/60 Series

Model Selector

	Model		O/P (V)	Min Load(A)	Convec. (A)	Forced Air(A)	Peak Load(A)**
Single Output	SCS4024	V1	24.0	-	1.6	2.3	2.5
	SCS4048	V1	48.0	-	0.9	1.2	1.3
	SCS6012	V1	12.0	-	5.0	6.7	7.5
	SCS6024	V1	24.0	-	2.5	3.3	3.8
	SCS6028	V1	28.0	-	2.1	2.9	3.2
	SCS6048	V1	48.0	-	1.3	1.7	1.9
Dual Output	SCD601515	V1	15.0	0.2	2.2	2.9	-
		V2	-15.0	0.2	1.8	2.4	-
Triple Output	SCT42	V1	5.0	0.4	4.0	5.0	7.0
		V2	12.0	0.2	2.0	2.5	4.0
		V3	-12.0	-	0.5	0.7	1.0
	SCT45	V1	5.0	0.4	4.0	5.0	7.0
		V2	15.0	0.2	2.0	2.5	3.0
		V3	-15.0	-	0.5	0.7	1.0
	SCT48/R*	V1	5.0	0.4	4.0	5.0	6.0
		V2	24.0	0.1	1.0	1.5	2.0
		V3	-5.0	-	0.5	0.7	1.0
	SCT62	V1	5.0	0.7	7.0	-	10.0
		V2	12.0	0.3	3.0	-	6.0
		V3	-12.0	-	0.7	-	1.5
	SCT63	V1	5.0	0.7	7.0	-	10.0
		V2	15.0	0.3	2.8	-	4.0
		V3	-15.0	-	0.7	-	1.5
	SCT65	V1	5.0	0.7	7.0	-	10.0
		V2	24.0	0.1	1.5	-	3.0
		V3	12.0	-	0.7	-	1.5

Model Selector Notes:
* /R = Remote Sense. Leave unconnected when not used.
** <30s, 10% duty cycle, average power must not exceed maximum ratings

Outline Drawing



NOTES:
1. DIMENSIONS SHOWN IN INCH [mm]
2. TOLERANCE .02 [0.5] MAXIMUM
3. MATING CONNECTORS:

CN1	MOLEX	09-50-8031
CN2	MOLEX	09-50-8061
CN2	MOLEX	09-50-8071 (SCT401/601)
CN1, 2 PINS	MOLEX	08-52-0113
CN3	MOLEX	22-01-3027
CN3	PINS MOLEX	08-50-0114

Other AC-DC Products

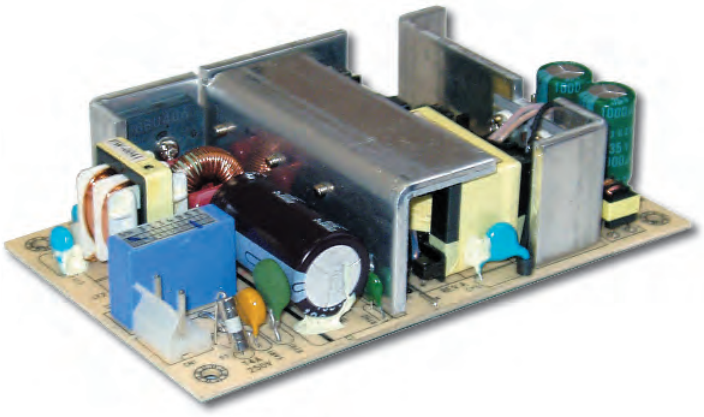
ZP	20 to 60W 2" x 4", 1-3 outputs
NV175	175W 3" x 5", 1-5 outputs
ZWS	5 to 240W single output, universal input
VSB, VSC, VSP	10 to 150W single output, 115VAC input
SCS120PW	120W 3" x 5" single output
CSS150	150W 3" x 5" single output

For Additional Information, please visit
us.tdk-lambda.com/lp/products/sc-series.htm

3055 Del Sol Blvd • San Diego, CA 92154 • 1-800-526-2324
Revision B2: Jan 2011

TDK·Lambda

SCS120PW Series



3 x 5" 120W Single Output Power Supplies

RoHS

- Low Profile
- Convection cooled
- Wide Range AC Input with PFC
- Global Safety Agency Compliance

Key Market Segments & Applications

Computer Peripherals
Datacom
Point of Sale
Test and Measurement

Features and Benefits

Feature	Benefit
◆ Industry standard footprint	◆ Availability to second source
◆ Power factor Correction	◆ Worldwide usage
◆ Convection Cooled	◆ Easier system integration
◆ Low profile	◆ Suitable for 1U enclosures

Specifications

ITEMS		
Output Power	W	120W
Line & Load Regulation	%	See model selector
Ripple & Noise	%	1%
Hold Up Time (typical)	ms	16ms (Full load at 115VAC input)
Overcurrent Protection	%	105 - 120%
Overvoltage Protection	%	110 - 130%, cycle AC line to reset
Input Voltage Range	-	90-264 VAC, 47-63 Hz (440Hz with reduced PFC)
AC Input Current	A	2.5A Max
Harmonic Correction (PFC)	-	Meets EN61000-3-2 (typically >0.9)
Efficiency	%	Typically 85% full load at nominal AC Line
Inrush Current Limiting	A	<50A peak @ 230VAC cold start
Leakage Current	mA	<0.75mA (264VAC, 60Hz)
Surge Immunity	-	EN61000-4 (-2 through -5)
EMI	-	FCC Class B, EN55022 B
Cooling	-	Convection
Withstand Voltage	-	Input to Output 1.5kVAC, Input to Output 3kVAC, Output to Ground 500VDC
Isolation Resistance	-	>20M at 25°C & 70%RH, Output to Ground 500VDC
Operating Temperature	°C	0 to +40°C, derate linearly to 50% load from 40°C to 60°C
Temperature Coefficient	%/°C	±0.05%/°C
Storage Temperature	°C	-10 to +70°C
Humidity (non-condensing)	-	20-90%RH operating, 20-95%RH non-operating
Shock	-	< 196.1m/s² (20G)
Vibration	-	10Hz-55Hz amplitude (sweep 1 min), <2G X, Y, Z axis for 1 hour each
Altitude	m	3000m operating, 5000m storage
Safety Agency Approval	-	UL60950-1, CSA60950-1, EN60950-1, CCC, CE Mark (LVD)
Size W x L x H	In	3 x 5 x 1.27"
Weight	g	300
Warranty	yrs	1 year

TDK·Lambda

SCS120PW Series

Model Selector

Models	Output Voltage	Output Load	Output Regulation
SCS120PW12	12V	10A	3%
SCS120PW15	15V	8A	2%
SCS120PW18	18V	6.67A	2%
SCS120PW19	19V	6.32A	2%
SCS120PW24	24V	5A	2%
SCS120PW30	30V	4A	2%
SCS120PW32	32V	3.75A	2%
SCS120PW36	36V	3.34A	2%
SCS120PW48	48V	2.5A	2%

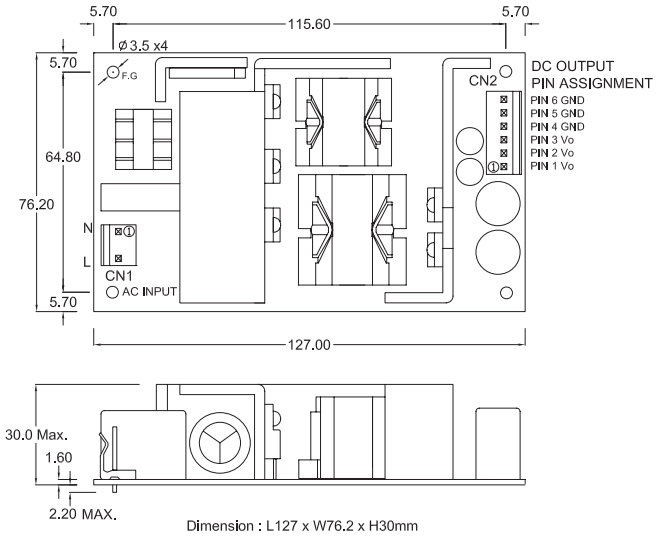
Mating Connectors

Mating	Molex Connector	Molex Pins
CN1	09-50-8031	08-52-0113
CN2	09-50-8061	08-52-0113

Other Industrial Products

EFE300	3" x 5" 300W single output
CSS150	3" x 5" 150W single output (Medical)
NV175	3" x 5" 175W single to quad outputs
SC40/60	3" x 5" 40 - 80W single to quad outputs
ZPSA/ZPT	2" X 4" 40 - 60W single to triple outputs
ZWS	5 to 240W single output

Outline Drawing



For Additional Information, please visit
us.tdk-lambda.com/lp/products/scs120-series.htm

3055 Del Sol Blvd • San Diego, CA 92154 • 1-800-526-2324

Revision B4: Mar 2011

TDK·Lambda

SWS Series

Single Output General Purpose Power Supplies

- Low Cost
- Power Factor Correction to EN61000-3-2
- Universal Input (85 - 265VAC)
- Input Transient Protected IEC61000-4
- Enclosed

RoHS

Key Market Segments & Applications

Factory Automation	Process Control, NC-Machining, Automotive, Packaging Equipment, Materials Handling, Chemical Processing, Robots
Test & Measurement	Burn-in & Test, Automated, Detection Test, Instrumentation, Measurement
Automated Service	Vending Machines, Elevators, Video Gaming, Point of Sale Equipment

Features and Benefits

Feature	Benefit
◆ Meets IEC61000-4	◆ Greater reliability
◆ Global safety Approvals	◆ Supports Global Use
◆ Power Factor Corrected	◆ Supports Global Use
◆ Level B EMI	◆ Assists System Compliance

Specifications

ITEMS \ MODEL		SWS50	SWS75	SWS100	SWS150
Input Voltage range (1)	-	85 - 265VAC (47 - 63Hz) or 120 - 370VDC			
Inrush Current (115/230VAC)	A	20/40		16/32	
Power Factor	-	Meets EN61000-3-2			
Input Current (115/230VAC)	A	1.2/0.6	1.6/0.8	1.2/0.6	1.8/0.9
Temperature Coefficient	-	<0.02%/°C			
Total Regulation	-	<5%			
Overcurrent Protection	-	>105%, Constant Current Style			
Overvoltage Protection	V	115 -135%, Cycle AC line to reset			
Hold Up Time (Typ)	ms	20ms at 115VAC			
Leakage Current Max.	mA	1mA (0.6mA typ@230VAC)		0.75mA (0.5mA typ@230VAC)	
Remote Sense	-	Not Available			
LED Indicator	-	Green LED = On			
Operating Temperature	-	-10 to +70°C (See table for derating - model specific)			
Storage Temperature	-	-30 to +85°C			
Operating Humidity (2)	-	30 - 90% RH			
Storage Humidity (2)	-	10 - 95% RH			
Cooling		Convection			
Withstand Voltage	-	Input to Ground 2kVAC, Input to Output 3kVAC, Output to Ground 500VAC for 1 min.			
Isolation Resistance	-	>100M at 25C & 70%RH, Output to Ground 500VDC			
Vibration (non operating)	-	19.6m/s^2(10 - 55Hz (constant sweep 1 min) X, Y, Z for 1 hour)			
Shock	-	< 196.1 m/s^2 (20G)			
Safety Agency Approvals	-	UL60950-1, CSA60950-1, EN60950-1, CE Mark, EN50178			
Conducted & Radiated EMI	-	EN55011 / EN55022-B, FCC Class B, VCCI-B			
Recommended EMI Filter	-	RSEL-2002W	RSEL-2003W	RSEL-2002W	RSEL-2003W
Immunity	-	EN61000-4-2,-3,-4,-5,-6,-8,-11			
Weight (Typ)	g	400	480	600	750
Size (WxHxD)	in	3.62 x 1.46 x 6.26	3.7 x 1.69 x 6.69	3.78 x 1.77 x 7.4	3.9 x 2 x 7.8
Warranty	-	Two Years			

(1) Derate to 85% load below 100VAC input (2) non condensing

TDK·Lambda

SWS Series

Model Selector

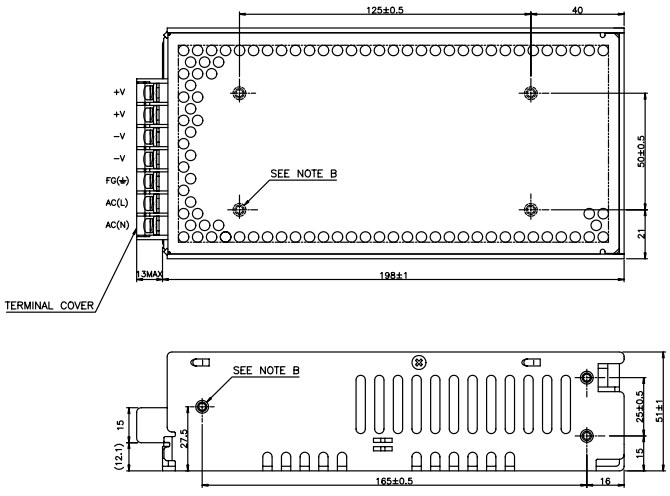
Model	Voltage	Adjust Range	Max Curr.	Load Reg mV	Line Reg mV	Ripple Noise	Eff. (typ)%
SWS50-3	3.3V	3-3.6V	10	40	20	80	73/70
SWS75-3	3.3V	3-3.6V	15	40	20	80	72/68
SWS100-3	3.3V	3-3.6V	20	40	20	100	69/70
SWS150-3	3.3V	3-3.6V	30	40	20	100	70/72
SWS50-5	5V	4.5-5.5V	10	50	20	80	77/75
SWS75-5	5V	4.5-5.5V	15	50	20	80	77/74
SWS100-5	5V	4.5-5.5V	20	40	20	100	75/77
SWS150-5	5V	4.5-5.5V	30	40	20	100	76/78
SWS50-12	12V	10.8-13.2V	4.3	96	48	80	82/79
SWS75-12	12V	10.8-13.2V	6.3	96	48	80	83/81
SWS100-12	12V	10.8-13.2V	8.5	96	48	100	79/81
SWS150-12	12V	10.8-13.2V	12.5	96	48	100	79/82
SWS50-15	15V	13.5-16.5V	3.5	120	60	100	84/80
SWS75-15	15V	13.5-16.5V	5	120	60	100	85/82
SWS100-15	15V	13.5-16.5V	6.7	120	60	100	81/83
SWS150-15	15V	13.5-16.5V	10	120	60	100	81/83
SWS150-18	18V	16.2-19.8V	8.4	144	72	120	82/84
SWS50-24	24V	21.6-26.4V	2.1	144	96	100	84/80
SWS75-24	24V	21.6-26.4V	3.2	144	96	100	85/82
SWS100-24	24V	21.6-26.4V	4.3	144	96	150	82/84
SWS150-24	24V	21.6-26.4V	6.3	144	96	150	82/85

Veritcal Mount Convection	25°C	30°C	35°C	40°C	45°C	50°C	55°C	60°C
SWS50	100%	100%	100%	100%	100%	100%	93%	85%
SWS75 (3.3-5V)	100%	100%	100%	100%	93%	85%	73%	60%
SWS75 (12V-24V)	100%	100%	100%	100%	100%	93%	85%	60%
SWS100	100%	100%	100%	100%	100%	87%	73%	60%
SWS150 (3.3-5V)	100%	95%	90%	85%	73%	60%	-	-
SWS150 (12V-24V)	100%	100%	100%	100%	100%	100%	80%	60%

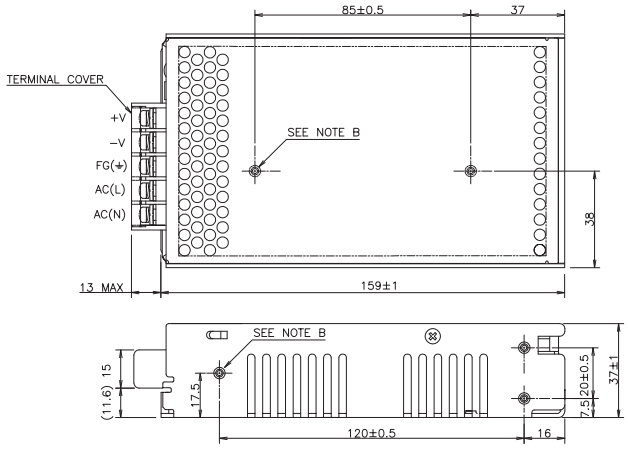
1.2m/s Forced Air	50°C	55°C	60°C	65°C	70°C
SWS75	100%	100%	90%	80%	70%
SWS100	100%	100%	90%	80%	70%
SWS150	100%	100%	90%	80%	70%

Derate to 80% load from 0 to -10°C

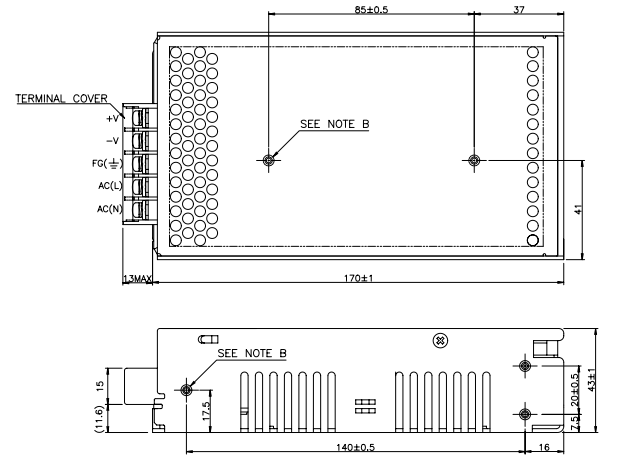
SWS150 Outline Drawing



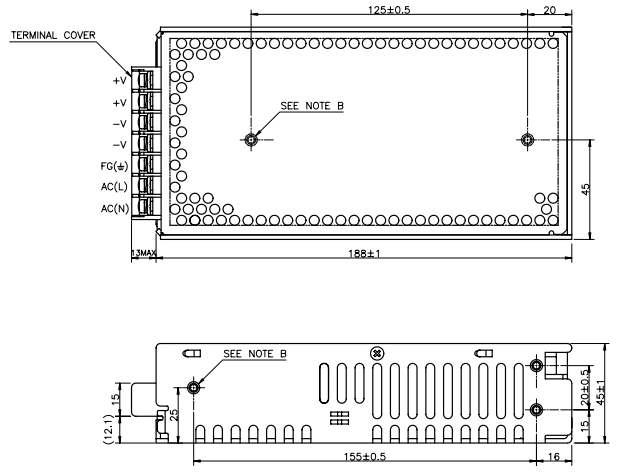
SWS50 Outline Drawing



SWS75 Outline Drawing



SWS100 Outline Drawing



Other Industrial Products

HWS	15W to 1500W Single Output
LS	25W to 200W Low Cost
SWS300/600/1000	300W to 1000W (Higher Power)

For Additional Information, please visit
us.tdk-lambda.com/lp/products/sws-series.htm

Options

Suffix	Descriptor
/CO2	Double sided conformal coating

3055 Del Sol Blvd • San Diego, CA 92154 • 1-800-526-2324

Revision B6: Jun 2011

TDK·Lambda

SWS300A-600

Single Output General Purpose Power Supplies

- Lower Cost
- Active Power Factor Correction
- Universal Input (85 - 265VAC)
- Input Transient Protected IEC61000-4
- Enclosed

RoHS

Key Market Segments & Applications

LED Signage
Automated Service
Test & Measurement

Features and Benefits

Feature	Benefit
◆ Meets IEC61000-4	◆ Greater reliability
◆ Global safety Approvals	◆ Supports Global Use
◆ Power Factor Corrected	◆ Supports Global Use
◆ Level B EMI	◆ Assists System Compliance

Specifications

MODELS		SWS300A	SWS600
Input Voltage range (1)		85 - 265VAC (47 - 63Hz) or 120 - 370VDC	
Inrush Current (115 / 230VAC)	A	20 / 40	
Power Factor		Meets EN61000-3-2	
Input Current (100/200VAC)	A	3.6 / 1.8A	7.2 / 3.6A
Temperature Coefficient	-	<0.02%/°C	
Overcurrent Protection	-	>105%, Constant current style	
Overvoltage Protection	V	Yes, cycle AC to reset	
Overtemperature Protection	-	Yes, cycle AC to reset	
Hold Up Time (Typ)	ms	20ms at 115/230VAC	
Leakage Current (max)	mA	SWS300: 0.75mA , SWS600: 1.5mA	
Remote Sense	-	None	Yes
Parallel Connection	-	None	Yes
Remote On/Off	-	None	Yes
AC Fail Signal	-	None	Yes, open collector output
LED Indicator	-	Green LED = On	
Operating Temperature	°C	-10 to +65°C (See table for derating - model specific)	
Storage Temperature	°C	-30 to +85°C	
Humidity (non condensing)	-	30 - 90% RH operating, 10 - 95%RH non operating	
Storage Humidity (non condensing)	-	10 - 95% RH	
Cooling	-	Internal fan	
Withstand Voltage	-	I/P to Grnd 2kVAC, I/P to O/P 3kVAC, O/P to Grnd 500VAC, O/P to CNT 100VAC for 1 min	
Isolation Resistance	-	>100M at 25°C & 70%RH, Output to Ground 500VDC	
Vibration (non operating)	-	10 - 55Hz (sweep for 1 min)19.6m/s^2 constant X, Y, Z 1 hour each plane)	
Immunity	-	EN61000-4-2, -3, -4, -5, -6, -8, -11	
Safety Agency Approvals	-	UL60950, CSA60950, EN60950, EN50178, CE Mark	
Conducted & Radiated EMI	-	EN55011 / EN55022-B, FCC Class B	
Recommended EMI Filter	-	RSAL2006	RSAN2010
Weight (Typ)	g	950	2000
Size (WxHxD)	In	2.05 x 4.01 x 7.8"	3.62 x 4.72 x 7.48"
Warranty	yrs	Two Years	

(1) Derate linearly to 85% load from 115VAC to 85VAC input (derate to 90% load for SWS600-3 & -5)

TDK·Lambda

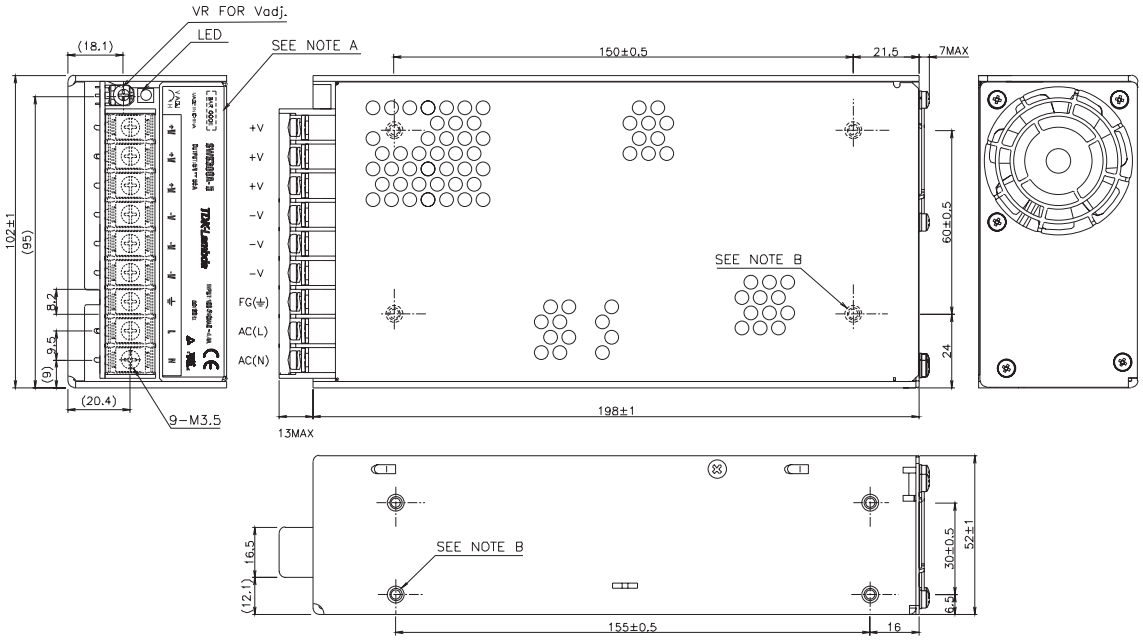
SWS300A-600

Model Selector

Model	Voltage	Adjust Range	Max Curr. (A)	Load Reg (mV)	Line Reg (mV)	Ripple Noise (mV)	Eff. (typ)%(1)
SWS300A-3	3.3V	2.97 - 3.96V	55A	40	20	120	69 / 72
SWS300A-4	4V	3.6 - 4.8V	55A	40	20	120	72 / 75
SWS300A-5	5V	4.5 - 6V	55A	40	20	120	75 / 78
SWS300A-7R5	7.5V	6 - 9V	40A	60	30	120	77 / 80
SWS300A-12	12V	9.6 - 13.2V	26A	96	48	120	79 / 83
SWS300A-15	15	13.2 - 18.6V	21A	120	48	120	80 / 84
SWS300A-24	24V	20 - 28.8V	13A	120	48	150	82 / 85
SWS300A-28	28V	22.4 - 33.6V	11A	140	56	150	83 / 86
SWS300A-36	36V	28.8 - 40V	8.8A	180	72	200	83 / 87
SWS300A-48	48V	40 - 57.6	6.7A	240	96	240	83 / 86
SWS600-3	3.3V	2.97-3.96V	100 (2)	40	20	100	69/71
SWS600-5	5V	4.5-6V	100 (2)	40	20	100	74/77
SWS600-12	12V	9.6-13.2	50	96	48	120	78/81
SWS600-15	15V	13.2-18V	40	120	48	120	80/83
SWS600-24	24V	20-28.8	25	120	48	150	81/84
SWS600-36	36V	28.8-40V	16.7	180	72	200	81/85
SWS600-48	48V	40-57.6	12.5	240	96	240	82/85

(2) Peak rating of 120A for 10s
(3) 115/230VAC

Outline Drawing (SWS300A)



NOTES

A: MODEL NAME, INPUT VOLTAGE RANGE, NOMINAL OUTPUT VOLTAGE, MAXIMUM OUTPUT CURRENT AND COUNTRY OF MANUFACTURE ARE SHOWN HERE IN ACCORDANCE WITH THE SPECIFICATIONS.

B: M4 EMBOSSED, TAPPED AND COUNTERSUNK HOLES (8) FOR CUSTOMER CHASSIS MOUNTING. SCREWS MUST NOT PROTRUDE INTO POWER SUPPLY BY MORE THAN 6m/m.

Options

Suffix	Descriptor
/CO2	Double sided conformal coating

Other Industrial Products

HWS	15W to 1500W Single output, high reliability
SWS	50 - 1000W Single Output
ZWS	5 - 240W pcb style single, output

Derating

	50°C	55°C	60°C	65°C
SWS300A	100%	91.6%	83.3%	50%
SWS600	100%	85%	70%	55%

For Additional Information, please visit
us.tdk-lambda.com/lp/products/sws-series.htm

3055 Del Sol Blvd • San Diego, CA 92154 • 1-800-526-2324
Revision A2: Jan 2010

TDK·Lambda

SWS600/1000L

Single Output Low Profile Power Supplies

RoHS

- Low Cost
- Low Profile
- Active Power Factor Correction
- Universal Input (85 - 265VAC)
- Input Transient Protected IEC61000-4
- Low Acoustical noise
- Medical Certifications (SWS1000L)

SWS600L model shown

Key Market Segments & Applications

LED Signs	Test & Measurement
Automated Service	Medical equipment

Features and Benefits

Feature	Benefit
◆ Global safety Approvals	◆ Supports Global Use
◆ Power Factor Corrected	◆ Supports Global Use
◆ Variable speed fan	◆ Greater reliability & lower acoustical noise

Specifications

ITEMS \ MODEL		SWS600L	SWS1000L
Input Voltage range	-	85 - 265VAC (47 - 63Hz) or 120 - 350VDC	
Inrush Current (115 / 230VAC)	A	20 / 40	
Power Factor	-	Meets EN61000-3-2 Class A	
Input Current (100/200VAC)	A	7.1 / 3.6 (3.3V: 5 / 2.5)	12 / 6
Temperature Coefficient	-	<0.02%/°C	
Overcurrent Protection	-	>105%, Constant current style	
Overvoltage Protection	V	125% -145%	
Overtemperature Protection	-	Yes, cycle AC or Remote On/Off to reset	
Hold Up Time (Typ)	ms	20ms at 115/230VAC	
Leakage Current (max)	mA	<0.75mA	100µA at 115VAC 60Hz(2)
Remote Sense	-	Yes	
Parallel Connection	-	Yes	
Remote On/Off (CNT)	-	Yes	
Voltage Programming (1)	-	Yes	
DC Good & Fan Fail Signal	-	Yes, open collector output	
Auxiliary Output	-	12V 0.1A	
LED Indicator	-	Green LED = On	
Operating Temperature	-	-40°C start up. -20 to 74°C, derating linearly to 50% load above 50°C	
Storage Temperature	-	-40 to +85°C	
Humidity (non condensing)	-	20 - 90% RH operating, 10 - 95%RH non operating	
Cooling	-	Variable speed internal fan	
Withstand Voltage(One minute)	-	Input to Ground 2kVAC, Input to Output 3kVAC, Output to Ground 500VAC, Output to CNT 100VAC	Input to Ground 2kVAC, Input to Output 4kVAC, Output to Ground 500VAC, Output to CNT 100VAC
Isolation Resistance	-	>50M at 25C & 70%RH, Output to Ground 500VDC	
Vibration (non operating)	-	MIL-STD-810F 514.5 Cat. 4,10	
Shock (in packaging)	-	MIL-STD-810F 516.5 Procedure I, VI	
Immunity	-	EN61000-4-2, -3, -4, -5, -6, -8, -11	
Safety Agency Certification	-	UL, CSA, EN60950-1, UL60601-1 (1000W only), IEC61010-1 (600W only), EN50178, CE Mark	
Conducted & Radiated EMI	-	EN55011 / EN55022-B, FCC Class B	
Weight (Typ)	g	1600	2300
Size (WxHxD)	in	2.4 x 4.72 x 7.48"	2.4 x 5.91 x 9.45"
Warranty	yrs	Three Years	

(1) 1-6V program voltage input to adjust output 20-120% (typical) of nominal. See instruction manual for details & models with this feature.

(2) 300uA worse case, 265VAC 63Hz

TDK·Lambda

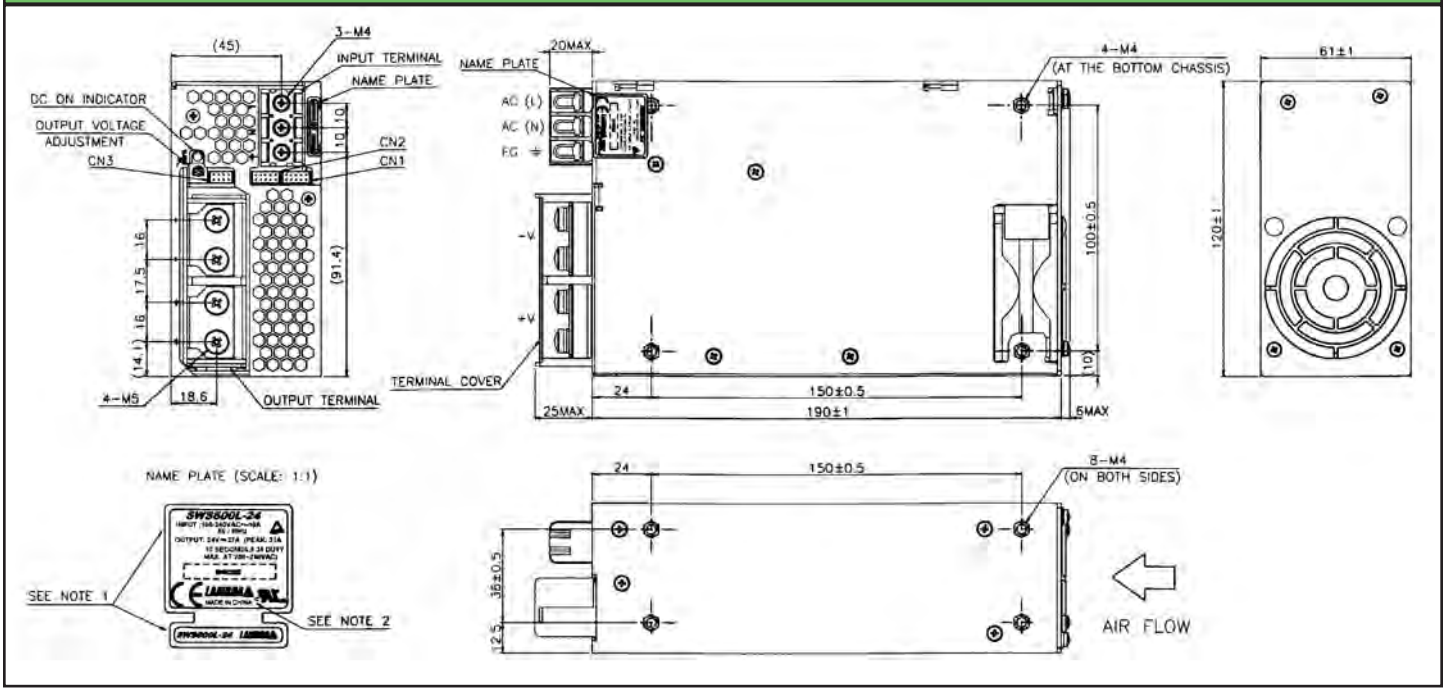
SWS600/1000L

Model Selector

Model	Voltage	Adjust Range	Max Curr. (A)	Max Pwr (W)	Load Reg (mV)	Line Reg (mV)	Ripple Noise (mV)	Eff.(3) (typ)%
SWS600L-3	3.3V	2.64 - 3.96V	120A	396W	30	20	120	70 / 72
SWS1000L-3	3.3V	2.64 - 3.96V	200A	660W	30	20	120	74 / 76
SWS600L-5	5V	4 - 6V	120A	600W	30	20	120	75 / 77
SWS1000L-5	5V	4 - 6V	200A	1000W	30	20	120	79 / 81
SWS600L-12	12V	9.6 - 14.4V	53A	636W	72	48	150	79 / 82
SWS1000L-12	12V	9.6 - 14.4V	88A	1056W	72	48	150	82 / 84
SWS600L-15	15V	12 - 19.5V	43A	645W	90	60	150	79 / 82
SWS1000L-15	15V	12 - 19.5V	70A	1050W	90	60	150	82 / 84
SWS600L-24	24V	19.2 - 28.8V	27A (31A)[4]	648W(744W)	144	96	150	81 / 84
SWS1000L-24	24V	19.2 - 28.8V	44A (51A)[4]	1056W(1224W)	144	96	150	84 / 86
SWS600L-36	36V	28.8 - 43.2V	18A	648W	216	144	200	82 / 84
SWS1000L-36	36V	28.8 - 43.2V	29A	1044W	216	144	200	84 / 86
SWS600L-48	48V	38.4 - 56V	13A (15A)[4]	624W(720W)	288	192	200	82 / 84
SWS1000L-48	48V	38.4 - 56V	22A (25A)[4]	1056W(1200W)	288	192	200	84 / 86
SWS600L-60	60V	48 - 66V	10A	600W	360	240	200	82 / 84
SWS1000L-60	60V	48 - 66V	17A	1020W	360	240	200	84 / 86

Notes: (3) 115 / 230VAC (4) Peak current and power possible at 170-26VAC input, 10s max, 35% duty cycle

SWS600L Outline Drawing



Other Industrial Products

SWS	50 - 300W Single Output
HWS	15 - 1800W Single output, high reliability
ZWS	5 - 240W pcb style single, output
DLP, DPP, DSP	10 - 480W DIN Rail mount
LS	25 - 200W Single output, low cost

For Additional Information, please visit
us.tdk-lambda.com/lp/products/sws-series.htm

3055 Del Sol Blvd • San Diego, CA 92154 • 1-800-526-2324

Revision A7: Jan 2010

TDK·Lambda

Vega Series

450 to 900W Multiple Output Modular Power Supply

RoHS

- 1-10 Wide Range Outputs With Adjustment
- Forward/Reverse/Low Noise/System Air Cooling
- Output Voltages From 0.5V - 62V
- 48VDC Input Option
- Medical Approval Options
- MIL-STD-810 Shock and Vibration

Features and Benefits

Feature	Benefit
◆ PFC compliant to EN61000-3-2	◆ Supports global use
◆ Wide Range Output Adjustment	◆ Capable of providing non-standard voltages, eliminating the need for custom models
◆ Safety Agency Approvals EN, cULus, BSI, CE	◆ Supports worldwide use, lowers risk to end user
◆ Flexibility with option choices	◆ Custom solutions available off the shelf

Specifications

ITEMS \ MODELS		VEGA 450	VEGA 650	VEGA 900
Input Voltage Range (47-440Hz with reduced PFC)	-	90 -264VAC 47-63Hz(1) or 34-75VDC	90-264VAC 47-63Hz(1)	150-264VAC 47-63Hz
Input Current (Typ. at 90VAC)	A	7.7A	11A	9.2A at 150VAC
Efficiency (Typ.)	%	75% at 230VAC (or 48VDC) and full load, configuration dependent		
Nominal Output Voltages	VDC	0.5 - 62 (See configuration guide)		
Output Voltage Adjustment	-	Wide range, via potentiometer or remote adjust pin, module dependent		
Minimum Load	A	0A		
Max Output Power	W	450(2)	650	900
Max Ripple & Noise (pk-pk)	mV	<1% (or 50mV which ever is greater) using EIAJ test method & 20MHz bandwidth		
Regulation (load, line, cross)	%	Less than 0.5%		
Hold Up Time	ms	16ms min at 90VAC (150VAC for 900W, 10ms for 450WDC input)		
Over Voltage Protection	%	120 - 150% (See website for more details)		
Overload/Short Circuit	%	105-125%, constant current characteristic, 150% max short circuit current.		
Remote ON/OFF Control	-	A TTL compatible signal will turn ON/OFF all output modules (optional)		
Remote Sense	V	Compensates for total of 0.75V total line drop (optional on dual output modules)		
Isolation (3)	-	Input-Output 4.3kVDC(3); Input-Ground 2.3kVDC; Output-Ground 200VDC		
Conducted EMI	-	EN55022 Class B, (as per CISPR .22), Class A for 48V input		
Radiated EMI	-	EN55022 Class B, (as per CISPR .22)		
Operating Temperature	°C	0°C to 50°C, derate ea. output @ 2.5%/°C from 50°C to 65°C.(4) Consult factory for 70°C operation. -20°C startup requires a 30 min. warm-up period.		
Cooling	-	Forced Air Cooled		
Dynamic Load Response	- -	<6% or 300mV of set voltage for 50% load change (above 25% load), recovery to within 1% of nominal within 500 µs		
Regulatory Agency Compliance (601-1 not available on 48V input)	-	UL, CSA, EN, IEC60950-1, EN61010-1, UL, EN, IEC60601-1, CE Mark for LVD		
Vibration	G	MIL-STD-810E, Method 514.4,Pro I, Cat 1, 9 2G, 10-200Hz sweep for 1hr to search for resonant. 6G random, 6-Axis to IEC68-2-64		
Shock	G	MIL-STD-810F, Method 516.5, Pro I, IV, VI; 20G per IEC68-2-27		
Switching Frequency	kHz	200		
Weight (Typ.)	lbs	3.0 lbs. + 0.25 lbs. / used slot; maximum # of slots =5		
Size (L×W×H)	in(mm)	10.6" x 5" x 2.5" (268.4mm x 127mm x 63.5mm)		
Warranty	-	3 Years		

Consult datasheet and application notes for detailed specifications and test methods.
(1) Will operate with 130-330VDC (2) DC Input <44V input 370W (3) 4kVAC Type tested (non-production test) Refer to CB Report (4) 450WDC 1.5%/°C

TDK·Lambda

Vega Series

Configuring Guide

Choose your options for boxes A through E. Select output voltage, single or dual output module code from the tables below, and options (if required) A maximum of 5 module slots may be used. List actual output voltages required to have them pre-set by the factory.

V [A] [B] [C] [D] [E] Choose the following power supply options.

Primary Options
(Leave empty if not required)

F	AC Fail, Global/fan Inhibit, 5V/100mA standby
FV	AC Fail, Global/fan Inhibit, 5V/300mA standby
xFW[5]	AC Fail, Global/fan Inhibit, 5-15V/1A standby
E	AC Fail, Global/fan Enable, 5V/100mA standby
EV	AC Fail, Global/fan Enable, 5V/300mA standby
xEW[5]	AC Fail, Global/fan Enable, 5-15V/1A standby

(5) Specify value of x from 5-15V.
(Increase leakage current by 90µA.)

Input Filter Choice*

	120VAC, 60Hz	240VAC, 60Hz	264VAC, 63Hz(9)
S	564µA	1270µA	1.5mA
M	244µA	550µA	650µA
L	109µA	246µA	290µA
R	66µA	148µA	175µA
T	23µA	51µA	60µA

Input Connection

F	Fast on terminals (7)
S	Screw terminals
I	Switched IEC 320 Connector (7)

Cooling

F	Standard forward air fan
Q	Quiet fan, forward air (7)
R	Standard reverse air fan (6)
P	Quiet fan, reverse air (6) (7)
C**	Customer air (30 CFM req'd)

Output Power

0	450W DC Input
4	450W
6	650W
9	900W

* Max Leakage calculated at 264VAC, 63Hz. Note: Contact Lambda Technical Support for non-standard leakage options emissions compliance.
** Thermocoupled evaluation unit recommended. Consult sales office.
(6) Not available on 900W Model (7) Not available on 450WDC Model
(8) Only available on 900W Model (9) Type testing result

Call 1-800-LAMBDA-4 for additional technical support or visit us.tdk-lambda.com/lp/products/vega-series.htm

Single Output Module Selection †

Output Options
(Leave empty if not required)
Inhibit, module good, and current share: N

Output Connection
Fast on terminals: F
Screw terminals: S

Vout | Module | Conn. | Opt.

Example
12B3SN: 12V @ 12A single output module, screw terminal outputs, inhibit option

† Remote sense is standard on single output modules, optional on duals

Dual Output Module Selection

V1 / V2 | Module | Conn. | Opt.

Output Connection
Fast on terminals: F
Screw terminals: S

Output Options
Inhibit, module good, and remote sense: N
Remote sense: R
(Leave empty if not required)

Example
3.3/12H1L/3FR: 3.3V @ 12A and 12V @ 6A output, fast on output terminals and remote sense option.

Full Description Example:

V4FSSFV 5L1S 3.3E1SN 15/15H3/3SR

450W power supply with standard forward air fan, screw terminal input connections, 1.5mA leakage input filter, AC fail with Global/fan inhibit & 5V @ 300mA aux. supply option with the following outputs:

5V @ 35A	Screw terminal connections with remote sense standard
3.3V @ 60A	Screw terminal connection with output inhibit, module good, and current share options, remote sense standard
15V @ 10A	Screw terminal connection with remote sense option (1st half of dual)
15V @ 6A	Screw terminal connection with remote sense option (2nd half of dual)

Note the module descriptions are to be used as listed in the module tables.

Vega Output Modules

Module	V Range	Amp	Slots	Module	V Range	Amp	Slots
Single Output							
B1L	1.8-3.8V	20A	1	E4	14-19.9V	30A	2
C1	1.8-4.1V	35A	1	E3H	14-15V	36A	2
C1Y	1.8-4.1V	40A	1	C4	16.2-21.5V	14A	1
D1L	1.8-3.8V	50A	1.5	CC3	18.2-32.4V	18A	2
E1	1.8-3.8V	60A	2	E5L	20-24V	27A	2
F1[6]	1.8-3.8V	80A	2	B5	21.6-31V	6A	1
Z2	1.8-3.8V	95A	3	C5	21.6-31V	10A	1
Z3	1.8-3.8V	114A	4	D5	21-28V	15A	1.5
B1H	3.9-5.5V	20A	1	E5H	24-28V	25A	2
L1	4.2-5.5V	35A	1	Z19[8]	24-28V	36A	3.5
D2	3.8-9V	45A	1.5	HH5/3	25.3-44.2V	5A	1
D1H	3.9-5.5V	50A	1.5	DD4	28-43V	18A	3
E2	3.8-8V	60A	2	EE4[8]	28-38	22.5	4
Z18	4.2-5.5V	66A	2	HH5/4	32.5-53V	4.5A	1
F2[6]	3.8-8V	75A	2	BB4	32.6-43V	10A	2
Z4	3.9-5.5V	95A	3	EE5L[8]	40-48	18	4
Z6	3.9-5.5V	104A	3.5	C5B4	43-48V	10A	2
B2	5-9V	25A	1	EE5H[8]	48-56	18	4
B3	9.1-16.2V	12A	1	CC5	48.1-62V	10A	2
C3	9.1-16.2V	18A	1	DD5	42-56V	15A	3
D3	8-16.5V	24A	1.5				
E3L	8-13.9V	40A	2	**Wide Range Programmable***			
Z7	8-16.5V	45A	3	W2[6]	1-7.5V	30A	1
EE2	7.6-16V	45A	4	W5	0.5-32V	8.5A	1
D4	14-21.5V	18A	1.5	* Refer to Vega Datasheet			

Vega Output Modules

Module	V1 Min - V1 Max	V1 Amp	V2 Min - V2 Max	V2 Amp	Slots
Dual Output					
H1L/1L	1.8V - 3.8V	12A	1.8V - 3.8V	8A	1
H1L/1H	1.8V - 3.8V	12A	3.9V - 5.5V	8A	1
H1L/2	1.8V - 3.8V	12A	5.6V - 9V	6A	1
H1L/3	1.8V - 3.8V	12A	9.1V - 16.2V	6A	1
H1L/4	1.8V - 3.8V	12A	16.3V - 25V	4.5A	1
H1H/1L	3.9V - 5.5V	12A	1.8V - 3.8V	8A	1
H1H/1H	3.9V - 5.5V	12A	3.9V - 5.5V	8A	1
H1H/2	3.9V - 5.5V	12A	5.6V - 9V	6A	1
H1H/3	3.9V - 5.5V	12A	9.1V - 16.2V	6A	1
H1H/4	3.9V - 5.5V	12A	16.3V - 25V	4.5A	1
H2/1L	5.6V - 9V	10A	1.8V - 3.8V	8A	1
H2/1H	5.6V - 9V	10A	3.9V - 5.5V	8A	1
H2/2	5.6V - 9V	10A	5.6V - 9V	6A	1
H2/3	5.6V - 9V	10A	9.1V - 16.2V	6A	1
H2/4	5.6V - 9V	10A	16.3V - 25V	4.5A	1
H3/1L	9.1V - 16.2V	10A	1.8V - 3.8V	8A	1
H3/1H	9.1V - 16.2V	10A	3.9V - 5.5V	8A	1
H3/2	9.1V - 16.2V	10A	5.6V - 9V	6A	1
H3/3	9.1V - 16.2V	10A	9.1V - 16.2V	6A	1
H3/4	9.1V - 16.2V	10A	16.3V - 25V	4.5A	1
H5/1L	16.2V - 28V	5A	1.8V - 3.8V	8A	1
H5/1H	16.2V - 28V	5A	3.9V - 5.5V	8A	1
H5/2	16.2V - 28V	5A	5.6V - 9V	6A	1
H5/3	16.2V - 28V	5A	9.1V - 16.2V	6A	1
H5/4	16.2V - 28V	5A	16.3V - 25V	4.5A	1

TDK·Lambda

Vega-Lite

550 to 900W Multiple Output Modular Power Supply

RoHS

- Suitable for higher volume applications
- 1-10 Wide Range Outputs With Adjustment
- Output Voltages From 1.8 - 56V
- Medical Approval Options
- MIL-STD-810 Shock and Vibration

Features and Benefits

Feature	Benefit
◆ PFC compliant to EN61000-3-2	◆ Supports global use
◆ Wide Range Output Adjustment	◆ Capable of providing non-standard voltages, eliminating the need for custom models
◆ Safety Agency Approvals EN, cULus, BSI, CE	◆ Supports worldwide use, lowers risk to end user
◆ Flexibility with option choices	◆ Custom solutions available off the shelf

Specifications

ITEMS / MODELS			VEGA Lite 550	VEGA Lite 750
Input Voltage Range	(1)	-	85-264VAC 47-63Hz(2)	85-264VAC 47-63Hz(2)
Efficiency (Typ.)		%	75% at 230VAC and full load, configuration dependent	
Nominal Output Voltages		VDC	1.8 - 56V (See page 2)	
Output Voltage Adjustment		-	Wide range, via potentiometer or remote adjust pin, module dependent	
Minimum Load		A	0A	
Max Output Power	(3)	W	700 (3)	900 (3)
Max Ripple & Noise (pk-pk)		mV	<1% (or 50mV which ever is greater) using EIAJ test method & 20MHz bandwidth	
Regulation (load, line, cross)		%	Less than 0.5%	
Hold Up Time		ms	16ms min at 100VAC and full load	
Over Voltage Protection		%	120% - 150% (See website for more details)	
Overload/Short Circuit		%	105-125%, constant current characteristic, 150% max short circuit current	
Remote ON/OFF Control		-	A TTL compatible signal will turn ON/OFF all output modules (optional)	
Remote Sense		V	Compensates for total of 0.75 volts total line drop (optional on dual output modules)	
Isolation	(4)	-	Input-Output 4.3kVDC[4]; Input-Ground 2.3kVDC; Output-Ground 200VDC	
Conducted EMI		-	EN55022 Class B, (as per CISPR .22)	
Radiated EMI		-	EN55022 Class B, (as per CISPR .22)	
Operating Temperature		°C	0°C to 50°C, derate ea. output @ 2.5%/°C from 50°C to 65°C. Consult factory for 70°C operation. -20°C startup requires a 30 min. warm-up period.	
Cooling		-	Internal fan	
Dynamic Load Response		- -	<6% or 300mV of set voltage for 50% load change (above 25% load), recovery to within 1% of nominal within 500 microseconds.	
Regulatory Agency Compliance		-	UL, CSA, EN, IEC 60950-1, EN61010-1, UL2601-1, EN, IEC6060-1, CE Mark for LVD	
Vibration		G	MIL-STD-810E, Method 514.4,Pro I, Cat 1, 9 2G, 10-200Hz sweep for 1hr to search for resonant. 6G random, 6-Axis to IEC68-2-64	
Shock		G	MIL-STD-810F, Method 516.5, Pro I, IV, VI; 20G per IEC68-2-27	
Switching Frequency		kHz	200	
Weight (Typ.)		lbs	3.0 lbs. + 0.25 lbs. / used slot; maximum # of slots =5	
Size (L×W×H)		in(mm)	10.6" x 5" x 2.5" (268.4mm x 127mm x 63.5mm)	
Warranty		-	3 Years	

Consult datasheet and application notes for detailed specifications and test methods.

(1) 440Hz with reduced PFC, consult factory

(2) Will operate with 130-330VDC

(3) See input derating curves

(4) 4kVAC type tested (non-production test). Refer to CB report

TDK·Lambda

Vega-Lite

Configuring Guide

Choose your options for boxes A through C. Select output voltage, single or dual output module code from the tables below, and options (if required) A maximum of 5 module slots may be used. List actual output voltages required to have them pre-set by the factory.

V [ ] F S [ ] [ ] Choose the following power supply options.

A B C

Primary Options
(Leave empty if not required)

F	AC Fail, Global/fan Inhibit, 5V/100mA standby
E	AC Fail, Global/fan Enable, 5V/100mA standby

Input Filter Choice*

	120VAC, 60Hz	240VAC, 60Hz	264VAC, 63Hz(5)
S	564µA	1270µA	1.5mA
L	109µA	246µA	290µA

Output Power

5	550W
7	750W

* Max Leakage calculated at 264VAC, 63Hz. Note: Contact Lambda Technical Support for non-standard leakage options emissions compliance.
(5) Type testing result

Vega Output Modules

Module	V Range	Amp	Slots	Module	V Range	Amp	Slots
Single Output							
C1S	1.8-3.4V	35A	1	D4S	14-18V	18A	1.5
D1LS	1.8-3.4V	50A	1.5	E4S	14-19V	30A	2
E1S	1.8-3.4V	60A	2	C4S	16.3-18V	14A	1
L1S	4.2-5.1V	35A	1	C5S	21.6-30V	10A	1
D2S	3.8-7.5V	45A	1.5	D5S	21-28V	15A	1.5
D1HS	3.9-5.1V	50A	1.5	E5HS	24-28V	25A	2
E2S	3.8-7.5V	60A	2	HH5/4S	32.5-48V	4.5A	1
B2S	5-8V	25A	1	BB4S	32.6-40V	10A	2
C3S	9.1-15V	18A	1	C5B4S	43-48V	10A	2
D3S	8-15V	24A	1.5	DD5S	42-56V	15A	3
E3LS	8-12.5V	40A	2				

Vega Output Modules

Module	V1 Min - V1 Max	V1 Amp	V2 Min - V2 Max	V2 Amp	Slots
Dual Output					
H1H/1LS	3.9V - 5.1V	12A	1.8V - 3.4V	8A	1
H1H/3S	3.9V - 5.1V	12A	9.1V - 15.5V	6A	1
H3/1HS	9.1V - 15.5V	10A	3.9V - 5.1V	8A	1
H3/3S	9.1V - 15.5V	10A	9.1V - 15.5V	6A	1
H5/1HS	16.2V - 28V	5A	3.9V - 5.1V	8A	1
H5/3S	16.2V - 28V	5A	9.1V - 15.5V	6A	1
H5/4S	16.2V - 28V	5A	16.3V - 24V	4.5A	1

Call 1-800-LAMBDA-4 for additional technical support or visit us.tdk-lambda.com/lp/products/vega-series.htm

Single Output Module Selection †

Output Options
(Leave empty if not required)
Inhibit, module good, and current share: N

Vout [ ] Module [ ] S Opt. [ ]

Example
12C3SN: 12V @ 18A single output module, with inhibit, module good, and current share option.
† Remote sense is standard on single output modules, optional on duals.

Dual Output Module Selection

V1 [ ] / V2 [ ] Module [ ] S Opt. [ ]

Output Options
Inhibit, module good, and remote sense: N

(Leave empty if not required)

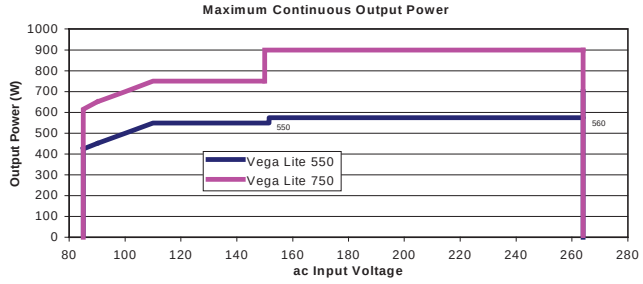
Example
12/12H3/3SN: 12V @ 10A and 12V @ 6A, dual output module with inhibit, module good, and remote sense option.

Full Description Example:

V5FSSF 5L1SN 12/12H3/3S 24C5S

550W power supply with standard forward air fan, screw terminal input connections, 1.5mA leakage input filter, AC fail with Global/fan inhibit & 5V @ 100mA aux. supply option with the following outputs:
5V @ 35A With O/P inhibit, module good & current share options
12V @ 10A
12V @ 6A
24V @ 10A
Note the module descriptions are to be used as listed in the module tables.

Derating Curve



3055 Del Sol Blvd • San Diego, CA 92154 • 1-800-526-2324
Revision A4: Jan 2010

TDK·Lambda

ZPSA20 Series

2 x 3.5" 20W AC-DC Power Supplies

- Wide Range AC Input
- Low profile, Industry Standard Footprint
- Global Safety Agency Compliance

RoHS

Key Market Segments & Applications

Video/Audio Routers
Datacom
Point of Sale
Test and Measurement

Features and Benefits

Feature	Benefit
◆ Industry standard footprint	◆ Availability to second source
◆ Wide Range AC Input	◆ Global Operation
◆ Class B conducted EMI	◆ Reduced system filtering required

Specifications

ITEMS		ZPSA20
Input Voltage range (1)	-	85 - 264VAC (47 - 440Hz) or 120 - 370VDC
Inrush Current	A	40A maximum at 240VAC input, 25°C ambient cold start
Input Current (115/230VAC)	A	0.25 / 0.12
Leakage Current	mA	0.6mA maximum (264VAC, 60Hz)
Hold Up Time (Typ)	ms	8ms at 115VAC input
Temperature Coefficient	-	±0.05%/°C
Voltage Accuracy	-	±1%
Adjustment Range	-	None
Minimum Load	A	None
Load Regulation	-	±1% (10 - 100% load change)
Line Regulation	-	±0.5% (100 - 240VAC line change)
Ripple & Noise (2)	mV	1% or 50mV whichever is greater
Short Circuit Protection	-	Continuous - hiccup mode
Overvoltage Protection	V	110 - 130% of nominal (Zener clamp)
Efficiency	%	82% typical
LED Indicator	-	Green LED = OK
Operating Temperature	-	0 to +70°C derate linearly to 37.5% load from 45 to 70°C
Storage Temperature	-	-20 to +85°C
Humidity (non condensing)	-	10 - 95% RH
Cooling	-	Convection
Withstand Voltage	-	Input to Ground 1.5kVAC, Input to Output 3kVAC, Output to Ground 500VAC for 1 min.
Isolation Resistance	-	>100M at 25C & 70%RH, Output to Ground 500VDC
Vibration (non operating)	-	23.52m/s^2 (10 - 55Hz: constant sweep 1 min X, Y, Z for 1 hour)
Shock	-	< 196.1 m/s^2 (20G)
Safety Agency Certification	-	UL60950-1, CSA60950-1 (cUL), EN60950-1, CE Mark
Conducted & Radiated EMI	-	EN55022-B, FCC Class B
Immunity	-	EN61000-4-2, -3, -4, -5, -6, -8
Weight (Typ)	g	100g
Size (WxLxH)	mm	2 x 3.5 x 0.79 (including underside components)
Warranty	yr	One Year

(1) Safety certified for 47 - 63Hz input only
(2) Measured with 0.1uF ceramic & 10uF electrolytic at 20MHz BW

TDK·Lambda

ZPSA20 Series

Model Selector

Model	Output (V)	Maximum Output (A)	Peak Load(A) (3)
ZPSA20-3R3	3.3	4.4	6.6
ZPSA20-5	5	4.4	6.6
ZPSA20-9	9	2.45	4.0
ZPSA20-12	12	1.8	2.7
ZPSA20-15	15	1.4	2.1
ZPSA20-24	24	0.92	1.4

(3) Average not to exceed max power, <30s, 10% duty cycle

Options

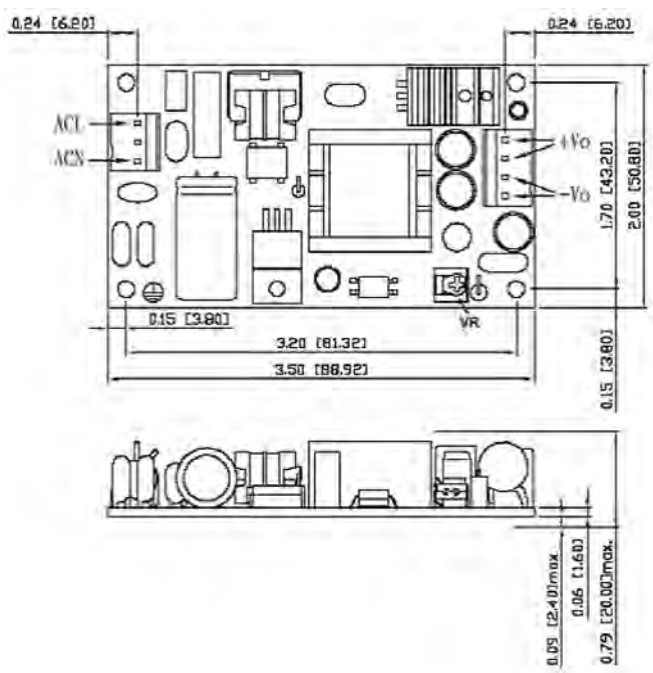
Suffix	Description
Blank	Molex connectors
/P	PCB mount pins

Other Industrial Products

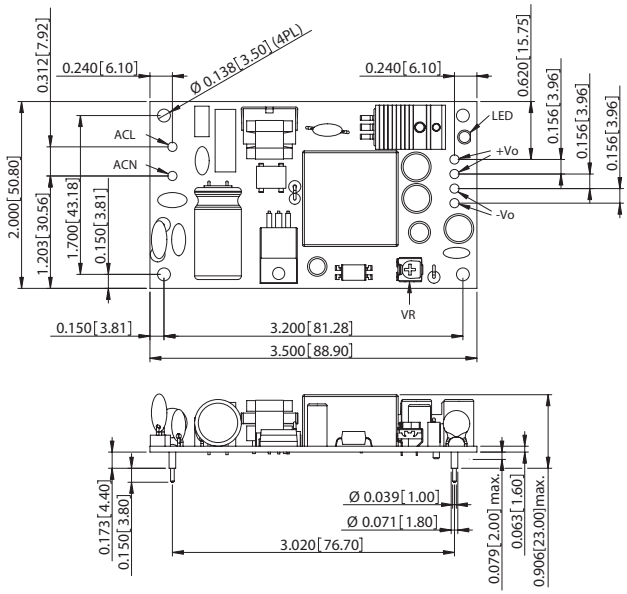
KPSA	5 - 15W pcb mount
KM	15 - 40W pcb mount medical
ZPSA/ZPD/ZPT	40 - 60W, single, dual and triple output
ZWS	5 - 240W single output

For Additional Information, please visit
us.tdk-lambda.com/lp/products/zpsa-series.htm

Outline Drawings (ZPSA20)



Outline Drawings (ZPSA20xx/P)



All Dimensions are in inches[mm]
Tolerances Inches X.XXX +/-0.02
Millimeters X.XX +/-0.5

3055 Del Sol Blvd • San Diego, CA 92154 • 1-800-526-2324

Revision A2: Oct 2008

TDK·Lambda

ZPSA40/60 Series

2 x 4" 40W to 60W AC-DC Power Supplies

RoHS

- Single Output
- Wide Range AC Input
- Low 1.07" profile
- Industry Standard Footprint
- Global Safety Agency Compliance

Key Market Segments & Applications

Computer Peripherals
Datacom
Point of Sale
Test and Measurement

Features and Benefits

Feature	Benefit
◆ Industry standard footprint	◆ Availability to second source
◆ Up to 88% efficiency	◆ Reduced system heating
◆ Broad product range	◆ Optimization of power supply to system
◆ Low Profile	◆ Less system space needed

Specifications

ITEMS		ZPSA40	ZPSA60
Input Voltage range		90 - 264VAC (47 - 440Hz) or 120 - 370VDC	
Inrush Current (115 / 230VAC)	A	25 / 50	
Input Current	A	< 1.2A	< 1.4A
Leakage Current	mA	0.8mA maximum (264VAC, 60Hz)	
Temperature Coefficient		±0.05%/°C	
Voltage Accuracy	%	±1%	
Minimum Load	-	None	
Load Regulation	%	±1%	
Line Regulation	%	±0.5%	
Ripple & Noise	mV	1% or 50mV whichever is greater	
Short Circuit Protection	-	Continuous - hiccup mode	
Overvoltage Protection	V	Typically 110-130% of nominal	
Hold Up Time (Typ)	ms	8ms at 115VAC input	
LED Indicator	-	Green LED = OK	
Operating Temperature	-	0 to +70°C derate according to charts on page 2	
Storage Temperature	°C	-20 to +85°C	
Humidity (non condensing)	-	10 - 95% RH	
Cooling	-	Convection	
Withstand Voltage	-	Input to Ground 1.5kVAC, Input to Output 3kVAC, Output to Ground 500VAC for 1 min.	
Isolation Resistance	-	>100M at 25C & 70%RH, Output to Ground 500VDC	
Vibration (non operating)		-23.52m/s^2 (10 - 55Hz: constant sweep 1 min X, Y, Z for 1 hour)	
Shock	-	< 196.1 m/s^2 (20G)	
Safety Agency Certification	-	UL60950-1, CSA60950-1, EN60950-1, CE Mark	
Conducted & Radiated EMI	-	EN55022-B, FCC Class B	
Immunity	-	EN61000-4-2, -3, -4, -5, -6, -8, -11	
Weight (Typ)	g	130	
Size (WxLxH)	in	2 x 4 x 1.07 (including underside components)	
Warranty	yrs	One Year	

TDK·Lambda

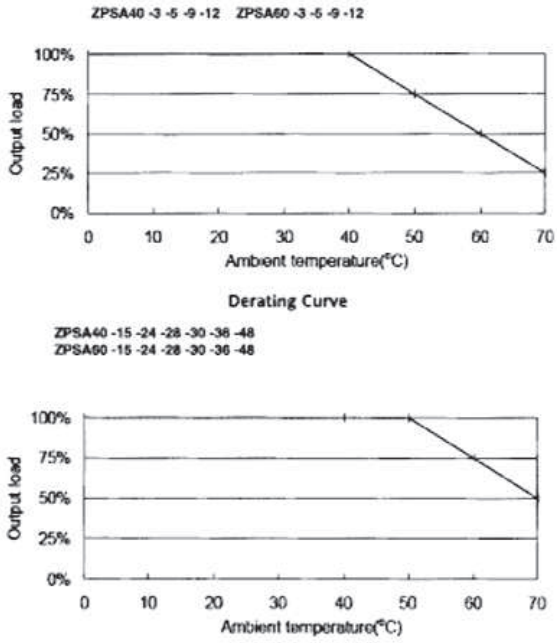
ZPSA40/60 Series

Model Selector

Model	Output (V)	Adjustment Range (V)	Maximum Output (A)	Peak Load (A)(4)	Output Power (W)	Efficiency (%)
ZPSA40-3R3	3.3	-	6.0	7.2	20	74
ZPSA60-3R3	3.3	-	8.0	8.5	26	74
ZPSA40-5	5	-	6.0	7.2	30	79
ZPSA60-5	5	-	8.0	9.0	40	79
ZPSA40-9	9	-	4.45	5.34	40	83
ZPSA60-9	9	-	6.67	8.0	60	83
ZPSA40-12	12	-	3.34	4.0	40	85
ZPSA60-12	12	-	5.0	6.0	60	85
ZPSA40-15	15	-	2.67	3.2	40	85
ZPSA60-15	15	-	4.0	4.8	60	85
ZPSA40-24	24	-	1.67	2.0	40	86
ZPSA60-24	24	-	2.5	3.0	60	86
ZPSA40-28	28	-	1.43	1.7	40	86
ZPSA60-28	28	-	2.14	2.6	60	86
ZPSA40-30	30	-	1.33	1.6	40	87
ZPSA60-30	30	-	2.0	2.4	60	87
ZPSA40-36	36	-	1.11	1.33	40	87
ZPSA60-36	36	-	1.67	2.0	60	87
ZPSA40-48	48	-	0.834	1.0	40	88
ZPSA60-48	48	-	1.25	1.5	60	88

(4) Average not to exceed max power, <30s, 10% duty cycle

Derating Curve



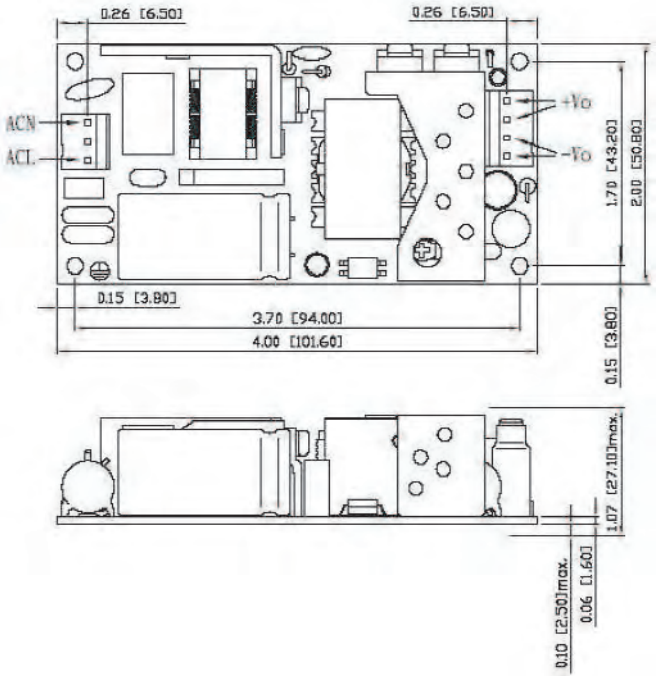
Other Industrial Products

SC40/60	40 to 80W, 3x5", 1 - 3 outputs
NV175	175W, 3x5", 1-5 outputs
ZWS	5 to 240W, single output
KPSA	5 to 15W, pcb mount
ZPD, ZPT	40W, 2x4" dual and triple outputs

For Additional Information, please visit
us.tdk-lambda.com/lp/products/zpsa-series.htm

Outline Drawings

All Dimensions are in inches[mm]
Tolerances : XX±.02[.XX±.5] unless otherwise noted



Options

Suffix	Description
Blank	Molex connectors
/P	PCB mount pins

3055 Del Sol Blvd • San Diego, CA 92154 • 1-800-526-2324

Revision A5: Jun 2011

TDK·Lambda

ZUP Series

Zero up programmable power supplies

- Constant Voltage / Constant Current
- Last Setting Memory
- Digital Meters
- Built-in RS232 & RS485 Interface w/ GPIB optional
- Bench or Rack Mount
- Embedded Microprocessor Controller
- Voltage up to 120V, Current up to 132A

RoHS

Specifications

ITEMS \ MODELS	Cond.	ZUP6	ZUP10	ZUP20	ZUP36	ZUP60	ZUP80	ZUP120
Load Regulation	CV	2mV + 0.005% over 0 - 100% load change						
Line Regulation	CV	1mV + 0.005% over 85 - 132 or 170 - 265VAC line change						
Recovery Time (1)	CV	1ms	0.5ms	0.2ms				
Temperature Coefficient	CV	30ppm/°C following 30 minute warm up						
Temperature Drift(2)	CV	0.01% + 2mV change in output						
Up programming response time	CV	50 - 60ms					80ms	120ms
Down prog. resp. time (CV)	Full	50ms (70ms ZUP60-14)						
Down prog. resp. time (CV)	Zero	250ms	350ms	400ms	500ms	750ms	600ms	800ms
Load Regulation	CC	0.01% + 5mA on 200W and 400W models, 0.07% + 10mA on 800W models						
Line Regulation	CC	0.01% + 2mA on 200W and 400W models, 0.01% + 5mA on 800W models						
Temperature Coefficient	CC	100ppm/°C from rated current after 30 minute warm up time						
Temperature Drift(2)	CC	0.02% + 5mA, 200W and 400W models, 0.05% + 10mA 800W models						
Prog Voltage resolution	-	Better than 0.028% of rated voltage						
Prog Voltage accuracy	-	.02%+5mV	.02%+8mV	.02%+12mV	.02%+20mV	.02%+35mV	.02%+50mV	.02%+70mV
Prog Current resolution	-	Better than 0.03% of rated voltage						
Prog Current accuracy	-	0.4% + 40mA						
Overvoltage Shutdown	V	0 - 7.5	0 - 13	0 - 24	0 - 40	0 - 66	0 - 88	0 - 132
Thermal Protection	-	Over temperature protected						
Display - Voltage	-	3 digits (6, 20, 36, 60, 80V models), 3.5 digits (10, 120V models). Accuracy 0.2% ± 2 digits						
Display - Current	-	3 digits, (3.5 digits 132A model). Accuracy 0.5% ± 3 digits						
Display - Status	-	CV / CC, Alarm, Foldback, Local/Remote, On/Off						
Remote On/Off	-	TTL signal or dry contact relay						
Output Good	-	Open Collector						
Voltage & Current Programming	-	By either Voltage (0-4V) or Resistance (0-4k)						
Remote Sense	-	Up to 0.5V compensation per output cable						
Communication Interface	-	RS232 & RS485 standard, IEEE488 optional						
Series & Parallel Operation	-	Series: Up to two units; Parallel: Up to five units in master-slave configuration						
AC Input Voltage range	-	85-265VAC (47-63Hz)						
Inrush Current (100/200VAC) (3)	-	15/30A, 200W models, 15A, 400W models, 30A, 800W models						
Hold Up Time (Typ) at 100VAC	ms	20						
Power Factor Correction	-	Complies with EN61000-3 Class A (0.99 typ)						
Temperature Range	-	Operating: 0 - 50°C; Storage: -20 to +70°C						
Humidity (non condensing)	-	Operating: 30 - 90% RH, Storage 10 - 95%RH						
Cooling	-	Internal fan						
Withstand Voltage	-	Input to Ground 2kVAC, Input to Output 3kVAC, Output to Ground 500VAC for 1 min.						
Isolation Resistance	-	>100M at 25°C & 70%RH						
Vibration & Shock (non-op.)	-	Vibration:10-55Hz(1 min.) 2G constant X, Y, Z, when correctly mounted; Shock: <20G						
Safety Agency Approvals	-	UL3111-1, EN61010-1, CE Mark						
Conducted & Radiated EMI	-	EN55022-B conducted, A radiated, FCC Class B conducted, A radiated, VCCI-2 conducted, -1 radiated						
Warranty	-	Three Years						

Notes:
(1) Recovery to within +/-50mV after load change of 50-100%
(2) Over 8 hour period following 30 minute warm up time
(3) 25°C ambient (cold start)

TDK·Lambda

ZUP Series

Model Selector

Model	Voltage Adjust Range	Current Adjust Range	Max Power	Ripple 5Hz-1MHz mV	Noise 20MHz BW mV	Ripple 5Hz-1MHz mA	Efficiency % (100/200VAC)	Weight kg
ZUP6-33/U	0-6V	0-33	198	5	50	50	69 / 72	2.9
ZUP6-66/U	0-6V	0-66	396	5	50	100	74 / 77	3.2
ZUP6-132/U	0-6V	0-132	792	8	100	200	74 / 77	5.8
ZUP10-20/U	0-10	0-20	200	5	50	25	73 / 77	2.9
ZUP10-40/U	0-10	0-40	400	5	50	50	79 / 82	3.2
ZUP10-80/U	0-10	0-80	800	8	90	100	77 / 81	5.8
ZUP20-10/U	0-20	0-10	200	5	50	15	74 / 78	2.9
ZUP20-20/U	0-20	0-20	400	5	50	30	79 / 83	3.2
ZUP20-40/U	0-20	0-40	800	5	80	60	79 / 82	5.8
ZUP36-6/U	0-36	0-6	216	5	50	7.5	76 / 80	2.9
ZUP36-12/U	0-36	0-12	432	5	50	15	80 / 84	3.2
ZUP36-24/U	0-36	0-24	864	5	70	30	80 / 84	5.8
ZUP60-3.5/U	0-60	0-3.5	210	5	50	5	75 / 79	2.9
ZUP60-7/U	0-60	0-7	420	5	50	10	80 / 84	3.2
ZUP60-14/U	0-60	0-14	840	5	60	20	80 / 84	5.8
ZUP80-2.5/U	0-80	0-2.5	200	30	80	5	77 / 82	2.9
ZUP80-5/U	0-80	0-5	400	30	80	10	83 / 87	3.2
ZUP120-1.8/U	0-120	0-1.8	216	30	80	5	77 / 82	2.9
ZUP120-3.6/U	0-120	0-3.6	432	30	80	10	83 / 87	3.2

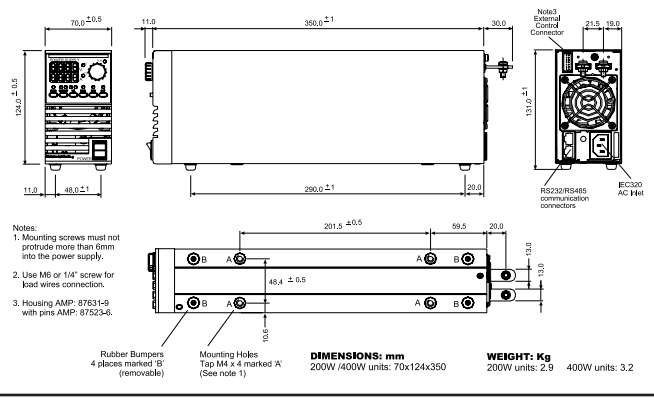
Options & Accessories

Option	Model Suffix	Part Number
Front panel terminals (20A max)[5]	/L[4]	ZUP200/400/L[4]
Front panel terminals (20A max)[6]	/L[4]	ZUP800/L[4]
IEC320 cable USA plug	/U	ZUP/U
Serial link cable RJ-45	/W	ZUP/W
GPIB Controller		GP485A*
Dual Unit Assembly (accepts 200W or 400W models)		NL200*
19" 3U rack (accepts up to 6 200/400W models)		NL100*
Blanking panels for NL100 (19 in. rack)		NL101*
RS232 Communications Cable DB-9		ZUP/NC401
RS232 Communications Cable DB-25		ZUP/NC403
RS485 Communications Cable DB-9		ZUP/NC402
RS485 Communications Cable DB-25		ZUP/NC404
User Manual		NL102

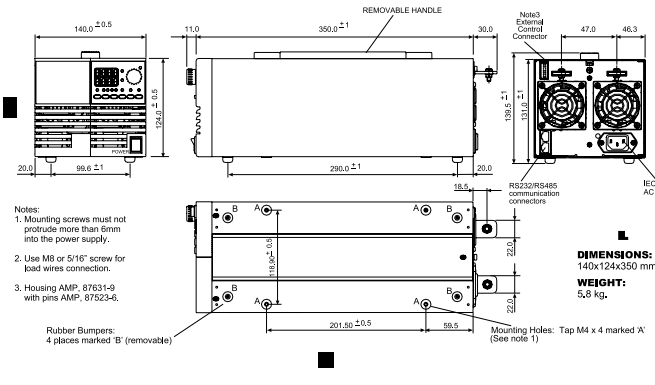
* (See website for more details)
[4] Not available with ZUP80 or ZUP120 models.
[5] 200W and 400W models
[6] 800W models

For Additional Information, please visit
us.tdk-lambda.com/lp/products/zup.htm

Outline Drawing 200/400W



Outline Drawing 800W



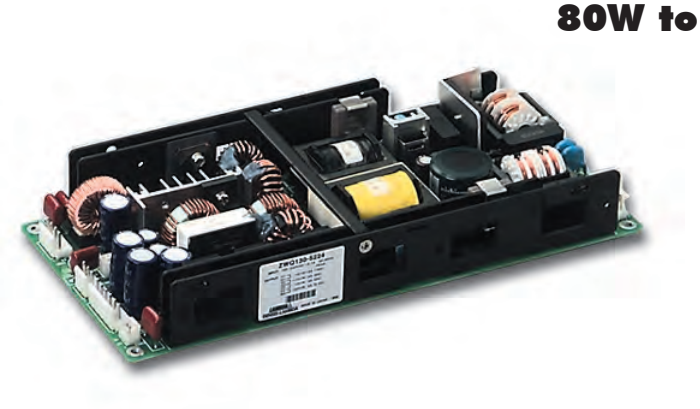
3055 Del Sol Blvd • San Diego, CA 92154 • 1-800-526-2324

Revision A5: Nov 2007

TDK·Lambda

ZWQ Series

80W to 170W Quad Output Power Supplies



- Universal Input (85 - 265VAC)
- Power Factor Corrected
- Floating Adjustable Fourth Output
- Low Profile <1U High

RoHS

Key Market Segments & Applications

Factory Automation
Test & Measurement
Light Industrial Equipment

Features and Benefits

Feature	Benefit
◆ Low Profile	◆ Fits in 1U Enclosures
◆ Adjustable Main and Fourth Output	◆ System Optimization
◆ Power Factor Corrected	◆ Supports Global Use
◆ Floating Fourth Output	◆ Can Use as Positive or Negative Output

Specifications

Items \ Models			ZWQ80 -5222	ZWQ80 -5223	ZWQ80 -5224	ZWQ80 -5225	ZWQ130 -5222	ZWQ130 -5223	ZWQ130 -5224	ZWQ130 -5225
Input Voltage		-	85-265VAC (47-63Hz), 120-370VDC							
Input Current	(1)	A	1.6 / 0.8				2.6 / 1.3			
Inrush Current	(1)	A	14/28							
Power Factor		-	Meets EN61000-3-2							
Temperature Coefficient		-	<0.02%/°C							
Max Output Power (convection)		W	80				130			
Max Output Power (forced air)		W	104	88.7	104	104	170	149.6	170	170
Overpower Protection	(2)	W	>109	>93	>109	>109	>173	>152	>173	>173
Minimum Load		A	V1: 0.9A Conv, 1.4A Forced Air				V1: 1.5A Conv, 2.1A Forced Air			
Output Voltage Accuracy		%	±5% for outputs V2 and V3							
Efficiency (Typ)		%	72							
Hold Up Time	(1)	ms	20							
Leakage Current		-	0.75mA max, 0.2mA (Typ) at 100VAC / 0.44mA(Typ) at 230VAC							
Remote On / Off		-	See installation manual (Not available with /A cover option)							
Oper Temp (convection cooled)		-	-10°C to 60°C, derate linearly to 50% load from 40°C to 60°C. (3)							
Oper Temp (forced air cooled)		-	-10°C to 70°C, derate linearly to 50% load from 50°C to 70°C. (>30cfm airflow)(3)							
Storage Temperature		-	-30° to +85°C							
Humidity (non condensing)		-	Operating: 30 - 90% RH; Non-operating 10-95% RH							
Withstand Voltage			I/P~Grnd 2kVAC (20mA), I/P~O/P 3kVAC (20mA), O/P~Grnd 500VAC (100mA) for 1 min.							
Isolation Resistance		-	>100M at 25°C & 70%RH, Output to Ground 500VDC							
Vibration (non operating)		-	10 - 55Hz (1 minute sweep), 19.6m/s² constant X, Y, Z 1 hour							
Shock		-	< 196.1 m/s²							
Safety Agency Approvals		-	UL60950-1, CSA60950-1, EN60950-1, CE Mark, EN50178							
Conducted & Radiated EMI		-	EN55011, EN55022-B, FCC Class B, VCCI-B							
Immunity		-	EN61000-4-2,-3,-4,-5,-6,-8,-11							
Weight (Typ)		g	550				730			
Size (W x H x D)		mm	93.5 x 35 x 210 (refer to outline drawing)				106 x 35 x 225 (refer to outline drawing)			
Warranty		yrs	One Year							

(1) 100/200VAC
(2) Avoid prolong operation in overload
(3) /A version - additional derating, see installation manual

ZWQ Series

Model Selector

Model	Output	Voltage (V)	Voltage Adjust Range (V)	Convect. (A)	Peak or Forced Air (A)(4)	Max Load Reg (mV)	Max Line Reg (mV)	Ripple Noise (mV)	OVP (V)(5)
ZWQ80-5222	V1	5	5.0-5.25	8.0	10.0	100	20	120	5.7-7.0
	V2	+12/15*	+12/+15	2.0	2.5	300	48	150	16.5-22.5
	V3	-12/15*	-12/-15	2.0	2.5	300	48	150	16.5-22.5
	V4	12	11.4-12.6	3.0	4.0	300	48	150	13.8-16.2
ZWQ80-5223	V1	5	5.0-5.25	8.0	10.0	100	20	120	5.7-7.0
	V2	+12/15*	+12/+15	2.0	2.5	300	48	150	16.5-22.5
	V3	-12/15*	-12/-15	2.0	2.5	300	48	150	16.5-22.5
	V4	3.3	2.0-3.63	7.0	9.0	100	20	120	3.79-4.95
ZWQ80-5224	V1	5	5.0-5.25	8.0	10.0	100	20	120	5.7-7.0
	V2	+12/15*	+12/+15	2.0	2.5	300	48	150	16.5-22.5
	V3	-12/15*	-12/-15	2.0	2.5	300	48	150	16.5-22.5
	V4	24	22.8-25.2	1.5	2.0	400	96	200	27.6-32.4
ZWQ80-5225	V1	5	5.0-5.25	8.0	10.0	100	20	120	5.7-7.0
	V2	+12/15*	+12/+15	2.0	2.5	300	48	150	16.5-22.5
	V3	-12/15*	-12/-15	2.0	2.5	300	48	150	16.5-22.5
	V4	5	2.0-5.25	7.0	9.0	100	20	120	5.7-7.0
ZWQ130-5222	V1	5	5.0-5.25	15.0	19.0	100	20	120	5.7-7.0
	V2	+12/15*	+12/+15	4.0	5.0	300	48	150	16.5-22.5
	V3	-12/15*	-12/-15	4.0	5.0	300	48	150	16.5-22.5
	V4	12	11.4-12.6	4.0	5.0	300	48	150	11.4-12.6
ZWQ130-5223	V1	5	5.0-5.25	15.0	19.0	100	20	120	5.7-7.0
	V2	+12/15*	+12/+15	4.0	5.0	300	48	150	16.5-22.5
	V3	-12/15*	-12/-15	4.0	5.0	300	48	150	16.5-22.5
	V4	3.3	2.0-3.63	10.0	12.0	100	20	120	3.79-4.95
ZWQ130-5224	V1	5	5.0-5.25	15.0	19.0	100	20	120	5.7-7.0
	V2	+12/15*	+12/+15	4.0	5.0	300	48	150	16.5-22.5
	V3	-12/15*	-12/-15	4.0	5.0	300	48	150	16.5-22.5
	V4	24	22.8-25.2	2.0	2.5	400	96	200	27.6-32.4
ZWQ130-5225	V1	5	5.0-5.25	15.0	19.0	100	20	120	5.7-7.0
	V2	+12/15*	+12/+15	4.0	5.0	300	48	150	16.5-22.5
	V3	-12/15*	-12/-15	4.0	5.0	300	48	150	16.5-22.5
	V4	5	2.0-5.25	10.0	12.0	100	20	120	5.7-7.0

* User selectable via connector or PCB. Outputs are floating from V1 & V4. Can be connected in series for 24/30V.

Other Industrial Products

ZWS/ZWD	5W to 480W Single and dual output
SC	30W to 120W Single, dual, & triple output
NV	175 to 700W Single and multiple output
HWS	15 to 1500W Single output

Options

Suffix	Description
blank	No cover or L Bracket
/L	L Bracket
/A	Cover and L Bracket

4 The peak current draw must not exceed a 10 sec. duration with a duty cycle of 35%.
5 An overvoltage condition on any output will shut down all outputs, the power supply must be re-set by cycling the AC input.

For Additional Information, please visit
us.tdk-lambda.com/lp/products/zwq-series.htm

3055 Del Sol Blvd • San Diego, CA 92154 • 1-800-526-2324
Revision A3: Oct 2007

TDK·Lambda

ZWS Series

Single Output, High Reliability

- Universal Input (85 - 265VAC)
- Input transient protected
- 2 year warranty
- High quality design
- Peak Power capability

RoHS

Key Market Segments & Applications

Factory Automation	Process Control, NC-Machining, Automotive, Packaging Equipment, Materials Handling, Chemical Processing, Robots
Test & Measurement	Burn-in & Test, Automated Test, Instrumentation, Measurement, Detection
Light Industrial	Gaming, Vending, Printers

Features and Benefits

Feature	Benefit
◆ Input Transient Protected	◆ Withstands harsh environments
◆ 2 Year Warranty	◆ Lower Cost of Ownership
◆ Peak Power capability	◆ Can drive high current start up devices

Specifications

ITEMS \ MODELS		ZWS5 ZWS10	ZWS15 ZWS30	ZWS50
AC Input Voltage range	-	85-265VAC (47-440Hz)		
DC Input Voltage range	-	110 - 330VDC		
Inrush Current (100/200VAC) (1)	A	15 / 30		
Temperature Coefficient	-	<0.02%/°C		
Overcurrent Protection (2)	-	~125%		
Overvoltage Protection	V	~140% diode clamp		~115 - 130%, manual reset
Hold Up Time (Typ) @ 100VAC	ms	17		
Remote Sense	-	None		
Operating Temperature	-	(open frame) -10°C~+60°C, derate linearly to 70% load from 50°C~60°C		
Operating Temperature	-	(with cover) Additional derating applies, please consult Installation Manual		
Storage Temperature	-	-30 to +85°C		
Humidity (non condensing)	-	10 - 95% RH		
Cooling	-	Convection		
Withstand Voltage	-	Input to Ground 2kVAC (20mA), Input to Output 3kVAC (20mA), Output to Ground 500VAC (100mA) for 1 min.		
Isolation Resistance	-	>100M at 25C & 70%RH, Output to Ground 500VDC		
Vibration (non operating)	-	10 - 55Hz (1 minute sweep), 19.6m/s² constant X, Y, Z 1 hour		
Shock	-	< 196.1 m/s²		
Safety Agency Approvals	-	UL60950-1, CSA60950-1, EN60950-1, CE Mark		
Conducted & Radiated	EM	EN55022-B, FCC Class B, VCCI-B		
Recommended EMI Filter	-	RSEL-20R5W	RSEL-2001W RSEL-2002W	RSEL-2002W
Weight (Typ)	g	120/120	140/270	370
Size (WxHxD)	mm	See Outline Drawings		
Warranty	-	2 years		

Notes:
(1) 25C ambient (cold start)
(2) Avoid prolonged operartion in overload

TDK·Lambda

ZWS Series

Output Ratings

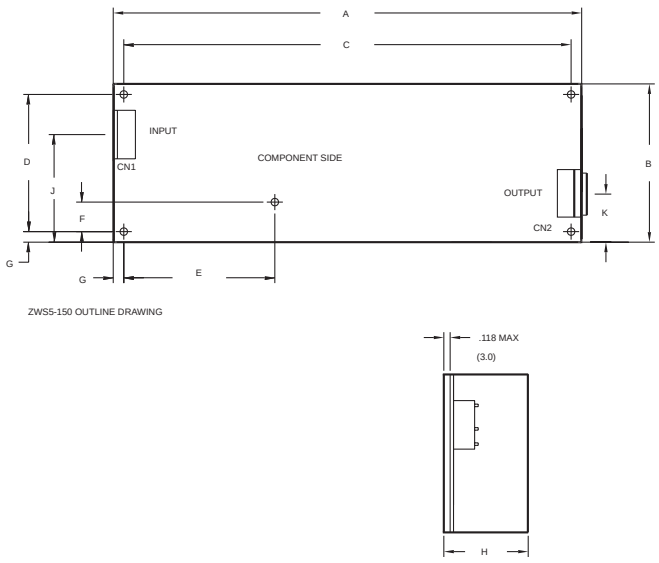
Model	Voltage	Adjust Range	Max Curr. A	Peak Curr. A	Load Reg mV	Line Reg mV	Ripple Noise mV	Eff. %
ZWS5-3	3.3V	2.97-3.63	1	1.2	40	20	120	62
ZWS10-3	3.3V	2.97-3.63	2	2.4	40	20	120	62
ZWS15-3	3.3V	2.97-3.63	3	3.6	40	20	120	63
ZWS30-3	3.3V	2.97-3.63	6	7.2	40	20	120	70
ZWS50-3	3.3V	2.97-3.63	10	12	40	20	120	73
ZWS5-5	5V	4.5-5.5	1	1.2	40	20	120	67
ZWS10-5	5V	4.5-5.5	2	2.4	40	20	120	70
ZWS15-5	5V	4.5-5.5	3	3.6	40	20	120	71
ZWS30-5	5V	4.5-5.5	6	7.2	40	20	120	75
ZWS50-5	5V	4.5-5.5	10	12	40	20	120	77
ZWS5-12	12V	10.8-13.2	0.42	0.51	96	48	150	68
ZWS10-12	12V	10.8-13.2	0.85	1.02	96	48	150	70
ZWS15-12	12V	10.8-13.2	1.25	1.5	96	48	150	71
ZWS30-12	12V	10.8-13.2	2.5	3	96	48	150	77
ZWS50-12	12V	10.8-13.2	4.3	5.16	96	48	150	80
ZWS5-15	15V	13.5-16.5	0.34	0.41	120	60	150	68
ZWS10-15	15V	13.5-16.5	0.7	0.84	120	60	150	71
ZWS15-15	15V	13.5-16.5	1	1.2	120	60	150	71
ZWS30-15	15V	13.5-16.5	2	2.4	120	60	150	77
ZWS50-15	15V	13.5-16.5	3.5	4.2	120	60	150	81
ZWS5-24	24V	21.6-26.4	0.22	0.27	150	96	200	70
ZWS10-24	24V	21.6-26.4	0.45	0.54	150	96	200	71
ZWS15-24	24V	21.6-26.4	0.65	0.78	150	96	200	71
ZWS30-24	24V	21.6-26.4	1.3	1.56	150	96	200	78
ZWS50-24	24V	21.6-26.4	2.1	2.52	150	96	200	82
ZWS30-36	36V	32.4-39.6	0.9	1.08	240	144	300	78
ZWS50-36	36V	32.4-39.6	1.4	1.68	240	144	300	82
ZWS30-48	48V	43.2-52.8	0.7	0.84	300	192	400	78
ZWS50-48	48V	43.2-52.8	1.1	1.32	300	192	400	82

Note for Peak Current: For 10s maximum, 35% duty cycle, average power not to exceed maximum ratings.

Options

Suffix	Description
-	Molex Terminals
/A	Cover option
/J	JST Connectors*
/JA	JST Connectors & Cover
Note:	* Recommended for new designs

ZWS Outline Drawing



DIMENSIONS:

MODEL	A	B	C	D	E	F	G	H	J	K	L
ZWS5	3.86 (98.0)	1.77 (44.9)	3.580 (90.9)	1.500 (38.1)	-	-	.14 (3.5)	.83 (21.0)	1.05 (26.6)	.54 (13.7)	-
ZWS10	4.14 (105.1)	1.97 (50.0)	3.860 (98.0)	1.690 (42.9)	-	-	.14 (3.5)	.83 (21.0)	.99 (25.1)	.67 (18.4)	-
ZWS15	4.93 (125.2)	1.97 (50.0)	4.650 (118.1)	1.690 (42.9)	-	-	.14 (3.5)	.83 (21.0)	1.04 (25.0)	.57 (14.4)	-
ZWS30	5.24 (133.0)	2.17 (55.1)	4.850 (123.1)	1.770 (45.0)	-	-	.20 (5.0)	1.02 (25.9)	.20 (31.0)	1.16 (40.2)	-
ZWS50	7.68 (195.0)	2.17 (55.1)	7.290 (185.1)	1.770 (45.0)	-	-	.20 (5.0)	1.02 (25.9)	1.32 (33.5)	.72 (18.2)	-

Other Industrial Products

ZWS-AF	50W to 150W Active PFC
ZWD/ZWQ	100W to 440W Single & multiple output
SC	30W to 120W Single, dual, & triple output
HWS	15W to 1800W Single output enclosed

For Additional Information, please visit
us.tdk-lambda.com/lp/products/zws-series.htm

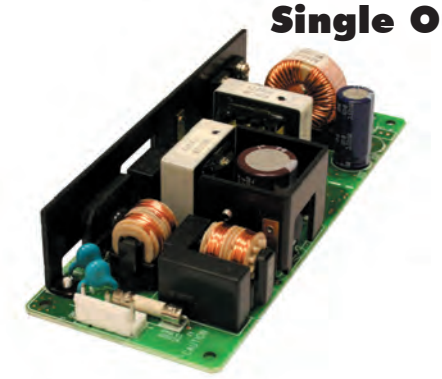
3055 Del Sol Blvd • San Diego, CA 92154 • 1-800-526-2324

Revision A8: Jun 2011

TDK·Lambda

ZWSBAF Series

Single Output, High Reliability AC-DC Power Supplies



- Universal Input (85 - 265VAC)
- Power factor Corrected
- Convection Cooled
- 5 year warranty
- Compact Design

RoHS

Key Market Segments & Applications

Factory Automation
Test & Measurement
Light Industrial Equipment

Features and Benefits

Feature	Benefit
◆ Convection Cooled	◆ Better Field Reliability
◆ 5 Year Warranty	◆ Lower Cost of Ownership
◆ Power Factor Corrected	◆ Supports Global Use

Specifications

ITEMS \ MODELS		ZWS50BAF	ZWS75BAF	ZWS100BAF	ZWS150BAF
AC Input Voltage range	-	85-265VAC (47-63Hz)			
DC Input Voltage range	-	120 - 370VDC			
Input Current (Typical)	A	0.65 / 0.35	0.95 / 0.5	1.3 / 0.65	1.9 / 0.95
Inrush Current	A	14 / 28 25°C ambient, cold start			
Power Factor (Active)	-	Meets EN61000-3-2 (Typically 0.97/0.91)			
Maximum Ripple and Noise	mV	3.3 & 5V: 120mV, 12 to 24V: 150mV, 48V: 200mV			
Temperature Coefficient	-	<0.02%/°C			
Overcurrent Protection (1)	-	>105% of maximum output current			
Hold Up Time (Typ) at 100VAC	ms	20ms			
Leakage Current	-	0.5mA max, 0.4mA typ at 230VAC			
Remote On / Off	-	None		Optional	
Operating Temperature (Convection)	-	-10 to +70°C, derate linearly to 50% load from 50 to 70°C			
Operating Temperature (Forced Air)	-	N/A		-10 ~+70°C, derate linearly to 75% load from 60 ~70°C	
Storage Temperature	°C	-30 to +75°C			
Humidity (non condensing)	-	Operating: 30 - 90%RH, storage: 10 - 90%RH			
Withstand Voltage	-	I/P to Grnd 2kVAC (10mA), I/P to O/P 3kVAC (10mA), O/P to Grnd 500VAC (20mA) for 1 min.			
Isolation Resistance	-	>100M at 25C & 70%RH, Output to Ground 500VDC			
Vibration (non operating)	-	10 - 55Hz (1 minute sweep), 19.6m/s^2 constant X, Y, Z 1 hour			
Shock	-	< 196.1 m/s^2			
Safety Agency Certifications	-	UL60950-1, CSA60950-1, EN60950-1, EN50178 (OV II), CE Mark			
Conducted & Radiated EMI	-	EN55011/EN55022-B, FCC-B, VCCI-B			
Immunity	-	IEC61000-4-2 (lv 2,3), -3 (lv3), -4 (lv 3), -5 (lv 3,4), -6 (lv 3), -8 (lv 4), -11			
Weight (Typ)	g	165	230	290	390
Size (W x H x D)	in	1.97 x 1.02 x 5.2"	1.97 x 1.3 x 5.9"	2.44 x 1.3 x 6.1"	2.95 x 1.66 x 6.3"
Warranty	yrs	Five Years			

Notes:
(1) Avoid prolonged operartion in overload
(2) 100 / 200VAC Input
(3) 60°C: 70% load

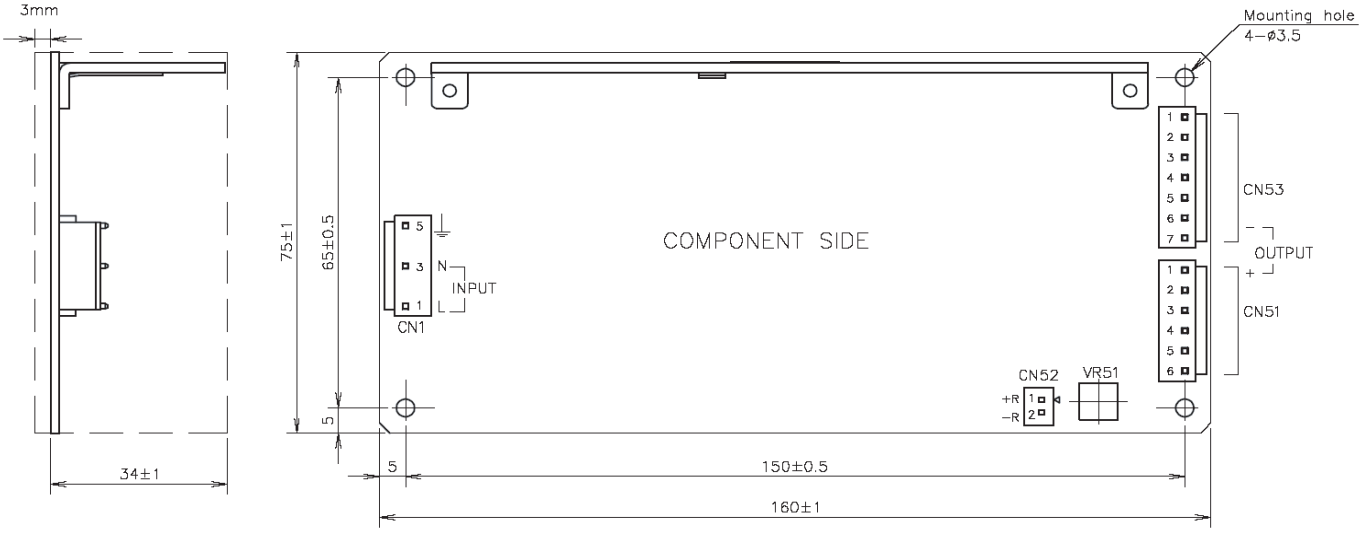
TDK·Lambda

ZWSBAF Series

Model Selector

Model	Voltage	Adjust Range	Max Current	Efficiency (typ) %	Load Reg (mV)	Line Reg (mV)	OVP (V)
ZWS50BAF-3	3.3V	2.97-3.63V	10A	76 / 78	40	20	3.79-4.95
ZWS75BAF-3	3.3V	2.97-3.63V	15A	76 / 78	40	20	3.79-4.95
ZWS100BAF-3	3.3V	2.97-3.63V	20A	82 / 84	40	20	3.79-4.95
ZWS150BAF-3	3.3V	2.97-3.63V	30A	82 / 84	40	20	3.79-4.95
ZWS50BAF-5	5V	4.5-5.5V	10A	82 / 84	40	20	5.75-7.0
ZWS75BAF-5	5V	4.5-5.5V	15A	82 / 84	40	20	5.75-7.0
ZWS100BAF-5	5V	4.5-5.5V	20A	84 / 86	40	20	5.75-7.0
ZWS150BAF-5	5V	4.5-5.5V	30A	85 / 87	40	20	5.75-7.0
ZWS50BAF-12	12V	10.8-13.2V	4.3A	83 / 85	96	48	13.8-16.2
ZWS75BAF-12	12V	10.8-13.2V	6.3A	83 / 85	96	48	13.8-16.2
ZWS100BAF-12	12V	10.8-13.2V	8.5A	86 / 88	96	48	13.8-16.2
ZWS150BAF-12	12V	10.8-13.2V	12.5A	85 / 88	96	48	13.8-16.2
ZWS50BAF-15	15V	13.5-16.5V	3.5A	83 / 86	120	60	17.3-20.3
ZWS75BAF-15	15V	13.5-16.5V	5A	84 / 86	120	60	17.3-20.3
ZWS100BAF-15	15V	13.5-16.5V	6.7A	86 / 88	120	60	17.3-20.3
ZWS150BAF-15	15V	13.5-16.5V	10A	86 / 89	120	60	17.3-20.3
ZWS50BAF-24	24V	21.6-26.4V	2.1A	84 / 87	150	96	27.6-32.4
ZWS75BAF-24	24V	21.6-26.4V	3.2A	84 / 87	150	96	27.6-32.4
ZWS100BAF-24	24V	21.6-26.4V	4.3A	87 / 89	150	96	27.6-32.4
ZWS150BAF-24	24V	21.6-26.4V	6.3A	88 / 90	150	96	27.6-32.4
ZWS50BAF-48	48V	39.5-52.8V	1.1A	84 / 86	240	192	55.2-64.8
ZWS75BAF-48	48V	39.5-52.8V	1.6A	85 / 88	240	192	55.2-64.8
ZWS100BAF-48	48V	39.5-52.8V	2.1A	88 / 90	240	192	55.2-64.8
ZWS150BAF-48	48V	39.5-52.8V	3.2A	89 / 91	240	192	55.2-64.8

Outline Drawing ZWS150BAF



Other Industrial Products

HWS	15W to 1800W Single output
ZPSA	20W to 60W Single, Dual & Triple output
NV	175W to 300W Single, Dual, Triple & Quad output
CSS	40W to 150W Single output

For Additional Information, please visit
us.tdk-lambda.com/lp/products/zws-series.htm

Options

Suffix	Description	Notes
-	Open Frame	-
/L	With L bracket case	-
/A	With L bracket & Cover	-
/R	Remote On/Off	Not on ZWS50 or 75BAF
/CO2	Conformal Coating	-

3055 Del Sol Blvd • San Diego, CA 92154 • 1-800-526-2324

Revision A2: Jan 2011

TDK·Lambda

ZWS-PAF Series

150W to 480W Single Output Power Supplies

- Universal Input (85 - 265VAC)
- Power factor Corrected
- 200% Peak Power capability
- 2 year warranty
- Less than 0.5mA earth leakage current

RoHS

Key Market Segments & Applications

Factory Automation
Test & Measurement
Light Industrial Equipment

Features and Benefits

Feature	Benefit
◆ Input Transient Protected	◆ Withstands harsh environments
◆ Power Factor Corrected	◆ Supports Global Use
◆ 200% Peak Power capability	◆ Can drive high current start up or pulse loads

Specifications

ITEMS \ MODELS			ZWS150PAF	ZWS240PAF
Input Voltage			85-265VAC (47-63Hz), 120-370VDC	
Input Current (Forced air)	(1)	A	2.8/1.4	4.0/2.0
Inrush Current	(1,2)	A	14 / 28	
Power Factor			0.99 at 100VAC, 0.95 at 200VAC, Meets EN61000-3-2	
Leakage Current		mA	0.5mA Max. Typically 0.1mA (100VAC), 0.22mA (230VAC)	
Temperature Coefficient			<0.02%/°C	
Overcurrent Protection	(3)	-	>102% of peak current capability	
Overvoltage Protection		V	24V: 30-35V, 36V: 43.2-50.4, 48V: 55.2-64.8V	
Hold Up Time (Typ) at 100VAC		ms	20 (16ms at forced air power ratings)	
Efficiency		%	82	
Remote On/Off			See installation manual (Not available with /A cover option)	
Line Regulation		%	0.4%	
Load Regulation		%	0.8%	
Ripple & Noise		%	1%	
Operating Temperature	(4)		(Open frame or L bracket) -10°C to +70°C, derate linearly to 70% load from 60°C to 70°C	
Operating Temperature	(4)		(With /A cover option) -10°C to +60°C, derate linearly to 70% load from 50°C to 60°C	
Storage Temperature			-30 to +85°C	
Humidity (non condensing)			Operating: 30 - 90% RH, Operating: 10 - 95% RH	
Cooling			Convection or Forced Air Cooled (1.5m/s)	
Withstand Voltage			Input to Ground 2kVAC (20mA), Input to Output 3kVAC (20mA), Output to Ground 500VAC (100mA) for 1 min.	
Isolation Resistance			>100M at 25C & 70% RH, Output to Ground 500VDC	
Vibration (non operating)			10 - 55Hz (1 minute sweep), 19.6m/s² constant X, Y, Z 1 hour	
Shock			< 196.1 m/s²	
Safety Agency Approvals			UL60950-1, CSA60950-1, EN60950-1, EN50178, CE Mark	
Conducted & Radiated EMI			EN55022/EN55022-B, FCC Class B, VCCI-B	
Recommended EMI Filter			RSEL-2006W	
Immunity			EN61000-4-2, -3, -4, -5, -6, -8, -11	
Weight (Typ)		g	500g (800g with cover)	750g (1100g with cover)
Size (WxHxD)		mm	See Outline Drawings	
Warranty		yrs	Two Years	

Notes:
(1) 100/200VAC
(2) 25°C ambient (cold start)
(3) Avoid prolonged operartion in overload
(4) With 0.7m/s airflow. See derating table for convection cooling

TDK·Lambda

ZWS-PAF Series

Model Selector

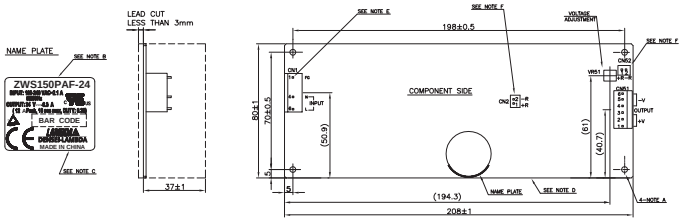
Model	Voltage	Adjust Range	Max Current Convection	Max Power Convection	Max Current Forced Air(6)	Max Power Forced Air(6)	Peak Current(5)	Peak Power(5)
ZWS150PAF24	24V	21.6 - 28.8V	6.3A	151.2W	8.4A	201.6W	12A	288W
ZWS150PAF36	36V	32.4 - 41.4V	4.2A	151.2W	5.6A	201.6W	8A	288W
ZWS150PAF48	48V	43.2 - 52.8V	3.1A	148.8W	4.3A	206.4W	6A	288W
ZWS240PAF24	24V	21.6 - 28.8V	10A	240W	12.5A	300W	20A	480W
ZWS240PAF36	36V	32.4 - 41.4V	6.7A	241.2W	8.4A	302.4W	13.3A	478.8W
ZWS240PAF48	48V	43.2 - 52.8V	5A	240W	6.3A	302.4W	10A	480W

Note 5: For 10s maximum, 35% duty cycle, average power not to exceed maximum ratings
Note 6: With 1.5m/s forced air

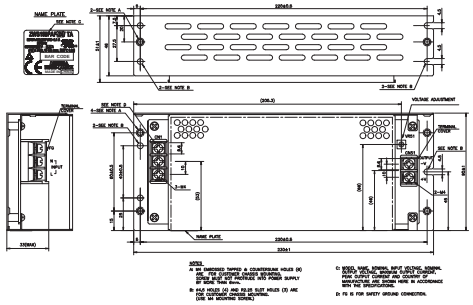
Model Derating for Conducted Cooling

Model	25°C	30°C	35°C	40°C	45°C	50°C	55°C	60°C
ZWS150PAF**	100%	100%	100%	100%	100%	100%	85%	70%
ZWS150PAF**/A	100%	100%	90%	80%	72.5%	65%	-	-
ZWS240PAF**	100%	100%	100%	100%	100%	86.7%	73.3%	60%
ZWS240PAF**/A	100%	90%	80%	70%	60%	50.0%	-	-

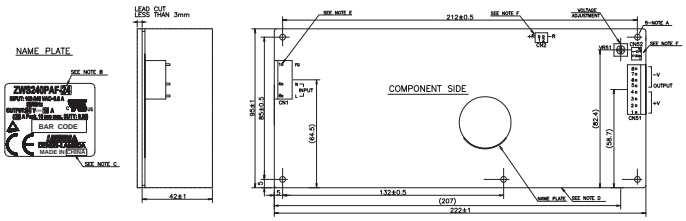
ZWS150PAF Outline Drawing



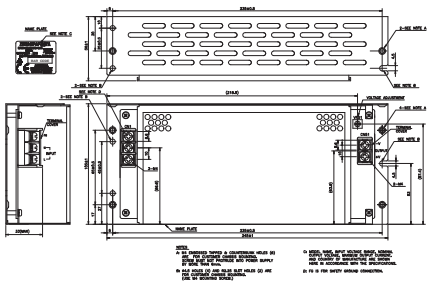
ZWS150PAF/TL Outline Drawing



ZWS240PAF Outline Drawing



ZWS240PAF/TL Outline Drawing



Options

Suffix	Option
Blank	Molex Input & Output Connectors
/L	L Bracket
/A	Cover and L Bracket
/J	JST Input & Output Connectors
/T	Vertical Mount Screw Terminals
/S	Horizontal Mount Screw Terminals

Preferred option combinations: Blank, /L, /TL or /TA.
Example: ZWS240PAF24/TA

Other Industrial Products

VSB/VSC	10W to 150W Single output 115VAC input
ZWS	5W to 150W Single output, 115/230VAC input
SC	30W to 120W Single, dual & triple output
HWS	15W to 1500W Single output, enclosed

For Additional Information, please visit
us.tdk-lambda.com/lp/products/zws-series.htm

3055 Del Sol Blvd • San Diego, CA 92154 • 1-800-526-2324
Revision A3: Jun 2011

TDK·Lambda

ZWX Series

180W to 300W Industrial ATX Power Supplies

- 90 - 150W convection cooled ratings
- 1U high
- Power factor corrected
- Peak power ratings
- No minimum loading required

RoHS

Features and Benefits

Feature	Benefit
◆ Convection cooled ratings	◆ No forced air or fan needed
◆ Low profile	◆ Fits into 1U high enclosures
◆ Industrial grade	◆ Greater reliability and field life
◆ No minimum loading	◆ Easier to use

Specifications

ITEMS / MODELS			ZWX180	ZWX240	ZWX300
Input Voltage		V	85-265VAC (47-63Hz)		
Input Current	(1)(2)	A	1.9 / 1.0	2.6 / 1.3	3.2 / 1.6
Inrush Current	(2)	A	14 / 28 Cold start 25°C ambient		
Power Factor		-	Meets EN61000-3-2		
Leakage Current		mA	< 0.75mA		
Temperature Coefficient		°C	<0.02%/°C		
Overcurrent Protection	(3)	-	>1.05% of forced air current rating (5s delay and manual reset on V1, 2 & 3)		
Overvoltage Protection	(4)	V	+3.3V: 3.76 - 4.3V, +5V: 5.74 - 7V, +12V: 13.4 - 15.6V		
Hold Up Time (Typ)	(1)	ms	20ms at 100VAC		
Efficiency	(1)(2)	%	81 / 84%		
Remote On/Off PS_ON		-	High: Unit off, Low: Unit On (enabled). Meets SFX 12V		
DC Good PWR_OK		-	High: Power supply is good. Meets SFX12V		
Remote Sense		-	+3.3V Only		
Output Voltage Setpoint Accuracy		-	±5% (all outputs)		
Output Voltage Adjustment		-	None		
Line Regulation		mV	3.3V: 20mV, 5V: 48mV, +12V: 48mV, -12V: 20mV, +5Vsb: 20mV		
Load Regulation		mV	3.3V: 100mV, 5V: 300mV, +12V: 300mV, -12V: 100mV, +5Vsb: 100mV		
Ripple & Noise		mV	3.3V: 120mV, 5V: 150mV, +12V: 150mV, -12V: 120mV, +5Vsb: 120mV		
Operating Temperature		-	-10°C to +70°C, derate linearly to 20% load from 50°C to 70°C		
Storage Temperature		°C	-30 to +85°C		
Humidity (non condensing)		-	Operating: 30 - 90%RH, Non operating: 10 - 95% RH		
Cooling		-	Convection or forced air cooled (30CFM, 0.85m^3/min)		
Withstand Voltage		-	I/P to Grnd 2kVAC (20mA), I/P to O/P 3kVAC (20mA), O/P to Grnd 500VAC (100mA) for 1 min.		
Isolation Resistance		-	>100M at 25C & 70%RH, Output to Ground 500VDC		
Vibration (non operating)		-	10 - 55Hz (1 minute sweep), 19.6m/s^2 constant X, Y, Z 1 hour		
Shock (non operating)		-	< 392m/s^2		
Safety Agency Approvals		-	UL60950-1, CSA60950-1, EN60950-1, EN50178 (OV II), CE Mark		
Conducted & Radiated EMI		-	EN55011/EN55022-B, FCC Class B, VCCI-B		
Immunity		-	EN61000-4-2, -3, -4, -5, -6, -8, -11		
Weight (Typ)		g	500	650	800
Size (WxHxD)		in	3.7 x 1.42 x 8.27	4.17 x 1.42 x 8.86	4.65 x 1.42 x 9.84
Warranty		yrs	Three Years		

(1) With output loading of:
ZWX180: V1=6.5A, V2=6.5A, V3=7.7A, V4=0.2A, V5=1A
ZWX240: V1=8.9A, V2=7.7A, V3=10.2A, V4=0.3A, V5=2A
ZWX300: V1=12A, V2=7A, V3-1=5A, V3-2=9.4A, V4=0.2A, V5=1A

(2) 100/200VAC
(3) Avoid prolonged operation in overload
(4) <5s operation at peak load

TDK·Lambda

ZWX Series

Output Ratings

Model		Output Voltage	Max Curr. (Convection)	Max Power (Convection)	Max Curr. (Forced Air)	Max Power (Forced Air)	Peak Curr.(4) (Forced Air)	Peak Power(4) (Forced Air)
ZWX180	V1	+3.3V	6A(5)		8.4A(5)		12A(5)	
	V2	+5V	5A(5)		7A(5)		10A(5)	
	V3	+12V	6A	90W	9A	153W	13A	180W
	V4	-12V	0.2A		0.3A		-	
	V5	+5V (sb)	1.4A		2A		-	
ZWX240	V1	+3.3V	7A		9.8A		14A	
	V2	+5V	6A		8.4A		12A	
	V3	+12V	8A	120W	11.2A	204W	16A	240W
	V4	-12V	0.2A		0.3A		-	
	V5	+5V (sb)	1.4A		2A		-	
ZWX300	V1	+3.3V	10A		14A		20A	
	V2	+5V	6A		8.4A		12A	
	V3-1	+12V	4A(6)	150W	5.6A	255W	8A(7)	300W
	V3-2	+12V	8A(6)		11.2A		16A(7)	
	V4	-12V	0.2A		0.4A		-	
	V5	+5V (sb)	1.4A		2A		-	

(5) Maximum combined power of V1 & V2: 32W convection, 54W forced air, 63W peak
(6) V3-1 & V3-2 combined current limited to 10.9A (131W)
(7) V3-1 & V3-2 combined current limited to 22A (264W)

Cable Harness

Connector	Harness	ZWX180	ZWX240	ZWX300
CN1	HA-2-IN	Y	Y	Y
CN21	ZWX-HA-04	Y	Y	Y
CN21(S-ATA)	ZWX-HA-02	Y	Y	Y
CN31/CN41	ZWX-HA-01	Y	Y	Y
CN51	ZWX-HA-03	-	-	Y

Options

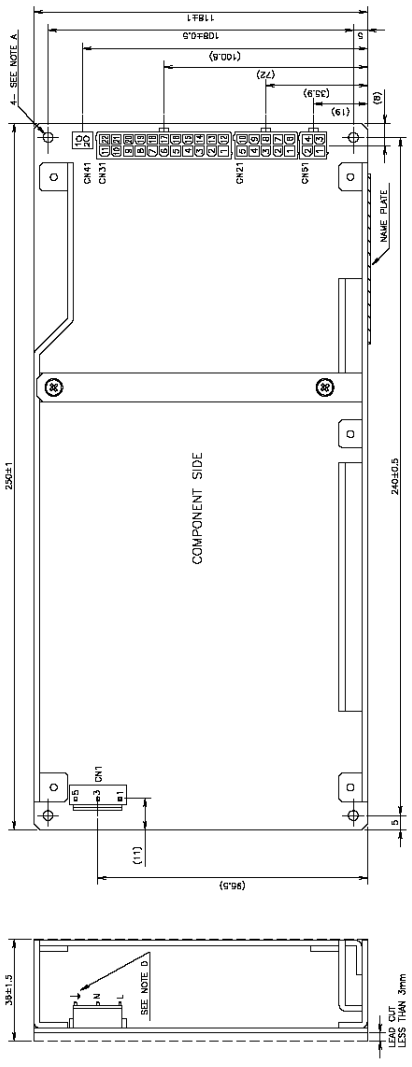
Suffix	Description
Blank	Open Frame
/L1	L bracket - input on the left side (rear mounting side facing away)
/L2	L bracket - input on the right side (rear mounting side facing away)
/A1	L bracket & cover - input on the left side (rear mounting side facing away)
/A2	L bracket & cover - input on the right side (rear mounting side facing away)

Other Industrial Products

ZWS, ZWSPAF NV	5-480W Single Output, 115/230VAC input 175W to 300W 4-5 Outputs

For Additional Information, please visit
us.tdk-lambda.com/lp/products/zwx-series.htm

Outline Drawing (ZWX300)



3055 Del Sol Blvd • San Diego, CA 92154 • 1-800-526-2324

Revision A2: Oct 2008

AC-DC Products

◆ DC-DC Products

Filters

Company

Enclosed or L Bracket
PCB Mount

DC-DC Selector

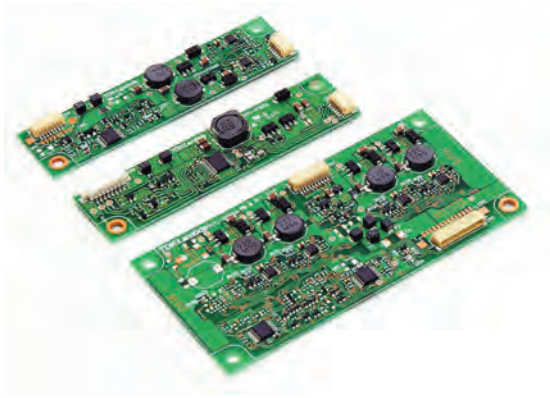
Nominal Input Voltage	# of Outputs	Output Power (W)								
		3	10	30	50	100	150	300	600	
5V	Single	CC-E								
	Dual	CC-E								
12V	Single	CC-E								
			PX							
	Dual	CC-E								
			PX							
	Triple			PXF						
24V	Single	CC-E								
			PX							
					PH-F					
				PH-S						
								PAH300		
									PAF	
	Dual	CC-E								
			PX							
					PAH75D*					
	Triple			PXF						
48V	Single	CC-E								
			PX							
				PAQ*						
				PH-F						
				PH-S						
					PAH					
								PAF		
	Dual	CC-E								
			PX							
					PAQ*					
					PAH75D*					
	Triple			PXF						
	Multiple							Vega*		
82-185VDC	Single			PH-F						
					PH-S					
200-400VDC	Single			PH-F						
				PH-S						
								PAF		

* See website

TDK·Lambda

ALD Series

LED Backlighting DC-DC Converters



- Two to Five Strings
- 12VDC Input
- Analog or Resistive Dimming
- Low Profile

RoHS

Key Market Segments & Applications

Industrial LED LCD Backlighting

Features and Benefits

Feature	Benefit
◆ Low Profile	◆ Can be used with thin displays
◆ Off the shelf solution	◆ No need to design a custom unit
◆ Resistive or Analog Dimming	◆ Easier system integration

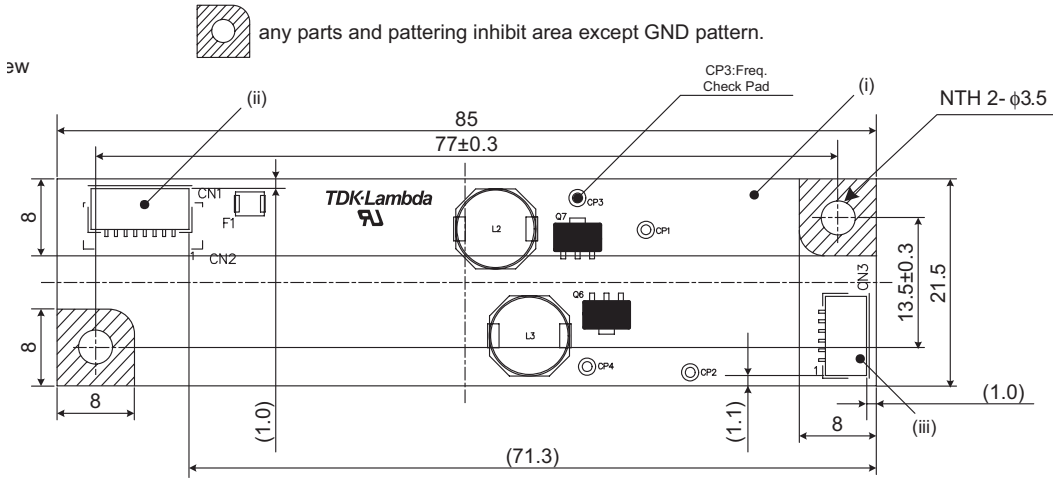
Specifications

ITEMS \ MODEL		ALD-214012PJ111	ALD-310012PJ125	ALD-414012PJ126	ALD-514012PJ134
Number of LED Strings		2	3	4	5
DC Input	VDC	10.8 - 13.2VDC			
Input Current Max.(norm./inhib.)	A	1.2 / 0.001A	1.5 / 0.001A	2.0 / 0.001A	2.5 / 0.001A
Output Current (each string)	mA	140mA	100mA	140mA	140mA
Dimming Frequency	Hz	200Hz	225Hz	200Hz	200Hz
Analog Dim. (Dark to Light) Vbr	VDC	2.5V to 0V	0V to 4V (Vbr2)	2.5V to 0V	2.5V to 0V
Analog Dim. (Dark to Light) Rbr	kΩ	50 - 0kΩ	0 - 10kΩ	50 - 0kΩ	50 - 0kΩ
PWM Dimming	VDC	2.5V to 0V	0 to 2.5V	2.5V to 0V	2.5V to 0V
Remote On/Off (Vrmt)	VDC	OFF: 0V - 0.4V, ON: 2.5V - Vin			
Maximum Output Voltage	VDC	44V	38V	44V	44V
Overvoltage Alarm	VDC	Approximately 5V if any one string is open			
Operating Temperature	°C	-30 to +85°C			
Storage Temperature	°C	-40 to +85°C			
Maximum Humidity (1)	%RH	95%RH (Storage or Operating)			
Cooling	-	Convection			
Input to Output Isolation	-	None			
Vibration	-	588m/s2 (60G) 11ms Half-sine wave once each axis X,Y,Z,-X,-Y,-Z total 6 times			
Shock	-	5~10Hz Amplitude 10mm 10~200Hz Accelerated Velocity 21.6m/s2(2.2G)			
Weight (Typ)	g	9g	9g	22g	22g
Size (LxWxH)	mm	85 x 21.5 x 5mm	85 x 21.5 x 5.5mm	100 x 50 x 5.2mm	100 x 50 x 5.2mm
Warranty	Yr	One Year			

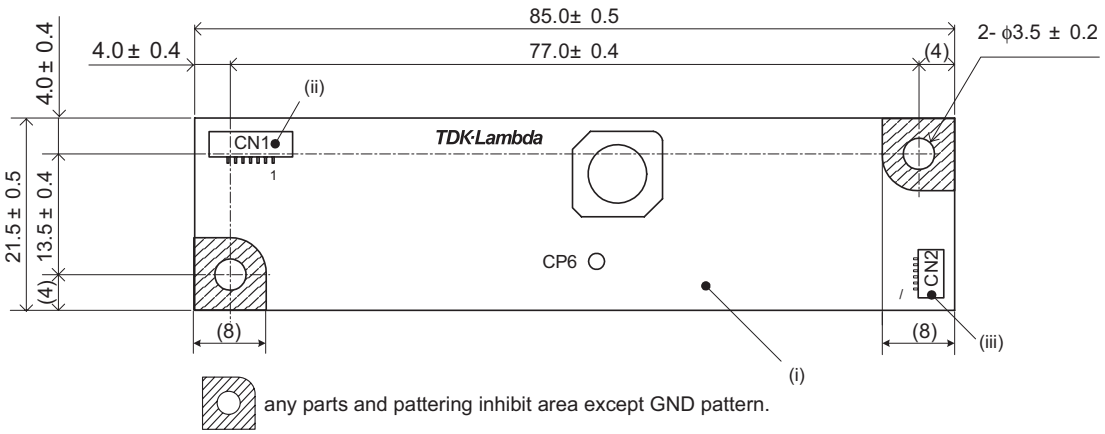
Note: See Installation Manual for full details, test methods of parameters and application notes
(1) non condensing

Outline Drawing

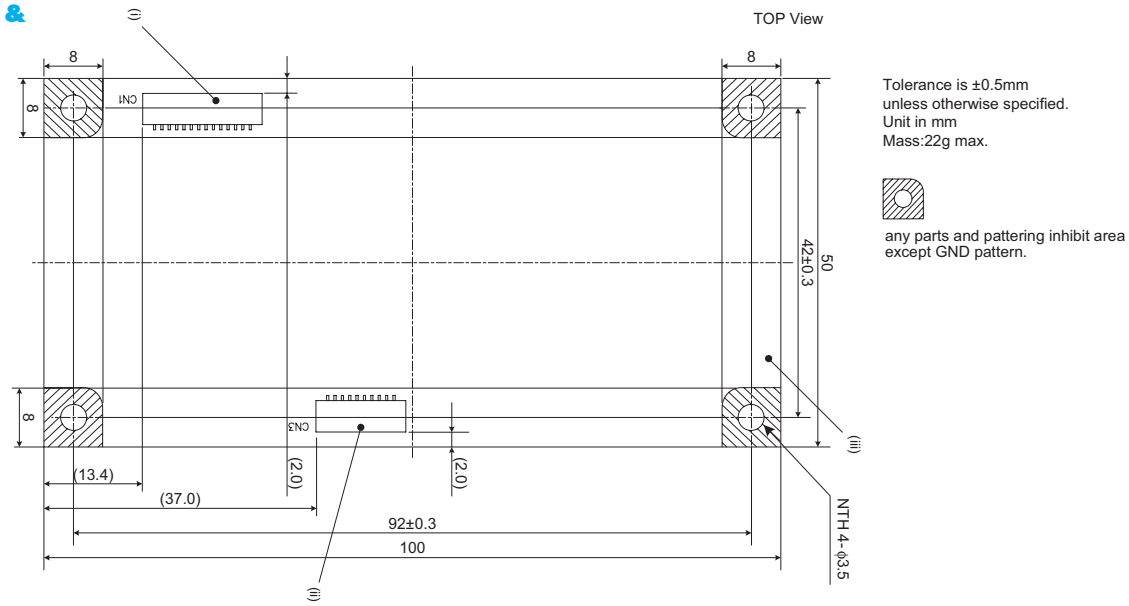
ALD-214012PJ111



ALD-310012PJ125



ALD-414012PJ126 & ALD-514012PJ134



Tolerance is ±0.5mm
unless otherwise specified.
Unit in mm
Mass:22g max.

any parts and pattering inhibit area except GND pattern.

For Additional Information, please visit us.tdk-lambda.com/lp/products/ald-series.htm

TDK·Lambda

CC-E Series

Ultra Compact, 1.5W to 25W Single and Dual DC-DC Converters

- Compact Footprint / Low Profile
- Through Hole or SMT Versions
- 5V, 12V, 24V & 48V Inputs
- 3.3 to 30V[1] Single, ±12 to 15V Dual Outputs
- Output Voltage Adjustment
- Input - Output Isolation
- RoHS Compliant
- 5 Year Warranty

RoHS

Key Market Segments & Applications

Telecommunications
Datacom
Instrumentation

Features & Benefits

Feature	Benefit
Compact	Less pcb area used
Self contained	Requires no external components
Multiple Input Voltage configurations	Easier system configuration
Open frame (no potting)	Lighter in weight, suitable for surface mount (R version)

Specifications

Nominal Output Voltage	V	3.3V	5V	12/15V	±12/15 (24/30)[1]
DC Input	V	5V: 4.5-9.0V, 12V: 9-18V, 24V: 18-36V, 48V: 36-76V			
Efficiency	%	71 to 90% model dependant			
Output Voltage Tolerance	%	1.5-10W: ±3%, 15-25W: ±5%			±5%
Output Adjustment (via trim pin)	V	3.15-3.6V (5)	4.75-6.0V (5)	11.4-15V	22.8 - 30V
Line Regulation	mV	20 (40 CC15; 30 CC25)		40	80
Load Regulation	mV	40 (120 CC15; 200 CC25)		100	600[2]
Temperature Coefficient	%	<± 0.02%/°C			
Preload	-	No preload required			
Output Ripple (typ./max.BW 50MHz)	mV	40/120		30/120	
Overcurrent Protection	-	Output current limiting with automatic recovery, shutdown CC15, 25 type			
Overvoltage Protection	-	No			
Remote On/ Off	-	CC1R5, 3, 6, & 10: RC terminal open, output is OFF; RC terminal to -Vin (0-0.4V), output is ON CC15 & CC25: RC terminal open, output is ON; RC terminal to +Vin, output is OFF			
Operating Temp.- Convection	°C	-40 to 85°C, derates linearly to 40% load from 50°C to 85°C			
Operating Temp.- Forced Air	°C	-40°C to 85°C with 1m/s air full load			
Storage Temperature	°C	-40°C to 85°C			
Humidity (non Condensing)	-	95% RH max.(maximum wet-bulb temperature: 38°C)			
Isolation Voltage	-	500VAC 1 min. Input to output, input to case, output to case			
Isolation Resistance	-	Input to output, input to case, output to case: 50M ohm min. (500VDC)			
Shock	m/s^2	980m/s^2 (100G) 6ms (6 directions, each 3 times)			
Vibration (non Operating)	-	10 to 55Hz (sweep for 15min) 1.52mm constant, 3 directions X, Y, Z each 2 hours			
Safety Agency Approvals	-	UL60950-1, CSA60950-1, EN60950-1, CE Mark			
Weight	g	CC1R5: 3.2, CC3: 4.5, CC6: 5.8, CC10:10.0, CC15: 12.5, CC25: 20.0			
Size (L x W x H) (DIP Through Hole and SMD package) (SIP Through Hole only)	in	CC1R5: 0.650 x 0.654 x 0.335; CC3: 0.900 x 0.654 x 0.335; CC6: 0.900 x 0.831 x 0.335 CC10: 1.400 x 0.890 x 0.335; CC15: 1.500 x 1.264 x 0.295; CC25: 1.701 x 1.768 x 0.295 CC3 (SIP): 1.09 x 0.362 x 0.705			
Warranty	-	5 years			

1. For 24V/30V output - connnect across +Vout & -Vout and leave "common out" pin not connected
2. Based upon equal load current from both outputs
3. For 15V output connect trim to -Vout
4. See Installation Manual for full specs, test methods of parameters & application notes
5. Not available on CC15 and CC25 models

TDK·Lambda

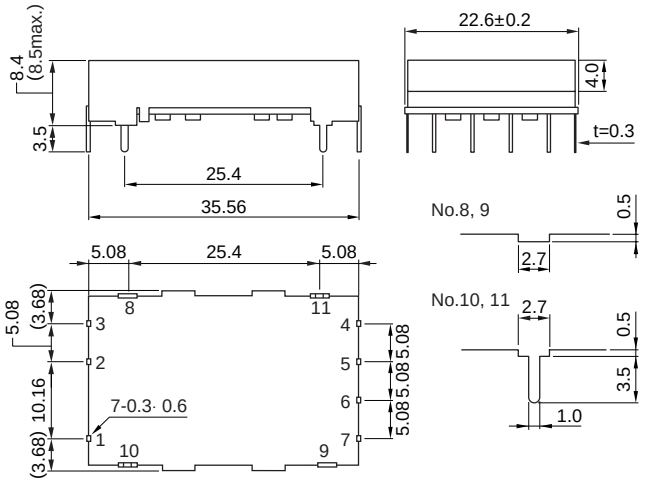
CC-E Series

Model Selector

Output Voltage (V)	Output Current (A)	Output Power (W)	5V Input	12V Input	24V Input	48V Input
Single Outputs						
3.3	0.4	1.5	CC1R5-0503SF-E	CC1R5-1203SF-E	CC1R5-2403SF-E	CC1R5-4803SF-E
3.3	0.8	3	CC3-0503SF-E	CC3-1203SF-E	CC3-2403SF-E	CC3-4803SF-E
3.3	1.2	6	CC6-0503SF-E	CC6-1203SF-E	CC6-2403SF-E	CC6-4803SF-E
3.3	2.5	10	CC10-0503SF-E	CC10-1203SF-E	CC10-2403SF-E	CC10-4803SF-E
3.3	4.5	15	-	-	CC15-2403SF-E	-
3.3	7.5	25	-	-	CC25-2403SF-E	-
5	0.3	1.5	CC1R5-0505SF-E	CC1R5-1205SF-E	CC1R5-2405SF-E	CC1R5-4805SF-E
5	0.6	3	CC3-0505SF-E	CC3-1205SF-E	CC3-2405SF-E	CC3-4805SF-E
5	1.0	5	CC6-0505SF-E	-	-	-
5	1.2	6	-	CC6-1205SF-E	CC6-2405SF-E	CC6-4805SF-E
5	2.0	10	CC10-0505SF-E	CC10-1205SF-E	CC10-2405SF-E	CC10-4805SF-E
5	3.0	15	-	-	CC15-2405SF-E	-
5	5.0	25	-	-	CC25-2405SF-E	-
12(15)	0.125(0.1)	1.5	CC1R5-0512SF-E	CC1R5-1212SF-E	CC1R5-2412SF-E	CC1R5-4812SF-E
12(15)	0.25(0.2)	3	CC3-0512SF-E	CC3-1212SF-E	CC3-2412SF-E	CC3-4812SF-E
12(15)	0.5(0.4)	6	CC6-0512SF-E	CC6-1212SF-E	CC6-2412SF-E	CC6-4812SF-E
12(15)	0.8(0.64)	10	CC10-0512SF-E	-	-	-
12(15)	1.0(0.8)	10	-	CC10-1212SF-E	CC10-2412SF-E	CC10-4812SF-E
Dual Outputs						
±12 (15)[3]	0.06(0.05)	1.5	CC1R5-0512DF-E	CC1R5-1212DF-E	CC1R5-2412DF-E	CC1R5-4812DF-E
±12 (15)[3]	0.125(0.1)	3	CC3-0512DF-E	CC3-1212DF-E	CC3-2412DF-E	CC3-4812DF-E
±12 (15)[3]	0.25(0.2)	6	CC6-0512DF-E	CC6-1212DF-E	CC6-2412DF-E	CC6-4812DF-E
±12 (15)[3]	0.4(0.32)	10	CC10-0512DF-E	-	-	-
±12 (15)[3]	0.45(0.36)	10	-	CC10-1212DF-E	CC10-2412DF-E	CC10-4812DF-E

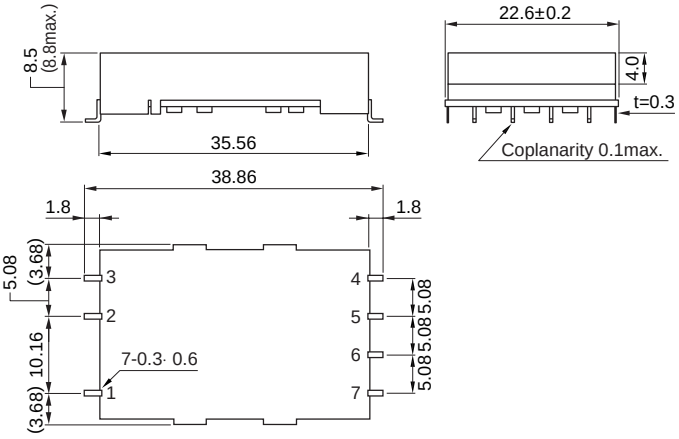
Outline Drawing

CC10- F-E (DIP TYPE)



Outline Drawing

CC10- R-E (SMD TYPE)



Options

Version	Description
F-E	Through hole mounting (DIP pkg)
R-E	Surface mount (DIP pkg)
S-E	Through hole mounting (SIP pkg - CC3)

Other Industrial Products

PX	10 - 40W 12, 24, 48V DC-DC converters
PAQ, PAH, PAF	50 -700W quarter, half & full bricks

Pinout (CC1R5, 3, 6, and 10)

Pin	Single	Dual
1	+Vin	+Vin
2	RC	RC
3	-Vin	-Vin
4	NC	-Vout
5	-Vout	Common out
6	TRM	TRM
7	+Vout	+Vout

For CC15 and 25 see Installation Manual online

For Additional Information, please visit
us.tdk-lambda.com/lp/products/cc-series.htm

3055 Del Sol Blvd • San Diego, CA 92154 • 1-800-526-2324

Revision A6: Feb 2011

TDK·Lambda

CC-P-E Series

Ultra Compact, 15W to 30W Single Output DC-DC Converters

- Compact Footprint / Low Profile
- 24V & 48V Inputs
- 3.3V to 15V Outputs
- Five Sided Shielding (Cased Version)
- Input - Output Isolation
- Parallel Operation
- Through Hole or SMT Versions
- DC OK signal
- Sequencing pin

RoHS

Key Market Segments & Applications

Process Control	Datacom & Telecom
Instrumentation	

Features & Benefits

Feature	Benefit
Compact	Less pcb area used
Five Sided Shielding (Cased version)	Lower radiated EMI
Parallel Operation	Provides additional power

Specifications

Nominal Output Voltage	V	3.3V	5V	12V	15V
DC Input	VDC	24V Nominal: 18-36V, 48V Nominal: 36-76V			
Efficiency	%	89 to 92% model dependant			
Initial set accuracy	%	±1%			
Total Regulation limits	%	+5%, -3%			
Output Adjustment	-	None			
Temperature Coefficient	%/°C	<0.02%/°C			
Preload	A	None			
Output Ripple	mV	50mV		150mV	
Overcurrent Protection	-	> 103% of nominal rating			
Overvoltage protection	-	Operates at 115 - 145% of nominal voltage			
Remote On/Off (RC)	-	Logic high (pull high to shutdown), referenced to -Vin			
Alarm (ALM)	-	Low On Fail, referenced to -Vin. 20 units maximum			
Sequencing (PO)	-	Connecting PO terminals on multiple power supplies ensures all simultaneously start up (20 units maximum)			
Cooling	-	Convection			
Operating Temp. Range	°C	-40 to 85°C, see derating curves on website			
Storage Temperature	°C	-40 to 85°C			
Humidity (Non condensing)	%RH	5 - 95%RH			
Isolation Voltage (Cased version)	VDC	1000VDC 1 min. Input-Output, Input-Chassis, Output-Chassis			
Isolation Voltage (Uncased version)	VDC	1500VDC 1 min. Input-Output			
Isolation Resistance	-	>50M at 25°C and 70%RH, 500 VDC Input-Output, Input-Case, Output-Case			
Shock (Non operating)	-	980m/s² (100G), 6ms, 6 directions, 3 times			
Vibration (non operating)	-	10-55-10 Hz (sweep for 15 min.) 1.52mm amplitude, 2 hour X, Y, Z			
Safety Certifications	-	UL60950-1, CSA C22.2 No.60950-1 (c-UL), EN60950-1			
Weight	g	With case: CC15 15g, CC30 20g. Without case: CC15 10g, CC30 15g			
Size (LxWxH) (Thru hole ver., w/ case)	mm	CC15: 38.4 x 6.8 x 29.6mm, CC30: 38.4 x 8.3 x 33.5mm			
Warranty	yrs	5 years			

Note: See Installation Manual for full specifications, test methods of parameters and application notes

TDK·Lambda

CC-P-E Series

Model Selector

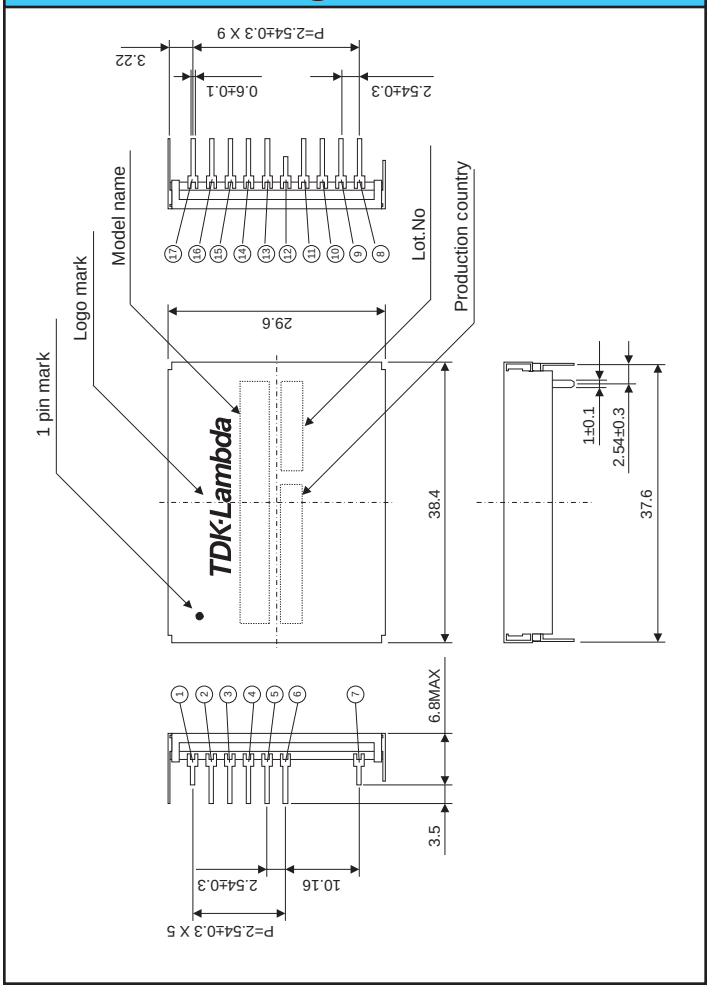
Output Volt.(V)	Output Curr.(A)	Max O/P Pwr (W)	24V Input	48V Input
3.3	4.5	15	CC15-2403SFP-E	CC15-4803SFP-E
3.3	9	30	CC30-2403SFP-E	CC30-4803SFP-E
5	3	15	CC15-2405SFP-E	CC15-4805SFP-E
5	6	30	CC30-2405SFP-E	CC30-4805SFP-E
12	1.25	15	CC15-2412SFP-E	CC15-4812SFP-E
12	2.5	30	CC30-2412SFP-E	CC30-4812SFP-E
15	1	15	CC15-2415SFP-E	CC15-4815SFP-E
15	2	30	CC30-2415SFP-E	CC30-4815SFP-E

Options

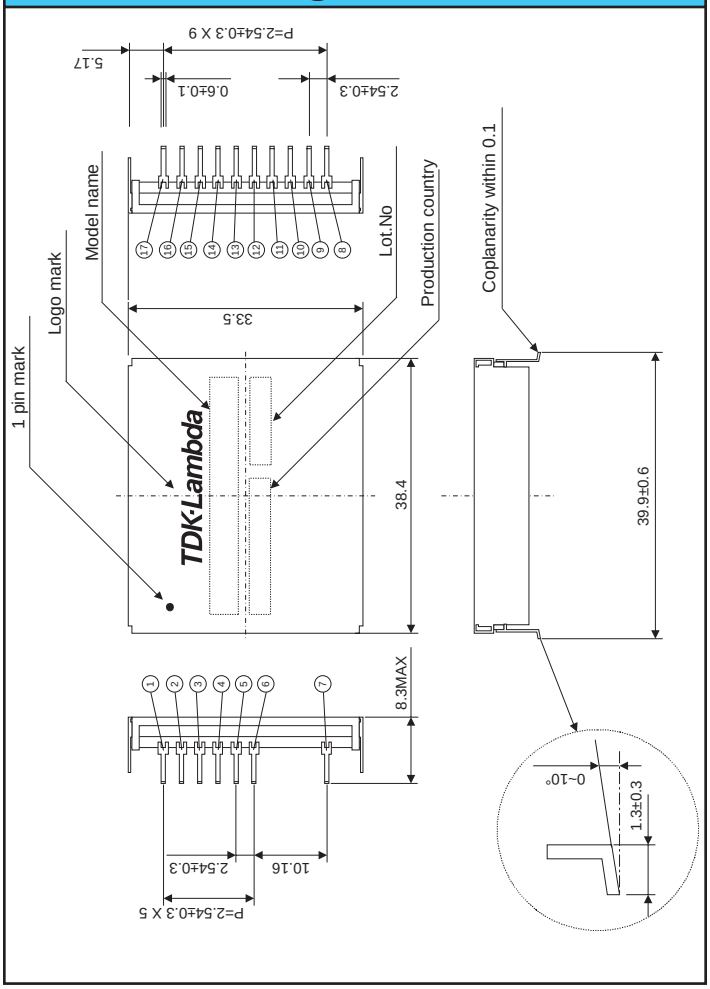
Version	PIN	Case
CCxx-yyyySFP-E	Through hole	Yes
CCxx-yyyySFH-E	Through hole	No
CCxx-yyyySRP-E	SMT	Yes
CCxx-yyyySRH-E	SMT	No

Where xx is output power & yyyy is input and output voltage combination. Shaded line is Preferred model

Outline Drawing CC15-xxxxSFP-E



Outline Drawing CC30-xxxxSRP-E



Other Lambda Industrial Products

CC-E	1.5 - 30W, 1 to 2 outputs, 5 to 48VDC input
PX	10 - 60W, 1 to 3 outputs, 12V, 24V, 48VDC input

For Additional Information, please visit
us.tdk-lambda.com/lp/products/cc-series.htm

3055 Del Sol Blvd • San Diego, CA 92154 • 1-800-526-2324

Revision A2: Sep 2010

TDK·Lambda

DPX Series

Single, Dual & Triple Output 40W to 60W DIN Mount DC-DC Converters

- DIN Rail Mount Version of TDK-Lambda's PX Series
- 1600VDC Input to Output Isolation
- Wide Operating Temperature Range
- Internally Protected

Key Market Segments & Applications

Factory Automation	Test & Measurement
Process Control	

Features and Benefits

Feature	Benefit
◆ All In One Package	◆ No need to design a pcb
◆ Wide input models available	◆ Less parts to inventory

Specifications

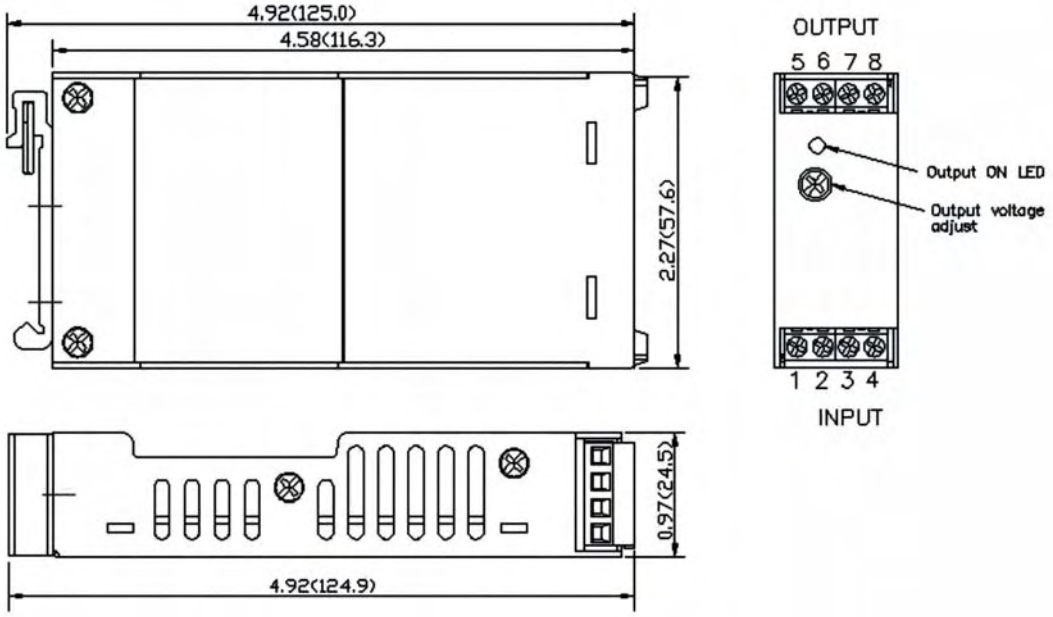
ITEMS \ MODELS		DPX40	DPX60
Max Output Power	W	40W	60W
Efficiency	%	85% typical at nominal input & full load	
Voltage Accuracy	%	Single, Dual & Triple Main ±1%, Triple auxiliaries ±5%	
Volt. Adjust. (Single Output Only)	%	±10%	
Minimum Load, each output (1)	%	Single output 0%, Dual & Triple outputs 10%	
Line Regulation	%	Single / Dual ±0.5%, Triple (main) ±1%, (auxiliaries) ±5%	
Load Regulation (10% to 100%)	%	Single ±0.5%, Dual ±1%, Triple (main) ±2%, (auxiliaries) ±5%	
Cross Regulation (25% to 100%)	%	Triple (main) ±1%, Dual / Triple (auxiliaries) ±5%	
Start up time	ms	100ms typ.	
Remote on/off (ref. to neg. input)	-	Positive Logic: ON: Open or 3.5-12V, OFF: Short or <1.2V	
Temperature Coefficient	%/°C	<±0.02%/°C	
Operating Temperature	-	-40 to 85°C, derate linearly to 20% load from 60°C to 85°C	
Storage Temperature	°C	-40 to 85°C	
Thermal Shock	-	MIL-STD-810D	
Relative Humidity	%RH	5 to 95%RH (non condensing)	
Trans. Resp.(25% step load chng.)	µs	250µs recovery	
Overvolt. Protection (Zener clamp)	-	5V: 6.2V, 12V: 15V, 15V: 18V	
Overcurr. & Short Circuit Protection	-	Typically at 150%, hiccup with self recovery	
Input Surge Volt. (Max. for 100ms)	-	12V input: 36V, 24V input: 50V, 48V input: 100V	
Isolation Voltage	VDC	1600VDC minimum	
Isolation Resistance	Ω	10^9 Ohms minimum	
Typical Switching Frequency (Fixed)	kHz	300kHz (typ)	
Shock & Vibration	-	MIL-STD-810F	
Conducted & Radiated Emissions	-	EN55022 Level B	
Immunity	-	EN61000-4-2, -3, -4, -5, -6 Pref Criteria A	
Safety Agency Approval	-	CE Mark	
Size (W x H x L)	In(mm)	0.96 x 2.27 x 4.92" (24.5 x 57.6 x 125mm)	
Weight	g	182g	
Warranty	Years	Two Years	

1. No load operation will not damage the unit

TDK·Lambda

DPX Series

Outline Drawing



Model Selector

Output Voltage	Output Current (A)	Input Voltage (VDC)	Model	Ripple & Noise (Pk to Pk mV)	Max Load Cap (uF)
Single Outputs					
5V	8A	9.5 - 36VDC	DPX4024WS05	50mV	13600uF
12V	3.33A	9.5 - 36VDC	DPX4024WS12	75mV	2360uF
15V	2.67A	9.5 - 36VDC	DPX4024WS15	75mV	1510uF
5V	8A	18 - 75VDC	DPX4048WS05	50mV	13600uF
12V	3.33A	18 - 75VDC	DPX4048WS12	75mV	2360uF
15V	2.67A	18 - 75VDC	DPX4048WS15	75mV	1510uF
5V	12A	18 - 36VDC	DPX6024S05	75mV	20400uF
12V	5A	18 - 36VDC	DPX6024S12	100mV	3550uF
15V	4A	18 - 36VDC	DPX6024S15	100mV	2300uF
5V	12A	36 - 75VDC	DPX6048S05	75mV	20400uF
12V	5A	36 - 75VDC	DPX6048S12	100mV	3550uF
15V	4A	36 - 75VDC	DPX6048S15	100mV	2300uF
Dual Outputs					
±12	1.667A	9.5 - 36VDC	DPX4024WD12	120mV	±1200uF
±15	1.333A	9.5 - 36VDC	DPX4024WD15	150mV	±1510uF
±12	1.667A	18 - 75VDC	DPX4048WD12	120mV	±1200uF
±15	1.333A	18 - 75VDC	DPX4048WD15	150mV	±1510uF
Triple Outputs					
+5V, ±12V	6, ±0.4A	9.5 - 18VDC	DPX4012T0512	50 / 75mV	6800uF, ±330uF
+5V, ±15V	6, ±0.3A	9.5 - 18VDC	DPX4012T0515	50 / 75mV	6800uF, ±110uF
+5V, ±12V	6, ±0.4A	18 - 36VDC	DPX4024T0512	50 / 75mV	6800uF, ±330uF
+5V, ±15V	6, ±0.3A	18 - 36VDC	DPX4024T0515	50 / 75mV	6800uF, ±110uF
+5V, ±12V	6, ±0.4A	36 - 75VDC	DPX4048T0512	50 / 75mV	6800uF, ±330uF
+5V, ±15V	6, ±0.3A	36 - 75VDC	DPX4048T0515	50 / 75mV	6800uF, ±110uF

Other DIN Products

DPP / DSP	10W to 960W, 5V to 48V power supplies
DLP	75W to 240W, 24V power supplies
DLP-PU	Redundancy Module (20A)
R Series	6A to 30A, single and three phase EMI filters

For Additional Information, please visit
us.tdk-lambda.com/lp/products/dpx-series.htm

3055 Del Sol Blvd • San Diego, CA 92154 • 1-800-526-2324

Revision A1: Nov 2010

TDK·Lambda

PAF500F Series

24V & 48V Input Full brick DC-DC Converters

- 12V output for driving non-isolated converters
- Safety Approved
- Up to 80A output current (48V models)
- Full power at 100°C baseplate
- Opto Isolated Remote On / Off
- Wide Adjustable Output Range

RoHS

Key Market Segments & Applications

Central Office:	ATM, Sonet, DSL, ISDN, Frame relay
Broadband:	Switching Equipment, Routers
Wireless/Cellular:	Micro Cells (larger in size/10 sq. mi.) Pico Cells (smaller in size/1 to 2 sq. mi.)
Remote Electronics:	Fixed Local Loop, Fiber Optic Transmission, Microwave Transmission, Wireless Local Loop
Customer Premise:	PBX, PABX, Datacomm, Voice Systems, Video Conferencing

Features and Benefits

Feature	Benefit
◆ Wide adjustment range	◆ Reduces need for custom modules
◆ Parallel Pin	◆ Modules can be connected together for higher current
◆ ASIC Design	◆ Reduced component count, increased MTBF
◆ No potting materials	◆ Lower weight

Specifications

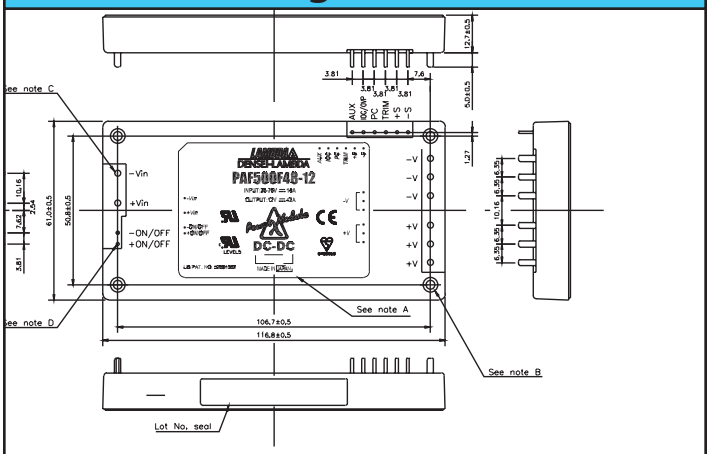
ITEMS \ MODEL		PAF500F48-3.3	PAF500F48-5	PAF500F24-12 PAF500F48-12	PAF500F24-28 PAF500F48-28
Nominal Output Voltage	VDC	3.3	5	12	28
Output Current (Max)	A	80	80	42	18
Max Output Power	W	264	400	504	504
Efficiency (Typ)	%	78	83	89	90
Input Voltage range	VDC	36-76		19-36 or 36-76	18-36 or 36-76
Input Current (Typ) (24V/48V)	A	7.3	10.4	24 / 12.2	23.8 / 12.1
Output Voltage Accuracy	%	±1			
Output Voltage Adjustment	VDC	2 - 4	3 - 6	7.2 - 13.2	16.8 - 30.8
Max Ripple & Noise	mV	100	100	200	280
Max Line Regulation	mV	10	10	24	56
Max Load Regulation	mV	10	10	24	56
Overcurrent Protection	%	105 - 140%			
Overvoltage Protection	%	130-160	125-145	115-135	115-135
Signals & Control	-	Remote sense, remote On/Off, Parallel Pin, DC Good (12, 28V models), Adjustable OVP (3.3, 5V models), 7-10V Auxiliary voltage			
Operating Temperature	-	-40°C to +100°C baseplate			
Cooling	-	Conduction (See Installation Manual for heatsink selection)			
Isolation Voltage	VDC	Input - Baseplate 1500V, Input - Output 1500V, Output-Baseplate 500V			
Shock	-	196.1m/s^2			
Vibration		Non Operating, 10-55Hz (sweep for 1 min.)			
Amplitude		0.825mm constant (Max 49m/s^2) X, Y, Z 1 hour each			
Safety Agency Approvals	-	UL60950-1, CSA60950-1, EN60950-1, CE LVD			
Weight (Typ)	g	250			
Size (WxHxD)	in(mm)	2.4x0.5x4.6 (61x12.7x116.8) See outline drawing			
Warranty	-	2 years			

Note: See Installation Manual for full details, test methods of parameters and application notes.

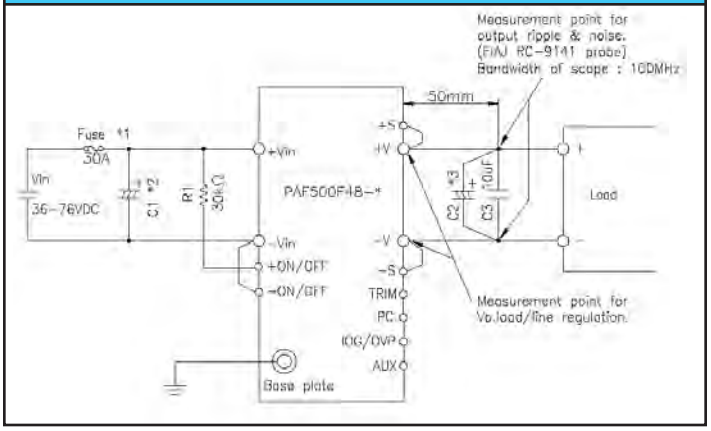
TDK·Lambda

PAF500F Series

Outline Drawing



Connection Example



Heatsink Table

Heatsink	Size (mm)	Thermal Resistance
HAF-10L	116.8 x 25.4 x 61	2.2°C/W
HAF-15L	116.8 x 38.1 x 61	1.9°C/W
HAF-15T	116.8 x 38.1 x 61	1.5°C/W

Pinout

Pin Description	Function
-Vin	Negative Input Terminal
+Vin	Positive Input Terminal
- ON/OFF	Remote On/Off negative terminal
+ON/OFF	Remote On/Off positive terminal
+V	Positive Output Terminal
-V	Negative Output Terminal
AUX	7-10V Aux voltage
IOG/OVP	DC Good / OVP adjustment
PC	Parallel control connection
TRIM	Output adjustment Trim pin
+S	Positive Remote sense
-S	Negative Remore sense

Other DC-DC Products

PAF	Full Brick 400-700W DC-DC
PAH	Half brick DC-DC
PAQ	Quarter brick DC-DC
PX	10-60W, 12-48V DC-DC

Options

Suffix	Description
Blank	
/T	No thread in mounting holes.

For Additional Information, please visit
us.tdk-lambda.com/lp/products/paf-series.htm

3055 Del Sol Blvd • San Diego, CA 92154 • 1-800-526-2324

Revision A4: Jan 2010

TDK·Lambda

PAF600F Series

24V & 48V Input Full brick DC-DC Converters

- 12V output for driving non-isolated converters
- Safety Approved
- Full power at 100°C baseplate
- Opto Isolated Remote On / Off
- Wide Adjustable Output Range

RoHS

Key Market Segments & Applications

Central Office:	ATM, Sonet, DSL, ISDN, Frame Relay
Broadband:	Switching Equipment, Routers
Wireless/Cellular:	Micro Cells (larger in size/10 sq. mi.) Pico Cells (smaller in size/1 to 2 sq. mi.)
Remote Electronics:	Fixed Local Loop, Fiber Optic Transmission, Microwave Transmission, Wireless Local Loop

Base Station Power Amplifiers

Features and Benefits

Feature	Benefit
◆ Wide Adjustment Range	◆ Reduces need for custom modules
◆ Parallel Pin	◆ Modules can be connected together for higher current
◆ ASIC Design	◆ Reduced component count, increased MTBF
◆ 24V & 48V Inputs	◆ Suitable for remote & central office applications

Specifications

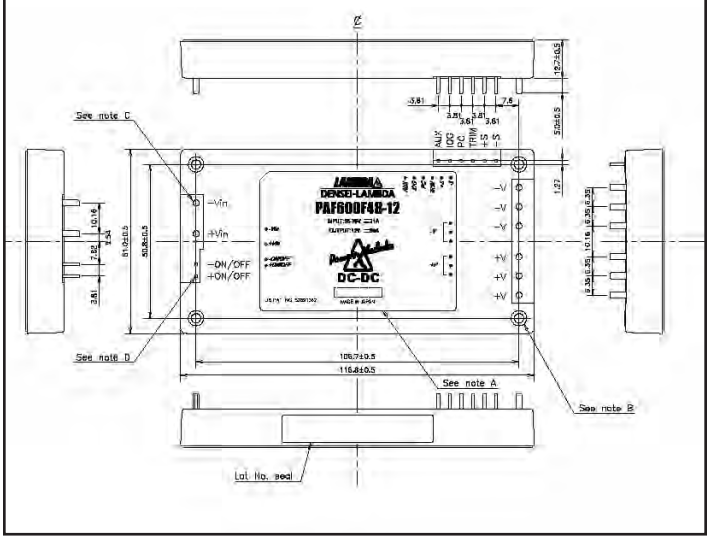
ITEMS \ MODEL		PAF600F24-12 PAF600F48-12	PAF600F24-28 PAF600F48-28
Nominal Output Voltage	VDC	12	28
Output Current (Max)	A	50	21.5
Output Power (Max)	W	600	602
Efficiency (Typ)	%	89 to 90%	
Input Voltage Range	VDC	20-36 / 36-76	19-36 / 36-76
Input Current (Typ) 24/48V input	A	28.9 / 14.2	28.9 / 14.1
Output Voltage Accuracy	%	±1	
Output Voltage Adjustment	VDC	7.2 - 13.2	16.8 - 30.8
Ripple & Noise (Max)	mV	200	280
Line Regulation (Max)	mV	24	56
Load Regulation (Max)	mV	24	56
Temperature Coefficient	-	0.02%/°C	
Overcurrent Protection	%	105 - 140%	
Overvoltage Protection	%	115-135%	
Signals & Control	-	Remote sense, remote On/Off, Parallel Pin, DC Good, 7-10V Auxiliary voltage	
Operating Temperature	-	-40°C to +100°C baseplate	
Humidity (operating)	-	30-95% RH Non condensing	
Humidity (storage)	-	10-95% RH Non condensing	
Cooling	-	Conduction (See Installation Manual for heatsink selection)	
Isolation Voltage	VDC	Input - Baseplate 1500V, Input - Output 1500V, Output-Baseplate 500V (for 1 min.)	
Shock	-	196.1m/s^2	
Vibration	-	Non Operating, 10-55Hz (sweep for 1 min.)	
		Amplitude 0.825mm constant (Max 49 m/s^2) X,Y,Z 1 hour each	
Safety Agency Approvals	-	UL60950-1, CSA60950-1, EN60950-1, CE LVD (48V model only)	
Weight (Typ)	g	250	
Size (WxHxD)	in(mm)	2.4 x 0.5 x 4.6 (61 x 12.7 x 116.8) See outline drawing	
Warranty	-	2 years	

Note: See Installation Manual for full details, test methods of parameters and application notes.

TDK·Lambda

PAF600F Series

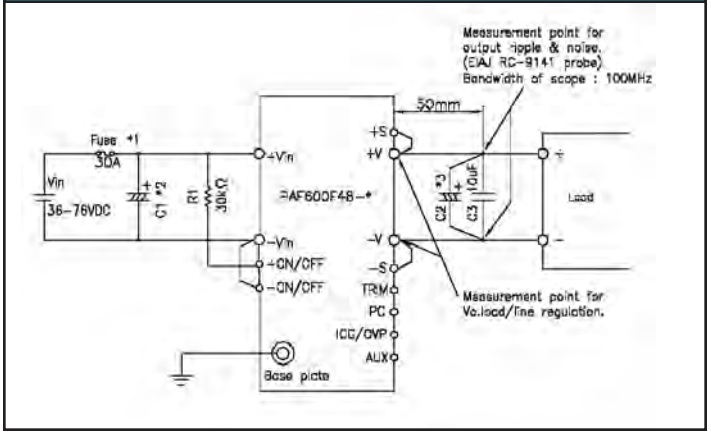
PAF Outline Drawing



Other DC-DC Products

PAF	Full brick 400-700W DC-DC
PAH	Half brick DC-DC
PAQ	Quarter brick DC-DC
PX	10-60W, 12-48V DC-DC

Connection Example



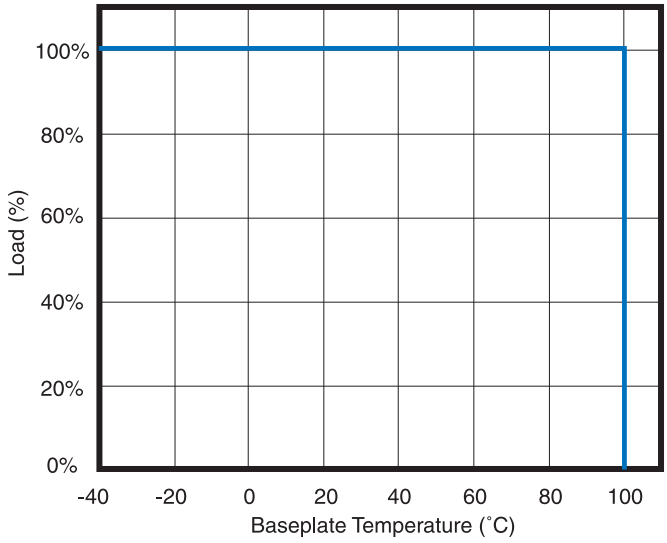
Heatsink Table

Heatsink	Size (mm)	Thermal Resistance
HAF-10L	116.8 x 25.4 x 61	2.2°C/W
HAF-15L	116.8 x 38.1 x 61	1.9°C/W
HAF-15T	116.8 x 38.1 x 61	1.5°C/W

Pinout

Pin Description	Function
-Vin	Negative Input Terminal
+Vin	Positive Input Terminal
- ON/OFF	Remote On/Off Negative Terminal
+ON/OFF	Remote On/Off Positive Terminal
+V	Positive Output Terminal
-V	Negative Output Terminal
AUX	7-10V Aux Voltage
IOG	DC Good
PC	Parallel Control Connection
TRIM	Output Adjustment Trim Pin
+S	Positive Remote Sense
-S	Negative Remote Sense

Derating Curve



Options

Suffix	Description
Blank	
/T	No thread in mounting holes.

For Additional Information, please visit
us.tdk-lambda.com/lp/products/paf-series.htm

TDK·Lambda

PAF-F280 Series

200V to 400VDC Input Full brick DC-DC Converters

- Output Voltages from 7.2V to 57V
- 450W to 600W Output Power
- Current Share
- Operation to 100°C Baseplate
- Wide Adjustable Output Range

RoHS

Key Market Segments & Applications

Servers & Rail Systems
High End Computers
Custom Power Supplies

Features and Benefits

Feature	Benefit
◆ Wide Adjustment Range	◆ Reduces need for custom modules
◆ Parallel Pin	◆ Modules can be connected together for higher current
◆ High Efficiency - up to 91%	◆ Reduced heat losses

Specifications

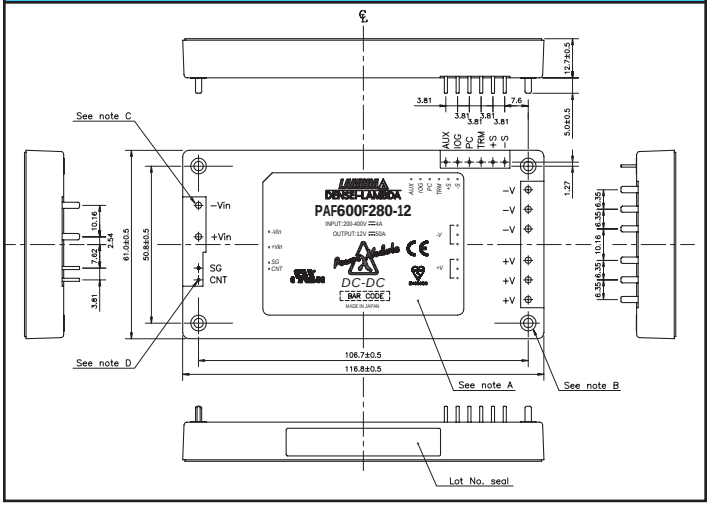
ITEMS \ MODEL			PAF450F280-12 PAF600F280-12	PAF450F280-24 PAF600F280-24	PAF450F280-28 PAF600F280-28	PAF450F280-48 PAF600F280-48
Nominal Output Voltage		VDC	12	24	28	48
Output Current (Max)	450W	A	38	19	16.5	9.5
	600W		50	25	21.5	12.5
Max Output Power	450W	W	456	456	462	456
	600W		600	600	602	600
Efficiency (Typ)		%	89-90	91	91	91
Input Voltage Range		VDC	200-400VDC			
Output Voltage Accuracy		%	±1			
Output Voltage Adjustment		VDC	7.2 - 14.4	14.4 - 28.8	16.8 - 33.6	28.8 - 57.6
Max Ripple & Noise		mV	120	240	280	480
Max Line Regulation		mV	48	56	56	96
Max Load Regulation		mV	48	56	56	96
Temperature Coefficient		°C	0.02%/°C			
Overcurrent Protection		%	105 - 140%			
Overvoltage Protection		%	125 - 145%			
Signals & Control		-	Remote Sense, Remote On/Off, Parallel Pin, Inverter Good, 11-14V Auxiliary voltage			
Baseplate Temperature		-	-40°C to +100°C Baseplate: (See derating chart)			
Humidity (non condensing)		-	5 - 95% RH Operating, 5 - 95% RH Non Operating			
Cooling		-	Conduction (See Installation Manual for heatsink selection)			
Isolation Voltage		-	Input to Baseplate: 2500VAC (20mA); Input to Output 3000VAC for 1 min.; Output to Baseplate: 500VDC for 1 min			
Shock		-	196.1m/s^2			
Vibration		-	Non Operating, 10-55Hz (sweep for 1 min.) Amplitude 0.825mm constant (Max 49 m/s^2) X,Y,Z 1 hour each			
Safety Agency Approvals		-	UL60950-1, CSA60950-1, EN60950-1, CE LVD			
Weight (Typ)		g	200			
Size (WxHxD)		mm	2.4 x 0.5 x 4.6 (61 x 12.7 x 116.8) See outline drawing			
Warranty		yr	2 years			

Note: See Installation Manual for full details, test methods of parameters and application notes.

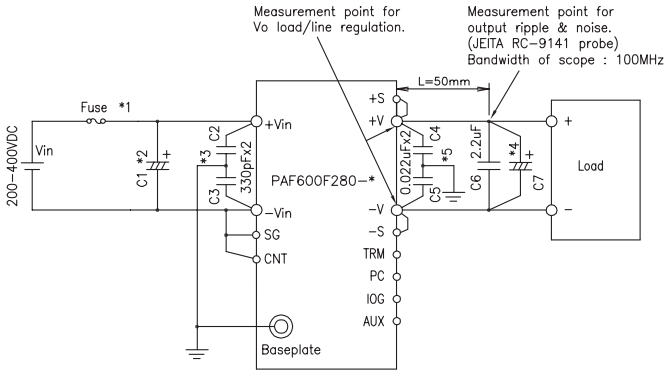
TDK·Lambda

PAF-F280 Series

PAF Outline Drawing



Connection Example



Pinout

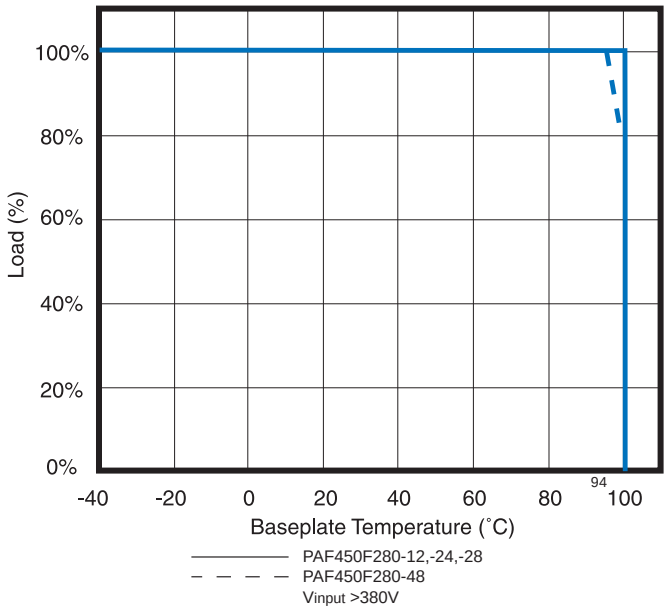
Pin Description	Function
-Vin	Negative Input Terminal
+Vin	Positive Input Terminal
CNT	Remote On/Off
+V	Positive Output Terminal
-V	Negative Output Terminal
AUX	11-14V Aux Voltage
PC	Parallel Control Connection
TRIM	Output Adjustment Trim Pin
+S	Positive Remote Sense
-S	Negative Remote Sense
SG	Remote ON/OFF Return

Other DC-DC Products

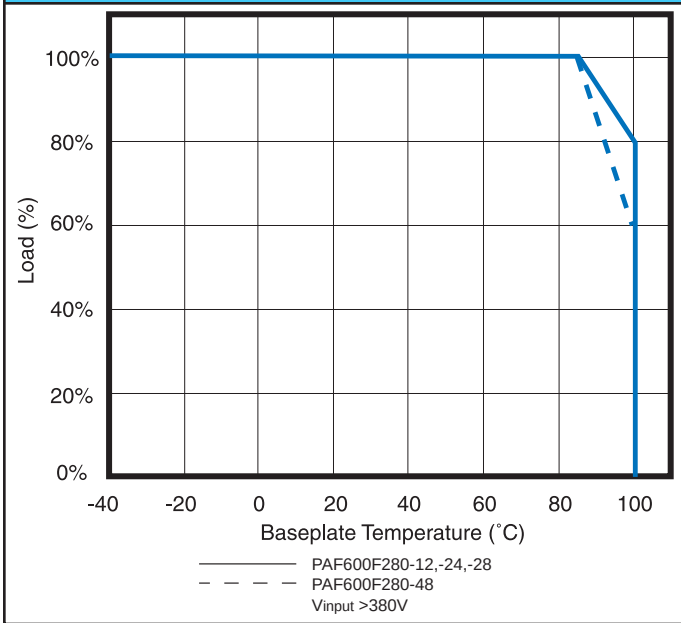
PAF	400-700W Full brick DC-DC
PAH300/450	300-450W Half Brick 24 & 48V Input
PH-F	Full function 200-400V Input DC-DC
PH-S	Simple function 200-400V Input DC-DC
PF	Power factor AC - 380VDC Front End
PFE	300-1000W, AC-DC Power module

For Additional Information, please visit
us.tdk-lambda.com/lp/products/paf400-series.htm

Derating Curve PAF450F280



Derating Curve PAF600F280



Options

Suffix	Description
Blank	M3 tapped mounting inserts (4)
/T	3.3mm non-threaded inserts (4)

Heatsink Table

Heatsink	Size (mm)	Thermal Resistance
HAF-10L	116.8 x 25.4 x 61	2.2°C/W
HAF-15L	116.8 x 38.1 x 61	1.9°C/W
HAF-15T	116.8 x 38.1 x 61	1.5°C/W

TDK·Lambda

PAF700F Series

48V Input Full brick DC-DC Converters

- 12V output for driving non-isolated converters
- Safety Approved
- Full power at 85°C baseplate, operation to 100°C
- Opto Isolated Remote On / Off
- Wide Adjustable Output Range

RoHS

Key Market Segments & Applications

Central Office:	ATM, Sonet, DSL, ISDN, Frame Relay
Broadband:	Switching Equipment, Routers
Wireless/Cellular:	Micro Cells (larger in size/10 sq. mi.) Pico Cells (smaller in size/1 to 2 sq. mi.)
Remote Electronics:	Fixed Local Loop, Fiber Optic Transmission, Microwave Transmission, Wireless Local Loop
Base Station Power Amplifiers	

Features and Benefits

Feature	Benefit
◆ Wide Adjustment Range	◆ Reduces need for custom modules
◆ Parallel Pin	◆ Modules can be connected together for higher current
◆ ASIC Design	◆ Reduced component count, increased MTBF

Specifications

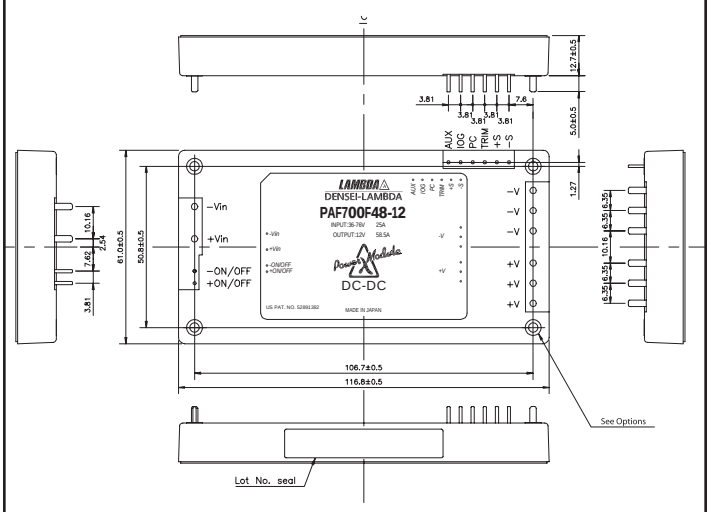
ITEMS \ MODEL		PAF700F48-12	PAF700F48-28
Nominal Output Voltage	VDC	12	28
Output Current (Max)	A	58.5	25
Output Power (Max)	W	702	700
Efficiency (Typ)	%	90 to 91%	
Input Voltage Range	VDC	36-76	
Input Current (Typ)	A	16.5	16.4
Output Voltage Accuracy	%	±1	
Output Voltage Adjustment	VDC	7.2 - 13.8	16.8 - 32.2
Ripple & Noise (Max)	mV	200	280
Line Regulation (Max)	mV	24	56
Load Regulation (Max)	mV	24	56
Temperature Coefficient	-	0.02%/°C	
Overcurrent Protection	%	105 - 140%	
Overvoltage Protection	%	120 - 135%	
Signals & Control	-	Remote sense, remote On/Off, Parallel Pin, DC Good, 7-10V Auxiliary voltage	
Operating Temperature	-	-40°C to +100°C baseplate	
Humidity (operating)	-	20-95% RH Non condensing	
Humidity (storage)	-	10-95% RH Non condensing	
Cooling	-	Conduction (See Installation Manual for heatsink selection)	
Isolation Voltage	VDC	Input - Baseplate 1500V, Input - Output 1500V, Output-Baseplate 500V (for 1 min.)	
Shock	-	196.1m/s^2	
Vibration	-	Non Operating, 10-55Hz (sweep for 1 min.)	
		Amplitude 0.825mm constant (Max 49 m/s^2) X,Y,Z 1 hour each	
Safety Agency Approvals	-	UL60950-1, CSA60950-1, EN60950-1, CE LVD	
Weight (Typ)	g	200	
Size (WxHxD)	in(mm)	2.4 x 0.5 x 4.6 (61 x 12.7 x 116.8) See outline drawing	
Warranty	-	2 years	

Note: See Installation Manual for full details, test methods of parameters and application notes.

TDK·Lambda

PAF700F Series

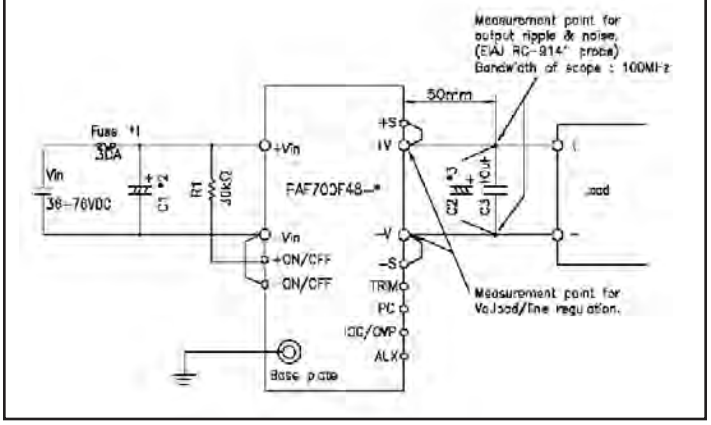
PAF Outline Drawing



Other DC-DC Products

PAF	Full Brick 400-700W DC-DC
PAH	Half brick DC-DC
PAQ	Quarter brick DC-DC
PX	10-60W, 12-48V DC-DC

Connection Example



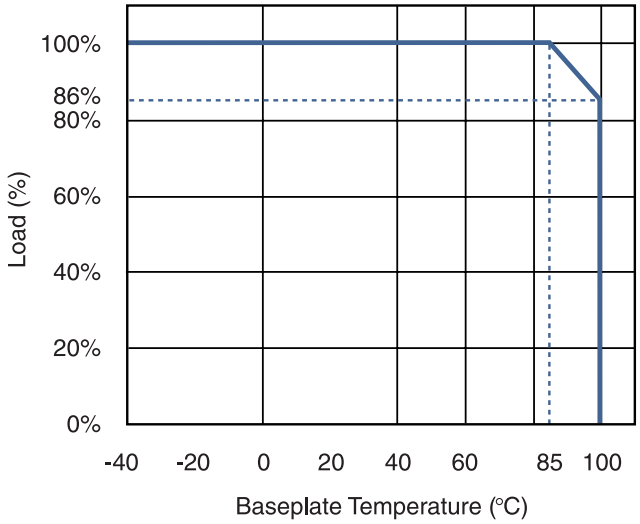
Heatsink Table

Heatsink	Size (mm)	Thermal Resistance
HAF-10L	116.8 x 25.4 x 61	2.2°C/W
HAF-15L	116.8 x 38.1 x 61	1.9°C/W
HAF-15T	116.8 x 38.1 x 61	1.5°C/W

Pinout

PIN	Description	Function
	-Vin	Negative Input Terminal
	+Vin	Positive Input Terminal
	- ON/OFF	Remote On/Off Negative Terminal
	+ON/OFF	Remote On/Off Positive Terminal
	+V	Positive Output Terminal
	-V	Negative Output Terminal
	AUX	7-10V Aux Voltage
	IOG	DC Good
	PC	Parallel Control Connection
	TRIM	Output Adjustment Trim Pin
	+S	Positive Remote Sense
	-S	Negative Remote Sense

Derating Curve



Options

Suffix	Description
Blank	M3 tapped inserts (4)
/T	3.3mm non-threaded inserts (4)

For Additional Information, please visit
us.tdk-lambda.com/lp/products/paf700-series.htm

3055 Del Sol Blvd • San Diego, CA 92154 • 1-800-526-2324

Revision A3: Oct 2007

TDK·Lambda

PAH Series

50W to 200W 48V Input Half brick DC-DC Converters

- Industry Standard Footprint & Pinouts
- 12V output for driving non-isolated converters
- Safety Approved
- Full power at 100°C baseplate
- Wide Adjustable Output Range

RoHS

Key Market Segments & Applications

Central Office:	ATM, Sonet, DSL, ISDN, Frame relay
Broadband:	Switching Equipment, Routers
Wireless/Cellular:	Micro Cells (larger in size/10 sq. mi.) Pico Cells (smaller in size/1 to 2 sq. mi.)
Remote Electronics:	Fixed Local Loop, Fiber Optic Transmission, Microwave Transmission, Wireless Local Loop
Customer Premise:	PBX, PABX, Datacomm, Voice Systems, Video Conferencing

Features and Benefits

Feature	Benefit
◆ Wide adjustment range	◆ Reduces need for custom modules
◆ Zero Pre-load	◆ Eliminates heat dissipation in system
◆ ASIC Design	◆ Reduced component count, increased MTBF
◆ No potting materials	◆ Lower weight

Specifications

ITEMS \ MODELS		2.5V	3.3V	5V	12V	15V	24V	28V	48V
Efficiency (Typ)	%	75-76	79-80	83-84	85-86		86-88		88
Input Voltage range	VDC	36-76							
Output Voltage Accuracy	%	±1.6							
Max Ripple & Noise	mV	150			200		280		250
Max Line Regulation	mV	10			24	30	48	56	96
Max Load Regulation	mV	10			24	30	48	56	96
Overcurrent Protection	A	105 - 150% automatic recovery							
Overvoltage Protection (1)	%	120-160	120-140	125-145					135-155
Remote Sense	-	Yes							
Remote On/Off	-	Standard; Low = ON, Open = OFF /P option; Low = OFF, Open = ON)							
Operating Temperature	-	-40°C to +100°C baseplate							
Overtemperature	-	Shutdown between 105 - 130°C, Auto restart							
Cooling	-	Conduction (See Installation Manual for heatsink selection)							
Isolation Voltage	V	Input - Baseplate 1500VAC, Input - Output 1500VAC, Output-Baseplate 500VDC							
Shock	-	196.1m/s^2							
Vibration	-	Non Operating, 10-55Hz (sweep for 1 min.)							
Amplitude	-	0.825mm constant (Max 49 m/s^2) X,Y,Z 1 hour each							
Safety Agency Approvals	-	UL60950-1, CSA60950-1, EN60950-1, CE LVD							
Weight (Typ)	g	80							
Size (WxHxD)	in(mm)	2.28x0.5x2.4 (57.9x12.7x61) See outline drawing							
Warranty	-	2 Years							

(1) See options table.
General: See Installation Manual for full details, test methods of parameters and application notes

TDK·Lambda

PAH Series

Model Selector

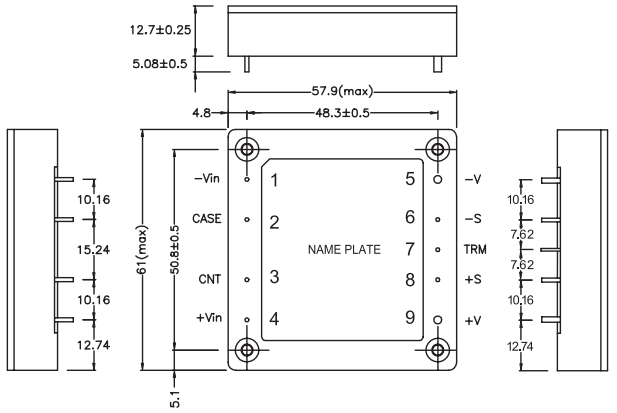
Model Name	Output Voltage	Adjustment	Output Current	Maximum Power
PAH50S48-2.5	2.5	2.25 - 2.75	11.70	29.3
PAH75S48-2.5	2.5	2.25 - 2.75	17.50	43.8
PAH100S48-2.5	2.5	2.25 - 2.75	23.40	58.5
PAH150S48-2.5	2.5	2.25 - 2.75	35.00	87.5
PAH50S48-3.3	3.3	2.97 - 3.63	11.70	38.6
PAH75S48-3.3	3.3	2.97 - 3.63	17.50	57.8
PAH100S48-3.3	3.3	2.97 - 3.63	23.40	77.2
PAH150S48-3.3	3.3	2.97 - 3.63	35.00	115.5
PAH50S48-5	5.0	3.0 - 5.75	10.00	50.0
PAH75S48-5	5.0	3.0 - 5.75	15.00	75.0
PAH100S48-5	5.0	3.0 - 5.75	20.00	100.0
PAH150S48-5	5.0	3.0 - 5.75	30.00	150.0
PAH50S48-12	12.0	7.2 - 13.2	4.20	50.4
PAH75S48-12	12.0	7.2 - 13.2	6.30	75.6
PAH100S48-12	12.0	7.2 - 13.2	8.40	100.8
PAH150S48-12	12.0	7.2 - 13.2	12.50	150.0
PAH200S48-12	12.0	7.2 - 13.2	16.70	200.4
PAH50S48-15	15.0	9.0 - 16.5	3.40	51.0
PAH75S48-15	15.0	9.0 - 16.5	5.00	75.0
PAH100S48-15	15.0	9.0 - 16.5	6.70	100.5
PAH150S48-15	15.0	9.0 - 16.5	10.00	150.0
PAH200S48-15	15.0	9.0 - 16.5	13.40	201.0
PAH50S48-24	24.0	14.4 - 26.4	2.10	50.4
PAH75S48-24	24.0	14.4 - 26.4	3.20	76.8
PAH100S48-24	24.0	14.4 - 26.4	4.20	100.8
PAH150S48-24	24.0	14.4 - 26.4	6.30	151.2
PAH200S48-24	24.0	14.4 - 26.4	8.40	201.6
PAH50S48-28	28.0	16.8 - 30.8	1.80	50.4
PAH75S48-28	28.0	16.8 - 30.8	2.70	75.6
PAH100S48-28	28.0	16.8 - 30.8	3.60	100.8
PAH150S48-28	28.0	16.8 - 30.8	5.40	151.2
PAH200S48-28	28.0	16.8 - 30.8	7.20	201.6
PAH150S48-48	48.0	38.4 - 57.6	3.20	153.6

Options

Suffix	ON/OFF Control	Overvoltage
-	Negative	Manual Reset
/P	Positive	Manual Reset
/V*	Negative	Auto Reset
/PV	Positive	Auto Reset

* Standard US Stock Item.

Outline Drawing



Pinout

Pin Description	Function
-Vin	Negative Input Terminal
+Vin	Positive Input Terminal
Case	Baseplate Terminal
CNT	On / Off Control terminal
+V	Positive Output Terminal
-V	Negative Output Terminal
TRIM	Output adjustment Trim pin
+S	Positive Remote sense
-S	Negative Remote sense

Other DC-DC Products

PAF	400-700W Full Brick DC-DC
PAH75D	Dual output Half Bricks
PAH200H	High Efficiency Half Brick
PAQ	Quarter brick DC-DC
CC-E	1.5 to 30W, 5-48V Input DC-DC
PX	10-60W, 12-48VDC Input DC-DC converters

For Additional Information, please visit
us.tdk-lambda.com/lp/products/pah-series.htm

3055 Del Sol Blvd • San Diego, CA 92154 • 1-800-526-2324

Revision A4: Dec 2006

TDK·Lambda

PAH300-450 Series

300W to 450W Half Brick Converters

RoHS

- Standard Half Brick Footprint
- 18-36 or 36-76VDC Inputs
- 12V 29A - 48V 9.4A Nominal Outputs
- Through Hole Mounting
- Low 12.7mm Profile

Key Market Segments & Applications

Base Station Power Amplifiers
Bus converters for Distributed Power Architectures

Features and Benefits

Feature	Benefit
◆ High operating efficiencies (up to 92%)	◆ Reduced system heating, smaller size
◆ Constant switching frequency	◆ Easier system filtering
◆ Baseplate cooling	◆ Allows improved thermal management with optional heatsink

Specifications

ITEM \ MODELS		PAH300S, 350S, 450S (see model selector)		
Nominal Output Voltage	VDC	12V	28V	48V
Input Voltage range	VDC	18-36 or 36-76		
Input Current (Max)	A	6.8-17.4A (model dependant)		
Output Voltage Adjustment	VDC	7.2 - 13.2	16.8 - 33	28.8 - 57.6 (5)
Ripple & Noise (max) (pk to pk)	mV	200	280(1)	480
Line Regulation (max)	mV	24	56	96
Load Regulation (max)	mV	24	56	96
Overload Protection	%	105 - 140%, constant current with auto recovery		
Overvoltage Protection (3)	%	115-135%	125-140%(2)	125-145% (6)
Remote Sense	-	Yes		
Remote On / Off (See options)	-	Standard; Low = ON, Open = OFF /P option; Low = OFF, Open = ON		
Temperature (operating)	°C	-40°C to +100°C baseplate, full power(4)		
Temperature (storage)	°C	-40°C to +100°C		
Temperature Coefficient	-	0.02%/°C		
Humidity (operating)	-	5-95% RH Non condensing		
Humidity (storage)	-	5-95% RH Non condensing		
Cooling	-	Conduction (See Installation Manual for heatsink selection)		
Isolation Voltage	VDC	1500VDC Input to output & baseplate, 500VDC Output to baseplate		
Vibration	-	Non Operating, 10-55Hz (sweep for 1 min.)		
Amplitude	-	0.825mm constant (Max 49 m/s^2) X,Y,Z 1 hour each		
Shock	-	196.1m/s^2		
Safety Agency Approvals	-	UL60950-1, CSA60950-1, EN60950-1, CE LVD (48V input models only)		
Weight (Typ)	g	110		
Size (WxHxD)	in(mm)	2.4x0.5x2.28 (61x12.7x57.9) See outline drawing		
Warranty	yrs	2 Years		

Note: See Installation Manual for full details, test methods of parameters and application notes
(1) 240mV for PAH300
(2) 125-145% for PAH450S48-28
(3) Manual reset
(4) PAH350S24-28 & -48: derate linearly to 85% load from 90°C to 100°C
(5) 28.8-52.8 PAH350S28-48
(6) 115-140% PAH350S28-48

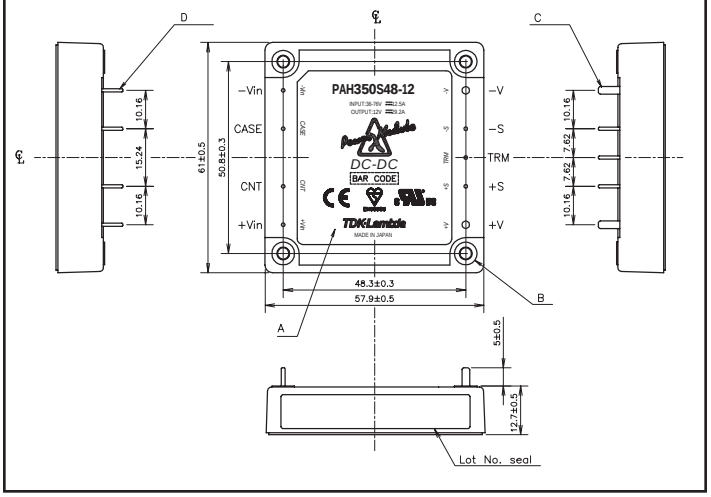
TDK·Lambda

PAH300-450 Series

Model Selector

Model	Input Voltage (V)	Output Voltage (V)	Max. Curr. (A)	Max. Output Power (W)	Efficiency Typ. (%)
PAH300S24-12	18 - 36	12	25	300	87
PAH300S48-12	36 - 76	12	25	300	90
PAH350S48-12	36 - 76	12	29.2	350	89
PAH300S24-28	18 - 36	28	11	308	88
PAH350S24-28	18 - 36	28	12.5	350	88
PAH350S24-48	18 - 36	48	7.3	350	87
PAH300S48-28	36 - 76	28	11	308	90
PAH350S48-28	36 - 76	28	12.5	350	89
PAH450S48-28	36 - 76	28	16	448	92
PAH450S48-48	36 - 76	48	9.4	451	92

Outline Drawing



For Additional Information, please visit
us.tdk-lambda.com/lp/products/pah300-series.htm

Pinout

Pin Description	Function
-Vin	Negative Input Terminal
+Vin	Positive Input Terminal
CNT	On / Off Control terminal
+V	Positive Output Terminal
-V	Negative Output Terminal
TRIM	Output adjustment Trim pin
+S	Positive Remote sense
-S	Negative Remote sense

Options

Suffix	Description
-	M3 Tapped inserts for mounting
/T	M3 clearance inserts for mounting
/P	Positive logic remote On/Off (Not on PAH450S)

Other DC-DC Products

PAF	400-700W Full brick DC-DC
PAH	Other half brick DC-DC converters
PAQ	Quarter brick DC-DC converters
PAE	Eighth brick DC-DC converters
PX	10-48W, 12-48V DC-DC

3055 Del Sol Blvd • San Diego, CA 92154 • 1-800-526-2324
Revision A3: Jan 2010

TDK·Lambda

PH-F Series

Full function, 50 to 300W DC-DC converters

RoHS

- High Density
- Wide Range Input
- Wide output adjustment capability
- Remote On/Off
- Fixed Switching Frequency
- International Safety Approvals
- Parallel Operation

Key Market Segments & Applications

Telecom
Custom Power Supplies
N+1 redundant systems
Scalable systems
Point of Load

Features and Benefits

Feature	Benefit
◆ Low component count	◆ High reliability demonstrated 5 million hours MTBF
◆ Wide output adjustment	◆ Avoids the need for custom modules
◆ Signals to support N+1 redundancy	◆ Ease of use in redundant configurations
◆ Variety of input voltages	◆ Systems can operate from different input voltages

Specifications

ITEMS		2V	3.3V	5V	12V	15V	24V	28V
Input range	VDC	24V nom: 18-36, 48V nom: 36-76V, 110V nom: 82-185V, 280V nom: 200-400V						
Output Voltage Adj. Range	VDC	1.6~2.4	2.64~3.96	2~6	4.8~14.4	6~18	9.6~28.8	11.2~33.6
Line Regulation	-	0.4% or 20mV (whichever is greater) over entire input range with constant load						
Load Regulation	-	0.8% or 40mV (whichever is greater) from no load to full load with constant input line						
Ripple and Noise	pk-pk	100mV			150mV		240mV	280mV
Series Operation	-	Possible - Refer to installation manual						
Over Voltage Protection	-	150 - 180%		125 - 145%				
Overload Protection	-	Approximately 105 - 140%, automatic recovery						
Remote On/Off	-	Low = ON, Open = OFF						
Remote Sensing	-	Yes						
Parallel operation	-	Using current share pin (PC). Will share within 5%, see app. notes for connection details						
Inverter Good signal	-	Signal available for status of inverter						
Auxiliary Bias Supply	-	8V 10mA auxiliary voltage to supply power to interface circuits (AUX pin)						
Thermal Protection	-	Internal sensing, self resetting						
Cooling	-	Conduction or forced air. See application notes for cooling and heatsink selection						
Operating Temperature Range	-	Baseplate temperature -20°C to +85°C. -40°C start up possible - consult factory						
Storage Temperature	-	-40°C to +85°C						
Temperature Coefficient	-	0.02%/°C						
Isolation	-	Input to output: 3000VAC, Input to Baseplate: 2500VAC(1)						
Isolation Resistance	-	Output to Baseplate -100MOhm at 500VDC and 70%RH						
Safety Agency Approval	-	UL60950-1, CSA60950-1, EN60950-1 and CE Mark.						
Warranty	-	Two years						

Note: See Installation Manual for full details, test methods of parameters and application notes
(1) 24V input models input to output: 2kVAC; input to baseplate: 2kVAC

TDK·Lambda

PH-F Series

Model Selector

Nominal Output Voltage (V)	Output Current (A)	Output Power (W)	24V input	48V input	110V input	280V input
2.0	15.0	30	-	PH75F48-2	PH75F110-2	PH75F280-2
2.0	20.0	40	PH100F24-2	-	-	-
2.0	30.0	60	-	PH150F48-2	PH150F110-2	PH150F280-2
2.0	60.0	120	-	PH300F48-2	PH300F110-2	PH300F280-2
3.3	15.0	45	-	PH75F48-3	PH75F110-3	PH75F280-3
3.3	20.0	60	PH100F24-3	-	-	-
3.3	30.0	90	-	PH150F48-3	PH150F110-3	PH150F280-3
3.3	60.0	180	-	PH300F48-3	PH300F110-3	PH300F280-3
5.0	15.0	75	-	PH75F48-5	PH75F110-5	PH75F280-5
5.0	20.0	100	PH100F24-5	-	-	-
5.0	30.0	150	-	PH150F48-5	PH150F110-5	PH150F280-5
5.0	60.0	300	-	PH300F48-5	PH300F110-5	PH300F280-5
12.0	6.3	75	-	PH75F48-12	PH75F110-12	PH75F280-12
12.0	8.4	100	PH100F24-12	-	-	-
12.0	12.5	150	-	PH150F48-12	PH150F110-12	PH150F280-12
12.0	20.0	240	PH300F24-12	-	-	-
12.0	25.0	300	-	PH300F48-12	PH300F110-12	PH300F280-12
15.0	5.0	75	-	PH75F48-15	PH75F110-15	PH75F280-15
15.0	6.7	100	PH100F24-15	-	-	-
15.0	10.0	150	-	PH150F48-15	PH150F110-15	PH150F280-15
15.0	20.0	300	-	PH300F48-15	PH300F110-15	PH300F280-15
24.0	3.2	75	-	PH75F48-24	PH75F110-24	PH75F280-24
24.0	4.2	100	PH100F24-24	-	-	-
24.0	6.3	150	-	PH150F48-24	PH150F110-24	PH150F280-24
24.0	12.6	300		PH300F48-24	PH300F110-24	PH300F280-24
28.0	2.7	50	-	PH75F48-28	PH75F110-28	PH75F280-28
28.0	3.6	100	PH100F24-28	-	-	-
28.0	5.4	150	-	PH150F48-28	PH150F110-28	PH150F280-28
28.0	10.8	300	PH300F24-28	PH300F48-28	PH300F110-28	PH300F280-28

Pinout

Pin Description	Function
-Vin	Negative Input Terminal
+Vin	Positive Input Terminal
+S	Positive Remote sense
-S	Negative Remote sense
+V	Positive Output Terminal
-V	Negative Output Terminal
AUX	Bias voltage output (secondary reference)
IOG	DC Good
TRIM	Output adjustment trim pin
CNT	On/Off Control Terminal
SG	Signal (CNT RTN)
PC	Parallel control connection

Other DC-DC Products

PH Simple Func.	50 - 300W, lower cost version of PH
PAQ, PAH, PAF	50 - 700W quarter, half & full bricks
PX	10-40W, 12-48V input, DC-DC
CC-E	1.5-30W, 5-48V input, DC-DC

For Additional Information, please visit
us.tdk-lambda.com/lp/products/ph-series-ff.htm

3055 Del Sol Blvd • San Diego, CA 92154 • 1-800-526-2324

Revision A4: Feb 2007

TDK·Lambda

PH-S Series

Simple function, 50 to 600W DC-DC converters

- High Density
- Wide Range Input
- Output adjustment Capability
- Remote On/Off
- Fixed Switching Frequency
- International Safety Approvals

RoHS

Key Market Segments & Applications

Telecom
Custom Power Supplies
Point of Load

Features and Benefits

Feature	Benefit
◆ High density	◆ Smaller package size
◆ Low component count	◆ High reliability Demonstrated 5 million hours MTBF
◆ Fixed operating frequency	◆ Easier system filtering
◆ Variety of input voltages	◆ Systems can operate from different input voltages

Specifications

ITEMS		3.3V	5V	12V	15V	24V	28V	48V
Input range	VDC	24V nom: 18-36, 48V nom: 36-76V, 110V nom: 82-185V, 280V nom: 200-400V						
Output Voltage Adj. Range	VDC	2.97~3.63	4.5~5.5	10.8~13.2	13.5~16.5	21.6~26.4	25.2~30.8	43.2~52.8
Line Regulation		0.4% or 20mV (whichever is greater) over entire input range with constant load						
Load Regulation		0.8% or 40mV (whichever is greater) from no load to full load with constant input line						
Ripple and Noise	pk-pk	100mV		150mV		240mV	280mV	480mV
Series Operation	-	Possible - Refer to installation manual						
Over Voltage Protection	-	150 - 180%	125 - 145%					
Overload Protection	-	Approximately 105 - 140%, automatic recovery						
Remote On/Off	-	Low = ON, Open = OFF						
Remote Sensing	-	PH100S, PH150S, PH300S, PH600S models						
Parallel operation	-	PH300S & PH600S only: Requires external circuitry						
Inverter Good signal	-	PH300S & PH600S only: Signal available for status of inverter						
Thermal Protection	-	Internal sensing, self resetting						
Cooling	-	Conduction or forced air. See application notes for cooling and heatsink selection						
Operating Temperature Range	- -	Baseplate temperature -20°C to +85°C (100°C on PH300 & PH600). -40°C start up possible - consult factory						
Storage Temperature	-	-40°C to +85°C (+100°C on PH300 & PH600)						
Temperature Coefficient	-	0.02%/°C						
Isolation	-	Input to output: 3000VAC, Input to Baseplate: 2500VAC(1)						
Isolation Resistance	-	Output to Baseplate -100MOhm at 500VDC and 70%RH						
Safety Agency Approval	-	UL60950-1, CSA60950-1, EN60950-1 and CE Mark.						
Warranty	-	Two years						

Note: See Installation Manual for full details, test methods of parameters and application notes

TDK·Lambda

PH-S Series

Model Selector

Nominal Output Voltage (V)	Output Current (A)	Output Power (W)	24V input	48V input	110V input	280V input
3.3	10.0	33.0	-	PH50S48-3.3	-	PH50S280-3.3
3.3	15.0	49.5	-	PH75S48-3.3	-	PH75S280-3.3
3.3	20.0	66.0	-	PH100S48-3.3	-	PH100S280-3.3
3.3	30.0	99.0	-	PH150S48-3.3	-	PH150S280-3.3
3.3	50.0	165.0	-	-	-	PH300S280-3.3
3.3	100.0	330.0	-	-	-	PH600S280-3.3
5.0	10.0	50.0	PH50S24-5	PH50S48-5	PH50S110-5	PH50S280-5
5.0	15.0	75.0	-	PH75S48-5	PH75S110-5	PH75S280-5
5.0	20.0	100.0	-	PH100S48-5	-	PH100S280-5
5.0	30.0	150.0	-	PH150S48-5	PH150S110-5	PH150S280-5
5.0	50.0	250.0	-	-	-	PH300S280-5
5.0	100.0	500.0	-	-	-	PH600S280-5
12.0	4.2	50.0	PH50S24-12	PH50S48-12	PH50S110-12	PH50S280-12
12.0	6.3	75.0	-	PH75S48-12	PH75S110-12	PH75S280-12
12.0	8.4	100.0	-	PH100S48-12	-	PH100S280-12
12.0	12.5	150.0	-	PH150S48-12	PH150S110-12	PH150S280-12
12.0	25.0	300.0	-	-	-	PH300S280-12
12.0	50.0	600.0	-	-	-	PH600S280-12
15.0	3.4	50.0	PH50S24-15	PH50S48-15	PH50S110-15	PH50S280-15
15.0	5.0	75.0	-	PH75S48-15	PH75110-15	PH75S280-15
15.0	6.7	100.0	-	PH100S48-15	-	PH100S280-15
15.0	10.0	150.0	-	PH150S48-15	PH150S110-15	PH150S280-15
15.0	20.0	300.0	-	-	-	PH300S280-15
15.0	40.0	600.0	-	-	-	PH600S280-15
24.0	2.1	50.0	PH50S24-24	PH50S48-24	PH50S110-24	PH50S280-24
24.0	3.2	75.0	-	PH75S48-24	PH75S110-24	PH75S280-24
24.0	4.2	100.0	-	PH100S48-24	-	PH100S280-24
24.0	6.3	150.0	-	PH150S48-24	PH150S110-24	PH150S280-24
24.0	12.5	300.0	-	-	-	PH300S280-24
24.0	25.0	600.0	-	-	-	PH600S280-24
28.0	1.8	50.0	PH50S24-28	PH50S48-28	PH50S110-28	PH50S280-28
28.0	2.7	75.0	-	PH75S48-28	PH75S110-28	PH75S280-28
28.0	3.6	100.0	-	PH100S48-28	-	PH100S280-28
28.0	5.4	150.0	-	PH150S48-28	PH150S110-28	PH150S280-28
28.0	10.8	302.0	-	-	-	PH300S280-28
28.0	21.5	602.0	-	-	-	PH600S280-28
48.0	6.3	302.0	-	-	-	PH300S280-48
48.0	12.5	600.0	-	-	-	PH600S280-48

Pinout

Pin Description	Function
-Vin	Negative Input Terminal
+Vin	Positive Input Terminal
+S	Positive Remote sense
-S	Negative Remote sense
+V	Positive Output Terminal
-V	Negative Output Terminal
IOG	Inverter Good Signal
TRIM	Output adjustment trim pin
CNT	On/Off Control Terminal
CS	Current Monitor Signal

Other DC-DC Products

PH Full Function	50 - 300W, full function versions of PH
PAQ, PAH, PAF	50 - 700W quarter, half & full bricks
PX	10-40W, 12-48V input, DC-DC
CC-E	1.5-30W, 5-48V input, DC-DC

For Additional Information, please visit
us.tdk-lambda.com/lp/products/ph-series-sf.htm

3055 Del Sol Blvd • San Diego, CA 92154 • 1-800-526-2324

Revision A9: Jul 2010

TDK·Lambda

PXA Series

Single Output 15W DC-DC Converters

- Industry Standard 1" x 1" Footprint
- Through hole or Surface Mount versions
- Agency Approved
- 12V, 24V and 48V Inputs

RoHS

Key Market Segments & Applications

Telecom	Datacom
Point of Load	Process Control

Features and Benefits

Feature	Benefit
◆ 1" x 1" footprint	◆ Can replace older 2 x 1" models
◆ Wide range input (PXA15W)	◆ Less parts to inventory

Specifications

ITEMS		PXA15	PXA15W
Max Output Power	W	15W	15W
Voltage Accuracy	%	±1%	
Voltage Adjustment (T Suffix)	%	±10%	
Minimum Load	-	None	
Line Regulation	%	±0.2%	
Load Regulation (0% to 100%)	%	±0.2%	
Start up time	ms	30ms	
Remote on/off	-	Negative Logic /N (standard): ON: Short or <1.2V, OFF: Open or 3-15V Positive Logic /P (optional): ON: Open or 3-15V, OFF Short or <1.2V	
Temperature Coefficient	°C	<±0.02%/°C	
Operating Temperature	°C	-40 to +85°C (See derating curves)	
Storage Temperature	°C	-55 to 125°C	
Thermal Shock	-	MIL-STD-810F	
Relative Humidity (non condensing)	%	5 to 95%	
Transient Response (25% step load change)	µs	200µs recovery	300µs recovery
Overvoltage Protection (Zener clamp)		1.5-3.3V: 3.9V, 5V: 6.2V, 12V: 15V, 15V: 18V	
Overcurrent and Short Circuit Protection		Typically at 150%, hiccup with self recovery	
Input Surge Voltage (Maximum for 100ms)	VDC	12V input: 36V, 24V input: 50V, 48V input: 100V	
Reflected input ripple (peak to peak)	mA	30mA	
Isolation Voltage	VDC	2250VDC minimum	
Isolation Resistance	Ω	109 Ohms minimum	
Isolation Capacitance (max)	pF	1000pF	1500pF
Typical Switching Frequency (Fixed)	kHz	3.3, 5V: 270kHz; 12,15V: 470kHz	3.3, 5V: 350kHz; 12,15V: 400kHz
MTBF (BELLCORE TR-NWT-000332)	Hours	2,200,000	1,322,000
Vibration	-	MIL-STD-810F	
Conducted and Radiated Emissions	-	EN55022 Level A	
Immunity	-	EN61000-4-3,-4,-5,-6	
Safety Agency Approval	-	IEC60950-1, UL60950-1, EN60950-1, CE Mark	
Size (L x W x H)	in	1.1 x 0.94 x 0.34"	
Mounting	-	Through Hole standard; Surface Mount (option "S")	
Weight	g	10.5	
Warranty	yrs	Two Years	

Notes:
See installation manual

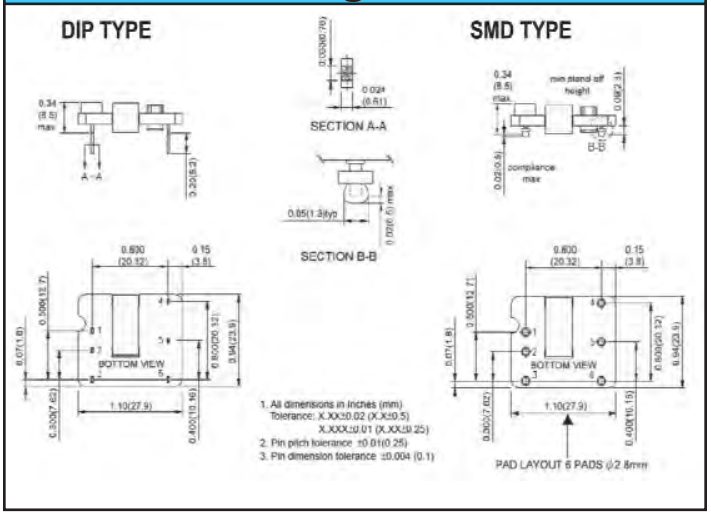
TDK·Lambda

PXA Series

Model Selector

Output Voltage (VDC)	Output Current (A)	Output Power (W)	Input Voltage (VDC)	Model	Ripple & Noise (Pk-Pk mV)	Nominal Input Current (mA)	Efficiency (%)	Maximum Load Capacitance (uF)
3.3	4	13.2	9 - 36	PXA15-24WS3P3/NT	100	680	85	1000
3.3	3.5	11.5	18 - 36	PXA15-24S3P3/NT	75	587	86	1000
3.3	4	13.2	18 - 75	PXA15-48WS3P3/NT	100	340	85	1000
3.3	3.5	11.5	36 - 75	PXA15-48S3P3/NT	75	297	85	1000
5	3	15	9 - 36	PXA15-24WS05/NT	100	754	87	1000
5	3	15	18 - 36	PXA15-24S05/NT	75	753	87	1000
5	3	15	18 - 75	PXA15-48WS05/NT	100	377	87	1000
5	3	15	36 - 75	PXA15-48S05/NT	75	377	87	1000
12	1.3	15.6	9 - 36	PXA15-24WS12/NT	100	793	86	330
12	1.25	15	18 - 36	PXA15-24S12/NT	100	753	87	330
12	1.3	15.6	18 - 75	PXA15-48WS12/NT	100	397	86	330
12	1.25	15	36 - 75	PXA15-48S12/NT	100	377	87	330
15	1	15	9 - 36	PXA15-24WS15/NT	100	763	86	220
15	1	15	18 - 36	PXA15-24S15/NT	100	744	88	220
15	1	15	18 - 75	PXA15-48WS15/NT	100	382	86	220
15	1	15	36 - 75	PXA15-48S15/NT	100	372	88	220

Outline Drawing



Pinout

Pin #	Function
1	+ Input
2	- Input
3	Remote On/Off
4	+ Output
5	Trim
6	- Output

Options

N	Negative logic remote on/off
P	Positive logic remote on/off
S	Surface mount termination
T	Trim - remote adjust
Preferred	Example PXA15-24WS3P3/NT

Other Industrial Products

CC-E	1.5 - 30W, 5, 12, 24 & 48V DC-DC
PX	10 - 60W, 12, 24 & 48V DC-DC

For Additional Information, please visit
us.tdk-lambda.com/lp/products/px-series.htm

3055 Del Sol Blvd • San Diego, CA 92154 • 1-800-526-2324

Revision A1: Jul 2009

TDK·Lambda

PXB Series

Single & Dual Output 15W DC-DC Converters

- Industry Standard 1" x 1" Footprint
- Through Hole
- Agency Approved

RoHS

Key Market Segments & Applications

Telecom	Datacom
Point of Load	Process Control

Features and Benefits

Feature	Benefit
1" x 1" footprint	Can replace older 2x1" models
Wide range input (PXB15-xxW)	Less parts to inventory
Six sided shielding	Reduced radiated noise

Specifications

ITEMS		PXB15-xxS	PXB15-xxWS	PXB15-xxD	PXB15-xxWD
Max Output Power	W	15W			
Voltage Accuracy	%	±1%			
Voltage Adjustment (T Suffix)	%	±10%		n/a	
Minimum Load	-	None		25% each output	
Line Regulation	%	±0.2%		±0.5%	
Load Regulation (0% to 100%)	%	±0.2%		±1.0%	
Start up time	ms	30ms			
Remote on/off	-	Negative Logic /N (standard): ON: Short or <1.2V, OFF: Open or 3-15V Positive Logic /P (optional): ON: Open or 3-15V, OFF Short or <1.2V			
Temperature Coefficient	°C	<±0.02%/°C			
Operating Temperature	°C	-40 to +85oC (See derating curves)			
Maximum Case Temperature	°C	105°C			
Storage Temperature	°C	-55 to 125°C			
Thermal Shock	-	MIL-STD-810F			
Relative Humidity (non condensing)	%	5 to 95%			
Transient Response (25% step load change)	µs	250µs recovery			
Overvoltage Protection (Zener clamp)	VDC	3.3V (3.7-5.4); 5V (5.6-7.0); 12V (13.5-19.6); 15V (16.8-20.5)			
Overcurrent and Short Circuit Protection	-	Typically at 150%, hiccup with self recovery			
Input Surge Voltage (Maximum for 100ms)	VDC	12V input: 36V, 24V input: 50V, 48V input: 100V			
Reflected input ripple (peak to peak)	mA	30mA			
Isolation Voltage (Input to Output)	VDC	1600VDC minimum			
Isolation Voltage I/P to Case , O/P to Case	VDC	1000VDC minimum			
Isolation Resistance	Ω	109 Ohms minimum			
Isolation Capacitance (max)	pF	1000pF			
Typical Switching Frequency (Fixed)	Hz	400kHz			
MTBF (BELLCORE TR-NWT-000332)	Hours	1,330,000			
Vibration	-	MIL-STD-810F			
Conducted and Radiated Emissions	-	EN55022 Level A			
Immunity		EN61000-4-2,-3,-4,-5,-6			
Safety Agency Approval	-	IEC60950-1, UL60950-1, EN60950-1, CE Mark			
Size (L x W x H)	inches	1 x 1 x 0.39"			
Mounting	-	Through Hole			
Weight	g	15			
Warranty	yrs	Two Years			

Notes:
See installation manual

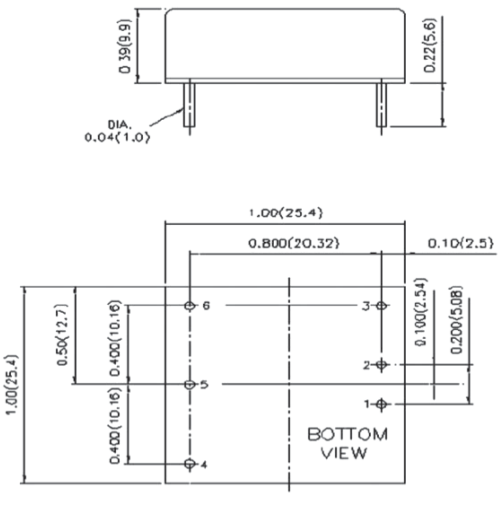
TDK·Lambda

PXB Series

Model Selector

Output Voltage (VDC)	Output Current (A)	Output Power (W)	Input Voltage (VDC)	Model	Ripple & Noise (Pk-Pk mV)	Nominal Input Current (mA)	Efficiency (%)	Maximum Load Capacitance (uF)
3.3	4	13.2	9 - 18	PXB15-12S3P3/NT	75	1375	84	1000
3.3	4	13.2	9 - 36	PXB15-24WS3P3/NT	75	688	86	1000
3.3	4	13.2	18 - 36	PXB15-24S3P3/NT	75	671	86	1000
3.3	4	13.2	18 - 75	PXB15-48WS3P3/NT	75	336	86	1000
3.3	4	13.2	36 - 75	PXB15-48S3P3/NT	75	336	86	1000
5	3	15	9 - 18	PXB15-12S05/NT	75	1524	86	1000
5	3	15	9 - 36	PXB15-24WS05/NT	75	762	86	1000
5	3	15	18 - 36	PXB15-24S05/NT	75	763	86	1000
5	3	15	18 - 75	PXB15-48WS05/NT	75	382	86	1000
5	3	15	36 - 75	PXB15-48S05/NT	75	372	88	1000
12	1.3	15.6	9 - 18	PXB15-12S12/NT	100	1605	85	330
12	1.3	15.6	9 - 36	PXB15-24WS12/NT	100	783	87	330
12	1.3	15.6	18 - 36	PXB15-24S12/NT	100	783	87	330
12	1.3	15.6	18 - 75	PXB15-48WS12/NT	100	392	87	330
12	1.3	15.6	36 - 75	PXB15-48S12/NT	100	387	88	330
15	1	15	9 - 18	PXB15-12S15/NT	100	1506	87	220
15	1	15	9 - 36	PXB15-24WS15/NT	100	753	87	220
15	1	15	18 - 36	PXB15-24S15/NT	100	744	88	220
15	1	15	18 - 75	PXB15-48WS15/NT	100	377	87	220
15	1	15	36 - 75	PXB15-48S15/NT	100	372	88	220
Dual Outputs								
±5	±1.5	15	9-18	PXB15-12D05/N	100	1543	85	±500
±5	±1.5	15	9-36	PXB15-24WD05/N	100	772	85	±500
±5	±1.5	15	18-36	PXB15-24D05/N	100	772	85	±500
±5	±1.5	15	18-75	PXB15-48WD05/N	100	386	85	±500
±5	±1.5	15	36-75	PXB15-48D05/N	100	386	85	±500
±12	±0.625	15	9-18	PXB15-12D12/N	100	1506	87	±150
±12	±0.625	15	9-36	PXB15-24WD12/N	100	753	87	±150
±12	±0.625	15	18-36	PXB15-24D12/N	100	744	88	±150
±12	±0.625	15	18-75	PXB15-48WD12/N	100	382	86	±150
±12	±0.625	15	36-75	PXB15-48D12/N	100	368	89	±150
±15	±0.500	15	9-18	PXB15-12D15/N	100	1488	88	±100
±15	±0.500	15	9-36	PXB15-24WD15/N	100	744	88	±100
±15	±0.500	15	18-36	PXB15-24D15/N	100	744	88	±100
±15	±0.500	15	18-75	PXB15-48WD15/N	100	377	87	±100
±15	±0.500	15	36-75	PXB15-48D15/N	100	372	88	±100

Outline Drawing



1. All dimensions in Inches (mm)
   Tolerance: X.XX±0.02 (X.X±0.5)
   X.XXX±0.01 (X.XX±0.25)
2. Pin pitch tolerance ±0.01(0.25)
3. Pin dimension tolerance ±0.004 (0.1)

Pinout

Pin #	Function	
	Single Output	**Dual Output**
1	+ Input	+ Input
2	- Input	- Input
3	Remote On/Off	Remote On/Off
4	+ Output	+ Output
5	Trim	Common
6	- Output	- Output

Options

N	Negative logic remote on/off
P	Positive logic remote on/off
T	Trim - remote adjust (single output models only)
Preferred	Example PXB15-24WS3P3/NT

Other Industrial Products

CC-E	1.5 - 30W, 5, 12, 24 & 48V DC-DC
PX	10 - 60W, 12, 24 & 48V DC-DC

For Additional Information, please visit
us.tdk-lambda.com/lp/products/px-series.htm

3055 Del Sol Blvd • San Diego, CA 92154 • 1-800-526-2324

Revision A2: May 2010

TDK·Lambda

PXD Series

Single and Dual Output 10 to 20W DC-DC Converters

- Industry Standard 2" x 1" Footprint
- Six Sided Shielding
- Agency Approved
- 12V, 24V and 48V Inputs

RoHS

Key Market Segments & Applications

Telecom, Datacom, Point of Load

Features & Benefits

Feature	Benefit
◆ UL, CSA, EN, CE approvals	◆ Easier system approvals
◆ Wide range input	◆ Less parts to inventory
◆ Six sided shielding	◆ Reduced radiated noise

Specifications

ITEMS		PXD10	PXD15	PXD20
Max Output Power		10W	15W	20W
Voltage Accuracy		±2%	±1%	±1%
Voltage Adjustment (Single Output Only)		None	None	±10%
Minimum Load, each output	(1)	10%	10%	Single 0%; Dual 10%
Line Regulation		±1%	±1%	±0.2%
Load Regulation (10% to 100%)		Single Output: ±1% Dual Output: ±2%	Single Output: ±1% Dual Output: ±2%	±0.5%
Cross Regulation (25% to 100%)			±5%	
Ripple and Noise		Single 50mV, Dual 75mV		Single 75mV, Dual 100mV
Start up time		20ms		10ms
Remote on/off	(3)	Positive Logic: ON: Open or 3.5-12V, OFF Short or <1.2V Negative Logic: ON: Short or <1.2V, OFF: Open or 3.5-12V		
Temperature Coefficient		<±0.02%/°C		
Operating Temperature		See derating curves		
Maximum Case Temperature		100°C		
Storage Temperature		-55 to 105°C		
Thermal Shock		MIL-STD-810D		
Relative Humidity		5 to 95% (non condensing)		
Transient Response (25% step load chg.)		500us recovery	500us recovery	300us recovery
Overvoltage Protection (Zener clamp)		1.5-3.3V: 3.9V, 5V: 6.2V, 12V: 15V, 15V: 18V		
Overcurrent & Short Circuit Protection		Typically at 150%, hiccup with self recovery		
Input Surge Voltage (Max. for 100ms)		12V input: 36V, 24V input: 50V, 48V input: 100V		
Reflected input ripple (peak to peak)	(2)	30mA	20mA	20mA
Isolation Voltage		1600VDC minimum		
Isolation Resistance		10^9 Ohms minimum		
Isolation Capacitance (max)		300pF		1000pF
Typical Switching Frequency (Fixed)		300kHz	Single: 500kHz Dual: 300kHz	500kHz
MTBF (BELLCORE TR-NWT-000332)		1,976,000 hours	2,041,000 hours	1,791,000 hours
Vibration		10 - 55Hz, 2G, 30 minutes each X, Y, Z axis		
Conducted and Radiated Emissions		EN55022 Level A		
Immunity		EN61000-4-2, -3, -4, -5, -6 Pref Criteria 2		
Safety Agency Approval		IEC60950-1, UL60950-1, EN60950-1, CE Mark (48V input only)		
Size (L x W x H)		2x1x0.4"		
Weight		0.95 oz (27g)		
Warranty		Two Year		

Notes:
(1) To meet regulation & noise specifications. Operation at zero load will not damage the device
(2) 12uH source impedance in series with + input
(3) Positive logic standard on 20W (see options table). Input current 2.5mA

* See website for detailed specifications

TDK·Lambda

PXD Series

Model Selector

Output Volt (V)	Output Curr (A)	Output Power (W)	Input Volt (V)	Model	Eff.(%)
3.3	2.0	6.6	9 - 18VDC	PXD10-12S3P3	80
3.3	2.0	6.6	18 - 36VDC	PXD10-24S3P3	80
3.3	2.0	6.6	36 - 75VDC	PXD10-48S3P3	79
3.3	5.0	16.5	9 - 18VDC	PXD20-12S3P3	84
3.3	5.0	16.5	18 - 36VDC	PXD20-24S3P3	86
3.3	5.0	16.5	36 - 75VDC	PXD20-48S3P3	87
5	2.0	10	9 - 36VDC	PXD10-24WS05	80
5	2.0	10	18 - 75VDC	PXD10-48WS05	80
5	4.0	20	9 - 18VDC	PXD20-12S05	87
5	4.0	20	18 - 36VDC	PXD20-24S05	89
5	4.0	20	36 - 75VDC	PXD20-48S05	89
12	0.83	10	9 - 36VDC	PXD10-24WS12	82
12	0.83	10	18 - 75VDC	PXD10-48WS12	84
12	1.67	20	9 - 18VDC	PXD20-12S12	85
12	1.67	20	18 - 36VDC	PXD20-24S12	87
12	1.67	20	36 - 75VDC	PXD20-48S12	88
15	0.67	10	9 - 36VDC	PXD10-24WS15	80
15	0.67	10	18 - 75VDC	PXD10-48WS15	84
15	1.33	20	9 - 18VDC	PXD20-12S15	85
15	1.33	20	18 - 36VDC	PXD20-24S15	87
15	1.33	20	36 - 75VDC	PXD20-48S15	87
Dual Outputs					
±5	±1.5	15	9 - 18VDC	PXD15-12D05	83
±5	±1.5	15	18 - 36VDC	PXD15-24D05	84
±5	±1.5	15	36 - 75VDC	PXD15-48D05	85
±12	±0.416	10	9 - 36VDC	PXD10-24WD12	80
±12	±0.416	10	18 - 75VDC	PXD10-48WD12	78
±12	±0.833	20	9 - 18VDC	PXD20-12D12	86
±12	±0.833	20	18 - 36VDC	PXD20-24D12	87
±12	±0.833	20	36 - 75VDC	PXD20-48D12	88
±15	±0.333	10	9 - 36VDC	PXD10-24WD15	80
±15	±0.333	10	18 - 75VDC	PXD10-48WD15	81
±15	±0.667	20	9 - 18VDC	PXD20-12D15	86
±15	±0.667	20	18 - 36VDC	PXD20-24D15	87
±15	±0.667	20	36 - 75VDC	PXD20-48D15	87

Pinout

PIN#	PXD10/PXD15 Single	PXD10/PXD15 Dual	PXD20 Single	PXD20 Dual
1	+Vin			
2	-Vin			
3	+Vout			
4	No Pin	Com	Trim	Com
5	-Vout			
6	Remote On/Off*		Remote On/Off	

* optional, see table below. If not requested, Pin is not fitted.

Remote On/Off Option

Suffix	Function	
-P*	Positive Logic	(* Included in PXD20 models)
-N	Negative Logic	

Example: PXD1548S12-N

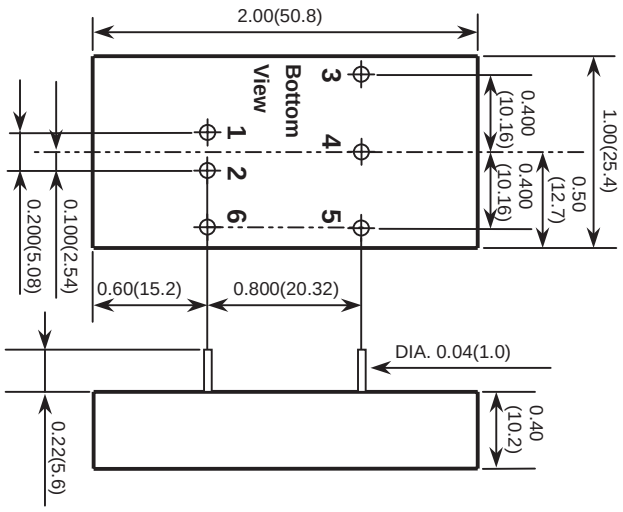
Heat Sink (0.22" high)

7G0020A (includes thermal adhesive pad)

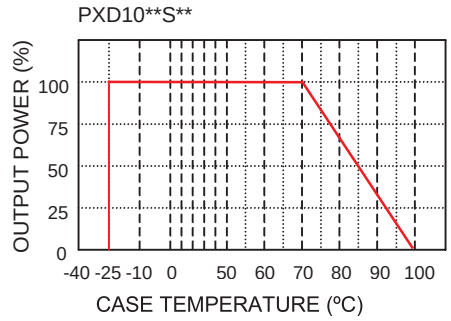
Other Industrial Products

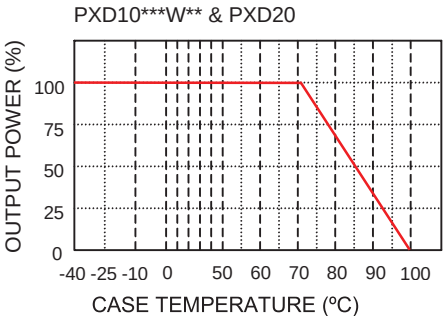
CC-E	1.5-30W, 5 to 48VDC input
PAQ,PAH,PAF	50-700W quarter, half & full bricks

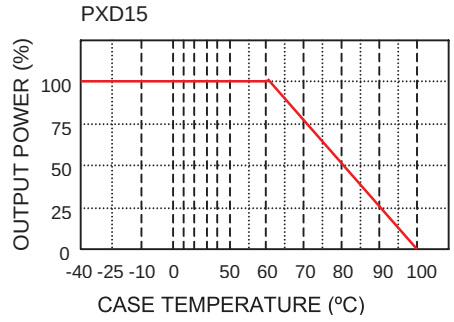
Outline Drawing



Derating Curves







For Additional Information, please visit us.tdk-lambda.com/lp/products/px-series.htm

3055 Del Sol Blvd • San Diego, CA 92154 • 1-800-526-2324

Revision A8: Sep 2008

TDK·Lambda

PXD30W Series

Single and Dual Output 30W DC-DC Converters

- Industry Standard 2" x 1" Footprint
- Six Sided Shielding
- Safety Agency Certifications
- 9-36V or 18-75VDC Input

RoHS

Key Market Segments & Applications

Telecom, Datacom, Process Control

Features & Benefits

Feature	Benefit
◆ Safety Certification	◆ Easier system approvals
◆ Wide range input	◆ Less parts to inventory
◆ Six sided shielding	◆ Reduced radiated noise

Specifications

ITEMS	Single Output	Dual Output
Max Output Power	30W	
Voltage Accuracy	±1%	
Voltage Adjustment	±10%	None
Minimum Load	None	
Line Regulation	±0.2%	
Load Regulation	±0.5%	±1%
Cross Regulation (25% to 100%)	-	±5%
Ripple and Noise (peak to peak)	<5.1V output: 100mV, 12-15V output: 150mV	
Start up time	30ms	
Remote on/off	Positive Logic: ON: Open or 3-12V, OFF Short or <1.2V Negative Logic: ON: Short or <1.2V, OFF: Open or 3-12V	
Temperature Coefficient	<±0.02%/°C	
Operating Temperature	-40 to +85°C, derating necessary above 50°C	
Maximum Case Temperature	105°C (Overtemperature Protection 115°C)	
Storage Temperature	-55 to 125°C	
Thermal Shock	MIL-STD-810F	
Relative Humidity (non condensing)	5 to 95%	
Transient Response (25% step load change)	250us recovery	
Overvoltage Protection (Zener clamp)	3.3V: 3.9V, 5V: 6.2V, 12V: 15V, 15V: 18V	
Overcurrent and Short Circuit Protection	Typically at 150%, hiccup with self recovery	
Input Surge Voltage (Maximum for 100ms)	24V input: 50V, 48V input: 100V	
Reflected input ripple (peak to peak)	20mA	
Isolation Voltage	1600VDC minimum	
Isolation Resistance	10^9 Ohms minimum	
Isolation Capacitance (max)	1500pF	
Typical Switching Frequency (Fixed)	430kHz	
MTBF (BELLCORE TR-NWT-000332)	3,163,000 hours	
Vibration	MIL-STD-810F	
Conducted and Radiated Emissions (1)	EN55022 Level A	
Immunity (2)	EN61000-4-2, -3, -4, -5, -6 Pref Criteria A	
Safety Agency Certifications	IEC60950-1, UL60950-1, EN60950-1, CE Mark	
Size (L x W x H)	2x1x0.4"	
Weight	1.07 oz (30.5g)	
Warranty	Two Year	

Notes:
(1) With external ceramic capacitor (24V: 4.7uF, 48V: 2.2uF) connected across input pins
(2) For EN61000-4-4 & -5 compliance fit external electrolytic capacitor (24V: 330uF, 48V: 220uF) connected across input pins

TDK·Lambda

PXD30W Series

Model Selector

Output Volt (V)	Output Curr (A)	Output Power (W)	Input Volt (V)	Model	Eff.(%)
Single Outputs					
3.3V	7.5A	24.75W	9 - 36VDC	PXD30-24WS3P3	86%
3.3V	7.5A	24.75W	18 - 75VDC	PXD30-48WS3P3	86%
5V	6.0A	30W	9 - 36VDC	PXD30-24WS05	88%
5V	6.0A	30W	18 - 75VDC	PXD30-48WS05	88%
12V	2.5A	30W	9 - 36VDC	PXD30-24WS12	89%
12V	2.5A	30W	18 - 75VDC	PXD30-48WS12	90%
15V	2.0A	30W	9 - 36VDC	PXD30-24WS15	89%
15V	2.0A	30W	18 - 75VDC	PXD30-48WS15	91%
Dual Outputs					
±5V	±3.0A	30W	9 - 36VDC	PXD30-24WD05	88%
±5V	±3.0A	30W	18 - 75VDC	PXD30-48WD05	88%
±12V	±1.25A	30W	9 - 36VDC	PXD30-24WD12	87%
±12V	±1.25A	30W	18 - 75VDC	PXD30-48WD12	88%
±15V	±1.0A	30W	9 - 36VDC	PXD30-24WD15	87%
±15V	±1.0A	30W	18 - 75VDC	PXD30-48WD15	88%

Pinout

Pin #	Function	
	Single Output	Dual Output
1	+ Input	+ Input
2	- Input	- Input
3	Remote On/Off	Remote On/Off
4	+ Output	+ Output
5	- Output	Common
6	Trim	- Output

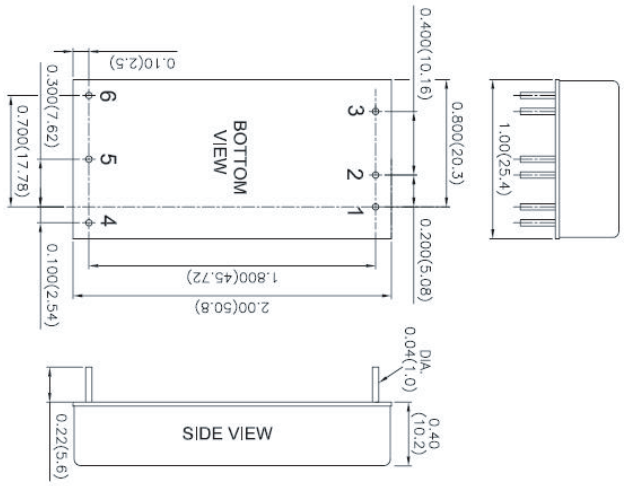
Remote On/Off Option

Suffix	Function
No Suffix	Positive Logic
-N	Negative Logic

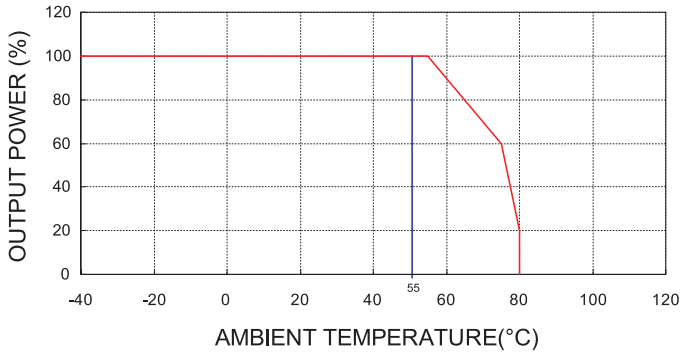
Other Lambda Industrial Products

PXD10, 20	10-20W, 12V, 24V, 48V input 2x1" DC-DC
PXE20, 30	20-30W, 12V, 24V, 48V input 2x1.6" DC-DC
PXF30-40	30-40W, 12V, 24V, 48V input 2x2" DC-DC
CC-E	1.5 - 25W, 5V, 12V, 24V & 48V input DC-DC

Outline Drawing



Derating Curves



For Additional Information, please visit
us.tdk-lambda.com/lp/products/px-series.htm

3055 Del Sol Blvd • San Diego, CA 92154 • 1-800-LAMBDA-4

Revision A2: Sep 2009

TDK·Lambda

PXE Series

Single and Dual Output 20W to 30W DC-DC Converters

- Industry Standard 2" x 1.6" Footprint
- Six Sided Shielding
- Agency Approved
- 12V, 24V and 48V Inputs

RoHS

Key Market Segments & Applications

Telecom, Datacom, Point of Load

Features & Benefits

Feature	Benefit
◆ UL, CSA, EN, CE approvals	◆ Easier system approvals
◆ Wide range input	◆ Less parts to inventory
◆ Six sided shielding	◆ Reduced radiated noise

Specifications

ITEMS		PXE20	PXE30
Max Output Power		20W	30W
Voltage Accuracy		±2%	±1%
Voltage Adjustment		±10%	
Minimum Load, each output	(1)	10%	10%
Line Regulation		±0.2% for single, ±0.5% for dual	
Load Regulation (25% to 100%)		Single ±0.5%, Dual ±3%	Single ±0.5%, Dual ±1%
Cross Regulation (25% to 100%)		Dual ±5%	
Ripple and Noise (P-P)		Single: 75mV; Dual: 100mV	
Start up time		20ms - 1100ms typ.	10 - 25ms typ.
Remote on/off	(3)	Positive Logic: ON: Open or 3.5-12V, OFF Short or <1.2V	
Temperature Coefficient		<±0.02%/°C	
Operating Temperature		-40 to +100°C, see derating curve	
Maximum Case Temperature		100°C (Over temperature protection at 115°C - PXE30 model)	
Storage Temperature		-55 to 105°C	
Thermal Shock		MIL-STD-810D	
Relative Humidity (non condensing)		5 to 95%	
Transient Response (25% step load change)		500us recovery	300us recovery
Overvoltage Protection (Zener clamp)		3.3V: 3.9V, 5V: 6.2V, 12V: 15V, 15V: 18V	
Overcurrent and Short Circuit Protection		Typically at 150%, hiccup with self recovery	
Input Surge Voltage (Maximum for 100ms)		12V input: 36V, 24V input: 50V, 48V input: 100V	
Reflected input ripple (peak to peak)	(2)	25mA	30mA
Isolation Voltage		1600VDC minimum (Input-Output, Input-Case)	
Isolation Resistance		10^9 Ohms minimum	
Isolation Capacitance (max)		300pF	1000pF
Typical Switching Frequency (Fixed)		300kHz	
MTBF (BELLCORE TR-NWT-000332)		1,976,000 hours	1,535,000 hours
Vibration		10 - 55Hz, 2G, 30 minutes each X, Y, Z axis	
Conducted and Radiated Emissions		EN55022 Level A	
Immunity		EN61000-4-2, -3, -4, -5, -6 Pref Criteria 2	
Safety Agency Approval		IEC60950-1, UL60950-1, EN60950-1, CE Mark (48V input only)	
Size (L x W x H)		2 x 1.6 x 0.4"	
Weight		1.69 oz (48g)	
Warranty		Two Year	

Notes:
(1) To meet regulation & noise specifications. Operation at zero load will not damage the device
(2) 12uH source impedance in series with + input
(3) Max sink current 20mA (PXE20), 2.5mA (PXE30); The on/off pin is referenced to the negative input

TDK·Lambda

PXE Series

Model Selector

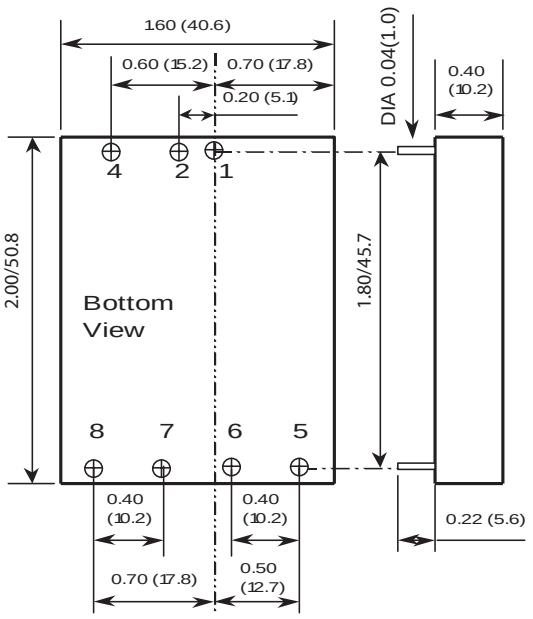
Output Volt (V)	Output Curr (A)	Output Power (W)	Input Volt (VDC)	Model	Eff.(%)
Single Outputs					
3.3	6.0	18	9 - 18	PXE30-12S3P3	85
3.3	6.0	20	10 - 40	PXE30-24WS3P3	87
3.3	6.0	18	18 - 36	PXE30-24S3P3	86
3.3	6.0	20	18 - 75	PXE30-48WS3P3	87
3.3	6.0	18	36 - 75	PXE30-48S3P3	87
5	4.0	20	9 - 36	PXE20-24WS05	79
5	4.0	20	18 - 75	PXE20-48WS05	80
5	6.0	30	9 - 18	PXE30-12S05	87
5	6.0	30	10 - 40	PXE30-24WS05	87
5	6.0	30	18 - 36	PXE30-24S05	88
5	6.0	30	18 - 75	PXE30-48WS05	88
5	6.0	30	36 - 75	PXE30-48S05	89
12	1.67	20	9 - 36	PXE20-24WS12	81
12	1.67	20	18 - 75	PXE20-48WS12	81
12	2.5	30	9 - 18	PXE30-12S12	88
12	2.5	30	10 -40	PXE30-24WS12	87
12	2.5	30	18 - 36	PXE30-24S12	89
12	2.5	30	18 - 75	PXE30-48WS12	87
12	2.5	30	36 - 75	PXE30-48S12	90
15	1.33	20	9 - 36	PXE20-24WS15	81
15	1.33	20	18 - 75	PXE20-48WS15	81
15	2.0	30	9 - 18	PXE30-12S15	88
15	2.0	30	10 - 40	PXE30-24WS15	88
15	2.0	30	18 - 36	PXE30-24S15	89
15	2.0	30	18 - 75	PXE30-48WS15	88
15	2.0	30	36 - 75	PXE30-48S15	90
Dual Outputs					
±5	±2.0	20	9 - 36	PXE20-24WD05	79
±5	±2.0	20	18 - 75	PXE20-48WD05	79
±12	±0.833	20	9 - 36	PXE20-24WD12	81
±12	±0.833	20	18 - 75	PXE20-48WD12	83
±12	±1.25	30	9 - 18	PXE30-12D12	87
±12	±1.25	30	18 - 36	PXE30-24D12	88
±12	±1.25	30	36 - 75	PXE30-48D12	88
±15	±0.666	20	9 - 36	PXE20-24WD15	82
±15	±0.666	20	18 - 75	PXE20-48WD15	84
±15	±1.0	30	9 - 18	PXE30-12D15	87
±15	±1.0	30	18 - 36	PXE30-24D15	88
±15	±1.0	30	36 - 75	PXE30-48D15	88

Pinout

PIN #	Function: Single Output	Function: Dual Output
1	+ Input	+ Input
2	- Input	- Input
4	Remote on/off	Remote on/off
5	No Pin	+ Output
6	+ Output	Common
7	- Output	- Output
8	Trim	Trim

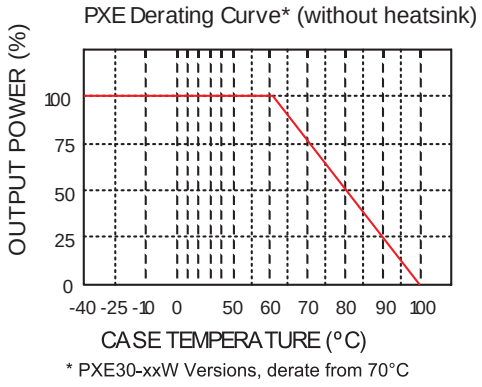
For Additional Information, please visit
us.tdk-lambda.com/lp/products/px-series.htm

Outline Drawing



1. All dimensions in Inches (mm)
2. Pin pitch tolerance –0.014(0.35)

Derating Curve



* PXE30-xxW Versions, derate from 70°C

Heat Sink (0.22" high)

7G0011A (includes thermal adhesive pad)

Other Industrial Products

CC-E	1.5-25W, 5 to 48VDC input
PAQ PAH PAF	50 - 700W quarter, half & full bricks

3055 Del Sol Blvd • San Diego, CA 92154 • 1-800-526-2324

Revision A8: Dec 2009

TDK·Lambda

PXF Series

Single, Dual, Triple Output 40W & 60W DC-DC Converters

- Industry Standard 2" x 2" Footprint
- Six Sided Shielding
- Agency Approved
- 12, 24V, and 48V Inputs (including 4:1 ranges)

RoHS

Key Market Segments & Applications

Telecom, Datacom, Point of Load

Features & Benefits

Feature	Benefit
◆ UL, CSA, EN, CE approvals	◆ Easier system approvals
◆ Wide range input	◆ Less parts to inventory
◆ Six sided shielding	◆ Reduced radiated noise

Specifications

ITEMS	
Maximum Output Power	40W or 60W
Voltage Accuracy (Full Load, Nom. Vin)	Single, Dual and Triple Main ±1%, Triple Auxiliaries ±5%
Voltage Adjustment (1)	±10% (Single and Dual Output Only)
Minimum Load, each output (2)	Single Output = 0%, Dual and Triple = 10% of full load rating
Line Regulation	Single / Dual ±0.5%, Triple (main) ±1%, Triple (auxiliary) ±5%
Load Regulation (10% to 100%) (3)	Single ±0.5%, Dual ±1%, Triple (main) ±2%, Triple (auxiliary) ±5%
Cross Regulation (25% to 100%) (4)	Triple (main) ±1%, Dual/Triple (auxiliary) ±5%
Start up time	PXF40: 25ms typ., PXF40xxW, PXF60: 20ms max.
Remote on/off (referenced to negative input)	Positive Logic: ON: Open or 3.0-12V, OFF Short or <1.2V
Temperature Coefficient	<±0.02%/°C
Operating Temperature	See derating curves
Maximum Case Temperature	PXF40: 100°C, PXF40-xxW 105°C, PXF60 110°C
Storage Temperature	PXF40: -55 to 105°C, PXF40xxW, PXF60 125°C
Thermal Shock	MIL-STD-810F
Relative Humidity (non condensing)	5 to 95%
Transient Response (25% step load change)	250us recovery
Overvoltage Protection (Zener clamp)	Typical 3.3V: 3.9V, 5V: 6.2V, 12V: 15V, 15V: 18V
Overcurrent and Short Circuit Protection	Typically at 150%, hiccup with self recovery
Input Surge Voltage (Maximum for 100ms)	12V input: 36V, 24V input: 50V, 48V input: 100V
Reflected input ripple (peak to peak) (6)	PXF40: 40mA, PXF40xxW, PXF60: 20mA
Isolation Voltage	Input - Output, Input to Case: 1600VDC minimum
Isolation Resistance	10^9 Ohms minimum
Isolation Capacitance (max)	PXF40, PXF60: 1000pF, PXF40xxW: 2500pF
Switching Frequency (Fixed)	300kHz (typ.)
MTBF (BELLCORE TR-NWT-000332)	PXF40: 1,398,000; PXF40xxW: 1,105,000, PXF60: 1.093,000 hours
Vibration	10 - 55Hz, 10G, 30 minutes each X, Y, Z axis
Conducted and Radiated Emissions	EN55022 Level A, see installation manual
Immunity	EN61000-4-2, -3, -4, -5, -6
Safety Agency Approval	IEC60950-1, UL60950-1, EN60950-1, CE Mark (48V input only)
Size (L x W x H)	2 x 2 x 0.4"
Weight	2.11 oz (60g)
Warranty	Two Year

(1) Maximum output deviation is 10% inclusive of remote sense and trim. If remote sense is not being used, the +Sense and - Sense should be connected to their corresponding outputs; + output, -output.
(2) Dual and Triple output models require a minimum load of 10% on the output to maintain specified regulation. No load operation will not damage the device.
(3) Load regulation for triple output: Main output:10-100%, with 10-100% balanced load on auxiliaries. Auxiliary outputs: 10% to 100% balanced on all outputs.
(4) Cross regulation for dual output: asymmetrical load 25% / 100% full load. Cross regulation for triple output: Main output 100% load, auxiliary 100%, other auxiliary 25% to 100%. Auxiliary outputs: main output 100% load, auxiliary 100%, other auxiliary 25% to 100% or main output 25%, auxiliary 25%, other auxiliary 25% to 100%.
(5) An external filter capacitor is required for normal operation. The capacitor should be capable of handling a 1A ripple current for 48V and 24V models.
(6) Simulated Source impedence of 12uH placed in series with + input.

TDK·Lambda

PXF Series

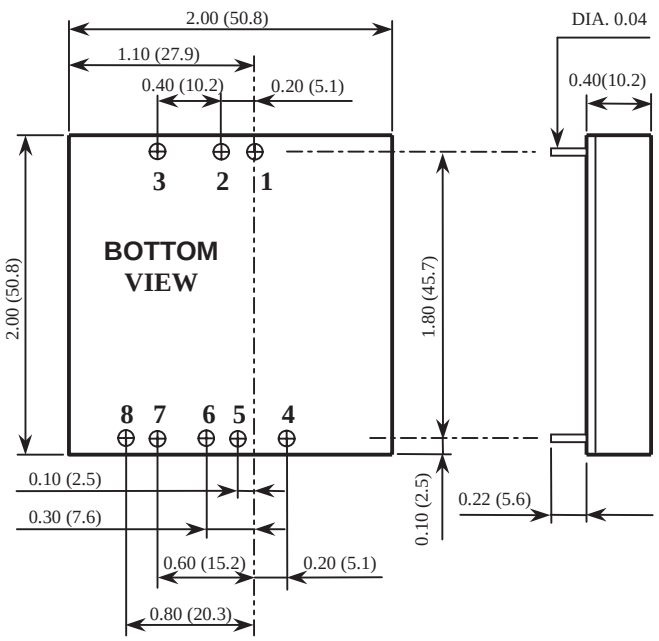
Model Selector

Output Volt(V)	Output Curr(A)	Input Volt(VDC)	Model	Ripple/Noise (mV)	Eff.(%)	Max Load Cap(uF)
Single Outputs						
3.3	8	9 - 18	PXF40-12S3P3	50	84	21000
3.3	10	9 - 36	PXF40-24WS3P3	50	86	25750
3.3	8	18 - 36	PXF40-24S3P3	50	87	21000
3.3	10	18 - 75	PXF40-48WS3P3	50	86	25750
3.3	14	18 - 36	PXF60-24S3P3	75	89	36000
3.3	8	36 - 75	PXF40-48S3P3	50	88	21000
3.3	14	36 - 75	PXF60-48S3P3	75	89	36000
5	8	9 - 18	PXF40-12S05	50	86	13600
5	8	9 - 36	PXF40-24WS05	50	87	13600
5	8	18 - 36	PXF40-24S05	50	89	13600
5	8	18 - 75	PXF40-48WS05	50	88	13600
5	8	36 - 75	PXF40-48S05	50	90	13600
5	12	18 - 36	PXF60-24S05	75	90	20400
5	12	36 - 75	PXF60-48S05	75	90	20400
12	3.333	9 - 18	PXF40-12S12	75	86	2360
12	3.333	9 - 36	PXF40-24WS12	75	87	2360
12	3.333	18 - 36	PXF40-24S12	75	88	2360
12	3.333	18 - 75	PXF40-48WS12	75	87	2360
12	3.333	36 - 75	PXF40-48S12	75	89	2360
12	5	18 - 36	PXF60-24S12	100	90	3550
12	5	36 - 75	PXF60-48S12	100	90	3550
15	2.666	9 - 18	PXF40-12S15	75	87	1510
15	2.666	9 - 36	PXF40-24WS15	75	87	1510
15	2.666	18 - 36	PXF40-24S15	75	89	1510
15	2.666	18 - 75	PXF40-48WS15	75	87	1510
15	2.666	36 - 75	PXF40-48S15	75	89	1510
15	4	18 - 36	PXF60-24S15	100	90	2300
15	4	36 - 75	PXF60-48S15	100	90	2300
Dual Outputs						
±12	±1.667	9 - 36	PXF40-24WD12	120	86	±1200
±12	±1.8	9 - 18	PXF40-12D12	120	85	±1200
±12	±1.8	18 - 36	PXF40-24D12	120	87	±1200
±12	±1.667	18 - 75	PXF40-48WD12	120	86	±1200
±12	±1.8	36 - 75	PXF40-48D12	120	87	±1200
±15	±1.333	9 - 36	PXF40-24WD15	150	86	±750
±15	±1.4	9 - 18	PXF40-12D15	150	85	±750
±15	±1.4	18 - 36	PXF40-24D15	150	87	±750
±15	±1.333	18 - 75	PXF40-48WD15	150	86	±750
±15	±1.4	36 - 75	PXF40-48D15	150	87	±750
Triple Outputs						
3.3V,±12V	6.0,±0.4	9 - 18	PXF40-12T3312	50 / 75	83	13000,±330
3.3V,±12V	6.0,±0.4	18 - 36	PXF40-24T3312	50 / 75	85	13000,±330
3.3V,±12V	6.0,±0.4	36 - 75	PXF40-48T3312	50 / 75	86	13000,±330
5V,±12V	6.0,±0.4	9 - 18	PXF40-12T0512	50 / 75	85	6800, ±330
5V,±12V	6.0,±0.4	18 - 36	PXF40-24T0512	50 / 75	87	6800, ±330
5V,±12V	6.0,±0.4	36 - 75	PXF40-48T0512	50 / 75	88	6800, ±330
5V, ±15V	6.0, ±0.3	9 - 18	PXF40-12T0515	50/75	86	6800, ±110
5V, ±15V	6.0, ±0.3	18 - 36	PXF40-24T0515	50/75	87	6800, ±110
5V, ±15V	6.0, ±0.3	36 - 75	PXF40-48T0515	50/75	88	6800, ±110

Pinout (PXF40)

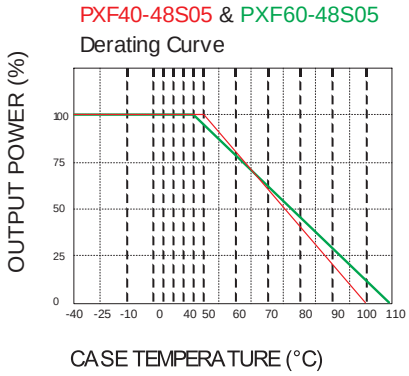
PIN#	Function Single Output	Dual Output	Triple Output
1	+ Input	+ Input	+ Input
2	- Input	- Input	- Input
3	Remote on/off	Remote on/off	Remote on/off
4	No Connection	No Pin	+ Aux
5	- Sense (Note 1)	+ VO	Common
6	+ Sense (Note 1)	Common	-Aux
7	+ Output	Common	+ Output
8	- Output	- VO	- Output (Com)
9	Trim	Trim	N/C

Outline Drawing (PXF60)



1. All dimensions in Inches (mm)
   Tolerance: X.XX±0.02 (X.X±0.5)
2. Pin pitch tolerance ±0.014(0.35)

Derating Curves



Heat Sink (0.22" high)

7G0026A (includes thermal adhesive pad)

Other Industrial Products

CC-E 1.5 - 30W, 5 to 48VDC input
PAQ, PAH, PAF 50 - 700W quarter, half & full bricks

For Additional Information, please visit
us.tdk-lambda.com/lp/products/px-series.htm

3055 Del Sol Blvd • San Diego, CA 92154 • 1-800-526-2324

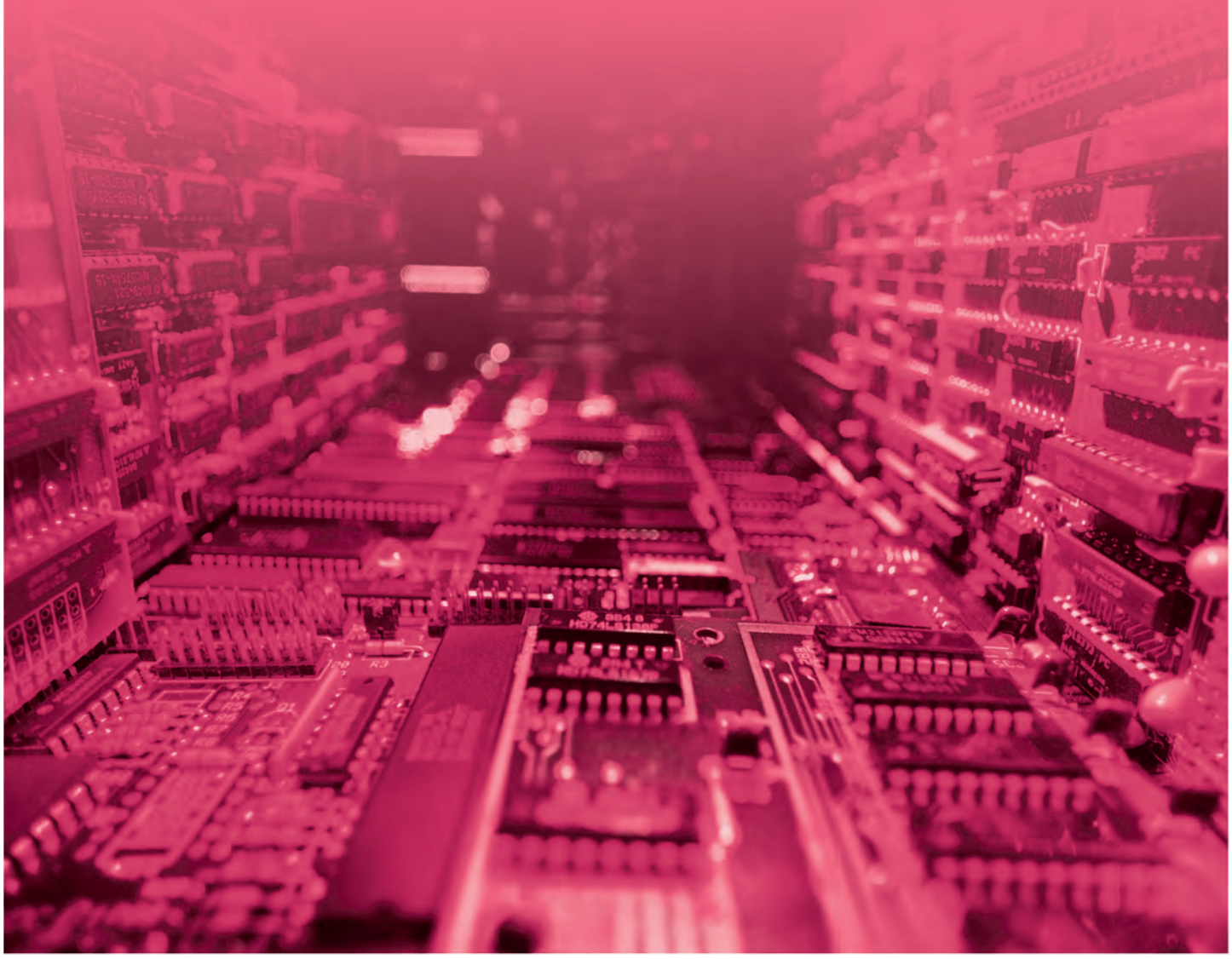
Revision B1: Jan 2011

AC-DC Products

DC-DC Products

◆ Filters

Company



Screw or Wire Termination
DIN Rail Mount

Filter Selector

Maximum Input Voltage	# of Phases	Current (A)
		1 · 6 · 10 · 15 · 30 · 50 · 150 · 300 · 1000
250VAC	Single	RSAL
		RSHN*
		RSHN*
500VAC	Three	RTAN*
		RTAN*
		RTHN*
72VDC	N/A	PAN
		MBS

* See website

TDK·Lambda

PAN Series

20A, 48VDC pcb mount EMI Filter

RoHS

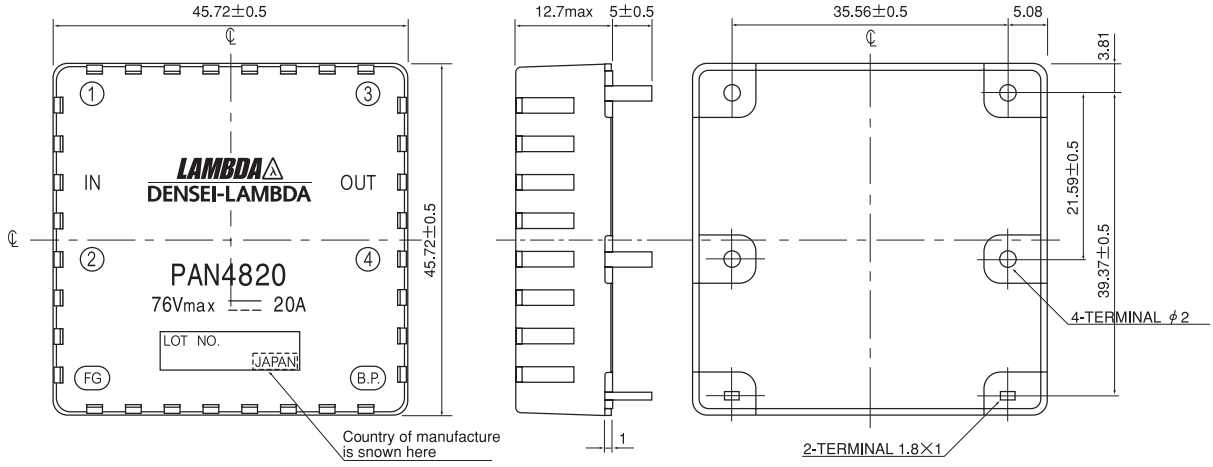
Features

- Compact Size
- PCB Mount
- Conforms to UL1950, CSA950, EN60950
- Suitable for use with Lambda's PAF Series

Specifications

ITEMS \ MODELS		PAN4820
Rated Voltage	VDC	76VDC Max
Rated Current	A	20A
Test Voltage (For 1 min.)	V	Terminals to Case: 1500VDC; Between terminals: 100VDC
Isolation Resistance	MΩ	100MΩ minimum (terminals to case, 500VDC)
Leakage Current	mA	Not Applicable
DC Resistance	mΩ	6
Operating Temperature	°C	-40 to +100 (see derating curve)
Storage Temperature	°C	-40 to +100
Operating Humidity	-	30 to 95% RH (non condensing)
Storage Humidity	-	10 to 95% RH (non condensing)
Vibration	-	10-55Hz sweep for 1 minute Amplitude 0.825mm (max 49m/s², X, Y, Z (1 hour each)
Safety Standards	-	Conforms to UL60950, CSA60950, EN60950
Weight (Typ)	g	45
Warranty	-	1 Year

Outline Drawing



[Input side terminal]

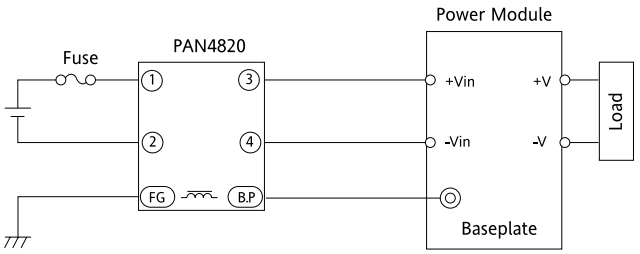
① :Input Terminal
② :Input Terminal
FG :Ground Terminal *1
*1 Connect to ground

[Output side terminal]

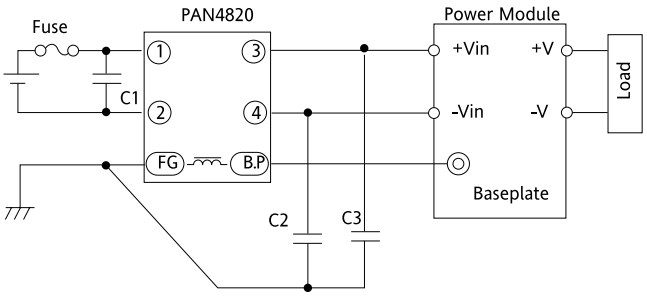
③ :Output Terminal
④ :Output Terminal
B.P. :Ground Terminal *2
*2 Connect to baseplate of power modules

Circuit Connection 1

◆ Conform to EN55011/55022, VCCI Class A

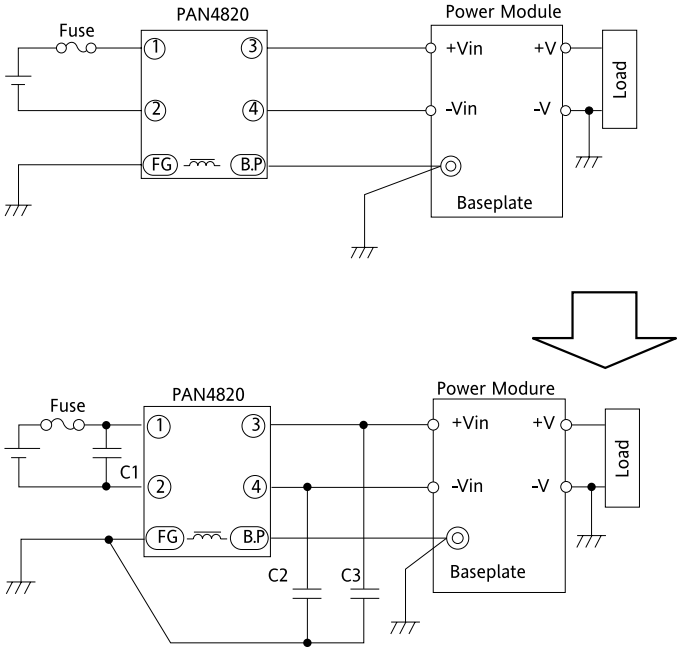


◆ Conform to EN55011/55022, VCCI Class B



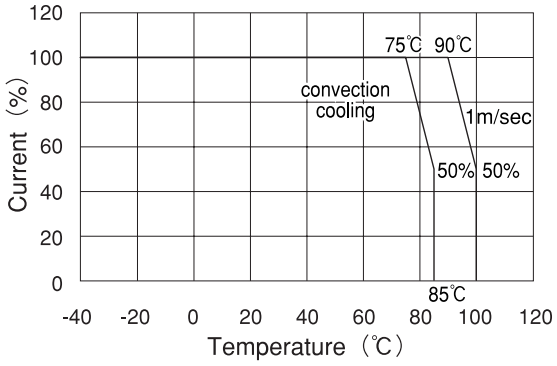
Recommended Values C1: 22 µF (Ceramic Capacitor)
C2,3: 0.47 µF(Film or Ceramic Capacitor)

Circuit Connection 2



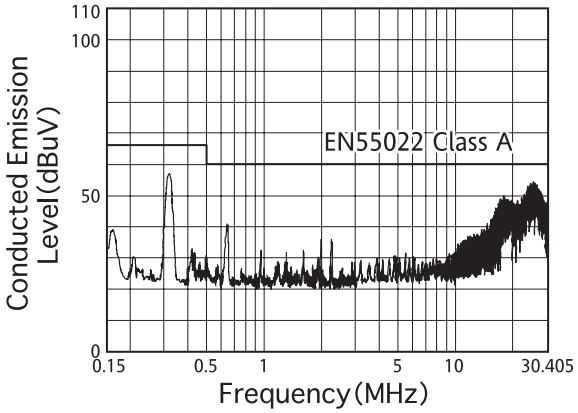
Recommended Values C1: 22 µF (Ceramic Capacitor)
C2,3: 0.47 µF(Film or Ceramic Capacitor)

Derating

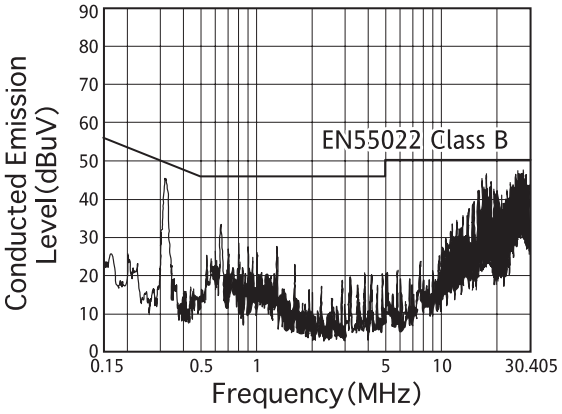


Attenuation

●CLASS-A Application
PAN4820＋PAF500F



●CLASS-B Application
PAN4820＋adding external components
(Capacitor: Net 3)＋PAF500F



For Additional Information, please visit
us.tdk-lambda.com/lp/products/pan-series.htm

TDK·Lambda

RSAL Series

0.5A to 6A, 250VAC EMI Filters

RoHS

Features

- High Voltage Pulse Attenuation
- Lug or Wire Terminations
- Low Earth Leakage Current Option
- Conforms to UL, CSA and EN Safety Agency Certifications

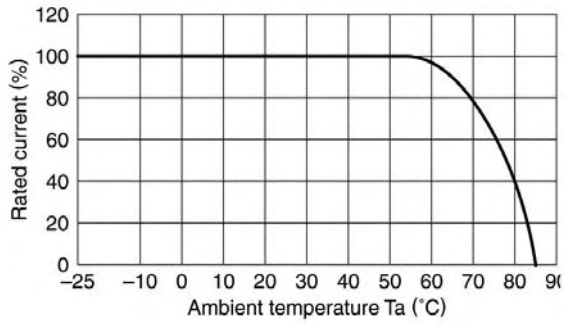
Specifications

ITEMS \ MODELS		RSAL-20R5W RSAL-20R5A RSAL-20R5WL RSAL-20R5AL	RSAL-2001W RSAL-2001A RSAL-2001WL RSAL-2001AL	RSAL-2002W RSAL-2002A RSAL-2002WL RSAL-2002AL	RSAL-2003W RSAL-2003A RSAL-2003WL RSAL-2003AL	RSAL-2006W RSAL-2006A RSAL-2006WL RSAL-2006AL
Rated Voltage (AC, DC)	V	250V				
Rated Current	A	0.5A	1A	2A	3A	6A
Withstand Voltage	V	Terminals to Case: 2500VAC (1 Minute)				
Isolation Resistance	MΩ	100MΩ minimum (500VDC, 1 Minute)				
Leakage Current (max)	A	RSAL-20xxx 1mA; RSAL20xxxL 10uA (250VAC, 60Hz)				
DC Resistance (total)	mΩ	700	600	250	150	80
Operating Temperature	°C	-25 to +85°C (Derate above 55°C, see derating curve)				
Storage Temperature	°C	-25 to +85°C				
Safety Agency Certifications	-	UL1283, CSA C22.2 No.8, EN60939				
Weight	g	61g Maximum				
Warranty	yr	1 Year				

Options

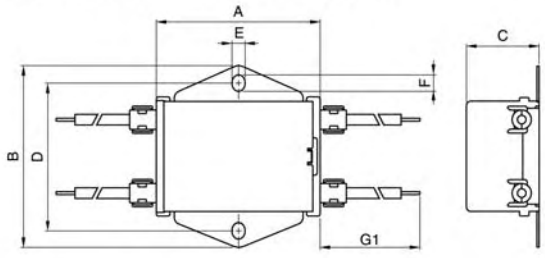
Wire Terminations	RSAL-20xxW
Lug Terminations	RSAL-20xxA
Wire Terminations & Low Leakage Current	RSAL-20xxWL
Lug Terminations & Low Leakage Current	RSAL-20xxAL

Derating

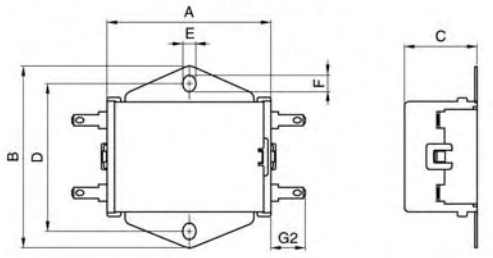


Outline Drawing

RSAL-20R5/2001/2002/2003/2006W(L)



RSAL-20R5/2001/2002/2003/2006A(L)

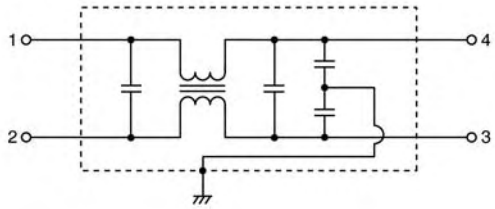


TDK·Lambda

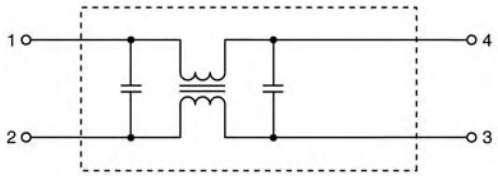
RSAL Series

Circuit

RSAL-2 ∗∗∗ W
RSAL-2 ∗∗∗ A

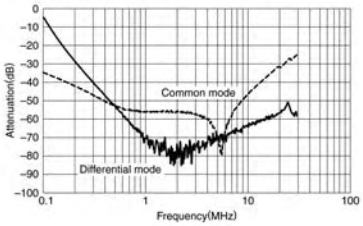


RSAL-2 ∗∗∗ WL
RSAL-2 ∗∗∗ AL

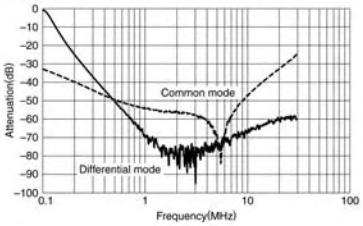


Attentuation Characteristics

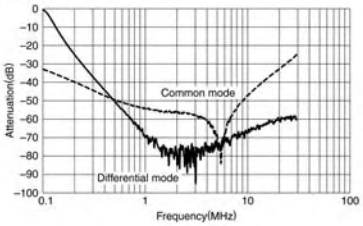
RSAL-20R5W/A



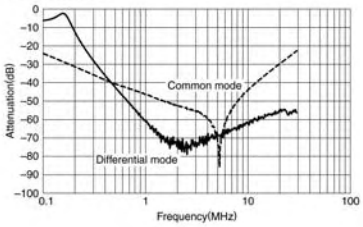
RSAL-2001W/A



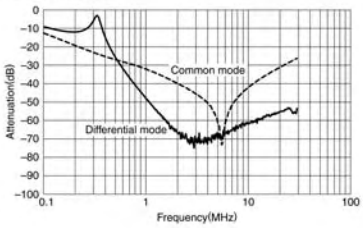
RSAL-2002W/A



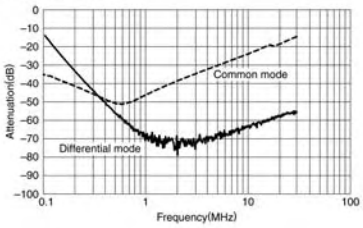
RSAL-2003W/A



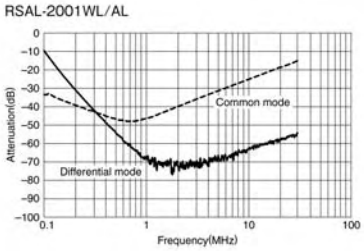
RSAL-2006W/A



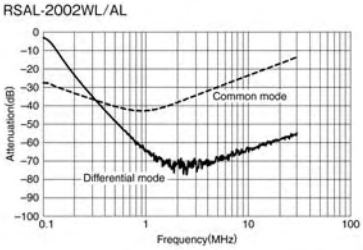
RSAL-20R5WL/AL



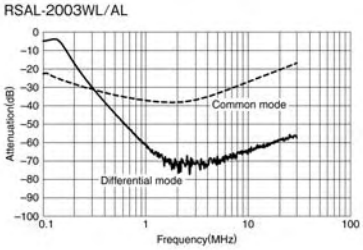
RSAL-2001WL/AL



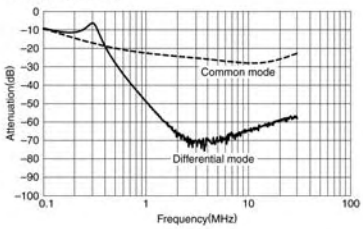
RSAL-2002WL/AL



RSAL-2003WL/AL



RSAL-2006WL/AL



For Additional Information, please visit
us.tdk-lambda.com/lp/products/r-series.htm

3055 Del Sol Blvd • San Diego, CA 92154 • 1-800-526-2324

Revision A2: Nov 2009

TDK·Lambda

RSHN Series

3A to 300A, 250VAC EMI Filters

RoHS

Features

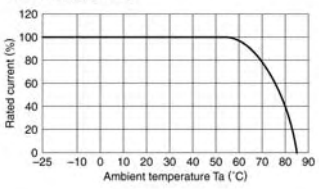
- Two Stage Filter for Better Performance
- DIN Rail Mount Option (Up 30A)
- Low Earth Leakage Current Option (Up to 30A)
- Conforms to UL, CSA and EN Safety Agency Certifications

Specifications

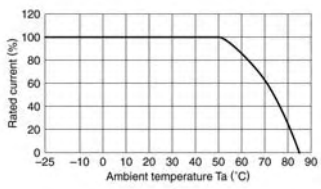
ITEMS / MODELS						
		RSHN-2003 RSHN-2003D RSHN-2003L	RSHN-2006 RSHN-2006D RSHN-2006L	RSHN-2010 RSHN-2010D RSHN-2010L	RSHN-2016 RSHN-2016D RSHN-2016L	RSHN-2020 RSHN-2020D RSHN-2020L
Rated Voltage (AC, DC)	V	250V				
Rated Current	A	3A	6A	10A	16A	20A
DC Resistance (total)	mΩ	350	140	60	35	22
ITEMS / MODELS		RSHN-2030 RSHN-2030D RSHN-2030L	RSHN-2040	RSHN-2050	RSHN-2060	RSHN-2080
Rated Voltage (AC, DC)	V	250V				
Rated Current	A	30A	40A	50A	60A	80A
DC Resistance (total)	mΩ	12	10	8	6	7
ITEMS / MODELS		RSHN-2100	RSHN-2150	RSHN-2200	RSHN-2250	RSHN-2300
Rated Voltage (AC, DC)	V	250V				
Rated Current	A	100A	150A	200A	250A	300A
DC Resistance (total)	mΩ	6	4	3	2	1.5
Withstand Voltage	V	Terminals to Case: 2500VAC (1 Minute)				
Isolation Resistance	MΩ	100MΩ minimum (500VDC, 1 Minute)				
Leakage Current (max)	A	RSHN-20xx 1mA; RSHN20xxL 100uA (250VAC, 60Hz)				
Operating Temperature	°C	-25 to +85°C (Derate above 50 / 55°C, see derating curve)				
Storage Temperature	°C	-25 to +85°C				
Safety Agency Certifications	-	Up to 30A Models - UL1283, CSA C22.2 No.8, EN60939				
Weight	g	190g to 13000g model dependant (See weights chart on website)				
Warranty	yr	1 Year				

Derating

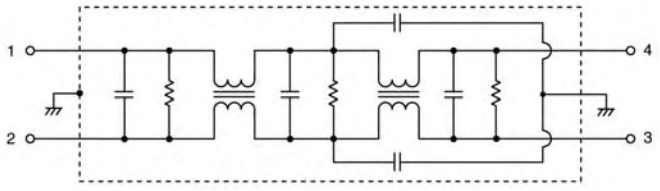
RSHN-2003/2006/2010/2016/2020/2030/2040/2050/2060



RSHN-2080/2100/2150/2200/2250/2300



Circuit

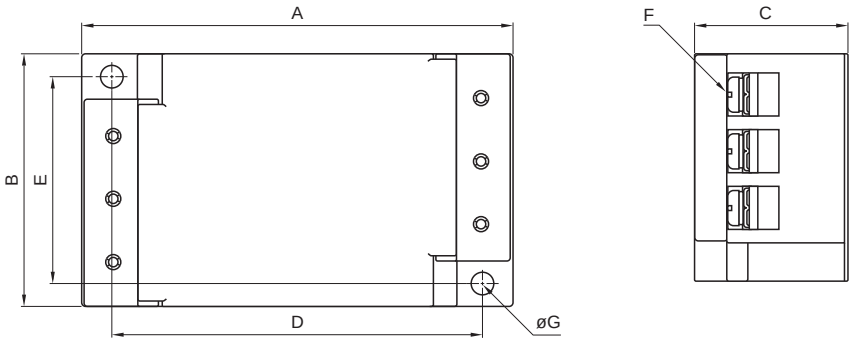


Options

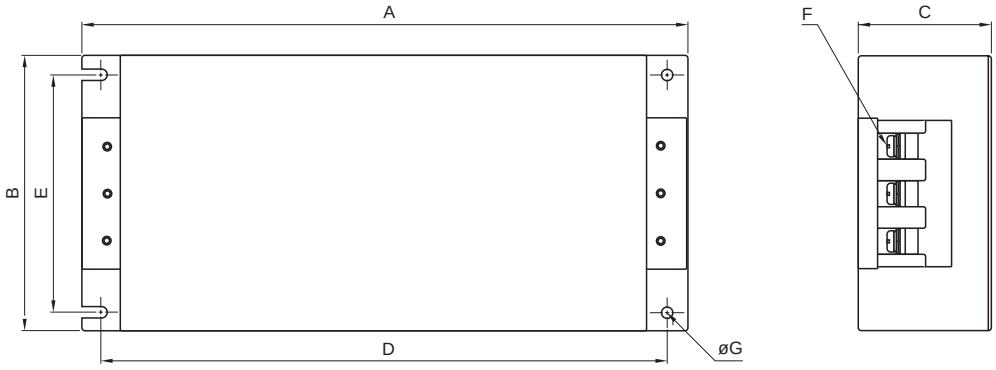
Chassis Mount & Standard Leakage Current	RSHN-20xx
DIN Rail Mount & Standard Leakage Current	RSHN-20xxD
Chassis Mount & Low Leakage Current	RSHN-20xxL

Outline Drawing

RSHN-2003/2006/2010/2016/2020/2030



RSHN-2040/2050/2060/2080/2100/2150/2200/2250/2300



Dimensions in mm

Part No.	A	B	C	D	E	F	G	Recommended clamping torque
RSHN-2003	98	52	35	86	43	M4	4.5	1.27N m
RSHN-2006								
RSHN-2010								
RSHN-2016	127	52	35	115	43	M4		
RSHN-2020								
RSHN-2030								
RSHN-2040	272	100	60	254	82	M5	5.5	2.5N m
RSHN-2050								
RSHN-2060								
RSHN-2080	430	161	85	410	135	M8	6.5	7.64N m
RSHN-2100								
RSHN-2150	473	190	88	453	164	M8		
RSHN-2200	593	195	103	573	169	M10		11.8N m
RSHN-2250								
RSHN-2300								

For Additional Information, please visit
us.tdk-lambda.com/lp/products/r-series.htm

TDK·Lambda

RTAN Series

6A to 60A, 500VAC EMI Filters

RoHS

Features

- High Voltage Pulse Attenuation
- DIN Rail Mount Option (Up 30A)
- Conforms to UL and EN Safety Agency Certifications

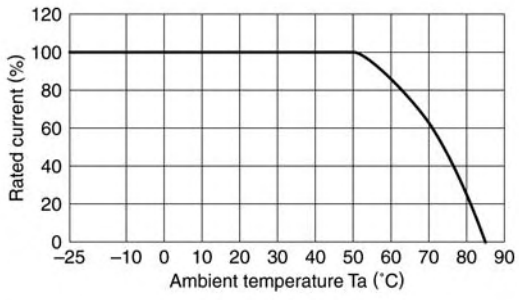
Specifications

ITEMS \ MODELS		RTAN-5006 RTAN-5006D	RTAN-5010 RTAN-5010D	RTAN-5020 RTAN-5020D	RTAN-5030 RTAN-5030D	RTAN-5040
Rated Voltage (AC, DC)	V	500V Three phase				
Rated Current	A	6A	10A	20A	30A	40A
DC Resistance (total)	mΩ	350	140	60	35	22
MODELS		RTAN-5050	RTAN-5060			
Rated Voltage (AC, DC)	V	500V Three phase				
Rated Current	A	50A	60A			
DC Resistance (total)	mΩ	7	5			
Withstand Voltage	V	Terminals to Case: 2500VAC (1 Minute)				
Isolation Resistance	MΩ	100MΩ minimum (500VDC, 1 Minute)				
Leakage Current (max)	A	2.5mA at 250VAC 60Hz, 5mA at 500VAC 60Hz				
Operating Temperature	°C	-25 to +85°C (Derate above 50°C, see derating curve)				
Storage Temperature	°C	-25 to +85°C				
Safety Agency Certifications	-	UL1283 & EN60939				
Weight	g	360g to 1120g model dependant (See weights chart on website)				
Warranty	yr	1 Year				

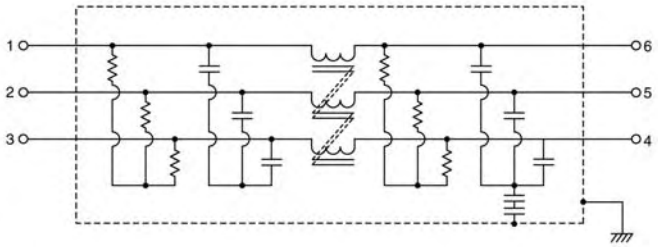
Options

Chassis Mount	RTAN-50xx
DIN Rail Mount (Models up to 30A)	RTAN-50xxD

Derating

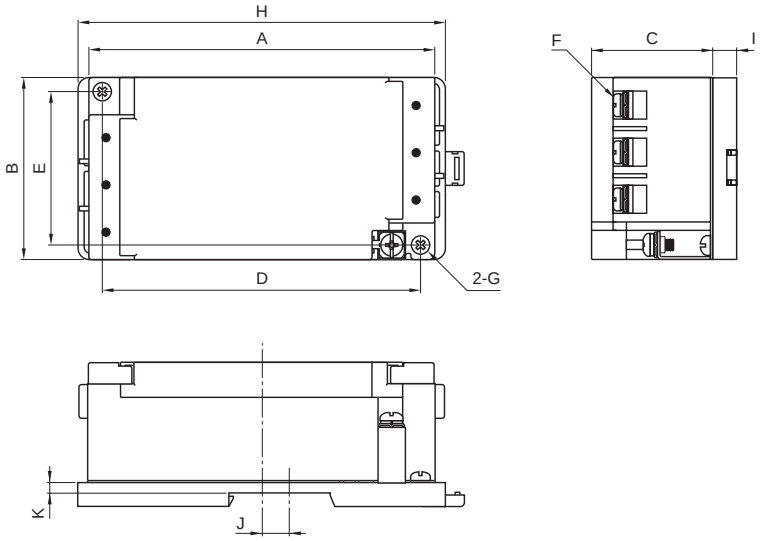


Circuit

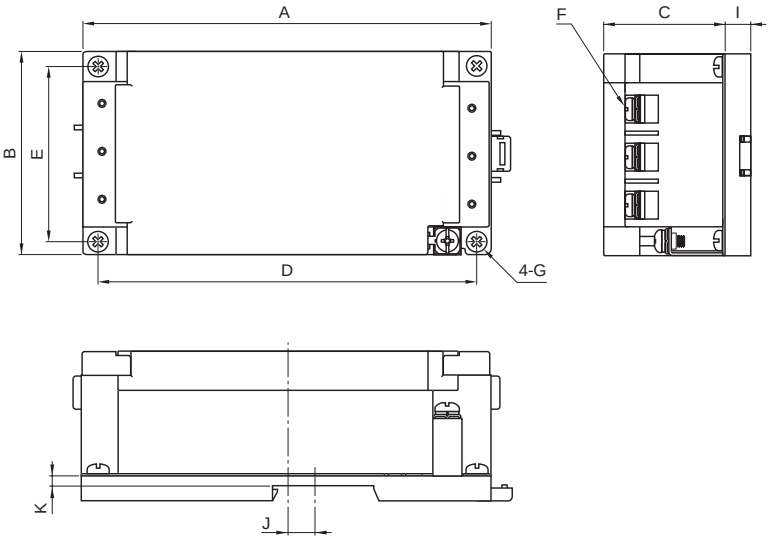


Outline Drawing

RTAN-5006D/5010D



RTAN-5020D/5030D



For Additional Information, please visit
us.tdk-lambda.com/lp/products/r-series.htm

TDK·Lambda

RTHN Series

6A to 1000A, 500VAC EMI Filters

RoHS

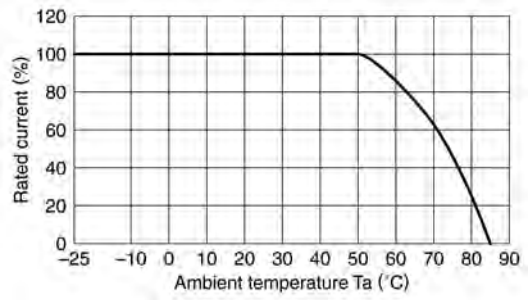
Features

- Two Stage Filter for Better Performance
- Low Profile
- Conforms to UL and EN Safety Agency Certifications

Specifications

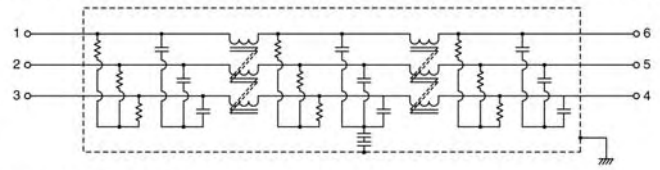
ITEMS / MODELS							
MODELS		RTHN-5006	RTHN-5010	RTHN-5020	RTHN-5030	RTHN-5040	RTHN-5050
Rated Voltage (AC, DC)	V	500V Three phase					
Rated Current	A	6A	10A	20A	30A	40A	50A
DC Resistance (total)	mΩ	290	120	50	25	20	14
MODELS		RTHN-5060	RTHN-5080	RTHN-5100	RTHN-5150	RTHN-5200	RTHN-5250
Rated Voltage (AC, DC)	V	500V Three phase					
Rated Current	A	60A	80A	100A	150A	200A	250A
DC Resistance (total)	mΩ	10	10	8	6	4	3
MODELS		RTHN-5300	RTHN-5400	RTHN-5080	RTHN-5A00		
Rated Voltage (AC, DC)	V	500V Three phase					
Rated Current	A	300A	400A	600A	1000A		
DC Resistance (total)	mΩ	2	0.2	0.3	0.5		
Withstand Voltage	V	Terminals to Case: 2500VAC (1 Minute)					
Isolation Resistance	MΩ	100MΩ minimum (500VDC, 1 Minute)					
Leakage Current (max)	mA	6A to 300A Models: 2.5mA at 250VAC 60Hz, 5mA at 500VAC 60Hz 400A to 1000A Models: 17.5mA at 250VAC 60Hz, 35mA at 500VAC 60Hz					
Operating Temperature	°C	-25 to +85°C (Derate above 50°C, see derating curve)					
Storage Temperature	°C	-25 to +85°C					
Safety Agency Certifications	-	UL1283 (Up to 150A) & EN60939 (Up to 300A)					
Weight	g	700g to 18000g model dependant (See weights chart on website)					
Warranty	yr	1 Year					

Derating

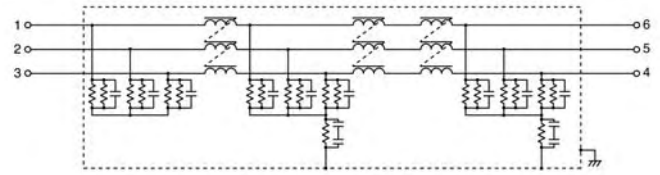


Circuit

RTHN-5006/5010/5020/5030/5040/5050/5060/5080/5100/5150/5200/5250/5300

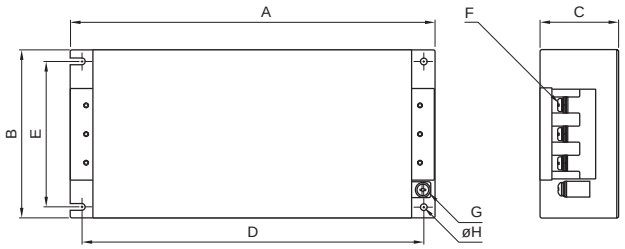


RTHN-5400/5600/5A00

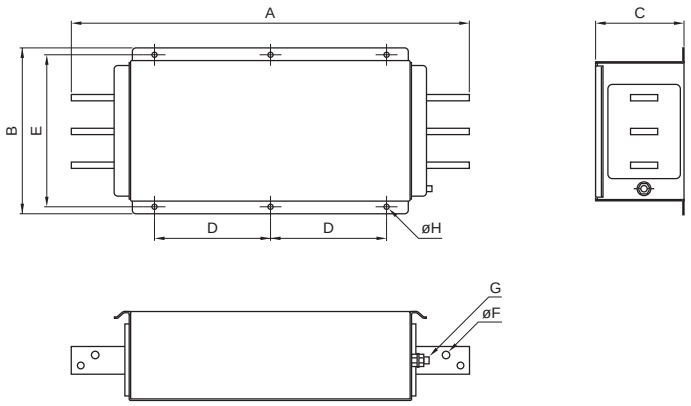


Outline Drawing

RTHN-5006/5010/5020/5030/5040/5050/5060/5080/5100/5150/5200/5250/5300



RTHN-5400/5600/5A00



Dimensions in mm

Part No.	A	B	C	D	E	F	G	H	Recommended clamping torque
RTHN-5006	210	95	50	195	78	M4	M4	4.5	
RTHN-5010									
RTHN-5020	240	105	55	225	85	M4	M4		
RTHN-5030									
RTHN-5040	300	128	68	280	102	M5	M4	5.5	
RTHN-5050									
RTHN-5060									
RTHN-5080	430	161	85	410	135	M8	M6	6.5	
RTHN-5100									
RTHN-5150	473	190	88	453	164	M8	M6		
RTHN-5200	593	195	103	573	169	M10	M8		
RTHN-5250									
RTHN-5300									
RTHN-5400	716	300	160	210	275	13	M12	9.0	
RTHN-5600	630								
RTHN-5A00	610								

M4 1.27N m
M5 2.5N m
M6 4.8N m
M8 7.64N m
M10 11.8N m
M12 14.0N m

For Additional Information, please visit
us.tdk-lambda.com/lp/products/r-series.htm

AC-DC Products

DC-DC Products

Filters

◆ Company

TDK·Lambda

Innovating Reliable Power

The choice and application of the power supply is an important one. Working with TDK-Lambda can help you save time and money, from design concept to years after your system or product is first installed.

Why TDK-Lambda?

- Over the last 60 years, TDK-Lambda has developed a worldwide reputation and heritage for high quality, robust power products.
- We at TDK-Lambda stand behind our products with industry leading warranties of up to a lifetime (limited).
- Our research and development budget is one of the largest in the industry, helping you design-in reliable, cutting edge technology, ahead of your competition.
- A broad range of product enables our customers to choose the right model for the application, and assists with their vendor reduction programs.
- Multiple manufacturing and design facilities across the globe. We can provide crucial local support when programs move between Asia, North America, and Europe. With those multiple factories we also have proven risk mitigation against natural disasters. Plus, our products are RoHS compliant and our sites are ISO9001 and ISO14001 certified.
- Our technical support can get your product to market faster. Please see next page for more details.
- As our Customer's product requirements became more diverse, we responded by broadening our product range from low cost 5W open frame AC-DC power supplies up to 22,500W hot-swap rack mount systems.
- We developed a large DC-DC converter portfolio to power applications in the growing fields of digital networking, communications, and medical equipment. We continue to launch leading-edge products to support these and other high tech markets.

- The need for fast customization has been met by our large array of Configurable Power Supplies and by our New York-based Custom Product Solutions Engineering Team. A wide variety of products can be developed, ranging from simple modifications, value-added solutions, or complete custom products.
- Not all of our Customer needs are product based though. Financial stability and the resources to continue to invest even in down markets, play a key factor in partner selection. Backed by the multi-billion dollar resources of the TDK Corporation*, we have increased our R&D and capital expenditures to offer our customers the latest in leading edge technologies.
- The end products that use TDK-Lambda power supplies are often designed on one continent and built in another. We can truly provide that global support with nine manufacturing sites, nine R&D facilities, sales and service offices across the world, and our authorized distribution network.

Thank you for your interest in TDK-Lambda products.

* In 2005 Lambda was acquired by the TDK Corporation of Japan (NYSE: TDK) thus combining Lambda's expertise in power supply innovation with TDK's global excellence in Ferrites and Multilayer Capacitor technology.

TDK·Lambda

Global Facilities

Ilfracombe Plant (U.K.)

Manufacturing and R&D
Modular (Vega, Alpha, Sirius) & DC-DC power supplies

Nagaoka (Japan)

Manufacturing & R&D
AC-DC, DC-DC & custom power supplies

Senai Plant (Malaysia)

Manufacturing
AC-DC, DC-DC power modules & custom products

Wuxi Plant (China)

Manufacturing and R&D
AC-DC Converters, filters & custom products

Kuantan Plant (Malaysia)

Manufacturing
AC-DC Converters & custom products

Karmiel Plant (Israel)

Manufacturing
Manufacturing & R&D

3055 Del Sol Blvd • San Diego, CA 92154 • 1-800-LAMBDA-4