



SEMTECH PROTECTION PRODUCTS



Transient Voltage Suppressors (TVS)

Transient voltage protection to meet the industry's toughest requirements

Semtech's protection products are industry-leading, state-of-the-art devices for protecting sensitive circuitry from Electrostatic Discharge (ESD), Electrical Fast Transients (EFT), Lightning, Cable Discharge Events (CDE) and other electrical overstress. They are designed to meet the industry's most rigid immunity standards, including:

- IEC 61000-4-2 (ESD)
- IEC 61000-4-4 (EFT)
- IEC 61000-4-5 (lightning)
- Telcordia GR-1089
- ITU K.20, K.21

Features:

- Sub 5V solutions: 2.5V – 3.3V
- Ultra-low capacitance devices: <1pF
- Extremely low clamping voltage
- ESD protection + EMI/RFI filtering
- Single-line and multi-line protection
- Small package solutions, including Semtech's own leadless package
- High volume manufacturing
- Solid-state silicon-avalanche technology
- RoHS/WEEE Compliant

Typical Applications:

- Portables
- Ethernet
- Set Top Box
- HDTV/Monitor Interfaces: HDMI / DVI / DisplayPort
- Telecom / Datacom Interfaces
- Servers / Desktop
- Notebooks / Tablets
- Automotive 

TVS Application Matrix

PART NUMBER	EMI Protection																							
	T1/E1 (Outside Line)	T1/E1 (Inside Line)	T3/E3	xDSL	Antenna	Automotive (AEC-Q100)	IEEE 1394 Firewire	10/100/1000 Ethernet	Serial/Parallel Ports	LVDS	USB 1.1/2.0/OTG	Multimedia Memory Port	Audio	Color LCD Display	Battery Contacts	Power Line	Keypad	Accessory Connector Kit	HDMI	DisplayPort	DVI	Analog Video		
EMI Clamp® - ESD + EMI Protection Devices																								
EClamp2374K														■				■						
EClamp2376K														■				■						
EClamp2378K														■				■						
EClamp2384K														■				■						
EClamp2386K														■				■						
EClamp2388K														■				■						
EClamp2394P														■				■						
EClamp2396P														■				■						
EClamp2398P														■				■						
EClamp2410P												■												
EClamp2422N													■											
EClamp2454P														■				■						
EClamp2456P														■				■						
EClamp2458P														■				■						
EClamp2455K												■												
EClamp2455P												■												
EClamp2465T												■												
EClamp2522P											■													
STF203-15											■							■						
STF203-22											■							■						
STF203-33											■							■						
TransClamp® - High-Power Surge TVS																								
TClamp0602N		■	■	■				■																
TClamp2502N								■															■	
TClamp3302N				■				■															■	
LC01-6	■																							
LC03-3.3				■				■																
LC03-6		■	■	■				■																
LC04-6		■	■	■																				
LC05-6		■																						
LC04-12		■		■																				
RailClamp® - Low Capacitance TVS																								
RClamp0502A						■	■			■	■												■	
RClamp0582B											■								■			■		
RClamp0582BQ					■					■														
RClamp0502BA						■	■			■	■			■								■	■	
RClamp0582N					■			■		■	■												■	
RClamp0504FA						■	■			■	■	■									■	■		
RClamp0504N		■	■	■		■	■	■	■	■	■										■	■		
RClamp0504PA						■	■			■	■	■					■				■	■		
RClamp0504S						■	■			■	■											■	■	
RClamp0506T						■				■								■		■	■			
RClamp0521PA										■	■	■												
RClamp0524PA						■				■				■					■	■	■			
RClamp0524S							■			■									■	■	■		■	
RClamp0534N							■			■												■		
RClamp0542T						■				■									■	■	■			
RClamp0544T						■				■									■	■	■			
RClamp0554S			■				■	■	■	■	■	■											■	
RClamp0584J						■				■									■	■	■			
RClamp0821P										■	■	■										■	■	
RClamp0854P										■														
RClamp1502B						■				■	■													
RClamp1521P										■	■	■										■	■	
RClamp1624T										■														
RClamp1654P										■														

PART NUMBER	T1/E1 (Outside Line)	T1/E1 (Inside Line)	T3/E3	xDSL	Antenna	Automotive (AEC-Q100)	IEEE 1394 Firewire	10/100/1000 Ethernet	Serial/ Parallel Ports	LVDS	USB 1.1-/2.0-/OTG	Multimedia Memory Port	Audio	Color LCD Display	Battery Contacts	Power Line	Keypad	Accessory Connector Kit	HDMI	DisplayPort	DVI	Analog Video
RailClamp® - Low Capacitance TVS																						
RCIamp2402B						■			■	■												
RCIamp2502L			■				■			■	■											
RCIamp2504N										■		■										
RCIamp2504P								■		■		■										■
RCIamp3304NA	■	■	■					■		■	■	■									■	■
RCIamp3304P								■		■		■										■
RCIamp3624T											■											
RCIamp3654PA											■											
SR05				■					■		■										■	■
SR12				■																		
SR2.8						■																■
SR3.3											■											■
SR70	■	■		■																		■
SRDA05-4	■	■									■											■
SRDA12-4				■																		
SRDA3.3-4	■	■									■											■
SRV05-4A			■				■	■	■	■	■											■
MicroClamp® - TVS Arrays																						
μClamp0501H									■					■	■	■	■					
μClamp0501P									■					■	■	■	■					
μClamp0502P													■		■	■	■	■				
μClamp0501T									■					■	■	■	■	■				
μClamp0502T									■					■	■	■	■	■				
μClamp0504T														■	■	■	■	■				
μClamp0505T														■	■	■	■	■				
μClamp0506T														■	■	■	■	■				
μClamp0508T									■				■				■	■				
μClamp0504A									■								■	■				
μClamp0505A									■				■				■	■				
μClamp0511P															■		■	■				
μClamp0511T											■			■	■	■	■	■				
μClamp0524P									■								■	■				
μClamp1201H									■					■	■	■	■	■				
μClamp1201P									■					■	■	■	■	■				
μClamp1211P														■			■	■				
μClamp1211T													■	■	■	■	■	■				
μClamp2401T									■					■	■	■	■	■				
μClamp2501T													■				■	■				
μClamp2511T												■					■	■				
μClamp2804L							■															
μClamp3301P									■					■	■		■	■				
μClamp3304A									■								■	■				
μClamp3305P									■					■			■	■				
μClamp3306P									■					■			■	■				
μClamp3311P														■			■	■				
μClamp3311PQ					■	■											■					
μClamp3311T												■					■	■				
μClamp3324P									■								■	■				
LCDA12C-1				■					■													
LCDA15C-1				■					■													
LCDA24C-1				■					■													
SLVU2-8Q					■																	■
SLVU2.8-4								■														
SLVU2.8-8								■														

New products added since last printing

EMIClamp® – ESD + EMI Protection Devices

PART NUMBER	DESCRIPTION	DEVICE SCHEMATIC	V _{RWM} MAX (V)	V _{BR} MIN (V)	C (pF) @ V _R = 0V	C (pF) @ V _R = 2.5V	R (ohm)	L (nH)	C MAX (pF) L-G @ V _R = 0V	I _R MAX (μA) @ V _{RWM}	PACKAGE
EClamp2374K EClamp2376K EClamp2378K	4, 6, 8 line ESD/EMI protection for Color LCD Interfaces		5	6	10	–	100	–	24	–	SLP1713P8 SLP2513P12 SLP3313P16
EClamp2384K EClamp2386K EClamp2388K	4, 6, 8 line ESD/EMI protection for Color LCD Interfaces, 400μm lead pitch		5	6	–	12	200	–	–	–	SLP1713P8 SLP2513P12 SLP3313P16
EClamp2394P EClamp2396P EClamp2398P	4, 6, 8 line ESD/EMI protection for Color LCD Interfaces		5	6	–	12	–	19	–	–	SLP2116P8 SLP3016P12 SLP4016P16
EClamp2410P	ESD protection for T-Flash/MicroSD Interfaces		5	6	–	12	45	–	–	–	SLP4016P16
EClamp2422N	2 line ESD/EMI protection for Audio Interfaces		5	6	100	–	–	2	–	–	SLP1510N6
EClamp2454P EClamp2456P EClamp2458P	4, 6, 8 line ESD/EMI protection for Color LCD Interfaces		5	6	–	12	–	28	–	–	SLP2116P8 SLP3016P12 SLP4016P16
EClamp2455K EClamp2455P	4 line ESD/EMI protection for SIM Cards, ('K'=400μm lead pitch) ('P'=500μm lead pitch)		5	6	20	–	100, 47	–	24	0.5	SLP1713P8 SLP2116P8
EClamp2465T	4 line ESD/EMI protection for SIM Card		5	6	10	–	100, 47	–	12	0.5	SLP1713P8T
EClamp2522P	USB upstream port filter & TVS for EMI filtering and ESD protection		5.5	6	20	–	22	–	45	1	SLP1616P6
STF203-15 STF203-22 STF203-33	USB upstream port filter & TVS for EMI filtering and ESD protection		5.25	6	47	–	15 22 33	–	–	5	SC-70 6L

TransClamp® – High-Power Surge TVS

PART NUMBER	DESCRIPTION	DEVICE SCHEMATIC	V _{RWM} MAX (V)	V _{BR} MIN (V)	C _J MAX (pF) L-L @ V _R = 0V	PEAK POWER (W) (8/20μs)	PEAK POWER (W) (10/1000μs)	I _{PP} (A) @ (10/1000μs)	I _{PP} (A) @ (8/20μs)	I _R MAX (μA) @ V _{RWM}	PACKAGE
LC03-3.3	2 line, Low Cap 3.3V TVS for high-speed interfaces		3.3	-	12	1800	-	-	100	1	SO-8
LC03-6	2 line, Low Cap TVS for high-speed data interfaces		6	6.8	12	2000	-	-	100	25	SO-8
LC04-6 LC05-6	Dual Low Cap TVS Array for telecom linecard applications, protects 2 tip & ring line pairs		6	6.8	15	- 2000	1000 -	70 -	200 100	15	SO-16
LC04-12	Dual Low Cap TVS Array for telecom linecard applications, protects 2 tip & ring line pairs		12	13.3	15	600	600	25	100	2	SO-16

RailClamp® – Low Capacitance TVS

PART NUMBER	DESCRIPTION	DEVICE SCHEMATIC	V _{RWM} MAX (V)	V _{BR} MIN (V)	C _J MAX (pF) L-L @ V _R = 0V	PEAK POWER (W) (8/20μs)	I _{PP} (A) @ (8/20μs)	I _R MAX (μA) @ V _{RWM}	PACKAGE
RClamp0502A	2 line, Ultra-Low Cap TVS Array		5	6	0.7	50	3	1	SC-89
RClamp0502BA RClamp1502B RClamp2402B	2 line protection, Ultra-Low Cap TVS for ESD/CDE protection		5 15 24	6 16.7 26.7	0.9	125 200 200	5 5 4	1	SC-75
RClamp0582B	2 line protection, Ultra-Low Cap TVS for High Speed Applications		5	6	0.8	300	15	0.1	SC-75
RClamp0582BQ	2 line protection, Ultra-Low Cap TVS for Automotive Applications		5	6	0.8	300	15	0.1	SC-75
RClamp0582N	2 data, 1 power line protection, Ultra-Low Cap TVS for Automotive Applications		6.5	7	0.5	125	5	0.1	SLP1210N6
RClamp0504FA RClamp0504S RClamp0504N	4 line protection, Low Cap TVS Array		5	6	1.5 1.5 5+	150 150 300	6 6 12	3 3 5	SC-70 6L SOT-23 6L SLP2020P6
RClamp0534N	4 line protection, Low Cap TVS for High Speed Applications		5	6	5	500	25	0.5	SLP3020N10
RClamp0504PA	4 line protection, Low Cap TVS Array		5	6	1	150	6	3	SLP1616P6
RClamp0506T	6 line protection, Ultra-Low Cap TVS for High Speed Applications		5	6.5	0.4	75	5	0.1	SLP3313P6T

RailClamp® – Low Capacitance TVS (Continued)

PART NUMBER	DESCRIPTION	DEVICE SCHEMATIC	V _{RWM} MAX (V)	V _{BR} MIN (V)	C: MAX (pF) L-L @ V _R = 0V	PEAK POWER (W) (8/20µs)	I _{PP} (A) @ (8/20µs)	I _R MAX (µA) @ V _{RWM}	PACKAGE
RCIamp2504N RCIamp3304NA	4 line protection, Low Cap TVS Array for Ethernet and Telecom Interfaces		2.5 3.3	-	5*	450	25	5	SLP2626P10
RCIamp2504P RCIamp3304P	4 line Ultra-Low Cap TVS Array		2.5 3.3	-	0.8*	80	5	0.5	SLP1616P6
RCIamp0521PA RCIamp0821P RCIamp1521P	Ultra-low Cap, 1 line ESD protection		5 8 15	6 10 16.7	0.5	100 100 120	4	1	SLP1006P2
RCIamp1624T	3 data line protection and 1 power line for USB charger and USB OTG		5	6.5	0.4	75	5	0.1	SLP1710P4T
RCIamp0542T	Protect 2 lines for High Speed Applications		5	6.5	0.4	75	5	0.05	SLP1610P4T
RCIamp0544T	Protect 4 lines for High Speed Applications		5	6.5	0.4	75	5	0.1	SLP2010P8T
RCIamp3624T	3 data line protection and 1 power line for USB charger and USB OTG		5	6.5	0.4	100	6	0.1	SLP1710P4T
RCIamp0522P	Protect 2 lines for High speed applications		5	6	0.4	150	5	1	SLP1610P4
RCIamp0524PA	Protect 4 lines for High speed applications		5	6	0.4	150	5	1	SLP2510P8
RCIamp0584J	4 line protection, Ultra-Low Cap for High Speed Applications		5	6.5	0.4	75	5	0.1	SLP2710P8
RCIamp0524S	4 line protection, low cap TVS for Ethernet Interfaces		5	6	5*	150	6	1	SOT-23 6L
RCIamp0554S	4 line protection, Low cap TVS for High Surge Applications		5	6	5*	375	25	0.5	SOT-23 6L
RCIamp1654P	3 data line protection and 1 power line for USB charger and USB OTG		5.5	6.5	0.5	100	3	1	SLP1616P6
RCIamp0854P	3 data line protection and 1 power line for USB charger and USB OTG		5.5	6.5	0.5	100	3	1	SLP1616P6
RCIamp3654PA	3 data line protection and 1 power line for USB charger and USB OTG		5.5	6.5	0.5	100	3	1	SLP1616P6

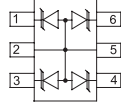
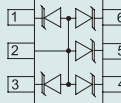
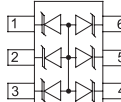
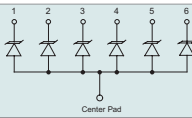
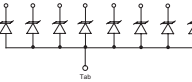
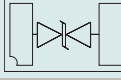
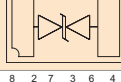
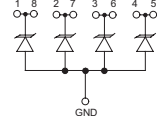
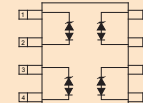
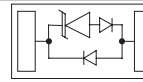
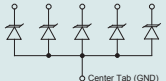
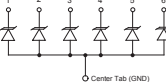
RailClamp® – Low Capacitance TVS (Continued)

PART NUMBER	DESCRIPTION	DEVICE SCHEMATIC	V _{RWM} MAX (V)	V _{BR} MIN (V)	C _i MAX (pF) L-L @ V _r = 0V	PEAK POWER (W) (8/20μs)	I _{PP} (A) @ (8/20μs)	I _R MAX (μA) @ V _{RWM}	PACKAGE
RClamp2502L	2.5V, Flow-through TVS for Gigabit and Fast Ethernet Protection		2.5	-	5	800	40	1	SO-8
SR05 SR12	2 line, Low Cap TVS Diode Array		5 12	6 13.3	10*	500 500	25 16	5 1	SOT-143
SR2.8 SR3.3	2 line, Low Cap TVS Diode Array		2.8 3.3	-	10*	200 150	14 10	1 1	SOT-143
SR70	2 line, Low Cap TVS Diode Array		70	85	10*	-	24	5	SOT-143
SRDA3.3-4	4 line, Low Capacitance TVS Diode Array		3.3	-	15*	500	25	1	SO-8
SRDA-5-4 SRDA12-4	4 line, Low Capacitance TVS Diode Array		5 12	6 13.3	15*	500	25 20	10 1	SO-8
SRV05-4A	4 line, Low Capacitance TVS Diode Array		5	6	5*	300	12	5	SOT-23 6L

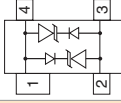
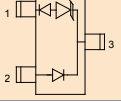
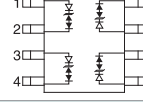
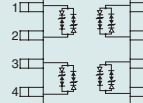
MicroClamp® - TVS Arrays

PART NUMBER	DESCRIPTION	DEVICE SCHEMATIC	V _{RWM} MAX (V)	V _{BR} MIN (V)	C _i MAX (pF) L-G @ V _r = 0V	PEAK POWER (W) (8/20μs)	I _{PP} (A) @ (8/20μs)	I _R MAX (μA) @ V _{RWM}	PACKAGE
μClamp0501H μClamp1201H	1 line ESD protection		5 12	6 13.3	160 60	240 200	16 8	5 1	SOD-523
μClamp0501P μClamp1201P	1 line ESD protection		5 12	6 13.3	160 60	200	16 8	5 1	SLP1006P2
μClamp0501T μClamp2401T	1 line ESD protection		5 24	6 27	10 50	25 150	2 3	0.25	SLP1006P2T
μClamp0511T	1 line ESD protection		5	6	7	-	2	0.05 (V _R =3.3V)	SLP1006P2T
μClamp2501T	1 line, 2.5V TVS for ESD protection		2.5	-	30	40	5	0.05	SLP1006P2T
μClamp2511T μClamp1211T μClamp3311T	1 line ESD protection		2.5 12 3.3	- 13.3 -	10 7 10	40 - 40	5 - 5	0.05	SLP1006P2T
μClamp0504T μClamp0505T μClamp0506T	4, 5, 6 line ESD protection		5	6	10	25	2	0.25	SLP1313P6T
μClamp0502P μClamp0502T	2 line ESD protection		5	6	10	25	2	0.25	SLP1006P3 SLP1006P3T

MicroClamp® – TVS Arrays (Continued)

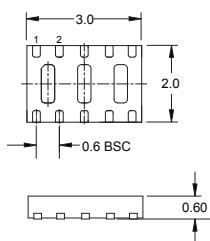
PART NUMBER	DESCRIPTION	DEVICE SCHEMATIC	V _{RWM} MAX (V)	V _{BR} MIN (V)	C _i MAX (pF) L-G @ V _R = 0V	PEAK POWER (W) (8/20μs)	I _{PP} (A) @ (8/20μs)	I _R MAX (μA) @ V _{RWM}	PACKAGE
μClamp0504A μClamp3304A	4 line ESD protection array		5 3.3	6 -	75 30	100 40	7 5	1 0.5	SC-89
μClamp0505A	5 line ESD protection array		5	6	75	100	7	1	SC-89
μClamp0506A	5 line ESD protection array		5	6	40	100	7	1	SC-89
μClamp0506P	6 line ESD protection array		5	6	75	100	7	1	SLP1616P6
μClamp0508T	8 line ESD protection		5	6	10	25	2	0.25	SLP1713P8T
μClamp0511P μClamp1211P μClamp3311P	1 line ESD protection		5 12 3.3	6 13.3 -	75 25 15	170 200 90	12 7 5	1 1 0.5	SLP1006P2
 μClamp3311PQ	1 line, Low Voltage TVS for Automotive Applications		3.3	-	15	90	5	0.5	SLP1006P2
μClamp0524P μClamp3324P	4 line, low voltage TVS for ESD protection		5 3.3	6 -	160 30	240 40	16 5	5 0.5	SLP2116P8
μClamp2804L	4 line, 2.8V TVS Array for Ethernet Applications		2.8	-	-	100	10	0.05	S0-8
μClamp3301P	1 line, low voltage ESD/CDE protection		3.3	-	30	40	5	0.5	SLP1006P2
μClamp3305P	5 line, 3.3V TVS		3.3	-	25	40	5	0.5	SLP1616P6
μClamp3306P	6 line, 3.3V TVS		3.3	-	25	40	5	0.5	SLP1616P6

LCDA/SLVU Families - TVS Arrays

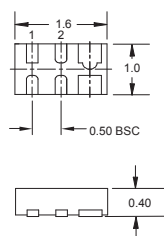
LCDA12C-1 LCDA15C-1 LCDA24C-1	1 line, Low Cap TVS Diode Array		12 15 24	13.3 16.7 26.7	15 15 10	500	-	5 5 1	SOT-143
 SLVU2-8Q	1 line, 2.8V TVS for Automotive Applications		2.8	-	100	400	24	0.25	SOT-23
SLVU2.8-4	4 line, EPD TVS Diode Array for ESD and latch-up protection		2.8	-	-	400	24	1	S0-8
SLVU2.8-8	8 line EPD TVS Diode Array for ESD and latch-up protection		2.8	-	-	600	30	1	S0-8

TVS Package Diagrams

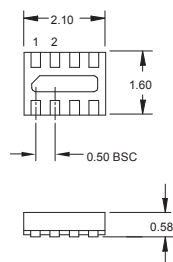
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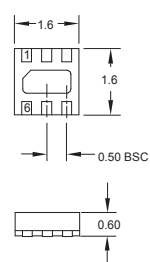
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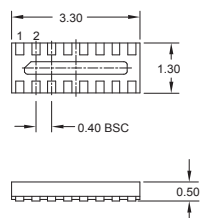
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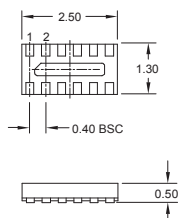
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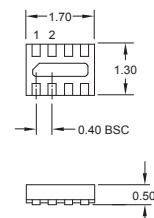
SLP3313P16



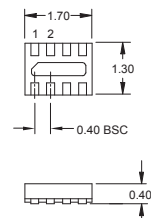
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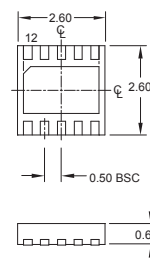
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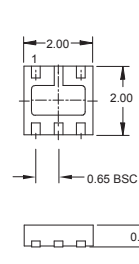
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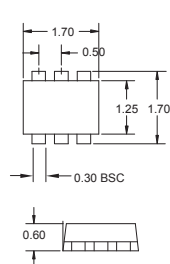
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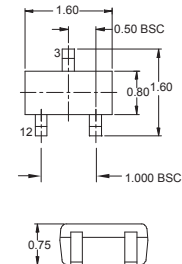
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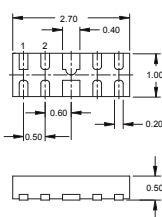
SC-89



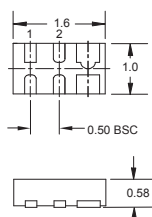
SC-75



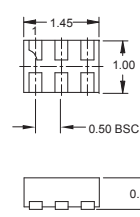
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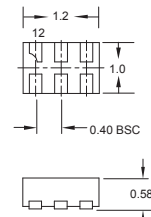
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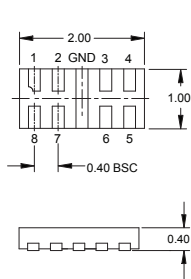
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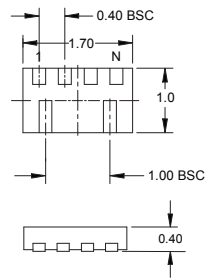
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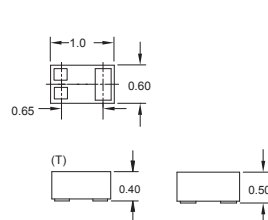
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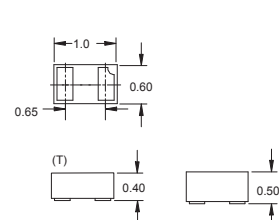
SLP1710P4T



SLP1006P3/T



SLP1006P2/T



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