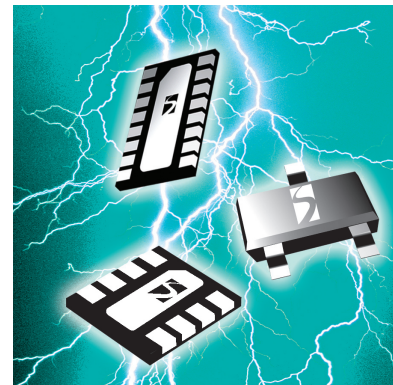


Product Portfolio Brief Q408



SEMTECH PROTECTION PRODUCTS



Transient Voltage Suppressors (TVS) Protection for Next Generation Designs

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 disturbances. They are designed to meet the industry's immunity standards, such as:

- IEC 61000-4-2 (ESD) $\pm 15\text{kV}$ (air)
- IEC 61000-4-2 (ESD) $\pm 8\text{kV}$ (contact)
- IEC 61000-4-4 (EFT) 40A (5/50ns)
- IEC 61000-4-5 (lightning)
- Telcordia GR-1089

Features:

- Sub 5V solutions: 2.8V, 3.3V
- Ultra-low capacitance: $< 1\text{pF}$
- Industry's lowest clamping voltage
- ESD protection + EMI/RFI filtering
- Single-line and multi-line protection
- Small package solutions, including Semtech's own leadless package (SLP)
- High reliability end product
- High volume manufacturing
- Solid-state silicon-avalanche technology
- Strong technical support
- RoHS/WEEE Compliant

Typical Applications:

- Portables
- Ethernet
- Set Top Box
- Digital Video: HDMI / DVI / DisplayPort
- Telecom / Datacom Interfaces
- Servers / Desktop / Notebooks

TVS Application Matrix

PART NUMBER	T1/E1 (Outside Line)	T1/E1 (Inside Line)	T3/E3	xDSL	ISDN S/T/U	SLIC	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																						
EClamp1002A																							
EClamp2342N																							
EClamp2357N																							
EClamp2374K*																							
EClamp2376K*																							
EClamp2378K*																							
EClamp2374P																							
EClamp2376P																							
EClamp2378P																							
EClamp2384K																							
EClamp2386K																							
EClamp2388K																							
EClamp2384P																							
EClamp2386P																							
EClamp2388P																							
EClamp2394P																							
EClamp2396P																							
EClamp2398P																							
EClamp2410P																							
EClamp2422N																							
EClamp2454P																							
EClamp2456P																							
EClamp2458P																							
EClamp2455K																							
EClamp2455P																							
EClamp2522P*																							
EClamp3202A																							
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																							
RailClamp® - Low Capacitance TVS																							
RClamp0502A																							
RClamp0502B																							
RClamp0503A																							
RClamp0502N																							
RClamp0503N																							
RClamp0503F																							
RClamp0504F																							
RClamp0504N																							
RClamp0504P																							
RClamp0504S																							
RClamp0508M																							

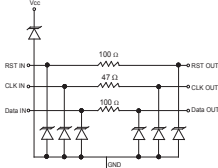
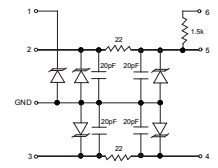
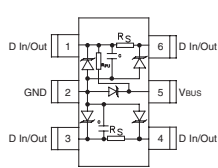
PART NUMBER	T1/E1 (Outside Line)	T1/E1 (Inside Line)	T3/E3	xDSL	ISDN S/T/U	SLIC	IEEE 1394 Firewire	10/100/1000 Ethernet	Serial/Parallel Ports	LVDS	USB 1.1/2.0/OTG	Multimedia Memory Port	Audio	Color LCD Display	Battery Contacts	Power Line	Keypad	Accessory Connector Kit	HDMI	DisplayPort	DVI	Analog Video	
	RailClamp® - Low Capacitance TVS																						
RClamp0521P																							
RClamp0522P																							
RClamp0524P																							
RClamp0821P																							
RClamp1502B																							
RClamp1521P																							
RClamp2402B																							
RClamp2504N																							
RClamp2504P																							
RClamp3304N																							
RClamp3304P																							
RClamp3654P*																							
RClamp7002M																							
SR05																							
SR12																							
SR2.8																							
SR3.3																							
SR70																							
SRDA05-4																							
SRDA12-4																							
SRDA3.3-4																							
MicroClamp™ - TVS Arrays																							
uClamp0501H																							
uClamp0501P																							
uClamp0502P																							
uClamp0501T*																							
uClamp0502T*																							
uClamp0508T*																							
uClamp0504A																							
uClamp0505A																							
uClamp0506A																							
uClamp0506P																							
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uClamp3305P																							
uClamp3306P																							
uClamp3311P																							
uClamp3324P																							
LCDA15-1																							
LCDA12C-1																							
LCDA15C-1																							
LCDA24C-1																							
SLVU2.8-4																							
SLVU2.8-8																							

* New products added since last printing.

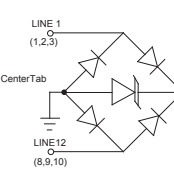
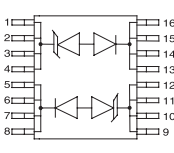
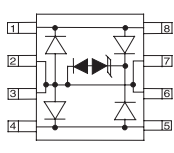
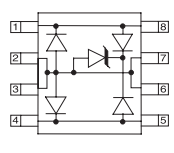
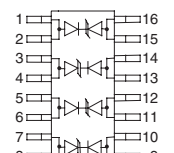
EMIClamp™ – ESD + EMI Protection Devices

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
EClamp1002A EClamp3202A	2 line ESD/EMI protection for speaker ports (EClamp1002A) and microphone ports (EClamp3202A)		5	6	-	-	10 32	-	160	5	SC-89
EClamp2342N	8 line ESD/EMI protection for Color LCD Interfaces		5	6	10 11	-	100 200	-	20 22	-	QFN
EClamp2357N	EMI Filter and ESD protection for Secure Digital Card Interfaces		5	6	10	-	100	-	22	-	QFN
EClamp2374K* EClamp2376K* EClamp2378K*	4, 6, 8 line ESD/EMI protection for Color LCD Interfaces		5	6	10	-	100	-	24	-	SLP1713P8 SLP2513P12 SLP3313P16
EClamp2374P EClamp2376P EClamp2378P	4, 6, 8 line ESD/EMI protection for Color LCD Interfaces		5	6	10	-	100	-	20	-	SLP2116P8 SLP3016P12 SLP4016P16
EClamp2384K EClamp2386K EClamp2388K	4, 6, 8 line ESD/EMI protection for Color LCD Interfaces, 400μm lead pitch		5	6	-	12	200	-	-	-	SLP1713P8 SLP2513P12 SLP3313P16
EClamp2384P EClamp2386P EClamp2388P	4, 6, 8 line ESD/EMI protection for Color LCD Interfaces		5	6	-	12	200	-	-	-	SLP2116P8 SLP3016P12 SLP4016P16
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

EMIClamp™ – ESD + EMI Protection Devices

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
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} @ (10/1000µs)	I _{PP} (A) @ (8/20µs)	I _R MAX (µA) @ V _{RWM}	PACKAGE
TClamp0602N TClamp2502N* TClamp3302N	2 line, Low Cap TVS for Ethernet and Telecom Interfaces		6 2.5 3.3	6.8 - -	12	2500 - -	-	-	95	5 0.5 1	SLP2626P10
LC01-6	Low Cap TVS for high-speed telecommunication systems		6	8	-	-	1500	100	-	25	SO-16W
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

RailClamp® – Low Capacitance TVS

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
RClamp0502A	2 line, Ultra-Low Cap TVS Array		5	6	0.7	50	3	1	SC-89
RClamp0502B 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
RClamp0502N	2 data, 1 power line protection, Ultra-Low Cap TVS Array		6.5	7	0.5	100	3	1	SLP1210N6
RClamp0503A	3 data, 1 power line protection, TVS Array		5.25	6	1*	60	3	1	SC-89
RClamp0503N	3 line, Low Cap TVS Array for USB OTG		6.5	7	0.5	100	3	1	SLP1510N6
RClamp0504F RClamp0504S	4 line protection, Low Cap TVS Array		5	6	1.5	150	6	3	SC-70 6L SOT-23 6L
RClamp0504N	4 line protection, Low Cap TVS Diode Array		5	6	5*	300	12	5	SLP2020P6
RClamp0504P	4 line protection, Low Cap TVS Array		5	6	1	150	6	3	SLP1616P6
RClamp2504N RClamp3304N	4 line protection, Low Cap TVS Array for Ethernet and Telecom Interfaces		3.3 2.5	-	5*	450	25	5 0.5	SLP2626P10
RClamp2504P RClamp3304P	4 line Ultra-Low Cap TVS Array		3.3 2.5	-	0.8*	80	5	0.5	SLP1616P6
RClamp0521P RClamp0821P RClamp1521P	Ultra-low Cap, 1 line ESD protection		5 8 15	6 10 16.7	0.5	100 100 120	4	1	SLP1006P2
RClamp0522P RClamp0524P	Protect 2 lines (RClamp0522P) and 4 lines (RClamp0524P) for High speed applications		5	6	0.4	150	5	1	SLP1610P4 SLP2510P8
RClamp3654P*	3 data line protection and 1 power line for USB charger and USB OTG		5.5	6.5	0.5	100	3	1	SLP1616P6

* Line-to-ground capacitance (max) value

RailClamp® – Low Capacitance TVS

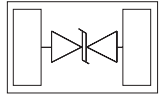
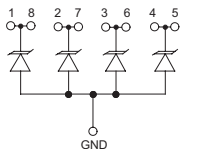
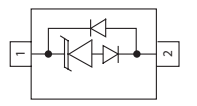
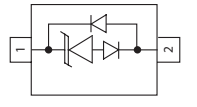
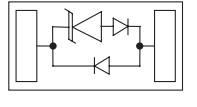
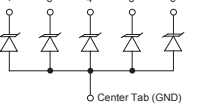
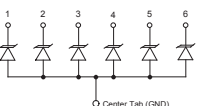
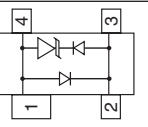
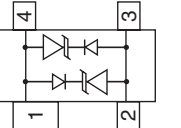
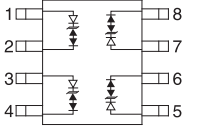
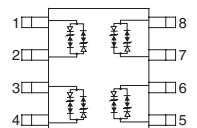
RClamp7002M	2 high speed line protection, Low Cap TVS Diode Array for ADSL application		70	85	10*	1000	70	5	MSOP-10
SR05 SR12	2 line, Low Cap TVS Diode Array		5 12	6 13.3	10*	500 500	25 16	5 1	SOT-143
SR2.8 SR3.3	2 line, Low Cap TVS Diode Array		2.8 3.3	-	10*	200 150	14 10	1 1	SOT-143
SR70	2 line, Low Cap TVS Diode Array		70	85	10*	-	24	5	SOT-143

MicroClamp™ - TVS Arrays

PART NUMBER	DESCRIPTION	DEVICE SCHEMATIC	V _{RWM} MAX (V)	V _{BR} MIN (V)	C _J 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
µClamp0502P µClamp0502T*	2 line ESD protection		5	6	10	25	2	0.25	SLP1006P3 SLP1006P3T
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

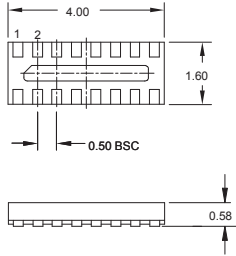
* Line-to-ground capacitance (max) value

MicroClamp™ – TVS Arrays (Continued)

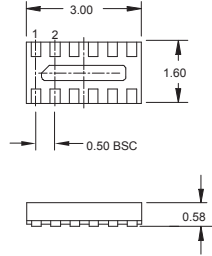
PART NUMBER	DESCRIPTION	DEVICE SCHEMATIC	V _{RWM} MAX (V)	V _{BR} MIN (V)	C _i MAX (pF) L-G @ V _r = 0V	PEAK POWER (W) (8/20μs)	I _{PP} (A) @ (8/20μs)	I _R MAX (μA) @ V _{RWM}	PACKAGE
μClamp0511P μClamp1211P μClamp3311P	1 line ESD protection		5 12 3.3	6 13.3 -	75 25 15	170 200 90	12 7 5	1 1 0.5	SLP1006P2
μClamp0524P μClamp3324P	4 line, low voltage TVS for ESD protection		5 3.3	6 -	160 30	240 40	16 5	5 0.5	SLP2116P8
μClamp3301D	1 line, low voltage ESD/CDE protection		3.3	-	50	100	10	0.5	SOD-323
μClamp3301H	1 line, low voltage ESD/CDE protection		3.3	-	30	40	5	0.5	SOD-523
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
LCDA15-1	1 line, Low Cap TVS Diode Array		15	16.7	15	500	15	5	SOT-143
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
SLVU2.8-4	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

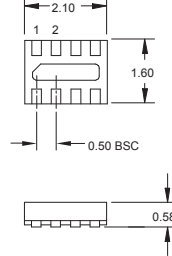
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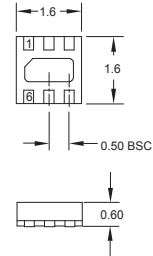
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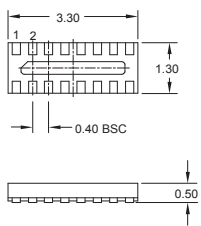
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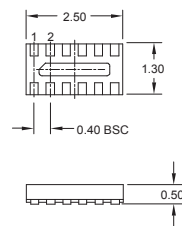
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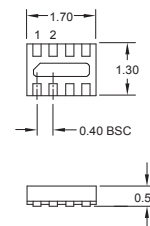
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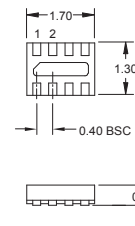
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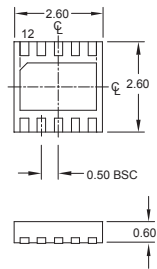
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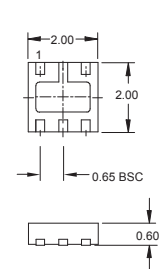
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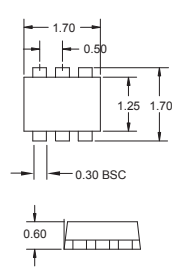
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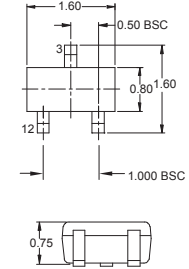
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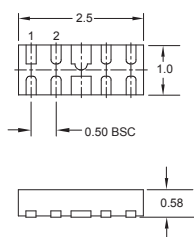
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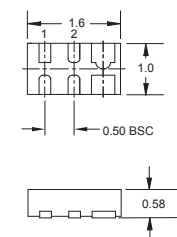
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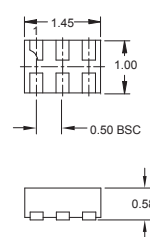
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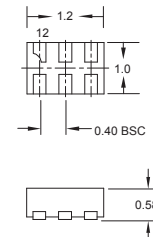
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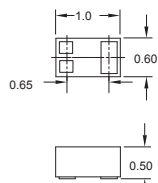
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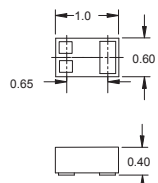
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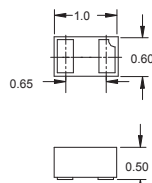
SLP1006P3



SLP1006P3T



SLP1006P2



SLP1006P2T

