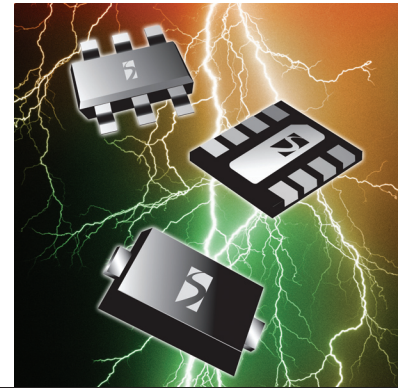


# Product Portfolio Brief Q406



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

Semtech's Protection product portfolio 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 / UDI
- Display Port
- 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	Antenna	Keypad	Accessory Connector Kit	HDMI	DVI	Analog Video	
EClamp1002A													•						•				
EClamp2340C														•					•	•			
EClamp2342N														•					•	•			
EClamp2343C											•												
EClamp2350N														•					•	•			
EClamp2356C														•					•	•			
EClamp2357N											•												
EClamp2374P *														•					•				
EClamp2376P *														•					•				
EClamp2378P *														•					•				
EClamp2384P *														•					•				
EClamp2386P *														•					•				
EClamp2388P *														•					•				
EClamp2394P *														•					•				
EClamp2396P *														•					•				
EClamp2398P *														•					•				
EClamp2454P *														•					•				
EClamp2456P *														•					•				
EClamp2458P *														•					•				
EClamp3202A												•							•				
EClamp3343C											•												
STF203-15											•								•				
STF203-22											•								•				
STF203-33											•								•				
STF701																			•				
RClamp0502B							•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
RClamp0504F							•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
RClamp0504M							•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
RClamp0504N	•	•	•	•			•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
RClamp0504P							•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
RClamp0504S							•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
RClamp0508M							•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
RClamp0514M							•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
RClamp0522P *							•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
RClamp0524P *							•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
RClamp0544M *							•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
RClamp1502B *							•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
RClamp2402B *							•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
RClamp3304N	•	•	•	•			•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
RClamp7002M				•		•																•	•
SR05				•				•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
SR12				•																			
SR2.8							•															•	•
SR3.3											•												•

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	Antenna	Keypad	Accessory Connector Kit	HDMI	DVI	Analog Video	
SR70	•	•		•	•	•																	•
SRDA05-4	•	•										•											•
SRDA05-6	•	•										•											•
SRDA12-4				•																			
SRDA3.3-4	•	•			•							•											•
SRDA3.3-6	•	•			•							•											•
SRDA70-4	•	•		•	•	•																	•
uClamp0501H								•							•	•			•	•			
uClamp0501P *								•							•	•			•	•			
uClamp0503C																			•	•			
uClamp0504A								•											•	•			
uClamp0505A								•					•						•	•			
uClamp0506A *								•				•							•	•			
uClamp0506P *								•				•							•	•			
uClamp0524P *								•											•	•			
uClamp1201H								•							•	•			•	•			
uClamp1201P *								•							•	•			•	•			
uClamp3301D								•							•	•			•	•			
uClamp3301H								•							•	•			•	•			
uClamp3301P *								•							•	•			•	•			
uClamp3304A								•											•	•			
uClamp3324P								•											•	•			
LCDA15-1									•														
LCDA12C-1									•														
LCDA15C-1									•														
LCDA24C-1									•														
SD05								•							•	•			•	•			
SD12								•							•	•			•	•			
SD05C								•					•		•	•			•	•			
SD12C								•						•	•	•			•	•			
SD15C								•						•	•	•			•	•			
SD24C								•						•	•	•			•	•			
SLVU2.8-4								•															
SLVU2.8-8								•															
SMF3.3								•						•	•				•	•			
SMS3.3								•						•	•				•	•			
SMF05								•											•	•			
SMF12								•											•	•			
SMF05C								•					•						•	•			
LC01-6	•																						
LC03-3.3				•				•															
LC03-6				•				•															
LC05-6				•																			

\* New products added since last printing.

# TRANSIENT VOLTAGE PROTECTION

## EMIClamp™ - ESD + EMI PROTECTION DEVICES

PART NUMBER	DESCRIPTION	DEVICE SCHEMATIC	V <sub>RWM</sub> MAX (V)	V <sub>BR</sub> MIN (V)	C (pF) @ V <sub>R</sub> = 0V	C (pF) @ V <sub>R</sub> = 2.5V	R (ohm)	L (nH)	C MAX @ V <sub>R</sub> = 0V (pF) L-G	I <sub>R</sub> MAX @ V <sub>RWM</sub> (μA)	PACKAGE
EClamp1002A EClamp3202A	2 line ESD/EMI protection for speaker ports (EClamp1002A) and microphone ports (EClamp3202A)		5	6			10 32		160	5	SC-89
EClamp2340C	10 line EMI filter and ESD protection for color LCD interfaces		5	6	13.5		100		27		Flip Chip
EClamp2342N EClamp2350N	8 line ESD/EMI protection for color LCD interfaces		5	6	10 11		100 200		20 22		QFN
EClamp2343C EClamp3343C	USB 2.0/OTG EMI/RFI filtering, termination, and protection		5.25	6	30 30		22 33		60	5	Flip Chip
EClamp2356C	10 line EMI filter and ESD protection for color LCD interfaces		5	6	6		100		15		Flip Chip
EClamp2357N	4 line EMI filter and ESD protection for secure digital card interfaces		5	6	10		100		22		3.0 x 3.0mm 16-lead QFN
EClamp2374P EClamp2376P EClamp2378P	4, 6, 8 line ESD/EMI protection for color LCD interfaces		5	6	10		100		20		SLP2116P8 SLP3016P12 SLP4016P16
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
EClamp2454P EClamp2456P EClamp2458P	4, 6, 8 line ESD/EMI protection for color LCD interfaces		5	6		12		28			SLP2116P8 SLP3016P12 SLP4016P16
SFC2309-200	10 line flip chip TVS diode with T-filter for color LCD interface protection		5	6	50			200	50	0.5	Flip Chip
STF203-15 STF203-22 STF203-33	USB upstream port filter & TVS for EMI filtering and ESD protection		5.25	6	47		15 22 33		60	5	SC-70 6L
STF701	T-Filter with TVS diode array for EMI filtering and ESD protection		5	6	100		50		230	5	SC-70 5L

# TRANSIENT VOLTAGE PROTECTION

## RailClamp® - LOW CAPACITANCE TVS

PART NUMBER	DESCRIPTION	DEVICE SCHEMATIC	V <sub>RWM</sub> MAX (V)	V <sub>BR</sub> MIN (V)	C <sub>J</sub> MAX (pF) @ V <sub>r</sub> = 0V L-L	PEAK POWER (W) (8/20µs)	I <sub>PP</sub> @ 8/20µs (A)	I <sub>r</sub> MAX @ V <sub>RWM</sub> (µA)	PACKAGE
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
RClamp0504N SRV05-4	4 line protection, low cap TVS diode array		5	6	5	300	12	5	SLP2020P6 SOT-23 6L
RClamp0504P	4 line protection, low cap TVS array		5	6	1	150	6	3	SLP1616P6
RClamp0508M	8 line protection, low cap TVS diode array		5	6	5 *	300	12	5	MSOP-10
RClamp0522P *	Ultra-low capacitance TVS array		5	6	0.8 *	150	5	1	SLP1610P4
RClamp0524P *	Ultra-low capacitance TVS array		5	6	0.8 *	150	5	1	SLP2510P8
RClamp3304N	4 line protection, low cap TVS array		3.3		5 *	450	25	5	SLP2626P10
RClamp7002M	2 high speed line protection, low cap TVS diode array		70	85	10 *	1000	70	5	MSOP-10
1) SR05 1) SR12 2) SR2.8 2) SR3.3	2 line, low cap TVS diode array		5 12 2.8 3.3	6 13.3 - -	10 *	500 500 200 150	25 16 14 10	5 1 1 1	SOT-143
SR70	2 line, low cap TVS diode array		70	85	10 *		24	5	SOT-143
SRDA05-4 SRDA3.3-4 SRDA12-4	4 line, low cap TVS diode array		5 3.3 12	6 - 13.3	15 *	500 375 500	25 25 20	10 1 1	SO-8
SRDA05-6 SRDA3.3-6	6 line, low cap TVS diode array		5 3.3	6	15 *	500 375	25	10 1	SO-8

\* Line-to-ground capacitance (max) value

# TRANSIENT VOLTAGE PROTECTION

## HIGH-POWER SURGE TVS

PART NUMBER	DESCRIPTION	DEVICE SCHEMATIC	V <sub>RWM</sub> MAX (V)	V <sub>BR</sub> MIN (V)	C <sub>J</sub> MAX (pF) @ V <sub>R</sub> = 0V L-L	PEAK POWER (W) (8/20µs)	PEAK POWER (W) (10/1000µs)	I <sub>PP</sub> @ 10/1000µs (A)	I <sub>PP</sub> @ 8/20µs (A)	I <sub>R</sub> MAX @ V <sub>RWM</sub> (µA)	PACKAGE
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
LC05-6	Dual low cap TVS array for telecom linecard applications		6	6.8	15	2000			100	15	SO-16

## MicroClamp™ - TVS ARRAYS

PART NUMBER	DESCRIPTION	DEVICE SCHEMATIC	V <sub>RWM</sub> MAX (V)	V <sub>BR</sub> MIN (V)	C <sub>J</sub> MAX (pF) @ V <sub>R</sub> = 0V L-G	PEAK POWER (W) (8/20µs)	I <sub>PP</sub> @ 8/20µs (A)	I <sub>R</sub> MAX @ V <sub>RWM</sub> (µA)	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
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

# TRANSIENT VOLTAGE PROTECTION

## MicroClamp™ - TVS ARRAYS (continued)

PART NUMBER	DESCRIPTION	DEVICE SCHEMATIC	V <sub>RWM</sub> MAX (V)	V <sub>BR</sub> MIN (V)	C <sub>J</sub> MAX (pF) @ V <sub>R</sub> = 0V L-G	PEAK POWER (W) (8/20μs)	I <sub>PP</sub> @ 8/20μs (A)	I <sub>R</sub> MAX @ V <sub>RWM</sub> (μA)	PACKAGE
μClamp0524P	4 line low voltage ESD protection		5	6	160	240	16	5	SLP2116P8
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
μClamp3324P	4 line, low voltage TVS for ESD protection		3.3		30	40	5	0.5	SLP2116P8
LCDA15-1	1 line, low cap TVS diode array		15	16.7		500	15	5	SOT-143
LCDA12C-1 LCDA15C-1 LCDA24C-1	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	SO-8
SLVU2.8-8	8 line EPD TVS diode array for ESD and latch-up protection		2.8			600	30	1	SO-8
SMF3.3	4 line, 3.3V TVS array for ESD and latch-up protection		3.3		30	40	5	0.5	SC70-5L
SMF05 SMF12	4 line TVS diode array for ESD and latch-up protection		5 12	6 13.3	175 75	200		10 1	SC70-5L
SMF05C	5 line TVS diode array for ESD and latch-up protection		5	6	130	100	8	5	SC70-6L

Visit the Semtech website at [www.semtech.com](http://www.semtech.com) to locate most current product specifications, datasheets and contact information for your local Semtech Field Applications Engineer.

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