RClamp®3354S Low Voltage RClamp® Surge Protection for GbE Interfaces

PROTECTION PRODUCTS - RailClamp®

Description

RailClamp® TVS diodes are specifically designed to protect sensitive components which are connected to high-speed data and transmission lines from overvoltage caused by ESD (electrostatic discharge), CDE (cable discharge events), and EFT (electrical fast transients).

The RClamp®3354S incorporates surge rated, low capacitance steering diodes and a TVS diode in a single package. Each device will protect up to four high-speed lines. The RClamp3354S can withstand a high level of surge current (25A, 8/20us) while maintaining a low loading capacitance of less than 5pF. The high surge capability means it can be used in high threat environments in applications such as Gigabit Ethernet, telecommunication lines, and LVDS interfaces.

The RClamp3354S is constructed using Semtech's proprietary EPD process technology. The EPD process provides low stand-off voltages with significant reductions in leakage current and capacitance over silicon-avalanche diode processes. It features a low operating voltage of 3.3 volts for superior protection.

The RClamp3354S is in a 5-lead SOT-23 package. The leads are finished with lead-free matte tin.

Features

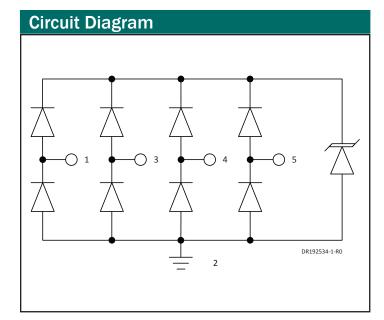
- ◆ Transient protection for high-speed data lines to IEC 61000-4-2 (ESD) 30kV (air), 30kV (contact) IEC 61000-4-4 (EFT) 40A (5/50ns) IEC 61000-4-5 (Lightning) 25A (8/20µs)
- Array of surge rated diodes with internal TVS Diode
- Protects up to four I/O lines
- ◆ Low capacitance (<5pF) for high-speed interfaces
- ◆ Low Dynamic Resistance: 0.25 Ohms
- Low operating voltage: 3.3V
- Solid-state silicon-avalanche technology

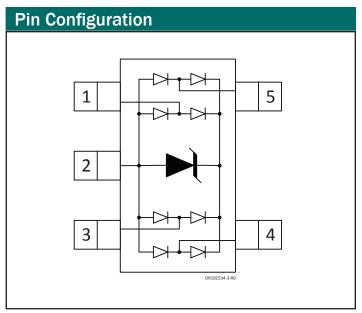
Mechanical Characteristics

- ◆ JEDEC SOT-23 5L package
- Pb-Free, Halogen Free, RoHS/WEEE Compliant
- Molding compound flammability rating: UL 94V-0
- ◆ Marking : Marking code + date code
- Packaging: Tape and Reel

Applications

- ◆ 10/100/1000 Ethernet
- Central Office Equipment
- LVDS Interfaces
- MagJacks / Integrated Magnetics
- Notebooks / Desktops / Servers







Absolute Maximum Ratings

Rating	Symbol	Value	Units	
Peak Pulse Power (tp = 8/20µs)	P _{PK}	400	W	
Peak Pulse Current (tp = 8/20µs)	l _{pp}	25	А	
ESD per IEC 61000-4-2 (Air)	.,,	30	kV	
ESD per IEC 61000-4-2 (Contact)	V _{ESD}	30		
Operating Temperature	T,	-55 to +85	°C	
Storage Temperature	T _{STG}	-55 to +150	°C	

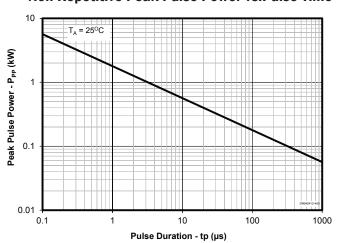
Electrical Characteristics (T=25°C unless otherwise specified)

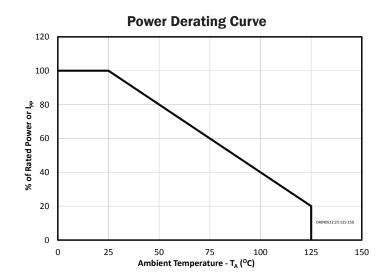
Parameter	Symbol	Conditions Min.		Тур.	Max.	Units	
Reverse Stand-Off Voltage	$V_{_{\mathrm{RWM}}}$				3.3	V	
Punch-Through Voltage	V _{PT}	$I_{PT} = 2\mu A$ 3.5			5.3	V	
Snap-Back Voltage	V _{SB}	I _{SB} = 50mA 2.8				V	
Reverse Leakage Current	I _R	V _{RWM} = 3.3V, T=25°C			0.5	μΑ	
Clamping Voltage	V _c	I _{PP} = 1A, tp = 8/20µs Any I/O to Ground			5.5	0 V	
		I _{PP} = 10A, tp = 8/20μs Any I/O to Ground			10		
		I _{PP} = 25A, tp = 8/20μs Any I/O to Ground			16		
Junction Capacitance	C _J	Between I/O pins and Ground $V_R = OV$, $f = 1MHz$		3.8	5		
		Between I/O pins V _R = OV, f = 1MHz		2.0		pF	



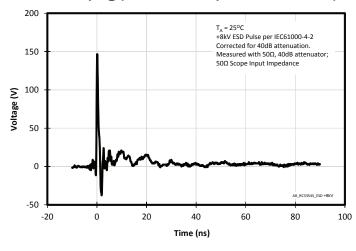
Typical Characteristics

Non-Repetitive Peak Pulse Power vs. Pulse Time

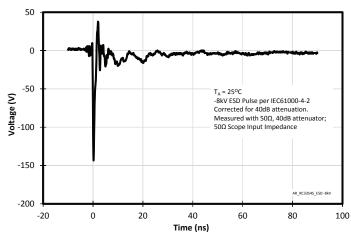




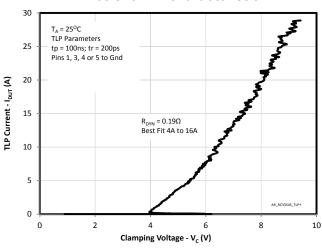
ESD Clamping (+8kV Contact per IEC 61000-4-2)



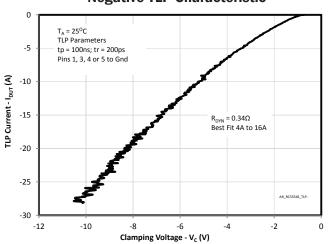
ESD Clamping (-8kV Contact per IEC 61000-4-2)



Positive TLP Characteristic

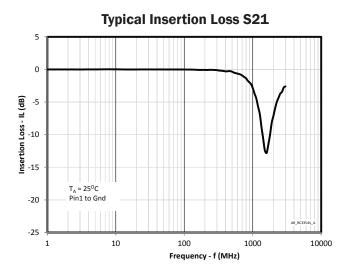


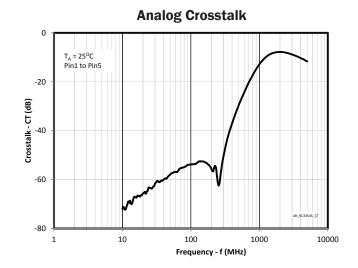
Negative TLP Characteristic



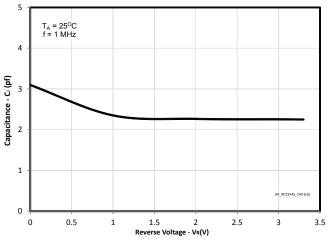


Typical Characteristics (Continued)

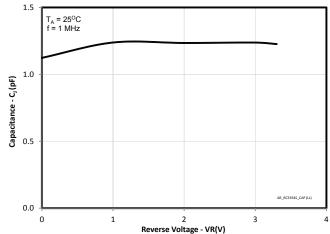




Capacitance v Reverse Voltage (Line to GND)



Capacitance v Reverse Voltage (Line to Line)





Applications Information

Gigabit Ethernet Protection Solutions

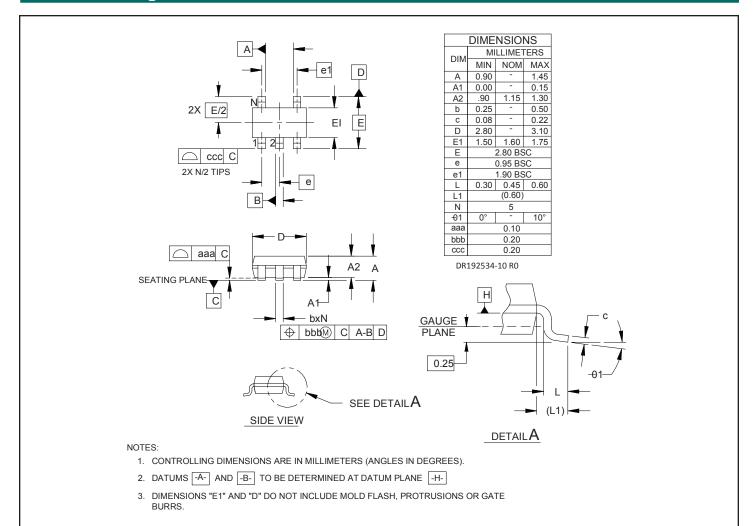
Ethernet systems with connections external to the building are subject to high-level transient threats. This type of equipment may even be required to meet the surge immunity requirements of Telcordia GR-1089. Reliable protection of the Ethernet transceiver requires a device that can absorb the expected transient energy, clamp the incoming surge to a safe level, and yet remain transparent to the system under normal operation. The RClamp3354S has been designed to meet these demanding requirements.

Transient Protection

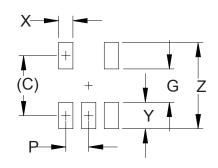
When designing Ethernet protection, the entire system must be considered. An Ethernet port includes interface magnetics in the form of transformers and common mode chokes. Transformers and chokes can be discrete components, but integrated solutions that include the RJ-45 connector, resistors, capacitors, and protection are also available. In either case, the transformer will provide a high level of common mode isolation to external voltages, but no protection for metallic (line-to-line) surges. During a metallic transient event, current will flow into one line, through the transformer and back to the source. As the current flows, it charges the windings of the transformer on the line side. Once the surge is removed, the windings on the line side will stop charging and will transfer its stored energy to the IC side where the PHY IC is located. The magnitude and duration of the surge is attenuated by the inductance of the magnetics. The amount of attenuation will vary by vendor and configuration of the magnetics. It is this transferred energy that must be clamped by the protection circuitry.



Outline Drawing - SOT-23 5L



Land Pattern - SOT-23 5L



DIMENSIONS				
DIM	MILLIMETERS			
С	(2.50)			
G	1.40			
Р	0.95			
Х	0.60			
Υ	1.10			
Ζ	3.60			

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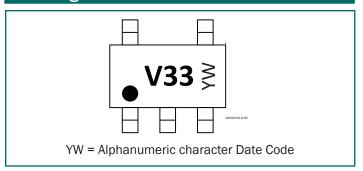
NOTES:

1.

2. THIS LAND PATTERN IS FOR REFERENCE PURPOSES ONLY. CONSULT YOUR MANUFACTURING GROUP TO ENSURE YOUR COMPANY'S MANUFACTURING GUIDELINES ARE MET.



Marking

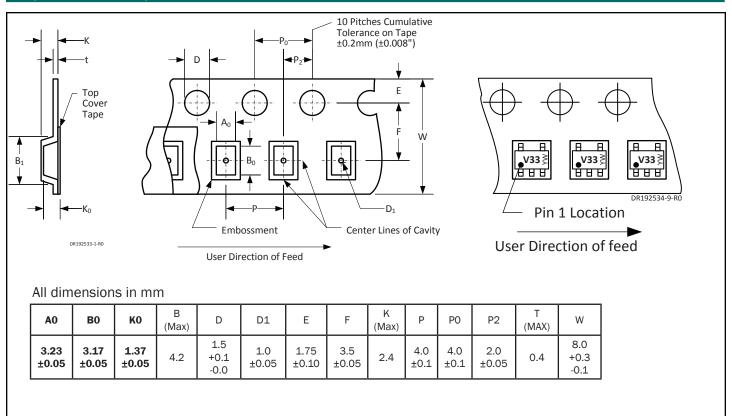


Ordering Information

Part Number	Lead	Qty per	Reel
	Finish	Reel	Size
RClamp3354S.TCT	Matte Tin	3,000	7 inch

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Tape and Reel Specification



Contact Information

Semtech Corporation Protection Products Division 200 Flynn Rd., Camarillo, CA 93012 Phone: (805)498-2111 FAX (805)498-3804

Mouser Electronics

Authorized Distributor

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Semtech:

RCLAMP3354S.TCT