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TVS Diode Arrays (SPA® Diodes)

Lightning Surge Protection - SP03-3.3 Series

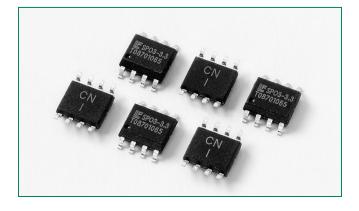


Po

GREEN

RoHS

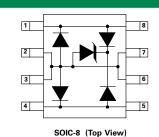
SP03-3.3 Series 3.3V 150A Diode Array



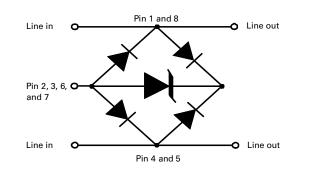
Agency Approvals - Pending

Agency	Agency File Number
SU	E128662

Pinout



Functional Block Diagram



Additional Information



Life Support Note:

Not Intended for Use in Life Support or Life Saving Applications

The products shown herein are not designed for use in life sustaining or life saving applications unless otherwise expressly indicated.

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Description

This new broadband protection device from Littelfuse provides overvoltage protection for applications such as 10/100/1000 BaseT Ethernet, T3/E3 DS3 interfaces, ADSL2+, and VDSL2+. This new protector combines the TVS diode element with a diode rectifier bridge to provide both longitudinal and differential protection in one package. This design innovation results in a capacitive loading characteristic that is log-linear with respect to the signal voltage across the device. This reduces intermodulation (IM) distortion caused by a typical solid-state protection solution. The application schematic provides the connection information.

Features

- RoHS compliant
- SOIC-8 surface mount package (JEDEC MS-012)
- Low insertion loss, loglinear capacitance
- Combined longitudinal and metallic protection
- Lightning Protection, IEC 61000-4-5, 100A (8/20µs)
- Clamping speed of nanoseconds
- UL 94V-0 epoxy molding
- UL recognized component
- Low clamping voltage

10/100/1000 BaseT

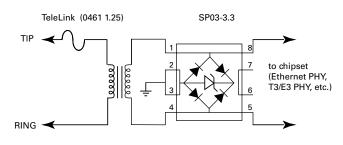
Ethernet

• Lead-free

Applications

- T1/E1 Line cards
- T3/E3 and DS3 Interfaces
- STS-1 Interfaces

Application Example



This schematic shows a high-speed data interface protection solution. The SP03-3.3 provides both metallic (differential) and longitudinal (common mode) protection from lightning induced surge events. Its surge rating is compatible with the intra-building surge requirements of Telcordia's GR-1089-CORE, and the Basic Level Recommendations of ITU K.20 and .21. This device protects against both positive and negative induced surge events. The TeleLink fuse provides overcurrent protection for the long term 50/60 Hz power fault events.

Absolute Maximum Ratings

Parameter	Rating	Units
Peak Pulse Current (8/20µs)	150	А
Peak Pulse Power (8/20µs)	3300	W
IEC 61000-4-2, Direct Discharge, (Level 4)	30	kV
IEC 61000-4-2, Air Discharge, (Level 4)	30	kV
IEC 61000-4-5 (8/20µs)	100	А
Telcordia GR 1089 (Intra-Building) (2/10µs)	100	А
ITU K.20 (5/310µs)	40	А

CAUTION: Stresses above those listed in "Absolute Maximum Ratings" may cause permanent damage to the device. This is a stress only rating and operation of the device at these or any other conditions above those indicated in the operational sections of this specification is not implied.

Electrical Characteristics (T_{op} = 25°C)

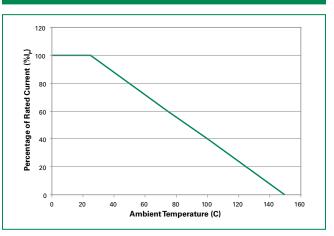
Thermal Information				
Parameter	Rating	Units		
SOIC Package	170	°C/W		
Operating Temperature Range	-40 to 125	°C		
Storage Temperature Range	–55 to 150	°C		
Maximum Junction Temperature	150	°C		
Maximum Lead Temperature (Soldering 20-40s) (SOIC - Lead Tips Only)	260	°C		

Electrical Characteristics (T _{OP} = 25°C)						
Parameter	Symbol	Test Conditions	Min	Тур	Max	Units
Reverse Stand-Off Voltage	V _{RWM}	-	-	-	3.3	V
Reverse Breakdown Voltage	V _{BR}	Ι _τ = 2μΑ	3.3	-	-	V
Reverse Breakdown Voltage	V _{BR}	I _T = 50μΑ	3.3	-	-	V
Reverse Leakage Current	I _R	V _{RWM} = 3.3V, T= 25°C	-	-	1	μA
Clamping Voltage, Line-Ground	V _c	I _{PP} = 50A, t _p =8/20 μs	-	-	11.5	V
Clamping Voltage, Line-Ground	V _c	I _{PP} = 100A, t _p =8/20 μs	-	-	15	V
Clamping Voltage, Line-Line	V _c	I _{PP} = 50A, t _p =8/20 μs	-	-	13.5	V
Clamping Voltage, Line-Line	V _c	I _{PP} = 100A, t _p =8/20 μs	-	-	18	V
	C	Between I/O Pins and Ground V_R =0V, f= 1MHz	-	16	25	pF
Junction Capacitance	C _j	Between I/O Pins V _R =0V, f= 1MHz	-	8	12	pF

Figure 1: Non-repetitive Peak Pulse Current vs. Pulse Time



Figure 2: Current Derating Curve



TVS Diode Arrays (SPA® Diodes)

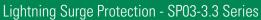




Figure 3: Pulse Waveform

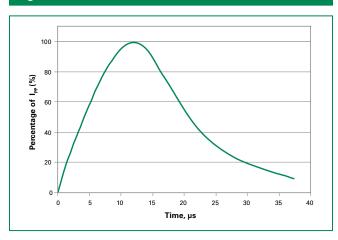
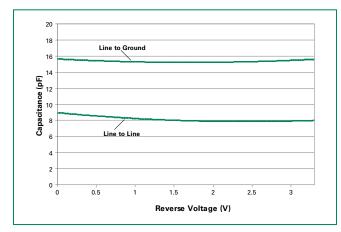


Figure 5: Capacitance vs. Reverse Voltage



Soldering Parameters

Reflow Co	ndition	Pb – Free assembly	
	-Temperature Min (T _{s(min)})	150°C	
Pre Heat	-Temperature Max (T _{s(max)})	200°C	
	-Time (min to max) (t _s)	60 – 180 secs	
Average ra (T _L) to pea	amp up rate (Liquidus) Temp k	3°C/second max	
T _{S(max)} to T _L - Ramp-up Rate		3°C/second max	
Poflow	-Temperature (T _L) (Liquidus)	217°C	
Reflow	-Temperature (t _L)	60 – 150 seconds	
PeakTemp	erature (T _P)	260 ^{+0/-5} °C	
Time with Temperatu	in 5°C of actual peak ıre (t _p)	20 – 40 seconds	
Ramp-down Rate		6°C/second max	
Time 25°C to peak Temperature (T _P)		8 minutes Max.	
Do not exceed		260°C	

Figure 4: Clamping Voltage vs. Peak Pulse Current

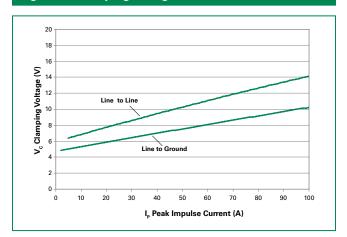
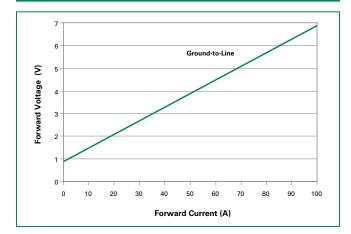
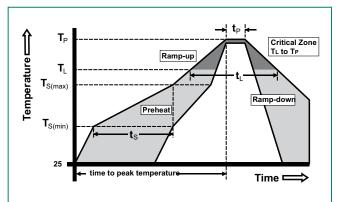


Figure 6: Forward Voltage vs. Forward Current

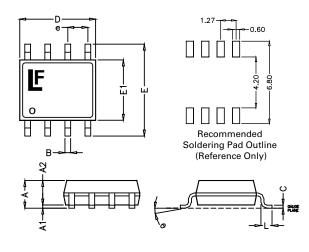




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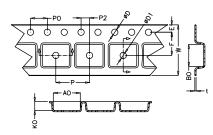


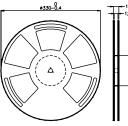
Package Dimensions — Mechanical Drawings and Recommended Solder Pad Outline



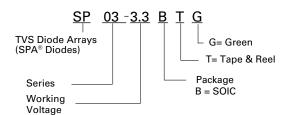
Package	SOIC-8			
Pins			8	
JEDEC		MS	S-012	
	Millim	etres	Incl	hes
	Min	Max	Min	Max
Α	1.35	1.75	0.053	0.069
A1	0.10	0.25	0.004	0.010
A2	1.25	1.65	0.050	0.065
В	0.31	0.51	0.012	0.020
C	0.17	0.25	0.007	0.010
D	4.80	5.00	0.189	0.197
Е	5.80	6.20	0.228	0.244
E1	3.80	4.00	0.150	0.157
е	1.27 BSC		0.050	BSC
L	0.40	1.27	0.016	0.050

Embossed Carrier Tape & Reel Specification - SOIC Package









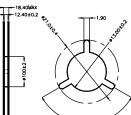
Part Marking System



First Line: Part number Second Line: Date code

Ordering Information

Part Number	Package	Marking	Min. Order Qty.
SP03-3.3BTG	SOIC Tape & Reel	SP03-3.3	2500



	Millimetres		Inc	ches
	Min	Max	Min	Max
E	1.65	1.85	0.065	0.073
F	5.4	5.6	0.213	0.22
P2	1.95	2.05	0.077	0.081
D	1.5	1.6	0.059	0.063
D1	1.50	Min	0.059 Min	
P0	3.9	4.1	0.154	0.161
10P0	40.0 ± 0.20		1.574	± 0.008
w	11.9	12.1	0.468	0.476
Р	7.9	8.1	0.311	0.319
A0	6.3	6.5	0.248	0.256
B0	5.1	5.3	0.2	0.209
К0	2	2.2	0.079	0.087
t	0.30 ± 0.05		0.012	± 0.002

Product Characteristics

Lead Plating	Matte Tin
Lead Material	Copper Alloy
Lead Coplanarity	0.004 inches (0.102mm)
Substitute Material	Silicon
Body Material	Molded Epoxy
Flammability	UL 94 V-0

Notes :

All dimensions are in millimeters
Dimensions include solder plating.
Dimensions are exclusive of mold flash & metal burr.

Blo is facing up for mold and facing down for trim/form, i.e. reverse trim/form.
Package surface matte finish VDI 11-13.