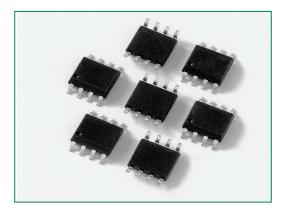
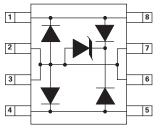


SP4040 Series 3.3V 75A Rail Clamp Array



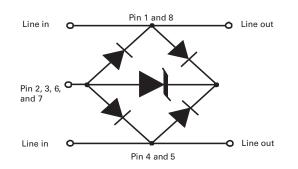
Pinout



SO-8 (Top View)

Note: Pinout diagrams above shown as device footprint on circuit board.

Functional Block Diagram



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.

Description

The SP4040 provides overvoltage protection for applications such as 10/100/1000 Base-T Ethernet and T3/ E3 interfaces. This device has a low capacitance of only 5pF making it suitable for PHY side Ethernet protection and the capability to protect against both longitudinal and differential transients. Furthermore, the SP4040 is rated up to 100A (tp=2/10 μ s) making it suitable for line side protection as well against lightning transients as defined by GR-1089 (intra-building), ITU, YD/T, etc. The application schematic provides the connection information for a PHY side protection scheme of a single differential pair.

Features

- Lightning protection, IEC61000-4-5, 75A (8/20µs)
- Low clamping voltage
- Low insertion loss, loglinear capacitance
- Combined longitudinal and metallic protection
- Clamping speed of nanoseconds
- MS-012 surface mount package (JEDEC SO-8)

F RoHS

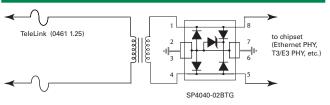
GREEN

- UL 94V-0 epoxy molding
- RoHS compliant

Applications

- T1/E1 Line cards
- 10/100/1000 BaseT Ethernet
- T3/E3 and DS3 Interfaces
- STS-1 Interfaces

Application Example



The schematic shows protection for a single differential pair as part of a larger high-speed data interface such as Ethernet. The SP4040 provides both metallic (differential) and longitudinal (common mode) protection from lightning induced surge events as specified by regulatory standards such as Telcordia's GR-1089 CORE and ITU K.20 and 21.

The SP4040 protects against both positive and negative induced surge events while the TeleLink fuse provides overcurrent protection for the long term 50/60 Hz power fault events.

Lightning Surge Protection - SP4040 Series



Absolute Maximum Ratings

Parameter	Rating	Units
Peak Pulse Current (8/20µs)	75	А
Peak Pulse Power (8/20µs)	2100	W
IEC 61000-4-2, Direct Discharge, (Level 4)	30	kV
IEC 61000-4-2, Air Discharge, (Level 4)	30	kV
Telcordia GR 1089 (Intra-Building) (2/10µs)	100	А
ITU K.20 (5/310µs)	20	A

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.

Thermal Information

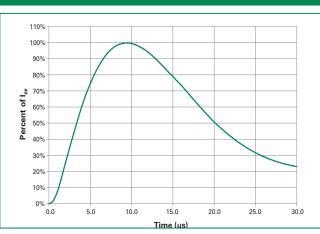
Parameter	Rating	Units
SOIC Package	170	°C/W
Operating Temperature Range	-55 to 125	°C
Storage Temperature Range	-65 to 150	°C
Maximum Junction Temperature	150	°C
Maximum Lead Temperature (Soldering 20-40s) (SOIC - Lead Tips Only)	260	°C

Electrical Characteristics (T _{op} = 25°C)						
Parameter	Symbol	Test Conditions	Min	Тур	Max	Units
Reverse Stand-Off Voltage	V _{RWM}	I _T ≤1μA	-	-	3.3	V
Reverse Breakdown Voltage	V _{BR}	Ι _τ = 2μΑ	3.3	-	-	V
Snap Back Voltage	V _{SB}	I _T = 50mA	3.3	-	-	V
Reverse Leakage Current	I _R	V _{RWM} = 3.3V	-	-	1	μA
Clamping Voltage, Line-Ground ¹	V _c	I _{PP} = 40A, t _p =8/20 μs	-	-	14	V
Clamping Voltage, Line-Ground ¹	V _c	I _{pp} = 75A, t _p =8/20 μs	-	-	20	V
Clamping Voltage, Line-Ground ¹	V _c	I _{pp} = 100A, t _p =2/10 μs			20	V
Dynamic Resistance, Line-Ground ¹	R _{DYN}	(V _{C2} -V _{C1})/(I _{PP2} -I _{PP1})	-	0.2	-	Ω
Clamping Voltage, Line-Line ¹	V _c	I _{pp} = 40A, t _p =8/20 μs	-	-	20	V
Clamping Voltage, Line-Line ¹	V _c	I _{pp} = 75A, t _p =8/20 μs	-	-	30	V
Clamping Voltage, Line-Line ¹	V _c	I _{pp} = 100A, t _p =2/10 μs			30	V
Dynamic Resistance, Line-Line ¹	R _{DYN}	(V _{C2} -V _{C1})/(I _{PP2} -I _{PP1})	-	0.3	-	Ω
hundrid Constitution 1	C	Line to Ground V _R =0V, f= 1MHz	_	5	8	pF
Junction Capacitance ¹	C _j	Line to Line, V _R =0V, f= 1MHz	-	2.5	5	pF

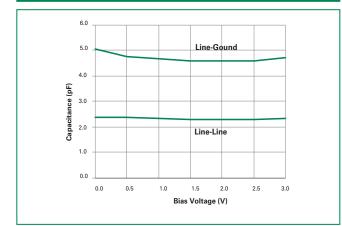
¹ Parameter is guaranteed by design and/or device characterization.



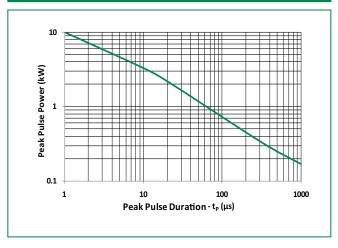
Pulse Waveform



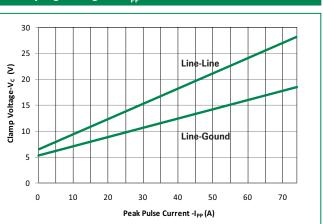
Capacitance vs. Reverse Bias at 1MHz



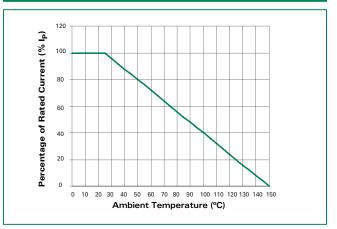
Non-Repetitive Peak Pulse Power vs. Pulse Time



Clamping Voltage vs. I_{PP}



Current Derating Curve

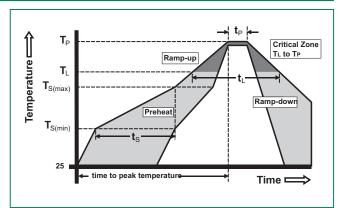


TVS Diode Arrays (SPA^w Family of Products)

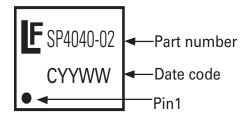
Lightning Surge Protection - SP4040 Series

Soldering Parameters

Reflow Condition		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	
Reflow	- Temperature (T _L) (Liquidus)	217°C	
Reliow	-Temperature (t _L)	60 – 150 seconds	
PeakTemp	erature (T _P)	260 ^{+0/-5} °C	
Time within 5°C of actual peak Temperature (t _p)		20 – 40 seconds	
Ramp-dov	vn Rate	6°C/second max	
Time 25°C	to peakTemperature (T _P)	8 minutes Max.	
Do not exc	ceed	260°C	



Part Marking System



Product Characteristics

Lead Plating	Matte Tin plating
Lead Material	Copper Alloy
Lead Coplanarity	0.0004 inches (0.102mm)
Substitute Material	Silicon
Body Material	Molded Epoxy
Flammability	UL 94 V-0

Notes :

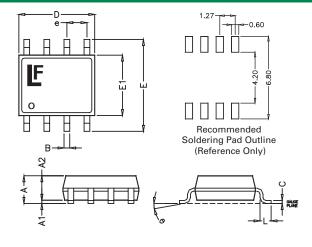
- 1. All dimensions are in millimeters
- 2. Dimensions include solder plating.
- 3. Dimensions are exclusive of mold flash & metal burr.
- 4. All specifications comply to JEDEC SPEC MO-223 Issue A
- 5. Blo is facing up for mold and facing down for trim/form, i.e. reverse trim/form.
- 6. Package surface matte finish VDI 11-13.

Littelfuse

Expertise Applied | Answers Delivered

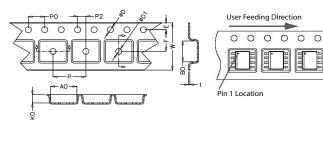


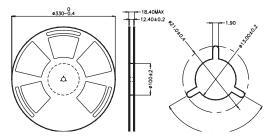
Package Dimensions – Mechanical Drawings and Recommended Solder Pad Outline



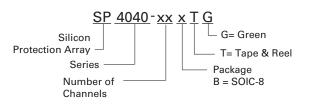
Package	MS-012 (SO-8)			
Pins	8			
JEDEC		MO-22	3 Issue A	
	Millim	etres	Incl	าes
	Min	Max	Min	Max
Α	1.35	1.75	0.053	0.069
A1	0.10	0.25	0.004	0.010
A2	1.25	1.65	0.050	0.065
В	0.31 0.51		0.012	0.020
C	0.17	0.25	0.007	0.010
D	4.80	5.00	0.189	0.197
Е	5.80	6.20	0.228	0.244
E1	3.80	4.00	0.150	0.157
е	1.27 E	BSC	0.050 BSC	
L	0.40	1.27	0.016	0.050

Embossed Carrier Tape & Reel Specification - SOIC Package





Part Numbering System



	Millimetres		Inches	
	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	

Ordering Information					
Part Number	Package	Marking	Min. Order Qty.		
SP4040-02BTG	SOIC-8	SP4040-02	2500		