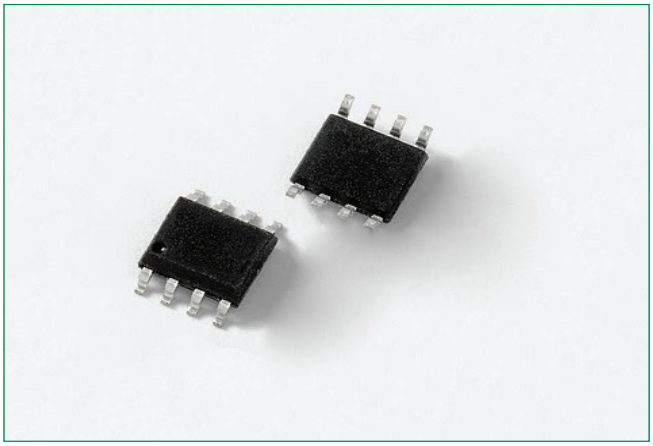
SP1050 Series for Power-over-Ethernet PSE Protection

RoHS Pb GREEN



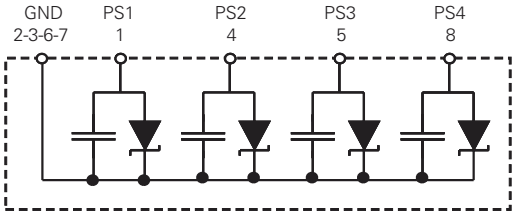
Description

The SP1050-04BTG provides over-voltage protection for Power-over-Ethernet PSE equipment in a space saving SOIC-8 package. It incorporates 4 TVS Diodes each with their own decoupling capacitor to stabilize power supplies.

The SP1050 is compatible with IEEE 802.3af and IEEE 802.3at requirements while allowing PoE based systems to be protected against damaging threats such as lightning-induced surges (IEC61000-4-5), electrical fast transients (IEC61000-4-4), and Electrostatic Discharges (IEC61000-4-2).

The low clamping voltage of 96V makes it compatible with PSE controller technologies.

Functional Block Diagram



Features

- Peak pulse power: up to 2.7 kW (8/20 µs)
- Lightning protection, IEC61000-4-5, 24A (t_p=8/20µs)
- ESD protection of ±30kV contact discharge, ±30kV air discharge, (IEC61000-4-2)
- Stand-off voltage of 58 V
- Low clamping voltage of 96V (MAX) at 24A
- Low leakage current of 0.1 µA at 25 °C and 1 µA at 85 °C
- Operating Tj max: 150 °C
- JEDEC registered package outline
- Embeds 4 decoupling capacititors
- Meets most stringent environment

Absolute Maximum Ratings

Parameter	Rating	Units
Peak Pulse Current (8/20µs)	24	A
Peak Pulse Power (8/20µs)	2700	W
IEC 61000-4-2, Contact Discharge, (Level 4)	30	kV
IEC 61000-4-2, Air Discharge, (Level 4)	30	kV

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.

Applications

- Power-over-Ethernet

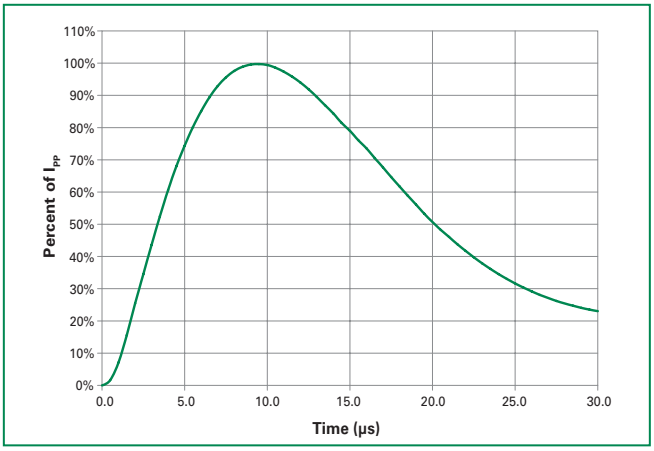
Revision: 01/15/16

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

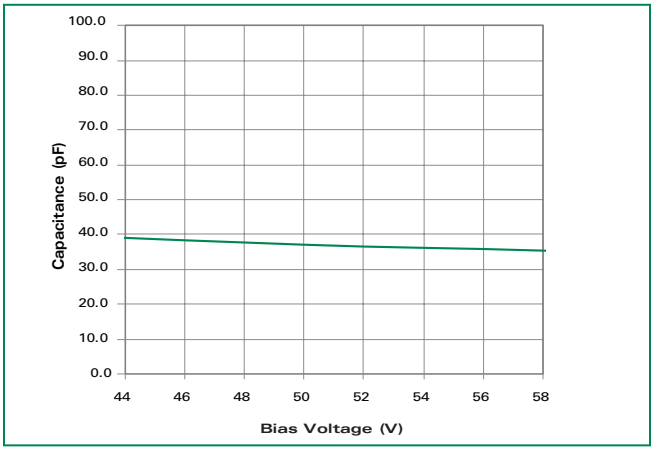
Parameter	Symbol	Test Conditions	Min	Typ	Max	Units
Leakage Current	I_{RM}	25°C, V_{PoE}= 58V	-	-	0.1	µA
		85°C, V_{PoE}= 58V [1]	-	-	1	µA
Breakdown Voltage	V_{BR}	I_R= 1mA	64	67	-	V
Clamping Voltage [2]	V_C	I_{PP}= 24A, t_p=8/20 µs	-	-	96	V
Dynamic Resistance [2]	R_{DYN}	TLP, t_p=100ns, I/O to GND [2]	-	0.35	-	Ω
Capacitance [1]	C	V_{PoE}= 58V	-	35	-	pF

Note: 1 Parameter is guaranteed by design and/or device characterization.
2. Transmission Line Pulse (TLP) with 100ns width and 200ps rise time.

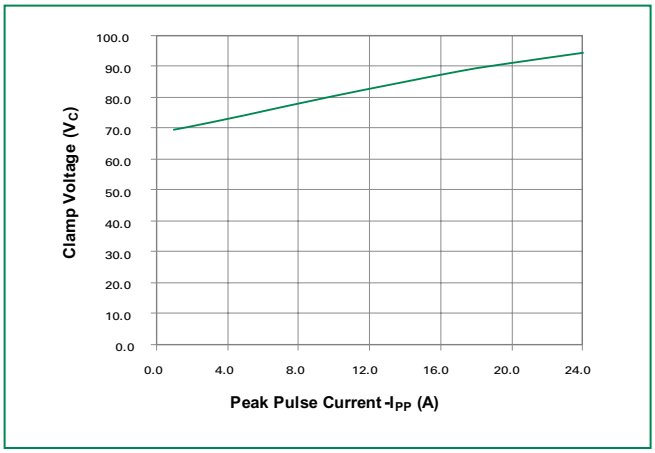
8/20µs 8/20µS Pulse Waveform



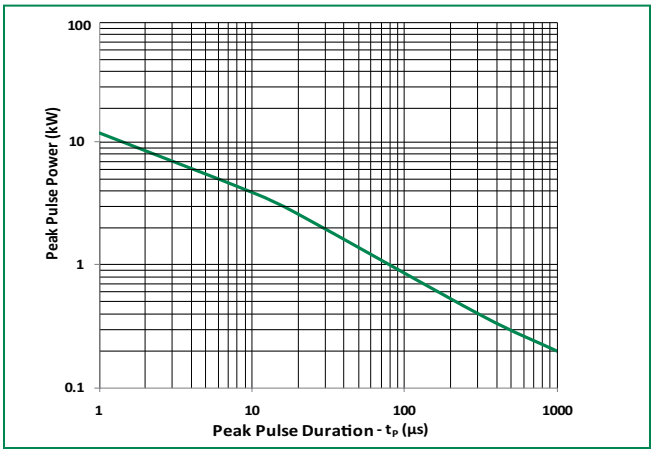
Capacitance vs. Reverse Bias



Clamping Voltage vs I_{PP}

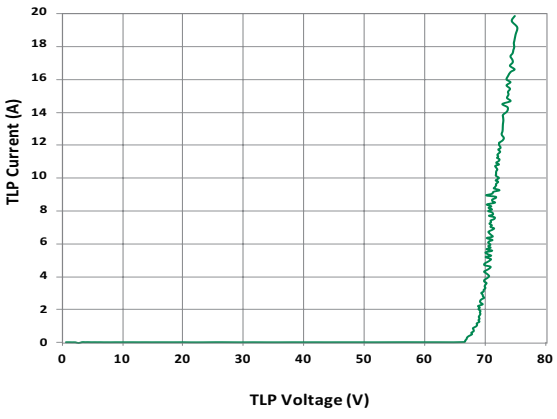


Non-Repetitive Peak Pulse Power vs. Pulse Time



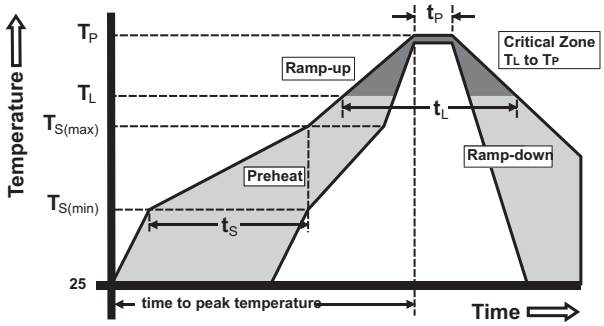
Revision: 01/15/16

Transmission Line Pulse (TLP)



Soldering Parameters

Reflow Condition		Pb – Free assembly
Pre Heat	- Temperature Min ($T_{s(min)}$)	150°C
	- Temperature Max ($T_{s(max)}$)	200°C
	- Time (min to max) (t_s)	60 – 180 secs
Average ramp up rate (Liquidus) Temp (T_L) to peak		3°C/second max
$T_{S(max)}$ to T_L - Ramp-up Rate		3°C/second max
Reflow	- Temperature (T_L) (Liquidus)	217°C
	- Temperature (t_L)	60 – 150 seconds
Peak Temperature (T_P)		$260^{+0/-5}$ °C
Time within 5°C of actual peak Temperature (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



Application Schematic

Figure 1: Typical application circuit with fully integrated PSE controller

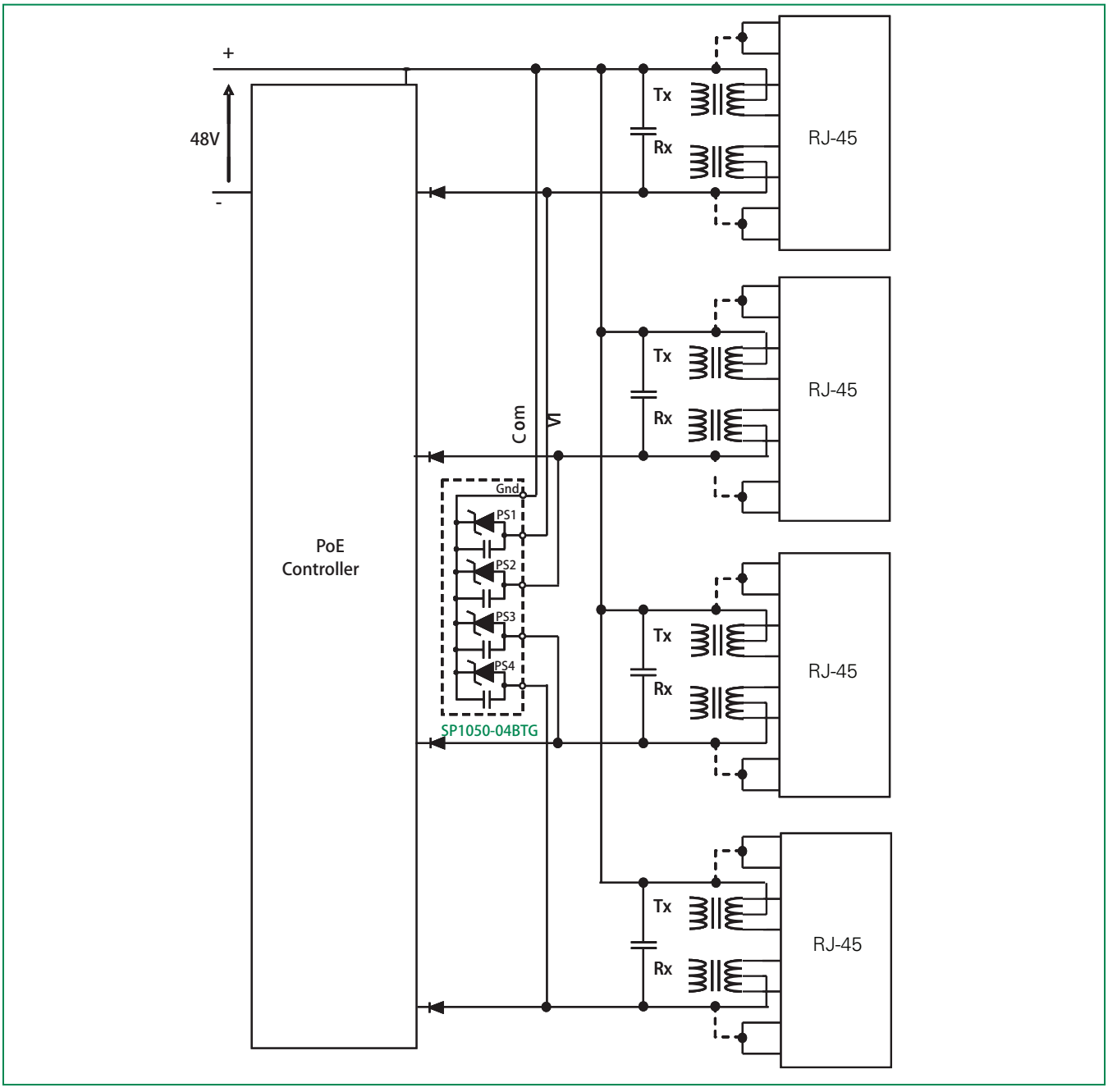
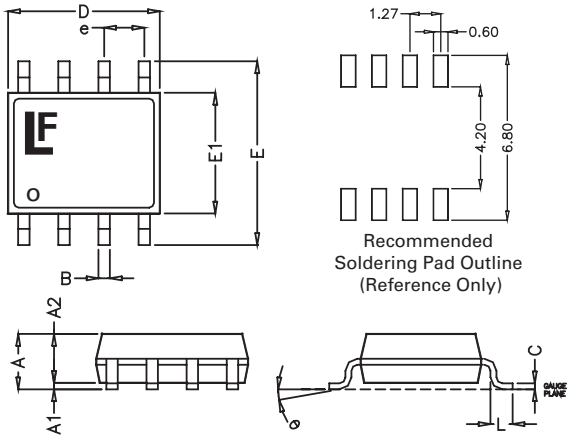


Figure 1 shows typical application of power sourcing equipment (PSE) allowing communication and power sourcing for several powered devices (PD). The SP1050-04BTG is optimized for space savings as there is generally a multiple of 4 present. This protection device complies with IEEE 802.3af and the IEC 61000-4-5 (Level 4) standard.

TVS Diode Arrays (SPA® Diodes)

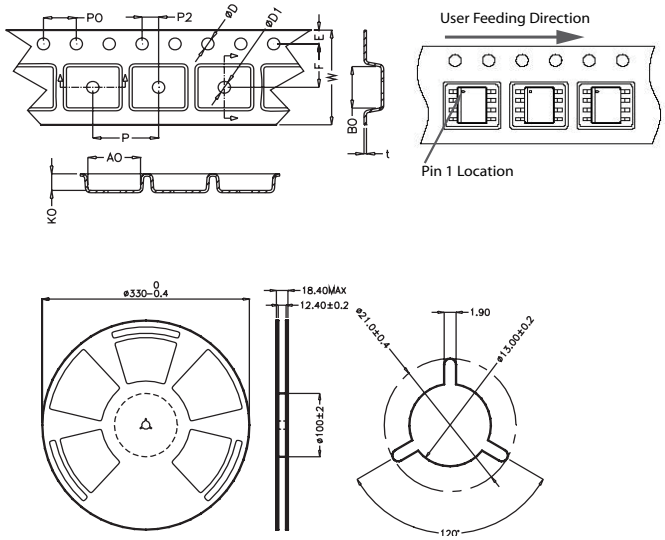
Lightning Surge Protection - SP1050 Series

Package Dimensions of SOIC-8



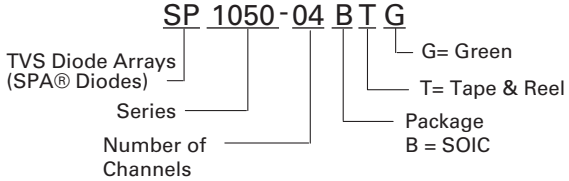
Package	SOIC			
Pins	8			
JEDEC	MS-012			
	Millimetres		Inches	
	Min	Max	Min	Max
A	1.35	1.75	0.053	0.069
A1	0.10	0.25	0.004	0.010
A2	1.25	1.65	0.050	0.065
B	0.31	0.51	0.012	0.020
c	0.17	0.25	0.007	0.010
D	4.80	5.00	0.189	0.197
E	5.80	6.20	0.228	0.244
E1	3.80	4.00	0.150	0.157
e	1.27 BSC		0.050 BSC	
L	0.40	1.27	0.016	0.050

Embossed Carrier Tape & Reel Specification — SOIC Package



	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
P	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
K0	2	2.2	0.079	0.087
t	0.30 +/- 0.05		0.012 +/- 0.002	

Part Numbering System



Ordering Information

Part Number	Package	Marking	Min. Order Qty.
SP1050-04BTG	SOIC Tape & Reel	SP1050	2500

Revision: 01/15/16