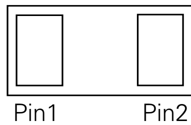
SP1013 Series 30pF 30kV Bidirectional Discrete TVS

OBSOLETE DATE: 6/10/2020 PCN/ECN# ESU270-51
REPLACED BY: SP1020-01WTG

Description

The SP1013 includes back-to-back Zener diodes which provides protection for electronic equipment that may experience destructive electrostatic discharges (ESD). It measures 0.52 x 0.27mm permitting use of the standard 0201 footprints, but offering a 30% reduction in occupied board space. The SP1013 can safely absorb repetitive ESD strikes above the maximum level specified in IEC 61000-4-2 international standard (Level 4, ±8kV contact discharge) without performance degradation, and the back-to-back configuration provides symmetrical standoff voltage which makes the component appropriate for use when AC signals are present on the data or signal line.

Pinout

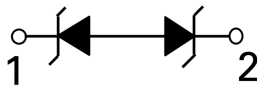


Note: Drawing not to scale

Features

- ESD, IEC 61000-4-2, ±30kV contact, ±30kV air
- EFT, IEC 61000-4-4, 40A (5/50ns)
- Lightning, IEC 61000-4-5 2nd edition, 8A (t_P=8/20μs)
- Low capacitance of 30pF (@ V_R=0V)
- Low leakage current of 5nA at 1.5V
- RoHS compliant, Lead-free, and Halogen free

Functional Block Diagram



Applications

- Mobile Phones
- Smart Phones
- Tablets
- Wearable Technology
- Portable Medical
- Digital Cameras
- MP3/PMP
- Portable Navigation Devices
- Point of Sale Terminals

Additional Information

Datasheet

Resources

Samples

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.

©2018 Littelfuse, Inc.
Specifications are subject to change without notice.

Absolute Maximum Ratings

Symbol	Parameter	Value	Units
I_{PP}	Peak Current (t_p=8/20μs)	8.0 [1]	A
T_{OP}	Operating Temperature	-40 to 125	°C
T_{STOR}	Storage Temperature	-55 to 150	°C

Notes:
1. 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

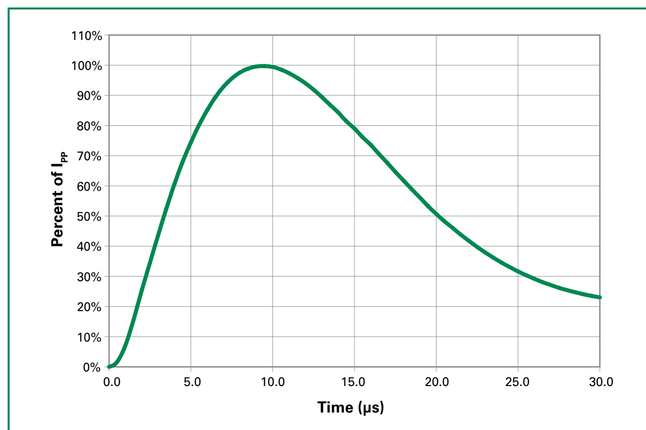
Parameter	Rating	Units
Storage Temperature Range	-55 to 150	°C
Maximum Junction Temperature	150	°C
Maximum Lead Temperature (Soldering 20-40s)	260	°C

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

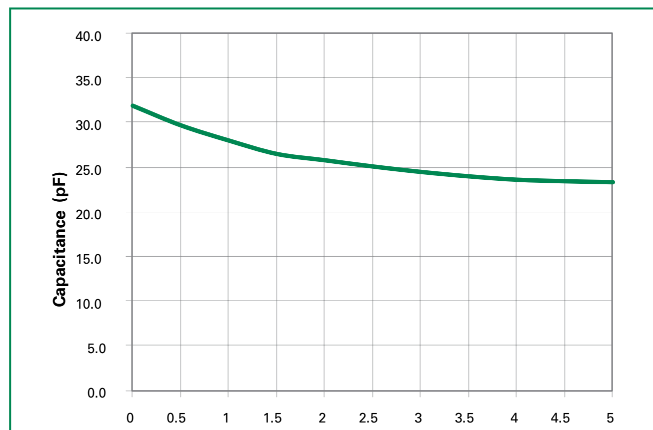
Parameter	Symbol	Test Conditions	Min	Typ	Max	Units
Reverse Standoff Voltage	V_{RWM}	I_R≤1μA with 1 pin to GND			5.0	V
Reverse Breakdown Voltage	V_{BR}	I_T=1mA with 1 pin at GND	7.0			V
Leakage Current	I_{LEAK}	V_R=1.5V with 1 pin at GND[1]			5	nA
		V_R=3.3V with 1 pin at GND[1]			10	nA
		V_R=5V with 1 pin at GND[1]			100	nA
Clamp Voltage[1]	V_C	I_{PP}=1A, t_p=8/20μs, Fwd		9		V
		I_{PP}=2A, t_p=8/20μs, Fwd		9.5		V
Dynamic Resistance[2]	R_{DYN}	TLP t_p=100ns, 1 Pin to GND		0.2		Ω
ESD Withstand Voltage[1]	V_{ESD}	IEC 61000-4-2 (Contact Discharge)	±30			kV
		IEC 61000-4-2 (Air Discharge)	±30			kV
Diode Capacitance[1]	C_D	Reverse Bias=0V, f=1MHz		30	35	pF

Note:
1 Parameter is guaranteed by design and/or component characterization.
2 Transmission Line Pulse (TLP) test setting : Std.TDR(50Ω),tp=100ns, tr=0.2ns ITLP and VTLP averaging window: star t1=70ns to end t2=80ns

8/20μS Pulse Waveform

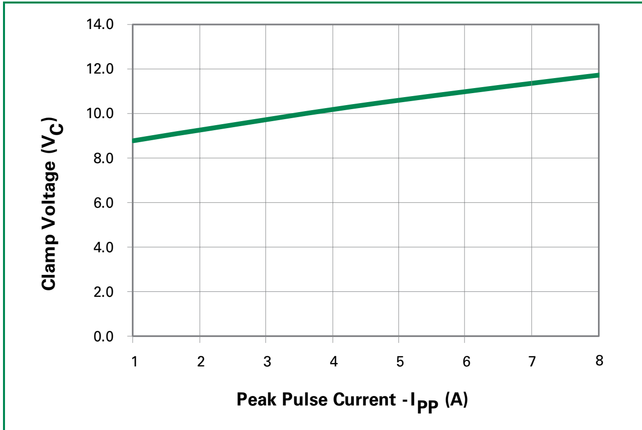


Capacitance vs. Reverse Bias (1 Pin to GND)

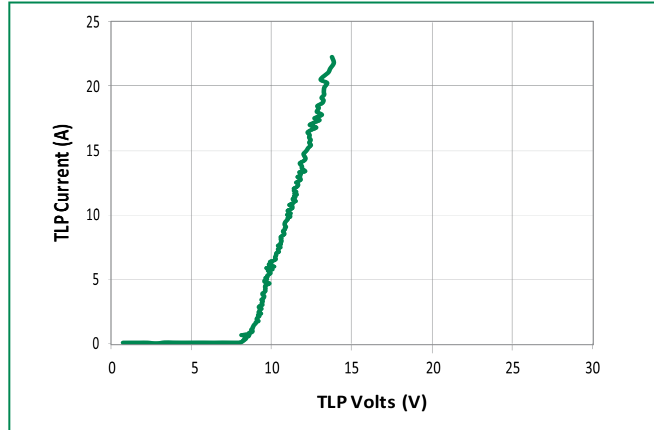


©2018 Littelfuse, Inc.
Specifications are subject to change without notice.

Clamping Voltage vs. Peak Pulse Currennt (1 Pin to GND)

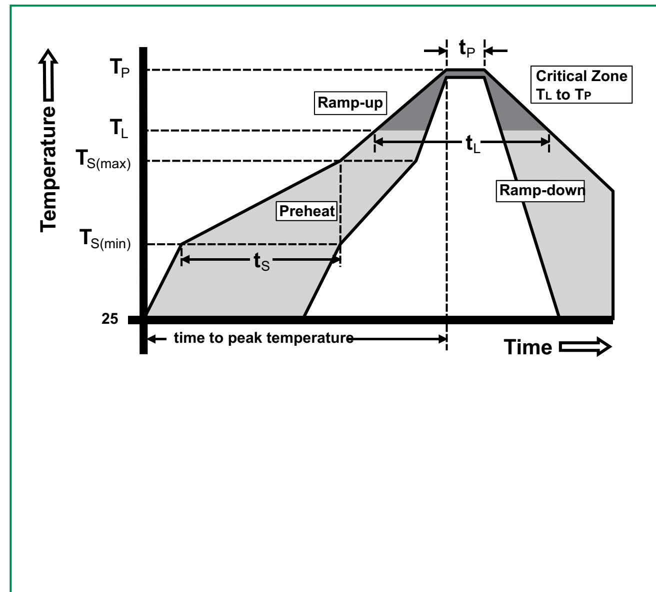


Transmission Line Pulsing(TLP) Plot(1 Pin to GND)

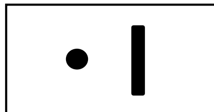


Soldering Parameters

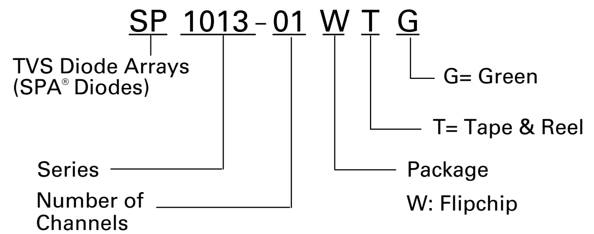
Reflow Condition		Pb – Free assembly
Pre Heat	- Temperature Min ($T_{s(min)}$)	150°C
	- Temperature Max ($T_{s(max)}$)	200°C
	- Time (min to max) (t_s)	60 – 180 secs
Average ramp up rate (Liquidus) Temp (T_L) to peak		3°C/second max
$T_{S(max)}$ to T_L - Ramp-up Rate		3°C/second max
Reflow	- Temperature (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



Part Marking System



Part Numbering System

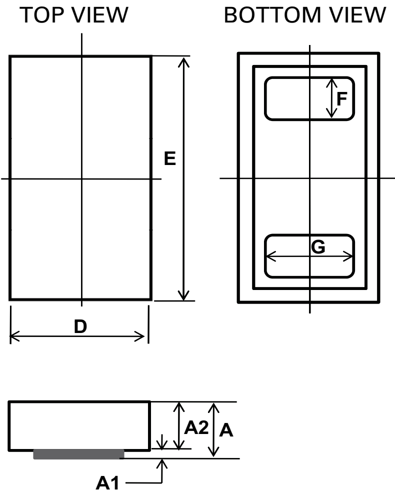


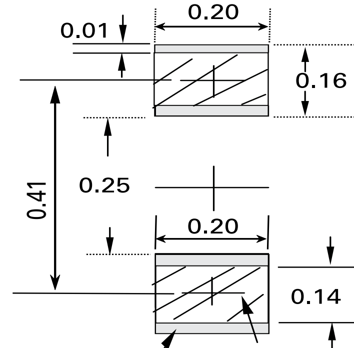
Ordering Information

Part Number	Package	Marking	Min. Order Qty.
SP1013-01WTG	Flipchip	• ▌	15000

©2018 Littelfuse, Inc.
Specifications are subject to change without notice.

Package Dimensions — Flipchip





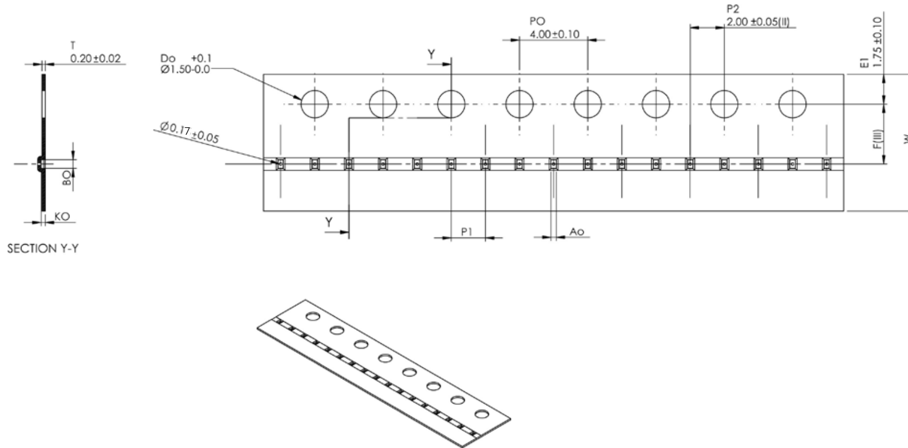
Recommended Solder Pad Footprint and Stencil opening

Thickness of Stencil opening is 0.08mm

***Sizes in mm**

Symbol	Flipchip					
	Millimeters			Inches		
	Min	Typ	Max	Min	Typ	Max
A	0.183	0.211	0.239	0.0072	0.0083	0.0094
A1	0.008	0.011	0.014	0.0003	0.0004	0.0006
A2	0.175	0.200	0.225	0.0069	0.0079	0.0089
D	0.280	0.290	0.300	0.0110	0.0114	0.0118
E	0.530	0.540	0.550	0.0209	0.0213	0.0217
F	-	0.100	-	-	0.0039	-
G	-	0.200	-	-	0.0079	-

Embossed Carrier Tape & Reel Specification — Flipchip



Symbol	Millimeters
A0	0.34+/-0.03
B0	0.60+/-0.03
K0	0.25 + 0.03
F	3.50 +/- 0.05
P1	2.00+/-0.10
W	8.00+/-0.10

©2018 Littelfuse, Inc.
Specifications are subject to change without notice.
Revision: 09/16/20