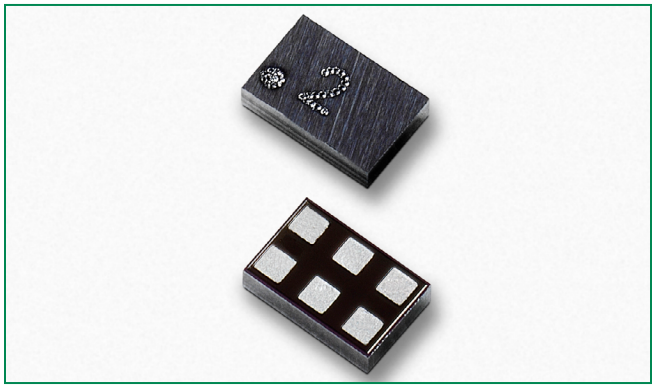
SP1012 Series 6.5pF, 15kV Bidirectional TVS Array

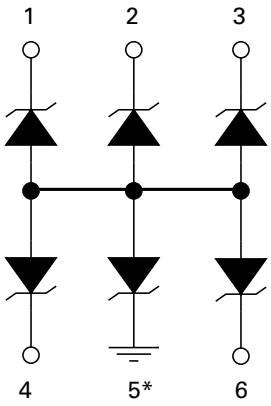
RoHS Pb GREEN



Description

The miniature 5 channel bidirectional TVS array provides protection for data lines that may experience destructive electrostatic discharges (ESD). These robust diodes can safely absorb repetitive ESD strikes at the maximum level specified in the IEC 61000-4-2 international standard without performance degradation. The bidirectional configuration provides symmetrical ESD protection for data lines when AC signals are present.

Functional Block Diagram

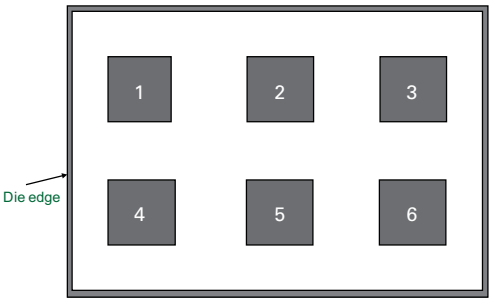


*Any pin can be used as GND.

Features

- RoHS compliant, Halogen-free and lead-free
- ESD, IEC 61000-4-2, ±15kV contact, ±30kV air
- EFT, IEC 61000-4-4,40A (5/50ns)
- Lightning protection, IEC 61000-4-5 2nd Edition, 3.0A (t_p=8/20µs)
- Highest density TVS array available today
- 5 channels of protection in a 0.94x0.61mm footprint (i.e. a discrete 0402)

Pinout



Applications

- Smart Phones
- Mobile Phones
- Wearable Technology

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.

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Absolute Maximum Ratings

Symbol	Parameter	Value	Units
I_{PP}	Peak Current (t_p=8/20µs)	3.0	A
T_{OP}	Operating Temperature	-40 to 125	°C
T_{STOR}	Storage Temperature	-55 to 150	°C

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)

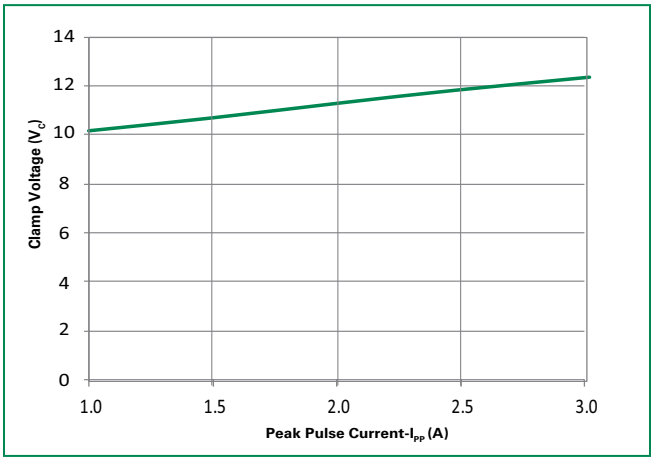
Parameter	Symbol	Test Conditions	Min	Typ	Max	Units
Reverse Standoff Voltage	V_{RWM}				5.0	V
Reverse Breakdown Voltage	V_{BD}	I_R=1mA	6.0			V
Leakage Current	I_R	V_R=5V			1.0	µA
Clamp Voltage[1]	V_C	I_{PP}=1A, t_p=8/20µs, Fwd		10.2		V
		I_{PP}=3A, t_p=8/20µs, Fwd		12.3		V
Dynamic Resistance [2]	R_{DYN}	TLP, t_p=100ns, I/O to GND		0.48		Ω
ESD Withstand Voltage[1]	V_{ESD}	IEC 61000-4-2 (Contact Discharge)	±15			kV
		IEC 61000-4-2 (Air Discharge)	±30			kV
Diode Capacitance[1]	C_D	Reverse Bias=0V (I/O to GND)		6.5		pF

Note:

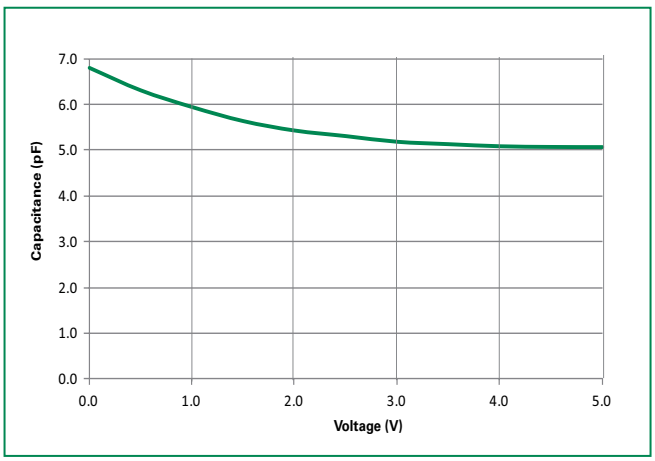
[1] Parameter is guaranteed by design and/or device characterization.

[2] Transmission Line Pulse (TLP) with 100ns width and 200ps rise time.

Clamping Voltage vs. I_{PP}



Capacitance vs. Reverse Bias



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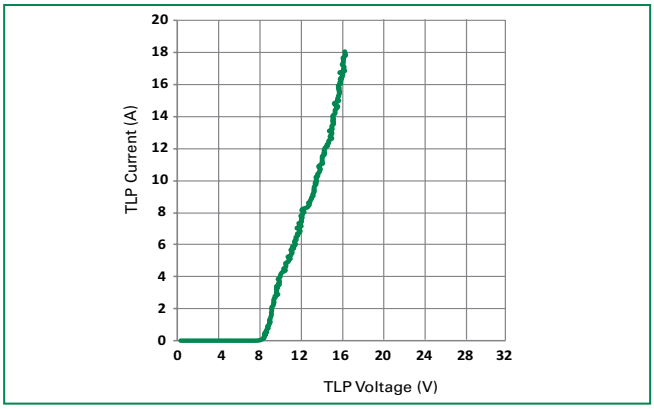
TVS Diode Arrays (SPA® Diodes)

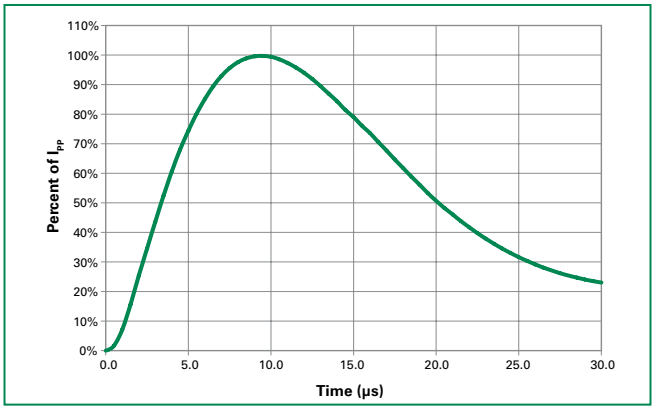
General Purpose ESD Protection-SP1012 Series

Littelfuse®
Expertise Applied | Answers Delivered

Transmission Line Pulsing(TLP) Plot

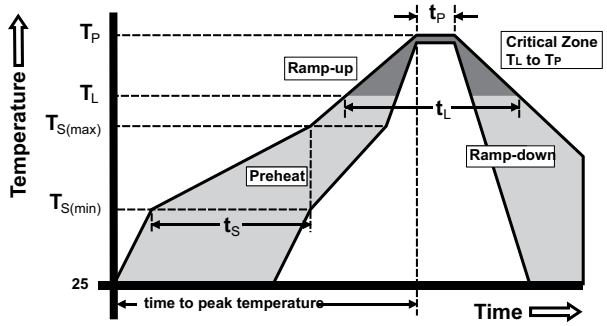


Pulse Waveform



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

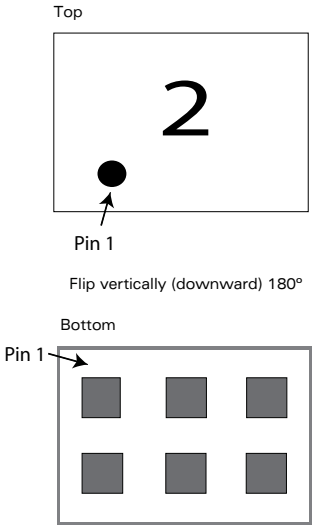


Part Numbering System

SP 1012 - 05 W T G

- SP: TVS Diode Arrays (SPA® Diodes)
- 1012: Series
- 05: Number of Channels
- W: Package W: Flipchip
- T: T= Tape & Reel
- G: G= Green

Part Marking System



Ordering Information

Part Number	Package	Marking	Min. Order Qty.
SP1012-05WTG	0.94x0.61mm Flip Chip	2	5000

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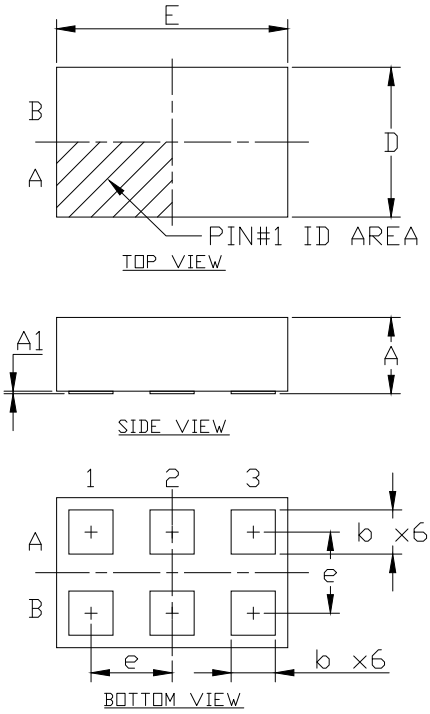
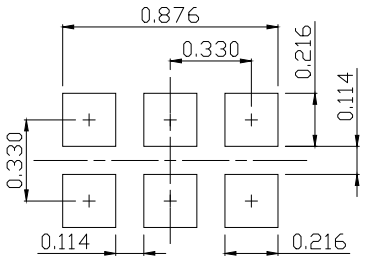
Package Dimensions

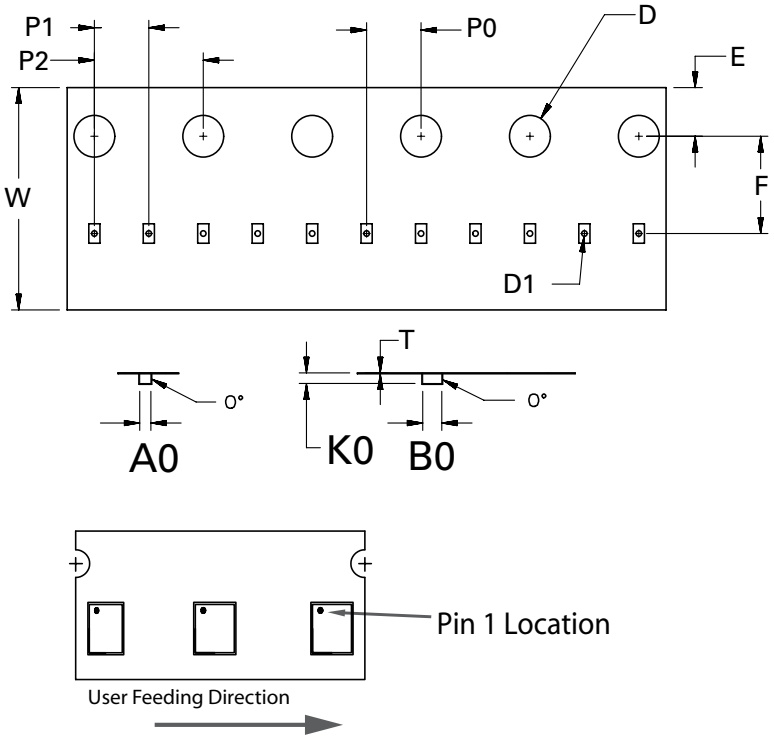


Symbol	0.94x0.61mm Flip Chip					
	Millimeters			Inches		
	Min	Typ	Max	Min	Typ	Max
A	0.280	0.310	0.340	0.0110	0.0122	0.0134
A1	0.005	0.010	0.015	0.0002	0.0004	0.0006
b	0.175	0.180	0.185	0.0069	0.0071	0.0073
D	0.585	0.610	0.635	0.0230	0.0240	0.0250
E	0.915	0.940	0.965	0.0360	0.0370	0.0380
e		0.330			0.0130	



SIZE IN MM

Embossed Carrier Tape & Reel Specification — Flipchip



Symbol	Millimeters
A0	0.68+/-0.03
B0	1.12+/-0.03
D	ø 1.50 + 0.10
D1	ø 0.40 +/- 0.05
E	1.75+/-0.10
F	3.50+/-0.05
K0	0.36+/-0.03
P0	2.00+/-0.05
P1	2.00+/-0.05
P2	4.00+/-0.10
W	8.00 + 0.30 -0.10
T	0.20+/-0.02

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