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TVS Diode Arrays (SPA® Diodes)

General Purpose ESD Protection - SP1015 Series

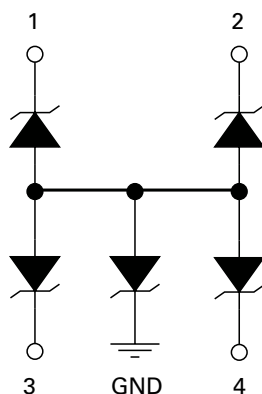
SP1015 Series 5pF, 20kV Bidirectional TVS Array



Description

The miniature 4 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 well above the maximum level specified in the IEC61000-4-2 international standard without performance degradation. The bidirectional configuration provides symmetrical ESD protection for data lines when AC signals are present.

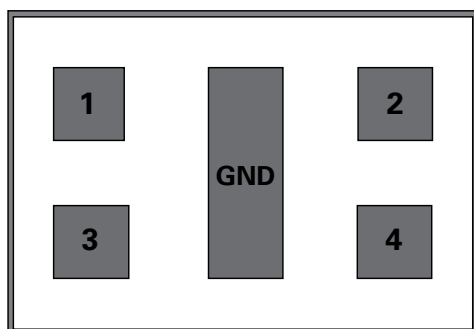
Functional Block Diagram



Features

- ESD, IEC61000-4-2, $\pm 20\text{kV}$ contact, $\pm 30\text{kV}$ air
- EFT, IEC61000-4-4, 40A (5/50ns)
- Lightning protection, IEC61000-4-5, 2.0A ($t_p = 8/20\mu\text{s}$)
- High density TVS Array available today
- 4 channels of protection in a $0.95 \times 0.55\text{mm}$ footprint
- Touch screen and I²C interfaces

Pinout



Applications

- Mobile Phones
- Wearable Technology
- Smart Phones
- eReaders/eBooks
- Tablets

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.

Absolute Maximum Ratings

Symbol	Parameter	Value	Units
I_{PP}	Peak Current ($t_p=8/20\mu s$)	2.0	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 ($T_{OP}=25^\circ C$)

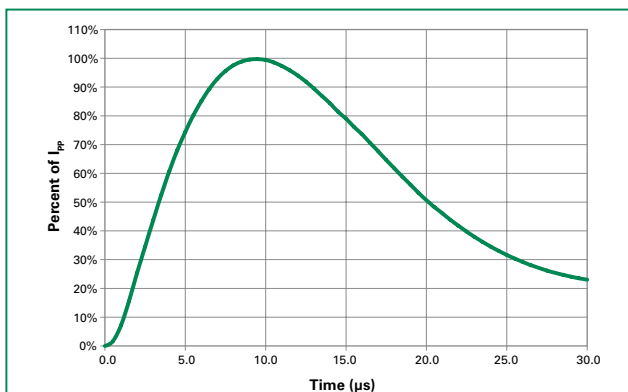
Parameter	Symbol	Test Conditions	Min	Typ	Max	Units
Reverse Standoff Voltage	V_{RWM}				5.0	V
Reverse Breakdown Voltage	V_{BD}	$I_R=1mA$	5.5			V
Leakage Current	I_R	$V_R=3V$			0.05	μA
		$V_R=5V$			0.1	μA
Clamp Voltage ¹	V_C	$I_{PP}=1A, t_p=8/20\mu s$, Fwd		11		V
		$I_{PP}=2A, t_p=8/20\mu s$, Fwd		12		V
Dynamic Resistance ²	R_{DYN}	TLP, $t_p=100ns$, I/O to GND		0.65		Ω
ESD Withstand Voltage ¹	V_{ESD}	IEC61000-4-2 (Contact Discharge)	± 20			kV
		IEC61000-4-2 (Air Discharge)	± 30			kV
Diode Capacitance ¹	C_D	Reverse Bias=0V (I/O to GND)		5		pF

Note:

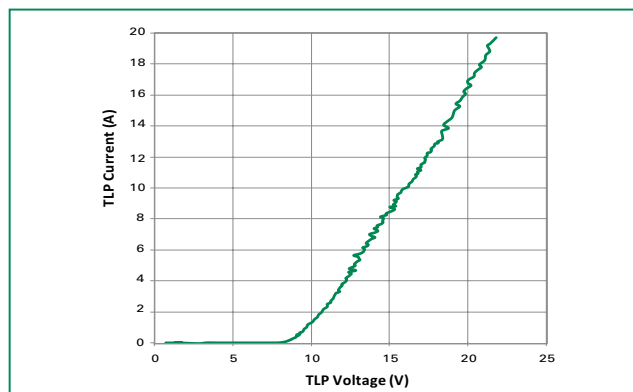
¹ Parameter is guaranteed by design and/or device characterization.

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

Pulse Waveform



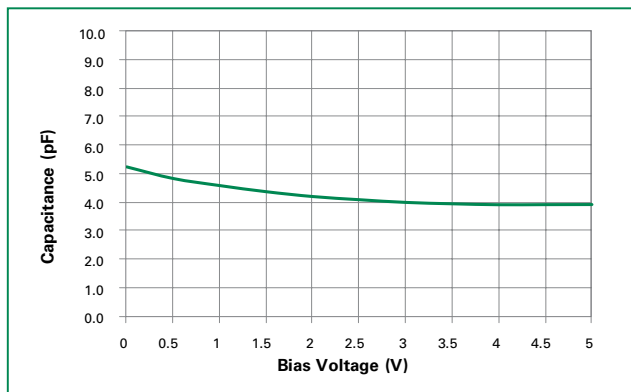
Transmission Line Pulse (TLP)



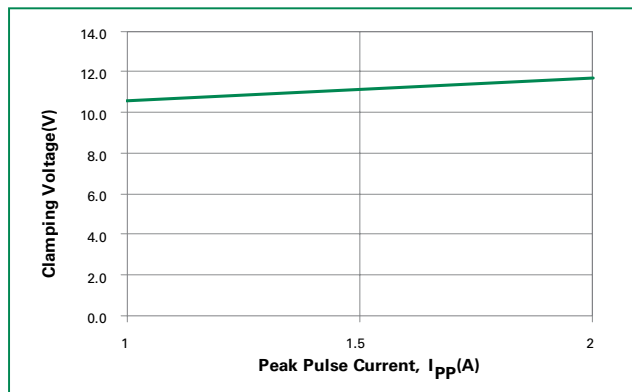
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General Purpose ESD Protection - SP1015 Series

Capacitance vs. Reverse Bias

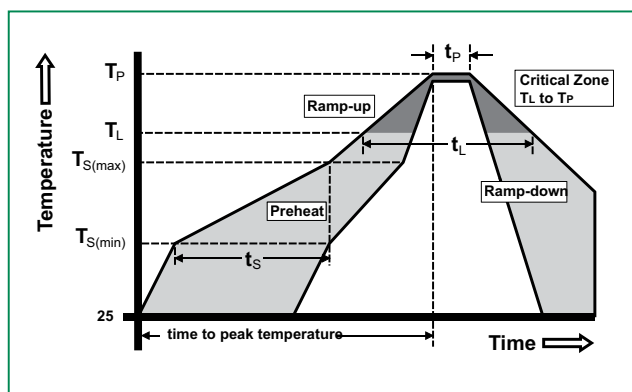


Clamping Voltage vs. I_{PP}

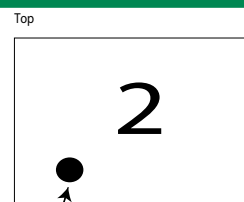


Soldering Parameters

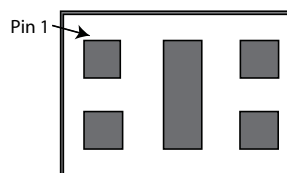
Reflow Condition		Pb – Free assembly
Pre Heat	- Temperature Min ($T_{s(min)}$)	150°C
	- Temperature Max ($T_{s(max)}$)	200°C
	- Time (min to max) (t_s)	60 – 180 secs
Average ramp up rate (Liquidus) Temp (T_L) to peak		3°C/second max
$T_{s(max)}$ to T_L - Ramp-up Rate		3°C/second max
Reflow	- Temperature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



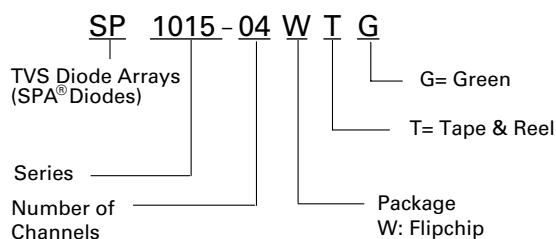
Part Marking System



Pin 1
 Flip vertically (downward) 180°



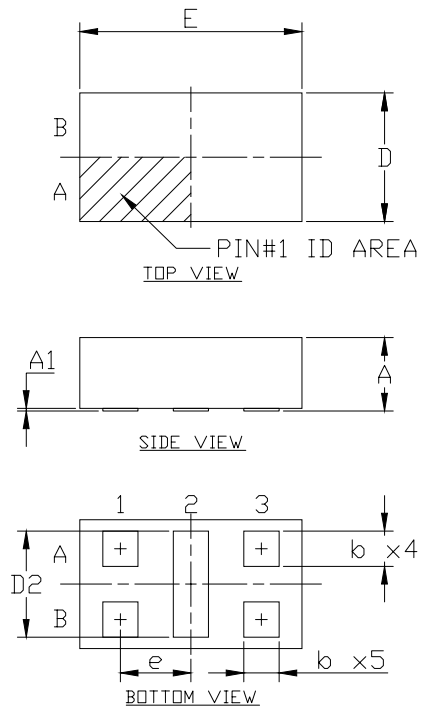
Part Numbering System



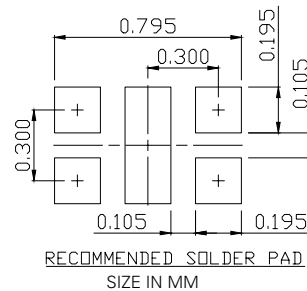
Ordering Information

Part Number	Package	Marking	Min. Order Qty.	Packaging Option	P0/P1	Packaging Specification
SP1015-04WTG	0.95x0.55mm Flip Chip	2	5000	Tape & Reel – 8mm tape/7" reel	2mm/2mm	EIA RS-481

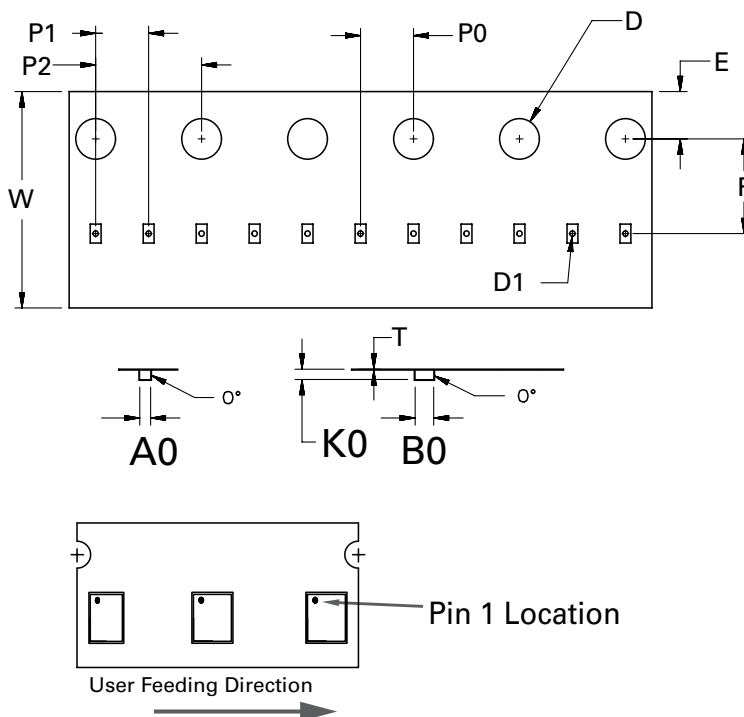
Package Dimensions



Symbol	0.95x0.55mm Flip Chip					
	Millimeters			Inches		
	Min	Typ	Max	Min	Typ	Max
A	0.294	0.311	0.328	0.0116	0.0122	0.0129
A1	0.009	0.011	0.013	0.0004	0.0004	0.0005
b	0.147	0.150	0.153	0.0058	0.0059	0.0060
D	0.525	0.545	0.565	0.0207	0.0215	0.0222
E	0.925	0.945	0.965	0.0364	0.0372	0.0380
D2	0.447	0.450	0.453	0.0176	0.0177	0.0178
e	0.300			0.0118		



Embossed Carrier Tape & Reel Specification



Symbol	Millimeters
A0	0.66+/-0.03
B0	1.06+/-0.03
D	1.50 + 0.10
D1	ø 0.20 +/- 0.05
E	1.75+/-0.10
F	3.50+/-0.05
K0	0.39+/-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