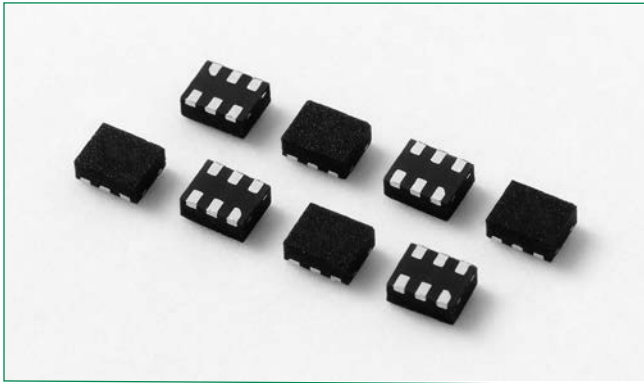
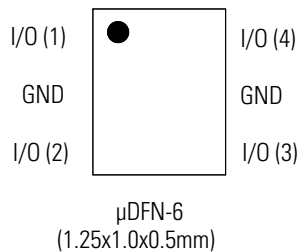


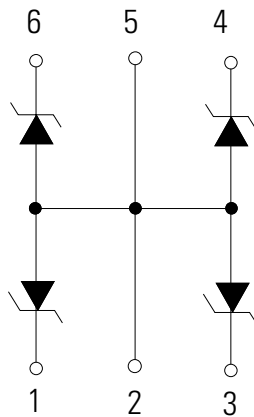
# SP1011 Series 7pF 15kV Unidirectional TVS Array



## Pinout



## Functional Block Diagram



## Description

Avalanche breakdown diodes fabricated in a proprietary silicon avalanche technology protect each I/O pin to provide a high level of protection for electronic equipment that may experience destructive electrostatic discharges (ESD). These robust diodes 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. Their very low loading capacitance also makes them ideal for protection high-speed signal pins.

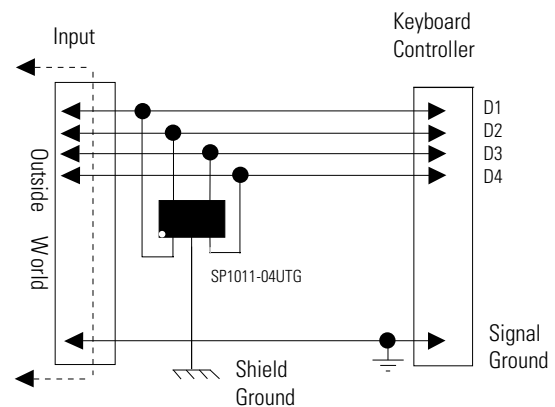
## Features

- RoHS compliant and lead-free
- ESD, IEC 61000-4-2, ±15kV contact, ±30kV air
- Lightning, 2A (8/20μs as defined in IEC 61000-4-5 2nd Edition)
- Low capacitance of 7 pF (TYP) per I/O @ 2.5V
- Low leakage current of 1μA (MAX) at 5V
- Tiny μDFN( JEDEC MO-229) package (1.25mm x 1.0mm x 0.5mm)
- EFT protection IEC 61000-4-4, 40A (5/50ns)

## Applications

- LCD/PDP TV
- DVD Player
- Desktop
- Set Top Box
- Mobile Phone
- Notebook
- MP3/PMP
- Digital camera

## Application Example



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 Pulse Current ( $t_p=8/20\mu s$ )	2	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 component. This is a stress only rating and operation of the component 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

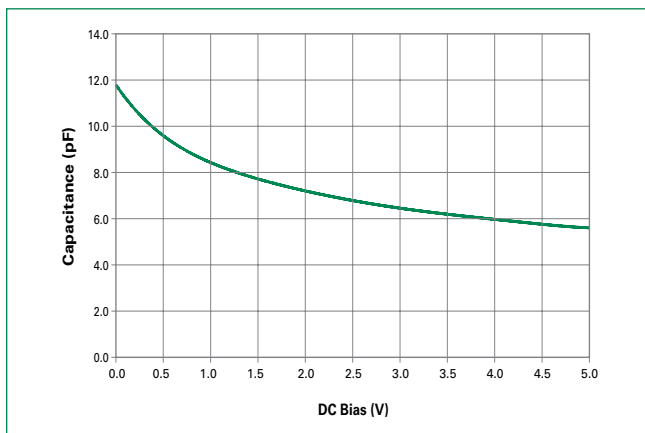
### Electrical Characteristics ( $T_{OP}=25^\circ C$ )

Parameter	Symbol	Test Conditions	Min	Typ	Max	Units
Reverse Voltage Drop	$V_R$	$I_R = 1mA$	7.0	7.8	8.5	V
Reverse Standoff Voltage	$V_{RWM}$	$I_R \leq 1\mu A$			6	V
Reverse Leakage Current	$I_{LEAK}$	$V_R = 5V$		0.1	1	$\mu A$
Clamp Voltage <sup>1</sup>	$V_C$	$I_{PP}=1A, t_p=8/20\mu s, Fwd$		8.7		V
		$I_{PP}=2A, t_p=8/20\mu s, Fwd$		10.2		V
Dynamic Resistance	$R_{DYN}$	$(V_{C2} - V_{C1}) / (I_{PP2} - I_{PP1})$		1.5		$\Omega$
ESD Withstand Voltage <sup>1</sup>	$V_{ESD}$	IEC 61000-4-2 (Contact Discharge)	$\pm 15$			kV
		IEC 61000-4-2 (Air Discharge)	$\pm 30$			kV
Diode Capacitance <sup>1</sup>	$C_D$	Reverse Bias = 0V		12	15	pF
		Reverse Bias = 2.5V		7		pF

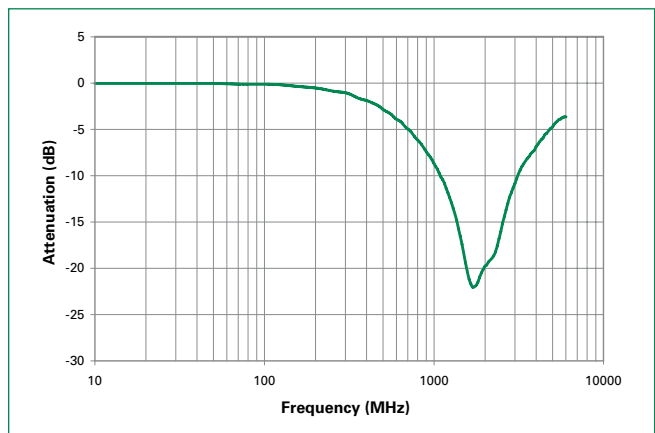
**Note:**

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

### Capacitance vs. Reverse Bias

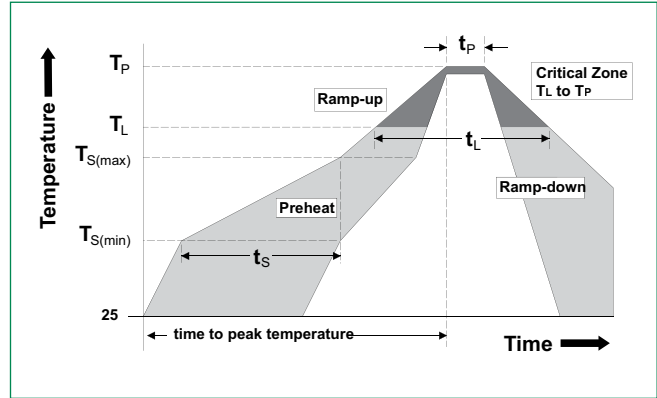


### Insertion Loss (S21) I/O to GND

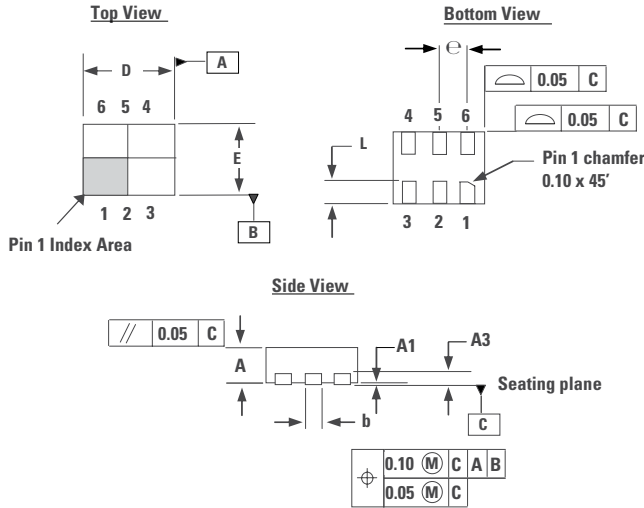


**Soldering Parameters**

<b>Reflow Condition</b>		Pb – Free assembly
<b>Pre Heat</b>	- Temperature Min ( $T_{s(min)}$ )	150°C
	- Temperature Max ( $T_{s(max)}$ )	200°C
	- Time (min to max) ( $t_s$ )	60 – 180 secs
<b>Average ramp up rate (Liquidus) Temp (<math>T_L</math>) to peak</b>		3°C/second max
<b><math>T_{S(max)}</math> to <math>T_L</math> - Ramp-up Rate</b>		3°C/second max
<b>Reflow</b>	- Temperature ( $T_L$ ) (Liquidus)	217°C
	- Temperature ( $t_L$ )	60 – 150 seconds
<b>Peak Temperature (<math>T_p</math>)</b>		260 <sup>+0.5</sup> °C
<b>Time within 5°C of actual peak Temperature (<math>t_p</math>)</b>		20 – 40 seconds
<b>Ramp-down Rate</b>		6°C/second max
<b>Time 25°C to peak Temperature (<math>T_p</math>)</b>		8 minutes Max.
<b>Do not exceed</b>		260°C

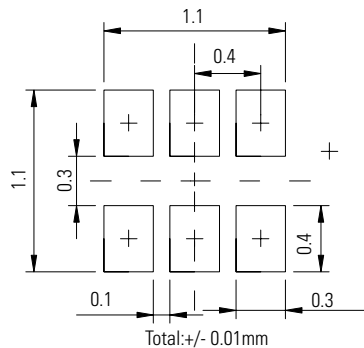


**Package Dimensions –  $\mu$ DFN-6 (1.25x1.0x0.5mm)**

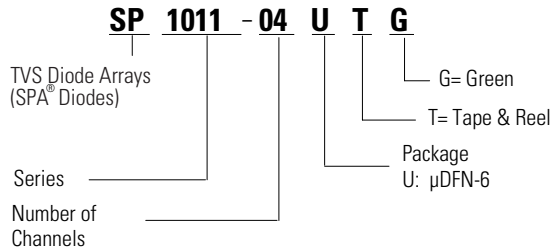


Package	$\mu$ DFN-6 (1.25x1.0x0.5mm)			
JEDEC	MO-229			
Symbol	Millimeters		Inches	
	Min	Max	Min	Max
A	0.45	0.55	0.018	0.022
A1	0.00	0.05	0.000	0.002
A3	0.127 REF		0.005 REF	
b	0.15	0.25	0.006	0.010
D	1.20	1.30	0.047	0.051
D2	-	-	-	-
E	0.95	1.05	0.037	0.041
E2	-	-	-	-
e	0.4 REF		0.016 REF	
L	0.25	0.35	0.010	0.014

Recommended Soldering Pad for  $\mu$ DFN-6L 1.25 x1.0x0.5 mm



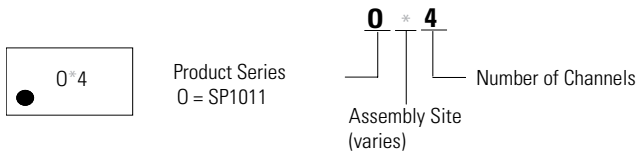
**Part Numbering System**



**Product Characteristics**

<b>Lead Plating</b>	Pre-Plated Frame
<b>Lead Material</b>	Copper Alloy
<b>Lead Coplanarity</b>	0.004 inches(0.102mm)
<b>Substrate material</b>	Silicon
<b>Body Material</b>	Molded Compound
<b>Flammability</b>	UL Recognized compound meeting flammability rating V-0

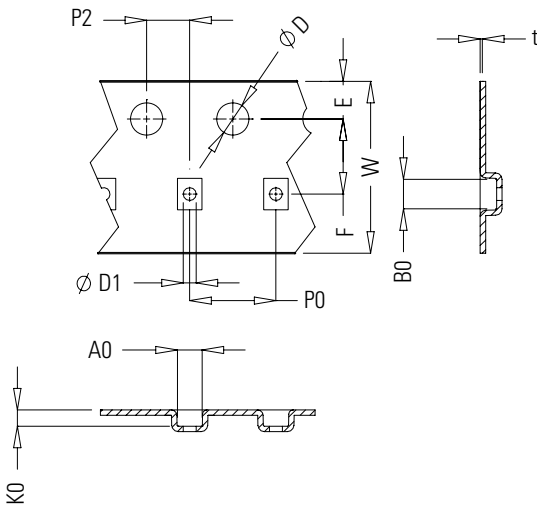
**Part Marking System**



**Ordering Information**

Part Number	Package	Min. Order Qty.
SP1011-04UTG	$\mu$ DFN-6 (1.25x1.0x0.5mm)	3000

**Embossed Carrier Tape & Reel Specification — $\mu$ DFN-6 (1.25x1.0x0.5mm)**



Symbol	Millimeters		Inches	
	Min	Max	Min	Max
<b>E</b>	1.65	1.85	0.06	0.07
<b>F</b>	3.45	3.55	0.14	0.14
<b>D1</b>	0.50	0.65	0.02	0.03
<b>D</b>	1.50 MIN		0.06 MIN	
<b>P0</b>	3.90	4.10	0.15	0.16
<b>10P0</b>	40.0 +/- 0.20		1.57 +/- 0.01	
<b>W</b>	7.90	8.30	0.31	0.33
<b>P2</b>	1.95	2.05	0.08	0.08
<b>A0</b>	1.09	1.19	0.04	0.05
<b>B0</b>	1.42	1.52	0.06	0.06
<b>K0</b>	0.71	0.81	0.03	0.03
<b>t</b>	0.25 TYP		0.01 TYP	