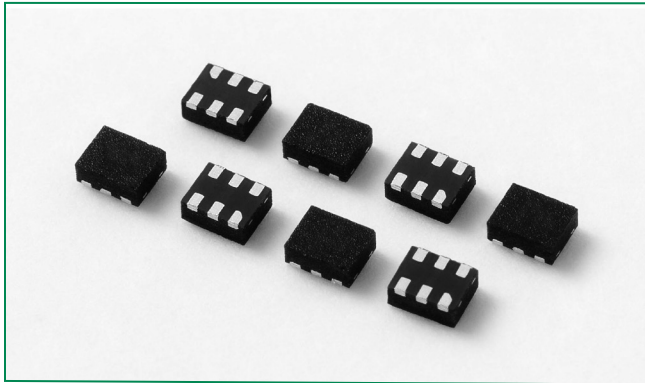


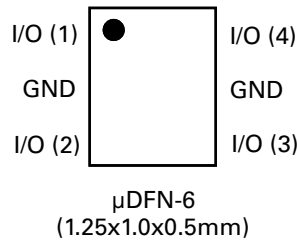
## SP1011 Series 7pF 15kV Unidirectional TVS Array



### Description

Zener 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 the IEC 61000-4-2 international standard (Level 4,  $\pm 8\text{kV}$  contact discharge) without performance degradation. Their very low loading capacitance also makes them ideal for protection high-speed signal pins.

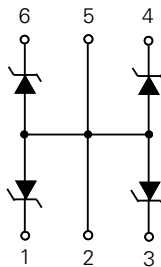
### Pinout



### Features

- ESD, IEC61000-4-2,  $\pm 15\text{kV}$  contact,  $\pm 30\text{kV}$  air
- Lightning, IEC61000-4-5, 2A ( $t_p=8/20\mu\text{s}$ )
- Low capacitance of 7 pF (TYP) per I/O @ 2.5V
- Low leakage current of 1 $\mu\text{A}$  (MAX) at 5V
- Tiny  $\mu\text{DFN}$  (JEDEC MO-229) package (1.25mm x 1.0mm x 0.5mm)
- EFT protection IEC61000-4-4, 40A (5/50ns)

### Functional Block Diagram



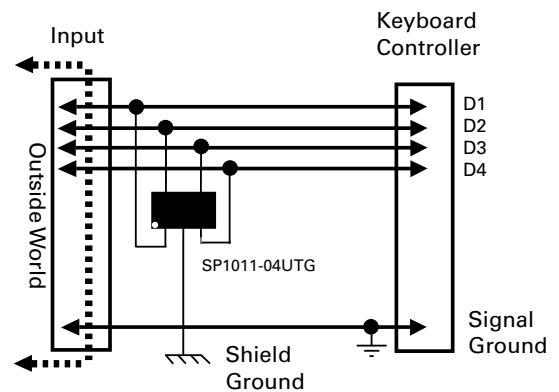
### Applications

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

### Additional Information



### 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 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

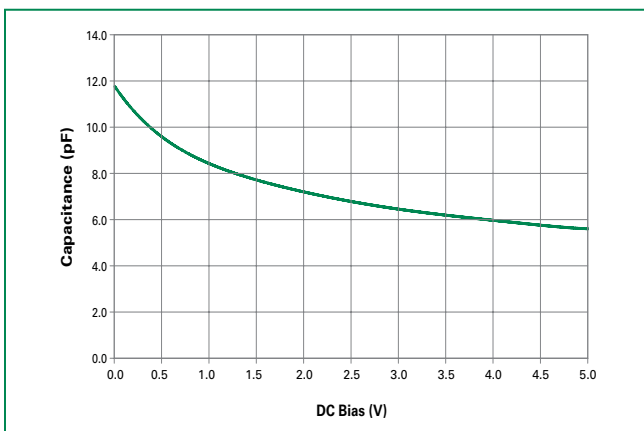
### Electrical Characteristics ( $T_{OP}=25^\circ C$ )

Parameter	Symbol	Test Conditions	Min	Typ	Max	Units
Reverse Voltage Drop	$V_R$	$I_R = 1mA$	6.0		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>	$V_{ESD}$	IEC61000-4-2 (Contact Discharge)	$\pm 15$			kV
		IEC61000-4-2 (Air Discharge)	$\pm 30$			kV
Diode Capacitance <sup>1</sup>	$C_D$	Reverse Bias = 0V		12	15	pF
		Reverse Bias = 2.5V		7		pF

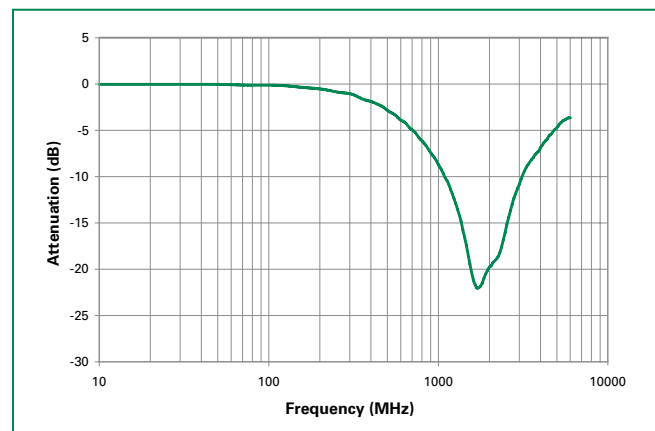
Note:

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

### Capacitance vs. Reverse Bias

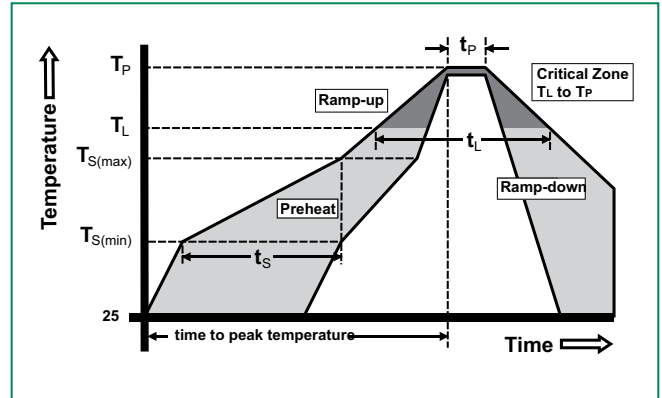


### Insertion Loss (S21) I/O to GND

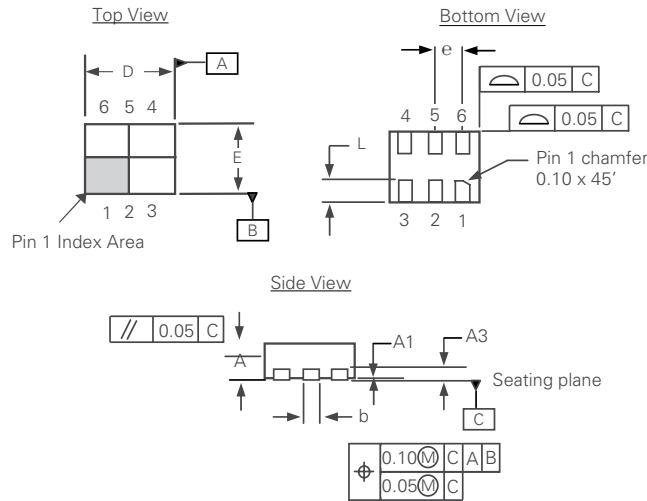


**Soldering Parameters**

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 <sup>+0/-5</sup> °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



**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
<b>A</b>	0.45	0.55	0.018	0.022
<b>A1</b>	0.00	0.05	0.000	0.002
<b>A3</b>	0.127 REF		0.005 REF	
<b>b</b>	0.15	0.25	0.006	0.010
<b>D</b>	1.20	1.30	0.047	0.051
<b>D2</b>	-	-	-	-
<b>E</b>	0.95	1.05	0.037	0.041
<b>E2</b>	-	-	-	-
<b>e</b>	0.4 REF		0.016 REF	
<b>L</b>	0.25	0.35	0.010	0.014

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

