

# SP1007 Series

## 5pF 8kV Bidirectional Discrete TVS

HF RoHS Pb



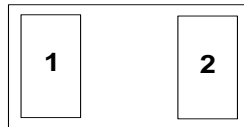
### Web Resources



Download ECAD models, order samples, and find technical resources at [www.littelfuse.com](http://www.littelfuse.com)

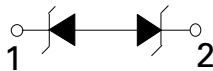
### Pinout

SOD882



AEC-Q101 qualified

### Functional Block Diagram



### Description

The SP1007 diodes are fabricated in a proprietary back-to-back silicon avalanche technology. These diodes provide a high ESD (electrostatic discharge) protection level for electronic equipment. The SP1007 TVS can safely absorb repetitive ESD strikes at the maximum level specified in IEC 61000-4-2 international standard (Level 4,  $\pm 8\text{kV}$  contact discharge) without performance degradation. The back-to-back configuration provides symmetrical ESD protection for data lines when AC signals are present.

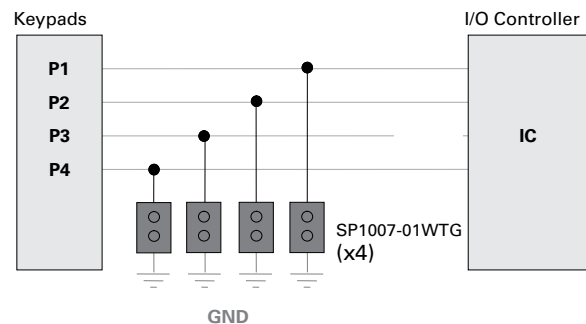
### Features and Benefits

- ESD, IEC 61000-4-2,  $\pm 8\text{kV}$  contact,  $\pm 15\text{kV}$  air
- EFT, IEC 61000-4-4, 40A (5/50ns)
- Lightning, IEC 61000-4-5, 2nd Edition 2A (8/20 $\mu\text{s}$ )
- Low capacitance of 5pF (TYP @  $V_R=5\text{V}$ )
- Low leakage current of 0.1 $\mu\text{A}$  at 5V
- Space efficient 0402 footprint
- AEC-Q101 qualified for SOD882 package
- Moisture Sensitivity Level (MSL -1) for SOD882 package
- Halogen-free, lead-free and RoHS compliant

### Applications

- Mobile Phones
- Smart Phones
- Camcorders
- Portable Medical
- Digital Cameras
- MP3/PMP
- Portable Navigation Components
- Tablets
- Point of Sale Terminals

### 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.

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### 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 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.

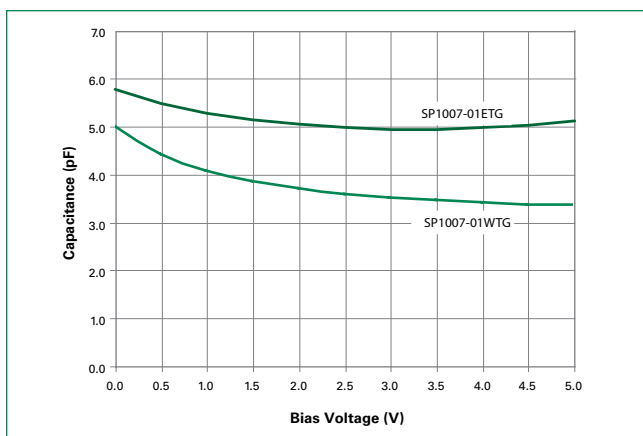
### Electrical Characteristics ( $T_{OP}=25^\circ C$ )

Parameter	Symbol	Test Conditions	Min	Typ	Max	Units
Reverse Standoff Voltage	$V_{RWM}$	$I_R = 1\mu A$	-	-	6.0	V
Breakdown Voltage	$V_{BR}$	$I_R = 1mA$	-	8.5	9.5	V
Reverse Leakage Current	$I_{LEAK}$	$V_R = 5V$	-	0.1	0.5	$\mu A$
Dynamic Resistance <sup>2</sup>	$R_{DYN}$	TLP, $t_p = 100ns$ , I/O to GND	-	0.8	-	$\Omega$
Clamp Voltage <sup>1</sup>	$V_C$	$I_{PP}=1A$ , $t_p=8/20\mu s$ , Fwd	-	10	50	V
		$I_{PP}=2A$ , $t_p=8/20\mu s$ , Fwd	-	12		
ESD Withstand Voltage <sup>1</sup>	$V_{ESD}$	IEC 61000-4-2 (Contact Discharge)	$\pm 8$	-	-	kV
		IEC 61000-4-2 (Air Discharge)	$\pm 15$	-	-	kV
Diode Capacitance <sup>1</sup>	$C_{I/O-I/O}$	Reverse Bias=0V $f = 1MHz$	-	5	6	pF

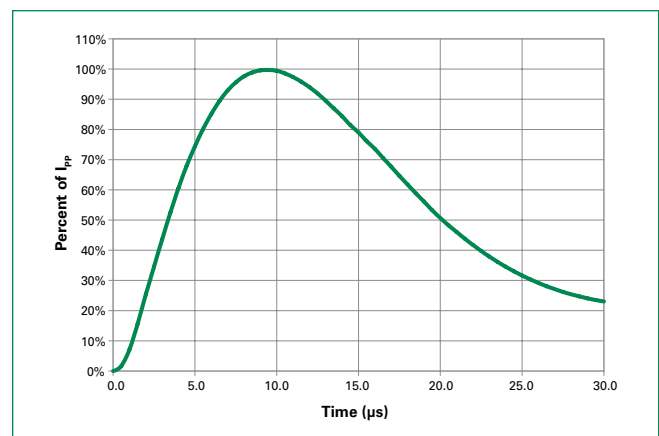
**Note:**

- Parameter is guaranteed by design and/or component characterization.
- Transmission Line Pulse (TLP) with 100ns width, 2ns rise time, and average window  $t1=70ns$  to  $t2=90ns$

### Capacitance vs. Reverse Bias



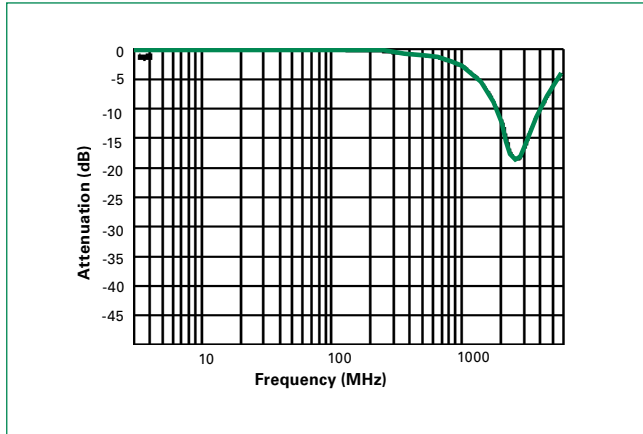
### 8/20 $\mu s$ Pulse Waveform



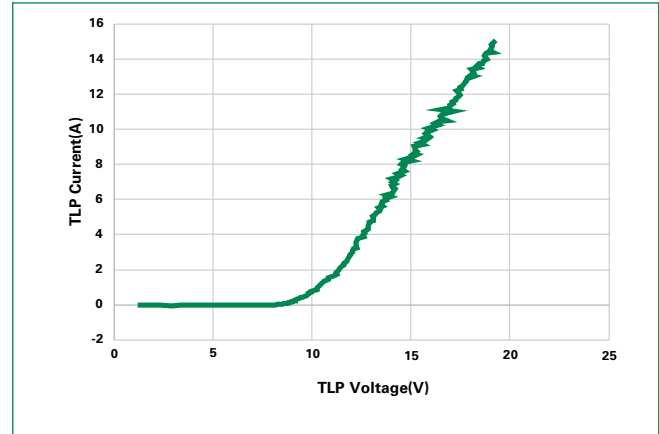
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### Insertion Loss (S21) I/O to GND



### Transmission Line Pulsing(TLP) Plot

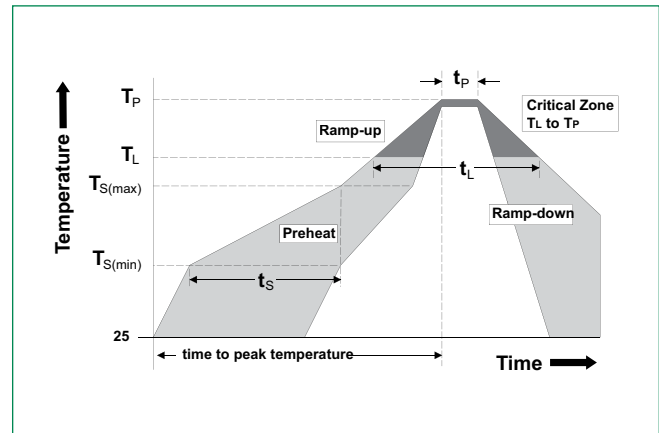


### Product Characteristics of SOD-882 Package

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

### Soldering Parameters

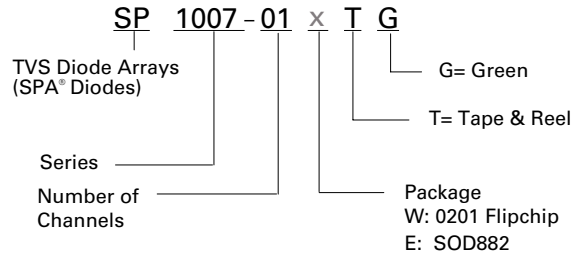
<b>Reflow Condition</b>	Pb – Free assembly	
<b>Pre Heat</b>	- Temperature Min ( $T_{s(min)}$ )	150°C
	- Temperature Max ( $T_{s(max)}$ )	200°C
	- Time (min to max) ( $t_s$ )	60 – 120 secs
<b>Average ramp up rate (Liquidus) Temp (<math>T_L</math>) to peak</b>	3°C/second max	
<b><math>T_{s(max)}</math> 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>	30 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	



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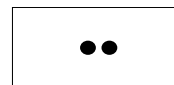
### Part Numbering System



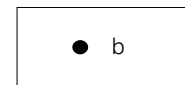
### Ordering Information

Part Number	Package	Min. Order Qty.
SP1007-01WTG	0201 Flipchip	10000
SP1007-01ETG	SOD882	10000

### Part Marking System

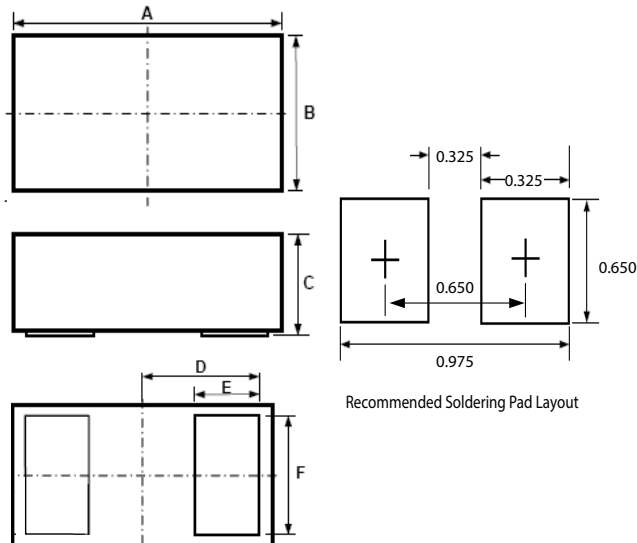


SP1007-01WTG



SP1007-01ETG

### Package Dimensions — SOD882

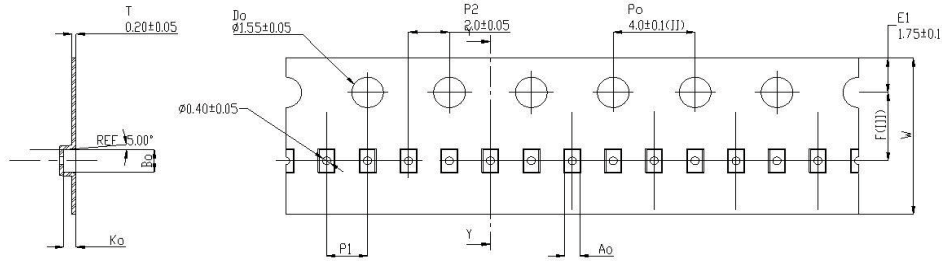


Symbol	Package	SOD882				
		JEDEC	MO-236			
	Millimeters			Inches		
	Min	Typ	Max	Min	Typ	Max
A	0.95	1.00	1.05	0.037	0.039	0.041
B	0.55	0.60	0.65	0.022	0.024	0.026
C	0.40	0.50	0.60	0.016	0.020	0.024
D		0.45			0.018	
E	0.20	0.25	0.30	0.008	0.010	0.012
F	0.45	0.50	0.55	0.018	0.020	0.022

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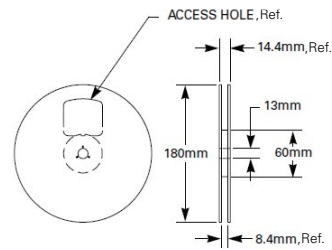
## 5pF 8kV Bidirectional Discrete TVS

### Embossed Carrier Tape & Reel Specification — SOD882



Symbol	Millimeters
A0	0.70+/-0.045
B0	1.10+/-0.045
K0	0.65+/-0.045
F	3.50+/-0.05
P1	2.00+/-0.10
W	8.00 + 0.30 -0.10

8mm TAPE AND REEL



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