

# SP3030 Series

## 0.5pF 20kV Unidirectional Discrete TVS



### Description

The SP3030 includes low capacitance rail to rail diodes with an additional Zener diode to provide 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 ( $\pm 20\text{kV}$  contact discharge) without performance degradation. The low loading capacitance makes it ideal for protecting high speed data lines such as HDMI, DVI, USB2.0, USB3.0 and eSATA.

### Features & Benefits

- ESD protection of  $\pm 20\text{kV}$  contact discharge,  $\pm 30\text{kV}$  air discharge, (IEC61000-4-2)
- EFT protection, IEC 61000-4-4, 40A ( $t_p=5/50\text{ns}$ )
- Lightning Protection, IEC 61000-4-5 2nd edition, 3A ( $t_p=8/20\mu\text{s}$ )
- Low capacitance of  $0.5\text{pF}$  @  $V_R=0\text{V}$
- Low leakage current of  $0.1\mu\text{A}$  at  $5\text{V}$
- Small SOD882 packaging helps save board space
- RoHS compliant and lead-free

### Additional Information



Resources

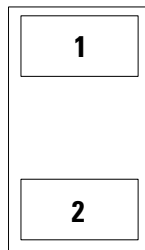


Accessories



Samples

### Pinout

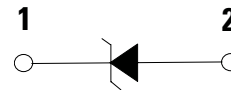


(AEC-Q101 qualified)

### Applications

- Tablets
- Ultrabook
- eReader
- Smart Phones
- Digital Cameras
- Automotive Electronics
- Set Top Boxes
- Portable Medical

### Functional Block Diagram

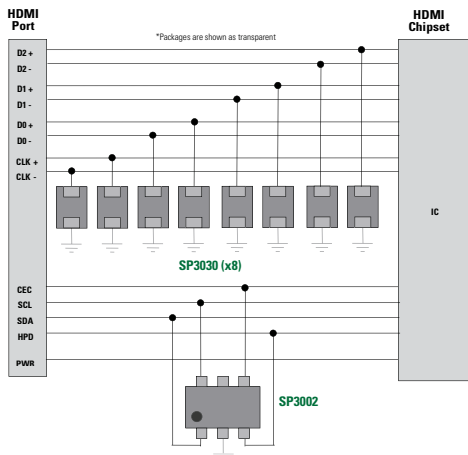


Life Support Note:

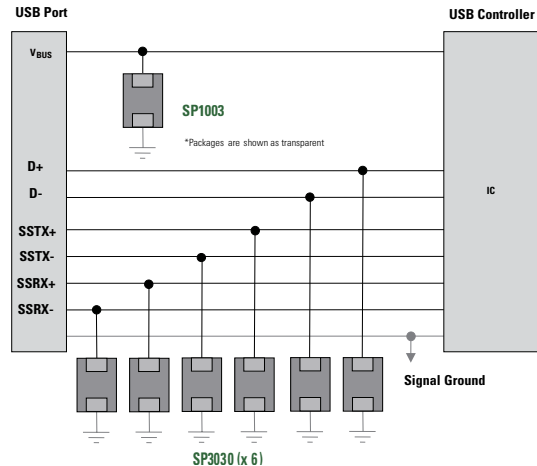
#### Not Intended for Use in Life Support or Life Saving Applications

The products shown herein are not designed for use in life sustaining or life saving applications unless otherwise expressly indicated.

### HDMI Application Example



### USB.0 Application Example



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### Absolute Maximum Ratings

Symbol	Parameter	Value	Units
$I_{PP}$	Peak Current ( $t_p=8/20\mu s$ )	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

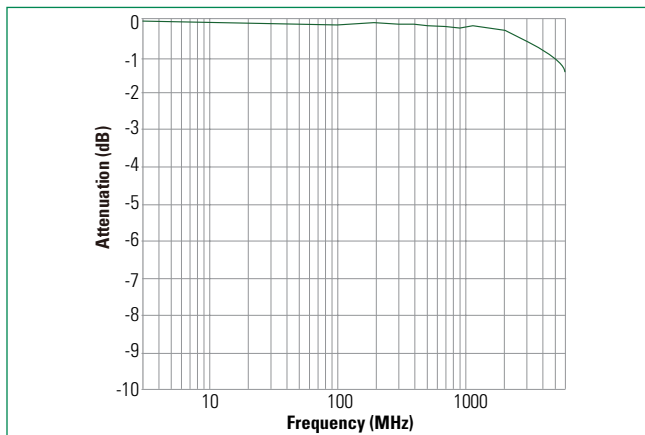
Parameter	Rating	Units
Storage Temperature Range	-55 to 150	°C
Maximum Junction Temperature	150	°C
Maximum Lead Temperature (Soldering 20-40s)	260	°C

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

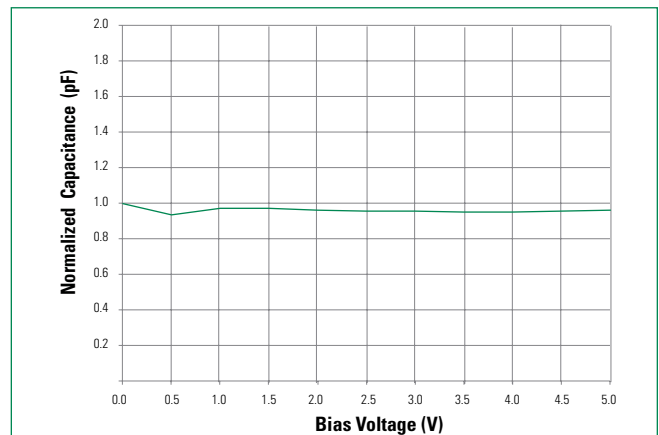
Parameter	Symbol	Test Conditions	Min	Typ	Max	Units
Reverse Standoff Voltage	$V_{RWM}$				5	V
Reverse Leakage Current	$I_{LEAK}$	$V_R=5V$ with 1pin at GND		0.1	0.5	$\mu A$
Clamp Voltage <sup>1</sup>	$V_C$	$I_{PP}=1A, t_p=8/20\mu s, Fwd$		9.2		V
		$I_{PP}=2A, t_p=8/20\mu s, Fwd$		10.0		V
ESD Withstand Voltage <sup>1</sup>	$V_{ESD}$	IEC61000-4-2 (Contact)	$\pm 20$			kV
		IEC61000-4-2 (Air)	$\pm 30$			kV
Dynamic Resistance	$R_{DYN}$	$(V_{C2}-V_{C1})/(I_{PP2}-I_{PP1})$		0.55		$\Omega$
Diode Capacitance <sup>1</sup>	$C_{I/O-I/O}$	Reverse Bias=0V, f=1 MHz		0.5		pF

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

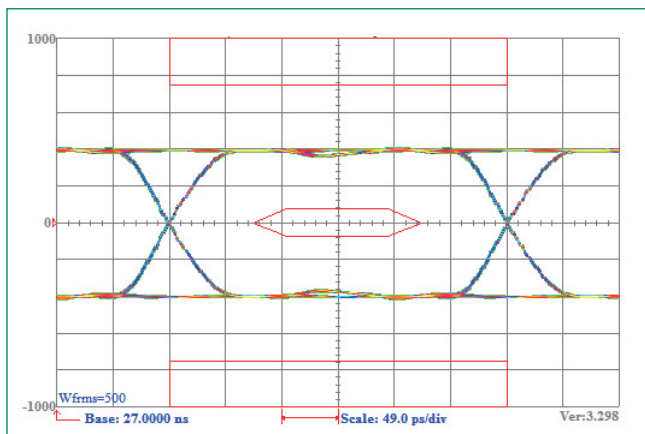
### Insertion Loss (S21) I/O to GND



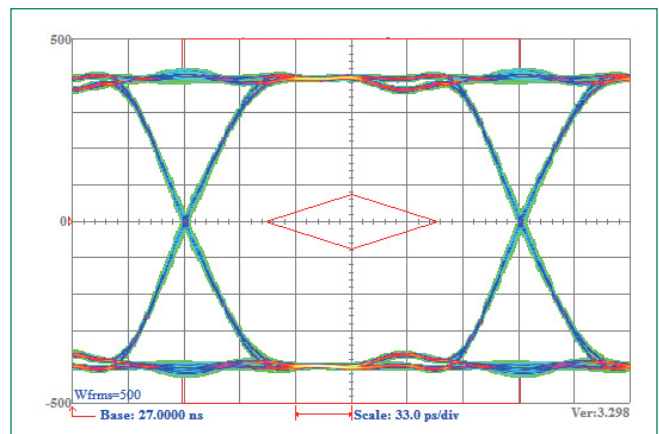
### Normalized Capacitance vs. Reverse Voltage



### HDMI 1.4 Eye Diagram



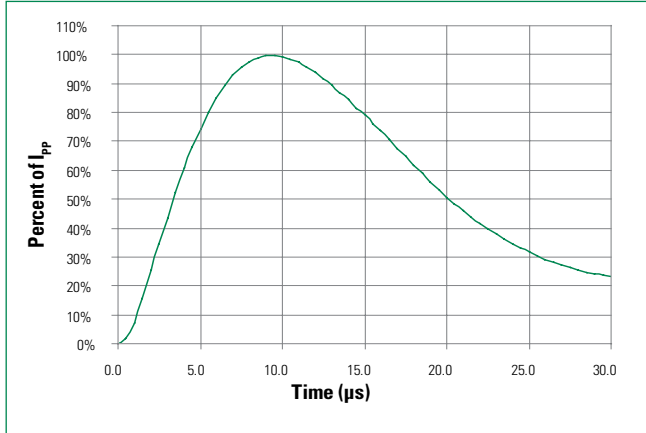
### USB3.0 Eye Diagram



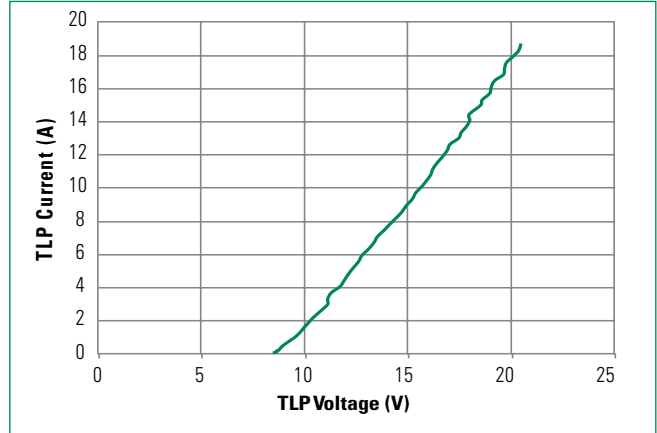
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## 0.5pF 20kV Unidirectional Discrete TVS

Pulse Waveform

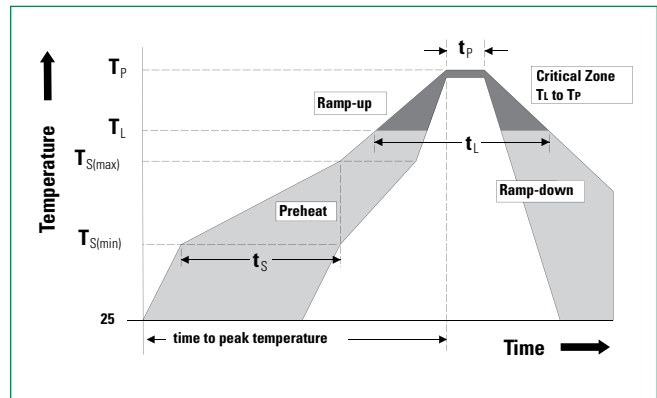


Transmission Line Pulsing(TLP) Plot



### 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



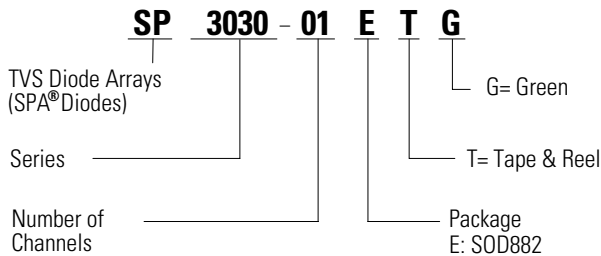
### Product Characteristics

<b>Lead Plating</b>	Pre-Plated Frame
<b>Lead Material</b>	Copper Alloy
<b>Lead Coplanarity</b>	0.0004 inches (0.102mm)
<b>Substitute Material</b>	Silicon
<b>Body Material</b>	Molded Epoxy
<b>Flammability</b>	UL 94 V-0

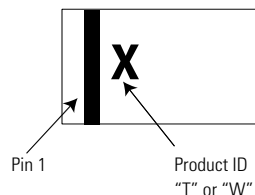
**Notes :**

1. All dimensions are in millimeters
2. Dimensions include solder plating.
3. Dimensions are exclusive of mold flash & metal burr.
4. Blo is facing up for mold and facing down for trim/form, i.e. reverse trim/form.
5. Package surface matte finish VDI 11-13.

### Part Numbering System



### Part Marking System



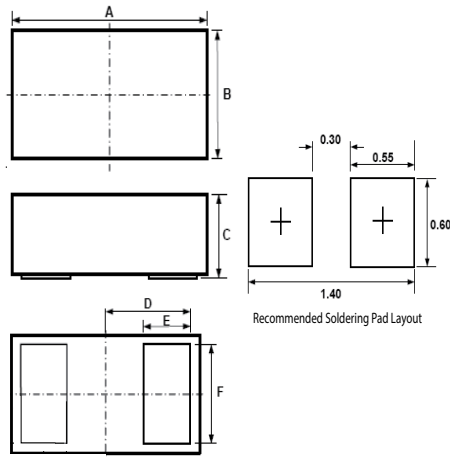
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### Ordering Information

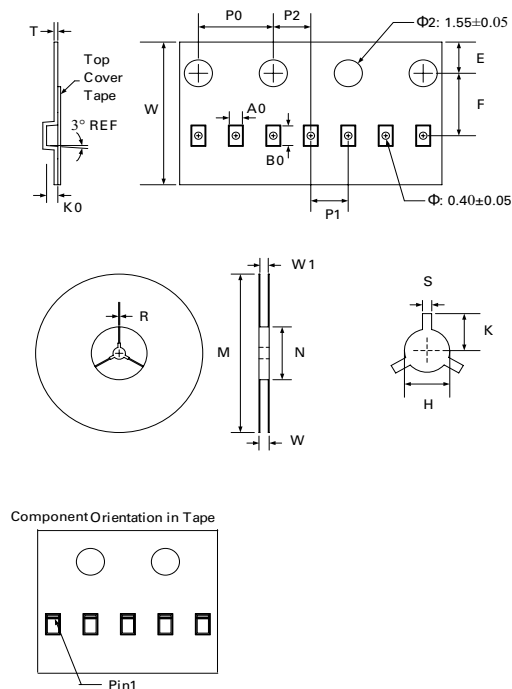
Part Number	Package	Marking	Packaging Options	P0/P1	Packaging Specifications	Min. Order Qty.
SP3030-01ETG	SOD882	“T” or “W”	Tape & Reel - 8mm tape/7” reel	4mm/2mm	EIA-481	10,000

### Package Dimensions – SOD882



Symbol	Package	SOD882					
	JEDEC	MO-236					
	Millimeters			Inches			
	Min	Typ	Max	Min	Typ	Max	
A	0.90	1.00	1.10	0.037	0.039	0.041	
B	0.50	0.60	0.70	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	0.35	0.008	0.010	0.012	
F	0.45	0.50	0.55	0.018	0.020	0.022	

### Embossed Carrier Tape & Reel Specification – SOD882



Symbol	Tape Dimensions	
	Millimeters	
	Min	Max
A0	0.65	0.75
B0	1.10	1.20
K0	0.50	0.60
E	1.65	1.85
F	3.45	3.55
P0	3.90	4.10
P1	1.90	2.10
P2	1.95	2.05
T	1.95	2.05
W	7.90	8.10

Symbol	Reel Dimensions (Size Ø 178)	
	Millimeters	
	Min	Max
M	177.0	179.0
N	59.0	61.0
W	11.0	12.0
W1	8.5	9.5
H	12.5	13.5
S	1.9	2.1
K	10.8	11.2
R	0.95	1.05

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