

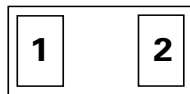
# SP3205 Series

## Low Capacitance ESD Protection

HF RoHS Pb

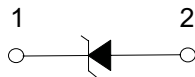


### Pinout



SOD882

### Functional Block Diagram



## Description

The SP3205 provides low capacitance, unidirectional and a high level of protection for electronic equipment that may experience destructive electrostatic discharges (ESD). The typical capacitance of 0.3pF helps ensure excellent signal integrity on the most challenging consumer electronics interfaces, such as USB 3.1, HDMI, DisplayPort, Thunderbolt and V-by-One®.

It can safely absorb repetitive ESD strikes at  $\pm 30\text{kV}$  (contact discharge, IEC 61000-4-2) without performance degradation and safely dissipate 4A of 8/20 $\mu\text{s}$  surge current (IEC 61000-4-5 2nd edition).

## Features

- ESD, IEC 61000-4-2,  $\pm 30\text{kV}$  contact,  $\pm 30\text{kV}$  air
- EFT, IEC 61000-4-4, 40A (5/50ns)
- Lightning, 4A (8/20 $\mu\text{s}$  as defined in IEC 61000-4-5 2nd edition)
- Low capacitance of 0.3pF (TYP @ VR=0V)
- Low leakage current of 1nA (TYP) at 3.3V
- Halogen free, lead free and RoHS compliant
- Moisture Sensitivity Level (MSL -1)
- AEC-Q101 Qualified

## Applications

- USB 3.1
- HDMI
- DisplayPort
- S-ATA
- NFC

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.

# SP3205 Series

## Low Capacitance ESD Protection

### Absolute Maximum Ratings

Symbol	Parameter	Value	Units
$I_{PP}$	Peak Current ( $t_p=8/20\mu s$ )	4	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.

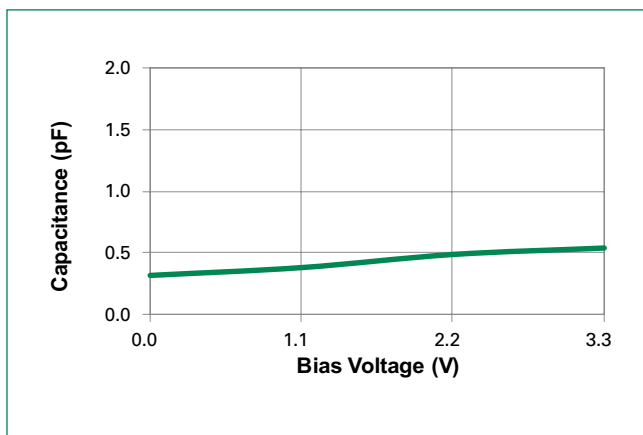
### Electrical Characteristics ( $T_{OP}=25^{\circ}C$ )

Parameter	Symbol	Test Conditions	Min	Typ	Max	Units
Reverse Standoff Voltage	$V_{RWM}$	$I_R=1\mu A$			3.3	V
Breakdown Voltage	$V_{BR}$	$I_R=1mA$	3.6	5.5		V
Reverse Leakage Current	$I_{LEAK}$	$V_R=3.3V$		1	100	nA
Clamp Voltage <sup>1</sup>	$V_C$	$I_{PP}=1A, t_p=8/20\mu s$		7.5	9	V
		$I_{PP}=4A, t_p=8/20\mu s$		9.5	12	V
Dynamic Resistance <sup>2</sup>	$R_{DYN}$	TLP, $t_p=100ns$		0.3		$\Omega$
ESD Withstand Voltage <sup>1</sup>	$V_{ESD}$	IEC 61000-4-2 (Contact Discharge)	$\pm 30$			kV
		IEC 61000-4-2 (Air Discharge)	$\pm 30$			kV
Diode Capacitance <sup>1</sup>	$C_{IO-GND}$	Reverse Bias=0V, $f=1MHz$		0.3	0.5	pF

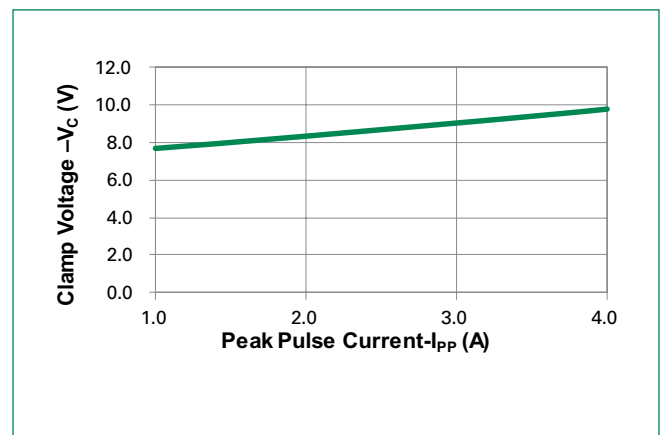
**Note:**

- Parameter is guaranteed by design and/or component characterization.
- Transmission Line Pulse (TLP) with 100ns width, 0.2ns rise time, and average window  $t_1=70ns$  to  $t_2=90ns$

#### Capacitance vs. Reverse Bias



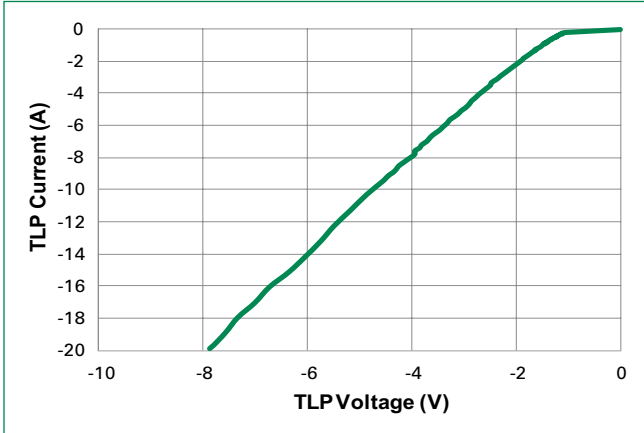
#### Clamping voltage vs. IPP for 8/20μs waveshape



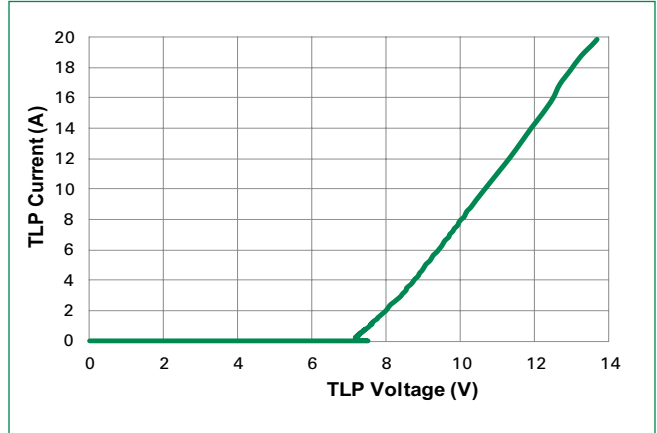
# SP3205 Series

## Low Capacitance ESD Protection

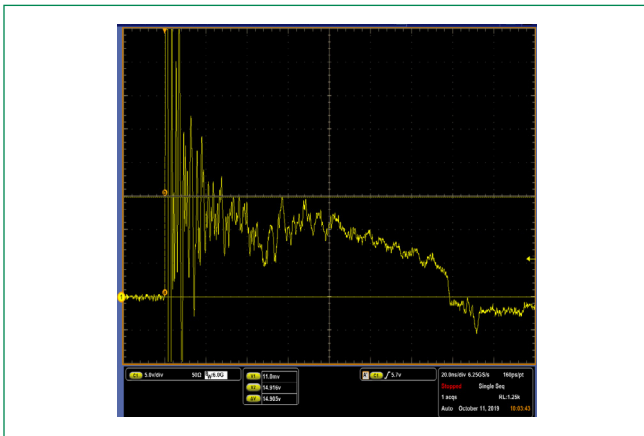
Negative Transmission Line Pulsing (TLP) Plot



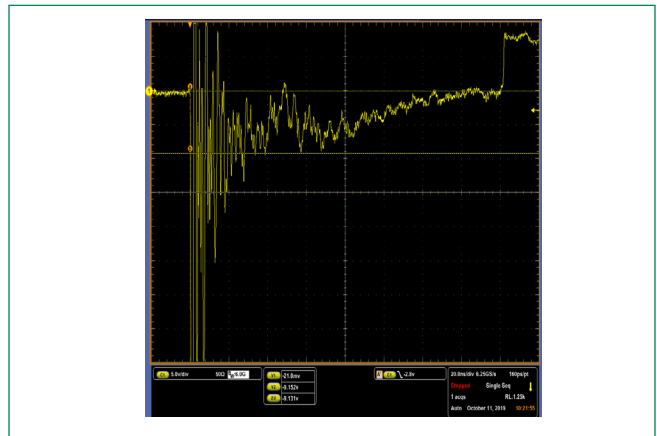
Positive Transmission Line Pulsing (TLP) Plot



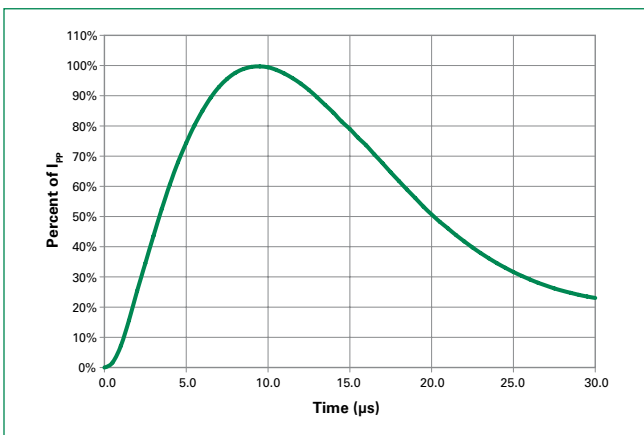
IEC 61000-4-2 +8 kV Contact ESD Clamping Voltage



IEC 61000-4-2 -8 kV Contact ESD Clamping Voltage



8/20µs Pulse Waveform

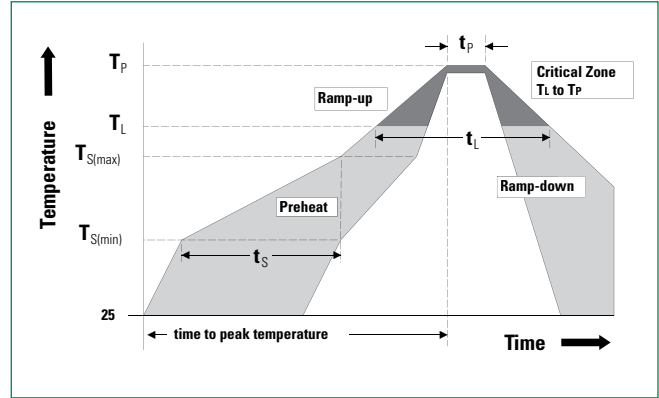


# SP3205 Series

## Low Capacitance ESD Protection

### 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



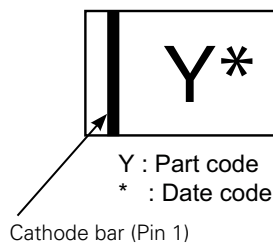
### Ordering Information

Part Number	Package	Min. Order Qty.
SP3205-01ETG	SOD882	10,000

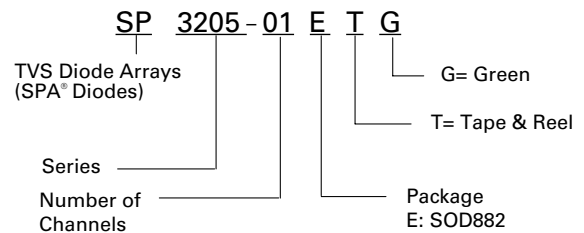
### Product Characteristics

<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

### Part Marking System



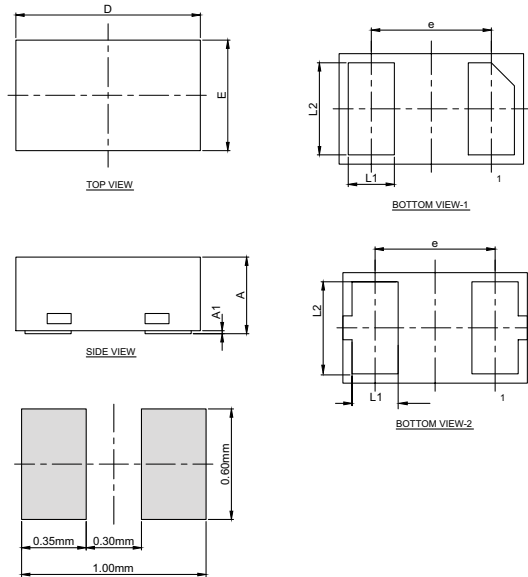
### Part Numbering System



# SP3205 Series

## Low Capacitance ESD Protection

### Package Dimensions – SOD882

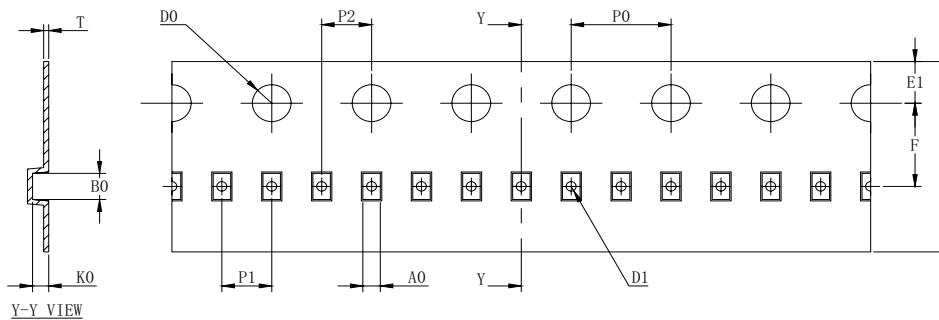


Recommended Soldering Pattern

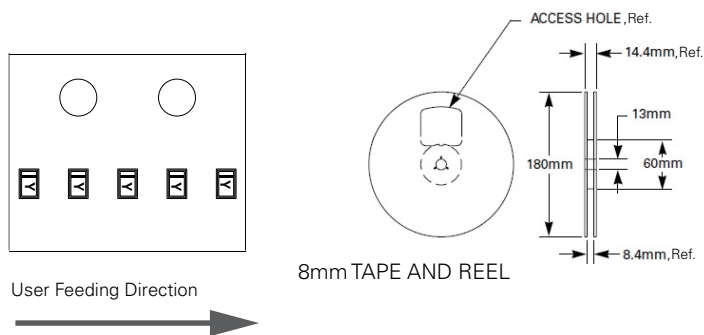
Drawing#: E03-B

Symbol	SOD882					
	Millimeters			Inches		
	Min	Typ	Max	Min	Typ	Max
<b>A</b>	0.40	0.50	0.55	0.016	0.020	0.022
<b>A1</b>	0.00	0.02	0.05	0.000	0.001	0.002
<b>L1</b>	0.20	0.25	0.30	0.008	0.010	0.012
<b>L2</b>	0.45	0.50	0.55	0.018	0.020	0.022
<b>D</b>	0.95	1.00	1.05	0.037	0.039	0.041
<b>E</b>	0.55	0.60	0.65	0.022	0.024	0.026
<b>e</b>	0.65 BSC			0.026 BSC		

### Embossed Carrier Tape & Reel Specification – SOD882



Symbol	Millimeters	
	Min	Max
<b>A0</b>	0.655	0.745
<b>B0</b>	1.055	1.145
<b>D0</b>	1.50	1.60
<b>D1</b>	0.35	0.45
<b>E1</b>	1.65	1.85
<b>F</b>	3.45	3.55
<b>K0</b>	0.695	0.605
<b>P0</b>	3.90	4.10
<b>P1</b>	1.90	2.10
<b>P2</b>	1.95	2.05
<b>T</b>	0.15	0.25
<b>W</b>	7.90	8.30



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