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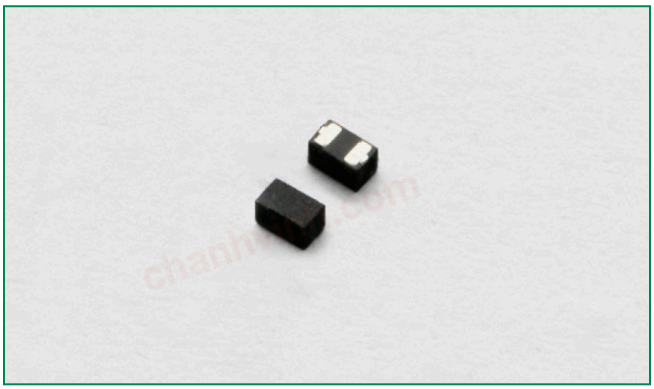
TVS Diode Arrays (SPA® Diodes)

Low Capacitance ESD Protection - SP3205

SP3205 0.3pF 4A Unidirectional Diode Array

HF RoHS Pb GREEN

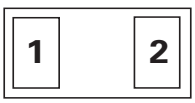


Description

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 ±30kV (contact discharge, IEC 61000-4-2) without performance degradation and safely dissipate 4A of 8/20µs surge current (IEC 61000-4-5 2nd edition).

Pinout

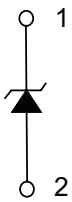


SOD882

Features

- ESD, IEC 61000-4-2, ±30kV contact, ±30kV air
- EFT, IEC 61000-4-4, 40A (5/50ns)
- Lightning, 4A (8/20µs as defined in IEC 61000-4-5 2nd edition)
- Low capacitance of 0.3pF (TYP @ V_R=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

Functional Block Diagram



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.

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Absolute Maximum Ratings

Symbol	Parameter	Value	Units
I_{PP}	Peak Current (t_p=8/20μs)	4	A
T_{OP}	Operating Temperature	-40 to 125	°C
T_{STOR}	Storage Temperature	-55 to 150	°C

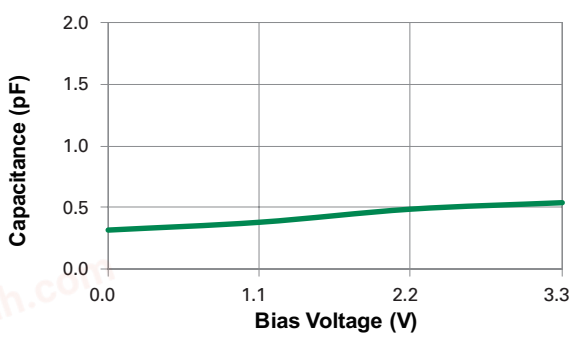
CAUTION: Stresses above those listed in "Absolute Maximum Ratings" may cause permanent damage to the component. This is a stress only rating and operation of the component at these or any other conditions above those indicated in the operational sections of this specification is not implied.

Electrical Characteristics (T_{OP}=25°C)

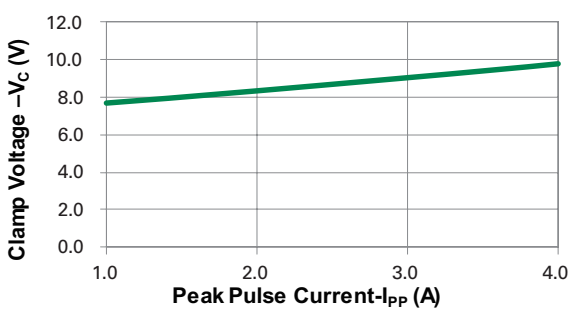
Parameter	Symbol	Test Conditions	Min	Typ	Max	Units
Reverse Standoff Voltage	V_{RWM}	I_R=1μA			3.3	V
Breakdown Voltage	V_{BR}	I_R=1mA	3.6	5.5		V
Reverse Leakage Current	I_{LEAK}	V_R=3.3V		1	100	nA
Clamp Voltage[1]	V_C	I_{PP}=1A, t_p=8/20μs		7.5	9	V
		I_{PP}=4A, t_p=8/20μs		9.5	12	V
Dynamic Resistance[2]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

Note:
1. Parameter is guaranteed by design and/or component characterization.
2.Transmission Line Pulse (TLP) with 100ns width, 0.2ns rise time, and average window t1=70ns to t2= 90ns

Capacitance vs. Reverse Bias



Clamping voltage vs. I_{PP} for 8/20μs waveshape



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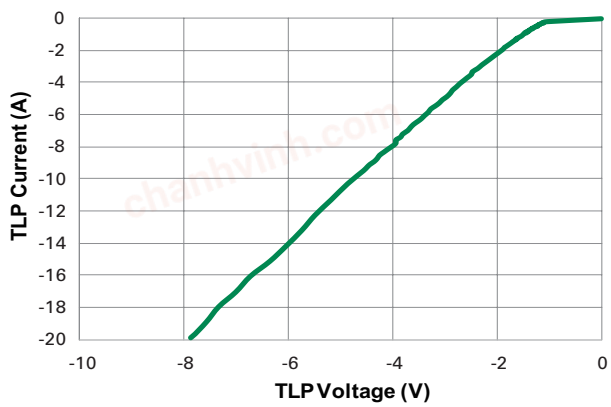
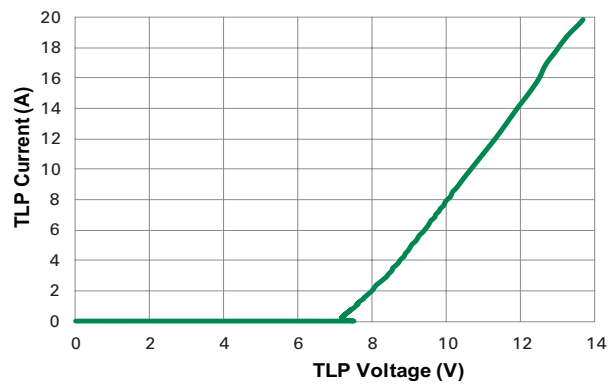
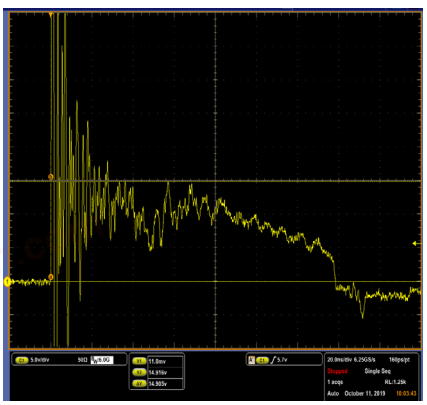
Negative Transmission Line Pulsing (TLP) Plot



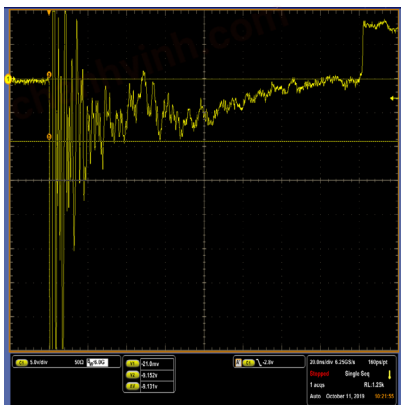
Positive Transmission Line Pulsing (TLP) Plot



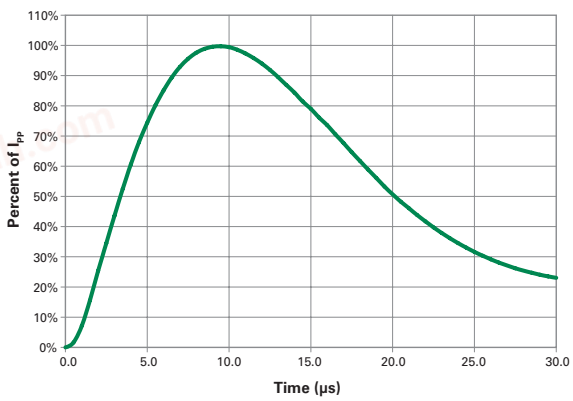
IEC 61000-4-2 +8 kV Contact ESD Clamping Voltage



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



8/20µs Pulse Waveform



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TVS Diode Arrays (SPA® Diodes)

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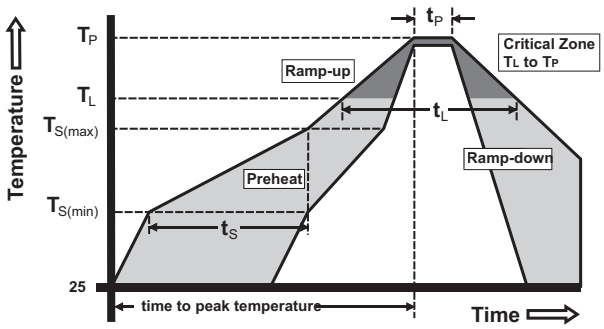
Soldering Parameters

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)		$260^{+0/-5}$ °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



Ordering Information

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

Product Characteristics

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

Part Marking System



Y : Part code
* : Date code

Part Numbering System

SP 3205 - 01 E T G

- SP: TVS Diode Arrays (SPA® Diodes)
- 3205: Series
- 01: Number of Channels
- E: Package E: SOD882
- T: T= Tape & Reel
- G: G= Green

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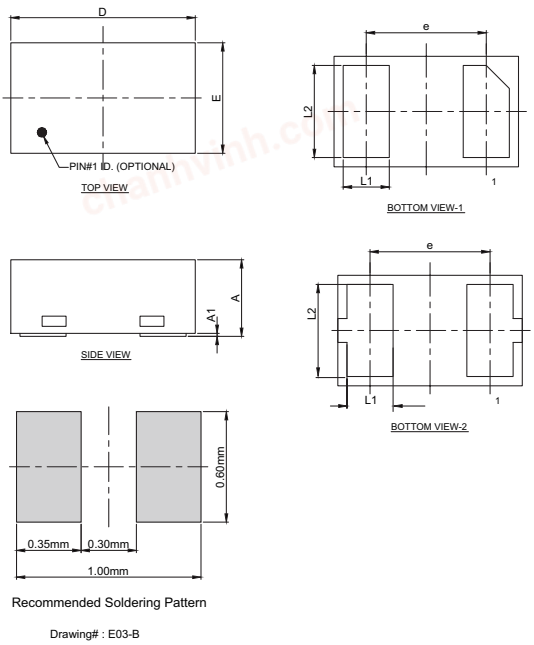
Package Dimensions — SOD882

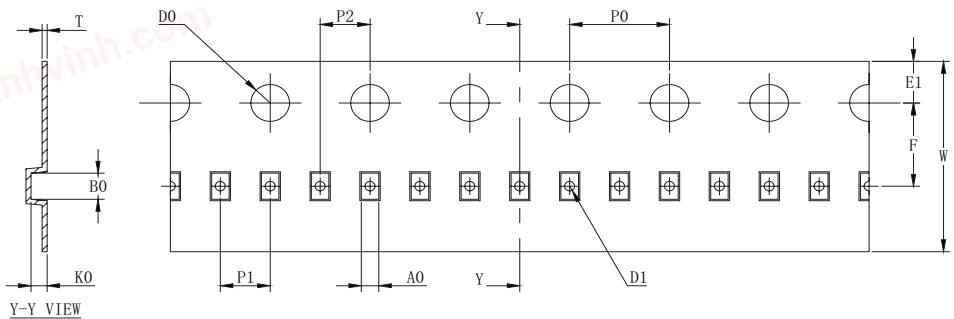


Recommended Soldering Pattern

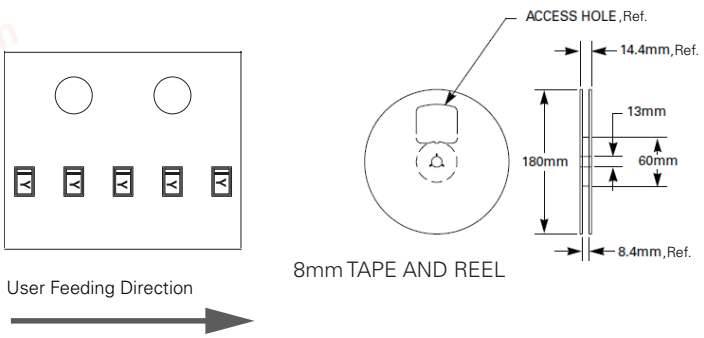
Drawing# : E03-B

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

Embossed Carrier Tape & Reel Specification — SOD882



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



8mm TAPE AND REEL

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