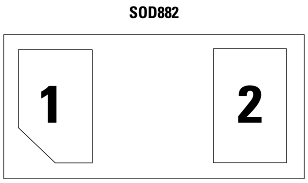
SP1250 50A Discrete Unidirectional TVS Diode

Note: This package image is for example and reference only. for detail package drawing, please refer to the package section in this datasheet.

Description

The SP1250 unidirectional TVS is fabricated in a proprietary silicon avalanche technology. These diodes provide a high ESD (electrostatic discharge) protection level for electronic equipment. The SP1250 TVS can safely absorb repetitive ESD strikes of ±30 kV (contact and air discharge as defined in IEC 61000-4-2) without any performance degradation. Additionally, each TVS can safely dissipate a 50A 8/20μs surge event as defined in IEC 61000-4-5 2nd edition.

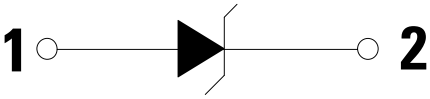
Pinout



Features

- ESD, IEC 61000-4-2, ±30kV contact, ±30kV air
- EFT, IEC 61000-4-4, 40A (5/50ns)
- Lightning, 50A (8/20μs as defined in IEC 61000-4-5 2nd edition)
- Low leakage current of 0.02μA (TYP) at 5V
- Halogen free, lead free and RoHS compliant
- Moisture Sensitivity Level (MSL -1)

Functional Block Diagram



Applications

- VBUS Protection
- Portable Battery
- Switches / Buttons
- Test Equipment / Instrumentation
- Medical Equipment
- Notebooks / Desktops / Servers
- Computer Peripherals
- Point-of-Sale Terminals

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 Current (t_p=8/20μs)	50	A
T_{OP}	Operating Temperature	-40 to 125	°C
T_{STOR}	Storage Temperature	-55 to 150	°C

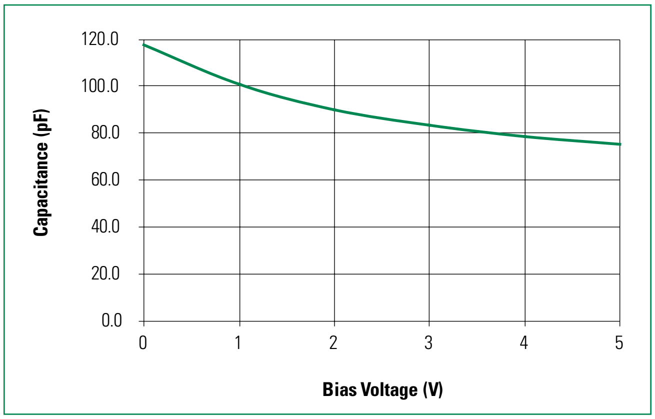
CAUTION: Stresses above those listed in “Absolute Maximum Ratings” may cause permanent damage to the component. This is a stress only rating and operation of the component at these or any other conditions above those indicated in the operational sections of this specification is not implied.

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

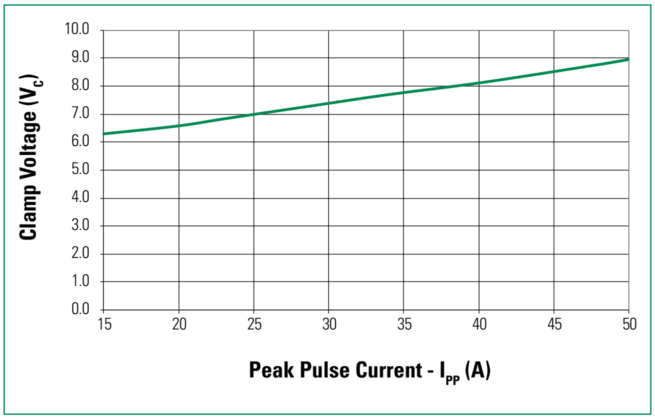
Parameter	Symbol	Test Conditions	Min	Typ	Max	Units
Reverse Standoff Voltage	V_{RWM}	I_R=1μA	-	-	5	V
Breakdown Voltage	V_{BR}	I_R=1mA	5.1	5.5	-	V
Reverse Leakage Current	I_{LEAK}	V_R=5V	-	0.02	0.1	μA
Clamp Voltage[1]	V_C	I_{PP}=50A, t_p=8/20μs	-	8.7	10	V
Dynamic Resistance[2]	R_{DYN}	TLP, t_p=100ns	-	0.05	-	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]	$C_{IO\text{-}GND}$	Reverse Bias=0V, f=1MHz	-	120	-	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

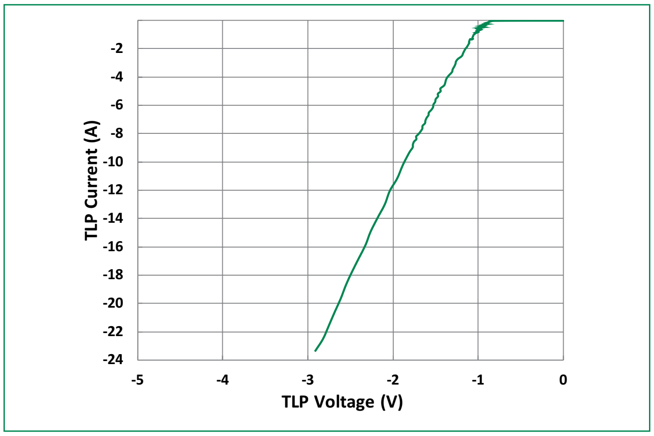
Capacitance vs. Reverse Bias



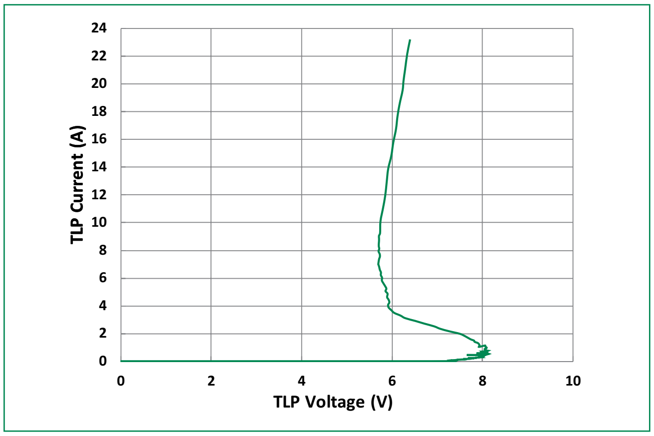
Clamping voltage vs. I_{PP} for 8/20μs waveshape



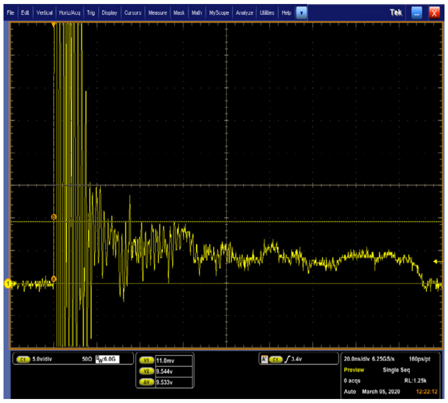
Negative Transmission Line Pulsing (TLP) Plot



Positive Transmission Line Pulsing (TLP) Plot

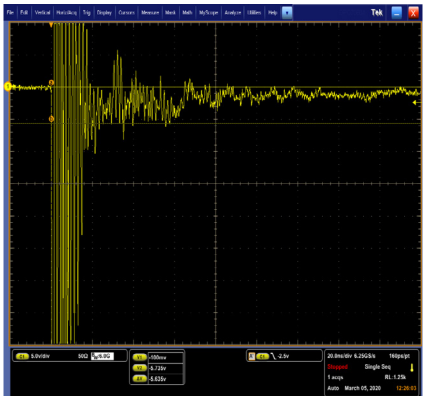


IEC 61000-4-2 +8 kV Contact ESD Clamping Voltage



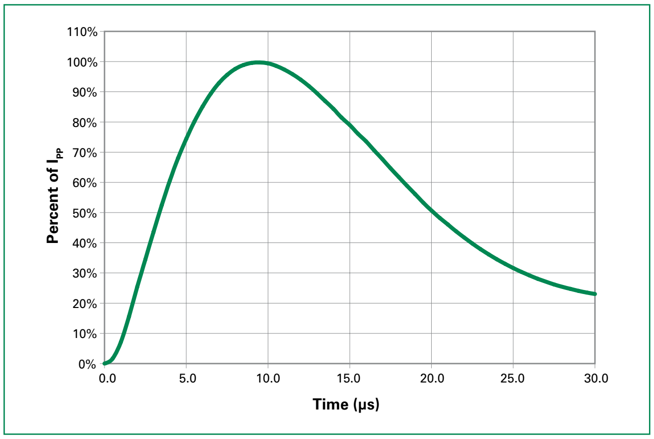
C1 5.0v/div 50Ω BW:6.0G
V1 11.0mv
V2 9.544v
ΔV 9.533v
A' C1 ∫ 3.4v
20.0ns/div 6.25GS/s 160ps/pt
Preview Single Seq
0 acqs RL:1.25k
Auto March 05, 2020 12:22:12

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



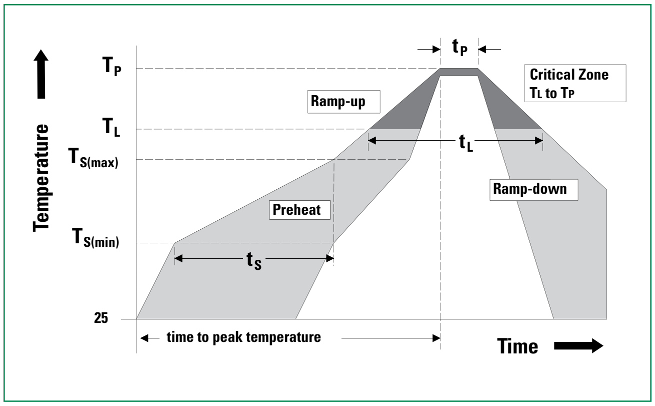
C1 5.0v/div 50Ω BW:6.0G
V1 -100mv
V2 -5.735v
ΔV -5.635v
A' C1 ⌊ -2.5v
20.0ns/div 6.25GS/s 160ps/pt
Stopped Single Seq
1 acqs RL:1.25k
Auto March 05, 2020 12:26:03

8/20μs Pulse Waveform



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



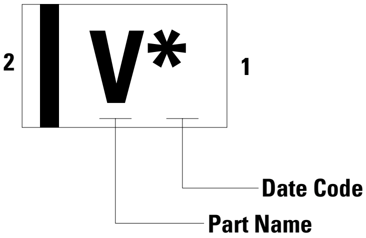
Ordering Information

Part Number	Package	Min. Order Qty.
SP1250-01ETG	SOD882	10,000

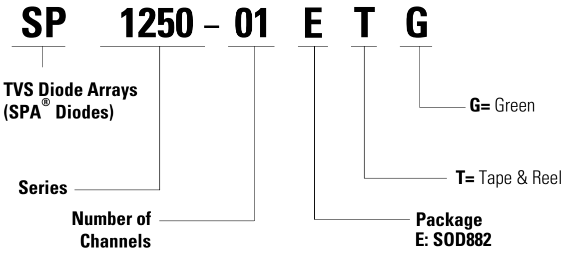
Product Characteristics

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

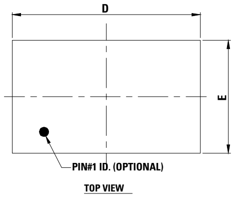
Part Marking System

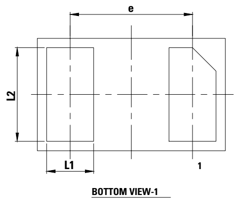


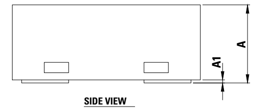
Part Numbering System

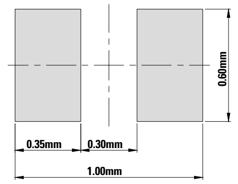


Package Dimensions — SOD882







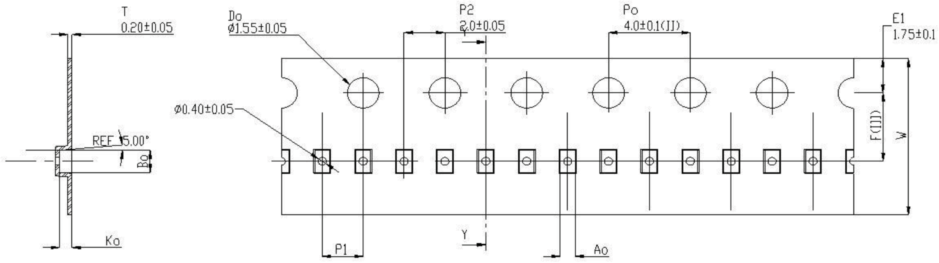


Recommended Soldering Pattern

Drawing# : E03-B

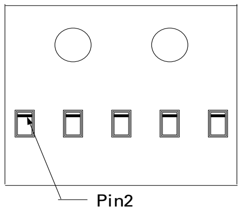
Symbol	SOD882					
	Millimeters			Inches		
	Min	Typ	Max	Min	Typ	Max
A	0.40	0.50	0.55	0.016	0.020	0.022
A1	0.00	0.02	0.05	0.000	0.001	0.002
L1	0.20	0.25	0.30	0.008	0.010	0.012
L2	0.45	0.50	0.55	0.018	0.020	0.022
D	0.95	1.00	1.05	0.037	0.039	0.041
E	0.55	0.60	0.65	0.022	0.024	0.026
e	0.65 BSC			0.026 BSC		

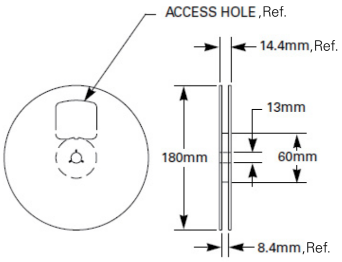
Embossed Carrier Tape & Reel Specification — SOD882



Symbol	Millimeters
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

Component Orientation in Tape





8mm TAPE AND REEL