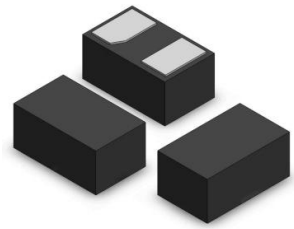
Transient Voltage Suppressors for ESD Protection

ESD3.3V02D-SLC

Description

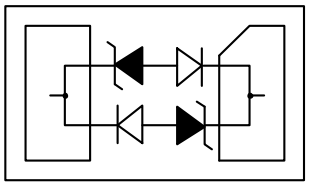
The ESD3.3V02D-SLC is low capacitance TVS designed to protect high speed data interfaces. This series has been specifically designed to protect sensitive components which are connected to high-speed data and transmission lines from over-voltage caused by ESD (electrostatic discharge), CDE (Cable Discharge Events), and EFT (electrical fast transients).



Feature

- 51 Watts Peak Pulse Power per Line (tp=8/20μs)
- Ultra small SMD package
- Low capacitance
- Protects One Bidirectional I/O line
- Low clamping voltage
- Low leakage current
- IEC61000-4-2(ESD):±25kV (air discharge)
  ±15kV (contact discharge);

Functional Diagram



Applications

- USB 3.0 / USB 3.1 Interfaces
- HDMI 1.4 / HDMI 2.0 Interfaces
- LVDS Interfaces
- Cellular Handsets & Accessories
- Notebooks & Handhelds
- Portable Instrumentation
- Industrial Controls

Mechanical Data

- JEDEC 0201/DFN0603 Package
- Molding Compound Flammability Rating : UL 94V-O
- Weight 0.3 Milligrams (Approximate)
- Lead Finish : Lead Free

Mechanical Characteristics

Symbol	Parameter	Value	Units
P_{PP}	**Peak Pulse Power (tp=8/20μs waveform)**	51	Watts
T_L	**Lead Soldering Temperature**	260 (10 sec.)	ºC
T_{STG}	**Storage Temperature Range**	-55 to +150	ºC
T_J	**Operating Junction Temperature Range**	-40 to +125	ºC

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Electrical Characteristics (@ 25℃ Unless Otherwise Specified)

Characteristics	Symbol	Test Conditions	Min.	Typ.	Max.	Unit
Reverse Working Voltage	V_{RWM}	--	--	--	3.3	V
Reverse Breakdown Voltage	V_{BR}	I_T=1mA	6.3	7.5	8.3	V
Reverse Leakage Current	I_R	V_{RWM}=3.3V；T=25°C	--	--	0.1	μA
Positive Clamping Voltage	V_C	I_{PP}=4.0A，T_P=8/20μs；	--	--	13	V
TLP Clamping Voltage	V_{CL}	I_{PP}=5.0A，T_P=100ns；	--	11	--	V
Junction capacitance	C_J	V_R = 0V, f = 1MHz	--	0.15	--	pF

Characteristic Curves

Fig1. 8/20μs Pulse Waveform

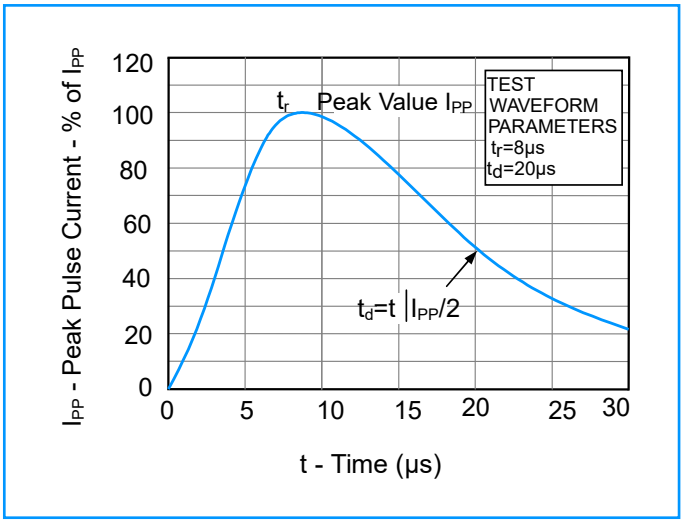
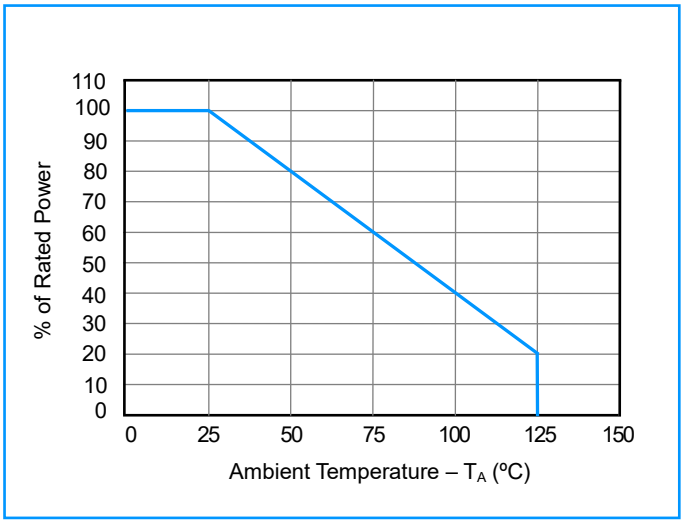


Fig2. Power Derating Curve



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Characteristic Curves

Fig3. Typic Breakdown Voltage vs. Temperature

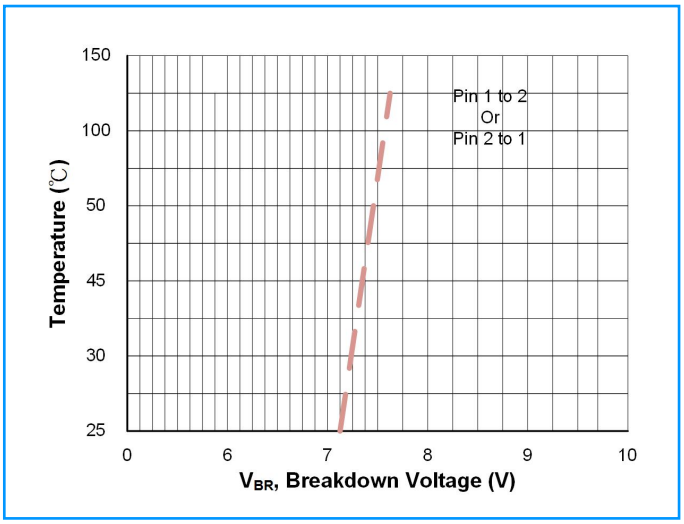


Fig4. Typic Reverse Current vs. Temperature

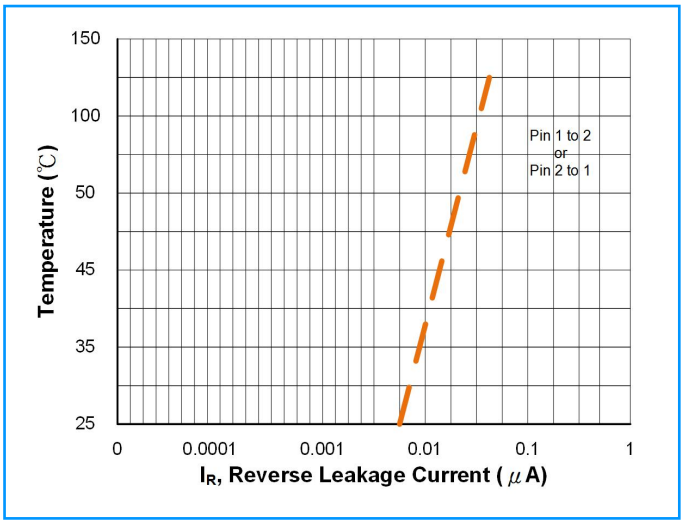


Fig5. Clamping Voltage vs. Peak Pulse Current (TLP)

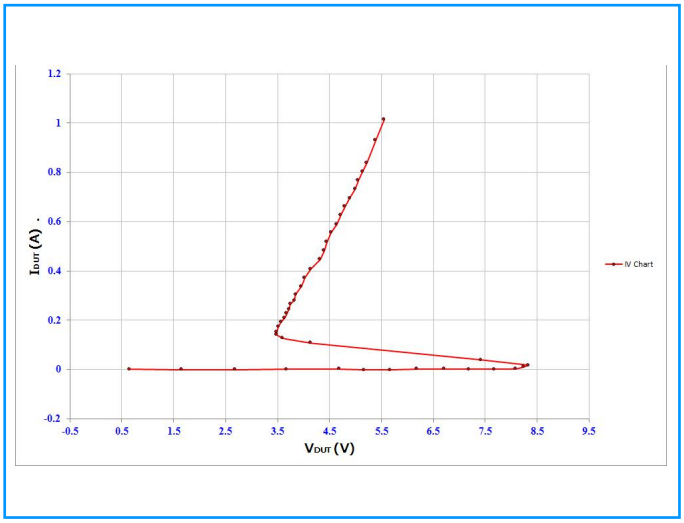
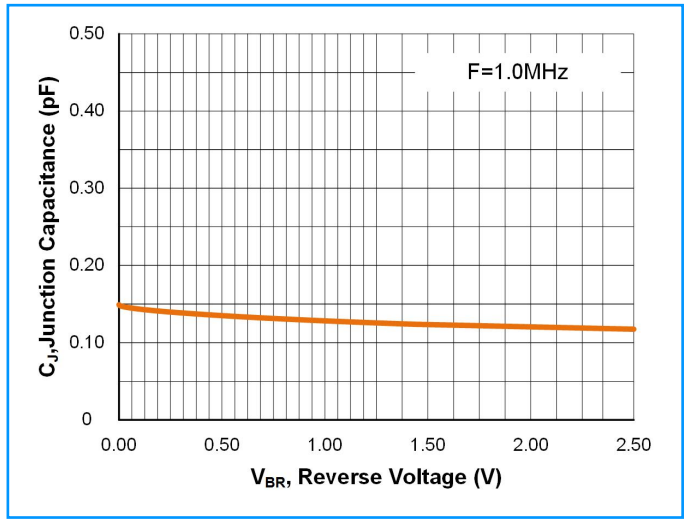


Fig6. Typic Capacitance vs. Reverse Voltage



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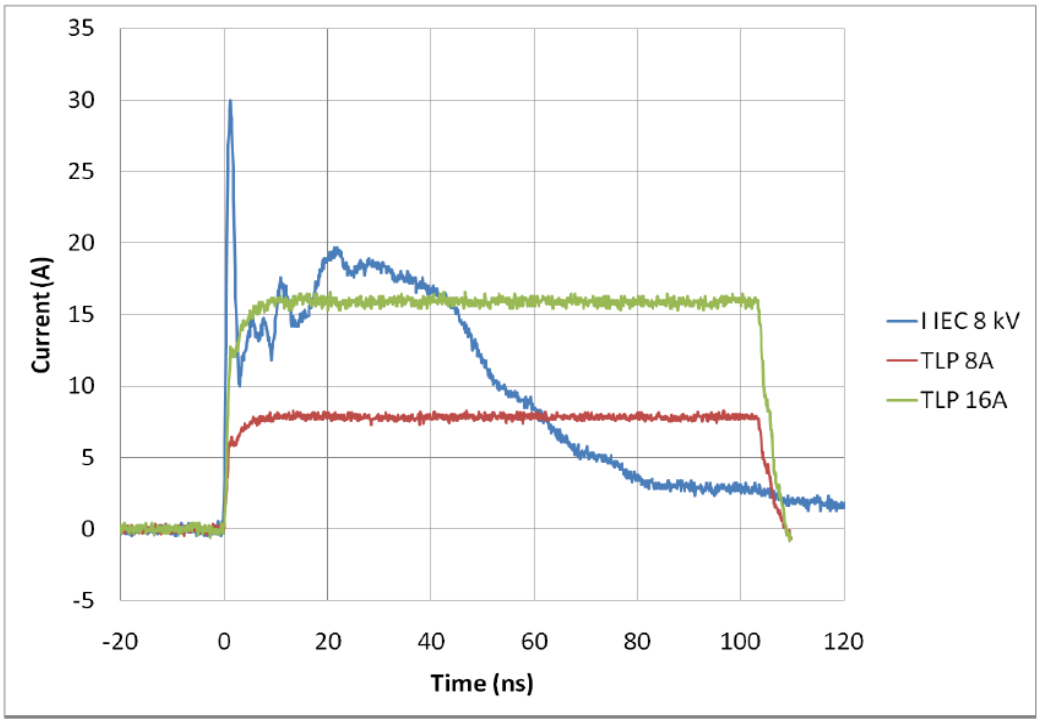
Transmission Line Pulse (TLP)

Transmission Line Pulse (TLP) is a measurement technique used in the Electrostatic Discharge (ESD) arena to characterize performance attributes of devices under ESD stresses. TLP is able to obtain current versus voltage (I−V) curves in which each data point is obtained with a 100 ns long pulse, with currents up to 40 A. TLP was first used in the ESD field to study human body model (HBM) in integrated circuits, but it is an equally valid tool in the field of system level ESD. The applicability of TLP to system level ESD is illustrated in Figure 1, which compares an 8 kV IEC 61000−4−2 current waveform with TLP current pulses of 8 and 16 A. The current levels and time duration for the pulses are similar and the initial rise time for the TLP pulse is comparable to the rise time of the IEC 61000−4−2's initial current spike. This application note will give a basic introduction to TLP measurements and explain the datasheet parameters extracted from TLP for SDI Technology's protection products.



Comparison Between 8 kV IEC 61000−4−2 and 8 A and 16 A TLP Waveforms

Comparison of a CurrentWaveform of IEC 61000−4−2with TLP Pulses at 8 and 16 A.
The IEC 61000−4−2 ESD waveforms is true to the Standard and is shown here as captured on an oscilloscope.
The points A, B, and C show the points on the aveforms specified in IEC 61000−4−2.
Transmission Line Pulse (TLP) Version.

Typic Characteristics

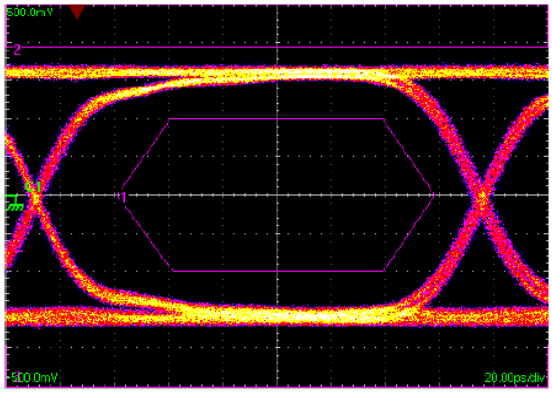


Fig7. @HDMI 2.0 mask at 5.94 Gbps per channel (Without Component)

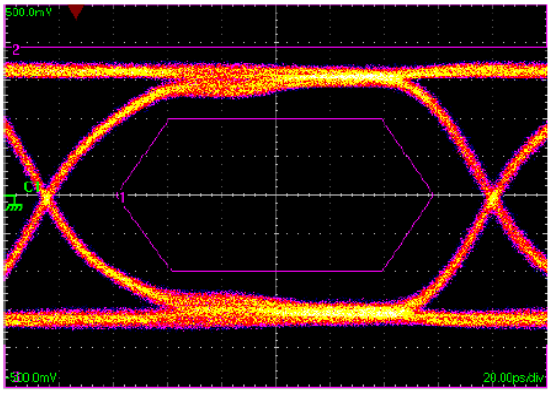


Fig8. @HDMI 2.0 mask at 5.94 Gbps per channel (With Component)

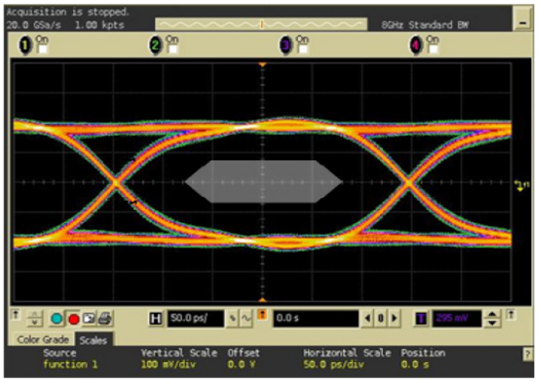


Fig9. @USB 3.0 mask at 5.0 Gbps per channel (Without Component)

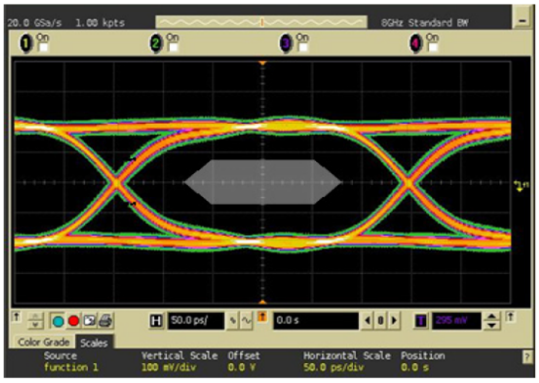


Fig10. @USB 3.0 mask at 5.0 Gbps per channel (With Component)

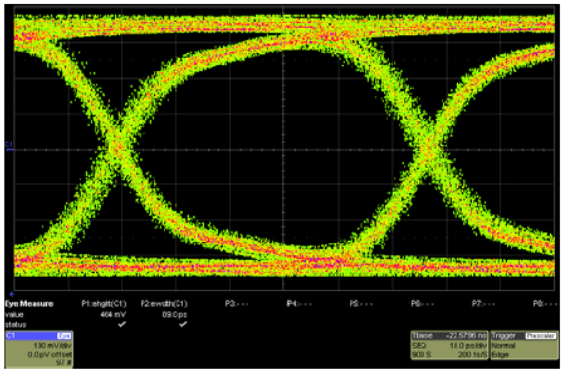


Fig11. @USB 3.1 mask at 10.0 Gbps per channel (Without Component)

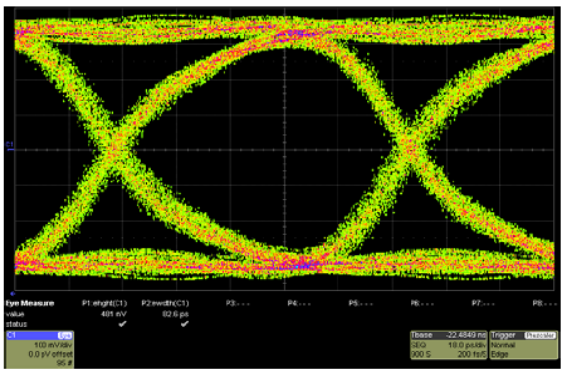


Fig12. @USB 3.1 mask at 10.0 Gbps per channel (With Component)

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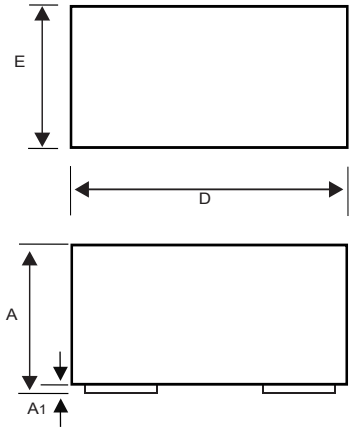
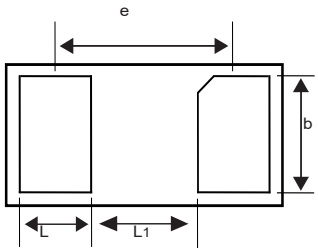
0201/DFN0603 Package Outline & Dimensions

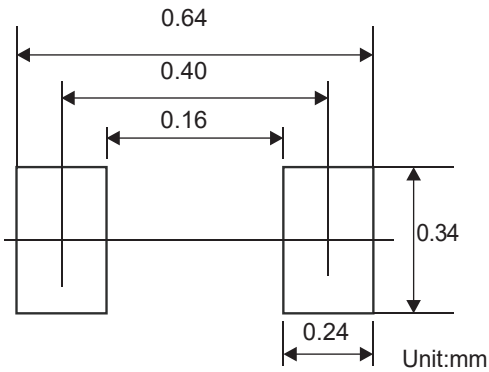
0201/DFN0603





Symbol	Millimeters		
	Min	Nom	Max
A	0.270	0.300	0.340
A1	0	0.020	0.050
D	0.550	0.600	0.650
E	0.250	0.300	0.350
e		0.340REF	
L	0.140	0.180	0.240
b	0.200	0.250	0.300
L1		0.150REF	

Suggested PAD Layout



Ordering Information

Device	Marking	Package	Quantity	Reel Size
ESD3.3V02D-SLC	3V	0201/DFN0603	12,000pcs/Reel	7 inch