Transient Voltage Suppressors Array for ESD Protection

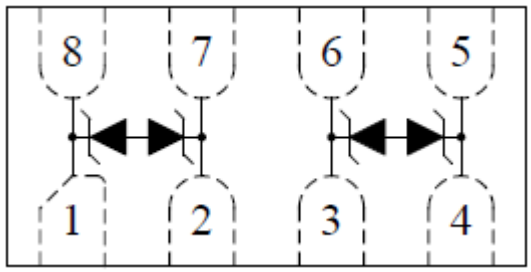
Low Capacitance

SE02NJD02HA

Description

SE02NJD02HA is a low-capacitance Transient Voltage Suppressor (TVS) array designed to provide electrostatic discharge (ESD) protection for high-speed data interfaces. With maxinum capacitance of 0.8pF only, SE02NJD02HA is designed to protect parasitic-sensitive systems against over-voltage and over-current transient events. It complies with IEC61000-4-2 (ESD), Level 4 (±15kV air, ±8kV contact discharge), IEC 61000-4-4 (electrical fast transient - EFT) (40A, 5/50 ns), IEC 61000-4-5 (Surge) (20 A, 8/20μs), very fast charged device model (CDM) ESD and cable discharge event (CDE), etc.

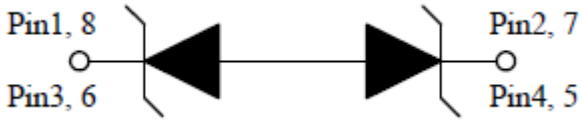
DFN2010-8L



Features

- Transient protection for high-speed data lines
  - IEC 61000-4-2 (ESD) ±30kV (Air)
  - ±30kV (Contact)
  - IEC 61000-4-4 (EFT) 40A (5/50 ns)
  - IEC 61000-4-5 (Surge) 20A (8/20 s)
- Package optimized for high-speed lines
- Provides protection for two line pairs
- Low capacitance: 0.8pF @ 2.5V (Typ.)
- Low leakage current: 0.01μA @ V_{RWM} (Typ.)
- Low operating and clamping voltage
- Each I/O pin can withstand over 1000 ESD strikes for ±8kV contact discharge

Circuit Configuration



Applications

- 10G Base-T Ethernet Ports
- 10/100/1000M Ethernet Ports
- WAN/LAN Equipment
- Desktops,Servers and Notebooks
- Cellular Phones
- Switching Systems
- Audio/Video Inputs

Mechanical Characteristics

- DFN2010-8L package
- Flammability Rating: UL 94V-0
- Packaging: Tape and Reel
- RoHS compliant

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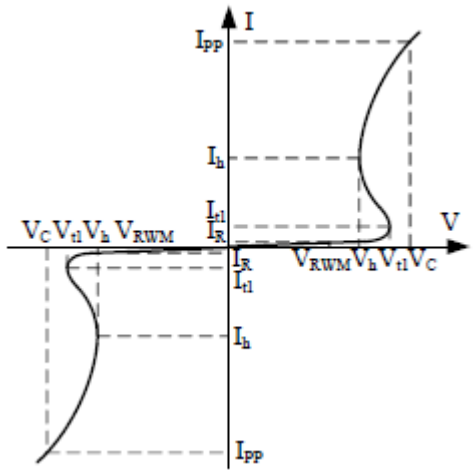
Absolute Maximum Rating

Symbol	Parameter	Value	Unit
I_{PP}	**Peak Pulse Current (8/20μs)**	10	A
T_{OPT}	**Operating Temperature Range**	-45 to +85	℃
T_{STG}	**Storage Temperature Range**	-55 to +150	℃
V_{ESD}	**ESD per IEC61000-4-2 (Air)** **ESD per IEC61000-4-2 (Contact)**	±30 ±30	KV

Electrical Parameters (T_A = 25℃)

Symbol	Parameter
V_{RWM}	Nominal Reverse Working Voltage
I_R	Reverse Leakage Current @ V_{RWM}
V_{t1}	Trigger Voltage
I_{t1}	Trigger Current @ V_{t1}
V_h	Holding Voltage
I_h	Holding Current @ V_h
V_C	Clamping Voltage @ I_{PP}
I_{PP}	Maximum Peak Pulse Current
C_{ESD}	Parasitic Capacitance
C_Δ	Variation in C_{ESD} with Reverse Bias

Bi-Directional TVS



Electrical Characteristics (T_A = 25℃ unless otherwisenoted)

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
V_{RWM}	Nominal Reverse Working Voltage	--	--	--	2.8	V
I_R	Reverse Leakage Current	V_{RWM} = 2.8V, T = 25℃	--	0.01	0.05	μA
V_{BR}	Reverse Breakdown Voltage	I_T = 1mA	3.3	--	--	V
V_C	Clamping Voltage	I_{PP} = 2A, t_P = 8/20μs (Each Line)	--	--	6.0	V
		I_{PP} = 10A, t_P = 8/20μs (Each Line)	--	--	11.5	V
C_{ESD}	Parasitic Capacitance	V_R = 2.5V, f = 1MHz (Each Line)	--	0.8	--	pF

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Characteristic Curves

Fig1. 8/20μs Pulse Waveform

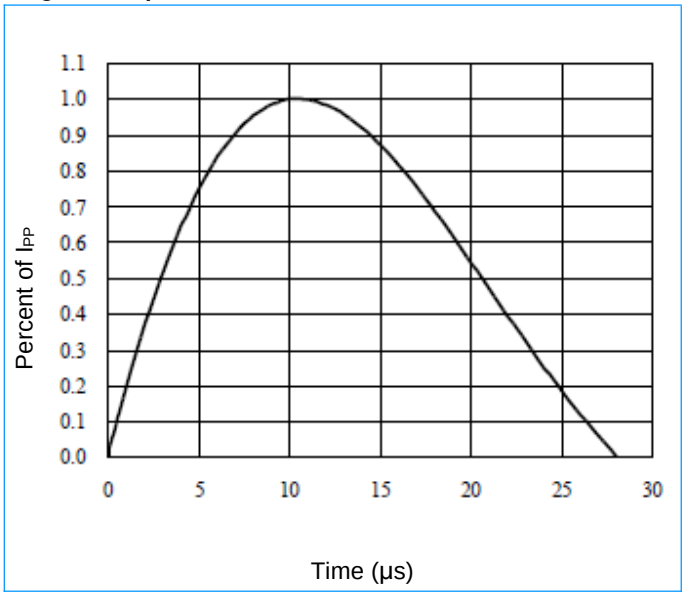


Fig2. Clamping Voltage V_C vs. Current I_{PP}

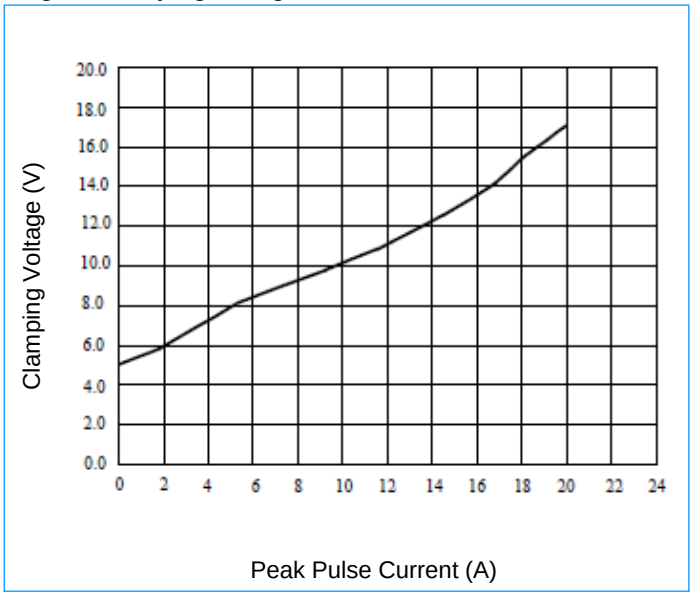


Fig3. Insertion Loss S21

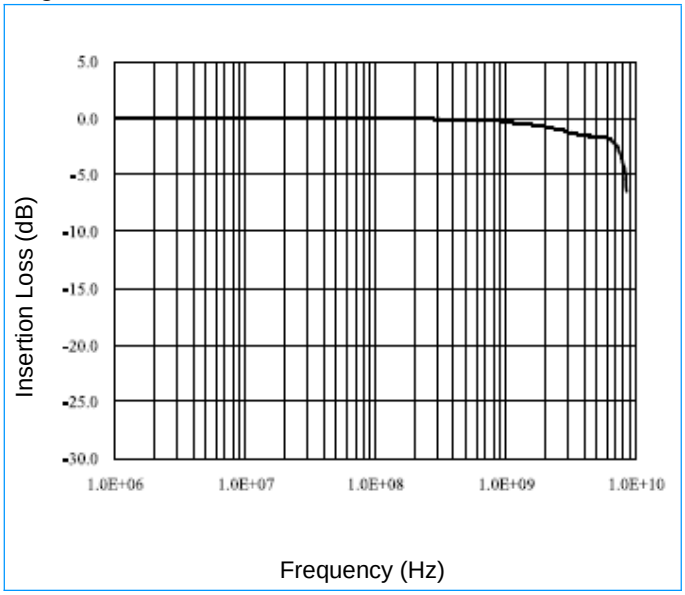
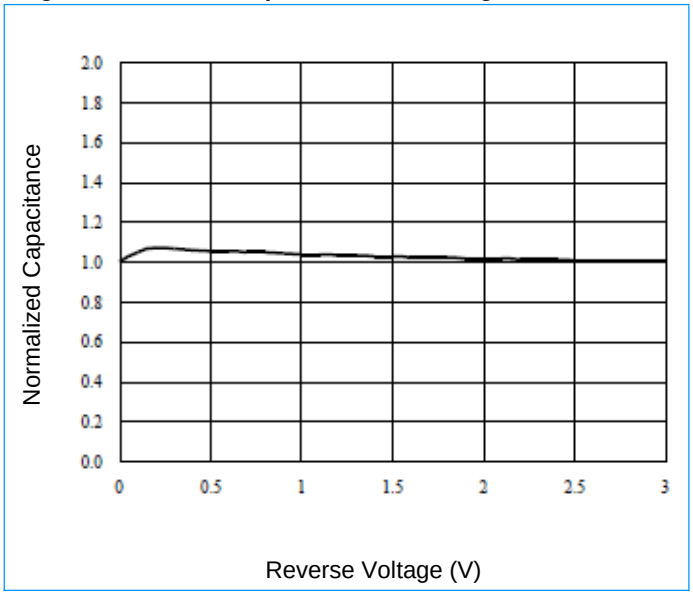


Fig4. Normalized Capacitance vs. Voltage



Characteristic Curves (Continue)

Fig5. ESD Clamping of I/O to GND (+8kV Contact per IEC 61000-4-2)

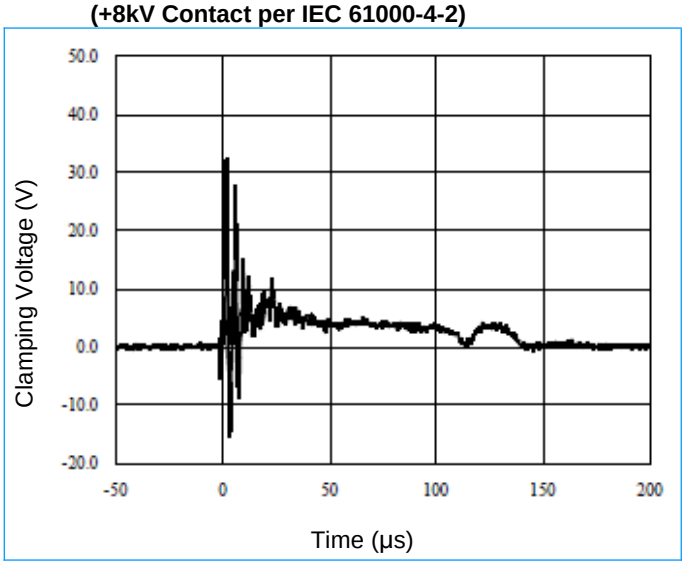
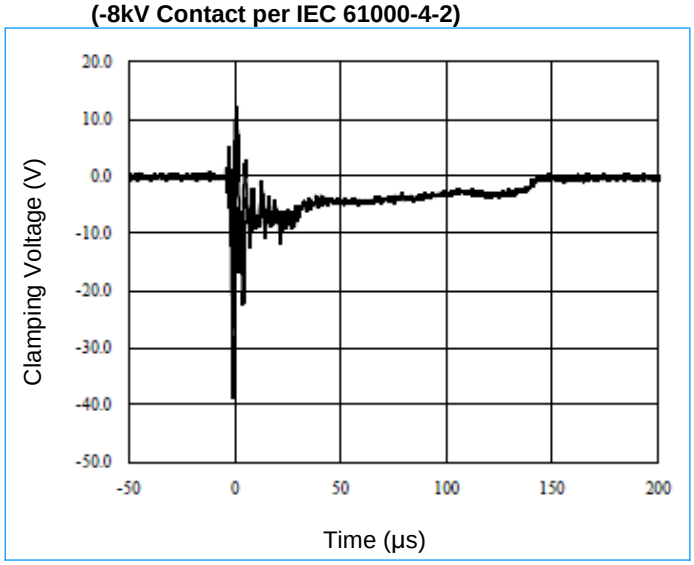
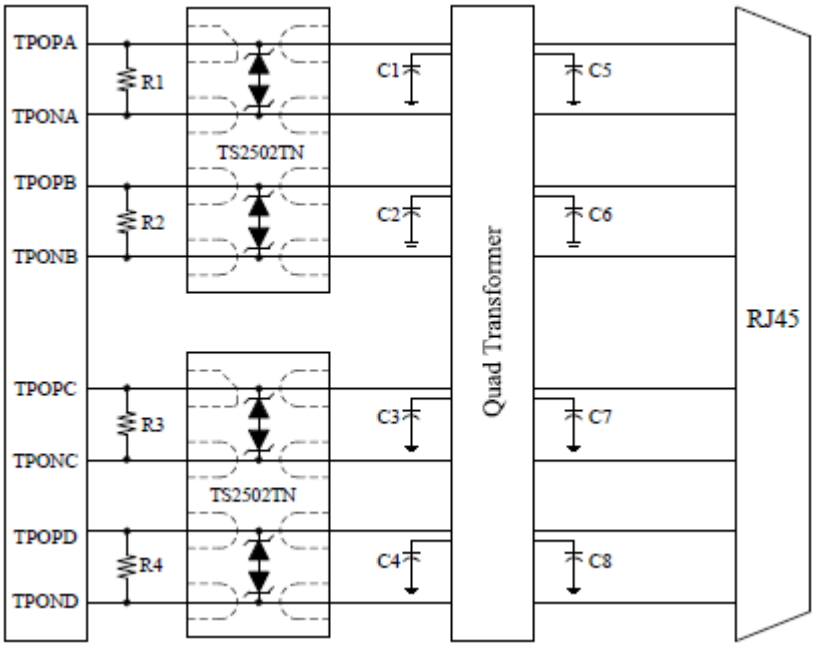


Fig6. ESD Clamping of I/O to GND (-8kV Contact per IEC 61000-4-2)



Application Information

Electronic equipment is susceptible to damage caused by a variety of sources, including Electrostatic Discharge (ESD), Electrical Fast Transients (EFT) and lightning strikes. SE02NJD02HA was designed to protect the sensitive equipment from damage which may be induced by such transient events. This product can be configured in a connection to meet the requirement of differential line pairs as follows:



Schematic Diagram for Gigabit Ethernet ESD/Surge Protection

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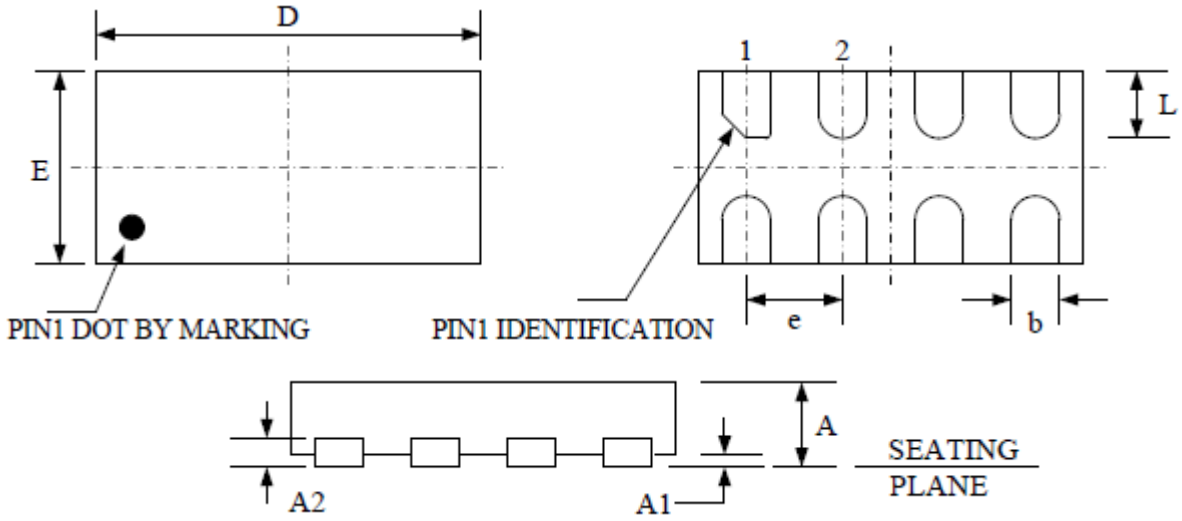
DFN2010-8L Package Outline

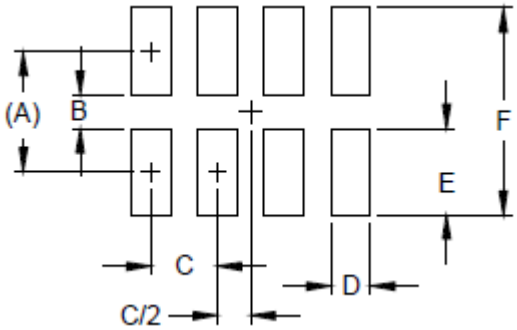
- **u** DFN2010-8L Package
- **u** Flow-Through
- **u** MSL 1 & Thermally-Enhanced



Symbol	Millimeters			Inches		
	Min.	Typ.	Max.	Min.	Typ.	Max.
A	0.370	0.400	0.430	0.015	0.016	0.017
A1	0.000	0.020	0.050	0.000	0.001	0.002
A2		0.130			0.005	
b	0.200	0.250	0.300	0.008	0.010	0.012
D	1.900	2.000	2.100	0.075	0.079	0.083
E	0.900	1.000	1.100	0.035	0.039	0.043
e		0.500 BSC			0.020 BSC	
L	0.300	0.350	0.400	0.012	0.014	0.016
R	0.050	0.100	0.150	0.002	0.004	0.006

SE02NJD02HA

DFN2010-8L Footprint



Symbol	Millimeters
A	(0.90)
B	0.25
C	0.50
D	0.30
E	0.65
F	1.55

Notes:

(1) Controlling dimensions are in millimeters.

(2) This land pattern is for reference purpose only.

Ordering Information

Part Number	Quantity Per Reel	Reel Size
SE02NJD02HA	3000 PCS	7 inch