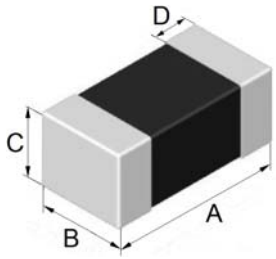
SMD Transient Voltage Suppressors

TVS0402N-Series

1. Dimension



Series	A(mm)	B(mm)	C(mm)	D(mm)
0402	1.00±0.05	0.60±0.05	0.50±0.05	0.20±0.05

2. Part Numbering

TVS	0402	N	050	-	0A8	A
A	B	C	D		E	F

A: Series
B: Dimension
C: TVS Network Device
D: Reverse Working Voltage 050=5V
E: Parasitic Capacitance 0A8=0.8pF
F: Inner Code

3. Features

1. Transient protection for high-speed data lines.
   IEC61000-4-2 (ESD) ±30KV (air)
   ±30KV (contact)
   IEC61000-4-4 (EFT) 20A (5/50ns)
   Cable discharge event (CDE).
2. Package optimized for high-speed lines.
3. Ultra-small package
4. Protects one data, controller or power line.
5. Low leakage current : 1nA @V_{RWM} (typical)
6. Low clamping voltage.
7. Each I/O pin can withstand over 1000 ESD strikes for ±8KV contact discharge.

4. Applications

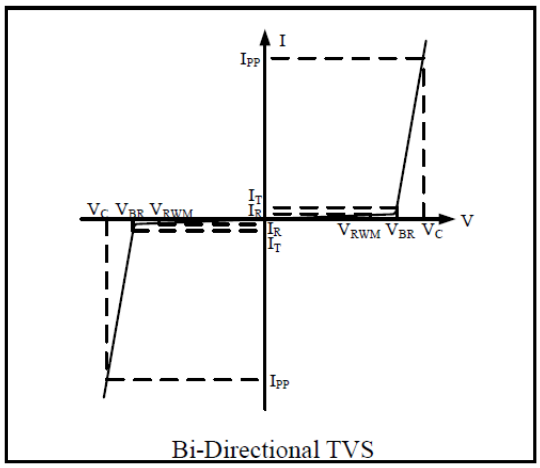
1. USB3.0
2. HDMI1.3 and HDMI1.4
3. Cellular phones
4. DVI
5. Notebook
6. PCI express

5. Absolute Maximum Ratings(Ta=25℃)

ITEM	Symbol	Unit	TVS0402N050-0R8A	TVS0402N050-1R5A
Peak pulse power (tp=8/20μs)	P_{PK}	W	100	300
Peak pulse current (tp=8/20μs)	I_{PP}	A	7	15
ESD per IEC61000-4-2 (air)	V_{ESD}	KV	±30	±30
ESD per IEC61000-4-2 (contact)	V_{ESD}	KV	±30	±30
Operating temperature range	T_{OPT}	℃	-55~125	-55~125
Storage temperature range	T_{STG}	℃	-55~150	-55~150

6. Electrical Characteristics(Ta=25℃)

Symbol	Parameter
V_{RWM}	Nominal Reverse Working Voltage
I_R	Reverse Leakage Current @ V_{RWM}
V_{BR}	Reverse Breakdown Voltage @ I_T
I_T	Test Current for Reverse Breakdown
V_C	Clamping Voltage @ I_{PP}
I_{PP}	Maximum Peak Pulse Current
C_{ESD}	Parasitic Capacitance
V_R	Reverse Voltage
f	Small Signal Frequency



Bi-Directional TVS

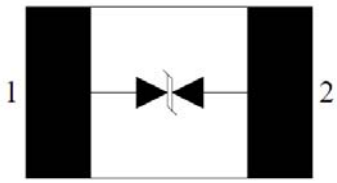
ITEM	Symbol	Unit	TVS0402N050-0R8A	TVS0402N050-1R5A
Working peak reverse voltage	V_{RWM}	V	5	5
Maximum reverse leakage (@V_{RWM}, 25℃) (between I/O_1 and I/O_2)	I_R	μA	Typ. 0.001 (Max. 0.1)	Typ. 0.001 (Max. 0.1)
Breakdown voltage (@I_T=1mA) (between I/O_1 and I/O_2)	V_{BR}	V	Typ. 8.0 (Min. 5.8)	Typ. 8.0 (Min. 5.8)
Clamping voltage (@I_{PP}=16A, t_p=100ns, TLP)	V_{CL}	V	Max. 13	Max. 12
Clamping voltage (@V_{ESD}=8KV)	V_{CL}	V	Max. 13	Max. 12
Maximum clamping voltage (@I_{PP}=1A, t_p=8/20μs) (between I/O_1 and I/O_2)	V_C	V	Max. 9	Max. 9
Maximum clamping voltage (@t_p=8/20μs) (between I/O_1 and I/O_2)	V_C	V	Max. 15	Max. 20 (@I_{PP}=15A)
Parasitic capacitance (@V_R=0V, f=1MHz) (between I/O_1 and I/O_2)	C_{ESD}	pF	Typ. 0.8 Max. 1.1	Typ. 1.35 Max. 1.6

7. Mechanical Characteristics

1. Case : 0402
2. Flammability rating : UL 94V-0
3. Packaging : tape and reel
4. Polarity : bidirectional

Circuit Diagram

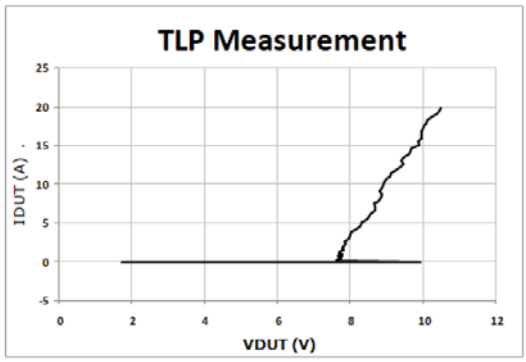
Pin Configuration

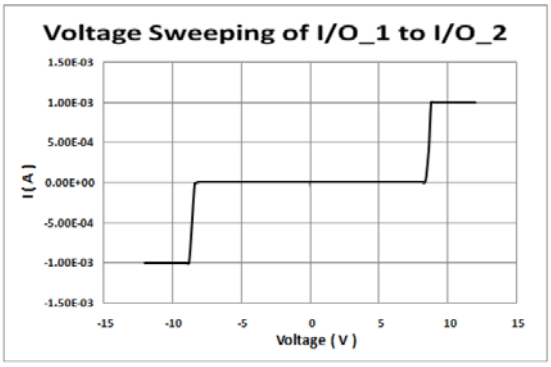


(TOP View)

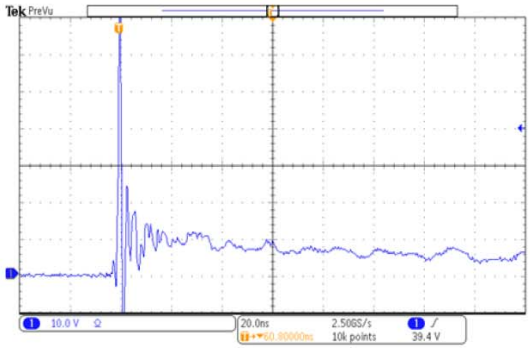
8. Rating and Characteristic Curves

TVS0402N050-0R8A

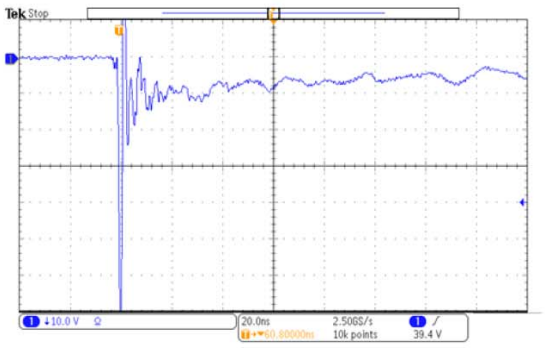


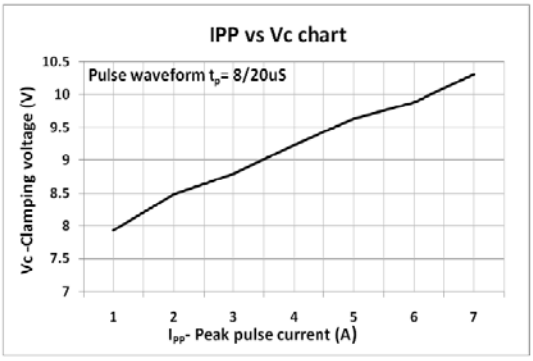


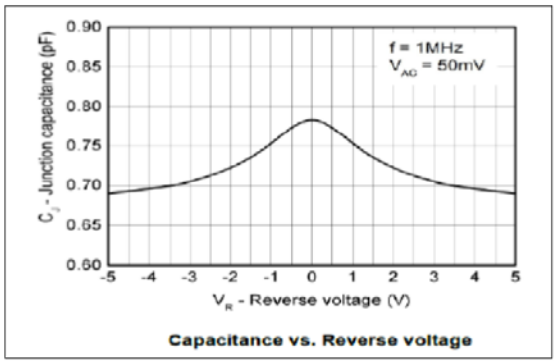
ESD Clamping of I/O_1 to I/O_2 (+8kV Contact per IEC 61000-4-2)

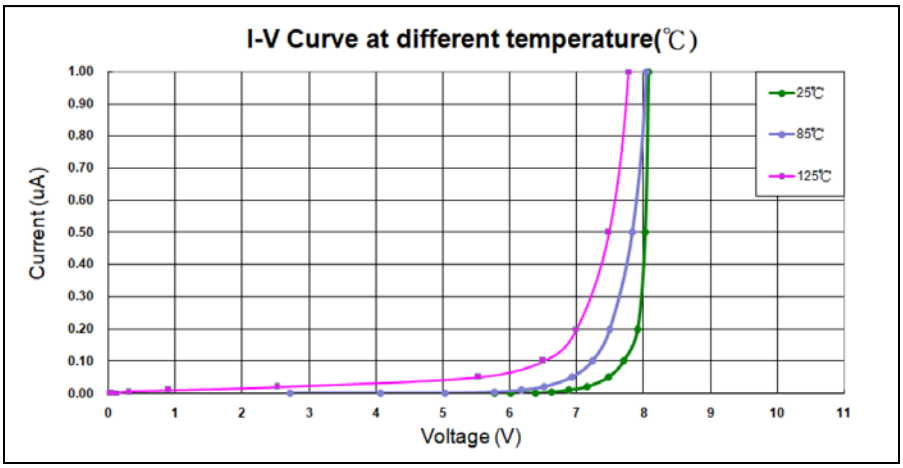


ESD Clamping of I/O_1 to I/O_2 (-8kV Contact per IEC 61000-4-2)

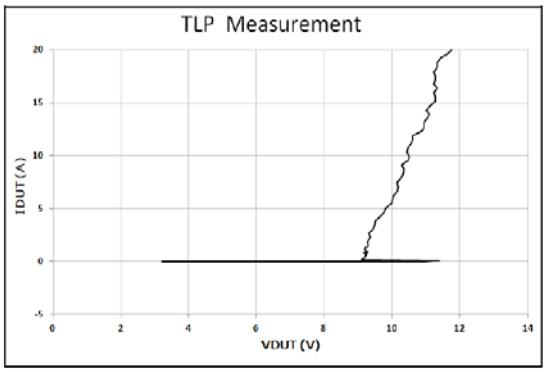


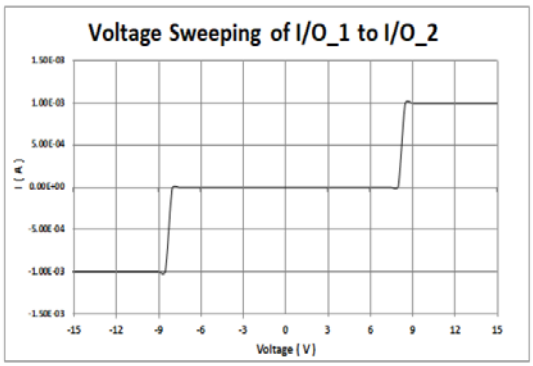




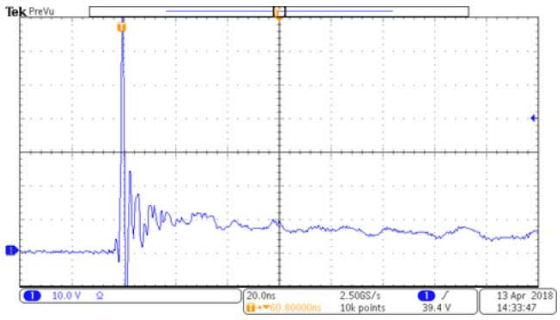


TVS0402N050-1R5A

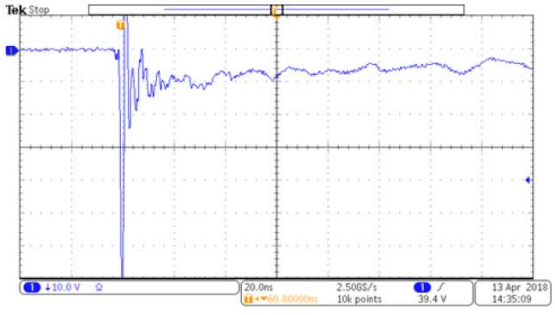


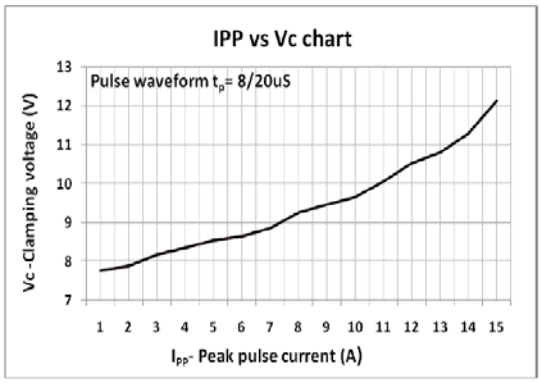


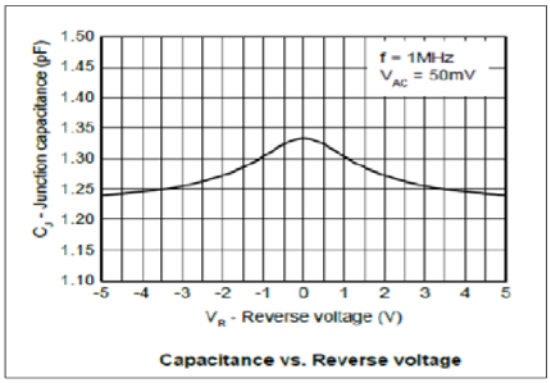
ESD Clamping of I/O_1 to I/O_2 (+8kV Contact per IEC 61000-4-2)

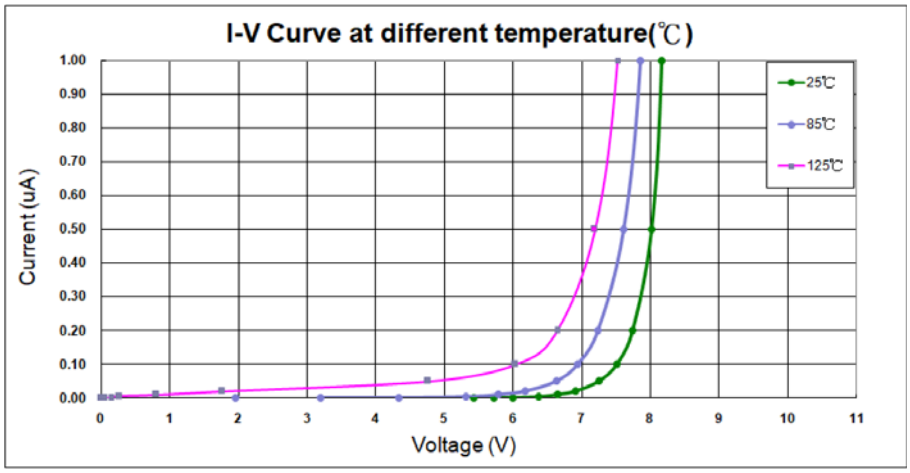


ESD Clamping of I/O_1 to I/O_2 (-8kV Contact per IEC 61000-4-2)




IPP vs Vc chart
Pulse waveform t_p= 8/20uS
Vc - Clamping voltage (V)
I_{PP} - Peak pulse current (A)


f = 1MHz
V_{AC} = 50mV
C_J - Junction capacitance (pF)
V_R - Reverse voltage (V)
Capacitance vs. Reverse voltage


I-V Curve at different temperature(℃)
Current (uA)
Voltage (V)
25℃
85℃
125℃