

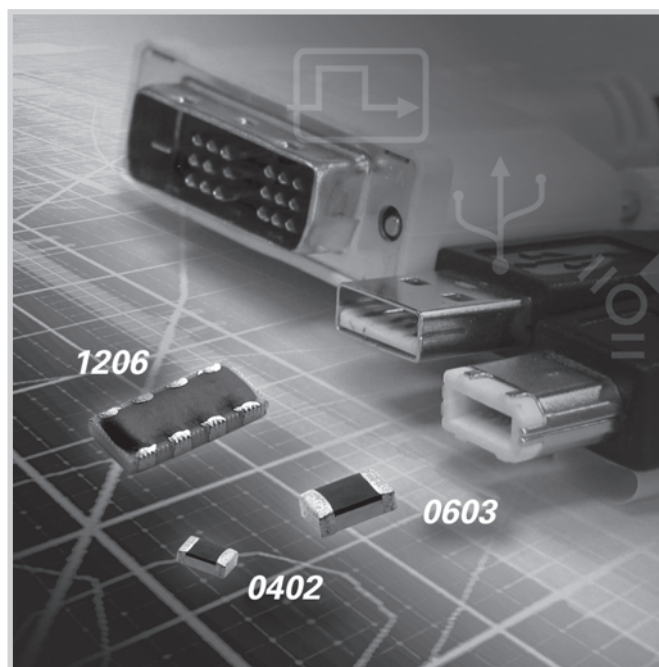


PESD Protection Devices

TE's Polymer ESD (PESD) line of devices helps protect I/O ports on HDMI 1.3, portable video players, LCD and plasma TVs, USB 2.0, digital visual interface (DVI) and antenna switches. PESD devices shunt electrostatic discharge away from sensitive circuitry in HDTV equipment, printers, laptops, cellular phones and other portable devices.

PESD devices offer many advantages over traditional protection devices, such as multi layer varistors (MLVs), which may degrade or distort the signal in high data rate circuits. Compared to transient voltage suppression (TVS) diodes and miniature gas discharge tubes (GDTs), PESD devices provide a more compact form factor and an economical solution for the shrinking profiles of today's compact information appliances.

Available in a range of form factors, our PESD protection devices provide low capacitance and meet transmission line pulse (TLP) testing, as well as IEC61000-4-2 testing.



Benefits

- ESD protection for high-frequency applications (HDMI 1.3)
- Smaller form factor for board space savings
- Helps protect sensitive electronic circuits against damage caused by electrostatic discharge (ESD) events
- Assists equipment to pass IEC 61000-4-2, level 4 testing

Features

- RoHS compliant
- Lead free
- Halogen free
(refers to: $Br \leq 900\text{ppm}$, $Cl \leq 900\text{ppm}$, $Br+Cl \leq 1500\text{ppm}$)
- 0.25 pF (typ) capacitance
- Low-leakage current
- Low-clamping voltage
- Fast response time ($< 1\text{ns}$)
- Capable of withstanding numerous ESD strikes
- Compatible with standard reflow installation procedures
- Thick film technology
- Bi-directional protection

Applications

- HDMI 1.3 interfaces
- LCD and plasma TVs
- Cellular phones
- Antennas
- Portable video players
- Portable devices (PDA, DSC, BlueTooth)
- Printer ports
- Satellite radios
- USB 2.0 and IEEE 1394 interfaces
- DVI
- GPS systems

Table E1 Electrical Characteristics for PESD Devices

	Continuous Max Operating Voltage	Typ Trigger Voltage*	Typ Clamping Voltage†	Typ Capacitance @1 MHz, 1V _{RMS}	Typ Leakage Current	Max Leakage Current @ Max V _{DC}
Symbol	V _{DC}	V _{T(TLP)}	V _{C(TLP)}	C _P	I _{L(TYP)}	I _{L(MAX)}
Unit	V	V	V	pF	μA	μA
PESD0402-140	14	250	40	0.25	< 0.01	10.0
PESD0603-240	24	215	45	0.25	< 0.01	10.0
PESD1206Q-240	24	250	45	0.25	< 0.01	10.0

Notes : * TLP test method at 1kV.
 † Measured 30ns after pulse initiation.
 Typical capacitance value is at 0V and max operating voltage bias.

Figure E1 Capacitance vs. Frequency for PESD Devices

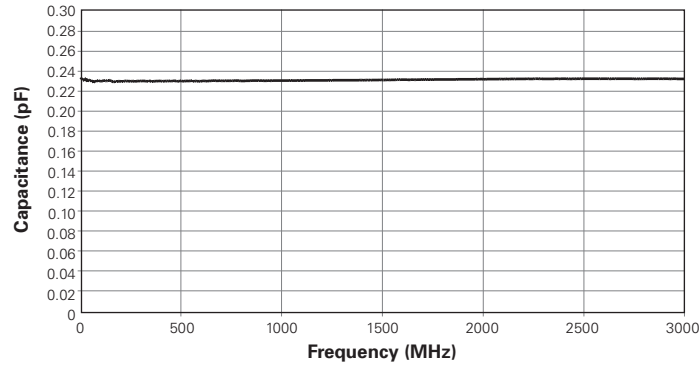


Figure E2 Eye Diagram Performance at 3.4 GHz for PESD Devices

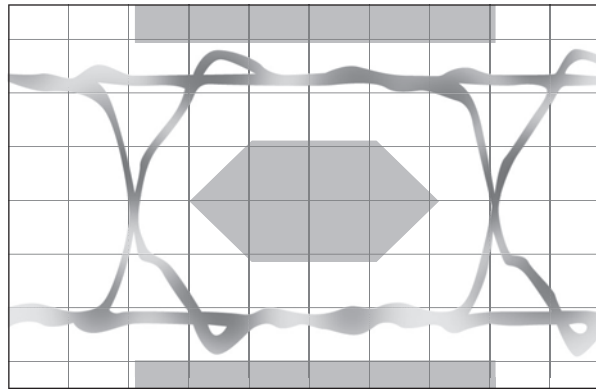
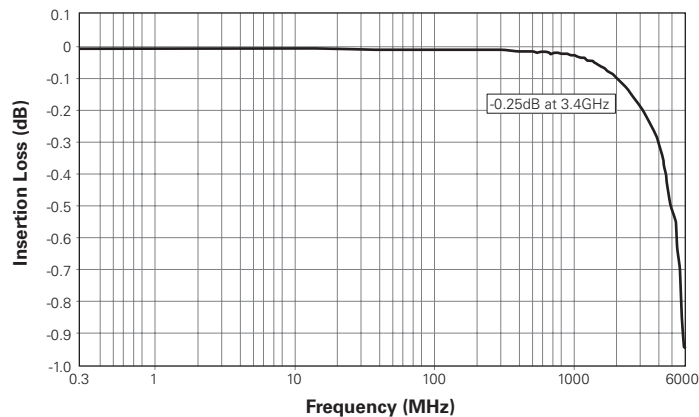
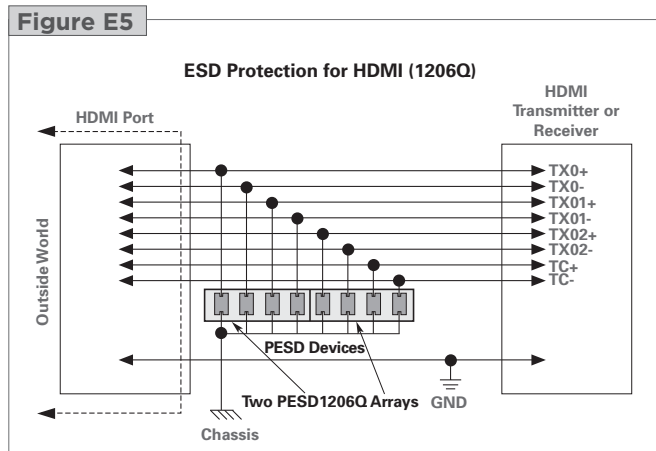
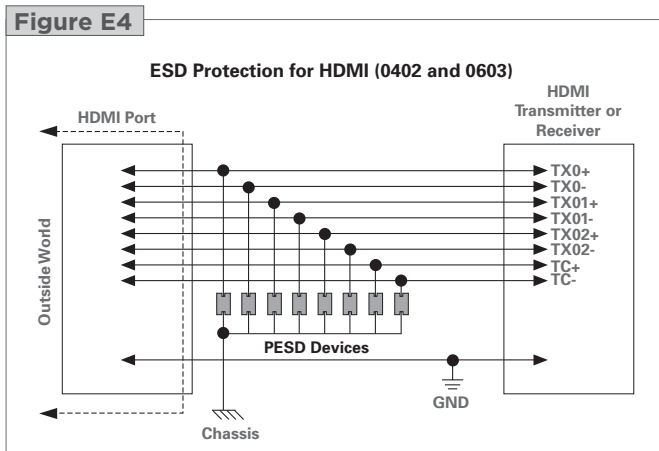


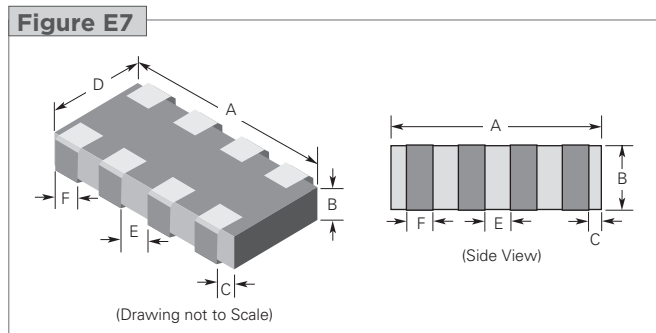
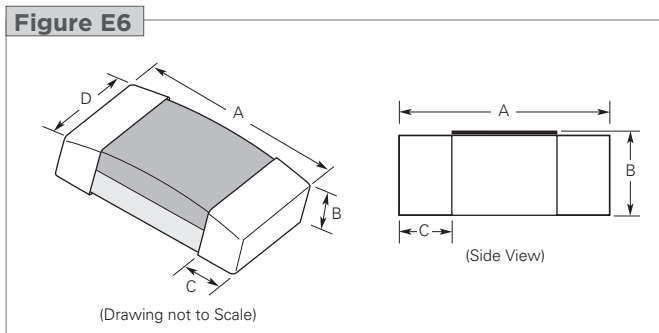
Figure E3 Insertion Loss Diagram for PESD Devices



Figures E4-E5 PESD Device Protection for HDMI (PESD devices provide electrostatic discharge protection)

Table E2 Dimensions for PESD Devices in Millimeters and (Inches*)

Part Number	A		B		C		D		E		F		Figure
	Min	Max	Min	Max	Min	Max	Min	Max	Min	Max	Min	Max	
PESD0402-140	0.90 (0.035)	1.10 (0.043)	0.23 (0.009)	0.43 (0.017)	0.10 (0.004)	0.30 (0.012)	0.40 (0.016)	0.60 (0.024)	—	—	—	—	E6
PESD0603-240	1.50 (0.059)	1.70 (0.067)	0.45 (0.018)	0.55 (0.022)	0.10 (0.004)	0.50 (0.020)	0.70 (0.028)	0.95 (0.037)	—	—	—	—	E6
PESD1206Q-240	3.10 (0.122)	3.30 (0.130)	0.40 (0.016)	0.60 (0.024)	0.10 (0.004)	0.30 (0.012)	1.50 (0.059)	1.70 (0.067)	0.20 (0.008)	0.60 (0.024)	0.20 (0.008)	0.60 (0.024)	E7

*The dimensions in inches are rounded approximations.


Table E3 Environmental Specifications for PESD Devices

	Test Conditions	Pass / Fail Criteria
Bias Humidity Test	85°C, 85% RH, $V_{DC(max)}$, 1000 hrs	$I_L \leq 10 \mu A$
Thermal Shock	-55°C to 125°C, 30 min Dwell, 1000 Cycles	$I_L \leq 10 \mu A$
Bias Heat Test	125°C, $V_{DC(max)}$, 1000 hrs	$I_L \leq 10 \mu A$
Bias Low Temp Test	-55°C, $V_{DC(max)}$, 1000 hrs	$I_L \leq 10 \mu A$
Solderability	250°C ± 5°C, 3 ± 1s	95% Coverage
Solder Heat	260°C, 10s	90% Coverage
Vibration	10 to 50Hz, 60s Cycle, 2 hrs Each in X-Y-Z-Direction	No Physical Damage
Solvent Resistance	IPA Ultrasonic 300s	No Physical Damage
Shock	1500G, 0.5ms Each, X-Y-Z Axis 3 Times Each Axis	No Physical Damage

Table E4 General Characteristics for PESD Devices

Storage Temperature	-40°C to +85°C
Operating Temperature	-55°C to +125°C
ESD Voltage Capability (Tested per IEC 61000-4-2)	Contact Discharge Mode: 8kV (Typ), 15kV (max) Air Discharge Mode : 15kV (Typ), 25kV (max) [1 Pulse: per Customer Request]
ESD Pulse Withstand	100 Pulses (Tested per IEC 61000-4-2, Level 4, Contact Method)

Table E5 Materials Information for PESD Devices

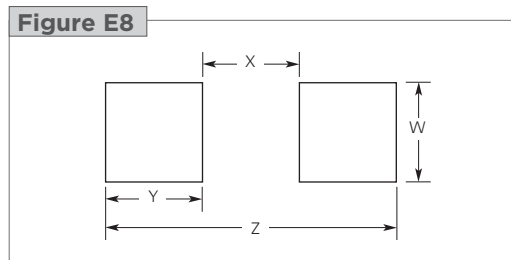
RoHS Compliant	Directive 2002/95/EC Compliant
RoHS 2.0	Directive 2011/65/EU Compliant
ELV Compliant	Directive 2000/53/EC Compliant
Halogen Free	Halogen Free Refers to: Br≤900ppm, Cl≤900ppm, Br+Cl≤1500ppm

Table E6 Recommended Pad Layout for PESD Devices in Millimeters and (Inches*)

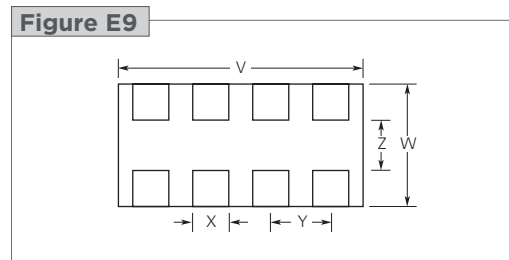
Part Number	V		W		X		Y		Z		Figure
	Min	Max	Min	Max	Min	Max	Min	Max	Min	Max	
PESD0402-140	—	—	0.60 (0.024)	0.70 (0.028)	0.30 (0.012)	0.40 (0.016)	0.80 (0.031)	0.90 (0.035)	2.10 (0.083)	2.20 (0.087)	E8
PESD0603-240	—	—	0.90 (0.035)	1.00 (0.039)	0.50 (0.020)	0.60 (0.024)	1.00 (0.039)	1.10 (0.043)	2.70 (0.106)	2.80 (0.110)	E8

Part Number	V Typ	W Typ	X Typ	Y Typ	Z Typ	Figure
PESD1206Q-240	3.20 (0.126)	2.20 (0.087)	0.50 (0.020)	0.80 (0.031)	1.00 (0.039)	E9

*The dimensions in inches are rounded approximations.



Note: Solder thickness 0.15 to 0.2mm.


Table E7 Solder Reflow Recommendations for PESD Devices

A	Temperature Ramp-up 1	From Ambient to Preheating Temperature	30s to 60s
B	Preheating	140°C - 160°C	60s to 120s
C	Temperature Ramp-up 2	From Preheating to Main Heating Temperature	20s to 40s
D	Main Heating	at 200°C at 220°C at 240°C at 260°C	60s to 70s 50s to 60s 30s to 40s 5s to 10s
E	Cooling	From Main Heating Temperature to 100°C	4°C/s max

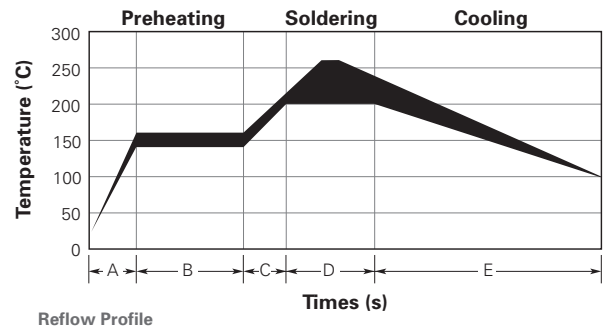
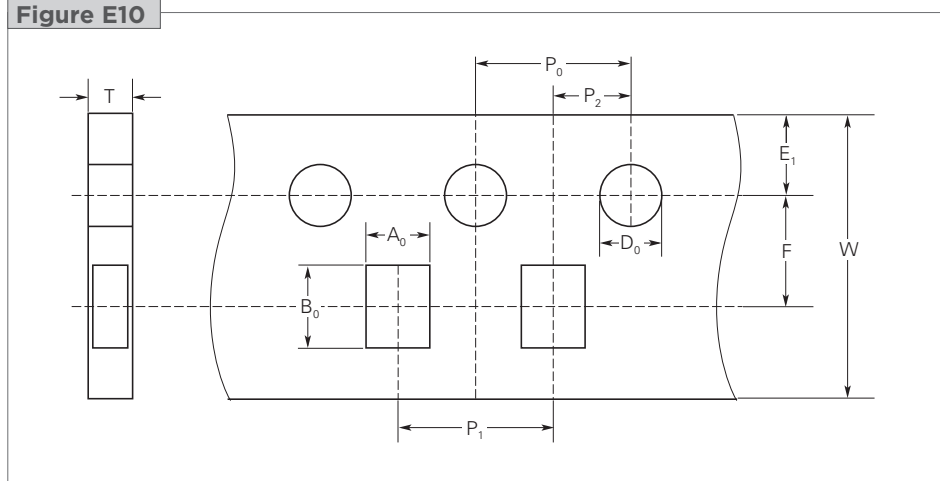
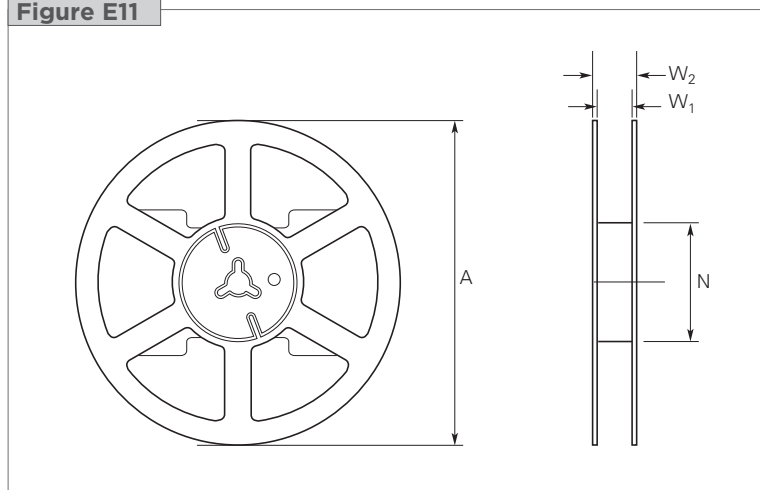


Table E8 Tape Specifications for PESD Devices

Tape Dimension EIA Mark	0402		0603		1206Q	
	Dimension (mm)	Tolerance	Dimension (mm)	Tolerance	Dimension (mm)	Tolerance
W	8.00	±0.30	8.00	±0.30	8.00	±0.30
P ₀	4.00	±0.10	4.00	±0.10	4.00	±0.10
P ₁	2.00	±0.05	4.00	±0.05	4.00	±0.05
P ₂	2.00	±0.05	2.00	±0.05	2.00	±0.05
A ₀	0.69	±0.05	1.27	±0.15	2.02	±0.20
B ₀	1.19	±0.05	2.02	±0.20	3.62	±0.20
D ₀	1.50	±0.10	1.50	±0.10	1.50	±0.10
F	3.50	±0.05	3.50	±0.05	3.50	±0.05
E ₁	1.75	±0.10	1.75	±0.10	1.75	±0.10
T	0.48	±0.03	0.60	±0.03	0.75	±0.03

Figure E10

Table E9 Reel Specifications for PESD Devices
Reel Dimensions (0402, 0603 & 1206Q)

EIA Mark	Dimension (mm)
A max	180.0
N min	60.5
W ₁ max	9.5
W ₂ max	14.0

Figure E11


Parameter Definitions for PESD Devices

Operation Voltage (V_{DC})

Defined as DC voltage, under which device is in OFF state and leakage current below certain threshold.

Leakage Current (I_L)

Current through device under Operation Voltage V_{DC} .

Trigger Voltage (V_T)

Voltage at which the device switches from the OFF to the ON state, during the IEC waveform or the TLP system.

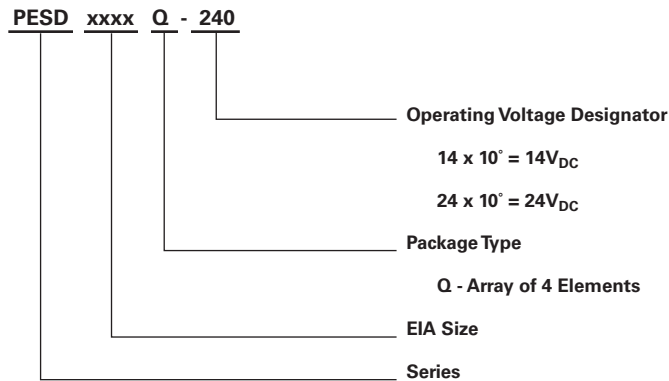
Clamping Voltage (V_C)

Voltage across device under 8kV per IEC or measured by TLP system. Typically measured 30ns after initiation of the ESD pulse (for TLP, both 30ns and 60ns are sometimes used).

Capacitance (C_P)

Capacitance of the device measured at 1MHz with 0V and max operating voltage bias.

Part Numbering System for Polymer ESD (PESD) Devices



Warning :

Application Limitations for PESD0402-140, PESD0603-240 and PESD1206Q-240: These parts are not intended to be used on power lines or for power bus applications. Users should independently evaluate the suitability of and test each product selected for their own application.

Notice :

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