

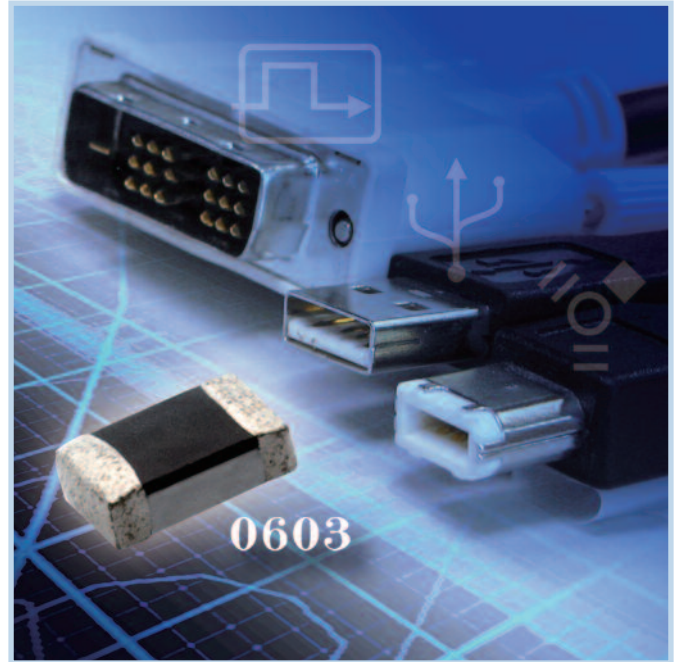


ESD Protection Devices

The Raychem PESD electro-static discharge (ESD) protection devices help protection I/O ports on HDMI 1.3, portable video players, LCD plasma TV, USB 2.0, digital visual interface (DVI), and antenna switches. PESD devices shunt ESD 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 Zener diodes and 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.

PESD protection devices provide low capacitance, and meet transmission line pulse (TLP) testing, as well as IEC61000-4-2 testing.



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Benefits

- Board space savings
- Help protect sensitive electronic circuits against electrostatic discharge (ESD)
- Assist equipment to pass IEC 61000-4-2, level 4 testing
- ESD protection for high frequency application (HDMI 1.3)
- Longer battery life due to low leakage current
- Suitable for high speed data transmission applications


Features

- Thick film technology
- Low capacitance (0.20 pF typical)
- Low clamping voltage
- Fast response time (< 1ns)
- Capable of withstanding numerous ESD strikes
- Compatible with standard reflow installation procedures
- Bi-directional protection

Applications

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

Table E1 Electrical Characteristics for PESD Devices

	Continuous Max Operating Voltage	Typical Trigger Voltage*	Typical Clamping Voltage†	Typical Capacitance @1 MHz, 1V _{rms}	Typical Leakage Current	Max Leakage Current @ Max V _{DC}
Symbol	V _{DC}	V _{T(TLP)}	V _{C(TLP)}	C _D	I _{L(TYP)}	I _{L(MAX)}
Unit	V	V	V	pF	μA	μA
 PESD0603-240	24	215	45	0.20	< 0.001	0.01

Notes : * TLP test method at 1kV
† Measured 30ns after pulse initiation
Typical capacitance value is also @ 0V, Max Operating Voltage bias

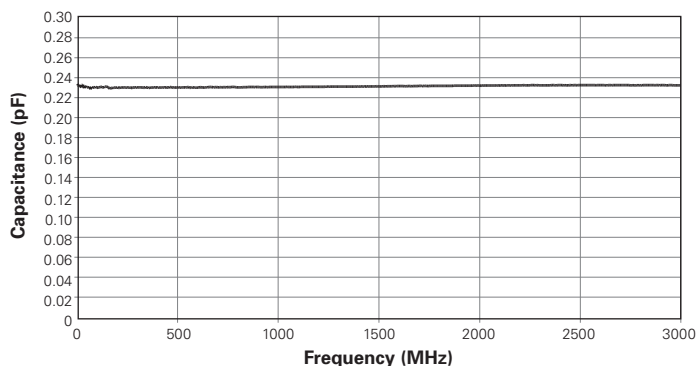
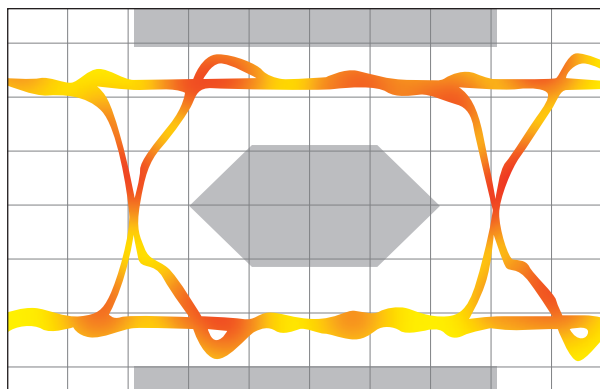
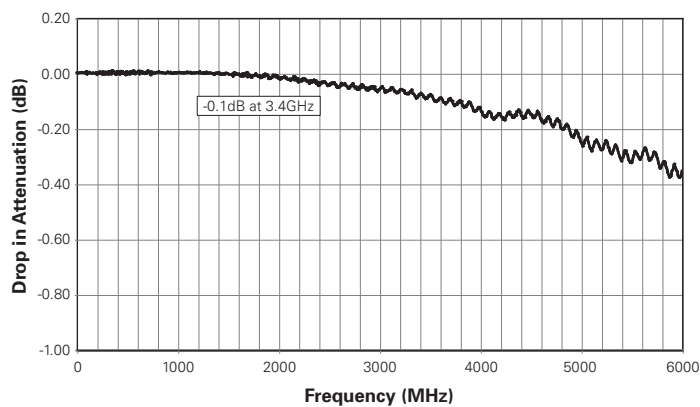
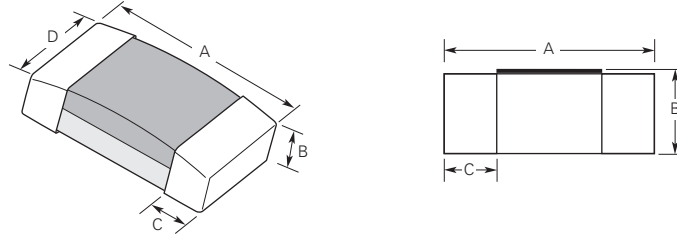
Figure E1 Capacitance vs. Frequency for PESD Devices**Figure E2** Eye Diagram Performance at 3.4 GHz for PESD Devices**Figure E3** Insertion Loss Diagram for PESD Devices

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

Part Number	Length A		Height B		Terminal Width C		Width D	
	Min	Max	Min	Max	Min	Max	Min	Max
0603-240	1.40	1.80	0.40	0.60	0.10	0.50	0.60	0.90
	(0.055)	(0.071)	(0.016)	(0.024)	(0.004)	(0.020)	(0.024)	(0.035)

*Rounded off approximation

**Table E3 Environmental Specifications for PESD Devices**

	Test Conditions	Pass / Fail Criteria
Bias Humidity Test	85°C, 85% RH, Max V_{DC} , 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, Max V_{DC} , 1000 hrs	$I_L \leq 10 \mu A$
Bias Low Temp Test	-55°C, Max V_{DC} , 1000 hrs	$I_L \leq 10 \mu A$
Solderability	230°C \pm 5°C, 3 \pm 1s	95% coverage
Solder Heat	260°C, 10s	90% coverage
Vibration	10 to 50Hz, 1 min cycle, 2 hrs each in X-Y-Z-direction	No physical damage
Solvent Resistance	IPA ultrasonic 300s	No physical damage
Shock	1500G 0.5 ms each, 30 shocks in X-Y-Z-direction	No physical damage

Table E4 General Characteristics for PESD Devices**PESD0603**

Storage Temperature:	-40°C to +85°C
Operating Temperature:	-55°C to +125°C
ESD Voltage Capability:	Contact discharge mode : typical 8kV, max 15kV
(tested per IEC 61000-4-2)	Air discharge mode : typical 15kV, max 25kV
ESD Pulse Withstand:	1000 pulses
(tested per IEC 61000-4-2, level 4, 8kV)	(tested per IEC 61000-4-2, level 4, contact method)

Table E5 Materials Information for PESD Devices

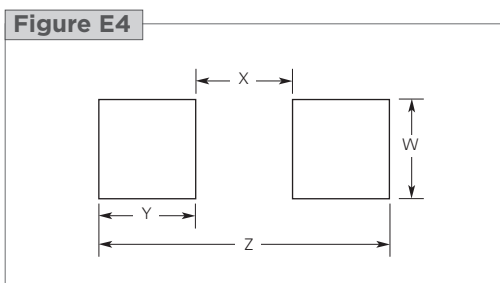
RoHS Compliant	Directive 2002/95/EC Compliant
ELV Compliant	Directive 2000/53/EC Compliant

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

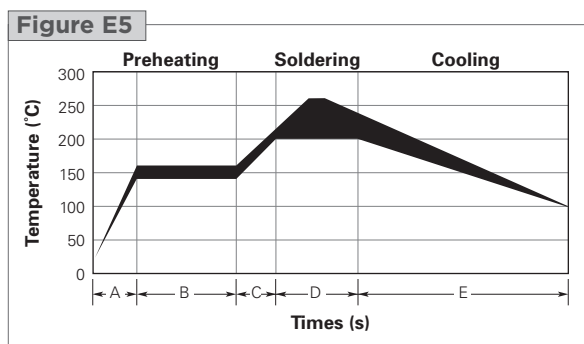
Part Number	W Ref	X Ref	Y Ref	Z Ref	Figure
PESD0603-240	0.9 min / 1.0 max	0.5 min / 0.6 max	1.0 min / 1.1 max	2.7 min / 2.8 max	E4

Note: Solder thickness 0.15 to 0.2 mm

*Rounded off approximation

**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	60s to 70s
		at 220°C	50s to 60s
		at 240°C	30s to 40s
		at 260°C	5s to 10s
E	Cooling	From main heating temperature to 100°C	max 4°C/s



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)

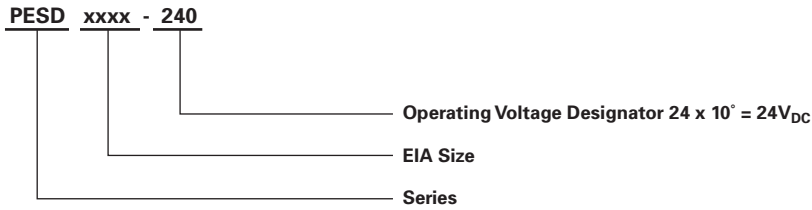
Voltage at which the device switches from the OFF to the ON state, during the IEC waveform or the TLP system

Clamping Voltage (V_C)

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

Capacitance (C_p)

Capacitance of the device measured at 1 MHz with 0 bias and 1 Vrms signal.



Warning :

Application Limitations for PESD0603-240. This part is not intended to be used under power bus applications. Users should independently evaluate the suitability of and test each product selected for their own application.

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