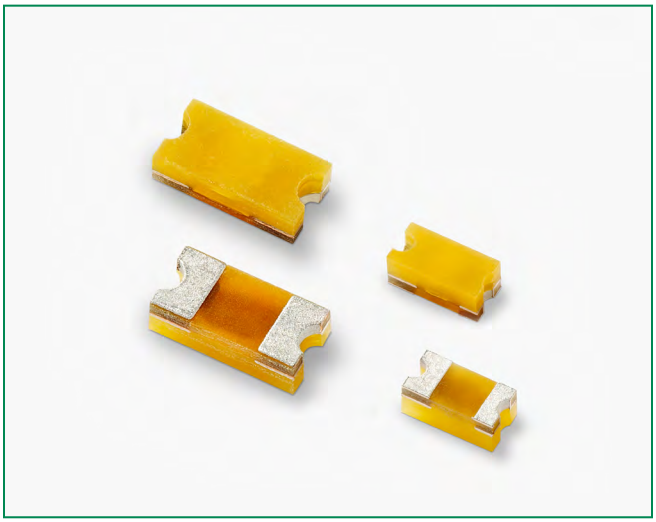
XTREME-GUARD™ ESD Suppressors

Surface Mount Polymeric Electrostatic Discharge Suppressors

Littelfuse
Expertise Applied | Answers Delivered

XGD Series

Pb HF RoHS



Description

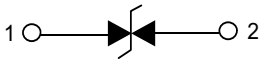
XTREME-GUARD™ ESD Suppressors protect sensitive electronic equipment against extreme ESD conditions, in very small 0402 and 0603 footprints. This series product is specifically designed to suppress fast-rising ESD transients up to 30kV while adding virtually no capacitance to the circuit, which helps preserve signal integrity and minimize data loss. It is a RoHS compliant, halogen free, and Pb free and Pb free ESD Suppressor.

Features

- High ESD Rating up to 30kV Contact/Air Discharge
- RoHS compliant, lead-free and halogen-free
- Ultra-low capacitance
- Low leakage current
- Fast response time
- Bi-directional
- Withstands multiple ESD strikes
- Compatible with pick-and-place processes
- Available in 1000, 5000, and 10000 piece reels (EIA-RS481)
- High rated voltage up to 32V maximum
- High operating temperature at 125°C

Equivalent Circuits

0402 and 0603 Devices



Applications

- Wearable Devices
- Notebooks/Laptops/PCs
- Gaming Consoles
- Smart TVs
- Smart Phones
- Tablets
- Set Top Boxes
- Networking and Wireless Hardware
- Stationary and Portable Medical Devices

Product Characteristics

Part Number	Lines Protected	Component Package	Available as Halogen-Free
XGD10402	1	0402	Yes
XGD10603	1	0603	Yes

Electrical Characteristics

Specification	XGD10402	XGD10603	Notes
ESD Capability: IEC 61000-4-2 Contact Discharge (typical) IEC 61000-4-2 Air Discharge (typical)	 30kV 30kV	 30kV 30kV	The ESD capability measured by direct and air discharge method is subject to testing equipment and conditions. Numerous factors could affect the reliability and reproducibility of the direct and air discharge test results.
Trigger Voltage (typical) Clamping Voltage (typical)	250V 40V	400V 40V	Measured per IEC 61000-4-2 8kV Direct Discharge Method
Trigger Voltage (typical) Clamping Voltage (typical)	150V 40V	300V 28V	Measured using 500V TLP Direct Discharge Method
Rated Voltage (maximum)	24V max	32V max	
Capacitance (typical)	0.04 pF	0.09 pF	Measured at 250MHz
Response Time	<1nS	<1nS	
Leakage Current (typical)	<1nA @24V	<1nA @24V	
ESD Pulse Withstand	1000 pulses min	1000 pulses min	Some shifting in characteristics may occur when tested over multiple pulses at a very rapid rate

Note:

1. Testing performed on Littelfuse test setup as described in Typical Test Setup Section on page 4 of this document.

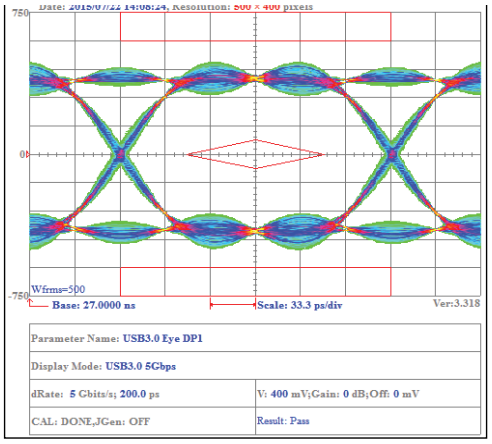
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XTREME-GUARD™ ESD Suppressors

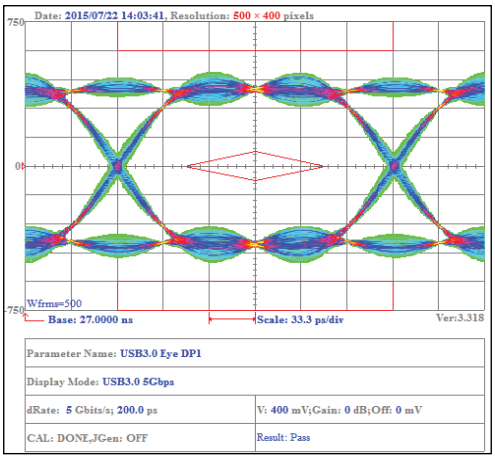
Surface Mount Polymeric Electrostatic Discharge Suppressors

Signal Integrity: USB3.0 5Gbps

Without XGD Device

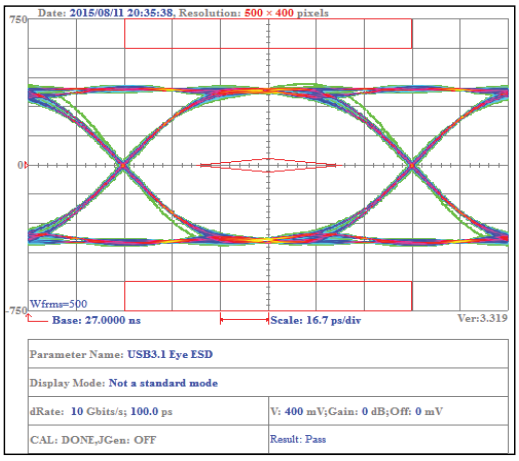


With XGD Device

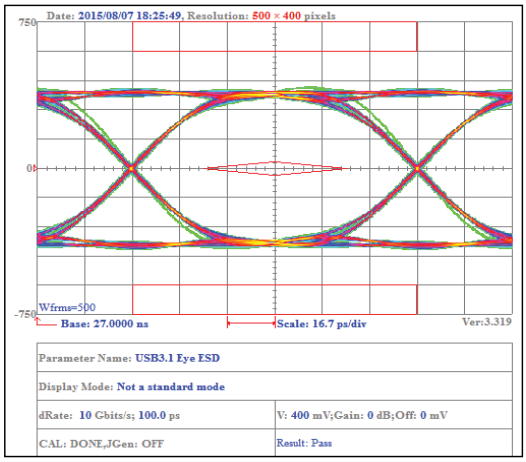


Signal Integrity: USB3.1 10Gbps

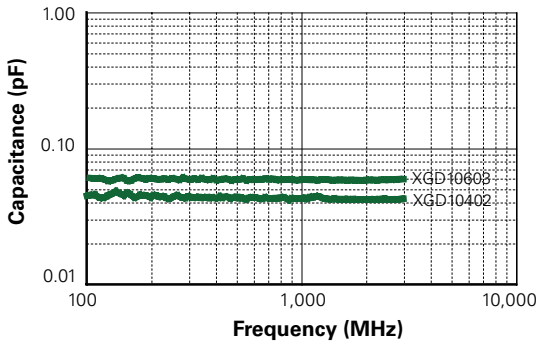
Without XGD Device



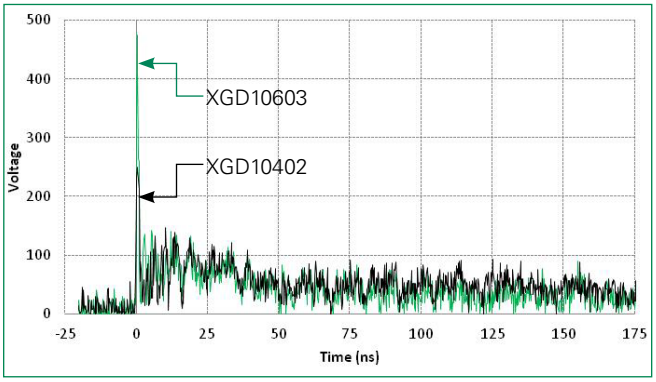
With XGD Device



Typical Device Capacitance



Typical ESD Response



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Physical Specifications

Materials	Body: Glass Epoxy Terminations: Copper/Nickel/Tin
Solderability	MIL-STD-202, Method 208
Soldering Parameters	Wave solder - 260°C, 10 seconds maximum Reflow solder - 260°C, 30 seconds maximum

Design Consideration

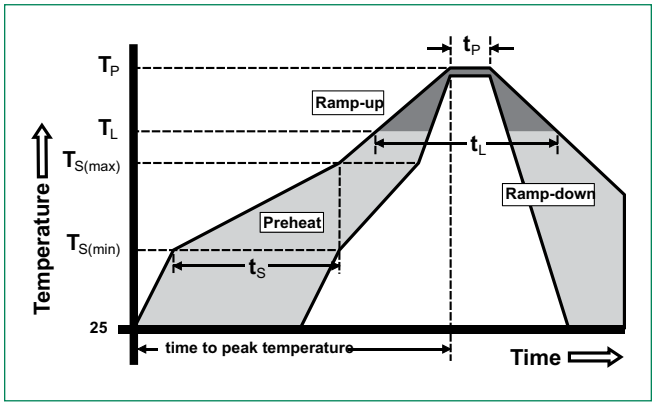
Because of the fast rise-time of the ESD transient, proper placement of XTREME-GUARD™ suppressors are a key design consideration to achieving optimal ESD suppression. The devices should be placed on the circuit board as close to the source of the ESD transient as possible. Install XTREME-GUARD™ suppressors (connected from signal/data line to ground) directly behind the connector so that they are the first board-level circuit component encountered by the ESD transient.

Environmental Specifications

Operating and Storage Temperature	-65°C to +125°C
Moisture Resistance	0402 and 0603 series: 85°C, 85% RH, 1000 hours 40°C, 95% RH, 1000 hours
Thermal Shock	MIL-STD-202, Method 107, -65°C to 125°C, 30 min. cycle, 10 cycles
Vibration	MIL-STD-202, Method 201, (10 to 55 to 10 Hz, 1 min. cycle, 2 hrs each in X-Y-Z)
Chemical Resistance	MIL-STD-202, Method 215

Soldering Parameters

Reflow Condition		Pb – Free assembly
Pre Heat	-Temperature Min ($T_{s(min)}$)	150°C
	-Temperature Max ($T_{s(max)}$)	200°C
	-Time (min to max) (t_s)	60 – 180 seconds
Average ramp up rate (Liquidus Temp (T_L) to peak		3°C/second max
$T_{S(max)}$ to T_L - Ramp-up Rate		3°C/second max
Reflow	-Temperature (T_L) (Liquidus)	217°C
	-Temperature (t_L)	60 – 150 seconds
Peak Temperature (T_P)		260°C
Time within 5°C of actual peak Temperature (t_p)		10 – 30 seconds
Ramp-down Rate		6°C/second max
Time 25°C to peak Temperature (T_P)		8 minutes max



Based on IPC/JEDEC J-STD-020

Packaging

Part Number	Quantity & Packaging Code	Quantity	Packaging Option	Packaging Specification
XGD10402	KR	10000	Tape & Reel (7" reel)	EIA RS-481-1 (IEC 286, part 3)
XGD10603	MR	1000	Tape & Reel (7" reel)	EIA RS-481-1 (IEC 286, part 3)
XGD10603	NR	5000	Tape & Reel (7" reel)	EIA RS-481-1 (IEC 286, part 3)

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XTREME-GUARD™ ESD Suppressors

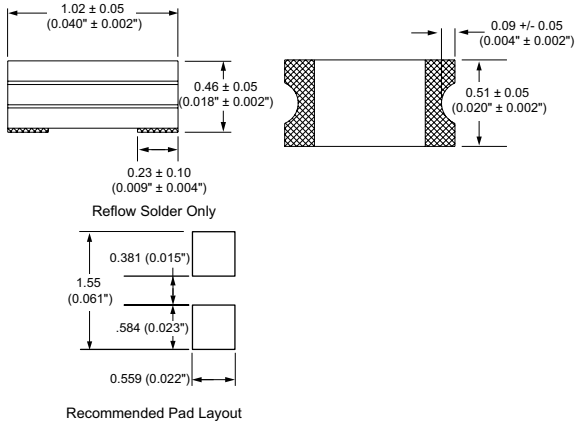
Surface Mount Polymeric Electrostatic Discharge Suppressors

Dimensions

0402 Device

Reference Dimensions:

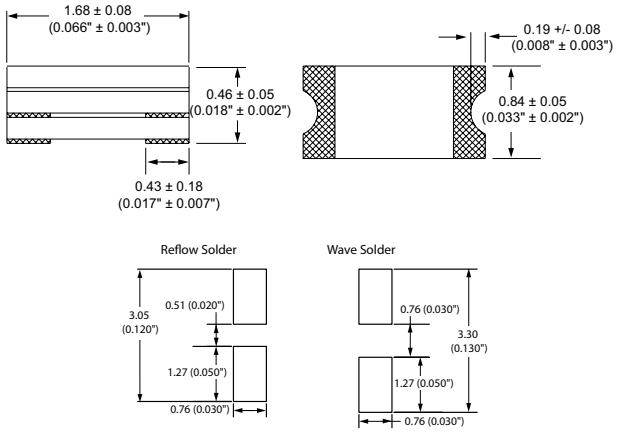
Dimensions: mm (inch)



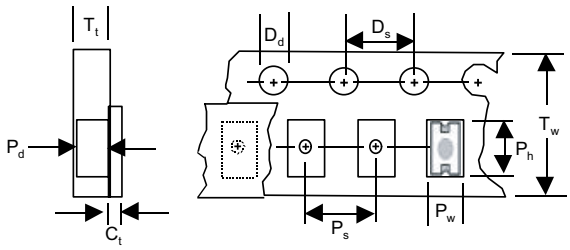
0603 Device

Reference Dimensions:

Dimensions: mm (inch)

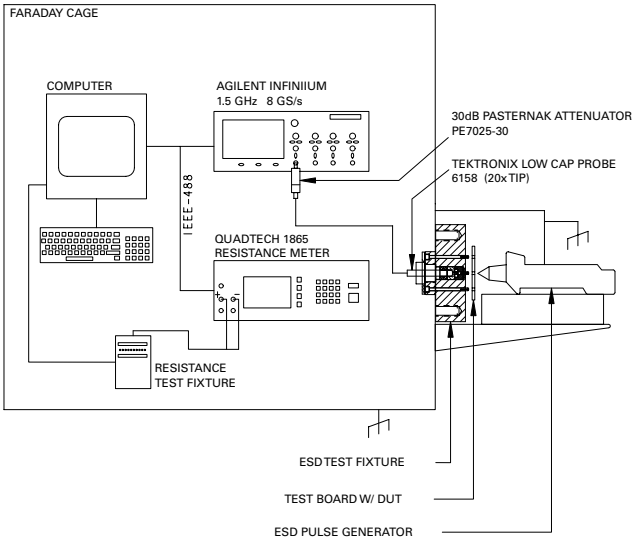


Tape and Reel Specifications



Description	0402 Series (mm)	0603 Series (mm)
C_t - Cover tape thickness	0.05	0.05
D_d - Drive hole diameter	1.50	1.50
D_s - Drive hole spacing	4.00	4.00
P_d - Pocket depth	0.56	0.58
P_h - Pocket height	1.14	1.85
P_s - Pocket spacing	2.00	4.00
P_w - Pocket width	0.62	1.02
T_t - Carrier tape thickness	0.65	0.65
T_w - Carrier tape width	8.00	8.00

Typical Test Setup



Part Numbering System

XGD 1 0603 NR

LEAD-FREE XTREME-GUARD™ ESD SUPPRESSORS

LINES PROTECTED:
1 = 1 line

DEVICE SIZE CODE:
0402 = 0402 (1005)
0603 = 0603 (1608)

QUANTITY & PACKAGING CODE:
MR = 1000 pieces, tape & reel
NR = 5000 pieces, tape & reel
KR = 10,000 pieces, tape & reel

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