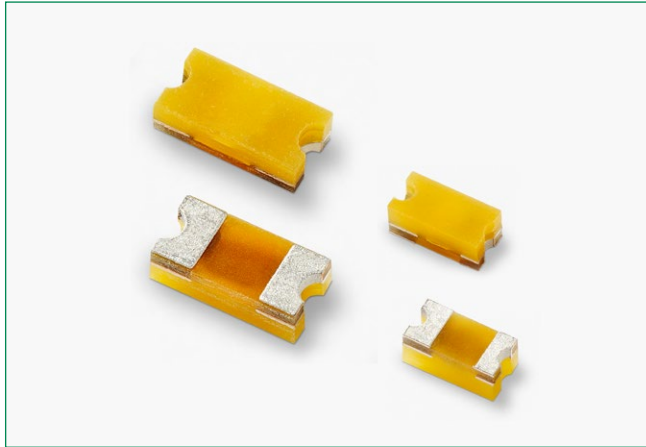


## XGD Series



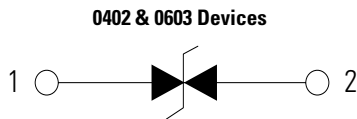
### Description

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 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



Life Support Note:

#### Not Intended for Use in Life Support or Life Saving Applications

The products shown herein are not designed for use in life sustaining or life saving applications unless otherwise expressly indicated.

### Product Characteristics

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

### 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

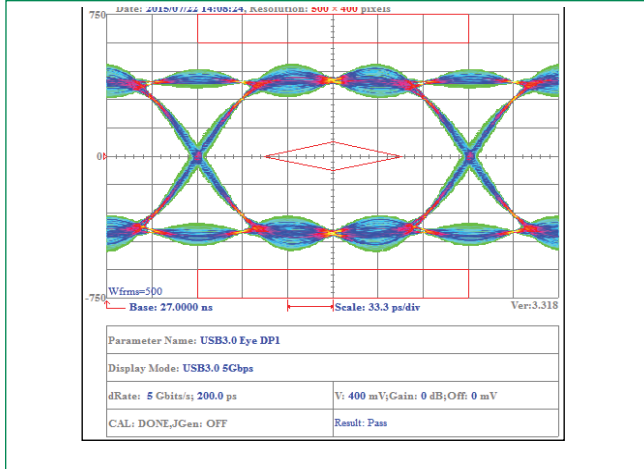
### Electrical Characteristics

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)	250V	400V	Measured per IEC 61000-4-2 8kV Direct Discharge Method
Clamping Voltage (typical)	40V	40V	
Trigger Voltage (typical)	150V	300V	Measured using 500V TLP Direct Discharge Method
Clamping Voltage (typical)	40V	28V	
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

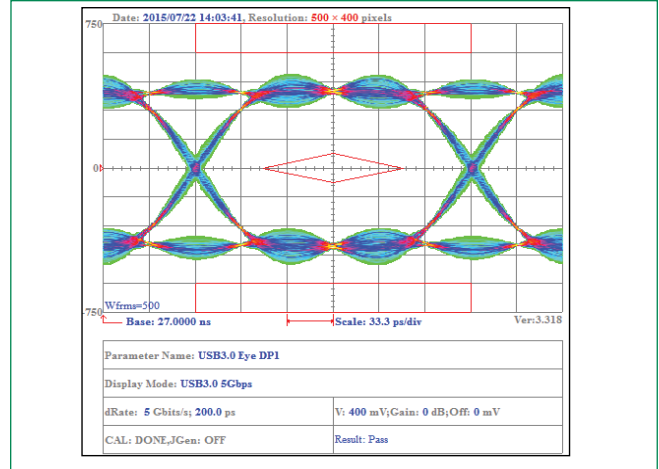
**Note:** Testing performed on Littelfuse test setup as described in Typical Test Setup Section on page 4 of this document.

### Signal Integrity: USB3.0 5Gbps

#### Without XGD Device

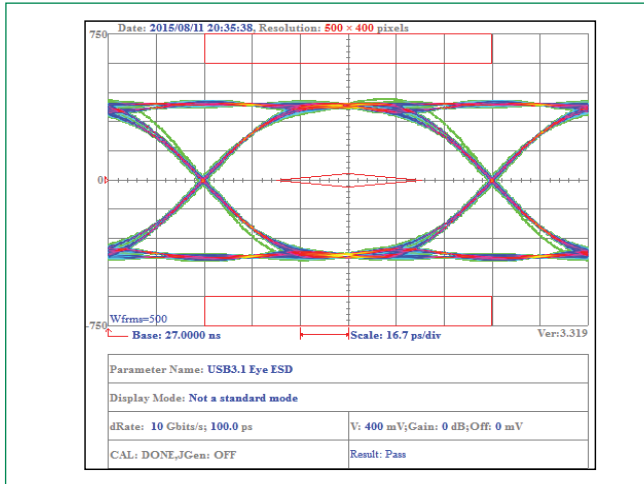


#### With XGD Device



### Signal Integrity: USB3.1 10Gbps

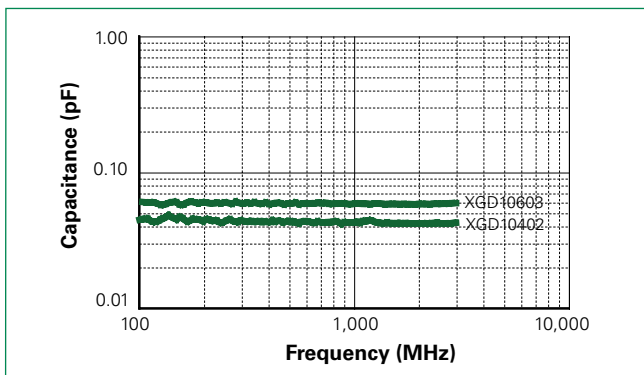
#### Without XGD Device



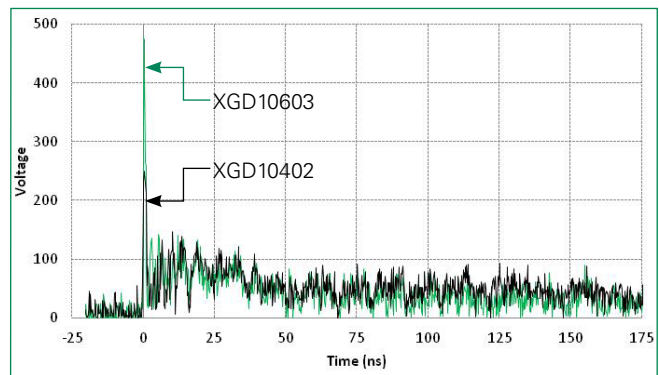
#### With XGD Device



### Typical Device Capacitance



### Typical ESD Response



### Physical Specifications

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

### Environmental Specifications

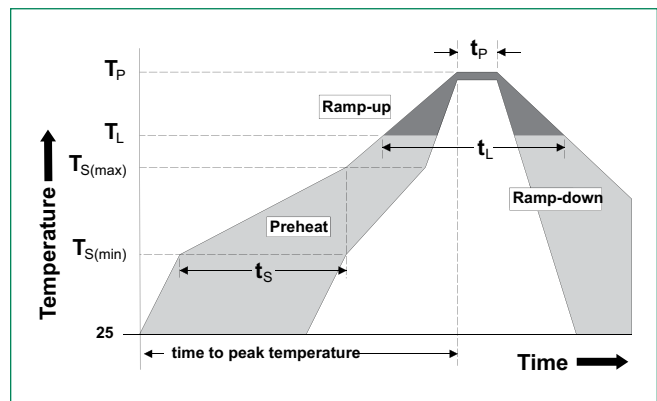
<b>Operating and Storage Temperature</b>	-65°C to +125°C
<b>Moisture Resistance</b>	0402 and 0603 series: 85°C, 85% RH, 1000 hours 40°C, 95% RH, 1000 hours
<b>Thermal Shock</b>	MIL-STD-202, Method 107, -65°C to 125°C, 30 min. cycle, 10 cycles
<b>Vibration</b>	MIL-STD-202, Method 201, (10 to 55 to 10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

### 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.

### Soldering Parameters

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



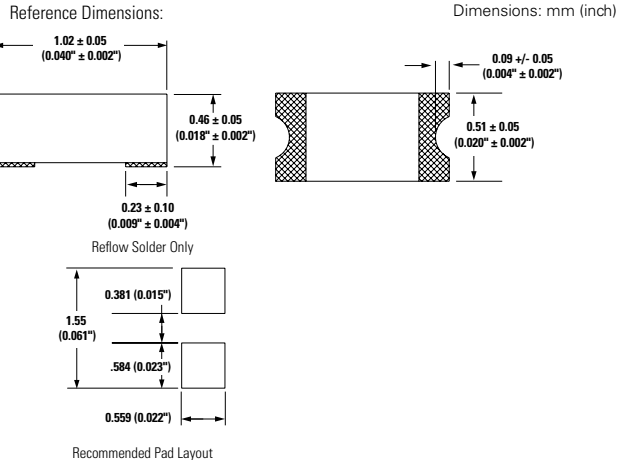
Based on IPC/JEDEC J-STD-020

### Packaging

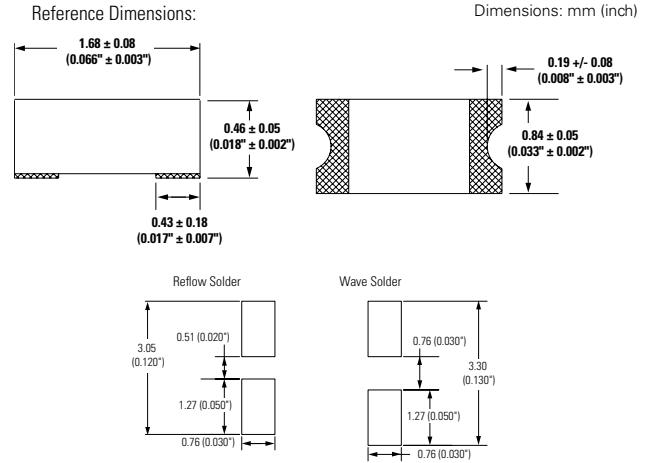
Part Number	Quantity & Packaging Code	Quantity	Packaging Option	Packaging Specification
XGD10402	KR	10000	Tape & Reel (7" reel)	EIA RS-481-1 (IEC 286, part 3)
XGD10603	MR	1000	Tape & Reel (7" reel)	EIA RS-481-1 (IEC 286, part 3)
XGD10603	NR	5000	Tape & Reel (7" reel)	EIA RS-481-1 (IEC 286, part 3)

### Dimensions

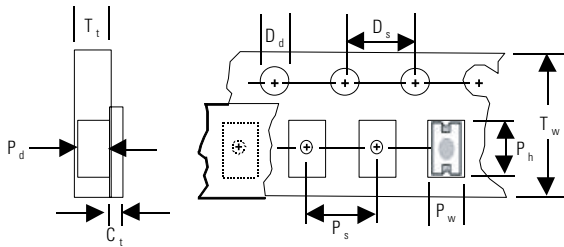
#### 0402 Device



#### 0603 Device

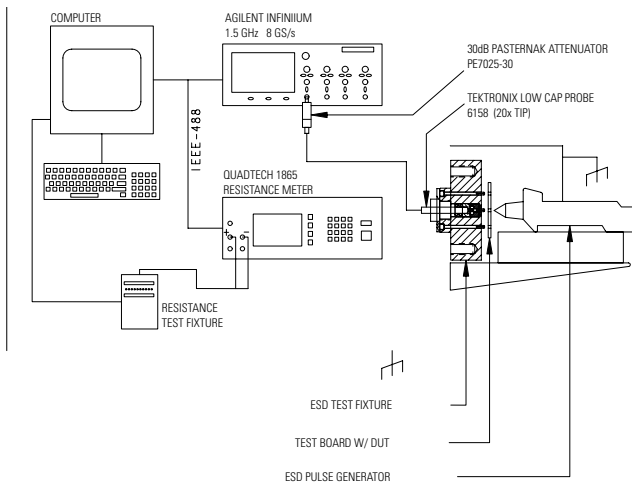


### Tape and Reel Specifications

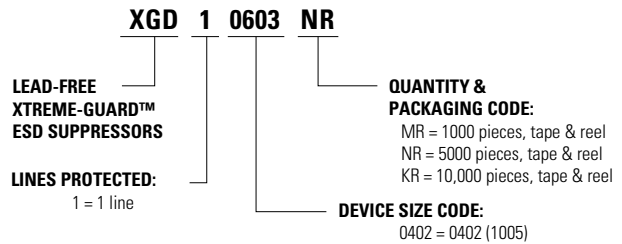


Description	0402 Series (mm)	0603 Series (mm)
C <sub>t</sub> - Cover tape thickness	0.05	0.05
D <sub>d</sub> - Drive hole diameter	1.50	1.50
D <sub>s</sub> - Drive hole spacing	4.00	4.00
P <sub>d</sub> - Pocket depth	0.56	0.58
P <sub>h</sub> - Pocket height	1.14	1.85
P <sub>s</sub> - Pocket spacing	2.00	4.00
P <sub>w</sub> - Pocket width	0.62	1.02
T <sub>t</sub> - Carrier tape thickness	0.65	0.65
T <sub>w</sub> - Carrier tape width	8.00	8.00

### Typical Test Setup



### Part Numbering System



**Disclaimer Notice** - Information furnished is believed to be accurate and reliable. However, users should independently evaluate the suitability of and test each product selected for their own applications. Littelfuse products are not designed for, and may not be used in, all applications. Read complete Disclaimer Notice at [www.littelfuse.com/disclaimer-electronics](http://www.littelfuse.com/disclaimer-electronics).