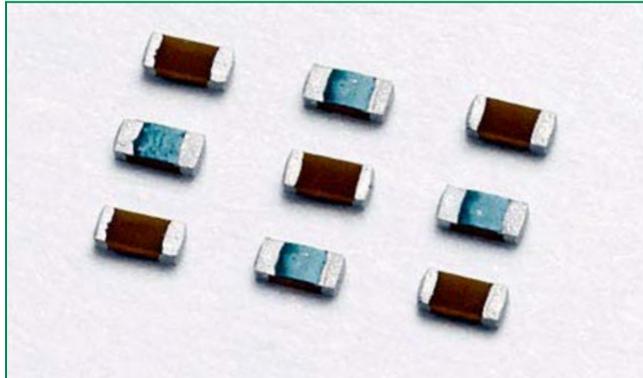


RoHS HF **PGB2 Series Halogen Free / Lead-Free**



### Equivalent Circuits



### Product Characteristics

Part Number	Lines Protected	Component Package
PGB2010402KRHF	1	0402

### Description

PulseGuard ESD Suppressors help protect sensitive electronic equipment against electrostatic discharge (ESD).

They use polymer composite materials to suppress fast-rising ESD transients (as specified in IEC 61000-4-2), while adding virtually no capacitance to the circuit.

They supplement the on-chip protection of integrated circuitry and are best suited for low-voltage, high-speed applications where low capacitance is important to ensure minimal interference of data signal integrity.

The new and ultra-small surface mount PGB2 0402 series offers a RoHS Compliant, Halogen Free, and 100% Lead Free circuit protection alternative.

### Features

- RoHS compliant
- Lead-free
- Halogen-free
- Ultra-low capacitance
- Low leakage current
- Fast response time
- One line of protection
- Bi-directional
- Withstands multiple ESD strikes
- Compatible with pick-and-place processes

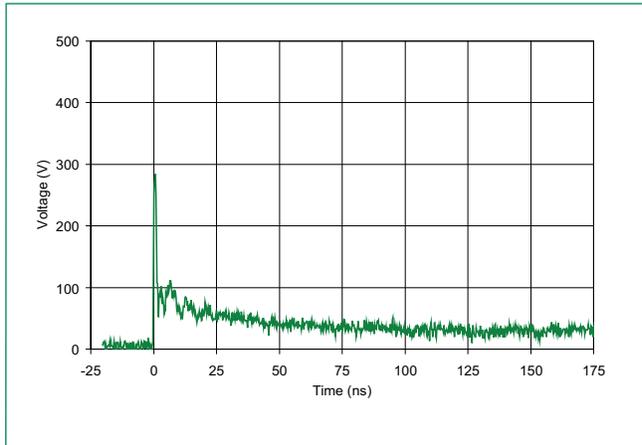
### Applications

- HDTV Hardware
- Laptop/Desktop Computers
- Network Hardware
- Computer Peripherals
- Digital Cameras
- External Storage
- Set-Top Boxes

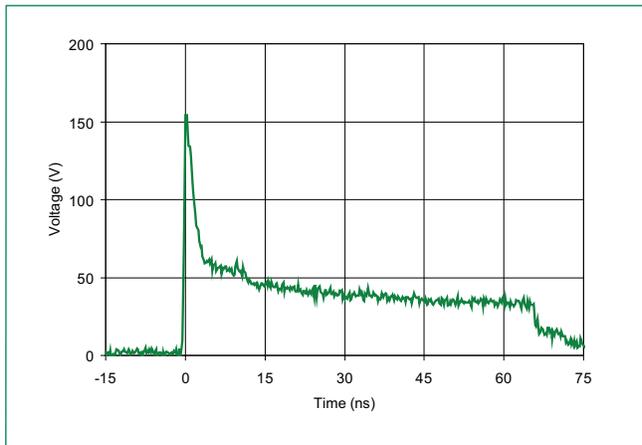
### Electrical Characteristics

Specification	PGB2010402	Notes
ESD Capability: IEC 61000-4-2 Direct Discharge IEC 61000-4-2 Air Discharge	8kV 15kV	
Trigger Voltage (typical) Clamping Voltage (typical)	250V 40V	Measured per IEC 61000-4-2 8kV Direct Discharge Method
Trigger Voltage (typical) Clamping Voltage (typical)	150V 40V	Measured using 500 V TLP Direct Discharge Method
Rated Voltage (maximum)	12VDC, max	
Capacitance (typical)	0.07 pF, typical	Measured at 250 MHz
Response Time	<1nS	Measured per IEC 61000-4-2 8kV Direct Discharge Method
Leakage Current (typical)	<1nA	Measured at 12 VDC
ESD Pulse Withstand	1000 pulses min	Some shifting in characteristics may occur when tested over multiple pulses at a very rapid rate

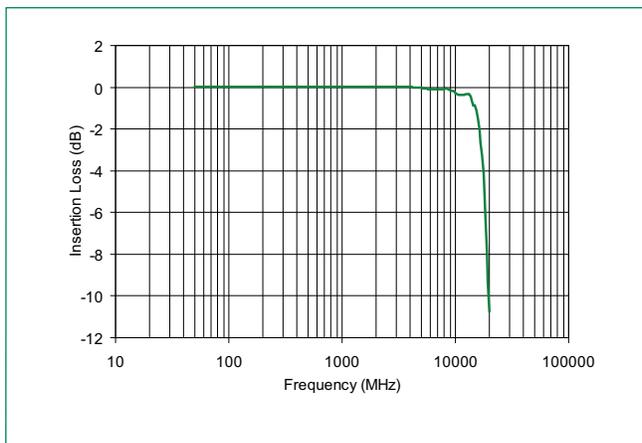
### Typical ESD Response Curve (8 kV IEC 61000-4-2 Direct Discharge)



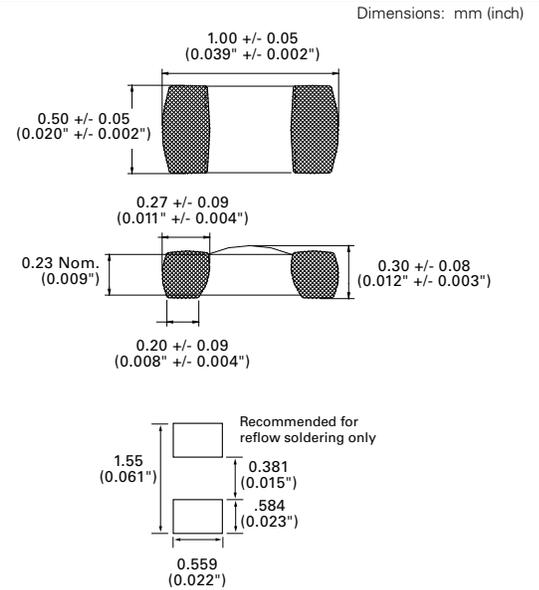
### Typical TLP Response Curve (500 V Direct Discharge)



### Typical Insertion Loss

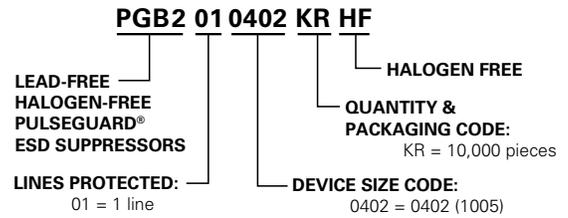


### Dimensions

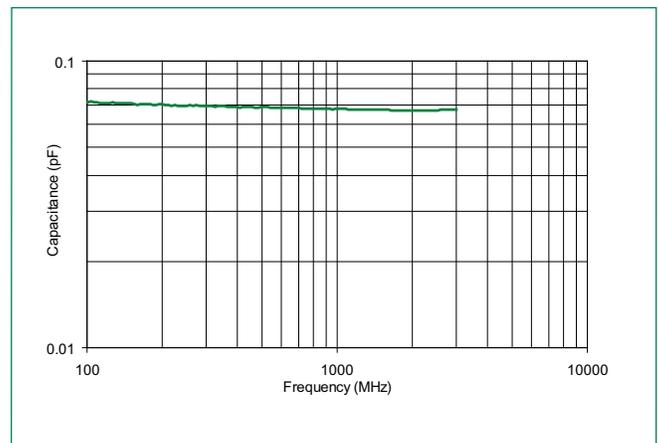


Recommended Pad Layout

### Part Numbering System



### Typical Device Capacitance



## Physical Specifications

<b>Materials</b>	Body: Epoxy / Glass Substrate Terminations: Nickel/Tin
<b>Device Weight</b>	0.258 mg
<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

## Design Consideration

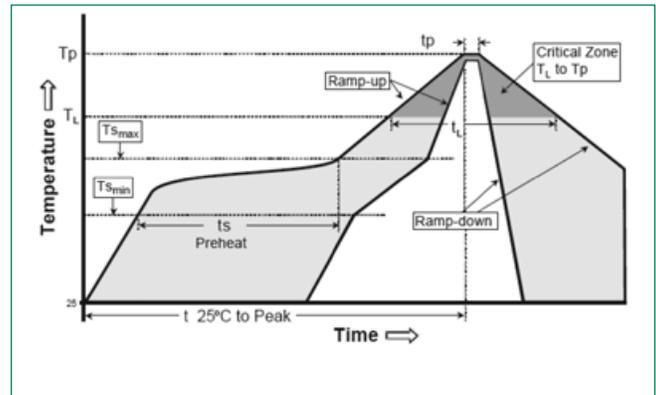
Because of the fast rise-time of the ESD transient, proper placement of PulseGuard suppressors are a key design consideration to achieving optimal ESD suppression. The devices should be placed on the circuit board as close to the source of the ESD transient as possible. Install PulseGuard suppressors (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

<b>Operating Temperature</b>	-65°C to +125°C
<b>Biased Humidity:</b> <b>Biased Heat:</b>	40°C, 95% RH, 1000 hours 85°C, 85% RH, 1000 hours
<b>Thermal Shock</b>	MIL-STD-202, Method 107G, -65°C to 125°C, 30 min. cycle, 10 cycles
<b>Vibration</b>	MIL-STD-202, Method 201A
<b>Chemical Resistance</b>	MIL-STD-202, Method 215
<b>Solder Leach Resistance and Terminal Adhesion</b>	IPC/EIA J-STD-002

## 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	



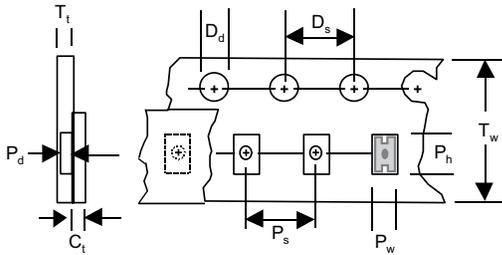
### Notes:

- PGB2 Series recommended for reflow soldering only
- Recommended profile based on IPC/JEDEC J-STD-020C
- For recommended soldering pad layout dimensions, please refer to Dimensions section of this data sheet

## Packaging

Part Number	Quantity & Packaging Code	Quantity	Packaging Option	Packaging Specification
PGB2010402	KR	10000	Tape & Reel (7" reel)	EIA RS-481-1 (IEC 286, part 3)

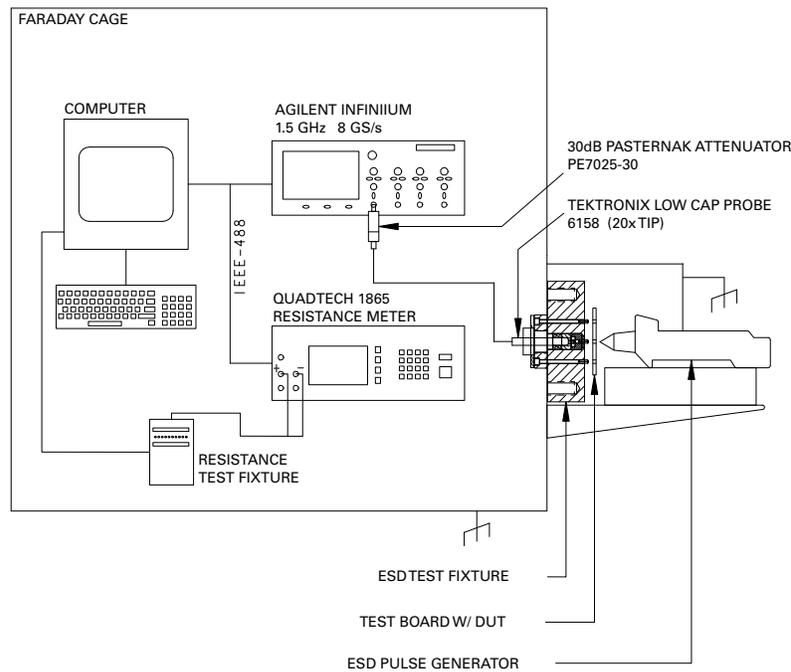
## Tape and Reel Specifications



**Carrier Tape:** 8mm, paper  
**Reel:** 7" (178mm)

Description	0402 Series (mm)
$C_t$ - Cover tape thickness	0.053
$D_d$ - Drive hole diameter	1.55
$D_s$ - Drive hole spacing	4.00
$P_d$ - Pocket depth	0.41
$P_h$ - Pocket height	1.12
$P_s$ - Pocket spacing	2.00
$P_w$ - Pocket width	0.62
$T_t$ - Carrier tape thickness	0.61
$T_w$ - Carrier tape width	8.00

## Typical ESD Pulse Test Setup



### Notes:

- QuadQuadTech 1865 High Resistance Meter: Measures insulation resistance values
- KeyTek MiniZap ESD simulator with IEC tip: Simulates 8kV, direct discharge ESD event per IEC 61000-4-2
- Faraday cage: Shields the acquisition equipment from the electromagnetic fields generated by the simulator
- Agilent 2.25 GHz 54846A Oscilloscope: Records the voltage waveform from the device under test
- Tektronix 6158 probe with 30dB attenuator: Transmits the waveform from the device to the oscilloscope