

### PGB Series SOT23 Surface Mount ESD Suppressor

#### Product Overview

PulseGuard ESD Suppressors help protect sensitive electronic equipment against electrostatic discharge (ESD). They supplement the on-chip protection of integrated circuitry and are best suited for low-voltage, high-speed applications where low capacitance is important. Data ports utilizing such high-speed protocols as USB 2.0, IEEE1394 and InfiniBand<sup>SM</sup> can benefit from this new technology. PulseGuard suppressors use polymer composite materials to suppress fast-rising ESD transients (as specified in IEC 61000-4-2 and MIL-STD-883E).

#### Features

- Ultra-low capacitance
- Low leakage current
- Fast response time
- 2-lines of protection
- Bi-directional
- Withstands multiple ESD strikes
- Standard JEDEC SOT23 outline
- Compatible with pick-and-place processes
- Available in 3,000 piece reels

#### Typical Applications

- Servers
- Laptop/Desktop Computers
- Network Hardware
- Computer Peripherals
- Digital Cameras
- External Storage

#### Electrical Characteristics

Trigger Voltage <sup>1</sup> . . . . .	1,000V typical
Clamping Voltage <sup>1</sup> . . . . .	150V typical
Rated Voltage . . . . .	24VDC max
Capacitance <sup>2</sup> . . . . .	0.055pF
Response Time <sup>1</sup> . . . . .	<1ns
Leakage Current <sup>3</sup> . . . . .	<1nA
ESD Pulse Withstand <sup>1</sup> . . . . .	1,000 pulses minimum

Notes:

1. 8 kV direct discharge method, per IEC 61000-4-2.
2. Measured at 1 MHz.
3. Measured at 6 VDC. Testing at fast ESD pulse rates (1-20Hz) may cause a change in leakage current performance (6µA, max).



#### Physical Specifications

##### Materials:

Body: Glass Epoxy  
Terminations: Tin-Lead

##### Soldering Parameters:

Wave solder -- 260°C, 10 seconds maximum  
Reflow solder -- 260°C, 30 seconds maximum

##### Operating Temperature Range:

-65°C to 125°C

#### Ordering Information

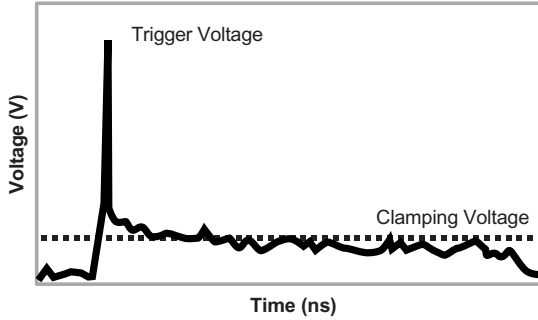
CATALOG NUMBER	PIECES PER REEL
PGB002ST23WR	3,000

#### Design Consideration

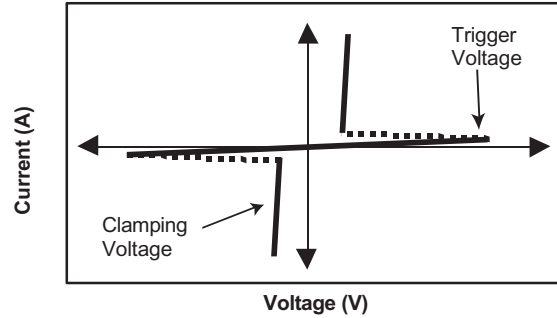
Because of the fast rise-time of the ESD transient, placement of PulseGuard suppressors is a key design consideration. To achieve optimal ESD suppression, the devices should be placed on the circuit board as close to the source of the ESD transient as possible. Install PulseGuard suppressors directly behind the connector so that they are the first board-level circuit component encountered by the ESD transient. They are connected from signal/data line to ground.

### PGB Series SOT23 Surface Mount ESD Suppressor

**Generalized PulseGuard Suppressor Response to ESD**  
(Positive and Negative Polarity ESD Pulses)



**Generalized I-V Curve**  
(Positive and Negative Polarity ESD Pulses)



#### Definitions

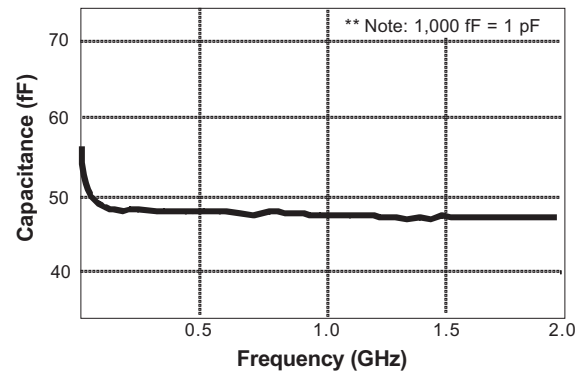
**Trigger Voltage:** The measured peak voltage across the ESD suppressor before it transitions from high to low resistance. It is manifested as a “spike” before the clamping voltage is achieved. This voltage is typically well below the damage threshold of on-chip IC protection.

**Clamping Voltage:** The voltage level to which the ESD impulse voltage is reduced. This is the voltage that the suppressor holds at, until the ESD transient energy is dissipated.

**ESD Impulse Voltage:** Also known as the ESD Threat Voltage. This is the voltage that is “zapped” into the circuit. Voltages generated by people can exceed 15 kV. The IEC 61000-4-2 defines four levels of impulse voltage for testing purposes:

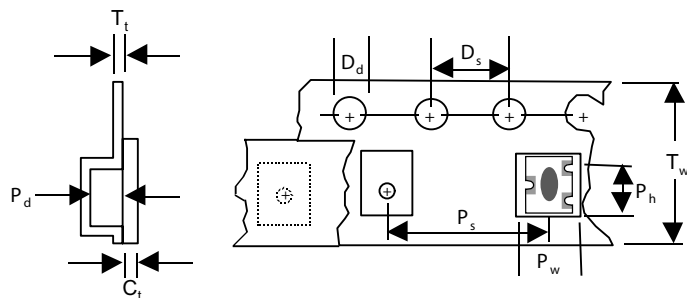
SEVERITY LEVEL	AIR DISCHARGE	DIRECT DISCHARGE
1	2 kV	2 kV
2	4 kV	4 kV
3	8 kV	6 kV
4	15 kV	8 kV

**Capacitance vs. Frequency**



#### Carrier Tape Specifications

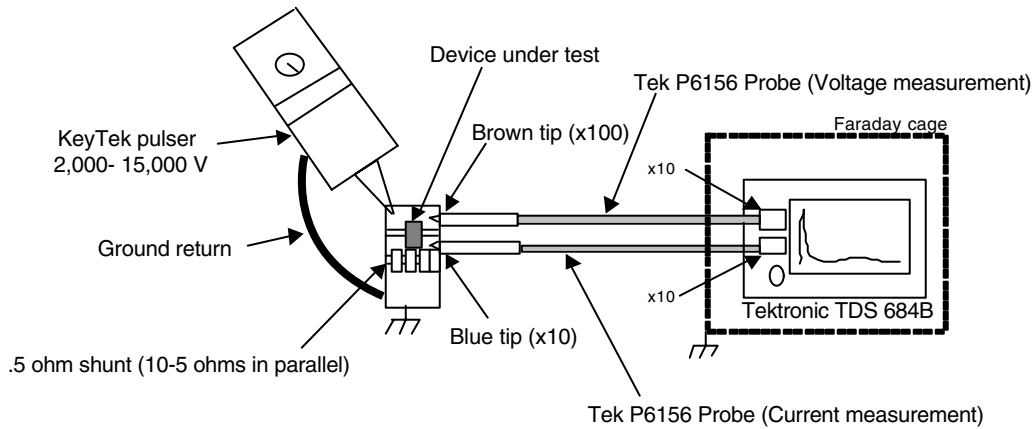
Parts are delivered on 7" (178mm) reel, plastic carrier tape



DESCRIPTION	MEASUREMENT (MM)
C <sub>t</sub> - Cover tape thickness	0.06
D <sub>d</sub> - Drive hole diameter	1.50
D <sub>s</sub> - Drive hole spacing	4.00
P <sub>d</sub> - Pocket depth	1.02
P <sub>h</sub> - Pocket height	3.23
P <sub>s</sub> - Pocket spacing	4.00
P <sub>w</sub> - Pocket width	2.46
T <sub>t</sub> - Carrier tape thickness	0.30
T <sub>w</sub> - Carrier tape width	8.00

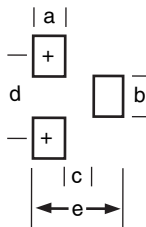
### PGB Series SOT23 Surface Mount ESD Suppressor

#### Test Set-up for IEC 61000-4-2 Waveform, 2kV-15kV

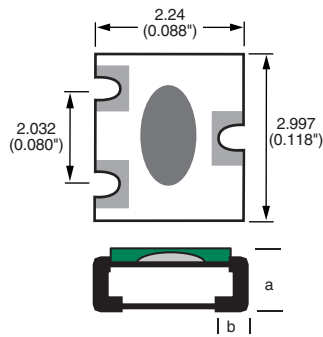


#### Reference Schematics:

##### Recommended Pad Layout:

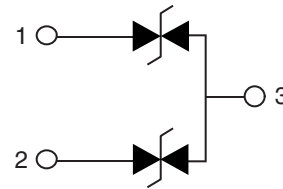


##### Device Dimensions:



\* Dimension "a" is: 0.066 (.026")  
 \* Dimension "b" is: 0.076 (.030")

##### Equivalent Circuit:



SOLDER METHOD	A		B		C		D		E	
	INCH	MM	INCH	MM	INCH	MM	INCH	MM	INCH	MM
Wave Solder	0.050	1.27	0.040	1.016	0.050	1.27	0.090	2.29	0.150	3.81
Reflow Solder	0.050	1.27	0.040	1.016	0.040	1.01	0.080	2.032	0.140	3.56

**Note:** Pin 3 (common) is typically connected to chassis ground. However, since PulseGuard suppressors are bi-directional, the system voltage bus can also be used as the ESD "dump".