



# THE DATASHEET OF RCLAMP0582BQTCT

### PROTECTION PRODUCTS

#### Description

The RClamp®0582BQ transient voltage suppressor is specifically designed to protect sensitive components which are connected to high-speed data and transmission lines from overvoltage caused by ESD (electrostatic discharge), CDE (cable discharge events), and EFT (electrical fast transients). It is rated to Grade 2 of AEC-Q100 for use in automotive applications.

The RClamp®0582BQ features high peak pulse current capability ( $I_{pp}=15A$ ,  $t_p=8/20\mu s$ ) for use in applications that require high surge immunity testing. It has a maximum capacitance of only 1.2pF (pin 1 or 2 to pin3). They may be used to meet the ESD immunity requirements of IEC 61000-4-2 ( $\pm 30kV$  air,  $\pm 25kV$  contact discharge). Each device can be configured to protect 1 bidirectional line or two unidirectional lines.

These devices are in a small SC-75 (SOT-523) package and feature a lead-free, matte tin finish. They are compatible with both lead free and SnPb assembly techniques. The combination of small size, low capacitance, and high level of surge protection makes them a flexible solution for protection of USB 2.0, LVDS, and video interfaces.

#### Features

- Transient protection for high-speed data lines to IEC 61000-4-2 (ESD)  $\pm 30kV$  (air),  $\pm 25kV$  (contact) IEC 61000-4-4 (EFT) 40A (5/50ns)
- Qualified to AEC-Q100, Grade 2
- Protects up to two I/O lines
- Low capacitance ( $<1.2pF$ )
- High surge capability: 15A ( $t_p=8/20\mu s$ )
- Low leakage current and clamping voltage
- Low operating voltage: 5.0V
- Solid-state silicon-avalanche technology

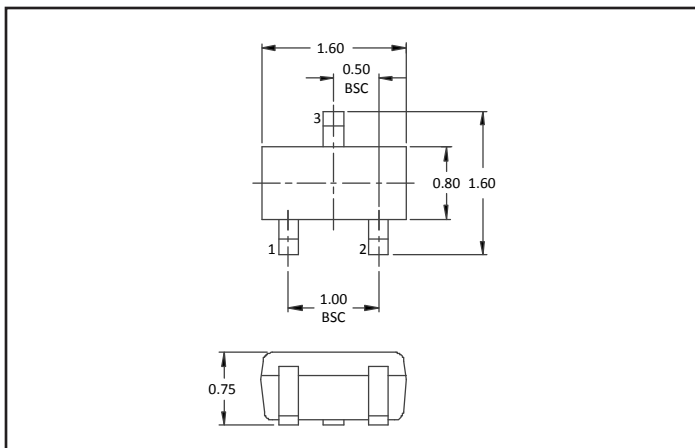
#### Mechanical Characteristics

- SC-75 (SOT-523) package
- Lead Finish: Matte Tin
- Pb-Free, Halogen Free, RoHS/WEEE Compliant
- Molding compound flammability rating: UL 94V-0
- Packaging: Tape and Reel

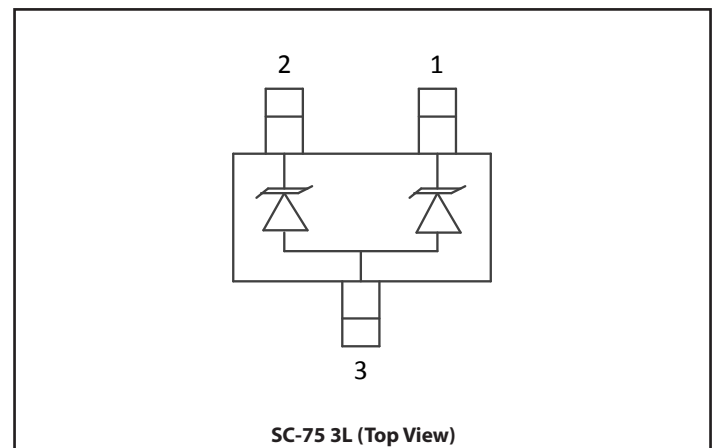
#### Applications

- USB 2.0
- Video Lines
- LVDS Lines

#### Nominal Dimensions (mm)



#### Schematic & Pin Configuration



## Absolute Maximum Rating

| Rating                                                                                       | Symbol    | Value                | Units |
|----------------------------------------------------------------------------------------------|-----------|----------------------|-------|
| Peak Pulse Power ( $t_p = 8/20\mu s$ )                                                       | $P_{PK}$  | 300                  | W     |
| Peak Pulse Current ( $t_p = 8/20\mu s$ )                                                     | $I_{PP}$  | 15                   | A     |
| ESD per IEC 61000-4-2 (Air) <sup>(1)</sup><br>ESD per IEC 61000-4-2 (Contact) <sup>(1)</sup> | $V_{ESD}$ | $\pm 30$<br>$\pm 25$ | kV    |
| Operating Temperature                                                                        | $T_{OP}$  | -40 to +105          | °C    |
| Storage Temperature                                                                          | $T_{STG}$ | -55 to +150          | °C    |

## Electrical Characteristics (T=25°C unless otherwise specified)

| Parameter                         | Symbol    | Conditions                                                                 | Min. | Typ. | Max. | Units    |
|-----------------------------------|-----------|----------------------------------------------------------------------------|------|------|------|----------|
| Reverse Stand-Off Voltage         | $V_{RWM}$ | Pin 1 or Pin 2 to Pin 3                                                    |      |      | 5    | V        |
| Reverse Breakdown Voltage         | $V_{BR}$  | $I_{BR} = 1mA$ , Pin 1 to Pin 2 to Pin 3                                   | 6    |      | 11   | V        |
| Reverse Leakage Current           | $I_R$     | $V_{RWM} = 5V$ , T=25 °C, Pin 1 or Pin 2 to Pin 3 and between Pin 1 and 2  |      |      | 0.1  | $\mu A$  |
| Reverse Leakage Current           | $I_R$     | $V_{RWM} = 5V$ , T=105 °C, Pin 1 or Pin 2 to Pin 3 and between Pin 1 and 2 |      |      | 0.3  | $\mu A$  |
| Clamping Voltage                  | $V_C$     | $t_p = 8/20\mu s$<br>Pin 1 or Pin 2 to Pin 3<br>$I_{PP} = 5A$              |      |      | 15   | V        |
|                                   |           | $t_p = 8/20\mu s$<br>Pin 1 or Pin 2 to Pin 3<br>$I_{PP} = 15A$             |      |      | 20   |          |
| ESD Clamping Voltage <sup>2</sup> | $V_C$     | $t_p = 0.2/100ns$<br>Pin 1 or Pin 2 to Pin 3<br>$I_{PP} = 4A$              |      | 11.6 |      | V        |
|                                   |           | $I_{PP} = 16A$                                                             |      | 15.8 |      |          |
| Dynamic Resistance <sup>2,3</sup> | $R_{DYN}$ | $t_p = 0.2/100ns$ , Pin 1 or Pin 2 to Pin 3                                |      | 0.35 |      | $\Omega$ |
| Junction Capacitance              | $C_J$     | $V_R = 0V$ , f = 1MHz<br>Pin 1 to Pin 2                                    |      | 0.5  | 0.8  | pF       |
| Junction Capacitance              | $C_J$     | $V_R = 0V$ , f = 1MHz<br>Pin 1 or Pin 2 to Pin 3                           |      |      | 1.2  | pF       |

Notes:

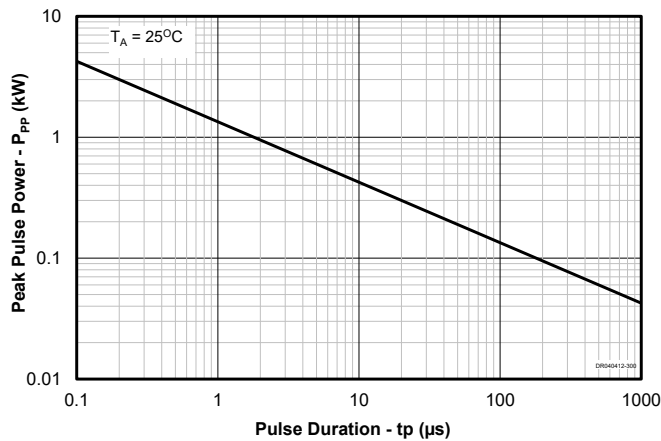
1) ESD gun return path connected to ESD ground plane.

2) Transmission Line Pulse Test (TLP) Settings:  $t_p = 100ns$ ,  $t_r = 0.2ns$ ,  $I_{TLP}$  and  $V_{TLP}$  averaging window:  $t_1 = 70ns$  to  $t_2 = 90ns$ .

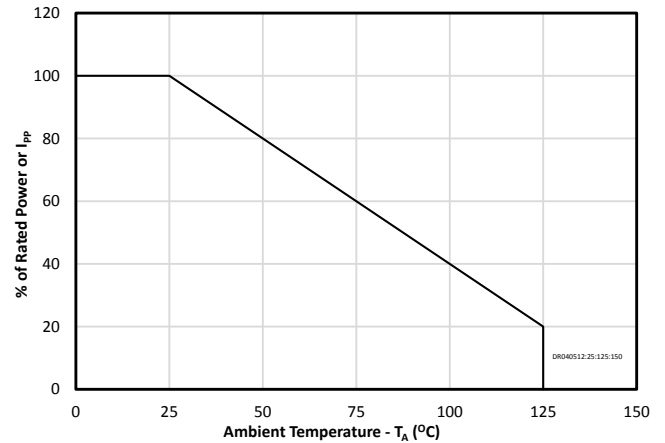
3) Dynamic resistance calculated from  $I_{TLP} = 4A$  to  $I_{TLP} = 16A$

# Typical Characteristics

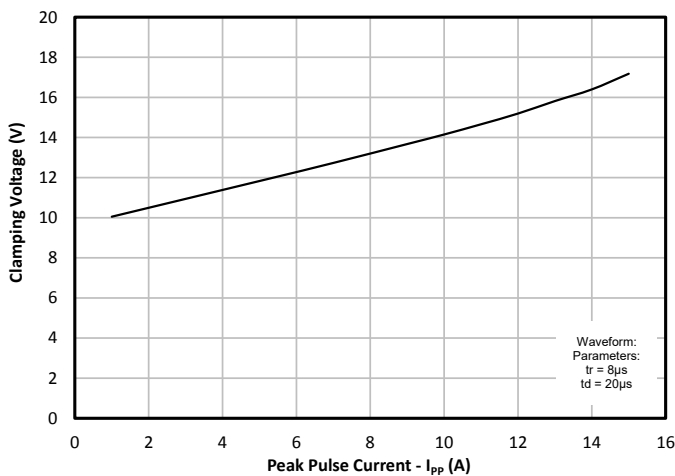
**Non Repetitive Peak Pulse Power vs. Pulse Time**



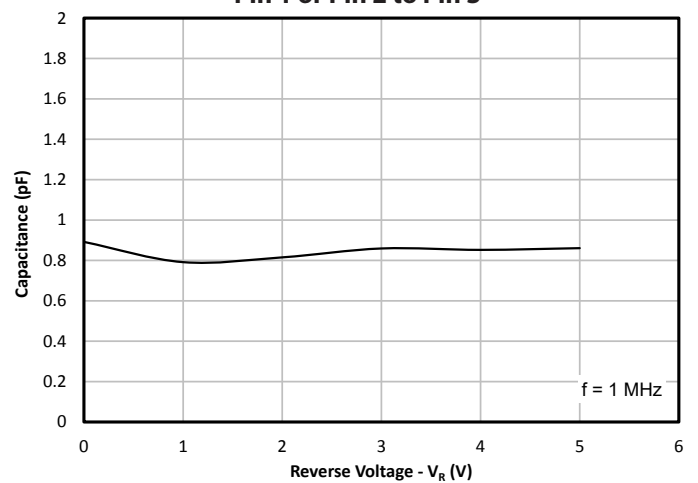
**Power Derating Curve**



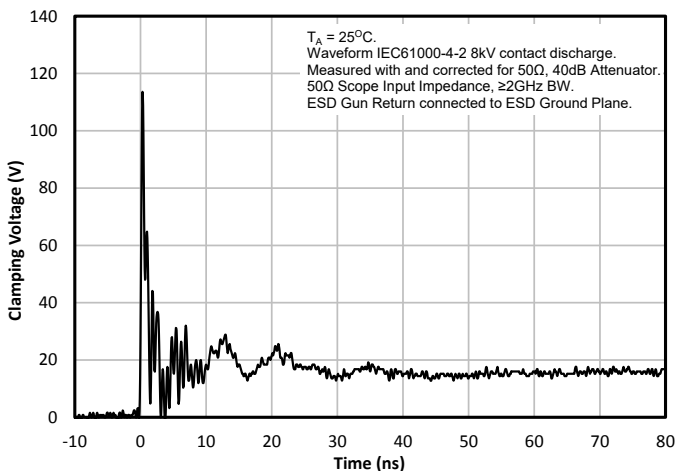
**Clamping Voltage vs. Peak Pulse Current ( $t_p=8/20\mu$ s)  
Pin 1 or Pin 2 to Pin 3**



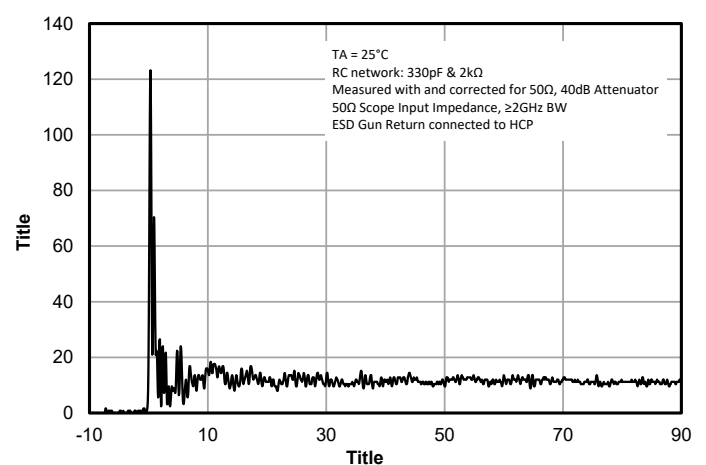
**Capacitance vs. Reverse Voltage  
Pin 1 or Pin 2 to Pin 3**



**ESD Clamping (8kV Contact per IEC 61000-4-2)  
Pin 1 or Pin 2 to Pin 3**

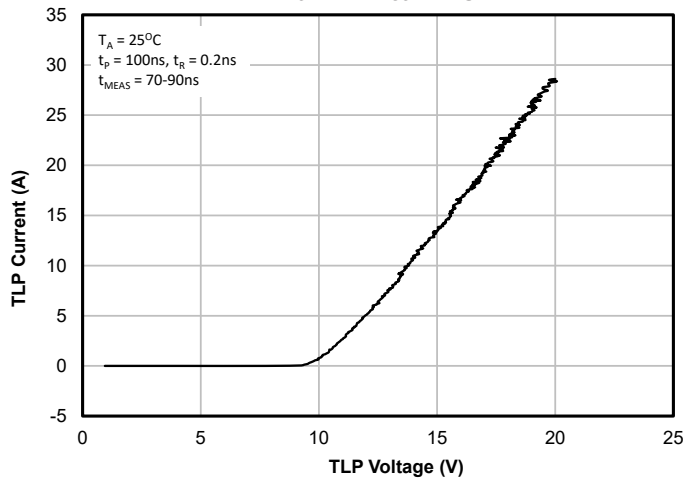


**ESD Clamping (+8kV Contact per ISO-10605 330pF, 2k $\Omega$ )  
Pin 1 or Pin 2 to Pin 3**

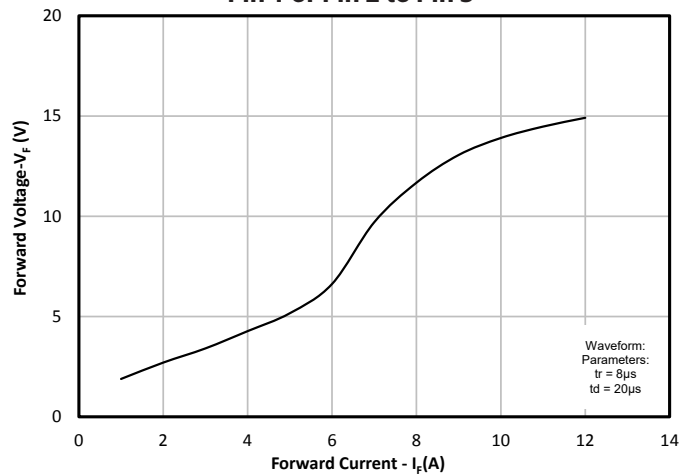


## Typical Characteristics (Continued)

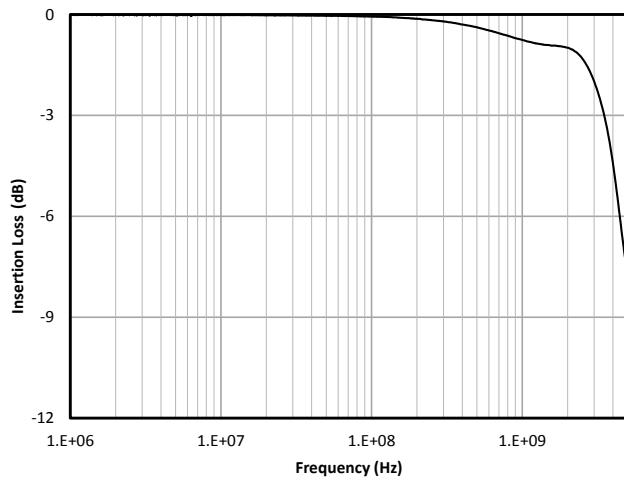
**TLP Characteristic**  
Pin 1 or Pin 2 to Pin 3



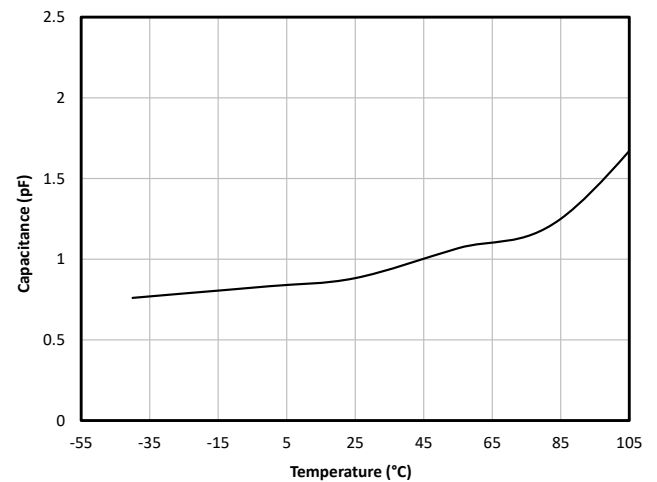
**Forward Voltage vs. Forward Current ( $t_p=8/20\mu\text{s}$ )**  
Pin 1 or Pin 2 to Pin 3



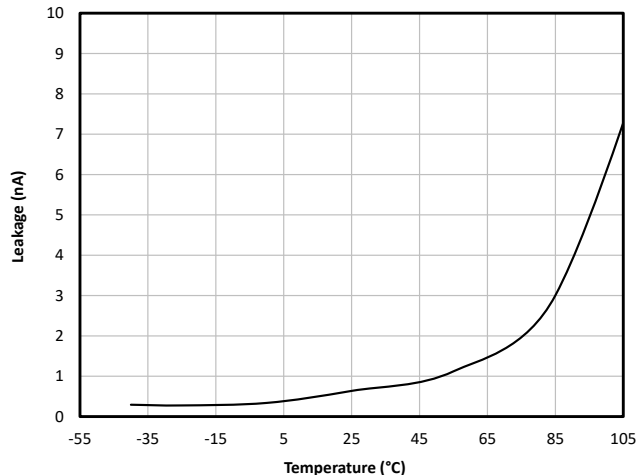
**Insertion Loss S21**  
Pin 1 or Pin 2 to Pin 3



**Capacitance vs. Temperature**



**Reverse Leakage Current vs. Temperature**  
Pin 1 or Pin 2 to Pin 3



## Application Information

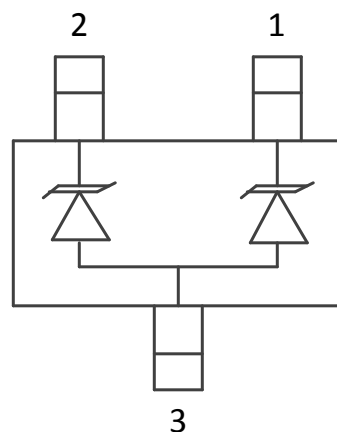
### Device Connection Options

This device is optimized for protection of two high speed data lines. The device is connected as follows: Protection of two lines is achieved by connecting data lines at pins 1 & 2. Pin 3 is connected to ground. The connection to ground should be made directly to a ground plane. The path length should also be kept as short as possible to minimize parasitic inductance.

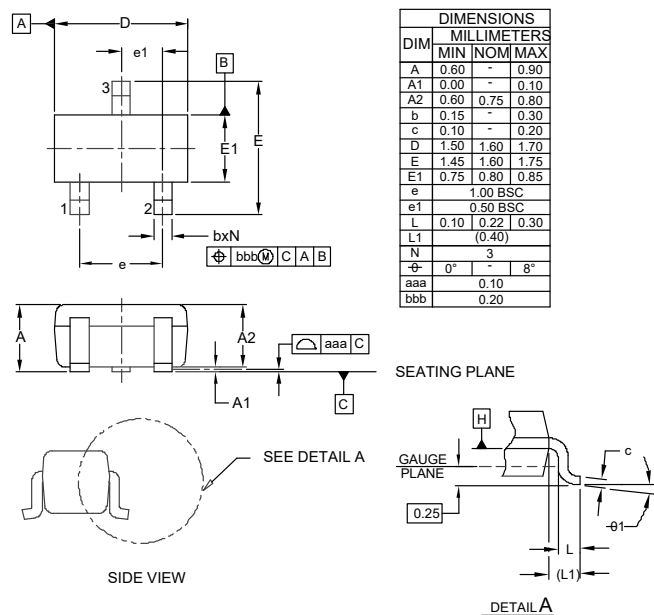
### Matte Tin Lead Finish

Matte tin has become the industry standard lead-free replacement for SnPb lead finishes. A matte tin finish is composed of 100% tin solder with large grains. Since the solder volume on the leads is small compared to the solder paste volume that is placed on the land pattern of the PCB, the reflow profile will be determined by the requirements of the solder paste. Therefore, these devices are compatible with both lead-free and SnPb assembly techniques. In addition, unlike other lead-free compositions, matte tin does not have any added alloys that can cause degradation of the solder joint.

Figure 1. Pin Configuration

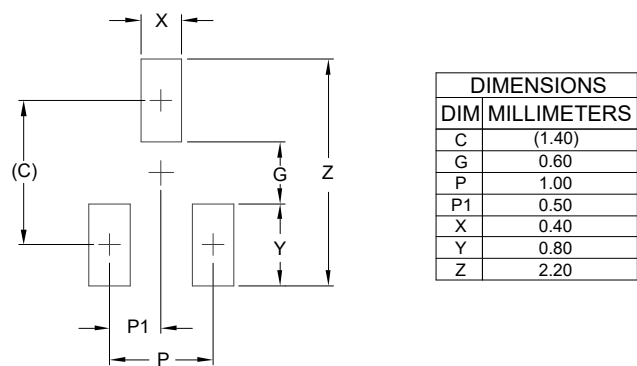


# Outline Drawing - SC75 3L



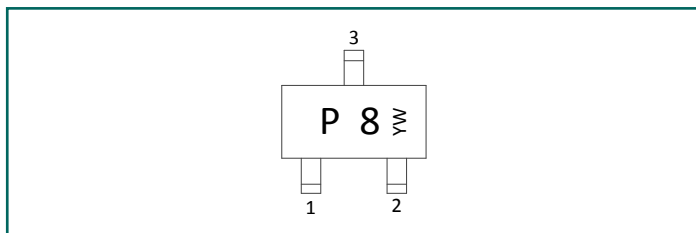
- NOTES:
1. CONTROLLING DIMENSIONS ARE IN MILLIMETERS (ANGLES IN DEGREES).
  2. DATUMS **-A-** AND **-B-** TO BE DETERMINED AT DATUM PLANE **-H-**
  3. DIMENSIONS "E1" AND "D" DO NOT INCLUDE MOLD FLASH, PROTRUSIONS OR GATE BURRS.

# Land Pattern - SC75 3L

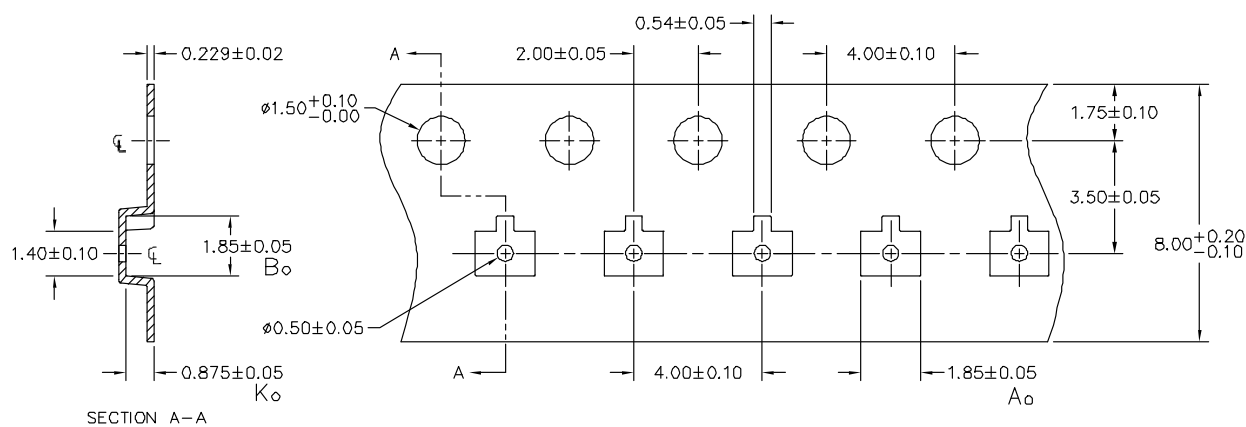


- NOTES:
1. CONTROLLING DIMENSIONS ARE IN MILLIMETERS (ANGLES IN DEGREES).
  2. THIS LAND PATTERN IS FOR REFERENCE PURPOSES ONLY  
CONSULT YOUR MANUFACTURING GROUP TO ENSURE YOUR  
COMPANY'S MANUFACTURING GUIDELINES ARE MET.

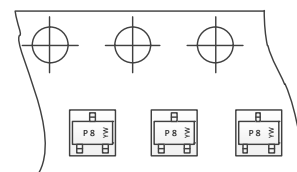
## Marking Code



## Tape and Reel Specification



NOTES: 1.) ALL DIMENSIONS IN MILLIMETERS UNLESS OTHERWISE SPECIFIED.



## Ordering Information

| Part Number     | Qty per Reel | Reel Size |
|-----------------|--------------|-----------|
| RClamp0582BQTCT | 3,000        | 7"        |



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