

**Features**

- Ultra small package: 0.6x0.3x0.3mm
- Protects one data or power line
- Ultra low leakage: nA level
- Low operating voltage: 5V
- Low clamping voltage
- 2-pin leadless package
- Complies with following standards:
  - IEC 61000-4-2 (ESD) immunity test  
Air discharge: ±30kV  
Contact discharge: ±30kV
  - IEC61000-4-4 (EFT) 40A (5/50ns)
  - IEC61000-4-5 (Lightning) 5A (8/20µs)
- RoHS Compliant

**Applications**

- Cellular Handsets and Accessories
- Personal Digital Assistants
- Notebooks and Handhelds
- Portable Instrumentation
- Digital Cameras
- Peripherals
- Audio Players
- Keypads, Side Keys, LCD Displays

**Mechanical Characteristics**

- Package: 0201
- Lead Finish: Sn
- Case Material: “Green” Molding Compound.
- UL Flammability Classification Rating 94V-0
- Moisture Sensitivity: Level 3 per J-STD-020

**Part Number Code**

|          |          |          |          |          |          |          |          |          |
|----------|----------|----------|----------|----------|----------|----------|----------|----------|
| <b>E</b> | <b>S</b> | <b>D</b> | <b>0</b> | <b>5</b> | <b>1</b> | <b>1</b> | <b>L</b> | <b>1</b> |
| <b>1</b> | <b>2</b> | <b>3</b> | <b>4</b> | <b>5</b> | <b>6</b> | <b>7</b> | <b>8</b> | <b>9</b> |

|              |                                       |
|--------------|---------------------------------------|
| Product Type |                                       |
| ESD          | TSK Electrostatic suppressor ESD Type |

|                             |      |
|-----------------------------|------|
| Reverse Working Voltage (V) |      |
| 3V3                         | 3.3V |
| 05                          | 5V   |
| 16                          | 16V  |

|      |        |
|------|--------|
| Line |        |
| 1    | 1-Line |
| 2    | 2-Line |
| 3    | 3-Line |

|                  |        |
|------------------|--------|
| Capacitance Type |        |
| L                | Low    |
| X                | Normal |

|             |     |
|-------------|-----|
| directional |     |
| 0           | Bi  |
| 1           | Uni |

|      |         |
|------|---------|
| Size |         |
| 1    | 0201    |
| 2    | 0402    |
| 3    | DFN0603 |
| 4    | DFN1006 |

★ Code 4 to 9 is optional

**Description**

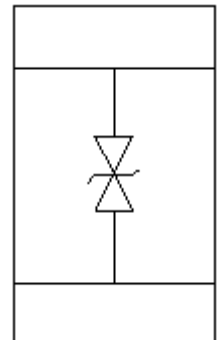
The ESD0510X1 is a bi-directional TVS diode, utilizing leading monolithic silicon technology to provide fast response time and low ESD clamping voltage, making this device an ideal solution for protecting voltage sensitive data and power line. The ESD0510X1 complies with the IEC 61000-4-2 (ESD) standard with ±15 kV air and ±8 kV contact discharge. It is assembled into an ultra-small 0.6x0.3x0.3mm lead-free 0201 package. The small size and high ESD surge protection make ESD0510X1 an ideal choice to protect cell phone, digital cameras, audio players and many other portable applications.



**Dimensions and Pin Configuration**



Package Outline



Circuit Schematic

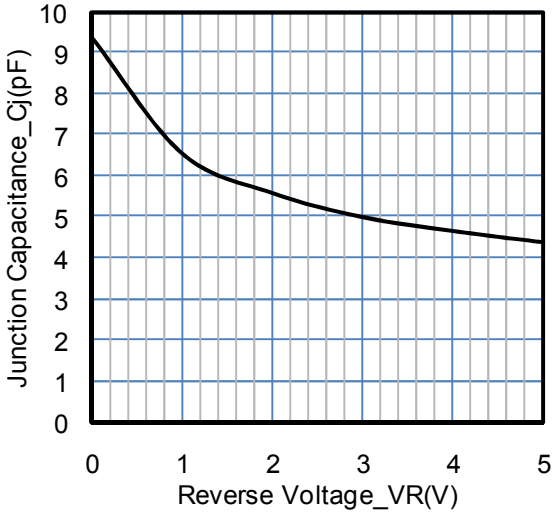
### Absolute Maximum Ratings ( $T_A=25^{\circ}\text{C}$ unless otherwise specified)

| Parameter                                | Symbol           | Value       | Unit               |
|--|------------------|-------------|--------------------|
| Peak Pulse Power (8/20 $\mu\text{s}$ )   | Ppk              | 60          | W                  |
| Peak Pulse Current (8/20 $\mu\text{s}$ ) | I <sub>PP</sub>  | 5           | A                  |
| ESD per IEC 61000-4-2 (Air)              | VESD             | $\pm 30$    | kV                 |
| ESD per IEC 61000-4-2 (Contact)          |                  | $\pm 30$    |                    |
| Operating Temperature Range              | T <sub>J</sub>   | -55 to +125 | $^{\circ}\text{C}$ |
| Storage Temperature Range                | T <sub>stg</sub> | -55 to +150 | $^{\circ}\text{C}$ |

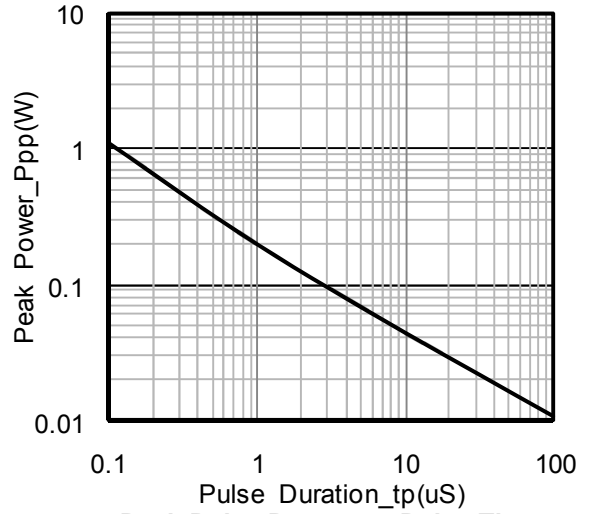
### Electrical Characteristics ( $T_A=25^{\circ}\text{C}$ unless otherwise specified)

| Parameter               | Symbol           | Min | Typ | Max | Unit | Test Condition                |
|-------------------------|------------------|-----|-----|-----|------|-------------------------------|
| Reverse Working Voltage | V <sub>RWM</sub> |     |     | 5   | V    |                               |
| Breakdown Voltage       | V <sub>BR</sub>  | 6   |     |     | V    | I <sub>T</sub> = 1mA          |
| Reverse Leakage Current | I <sub>R</sub>   |     |     | 200 | nA   | V <sub>RWM</sub> = 5V         |
| Clamping Voltage        | V <sub>C</sub>   |     |     | 8   | V    | I <sub>PP</sub> = 1A          |
| Clamping Voltage        | V <sub>C</sub>   |     |     | 12  | V    | I <sub>PP</sub> = 5A          |
| Junction Capacitance    | C <sub>J</sub>   |     |     | 10  | pF   | V <sub>R</sub> = 0V, f = 1MHz |

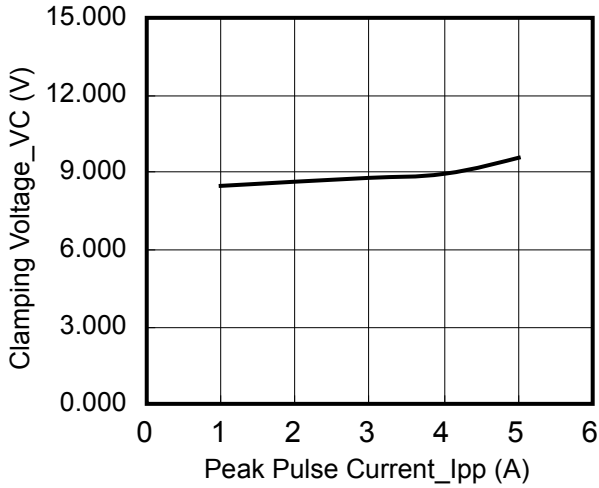
Typical Performance Characteristics (TA=25°C unless otherwise Specified)



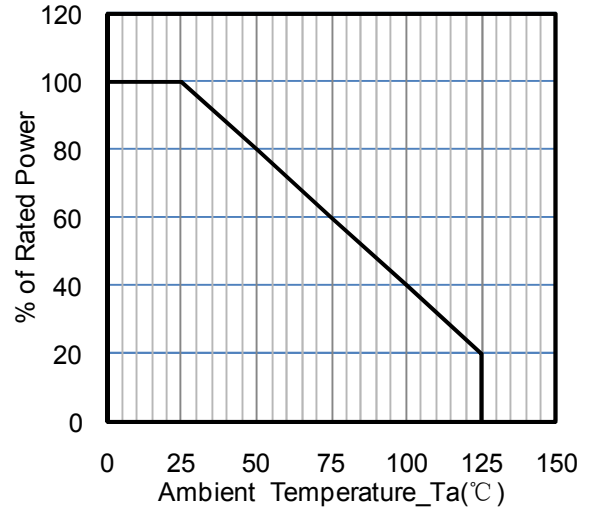
Junction Capacitance vs. Reverse Voltage



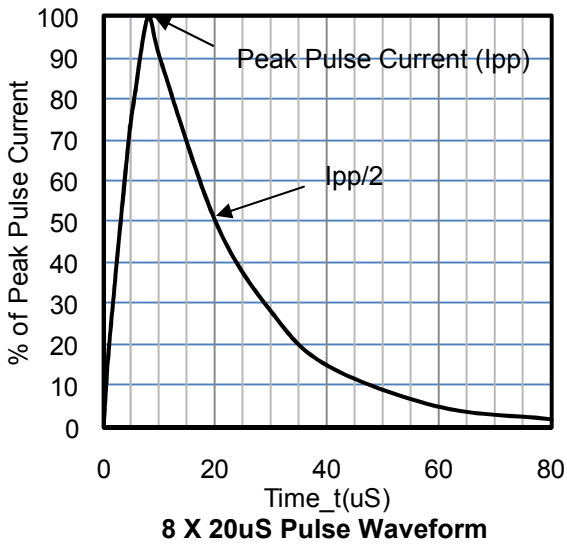
Peak Pulse Power vs. Pulse Time



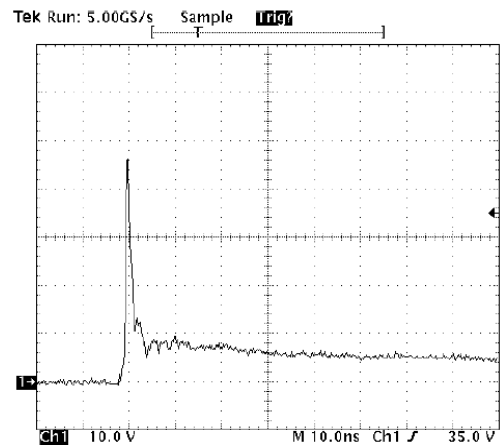
Clamping Voltage vs. Peak Pulse Current (tp = 8/20us)



Power Derating Curve



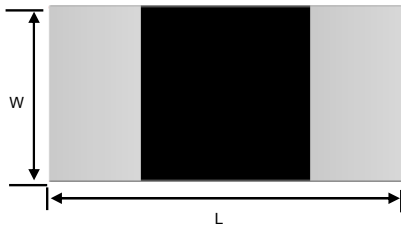
8 X 20uS Pulse Waveform



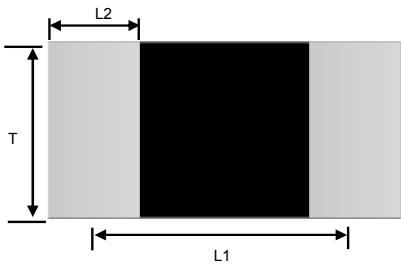
ESD Clamping Voltage

8 kV Contact per IEC61000-4-2

**0201 Package Outline Drawing**



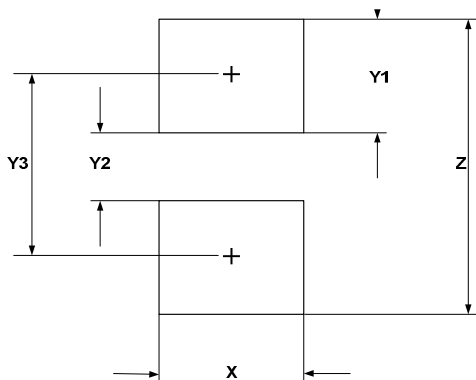
**Top View**



**Side View**

| SYM | DIMENSIONS  |      |      |           |       |       |
|-----|-------------|------|------|-----------|-------|-------|
|     | MILLIMETERS |      |      | INCHES    |       |       |
|     | MIN         | NOM  | MAX  | MIN       | NOM   | MAX   |
| W   | 0.25        | 0.30 | 0.35 | 0.010     | 0.012 | 0.014 |
| L   | 0.55        | 0.60 | 0.65 | 0.022     | 0.024 | 0.026 |
| T   | 0.25        | 0.30 | 0.35 | 0.010     | 0.012 | 0.014 |
| L1  | 0.30 BSC    |      |      | 0.012 BSC |       |       |
| L2  | 0.10        | 0.15 | 0.20 | 0.004     | 0.006 | 0.008 |

**Suggested Land Pattern**



| SYM | DIMENSIONS  |        |
|-----|-------------|--------|
|     | MILLIMETERS | INCHES |
| X   | 0.30        | 0.012  |
| Y1  | 0.25        | 0.010  |
| Y2  | 0.30        | 0.012  |
| Y3  | 0.55        | 0.022  |
| Z   | 0.80        | 0.032  |

**Ordering Information**

| Part Number | Packaging         | Reel Size |
|-------------|-------------------|-----------|
| ESD0510X1   | 10000/Tape & Reel | 7 inch    |