

# ESD5Z5.0C

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# ESD5Z5.0C

## Surface Mount Bi-Directional TVS For ESD Protection Diode-5.0V

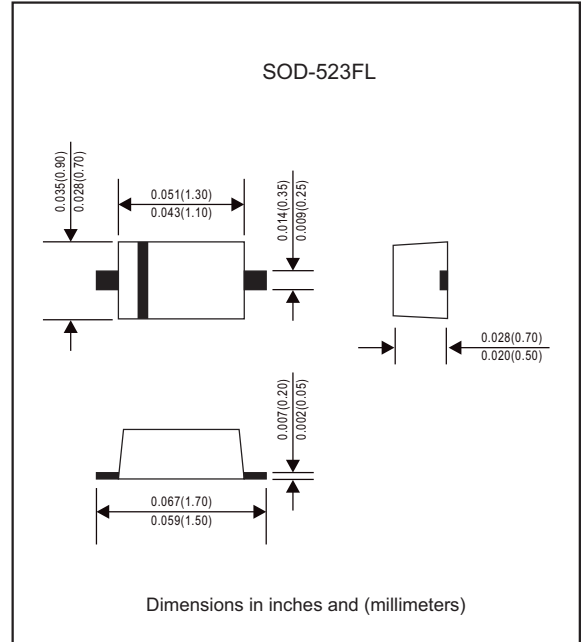
### Features

- Stand-off voltage: 5.0V
- Small body outline dimensions
- Low body height
- Peak power up to 174 watts@8x20µs pulse
- ESD rating of class 3 per human body model
- Low leakage current
- Response time is typically <1ns
- Provide transient protection:  
IEC 61000-4-2 (ESD) meets level 4, ±15kV (air), ±8kV (contact)  
IEC 61000-4-4 (EFT) 40A (5/50ns)  
IEC 61000-4-5 (Surge) 9.4A (8/20µs)
- Lead-free parts meet RoHS requirements
- Suffix "-H" indicates Halogen-free part, ex.ESD5Z5.0C-H

### Mechanical data

- Epoxy:UL94-V0 rated flame retardant
- Case : Molded plastic, SOD-523FL
- Terminals : Solder plated, solderable per MIL-STD-750, Method 2026
- Mounting Position : Any
- Weight : Approximated 0.002 gram

### Package outline



### Applications

- Cellular phones
- Portable devices
- Digital cameras
- Power supplies

### Maximum ratings (at T<sub>A</sub>=25°C unless otherwise noted)

| Parameter                        | Conditions   | Symbol | Limits      | Unit |
|----------------------------------|--|--------|-------------|------|
| Electrostatic discharge          | IEC61000-4-2 air discharge<br>IEC61000-4-2 contact discharge | ESD    | ±15<br>±8   | kV   |
| Electrostatic discharge          | IEC61000-4-4   | EFT    | 40          | A    |
| Peak pulse power                 | tp=8/20µs  | PPP    | 174         | W    |
| Lead solder temperature -maximum |  | TL     | 260(10s)    | °C   |
| Maximum junction temperature     |  | TJ     | +150        | °C   |
| Storage temperature range        |  | TSTG   | -55 to +155 | °C   |
| Operating temperature range      |  | TOP    | -55 to +150 | °C   |

### Electrical characteristics (at T<sub>A</sub>=25°C unless otherwise noted)

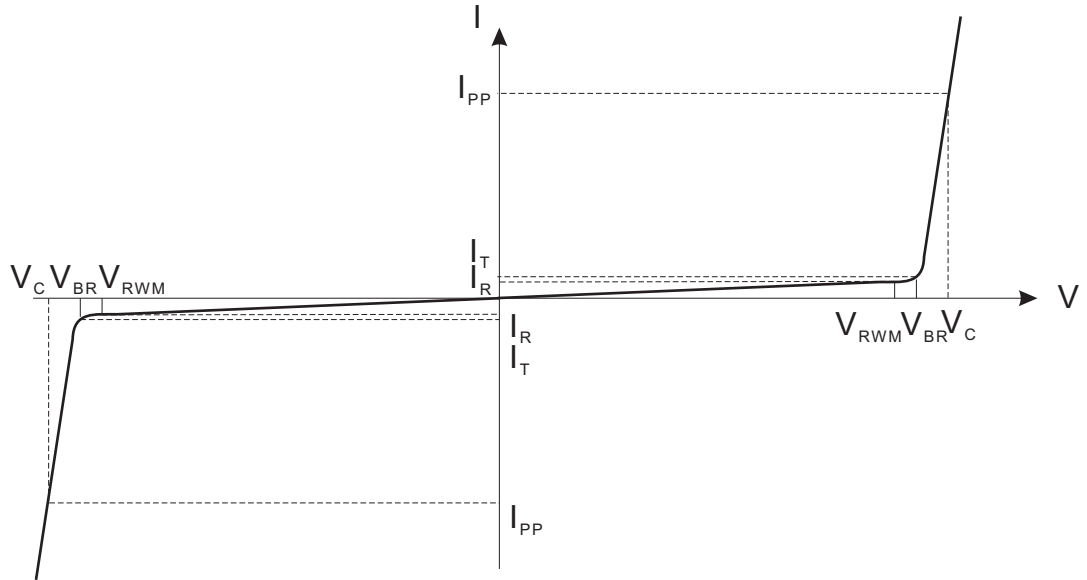
| Part No.  | V <sub>RWM</sub> (V)<br>Max | I <sub>R</sub> (µA)<br>@V <sub>RWM</sub><br>Max | V <sub>BR</sub> (V)@I <sub>T</sub><br>(Note 2) |     | I <sub>T</sub><br>(mA) | V <sub>C</sub> (V)(Note 1)<br>@ I <sub>PP</sub> =5.0A<br>Max | I <sub>PP</sub> (Note 1)<br>(A)<br>Max | V <sub>C</sub> (V)(Note 1)<br>@Max I <sub>PP</sub><br>Max | PPK<br>(W)<br>(Note 1)<br>Max | C <sub>J</sub> (pF)<br>V <sub>R</sub> =0V and<br>f=1MHz<br>Typ. |
|-----------|-----------------------------|---|--|-----|------------------------|--|--|---|-------------------------------|---|
|           |                             |   | Min.   | Max |                        |  |  |   |                               |   |
| ESD5Z5.0C | 5.0                         | 1.0   | 5.6  | 7.8 | 1.0                    | 11.6   | 9.4                                    | 18.6  | 174                           | 25  |

Notes 1: Surge current waveform per Fig.1

2: V<sub>BR</sub> is measured with a pulse test current I<sub>T</sub> at an ambient temperature of 25°C

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Typical characteristics (at  $T_A=25^\circ\text{C}$  unless otherwise noted)



Bi-Directional TVS

- $V_C$  : Clamping Voltage @  $I_{PP}$
- $I_{PP}$  : Maximum Reverse Peak Pulse Current
- $V_{RWM}$  : Maximum Working Peak Reverse voltage
- $I_R$  : Maximum Reverse Leakage Current @  $V_{RWM}$
- $V_{BR}$  : Breakdown voltage @  $I_T$
- $I_T$  : Test Current
- $C_J$  : Capacitance @  $V_R = 0\text{V}$  and  $f = 1\text{MHz}$

## Rating and characteristic curves (ESD5Z5.0C)

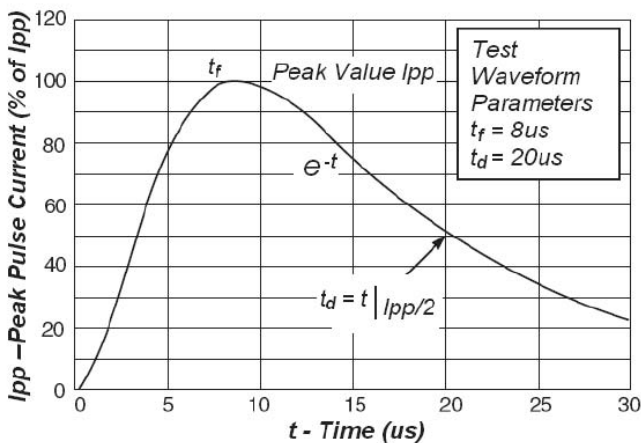


Fig1. Pulse Waveform

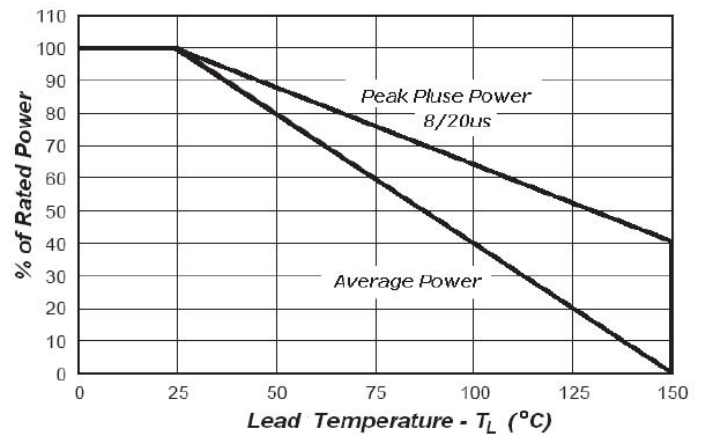


Fig2. Power Derating


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## Application Note

Electrostatic discharge (ESD) is a major cause of failure in electronic system. Transient Voltage Suppressors (TVS) are an ideal choice for ESD protection. They are capable of clamping the incoming transient to a low enough level such that damage to the protected semiconductor is prevented. Surface mount TVS offers the best choice for minimal lead inductance. They serve as parallel protection elements, connected between the signal lines to ground. As the transient rise above the operating voltage of the device, the TVS becomes a low impedance path diverting the transient current to ground. The ESD5Z is the ideal board level protection of ESD sensitive semiconductor components.

The tiny SOD-523FL package allows design flexibility in the design of high density boards where the space is at a premium. This enables to shorten the routing and contributes to hardening against ESD.

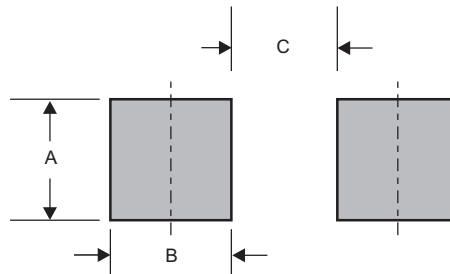
## Pinning information

| Pin            | Symbol  |
|----------------|---|
| Bi-Directional |  |

## Marking

| Type number | Marking code |
|-------------|--------------|
| ESD5Z5.0C   | 5C           |

## Suggested solder pad layout

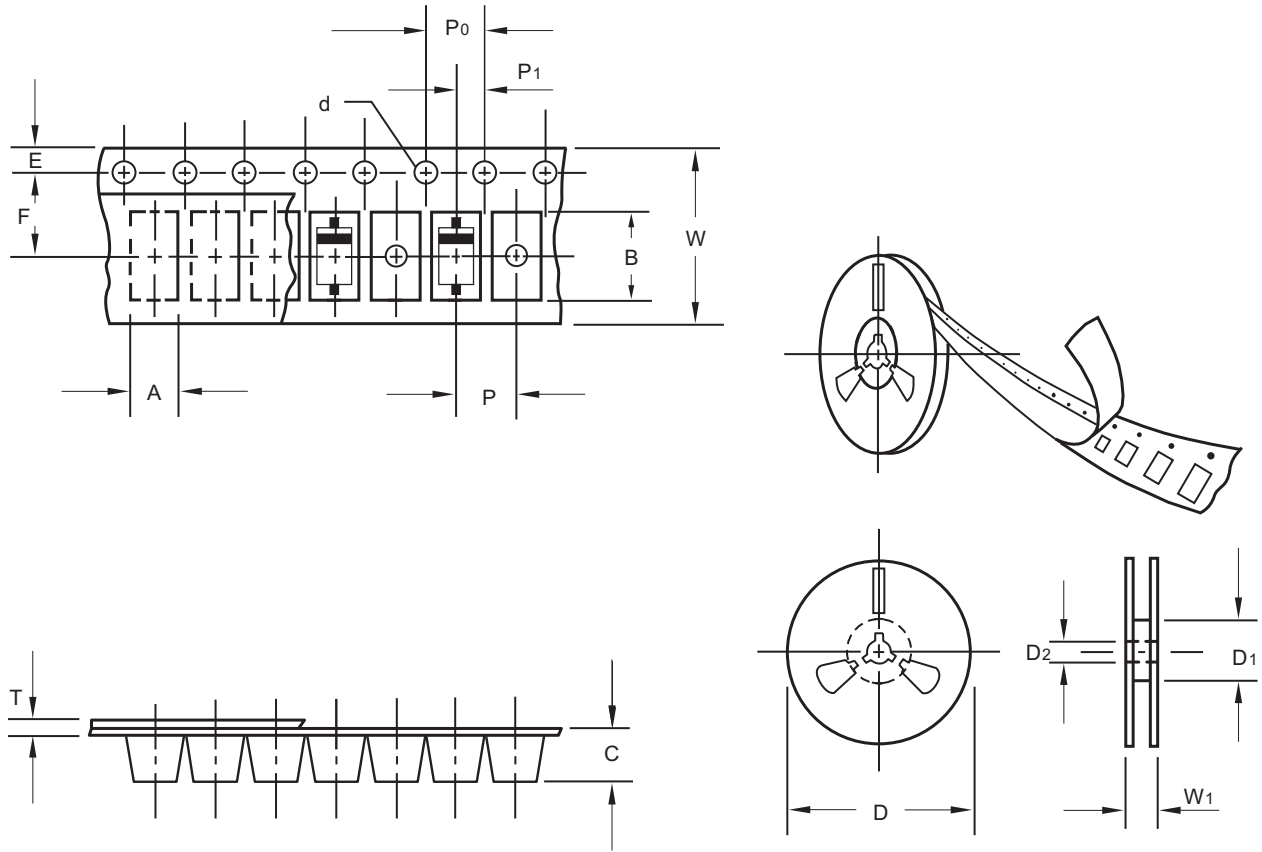


Dimensions in inches and (millimeters)

| PACKAGE   | A            | B            | C            |
|-----------|--------------|--------------|--------------|
| SOD-523FL | 0.032 (0.80) | 0.024 (0.60) | 0.044 (1.10) |

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## Packing information



unit:mm

| Item                     | Symbol | Tolerance | SOD-523FL |
|--------------------------|--------|-----------|-----------|
| Carrier width            | A      | 0.05      | 0.96      |
| Carrier length           | B      | 0.05      | 1.94      |
| Carrier depth            | C      | 0.1       | 0.76      |
| Sprocket hole            | d      | 0.1       | 1.50      |
| 7" Reel outside diameter | D      | 1.0       | 178.00    |
| 7" Reel inner diameter   | D1     | 0.4       | 54.40     |
| Feed hole diameter       | D2     | 0.05      | 1.30      |
| Sprocket hole position   | E      | 0.01      | 1.75      |
| Punch hole position      | F      | 0.05      | 3.50      |
| Punch hole pitch         | P      | 0.05      | 2.00      |
| Sprocket hole pitch      | P0     | 0.1       | 4.00      |
| Embossment center        | P1     | 0.05      | 2.00      |
| Overall tape thickness   | T      | 0.02      | 0.18      |
| Tape width               | W      | 0.4       | 8.00      |
| Reel width               | W1     | 0.2       | 12.30     |

Note: Devices are packed in accordance with EIA standard RS-481-A and specifications listed above.

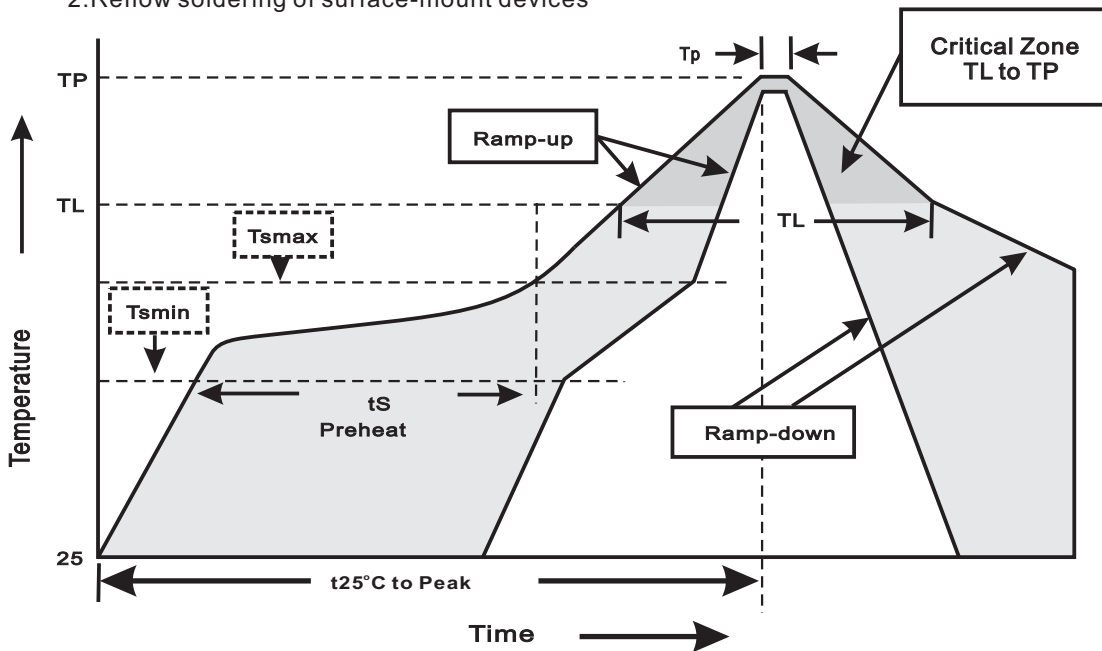
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## Reel packing

| PACKAGE   | REEL SIZE | REEL (pcs) | COMPONENT SPACING (m/m) | BOX (pcs) | INNER BOX (m/m) | REEL DIA. (m/m) | CARTON SIZE (m/m) | CARTON (pcs) | APPROX. GROSS WEIGHT (kg) |
|-----------|-----------|------------|-------------------------|-----------|-----------------|-----------------|-------------------|--------------|---------------------------|
| SOD-523FL | 7"        | 3,000      | 2.0                     | 30,000    | 183*123*183     | 178             | 382*257*387       | 240,000      | 9.5                       |

## Suggested thermal profiles for soldering processes

- 1.Storage environment: Temperature=5°C~40°C Humidity=55%±25%
- 2.Reflow soldering of surface-mount devices



### 3.Reflow soldering

| Profile Feature   | Soldering Condition         |
|---|-----------------------------|
| Average ramp-up rate(TL to TP)  | <3°C/sec                    |
| Preheat<br>-Temperature Min(T Amin)<br>-Temperature Max(Tsmax)<br>-Time(min to max)(ts) | 150°C<br>200°C<br>60~120sec |
| Tsmax to TL<br>-Ramp-upRate   | <3°C/sec                    |
| Time maintained above:<br>-Temperature(TL)<br>-Time(tL)                                 | 217°C<br>60~260sec          |
| Peak Temperature(TP)  | 255°C-0/+5°C                |
| Time within 5°C of actual Peak Temperature(tp)  | 10~30sec                    |
| Ramp-down Rate  | <6°C/sec                    |
| Time 25°C to Peak Temperature   | <6minutes                   |

**ESD5Z5.0C****High reliability test capabilities**

| Item Test                        | Conditions  | Reference                   |
|----------------------------------|---|-----------------------------|
| 1. Solder Resistance             | at 260±5°C for 10±2sec.   | MIL-STD-750D<br>METHOD-2031 |
| 2. Solderability                 | at 245±5°C for 5 sec.   | MIL-STD-202F<br>METHOD-208  |
| 3. High Temperature Reverse Bias | $V_{BR} = V_{BR} \text{ Min} * 80\%$ at $T_J=150^\circ\text{C}$ for 168 hrs.      | MIL-STD-750D<br>METHOD-1038 |
| 4. Pressure Cooker               | 15P <sub>SIG</sub> at $T_A=121^\circ\text{C}$ for 4 hrs.                          | JESD22-A102                 |
| 5. Temperature Cycling           | -55°C to +125°C dwelled for 30 min.<br>and transferred for 5min. total 10 cycles. | MIL-STD-750D<br>METHOD-1051 |
| 6. Humidity                      | at $T_A=85^\circ\text{C}$ , RH=85% for 1000hrs.                                   | MIL-STD-750D<br>METHOD-1021 |
| 7. High Temperature Storage Life | at 175°C for 1000 hrs.  | MIL-STD-750D<br>METHOD-1031 |