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PLED

1SMB59XXBT3G-MS

Product specification

Features

- Zener Voltage Range – 3.3 V to 200 V
- ESD Rating of Class 3 (> 16 kV) per Human Body Model
- Flat Handling Surface for Accurate Placement
- Package Design for Top Side or Bottom Circuit Board Mounting

Mechanical Characteristics:

CASE: Void-free, transfer-molded plastic

FINISH: All external surfaces are corrosion resistant and leads are readily solderable

MAXIMUM CASE TEMPERATURE FOR SOLDERING PURPOSES:

260°C for 10 seconds

LEADS: Modified L-Bend providing more contact area to bond pads

POLARITY: Cathode indicated by polarity band

FLAMMABILITY RATING: UL 94 V-0


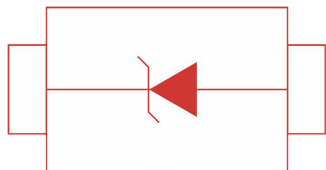
MAXIMUM RATINGS

| Rating | Symbol | Value | Unit |
|---|----------|-------------|---------------|
| Maximum Steady State Power Dissipation @ TL = 75°C Measured at Zero Lead Length Derate Above 75°C | PD | 3.0 | W |
| Thermal Resistance from Junction-to-Lead | RθJL | 40 25 | mW/°C °C/W |
| Maximum Steady State Power Dissipation @ TA = 25°C (Note) Derate Above 25°C | PD | 550 | mW |
| Thermal Resistance from Junction-to-Ambient | RθJA | 4.4 226 | mW/°C °C/W |
| Operating and Storage Temperature Range | TJ, Tstg | -65 to +150 | °C |

Stresses exceeding those listed in the Maximum Ratings table may damage the device. If any of these limits are exceeded, device functionality should not be assumed, damage may occur and reliability may be affected.

1. FR-4 board, using recommended footprint.

Reference News

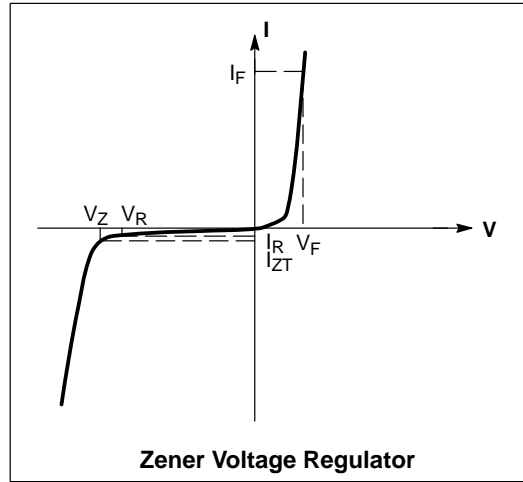
| PACKAGE OUTLINE | PIN CONFIGURATION |
|---|---|
|  |  |
| SMB(DO-214AA) | |

ELECTRICAL CHARACTERISTICS

(TL = 30°C unless otherwise noted,

VF = 1.5 V Max. @ IF = 200 mA(dc) for all types)

| Symbol | Parameter |
|--------|-------------------------------|
| VZ | Reverse Zener Voltage @ IZT |
| IZT | Reverse Current |
| ZZT | Maximum Zener Impedance @ IZT |
| IZK | Reverse Current |
| ZZK | Maximum Zener Impedance @ IZK |
| IR | Reverse Leakage Current @ VR |
| VR | Reverse Voltage |
| IF | Forward Current |
| VF | Forward Voltage @ IF |
| IZM | Maximum DC Zener Current |



ELECTRICAL CHARACTERISTICS ($T_L = 30$. C unless otherwise noted, $V_F = 1.5$ V Max. @ $I_F = 200$ mA(dc) for all types) (Devices listed in **bold, italic** are ON Semiconductor Preferred devices.)

| Device* (Note 2) | Device Marking | Zener Voltage (Note 3) | | | | Zener Impedance (Note 4) | | | Leakage Current | | I _{ZM} mA(dc) |
|------------------------|---------------------|------------------------|------------|--------------|-------------------|-----------------------------------|-----------------------------------|-------------|---------------------------------|-------------|---------------------------|
| | | V _Z (Volts) | | | @ I _{ZT} | Z _{ZT} @ I _{ZT} | Z _{ZK} @ I _{ZK} | | I _R @ V _R | | |
| | | Min | Nom | Max | mA | Ω | Ω | mA | μA | Volts | |
| 1SMB5913BT3G-MS | MSKSEMI 913B | 3.13 | 3.3 | 3.47 | 113.6 | 10 | 500 | 1 | 100 | 1 | 454 |
| 1SMB5914BT3G-MS | MSKSEMI 914B | 3.42 | 3.6 | 3.78 | 104.2 | 9 | 500 | 1 | 75 | 1 | 416 |
| 1SMB5915BT3G-MS | MSKSEMI 915B | 3.70 | 3.9 | 4.10 | 96.1 | 7.5 | 500 | 1 | 25 | 1 | 384 |
| 1SMB5916BT3G-MS | MSKSEMI 916B | 4.08 | 4.3 | 4.52 | 87.2 | 6 | 500 | 1 | 5 | 1 | 348 |
| 1SMB5917BT3G-MS | MSKSEMI 917B | 4.46 | 4.7 | 4.94 | 79.8 | 5 | 500 | 1 | 5 | 1.5 | 319 |
| 1SMB5918BT3G-MS | MSKSEMI 918B | 4.84 | 5.1 | 5.36 | 73.5 | 4 | 350 | 1 | 5 | 2 | 294 |
| 1SMB5919BT3G-MS | MSKSEMI 919B | 5.32 | 5.6 | 5.88 | 66.9 | 2 | 250 | 1 | 5 | 3 | 267 |
| 1SMB5920BT3G-MS | MSKSEMI 920B | 5.89 | 6.2 | 6.51 | 60.5 | 2 | 200 | 1 | 5 | 4 | 241 |
| 1SMB5921BT3G-MS | MSKSEMI 921B | 6.46 | 6.8 | 7.14 | 55.1 | 2.5 | 200 | 1 | 5 | 5.2 | 220 |
| 1SMB5922BT3G-MS | MSKSEMI 922B | 7.12 | 7.5 | 7.88 | 50 | 3 | 400 | 0.5 | 5 | 6 | 200 |
| 1SMB5923BT3G-MS | MSKSEMI 923B | 7.79 | 8.2 | 8.61 | 45.7 | 3.5 | 400 | 0.5 | 5 | 6.5 | 182 |
| 1SMB5924BT3G-MS | MSKSEMI 924B | 8.64 | 9.1 | 9.56 | 41.2 | 4 | 500 | 0.5 | 5 | 7 | 164 |
| 1SMB5925BT3G-MS | MSKSEMI 925B | 9.5 | 10 | 10.5 | 37.5 | 4.5 | 500 | 0.25 | 5 | 8 | 150 |
| 1SMB5926BT3G-MS | MSKSEMI 926B | 10.45 | 11 | 11.55 | 34.1 | 5.5 | 550 | 0.25 | 1 | 8.4 | 136 |
| 1SMB5927BT3G-MS | MSKSEMI 927B | 11.4 | 12 | 12.6 | 31.2 | 6.5 | 550 | 0.25 | 1 | 9.1 | 125 |
| 1SMB5928BT3G-MS | MSKSEMI 928B | 12.35 | 13 | 13.65 | 28.8 | 7 | 550 | 0.25 | 1 | 9.9 | 115 |
| 1SMB5929BT3G-MS | MSKSEMI 929B | 14.25 | 15 | 15.75 | 25 | 9 | 600 | 0.25 | 1 | 11.4 | 100 |
| 1SMB5930BT3G-MS | MSKSEMI 930B | 15.2 | 16 | 16.8 | 23.4 | 10 | 600 | 0.25 | 1 | 12.2 | 93 |
| 1SMB5931BT3G-MS | MSKSEMI 931B | 17.1 | 18 | 18.9 | 20.8 | 12 | 650 | 0.25 | 1 | 13.7 | 83 |
| 1SMB5932BT3G-MS | MSKSEMI 932B | 19 | 20 | 21 | 18.7 | 14 | 650 | 0.25 | 1 | 15.2 | 75 |
| 1SMB5933BT3G-MS | MSKSEMI 933B | 20.9 | 22 | 23.1 | 17 | 17.5 | 650 | 0.25 | 1 | 16.7 | 68 |
| 1SMB5934BT3G-MS | MSKSEMI 934B | 22.8 | 24 | 25.2 | 15.6 | 19 | 700 | 0.25 | 1 | 18.2 | 62 |
| 1SMB5935BT3G-MS | MSKSEMI 935B | 25.65 | 27 | 28.35 | 13.9 | 23 | 700 | 0.25 | 1 | 20.6 | 55 |
| 1SMB5936BT3G-MS | MSKSEMI 936B | 28.5 | 30 | 31.5 | 12.5 | 28 | 750 | 0.25 | 1 | 22.8 | 50 |
| 1SMB5937BT3G-MS | MSKSEMI 937B | 31.35 | 33 | 34.65 | 11.4 | 33 | 800 | 0.25 | 1 | 25.1 | 45 |
| 1SMB5938BT3G-MS | MSKSEMI 938B | 34.2 | 36 | 37.8 | 10.4 | 38 | 850 | 0.25 | 1 | 27.4 | 41 |
| 1SMB5939BT3G-MS | MSKSEMI 939B | 37.05 | 39 | 40.95 | 9.6 | 45 | 900 | 0.25 | 1 | 29.7 | 38 |
| 1SMB5940BT3G-MS | MSKSEMI 940B | 40.85 | 43 | 45.15 | 8.7 | 53 | 950 | 0.25 | 1 | 32.7 | 34 |
| 1SMB5941BT3G-MS | MSKSEMI 941B | 44.65 | 47 | 49.35 | 8 | 67 | 1000 | 0.25 | 1 | 35.8 | 31 |
| 1SMB5942BT3G-MS | MSKSEMI 942B | 48.45 | 51 | 53.55 | 7.3 | 70 | 1100 | 0.25 | 1 | 38.8 | 29 |
| 1SMB5943BT3G-MS | MSKSEMI 943B | 53.2 | 56 | 58.8 | 6.7 | 86 | 1300 | 0.25 | 1 | 42.6 | 26 |
| 1SMB5944BT3G-MS | MSKSEMI 944B | 58.9 | 62 | 65.1 | 6 | 100 | 1500 | 0.25 | 1 | 47.1 | 24 |
| 1SMB5945BT3G-MS | MSKSEMI 945B | 64.6 | 68 | 71.4 | 5.5 | 120 | 1700 | 0.25 | 1 | 51.7 | 22 |
| 1SMB5946BT3G-MS | MSKSEMI 946B | 71.25 | 75 | 78.75 | 5 | 140 | 2000 | 0.25 | 1 | 56 | 20 |
| 1SMB5947BT3G-MS | MSKSEMI 947B | 77.9 | 82 | 86.1 | 4.6 | 160 | 2500 | 0.25 | 1 | 62.2 | 18 |
| 1SMB5948BT3G-MS | MSKSEMI 948B | 86.45 | 91 | 95.55 | 4.1 | 200 | 3000 | 0.25 | 1 | 69.2 | 16 |
| 1SMB5949BT3G-MS | MSKSEMI 949B | 95 | 100 | 105 | 3.7 | 250 | 3100 | 0.25 | 1 | 76 | 15 |
| 1SMB5951BT3G-MS | MSKSEMI 951B | 114 | 120 | 126 | 3.1 | 380 | 4500 | 0.25 | 1 | 91.2 | 12 |
| 1SMB5952BT3G-MS | MSKSEMI 952B | 123.5 | 130 | 136.5 | 2.9 | 450 | 5000 | 0.25 | 1 | 98.8 | 11 |
| 1SMB5953BT3G-MS | MSKSEMI 953B | 142.5 | 150 | 157.5 | 2.5 | 600 | 6000 | 0.25 | 1 | 114 | 10 |
| 1SMB5954BT3G-MS | MSKSEMI 954B | 152 | 160 | 168 | 2.3 | 700 | 6500 | 0.25 | 1 | 121.6 | 9 |
| 1SMB5955BT3G-MS | MSKSEMI 955B | 171 | 180 | 189 | 2.1 | 900 | 7000 | 0.25 | 1 | 136.8 | 8 |
| 1SMB5956BT3G-MS | MSKSEMI 956B | 190 | 200 | 210 | 1.9 | 1200 | 8000 | 0.25 | 1 | 152 | 7 |

2. **TOLERANCE AND TYPE NUMBER DESIGNATION** The type numbers listed indicate a tolerance of ±5%.

3. **ZENER VOLTAGE (V_Z) MEASUREMENT**

Nominal Zener voltage is measured with the device junction in thermal equilibrium with ambient temperature at 25. C.

4. **ZENER IMPEDANCE (Z_Z) DERIVATION** Z_{ZT} and Z_{ZK} are measured by dividing the ac voltage drop across the device by the ac current applied.

The specified limits are for I_{Z(ac)} = 0.1 I_{Z(dc)} with the ac frequency = 60 Hz.

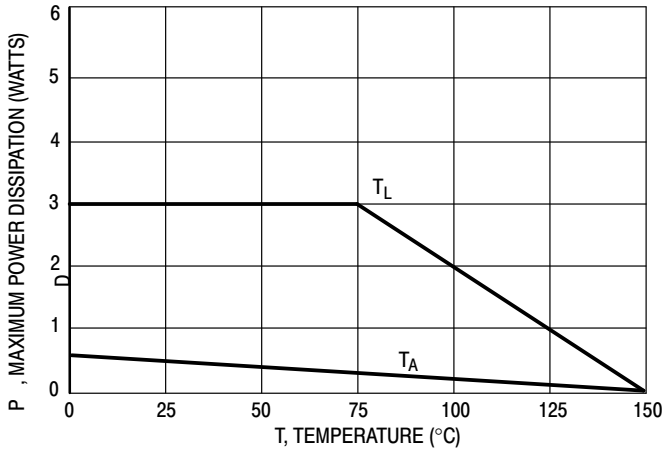


Figure 1. Steady State Power Derating

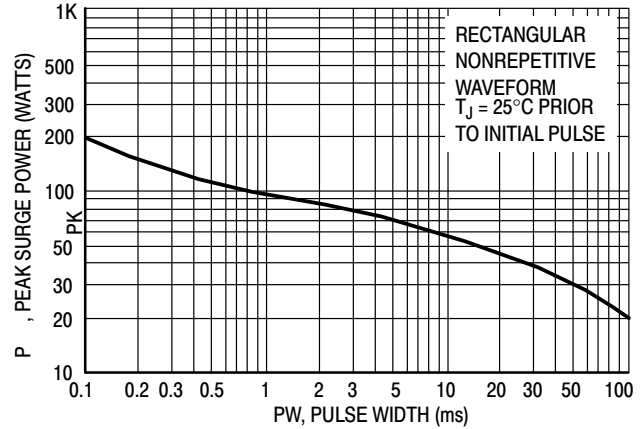


Figure 2. Maximum Surge Power

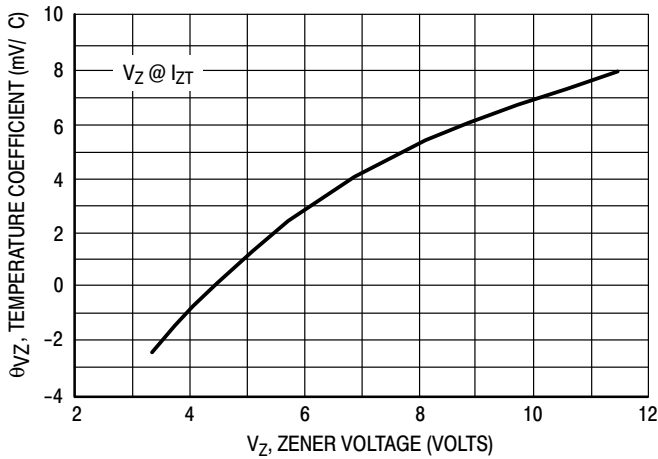


Figure 3. Zener Voltage - To 12 Volts

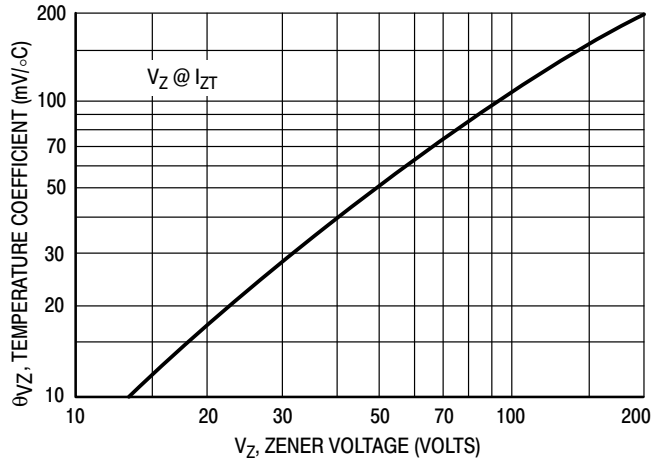


Figure 4. Zener Voltage - 14 To 200 Volts

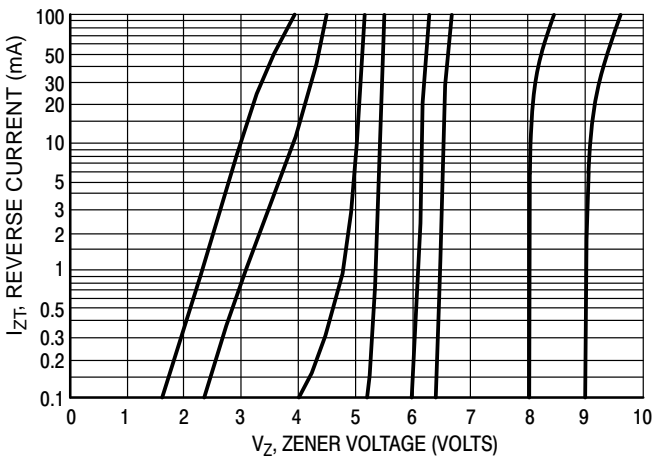


Figure 5. $V_Z = 3.3$ thru 10 Volts

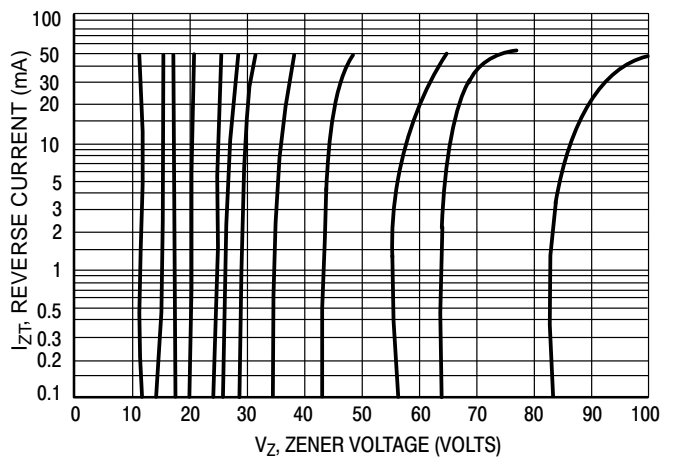


Figure 6. $V_Z = 12$ thru 82 Volts

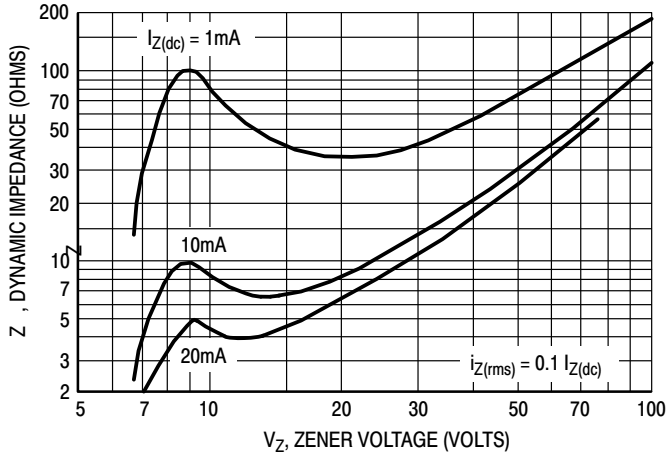


Figure 7. Effect of Zener Voltage

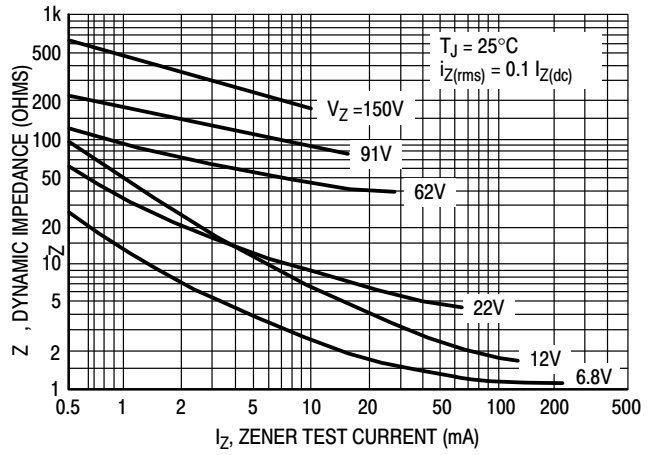


Figure 8. Effect of Zener Current

Rating and Typical Characteristic Curves ($T_A = 25^\circ\text{C}$)

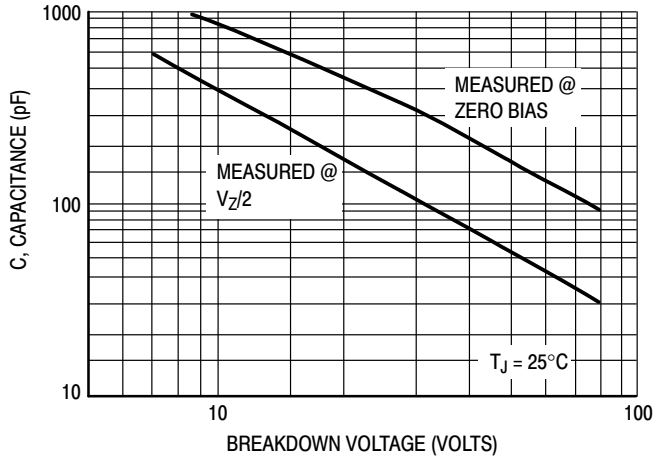


Figure 9. Capacitance Curve

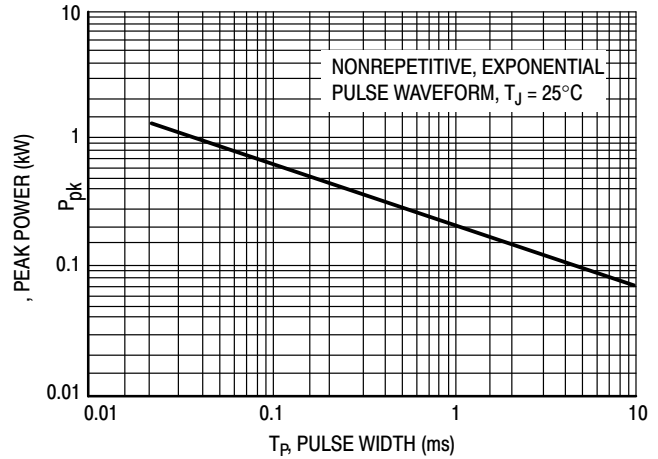


Figure 10. Typical Pulse Rating Curve

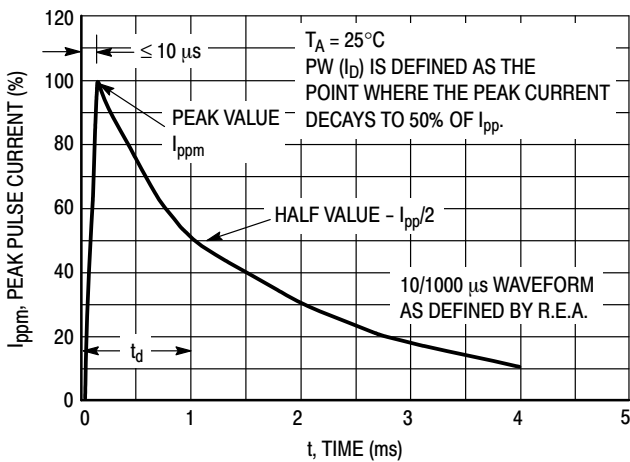


Figure 11. Pulse Waveform

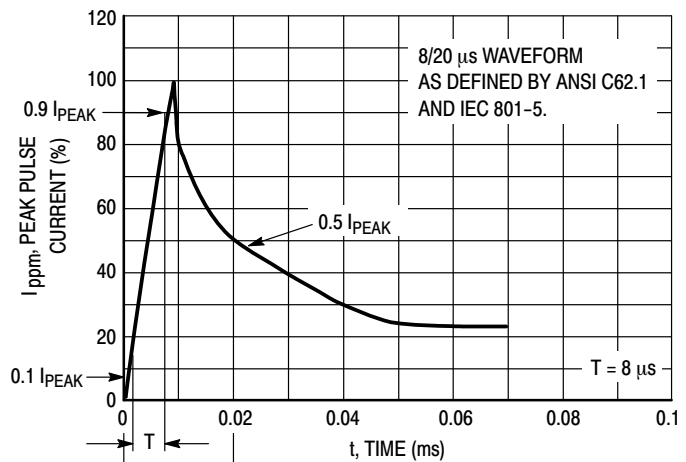
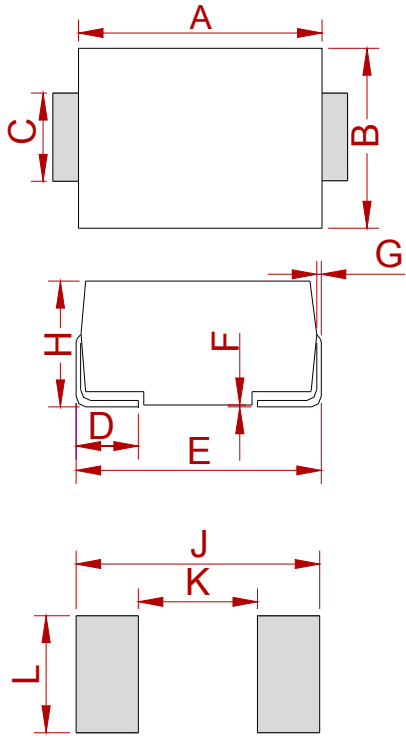


Figure 12. Pulse Waveform

PACKAGE MECHANICAL DATA



DO-214AA (SMB)

| Ref. | Dimensions | | | |
|------|-------------|-------|--------|-------|
| | Millimeters | | Inches | |
| | Min. | Max. | Min. | Max. |
| A | 4.25 | 4.75 | 0.167 | 0.187 |
| B | 3.30 | 3.94 | 0.130 | 0.155 |
| C | 1.85 | 2.21 | 0.073 | 0.087 |
| D | 0.76 | 1.52 | 0.030 | 0.060 |
| E | 5.08 | 5.59 | 0.200 | 0.220 |
| F | 0.051 | 0.203 | 0.002 | 0.008 |
| G | 0.15 | 0.31 | 0.006 | 0.012 |
| H | 2.11 | 2.44 | 0.083 | 0.096 |
| J | 6.80 | | 0.270 | |
| K | | 2.60 | | 0.100 |
| L | 2.40 | | 0.090 | |

REEL SPECIFICATION

| P/N | PKG | QTY |
|-----------------|-----|------|
| 1SMB59XXBT3G-MS | SMB | 2500 |

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