

# MSKSEMI 美森科

SEMICONDUCTOR



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PLED

**1SMA59XXBT3G-MS**

**Product specification**

**Features**

- Standard Zener Breakdown Voltage Range – 3.3 V to 68 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
- Low Profile Package
- Ideal Replacement for MELF Packages

**Mechanical Characteristics:**

**CASE:** Void-free, transfer-molded plastic

**FINISH:** All external surfaces are corrosion resistant with readily solderable leads

**MAXIMUM CASE TEMPERATURE FOR SOLDERING PURPOSES:**

260°C for 10 seconds

**POLARITY:** Cathode indicated by molded polarity notch or cathode band

**FLAMMABILITY RATING:** UL 94 V-0 @ 0.125 in


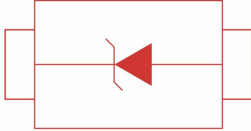
**MAXIMUM RATINGS**

| Rating   | Symbol         | Value             | Unit               |
|--|----------------|-------------------|--------------------|
| DC Power Dissipation @ TL = 75°C,<br>Measured Zero Lead Length (Note 1) Derate<br>above 75°C<br>Thermal Resistance, Junction-to-Lead | PD<br><br>RθJL | 1.5<br>20<br>50   | W<br>mW/°C<br>°C/W |
| DC Power Dissipation @ TA = 25°C (Note 2) Derate<br>above 25°C<br>Thermal Resistance, Junction-to-Ambient                            | PD<br><br>RθJA | 0.5<br>4.0<br>250 | W<br>mW/°C<br>°C/W |
| Operating and Storage Temperature Range  | TJ, Tstg       | -65 to<br>+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.

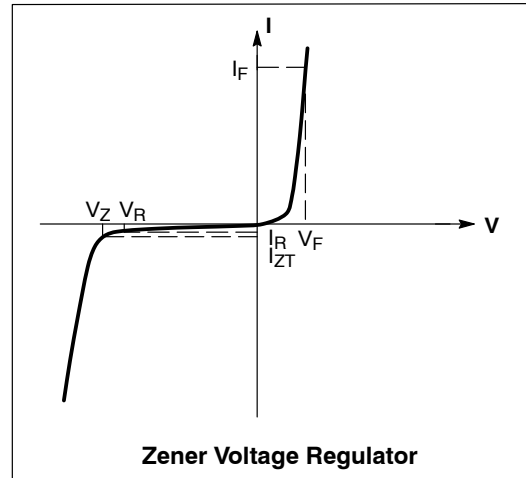
1. 1 in square copper pad, FR-4 board.
2. FR-4 Board, using **onsemi** minimum recommended footprint.

**Reference News**

| PACKAGE OUTLINE   | PIN CONFIGURATION   |
|---|---|
|  |  |
| SMA(DO-214AC)   |   |

**ELECTRICAL CHARACTERISTICS** (TA = 25°C  
unless otherwise noted, VF = 1.2 V Max. @ IF = 200  
mA 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** (TA = 25°C unless otherwise noted, VF = 1.2 V Max. @ IF = 200 mA for all types)

| Device* (Note 3) | Device Marking | Zener Voltage (Note 4) |     |       |       | Zener Impedance |           |         | Leakage Current |       | IZM |
|------------------|----------------|------------------------|-----|-------|-------|-----------------|-----------|---------|-----------------|-------|-----|
|                  |                | Vz(Volts)              |     |       | @ IZT | ZzT @ IZT       | Zzk @ IZK | IR @ VR |                 |       |     |
|                  |                | Min                    | Nom | Max   | mA    | Ω               | Ω         | mA      | μA              | Volts |     |
| 1SMA5913BT3G-MS  | MSKSEMI 813B   | 3.13                   | 3.3 | 3.47  | 113.6 | 10              | 500       | 1.0     | 50              | 1.0   | 455 |
| 1SMA5914BT3G-MS  | MSKSEMI 814B   | 3.42                   | 3.6 | 3.78  | 104.2 | 9.0             | 500       | 1.0     | 35.5            | 1.0   | 417 |
| 1SMA5915BT3G-MS  | MSKSEMI 815B   | 3.70                   | 3.9 | 4.10  | 96.1  | 7.5             | 500       | 1.0     | 12.5            | 1.0   | 385 |
| 1SMA5916BT3G-MS  | MSKSEMI 816B   | 4.08                   | 4.3 | 4.52  | 87.2  | 6.0             | 500       | 1.0     | 2.5             | 1.0   | 349 |
| 1SMA5917BT3G-MS  | MSKSEMI 817B   | 4.46                   | 4.7 | 4.94  | 79.8  | 5.0             | 500       | 1.0     | 2.5             | 1.5   | 319 |
| 1SMA5918BT3G-MS  | MSKSEMI 818B   | 4.84                   | 5.1 | 5.36  | 73.5  | 4.0             | 350       | 1.0     | 2.5             | 2.0   | 294 |
| 1SMA5919BT3G-MS  | MSKSEMI 819B   | 5.32                   | 5.6 | 5.88  | 66.9  | 2.0             | 250       | 1.0     | 2.5             | 3.0   | 268 |
| 1SMA5920BT3G-MS  | MSKSEMI 820B   | 5.89                   | 6.2 | 6.51  | 60.5  | 2.0             | 200       | 1.0     | 2.5             | 4.0   | 242 |
| 1SMA5921BT3G-MS  | MSKSEMI 821B   | 6.46                   | 6.8 | 7.14  | 55.1  | 2.5             | 200       | 1.0     | 2.5             | 5.2   | 221 |
| 1SMA5922BT3G-MS  | MSKSEMI 822B   | 7.12                   | 7.5 | 7.88  | 50    | 3.0             | 400       | 0.5     | 2.5             | 6.0   | 200 |
| 1SMA5923BT3G-MS  | MSKSEMI 823B   | 7.79                   | 8.2 | 8.61  | 45.7  | 3.5             | 400       | 0.5     | 2.5             | 6.5   | 183 |
| 1SMA5924BT3G-MS  | MSKSEMI 824B   | 8.64                   | 9.1 | 9.56  | 41.2  | 4.0             | 500       | 0.5     | 2.5             | 7.0   | 165 |
| 1SMA5925BT3G-MS  | MSKSEMI 825B   | 9.5                    | 10  | 10.5  | 37.5  | 4.5             | 500       | 0.25    | 2.5             | 8.0   | 150 |
| 1SMA5926BT3G-MS  | MSKSEMI 826B   | 10.45                  | 11  | 11.55 | 34.1  | 5.5             | 550       | 0.25    | 0.5             | 8.4   | 136 |
| 1SMA5927BT3G-MS  | MSKSEMI 827B   | 11.4                   | 12  | 12.6  | 31.2  | 6.5             | 550       | 0.25    | 0.5             | 9.1   | 125 |
| 1SMA5928BT3G-MS  | MSKSEMI 828B   | 12.35                  | 13  | 13.65 | 28.8  | 7.0             | 550       | 0.25    | 0.5             | 9.9   | 115 |
| 1SMA5929BT3G-MS  | MSKSEMI 829B   | 14.25                  | 15  | 15.75 | 25    | 9.0             | 600       | 0.25    | 0.5             | 11.4  | 100 |
| 1SMA5930BT3G-MS  | MSKSEMI 830B   | 15.2                   | 16  | 16.8  | 23.4  | 10              | 600       | 0.25    | 0.5             | 12.2  | 94  |
| 1SMA5931BT3G-MS  | MSKSEMI 831B   | 17.1                   | 18  | 18.9  | 20.8  | 12              | 650       | 0.25    | 0.5             | 13.7  | 83  |
| 1SMA5932BT3G-MS  | MSKSEMI 832B   | 19                     | 20  | 21    | 18.7  | 14              | 650       | 0.25    | 0.5             | 15.2  | 75  |
| 1SMA5933BT3G-MS  | MSKSEMI 833B   | 20.9                   | 22  | 23.1  | 17    | 17.5            | 650       | 0.25    | 0.5             | 16.7  | 68  |
| 1SMA5934BT3G-MS  | MSKSEMI 834B   | 22.8                   | 24  | 25.2  | 15.6  | 19              | 700       | 0.25    | 0.5             | 18.2  | 63  |
| 1SMA5935BT3G-MS  | MSKSEMI 835B   | 25.65                  | 27  | 28.35 | 13.9  | 23              | 700       | 0.25    | 0.5             | 20.6  | 56  |
| 1SMA5936BT3G-MS  | MSKSEMI 836B   | 28.5                   | 30  | 31.5  | 12.5  | 26              | 750       | 0.25    | 0.5             | 22.8  | 50  |
| 1SMA5937BT3G-MS  | MSKSEMI 837B   | 31.35                  | 33  | 34.65 | 11.4  | 33              | 800       | 0.25    | 0.5             | 25.1  | 45  |
| 1SMA5938BT3G-MS  | MSKSEMI 838B   | 34.2                   | 36  | 37.8  | 10.4  | 38              | 850       | 0.25    | 0.5             | 27.4  | 42  |
| 1SMA5939BT3G-MS  | MSKSEMI 839B   | 37.05                  | 39  | 40.95 | 9.6   | 45              | 900       | 0.25    | 0.5             | 29.7  | 38  |
| 1SMA5940BT3G-MS  | MSKSEMI 840B   | 40.85                  | 43  | 45.15 | 8.7   | 53              | 950       | 0.25    | 0.5             | 32.7  | 35  |
| 1SMA5941BT3G-MS  | MSKSEMI 841B   | 44.65                  | 47  | 49.35 | 8.0   | 67              | 1000      | 0.25    | 0.5             | 35.8  | 32  |
| 1SMA5942BT3G-MS  | MSKSEMI 842B   | 48.45                  | 51  | 53.55 | 7.3   | 70              | 1100      | 0.25    | 0.5             | 38.8  | 29  |
| 1SMA5943BT3G-MS  | MSKSEMI 843B   | 53.2                   | 56  | 58.8  | 6.7   | 86              | 1300      | 0.25    | 0.5             | 42.6  | 27  |
| 1SMA5945BT3G-MS  | MSKSEMI 845B   | 64.6                   | 68  | 71.4  | 5.5   | 120             | 1700      | 0.25    | 0.5             | 51.7  | 22  |

3. Tolerance and Voltage Regulation Designation – The type number listed indicates a tolerance of ±5%.

4. Vz limits are to be guaranteed at thermal equilibrium.

RATING AND TYPICAL CHARACTERISTIC CURVES (TA = 25°C)

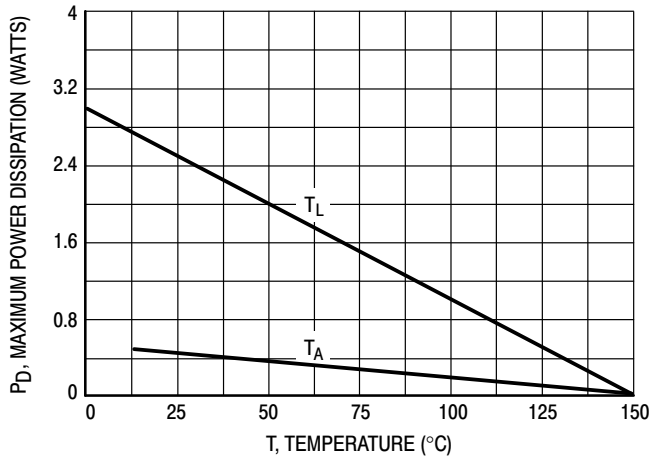


Figure 1. Steady State Power Derating

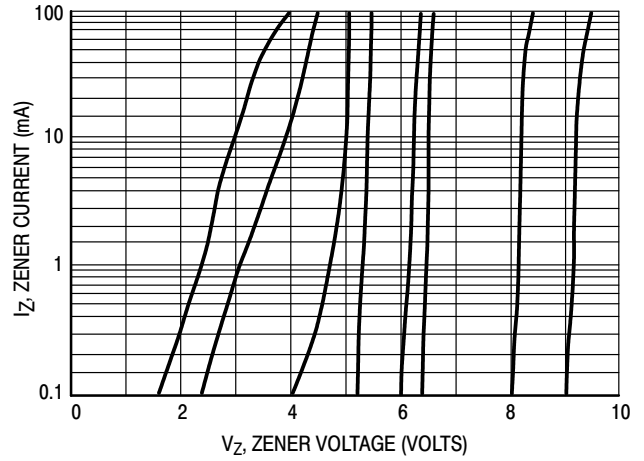


Figure 2.  $V_Z$  - 3.3 thru 10 Volts

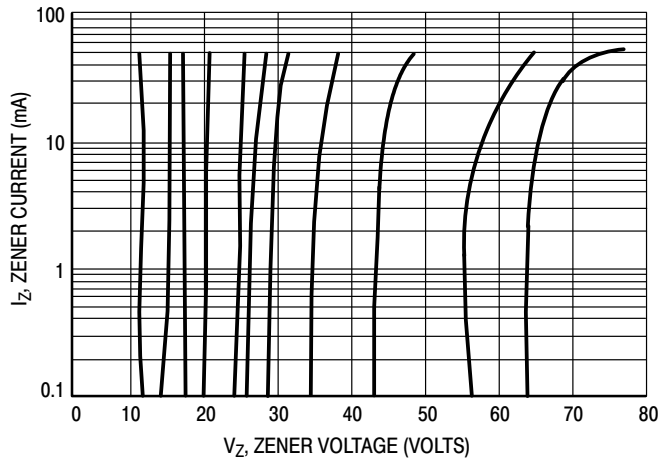


Figure 3.  $V_Z = 12$  thru 68 Volts

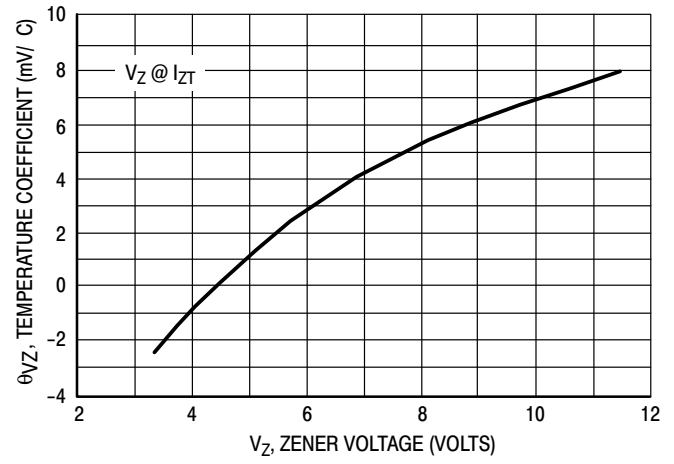


Figure 4. Zener Voltage - 3.3 to 12 Volts

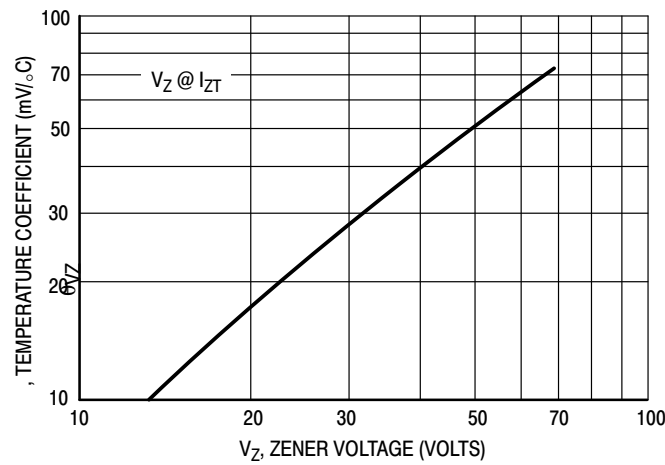


Figure 5. Zener Voltage - 12 to 68 Volts

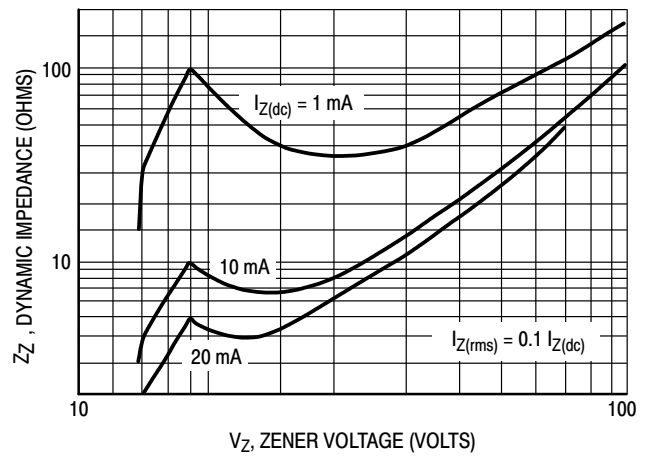
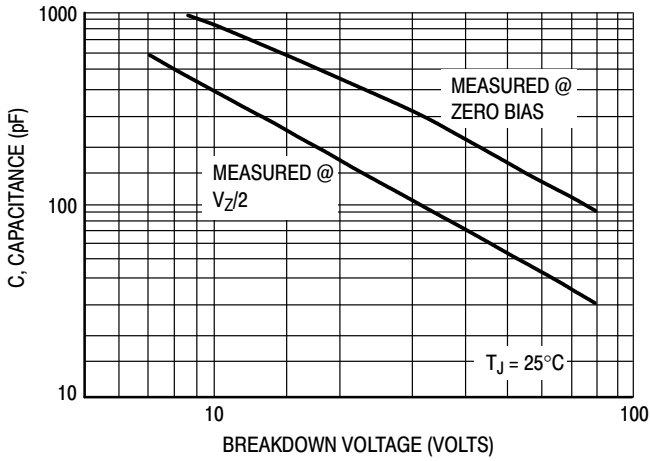
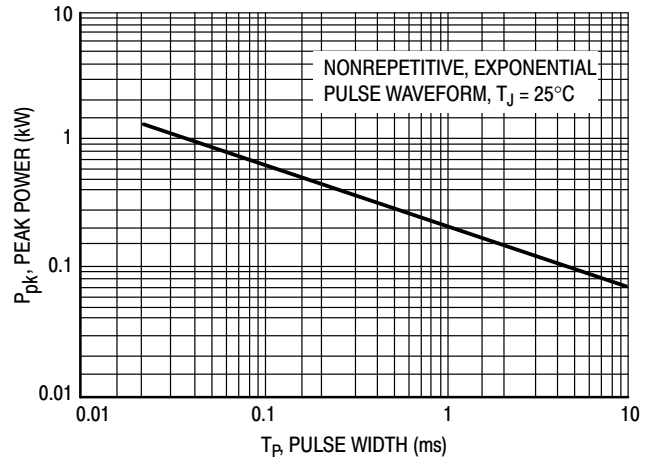


Figure 6. Effect of Zener Voltage

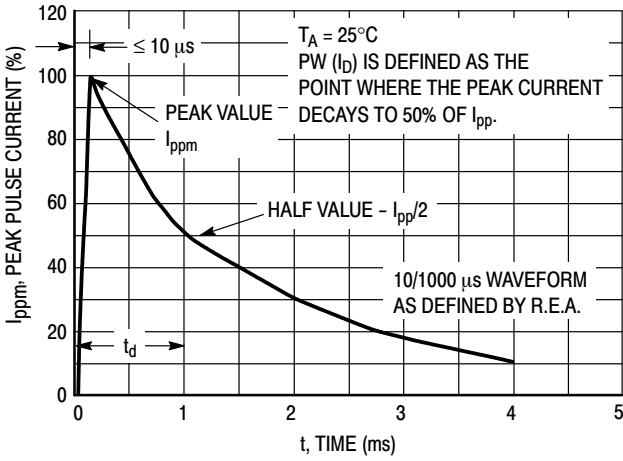
**RATING AND TYPICAL CHARACTERISTIC CURVES (TA = 25°C)**



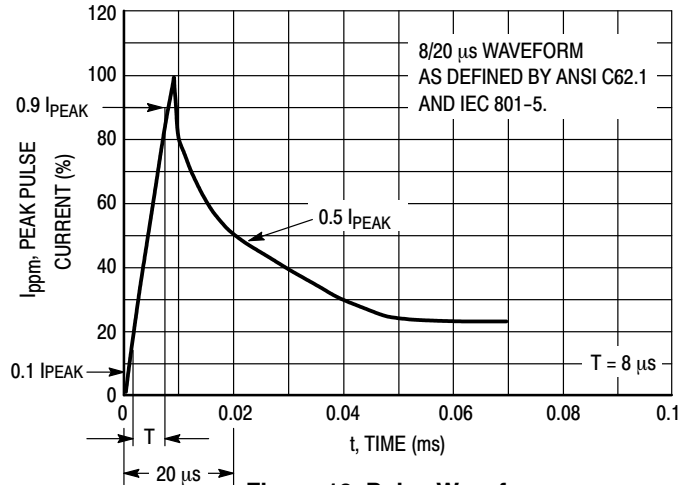
**Figure 7. Capacitance Curve**



**Figure 8. Typical Pulse Rating Curve**

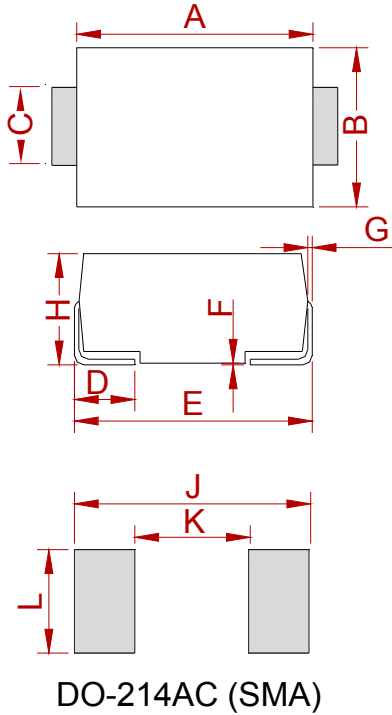


**Figure 9. Pulse Waveform**



**Figure 10. Pulse Waveform**

**PACKAGE MECHANICAL DATA**



| Ref. | Dimensions  |       |        |       |
|------|-------------|-------|--------|-------|
|      | Millimeters |       | Inches |       |
|      | Min.        | Max.  | Min.   | Max.  |
| A    | 4.25        | 4.65  | 0.167  | 0.183 |
| B    | 2.50        | 2.90  | 0.098  | 0.114 |
| C    | 1.35        | 1.65  | 0.053  | 0.065 |
| D    | 0.76        | 1.52  | 0.030  | 0.060 |
| E    | 4.93        | 5.28  | 0.194  | 0.208 |
| F    | 0.051       | 0.203 | 0.002  | 0.008 |
| G    | 0.15        | 0.31  | 0.006  | 0.012 |
| H    | 1.98        | 2.41  | 0.078  | 0.095 |
| J    | 6.50        |       | 0.256  |       |
| K    |             | 2.30  |        | 0.090 |
| L    | 1.70        |       | 0.067  |       |

**REEL SPECIFICATION**

| P/N             | PKG | QTY  |
|-----------------|-----|------|
| 1SMA59XXBT3G-MS | SMA | 2000 |

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