



## Features

- Standard Zener Breakdown Voltage Range – 2.0 V to 75 V
- Steady State Power Rating of 200 mW
- Small Body Outline Dimensions: 0.047" x 0.032" (1.20 mm x 0.80 mm)
- Low Body Height: 0.028" (0.7 mm)
- ESD Rating of Class 3 (>16 kV) per Human Body Model



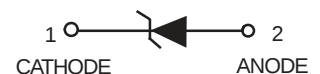
## Package Marking and Ordering Information

| Product ID | Pack                  | Marking | Qty(PCS) |
|------------|-----------------------|---------|----------|
| MM5ZXX     | SOD-523<br>(SOD-523F) | XX      | 3000     |

XX=Device code, see table on page2 the marking code.

The marking bar indicates the cathode.

SOD-523  
(SOD-523F)



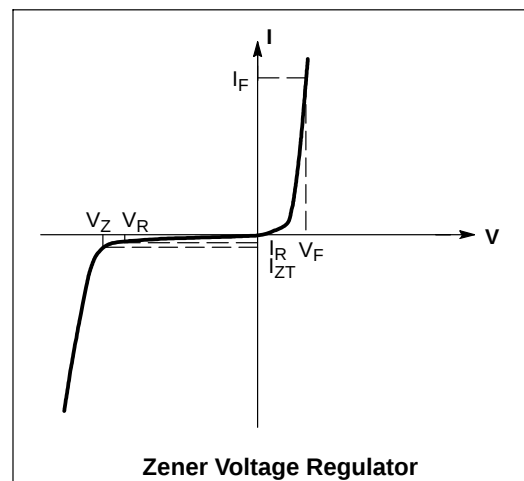
## Absolute Maximum Ratings(Ta=25°C)

| Rating                                                          | Symbol                            | Max            | Unit |
|-----------------------------------------------------------------|-----------------------------------|----------------|------|
| Total Device Dissipation FR-5 Board,<br>@ T <sub>A</sub> = 25°C | P <sub>D</sub>                    | 200            | mW   |
| Junction and Storage<br>Temperature Range                       | T <sub>J</sub> , T <sub>stg</sub> | -65 to<br>+150 | °C   |

## Electrical Characteristics

(T<sub>A</sub> = 25°C unless otherwise noted,  
V<sub>F</sub> = 0.9 V Max. @ I<sub>F</sub> = 10 mA for all types)

| Symbol          | Parameter                                           |
|-----------------|-----------------------------------------------------|
| V <sub>Z</sub>  | Reverse Zener Voltage @ I <sub>ZT</sub>             |
| I <sub>ZT</sub> | Reverse Current                                     |
| Z <sub>ZT</sub> | Maximum Zener Impedance @ I <sub>ZT</sub>           |
| I <sub>ZK</sub> | Reverse Current                                     |
| Z <sub>ZK</sub> | Maximum Zener Impedance @ I <sub>ZK</sub>           |
| I <sub>R</sub>  | Reverse Leakage Current @ V <sub>R</sub>            |
| V <sub>R</sub>  | Reverse Voltage                                     |
| I <sub>F</sub>  | Forward Current                                     |
| V <sub>F</sub>  | Forward Voltage @ I <sub>F</sub>                    |
| ΘV <sub>Z</sub> | Maximum Temperature Coefficient of V <sub>Z</sub>   |
| C               | Max. Capacitance @ V <sub>R</sub> = 0 and f = 1 MHz |





**Electrical Characteristics** ( $T_A = 25^\circ\text{C}$  unless otherwise noted,  $V_F = 0.9\text{ V}$  Max. @  $I_F = 10\text{ mA}$  for all types)

| Device  | Device Marking | Zener Voltage (Note 1) |       |      |                   | Zener Impedance                      |                                   |                                 | Leakage Current |       | θV <sub>Z</sub><br>(mV/k)<br>@ I <sub>ZT</sub> |      | C<br>@ V <sub>R</sub> = 0<br>f = 1 MHz |
|---------|----------------|------------------------|-------|------|-------------------|--------------------------------------|-----------------------------------|---------------------------------|-----------------|-------|------------------------------------------------|------|----------------------------------------|
|         |                | V <sub>Z</sub> (Volts) |       |      | @ I <sub>ZT</sub> | Z <sub>ZT</sub><br>@ I <sub>ZT</sub> | Z <sub>ZK</sub> @ I <sub>ZK</sub> | I <sub>R</sub> @ V <sub>R</sub> |                 |       |                                                |      |                                        |
|         |                | Min                    | Nom   | Max  | mA                | Ω                                    | Ω                                 | mA                              | μA              | Volts | Min                                            | Max  | pF                                     |
| MM5Z2V0 | WY             | 1.91                   | 2.0   | 2.09 | 5                 | 100                                  | 600                               | 1.0                             | 150             | 1.0   | -3.5                                           | 0    | 450                                    |
| MM5Z2V4 | 00             | 2.2                    | 2.4   | 2.6  | 5                 | 100                                  | 1000                              | 1.0                             | 50              | 1.0   | -3.5                                           | 0    | 450                                    |
| MM5Z2V7 | 01             | 2.5                    | 2.7   | 2.9  | 5                 | 100                                  | 1000                              | 1.0                             | 20              | 1.0   | -3.5                                           | 0    | 450                                    |
| MM5Z3V0 | 02             | 2.8                    | 3.0   | 3.2  | 5                 | 100                                  | 1000                              | 1.0                             | 10              | 1.0   | -3.5                                           | 0    | 450                                    |
| MM5Z3V3 | 05             | 3.1                    | 3.3   | 3.5  | 5                 | 95                                   | 1000                              | 1.0                             | 5               | 1.0   | -3.5                                           | 0    | 450                                    |
| MM5Z3V6 | 06             | 3.4                    | 3.6   | 3.8  | 5                 | 90                                   | 1000                              | 1.0                             | 5               | 1.0   | -3.5                                           | 0    | 450                                    |
| MM5Z3V9 | 07             | 3.7                    | 3.9   | 4.1  | 5                 | 90                                   | 1000                              | 1.0                             | 3               | 1.0   | -3.5                                           | -2.5 | 450                                    |
| MM5Z4V3 | 08             | 4.0                    | 4.3   | 4.6  | 5                 | 90                                   | 1000                              | 1.0                             | 3               | 1.0   | -3.5                                           | 0    | 450                                    |
| MM5Z4V7 | 09             | 4.4                    | 4.7   | 5.0  | 5                 | 80                                   | 800                               | 1.0                             | 3               | 2.0   | -3.5                                           | 0.2  | 260                                    |
| MM5Z5V1 | 0A             | 4.8                    | 5.1   | 5.4  | 5                 | 60                                   | 500                               | 1.0                             | 2               | 2.0   | -2.7                                           | 1.2  | 225                                    |
| MM5Z5V6 | W9             | 5.2                    | 5.6   | 6.0  | 5                 | 40                                   | 400                               | 1.0                             | 1               | 2.0   | -2.0                                           | 2.5  | 200                                    |
| MM5Z6V2 | 0E             | 5.8                    | 6.2   | 6.6  | 5                 | 10                                   | 100                               | 1.0                             | 3               | 4.0   | 0.4                                            | 3.7  | 185                                    |
| MM5Z6V8 | 0F             | 6.4                    | 6.8   | 7.2  | 5                 | 15                                   | 160                               | 1.0                             | 2               | 4.0   | 1.2                                            | 4.5  | 155                                    |
| MM5Z7V5 | 0G             | 7.0                    | 7.5   | 7.9  | 5                 | 15                                   | 160                               | 1.0                             | 1               | 5.0   | 2.5                                            | 5.3  | 140                                    |
| MM5Z8V2 | 0H             | 7.7                    | 8.2   | 8.7  | 5                 | 15                                   | 160                               | 1.0                             | 0.7             | 5.0   | 3.2                                            | 6.2  | 135                                    |
| MM5Z9V1 | 0K             | 8.5                    | 9.1   | 9.6  | 5                 | 15                                   | 160                               | 1.0                             | 0.2             | 7.0   | 3.8                                            | 7.0  | 130                                    |
| MM5Z10V | 0L             | 9.4                    | 10    | 10.6 | 5                 | 20                                   | 160                               | 1.0                             | 0.1             | 8.0   | 4.5                                            | 8.0  | 130                                    |
| MM5Z11V | 0M             | 10.4                   | 11    | 11.6 | 5                 | 20                                   | 160                               | 1.0                             | 0.1             | 8.0   | 5.4                                            | 9.0  | 130                                    |
| MM5Z12V | 0N             | 11.4                   | 12    | 12.7 | 5                 | 25                                   | 80                                | 1.0                             | 0.1             | 8.0   | 6.0                                            | 10   | 130                                    |
| MM5Z13V | 0P             | 12.4                   | 13.25 | 14.1 | 5                 | 30                                   | 80                                | 1.0                             | 0.1             | 8.0   | 7.0                                            | 11   | 120                                    |
| MM5Z15V | 0T             | 14.3                   | 15    | 15.8 | 5                 | 30                                   | 200                               | 1.0                             | 0.05            | 10.5  | 9.2                                            | 13   | 110                                    |
| MM5Z16V | 0U             | 15.3                   | 16.2  | 17.1 | 2                 | 40                                   | 200                               | 1.0                             | 0.05            | 11.2  | 10.4                                           | 14   | 105                                    |
| MM5Z18V | 0W             | 16.8                   | 18    | 19.1 | 2                 | 45                                   | 225                               | 1.0                             | 0.05            | 12.6  | 12.4                                           | 16   | 100                                    |
| MM5Z20V | 0Z             | 18.8                   | 20    | 21.2 | 2                 | 55                                   | 225                               | 1.0                             | 0.05            | 14.0  | 14.4                                           | 18   | 85                                     |
| MM5Z22V | 10             | 20.8                   | 22    | 23.3 | 2                 | 55                                   | 250                               | 1.0                             | 0.05            | 15.4  | 16.4                                           | 20   | 85                                     |
| MM5Z24V | 11             | 22.8                   | 24.2  | 25.6 | 2                 | 70                                   | 120                               | 1.0                             | 0.05            | 16.8  | 18.4                                           | 22   | 80                                     |
| MM5Z27V | 12             | 25.1                   | 27    | 28.9 | 2                 | 80                                   | 300                               | 1.0                             | 0.05            | 18.9  | 21.4                                           | 25.3 | 70                                     |
| MM5Z30V | 14             | 28                     | 30    | 32   | 2                 | 80                                   | 300                               | 1.0                             | 0.05            | 21.0  | 24.4                                           | 29.4 | 70                                     |
| MM5Z33V | 18             | 31                     | 33    | 35   | 2                 | 80                                   | 300                               | 1.0                             | 0.05            | 23.2  | 27.4                                           | 33.4 | 70                                     |
| MM5Z36V | 19             | 34                     | 36    | 38   | 2                 | 90                                   | 500                               | 1.0                             | 0.05            | 25.2  | 30.4                                           | 37.4 | 70                                     |
| MM5Z39V | 20             | 37                     | 39    | 41   | 2                 | 130                                  | 500                               | 1.0                             | 0.05            | 27.3  | 33.4                                           | 41.2 | 45                                     |

1. Zener voltage is measured with a pulse test current  $I_Z$  at an ambient temperature of  $25^\circ\text{C}$ .



## Typical Characteristics

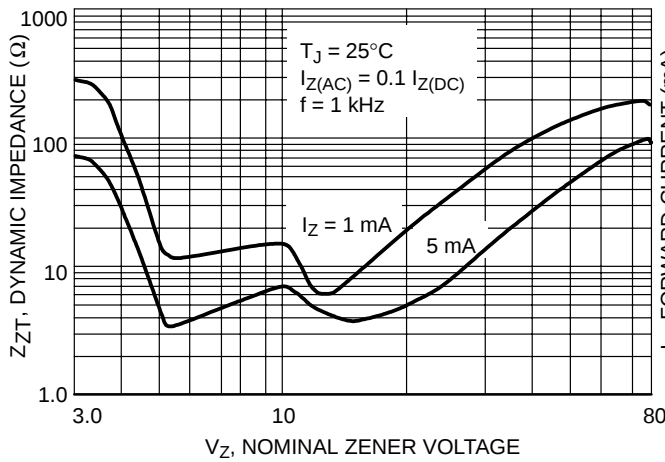


Figure 1. Effect of Zener Voltage on Zener Impedance

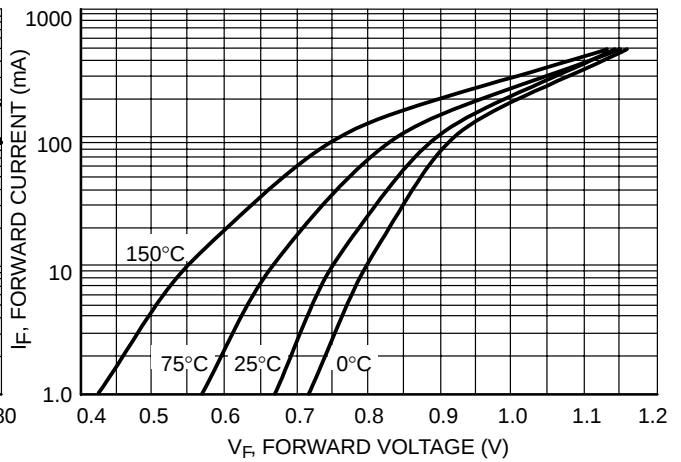


Figure 2. Typical Forward Voltage

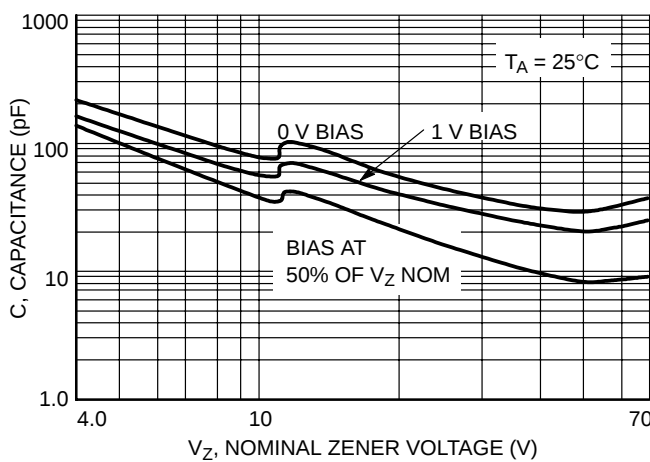


Figure 3. Typical Capacitance

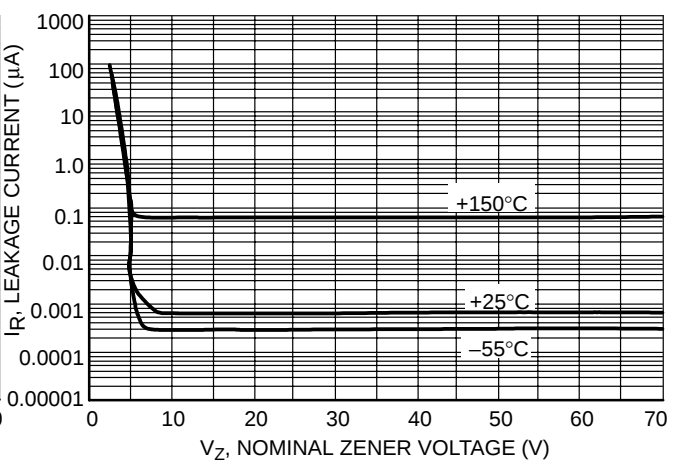


Figure 4. Typical Leakage Current



## Typical Characteristics

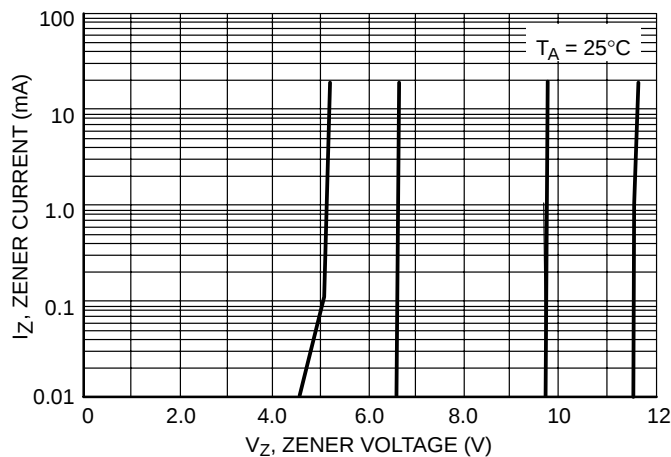


Figure 5. Zener Voltage versus Zener Current  
( $V_Z$  Up to 12 V)

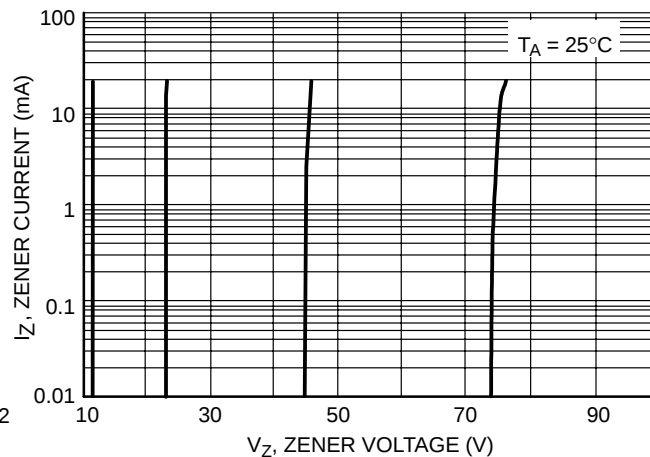


Figure 6. Zener Voltage versus Zener Current  
(12 V to 75 V)

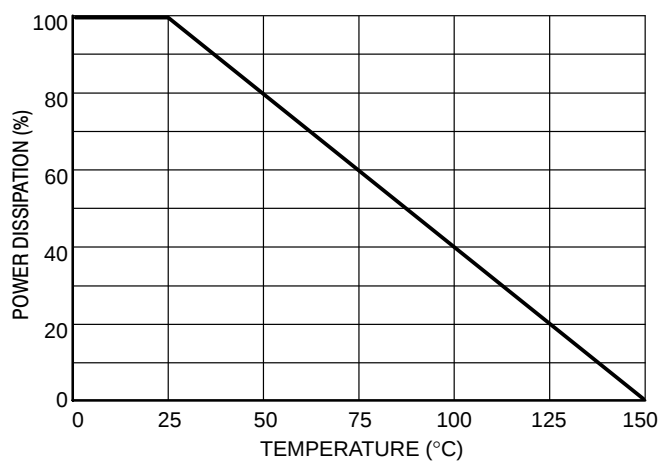
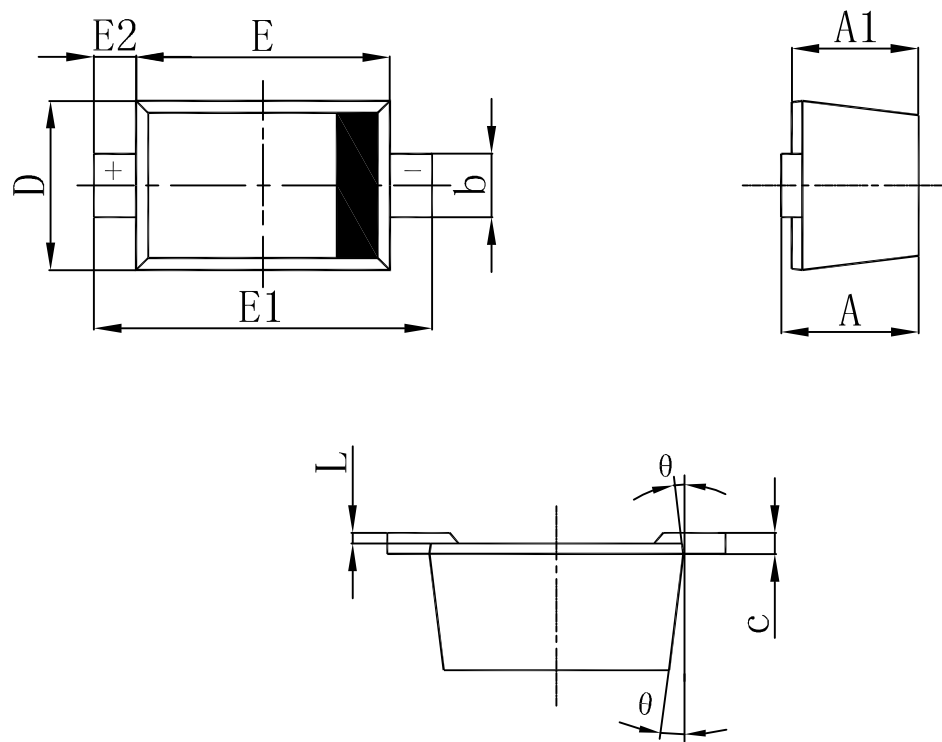


Figure 7. Steady State Power Derating



SOD-523(SOD-523F) Package Outline Dimensions



| Sym ol | imensions In Millimeters |       | imensions In Inches |       |
|--------|--------------------------|-------|---------------------|-------|
|        | Min                      | Max   | Min                 | Max   |
| A      | 0.510                    | 0.770 | 0.020               | 0.031 |
| A1     | 0.500                    | 0.700 | 0.020               | 0.028 |
| b      | 0.250                    | 0.350 | 0.010               | 0.014 |
| c      | 0.080                    | 0.150 | 0.003               | 0.006 |
| D      | 0.750                    | 0.850 | 0.030               | 0.033 |
| E      | 1.100                    | 1.300 | 0.043               | 0.051 |
| E1     | 1.500                    | 1.700 | 0.059               | 0.067 |
| E2     | 0.200 REF                |       | 0.008 REF           |       |
| L      | 0.010                    | 0.070 | 0.001               | 0.003 |
| θ      | 7° REF                   |       | 7° REF              |       |



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