

# Zener Voltage Regulators

## 500 mW SOD-323 Surface Mount

### MM3ZxxxT1G Series, SZMM3ZxxxT1G Series

This series of Zener diodes is packaged in a SOD-323 surface mount package that has a power dissipation of 500 mW. They are designed to provide voltage regulation protection and are especially attractive in situations where space is at a premium. They are well suited for applications such as cellular phones, hand held portables, and high density PC boards.

#### Specification Features:

- Standard Zener Breakdown Voltage Range – 2.4 V to 75 V
- Steady State Power Rating of 500 mW
- Small Body Outline Dimensions:  
0.067" x 0.049" (1.7 mm x 1.25 mm)
- Low Body Height: 0.035" (0.9 mm)
- Package Weight: 4.507 mg/Unit
- ESD Rating of Class 3 (> 16 kV) per Human Body Model
- SZ Prefix for Automotive and Other Applications Requiring Unique Site and Control Change Requirements; AEC-Q101 Qualified and PPAP Capable
- These are Pb-Free Devices\*

#### Mechanical Characteristics:

**CASE:** Void-free, Transfer-Molded Plastic

**FINISH:** All External Surfaces are Corrosion Resistant

#### MAXIMUM CASE TEMPERATURE FOR SOLDERING PURPOSES:

260°C for 10 Seconds

**LEADS:** Plated with Pb-Sn or Sn Only (Pb-Free)

**POLARITY:** Cathode Indicated by Polarity Band

**FLAMMABILITY RATING:** UL 94 V-0

**MOUNTING POSITION:** Any

#### MAXIMUM RATINGS

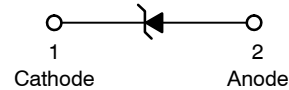
| Rating                                                                                                                                                 | Symbol                            | Max                      | Unit                       |
|--------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------|--------------------------|----------------------------|
| Total Device Dissipation FR-4 Board,<br>(Note 1) @ T <sub>A</sub> = 25°C<br>Derate above 25°C<br>(Note 2) @ T <sub>A</sub> = 25°C<br>Derate above 25°C | P <sub>D</sub>                    | 300<br>2.4<br>500<br>4.0 | mW<br>mW/°C<br>mW<br>mW/°C |
| Thermal Resistance<br>from Junction-to-Ambient<br>(Note 1)<br>(Note 2)                                                                                 | R <sub>θJA</sub>                  | 416<br>250               | °C/W<br>°C/W               |
| Junction and Storage Temperature Range                                                                                                                 | T <sub>J</sub> , T <sub>stg</sub> | -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.

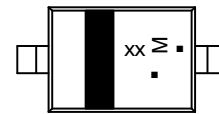
1. FR-4 printed circuit board, single-sided copper, mounting pad 1 cm<sup>2</sup>.
2. FR-4 printed circuit board, single-sided copper, mounting pad = 0.72 mm<sup>2</sup>, 1 inch<sup>2</sup> Copper Heat Sink



SOD-323  
CASE 477  
STYLE 1



#### MARKING DIAGRAM



xx = Specific Device Code

M = Date Code\*

■ = Pb-Free Package

(Note: Microdot may be in either location)

\*Date Code orientation may vary depending upon manufacturing location.

#### ORDERING INFORMATION

| Device                      | Package              | Shipping†               |
|-----------------------------|----------------------|-------------------------|
| MM3ZxxxT1G,<br>SZMM3ZxxxT1G | SOD-323<br>(Pb-Free) | 3,000 /<br>Tape & Reel  |
| MM3ZxxxT3G,<br>SZMM3ZxxxT3G | SOD-323<br>(Pb-Free) | 10,000 /<br>Tape & Reel |

†For information on tape and reel specifications, including part orientation and tape sizes, please refer to our Tape and Reel Packaging Specifications Brochure, BRD8011/D.

#### DEVICE MARKING INFORMATION

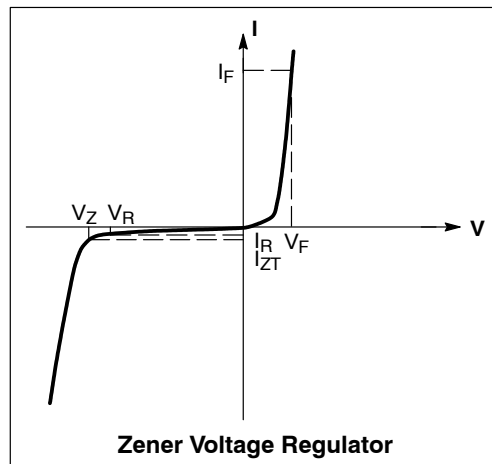
See specific marking information in the device marking column of the Electrical Characteristics table on page 2 of this data sheet.

\*For additional information on our Pb-Free strategy and soldering details, please download the onsemi Soldering and Mounting Techniques Reference Manual, SOLDERRM/D.

# MM3ZxxxT1G Series, SZMM3ZxxxT1G Series

## ELECTRICAL CHARACTERISTICS

| Symbol       | Parameter                                    |
|--------------|----------------------------------------------|
| $V_Z$        | Reverse Zener Voltage @ $I_{ZT}$             |
| $I_{ZT}$     | Reverse Current                              |
| $Z_{ZT}$     | Maximum Zener Impedance @ $I_{ZT}$           |
| $I_{ZK}$     | Reverse Current                              |
| $Z_{ZK}$     | Maximum Zener Impedance @ $I_{ZK}$           |
| $I_R$        | Reverse Leakage Current @ $V_R$              |
| $V_R$        | Reverse Voltage                              |
| $I_F$        | Forward Current                              |
| $V_F$        | Forward Voltage @ $I_F$                      |
| $\Theta V_Z$ | Maximum Temperature Coefficient of $V_Z$     |
| C            | Max. Capacitance @ $V_R = 0$ and $f = 1$ MHz |



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

| Device*    | Device Marking | Zener Voltage (Note 3) |       |      |                   | 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                                     |
| MM3Z2V4T1G | 00             | 2.2                    | 2.4   | 2.6  | 5                 | 100                                  | 1000                              | 0.5                             | 50              | 1.0   | −3.5                                           | 0    | 450                                    |
| MM3Z2V7T1G | 01             | 2.5                    | 2.7   | 2.9  | 5                 | 100                                  | 1000                              | 0.5                             | 20              | 1.0   | −3.5                                           | 0    | 450                                    |
| MM3Z3V0T1G | 02             | 2.8                    | 3.0   | 3.2  | 5                 | 100                                  | 1000                              | 0.5                             | 10              | 1.0   | −3.5                                           | 0    | 450                                    |
| MM3Z3V3T1G | 05             | 3.1                    | 3.3   | 3.5  | 5                 | 95                                   | 1000                              | 0.5                             | 5               | 1.0   | −3.5                                           | 0    | 450                                    |
| MM3Z3V6T1G | 06             | 3.4                    | 3.6   | 3.8  | 5                 | 90                                   | 1000                              | 0.5                             | 5               | 1.0   | −3.5                                           | 0    | 450                                    |
| MM3Z3V9T1G | 07             | 3.7                    | 3.9   | 4.1  | 5                 | 90                                   | 1000                              | 0.5                             | 3               | 1.0   | −3.5                                           | −2.5 | 450                                    |
| MM3Z4V3T1G | 08             | 4.0                    | 4.3   | 4.6  | 5                 | 90                                   | 1000                              | 0.5                             | 3               | 1.0   | −3.5                                           | 0    | 450                                    |
| MM3Z4V7T1G | 09             | 4.4                    | 4.7   | 5.0  | 5                 | 80                                   | 800                               | 0.5                             | 3               | 2.0   | −3.5                                           | 0.2  | 260                                    |
| MM3Z5V1T1G | 0A             | 4.8                    | 5.1   | 5.4  | 5                 | 60                                   | 500                               | 0.5                             | 2               | 2.0   | −2.7                                           | 1.2  | 225                                    |
| MM3Z5V6T1G | 0C             | 5.2                    | 5.6   | 6.0  | 5                 | 40                                   | 200                               | 0.5                             | 1               | 2.0   | −2.0                                           | 2.5  | 200                                    |
| MM3Z6V2T1G | 0E             | 5.8                    | 6.2   | 6.6  | 5                 | 10                                   | 100                               | 0.5                             | 3               | 4.0   | 0.4                                            | 3.7  | 185                                    |
| MM3Z6V8T1G | 0F             | 6.4                    | 6.8   | 7.2  | 5                 | 15                                   | 160                               | 0.5                             | 2               | 4.0   | 1.2                                            | 4.5  | 155                                    |
| MM3Z7V5T1G | 0G             | 7.0                    | 7.5   | 7.9  | 5                 | 15                                   | 160                               | 0.5                             | 1               | 5.0   | 2.5                                            | 5.3  | 140                                    |
| MM3Z8V2T1G | 0H             | 7.7                    | 8.2   | 8.7  | 5                 | 15                                   | 160                               | 0.5                             | 0.7             | 5.0   | 3.2                                            | 6.2  | 135                                    |
| MM3Z9V1T1G | 0K             | 8.5                    | 9.1   | 9.6  | 5                 | 15                                   | 160                               | 0.5                             | 0.2             | 7.0   | 3.8                                            | 7.0  | 130                                    |
| MM3Z10VT1G | 0L             | 9.4                    | 10    | 10.6 | 5                 | 20                                   | 160                               | 0.5                             | 0.1             | 8.0   | 4.5                                            | 8.0  | 130                                    |
| MM3Z11VT1G | 0M             | 10.4                   | 11    | 11.6 | 5                 | 20                                   | 160                               | 0.5                             | 0.1             | 8.0   | 5.4                                            | 9.0  | 130                                    |
| MM3Z12VT1G | 0N             | 11.4                   | 12    | 12.7 | 5                 | 25                                   | 80                                | 0.5                             | 0.1             | 8.0   | 6.0                                            | 10   | 130                                    |
| MM3Z13VT1G | 0P             | 12.4                   | 13.25 | 14.1 | 5                 | 30                                   | 80                                | 0.5                             | 0.1             | 8.0   | 7.0                                            | 11   | 120                                    |
| MM3Z15VT1G | 0T             | 14.3                   | 15    | 15.8 | 5                 | 30                                   | 80                                | 0.5                             | 0.05            | 10.5  | 9.2                                            | 13   | 110                                    |
| MM3Z16VT1G | 0U             | 15.3                   | 16.2  | 17.1 | 5                 | 40                                   | 80                                | 0.5                             | 0.05            | 11.2  | 10.4                                           | 14   | 105                                    |
| MM3Z18VT1G | 0W             | 16.8                   | 18    | 19.1 | 5                 | 45                                   | 80                                | 0.5                             | 0.05            | 12.6  | 12.4                                           | 16   | 100                                    |
| MM3Z20VT1G | 0Z             | 18.8                   | 20    | 21.2 | 5                 | 55                                   | 100                               | 0.5                             | 0.05            | 14.0  | 14.4                                           | 18   | 85                                     |
| MM3Z22VT1G | 10             | 20.8                   | 22    | 23.3 | 5                 | 55                                   | 100                               | 0.5                             | 0.05            | 15.4  | 16.4                                           | 20   | 85                                     |
| MM3Z24VT1G | 11             | 22.8                   | 24.2  | 25.6 | 5                 | 70                                   | 120                               | 0.5                             | 0.05            | 16.8  | 18.4                                           | 22   | 80                                     |
| MM3Z27VT1G | 12             | 25.1                   | 27    | 28.9 | 2                 | 80                                   | 300                               | 0.5                             | 0.05            | 18.9  | 21.4                                           | 25.3 | 70                                     |
| MM3Z30VT1G | 14             | 28                     | 30    | 32   | 2                 | 80                                   | 300                               | 0.5                             | 0.05            | 21.0  | 24.4                                           | 29.4 | 70                                     |
| MM3Z33VT1G | 18             | 31                     | 33    | 35   | 2                 | 80                                   | 300                               | 0.5                             | 0.05            | 23.2  | 27.4                                           | 33.4 | 70                                     |
| MM3Z36VT1G | 19             | 34                     | 36    | 38   | 2                 | 90                                   | 500                               | 0.5                             | 0.05            | 25.2  | 30.4                                           | 37.4 | 70                                     |
| MM3Z39VT1G | 20             | 37                     | 39    | 41   | 2                 | 130                                  | 500                               | 0.5                             | 0.05            | 27.3  | 33.4                                           | 41.2 | 45                                     |
| MM3Z43VT1G | 21             | 40                     | 43    | 46   | 2                 | 150                                  | 500                               | 0.5                             | 0.05            | 30.1  | 37.6                                           | 46.6 | 40                                     |
| MM3Z47VT1G | 1A             | 44                     | 47    | 50   | 2                 | 170                                  | 500                               | 0.5                             | 0.05            | 32.9  | 42.0                                           | 51.8 | 40                                     |
| MM3Z51VT1G | 1C             | 48                     | 51    | 54   | 2                 | 180                                  | 500                               | 0.5                             | 0.05            | 35.7  | 46.6                                           | 57.2 | 40                                     |
| MM3Z56VT1G | 1D             | 52                     | 56    | 60   | 2                 | 200                                  | 500                               | 0.5                             | 0.05            | 39.2  | 52.2                                           | 63.8 | 40                                     |
| MM3Z62VT1G | 2A             | 58                     | 62    | 66   | 2                 | 215                                  | 500                               | 0.5                             | 0.05            | 43.4  | 58.9                                           | 71.8 | 35                                     |
| MM3Z68VT1G | 1F             | 64                     | 68    | 72   | 2                 | 240                                  | 500                               | 0.5                             | 0.05            | 47.6  | 65.6                                           | 79.8 | 35                                     |
| MM3Z75VT1G | 1G             | 70                     | 75    | 79   | 2                 | 255                                  | 500                               | 0.5                             | 0.05            | 52.5  | 73.4                                           | 88.6 | 35                                     |

\*Includes SZ-prefix devices where applicable.

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

# MM3ZxxxT1G Series, SZMM3ZxxxT1G Series

## TYPICAL CHARACTERISTICS

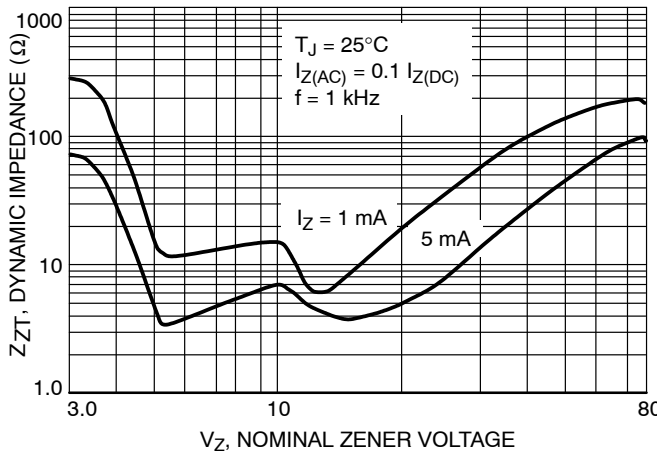


Figure 1. Effect of Zener Voltage on Zener Impedance



Figure 2. Typical Forward Voltage

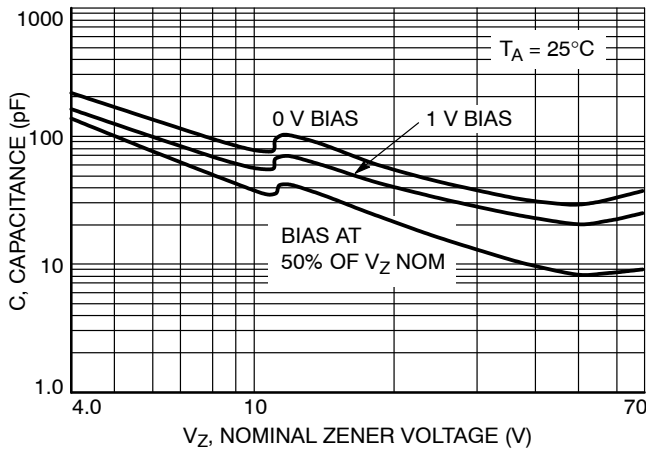


Figure 3. Typical Capacitance



Figure 4. Typical Leakage Current

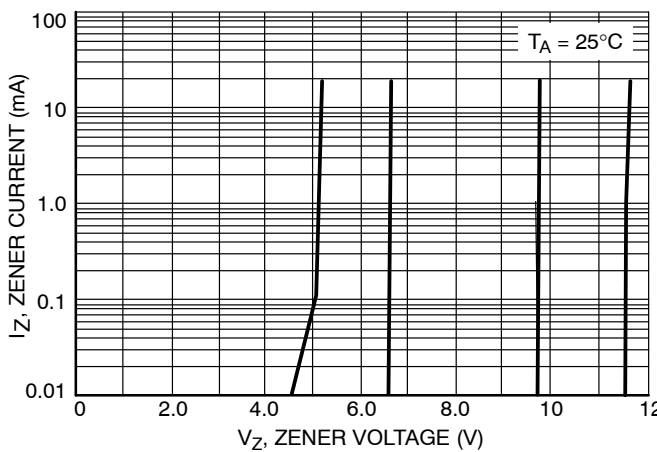


Figure 5. Zener Voltage versus Zener Current ( $V_Z$  Up to 12 V)

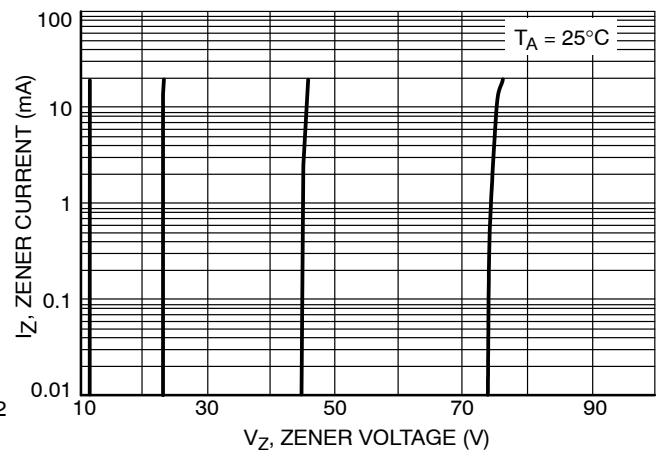


Figure 6. Zener Voltage versus Zener Current (12 V to 75 V)

## MM3ZxxxT1G Series, SZMM3ZxxxT1G Series

### TYPICAL CHARACTERISTICS

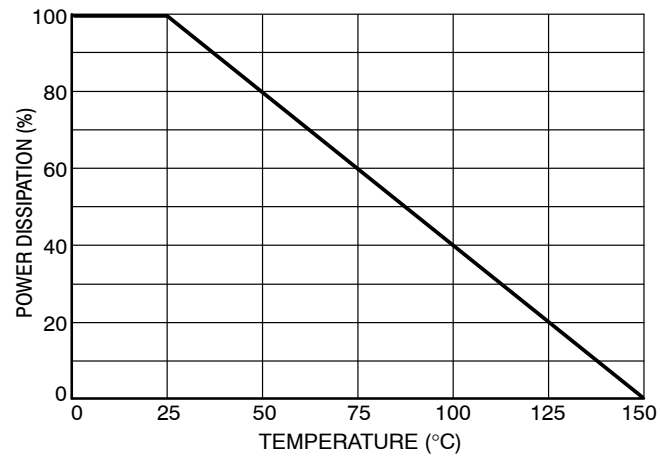
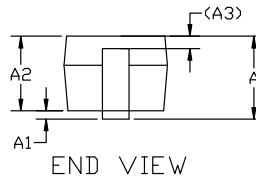


Figure 7. Steady State Power Derating


**SOD-323 1.70x1.25x0.85**  
**CASE 477**  
**ISSUE K**

DATE 11 MAR 2024



\*For additional information on our Pb-Free strategy and soldering details, please download the ON Semiconductor Soldering and Mounting Techniques Reference manual, SOLDERRM/D.

## NOTES:

1. DIMENSIONING AND TOLERANCING AS PER ASME Y14.5M, 2018.
2. CONTROLLING DIMENSION: MILLIMETERS.
3. LEAD THICKNESS SPECIFIED PER L/F DRAWING WITH SOLDER PLATING.
4. DIMENSIONS A AND B DO NOT INCLUDE MOLD FLASH, PROTRUSIONS OR GATE BURRS.
5. DIMENSION L IS MEASURE FROM END OF RADIUS.

| DIM | MILLIMETERS |      |      |
|-----|-------------|------|------|
|     | MIN.        | NOM. | MAX. |
| A   | 0.80        | 0.90 | 1.00 |
| A1  | 0.00        | 0.05 | 0.10 |
| A2  | 0.75        | 0.85 | 0.95 |
| A3  | 0.15 (REF)  |      |      |
| b   | 0.25        | 0.32 | 0.4  |
| c   | 0.09        | 0.12 | 0.18 |
| D   | 1.60        | 1.70 | 1.80 |
| E   | 1.15        | 1.25 | 1.35 |
| H   | 2.30        | 2.50 | 2.70 |
| L   | 0.08        | ---  | ---  |
| L1  | 0.40 (REF)  |      |      |

**GENERIC MARKING DIAGRAM\***


XX = Specific Device Code  
M = Date Code

\*This information is generic. Please refer to device data sheet for actual part marking. Pb-Free indicator, "G" or microdot "•", may or may not be present. Some products may not follow the Generic Marking.

STYLE 1:  
PIN 1: CATHODE (POLARITY BAND)  
2: ANODE

STYLE 2:  
NO POLARITY

|                         |                               |                                                                                                                                                                                  |
|-------------------------|-------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>DOCUMENT NUMBER:</b> | <b>98ASB17533C</b>            | Electronic versions are uncontrolled except when accessed directly from the Document Repository. Printed versions are uncontrolled except when stamped "CONTROLLED COPY" in red. |
| <b>DESCRIPTION:</b>     | <b>SOD-323 1.70x1.25x0.85</b> | <b>PAGE 1 OF 1</b>                                                                                                                                                               |

onsemi and Onsemi are trademarks of Semiconductor Components Industries, LLC dba onsemi or its subsidiaries in the United States and/or other countries. onsemi reserves the right to make changes without further notice to any products herein. onsemi makes no warranty, representation or guarantee regarding the suitability of its products for any particular purpose, nor does onsemi assume any liability arising out of the application or use of any product or circuit, and specifically disclaims any and all liability, including without limitation special, consequential or incidental damages. onsemi does not convey any license under its patent rights nor the rights of others.

**onsemi**, **Onsemi**, and other names, marks, and brands are registered and/or common law trademarks of Semiconductor Components Industries, LLC dba "**onsemi**" or its affiliates and/or subsidiaries in the United States and/or other countries. **onsemi** owns the rights to a number of patents, trademarks, copyrights, trade secrets, and other intellectual property. A listing of **onsemi**'s product/patent coverage may be accessed at [www.onsemi.com/site/pdf/Patent-Marking.pdf](http://www.onsemi.com/site/pdf/Patent-Marking.pdf). **onsemi** reserves the right to make changes at any time to any products or information herein, without notice. The information herein is provided "as-is" and **onsemi** makes no warranty, representation or guarantee regarding the accuracy of the information, product features, availability, functionality, or suitability of its products for any particular purpose, nor does **onsemi** assume any liability arising out of the application or use of any product or circuit, and specifically disclaims any and all liability, including without limitation special, consequential or incidental damages. Buyer is responsible for its products and applications using **onsemi** products, including compliance with all laws, regulations and safety requirements or standards, regardless of any support or applications information provided by **onsemi**. "Typical" parameters which may be provided in **onsemi** data sheets and/or specifications can and do vary in different applications and actual performance may vary over time. All operating parameters, including "Typicals" must be validated for each customer application by customer's technical experts. **onsemi** does not convey any license under any of its intellectual property rights nor the rights of others. **onsemi** products are not designed, intended, or authorized for use as a critical component in life support systems or any FDA Class 3 medical devices or medical devices with a same or similar classification in a foreign jurisdiction or any devices intended for implantation in the human body. Should Buyer purchase or use **onsemi** products for any such unintended or unauthorized application, Buyer shall indemnify and hold **onsemi** and its officers, employees, subsidiaries, affiliates, and distributors harmless against all claims, costs, damages, and expenses, and reasonable attorney fees arising out of, directly or indirectly, any claim of personal injury or death associated with such unintended or unauthorized use, even if such claim alleges that **onsemi** was negligent regarding the design or manufacture of the part. **onsemi** is an Equal Opportunity/Affirmative Action Employer. This literature is subject to all applicable copyright laws and is not for resale in any manner.

## ADDITIONAL INFORMATION

### TECHNICAL PUBLICATIONS:

Technical Library: [www.onsemi.com/design/resources/technical-documentation](http://www.onsemi.com/design/resources/technical-documentation)  
onsemi Website: [www.onsemi.com](http://www.onsemi.com)

### ONLINE SUPPORT: [www.onsemi.com/support](http://www.onsemi.com/support)

For additional information, please contact your local Sales Representative at  
[www.onsemi.com/support/sales](http://www.onsemi.com/support/sales)