

MSR1560G, MSRF1560G

Switch-mode Soft Recovery Power Rectifier

These state-of-the-art devices are designed for boost converter or hard-switched converter applications, especially for Power Factor Correction application. It could also be used as a free wheeling diode in variable speed motor control applications and switching mode power supplies.

Features

- Soft Recovery with Low Reverse Recovery Charge (Q_{RR}) and Peak Reverse Recovery Current (I_{RRM})
- Epoxy meets UL 94 V-0 @ 0.125 in
- Low Forward Voltage
- Low Leakage Current
- High Temperature Glass Passivated Junction
- These are Pb-Free Devices

Mechanical Characteristics:

- Case: Epoxy, Molded
- Weight: 1.9 Grams (Approximately)
- Finish: All External Surfaces Corrosion Resistant and Terminal Leads Readily Solderable
- Lead Temperature for Soldering Purposes: 260°C Max. for 10 Seconds

MAXIMUM RATINGS

| Rating | Symbol | Value | Unit |
|--|---------------------------------|-------------|------|
| Peak Repetitive Reverse Voltage Working Peak Reverse Voltage DC Blocking Voltage | V_{RRM} V_{RWM} V_R | 600 | V |
| Average Rectified Forward Current (At Rated V_R , $T_C = 125^\circ\text{C}$) | I_O | 15 | A |
| Peak Repetitive Forward Current (At Rated V_R , Square Wave, 20 kHz, $T_C = 125^\circ\text{C}$) | I_{FRM} | 30 | A |
| Non-Repetitive Peak Surge Current (Surge applied at rated load conditions, halfwave, single phase, 60 Hz) | I_{FSM} | 100 | A |
| Operating Junction and Storage Temperature Range | T_J, T_{stg} | -65 to +150 | °C |

THERMAL CHARACTERISTICS

| Parameter | Symbol | Value | Unit |
|--|------------------------------------|-------------|------|
| MSR1560G: Thermal Resistance Junction-to-Case Junction-to-Ambient | $R_{\theta JC}$ $R_{\theta JA}$ | 1.6 72.8 | °C/W |
| MSRF1560G: Thermal Resistance Junction-to-Case Junction-to-Ambient | $R_{\theta JC}$ $R_{\theta JA}$ | 4.25 75 | °C/W |

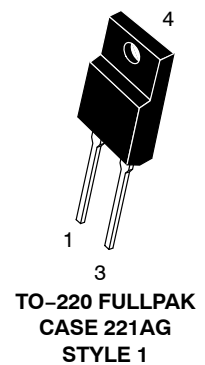
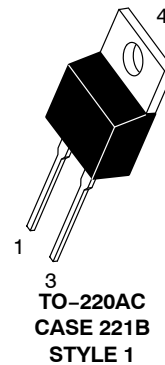
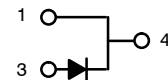
Stresses exceeding those listed in the Maximum Ratings table may damage the device. If any of these limits are exceeded, device functionality should not be assumed, damage may occur and reliability may be affected.



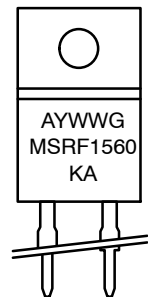
ON Semiconductor®

<http://onsemi.com>

SOFT RECOVERY POWER RECTIFIER 15 AMPERES, 600 VOLTS



MARKING DIAGRAMS



- A = Assembly Location
- Y = Year
- WW = Work Week
- G = Pb-Free Package
- KA = Diode Polarity

ORDERING INFORMATION

| Device | Package | Shipping |
|-----------|-----------------------|---------------|
| MSR1560G | TO-220AC (Pb-Free) | 50 Units/Rail |
| MSRF1560G | TO-220FP (Pb-Free) | 50 Units/Rail |

MSR1560G, MSRF1560G

ELECTRICAL CHARACTERISTICS

| Characteristic | Symbol | Value | | Unit |
|--|-----------|--|---|--------------------------------------|
| | | $T_J = 25^\circ\text{C}$ | $T_J = 150^\circ\text{C}$ | |
| Instantaneous Forward Voltage (Note 1) ($I_F = 15\text{ A}$) Maximum Typical | V_F | $T_J = 25^\circ\text{C}$ 1.8 1.5 | $T_J = 150^\circ\text{C}$ 1.4 1.2 | V |
| | | Instantaneous Reverse Current ($V_R = 600\text{ V}$) Maximum Typical | I_R | |
| Reverse Recovery Time (Note 2) ($V_R = 30\text{ V}$, $I_F = 1\text{ A}$, $di/dt = 100\text{ A}/\mu\text{s}$) Maximum Typical | t_{rr} | | | $T_J = 25^\circ\text{C}$ 45 35 |
| | | Typical Recovery Softness Factor ($V_R = 30\text{ V}$, $I_F = 1\text{ A}$, $di/dt = 100\text{ A}/\mu\text{s}$) | $s = t_b/t_a$ | 0.67 |
| Typical Peak Reverse Recovery Current ($V_R = 30\text{ V}$, $I_F = 1\text{ A}$, $di/dt = 100\text{ A}/\mu\text{s}$) | I_{RRM} | 2.3 | 3.2 | A |
| Typical Reverse Recovery Charge ($V_R = 30\text{ V}$, $I_F = 1\text{ A}$, $di/dt = 100\text{ A}/\mu\text{s}$) | Q_{RR} | 31 | 78 | nC |

Product parametric performance is indicated in the Electrical Characteristics for the listed test conditions, unless otherwise noted. Product performance may not be indicated by the Electrical Characteristics if operated under different conditions.

1. Pulse Test: Pulse Width $\leq 380\ \mu\text{s}$, Duty Cycle $\leq 2\%$
2. T_{RR} measured projecting from 25% of I_{RRM} to zero current

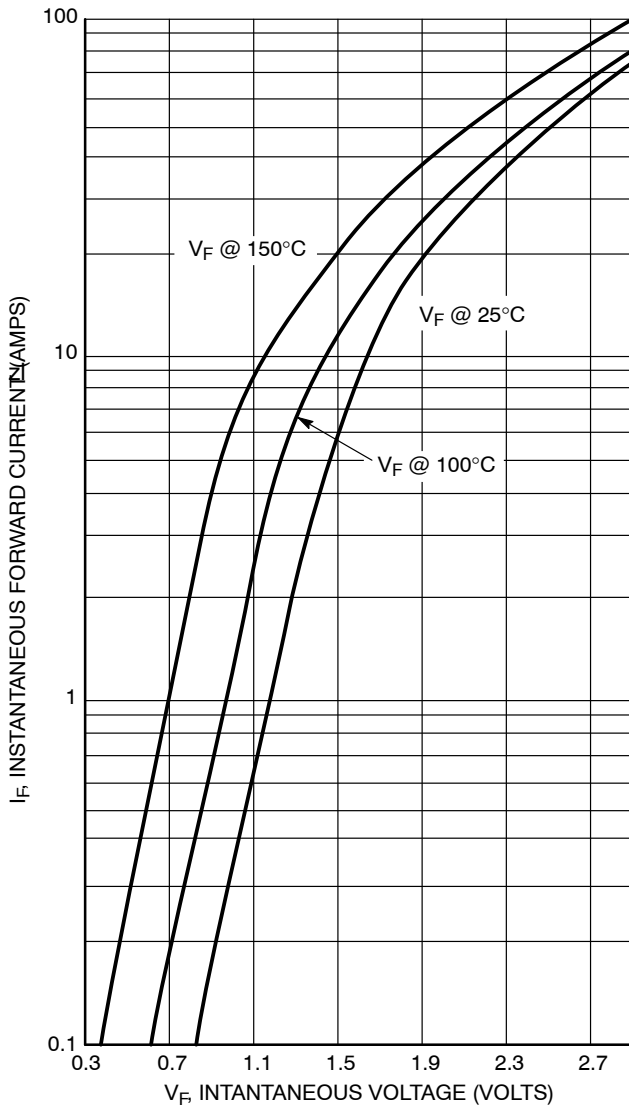


Figure 1. Maximum Forward Voltage

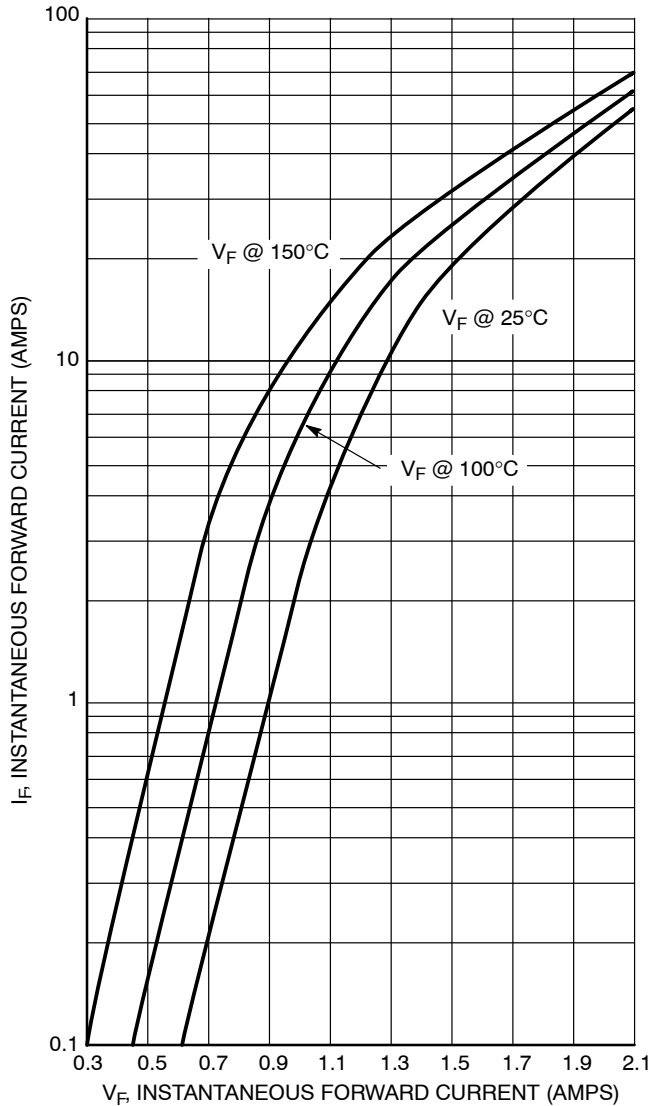


Figure 2. Typical Forward Voltage

MSR1560G, MSRF1560G

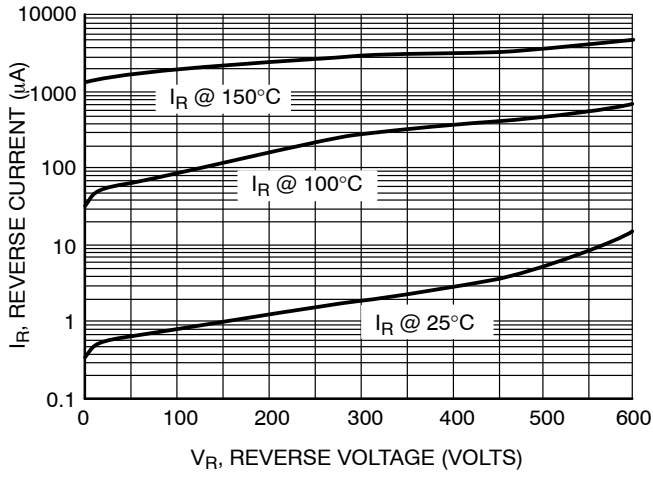


Figure 3. Maximum Reverse Current

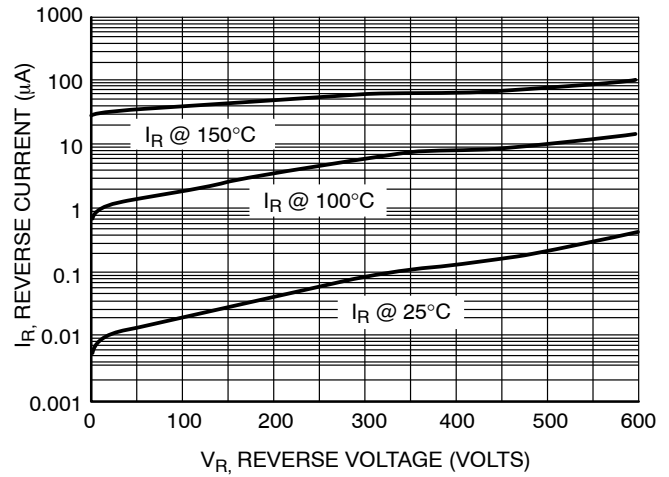


Figure 4. Typical Reverse Current

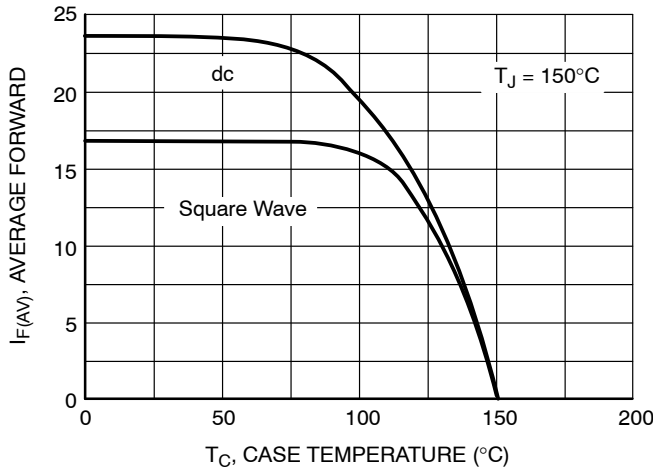


Figure 5. Current Derating

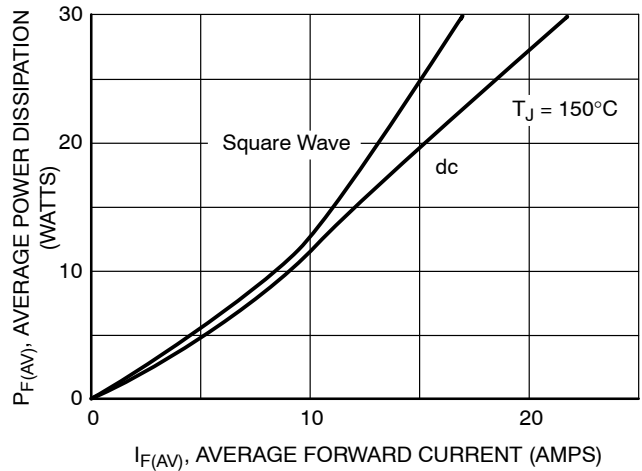


Figure 6. Power Dissipation

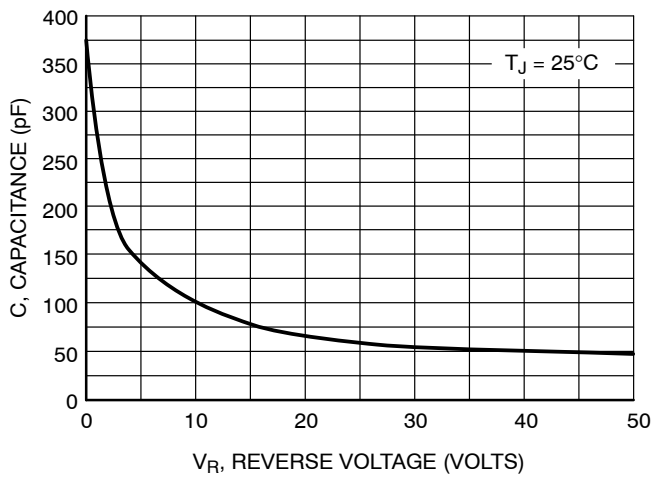


Figure 7. Maximum Capacitance

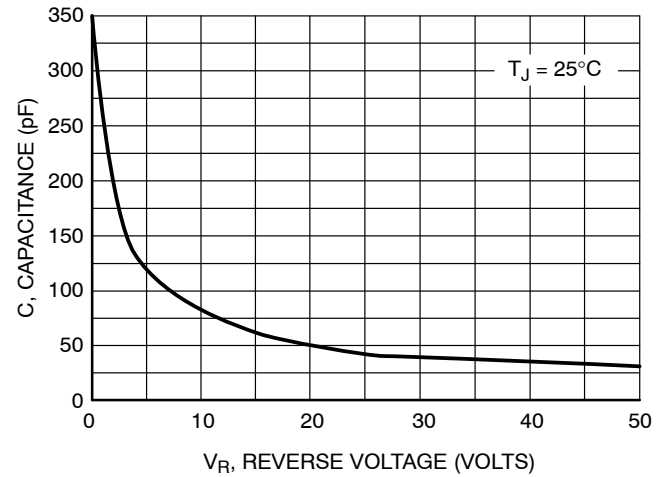


Figure 8. Typical Capacitance

MSR1560G, MSRF1560G

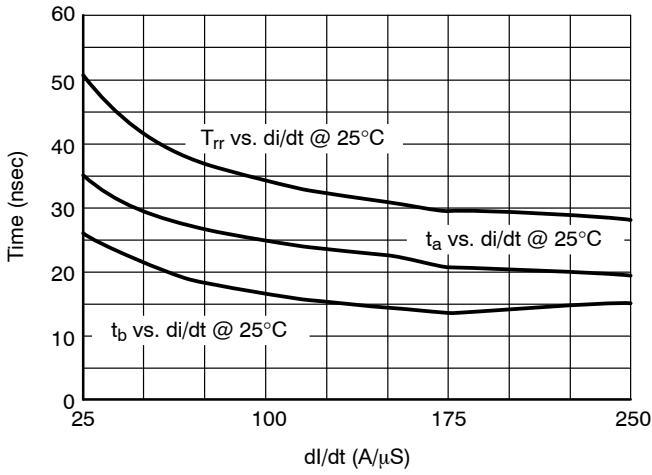


Figure 9. Typical Trr vs. di/dt

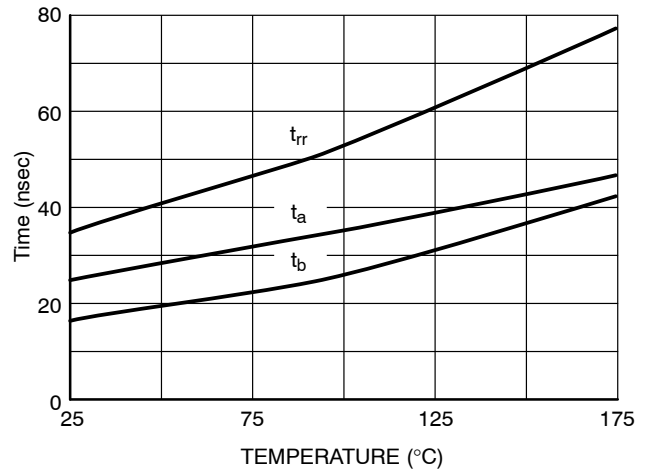


Figure 10. Typical Trr vs. Temperature

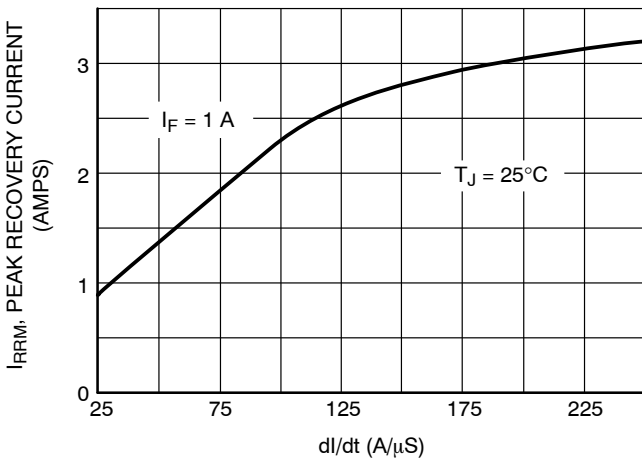


Figure 11. Typical Peak Reverse Recovery Current

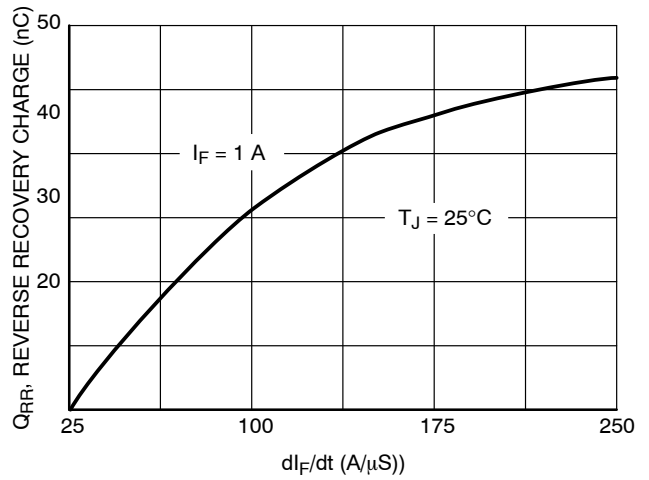


Figure 12. Typical Reverse Recovery Charge

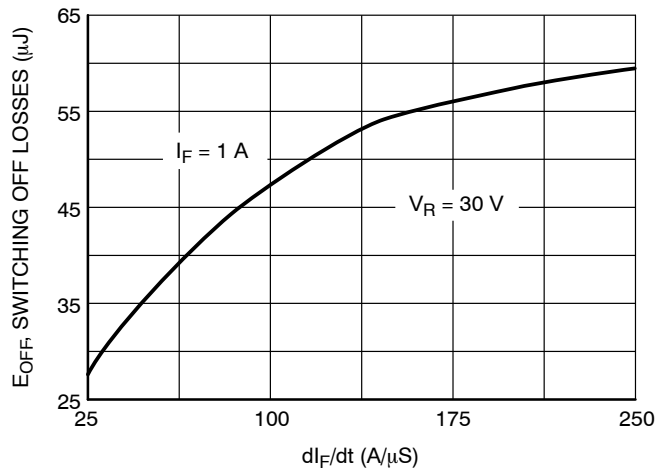


Figure 13. Typical Switching Off Losses

MSR1560G, MSRF1560G

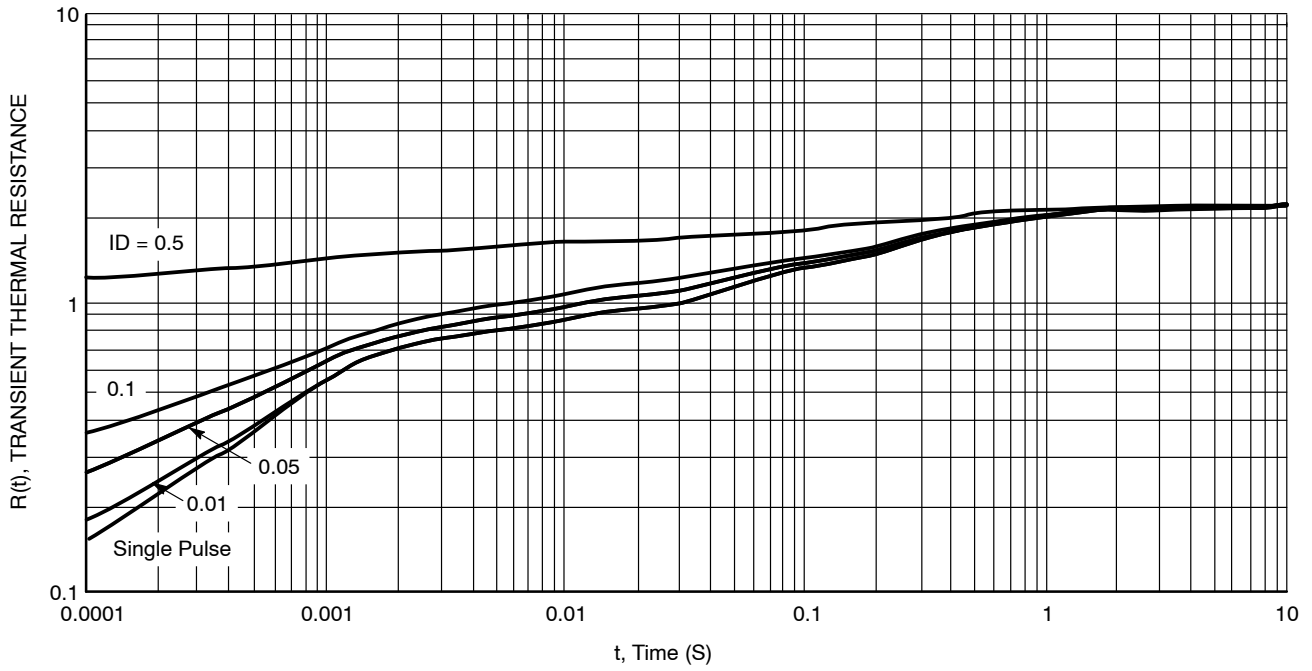


Figure 14. Transient Thermal Response

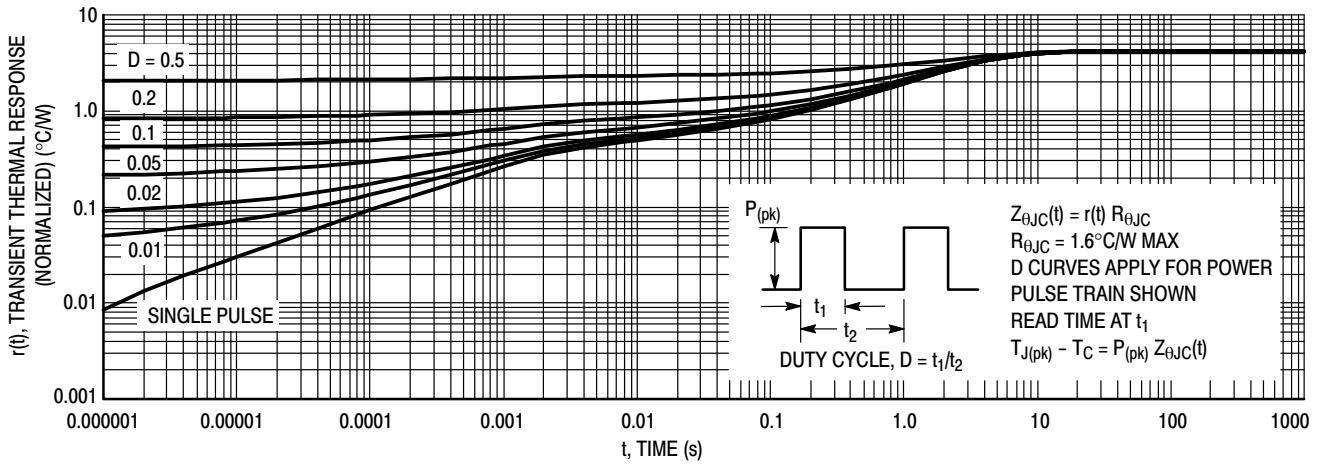


Figure 15. Thermal Response, (MSRF1560) Junction-to-Case ($R_{\theta JC}$)

MSR1560G, MSRF1560G

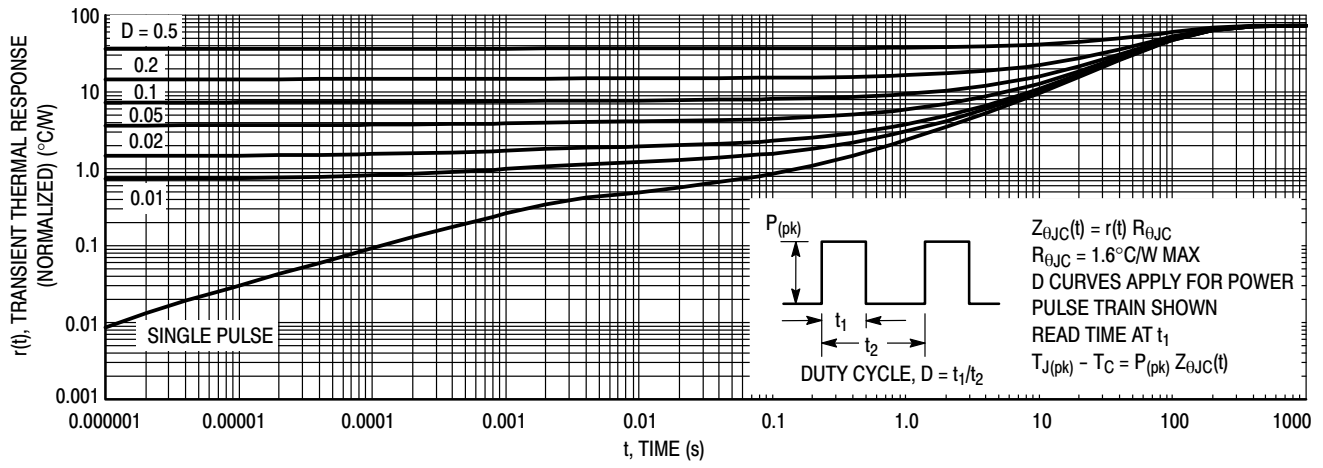


Figure 16. Thermal Response, (MSRF1560) Junction-to-Ambient ($R_{\theta JA}$)

MECHANICAL CASE OUTLINE

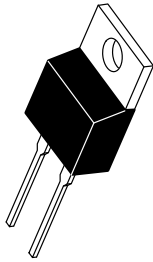
PACKAGE DIMENSIONS

ON Semiconductor®

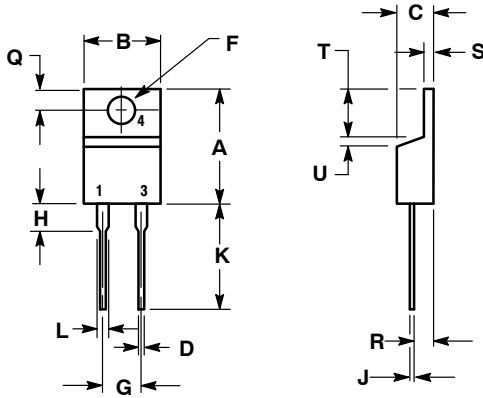


TO-220, 2-LEAD CASE 221B-04 ISSUE F

DATE 12 APR 2013



SCALE 1:1



NOTES:

1. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.
2. CONTROLLING DIMENSION: INCH.

| DIM | INCHES | | MILLIMETERS | |
|-----|--------|-------|-------------|-------|
| | MIN | MAX | MIN | MAX |
| A | 0.595 | 0.620 | 15.11 | 15.75 |
| B | 0.380 | 0.405 | 9.65 | 10.29 |
| C | 0.160 | 0.190 | 4.06 | 4.82 |
| D | 0.025 | 0.039 | 0.64 | 1.00 |
| F | 0.142 | 0.161 | 3.61 | 4.09 |
| G | 0.190 | 0.210 | 4.83 | 5.33 |
| H | 0.110 | 0.130 | 2.79 | 3.30 |
| J | 0.014 | 0.025 | 0.36 | 0.64 |
| K | 0.500 | 0.562 | 12.70 | 14.27 |
| L | 0.045 | 0.060 | 1.14 | 1.52 |
| Q | 0.100 | 0.120 | 2.54 | 3.04 |
| R | 0.080 | 0.110 | 2.04 | 2.79 |
| S | 0.045 | 0.055 | 1.14 | 1.39 |
| T | 0.235 | 0.255 | 5.97 | 6.48 |
| U | 0.000 | 0.050 | 0.000 | 1.27 |

STYLE 1:
PIN 1. CATHODE
2. N/A
3. ANODE
4. CATHODE

STYLE 2:
PIN 1. ANODE
2. N/A
3. CATHODE
4. ANODE

| | | |
|-------------------------|-----------------------|--|
| DOCUMENT NUMBER: | 98ASB42149B | Electronic versions are uncontrolled except when accessed directly from the Document Repository. Printed versions are uncontrolled except when stamped "CONTROLLED COPY" in red. |
| DESCRIPTION: | TO-220, 2-LEAD | PAGE 1 OF 1 |

ON Semiconductor and are trademarks of Semiconductor Components Industries, LLC dba ON Semiconductor or its subsidiaries in the United States and/or other countries. ON Semiconductor reserves the right to make changes without further notice to any products herein. ON Semiconductor makes no warranty, representation or guarantee regarding the suitability of its products for any particular purpose, nor does ON Semiconductor 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. ON Semiconductor 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. **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.

PUBLICATION ORDERING INFORMATION

LITERATURE FULFILLMENT:

Email Requests to: orderlit@onsemi.com

onsemi Website: www.onsemi.com

TECHNICAL SUPPORT

North American Technical Support:

Voice Mail: 1 800-282-9855 Toll Free USA/Canada

Phone: 011 421 33 790 2910

Europe, Middle East and Africa Technical Support:

Phone: 00421 33 790 2910

For additional information, please contact your local Sales Representative