

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 | $^\circ\text{C}$ |

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 | $^\circ\text{C/W}$ |
| MSRF1560G: Thermal Resistance Junction-to-Case Junction-to-Ambient | $R_{\theta JC}$ $R_{\theta JA}$ | 4.25 75 | $^\circ\text{C/W}$ |

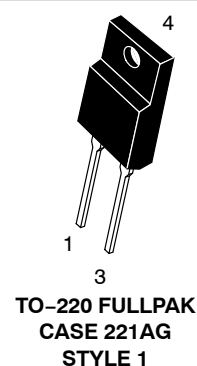
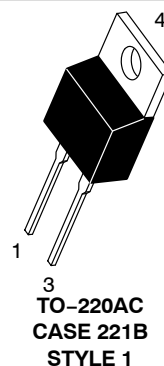
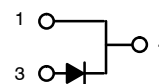
Stresses exceeding those listed in the Maximum Ratings table may damage the device. If any of these limits are exceeded, device functionality should not be assumed, damage may occur and reliability may be affected.



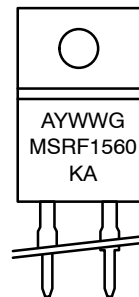
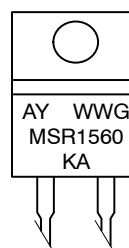
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SOFT RECOVERY POWER RECTIFIER 15 AMPERES, 600 VOLTS



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 |

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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 | 1.8 1.5 | 1.4 1.2 | V |
| | | $T_J = 25^\circ\text{C}$ | $T_J = 150^\circ\text{C}$ | |
| Instantaneous Reverse Current ($V_R = 600\text{ V}$) Maximum Typical | I_R | 15 0.4 | 5000 100 | μA |
| | | $T_J = 25^\circ\text{C}$ | $T_J = 150^\circ\text{C}$ | |
| 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} | 45 35 | 65 54 | ns |
| | | $T_J = 25^\circ\text{C}$ | $T_J = 100^\circ\text{C}$ | |
| 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 | 0.74 | |
| 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

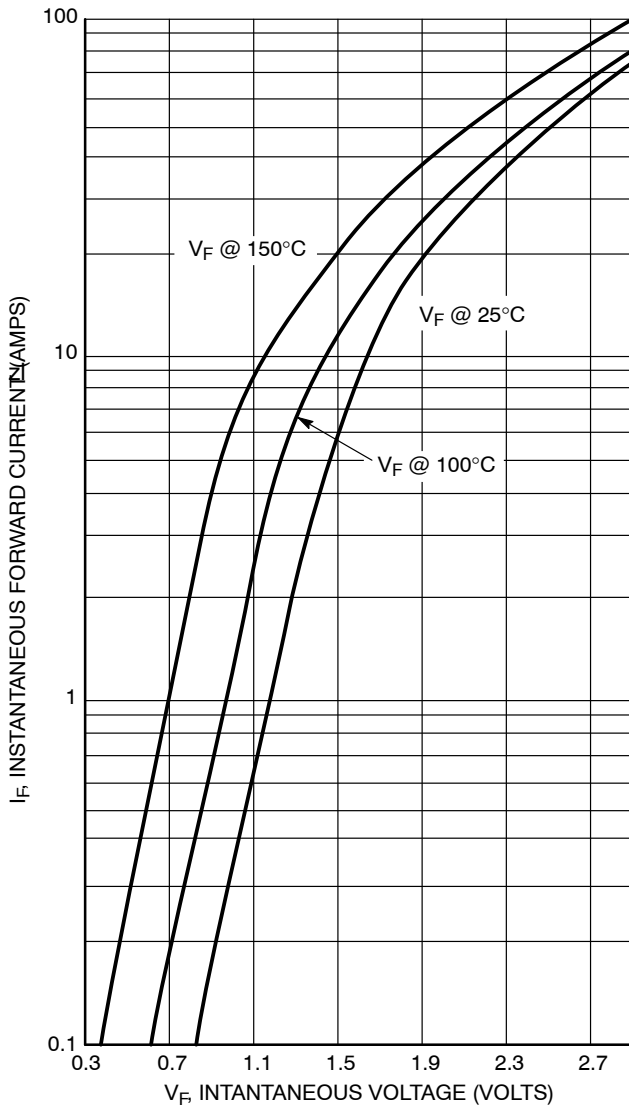


Figure 1. Maximum Forward Voltage

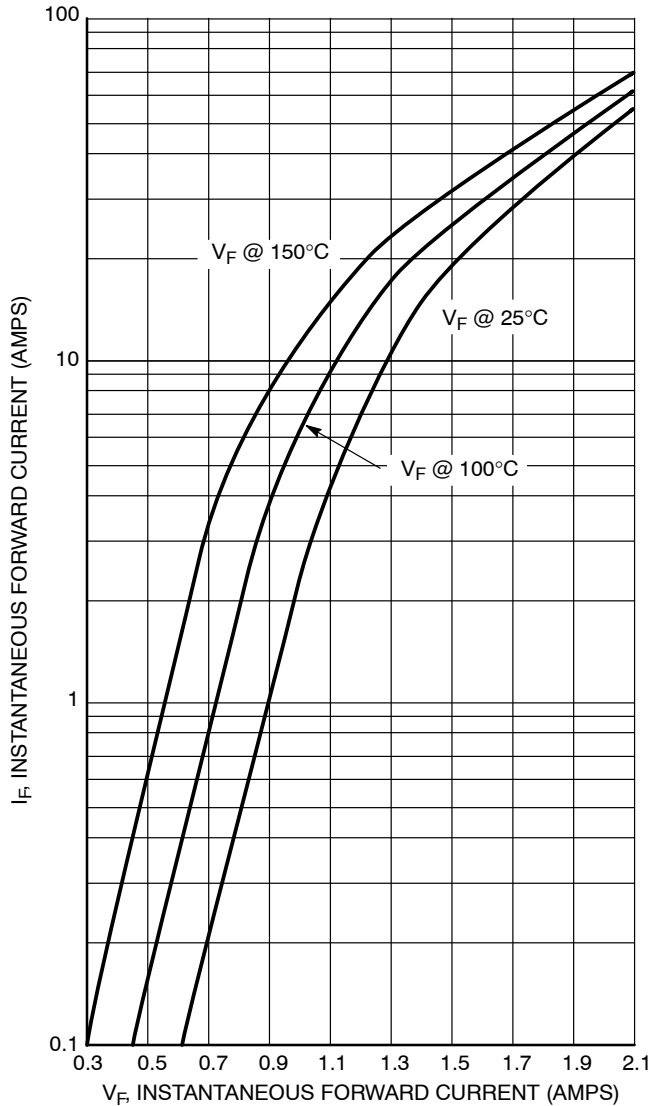


Figure 2. Typical Forward Voltage

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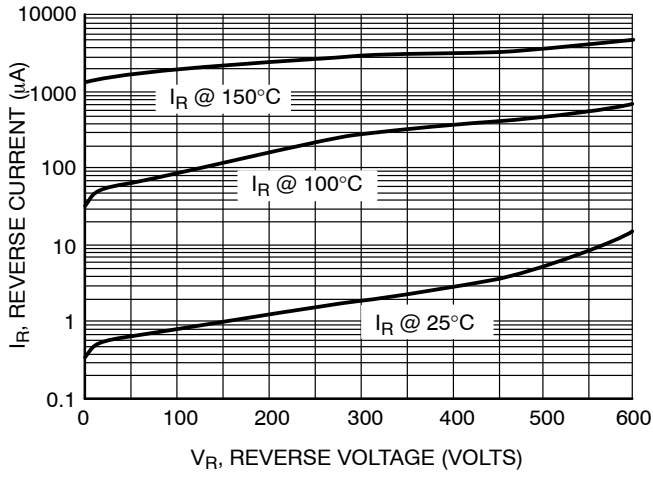


Figure 3. Maximum Reverse Current

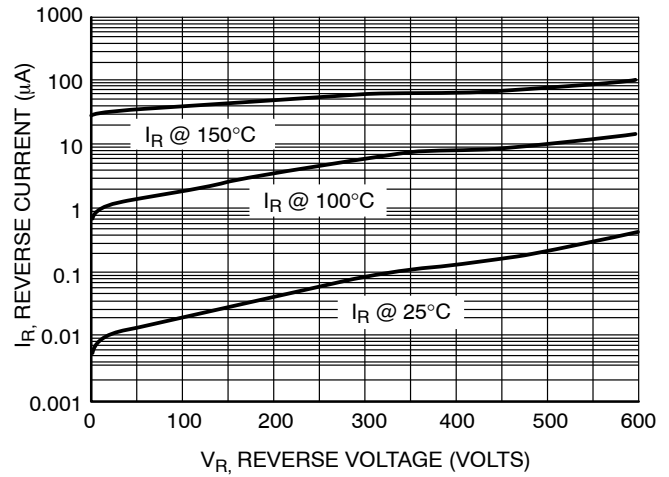


Figure 4. Typical Reverse Current

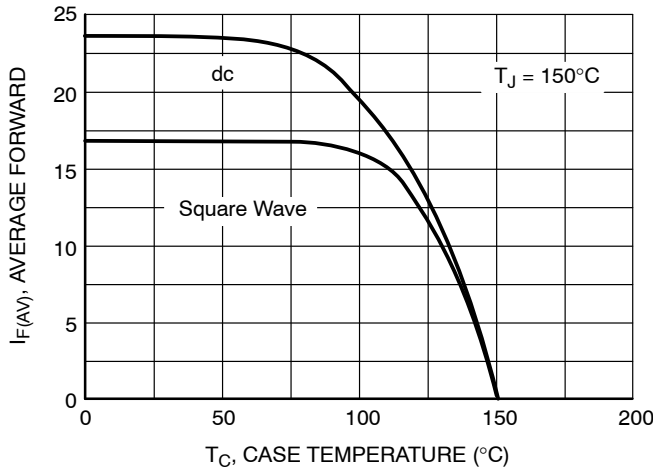


Figure 5. Current Derating

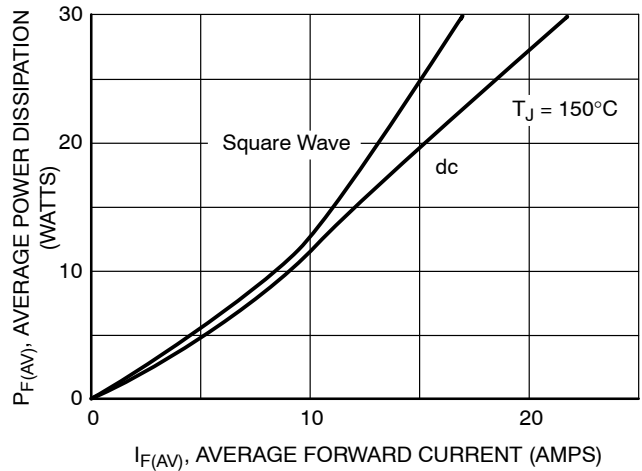


Figure 6. Power Dissipation

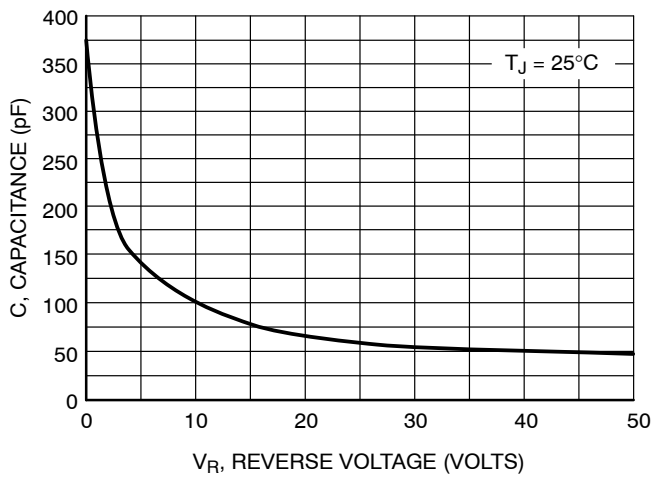


Figure 7. Maximum Capacitance

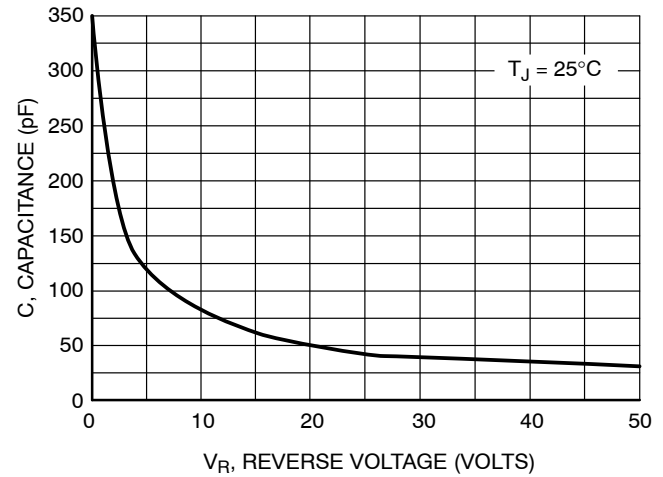


Figure 8. Typical Capacitance

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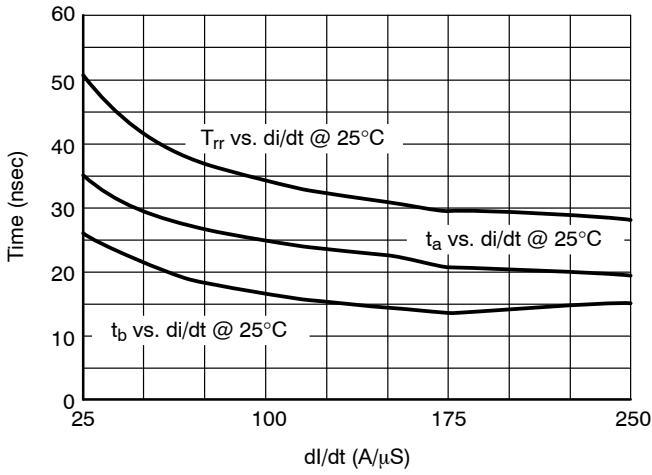


Figure 9. Typical Trr vs. di/dt

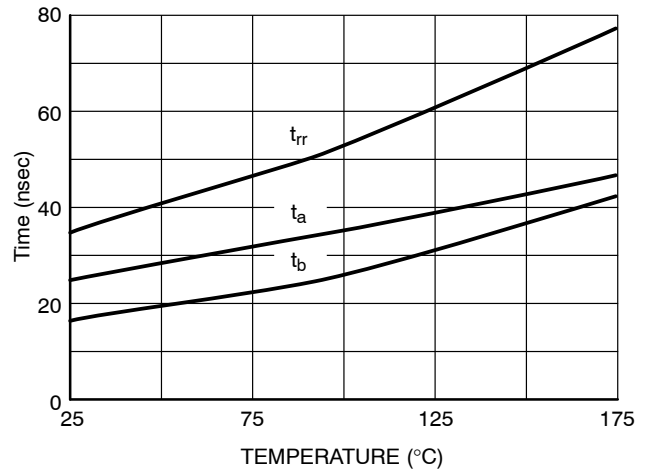


Figure 10. Typical Trr vs. Temperature

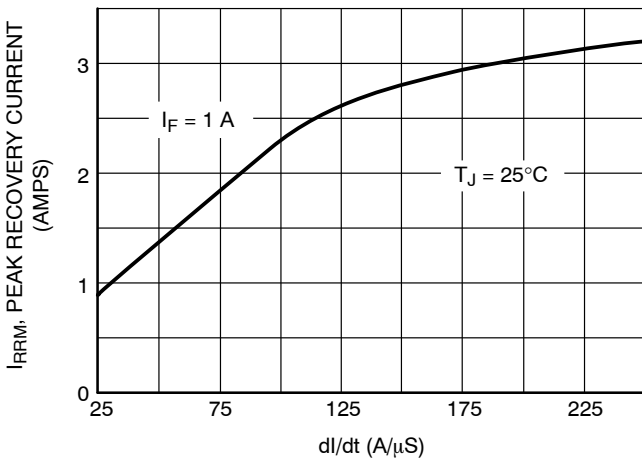


Figure 11. Typical Peak Reverse Recovery Current

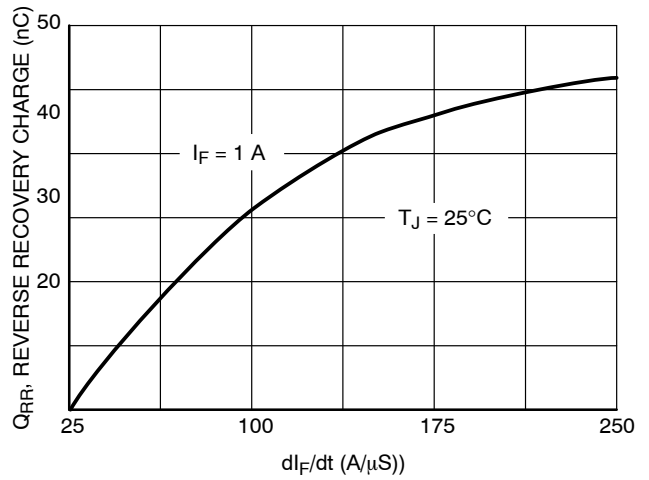


Figure 12. Typical Reverse Recovery Charge

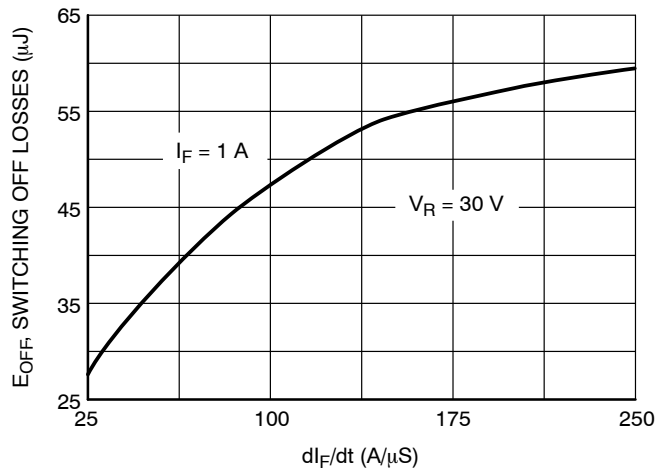


Figure 13. Typical Switching Off Losses

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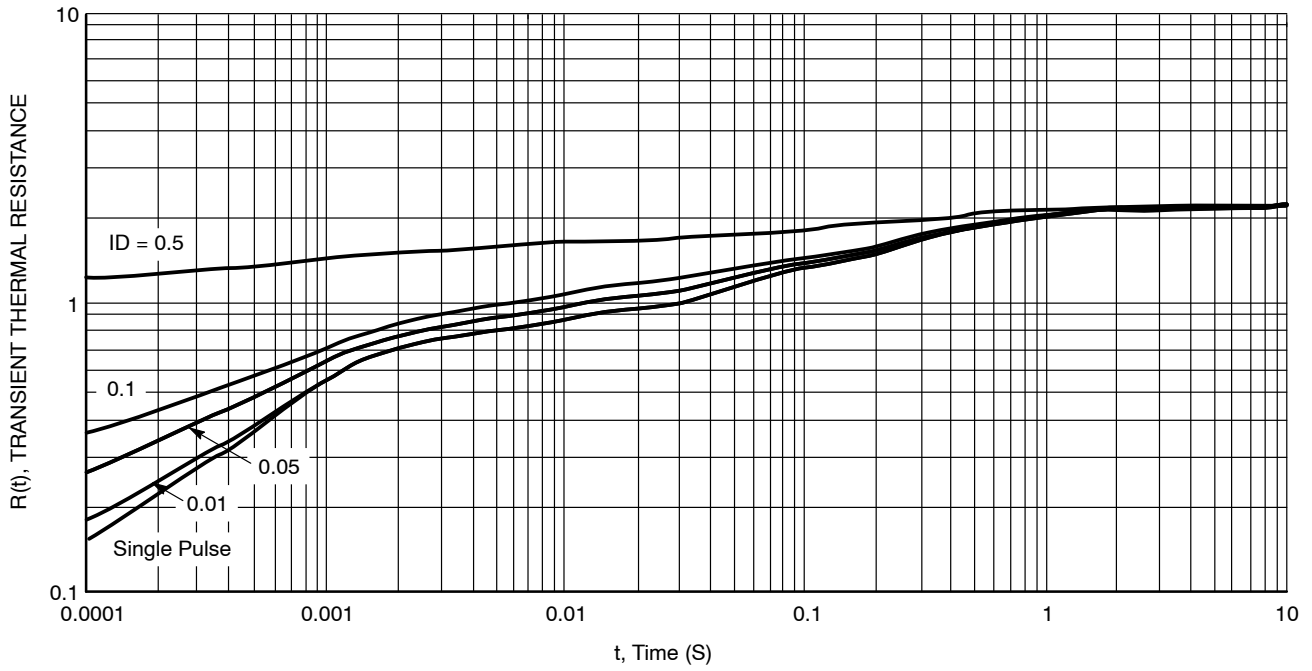


Figure 14. Transient Thermal Response

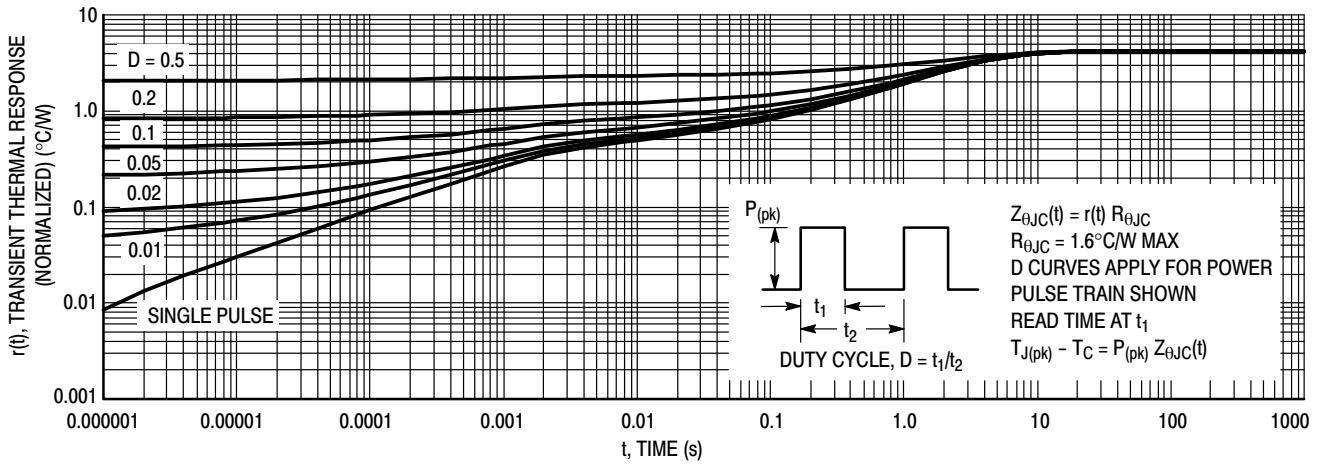


Figure 15. Thermal Response, (MSRF1560) Junction-to-Case ($R_{\theta JC}$)

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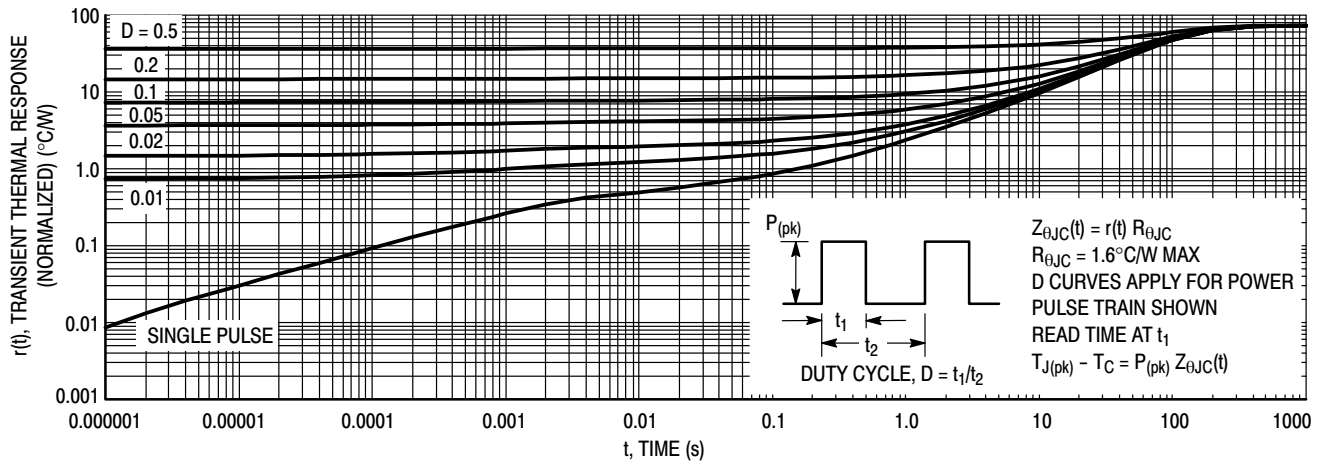


Figure 16. Thermal Response, (MSRF1560) Junction-to-Ambient ($R_{\theta JA}$)

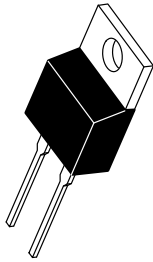
MECHANICAL CASE OUTLINE

PACKAGE DIMENSIONS

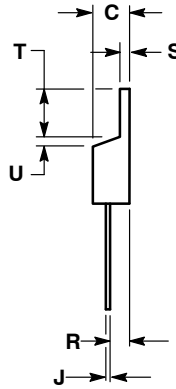
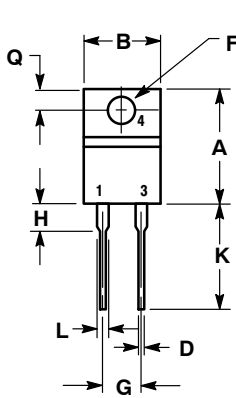


TO-220, 2-LEAD CASE 221B-04 ISSUE F

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

| | | |
|-------------------------|-----------------------|--|
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