MR754 and MR760 are Preferred Devices

High Current Lead Mounted Rectifiers

Features

- Current Capacity Comparable to Chassis Mounted Rectifiers
- Very High Surge Capacity
- Insulated Case
- Pb-Free Packages are Available*

Mechanical Characteristics:

- Case: Epoxy, Molded
- Weight: 2.5 grams (approximately)
- Finish: All External Surfaces Corrosion Resistant and Terminal Lead is Readily Solderable
- Lead Temperature for Soldering Purposes: 260°C Max. for 10 Seconds
- Polarity: Cathode Polarity Band
- Shipped 1000 units per plastic bag. Available Tape and Reeled, 800 units per reel by adding a "RL" suffix to the part number



ON Semiconductor®

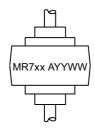
http://onsemi.com

HIGH CURRENT LEAD MOUNTED SILICON RECTIFIERS 50 - 1000 VOLTS DIFFUSED JUNCTION



AXIAL LEAD BUTTON CASE 194 STYLE 1

MARKING DIAGRAM



MR7 = Device Code

xx = 50, 51, 52, 54, 56 or 60

A = Location Code YY = Year WW = Work Week

ORDERING INFORMATION

See detailed ordering and shipping information in the package dimensions section on page 2 of this data sheet.

Preferred devices are recommended choices for future use and best overall value.

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

MAXIMUM RATINGS

| Characteristic | Symbol | MR750 | MR751 | MR752 | MR754 | MR756 | MR760 | Unit |
|---|--|---|-------|-------|-------|-------|-------|------|
| Peak Repetitive Reverse Voltage Working Peak Reverse Voltage DC Blocking Voltage | V _{RRM} V _{RWM} V _R | 50 | 100 | 200 | 400 | 600 | 1000 | V |
| Non-Repetitive Peak Reverse Voltage (Halfwave, single phase, 60 Hz peak) | V _{RSM} | 60 | 120 | 240 | 480 | 720 | 1200 | V |
| RMS Reverse Voltage | V _{R(RMS)} | 35 | 70 | 140 | 280 | 420 | 700 | V |
| Average Rectified Forward Current (Single phase, resistive load, 60 Hz) See Figures 5 and 6 | Io | 22 (T _L = 60°C, 1/8 in Lead Lengths) 6.0 (T _A = 60°C, P.C. Board mounting) | | | Α | | | |
| Non-Repetitive Peak Surge Current (Surge applied at rated load conditions) | I _{FSM} | 400 (for 1 cycle) | | | | Α | | |
| Operating and Storage Junction Temperature Range | T _J , T _{stg} | -65 to +175 | | | | °C | | |

Maximum ratings are those values beyond which device damage can occur. Maximum ratings applied to the device are individual stress limit values (not normal operating conditions) and are not valid simultaneously. If these limits are exceeded, device functional operation is not implied, damage may occur and reliability may be affected.

ELECTRICAL CHARACTERISTICS

| Characteristic and Conditions | Symbol | Max | Unit |
|---|----------------|-----------|----------|
| Maximum Instantaneous Forward Voltage Drop (i _F = 100 Amps, T _J = 25°C) | VF | 1.25 | V |
| Maximum Forward Voltage Drop (I _F = 6.0 Amps, T _A = 25°C, 3/8 in leads) | | 0.90 | V |
| Maximum Reverse Current $T_J = 25^{\circ}C$ (Rated DC Voltage) $T_J = 100^{\circ}C$ | I _R | 25 1.0 | μA mA |

ORDERING INFORMATION

| Device | Package | Shipping [†] | |
|----------|-------------------------|-----------------------|--|
| MR750 | Axial Lead | 1000 Units / Bag | |
| MR750RL | Axial Lead | 800 / Tape & Reel | |
| MR751 | Axial Lead | 1000 Units / Bag | |
| MR751G | Axial Lead (Pb-Free) | 1000 Units / Bag | |
| MR751RL | Axial Lead | 800 / Tape & Reel | |
| MR751RLG | Axial Lead (Pb-Free) | 800 / Tape & Reel | |
| MR752 | Axial Lead | 1000 Units / Bag | |
| MR752G | Axial Lead (Pb-Free) | 1000 Units / Bag | |
| MR752RL | Axial Lead | 800 / Tape & Reel | |
| MR752RLG | Axial Lead (Pb-Free) | 800 / Tape & Reel | |
| MR754 | Axial Lead | 1000 Units / Bag | |
| MR754RL | Axial Lead | 800 / Tape & Reel | |
| MR756 | Axial Lead | 1000 Units / Bag | |
| MR756RL | Axial Lead | 800 / Tape & Reel | |
| MR756RLG | Axial Lead (Pb-Free) | 800 / Tape & Reel | |
| MR760 | Axial Lead | 1000 Units / Bag | |
| MR760RL | Axial Lead | 800 / 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.

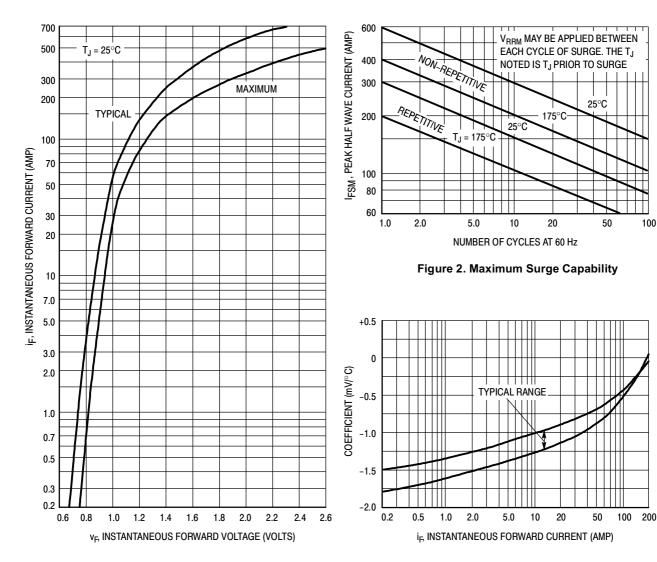


Figure 1. Forward Voltage

Figure 3. Forward Voltage Temperature Coefficient

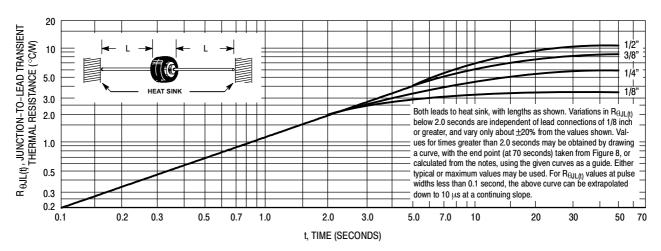


Figure 4. Typical Transient Thermal Resistance

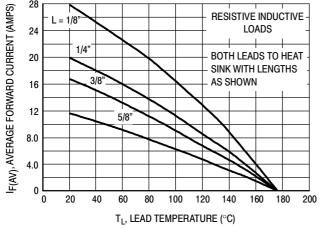


Figure 5. Maximum Current Ratings

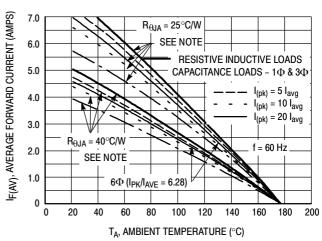


Figure 6. Maximum Current Ratings

NOTES

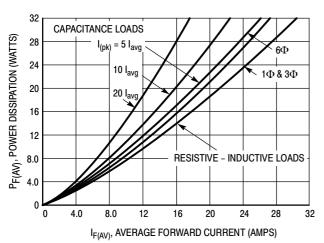
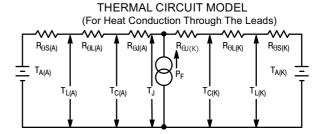


Figure 7. Power Dissipation



Use of the above model permits junction to lead thermal resistance for any mounting configuration to be found. Lowest values occur when one side of the rectifier is brought as close as possible to the heat sink as shown below. Terms in the model signify:

 T_A = Ambient Temperature T_C = Case Temperature T_J = Lead Temperature T_J = Junction Temperature

 $R_{\Theta S}^{-}$ = Thermal Resistance, Heat Sink to Ambient $R_{\Theta L}^{-}$ = Thermal Resistance, Lead to Heat Sink $R_{\Theta J}^{-}$ = Thermal Resistance, Junction to Case

P_F = Power Dissipation

(Subscripts A and K refer to anode and cathode sides, respectively.)

Values for thermal resistance components are:

 $R_{\theta L}$ = 40°C/W/in. Typically and 44°C/W/in Maximum.

 $R_{\theta J} = 2^{\circ}C/W$ typically and $4^{\circ}C/W$ Maximum.

Since $R_{\theta,J}$ is so low, measurements of the case temperature, T_C , will be approximately equal to junction temperature in practical lead mounted applications. When used as a 60 Hz rectifierm the slow thermal response holds $T_{J(PK)}$ close to $T_{J(AVG)}$. Therefore maximum lead temperature may be found from: $T_L = 175^\circ - R_{\theta,JL} P_F$. P_F may be found from Figure 7. The recommended method of mounting to a P.C. board is shown on the

The recommended method of mounting to a P.C. board is shown on the sketch, where $R_{\theta JA}$ is approximately 25°C/W for a 1–1/2" x 1–1/2" copper surface area. Values of 40°C/W are typical for mounting to terminal strips or P.C. boards where available surface area is small.

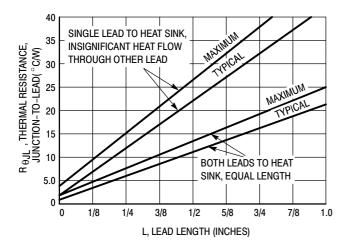
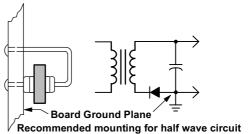


Figure 8. Steady State Thermal Resistance



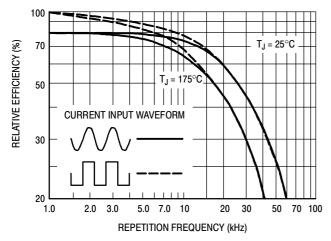


Figure 9. Rectification Efficiency

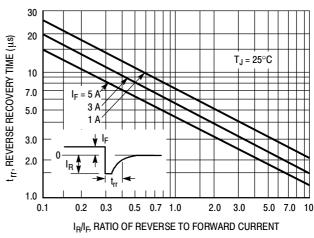


Figure 10. Reverse Recovery Time

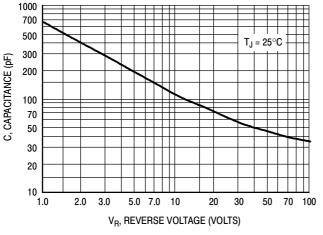


Figure 11. Junction Capacitance

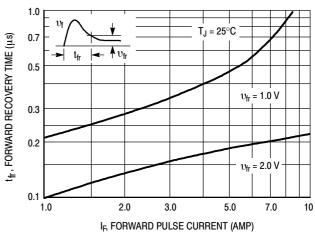


Figure 12. Forward Recovery Time



Figure 13. Single-Phase Half-Wave Rectifier Circuit

The rectification efficiency factor σ shown in Figure 9 was calculated using the formula:

$$\sigma = \frac{P_{(dc)}}{P_{(rms)}} = \frac{\frac{V_{20}(dc)}{R_L}}{\frac{V_{20}(rms)}{R_L}} \cdot 100\% = \frac{V_{20}(dc)}{V_{20}(ac) + V_{20}(dc)} \cdot 100\%$$

For a sine wave input $V_m \sin(wt)$ to the diode, assumed lossless, the maximum theoretical efficiency factor becomes:

$$\sigma_{\text{(sine)}} = \frac{\frac{V^2 m}{\pi^2 R_L}}{\frac{V^2 m}{4 R_L}} \cdot 100\% = \frac{4}{\pi^2} \cdot 100\% = 40.6\%$$
 (2)

For a square wave input of amplitude V_m , the efficiency factor becomes:

$$\sigma_{\text{(square)}} = \frac{\frac{V^2 m}{^2 R_L}}{\frac{V^2 m}{R_I}} \cdot 100\% = 50\%$$
 (3)

(A full wave circuit has twice these efficiencies)

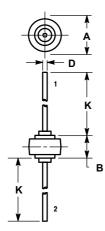
As the frequency of the input signal is increased, the reverse recovery time of the diode (Figure 10) becomes significant, resulting in an increasing AC voltage component across R_L which is opposite in polarity to the forward current, thereby reducing the value of the efficiency factor σ , as shown on Figure 9.

It should be emphasized that Figure 9 shows waveform efficiency only; it does not provide a measure of diode losses. Data was obtained by measuring the AC component of $V_{\rm o}$ with a true rms AC voltmeter and the DC component with a DC voltmeter. The data was used in Equation 1 to obtain points for Figure 9.

PACKAGE DIMENSIONS

AXIAL LEAD BUTTON

CASE 194-04 ISSUE H



NOTES:

- CATHODE SYMBOL ON PACKAGE
 194-01 OBSOLETE, 194-04 NEW
- STANDARD

| | MILLIN | IETERS | INCHES | | |
|-----|--------|--------|--------|-------|--|
| DIM | MIN | MAX | MIN | MAX | |
| Α | 8.43 | 8.69 | 0.332 | 0.342 | |
| В | 5.94 | 6.25 | 0.234 | 0.246 | |
| D | 1.27 | 1.35 | 0.050 | 0.053 | |
| K | 25.15 | 25.65 | 0.990 | 1.010 | |

STYLE 1: PIN 1. CATHODE 2. ANODE

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