

MR750 SERIES

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:

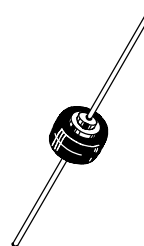
- Case: Epoxy, Molded
- Weight: 2.5 grams (approximately)
- Finish: All External Surfaces Corrosion Resistant and Terminal Lead is Readily Solderable
- Lead Temperature for Soldering Purposes: 260°C Max. for 10 Seconds
- Polarity: Cathode Polarity Band



ON Semiconductor®

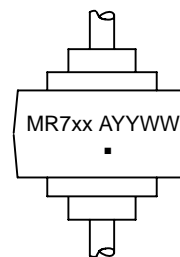
<http://onsemi.com>

**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
▪ = Pb-Free Package

(Note: Microdot may be in either location)

ORDERING INFORMATION

See detailed ordering and shipping information in the package dimensions section on page 6 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.

MR750 SERIES

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) | I_O | 22 ($T_L = 60^\circ\text{C}$, 1/8 in Lead Lengths) 6.0 ($T_A = 60^\circ\text{C}$, P.C. Board mounting) | | | | | | A |
| Non–Repetitive Peak Surge Current (Surge applied at rated load conditions) | I_{FSM} | 400 (for 1 cycle) | | | | | | A |
| Operating and Storage Junction Temperature Range | T_J, T_{stg} | – 65 to +175 | | | | | | $^\circ\text{C}$ |

Stresses exceeding Maximum Ratings may damage the device. Maximum Ratings are stress ratings only. Functional operation above the Recommended Operating Conditions is not implied. Extended exposure to stresses above the Recommended Operating Conditions may affect device reliability.

ELECTRICAL CHARACTERISTICS

| Characteristic and Conditions | Symbol | Max | Unit |
|---|--------|----------------------------------|---------------|
| Maximum Instantaneous Forward Voltage Drop ($i_F = 100 \text{ A}$, $T_J = 25^\circ\text{C}$) | v_F | 1.25 | V |
| Maximum Forward Voltage Drop ($I_F = 6.0 \text{ A}$, $T_A = 25^\circ\text{C}$, 3/8 in leads) | V_F | 0.90 | V |
| Maximum Reverse Current (Rated DC Voltage) | I_R | $T_J = 25^\circ\text{C}$ 25 | μA |
| | | $T_J = 100^\circ\text{C}$ 1.0 | mA |

MR750 SERIES

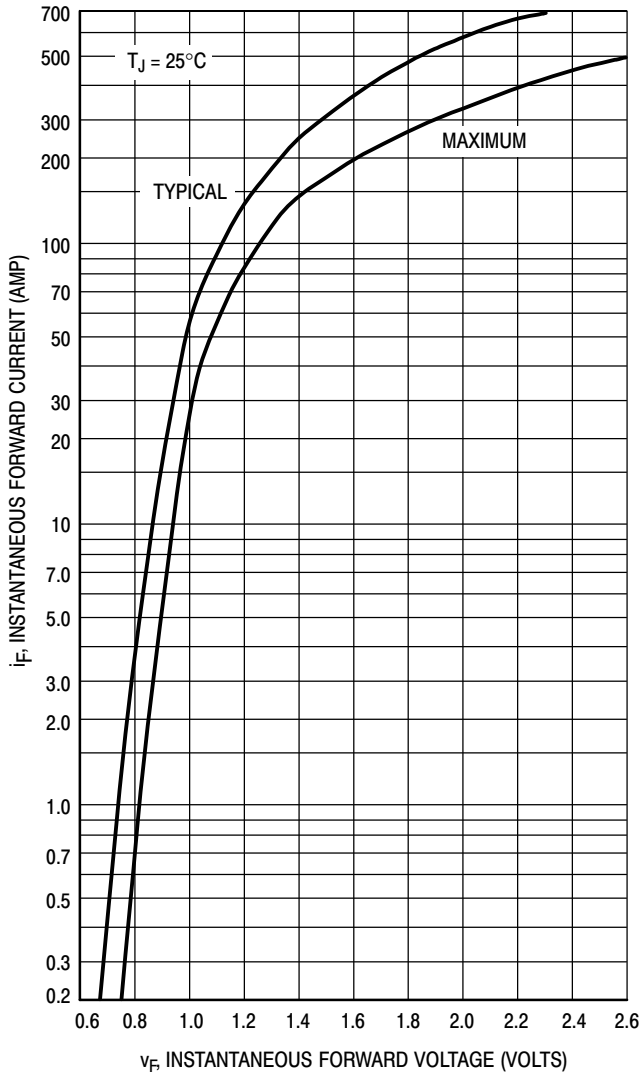


Figure 1. Forward Voltage

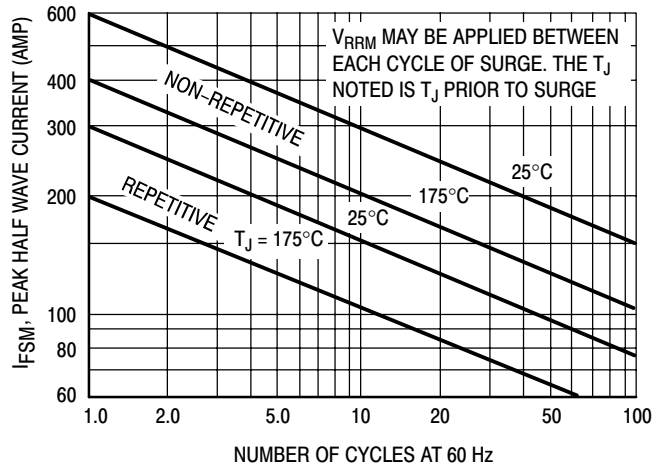


Figure 2. Maximum Surge Capability

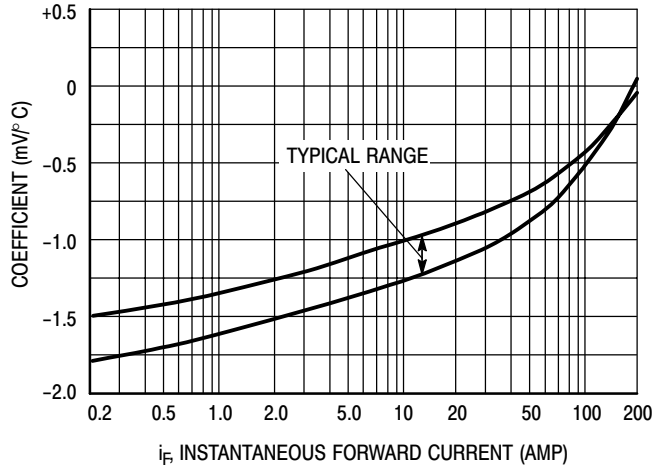


Figure 3. Forward Voltage Temperature Coefficient

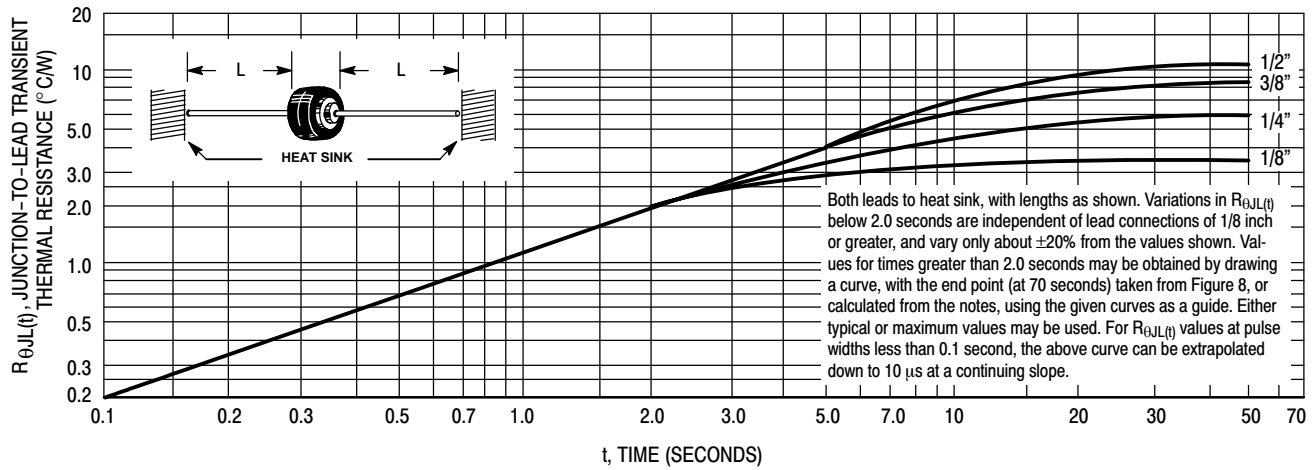


Figure 4. Typical Transient Thermal Resistance

MR750 SERIES

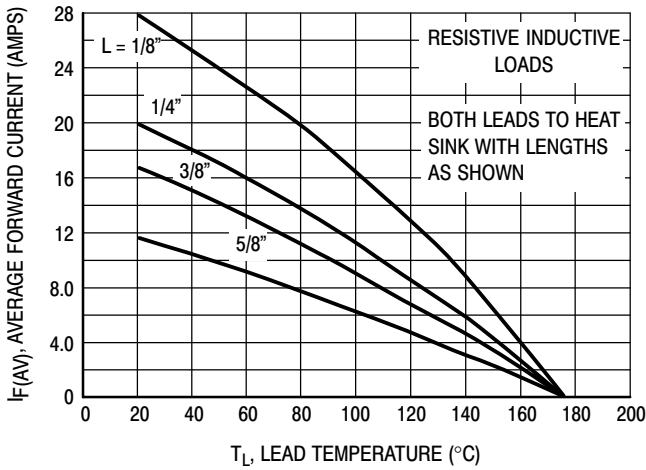


Figure 5. Maximum Current Ratings

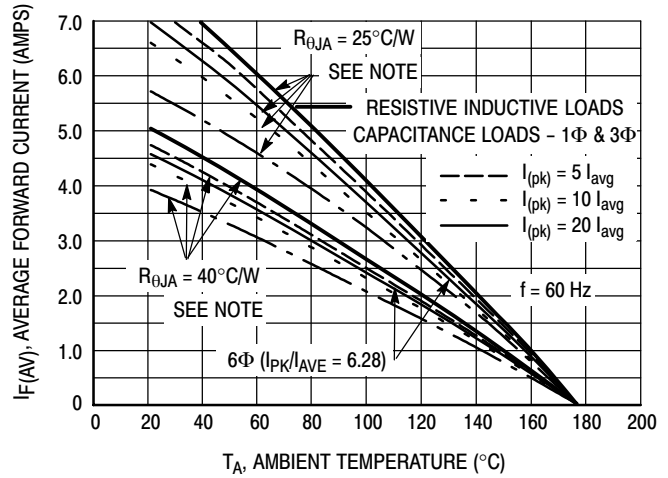


Figure 6. Maximum Current Ratings

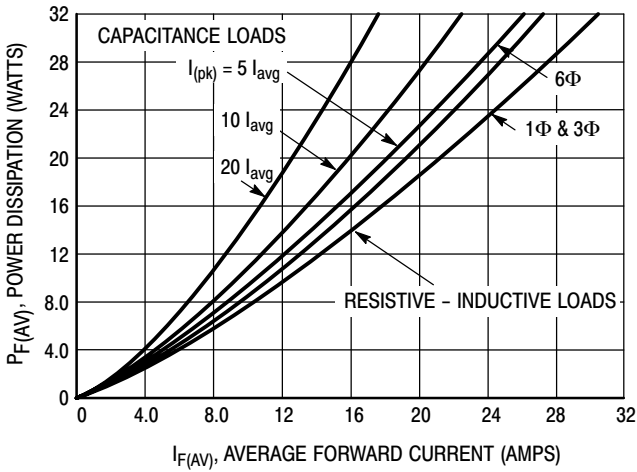


Figure 7. Power Dissipation

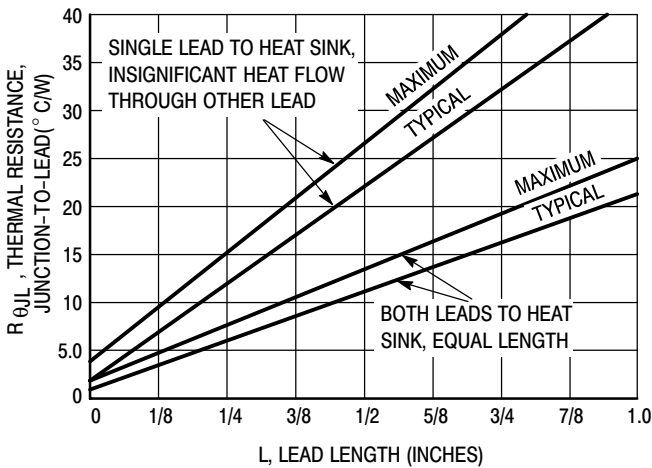
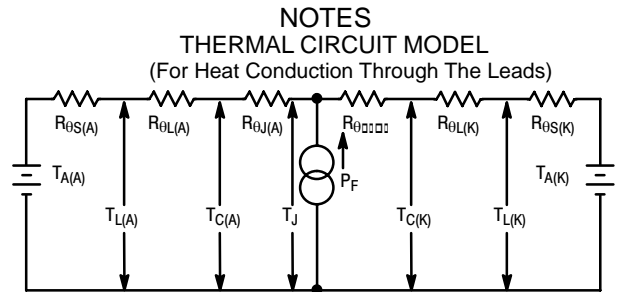


Figure 8. Steady State Thermal Resistance



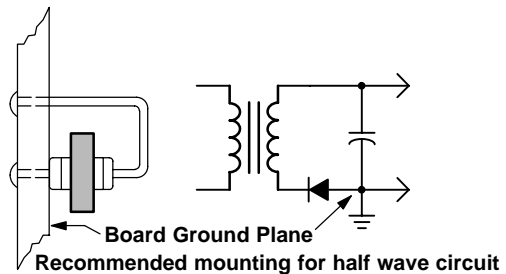
Use of the above model permits junction to lead thermal resistance for any mounting configuration to be found. Lowest values occur when one side of the rectifier is brought as close as possible to the heat sink as shown below. Terms in the model signify:

- T_A = Ambient Temperature
 - T_L = Lead 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
 - T_C = Case Temperature
 - T_J = Junction Temperature
- (Subscripts A and K refer to anode and cathode sides, respectively.)

Values for thermal resistance components are:
 $R_{\theta L} = 40^\circ\text{C/W/in.}$ Typically and 44°C/W/in. Maximum.
 $R_{\theta J} = 2^\circ\text{C/W}$ typically and 4°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 rectifier the slow thermal response holds $T_{J(pk)}$ close to $T_{J(ave)}$. 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 sketch, where $R_{\theta JA}$ is approximately 25°C/W for a $1-1/2'' \times 1-1/2''$ 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.



MR750 SERIES

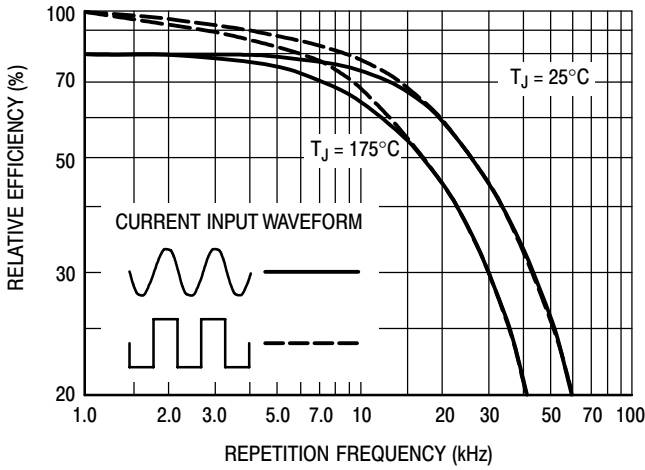


Figure 9. Rectification Efficiency

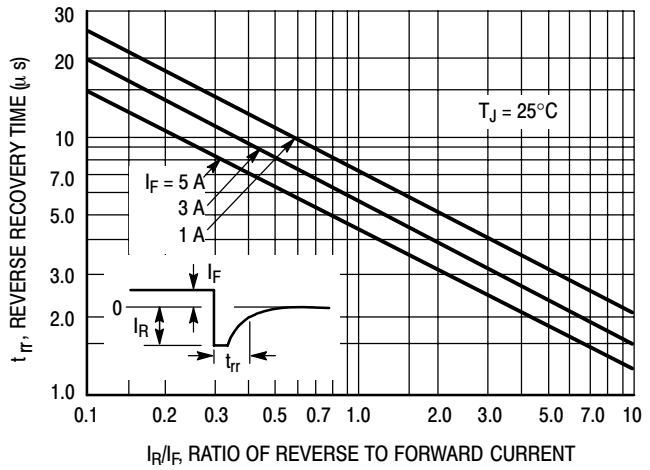


Figure 10. Reverse Recovery Time

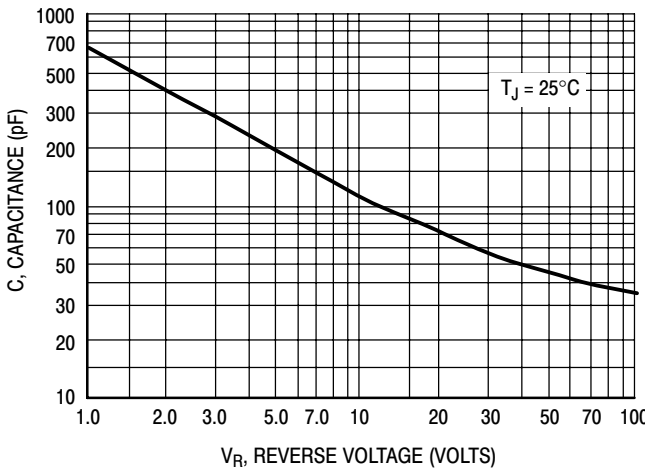


Figure 11. Junction Capacitance

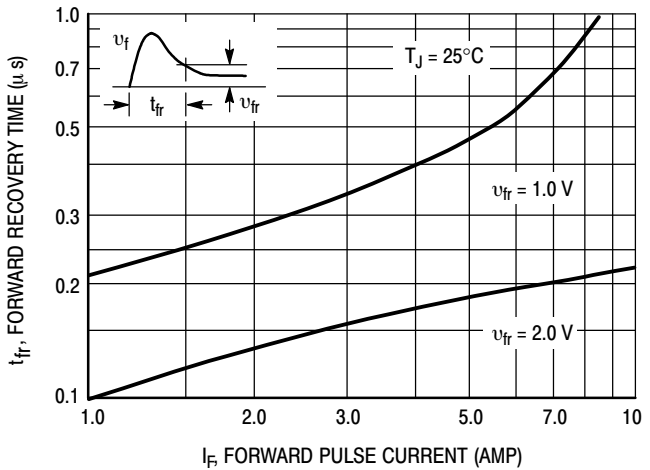


Figure 12. Forward Recovery Time

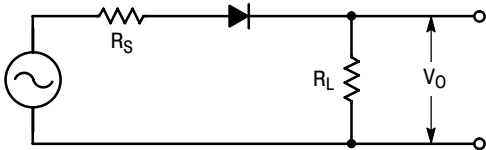


Figure 13. Single-Phase Half-Wave Rectifier Circuit

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

$$\sigma = \frac{P_{(dc)}}{P_{(rms)}} = \frac{\frac{\sqrt{2}V_o(dc)}{R_L}}{\frac{\sqrt{2}V_o(rms)}{R_L}} \cdot 100\% = \frac{V_o(dc)}{\sqrt{V_o(ac)^2 + V_o(dc)^2}} \cdot 100\% \quad (1)$$

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

$$\sigma_{(sine)} = \frac{\frac{\sqrt{2}V_m}{\pi^2 R_L}}{\frac{\sqrt{2}V_m}{4R_L}} \cdot 100\% = \frac{4}{\pi^2} \cdot 100\% = 40.6\% \quad (2)$$

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

$$\sigma_{(square)} = \frac{\frac{\sqrt{2}V_m}{2R_L}}{\frac{\sqrt{2}V_m}{R_L}} \cdot 100\% = 50\% \quad (3)$$

(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_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.

MR750 SERIES

ORDERING INFORMATION

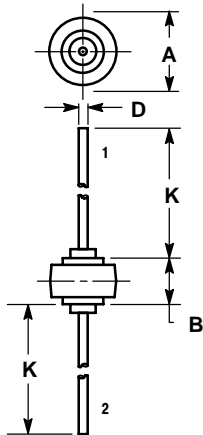
| Device | Package | Shipping† |
|----------|-------------------------|-------------------|
| MR750 | Axial Lead | 1000 Units / Box |
| MR750G | Axial Lead (Pb-Free) | |
| MR750RL | Axial Lead | 800 / Tape & Reel |
| MR750RLG | Axial Lead (Pb-Free) | |
| MR751 | Axial Lead | 1000 Units / Box |
| MR751G | Axial Lead (Pb-Free) | |
| MR751RL | Axial Lead | 800 / Tape & Reel |
| MR751RLG | Axial Lead (Pb-Free) | |
| MR752 | Axial Lead | 1000 Units / Box |
| MR752G | Axial Lead (Pb-Free) | |
| MR752RL | Axial Lead | 800 / Tape & Reel |
| MR752RLG | Axial Lead (Pb-Free) | |
| MR754 | Axial Lead | 1000 Units / Box |
| MR754G | Axial Lead (Pb-Free) | |
| MR754RL | Axial Lead | 800 / Tape & Reel |
| MR754RLG | Axial Lead (Pb-Free) | |
| MR756 | Axial Lead | 1000 Units / Box |
| MR756G | Axial Lead (Pb-Free) | |
| MR756RL | Axial Lead | 800 / Tape & Reel |
| MR756RLG | Axial Lead (Pb-Free) | |
| MR760 | Axial Lead | 1000 Units / Box |
| MR760G | Axial Lead (Pb-Free) | |
| MR760RL | Axial Lead | 800 / Tape & Reel |
| MR760RLG | Axial Lead (Pb-Free) | |

†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.

MR750 SERIES

PACKAGE DIMENSIONS

AXIAL LEAD BUTTON CASE 194-04 ISSUE H




NOTES:

1. CATHODE SYMBOL ON PACKAGE.
2. 194-01 OBSOLETE, 194-04 NEW STANDARD.

| DIM | MILLIMETERS | | INCHES | |
|-----|-------------|-------|--------|-------|
| | MIN | MAX | MIN | MAX |
| A | 8.43 | 8.69 | 0.332 | 0.342 |
| B | 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

ON Semiconductor and  are registered trademarks of Semiconductor Components Industries, LLC (SCILLC). SCILLC reserves the right to make changes without further notice to any products herein. SCILLC makes no warranty, representation or guarantee regarding the suitability of its products for any particular purpose, nor does SCILLC 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. "Typical" parameters which may be provided in SCILLC 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. SCILLC does not convey any license under its patent rights nor the rights of others. SCILLC products are not designed, intended, or authorized for use as components in systems intended for surgical implant into the body, or other applications intended to support or sustain life, or for any other application in which the failure of the SCILLC product could create a situation where personal injury or death may occur. Should Buyer purchase or use SCILLC products for any such unintended or unauthorized application, Buyer shall indemnify and hold SCILLC 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 SCILLC was negligent regarding the design or manufacture of the part. SCILLC 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:

Literature Distribution Center for ON Semiconductor
P.O. Box 5163, Denver, Colorado 80217 USA
Phone: 303-675-2175 or 800-344-3860 Toll Free USA/Canada
Fax: 303-675-2176 or 800-344-3867 Toll Free USA/Canada
Email: orderlit@onsemi.com

N. American Technical Support: 800-282-9855 Toll Free
USA/Canada
Europe, Middle East and Africa Technical Support:
Phone: 421 33 790 2910
Japan Customer Focus Center
Phone: 81-3-5773-3850

ON Semiconductor Website: www.onsemi.com

Order Literature: <http://www.onsemi.com/orderlit>

For additional information, please contact your local
Sales Representative