

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:

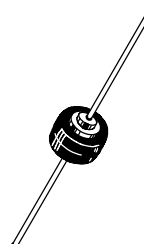
- Case: Epoxy, Molded
- Weight: 2.5 grams (approximately)
- Finish: All External Surfaces Corrosion Resistant and Terminal Lead is Readily Solderable
- Lead Temperature for Soldering Purposes:
260°C Max. for 10 Seconds
- Polarity: Cathode Polarity Band



ON Semiconductor®

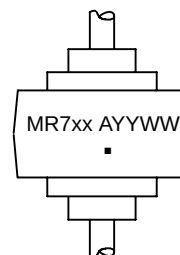
<http://onsemi.com>

**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	25 1.0	μA mA

MR750 SERIES

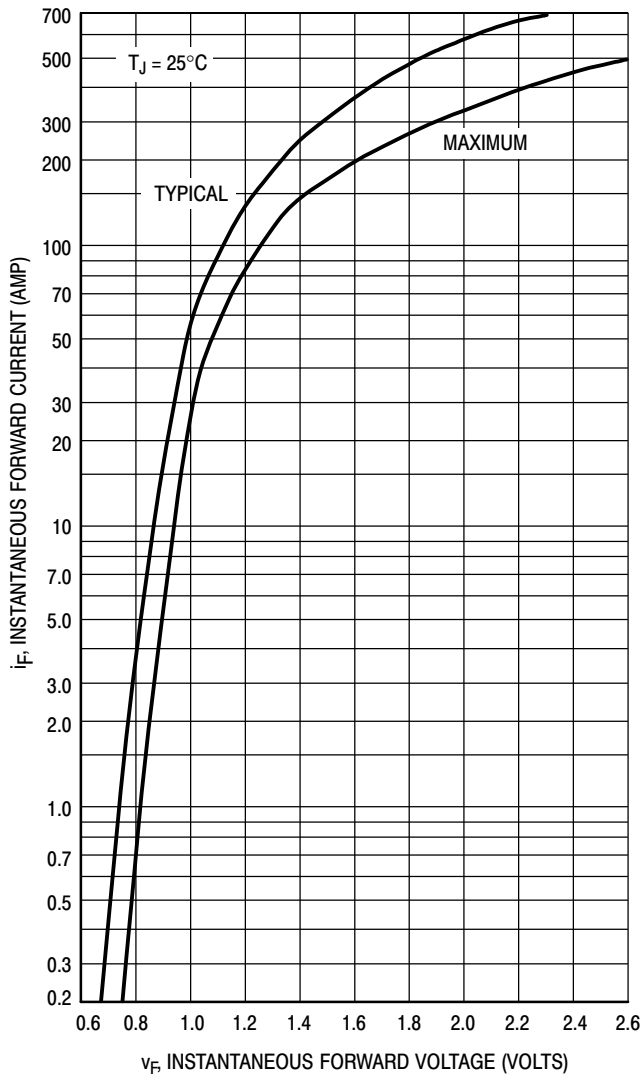


Figure 1. Forward Voltage

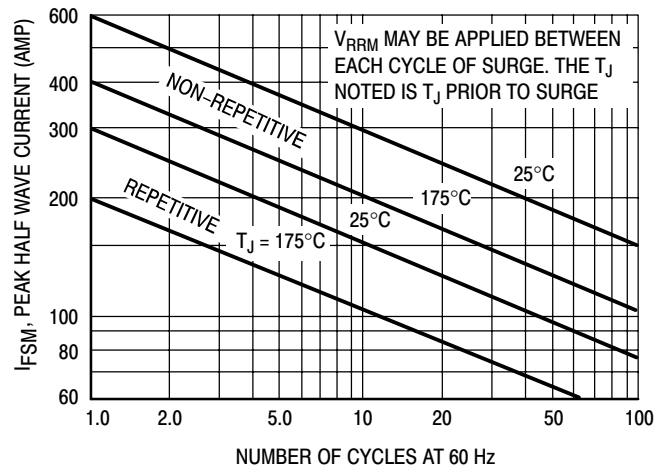


Figure 2. Maximum Surge Capability

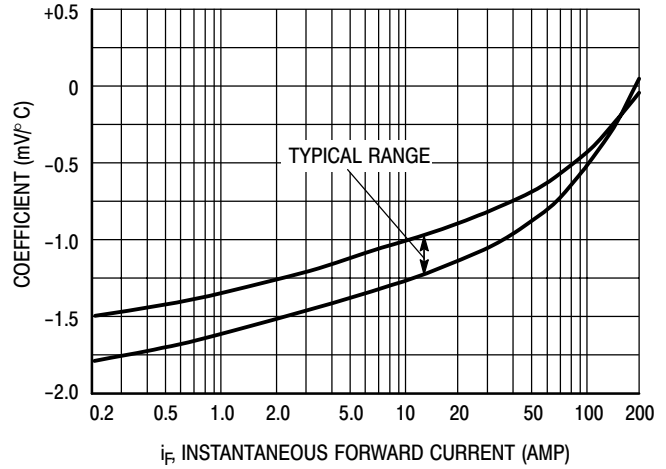


Figure 3. Forward Voltage Temperature Coefficient

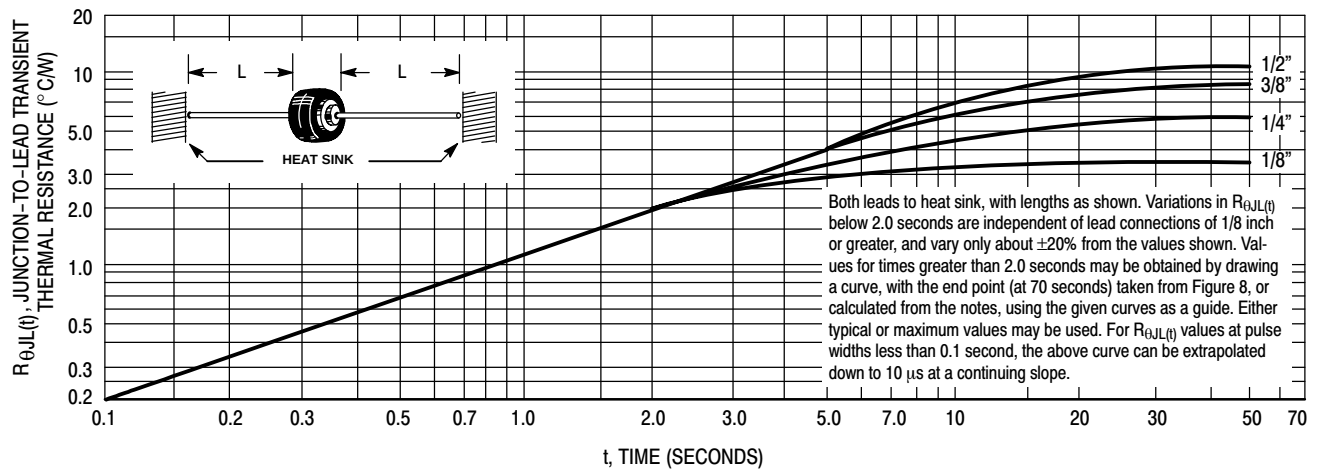


Figure 4. Typical Transient Thermal Resistance

MR750 SERIES

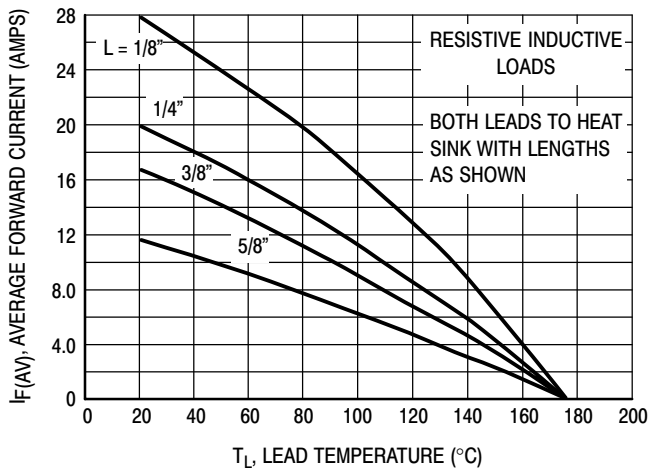


Figure 5. Maximum Current Ratings

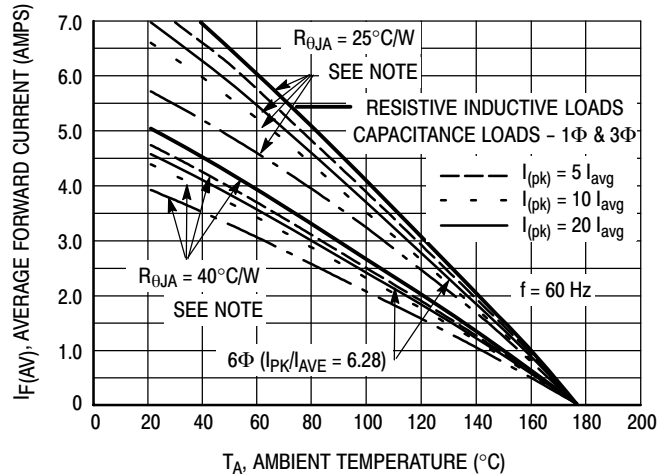


Figure 6. Maximum Current Ratings

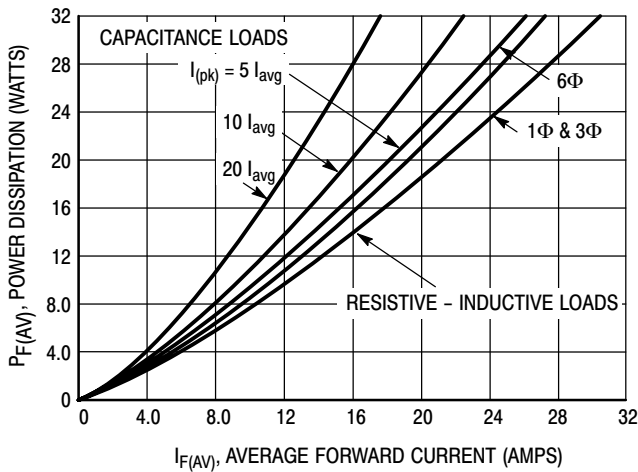


Figure 7. Power Dissipation

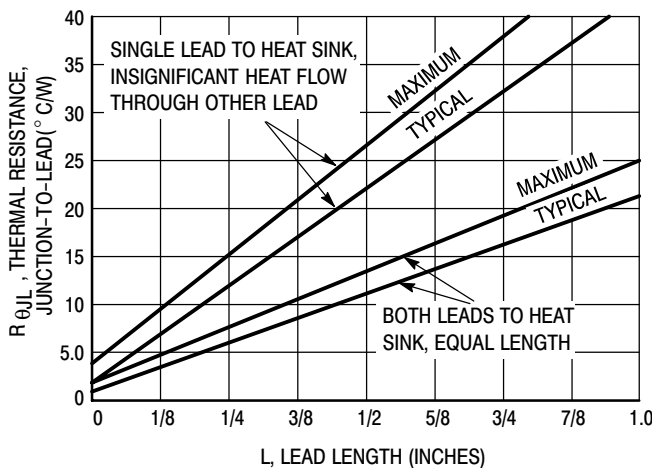
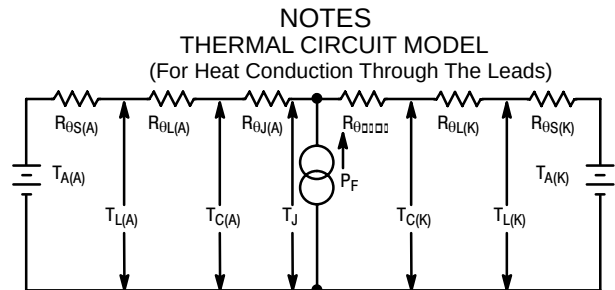


Figure 8. Steady State Thermal Resistance



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_C = Case Temperature
 T_L = 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.)

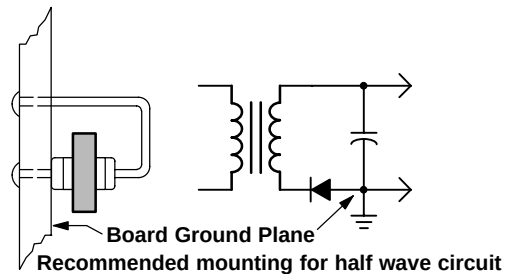
Values for thermal resistance components are:

$R_{\Theta L} = 40^\circ\text{C/W/in.}$ 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 $T_{J(AVG)}$. 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 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

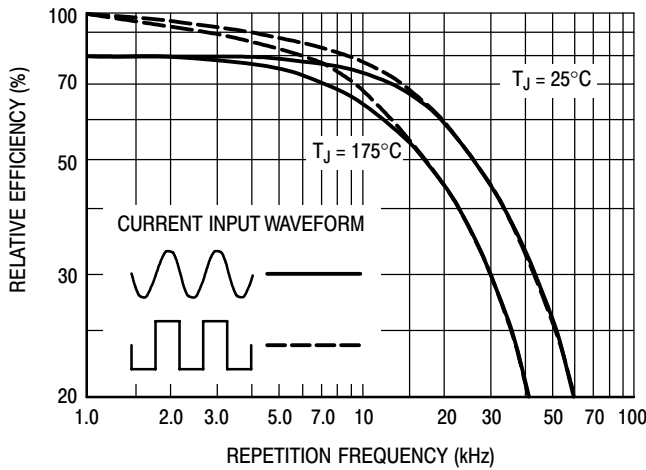


Figure 9. Rectification Efficiency

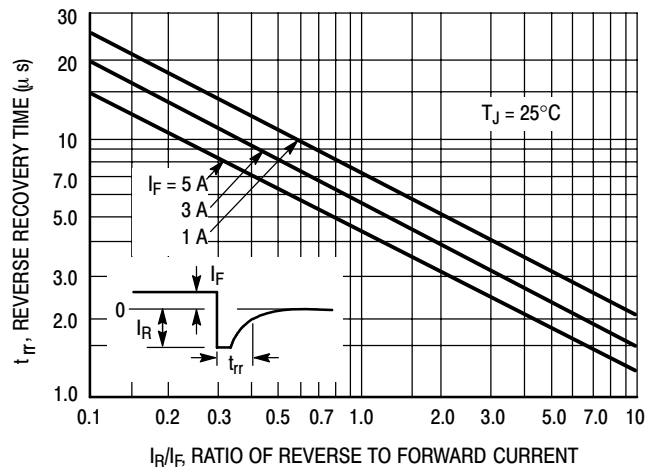


Figure 10. Reverse Recovery Time

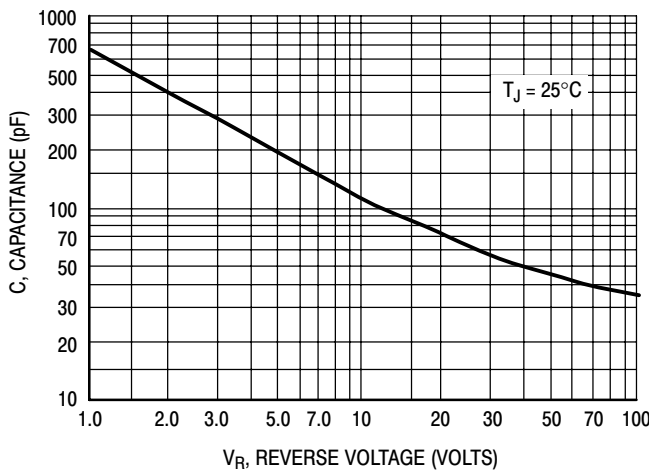


Figure 11. Junction Capacitance

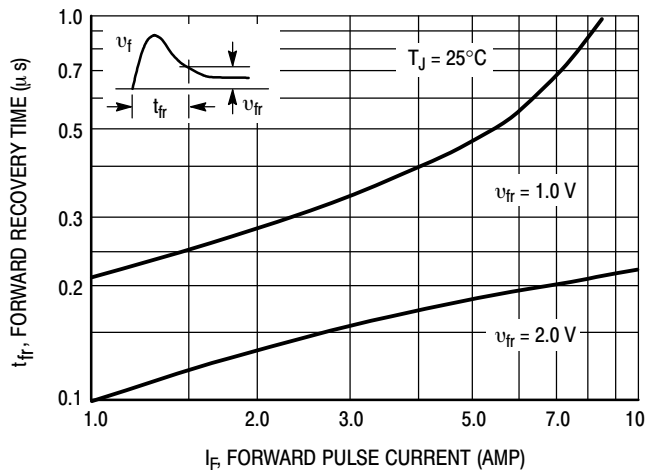


Figure 12. Forward Recovery Time

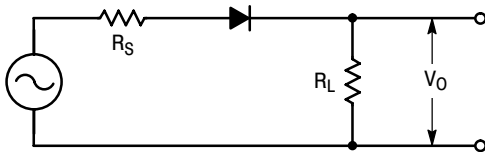


Figure 13. Single-Phase Half-Wave Rectifier Circuit

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

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

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

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

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

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

(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_0 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)	

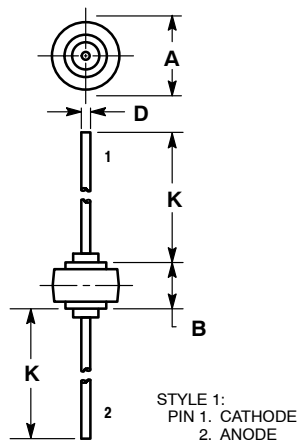
[†]For information on tape and reel specifications, including part orientation and tape sizes, please refer to our Tape and Reel Packaging Specifications Brochure, BRD8011/D.

MICRODE AXIAL
CASE 194-04
ISSUE H

DATE 09 SEP 2003



SCALE 1:1

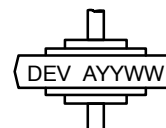


NOTES:

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

GENERIC
MARKING DIAGRAM*



DEV = Specific Device Code
A = Assembly Location
YY = Year
WW = Work Week

*This information is generic. Please refer to device data sheet for actual part marking.

DOCUMENT NUMBER:	98ASB42126B	Electronic versions are uncontrolled except when accessed directly from the Document Repository. Printed versions are uncontrolled except when stamped "CONTROLLED COPY" in red.
DESCRIPTION:	MICRODE AXIAL	PAGE 1 OF 1

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. **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
onsemi Website: www.onsemi.com

ONLINE SUPPORT: www.onsemi.com/support

For additional information, please contact your local Sales Representative at
www.onsemi.com/support/sales