

# Axial-Lead Glass Passivated Standard Recovery Rectifiers

**1N4001, 1N4002, 1N4003,  
1N4004, 1N4005, 1N4006,  
1N4007**

This data sheet provides information on subminiature size, axial lead mounted rectifiers for general-purpose low-power applications.

## Features

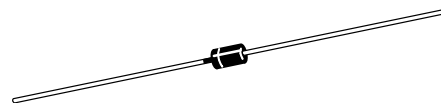
- Shipped in Plastic Bags, 1000 per bag
- Available Tape and Reeled, 5000 per reel, by adding a “RL” suffix to the part number
- Available in Fan-Fold Packaging, 3000 per box, by adding a “FF” suffix to the part number
- Pb-Free Packages are Available

## Mechanical Characteristics

- Case: Epoxy, Molded
- Weight: 0.4 gram (approximately)
- Finish: All External Surfaces Corrosion Resistant and Terminal Leads are Readily Solderable
- Lead and Mounting Surface Temperature for Soldering Purposes: 260°C Max. for 10 Seconds, 1/16 in. from case
- Polarity: Cathode Indicated by Polarity Band

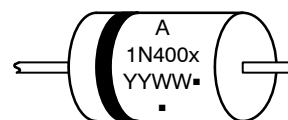
\*For additional information on our Pb-Free strategy and soldering details, please download the **onsemi** Soldering and Mounting Techniques Reference Manual, SOLDERRM/D.

## LEAD MOUNTED RECTIFIERS 50–1000 VOLTS DIFFUSED JUNCTION



**CASE 59-10  
AXIAL LEAD  
PLASTIC**

## MARKING DIAGRAM



A = Assembly Location  
 1N400x = Device Number  
 x = 1, 2, 3, 4, 5, 6 or 7  
 YY = Year  
 WW = Work Week  
 ■ = Pb-Free Package  
 (Note: Microdot may be in either location)

## ORDERING INFORMATION

See detailed ordering and shipping information on page 5 of this data sheet.

# 1N4001, 1N4002, 1N4003, 1N4004, 1N4005, 1N4006, 1N4007

## MAXIMUM RATINGS

| Rating                                                                                                    | Symbol                          | 1N4001           | 1N4002 | 1N4003 | 1N4004 | 1N4005 | 1N4006 | 1N4007 | Unit             |
|-----------------------------------------------------------------------------------------------------------|---------------------------------|------------------|--------|--------|--------|--------|--------|--------|------------------|
| †Peak Repetitive Reverse Voltage<br>Working Peak Reverse Voltage<br>DC Blocking Voltage                   | $V_{RRM}$<br>$V_{RWM}$<br>$V_R$ | 50               | 100    | 200    | 400    | 600    | 800    | 1000   | V                |
| †Non-Repetitive Peak Reverse Voltage<br>(halfwave, single phase, 60 Hz)                                   | $V_{RSM}$                       | 60               | 120    | 240    | 480    | 720    | 1000   | 1200   | V                |
| †RMS Reverse Voltage                                                                                      | $V_{R(RMS)}$                    | 35               | 70     | 140    | 280    | 420    | 560    | 700    | V                |
| †Average Rectified Forward Current<br>(single phase, resistive load,<br>60 Hz, $T_A = 75^\circ\text{C}$ ) | $I_O$                           | 1.0              |        |        |        |        |        |        | A                |
| †Non-Repetitive Peak Surge Current<br>(surge applied at rated load conditions)                            | $I_{FSM}$                       | 30 (for 1 cycle) |        |        |        |        |        |        | A                |
| Operating and Storage Junction<br>Temperature Range                                                       | $T_J$<br>$T_{stg}$              | -65 to +150      |        |        |        |        |        |        | $^\circ\text{C}$ |

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.

†Indicates JEDEC Registered Data

## THERMAL CHARACTERISTICS

| Rating                                          | Symbol          | Max    | Unit               |
|-------------------------------------------------|-----------------|--------|--------------------|
| Maximum Thermal Resistance, Junction-to-Ambient | $R_{\theta JA}$ | Note 1 | $^\circ\text{C/W}$ |

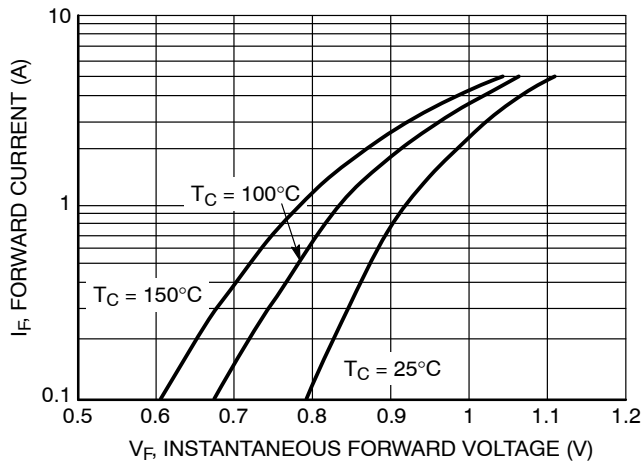
## ELECTRICAL CHARACTERISTICS†

| Rating                                                                                                       | Symbol      | Typ         | Max      | Unit          |
|--------------------------------------------------------------------------------------------------------------|-------------|-------------|----------|---------------|
| Maximum Instantaneous Forward Voltage Drop, ( $I_F = 1.0$ Amp, $T_J = 25^\circ\text{C}$ )                    | $V_F$       | 0.93        | 1.1      | V             |
| Maximum Full-Cycle Average Forward Voltage Drop, ( $I_O = 1.0$ Amp, $T_L = 75^\circ\text{C}$ , 1 inch leads) | $V_{F(AV)}$ | –           | 0.8      | V             |
| Maximum Reverse Current (rated DC voltage)<br>( $T_J = 25^\circ\text{C}$ )<br>( $T_J = 100^\circ\text{C}$ )  | $I_R$       | 0.05<br>1.0 | 10<br>50 | $\mu\text{A}$ |
| Maximum Full-Cycle Average Reverse Current, ( $I_O = 1.0$ Amp, $T_L = 75^\circ\text{C}$ , 1 inch leads)      | $I_{R(AV)}$ | –           | 30       | $\mu\text{A}$ |

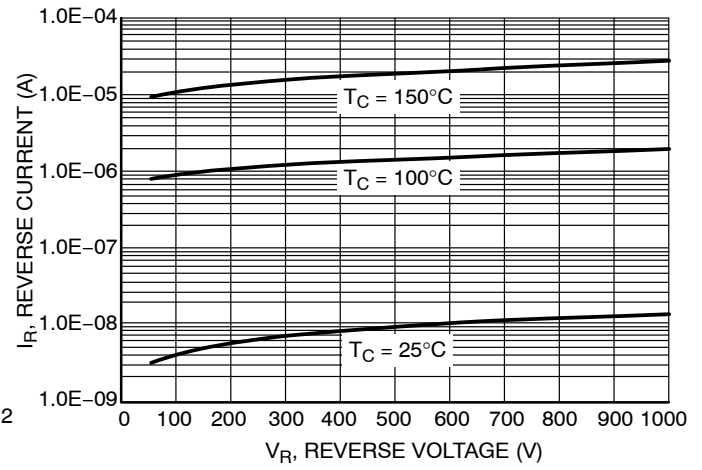
Product parametric performance is indicated in the Electrical Characteristics for the listed test conditions, unless otherwise noted. Product performance may not be indicated by the Electrical Characteristics if operated under different conditions.

†Indicates JEDEC Registered Data

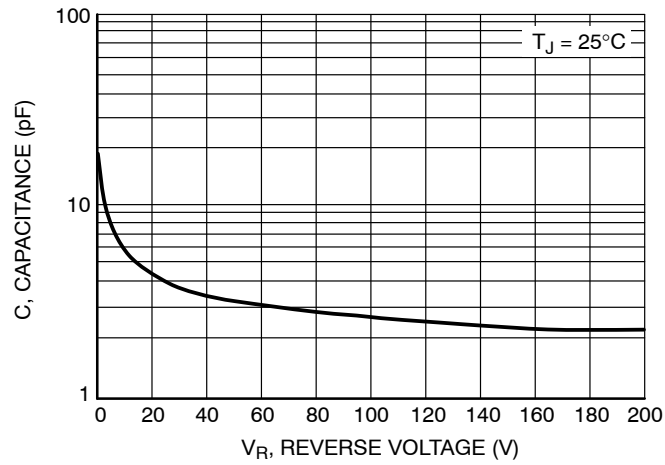
# 1N4001, 1N4002, 1N4003, 1N4004, 1N4005, 1N4006, 1N4007



**Figure 1. Typical Forward Voltage**



**Figure 2. Typical Reverse Current**



**Figure 3. Typical Capacitance**

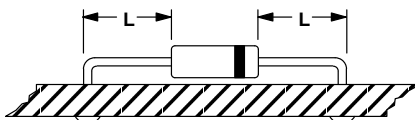
NOTE 1. – AMBIENT MOUNTING DATA

Data shown for thermal resistance, junction-to-ambient ( $R_{\theta JA}$ ) for the mountings shown is to be used as typical guideline values for preliminary engineering or in case the tie point temperature cannot be measured.

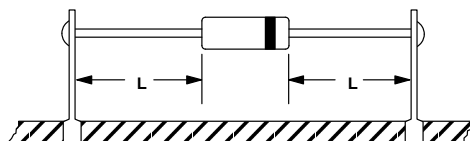
TYPICAL VALUES FOR  $R_{\theta JA}$  IN STILL AIR

| Mounting Method |                 | Lead Length, L |     |     | Units |
|-----------------|-----------------|----------------|-----|-----|-------|
|                 |                 | 1/8            | 1/4 | 1/2 |       |
| 1               | $R_{\theta JA}$ | 52             | 65  | 72  | °C/W  |
| 2               |                 | 67             | 80  | 87  | °C/W  |
| 3               |                 | 50             |     |     | °C/W  |

MOUNTING METHOD 1

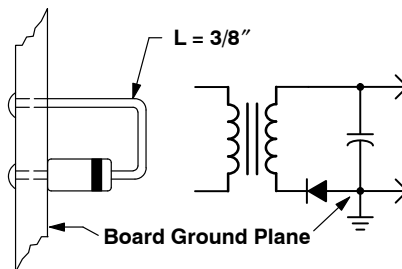


MOUNTING METHOD 2



Vector Pin Mounting

MOUNTING METHOD 3



P.C. Board with  
1-1/2" X 1-1/2" Copper Surface

# 1N4001, 1N4002, 1N4003, 1N4004, 1N4005, 1N4006, 1N4007

## ORDERING INFORMATION

| Device    | Package                  | Shipping <sup>†</sup> |
|-----------|--------------------------|-----------------------|
| 1N4001    | Axial Lead*              | 1000 Units/Bag        |
| 1N4001G   | Axial Lead*<br>(Pb-Free) | 1000 Units/Bag        |
| 1N4001RL  | Axial Lead*              | 5000/Tape & Reel      |
| 1N4001RLG | Axial Lead*<br>(Pb-Free) | 5000/Tape & Reel      |
| 1N4002    | Axial Lead*              | 1000 Units/Bag        |
| 1N4002G   | Axial Lead*<br>(Pb-Free) | 1000 Units/Bag        |
| 1N4002RL  | Axial Lead*              | 5000/Tape & Reel      |
| 1N4002RLG | Axial Lead*<br>(Pb-Free) | 5000/Tape & Reel      |
| 1N4003    | Axial Lead*              | 1000 Units/Bag        |
| 1N4003G   | Axial Lead*<br>(Pb-Free) | 1000 Units/Bag        |
| 1N4003RL  | Axial Lead*              | 5000/Tape & Reel      |
| 1N4003RLG | Axial Lead*<br>(Pb-Free) | 5000/Tape & Reel      |
| 1N4004    | Axial Lead*              | 1000 Units/Bag        |
| 1N4004G   | Axial Lead*<br>(Pb-Free) | 1000 Units/Bag        |
| 1N4004RL  | Axial Lead*              | 5000/Tape & Reel      |
| 1N4004RLG | Axial Lead*<br>(Pb-Free) | 5000/Tape & Reel      |
| 1N4005    | Axial Lead*              | 1000 Units/Bag        |
| 1N4005G   | Axial Lead*<br>(Pb-Free) | 1000 Units/Bag        |
| 1N4005RL  | Axial Lead*              | 5000/Tape & Reel      |
| 1N4005RLG | Axial Lead*<br>(Pb-Free) | 5000/Tape & Reel      |
| 1N4006    | Axial Lead*              | 1000 Units/Bag        |
| 1N4006G   | Axial Lead*<br>(Pb-Free) | 1000 Units/Bag        |
| 1N4006FFG | Axial Lead*<br>(Pb-Free) | 3000 Units/Box        |
| 1N4006RL  | Axial Lead*              | 5000/Tape & Reel      |
| 1N4006RLG | Axial Lead*<br>(Pb-Free) | 5000/Tape & Reel      |
| 1N4007    | Axial Lead*              | 1000 Units/Bag        |
| 1N4007G   | Axial Lead*<br>(Pb-Free) | 1000 Units/Bag        |
| 1N4007FFG | Axial Lead*<br>(Pb-Free) | 3000 Units/Box        |
| 1N4007RL  | Axial Lead*              | 5000/Tape & Reel      |
| 1N4007RLG | Axial Lead*<br>(Pb-Free) | 5000/Tape & Reel      |

<sup>†</sup>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.

\*This package is inherently Pb-Free.

# MECHANICAL CASE OUTLINE

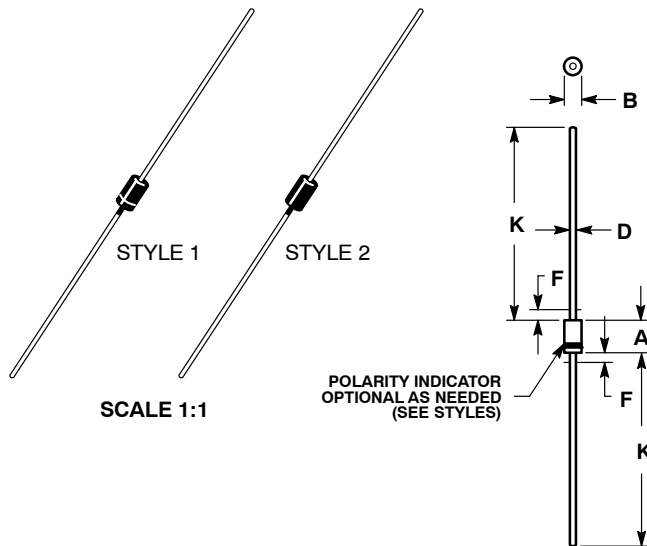
## PACKAGE DIMENSIONS

ON Semiconductor®



### AXIAL LEAD CASE 59-10 ISSUE U

DATE 15 FEB 2005



STYLE 1:  
PIN 1: CATHODE (POLARITY BAND)  
2: ANODE

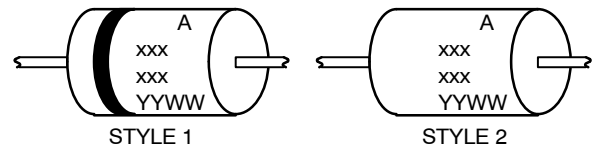
STYLE 2:  
NO POLARITY

#### NOTES:

1. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.
2. CONTROLLING DIMENSION: INCH.
3. ALL RULES AND NOTES ASSOCIATED WITH JEDEC DO-41 OUTLINE SHALL APPLY.
4. POLARITY DENOTED BY CATHODE BAND.
5. LEAD DIAMETER NOT CONTROLLED WITHIN F DIMENSION.

| DIM | INCHES |       | MILLIMETERS |      |
|-----|--------|-------|-------------|------|
|     | MIN    | MAX   | MIN         | MAX  |
| A   | 0.161  | 0.205 | 4.10        | 5.20 |
| B   | 0.079  | 0.106 | 2.00        | 2.70 |
| D   | 0.028  | 0.034 | 0.71        | 0.86 |
| F   | ---    | 0.050 | ---         | 1.27 |
| K   | 1.000  | ---   | 25.40       | ---  |

### GENERIC MARKING DIAGRAM\*



xxx = 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.  
Pb-Free indicator, "G" or microdot "▪", may or may not be present.

|                  |             |                                                                                                                                                                                     |
|------------------|-------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
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| DESCRIPTION:     | AXIAL LEAD  | PAGE 1 OF 1                                                                                                                                                                         |

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