

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

## Axial Lead Standard Recovery Rectifiers

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

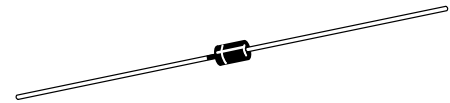
- Case: Epoxy, Molded
- Weight: 0.4 gram (approximately)
- Finish: All External Surfaces Corrosion Resistant and Terminal Leads are Readily Solderable
- Lead and Mounting Surface Temperature for Soldering Purposes: 260°C Max. for 10 Seconds, 1/16 in. from case
- Polarity: Cathode Indicated by Polarity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



**ON Semiconductor®**

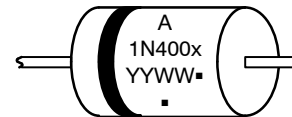
<http://onsemi.com>

## 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.

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

# 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 +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.

†Indicates JEDEC Registered Data

## THERMAL CHARACTERISTICS

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

## 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       | $\mu\text{A}$ |

†Indicates JEDEC Registered Data

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

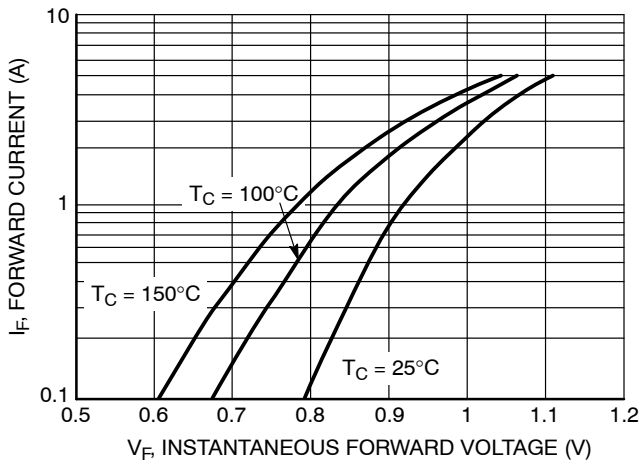


Figure 1. Typical Forward Voltage

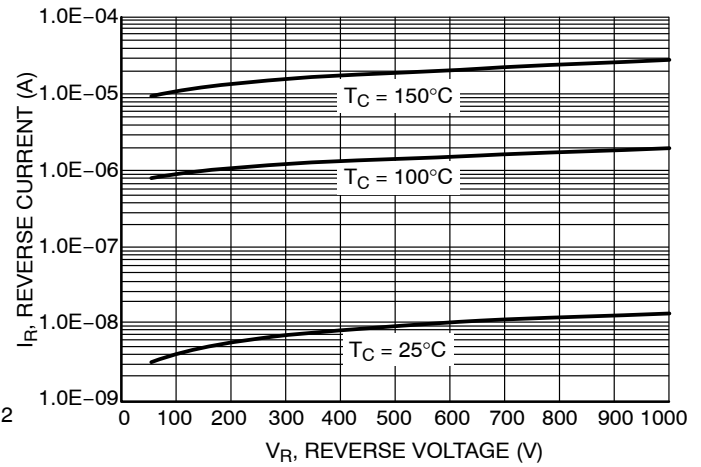


Figure 2. Typical Reverse Current

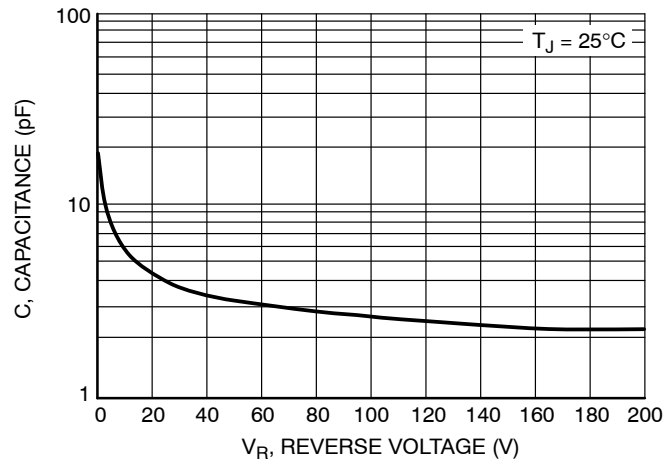


Figure 3. Typical Capacitance

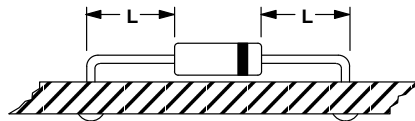
NOTE 1. – AMBIENT MOUNTING DATA

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.

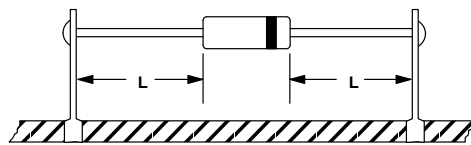
TYPICAL VALUES FOR  $R_{\theta JA}$  IN STILL AIR

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

MOUNTING METHOD 1

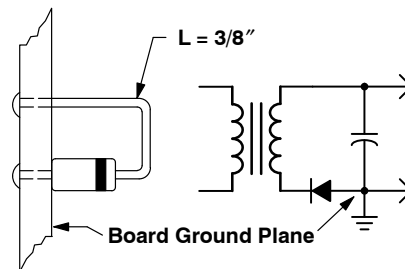


MOUNTING METHOD 2



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†        |
|-----------|--------------------------|------------------|
| 1N4001    | Axial Lead*              | 1000 Units/Bag   |
| 1N4001G   | Axial Lead*<br>(Pb-Free) | 1000 Units/Bag   |
| 1N4001FF  | Axial Lead*              | 3000 Units/Box   |
| 1N4001FFG | Axial Lead*<br>(Pb-Free) | 3000 Units/Box   |
| 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   |
| 1N4002FF  | Axial Lead*              | 3000 Units/Box   |
| 1N4002FFG | Axial Lead*<br>(Pb-Free) | 3000 Units/Box   |
| 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   |
| 1N4003FF  | Axial Lead*              | 3000 Units/Box   |
| 1N4003FFG | Axial Lead*<br>(Pb-Free) | 3000 Units/Box   |
| 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   |
| 1N4004FF  | Axial Lead*              | 3000 Units/Box   |
| 1N4004FFG | Axial Lead*<br>(Pb-Free) | 3000 Units/Box   |
| 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   |
| 1N4005FF  | Axial Lead*              | 3000 Units/Box   |
| 1N4005FFG | Axial Lead*<br>(Pb-Free) | 3000 Units/Box   |
| 1N4005RL  | Axial Lead*              | 5000/Tape & Reel |
| 1N4005RLG | Axial Lead*<br>(Pb-Free) | 5000/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.

\*This package is inherently Pb-Free.

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

## ORDERING INFORMATION

| Device    | Package                  | Shipping†        |
|-----------|--------------------------|------------------|
| 1N4006    | Axial Lead*              | 1000 Units/Bag   |
| 1N4006G   | Axial Lead*<br>(Pb-Free) | 1000 Units/Bag   |
| 1N4006FF  | Axial Lead*              | 3000 Units/Box   |
| 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   |
| 1N4007FF  | Axial Lead*              | 3000 Units/Box   |
| 1N4007FFG | Axial Lead*<br>(Pb-Free) | 3000 Units/Box   |
| 1N4007RL  | Axial Lead*              | 5000/Tape & Reel |
| 1N4007RLG | Axial Lead*<br>(Pb-Free) | 5000/Tape & Reel |

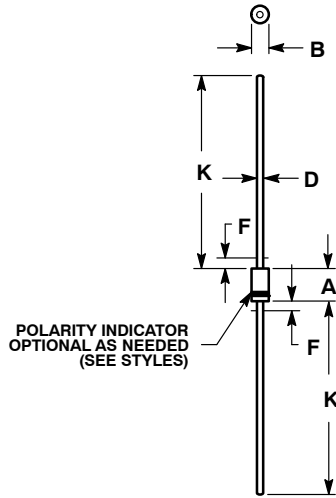
†For information on tape and reel specifications, including part orientation and tape sizes, please refer to our Tape and Reel Packaging Specifications Brochure, BRD8011/D.

\*This package is inherently Pb-Free.

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

## PACKAGE DIMENSIONS

### AXIAL LEAD CASE 59-10 ISSUE U



#### 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       | ---  |

**ON Semiconductor** and **ON** are registered trademarks of Semiconductor Components Industries, LLC (SCILLC). SCILLC owns the rights to a number of patents, trademarks, copyrights, trade secrets, and other intellectual property. A listing of SCILLC's product/patent coverage may be accessed at [www.onsemi.com/site/pdf/Patent-Marking.pdf](http://www.onsemi.com/site/pdf/Patent-Marking.pdf). 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](mailto: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: 81-3-5817-1050

**ON Semiconductor Website:** [www.onsemi.com](http://www.onsemi.com)  
**Order Literature:** <http://www.onsemi.com/orderlit>

For additional information, please contact your local Sales Representative