

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

Axial-Lead Glass Passivated 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

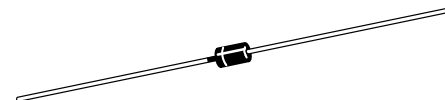
*For additional information on our Pb-Free strategy and soldering details, please download the ON Semiconductor Soldering and Mounting Techniques Reference Manual, SOLDERRM/D.



ON Semiconductor®

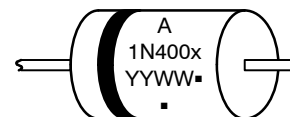
www.onsemi.com

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.

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

MAXIMUM RATINGS

Rating	Symbol	1N4001	1N4002	1N4003	1N4004	1N4005	1N4006	1N4007	Unit
†Peak Repetitive Reverse Voltage Working Peak Reverse Voltage DC Blocking Voltage	V_{RRM} V_{RWM} V_R	50	100	200	400	600	800	1000	V
†Non-Repetitive Peak Reverse Voltage (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 (single phase, resistive load, 60 Hz, $T_A = 75^\circ\text{C}$)	I_O	1.0							A
†Non-Repetitive Peak Surge Current (surge applied at rated load conditions)	I_{FSM}	30 (for 1 cycle)							A
Operating and Storage Junction Temperature Range	T_J T_{stg}	-65 to +175							$^\circ\text{C}$

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	$^\circ\text{C}/\text{W}$

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) ($T_J = 25^\circ\text{C}$) ($T_J = 100^\circ\text{C}$)	I_R	0.05 1.0	10 50	μA
Maximum Full-Cycle Average Reverse Current, ($I_O = 1.0$ Amp, $T_L = 75^\circ\text{C}$, 1 inch leads)	$I_{R(AV)}$	–	30	μA

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

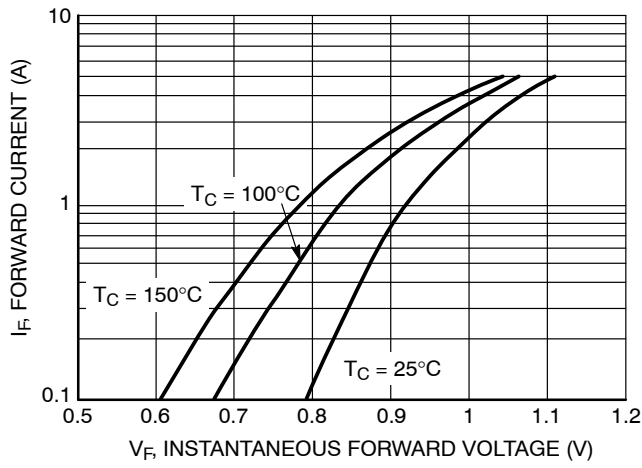


Figure 1. Typical Forward Voltage

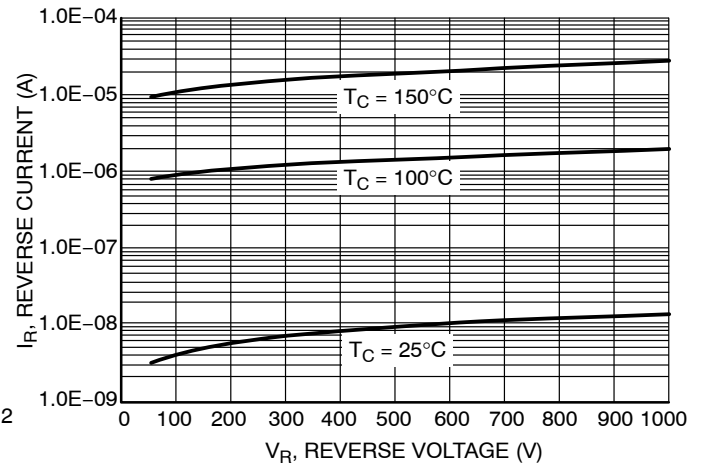


Figure 2. Typical Reverse Current

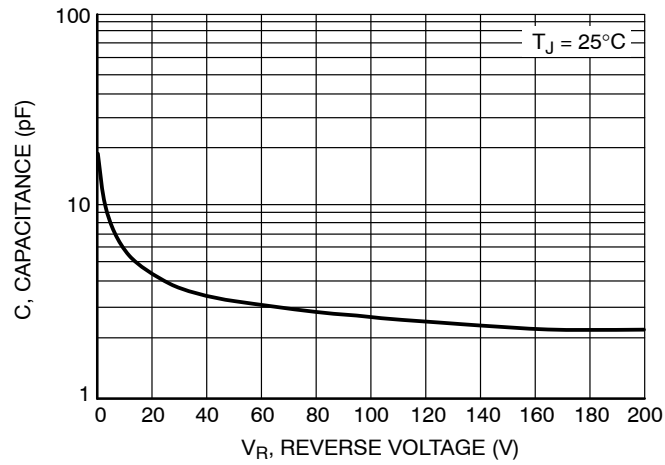


Figure 3. Typical Capacitance

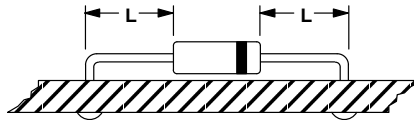
NOTE 1. – AMBIENT MOUNTING DATA

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.

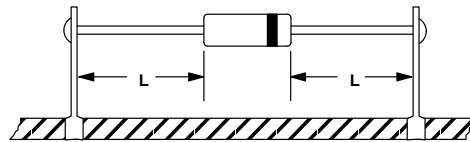
TYPICAL VALUES FOR $R_{\theta JA}$ IN STILL AIR

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

MOUNTING METHOD 1

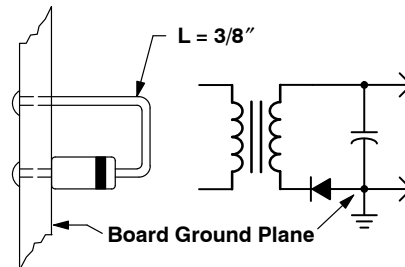


MOUNTING METHOD 2



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 [†]
1N4001	Axial Lead*	1000 Units/Bag
1N4001G	Axial Lead* (Pb-Free)	1000 Units/Bag
1N4001FF	Axial Lead*	3000 Units/Box
1N4001FFG	Axial Lead* (Pb-Free)	3000 Units/Box
1N4001RL	Axial Lead*	5000/Tape & Reel
1N4001RLG	Axial Lead* (Pb-Free)	5000/Tape & Reel
1N4002	Axial Lead*	1000 Units/Bag
1N4002G	Axial Lead* (Pb-Free)	1000 Units/Bag
1N4002FF	Axial Lead*	3000 Units/Box
1N4002FFG	Axial Lead* (Pb-Free)	3000 Units/Box
1N4002RL	Axial Lead*	5000/Tape & Reel
1N4002RLG	Axial Lead* (Pb-Free)	5000/Tape & Reel
1N4003	Axial Lead*	1000 Units/Bag
1N4003G	Axial Lead* (Pb-Free)	1000 Units/Bag
1N4003FF	Axial Lead*	3000 Units/Box
1N4003FFG	Axial Lead* (Pb-Free)	3000 Units/Box
1N4003RL	Axial Lead*	5000/Tape & Reel
1N4003RLG	Axial Lead* (Pb-Free)	5000/Tape & Reel
1N4004	Axial Lead*	1000 Units/Bag
1N4004G	Axial Lead* (Pb-Free)	1000 Units/Bag
1N4004FF	Axial Lead*	3000 Units/Box
1N4004FFG	Axial Lead* (Pb-Free)	3000 Units/Box
1N4004RL	Axial Lead*	5000/Tape & Reel
1N4004RLG	Axial Lead* (Pb-Free)	5000/Tape & Reel
1N4005	Axial Lead*	1000 Units/Bag
1N4005G	Axial Lead* (Pb-Free)	1000 Units/Bag
1N4005FF	Axial Lead*	3000 Units/Box
1N4005FFG	Axial Lead* (Pb-Free)	3000 Units/Box
1N4005RL	Axial Lead*	5000/Tape & Reel
1N4005RLG	Axial Lead* (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

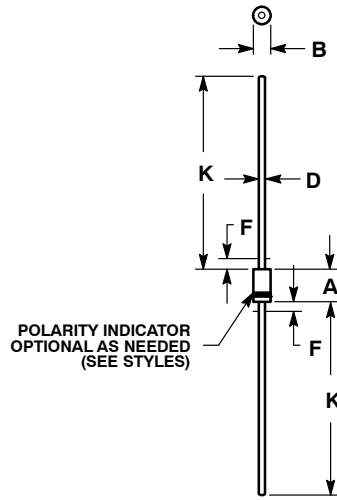
Device	Package	Shipping [†]
1N4006	Axial Lead*	1000 Units/Bag
1N4006G	Axial Lead* (Pb-Free)	1000 Units/Bag
1N4006FF	Axial Lead*	3000 Units/Box
1N4006FFG	Axial Lead* (Pb-Free)	3000 Units/Box
1N4006RL	Axial Lead*	5000/Tape & Reel
1N4006RLG	Axial Lead* (Pb-Free)	5000/Tape & Reel
1N4007	Axial Lead*	1000 Units/Bag
1N4007G	Axial Lead* (Pb-Free)	1000 Units/Bag
1N4007FF	Axial Lead*	3000 Units/Box
1N4007FFG	Axial Lead* (Pb-Free)	3000 Units/Box
1N4007RL	Axial Lead*	5000/Tape & Reel
1N4007RLG	Axial Lead* (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.

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	---

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Zener Diodes



FEATURES

- Silicon planar power Zener diodes
- For use in stabilizing and clipping circuits with high power rating
- Standard Zener voltage tolerance is $\pm 5\%$
- Material categorization:
for definitions of compliance please see www.vishay.com/doc?99912



RoHS
COMPLIANT
HALOGEN
FREE

APPLICATIONS

- Voltage stabilization

LINKS TO ADDITIONAL RESOURCES



PRIMARY CHARACTERISTICS

PARAMETER	VALUE	UNIT
V_Z range nom.	3.3 to 75	V
Test current I_{ZT}	3.3 to 76	mA
V_Z specification	Thermal equilibrium	
Circuit configuration	Single	

ORDERING INFORMATION

DEVICE NAME	ORDERING CODE	TAPED UNITS PER REEL	MINIMUM ORDER QUANTITY
1N4728A to 1N4761A	1N4728A to 1N4761A -series-TR	5000 per 13" reel	25 000/box
1N4728A to 1N4761A	1N4728A to 1N4761A-series-TAP	5000 per ammpack (52 mm tape)	25 000/box

PACKAGE

PACKAGE NAME	WEIGHT	MOLDING COMPOUND FLAMMABILITY RATING	MOISTURE SENSITIVITY LEVEL	SOLDERING CONDITIONS
DO-41 (DO-204AL)	310 mg	UL 94 V-0	MSL level 1 (according J-STD-020)	Peak temperature max. 260 °C

ABSOLUTE MAXIMUM RATINGS ($T_{amb} = 25\text{ °C}$, unless otherwise specified)

PARAMETER	TEST CONDITION	SYMBOL	VALUE	UNIT
Power dissipation	Valid provided that leads at a distance of 4 mm from case are kept at ambient temperature	P_{tot}	1300	mW
Zener current		I_Z	P_V/V_Z	mA
Thermal resistance junction to ambient air	Valid provided that leads at a distance of 4 mm from case are kept at ambient temperature	R_{thJA}	110	K/W
Junction temperature		T_j	175	°C
Storage temperature range		T_{stg}	-65 to +175	°C
Forward voltage (max.)	$I_F = 200\text{ mA}$	V_F	1.2	V

**ELECTRICAL CHARACTERISTICS** ($T_{amb} = 25\text{ }^{\circ}\text{C}$, unless otherwise specified)

PART NUMBER	ZENER VOLTAGE RANGE ⁽¹⁾	TEST CURRENT		REVERSE LEAKAGE CURRENT		DYNAMIC RESISTANCE $f = 1\text{ kHz}$		SURGE CURRENT ⁽³⁾	REGULATOR CURRENT ⁽²⁾
	V_Z at I_{ZT1}	I_{ZT1}	I_{ZT2}	I_R at V_R		Z_{ZT} at I_{ZT1}	Z_{ZK} at I_{ZT2}	I_R	I_{ZM}
	V	mA	mA	μA	V	Ω		mA	mA
	NOM.			MAX.		TYP.	MAX.		MAX.
1N4728A	3.3	76	1	100	1	10	400	1380	276
1N4729A	3.6	69	1	100	1	10	400	1260	252
1N4730A	3.9	64	1	50	1	9	400	1190	234
1N4731A	4.3	58	1	10	1	9	400	1070	217
1N4732A	4.7	53	1	10	1	8	500	970	193
1N4733A	5.1	49	1	10	1	7	550	890	178
1N4734A	5.6	45	1	10	2	5	600	810	162
1N4735A	6.2	41	1	10	3	2	700	730	146
1N4736A	6.8	37	1	10	4	3.5	700	660	133
1N4737A	7.5	34	0.5	10	5	4	700	605	121
1N4738A	8.2	31	0.5	10	6	4.5	700	550	110
1N4739A	9.1	28	0.5	10	7	5	700	500	100
1N4740A	10	25	0.25	10	7.6	7	700	454	91
1N4741A	11	23	0.25	5	8.4	8	700	414	83
1N4742A	12	21	0.25	5	9.1	9	700	380	76
1N4743A	13	19	0.25	5	9.9	10	700	344	69
1N4744A	15	17	0.25	5	11.4	14	700	304	61
1N4745A	16	15.5	0.25	5	12.2	16	700	285	57
1N4746A	18	14	0.25	5	13.7	20	750	250	50
1N4747A	20	12.5	0.25	5	15.2	22	750	225	45
1N4748A	22	11.5	0.25	5	16.7	23	750	205	41
1N4749A	24	10.5	0.25	5	18.2	25	750	190	38
1N4750A	27	9.5	0.25	5	20.6	35	750	170	34
1N4751A	30	8.5	0.25	5	22.8	40	1000	150	30
1N4752A	33	7.5	0.25	5	25.1	45	1000	135	27
1N4753A	36	7	0.25	5	27.4	50	1000	125	25
1N4754A	39	6.5	0.25	5	29.7	60	1000	115	23
1N4755A	43	6	0.25	5	32.7	70	1500	110	22
1N4756A	47	5.5	0.25	5	35.8	80	1500	95	19
1N4757A	51	5	0.25	5	38.8	95	1500	90	18
1N4758A	56	4.5	0.25	5	42.6	110	2000	80	16
1N4759A	62	4	0.25	5	47.1	125	2000	70	14
1N4760A	68	3.7	0.25	5	51.7	150	2000	65	13
1N4761A	75	3.3	0.25	5	56	175	2000	60	12

Notes

⁽¹⁾ Based on DC measurement at thermal equilibrium while maintaining the lead temperature (T_L) at $30\text{ }^{\circ}\text{C} + 1\text{ }^{\circ}\text{C}$, 9.5 mm (3/8") from the diode body

⁽²⁾ Valid provided that electrodes at a distance of 4 mm from case are kept at ambient temperature

⁽³⁾ $t_p = 10\text{ ms}$.

BASIC CHARACTERISTICS ($T_{amb} = 25\text{ }^{\circ}\text{C}$, unless otherwise specified)

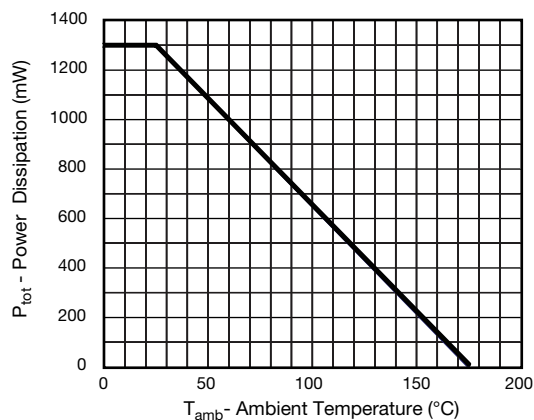
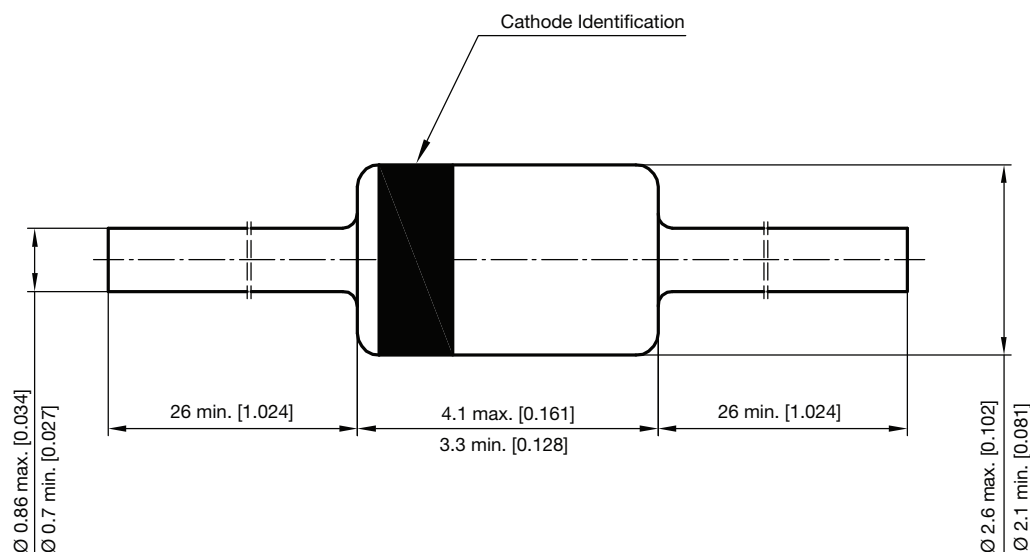


Fig. 1 - Admissible Power Dissipation vs. Ambient Temperature
 $P_{tot} = f(T_{amb})$

PACKAGE DIMENSIONS in millimeters (inches): **DO-41 (DO-204AL)_1N47xx**



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 Rev. 1 - Date: 30. Nov. 2011
 22624



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