

# 1N5333B Series

Preferred Device

## 5 Watt Surmetic™ 40 Zener Voltage Regulators

This is a complete series of 5 Watt Zener diodes with tight limits and better operating characteristics that reflect the superior capabilities of silicon-oxide passivated junctions. All this in an axial lead, transfer-molded plastic package that offers protection in all common environmental conditions.

### Features

- Zener Voltage Range - 3.3 V to 200 V
- ESD Rating of Class 3 (>16 kV) per Human Body Model
- Surge Rating of up to 180 W @ 8.3 ms
- Maximum Limits Guaranteed on up to Six Electrical Parameters
- Pb-Free Packages are Available\*

### Mechanical Characteristics

**CASE:** Void free, transfer-molded, thermosetting plastic

**FINISH:** All external surfaces are corrosion resistant and leads are readily solderable

**MAXIMUM LEAD TEMPERATURE FOR SOLDERING PURPOSES:**

260°C, 1/16 in. from the case for 10 seconds

**POLARITY:** Cathode indicated by polarity band

**MOUNTING POSITION:** Any

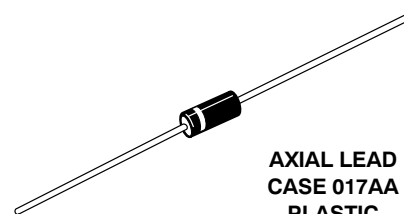
### MAXIMUM RATINGS

Rating	Symbol	Value	Unit
Max. Steady State Power Dissipation @ $T_L = 75^\circ\text{C}$ , Lead Length = 3/8 in Derate above $75^\circ\text{C}$	$P_D$	5 40	W mW/ $^\circ\text{C}$
Operating and Storage Temperature Range	$T_J, T_{stg}$	-65 to +200	$^\circ\text{C}$

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.

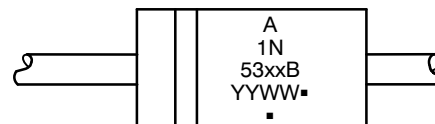


ON Semiconductor®



AXIAL LEAD  
CASE 017AA  
PLASTIC

### MARKING DIAGRAM



A = Assembly Location  
1N53xxB = Device Number  
(Refer to Tables on Pages 3 & 4)  
YY = Year  
WW = Work Week  
▪ = Pb-Free Package  
(Note: Microdot may be in either location)

### ORDERING INFORMATION

Device	Package	Shipping†
1N53xxB, G	Axial Lead (Pb-Free)	1000 Units/Box
1N53xxBRL, G	Axial Lead (Pb-Free)	4000/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.

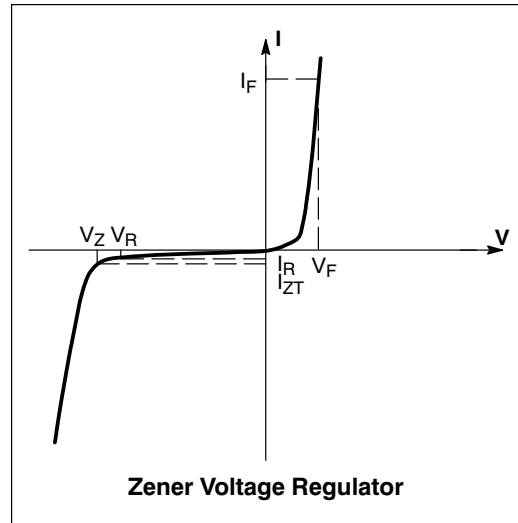
**Preferred** devices are recommended choices for future use and best overall value.

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

# 1N5333B Series

**ELECTRICAL CHARACTERISTICS** ( $T_A = 25^\circ\text{C}$  unless otherwise noted,  $V_F = 1.2\text{ V Max}$  @  $I_F = 1.0\text{ A}$  for all types)

Symbol	Parameter
$V_Z$	Reverse Zener Voltage @ $I_{ZT}$
$I_{ZT}$	Reverse Current
$Z_{ZT}$	Maximum Zener Impedance @ $I_{ZT}$
$I_{ZK}$	Reverse Current
$Z_{ZK}$	Maximum Zener Impedance @ $I_{ZK}$
$I_R$	Reverse Leakage Current @ $V_R$
$V_R$	Breakdown Voltage
$I_F$	Forward Current
$V_F$	Forward Voltage @ $I_F$
$I_R$	Maximum Surge Current @ $T_A = 25^\circ\text{C}$
$\Delta V_Z$	Reverse Zener Voltage Change
$I_{ZM}$	Maximum DC Zener Current



**ELECTRICAL CHARACTERISTICS** ( $T_A = 25^\circ\text{C}$  unless otherwise noted,  $V_F = 1.2\text{ V Max}$  @  $I_F = 1.0\text{ A}$  for all types)

Device <sup>†</sup> (Note 1)	Device Marking	Zener Voltage (Note 2)				Zener Impedance (Note 2)			Leakage Current		I <sub>R</sub> (Note 3)	ΔV <sub>Z</sub> (Note 4)	I <sub>ZM</sub> (Note 5)
		V <sub>Z</sub> (Volts)			@ I <sub>ZT</sub>	Z <sub>TT</sub> @ I <sub>ZT</sub>	Z <sub>ZK</sub> @ I <sub>ZK</sub>	I <sub>ZK</sub>	I <sub>R</sub> @ V <sub>R</sub>				
		Min	Nom	Max	mA	Ω	Ω	mA	μA Max	Volts			
<b>1N5333B, G</b>	<b>1N5333B</b>	<b>3.14</b>	<b>3.3</b>	<b>3.47</b>	<b>380</b>	<b>3</b>	<b>400</b>	<b>1</b>	<b>300</b>	<b>1</b>	<b>20</b>	<b>0.85</b>	<b>1440</b>
1N5334BG	1N5334B	3.42	3.6	3.78	350	2.5	500	1	150	1	18.7	0.8	1320
1N5335BG	1N5335B	3.71	3.9	4.10	320	2	500	1	50	1	17.6	0.54	1220
1N5336BG	1N5336B	4.09	4.3	4.52	290	2	500	1	10	1	16.4	0.49	1100
<b>1N5337BG</b>	<b>1N5337B</b>	<b>4.47</b>	<b>4.7</b>	<b>4.94</b>	<b>260</b>	<b>2</b>	<b>450</b>	<b>1</b>	<b>5</b>	<b>1</b>	<b>15.3</b>	<b>0.44</b>	<b>1010</b>
<b>1N5338BG</b>	<b>1N5338B</b>	<b>4.85</b>	<b>5.1</b>	<b>5.36</b>	<b>240</b>	<b>1.5</b>	<b>400</b>	<b>1</b>	<b>1</b>	<b>1</b>	<b>14.4</b>	<b>0.39</b>	<b>930</b>
<b>1N5339B, G</b>	<b>1N5339B</b>	<b>5.32</b>	<b>5.6</b>	<b>5.88</b>	<b>220</b>	<b>1</b>	<b>400</b>	<b>1</b>	<b>1</b>	<b>2</b>	<b>13.4</b>	<b>0.25</b>	<b>865</b>
1N5340B, G	1N5340B	5.70	6.0	6.30	200	1	300	1	1	3	12.7	0.19	790
<b>1N5341B, G</b>	<b>1N5341B</b>	<b>5.89</b>	<b>6.2</b>	<b>6.51</b>	<b>200</b>	<b>1</b>	<b>200</b>	<b>1</b>	<b>1</b>	<b>3</b>	<b>12.4</b>	<b>0.1</b>	<b>765</b>
<b>1N5342BG</b>	<b>1N5342B</b>	<b>6.46</b>	<b>6.8</b>	<b>7.14</b>	<b>175</b>	<b>1</b>	<b>200</b>	<b>1</b>	<b>10</b>	<b>5.2</b>	<b>11.5</b>	<b>0.15</b>	<b>700</b>
1N5343BG	1N5343B	7.13	7.5	7.88	175	1.5	200	1	10	5.7	10.7	0.15	630
1N5344B, G	1N5344B	7.79	8.2	8.61	150	1.5	200	1	10	6.2	10	0.2	580
1N5345B, G	1N5345B	8.27	8.7	9.14	150	2	200	1	10	6.6	9.5	0.2	545
1N5346BG	1N5346B	8.65	9.1	9.56	150	2	150	1	7.5	6.9	9.2	0.22	520
<b>1N5347B, G</b>	<b>1N5347B</b>	<b>9.50</b>	<b>10</b>	<b>10.5</b>	<b>125</b>	<b>2</b>	<b>125</b>	<b>1</b>	<b>5</b>	<b>7.6</b>	<b>8.6</b>	<b>0.22</b>	<b>475</b>

Devices listed in **bold, italic** are ON Semiconductor **Preferred** devices. **Preferred** devices are recommended choices for future use and best overall value.

- TOLERANCE AND TYPE NUMBER DESIGNATION:** The JEDEC type numbers shown indicate a tolerance of  $\pm 5\%$ .
- ZENER VOLTAGE ( $V_Z$ ) and IMPEDANCE ( $I_{ZT}$  and  $I_{ZK}$ ):** Test conditions for zener voltage and impedance are as follows:  $I_Z$  is applied  $40 \pm 10$  ms prior to reading. Mounting contacts are located  $3/8''$  to  $1/2''$  from the inside edge of mounting clips to the body of the diode ( $T_A = 25^\circ\text{C} + 8^\circ\text{C}, -2^\circ\text{C}$ ).
- SURGE CURRENT ( $I_R$ ):** Surge current is specified as the maximum allowable peak, non-recurrent square-wave current with a pulse width, PW, of 8.3 ms. The data given in Figure 5 may be used to find the maximum surge current for a square wave of any pulse width between 1 ms and 1000 ms by plotting the applicable points on logarithmic paper. Examples of this, using the 3.3 V and 200 V zener are shown in Figure 6. Mounting contact located as specified in Note 2 ( $T_A = 25^\circ\text{C} + 8^\circ\text{C}, -2^\circ\text{C}$ ).
- VOLTAGE REGULATION ( $\Delta V_Z$ ):** The conditions for voltage regulation are as follows:  $V_Z$  measurements are made at 10% and then at 50% of the  $I_Z$  max value listed in the electrical characteristics table. The test current time duration for each  $V_Z$  measurement is  $40 \pm 10$  ms. Mounting contact located as specified in Note 2 ( $T_A = 25^\circ\text{C} + 8^\circ\text{C}, -2^\circ\text{C}$ ).
- MAXIMUM REGULATOR CURRENT ( $I_{ZM}$ ):** The maximum current shown is based on the maximum voltage of a 5% type unit, therefore, it applies only to the B-suffix device. The actual  $I_{ZM}$  for any device may not exceed the value of 5 watts divided by the actual  $V_Z$  of the device.  $T_L = 75^\circ\text{C}$  at  $3/8''$  maximum from the device body.

<sup>†</sup>The "G" suffix indicates Pb-Free package or Pb-Free packages are available.

# 1N5333B Series

## ELECTRICAL CHARACTERISTICS ( $T_A = 25^\circ\text{C}$ unless otherwise noted, $V_F = 1.2\text{ V Max @ } I_F = 1.0\text{ A}$ for all types)

Device† (Note 6)	Device Marking	Zener Voltage (Note 7)				Zener Impedance (Note 7)			Leakage Current		I <sub>R</sub> (Note 8)	ΔV <sub>Z</sub> (Note 9)	I <sub>ZM</sub> (Note 10)
		V <sub>Z</sub> (Volts)			@ I <sub>ZT</sub>	Z <sub>TT</sub> @ I <sub>ZT</sub>	Z <sub>ZK</sub> @ I <sub>ZK</sub>	I <sub>ZK</sub>	I <sub>R</sub> @ V <sub>R</sub>				
		Min	Nom	Max	mA	Ω	Ω	mA	μA Max	Volts			
1N5348BG	1N5348B	10.45	11	11.55	125	2.5	125	1	5	8.4	8.0	0.25	430
1N5349B, G	1N5349B	11.4	12	12.6	100	2.5	125	1	2	9.1	7.5	0.25	395
1N5350B, G	1N5350B	12.35	13	13.65	100	2.5	100	1	1	9.9	7.0	0.25	365
1N5351BG	1N5351B	13.3	14	14.7	100	2.5	75	1	1	10.6	6.7	0.25	340
1N5352B, G	1N5352B	14.25	15	15.75	75	2.5	75	1	1	11.5	6.3	0.25	315
1N5353B, G	1N5353B	15.2	16	16.8	75	2.5	75	1	1	12.2	6.0	0.3	295
1N5354B, G	1N5354B	16.15	17	17.85	70	2.5	75	1	0.5	12.9	5.8	0.35	280
1N5355B, G	1N5355B	17.1	18	18.9	65	2.5	75	1	0.5	13.7	5.5	0.4	264
1N5356BG	1N5356B	18.05	19	19.95	65	3	75	1	0.5	14.4	5.3	0.4	250
1N5357BG	1N5357B	19	20	21	65	3	75	1	0.5	15.2	5.1	0.4	237
1N5358B, G	1N5358B	20.9	22	23.1	50	3.5	75	1	0.5	16.7	4.7	0.45	216
1N5359B, G	1N5359B	22.8	24	25.2	50	3.5	100	1	0.5	18.2	4.4	0.55	198
1N5360BG	1N5360B	23.75	25	26.25	50	4	110	1	0.5	19	4.3	0.55	190
1N5361B, G	1N5361B	25.65	27	28.35	50	5	120	1	0.5	20.6	4.1	0.6	176
1N5362BG	1N5362B	26.6	28	29.4	50	6	130	1	0.5	21.2	3.9	0.6	170
1N5363BG	1N5363B	28.5	30	31.5	40	8	140	1	0.5	22.8	3.7	0.6	158
1N5364BG	1N5364B	31.35	33	34.65	40	10	150	1	0.5	25.1	3.5	0.6	144
1N5365B, G	1N5365B	34.2	36	37.8	30	11	160	1	0.5	27.4	3.5	0.65	132
1N5366B, G	1N5366B	37.05	39	40.95	30	14	170	1	0.5	29.7	3.1	0.65	122
1N5367BG	1N5367B	40.85	43	45.15	30	20	190	1	0.5	32.7	2.8	0.7	110
1N5368BG	1N5368B	44.65	47	49.35	25	25	210	1	0.5	35.8	2.7	0.8	100
1N5369B, G	1N5369B	48.45	51	53.55	25	27	230	1	0.5	38.8	2.5	0.9	93
1N5370B, G	1N5370B	53.2	56	58.8	20	35	280	1	0.5	42.6	2.3	1.0	86
1N5371BG	1N5371B	57	60	63	20	40	350	1	0.5	45.5	2.2	1.2	79
1N5372BG	1N5372B	58.9	62	65.1	20	42	400	1	0.5	47.1	2.1	1.35	76
1N5373B, G	1N5373B	64.6	68	71.4	20	44	500	1	0.5	51.7	2.0	1.52	70
1N5374BG	1N5374B	71.25	75	78.75	20	45	620	1	0.5	56	1.9	1.6	63
1N5375BG	1N5375B	77.9	82	86.1	15	65	720	1	0.5	62.2	1.8	1.8	58
1N5377BG	1N5377B	86.45	91	95.55	15	75	760	1	0.5	69.2	1.6	2.2	52.5
1N5378B, G	1N5378B	95	100	105	12	90	800	1	0.5	76	1.5	2.5	47.5
1N5380BG	1N5380B	114	120	126	10	170	1150	1	0.5	91.2	1.3	2.5	39.5
1N5381BG	1N5381B	123.5	130	136.5	10	190	1250	1	0.5	98.8	1.2	2.5	36.6
1N5383B, G	1N5383B	142.5	150	157.5	8	330	1500	1	0.5	114	1.1	3.0	31.6
1N5384BG	1N5384B	152	160	168	8	350	1650	1	0.5	122	1.1	3.0	29.4
1N5386BG	1N5386B	171	180	189	5	430	1750	1	0.5	137	1.0	4.0	26.4
1N5387BG	1N5387B	180.5	190	199.5	5	450	1850	1	0.5	144	0.9	5.0	25
1N5388B, G	1N5388B	190	200	210	5	480	1850	1	0.5	152	0.9	5.0	23.6

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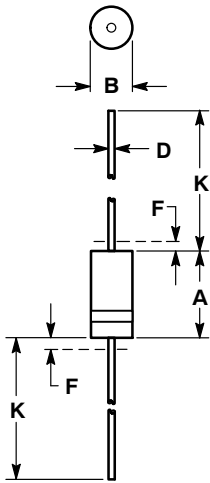
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1N5333B Series

PACKAGE DIMENSIONS

SURMETIC 40, AXIAL LEAD  
CASE 017AA-01  
ISSUE O



- NOTES:
- 1. CONTROLLING DIMENSION: INCH
  - 2. LEAD DIAMETER AND FINISH NOT CONTROLLED WITHIN DIMENSION F.
  - 3. CATHODE BAND INDICATES POLARITY

DIM	INCHES		MILLIMETERS	
	MIN	MAX	MIN	MAX
A	0.330	0.350	8.38	8.89
B	0.130	0.145	3.30	3.68
D	0.037	0.043	0.94	1.09
F	---	0.050	---	1.27
K	1.000	1.250	25.40	31.75