Microsemi
SCOTTSDALE DIVISION

1N5333B thru 1N5388B, e3

Silicon 5 Watt Zener Diodes

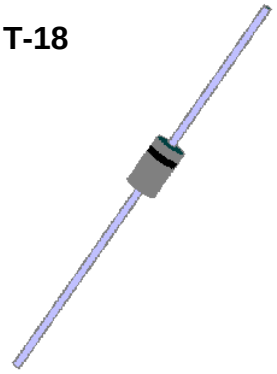
ALSO AVAILABLE IN SURFACE MOUNT

DESCRIPTION

The 1N5333-5388B JEDEC registered series of axial-leaded 5.0 watt Zeners provides voltage regulation in a selection from 3.3 to 200 volts with different tolerances as identified by specific suffix letter on the part number. These plastic encapsulated Zeners have moisture classification of Level 1 with no dry pack required and are also available in various military equivalent screening levels by adding a prefix identifier as also described in the Features section. They may be operated at high maximum dc currents with adequate heat sinking with their comparatively low thermal resistance design. Microsemi also offers numerous other Zener products to meet higher and lower power applications.

APPEARANCE

T-18



IMPORTANT: For the most current data, consult *MICROSEMI's* website: **http://www.microsemi.com**

FEATURES

- JEDEC registered 1N5333 to 1N5388B
- Zener voltage available 3.3V to 200V
- Standard voltage tolerances are plus/minus 5% with B suffix and 10 % with A suffix identification
- Tight tolerances available in plus or minus 2% or 1% with C or D suffix respectively
- Options for screening in accordance with MIL-PRF-19500 for JAN, JANTX, and JANTXV are available by adding MQ, MX, or MV prefixes respectively to part numbers.
- Surface mount equivalents available as SMBJ5333 to SMBJ5388B, or SMBG5333B to SMBG5388B
- RoHS Compliant devices available by adding e3 suffix

APPLICATIONS / BENEFITS

- Regulates voltage over a broad operating current and temperature range
- Wide selection from 3.3 to 200 V
- Flexible axial-lead mounting terminals
- Nonsensitive to ESD per MIL-STD-750 Method 1020
- Withstands high surge stresses
- Minimal changes of voltage versus current as specified by voltage regulation (ΔV_Z)
- High specified maximum current (I_{ZM}) when adequately heat sunk
- Moisture classification is Level 1 per IPC/JEDEC J-STD-020B with no dry pack required

MAXIMUM RATINGS

- Power dissipation at 25°C: 5.0 watts (also see derating in Figure 1).
- Operating and Storage temperature: -65°C to +150°C
- Thermal Resistance: 25°C/W junction to lead at 3/8 (10 mm) lead length from body, or 85°C/W junction to ambient when mounted on FR4 PC board (1oz Cu) with 4 mm^2 copper pads and track width 1 mm, length 25 mm
- Steady-State Power: 5 watts at $T_L \leq 25°C$ 3/8 inch (10 mm) from body, or 1.47 watts at $T_A = 25°C$ when mounted on FR4 PC described for thermal resistance (also see Figure 1)
- Forward voltage @1.0 A: 1.2 volts (maximum)
- Solder Temperatures: 260°C for 10 s (max)

MECHANICAL AND PACKAGING

- CASE: Void-free transfer molded thermosetting epoxy body meeting UL94V-0
- TERMINALS: Leads, Tin-Lead or RoHS Compliant annealed matte-Tin plating solderable per MIL-STD-750, method 2026
- POLARITY: Cathode indicated by band. Diode to be operated with the banded end positive with respect to the opposite end.
- MARKING: Part number
- TAPE & REEL option: Standard per EIA-296 (add "TR" suffix to part number)
- WEIGHT: 0.7 grams
- See package dimensions on last page

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*ELECTRICAL CHARACTERISTICS @ 25°C

TYPE NUMBER	REGULATOR VOLTAGE (V_Z)	TEST CURRENT (I_{ZT})	MAXIMUM DYNAMIC IMPEDANCE (Z_Z) (A&B Suffix)	MAXIMUM REVERSE CURRENT (I_R)	I_R TEST VOLTAGE (V_R) (Non-Suffix & A Suffix)	I_R TEST VOLTAGE (V_R) (B,C,D Suffix)	MAXIMUM REGULATOR CURRENT (I_{ZM}) (B,C,D Suffix)	MAXIMUM DYNAMIC KNEE IMPEDANCE Z_{ZK} @ 1.0 mA (A,B,C,D Suffix)	MAXIMUM SURGE CURRENT (I_{ZSM})	MAXIMUM VOLTAGE REGULATION (ΔV_Z) (A,B,C,D Suffix)
	V	mA dc	OHMS	µA	V	V	mA	OHMS	AMPS	VOLTS
1N5333B	3.3	380	3.0	300	1.0	1.0	1440	400	20	0.85
1N5334B	3.6	350	2.5	150	1.0	1.0	1320	500	18.7	0.80
1N5335B	3.9	320	2.0	50	1.0	1.0	1220	500	17.6	0.54
1N5336B	4.3	290	2.0	10	1.0	1.0	1100	500	16.4	0.49
1N5337B	4.7	260	2.0	5.0	1.0	1.0	1010	450	15.3	0.44
1N5338B	5.1	240	1.5	1.0	1.0	1.0	930	400	14.4	0.39
1N5339B	5.6	220	1.0	1.0	2.0	2.0	865	400	13.4	0.25
1N5340B	6.0	200	1.0	1.0	3.0	3.0	790	300	12.7	0.19
1N5341B	6.2	200	1.0	1.0	3.0	3.0	765	200	12.4	0.10
1N5342B	6.8	175	1.0	10	4.9	5.2	700	200	11.5	0.15
1N5343B	7.5	175	1.5	10	5.4	5.7	630	200	10.7	0.15
1N5344B	8.2	150	1.5	10	5.9	6.2	580	200	10	0.20
1N5345B	8.7	150	2.0	10	6.25	6.6	545	200	9.5	0.20
1N5346B	9.1	150	2.0	7.5	6.6	6.9	520	150	9.2	0.22
1N5347B	10	125	2.0	5.0	7.2	7.6	475	125	8.6	0.22
1N5348B	11	125	2.5	5.0	8.0	8.4	430	125	8.0	0.25
1N5349B	12	100	2.5	2.0	8.6	9.1	395	125	7.5	0.25
1N5350B	13	100	2.5	1.0	9.4	9.9	365	100	7.0	0.25
1N5351B	14	100	2.5	1.0	10.1	10.6	340	75	6.7	0.25
1N5352B	15	75	2.5	1.0	10.8	11.5	315	75	6.3	0.25
1N5353B	16	75	2.5	1.0	11.5	12.2	295	75	6.0	0.30
1N5354B	17	70	2.5	0.5	12.2	12.9	280	75	5.8	0.35
1N5355B	18	65	2.5	0.5	13	13.7	264	75	5.5	0.40
1N5356B	19	65	3.0	0.5	13.7	14.4	250	75	5.3	0.40
1N5357B	20	65	3.0	0.5	14.4	15.2	237	75	5.1	0.40
1N5358B	22	50	3.5	0.5	15.8	16.7	216	75	4.7	0.45
1N5359B	24	50	3.5	0.5	17.3	18.2	198	100	4.4	0.55
1N5360B	25	50	4.0	0.5	18	19	190	110	4.3	0.55
1N5361B	27	50	5.0	0.5	19.4	20.6	176	120	4.1	0.60
1N5362B	28	50	6.0	0.5	20.1	21.2	170	130	3.9	0.60
1N5363B	30	40	8.0	0.5	21.6	22.8	158	140	3.7	0.60
1N5364B	33	40	10	0.5	23.8	25.1	144	150	3.5	0.60
1N5365B	36	30	11	0.5	25.9	27.4	132	160	3.3	0.65
1N5366B	39	30	14	0.5	28.1	29.7	122	170	3.1	0.65
1N5367B	43	30	20	0.5	31	32.7	110	190	2.8	0.70
1N5368B	47	25	25	0.5	33.8	35.8	100	210	2.7	0.80
1N5369B	51	25	27	0.5	36.7	38.8	93	230	2.5	0.90
1N5370B	56	20	35	0.5	40.3	42.6	86	280	2.3	1.00
1N5371B	60	20	40	0.5	43	45.5	79	350	2.2	1.20
1N5372B	62	20	42	0.5	44.6	47.1	76	400	2.1	1.35
1N5373B	68	20	44	0.5	49	51.7	70	500	2.0	1.50
1N5374B	75	20	45	0.5	54	56	63	620	1.9	1.60
1N5375B	82	15	65	0.5	59	62.2	58	720	1.8	1.80
1N5376B	87	15	75	0.5	63	66	54.5	760	1.7	2.00
1N5377B	91	15	75	0.5	65.5	69.2	52.5	760	1.6	2.20
1N5378B	100	12	90	0.5	72	76	47.5	800	1.5	2.30
1N5379B	110	12	125	0.5	79.2	83.6	43	1000	1.4	2.50
1N5380B	120	10	170	0.5	86.4	91.2	39.5	1150	1.3	2.50
1N5381B	130	10	190	0.5	93.6	98.8	36.6	1250	1.2	2.50
1N5382B	140	8.0	230	0.5	101	106	34	1500	1.2	2.50
1N5383B	150	8.0	330	0.5	108	114	31.6	1500	1.1	3.00
1N5384B	160	8.0	350	0.5	115	122	29.4	1650	1.1	3.00
1N5385B	170	8.0	380	0.5	122	129	28	1750	1.0	3.00
1N5386B	180	5.0	430	0.5	130	137	26.4	1750	1.0	4.00
1N5387B	190	5.0	450	0.5	137	144	25	1850	0.9	5.00
1N5388B	200	5.0	480	0.5	144	152	23.6	1850	0.9	5.00

*JEDEC Registered Data.

NOTE 1: Devices listed above with B suffix have ±5% tolerance, A suffix designates ±10% tolerance, C suffix designates ±2% tolerance, and D suffix designates ±1% tolerance. No suffix designates ±20%.

NOTE 2: Zener voltage (Vz) is measured at T_L = 25°C (+8, -2°C). Voltage measurement performed at 40 ±10 milliseconds after application of dc current.

NOTE 3: The zener impedance is derived from 1 kHz ac voltage resulting from an ac current modulation having an rms value equal to 10% of the dc zener current (I_{ZT} or I_{ZK}) superimposed on I_{ZT} or I_{ZK}. See Micro Note 202 for zener impedance variation with different operating currents.

NOTE 4: The maximum current (I_{ZM}) shown is for a ±5% tolerance devices. The I_{ZM} for other tolerances can be calculated using the formula: $I_{ZM} = P/V_{ZM}$ where V_{ZM} is the V_Z at the high end of the voltage tolerance specified and P is the rated power for the method of mounting.

NOTE 5: The surge current (I_{ZSM}) is specified as the maximum peak of a non-recurrent half-sine wave of 8.3 ms duration.

NOTE 6: Voltage regulation (ΔV_Z) is the difference between the voltage measured at 10% and 50% of I_{ZM}.

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OUTLINE AND CIRCUIT

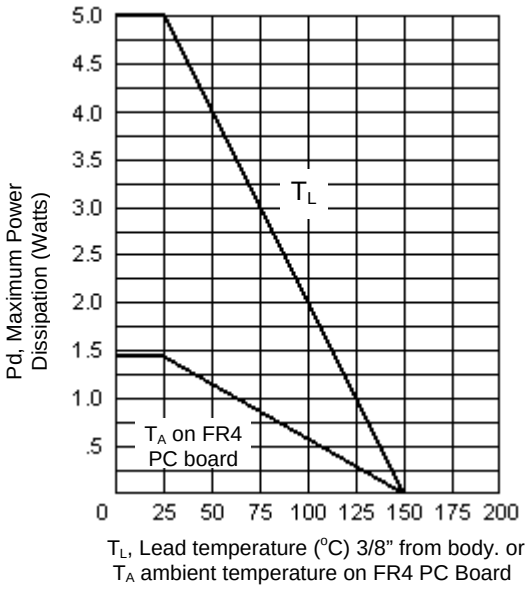


FIGURE 1
Power Derating Curve

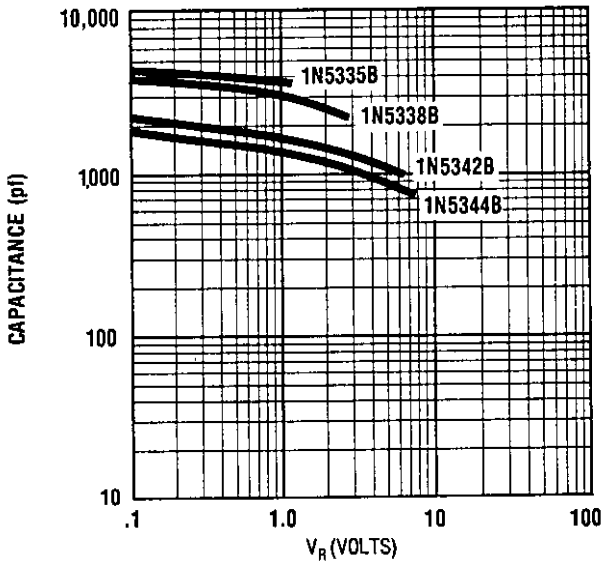


FIGURE 2
Typical Capacitance vs.
Reverse Voltage for 5 Watt Zeners

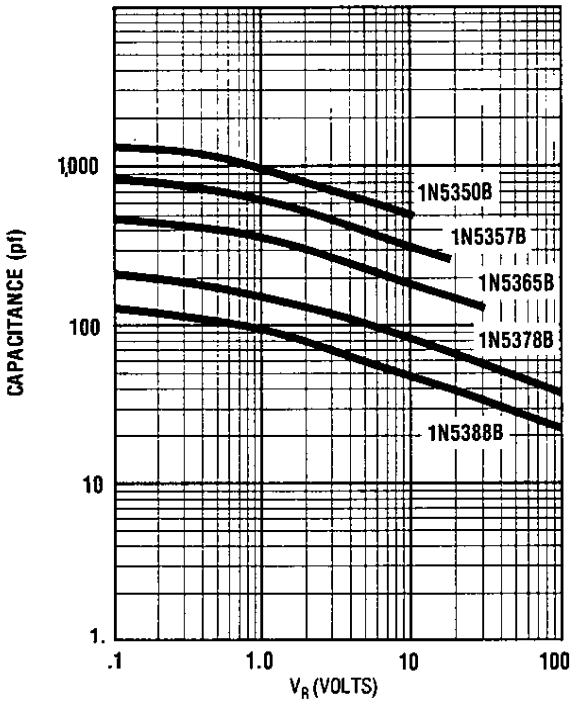
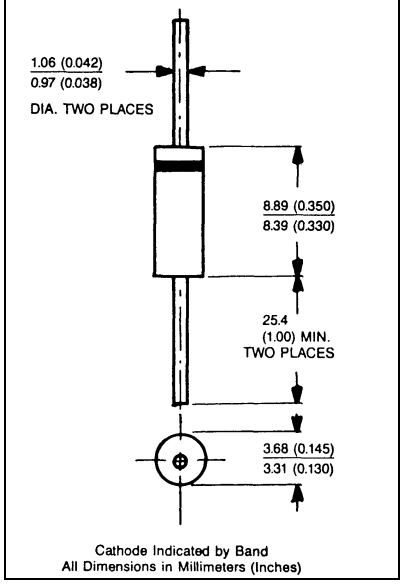


FIGURE 3
Typical Capacitance vs.
Reverse Voltage for 5 Watt Zeners

PACKAGE DIMENSIONS



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