1SMB2EZ11 THRU 1SMB2EZ200

SURFACE MOUNT SILICON ZENER DIODE

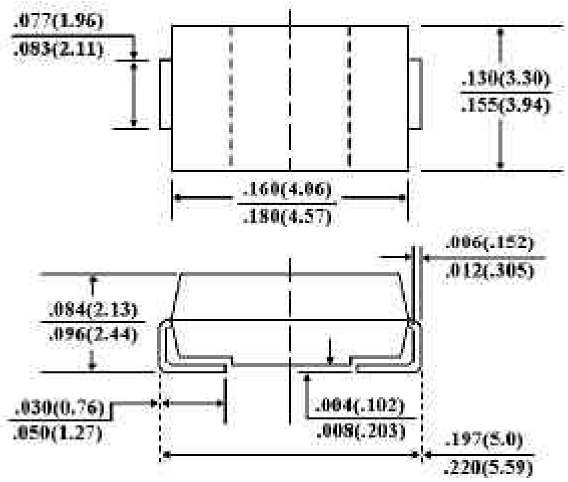
VOLTAGE - 11 TO 200 Volts   Power - 2.0 Watts

TRANSYS ELECTRONICS LIMITED

FEATURES

- Low prof e package
- Built-in strain re ef
- Glass passivated junction
- Low inductance
- Excellent clamping capab ity
- Typical I_D less than 1 £gA above 11V
- High temperature soldering : 260 ¢J/10 seconds at terminals
- Plastic package has Underwriters Laboratory Flammabi ty Classification 94V-O

DO-214AA



Dimensions in inches and (millimeters)

MECHANICAL DATA

Case: JEDEC DO-214AA, Molded plastic over passivated junction

Terminals: Solder plated, solderable per MIL-STD-750, method 2026

Polarity: Color band denotes positive end (cathode) except Brdirectional

Standard Packaging: 12mm tape (EIA-481)

Weight: 0.003 ounce, 0.093 gram

MAXIMUM RATINGS AND ELECTRICAL CHARACTERISTICS

Ratings at 25 ¢J ambient temperature unless otherwise specified.

	SYMBOL	VALUE	UNITS
Peak Pulse Power Dissipation (Note A) Derate above 75 ¢J	P_D	2 24	Watts mW/¢J
Peak forward Surge Current 8.3ms single half sine-wave superimposed on rated load(JEDEC Method) (Note B)	I_{FSM}	15	Amps
Operating Junction and Storage Temperature Range	T_J, T_{STG}	-55 to +150	¢J

NOTES:

A. Mounted on 5.0mm^2(.013mm thick) land areas.

B. Measured on 8.3ms, single half sine-wave or equivalent square wave, duty cycle = 4 pulses per minute maximum.

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ELECTRICAL CHARACTERISTICS (T_A=25 ¢J unless otherwise noted) V_F=1.2 V max , I_F=500 mA for all types

Type No. (Note 1.)	Nominal Zener Voltage Vz @ I_{ZT} volts (Note 2.)	Test current I_{ZT} mA	Maximum Zener Impedance (Note 3.)			Leakage Current		Maximum Zener Current I_{ZM} mA	Surge Current @ T_A = 25 ¢J ir - mA (Note 4.)
			Z_{ZT} @ I_{ZT} Ohms	Z_{ZK} @ I_{ZK} Ohms	I_{ZK} mA	I_R £gA Max @	V_R Volts		
1SMB2EZ11	11.0	45.5	4.0	700	0.25	1.0	8.4	166	1.82
1SMB2EZ12	12.0	41.5	4.5	700	0.25	1.0	9.1	152	1.66
1SMB2EZ13	13.0	38.5	5.0	700	0.25	0.5	9.9	138	1.54
1SMB2EZ14	14.0	35.7	5.5	700	0.25	0.5	10.6	130	1.43
1SMB2EZ15	15.0	33.4	7.0	700	0.25	0.5	11.4	122	1.33
1SMB2EZ16	16.0	31.2	8.0	700	0.25	0.5	12.2	114	1.25
1SMB2EZ17	17.0	29.4	9.0	750	0.25	0.5	13.0	107	1.18
1SMB2EZ18	18.0	27.8	10.0	750	0.25	0.5	13.7	100	1.11
1SMB2EZ19	19.0	26.3	11.0	750	0.25	0.5	14.4	95	1.05
1SMB2EZ20	20.0	25.0	11.0	750	0.25	0.5	15.2	90	1.00
1SMB2EZ22	22.0	22.8	12.0	750	0.25	0.5	16.7	82	0.91
1SMB2EZ24	24.0	20.8	13.0	750	0.25	0.5	18.2	76	0.83
1SMB2EZ27	27.0	18.5	18.0	750	0.25	0.5	20.6	68	0.74
1SMB2EZ30	30.0	16.6	20.0	1000	0.25	0.5	22.5	60	0.67
1SMB2EZ33	33.0	15.1	23.0	1000	0.25	0.5	25.1	55	0.61
1SMB2EZ36	36.0	13.9	25.0	1000	0.25	0.5	27.4	50	0.56
1SMB2EZ39	39.0	12.8	30.0	1000	0.25	0.5	29.7	47	0.51
1SMB2EZ43	43.0	11.6	35.0	1500	0.25	0.5	32.7	43	0.45
1SMB2EZ47	47.0	10.6	40.0	1500	0.25	0.5	35.8	39	0.42
1SMB2EZ51	51.0	9.8	48.0	1500	0.25	0.5	38.8	36	0.39
1SMB2EZ56	56.0	9.0	55.0	2000	0.25	0.5	42.6	32	0.36
1SMB2EZ62	62.0	8.1	60.0	2000	0.25	0.5	47.1	29	0.32
1SMB2EZ68	68.0	7.4	75.0	2000	0.25	0.5	51.7	27	0.29
1SMB2EZ75	75.0	6.7	90.0	2000	0.25	0.5	56.0	24	0.27
1SMB2EZ82	82.0	6.1	100.0	3000	0.25	0.5	62.2	22	0.24
1SMB2EZ91	91.0	5.5	125.0	3000	0.25	0.5	69.2	20	0.22
1SMB2EZ100	100.0	5.0	175.0	3000	0.25	0.5	76.0	18	0.20
1SMB2EZ110	110.0	4.5	250.0	4000	0.25	0.5	83.6	17	0.18
1SMB2EZ120	120.0	4.2	325.0	4500	0.25	0.5	91.2	15	0.16
1SMB2EZ130	130.0	3.8	400.0	5000	0.25	0.5	98.8	14	0.15
1SMB2EZ140	140.0	3.6	500.0	5500	0.25	0.5	106.4	13	0.14
1SMB2EZ150	150.0	3.3	575.0	6000	0.25	0.5	114.0	12	0.13
1SMB2EZ160	160.0	3.1	650.0	6500	0.25	0.5	121.6	11	0.12
1SMB2EZ170	170.0	2.9	675.0	7000	0.25	0.5	130.4	11	0.12
1SMB2EZ180	180.0	2.8	725.0	7000	0.25	0.5	136.8	10	0.11
1SMB2EZ190	190.0	2.6	825.0	8000	0.25	0.5	144.8	10	0.10
1SMB2EZ200	200.0	2.5	900.0	8000	0.25	0.5	152.0	9	0.10

NOTES:

1. TOLERANCES - Suffix indicates 5% tolerance any other tolerance wi be considered as a special device.
2. ZENER VOLTAGE (Vz) MEASUREMENT - guarantees the zener voltage when measured at 40 ms ¡Ó10ms from the diode body, and an ambient temperature of 25 ¢J (¡Ï 8 ¢J, -2 ¢J).
3. ZENER IMPEDANCE (Zz) DERIVATION - The zener impedance is derived from the 60 cycle ac voltage, which results when an ac current having an rms falue equal to 10% of the dc zener current (I_{ZT} or I_{ZK}) is superimposed on I_{ZT} or I_{ZK}.
4. SURGE CURRENT (Ir) NON-REPETITIVE - The rating listed in the electrical characteristics table is maximum peak, non-repetitive, reverse surge current of 1/2 square wave or equivalent sine wave pulse of 1/120 second duration superimposed on the test current, I_{ZT}, per JEDEC standards, however, actual device capabi ty is as described in Figure 3.

RATING AND CHARACTERISTICS CURVES

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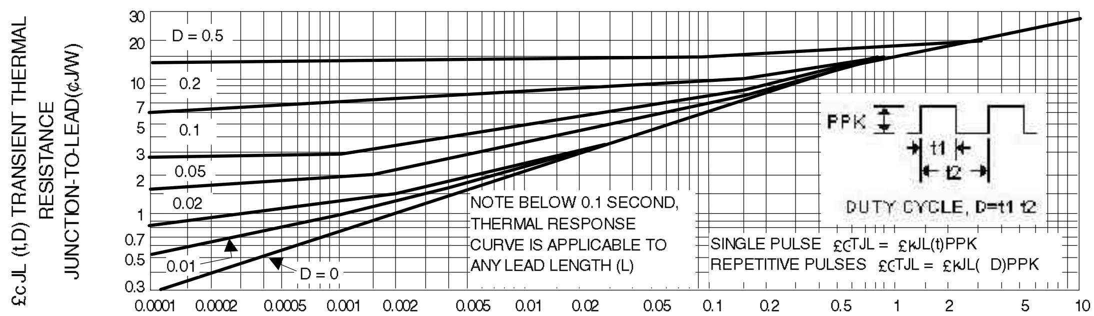

Fig. 2-TYPICAL THERMAL RESPONSE L,

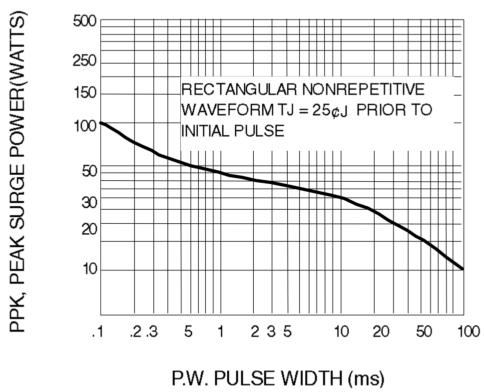

Fig. 3-MAXIMUM SURGE POWER

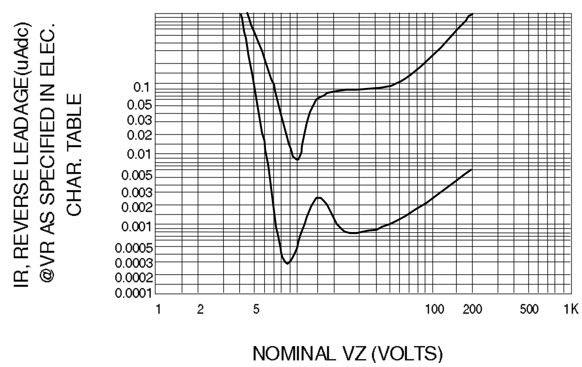

Fig. 4-TYPICAL REVERSE LEAKAGE

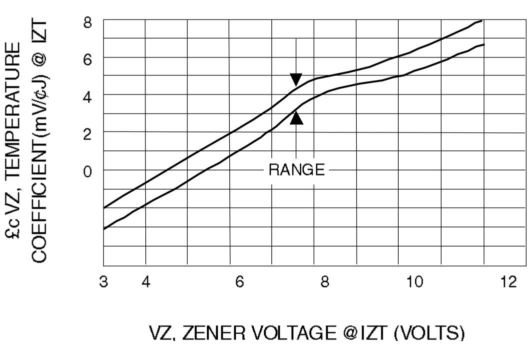

Fig. 5-UNITS TO 12 VOLTS

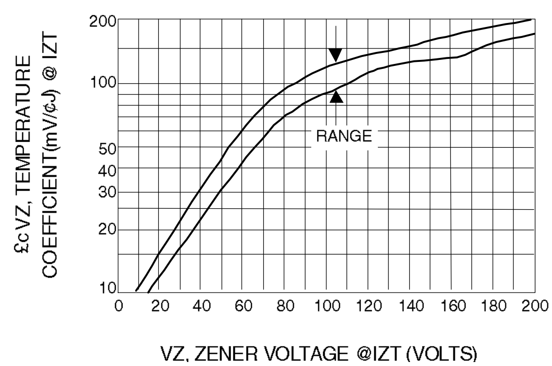

Fig. 6-UNITS 10 TO 200 VOLTS

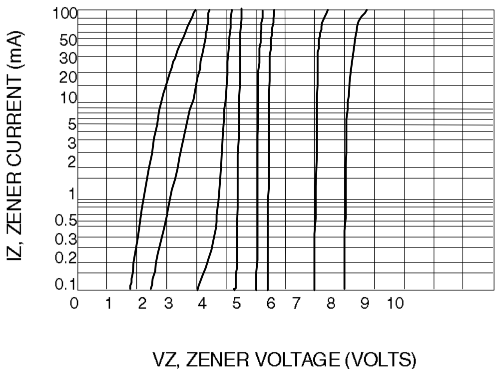

Fig. 7-VZ = 3.9 THRU 10 VOLTS

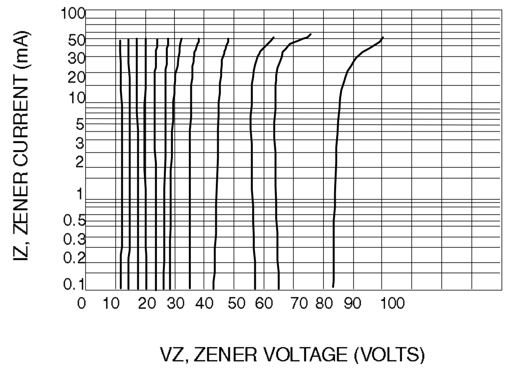

Fig. 8-VZ = 12 THRU 82 VOLTS

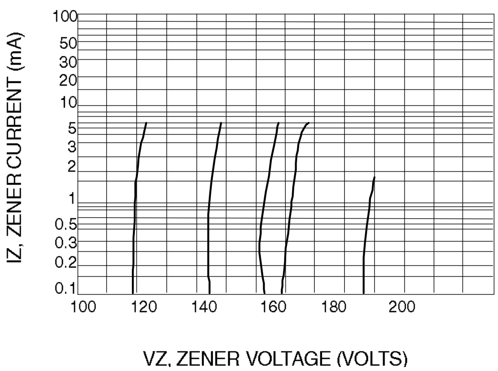

Fig. 9-VZ = 100 THRU 200 VOLTS

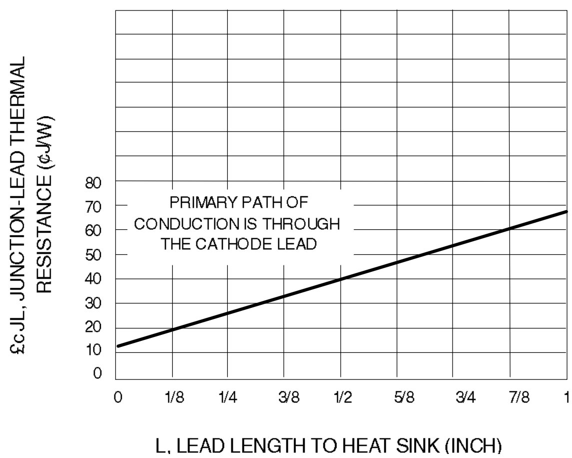

Fig. 10-TYPICAL THERMAL RESISTANCE

APPLICATION NOTE:

Since the actual voltage ava able from a given zener diode is temperature dependent, it is necessary to determine junction temperature under any set of operating conditions in order to calculate its value. The fo owing procedure is recommended:

Lead Temperature, T_L, should be determined from:

$$TL = £c_{LA}P_D + T_A$$

$£c_{LA}$ is the lead-to-ambient thermal resistance (¢J/W) and P_D is the power dissipation. The value for $£c_{LA}$ wi vary and depends on the device mounting method.

$£c_{LA}$ is generally 30-40 ¢J/W for the various chips and tie points in common use and for printed circuit board wiring.

The temperature of the lead can also be measured using a thermocouple placed on the lead as close as possible to the tie point. The thermal mass connected to the tie point is normally large enough so that it w l not significantly respond to heat surges generated in the diode as a result of pulsed operation once steady-state conditions are achieved. Using the measured value of T_L, the junction temperature may be determined by:

$$T_J = T_L + £GT_{JL}$$

$£GT_{JL}$ is the increase in junction temperature above the lead temperature and may be found from Figure 2 for a train of power pulses or from Figure 10 for dc power.

$$£GT_{JL} = £c_{LA}P_D$$

For worst-case design, using expected limits of Iz, mits of P_D and the extremes of T_J ($£GT_{JL}$) may be estimated. Changes in voltage, Vz, can then be found from:

$$£GV = £c_{VZ}\,£GT_J$$

$£c_{VZ}$, the zener voltage temperature coefficient, is found from Figures 5 and 6.

Under high power-pulse operation, the zener voltage w l vary with time and may also be affected significantly be the zener resistance. For best regulation, keep current excursions as low as possible.

Data of Figure 2 should not be used to compute surge capabi ty. Surge mitations are given in Figure 3. They are lower than would be expected by considering only junction temperature, as current crowding effects cause temperatures to be extremely high in small spots resulting in device degradation should the limits of Figure 3 be exceeded.