Surface Mount Zener Diode

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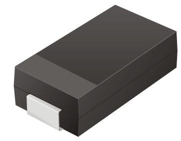
CZRA3011 Thru CZRA3100

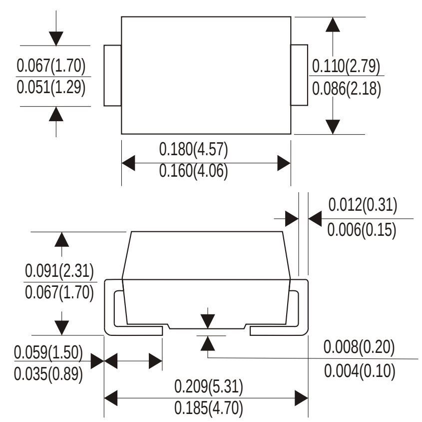
Voltage: 11 - 100 Volts
Power: 3.0 Watt



Features

- For surf ace mounted applications in order to optimize board space
- Low profile package
- Built-in strain relief
- Glass passivated junction
- Low inductance
- Excellent clamping capability
- Typical I_D less than 1uA above 11V
- High temperature soldering 260°C /10 seconds at terminals
- Plastic package has underwriters laboratory flammability classification 94V-O

DO-214AC (SMA)



Dimensions in inches and (millimeters)

Mechanical data

- Case: JEDEC DO-214AC, Molded plastic over passivated junction
- Terminals: Solder plated, solderable per MIL-STD-750, method 2026
- Polarity: Color band denotes positive end (cathode) except Bidirectional
- Standard Packaging: 12mm tape (EIA-481)
- Weight: 0.002 ounce, 0.064 gram

Maximum Ratings and Electrical Characteristics

Ratings at 25°C ambient temperature unless otherwise specified.

Rating	Symbol	Value	Units
Peak Pulse Power Dissipation (Note A) Derate above 75	P_D	3 24	Watts mW/°C
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	°C

ELECTRICAL CHARACTERISTICS

(T_A=25°C unless otherwise noted) (V_F=1.2Volts Max, I_F=500mA for all types.)

Device (Note 1.)	Nominal Zener Voltage V_Z @ I_{ZT} (Note 2.)	Test current I_{ZT}	Maximum Zener Impedance (Note 3.)			Leakage Current		Maximum Zener Current I_{ZM}	Surge Current @T_A=25°C (Note 4.)
			Z_{ZT} @ I_{ZT}	Z_{ZK} @ I_{ZK}	I_{ZK}	I_R	V_R		
	(Volts)	(mA)	(Ohms)	(Ohms)	(mA)	(uA)	(Volts)	Madc	Ir - mA
CZRA3011	11	68	4	700	0.25	1	8.4	225	1.82
CZRA3012	12	63	4.5	700	0.25	1	9.1	246	1.66
CZRA3013	13	58	4.5	700	0.25	0.5	9.9	208	1.54
CZRA3014	14	53	5	700	0.25	0.5	10.6	193	1.43
CZRA3015	15	50	5.5	700	0.25	0.5	11.4	180	1.33
CZRA3016	16	47	5.5	700	0.25	0.5	12.2	169	1.25
CZRA3017	17	44	6	750	0.25	0.5	13	150	1.18
CZRA3018	18	42	6	750	0.25	0.5	13.7	159	1.11
CZRA3019	19	40	7	750	0.25	0.5	14.4	142	1.05
CZRA3020	20	37	7	750	0.25	0.5	15.2	135	1.00
CZRA3022	22	34	8	750	0.25	0.5	16.7	123	0.91
CZRA3024	24	31	9	750	0.25	0.5	18.2	112	0.83
CZRA3027	27	28	10	750	0.25	0.5	20.6	100	0.74
CZRA3028	28	27	12	750	0.25	0.5	21	96	0.71
CZRA3030	30	25	16	1000	0.25	0.5	22.5	90	0.67
CZRA3033	33	23	20	1000	0.25	0.5	25.1	82	0.61
CZRA3036	36	21	22	1000	0.25	0.5	27.4	75	0.56
CZRA3039	39	19	28	1000	0.25	0.5	29.7	69	0.51
CZRA3043	43	17	33	1500	0.25	0.5	32.7	63	0.45
CZRA3047	47	16	38	1500	0.25	0.5	35.6	57	0.42
CZRA3051	51	15	45	1500	0.25	0.5	38.8	53	0.39
CZRA3056	56	13	50	2000	0.25	0.5	42.6	48	0.36
CZRA3062	62	12	55	2000	0.25	0.5	47.1	44	0.32
CZRA3068	68	11	70	2000	0.25	0.5	51.7	40	0.29
CZRA3075	75	10	85	2000	0.25	0.5	56	36	0.27
CZRA3082	82	9.1	95	3000	0.25	0.5	62.2	33	0.24
CZRA3091	91	8.2	115	3000	0.25	0.5	69.2	30	0.22
CZRA3100	100	7.5	160	3000	0.25	0.5	76	27	0.20

NOTE:

1. Tolerance and Type Number Designation. The type numbers listed have a standard tolerance on the nominal zener voltage of ±5%.
2. ZENER VOLTAGE (Vz) MEASUREMENT - guarantees the zener voltage when measured at 40 ms +- 10ms from the diode body, and an ambient temperature of 25 °C (+8°C , -2°C).
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 capability is as described in Figure 3.

Rating and Characteristic Curves (CZRA3011 Thru CZRA3100)

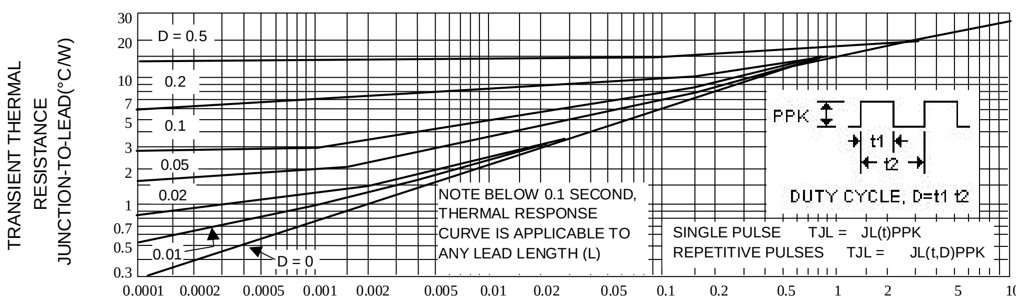


Fig. 2-TYPICAL THERMAL RESPONSE L,

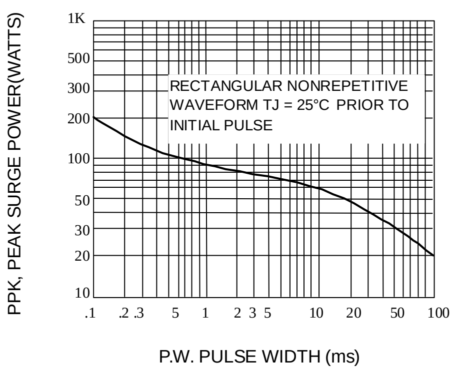


Fig. 3-MAXIMUM SURGE POWER

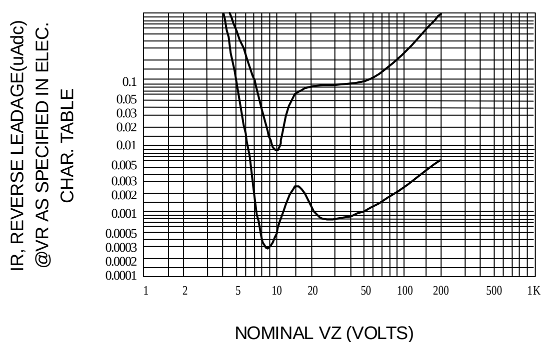


Fig. 4-TYPICAL REVERSE LEAKAGE

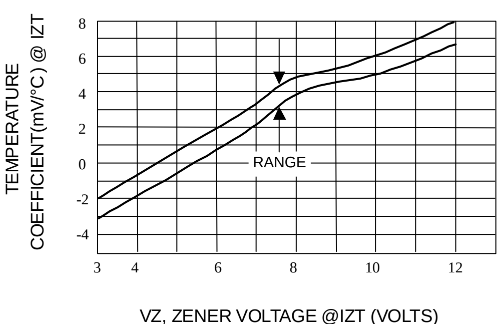


Fig. 5 - UNITS TO 12 VOLTS

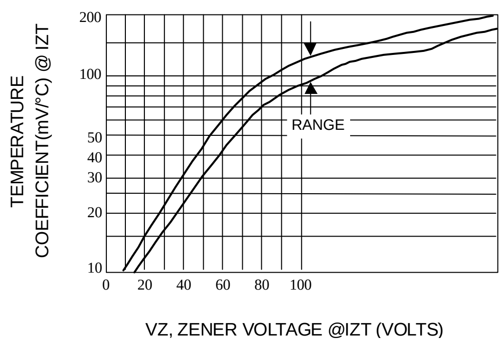
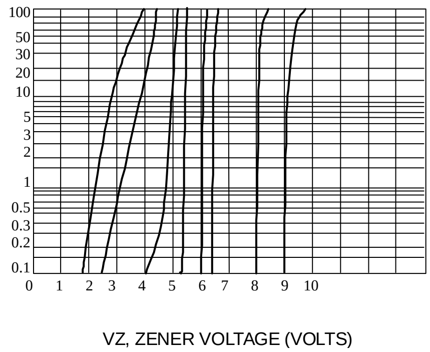
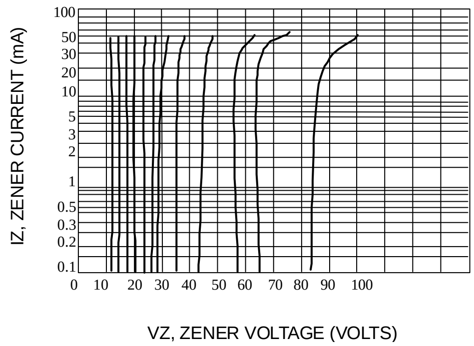


Fig. 6 - UNITS 10 TO 100 VOLTS

Rating and Characteristic Curves (CZRA3011 Thru CZRA3100)





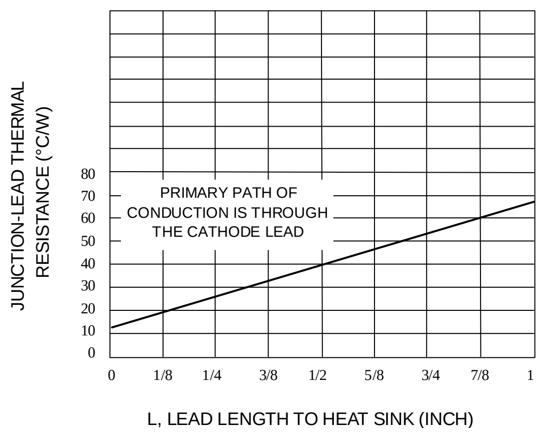


Fig. 9 -TYPICAL THERMAL RESISTANCE

APPLICATION NOTE:

Since the actual voltage available 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 following procedure is recommended:

Lead Temperature, T_L, should be determined from:

$$T_L = \theta_{LA}P_D + T_A$$

θ_{LA} is the lead-to-ambient thermal resistance (°C/W) and PD is the power dissipation. The value for θ_{LA} will vary and depends on the device mounting method. θ_{LA} is generally 30-40 °C/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 will 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:

$$T_J = T_L + \Delta T_{JL}$$

ΔT_{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.

$$\Delta T_{JL} = \theta_{LA}P_D$$

For worst-case design, using expected limits of Iz, limits of PD and the extremes of TJ (ΔT_{JL}) may be estimated. Changes in voltage, Vz, can then be found from:

$$\Delta V = \theta_{VZ}\ \Delta T_J$$

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

Under high power-pulse operation, the zener voltage will 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 capability. Surge limitations 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.