NEC

ZENER DIODES

RD2.0E to RD200E

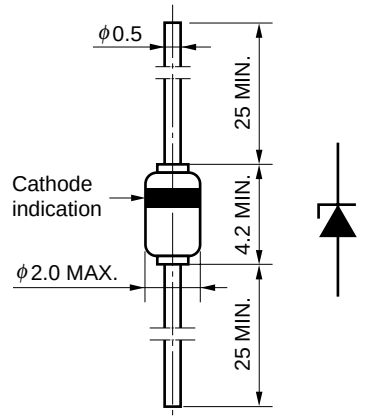
500 mW DHD ZENER DIODE (DO-35)

DESCRIPTION

NEC Type RD2.0E to RD200E Series are planar type zener diode in the popular DO-35 package with DHD (Double Heatsink Diode) construction having allowable power dissipation of 500 mW. To meet various application at customers, V_Z (zener voltage) is classified into the tight tolerance under the specific suffix (B, B1 to B7).

PACKAGE DIMENSIONS

(in millimeters)



FEATURES

- DHD (Double Heatsink Diode) Construction
- V_Z: Applied E24 standard (RD130E to RD200E: 10 volts step)
- DO-35 Glass sealed package

ORDER INFORMATION

RD2.0 E to RD39E with suffix “B1”, “B2”, “B3”, “B4”, “B5”, “B6” or “B7” should be applied for orders for suffix “B”.

APPLICATIONS

Circuits for Constant Voltage, Constant Current, Waveform Clipper, Surge absorber, etc.

ABSOLUTE MAXIMUM RATINGS (T_A = 25 ˚C)

Forward Current	I_F	200 mA	
Power Dissipation	P	500 mW	
Surge Reverse Power	P_{RSM}	100 W (t = 10 μs)	to see Fig. 17
Junction Temperature	T_j	175 ˚C	
Storage Temperature	T_{stg}	–65 to +175 ˚C	

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ELECTRICAL CHARACTERISTICS (T_A = 25 °C)

Type Number	Suffix	Zener Voltage V_Z (V)Note 1			Dynamic Impedance Z_Z (Ω)Note 2		Knee Dynamic Impedance Z_{ZK} (Ω)Note 2		Reverse Current I_R (μA)	
		MIN.	MAX.	I_Z (mA)	MAX.	I_Z (mA)	MAX.	I_Z (mA)	MAX.	V_R(V)
RD2.0E	B	1.88	2.20	20	140	20	2 000	1	120	0.5
	B1	1.88	2.10							
	B2	2.02	2.20							
RD2.2E	B	2.12	2.41	20	120	20	2 000	1	120	0.7
	B1	2.12	2.30							
	B2	2.22	2.41							
RD2.4E	B	2.33	2.63	20	100	20	2 000	1	120	1.0
	B1	2.33	2.52							
	B2	2.43	2.63							
RD2.7E	B	2.54	2.91	20	100	20	1 000	1	100	1.0
	B1	2.54	2.75							
	B2	2.69	2.91							
RD3.0E	B	2.85	3.22	20	80	20	1 000	1	50	1.0
	B1	2.85	3.07							
	B2	3.01	3.22							
RD3.3E	B	3.16	3.53	20	70	20	1 000	1	20	1.0
	B1	3.16	3.38							
	B2	3.32	3.53							
RD3.6E	B	3.47	3.83	20	60	20	1 000	1	10	1.0
	B1	3.47	3.68							
	B2	3.62	3.83							
RD3.9E	B	3.77	4.14	20	50	20	1 000	1	5	1.0
	B1	3.77	3.98							
	B2	3.92	4.14							
RD4.3E	B	4.05	4.53	20	40	20	1 000	1	5	1.0
	B1	4.05	4.26							
	B2	4.20	4.40							
	B3	4.34	4.53							
RD4.7E	B	4.47	4.91	20	25	20	900	1	5	1.0
	B1	4.47	4.65							
	B2	4.59	4.77							
	B3	4.71	4.91							
RD5.1E	B	4.85	5.35	20	20	20	800	1	5	1.5
	B1	4.85	5.03							
	B2	4.97	5.18							
	B3	5.12	5.35							
RD5.6E	B	5.29	5.88	20	13	20	500	1	5	2.5
	B1	5.29	5.52							
	B2	5.46	5.70							
	B3	5.64	5.88							
RD6.2E	B	5.81	6.40	20	10	20	300	1	5	3.0
	B1	5.81	6.06							
	B2	5.99	6.24							
	B3	6.16	6.40							
RD6.8E	B	6.32	6.97	20	8	20	150	0.5	2	3.5
	B1	6.32	6.59							
	B2	6.52	6.79							
	B3	6.70	6.97							

Type Number	Suffix	Zener Voltage V_Z (V)Note 1			Dynamic Impedance Z_Z (Ω)Note 2		Knee Dynamic Impedance Z_{ZK} (Ω)Note 2		Reverse Current I_R (μA)	
		MIN.	MAX.	I_Z (mA)	MAX.	I_Z (mA)	MAX.	I_Z (mA)	MAX.	V_R(V)
RD7.5E	B	6.88	7.64	20	8	20	120	0.5	0.5	4.0
	B1	6.88	7.19							
	B2	7.11	7.41							
	B3	7.33	7.64							
RD8.2E	B	7.56	8.41	20	8	20	120	0.5	0.5	5.0
	B1	7.56	7.90							
	B2	7.82	8.15							
	B3	8.07	8.41							
RD9.1E	B	8.33	9.29	20	8	20	120	0.5	0.5	6.0
	B1	8.33	8.70							
	B2	8.61	8.99							
	B3	8.89	9.29							
RD10E	B	9.19	10.30	20	8	20	120	0.5	0.2	7.0
	B1	9.19	9.59							
	B2	9.48	9.90							
	B3	9.82	10.30							
RD11E	B	10.18	11.26	10	10	10	120	0.5	0.2	8.0
	B1	10.18	10.63							
	B2	10.50	10.95							
	B3	10.82	11.16							
RD12E	B	11.13	12.30	10	12	10	110	0.5	0.2	9.0
	B1	11.13	11.63							
	B2	11.50	11.92							
	B3	11.80	12.30							
RD13E	B	12.18	13.62	10	14	10	110	0.5	0.2	10
	B1	12.18	12.71							
	B2	12.59	13.16							
	B3	13.03	13.62							
RD15E	B	13.48	15.02	10	16	10	110	0.5	0.2	11
	B1	13.48	14.09							
	B2	13.95	14.56							
	B3	14.42	15.02							
RD16E	B	14.87	16.50	10	18	10	150	0.5	0.2	12
	B1	14.87	15.50							
	B2	15.33	15.96							
	B3	15.79	16.50							
RD18E	B	16.34	18.30	10	23	10	150	0.5	0.2	13
	B1	16.34	17.06							
	B2	16.90	17.67							
	B3	17.51	18.30							
RD20E	B	18.11	20.72	10	28	10	200	0.5	0.2	15
	B1	18.11	18.92							
	B2	18.73	19.57							
	B3	19.38	20.22							
	B4	19.88	20.72							
RD22E	B	20.23	22.61	5	30	5	200	0.5	0.2	17
	B1	20.23	21.08							
	B2	20.76	21.65							
	B3	21.22	22.09							
	B4	21.68	22.61							

Type Number	Suffix	Zener Voltage V_Z (V)Note 1			Dynamic Impedance Z_Z (Ω)Note 2		Knee Dynamic Impedance Z_{ZK} (Ω)Note 2		Reverse Current I_R (μA)	
		MIN.	MAX.	I_Z (mA)	MAX.	I_Z (mA)	MAX.	I_Z (mA)	MAX.	V_R(V)
RD24E	B	22.26	24.81	5	35	5	200	0.5	0.2	19
	B1	22.26	23.12							
	B2	23.75	23.73							
	B3	23.29	24.27							
	B4	23.81	24.81							
RD27E	B	24.26	27.64	5	45	5	250	0.5	0.2	21
	B1	24.26	25.52							
	B2	24.97	26.26							
	B3	25.63	26.95							
	B4	26.29	27.64							
RD30E	B	26.99	30.51	5	55	5	250	0.5	0.2	23
	B1	26.99	28.39							
	B2	27.70	29.13							
	B3	28.36	29.82							
	B4	29.02	30.51							
RD33E	B	29.68	33.11	5	65	5	250	0.5	0.2	25
	B1	29.68	31.22							
	B2	30.32	31.88							
	B3	30.90	32.50							
	B4	31.49	33.11							
RD36E	B	32.14	35.77	5	75	5	250	0.5	0.2	27
	B1	32.14	33.79							
	B2	32.79	34.49							
	B3	33.40	35.13							
	B4	34.01	35.77							
RD39E	B	34.68	40.80	5	85	5	250	0.5	0.2	30
	B1	34.68	36.47							
	B2	35.36	37.19							
	B3	36.00	37.85							
	B4	36.63	38.52							
	B5	37.36	39.29							
	B6	38.14	40.11							
	B7	38.94	40.80							
RD43E	B	40	45	5	90	5			0.2	33
RD47E	B	44	49	5	90	5			0.2	36
RD51E	B	48	54	5	110	5			0.2	39
RD56E	B	53	60	5	110	5			0.2	43
RD62E	B	58	66	2	200	2			0.2	47
RD68E	B	64	72	2	200	2			0.2	52
RD75E	B	70	79	2	300	2			0.2	57
RD82E	B	77	87	2	300	2			0.2	63
RD91E	B	85	96	2	400	2			0.2	69
RD100E	B	94	106	2	400	2			0.2	76
RD110E	B	104	116	1	750	1			0.2	84
RD120E	B	114	126	1	900	1			0.2	91
RD130E	B	120	140	1	1100	1			0.2	100
RD140E	B	130	150	1	1300	1			0.2	110
RD150E	B	140	160	1	1500	1			0.2	120
RD160E	B	150	170	1	1700	1			0.2	130
RD170E	B	160	180	1	1900	1			0.2	140
RD180E	B	170	190	1	2200	1			0.2	140
RD190E	B	180	200	1	2400	1			0.2	150
RD200E	B	190	210	1	2500	1			0.2	160

Note 1. tested with pulse (40 ms)

2. Z_Z and Z_{ZK} are measured at I_Z by given a very small A.C. current signal.

3. Suffix B is Suffix B1, B2, B3, B4, B5, B6 or B7.

TYPICAL CHARACTERISTICS (T_A = 25 °C)

Fig. 1 ZENER CURRENT vs. ZENER VOLTAGE

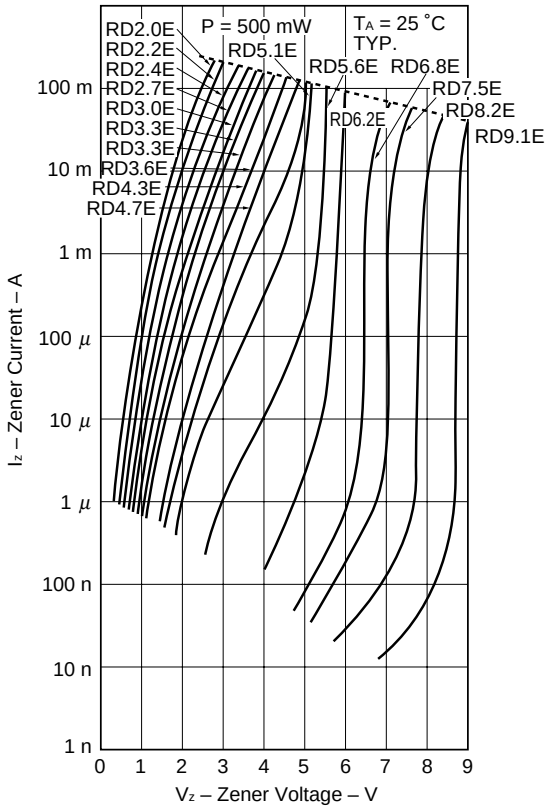


Fig. 2 ZENER CURRENT vs. ZENER VOLTAGE

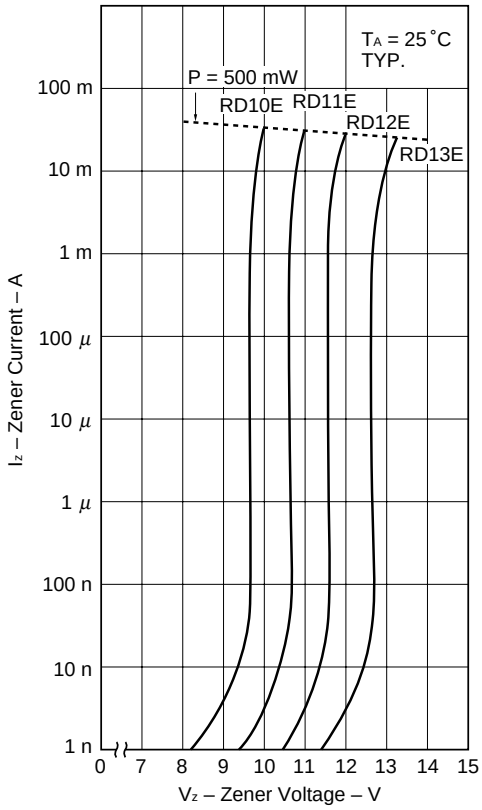


Fig. 3 ZENER CURRENT vs. ZENER VOLTAGE

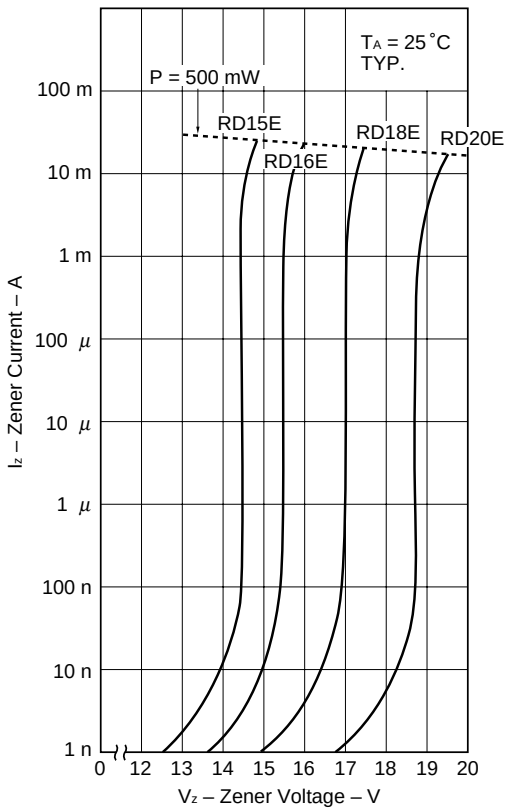


Fig. 4 ZENER CURRENT vs. ZENER VOLTAGE

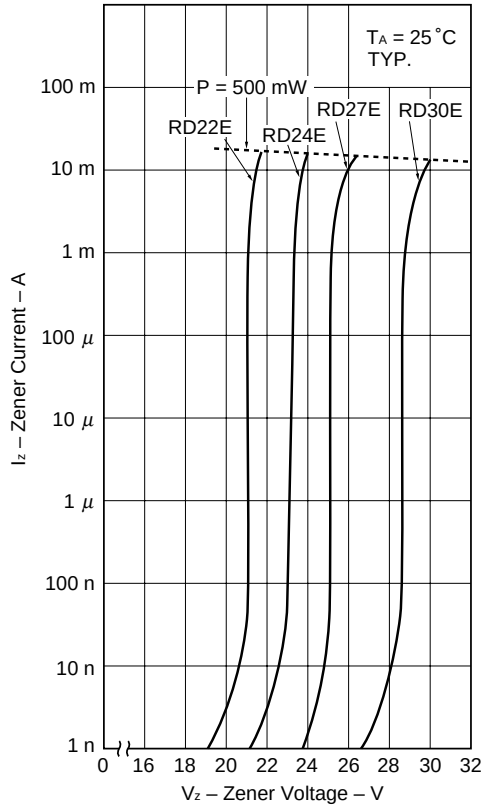


Fig. 5 ZENER CURRENT vs. ZENER VOLTAGE

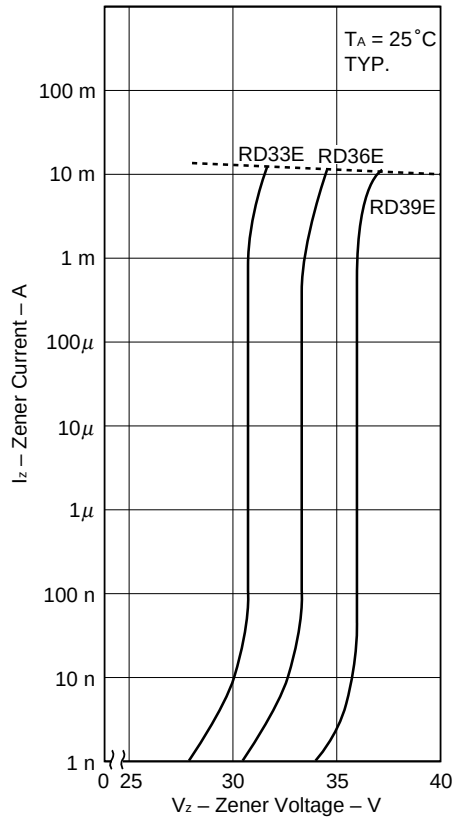


Fig. 6 ZENER CURRENT vs. ZENER VOLTAGE

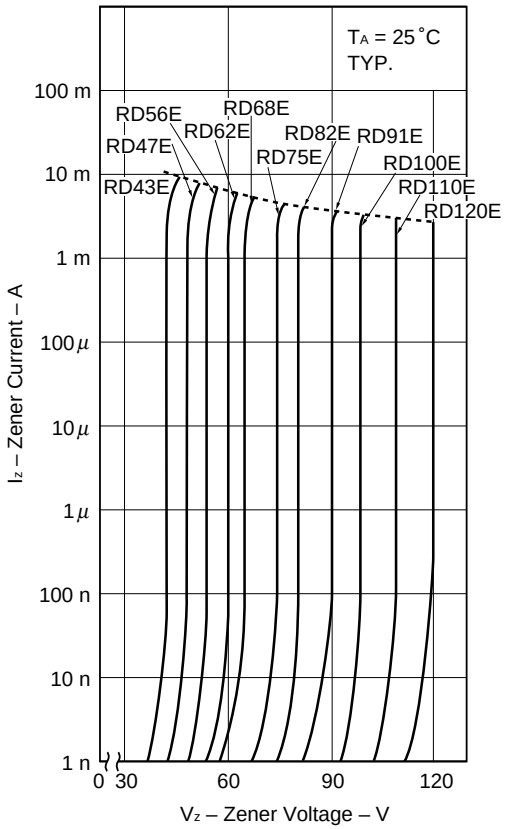


Fig. 7 ZENER CURRENT vs. ZENER VOLTAGE

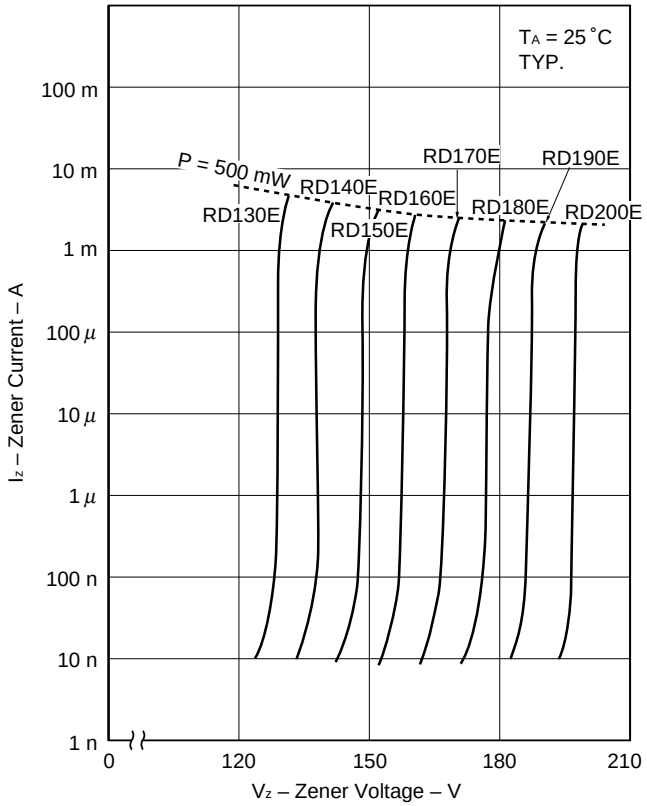


Fig. 8 POWER DISSIPATION vs. AMBIENT TEMPERATURE

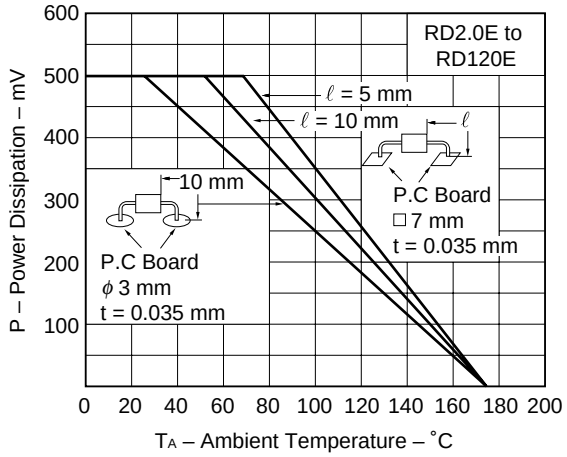


Fig. 9 POWER DISSIPATION vs. AMBIENT TEMPERATURE

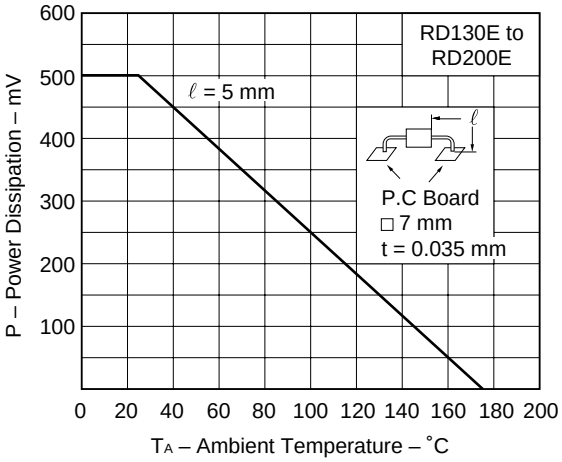


Fig. 10 THERMAL RESISTANCE vs. SIZE OF P.C BOARD

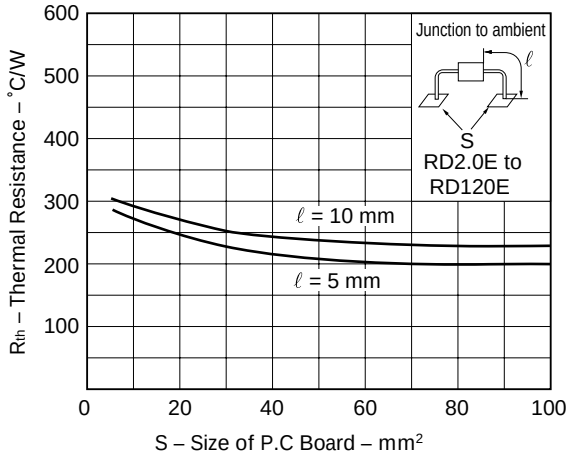


Fig. 11 THERMAL RESISTANCE vs. SIZE OF P.C BOARD

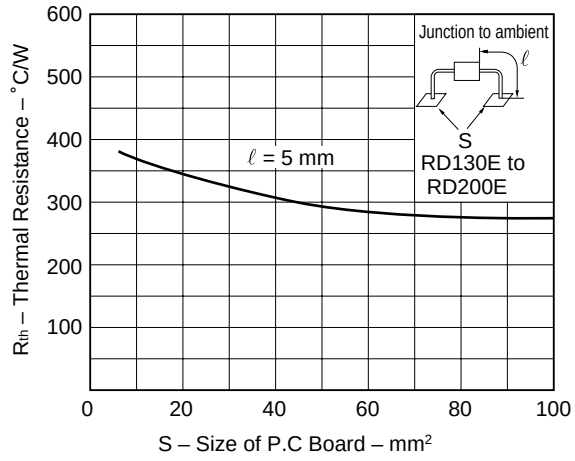


Fig. 12 DYNAMIC IMPEDANCE vs. ZENER CURRENT

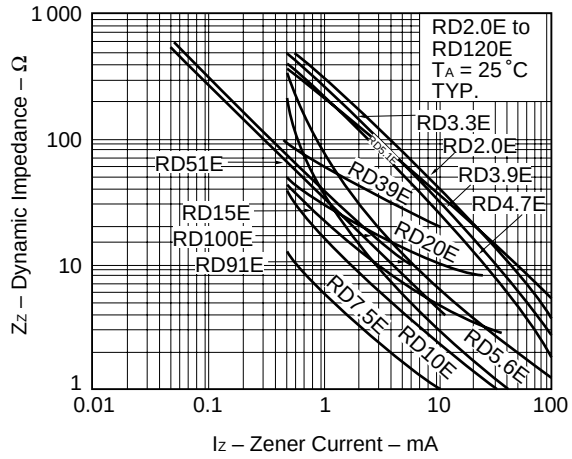


Fig. 13 DYNAMIC IMPEDANCE vs. ZENER CURRENT

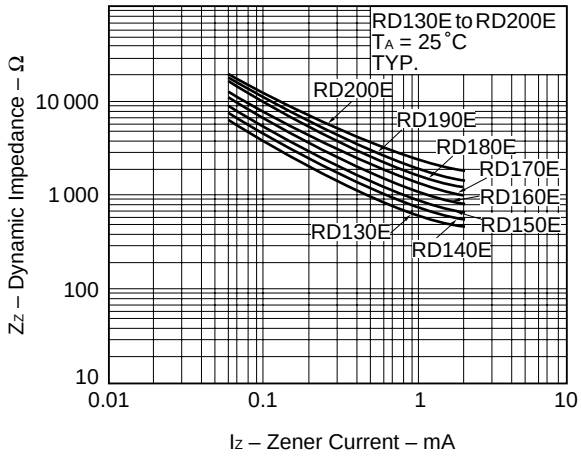


Fig. 14 ZENER VOLTAGE TEMPERATURE COEFFICIENT vs. ZENER VOLTAGE

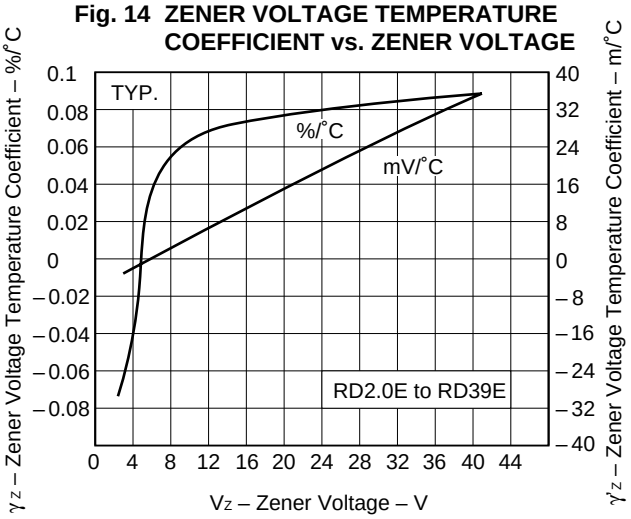


Fig. 15 ZENER VOLTAGE TEMPERATURE COEFFICIENT vs. ZENER VOLTAGE

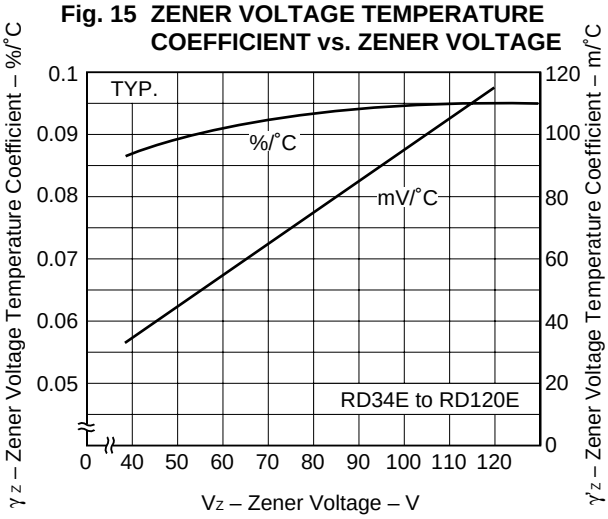


Fig. 16 ZENER VOLTAGE TEMPERATURE COEFFICIENT vs. ZENER VOLTAGE

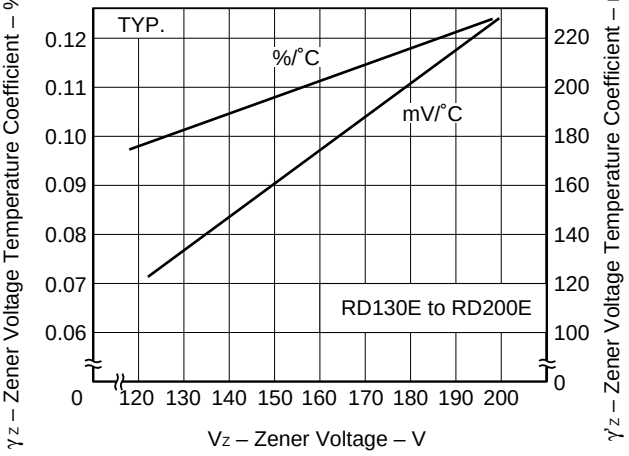
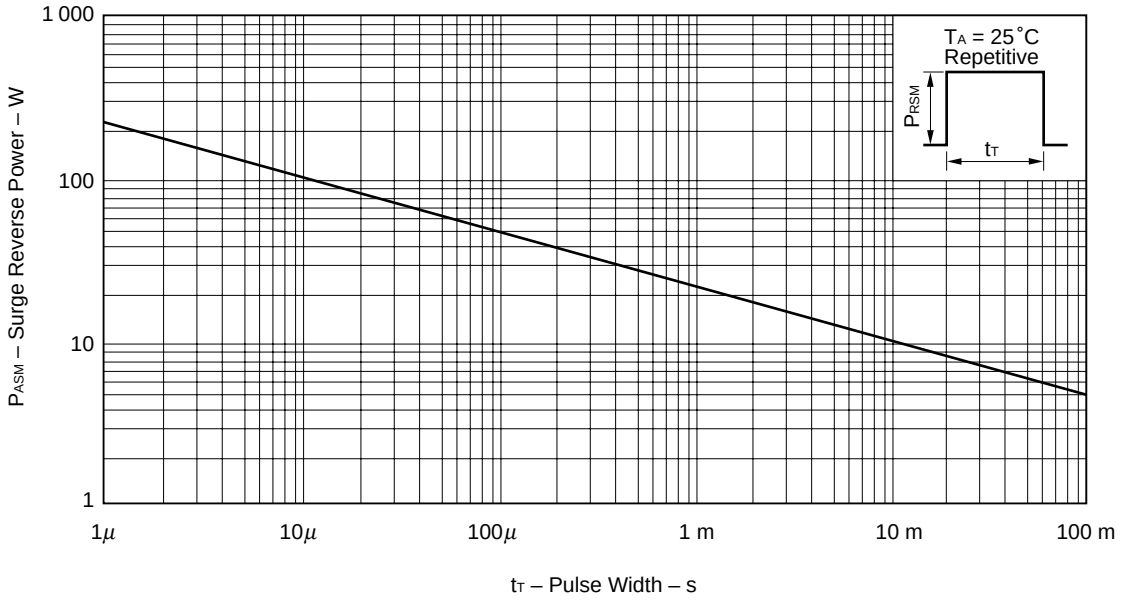


Fig. 17 SURGE REVERSE POWER RATINGS



GENERAL PURPOSE INFORMATION

- Power Dissipation

  Total power dissipation P can be calculated by the maximum junction temperature, ambient temperature and thermal resistance.

$$P = \frac{T_{jMAX.} - T_A}{R_{th}}$$

$T_{jMAX.}$: Maximum Junction Temperature
T_A : Ambient Temperature
R_{th} : Thermal Resistance (to see Fig. 10, 11)

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