

# 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).

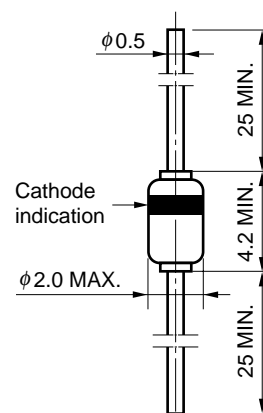
### FEATURES

- 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".

### PACKAGE DIMENSIONS (in millimeters)



### APPLICATIONS

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

### ABSOLUTE MAXIMUM RATINGS ( $T_A = 25^\circ\text{C}$ )

Forward Current	$I_F$	200 mA	
Power Dissipation	P	500 mW	
Surge Reverse Power	$P_{RSM}$	100 W ( $t = 10 \mu\text{s}$ )	to see Fig. 17
Junction Temperature	$T_j$	$175^\circ\text{C}$	
Storage Temperature	$T_{stg}$	$-65$ to $+175^\circ\text{C}$	

ELECTRICAL CHARACTERISTICS (T<sub>A</sub> = 25 °C)

Type Number	Suffix	Zener Voltage V <sub>Z</sub> (V) <sup>Note 1</sup>			Dynamic Impedance Z <sub>Z</sub> (Ω) <sup>Note 2</sup>		Knee Dynamic Impedance Z <sub>ZK</sub> (Ω) <sup>Note 2</sup>		Reverse Current I <sub>R</sub> (μA)	
		MIN.	MAX.	I <sub>Z</sub> (mA)	MAX.	I <sub>Z</sub> (mA)	MAX.	I <sub>Z</sub> (mA)	MAX.	V <sub>R</sub> (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 <sub>Z</sub> (V) <sup>Note 1</sup>			Dynamic Impedance Z <sub>Z</sub> (Ω) <sup>Note 2</sup>		Knee Dynamic Impedance Z <sub>ZK</sub> (Ω) <sup>Note 2</sup>		Reverse Current I <sub>R</sub> (μA)	
		MIN.	MAX.	I <sub>Z</sub> (mA)	MAX.	I <sub>Z</sub> (mA)	MAX.	I <sub>Z</sub> (mA)	MAX.	V <sub>R</sub> (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) <sup>Note 1</sup>			Dynamic Impedance $Z_Z$ ( $\Omega$ ) <sup>Note 2</sup>		Knee Dynamic Impedance $Z_{ZK}$ ( $\Omega$ ) <sup>Note 2</sup>		Reverse Current $I_R$ ( $\mu A$ )	
		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 ( $T_A = 25^\circ\text{C}$ )

Fig. 1 ZENER CURRENT vs. ZENER VOLTAGE

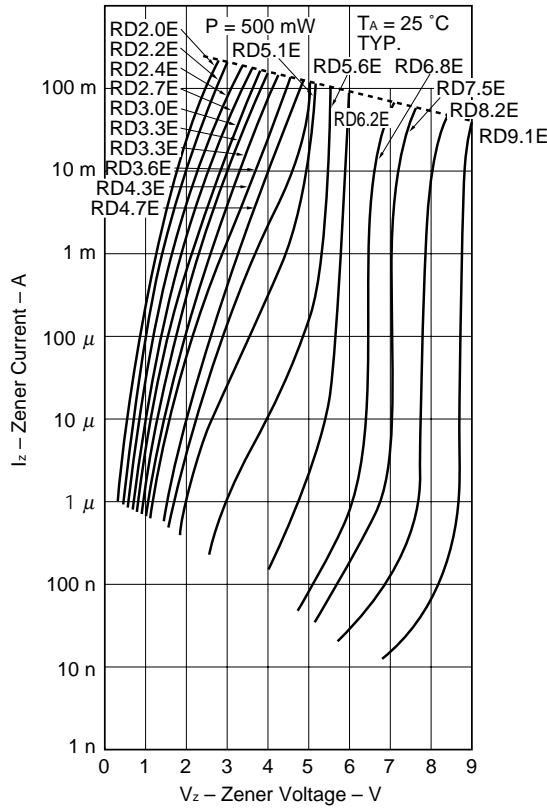


Fig. 2 ZENER CURRENT vs. ZENER VOLTAGE

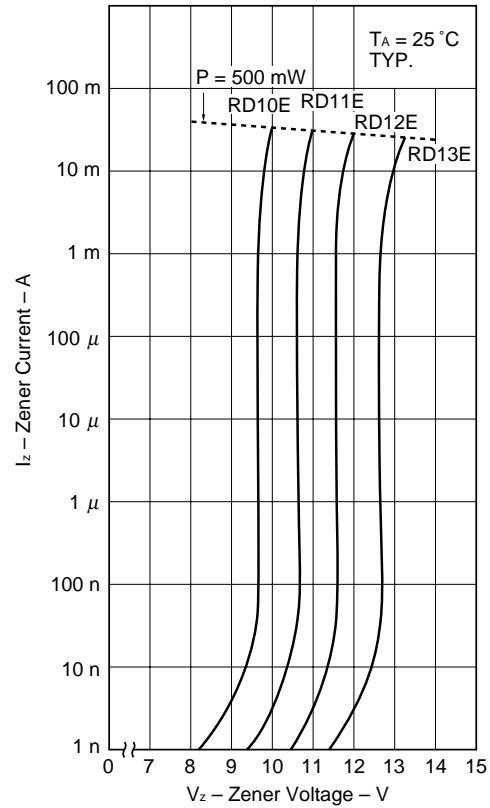


Fig. 3 ZENER CURRENT vs. ZENER VOLTAGE

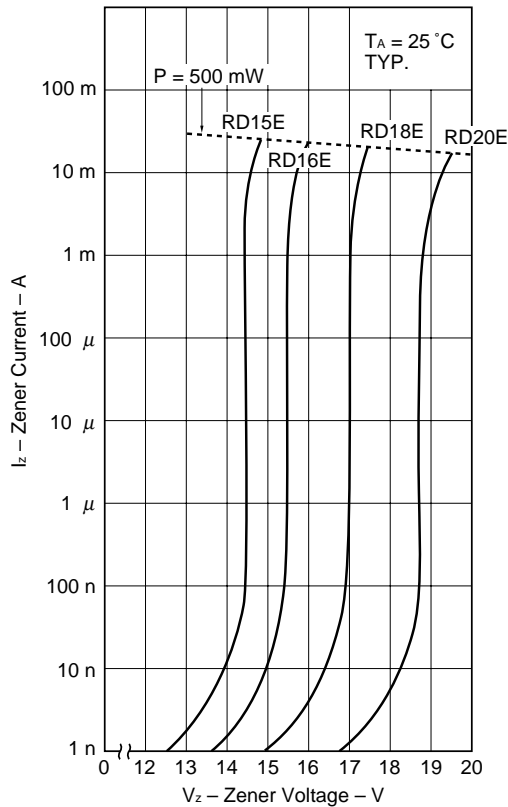
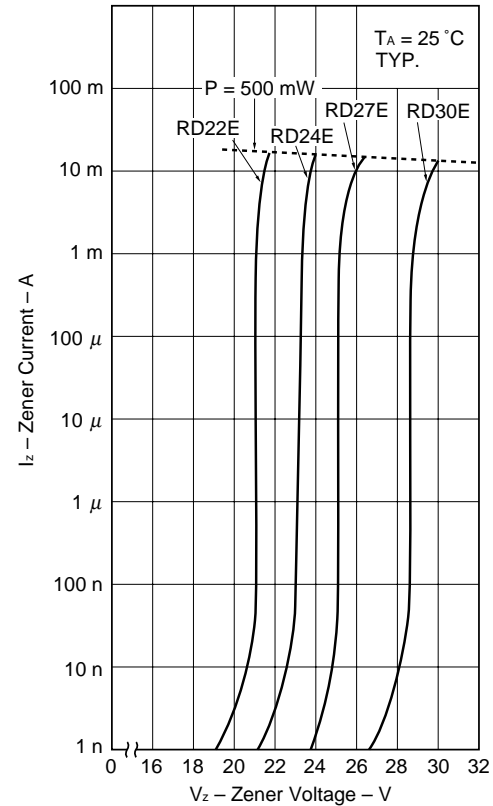
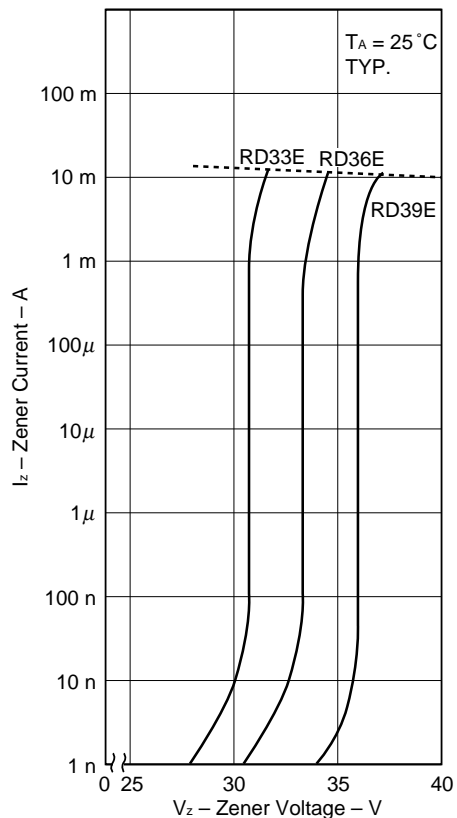


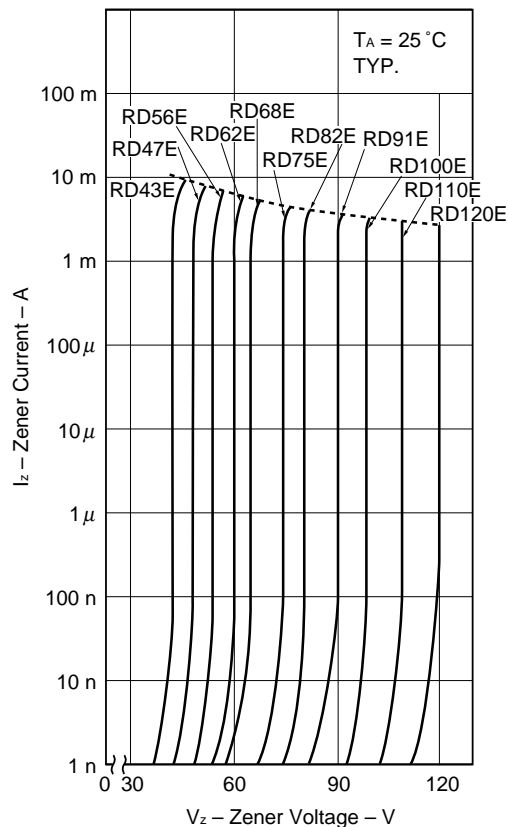
Fig. 4 ZENER CURRENT vs. ZENER VOLTAGE



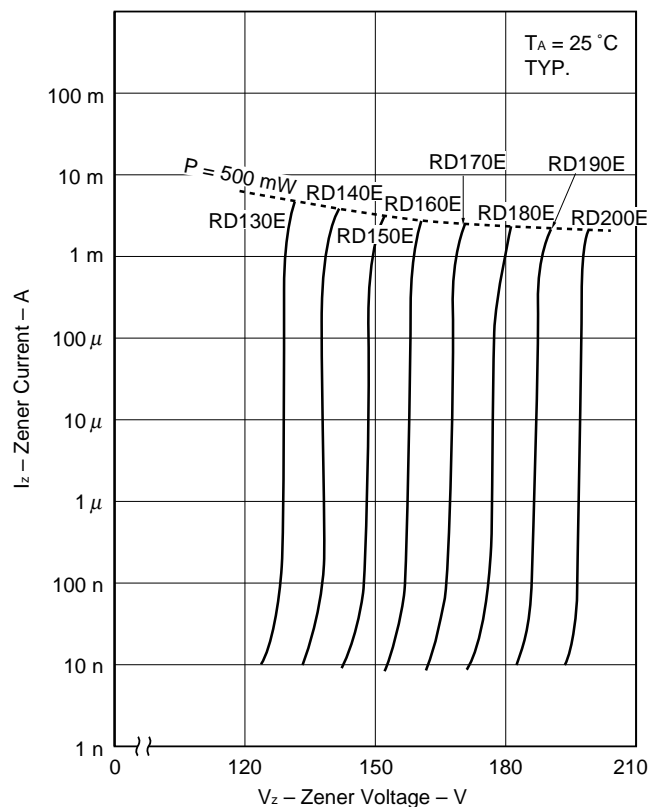
**Fig. 5 ZENER CURRENT vs.  
ZENER VOLTAGE**



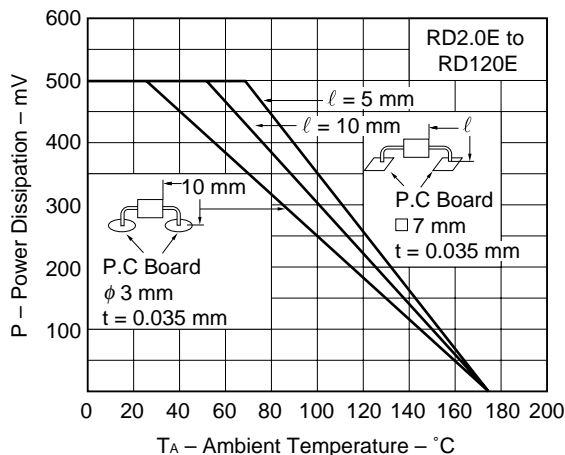
**Fig. 6 ZENER CURRENT vs.  
ZENER VOLTAGE**



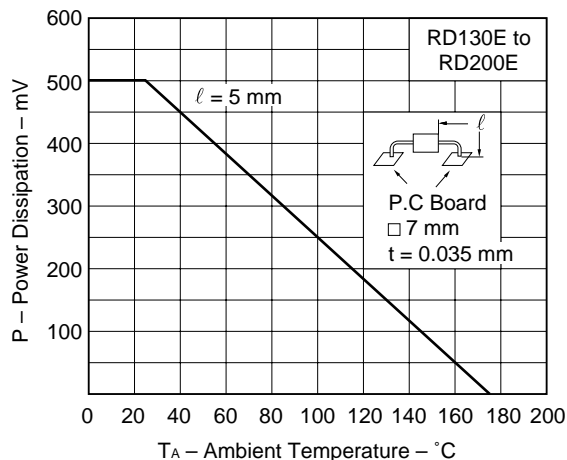
**Fig. 7 ZENER CURRENT vs.  
ZENER VOLTAGE**



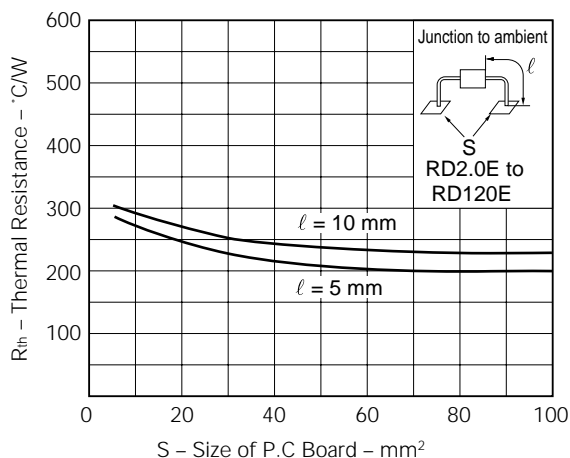
**Fig. 8 POWER DISSIPATION vs. AMBIENT TEMPERATURE**



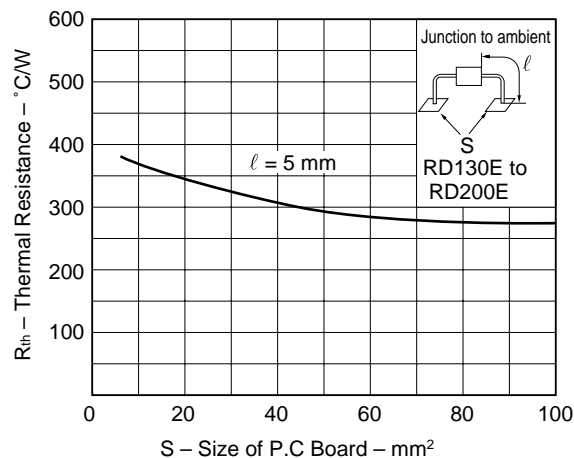
**Fig. 9 POWER DISSIPATION vs. AMBIENT TEMPERATURE**



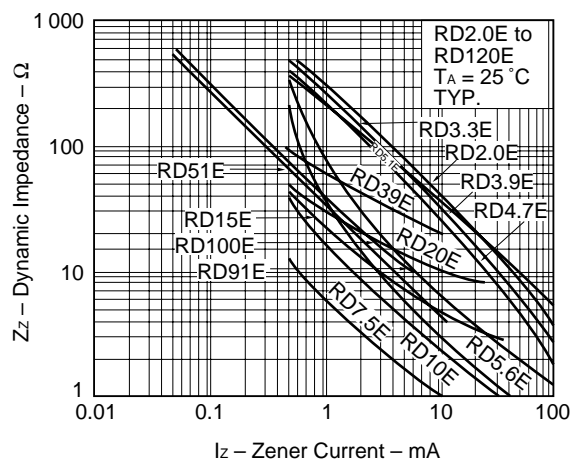
**Fig. 10 THERMAL RESISTANCE vs. SIZE OF P.C BOARD**



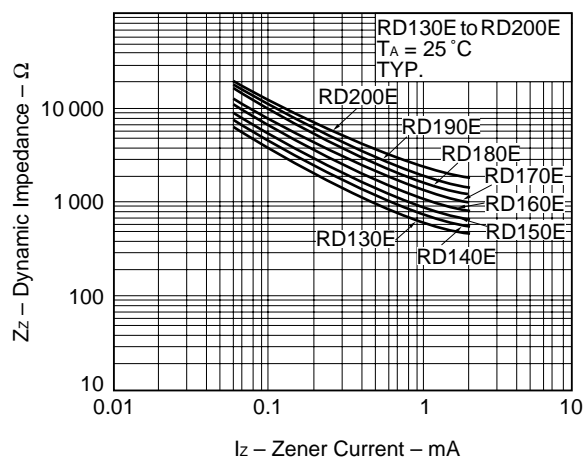
**Fig. 11 THERMAL RESISTANCE vs. SIZE OF P.C BOARD**



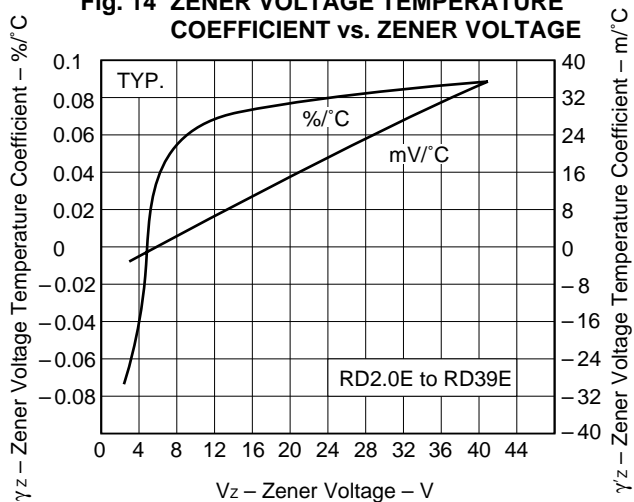
**Fig. 12 DYNAMIC IMPEDANCE vs. ZENER CURRENT**



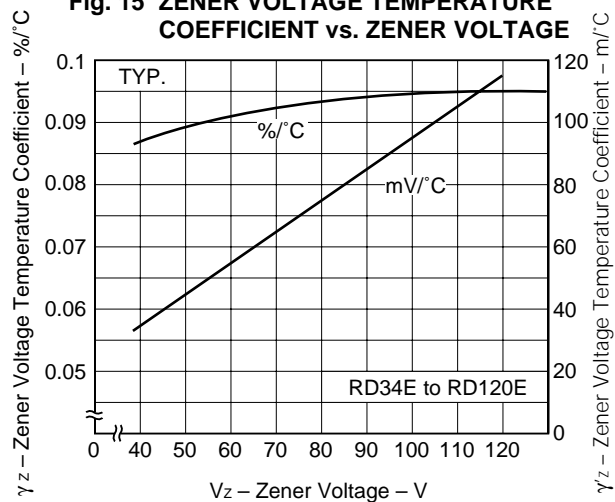
**Fig. 13 DYNAMIC IMPEDANCE vs. ZENER CURRENT**



**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**

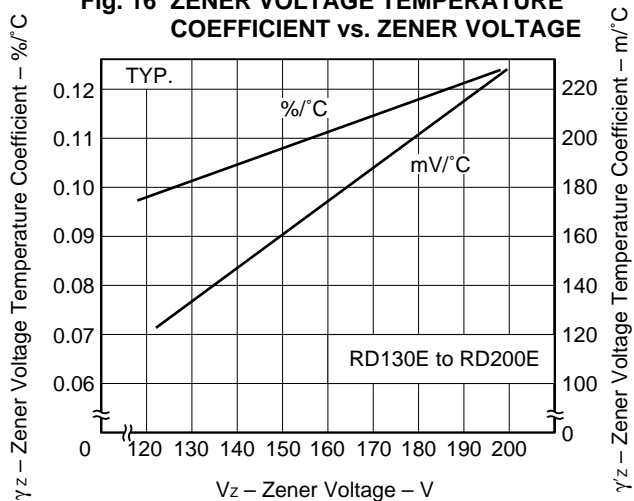
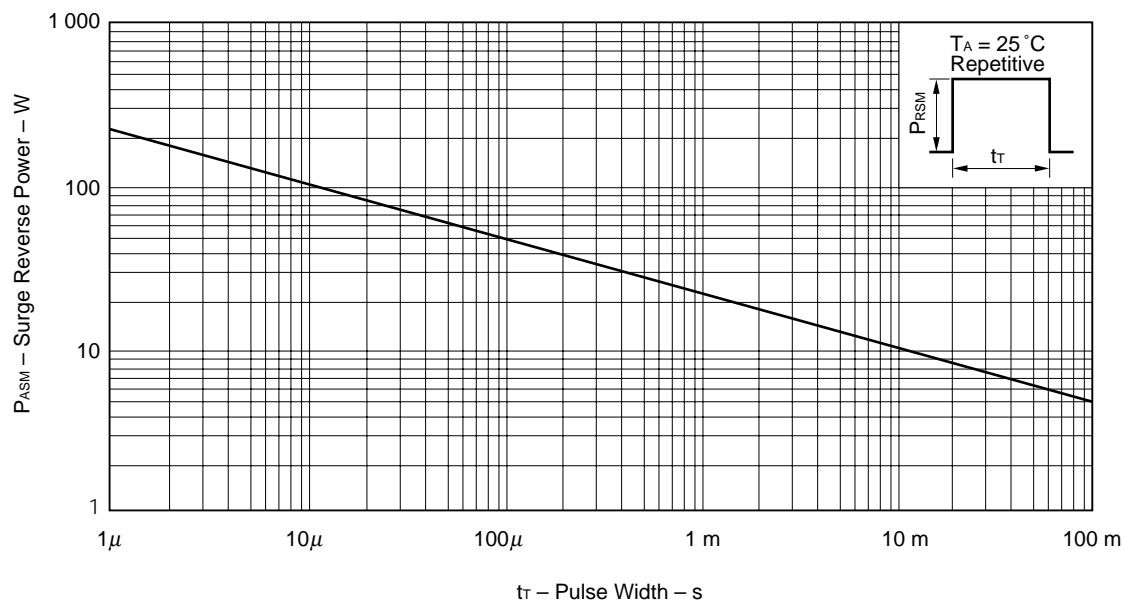




Fig. 17 SURGE REVERSE POWER RATINGS



### 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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