

RD2.0E to RD200E

500 mW DHD ZENER DIODE  
(DO-35)

**DESCRIPTION**

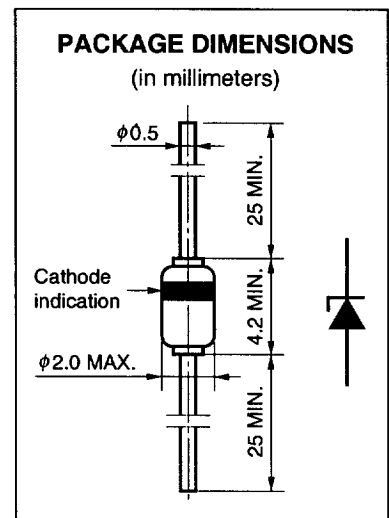
NEC Type RD2.0E to RD200E Series are planar type zener diode in the popular DO-35 package with DHD (Double Heatsink Diode) construction having allowable power dissipation of 500 mW. To meet various application at customers,  $V_z$  (zener voltage) is classified into the tight tolerance under the specific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



**APPLICATIONS**

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

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

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 $V_z$ (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)
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 <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)
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							
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							
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							
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							
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							
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<sub>Z</sub> and Z<sub>ZK</sub> are measured at I<sub>Z</sub> 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<sub>A</sub> = 25 °C)

Fig. 1 ZENER CURRENT vs. ZENER VOLTAGE

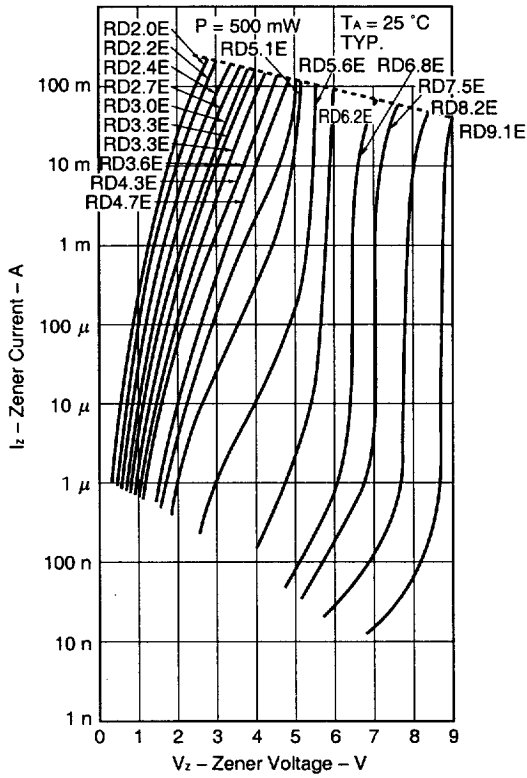


Fig. 2 ZENER CURRENT vs. ZENER VOLTAGE

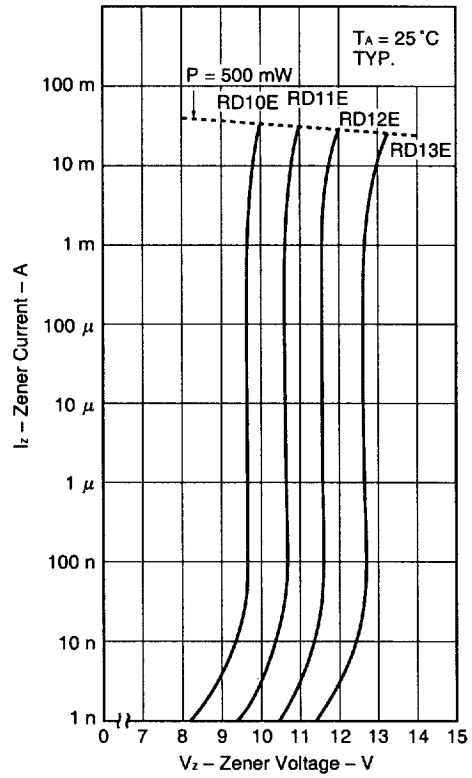


Fig. 3 ZENER CURRENT vs. ZENER VOLTAGE

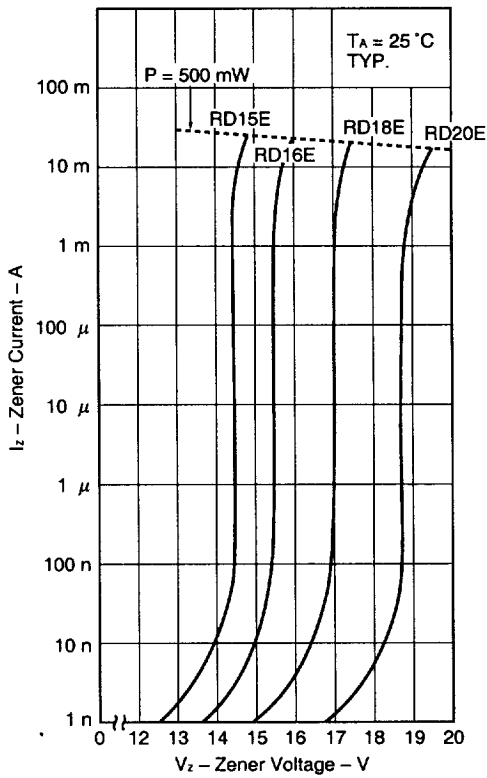


Fig. 4 ZENER CURRENT vs. ZENER VOLTAGE

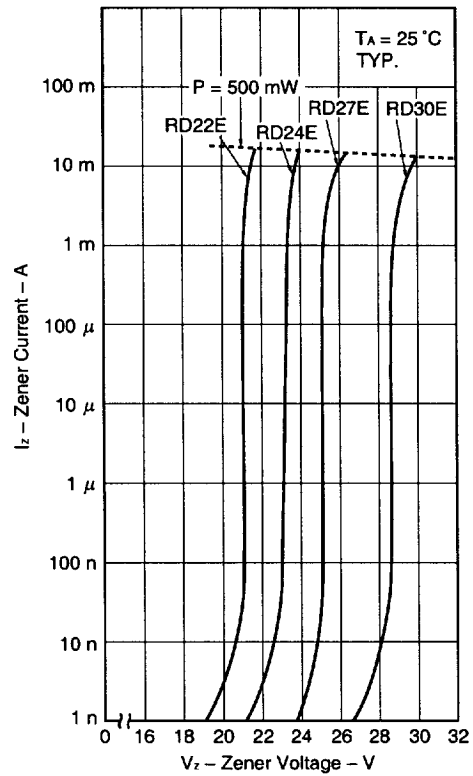


Fig. 5 ZENER CURRENT vs. ZENER VOLTAGE

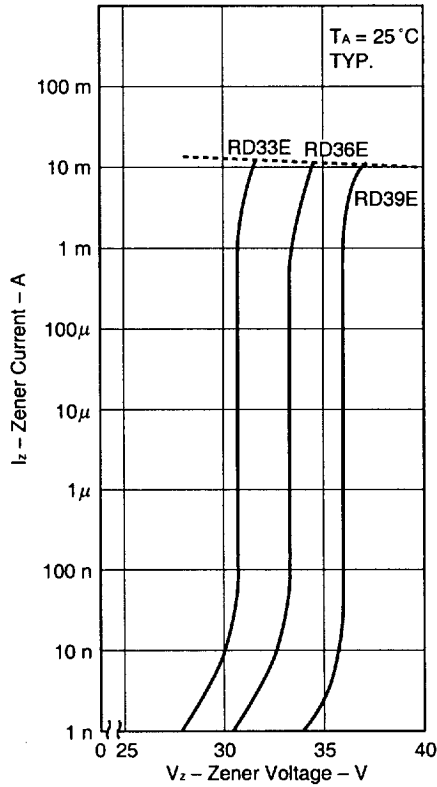


Fig. 6 ZENER CURRENT vs. ZENER VOLTAGE

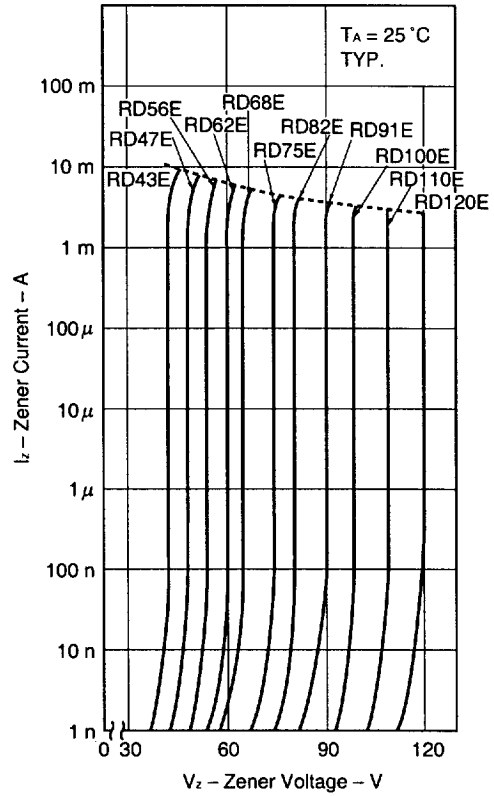


Fig. 7 ZENER CURRENT vs. ZENER VOLTAGE

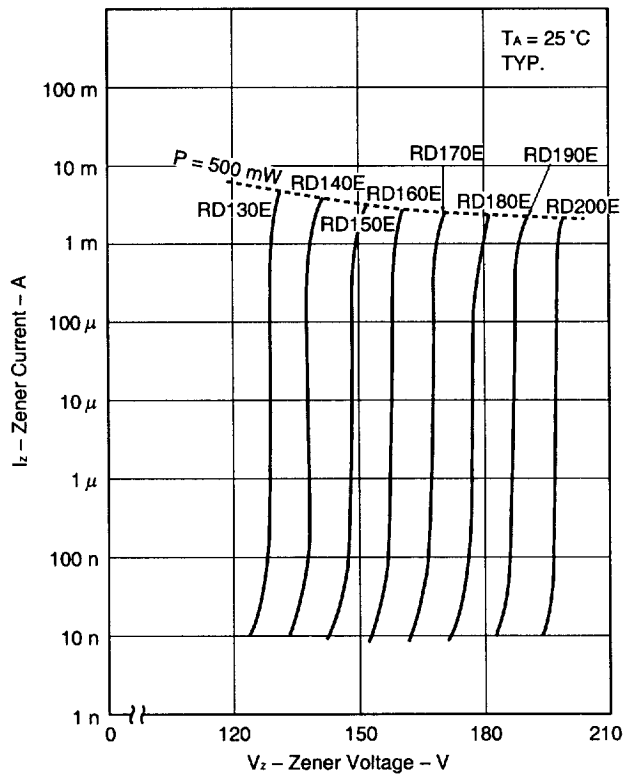


Fig. 8 POWER DISSIPATION vs. AMBIENT TEMPERATURE

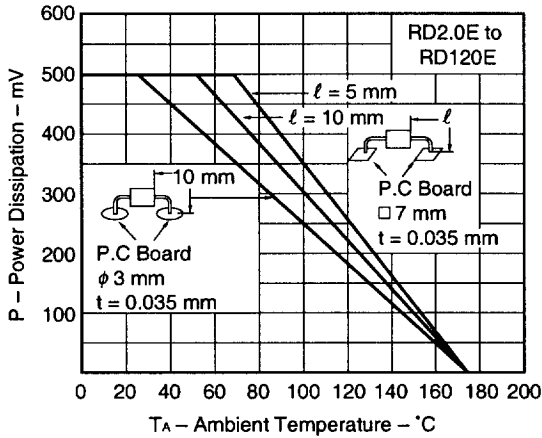


Fig. 9 POWER DISSIPATION vs. AMBIENT TEMPERATURE

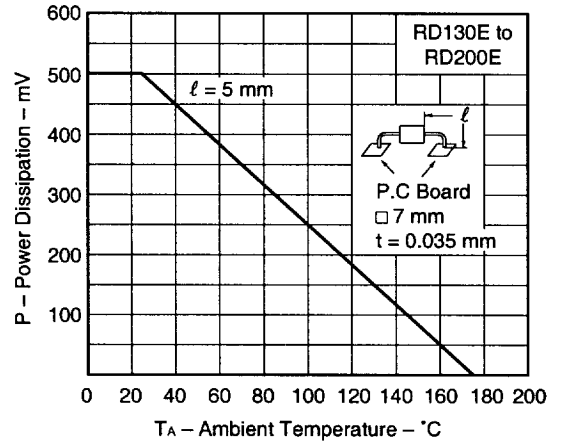


Fig. 10 THERMAL RESISTANCE vs. SIZE OF P.C BOARD

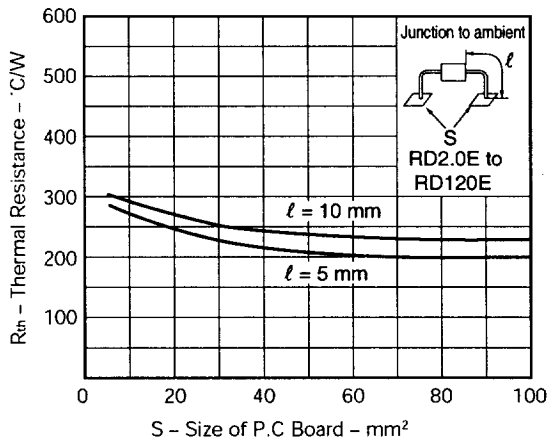


Fig. 11 THERMAL RESISTANCE vs. SIZE OF P.C BOARD

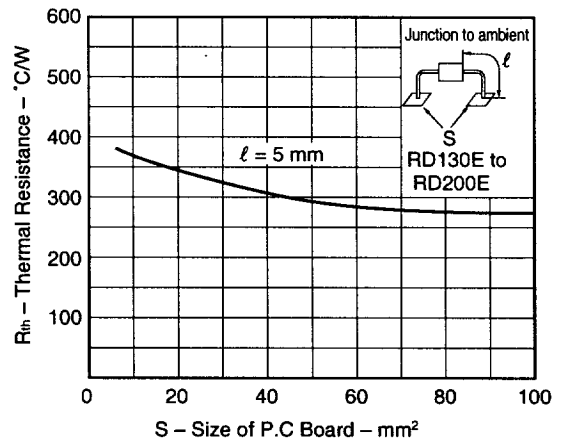


Fig. 12 DYNAMIC IMPEDANCE vs. ZENER CURRENT

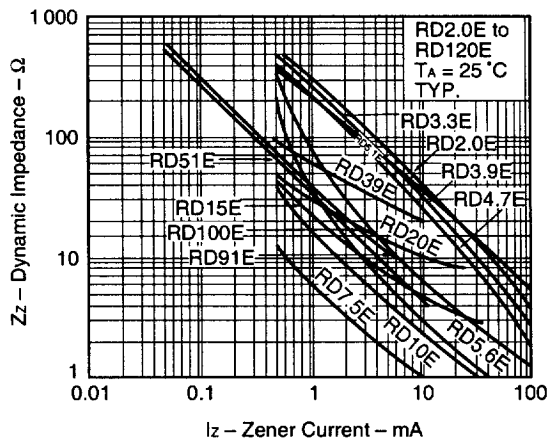
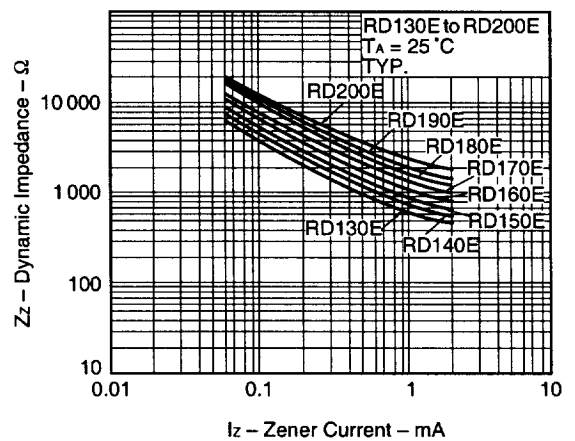
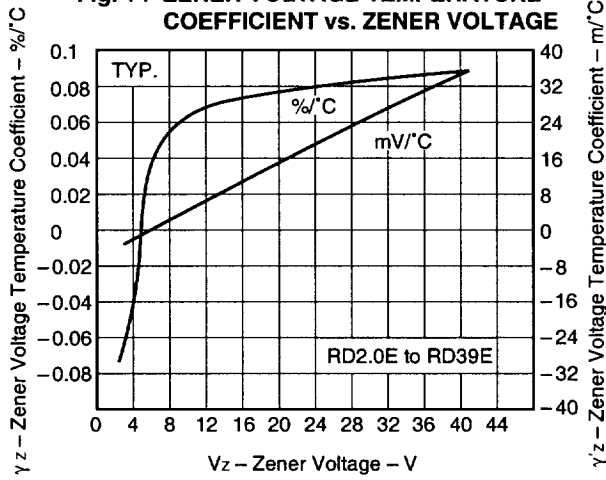


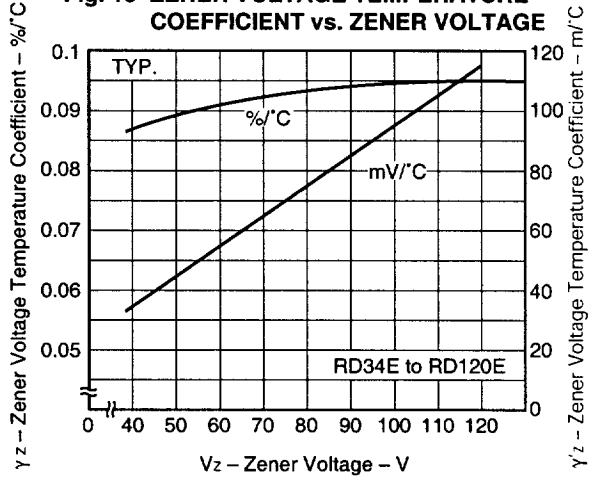
Fig. 13 DYNAMIC IMPEDANCE vs. ZENER CURRENT



**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**

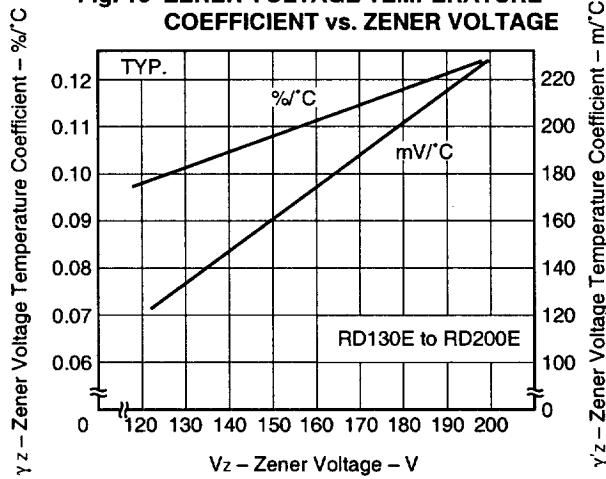
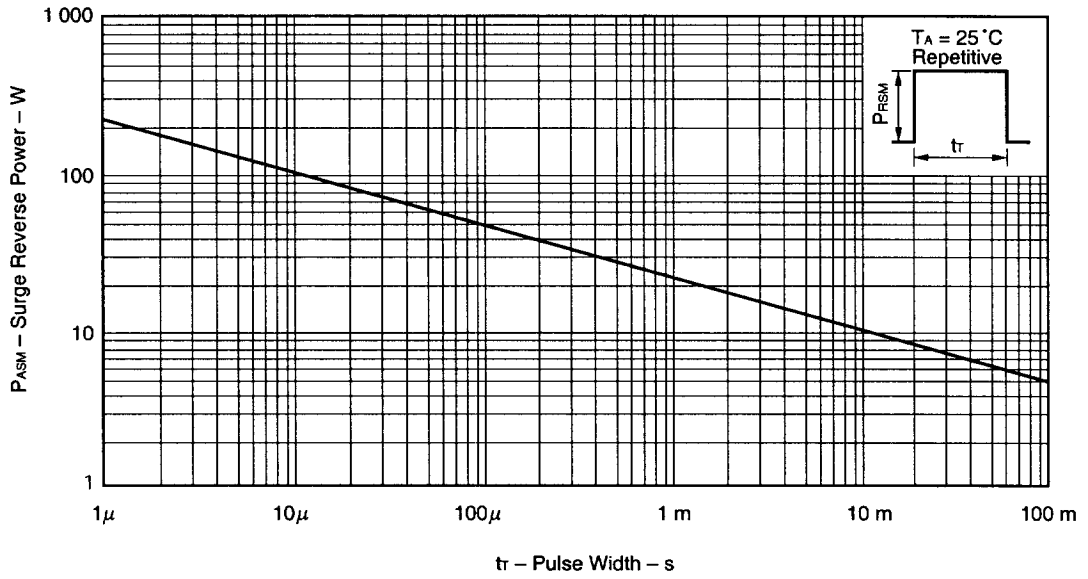




Fig. 17 SURGE REVERSE POWER RATINGS



**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<sub>jMAX</sub> : Maximum Junction Temperature

T<sub>A</sub> : Ambient Temperature

R<sub>th</sub> : Thermal Resistance (to see Fig. 10, 11)

[MEMO]

[MEMO]

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While NEC Corporation has been making continuous effort to enhance the reliability of its semiconductor devices, the possibility of defects cannot be eliminated entirely. To minimize risks of damage or injury to persons or property arising from a defect in an NEC semiconductor device, customers must incorporate sufficient safety measures in its design, such as redundancy, fire-containment, and anti-failure features.

NEC devices are classified into the following three quality grades:

"Standard", "Special", and "Specific". The Specific quality grade applies only to devices developed based on a customer designated "quality assurance program" for a specific application. The recommended applications of a device depend on its quality grade, as indicated below. Customers must check the quality grade of each device before using it in a particular application.

**Standard:** Computers, office equipment, communications equipment, test and measurement equipment, audio and visual equipment, home electronic appliances, machine tools, personal electronic equipment and industrial robots

**Special:** Transportation equipment (automobiles, trains, ships, etc.), traffic control systems, anti-disaster systems, anti-crime systems, safety equipment and medical equipment (not specifically designed for life support)

**Specific:** Aircrafts, aerospace equipment, submersible repeaters, nuclear reactor control systems, life support systems or medical equipment for life support, etc.

The quality grade of NEC devices is "Standard" unless otherwise specified in NEC's Data Sheets or Data Books. If customers intend to use NEC devices for applications other than those specified for Standard quality grade, they should contact an NEC sales representative in advance.

Anti-radioactive design is not implemented in this product.

[NEC Corporation]

Discrete

## Taping Specification

What's

EET

### SC-76 (SSP)

Bicolor

There are two types (-T1, -T2) of taping depending on the direction of the device.

Diode

-T1, -T2

Inverse

Devices are taped in the direction as shown in the figure above, 3000 devices are w one reel, as shown below.

Figure of Reel

You can get information about the dimensions of the taping and the reel by downlo the PDF files below.

- [Taping drawing](#)
- [Reel drawing](#)

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## Caution

The part number consists of a device name and a taping specification.  
For example, if you want to buy a RD6.2S in -T1 taping, the part number is: **RD6.2**

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