

To our customers,

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## Old Company Name in Catalogs and Other Documents

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On April 1<sup>st</sup>, 2010, NEC Electronics Corporation merged with Renesas Technology Corporation, and Renesas Electronics Corporation took over all the business of both companies. Therefore, although the old company name remains in this document, it is a valid Renesas Electronics document. We appreciate your understanding.

Renesas Electronics website: <http://www.renesas.com>

April 1<sup>st</sup>, 2010  
Renesas Electronics Corporation

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Phase-out/Discontinued

## RD2.0E to RD120E

## 500 mW PLANAR TYPE SILICON ZENER DIODES

## DESCRIPTION

These products are zener diodes with an allowable dissipation of 500 mW and a planar type glass sealed DHD (double heatsink diode) structure.

## FEATURES

- The zener voltage series has a wide voltage range of 2 to 120 V and is ideal for standardization.
- The E24 series is employed for the zener voltage nominal value.

## ORDERING INFORMATION

Any of the B1 to B7 voltage classifications are available for customers who request the B grade product of the RD2.0E to RD39E.

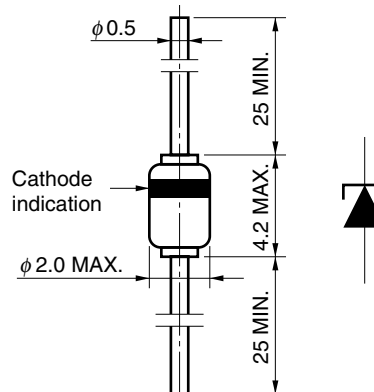
## APPLICATIONS

- Zener voltage and constant-current circuit
- Waveform clipper circuit and limiter circuit
- Surge absorption circuit

ABSOLUTE MAXIMUM RATINGS (T<sub>A</sub> = 25°C)

Parameter	Symbol	Ratings	Unit	Remarks
Power dissipation	P	500	mW	
Junction temperature	T <sub>i</sub>	175	°C	
Forward current	I <sub>F</sub>	200	mA	
Storage temperature	T <sub>stg</sub>	-65 to +175	°C	
Surge reverse power	P <sub>RSM</sub>	100 (t = 100 μs)	W	Refer to Figure 6.

## PACKAGE DRAWING (Unit: mm)



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**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)		Zener Voltage Temperature Coefficient γ <sub>Z</sub> (mV/°C)	
		MIN.	MAX.	I <sub>Z</sub> (mA)	MAX.	I <sub>Z</sub> (mA)	MAX.	I <sub>Z</sub> (mA)	MAX.	I <sub>Z</sub> (mA)	TYP.	I <sub>Z</sub> (mA)
RD2.0E	B	1.88	2.20	20	140	20	2000	1	120	0.5	-1.0	20
	B1	1.88	2.10									
	B2	2.02	2.20									
RD2.2E	B	2.12	2.41	20	120	20	2000	1	120	0.7	-1.5	20
	B1	2.12	2.30									
	B2	2.22	2.41									
RD2.4E	B	2.33	2.63	20	100	20	2000	1	120	1.0	-1.5	20
	B1	2.33	2.52									
	B2	2.43	2.63									
RD2.7E	B	2.54	2.91	20	100	20	1000	1	100	1.0	-1.5	20
	B1	2.54	2.75									
	B2	2.69	2.91									
RD3.0E	B	2.85	3.22	20	80	20	1000	1	50	1.0	-2.0	20
	B1	2.85	3.07									
	B2	3.01	3.22									
RD3.3E	B	3.16	3.53	20	70	20	1000	1	20	1.0	-2.0	20
	B1	3.16	3.38									
	B2	3.32	3.53									
RD3.6E	B	3.47	3.83	20	60	20	1000	1	10	1.0	-2.0	20
	B1	3.47	3.68									
	B2	3.62	3.83									
RD3.9E	B	3.77	4.14	20	50	20	1000	1	5	1.0	-2.0	20
	B1	3.77	3.98									
	B2	3.92	4.14									
RD4.3E	B	4.05	4.53	20	40	20	1000	1	5	1.0	-1.5	20
	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	-1.0	20
	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	0.5	20
	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	1.5	20
	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	2.0	20
	B1	5.81	6.06									
	B2	5.99	6.24									
	B3	6.16	6.40									

★

Type Number	Suffix	Zener Voltage Vz (V) <sup>Note 1</sup>			Dynamic Impedance Zz (Ω) <sup>Note 2</sup>		Knee Dynamic Impedance Zzk (Ω) <sup>Note 2</sup>		Reverse Current Ir (μA)		Zener Voltage Temperature Coefficient γz (mV/°C)	
		MIN.	MAX.	Iz (mA)	MAX.	Iz (mA)	MAX.	Iz (mA)	MAX.	Iz (mA)	TYP.	Iz (mA)
RD6.8E	B	6.32	6.97	20	8	20	150	0.5	2	3.5	2.5	20
	B1	6.32	6.59									
	B2	6.52	6.79									
	B3	6.70	6.97									
RD7.5E	B	6.88	7.64	20	8	20	120	0.5	0.5	4.0	3.0	20
	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	4.0	20
	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	4.5	20
	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	5.5	20
	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	6.5	10
	B1	10.18	10.63									
	B2	10.50	10.95									
	B3	10.82	11.26									
RD12E	B	11.13	12.30	10	12	10	110	0.5	0.2	9.0	7.5	10
	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	8.5	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	10	10
	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	11	10
	B1	14.87	15.50									
	B2	15.33	15.93									
	B3	15.79	16.50									
RD18E	B	16.34	18.30	10	23	10	150	0.5	0.2	13	13	10
	B1	16.34	17.06									
	B2	16.90	17.67									
	B3	17.51	18.30									

★

Type Number	Suffix	Zener Voltage Vz (V) <sup>Note 1</sup>			Dynamic Impedance Zz (Ω) <sup>Note 2</sup>		Knee dynamic Impedance Zzk (Ω) <sup>Note 2</sup>		Reverse Current IR (μA)		Zener Voltage Temperature Coefficient γz (mV/°C)		★
		MIN.	MAX.	Iz (mA)	MAX.	Iz (mA)	MAX.	Iz (mA)	MAX.	Iz (mA)	TYP.	Iz (mA)	
RD20E	B	18.11	20.72	10	28	10	200	0.5	0.2	15	15	10	
	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	17	5	
	B1	20.23	21.08										
	B2	20.76	21.65										
	B3	21.22	22.09										
	B4	21.68	22.61										
RD24E	B	22.26	24.81	5	35	5	200	0.5	0.2	19	19	5	
	B1	22.26	23.12										
	B2	22.75	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	21	5	
	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	24	5	
	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	26	5	
	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	29	5	
	B1	32.14	33.79										
	B2	32.79	34.49										
	B3	33.40	35.13										
	B4	34.01	35.77										
R39E	B	34.68	40.80	5	85	5	250	0.5	0.2	30	32	5	
	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											

- Notes**
1. The zener voltage (Vz) of the B and B1 to B7 grades is tested for 40 ms after power ON.
  2. The operation resistance (Zz, Zzk) is tested by superimposing a micro AC on the standard current (Iz).

**Remark** The B grade is a composition of the B1 to B7 grades. Any of the B1 to B7 voltage classifications are available for customers who request the B grade product.

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>		Reverse Current I <sub>R</sub> (μA)		Zener Voltage Temperature Coefficient γ <sub>z</sub> (mV/°C)	
		MIN.	MAX.	I <sub>z</sub> (mA)	MAX.	I <sub>z</sub> (mA)	MAX.	I <sub>z</sub> (mA)	TYP.	I <sub>z</sub> (mA)
RD43E	B	40	45	5	90	5	0.2	33	37	5
RD47E	B	44	49	5	90	5	0.2	36	41	5
RD51E	B	48	54	5	110	5	0.2	39	45	5
RD56E	B	53	60	5	110	5	0.2	43	51	5
RD62E	B	58	66	2	200	2	0.2	47	56	2
RD68E	B	64	72	2	200	2	0.2	52	62	2
RD75E	B	70	79	2	300	2	0.2	57	69	2
RD82E	B	77	87	2	300	2	0.2	63	76	2
RD91E	B	85	96	2	400	2	0.2	69	85	2
RD100E	B	94	106	2	400	2	0.2	76	95	2
RD110E	B	104	116	1	750	1	0.2	84	105	1
RD120E	B	114	126	1	900	1	0.2	91	115	1

★

- Notes**
1. The zener voltage (V<sub>z</sub>) is tested for 40 ms after power ON.
  2. The operation resistance (Z<sub>z</sub>) is tested by superimposing a micro AC on the standard current (I<sub>z</sub>).

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

Figure 1. P vs. T<sub>A</sub> Rating

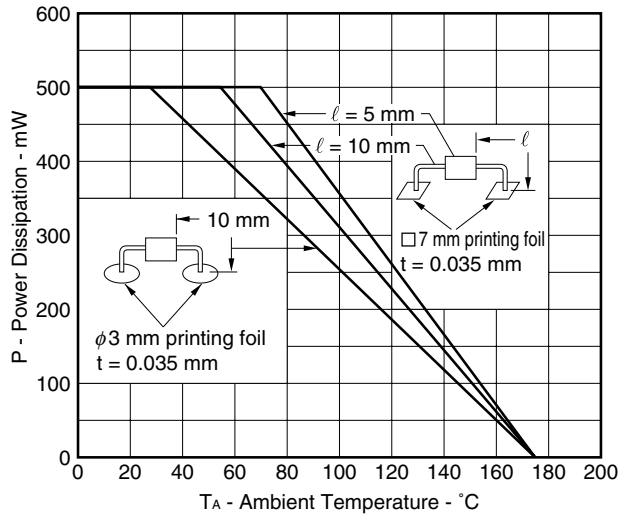


Figure 2. R<sub>th</sub> vs. S Example of Characteristics

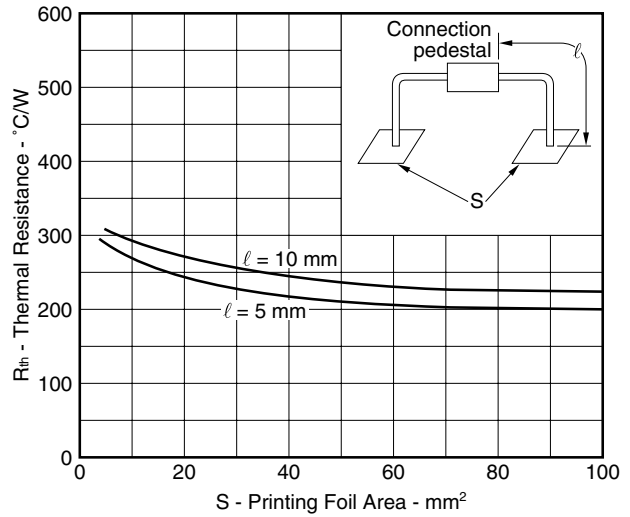
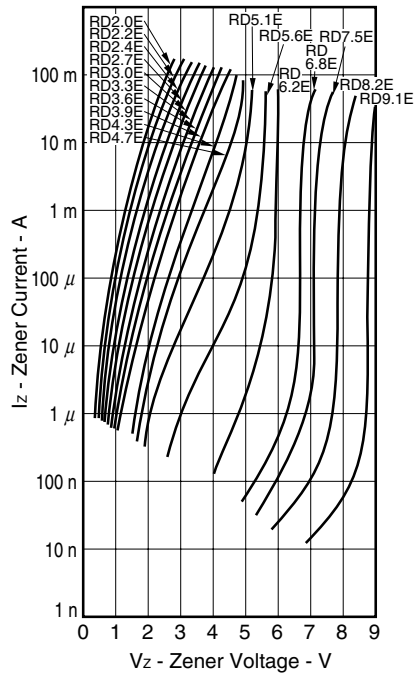
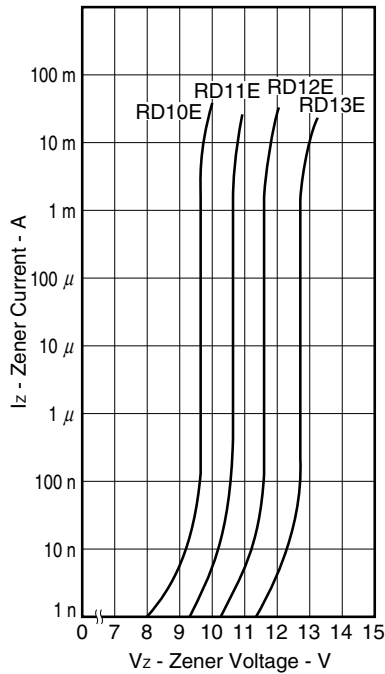


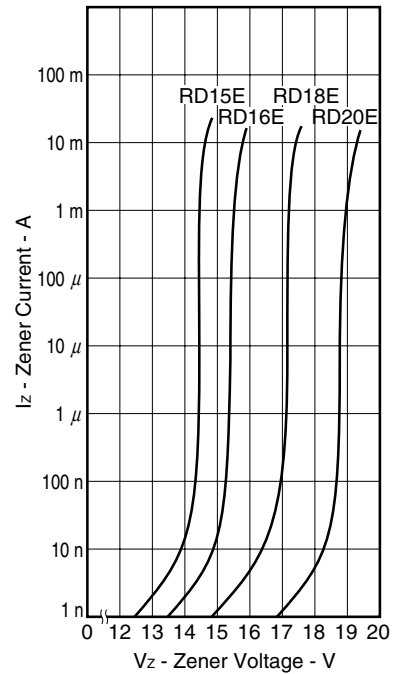
Figure 3. I<sub>Z</sub> vs. V<sub>Z</sub> Rating



(a)

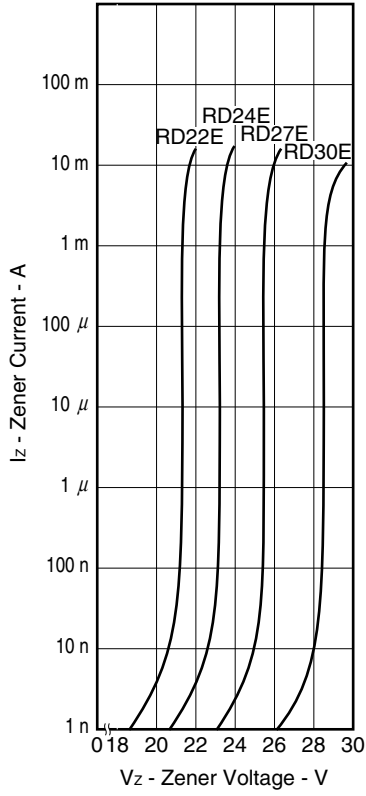


(b)

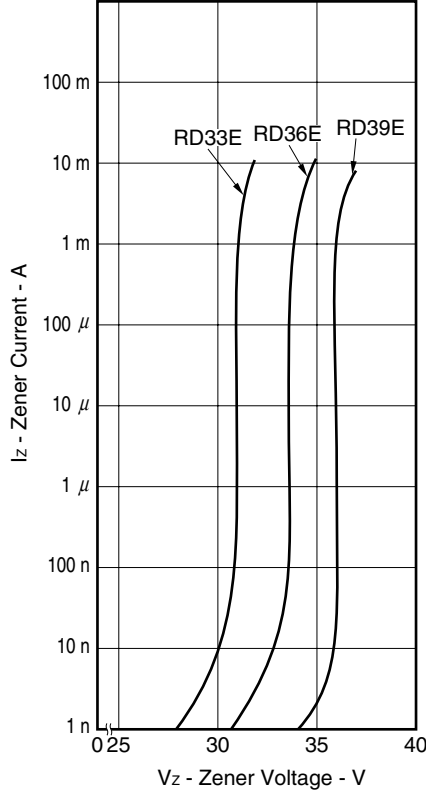


(c)

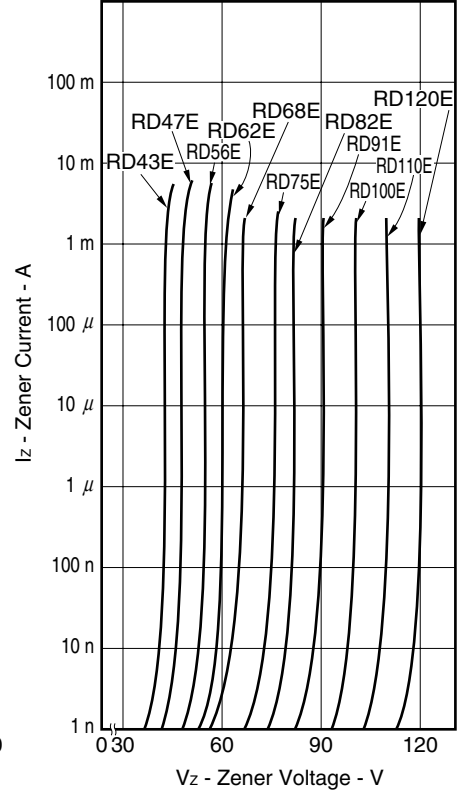




(d)



(e)



(f)

Figure 4.  $Z_z$  vs.  $I_z$  Example of Characteristics

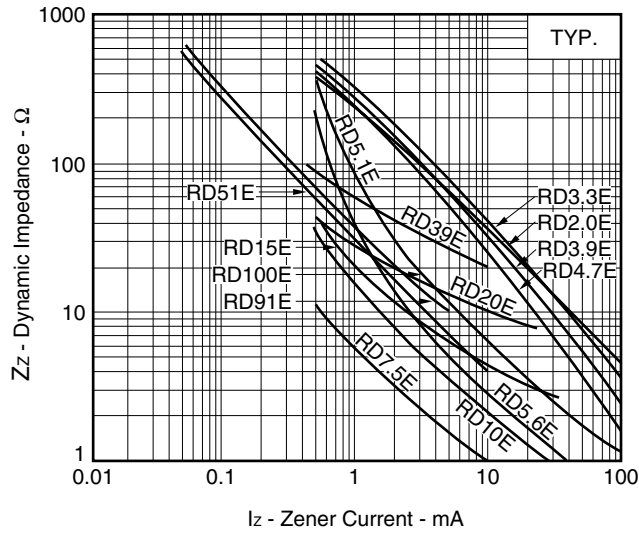


Figure 5.  $\gamma_z$  vs.  $V_z$  Example of Characteristics

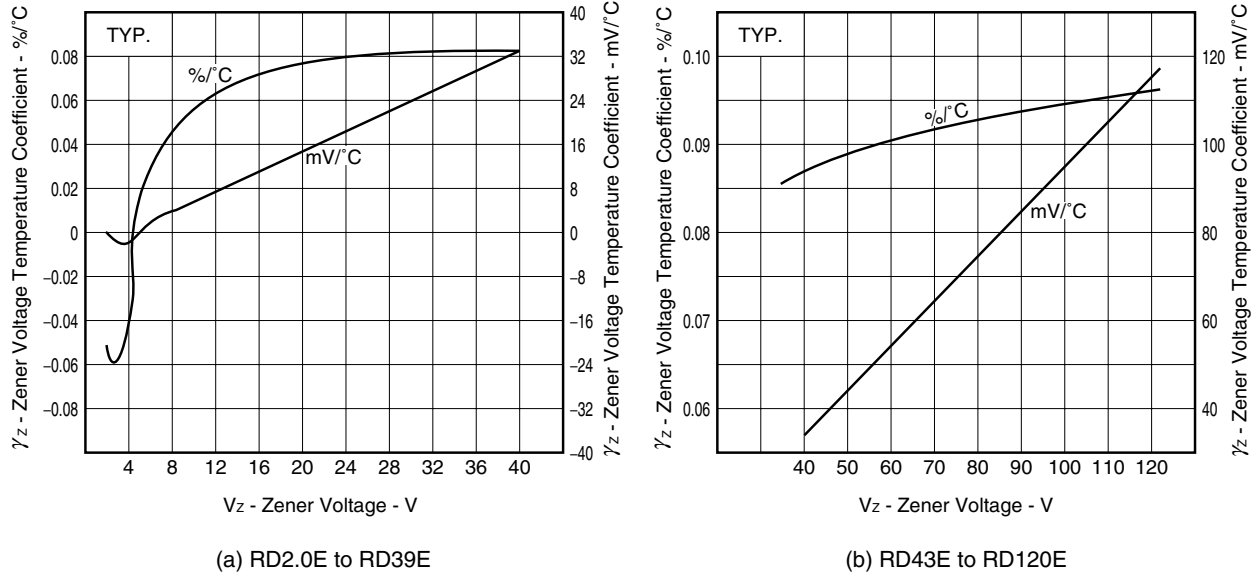


Figure 6. Surge Reverse Power Rating

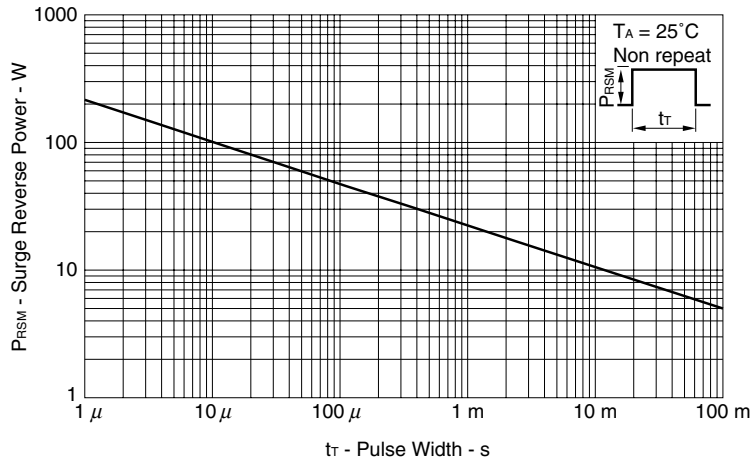
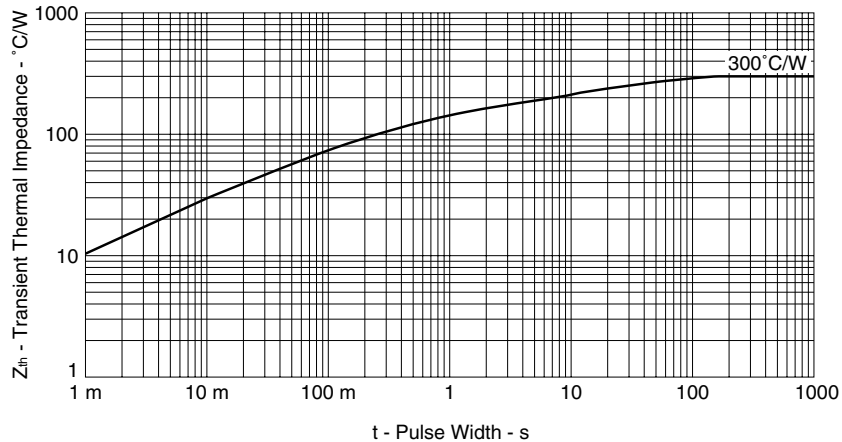


Figure 7. Transient Heat Thermal Impedance



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