RENESAS

Phase-out/Discontinued

ZENER DIODES
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.

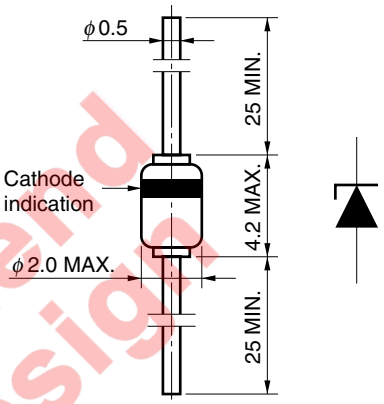
ORDERING INFORMATION

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

PACKAGE DRAWING (Unit: mm)



Marking color: Black
JEDEC: DO-35

ABSOLUTE MAXIMUM RATINGS (T_A = 25°C)

Parameter	Symbol	Ratings	Unit	Remarks
Power dissipation	P	500	mW	
Junction temperature	T_j	175	°C	
Forward current	I_F	200	mA	
Storage temperature	T_{stg}	–65 to +175	°C	
Surge reverse power	P_{RSM}	100 (t = 100 μs)	W	Refer to Figure 6.

Document No. D10211EJ6V1DS00 (6th edition)
Date Published December 2004 NS CP(K)
Printed in Japan

The mark ★ shows major revised points.

ELECTRICAL CHARACTERISTICS (T_A = 25°C)

Type Number	Suffix	Zener Voltage Vz (V) Note 1			Dynamic Impedance Z_Z (Ω) Note 2		Knee Dynamic Impedance Z_{ZK} (Ω) Note 2		Reverse Current I_R (μA)		Zener Voltage Temperature Coefficient γ_Z (mV/°C)		★
		MIN.	MAX.	Iz (mA)	MAX.	Iz (mA)	MAX.	Iz (mA)	MAX.	Iz (mA)	TYP.	Iz (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) Note 1			Dynamic Impedance Zz (Ω) Note 2		Knee Dynamic Impedance Zzk (Ω) Note 2		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) Note 1			Dynamic Impedance Zz (Ω) Note 2		Knee dynamic Impedance Zzk (Ω) Note 2		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 Vz (V) Note 1			Dynamic Impedance Zz (Ω) Note 2		Reverse Current IR (μA)		Zener Voltage Temperature Coefficient γz (mV/°C)		★
		MIN.	MAX.	Iz (mA)	MAX.	Iz (mA)	MAX.	Iz (mA)	TYP.	Iz (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 (Vz) is tested for 40 ms after power ON.

2. The operation resistance (Zz) is tested by superimposing a micro AC on the standard current (Iz).

TYPICAL CHARACTERISTICS (T_A = 25°C)

Figure 1. P vs. T_A Rating

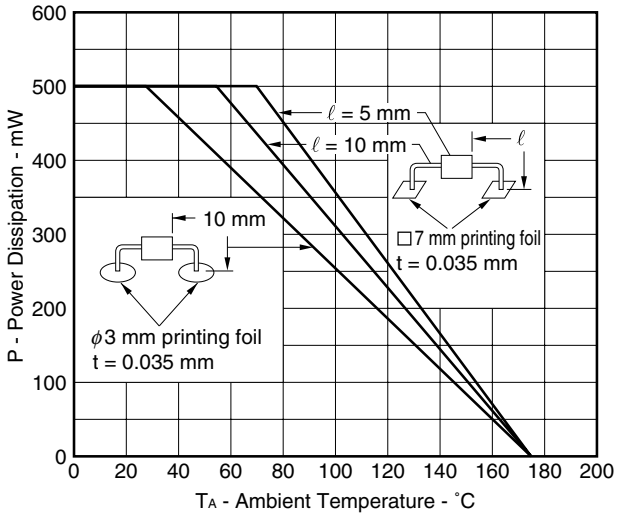


Figure 2. R_{th} vs. S Example of Characteristics

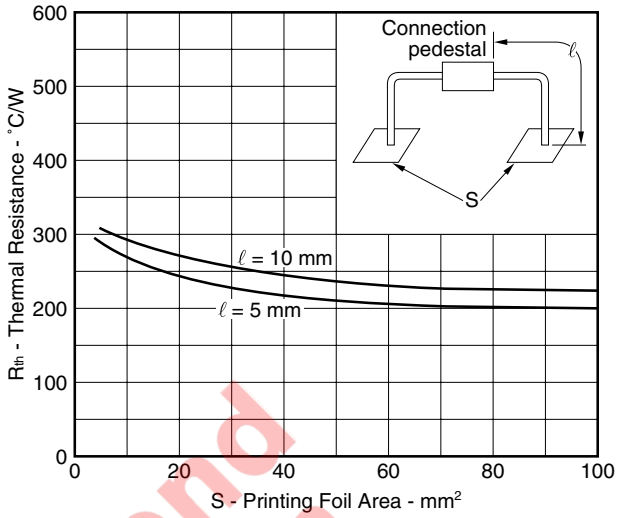
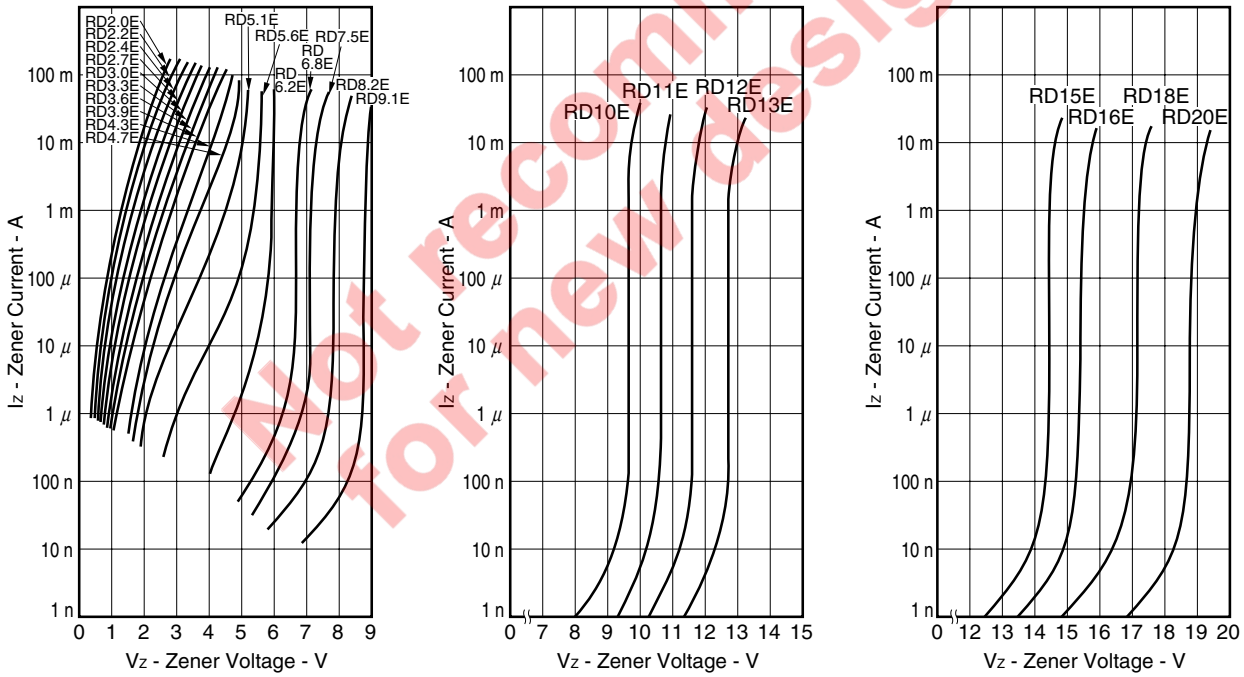


Figure 3. I_Z vs. V_Z Rating



(a) (b) (c)

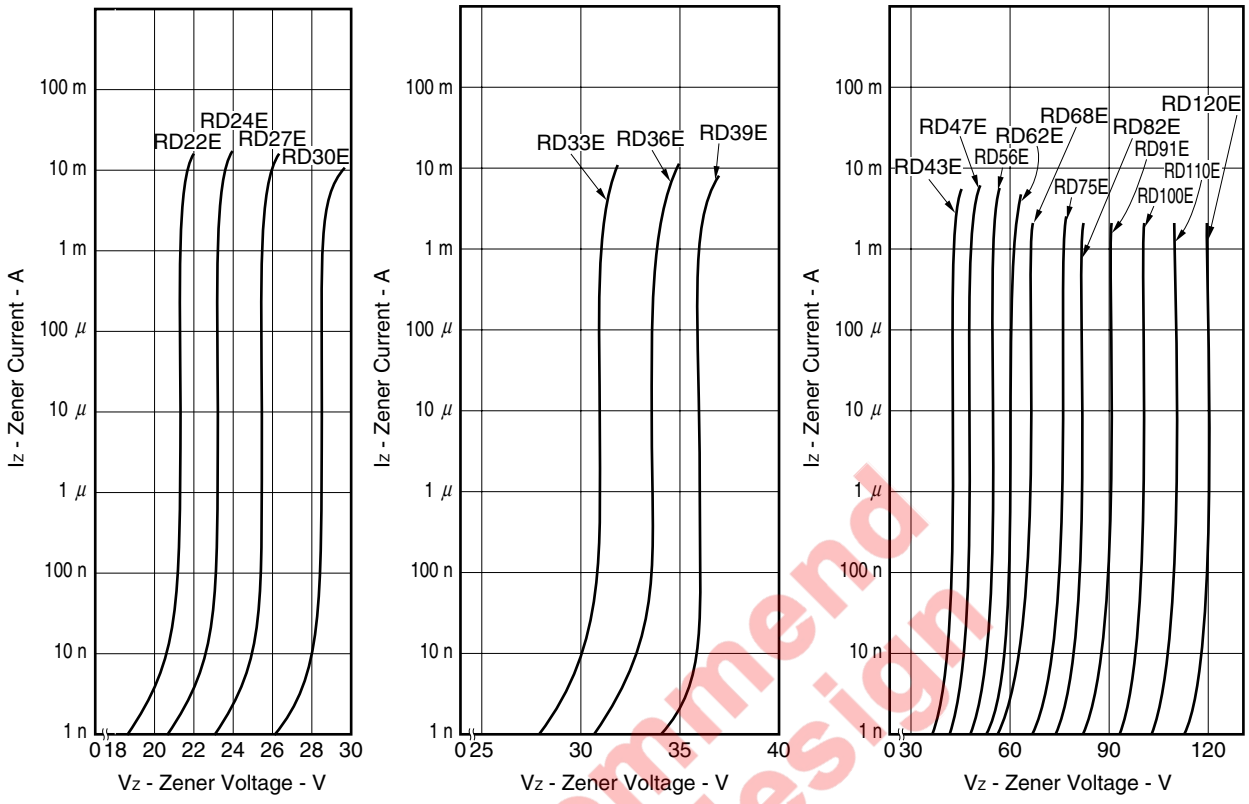


Figure 4. Zz vs. Iz Example of Characteristics

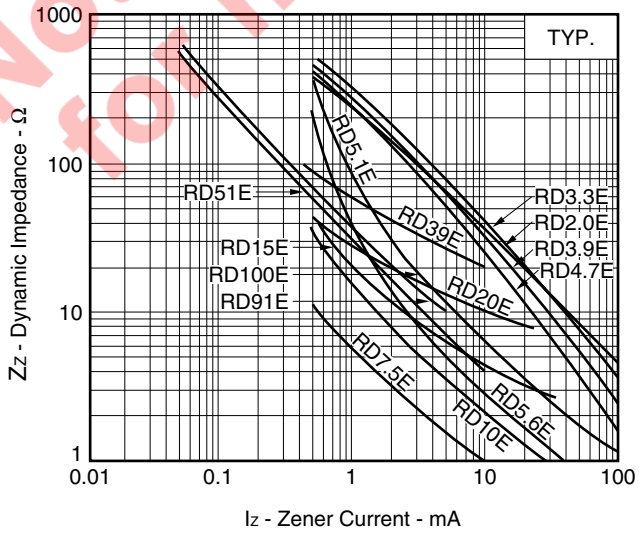
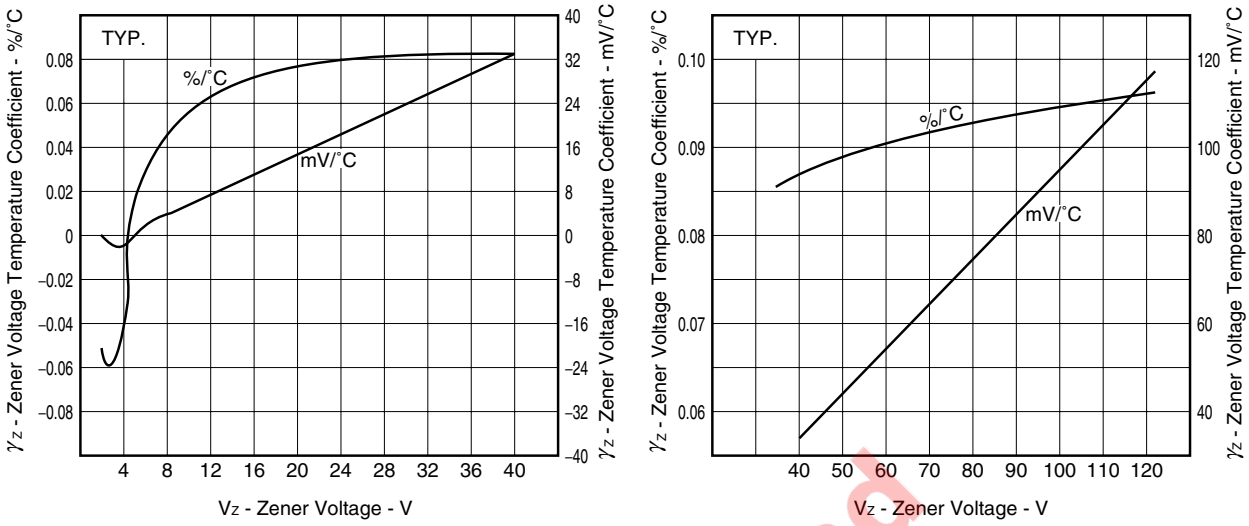


Figure 5. γ_Z vs. V_Z Example of Characteristics



(a) RD2.0E to RD39E (b) RD43E to RD120E

Figure 6. Surge Reverse Power Rating

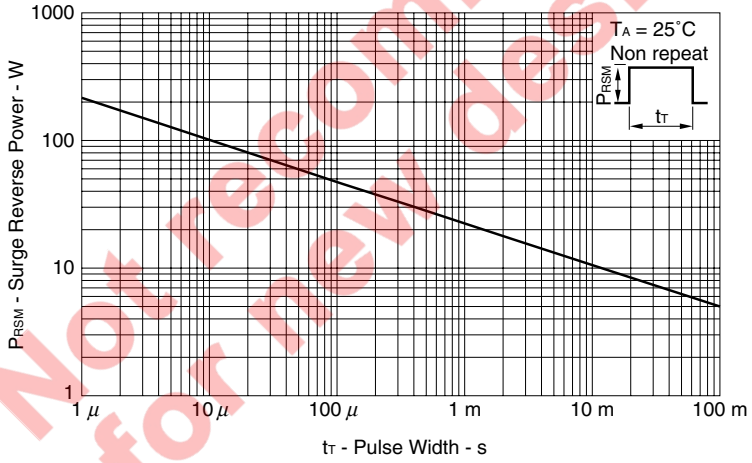
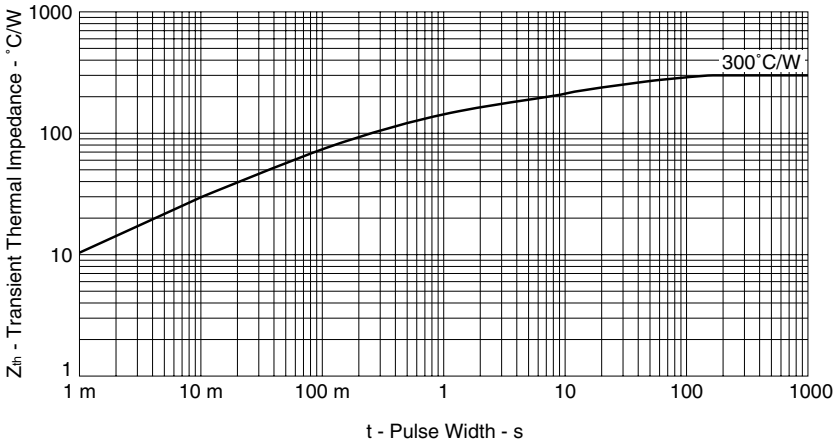


Figure 7. Transient Heat Thermal Impedance



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