To our customers,

Old Company Name in Catalogs and Other Documents

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

April 1st, 2010
Renesas Electronics Corporation

Issued by: Renesas Electronics Corporation (http://www.renesas.com)

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RENESAS

Phase-out/Discontinued

ZENER DIODES

RD2.0ES to RD39ES

400 mW DHD ZENER DIODE

(DO-34)

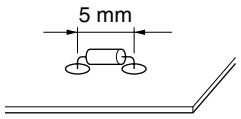
DESCRIPTION

NEC Type RD2.0ES to RD39ES Series are planar type diodes into DO-34 Package (Body length 2.4 mm MAX.) with DHD (Double Heatsink Diode) construction having allowable power dissipation of 400 mW.

FEATURES

- DO-34 Glass sealed package

  This diode can be inserted into a PC board with a shorter pitch (5 mm)

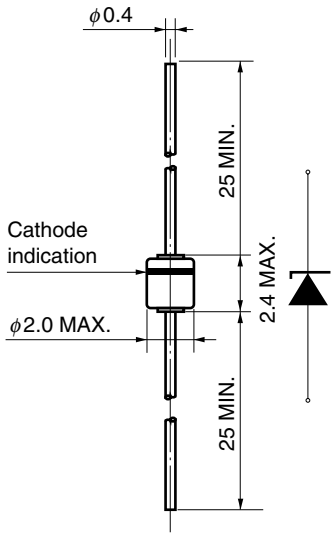


- Planar process
- DHD (Double Heatsink Diode) construction
- V_Z Applied E24 standard

ORDERING INFORMATION

RD2.0ES to RD39ES with suffix "AB1", "AB2", or "AB3" should be applied for orders for suffix "AB".

PACKAGE DIMENSIONS
(in millimeters)



DO-34 (JEDEC)
Marking color: Black

APPLICATIONS

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

ABSOLUTE MAXIMUM RATINGS (T_A = 25°C)

Forward Current	I_F	150 mA	
Power Dissipation	P	400 mW	to see Fig. 6
Surge Reverse Power	P_{RSM}	100 W (t = 10 μs)	to see Fig. 10
Junction Temperature	T_j	175°C	
Storage Temperature	T_{stg}	–65 to +175°C	

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Printed in Japan

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)
RD2.0ES	AB	1.88	2.20	5	100	5	1000	0.5	120	0.5
	AB1	1.88	2.10							
	AB2	2.02	2.20							
RD2.2ES	AB	2.12	2.41	5	100	5	1000	0.5	120	0.7
	AB1	2.12	2.30							
	AB2	2.22	2.41							
RD2.4ES	AB	2.33	2.63	5	100	5	1000	0.5	120	1.0
	AB1	2.33	2.52							
	AB2	2.43	2.63							
RD2.7ES	AB	2.54	2.91	5	110	5	1000	0.5	100	1.0
	AB1	2.54	2.75							
	AB2	2.69	2.91							
RD3.0ES	AB	2.85	3.22	5	120	5	1000	0.5	50	1.0
	AB1	2.85	3.07							
	AB2	3.01	3.22							
RD3.3ES	AB	3.16	3.53	5	120	5	1000	0.5	20	1.0
	AB1	3.16	3.38							
	AB2	3.32	3.53							
RD3.6ES	AB	3.47	3.83	5	120	5	1100	0.5	10	1.0
	AB1	3.47	3.68							
	AB2	3.62	3.83							
RD3.9ES	AB	3.77	4.14	5	120	5	1200	0.5	5	1.0
	AB1	3.77	3.98							
	AB2	3.92	4.14							
RD4.3ES	AB	4.05	4.53	5	120	5	1200	0.5	5	1.0
	AB1	4.05	4.26							
	AB2	4.20	4.40							
	AB3	4.34	4.53							
RD4.7ES	AB	4.47	4.91	5	100	5	1200	0.5	5	1.0
	AB1	4.47	4.65							
	AB2	4.59	4.77							
	AB3	4.71	4.91							
RD5.1ES	AB	4.85	5.35	5	70	5	1200	0.5	5	1.5
	AB1	4.85	5.03							
	AB2	4.97	5.18							
	AB3	5.12	5.35							
RD5.6ES	AB	5.29	5.88	5	40	5	900	0.5	5	2.5
	AB1	5.29	5.52							
	AB2	5.46	5.70							
	AB3	5.64	5.88							
RD6.2ES	AB	5.81	6.40	5	30	5	500	0.5	5	3.0
	AB1	5.81	6.06							
	AB2	5.99	6.24							
	AB3	6.16	6.40							
RD6.8ES	AB	6.32	6.97	5	25	5	150	0.5	2	3.5
	AB1	6.32	6.59							
	AB2	6.52	6.79							
	AB3	6.70	6.97							
RD7.5ES	AB	6.88	7.64	5	25	5	120	0.5	0.5	4.0
	AB1	6.88	7.19							
	AB2	7.11	7.41							
	AB3	7.33	7.64							
RD8.2ES	AB	7.56	8.41	5	20	5	120	0.5	0.5	5.0
	AB1	7.56	7.90							
	AB2	7.82	8.15							
	AB3	8.07	8.41							
RD9.1ES	AB	8.33	9.29	5	20	5	120	0.5	0.5	6.0
	AB1	8.33	8.70							
	AB2	8.61	8.99							
	AB3	8.89	9.29							
RD10ES	AB	9.19	10.30	5	20	5	120	0.5	0.2	7.0
	AB1	9.19	9.59							
	AB2	9.48	9.90							
	AB3	9.82	10.30							

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)
RD11ES	AB	10.18	11.26	5	20	5	120	0.5	0.2	8.0
	AB1	10.18	10.63							
	AB2	10.50	10.95							
	AB3	10.82	11.26							
RD12ES	AB	11.13	12.30	5	25	5	110	0.5	0.2	9.0
	AB1	11.13	11.63							
	AB2	11.50	11.92							
	AB3	11.80	12.30							
RD13ES	AB	12.18	13.62	5	25	5	110	0.5	0.2	10
	AB1	12.18	12.71							
	AB2	12.59	13.16							
	AB3	13.03	13.62							
RD15ES	AB	13.48	15.02	5	25	5	110	0.5	0.2	11
	AB1	13.48	14.09							
	AB2	13.95	14.56							
	AB3	14.42	15.02							
RD16ES	AB	14.87	16.50	5	25	5	150	0.5	0.2	12
	AB1	14.87	15.50							
	AB2	15.33	15.96							
	AB3	15.79	16.50							
RD18ES	AB	16.34	18.30	5	30	5	150	0.5	0.2	13
	AB1	16.34	17.06							
	AB2	16.90	17.67							
	AB3	17.51	18.30							
RD20ES	AB	18.14	20.45	5	30	5	200	0.5	0.2	15
	AB1	18.14	18.96							
	AB2	18.80	19.68							
	AB3	19.52	20.45							
RD22ES	AB	20.23	22.61	5	30	5	200	0.5	0.2	17
	AB1	20.23	21.08							
	AB2	20.76	21.65							
	AB3	21.22	22.09							
	AB4	21.68	22.61							
RD24ES	AB	22.26	24.81	5	35	5	200	0.5	0.2	19
	AB1	22.26	23.12							
	AB2	22.75	23.73							
	AB3	23.29	24.27							
	AB4	23.81	24.81							
RD27ES	AB	24.26	27.64	5	45	5	250	0.5	0.2	21
	AB1	24.26	25.52							
	AB2	24.97	26.26							
	AB3	25.63	26.95							
	AB4	26.29	27.64							
RD30ES	AB	26.99	30.51	5	55	5	250	0.5	0.2	23
	AB1	26.99	28.39							
	AB2	27.70	29.13							
	AB3	28.36	29.82							
	AB4	29.02	30.51							
RD33ES	AB	29.68	33.11	5	65	5	250	0.5	0.2	25
	AB1	29.68	31.22							
	AB2	30.32	31.88							
	AB3	30.90	32.50							
	AB4	31.49	33.11							
RD36ES	AB	32.14	35.77	5	75	5	250	0.5	0.2	27
	AB1	32.14	33.79							
	AB2	32.79	34.49							
	AB3	33.40	35.13							
	AB4	34.01	35.77							
RD39ES	AB	34.68	38.52	5	85	5	250	0.5	0.2	30
	AB1	34.68	36.47							
	AB2	35.36	37.19							
	AB3	36.00	37.85							
	AB4	36.63	38.52							

Notes 1. tested with pulse (40 ms)

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

3. Suffix AB is Suffix AB1, AB2, AB3 or AB4.

TYPICAL CHARACTERISTICS (T_A = 25°C)

Fig. 1 ZENER CURRENT vs. ZENER VOLTAGE

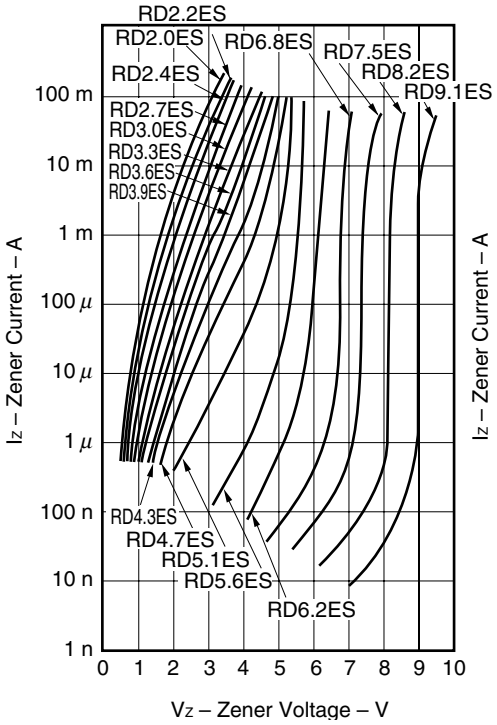


Fig. 2 ZENER CURRENT vs. ZENER VOLTAGE

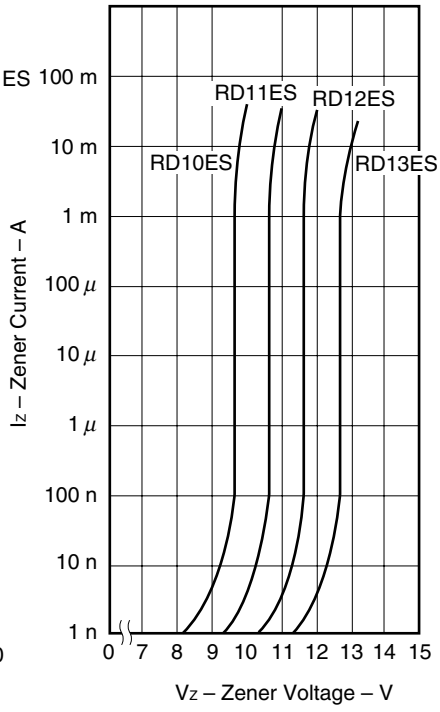


Fig. 3 ZENER CURRENT vs. ZENER VOLTAGE

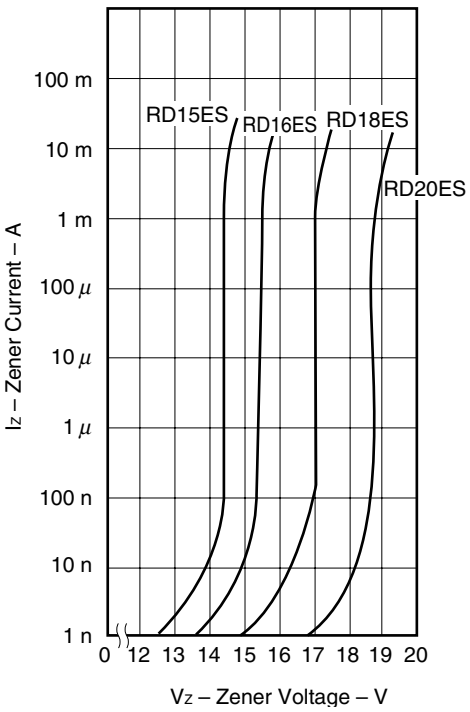


Fig. 4 ZENER CURRENT vs. ZENER VOLTAGE

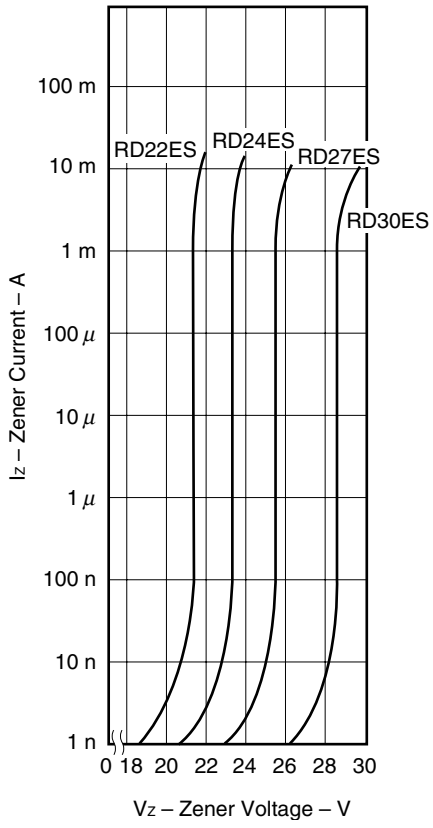


Fig. 5 ZENER CURRENT vs. ZENER VOLTAGE

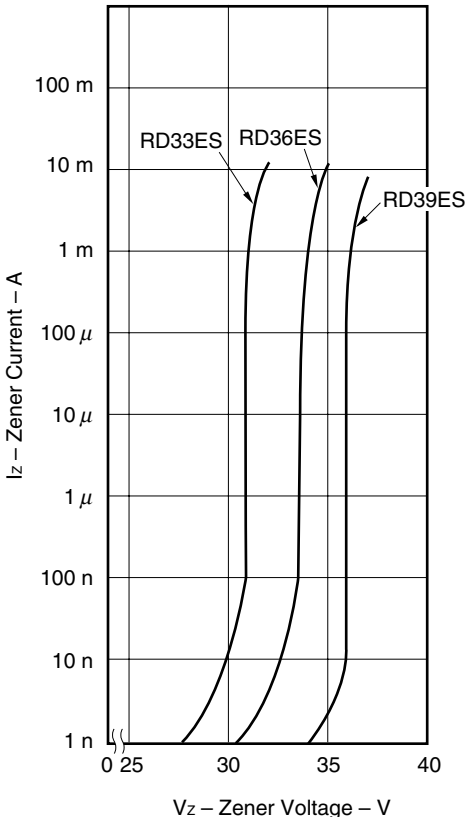


Fig. 6 POWER DISSIPATION vs. AMBIENT TEMPERATURE

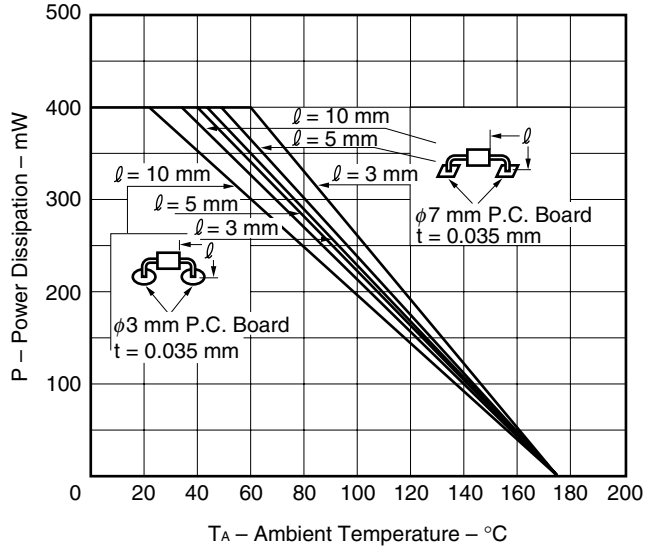


Fig. 7 THERMAL RESISTANCE vs. SIZE OF P.C BOARD

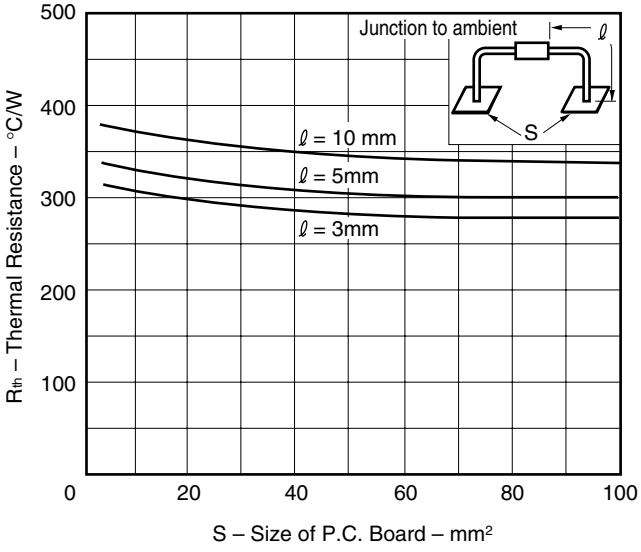


Fig. 8 DYNAMIC IMPEDANCE vs. ZENER CURRENT

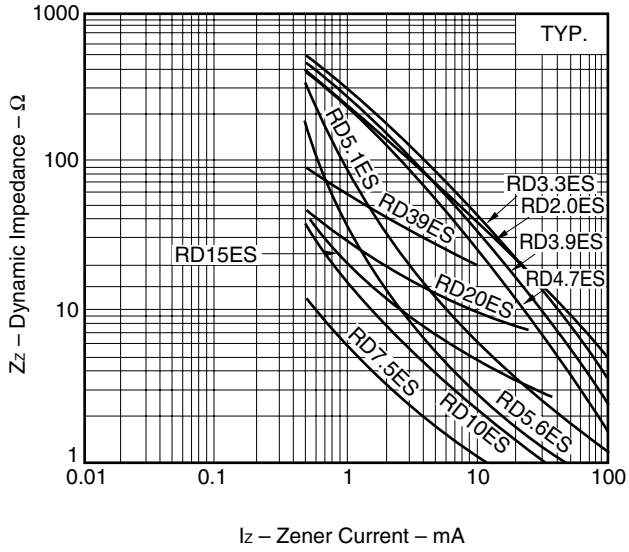


Fig. 9 ZENER VOLTAGE TEMPERATURE COEFFICIENT vs. ZENER VOLTAGE

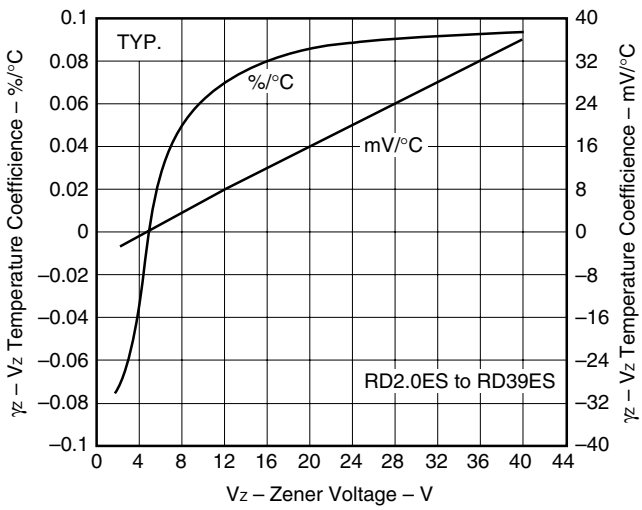


Fig. 10 SURGE REVERSE POWER RATINGS

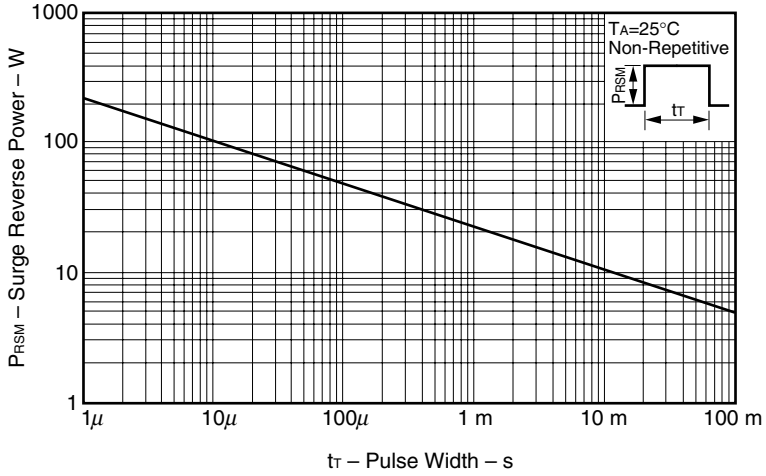
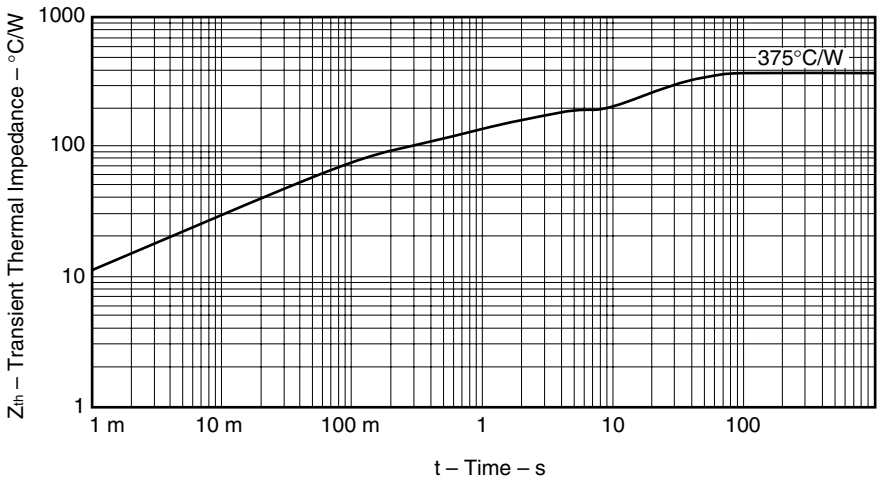


Fig. 11 TRANSIENT THERMAL IMPEDANCE CHARACTERISTIC



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