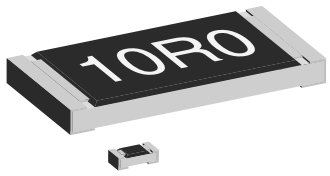
Thick Film, Rectangular Chip Resistors



FEATURES

- Metal glaze on high quality ceramic
- Protective overglaze
- Solder contacts on Ni barrier layer
- Excellent stability in different environmental conditions
- High volume product suitable for commercial and special applications

STANDARD ELECTRICAL SPECIFICATIONS

MODEL	SIZE		POWER RATING $P_{70\,°C}$ W	LIMITING ELEMENT VOLTAGE MAX V≅	TEMPERATURE COEFFICIENT ppm/K	TOLERANCE %	RESISTANCE RANGE Ω	E-SERIES
	INCH	METRIC	CECC 40401-802/EIA-575					
CRCW0201	0201	0525	0.05	30	± 200	± 1 ± 5	10R – 1M0 10R – 1M0	24 + 96 24
			Zero-Ohm-Resistor: R_{max} = 50 mΩ, I_{max} = 1 A					
D10 __ __ CRCW0402	0402	1005	0.063	50	± 200[1)] ± 100 ± 200	± 1 ± 1 ± 5	1R0 – 9R76 10R – 10M 1R0 – 10M	24 + 96 24 + 96 24
			Zero-Ohm-Resistor: R_{max} = 20 mΩ, I_{max} = 1 A					
D11 __ __ CRCW0603	0603	1608	0.10	75	± 200[1)] ± 100 ± 200	± 1 ± 1 ± 5	1R0 – 9R76 10R – 10M 1R0 – 10M	24 + 96 24 + 96 24
			Zero-Ohm-Resistor: R_{max} = 20 mΩ, I_{max} = 1.5 A					
D12 __ __ CRCW0805	0805	2012	0.125	150	± 200[1)] ± 100 ± 200	± 1 ± 1 ± 5	1R0 – 9R76 10R – 10M 1R0 – 10M	24 + 96 24 + 96 24
			Zero-Ohm-Resistor: R_{max} = 20 mΩ, I_{max} = 2 A					
D25 __ __ CRCW1206	1206	3216	0.25	200	± 200[1)] ± 100 ± 200	± 1 ± 1 ± 5	1R0 – 9R76 10R – 10M 1R0 – 10M	24 + 96 24 + 96 24
			Zero-Ohm-Resistor: R_{max} = 20 mΩ, I_{max} = 2.5 A					
CRCW1210	1210	3225	0.33	200	± 200[1)] ± 100 ± 200	± 1 ± 1 ± 5	1R0 – 9R76 10R – 1M0 1R0 – 10M	24 + 96 24 + 96 24
			Zero-Ohm-Resistor: R_{max} = 20 mΩ, I_{max} = 2.5 A					
CRCW1218	1218	3246	1.0	200	± 200[1)] ± 100 ± 200	± 1 ± 1 ± 5	1R0 – 9R76 10R – 2M2 1R0 – 2M2	24 + 96 24 + 96 24
			Zero-Ohm-Resistor: R_{max} = 20 mΩ, I_{max} = 4 A					
CRCW2010	2010	5025	0.5	400	± 200[1)] ± 100 ± 200	± 1 ± 1 ± 5	1R0 – 9R76 10R – 10M 1R0 – 10M	24 + 96 24 + 96 24
			Zero-Ohm-Resistor: R_{max} = 20 mΩ, I_{max} = 3 A					
CRCW2512	2512	6332	1.0	500	± 200[1)] ± 100 ± 200	± 1 ± 1 ± 5	1R0 – 9R76 10R – 10M 1R0 – 10M	24 + 96 24 + 96 24
			Zero-Ohm-Resistor: R_{max} = 20 mΩ, I_{max} = 4 A					

[1)] 100 ppm/K on request

- Ask about further value ranges
- For low values see Thick Film rectangular low value resistors
- For high values see Thick Film rectangular high values
- Marking and packaging: see appropriate catalog or web pages
- For precision Thick Film CRCW see Thick Film rectangular Precision Resistors
- Power rating depends on the max. temperature at the solder point, the component placement density and the substrate material
- AgPd or Pd terminations for conductive adhesive attachment on request

TECHNICAL SPECIFICATIONS

PARAMETER	UNIT	CRCW0201	D10 CRCW0402	D11 CRCW0603	D12 CRCW0805	D25 CRCW1206	CRCW1210	CRCW1218	CRCW2010	CRCW2512
Rated Dissipation at 70 °C (CECC 40401 | EIA 575)	W	0.05	0.063	0.10	0.125	0.25	0.33	1.0	0.5	1.0
Limiting Element Voltage[2)]	V≅	30	50	75	150	200	200	200	400	500
Insulation Voltage (1 min)	V_{peak}	50	> 75	> 100	> 200	> 300	> 300	> 300	> 300	> 300
Thermal Resistance	K/W		≤ 870[1)]	≤ 550[1)]	≤ 440[1)]	≤ 220[1)]	≤ 140[3)]	≤ 65[3)]	≤ 88[3)]	≤ 65[3)]
Insulation Resistance	Ω	> 10^9								
Category Temperature Range	°C	- 55 to + 125 (+ 155)								
Failure Rate	h^{-1}	1.10^{-9}	$0.3 \bullet 10^{-9}$							
Weight / 1000pcs	g	0.17	0.65	2	5.5	10	16	29.5	25.5	40.5

[1)] Measuring conditions in acc. to CECC 4040

[2)] Rated voltage: $\sqrt{P \times R}$

[3)] Depending on solder pad dimensions

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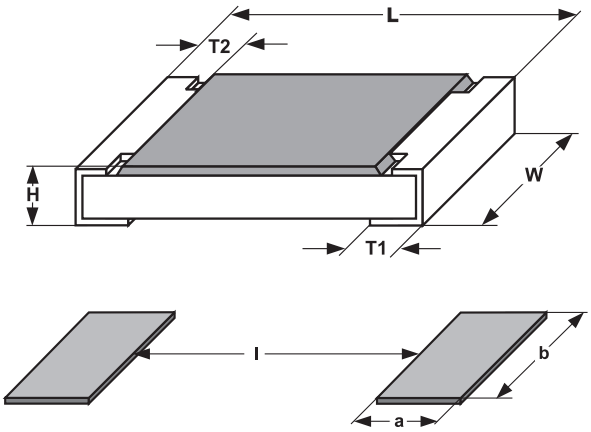
DIMENSIONS



SIZE		DIMENSIONS [in millimeters]				
INCH	METRIC	L	W	H	T1	T2
0201	0525	0.6 ± 0.05	0.3 ± 0.05	0.23 ± 0.05	0.15 ± 0.05	0.6 ± 0.05
0402	1005	1.0 ± 0.05	0.5 ± 0.05	0.35 ± 0.05	0.25 ± 0.05	0.2 ± 0.1
0603	1608	$1.55^{+0.10}_{-0.05}$	0.85 ± 0.1	0.45 ± 0.05	0.3 ± 0.2	0.3 ± 0.2
0805	2012	$2.0^{+0.20}_{-0.10}$	1.25 ± 0.15	0.45 ± 0.05	$0.3^{+0.20}_{-0.10}$	0.3 ± 0.2
1206	3216	$3.2^{+0.10}_{-0.20}$	1.6 ± 0.15	0.55 ± 0.05	0.45 ± 0.2	0.4 ± 0.2
1210	3225	3.2 ± 0.2	2.5 ± 0.2	0.55 ± 0.05	0.45 ± 0.2	0.4 ± 0.2
1218	3246	$3.2^{+0.10}_{-0.20}$	4.6 ± 0.15	0.55 ± 0.05	0.45 ± 0.2	0.4 ± 0.2
2010	5025	5.0 ± 0.15	2.5 ± 0.15	0.6 ± 0.05	0.6 ± 0.2	0.6 ± 0.2
2512	6332	6.3 ± 0.2	3.15 ± 0.15	0.6 ± 0.05	0.6 ± 0.2	0.6 ± 0.2

SIZE		SOLDER PAD DIMENSIONS [in millimeters]					
		REFLOW SOLDERING			WAVE SOLDERING		
INCH	METRIC	a	b	l	a	b	l
0201	0525	0.28	0.43	0.23			
0402	1005	0.4	0.6	0.5			
0603	1608	0.5	0.9	1.0	0.9	0.9	1.0
0805	2012	0.7	1.3	1.2	0.9	1.3	1.3
1206	3216	0.9	1.7	2.0	1.1	1.7	2.3
1210	3225	0.9	2.5	2.0	1.1	2.5	2.2
1218	3246	1.05	4.9	1.9	1.25	4.8	1.9
2010	5025	1.0	2.5	3.9	1.2	2.5	3.9
2512	6332	1.0	3.2	5.2	1.2	3.2	5.2

PART NUMBER AND PRODUCT DESCRIPTION[1)]

PART NUMBER[2)]: D1208050B5620FP0

D	1	2	0	8	0	5	0	B	5	6	2	0	F	P	0		

MODEL/SIZE	SPECIAL CHARACTER	T.C.	VALUE	TOLERANCE	PACKING[3)]	SPECIAL
D100402 D110603 D120805 D251206	0 = neutral	B = ± 100 ppm/K A = ± 200 ppm/K 0 = Jumper	3 digit value 1 digit multiplier **MULTIPLIER** 7 = *10^{-3} 2 = *10^{2} 8 = *10^{-2} 3 = *10^{3} 9 = *10^{-1} 4 = *10^{4} 0 = *10^{0} 5 = *10^{5} 1 = *10^{1} 6 = *10^{6} 0000 = Jumper	F = ± 1 % J = ± 5 %	P0 M0 P5 PZ PN B5 MZ BN MU	up to 2 digits

PRODUCT DESCRIPTION: D12 100 562R 1% P5

D12	100	562R	1 %	P5
MODEL D10 D11 D12 **D25**	TC ± 100 ppm/K ± 200 ppm/K	RESISTANCE VALUE 49K9 = 49.9KΩ 5R1 = 5.1Ω 0R0 = Jumper	TOLERANCE ± 1 % ± 5 %	PACKING[3)] P0 M0 P5 PZ PN B5 MZ BN MU

PART NUMBER[2)]: CRCW0805562RFKTA

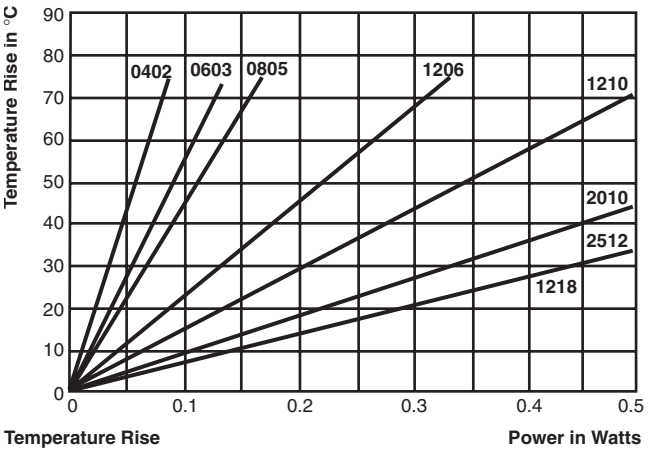
C	R	C	W	0	8	0	5	5	6	2	R	F	K	T	A		

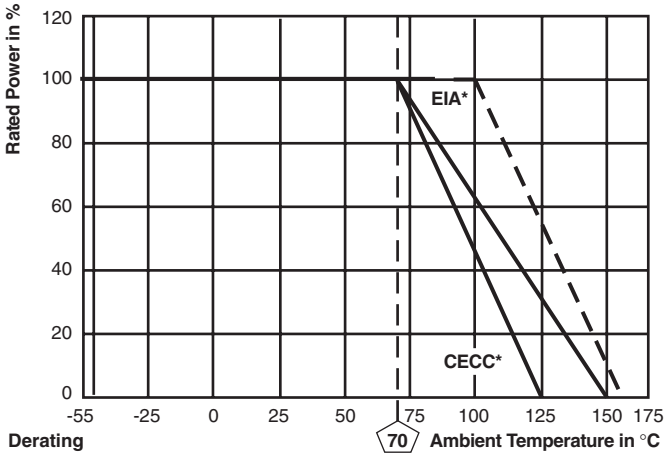
MODEL/SIZE	VALUE	TOLERANCE	T.C.	PACKING[3)]	SPECIAL
CRCW0201 CRCW0402 CRCW0603 CRCW0805 CRCW1206 CRCW1210 CRCW2512 CRCW2010 CRCW2512	R = Decimal K = Thousand M = Million 0000 = Jumper	F = ± 1 % J = ± 5 % Z = Zero Ohm Jumper	K = ± 100 ppm/K N = ± 200 ppm/K S = Jumper or Special	TA = RT1 TB = RT5 TC = RT6 TD = RT7 TF = R02 TG = R67 TH = R82 TK = RT9 BA = B27	up to 2 digits TR = Customer Trimmable

PRODUCT DESCRIPTION: CRCW 0805 5620 F 100 RT1

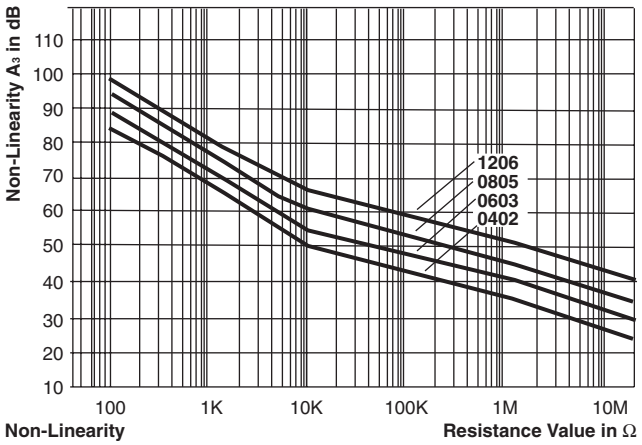
CRCW	0805	5620	F	100	RT1
MODEL CRCW	SIZE 0201 1201 0402 1218 0603 2010 0805 2512 1206	RESISTANCE VALUE 685 = 6.8MΩ 224 = 220KΩ ± 1 % = 3 sig.digits, plus multiplier ± 5 % = 2 sig.digits, plus multiplier	TOLERANCE F = ± 1 % J = ± 5 % Z = Zero Ohm Jumper	T.C. ± 100 ppm/K ± 200 ppm/K	PACKING[3)] RT1 R67 RT5 R82 RT6 RT9 RT7 B27 R02

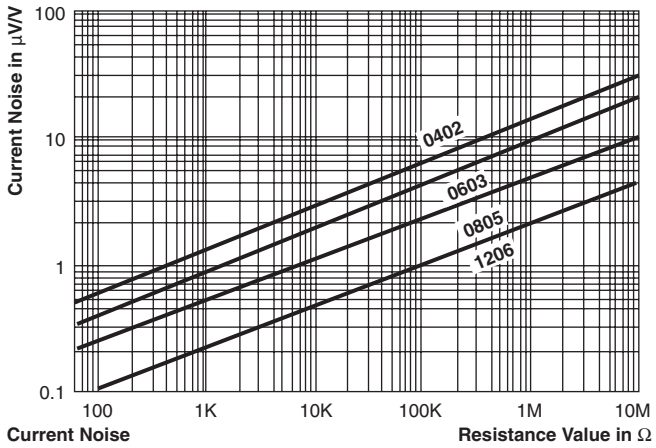
Note
1. Products can be ordered using either the PRODUCT DESCRIPTION or the PART NUMBER.
2. The PART NUMBER is shown to facilitate the introduction of a unified part numbering system. Currently, this PART NUMBER is applicable in the Americas only.
3. Please refer to table PACKING, page 80.





*There are differences in board layout and measurements between CECC and EIA.





PACKING

MODEL	REEL						BULK	
	TAPE WIDTH	DIAMETER	PIECES/REEL	PITCH	PACKING CODE		BULK FEEDING MAGAZINE PIECES/MAGAZINE	
					PAPER[1]	BLISTER[2]	PIECES[1]	CODE[2]
CRCW0201	8 mm Papertape	180 mm/7" 330 mm/13"	10 000 50 000	2 mm 2 mm	ET7 EF4			
D10 _ _ _ CRCW0402	8 mm	180 mm/7" 330 mm/13"	10 000 50 000	2 mm 2 mm	P0/RT7 PZ/RF4		50000	MZ/B27
D11 _ _ _ CRCW0603	8 mm	180 mm/7" 255 mm/10" 330 mm/13"	5 000 10 000 20 000	4 mm 4 mm 4 mm	P5/RT1 P0/RT5 PN/RT6	B5/na BN/na	25000	MU/B27
D12 _ _ _ CRCW0805	8 mm	180 mm/7" 255 mm/10" 330 mm/13"	5 000 10 000 20 000	4 mm 4 mm 4 mm	P5/RT1 P0/RT5 PN/RT6	B5/na BN/na	10000	MO/B27
D25 _ _ _ CRCW1206	8 mm	180 mm/7" 255 mm/10" 330 mm/13"	5 000 10 000 20 000	4 mm 4 mm 4 mm	P5/RT1 P0/RT5 PN/RT6	B5/na BN/na		
CRCW1210	8 mm	180 mm/7" 330 mm/13"	5 000 20 000	4 mm 4 mm	P5/RT1 PN/RT6	B5/na BN/na		
CRCW1218	12 mm	180 mm/7"	4 000	4 mm		RT9		
CRCW2010	12 mm	180 mm/7"	4 000	4 mm		R02		
CRCW2512	12 mm	180 mm/7"	2 000 4 000	8 mm 4 mm		B2/R67 R82		

[1] On request

[2] European/N.American packaging codes: na = NOT AVAILABLE • Further information about packaging: see appropriate catalog or web page.

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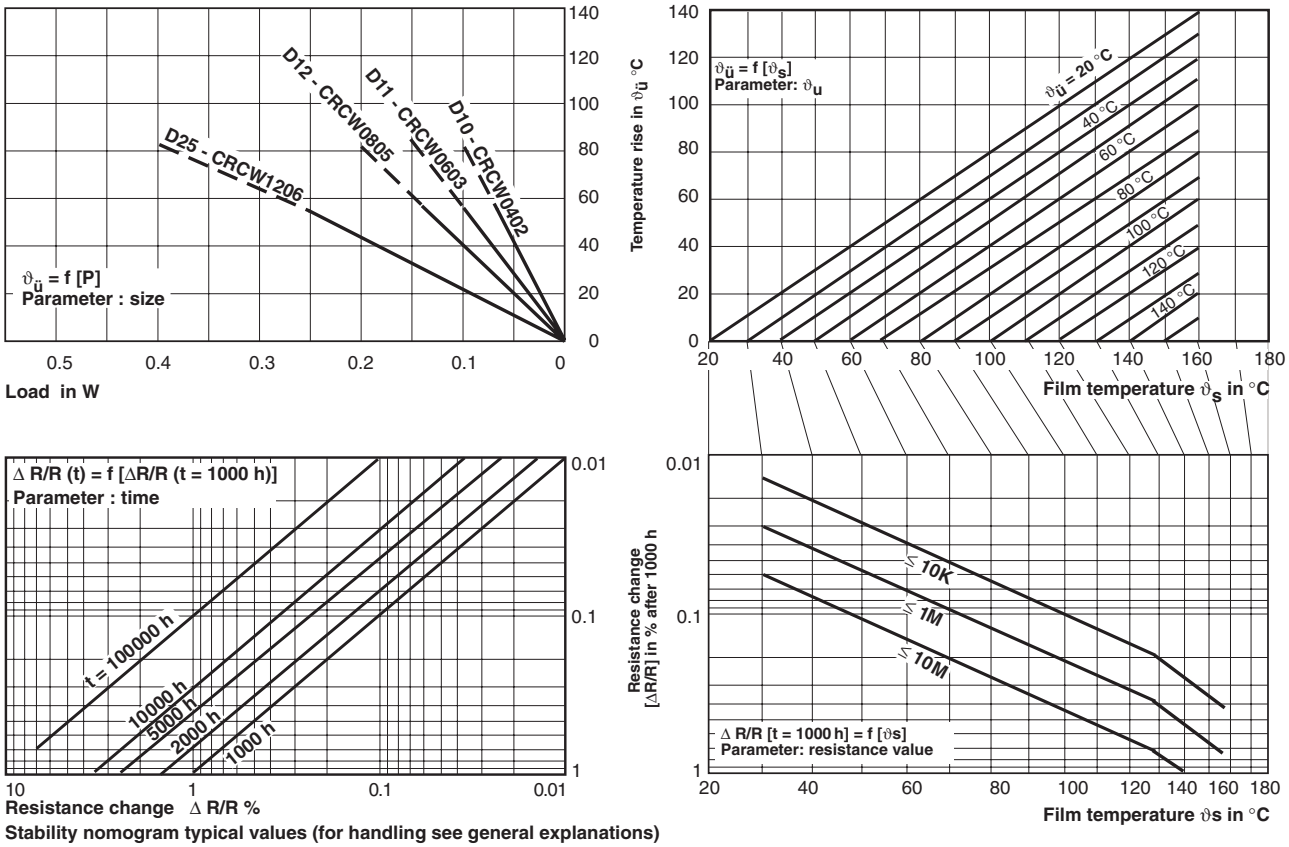
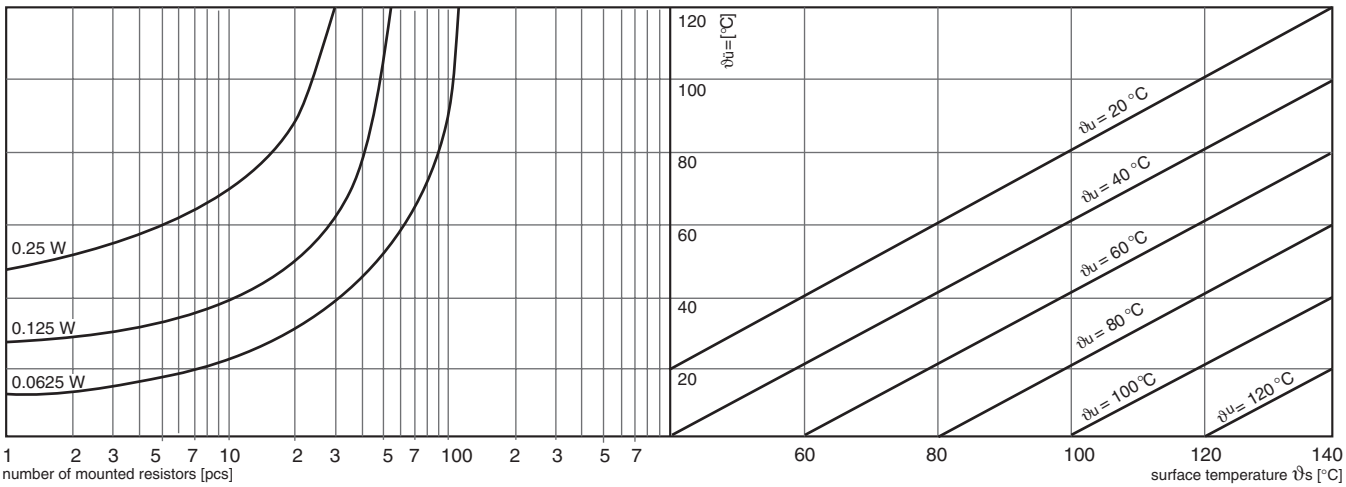
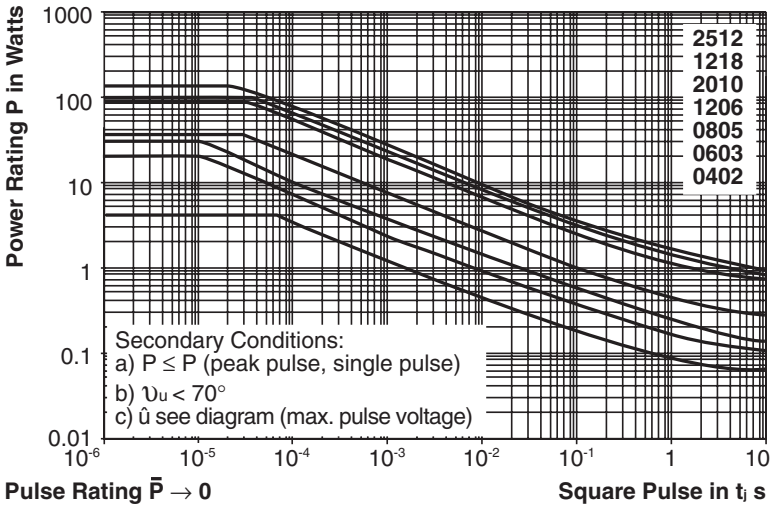
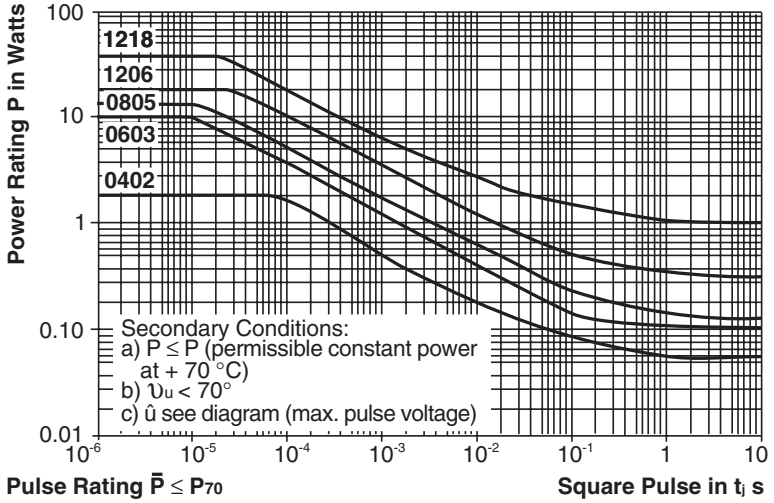


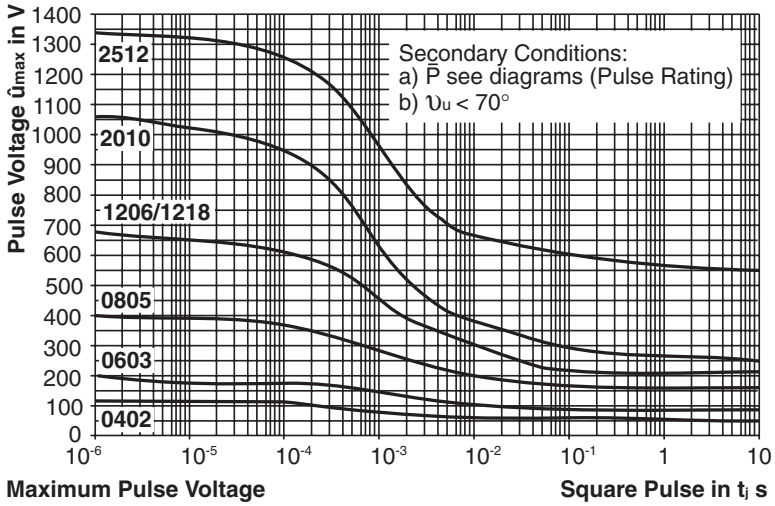
Stability nomogram typical values (for handling see general explanations)



Power rating as a function of packaging density (guideline)


Power Rating P in Watts
1000
100
10
1
0.1
0.01
2512
1218
2010
1206
0805
0603
0402
Secondary Conditions:
a) P ≤ P (peak pulse, single pulse)
b) υu < 70°
c) û see diagram (max. pulse voltage)
10-6
10-5
10-4
10-3
10-2
10-1
1
10
Pulse Rating P̄ → 0
Square Pulse in tj s


Power Rating P in Watts
100
10
1
0.10
0.01
1218
1206
0805
0603
0402
Secondary Conditions:
a) P ≤ P (permissible constant power at + 70 °C)
b) υu < 70°
c) û see diagram (max. pulse voltage)
10-6
10-5
10-4
10-3
10-2
10-1
1
10
Pulse Rating P̄ ≤ P70
Square Pulse in tj s


Pulse Voltage ûmax in V
1400
1300
1200
1100
1000
900
800
700
600
500
400
300
200
100
0
2512
2010
1206/1218
0805
0603
0402
Secondary Conditions:
a) P̄ see diagrams (Pulse Rating)
b) υu < 70°
10-6
10-5
10-4
10-3
10-2
10-1
1
10
Maximum Pulse Voltage
Square Pulse in tj s

PERFORMANCE

TEST	CONDITIONS OF TEST	REQUIREMENTS IN %[1]			
		0402 0603	0805 1206 1210	1218 2010 2512	0201
Endurance Test at 70 °C IEC 60115-1 4.25.1; EIA-575	1000 hours at 70 °C, 1.5 hours "ON", 0.5 hours "OFF"	≤ ± 1.0	≤ ± 0.5	≤ ± 1.0	≤ ± 3.0
Endurance at UCT IEC 60115-1 4.25.3	1000 hours at 125 °C without load	≤ ± 1.0	≤ ± 0.5	≤ ± 1.0	≤ ± 2.0
Overload Test IEC 60115-1 4.13; EIA-575	Short time overload, 2.5 x rated voltage or 2 x limiting element voltage.	≤ ± 0.25	≤ ± 0.25	≤ ± 0.5	≤ ± 1.0
Thermal Shock IEC 60115-1 4.19; IEC 60068-2-14; EIA-575	Rapid change between upper and lower category temperature	≤ ± 0.25	≤ ± 0.25	≤ ± 0.5	≤ ± 0.5
Damp Heat Steady State IEC 60115-1 4.24; IEC 60068-2-3	56 days at 40 °C and 93 % relative humidity	≤ ± 1.0	≤ ± 0.5	≤ ± 1.0	≤ ± 2.0
Resistance to Soldering Heat IEC 60115-1 4.18; IEC 60068-2-20; EIA-575	10 seconds at 260 °C solder bath temperature	≤ ± 0.25	≤ ± 0.25	≤ ± 0.5	≤ ± 1.0

[1] Limits for change of resistance at test acc. to CECC

APPLICABLE SPECIFICATIONS

- CECC40000/40400/40401-004,-006,-007,-802
- EN140400/IEC 60115-1
- EIA-575

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