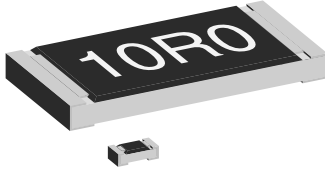


## Lead (Pb)-bearing Thick Film, Rectangular Chip Resistors



### FEATURES

- High volume product suitable for commercial and special applications
- Excellent stability ( $\Delta R/R \leq \pm 1\%$  for 1000 h at 70 °C)
- Lead (Pb)-bearing solder contacts on Ni barrier layer
- Metal glaze on high quality ceramic
- Protective overglaze

### STANDARD ELECTRICAL SPECIFICATIONS

MODEL	SIZE		POWER RATING $P_{70\text{ }^\circ\text{C}}$ W	LIMITING ELEMENT VOLTAGE MAX. V $\leq$	TEMPERATURE COEFFICIENT ppm/K	TOLERANCE %	RESISTANCE RANGE $\Omega$	E-SERIES
	INCH	METRIC						
D10/CRCW0402	0402	1005	0.063	50	$\pm 100$ $\pm 200$	$\pm 1$ $\pm 5$	1R0 - 10M	24 + 96 24
			Zero-Ohm-Resistor: $R_{\text{max.}} = 20\text{ m}\Omega$ , $I_{\text{max.}}$ at 70 °C = 1.5 A					
D11/CRCW0603	0603	1608	0.10	75	$\pm 100$ $\pm 200$	$\pm 1$ $\pm 5$	1R0 - 10M	24 + 96 24
			Zero-Ohm-Resistor: $R_{\text{max.}} = 20\text{ m}\Omega$ , $I_{\text{max.}}$ at 70 °C = 2.0 A					
D12/CRCW0805	0805	2012	0.125	150	$\pm 100$ $\pm 200$	$\pm 1$ $\pm 5$	1R0 - 10M	24 + 96 24
			Zero-Ohm-Resistor: $R_{\text{max.}} = 20\text{ m}\Omega$ , $I_{\text{max.}}$ at 70 °C = 2.5 A					
D25/CRCW1206	1206	3216	0.25	200	$\pm 100$ $\pm 200$	$\pm 1$ $\pm 5$	1R0 - 10M	24 + 96 24
			Zero-Ohm-Resistor: $R_{\text{max.}} = 20\text{ m}\Omega$ , $I_{\text{max.}}$ at 70 °C = 3.5 A					
CRCW1210	1210	3225	0.33	200	$\pm 100$ $\pm 200$	$\pm 1$ $\pm 5$	1R0 - 10M	24 + 96 24
			Zero-Ohm-Resistor: $R_{\text{max.}} = 20\text{ m}\Omega$ , $I_{\text{max.}}$ at 70 °C = 4.0 A					
CRCW1218	1218	3246	1.0	200	$\pm 100$ $\pm 200$	$\pm 1$ $\pm 5$	1R0 - 2M2	24 + 96 24
			Zero-Ohm-Resistor: $R_{\text{max.}} = 20\text{ m}\Omega$ , $I_{\text{max.}}$ at 70 °C = 7.0 A					
CRCW2010	2010	5025	0.50	400	$\pm 100$ $\pm 200$	$\pm 1$ $\pm 5$	1R0 - 10M	24 + 96 24
			Zero-Ohm-Resistor: $R_{\text{max.}} = 20\text{ m}\Omega$ , $I_{\text{max.}}$ at 70 °C = 5.0 A					
CRCW2512	2512	6332	1.0	500	$\pm 100$ $\pm 200$	$\pm 1$ $\pm 5$	1R0 - 10M	24 + 96 24
			Zero-Ohm-Resistor: $R_{\text{max.}} = 20\text{ m}\Omega$ , $I_{\text{max.}}$ at 70 °C = 7.0 A					

### Notes

- These resistors do not feature a limited lifetime when operated within the permissible limits. However, resistance value drift increasing over operating time may result in exceeding a limit acceptable to the specific application, thereby establishing a functional lifetime.
- Marking and packaging: see appropriate catalog or web pages
- Power rating depends on the max. temperature at the solder point, the component placement density and the substrate material



TECHNICAL SPECIFICATIONS									
PARAMETER	UNIT	D10/ CRCW0402	D11/ CRCW0603	D12/ CRCW0805	D25/ CRCW1206	CRCW1210	CRCW1218	CRCW2010	CRCW2512
Rated Dissipation at 70 °C <sup>(3)</sup>	W	0.063	0.1	0.125	0.25	0.33	1.0	0.5	1.0
Limiting Element Voltage <sup>(2)</sup>	V <sub>≅</sub>	50	75	150	200	200	200	400	500
Insulation Voltage (1 min)	V <sub>peak</sub>	> 75	> 100	> 200	> 300	> 300	> 300	> 300	> 300
Thermal Resistance <sup>(1)</sup>	K/W	≤ 870	≤ 550	≤ 440	≤ 220	≤ 140	≤ 65	≤ 88	≤ 65
Insulation Resistance	Ω	> 10 <sup>9</sup>							
Category Temperature Range	°C	- 55 to + 155							
Failure Rate	h <sup>-1</sup>	0.3 x 10 <sup>-9</sup>							
Weight/1000 pieces	g	0.65	2	5.5	10	16	29.5	25.5	40.5

**Notes**

- (1) For sizes 0402 until 1206 the measuring conditions are in acc. to EN 140401-802. For all other sizes the result depends on the solder pad dimensions.
- (2) Rated voltage:  $\sqrt{PxR}$
- (3) The power dissipation on the resistor generates a temperature rise against the local ambient, depending on the heat flow support of the printed-circuit board (thermal resistance). The rated dissipation applies only if the permitted film temperature of 155 °C is not exceeded.

**PART NUMBER AND PRODUCT DESCRIPTION**

PART NUMBER: CRCW0805562RFKTA

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

**MODEL**

CRCW0402  
CRCW0603  
CRCW0805  
CRCW1206  
CRCW1210  
CRCW1218  
CRCW2010  
CRCW2512

**VALUE**

R = Decimal  
K = Thousand  
M = Million  
0000 = Jumper

**TOLERANCE**

F = ± 1 %  
J = ± 5 %  
Z = Zero Ohm Jumper

**TCR**

K = ± 100 ppm/K  
N = ± 200 ppm/K  
S = Jumper or special

**PACKAGING <sup>(5)</sup>**

TA	TB
TC	TD
TE	TF
TG	TH
TI	TK
TL	BA

**SPECIAL**

Up to 2 digits

**PRODUCT DESCRIPTION: CRCW 0805 5620 F 100 RT1**

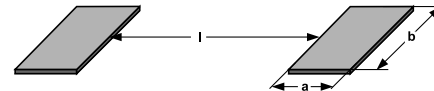
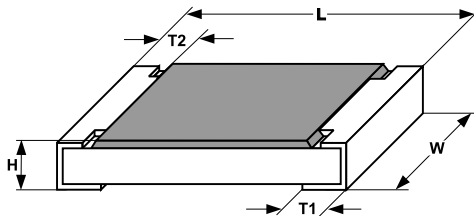
CRCW	0805	5620	F	100	RT1
MODEL	SIZE	RESISTANCE VALUE	TOLERANCE	TCR	PACKAGING <sup>(5)</sup>
CRCW	0402 1201 0603 1218 0805 2010 1206 2512	685 = 6.8 MΩ 224 = 220 kΩ ± 1 % = 3 sig.digits, plus multiplier ± 5 % = 2 sig.digits, plus multiplier	F = ± 1 % J = ± 5 % Z = Zero Ohm Jumper	± 100 ppm/K ± 200 ppm/K	RT1 RT5 RT6 RT7 RT4 R02 R67 R82 RG1 RT9 R20 B27

**Notes**

- (4) Preferred way for ordering products is by use of the PART NUMBER
- (5) Please refer to table PACKAGING, see next page

PACKAGING											
MODEL	REEL								BULK		
	TAPE WIDTH	DIAMETER	PITCH	PIECES/ REEL	PACKAGING CODE				PIECES	PACKAGING CODE	
					PART NUMBER		PRODUCT DESC.			PART NUMBER	PRODUCT DESC.
					PAPER	BLISTER	PAPER	BLISTER			
D10/CRCW0402	8 mm	180 mm/7"	2 mm	10 000	TD		RT7		50 000	BA	B27
		330 mm/13"	2 mm	50 000	TE		RF4				
D11/CRCW0603	8 mm	180 mm/7"	4 mm	5000	TA	TI	RT1	RG1	25 000	BA	B27
		285 mm/11.25"	4 mm	10 000	TB		RT5				
		330 mm/13"	4 mm	20 000	TC	TL	RT6	R20			
D12/CRCW0805	8 mm	180 mm/7"	4 mm	5000	TA	TI	RT1	RG1	10 000	BA	B27
		285 mm/11.25"	4 mm	10 000	TB		RT5				
		330 mm/13"	4 mm	20 000	TC	TL	RT6	R20			
D25/CRCW1206	8 mm	180 mm/7"	4 mm	5000	TA	TI	RT1	RG1			
		285 mm/11.25"	4 mm	10 000	TB		RT5				
		330 mm/13"	4 mm	15 000		TL		R20			
CRCW1210	12 mm	180 mm/7"	4 mm	5000	TA		RT1				
		285 mm/11.25"	4 mm	10 000	TB		RT5				
		330 mm/13"	4 mm	20 000	TC		RT6				
CRCW1218	12 mm	180 mm/7"	4 mm	4000		TK		RT9			
CRCW2010	12 mm	180 mm/7"	4 mm	4000		TF		R02			
CRCW2512	12 mm	180 mm/7"	8 mm	2000		TG		R67			
			4 mm	4000		TH		R82			

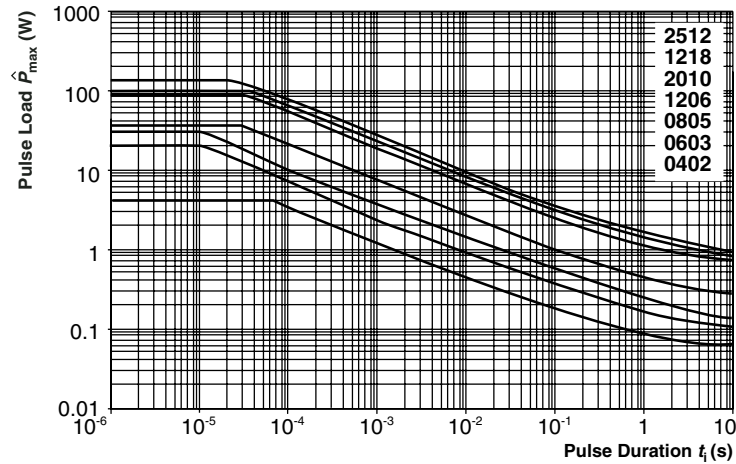
**DIMENSIONS**



SIZE		DIMENSIONS [in millimeters]					SOLDER PAD DIMENSIONS [in millimeters]					
							REFLOW SOLDERING			WAVE SOLDERING		
INCH	METRIC	L	W	H	T1	T2	a	b	l	a	b	l
0402	1005	1.0 ± 0.05	0.5 ± 0.05	0.35 ± 0.05	0.25 ± 0.05	0.2 ± 0.1	0.4	0.6	0.5			
0603	1608	1.55 <sup>+0.10</sup> / <sub>-0.05</sub>	0.85 ± 0.1	0.45 ± 0.05	0.3 ± 0.2	0.3 ± 0.2	0.5	0.9	1.0	0.9	0.9	1.0
0805	2012	2.0 <sup>+0.20</sup> / <sub>-0.10</sub>	1.25 ± 0.15	0.45 ± 0.05	0.3 <sup>+0.20</sup> / <sub>-0.10</sub>	0.3 ± 0.2	0.7	1.3	1.2	0.9	1.3	1.3
1206	3216	3.2 <sup>+0.10</sup> / <sub>-0.20</sub>	1.6 ± 0.15	0.55 ± 0.05	0.45 ± 0.2	0.4 ± 0.2	0.9	1.7	2.0	1.1	1.7	2.3
1210	3225	3.2 ± 0.2	2.5 ± 0.2	0.55 ± 0.05	0.45 ± 0.2	0.4 ± 0.2	0.9	2.5	2.0	1.1	2.5	2.2
1218	3246	3.2 <sup>+0.10</sup> / <sub>-0.20</sub>	4.6 ± 0.15	0.55 ± 0.05	0.45 ± 0.2	0.4 ± 0.2	1.05	4.9	1.9	1.25	4.8	1.9
2010	5025	5.0 ± 0.15	2.5 ± 0.15	0.6 ± 0.1	0.6 ± 0.2	0.6 ± 0.2	1.0	2.5	3.9	1.2	2.5	3.9
2512	6332	6.3 ± 0.2	3.15 ± 0.15	0.6 ± 0.1	0.6 ± 0.2	0.6 ± 0.2	1.0	3.2	5.2	1.2	3.2	5.2

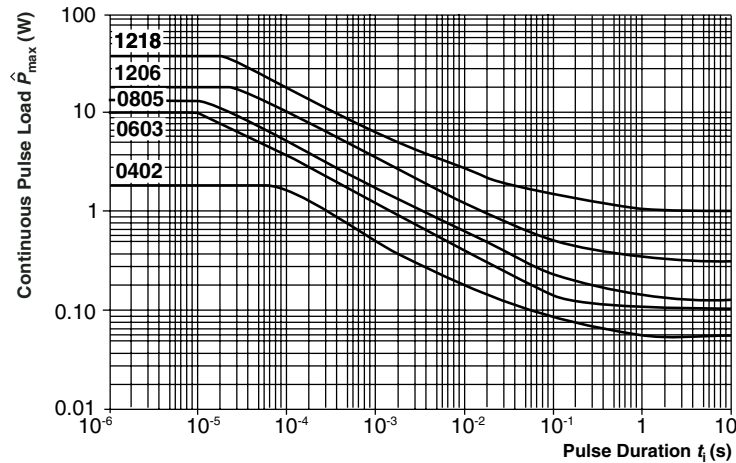
**FUNCTIONAL PERFORMANCE**

**Single Pulse**



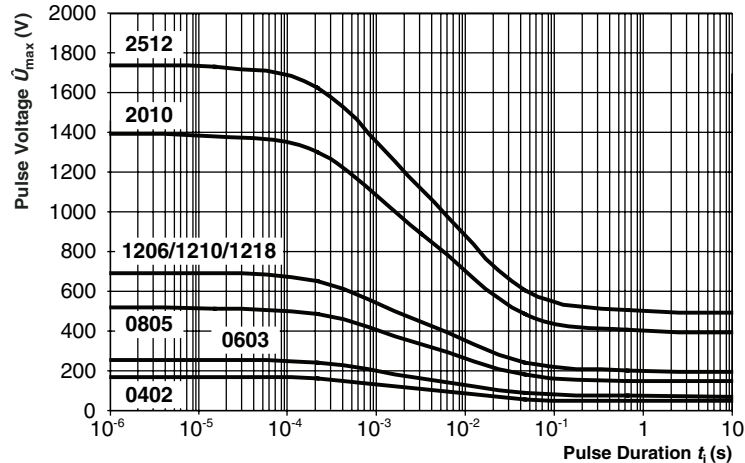
Maximum pulse load, single pulse; applicable if  $\bar{P} \rightarrow 0$  and  $n \leq 1000$  and  $\hat{U} \leq \hat{U}_{max}$ ; for permissible resistance change equivalent to 8000 h operation

**Continuous Pulse**

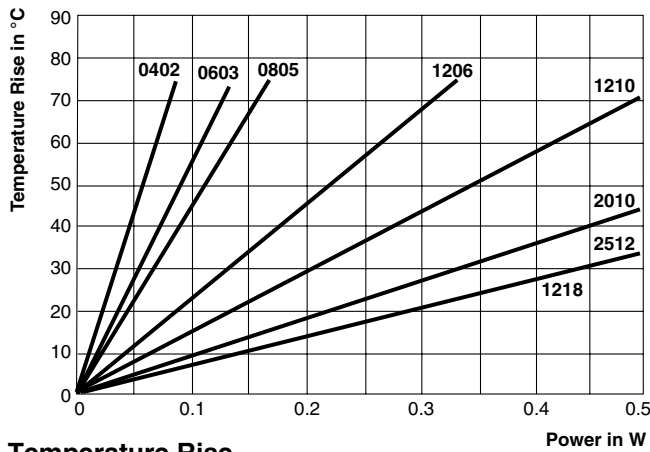


Maximum pulse load, continuous pulses; applicable if  $\bar{P} \leq P(\vartheta_{amb})$  and  $\hat{U} \leq \hat{U}_{max}$ ; for permissible resistance change equivalent to 8000 h operation

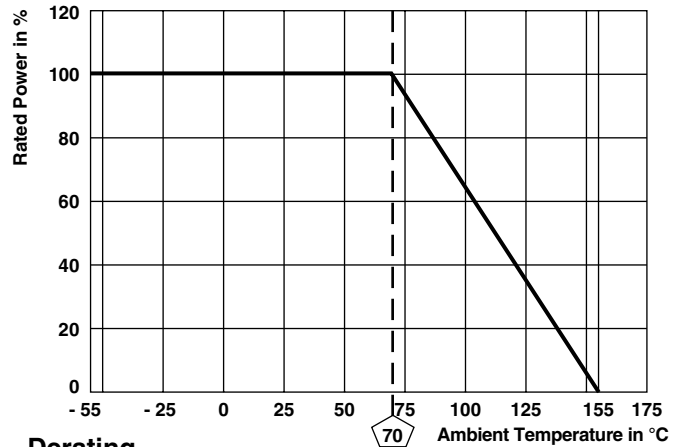
**Pulse Voltage**



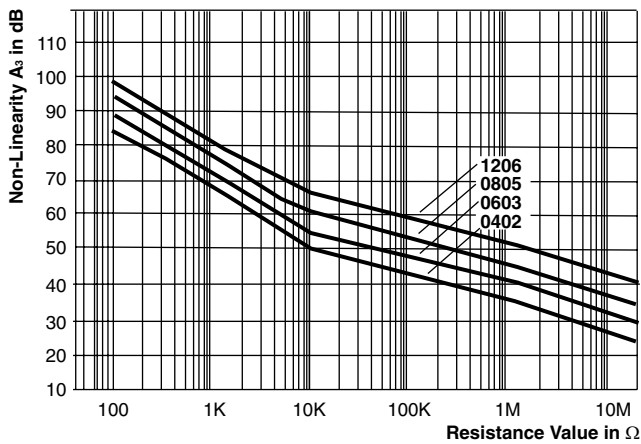
Maximum pulse voltage, single and continuous pulses; applicable if  $\hat{P} \leq \hat{P}_{max}$ ; for permissible resistance change equivalent to 8000 h operation



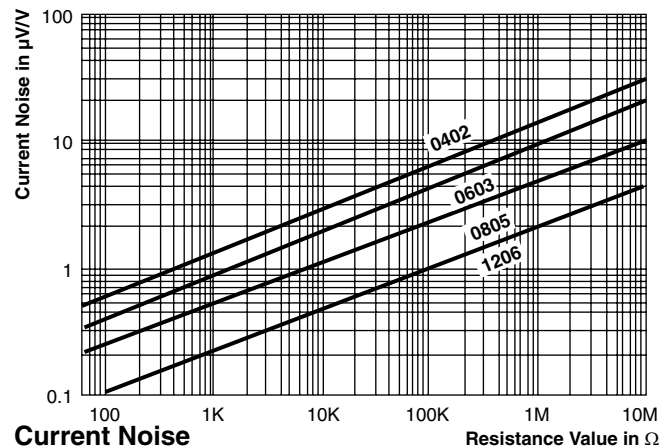
Temperature Rise



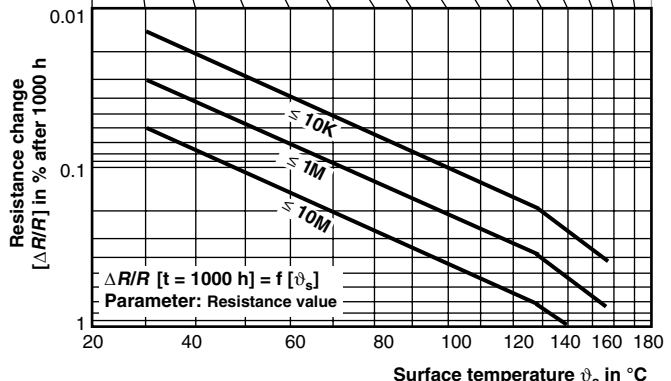
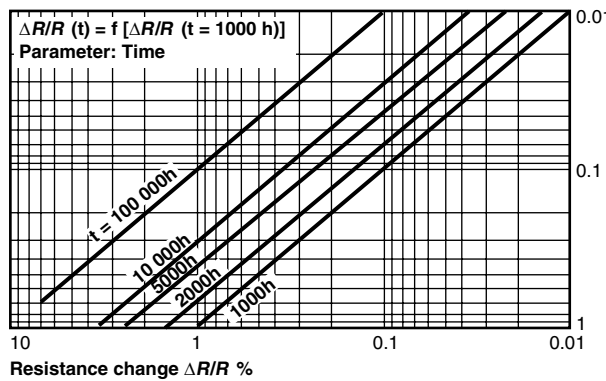
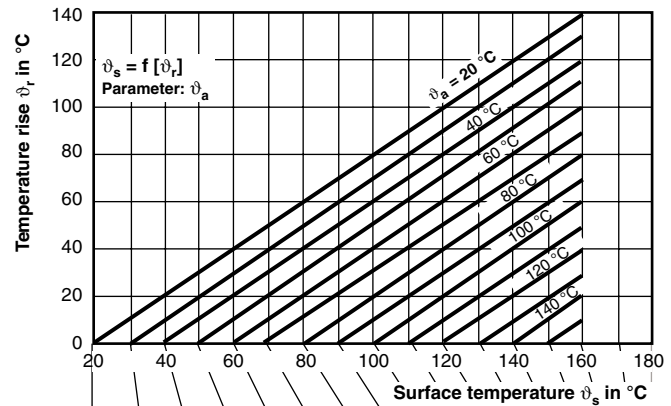
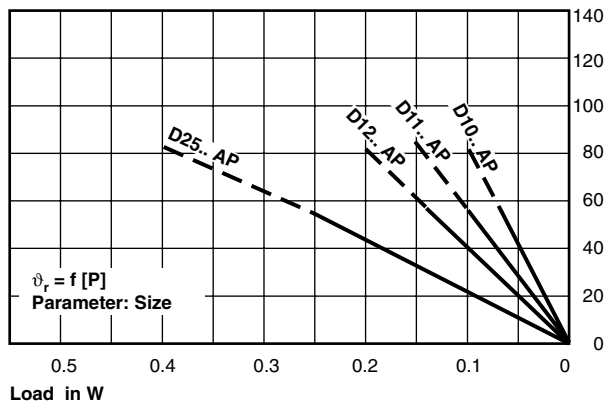
Derating



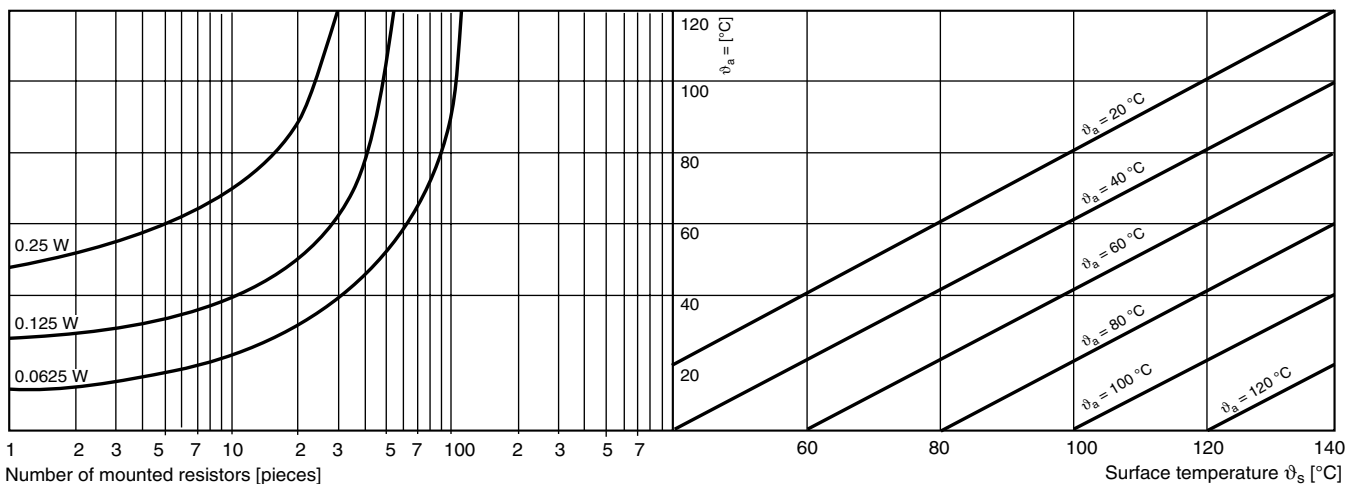
Non-Linearity



Current Noise



Stability nomogram typical values (for handling see general explanations)



Power rating as a function of packaging density (guideline)

<b>TEST PROCEDURES AND REQUIREMENTS</b>			
EN 60115-1			
TEST (clause)	CONDITIONS OF TEST	REQUIREMENTS	
		STABILITY CLASS 1 OR BETTER	STABILITY CLASS 2 OR BETTER
	Stability for product types: <b>D../CRCW...</b>	1 Ω to 10 MΩ	1 Ω to 10 MΩ
Resistance (4.5)	-	± 1 %	± 5 %
Temperature coefficient (4.8.4.2)	20/- 55/20 °C and 20/125/20 °C	± 100 ppm/K	± 200 ppm/K
Overload (4.13)	$U = 2.5 \times (P_{70} \times R)^{1/2}$ $\leq 2 \times U_{max.}$ ; Duration: according the style	± (0.25 % R + 0.05 Ω)	± (0.5 % R + 0.05 Ω)
Solderability (4.17.5)	Aging 4 h at 155 °C, dryheat solder bath method; 235 °C; 2 s visual examination	Good tinning (≥ 95 % covered) no visible damage	
Resistance to soldering heat (4.18.2)	Solder bath method; (260 ± 5) °C; (10 ± 1) s	± (0.25 % R + 0.05 Ω)	± (0.5 % R + 0.05 Ω)
Rapid change of temperature (4.19)	30 min at LCT = - 55 °C; 30 min at UCT = 125 °C; 5 cycles	± (0.25 % R + 0.05 Ω)	± (0.5 % R + 0.05 Ω)
Damp heat, steady state (4.24)	(40 ± 2) °C; 56 days; (93 ± 3) % RH	± (1 % R + 0.05 Ω)	± (2 % R + 0.1 Ω)
Climatic sequence (4.23)	16 h at UCT = 125 °C; 1 cycle at 55 °C; 2 h at LCT = - 55 °C; 1 h/1 kPa at 15 °C to 35 °C; 5 cycles at 55 °C $U = (P_{70} \times R)^{1/2}$ $U = U_{max.}$ ; whichever is less severe	± (1 % R + 0.05 Ω)	± (2 % R + 0.1 Ω)
Endurance at 70 °C (4.25.1)	$U = (P_{70} \times R)^{1/2}$ $U = U_{max.}$ ; whichever is less severe 1.5 h ON; 0.5 h OFF; 70 °C; 1000 h	± (1 % R + 0.05 Ω)	± (2 % R + 0.1 Ω)
Extended endurance (4.25.1.8)	Duration extended to 8000 h	± (2 % R + 0.1 Ω)	± (4 % R + 0.1 Ω)
Endurance at upper category temperature (4.25.3)	UCT = 125 °C; 1000 h	± (1 % R + 0.05 Ω)	± (2 % R + 0.1 Ω)

<b>APPLICABLE SPECIFICATIONS</b>	
• EN 60115-1	Generic specification
• EN 140400	Sectional specification
• EN 140401-802	Detail specification
• IEC 60068-2-X	Variety of environmental test procedures
• IEC 60286-3	Packaging of SMD components



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