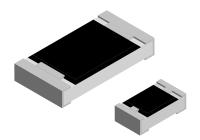
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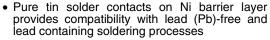


Pulse Proof, High Power Thick Film Chip Resistors



FEATURES

- · Excellent pulse load capability
- Enhanced power rating
- Double side printed resistor element
- Protective overglaze



- Compliant to RoHS Directive 2002/95/EC
- Halogen-free according to IEC 61249-2-21 definition
- AEC-Q200 qualified, rev. C compliant

(Pb)
RoHS COMPLIANT
HALOGEN FREE

STANDARD EL	ECTF.	RICAL S	PECIFICATIO	NS							
MODEL	INCH METRIC		$\begin{array}{c c} \textbf{RATED} & \textbf{LIMITING} \\ \textbf{DISSIPATION} & \textbf{ELEMENT} \\ \textbf{P_{70}} & \textbf{VOLTAGE} \\ \textbf{W} & \textbf{$U_{\text{max.}}$ AC/DC} \\ \end{array}$		TEMPERATURE COEFFICIENT ppm/K	TOLERANCE %	RESISTANCE RANGE Ω	SERIES			
CRCW0402-HP e3	0402	RR1005	0.125 ⁽¹⁾	50	± 100 ± 200	±1	1R to 1M	E24; E96 E24			
CRCW0402-HP e3	0402	HH 1005	Zero-Ohm-Resisto	<u> </u> r: R = 0.010		± 5		E24			
CRCW0603-HP e3	0603	RR1608	0.25	75	± 100 ± 200	± 1 ± 5	1R to 1M	E24; E96 E24			
0110110000111 00	0000	11111000	Zero-Ohm-Resisto	r: $R_{\text{max}} = 0.008$							
CRCW0805-HP e3	0805	RR2012	0.33	150	± 100 ± 200	± 1 ± 5	1R to 1M	E24; E96 E24			
			Zero-Ohm-Resistor: $R_{\text{max.}} = 0.005 \Omega$, $I_{\text{max.}} = 6 \text{A}$								
CRCW1206-HP e3	1206	RR3216	0.5	200	± 100 ± 200	± 1 ± 5	1R to 1M	E24; E96 E24			
			Zero-Ohm-Resistor: $R_{\text{max.}} = 0.005 \Omega$, $I_{\text{max.}} = 10 \text{A}$								
CRCW1210-HP e3	1210	RR3225	0.75	200	± 100 ± 200	± 1 ± 5	1R to 1M	E24; E96 E24			
			Zero-Ohm-Resistor: $R_{\text{max.}} = 0.004 \Omega$, $I_{\text{max.}} = 12 \text{A}$								
CRCW1218-HP e3	1218	RR3246	1.5	200	± 100 ± 200	± 1 ± 5	1R to 1M	E24; E96 E24			
			Zero-Ohm-Resistor: $R_{\text{max.}} = 0.004 \Omega$, $I_{\text{max.}} = 20 \text{A}$								
CRCW2010-HP e3	2010	RR5025	1.0	400	± 100 ± 200	± 1 ± 5	1R to 1M	E24; E96 E24			
Zero-Ohm-Resistor: $R_{\text{max.}} = 0.005 \Omega$, $I_{\text{max.}} = 12 \text{A}$											
CRCW2512-HP e3	2512	RR6332	1.5	500	± 100 ± 200	± 1 ± 5	1R to 1M	E24; E96 E24			
Zero-Ohm-Resistor: $R_{\text{max.}} = 0.005 \Omega$, $I_{\text{max.}} = 16 \text{A}$											

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: See document "Surface Mount Resistor Marking" (document number 20020).
 Power rating depends on the max. temperature at the solder point, the component placement density and the substrate material.
 (1) CRCW0402-HP resistors feature a single side printed resistive layer only.

TECHNICAL SPECIFICATIONS									
PARAMETER	UNIT	CRCW 0402-HP	CRCW 0603-HP	CRCW 0805-HP	CRCW 1206-HP	CRCW 1210-HP	CRCW 1218-HP	CRCW 2010-HP	CRCW 2512-HP
Rated dissipation P ₇₀ ⁽²⁾	W	0.125	0.25	0.33	0.5	0.75	1.5	1.0	1.5
Limiting element voltage U _{max.} AC/DC	V	50	75	150	200	200	200	400	500
Insulation voltage U _{ins.} (1 min)	V	> 75	> 100	> 200	> 300	> 300	> 300	> 300	> 300
Insulation resistance	Ω	> 10 ⁹							
Category temperature range	°C	- 55 to + 155							
Weight	mg	0.65	2	5.5	10	18	31	25.5	42

(2) The power dissipation on the resistors 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.

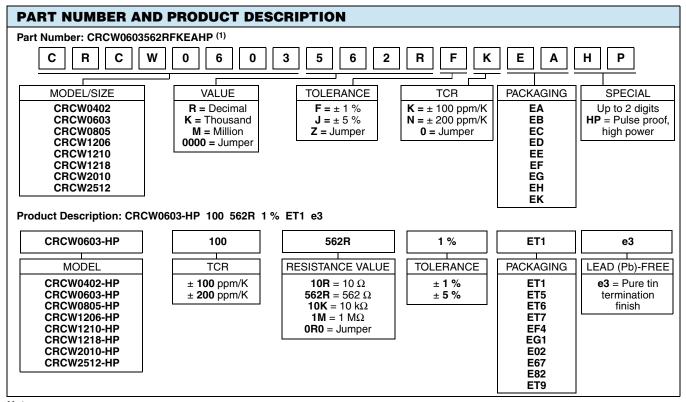
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Note

⁽¹⁾ Preferred way for ordering products is by use of the PART NUMBER.

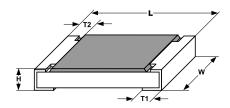
PACKAGING									
MODEL	UNIT	AC	PAPER TAPE ON CC. TO IEC 60286-		BLISTER TAPE ON REEL ACC. TO IEC 60286-3, TYPE II				
		QUANTITY	PART NUMBER	PRODUCT DESC.	QUANTITY	PART NUMBER	PRODUCT DESC.		
CRCW0402-HP	180 mm/7" 330 mm/13"	10 000 50 000	ED EE	ET7 EF4					
CRCW0603-HP	180 mm/7" 285 mm/11.25" 330 mm/13"	5000 10 000 20 000	EA EB EC	ET1 ET5 ET6					
CRCW0805-HP	180 mm/7" 285 mm/11.25" 330 mm/13"	5000 10 000 20 000	EA EB EC	ET1 ET5 ET6					
CRCW1206-HP	180 mm/7" 285 mm/11.25" 330 mm/13"	5000 10 000 20 000	EA EB EC	ET1 ET5 ET6					
CRCW1210-HP	180 mm/7" 285 mm/11.25" 330 mm/13"	5000 10 000 20 000	EA EB EC	ET1 ET5 ET6					
CRCW1218-HP	180 mm/7"				4000	EK	ET9		
CRCW2010-HP	180 mm/7"				4000	EF	E02		
CRCW2512-HP	180 mm/7"				2000 4000	EG EH	E67 E82		

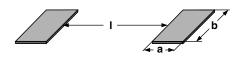
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Pulse Proof, High Power Thick Film Chip Resistors



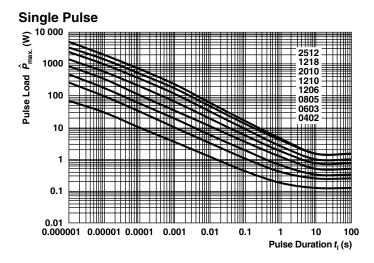
DIMENSIONS in millimeters





	SIZE DIMENSIONS							SOLDER PAD DIMENSIONS						
5	OIZE	DIMENSIONS				REFLOW SOLDERING				WAVE SOLDERING				
INCH	METRIC	L	w	Н	T1	T2	а	b	I	а	b	I		
0402	1005	1.0 ± 0.05	0.5 ± 0.05	0.3 ± 0.1	0.25 ± 0.1	0.2 ± 0.1	0.4	0.6	0.5					
0603	1608	1.6 ± 0.1	0.85 ± 0.1	0.45 ± 0.1	0.3 ± 0.2	0.3 ± 0.2	0.5	0.9	1.0	0.9	0.9	1.0		
0805	2012	2.0 ± 0.15	1.25 ± 0.15	0.50 ± 0.1	0.4 ± 0.2	0.35 ± 0.2	0.7	1.3	1.2	0.9	1.3	1.3		
1206	3216	3.1 ± 0.2	1.6 ± 0.15	0.50 ± 0.15	0.5 ± 0.2	0.45 ± 0.2	0.9	1.7	2.0	1.1	1.7	2.3		
1210	3225	3.2 ± 0.2	2.5 ± 0.2	0.6 ± 0.1	0.45 ± 0.2	0.4 ± 0.2	0.9	2.5	2.0	1.1	2.5	2.2		
1218	3246	3.1 ± 0.2	4.6 ± 0.2	0.6 ± 0.1	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

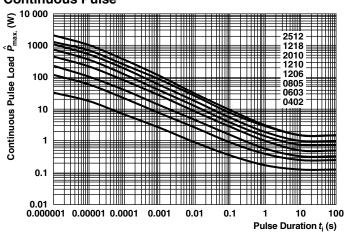


Maximum pulse load, single pulse; applicable if $\overline{P} \to 0$ and n < 1000 and $\hat{U} \le \hat{U}_{max}$; for permissible resistance change equivalent to 8000 h operation



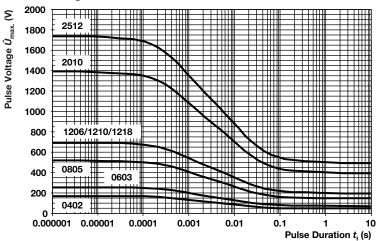
Pulse Proof, High Power Thick Film Chip Resistors

Continuous Pulse



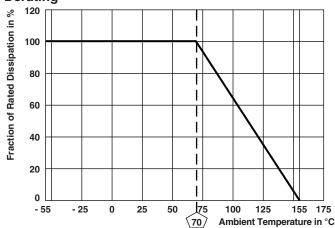
Maximum pulse load, continuous pulses; applicable if $\bar{P} \leq P$ (ϑ_{amb}) and $\hat{U} \leq \hat{U}_{max}$; for permissible resistance change equivalent to 8000 h operation

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

Derating



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Pulse Proof, High Power Thick Film Chip Resistors



TEST PROCEDURES AND REQUIREMENTS									
EN 60115-1	IEC 60068-2 TEST	TEST	PROCEDURE	REQUIREMENTS PERMISSIBLE CHANGE ($\triangle R$)					
CLAUSE	METHOD			STABILITY CLASS 2 OR BETTER					
	•		Stability for product types:	1 Ω to 1 MΩ					
			CRCW-HP e3	1 22 to 1 10122					
4.5	-	Resistance	-	± 1 %, ± 5 %					
4.7	-	Voltage proof	$U = 1.4 \times U_{ins}$; 60 s	-					
4.13	-	Short time overload	$U = 2.5 \text{ x } \sqrt{P_{70} \text{ x } R}$ $\leq 2 \times U_{\text{max.}}$; duration: According to style	$\pm (0.5 \% R + 0.05 \Omega)$					
4.17.2	58 (Td)	Solderability	Solder bath method; Sn60Pb40; non-activated flux; (235 ± 5) °C; (2 ± 0.2) s	Good tinning (≥ 95 % covered) no visible damage					
4.17.2	00 (1u)	Colderability	Solder bath method; Sn96.5Ag3Cu0.5; non-activated flux; (245 \pm 5) °C; (3 \pm 0.3) s	Good tinning (≥ 95 % covered) no visible damage					
4.8.4.2	-	Temperature coefficient	(20/- 55/20) °C and (20/125/20) °C	± 100 ppm/K, ± 200 ppm/K					
4.32	21 (U _{U3})	Shear (adhesion)	RR 1608 and smaller: 9 N RR 2012 and larger: 45 N	No visible damage					
4.33	21 (U _{U1})	Substrate bending	Depth 2 mm; 3 times	No visible damage, no open circuit in bent position $\pm (0.25 \% R + 0.05 \Omega)$					
4.19	14 (Na)	Rapid change of temperature	30 min. at - 55 °C; 30 min at 125 °C 5 cycles 1000 cycles	\pm (0.5 % R + 0.05 Ω) \pm (1 % R + 0.05 Ω)					
4.23	-	Dry heat	-						
4.23.2	2 (Ba)	Damp heat, cyclic	125 °C; 16 h						
4.23.3	30 (Db)	cold	55 °C; ≥ 90 % RH; 24 h; 1 cycle						
4.23.4	1 (Aa)	Low air pressure	- 55 °C; 2 h	\pm (2 % R + 0.1 Ω)					
4.23.5	13 (M)	-	1 kPa; (25 ± 10) °C; 1 h						
4.23.6	30 (Db)	Damp heat, cyclic	55 °C; ≥ 90 % RH; 24 h; 5 cycle						
4.23.7	-	D.C. load	$U = \sqrt{P_{70} \times R}$						
4.25.1	-	Endurance at 70 °C	$U = \sqrt{P_{70} \times R} \le U_{max}$ 1.5 h on; 0.5 h off; 70 °C; 1000 h 70 °C; 8000 h	± (2 % R + 0.1 Ω) ± (4 % R + 0.1 Ω)					
4.18.2	58 (Td)	Resistance to soldering heat	Solder bath method; (260 ± 5) °C; (10 ± 1) s	± (0.5 % R + 0.05 Ω)					
4.35	-	Flammability, needle flame test	IEC 60695-15-5; 10 s	No burning after 30 s					
4.24	78 (Cab)	Damp heat, steady state	(40 ± 2) °C; (93 ± 3) % RH; 56 days	± (1 % R + 0.05 Ω)					
4.25.3	-	Endurance at upper category temperature	155 °C; 1000 h	± (2 % R + 0.1 Ω)					
4.40	-	Electrostatic discharge (human body model)	IEC 61340-3-1; 3 positive and 3 negative discharges; ESD voltage according to size	± (1 % R + 0.05 Ω)					
4.29	45 (XA)	Component solvent resistance	Isopropyl alcohol; 50 °C; method 2	No visible damage					
4.30	45 (XA)	Solvent resistance of marking	Isopropyl alcohol; 50 °C; method 1; toothbrush	Marking legible, no visible damage					
4.22	6 (Fc)	Vibration, endurance by sweeping	$f = 10 \text{ Hz to } 2000 \text{ Hz; x, y, z} \le 1.5 \text{ mm;}$ $A \le 200 \text{ m/s}^2; 10 \text{ sweeps per axis}$	$\pm (0.5 \% R + 0.05 \Omega)$					
4.37	-	Periodic electric overload	$U = \sqrt{15 \times P_{70} \times R} \le 2 \times U_{\text{max.}}$ 0.1 s "ON"; 2.5 s "OFF"; 1000 cycles	± (1 % R + 0.05 Ω)					
4.27	-	Single pulse high voltage overload, 10 μs/700 μs	$\hat{U} = 10 \text{ x } \sqrt{P_{70} \text{ x } R} \le 2 \text{ x } U_{\text{max.}}$ 10 pulses	± (1 % R + 0.05 Ω)					

All tests are carried out in accordance with the following specifications:

- EN 60115-1, generic specification
- EN 140400, sectional specification
- EN 140401-802, detail specification
- IEC 60068-2, environmental test procedures

Packaging of components is done in paper or blister tapes according to IEC 60286-3.

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