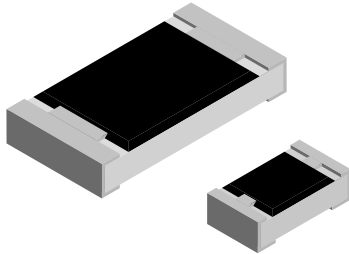


Pulse Proof, High Power Thick Film Chip Resistors



FEATURES

- Excellent pulse load capability
- Enhanced power rating
- Double side printed resistor element
- Protective overglaze
- Pure tin solder contacts on Ni barrier layer provides compatibility with lead (Pb)-free and lead containing soldering processes
- Compliant to RoHS directive 2002/95/EC
- Halogen-free according to IEC 61249-2-21 definition
- AEC-Q200 qualified, rev. C compliant



RoHS
COMPLIANT
HALOGEN
FREE

STANDARD ELECTRICAL SPECIFICATIONS

MODEL	SIZE		POWER RATING P_{70} W	LIMITING ELEMENT VOLTAGE MAX. V	TEMPERATURE COEFFICIENT ppm/K	TOLERANCE %	RESISTANCE RANGE Ω	E-SERIES
	INCH	METRIC						
CRCW0402-HP e3	0402	RR1005	0.125 ⁽¹⁾	50	± 100	± 1	1R to 1M	E24 + E96 E24
					± 200	± 5		
Zero-Ohm-Resistor: $R_{max.} = 0.010 \Omega$, $I_{max.} = 3 A$								
CRCW0603-HP e3	0603	RR1608	0.25	75	± 100	± 1	1R to 1M	E24 + E96 E24
					± 200	± 5		
Zero-Ohm-Resistor: $R_{max.} = 0.008 \Omega$, $I_{max.} = 5 A$								
CRCW0805-HP e3	0805	RR2012	0.33	150	± 100	± 1	1R to 1M	E24 + E96 E24
					± 200	± 5		
Zero-Ohm-Resistor: $R_{max.} = 0.005 \Omega$, $I_{max.} = 6 A$								
CRCW1206-HP e3	1206	RR3216	0.5	200	± 100	± 1	1R to 1M	E24 + E96 E24
					± 200	± 5		
Zero-Ohm-Resistor: $R_{max.} = 0.005 \Omega$, $I_{max.} = 10 A$								
CRCW1210-HP e3	1210	RR3225	0.75	200	± 100	± 1	1R to 1M	E24 + E96 E24
					± 200	± 5		
Zero-Ohm-Resistor: $R_{max.} = 0.004 \Omega$, $I_{max.} = 12 A$								
CRCW1218-HP e3	1218	RR3246	1.5	200	± 100	± 1	1R to 1M	E24 + E96 E24
					± 200	± 5		
Zero-Ohm-Resistor: $R_{max.} = 0.004 \Omega$, $I_{max.} = 20 A$								
CRCW2010-HP e3	2010	RR5025	1.0	400	± 100	± 1	1R to 1M	E24 + E96 E24
					± 200	± 5		
Zero-Ohm-Resistor: $R_{max.} = 0.005 \Omega$, $I_{max.} = 12 A$								
CRCW2512-HP e3	2512	RR6332	1.5	500	± 100	± 1	1R to 1M	E24 + E96 E24
					± 200	± 5		
Zero-Ohm-Resistor: $R_{max.} = 0.005 \Omega$, $I_{max.} = 16 A$								

Notes

- (1) CRCW0402-HP resistors feature a single side printed resistive layer only
- 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

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} ⁽¹⁾	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	$^{\circ}C$	- 55 to + 155							
Weight	mg	0.65	2	5.5	10	18	31	25.5	42

Note

- (1) 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 $^{\circ}C$ is not exceeded.

PART NUMBER AND PRODUCT DESCRIPTION																	
PART NUMBER: CRCW0603562RFKEAHP ⁽¹⁾																	
C	R	C	W	0	6	0	3	5	6	2	R	F	K	E	A	H	P
MODEL/SIZE		VALUE		TOLERANCE		TCR		PACKAGING ⁽²⁾		SPECIAL							
CRCW0402 CRCW0603 CRCW0805 CRCW1206 CRCW1210 CRCW1218 CRCW2010 CRCW2512		R = Decimal K = Thousand M = Million 0000 = Jumper		F = ± 1 % J = ± 5 % Z = Jumper		K = ± 100 ppm/K N = ± 200 ppm/K 0 = Jumper		EA EB EC ED EE EI EL EF EG EH EK		Up to 2 digits HP = Pulse proof, High Power							
PRODUCT DESCRIPTION: CRCW0603-HP 100 562R 1% ET1 e3																	
CRCW0603-HP		100		562R		1%		ET1		e3							
MODEL		TCR		RESISTANCE VALUE		TOLERANCE		PACKAGING ⁽²⁾		LEAD (Pb)-FREE							
CRCW0402-HP CRCW0603-HP CRCW0805-HP CRCW1206-HP CRCW1210-HP CRCW1218-HP CRCW2010-HP CRCW2512-HP		± 100 ppm/K ± 200 ppm/K		10R = 10 Ω 562R = 562 Ω 10K = 10 kΩ 1M = 1 MΩ 0R0 = Jumper		± 1 % ± 5 %		ET1 ET5 ET6 ET7 EF4 EG1 E20 E02 E67 E82 ET9		e3 = Pure tin termination finish							

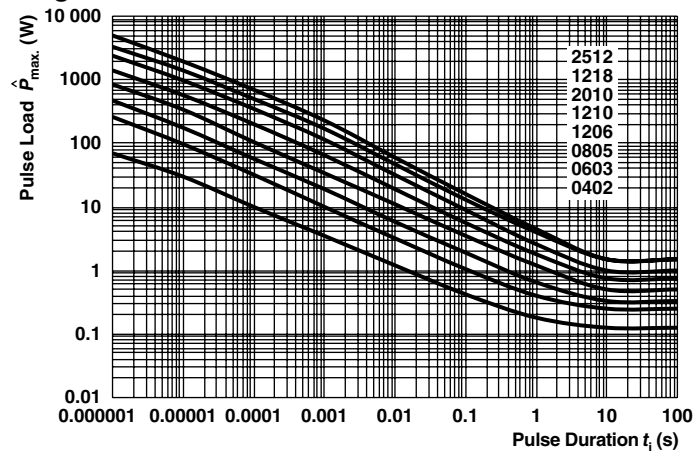
Notes

- (1) Preferred way for ordering products is by use of the PART NUMBER
- (2) Please refer to table PACKAGING, see below

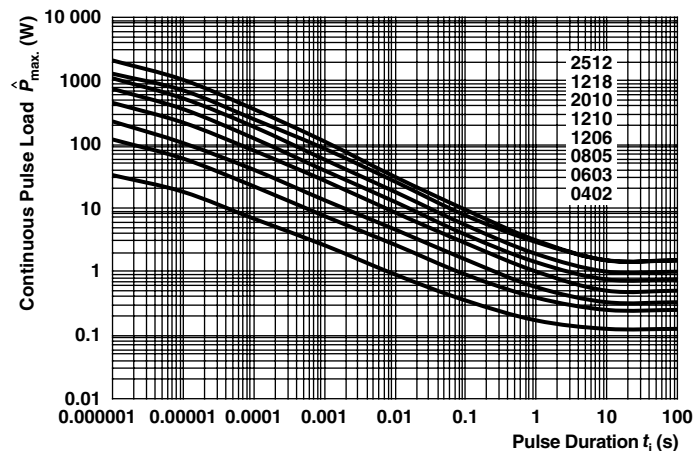
PACKAGING								
MODEL	REEL							
	TAPE WIDTH	DIAMETER	PITCH	PIECES/ REEL	PACKAGING CODE			
					PART NUMBER		PRODUCT DESC.	
					PAPER	BLISTER	PAPER	BLISTER
CRCW0402-HP	8 mm	180 mm/7" 330 mm/13"	2 mm 2 mm	10 000 50 000	ED EE		ET7 EF4	
CRCW0603-HP	8 mm	180 mm/7" 285 mm/11.25" 330 mm/13"	4 mm 4 mm 4 mm	5000 10 000 20 000	EA EB EC		ET1 ET5 ET6	
CRCW0805-HP	8 mm	180 mm/7" 285 mm/11.25" 330 mm/13"	4 mm 4 mm 4 mm	5000 10 000 20 000	EA EB EC		ET1 ET5 ET6	
CRCW1206-HP	8 mm	180 mm/7" 285 mm/11.25" 330 mm/13"	4 mm 4 mm 4 mm	5000 10 000 20 000	EA EB EC		ET1 ET5 ET6	
CRCW1210-HP	8 mm	180 mm/7" 285 mm/11.25" 330 mm/13"	4 mm 4 mm 4 mm	5000 10 000 20 000	EA EB EC		ET1 ET5 ET6	
CRCW1218-HP	12 mm	180 mm/7"	4 mm	4000		EK		ET9
CRCW2010-HP	12 mm	180 mm/7"	4 mm	4000		EF		E02
CRCW2512-HP	12 mm	180 mm/7"	8 mm 4 mm	2000 4000		EG EH		E67 E82

DIMENSIONS in millimeters


SIZE		DIMENSIONS					SOLDER PAD DIMENSIONS					
							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	0.3 ± 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
Single Pulse


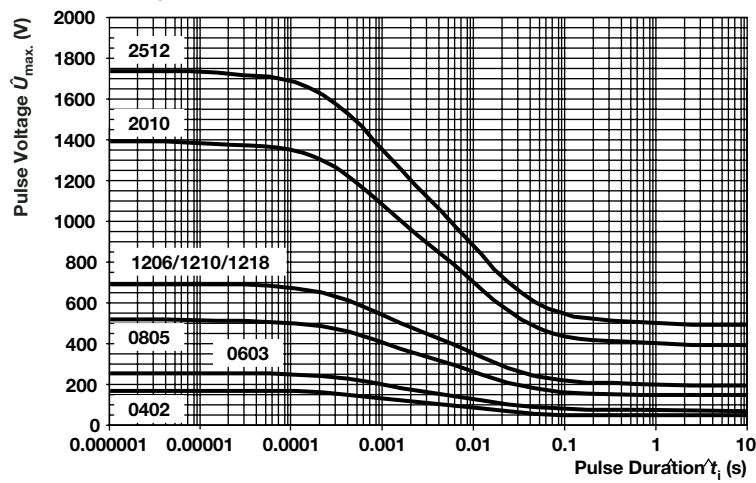
Maximum pulse dissipation as a function of the pulse duration, single pulse for CRCW...-HP

Continuous Pulse


Maximum pulse dissipation as a function of the pulse duration, continuous pulse for CRCW...-HP

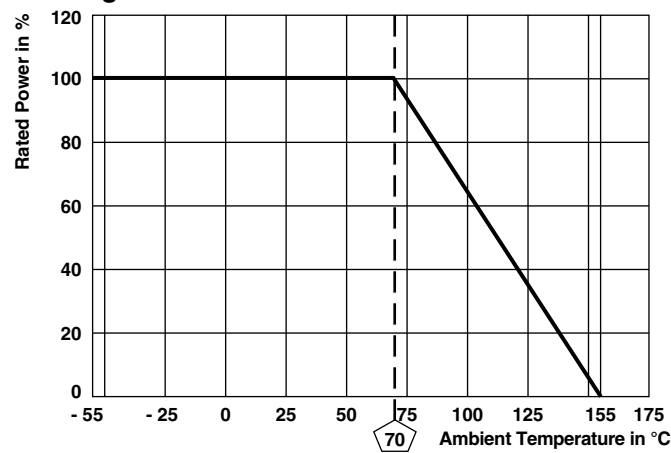


Pulse Voltage



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

Derating



TEST PROCEDURES AND REQUIREMENTS				
EN 60115-1 CLAUSE	IEC 60068-2 TEST METHOD	TEST	PROCEDURE	REQUIREMENTS PERMISSIBLE CHANGE (ΔR)
				STABILITY CLASS 2 OR BETTER
			Stability for product types:	1 Ω to 1 M Ω
			CRCW-HP e3	
4.5	-	Resistance	-	$\pm 1\%$, $\pm 5\%$
4.7	-	Voltage proof	$U = 1.4 \times U_{\text{Insi}}$; 60 s	-
4.13	-	Short time overload	$U = 2.5 \times \sqrt{P_{70}} \times \bar{R}$ $\leq 2 \times U_{\text{max}}$; 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 \pm 5) $^{\circ}\text{C}$; (2 \pm 0.2) s	Good tinning ($\geq 95\%$ covered) no visible damage
			Solder bath method; Sn96.5Ag3Cu0.5; non-activated flux; (245 \pm 5) $^{\circ}\text{C}$; (3 \pm 0.3) s	Good tinning ($\geq 95\%$ covered) no visible damage
4.8.4.2	-	Temperature coefficient	(20/- 55/20) $^{\circ}\text{C}$ and (20/125/20) $^{\circ}\text{C}$	± 100 ppm/K, ± 200 ppm/K
4.32	21 (U _{U3})	Shear (adhesion)	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 $^{\circ}\text{C}$; 30 min at 125 $^{\circ}\text{C}$ 5 cycles 1000 cycles	$\pm (0.5\% R + 0.05 \Omega)$ $\pm (1\% R + 0.05 \Omega)$
4.23	-	Dry heat	-	$\pm (2\% R + 0.1 \Omega)$
4.23.2	2 (Ba)	Damp heat, cyclic	125 $^{\circ}\text{C}$; 16 h	
4.23.3	30 (Db)	cold	55 $^{\circ}\text{C}$; $\geq 90\%$ RH; 24 h; 1 cycle	
4.23.4	1 (Aa)	Low air pressure	- 55 $^{\circ}\text{C}$; 2 h	
4.23.5	13 (M)	-	1 kPa; (25 \pm 10) $^{\circ}\text{C}$; 1 h	
4.23.6	30 (Db)	Damp heat, cyclic	55 $^{\circ}\text{C}$; $\geq 90\%$ RH; 24 h; 5 cycle	
4.23.7	-	D.C. load	$U = \sqrt{P_{70}} \times \bar{R}$	
4.25.1	-	Endurance at 70 $^{\circ}\text{C}$	$U = \sqrt{P_{70}} \times \bar{R} \leq U_{\text{max}}$ 1.5 h on; 0.5 h off; 70 $^{\circ}\text{C}$; 1000 h 70 $^{\circ}\text{C}$; 8000 h	$\pm (2\% R + 0.1 \Omega)$ $\pm (4\% R + 0.1 \Omega)$
4.18.2	58 (Td)	Resistance to soldering heat	Solder bath method; (260 \pm 5) $^{\circ}\text{C}$; (10 \pm 1) s	$\pm (0.5\% R + 0.05 \Omega)$
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 \pm 2) $^{\circ}\text{C}$; (93 \pm 3) % RH; 56 days	$\pm (1\% R + 0.05 \Omega)$
4.25.3	-	Endurance at upper category temperature	155 $^{\circ}\text{C}$; 1000 h	$\pm (2\% R + 0.1 \Omega)$
4.40	-	Electrostatic discharge (human body model)	IEC 61340-3-1; 3 positive and 3 negative discharges; ESD voltage according to size	$\pm (1\% R + 0.05 \Omega)$
4.29	45 (XA)	Component solvent resistance	Isopropyl alcohol; 50 $^{\circ}\text{C}$; method 2	No visible damage
4.30	45 (XA)	Solvent resistance of marking	Isopropyl alcohol; 50 $^{\circ}\text{C}$; method 1; toothbrush	Marking legible, no visible damage
4.22	6 (Fc)	Vibration, endurance by sweeping	f = 10 Hz to 2000 Hz; x, y, z ≤ 1.5 mm; A ≤ 200 m/s ² ; 10 sweeps per axis	$\pm (0.5\% R + 0.05 \Omega)$
4.37	-	Periodic electric overload	$U = \sqrt{15} \times \sqrt{P_{70}} \times \bar{R} \leq 2 \times U_{\text{max}}$ 0.1 s on; 2.5 s off; 1000 cycles	$\pm (1\% R + 0.05 \Omega)$
4.27	-	Single pulse high voltage overload, 10 μs /700 μs	$\dot{U} = 10 \times \sqrt{P_{70}} \times \bar{R} \leq 2 \times U_{\text{max}}$ 10 pulses	$\pm (1\% R + 0.05 \Omega)$

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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