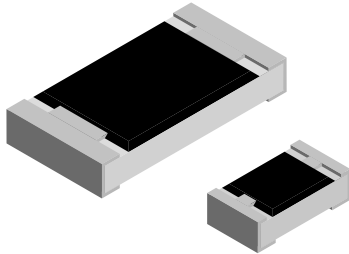


Pulse Proof, High Power Thick Film Chip Resistors



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

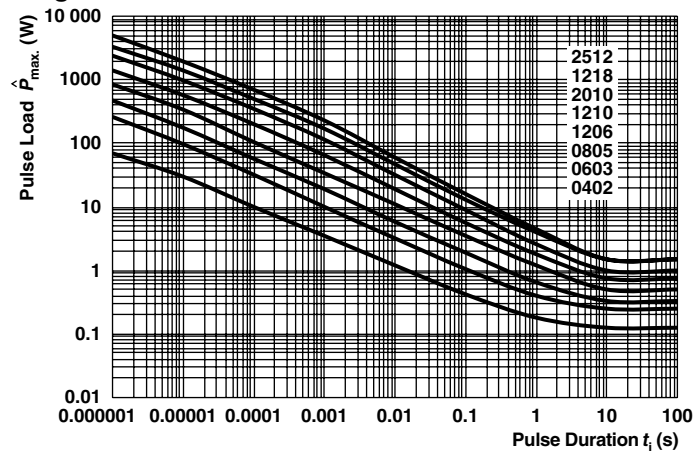
DIMENSIONS in millimeters



SIZE		DIMENSIONS					SOLDER PAD DIMENSIONS					
INCH	METRIC	L	W	H	T1	T2	REFLOW SOLDERING			WAVE SOLDERING		
							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

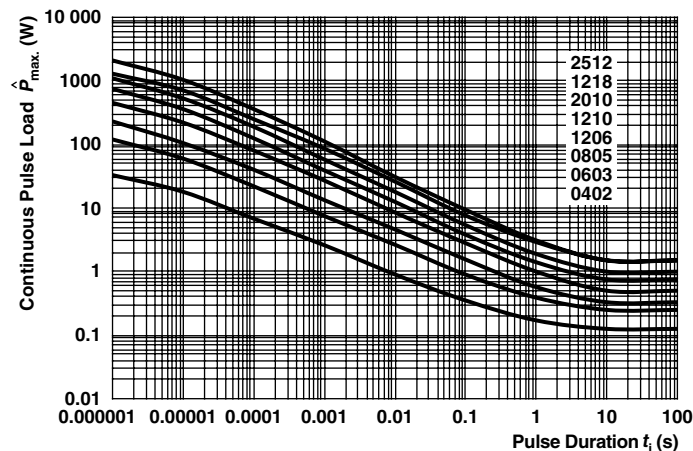
FUNCTIONAL PERFORMANCE

Single Pulse



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

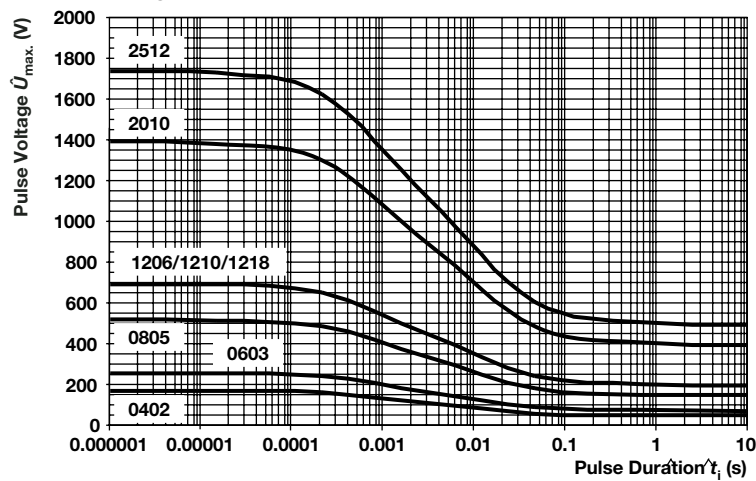
Continuous Pulse



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

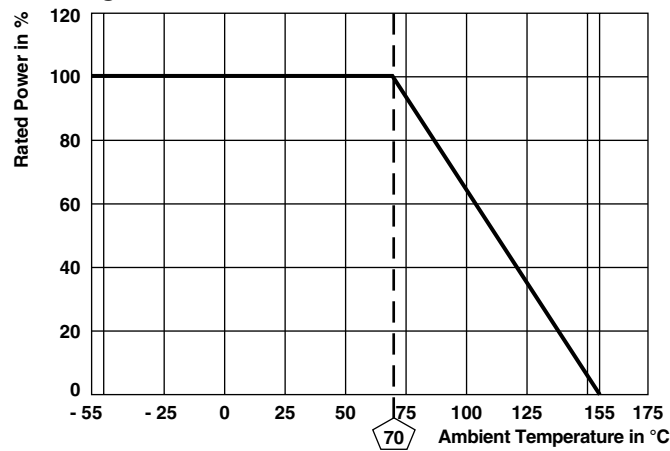


Pulse Voltage



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 \leq 1.5 mm; A \leq 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



Disclaimer

All product specifications and data are subject to change without notice.

Vishay Intertechnology, Inc., its affiliates, agents, and employees, and all persons acting on its or their behalf (collectively, "Vishay"), disclaim any and all liability for any errors, inaccuracies or incompleteness contained herein or in any other disclosure relating to any product.

Vishay disclaims any and all liability arising out of the use or application of any product described herein or of any information provided herein to the maximum extent permitted by law. The product specifications do not expand or otherwise modify Vishay's terms and conditions of purchase, including but not limited to the warranty expressed therein, which apply to these products.

No license, express or implied, by estoppel or otherwise, to any intellectual property rights is granted by this document or by any conduct of Vishay.

The products shown herein are not designed for use in medical, life-saving, or life-sustaining applications unless otherwise expressly indicated. Customers using or selling Vishay products not expressly indicated for use in such applications do so entirely at their own risk and agree to fully indemnify Vishay for any damages arising or resulting from such use or sale. Please contact authorized Vishay personnel to obtain written terms and conditions regarding products designed for such applications.

Product names and markings noted herein may be trademarks of their respective owners.