

FEATURES



- Stability $\Delta R/R = 1 \%$ for 1000 h at 70 ° C
- 2 mm pitch packaging option for 0603 size
- ROHS
- Pure tin solder contacts on Ni barrier layer HALOGEN provides compatibility with lead (Pb)-free and lead containing soldering processes
- containing soldering processesMetal glaze on high quality ceramic
- 3 3 1 7
- · AEC-Q200 qualified
- Material categorization: For definitions of compliance please see www.vishay.com/doc?99912

ELEC	TRICAL	SPECIFICATIO	NS									
INCH METRIC		RATED DISSIPATION P _{70°C} W	LIMITING ELEMENT VOLTAGE U _{max.} AC/DC	TEMPERATURE COEFFICIENT ppm/K	TOLERANCE %	RESISTANCE RANGE Ω	SERIES					
0402	RR 1005M	0.063	50	± 100 ± 200	± 1 ± 5	1R0 to 10M	E24; E96 E24					
		Zero-Ohm-Resistor	$R_{\text{max.}} = 20 \text{ m}\Omega$	o, <i>I</i> _{max.} at 70 °C = 1.	5 A							
0603	RR 1608M	0.10	75	± 100 ± 200	± 1 ± 5	1R0 to 10M	E24; E96 E24					
		Zero-Ohm-Resistor	$R_{\text{max.}} = 20 \text{ m}\Omega$	2, I _{max.} at 70 °C = 2.	0 A		•					
0805	0805	0805	RR 2012M	0.125	150	± 100 ± 200	± 1 ± 5	1R0 to 10M	E24; E96 E24			
		Zero-Ohm-Resistor: $R_{\text{max.}}$ = 20 m Ω , $I_{\text{max.}}$ at 70 °C = 2.5 A										
1206	RR 3216M	0.25	200	± 100 ± 200	± 1 ± 5	1R0 to 10M	E24; E96 E24					
		Zero-Ohm-Resistor: $R_{\text{max.}} = 20 \text{ m}\Omega$, $I_{\text{max.}}$ at 70 °C = 3.5 A										
1210	1210	RR 3225M	0.5	200	± 100 ± 200	± 1 ± 5	1R0 to 10M	E24; E96 E24				
		Zero-Ohm-Resistor: $R_{\text{max.}} = 20 \text{ m}\Omega$, $I_{\text{max.}}$ at 70 °C = 5.0 A										
1218	1218	RR 3246M	1.0	200	± 100 ± 200	± 1 ± 5	1R0 to 2M2	E24; E96 E24				
		Zero-Ohm-Resistor: $R_{\text{max.}} = 20 \text{ m}\Omega$, $I_{\text{max.}}$ at 70 °C = 7.0 A										
2010	2010	RR 5025M	0.75	400	± 100 ± 200	± 1 ± 5	1R0 to 10M	E24; E96 E24				
		Zero-Ohm-Resistor	$R_{\text{max.}} = 20 \text{ m}\Omega$	$I_{\text{max.}}$ at 70 °C = 6.0	0 A							
2512	RR 6332M	1.0	500	± 100 ± 200	± 1 ± 5	1R0 to 10M	E24; E96 E24					
		Zero-Ohm-Resistor	$R_{\text{max.}} = 20 \text{ m}\Omega$	$I_{\text{max.}}$ at 70 °C = 7.	0 A	Zero-Ohm-Resistor: $R_{\text{max.}} = 20 \text{ m}\Omega$, $I_{\text{max.}}$ at 70 °C = 7.0 A						
	1000 0402 0603 0805 1206 1210 1218	INCH METRIC 0402 RR 1005M 0603 RR 1608M 0805 RR 2012M 1206 RR 3216M 1210 RR 3225M 1218 RR 3246M 2010 RR 5025M	INCH METRIC RATED DISSIPATION P70°C W 0402 RR 1005M 0.063 2ero-Ohm-Resistor 0.10 0805 RR 2012M 0.125 2ero-Ohm-Resistor Zero-Ohm-Resistor 1206 RR 3216M 0.25 1210 RR 3225M 0.5 1210 RR 3246M 1.0 2212 RR 5025M 0.75 2ero-Ohm-Resistor 2ero-Ohm-Resistor 2512 RR 6332M 1.0	NCH METRIC DISSIPATION P70 °C W	NCH METRIC DISSIPATION P70 °C W DISSIPATION P70 °C Umax. AC/DC DISSIPATION P70 °C Umax. AC/DC DISSIPATION P70 °C Umax. AC/DC DISSIPATION DISSIPATION	SIZE RATED DISSIPATION PTO "C W" LIMITING ELEMENT VOLTAGE Umax. AC/DC RR 1005M $\frac{1}{2}$ $\frac{1}{2}$	SIZE PRATED DISSIPATION Pro					

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 data sheet "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.

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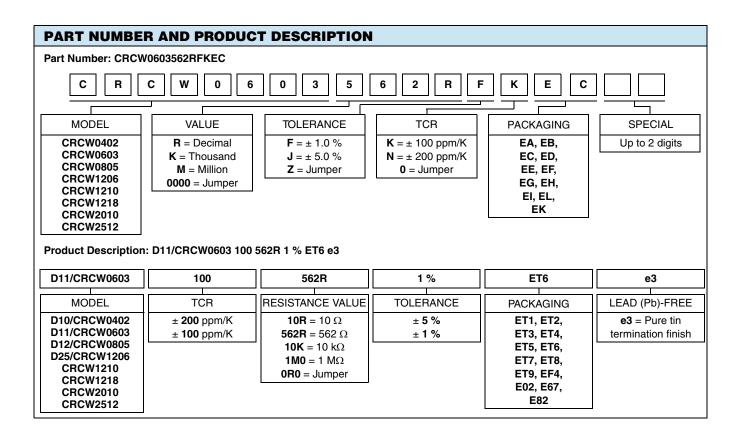
Standard Thick Film Chip Resistors



TECHNICAL SPECIFICATIONS									
PARAMETER	UNIT	D10/ CRCW0402	D11/ CRCW0603	D12/ CRCW0805	D25/ CRCW1206	CRCW1210	CRCW1218	CRCW2010	CRCW2512
Rated dissipation P_{70} ⁽¹⁾	W	0.063	0.1	0.125	0.25	0.5	1.0	0.75	1.0
Limiting element voltage U _{max.} AC/DC	V	50	75	150	200	200	200	400	500
Insulation voltage Uins (1 min)	V	> 75	> 100	> 200	> 300	> 300	> 300	> 300	> 300
Insulation resistance	Ω	> 109							
Category temperature range	°C	- 55 to + 155							
Failure rate	h ⁻¹	< 0.1 x 10 ⁻⁹							
Weight	mg	0.65	2	5.5	10	16	29.5	25.5	40.5

Note

⁽¹⁾ 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.



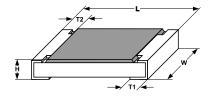
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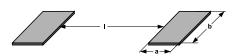


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PACKAGING								
MODEL	CODE	QUANTITY	CARRIER TAPE	WIDTH	PITCH	REEL DIAMETER		
CRCW0402	ED = ET7	10 000		8 mm	2 mm	180 mm/7"		
ChCVV0402	EE = EF4	50 000				330 mm/13"		
	EI = ET2	5000				180 mm/7"		
	ED = ET3	10 000		8 mm	2 mm	180 mm/7"		
	EL = ET4	20 000		0 111111	2 111111	285 mm/11.25"		
CRCW0603	EE = ET8	50 000				330 mm/13"		
	EA = ET1	5000				180 mm/7"		
	EB = ET5	10 000		8 mm	4 mm	285 mm/11.25"		
	EC = ET6	20 000	Paper tape acc. to IEC 60068-3			330 mm/13"		
	EA = ET1	5000	Type I	8 mm	4 mm	180 mm/7"		
CRCW0805	EB = ET5	10 000	.,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,			285 mm/11.25"		
	EC = ET6	20 000				330 mm/13"		
	EA = ET1	5000		8 mm	4 mm	180 mm/7"		
CRCW1206	EB = ET5	10 000				285 mm/11.25"		
	EC = ET6	20 000				330 mm/13"		
	EA = ET1	5000				180 mm/7"		
CRCW1210	EB = ET5	10 000		8 mm	4 mm	285 mm/11.25"		
	EC = ET6	20 000				330 mm/13"		
CRCW1218	EK = ET9	4000		12 mm	4 mm	180 mm/7"		
CRCW2010	EF = E02	4000	Blister tape acc.	12 mm	4 mm	180 mm/7"		
CRCW2512	EG = E67	2000	to IEC 60068-3 Type II	12 mm	8 mm	190 mm/7"		
UNUVV2512	EH = E82	4000	.,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,	12 11111	4 mm	180 mm/7"		

DIMENSIONS



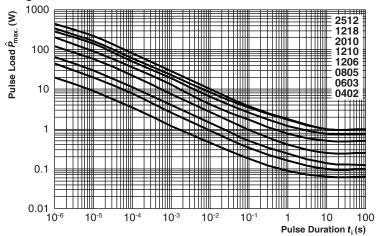


SIZE DIMENSIONS in millimeters						SOLDER PAD DIMENSIONS in millimeters							
3	OIZE		DIMENSIONS III IIIIIIIIIIleteis					REFLOW SOLDERING			WAVE SOLDERING		
INCH	METRIC	L	W	Н	T1	T2	а	b	I	а	b	- 1	
0402	1005	1.0 ± 0.05	0.5 ± 0.05	0.35 ± 0.05	0.25 ± 0.05	0.2 ± 0.1	0.4	0.6	0.5				
0603	1608	1.55 ^{+ 0.10} - 0.05	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 + 0.20 - 0.10	1.25 ± 0.15	0.45 ± 0.05	0.3 + 0.20 - 0.10	0.3 ± 0.2	0.7	1.3	1.2	0.9	1.3	1.3	
1206	3216	3.2 + 0.10	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 + 0.10	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	



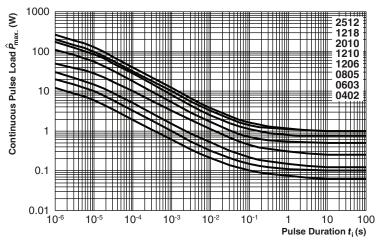
FUNCTIONAL PERFORMANCE

Single Pulse

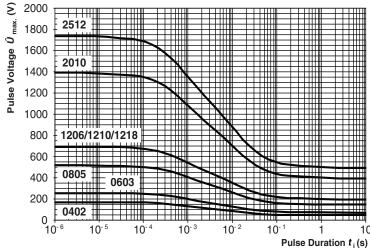


Maximum pulse load, single pulse; applicable if $\bar{P} \longrightarrow 0$ and n < 1000 and $\hat{U} \le \hat{U}_{max}$; for permissible resistance change equivalent to 8000 h operation

Continuous Pulse



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

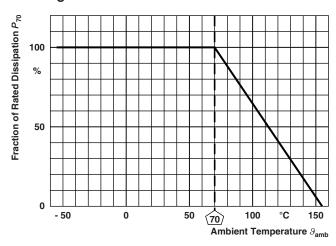


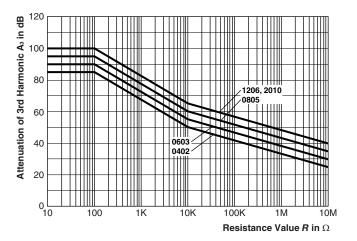
Maximum pulse voltage, single and continuous pulses; applicable if $\hat{P} \le \hat{P}_{\text{max}}$; for permissible resistance change equivalent to 8000 h operation

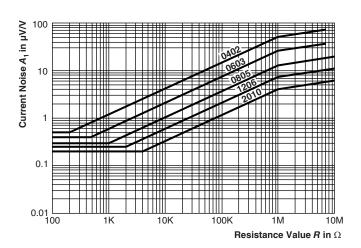
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Derating









				REQUIRE			
EN	IEC		_	PERMISSIBLE CHANGE (△R) SIZE 0402 to 2512			
60115-1 CLAUSE	60068-2 TEST METHOD	TEST	PROCEDURE	STABILITY CLASS 1 OR BETTER	STABILITY CLASS 2 OR BETTER		
- 1			Stability for product types:				
			D/CRCW e3	1 Ω to 1	0 ΜΩ		
4.5	-	Resistance	-	± 1 %	± 5 %		
4.7	-	Voltage proof	$U = 1.4 \times U_{ins}$; 60 s	No flashover o	r breakdown		
4.13	-	Short time overload	$U = 2.5 \times \sqrt{P_{70} \times R}$ $\leq 2 \times U_{\text{max.}};$ duration: Acc. to style	$\pm (0.25 \% R + 0.05 \Omega)$	$\pm (0.5 \% R + 0.05 \Omega)$		
4.17.0			Solder bath method; Sn60Pb40 non activated flux; (235 ± 5) °C (2 ± 0.2) s	Good tinning (≥ no visible			
4.17.2 58 (Td) Solderability		Solderability	Solder bath method; Sn96.5Ag3Cu0.5 non-activated flux; (245 ± 5) °C (3 ± 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 (Uu ₃)	Shear (adhesion)	RR 1608 and smaller: 9 N RR 2012 and larger: 45 N	No visible	damage		
4.33	21 (Uu ₁)	Substrate bending	Depth 2 mm; 3 times	No visible damage, no ope ± (0.25 % R			
4.19	14 (Na)	Rapid change of temperature	30 min. at - 55 °C; 30 min. at 125 °C 5 cycles 1000 cycles	\pm (0.25 % R + 0.05 Ω) \pm (1 % R + 0.05 Ω)	± (0.5 % R + 0.05 Ω) ± (1 % R + 0.05 Ω)		
4.23	-	Climatic sequence:	-				
4.23.2	2 (Ba)	Dry heat	125 °C; 16 h				
4.23.3	30 (Db)	Damp heat, cyclic	55 °C; ≥ 90 % RH; 24 h; 1 cycle				
4.23.4	1 (Aa)	Cold	- 55 °C; 2 h	\pm (1 % R + 0.05 Ω)	\pm (2 % R + 0.1 Ω)		
4.23.5	13 (M)	Low air pressure	1 kPa; (25 ± 10) °C; 1 h				
4.23.6	30 (Db)	Damp heat, cyclic	55 °C; ≥ 90 % RH; 24 h; 5 cycles				
4.23.7	-	DC load	$U = \sqrt{P_{70} \times R}$				
4.05.4		Endurance	$U = \sqrt{P_{70} \times R} \le U_{\text{max}};$ 1.5 h on; 0.5 h off;				
4.25.1	-	at 70 °C	70 °C; 1000 h	\pm (1 % R + 0.05 Ω)	± (2 % R + 0.1 Ω)		
			70 °C; 8000 h	± (2 % R + 0.1 Ω)	± (4 % R + 0.1 Ω)		



TEST PROCEDURES AND REQUIREMENTS								
	IEC			REQUIREMENTS PERMISSIBLE CHANGE (ΔR)				
EN 60115-1	60068-2	TEST	PROCEDURE	SIZE 0402 to 2512				
CLAUSE	TEST METHOD	1201	THOUSE	STABILITY CLASS 1 OR BETTER	STABILITY CLASS 2 OR BETTER			
			Stability for product types:					
			D/CRCW e3	1 Ω to 1	0 ΜΩ			
4.18.2	58 (Td)	Resistance to soldering heat	Solder bath method (260 ± 5) °C; (10 ± 1) s	± (0.25 % R + 0.05 Ω)	± (0.5 % R + 0.05 Ω)			
4.35	-	Flamability, needle flame test	IEC 60695-11-5; 10 s	No burning after 30 s				
4.24	.24 78 (Cab) Damp heat, steady state		(40 ± 2) °C; (93 ± 3) % RH; 56 days	± (1 % <i>R</i> +	- 0.05 Ω)			
4.25.3	-	Endurance at upper category temperature	155 °C, 1000 h	± (1 % R + 0.05 Ω)	± (2 % R + 0.1 Ω)			
4.40	4.40 - Electrostatic discharge (human body model)		IEC 61340-3-1; 3 pos. + 3 neg. discharges; ESD voltage acc. to size	± (1 % <i>R</i> + 0.05 Ω)				
4.29	45 (XA)	Component solvent resistance	Isopropyl alcohol; 50 °C; method 2	No visible	damage			
4.30	4.30 45 (XA) Solvent resistance of marking		Isopropyl alcohol; 50 °C; method 1, toothbrush	Marking no visible	•			
4.22	6 (Fc)	Vibration, endurance by sweeping	$f = 10 \text{ Hz to } 2000 \text{ Hz}; \\ x, y, z \le 1.5 \text{ mm}; \\ A \le 200 \text{ m/s}^2; \\ 10 \text{ sweeps per axis}$	± (0.25 % R + 0.05 Ω)	± (0.5 % R + 0.05 Ω)			
4.37	-	Periodic electric overload	$U = \sqrt{15 \times P_{70} \times R}$ $\leq 2 \times U_{\text{max.}};$ 0.1 s on; 2.5 s off; 1000 cycles	± (1 % <i>R</i> +	- 0.05 Ω)			
4.27	Single pulse high 27 - voltage overload, 10 µs/700 µs		$\hat{U} = 10 \text{ x } \sqrt{P_{70} \text{ x } R}$ $\leq 2 \text{ x } U_{\text{max.}};$ 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-x, environmental test procedures

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



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