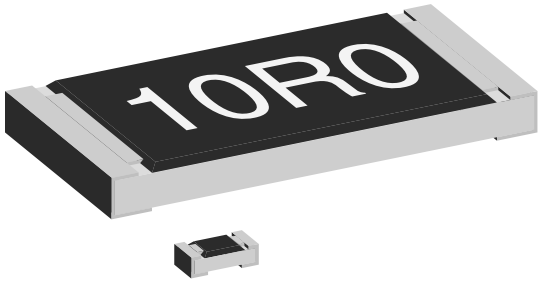
Lead (Pb)-free Thick Film, Rectangular Commodity Chip Resistors



FEATURES

- High volume product suitable for commercial applications
- Stability ($\Delta R/R \leq 1$ % for 1000 h at 70 °C)
- Lead (Pb)-free solder contacts on Ni barrier layer
- Metal glaze on ceramic
- Material categorization: for definitions of compliance please see www.vishay.com/doc?99912

RoHS COMPLIANT

HALOGEN FREE

STANDARD ELECTRICAL SPECIFICATIONS

MODEL	CASE SIZE INCH	CASE SIZE METRIC	POWER RATING $P_{70\,°C}$ W	LIMITING ELEMENT VOLTAGE MAX. V ≅	TEMPERATURE COEFFICIENT ppm/K	TOLERANCE %	RESISTANCE RANGE Ω	E-SERIES
CRCW0402...C	0402	RR 1005M	0.063	50	± 100	± 1	1R0 to 10M	E24; E96
					± 200	± 5	1R0 to 10M	E24
			Zero-Ohm-Resistor: $R_{max.}$ = 20 mΩ, $I_{max.}$ at 70 °C = 1.5 A					
CRCW0603...C	0603	RR 1608M	0.10	75	± 100	± 1	1R0 to 10M	E24; E96
					± 200	± 5	1R0 to 10M	E24
			Zero-Ohm-Resistor: $R_{max.}$ = 20 mΩ, $I_{max.}$ at 70 °C = 2.0 A					
CRCW0805...C	0805	RR 2012M	0.125	150	± 100	± 1	1R0 to 10M	E24; E96
					± 200	± 5	1R0 to 10M	E24
			Zero-Ohm-Resistor: $R_{max.}$ = 20 mΩ, $I_{max.}$ at 70 °C = 2.5 A					
CRCW1206...C	1206	RR 3216M	0.25	200	± 100	± 1	1R0 to 10M	E24; E96
					± 200	± 5	1R0 to 10M	E24
			Zero-Ohm-Resistor: $R_{max.}$ = 20 mΩ, $I_{max.}$ at 70 °C = 3.5 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
- Power rating depends on the max. temperature at the solder point, the component placement density and the substrate material

TECHNICAL SPECIFICATIONS

PARAMETER	UNIT	CRCW0402...C	CRCW0603...C	CRCW0805...C	CRCW1206...C
Rated dissipation at 70°C (1)	W	0.063	0.10	0.125	0.25
Limiting element voltage $U_{max.}$ AC/DC	V	50	75	150	200
Insulation voltage $U_{ins.}$ (1 min)	V	> 75	> 100	> 200	> 300
Insulation resistance	Ω	$> 10^9$			
Category temperature range	°C	- 55 to + 155			
Failure rate	h^{-1}	0.1×10^{-9}			
Weight/1000 pieces	g	0.65	2	5.5	10

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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PART NUMBER AND PRODUCT DESCRIPTION

PART NUMBER: CRCW0603562RFKECC

C	R	C	W	0	6	0	3	5	6	2	R	F	K	E	C	C	

MODEL/SIZE	VALUE	TOLERANCE	TCR	PACKAGING	SPECIAL
CRCW0402 **CRCW0603** **CRCW0805** **CRCW1206**	**R** = decimal **K** = thousand **M** = million **0000** = jumper	**F** = ± 1.0 % **J** = ± 5.0 % **Z** = jumper	**K** = ± 100 ppm/K **N** = ± 200 ppm/K **0** = jumper	**EA, EB,** **EC, ED,** **EE**	Up to 2 digits **C** = commodity

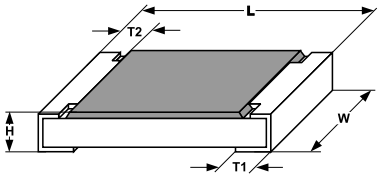
PRODUCT DESCRIPTION: CRCW0603-C 100 562R 1 % ET6 E3

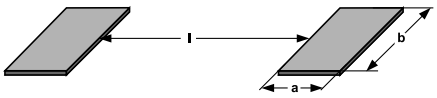
CRCW0603-C	100	562R	1 %	ET6	e3
MODEL	TCR	RESISTANCE VALUE	TOLERANCE	PACKAGING	LEAD (Pb)-FREE
CRCW0402-C **CRCW0603-C** **CRCW0805-C** **CRCW1206-C**	**± 200** ppm/K **± 100** ppm/K	**10R** = 10 Ω **562R** = 562 Ω **10K** = 10.0 kΩ **1M** = 1 MΩ **0R0** = jumper	**± 5 %** **± 1 %**	**ET1, ET5,** **ET6, ET7,** **EF4**	**e3** = pure tin termination finish

PACKAGING

TYPE / SIZE	CODE	QUANTITY	PACKAGING STYLE	WIDTH	PITCH	PACKAGING DIMENSIONS
CRCW0402…C	ED = ET7	10 000	Paper tape acc. to IEC 60286-3, Type 1a	8 mm	2 mm	Ø 180 mm/7"
	EE = EF4	50 000				Ø 330 mm/13"
CRCW0603…C	EA = ET1	5000			4 mm	Ø 180 mm/7"
	EB = ET5	10 000				Ø 254 mm/10"
	EC = ET6	20 000				Ø 330 mm/13"
CRCW0805…C	EA = ET1	5000			4 mm	Ø 180 mm/7"
	EB = ET5	10 000				Ø 254 mm/10"
	EC = ET6	20 000				Ø 330 mm/13"
CRCW1206…C	EA = ET1	5000			4 mm	Ø 180 mm/7"
	EB = ET5	10 000				Ø 254 mm/10"
	EC = ET6	20 000				Ø 330 mm/13"

DIMENSIONS





SIZE		DIMENSIONS (in millimeters)					SOLDER PAD DIMENSIONS [1] (in millimeters)					
							REFLOW SOLDERING			WAVE SOLDERING		
INCH	METRIC	L	W	H	T1	T2	a	b	l	a	b	l
0402	1005	1.0 ± 0.10	0.5 ± 0.05	0.30 ± 0.05	0.25 ± 0.10	0.2 ± 0.1	0.4	0.6	0.5			
0603	1608	1.60 ± 0.10	0.80 ± 0.10	0.45 ± 0.10	0.3 ± 0.2	0.3 ± 0.2	0.5	0.9	1.0	0.9	0.9	1.0
0805	2012	2.0 ± 0.10	1.25 ± 0.15	0.50 ± 0.10	0.35 ± 0.15	0.35 ± 0.2	0.7	1.3	1.2	0.9	1.3	1.3
1206	3216	3.05 ± 0.10	1.55 ± 0.10	$0.55^{+0.10}_{-0.05}$	0.35 ± 0.15	0.45 ± 0.2	0.9	1.7	2.0	1.1	1.7	2.3

Note

(1) The rated dissipation applies only if the permitted film temperature is not exceeded. Furthermore, a high level of ambient temperature or of power dissipation may raise the temperature of the solder joint, hence special solder alloys or board materials maybe required to maintain the reliability of the assembly. Specified power rating above 125 °C requires dedicated heat-sink pads, which depend on board materials. The given solder pad dimensions reflect the considerations for board design and assembly as outlined e.g. in standards IEC 61188-5-x, or in publication IPC-7351. They do not guarantee any supposed thermal properties, particularly as these are also strongly influenced by many other parameters. Still the given solder pad dimensions will be found adequate for most general applications

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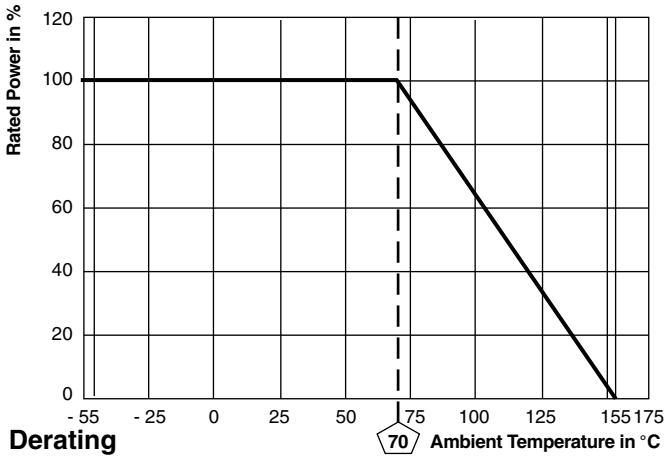
FUNCTIONAL PERFORMANCE



TEST PROCEDURES AND REQUIREMENTS

EN 60115-1 CLAUSE	IEC 60068-2 TEST METHOD	TEST	PROCEDURE		REQUIREMENTS PERMISSIBLE CHANGE (ΔR) STABILITY CLASS 1 OR BETTER	REQUIREMENTS PERMISSIBLE CHANGE (ΔR) STABILITY CLASS 2 OR BETTER
			Stability for product types: CRCW...C e3		1 Ω to 10 MΩ	1 Ω to 10 MΩ
4.5	-	Resistance	-		± 1 %	± 5 %
4.8.4.2	-	Temperature coefficient	(20/- 55/20) °C and (20/125/20) °C		± 100 ppm/K	± 200 ppm/K
4.13	-	Short time overload	$U = 2.5 \times \sqrt{P_{70} \times R} \leq 2 \times U_{max.}$; 5 s		± (2 % R + 0.1 Ω)	
4.17.5	58 (Td)	Solderability	Pre-aging 4 h at 155 °C, dryheat	Solder bath method; Sn60Pb40 non activated flux; (235 ± 5) °C (2 ± 0.2) s	Good tinning (≥ 95 % covered) no visible damage	
				Solder bath method; Sn96.5Ag3Cu0.5 non activated flux; (245 ± 5) °C (3 ± 0.3) s	Good tinning (≥ 95 % covered) no visible damage	
4.18.2	58 (Td)	Resistance to soldering heat	Solder bath method (260 ± 5) °C; (10 ± 1) s		± (1% R + 0.05 Ω)	
4.19	14 (Na)	Rapid change of temperature	30 min. at - 55 °C; 30 min. at 125 °C; 5 cycles		± (0.25 % R + 0.05 Ω)	± (0.5 % R + 0.05 Ω)
4.24	78 (Cab)	Damp heat, steady state	(40 ± 2) °C; 56 days; (93 ± 3) % RH		± (1 % R + 0.05 Ω)	± (2 % R + 0.1 Ω)
4.36	-	Operation at low temperature	-55 °C, 1 h		± (1 % R + 0.05 Ω)	
4.25.1	-	Endurance at 70 °C	$U = \sqrt{P_{70} \times R} \leq U_{max.}$; 1.5 h on; 0.5 h off;			
			70 °C; 1000 h		± (1 % R + 0.05 Ω)	± (2 % R + 0.1 Ω)
			70 °C; 8000 h		± (2 % R + 0.1 Ω)	± (4 % R + 0.1 Ω)
4.25.3	-	Endurance at upper category temperature	155 °C, 1000 h		± (1 % R + 0.05 Ω)	± (2 % R + 0.1 Ω)

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APPLICABLE SPECIFICATIONS	
• 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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