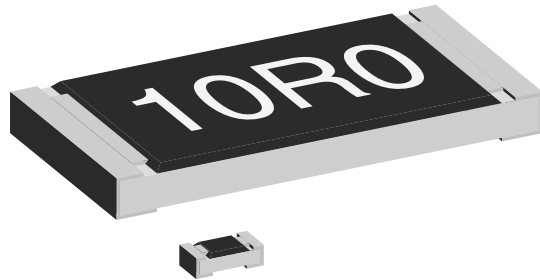


# Lead (Pb)-free Thick Film, Rectangular Commodity Chip Resistors



## FEATURES

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



**RoHS**  
COMPLIANT  
HALOGEN  
**FREE**

STANDARD ELECTRICAL SPECIFICATIONS									
TYPE	CASE SIZE IMPERIAL	CASE SIZE METRIC	POWER RATING $P_{70}$ W	LIMITING ELEMENT VOLTAGE $U_{max}$ AC/RMS/DC V	TEMPERATURE COEFFICIENT ppm/K	TOLERANCE %	RESISTANCE RANGE $\Omega$	SERIES	
CRCW01005...BC	01005	RR0402M	0.031	15	$\pm 250$	$\pm 1$	10.0 to 1M	E24; E96	
						$\pm 2, \pm 5$		E24	
						$-200 / +600$	$\pm 1$	1.0 to 9.76	E24; E96
Zero-Ohm-Resistor: $R_{max.} = 50\text{ m}\Omega$ , $I_{max.} = 0.5\text{ A}$						$\pm 2, \pm 5$	1.0 to 9.1	E24	
CRCW0201...BC	0201	RR 0603M	0.05	30	$\pm 200$	$\pm 0.5$	10R to 10M	E96	
							- 200/+ 400		1R0 to 9R76
						$\pm 100$	$\pm 1$	47R to 1M	E24; E96
								$\pm 200$	
						$- 200 / + 400$	$\pm 5$	1R0 to 9R76	E24
								$\pm 200$	
Zero-Ohm-Resistor: $R_{max.} = 50\text{ m}\Omega$ , $I_{max.}$ at 70 °C = 1.0 A						$- 200 / + 400$	1R0 to 9R1		
CRCW0402...BC	0402	RR 1005M	0.063	50	$\pm 100$	$\pm 1$	1R0 to 10M	E24; E96	
							$\pm 200$		1R0 to 9R76
						$\pm 200$	$\pm 5$	1R0 to 10M	E24
Zero-Ohm-Resistor: $R_{max.} = 20\text{ m}\Omega$ , $I_{max.}$ at 70 °C = 1.5 A									
CRCW0603...BC	0603	RR 1608M	0.10	75	$\pm 100$	$\pm 1$	1R0 to 10M	E24; E96	
							$\pm 200$		1R0 to 9R76
						$\pm 200$	$\pm 5$	1R0 to 10M	E24
Zero-Ohm-Resistor: $R_{max.} = 20\text{ m}\Omega$ , $I_{max.}$ at 70 °C = 2.0 A									
CRCW0805...BC	0805	RR 2012M	0.125	150	$\pm 100$	$\pm 1$	1R0 to 10M	E24; E96	
							$\pm 200$		1R0 to 9R76
						$\pm 200$	$\pm 5$	1R0 to 10M	E24
Zero-Ohm-Resistor: $R_{max.} = 20\text{ m}\Omega$ , $I_{max.}$ at 70 °C = 2.5 A									
CRCW1206...BC	1206	RR 3216M	0.25	200	$\pm 100$	$\pm 1$	1R0 to 10M	E24; E96	
							$\pm 200$		1R0 to 9R76
						$\pm 200$	$\pm 5$	1R0 to 10M	E24
Zero-Ohm-Resistor: $R_{max.} = 20\text{ m}\Omega$ , $I_{max.}$ at 70 °C = 3.5 A									
CRCW1210...BC	1210	RR 3225M	0.50	200	$\pm 100$	$\pm 1$	1R0 to 10M	E24; E96	
							$\pm 200$		1R0 to 9R76
						$\pm 200$	$\pm 5$	1R0 to 10M	E24
Zero-Ohm-Resistor: $R_{max.} = 20\text{ m}\Omega$ , $I_{max.}$ at 70 °C = 4.0 A									
CRCW2010...BC	2010	RR 5025M	0.75	400	$\pm 100$	$\pm 1$	1R0 to 10M	E24; E96	
							$\pm 200$		1R0 to 9R76
						$\pm 200$	$\pm 5$	1R0 to 10M	E24
Zero-Ohm-Resistor: $R_{max.} = 20\text{ m}\Omega$ , $I_{max.}$ at 70 °C = 5.0 A									
CRCW2512...BC	2512	RR 6332M	1.0	500	$\pm 100$	$\pm 1$	1R0 to 10M	E24; E96	
							$\pm 200$		1R0 to 9R76
						$\pm 200$	$\pm 5$	1R0 to 10M	E24
Zero-Ohm-Resistor: $R_{max.} = 20\text{ m}\Omega$ , $I_{max.}$ at 70 °C = 7.0 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 maximum temperature at the solder point, the component placement density and the substrate material.



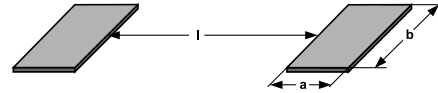
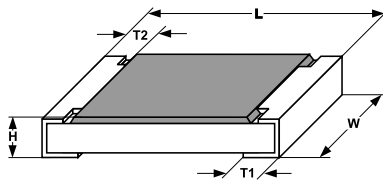
TECHNICAL SPECIFICATIONS										
PARAMETER	UNIT	CRCW 01005...BC	CRCW 0201...BC	CRCW 0402...BC	CRCW 0603...BC	CRCW 0805...BC	CRCW 1206...BC	CRCW 1210...BC	CRCW 2010...BC	CRCW 2512...BC
Rated Dissipation $P_{70}^{(1)}$	W	0.031	0.050	0.063	0.10	0.125	0.25	0.50	0.75	1.0
Limiting Element Voltage $U_{max. AC_{RMS}/DC}$	V	15	30	50	75	150	200	200	400	500
Insulation Voltage $U_{ins}$ (1 min)	V	30	50	75	100	200	300	300	300	300
Insulation Resistance	$\Omega$	> $10^9$								
Operating Temperature Range	$^{\circ}C$	-55 to +125			-55 to +155					
Failure Rate	$^{\circ}C$	$0.3 \times 10^{-9}$								
Mass	mg	0.07	0.17	0.65	2	5.5	10	16	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.

PART NUMBER AND PRODUCT DESCRIPTION																	
<b>PART NUMBER: CRCW0603562RFKTCBC</b>																	
C	R	C	W	0	6	0	3	5	6	2	R	F	K	T	C	B	C
<b>TYPE</b>		<b>RESISTANCE</b>		<b>TOLERANCE</b>		<b>TCR</b>		<b>PACKAGING</b>		<b>Special</b>							
CRCW0100 CRCW0201 CRCW0402 CRCW0603 CRCW0805 CRCW1206 CRCW1210 CRCW2010 CRCW2512		R = decimal K = thousand M = million 0000 = jumper		D = ± 0.5 % F = ± 1.0 % G = ± 2.0 % J = ± 5.0 % Z = Jumper		K = ± 100 ppm/K N = ± 200 ppm/K R = ± 250 ppm/K X = -200 ppm/K / +400 ppm/K Y = -200 ppm/K / +600 ppm/K 0 = Jumper		TA, TB, TC, TD, TE, TF, TH, TI, TL		Up to 2 digits BC = commodity							
<b>PRODUCT DESCRIPTION: CRCW0603-BC 100 562R 1 % RT6 e3</b>																	
CRCW0603-BC		100		562R		1 %		RT6		e3							
<b>TYPE</b>		<b>TCR</b>		<b>RESISTANCE</b>		<b>TOLERANCE VALUE</b>		<b>PACKAGING</b>		<b>LEAD (Pb)-FREE</b>							
CRCW01005-BC CRCW0201-BC CRCW0402-BC CRCW0603-BC CRCW0805-BC CRCW1206-BC CRCW1210-BC CRCW2010-BC CRCW2512-BC		± 100 ppm/K ± 200 ppm/K ± 250 ppm/K -200 ppm/K / +400 ppm/K -200 ppm/K / +600 ppm/K		10R = 10 $\Omega$ 562R = 562 $\Omega$ 10K = 10.0 k $\Omega$ 1M = 1 M $\Omega$ 0R0 = Jumper		± 0.5 % ± 1 % ± 2 % ± 5 %		RT1, RT2, RT3, RT5, RT6, RT7, RF4, R02, R82		e3 = pure tin termination finish							

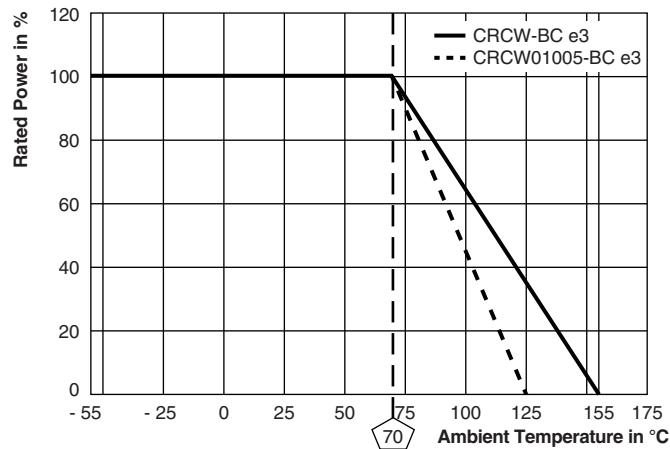
PACKAGING						
TYPE	CODE	QUANTITY	CARRIER TAPE	WIDTH	PITCH	REEL DIAMETER
CRCW01005...BC	TL = RT3	20 000	Paper tape acc. to IEC 60286-3, Type 1a	8 mm	2 mm	180 mm/7"
CRCW0201...BC	TD = RT7	10 000		8 mm	2 mm	180 mm/7"
	TI = RT2	20 000				254 mm/10"
	TE = RF4	50 000				330 mm/13"
CRCW0402...BC	TD = RT7	10 000		8 mm	2 mm	180 mm/7"
	TI = RT2	20 000				254 mm/10"
	TE = RF4	50 000				330 mm/13"
CRCW0603...BC	TA = RT1	5000		8 mm	4 mm	180 mm/7"
	TB = RT5	10 000				254 mm/10"
	TC = RT6	20 000				330 mm/13"
CRCW0805...BC	TA = RT1	5000		8 mm	4 mm	180 mm/7"
	TB = RT5	10 000				254 mm/10"
	TC = RT6	20 000				330 mm/13"
CRCW1206...BC	TA = RT1	5000		8 mm	4 mm	180 mm/7"
	TB = RT5	10 000				254 mm/10"
	TC = RT6	20 000				330 mm/13"
CRCW1210...BC	TA = RT1	5000	8 mm	4 mm	180 mm/7"	
	TB = RT5	10 000			254 mm/10"	
	TC = RT6	20 000			330 mm/13"	
CRCW2010...BC	TF = R02	4000	12 mm	4 mm	180 mm/7"	
CRCW2512...BC	TH = R82	4000	12 mm	4 mm	180 mm/7"	

**DIMENSIONS** in millimeters


SIZE		DIMENSIONS					RECOMMENDED SOLDER PAD DIMENSIONS <sup>(1)</sup>					
IMPERIAL	METRIC	L	W	H	T1	T2	REFLOW SOLDERING			WAVE SOLDERING		
							a	b	l	a	b	l
01005	0402	0.4 ± 0.02	0.2 ± 0.02	0.13 ± 0.02	0.10 ± 0.03	0.10 ± 0.03	0.15	0.2	0.2	-	-	-
0201	0603	0.6 ± 0.05	0.3 ± 0.05	0.23 ± 0.05	0.15 ± 0.05	0.10 ± 0.05	0.3	0.43	0.2	-	-	-
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	1.6 ± 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	0.50 <sup>+0.10</sup> <sub>-0.05</sub>	0.35 ± 0.15	0.45 ± 0.2	0.9	1.7	2.0	1.1	1.7	2.3
1210	3225	3.05 ± 0.10	2.5 ± 0.2	0.55 ± 0.10	0.50 ± 0.2	0.50 ± 0.2	0.9	2.5	2.0	1.1	2.5	2.2
2010	5025	5.0 ± 0.20	2.5 ± 0.20	0.55 ± 0.10	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	3.20 ± 0.20	0.55 ± 0.1	0.6 ± 0.2	0.6 ± 0.2	1.0	3.2	5.2	1.2	3.2	5.2

**Notes**

- <sup>(1)</sup> 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 may be required to maintain the reliability of the assembly. 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.
- <sup>(2)</sup> No marking for 01005, 0201, and 0402 sizes.

**DERATING**


TEST PROCEDURES AND REQUIREMENTS						
EN 60115-1 CLAUSE	IEC 60068-2 TEST METHOD	TEST	PROCEDURE	REQUIREMENTS PERMISSIBLE CHANGE ( $\Delta R$ )		
				STABILITY CLASS 1 OR BETTER	STABILITY CLASS 2 OR BETTER	SIZE 0201
			Stability for product types:			
			<b>CRCW...BC e3</b>	1 $\Omega$ to 10 M $\Omega$	1 $\Omega$ to 10 M $\Omega$	1 $\Omega$ to 10 M $\Omega$
4.5	-	Resistance	-	$\pm 1 \%$	$\pm 5 \%$	$\pm 0.5 \%$ , $\pm 1 \%$ , $\pm 5 \%$
4.8.4.2	-	Temperature coefficient	(20 / -55 / 20) °C and (20 / 125 / 20) °C	$\pm 100$ ppm/K, $\pm 200$ ppm/K	$\pm 200$ ppm/K	$\pm 100$ ppm/K, $\pm 200$ ppm/K, - 200 ppm/K/ + 400 ppm/K
4.13	-	Short time overload	$U = 2.5 \times \sqrt{P_{70} \times R} \leq 2 \times U_{max}$ ; duration: Acc. to the style	$\pm (0.25 \% R + 0.05 \Omega)$	$\pm (0.5 \% R + 0.05 \Omega)$	$\pm (1 \% R + 0.05 \Omega)$
4.17.5	58 (Td)	Solderability	Pre-aging 4 h at 155 °C, dryheat	Solder bath method; Sn60Pb40 non activated flux; (235 $\pm$ 5) °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) °C (3 $\pm$ 0.3) s	Good tinning ( $\geq 95 \%$ covered) no visible damage	
4.18.2	58 (Td)	Resistance to soldering heat	Solder bath method (260 $\pm$ 5) °C; (10 $\pm$ 1) s	$\pm (0.25 \% R + 0.05 \Omega)$	$\pm (0.5 \% R + 0.05 \Omega)$	$\pm (1 \% R + 0.05 \Omega)$
4.19	14 (Na)	Rapid change of temperature	30 min. at - 55 °C; 30 min. at 125 °C; 5 cycles	$\pm (0.25 \% R + 0.05 \Omega)$	$\pm (0.5 \% R + 0.05 \Omega)$	$\pm (0.5 \% R + 0.05 \Omega)$
			1000 cycles	$\pm (1 \% R + 0.05 \Omega)$	$\pm (1 \% R + 0.05 \Omega)$	$\pm (1 \% R + 0.05 \Omega)$
4.24	78 (Cab)	Damp heat, steady state	(40 $\pm$ 2) °C; 56 days; (93 $\pm$ 3) % RH	$\pm (1 \% R + 0.05 \Omega)$	$\pm (2 \% R + 0.1 \Omega)$	$\pm (2 \% R + 0.1 \Omega)$



TEST PROCEDURES AND REQUIREMENTS						
EN 60115-1 CLAUSE	IEC 60068-2 TEST METHOD	TEST	PROCEDURE	REQUIREMENTS PERMISSIBLE CHANGE ( $\Delta R$ )		
				STABILITY CLASS 1 OR BETTER	STABILITY CLASS 2 OR BETTER	SIZE 0201
			Stability for product types:			
			<b>CRCW...BC e3</b>	1 $\Omega$ to 10 M $\Omega$	1 $\Omega$ to 10 M $\Omega$	1 $\Omega$ to 10 M $\Omega$
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; $\geq$ 90 % RH; 24 h; 1 cycle			
4.23.4	1 (Aa)	Cold	-55 °C; 2 h	$\pm$ (1 % $R$ + 0.05 $\Omega$ )	$\pm$ (2 % $R$ + 0.1 $\Omega$ )	$\pm$ (2 % $R$ + 0.1 $\Omega$ )
4.23.5	13 (M)	Low air pressure	1 kPa; (25 $\pm$ 10) °C; 1 h			
4.23.6	30 (Db)	Damp heat, cyclic	55 °C; $\geq$ 90 % RH; 24 h; 5 cycles			
4.23.7	-	DC load	$U = \sqrt{P_{70} \times R} \leq U_{max.}$			
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 70 °C; 8000 h	$\pm$ (1 % $R$ + 0.05 $\Omega$ ) $\pm$ (2 % $R$ + 0.1 $\Omega$ )	$\pm$ (2 % $R$ + 0.1 $\Omega$ ) $\pm$ (4 % $R$ + 0.1 $\Omega$ )	$\pm$ (2 % $R$ + 0.1 $\Omega$ ) $\pm$ (4 % $R$ + 0.1 $\Omega$ )
4.25.3	-	Endurance at 125 °C	125 °C, 1000 h	$\pm$ (1 % $R$ + 0.05 $\Omega$ )	$\pm$ (2 % $R$ + 0.1 $\Omega$ )	$\pm$ (2 % $R$ + 0.1 $\Omega$ )

TEST PROCEDURES AND REQUIREMENTS						
EN 60115-1 CLAUSE	IEC 60068-2 TEST METHOD	TEST	PROCEDURE	REQUIREMENTS PERMISSIBLE CHANGE ( $\Delta R$ )		
				STABILITY CLASS 1 OR BETTER		
						Stability for product types:
			<b>CRCW01005 e3</b>	1 $\Omega$ to 1 M $\Omega$		
4.5	-	Resistance	-	$\pm$ 1 %; $\pm$ 2 %; $\pm$ 5 %		
4.13	-	Short time overload	$U = 2.5 \times \sqrt{P_{70} \times R} \leq 2 \times U_{max.};$ duration according to style	$\pm$ (2 % $R$ + 0.1 $\Omega$ )		
4.17.2	58 (Td)	Solderability	Solder bath method; Sn60Pb40 non activated flux; (235 $\pm$ 5) °C (2 $\pm$ 0.2) s	Good tinning ( $\geq$ 95 % covered) no visible damage		
			Solder bath method; Sn96.5Ag3Cu0.5 non-activated flux; (235 $\pm$ 3) °C (2 $\pm$ 0.5) s	Good tinning ( $\geq$ 95 % covered) no visible damage		
4.8.4.2	-	Temperature coefficient	(20/-55/20) °C and (20/125/20) °C	- 200 ppm/K/+600 ppm/K, $\pm$ 250 ppm/K		
4.33	21 (Uu <sub>1</sub> )	Substrate bending	Depth 3 mm; 1 time	No visible damage, no open circuit in bent position $\pm$ (1 % $R$ + 0.05 $\Omega$ )		



**TEST PROCEDURES AND REQUIREMENTS**

EN 60115-1 CLAUSE	IEC 60068-2 TEST METHOD	TEST	PROCEDURE	REQUIREMENTS PERMISSIBLE CHANGE ( $\Delta R$ )
			STABILITY CLASS 1 OR BETTER	
			Stability for product types: <b>CRCW01005 e3</b>	
				1 $\Omega$ to 1 M $\Omega$
4.19	14 (Na)	Rapid change of temperature	15 min. at -55 °C; 15 min. at 125 °C; 300 cycles	$\pm (2 \% R + 0.1 \Omega)$
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	$\pm (5 \% R + 0.1 \Omega)$
4.18.2	58 (Td)	Resistance to soldering heat	Solder bath method (260 $\pm$ 5) °C; (10 $\pm$ 1) s	$\pm (2 \% R + 0.1 \Omega)$
4.24	78 (Cab)	Damp heat, steady state	(40 $\pm$ 2) °C; (90 to 95) % RH; 1000 h	$\pm (5 \% R + 0.1 \Omega)$
4.25.3	-	Endurance at upper category temperature	125 °C, 1000 h	$\pm (2 \% R + 0.1 \Omega)$
4.29	45 (XA)	Component solvent resistance	Isopropyl alcohol; (20 to 25) °C; (5 $\pm$ 0.5) min	No visible damage

**APPLICABLE SPECIFICATIONS**

<ul style="list-style-type: none"> <li>• EN60115-1 Generic specification</li> <li>• EN60115-8 Sectional specification</li> <li>• EN140401-802 Detail specification</li> </ul>	<ul style="list-style-type: none"> <li>• IEC 60068-2-X Environmental test procedures</li> <li>• IEC 60286-3 Packaging of SMD components</li> </ul>
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