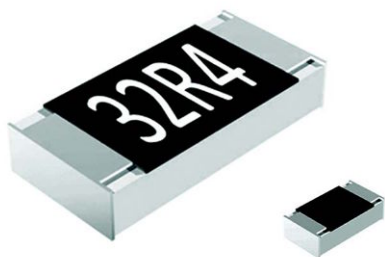


Green Thick Film Chip Resistors



FEATURES

- Green resistor - does not use RoHS exemptions
- Stability $\Delta R/R = 1\%$ for 1000 h at 70 °C
- 2 mm pitch packaging option for 0603 size
- Material categorization:
for definitions of compliance please see
www.vishay.com/doc?99912



RoHS
COMPLIANT
HALOGEN
FREE
GREEN
(5-2008)

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 $\pm$ ppm/K	TOLERANCE $\pm$ %	RESISTANCE RANGE Ω	SERIES
RCG0402	0402	RR1005M	0.063	50	100	0.5, 1	150 to 10M	E24; E96
					150		1.0 to 147	
					200	5	1.0 to 10M	E24
					Zero-Ohm-Resistor: $R_{max.} = 20\text{ m}\Omega$, $I_{max.} = 1.5\text{ A}$			
RCG0603	0603	RR1608M	0.1	75	100	0.5, 1	1.0 to 10M	E24; E96
					200			
						5		E24
					Zero-Ohm-Resistor: $R_{max.} = 20\text{ m}\Omega$, $I_{max.} = 2.0\text{ A}$			
RCG0805	0805	RR2012M	0.125	150	100	0.5, 1	1.0 to 10M	E24; E96
					200			
						5		E24
					Zero-Ohm-Resistor: $R_{max.} = 20\text{ m}\Omega$, $I_{max.} = 2.5\text{ A}$			
RCG1206	1206	RR3216M	0.25	200	100	0.5, 1	1.0 to 10M	E24; E96
					200			
						5		E24
					Zero-Ohm-Resistor: $R_{max.} = 20\text{ m}\Omega$, $I_{max.} = 3.5\text{ A}$			

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.
- Marking: See datasheet "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	RCG0402	RCG0603	RCG0805	RCG1206
Rated dissipation P_{70} ⁽¹⁾	W	0.063	0.1	0.125	0.25
Operating voltage $U_{max.}$ AC_{RMS}/DC	V	50	75	150	200
Insulation voltage U_{ins} (1 min)	V	75	100	200	300
Insulation resistance	Ω	$> 10^9$			
Operating temperature range	°C	- 55 to + 155			
Mass	mg	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.

**PART NUMBER AND PRODUCT DESCRIPTION****PART NUMBER: RCG080510K0FKEA**

R	C	G	0	8	0	5	1	0	K	0	F	K	E	A
----------	----------	----------	----------	----------	----------	----------	----------	----------	----------	----------	----------	----------	----------	----------

TYPE
RCG0402
RCG0603
RCG0805
RCG1206

VALUE
R = Decimal
K = Thousand
M = Million
0000 = 0 Ω Jumper

TOLERANCE
D = $\pm 0.5\%$
F = $\pm 1.0\%$
J = $\pm 5.0\%$
Z = Jumper

TCR
K = ± 100 ppm/K
L = ± 150 ppm/K
N = ± 200 ppm/K
0 = Jumper

PACKAGING
EA, EB,
EC, ED,
EE, EI,
EL

PRODUCT DESCRIPTION: RCG0805 100 10K 1 % EA

RCG0805
TYPE
RCG0402
RCG0603
RCG0805
RCG1206

100
TCR
± 100 ppm/K
± 150 ppm/K
± 200 ppm/K

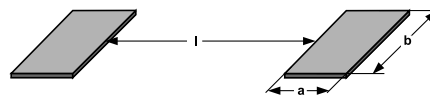
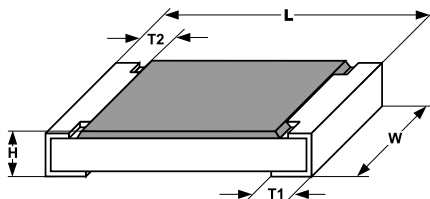
10K
RESISTANCE VALUE
10R = 10 Ω
10K = 10 k Ω
1M = 1 M Ω
0R0 = Jumper

1 %
TOLERANCE
$\pm 0.5\%$
$\pm 1\%$
$\pm 5\%$

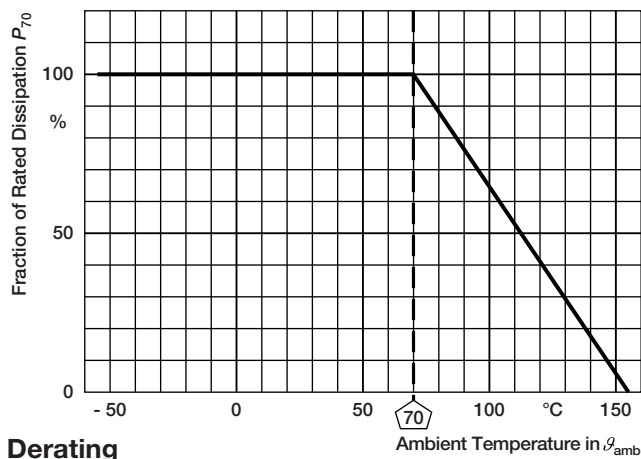
EA
PACKAGING
EA, EB,
EC, ED,
EE, EI,
EL

PACKAGING

TYPE	CODE	QUANTITY	CARRIER TAPE	WIDTH	PITCH	REEL DIAMETER
RCG0402	ED	10 000	Paper tape acc. to IEC 60286-3 Type 1a	8 mm	2 mm	180 mm/7"
	EE	50 000				330 mm/13"
RCG0603	EI	5000	Paper tape acc. to IEC 60268-3 Type 1a	8 mm	2 mm	180 mm/7"
	ED	10 000				180 mm/7"
	EL	20 000				285 mm/11.25"
	EE	50 000				330 mm/13"
	EA	5000	Paper tape acc. to IEC 60268-3 Type 1a	8 mm	4 mm	180 mm/7"
	EB	10 000				285 mm/11.25"
	EC	20 000				330 mm/13"
RCG0805	EA	5000	Paper tape acc. to IEC 60268-3 Type 1a	8 mm	4 mm	180 mm/7"
	EB	10 000				285 mm/11.25"
	EC	20 000				330 mm/13"
RCG1206	EA	5000	Paper tape acc. to IEC 60268-3 Type 1a	8 mm	4 mm	180 mm/7"
	EB	10 000				285 mm/11.25"
	EC	20 000				330 mm/13"

DIMENSIONS in millimeters


SIZE		DIMENSIONS					SOLDER PAD DIMENSIONS					
							REFLOW SOLDERING			WAVE SOLDERING		
IMPERIAL	METRIC	L	W	H	T1	T2	a	b	l	a	b	l
0402	RR1005M	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	RR1608M	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	RR2012M	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	RR3216M	3.2 ^{+0.10} _{-0.20}	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

FUNCTIONAL PERFORMANCE

GREEN REQUIREMENTS

SUBSTANCES	CONCENTRATION LIMIT
Lead (Pb)	< 1000 ppm
Mercury (Hg)	< 1000 ppm
Cadmium (Cd)	< 100 ppm
Hexavalent Chromium	< 1000 ppm
Polybrominated Biphenyl (PBB)	< 1000 ppm
Polybrominated Diphenyl Ether (PBDE)	< 1000 ppm
Bromine (Br)	< 900 ppm
Chlorine (Cl)	< 900 ppm
Sum of Bromine and Chlorine	≤ 1500 ppm max.
Antimony (Sb)	< 900 ppm
Red Phosphorous	< 100 ppm

Notes

- No exemptions (e.g. Pb in glass) may be applied to any substances or application for the "Green" category
- All concentration levels are based on homogenous materials

**TEST PROCEDURES AND REQUIREMENTS**

EN 60115-1 CLAUSE	IEC 60068-2 TEST METHOD	TEST	PROCEDURE	REQUIREMENTS PERMISSIBLE CHANGE (ΔR)	
			Stability for product types:	STABILITY CLASS 1 OR BETTER	STABILITY CLASS 2 OR BETTER
			RCG e3	1 Ω to 10 M Ω	1 Ω to 10 M Ω
4.5	-	Resistance	-	$\pm 0.5 \%$, $\pm 1 \%$	$\pm 5 \%$
4.7	-	Voltage proof	$U = 1.4 \times U_{ins}$; 60 s	No flashover or breakdown	
4.13	-	Short time overload	$U = 2.5 \times \sqrt{P_{70} \times R} \leq 2 \times U_{max.}$; Duration acc. to style	$\pm (0.25 \% R + 0.05 \Omega)$	$\pm (0.5 \% R + 0.05 \Omega)$
4.17.2	58 (Td)	Solderability	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) $^{\circ}\text{C}$	$\pm 100 \text{ ppm/K}$, $\pm 150 \text{ ppm/K}$	$\pm 200 \text{ ppm/K}$
4.32	21 (U_{u3})	Shear (adhesion)	RR 1608 and smaller: 9 N RR 2012 and larger: 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	
				$\pm (0.25 \% R + 0.05 \Omega)$	$\pm (0.5 \% R + 0.05 \Omega)$
4.23	-	Climatic sequence:	-	$\pm (1 \% R + 0.05 \Omega)$	$\pm (2 \% R + 0.1 \Omega)$
4.23.2	2 (Ba)	Dry heat	125 $^{\circ}\text{C}$; 16 h		
4.23.3	30 (Db)	Damp heat, cyclic	55 $^{\circ}\text{C}$; $\geq 90 \%$ RH; 24 h; 1 cycle		
4.23.4	1 (Aa)	Cold	- 55 $^{\circ}\text{C}$; 2 h		
4.23.5	13 (M)	Low air pressure	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 cycles		
4.23.7	-	DC load	$U = \sqrt{P_{70} \times R}$	$\pm (1 \% R + 0.05 \Omega)$	$\pm (2 \% R + 0.1 \Omega)$
4.25.1	-	Endurance at 70 $^{\circ}\text{C}$	$U = \sqrt{P_{70} \times R} \leq U_{max.}$; 1.5 h on; 0.5 h off; 70 $^{\circ}\text{C}$; 1000 h		
4.18.2	58 (Td)	Resistance to soldering heat	Solder bath method (260 $\pm$ 5) $^{\circ}\text{C}$; (10 $\pm$ 1) s	$\pm (0.25 \% R + 0.05 \Omega)$	$\pm (0.5 \% R + 0.05 \Omega)$
4.35	-	Flamability, needle flame test	IEC 60695-11-5; 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	$\pm (1 \% R + 0.05 \Omega)$	$\pm (1 \% R + 0.1 \Omega)$
4.25.3	-	Endurance at upper category temperature	155 $^{\circ}\text{C}$, 1000 h	$\pm (1 \% R + 0.05 \Omega)$	$\pm (2 \% R + 0.1 \Omega)$
4.40	-	Electrostatic discharge (human body model)	IEC 61340-3-1; 3 pos. + 3 neg. discharges; ESD test voltage acc. to size	$\pm (1 \% R + 0.05 \Omega)$	

TEST PROCEDURES AND REQUIREMENTS					
EN 60115-1 CLAUSE	IEC 60068-2 TEST METHOD	TEST	PROCEDURE	REQUIREMENTS PERMISSIBLE CHANGE (ΔR)	
			Stability for product types:	STABILITY CLASS 1 OR BETTER	STABILITY CLASS 2 OR BETTER
			RCG e3	1 Ω to 10 M Ω	1 Ω to 10 M Ω
4.29	45 (XA)	Component solvent resistance	Isopropyl alcohol; 50 °C; method 2	No visible damage	
4.30	45 (XA)	Solvent resistance of marking	Isopropyl alcohol; 50 °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	$\pm (0.25 \% R + 0.05 \Omega)$	$\pm (0.5 \% R + 0.05 \Omega)$
4.37	-	Periodic electric overload	$U = \sqrt{15 \times P_{70} \times R}$ $\leq 2 \times U_{\max.}$; 0.1 s on; 2.5 s off; 1000 cycles	$\pm (1 \% R + 0.05 \Omega)$	
4.27	-	Single pulse high voltage overload, 10 μ s/700 μ s	$\dot{U} = 10 \times \sqrt{P_{70} \times R}$ $\leq 2 \times U_{\max.}$; 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 tapes according to IEC 60286-3.



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<u>RCG0402100RJNED</u>	<u>RCG04021R00JNED</u>	<u>RCG040233K0JNED</u>	<u>RCG04022R20JNED</u>	<u>RCG12061K50FKEA</u>
<u>RCG0805100RJNEA</u>	<u>RCG0805499RFKEA</u>	<u>RCG0402220RJNED</u>	<u>RCG08057K50JNEA</u>	<u>RCG080575K0JNEA</u>
<u>RCG0805470RJNEA</u>	<u>RCG12061K00JNEA</u>	<u>RCG0805470KJNEA</u>	<u>RCG12061M00JNEA</u>	<u>RCG12061R00FKEA</u>
<u>RCG12061R00JNEA</u>	<u>RCG120610K0JNEA</u>	<u>RCG0805220RJNEA</u>	<u>RCG080515K0FKEA</u>	<u>RCG08052K00FKEA</u>
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<u>RCG1206470KJNEA</u>	<u>RCG1206470RJNEA</u>	<u>RCG120649K9FKEA</u>	<u>RCG1206499RFKEA</u>	<u>RCG12067K50JNEA</u>
<u>RCG120675K0JNEA</u>	<u>RCG120610R0JNEA</u>	<u>RCG12064R70JNEA</u>	<u>RCG120622R0JNEA</u>	<u>RCG080549K9FKEA</u>
<u>RCG1206100RJNEA</u>	<u>RCG120615K0FKEA</u>	<u>RCG12062K00FKEA</u>	<u>RCG12062K20JNEA</u>	<u>RCG12062R20JNEA</u>
<u>RCG120647R0JNEA</u>	<u>RCG120622K0JNEA</u>	<u>RCG120647K0JNEA</u>	<u>RCG1206220KJNEA</u>	<u>RCG1206220RJNEA</u>
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