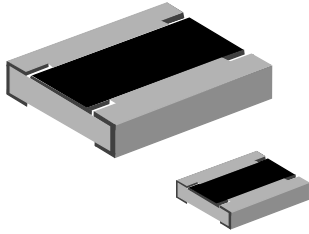


# Long Side Termination Thick Film Chip Resistors



## FEATURES

- Enhanced power rating
- Long side terminations
- Enhanced thermo cycling performance in 0406 size
- Pure tin solder contacts on Ni barrier layer, provides compatibility with lead (Pb)-free and lead containing soldering processes
- AEC-Q200 qualified
- 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								
MODEL	CASE SIZE INCH	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
RCL0406 e3	0406	RR 1016M	0.25	50	$\pm 100$	$\pm 1$	1R0 to 1M	E24; E96
					$\pm 200$	$\pm 5$		E24
Zero-Ohm-Resistor: $R_{max.} = 10 \text{ m}\Omega$ , $I_{max.}$ at $70^\circ\text{C} = 4.0 \text{ A}$								
RCL0612 e3	0612	RR 1632M	0.5	75	$\pm 100$	$\pm 1$	1R0 to 1M	E24; E96
					$\pm 200$	$\pm 5$		E24
Zero-Ohm-Resistor: $R_{max.} = 10 \text{ m}\Omega$ , $I_{max.}$ at $70^\circ\text{C} = 6.0 \text{ A}$								
RCL1218 e3	1218	RR 3246M	1.0	200	$\pm 100$	$\pm 1$	1R0 to 2.2M	E24; E96
					$\pm 200$	$\pm 5$		E24
Zero-Ohm-Resistor: $R_{max.} = 20 \text{ m}\Omega$ , $I_{max.}$ at $70^\circ\text{C} = 7.0 \text{ A}$								
RCL1225 e3	1225	RR 3263M	2.0 <sup>(1)</sup>	200	$\pm 100$	$\pm 1$	1R0 to 1M	E24; E96
					$\pm 200$	$\pm 5$		E24
Zero-Ohm-Resistor: $R_{max.} = 10 \text{ m}\Omega$ , $I_{max.}$ at $70^\circ\text{C} = 12 \text{ A}$								

## Notes

- These resistors do not feature a lifetime limitation when operated within the limits of rated dissipation, permissible operating voltage and permissible film temperature. However, the resistance typically increases due to the resistor's film temperature over operating time, generally known as drift. The drift may exceed the stability requirements of an individual application circuit and thereby limits the functional lifetime.
- Marking and packaging: See datasheet "Surface Mount Resistor Marking" ([www.vishay.com/doc?20020](http://www.vishay.com/doc?20020)). No marking for 0406 size.
- Power rating depends on the max. temperature at the solder point, the component placement density and the substrate material.
- <sup>(1)</sup> Specified power rating requires dedicated mounting conditions to achieve the required thermal resistance.

TECHNICAL SPECIFICATIONS					
PARAMETER	UNIT	RCL0406	RCL0612	RCL1218	RCL1225
Rated Dissipation at $P_{70}$ <sup>(2)</sup>	W	0.25	0.5	1.0	2.0 <sup>(3)</sup>
Operating Voltage $U_{max. AC_{RMS}/DC}$	V	50	75	200	200
Insulation Voltage $U_{ins}$ (1 min)	V	100	100	300	300
Insulation Resistance	$\Omega$	$> 10^9$			
Operating Temperature Range	$^\circ\text{C}$	- 55 to + 155			
Weight	mg	3.5	11	29.5	55

## Notes

- <sup>(2)</sup> 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  $155^\circ\text{C}$  is not exceeded.
- <sup>(3)</sup> Specified power rating requires dedicated mounting conditions to achieve the required thermal resistance.

PART NUMBER AND PRODUCT DESCRIPTION														
PART NUMBER: RCL061210K0FKEA														
R	C	L	0	6	1	2	1	0	K	0	F	K	E	A
MODEL		RESISTANCE			TOLERANCE			TCR		PACKAGING				
RCL0406 RCL0612 RCL1218 RCL1225		R = Decimal K = Thousand M = Million 0000 = 0 Ω Jumper			F = ± 1 % J = ± 5 % Z = Jumper			K = ± 100 ppm/K N = ± 200 ppm/K 0 = Jumper		EA EB EC EK EG				
PRODUCT DESCRIPTION: RCL0612 100 10K 1 % ET1 e3														
RCL0612	100	10K	1 %	ET1	e3									
MODEL	TCR	RESISTANCE	TOLERANCE	PACKAGING	LEAD (Pb)-FREE									
RCL0406 RCL0612 RCL1218 RCL1225	± 100 ppm/K ± 200 ppm/K	10R = 10 Ω 10K = 10 kΩ 1M = 1 MΩ 0R0 = Jumper	± 1 % ± 5 %	ET1 ET5 ET6 ET9 E67	e3 = Pure tin termination finish									

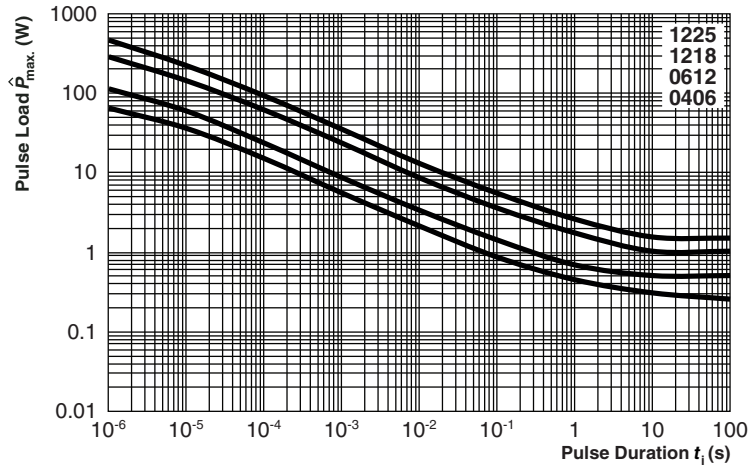
PACKAGING						
MODEL	CODE	QUANTITY	CARRIER TAPE	WIDTH	PITCH	REEL DIAMETER
RCL0406	EA = ET1	5000	Paper tape acc. to IEC 60068-3 Type I	8 mm	4 mm	180 mm/7"
	EB = ET5	10 000				285 mm/11.25"
	EC = ET6	20 000				330 mm/13"
RCL0612	EA = ET1	5000		8 mm	4 mm	180 mm/7"
	EB = ET5	10 000				285 mm/11.25"
	EC = ET6	20 000				330 mm/13"
RCL1218	EK = ET9	4000	Blister tape acc. to IEC 60068-3 Type II	12 mm	4 mm	180 mm/7"
RCL1225	EG = E67	2000		12 mm	8 mm	180 mm/7"

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	
0406	1016	1.0 ± 0.1	1.6 ± 0.1	0.25 ± 0.1	0.2 <sup>+0.10</sup> <sub>-0.15</sub>	0.2 ± 0.1	0.55	1.75	0.35	0.75	1.8	0.35	
0612	1608	1.6 ± 0.2	3.2 ± 0.2	0.55 ± 0.1	0.35 ± 0.15	0.25 ± 0.15	0.6	3.2	1.0	1.1	3.2	1.0	
1218	3246	3.2 <sup>+0.10</sup> <sub>-0.20</sub>	4.6 ± 0.15	0.55 ± 0.05	0.45 ± 0.2	0.4 ± 0.2	1.1	4.9	1.9	1.25	4.8	1.9	
1225	3263	3.2 ± 0.2	6.3 ± 0.2	0.75 ± 0.15	0.8 ± 0.2	0.4 ± 0.2	1.9	7.6	1.2	1.9	7.6	1.2	

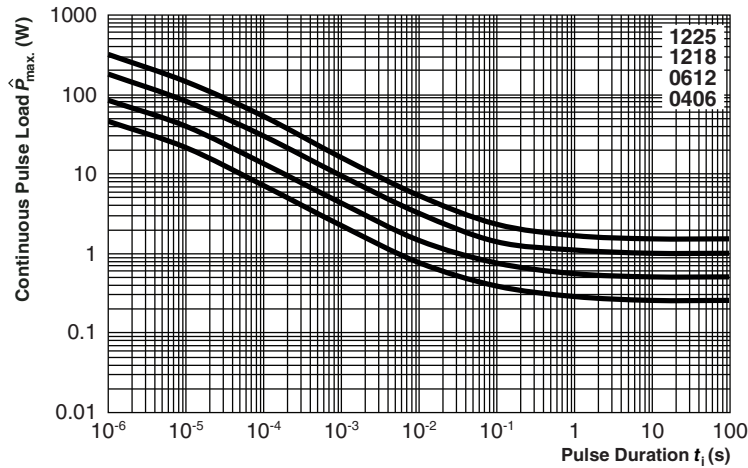


FUNCTIONAL PERFORMANCE

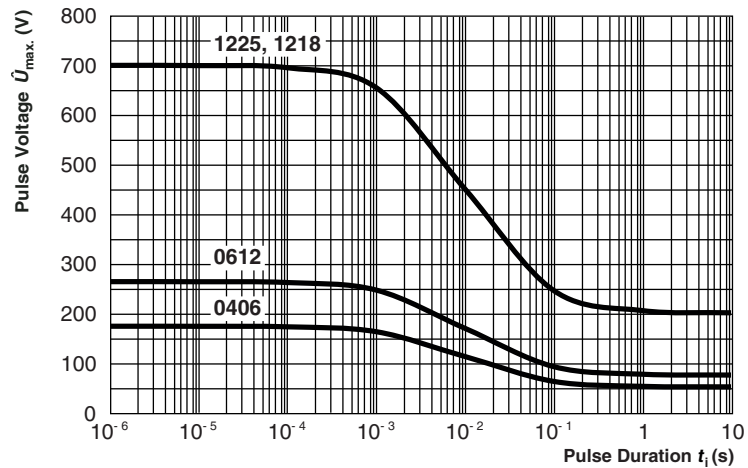
Single Pulse

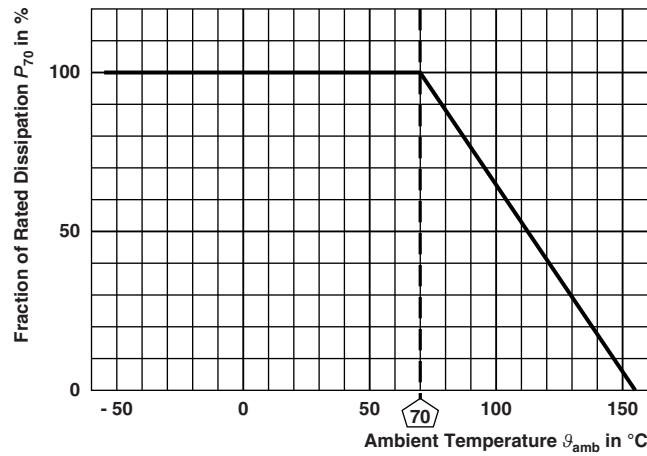


Continuous Pulse



Pulse Voltage



**Derating**


TEST PROCEDURES AND REQUIREMENTS					
EN 60115-1 CLAUSE	IEC 60068-2 TEST METHOD	TEST	PROCEDURE	REQUIREMENTS PERMISSIBLE CHANGE ( $\Delta R$ )	
			Stability for product types:	<b>STABILITY CLASS 2 OR BETTER</b>	
			<b>RCL e3</b>	1 $\Omega$ to 2.2 M $\Omega$	
4.5	-	Resistance	-	$\pm 1 \%$	$\pm 5 \%$
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; 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	
4.8.4.2	-	Temperature coefficient	(20/- 55/20) °C and (20/125/20) °C	$\pm 100$ ppm/K	$\pm 200$ ppm/K
4.32	21 (Uu <sub>3</sub> )	Shear (adhesion)	45 N	No visible damage	
4.33	21 (Uu <sub>1</sub> )	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 °C; 30 min at 125 °C  5 cycles  1000 cycles	$\pm (0.25 \% R + 0.05 \Omega)$  $\pm (1 \% R + 0.05 \Omega)$	$\pm (0.5 \% R + 0.05 \Omega)$  $\pm (1 \% R + 0.05 \Omega)$



TEST PROCEDURES AND REQUIREMENTS					
EN 60115-1 CLAUSE	IEC 60068-2 TEST METHOD	TEST	PROCEDURE	REQUIREMENTS PERMISSIBLE CHANGE ( $\Delta R$ )	
			Stability for product types:	<b>STABILITY CLASS 2 OR BETTER</b>	
			<b>RCL e3</b>	1 $\Omega$ to 2.2 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	$\pm (1 \% R + 0.05 \Omega)$	$\pm (2 \% R + 0.1 \Omega)$
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	$U = \sqrt{P_{70} \times R}$		
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	$\pm (0.5 \% R + 0.05 \Omega)$ $\pm (1 \% R + 0.05 \Omega)$	$\pm (2 \% R + 0.1 \Omega)$ $\pm (4 \% R + 0.1 \Omega)$
4.18.2	58 (Td)	Resistance to soldering heat	Solder bath method (260 $\pm$ 5) °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) °C; (93 $\pm$ 3) % RH; 56 days	$\pm (1 \% R + 0.05 \Omega)$	
4.25.3	-	Endurance at upper category temperature	155 °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 voltage: 1000 V	$\pm (1 \% R + 0.05 \Omega)$	
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 <sup>2</sup> ; 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 $\mu$ s/700 $\mu$ s	$\hat{U} = 10 \times \sqrt{P_{70} \times R}$ $\leq 2 \times U_{max.};$ 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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