

## Long Side Termination Thick Film Chip Resistors



### FEATURES

- Enhanced power rating
- Long side terminations
- Pure tin solder contacts on Ni barrier layer, provides compatibility with lead (Pb)-free and lead containing soldering processes
- Compliant to RoHS Directive 2002/95/EC
- Halogen-free according to IEC 61249-2-21 definition
- AEC-Q200 qualified



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

STANDARD ELECTRICAL SPECIFICATIONS								
MODEL	SIZE		RATED DISSIPATION $P_{70}$ W	LIMITING ELEMENT VOLTAGE $U_{max. AC/DC}$ V	TEMPERATURE COEFFICIENT ppm/K	TOLERANCE %	RESISTANCE RANGE $\Omega$	SERIES
	INCH	METRIC						
RCL0612 e3	0612	RR 1632M	0.5	75	$\pm 100$	$\pm 1$	1R0 to 1M	E24; E96
								$\pm 200$
RCL1218 e3	1218	RR 3246M	1.0	200	$\pm 100$	$\pm 1$	1R0 to 2.2M	E24; E96
								$\pm 200$
RCL1225 e3	1225	RR 3263M	2.0 <sup>(1)</sup>	200	$\pm 100$	$\pm 1$	1R0 to 1M	E24; E96
								$\pm 200$

#### 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.
- <sup>(1)</sup> Specified power rating requires dedicated mounting conditions to achieve the required thermal resistance.

TECHNICAL SPECIFICATIONS				
DESCRIPTION	UNIT	RCL0612	RCL1218	RCL1225
Rated Dissipation $P_{70}$ <sup>(2)</sup>	W	0.5	1.0	2.0 <sup>(3)</sup>
Limiting Element Voltage $U_{max. AC/DC}$	V	75	200	200
Insulation Voltage $U_{ins}$ (1 min)	V	> 100	> 300	> 300
Insulation Resistance	$\Omega$	> $10^9$		
Category Temperature Range	$^{\circ}\text{C}$	- 55 to + 155		
Weight	mg	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	0	0
MODEL/SIZE			RESISTANCE			TOLERANCE			TCR			PACKAGING		SPECIAL		
RCL0612 RCL1218 RCL1225			R = Decimal K = Thousand M = Million 0000 = Jumper			F = ± 1 % J = ± 5 % Z = Jumper			K = ± 100 ppm/K N = ± 200 ppm/K 0 = Jumper			EA EB EC EK EG		Up to 2 digits 00 = Standard		
PRODUCT DESCRIPTION: RCL0612 100 10K 1% ET1 e3																
RCL0612		100		10K		1%		ET1		e3						
MODEL		TCR		RESISTANCE		TOLERANCE		PACKAGING		LEAD (Pb)-FREE						
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	UNIT	PAPER TAPE ON REEL ACC. TO IEC 60286-3, TYPE I			BLISTER TAPE ON REEL ACC. TO IEC 60286-3, TYPE II		
		QUANTITY	PART NUMBER	PRODUCT DESC.	QUANTITY	PART NUMBER	PRODUCT DESC.
RCL0612	180 mm/7"	5000	EA	ET1			
	285 mm/11.25"	10 000	EB	ET5			
	330 mm/13"	20 000	EC	ET6			
RCL1218	180 mm/7"				4000	EK	ET9
RCL1225	180 mm/7"				2000	EG	E67

**DIMENSIONS** in millimeters



SIZE		DIMENSIONS					SOLDER PAD DIMENSIONS					
							REFLOW SOLDERING			WAVE SOLDERING		
INCH	METRIC	L	W	H	T1	T2	a	b	l	a	b	l
0612	1632	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**



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

**Continuous Pulse**



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

**Pulse Voltage**



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



Derating



TEST PROCEDURES AND REQUIREMENTS					
EN 60115-1 CLAUSE	IEC 60068-2 TEST METHOD	TEST	PROCEDURE	REQUIREMENTS PERMISSIBLE CHANGE ( $\Delta R$ )	
				STABILITY CLASS 2 OR BETTER	
			Stability for product types:		
			<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)	45N	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	$\pm (0.25\% R + 0.05 \Omega)$	$\pm (0.5\% R + 0.05 \Omega)$
			1000 cycles	$\pm (1\% R + 0.05 \Omega)$	$\pm (1\% R + 0.05 \Omega)$



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				STABILITY CLASS 2 OR BETTER	
			Stability for product types:	1 $\Omega$ to 2.2 M $\Omega$	
			RCL e3		
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	$\dot{U} = 10 \times \sqrt{P_{70} \times R}$ $\leq 2 \times U_{max.};$ 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-x environmental test procedures

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



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