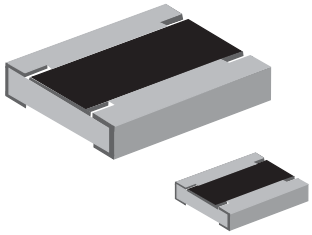
# Long Side Termination Thick Film Chip Resistors



## 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 Ω | SERIES |
|---|---|---|---|---|---|---|---|---|
| | INCH | METRIC | | | | | | |
| RCL0612 e3 | 0612 | RR 1632M | 0.5 | 75 | ± 100 | ± 1 | 1R0 to 1M | E24; E96 |
| | | | | | ± 200 | ± 5 | | E24 |
| RCL1218 e3 | 1218 | RR 3246M | 1.0 | 200 | ± 100 | ± 1 | 1R0 to 2.2M | E24; E96 |
| | | | | | ± 200 | ± 5 | | E24 |
| RCL1225 e3 | 1225 | RR 3263M | 2.0 (1) | 200 | ± 100 | ± 1 | 1R0 to 1M | E24; E96 |
| | | | | | ± 200 | ± 5 | | E24 |

**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.

(1) Specified power rating requires dedicated mounting conditions to achieve the required thermal resistance.

## TECHNICAL SPECIFICATIONS

| DESCRIPTION | UNIT | RCL0612 | RCL1218 | RCL1225 |
|---|---|---|---|---|
| Rated Dissipation $P_{70}$ (2) | W | 0.5 | 1.0 | 2.0 (3) |
| Limiting Element Voltage $U_{max.}$ AC/DC | V | 75 | 200 | 200 |
| Insulation Voltage $U_{ins}$ (1 min) | V | > 100 | > 300 | > 300 |
| Insulation Resistance | Ω | $> 10^9$ | | |
| Category Temperature Range | °C | - 55 to + 155 | | |
| Weight | mg | 11 | 29.5 | 55 |

**Notes**

(2) 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 °C is not exceeded.

(3) Specified power rating requires dedicated mounting conditions to achieve the required thermal resistance.



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## 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**<br>**RCL1218**<br>**RCL1225** | **R** = Decimal<br>**K** = Thousand<br>**M** = Million<br>**0000** = Jumper | **F** = ± 1 %<br>**J** = ± 5 %<br>**Z** = Jumper | **K** = ± 100 ppm/K<br>**N** = ± 200 ppm/K<br>**0** = Jumper | **EA**<br>**EB**<br>**EC**<br>**EK**<br>**EG** | Up to 2 digits<br>**00** = Standard |

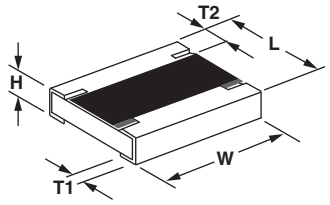
**PRODUCT DESCRIPTION: RCL0612 100 10K 1 % ET1 e3**

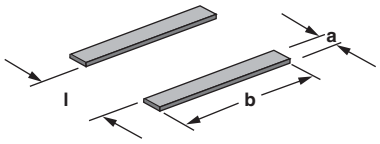
| RCL0612 | 100 | 10K | 1 % | ET1 | e3 |
|---|---|---|---|---|---|
| MODEL | TCR | RESISTANCE | TOLERANCE | PACKAGING | LEAD (Pb)-FREE |
| **RCL0612**<br>**RCL1218**<br>**RCL1225** | ± **100** ppm/K<br>± **200** ppm/K | **10R** = 10 Ω<br>**10K** = 10 kΩ<br>**1M** = 1 MΩ<br>**0R0** = Jumper | ± **1 %**<br>± **5 %** | **ET1**<br>**ET5**<br>**ET6**<br>**ET9**<br>**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 $^{+0.10}_{-0.20}$ | 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 |

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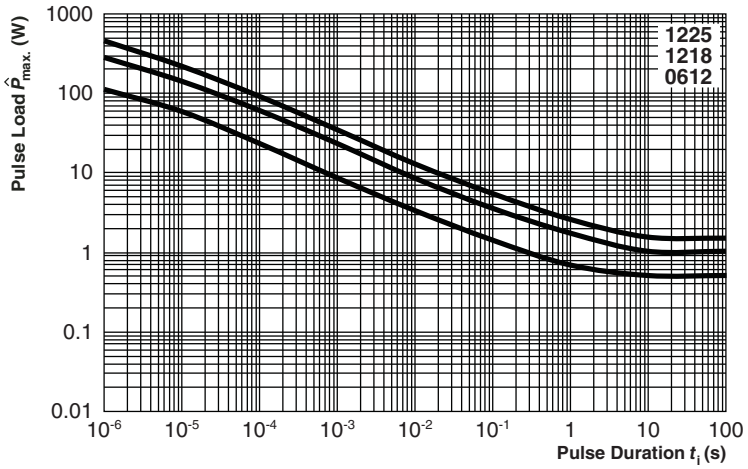
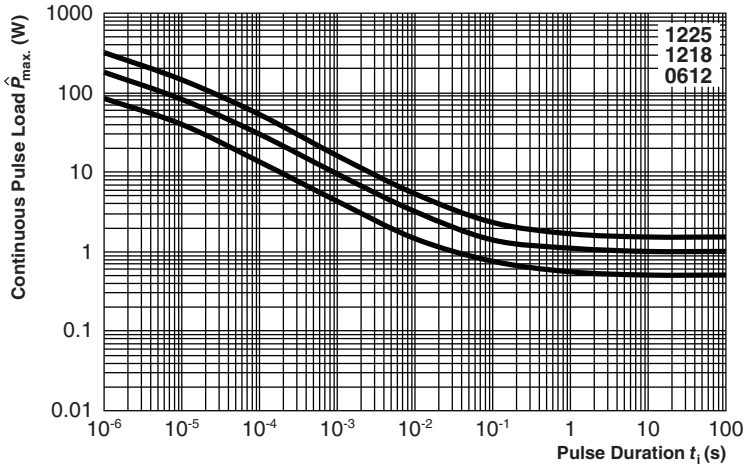
## FUNCTIONAL PERFORMANCE

### Single Pulse



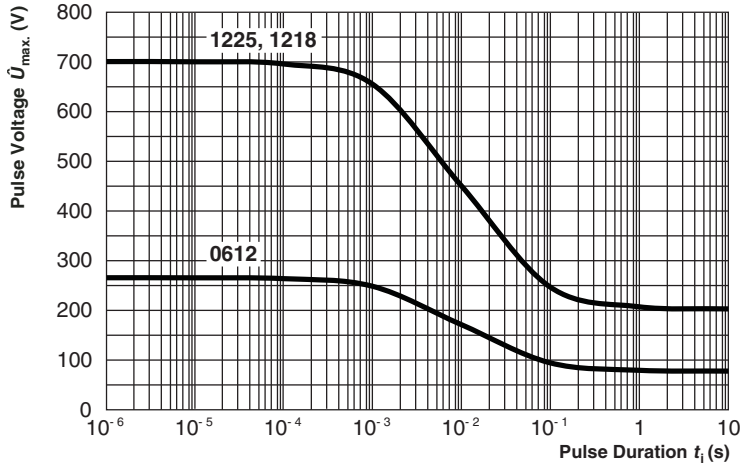

Maximum pulse load, single pulse; applicable if $\bar{P} \rightarrow 0$ and n < 1000 and $\hat{U} \leq \hat{U}_{max.}$; for permissible resistance change equivalent to 8000 h operation

### Continuous Pulse




Maximum pulse load, continuous pulses; applicable if $\bar{P} \leq P\ (\vartheta_{amb})$ and $\hat{U} \leq \hat{U}_{max.}$; 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



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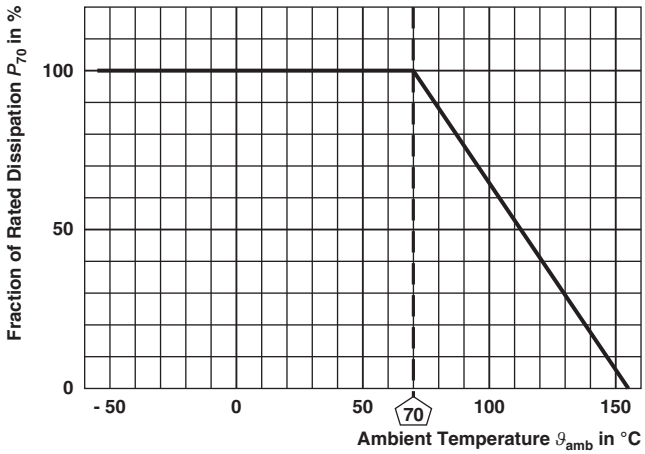
## Derating




| 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: | 1 Ω to 2.2 MΩ | |
| | | | RCL e3 | | |
| 4.5 | - | Resistance | - | ± 1 % | ± 5 % |
| 4.7 | - | Voltage proof | $U$ = 1.4 x $U_{ins}$; 60 s | No flashover or breakdown | |
| 4.13 | - | Short time overload | $U = 2.5 \times \sqrt{P_{70} \times R}$ ≤ 2 x $U_{max.}$; Duration acc. to style | ± (0.25 % $R$ + 0.05 Ω) | ± (0.5 % $R$ + 0.05 Ω) |
| 4.17.2 | 58 (Td) | Solderability | 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 | |
| 4.8.4.2 | - | Temperature coefficient | (20/- 55/20) °C and (20/125/20) °C | ± 100 ppm/K | ± 200 ppm/K |
| 4.32 | 21 ($Uu_3$) | Shear (adhesion) | 45N | No visible damage | |
| 4.33 | 21 ($Uu_1$) | Substrate bending | Depth 2 mm; 3 times | No visible damage, no open circuit in bent position ± (0.25 % $R$ + 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) |
| | | | 1000 cycles | ± (1 % $R$ + 0.05 Ω) | ± (1 % $R$ + 0.05 Ω) |

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## 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: RCL e3 | 1 Ω to 2.2 MΩ | |
| 4.23 | - | Climatic sequence: | - | ± (1 % $R$ + 0.05 Ω) | ± (2 % $R$ + 0.1 Ω) |
| 4.23.2 | 2 (Ba) | Dry heat | 125 °C; 16 h | | |
| 4.23.3 | 30 (Db) | Damp heat, cyclic | 55 °C; ≥ 90 % RH; 24 h; 1 cycle | | |
| 4.23.4 | 1 (Aa) | Cold | - 55 °C; 2 h | | |
| 4.23.5 | 13 (M) | Low air pressure | 1 kPa; (25 ± 10) °C; 1 h | | |
| 4.23.6 | 30 (Db) | Damp heat, cyclic | 55 °C; ≥ 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 | ± (0.5 % $R$ + 0.05 Ω) | ± (2 % $R$ + 0.1 Ω) |
| | | | 70 °C; 8000 h | ± (1 % $R$ + 0.05 Ω) | ± (4 % $R$ + 0.1 Ω) |
| 4.18.2 | 58 (Td) | Resistance to soldering heat | Solder bath method (260 ± 5) °C; (10 ± 1) s | ± (0.25 % $R$ + 0.05 Ω) | ± (0.5 % $R$ + 0.05 Ω) |
| 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 ± 2) °C; (93 ± 3) % RH; 56 days | ± (1 % $R$ + 0.05 Ω) | |
| 4.25.3 | - | Endurance at upper category temperature | 155 °C, 1000 h | ± (1 % $R$ + 0.05 Ω) | ± (2 % $R$ + 0.1 Ω) |
| 4.40 | - | Electrostatic discharge (Human Body Model) | IEC 61340-3-1 3 pos. + 3 neg. discharges; ESD voltage: 1000 V | ± (1 % $R$ + 0.05 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 ≤ 1.5 mm; A ≤ 200 m/s$^2$; 10 sweeps per axis | ± (0.25 % $R$ + 0.05 Ω) | ± (0.5 % $R$ + 0.05 Ω) |
| 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 | ± (1 % $R$ + 0.05 Ω) | |
| 4.27 | - | Single pulse high voltage overload, 10 µs/700 µs | $\hat{U} = 10 \times \sqrt{P_{70} \times R} \leq 2 \times U_{max.}$; 10 pulses | ± (1 % $R$ + 0.05 Ω) | |

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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- Экспресс доставка в любую точку России;
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- Система менеджмента качества сертифицирована по Международному стандарту ISO 9001;
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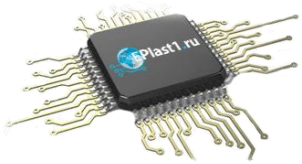
- Подбор аналогов;
- Консультации по применению компонента;
- Поставка образцов и прототипов;
- Техническая поддержка проекта;
- Защита от снятия компонента с производства.




**Как с нами связаться**

**Телефон:** 8 (812) 309 58 32 (многоканальный)
**Факс:** 8 (812) 320-02-42
**Электронная почта:** org@eplast1.ru
**Адрес:** 198099, г. Санкт-Петербург, ул. Калинина, дом 2, корпус 4, литера А.