

## 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<br>$P_{70}$<br>W | LIMITING ELEMENT VOLTAGE<br>$U_{max. AC/DC}$<br>V | TEMPERATURE COEFFICIENT<br>ppm/K | TOLERANCE<br>% | RESISTANCE RANGE<br>$\Omega$ | SERIES   |
|                                    | INCH | METRIC   |                                    |                                                   |                                  |                |                              |          |
| RCL0612 e3                         | 0612 | RR 1632M | 0.5                                | 75                                                | $\pm 100$                        | $\pm 1$        | 1R0 to 1M                    | E24; E96 |
|                                    |      |          |                                    |                                                   | $\pm 200$                        | $\pm 5$        |                              | E24      |
| RCL1218 e3                         | 1218 | RR 3246M | 1.0                                | 200                                               | $\pm 100$                        | $\pm 1$        | 1R0 to 2.2M                  | E24; E96 |
|                                    |      |          |                                    |                                                   | $\pm 200$                        | $\pm 5$        |                              | E24      |
| 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      |

#### 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<br>$U_{max. AC/DC}$ | 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<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<br>ACC. TO IEC 60286-3, TYPE I |             |               | BLISTER TAPE ON REEL<br>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**



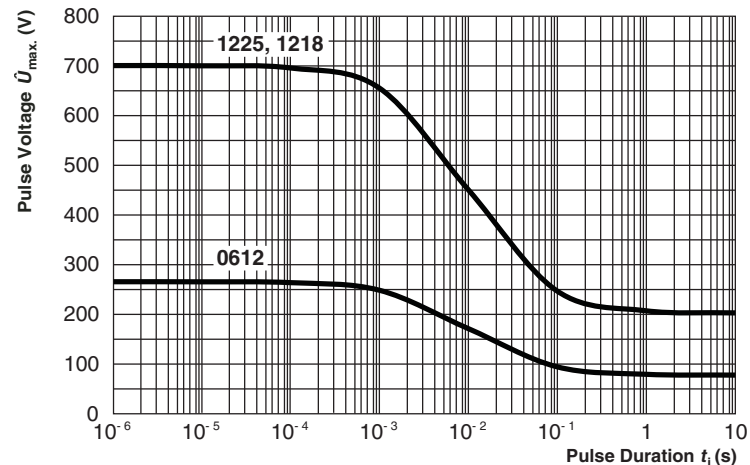
Maximum pulse load, single pulse; applicable if  $\bar{P} \rightarrow 0$  and  $n < 1000$  and  $\dot{U} \leq \dot{U}_{max}$ ; for permissible resistance change equivalent to 8000 h operation

**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<br>$\pm (0.25\% R + 0.05 \Omega)$ |                               |
| 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                                                                             | $\pm (1\% R + 0.05 \Omega)$                                                           | $\pm (1\% R + 0.05 \Omega)$   |



| 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 $\Omega$ 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;<br>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;<br>24 h; 5 cycles                                                                   |                                                                |                                                            |
| 4.23.7                           | -                       | DC load                                                    | $U = \sqrt{P_{70} \times R}$                                                                               |                                                                |                                                            |
| 4.25.1                           | -                       | Endurance at 70 °C                                         | $U = \sqrt{P_{70} \times R} \leq U_{max.};$<br>1.5 h on; 0.5 h off;<br>70 °C; 1000 h<br>70 °C; 8000 h      | $\pm (0.5 \% R + 0.05 \Omega)$<br>$\pm (1 \% R + 0.05 \Omega)$ | $\pm (2 \% R + 0.1 \Omega)$<br>$\pm (4 \% R + 0.1 \Omega)$ |
| 4.18.2                           | 58 (Td)                 | Resistance to soldering heat                               | Solder bath method<br>(260 $\pm$ 5) °C;<br>(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;<br>10 s                                                                                    | No burning after 30 s                                          |                                                            |
| 4.24                             | 78 (Cab)                | Damp heat, steady state                                    | (40 $\pm$ 2) °C;<br>(93 $\pm$ 3) % RH;<br>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<br>3 pos. + 3 neg. discharges;<br>ESD voltage: 1000 V                                        | $\pm (1 \% R + 0.05 \Omega)$                                   |                                                            |
| 4.29                             | 45 (XA)                 | Component solvent resistance                               | Isopropyl alcohol;<br>50 °C; method 2                                                                      | No visible damage                                              |                                                            |
| 4.30                             | 45 (XA)                 | Solvent resistance of marking                              | Isopropyl alcohol;<br>50 °C; method 1,<br>toothbrush                                                       | Marking legible,<br>no visible damage                          |                                                            |
| 4.22                             | 6 (Fc)                  | Vibration, endurance by sweeping                           | f = 10 Hz to 2000 Hz;<br>x, y, z $\leq$ 1.5 mm;<br>A $\leq$ 200 m/s <sup>2</sup> ;<br>10 sweeps per axis   | $\pm (0.25 \% R + 0.05 \Omega)$                                | $\pm (0.5 \% R + 0.05 \Omega)$                             |
| 4.37                             | -                       | Periodic electric overload                                 | $U = \sqrt{15 \times P_{70} \times R}$<br>$\leq 2 \times U_{max.};$<br>0.1 s on; 2.5 s off;<br>1000 cycles | $\pm (1 \% R + 0.05 \Omega)$                                   |                                                            |
| 4.27                             | -                       | Single pulse high voltage overload, 10 $\mu$ s/700 $\mu$ s | $\dot{U} = 10 \times \sqrt{P_{70} \times R}$<br>$\leq 2 \times U_{max.};$<br>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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- Подбор аналогов;
- Консультации по применению компонента;
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- Техническая поддержка проекта;
- Защита от снятия компонента с производства.



#### Как с нами связаться

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