

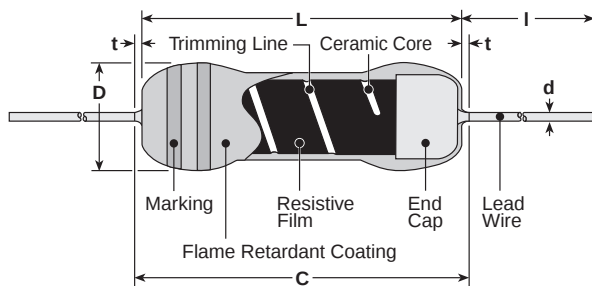
## anti-surge power type leaded resistor



### features

- Excellent anti-surge characteristics
- Stable characteristics of moisture resistance up to high resistance range
- RCR50 (+)(1M $\Omega$  - 12M $\Omega$ ), RCR50EN (1M $\Omega$  - 12M $\Omega$ ) and RCR60 (1M $\Omega$  - 12M $\Omega$ ) are discharge resistors recognized by UL1676 and c-UL(CSA-C22.2 No.1-M94)
- RCR25EN (100k $\Omega$ ~33M $\Omega$ ), RCR50EN (100k $\Omega$  - 33M $\Omega$ ) and RCR60 (100k $\Omega$  - 56M $\Omega$ ) is approved by EN6234-68-1 G.10 safety
- Products with lead-free terminations meet EU RoHS requirements. EU RoHS regulation is not intended for Pb-glass contained in electrode, resistor element and glass.
- Surface mount style "N" forming is suitable for automatic mounting

### dimensions and construction



\* Lead length changes depending on taping and forming.

| Type                | Dimensions inches (mm)                                                            |               |               |                                                                                   |                |                          |
|---------------------|-----------------------------------------------------------------------------------|---------------|---------------|-----------------------------------------------------------------------------------|----------------|--------------------------|
|                     | L                                                                                 | C (max.)      | t (max.)      | D                                                                                 | d (nom.)       | I*                       |
| RCR16               | .126 $\pm$ .008<br>(3.2 $\pm$ 0.2)                                                | .134<br>(3.4) | —             | .067 <sup>+0.08</sup> <sub>-.004</sub><br>(1.7 <sup>+0.2</sup> <sub>-0.1</sub> )  | .018<br>(0.45) | .787 Min.<br>(20.0 Min.) |
| RCR25<br>RCR25EN    | .248 $\pm$ .02<br>(6.3 $\pm$ 0.5)                                                 | .28<br>(7.1)  | —             | .098 $\pm$ .02<br>(2.5 $\pm$ 0.5)                                                 | .024<br>(0.6)  |                          |
| RCR50(+)<br>RCR50EN | .374 $\pm$ .039<br>(9.5 $\pm$ 1.0)                                                | —             | .118<br>(3.0) | .138 $\pm$ .016<br>(3.5 $\pm$ 0.4)                                                | .028<br>(0.7)  |                          |
| RCR60               | .374 <sup>+0.039</sup> <sub>-.004</sub><br>(9.5 <sup>+1.0</sup> <sub>-0.2</sub> ) | —             | .118<br>(3.0) | .157 $\pm$ .02<br>(4.0 $\pm$ 0.5)                                                 | .031<br>(0.8)  |                          |
| RCR75               | .472 $\pm$ .039<br>(12 $\pm$ 1.0)                                                 | —             | .118<br>(3.0) | .236 <sup>+0.039</sup> <sub>-.016</sub><br>(6.0 <sup>+1.0</sup> <sub>-0.4</sub> ) | .031<br>(0.8)  |                          |
| RCR100              | .610 $\pm$ .039<br>(15.5 $\pm$ 1.0)                                               | —             | .118<br>(3.0) |                                                                                   |                |                          |

### ordering information

| RCR  | 50                                                                | EN                                                    | C                    | T52                                                                                                                                   | A                                                         | 105                                                                                                    | J                          |
|------|-------------------------------------------------------------------|-------------------------------------------------------|----------------------|---------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------|--------------------------------------------------------------------------------------------------------|----------------------------|
| Type | Power Rating                                                      | Safety Appr. Marking                                  | Termination Material | Taping and Forming                                                                                                                    | Packaging                                                 | Nominal Resistance                                                                                     | Tolerance                  |
| RCR  | 16: 0.25W<br>25: 0.25W<br>50: 0.5W<br>60: 1W<br>75: 2W<br>100: 3W | RCR50+: +<br>RCR25EN,<br>RCR50EN: EN<br>Blank: Others | C: SnCu              | RCR16: T26, T52<br>RCR25, RCR25EN: T26, T52<br>RCR50(+, EN): T52<br>RCR60: T52<br>RCR75: T52<br>RCR100: T521, T631<br>L, M, N Forming | A: Ammo<br>R: Reel<br>TEB: Plastic embossed:<br>N forming | 2 significant figures + 1 multiplier for $\pm$ 5%<br>3 significant figures + 1 multiplier for $\pm$ 1% | F: $\pm$ 1%<br>J: $\pm$ 5% |

### applications and ratings

| Part Designation | Power Rating @ 70°C | Minimum Dielectric Withstanding Voltage | Resistance Range E-24, E-96 (F±1%) | Resistance Range E-24 (J±5%) | Absolute Maximum Working Voltage | Absolute Maximum Overload Voltage | Operating Temperature Range |       |
|------------------|---------------------|-----------------------------------------|------------------------------------|------------------------------|----------------------------------|-----------------------------------|-----------------------------|-------|
| RCR16            | 0.25W               | 300V                                    | 100kΩ - 5.1MΩ                      | 100kΩ - 5.1MΩ                | 500V                             | 1000V                             | -55°C to +155°C             |       |
| RCR25<br>RCR25EN |                     | 700V                                    | 100kΩ - 9.1MΩ                      | 100kΩ - 33MΩ                 | DC 1600V<br>AC 1150V             | DC 2000V<br>AC 1500V              |                             |       |
| RCR50            | 0.5W                |                                         | 3.3Ω - 910kΩ                       | 3.3Ω - 910kΩ                 | 2000V                            | 2500V                             |                             |       |
| RCR50+           |                     |                                         |                                    | 13MΩ - 33MΩ                  |                                  |                                   |                             |       |
| RCR50EN          |                     |                                         | 1MΩ - 9.1MΩ                        | 1MΩ - 12MΩ                   |                                  |                                   |                             |       |
| RCR60            | 1.0W                |                                         | 100kΩ - 9.1MΩ                      | 100kΩ - 33MΩ                 | 100kΩ - 56MΩ                     | 4000V                             |                             | 5000V |
| RCR75            | 2.0W                |                                         | 100kΩ - 9.1MΩ                      | 100kΩ - 100MΩ                | 5000V                            |                                   |                             |       |
| RCR100           | 3.0W                | 1000V                                   | 100kΩ - 9.1MΩ                      | 100kΩ - 51MΩ                 |                                  |                                   |                             |       |

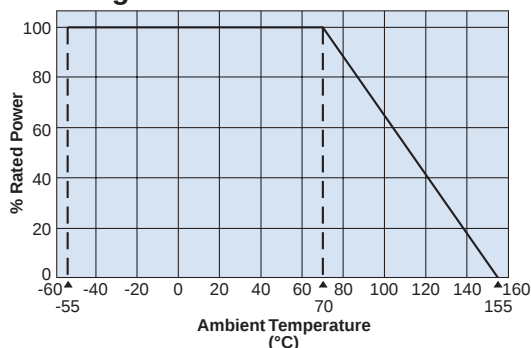
For further information on packaging, please refer to Appendix C.

Specifications given herein may be changed at any time without prior notice. Please confirm technical specifications before you order and/or use.

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## environmental applications

### Derating Curve

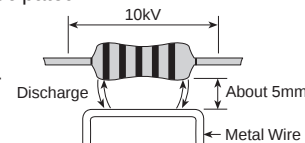


For resistors operated at an ambient temperature of 70°C or above, a power rating shall be derated in accordance with the above derating curve.

### Notice of Surge Load

Surge withstanding load voltage for the resistors cannot be guaranteed when the undermentioned 4 items get to a remarkable overload in comparison with the conditions shown by surge withstanding voltage in Anti-surge characteristics. Please contact KOA in advance if such a case is anticipated.

1. Peak voltage to be applied
2. Pulse width
3. Conditions of protecting insulation around the resistor
4. Situation of proximity conductivity object



For example: In the figure, a metal wire is placed less than 5mm away from the resistor body, there is such a case that causes an electric discharge by a surge load 10kV and then destroys the outer coating.

### Approvals Awarded

| Type    | UL1676 & c-UL (CSA-C22.2 No.1-M94) | EN60065 14.1 Test a | EN60065 14.1 Test b | EN62368-1 G.10 |
|---------|------------------------------------|---------------------|---------------------|----------------|
| RCR25EN | —                                  | —                   | ○                   | ○              |
| RCR50+  | —                                  | —                   | —                   | —              |
| RCR50EN | ○(1MΩ~12MΩ)                        | ○                   | ○                   | ○              |
| RCR60   | —                                  | ○                   | ○                   | ○              |

### Performance Characteristics

| Parameter                           | Requirement $\Delta R \pm(\% + 0.05\Omega)$         |                                    |                               | Typical | Test Method                                                                                                                 |       |                  |                                    |                               |
|-------------------------------------|-----------------------------------------------------|------------------------------------|-------------------------------|---------|-----------------------------------------------------------------------------------------------------------------------------|-------|------------------|------------------------------------|-------------------------------|
| Resistance                          | Within regulated tolerance                          |                                    |                               | —       | Measuring points are 10mm $\pm$ 1mm from the end cap                                                                        |       |                  |                                    |                               |
| T.C.R.                              | Type                                                | T.C.R.                             | Resistance Range              | —       | +25°C/+125°C                                                                                                                |       |                  |                                    |                               |
|                                     | RCR16                                               | $\pm 200\text{ppm}/^\circ\text{C}$ | 100k $\Omega$ - 5.1M $\Omega$ |         |                                                                                                                             |       |                  |                                    |                               |
|                                     | RCR25 (EN)                                          | $\pm 350\text{ppm}/^\circ\text{C}$ | 100k $\Omega$ - 33M $\Omega$  |         |                                                                                                                             |       |                  |                                    |                               |
|                                     | RCR50 (+)                                           | $\pm 500\text{ppm}/^\circ\text{C}$ | 3.3 $\Omega$ - 91k $\Omega$   |         |                                                                                                                             |       |                  |                                    |                               |
|                                     |                                                     | $\pm 350\text{ppm}/^\circ\text{C}$ | 100k $\Omega$ - 33M $\Omega$  |         |                                                                                                                             |       |                  |                                    |                               |
|                                     | RCR50EN                                             | $\pm 350\text{ppm}/^\circ\text{C}$ | 100k $\Omega$ - 33M $\Omega$  |         |                                                                                                                             |       |                  |                                    |                               |
|                                     | RCR60                                               | $\pm 350\text{ppm}/^\circ\text{C}$ | 100k $\Omega$ - 56M $\Omega$  |         |                                                                                                                             |       |                  |                                    |                               |
|                                     | RCR75                                               | $\pm 350\text{ppm}/^\circ\text{C}$ | 100k $\Omega$ - 100M $\Omega$ |         |                                                                                                                             |       |                  |                                    |                               |
| RCR100                              | $\pm 200\text{ppm}/^\circ\text{C}$                  | 100K $\Omega$ - 51M $\Omega$       |                               |         |                                                                                                                             |       |                  |                                    |                               |
| Overload                            | 1%                                                  |                                    |                               | 0.5%    | Rated voltage x 2.5 or maximum overload voltage for 5 seconds, whichever is less                                            |       |                  |                                    |                               |
| Resistance to Solder Heat           | 1%                                                  |                                    |                               | 0.5%    | 260°C $\pm$ 5°C, 10 seconds $\pm$ 1 second or 350°C $\pm$ 10°C, 3.5 seconds $\pm$ 0.5 seconds                               |       |                  |                                    |                               |
| Terminal Strength                   | No mechanical damage                                |                                    |                               | —       | Twist 360°, 5 times                                                                                                         |       |                  |                                    |                               |
| Rapid Change of Temperature         | 1%                                                  |                                    |                               | 0.5%    | -55°C (30 minutes)/+155°C (30 minutes), 5 cycles                                                                            |       |                  |                                    |                               |
| Moisture Resistance                 | 5%                                                  |                                    |                               | 2.5%    | 40°C $\pm$ 2°C, 90-95% RH, 1000 hours, 1.5 hr ON, 0.5 hr OFF cycle<br>RCR16, 25, 50 (+), 60: W; RCR75, 100: Wx0.1           |       |                  |                                    |                               |
| Endurance @ 70°C                    | 5%                                                  |                                    |                               | 2.5%    | 70°C $\pm$ 2°C, 1000 hours, 1.5 hr ON, 0.5 hr OFF cycle                                                                     |       |                  |                                    |                               |
| Resistance to Solvent               | No visible damage to protective coating and marking |                                    |                               | —       | Isopropyl alcohol with ultrasonic washing, 2 minutes<br>Power: 0.3W/cm <sup>2</sup> , f: 28kHz, Temperature: 35°C $\pm$ 5°C |       |                  |                                    |                               |
| Surge Withstanding                  | 10%                                                 |                                    |                               | 2.5%    | Discharge test: 2kV - 10kV, 0.01 $\mu$ F capacitor discharge pulse, 10 times (1 pulse/5 seconds maximum)                    |       |                  |                                    |                               |
|                                     |                                                     |                                    |                               |         | Type                                                                                                                        | RCR16 | RCR25<br>RCR25EN | RCR50, RCR50+                      | RCR50EN, RCR60, RCR75, RCR100 |
|                                     |                                                     |                                    |                               |         | Applied Voltage                                                                                                             | 2kV   | 3kV              | 3.3 $\Omega$ - 6.2 $\Omega$ : 10kV | 10kV                          |
|                                     |                                                     |                                    |                               |         |                                                                                                                             |       |                  | 6.8 $\Omega$ - 10 $\Omega$ : 7kV   |                               |
|                                     |                                                     |                                    |                               |         |                                                                                                                             |       |                  | 11 $\Omega$ - 9.1k $\Omega$ : 5kV  |                               |
|                                     |                                                     |                                    |                               |         |                                                                                                                             |       |                  | 10k $\Omega$ - 91k $\Omega$ : 7kV  |                               |
| 100k $\Omega$ - 33M $\Omega$ : 10kV |                                                     |                                    |                               |         |                                                                                                                             |       |                  |                                    |                               |
| EN60065 Test (RCR50EN, RCR60 only)  | 20%                                                 |                                    |                               | —       | Discharge test: 10kV, 1000pF capacitor discharge pulse, 50 times (1 pulse/5 seconds maximum)                                |       |                  |                                    |                               |

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