KOA SPEER ELECTRONICS, INC.

# Caution & Terms

resistors

## Precautions for the Resistors

Refer to the precautions of common matters for all products in the beginning of this catalog.

### General in Fixed Resistors

- For basic precautions of using resistors, refer to the technical report "EIAJ RCR-2121A Guideline of notabilia for fixed resistors for use in electronic equipment" issued by JEITA.
- When the resistors are operated in ambient temperature above the rated temperature, the power rating must be derated according to the derating curve.
- Resistors in general may emit flame, fire or smoke when overload is applied.
- Flame retardant resistors may emit smoke or appear red hot when overload is applied but are unlikely to emit flame or fire.
- When the resistors are sealed and coated by coating materials such as resin, deterioration of the resistor by thermal stress or resin may affect the characteristics. Confirm with KOA for the performance and reliability specifications in advance.

  When the resin absorbs moisture, the resistance to moisture and corrosion of the resistor may deteriorate, so be aware.
- When the resistor is coated, potted or molded by resin materials, the curing stress could cause peeling of protective coating and cracking of solder fillet, resulting in resistance change and disconnection. Do not coat nor seal the flame retardant coated resistors.
- Allow enough time for cooling after mounting metal film resistors, before washing off the flux. Residues of ionic substances may deteriorate resistances to moisture and corrosion.
- KOA can only guarantee safety when the average power is below the rated power, When power, exceeding the rated power, is applied for a short duration, please contact us with the surge voltage or current waveform for advice.
- Cylindrical film resistors have inductance due to the spiral trimming.

  Please be aware when using in a high-frequency circuit.
- The flame retardant resistors are weak against mechanical stress compared with the general resistors due to the special coating. Please do not apply impact, vibration or pinching with pliers, tweezers to the resistor body. Do not apply any external force to the protective coating until drying is fully completed after washing.

### Chip Resistor Array and Networks

- Misalignment of the mounting, abnormal solder amount or a loading direction mistake in the flow soldering process could cause a solder bridge to the neighboring terminations.
- Adhesive of ionic residuals on the resistor or board could cause migration between the neighboring terminations.

### Wirewound Type Resistors

- Wirewound type resistors have inductances and parasitic capacitances resulting from the winding structure. Therefore, they could resonate when used in a high frequency circuit.

### Fusing Resistors

- Confirm beforehand that the overload condition of the abnormal situations are within the fusing characteristics.
- Contact KOA in advance when excess overload above the rated voltage is continuously applied, since there is a possibility of damage accumulated in the resistor.
- The arc phenomenon may occur when high voltage is applied again after fusing by over current. Make sure to use the product below the maximum open circuit voltage.
- Contact KOA about the maximum open circuit voltage, it varies depending on the product type and resistance.
- The fusing characteristics could change when the resistors are coated, potted and molded by resin materials.

## Terms and Definitions

**Nominal Resistance**
- Designed resistance value usually indicated on the resistor.

**Power Rating**
- Maximum allowable power at rated temperature. Some of our chip resistor arrays and networks specify the power rating for the entire package, as opposed to each element.

**Rated Temperature**
- Maximum ambient temperature at which the power rating may be applied continuously. The rated ambient temperature refers to the temperature around the resistor mounted inside the equipment, not to the air temperature outside the equipment.

**Derating Curve**
- Plot that expresses the relation between ambient temperature and the maximum allowable power, which is generally expressed in percentage.

**Rated Voltage**
- Maximum allowable D.C. or A.C. voltage, to be continuously applied to a resistor or a resistor element.

  Rated Voltage (V) = $\sqrt{\text{Rated Power (W) X Nominal Resistance Value (}\Omega\text{)}}$

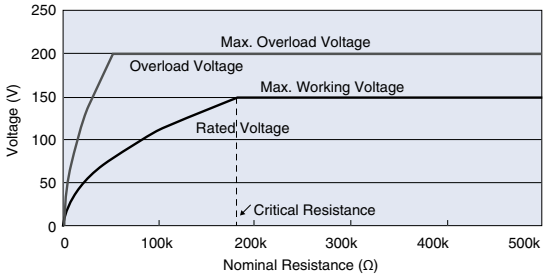
  Rated voltage shall be the calculated value or max. working voltage, whichever is lower.

**Critical Resistance**
- The maximum nominal resistance value at which the rated power can be applied without exceeding the maximum working voltage. The rated voltage is equal to the max. working voltage at the critical resistance value.

**Max. Working Voltage**
- Maximum D.C. or A.C. voltage that can be continuously applied to the terminations of a resistor. However, the maximum value of the applicable voltage is the rated voltage at the critical resistance value or lower.

**Overload Voltage**
- Allowable voltage which is applied for 5 sec. according to the short time overload test. Overload voltage shall be 2.5 times of rated voltage or max. overload voltage, whichever is lower.

**Maximum Overload Voltage**
- Largest value of overload voltage




Example of Various Voltage of RK73G 2A

**Dielectric Withstanding Voltage**
- A.C. voltage (rms) that can be applied to a designated spot between the electrode and the outer coating for one minute according to the proof test.

**Temperature Coefficient of Resistance (T.C.R.)**
- Relative variation of resistance between two given temperatures when temperature is changed by 1K, which is calculated by the following formula.

$$\text{T.C.R. } (\times 10^{-6}/\text{K}) = \frac{R-R_0}{R_0} \times \frac{1 \times 10^6}{T-T_0}$$

R : Resistance value (Ω) at T

$R_0$ : Resistance value (Ω) at $T_0$

T : Measured test temperature (°C)

$T_0$ : Measured base temperature (°C)