

# Resistor Precautions in Use

## ▶ Resistor Precautions in Usage

### Resistor in General

When an ambient temperature exceeds a rated ambient temperature, resistors shall be applied on the derating curve by derating the load power. General resistors are not combustion-resistant and are likely to emit, flame, gas, smoke, red heat, etc. under overloads. Flame retardant resistors generally emit smoke and red heat in a certain power and over but do not emit fire or flame.

When resistors are shielded or coated with resin etc., stress from the storage heat and the resin are applied to the resistors. So, performance and reliability of resistors should be checked well before use.

When a voltage higher than rated is applied in a short time (single pulse, repeated pulses, surge, etc.), it does not necessarily ensure safety that an effective wattage is not higher than a rated wattage. Then consult with us with your specified pulse wave shape. Resistors shall be used in a condition causing no dew condensation.

Keep temperature from rising by choosing resistors with a higher rated capacity; do not use a component having the exact load value required. For considerations of safety in extended period applications, the rating should be more than four times higher than the actual wattage involved, but never use resistors at less than 25% of its rated power.

In applications where resistors are subject to intermittent current surges and spikes, be sure in advance that the components selected are capable of withstanding brief durations of increased load.

Do not exceed the recommended rated load. Resistors must be used within the rated voltage range to prevent the shortening of service life and/or failure of the wound resistance elements.

Minimum load: Resistors must be utilized at 1/10 or more of the rated voltage to prevent poor conductance due to oxidation build-up. For basic particulars for cautions, refer to EIAJ Technical Report RCR-2121 "Guidance for care note on fixed resistors".

### Metal Oxide Film Resistors

All resistors manufactured by Token Electronics Co., Ltd. comply with the U.S. UL-94 non-flammability test, Class V-0, a continuous combustion period of zero seconds.

Smoke emitted from non-flammable resistors on initial use in powered circuits is a normal phenomenon and the component can be safely utilized. Never use organic solvents to clean non-flammable resistors.

Non-flammable resistors cannot be utilized in oil. Non-flammable resistors cannot be used in high frequency machinery because of the inductance produced by the windings.

## Metal Oxide Film Resistors

Although the hardness exceeds that of a 3H pencil lead, do not nick the coating with screwdrivers or other pointed objects.

Avoid touching non-flammable resistors in operation; the surface temperature ranges from approximately 350°C to 400°C when utilized at the full rated value. Maintaining a surface temperature of 200°C or less will extend resistors service life.

Less resistant against external shocks than ordinary resistors due to special flame retardant coating. So, never give shocks or vibrations on the resistors. Also never damage them by picking up the coated films with pliers, tweezers, etc. After cleaning, no external power should be put on the coated films before they are well dried.

A suitable type of resistors must be selected. Contact us for details.

## Wirewound Resistors

When being used in AC circuits, some wirewound structures give inductance ingredients or parasitic capacity, so they may cause unusual phenomena such as oscillations etc. Quorum deviations of other components should be carefully taken into account for use.

**Application and Placement:** Wire wound resistors use different gauges of wire as resistance elements. Sometimes the gauge is extremely thin (finer than a strand of human hair) and very susceptible to breakage in environments containing salts, ash, dust and corrosives. Avoid utilization in such environments.

Do not install in dusty areas because the accumulation will cause shorts and poor conductance.

## Fusing Resistors

When using, it shall be made sure that the overload conditions at unusual moments lie within the fusing territory. Consult with us in advance when overloaded higher than the rated voltage under an ordinary situation since such an overload may store up damages on resistors. Use at the maximum open- circuit voltage or lower as an arc phenomenon may arise when high voltage is applied again after fusing by an over current.

Consult with us for the maximum open- circuit voltage because it varies with type and resistance.

## Chip Networks

Care should be taken to the fact that slipping out of position during mounting may increase to cause solder bridges.

As chip networks receive mechanical stress easier than chip resistors, take care so that no strong mechanical stress is given during and after the mounting. An incorrect solder volume increases stress on resistors and may result in cracks or performance defects. Be careful to avoid too much or too little soldered volume.

### Precautions in Use

The types and the specifications in this catalog are typical ones. Before use, please make sure of specifications and precautions in use with the contents of specifications for supply or ask our sales offices for the specifications.

## ▶ Particulars Common to all Kinds of Product Types

### Applications

When components are used for special applications requiring high reliability (life maintenance equipment, atomic energy, airplanes, artificial satellites, etc.), contact us beforehand. Also make sure to evaluate and verify the components in a state that they are mounted on actual equipment.

### Soldering

Soldering shall be performed within the specified temperature, time and number of times for each component. If the components are heated to high temperature for a long time, the colors and characteristics may change, and disconnection may occur.

After soldering, keep the component from stress until it is cooled down.

After soldering, be sure not to give any mechanical stress on the terminal section by warping of the printed board, etc.

### Insertion and Mounting

The coating is covered to ensure the performance of components. Do not give any damages or excessive impacts on the products with pliers or pinsetter, or improper adjustment of an automatic moulder.

They may cause characteristic changes, disconnection, crack, etc.

Do not use the components dropped at the time of mounting or ones removed from the printed boards.

Make sure to avoid heat radiation generated by other heated components.

In case boards are sealed by molding or coated after mounting components, consult us beforehand.

Take care not to have electrostatics applied to the components when assembling.

### Resistance to Pulse

If the components are used in circuits where pulse wave current (single pulse, repeated pulse) or surge current flows, consult us beforehand. Also note that it is necessary to check with actual circuits considering dispersion of the tolerance values of the other components.

### Storage

The components should be kept away from high temperature, high humidity, direct sunlight, heat, corrosive gas (brimstone, chlorine, acid, alkali, etc.). Please inquire us about the storage term of products.

### Cleaning

Be careful not to leave ionic substances contained in solder flux after washing the flux. Especially when non-washing- soldering, water washing or water- soluble detergent is used, it is essential to confirm reliability of the components before use.

## General

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For basic particulars for cautions, refer to EIAJ Technical Report RCR-1001 “Safety application guide for electronic parts”.

## Particulars Common to Chip Components

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Warping of printed boards, which is caused by heat, gives stress directly to components when boards are cooled down. Be careful of the following particulars:

The arrangement of electrodes of chip components should go along with the fiber direction (vertical direction) of printed boards.

When printed boards are divided after soldering, proper positioning of the components is required in order to avoid any stress caused by warping, bending, etc. of the boards.

Be sure to design the same size of pads both on left and right sides.

If far different sizes of components are mixed on a board, take care of the positioning of the components.

## Particulars Common to Discrete Components

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To avoid mechanical force to components, pay attention to following the particulars:

Be careful not to create resonance by vibration.

The bodies of the discrete components should be free from twisting or bending.

The bodies of the large components should be firmly fixed.

When the lead wires need to be bent, try to make larger radius of curve in order to avoid excessive force at the foot of the terminals.

When cutting or clinching the lead wires on the mounter, be careful not to apply excessive forces to them.