

### Precautions for the Fusing Components

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

#### Safety Standards

- KOA's fuse components comply with the following safety standards:
  - U.S.A. UL (Underwriters Laboratories Inc.) UL248
  - CANADA CSA (Canadian Standards Association) C22.2 No.248  
c-UL (Underwriters Laboratories Inc.) UL248  
\*c-UL is equivalent to CSA in recognition
  - INTERNATIONAL IEC (International Electrotechnical Commission) 60127-1, -4
  - JAPAN Electrical Appliances and Materials Safety Act (PSE) Class-B

#### Rated Current

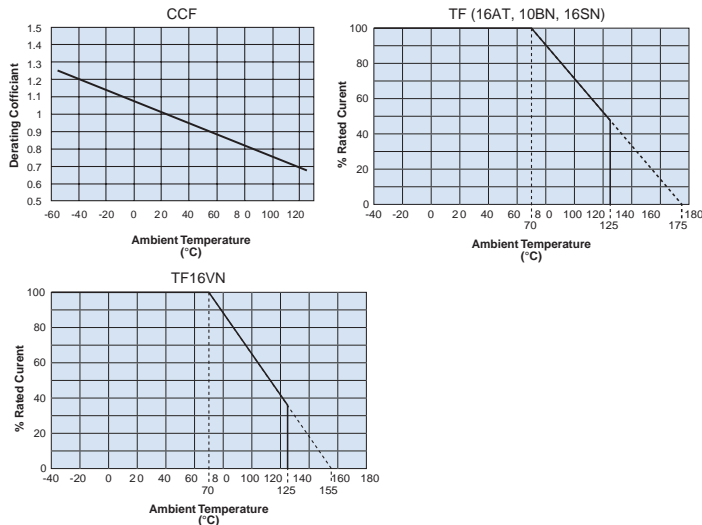
- Specified amperage that conforms to safety standards, such as fusing time. This is not to be confused with the steady-state (stationary) current, which is calculated using the following equation:  

$$\text{Stationary Current} \leq \text{Rated Current} \times \text{Stationary Derating Coefficient} \times \text{Ambient Temperature Derating}$$
 The table below indicates deratings for each type of products.

Type	Stationary Derating Coefficient
CCF1N, CCF1F	0.7
TF16AT	0.75
TF10BN, TF16SN, TF16VN	1.0

#### Deratings for Ambient Temperatures

The following Deratings for Ambient Temperatures are required:



- If the current waveform is a repeated pulse or AC waveform, the peak current shall be both the rated current and stationary current. Do not use the effective value of the current waveform.

#### Rated Voltage

- A rated voltage indicates the voltage that does not run through electrodes after the fuse blows. In case of exceeding the rated voltage, the circuit voltage should be applied at voltage not higher than the rated voltage because the current may run again or may break the elements.

#### Interrupting Capacity

- Maximum current and voltage that can be interrupted when an abnormal situation arises. Make sure beforehand that voltage and current at the time of abnormality occurring in the circuit are within the interrupting capacity.

Type	Fusing Current	Fusing Time
CCF1N (0.4~10)	Rated Current x 2 or Over	1 second
TF16SN	Rated Current x 2 or Over	1 second
TF10BN	Rated Current x 2 or Over	5 seconds
TF16AT	Rated Current x 2 or Over	5 seconds
TF16VN	Rated Current x 2.5 or Over	5 seconds
CCF1N (12~30)	Rated Current x 2 or Over	60 seconds
CCF1F	Rated Current x 2 or Over	60 seconds

#### Fusing Current

- Minimum current needed to break fusing element. Refer to the following list to quickly interrupt if an abnormal current occurred in the circuit:  
 If fusing time is within 1 second, the variance in the fusing time is largely affected by the surroundings (temperature, mounting pad dimensions, substrate material, etc.). If the fusing time is not less than 1 second, the verification should be made with an actual circuit.

#### Anti-Surge Characteristics

Be careful of the short time over current (inrush current, reversible current at motor-lock etc.) that is generated in the circuit.

- Inrush current will differ according to the ambient temperature and the charging/discharging condition of the capacitor etc. Check the current wave form with the condition which will be the maximum current.
- When components that are highly dependent on temperatures such as thermistors are used within the circuit, check the current wave form with the condition which will be the maximum current.
- Set the sampling frequency at a level which the peak current can be detected when measuring the surge current with a digital oscilloscope.
- Generally, current probes are used for current measurement. When shunt resistors are used, be sure to use the lowest resistance value as possible according to the impedance in the circuit.

#### Operation Check

- Before you decide which fuse product you use, please mount the selected fuse on actual device and confirm that rush current and surge current have enough margin and that the product has performance that enables it to interrupt the abnormal current quickly.

#### Soldering

- This product is suitable both for reflow-soldering and for flowsoldering, but excessive heat may cause an open-circuit and change its characteristics.
- The part shall be soldered at the maximum temperature of 260°C or less.
- If a soldering iron is used, it shall be at 350°C or less and should be soldered in a short time. Further, pay attention that the products are not touched directly by the top of the iron. It may cause disconnection or characteristic change.

#### Placement

- Please confirm sufficiently the evaluation of reliability and use those that have small contractile stress at a resin stiffening time. By contractile stress at the resin stiffening time, fuses might be broken, resistance value may be changed and disconnection might occur in case of resin coating/potting or molded sealing. There is a possibility that heat may fill the surrounding of the fuses by shielding and may cause the fusing characteristics to change so, please check with the actual circuit.
- The fusing characteristics may change when there are components that generate heat around the fuses. Keep fuses away from those parts.

#### Storage

- Avoid storing components under the condition of high temperature/high humidity (40°C/70%RH or more) which may deteriorate solderability.
- Also avoid direct sun light which may deteriorate solderability and induce changes in taping strength.se parts.

#### Parts Selection

- If you have any questions about fuse selection, please do not hesitate contacting us.

#### Reference

- For basic precautions, refer to JEITA technical report "JEITA RCR-4800 Safety application guide on fuse for use in electronic and electrical equipment".