

Article Overview

Fuse performance in DC power supplies is highly temperature-dependent, and ambient temperature derating is essential to ensure safe and reliable operation.

Fuse Temperature and Derating

Fuses are temperature-sensitive devices, meaning their current-carrying capacity decreases as ambient temperature rises. The ambient temperature is the air temperature immediately surrounding the fuse, which can be higher than room temperature if the fuse is enclosed in a panel or mounted near heat-generating components. To compensate, engineers typically derate the fuse current rating based on the operating temperature. For example, if a fuse has a rated current of 250A and the ambient temperature is 80°C, the derating factor might be 0.7, effectively increasing the required fuse rating to 425A to maintain safe operation.

Selecting Fuses for DC Circuits

DC circuits present unique challenges because DC lacks a natural zero-crossing, making arc interruption more difficult than in AC circuits. This requires DC-rated fuses or fuses tested for DC operation, especially in high-voltage or high-inductance circuits. The fuse must be able to safely interrupt the maximum available fault current without sustaining damage. The operating temperature directly affects the fuse's melting time and interrupting capability, so it is critical to consider both the ambient temperature and the heat generated by the current itself.

Practical Guidelines

- o Derate fuse current: Typically, fuses are loaded to no more than 75% of their nominal rating at standard conditions (25°C) to account for temperature variations and ensure long life.
- o Check manufacturer curves: Use the fuse's temperature derating curve to determine the safe operating current at your specific ambient temperature.
- o Consider enclosure effects: Fuses in enclosed holders or near heat sources may experience higher temperatures, requiring additional derating.
- o DC-specific selection: Ensure the fuse is rated for DC voltage and tested for the expected L/R time constant of the circuit to prevent failure during short-circuit events. By carefully considering ambient temperature, derating factors, and DC-specific requirements, you can select a fuse that protects your DC power supply unit effectively while avoiding premature blowing or thermal damage.

DC power supply unit fuse temperature

I also have a 12 V to 5 V 20 A DC-DC converter which I plan to use for the remaining two SBCs. Do I need to put a

Power Supplies We have a wide selection of power supply units (PSUs) for use in various domestic and industrial applications. Our

5 V at 1 A gives an output power of 5 W. Assume it is 50% efficient (conservative) this gives an input power of 10 W. 10

ALP Series Rated Functioning Temp. (Tf): 102- 125°C Rated Current (Ir): 15A / 60A Rated Voltage (Ur): DC 180V / 200V [Download PDF](#)

The average case temperature of the device reaches ~121°C, and as a result, the average junction temperature of the device

5.1 Protection of Power Conversion Devices A typical application of high-speed fuses in a general industrial environment would

effectiveness in the protection of different loads. This paper describes a three-dimensional model of a DC fuse with two different types

Highlights o Melting fuse curves are isothermal curves, not energy curves. o Modern automotive power distribution

Fuse Characteristics, Terms and Consideration Factors The purpose of this introductory section is to promote a better understanding

When sizing a fuse, the wire size also needs to be considered. What wire diameter are you using on the input side,

As the response of fuse and PTC resistors depends on heating effect (temperature, a lagging parameter) for their operation, many

The most useful value is usually the temperature around the fuse holder inside the equipment, not only the room temperature outside

Have you got a dead power supply? The problem could be just a 50-cent fuse. Find out how to determine if a fuse is

The typical internal AC/DC power supply can be expected to offer its full nameplate-rated

DC power supply unit fuse temperature

Introduction A fuse is a device for protecting an electrical system against the effects of overcurrents (excess currents), by melting one

Please exercise caution. Will the fuse be used in an AC circuit or a DC circuit? Only select DC rated fuses for DC circuits, and AC

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