

# Screwed Connection Type SCP - SFM series Datasheet -

Dexerials Corporation

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caution

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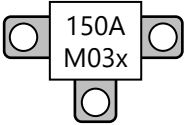
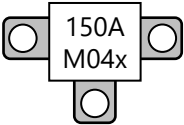
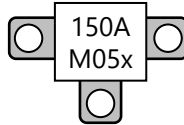
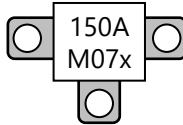
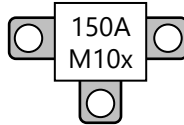
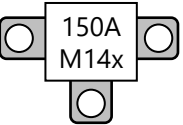


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# SFM-150 Ampere series Specification

## ● Products Lineup

| Applicable Cells in series      | 3 cells                                                                           | 4 cells                                                                           | 5 cells                                                                            | 6 - 7 cells                                                                         | 8 - 11 cells                                                                        | 12 - 14 cells                                                                       |
|---------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|
| Product ("x" is Any Letter(*1)) | SFM-12150x                                                                        | SFM-14150x                                                                        | SFM-20150x                                                                         | SFM-30150x                                                                          | SFM-40150x                                                                          | SFM-50150x                                                                          |
| Rated Current                   | 150 A                                                                             |                                                                                   |                                                                                    |                                                                                     |                                                                                     |                                                                                     |
| Size                            | 40.0 <sup>±0.5</sup> x 29.4 <sup>±0.5</sup> x 18.0 <sup>±0.5</sup> mm             |                                                                                   |                                                                                    |                                                                                     |                                                                                     |                                                                                     |
| Fuse Resistance (Typical)       | 0.4 m-ohm                                                                         |                                                                                   |                                                                                    |                                                                                     |                                                                                     |                                                                                     |
| Operating Voltage               | 8.2 - 13.5 V                                                                      | 10.8 - 18.0 V                                                                     | 14.2 - 23.5 V                                                                      | 18.9 - 31.5 V                                                                       | 29.7 - 49.5 V                                                                       | 37.7 - 62.0 V                                                                       |
| Heater Resistance               | 1.0 - 1.6 ohm                                                                     | 1.8 - 2.7 ohm                                                                     | 3.0 - 4.7 ohm                                                                      | 5.5 - 8.3 ohm                                                                       | 13.6 - 20.5 ohm                                                                     | 22.0 - 33.0 ohm                                                                     |
| Marking                         |  |  |  |  |  |  |

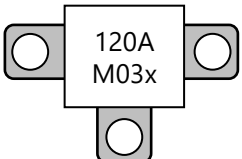
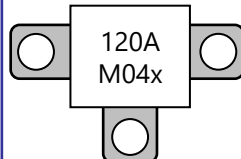
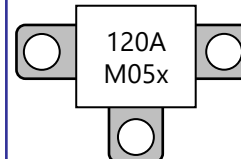
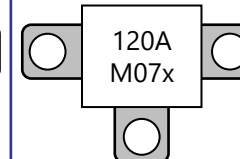
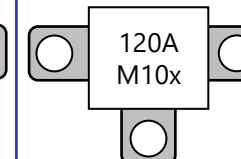
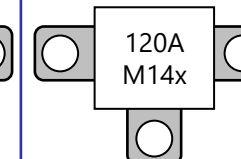
| Items                    | General Specification                                                                                                                 |
|--------------------------|---------------------------------------------------------------------------------------------------------------------------------------|
| Environmental Compliance | Compliance with RoHS                                                                                                                  |
| Halogen Free             | Bromine (Br)=900 ppm or less, Chlorine (Cl)=900 ppm or less, Br + Cl=1500 ppm or less (By weight)                                     |
| Lead Free                | Lead (Pb) = 1000 ppm or less                                                                                                          |
| Qualification            | UL248-14 (File No. E489967)                                                                                                           |
| Rated Voltage            | 125 VDC<br>(*1) This value is the maximum voltage can be cut off by fuse. It doesn't represent the operational voltage of the heater. |
| Rated Breaking Capacity  | 400 A                                                                                                                                 |

\*1 "x" is defined according to the version of the product. The latest letter is "A"

\*Caution: The specification may be subject to change without prior notice in the future.

# SFM-120 Ampere series Specification

## ● Products Lineup

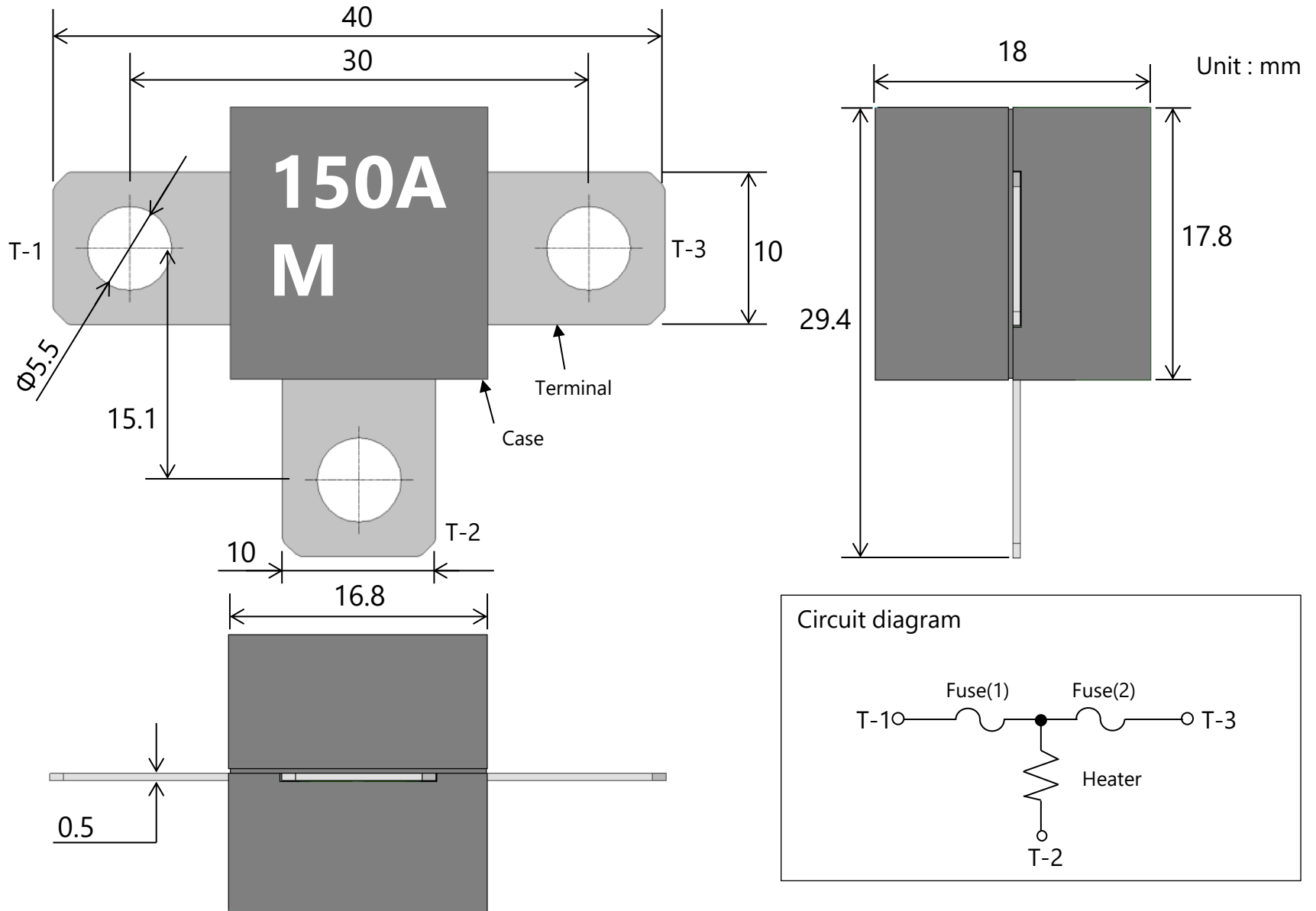
| Applicable Cells in series      | 3 cells                                                                           | 4 cells                                                                           | 5 cells                                                                            | 6 - 7 cells                                                                         | 8 - 11 cells                                                                        | 12 - 14 cells                                                                       |
|---------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|
| Product ("x" is Any Letter(*1)) | SFM-12120x                                                                        | SFM-14120x                                                                        | SFM-20120x                                                                         | SFM-30120x                                                                          | SFM-40120x                                                                          | SFM-50120x                                                                          |
| Rated Current                   | 120A                                                                              |                                                                                   |                                                                                    |                                                                                     |                                                                                     |                                                                                     |
| Size                            | 40.0 $\pm$ 0.5 x 29.4 $\pm$ 0.5 x 6.0 $\pm$ 0.5 mm                                |                                                                                   |                                                                                    |                                                                                     |                                                                                     |                                                                                     |
| Fuse Resistance (Typical)       | 0.5 m-ohm                                                                         |                                                                                   |                                                                                    |                                                                                     |                                                                                     |                                                                                     |
| Operating Voltage               | 8.2 - 13.5 V                                                                      | 10.8 - 18.0 V                                                                     | 14.2 - 23.5 V                                                                      | 18.9 - 31.5 V                                                                       | 29.7 - 49.5 V                                                                       | 37.7 - 62.0 V                                                                       |
| Heater Resistance               | 1.0 - 1.6 ohm                                                                     | 1.8 - 2.7 ohm                                                                     | 3.0 - 4.7 ohm                                                                      | 5.5 - 8.3 ohm                                                                       | 13.6 - 20.5 ohm                                                                     | 22.0 - 33.0 ohm                                                                     |
| Marking                         |  |  |  |  |  |  |

| Items                    | General Specification                                                                                                                |
|--------------------------|--------------------------------------------------------------------------------------------------------------------------------------|
| Environmental Compliance | Compliance with RoHS                                                                                                                 |
| Halogen Free             | Bromine (Br)=900 ppm or less, Chlorine (Cl)=900 ppm or less, Br+Cl=1500 ppm or less (By weight)                                      |
| Qualification            | UL248-14 (File No. E489967)                                                                                                          |
| Rated Voltage            | 80 VDC<br>(*1) This value is the maximum voltage can be cut off by fuse. It doesn't represent the operational voltage of the heater. |
| Rated Breaking Capacity  | 300 A                                                                                                                                |

\*1 "x" is defined according to the version of the product. The latest letter is "B"

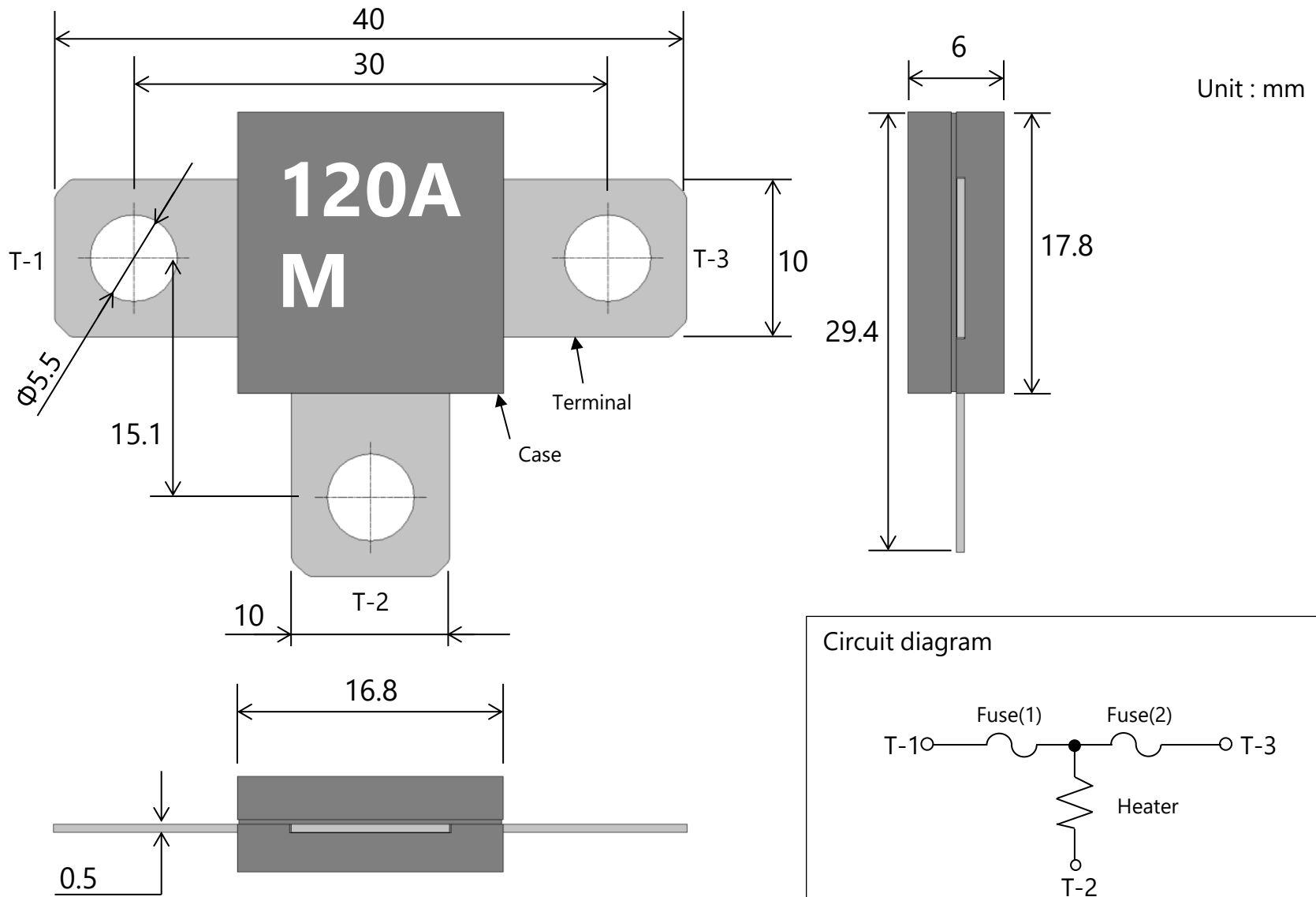
\*Caution: The specification may be subject to change without prior notice in the future.

# SFM-150x External View & Equivalent Circuit



\*Caution: The specification may be subject to change without prior notice in the future.

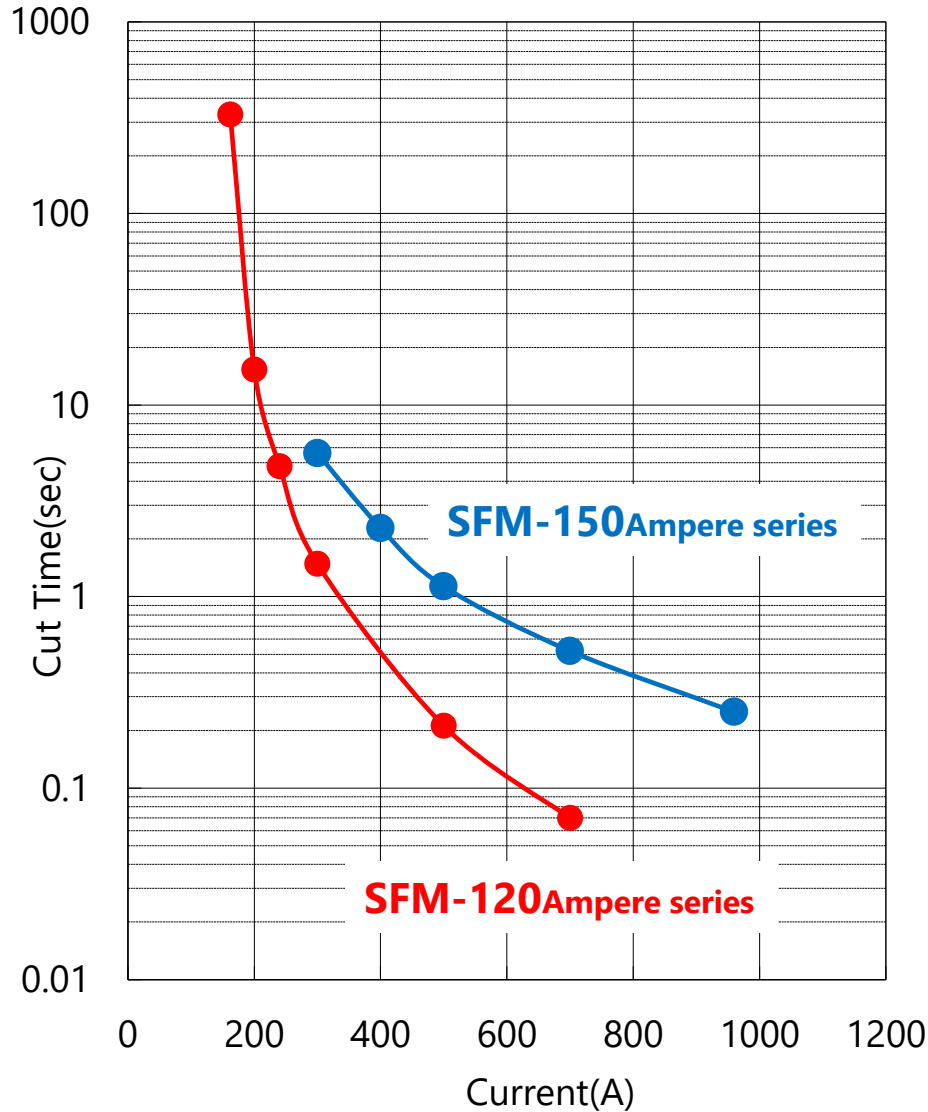
# SFM-120x External View & Equivalent Circuit



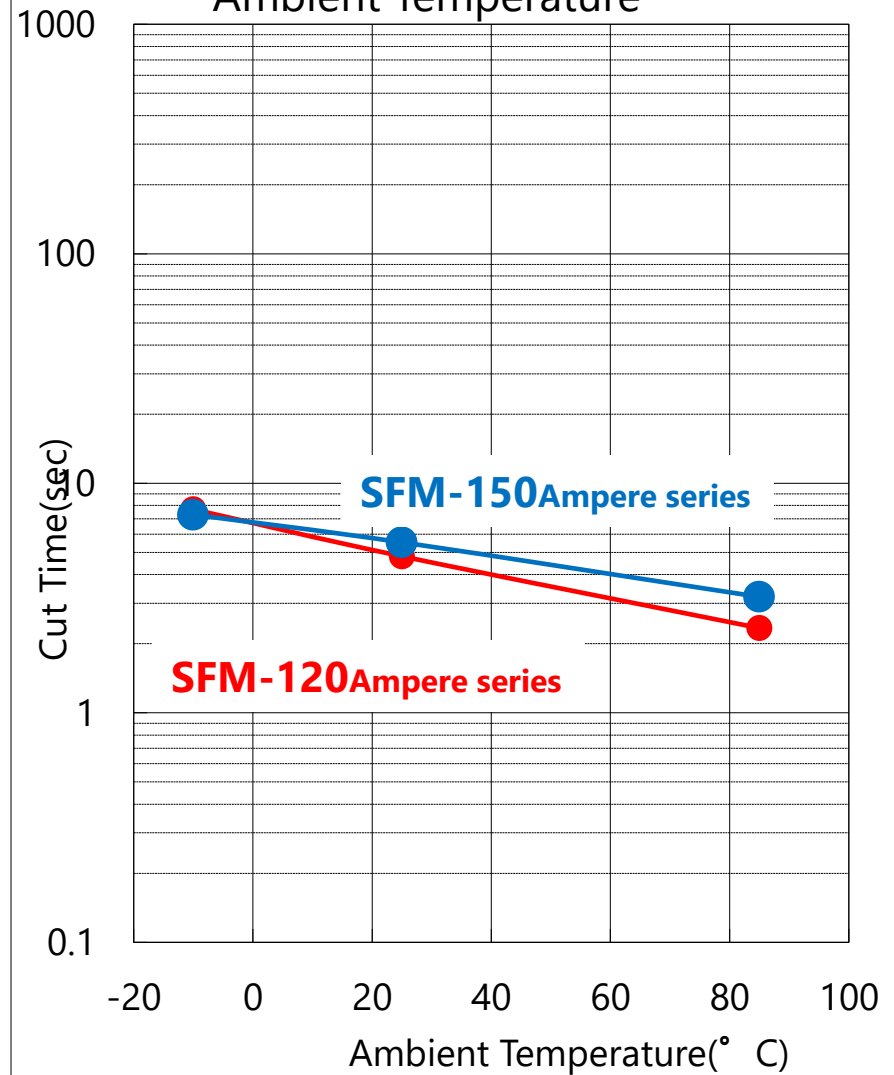
\*Caution: The specification may be subject to change without prior notice in the future.

# Current Operation

### Current vs Cut Time (at 25° C)



### Cut Time by 2\*Rated-Current vs Ambient Temperature

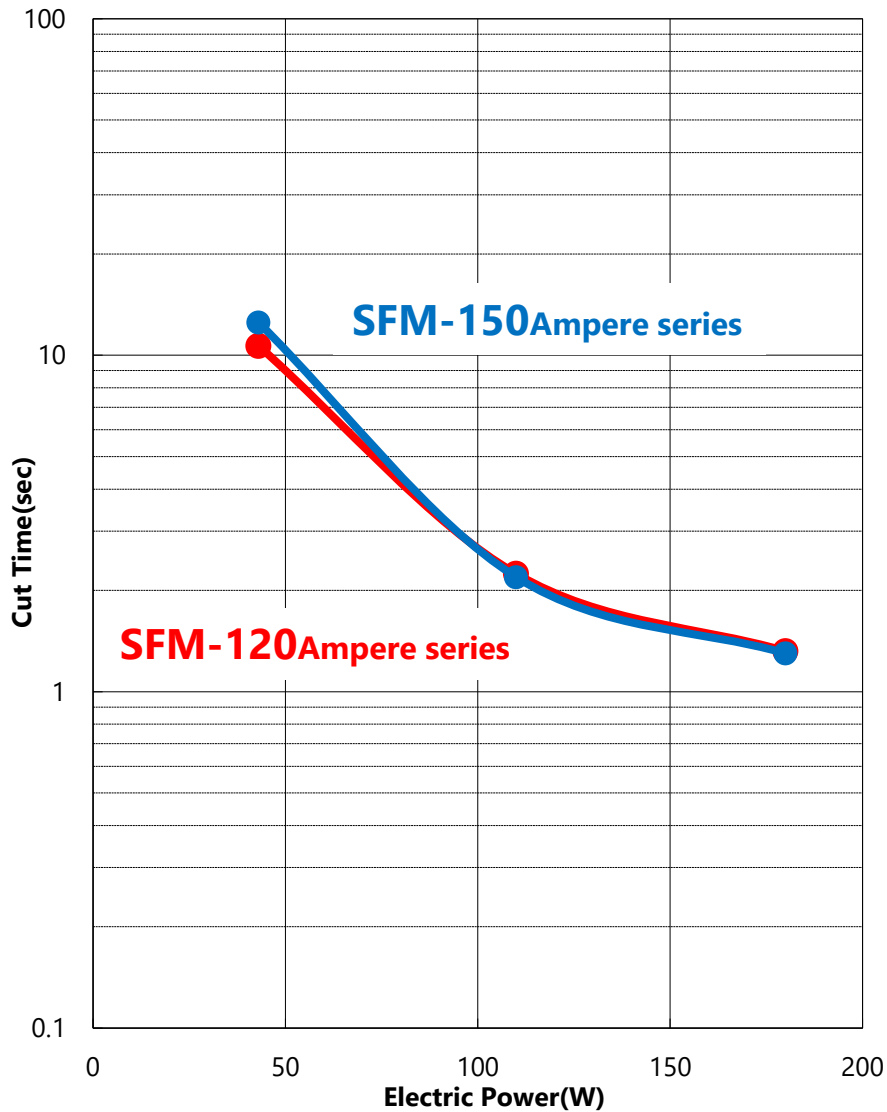


\*Caution: The specification may be subject to change without prior notice in the future.

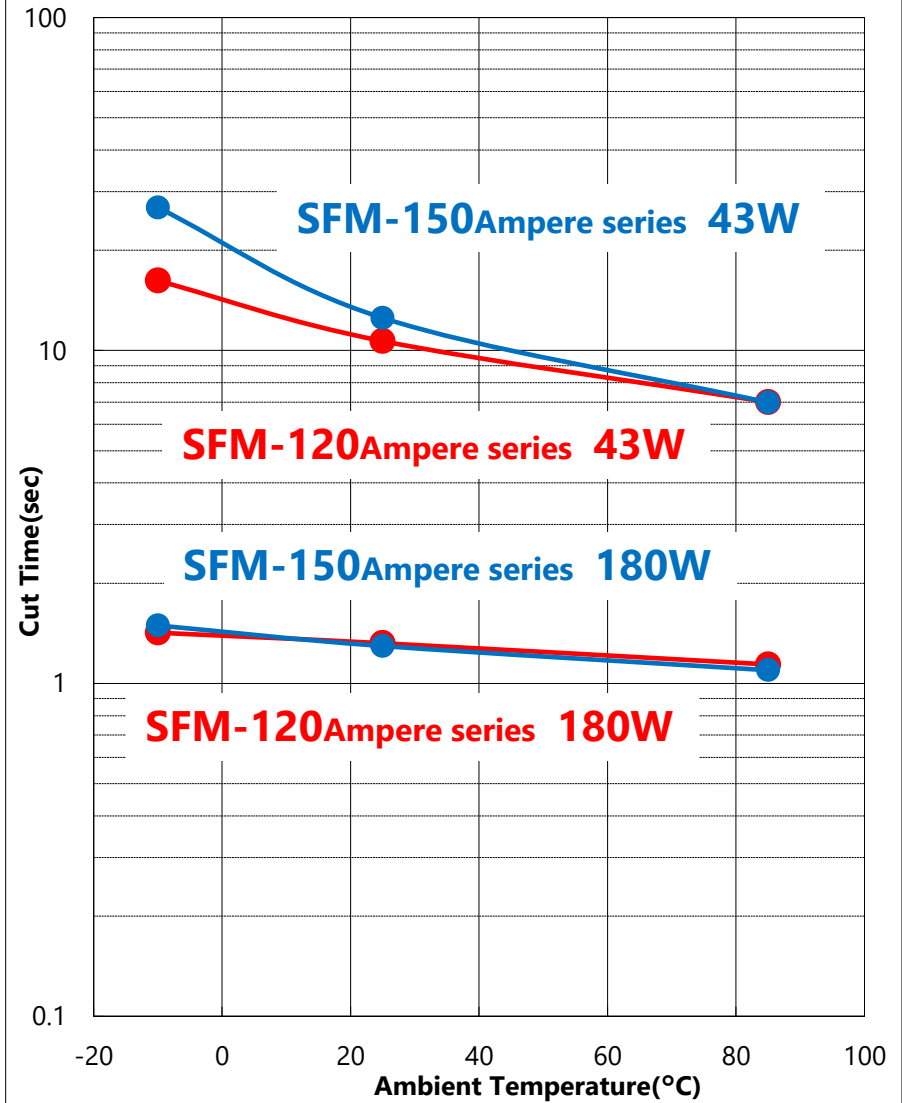
This is the typical value evaluated with our company's standard tool (1.0t copper terminals).

# Heater Operation

### Cut by heater wattage (at 25°C)



### Cut time vs Ambient Temperature



\*Caution: The specification may be subject to change without prior notice in the future.

This is the typical value evaluated with our company's standard tool (1.0t copper terminals).



# Current Carrying Capacity

| Product Name                 | Nominal Rated current | Current-Carrying Capacity <sup>(*1)</sup> |       |       | Current Rush Withstand <sup>(*2)</sup> |
|------------------------------|-----------------------|-------------------------------------------|-------|-------|----------------------------------------|
|                              |                       | 25 °C                                     | 40 °C | 60 °C |                                        |
| <b>SFM-120 Ampare series</b> | 120 A                 | 134 A                                     | 122 A | 106 A | 500 A-5 ms                             |
| <b>SFM-150 Ampare series</b> | 150 A                 | 189 A                                     | 180 A | 158 A | 650 A-5 ms                             |

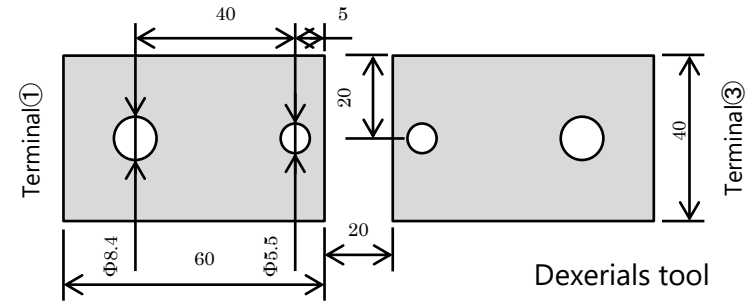
(\*Note)

- This is the standard value derived from a temperature of 100 degrees Celsius, a temperature at which we have verified the reliability using our company's standard tool (1.0t copper terminals). The thermal capacity of the PCB can affect it, so we recommend verifying it with your specific PCB.

  - > 25 °C, 40 °C and 60 °C are ambient temperature.
  - > The temperature at which we verified reliability is not a critical condition. SCP fusing-off temperature is 200 °C or more.
  - > The current-carrying capacity is measured under thermal equilibrium conditions. Therefore, if the duration of current-carrying is short, the current-carrying capacity will increase.
- Reliability was confirmed under the test conditions (10 ms-On, 9990 ms-Off, 500 cycle). However, this does not mean critical conditions for SCP.

# Handling of data in this document

- 1. Please confirm the latest product information before a design.
  - You can confirm the latest information about SCP on the following website.
  - <http://www.dexerials.jp/en/products/c3/>
- 2. SCP complies with following environmental regulation.
  - 1) RoHS.
  - 2) General requirement for Halogen Free.
- 3. These data are typical values.
  - 1) These data is not a guaranteed value.
  - 2) These data is measured with our company's standard tool (1.0t copper terminals).The characteristics are influenced by thermal capacity of PCB. Generally, as the thermal capacity of the PCB increases, the current-carrying capacity will also increase, and the clearing time will be longer.
- 4. Please select the product based on [Current-carrying capacity] and [Heater operation characteristics].
  - 1) Nominal rated current is provided based on UL standard (The maximum temperature rise on body or contact that is passed the current shall not exceed 75 °C) and so it is not Current-carrying capacity. Therefore, please select a product based on Current-carrying capacity instead of Nominal rated current.
  - 2) [Current-carrying capacity] and [Heater operation characteristics] are influenced by thermal capacity of PCB and so on. Therefore, we recommend checking it on your PCB.
  - 3) We can perform tests using your printed circuit boards (current-carrying characteristics, clearing characteristics, etc.).Please feel free to contact us.
- 5. Current-carrying capacity
  - 1) The current-carrying capacity is the value at which SCP reaches the temperature that we have verified for reliability within our company.
  - 2) The temperature at which we have confirmed reliability is 100 degrees Celsius. However, this is not a critical condition for SCP. For instance, if SCP's temperature exceeds this, it does not immediately fuse off like a typical thermal fuse. SCP's fusing-off temperature is 200 degrees Celsius or higher, indicating that it has a significant capacity to withstand temperature increases.
  - 3) The current-carrying capacity is measured under thermal equilibrium conditions. Therefore, if the duration of current-carrying is short, the current-carrying capacity will increase.
- 6. Precautions regarding handling
  - 1) Make sure that the terminals of this product are connected on the lands of the circuit board, and that the heater resistance is rated value.
  - 2) Ultrasonic cleaning, immersion cleaning, and similar methods should not be applied to SCP either before or after mounting. If cleaning is performed, the flux on the element could flow, potentially causing it to fail to meet its specifications. Additionally, similar influence can occur when the product comes into contact with a cleaning solution. Any products cleaned in this manner will not be guaranteed.
  - 3) Please avoid contacting SCP and resin-mold. The resin might infiltrate into the product, and it doesn't meet the specification when the resin-mold is done to this product. These products after resin-mold will not be guaranteed.
  - 4) Please do not re-use of the SCP that removed by the solder correction.
  - 5) SCP should be stored in a shaded, low-dust area with a temperature of 40°C or lower, without sudden temperature changes. The relative humidity should be 60% or less, and the air should be free of corrosive gases. Under these conditions, the maximum storage period is 1 year from the delivery date.



# Application Note

To use SFM properly, check the following points when mounting and using SFM.

1. To prevent terminals from bending or rotating, do not fully tighten the bolts initially until each bolt is loosely screwed into terminals.
  - Tightening torque should not exceed  $4.5[\text{N}\cdot\text{m}]$ .
  - When fixing the terminals with bolts and nuts, make sure that the nuts do not rotate when tightening the bolts.
  - To minimize stress on the terminals when tightening, the use of washers is recommended.
2. Make sure SFM is securely fixed inside the battery pack.
  - Avoid mechanical stress on SFM, to prevent damage from impact such as dropping.
  - SFM may be damaged if stress such as twisting, or vibration is concentrated between the terminals.
3. Securely fix the bus-bars and cables connected to the SFM to the battery pack.
  - If bus-bars or cables are not sufficiently fixed, the SFM may be damaged by the stress of vibration or impact.
4. Check the performance and functions of SFM under actual usage conditions.
  - If the electric resistance of the bus-bars or cables connected to the SFM is high, the heat generated when electricity is applied will increase, which will reduce current carrying capacity of the SFM.
  - If the heat dissipated to the bus bar or cable connected to the SFM is high, the heat of the heater required to blow the fuse element may be insufficient and the fuse may not blow normally.
5. With the SFM mounted on the actual battery pack or module, make sure that the SFM is not damaged and that the fuse resistance value is normal before using it.

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