

### SinglFuse™ SF-0603S-M Series Features

- Single blow fuse for overcurrent protection
- 1608 (EIA 0603) miniature footprint
- Slow blow fuse (Fusing time ≤5 seconds at 250 % rated current)
- UL 248-14 compliant
- Surface mount packaging for automated assembly
- Multilayer SMD design
- RoHS compliant\* and halogen free\*\*

# SF-0603S-M Series - Slow Blow Multilayer Surface Mount Fuses

#### **Clearing Time Characteristics for Series**

| % of Current Rating | Clearing Time at 25 °C |              |  |
|---------------------|------------------------|--------------|--|
|                     | Min.                   | Max.         |  |
| 100 %               | 4 hours                | _            |  |
| 250 %               | _                      | 5 seconds    |  |
| 400 %               | _                      | 0.05 seconds |  |

#### **Additional Information**

Click these links for more information:











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#### **Electrical Characteristics**

| Model          | Rated Current | Resistance  | Rated                |               | Typical<br>I²t (A²s)**** | Certifications      |   |
|----------------|---------------|-------------|----------------------|---------------|--------------------------|---------------------|---|
|                | (A)           | (Ω) Typ.*** | Voltage              |               |                          | cUL: <u>E198545</u> |   |
| SF-0603S050M-2 | 0.50          | 0.483       | 63 VDC 35 A @ 63 VDC |               | 0.0030                   | ✓                   |   |
| SF-0603S075M-2 | 0.75          | 0.253       |                      | 0.0061        | ✓                        |                     |   |
| SF-0603S100M-2 | 1.00          | 0.146       |                      | 0.0132        | ✓                        |                     |   |
| SF-0603S150M-2 | 1.50          | 0.0587      |                      |               | 0.0303                   | <b>✓</b>            |   |
| SF-0603S200M-2 | 2.00          | 0.0438      | 32 VDC 35 A @ 32     |               | 0.061                    | ✓                   |   |
| SF-0603S250M-2 | 2.50          | 0.0318      |                      |               | 0.101                    | ✓                   |   |
| SF-0603S300M-2 | 3.00          | 0.0249      |                      | 35 A @ 33 VDC | 0.18                     | ✓                   |   |
| SF-0603S350M-2 | 3.50          | 0.0239      |                      | 35 A @ 32 VDC | 0.303                    | ✓                   |   |
| SF-0603S400M-2 | 4.00          | 0.0179      |                      |               |                          | 0.51                | ✓ |
| SF-0603S500M-2 | 5.00          | 0.0129      |                      |               | 0.81                     | 1                   |   |
| SF-0603S600M-2 | 6.00          | 0.0100      | 24 VDC               | 35 A @ 24 VDC | 1.11                     | 1                   |   |

<sup>\*\*\*</sup> Resistance value measured with ≤10 % rated current at 25 °C ambient. Tolerance ±30 %.

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WARNING Cancer and Reproductive Harm www.P65Warnings.ca.gov

Specifications are subject to change without notice.

Users should verify actual device performance in their specific applications.

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<sup>\*\*\*\*</sup>Melting I2t calculated at 0.001 second pre-arcing time.

<sup>\*</sup>RoHS Directive 2015/863, Mar 31, 2015 and Annex.

<sup>\*\*</sup>Bourns considers a product to be "halogen free" if (a) the Bromine (Br) content is 900 ppm or less; (b) the Chlorine (Cl) content is 900 ppm or less; and (c) the total Bromine (Br) and Chlorine (Cl) content is 1500 ppm or less.

<sup>&</sup>quot;SinglFuse" is a trademark of Bourns, Inc.

## SinglFuse™ SF-0603S-M Series Applications

- Portable memory
- LCD monitors
- Disk drives
- PDAs
- Digital cameras
- MP3 players

- Cell phones
- Rechargeable battery packs
- Battery chargers
- Set-top boxes
- Industrial controllers
- Battery Management Systems (BMS)

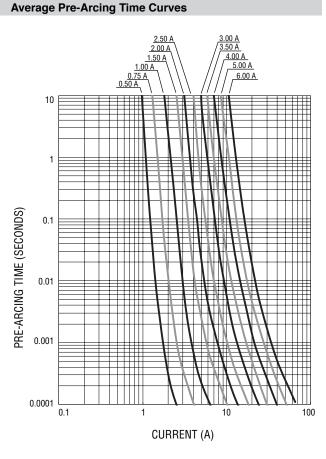
#### LED lighting

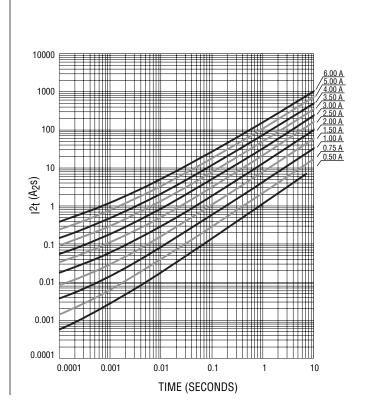
Power tools

Average I2t vs. t Curves

# SF-0603S-M Series - Slow Blow Multilayer Surface Mount Fuses

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#### **Environmental Characteristics**

 Operating Temperature...
 -55 °C to +125 °C

 Storage Conditions
 -55 °C to +125 °C

 Temperature...
 +5 °C to +35 °C

 Humidity...
 40 % to 75 %

 Shelf Life...
 2 years from manufacturing date

 Moisture Sensitivity Level.
 1

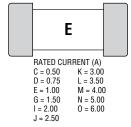
 ESD Classification (HBM).
 Class 6

# SF-0603S-M Series - Slow Blow Multilayer Surface Mount Fuses

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#### **Typical Part Marking**

Represents total content. Layout may vary.



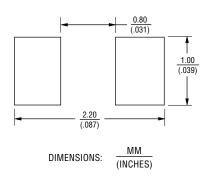
# SF - 0603 S 100 M - 2 SinglFuse™ Product Designator SMD Footprint 0603 = 1608 (EIA 0603) size Fuse Blow Type S = Slow blow Rated Current 050-600 (0.50 A - 6.00 A) Structure M = Multilayer Packaging Type - 2 = Tape & Reel

# Packaging Reel Dimension 7-inch Tape and Reel Specification EIA 481-2 Quantity 4,000 pieces

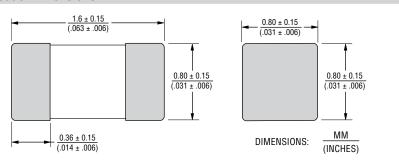
-2

#### **Recommended Pad Layout**

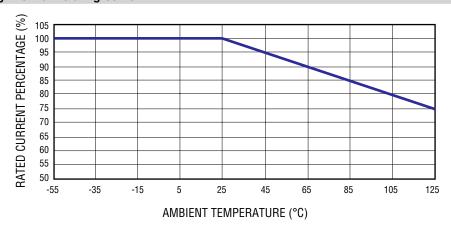
**Packaging Code** 



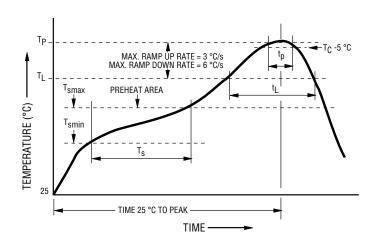
#### **Product Dimensions**



#### **Current Rating Thermal Derating Curve**



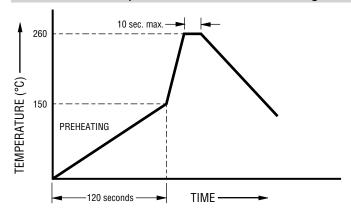
#### **Solder Reflow Recommendations**



| Profile Feature   | Pb-Free Assembly   |
|---|--------------------|
| Preheat / Soak:   | ,                  |
| Temperature Min. (T <sub>smin</sub> )   | 150 °C             |
| Temperature Max. (T <sub>smax</sub> )   | 200 °C             |
| Time (t <sub>s</sub> ) from (T <sub>smin</sub> to T <sub>smax</sub> )                             | 60~120 seconds     |
| Ramp Up Rate (T <sub>L</sub> to T <sub>p</sub> )  | 3 °C / second max. |
| Liquidous Temperature (T <sub>L</sub> )   | 217 °C             |
| Time (t <sub>L</sub> ) maintained above T <sub>L</sub>  | 60~150 seconds     |
| Peak Package Body<br>Temperature (T <sub>p</sub> )  | 260 °C             |
| Time (t <sub>p</sub> )* within 5 °C of the specified classification temperature (T <sub>c</sub> ) | 30 seconds*        |
| Ramp Down Rate (T <sub>p</sub> to T <sub>L</sub> )  | 6 °C / second max. |
| Time 25 °C to Peak Temperature  | 8 minutes max.     |

<sup>\*</sup>Tolerance for peak profile temperature  $(T_p)$  is defined as a supplier minimum and a user maximum.

#### **Recommended Temperature Profile for Wave Soldering**



Wave soldering is suitable for 0603 size models.

# SF-0603S-M Series - Slow Blow Multilayer Surface Mount Fuses

#### **Reliability Testing**

| No. | Test                      | Requirement  | Test Condition   | Test Reference            |
|-----|---------------------------|--|--|---------------------------|
| 1   | Soldering heat resistance | DCR change ≤ ±10 %<br>No mechanical damage   | One dip at 260 °C for 60 seconds   | MIL-STD-202<br>Method 210 |
| 2   | Solderability             | Minimum 95 % coverage  | One dip at 245 °C for 5 seconds  | MIL-STD-202<br>Method 208 |
| 3   | Thermal shock             | DCR change ≤ ±10 %<br>No mechanical damage   | 100 cycles between -65 °C and +125 °C  | MIL-STD-202<br>Method 107 |
| 4   | Moisture resistance       | DCR change ≤ ±15 %<br>No excessive corrosion   | 10 cycles  | MIL-STD-202<br>Method 106 |
| 5   | Salt spray                | DCR change ≤ ±10 %<br>No excessive corrosion   | 48 hour exposure, 5 % salt solution  | MIL-STD-202<br>Method 101 |
| 6   | Mechanical vibration      | DCR change ≤ ±10 %<br>No mechanical damage   | 0.4 inch D.A. or 30 G between 5-3000 Hz  | MIL-STD-202<br>Method 204 |
| 7   | Mechanical shock          | DCR change ≤ ±10 %<br>No mechanical damage   | 1500 G, 0.5 ms, half-sine shocks   | MIL-STD-202<br>Method 213 |
| 8   | Life                      | No electrical "opens" during testing.<br>Voltage drop change shall be less than<br>±20 % of initial value. | 80 % rated current (75 % for ≤1 A fuses) for 2000 hours at ambient temperature +20 °C ~ +30 °C | Refer to STP document     |
| 9   | Terminal strength         | No mechanical damage   | 0.5 Kg pushing force   | Refer to STP document     |

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