

## SolidMatrix® Surface Mount Fuses

### FF Series (Very Fast Acting), 0603 Size



#### Features:

- Very fast acting at 200% and 300% overloads
- Excellent inrush current withstanding capability at high overloads
- Thin body for space limiting applications
- Glass ceramic monolithic structure
- Silver fusing element and silver termination with nickel and tin plating
- Symmetrical design with marking on both sides (optional)
- Operating temperature range: -55°C to +150°C (with de-rating)

#### Clearing Time Characteristics:

| % of Current Rating | Clearing Time at 25°C |                  |
|---------------------|-----------------------|------------------|
|                     | 100%                  | 4 hours min.     |
| 200%                | 0.01 seconds min.     | 5 seconds max.   |
| 300%                | 0.001 seconds min.    | 0.2 seconds max. |

#### Agency Approval:

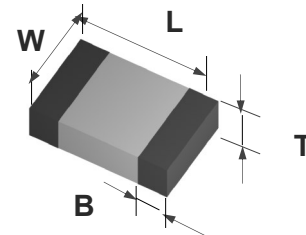
Recognized Under the Components Program of UL.  
File Number: E232989.

#### Patents:

Patent numbers "US6,034,589", "US6,602,766",  
"US6,844,278", "ZL00134544.3", "ZL02114719.1",  
"ZL201020551360.8", "ZL201010299185.2",  
"ZL201220030614.0", "ZL201210020693.1".

#### Shape and Dimensions:

| Unit | Inch                   | mm                  |
|------|------------------------|---------------------|
| L    | 0.063 ± 0.006          | 1.60 ± 0.15         |
| W    | 0.031 ± 0.006          | 0.80 ± 0.15         |
| T    | 0.012 + 0.007 / -0.003 | 0.30 + 0.18 / -0.08 |
| B    | 0.014 ± 0.006          | 0.36 ± 0.15         |



#### Ordering Information:

| Part Number      | Current Rating(A) | Voltage Rating (VDC) | Interrupting Ratings  | Nominal Cold DCR(Ω) <sup>1</sup> | Nominal I <sup>2</sup> t (A <sup>2</sup> s) <sup>2</sup> | Marking (Optional) <sup>3</sup> |
|------------------|-------------------|----------------------|-----------------------|----------------------------------|--|---------------------------------|
| F0603FF0500V032T | 0.5               | 32                   | 50 A at rated voltage | 1.000                            | 0.0093   | C                               |
| F0603FF0750V032T | 0.75              | 32                   |                       | 0.450                            | 0.0191   | D                               |
| F0603FF1000V032T | 1.0               | 32                   |                       | 0.280                            | 0.036  | E                               |
| F0603FF1250V032T | 1.25              | 32                   | 35 A at rated voltage | 0.205                            | 0.063  | F                               |
| F0603FF1500V032T | 1.5               | 32                   |                       | 0.143                            | 0.095  | G                               |
| F0603FF1750V032T | 1.75              | 32                   |                       | 0.095                            | 0.14   | H                               |
| F0603FF2000V032T | 2.0               | 32                   |                       | 0.073                            | 0.21   | I                               |
| F0603FF2500V032T | 2.5               | 32                   |                       | 0.046                            | 0.30   | J                               |
| F0603FF3000V032T | 3.0               | 32                   |                       | 0.039                            | 0.46   | K                               |
| F0603FF3500V032T | 3.5               | 32                   |                       | 0.028                            | 0.73   | L                               |
| F0603FF4000V032T | 4.0               | 32                   |                       | 0.023                            | 1.15   | M                               |
| F0603FF4500V032T | 4.5               | 32                   |                       | 0.019                            | 1.68   | T                               |
| F0603FF5000V032T | 5.0               | 32                   |                       | 0.015                            | 2.62   | N                               |

1. Measured at ≤ 10% rated current and 25°C ambient.

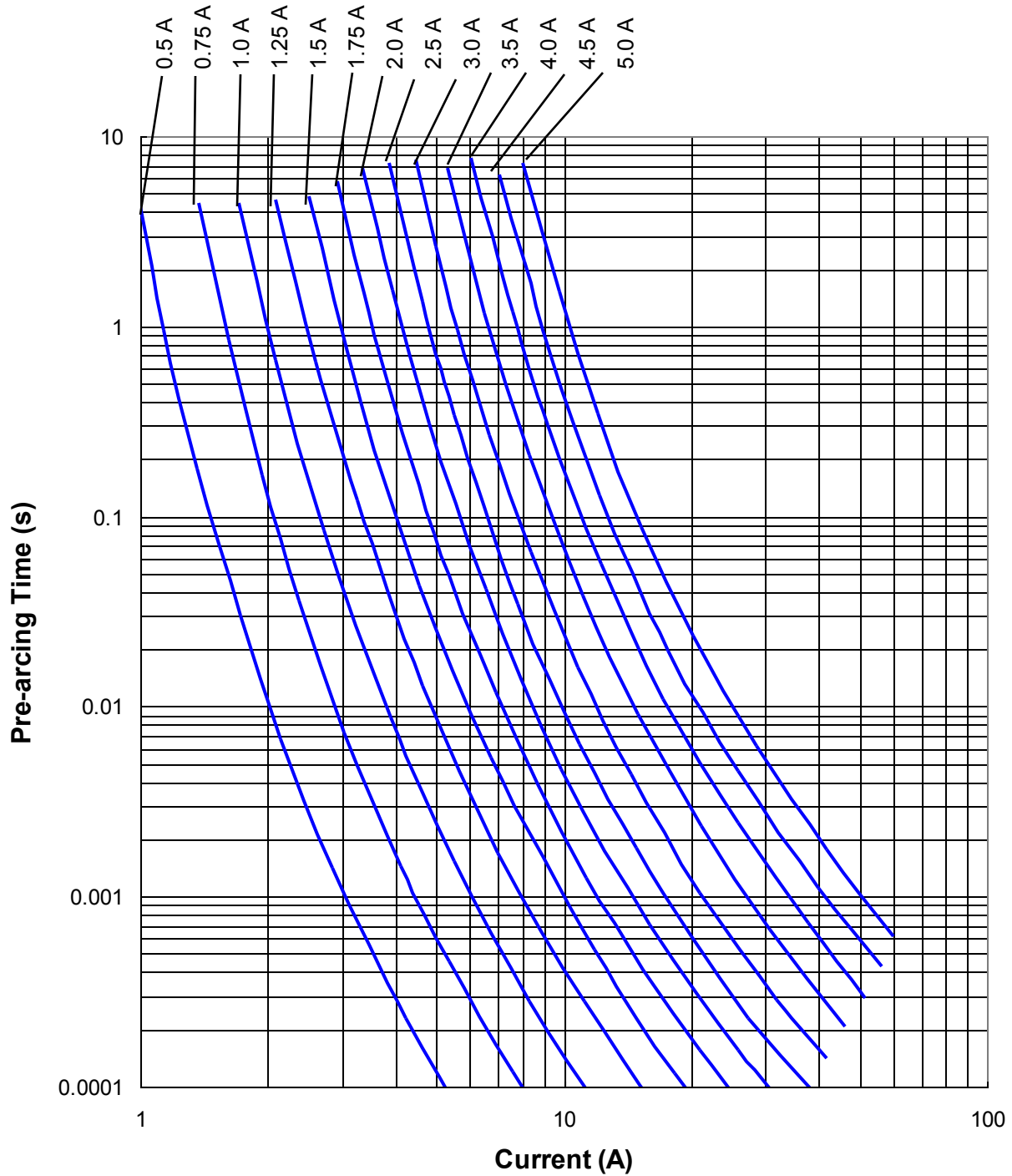
2. Melting I<sup>2</sup>t at 0.001 second pre-arcing time.

3. Blue Marking Character Code.

# SolidMatrix® Surface Mount Fuses

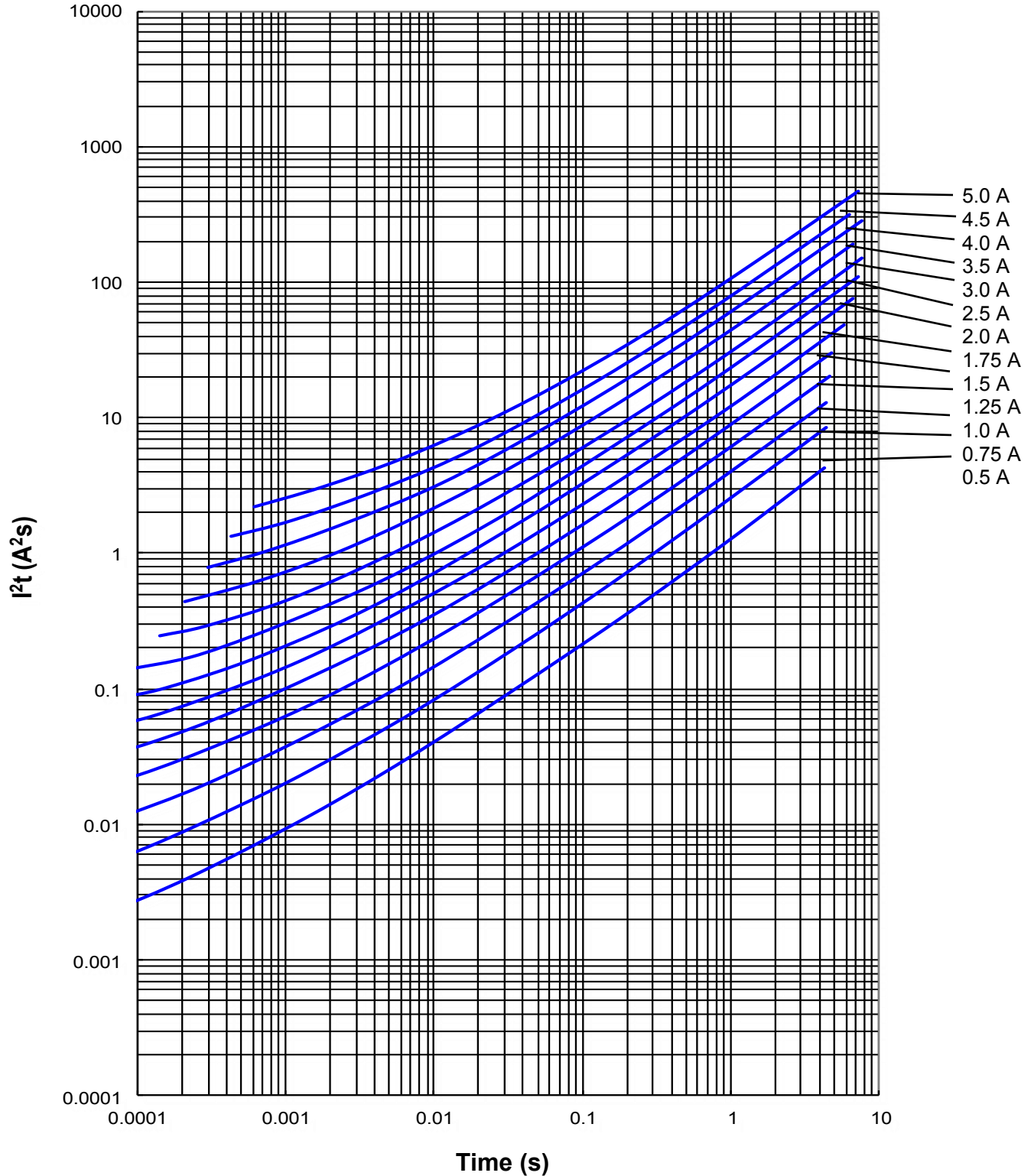
## FF Series (Very Fast Acting), 0603 Size

### Average Pre-arcing Time Curves:



# SolidMatrix<sup>®</sup> Surface Mount Fuses FF Series (Very Fast Acting), 0603 Size

## Average $I^2t$ vs. $t$ Curves:



## SolidMatrix® Surface Mount Fuses

### Product Identification:

#### **F 0603 FA 1000 V032 T M**

(1) (2) (3) (4) (5) (6) (7)

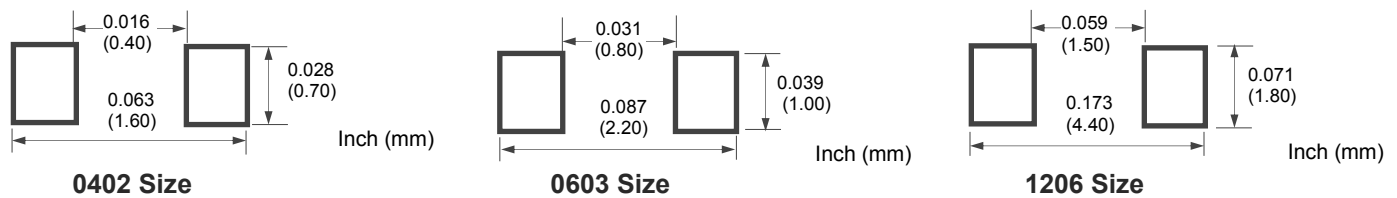
- (1) **Product Code:** F—Chip Fuse
- (2) **Size Code:** Standard EIA Chip Sizes
- (3) **Series Code:** FA - Fast Acting, SB - Slow Blow,  
HI - High Inrush, FF - Very Fast Acting, HB - High Current
- (4) **Current Rating Code:** 1000 - 1000 mA (For HB, 10 - 10A)
- (5) **Voltage Rating Code:** V032 - 32 VDC
- (6) **Package Code:** T - Tape & Reel, B - Bulk
- (7) **Marking Code:** M - With Marking

#### **F 1206 HC 20A0 T M**

(1) (2) (3) (4) (5) (6)

- (1) **Product Code:** F—Chip Fuse
- (2) **Size Code:** L x W (inch),  
the first two digits-L (length),  
the last two digits-W (width)
- (3) **Series Code:** HC Series
- (4) **Current Rating Code:** 20A0—20.0A
- (5) **Package Code:** T - Tape & Reel, B - Bulk

### Recommended Land Pattern:



### Environmental Tests:

| No. | Test                      | Requirement  | Test condition  | Test reference            |
|-----|---------------------------|--|---|---------------------------|
| 1   | Soldering heat resistance | DCR change $\leq \pm 10\%$<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 $\leq \pm 10\%$<br>No mechanical damage   | 100 cycles between -65°C and +125°C   | MIL-STD-202<br>Method 107 |
| 4   | Moisture resistance       | DCR change $\leq \pm 15\%$<br>No excessive corrosion   | 10 cycles   | MIL-STD-202<br>Method 106 |
| 5   | Salt spray                | DCR change $\leq \pm 10\%$<br>No excessive corrosion   | 48 hour exposure  | MIL-STD-202<br>Method 101 |
| 6   | Mechanical vibration      | DCR change $\leq \pm 10\%$<br>No mechanical damage   | 0.4 " D.A. or 30 G between 5 – 3000 Hz  | MIL-STD-202<br>Method 204 |
| 7   | Mechanical shock          | DCR change $\leq \pm 10\%$<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 $\pm 20\%$ of initial value | 80% rated current (75% for < 1 A fuses) for 2000 hours at ambient temperature between +20°C and +30°C | Refer to AEM<br>QIQ106    |

## SolidMatrix® Surface Mount Fuses

### Electrical Specification:

#### Clearing Time Characteristics:

Same as specified on the Short Form Data Sheet

#### Insulation Resistance after Opening:

20,000 ohms typical when cleared with rated voltage applied. Fuse clearing under low voltage conditions may result in lower after clearing insulation resistance values. (Note: Under normal fault conditions (low or rated voltage conditions), AEM SolidMatrix fuses provide sufficient after clearing insulation resistance values for circuit protection.)

#### Current Carrying Capacity:

100% rated current at +25°C ambient for 4 hours minimum when evaluated per MIL-PRF-23419

#### Interrupt Ratings:

### Fuse Selection and Temperature De-rating Guideline:

The ambient temperature affects the current carrying capacity of fuses. When a fuse is operating at a temperature higher than 25°C, the fuse shall be “de-rated”.

To select a fuse from the catalog, the following rule may be followed:

Catalog Fuse Current Rating = Nominal Operating Current / 0.75 / % De-rating at the maximum operating temperature.

Example: At maximum operating temperature of 65°C, % De-rating is 90%. The nominal operating current is 4 A. The current rating for fuse selected from the catalog shall be:  $4 / 0.75 / 90\% = 5.9$  or 6 A. Specifications and descriptions in this literature are as accurate as known at the time of publish, but are subject to change without notice.

Temperature De-Rating Curve for SolidMatrix Fuses



## SolidMatrix® Surface Mount Fuses

### Soldering Temperature Profile:

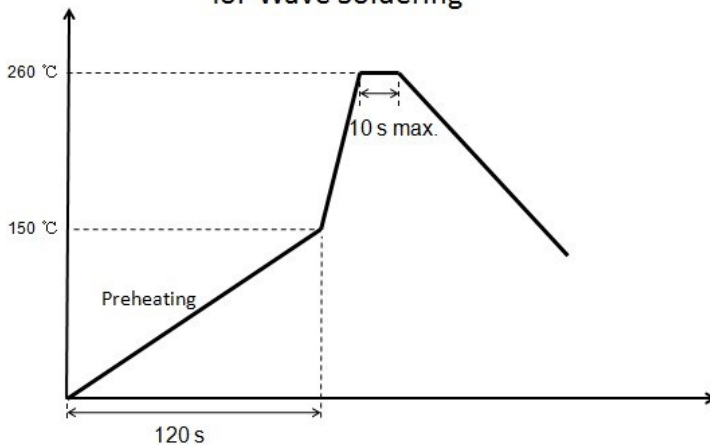
\* Recommended Temperature Profile for Reflow Soldering



| Profile Feature   | Pb-Free Assembly                 |
|---|----------------------------------|
| <b>Preheat/Soak</b><br>Temperature Min ( $T_{smin}$ )<br>Temperature Max ( $T_{smax}$ )<br>Time ( $t_s$ ) from ( $T_{smin}$ to $T_{smax}$ ) | 150°C<br>200°C<br>60~120 seconds |
| Ramp-up rate ( $T_L$ to $T_p$ )   | 3°C/second max.                  |
| Liquidous temperature ( $T_L$ )<br>Time ( $t_L$ ) maintained above $T_L$  | 217°C<br>60~150 seconds          |
| Peak package body temperature ( $T_p$ )   | 260°C                            |
| Time ( $t_p$ )* within 5°C of the specified classification temperature ( $T_c$ )  | 30 seconds *                     |
| Ramp-down rate ( $T_p$ to $T_L$ )   | 6°C/second max.                  |
| Time 25°C to peak temperature   | 8 minutes max.                   |
| * Tolerance for peak profile temperature ( $T_p$ ) is defined as a supplier minimum and a user maximum                                      |                                  |

\* Recommended Temperature Profile for Wave Soldering

### Recommended Temperature Profile for Wave Soldering



Notice: Wave Soldering is suitable for 1206 and 0603 size.

### Packaging:

| Chip Size     | Parts on 7 inch (178 mm) Reel |
|---------------|-------------------------------|
| 0402 (1005)   | 10,000                        |
| 0603 (1608)   | 4,000                         |
| 0603FF (1608) | 6,000                         |
| 1206 (3216)   | 3,000                         |

## Disclaimer

*Specifications are subject to change without notice. AEM products are designed for specific applications and should not be used for any purpose (including, without limitation, automotive, aerospace, medical, life-saving applications, or any other application which requires especially high reliability for the prevention of such defect as may directly cause damage to the third party's life, body or property) not expressly set forth in applicable AEM product documentation. It is the customer's responsibility to validate that a particular product with the properties described in the product specification is suitable for use in a particular application. Warranties granted by AEM shall be deemed void for products used for any purpose not expressly set forth in applicable AEM product documentation. AEM shall not be liable for any claims or damages arising out of products used in applications not expressly intended by AEM as set forth in applicable AEM product documentation. The sale and use of AEM products is subject to AEM terms and conditions of sale. Please refer*