

# SolidMatrix<sup>®</sup> Surface Mount Fuses

## HA Series (High Current), 1206 Size



### Features:

- Special products for high current rating applications
- Glass ceramic monolithic structure
- Silver fusing element and silver termination with nickel and tin plating
- RoHS compliant and lead-free materials
- Superior arc suppression capability
- High current ratings
- 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.          |
| 250%                | 5 seconds max.        |

### Agency Approval:

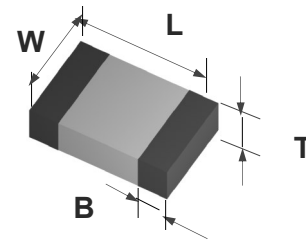
Recognized Under the Components Program of UL.  
File Number: E232989.

### Patents:

Patent numbers "US6,602,766", "US7,268,661 B2", "ZL02114719.1", "ZL200410104280.7", "ZL201020551360.8", "ZL201010299185.2", "ZL201220030614.0", "ZL201210020693.1".

### Shape and Dimensions:

| Unit | Inch          | mm          |
|------|---------------|-------------|
| L    | 0.126 ± 0.008 | 3.20 ± 0.20 |
| W    | 0.063 ± 0.008 | 1.60 ± 0.20 |
| T    | 0.038 ± 0.008 | 0.97 ± 0.20 |
| B    | 0.020 ± 0.010 | 0.51 ± 0.25 |



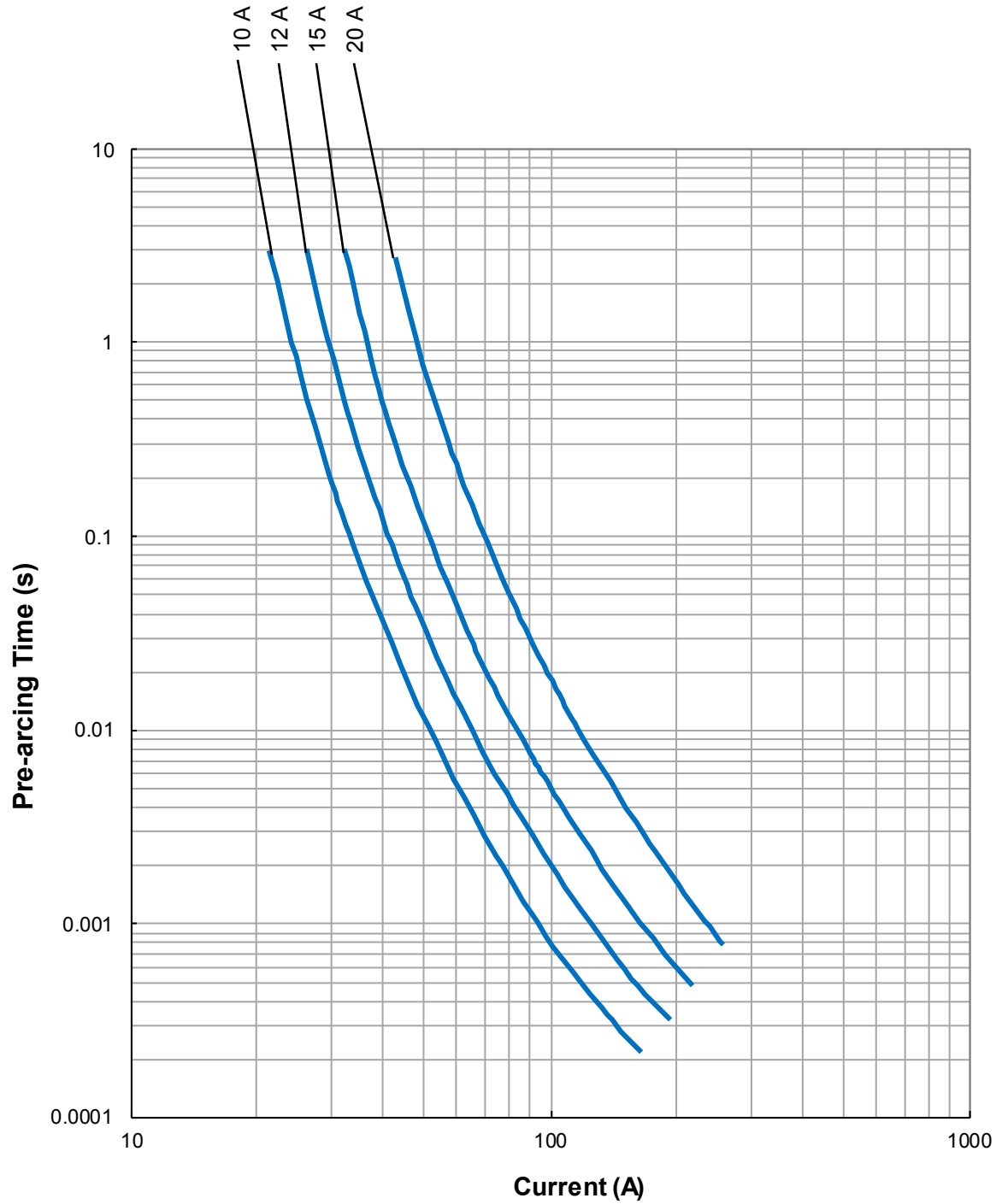
### Ordering Information:

| Part Number     | Current Rating (A) | Voltage Rating (VDC) | Interrupting Ratings | Nominal Cold DCR ( $\Omega$ ) <sup>1</sup> | Nominal $I^2t$ ( $A^2s$ ) <sup>2</sup> | Marking Code <sup>3</sup> |
|-----------------|--------------------|----------------------|----------------------|--|--|---------------------------|
| F1206HA10V024TM | 10                 | 24                   | 100A@24Vdc           | 0.010                                      | 9                                      | Q                         |
| F1206HA12V024TM | 12                 | 24                   |                      | 0.008                                      | 14                                     | X                         |
| F1206HA15V024TM | 15                 | 24                   |                      | 0.005                                      | 26                                     | Y                         |
| F1206HA20V024TM | 20                 | 24                   |                      | 0.003                                      | 56                                     | Z                         |

1. Measured at  $\leq 10\%$  rated current and 25°C ambient.
2. Melting  $I^2t$  at 0.001 second pre-arcing time
3. Black Marking Character Code.

**SolidMatrix<sup>®</sup> Surface Mount Fuses**  
**HB Series (High Current), 1206 Size**

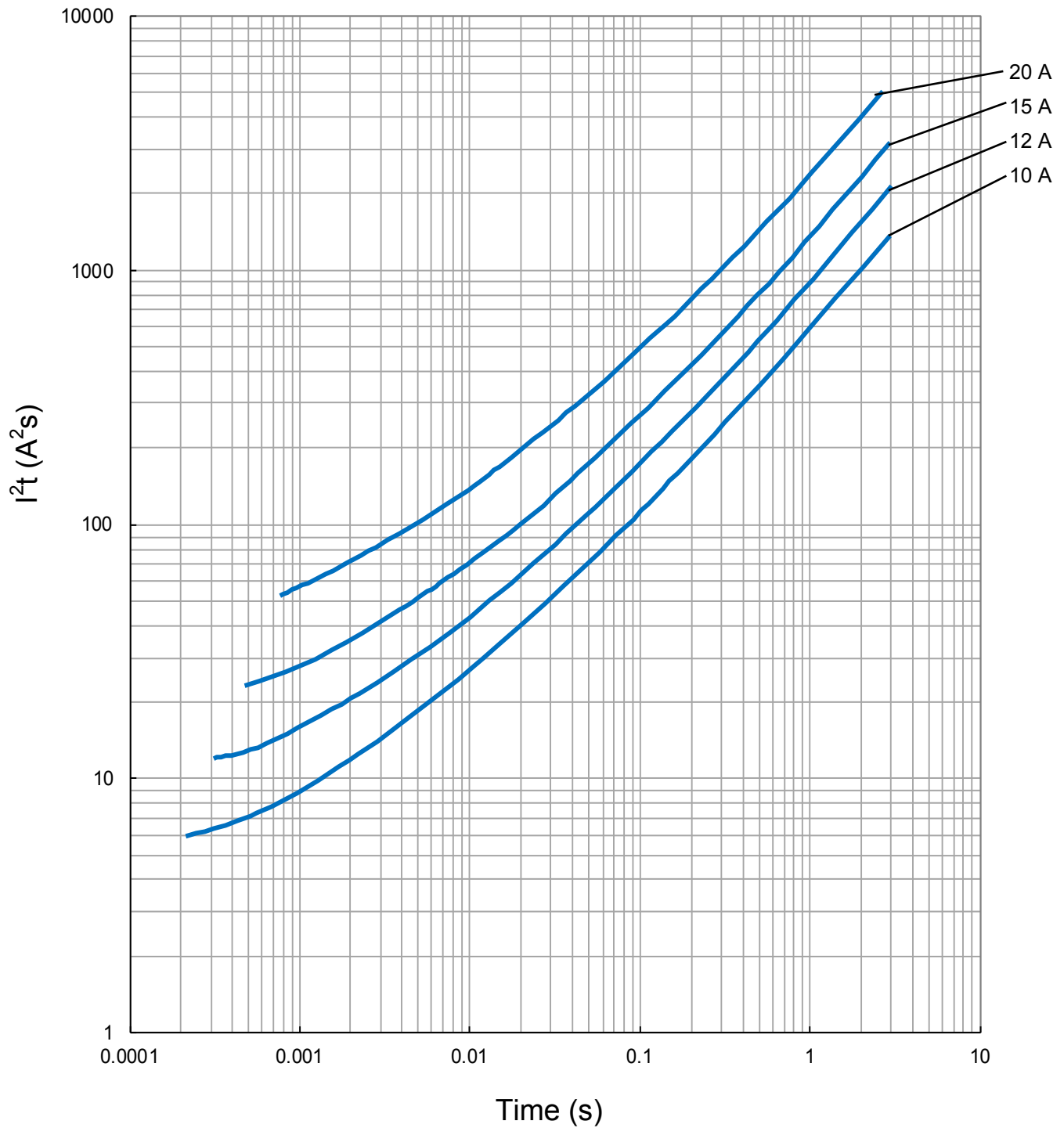
**Average Pre-arcing Time Curves:**



# SolidMatrix<sup>®</sup> Surface Mount Fuses

## HA Series (High Current), 1206 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)

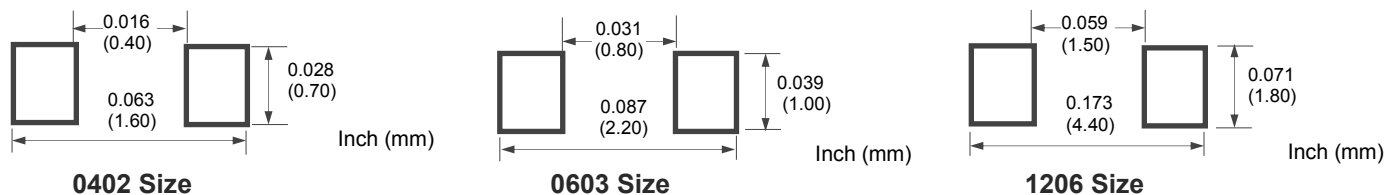
- (1) **Product Code:** F—Chip Fuse
- (2) **Size Code:** Standard EIA Chip Sizes
- (3) **Series Code:** FA - Fast Acting, SB - Slow Blow, HI - High Inrush, FF - Very Fast Acting, HB - High Current
- (4) **Current Rating Code:** 1000 - 1000 mA (For HB, 10 - 10A)
- (5) **Voltage Rating Code:** V032 - 32 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.

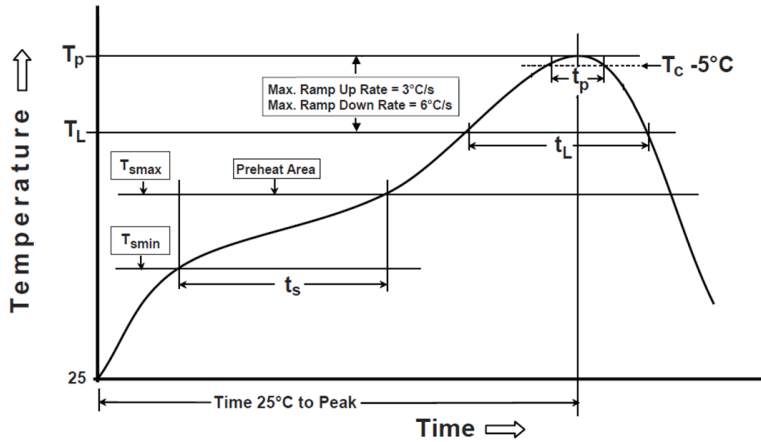
Temperature De-Rating Curve for SolidMatrix Fuses



## 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

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