

# Type 0678H

## Enhanced-breaking Capability Brick Fuse

**HF** 0678H Series-3912 Size

RoHS 2 Compliant

### Features

- Enhanced – Breaking capacity
- Surface mount high current fuse
- Current rating from 500mA to 40A
- Wide operating temperature range from -55°C to 125°C
- Tape & Reel for auto-insert SMD process
- Compatible with 260°C, IR Pb-free solder process
- AEC-Q Compliant
- RoHS compliant with exemption 7(a)
- Halogen Free, (MSL=1)
- Meets Bel automotive qualification\*
- \* - Largely based on internal AEC-Q test plan

### Applications



- Voltage regulator module
- PC server
- Office electronic equipment
- Industrial equipment
- Medical equipment
- POE, POE+
- Power supply
- DC-DC converter
- Mass storage systems




**AEC-Q Compliant**

HALOGEN FREE = **HF**

### Physical Specifications

|           |   |
|-----------|---|
| Materials | Body : Ceramic  |
|           | Terminations : Silver Plated Caps   |
| Marking   | On Fuse :   |
|           | "Current Rating", "H" in green color.<br>"bel" stamped in end caps,   |
|           | On Label :  |
|           | "bel", "0678H", "Current Rating", "Voltage Rating", "Interrupting Rating", "Appropriate Safety Logos" and "  , "  " (China RoHS compliant). |

### Safety Agency Approvals

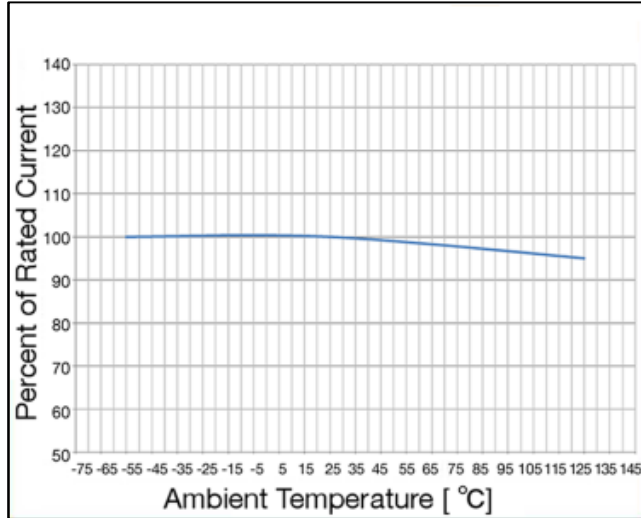
| Safety Agency   | Safety Agency Certificate | Voltage Rating (V)           | Ampere Range / Volt @ I.R. ability*  |
|---|---------------------------|------------------------------|--|
|  | E20624                    | 500mA-40A/250V AC<br>125V DC | 500mA-5A /125V @ 1000A AC<br>250V @ 300A AC<br>125V @ 2000A DC                   |
|   |                           |                              | >5A-20A /250V @ 100A AC<br>125V @ 500A AC<br>125V @ 1000A DC<br>100V @ 1500A DC  |
|   |                           |                              | >20A-30A /250V @ 100A AC<br>125V @ 200A AC<br>125V @ 1000A DC                    |
|   |                           |                              | >30A-40A /250V @ 100A AC<br>125V @ 500A AC<br>125V @ 1000A DC<br>100V @ 1500A DC |

\*I.R.= Interrupting Rating = Short Circuit Rating(Amps)

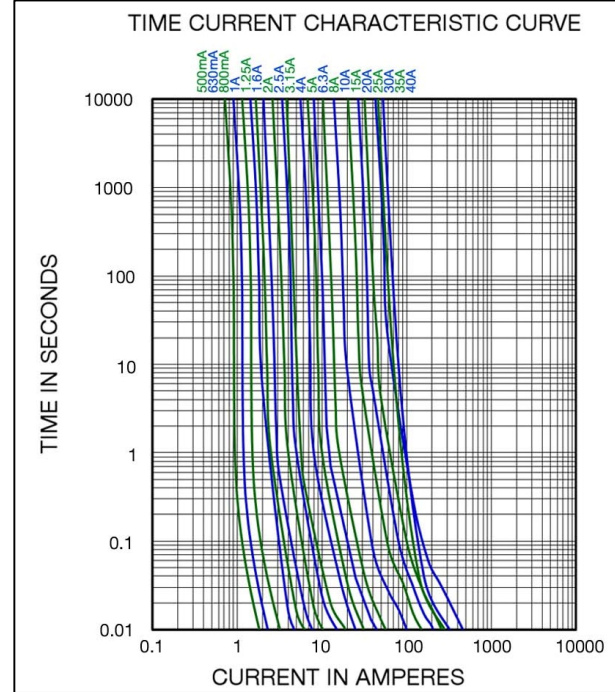
### Electrical Characteristics (UL/CSA STD.248-14)

| Testing Current | Blow Time |         |
|-----------------|-----------|---------|
|                 | Minimum   | Maximum |
| 100%            | 4 hrs.    | N/A     |
| 200%            | N/A       | 60 sec  |

## Temperature Derating Curve



## Average Time Current Curve



## Electrical Specifications

| Part Number  | Ampere Rating | Nominal Cold Resistance (ohms) | Nominal Volt-drop @100%In (Volt) | Voltage and Interrupting Ratings  | Melting I <sup>2</sup> T @10 In (A <sup>2</sup> Sec) | Nominal Power Dissipation (W) | Agency Approvals |
|--------------|---------------|--------------------------------|----------------------------------|---|--|-------------------------------|------------------|
|              |               |                                |                                  |   |  |                               |                  |
| 0678H0500-02 | 500mA         | 0.66                           | 1.00                             | See Table of Safety Approvals on Page 1 for Voltage and associated Interrupting Ratings | 0.03   | 0.5                           | Y                |
| 0678H0630-02 | 630mA         | 0.54                           | 1.30                             |   | 0.06   | 0.8                           | Y                |
| 0678H0800-02 | 800mA         | 0.38                           | 1.10                             |   | 0.08   | 0.9                           | Y                |
| 0678H1000-02 | 1A            | 0.21                           | 0.70                             |   | 0.3  | 0.7                           | Y                |
| 0678H1250-02 | 1.25A         | 0.10                           | 0.20                             |   | 0.4  | 0.3                           | Y                |
| 0678H1600-02 | 1.6A          | 0.08                           | 0.19                             |   | 0.5  | 0.3                           | Y                |
| 0678H2000-02 | 2A            | 0.059                          | 0.18                             |   | 1.0  | 0.4                           | Y                |
| 0678H2500-02 | 2.5A          | 0.043                          | 0.18                             |   | 1.8  | 0.5                           | Y                |
| 0678H3150-02 | 3.15A         | 0.035                          | 0.18                             |   | 2.8  | 0.6                           | Y                |
| 0678H4000-02 | 4A            | 0.021                          | 0.18                             |   | 7.8  | 0.7                           | Y                |
| 0678H5000-02 | 5A            | 0.016                          | 0.18                             |   | 10   | 0.9                           | Y                |
| 0678H6300-02 | 6.3A          | 0.013                          | 0.17                             |   | 20   | 1.1                           | Y                |
| 0678H8000-02 | 8A            | 0.010                          | 0.15                             |   | 34   | 1.2                           | Y                |
| 0678H9100-02 | 10A           | 0.0060                         | 0.13                             |   | 90   | 1.3                           | Y                |
| 0678H9150-02 | 15A           | 0.0041                         | 0.12                             |   | 220  | 1.8                           | Y                |
| 0678H9200-02 | 20A           | 0.0028                         | 0.09                             |   | 420  | 1.8                           | Y                |
| 0678H9250-02 | 25A           | 0.0023                         | 0.08                             |   | 660  | 2.0                           | Y                |
| 0678H9300-02 | 30A           | 0.0015                         | 0.08                             |   | 2000   | 2.4                           | Y                |
| 0678H9350-02 | 35A           | 0.0016                         | 0.11                             |   | 735  | 3.9                           | Y                |
| 0678H9400-02 | 40A           | 0.0015                         | 0.11                             |   | 1000   | 4.4                           | Y                |

Consult manufacturer for other ratings

### NOTES:

All tests were conducted with the fuses soldered to a printed circuit boards with a nominal thickness of 1.6 mm. The copper test circuit trace was a printed circuit with an overall length of 100 mm, copper thickness/width as described below. The printed circuit boards were mounted by screws to a test fixture having brass blocks for connection of the test leads. All samples were soldered to the test boards by the manufacturer.

### Caution

- Minimum fusing point:

The 0678H Series fuse are NOT intended to be operated at currents between 100% and 200% of ampere rating. Prolonged operation at currents in this range may result in overheating of the fuse and/or desoldering of the fuse caps from the PCB pad.

| Fuse rating | Test Board Trace Dimensions |
|-------------|-----------------------------|
| 500mA-5A    | 1 oz. copper, 5.0mm wide.   |
| >5A-30A     | 3 oz. copper, 10mm wide.    |
| >30A-40A    | 3 oz. copper, 15mm wide.    |



Specifications subject to change without notice

Bel Fuse Inc.  
206 Van Vorst Street  
Jersey City, NJ 07302 USA

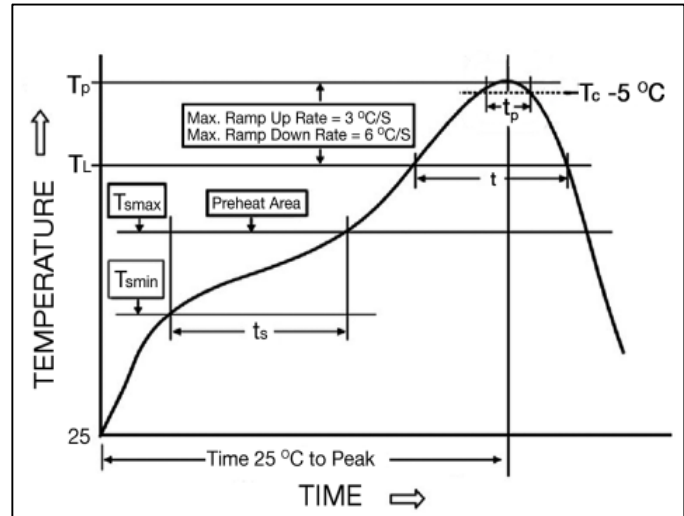
+1 201.432.0463  
Bel.US.CS@belf.com  
[belfuse.com/circuit-protection](http://belfuse.com/circuit-protection)

## Environmental Specifications

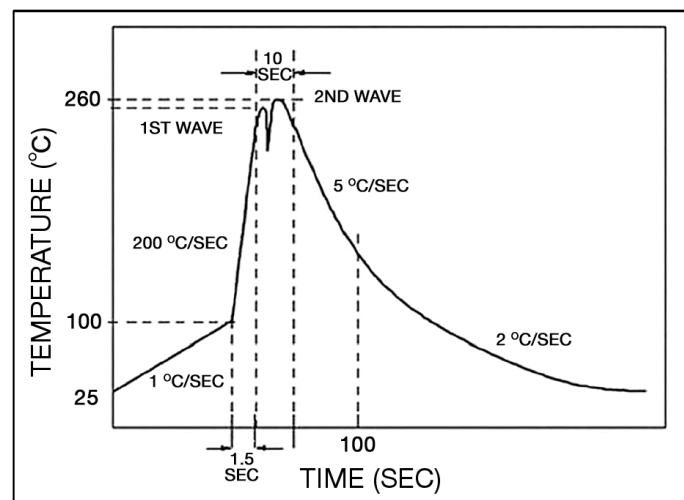
|                            |   |                              |  |
|----------------------------|---|------------------------------|--|
| Shock Resistance           | MIL-STD-202G, Method 213B, Test Condition 1 (100 G's peak for 6 milliseconds; Sawtooth waveform)  | High temperature storage     | MIL-STD-202 Method 108   |
| Vibration Resistance       | MIL-STD-202G, Method 201A (10-55 Hz, 0.06 inch, total excursion).   | Temperature cycling          | JESD22 Method JA-104, Test Condition B                                     |
| Salt Spray Resistance      | MIL-STD-202G, Method 101E, Test Condition B (48 hrs.).  | Biased humidity              | MIL-STD-202 Method 103, 85°C/85% RH with 10% operating power for 1000 hrs. |
| Insulation Resistance      | MIL-STD-202G, Method 302, Test Condition A (After Opening) 10,000 ohms minimum.   | Operational life             | MIL-STD-202 Method 108, Test Condition D                                   |
| Solderability              | MIL-STD-202G, Method 208H   | Resistance to solvents       | MIL-STD-202 Method 215   |
| Resistance to solder Heat  | MIL-STD-202G, Method 210F, Test Condition C. Top Side (260°C, 20 sec)<br>MIL-STD-202G, Method 210F, Test Condition D. Bottom Side (260°C, 10 sec) | Mechanical shock             | MIL-STD-202 Method 213, Test Condition C                                   |
| Thermal Shock              | MIL-STD-202G, Method 107G, Test Condition B (-65°C to +125°C).  | Vibration                    | MIL-STD-202 Method 204   |
| Operating Temperature      | -55°C to +125°C   | Resistance to soldering heat | MIL-STD-202 Method 210, Test condition B                                   |
| Moisture Sensitivity Level | 1 (According to IPC J-Std-020)  | Thermal shock                | MIL-STD-202 Method 107   |
|                            |   | Solderability                | J-STD-002  |
|                            |   | Board flex(SMD)              | AEC-Q200-005   |
|                            |   | Terminal strength            | AEC-Q200-006   |
|                            |   | Electrical characterization  | 3 temperature electrical   |

## Soldering Parameters

| IR Reflow Profile (IPC/JEDEC J-STD-020D)  |                   |
|---|-------------------|
| <b>Preheat &amp; Soak</b>   |                   |
| Temperature min ( $T_{smin}$ )  | 150°C             |
| Temperature max ( $T_{smax}$ )  | 200°C             |
| Time ( $T_{smin}$ to $T_{smax}$ ) ( $t_s$ )                                     | 60-120 seconds    |
| Average ramp-up rate ( $T_{smax}$ to $T_p$ )                                    | 3°C / second max. |
| Liquidous temperature ( $T_L$ )   | 217°C             |
| Time at liquidous ( $t_L$ )   | 60 – 150 seconds  |
| Peak temperature ( $T_p$ )  | 260°C max         |
| Time ( $t_p$ ) within 5°C of the specified classification temperature ( $T_c$ ) | 30 seconds        |
| Average ramp-down rate ( $T_p$ to $T_{smax}$ )                                  | 6°C / second max. |
| Time 25°C to peak temperature   | 8 minutes max.    |



| Lead-free Wave Soldering Profile                   |  |
|--|--|
| Wave Soldering Parameter                           |  |
| Average ramp-up rate                               | 200°C / second                               |
| Heating rate during preheat                        | typical 1 - 2°C / second<br>Max 4°C / second |
| Final preheat temperature                          | within 125°C of soldering temperature        |
| Peak temperature $T_p$                             | 260°C  |
| Time within +0°C / -5°C of actual peak temperature | 10 seconds                                   |
| Ramp-down rate                                     | 5°C / second max.                            |



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## Fuse FGNO Explanation

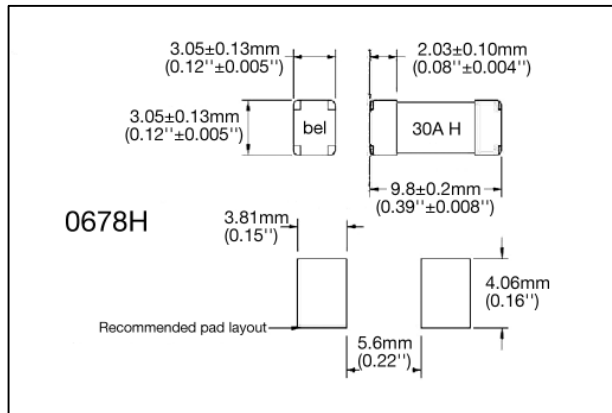
0678H [XXXX] -02

0678H=0678H Series; [XXXX]=Ampere Rating; XX=See Ordering Information as below

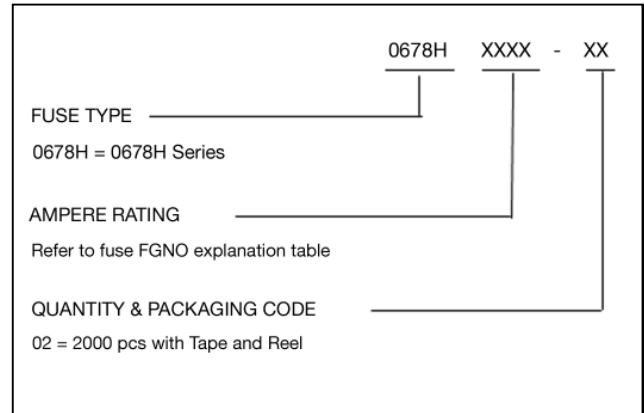
| Fraction | Decimal | Milliamps | Bel FGNO[XXXX] |
|----------|---------|-----------|----------------|
| 1/2      | 0.500   | 500       | 0500           |
|          | .630    | 630       | 0630           |
| 8/10     | .800    | 800       | 0800           |

| Fraction | Decimal | Amps | Bel FGNO[XXXX] |
|----------|---------|------|----------------|
|          | 1.0     | 1    | 1000           |
| 1-1/4    | 1.25    | 1.25 | 1250           |
|          | 1.60    | 1.6  | 1600           |
|          | 2.0     | 2    | 2000           |
| 2-1/2    | 2.5     | 2.5  | 2500           |
|          | 3.15    | 3.15 | 3150           |
|          | 4.0     | 4    | 4000           |
|          | 5.0     | 5    | 5000           |
|          | 6.3     | 6.3  | 6300           |
|          | 8.0     | 8    | 8000           |
|          |         | 10   | 9100           |
|          |         | 15   | 9150           |
|          |         | 20   | 9200           |
|          |         | 25   | 9250           |
|          |         | 30   | 9300           |
|          |         | 35   | 9350           |
|          |         | 40   | 9400           |

## Mechanical Dimensions



## Ordering Information



## Packaging

| Packaging Tape & Reel                       | Packaging Specification | Quantity | Quantity & Packaging Code |
|---|-------------------------|----------|---------------------------|
| 16mm wide tape with 13 inches Diameter reel | EIA Standard 481-E      | 2000     | 0678HXXXX-02              |



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