

# Type C2F

## Surface Mount Fast Acting Chip Fuse

HF  C2F Series – 0603 Size

RoHS 2 Compliant

### Features

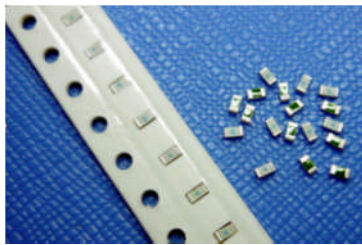
- Fast Acting, with improved surge withstand performance
- Small size, 0603 SMD
- Current rating from 500mA to 8A, fuse marked with ampere code
- Wide operating temperature range from -55°C to 125°C
- Tape and Reel for automatic SMD placement
- Compatible with 260°C IR Pb-free and wave soldering process
- AEC-Q Compliant
- RoHS 2 compliant (MSL = 1)
- Halogen Free
- Lead Free
- Meets Bel automotive qualification\*
- \* - Largely based on internal AEC-Q test plan

### Applications

- Notebook
- Automotive Navigation System
- LED Lighting
- Thin film transistor LCD flat-panel display screen
- PC computer
- Office electronic equipment
- Industrial equipment
- Medical equipment
- POE, POE+
- LCD / LED monitor and LCD / LED TV
- Power supply
- DC-DC Converter

LEAD FREE = 

HALOGEN FREE = 



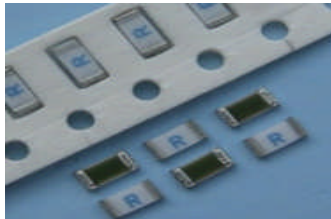


**AEC-Q Compliant**

### Typical Part Marking

Fuse body (ceramic white side) marked with marking code.

Example:




| Current Rating | Marking Code | Current Rating | Marking Code |
|----------------|--------------|----------------|--------------|
| 500mA          | J            | 3A             | 3            |
| 750mA          | M            | 3.5A           | Z            |
| 1A             | 1            | 4A             | 4            |
| 1.25A          | P            | 5A             | 5            |
| 1.5A           | R            | 6A             | 6            |
| 2A             | 2            | 7A             | 7            |
| 2.5A           | T            | 8A             | 8            |

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



| Testing Current | Blow Time |         |
|-----------------|-----------|---------|
|                 | Minimum   | Maximum |
| 100%            | 4 Hrs.    | N/A     |
| 200%            | N/A       | 5 Sec   |
| 300%            | N/A       | 0.2 Sec |

### Safety Agency Approvals

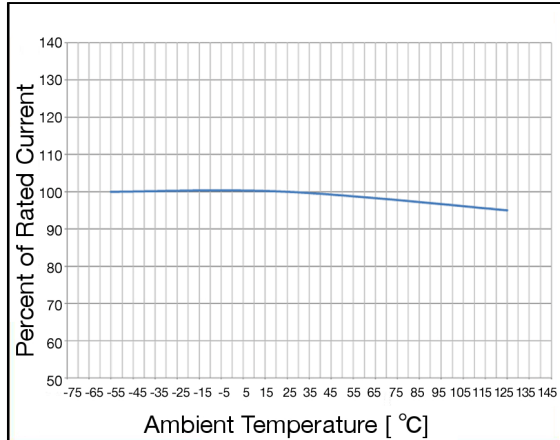
| Safety Agency   | Safety Agency Certificate | Voltage Rating (V)         | Ampere Range / Volt @ I.R. ability*  |
|---|---------------------------|----------------------------|--------------------------------------|
|  | E20624                    | 500mA–8A/32V AC<br>/63V DC | 500mA–8A/35A@ 32V AC<br>/50A@ 63V DC |

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

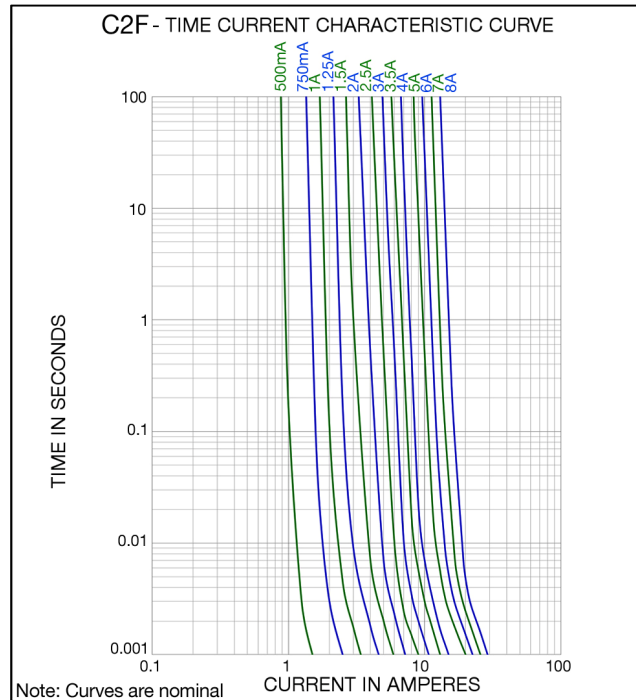
### Physical Specifications

|   |  |
|---|--|
| Materials   | Body : Ceramic Substrate                     |
|   | Terminations : Ag / Ni / Sn (100% Lead-free) |
|   | Element Cover Coating : Lead-free Glass      |
| Marking   | On Fuse :                                    |
|   | Marking Code                                 |
|   | On Label :                                   |
| "bel", "C2F", "Current Rating", "Voltage Rating", "Interrupting Rating",<br>"Appropriate Safety Logos" and "  ", "  " (China RoHS compliant). |  |

## Temperature Derating Curve



## Average Time Current Curve



## Electrical Specifications

| Part Number  | Ampere Rating (A) | Marking Code | Nominal Cold Resistance (ohms) | Maximum Volt-drop @100% In (Volt) max. | Voltage and Interrupting Ratings  | Nominal Melting I <sup>2</sup> T @ 10 In (A <sup>2</sup> Sec) | Maximum Power Dissipation @ 100% In (W) | Agency Approvals |
|--------------|-------------------|--------------|--------------------------------|--|---|---|---|------------------|
|              |                   |              |                                |  |   |   |   |                  |
| 0686F0500-XX | 500mA             | J            | 0.430                          | 0.310                                  | See Table of Safety Approvals on Page 1 for Voltage and associated Interrupting Ratings | 0.0003  | 0.16                                    | Y                |
| 0686F0750-XX | 750mA             | M            | 0.225                          | 0.230                                  |   | 0.0013  | 0.17                                    | Y                |
| 0686F1000-XX | 1A                | 1            | 0.150                          | 0.215                                  |   | 0.0028  | 0.22                                    | Y                |
| 0686F1250-XX | 1.25A             | P            | 0.110                          | 0.195                                  |   | 0.0045  | 0.24                                    | Y                |
| 0686F1500-XX | 1.5A              | R            | 0.088                          | 0.185                                  |   | 0.008   | 0.28                                    | Y                |
| 0686F2000-XX | 2A                | 2            | 0.060                          | 0.180                                  |   | 0.014   | 0.36                                    | Y                |
| 0686F2500-XX | 2.5A              | T            | 0.035                          | 0.115                                  |   | 0.027   | 0.29                                    | Y                |
| 0686F3000-XX | 3A                | 3            | 0.026                          | 0.110                                  |   | 0.040   | 0.33                                    | Y                |
| 0686F3500-XX | 3.5A              | Z            | 0.021                          | 0.103                                  |   | 0.058   | 0.36                                    | Y                |
| 0686F4000-XX | 4A                | 4            | 0.017                          | 0.100                                  |   | 0.110   | 0.40                                    | Y                |
| 0686F5000-XX | 5A                | 5            | 0.0135                         | 0.098                                  |   | 0.140   | 0.49                                    | Y                |
| 0686F6000-XX | 6A                | 6            | 0.0113                         | 0.106                                  |   | 0.210   | 0.64                                    | Y                |
| 0686F7000-XX | 7A                | 7            | 0.0092                         | 0.107                                  |   | 0.350   | 0.75                                    | Y                |
| 0686F8000-XX | 8A                | 8            | 0.0075                         | 0.097                                  |   | 0.500   | 0.78                                    | Y                |

Consult manufacturer for other ratings

**NOTES: Test Conditions**

All test for ratings 500mA - 5A were conducted with fuse samples soldered on a PCB (1.6mm thick) test board with copper traces measuring 0.035 mm (35µm) nominal thickness (1 oz. clad), 5mm wide and 100 mm overall length.

All test for ratings 6A-8A were conducted with fuse samples soldered on a PCB (1.6mm thick) test board with copper traces measuring 0.070 mm (70µm) nominal thickness (2 oz. clad), 7.5mm wide and 100 mm overall length.

Device designed to be mounted with marking facing up.

Device designed to carry rated current for 4 hours minimum. It is recommended that device be operated continuously at no more than 80% of rated current when in a +25°C ambient, with further derating at elevated ambient temperatures.



Specifications subject to change without notice

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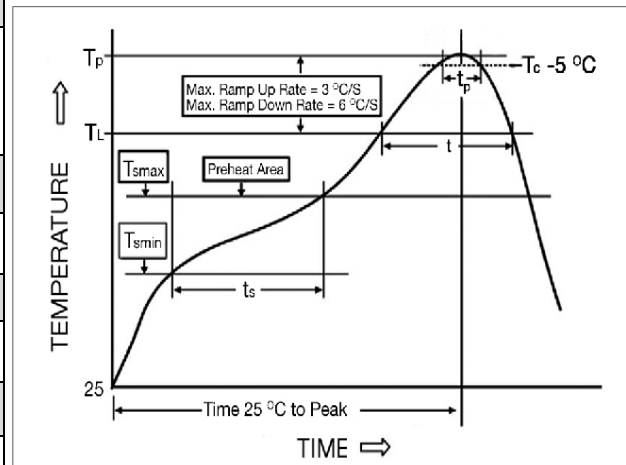
## Environmental Specifications

|                            |   |
|----------------------------|---|
| Shock Resistance           | MIL-STD-202G, Method 213B, Test Condition 1 (100 G's peak for 6 milliseconds; Sawtooth waveform)  |
| Vibration Resistance       | MIL-STD-202G, Method 201A (10-55 Hz, 0.06 inch, total excursion).   |
| Salt Spray Resistance      | MIL-STD-202G, Method 101E, Test Condition B (48 hrs).   |
| Insulation Resistance      | MIL-STD-202G, Method 302, Test Condition A (After Opening) 10,000 ohms minimum.   |
| Solderability              | MIL-STD-202G, Method 208H   |
| 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) |
| Thermal Shock              | MIL-STD-202G, Method 107G, Test Condition B (-65°C to +125°C).  |
| Operating Temperature      | -55°C to +125°C   |
| Moisture Sensitivity Level | 1 (According to IPC J-Std-020)  |

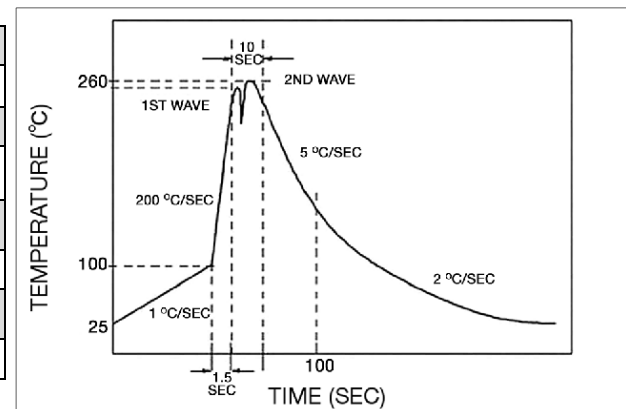
|                              |   |
|------------------------------|---|
| High temperature storage     | MIL-STD-202 Method 108  |
| Temperature cycling          | JESD22 Method JA-104, Test Condition B                                    |
| Biased humidity              | MIL-STD-202 Method 103, 85°C/85% RH with 10% operating power for 1000 hrs |
| Operational life             | MIL-STD-202 Method 108, Test Condition D                                  |
| Resistance to solvents       | MIL-STD-202 Method 215  |
| Mechanical shock             | MIL-STD-202 Method 213, Test Condition C                                  |
| Vibration                    | MIL-STD-202 Method 204  |
| Resistance to soldering heat | MIL-STD-202 Method 210, Test condition B                                  |
| 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 <sub>smin</sub> )  | 150°C           |
| Temperature max (T <sub>smax</sub> )  | 200°C           |
| Time (T <sub>smin</sub> to T <sub>smax</sub> ) (ts)   | 60-120 seconds  |
| Average ramp-up rate (T <sub>smax</sub> to T <sub>p</sub> )                                     | 3°C/second max. |
| Liquidous temperature (TL)  | 217°C           |
| Time at liquidous (tL)  | 60-150 seconds  |
| Peak temperature (T <sub>p</sub> )  | 260°C max       |
| Time (t <sub>p</sub> ) within 5°C of the specified classification temperature (T <sub>c</sub> ) | 30 seconds      |
| Average ramp-down rate (T <sub>p</sub> to T <sub>smax</sub> )                                   | 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 <sub>p</sub>                    | 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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