

# Type 0685P

## Surface Mount Fast Acting Chip Fuse

HF  0685P Series – 1206 Size

RoHS 2 Compliant

### Features

- Fast Acting, with improved surge withstand performance
- Small size, 1206 SMD
- Current rating from 2A to 50A, 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

- Automotive Navigation System
- Thin film transistor LCD flat-panel display screen
- Notebook
- PC computer
- Office electronic equipment
- Industrial equipment
- Medical equipment
- POE, POE+
- LCD / LED monitor
- Power supply
- LCD / LED TV
- 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 |
|----------------|--------------|----------------|--------------|
| 2A             | 2            | 10A            | 10           |
| 2.5A           | T            | 12A            | 12           |
| 3A             | 3            | 15A            | 15           |
| 3.5A           | Z            | 20A            | 20           |
| 4A             | 4            | 25A            | 25           |
| 5A             | 5            | 30A            | 30           |
| 6A             | 6            | 40A            | 40           |
| 7A             | 7            | 50A            | 50           |
| 8A             | 8            |                |              |

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

| Amp Rating | Testing Current | Blow Time |         |
|------------|-----------------|-----------|---------|
|            |                 | Minimum   | Maximum |
| 2A-50A     | 100%            | 4 Hrs.    | N/A     |
| 2A-8A      | 250%            | N/A       | 5 Sec   |
| 10A-50A    | 350%            | N/A       | 5 Sec   |

### Safety Agency Approvals

| Safety Agency                                                                       | Safety Agency Certificate | Voltage Rating (V)                                           | Ampere Range / Volt @ I.R. ability*                                                                     |
|-------------------------------------------------------------------------------------|---------------------------|--------------------------------------------------------------|---------------------------------------------------------------------------------------------------------|
|  | E20624                    | 2A-8A/50V AC<br>/63V DC<br>>8A-30A/50V DC<br>>30A-50A/32V DC | 2A-8A/50A@50VAC<br>/100A@63V DC<br>>8A-25A/150A@50V DC<br>>25A-30A/250A @50V DC<br>>30A-50A/200A@32V DC |

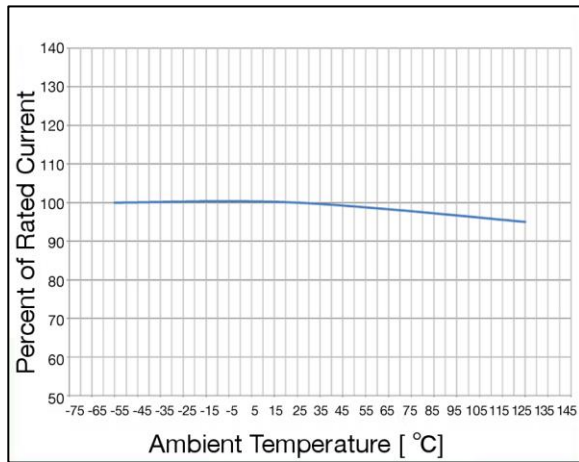
\*I.R.= Interrupting Rating = Short Circuit Rating(Amps)

### Physical Specifications

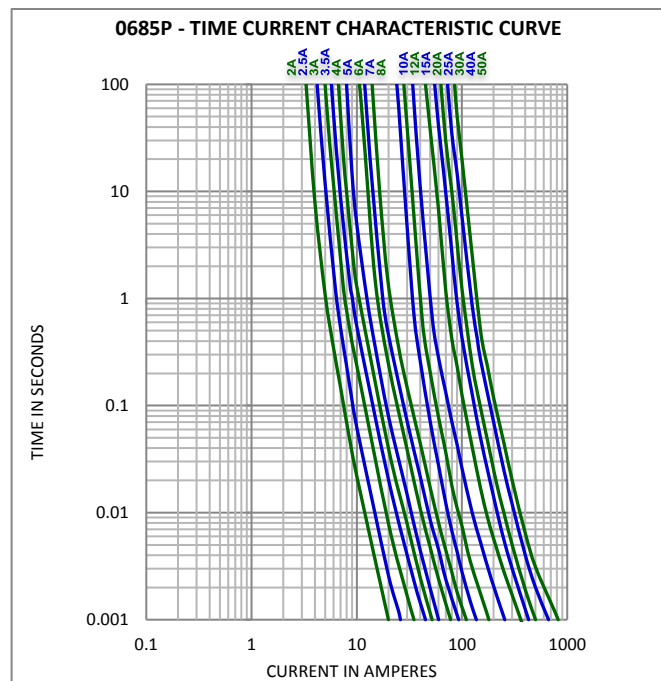
|           |                                                                                                                                                                                                                                                                                                                          |
|-----------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 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", "0685P", "Current Rating", "Voltage Rating", "Interrupting Rating",<br>"Appropriate Safety Logos" and "  ", "  "(China RoHS compliant). |

Specifications subject to change without notice

## Temperature Derating Curve



## Average Time Current Curve



## Electrical Specifications

| Part Number  | Ampere Rating (A) | Marking Code | Nominal Cold Resistance (mohms) | 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 |
|--------------|-------------------|--------------|---------------------------------|----------------------------------------|-----------------------------------------------------------------------------------------|--------------------------------------------------------------|----------------------------------------|------------------|
| 0685P2000-01 | 2                 | 2            | 131.0                           | 0.370                                  | See Table of Safety Approvals on Page 1 for Voltage and associated Interrupting Ratings | 0.2                                                          | 0.74                                   | Y                |
| 0685P2500-01 | 2.5               | T            | 88.0                            | 0.305                                  |                                                                                         | 0.6                                                          | 0.76                                   | Y                |
| 0685P3000-01 | 3                 | 3            | 65.0                            | 0.270                                  |                                                                                         | 1.3                                                          | 0.81                                   | Y                |
| 0685P3500-01 | 3.5               | Z            | 51.0                            | 0.240                                  |                                                                                         | 2.6                                                          | 0.84                                   | Y                |
| 0685P4000-01 | 4                 | 4            | 39.0                            | 0.210                                  |                                                                                         | 4.0                                                          | 0.84                                   | Y                |
| 0685P5000-01 | 5                 | 5            | 27.0                            | 0.205                                  |                                                                                         | 4.1                                                          | 1.03                                   | Y                |
| 0685P6000-01 | 6                 | 6            | 20.0                            | 0.166                                  |                                                                                         | 8.0                                                          | 1.00                                   | Y                |
| 0685P7000-01 | 7                 | 7            | 16.0                            | 0.159                                  |                                                                                         | 12.5                                                         | 1.11                                   | Y                |
| 0685P8000-01 | 8                 | 8            | 11.5                            | 0.128                                  |                                                                                         | 19                                                           | 1.02                                   | Y                |
| 0685P9100-01 | 10                | 10           | 5.2                             | 0.065                                  |                                                                                         | 28                                                           | 0.65                                   | Y                |
| 0685P9120-01 | 12                | 12           | 4.0                             | 0.065                                  |                                                                                         | 48                                                           | 0.78                                   | Y                |
| 0685P9150-01 | 15                | 15           | 2.9                             | 0.065                                  |                                                                                         | 110                                                          | 0.98                                   | Y                |
| 0685P9200-01 | 20                | 20           | 1.6                             | 0.050                                  |                                                                                         | 200                                                          | 1.00                                   | Y                |
| 0685P9250-01 | 25                | 25           | 1.3                             | 0.050                                  |                                                                                         | 320                                                          | 1.25                                   | Y                |
| 0685P9300-01 | 30                | 30           | 1.0                             | 0.050                                  |                                                                                         | 450                                                          | 1.50                                   | Y                |
| 0685P9400-01 | 40                | 40           | 0.7                             | 0.054                                  |                                                                                         | 680                                                          | 2.16                                   | Y                |
| 0685P9500-01 | 50                | 50           | 0.55                            | 0.072                                  |                                                                                         | 750                                                          | 3.60                                   | Y                |

Consult manufacturer for other ratings

### NOTES: Test Conditions

All test were conducted with the fuses soldered to a PCB with a nominal thickness of 1.6mm with copper traces measuring 100mm overall length. Copper trace/width as described below. 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.

| Fuse Rating      | Test Board Trace Dimension |
|------------------|----------------------------|
| 2A – 5.0 A       | 1 oz. copper, 5.0 mm wide  |
| >5.0 A – 8.0 A   | 2 oz. copper, 7.5 mm wide  |
| >8.0 A – 30.0 A  | 3 oz. copper, 10.0mm wide  |
| >30.0 A – 40.0 A | 3 oz. copper, 15.0 mm wide |
| >40.0 A – 50.0 A | 3 oz. copper, 25.0 mm wide |

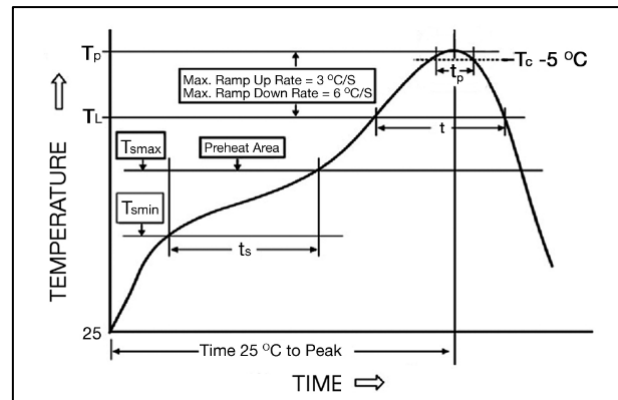
## Environmental Specifications

|                            |                                                                                                                                               |
|----------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------|
| 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)                                                                                                                |

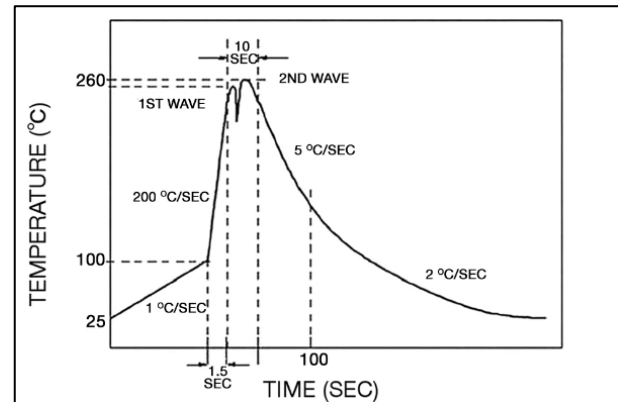
|                              |                                                                            |
|------------------------------|----------------------------------------------------------------------------|
| High temperature storage     | MIL-STD-202 Method 108                                                     |
| 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>min</sub> )                                                             | 150°C           |
| Temperature max (T <sub>max</sub> )                                                             | 200°C           |
| Time (T <sub>min</sub> to T <sub>max</sub> ) (t <sub>s</sub> )                                  | 60-120 seconds  |
| Average ramp-up rate (T <sub>max</sub> to T <sub>p</sub> )                                      | 3°C/second max. |
| Liquidous temperature (T <sub>L</sub> )                                                         | 217°C           |
| Time at liquidous (t <sub>L</sub> )                                                             | 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>max</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.                            |



# Type 0685P

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## Fuse FGNO Explanation

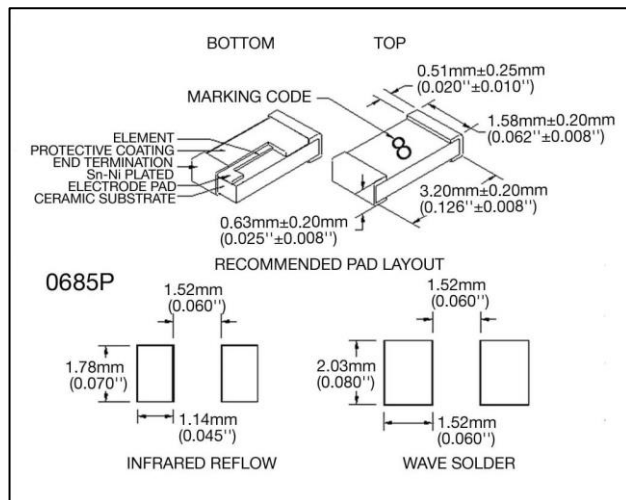
0685 P [XXXX] -XX

0685P=0685P; [XXXX]=Ampere Rating; XX=See Ordering Information as below

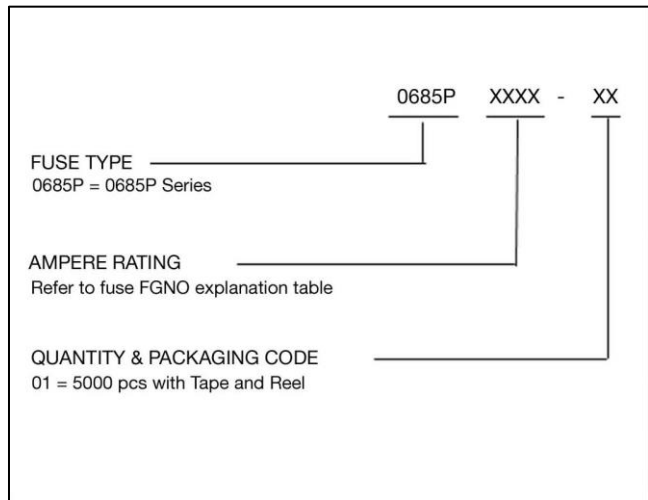
| Amps | Bel FGNO[XXXX] |
|------|----------------|
| 2    | 2000           |
| 2.5  | 2500           |
| 3    | 3000           |
| 3.5  | 3500           |
| 4    | 4000           |
| 5    | 5000           |
| 6    | 6000           |
| 7    | 7000           |
| 8    | 8000           |

| Amps | Bel FGNO[XXXX] |
|------|----------------|
| 10   | 9100           |
| 12   | 9120           |
| 15   | 9150           |
| 20   | 9200           |
| 25   | 9250           |
| 30   | 9300           |
| 40   | 9400           |
| 50   | 9500           |

## Mechanical Dimensions



## Ordering Information



## Packaging

| Packaging Tape & Reel                      | Packaging Specification | Quantity | Quantity & Packaging Code |
|--------------------------------------------|-------------------------|----------|---------------------------|
| 8 mm wide tape with 7 inches Diameter reel | EIA Standard 481-E      | 5000     | 0685PXXXX-01              |