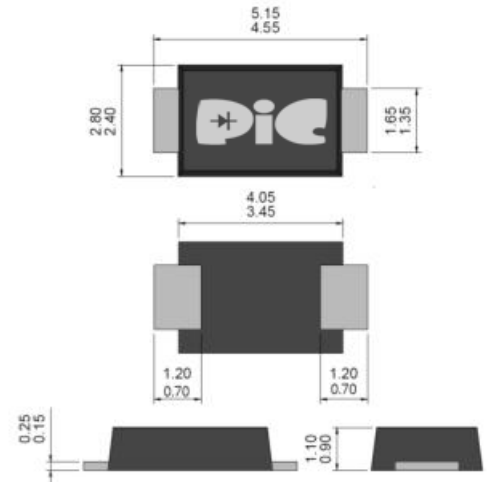


### Features

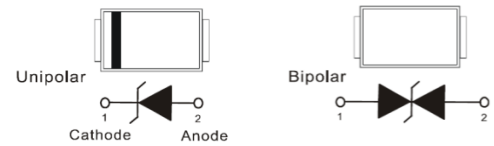
- Glass passivated chip
- 400W peak pulse power capability with a 10/1000  $\mu$ s waveform, Repetitive rate (duty cycle):0.01 %
- Low leakage
- Uni and Bidirectional unit
- Excellent clamping capability
- Very fast response time
- RoHS compliant

SMA-F



### Mechanical Data

- Epoxy: UL 94V-0 rate flame retardant
- Case: Epoxy, Molded
- Terminals: Solder plated solderable per MIL-STD-750 Method 2026
- Polarity: Color band denotes cathode end



### Maximum Ratings & Electrical Characteristic ( TA=25°C unless otherwise noted )

| Parameter   | Symbol                           | Value          | UNITS |
|---|----------------------------------|----------------|-------|
| Peak Power Dissipation with a 10/1000 $\mu$ s waveform (Notes 1)                        | P <sub>PP</sub>                  | 400            | Watts |
| Peak Forward Surge Current , 8.3 ms single half sine-wave unidirectional only (Notes 2) | I <sub>FSM</sub>                 | 40             | Amps  |
| Peak Pulse Current with a 10/1000 $\mu$ s waveform (Notes 1)                            | I <sub>PP</sub>                  | See Next Table | Amps  |
| Power dissipation on infinite heatsink at T <sub>L</sub> =75°C                          | P <sub>D</sub>                   | 1.0            | Watts |
| Max. instantaneous forward voltage at 25 A for unidirectional only (Notes 3)            | V <sub>F</sub>                   | 3.5/5.0        | Volts |
| Operating Junction and Storage Temperature Range  | T <sub>J</sub> ,T <sub>STG</sub> | -55~+150       | °C    |

#### Notes :

- (1) Non-repetitive current pulse, per Fig.5 and derated above T<sub>A</sub> = 25°C per Fig.1.
- (2) Measured on 8.3ms single half sine-wave, or equivalent square wave, duty cycle = 4 pulses per minutes maximum.
- (3) V<sub>F</sub><3.5V for devices of V<sub>BR</sub><200V and V<sub>F</sub><5.0V for devices of V<sub>BR</sub>>210V



# SMAFJ5.0~SMAFJ440CA

## 400W Transient Voltage Suppressors

### Electrical Characteristics ( TA=25°C unless otherwise noted )

| Part Number |            | Marking Code |    | Reverse Stand-off Voltage | Breakdown Voltage |                                  | Test Current | Reverse Leakage                   |      | Max. Clamp Voltage<br>10/1000µs | Peak Pulse Current<br>10/1000µs |                                  |                 |    |
|-------------|------------|--------------|----|---------------------------|-------------------|----------------------------------|--------------|-----------------------------------|------|---------------------------------|---------------------------------|----------------------------------|-----------------|----|
|             |            |              |    |                           | V <sub>RWM</sub>  | V <sub>BR</sub> @ I <sub>T</sub> |              | I <sub>R</sub> @ V <sub>RWM</sub> |      |                                 |                                 | V <sub>C</sub> @ I <sub>PP</sub> | I <sub>PP</sub> |    |
|             |            |              |    |                           |                   | Min.                             |              | Max.                              | UNI  |                                 |                                 |                                  |                 | BI |
| UNI         | BI         | UNI          | BI | V                         | V                 | V                                | mA           | µA                                | µA   | V                               | A                               |                                  |                 |    |
| SMAFJ5.0A   | SMAFJ5.0CA | AE           | WE | 5                         | 6.4               | 7                                | 10           | 800                               | 1600 | 9.2                             | 43.48                           |                                  |                 |    |
| SMAFJ6.0A   | SMAFJ6.0CA | AG           | WG | 6                         | 6.67              | 7.37                             | 10           | 800                               | 1600 | 10.3                            | 38.83                           |                                  |                 |    |
| SMAFJ6.5A   | SMAFJ6.5CA | AK           | WK | 6.5                       | 7.22              | 7.98                             | 10           | 500                               | 1000 | 11.2                            | 35.71                           |                                  |                 |    |
| SMAFJ7.0A   | SMAFJ7.0CA | AM           | WM | 7                         | 7.78              | 8.6                              | 10           | 200                               | 400  | 12                              | 33.33                           |                                  |                 |    |
| SMAFJ7.5A   | SMAFJ7.5CA | AP           | WP | 7.5                       | 8.33              | 9.21                             | 1            | 100                               | 200  | 12.9                            | 31.01                           |                                  |                 |    |
| SMAFJ8.0A   | SMAFJ8.0CA | AR           | WR | 8                         | 8.89              | 9.83                             | 1            | 50                                | 100  | 13.6                            | 29.41                           |                                  |                 |    |
| SMAFJ8.5A   | SMAFJ8.5CA | AT           | WT | 8.5                       | 9.44              | 10.4                             | 1            | 10                                | 20   | 14.4                            | 27.78                           |                                  |                 |    |
| SMAFJ9.0A   | SMAFJ9.0CA | AV           | WV | 9                         | 10                | 11.1                             | 1            | 5                                 | 5    | 15.4                            | 25.97                           |                                  |                 |    |
| SMAFJ10A    | SMAFJ10CA  | AX           | WX | 10                        | 11.1              | 12.3                             | 1            | 5                                 | 5    | 17                              | 23.53                           |                                  |                 |    |
| SMAFJ11A    | SMAFJ11CA  | AZ           | WZ | 11                        | 12.2              | 13.5                             | 1            | 1                                 | 1    | 18.2                            | 21.98                           |                                  |                 |    |
| SMAFJ12A    | SMAFJ12CA  | BE           | XE | 12                        | 13.3              | 14.7                             | 1            | 1                                 | 1    | 19.9                            | 20.1                            |                                  |                 |    |
| SMAFJ13A    | SMAFJ13CA  | BG           | XG | 13                        | 14.4              | 15.9                             | 1            | 1                                 | 1    | 21.5                            | 18.6                            |                                  |                 |    |
| SMAFJ14A    | SMAFJ14CA  | BK           | XK | 14                        | 15.6              | 17.2                             | 1            | 1                                 | 1    | 23.2                            | 17.24                           |                                  |                 |    |
| SMAFJ15A    | SMAFJ15CA  | BM           | XM | 15                        | 16.7              | 18.5                             | 1            | 1                                 | 1    | 24.4                            | 16.39                           |                                  |                 |    |
| SMAFJ16A    | SMAFJ16CA  | BP           | XP | 16                        | 17.8              | 19.7                             | 1            | 1                                 | 1    | 26                              | 15.38                           |                                  |                 |    |
| SMAFJ17A    | SMAFJ17CA  | BR           | XR | 17                        | 18.9              | 20.9                             | 1            | 1                                 | 1    | 27.6                            | 14.49                           |                                  |                 |    |
| SMAFJ18A    | SMAFJ18CA  | BT           | XT | 18                        | 20                | 22.1                             | 1            | 1                                 | 1    | 29.2                            | 13.7                            |                                  |                 |    |
| SMAFJ19A    | SMAFJ19CA  | BB           | XB | 19                        | 21.1              | 23.3                             | 1            | 1                                 | 1    | 30.8                            | 13                              |                                  |                 |    |
| SMAFJ20A    | SMAFJ20CA  | BV           | XV | 20                        | 22.2              | 24.5                             | 1            | 1                                 | 1    | 32.4                            | 12.35                           |                                  |                 |    |
| SMAFJ22A    | SMAFJ22CA  | BX           | XX | 22                        | 24.4              | 26.9                             | 1            | 1                                 | 1    | 35.5                            | 11.27                           |                                  |                 |    |
| SMAFJ24A    | SMAFJ24CA  | BZ           | XZ | 24                        | 26.7              | 29.5                             | 1            | 1                                 | 1    | 38.9                            | 10.28                           |                                  |                 |    |
| SMAFJ26A    | SMAFJ26CA  | CE           | YE | 26                        | 28.9              | 31.9                             | 1            | 1                                 | 1    | 42.1                            | 9.5                             |                                  |                 |    |
| SMAFJ28A    | SMAFJ28CA  | CG           | YG | 28                        | 31.1              | 34.4                             | 1            | 1                                 | 1    | 45.4                            | 8.81                            |                                  |                 |    |
| SMAFJ30A    | SMAFJ30CA  | CK           | YK | 30                        | 33.3              | 36.8                             | 1            | 1                                 | 1    | 48.4                            | 8.26                            |                                  |                 |    |
| SMAFJ33A    | SMAFJ33CA  | CM           | YM | 33                        | 36.7              | 40.6                             | 1            | 1                                 | 1    | 53.3                            | 7.5                             |                                  |                 |    |
| SMAFJ36A    | SMAFJ36CA  | CP           | YP | 36                        | 40                | 44.2                             | 1            | 1                                 | 1    | 58.1                            | 6.88                            |                                  |                 |    |
| SMAFJ40A    | SMAFJ40CA  | CR           | YR | 40                        | 44.4              | 49.1                             | 1            | 1                                 | 1    | 64.5                            | 6.2                             |                                  |                 |    |
| SMAFJ43A    | SMAFJ43CA  | CT           | YT | 43                        | 47.8              | 52.8                             | 1            | 1                                 | 1    | 69.4                            | 5.76                            |                                  |                 |    |
| SMAFJ45A    | SMAFJ45CA  | CV           | YV | 45                        | 50                | 55.3                             | 1            | 1                                 | 1    | 72.7                            | 5.5                             |                                  |                 |    |

### Electrical Characteristics ( $T_A=25^\circ\text{C}$ unless otherwise noted )

| Part Number |            | Marking Code |    | Reverse Stand-off Voltage | Breakdown Voltage |                                | Test Current | Reverse Leakage |                                 | Max. Clamp Voltage<br>10/1000 $\mu\text{s}$ | Peak Pulse Current<br>10/1000 $\mu\text{s}$ |
|-------------|------------|--------------|----|---------------------------|-------------------|--------------------------------|--------------|-----------------|---------------------------------|---|---|
|             |            |              |    |                           | $V_{\text{RWM}}$  | $V_{\text{BR}} @ I_{\text{T}}$ |              | $I_{\text{r}}$  | $I_{\text{r}} @ V_{\text{RWM}}$ |   |   |
|             |            |              |    | Min.                      |                   | Max.                           | UNI          |                 | BI                              | $V_{\text{C}} @ I_{\text{PP}}$              | $I_{\text{PP}}$                             |
| UNI         | BI         | UNI          | BI | V                         | V                 | V                              | mA           | $\mu\text{A}$   | $\mu\text{A}$                   | V   | A   |
| SMAFJ48A    | SMAFJ48CA  | CX           | YX | 48                        | 53.3              | 58.9                           | 1            | 1               | 1                               | 77.4  | 5.17  |
| SMAFJ51A    | SMAFJ51CA  | CZ           | YZ | 51                        | 56.7              | 62.7                           | 1            | 1               | 1                               | 82.4  | 4.85  |
| SMAFJ54A    | SMAFJ54CA  | RE           | ZE | 54                        | 60                | 66.3                           | 1            | 1               | 1                               | 87.1  | 4.59  |
| SMAFJ58A    | SMAFJ58CA  | RG           | ZG | 58                        | 64.4              | 71.2                           | 1            | 1               | 1                               | 93.6  | 4.27  |
| SMAFJ60A    | SMAFJ60CA  | RK           | ZK | 60                        | 66.7              | 73.7                           | 1            | 1               | 1                               | 96.8  | 4.13  |
| SMAFJ64A    | SMAFJ64CA  | RM           | ZM | 64                        | 71.1              | 78.6                           | 1            | 1               | 1                               | 103   | 3.88  |
| SMAFJ70A    | SMAFJ70CA  | RP           | ZP | 70                        | 77.8              | 86                             | 1            | 1               | 1                               | 113   | 3.54  |
| SMAFJ75A    | SMAFJ75CA  | RR           | ZR | 75                        | 83.3              | 92.1                           | 1            | 1               | 1                               | 121   | 3.31  |
| SMAFJ78A    | SMAFJ78CA  | RT           | ZT | 78                        | 86.7              | 95.8                           | 1            | 1               | 1                               | 126   | 3.17  |
| SMAFJ80A    | SMAFJ80CA  | RB           | ZB | 80                        | 88.8              | 97.6                           | 1            | 1               | 1                               | 129.6                                       | 3.09  |
| SMAFJ85A    | SMAFJ85CA  | RV           | ZV | 85                        | 94.4              | 104                            | 1            | 1               | 1                               | 137   | 2.92  |
| SMAFJ90A    | SMAFJ90CA  | RX           | ZX | 90                        | 100               | 111                            | 1            | 1               | 1                               | 146   | 2.74  |
| SMAFJ100A   | SMAFJ100CA | RZ           | ZZ | 100                       | 111               | 123                            | 1            | 1               | 1                               | 162   | 2.47  |
| SMAFJ110A   | SMAFJ110CA | SE           | VE | 110                       | 122               | 135                            | 1            | 1               | 1                               | 177   | 2.26  |
| SMAFJ120A   | SMAFJ120CA | SG           | VG | 120                       | 133               | 147                            | 1            | 1               | 1                               | 193   | 2.07  |
| SMAFJ130A   | SMAFJ130CA | SK           | VK | 130                       | 144               | 159                            | 1            | 1               | 1                               | 209   | 1.91  |
| SMAFJ140A   | SMAFJ140CA | SB           | VB | 140                       | 155               | 171                            | 1            | 1               | 1                               | 226.8                                       | 1.76  |
| SMAFJ150A   | SMAFJ150CA | SM           | VM | 150                       | 167               | 185                            | 1            | 1               | 1                               | 243   | 1.65  |
| SMAFJ160A   | SMAFJ160CA | SP           | VP | 160                       | 178               | 197                            | 1            | 1               | 1                               | 259   | 1.54  |
| SMAFJ170A   | SMAFJ170CA | SR           | VR | 170                       | 189               | 209                            | 1            | 1               | 1                               | 275   | 1.45  |
| SMAFJ180A   | SMAFJ180CA | ST           | VT | 180                       | 200               | 220                            | 1            | 1               | 1                               | 291.6                                       | 1.37  |
| SMAFJ190A   | SMAFJ190CA | SV           | VV | 190                       | 211               | 232                            | 1            | 1               | 1                               | 307.8                                       | 1.3   |
| SMAFJ200A   | SMAFJ200CA | SW           | VW | 200                       | 224               | 247                            | 1            | 1               | 1                               | 324   | 1.23  |
| SMAFJ220A   | SMAFJ220CA | SX           | VX | 220                       | 246               | 272                            | 1            | 1               | 1                               | 356   | 1.12  |
| SMAFJ250A   | SMAFJ250CA | SZ           | VZ | 250                       | 279               | 309                            | 1            | 1               | 1                               | 405   | 0.99  |
| SMAFJ300A   | SMAFJ300CA | DE           | HE | 300                       | 335               | 371                            | 1            | 1               | 1                               | 486   | 0.82  |
| SMAFJ350A   | SMAFJ350CA | DG           | HG | 350                       | 391               | 432                            | 1            | 1               | 1                               | 567   | 0.71  |
| SMAFJ400A   | SMAFJ400CA | DK           | HK | 400                       | 447               | 494                            | 1            | 1               | 1                               | 648   | 0.62  |
| SMAFJ440A   | SMAFJ440CA | DM           | HM | 440                       | 492               | 543                            | 1            | 1               | 1                               | 713   | 0.56  |

### Rating & Characteristic Curves

Fig. 1 Pulse Derating Curve

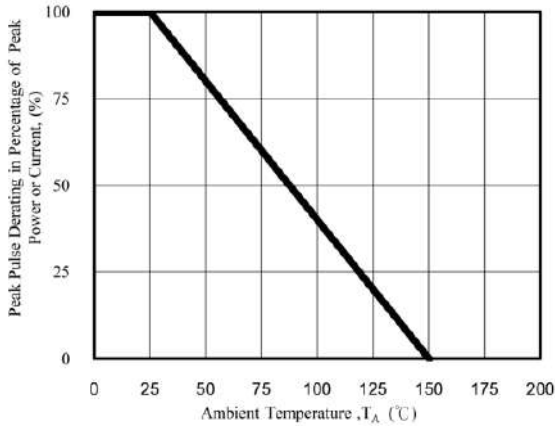


Fig. 2 Max. Non-Repetitive Surge Current

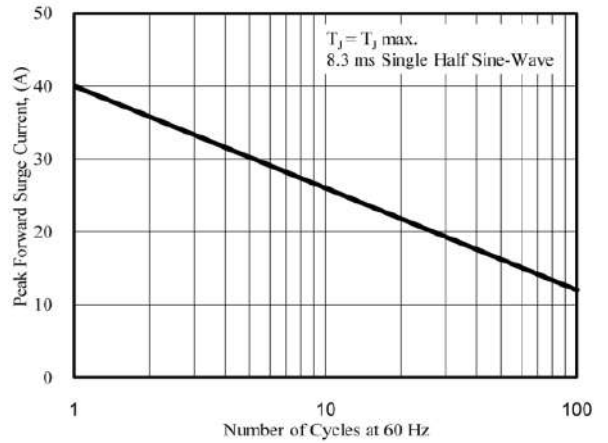


Fig. 3 Steady State Power Derating Curve

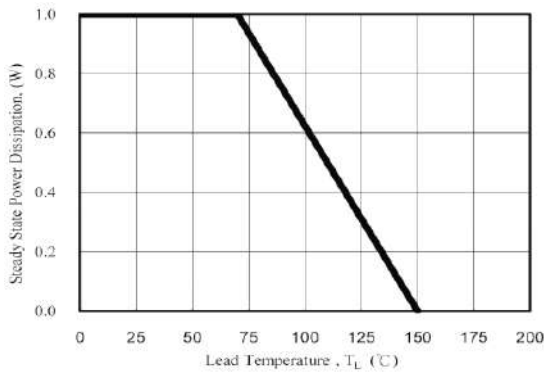


Fig. 4 Peak Pulse Power Rating Curve

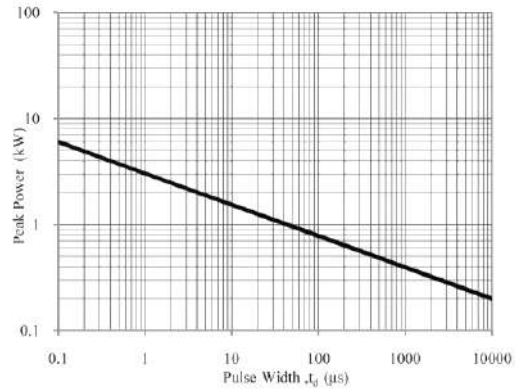


Fig. 5 Pulse Waveform

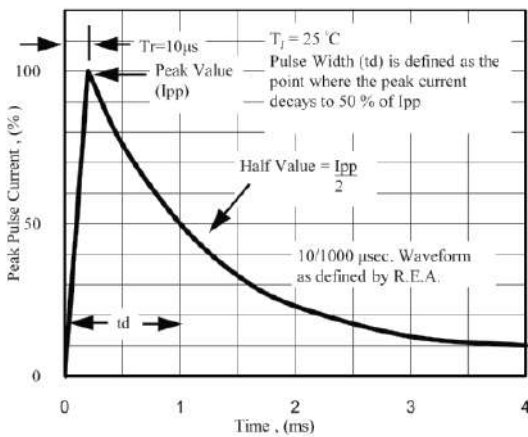
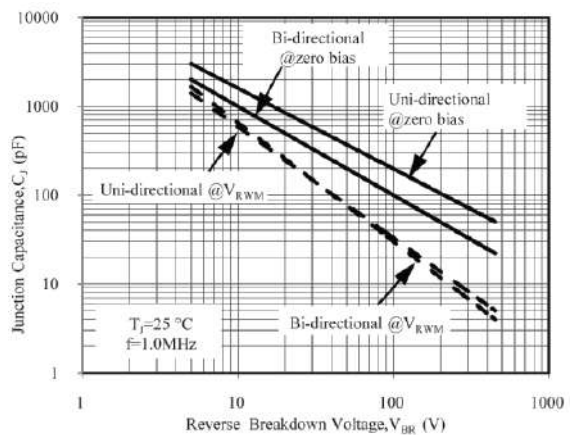
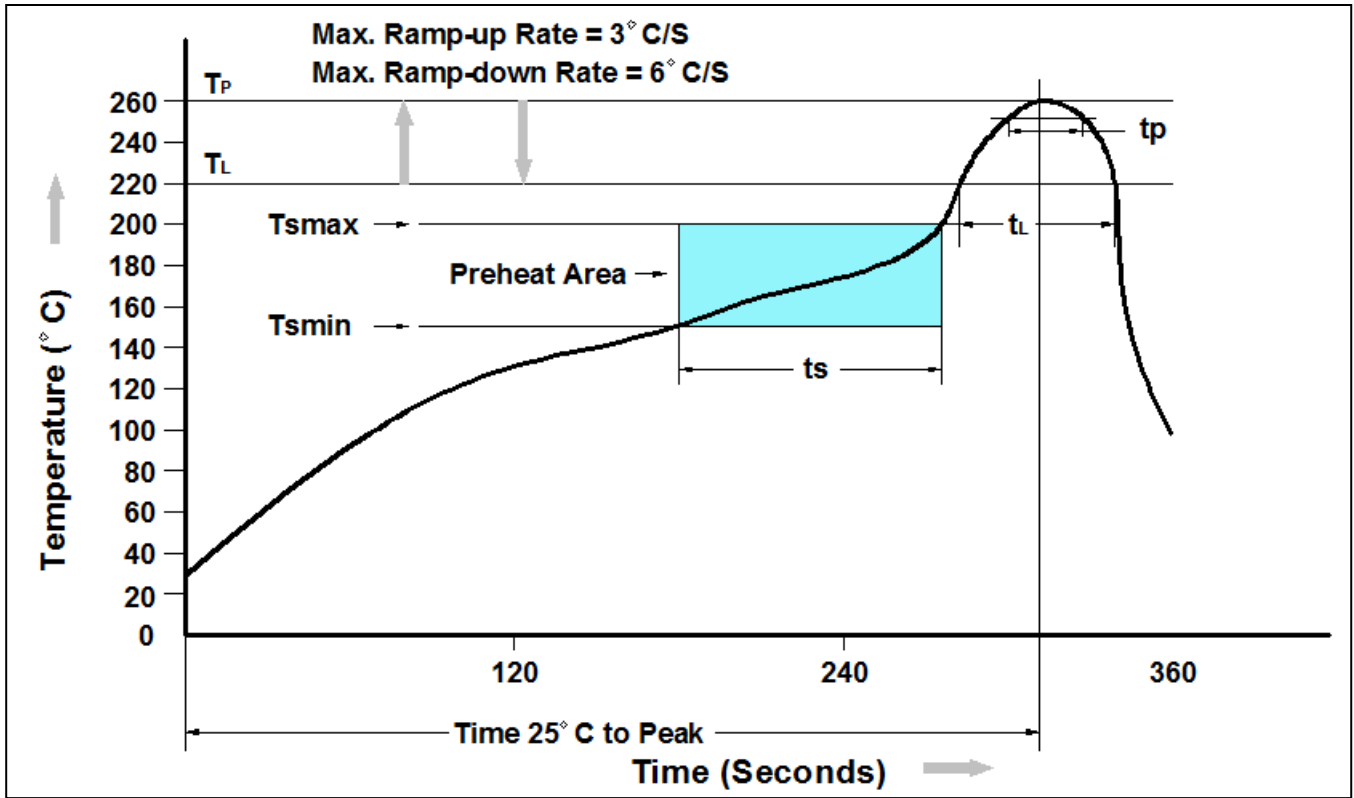


Fig. 6 Typical Junction Capacitance

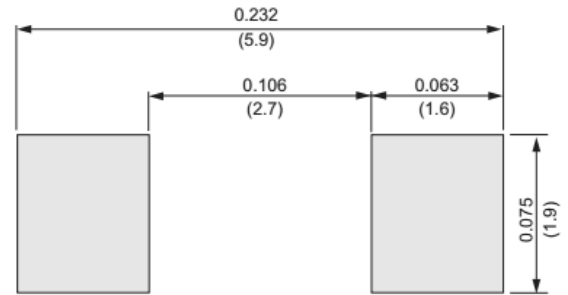


### Recommnd IR Reflow Soldering Thermal Profile



| Profile Feature   | Pb-Free Assembly Profile |
|---|--------------------------|
| Temperature Min. (T <sub>min</sub> )                                | 150°C                    |
| Temperature Max. (T <sub>max</sub> )                                | 200°C                    |
| Time (t <sub>s</sub> ) from (T <sub>min</sub> to T <sub>max</sub> ) | 60-120 seconds           |
| Average Ramp-up Rate (t <sub>L</sub> to t <sub>P</sub> )            | 3°C/second max.          |
| Liquidous Temperature (T <sub>L</sub> )                             | 217°C                    |
| Time (t <sub>L</sub> ) Maintained Above (T <sub>L</sub> )           | 60 – 150 seconds         |
| Peak Temperature  | 260°C +0°C / -5°C        |
| Time (t <sub>P</sub> ) within 5°C of actual Peak Temperature        | 30 seconds               |
| Ramp-down Rate (T <sub>P</sub> to T <sub>L</sub> )                  | 6°C/second max           |
| Time 25°C to Peak Temperature                                       | 8 minutes max.           |

### Suggested Pad Layout



Unit: inch (mm)

### Ordering Information

| Part Number            | Description | Quantity |
|------------------------|-------------|----------|
| SMAFJ5.0A ~ SMAFJ440CA | SMA-F Reel  | 3000 pcs |

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