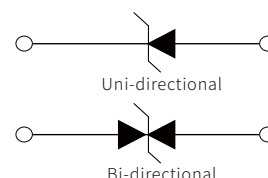


## FEATURES

- | Low profile package
- | Ideal for automated placement
- | 600 Watt peak pulse power capability with a 10/1000µs waveform
- | For surface mounted applications to optimize board space
- | Excellent clamping capability
- | Very fast response time
- | Low incremental surge resistance
- | Meet AEC-Q101 Requirements



SMAF



Schematic Symbol

## APPLICATIONS

- | Power supply protection
- | Automotive application
- | Industrial application
- | Power management

## APPROVALS

|             |                                    |
|-------------|------------------------------------|
| <b>RoHS</b> | Compliance with 2011/65/EU         |
| <b>HF</b>   | Compliance with IEC61249-2-21:2003 |

## THERMAL CONSIDERATIONS

| Parameter                                                | Symbol    | Value          | Unit |
|----------------------------------------------------------|-----------|----------------|------|
| Peak Pulse Power Dissipation on $T_A=25^{\circ}\text{C}$ | $P_{PPM}$ | 600            | W    |
| Peak Forward Surge Current                               | $I_{FSM}$ | 100            | A    |
| Peak Pulse Current on 10/1000 us waveform                | $I_{PPM}$ | See Next Table | A    |

## THERMAL CONSIDERATIONS

| Parameter                              | Symbol          | Value       | Unit                 |
|----------------------------------------|-----------------|-------------|----------------------|
| Operating junction Temperature         | $T_J$           | -55 to +150 | $^{\circ}\text{C}$   |
| Storage Temperature Range              | $T_S$           | -55 to +150 | $^{\circ}\text{C}$   |
| Junction to Ambient on Printed circuit | $R_{\theta JA}$ | 150         | $^{\circ}\text{C/W}$ |

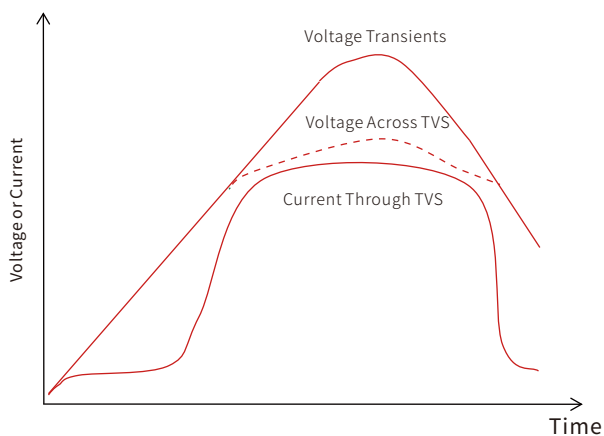
## ELECTRICAL CHARACTERISTICS

| Part Number    |               | Device Marking Code |     | Reverse Stand-off Voltage | Breakdown Voltage Min.@I <sub>T</sub> | Breakdown Voltage Max.@I <sub>T</sub> | Test Current        | Maximum Clamping Voltage @I <sub>PP</sub> | Maximum Peak Pulse Current | Maximum Reverse Leakage @V <sub>RWM</sub> |
|----------------|---------------|---------------------|-----|---------------------------|---------------------------------------|---------------------------------------|---------------------|-------------------------------------------|----------------------------|-------------------------------------------|
| Unidirectional | Bidirectional | UNI                 | BI  | V <sub>RWM</sub> (V)      | V <sub>BR</sub> (V)                   | V <sub>BR</sub> (V)                   | I <sub>T</sub> (mA) | V <sub>C</sub> (V)                        | I <sub>PP</sub> (A)        | I <sub>R</sub> (uA)                       |
| TP6SMAF5.0A    | TP6SMAF5.0CA  | KEA                 | AEA | 5.0                       | 6.40                                  | 7.00                                  | 10                  | 9.2                                       | 63.5                       | 200                                       |
| TP6SMAF6.0A    | TP6SMAF6.0CA  | KGA                 | AGA | 6.0                       | 6.67                                  | 7.37                                  | 10                  | 10.3                                      | 58.3                       | 200                                       |
| TP6SMAF6.5A    | TP6SMAF6.5CA  | KKA                 | AKA | 6.5                       | 7.22                                  | 7.98                                  | 10                  | 11.2                                      | 53.6                       | 100                                       |
| TP6SMAF7.0A    | TP6SMAF7.0CA  | KMA                 | AMA | 7.0                       | 7.78                                  | 8.60                                  | 10                  | 12.0                                      | 50.0                       | 80                                        |
| TP6SMAF7.5A    | TP6SMAF7.5CA  | KPA                 | APA | 7.5                       | 8.33                                  | 9.21                                  | 1                   | 12.9                                      | 46.6                       | 50                                        |
| TP6SMAF8.0A    | TP6SMAF8.0CA  | KRA                 | ARA | 8.0                       | 8.89                                  | 9.83                                  | 1                   | 13.6                                      | 44.2                       | 20                                        |
| TP6SMAF8.5A    | TP6SMAF8.5CA  | KTA                 | ATA | 8.5                       | 9.44                                  | 10.40                                 | 1                   | 14.4                                      | 41.7                       | 10                                        |
| TP6SMAF9.0A    | TP6SMAF9.0CA  | KVA                 | AVA | 9.0                       | 10.00                                 | 11.10                                 | 1                   | 15.4                                      | 39.0                       | 5                                         |
| TP6SMAF10A     | TP6SMAF10CA   | KXA                 | KXA | 10.0                      | 11.10                                 | 12.30                                 | 1                   | 17.0                                      | 35.3                       | 2                                         |
| TP6SMAF11A     | TP6SMAF11CA   | KZA                 | AZA | 11.0                      | 12.20                                 | 13.50                                 | 1                   | 18.2                                      | 33.0                       | 1                                         |
| TP6SMAF12A     | TP6SMAF12CA   | LEA                 | BEA | 12.0                      | 13.30                                 | 14.70                                 | 1                   | 19.9                                      | 30.2                       | 1                                         |
| TP6SMAF13A     | TP6SMAF13CA   | LGA                 | BGA | 13.0                      | 14.40                                 | 15.90                                 | 1                   | 21.5                                      | 28.0                       | 1                                         |
| TP6SMAF14A     | TP6SMAF14CA   | LKA                 | BKA | 14.0                      | 15.60                                 | 17.20                                 | 1                   | 23.2                                      | 25.9                       | 1                                         |
| TP6SMAF15A     | TP6SMAF15CA   | LMA                 | BMA | 15.0                      | 16.70                                 | 18.50                                 | 1                   | 24.4                                      | 24.6                       | 1                                         |
| TP6SMAF16A     | TP6SMAF16CA   | LPA                 | BPA | 16.0                      | 17.80                                 | 19.70                                 | 1                   | 26.0                                      | 23.1                       | 1                                         |
| TP6SMAF17A     | TP6SMAF17CA   | LRA                 | BRA | 17.0                      | 18.90                                 | 20.90                                 | 1                   | 27.6                                      | 21.8                       | 1                                         |
| TP6SMAF18A     | TP6SMAF18CA   | LTA                 | BTA | 18.0                      | 20.00                                 | 22.10                                 | 1                   | 29.2                                      | 20.6                       | 1                                         |
| TP6SMAF20A     | TP6SMAF20CA   | LVA                 | BVA | 20.0                      | 22.20                                 | 24.50                                 | 1                   | 32.4                                      | 18.6                       | 1                                         |
| TP6SMAF22A     | TP6SMAF22CA   | LXA                 | BXA | 22.0                      | 24.40                                 | 26.90                                 | 1                   | 35.5                                      | 16.9                       | 1                                         |
| TP6SMAF24A     | TP6SMAF24CA   | LZA                 | BZA | 24.0                      | 26.70                                 | 29.50                                 | 1                   | 38.9                                      | 15.5                       | 1                                         |
| TP6SMAF26A     | TP6SMAF26CA   | MEA                 | CEA | 26.0                      | 28.90                                 | 31.90                                 | 1                   | 42.1                                      | 14.3                       | 1                                         |
| TP6SMAF28A     | TP6SMAF28CA   | MGA                 | CGA | 28.0                      | 31.10                                 | 34.40                                 | 1                   | 45.4                                      | 13.3                       | 1                                         |
| TP6SMAF30A     | TP6SMAF30CA   | MKA                 | CKA | 30.0                      | 33.30                                 | 36.80                                 | 1                   | 48.4                                      | 12.4                       | 1                                         |
| TP6SMAF33A     | TP6SMAF33CA   | MMA                 | CMA | 33.0                      | 36.70                                 | 40.60                                 | 1                   | 53.3                                      | 11.3                       | 1                                         |
| TP6SMAF36A     | TP6SMAF36CA   | MPA                 | CPA | 36.0                      | 40.00                                 | 44.20                                 | 1                   | 58.1                                      | 10.4                       | 1                                         |
| TP6SMAF40A     | TP6SMAF40CA   | MRA                 | CRA | 40.0                      | 44.40                                 | 49.10                                 | 1                   | 64.5                                      | 9.3                        | 1                                         |
| TP6SMAF43A     | TP6SMAF43CA   | MTA                 | CTA | 43.0                      | 47.80                                 | 52.80                                 | 1                   | 69.4                                      | 8.7                        | 1                                         |
| TP6SMAF45A     | TP6SMAF45CA   | MVA                 | CVA | 45.0                      | 50.00                                 | 55.30                                 | 1                   | 72.7                                      | 8.3                        | 1                                         |
| TP6SMAF48A     | TP6SMAF48CA   | MXA                 | CXA | 48.0                      | 53.30                                 | 58.90                                 | 1                   | 77.4                                      | 7.8                        | 1                                         |
| TP6SMAF51A     | TP6SMAF51CA   | MZA                 | CZA | 51.0                      | 56.70                                 | 62.70                                 | 1                   | 82.4                                      | 7.3                        | 1                                         |

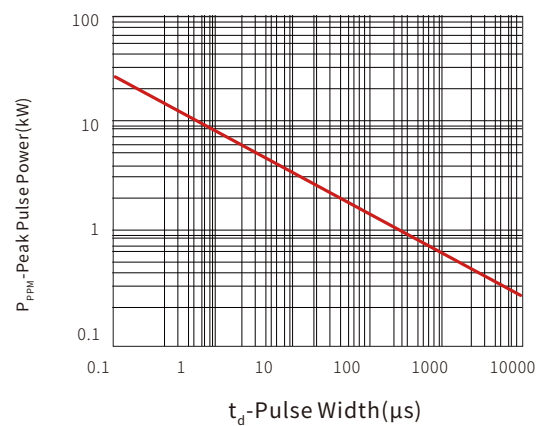
| Part Number    |               | Device Marking Code |     | Reverse Stand-off Voltage | Breakdown Voltage Min.@I <sub>T</sub> | Breakdown Voltage Max.@I <sub>T</sub> | Test Current        | Maximum Clamping Voltage @I <sub>PP</sub> | Maximum Peak Pulse Current | Maximum Reverse Leakage @V <sub>RWM</sub> |
|----------------|---------------|---------------------|-----|---------------------------|---------------------------------------|---------------------------------------|---------------------|-------------------------------------------|----------------------------|-------------------------------------------|
| Unidirectional | Bidirectional | UNI                 | BI  | V <sub>RWM</sub> (V)      | V <sub>BR</sub> (V)                   | V <sub>BR</sub> (V)                   | I <sub>T</sub> (mA) | V <sub>C</sub> (V)                        | I <sub>PP</sub> (A)        | I <sub>R</sub> (uA)                       |
| TP6SMAF54A     | TP6SMAF54CA   | NEA                 | DEA | 54.0                      | 60.00                                 | 66.30                                 | 1                   | 87.1                                      | 6.9                        | 1                                         |
| TP6SMAF58A     | TP6SMAF58CA   | NGA                 | DGA | 58.0                      | 64.40                                 | 71.20                                 | 1                   | 93.6                                      | 6.5                        | 1                                         |
| TP6SMAF60A     | TP6SMAF60CA   | NKA                 | DKA | 60.0                      | 66.70                                 | 73.70                                 | 1                   | 96.8                                      | 6.2                        | 1                                         |
| TP6SMAF64A     | TP6SMAF64CA   | NMA                 | DMA | 64.0                      | 71.10                                 | 78.60                                 | 1                   | 103.0                                     | 5.9                        | 1                                         |
| TP6SMAF70A     | TP6SMAF70CA   | NPA                 | DPA | 70.0                      | 77.80                                 | 86.00                                 | 1                   | 113.0                                     | 5.3                        | 1                                         |
| TP6SMAF75A     | TP6SMAF75CA   | NRA                 | DRA | 75.0                      | 83.30                                 | 92.10                                 | 1                   | 121.0                                     | 5.0                        | 1                                         |
| TP6SMAF78A     | TP6SMAF78CA   | NTA                 | DTA | 78.0                      | 86.70                                 | 95.80                                 | 1                   | 126.0                                     | 4.8                        | 1                                         |
| TP6SMAF85A     | TP6SMAF85CA   | NVA                 | DVA | 85.0                      | 94.40                                 | 104.00                                | 1                   | 137.0                                     | 4.4                        | 1                                         |
| TP6SMAF90A     | TP6SMAF90CA   | NXA                 | DXA | 90.0                      | 100.00                                | 111.00                                | 1                   | 146.0                                     | 4.1                        | 1                                         |
| TP6SMAF100A    | TP6SMAF100CA  | NZA                 | DZA | 100.0                     | 111.00                                | 123.00                                | 1                   | 162.0                                     | 3.7                        | 1                                         |

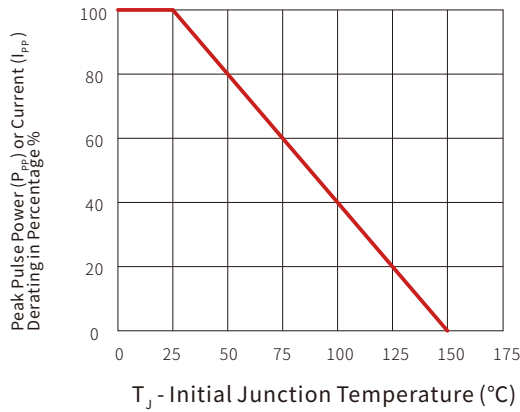
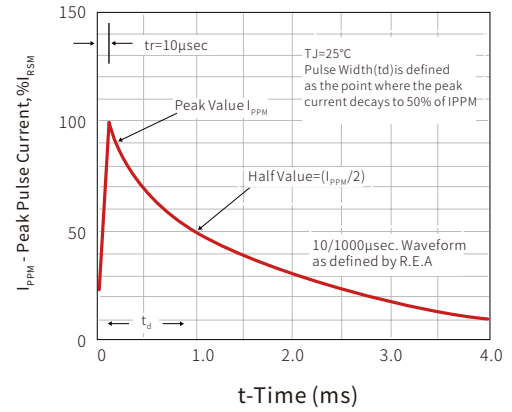
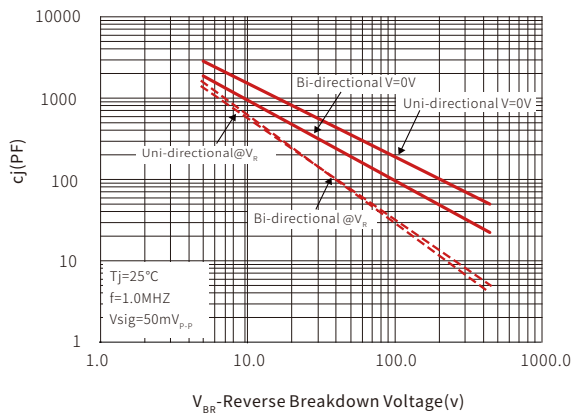
## RATINGS AND CHARACTERISTIC CURVES (T<sub>A</sub>=25°C)

TVS Transients Clamping Waveform



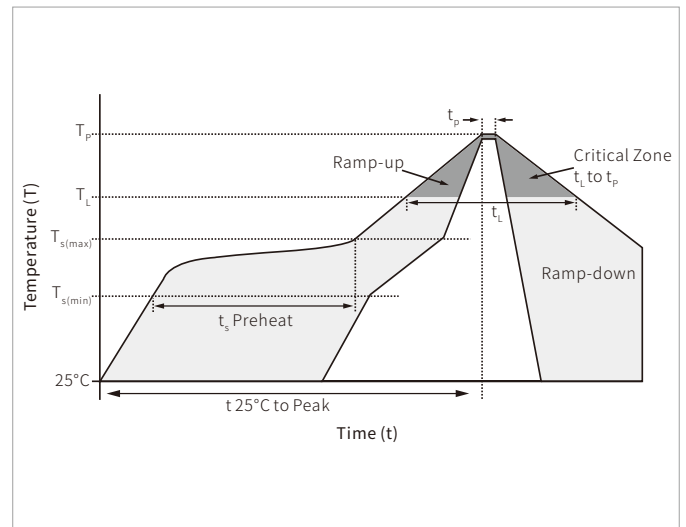
Peak Pulse Power Rating Curve



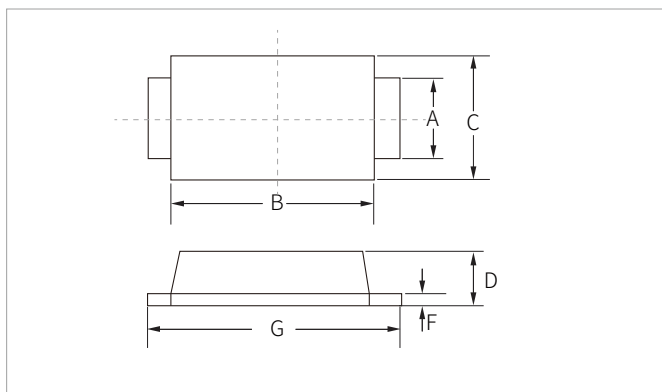
**Pulse Derating Curve**

**Pulse Waveform**

**Typical Junction Capacitance**


## SOLDERING PARAMETERS

| Reflow Condition                                      |                                  | Lead-free assembly |
|-------------------------------------------------------|----------------------------------|--------------------|
| Pre Heat                                              | Temperature Max ( $T_{s(min)}$ ) | 150°C              |
|                                                       | Temperature Max ( $T_{s(max)}$ ) | 200°C              |
|                                                       | Time (min to max) ( $t_s$ )      | 60 – 180 secs      |
| Average ramp up rate (Liquidus Temp ( $T_L$ ) to peak |                                  | 3°C/second max     |
| $T_{s(max)}$ to $T_L$ - Ramp-up Rate                  |                                  | 3°C/second max     |
| Reflow                                                | Temperature ( $T_L$ ) (Liquidus) | 217°C              |
|                                                       | Time (min to max) ( $t_L$ )      | 60 – 150 seconds   |
| Peak Temperature ( $T_p$ )                            |                                  | 260°C              |
| Time within 5°C of actual peak Temperature ( $t_p$ )  |                                  | 20 – 40 seconds    |
| Ramp-down Rate                                        |                                  | 6°C/second max     |
| Time 25°C to peak Temperature ( $T_p$ )               |                                  | 8 minutes max.     |
| Do not exceed                                         |                                  | 260°C              |

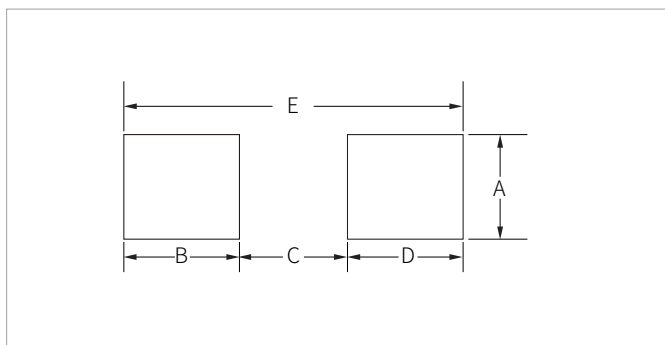


## SMAF PACKAGE INFORMATION



| Ref. | Millimeters |      | Inches |       |
|------|-------------|------|--------|-------|
|      | Min.        | Max. | Min.   | Max.  |
| A    | 1.35        | 1.60 | 0.053  | 0.063 |
| B    | 3.40        | 3.80 | 0.134  | 0.145 |
| C    | 2.40        | 2.80 | 0.094  | 0.110 |
| D    | 0.95        | 1.45 | 0.037  | 0.057 |
| F    | 0.15        | 0.22 | 0.006  | 0.009 |
| G    | 4.40        | 4.80 | 0.173  | 0.189 |

## RECOMMENDED PAD LAYOUT DIMENSIONS



| Ref. | Millimeters |      | Inches   |       |
|------|-------------|------|----------|-------|
|      | Min.        | Max. | Min.     | Max.  |
| A    | 1.70        | -    | 0.067    | -     |
| B    | 2.50        | -    | 0.098    | -     |
| C    | -           | 1.5  | -        | 0.059 |
| D    | 2.50        | -    | 0.098    | -     |
| E    | 6.50REF     |      | 0.256REF |       |

## ORDERING INFORMATION

| Part Number   | Component Package | QTY/Reel | Reel Size |
|---------------|-------------------|----------|-----------|
| TP6SMAFxx(C)A | SMAF              | 5000PCS  | 13"       |

**Headquarters**

No.3387 Shendu Road  
Pujiang I&E Park  
Minhang Shanghai China  
201000

**Hotline**

400-021-5756

**Web**

<https://www.semiware.com>

**Sales Center**

Tel: 86-21-3463-7458  
Email: [sales18@semiware.com](mailto:sales18@semiware.com)

**Customer Service**

Tel: 86-21-5484-1001  
Email: [sales17@semiware.com](mailto:sales17@semiware.com)

**Technical Support**

Tel: 86-21-3463-7654  
Email: [fae01@semiware.com](mailto:fae01@semiware.com)

**Complaint & Suggestions**

Tel: 86-21-3463-7172  
Ext: 8868  
Email: [cs03@semiware.com](mailto:cs03@semiware.com)

**By QR Code**

Website



Wechat

To find your local partner within Semiware's global website: [www.semiware.com](http://www.semiware.com)

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