



# THE DATASHEET OF SMF24A-TP

## Features

- Uni and Bi-directional Type Available (Suffix "C" means Bi-directional)
- Surface Mount
- Low Clamping Voltage
- Small, High Thermal Efficiency
- Halogen Free. "Green" Device (Note 1)
- Moisture Sensitivity Level 1
- Epoxy Meets UL 94 V-0 Flammability Rating
- Lead Free Finish/RoHS Compliant (Note 2) ("P" Suffix Designates RoHS Compliant. See Ordering Information)

## Maximum Ratings

- Operating Junction Temperature Range: -65°C to +175°C
- Storage Temperature Range: -65°C to +175°C
- Typical Thermal Resistance: 26°C/W Junction to Lead
- Typical Thermal Resistance: 300°C/W Junction to Ambient

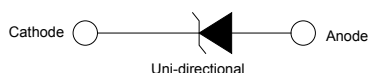
## Electrical Characteristics @ 25°C Unless Otherwise Specified

|                                                          |             |                |   |
|----------------------------------------------------------|-------------|----------------|---|
| Peak Pulse Power Dissipation with a 10/1000µs Waveform   | $P_{PP}$    | 200W           | - |
| ESD Voltage(HBM)                                         | $V_{ESD}$   | >16KV          | - |
| IEC61000-4-2(ESD)                                        | Air Contact | ±30KV<br>±30KV | - |
| Peak forward surge current, 8.3 ms single half sine-wave | $I_{FSM}$   | 30A            | - |

Note: 1. Halogen free "Green" products are defined as those which contain <900ppm bromine, <900ppm chlorine (<1500ppm total Br + Cl) and <1000ppm antimony compounds.

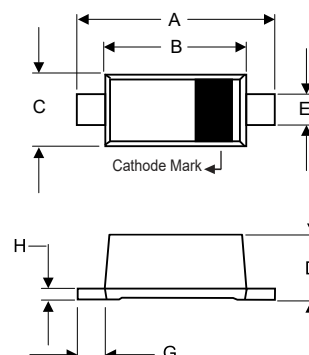
2. High Temperature Solder Exemption Applied, see EU Directive Annex 7a.

Pin Configuration:



## 200 Watt TVS 5.0 to 170 Volts

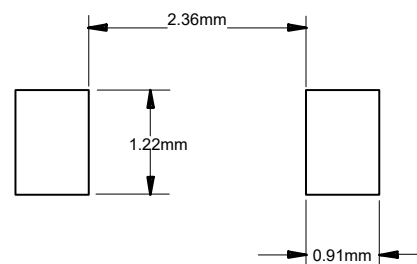
## SOD-123FL



### DIMENSIONS

| DIM | INCHES |       | MM   |      | NOTE |
|-----|--------|-------|------|------|------|
|     | MIN    | MAX   | MIN  | MAX  |      |
| A   | 0.130  | 0.152 | 3.30 | 3.85 |      |
| B   | 0.100  | 0.122 | 2.55 | 3.10 |      |
| C   | 0.055  | 0.075 | 1.40 | 1.90 |      |
| D   | 0.035  | 0.053 | 0.90 | 1.35 |      |
| E   | 0.020  | 0.041 | 0.50 | 1.05 |      |
| G   | 0.010  | ----  | 0.25 | ---- |      |
| H   | ----   | 0.010 | ---- | 0.25 |      |

### SUGGESTED SOLDER PAD LAYOUT



Electrical Characteristics @ 25°C Unless Otherwise Specified

| MCC<br>Part Number | Reverse<br>Stand-Off<br>Voltage | Breakdown Voltage<br>$V_{BR}(V)$ |      | Test Current | Max.<br>Clamping<br>Voltage @ $I_{PP}$ | Max.<br>Peak<br>Pulse<br>Current | Max. Reverse<br>Leakage<br>Current<br>@ $V_{WM}$ | Marking Code |
|--------------------|---------------------------------|----------------------------------|------|--------------|----------------------------------------|----------------------------------|--------------------------------------------------|--------------|
|                    | $V_{WM}(V)$                     | Min                              | Max  | $I_T(mA)$    | $V_C(V)$                               | $I_{PP}(A)$                      | $I_D(\mu A)$                                     |              |
| SMF5.0A            | 5.0                             | 6.4                              | 7.0  | 10           | 9.2                                    | 21.7                             | 400                                              | 5.0A         |
| SMF6.0A            | 6.0                             | 6.67                             | 7.37 | 10           | 10.3                                   | 19.4                             | 400                                              | 6.0A         |
| SMF6.5A            | 6.5                             | 7.22                             | 7.98 | 10           | 11.2                                   | 17.9                             | 250                                              | 6.5A         |
| SMF7.0A            | 7.0                             | 7.78                             | 8.6  | 10           | 12                                     | 16.7                             | 100                                              | 7.0A         |
| SMF7.5A            | 7.5                             | 8.33                             | 9.21 | 1.0          | 12.9                                   | 15.5                             | 50                                               | 7.5A         |
| SMF8.0A            | 8.0                             | 8.89                             | 9.83 | 1.0          | 13.6                                   | 14.7                             | 25                                               | 8.0A         |
| SMF8.5A            | 8.5                             | 9.44                             | 10.4 | 1.0          | 14.4                                   | 13.9                             | 10                                               | 8.5A         |
| SMF9.0A            | 9.0                             | 10                               | 11.1 | 1.0          | 15.4                                   | 13                               | 5.0                                              | 9.0A         |
| SMF10A             | 10                              | 11.1                             | 12.3 | 1.0          | 17                                     | 11.8                             | 2.5                                              | 10A          |
| SMF11A             | 11                              | 12.2                             | 13.5 | 1.0          | 18.2                                   | 11                               | 2.5                                              | 11A          |
| SMF12A             | 12                              | 13.3                             | 14.7 | 1.0          | 19.9                                   | 10.1                             | 2.5                                              | 12A          |
| SMF13A             | 13                              | 14.4                             | 15.9 | 1.0          | 21.5                                   | 9.3                              | 1.0                                              | 13A          |
| SMF14A             | 14                              | 15.6                             | 17.2 | 1.0          | 23.2                                   | 8.6                              | 1.0                                              | 14A          |
| SMF15A             | 15                              | 16.7                             | 18.5 | 1.0          | 24.4                                   | 8.2                              | 1.0                                              | 15A          |
| SMF16A             | 16                              | 17.8                             | 19.7 | 1.0          | 26                                     | 7.7                              | 1.0                                              | 16A          |
| SMF17A             | 17                              | 18.9                             | 20.9 | 1.0          | 27.6                                   | 7.2                              | 1.0                                              | 17A          |
| SMF18A             | 18                              | 20                               | 22.1 | 1.0          | 29.2                                   | 6.8                              | 1.0                                              | 18A          |
| SMF20A             | 20                              | 22.2                             | 24.5 | 1.0          | 32.4                                   | 6.2                              | 1.0                                              | 20A          |
| SMF22A             | 22                              | 24.4                             | 26.9 | 1.0          | 35.5                                   | 5.6                              | 1.0                                              | 22A          |
| SMF24A             | 24                              | 26.7                             | 29.5 | 1.0          | 38.9                                   | 5.1                              | 1.0                                              | 24A          |
| SMF26A             | 26                              | 28.9                             | 31.9 | 1.0          | 42.1                                   | 4.8                              | 1.0                                              | 26A          |
| SMF28A             | 28                              | 31.1                             | 34.4 | 1.0          | 45.4                                   | 4.4                              | 1.0                                              | 28A          |
| SMF30A             | 30                              | 33.3                             | 36.8 | 1.0          | 48.4                                   | 4.1                              | 1.0                                              | 30A          |
| SMF33A             | 33                              | 36.7                             | 40.6 | 1.0          | 53.3                                   | 3.8                              | 1.0                                              | 33A          |
| SMF36A             | 36                              | 40                               | 44.2 | 1.0          | 58.1                                   | 3.4                              | 1.0                                              | 36A          |
| SMF40A             | 40                              | 44.4                             | 49.1 | 1.0          | 64.5                                   | 3.1                              | 1.0                                              | 40A          |
| SMF43A             | 43                              | 47.8                             | 52.8 | 1.0          | 69.4                                   | 2.9                              | 1.0                                              | 43A          |
| SMF45A             | 45                              | 50                               | 55.3 | 1.0          | 72.7                                   | 2.8                              | 1.0                                              | 45A          |
| SMF48A             | 48                              | 53.3                             | 58.9 | 1.0          | 77.4                                   | 2.6                              | 1.0                                              | 48A          |
| SMF51A             | 51                              | 56.7                             | 62.7 | 1.0          | 82.4                                   | 2.4                              | 1.0                                              | 51A          |
| SMF54A             | 54                              | 60                               | 66.3 | 1.0          | 87.1                                   | 2.3                              | 1.0                                              | 54A          |
| SMF58A             | 58                              | 64.4                             | 71.2 | 1.0          | 93.6                                   | 2.1                              | 1.0                                              | 58A          |
| SMF60A             | 60                              | 66.7                             | 73.7 | 1.0          | 96.8                                   | 1.8                              | 1.0                                              | 60A          |
| SMF64A             | 64                              | 71.1                             | 78.6 | 1.0          | 103                                    | 1.7                              | 1.0                                              | 64A          |
| SMF70A             | 70                              | 77.8                             | 86   | 1.0          | 113                                    | 1.5                              | 1.0                                              | 70A          |
| SMF75A             | 75                              | 83.3                             | 92.1 | 1.0          | 121                                    | 1.4                              | 1.0                                              | 75A          |
| SMF78A             | 78                              | 86.7                             | 95.8 | 1.0          | 126                                    | 1.4                              | 1.0                                              | 78A          |
| SMF85A             | 85                              | 94.4                             | 104  | 1.0          | 137                                    | 1.3                              | 1.0                                              | 85A          |
| SMF90A             | 90                              | 100                              | 111  | 1.0          | 146                                    | 1.2                              | 1.0                                              | 90A          |
| SMF100A            | 100                             | 111                              | 123  | 1.0          | 162                                    | 1.1                              | 1.0                                              | 100          |
| SMF110A            | 110                             | 122                              | 135  | 1.0          | 177                                    | 1.0                              | 1.0                                              | 110          |
| SMF120A            | 120                             | 133                              | 147  | 1.0          | 193                                    | 0.9                              | 1.0                                              | 120          |
| SMF130A            | 130                             | 144                              | 159  | 1.0          | 209                                    | 0.8                              | 1.0                                              | 130          |
| SMF150A            | 150                             | 167                              | 185  | 1.0          | 243                                    | 0.7                              | 1.0                                              | 150          |
| SMF160A            | 160                             | 178                              | 197  | 1.0          | 259                                    | 0.7                              | 1.0                                              | 160          |
| SMF170A            | 170                             | 189                              | 209  | 1.0          | 275                                    | 0.6                              | 1.0                                              | 170          |

## Electrical Characteristics @ 25°C Unless Otherwise Specified

| MCC<br>Part Number | Reverse<br>Stand-Off<br>Voltage | Breakdown Voltage<br>$V_{BR}(V)$ |      | Test Current | Max.<br>Clamping<br>Voltage @ $I_{PP}$ | Max.<br>Peak<br>Pulse<br>Current | Max. Reverse<br>Leakage<br>Current<br>@ $V_{WM}$ | Marking Code |
|--------------------|---------------------------------|----------------------------------|------|--------------|----------------------------------------|----------------------------------|--------------------------------------------------|--------------|
|                    | $V_{WM}(V)$                     | Min                              | Max  | $I_T(mA)$    | $V_C(V)$                               | $I_{PP}(A)$                      | $I_D(\mu A)$                                     |              |
| SMF5.0CA           | 5.0                             | 6.4                              | 7.0  | 10           | 9.2                                    | 21.7                             | 400                                              | 5.0CA        |
| SMF6.0CA           | 6.0                             | 6.67                             | 7.37 | 10           | 10.3                                   | 19.4                             | 400                                              | 6.0CA        |
| SMF6.5CA           | 6.5                             | 7.22                             | 7.98 | 10           | 11.2                                   | 17.9                             | 250                                              | 6.5CA        |
| SMF7.0CA           | 7.0                             | 7.78                             | 8.6  | 10           | 12                                     | 16.7                             | 100                                              | 7.0CA        |
| SMF7.5CA           | 7.5                             | 8.33                             | 9.21 | 1.0          | 12.9                                   | 15.5                             | 50                                               | 7.5CA        |
| SMF8.0CA           | 8.0                             | 8.89                             | 9.83 | 1.0          | 13.6                                   | 14.7                             | 25                                               | 8.0CA        |
| SMF8.5CA           | 8.5                             | 9.44                             | 10.4 | 1.0          | 14.4                                   | 13.9                             | 10                                               | 8.5CA        |
| SMF9.0CA           | 9.0                             | 10                               | 11.1 | 1.0          | 15.4                                   | 13                               | 5.0                                              | 9.0CA        |
| SMF10CA            | 10                              | 11.1                             | 12.3 | 1.0          | 17                                     | 11.8                             | 2.5                                              | 10CA         |
| SMF11CA            | 11                              | 12.2                             | 13.5 | 1.0          | 18.2                                   | 11                               | 2.5                                              | 11CA         |
| SMF12CA            | 12                              | 13.3                             | 14.7 | 1.0          | 19.9                                   | 10.1                             | 2.5                                              | 12CA         |
| SMF13CA            | 13                              | 14.4                             | 15.9 | 1.0          | 21.5                                   | 9.3                              | 1.0                                              | 13CA         |
| SMF14CA            | 14                              | 15.6                             | 17.2 | 1.0          | 23.2                                   | 8.6                              | 1.0                                              | 14CA         |
| SMF15CA            | 15                              | 16.7                             | 18.5 | 1.0          | 24.4                                   | 8.2                              | 1.0                                              | 15CA         |
| SMF16CA            | 16                              | 17.8                             | 19.7 | 1.0          | 26                                     | 7.7                              | 1.0                                              | 16CA         |
| SMF17CA            | 17                              | 18.9                             | 20.9 | 1.0          | 27.6                                   | 7.2                              | 1.0                                              | 17CA         |
| SMF18CA            | 18                              | 20                               | 22.1 | 1.0          | 29.2                                   | 6.8                              | 1.0                                              | 18CA         |
| SMF20CA            | 20                              | 22.2                             | 24.5 | 1.0          | 32.4                                   | 6.2                              | 1.0                                              | 20CA         |
| SMF22CA            | 22                              | 24.4                             | 26.9 | 1.0          | 35.5                                   | 5.6                              | 1.0                                              | 22CA         |
| SMF24CA            | 24                              | 26.7                             | 29.5 | 1.0          | 38.9                                   | 5.1                              | 1.0                                              | 24CA         |
| SMF26CA            | 26                              | 28.9                             | 31.9 | 1.0          | 42.1                                   | 4.8                              | 1.0                                              | 26CA         |
| SMF28CA            | 28                              | 31.1                             | 34.4 | 1.0          | 45.4                                   | 4.4                              | 1.0                                              | 28CA         |
| SMF30CA            | 30                              | 33.3                             | 36.8 | 1.0          | 48.4                                   | 4.1                              | 1.0                                              | 30CA         |
| SMF33CA            | 33                              | 36.7                             | 40.6 | 1.0          | 53.3                                   | 3.8                              | 1.0                                              | 33CA         |
| SMF36CA            | 36                              | 40                               | 44.2 | 1.0          | 58.1                                   | 3.4                              | 1.0                                              | 36CA         |
| SMF40CA            | 40                              | 44.4                             | 49.1 | 1.0          | 64.5                                   | 3.1                              | 1.0                                              | 40CA         |
| SMF43CA            | 43                              | 47.8                             | 52.8 | 1.0          | 69.4                                   | 2.9                              | 1.0                                              | 43CA         |
| SMF45CA            | 45                              | 50                               | 55.3 | 1.0          | 72.7                                   | 2.8                              | 1.0                                              | 45CA         |
| SMF48CA            | 48                              | 53.3                             | 58.9 | 1.0          | 77.4                                   | 2.6                              | 1.0                                              | 48CA         |
| SMF51CA            | 51                              | 56.7                             | 62.7 | 1.0          | 82.4                                   | 2.4                              | 1.0                                              | 51CA         |
| SMF54CA            | 54                              | 60                               | 66.3 | 1.0          | 87.1                                   | 2.3                              | 1.0                                              | 54CA         |
| SMF58CA            | 58                              | 64.4                             | 71.2 | 1.0          | 93.6                                   | 2.1                              | 1.0                                              | 58CA         |
| SMF60CA            | 60                              | 66.7                             | 73.7 | 1.0          | 96.8                                   | 1.8                              | 1.0                                              | 60CA         |
| SMF64CA            | 64                              | 71.1                             | 78.6 | 1.0          | 103                                    | 1.7                              | 1.0                                              | 64CA         |
| SMF70CA            | 70                              | 77.8                             | 86   | 1.0          | 113                                    | 1.5                              | 1.0                                              | 70CA         |
| SMF75CA            | 75                              | 83.3                             | 92.1 | 1.0          | 121                                    | 1.4                              | 1.0                                              | 75CA         |
| SMF78CA            | 78                              | 86.7                             | 95.8 | 1.0          | 126                                    | 1.4                              | 1.0                                              | 78CA         |
| SMF85CA            | 85                              | 94.4                             | 104  | 1.0          | 137                                    | 1.3                              | 1.0                                              | 85CA         |
| SMF90CA            | 90                              | 100                              | 111  | 1.0          | 146                                    | 1.2                              | 1.0                                              | 90CA         |
| SMF100CA           | 100                             | 111                              | 123  | 1.0          | 162                                    | 1.1                              | 1.0                                              | 100C         |
| SMF110CA           | 110                             | 122                              | 135  | 1.0          | 177                                    | 1.0                              | 1.0                                              | 110C         |
| SMF120CA           | 120                             | 133                              | 147  | 1.0          | 193                                    | 0.9                              | 1.0                                              | 120C         |
| SMF130CA           | 130                             | 144                              | 159  | 1.0          | 209                                    | 0.8                              | 1.0                                              | 130C         |
| SMF150CA           | 150                             | 167                              | 185  | 1.0          | 243                                    | 0.7                              | 1.0                                              | 150C         |
| SMF160CA           | 160                             | 178                              | 197  | 1.0          | 259                                    | 0.7                              | 1.0                                              | 160C         |
| SMF170CA           | 170                             | 189                              | 209  | 1.0          | 275                                    | 0.6                              | 1.0                                              | 170C         |

## Curve Characteristics

Fig. 1 - Peak Pulse Power Rating Curve

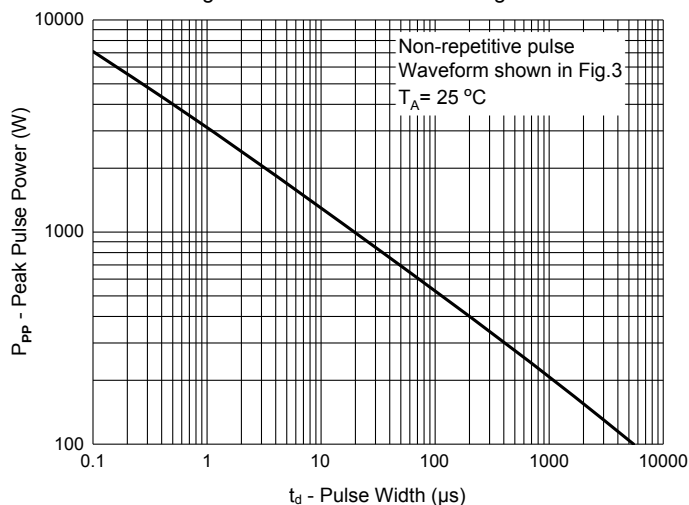


Fig. 2 - Typical Junction Capacitance

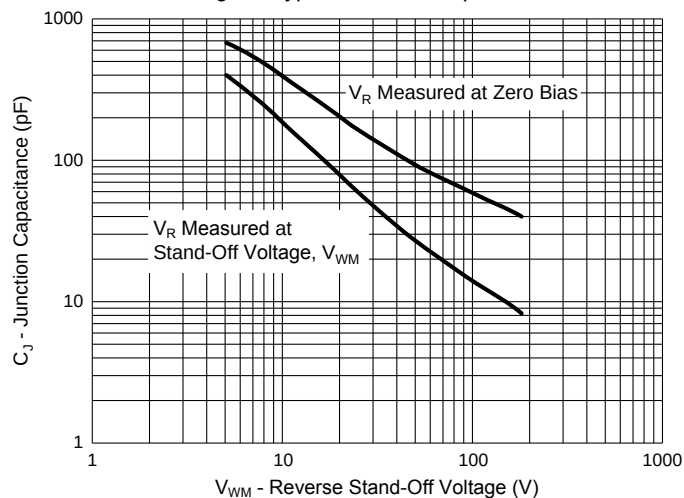


Fig. 3 - Pulse Waveform

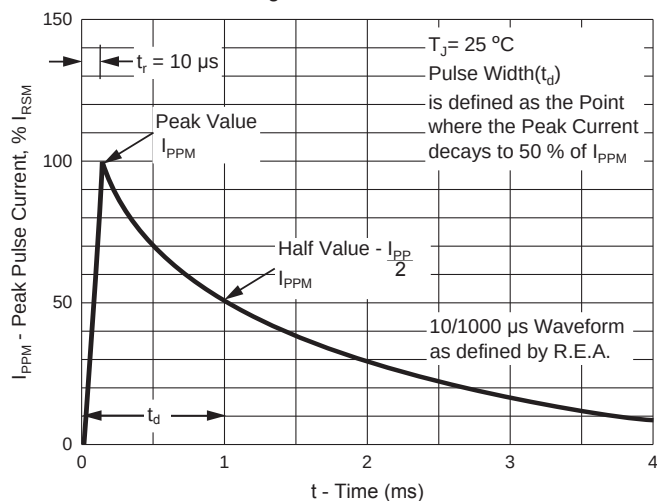
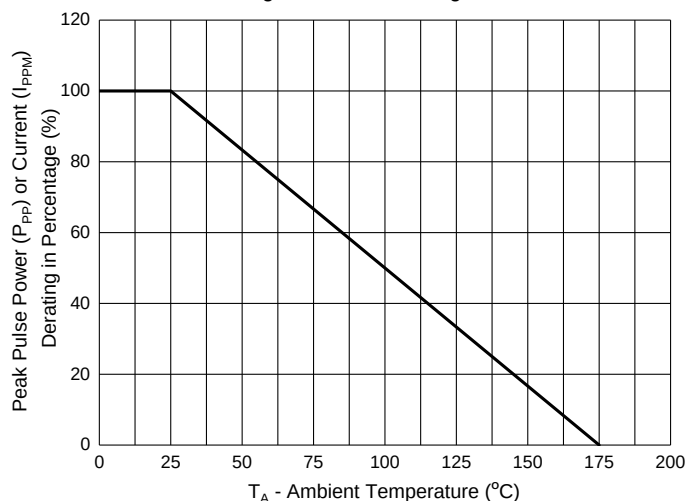


Fig. 4 - Pulse Derating Curve



## Ordering Information

| Device         | Packing                |
|----------------|------------------------|
| Part Number-TP | Tape&Reel:2.5Kpcs/Reel |

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