

## FEATURES

- | Low profile package
- | Ideal for automated placement
- | 200 Watt peak pulse power capability with a 10/1000 $\mu$ s waveform
- | For surface mounted applications to optimize board space
- | Excellent clamping capability
- | Very fast response time
- | Low incremental surge resistance



SOD-123FL



Uni-directional



Bi-directional

## 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 |

## MAXIMUM RATINGS ( $T_A=25^\circ\text{C}$ )

| Parameter  | Symbo     | Value | Unit  |
|--|-----------|-------|-------|
| Peak Pulse Power Dissipation on 10/1000 $\mu$ s waveform (Note1) | $P_{PPM}$ | 200   | Watts |
| Steady State Power Dissipation at $T_L=75^\circ\text{C}$         | $P_D$     | 0.4   | Watts |

**Notes :** 1.Non-repetitive current pulse, $T_A=25^\circ\text{C}$ .  
 2.8.3ms single half sine-wave, or equivalent square wave, Duty cycle = 4 pulses per minutes maximum

## THERMAL CONSIDERATIONS

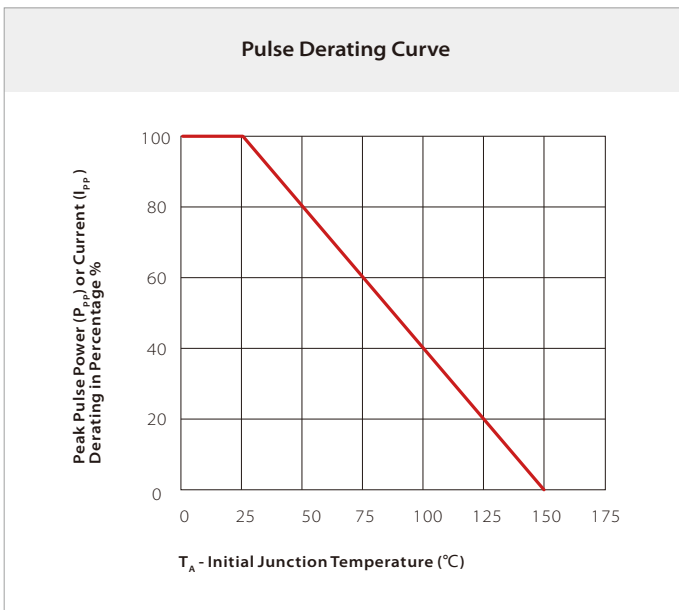
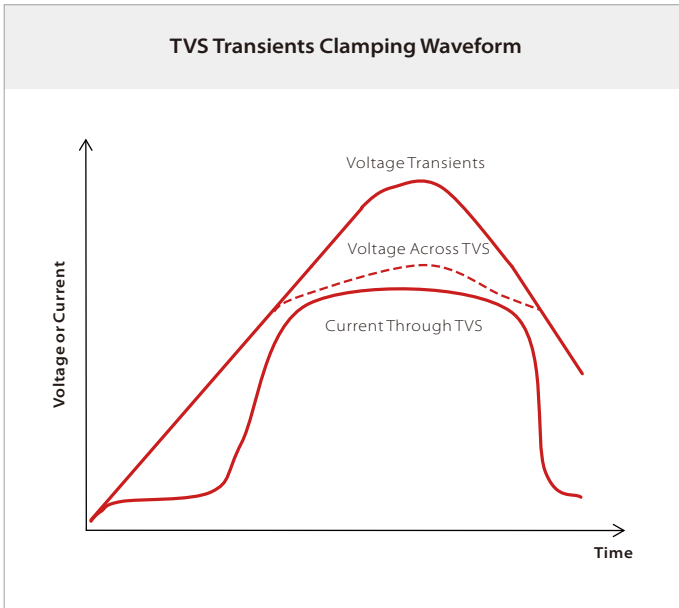
| Parameter                              | Symbol          | Value       | Unit                      |
|--|-----------------|-------------|---------------------------|
| Operating Junction Temperature         | $T_J$           | -55 to +150 | $^\circ\text{C}$          |
| Storage Temperature Range              | $T_{STG}$       | -55 to +150 | $^\circ\text{C}$          |
| Junction to Ambient on printed circuit | $R_{\theta JA}$ | 220         | $^\circ\text{C}/\text{W}$ |

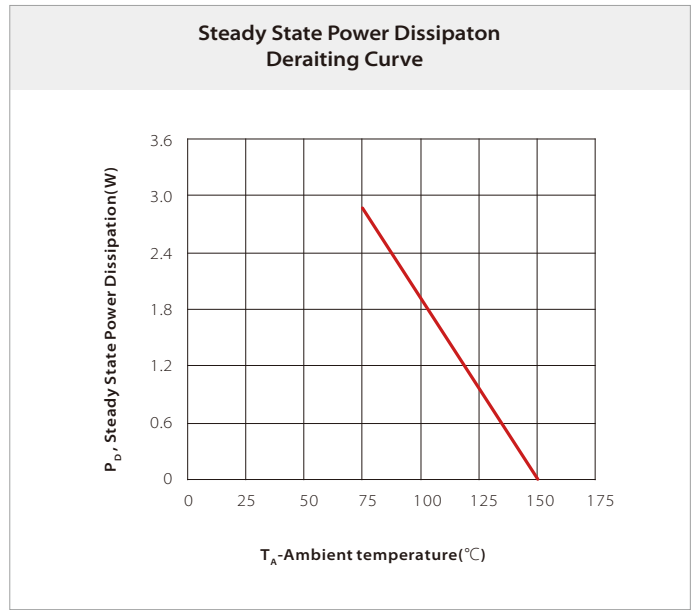
## ELECTRICAL CHARACTERISTICS (T<sub>A</sub> = 25°C)

| 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> | Peak Pulse Current  | Reverse Leakage @V <sub>RWM</sub> |
|-------------|----------|---------------------|----|---------------------------|---------------------------------------|---------------------------------------|---------------------|---|---------------------|-----------------------------------|
| Uni-Polar   | Bi-Polar | 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)               |
| SMF3.3A     | SMF3.3CA | HZ                  | GZ | 3.3                       | 5.2                                   | 6.00                                  | 10                  | 8.0                                       | 25.0                | 800                               |
| SMF5.0A     | SMF5.0CA | AE                  | FE | 5.0                       | 6.4                                   | 7.00                                  | 10                  | 9.2                                       | 21.7                | 800                               |
| SMF6.0A     | SMF6.0CA | AG                  | FG | 6.0                       | 6.67                                  | 7.37                                  | 10                  | 10.3                                      | 19.4                | 800                               |
| SMF6.5A     | SMF6.5CA | AK                  | FK | 6.5                       | 7.22                                  | 7.98                                  | 10                  | 11.2                                      | 17.9                | 500                               |
| SMF7.0A     | SMF7.0CA | AM                  | FM | 7.0                       | 7.78                                  | 8.60                                  | 10                  | 12.0                                      | 16.7                | 200                               |
| SMF7.5A     | SMF7.5CA | AP                  | FP | 7.5                       | 8.33                                  | 9.21                                  | 1                   | 12.9                                      | 15.5                | 100                               |
| SMF8.0A     | SMF8.0CA | AR                  | FR | 8.0                       | 8.89                                  | 9.83                                  | 1                   | 13.6                                      | 14.7                | 50                                |
| SMF8.5A     | SMF8.5CA | AT                  | FT | 8.5                       | 9.44                                  | 10.4                                  | 1                   | 14.4                                      | 13.9                | 20                                |
| SMF9.0A     | SMF9.0CA | AV                  | FV | 9.0                       | 10.0                                  | 11.1                                  | 1                   | 15.4                                      | 13.0                | 10                                |
| SMF10A      | SMF10CA  | AX                  | FX | 10.0                      | 11.1                                  | 12.3                                  | 1                   | 17.0                                      | 11.8                | 5                                 |
| SMF11A      | SMF11CA  | AZ                  | FZ | 11.0                      | 12.2                                  | 13.5                                  | 1                   | 18.2                                      | 11.0                | 1                                 |
| SMF12A      | SMF12CA  | BE                  | GE | 12.0                      | 13.3                                  | 14.7                                  | 1                   | 19.9                                      | 10.1                | 1                                 |
| SMF13A      | SMF13CA  | BG                  | GG | 13.0                      | 14.4                                  | 15.9                                  | 1                   | 21.5                                      | 9.3                 | 1                                 |
| SMF14A      | SMF14CA  | BK                  | GK | 14.0                      | 15.6                                  | 17.2                                  | 1                   | 23.2                                      | 8.6                 | 1                                 |
| SMF15A      | SMF15CA  | BM                  | GM | 15.0                      | 16.7                                  | 18.5                                  | 1                   | 24.4                                      | 8.2                 | 1                                 |
| SMF16A      | SMF16CA  | BP                  | GP | 16.0                      | 17.8                                  | 19.7                                  | 1                   | 26.0                                      | 7.7                 | 1                                 |
| SMF17A      | SMF17CA  | BR                  | GR | 17.0                      | 18.9                                  | 20.9                                  | 1                   | 27.6                                      | 7.2                 | 1                                 |
| SMF18A      | SMF18CA  | BT                  | GT | 18.0                      | 20.0                                  | 22.1                                  | 1                   | 29.2                                      | 6.8                 | 1                                 |
| SMF20A      | SMF20CA  | BV                  | GV | 20.0                      | 22.2                                  | 24.5                                  | 1                   | 32.4                                      | 6.2                 | 1                                 |
| SMF22A      | SMF22CA  | BX                  | GX | 22.0                      | 24.4                                  | 26.9                                  | 1                   | 35.5                                      | 5.6                 | 1                                 |
| SMF24A      | SMF24CA  | BZ                  | GZ | 24.0                      | 26.7                                  | 29.5                                  | 1                   | 38.9                                      | 5.1                 | 1                                 |
| SMF26A      | SMF26CA  | CE                  | HE | 26.0                      | 28.9                                  | 31.9                                  | 1                   | 42.1                                      | 4.8                 | 1                                 |
| SMF28A      | SMF28CA  | CG                  | HG | 28.0                      | 31.1                                  | 34.4                                  | 1                   | 45.4                                      | 4.4                 | 1                                 |
| SMF30A      | SMF30CA  | CK                  | HK | 30.0                      | 33.3                                  | 36.8                                  | 1                   | 48.4                                      | 4.1                 | 1                                 |
| SMF33A      | SMF33CA  | CM                  | HM | 33.0                      | 36.7                                  | 40.6                                  | 1                   | 53.3                                      | 3.8                 | 1                                 |
| SMF36A      | SMF36CA  | CP                  | HP | 36.0                      | 40.0                                  | 44.2                                  | 1                   | 58.1                                      | 3.4                 | 1                                 |
| SMF40A      | SMF40CA  | CR                  | HR | 40.0                      | 44.4                                  | 49.1                                  | 1                   | 64.5                                      | 3.1                 | 1                                 |
| SMF43A      | SMF43CA  | CT                  | HT | 43.0                      | 47.8                                  | 52.8                                  | 1                   | 69.4                                      | 2.9                 | 1                                 |
| SMF45A      | SMF45CA  | CV                  | HV | 45.0                      | 50.0                                  | 55.3                                  | 1                   | 72.7                                      | 2.8                 | 1                                 |
| SMF48A      | SMF48CA  | CX                  | HX | 48.0                      | 53.3                                  | 58.9                                  | 1                   | 77.4                                      | 2.6                 | 1                                 |
| SMF51A      | SMF51CA  | CZ                  | HZ | 51.0                      | 56.7                                  | 62.7                                  | 1                   | 82.4                                      | 2.4                 | 1                                 |
| SMF54A      | SMF54CA  | DE                  | IE | 54.0                      | 60.0                                  | 66.3                                  | 1                   | 87.1                                      | 2.3                 | 1                                 |
| SMF58A      | SMF58CA  | DG                  | IG | 58.0                      | 64.4                                  | 71.2                                  | 1                   | 93.6                                      | 2.1                 | 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> | Peak Pulse Current  | Reverse Leakage @V <sub>RWM</sub> |
|-------------|----------|---------------------|----|---------------------------|---------------------------------------|---------------------------------------|---------------------|---|---------------------|-----------------------------------|
| Uni-Polar   | Bi-Polar | 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> (μA)               |
| SMF60A      | SMF60CA  | DK                  | IK | 60.0                      | 66.7                                  | 73.7                                  | 1                   | 96.8                                      | 1.86                | 1                                 |
| SMF64A      | SMF64CA  | DM                  | IM | 64.0                      | 71.1                                  | 78.6                                  | 1                   | 103.0                                     | 1.75                | 1                                 |
| SMF70A      | SMF70CA  | DP                  | IP | 70.0                      | 77.8                                  | 86.0                                  | 1                   | 113.0                                     | 1.59                | 1                                 |
| SMF75A      | SMF75CA  | DR                  | IR | 75.0                      | 83.3                                  | 92.1                                  | 1                   | 121.0                                     | 1.49                | 1                                 |
| SMF78A      | SMF78CA  | DT                  | IT | 78.0                      | 86.7                                  | 95.8                                  | 1                   | 126.0                                     | 1.43                | 1                                 |
| SMF85A      | SMF85CA  | DV                  | IV | 85.0                      | 94.4                                  | 104.0                                 | 1                   | 137.0                                     | 1.31                | 1                                 |
| SMF90A      | SMF90CA  | DX                  | IX | 90.0                      | 100.0                                 | 111.0                                 | 1                   | 146.0                                     | 1.23                | 1                                 |
| SMF100A     | SMF100CA | EZ                  | JZ | 100.0                     | 111.0                                 | 123.0                                 | 1                   | 162.0                                     | 1.11                | 1                                 |
| SMF110A     | SMF110CA | EE                  | JE | 110.0                     | 122.0                                 | 135.0                                 | 1                   | 177.0                                     | 1.02                | 1                                 |
| SMF120A     | SMF120CA | EG                  | JG | 120.0                     | 133.0                                 | 147.0                                 | 1                   | 193.0                                     | 0.93                | 1                                 |
| SMF130A     | SMF130CA | EK                  | JK | 130.0                     | 144.0                                 | 159.0                                 | 1                   | 209.0                                     | 0.86                | 1                                 |
| SMF150A     | SMF150CA | EM                  | JM | 150.0                     | 167.0                                 | 185.0                                 | 1                   | 243.0                                     | 0.74                | 1                                 |
| SMF160A     | SMF160CA | EP                  | JP | 160.0                     | 178.0                                 | 197.0                                 | 1                   | 259.0                                     | 0.69                | 1                                 |
| SMF170A     | SMF170CA | ER                  | JR | 170.0                     | 189.0                                 | 209.0                                 | 1                   | 275.0                                     | 0.65                | 1                                 |
| SMF180A     | SMF180CA | ET                  | JT | 180.0                     | 201.0                                 | 222.0                                 | 1                   | 292.0                                     | 0.66                | 1                                 |
| SMF190A     | SMF190CA | EU                  | JU | 190.0                     | 209.0                                 | 243.0                                 | 1                   | 308.0                                     | 0.63                | 1                                 |
| SMF200A     | SMF200CA | EV                  | JV | 200.0                     | 224.0                                 | 247.0                                 | 1                   | 324.0                                     | 0.59                | 1                                 |
| SMF210A     | SMF210CA | EW                  | JW | 210.0                     | 231.0                                 | 269.0                                 | 1                   | 340.0                                     | 0.57                | 1                                 |
| SMF220A     | SMF220CA | EY                  | JY | 220.0                     | 246.0                                 | 272.0                                 | 1                   | 356.0                                     | 0.54                | 1                                 |

# CHARACTERISTIC CURVES





## SOLDERING PARAMETERS

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



## SOD-123FL PACKAGE INFORMATION



| Ref.           | Millimeters |      | Inches |       |
|----------------|-------------|------|--------|-------|
|                | Min.        | Max. | Min.   | Max.  |
| A              | 0.95        | 1.45 | 0.037  | 0.057 |
| A1             | 0.00        | 0.10 | 0.000  | 0.004 |
| b              | 0.70        | 1.20 | 0.028  | 0.047 |
| c              | 0.05        | 0.30 | 0.002  | 0.012 |
| D              | 1.50        | 2.00 | 0.059  | 0.079 |
| E              | 2.50        | 2.90 | 0.098  | 0.114 |
| L              | 0.35        | 0.90 | 0.014  | 0.035 |
| H <sub>E</sub> | 3.40        | 3.90 | 0.134  | 0.154 |

## RECOMMENDED PAD LAYOUT DIMENSIONS



| Ref. | Millimeters | Inches |
|------|-------------|--------|
| A    | 4.20        | 0.165  |
| B    | 1.50        | 0.059  |
| C    | 1.20        | 0.047  |

## ORDERING INFORMATION

| Part Number | Component Package | QTY/Reel | Reel Size |
|-------------|-------------------|----------|-----------|
| SMFxx(C)A   | SOD-123FL         | 3000PCS  | 7"        |

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