

Working Voltage: 5.0 to 250Volts

Peak Pulse Power: 400 Watts

## Features

- ◇ Maximum 400 W peak pulse capability with a 10/1000  $\mu$ s waveform, repetitive rate (duty cycle): 0.01%
- ◇ Low inductance, excellent clamping capability
- ◇ For surface mounted applications to optimize board space
- ◇ Typical failure mode is short from over-specification Voltage or current
- ◇ Whisker test is conducted based on JEDEC JESD201A per its table 4a and 4c
- ◇ IEC-61000-4-2 ESD 30KV(Air), 30KV(Contact)
- ◇ ESD protection of data lines in accordance with IEC61000-4-2
- ◇ EFT protection of data lines in accordance with IEC-61000-4-4
- ◇ Fast response time: typically less than 1.0ns from 0 volts to VBRmin.
- ◇ High temperature soldering: 260°C/30seconds at terminals
- ◇ Glass passivated junction
- ◇ Built-in strain relief
- ◇ Halogen-free and RoHS compliant

## Applications

- ◇ The protection of I/O interfaces, VCC bus and other vulnerable circuit used in cellular phones, portable devices, business machines, power supplies and other consumer applications.

## Mechanical Data

- ◇ Moisture Sensitivity: MSL Level 1, per J-STD-020
- ◇ Terminals: Matte Tin lead-free plated Finish. Solderable per MIL-STD-202 Method 208
- ◇ Case Material: Molded Plastic; Molding compound meet UL Flammability Classification Rating 94V-0
- ◇ Case: JEDEC SOD-123FL

## ORDERING PACK INFORMATION

| Part No.   | Packge    | Packing (pcs/reel) | Box Size L×W×H(mm) | Quatity (pcs/box) | Carton Size L×W×H(mm) | Quatity (pcs/carton) |
|------------|-----------|--------------------|--------------------|-------------------|-----------------------|----------------------|
| SMFxxxA/CA | SOD-123FL | 3000               | 210×210×210        | 45000             | 420×420×210           | 180000               |

## MAXIMUM RATING CHARACTERISTICS

Ratings at 25°C ambient temperature unless otherwise specified.

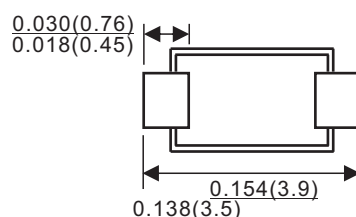
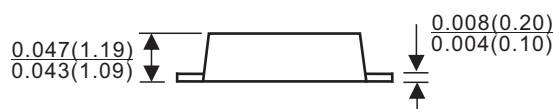
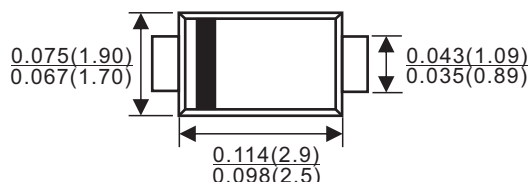
| PARAMETER                                                                                  | SYMBOL           | VALUE          | UNITS |
|--------------------------------------------------------------------------------------------|------------------|----------------|-------|
| Peak power dissipation with a 10/1000 $\mu$ s waveform <sup>(1)(3)</sup>                   | P <sub>PP</sub>  | 400            | W     |
| Peak power dissipation with a 8/20 $\mu$ s waveform <sup>(1)</sup>                         | P <sub>PP</sub>  | 2000           | W     |
| Peak pulse current with a 10/1000 $\mu$ s waveform <sup>(1)</sup>                          | I <sub>PP</sub>  | See next table | A     |
| Peak forward surge current, 8.3ms single half sine-wave unidirectional only <sup>(2)</sup> | I <sub>FSM</sub> | 30             | A     |
| Maximum instantaneous forward voltage at 25A for unidirectional only                       | V <sub>F</sub>   | 3.5            | V     |
| Thermal resistance Junction to Ambient                                                     | R <sub>θJA</sub> | 220            | °C/W  |
| Thermal resistance Junction to Lead                                                        | R <sub>θJL</sub> | 100            | °C/W  |
| Junction temperature                                                                       | T <sub>J</sub>   | 150            | °C    |
| Storage temperature range                                                                  | T <sub>STG</sub> | -55~150        | °C    |

Note:

(1) Non-repetitive current pulse per Fig.3 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 minute maximum

SOD-123FL



Dimensions in inches and (millimeters)

### ELELTRICAL CHARACTERISTICS

| Part Number     |                | Marking Code    |                | Breakdown Voltage<br>V <sub>BR</sub> (Volts)@I <sub>T</sub> |        | Test<br>Current<br>I <sub>T</sub> (mA) | Reverse<br>Stand off<br>Voltage<br>V <sub>R</sub> (V) | Maximum<br>Reverse<br>Leakage<br>@V <sub>R</sub><br>I <sub>R</sub> ( $\mu$ A) | Maximum<br>Peak Pulse<br>Current<br>I <sub>PP</sub> (A) | Maximum<br>Clamping<br>Voltage<br>@I <sub>PP</sub><br>V <sub>C</sub> (V) |
|-----------------|----------------|-----------------|----------------|-------------------------------------------------------------|--------|----------------------------------------|-------------------------------------------------------|-------------------------------------------------------------------------------|---------------------------------------------------------|--------------------------------------------------------------------------|
| Uni-directional | Bi-directional | Uni-directional | Bi-directional | Min                                                         | Max    |                                        |                                                       |                                                                               |                                                         |                                                                          |
| SMF4L5.0A       | SMF4L5.0CA     | KE              | AE             | 6.40                                                        | 7.00   | 10                                     | 5.0                                                   | 800                                                                           | 43.48                                                   | 9.2                                                                      |
| SMF4L6.0A       | SMF4L6.0CA     | KG              | AG             | 6.67                                                        | 7.37   | 10                                     | 6.0                                                   | 800                                                                           | 38.83                                                   | 10.3                                                                     |
| SMF4L6.5A       | SMF4L6.5CA     | KK              | AK             | 7.22                                                        | 7.98   | 10                                     | 6.5                                                   | 500                                                                           | 35.71                                                   | 11.2                                                                     |
| SMF4L7.0A       | SMF4L7.0CA     | KM              | AM             | 7.78                                                        | 8.60   | 10                                     | 7.0                                                   | 200                                                                           | 33.33                                                   | 12.0                                                                     |
| SMF4L7.5A       | SMF4L7.5CA     | KP              | AP             | 8.33                                                        | 9.21   | 1                                      | 7.5                                                   | 100                                                                           | 31.01                                                   | 12.9                                                                     |
| SMF4L8.0A       | SMF4L8.0CA     | KR              | AR             | 8.89                                                        | 9.83   | 1                                      | 8.0                                                   | 50                                                                            | 29.41                                                   | 13.6                                                                     |
| SMF4L8.5A       | SMF4L8.5CA     | KT              | AT             | 9.44                                                        | 10.40  | 1                                      | 8.5                                                   | 20                                                                            | 27.78                                                   | 14.4                                                                     |
| SMF4L9.0A       | SMF4L9.0CA     | KV              | AV             | 10.00                                                       | 11.10  | 1                                      | 9.0                                                   | 10                                                                            | 25.97                                                   | 15.4                                                                     |
| SMF4L10A        | SMF4L10CA      | KX              | AX             | 11.10                                                       | 12.30  | 1                                      | 10                                                    | 5                                                                             | 23.53                                                   | 17.0                                                                     |
| SMF4L11A        | SMF4L11CA      | KZ              | AZ             | 12.20                                                       | 13.50  | 1                                      | 11                                                    | 1                                                                             | 21.98                                                   | 18.2                                                                     |
| SMF4L12A        | SMF4L12CA      | LE              | BE             | 13.30                                                       | 14.70  | 1                                      | 12                                                    | 1                                                                             | 20.10                                                   | 19.9                                                                     |
| SMF4L13A        | SMF4L13CA      | LG              | BG             | 14.40                                                       | 15.90  | 1                                      | 13                                                    | 1                                                                             | 18.60                                                   | 21.5                                                                     |
| SMF4L14A        | SMF4L14CA      | LK              | BK             | 15.60                                                       | 17.20  | 1                                      | 14                                                    | 1                                                                             | 17.24                                                   | 23.2                                                                     |
| SMF4L15A        | SMF4L15CA      | LM              | BM             | 16.70                                                       | 18.50  | 1                                      | 15                                                    | 1                                                                             | 16.39                                                   | 24.4                                                                     |
| SMF4L16A        | SMF4L16CA      | LP              | BP             | 17.80                                                       | 19.70  | 1                                      | 16                                                    | 1                                                                             | 15.38                                                   | 26.0                                                                     |
| SMF4L17A        | SMF4L17CA      | LR              | BR             | 18.90                                                       | 20.90  | 1                                      | 17                                                    | 1                                                                             | 14.49                                                   | 27.6                                                                     |
| SMF4L18A        | SMF4L18CA      | LT              | BT             | 20.00                                                       | 22.10  | 1                                      | 18                                                    | 1                                                                             | 13.70                                                   | 29.2                                                                     |
| SMF4L20A        | SMF4L20CA      | LV              | BV             | 22.20                                                       | 24.50  | 1                                      | 20                                                    | 1                                                                             | 12.35                                                   | 32.4                                                                     |
| SMF4L22A        | SMF4L22CA      | LX              | BX             | 24.40                                                       | 26.90  | 1                                      | 22                                                    | 1                                                                             | 11.27                                                   | 35.5                                                                     |
| SMF4L24A        | SMF4L24CA      | LZ              | BZ             | 26.70                                                       | 29.50  | 1                                      | 24                                                    | 1                                                                             | 10.28                                                   | 38.9                                                                     |
| SMF4L26A        | SMF4L26CA      | ME              | CE             | 28.90                                                       | 31.90  | 1                                      | 26                                                    | 1                                                                             | 9.50                                                    | 42.1                                                                     |
| SMF4L28A        | SMF4L28CA      | MG              | CG             | 31.10                                                       | 34.40  | 1                                      | 28                                                    | 1                                                                             | 8.81                                                    | 45.4                                                                     |
| SMF4L30A        | SMF4L30CA      | MK              | CK             | 33.30                                                       | 36.80  | 1                                      | 30                                                    | 1                                                                             | 8.26                                                    | 48.4                                                                     |
| SMF4L33A        | SMF4L33CA      | MM              | CM             | 36.70                                                       | 40.60  | 1                                      | 33                                                    | 1                                                                             | 7.50                                                    | 53.3                                                                     |
| SMF4L36A        | SMF4L36CA      | MP              | CP             | 40.00                                                       | 44.20  | 1                                      | 36                                                    | 1                                                                             | 6.88                                                    | 58.1                                                                     |
| SMF4L40A        | SMF4L40CA      | MR              | CR             | 44.40                                                       | 49.10  | 1                                      | 40                                                    | 1                                                                             | 6.20                                                    | 64.5                                                                     |
| SMF4L43A        | SMF4L43CA      | MT              | CT             | 47.80                                                       | 52.80  | 1                                      | 43                                                    | 1                                                                             | 5.76                                                    | 69.4                                                                     |
| SMF4L45A        | SMF4L45CA      | MV              | CV             | 50.00                                                       | 55.30  | 1                                      | 45                                                    | 1                                                                             | 5.50                                                    | 72.7                                                                     |
| SMF4L48A        | SMF4L48CA      | MX              | CX             | 53.30                                                       | 58.90  | 1                                      | 48                                                    | 1                                                                             | 5.17                                                    | 77.4                                                                     |
| SMF4L51A        | SMF4L51CA      | MZ              | CZ             | 56.70                                                       | 62.70  | 1                                      | 51                                                    | 1                                                                             | 4.85                                                    | 82.4                                                                     |
| SMF4L54A        | SMF4L54CA      | NE              | DE             | 60.00                                                       | 66.30  | 1                                      | 54                                                    | 1                                                                             | 4.59                                                    | 87.1                                                                     |
| SMF4L58A        | SMF4L58CA      | NG              | DG             | 64.40                                                       | 71.20  | 1                                      | 58                                                    | 1                                                                             | 4.27                                                    | 93.6                                                                     |
| SMF4L60A        | SMF4L60CA      | NK              | DK             | 66.70                                                       | 73.70  | 1                                      | 60                                                    | 1                                                                             | 4.13                                                    | 96.8                                                                     |
| SMF4L64A        | SMF4L64CA      | NM              | DM             | 71.10                                                       | 78.60  | 1                                      | 64                                                    | 1                                                                             | 3.88                                                    | 103.0                                                                    |
| SMF4L70A        | SMF4L70CA      | NP              | DP             | 77.80                                                       | 86.00  | 1                                      | 70                                                    | 1                                                                             | 3.54                                                    | 113.0                                                                    |
| SMF4L75A        | SMF4L75CA      | NR              | DR             | 83.30                                                       | 92.10  | 1                                      | 75                                                    | 1                                                                             | 3.31                                                    | 121.0                                                                    |
| SMF4L78A        | SMF4L78CA      | NT              | DT             | 86.70                                                       | 95.80  | 1                                      | 78                                                    | 1                                                                             | 3.17                                                    | 126.0                                                                    |
| SMF4L85A        | SMF4L85CA      | NV              | DV             | 94.40                                                       | 104.00 | 1                                      | 85                                                    | 1                                                                             | 2.92                                                    | 137.0                                                                    |
| SMF4L90A        | SMF4L90CA      | NX              | DX             | 100.00                                                      | 111.00 | 1                                      | 90                                                    | 1                                                                             | 2.74                                                    | 146.0                                                                    |
| SMF4L100A       | SMF4L100CA     | NZ              | DZ             | 111.00                                                      | 123.00 | 1                                      | 100                                                   | 1                                                                             | 2.47                                                    | 162.0                                                                    |
| SMF4L110A       | SMF4L110CA     | OE              | EE             | 122.00                                                      | 135.00 | 1                                      | 110                                                   | 1                                                                             | 2.26                                                    | 177.0                                                                    |
| SMF4L120A       | SMF4L120CA     | OG              | EG             | 133.00                                                      | 147.00 | 1                                      | 120                                                   | 1                                                                             | 2.07                                                    | 193.0                                                                    |
| SMF4L130A       | SMF4L130CA     | OK              | EK             | 144.00                                                      | 159.00 | 1                                      | 130                                                   | 1                                                                             | 1.91                                                    | 209.0                                                                    |
| SMF4L150A       | SMF4L150CA     | OM              | EM             | 167.00                                                      | 185.00 | 1                                      | 150                                                   | 1                                                                             | 1.65                                                    | 243.0                                                                    |
| SMF4L160A       | SMF4L160CA     | OP              | EP             | 178.00                                                      | 197.00 | 1                                      | 160                                                   | 1                                                                             | 1.54                                                    | 259.0                                                                    |
| SMF4L170A       | SMF4L170CA     | OR              | ER             | 189.00                                                      | 209.00 | 1                                      | 170                                                   | 1                                                                             | 1.45                                                    | 275.0                                                                    |
| SMF4L180A       | SMF4L180CA     | OT              | ET             | 201.00                                                      | 222.00 | 1                                      | 180                                                   | 1                                                                             | 1.37                                                    | 291.6                                                                    |
| SMF4L188A       | SMF4L188CA     | OV              | EV             | 209.00                                                      | 231.00 | 1                                      | 188                                                   | 1                                                                             | 1.32                                                    | 304.0                                                                    |
| SMF4L200A       | SMF4L200CA     | OX              | EX             | 224.00                                                      | 247.00 | 1                                      | 200                                                   | 1                                                                             | 1.23                                                    | 324.0                                                                    |
| SMF4L220A       | SMF4L220CA     | OZ              | EZ             | 246.00                                                      | 272.00 | 1                                      | 220                                                   | 1                                                                             | 1.12                                                    | 356.0                                                                    |
| SMF4L250A       | SMF4L250CA     | PE              | FE             | 279.00                                                      | 309.00 | 1                                      | 250                                                   | 1                                                                             | 0.99                                                    | 405.0                                                                    |

#### Note:

1. VBR measured after IT applied for 300 $\mu$ s, IT = square wave pulse or equivalent.
2. Surge current waveform per 10/1000 $\mu$ s exponential wave and derated per Fig.2.
3. All terms and symbols are consistent with ANSI/IEEE C62.35.

## RATING AND CHARACTERISTICS CURVES

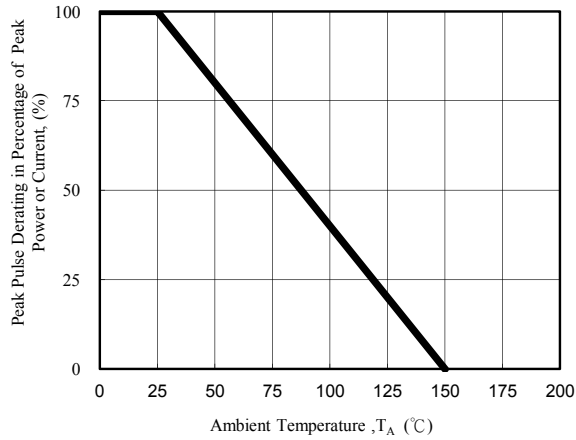


Fig. 1 - Pulse Derating Curve

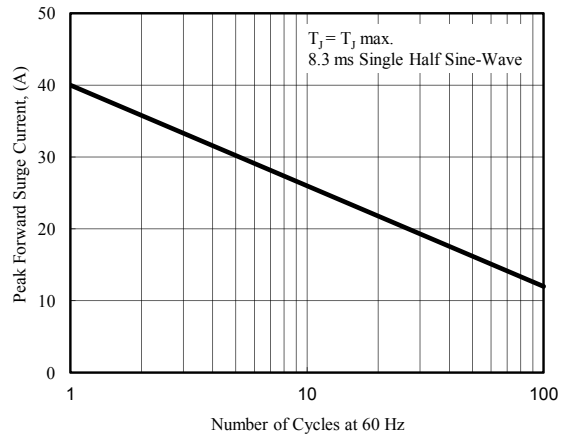


Fig. 2 - Maximum Non-Repetitive Surge Current

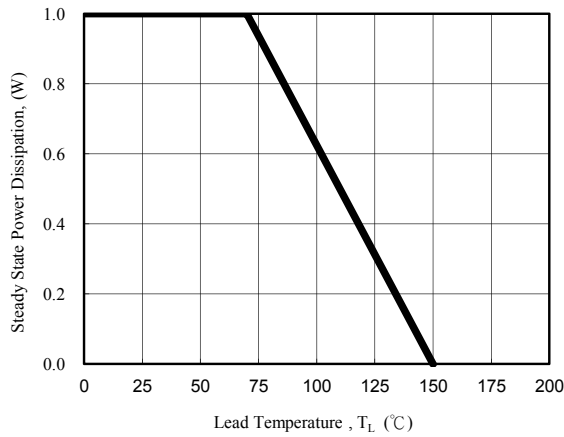


Fig. 3 - Steady State Power Derating Curve

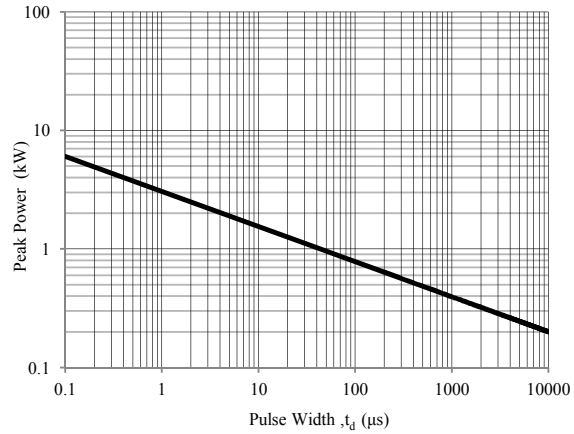


Fig. 4 - Peak Pulse Power Rating Curve

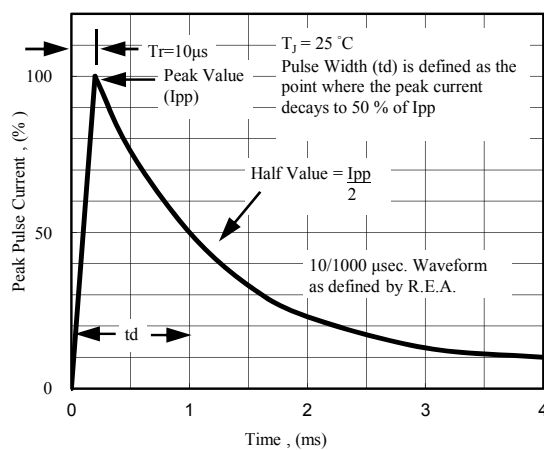


Fig. 5 - Pulse Waveform

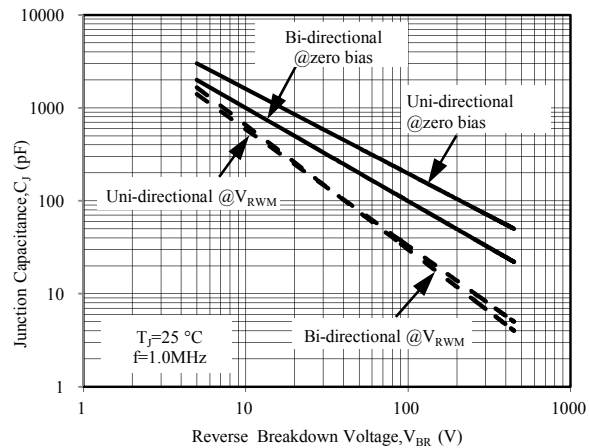


Fig. 6 - Typical Junction Capacitance