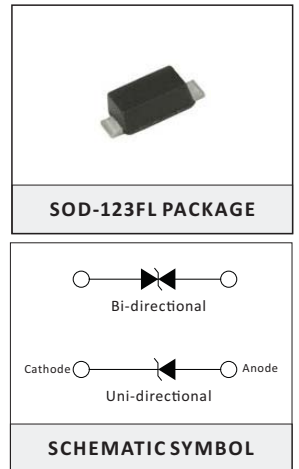


DESCRIPTION

The SMF series is designed specifically to protect sensitive electronic equipment from voltage transients induced by lightning and other transient voltage events.

FEATURES

- > For surface mounted applications in order to optimize board space.
- > Low profile package.
- > Built-in strain relief.
- > Glass passivated junction.
- > Low inductance.
- > Excellent clamping capability.
- > Fast response time: typically less than 1.0ps from 0 Volts to V_{BR} min for unidirectional types.
- > Typical IR less than 1 μ A above 10V
- > Plastic package has Underwriters Laboratory Flammability 94V-0.



MAXIMUM RATINGS AND CHARACTERISTICS Ratings at 25°C ambient temperature unless otherwise specified.

| RATING | SYMBOL | VALUE | UNITS |
|--|---------------|-----------|-------|
| Peak Pulse Power Dissipation on 10/1000us waveform (Note1). | PPPM | 200 | Watts |
| Peak Pulse Current of on 10/1000us waveform(Note1) | IPPM | See Table | Amps |
| Junction to Ambient on printed circuit | R θ JA | 220 | °C/W |
| Peak Forward Surge Current,8.3ms Single Half Sine-Wave Superimposed on Rated Load, (JEDEC Method) .(Note2) | IFSM | 30 | Amps |
| Operating junction Temperatur Range. | TJ | -55~+150 | °C |
| Storage Temperature Range. | TSTG | -55~+150 | °C |

NOTES:

1. Non-repetitive current pulse, T $_A$ = 25°C.
2. 8.3ms single half sine-wave, or equivalent square wave for Unidirectional Only , Duty cycle=4 pulses per minutes maximum.

ELECTRICAL CHARACTERISTICS

| Part Number | | Marking Code | | Reverse Stand-off Voltage | Breakdown Voltage Min.@I $_T$ | Breakdown Voltage Max.@I $_T$ | Test Current | Maximum Clamping Voltage @I $_{PP}$ | Peak Pulse Current | Maximum Reverse Leakage @V $_{RWM}$ |
|-------------|----------|--------------|----|---------------------------|-------------------------------|-------------------------------|--------------|-------------------------------------|--------------------|-------------------------------------|
| UNI | BI | UNI | BI | V $_R$ (V) | V $_B$ (V) | V $_B$ (V) | I $_T$ (mA) | V $_C$ (V) | I $_{PP}$ (A) | I $_R$ (μ A) |
| SMF5.0A | SMF5.0CA | AE | FE | 5 | 6.4 | 7 | 10 | 9.2 | 21.7 | 800 |
| SMF6.0A | SMF6.0CA | AG | FG | 6 | 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 | 7.78 | 8.6 | 10 | 12 | 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 | 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 |



ELECTRICAL CHARACTERISTICS

| Part Number | | Marking Code | | Reverse Stand-off Voltage | Breakdown Voltage Min.@I _T | Breakdown Voltage Max.@I _T | Test Current | Maximum Clamping Voltage @I _{PP} | Peak Pulse Current | Maximum Reverse Leakage @V _{RWM} |
|-------------|----------|--------------|----|---------------------------|---------------------------------------|---------------------------------------|---------------------|---|---------------------|---|
| UNI | BI | UNI | BI | V _R (V) | V _B (V) | V _B (V) | I _T (mA) | V _C (V) | I _{PP} (A) | I _R (μ A) |
| SMF9.0A | SMF9.0CA | AV | FV | 9 | 10 | 11.1 | 1 | 15.4 | 13 | 10 |
| SMF10A | SMF10CA | AX | FX | 10 | 11.1 | 12.3 | 1 | 17 | 11.8 | 5 |
| SMF11A | SMF11CA | AZ | FZ | 11 | 12.2 | 13.5 | 1 | 18.2 | 11 | 1 |
| SMF12A | SMF12CA | BE | GE | 12 | 13.3 | 14.7 | 1 | 19.9 | 10.1 | 1 |
| SMF13A | SMF13CA | BG | GG | 13 | 14.4 | 15.9 | 1 | 21.5 | 9.3 | 1 |
| SMF14A | SMF14CA | BK | GK | 14 | 15.6 | 17.2 | 1 | 23.2 | 8.6 | 1 |
| SMF15A | SMF15CA | BM | GM | 15 | 16.7 | 18.5 | 1 | 24.4 | 8.2 | 1 |
| SMF16A | SMF16CA | BP | GP | 16 | 17.8 | 19.7 | 1 | 26 | 7.7 | 1 |
| SMF17A | SMF17CA | BR | GR | 17 | 18.9 | 20.9 | 1 | 27.6 | 7.2 | 1 |
| SMF18A | SMF18CA | BT | GT | 18 | 20 | 22.1 | 1 | 29.2 | 6.8 | 1 |
| SMF20A | SMF20CA | BV | GV | 20 | 22.2 | 24.5 | 1 | 32.4 | 6.2 | 1 |
| SMF22A | SMF22CA | BX | GX | 22 | 24.4 | 26.9 | 1 | 35.5 | 5.6 | 1 |
| SMF24A | SMF24CA | BZ | GZ | 24 | 26.7 | 29.5 | 1 | 38.9 | 5.1 | 1 |
| SMF26A | SMF26CA | CE | HE | 26 | 28.9 | 31.9 | 1 | 42.1 | 4.8 | 1 |
| SMF28A | SMF28CA | CG | HG | 28 | 31.1 | 34.4 | 1 | 45.4 | 4.4 | 1 |
| SMF30A | SMF30CA | CK | HK | 30 | 33.3 | 36.8 | 1 | 48.4 | 4.1 | 1 |
| SMF33A | SMF33CA | CM | HM | 33 | 36.7 | 40.6 | 1 | 53.3 | 3.8 | 1 |
| SMF36A | SMF36CA | CP | HP | 36 | 40 | 44.2 | 1 | 58.1 | 3.4 | 1 |
| SMF40A | SMF40CA | CR | HR | 40 | 44.4 | 49.1 | 1 | 64.5 | 3.1 | 1 |
| SMF43A | SMF43CA | CT | HT | 43 | 47.8 | 52.8 | 1 | 69.4 | 2.9 | 1 |
| SMF45A | SMF45CA | CV | HV | 45 | 50 | 55.3 | 1 | 72.7 | 2.8 | 1 |
| SMF48A | SMF48CA | CX | HX | 48 | 53.3 | 58.9 | 1 | 77.4 | 2.6 | 1 |
| SMF51A | SMF51CA | CZ | HZ | 51 | 56.7 | 62.7 | 1 | 82.4 | 2.4 | 1 |
| SMF54A | SMF54CA | DE | IE | 54 | 60 | 66.3 | 1 | 87.1 | 2.3 | 1 |
| SMF58A | SMF58CA | DG | IG | 58 | 64.4 | 71.2 | 1 | 93.6 | 2.1 | 1 |
| SMF60A | SMF60CA | DK | IK | 60 | 66.7 | 73.7 | 1 | 96.8 | 1.86 | 1 |
| SMF64A | SMF64CA | DM | IM | 64 | 71.1 | 78.6 | 1 | 103 | 1.75 | 1 |
| SMF70A | SMF70CA | DP | IP | 70 | 77.8 | 86 | 1 | 113 | 1.59 | 1 |
| SMF75A | SMF75CA | DR | IR | 75 | 83.3 | 92.1 | 1 | 121 | 1.49 | 1 |
| SMF78A | SMF78CA | DT | IT | 78 | 86.7 | 95.8 | 1 | 126 | 1.43 | 1 |
| SMF85A | SMF85CA | DV | IV | 85 | 94.4 | 104 | 1 | 137 | 1.31 | 1 |
| SMF90A | SMF90CA | DX | IX | 90 | 100 | 111 | 1 | 146 | 1.23 | 1 |
| SMF100A | SMF100CA | EZ | JZ | 100 | 111 | 123 | 1 | 162 | 1.11 | 1 |
| SMF110A | SMF110CA | EE | JE | 110 | 122 | 135 | 1 | 177 | 1.02 | 1 |
| SMF120A | SMF120CA | EG | JG | 120 | 133 | 147 | 1 | 193 | 0.93 | 1 |
| SMF130A | SMF130CA | EK | JK | 130 | 144 | 159 | 1 | 209 | 0.86 | 1 |
| SMF150A | SMF150CA | EM | JM | 150 | 167 | 185 | 1 | 243 | 0.74 | 1 |
| SMF160A | SMF160CA | EP | JP | 160 | 178 | 197 | 1 | 259 | 0.69 | 1 |
| SMF170A | SMF170CA | ER | JR | 170 | 189 | 209 | 1 | 275 | 0.65 | 1 |

RATINGS AND CHARACTERISTIC CURVES ($T_A=25^{\circ}\text{C}$ unless otherwise noted)

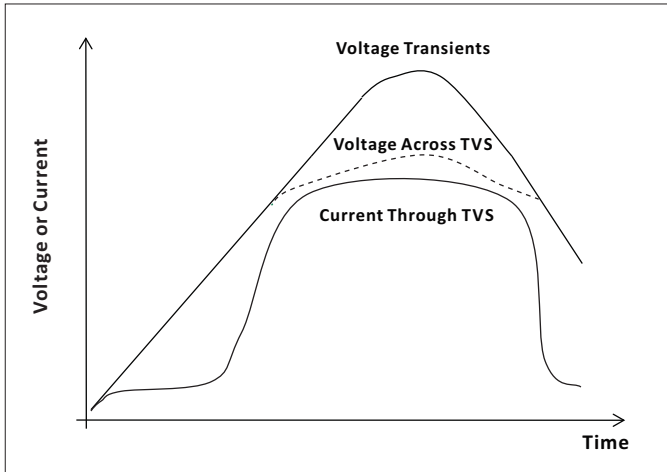


Figure 1 - TVS Transients Clamping Waveform

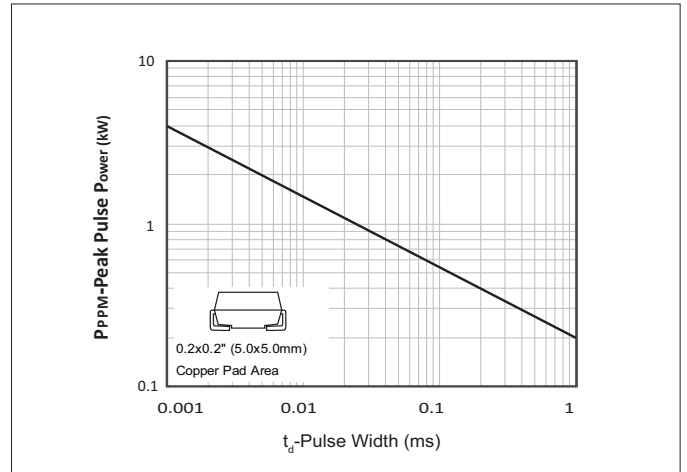


Figure 2 - Peak Pulse Power Rang Curve

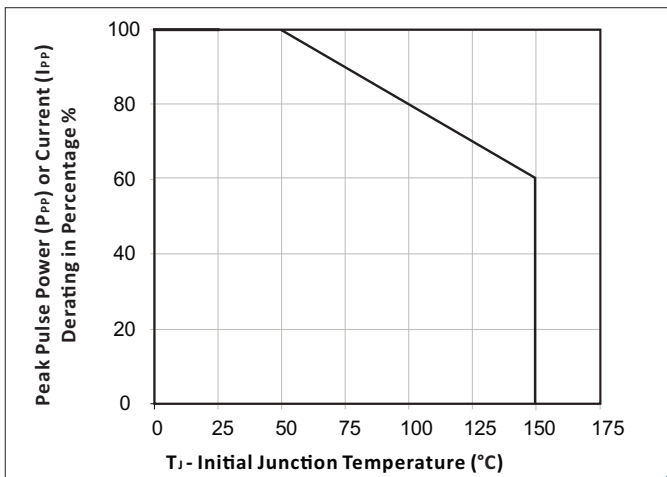


Figure 3 - Peak Pulse Power Derating Curve

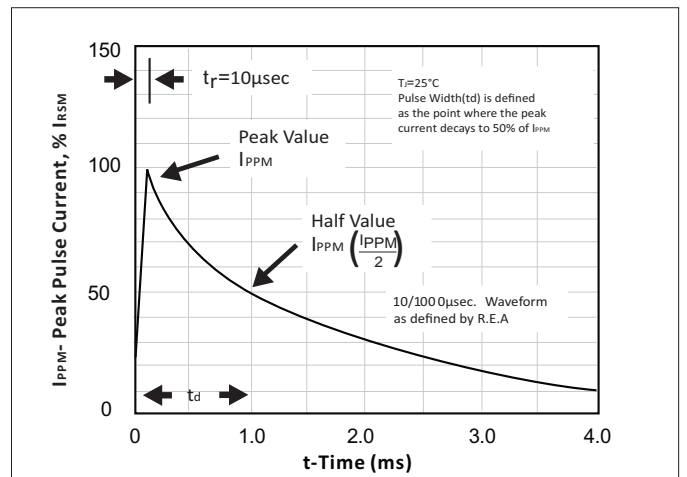


Figure 4 - Pulse Waveform - 10/1000µS

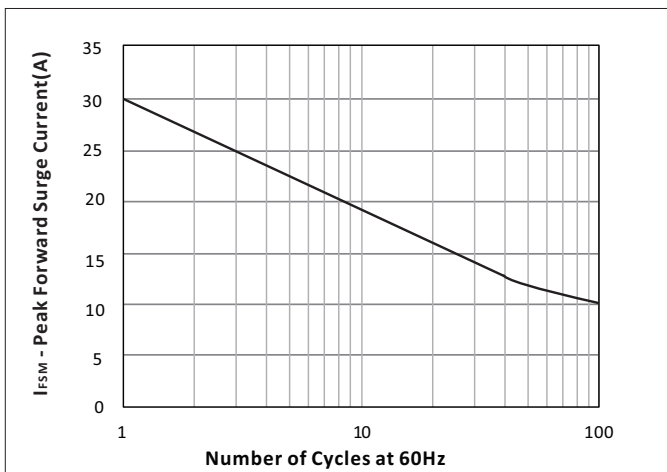
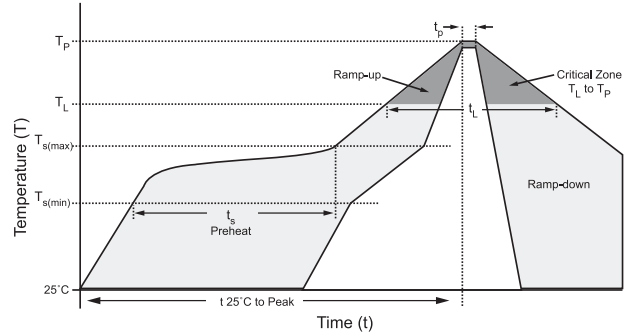


Figure 5 - Maximum Non-Repetitive Peak Forward Surge Current Uni-Directional Only

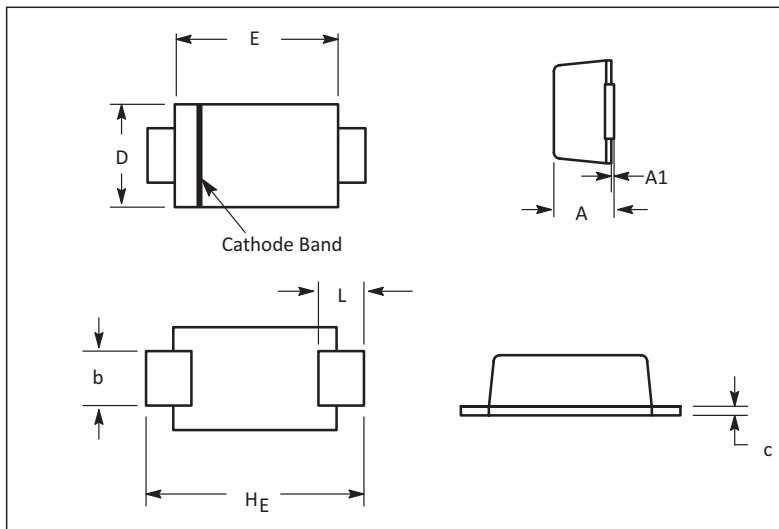


SOLDERING PARAMETERS

| Reflow Condition | | Lead-free assembly |
|---|-----------------------------|--------------------|
| Pre Heat | Temperature Min (Ts(min)) | 150°C |
| | Temperature Max (Ts(max)) | 200°C |
| | Time (min to max) (ts) | 60 – 180 secs |
| Average ramp up rate (Liquidus Temp (TL) to peak) | | 3°C/second max |
| Ts(max)to TL - Ramp-up Rate | | 3°C/second max |
| Reflow | Temperature (TL) (Liquidus) | 217°C |
| | Time (min to max) (tl) | 60 – 150 seconds |
| Peak Temperature (TP) | | 260°C |
| Time within 5°C of actual peak Temperature (tp) | | 20 – 40 seconds |
| Ramp-down Rate | | 6°C/second max |
| Time 25°C to peak Temperature (TP) | | 8 minutes Max. |
| Do not exceed | | 260°C |



SOD-123FL PACKAGE DIMENSION



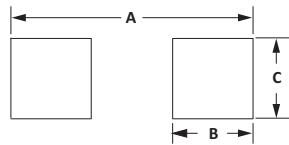
| DIM | MILLIMETERS | | INCHES | |
|-----|-------------|------|--------|-------|
| | Min. | Max. | Min. | Max. |
| A | 1.05 | 1.45 | 0.041 | 0.057 |
| A1 | 0.00 | 0.10 | 0.000 | 0.004 |
| b | 0.80 | 1.10 | 0.031 | 0.043 |
| c | 0.15 | 0.25 | 0.006 | 0.010 |
| D | 1.75 | 1.95 | 0.069 | 0.077 |
| E | 2.70 | 3.10 | 0.106 | 0.122 |
| L | 0.80 | 1.10 | 0.032 | 0.043 |
| HE | 3.50 | 3.90 | 0.138 | 0.154 |

NOTES:

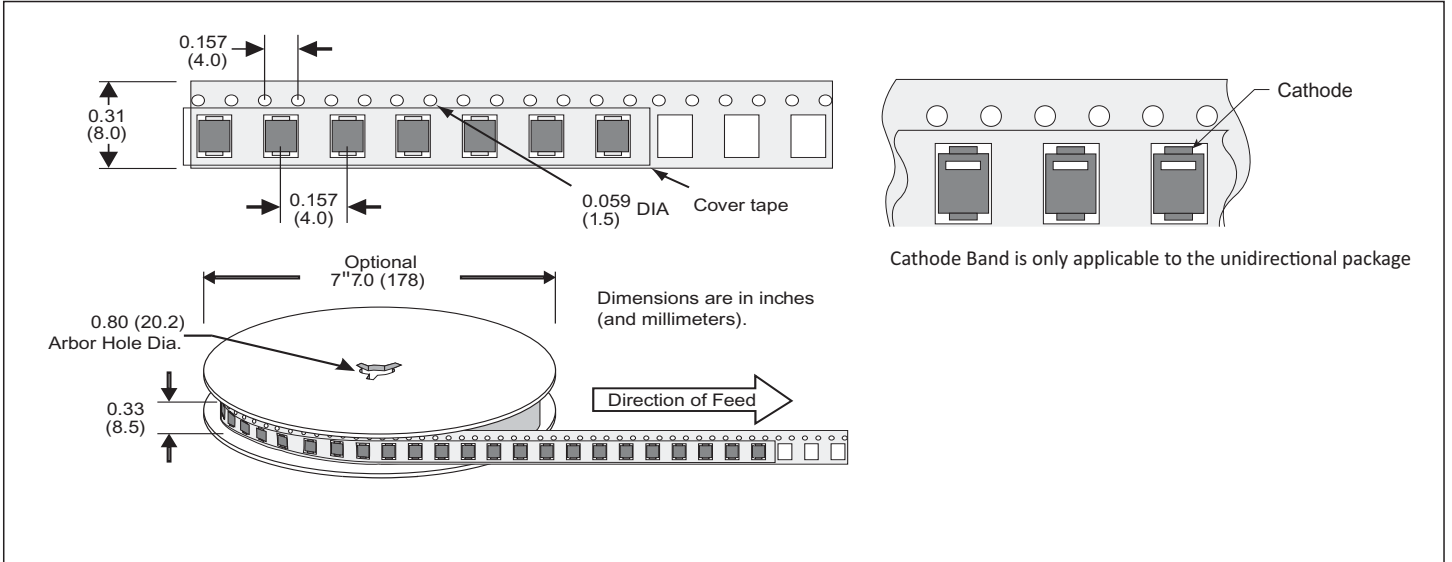
1. Dimensions are exclusive of mold flash and metal burrs
2. Cathode Band is only applicable to the unidirectional package

RECOMMENDED PAD LAYOUT DIMENSIONS

| DIM | MILLIMETERS | INCHES |
|-----|-------------|--------|
| A | 4.19 | 0.165 |
| B | 0.91 | 0.036 |
| C | 1.22 | 0.048 |



TAPE AND REEL SPECIFICATION



ORDERING INFORMATION

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

CONTACT US

Headquarters

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

Hotline

400-021-5756

Web

[Http://www.semiware.com.cn](http://www.semiware.com.cn)

By Telephone

General: 86-21-3463-7172

Sales: 86-21-3463-7345

Technical Support: 86-21-34637172-8811

By Email

General: china@semiware.com.cn

Sales: sales33@semiware.com.cn

Technical Support: fae01@semiware.com.cn

By Fax

General: 86-21-3965-0654

Sales: 86-21-3463-7458

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[SMLJ45CA-TP](#) [CEN955 W/DATA](#) [82350120560](#) [VESD12A1A-HD1-GS08](#) [CPDUR5V0R-HF](#) [CPDQC5V0U-HF](#) [CPDQC5V0USP-HF](#)
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