

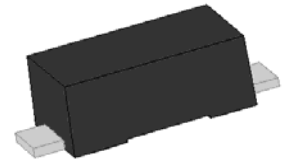


SMF Series 200W Transient Voltage Suppressor

Rev.6.1

DESCRIPTION:

TVS diodes can be used in a wide range of applications which like consumer electronic products, automotive industries, munitions, telecommunications, aerospace industries, and intelligent control systems.



SOD-123FL

FEATURES:

- ✧ Low profile package.
- ✧ Low inductance.
- ✧ Excellent clamping capability.
- ✧ 200W peak pulse power capability at 10/1000μs waveform.
- ✧ Typical I_R less than 1μA above 10V.
- ✧ Fast response time: typically less than 1.0ps from 0V to V_{BR} min.
- ✧ High temperature reflow soldering: 260°C/40s at terminals.
- ✧ Plastic package has underwriters laboratory flammability 94V-0.
- ✧ Meets MSL level 1, per J-STD020, LF maximum peak of 260°C.
- ✧ For surface mounted applications in order to optimize board space.



Bi-directional



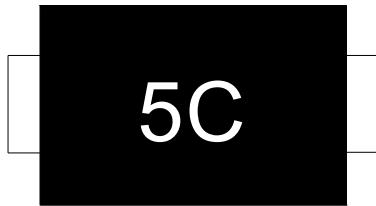
Uni-directional

Symbol

ABSOLUTE MAXIMUM RATINGS ($T_A=25^\circ\text{C}$, RH=45%-75%, unless otherwise noted)

| Parameter | Symbol | Value | Unit |
|---|-----------------|-------------|------|
| Storage and operating junction temperature range | T_{STG}/T_J | -55 to +150 | °C |
| Steady state power dissipation at $T_L=75^\circ\text{C}$ | $P_{M(AV)}$ | 2.8 | W |
| Peak pulse power dissipation on 10/1000μs waveform | P_{PP} | 200 | W |
| Maximum instantaneous forward voltage at 20A for unidirectional | V_F | 3.5 | V |
| Typical thermal resistance junction to lead | $R_{\theta JL}$ | 100 | °C/W |
| Typical thermal resistance junction to ambient | $R_{\theta JA}$ | 220 | °C/W |

MARKING



5C : Device Marking Code

ELECTRICAL CHARACTERISTICS (T_A=25°C)

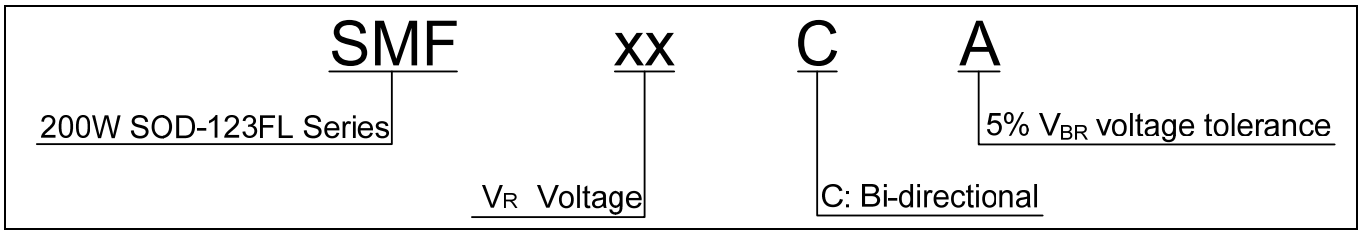
| Part Number | | Marking | | V _R | I _R @ V _R | V _{BR} @I _T | | I _T | V _C @I _{PP} | I _{PP} ^① |
|-------------|----------|---------|-----|----------------|------------------------------------|---------------------------------|--------|----------------|---------------------------------|------------------------------|
| Uni-Polar | Bi-Polar | Uni | Bi | V | μA | min(V) | max(V) | mA | max(V) | A |
| SMF5.0A | SMF5.0CA | KE | 5C | 5.0 | 100 | 6.40 | 7.00 | 10 | 9.2 | 21.7 |
| SMF6.0A | SMF6.0CA | KG | 6C | 6.0 | 100 | 6.67 | 7.37 | 10 | 10.3 | 19.4 |
| SMF6.5A | SMF6.5CA | KK | 6VC | 6.5 | 30 | 7.22 | 7.98 | 10 | 11.2 | 17.9 |
| SMF7.0A | SMF7.0CA | KM | 7C | 7.0 | 10 | 7.78 | 8.60 | 10 | 12.0 | 16.7 |
| SMF7.5A | SMF7.5CA | KP | 7VC | 7.5 | 5 | 8.33 | 9.21 | 1 | 12.9 | 15.5 |
| SMF8.0A | SMF8.0CA | KR | 8C | 8.0 | 2 | 8.89 | 9.83 | 1 | 13.6 | 14.7 |
| SMF8.5A | SMF8.5CA | KT | 8VC | 8.5 | 2 | 9.44 | 10.40 | 1 | 14.4 | 13.8 |
| SMF9.0A | SMF9.0CA | KV | 9C | 9.0 | 2 | 10.00 | 11.10 | 1 | 15.4 | 13.0 |
| SMF10A | SMF10CA | KX | 10C | 10.0 | 1 | 11.10 | 12.30 | 1 | 17.0 | 11.8 |
| SMF11A | SMF11CA | KZ | 11C | 11.0 | 1 | 12.20 | 13.50 | 1 | 18.2 | 11.0 |
| SMF12A | SMF12CA | LE | 12C | 12.0 | 1 | 13.30 | 14.70 | 1 | 19.9 | 10.1 |
| SMF13A | SMF13CA | LG | 13C | 13.0 | 1 | 14.40 | 15.90 | 1 | 21.5 | 9.3 |
| SMF14A | SMF14CA | LK | 14C | 14.0 | 1 | 15.60 | 17.20 | 1 | 23.2 | 8.6 |
| SMF15A | SMF15CA | LM | 15C | 15.0 | 1 | 16.70 | 18.50 | 1 | 24.4 | 8.2 |
| SMF16A | SMF16CA | LP | 16C | 16.0 | 1 | 17.80 | 19.70 | 1 | 26.0 | 7.7 |
| SMF17A | SMF17CA | LR | 17C | 17.0 | 1 | 18.90 | 20.90 | 1 | 27.6 | 7.2 |
| SMF18A | SMF18CA | LT | 18C | 18.0 | 1 | 20.00 | 22.10 | 1 | 29.2 | 6.8 |
| SMF20A | SMF20CA | LV | 20C | 20.0 | 1 | 22.20 | 24.50 | 1 | 32.4 | 6.2 |
| SMF22A | SMF22CA | LX | 22C | 22.0 | 1 | 24.40 | 26.90 | 1 | 35.5 | 5.6 |
| SMF24A | SMF24CA | LZ | 24C | 24.0 | 1 | 26.70 | 29.50 | 1 | 38.9 | 5.1 |
| SMF26A | SMF26CA | ME | 26C | 26.0 | 1 | 28.90 | 31.90 | 1 | 42.1 | 4.8 |
| SMF28A | SMF28CA | MG | 28C | 28.0 | 1 | 31.10 | 34.40 | 1 | 45.4 | 4.4 |
| SMF30A | SMF30CA | MK | 30C | 30.0 | 1 | 33.30 | 36.80 | 1 | 48.4 | 4.1 |

ELECTRICAL CHARACTERISTICS ($T_A=25^{\circ}\text{C}$, continued)

| Part Number | | Marking | | V_R | $I_R@V_R$ | $V_{BR}@I_T$ | | I_T | $V_C@I_{PP}$ | $I_{PP}^{\text{①}}$ |
|-------------|----------|---------|------|-------|---------------|--------------|--------|-------|--------------|---------------------|
| Uni-Polar | Bi-Polar | Uni | Bi | V | μA | min(V) | max(V) | mA | max(V) | A |
| SMF33A | SMF33CA | MM | 33C | 33.0 | 1 | 36.70 | 40.60 | 1 | 53.3 | 3.8 |
| SMF36A | SMF36CA | MP | 36C | 36.0 | 1 | 40.00 | 44.20 | 1 | 58.1 | 3.4 |
| SMF40A | SMF40CA | MR | 40C | 40.0 | 1 | 44.40 | 49.10 | 1 | 64.5 | 3.1 |
| SMF43A | SMF43CA | MT | 43C | 43.0 | 1 | 47.80 | 52.80 | 1 | 69.4 | 2.8 |
| SMF45A | SMF45CA | MV | 45C | 45.0 | 1 | 50.00 | 55.30 | 1 | 72.7 | 2.7 |
| SMF48A | SMF48CA | MX | 48C | 48.0 | 1 | 53.30 | 58.90 | 1 | 77.4 | 2.6 |
| SMF51A | SMF51CA | MZ | 51C | 51.0 | 1 | 56.70 | 62.70 | 1 | 82.4 | 2.4 |
| SMF54A | SMF54CA | NE | 54C | 54.0 | 1 | 60.00 | 66.30 | 1 | 87.1 | 2.3 |
| SMF58A | SMF58CA | NG | 58C | 58.0 | 1 | 64.40 | 71.20 | 1 | 93.6 | 2.1 |
| SMF60A | SMF60CA | NK | 60C | 60.0 | 1 | 66.70 | 73.70 | 1 | 96.8 | 2.0 |
| SMF64A | SMF64CA | NM | 64C | 64.0 | 1 | 71.10 | 78.60 | 1 | 103.0 | 1.9 |
| SMF70A | SMF70CA | NP | 70C | 70.0 | 1 | 77.80 | 86.00 | 1 | 113.0 | 1.8 |
| SMF75A | SMF75CA | NR | 75C | 75.0 | 1 | 83.30 | 92.10 | 1 | 121.0 | 1.7 |
| SMF78A | SMF78CA | NV | 78C | 78.0 | 1 | 86.70 | 95.80 | 1 | 126.0 | 1.6 |
| SMF85A | SMF85CA | NX | 85C | 85.0 | 1 | 94.40 | 104.0 | 1 | 137.0 | 1.5 |
| SMF90A | SMF90CA | NZ | 90C | 90.0 | 1 | 100.0 | 111.0 | 1 | 146.0 | 1.4 |
| SMF100A | SMF100CA | PE | 100C | 100.0 | 1 | 111.0 | 123.0 | 1 | 162.0 | 1.2 |
| SMF110A | SMF110CA | PG | 110C | 110.0 | 1 | 122.0 | 135.0 | 1 | 177.0 | 1.1 |
| SMF120A | SMF120CA | PK | 120C | 120.0 | 1 | 133.0 | 147.0 | 1 | 193.0 | 1.0 |
| SMF130A | SMF130CA | PM | 130C | 130.0 | 1 | 144.0 | 159.0 | 1 | 209.0 | 0.9 |
| SMF150A | SMF150CA | PR | 150C | 150.0 | 1 | 167.0 | 185.0 | 1 | 243.0 | 0.8 |
| SMF160A | SMF160CA | PV | 160C | 160.0 | 1 | 178.0 | 197.0 | 1 | 259.0 | 0.8 |
| SMF170A | SMF170CA | PX | 170C | 170.0 | 1 | 189.0 | 209.0 | 1 | 275.0 | 0.7 |
| SMF180A | SMF180CA | PZ | 180C | 180.0 | 1 | 201.0 | 222.0 | 1 | 292.0 | 0.7 |
| SMF200A | SMF200CA | QE | 200C | 200.0 | 1 | 224.0 | 247.0 | 1 | 324.0 | 0.6 |
| SMF220A | SMF220CA | QR | 220C | 220.0 | 1 | 246.0 | 272.0 | 1 | 356.0 | 0.5 |

① Surge waveform: 10/1000 μs V_R : Stand-off voltage -- maximum voltage that can be applied V_{BR} : Breakdown voltage V_C : Clamping voltage -- peak voltage measured across the suppressor at a specified I_{PP} I_R : Reverse leakage current

ORDERING INFORMATION



RATINGS AND V-I CHARACTERISTICS CURVES (T_A=25°C, unless otherwise noted)

FIG.1: V- I curve characteristics (Uni-directional)

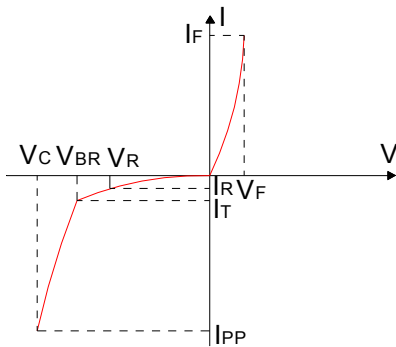


FIG.2: V- I curve characteristics (Bi-directional)

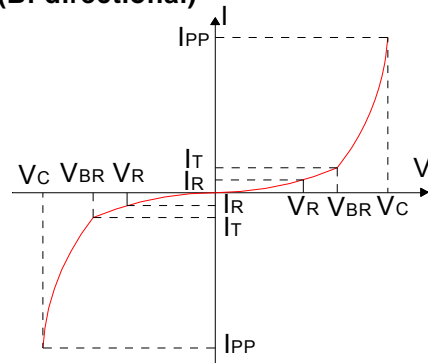


FIG.3: Pulse waveform

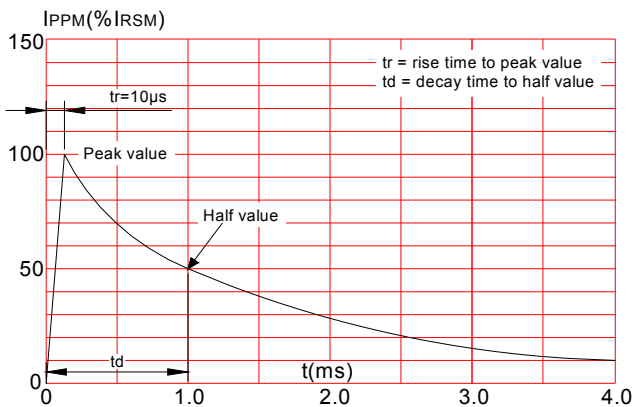
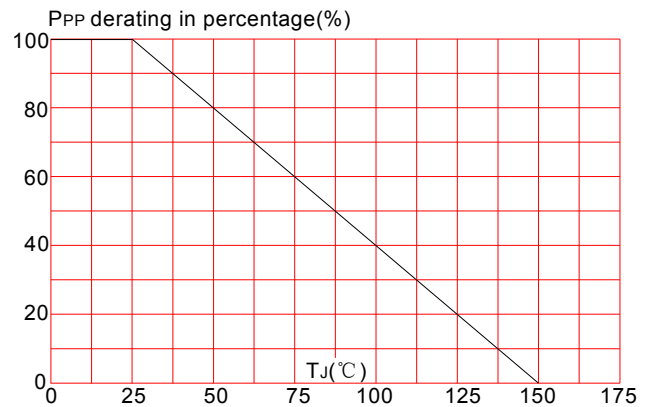
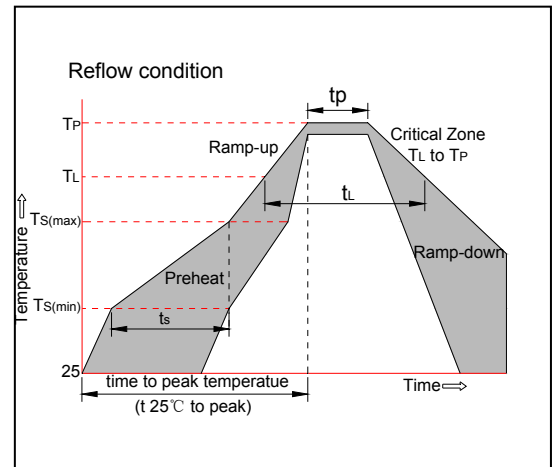


FIG.4: Pulse derating curve

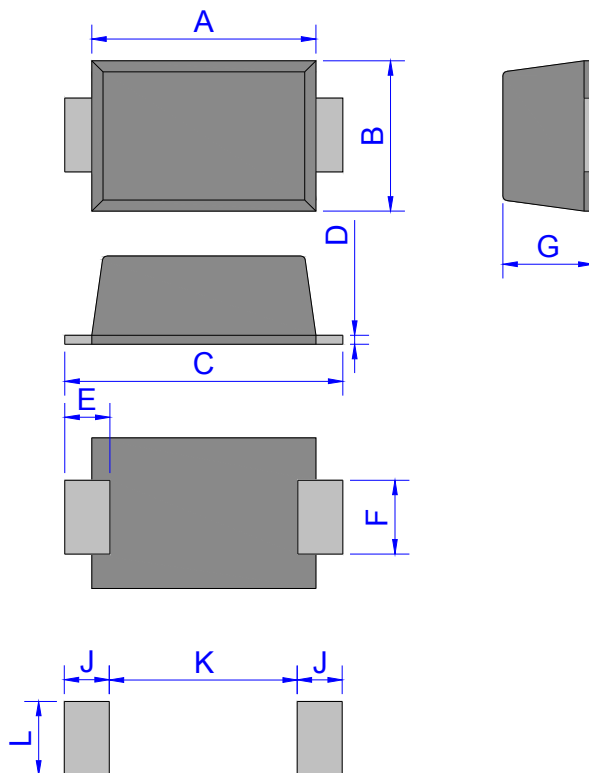


SOLDERING PARAMETERS

| | | |
|--|-----------------------------------|---|
| Reflow Condition | | Pb-Free assembly (see figure at right) |
| Pre Heat | -Temperature Min ($T_{s(min)}$) | +150°C |
| | -Temperature Max($T_{s(max)}$) | +200°C |
| | -Time (Min to Max) (ts) | 60-180 secs. |
| Average ramp up rate (Liquidus Temp (T_L) to peak) | | 3°C/sec. Max |
| $T_{s(max)}$ to T_L - Ramp-up Rate | | 3°C/sec. Max |
| Reflow | -Temperature(T_L)(Liquidus) | +217°C |
| | -Temperature(t_L) | 60-150 secs. |
| Peak Temp (T_p) | | +260(+0/-5)°C |
| Time within 5°C of actual Peak Temp (t_p) | | 20-40secs. |
| Ramp-down Rate | | 6°C/sec. Max |
| Time 25°C to Peak Temp (T_p) | | 8 min. Max |
| Do not exceed | | +260°C |



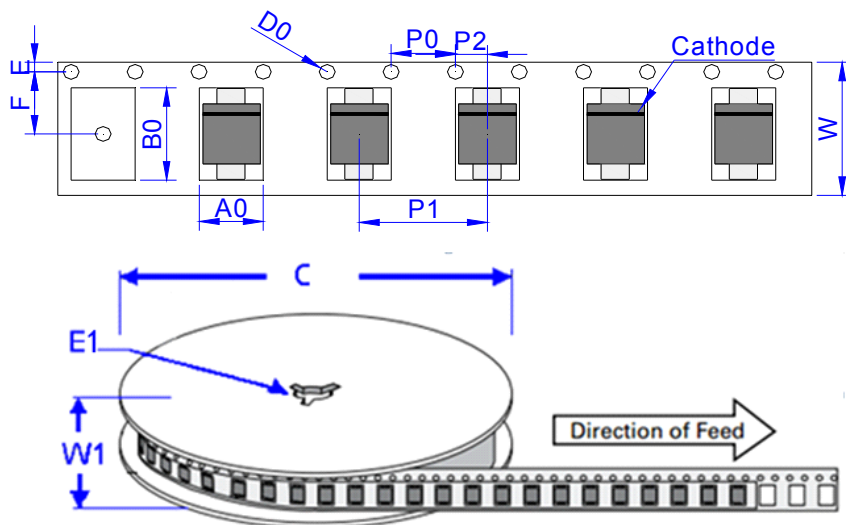
PACKAGE MECHANICAL DATA



SOD-123FL

| Ref. | Dimensions | | | |
|------|-------------|------|--------|-------|
| | Millimeters | | Inches | |
| | Min. | Max. | Min. | Max. |
| A | 2.60 | 3.00 | 0.102 | 0.118 |
| B | 1.60 | 2.00 | 0.063 | 0.079 |
| C | 3.45 | 3.95 | 0.136 | 0.156 |
| D | 0.10 | 0.25 | 0.004 | 0.01 |
| E | 0.3 | 0.9 | 0.012 | 0.035 |
| F | 0.80 | 1.20 | 0.031 | 0.047 |
| G | 0.95 | 1.35 | 0.037 | 0.053 |
| J | 1.30 | | 0.051 | |
| K | | 1.70 | | 0.067 |
| L | 1.30 | | 0.051 | |

TAPE AND REEL SPECIFICATION-SOD-123FL



| Ref. | Dimensions | |
|------|-------------|---------------|
| | Millimeters | Inches |
| A0 | 1.95 ± 0.3 | 0.077± 0.012 |
| B0 | 3.95 ± 0.3 | 0.156 ± 0.012 |
| C | 178 | 7.0 |
| D0 | 1.55 ± 0.1 | 0.061 ± 0.004 |
| E | 1.75 ± 0.2 | 0.069 ± 0.008 |
| E1 | 13.3 ± 0.3 | 0.524± 0.012 |
| F | 3.50 ± 0.2 | 0.138 ± 0.008 |
| P0 | 4.00 ± 0.2 | 0.157 ± 0.008 |
| P1 | 4.00 ± 0.2 | 0.157 ± 0.008 |
| P2 | 2.00 ± 0.2 | 0.079 ± 0.008 |
| W | 8.0± 0.2 | 0.315 ± 0.008 |
| W1 | 11.5 ± 1.0 | 0.453 ± 0.039 |

| PART No. | UNIT WEIGHT (g/PCS) typ. | PACKAGE | REEL (PCS) | DESCRIPTION |
|-----------|--------------------------|-----------|------------|------------------|
| SMFxxA/CA | 0.0136 | SOD-123FL | 3000 | 7 inch reel pack |

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