

## 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.

## FEATURES:

- ✧ Glass passivated or planar junction
- ✧ Excellent clamping capability
- ✧ Repetition rate (duty cycle): 0.01%
- ✧ Typical  $I_R$  less than  $1\mu A$  above 10V.
- ✧ Low profile package and low inductance
- ✧ 200W Peak Pulse power capability at  $10 \times 1000\mu s$  waveform.
- ✧ Fast response time: typically less than 1.0ps from 0V to  $V_{BR}$  min.
- ✧ High temperature soldering:  $260^\circ C/10s$  at terminals.
- ✧ Plastic package has Underwriters Laboratory Flammability 94V-0.
- ✧ For surface mounted applications in order to optimize board space



SOD-123FL



Bi-directional



Uni-direction

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

| Parameter                                                       | Symbol      | Value       | Unit       |
|-----------------------------------------------------------------|-------------|-------------|------------|
| Storage temperature range                                       | $T_{stg}$   | -55 to +125 | $^\circ C$ |
| Operating junction temperature range                            | $T_j$       | -55 to +125 | $^\circ C$ |
| Steady state power dissipation at $T_L=75^\circ C$              | $P_{M(AV)}$ | 2.8         | W          |
| Peak pulse power dissipation on 10/1000 $\mu s$ waveform        | $P_{PP}$    | 200         | W          |
| Maximum Instantaneous Forward Voltage at 20A for Unidirectional | $V_F$       | 5.0         | V          |

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

| Part Number |          | V <sub>R</sub> | I <sub>R</sub> @<br>V <sub>R</sub> | V <sub>BR</sub> @I <sub>T</sub> |        | I <sub>T</sub> | V <sub>C</sub> @I <sub>PP</sub> | I <sub>PP</sub> <sup>①</sup> |
|-------------|----------|----------------|------------------------------------|---------------------------------|--------|----------------|---------------------------------|------------------------------|
| Uni-Polar   | Bi-Polar | V              | μA                                 | min(V)                          | max(V) | mA             | max(V)                          | A                            |
| SMF5.0A     | SMF5.0CA | 5.0            | 150                                | 6.40                            | 7.00   | 10             | 9.2                             | 21.7                         |
| SMF6.0A     | SMF6.0CA | 6.0            | 100                                | 6.67                            | 7.37   | 10             | 10.3                            | 19.4                         |
| SMF6.5A     | SMF6.5CA | 6.5            | 100                                | 7.22                            | 7.98   | 10             | 11.2                            | 17.9                         |
| SMF7.0A     | SMF7.0CA | 7.0            | 50                                 | 7.78                            | 8.60   | 10             | 12.0                            | 16.7                         |
| SMF7.5A     | SMF7.5CA | 7.5            | 50                                 | 8.33                            | 9.21   | 1              | 12.9                            | 15.5                         |
| SMF8.0A     | SMF8.0CA | 8.0            | 20                                 | 8.89                            | 9.83   | 1              | 13.6                            | 14.7                         |
| SMF9.0A     | SMF9.0CA | 9.0            | 5                                  | 10.00                           | 11.10  | 1              | 15.4                            | 13.0                         |
| SMF10A      | SMF10CA  | 10.0           | 2                                  | 11.10                           | 12.30  | 1              | 17.0                            | 11.8                         |
| SMF11A      | SMF11CA  | 11.0           | 1                                  | 12.20                           | 13.50  | 1              | 18.2                            | 11.0                         |
| SMF12A      | SMF12CA  | 12.0           | 1                                  | 13.30                           | 14.70  | 1              | 19.9                            | 10.1                         |
| SMF13A      | SMF13CA  | 13.0           | 1                                  | 14.40                           | 15.90  | 1              | 21.5                            | 9.3                          |
| SMF14A      | SMF14CA  | 14.0           | 1                                  | 15.60                           | 17.20  | 1              | 23.2                            | 8.6                          |
| SMF15A      | SMF15CA  | 15.0           | 1                                  | 16.70                           | 18.50  | 1              | 24.4                            | 8.2                          |
| SMF16A      | SMF16CA  | 16.0           | 1                                  | 17.80                           | 19.70  | 1              | 26.0                            | 7.7                          |
| SMF17A      | SMF17CA  | 17.0           | 1                                  | 18.90                           | 20.90  | 1              | 27.6                            | 7.2                          |
| SMF18A      | SMF18CA  | 18.0           | 1                                  | 20.00                           | 22.10  | 1              | 29.2                            | 6.8                          |
| SMF20A      | SMF20CA  | 20.0           | 1                                  | 22.20                           | 24.50  | 1              | 32.4                            | 6.2                          |
| SMF22A      | SMF22CA  | 22.0           | 1                                  | 24.40                           | 26.90  | 1              | 35.5                            | 5.6                          |
| SMF24A      | SMF24CA  | 24.0           | 1                                  | 26.70                           | 29.50  | 1              | 38.9                            | 5.1                          |
| SMF26A      | SMF26CA  | 26.0           | 1                                  | 28.90                           | 31.90  | 1              | 42.1                            | 4.8                          |
| SMF28A      | SMF28CA  | 28.0           | 1                                  | 31.10                           | 34.40  | 1              | 45.4                            | 4.4                          |
| SMF30A      | SMF30CA  | 30.0           | 1                                  | 33.30                           | 36.80  | 1              | 48.4                            | 4.1                          |
| SMF33A      | SMF33CA  | 33.0           | 1                                  | 36.70                           | 40.60  | 1              | 53.3                            | 3.8                          |
| SMF36A      | SMF36CA  | 36.0           | 1                                  | 40.00                           | 44.20  | 1              | 58.1                            | 3.4                          |
| SMF40A      | SMF40CA  | 40.0           | 1                                  | 44.40                           | 49.10  | 1              | 64.5                            | 3.1                          |
| SMF43A      | SMF43CA  | 43.0           | 1                                  | 47.80                           | 52.80  | 1              | 69.4                            | 2.9                          |
| SMF45A      | SMF45CA  | 45.0           | 1                                  | 50.00                           | 55.30  | 1              | 72.7                            | 2.8                          |
| SMF48A      | SMF48CA  | 48.0           | 1                                  | 53.30                           | 58.90  | 1              | 77.4                            | 2.6                          |
| SMF51A      | SMF51CA  | 51.0           | 1                                  | 56.70                           | 62.70  | 1              | 82.4                            | 2.4                          |

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

| Part Number |          | $V_R$ | $I_R@V_R$     | $V_{BR}@I_T$ |        | $I_T$ | $V_C@I_{PP}$ | $I_{PP}^{①}$ |
|-------------|----------|-------|---------------|--------------|--------|-------|--------------|--------------|
| Uni-Polar   | Bi-Polar | V     | $\mu\text{A}$ | min(V)       | max(V) | mA    | max(V)       | A            |
| SMF54A      | SMF54CA  | 54.0  | 1             | 60.0         | 66.3   | 1     | 87.1         | 2.3          |
| SMF58A      | SMF58CA  | 58.0  | 1             | 64.4         | 71.2   | 1     | 93.6         | 2.1          |
| SMF60A      | SMF60CA  | 60.0  | 1             | 66.70        | 73.70  | 1     | 96.8         | 2.1          |
| SMF64A      | SMF64CA  | 64.0  | 1             | 71.10        | 78.60  | 1     | 103.0        | 1.9          |
| SMF70A      | SMF70CA  | 70.0  | 1             | 77.80        | 86.00  | 1     | 113.0        | 1.8          |
| SMF75A      | SMF75CA  | 75.0  | 1             | 83.30        | 92.10  | 1     | 121.0        | 1.7          |
| SMF78A      | SMF78CA  | 78.0  | 1             | 86.70        | 95.80  | 1     | 126.0        | 1.6          |
| SMF85A      | SMF85CA  | 85.0  | 1             | 94.40        | 104.0  | 1     | 137.0        | 1.5          |
| SMF90A      | SMF90CA  | 90.0  | 1             | 100.0        | 111.0  | 1     | 146.0        | 1.4          |
| SMF100A     | SMF100CA | 100.0 | 1             | 111.0        | 123.0  | 1     | 162.0        | 1.2          |
| SMF110A     | SMF110CA | 110.0 | 1             | 122.0        | 135.0  | 1     | 177.0        | 1.1          |
| SMF120A     | SMF120CA | 120.0 | 1             | 133.0        | 147.0  | 1     | 193.0        | 1.0          |
| SMF130A     | SMF130CA | 130.0 | 1             | 144.0        | 159.0  | 1     | 209.0        | 0.9          |
| SMF150A     | SMF150CA | 150.0 | 1             | 167.0        | 185.0  | 1     | 243.0        | 0.8          |
| SMF160A     | SMF160CA | 160.0 | 1             | 178.0        | 197.0  | 1     | 259.0        | 0.8          |
| SMF170A     | SMF170CA | 170.0 | 1             | 189.0        | 209.0  | 1     | 275.0        | 0.7          |
| SMF180A     | SMF180CA | 180.0 | 1             | 201.0        | 222.0  | 1     | 292.0        | 0.7          |
| SMF188A     | SMF188CA | 188.0 | 1             | 209.0        | 231.0  | 1     | 304.0        | 0.7          |
| SMF200A     | SMF200CA | 200.0 | 1             | 224.0        | 247.0  | 1     | 324.0        | 0.6          |
| SMF220A     | SMF220CA | 220.0 | 1             | 246.0        | 272.0  | 1     | 356.0        | 0.6          |
| SMF250A     | SMF250CA | 250.0 | 1             | 279.0        | 309.0  | 1     | 405.0        | 0.5          |

① Surge waveform: 10/1000 $\mu\text{s}$

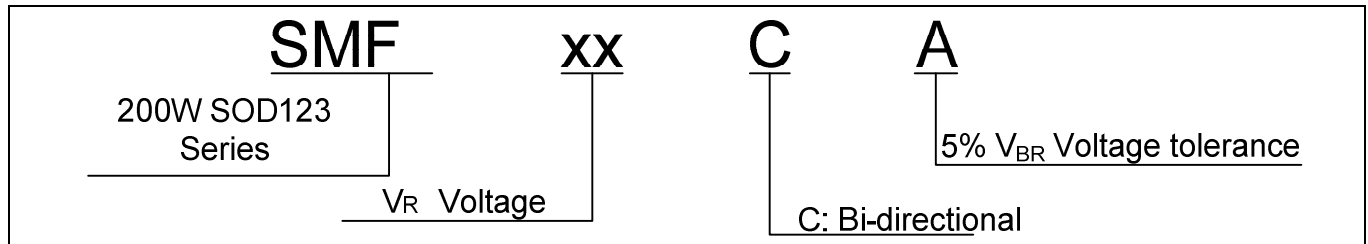
$V_R$ : Stand-off voltage -- maximum voltage that can be applied

$V_{BR}$ : Breakdown voltage

$V_C$ : Clamping voltage -- peak voltage measured across the suppressor at a specified  $I_{PP}$

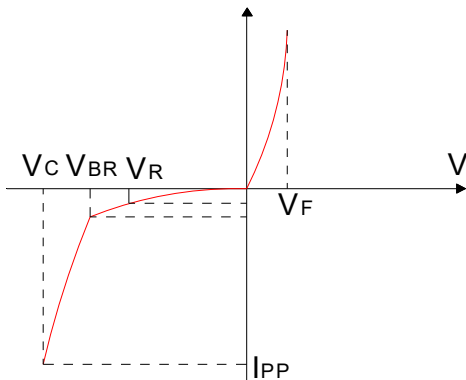
$I_R$ : Reverse leakage current

## ORDERING INFORMATION

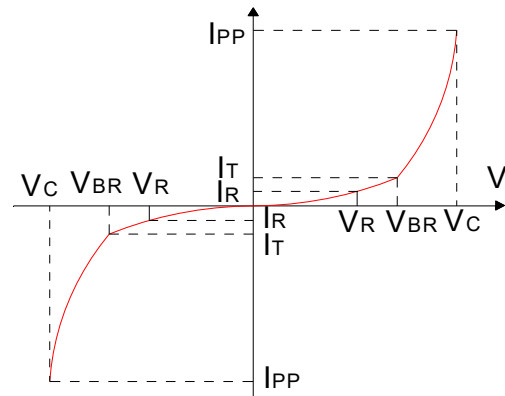


## RATINGS AND V-I CHARACTERISTICS CURVES ( $T_A=25^\circ\text{C}$ , unless otherwise noted)

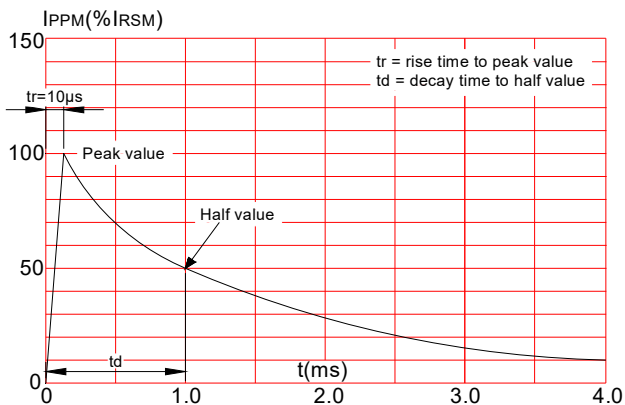
**FIG.1: V- I curve characteristics (Uni-directional)**



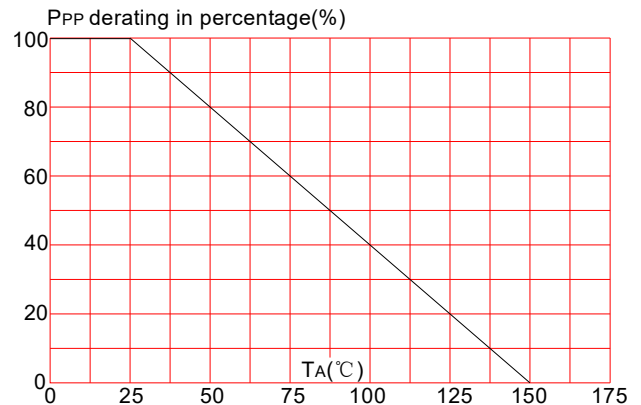
**FIG.2: V- I curve characteristics (Bi-directional)**



**FIG.3: Pulse waveform**

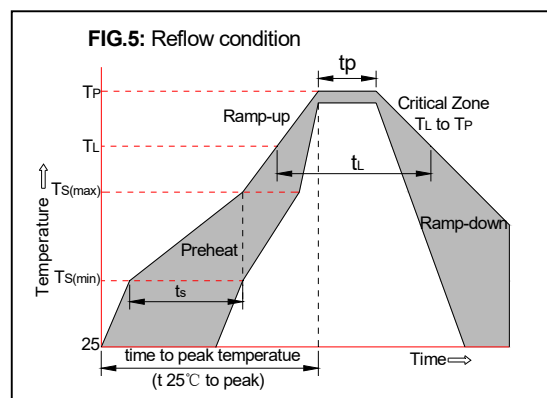


**FIG.4: Pulse derating curve**

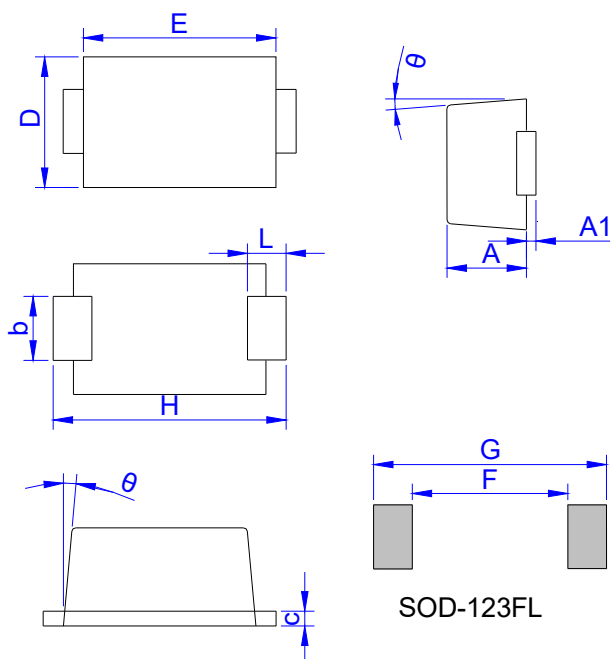


## SOLDERING PARAMETERS

| Reflow Condition                                        |                                   | Pb-Free assembly<br>(see FIG.5) |
|---------------------------------------------------------|-----------------------------------|---------------------------------|
| Pre Heat                                                | -Temperature Min ( $T_{s(min)}$ ) | +150°C                          |
|                                                         | -Temperature Max( $T_{s(max)}$ )  | +200°C                          |
|                                                         | -Time (Min to Max) ( $t_s$ )      | 60-180 secs.                    |
| Average ramp up rate (Liquid us Temp ( $T_L$ ) to peak) |                                   | 3°C/sec. Max                    |
| $T_{s(max)}$ to $T_L$ - Ramp-up Rate                    |                                   | 3°C/sec. Max                    |
| Reflow                                                  | -Temperature( $T_L$ )(Liquid us)  | +217°C                          |
|                                                         | -Temperature( $t_L$ )             | 60-150 secs.                    |
| Peak Temp ( $T_P$ )                                     |                                   | +260(+0/-5)°C                   |
| Time within 5°C of actual Peak Temp ( $t_p$ )           |                                   | 30 secs. Max                    |
| 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



| Ref. | Dimensions  |      |        |       |
|------|-------------|------|--------|-------|
|      | Millimeters |      | Inches |       |
|      | Min.        | Max. | Min.   | Max.  |
| A    | 0.90        | 1.40 | 0.035  | 0.055 |
| A1   | 0           | 0.10 | 0      | 0.004 |
| b    | 0.70        | 1.10 | 0.028  | 0.043 |
| c    | 0.10        | 0.25 | 0.004  | 0.010 |
| D    | 1.50        | 1.95 | 0.059  | 0.077 |
| E    | 2.50        | 2.90 | 0.098  | 0.114 |
| F    | 2.36        | -    | 0.093  | -     |
| G    | 4.19        | -    | 0.165  | -     |
| H    | 3.40        | 3.90 | 0.134  | 0.154 |
| L    | 0.35        | 0.95 | 0.014  | 0.037 |
| θ    | 0           | 8°   | 0      | 8°    |

| PART No.  | PACKAGE   | QUANTITY | TAPE & REEL |
|-----------|-----------|----------|-------------|
| SMFxxCA/A | SOD-123FL | 3,000    | 13 inch     |

Shanghai Leiditech Electronic Co.,Ltd  
Email: sale1@leiditech.com  
Tel : +86- 021 50828806  
Fax : +86- 021 50477059