

### 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.



SMB

### 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
- ✧ 600W 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
- ✧ AEC-Q101 qualified.



Bi-directional



Uni-direction

Symbol

### 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 $T_L=75^\circ C$              | $P_{M(AV)}$ | 5.0         | W          |
| Peak pulse power dissipation on 10/1000 $\mu s$ waveform        | $P_{PP}$    | 600         | W          |
| Maximum Instantaneous Forward Voltage at 50A 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> @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                            |
| SMBJ5.0A    | SMBJ5.0CA | 5.0            | 100                            | 6.40                            | 7.00   | 10             | 9.2                             | 65.2                         |
| SMBJ6.0A    | SMBJ6.0CA | 6.0            | 100                            | 6.67                            | 7.37   | 10             | 10.3                            | 58.3                         |
| SMBJ6.5A    | SMBJ6.5CA | 6.5            | 50                             | 7.22                            | 7.98   | 10             | 11.2                            | 53.6                         |
| SMBJ7.0A    | SMBJ7.0CA | 7.0            | 50                             | 7.78                            | 8.60   | 10             | 12.0                            | 50.0                         |
| SMBJ7.5A    | SMBJ7.5CA | 7.5            | 50                             | 8.33                            | 9.21   | 1              | 12.9                            | 46.5                         |
| SMBJ8.0A    | SMBJ8.0CA | 8.0            | 20                             | 8.89                            | 9.83   | 1              | 13.6                            | 44.1                         |
| SMBJ8.5A    | SMBJ8.5CA | 8.5            | 10                             | 9.44                            | 10.40  | 1              | 14.4                            | 41.7                         |
| SMBJ9.0A    | SMBJ9.0CA | 9.0            | 5                              | 10.00                           | 11.10  | 1              | 15.4                            | 39.0                         |
| SMBJ10A     | SMBJ10CA  | 10             | 2                              | 11.10                           | 12.30  | 1              | 17.0                            | 35.3                         |
| SMBJ11A     | SMBJ11CA  | 11             | 1                              | 12.20                           | 13.50  | 1              | 18.2                            | 33.0                         |
| SMBJ12A     | SMBJ12CA  | 12             | 1                              | 13.30                           | 14.70  | 1              | 19.9                            | 30.2                         |
| SMBJ13A     | SMBJ13CA  | 13             | 1                              | 14.40                           | 15.90  | 1              | 21.5                            | 27.9                         |
| SMBJ14A     | SMBJ14CA  | 14             | 1                              | 15.60                           | 17.20  | 1              | 23.2                            | 25.9                         |
| SMBJ15A     | SMBJ15CA  | 15             | 1                              | 16.70                           | 18.50  | 1              | 24.4                            | 24.6                         |
| SMBJ16A     | SMBJ16CA  | 16             | 1                              | 17.80                           | 19.70  | 1              | 26.0                            | 23.1                         |
| SMBJ17A     | SMBJ17CA  | 17             | 1                              | 18.90                           | 20.90  | 1              | 27.6                            | 21.8                         |
| SMBJ18A     | SMBJ18CA  | 18             | 1                              | 20.00                           | 22.10  | 1              | 29.2                            | 20.6                         |
| SMBJ20A     | SMBJ20CA  | 20             | 1                              | 22.20                           | 24.50  | 1              | 32.4                            | 18.6                         |
| SMBJ22A     | SMBJ22CA  | 22             | 1                              | 24.40                           | 26.90  | 1              | 35.5                            | 16.9                         |
| SMBJ24A     | SMBJ24CA  | 24             | 1                              | 26.70                           | 29.50  | 1              | 38.9                            | 15.4                         |
| SMBJ26A     | SMBJ26CA  | 26             | 1                              | 28.90                           | 31.90  | 1              | 42.1                            | 14.3                         |
| SMBJ28A     | SMBJ28CA  | 28             | 1                              | 31.10                           | 34.40  | 1              | 45.4                            | 13.2                         |
| SMBJ30A     | SMBJ30CA  | 30             | 1                              | 33.30                           | 36.80  | 1              | 48.4                            | 12.4                         |
| SMBJ33A     | SMBJ33CA  | 33             | 1                              | 36.70                           | 40.60  | 1              | 53.3                            | 11.3                         |
| SMBJ36A     | SMBJ36CA  | 36             | 1                              | 40.00                           | 44.20  | 1              | 58.1                            | 10.4                         |
| SMBJ40A     | SMBJ40CA  | 40             | 1                              | 44.40                           | 49.10  | 1              | 64.5                            | 9.3                          |
| SMBJ43A     | SMBJ43CA  | 43             | 1                              | 47.80                           | 52.80  | 1              | 69.4                            | 8.7                          |
| SMBJ45A     | SMBJ45CA  | 45             | 1                              | 50.00                           | 55.30  | 1              | 72.7                            | 8.3                          |
| SMBJ48A     | SMBJ48CA  | 48             | 1                              | 53.30                           | 58.90  | 1              | 77.4                            | 7.8                          |
| SMBJ51A     | SMBJ51CA  | 51             | 1                              | 56.70                           | 62.70  | 1              | 82.4                            | 7.3                          |

### 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            |
| SMBJ54A     | SMBJ54CA  | 54    | 1             | 60.00        | 66.30  | 1     | 87.1         | 6.9          |
| SMBJ58A     | SMBJ58CA  | 58    | 1             | 64.40        | 71.20  | 1     | 93.6         | 6.4          |
| SMBJ60A     | SMBJ60CA  | 60    | 1             | 66.70        | 73.70  | 1     | 96.8         | 6.2          |
| SMBJ64A     | SMBJ64CA  | 64    | 1             | 71.10        | 78.60  | 1     | 103.0        | 5.8          |
| SMBJ70A     | SMBJ70CA  | 70    | 1             | 77.80        | 86.00  | 1     | 113.0        | 5.3          |
| SMBJ75A     | SMBJ75CA  | 75    | 1             | 83.30        | 92.10  | 1     | 121.0        | 5.0          |
| SMBJ78A     | SMBJ78CA  | 78    | 1             | 86.70        | 95.80  | 1     | 126.0        | 4.8          |
| SMBJ85A     | SMBJ85CA  | 85    | 1             | 94.40        | 104.0  | 1     | 137.0        | 4.4          |
| SMBJ90A     | SMBJ90CA  | 90    | 1             | 100.0        | 111.0  | 1     | 146.0        | 4.1          |
| SMBJ100A    | SMBJ100CA | 100   | 1             | 111.0        | 123.0  | 1     | 162.0        | 3.7          |
| SMBJ110A    | SMBJ110CA | 110   | 1             | 122.0        | 135.0  | 1     | 177.0        | 3.4          |
| SMBJ120A    | SMBJ120CA | 120   | 1             | 133.0        | 147.0  | 1     | 193.0        | 3.1          |
| SMBJ130A    | SMBJ130CA | 130   | 1             | 144.0        | 159.0  | 1     | 209.0        | 2.9          |
| SMBJ150A    | SMBJ150CA | 150   | 1             | 167.0        | 185.0  | 1     | 243.0        | 2.5          |
| SMBJ160A    | SMBJ160CA | 160   | 1             | 178.0        | 197.0  | 1     | 259.0        | 2.3          |
| SMBJ170A    | SMBJ170CA | 170   | 1             | 189.0        | 209.0  | 1     | 275.0        | 2.2          |
| SMBJ180A    | SMBJ180CA | 180   | 1             | 201.0        | 222.0  | 1     | 292.0        | 2.1          |
| SMBJ190A    | SMBJ190CA | 190   | 1             | 211.0        | 234.0  | 1     | 307.0        | 2.0          |
| SMBJ200A    | SMBJ200CA | 200   | 1             | 224.0        | 247.0  | 1     | 324.0        | 1.9          |
| SMBJ210A    | SMBJ210CA | 210   | 1             | 233.0        | 258.0  | 1     | 337.0        | 1.8          |
| SMBJ220A    | SMBJ220CA | 220   | 1             | 246.0        | 272.0  | 1     | 356.0        | 1.7          |
| SMBJ250A    | SMBJ250CA | 250   | 1             | 279.0        | 309.0  | 1     | 405.0        | 1.5          |
| SMBJ300A    | SMBJ300CA | 300   | 1             | 335.0        | 371.0  | 1     | 486.0        | 1.3          |
| SMBJ350A    | SMBJ350CA | 350   | 1             | 391.0        | 432.0  | 1     | 567.0        | 1.1          |
| SMBJ400A    | SMBJ400CA | 400   | 1             | 447.0        | 494.0  | 1     | 648.0        | 0.9          |
| SMBJ440A    | SMBJ440CA | 440   | 1             | 492.0        | 543.0  | 1     | 713.0        | 0.8          |

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

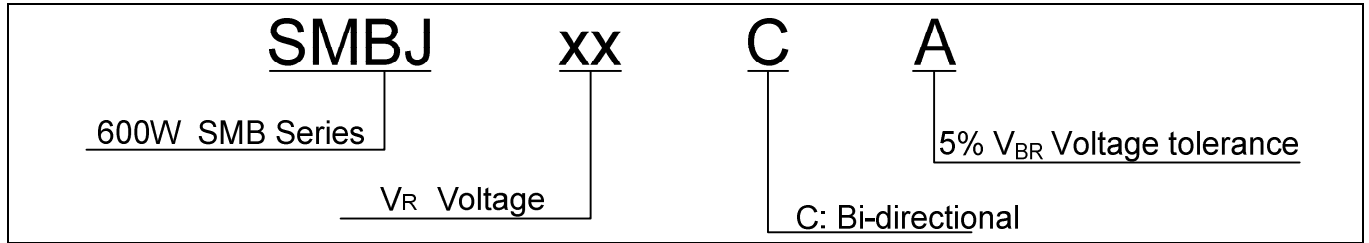
$V_R$  : Stand-off Voltage -- Maximum voltage that can be applied

$V_{BR}$ : Breakdown Voltage

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

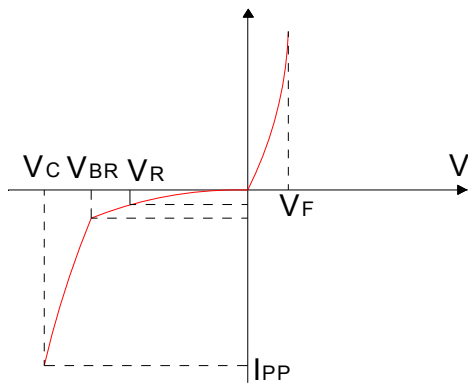
$I_R$ : Reverse Leakage Current

**ORDERING INFORMATION**

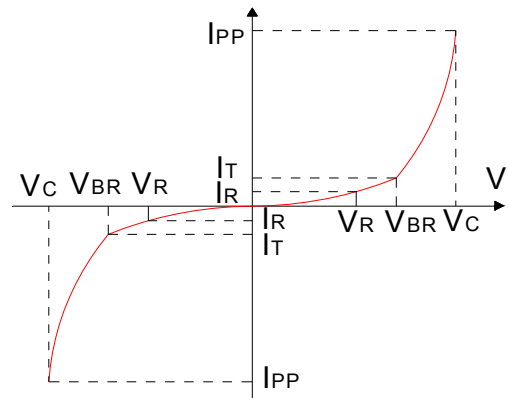


**RATINGS AND V-I CHARACTERISTICS CURVES** ( $T_A=25^\circ\text{C}$ , unless otherwise noted)

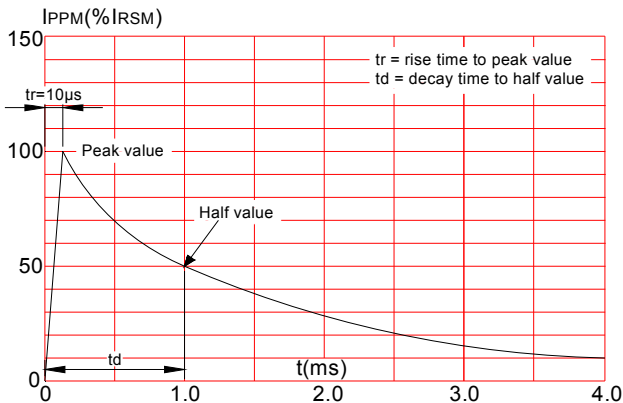
**FIG.1: V- I curve characteristics (Uni-directional)**



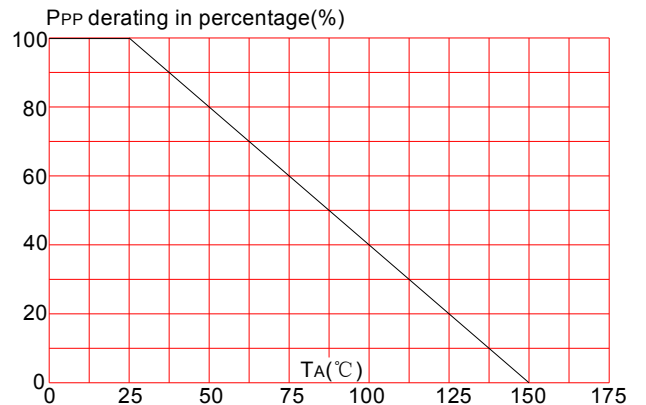
**FIG.2: V- I curve characteristics (Bi-directional)**



**FIG.3: Pulse waveform**

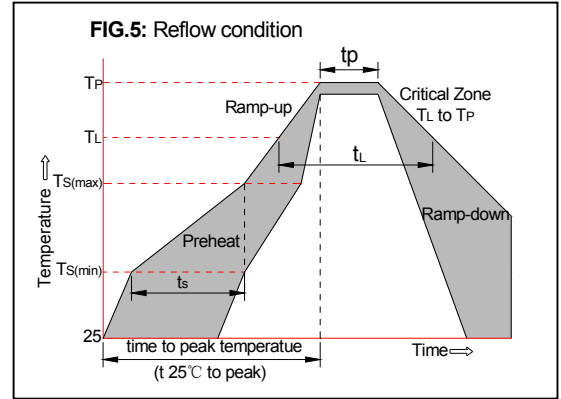


**FIG.4: Pulse derating curve**

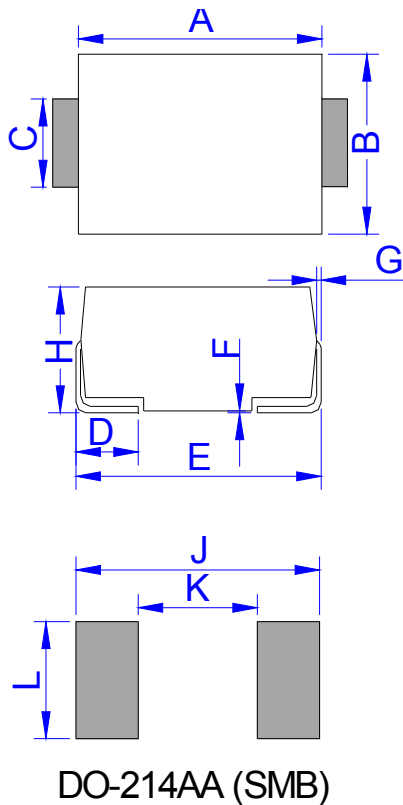


**SOLDERING PARAMETERS**

|   |                                   |                              |
|---|-----------------------------------|------------------------------|
| Reflow Condition  |                                   | Pb-Free assembly (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                       |

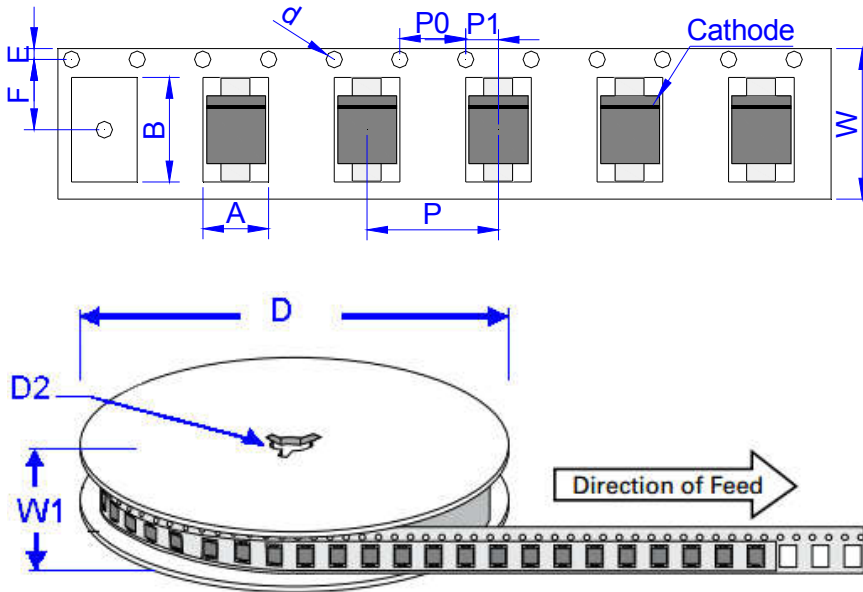


**PACKAGE MECHANICAL DATA**



| Ref. | Dimensions  |       |        |       |
|------|-------------|-------|--------|-------|
|      | Millimeters |       | Inches |       |
|      | Min.        | Max.  | Min.   | Max.  |
| A    | 4.25        | 4.75  | 0.167  | 0.187 |
| B    | 3.30        | 3.94  | 0.130  | 0.155 |
| C    | 1.85        | 2.21  | 0.073  | 0.087 |
| D    | 0.76        | 1.52  | 0.030  | 0.060 |
| E    | 5.08        | 5.59  | 0.200  | 0.220 |
| F    | 0.051       | 0.203 | 0.002  | 0.008 |
| G    | 0.15        | 0.31  | 0.006  | 0.012 |
| H    | 2.11        | 2.44  | 0.083  | 0.096 |
| J    | 6.80        |       | 0.270  |       |
| K    |             | 2.60  |        | 0.100 |
| L    | 2.40        |       | 0.090  |       |

## TAPE AND REEL SPECIFICATION-SMB



| Ref. | Dimensions  |               |
|------|-------------|---------------|
|      | Millimeters | Inches        |
| A    | 3.76 ± 0.2  | 0.144 ± 0.012 |
| B    | 5.69 ± 0.2  | 0.244 ± 0.012 |
| d    | 1.5 ± 0.25  | 0.059 ± 0.004 |
| D    | 330.0       | 13.0          |
| D2   | 13 ± 1      | 0.512 ± 0.039 |
| E    | 1.75 ± 0.2  | 0.059 ± 0.008 |
| F    | 5.5 ± 0.1   | 0.222 ± 0.008 |
| P    | 8.0 ± 0.2   | 0.315 ± 0.008 |
| P0   | 4.0 ± 0.2   | 0.157 ± 0.008 |
| P1   | 2.0 ± 0.2   | 0.079 ± 0.008 |
| W    | 12.0 ± 0.3  | 0.472 ± 0.008 |
| W1   | 16.8 ± 2.0  | 0.661 ± 0.079 |

| OUTLINE | REEL (PCS) | PER CARTON (PCS) | REEL DIAMETERS (mm) |
|---------|------------|------------------|---------------------|
| TAPING  | 3,000      | 48,000           | 330                 |

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