

# SMBJ 5.0C - 170CA

# BIDIRECTIONAL TRANSIENT VOLTAGE SUPPRESSOR

**V<sub>BR</sub> : 6.8 - 200 Volts**

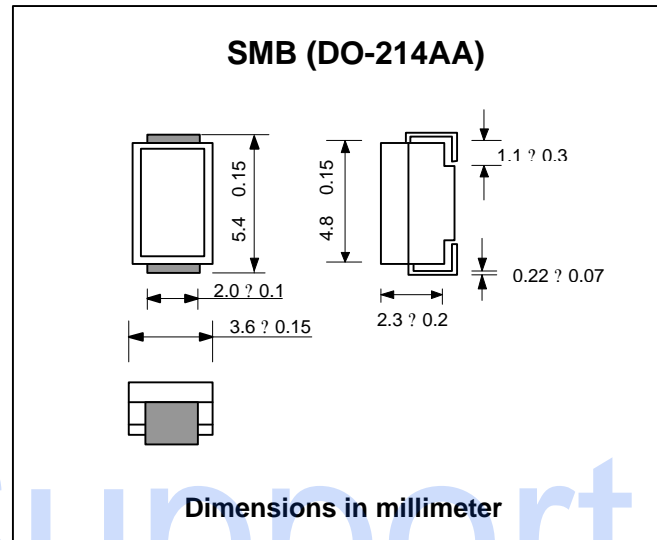
**P<sub>PK</sub> : 600 Watts**

## FEATURES :

- \* 600W surge capability at 1ms
- \* Excellent clamping capability
- \* Low inductance
- \* Response Time Typically < 1ns
- \* Typical I<sub>R</sub> less then 1μA above 10V

## MECHANICAL DATA

- \* Case : SMB Molded plastic
- \* Epoxy : UL94V-O rate flame retardant
- \* Lead : Lead Formed for Surface Mount
- \* Mounting position : Any
- \* Weight : 0.109 gram



## MAXIMUM RATINGS

Rating at T<sub>a</sub> = 25 °C ambient temperature unless otherwise specified.

| Rating  | Symbol                            | Value         | Units |
|---|-----------------------------------|---------------|-------|
| Peak Pulse Power Dissipation on 10/1000μs (1) waveform (Notes 1, 2, Fig. 4) | P <sub>PPM</sub>                  | Minimum 600   | Watts |
| Peak Pulse Current on 10/1000μs waveform (Note 1, Fig. 3)                   | I <sub>PPM</sub>                  | See Table     | Amps  |
| Operating Junction and Storage Temperature Range                            | T <sub>J</sub> , T <sub>STG</sub> | - 55 to + 150 | °C    |

## Note :

- (1) Non-repetitive Current pulse, per Fig. 3 and derated above T<sub>a</sub> = 25 °C per Fig. 1
- (2) Mounted on 5.0mm<sup>2</sup> (0.013mm) land areas.

UPDATE : MAY 10, 2000

## ELECTRICAL CHARACTERISTICS

Rating at Ta = 25 °C ambient temperature unless otherwise specified

| TYPE      | Marking Code | Breakdown Voltage @ I <sub>T</sub><br>( Note 1 ) |       |                | Reverse Stand-off Voltage | Maximum Reverse Leakage @ V <sub>WM</sub> | Maximum Peak Pulse Surge Current (See Fig. 3) | Maximum Clamping Voltage @ I <sub>PPM</sub> |
|-----------|--------------|--|-------|----------------|---------------------------|---|---|---|
|           |              | V <sub>BR</sub> (V)                              |       | I <sub>T</sub> |                           |   |   |   |
|           |              | Min.   | Max.  | (mA)           | V <sub>WM</sub><br>(V)    | I <sub>D</sub><br>(μA)                    | I <sub>PPM</sub><br>(A)                       | V <sub>C</sub><br>(V)                       |
| SMBJ5.0C  | 606I         | 6.40   | 7.55  | 10             | 5.0                       | 1600                                      | 62.5  | 9.6   |
| SMBJ5.0CA | 656I         | 6.40   | 7.25  | 10             | 5.0                       | 1600                                      | 65.2  | 9.2   |
| SMBJ6.0C  | 607C         | 6.67   | 8.45  | 10             | 6.0                       | 1600                                      | 52.6  | 11.4  |
| SMBJ6.0CA | 657C         | 6.67   | 7.67  | 10             | 6.0                       | 1600                                      | 58.3  | 10.3  |
| SMBJ6.5C  | 607I         | 7.22   | 9.14  | 10             | 6.5                       | 1000                                      | 48.7  | 12.3  |
| SMBJ6.5CA | 657I         | 7.22   | 8.30  | 10             | 6.5                       | 1000                                      | 53.6  | 11.2  |
| SMBJ7.0C  | 608E         | 7.78   | 9.86  | 10             | 7.0                       | 400                                       | 45.1  | 13.3  |
| SMBJ7.0CA | 658E         | 7.78   | 8.95  | 10             | 7.0                       | 400                                       | 50.0  | 12.0  |
| SMBJ7.5C  | 609A         | 8.33   | 10.67 | 1.0            | 7.5                       | 200                                       | 42.0  | 14.3  |
| SMBJ7.5CA | 659A         | 8.33   | 9.58  | 1.0            | 7.5                       | 200                                       | 46.5  | 12.9  |
| SMBJ8.0C  | 609G         | 8.89   | 11.3  | 1.0            | 8.0                       | 100                                       | 40.0  | 15.0  |
| SMBJ8.0CA | 659G         | 8.89   | 10.23 | 1.0            | 8.0                       | 100                                       | 44.1  | 13.6  |
| SMBJ8.5C  | 6010         | 9.44   | 11.92 | 1.0            | 8.5                       | 20  | 37.7  | 15.9  |
| SMBJ8.5CA | 6510         | 9.44   | 10.82 | 1.0            | 8.5                       | 20  | 41.7  | 14.4  |
| SMBJ9.0C  | 6011         | 10.0   | 12.6  | 1.0            | 9.0                       | 10  | 35.5  | 16.9  |
| SMBJ9.0CA | 6511         | 10.0   | 11.5  | 1.0            | 9.0                       | 10  | 39.0  | 15.4  |
| SMBJ10C   | 6012         | 11.1   | 14.1  | 1.0            | 10                        | 5.0                                       | 31.9  | 18.8  |
| SMBJ10CA  | 6512         | 11.1   | 12.8  | 1.0            | 10                        | 5.0                                       | 35.3  | 17.0  |
| SMBJ11C   | 6013         | 12.2   | 15.4  | 1.0            | 11                        | 5.0                                       | 29.9  | 20.1  |
| SMBJ11CA  | 6513         | 12.2   | 14.0  | 1.0            | 11                        | 5.0                                       | 33.0  | 18.2  |
| SMBJ12C   | 6014         | 13.3   | 16.9  | 1.0            | 12                        | 5.0                                       | 27.3  | 22.0  |
| SMBJ12CA  | 6514         | 13.3   | 15.3  | 1.0            | 12                        | 5.0                                       | 30.2  | 19.9  |
| SMBJ13C   | 6015         | 14.4   | 18.2  | 1.0            | 13                        | 5.0                                       | 25.2  | 23.8  |
| SMBJ13CA  | 6515         | 14.4   | 16.5  | 1.0            | 13                        | 5.0                                       | 27.9  | 21.5  |
| SMBJ14C   | 6017         | 15.6   | 19.8  | 1.0            | 14                        | 5.0                                       | 23.3  | 25.8  |
| SMBJ14CA  | 6517         | 15.6   | 17.9  | 1.0            | 14                        | 5.0                                       | 25.8  | 23.2  |
| SMBJ15C   | 6018         | 16.7   | 21.1  | 1.0            | 15                        | 5.0                                       | 22.3  | 26.9  |
| SMBJ15CA  | 6518         | 16.7   | 19.2  | 1.0            | 15                        | 5.0                                       | 24.0  | 24.4  |
| SMBJ16C   | 6019         | 17.8   | 22.6  | 1.0            | 16                        | 5.0                                       | 20.8  | 28.8  |
| SMBJ16CA  | 6519         | 17.8   | 20.5  | 1.0            | 16                        | 5.0                                       | 23.1  | 26.0  |
| SMBJ17C   | 6020         | 18.9   | 23.9  | 1.0            | 17                        | 5.0                                       | 19.7  | 30.5  |
| SMBJ17CA  | 6520         | 18.9   | 21.7  | 1.0            | 17                        | 5.0                                       | 21.7  | 27.6  |
| SMBJ18C   | 6022         | 20.0   | 25.3  | 1.0            | 18                        | 5.0                                       | 18.6  | 32.2  |
| SMBJ18CA  | 6522         | 20.0   | 23.3  | 1.0            | 18                        | 5.0                                       | 20.5  | 29.2  |
| SMBJ20C   | 6024         | 22.2   | 28.1  | 1.0            | 20                        | 5.0                                       | 16.7  | 35.8  |
| SMBJ20CA  | 6524         | 22.2   | 25.5  | 1.0            | 20                        | 5.0                                       | 18.5  | 32.4  |
| SMBJ22C   | 6026         | 24.4   | 30.9  | 1.0            | 22                        | 5.0                                       | 15.2  | 39.4  |
| SMBJ22CA  | 6526         | 24.4   | 28.0  | 1.0            | 22                        | 5.0                                       | 16.9  | 35.5  |
| SMBJ24C   | 6029         | 26.7   | 33.8  | 1.0            | 24                        | 5.0                                       | 14.0  | 43.0  |
| SMBJ24CA  | 6529         | 26.7   | 30.7  | 1.0            | 24                        | 5.0                                       | 15.4  | 38.9  |
| SMBJ26C   | 6031         | 28.9   | 36.6  | 1.0            | 26                        | 5.0                                       | 12.4  | 46.6  |
| SMBJ26CA  | 6531         | 28.9   | 33.2  | 1.0            | 26                        | 5.0                                       | 14.2  | 42.1  |
| SMBJ28C   | 6033         | 31.1   | 39.4  | 1.0            | 28                        | 5.0                                       | 12.0  | 50.0  |
| SMBJ28CA  | 6533         | 31.1   | 35.8  | 1.0            | 28                        | 5.0                                       | 13.2  | 45.4  |
| SMBJ30C   | 6036         | 33.3   | 42.2  | 1.0            | 30                        | 5.0                                       | 11.2  | 53.5  |
| SMBJ30CA  | 6536         | 33.1   | 38.3  | 1.0            | 30                        | 5.0                                       | 12.4  | 46.6  |

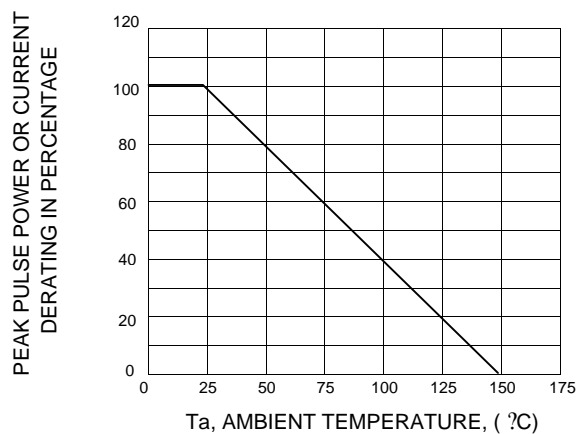
| TYPE      | Marking Code | Breakdown Voltage @ I <sub>T</sub><br>( Note 1 ) |       |                | Reverse<br>Stand-off<br>Voltage | Maximum<br>Reverse<br>Leakage<br>@ V <sub>WM</sub> | Maximum<br>Peak Pulse<br>Surge Current<br>(See Fig. 3) | Maximum<br>Clamping<br>Voltage @ I <sub>PPM</sub> |                 |                |                  |                |
|-----------|--------------|--|-------|----------------|---------------------------------|--|--|---|-----------------|----------------|------------------|----------------|
|           |              | V <sub>BR</sub> (V)                              |       | I <sub>T</sub> |                                 |  |  |   | V <sub>WM</sub> | I <sub>D</sub> | I <sub>PPM</sub> | V <sub>C</sub> |
|           |              | Min.   | Max.  | (mA)           |                                 |  |  |   | (V)             | (μA)           | (A)              | (V)            |
| SMBJ33C   | 6040         | 36.7   | 46.5  | 1.0            | 33                              | 5.0  | 10.2   | 59.0  |                 |                |                  |                |
| SMBJ33CA  | 6540         | 36.7   | 42.2  | 1.0            | 33                              | 5.0  | 11.3   | 53.3  |                 |                |                  |                |
| SMBJ36C   | 6043         | 40.0   | 50.7  | 1.0            | 36                              | 5.0  | 9.3  | 64.3  |                 |                |                  |                |
| SMBJ36CA  | 6543         | 40.0   | 46.0  | 1.0            | 36                              | 5.0  | 10.3   | 58.1  |                 |                |                  |                |
| SMBJ40C   | 6048         | 44.4   | 56.3  | 1.0            | 40                              | 5.0  | 8.4  | 71.4  |                 |                |                  |                |
| SMBJ40CA  | 6548         | 44.4   | 51.1  | 1.0            | 40                              | 5.0  | 9.3  | 64.5  |                 |                |                  |                |
| SMBJ43C   | 6051         | 47.8   | 60.5  | 1.0            | 43                              | 5.0  | 7.8  | 76.7  |                 |                |                  |                |
| SMBJ43CA  | 6551         | 47.8   | 54.9  | 1.0            | 43                              | 5.0  | 8.6  | 69.4  |                 |                |                  |                |
| SMBJ45C   | 6054         | 50.0   | 63.3  | 1.0            | 45                              | 5.0  | 7.5  | 80.3  |                 |                |                  |                |
| SMBJ45CA  | 6554         | 50.0   | 57.5  | 1.0            | 45                              | 5.0  | 8.3  | 72.7  |                 |                |                  |                |
| SMBJ48C   | 6057         | 53.3   | 67.5  | 1.0            | 48                              | 5.0  | 7.0  | 85.5  |                 |                |                  |                |
| SMBJ48CA  | 6557         | 53.3   | 61.3  | 1.0            | 48                              | 5.0  | 7.7  | 77.4  |                 |                |                  |                |
| SMBJ51C   | 6061         | 56.7   | 71.8  | 1.0            | 51                              | 5.0  | 6.6  | 91.1  |                 |                |                  |                |
| SMBJ51CA  | 6561         | 56.7   | 65.2  | 1.0            | 51                              | 5.0  | 7.3  | 82.4  |                 |                |                  |                |
| SMBJ54C   | 6065         | 60.0   | 76.0  | 1.0            | 54                              | 5.0  | 6.2  | 96.3  |                 |                |                  |                |
| SMBJ54CA  | 6565         | 60.0   | 69.0  | 1.0            | 54                              | 5.0  | 6.9  | 87.1  |                 |                |                  |                |
| SMBJ58C   | 6070         | 64.4   | 81.6  | 1.0            | 58                              | 5.0  | 5.8  | 103.0   |                 |                |                  |                |
| SMBJ58CA  | 6570         | 64.4   | 74.1  | 1.0            | 58                              | 5.0  | 6.4  | 93.6  |                 |                |                  |                |
| SMBJ60C   | 6072         | 66.7   | 84.5  | 1.0            | 60                              | 5.0  | 5.6  | 107   |                 |                |                  |                |
| SMBJ60CA  | 6572         | 66.7   | 76.7  | 1.0            | 60                              | 5.0  | 6.2  | 96.8  |                 |                |                  |                |
| SMBJ64C   | 6076         | 71.1   | 90.1  | 1.0            | 64                              | 5.0  | 5.3  | 114   |                 |                |                  |                |
| SMBJ64CA  | 6576         | 71.1   | 81.8  | 1.0            | 64                              | 5.0  | 5.8  | 103   |                 |                |                  |                |
| SMBJ70C   | 6084         | 77.8   | 98.6  | 1.0            | 70                              | 5.0  | 4.8  | 125   |                 |                |                  |                |
| SMBJ70CA  | 6584         | 77.8   | 89.5  | 1.0            | 70                              | 5.0  | 5.3  | 113   |                 |                |                  |                |
| SMBJ75C   | 6090         | 83.3   | 105.7 | 1.0            | 75                              | 5.0  | 4.5  | 134   |                 |                |                  |                |
| SMBJ75CA  | 6590         | 83.3   | 95.8  | 1.0            | 75                              | 5.0  | 4.9  | 121   |                 |                |                  |                |
| SMBJ78C   | 6093         | 86.7   | 109.8 | 1.0            | 78                              | 5.0  | 4.3  | 139   |                 |                |                  |                |
| SMBJ78CA  | 6593         | 86.7   | 99.7  | 1.0            | 78                              | 5.0  | 4.7  | 126   |                 |                |                  |                |
| SMBJ85C   | 60B0         | 94.4   | 119.2 | 1.0            | 85                              | 5.0  | 3.9  | 151   |                 |                |                  |                |
| SMBJ85CA  | 65B0         | 94.4   | 108.2 | 1.0            | 85                              | 5.0  | 4.4  | 137   |                 |                |                  |                |
| SMBJ90C   | 60B1         | 100  | 126.5 | 1.0            | 90                              | 5.0  | 3.8  | 160   |                 |                |                  |                |
| SMBJ90CA  | 65B1         | 100  | 115.5 | 1.0            | 90                              | 5.0  | 4.1  | 146   |                 |                |                  |                |
| SMBJ100C  | 60B2         | 111  | 141.0 | 1.0            | 100                             | 5.0  | 3.4  | 179   |                 |                |                  |                |
| SMBJ100CA | 65B2         | 111  | 128.0 | 1.0            | 100                             | 5.0  | 3.7  | 162   |                 |                |                  |                |
| SMBJ110C  | 60B3         | 122  | 154.5 | 1.0            | 110                             | 5.0  | 3.0  | 196   |                 |                |                  |                |
| SMBJ110CA | 65B3         | 122  | 140.5 | 1.0            | 110                             | 5.0  | 3.4  | 177   |                 |                |                  |                |
| SMBJ120C  | 60B4         | 133  | 169.0 | 1.0            | 120                             | 5.0  | 2.8  | 214   |                 |                |                  |                |
| SMBJ120CA | 65B4         | 133  | 153.0 | 1.0            | 120                             | 5.0  | 3.1  | 193   |                 |                |                  |                |
| SMBJ130C  | 60B5         | 144  | 182.5 | 1.0            | 130                             | 5.0  | 2.6  | 231   |                 |                |                  |                |
| SMBJ130CA | 65B5         | 144  | 165.5 | 1.0            | 130                             | 5.0  | 2.9  | 209   |                 |                |                  |                |
| SMBJ150C  | 60B8         | 167  | 211.5 | 1.0            | 150                             | 5.0  | 2.2  | 268   |                 |                |                  |                |
| SMBJ150CA | 65B8         | 167  | 192.5 | 1.0            | 150                             | 5.0  | 2.5  | 243   |                 |                |                  |                |
| SMBJ160C  | 60B9         | 178  | 226.0 | 1.0            | 160                             | 5.0  | 2.1  | 287   |                 |                |                  |                |
| SMBJ160CA | 65B9         | 178  | 205.0 | 1.0            | 160                             | 5.0  | 2.3  | 259   |                 |                |                  |                |
| SMBJ170C  | 60D0         | 189  | 239.5 | 1.0            | 170                             | 5.0  | 2.0  | 304   |                 |                |                  |                |
| SMBJ170CA | 65D0         | 189  | 217.5 | 1.0            | 170                             | 5.0  | 2.2  | 275   |                 |                |                  |                |

**Note:**

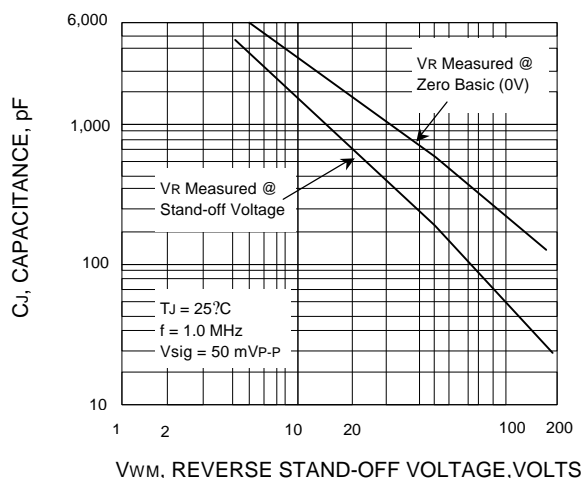
- ( 1 ) V<sub>BR</sub> measured after I<sub>T</sub> applied for 300 μs., I<sub>T</sub> = square wave pulse or equivalent.
- ( 2 ) Surge Current Waveform per Fig. 3 and Derate per Fig. 1.
- ( 3 ) A TransZorb TVS is normally selected according to the reverse "Stand Off Voltage" (V<sub>WM</sub>) which should be equal to or greater than the DC or continuous peak operating voltage level.

## RATING AND CHARACTERISTIC CURVES ( SMBJ5.0C - SMBJ170CA )

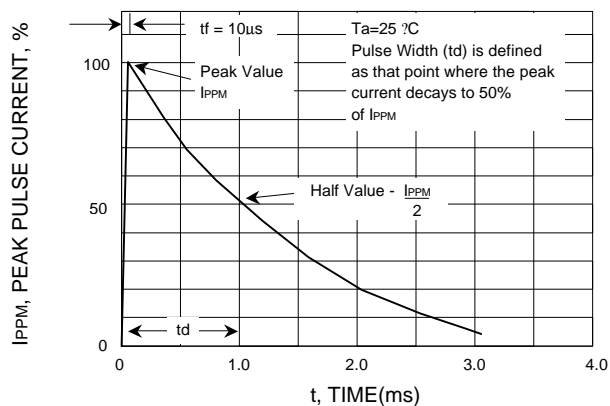
**FIG.1 - PULSE DERATING CURVE**



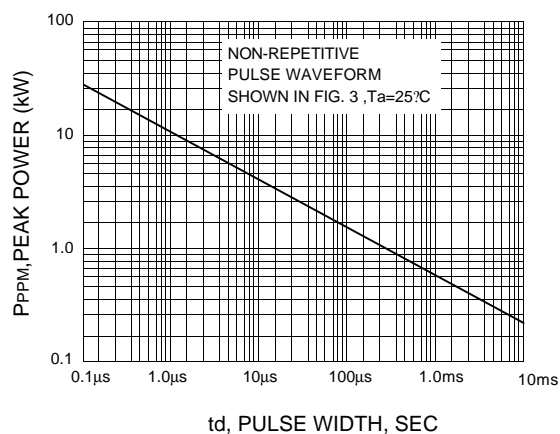
**FIG.2 - TYPICAL JUNCTION CAPACITANCE**



**FIG.3 - PULSE WAVEFORM**



**FIG.4 - PEAK PULSE POWER RATING CURVE**



**FIG.5 - MAXIMUM NON-REPETITIVE PEAK FORWARD SURGE CURRENT**

