



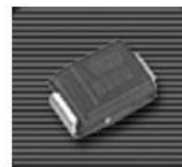
SYNSEMI SEMICONDUCTOR

## SMBJ5.0 thru 188CA

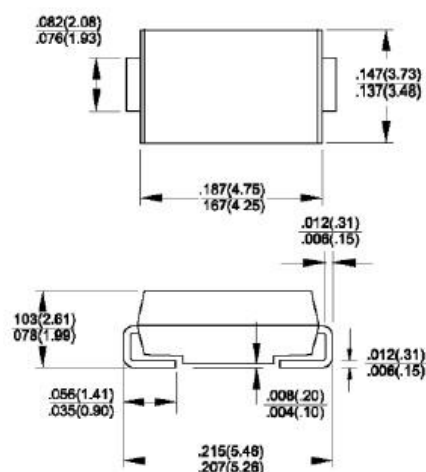
Surface Mount Transient Voltage Suppressors  
Peak Pulse Power 600W Stand-off Voltage 5.0 to 188V

### Features

- ◆ Plastic package has Underwriters Laboratory Flammability Classification 94V-0
- ◆ Low profile package with built-in strain relief for surface mounted applications
- ◆ Glass passivated junction
- ◆ Low incremental surge resistance, excellent clamping capability
- ◆ 600W peak pulse power capability with a 10/1000us waveform, repetition rate (duty cycle): 0.01%
- ◆ Very fast response time
- ◆ High temperature soldering guaranteed: 250°C/10 seconds at terminals



DO-214AA (SMB)



### Mechanical Data

- ◆ Case: JEDEC DO-214AA(SMB J-Bend) molded plastic over passivated junction
- ◆ Terminals: Solder plated, solderable per MIL-STD-750, Method 2026
- ◆ Polarity: For unidirectional types the band denotes the cathode, which is positive with respect to the anode under normal TVS operation
- ◆ Weight: 0.003oz., 0.093g

### Devices for Bidirectional Applications

For bi-directional devices, use suffix CA (e.g. SMBJ10CA). Electrical characteristics apply in both directions.

### Maximum Ratings and Thermal Characteristics

(Ratings at 25°C ambient temperature unless otherwise specified.)

| Parameter                                                                                  | Symbol          | Value          | Unit |
|--------------------------------------------------------------------------------------------|-----------------|----------------|------|
| Peak pulse power dissipation with a 10/1000us waveform <sup>(1,2)</sup> (see Fig. 1)       | $P_{PPM}$       | Minimum 600    | W    |
| Peak pulse current with a 10/1000us waveform <sup>(1)</sup>                                | $I_{PPM}$       | See Next Table | A    |
| Peak forward surge current 8.3ms single half sine-wave uni-directional only <sup>(3)</sup> | $I_{FSM}$       | 100            | A    |
| Typical thermal resistance, junction to ambient <sup>(4)</sup>                             | $R_{\theta JA}$ | 100            | °C/W |
| Typical thermal resistance, junction to lead                                               | $R_{\theta JL}$ | 20             | °C/W |
| Operating junction and storage temperature range                                           | $T_J, T_{STG}$  | -55 to +150    | °C   |

- Notes:**
1. Non-repetitive current pulse, per Fig.3 and derated above  $T_A=25^\circ\text{C}$  per Fig. 2
  2. Mounted on 0.2 x 0.2" (5.0 x 5.0 mm) copper pads to each terminal
  3. Mounted on minimum recommended pad layout

# SMBJ5.0 thru 188CA

## Electrical Characteristics

Ratings at 25°C ambient temperature unless otherwise specified.  $V_F=3.5V$  at  $I_F=50A$  (uni-directional only)

| Device Type             | Device marking code |    | Breakdown voltage $V_{(BR)}$ (Volts) <sup>(1)</sup> |      | Test current at $I_T$ (mA) | Stand-off voltage $V_{WM}$ (Volts) | Maximum reverse leakage at $V_{WM}$ $I_D^{(3)}$ (uA) | Maximum peak pulse surge current $I_{PPM}^{(2)}$ (A) | Maximum clamping voltage at $I_{PPM}$ $V_C$ (Volts) |
|-------------------------|---------------------|----|-----------------------------------------------------|------|----------------------------|------------------------------------|------------------------------------------------------|------------------------------------------------------|-----------------------------------------------------|
|                         | UNI                 | BI | Min.                                                | Max. |                            |                                    |                                                      |                                                      |                                                     |
| SMBJ5.0                 | KD                  | AD | 6.40                                                | 7.82 | 10                         | 5.0                                | 800                                                  | 62.5                                                 | 9.6                                                 |
| SMBJ5.0A <sup>(4)</sup> | KE                  | AE | 6.40                                                | 7.07 | 10                         | 5.0                                | 800                                                  | 65.2                                                 | 9.2                                                 |
| SMBJ6.0                 | KF                  | AF | 6.67                                                | 8.15 | 10                         | 6.0                                | 800                                                  | 52.6                                                 | 11.4                                                |
| SMBJ6.0A                | KG                  | AG | 6.67                                                | 7.37 | 10                         | 6.0                                | 800                                                  | 58.3                                                 | 10.3                                                |
| SMBJ6.5                 | KH                  | AH | 7.22                                                | 8.82 | 10                         | 6.5                                | 500                                                  | 48.8                                                 | 12.3                                                |
| SMBJ6.5A                | KK                  | AK | 7.22                                                | 7.98 | 10                         | 6.5                                | 500                                                  | 63.6                                                 | 11.2                                                |
| SMBJ7.0                 | KL                  | AL | 7.78                                                | 9.51 | 10                         | 7.0                                | 200                                                  | 46.1                                                 | 13.3                                                |
| SMBJ7.0A                | KM                  | AM | 7.78                                                | 8.60 | 10                         | 7.0                                | 200                                                  | 50.0                                                 | 12.0                                                |
| SMBJ7.5                 | KN                  | AN | 8.33                                                | 10.2 | 1.0                        | 7.5                                | 100                                                  | 42.0                                                 | 14.3                                                |
| SMBJ7.5A                | KP                  | AP | 8.33                                                | 9.21 | 1.0                        | 7.5                                | 100                                                  | 46.5                                                 | 12.9                                                |
| SMBJ8.0                 | KQ                  | AQ | 8.89                                                | 10.9 | 1.0                        | 8.0                                | 50                                                   | 40.0                                                 | 15.0                                                |
| SMBJ8.0A                | KR                  | AR | 8.89                                                | 9.83 | 1.0                        | 8.0                                | 50                                                   | 44.1                                                 | 13.6                                                |
| SMBJ8.5                 | KS                  | AS | 9.44                                                | 11.5 | 1.0                        | 8.5                                | 20                                                   | 37.7                                                 | 15.9                                                |
| SMBJ8.5A                | KT                  | AT | 9.44                                                | 10.4 | 1.0                        | 8.5                                | 20                                                   | 41.7                                                 | 14.4                                                |
| SMBJ9.0                 | KU                  | AU | 10.0                                                | 12.2 | 1.0                        | 9.0                                | 10                                                   | 35.5                                                 | 16.9                                                |
| SMBJ9.0A                | KV                  | AV | 10.0                                                | 11.1 | 1.0                        | 9.0                                | 10                                                   | 39.0                                                 | 15.4                                                |
| SMBJ10                  | KW                  | AW | 11.1                                                | 13.6 | 1.0                        | 10                                 | 5.0                                                  | 31.9                                                 | 18.8                                                |
| SMBJ10A                 | KX                  | AX | 11.1                                                | 12.3 | 1.0                        | 10                                 | 5.0                                                  | 35.3                                                 | 17.0                                                |
| SMBJ11                  | KY                  | AY | 12.2                                                | 14.9 | 1.0                        | 11                                 | 5.0                                                  | 29.9                                                 | 20.1                                                |
| SMBJ11A                 | KZ                  | AZ | 12.2                                                | 13.5 | 1.0                        | 11                                 | 5.0                                                  | 33.0                                                 | 18.2                                                |
| SMBJ12                  | LD                  | BD | 13.3                                                | 16.3 | 1.0                        | 12                                 | 5.0                                                  | 27.3                                                 | 22.0                                                |
| SMBJ12A                 | LE                  | BE | 13.3                                                | 14.7 | 1.0                        | 12                                 | 5.0                                                  | 30.2                                                 | 19.9                                                |
| SMBJ13                  | LF                  | BF | 14.4                                                | 17.6 | 1.0                        | 13                                 | 1.0                                                  | 25.2                                                 | 23.8                                                |
| SMBJ13A                 | LG                  | BG | 14.4                                                | 15.9 | 1.0                        | 13                                 | 1.0                                                  | 27.9                                                 | 21.5                                                |
| SMBJ14                  | LH                  | BH | 15.6                                                | 19.1 | 1.0                        | 14                                 | 1.0                                                  | 23.3                                                 | 25.8                                                |
| SMBJ14A                 | LK                  | BK | 15.6                                                | 17.2 | 1.0                        | 14                                 | 1.0                                                  | 25.9                                                 | 23.2                                                |
| SMBJ15                  | LL                  | BL | 16.7                                                | 20.4 | 1.0                        | 15                                 | 1.0                                                  | 22.3                                                 | 26.9                                                |
| SMBJ15A                 | LM                  | BM | 16.7                                                | 18.5 | 1.0                        | 15                                 | 1.0                                                  | 24.6                                                 | 24.4                                                |
| SMBJ16                  | LN                  | BN | 17.8                                                | 21.8 | 1.0                        | 16                                 | 1.0                                                  | 20.8                                                 | 28.8                                                |
| SMBJ16A                 | LP                  | BP | 17.8                                                | 19.7 | 1.0                        | 16                                 | 1.0                                                  | 23.1                                                 | 26.0                                                |
| SMBJ17                  | LQ                  | BQ | 18.9                                                | 23.1 | 1.0                        | 17                                 | 1.0                                                  | 19.7                                                 | 30.5                                                |
| SMBJ17A                 | LR                  | BR | 18.9                                                | 20.9 | 1.0                        | 17                                 | 1.0                                                  | 21.7                                                 | 27.6                                                |
| SMBJ18                  | LS                  | BS | 20.0                                                | 24.4 | 1.0                        | 18                                 | 1.0                                                  | 18.6                                                 | 32.2                                                |
| SMBJ18A                 | LT                  | BT | 20.0                                                | 22.1 | 1.0                        | 18                                 | 1.0                                                  | 20.5                                                 | 29.2                                                |
| SMBJ20                  | LU                  | BU | 22.2                                                | 27.1 | 1.0                        | 20                                 | 1.0                                                  | 16.8                                                 | 35.8                                                |
| SMBJ20A                 | LV                  | BV | 22.2                                                | 24.5 | 1.0                        | 20                                 | 1.0                                                  | 18.5                                                 | 32.4                                                |
| SMBJ22                  | LW                  | BW | 24.4                                                | 29.8 | 1.0                        | 22                                 | 1.0                                                  | 15.2                                                 | 39.4                                                |
| SMBJ22A                 | LX                  | BX | 24.4                                                | 26.9 | 1.0                        | 22                                 | 1.0                                                  | 16.9                                                 | 35.5                                                |
| SMBJ24                  | LY                  | BY | 26.7                                                | 32.6 | 1.0                        | 24                                 | 1.0                                                  | 14.0                                                 | 43.0                                                |
| SMBJ24A                 | LZ                  | BZ | 26.7                                                | 29.5 | 1.0                        | 24                                 | 1.0                                                  | 15.4                                                 | 38.9                                                |
| SMBJ26                  | MD                  | CD | 28.9                                                | 35.3 | 1.0                        | 26                                 | 1.0                                                  | 12.9                                                 | 46.6                                                |
| SMBJ26A                 | ME                  | CE | 28.9                                                | 31.9 | 1.0                        | 26                                 | 1.0                                                  | 14.3                                                 | 42.1                                                |
| SMBJ28                  | MF                  | CF | 31.1                                                | 38.0 | 1.0                        | 28                                 | 1.0                                                  | 12.0                                                 | 50.0                                                |
| SMBJ28A                 | MG                  | CG | 31.1                                                | 34.4 | 1.0                        | 28                                 | 1.0                                                  | 13.2                                                 | 45.4                                                |
| SMBJ30                  | MH                  | CH | 33.3                                                | 40.7 | 1.0                        | 30                                 | 1.0                                                  | 11.2                                                 | 53.5                                                |
| SMBJ30A                 | MK                  | CK | 33.3                                                | 36.8 | 1.0                        | 30                                 | 1.0                                                  | 12.4                                                 | 48.4                                                |

- Notes:**
1.  $V_{(BR)}$  measured after  $I_T$  applied for 300us square wave pulse or equivalent
  2. Surge current waveform per Fig. 3 and derate per Fig. 2
  3. For bi-directional types having  $V_{WM}$  of 10 Volts and less, the  $I_D$  limit is doubled
  4. All terms and symbols are consistent with ANSI/IEEE C62.35
  5. For the bidirectional SMBJ5.0CA, the maximum  $V_{(BR)}$  is 7.25V.

# SMBJ5.0 thru 188CA

## Electrical Characteristics

Ratings at 25°C ambient temperature unless otherwise specified.  $V_F = 3.5V$  at  $I_F = 50A$  (uni-directional only)

| Device type | Device marking code |    | Breakdown voltage<br>$V_{BR}$<br>(Volts) <sup>(1)</sup> |      | Test current at $I_T$<br>(mA) | Stand-off voltage<br>$V_{WM}$<br>(Volts) | Maximum reverse leakage at $V_{WM}$<br>$I_{R0}^{(2)}$<br>( $\mu A$ ) | Maximum peak pulse surge current<br>$I_{PPM}^{(2)}$<br>(A) | Maximum clamping voltage at $I_{PPM}$<br>$V_C$<br>(Volts) |
|-------------|---------------------|----|---------------------------------------------------------|------|-------------------------------|------------------------------------------|----------------------------------------------------------------------|------------------------------------------------------------|-----------------------------------------------------------|
|             | UNI                 | BI | Min.                                                    | Max. |                               |                                          |                                                                      |                                                            |                                                           |
| SMBJ33      | ML                  | CL | 36.7                                                    | 44.9 | 1.0                           | 33                                       | 1.0                                                                  | 10.2                                                       | 59.0                                                      |
| SMBJ33A     | MM                  | CM | 36.7                                                    | 40.6 | 1.0                           | 33                                       | 1.0                                                                  | 11.3                                                       | 53.3                                                      |
| SMBJ36      | MN                  | CN | 40.0                                                    | 48.9 | 1.0                           | 36                                       | 1.0                                                                  | 9.3                                                        | 64.3                                                      |
| SMBJ36A     | MP                  | CP | 40.0                                                    | 44.2 | 1.0                           | 36                                       | 1.0                                                                  | 10.3                                                       | 58.1                                                      |
| SMBJ40      | MQ                  | CQ | 44.4                                                    | 54.3 | 1.0                           | 40                                       | 1.0                                                                  | 8.4                                                        | 71.4                                                      |
| SMBJ40A     | MR                  | CR | 44.4                                                    | 49.1 | 1.0                           | 40                                       | 1.0                                                                  | 9.3                                                        | 64.5                                                      |
| SMBJ43      | MS                  | CS | 47.8                                                    | 58.4 | 1.0                           | 43                                       | 1.0                                                                  | 7.8                                                        | 76.7                                                      |
| SMBJ43A     | MT                  | CT | 47.8                                                    | 52.8 | 1.0                           | 43                                       | 1.0                                                                  | 8.6                                                        | 69.4                                                      |
| SMBJ45      | MU                  | CU | 50.0                                                    | 61.1 | 1.0                           | 45                                       | 1.0                                                                  | 7.5                                                        | 80.3                                                      |
| SMBJ45A     | MV                  | CV | 50.0                                                    | 55.3 | 1.0                           | 45                                       | 1.0                                                                  | 8.3                                                        | 72.7                                                      |
| SMBJ48      | MW                  | CW | 53.3                                                    | 65.1 | 1.0                           | 48                                       | 1.0                                                                  | 7.0                                                        | 85.5                                                      |
| SMBJ48A     | MX                  | CX | 53.3                                                    | 58.9 | 1.0                           | 48                                       | 1.0                                                                  | 7.8                                                        | 77.4                                                      |
| SMBJ51      | MY                  | CY | 56.7                                                    | 69.3 | 1.0                           | 51                                       | 1.0                                                                  | 6.6                                                        | 91.1                                                      |
| SMBJ51A     | MZ                  | CZ | 56.7                                                    | 62.7 | 1.0                           | 51                                       | 1.0                                                                  | 7.3                                                        | 82.4                                                      |
| SMBJ54      | ND                  | DD | 60.0                                                    | 73.3 | 1.0                           | 54                                       | 1.0                                                                  | 6.2                                                        | 96.3                                                      |
| SMBJ54A     | NE                  | DE | 60.0                                                    | 66.3 | 1.0                           | 54                                       | 1.0                                                                  | 6.9                                                        | 87.1                                                      |
| SMBJ58      | NF                  | DF | 64.4                                                    | 78.7 | 1.0                           | 58                                       | 1.0                                                                  | 5.8                                                        | 103                                                       |
| SMBJ58A     | NG                  | DG | 64.4                                                    | 71.2 | 1.0                           | 58                                       | 1.0                                                                  | 6.4                                                        | 93.6                                                      |
| SMBJ60      | NH                  | DH | 66.7                                                    | 81.5 | 1.0                           | 60                                       | 1.0                                                                  | 5.6                                                        | 107                                                       |
| SMBJ60A     | NK                  | DK | 66.7                                                    | 73.7 | 1.0                           | 60                                       | 1.0                                                                  | 6.2                                                        | 96.8                                                      |
| SMBJ64      | NL                  | DL | 71.1                                                    | 86.9 | 1.0                           | 64                                       | 1.0                                                                  | 5.3                                                        | 114                                                       |
| SMBJ64A     | NM                  | DM | 71.1                                                    | 78.6 | 1.0                           | 64                                       | 1.0                                                                  | 5.8                                                        | 103                                                       |
| SMBJ70      | NN                  | DN | 77.8                                                    | 95.1 | 1.0                           | 70                                       | 1.0                                                                  | 4.8                                                        | 125                                                       |
| SMBJ70A     | NP                  | DP | 77.8                                                    | 86.0 | 1.0                           | 70                                       | 1.0                                                                  | 5.3                                                        | 113                                                       |
| SMBJ75      | NQ                  | DQ | 83.3                                                    | 102  | 1.0                           | 75                                       | 1.0                                                                  | 4.5                                                        | 134                                                       |
| SMBJ75A     | NR                  | DR | 83.3                                                    | 92.1 | 1.0                           | 75                                       | 1.0                                                                  | 5.0                                                        | 121                                                       |
| SMBJ78      | NS                  | DS | 86.7                                                    | 106  | 1.0                           | 78                                       | 1.0                                                                  | 4.3                                                        | 139                                                       |
| SMBJ78A     | NT                  | DT | 86.7                                                    | 95.8 | 1.0                           | 78                                       | 1.0                                                                  | 4.8                                                        | 126                                                       |
| SMBJ85      | NU                  | DU | 94.4                                                    | 115  | 1.0                           | 85                                       | 1.0                                                                  | 4.0                                                        | 151                                                       |
| SMBJ85A     | NV                  | DV | 94.4                                                    | 104  | 1.0                           | 85                                       | 1.0                                                                  | 4.4                                                        | 137                                                       |
| SMBJ90      | NW                  | DW | 100                                                     | 122  | 1.0                           | 90                                       | 1.0                                                                  | 3.8                                                        | 160                                                       |
| SMBJ90A     | NX                  | DX | 100                                                     | 111  | 1.0                           | 90                                       | 1.0                                                                  | 4.1                                                        | 146                                                       |
| SMBJ100     | NY                  | DY | 111                                                     | 136  | 1.0                           | 100                                      | 1.0                                                                  | 3.4                                                        | 179                                                       |
| SMBJ100A    | NZ                  | DZ | 111                                                     | 123  | 1.0                           | 100                                      | 1.0                                                                  | 3.7                                                        | 162                                                       |
| SMBJ110     | PD                  | FD | 122                                                     | 149  | 1.0                           | 110                                      | 1.0                                                                  | 3.1                                                        | 196                                                       |
| SMBJ110A    | PE                  | FE | 122                                                     | 135  | 1.0                           | 110                                      | 1.0                                                                  | 3.4                                                        | 177                                                       |
| SMBJ120     | PF                  | FF | 133                                                     | 163  | 1.0                           | 120                                      | 1.0                                                                  | 2.8                                                        | 214                                                       |
| SMBJ120A    | PG                  | FG | 133                                                     | 147  | 1.0                           | 120                                      | 1.0                                                                  | 3.1                                                        | 193                                                       |
| SMBJ130     | PH                  | FH | 144                                                     | 176  | 1.0                           | 130                                      | 1.0                                                                  | 2.6                                                        | 231                                                       |
| SMBJ130A    | PK                  | FK | 144                                                     | 159  | 1.0                           | 130                                      | 1.0                                                                  | 2.9                                                        | 209                                                       |
| SMBJ150     | PL                  | FL | 167                                                     | 204  | 1.0                           | 150                                      | 1.0                                                                  | 2.2                                                        | 268                                                       |
| SMBJ150A    | PM                  | FM | 167                                                     | 185  | 1.0                           | 150                                      | 1.0                                                                  | 2.5                                                        | 243                                                       |
| SMBJ160     | PN                  | FN | 178                                                     | 218  | 1.0                           | 160                                      | 1.0                                                                  | 2.1                                                        | 287                                                       |
| SMBJ160A    | PP                  | FP | 178                                                     | 197  | 1.0                           | 160                                      | 1.0                                                                  | 2.3                                                        | 259                                                       |
| SMBJ170     | PQ                  | FQ | 189                                                     | 231  | 1.0                           | 170                                      | 1.0                                                                  | 2.0                                                        | 304                                                       |
| SMBJ170A    | PR                  | FR | 189                                                     | 209  | 1.0                           | 170                                      | 1.0                                                                  | 2.2                                                        | 275                                                       |
| SMBJ188     | PS                  | FS | 209                                                     | 255  | 1.0                           | 188                                      | 1.0                                                                  | 1.7                                                        | 344                                                       |
| SMBJ188A    | PT                  | FT | 209                                                     | 231  | 1.0                           | 188                                      | 1.0                                                                  | 2.0                                                        | 328                                                       |

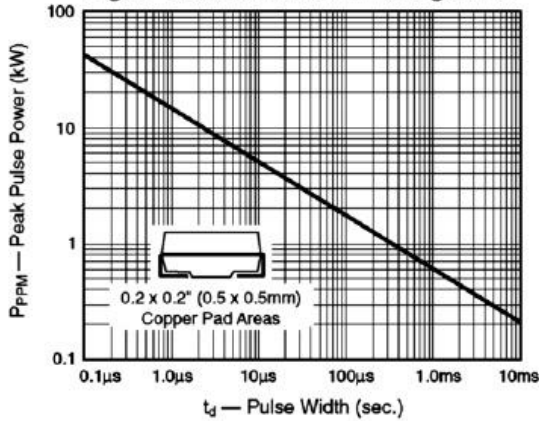
- Notes:**
1.  $V_{BR}$  measured after  $I_F$  applied for 300 $\mu s$  square wave pulse or equivalent
  2. Surge current waveform per Fig. 3 and derate per Fig. 2
  3. For bi-directional types having  $V_{WM}$  of 10 Volts and less, the  $I_{PPM}$  limit is doubled
  4. All terms and symbols are consistent with ANSI/IEEE C62.35

# SMBJ5.0 thru 188CA

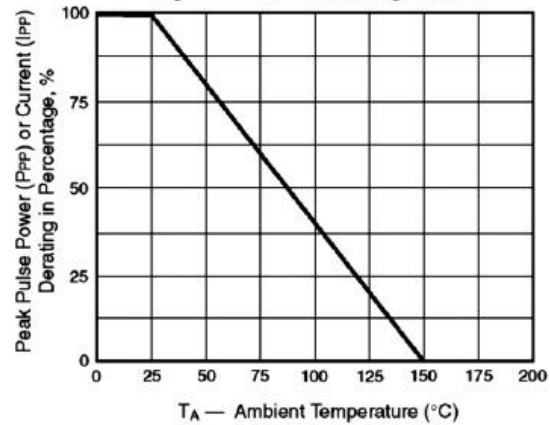
## RATINGS AND CHARACTERISTIC CURVES

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

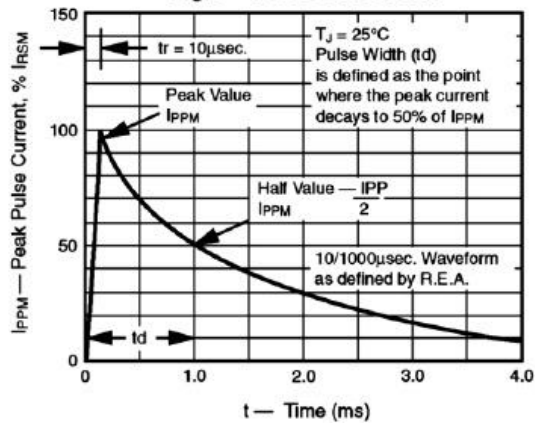
**Fig. 1 – Peak Pulse Power Rating Curve**



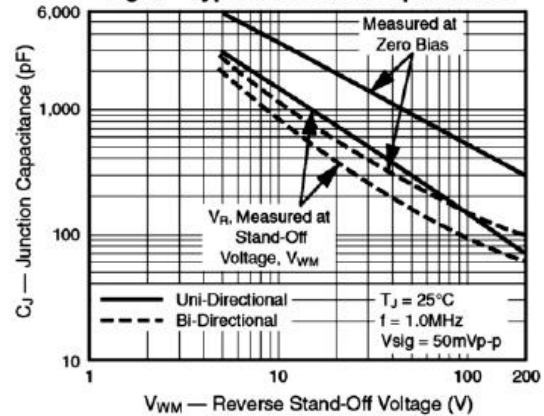
**Fig. 2 – Pulse Derating Curve**



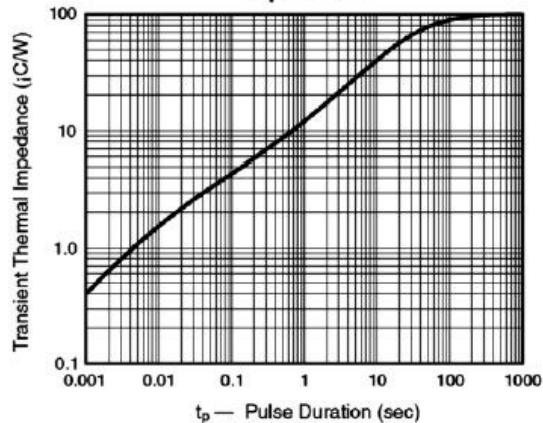
**Fig. 3 – Pulse Waveform**



**Fig. 4 – Typical Junction Capacitance**



**Fig. 5 – Typical Transient Thermal Impedance**



**Fig. 6 – Maximum Non-Repetitive Peak Forward Surge Current**

