

# Transient Suppression Diodes

## For General Purpose Use



### GENERAL DESCRIPTION

The SMAJ, SMBJ, and SMCJ Series are a popular format of general purpose transient voltage suppression diodes. They are based on the low leakage, high reliability, but low cost glass passivated chip rectifier technology.

### FEATURES

- Glass passivated chip
- 400W, 600W and 1500W types (10/1000us)
- Low leakage
- Flat clamping
- Very fast response time
- Halogen Free
- $\leq 1\mu\text{A}$  leakage for 12V and up
- Lead-Free Terminations

### APPLICATIONS

- Consumer
- Industrial
- Telecom
- Computer

### HOW TO ORDER

| SMAJ                                       | 12                    | CA                                                                                    |
|--------------------------------------------|-----------------------|---------------------------------------------------------------------------------------|
| Series                                     | Voltage <sub>WM</sub> | C = Bi-directional, 5% Voltage Tolerance<br>A = Uni-directional, 5% Voltage Tolerance |
| SMAJ = 400W<br>SMBJ = 600W<br>SMCJ = 1500W | 5V - 440V             |                                                                                       |

### MAXIMUM RATINGS

| RATING                                                                                   | SYMBOL         | SMAJ       | SMBJ      | SMCJ      | UNITS              |
|------------------------------------------------------------------------------------------|----------------|------------|-----------|-----------|--------------------|
| Peak power dissipation with a 10/1000us waveform <sup>1</sup>                            | $P_{PPM}$      | 400        | 600       | 1500      | Watts              |
| Peak pulse current with a 10/1000us waveform <sup>1</sup>                                | $I_{PPM}$      | See tables |           |           | Amps               |
| Power dissipation on infinite heat sink at $T_L = 75^\circ\text{C}$                      | $P_D$          | 1.0        | 5.0       | 6.5       | Watts              |
| Peak forward surge current, 8.3ms single half sine-wave unidirectional only <sup>2</sup> | $I_{FSM}$      | 40         | 100       | 200       | Amps               |
| Operating junction and storage temperature range                                         | $T_J, T_{STG}$ | -55 ~ 150  | -55 ~ 150 | -55 ~ 150 | $^\circ\text{C}$   |
| Typical thermal resistance junction to air                                               | $\theta_{JA}$  | 120        | 100       | 75        | $^\circ\text{C/W}$ |
| Typical thermal resistance junction to case                                              | $\theta_{JC}$  | 30         | 20        | 15        | $^\circ\text{C/W}$ |

#### NOTES:

1. Non-repetitive current pulse per Fig. 5 and derated above  $T_A = 25^\circ\text{C}$  per Fig. 1
2. Measured on 8.3ms single half sine-wave or equivalent square wave, duty cycle = 4 pulses per minute maximum.

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### SMAJ SERIES PARAMETERS

| SMAJ Part Number |           | Device Marking Code |    | Working Peak Reverse Voltage<br>$V_{RWM}$<br>(V) | Breakdown Voltage<br>$V_{BR}$ @ $I_T$ |          |            | Maximum Clamping Voltage $V_c$ (V)<br>@ $I_{PP}$ | Maximum Reverse Surge Current<br>@ $10 \times 1000\mu s$ | Maximum Reverse Leakage $I_R$ ( $\mu A$ )<br>@ $V_{RWM}$ |
|------------------|-----------|---------------------|----|--------------------------------------------------|---------------------------------------|----------|------------|--------------------------------------------------|----------------------------------------------------------|----------------------------------------------------------|
| UNI-POLAR        | BI-POLAR  | UNI                 | BI |                                                  | Min. (V)                              | Max. (V) | $I_T$ (mA) |                                                  |                                                          |                                                          |
| SMAJ5.0A         | SMAJ5.0CA | AE                  | WE | 5                                                | 6.4                                   | 7        | 10         | 9.2                                              | 43.48                                                    | 800                                                      |
| SMAJ6.0A         | SMAJ6.0CA | AG                  | WG | 6                                                | 6.7                                   | 7.37     | 10         | 10.3                                             | 38.83                                                    | 800                                                      |
| SMAJ6.5A         | SMAJ6.5CA | AK                  | WK | 6.5                                              | 7.2                                   | 7.98     | 10         | 11.2                                             | 35.71                                                    | 500                                                      |
| SMAJ7.0A         | SMAJ7.0CA | AM                  | WM | 7                                                | 7.8                                   | 8.6      | 10         | 12                                               | 33.33                                                    | 200                                                      |
| SMAJ7.5A         | SMAJ7.5CA | AP                  | WP | 7.5                                              | 8.3                                   | 9.21     | 1          | 12.9                                             | 31.01                                                    | 100                                                      |
| SMAJ8.0A         | SMAJ8.0CA | AR                  | WR | 8                                                | 8.9                                   | 9.83     | 1          | 13.6                                             | 29.41                                                    | 50                                                       |
| SMAJ8.5A         | SMAJ8.5CA | AT                  | WT | 8.5                                              | 9.4                                   | 10.4     | 1          | 14.4                                             | 27.78                                                    | 10                                                       |
| SMAJ9.0A         | SMAJ9.0CA | AV                  | VW | 9                                                | 10                                    | 11.1     | 1          | 15.4                                             | 25.97                                                    | 1                                                        |
| SMAJ10A          | SMAJ10CA  | AX                  | WX | 10                                               | 11.1                                  | 12.3     | 1          | 17                                               | 23.53                                                    | 1                                                        |
| SMAJ11A          | SMAJ11CA  | AZ                  | WZ | 11                                               | 12.2                                  | 13.5     | 1          | 18.2                                             | 21.98                                                    | 1                                                        |
| SMAJ12A          | SMAJ12CA  | BE                  | XE | 12                                               | 13.3                                  | 14.7     | 1          | 19.9                                             | 20.1                                                     | 1                                                        |
| SMAJ13A          | SMAJ13CA  | BG                  | XG | 13                                               | 14.4                                  | 15.9     | 1          | 21.5                                             | 18.6                                                     | 1                                                        |
| SMAJ14A          | SMAJ14CA  | BK                  | XK | 14                                               | 15.6                                  | 17.2     | 1          | 23.2                                             | 17.24                                                    | 1                                                        |
| SMAJ15A          | SMAJ15CA  | BM                  | XM | 15                                               | 16.7                                  | 18.5     | 1          | 24.4                                             | 16.39                                                    | 1                                                        |
| SMAJ16A          | SMAJ16CA  | BP                  | XP | 16                                               | 17.8                                  | 19.7     | 1          | 26                                               | 15.38                                                    | 1                                                        |
| SMAJ17A          | SMAJ17CA  | BR                  | XR | 17                                               | 18.9                                  | 20.9     | 1          | 27.6                                             | 14.49                                                    | 1                                                        |
| SMAJ18A          | SMAJ18CA  | BT                  | XT | 18                                               | 20                                    | 22.1     | 1          | 29.2                                             | 13.7                                                     | 1                                                        |
| SMAJ19A          | SMAJ19CA  | BB                  | XB | 19                                               | 21.1                                  | 23.3     | 1          | 30.8                                             | 13                                                       | 1                                                        |
| SMAJ20A          | SMAJ20CA  | BV                  | XV | 20                                               | 22.2                                  | 24.5     | 1          | 32.4                                             | 12.35                                                    | 1                                                        |
| SMAJ22A          | SMAJ22CA  | BX                  | XX | 22                                               | 24.4                                  | 26.9     | 1          | 35.5                                             | 11.27                                                    | 1                                                        |
| SMAJ24A          | SMAJ24CA  | BZ                  | XZ | 24                                               | 26.7                                  | 29.5     | 1          | 38.9                                             | 10.28                                                    | 1                                                        |
| SMAJ26A          | SMAJ26CA  | CE                  | YE | 26                                               | 28.9                                  | 31.9     | 1          | 42.1                                             | 9.5                                                      | 1                                                        |
| SMAJ28A          | SMAJ28CA  | CG                  | YG | 28                                               | 31.1                                  | 34.4     | 1          | 45.4                                             | 8.81                                                     | 1                                                        |
| SMAJ30A          | SMAJ30CA  | CK                  | YK | 30                                               | 33.3                                  | 36.8     | 1          | 48.4                                             | 8.26                                                     | 1                                                        |
| SMAJ33A          | SMAJ33CA  | CM                  | YM | 33                                               | 36.7                                  | 40.6     | 1          | 53.3                                             | 7.5                                                      | 1                                                        |
| SMAJ36A          | SMAJ36CA  | CP                  | YP | 36                                               | 40                                    | 44.2     | 1          | 58.1                                             | 6.88                                                     | 1                                                        |
| SMAJ40A          | SMAJ40CA  | CR                  | YR | 40                                               | 44.4                                  | 49.1     | 1          | 64.5                                             | 6.2                                                      | 1                                                        |
| SMAJ43A          | SMAJ43CA  | CT                  | YT | 43                                               | 47.8                                  | 52.8     | 1          | 69.4                                             | 5.76                                                     | 1                                                        |
| SMAJ45A          | SMAJ45CA  | CV                  | YV | 45                                               | 50                                    | 55.3     | 1          | 72.7                                             | 5.5                                                      | 1                                                        |
| SMAJ48A          | SMAJ48CA  | CX                  | YX | 48                                               | 53.3                                  | 58.9     | 1          | 77.4                                             | 5.17                                                     | 1                                                        |
| SMAJ51A          | SMAJ51CA  | CZ                  | YZ | 51                                               | 56.7                                  | 62.7     | 1          | 82.4                                             | 4.85                                                     | 1                                                        |
| SMAJ54A          | SMAJ54CA  | RE                  | ZE | 54                                               | 60                                    | 66.3     | 1          | 87.1                                             | 4.59                                                     | 1                                                        |
| SMAJ58A          | SMAJ58CA  | RG                  | ZG | 58                                               | 64.4                                  | 71.2     | 1          | 93.6                                             | 4.27                                                     | 1                                                        |
| SMAJ60A          | SMAJ60CA  | RK                  | ZK | 60                                               | 66.7                                  | 73.7     | 1          | 96.8                                             | 4.13                                                     | 1                                                        |
| SMAJ64A          | SMAJ64CA  | RM                  | ZM | 64                                               | 71.1                                  | 78.6     | 1          | 103                                              | 3.88                                                     | 1                                                        |
| SMAJ70A          | SMAJ70CA  | RP                  | ZP | 70                                               | 77.8                                  | 86       | 1          | 113                                              | 3.54                                                     | 1                                                        |
| SMAJ75A          | SMAJ75CA  | RR                  | ZR | 75                                               | 83.3                                  | 92.1     | 1          | 121                                              | 3.31                                                     | 1                                                        |
| SMAJ78A          | SMAJ78CA  | RT                  | ZT | 78                                               | 86.7                                  | 95.8     | 1          | 126                                              | 3.17                                                     | 1                                                        |
| SMAJ80A          | SMAJ80CA  | RB                  | ZB | 80                                               | 88.8                                  | 97.6     | 1          | 130                                              | 3.09                                                     | 1                                                        |
| SMAJ85A          | SMAJ85CA  | RV                  | ZV | 85                                               | 94.4                                  | 104      | 1          | 137                                              | 2.92                                                     | 1                                                        |
| SMAJ90A          | SMAJ90CA  | RX                  | ZX | 90                                               | 100                                   | 111      | 1          | 146                                              | 2.74                                                     | 1                                                        |
| SMAJ100A         | SMAJ100CA | RZ                  | ZZ | 100                                              | 111                                   | 123      | 1          | 162                                              | 2.47                                                     | 1                                                        |
| SMAJ110A         | SMAJ110CA | SE                  | VE | 110                                              | 122                                   | 135      | 1          | 177                                              | 2.26                                                     | 1                                                        |
| SMAJ120A         | SMAJ120CA | SG                  | VG | 120                                              | 133                                   | 147      | 1          | 193                                              | 2.07                                                     | 1                                                        |
| SMAJ130A         | SMAJ130CA | SK                  | VK | 130                                              | 144                                   | 159      | 1          | 209                                              | 1.91                                                     | 1                                                        |
| SMAJ140A         | SMAJ140CA | SB                  | VB | 140                                              | 155                                   | 171      | 1          | 227                                              | 1.76                                                     | 1                                                        |
| SMAJ150A         | SMAJ150CA | SM                  | VM | 150                                              | 167                                   | 185      | 1          | 243                                              | 1.65                                                     | 1                                                        |
| SMAJ160A         | SMAJ160CA | SP                  | VP | 160                                              | 178                                   | 197      | 1          | 259                                              | 1.54                                                     | 1                                                        |
| SMAJ170A         | SMAJ170CA | SR                  | VR | 170                                              | 189                                   | 209      | 1          | 275                                              | 1.45                                                     | 1                                                        |
| SMAJ180A         | SMAJ180CA | ST                  | VT | 180                                              | 200                                   | 220      | 1          | 292                                              | 1.37                                                     | 1                                                        |
| SMAJ190A         | SMAJ190CA | SV                  | VV | 190                                              | 211                                   | 232      | 1          | 308                                              | 1.3                                                      | 1                                                        |
| SMAJ200A         | SMAJ200CA | SW                  | VW | 200                                              | 224                                   | 247      | 1          | 324                                              | 1.23                                                     | 1                                                        |
| SMAJ220A         | SMAJ220CA | SX                  | VX | 220                                              | 246                                   | 272      | 1          | 356                                              | 1.12                                                     | 1                                                        |
| SMAJ250A         | SMAJ250CA | SZ                  | VZ | 250                                              | 279                                   | 309      | 1          | 405                                              | 0.99                                                     | 1                                                        |
| SMAJ300A         | SMAJ300CA | DE                  | HE | 300                                              | 335                                   | 371      | 1          | 486                                              | 0.82                                                     | 1                                                        |
| SMAJ350A         | SMAJ350CA | DG                  | HG | 350                                              | 391                                   | 432      | 1          | 567                                              | 0.71                                                     | 1                                                        |
| SMAJ400A         | SMAJ400CA | DK                  | HK | 400                                              | 447                                   | 494      | 1          | 648                                              | 0.62                                                     | 1                                                        |
| SMAJ440A         | SMAJ440CA | DM                  | HM | 440                                              | 492                                   | 543      | 1          | 713                                              | 0.56                                                     | 1                                                        |

#### NOTES:

1. Suffix "A" denotes 5% tolerance device.
2. Add suffix "CA" after part number to specify Bi-directional devices.
3. For Bi-Directional devices having VR of 10 volts and under, the  $I_R$  limit is double.

# Transient Suppression Diodes



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## SMAJ SERIES RATINGS AND CHARACTERISTICS

FIG 1. PULSE DERATING CURVE



FIG 2. MAXIMUM NON-REPETITIVE



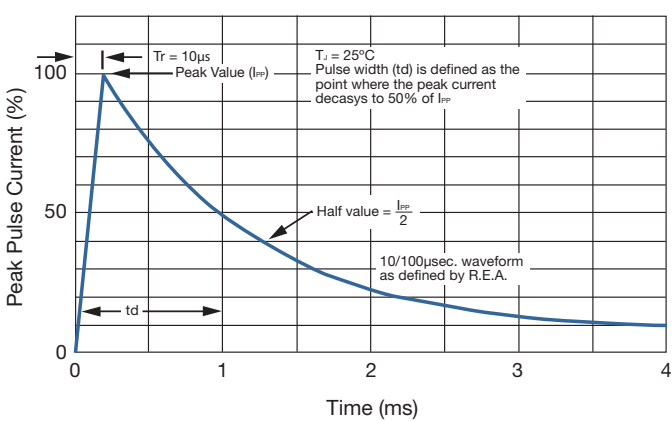
FIG 3. STEADY STATE POWER DERATING CURVE



FIG 4. PEAK PULSE POWER RATING CURVE



FIG 5. PULSE WAVEFORM



# Transient Suppression Diodes



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### SMBJ SERIES PARAMETERS

| SMBJ Part Number |           | Device Marking Code |    | Working Peak Reverse Voltage<br>$V_{RWM}$<br>(V) | Breakdown Voltage<br>$V_{BR}$ @ $I_T$ |          |            | Maximum Clamping Voltage $V_c$ (V)<br>@ $I_{PP}$ | Maximum Reverse Surge Current<br>@ 10 x 1000 $\mu$ s | Maximum Reverse Leakage $I_R$ ( $\mu$ A)<br>@ $V_{RWM}$ |
|------------------|-----------|---------------------|----|--------------------------------------------------|---------------------------------------|----------|------------|--------------------------------------------------|------------------------------------------------------|---------------------------------------------------------|
| UNI-POLAR        | BI-POLAR  | UNI                 | BI |                                                  | Min. (V)                              | Max. (V) | $I_T$ (mA) |                                                  |                                                      |                                                         |
| SMBJ5.0A         | SMBJ5.0CA | KE                  | AE | 5.0                                              | 6.40                                  | 7.00     | 10         | 9.2                                              | 65.22                                                | 800                                                     |
| SMBJ6.0A         | SMBJ6.0CA | KG                  | AG | 6.0                                              | 6.67                                  | 7.37     | 10         | 10.3                                             | 58.25                                                | 800                                                     |
| SMBJ6.5A         | SMBJ6.5CA | KK                  | AK | 6.5                                              | 7.22                                  | 7.98     | 10         | 11.2                                             | 53.57                                                | 500                                                     |
| SMBJ7.0A         | SMBJ7.0CA | KM                  | AM | 7.0                                              | 7.78                                  | 8.60     | 10         | 12.0                                             | 50.00                                                | 200                                                     |
| SMBJ7.5A         | SMBJ7.5CA | KP                  | AP | 7.5                                              | 8.33                                  | 9.21     | 1          | 12.9                                             | 46.51                                                | 100                                                     |
| SMBJ8.0A         | SMBJ8.0CA | KR                  | AR | 8.0                                              | 8.89                                  | 9.83     | 1          | 13.6                                             | 44.12                                                | 50                                                      |
| SMBJ8.5A         | SMBJ8.5CA | KT                  | AT | 8.5                                              | 9.44                                  | 10.4     | 1          | 14.4                                             | 41.67                                                | 10                                                      |
| SMBJ9.0A         | SMBJ9.0CA | KV                  | AV | 9.0                                              | 10.0                                  | 11.1     | 1          | 15.4                                             | 38.96                                                | 1                                                       |
| SMBJ10A          | SMBJ10CA  | KX                  | AX | 10                                               | 11.1                                  | 12.3     | 1          | 17.0                                             | 35.29                                                | 1                                                       |
| SMBJ11A          | SMBJ11CA  | KZ                  | AZ | 11                                               | 12.2                                  | 13.5     | 1          | 18.2                                             | 32.97                                                | 1                                                       |
| SMBJ12A          | SMBJ12CA  | LE                  | BE | 12                                               | 13.3                                  | 14.7     | 1          | 19.9                                             | 30.15                                                | 1                                                       |
| SMBJ13A          | SMBJ13CA  | LG                  | BG | 13                                               | 14.4                                  | 15.9     | 1          | 21.5                                             | 27.91                                                | 1                                                       |
| SMBJ14A          | SMBJ14CA  | LK                  | BK | 14                                               | 15.6                                  | 17.2     | 1          | 23.2                                             | 25.86                                                | 1                                                       |
| SMBJ15A          | SMBJ15CA  | LM                  | BM | 15                                               | 16.7                                  | 18.5     | 1          | 24.4                                             | 24.59                                                | 1                                                       |
| SMBJ16A          | SMBJ16CA  | LP                  | BP | 16                                               | 17.8                                  | 19.7     | 1          | 26.0                                             | 23.08                                                | 1                                                       |
| SMBJ17A          | SMBJ17CA  | LR                  | BR | 17                                               | 18.9                                  | 20.9     | 1          | 27.6                                             | 21.74                                                | 1                                                       |
| SMBJ18A          | SMBJ18CA  | LT                  | BT | 18                                               | 20.0                                  | 22.1     | 1          | 29.2                                             | 20.55                                                | 1                                                       |
| SMBJ19A          | SMBJ19CA  | LB                  | BB | 19                                               | 21.1                                  | 23.3     | 1          | 30.8                                             | 19.49                                                | 1                                                       |
| SMBJ20A          | SMBJ20CA  | LV                  | BV | 20                                               | 22.2                                  | 24.5     | 1          | 32.4                                             | 18.52                                                | 1                                                       |
| SMBJ22A          | SMBJ22CA  | LX                  | BX | 22                                               | 24.4                                  | 26.9     | 1          | 35.5                                             | 16.90                                                | 1                                                       |
| SMBJ24A          | SMBJ24CA  | LZ                  | BZ | 24                                               | 26.7                                  | 29.5     | 1          | 38.9                                             | 15.42                                                | 1                                                       |
| SMBJ26A          | SMBJ26CA  | ME                  | CE | 26                                               | 28.9                                  | 31.9     | 1          | 42.1                                             | 14.25                                                | 1                                                       |
| SMBJ28A          | SMBJ28CA  | MG                  | CG | 28                                               | 31.1                                  | 34.4     | 1          | 45.4                                             | 13.22                                                | 1                                                       |
| SMBJ30A          | SMBJ30CA  | MK                  | CK | 30                                               | 33.3                                  | 36.8     | 1          | 48.4                                             | 12.40                                                | 1                                                       |
| SMBJ33A          | SMBJ33CA  | MM                  | CM | 33                                               | 36.7                                  | 40.6     | 1          | 53.3                                             | 11.26                                                | 1                                                       |
| SMBJ36A          | SMBJ36CA  | MP                  | CP | 36                                               | 40.0                                  | 44.2     | 1          | 58.1                                             | 10.33                                                | 1                                                       |
| SMBJ40A          | SMBJ40CA  | MR                  | CR | 40                                               | 44.4                                  | 49.1     | 1          | 64.5                                             | 9.30                                                 | 1                                                       |
| SMBJ43A          | SMBJ43CA  | MT                  | CT | 43                                               | 47.8                                  | 52.8     | 1          | 69.4                                             | 8.65                                                 | 1                                                       |
| SMBJ45A          | SMBJ45CA  | MV                  | CV | 45                                               | 50.0                                  | 55.3     | 1          | 72.7                                             | 8.25                                                 | 1                                                       |
| SMBJ48A          | SMBJ48CA  | MX                  | CX | 48                                               | 53.3                                  | 58.9     | 1          | 77.4                                             | 7.75                                                 | 1                                                       |
| SMBJ51A          | SMBJ51CA  | MZ                  | CZ | 51                                               | 56.7                                  | 62.7     | 1          | 82.4                                             | 7.28                                                 | 1                                                       |
| SMBJ54A          | SMBJ54CA  | NE                  | DE | 54                                               | 60.0                                  | 66.3     | 1          | 87.1                                             | 6.89                                                 | 1                                                       |
| SMBJ58A          | SMBJ58CA  | NG                  | DG | 58                                               | 64.4                                  | 71.2     | 1          | 93.6                                             | 6.41                                                 | 1                                                       |
| SMBJ60A          | SMBJ60CA  | NK                  | DK | 60                                               | 66.7                                  | 73.7     | 1          | 96.8                                             | 6.20                                                 | 1                                                       |
| SMBJ64A          | SMBJ64CA  | NM                  | DM | 64                                               | 71.1                                  | 78.6     | 1          | 103                                              | 5.83                                                 | 1                                                       |
| SMBJ70A          | SMBJ70CA  | NP                  | DP | 70                                               | 77.8                                  | 86.0     | 1          | 113                                              | 5.31                                                 | 1                                                       |
| SMBJ75A          | SMBJ75CA  | NR                  | DR | 75                                               | 83.3                                  | 92.1     | 1          | 121                                              | 4.96                                                 | 1                                                       |
| SMBJ78A          | SMBJ78CA  | NT                  | DT | 78                                               | 86.7                                  | 95.8     | 1          | 126                                              | 4.76                                                 | 1                                                       |
| SMBJ80A          | SMBJ80CA  | NB                  | DB | 80                                               | 88.8                                  | 97.6     | 1          | 130                                              | 4.63                                                 | 1                                                       |
| SMBJ85A          | SMBJ85CA  | NV                  | DV | 85                                               | 94.4                                  | 104      | 1          | 137                                              | 4.38                                                 | 1                                                       |
| SMBJ90A          | SMBJ90CA  | NX                  | DX | 90                                               | 100                                   | 111      | 1          | 146                                              | 4.11                                                 | 1                                                       |
| SMBJ100A         | SMBJ100CA | NZ                  | DZ | 100                                              | 111                                   | 123      | 1          | 162                                              | 3.70                                                 | 1                                                       |
| SMBJ110A         | SMBJ110CA | PE                  | EE | 110                                              | 122                                   | 135      | 1          | 177                                              | 3.39                                                 | 1                                                       |
| SMBJ120A         | SMBJ120CA | PG                  | EG | 120                                              | 133                                   | 147      | 1          | 193                                              | 3.11                                                 | 1                                                       |
| SMBJ130A         | SMBJ130CA | PK                  | EK | 130                                              | 144                                   | 159      | 1          | 209                                              | 2.87                                                 | 1                                                       |
| SMBJ140A         | SMBJ140CA | PB                  | EB | 140                                              | 155                                   | 171      | 1          | 227                                              | 2.65                                                 | 1                                                       |
| SMBJ150A         | SMBJ150CA | PM                  | EM | 150                                              | 167                                   | 185      | 1          | 243                                              | 2.47                                                 | 1                                                       |
| SMBJ160A         | SMBJ160CA | PP                  | EP | 160                                              | 178                                   | 197      | 1          | 259                                              | 2.32                                                 | 1                                                       |
| SMBJ170A         | SMBJ170CA | PR                  | ER | 170                                              | 189                                   | 209      | 1          | 275                                              | 2.18                                                 | 1                                                       |
| SMBJ180A         | SMBJ180CA | PT                  | ET | 180                                              | 200                                   | 220      | 1          | 292                                              | 2.06                                                 | 1                                                       |
| SMBJ190A         | SMBJ190CA | PV                  | EV | 190                                              | 211                                   | 232      | 1          | 308                                              | 1.95                                                 | 1                                                       |
| SMBJ200A         | SMBJ200CA | PW                  | EW | 200                                              | 224                                   | 247      | 1          | 324                                              | 1.85                                                 | 1                                                       |
| SMBJ220A         | SMBJ220CA | PX                  | EX | 220                                              | 246                                   | 272      | 1          | 356                                              | 1.69                                                 | 1                                                       |
| SMBJ250A         | SMBJ250CA | PZ                  | EZ | 250                                              | 279                                   | 309      | 1          | 405                                              | 1.48                                                 | 1                                                       |
| SMBJ300A         | SMBJ300CA | QE                  | FE | 300                                              | 335                                   | 371      | 1          | 486                                              | 1.23                                                 | 1                                                       |
| SMBJ350A         | SMBJ350CA | QG                  | FG | 350                                              | 391                                   | 432      | 1          | 567                                              | 1.06                                                 | 1                                                       |
| SMBJ400A         | SMBJ400CA | QK                  | FK | 400                                              | 447                                   | 494      | 1          | 648                                              | 0.93                                                 | 1                                                       |
| SMBJ440A         | SMBJ440CA | QM                  | FM | 440                                              | 492                                   | 543      | 1          | 713                                              | 0.84                                                 | 1                                                       |

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FIG 1. PULSE DERATING CURVE

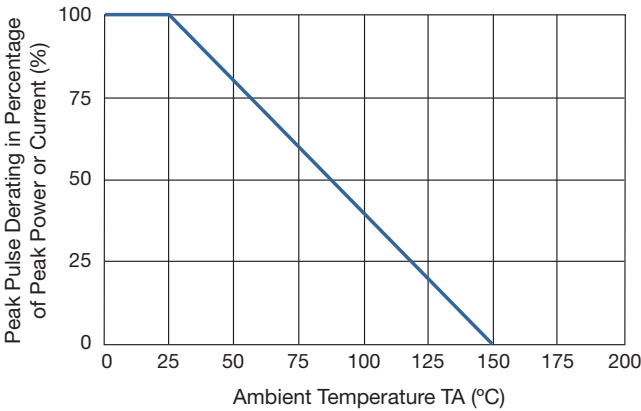


FIG 2. MAXIMUM NON-REPETITIVE

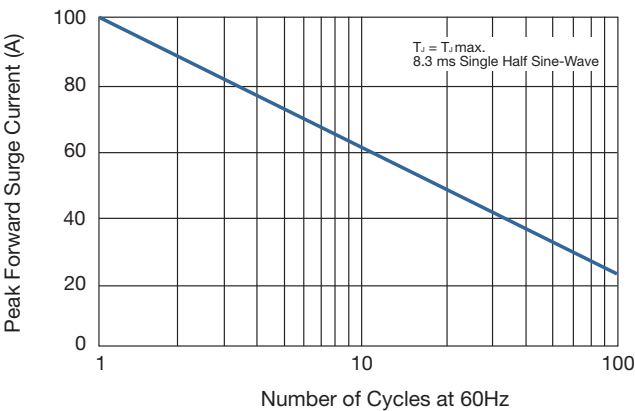


FIG 3. STEADY STATE POWER DERATING CURVE

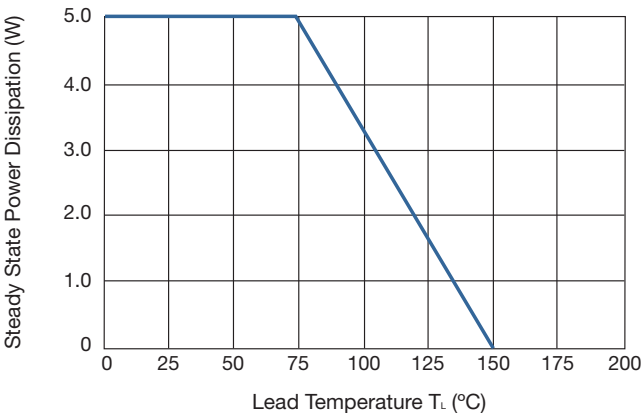


FIG 4. PEAK PULSE POWER RATING CURVE

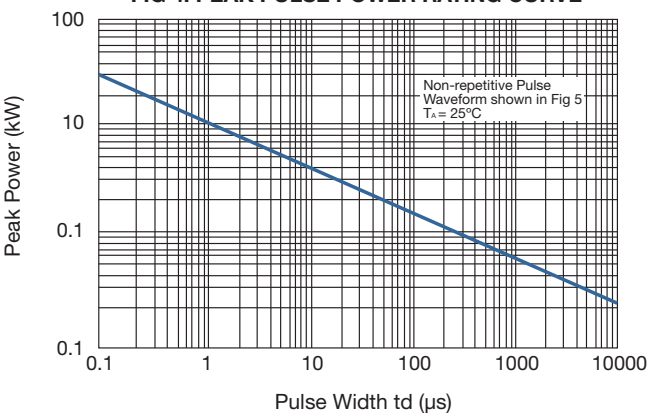
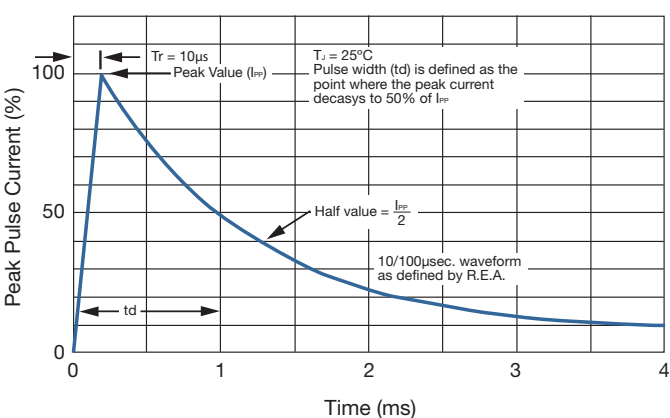


FIG 5. PULSE WAVEFORM



# Transient Suppression Diodes



For General Purpose Use

## SMCJ SERIES PARAMETERS

| SMCJ<br>Part Number |           | Device<br>Marking<br>Code |     | Working Peak<br>Reverse Voltage<br>$V_{RWM}$<br>(V) | Breakdown Voltage<br>$V_{BR}$ @ $I_T$ |          |            | Maximum<br>Clamping<br>Voltage $V_c$ (V)<br>@ $I_{PP}$ | Maximum<br>Reverse<br>Surge Current<br>@ $10 \times 1000\mu s$ | Maximum<br>Reverse<br>Leakage $I_R$ ( $\mu A$ )<br>@ $V_{RWM}$ |
|---------------------|-----------|---------------------------|-----|-----------------------------------------------------|---------------------------------------|----------|------------|--------------------------------------------------------|----------------------------------------------------------------|----------------------------------------------------------------|
| UNI-POLAR           | BI-POLAR  | UNI                       | BI  |                                                     | Min. (V)                              | Max. (V) | $I_T$ (mA) |                                                        |                                                                |                                                                |
| SMCJ5.0A            | SMCJ5.0CA | GDE                       | BDE | 5.0                                                 | 6.40                                  | 7.00     | 10         | 9.2                                                    | 163.0                                                          | 800                                                            |
| SMCJ6.0A            | SMCJ6.0CA | GDG                       | BDG | 6.0                                                 | 6.67                                  | 7.37     | 10         | 10.3                                                   | 145.6                                                          | 800                                                            |
| SMCJ6.5A            | SMCJ6.5CA | GDK                       | BDK | 6.5                                                 | 7.22                                  | 7.98     | 10         | 11.2                                                   | 133.9                                                          | 500                                                            |
| SMCJ7.0A            | SMCJ7.0CA | GDM                       | BDM | 7.0                                                 | 7.78                                  | 8.60     | 10         | 12.0                                                   | 125.0                                                          | 200                                                            |
| SMCJ7.5A            | SMCJ7.5CA | GDP                       | BDP | 7.5                                                 | 8.33                                  | 9.21     | 1          | 12.9                                                   | 116.3                                                          | 100                                                            |
| SMCJ8.0A            | SMCJ8.0CA | GDR                       | BDR | 8.0                                                 | 8.89                                  | 9.83     | 1          | 13.6                                                   | 110.3                                                          | 50                                                             |
| SMCJ8.5A            | SMCJ8.5CA | GDT                       | BDT | 8.5                                                 | 9.44                                  | 10.40    | 1          | 14.4                                                   | 104.2                                                          | 10                                                             |
| SMCJ9.0A            | SMCJ9.0CA | GDV                       | BDV | 9.0                                                 | 10.00                                 | 11.10    | 1          | 15.4                                                   | 97.4                                                           | 5.0                                                            |
| SMCJ10A             | SMCJ10CA  | GDX                       | BDX | 10                                                  | 11.10                                 | 12.30    | 1          | 17.0                                                   | 88.2                                                           | 5.0                                                            |
| SMCJ11A             | SMCJ11CA  | GDZ                       | BDZ | 11                                                  | 12.20                                 | 13.50    | 1          | 18.2                                                   | 82.4                                                           | 5.0                                                            |
| SMCJ12A             | SMCJ12CA  | GEE                       | BEE | 12                                                  | 13.30                                 | 14.70    | 1          | 19.9                                                   | 75.4                                                           | 5.0                                                            |
| SMCJ13A             | SMCJ13CA  | GEG                       | BEG | 13                                                  | 14.40                                 | 15.90    | 1          | 21.5                                                   | 69.8                                                           | 5.0                                                            |
| SMCJ14A             | SMCJ14CA  | GEK                       | BEK | 14                                                  | 15.60                                 | 17.20    | 1          | 23.2                                                   | 64.7                                                           | 5.0                                                            |
| SMCJ15A             | SMCJ15CA  | GEM                       | BEM | 15                                                  | 16.70                                 | 18.50    | 1          | 24.4                                                   | 61.5                                                           | 5.0                                                            |
| SMCJ16A             | SMCJ16CA  | GEP                       | BEP | 16                                                  | 17.80                                 | 19.70    | 1          | 26.0                                                   | 57.7                                                           | 5.0                                                            |
| SMCJ17A             | SMCJ17CA  | GER                       | BER | 17                                                  | 18.90                                 | 20.90    | 1          | 27.6                                                   | 54.3                                                           | 5.0                                                            |
| SMCJ18A             | SMCJ18CA  | GET                       | BET | 18                                                  | 20.00                                 | 22.10    | 1          | 29.2                                                   | 51.4                                                           | 5.0                                                            |
| SMCJ19A             | SMCJ19CA  | GEB                       | BEB | 19                                                  | 21.10                                 | 23.30    | 1          | 30.8                                                   | 48.7                                                           | 5.0                                                            |
| SMCJ20A             | SMCJ20CA  | GEV                       | BEV | 20                                                  | 22.20                                 | 24.50    | 1          | 32.4                                                   | 46.3                                                           | 5.0                                                            |
| SMCJ22A             | SMCJ22CA  | GEX                       | BEX | 22                                                  | 24.40                                 | 26.90    | 1          | 35.5                                                   | 42.3                                                           | 5.0                                                            |
| SMCJ24A             | SMCJ24CA  | GEZ                       | BEZ | 24                                                  | 26.70                                 | 29.50    | 1          | 38.9                                                   | 38.6                                                           | 5.0                                                            |
| SMCJ26A             | SMCJ26CA  | GFE                       | BEF | 26                                                  | 28.90                                 | 31.90    | 1          | 42.1                                                   | 35.6                                                           | 5.0                                                            |
| SMCJ28A             | SMCJ28CA  | GFG                       | BEF | 28                                                  | 31.10                                 | 34.40    | 1          | 45.4                                                   | 33.0                                                           | 5.0                                                            |
| SMCJ30A             | SMCJ30CA  | GFK                       | BEF | 30                                                  | 33.30                                 | 36.80    | 1          | 48.4                                                   | 31.0                                                           | 5.0                                                            |
| SMCJ33A             | SMCJ33CA  | GFM                       | BFM | 33                                                  | 36.70                                 | 40.60    | 1          | 53.3                                                   | 28.1                                                           | 5.0                                                            |
| SMCJ36A             | SMCJ36CA  | GFP                       | BFP | 36                                                  | 40.00                                 | 44.20    | 1          | 58.1                                                   | 25.8                                                           | 5.0                                                            |
| SMCJ40A             | SMCJ40CA  | GFR                       | BFR | 40                                                  | 44.40                                 | 49.10    | 1          | 64.5                                                   | 23.3                                                           | 5.0                                                            |
| SMCJ43A             | SMCJ43CA  | GFT                       | BFT | 43                                                  | 47.80                                 | 52.80    | 1          | 69.4                                                   | 21.6                                                           | 5.0                                                            |
| SMCJ45A             | SMCJ45CA  | GFV                       | BFV | 45                                                  | 50.00                                 | 55.30    | 1          | 72.7                                                   | 20.6                                                           | 5.0                                                            |
| SMCJ48A             | SMCJ48CA  | GFX                       | BFX | 48                                                  | 53.30                                 | 58.90    | 1          | 77.4                                                   | 19.4                                                           | 5.0                                                            |
| SMCJ51A             | SMCJ51CA  | GFZ                       | BFZ | 51                                                  | 56.70                                 | 62.70    | 1          | 82.4                                                   | 18.2                                                           | 5.0                                                            |
| SMCJ54A             | SMCJ54CA  | GGE                       | BGE | 54                                                  | 60.00                                 | 66.30    | 1          | 87.1                                                   | 17.2                                                           | 5.0                                                            |
| SMCJ58A             | SMCJ58CA  | GGG                       | BGG | 58                                                  | 64.40                                 | 71.20    | 1          | 93.6                                                   | 16.0                                                           | 5.0                                                            |
| SMCJ60A             | SMCJ60CA  | GGK                       | BGK | 60                                                  | 66.70                                 | 73.70    | 1          | 96.8                                                   | 15.5                                                           | 5.0                                                            |
| SMCJ64A             | SMCJ64CA  | GGM                       | BGM | 64                                                  | 71.10                                 | 78.60    | 1          | 103                                                    | 14.6                                                           | 5.0                                                            |
| SMCJ70A             | SMCJ70CA  | GGP                       | BGP | 70                                                  | 77.80                                 | 86.00    | 1          | 113                                                    | 13.3                                                           | 5.0                                                            |
| SMCJ75A             | SMCJ75CA  | GGR                       | BGR | 75                                                  | 83.30                                 | 92.10    | 1          | 121                                                    | 12.4                                                           | 5.0                                                            |
| SMCJ78A             | SMCJ78CA  | GGT                       | BGT | 78                                                  | 86.70                                 | 95.80    | 1          | 126                                                    | 11.9                                                           | 5.0                                                            |
| SMCJ80A             | SMCJ80CA  | GGB                       | BGB | 80                                                  | 88.80                                 | 97.60    | 1          | 130                                                    | 11.6                                                           | 5.0                                                            |
| SMCJ85A             | SMCJ85CA  | GGV                       | BGV | 85                                                  | 94.40                                 | 104      | 1          | 137                                                    | 10.9                                                           | 5.0                                                            |
| SMCJ90A             | SMCJ90CA  | GGX                       | BGX | 90                                                  | 100                                   | 111      | 1          | 146                                                    | 10.3                                                           | 5.0                                                            |
| SMCJ100A            | SMCJ100CA | GGZ                       | BGZ | 100                                                 | 111                                   | 123      | 1          | 162                                                    | 9.3                                                            | 5.0                                                            |
| SMCJ110A            | SMCJ110CA | GHE                       | BHE | 110                                                 | 122                                   | 135      | 1          | 177                                                    | 8.5                                                            | 5.0                                                            |
| SMCJ120A            | SMCJ120CA | GHG                       | BHG | 120                                                 | 133                                   | 147      | 1          | 193                                                    | 7.8                                                            | 5.0                                                            |
| SMCJ130A            | SMCJ130CA | GHK                       | BHK | 130                                                 | 144                                   | 159      | 1          | 209                                                    | 7.2                                                            | 5.0                                                            |
| SMCJ140A            | SMCJ140CA | GHB                       | BHB | 140                                                 | 155                                   | 171      | 1          | 227                                                    | 6.6                                                            | 5.0                                                            |
| SMCJ150A            | SMCJ150CA | GHM                       | BHM | 150                                                 | 167                                   | 185      | 1          | 243                                                    | 6.2                                                            | 5.0                                                            |
| SMCJ160A            | SMCJ160CA | GHP                       | BHP | 160                                                 | 178                                   | 197      | 1          | 259                                                    | 5.8                                                            | 5.0                                                            |
| SMCJ170A            | SMCJ170CA | GHR                       | BHR | 170                                                 | 189                                   | 209      | 1          | 275                                                    | 5.5                                                            | 5.0                                                            |
| SMCJ180A            | SMCJ180CA | GHT                       | BHT | 180                                                 | 200                                   | 220      | 1          | 291                                                    | 5.1                                                            | 5.0                                                            |
| SMCJ190A            | SMCJ190CA | GHV                       | BHV | 190                                                 | 211                                   | 232      | 1          | 308                                                    | 4.9                                                            | 5.0                                                            |
| SMCJ200A            | SMCJ200CA | GHW                       | BHW | 200                                                 | 224                                   | 247      | 1          | 324                                                    | 4.6                                                            | 5.0                                                            |
| SMCJ220A            | SMCJ220CA | GHX                       | BHX | 220                                                 | 246                                   | 272      | 1          | 356                                                    | 4.2                                                            | 5.0                                                            |
| SMCJ250A            | SMCJ250CA | GHZ                       | BHZ | 250                                                 | 279                                   | 309      | 1          | 405                                                    | 3.7                                                            | 5.0                                                            |
| SMCJ300A            | SMCJ300CA | GJE                       | BJE | 300                                                 | 335                                   | 371      | 1          | 486                                                    | 3.1                                                            | 5.0                                                            |
| SMCJ350A            | SMCJ350CA | GJG                       | BJG | 350                                                 | 391                                   | 432      | 1          | 567                                                    | 2.6                                                            | 5.0                                                            |
| SMCJ400A            | SMCJ400CA | GJK                       | BJK | 400                                                 | 447                                   | 494      | 1          | 648                                                    | 2.3                                                            | 5.0                                                            |
| SMCJ440A            | SMCJ440CA | GJM                       | BJM | 440                                                 | 492                                   | 543      | 1          | 713                                                    | 2.1                                                            | 5.0                                                            |

NOTES:

1. Suffix "A" denotes 5% tolerance device.
2. Add suffix "CA" after part number to specify Bi-directional devices.
3. For Bi-Directional devices having VR of 10 volts and under, the  $I_R$  limit is double.

# Transient Suppression Diodes



For General Purpose Use

## SMCJ SERIES RATINGS AND CHARACTERISTICS

FIG 1. PULSE DERATING CURVE



FIG 2. MAXIMUM NON-REPETITIVE



FIG 3. STEADY STATE POWER DERATING CURVE



FIG 4. PEAK PULSE POWER RATING CURVE



FIG 5. PULSE WAVEFORM



# Transient Suppression Diodes

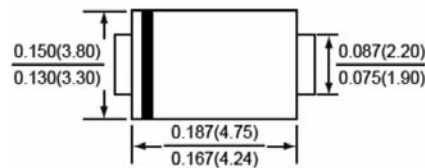


For General Purpose Use

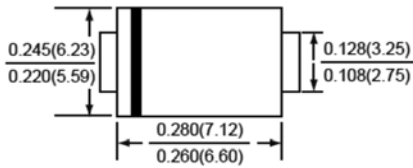
## COMPONENT DIMENSIONS



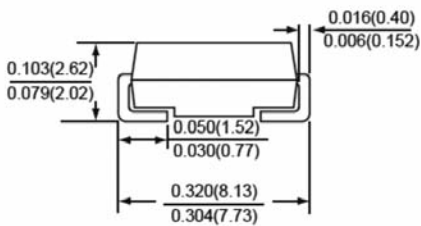
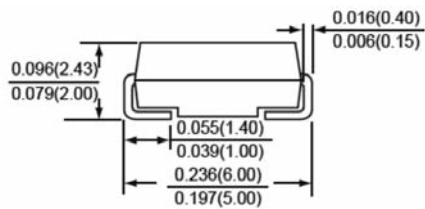
SMA/DO-214AC



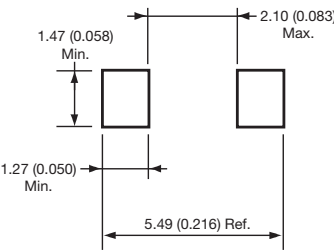
SMB/DO-214AA



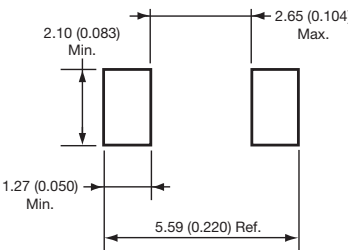
SMC/DO-214AB



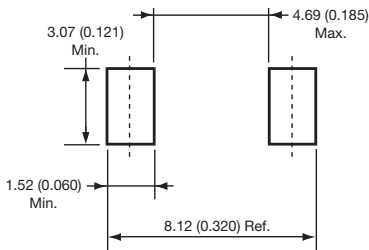
## RECOMMENDED PAD DIMENSIONS



DO-214AC (SMA)



DO-214AA (SMB)



DO-214AB (SMC)





## PACKAGING SPECIFICATIONS FOR SMA, SMB, SMC SERIES OR GENERAL PURPOSE TRANSIENT VOLTAGE SUPPRESSION DIODES

Technical drawing of a 30° tapered roller bearing, showing a cross-section (left) and an end view (right).

**Cross-section (Left):**

- $K$ : Addendum of the outer race.
- $t$ : Thickness of the top cover tape.
- Top Cover Tape**: Label pointing to the top layer of the bearing.
- $B_1$ : Width of the bearing at the small end.
- $K_0$ : Addendum of the inner race.

**End View (Right):**

- $D$ : Pitch diameter of the outer race.
- $P_0$ : Pitch diameter of the inner race.
- $P_2$ : Pitch diameter of the intermediate race.
- 10 pitches cumulative tolerance on tape  $\pm 0.2\text{ mm}$  (0.008)**: Tolerance specification for the tape.
- $E$ : Width of the bearing at the large end.
- $F$ : Width of the bearing at the intermediate race.
- $W$ : Total width of the bearing.
- $A_0$ : Addendum of the outer race at the intermediate race.
- $B_0$ : Width of the bearing at the intermediate race.
- $P$ : Pitch diameter of the intermediate race.
- $D_1$ : Pitch diameter of the inner race at the large end.

**For Machine Reference Only Including Draft Radii Concentric Around  $B_0$** : Label pointing to the draft radii in the cross-section.

**User Direction of Feed**: Arrow indicating the direction of feed.

**For components 2.00 mm x 1.20 mm and larger (0.079 x 0.047)**: Note indicating the tolerance for components of this size.

| SYMBOL   | SPECIFICATIONS |              |              |              |
|----------|----------------|--------------|--------------|--------------|
|          | Unit           | SMA          | SMB          | SMC          |
| W        | mm             | 12.0±0.3     | 12.0±0.3     | 16.0±0.3     |
| D        | mm             | 1.55±0.1-0.0 | 1.55±0.1-0.0 | 1.55±0.1-0.0 |
| E        | mm             | 1.75±0.10    | 1.75±0.10    | 1.75±0.10    |
| P0       | mm             | 4.0±0.10     | 4.0±0.10     | 4.0±0.10     |
| t (Max)  | mm             | 0.400        | 0.400        | 0.400        |
| A0       | mm             | 2.79±0.10    | 3.67±0.10    | 6.05±0.10    |
| B0       | mm             | 5.33±0.10    | 5.69±0.10    | 8.31±0.10    |
| K0       | mm             | 2.36±0.10    | 2.67±0.10    | 2.54±0.10    |
| B1 (Max) | mm             | 8.2          | 8.2          | 12.1         |
| D1 (Min) | mm             | 1.5          | 1.5          | 1.5          |
| F        | mm             | 5.5±0.05     | 5.5±0.05     | 7.5±0.05     |
| K (Max)  | mm             | 4.5          | 4.5          | 3.29         |
| P2       | mm             | 2.0±0.05     | 2.0±0.05     | 2.0±0.05     |
| P        | mm             | 4.0±0.10     | 8.0±0.10     | 8.0±0.10     |

# Transient Suppression Diodes

For General Purpose Use



## REEL



| SYMBOL    | SPECIFICATIONS |               |                |                |
|-----------|----------------|---------------|----------------|----------------|
|           | Unit           | SMA           | SMB            | SMC            |
| Tape size | mm             | 12            | 12             | 16             |
| A         | inch           | 13            | 13             | 13             |
| B (max)   | mm             | 1.5           | 1.5            | 1.5            |
| C         | mm             | 13±0.2        | 13±0.2         | 13±0.2         |
| D (max)   | mm             | 20.2          | 20.2           | 20.2           |
| N (min)   | mm             | 50            | 50             | 50             |
| G         | mm             | 12.4 +2.0/0.0 | 12.4 +2.0/-0.0 | 16.4 +2.0/-0.0 |
| T (max)   | mm             | 18.4          | 18.4           | 22.4           |

## QUANTITIES

| SYMBOL          | SPECIFICATIONS |      |     |     |
|-----------------|----------------|------|-----|-----|
|                 | Unit           | SMA  | SMB | SMC |
| Qty per reel    | k              | 7.5  | 3   | 3   |
| Weight per reel | kg             | 0.85 | 0.6 | 1.2 |