

# SURGiNG

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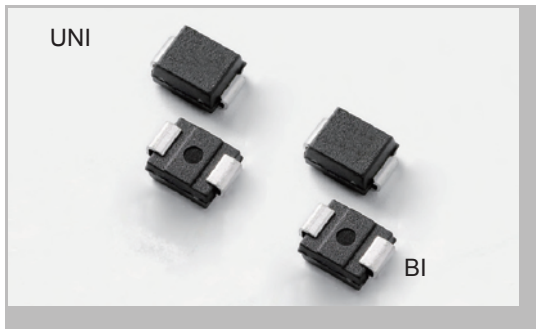


# Transient Voltage Suppressor

瞬态抑制二极管

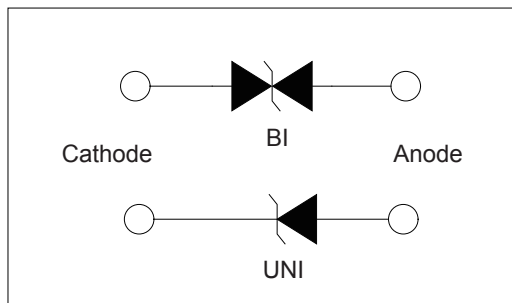
SMBJ Series

## Transient Voltage Suppressors - SMBJ Series



### Features

1. Halogen-free
2. Rohs compliant
3. Typical maximum temperature coefficient
4.  $\Delta V_{BR} = 0.1\% \times V_{BR}@25^{\circ}\text{C} \times \Delta T$
5. Glass passivated Chip junction in DO-214AA package
6. 600W peak pulse capability at 10×1000μs waveform, repetition rate(duty cycles):0.01%
7. Fast response time:typically less than 1.0ps from 0 Volts to BV min
8. Excellent clamping capability
9. Low incremental surge resistance
10. Typical IR less than 5μA above 12V
11. High temperature soldering guaranteed: 260°C/40 seconds / 0.375", (9.5mm) lead length, 5lbs., (2.3kg) tension
12. Plastic package has underwriters laboratory flammability classification 94v-0



### Applications

TVS devices are ideal for the protection of I/O interfaces,VCC bus and other vulnerable circuits used in telecom, computer, industrial and consumer electronic applications.

### Mechanical Characteristics

| Rating   | Symbol          | Value          | Units |
|--|-----------------|----------------|-------|
| Peak Pulse Power Dissipation by 10x1000μs test waveform (Fig.1)(Note 1)              | $P_{PPM}$       | 600            | Watts |
| Steady State Power Dissipation on infinite heat sink at TL=75°C (Fig. 5)             | $P_D$           | 5              | Watts |
| Peak Forward Surge Current, 8.3ms Single Half Sine Wave Unidirectional only (Note 2) | $I_{FSM}$       | 100            | Amps  |
| Maximum Instantaneous Forward Voltage at 25A for Unidirectional only (Note 3)        | $V_F$           | 3.5/5.0        | V     |
| Operating junction and Storage Temperature Range.                                    | $T_J, T_{STG}$  | -55°C to 150°C | °C    |
| Typical Thermal Resistance Junction to Lead  | $R_{\theta JL}$ | 20             | °C/W  |
| Typical Thermal Resistance Junction to Ambient                                       | $R_{\theta JA}$ | 100            | °C/W  |

Notes:

1. Non-repetitive current pulse , per Fig. 3 and derated above  $T_A = 25^{\circ}\text{C}$  per Fig. 2.
2. Mounted on copper pad area of 0.2x0.2" (5.0 x 5.0mm) to each terminal.
3. Measured on 8.3ms single half sine wave or equivalent square wave for unidirectional device only, duty cycle=4 per minute maximum.
4.  $V_F < 3.5V$  for  $V_{BR} < 200V$  and  $V_F < 5.0V$  for  $V_{BR} > 201V$ .

## Electrical Characteristics

| Type Number |           | Device Marking Code |    | Reverse Stand-Off Voltage | Breakdown Voltage@I <sub>T</sub> |                         | Test Current        | Maximum Clamping Voltage@I <sub>pp</sub> | Peak Pulse Current  | Reverse Leakage @V <sub>RWM</sub> |
|-------------|-----------|---------------------|----|---------------------------|----------------------------------|-------------------------|---------------------|--|---------------------|-----------------------------------|
| (UNI)       | (BI)      | UNI                 | BI | V <sub>RWM</sub> (V)      | V <sub>BR</sub> MIN.(V)          | V <sub>BR</sub> MAX.(V) | I <sub>T</sub> (mA) | V <sub>C</sub> (V)                       | I <sub>pp</sub> (A) | IR(μA)                            |
| SMBJ3.3A    | SMBJ3.3CA | KC                  | *  | 3.3                       | 4.10                             | 4.60                    | 1                   | 7.3                                      | 50.0                | 200                               |
| SMBJ5.0A    | SMBJ5.0CA | KE                  | AE | 5.0                       | 6.40                             | 7.25                    | 10                  | 9.2                                      | 65.2                | 800                               |
| SMBJ6.0A    | SMBJ6.0CA | KG                  | AG | 6.0                       | 6.67                             | 7.67                    | 10                  | 10.3                                     | 58.3                | 800                               |
| SMBJ6.5A    | SMBJ6.5CA | KK                  | AK | 6.5                       | 7.22                             | 8.30                    | 10                  | 11.2                                     | 53.6                | 500                               |
| SMBJ7.0A    | SMBJ7.0CA | KM                  | AM | 7.0                       | 7.78                             | 8.95                    | 10                  | 12.0                                     | 50.0                | 200                               |
| SMBJ7.5A    | SMBJ7.5CA | KP                  | AP | 7.5                       | 8.33                             | 9.58                    | 1                   | 12.9                                     | 46.6                | 100                               |
| SMBJ8.0A    | SMBJ8.0CA | KR                  | AR | 8.0                       | 8.89                             | 10.23                   | 1                   | 13.6                                     | 44.1                | 50                                |
| SMBJ8.5A    | SMBJ8.5CA | KT                  | AT | 8.5                       | 9.44                             | 10.82                   | 1                   | 14.4                                     | 41.7                | 20                                |
| SMBJ9.0A    | SMBJ9.0CA | KV                  | AV | 9.0                       | 10.00                            | 11.50                   | 1                   | 15.4                                     | 39.0                | 10                                |
| SMBJ10A     | SMBJ10CA  | KX                  | AX | 10.0                      | 11.10                            | 12.80                   | 1                   | 17.0                                     | 35.3                | 5.0                               |
| SMBJ11A     | SMBJ11CA  | KZ                  | AZ | 11.0                      | 12.20                            | 14.00                   | 1                   | 18.2                                     | 33.0                | 5.0                               |
| SMBJ12A     | SMBJ12CA  | LE                  | BE | 12.0                      | 13.30                            | 15.30                   | 1                   | 19.9                                     | 30.2                | 5.0                               |
| SMBJ13A     | SMBJ13CA  | LG                  | BG | 13.0                      | 14.40                            | 16.50                   | 1                   | 21.5                                     | 27.9                | 5.0                               |
| SMBJ14A     | SMBJ14CA  | LK                  | BK | 14.0                      | 15.60                            | 17.90                   | 1                   | 23.2                                     | 25.8                | 5.0                               |
| SMBJ15A     | SMBJ15CA  | LM                  | BM | 15.0                      | 16.70                            | 19.20                   | 1                   | 24.4                                     | 24.6                | 5.0                               |
| SMBJ16A     | SMBJ16CA  | LP                  | BP | 16.0                      | 17.80                            | 20.50                   | 1                   | 26.0                                     | 23.1                | 5.0                               |
| SMBJ17A     | SMBJ17CA  | LR                  | BR | 17.0                      | 18.90                            | 21.70                   | 1                   | 27.6                                     | 21.7                | 5.0                               |
| SMBJ18A     | SMBJ18CA  | LT                  | BT | 18.0                      | 20.00                            | 23.30                   | 1                   | 29.2                                     | 20.5                | 5.0                               |
| SMBJ20A     | SMBJ20CA  | LV                  | BV | 20.0                      | 22.20                            | 25.50                   | 1                   | 32.4                                     | 18.5                | 5.0                               |
| SMBJ22A     | SMBJ22CA  | LX                  | BX | 22.0                      | 24.40                            | 28.00                   | 1                   | 35.5                                     | 16.9                | 5.0                               |
| SMBJ24A     | SMBJ24CA  | LZ                  | BZ | 24.0                      | 26.70                            | 30.70                   | 1                   | 38.9                                     | 15.2                | 5.0                               |
| SMBJ26A     | SMBJ26CA  | ME                  | CE | 26.0                      | 28.90                            | 33.20                   | 1                   | 42.1                                     | 14.2                | 5.0                               |
| SMBJ28A     | SMBJ28CA  | MG                  | CG | 28.0                      | 31.10                            | 35.80                   | 1                   | 45.4                                     | 13.2                | 5.0                               |
| SMBJ30A     | SMBJ30CA  | MK                  | CK | 30.0                      | 33.30                            | 38.30                   | 1                   | 48.4                                     | 12.4                | 5.0                               |
| SMBJ33A     | SMBJ33CA  | MM                  | CM | 33.0                      | 36.70                            | 42.20                   | 1                   | 53.3                                     | 11.3                | 5.0                               |
| SMBJ36A     | SMBJ36CA  | MP                  | CP | 36.0                      | 40.00                            | 46.00                   | 1                   | 58.1                                     | 10.3                | 5.0                               |
| SMBJ40A     | SMBJ40CA  | MR                  | CR | 40.0                      | 44.40                            | 51.10                   | 1                   | 64.5                                     | 9.3                 | 5.0                               |
| SMBJ43A     | SMBJ43CA  | MT                  | CT | 43.0                      | 47.80                            | 54.90                   | 1                   | 69.4                                     | 8.6                 | 5.0                               |
| SMBJ45A     | SMBJ45CA  | MV                  | CV | 45.0                      | 50.00                            | 57.50                   | 1                   | 72.7                                     | 8.3                 | 5.0                               |
| SMBJ48A     | SMBJ48CA  | MX                  | CX | 48.0                      | 53.30                            | 61.30                   | 1                   | 77.4                                     | 7.7                 | 5.0                               |
| SMBJ51A     | SMBJ51CA  | MZ                  | CZ | 51.0                      | 56.70                            | 65.20                   | 1                   | 82.4                                     | 7.3                 | 5.0                               |
| SMBJ54A     | SMBJ54CA  | NE                  | DE | 54.0                      | 60.00                            | 69.00                   | 1                   | 87.1                                     | 6.9                 | 5.0                               |
| SMBJ58A     | SMBJ58CA  | NG                  | DG | 58.0                      | 64.40                            | 74.10                   | 1                   | 93.6                                     | 6.4                 | 5.0                               |
| SMBJ60A     | SMBJ60CA  | NK                  | DK | 60.0                      | 66.70                            | 76.70                   | 1                   | 96.8                                     | 6.2                 | 5.0                               |
| SMBJ64A     | SMBJ64CA  | NM                  | DM | 64.0                      | 71.10                            | 81.80                   | 1                   | 103.0                                    | 5.8                 | 5.0                               |
| SMBJ70A     | SMBJ70CA  | NP                  | DP | 70.0                      | 77.80                            | 89.50                   | 1                   | 113.0                                    | 5.3                 | 5.0                               |
| SMBJ75A     | SMBJ75CA  | NR                  | DR | 75.0                      | 83.30                            | 95.80                   | 1                   | 121.0                                    | 4.9                 | 5.0                               |
| SMBJ78A     | SMBJ78CA  | NT                  | DT | 78.0                      | 86.70                            | 99.70                   | 1                   | 126.0                                    | 4.7                 | 5.0                               |
| SMBJ85A     | SMBJ85CA  | NV                  | DV | 85.0                      | 94.40                            | 108.20                  | 1                   | 137.0                                    | 4.4                 | 5.0                               |
| SMBJ90A     | SMBJ90CA  | NX                  | DX | 90.0                      | 100.00                           | 115.50                  | 1                   | 146.0                                    | 4.1                 | 5.0                               |
| SMBJ100A    | SMBJ100CA | NZ                  | DZ | 100.0                     | 111.00                           | 128.00                  | 1                   | 162.0                                    | 3.7                 | 5.0                               |
| SMBJ110A    | SMBJ110CA | PE                  | EE | 110.0                     | 122.00                           | 140.50                  | 1                   | 177.0                                    | 3.4                 | 5.0                               |
| SMBJ120A    | SMBJ120CA | PG                  | EG | 120.0                     | 133.00                           | 153.00                  | 1                   | 193.0                                    | 3.1                 | 5.0                               |
| SMBJ130A    | SMBJ130CA | PK                  | EK | 130.0                     | 144.00                           | 165.50                  | 1                   | 209.0                                    | 2.9                 | 5.0                               |
| SMBJ150A    | SMBJ150CA | PM                  | EM | 150.0                     | 167.00                           | 192.60                  | 1                   | 243.0                                    | 2.5                 | 5.0                               |
| SMBJ160A    | SMBJ160CA | PP                  | EP | 160.0                     | 178.00                           | 197.00                  | 1                   | 259.0                                    | 2.3                 | 5.0                               |
| SMBJ170A    | SMBJ170CA | PR                  | ER | 170.0                     | 189.00                           | 209.00                  | 1                   | 275.0                                    | 2.2                 | 5.0                               |
| SMBJ180A    | SMBJ180CA | PT                  | ET | 180.0                     | 201.00                           | 222.00                  | 1                   | 292.0                                    | 2.1                 | 5.0                               |
| SMBJ190A    | SMBJ190CA | PV                  | EV | 190.0                     | 209.00                           | 243.20                  | 1                   | 308.0                                    | 2.0                 | 5.0                               |
| SMBJ200A    | SMBJ200CA | PX                  | EX | 200.0                     | 220.00                           | 247.00                  | 1                   | 324.0                                    | 1.9                 | 5.0                               |
| SMBJ210A    | SMBJ210CA | PZ                  | EZ | 210.0                     | 231.00                           | 268.80                  | 1                   | 340.0                                    | 1.8                 | 5.0                               |
| SMBJ220A    | SMBJ220CA | QE                  | FE | 220.0                     | 242.00                           | 281.60                  | 1                   | 356.0                                    | 1.7                 | 5.0                               |
| SMBJ250A    | SMBJ250CA | QG                  | FG | 250.0                     | 279.00                           | 309.00                  | 1                   | 405.0                                    | 1.5                 | 5.0                               |
| SMBJ300A    | SMBJ300CA | QK                  | FK | 300.0                     | 335.00                           | 371.00                  | 1                   | 486.0                                    | 1.3                 | 5.0                               |

# Transient Voltage Suppressors - SMBJ Series

## Ratings and Characteristic Curves

Figure 1 - Peak Pulse Power Rating

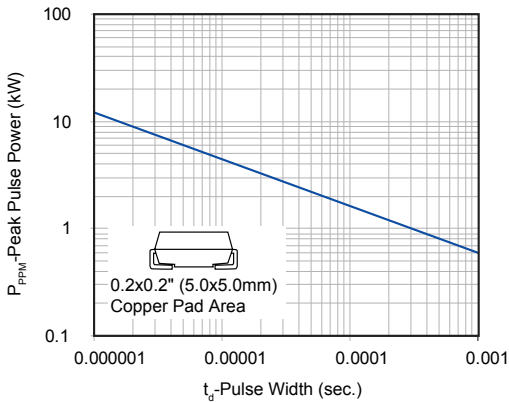


Figure 2 - Pulse Derating Curve

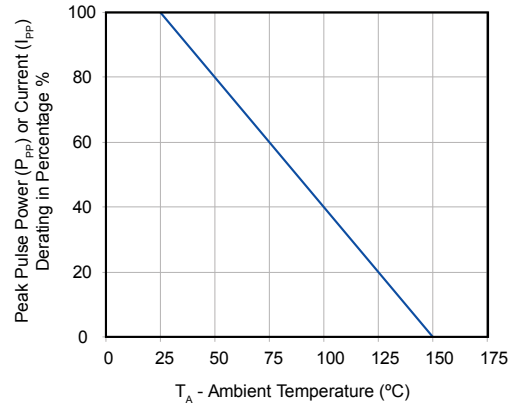


Figure 3 - Pulse Waveform

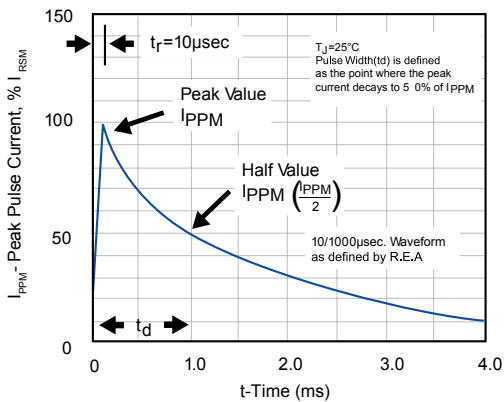


Figure 4 - Typical Junction Capacitance

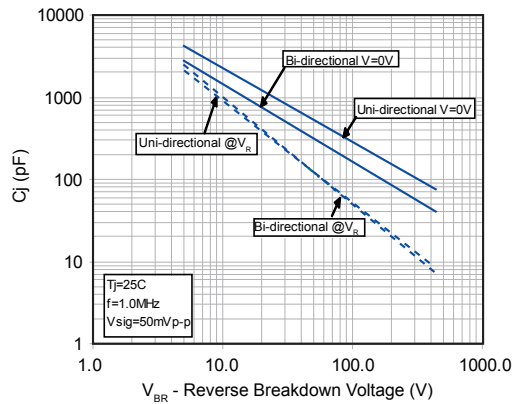


Figure 5 - Steady State Power Derating Curve

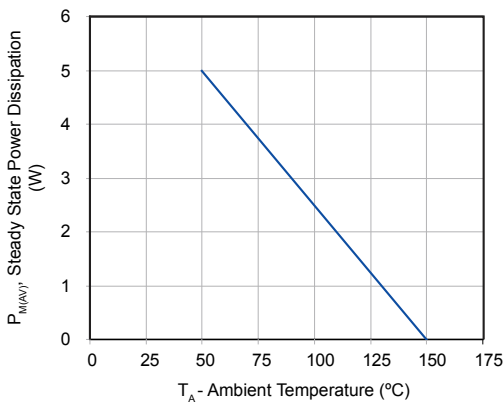
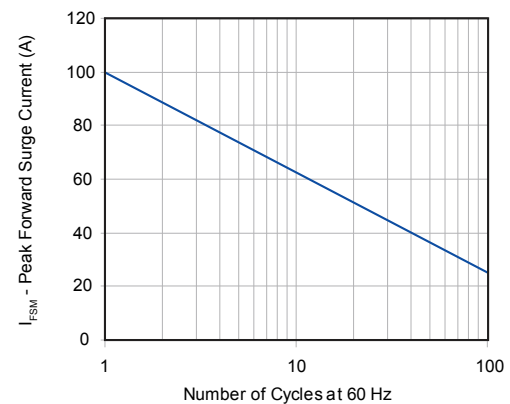


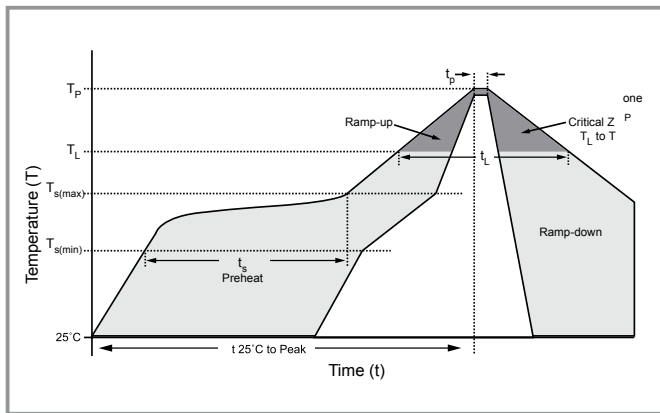
Figure 6 - Maximum Non-Repetitive Peak Forward Surge Current Uni-Directional Only



## Transient Voltage Suppressors - SMBJ Series

### Soldering Parameters

|  | Flow Condition                     | Lead-free assembly      |
|--|------------------------------------|-------------------------|
| Pre Heat   | - Temperature Min ( $T_{s(min)}$ ) | 150°C                   |
|  | - Temperature Max ( $T_{s(max)}$ ) | 200°C                   |
|  | - Time (min to max) ( $t_s$ )      | 60-180 secs             |
| Average ramp up rate (Liquidus Temp ( $T_L$ ) to peak) |                                    | 3°C/second max          |
| $T_{s(max)}$ to $T_L$ - Ramp-up Rate                   |                                    | 3°C/second max          |
| Reflow   | - Temperature ( $T_L$ ) (Liquidus) | 217°C                   |
|  | - Time (min to max) ( $t_s$ )      | 60-150 seconds          |
| Peak Temperature ( $T_p$ )                             |                                    | 260 <sup>+0/-5</sup> °C |
| Time within 5°C of actual peak Temperature ( $t_p$ )   |                                    | 20-40 seconds           |
| Ramp-down Rate   |                                    | 6°C/second max          |
| Time 25°C to peak Temperature ( $T_p$ )                |                                    | 8 minutes Max.          |
| Do not exceed  |                                    | 280°C                   |



### Physical Specifications

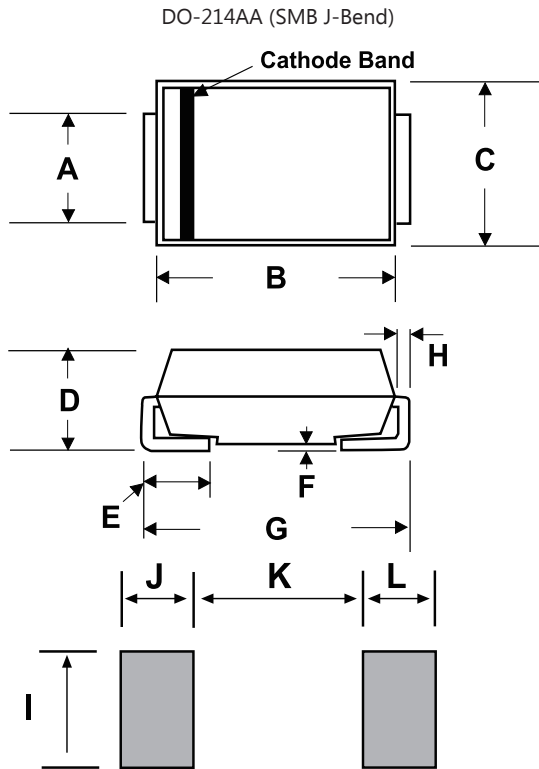
|             |   |
|-------------|---|
| Weight      | 0.003 ounce, 0.093 grams  |
| Case        | JEDEC DO214AA. Molded plastic body over glass passivated junction |
| Polarity    | Color band denotes cathode except Bidirectional.                  |
| Termination | Matte Tin-plated leads, Solderable per JESD22-B102D               |

### Environmental Specifications

|                    |              |
|--------------------|--------------|
| Temperature Cycle  | JESD22-A104  |
| Pressure Cooker    | JESD 22-A102 |
| High Temp. Storage | JESD22-A103  |
| HTRB               | JESD22-A108  |
| Thermal Shock      | JESD22-A106  |

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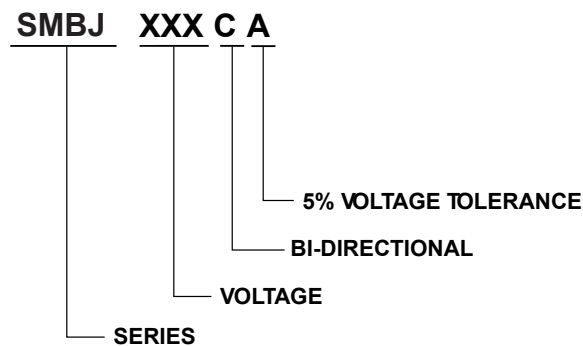
### Dimensions



Unit:mm

| DIM | Inches |       | Millimeters |       |
|-----|--------|-------|-------------|-------|
|     | Min    | Max   | Min         | Max   |
| A   | 0.077  | 0.086 | 1.950       | 2.200 |
| B   | 0.160  | 0.180 | 4.060       | 4.570 |
| C   | 0.130  | 0.155 | 3.300       | 3.940 |
| D   | 0.084  | 0.096 | 2.130       | 2.440 |
| E   | 0.030  | 0.060 | 0.760       | 1.520 |
| F   | -      | 0.008 | -           | 0.203 |
| G   | 0.205  | 0.220 | 5.210       | 5.590 |
| H   | 0.006  | 0.012 | 0.152       | 0.305 |
| I   | 0.089  | -     | 2.260       | -     |
| J   | 0.085  | -     | 2.160       | -     |
| K   | -      | 0.107 | -           | 2.740 |
| L   | 0.085  | -     | 2.160       | -     |

### Part Numbering System



### Packaging

| Part Number | Component Package | Quantity | Packaging Option | Packaging Specification |
|-------------|-------------------|----------|------------------|-------------------------|
| SMBJxxxXX   | DO-214AA          | 3000     | Tape & Reel      | EIA STD RS-481          |

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