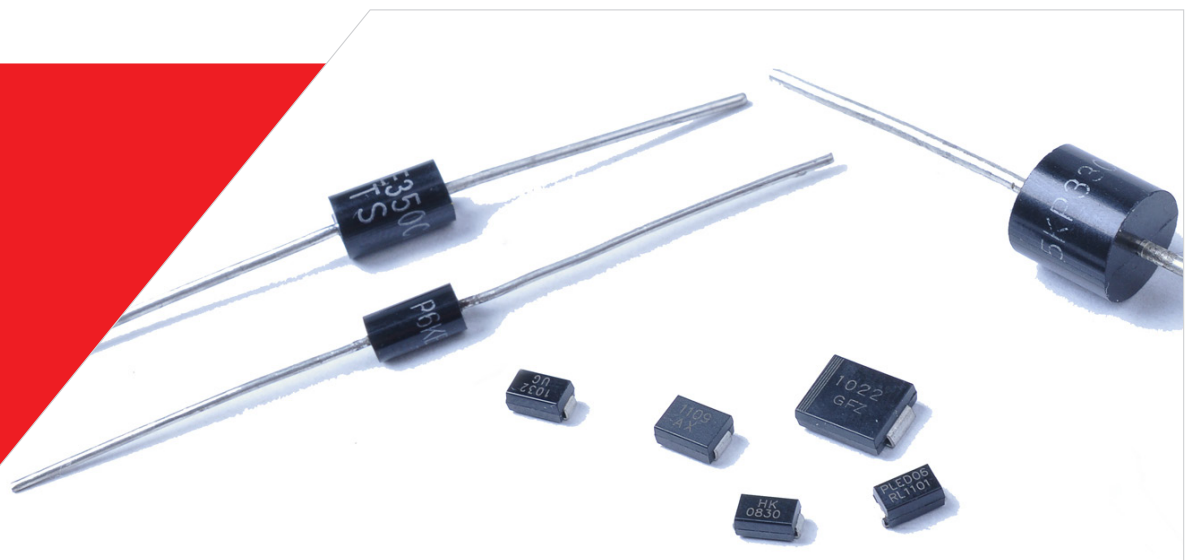


ELECTRONICS



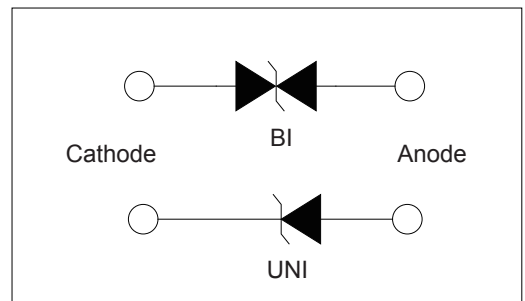
# Transient Voltage Suppressors

SMCJ Series

# Transient Voltage Suppressors - SMCJ 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-214AB package
6. 1500W peak pulse capability at 10x1000 $\mu\text{s}$  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 5 $\mu\text{A}$  above 12V
11. High temperature soldering guaranteed: 260°C/40 seconds / 0.375",
12. (9.5mm) lead length, 5lbs., (2.3kg) tension
13. 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 at TA=25°C by 10x1000 $\mu\text{s}$ waveform (Fig.1)(Note 1), (Note 2) | $P_{PPM}$      | 1500           | Watts |
| Power Dissipation on infinite heat sink at TA=50°C  | $P_D$          | 6.5            | Watts |
| Peak Forward Surge Current, 8.3ms Single Half Sine Wave (Note 3)                                    | $I_{FSM}$      | 200            | Amps  |
| Maximum Instantaneous Forward Voltage at 25A for Unidirectional only (Note 4)                       | $V_F$          | 3.5V/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   | $R_{wJL}$      | 15             | °C/W  |
| Typical Thermal Resistance Junction to Ambient  | $R_{wJA}$      | 75             | °C/W  |

### Notes:

1. Non-repetitive current pulse, per Fig. 3 and derated above TA = 25°C per Fig. 2.
2. Measured on 8.3ms single half sine wave or equivalent square wave, duty cycle=4 per minute maximum.
3.  $V_F < 3.5V$  for devices of  $V_{BR} < 200V$  and  $V_F < 5.0V$  for devices of  $V_{BR} > 201V$ .

## Electrical Characteristics

| Type Number |           | Device Marking Code |     | Reverse Stand-Off Voltage | Breakdown Voltage@IT |             | Test Current | Maximum Clamping Voltage@Ipp | Peak Pulse Current | Reverse Leakage @VRWM |
|-------------|-----------|---------------------|-----|---------------------------|----------------------|-------------|--------------|------------------------------|--------------------|-----------------------|
| (UNI)       | (BI)      | UNI                 | BI  | VRWM(V)                   | VBR MIN.(V)          | VBR MAX.(V) | IT(mA)       | VC(V)                        | Ipp(A)             | IR(μA)                |
| SMCJ5.0A    | SMCJ5.0CA | GDE                 | BDE | 5.0                       | 6.40                 | 7.25        | 10           | 9.2                          | 163.0              | 800                   |
| SMCJ6.0A    | SMCJ6.0CA | GDG                 | BDG | 6.0                       | 6.67                 | 7.67        | 10           | 10.3                         | 145.7              | 800                   |
| SMCJ6.5A    | SMCJ6.5CA | GDK                 | BDK | 6.5                       | 7.22                 | 8.30        | 10           | 11.2                         | 134.0              | 500                   |
| SMCJ7.0A    | SMCJ7.0CA | GDM                 | BDM | 7.0                       | 7.78                 | 8.95        | 10           | 12.0                         | 125.0              | 200                   |
| SMCJ7.5A    | SMCJ7.5CA | GDP                 | BDP | 7.5                       | 8.33                 | 9.58        | 1            | 12.9                         | 116.3              | 100                   |
| SMCJ8.0A    | SMCJ8.0CA | GDR                 | BDR | 8.0                       | 8.89                 | 10.23       | 1            | 13.6                         | 110.3              | 50                    |
| SMCJ8.5A    | SMCJ8.5CA | GDT                 | BDT | 8.5                       | 9.44                 | 10.82       | 1            | 14.4                         | 104.2              | 20                    |
| SMCJ9.0A    | SMCJ9.0CA | GDV                 | BDV | 9.0                       | 10.00                | 11.50       | 1            | 15.4                         | 97.4               | 10                    |
| SMCJ10A     | SMCJ10CA  | GDX                 | BDX | 10.0                      | 11.10                | 12.80       | 1            | 17.0                         | 88.3               | 5                     |
| SMCJ11A     | SMCJ11CA  | GDZ                 | BDZ | 11.0                      | 12.20                | 14.00       | 1            | 18.2                         | 82.5               | 5                     |
| SMCJ12A     | SMCJ12CA  | GEE                 | BEE | 12.0                      | 13.30                | 15.30       | 1            | 19.9                         | 75.4               | 5                     |
| SMCJ13A     | SMCJ13CA  | GEG                 | BEG | 13.0                      | 14.40                | 16.50       | 1            | 21.5                         | 69.8               | 5                     |
| SMCJ14A     | SMCJ14CA  | GEK                 | BEK | 14.0                      | 15.60                | 17.90       | 1            | 23.2                         | 64.7               | 5                     |
| SMCJ15A     | SMCJ15CA  | GEM                 | BEM | 15.0                      | 16.70                | 19.20       | 1            | 24.4                         | 61.5               | 5                     |
| SMCJ16A     | SMCJ16CA  | GEP                 | BEP | 16.0                      | 17.80                | 20.50       | 1            | 26.0                         | 57.7               | 5                     |
| SMCJ17A     | SMCJ17CA  | GER                 | BER | 17.0                      | 18.90                | 21.70       | 1            | 27.6                         | 54.4               | 5                     |
| SMCJ18A     | SMCJ18CA  | GET                 | BET | 18.0                      | 20.00                | 23.30       | 1            | 29.2                         | 51.4               | 5                     |
| SMCJ20A     | SMCJ20CA  | GEV                 | BEV | 20.0                      | 22.20                | 25.50       | 1            | 32.4                         | 46.3               | 5                     |
| SMCJ22A     | SMCJ22CA  | GEX                 | BEX | 22.0                      | 24.40                | 28.00       | 1            | 35.5                         | 42.3               | 5                     |
| SMCJ24A     | SMCJ24CA  | GEZ                 | BEZ | 24.0                      | 26.70                | 30.70       | 1            | 38.9                         | 38.6               | 5                     |
| SMCJ26A     | SMCJ26CA  | GFE                 | BFE | 26.0                      | 28.90                | 33.20       | 1            | 42.1                         | 35.7               | 5                     |
| SMCJ28A     | SMCJ28CA  | GFG                 | BFG | 28.0                      | 31.10                | 35.80       | 1            | 45.4                         | 33.1               | 5                     |
| SMCJ30A     | SMCJ30CA  | GFK                 | BFK | 30.0                      | 33.30                | 38.30       | 1            | 48.4                         | 31.0               | 5                     |
| SMCJ33A     | SMCJ33CA  | GFM                 | BFM | 33.0                      | 36.70                | 42.20       | 1            | 53.3                         | 28.2               | 5                     |
| SMCJ36A     | SMCJ36CA  | GFP                 | BFP | 36.0                      | 40.00                | 46.00       | 1            | 58.1                         | 25.9               | 5                     |
| SMCJ40A     | SMCJ40CA  | GFR                 | BFR | 40.0                      | 44.40                | 51.10       | 1            | 64.5                         | 23.3               | 5                     |
| SMCJ43A     | SMCJ43CA  | GFT                 | BFT | 43.0                      | 47.80                | 54.90       | 1            | 69.4                         | 21.7               | 5                     |
| SMCJ45A     | SMCJ45CA  | GFV                 | BFV | 45.0                      | 50.00                | 57.50       | 1            | 72.7                         | 20.6               | 5                     |
| SMCJ48A     | SMCJ48CA  | GJT                 | BJT | 48.0                      | 53.30                | 61.30       | 1            | 77.4                         | 19.4               | 5                     |
| SMCJ51A     | SMCJ51CA  | GJV                 | BJV | 51.0                      | 56.70                | 65.20       | 1            | 82.4                         | 18.2               | 5                     |
| SMCJ54A     | SMCJ54CA  | GFX                 | BFX | 54.0                      | 60.00                | 69.00       | 1            | 87.1                         | 17.3               | 5                     |
| SMCJ58A     | SMCJ58CA  | GFZ                 | BFZ | 58.0                      | 64.40                | 74.10       | 1            | 93.6                         | 16.1               | 5                     |
| SMCJ60A     | SMCJ60CA  | GGE                 | BGE | 60.0                      | 66.70                | 76.70       | 1            | 96.8                         | 15.5               | 5                     |
| SMCJ64A     | SMCJ64CA  | GGG                 | BGG | 64.0                      | 71.10                | 81.80       | 1            | 103.0                        | 14.6               | 5                     |
| SMCJ70A     | SMCJ70CA  | GGK                 | BGK | 70.0                      | 77.80                | 89.50       | 1            | 113.0                        | 13.3               | 5                     |
| SMCJ75A     | SMCJ75CA  | GGM                 | BGM | 75.0                      | 83.30                | 95.80       | 1            | 121.0                        | 12.4               | 5                     |
| SMCJ78A     | SMCJ78CA  | GGP                 | BGP | 78.0                      | 86.70                | 99.70       | 1            | 126.0                        | 11.9               | 5                     |
| SMCJ85A     | SMCJ85CA  | GGR                 | BGR | 85.0                      | 94.40                | 108.20      | 1            | 137.0                        | 11.0               | 5                     |
| SMCJ90A     | SMCJ90CA  | GGT                 | BGT | 90.0                      | 100.00               | 115.50      | 1            | 146.0                        | 10.3               | 5                     |
| SMCJ100A    | SMCJ100CA | GGV                 | BGV | 100.0                     | 111.00               | 128.00      | 1            | 162.0                        | 9.3                | 5                     |
| SMCJ110A    | SMCJ110CA | GGX                 | BGX | 110.0                     | 122.00               | 140.50      | 1            | 177.0                        | 8.5                | 5                     |
| SMCJ120A    | SMCJ120CA | GGZ                 | BGZ | 120.0                     | 133.00               | 153.00      | 1            | 193.0                        | 7.8                | 5                     |
| SMCJ130A    | SMCJ130CA | GHE                 | BHK | 130.0                     | 144.00               | 165.50      | 1            | 209.0                        | 7.2                | 5                     |
| SMCJ150A    | SMCJ150CA | GHG                 | BHG | 150.0                     | 167.00               | 192.60      | 1            | 243.0                        | 6.2                | 5                     |
| SMCJ160A    | SMCJ160CA | GHK                 | BHK | 160.0                     | 178.00               | 197.00      | 1            | 259.0                        | 5.8                | 5                     |
| SMCJ170A    | SMCJ170CA | GHM                 | BHM | 170.0                     | 189.00               | 209.00      | 1            | 275.0                        | 5.5                | 5                     |
| SMCJ180A    | SMCJ180CA | GHP                 | BHP | 180.0                     | 198.00               | 222.00      | 1            | 292.0                        | 5.1                | 5                     |
| SMCJ190A    | SMCJ190CA | GHR                 | BHR | 190.0                     | 209.00               | 243.20      | 1            | 308.0                        | 4.8                | 5                     |
| SMCJ200A    | SMCJ200CA | GHX                 | BHX | 200.0                     | 220.00               | 247.00      | 1            | 324.0                        | 4.6                | 5                     |
| SMCJ220A    | SMCJ220CA | GJE                 | BJE | 220.0                     | 242.00               | 272.00      | 1            | 356.0                        | 4.2                | 5                     |
| SMCJ250A    | SMCJ250CA | GJG                 | BJG | 250.0                     | 279.00               | 309.00      | 1            | 405.0                        | 3.7                | 5                     |
| SMCJ300A    | SMCJ300CA | GJK                 | BJK | 300.0                     | 335.00               | 371.00      | 1            | 486.0                        | 3.1                | 5                     |

# Transient Voltage Suppressors - SMCJ Series

## Ratings and Characteristic Curves

Figure 1 - Peak Pulse Power Rating

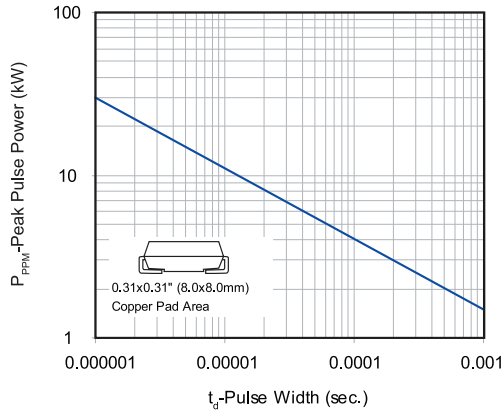


Figure 2 - Pulse Derating Curve

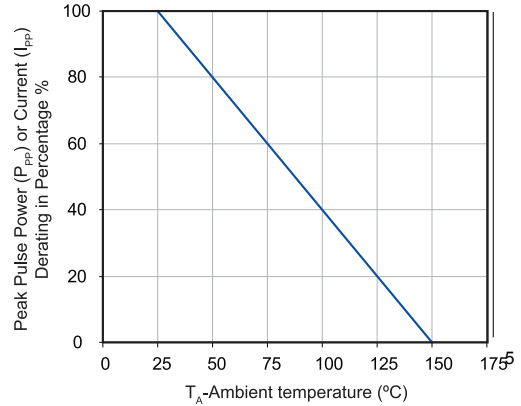


Figure 3 - Pulse Waveform

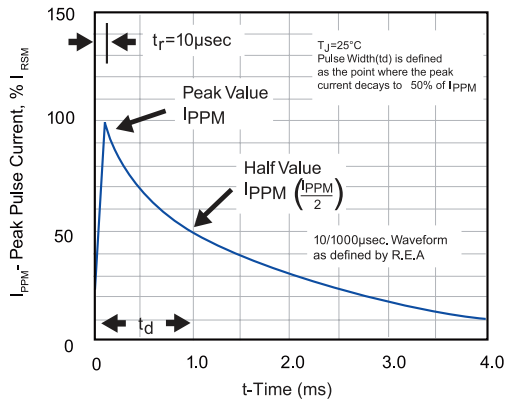


Figure 4 - Typical Junction Capacitance

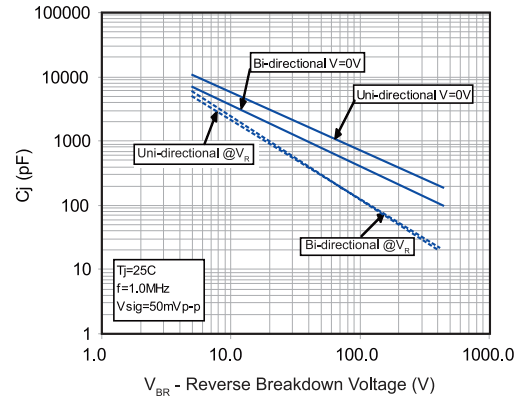


Figure 5 - Steady State Power Derating Curve

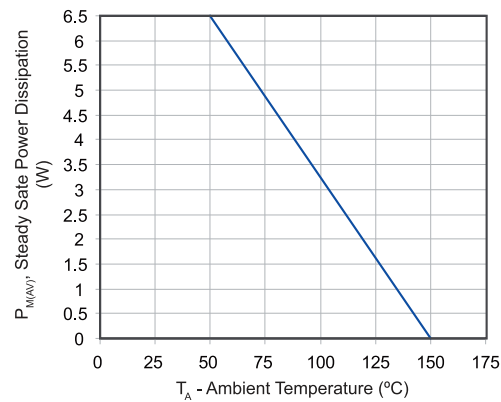
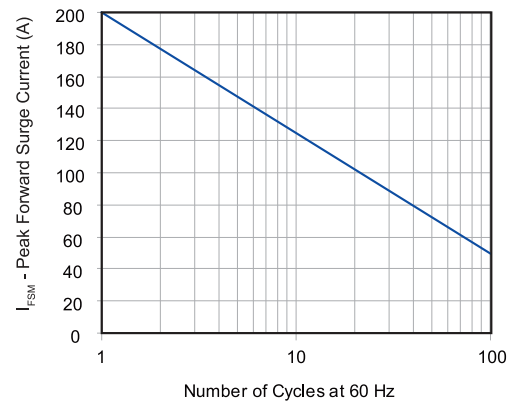


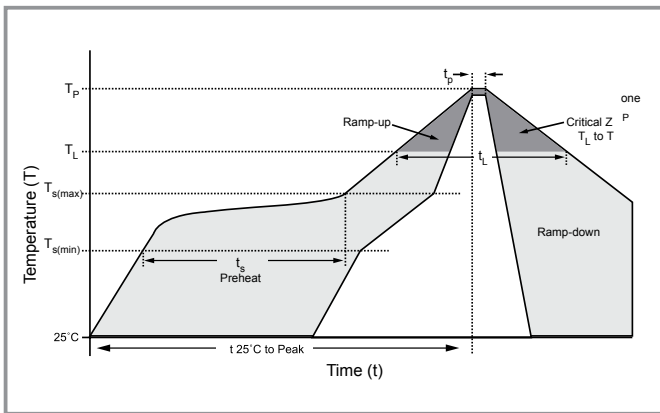
Figure 6 - Maximum Non-Repetitive Peak Forward Surge Current Uni-Directional Only



# Transient Voltage Suppressors - SMCJ Series

## Soldering Parameters

|  | Reflow 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

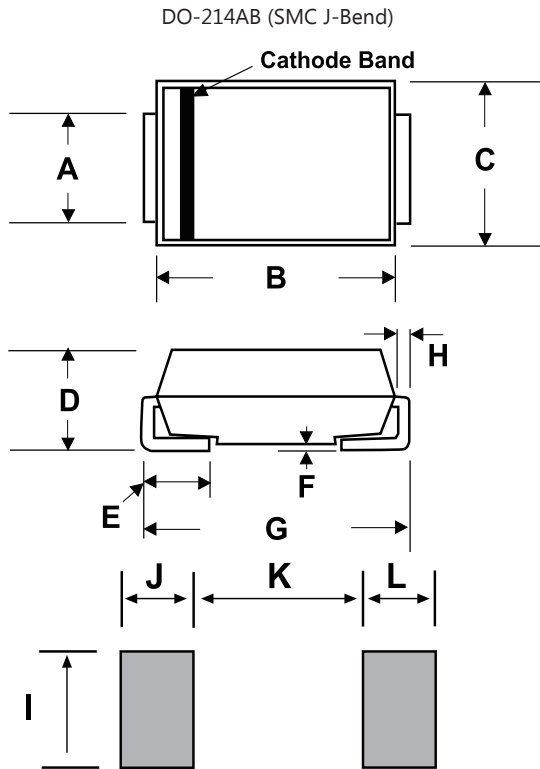
|           |   |
|-----------|---|
| Weight    | 0.007 ounce, 0.21 grams   |
| Case      | JEDEC DO214AA. Molded plastic body over glass passivated junction |
| Polarity  | Color band denotes cathode except Bidirectional.                  |
| Terminals | Matte Tin-plated leads, Solderable per JESD22-B102D               |

## Environmental Specifications

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

# Transient Voltage Suppressors - SMCJ Series

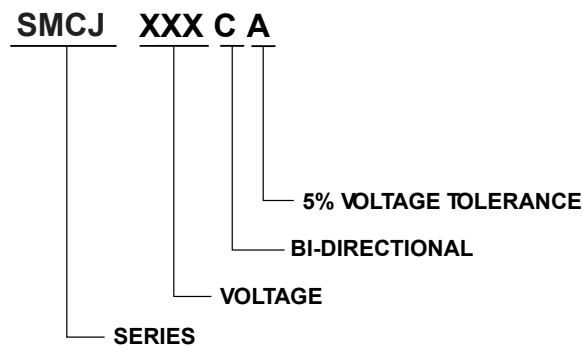
## Dimensions



Unit:mm

| DIM | Inches |       | Millimeters |       |
|-----|--------|-------|-------------|-------|
|     | Min    | Max   | Min         | Max   |
| A   | 0.114  | 0.126 | 2.900       | 3.200 |
| B   | 0.260  | 0.280 | 6.600       | 7.110 |
| C   | 0.220  | 0.245 | 5.590       | 6.220 |
| D   | 0.079  | 0.103 | 2.060       | 2.620 |
| E   | 0.030  | 0.060 | 0.760       | 1.520 |
| F   | -      | 0.008 | -           | 0.203 |
| G   | 0.305  | 0.320 | 7.750       | 8.130 |
| H   | 0.006  | 0.012 | 0.152       | 0.305 |
| I   | 0.129  | -     | 3.300       | -     |
| J   | 0.094  | -     | 24.00       | -     |
| K   | -      | 0.165 | -           | 4.200 |
| L   | 0.094  | -     | 2.400       | -     |

## Part Numbering System



## Packaging

| Part Number | Component Package | Quantity | Packaging Option         | Packaging Specification |
|-------------|-------------------|----------|--------------------------|-------------------------|
| SMCJxxxXX   | DO-214AB          | 500      | Tape & Reel-16mm/13"tape | EIA STD RS-481          |

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