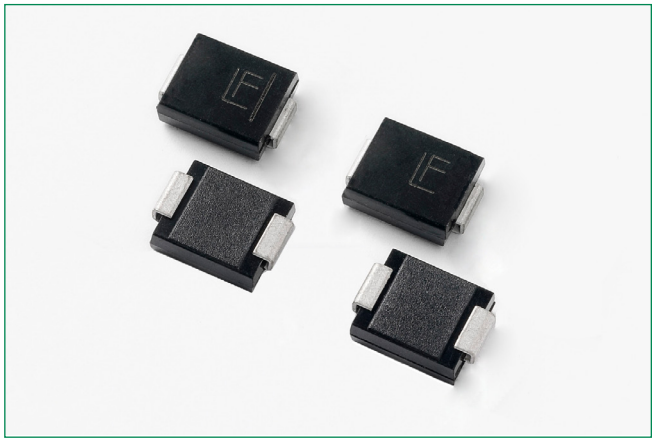
# THE DATASHEET OF

# 3.0SMCJ28A

# 3.0SMCJ Series

## Surface Mount – 3000W – DO-214AB



### Agency Approvals

| Agency | Agency File Number |
|---|---|
| | E230531 |

### Maximum Ratings and Thermal Characteristics

($T_A$=25°C unless otherwise noted)

| Parameter | Symbol | Value | Unit |
|---|---|---|---|
| Peak Pulse Power Dissipation by 10/1000µs Waveform (Fig.4)(Note 1), (Note 2) | $P_{PPM}$ | 3000 | W |
| Power dissipation on infinite heatsink at $T_C$ = 25 °C | $P_D$ | 6.5 | W |
| Peak Forward Surge Current, 8.3ms Single Half Sine Wave (Note 3) | $I_{FSM}$ | 300 | A |
| Maximum Instantaneous Forward Voltage at 100A for Unidirectional Only | $V_F$ | 3.5 | V |
| Operating Temperature Range | $T_J$ | -65 to 150 | °C |
| Storage Temperature Range | $T_{STG}$ | -65 to 175 | °C |
| Typical Thermal Resistance Junction to Lead | $R_{\theta JL}$ | 15 | °C/W |
| Typical Thermal Resistance Junction to Ambient | $R_{\theta JA}$ | 75 | °C/W |

**Notes:**

1. Non-repetitive current pulse , per Fig. 4 and derated above $T_J$ (initial) =25°C per Fig. 3.
2. Mounted on copper pad area of 0.31x0.31" (8.0 x 8.0mm) to each terminal.
3. Measured on 8.3ms single half sine wave or equivalent square wave for unidirectional component only, duty cycle=4 per minute maximum.

## Description

The 3.0SMCJ Series is designed specifically to protect sensitive electronic equipment from voltage transients induced by lightning and other transient voltage events.

## Features

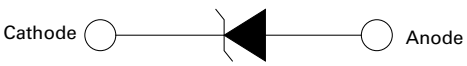
- 3000W $P_{PPM}$ peak pulse power capability at 10/1000µs waveform, repetition rate (duty cycles):0.01%
- For surface mounted applications in order to optimize board space
- Low profile package
- Typical failure mode is short from over-specified voltage or current
- Whisker test is conducted based on JEDEC JESD201A per its table 4a and 4c
- ESD protection of data lines in accordance with IEC 61000-4-2,30kV(Air), 30kV (Contact)
- EFT protection of data lines in accordance with IEC 61000-4-4
- Built-in strain relief
- Glass passivated chip junction
- Fast response time: typically less than 1.0ps from 0V to BV min
- Excellent clamping capability
- Low incremental surge resistance
- High temperature to reflow soldering guaranteed: 260°C/40sec
- $V_{BR}$ @ $T_J$= $V_{BR}$@25°C x (1+$\alpha$T x ($T_J$ - 25)) ($\alpha$T:Temperature Coefficient, typical value is 0.1%)
- UL Recognized compound meeting flammability rating V-0.
- Meet MSL level1, per J-STD-020, LF maximun peak of 260°C
- Matte tin lead–free plated
- Halogen free and RoHS compliant
- Pb-free E3 means 2nd level interconnect is Pb-free and the terminal finish material is tin(Sn) (IPC/JEDEC J-STD-609A.01)

### Applications

TVS components are ideal for the protection of I/O Interfaces, $V_{CC}$ bus and other vulnerable circuits used in Telecom, Computer, Industrial and Consumer electronic applications.

### Functional Diagram

Bi-directional




Uni-directional

# 3.0SMCJ Series

## Surface Mount – 3000W – DO-214AB

### Electrical Characteristics ($T_A$=25°C unless otherwise noted)

| Part Number (Uni) | Part Number (Bi) | Marking | | Reverse Stand off Voltage $V_R$ (Volts) | Breakdown Voltage $V_{BR}$ (Volts) @ $I_T$ | | Test Current $I_T$ (mA) | Maximum Clamping Voltage $V_C$ @ $I_{PP}$ (10/1000µs) (V) | Maximum Peak Pulse Current $I_{PP}$ (10/1000µs) (A) | Maximum Clamping Voltage $V_C$ @ $I_{PP}$ (8/20µs) (V) | Maximum Peak Pulse Current $I_{PP}$ (8/20µs) (A) | Maximum Reverse Leakage $I_R$ @ $V_R$ (µA) | Maximum Temperature coefficient of $V_{BR}$ (%/C) | Agency Approval |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | UNI | BI | | MIN | MAX | | | | | | | | |
| - | 3.0SMCJ5.0CA | - | 3DDE | 5.00 | 6.40 | 7.00 | 10 | 9.2 | 326.1 | 11.89 | 1630.5 | 800 | 0.041 | X |
| - | 3.0SMCJ6.0CA | - | 3DDG | 6.00 | 6.67 | 7.37 | 10 | 10.3 | 291.3 | 13.31 | 1456.5 | 800 | 0.046 | X |
| - | 3.0SMCJ6.5CA | - | 3DDK | 6.50 | 7.22 | 7.98 | 10 | 11.2 | 267.9 | 14.47 | 1339.5 | 500 | 0.052 | X |
| - | 3.0SMCJ7.0CA | - | 3DDM | 7.00 | 7.78 | 8.60 | 10 | 12.0 | 250.0 | 15.50 | 1250.0 | 200 | 0.058 | X |
| - | 3.0SMCJ7.5CA | - | 3DDP | 7.50 | 8.33 | 9.21 | 1 | 12.9 | 232.6 | 16.67 | 1163.0 | 100 | 0.061 | X |
| - | 3.0SMCJ8.0CA | - | 3DDR | 8.00 | 8.89 | 9.83 | 1 | 13.6 | 220.6 | 17.57 | 1103.0 | 50 | 0.064 | X |
| - | 3.0SMCJ8.5CA | - | 3DDT | 8.50 | 9.44 | 10.40 | 1 | 14.4 | 208.3 | 18.60 | 1041.5 | 20 | 0.066 | X |
| 3.0SMCJ9.0A | 3.0SMCJ9.0CA | 3PDV | 3DDV | 9.00 | 10.00 | 11.10 | 1 | 15.4 | 194.8 | 19.90 | 974.0 | 10 | 0.069 | X |
| 3.0SMCJ10A | 3.0SMCJ10CA | 3PDX | 3DDX | 10.00 | 11.10 | 12.30 | 1 | 17.0 | 176.5 | 21.96 | 882.5 | 5 | 0.071 | X |
| 3.0SMCJ11A | 3.0SMCJ11CA | 3PDZ | 3DDZ | 11.00 | 12.20 | 13.50 | 1 | 18.2 | 164.8 | 23.51 | 824.0 | 2 | 0.074 | X |
| 3.0SMCJ12A | 3.0SMCJ12CA | 3PEE | 3DEE | 12.00 | 13.30 | 14.70 | 1 | 19.9 | 150.8 | 25.71 | 754.0 | 2 | 0.075 | X |
| 3.0SMCJ13A | 3.0SMCJ13CA | 3PEG | 3DEG | 13.00 | 14.40 | 15.90 | 1 | 21.5 | 139.5 | 27.78 | 697.5 | 2 | 0.076 | X |
| 3.0SMCJ14A | 3.0SMCJ14CA | 3PEK | 3DEK | 14.00 | 15.60 | 17.20 | 1 | 23.2 | 129.3 | 29.97 | 646.5 | 2 | 0.080 | X |
| 3.0SMCJ15A | 3.0SMCJ15CA | 3PEM | 3DEM | 15.00 | 16.70 | 18.50 | 1 | 24.4 | 123.0 | 31.52 | 615.0 | 2 | 0.083 | X |
| 3.0SMCJ16A | 3.0SMCJ16CA | 3PEP | 3DEP | 16.00 | 17.80 | 19.70 | 1 | 26.0 | 115.4 | 33.59 | 577.0 | 2 | 0.084 | X |
| 3.0SMCJ17A | 3.0SMCJ17CA | 3PER | 3DER | 17.00 | 18.90 | 20.90 | 1 | 27.6 | 108.7 | 35.66 | 543.5 | 2 | 0.085 | X |
| 3.0SMCJ18A | 3.0SMCJ18CA | 3PET | 3DET | 18.00 | 20.00 | 22.10 | 1 | 29.2 | 102.7 | 37.73 | 513.5 | 2 | 0.088 | X |
| 3.0SMCJ20A | 3.0SMCJ20CA | 3PEV | 3DEV | 20.00 | 22.20 | 24.50 | 1 | 32.4 | 92.6 | 41.86 | 463.0 | 2 | 0.091 | X |
| 3.0SMCJ22A | 3.0SMCJ22CA | 3PEX | 3DEX | 22.00 | 24.40 | 26.90 | 1 | 35.5 | 84.5 | 45.87 | 422.5 | 2 | 0.092 | X |
| 3.0SMCJ24A | 3.0SMCJ24CA | 3PEZ | 3DEZ | 24.00 | 26.70 | 29.50 | 1 | 38.9 | 77.1 | 50.26 | 385.5 | 2 | 0.092 | X |
| 3.0SMCJ26A | 3.0SMCJ26CA | 3PFE | 3DFE | 26.00 | 28.90 | 31.90 | 1 | 42.1 | 71.3 | 54.39 | 356.5 | 2 | 0.093 | X |
| 3.0SMCJ28A | 3.0SMCJ28CA | 3PFG | 3DFG | 28.00 | 31.10 | 34.40 | 1 | 45.4 | 66.1 | 58.66 | 330.5 | 2 | 0.094 | X |
| 3.0SMCJ30A | 3.0SMCJ30CA | 3PFK | 3DFK | 30.00 | 33.30 | 36.80 | 1 | 48.4 | 62.0 | 62.53 | 310.0 | 2 | 0.096 | X |
| 3.0SMCJ33A | 3.0SMCJ33CA | 3PFM | 3DFM | 33.00 | 36.70 | 40.60 | 1 | 53.3 | 56.3 | 68.86 | 281.5 | 2 | 0.097 | X |
| 3.0SMCJ36A | 3.0SMCJ36CA | 3PFP | 3DFP | 36.00 | 40.00 | 44.20 | 1 | 58.1 | 51.6 | 75.06 | 258.0 | 2 | 0.098 | X |
| 3.0SMCJ40A | 3.0SMCJ40CA | 3PFR | 3DFR | 40.00 | 44.40 | 49.10 | 1 | 64.5 | 46.5 | 83.33 | 232.5 | 2 | 0.099 | X |
| - | 3.0SMCJ43CA | - | 3DFT | 43.00 | 47.80 | 52.80 | 1 | 69.4 | 43.2 | 89.66 | 216.0 | 2 | 0.100 | X |
| - | 3.0SMCJ45CA | - | 3DFV | 45.00 | 50.00 | 55.30 | 1 | 72.7 | 41.3 | 93.93 | 206.5 | 2 | 0.101 | X |
| - | 3.0SMCJ48CA | - | 3DFX | 48.00 | 53.30 | 58.90 | 1 | 77.4 | 38.8 | 100.00 | 194.0 | 2 | 0.101 | X |
| - | 3.0SMCJ51CA | - | 3DFZ | 51.00 | 56.70 | 62.70 | 1 | 82.4 | 36.4 | 106.46 | 182.0 | 2 | 0.101 | X |
| - | 3.0SMCJ54CA | - | 3DGE | 54.00 | 60.00 | 66.30 | 1 | 87.1 | 34.4 | 112.53 | 172.0 | 2 | 0.102 | X |
| - | 3.0SMCJ58CA | - | 3DGG | 58.00 | 64.40 | 71.20 | 1 | 93.6 | 32.1 | 120.93 | 160.5 | 2 | 0.103 | X |

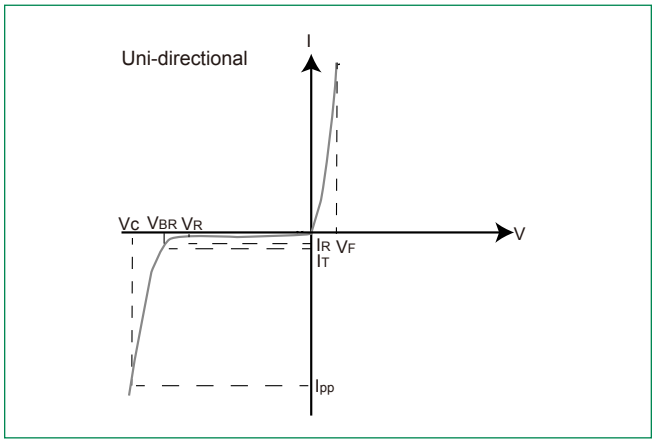
Notes:
1. $V_{BR}$ measured after $I_T$ applied for 300µs, $I_T$= square wave pulse or equivalent.
2. Surge current waveform per 10µs/1000µs exponential wave and derated per Fig. 2
3. All terms and symbols are consistent with ANSI/IEEE C62.35

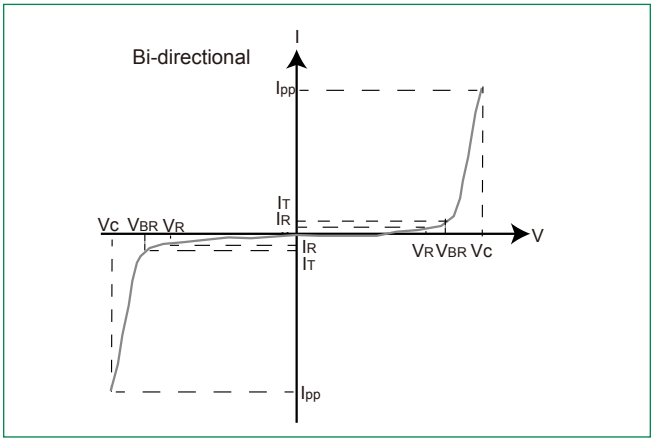



Revised: GD. 08/17/21

# 3.0SMCJ Series
## Surface Mount – 3000W – DO-214AB

### I-V Curve Characteristics




**$P_{PPM}$ Peak Pulse Power Dissipation** -- Max power dissipation
**$V_R$ Stand-off Voltage** -- Maximum voltage that can be applied to the TVS without operation
**$V_{BR}$ Breakdown Voltage** -- Maximum voltage that flows though the TVS at a specified test current ($I_T$)
**$V_C$ Clamping Voltage** -- Peak voltage measured across the TVS at a specified Ippm (peak impulse current)
**$I_R$ Reverse Leakage Current** -- Current measured at $V_R$
**$V_F$ Forward Voltage Drop for Uni-directional**

### Ratings and Characteristic Curves ($T_A$=25°C unless otherwise noted)

**Figure 1:**
TVS Transients Clamping Waveform

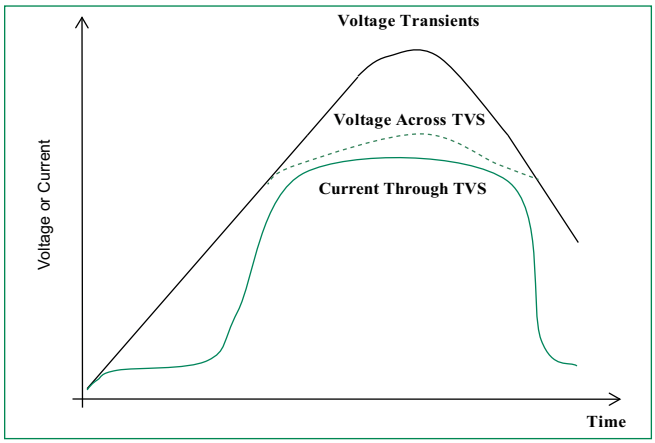
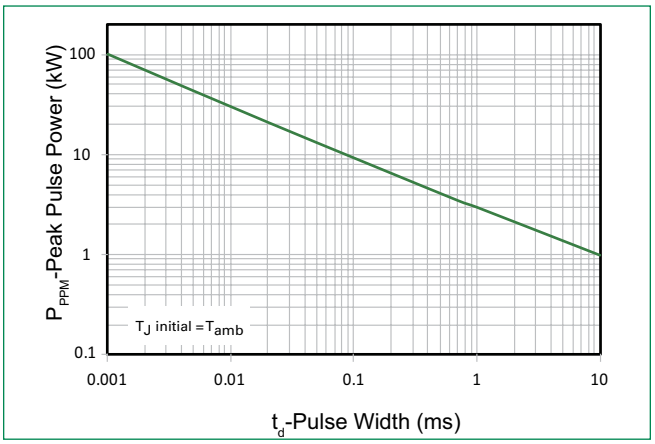



**Figure 2:**
Peak Pulse Power Rating



# 3.0SMCJ Series
## Surface Mount – 3000W – DO-214AB

**Figure 3:**
Peak Pulse Power Derating Curve

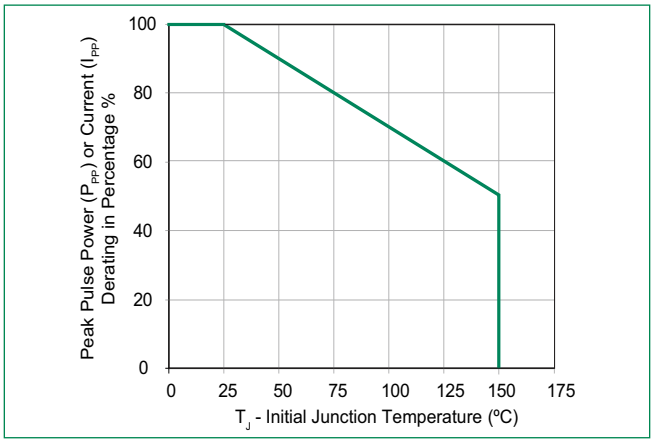



**Figure 4:**
Pulse Waveform

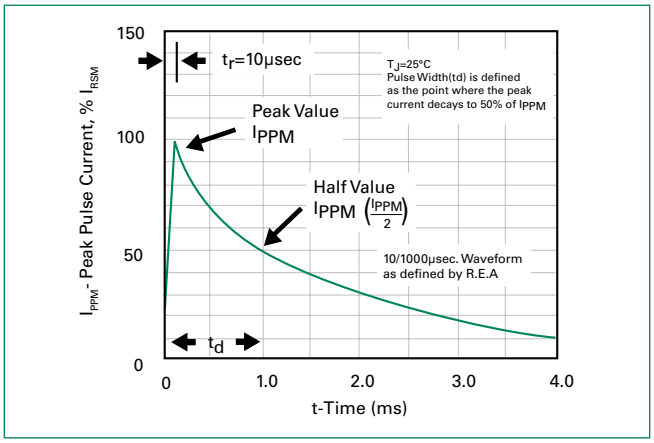



**Figure 5:**
Typical Junction Capacitance

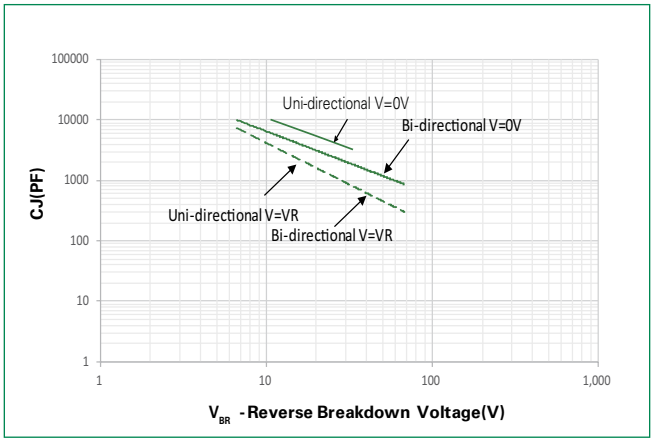



**Figure 6:**
Typical Transient Thermal Impedance

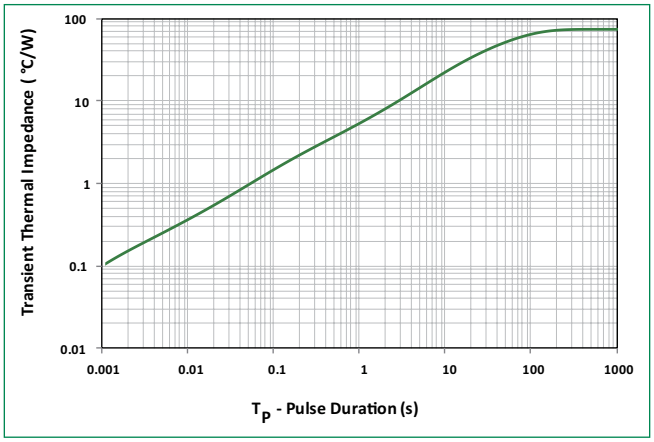



**Figure 7:**
Maximum Non-Repetitive Peak Forward Surge Current Uni-Directional Only

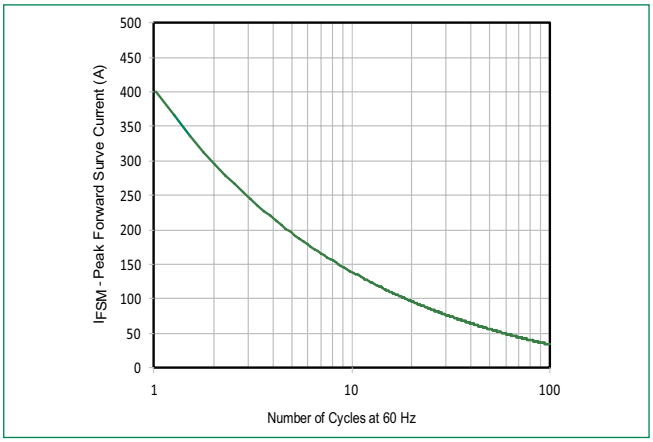
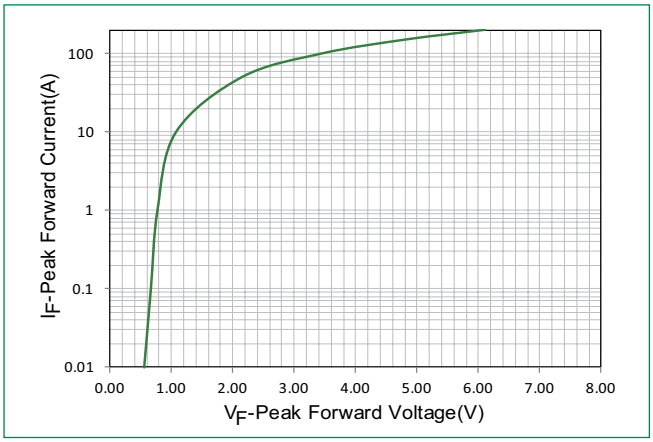



**Figure 8:**
Peak Forward Voltage Drop vs Peak Forward Current (Typical Values)

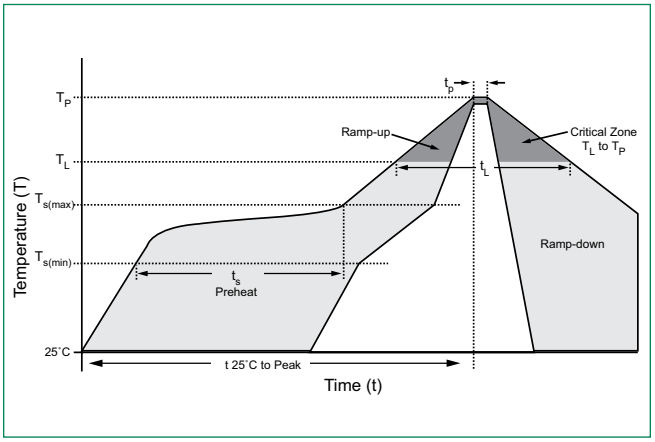


# 3.0SMCJ Series

## Surface Mount – 3000W – DO-214AB

### 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 $T_A$ - 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 ($T_P$)** | | $260^{+0/-5}$ °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** | | 260°C |




### Physical Specifications

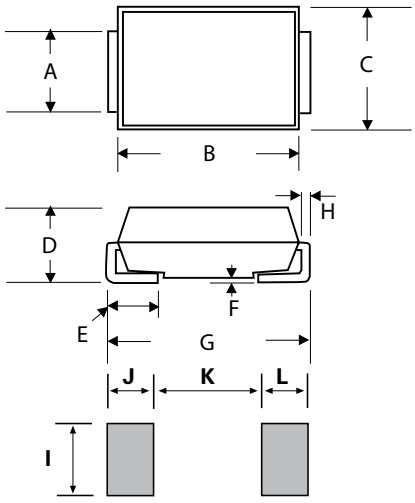
| | |
|---|---|
| **Weight** | 0.007 ounce, 0.21 grams |
| **Case** | JEDEC DO214AB. Molded plastic body over glass passivated junction |
| **Terminal** | Matte Tin-plated leads, Solderable per JESD22-B102 |

### Environmental Specifications

| | |
|---|---|
| **High Temp. Storage** | JESD22-A103 |
| **HTRB** | JESD22-A108 |
| **Temperature Cycling** | JESD22-A104 |
| **MSL** | JEDEC-J-STD-020, LEVEL 1 |
| **H3TRB** | JESD22-A101 |
| **RSH** | JESD22-A111 |

### Dimensions

DO-214AB (SMC J-Bend)

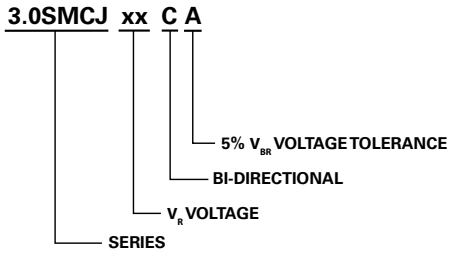


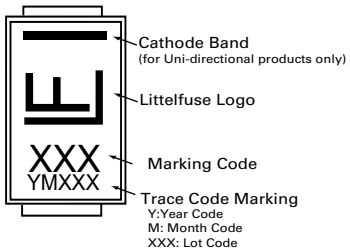

| Dimensions | Inches | | Millimeters | |
|---|---|---|---|---|
| | Min | Max | Min | Max |
| A | 0.114 | 0.126 | 2.900 | 3.200 |
| B | 0.260 | 0.280 | 6.600 | 7.110 |
| C | 0.220 | 0.245 | 5.590 | 6.220 |
| D | 0.079 | 0.103 | 2.060 | 2.620 |
| E | 0.030 | 0.060 | 0.760 | 1.520 |
| F | - | 0.008 | - | 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 | - | 2.400 | - |
| K | - | 0.165 | - | 4.200 |
| L | 0.094 | - | 2.400 | - |

# 3.0SMCJ Series

## Surface Mount – 3000W – DO-214AB

### Part Marking System

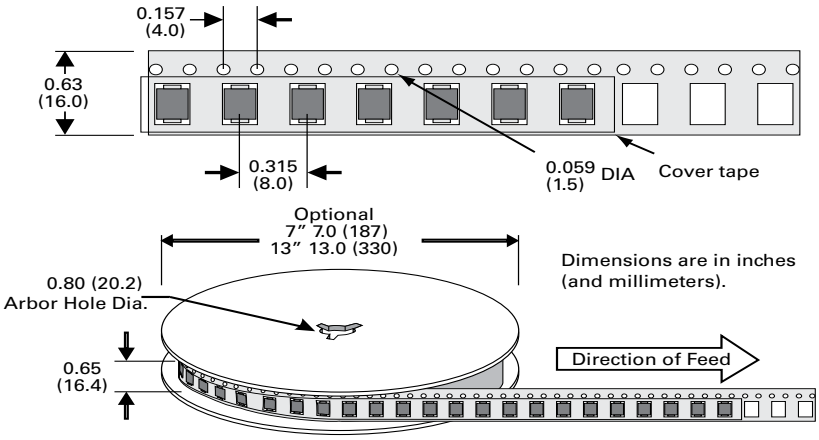



### Packing Options

| Part Number | Component Package | Quantity | Packaging Option | Packaging Specification |
|---|---|---|---|---|
| 3.0SMCJxxXX | DO-214AB | 3000 | Tape & Reel - 16mm tape/13" reel | EIA-481 |

### Tape and Reel Specification









Revised: GD. 08/17/21

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