

# Surface Mount TRANSZORB® Transient Voltage Suppressors


**DO-214AB (SMC)**

## PRIMARY CHARACTERISTICS

|                                  |                                 |
|----------------------------------|---------------------------------|
| $V_{BR}$ uni-directional         | 6.40 V to 231 V                 |
| $V_{BR}$ bi-directional          | 6.40 V to 231 V                 |
| $V_{WM}$                         | 5.0 V to 188 V                  |
| $P_{PPM}$                        | 1500 W                          |
| $P_D$                            | 6.5 W                           |
| $I_{FSM}$ (uni-directional only) | 200 A                           |
| $T_J$ max.                       | 150 °C                          |
| Polarity                         | Uni-directional, bi-directional |
| Package                          | DO-214AB (SMCJ)                 |

## DEVICES FOR BI-DIRECTION APPLICATIONS

For bi-directional devices use CA suffix (e.g. SMCJ188CA).

Electrical characteristics apply in both directions.

## FEATURES

- Low profile package
- Ideal for automated placement
- Glass passivated chip junction
- Available in uni-directional and bi-directional
- Excellent clamping capability
- Very fast response time
- Low incremental surge resistance
- Meets MSL level 1, per J-STD-020, LF maximum peak of 260 °C
- AEC-Q101 qualified
- Material categorization: For definitions of compliance please see [www.vishay.com/doc?99912](http://www.vishay.com/doc?99912)


**RoHS**  
COMPLIANT

## TYPICAL APPLICATIONS

Use in sensitive electronics protection against voltage transients induced by inductive load switching and lighting on ICs, MOSFET, signal lines of sensor units for consumer, computer, industrial, automotive, and telecommunication.

## MECHANICAL DATA

**Case:** DO-214AB (SMCJ)

Molding compound meets UL 94 V-0 flammability rating  
Base P/N-E3 - RoHS compliant, commercial grade  
Base P/NHE3 - RoHS compliant, AEC-Q101 qualified

**Terminals:** Matte tin plated leads, solderable per J-STD-002 and JESD 22-B102

E3 suffix meets JESD 201 class 2 whisker test, HE3 suffix meets JESD 201 class 2 whisker test

**Polarity:** For uni-directional types the band denotes cathode end, no marking on bi-directional types

## MAXIMUM RATINGS ( $T_A = 25\text{ °C}$ unless otherwise noted)

| PARAMETER                                                                                   | SYMBOL         | VALUE          | UNIT |
|---------------------------------------------------------------------------------------------|----------------|----------------|------|
| Peak pulse power dissipation with a 10/1000 $\mu$ s waveform <sup>(1)(2)</sup>              | $P_{PPM}$      | 1500           | W    |
| Peak pulse current with a 10/1000 $\mu$ s waveform <sup>(1)</sup>                           | $I_{PPM}$      | See next table | A    |
| Peak forward surge current 8.3 ms single half sine-wave uni-directional only <sup>(2)</sup> | $I_{FSM}$      | 200            | A    |
| Power dissipation on infinite heatsink, $T_A = 50\text{ °C}$                                | $P_D$          | 6.5            | W    |
| Operating junction and storage temperature range                                            | $T_J, T_{STG}$ | - 55 to + 150  | °C   |

## Notes

<sup>(1)</sup> Non-repetitive current pulse, per fig. 3 and derated above  $T_A = 25\text{ °C}$  per fig. 2.

<sup>(2)</sup> Mounted on 0.31" x 0.31" (8.0 mm x 8.0 mm) copper pads to each terminal

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

| DEVICE TYPE<br>MODIFIED<br>"J" BEND LEAD | DEVICE MARKING<br>CODE |     | BREAKDOWN<br>VOLTAGE<br>$V_{BR}$ AT $I_T$ <sup>(1)</sup><br>(V) |      | TEST<br>CURRENT<br>$I_T$<br>(mA) | STAND-OFF<br>VOLTAGE<br>$V_{WM}$<br>(V) | MAXIMUM<br>REVERSE<br>LEAKAGE<br>AT $V_{WM}$<br>$I_D$ ( $\mu\text{A}$ ) <sup>(3)</sup> | MAXIMUM<br>PEAK PULSE<br>SURGE<br>CURRENT<br>$I_{PPM}$ (A) <sup>(2)</sup> | MAXIMUM<br>CLAMPING<br>VOLTAGE AT<br>$I_{PPM}$<br>$V_C$ (V) |
|------------------------------------------|------------------------|-----|-----------------------------------------------------------------|------|----------------------------------|-----------------------------------------|----------------------------------------------------------------------------------------|---------------------------------------------------------------------------|-------------------------------------------------------------|
|                                          | UNI                    | BI  | MIN.                                                            | MAX. |                                  |                                         |                                                                                        |                                                                           |                                                             |
| (+)SMCJ5.0A <sup>(5)</sup>               | GDE                    | GDE | 6.40                                                            | 7.07 | 10                               | 5.0                                     | 1000                                                                                   | 163.0                                                                     | 9.2                                                         |
| (+)SMCJ6.0A                              | GDG                    | GDG | 6.67                                                            | 7.37 | 10                               | 6.0                                     | 1000                                                                                   | 145.6                                                                     | 10.3                                                        |
| (+)SMCJ6.5A                              | GDK                    | BDK | 7.22                                                            | 7.98 | 10                               | 6.5                                     | 500                                                                                    | 133.9                                                                     | 11.2                                                        |
| (+)SMCJ7.0A                              | GDM                    | GDM | 7.78                                                            | 8.60 | 10                               | 7.0                                     | 200                                                                                    | 125.0                                                                     | 12.0                                                        |
| (+)SMCJ7.5A                              | GDP                    | BDP | 8.33                                                            | 9.21 | 1.0                              | 7.5                                     | 100                                                                                    | 116.3                                                                     | 12.9                                                        |
| (+)SMCJ8.0A                              | GDR                    | BDR | 8.89                                                            | 9.83 | 1.0                              | 8.0                                     | 50                                                                                     | 110.3                                                                     | 13.6                                                        |
| (+)SMCJ8.5A                              | GDT                    | BDT | 9.44                                                            | 10.4 | 1.0                              | 8.5                                     | 20                                                                                     | 104.2                                                                     | 14.4                                                        |
| (+)SMCJ9.0A                              | GDV                    | BDV | 10.0                                                            | 11.1 | 1.0                              | 9.0                                     | 10                                                                                     | 97.4                                                                      | 15.4                                                        |
| (+)SMCJ10A                               | GDX                    | BDX | 11.1                                                            | 12.3 | 1.0                              | 10                                      | 5.0                                                                                    | 88.2                                                                      | 17.0                                                        |
| (+)SMCJ11A                               | GDZ                    | GDZ | 12.2                                                            | 13.5 | 1.0                              | 11                                      | 5.0                                                                                    | 82.4                                                                      | 18.2                                                        |
| (+)SMCJ12A                               | GEE                    | BEE | 13.3                                                            | 14.7 | 1.0                              | 12                                      | 5.0                                                                                    | 75.4                                                                      | 19.9                                                        |
| (+)SMCJ13A                               | GEG                    | GEG | 14.4                                                            | 15.9 | 1.0                              | 13                                      | 1.0                                                                                    | 69.8                                                                      | 21.5                                                        |
| (+)SMCJ14A                               | GEK                    | BEK | 15.6                                                            | 17.2 | 1.0                              | 14                                      | 1.0                                                                                    | 64.7                                                                      | 23.2                                                        |
| (+)SMCJ15A                               | GEM                    | BEM | 16.7                                                            | 18.5 | 1.0                              | 15                                      | 1.0                                                                                    | 61.5                                                                      | 24.4                                                        |
| (+)SMCJ16A                               | GEP                    | GEP | 17.8                                                            | 19.7 | 1.0                              | 16                                      | 1.0                                                                                    | 57.7                                                                      | 26.0                                                        |
| (+)SMCJ17A                               | GER                    | GER | 18.9                                                            | 20.9 | 1.0                              | 17                                      | 1.0                                                                                    | 54.3                                                                      | 27.6                                                        |
| (+)SMCJ18A                               | GET                    | BET | 20.0                                                            | 22.1 | 1.0                              | 18                                      | 1.0                                                                                    | 51.4                                                                      | 29.2                                                        |
| (+)SMCJ20A                               | GEV                    | BEV | 22.2                                                            | 24.5 | 1.0                              | 20                                      | 1.0                                                                                    | 46.3                                                                      | 32.4                                                        |
| (+)SMCJ22A                               | GEX                    | BEX | 24.4                                                            | 26.9 | 1.0                              | 22                                      | 1.0                                                                                    | 42.3                                                                      | 35.5                                                        |
| (+)SMCJ24A                               | GEZ                    | BEZ | 26.7                                                            | 29.5 | 1.0                              | 24                                      | 1.0                                                                                    | 38.6                                                                      | 38.9                                                        |
| (+)SMCJ26A                               | GFE                    | BFE | 28.9                                                            | 31.9 | 1.0                              | 26                                      | 1.0                                                                                    | 35.6                                                                      | 42.1                                                        |
| (+)SMCJ28A                               | GFG                    | BFG | 31.1                                                            | 34.4 | 1.0                              | 28                                      | 1.0                                                                                    | 33.0                                                                      | 45.4                                                        |
| (+)SMCJ30A                               | GFK                    | BFK | 33.3                                                            | 36.8 | 1.0                              | 30                                      | 1.0                                                                                    | 31.0                                                                      | 48.4                                                        |
| (+)SMCJ33A                               | GFM                    | BFM | 36.7                                                            | 40.6 | 1.0                              | 33                                      | 1.0                                                                                    | 28.1                                                                      | 53.3                                                        |
| (+)SMCJ36A                               | GFP                    | BFP | 40.0                                                            | 44.2 | 1.0                              | 36                                      | 1.0                                                                                    | 25.8                                                                      | 58.1                                                        |
| (+)SMCJ40A                               | GFR                    | BFR | 44.4                                                            | 49.1 | 1.0                              | 40                                      | 1.0                                                                                    | 23.3                                                                      | 64.5                                                        |
| (+)SMCJ43A                               | GFT                    | BFT | 47.8                                                            | 52.8 | 1.0                              | 43                                      | 1.0                                                                                    | 21.6                                                                      | 69.4                                                        |
| (+)SMCJ45A                               | GFV                    | GFV | 50.0                                                            | 55.3 | 1.0                              | 45                                      | 1.0                                                                                    | 20.6                                                                      | 72.7                                                        |
| (+)SMCJ48A                               | GFX                    | GFX | 53.3                                                            | 58.9 | 1.0                              | 48                                      | 1.0                                                                                    | 19.4                                                                      | 77.4                                                        |
| (+)SMCJ51A                               | GFZ                    | GFZ | 56.7                                                            | 62.7 | 1.0                              | 51                                      | 1.0                                                                                    | 18.2                                                                      | 82.4                                                        |
| (+)SMCJ54A                               | GGE                    | GGE | 60.0                                                            | 66.3 | 1.0                              | 54                                      | 1.0                                                                                    | 17.2                                                                      | 87.1                                                        |
| (+)SMCJ58A                               | GGG                    | GGG | 64.4                                                            | 71.2 | 1.0                              | 58                                      | 1.0                                                                                    | 16.0                                                                      | 93.6                                                        |
| (+)SMCJ60A                               | GGK                    | GGK | 66.7                                                            | 73.7 | 1.0                              | 60                                      | 1.0                                                                                    | 15.5                                                                      | 96.8                                                        |
| (+)SMCJ64A                               | GGM                    | GGM | 71.1                                                            | 78.6 | 1.0                              | 64                                      | 1.0                                                                                    | 14.6                                                                      | 103                                                         |
| (+)SMCJ70A                               | GGP                    | GGP | 77.8                                                            | 86.0 | 1.0                              | 70                                      | 1.0                                                                                    | 13.3                                                                      | 113                                                         |
| (+)SMCJ75A                               | GGR                    | GGR | 83.3                                                            | 92.1 | 1.0                              | 75                                      | 1.0                                                                                    | 12.4                                                                      | 121                                                         |
| (+)SMCJ78A                               | GGT                    | GGT | 86.7                                                            | 95.8 | 1.0                              | 78                                      | 1.0                                                                                    | 11.9                                                                      | 126                                                         |
| (+)SMCJ85A                               | GGV                    | GGV | 94.4                                                            | 104  | 1.0                              | 85                                      | 1.0                                                                                    | 10.9                                                                      | 137                                                         |
| (+)SMCJ90A                               | GGX                    | GGX | 100                                                             | 111  | 1.0                              | 90                                      | 1.0                                                                                    | 10.3                                                                      | 146                                                         |
| (+)SMCJ100A                              | GGZ                    | GGZ | 111                                                             | 123  | 1.0                              | 100                                     | 1.0                                                                                    | 9.3                                                                       | 162                                                         |
| (+)SMCJ110A                              | GHE                    | GHE | 122                                                             | 135  | 1.0                              | 110                                     | 1.0                                                                                    | 8.5                                                                       | 177                                                         |
| (+)SMCJ120A                              | GHG                    | GHG | 133                                                             | 147  | 1.0                              | 120                                     | 1.0                                                                                    | 7.8                                                                       | 193                                                         |
| (+)SMCJ130A                              | GHK                    | GHK | 144                                                             | 159  | 1.0                              | 130                                     | 1.0                                                                                    | 7.2                                                                       | 209                                                         |
| (+)SMCJ150A                              | GHM                    | GHM | 167                                                             | 185  | 1.0                              | 150                                     | 1.0                                                                                    | 6.2                                                                       | 243                                                         |
| (+)SMCJ160A                              | GHP                    | GHP | 178                                                             | 197  | 1.0                              | 160                                     | 1.0                                                                                    | 5.8                                                                       | 259                                                         |
| (+)SMCJ170A                              | GHR                    | GHR | 189                                                             | 209  | 1.0                              | 170                                     | 1.0                                                                                    | 5.5                                                                       | 275                                                         |
| SMCJ188A                                 | GHS                    | GHS | 209                                                             | 231  | 1.0                              | 188                                     | 1.0                                                                                    | 4.6                                                                       | 328                                                         |

**Notes**(1) Pulse test:  $t_p \leq 50$  ms

(2) Surge current waveform per fig. 3 and derate per fig. 2

(3) For bi-directional types having  $V_{WM}$  of 10 V and less, the  $I_D$  limit is doubled

(4) All terms and symbols are consistent with ANSI/IEEE C62.35

(5) For the bi-directional SMCJ5.0CA, the maximum  $V_{BR}$  is 7.25 V(6)  $V_F = 3.5$  V at  $I_F = 100$  A (uni-directional only)

(+) Underwriters laboratory recognition for the classification of protectors (QVGQ2) under the UL standard for safety 497B and file number E136766 for both uni-directional and bi-directional devices

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

| PARAMETER                                                          | SYMBOL          | VALUE | UNIT                        |
|--------------------------------------------------------------------|-----------------|-------|-----------------------------|
| Typical thermal resistance, junction to ambient air <sup>(1)</sup> | $R_{\theta JA}$ | 75    | $^{\circ}\text{C}/\text{W}$ |
| Typical thermal resistance, junction to lead                       | $R_{\theta JL}$ | 15    |                             |

**Note**
<sup>(1)</sup> Mounted on minimum recommended pad layout

**ORDERING INFORMATION** (Example)

| PREFERRED P/N                  | UNIT WEIGHT (g) | PREFERRED PACKAGE CODE | BASE QUANTITY | DELIVERY MODE                      |
|--------------------------------|-----------------|------------------------|---------------|------------------------------------|
| SMCJ5.0A-E3/57T                | 0.211           | 57T                    | 850           | 7" diameter plastic tape and reel  |
| SMCJ5.0A-E3/9AT                | 0.211           | 9AT                    | 3500          | 13" diameter plastic tape and reel |
| SMCJ5.0AHE3/57T <sup>(1)</sup> | 0.211           | 57T                    | 850           | 7" diameter plastic tape and reel  |
| SMCJ5.0AHE3/9AT <sup>(1)</sup> | 0.211           | 9AT                    | 3500          | 13" diameter plastic tape and reel |

**Note**
<sup>(1)</sup> AEC-Q101 qualified

**RATINGS AND CHARACTERISTICS CURVES** ( $T_A = 25\text{ }^{\circ}\text{C}$  unless otherwise noted)


Fig. 1 - Peak Pulse Power Rating Curve



Fig. 3 - Pulse Waveform



Fig. 2 - Pulse Power or Current vs. Initial Junction Temperature



Fig. 4 - Typical Junction Capacitance Uni-Directional



Fig. 5 - Typical Transient Thermal Impedance


Fig. 6 - Maximum Non-Repetitive Peak Forward Surge Current  
Uni-Directional Use Only

**PACKAGE OUTLINE DIMENSIONS** in inches (millimeters)




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