



## Surface Mount TRANSZORB® Transient Voltage Suppressors



SMC (DO-214AB)



## LINKS TO ADDITIONAL RESOURCES



| PRIMARY CHARACTERISTICS         |                               |
|---------------------------------|-------------------------------|
| $V_{BR}$ unidirectional         | 6.40 V to 231 V               |
| $V_{BR}$ bidirectional          | 6.40 V to 231 V               |
| $V_{WM}$                        | 5.0 V to 188 V                |
| $P_{PPM}$                       | 1500 W                        |
| $P_D$                           | 6.5 W                         |
| $I_{FSM}$ (unidirectional only) | 200 A                         |
| $T_J$ max.                      | 150 °C                        |
| Polarity                        | Unidirectional, bidirectional |
| Package                         | SMC (DO-214AB)                |

## DEVICES FOR BIDIRECTION APPLICATIONS

For bidirectional 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 unidirectional and bidirectional
- 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 available
  - Automotive ordering code: base P/NHE3 or P/NHM3
- Material categorization: for definitions of compliance please see [www.vishay.com/doc?99912](http://www.vishay.com/doc?99912)



## 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:** SMC (DO-214AB)

Molding compound meets UL 94 V-0 flammability rating

Base P/N-E3 - RoHS-compliant, commercial grade

Base P/N-M3 - halogen-free, RoHS-compliant, commercial grade

Base P/NHE3\_X - RoHS-compliant and AEC-Q101 qualified

Base P/NHM3\_X - halogen-free, RoHS-compliant, and

AEC-Q101 qualified

("\_X" denotes revision code e.g. A, B, ...)

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

E3, M3, HE3, and HM3 suffix meets JESD 201 class 2 whisker test

**Polarity:** for unidirectional types the band denotes cathode end, no marking on bidirectional 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    |
| Power dissipation on infinite heatsink, $T_A = 50\text{ °C}$                               | $P_D$          | 6.5            | W    |
| Peak forward surge current 8.3 ms single half sine-wave unidirectional only <sup>(2)</sup> | $I_{FSM}$      | 200            | A    |
| 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<br>LEAD | DEVICE<br>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<br>AT $I_{PPM}$<br>$V_C$ (V) | MAXIMUM<br>TEMPERATURE<br>COEFFICIENT<br>OF $V_{BR}$<br>(%/°C) |
|---------------------------------------------|---------------------------|-----|-----------------------------------------------------------------|------|----------------------------------|-----------------------------------------|----------------------------------------------------------------------------------------|---------------------------------------------------------------------------|-------------------------------------------------------------|----------------------------------------------------------------|
|                                             | UNI                       | BI  | MIN.                                                            | MAX. |                                  |                                         |                                                                                        |                                                                           |                                                             |                                                                |
| (+)SMCJ5.0A <sup>(5)</sup>                  | GDE                       | GDE | 6.40                                                            | 7.07 | 10                               | 5.0                                     | 1000                                                                                   | 163.0                                                                     | 9.2                                                         | 0.057                                                          |
| (+)SMCJ6.0A                                 | GDG                       | GDG | 6.67                                                            | 7.37 | 10                               | 6.0                                     | 1000                                                                                   | 145.6                                                                     | 10.3                                                        | 0.059                                                          |
| (+)SMCJ6.5A                                 | GDK                       | BDK | 7.22                                                            | 7.98 | 10                               | 6.5                                     | 500                                                                                    | 133.9                                                                     | 11.2                                                        | 0.061                                                          |
| (+)SMCJ7.0A                                 | GDM                       | GDM | 7.78                                                            | 8.60 | 10                               | 7.0                                     | 200                                                                                    | 125.0                                                                     | 12.0                                                        | 0.065                                                          |
| (+)SMCJ7.5A                                 | GDP                       | BDP | 8.33                                                            | 9.21 | 1.0                              | 7.5                                     | 100                                                                                    | 116.3                                                                     | 12.9                                                        | 0.067                                                          |
| (+)SMCJ8.0A                                 | GDR                       | BDR | 8.89                                                            | 9.83 | 1.0                              | 8.0                                     | 50                                                                                     | 110.3                                                                     | 13.6                                                        | 0.069                                                          |
| (+)SMCJ8.5A                                 | GDT                       | BDT | 9.44                                                            | 10.4 | 1.0                              | 8.5                                     | 20                                                                                     | 104.2                                                                     | 14.4                                                        | 0.073                                                          |
| (+)SMCJ9.0A                                 | GDV                       | BDV | 10.0                                                            | 11.1 | 1.0                              | 9.0                                     | 10                                                                                     | 97.4                                                                      | 15.4                                                        | 0.074                                                          |
| (+)SMCJ10A                                  | GDX                       | BDX | 11.1                                                            | 12.3 | 1.0                              | 10                                      | 5.0                                                                                    | 88.2                                                                      | 17.0                                                        | 0.078                                                          |
| (+)SMCJ11A                                  | GDZ                       | GDZ | 12.2                                                            | 13.5 | 1.0                              | 11                                      | 5.0                                                                                    | 82.4                                                                      | 18.2                                                        | 0.080                                                          |
| (+)SMCJ12A                                  | GEE                       | BEE | 13.3                                                            | 14.7 | 1.0                              | 12                                      | 5.0                                                                                    | 75.4                                                                      | 19.9                                                        | 0.083                                                          |
| (+)SMCJ13A                                  | GEG                       | GEG | 14.4                                                            | 15.9 | 1.0                              | 13                                      | 1.0                                                                                    | 69.8                                                                      | 21.5                                                        | 0.084                                                          |
| (+)SMCJ14A                                  | GEK                       | BEK | 15.6                                                            | 17.2 | 1.0                              | 14                                      | 1.0                                                                                    | 64.7                                                                      | 23.2                                                        | 0.087                                                          |
| (+)SMCJ15A                                  | GEM                       | BEM | 16.7                                                            | 18.5 | 1.0                              | 15                                      | 1.0                                                                                    | 61.5                                                                      | 24.4                                                        | 0.088                                                          |
| (+)SMCJ16A                                  | GEP                       | GEP | 17.8                                                            | 19.7 | 1.0                              | 16                                      | 1.0                                                                                    | 57.7                                                                      | 26.0                                                        | 0.089                                                          |
| (+)SMCJ17A                                  | GER                       | GER | 18.9                                                            | 20.9 | 1.0                              | 17                                      | 1.0                                                                                    | 54.3                                                                      | 27.6                                                        | 0.090                                                          |
| (+)SMCJ18A                                  | GET                       | BET | 20.0                                                            | 22.1 | 1.0                              | 18                                      | 1.0                                                                                    | 51.4                                                                      | 29.2                                                        | 0.092                                                          |
| (+)SMCJ20A                                  | GEV                       | BEV | 22.2                                                            | 24.5 | 1.0                              | 20                                      | 1.0                                                                                    | 46.3                                                                      | 32.4                                                        | 0.094                                                          |
| (+)SMCJ22A                                  | GEX                       | BEX | 24.4                                                            | 26.9 | 1.0                              | 22                                      | 1.0                                                                                    | 42.3                                                                      | 35.5                                                        | 0.096                                                          |
| (+)SMCJ24A                                  | GEZ                       | BEZ | 26.7                                                            | 29.5 | 1.0                              | 24                                      | 1.0                                                                                    | 38.6                                                                      | 38.9                                                        | 0.096                                                          |
| (+)SMCJ26A                                  | GFE                       | BFE | 28.9                                                            | 31.9 | 1.0                              | 26                                      | 1.0                                                                                    | 35.6                                                                      | 42.1                                                        | 0.097                                                          |
| (+)SMCJ28A                                  | GFG                       | BFG | 31.1                                                            | 34.4 | 1.0                              | 28                                      | 1.0                                                                                    | 33.0                                                                      | 45.4                                                        | 0.098                                                          |
| (+)SMCJ30A                                  | GFK                       | BFK | 33.3                                                            | 36.8 | 1.0                              | 30                                      | 1.0                                                                                    | 31.0                                                                      | 48.4                                                        | 0.099                                                          |
| (+)SMCJ33A                                  | GFM                       | BFM | 36.7                                                            | 40.6 | 1.0                              | 33                                      | 1.0                                                                                    | 28.1                                                                      | 53.3                                                        | 0.100                                                          |
| (+)SMCJ36A                                  | GFP                       | BFP | 40.0                                                            | 44.2 | 1.0                              | 36                                      | 1.0                                                                                    | 25.8                                                                      | 58.1                                                        | 0.100                                                          |
| (+)SMCJ40A                                  | GFR                       | BFR | 44.4                                                            | 49.1 | 1.0                              | 40                                      | 1.0                                                                                    | 23.3                                                                      | 64.5                                                        | 0.101                                                          |
| (+)SMCJ43A                                  | GFT                       | BFT | 47.8                                                            | 52.8 | 1.0                              | 43                                      | 1.0                                                                                    | 21.6                                                                      | 69.4                                                        | 0.102                                                          |
| (+)SMCJ45A                                  | GFV                       | GFV | 50.0                                                            | 55.3 | 1.0                              | 45                                      | 1.0                                                                                    | 20.6                                                                      | 72.7                                                        | 0.102                                                          |
| (+)SMCJ48A                                  | GFX                       | GFX | 53.3                                                            | 58.9 | 1.0                              | 48                                      | 1.0                                                                                    | 19.4                                                                      | 77.4                                                        | 0.103                                                          |
| (+)SMCJ51A                                  | GFZ                       | GFZ | 56.7                                                            | 62.7 | 1.0                              | 51                                      | 1.0                                                                                    | 18.2                                                                      | 82.4                                                        | 0.104                                                          |
| (+)SMCJ54A                                  | GGE                       | GGE | 60.0                                                            | 66.3 | 1.0                              | 54                                      | 1.0                                                                                    | 17.2                                                                      | 87.1                                                        | 0.104                                                          |
| (+)SMCJ58A                                  | GGG                       | GGG | 64.4                                                            | 71.2 | 1.0                              | 58                                      | 1.0                                                                                    | 16.0                                                                      | 93.6                                                        | 0.104                                                          |
| (+)SMCJ60A                                  | GGK                       | GGK | 66.7                                                            | 73.7 | 1.0                              | 60                                      | 1.0                                                                                    | 15.5                                                                      | 96.8                                                        | 0.105                                                          |
| (+)SMCJ64A                                  | GGM                       | GGM | 71.1                                                            | 78.6 | 1.0                              | 64                                      | 1.0                                                                                    | 14.6                                                                      | 103                                                         | 0.105                                                          |
| (+)SMCJ70A                                  | GGP                       | GGP | 77.8                                                            | 86.0 | 1.0                              | 70                                      | 1.0                                                                                    | 13.3                                                                      | 113                                                         | 0.105                                                          |
| (+)SMCJ75A                                  | GGR                       | GGR | 83.3                                                            | 92.1 | 1.0                              | 75                                      | 1.0                                                                                    | 12.4                                                                      | 121                                                         | 0.106                                                          |
| (+)SMCJ78A                                  | GGT                       | GGT | 86.7                                                            | 95.8 | 1.0                              | 78                                      | 1.0                                                                                    | 11.9                                                                      | 126                                                         | 0.106                                                          |
| (+)SMCJ85A                                  | GGV                       | GGV | 94.4                                                            | 104  | 1.0                              | 85                                      | 1.0                                                                                    | 10.9                                                                      | 137                                                         | 0.106                                                          |
| (+)SMCJ90A                                  | GGX                       | GGX | 100                                                             | 111  | 1.0                              | 90                                      | 1.0                                                                                    | 10.3                                                                      | 146                                                         | 0.106                                                          |
| (+)SMCJ100A                                 | GGZ                       | GGZ | 111                                                             | 123  | 1.0                              | 100                                     | 1.0                                                                                    | 9.3                                                                       | 162                                                         | 0.107                                                          |
| (+)SMCJ110A                                 | GHE                       | GHE | 122                                                             | 135  | 1.0                              | 110                                     | 1.0                                                                                    | 8.5                                                                       | 177                                                         | 0.107                                                          |
| (+)SMCJ120A                                 | GHG                       | GHG | 133                                                             | 147  | 1.0                              | 120                                     | 1.0                                                                                    | 7.8                                                                       | 193                                                         | 0.108                                                          |
| (+)SMCJ130A                                 | GHK                       | GHK | 144                                                             | 159  | 1.0                              | 130                                     | 1.0                                                                                    | 7.2                                                                       | 209                                                         | 0.108                                                          |
| (+)SMCJ150A                                 | GHM                       | GHM | 167                                                             | 185  | 1.0                              | 150                                     | 1.0                                                                                    | 6.2                                                                       | 243                                                         | 0.108                                                          |
| (+)SMCJ160A                                 | GHP                       | GHP | 178                                                             | 197  | 1.0                              | 160                                     | 1.0                                                                                    | 5.8                                                                       | 259                                                         | 0.108                                                          |
| (+)SMCJ170A                                 | GHR                       | GHR | 189                                                             | 209  | 1.0                              | 170                                     | 1.0                                                                                    | 5.5                                                                       | 275                                                         | 0.108                                                          |
| SMCJ188A                                    | GHS                       | GHS | 209                                                             | 231  | 1.0                              | 188                                     | 1.0                                                                                    | 4.6                                                                       | 328                                                         | 0.108                                                          |

**Notes**

- (1) Pulse test:  $t_p \leq 50$  ms  
(2) Surge current waveform per fig. 3 and derate per fig. 2  
(3) For bidirectional 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 bidirectional SMCJ5.0CA, the maximum  $V_{BR}$  is 7.25 V  
(6)  $V_F = 3.5$  V at  $I_F = 100$  A (unidirectional 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    | $^{\circ}\text{C/W}$ |
| 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-M3/57T                |                 |                        |               |                                    |
| SMCJ5.0A-E3/9AT                | 0.211           | 9AT                    | 3500          | 13" diameter plastic tape and reel |
| SMCJ5.0A-M3/9AT                |                 |                        |               |                                    |
| SMCJ5.0AHE3_A/H <sup>(1)</sup> | 0.211           | H                      | 850           | 7" diameter plastic tape and reel  |
| SMCJ5.0AHM3_A/H <sup>(1)</sup> |                 |                        |               |                                    |
| SMCJ5.0AHE3_A/I <sup>(1)</sup> | 0.211           | I                      | 3500          | 13" diameter plastic tape and reel |
| SMCJ5.0AHM3_A/I <sup>(1)</sup> |                 |                        |               |                                    |

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

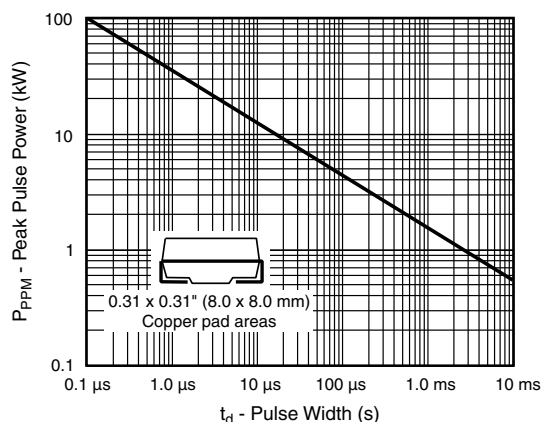
**RATINGS AND CHARACTERISTICS CURVES** ( $T_A = 25\text{ }^{\circ}\text{C}$  unless otherwise noted)


Fig. 1 - Peak Pulse Power Rating Curve



Fig. 4 - Typical Junction Capacitance Unidirectional



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



Fig. 5 - Typical Transient Thermal Impedance

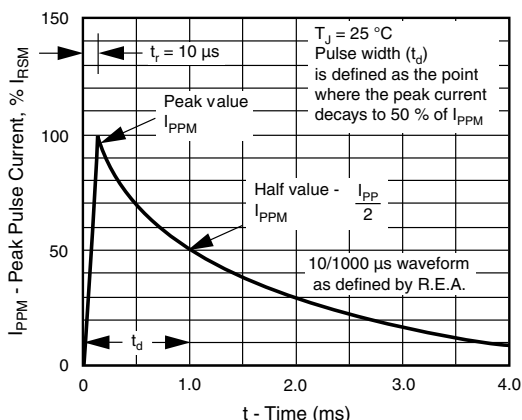


Fig. 3 - Pulse Waveform

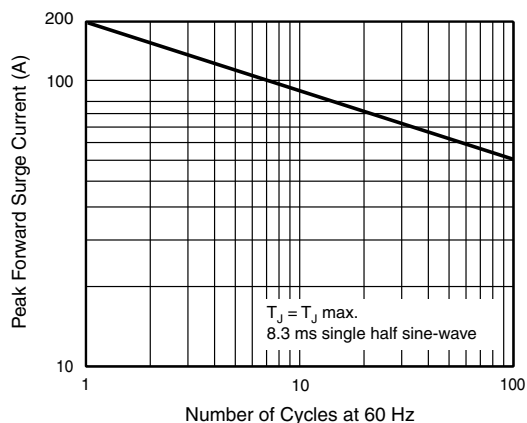


Fig. 6 - Maximum Non-Repetitive Peak Forward Surge Current Unidirectional Use On



## PACKAGE OUTLINE DIMENSIONS in inches (millimeters)





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