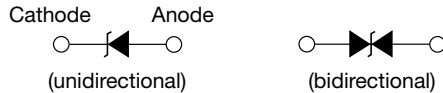


# Surface Mount TRANSZORB<sup>®</sup> Transient Voltage Suppressors


**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 <sub>A</sub> = 25 °C unless otherwise noted) |                           |     |                                                                      |      |                                           |                                                |                                                                                |                                                                       |                                                                             |                                                                       |
|----------------------------------------------------------------------------|---------------------------|-----|----------------------------------------------------------------------|------|-------------------------------------------|------------------------------------------------|--------------------------------------------------------------------------------|-----------------------------------------------------------------------|-----------------------------------------------------------------------------|-----------------------------------------------------------------------|
| DEVICE TYPE<br>MODIFIED<br>"J" BEND<br>LEAD                                | DEVICE<br>MARKING<br>CODE |     | BREAKDOWN<br>VOLTAGE<br>V <sub>BR</sub> AT I <sub>T</sub> (1)<br>(V) |      | TEST<br>CURRENT<br>I <sub>T</sub><br>(mA) | STAND-OFF<br>VOLTAGE<br>V <sub>WM</sub><br>(V) | MAXIMUM<br>REVERSE<br>LEAKAGE<br>AT V <sub>WM</sub><br>I <sub>D</sub> (μA) (3) | MAXIMUM<br>PEAK PULSE<br>SURGE<br>CURRENT<br>I <sub>PPM</sub> (A) (2) | MAXIMUM<br>CLAMPING<br>VOLTAGE<br>AT I <sub>PPM</sub><br>V <sub>C</sub> (V) | MAXIMUM<br>TEMPERATURE<br>COEFFICIENT<br>OF V <sub>BR</sub><br>(%/°C) |
|                                                                            | UNI                       | BI  | MIN.                                                                 | MAX. |                                           |                                                |                                                                                |                                                                       |                                                                             |                                                                       |
| (+)SMCJ5.0A (5)                                                            | 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<sub>p</sub> ≤ 50 ms
- (2) Surge current waveform per fig. 3 and derate per fig. 2
- (3) For bidirectional types having V<sub>WM</sub> of 10 V and less, the I<sub>D</sub> limit is doubled
- (4) All terms and symbols are consistent with ANSI/IEEE C62.35
- (5) For the bidirectional SMCJ5.0CA, the maximum V<sub>BR</sub> is 7.25 V
- (6) V<sub>F</sub> = 3.5 V at I<sub>F</sub> = 100 A (unidirectional only)
- (+) Underwriters laboratory recognition for the classification of protectors (QVGG2) under the UL standard for safety 497B and file number E136766 for both uni-directional and bi-directional devices



| <b>THERMAL CHARACTERISTICS</b> ( $T_A = 25\text{ }^\circ\text{C}$ unless otherwise noted) |                 |       |      |
|-------------------------------------------------------------------------------------------|-----------------|-------|------|
| PARAMETER                                                                                 | SYMBOL          | VALUE | UNIT |
| Typical thermal resistance, junction to ambient air <sup>(1)</sup>                        | $R_{\theta JA}$ | 75    | °C/W |
| Typical thermal resistance, junction to lead                                              | $R_{\theta JL}$ | 15    |      |

**Note**

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

| <b>ORDERING INFORMATION</b> (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<sub>A</sub> = 25 °C unless otherwise noted)

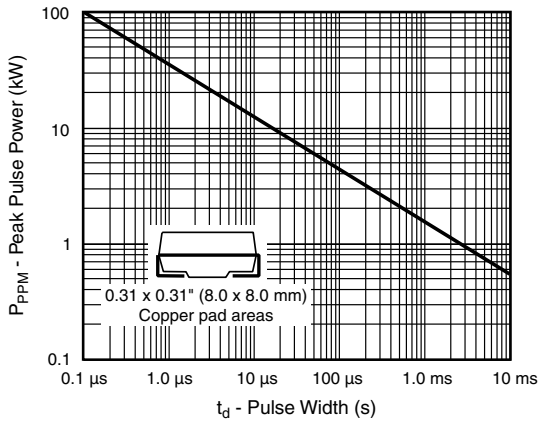


Fig. 1 - Peak Pulse Power Rating Curve

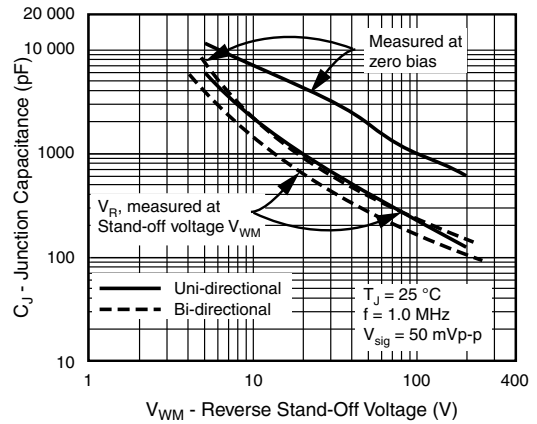


Fig. 4 - Typical Junction Capacitance Unidirectional

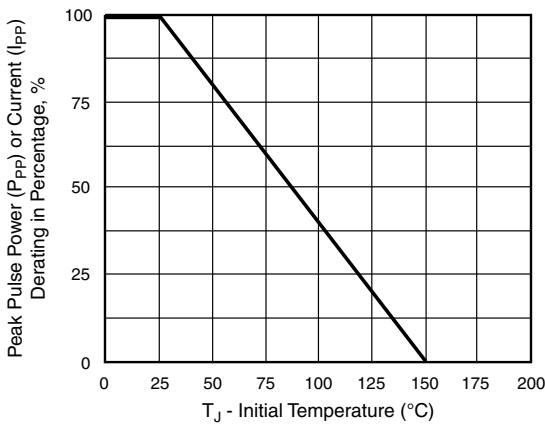


Fig. 2 - Pulse Power or Current vs. Initial Junction Temperature

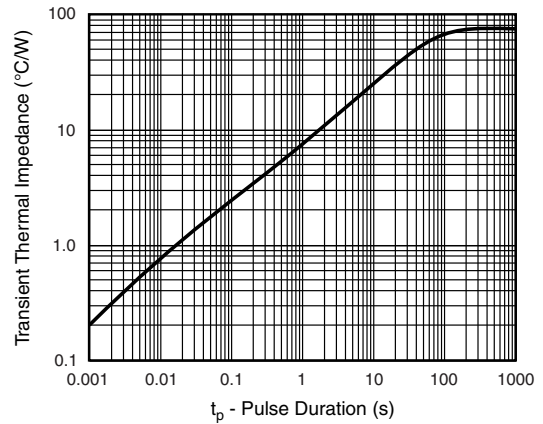


Fig. 5 - Typical Transient Thermal Impedance

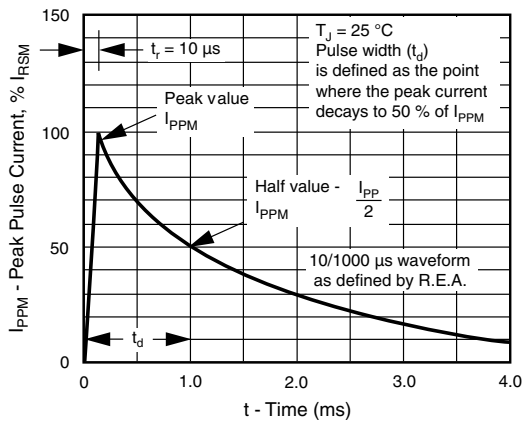


Fig. 3 - Pulse Waveform

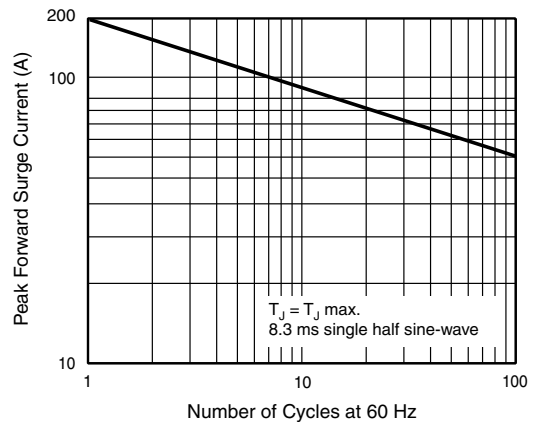


Fig. 6 - Maximum Non-Repetitive Peak Forward Surge Current Unidirectional Use On



### PACKAGE OUTLINE DIMENSIONS in inches (millimeters)





## Disclaimer

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