

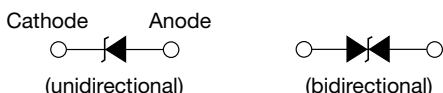


# THE DATASHEET OF SM15T68CAHE3\_A/H

# Surface Mount TRANSZORB® Transient Voltage Suppressors



**SMC (DO-214AB)**



## LINKS TO ADDITIONAL RESOURCES



| PRIMARY CHARACTERISTICS          |                               |
|----------------------------------|-------------------------------|
| $V_{WM}$                         | 5.8 V to 188 V                |
| $V_{BR}$ unidirectional          | 6.8 V to 220 V                |
| $V_{BR}$ bidirectional           | 6.8 V to 220 V                |
| $P_{PPM}$                        | 1500 W                        |
| $P_D$                            | 6.5 W                         |
| $I_{FSM}$ (uni-directional only) | 200 A                         |
| $T_J$ max.                       | 150 °C                        |
| Polarity                         | Unidirectional, bidirectional |
| Package                          | SMC (DO-214AB)                |

## DEVICES FOR BIDIRECTIONAL APPLICATIONS

For bidirectional devices use CA suffix (e.g. SM15T12CA). Electrical characteristics apply in both directions.

## APPLICATION NOTES

A 1500 W (SMC) device is normally selected when the threat of transients is from lightning induced transients, conducted via external leads or I/O lines. It is also used to protect against switching transients induced by large coils or industrial motors. Source impedance at component level in a system is usually high enough to limit the current within the peak pulse current ( $I_{PP}$ ) rating of this series. In an overstress condition, the failure mode is a short circuit.

## FEATURES

- Low profile package
- Ideal for automated placement
- Glass passivated chip junction
- Available in unidirectional and bidirectional
- 1500 W peak pulse power capability with a 10/1000  $\mu$ s waveform
- Excellent clamping capability
- Low inductance
- 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 and 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 power dissipation with a 10/1000 $\mu$ s waveform <sup>(1)(2)</sup> (fig. 1)          | $P_{PPM}$      | 1500           | W    |
| Peak pulse current with a 10/1000 $\mu$ s waveform <sup>(1)</sup> (fig. 3)                 | $I_{PPM}$      | See next table | A    |
| Power dissipation on infinite heatsink at $T_A = 50\text{ °C}$                             | $P_D$          | 6.5            | W    |
| Peak forward surge current 10 ms single half sine-wave uni-directional only <sup>(2)</sup> | $I_{FSM}$      | 200            | A    |
| Operating junction and storage temperature range                                           | $T_J, T_{STG}$ | -65 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** ( $T_A = 25\text{ }^{\circ}\text{C}$  unless otherwise noted)

| TYPE <sup>(1)</sup> | DEVICE MARKING CODE |      | BREAKDOWN VOLTAGE $V_{BR}$ AT $I_T$ <sup>(2)</sup> (V) |      | TEST CURRENT $I_T$ (mA) | STAND-OFF VOLTAGE $V_{WM}$ (V) | MAXIMUM REVERSE LEAKAGE AT $V_{WM}$ $I_D$ <sup>(3)</sup> ( $\mu\text{A}$ ) | MAXIMUM CLAMPING VOLTAGE $V_C$ AT $I_{PPM}$ (10/1000 $\mu\text{s}$ ) |      | MAXIMUM CLAMPING VOLTAGE $V_C$ AT $I_{PPM}$ (8/20 $\mu\text{s}$ ) |     | $\alpha_T$ MAX. $10^{-4}/^{\circ}\text{C}$ |
|---------------------|---------------------|------|--------------------------------------------------------|------|-------------------------|--------------------------------|----------------------------------------------------------------------------|----------------------------------------------------------------------|------|-------------------------------------------------------------------|-----|--------------------------------------------|
|                     | UNI                 | BI   | MIN.                                                   | MAX. |                         |                                |                                                                            | (V)                                                                  | (A)  | (V)                                                               | (A) |                                            |
| SM15T6V8A           | GDE7                | GDE7 | 6.45                                                   | 7.14 | 10                      | 5.80                           | 1000                                                                       | 10.5                                                                 | 143  | 13.4                                                              | 746 | 5.7                                        |
| SM15T7V5A           | GDK7                | BDK7 | 7.13                                                   | 7.88 | 10                      | 6.40                           | 500                                                                        | 11.3                                                                 | 132  | 14.5                                                              | 690 | 6.1                                        |
| SM15T10A            | GDT7                | BDT7 | 9.50                                                   | 10.5 | 1.0                     | 8.55                           | 10                                                                         | 14.5                                                                 | 103  | 18.6                                                              | 538 | 7.3                                        |
| SM15T12A            | GDX7                | BDX7 | 11.4                                                   | 12.6 | 1.0                     | 10.2                           | 5.0                                                                        | 16.7                                                                 | 90.0 | 21.7                                                              | 461 | 7.8                                        |
| SM15T15A            | GEG7                | GEG7 | 14.3                                                   | 15.8 | 1.0                     | 12.8                           | 1.0                                                                        | 21.2                                                                 | 71.0 | 27.2                                                              | 368 | 8.4                                        |
| SM15T18A            | GEM7                | BEM7 | 17.1                                                   | 18.9 | 1.0                     | 15.3                           | 1.0                                                                        | 25.2                                                                 | 59.5 | 32.5                                                              | 308 | 8.8                                        |
| SM15T22A            | GET7                | BET7 | 20.9                                                   | 23.1 | 1.0                     | 18.8                           | 1.0                                                                        | 30.6                                                                 | 49.0 | 39.3                                                              | 254 | 9.2                                        |
| SM15T24A            | GEV7                | GEV7 | 22.8                                                   | 25.2 | 1.0                     | 20.5                           | 1.0                                                                        | 33.2                                                                 | 45.0 | 42.8                                                              | 234 | 9.4                                        |
| SM15T27A            | GEX7                | BEX7 | 25.7                                                   | 28.4 | 1.0                     | 23.1                           | 1.0                                                                        | 37.5                                                                 | 40.0 | 48.3                                                              | 207 | 9.6                                        |
| SM15T30A            | GFE7                | BFE7 | 28.5                                                   | 31.5 | 1.0                     | 25.6                           | 1.0                                                                        | 41.5                                                                 | 36.0 | 53.5                                                              | 187 | 9.7                                        |
| SM15T33A            | GFG7                | GFG7 | 31.4                                                   | 34.7 | 1.0                     | 28.2                           | 1.0                                                                        | 45.7                                                                 | 33.0 | 59.0                                                              | 169 | 9.8                                        |
| SM15T36A            | GFK7                | BFK7 | 34.2                                                   | 37.8 | 1.0                     | 30.8                           | 1.0                                                                        | 49.9                                                                 | 30.0 | 64.3                                                              | 156 | 9.9                                        |
| SM15T39A            | GFM7                | BFM7 | 37.1                                                   | 41.0 | 1.0                     | 33.3                           | 1.0                                                                        | 53.9                                                                 | 28.0 | 69.7                                                              | 143 | 10.0                                       |
| SM15T68A            | GGG7                | GGG7 | 64.6                                                   | 71.4 | 1.0                     | 58.1                           | 1.0                                                                        | 92.0                                                                 | 16.3 | 121                                                               | 83  | 10.4                                       |
| SM15T100A           | GGV7                | GGV7 | 95.0                                                   | 105  | 1.0                     | 85.5                           | 1.0                                                                        | 137                                                                  | 11.0 | 178                                                               | 56  | 10.6                                       |
| SM15T150A           | GHK7                | GHK7 | 143                                                    | 158  | 1.0                     | 128                            | 1.0                                                                        | 207                                                                  | 7.20 | 265                                                               | 38  | 10.8                                       |
| SM15T200A           | GHR7                | GHR7 | 190                                                    | 210  | 1.0                     | 171                            | 1.0                                                                        | 274                                                                  | 5.50 | 353                                                               | 28  | 10.8                                       |
| SM15T220A           | GHR8                | GHR8 | 209                                                    | 231  | 1.0                     | 188                            | 1.0                                                                        | 328                                                                  | 4.60 | 388                                                               | 26  | 10.8                                       |

**Notes**

- (1) For bidirectional devices add suffix "CA" instead of "A"  
 (2)  $V_{BR}$  measured after  $I_T$  applied for 300  $\mu\text{s}$  square wave pulse  
 (3) For bi-polar devices with  $V_{WM} = 10\text{ V}$  or under, the  $I_D$  limit is doubled

**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**

- (1) Mounted on minimum recommended pad layout

**ORDERING INFORMATION** (Example)

| PREFERRED P/N                  | UNIT WEIGHT (g) | PREFERRED PACKAGE CODE | BASE QUANTITY | DELIVERY MODE                      |
|--------------------------------|-----------------|------------------------|---------------|------------------------------------|
| SM15T10A-E3/57T                | 0.211           | 57T                    | 850           | 7" diameter plastic tape and reel  |
| SM15T10A-M3/57T                |                 |                        |               |                                    |
| SM15T10A-E3/9AT                | 0.211           | 9AT                    | 3500          | 13" diameter plastic tape and reel |
| SM15T10A-M3/9AT                |                 |                        |               |                                    |
| SM15T10AHE3_A/H <sup>(1)</sup> | 0.211           | H                      | 850           | 7" diameter plastic tape and reel  |
| SM15T10AHM3_A/H <sup>(1)</sup> |                 |                        |               |                                    |
| SM15T10AHE3_A/I <sup>(1)</sup> | 0.211           | I                      | 3500          | 13" diameter plastic tape and reel |
| SM15T10AHM3_A/I <sup>(1)</sup> |                 |                        |               |                                    |

**Note**

- (1) AEC-Q101 qualified

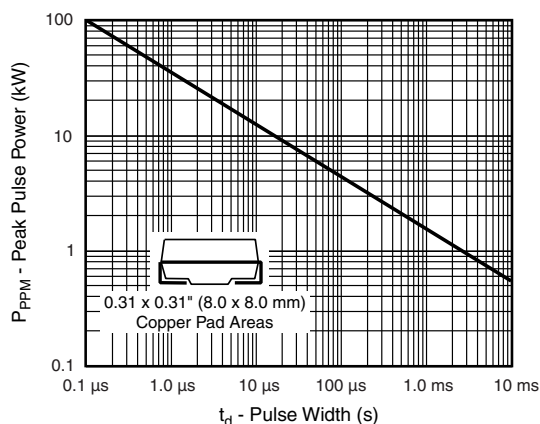
**RATINGS AND CHARACTERISTICS CURVES** ( $T_A = 25\text{ }^{\circ}\text{C}$  unless otherwise noted)


Fig. 1 - Peak Pulse Power Rating Curve

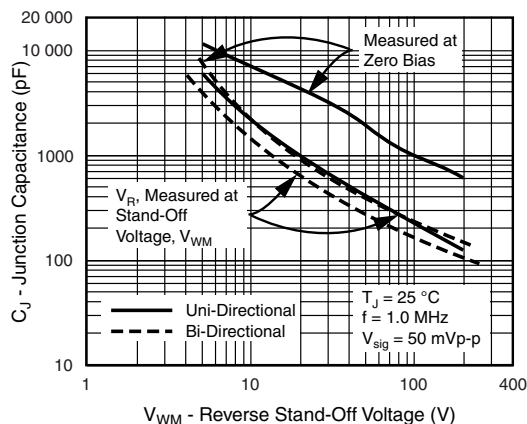


Fig. 4 - Typical Junction Capacitance Uni-Directional

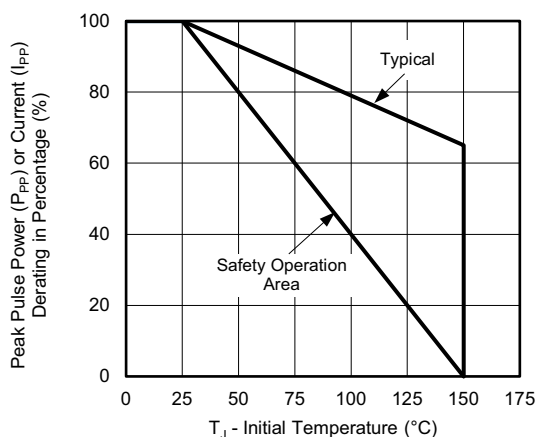


Fig. 2 - Pulse Power or Current vs. Initial Junction Temperature

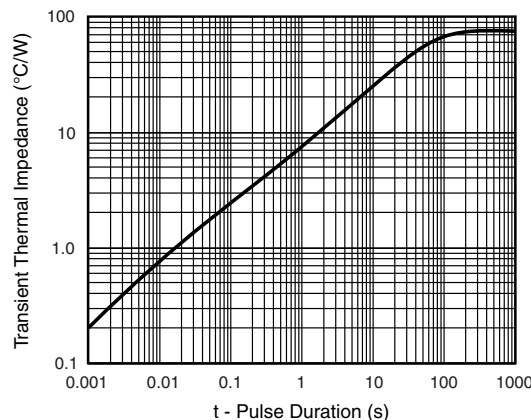


Fig. 5 - Typical Transient Thermal Impedance

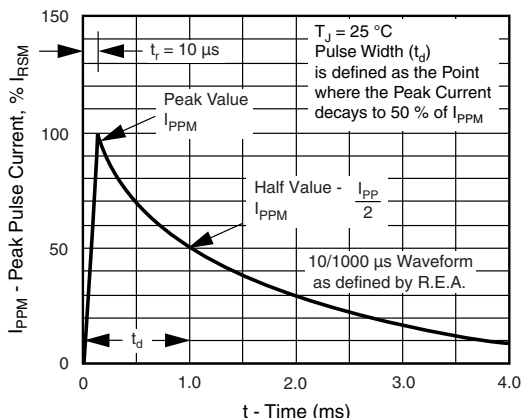


Fig. 3 - Pulse Waveform

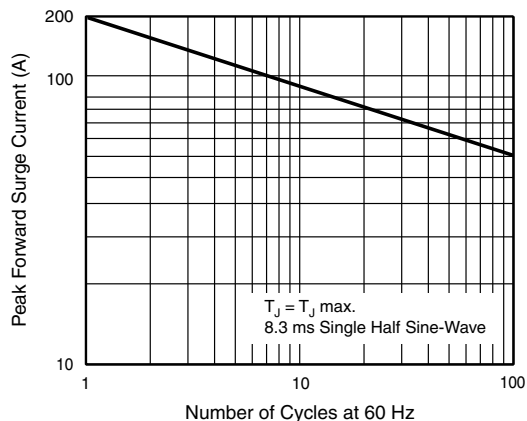
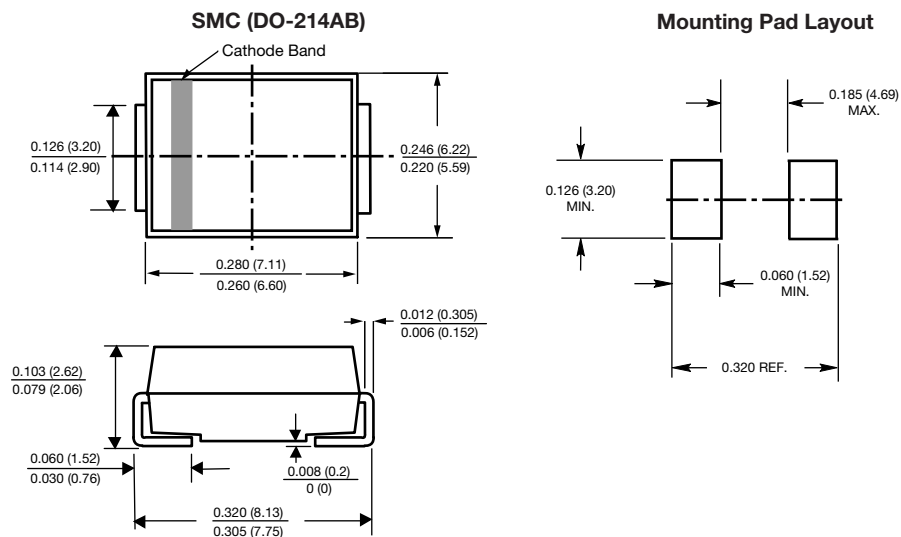


Fig. 6 - Maximum Non-Repetitive Forward Surge Current Unidirectional Use Only



### PACKAGE OUTLINE DIMENSIONS in inches (millimeters)





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