

# Surface Mount TRANSZORB® Transient Voltage Suppressors


**SMC (DO-214AB)**

 Cathode  Anode

## LINKS TO ADDITIONAL RESOURCES



| PRIMARY CHARACTERISTICS |                 |
|-------------------------|-----------------|
| $V_{BR}$                | 11.1 V to 104 V |
| $V_{WM}$                | 10 V to 85 V    |
| $P_{PPM}$               | 5000 W          |
| $T_J$ max.              | 150 °C          |
| Polarity                | Unidirectional  |
| Package                 | SMC (DO-214AB)  |

## 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.

## FEATURES

- Unidirectional
- Peak pulse power:
  - 5000 W (10/1000  $\mu$ s)
  - 40 kW (8/20  $\mu$ s)
- 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
  - Automotive ordering code: base P/NHM3 for SMC5K10A to SMC5K20A
- Material categorization: for definitions of compliance please see [www.vishay.com/doc?99912](http://www.vishay.com/doc?99912)


**RoHS**  
COMPLIANT  
HALOGEN  
**FREE**

## MECHANICAL DATA

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

Molding compound meets UL 94 V-0 flammability rating  
 Base P/N-M3 - halogen-free, RoHS-compliant  
 Base P/NHM3\_X - halogen-free, RoHS-compliant, and AEC-Q101 qualified  
 (“\_X” denotes revision code e.g. A, B, ... and only available for SMC5K10A to 20A types)

**Terminals:** matte tin plated leads, solderable per J-STD-002 and JESD 22-B102  
 M3 suffix meets JESD 201 class 2 whisker test, HM3 suffix meets JESD 201 class 2 whisker test

### Note

- SMC5K22A to SMC5K85A for industrial grade only

**Polarity:** color band denotes cathode end

| MAXIMUM RATINGS ( $T_A = 25$ °C unless otherwise noted)               |                 |                |      |
|---|-----------------|----------------|------|
| PARAMETER   | SYMBOL          | VALUE          | UNIT |
| Peak pulse power dissipation with a 10/1000 $\mu$ s waveform (fig. 1) | $P_{PPM}^{(1)}$ | 5000           | W    |
| Peak pulse current with a 10/1000 $\mu$ s waveform (fig 3.)           | $I_{PPM}^{(1)}$ | See next table | A    |
| Operating junction and storage temperature range                      | $T_J, T_{STG}$  | -55 to +150    | °C   |

### Note

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



| <b>ELECTRICAL CHARACTERISTICS</b> ( $T_A = 25\text{ }^\circ\text{C}$ unless otherwise noted) |                     |  |      |                         |                                |  |  |      |   |      |
|--|---------------------|--|------|-------------------------|--------------------------------|--|--|------|---|------|
| DEVICE TYPE  | DEVICE MARKING CODE | BREAKDOWN VOLTAGE $V_{BR}$ AT $I_T$ <sup>(1)</sup> (V) |      | TEST CURRENT $I_T$ (mA) | STAND-OFF VOLTAGE $V_{WM}$ (V) | MAXIMUM REVERSE LEAKAGE AT $V_{WM}$ (μA) | MAXIMUM CLAMPING VOLTAGE $V_C$ AT $I_{PPM}$ 10/1000 μs |      | MAXIMUM CLAMPING VOLTAGE $V_C$ AT $I_{PPM}$ 8/20 μs |      |
|  |                     | MIN.   | MAX. |                         |                                |  | (V)  | (A)  | (V)   | (A)  |
| SMC5K10A   | 5GDY                | 11.1   | 12.3 | 1.0                     | 10                             | 10.0                                     | 17.0   | 294  | 24.1  | 1660 |
| SMC5K12A   | 5GEE                | 13.3   | 14.7 | 1.0                     | 12                             | 5.0                                      | 19.9   | 251  | 25.3  | 1581 |
| SMC5K13A   | 5GEG                | 14.4   | 15.9 | 1.0                     | 13                             | 2.0                                      | 21.5   | 233  | 27.2  | 1471 |
| SMC5K14A   | 5GEK                | 15.6   | 17.2 | 1.0                     | 14                             | 2.0                                      | 23.2   | 216  | 30.0  | 1333 |
| SMC5K15A   | 5GEM                | 16.7   | 18.5 | 1.0                     | 15                             | 2.0                                      | 24.4   | 205  | 32.5  | 1231 |
| SMC5K16A   | 5GEP                | 17.8   | 19.7 | 1.0                     | 16                             | 2.0                                      | 26.0   | 192  | 34.4  | 1163 |
| SMC5K17A   | 5GER                | 18.9   | 20.9 | 1.0                     | 17                             | 2.0                                      | 27.6   | 181  | 37.0  | 1081 |
| SMC5K18A   | 5GET                | 20.0   | 22.1 | 1.0                     | 18                             | 2.0                                      | 29.2   | 171  | 39.3  | 1018 |
| SMC5K20A   | 5GEV                | 22.2   | 24.5 | 1.0                     | 20                             | 2.0                                      | 32.4   | 154  | 42.8  | 935  |
| SMC5K22A   | 5GEX                | 24.4   | 26.9 | 1.0                     | 22                             | 1.0                                      | 35.5   | 141  | 48.2  | 830  |
| SMC5K24A   | 5GEZ                | 26.7   | 29.5 | 1.0                     | 24                             | 1.0                                      | 38.9   | 129  | 51.6  | 775  |
| SMC5K26A   | 5GFE                | 28.9   | 31.9 | 1.0                     | 26                             | 1.0                                      | 42.1   | 119  | 55.8  | 717  |
| SMC5K28A   | 5GFG                | 31.1   | 34.4 | 1.0                     | 28                             | 1.0                                      | 45.4   | 110  | 60.2  | 664  |
| SMC5K30A   | 5GFK                | 33.3   | 36.8 | 1.0                     | 30                             | 1.0                                      | 48.4   | 103  | 64.0  | 625  |
| SMC5K33A   | 5GFM                | 36.7   | 40.6 | 1.0                     | 33                             | 1.0                                      | 53.3   | 93.8 | 69.8  | 573  |
| SMC5K36A   | 5GFP                | 40.0   | 44.2 | 1.0                     | 36                             | 1.0                                      | 58.1   | 86.1 | 76.0  | 526  |
| SMC5K40A   | 5GFR                | 44.4   | 49.1 | 1.0                     | 40                             | 1.0                                      | 64.5   | 77.5 | 84.0  | 476  |
| SMC5K43A   | 5GFT                | 47.8   | 52.8 | 1.0                     | 43                             | 1.0                                      | 69.4   | 72.0 | 90.3  | 443  |
| SMC5K45A   | 5GFV                | 50.0   | 55.3 | 1.0                     | 45                             | 1.0                                      | 72.7   | 68.8 | 94.6  | 423  |
| SMC5K48A   | 5GFX                | 53.3   | 58.9 | 1.0                     | 48                             | 1.0                                      | 77.4   | 64.6 | 100   | 400  |
| SMC5K51A   | 5GFZ                | 56.7   | 62.7 | 1.0                     | 51                             | 1.0                                      | 82.4   | 60.7 | 107   | 374  |
| SMC5K54A   | 5GGE                | 60.0   | 66.3 | 1.0                     | 54                             | 1.0                                      | 87.1   | 57.4 | 113   | 354  |
| SMC5K58A   | 5GGG                | 64.4   | 71.2 | 1.0                     | 58                             | 1.0                                      | 93.6   | 53.4 | 121   | 331  |
| SMC5K60A   | 5GGK                | 66.7   | 73.7 | 1.0                     | 60                             | 1.0                                      | 96.8   | 51.7 | 125   | 320  |
| SMC5K64A   | 5GGM                | 71.1   | 78.6 | 1.0                     | 64                             | 1.0                                      | 103  | 48.5 | 134   | 299  |
| SMC5K70A   | 5GGP                | 77.8   | 86.0 | 1.0                     | 70                             | 1.0                                      | 113  | 44.2 | 146   | 274  |
| SMC5K75A   | 5GGR                | 83.3   | 92.1 | 1.0                     | 75                             | 1.0                                      | 121  | 41.3 | 157   | 255  |
| SMC5K78A   | 5GGT                | 86.7   | 95.8 | 1.0                     | 78                             | 1.0                                      | 126  | 39.7 | 163   | 245  |
| SMC5K85A   | 5GGV                | 94.4   | 104  | 1.0                     | 85                             | 1.0                                      | 137  | 36.5 | 177   | 226  |

**Notes**

- (1) Pulse test:  $t_p \leq 50$  ms
- (2) Surge current waveform per fig. 3 and derated per fig.2
- (3) All terms and symbols are consistent with ANSI/IEEE C62.35

| <b>THERMAL CHARACTERISTICS</b> ( $T_A = 25\text{ }^\circ\text{C}$ unless otherwise noted) |                           |      |                    |
|---|---------------------------|------|--------------------|
| PARAMETER   | SYMBOL                    | TYP. | UNIT               |
| Thermal resistance  | $R_{thJA}$ <sup>(1)</sup> | 90   | $^\circ\text{C/W}$ |
|   | $R_{thJM}$ <sup>(2)</sup> | 4.0  | $^\circ\text{C/W}$ |

**Notes**

- (1) Thermal resistance junction-to-ambient to follow JEDEC<sup>®</sup> 51-2A, device mounted on FR4 PCB, 2 oz. standard footprint
- (2) Thermal resistance junction-to-mount to follow JEDEC<sup>®</sup> 51-14 using Transient Dual Interface Test Method (TDIM)

| <b>IMMUNITY TO STATIC ELECTRICAL DISCHARGE TO THE FOLLOWING STANDARDS</b><br>( $T_A = 25\text{ }^\circ\text{C}$ unless otherwise noted) |                                       |                                  |        |       |
|---|---------------------------------------|----------------------------------|--------|-------|
| STANDARD  | TEST TYPE                             | TEST CONDITIONS                  | SYMBOL | VALUE |
| IEC 61000-4-2   | Human body model (contact mode)       | $C = 150$ pF, $R = 330$ $\Omega$ | ESD    | 30 kV |
|   | Human body model (air discharge mode) |                                  |        | 30 kV |



| ORDERING INFORMATION (Example) |                 |                        |               |                                    |
|--------------------------------|-----------------|------------------------|---------------|------------------------------------|
| PREFERRED P/N                  | UNIT WEIGHT (g) | PREFERRED PACKAGE CODE | BASE QUANTITY | DELIVERY MODE                      |
| SMC5K10A-M3/H <sup>(1)</sup>   | 0.257           | H                      | 850           | 7" diameter plastic tape and reel  |
| SMC5K10A-M3/I <sup>(1)</sup>   | 0.257           | I                      | 3500          | 13" diameter plastic tape and reel |
| SMC5K10AHM3_A/H <sup>(2)</sup> | 0.257           | H                      | 850           | 7" diameter plastic tape and reel  |
| SMC5K10AHM3_A/I <sup>(2)</sup> | 0.257           | I                      | 3500          | 13" diameter plastic tape and reel |

**Notes**

- (1) Available for SMC5K10A to SMC5K85A
- (2) AEC-Q101 qualified, available for SMC5K10A to SMC5K20A only

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

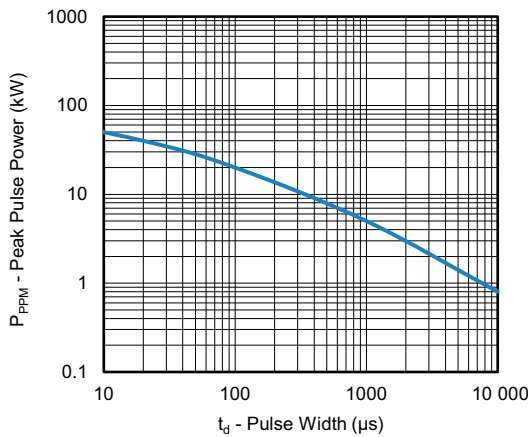


Fig. 1 - Peak Pulse Power Derating Curve

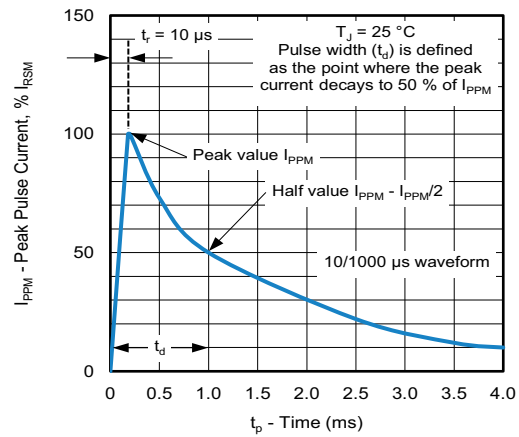


Fig. 3 - Pulse Waveform

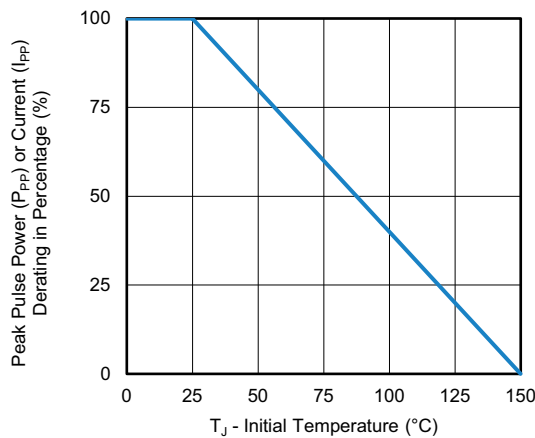


Fig. 2 - Peak Pulse Power or Current vs. Initial Junction Temperature

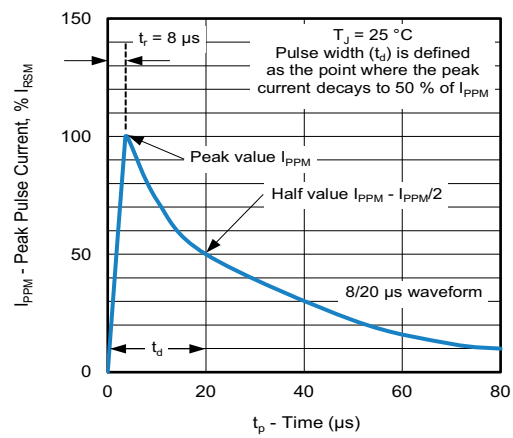


Fig. 4 - Pulse Waveform

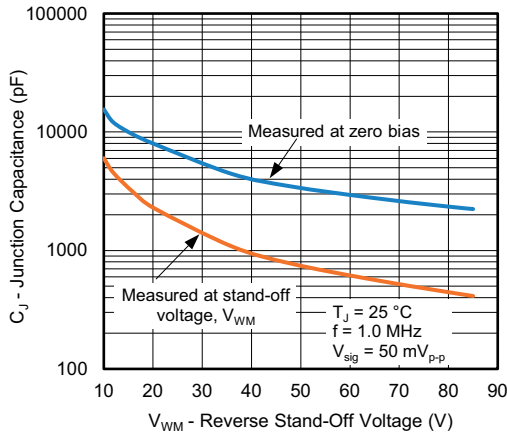


Fig. 5 - Typical Junction Capacitance

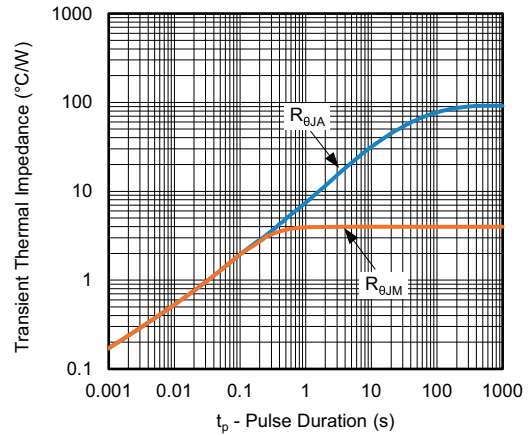
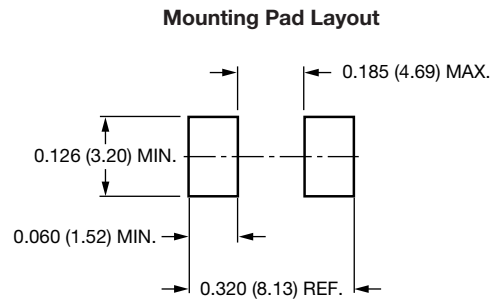
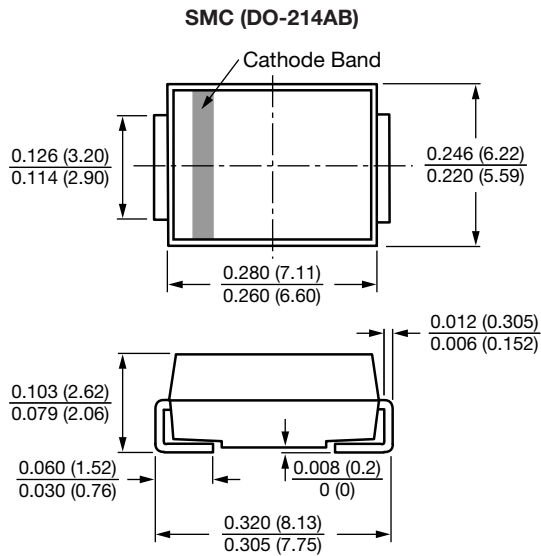


Fig. 6 - Typical Transient thermal Impedance

**Notes**

- Fig.1 - Power calculations is based on  $I_{PPM}$  times defined maximum clamping voltage by pulse width
- Fig.1 - 10 000  $\mu s$   $P_{PPM}$  is actual test for  $V_{WM} \leq 60$  V types, over 60 V types 10 000  $\mu s$   $P_{PPM}$  is curve extensional value

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





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