



**THE DATASHEET OF  
SMA5J24CA-M3/61**





## High Power Density Surface-Mount TRANSZORB® Transient Voltage Suppressors



SMA (DO-214AC)



RoHS  
COMPLIANT  
HALOGEN  
FREE  
Available

### 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)

### LINKS TO ADDITIONAL RESOURCES



| PRIMARY CHARACTERISTICS                |                               |
|--|-------------------------------|
| V <sub>BR</sub>                        | 6.4 V to 49.1 V               |
| V <sub>WM</sub>                        | 5.0 V to 40 V                 |
| P <sub>PPM</sub>                       | 500 W                         |
| I <sub>FSM</sub> (unidirectional only) | 40 A                          |
| T <sub>J</sub> max.                    | 150 °C                        |
| Polarity                               | Unidirectional, bidirectional |
| Package                                | SMA (DO-214AC)                |

### 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:** SMA (DO-214AC)  
 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

### DEVICES FOR BIDIRECTION APPLICATIONS

For bidirectional devices use CA suffix (e.g. SMA5J40CA). Electrical characteristics apply in both directions.

| MAXIMUM RATINGS (T <sub>A</sub> = 25 °C unless otherwise noted)                            |                                   |                |      |
|--|-----------------------------------|----------------|------|
| PARAMETER  | SYMBOL                            | VALUE          | UNIT |
| Peak pulse power dissipation with a 10/1000 μs waveform <sup>(1)(2)</sup> (fig. 1)         | P <sub>PPM</sub>                  | 500            | W    |
| Peak pulse current with a 10/1000 μs waveform <sup>(1)</sup>                               | I <sub>PPM</sub>                  | See next table | A    |
| Peak forward surge current 8.3 ms single half sine-wave unidirectional only <sup>(2)</sup> | I <sub>FSM</sub>                  | 40             | A    |
| Operating junction and storage temperature range   | T <sub>J</sub> , T <sub>STG</sub> | -55 to +150    | °C   |

#### Notes

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

<sup>(2)</sup> Mounted on 0.2" x 0.2" (5.0 mm x 5.0 mm) copper pads to each terminal



| ELECTRICAL CHARACTERISTICS (T <sub>A</sub> = 25 °C unless otherwise noted) |                     |     |  |      |                                  |                                       |   |  |   |
|--|---------------------|-----|--|------|----------------------------------|---------------------------------------|---|--|---|
| DEVICE TYPE  | DEVICE MARKING CODE |     | BREAKDOWN VOLTAGE V <sub>BR</sub> (V) <sup>(1)</sup> |      | TEST CURRENT I <sub>T</sub> (mA) | STAND-OFF VOLTAGE V <sub>WM</sub> (V) | MAXIMUM REVERSE LEAKAGE AT V <sub>WM</sub> I <sub>D</sub> (μA) <sup>(3)</sup> | MAXIMUM PEAK PULSE SURGE CURRENT I <sub>PPM</sub> (A) <sup>(2)</sup> | MAXIMUM CLAMPING VOLTAGE AT I <sub>PPM</sub> V <sub>C</sub> (V) |
|  | UNI                 | BI  | MIN.   | MAX. |                                  |                                       |   |  |   |
| SMA5J5.0A <sup>(5)</sup>   | 5AE                 | 5AE | 6.40   | 7.07 | 10                               | 5.0                                   | 800   | 54.3   | 9.2   |
| SMA5J6.0A  | 5AG                 | 5AG | 6.67   | 7.37 | 10                               | 6.0                                   | 800   | 48.5   | 10.3  |
| SMA5J6.5A  | 5AK                 | 5AK | 7.22   | 7.98 | 10                               | 6.5                                   | 500   | 44.6   | 11.2  |
| SMA5J7.0A  | 5AM                 | 5AM | 7.78   | 8.60 | 10                               | 7.0                                   | 200   | 41.7   | 12.0  |
| SMA5J7.5A  | 5AP                 | 5AP | 8.33   | 9.21 | 1.0                              | 7.5                                   | 100   | 38.8   | 12.9  |
| SMA5J8.0A  | 5AR                 | 5AR | 8.89   | 9.83 | 1.0                              | 8.0                                   | 50  | 36.8   | 13.6  |
| SMA5J8.5A  | 5AT                 | 5AT | 9.44   | 10.4 | 1.0                              | 8.5                                   | 10  | 34.7   | 14.4  |
| SMA5J9.0A  | 5AV                 | 5AV | 10.0   | 11.1 | 1.0                              | 9.0                                   | 5.0   | 32.5   | 15.4  |
| SMA5J10A   | 5AX                 | 5AX | 11.1   | 12.3 | 1.0                              | 10                                    | 1.0   | 29.4   | 17.0  |
| SMA5J11A   | 5AZ                 | 5AZ | 12.2   | 13.5 | 1.0                              | 11                                    | 1.0   | 27.5   | 18.2  |
| SMA5J12A   | 5BE                 | 5BE | 13.3   | 14.7 | 1.0                              | 12                                    | 1.0   | 25.1   | 19.9  |
| SMA5J13A   | 5BG                 | 5BG | 14.4   | 15.9 | 1.0                              | 13                                    | 1.0   | 23.3   | 21.5  |
| SMA5J14A   | 5BK                 | 5BK | 15.6   | 17.2 | 1.0                              | 14                                    | 1.0   | 21.6   | 23.2  |
| SMA5J15A   | 5BM                 | 5BM | 16.7   | 18.5 | 1.0                              | 15                                    | 1.0   | 20.5   | 24.4  |
| SMA5J16A   | 5BP                 | 5BP | 17.8   | 19.7 | 1.0                              | 16                                    | 1.0   | 19.2   | 26.0  |
| SMA5J17A   | 5BR                 | 5BR | 18.9   | 20.9 | 1.0                              | 17                                    | 1.0   | 18.1   | 27.6  |
| SMA5J18A   | 5BT                 | 5BT | 20.0   | 22.1 | 1.0                              | 18                                    | 1.0   | 17.1   | 29.2  |
| SMA5J20A   | 5BV                 | 5BV | 22.2   | 24.5 | 1.0                              | 20                                    | 1.0   | 15.4   | 32.4  |
| SMA5J22A   | 5BX                 | 5BX | 24.4   | 26.9 | 1.0                              | 22                                    | 1.0   | 14.1   | 35.5  |
| SMA5J24A   | 5BZ                 | 5BZ | 26.7   | 29.5 | 1.0                              | 24                                    | 1.0   | 12.9   | 38.9  |
| SMA5J26A   | 5CE                 | 5CE | 28.9   | 31.9 | 1.0                              | 26                                    | 1.0   | 11.9   | 42.1  |
| SMA5J28A   | 5CG                 | 5CG | 31.1   | 34.4 | 1.0                              | 28                                    | 1.0   | 11.0   | 45.4  |
| SMA5J30A   | 5CK                 | 5CK | 33.3   | 36.8 | 1.0                              | 30                                    | 1.0   | 10.3   | 48.4  |
| SMA5J33A   | 5CM                 | 5CM | 36.7   | 40.6 | 1.0                              | 33                                    | 1.0   | 9.4  | 53.3  |
| SMA5J36A   | 5CP                 | 5CP | 40.0   | 44.2 | 1.0                              | 36                                    | 1.0   | 8.6  | 58.1  |
| SMA5J40A   | 5CR                 | 5CR | 44.4   | 49.1 | 1.0                              | 40                                    | 1.0   | 7.8  | 64.5  |

**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 SMA5J5.0CA, the maximum V<sub>BR</sub> is 7.25 V
- (6) V<sub>F</sub> = 3.5 V at I<sub>F</sub> = 25 A (uni-directional only)

| THERMAL CHARACTERISTICS (T <sub>A</sub> = 25 °C unless otherwise noted) |                  |       |       |
|---|------------------|-------|-------|
| PARAMETER   | SYMBOL           | VALUE | UNIT  |
| Typical thermal resistance, junction to ambient <sup>(1)</sup>          | R <sub>θJA</sub> | 80    | °C/ W |
| Typical thermal resistance, junction to lead                            | R <sub>θJL</sub> | 25    |       |

**Note**

- (1) Mounted on minimum recommended pad layout

| ORDERING INFORMATION (Example)  |                 |                        |               |                                    |
|---------------------------------|-----------------|------------------------|---------------|------------------------------------|
| PREFERRED P/N                   | UNIT WEIGHT (g) | PREFERRED PACKAGE CODE | BASE QUANTITY | DELIVERY MODE                      |
| SMA5J5.0A-E3/61                 | 0.064           | 61                     | 1800          | 7" diameter plastic tape and reel  |
| SMA5J5.0A-M3/61                 |                 |                        |               |                                    |
| SMA5J5.0A-E3/5A                 | 0.064           | 5A                     | 7500          | 13" diameter plastic tape and reel |
| SMA5J5.0A-M3/5A                 |                 |                        |               |                                    |
| SMA5J5.0AHE3_A/H <sup>(1)</sup> | 0.064           | H                      | 1800          | 7" diameter plastic tape and reel  |
| SMA5J5.0AHM3_A/H <sup>(1)</sup> |                 |                        |               |                                    |
| SMA5J5.0AHE3_A/I <sup>(1)</sup> | 0.064           | I                      | 7500          | 13" diameter plastic tape and reel |
| SMA5J5.0AHM3_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



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



Fig. 5 - Typical Transient Thermal Impedance

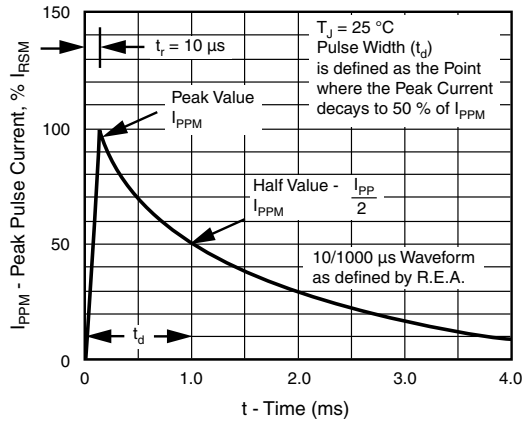


Fig. 3 - Pulse Waveform

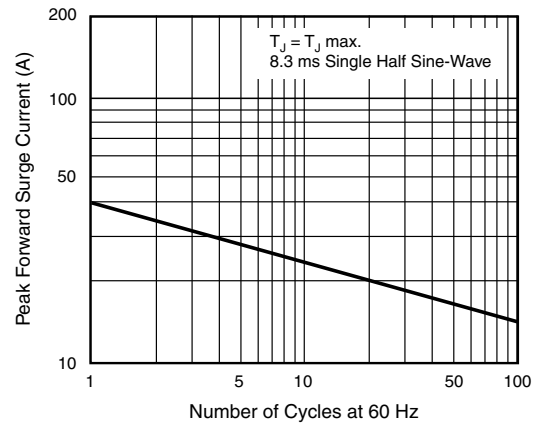
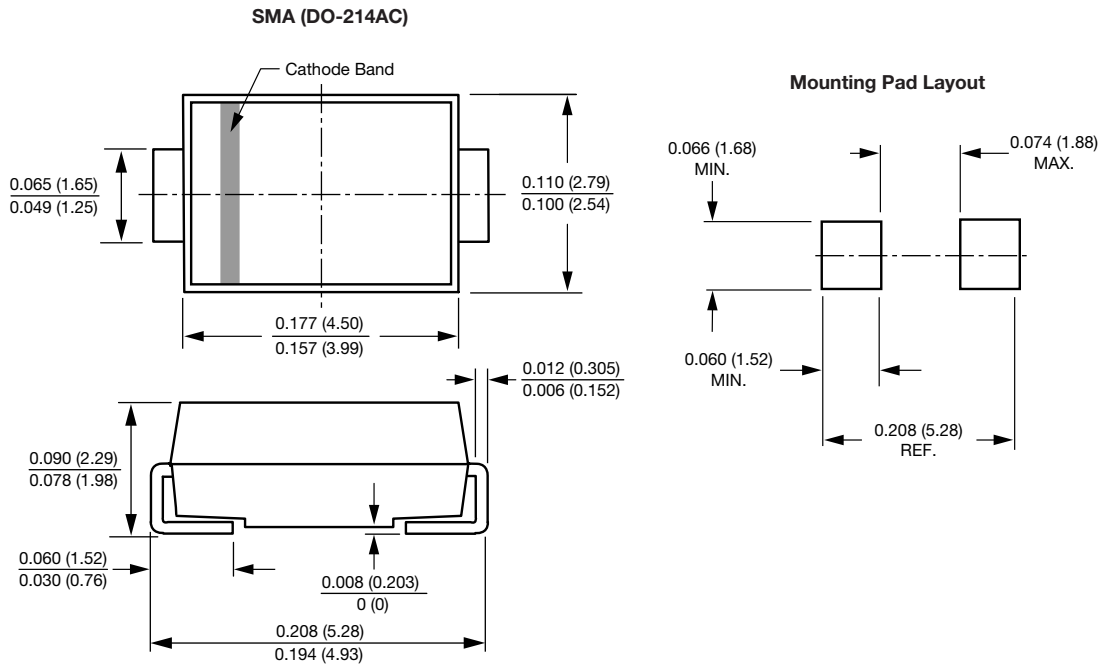


Fig. 6 - Maximum Non-Repetitive Peak Forward Surge Current Unidirectional Use Only



### PACKAGE OUTLINE DIMENSIONS in inches (millimeters)





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