

# Surface Mount TRANSZORB® Transient Voltage Suppressors


**SMA (DO-214AC)**

## FEATURES

- Low profile package
- Ideal for automated placement
- Available in uni-directional polarity only
- Excellent clamping capability
- Meets MSL level 1, per J-STD-020, LF maximum peak of 260 °C
- Material categorization: for definitions of compliance please see [www.vishay.com/doc?99912](http://www.vishay.com/doc?99912)


**RoHS**  
COMPLIANT

## 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 and commercial grade

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

E3 suffix meets JESD 201 class 2 whisker test

**Polarity:** Color band denotes cathode end

| PRIMARY CHARACTERISTICS       |                 |
|-------------------------------|-----------------|
| $V_{BR}$                      | 6.4 V to 34.4 V |
| $V_{WM}$                      | 5.0 V to 28 V   |
| $P_{PPM}$ (10 x 1000 $\mu$ s) | 600 W           |
| $P_{PPM}$ (8 x 20 $\mu$ s)    | 4000 W          |
| $P_D$ at $T_A = 50$ °C        | 4 W             |
| $I_{FSM}$                     | 50 A            |
| $T_J$ max.                    | 150 °C          |
| Polarity                      | Uni-directional |
| Package                       | SMA (DO-214AC)  |

| MAXIMUM RATINGS ( $T_A = 25$ °C unless otherwise noted)                        |                |                |      |
|--------------------------------------------------------------------------------|----------------|----------------|------|
| PARAMETER                                                                      | SYMBOL         | VALUE          | UNIT |
| Peak pulse power dissipation with a 10/1000 $\mu$ s waveform <sup>(1)(2)</sup> | $P_{PPM}$      | 600            | W    |
| Peak pulse power dissipation with a 8/20 $\mu$ s waveform                      |                | 4000           |      |
| Peak pulse current with a 10/1000 $\mu$ s waveform <sup>(1)(2)</sup>           | $I_{PPM}$      | See next table | A    |
| Peak pulse current with a 8/20 $\mu$ s waveform                                |                |                |      |
| Power dissipation on infinite heatsink, $T_A = 50$ °C                          | $P_D$          | 4.0            | W    |
| Peak forward surge current 8.3 ms single half sine-wave                        | $I_{FSM}$      | 50             | A    |
| Operating junction and storage temperature range                               | $T_J, T_{STG}$ | -55 to +150    | °C   |

## Notes

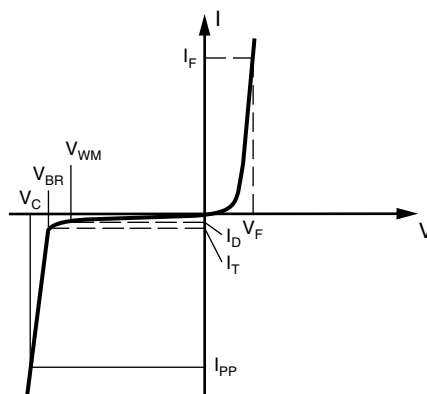
<sup>(1)</sup> Non-repetitive current pulse, per fig. 1 and derated above  $T_A = 25$  °C per fig. 2

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



## INDEX OF SYMBOLS

| SYMBOL     | PARAMETER                       |
|------------|---------------------------------|
| $V_{WM}$   | Stand-off voltage               |
| $V_{BR}$   | Breakdown voltage               |
| $V_C$      | Clamping voltage                |
| $I_D$      | Leakage current at $V_{WM}$     |
| $I_{PP}$   | Peak pulse current              |
| $\alpha T$ | Voltage temperature coefficient |
| $V_F$      | Forward voltage drop            |
| $R_D$      | Dynamic resistance              |

ELECTRICAL CHARACTERISTICS ( $T_A = 25^\circ\text{C}$  unless otherwise noted)

| DEVICE<br>TYPE | DEVICE<br>MARKING<br>CODE | BREAKDOWN<br>VOLTAGE<br>V <sub>BR</sub> AT I <sub>T</sub> <sup>(1)</sup> |      |    | MAXIMUM<br>REVERSE<br>LEAKAGE<br>I <sub>D</sub> AT V <sub>WM</sub> |       | STAND-OFF<br>VOLTAGE<br>V <sub>WM</sub> | V <sub>C</sub> AT I <sub>PP</sub> |      | R <sub>D</sub> <sup>(2)</sup> | V <sub>C</sub> AT I <sub>PP</sub> |      | R <sub>D</sub> <sup>(2)</sup> | αT <sup>(3)</sup> |                      |
|----------------|---------------------------|--------------------------------------------------------------------------|------|----|--------------------------------------------------------------------|-------|-----------------------------------------|-----------------------------------|------|-------------------------------|-----------------------------------|------|-------------------------------|-------------------|----------------------|
|                |                           |                                                                          |      |    |                                                                    |       |                                         | 10/1000 μs                        |      |                               | 8/20 μs                           |      |                               |                   |                      |
|                |                           | MIN.                                                                     | MAX. |    | 25 °C                                                              | 85 °C |                                         |                                   | MAX. |                               |                                   | MAX. |                               |                   |                      |
|                |                           | V                                                                        |      | mA | μA                                                                 |       |                                         | V                                 | V    | A                             | Ω                                 | V    | A                             | Ω                 | 10 <sup>-4</sup> /°C |
| SMA6J5.0A      | 6AE                       | 6.4                                                                      | 7.07 | 10 | 150                                                                | 375   | 5.0                                     | 9.1                               | 65.9 | 0.031                         | 13.4                              | 298  | 0.021                         | 5.7               |                      |
| SMA6J6.0A      | 6AG                       | 6.7                                                                      | 7.41 | 10 | 600                                                                | 1500  | 6.0                                     | 9.5                               | 63.2 | 0.033                         | 13.7                              | 290  | 0.022                         | 5.9               |                      |
| SMA6J6.5A      | 6AK                       | 7.2                                                                      | 7.96 | 10 | 100                                                                | 250   | 6.5                                     | 10.2                              | 58.8 | 0.038                         | 14.5                              | 276  | 0.024                         | 6.1               |                      |
| SMA6J7.5A      | 6AP                       | 8.33                                                                     | 9.21 | 1  | 50                                                                 | 125   | 7.5                                     | 11.8                              | 50.8 | 0.051                         | 17.0                              | 235  | 0.033                         | 6.5               |                      |
| SMA6J8.0A      | 6AR                       | 8.89                                                                     | 9.83 | 1  | 20                                                                 | 50    | 8.0                                     | 12.5                              | 48.0 | 0.056                         | 18.2                              | 220  | 0.038                         | 7.0               |                      |
| SMA6J8.5A      | 6AT                       | 9.4                                                                      | 10.4 | 1  | 20                                                                 | 50    | 8.5                                     | 13.3                              | 45.1 | 0.064                         | 18.7                              | 205  | 0.040                         | 7.3               |                      |
| SMA6J10A       | 6AX                       | 11.1                                                                     | 12.3 | 1  | 1                                                                  | 5     | 10                                      | 15.7                              | 38.2 | 0.089                         | 19.6                              | 184  | 0.040                         | 7.8               |                      |
| SMA6J11A       | 6AZ                       | 12.2                                                                     | 13.5 | 1  | 1                                                                  | 5     | 11                                      | 17.2                              | 34.8 | 0.107                         | 21.5                              | 172  | 0.047                         | 8.1               |                      |
| SMA6J12A       | 6BE                       | 13.3                                                                     | 14.7 | 1  | 0.2                                                                | 1     | 12                                      | 18.8                              | 31.9 | 0.128                         | 23.5                              | 157  | 0.056                         | 8.3               |                      |
| SMA6J13A       | 6BG                       | 14.4                                                                     | 15.9 | 1  | 0.2                                                                | 1     | 13                                      | 20.4                              | 29.4 | 0.153                         | 23.9                              | 147  | 0.054                         | 8.4               |                      |
| SMA6J15A       | 6BM                       | 16.7                                                                     | 18.5 | 1  | 0.2                                                                | 1     | 15                                      | 23.6                              | 25.4 | 0.201                         | 27.7                              | 123  | 0.075                         | 8.8               |                      |
| SMA6J16A       | 6BP                       | 17.8                                                                     | 19.7 | 1  | 0.2                                                                | 1     | 16                                      | 25.2                              | 23.8 | 0.229                         | 29.5                              | 119  | 0.083                         | 8.8               |                      |
| SMA6J17A       | 6BR                       | 18.9                                                                     | 20.9 | 1  | 0.2                                                                | 1     | 17                                      | 26.7                              | 22.5 | 0.259                         | 31.4                              | 111  | 0.094                         | 9.0               |                      |
| SMA6J18A       | 6BT                       | 20.0                                                                     | 22.1 | 1  | 0.2                                                                | 1     | 18                                      | 28.3                              | 21.2 | 0.292                         | 33.2                              | 102  | 0.109                         | 9.2               |                      |
| SMA6J20A       | 6BV                       | 22.2                                                                     | 24.5 | 1  | 0.2                                                                | 1     | 20                                      | 31.4                              | 19.1 | 0.361                         | 36.8                              | 93   | 0.132                         | 9.4               |                      |
| SMA6J22A       | 6BX                       | 24.4                                                                     | 26.9 | 1  | 0.2                                                                | 1     | 22                                      | 34.5                              | 17.4 | 0.437                         | 40.4                              | 89   | 0.152                         | 9.5               |                      |
| SMA6J24A       | 6BZ                       | 26.7                                                                     | 29.5 | 1  | 0.2                                                                | 1     | 24                                      | 37.8                              | 15.9 | 0.523                         | 44.3                              | 80   | 0.185                         | 9.6               |                      |
| SMA6J26A       | 6CE                       | 28.9                                                                     | 31.9 | 1  | 0.2                                                                | 1     | 26                                      | 40.9                              | 14.7 | 0.614                         | 47.9                              | 75   | 0.213                         | 9.7               |                      |
| SMA6J28A       | 6CG                       | 31.1                                                                     | 34.4 | 1  | 0.2                                                                | 1     | 28                                      | 44.0                              | 13.6 | 0.704                         | 51.6                              | 68   | 0.253                         | 9.8               |                      |

## Notes

- (1) Pulse test:  $t_p \leq 50$  ms  
 (2) To calculate maximum clamping voltage at other surge currents, use the following formula:  $V_{CLmax.} = R_D \times I_{PP} + V_{BRmax.}$   
 (3) To calculate  $V_{BR}$  vs. junction temperature, use the following formula:  $V_{BR}$  at  $T_J = V_{BR}$  at  $25^\circ\text{C} \times (1 + \alpha T \times (T_J - 25))$   
 (4)  $V_F = 3.5$  V at  $I_F = 25$  A, pulse test: 300  $\mu\text{s}$  pulse width

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

| PARAMETER                                                      | SYMBOL          | VALUE | UNIT                        |
|----------------------------------------------------------------|-----------------|-------|-----------------------------|
| Typical thermal resistance, junction to ambient <sup>(1)</sup> | $R_{\theta JA}$ | 120   | $^{\circ}\text{C}/\text{W}$ |
| Typical thermal resistance, junction to lead                   | $R_{\theta JL}$ | 25    |                             |

**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                      |
|-----------------|-----------------|------------------------|---------------|------------------------------------|
| SMA6J5.0A-E3/61 | 0.064           | 61                     | 1800          | 7" diameter plastic tape and reel  |
| SMA6J5.0A-E3/5A | 0.064           | 5A                     | 7500          | 13" diameter plastic tape and reel |

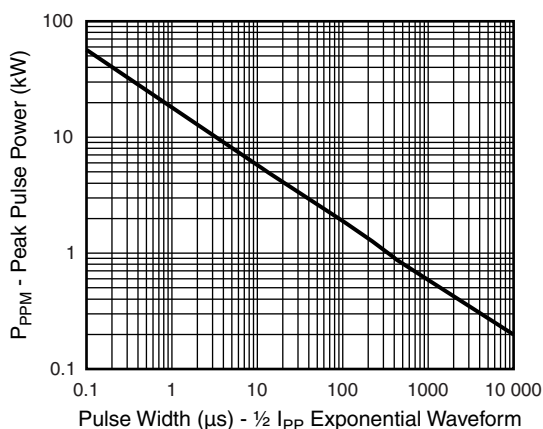
**RATINGS AND CHARACTERISTICS CURVES** ( $T_A = 25\text{ }^{\circ}\text{C}$  unless otherwise noted)

Fig. 1 - Peak Pulse Power Rating Curve

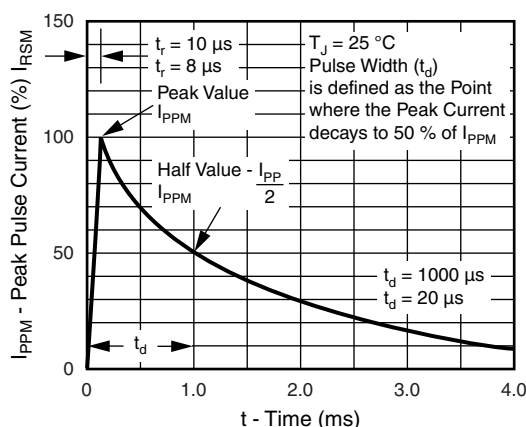


Fig. 3 - Pulse Waveform

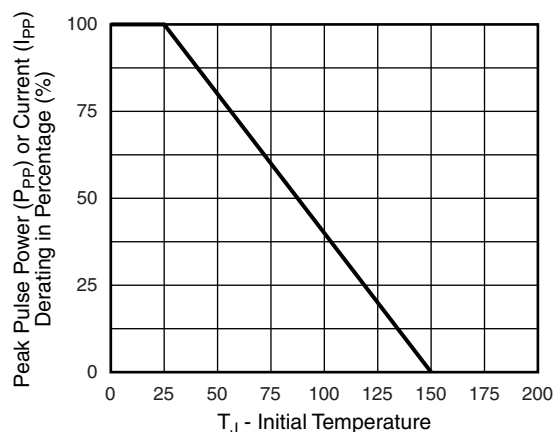


Fig. 2 - Pulse Power or Current vs. Initial Junction Temperature

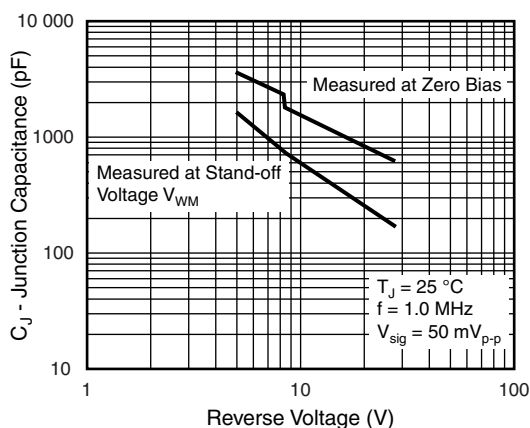


Fig. 4 - Typical Junction Capacitance

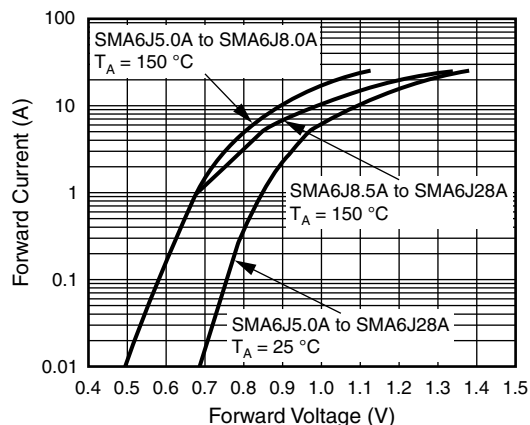


Fig. 5 - Typical Forward Characteristics

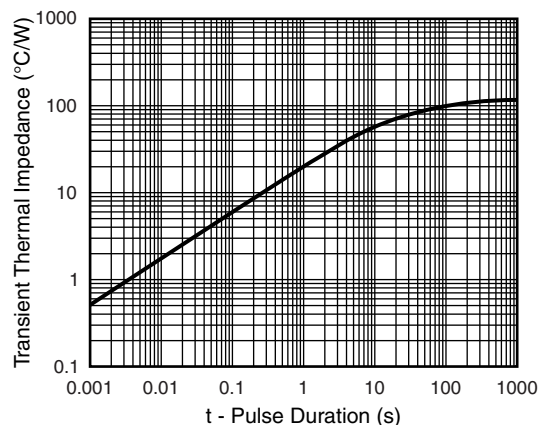
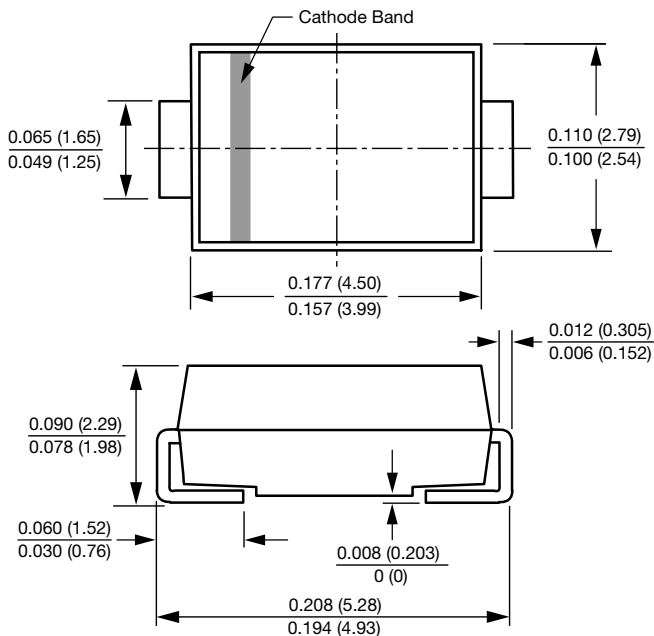


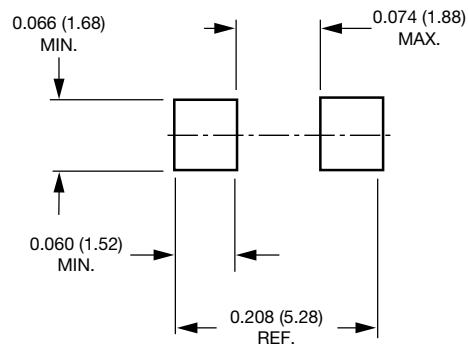
Fig. 6 - Typical Transient Thermal Impedance

### PACKAGE OUTLINE DIMENSIONS in inches (millimeters)

#### SMA (DO-214AC)



#### Mounting Pad Layout





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