

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



DO-214AC (SMA)

| PRIMARY CHARACTERISTICS          |                                 |
|----------------------------------|---------------------------------|
| $V_{WM}$                         | 6.4 V to 459 V                  |
| $V_{BR}$ (uni-directional)       | 6.8 V to 540 V                  |
| $V_{BR}$ (bi-directional)        | 6.8 V to 220 V                  |
| $P_{PPM}$                        | 400 W, 300 W                    |
| $P_D$                            | 3.3 W                           |
| $I_{FSM}$ (uni-directional only) | 40 A                            |
| $T_J$ max.                       | 150 °C                          |
| Polarity                         | Uni-directional, bi-directional |
| Package                          | DO-214AC (SMA)                  |

## DEVICES FOR BI-DIRECTION APPLICATIONS

For bi-directional devices use CA suffix (e.g. P4SMA10CA).  
Electrical characteristics apply in both directions.

## FEATURES

- Low profile package
- Ideal for automated placement
- Glass passivated chip junction
- Available in uni-directional and bi-directional
- 400 W peak pulse power capability with a 10/1000  $\mu$ s waveform, repetitive rate (duty cycle): 0.01 % (300 W above 91 V)
- 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
- 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, and telecommunication.

## MECHANICAL DATA

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

Molding compound meets UL 94 V-0 flammability rating  
Base P/N-E3 - RoHS compliant and commercial grade  
Base P/NHE3 - RoHS compliant and AEC-Q101 qualified  
Base P/NHE3\_X - 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 suffix meets JESD 201 class 1A whisker test, HE3 suffix meets JESD 201 class 2 whisker test

**Polarity:** For uni-directional types the band denotes cathode end, no marking on bi-directional types

| MAXIMUM RATINGS ( $T_A = 25$ °C unless otherwise noted)                                     |                |                |      |
|---------------------------------------------------------------------------------------------|----------------|----------------|------|
| PARAMETER                                                                                   | SYMBOL         | VALUE          | UNIT |
| Peak power dissipation with a 10/1000 $\mu$ s waveform <sup>(1)(2)</sup> (fig. 1)           | $P_{PPM}$      | 400            | 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 $T_A = 50$ °C                                     | $P_D$          | 3.3            | W    |
| Peak forward surge current 8.3 ms single half sine-wave uni-directional only <sup>(2)</sup> | $I_{FSM}$      | 40             | 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  $T_A = 25$  °C per fig. 2. Rating is 300 W above 91 V

<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) |                     |      |                                                                        |      |                                  |                                       |                                                                               |                                                                |                                                                 |                                                           |
|----------------------------------------------------------------------------|---------------------|------|------------------------------------------------------------------------|------|----------------------------------|---------------------------------------|-------------------------------------------------------------------------------|----------------------------------------------------------------|-----------------------------------------------------------------|-----------------------------------------------------------|
| PART NUMBER                                                                | DEVICE MARKING CODE |      | BREAKDOWN VOLTAGE V <sub>BR</sub> AT I <sub>T</sub> <sup>(1)</sup> (V) |      | 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> <sup>(4)</sup> (µA) | MAXIMUM PEAK PULSE CURRENT I <sub>PPM</sub> <sup>(2)</sup> (A) | MAXIMUM CLAMPING VOLTAGE AT I <sub>PPM</sub> V <sub>C</sub> (V) | MAXIMUM TEMPERATURE COEFFICIENT OF V <sub>BR</sub> (%/°C) |
|                                                                            | UNI                 | BI   | MIN.                                                                   | MAX. |                                  |                                       |                                                                               |                                                                |                                                                 |                                                           |
| P4SMA6.8A                                                                  | 6V8A                | 6V8C | 6.45                                                                   | 7.14 | 10                               | 5.80                                  | 1000                                                                          | 38.1                                                           | 10.5                                                            | 0.057                                                     |
| P4SMA7.5A                                                                  | 7V5A                | 7V5C | 7.13                                                                   | 7.88 | 10                               | 6.40                                  | 500                                                                           | 35.4                                                           | 11.3                                                            | 0.061                                                     |
| P4SMA8.2A                                                                  | 8V2A                | 8V2C | 7.79                                                                   | 8.61 | 10                               | 7.02                                  | 200                                                                           | 33.1                                                           | 12.1                                                            | 0.065                                                     |
| P4SMA9.1A                                                                  | 9V1A                | 9V1C | 8.65                                                                   | 9.55 | 1.0                              | 7.78                                  | 50                                                                            | 29.9                                                           | 13.4                                                            | 0.068                                                     |
| P4SMA10A                                                                   | 10A                 | 10C  | 9.5                                                                    | 10.5 | 1.0                              | 8.55                                  | 10                                                                            | 27.6                                                           | 14.5                                                            | 0.073                                                     |
| P4SMA11A                                                                   | 11A                 | 11C  | 10.5                                                                   | 11.6 | 1.0                              | 9.40                                  | 5.0                                                                           | 25.6                                                           | 15.6                                                            | 0.075                                                     |
| P4SMA12A                                                                   | 12A                 | 12C  | 11.4                                                                   | 12.6 | 1.0                              | 10.2                                  | 1.0                                                                           | 24.0                                                           | 16.7                                                            | 0.078                                                     |
| P4SMA13A                                                                   | 13A                 | 13C  | 12.4                                                                   | 13.7 | 1.0                              | 11.1                                  | 1.0                                                                           | 22.0                                                           | 18.2                                                            | 0.081                                                     |
| P4SMA15A                                                                   | 15A                 | 15C  | 14.3                                                                   | 15.8 | 1.0                              | 12.8                                  | 1.0                                                                           | 18.9                                                           | 21.2                                                            | 0.084                                                     |
| P4SMA16A                                                                   | 16A                 | 16C  | 15.2                                                                   | 16.8 | 1.0                              | 13.6                                  | 1.0                                                                           | 17.8                                                           | 22.5                                                            | 0.086                                                     |
| P4SMA18A                                                                   | 18A                 | 18C  | 17.1                                                                   | 18.9 | 1.0                              | 15.3                                  | 1.0                                                                           | 15.9                                                           | 25.2                                                            | 0.089                                                     |
| P4SMA20A                                                                   | 20A                 | 20C  | 19.0                                                                   | 21.0 | 1.0                              | 17.1                                  | 1.0                                                                           | 14.4                                                           | 27.7                                                            | 0.090                                                     |
| P4SMA22A                                                                   | 22A                 | 22C  | 20.9                                                                   | 23.1 | 1.0                              | 18.8                                  | 1.0                                                                           | 13.1                                                           | 30.6                                                            | 0.092                                                     |
| P4SMA24A                                                                   | 24A                 | 24C  | 22.8                                                                   | 25.2 | 1.0                              | 20.5                                  | 1.0                                                                           | 12.0                                                           | 33.2                                                            | 0.090                                                     |
| P4SMA27A                                                                   | 27A                 | 27C  | 25.7                                                                   | 28.4 | 1.0                              | 23.1                                  | 1.0                                                                           | 10.7                                                           | 37.5                                                            | 0.096                                                     |
| P4SMA30A                                                                   | 30A                 | 30C  | 28.5                                                                   | 31.5 | 1.0                              | 25.6                                  | 1.0                                                                           | 9.7                                                            | 41.4                                                            | 0.097                                                     |
| P4SMA33A                                                                   | 33A                 | 33C  | 31.4                                                                   | 34.7 | 1.0                              | 28.2                                  | 1.0                                                                           | 8.8                                                            | 45.7                                                            | 0.098                                                     |
| P4SMA36A                                                                   | 36A                 | 36C  | 34.2                                                                   | 37.8 | 1.0                              | 30.8                                  | 1.0                                                                           | 8.0                                                            | 49.9                                                            | 0.099                                                     |
| P4SMA39A                                                                   | 39A                 | 39C  | 37.1                                                                   | 41.0 | 1.0                              | 33.3                                  | 1.0                                                                           | 7.4                                                            | 53.9                                                            | 0.100                                                     |
| P4SMA43A                                                                   | 43A                 | 43C  | 40.9                                                                   | 45.2 | 1.0                              | 36.8                                  | 1.0                                                                           | 6.7                                                            | 59.3                                                            | 0.101                                                     |
| P4SMA47A                                                                   | 47A                 | 47C  | 44.7                                                                   | 49.4 | 1.0                              | 40.2                                  | 1.0                                                                           | 6.2                                                            | 64.8                                                            | 0.101                                                     |
| P4SMA51A                                                                   | 51A                 | 51C  | 48.5                                                                   | 53.6 | 1.0                              | 43.6                                  | 1.0                                                                           | 5.7                                                            | 70.1                                                            | 0.102                                                     |
| P4SMA56A                                                                   | 56A                 | 56C  | 53.2                                                                   | 58.8 | 1.0                              | 47.8                                  | 1.0                                                                           | 5.2                                                            | 77.0                                                            | 0.103                                                     |
| P4SMA62A                                                                   | 62A                 | 62C  | 58.9                                                                   | 65.1 | 1.0                              | 53.0                                  | 1.0                                                                           | 4.7                                                            | 85.0                                                            | 0.104                                                     |
| P4SMA68A                                                                   | 68A                 | 68C  | 64.6                                                                   | 71.4 | 1.0                              | 58.1                                  | 1.0                                                                           | 4.3                                                            | 92.0                                                            | 0.104                                                     |
| P4SMA75A                                                                   | 75A                 | 75C  | 71.3                                                                   | 78.8 | 1.0                              | 64.1                                  | 1.0                                                                           | 3.9                                                            | 104                                                             | 0.105                                                     |
| P4SMA82A                                                                   | 82A                 | 82C  | 77.9                                                                   | 86.1 | 1.0                              | 70.1                                  | 1.0                                                                           | 3.5                                                            | 113                                                             | 0.105                                                     |
| P4SMA91A                                                                   | 91A                 | 91C  | 86.5                                                                   | 95.5 | 1.0                              | 77.8                                  | 1.0                                                                           | 3.2                                                            | 125                                                             | 0.106                                                     |
| P4SMA100A                                                                  | 100A                | 100C | 95.0                                                                   | 105  | 1.0                              | 85.5                                  | 1.0                                                                           | 2.2                                                            | 137                                                             | 0.106                                                     |
| P4SMA110A                                                                  | 110A                | 110C | 105                                                                    | 116  | 1.0                              | 94.0                                  | 1.0                                                                           | 2.0                                                            | 152                                                             | 0.107                                                     |
| P4SMA120A                                                                  | 120A                | 120C | 114                                                                    | 126  | 1.0                              | 102                                   | 1.0                                                                           | 1.8                                                            | 165                                                             | 0.107                                                     |
| P4SMA130A                                                                  | 130A                | 130C | 124                                                                    | 137  | 1.0                              | 111                                   | 1.0                                                                           | 1.7                                                            | 179                                                             | 0.107                                                     |
| P4SMA150A                                                                  | 150A                | 150C | 143                                                                    | 158  | 1.0                              | 128                                   | 1.0                                                                           | 1.4                                                            | 207                                                             | 0.106                                                     |
| P4SMA160A                                                                  | 160A                | 160C | 152                                                                    | 168  | 1.0                              | 136                                   | 1.0                                                                           | 1.4                                                            | 219                                                             | 0.108                                                     |
| P4SMA170A                                                                  | 170A                | 170C | 162                                                                    | 179  | 1.0                              | 145                                   | 1.0                                                                           | 1.3                                                            | 234                                                             | 0.108                                                     |
| P4SMA180A                                                                  | 180A                | 180C | 171                                                                    | 189  | 1.0                              | 154                                   | 1.0                                                                           | 1.2                                                            | 246                                                             | 0.108                                                     |
| P4SMA200A                                                                  | 200A                | 200C | 190                                                                    | 210  | 1.0                              | 171                                   | 1.0                                                                           | 1.1                                                            | 274                                                             | 0.108                                                     |
| P4SMA220A                                                                  | 220A                | 220C | 209                                                                    | 231  | 1.0                              | 185                                   | 1.0                                                                           | 0.9                                                            | 328                                                             | 0.108                                                     |
| P4SMA250A                                                                  | 250A                | -    | 237                                                                    | 263  | 1.0                              | 214                                   | 1.0                                                                           | 0.87                                                           | 344                                                             | 0.110                                                     |
| P4SMA300A                                                                  | 300A                | -    | 285                                                                    | 315  | 1.0                              | 256                                   | 1.0                                                                           | 0.73                                                           | 414                                                             | 0.110                                                     |
| P4SMA350A                                                                  | 350A                | -    | 333                                                                    | 368  | 1.0                              | 300                                   | 1.0                                                                           | 0.62                                                           | 482                                                             | 0.110                                                     |
| P4SMA400A                                                                  | 400A                | -    | 380                                                                    | 420  | 1.0                              | 342                                   | 1.0                                                                           | 0.55                                                           | 548                                                             | 0.110                                                     |
| P4SMA440A                                                                  | 440A                | -    | 418                                                                    | 462  | 1.0                              | 376                                   | 1.0                                                                           | 0.50                                                           | 602                                                             | 0.110                                                     |
| P4SMA480A                                                                  | 480A                | -    | 456                                                                    | 504  | 1.0                              | 408                                   | 1.0                                                                           | 0.46                                                           | 658                                                             | 0.110                                                     |
| P4SMA510A                                                                  | 510A                | -    | 485                                                                    | 535  | 1.0                              | 434                                   | 1.0                                                                           | 0.43                                                           | 698                                                             | 0.110                                                     |
| P4SMA540A                                                                  | 540A                | -    | 513                                                                    | 567  | 1.0                              | 459                                   | 1.0                                                                           | 0.41                                                           | 740                                                             | 0.110                                                     |

Notes

- (1) Pulse test: t<sub>p</sub> ≤ 50 ms
- (2) Surge current waveform per fig. 3 and derate per fig. 2
- (3) All terms and symbols are consistent with ANSI/IEEE CA62.35
- (4) For bi-directional types with V<sub>R</sub> of 10 V and less, the I<sub>D</sub> limit is doubled
- (5) V<sub>F</sub> = 3.5 V at I<sub>F</sub> = 25 A (uni-directional only)

| <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>                        | $R_{\theta JA}$ | 120   | $^\circ\text{C}/\text{W}$ |
| Typical thermal resistance, junction to lead                                              | $R_{\theta JL}$ | 30    |                           |

**Note**

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

| <b>ORDERING INFORMATION</b> (Example)voltage range |                 |                   |            |              |               |                                    |
|----------------------------------------------------|-----------------|-------------------|------------|--------------|---------------|------------------------------------|
| PREFERRED P/N                                      | UNIT WEIGHT (g) | VOLTAGE RANGE (V) |            | PACKAGE CODE | BASE QUANTITY | DELIVERY MODE                      |
|                                                    |                 | UNI -             | BI -       |              |               |                                    |
| P4SMA6.8A-E3/61                                    | 0.064           | 6.8 to 540        | 6.8 to 220 | 61           | 1800          | 7" diameter plastic tape and reel  |
| P4SMA6.8A-E3/5A                                    | 0.064           | 6.8 to 540        | 6.8 to 220 | 5A           | 7500          | 13" diameter plastic tape and reel |
| P4SMA6.8AHE3/61 <sup>(1)</sup>                     | 0.064           | 6.8 to 540        | 6.8 to 220 | 61           | 1800          | 7" diameter plastic tape and reel  |
| P4SMA6.8AHE3/5A <sup>(1)</sup>                     | 0.064           | 6.8 to 540        | 6.8 to 220 | 5A           | 7500          | 13" diameter plastic tape and reel |
| P4SMA250AHE3_A/H <sup>(1)</sup>                    | 0.064           | 250 to 540        | -          | H            | 1800          | 7" diameter plastic tape and reel  |
| P4SMA250AHE3_A/I <sup>(1)</sup>                    | 0.064           | 250 to 540        | -          | I            | 7500          | 13" diameter plastic tape and reel |

**Note**

<sup>(1)</sup> AEC-Q101 qualified

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

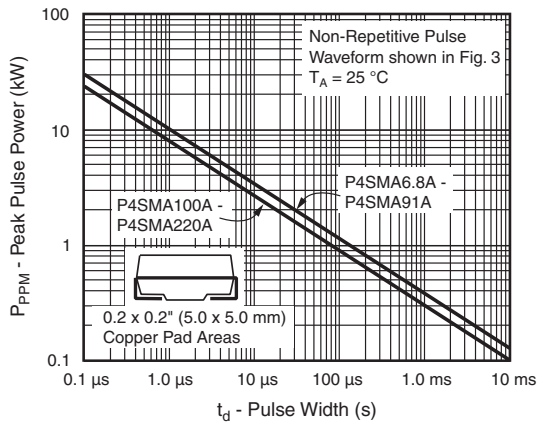


Fig. 1 - Peak Pulse Power Rating Curve

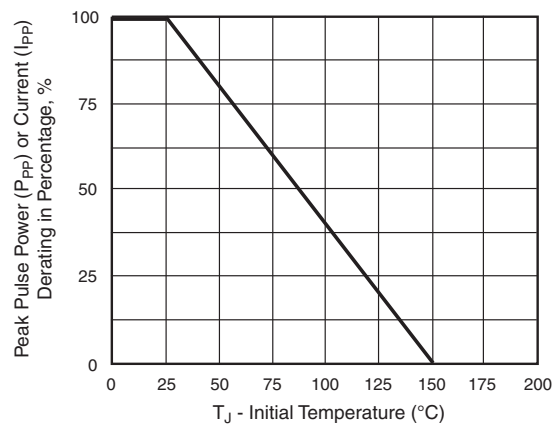


Fig. 2 - Pulse Power or Current vs. Initial Junction Temperature

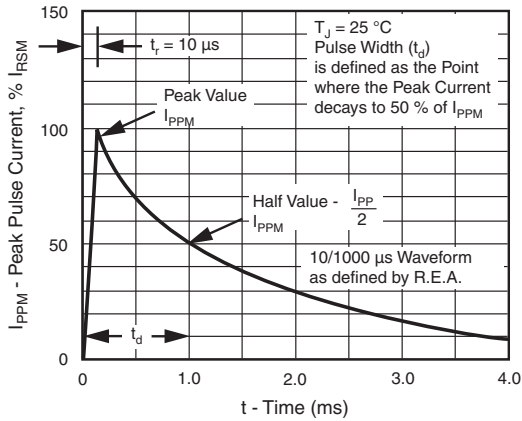


Fig. 3 - Pulse Waveform

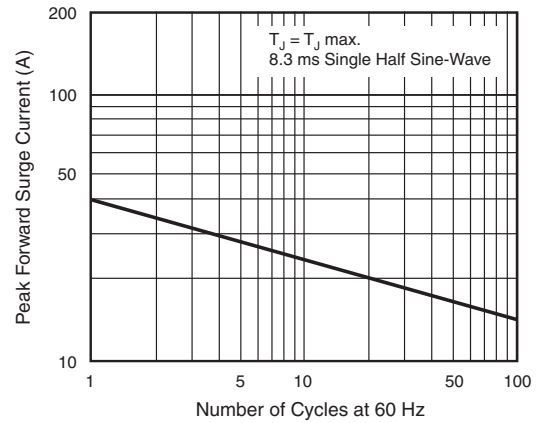


Fig. 6 - Maximum Non-Repetitive Forward Surge Current  
Uni-Directional Use Only

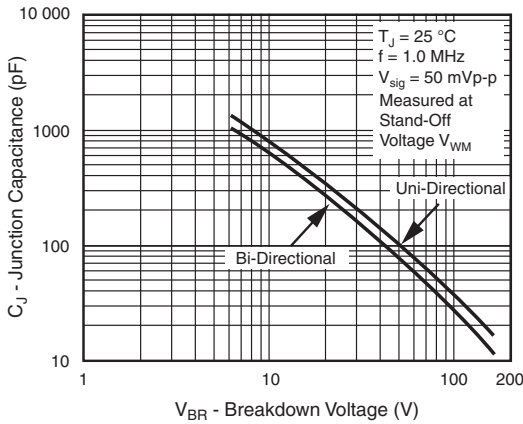


Fig. 4 - Typical Junction Capacitance

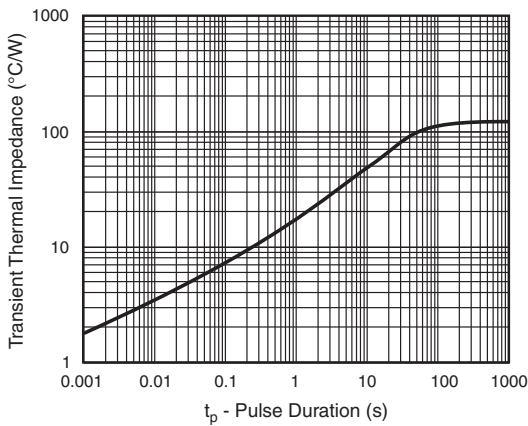
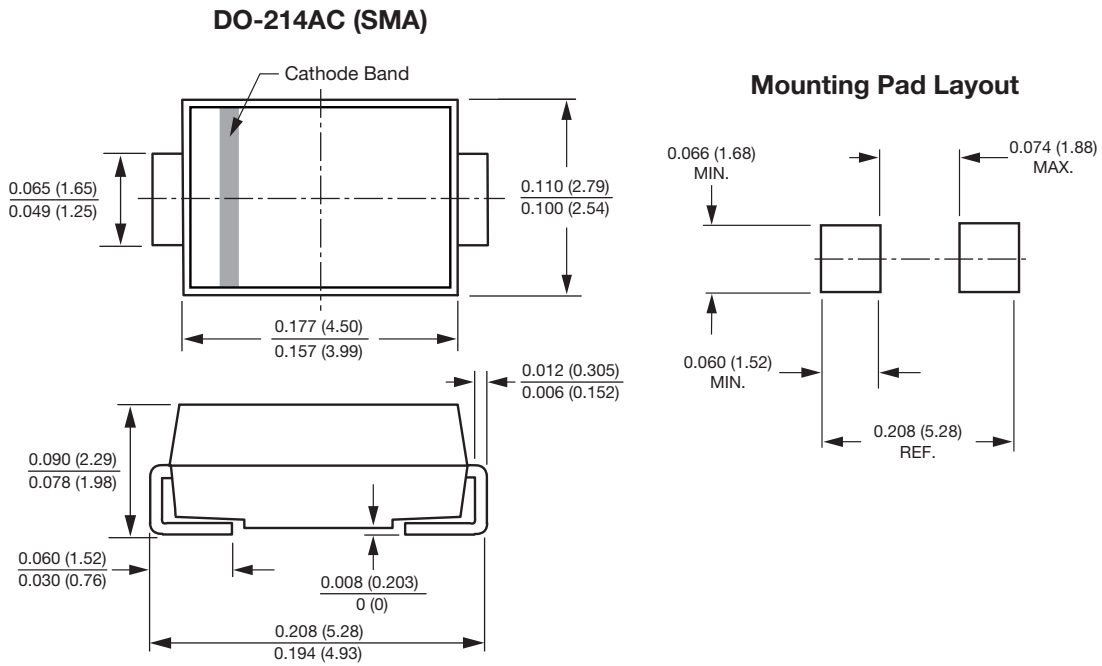


Fig. 5 - Typical Transient Thermal Impedance



### PACKAGE OUTLINE DIMENSIONS in inches (millimeters)





## Disclaimer

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