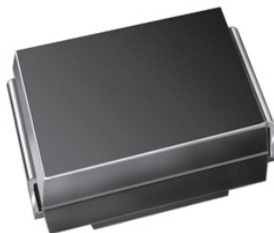


# Surface Mount PAR<sup>®</sup> Transient Voltage Suppressors

High Temperature Stability and High Reliability Conditions



DO-214AA (SMBJ)

## PRIMARY CHARACTERISTICS

|            |                  |
|------------|------------------|
| $V_{BR}$   | 6.8 V to 43 V    |
| $V_{WM}$   | 5.50 V to 36.8 V |
| $P_{PPM}$  | 600 W            |
| $I_{FSM}$  | 75 A             |
| $T_J$ max. | 185 °C           |
| Polarity   | Uni-directional  |
| Package    | DO-214AA (SMBJ)  |

## 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

- Junction passivation optimized design passivated anisotropic rectifier technology
- $T_J = 185$  °C capability suitable for high reliability and automotive requirement
- Available in uni-directional polarity only
- 600 W peak pulse power capability with a 10/1000  $\mu$ s waveform, repetitive rate (duty cycle): 0.01 %
- 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

## MECHANICAL DATA

**Case:** DO-214AA (SMBJ)

Molding compound meets UL 94 V-0 flammability rating  
Base P/NHE3 - RoHS compliant, AEC-Q101 qualified

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

HE3 suffix meets JESD 201 class 2 whisker test

**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) <sup>(1)(2)</sup> | $P_{PPM}$      | 600                 | W    |
| Peak pulse current with a 10/1000 $\mu$ s waveform (fig. 3) <sup>(1)</sup>              | $I_{PPM}$      | See table next page | A    |
| Peak forward surge current 8.3 ms single half sine-wave <sup>(2)(3)</sup>               | $I_{FSM}$      | 75                  | A    |
| Maximum instantaneous forward voltage at 50 A <sup>(2)(3)</sup>                         | $V_F$          | 3.5                 | V    |
| Operating junction and storage temperature range                                        | $T_J, T_{STG}$ | - 65 to + 185       | °C   |

## Notes

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

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

<sup>(3)</sup> Measured on 8.3 ms single half sine-wave, or equivalent square wave, duty cycle = 4 pulses per minute maximum

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

| DEVICE TYPE | DEVICE MARKING CODE | BREAKDOWN VOLTAGE<br>$V_{BR}^{(1)}$ AT $I_T$<br>(V) |      | TEST CURRENT<br>$I_T$<br>(mA) | STAND-OFF VOLTAGE<br>$V_{WM}$<br>(V) | MAXIMUM REVERSE LEAKAGE<br>AT $V_{WM}$<br>$I_R$<br>( $\mu\text{A}$ ) | MAXIMUM REVERSE LEAKAGE<br>AT $V_{WM}$<br>$T_J = 150\text{ }^{\circ}\text{C}$<br>$I_D$<br>( $\mu\text{A}$ ) | MAXIMUM PEAK PULSE SURGE CURRENT<br>$I_{PPM}^{(2)}$<br>(A) | MAXIMUM CLAMPING VOLTAGE<br>AT $I_{PPM}$<br>$V_C$<br>(V) |
|-------------|---------------------|-----------------------------------------------------|------|-------------------------------|--------------------------------------|----------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------|------------------------------------------------------------|----------------------------------------------------------|
|             |                     | MIN.                                                | MAX. |                               |                                      |                                                                      |                                                                                                             |                                                            |                                                          |
| TPSMB6.8    | KDP                 | 6.12                                                | 7.48 | 10                            | 5.5                                  | 500                                                                  | 1000                                                                                                        | 55.6                                                       | 10.8                                                     |
| TPSMB6.8A   | KEP                 | 6.45                                                | 7.14 | 10                            | 5.8                                  | 500                                                                  | 1000                                                                                                        | 57.1                                                       | 10.5                                                     |
| TPSMB7.5    | KFP                 | 6.75                                                | 8.25 | 10                            | 6.05                                 | 250                                                                  | 500                                                                                                         | 51.3                                                       | 11.7                                                     |
| TPSMB7.5A   | KGP                 | 7.13                                                | 7.88 | 10                            | 6.4                                  | 250                                                                  | 500                                                                                                         | 53.1                                                       | 11.3                                                     |
| TPSMB8.2    | KHP                 | 7.38                                                | 9.02 | 10                            | 6.63                                 | 100                                                                  | 200                                                                                                         | 48                                                         | 12.5                                                     |
| TPSMB8.2A   | KKP                 | 7.79                                                | 8.61 | 10                            | 7.02                                 | 100                                                                  | 200                                                                                                         | 49.6                                                       | 12.1                                                     |
| TPSMB9.1    | KLP                 | 8.19                                                | 10   | 1                             | 7.37                                 | 25                                                                   | 50                                                                                                          | 43.5                                                       | 13.8                                                     |
| TPSMB9.1A   | KMP                 | 8.65                                                | 9.55 | 1                             | 7.78                                 | 25                                                                   | 50                                                                                                          | 44.8                                                       | 13.4                                                     |
| TPSMB10     | KNP                 | 9                                                   | 11   | 1                             | 8.1                                  | 5                                                                    | 20                                                                                                          | 40                                                         | 15                                                       |
| TPSMB10A    | KPP                 | 9.5                                                 | 10.5 | 1                             | 8.55                                 | 5                                                                    | 20                                                                                                          | 41.4                                                       | 14.5                                                     |
| TPSMB11     | KQP                 | 9.9                                                 | 12.1 | 1                             | 8.92                                 | 2                                                                    | 5                                                                                                           | 37                                                         | 16.2                                                     |
| TPSMB11A    | KRP                 | 10.5                                                | 11.6 | 1                             | 9.4                                  | 2                                                                    | 5                                                                                                           | 38.5                                                       | 15.6                                                     |
| TPSMB12     | KSP                 | 10.8                                                | 13.2 | 1                             | 9.72                                 | 2                                                                    | 5                                                                                                           | 34.7                                                       | 17.3                                                     |
| TPSMB12A    | KTP                 | 11.4                                                | 12.6 | 1                             | 10.2                                 | 2                                                                    | 5                                                                                                           | 35.9                                                       | 16.7                                                     |
| TPSMB13     | KUP                 | 11.7                                                | 14.3 | 1                             | 10.5                                 | 2                                                                    | 5                                                                                                           | 31.6                                                       | 19                                                       |
| TPSMB13A    | KVP                 | 12.4                                                | 13.7 | 1                             | 11.1                                 | 2                                                                    | 5                                                                                                           | 33                                                         | 18.2                                                     |
| TPSMB15     | KWP                 | 13.5                                                | 16.5 | 1                             | 12.1                                 | 1                                                                    | 5                                                                                                           | 27.3                                                       | 22                                                       |
| TPSMB15A    | KXP                 | 14.3                                                | 15.8 | 1                             | 12.8                                 | 1                                                                    | 5                                                                                                           | 28.3                                                       | 21.2                                                     |
| TPSMB16     | KYP                 | 14.4                                                | 17.6 | 1                             | 12.9                                 | 1                                                                    | 5                                                                                                           | 25.5                                                       | 23.5                                                     |
| TPSMB16A    | KZP                 | 15.2                                                | 16.8 | 1                             | 13.6                                 | 1                                                                    | 5                                                                                                           | 26.7                                                       | 22.5                                                     |
| TPSMB18     | LDP                 | 16.2                                                | 19.8 | 1                             | 14.5                                 | 1                                                                    | 5                                                                                                           | 22.6                                                       | 26.5                                                     |
| TPSMB18A    | LEP                 | 17.1                                                | 18.9 | 1                             | 15.3                                 | 1                                                                    | 5                                                                                                           | 23.8                                                       | 25.2                                                     |
| TPSMB20     | LFP                 | 18                                                  | 22   | 1                             | 16.2                                 | 1                                                                    | 5                                                                                                           | 20.6                                                       | 29.1                                                     |
| TPSMB20A    | LGP                 | 19                                                  | 21   | 1                             | 17.1                                 | 1                                                                    | 5                                                                                                           | 21.7                                                       | 27.7                                                     |
| TPSMB22     | LHP                 | 19.8                                                | 24.2 | 1                             | 17.8                                 | 1                                                                    | 5                                                                                                           | 18.8                                                       | 31.9                                                     |
| TPSMB22A    | LKP                 | 20.9                                                | 23.1 | 1                             | 18.8                                 | 1                                                                    | 5                                                                                                           | 19.6                                                       | 30.6                                                     |
| TPSMB24     | LLP                 | 21.6                                                | 26.4 | 1                             | 19.4                                 | 1                                                                    | 5                                                                                                           | 17.3                                                       | 34.7                                                     |
| TPSMB24A    | LMP                 | 22.8                                                | 25.2 | 1                             | 20.5                                 | 1                                                                    | 5                                                                                                           | 18.1                                                       | 33.2                                                     |
| TPSMB27     | LNP                 | 24.3                                                | 29.7 | 1                             | 21.8                                 | 1                                                                    | 5                                                                                                           | 15.3                                                       | 39.1                                                     |
| TPSMB27A    | LPP                 | 25.7                                                | 28.4 | 1                             | 23.1                                 | 1                                                                    | 5                                                                                                           | 16                                                         | 37.5                                                     |
| TPSMB30     | LQP                 | 27                                                  | 33   | 1                             | 24.3                                 | 1                                                                    | 5                                                                                                           | 13.8                                                       | 43.5                                                     |
| TPSMB30A    | LRP                 | 28.5                                                | 31.5 | 1                             | 25.6                                 | 1                                                                    | 5                                                                                                           | 14.5                                                       | 41.4                                                     |
| TPSMB33     | LSP                 | 29.7                                                | 36.3 | 1                             | 26.8                                 | 1                                                                    | 5                                                                                                           | 12.6                                                       | 47.7                                                     |
| TPSMB33A    | LTP                 | 31.4                                                | 34.7 | 1                             | 28.2                                 | 1                                                                    | 5                                                                                                           | 13.1                                                       | 45.7                                                     |
| TPSMB36     | LUP                 | 32.4                                                | 39.6 | 1                             | 29.1                                 | 1                                                                    | 5                                                                                                           | 11.5                                                       | 52                                                       |
| TPSMB36A    | LVP                 | 34.2                                                | 37.8 | 1                             | 30.8                                 | 1                                                                    | 5                                                                                                           | 12                                                         | 49.9                                                     |
| TPSMB39     | LWP                 | 35.1                                                | 42.9 | 1                             | 31.6                                 | 1                                                                    | 5                                                                                                           | 10.6                                                       | 56.4                                                     |
| TPSMB39A    | LXP                 | 37.1                                                | 41   | 1                             | 33.3                                 | 1                                                                    | 5                                                                                                           | 11.1                                                       | 53.9                                                     |
| TPSMB43     | LYP                 | 38.7                                                | 47.3 | 1                             | 34.8                                 | 1                                                                    | 5                                                                                                           | 9.7                                                        | 61.9                                                     |
| TPSMB43A    | LZP                 | 40.9                                                | 45.2 | 1                             | 36.8                                 | 1                                                                    | 5                                                                                                           | 10.1                                                       | 59.3                                                     |

**Notes**(1)  $V_{BR}$  measured after  $I_T$  applied for 300  $\mu\text{s}$ ,  $I_T$  = square wave pulse or equivalent

(2) Surge current waveform per fig. 3 and derated per fig. 2

(3) All terms and symbols are consistent with ANSI/IEEE C62.35

**ORDERING INFORMATION (Example)**

| PREFERRED P/N                   | UNIT WEIGHT (g) | PREFERRED PACKAGE CODE | BASE QUANTITY | DELIVERY MODE                      |
|---------------------------------|-----------------|------------------------|---------------|------------------------------------|
| TPSMB6.8AHE3/52T <sup>(1)</sup> | 0.096           | 52T                    | 750           | 7" diameter plastic tape and reel  |
| TPSMB6.8AHE3/5BT <sup>(1)</sup> | 0.096           | 5BT                    | 3200          | 13" diameter plastic tape and reel |

**Note**
<sup>(1)</sup> Automotive grade

**RATINGS AND CHARACTERISTICS CURVES**

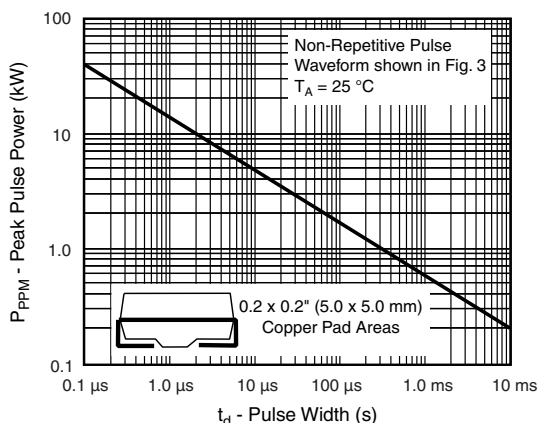
( $T_A = 25\text{ }^{\circ}\text{C}$  unless otherwise noted)


Fig. 1 - Peak Pulse Power Rating Curve

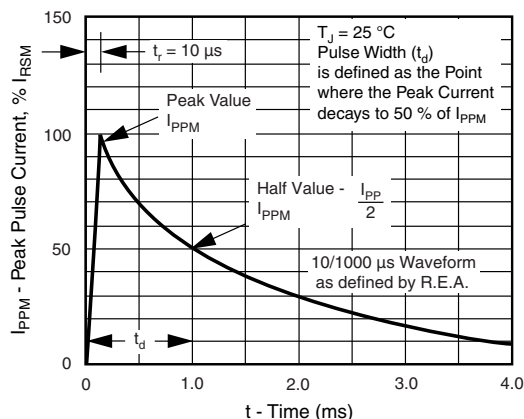


Fig. 3 - Pulse Waveform

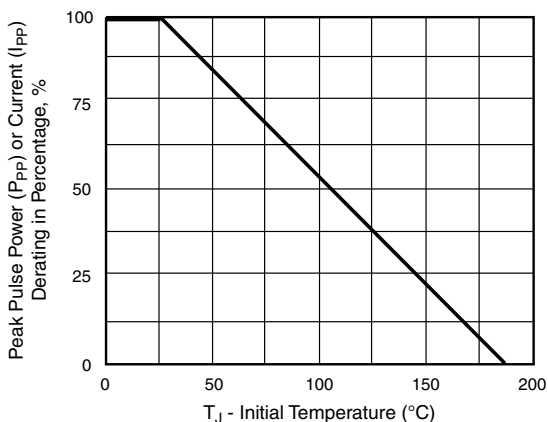


Fig. 2 - Pulse Power or Current vs. Initial Junction Temperature

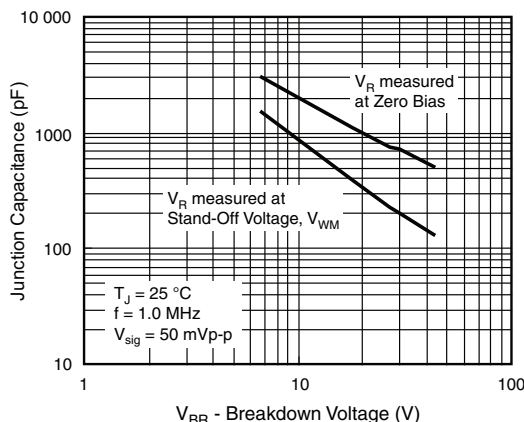


Fig. 4 - Typical Junction Capacitance

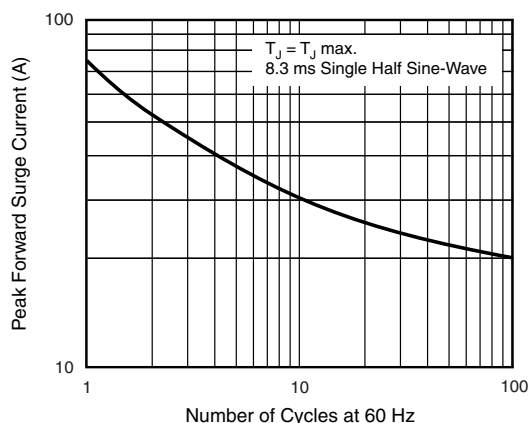
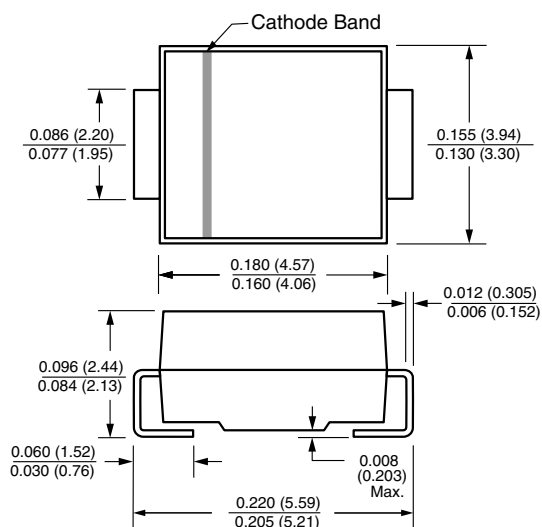


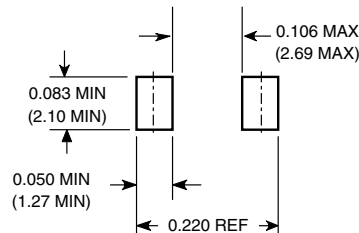
Fig. 5 - Maximum Non-Repetitive/Peak Forward Surge Current

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

## **DO-214AA (SMBJ)**



## **Mounting Pad Layout**





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