# Surface Mount PAR® Transient Voltage Suppressors

High Temperature Stability and High Reliability Conditions

**eSMP® Series**

**Top View** **Bottom View**

**SlimSMAW (DO-221AD)**

Cathode ○—|◀|—○ Anode

## LINKS TO ADDITIONAL RESOURCES

3D Models | Related Documents | Packages | Marking

| PRIMARY CHARACTERISTICS | |
|---|---|
| $V_{BR}$ | 6.8 V to 100 V |
| $V_{WM}$ | 5.8 V to 85.5 V |
| $P_{PPM}$ (10 x 1000 µs) | 600 W |
| $T_J$ max. | 185 °C |
| Polarity | Unidirectional |
| Package | SlimSMAW (DO-221AD) |
| Circuit configuration | Single |

## FEATURES

AUTOMOTIVE GRADE Available

RoHS COMPLIANT HALOGEN FREE

- Low-profile package
- Meets MSL level 1, per J-STD-020, LF maximum peak of 260 °C
- Junction passivation optimized design passivated anisotropic rectifier technology
- $T_J$ = 185 °C capability suitable for high reliability and automotive requirement
- Excellent clamping capability
- Peak pulse power: 600 W (10 µs/1000 µs)
- AEC-Q101 qualified available, HM3 suffix meets JESD 201 class 2 whisker test
- ESD protection up to 30 kV per IEC 61000-4-2
- Compatible to SOD-128 package case outline
- Material categorization: for definitions of compliance please see www.vishay.com/doc?99912

## TYPICAL APPLICATIONS

Use in sensitive electronics protection against voltage transients induced by inductive load switching and lightning on ICs, MOSFET, signal lines of sensor units for automotive.

## MECHANICAL DATA

**Case:** SlimSMAW (DO-221AD)

Molding compound meets UL 94 V-0 flammability rating

Base P/NHM3 - halogen-free, RoHS-compliant, and AEC-Q101 qualified

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

**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 µs waveform | $P_{PPM}$ | 600 | W |
| Peak pulse current | with a 10/1000 µs waveform | $I_{PPM}$ | See table next page | A |
| Power dissipation | $T_M$ = 65 °C | $P_D$ (2) | 8 | W |
| | $T_A$ = 25 °C | $P_D$ (3) | 1.1 | |
| Operating junction and storage temperature range | | $T_J$, $T_{STG}$ | -65 to +185 | °C |

**Note**

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

(2) Power dissipation mounted on infinite heat sink

(3) Power dissipation mounted on minimum recommended pad layout

## ELECTRICAL CHARACTERISTICS ($T_A$ = 25 °C, unless otherwise noted)

| DEVICE TYPE | DEVICE MARKING CODE | BREAKDOWN VOLTAGE $V_{BR}$ (1) AT $I_T$ (V) | | | TEST CURRENT $I_T$ (mA) | STAND-OFF VOLTAGE $V_{WM}$ (V) | MAXIMUM REVERSE LEAKAGE AT $V_{WM}$ $I_R$ (µA) | MAXIMUM REVERSE LEAKAGE AT $V_{WM}$ $T_J$ = 150 °C $I_D$ (µA) | MAXIMUM PEAK PULSE SURGE CURRENT $I_{PPM}$ (2) (A) | MAXIMUM CLAMPING VOLTAGE AT $I_{PPM}$ $V_C$ (V) | TYPICAL TEMP. COEFFICIENT OF $V_{BR}$ (3) $\alpha T$ (%/°C) |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | MIN. | NOM. | MAX. | | | | | | | |
| TA6L6.8A | AEL | 6.45 | 6.80 | 7.14 | 10 | 5.80 | 500 | 1000 | 57.1 | 10.5 | 0.047 |
| TA6L7.5A | AGL | 7.13 | 7.50 | 7.88 | 10 | 6.40 | 250 | 500 | 53.1 | 11.3 | 0.052 |
| TA6L8.2A | AKL | 7.79 | 8.20 | 8.61 | 10 | 7.02 | 100 | 200 | 49.6 | 12.1 | 0.056 |
| TA6L9.1A | AML | 8.65 | 9.10 | 9.55 | 1.0 | 7.78 | 25 | 50 | 44.8 | 13.4 | 0.060 |
| TA6L10A | APL | 9.5 | 10.0 | 10.5 | 1.0 | 8.55 | 5.0 | 20 | 41.4 | 14.5 | 0.064 |
| TA6L11A | ARL | 10.5 | 11.0 | 11.6 | 1.0 | 9.40 | 2.0 | 5.0 | 38.5 | 15.6 | 0.067 |
| TA6L12A | ATL | 11.4 | 12.0 | 12.6 | 1.0 | 10.2 | 2.0 | 5.0 | 35.9 | 16.7 | 0.070 |
| TA6L13A | AVL | 12.4 | 13.0 | 13.7 | 1.0 | 11.1 | 2.0 | 5.0 | 33.0 | 18.2 | 0.072 |
| TA6L15A | AXL | 14.3 | 15.0 | 15.8 | 1.0 | 12.8 | 1.0 | 5.0 | 28.3 | 21.2 | 0.076 |
| TA6L16A | AZL | 15.2 | 16.0 | 16.8 | 1.0 | 13.6 | 1.0 | 5.0 | 26.7 | 22.5 | 0.078 |
| TA6L18A | BEL | 17.1 | 18.0 | 18.9 | 1.0 | 15.3 | 1.0 | 5.0 | 23.5 | 25.5 | 0.080 |
| TA6L20A | BGL | 19.0 | 20.0 | 21.0 | 1.0 | 17.1 | 1.0 | 5.0 | 21.7 | 27.7 | 0.082 |
| TA6L22A | BKL | 20.9 | 22.0 | 23.1 | 1.0 | 18.8 | 1.0 | 5.0 | 19.6 | 30.6 | 0.084 |
| TA6L24A | BML | 22.8 | 24.0 | 25.2 | 1.0 | 20.5 | 1.0 | 5.0 | 18.1 | 33.2 | 0.085 |
| TA6L27A | BPL | 25.7 | 27.0 | 28.4 | 1.0 | 23.1 | 1.0 | 5.0 | 16.0 | 37.5 | 0.087 |
| TA6L30A | BRL | 28.5 | 30.0 | 31.5 | 1.0 | 25.6 | 1.0 | 5.0 | 14.5 | 41.4 | 0.088 |
| TA6L33A | BTL | 31.4 | 33.0 | 34.7 | 1.0 | 28.2 | 1.0 | 5.0 | 13.1 | 45.7 | 0.089 |
| TA6L36A | BVL | 34.2 | 36.0 | 37.8 | 1.0 | 30.8 | 1.0 | 5.0 | 12.0 | 49.9 | 0.090 |
| TA6L39A | BXL | 37.1 | 39.0 | 41.0 | 1.0 | 33.3 | 1.0 | 5.0 | 11.1 | 53.9 | 0.091 |
| TA6L43A | BZL | 40.9 | 43.0 | 45.2 | 1.0 | 36.8 | 1.0 | 5.0 | 10.1 | 59.3 | 0.092 |
| TA6L47A | CEL | 44.7 | 47.0 | 49.4 | 1.0 | 40.2 | 1.0 | 5.0 | 9.3 | 64.8 | 0.092 |
| TA6L51A | CGL | 48.5 | 51.0 | 53.6 | 1.0 | 43.6 | 1.0 | 5.0 | 8.6 | 70.1 | 0.093 |
| TA6L56A | CKL | 53.2 | 56.0 | 58.8 | 1.0 | 47.8 | 1.0 | 10.0 | 7.8 | 77.0 | 0.096 |
| TA6L62A | CML | 58.9 | 62.0 | 65.1 | 1.0 | 53.0 | 1.0 | 10.0 | 7.1 | 85.0 | 0.096 |
| TA6L68A | CPL | 64.6 | 68.0 | 71.4 | 1.0 | 58.1 | 1.0 | 10.0 | 6.5 | 92.0 | 0.097 |
| TA6L75A | CRL | 71.3 | 75.0 | 78.8 | 1.0 | 64.1 | 1.0 | 10.0 | 5.8 | 104 | 0.097 |
| TA6L82A | CTL | 77.9 | 82.0 | 86.1 | 1.0 | 70.1 | 1.0 | 10.0 | 5.3 | 113 | 0.097 |
| TA6L91A | CVL | 86.5 | 91.0 | 95.6 | 1.0 | 77.8 | 1.0 | 15.0 | 4.8 | 125 | 0.098 |
| TA6L100A | CXL | 95.0 | 100 | 105 | 1.0 | 85.5 | 1.0 | 15.0 | 4.4 | 137 | 0.098 |

**Notes**

(1) Pulse test: $t_p \leq 50$ ms

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

(3) To calculate $V_{BR}$ vs. junction temperature, use the following formula: $V_{BR}$ at $T_J$ = $V_{BR}$ at 25 °C x (1 + $\alpha T$ x ($T_J$ - 25))

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

## THERMAL CHARACTERISTICS ($T_A$ = 25 °C unless otherwise noted)

| PARAMETER | SYMBOL | TYP. | MAX. | UNIT |
|---|---|---|---|---|
| Thermal resistance | $R_{\theta JA}$ (1) | 120 | 150 | °C/W |
| | $R_{\theta JM}$ (2) | 12 | 15 | °C/W |

**Notes**

(1) Thermal resistance junction-to-ambient to follow JEDEC® 51-2A,device mounted on FR4 PCB, 2 oz. standard footprint

(2) Thermal resistance junction-to-mount to follow JEDEC® 51-14 using Transient Dual Interface Test Method (TDIM)

| IMMUNITY TO STATIC ELECTRICAL DISCHARGE TO THE FOLLOWING STANDARDS ($T_A$ = 25 °C unless otherwise noted) | | | | |
|---|---|---|---|---|
| **STANDARD** | **TEST TYPE** | **TEST CONDITIONS** | **SYMBOL** | **VALUE** |
| IEC 61000-4-2 | Contact discharge | C = 150 pF, R = 330 Ω | ESD | 30 kV |
| | Air discharge | | | 30 kV |

| ORDERING INFORMATION (Example) | | | | |
|---|---|---|---|---|
| **PREFERRED P/N** | **UNIT WEIGHT (g)** | **PREFERRED PACKAGE CODE** | **BASE QUANTITY** | **DELIVERY MODE** |
| TA6L6.8AHM3/H (1) | 0.033 | H | 3500 | 7" diameter plastic tape and reel |
| TA6L6.8AHM3/I (1) | 0.033 | I | 14 000 | 13" diameter plastic tape and reel |

**Note**

(1) AEC-Q101 qualified

## RATINGS AND CHARACTERISTICS CURVES ($T_A$ = 25 °C, unless otherwise noted)

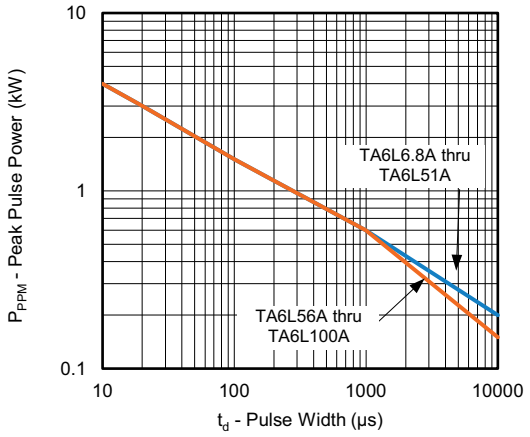



Fig. 1 - Peak Pulse Power Rating Curve

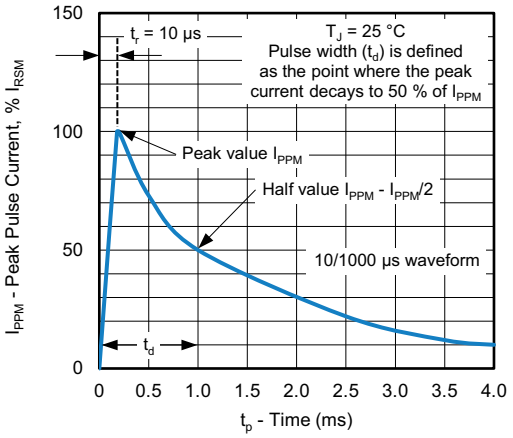



Fig. 3 - Pulse Waveform

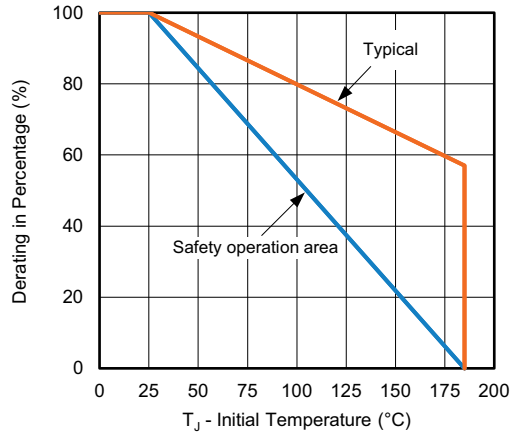



Fig. 2 - Pulse Power or Current vs. Initial Junction Temperature

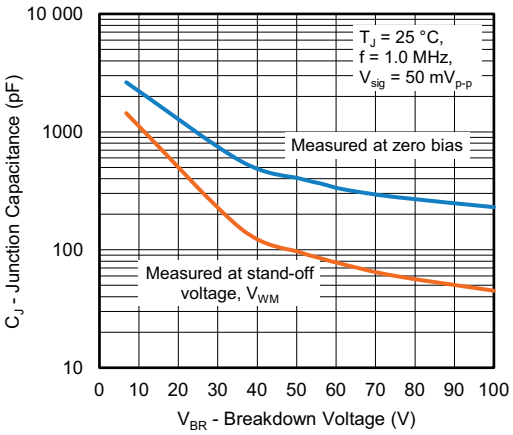



Fig. 4 - Typical Junction Capacitance

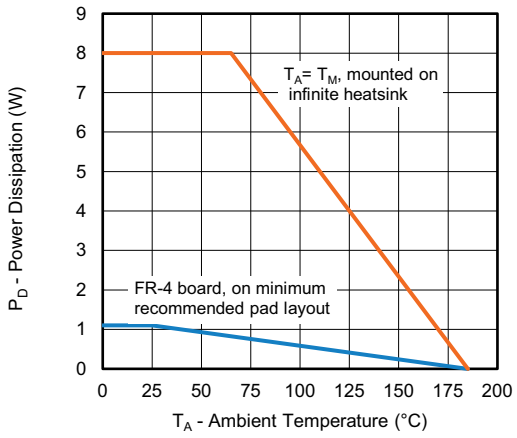



Fig. 5 - Power Dissipation Derating Curve

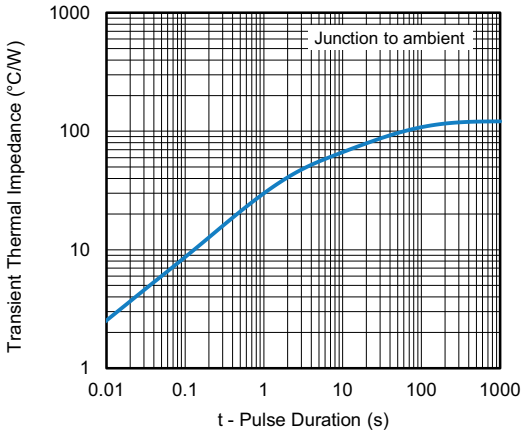


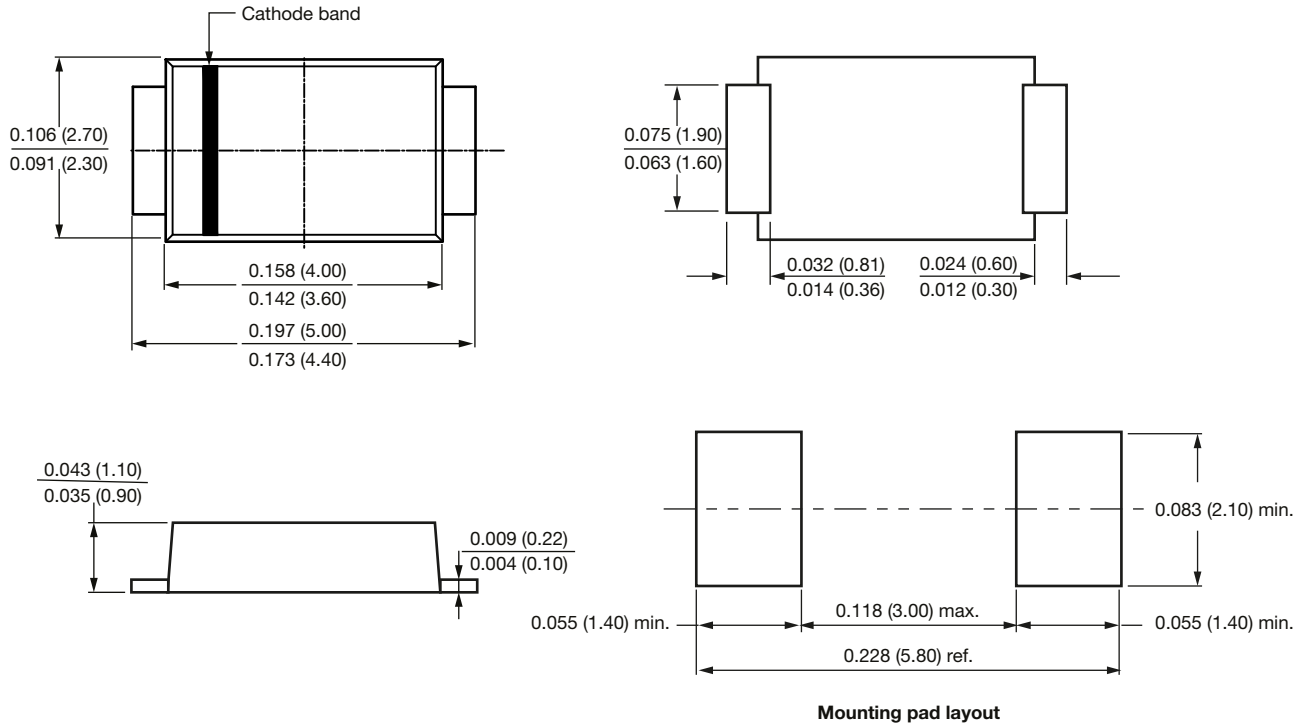

Fig. 6 - Typical Transient Thermal Impedance

**Note**

- Fig. 1, power calculations is based on $I_{PPM}$ times defined maximum clamping voltage by pulse width

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

### SlimSMAW (DO-221AD)




**Mounting pad layout**

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