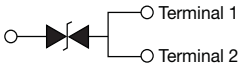
# Surface Mount PAR® Transient Voltage Suppressors

High Temperature Stability and High Reliability Conditions

**eSMP® Series**

**TO-277A (SMPC)**




## FEATURES

- Junction passivation optimized PAR® design
- $T_J$ = 175 °C capability suitable for high reliability and automotive requirement
- Very low profile - typical height of 1.1 mm
- Ideal for automated placement
- Bi-direction only
- Excellent clamping capability
- Low leakage current
- Very fast response time
- AEC-Q101 qualified available
  - Automotive ordering code: base P/NHM3
- 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

RoHS COMPLIANT
HALOGEN FREE

| PRIMARY CHARACTERISTICS | |
|---|---|
| $V_{WM}$ | 10.5 V to 37.8 V |
| $V_{BR}$ (Bi-directional) | 11 V to 36 V |
| $P_{PPM}$ | 1500 W |
| $T_J$ max. | 175 °C |
| Polarity | Bi-directional |
| Package | TO-277A (SMPC) |

**Note**

- All electrical characteristics are only applicable when two identical polarity terminals are connected.

## 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 automotive, consumer, computer, industrial, and telecommunication.

## MECHANICAL DATA

**Case:** TO-277A (SMPC)
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
HM3 suffix meets JESD 201 class 2 whisker test

**Polarity:** 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 µs waveform (1) | $P_{PPM}$ | 1500 | W |
| Peak pulse current with a 10/1000 µs waveform (1) | $I_{PPM}$ | See next table | A |
| Operating junction and storage temperature range | $T_J$, $T_{STG}$ | -65 to +175 | °C |

**Note**

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

| **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 $V_{WM}$ $I_D$ (µA)** | **MAXIMUM PEAK PULSE SURGE CURRENT $I_{PPM}$ (2) (A)** | **MAXIMUM CLAMPING VOLTAGE AT $I_{PPM}$ $V_C$ (V)** |
| | **BI** | **MIN.** | **MAX.** | | | | | |
| TPC11CA | BAF | 10.5 | 11.6 | 1.0 | 9.40 | 5.0 | 96.2 | 15.6 |
| TPC12CA | BAG | 11.4 | 12.6 | 1.0 | 10.2 | 2.0 | 89.8 | 16.7 |
| TPC13CA | BAH | 12.4 | 13.7 | 1.0 | 11.1 | 2.0 | 82.4 | 18.2 |
| TPC15CA | BAI | 14.3 | 15.8 | 1.0 | 12.8 | 1.0 | 70.8 | 21.2 |
| TPC16CA | BAJ | 15.2 | 16.8 | 1.0 | 13.6 | 1.0 | 66.7 | 22.5 |
| TPC18CA | BAK | 17.1 | 18.9 | 1.0 | 15.3 | 1.0 | 59.5 | 25.2 |
| TPC20CA | BAL | 19.0 | 21.0 | 1.0 | 17.1 | 1.0 | 54.2 | 27.7 |
| TPC22CA | BAM | 20.9 | 23.1 | 1.0 | 18.8 | 1.0 | 49 | 30.6 |
| TPC24CA | BAN | 22.8 | 25.2 | 1.0 | 20.5 | 1.0 | 45.2 | 33.2 |
| TPC27CA | BAO | 25.7 | 28.4 | 1.0 | 23.1 | 1.0 | 40 | 37.5 |
| TPC30CA | BAP | 28.5 | 31.5 | 1.0 | 25.6 | 1.0 | 36.2 | 41.4 |
| TPC33CA | BAQ | 31.4 | 34.7 | 1.0 | 28.2 | 1.0 | 32.8 | 45.7 |
| TPC36CA | BAR | 34.2 | 37.8 | 1.0 | 30.8 | 1.0 | 30.1 | 49.9 |

**Notes**

- All terms and symbols are consistent with ANSI/IEEE C62.35

(1) $V_{BR}$ measured after $I_T$ applied for 300 µs, $I_T$ = square wave pulse or equivalent

(2) Surge current waveform per fig.3

| **ORDERING INFORMATION** (Example) | | | | |
|---|---|---|---|---|
| **PREFERRED P/N** | **UNIT WEIGHT (g)** | **PREFERRED PACKAGE CODE** | **BASE QUANTITY** | **DELIVERY MODE** |
| TPC11CAHM3/H (1) | 0.10 | H | 1500 | 7" diameter plastic tape and reel |
| TPC11CAHM3/I (1) | 0.10 | I | 6500 | 13" diameter plastic tape and reel |

**Note**

(1) AEC-Q101 qualified

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

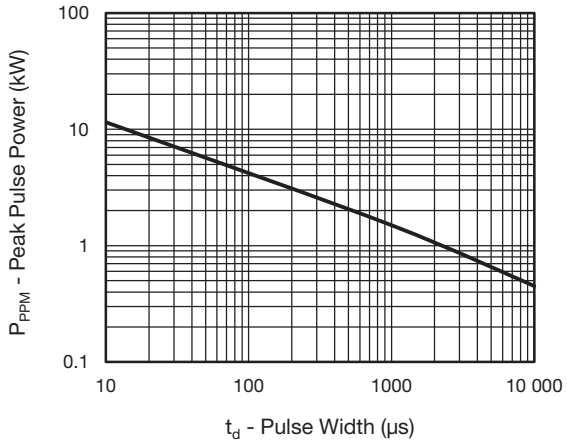



Fig. 1 - Peak Pulse Power Rating Curve

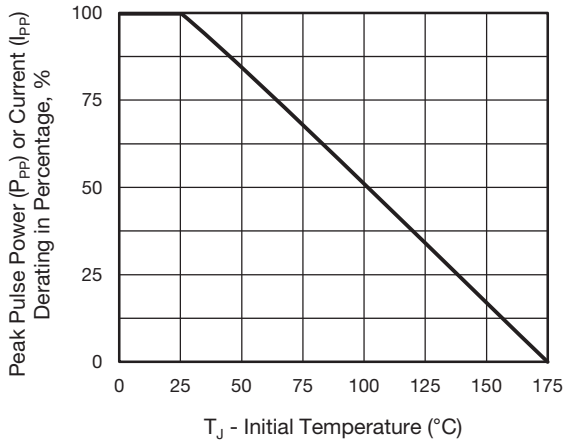



Fig. 2 - Pulse Power or Current vs. Initial Junction Temperature

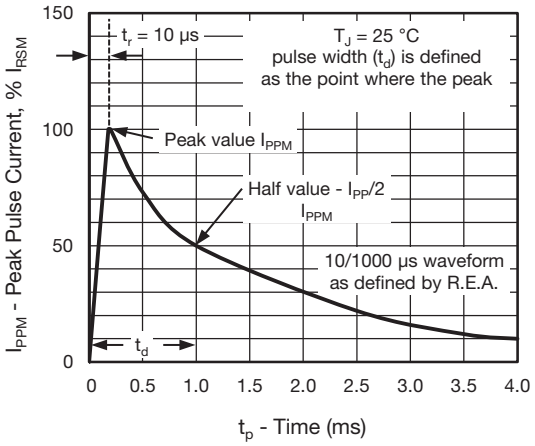



Fig. 3 - Pulse Waveform

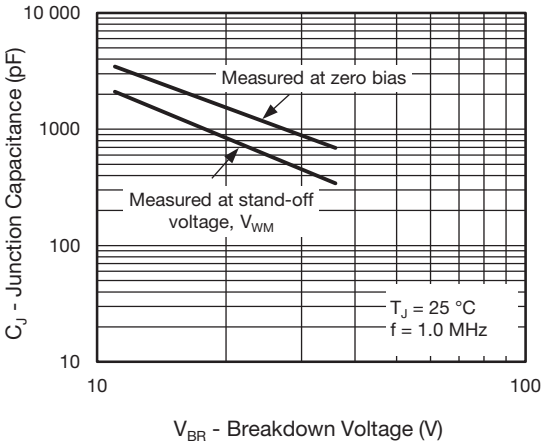
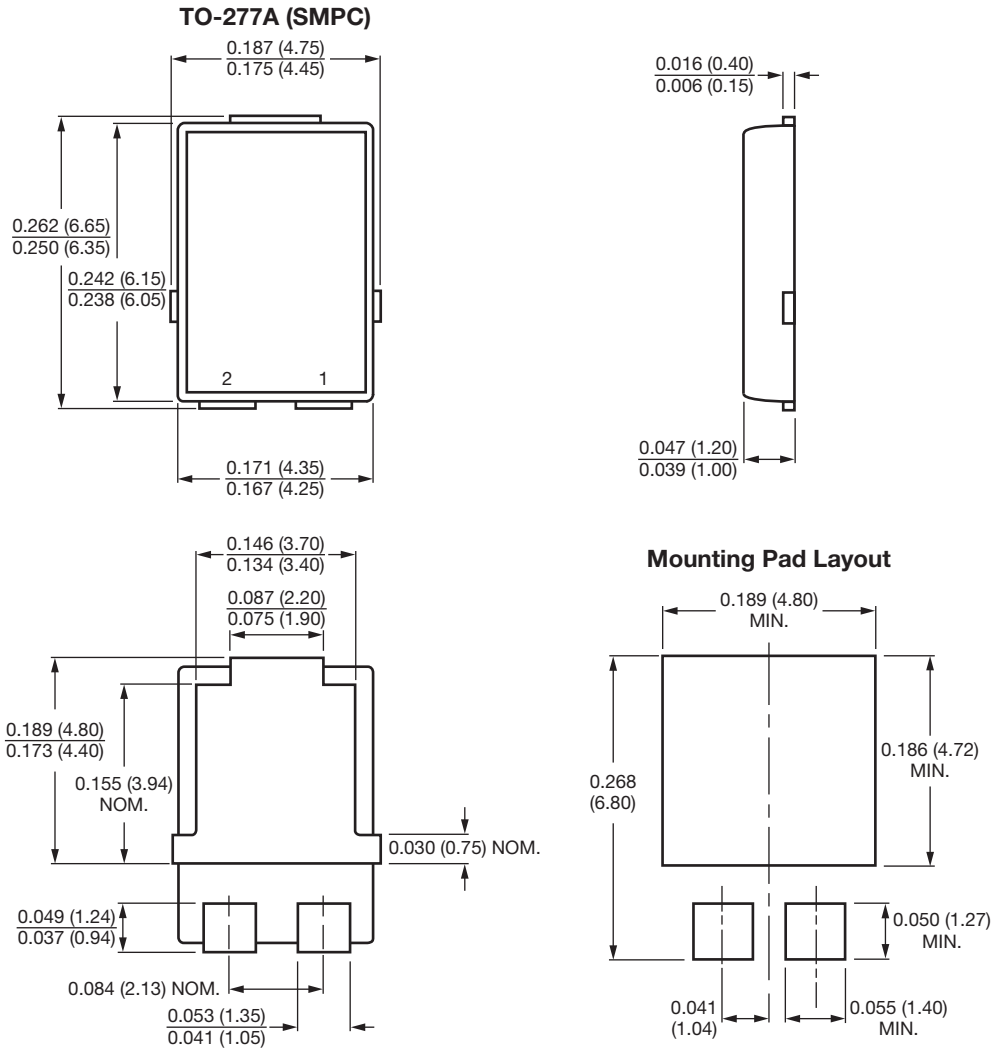



Fig. 4 - Typical Junction Capacitance

**Note**

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

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




Conform to JEDEC® TO-277A

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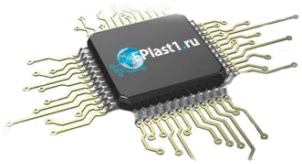


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