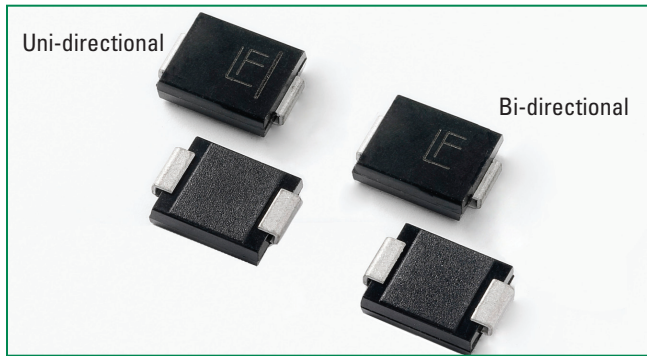


**TPSMC Series**



**Agency Approvals**

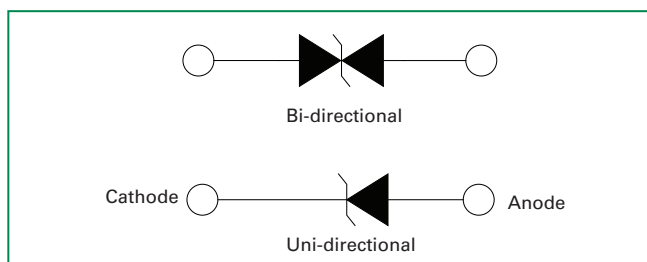
| AGENCY | AGENCY FILE NUMBER |
|--------|--------------------|
|        | E230531            |

**Maximum Ratings and Thermal Characteristics (T<sub>A</sub>=25°C unless otherwise noted)**

| Parameter  | Symbol                            | Value      | Unit |
|--|-----------------------------------|------------|------|
| Peak Pulse Power Dissipation at T <sub>A</sub> =25°C by 10/1000µs Waveform (Fig.2)(Note 1), (Note 2) | P <sub>PPM</sub>                  | 1500       | W    |
| Power Dissipation on Infinite Heat Sink at T <sub>A</sub> =50°C                                      | P <sub>M(AV)</sub>                | 6.5        | W    |
| Peak Forward Surge Current, 8.3ms Single Half Sine Wave (Note 3)                                     | I <sub>FSM</sub>                  | 200        | A    |
| Maximum Instantaneous Forward Voltage at 100A for Unidirectional Only (Note 4)                       | V <sub>F</sub>                    | 3.5/5.0    | V    |
| Operating Junction and Storage Temperature Range   | T <sub>J</sub> , T <sub>STG</sub> | -55 to 150 | °C   |
| Typical Thermal Resistance Junction to Lead  | R <sub>wJL</sub>                  | 15         | °C/W |
| Typical Thermal Resistance Junction to Ambient   | R <sub>wJA</sub>                  | 75         | °C/W |

- Notes:**
1. Non-repetitive current pulse, per Fig. 4 and derated above T<sub>A</sub> = 25°C per Fig. 3.
  2. Mounted on copper pad area of 0.31x0.31" (8.0 x 8.0mm) to each terminal.
  3. Measured on 8.3ms single half sine wave or equivalent square wave for unidirectional device only, duty cycle=4 per minute maximum.
  4. V<sub>F</sub><3.5V for V<sub>BR</sub> ≤ 200V and V<sub>F</sub><5.0V for V<sub>BR</sub> ≥ 201V.

**Functional Diagram**



**Description**

The TPSMC series is designed specifically to protect sensitive electronic equipment from voltage transients induced by lightning and other transient voltage events.


**Features**

- Hi reliability application and automotive grade AEC Q101 qualified
- For surface mounted applications to optimize board space
- Low profile package.
- Typical failure mode is short from over-specified voltage or current
- Whisker test is conducted based on JEDEC JESD201A per its table 4a and 4c
- IEC-61000-4-2 ESD 15kV(Air), 8kV (Contact)
- ESD protection of data lines in accordance with IEC 61000-4-2 (IEC801-2)
- EFT protection of data lines in accordance with IEC 61000-4-4 (IEC801-4)
- Built-in strain relief
- V<sub>BR</sub> @T<sub>J</sub> = V<sub>BR</sub> @25°C x (1 + α T x (T<sub>J</sub> - 25)) (α T: Temperature Coefficient)
- Glass passivated chip junction
- 1500W peak pulse power capability at 10/1000µs waveform, repetition rate (duty cycles):0.01%
- Fast response time: typically less than 1.0ps from 0V to BV min
- Excellent clamping capability
- Low incremental surge resistance
- Typical I<sub>R</sub> less than 1µA above 13V
- High temperature soldering guaranteed: 160°C/10 seconds at terminals
- Plastic package has underwriters laboratory flammability 94V-0
- Meet MSL level1, per J-STD-020, LF maximum peak of 260°C
- Matte tin lead-free plated
- Halogen free and RoHS compliant
- 2nd level interconnect is Pb-free per IPC/JEDEC J-STD-609A.01

**Applications**

TVS devices are ideal for the protection of I/O Interfaces, V<sub>CC</sub> bus and other vulnerable circuits used in Telecom, Computer, Industrial and Consumer electronic applications.

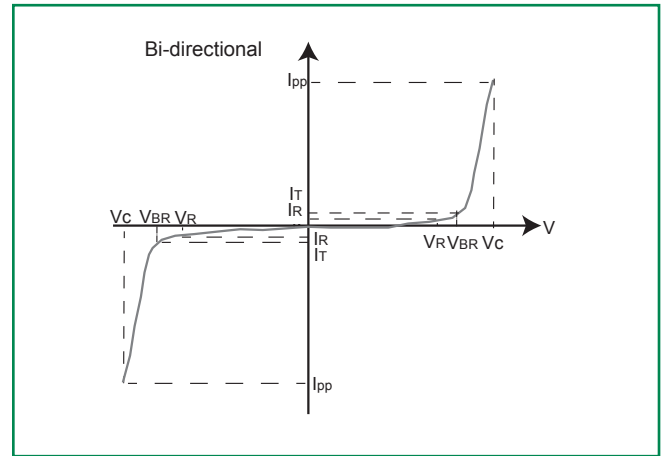
### Electrical Characteristics

| Part Number (Uni) | Part Number (Bi) | Marking |      | Reverse Stand off Voltage $V_R$ (Volts) | Breakdown Voltage $V_{BR}$ (Volts) @ $I_T$ |       | Test Current $I_T$ (mA) | Maximum Clamping Voltage $V_C$ @ $I_{pp}$ (V) | Maximum Peak Pulse Current $I_{pp}$ (A) | Maximum Reverse Leakage $I_R$ @ $V_R$ ( $\mu$ A) | Agency Approval  |
|-------------------|------------------|---------|------|---|--|-------|-------------------------|---|---|--|---|
|                   |                  | UNI     | BI   |   | MIN  | MAX   |                         |   |   |  |   |
| TPSMC12A          | TPSMC12CA        | 12AA    | 12CA | 10.20                                   | 11.40                                      | 12.60 | 1                       | 16.7  | 91.0                                    | 5  | X   |
| TPSMC13A          | TPSMC13CA        | 13AA    | 13CA | 11.10                                   | 12.40                                      | 13.70 | 1                       | 18.2  | 83.5                                    | 1  | X   |
| TPSMC15A          | TPSMC15CA        | 15AA    | 15CA | 12.80                                   | 14.30                                      | 15.80 | 1                       | 21.2  | 71.7                                    | 1  | X   |
| TPSMC16A          | TPSMC16CA        | 16AA    | 16CA | 13.60                                   | 15.20                                      | 16.80 | 1                       | 22.5  | 67.6                                    | 1  | X   |
| TPSMC18A          | TPSMC18CA        | 18AA    | 18CA | 15.30                                   | 17.10                                      | 18.90 | 1                       | 25.2  | 60.3                                    | 1  | X   |
| TPSMC20A          | TPSMC20CA        | 20AA    | 20CA | 17.10                                   | 19.00                                      | 21.00 | 1                       | 27.7  | 54.9                                    | 1  | X   |
| TPSMC22A          | TPSMC22CA        | 22AA    | 22CA | 18.80                                   | 20.90                                      | 23.10 | 1                       | 30.6  | 49.7                                    | 1  | X   |
| TPSMC24A          | TPSMC24CA        | 24AA    | 24CA | 20.50                                   | 22.80                                      | 25.20 | 1                       | 33.2  | 45.8                                    | 1  | X   |
| TPSMC27A          | TPSMC27CA        | 27AA    | 27CA | 23.10                                   | 25.70                                      | 28.40 | 1                       | 37.5  | 40.5                                    | 1  | X   |
| TPSMC30A          | TPSMC30CA        | 30AA    | 30CA | 25.60                                   | 28.50                                      | 31.50 | 1                       | 41.4  | 36.7                                    | 1  | X   |
| TPSMC33A          | TPSMC33CA        | 33AA    | 33CA | 28.20                                   | 31.40                                      | 34.70 | 1                       | 45.7  | 33.3                                    | 1  | X   |
| TPSMC36A          | TPSMC36CA        | 36AA    | 36CA | 30.80                                   | 34.20                                      | 37.80 | 1                       | 49.9  | 30.5                                    | 1  | X   |
| TPSMC39A          | TPSMC39CA        | 39AA    | 39CA | 33.30                                   | 37.10                                      | 41.00 | 1                       | 53.9  | 28.2                                    | 1  | X   |
| TPSMC43A          | TPSMC43CA        | 43AA    | 43CA | 36.80                                   | 40.90                                      | 45.20 | 1                       | 59.3  | 25.6                                    | 1  | X   |
| TPSMC47A          | TPSMC47CA        | 47AA    | 47CA | 40.20                                   | 44.70                                      | 49.40 | 1                       | 64.8  | 23.5                                    | 1  | X   |
| TPSMC51A          | TPSMC51CA        | 51AA    | 51CA | 43.60                                   | 48.50                                      | 53.60 | 1                       | 70.1  | 21.7                                    | 1  | X   |
| TPSMC56A          | TPSMC56CA        | 56AA    | 56CA | 47.80                                   | 53.20                                      | 58.80 | 1                       | 77.0  | 19.7                                    | 1  | X   |
| TPSMC62A          | TPSMC62CA        | 62AA    | 62CA | 53.00                                   | 58.90                                      | 65.10 | 1                       | 85.0  | 17.9                                    | 1  | X   |
| TPSMC68A          | TPSMC68CA        | 68AA    | 68CA | 58.10                                   | 64.60                                      | 71.40 | 1                       | 92.0  | 16.5                                    | 1  | X   |
| TPSMC75A          | TPSMC75CA        | 75AA    | 75CA | 64.10                                   | 71.30                                      | 78.80 | 1                       | 103.0   | 14.8                                    | 1  | X   |
| TPSMC82A          | TPSMC82CA        | 82AA    | 82CA | 70.10                                   | 77.90                                      | 86.10 | 1                       | 113.0   | 13.5                                    | 1  | X   |
| TPSMC91A          | TPSMC91CA        | 91AA    | 91CA | 77.80                                   | 86.50                                      | 95.50 | 1                       | 125.0   | 12.2                                    | 1  | X   |

For bidirectional type having  $V_R$  of 10 volts and less, the  $I_R$  limit is double.

For parts without A, the  $V_{BR}$  is  $\pm 10\%$  and  $V_C$  is 5% higher than with A parts.

**I-V Curve Characteristics**



**P<sub>PPM</sub> Peak Pulse Power Dissipation** – Max power dissipation

**V<sub>R</sub> Stand-off Voltage** – Maximum voltage that can be applied to the TVS without operation

**V<sub>BR</sub> Breakdown Voltage** – Maximum voltage that flows through the TVS at a specified test current (I<sub>T</sub>)

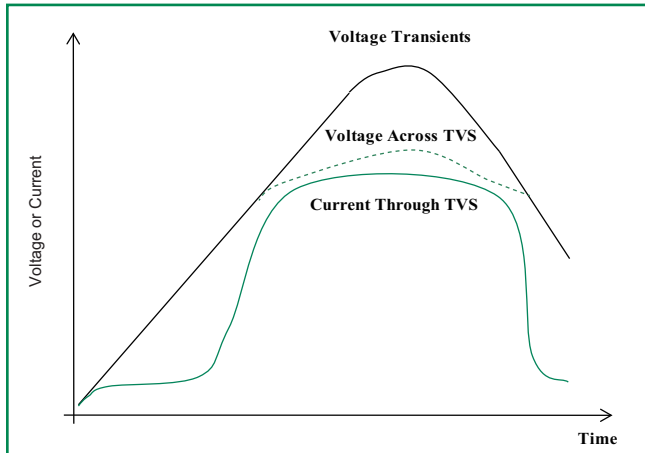
**V<sub>C</sub> Clamping Voltage** – Peak voltage measured across the suppressor at a specified I<sub>ppm</sub> (peak impulse current)

**I<sub>R</sub> Reverse Leakage Current** – Current measured at V<sub>R</sub>

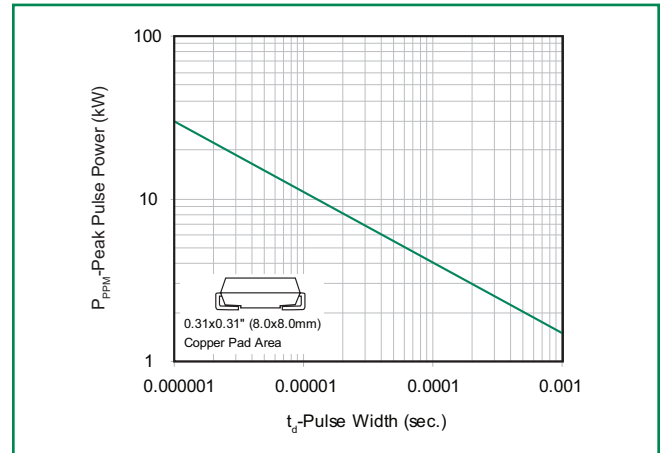
**V<sub>F</sub> Forward Voltage Drop for Uni-directional**

**Ratings and Characteristic Curves (T<sub>A</sub>=25°C unless otherwise noted)**

**Figure 1 - TVS Transients Clamping Waveform**



**Figure 2 - Peak Pulse Power Rating**



continues on next page.

**Ratings and Characteristic Curves** ( $T_A=25^\circ\text{C}$  unless otherwise noted) (Continued)

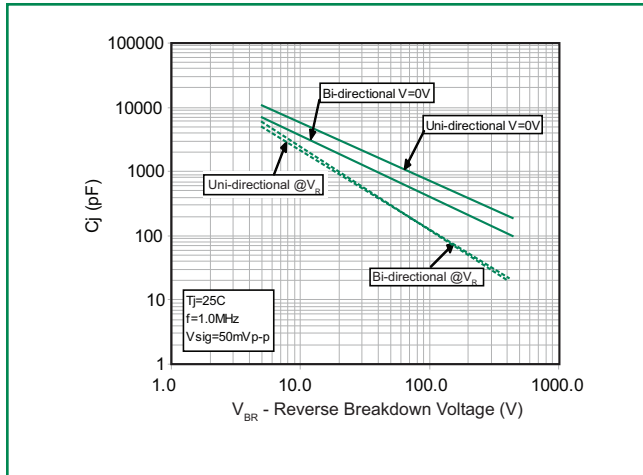
**Figure 3 - Pulse Derating Curve**



**Figure 4 - Pulse Waveform**



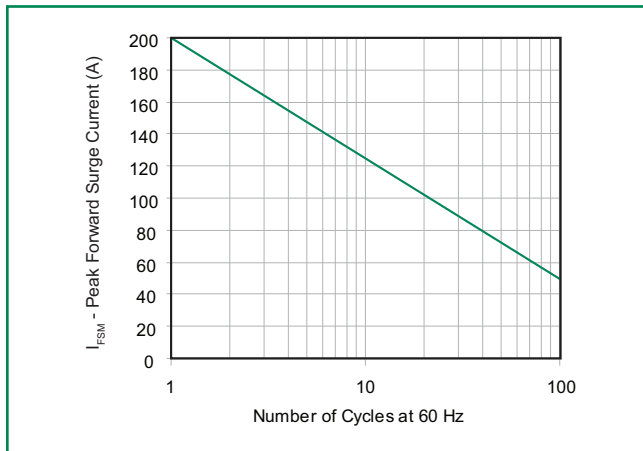
**Figure 5 - Typical Junction Capacitance**



**Figure 6 - Steady State Power Dissipation Derating Curve**



**Figure 7 - Maximum Non-Repetitive Peak Forward Surge Current Uni-Directional Only**



**Soldering Parameters**

|  |                                    |                         |
|--|------------------------------------|-------------------------|
| Reflow Condition                                       |                                    | Lead-free assembly      |
| Pre Heat   | - Temperature Min ( $T_{s(min)}$ ) | 150°C                   |
|  | - Temperature Max ( $T_{s(max)}$ ) | 200°C                   |
|  | - Time (min to max) ( $t_s$ )      | 60 – 120 secs           |
| Average ramp up rate (Liquidus Temp ( $T_L$ ) to peak) |                                    | 3°C/second max          |
| $T_{s(max)}$ to $T_L$ - Ramp-up Rate                   |                                    | 3°C/second max          |
| Reflow   | - Temperature ( $T_L$ ) (Liquidus) | 217°C                   |
|  | - Time (min to max) ( $t_s$ )      | 60 – 150 seconds        |
| Peak Temperature ( $T_p$ )                             |                                    | 260 <sup>+0/-5</sup> °C |
| Time within 5°C of actual peak Temperature ( $t_p$ )   |                                    | 30 seconds max          |
| Ramp-down Rate   |                                    | 6°C/second max          |
| Time 25°C to peak Temperature ( $T_p$ )                |                                    | 8 minutes max.          |
| Do not exceed  |                                    | 280°C                   |



**Physical Specifications**

|                 |   |
|-----------------|---|
| <b>Weight</b>   | 0.007 ounce, 0.21 grams   |
| <b>Case</b>     | JEDEC DO214AB. Molded plastic body over glass passivated junction |
| <b>Polarity</b> | Color band denotes positive end (cathode) except Bidirectional.   |
| <b>Terminal</b> | Matte Tin-plated leads, Solderable per JESD22-B102                |

**Environmental Specifications**

|                            |                          |
|----------------------------|--------------------------|
| <b>High Temp. Storage</b>  | JESD22-A103              |
| <b>HTRB</b>                | JESD22-A108              |
| <b>Temperature Cycling</b> | JESD22-A104              |
| <b>MSL</b>                 | JEDEC-J-STD-020, Level 1 |
| <b>H3TRB</b>               | JESD22-A101              |
| <b>RSH</b>                 | JESD22-B106              |

**Dimensions**

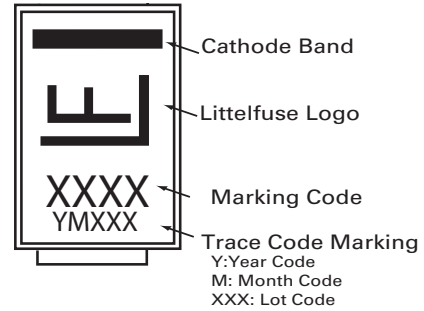


| Dimensions | Inches |       | Millimeters |       |
|------------|--------|-------|-------------|-------|
|            | Min    | Max   | Min         | Max   |
| A          | 0.114  | 0.126 | 2.900       | 3.200 |
| B          | 0.260  | 0.280 | 6.600       | 7.110 |
| C          | 0.220  | 0.245 | 5.590       | 6.220 |
| D          | 0.079  | 0.103 | 2.060       | 2.620 |
| E          | 0.030  | 0.060 | 0.760       | 1.520 |
| F          | -      | 0.008 | -           | 0.203 |
| G          | 0.305  | 0.320 | 7.750       | 8.130 |
| H          | 0.006  | 0.012 | 0.152       | 0.305 |
| I          | 0.129  | -     | 3.300       | -     |
| J          | 0.094  | -     | 2.400       | -     |
| K          | -      | 0.165 | -           | 4.200 |
| L          | 0.094  | -     | 2.400       | -     |

### Part Numbering System



### Part Marking System



### Packaging

| Part number | Component Package | Quantity | Packaging Option                 | Packaging Specification |
|-------------|-------------------|----------|----------------------------------|-------------------------|
| TPSMCxxxXX  | DO-214AB          | 3000     | Tape & Reel - 16mm tape/13" reel | EIA STD RS-481          |

### Tape and Reel Specification





Компания «ЭлектроПласт» предлагает заключение долгосрочных отношений при поставках импортных электронных компонентов на взаимовыгодных условиях!

Наши преимущества:

- Оперативные поставки широкого спектра электронных компонентов отечественного и импортного производства напрямую от производителей и с крупнейших мировых складов;
- Поставка более 17-ти миллионов наименований электронных компонентов;
- Поставка сложных, дефицитных, либо снятых с производства позиций;
- Оперативные сроки поставки под заказ (от 5 рабочих дней);
- Экспресс доставка в любую точку России;
- Техническая поддержка проекта, помощь в подборе аналогов, поставка прототипов;
- Система менеджмента качества сертифицирована по Международному стандарту ISO 9001;
- Лицензия ФСБ на осуществление работ с использованием сведений, составляющих государственную тайну;
- Поставка специализированных компонентов (Xilinx, Altera, Analog Devices, Intersil, Interpoint, Microsemi, Aeroflex, Peregrine, Syfer, Eurofarad, Texas Instrument, Miteq, Cobham, E2V, MA-COM, Hittite, Mini-Circuits, General Dynamics и др.);

Помимо этого, одним из направлений компании «ЭлектроПласт» является направление «Источники питания». Мы предлагаем Вам помощь Конструкторского отдела:

- Подбор оптимального решения, техническое обоснование при выборе компонента;
- Подбор аналогов;
- Консультации по применению компонента;
- Поставка образцов и прототипов;
- Техническая поддержка проекта;
- Защита от снятия компонента с производства.



#### Как с нами связаться

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