

**TPSMD 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>                  | 3000       | 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>                  | 300        | A    |
| Maximum Instantaneous Forward Voltage at 100A for Unidirectional Only                                | V <sub>F</sub>                    | 3.5        | 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>θJL</sub>                  | 15         | °C/W |
| Typical Thermal Resistance Junction to Ambient   | R <sub>θJA</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.

**Functional Diagram**



**Description**

The TPSMD 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 in order 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
- 3000W 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 2µA above 12V
- 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

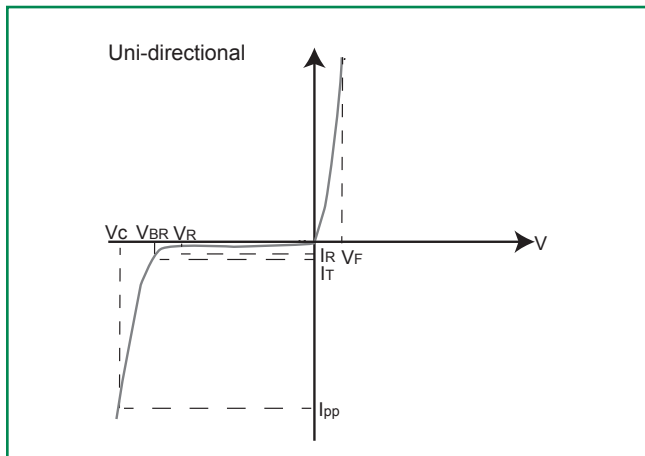
**Applications**

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) | 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  |
|-------------------|---------|---|--|-------|-------------------------|---|---|--|---|
|                   |         |   | MIN  | MAX   |                         |   |   |  |   |
| TPSMD10A          | PDXA    | 10.0                                    | 11.10                                      | 12.30 | 1                       | 17.0  | 176.5                                   | 5  | X   |
| TPSMD11A          | PDZA    | 11.0                                    | 12.20                                      | 13.50 | 1                       | 18.2  | 164.8                                   | 2  | X   |
| TPSMD12A          | PEEA    | 12.0                                    | 13.30                                      | 14.70 | 1                       | 19.9  | 150.8                                   | 2  | X   |
| TPSMD13A          | PEGA    | 13.0                                    | 14.40                                      | 15.90 | 1                       | 21.5  | 139.5                                   | 2  | X   |
| TPSMD14A          | PEKA    | 14.0                                    | 15.60                                      | 17.20 | 1                       | 23.2  | 129.3                                   | 2  | X   |
| TPSMD15A          | PEMA    | 15.0                                    | 16.70                                      | 18.50 | 1                       | 24.4  | 123.0                                   | 2  | X   |
| TPSMD16A          | PEPA    | 16.0                                    | 17.80                                      | 19.70 | 1                       | 26.0  | 115.4                                   | 2  | X   |
| TPSMD17A          | PERA    | 17.0                                    | 18.90                                      | 20.90 | 1                       | 27.6  | 108.7                                   | 2  | X   |
| TPSMD18A          | PETA    | 18.0                                    | 20.00                                      | 22.10 | 1                       | 29.2  | 102.7                                   | 2  | X   |
| TPSMD20A          | PEVA    | 20.0                                    | 22.20                                      | 24.50 | 1                       | 32.4  | 92.6                                    | 2  | X   |
| TPSMD22A          | PEXA    | 22.0                                    | 24.40                                      | 26.90 | 1                       | 35.5  | 84.5                                    | 2  | X   |
| TPSMD24A          | PEZA    | 24.0                                    | 26.70                                      | 29.50 | 1                       | 38.9  | 77.1                                    | 2  | X   |
| TPSMD26A          | PFEA    | 26.0                                    | 28.90                                      | 31.90 | 1                       | 42.1  | 71.3                                    | 2  | X   |
| TPSMD28A          | PFGA    | 28.0                                    | 31.10                                      | 34.40 | 1                       | 45.4  | 66.1                                    | 2  | X   |
| TPSMD30A          | PFKA    | 30.0                                    | 33.30                                      | 36.80 | 1                       | 48.4  | 62.0                                    | 2  | X   |
| TPSMD33A          | PFMA    | 33.0                                    | 36.70                                      | 40.60 | 1                       | 53.3  | 56.3                                    | 2  | X   |
| TPSMD36A          | PFPA    | 36.0                                    | 40.00                                      | 44.20 | 1                       | 58.1  | 51.6                                    | 2  | X   |
| TPSMD40A          | PFRA    | 40.0                                    | 44.40                                      | 49.10 | 1                       | 64.5  | 46.5                                    | 2  | X   |
| TPSMD43A          | PFTA    | 43.0                                    | 47.80                                      | 52.80 | 1                       | 69.4  | 43.2                                    | 2  | X   |

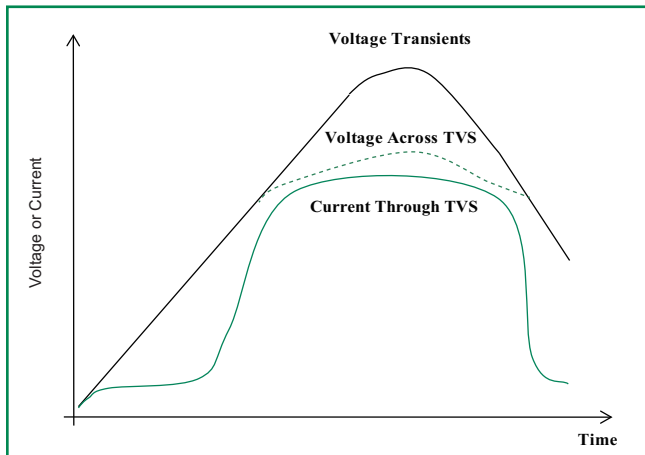
**I-V Curve Characteristics**



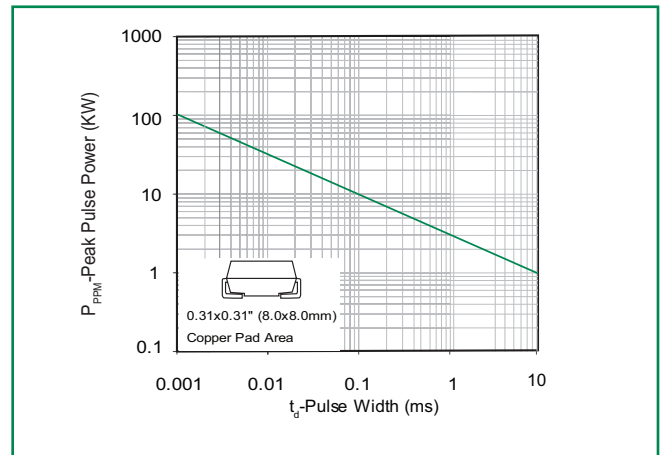
- P<sub>PPM</sub> Peak Pulse Power Dissipation** – Max power dissipation
- V<sub>R</sub> Stand-off Voltage** – Maximum voltage that can be applied to the TVS without operation
- V<sub>BR</sub> Breakdown Voltage** – Maximum voltage that flows through the TVS at a specified test current (I<sub>T</sub>)
- 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 - Peak Pulse Power or Current Derating Curve vs Initial Junction Temperature**



**Figure 4 - Pulse Waveform**



**Figure 5 - Typical Junction Capacitance**



**Figure 6 - Steady State Power 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                   |



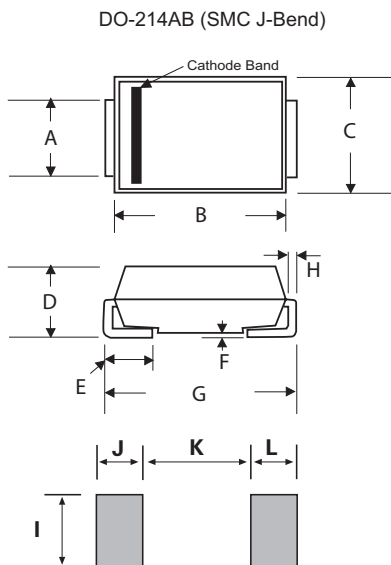
**Physical Specifications**

|                 |   |
|-----------------|---|
| <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 Options

| Part number  | Component Package | Quantity | Packaging Option                 | Packaging Specification |
|--------------|-------------------|----------|----------------------------------|-------------------------|
| TPSMDxxxX    | DO-214AB          | 3000     | Tape & Reel - 16mm tape/13" reel | EIA STD RS-481          |
| TPSMDxxxX-T7 | DO-214AB          | 500      | Tape & Reel - 16mm tape /7" reel | EIA STD RS-481          |

### Tape and Reel Specification



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- Широкая линейка поставок активных и пассивных импортных электронных компонентов (более 30 млн. наименований);
- Поставка сложных, дефицитных, либо снятых с производства позиций;
- Оперативные сроки поставки под заказ (от 5 рабочих дней);
- Экспресс доставка в любую точку России;
- Помощь Конструкторского Отдела и консультации квалифицированных инженеров;
- Техническая поддержка проекта, помощь в подборе аналогов, поставка прототипов;
- Поставка электронных компонентов под контролем ВП;
- Система менеджмента качества сертифицирована по Международному стандарту ISO 9001;
- При необходимости вся продукция военного и аэрокосмического назначения проходит испытания и сертификацию в лаборатории (по согласованию с заказчиком);
- Поставка специализированных компонентов военного и аэрокосмического уровня качества (Xilinx, Altera, Analog Devices, Intersil, Interpoint, Microsemi, Actel, Aeroflex, Peregrine, VPT, Syfer, Eurofarad, Texas Instruments, MS Kennedy, Miteq, Cobham, E2V, MA-COM, Hittite, Mini-Circuits, General Dynamics и др.);

Компания «Океан Электроники» является официальным дистрибьютором и эксклюзивным представителем в России одного из крупнейших производителей разъемов военного и аэрокосмического назначения «JONHON», а так же официальным дистрибьютором и эксклюзивным представителем в России производителя высокотехнологичных и надежных решений для передачи СВЧ сигналов «FORSTAR».



## JONHON

«JONHON» (основан в 1970 г.)

Разъемы специального, военного и аэрокосмического назначения:

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«FORSTAR» (основан в 1998 г.)

ВЧ соединители, коаксиальные кабели,  
кабельные сборки и микроволновые компоненты:

(Применяются в телекоммуникациях гражданского и специального назначения, в средствах связи, РЛС, а так же военной, авиационной и аэрокосмической отраслях промышленности).



Телефон: 8 (812) 309-75-97 (многоканальный)

Факс: 8 (812) 320-03-32

Электронная почта: [ocean@oceanchips.ru](mailto:ocean@oceanchips.ru)

Web: <http://oceanchips.ru/>

Адрес: 198099, г. Санкт-Петербург, ул. Калинина, д. 2, корп. 4, лит. А