

## Features

- RoHS compliant\* and halogen free\*\*
- Surface Mount SMB package
- Breakdown Voltage: 6.8 to 550 volts
- Peak Pulse Power: 600 watts
- Typical temperature coefficient:  
 $\Delta V_{BR} = 0.1 \% \times V_{BR} @ 25^{\circ}C \times \Delta T$

## Applications

- IEC 61000-4-2 ESD (Min. Level 4)
- IEC 61000-4-4 EFT
- IEC 61000-4-5 Surge

# P6SMB Transient Voltage Suppressor Diode Series

## General Information

The markets of portable communications, computing and video equipment are challenging the semiconductor industry to develop increasingly smaller electronic components.

Bourns offers Transient Voltage Suppressor Diodes for surge and ESD protection applications, in compact chip package DO-214AA (SMB) size format. The Transient Voltage Suppressor series offers a choice of Breakdown Voltages from 6.8 V up to 550 V. Typical fast response times are less than 1.0 picosecond for unidirectional devices and less than 5.0 picoseconds for bidirectional devices from 0 V to Minimum Breakdown Voltage.

Bourns® Chip Diodes conform to JEDEC standards, are easy to handle with standard pick and place equipment and the flat configuration minimizes roll away.

## Maximum Characteristics (@ $T_A = 25^{\circ}C$ Unless Otherwise Noted)

| Parameter  | Symbol    | Value       | Unit        |
|--|-----------|-------------|-------------|
| Peak Pulse Power Dissipation ( $T_P = 1$ ms) (Note 1,2)  | $P_{PK}$  | 600         | Watts       |
| Peak Forward Surge Current<br>8.3 ms Single Half Sine Wave Superimposed on Rated Load<br>(JEDEC Method) (Note 3) | $I_{FSM}$ | 100         | Amps        |
| Maximum Instantaneous Forward Voltage @ $I_{PP} = 50$ A<br>(For Unidirectional Units Only)                       | $V_F$     | 3.5<br>5.0  | Volts       |
| Operating Temperature Range  | $T_J$     | -55 to +150 | $^{\circ}C$ |
| Storage Temperature Range  | $T_{STG}$ | -55 to +150 | $^{\circ}C$ |

1. Non-repetitive current pulse, per Pulse Waveform graph and derated above  $T_A = 25^{\circ}C$  per Pulse Derating Curve.
2. Thermal Resistance Junction to Lead.
3. 8.3 ms Single Half-Sine Wave duty cycle = 4 pulses maximum per minute (unidirectional units only).

# BOURNS®

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## How to Order

**P6SMB 6.8 CA - H**

Series \_\_\_\_\_  
 P6SMB= SMB/DO-214AA

Breakdown Voltage \_\_\_\_\_  
 6.8 to 550 = 6.8 to 550  $V_{BD}$  (Volts)

Suffix \_\_\_\_\_  
 A = 5 % Tolerance Unidirectional Device  
 CA = 5 % Tolerance Bidirectional Device

Reel \_\_\_\_\_  
 (blank) = 13 inch reel  
 -H = 7 inch reel

\* RoHS Directive 2015/863, Mar 31, 2015 and Annex.

\*\*Bourns considers a product to be "halogen free" if (a) the Bromine (Br) content is 900 ppm or less; (b) the Chlorine (Cl) content is 900 ppm or less; and (c) the total Bromine (Br) and Chlorine (Cl) content is 1500 ppm or less.

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# P6SMB Transient Voltage Suppressor Diode Series

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## Electrical Characteristics (@ T<sub>A</sub> = 25 °C Unless Otherwise Noted)

| Unidirectional Device |         | Bidirectional Device |         | Breakdown Voltage V <sub>BR</sub> (Volts) |       |                       | Working Peak Reverse Voltage | Maximum Reverse Leakage @ V <sub>RWM</sub> | Maximum Clamping Voltage @ I <sub>pp</sub> (10/1000 μs) | Maximum Peak Pulse Current (10/1000 μs) | Maximum Clamping Voltage @ I <sub>pp</sub> (8/20 μs) | Maximum Peak Pulse Current (8/20 μs) |
|-----------------------|---------|----------------------|---------|---|-------|-----------------------|------------------------------|--|---|---|--|--------------------------------------|
| Part No.              | Marking | Part No.             | Marking | Min.                                      | Max.  | @ I <sub>T</sub> (mA) | V <sub>RWM</sub> (V)         | I <sub>R</sub> (μA)                        | V <sub>c</sub> (V)                                      | I <sub>pp</sub> (A)                     | V <sub>c</sub> (V)                                   | I <sub>pp</sub> (A)                  |
| P6SMB6.8A             | 6V8A    | P6SMB6.8CA           | 6V8C    | 6.45                                      | 7.14  | 10                    | 5.8                          | 1000                                       | 10.5  | 58.1                                    | 13.7   | 290.5                                |
| P6SMB7.5A             | 7V5A    | P6SMB7.5CA           | 7V5C    | 7.13                                      | 7.88  | 10                    | 6.4                          | 500  | 11.3  | 54                                      | 15   | 270                                  |
| P6SMB8.2A             | 8V2A    | P6SMB8.2CA           | 8V2C    | 7.79                                      | 8.61  | 10                    | 7.02                         | 200  | 12.1  | 50.4                                    | 15.7   | 252.0                                |
| P6SMB9.1A             | 9V1A    | P6SMB9.1CA           | 9V1C    | 8.65                                      | 9.55  | 1                     | 7.78                         | 50   | 13.4  | 45.5                                    | 17.4   | 227.5                                |
| P6SMB10A              | 10A     | P6SMB10CA            | 10C     | 9.5                                       | 10.5  | 1                     | 8.55                         | 10   | 14.5  | 42.1                                    | 18.9   | 210.5                                |
| P6SMB11A              | 11A     | P6SMB11CA            | 11C     | 10.5                                      | 11.6  | 1                     | 9.4                          | 5  | 15.6  | 39.1                                    | 20.3   | 195.5                                |
| P6SMB12A              | 12A     | P6SMB12CA            | 12C     | 11.4                                      | 12.6  | 1                     | 10.2                         | 5  | 16.7  | 36.5                                    | 21.7   | 182.5                                |
| P6SMB13A              | 13A     | P6SMB13CA            | 13C     | 12.4                                      | 13.7  | 1                     | 11.1                         | 1  | 18.2  | 33.5                                    | 23.7   | 167.5                                |
| P6SMB15A              | 15A     | P6SMB15CA            | 15C     | 14.3                                      | 15.8  | 1                     | 12.8                         | 1  | 21.2  | 28.8                                    | 27.6   | 144.0                                |
| P6SMB16A              | 16A     | P6SMB16CA            | 16C     | 15.2                                      | 16.8  | 1                     | 13.6                         | 1  | 22.5  | 27.1                                    | 29.3   | 135.5                                |
| P6SMB18A              | 18A     | P6SMB18CA            | 18C     | 17.1                                      | 18.9  | 1                     | 15.3                         | 1  | 25.5  | 24.2                                    | 33.2   | 121.0                                |
| P6SMB20A              | 20A     | P6SMB20CA            | 20C     | 19  | 21    | 1                     | 17.1                         | 1  | 27.7  | 22                                      | 36   | 110                                  |
| P6SMB22A              | 22A     | P6SMB22CA            | 22C     | 20.9                                      | 23.1  | 1                     | 18.8                         | 1  | 30.6  | 19.9                                    | 39.8   | 99.5                                 |
| P6SMB24A              | 24A     | P6SMB24CA            | 24C     | 22.8                                      | 25.2  | 1                     | 20.5                         | 1  | 33.2  | 18.4                                    | 43.2   | 92.0                                 |
| P6SMB27A              | 27A     | P6SMB27CA            | 27C     | 25.7                                      | 28.4  | 1                     | 23.1                         | 1  | 37.5  | 16.3                                    | 48.8   | 81.5                                 |
| P6SMB30A              | 30A     | P6SMB30CA            | 30C     | 28.5                                      | 31.5  | 1                     | 25.6                         | 1  | 41.4  | 14.7                                    | 53.8   | 73.5                                 |
| P6SMB33A              | 33A     | P6SMB33CA            | 33C     | 31.4                                      | 34.7  | 1                     | 28.2                         | 1  | 45.7  | 13.3                                    | 59.4   | 66.5                                 |
| P6SMB36A              | 36A     | P6SMB36CA            | 36C     | 34.2                                      | 37.8  | 1                     | 30.8                         | 1  | 49.9  | 12.2                                    | 64.9   | 61.0                                 |
| P6SMB39A              | 39A     | P6SMB39CA            | 39C     | 37.1                                      | 41    | 1                     | 33.3                         | 1  | 53.9  | 11.3                                    | 70.1   | 56.5                                 |
| P6SMB43A              | 43A     | P6SMB43CA            | 43C     | 40.9                                      | 45.2  | 1                     | 36.8                         | 1  | 59.3  | 10.3                                    | 77.1   | 51.5                                 |
| P6SMB47A              | 47A     | P6SMB47CA            | 47C     | 44.7                                      | 49.4  | 1                     | 40.2                         | 1  | 64.8  | 9.4                                     | 84.2   | 47.0                                 |
| P6SMB51A              | 51A     | P6SMB51CA            | 51C     | 48.5                                      | 53.6  | 1                     | 43.6                         | 1  | 70.1  | 8.7                                     | 91.1   | 43.5                                 |
| P6SMB56A              | 56A     | P6SMB56CA            | 56C     | 53.2                                      | 58.8  | 1                     | 47.8                         | 1  | 77  | 7.9                                     | 100.1  | 39.5                                 |
| P6SMB62A              | 62A     | P6SMB62CA            | 62C     | 58.9                                      | 65.1  | 1                     | 53                           | 1  | 85  | 7.2                                     | 110.5  | 36.0                                 |
| P6SMB68A              | 68A     | P6SMB68CA            | 68C     | 64.6                                      | 71.4  | 1                     | 58.1                         | 1  | 92  | 6.6                                     | 119.6  | 33.0                                 |
| P6SMB75A              | 75A     | P6SMB75CA            | 75C     | 71.3                                      | 78.8  | 1                     | 64.1                         | 1  | 103   | 5.9                                     | 133.9  | 29.5                                 |
| P6SMB82A              | 82A     | P6SMB82CA            | 82C     | 77.9                                      | 86.1  | 1                     | 70.1                         | 1  | 113   | 5.4                                     | 146.9  | 27.0                                 |
| P6SMB91A              | 91A     | P6SMB91CA            | 91C     | 86.5                                      | 95.5  | 1                     | 77.8                         | 1  | 125   | 4.9                                     | 162.5  | 24.5                                 |
| P6SMB100A             | 100A    | P6SMB100CA           | 100C    | 95  | 105   | 1                     | 85.5                         | 1  | 137   | 4.5                                     | 178.1  | 22.5                                 |
| P6SMB110A             | 110A    | P6SMB110CA           | 110C    | 105                                       | 116   | 1                     | 94                           | 1  | 152   | 4                                       | 198  | 20                                   |
| P6SMB120A             | 120A    | P6SMB120CA           | 120C    | 114                                       | 126   | 1                     | 102                          | 1  | 165   | 3.7                                     | 214.5  | 18.5                                 |
| P6SMB130A             | 130A    | P6SMB130CA           | 130C    | 124                                       | 137   | 1                     | 111                          | 1  | 179   | 3.4                                     | 232.7  | 17.0                                 |
| P6SMB150A             | 150A    | P6SMB150CA           | 150C    | 143                                       | 158   | 1                     | 128                          | 1  | 207   | 2.9                                     | 269.1  | 14.5                                 |
| P6SMB160A             | 160A    | P6SMB160CA           | 160C    | 152                                       | 168   | 1                     | 136                          | 1  | 219   | 2.8                                     | 284.7  | 14.0                                 |
| P6SMB170A             | 170A    | P6SMB170CA           | 170C    | 162                                       | 179   | 1                     | 145                          | 1  | 234   | 2.6                                     | 304.2  | 13.0                                 |
| P6SMB180A             | 180A    | P6SMB180CA           | 180C    | 171                                       | 189   | 1                     | 154                          | 1  | 246   | 2.5                                     | 319.8  | 12.5                                 |
| P6SMB200A             | 200A    | P6SMB200CA           | 200C    | 190                                       | 210   | 1                     | 171                          | 1  | 274   | 2.2                                     | 356.2  | 11.0                                 |
| P6SMB220A             | 220A    | P6SMB220CA           | 220C    | 209                                       | 231   | 1                     | 185                          | 1  | 328   | 1.9                                     | 426.4  | 9.5                                  |
| P6SMB250A             | 250A    | P6SMB250CA           | 250C    | 237                                       | 263   | 1                     | 214                          | 1  | 344   | 1.8                                     | 447.2  | 9.0                                  |
| P6SMB300A             | 300A    | P6SMB300CA           | 300C    | 285                                       | 315   | 1                     | 256                          | 1  | 414   | 1.5                                     | 538.2  | 7.5                                  |
| P6SMB350A             | 350A    | P6SMB350CA           | 350C    | 332                                       | 368   | 1                     | 300                          | 1  | 482   | 1.3                                     | 626.6  | 6.5                                  |
| P6SMB400A             | 400A    | P6SMB400CA           | 400C    | 380                                       | 420   | 1                     | 342                          | 1  | 548   | 1.1                                     | 712.4  | 5.5                                  |
| P6SMB440A             | 440A    | P6SMB440CA           | 440C    | 418                                       | 462   | 1                     | 376                          | 1  | 602   | 1                                       | 783  | 5                                    |
| P6SMB480A             | 480A    | P6SMB480CA           | 480C    | 456                                       | 504   | 1                     | 408                          | 1  | 658   | 0.9                                     | 855.4  | 4.6                                  |
| P6SMB510A             | 510A    | P6SMB510CA           | 510C    | 485                                       | 535   | 1                     | 434                          | 1  | 698   | 0.9                                     | 907.4  | 4.3                                  |
| P6SMB530A             | 530A    | P6SMB530CA           | 530C    | 503.5                                     | 556.5 | 1                     | 477                          | 1  | 725   | 0.8                                     | 942.5  | 4.1                                  |
| P6SMB540A             | 540A    | P6SMB540CA           | 540C    | 513                                       | 567   | 1                     | 486                          | 1  | 740   | 0.8                                     | 962.0  | 4.1                                  |
| P6SMB550A             | 550A    | P6SMB550CA           | 550C    | 522.5                                     | 577.5 | 1                     | 495                          | 1  | 760   | 0.8                                     | 988.0  | 3.9                                  |

### Notes:

1. Suffix 'A' denotes a 5 % tolerance unidirectional device.
2. Suffix 'CA' denotes a 5 % tolerance bidirectional device.
3. For bidirectional devices with a V<sub>R</sub> of 10 volts or less, the I<sub>R</sub> limit is double.

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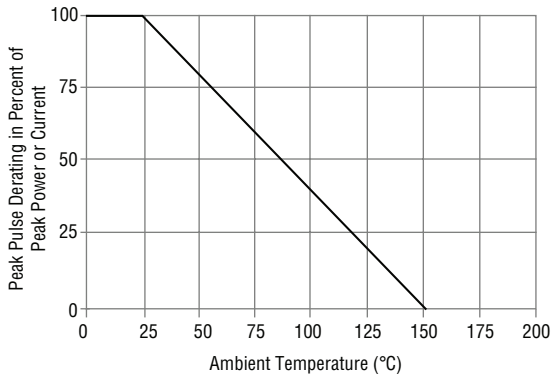
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# P6SMB Transient Voltage Suppressor Diode Series

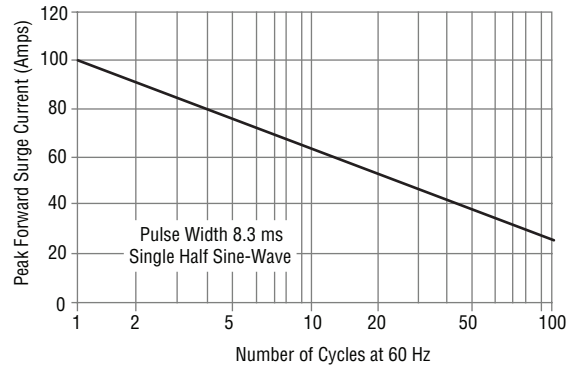
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## Rating & Characteristic Curves

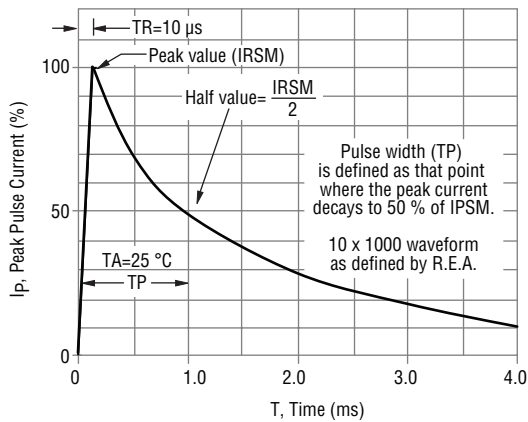
### Pulse Derating Curve



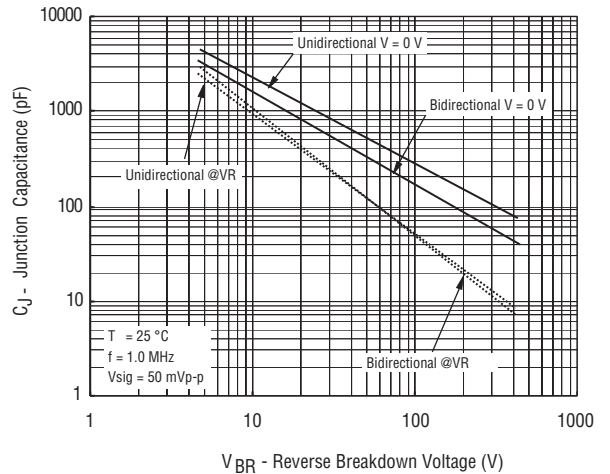
### Maximum Non-Repetitive Surge Current



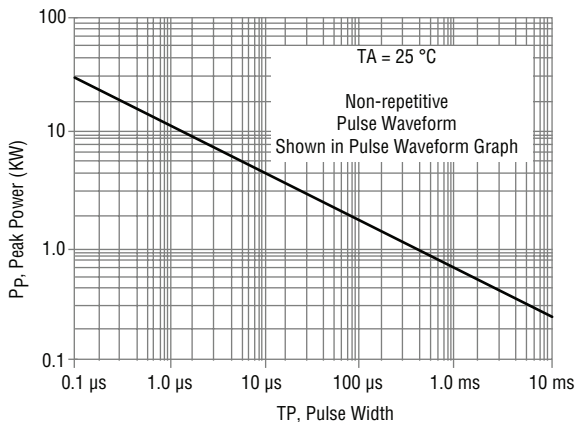
### Pulse Waveform



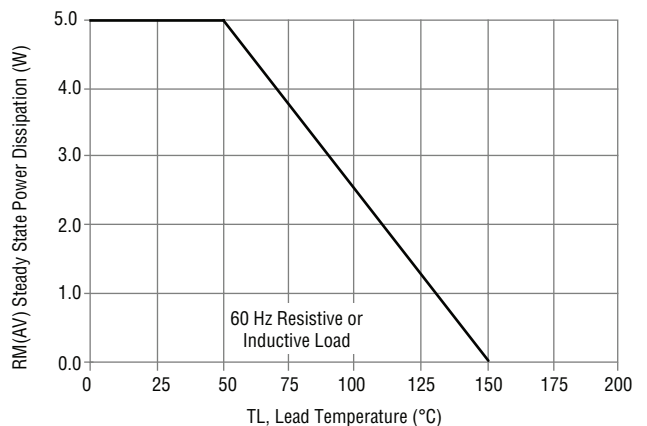
### Typical Junction Capacitance



### Pulse Rating Curve



### Steady State Power Derating Curve



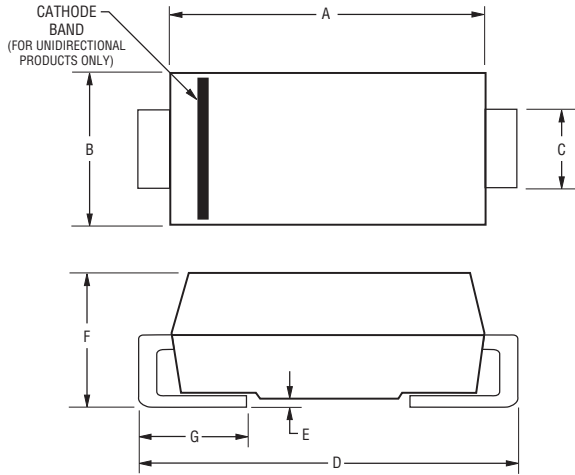
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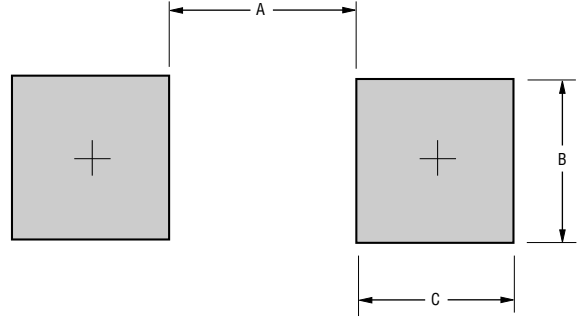
## Product Dimensions



| Dimension | SMB (DO-214AA)                         |
|-----------|--|
| A         | $\frac{4.06 - 4.57}{(0.160 - 0.180)}$  |
| B         | $\frac{3.30 - 3.94}{(0.130 - 0.155)}$  |
| C         | $\frac{1.95 - 2.20}{(0.077 - 0.087)}$  |
| D         | $\frac{5.21 - 5.59}{(0.205 - 0.220)}$  |
| E         | $\frac{0.05 - 0.203}{(0.002 - 0.008)}$ |
| F         | $\frac{2.13 - 2.44}{(0.084 - 0.096)}$  |
| G         | $\frac{0.76 - 1.52}{(0.030 - 0.060)}$  |

DIMENSIONS:  $\frac{\text{MM}}{\text{(INCHES)}}$

## Recommended Footprint



| Dimension | SMB (DO-214AA)         |
|-----------|------------------------|
| a (Max.)  | $\frac{2.69}{(0.106)}$ |
| b (Min.)  | $\frac{2.10}{(0.083)}$ |
| c (Min.)  | $\frac{1.27}{(0.050)}$ |

DIMENSIONS:  $\frac{\text{MM}}{\text{(INCHES)}}$

## Physical Specifications

Case ..... Molded plastic per UL Class 94V-0  
 Polarity..... Cathode band indicates unidirectional device  
 No cathode band indicates bidirectional device

## Environmental Specifications

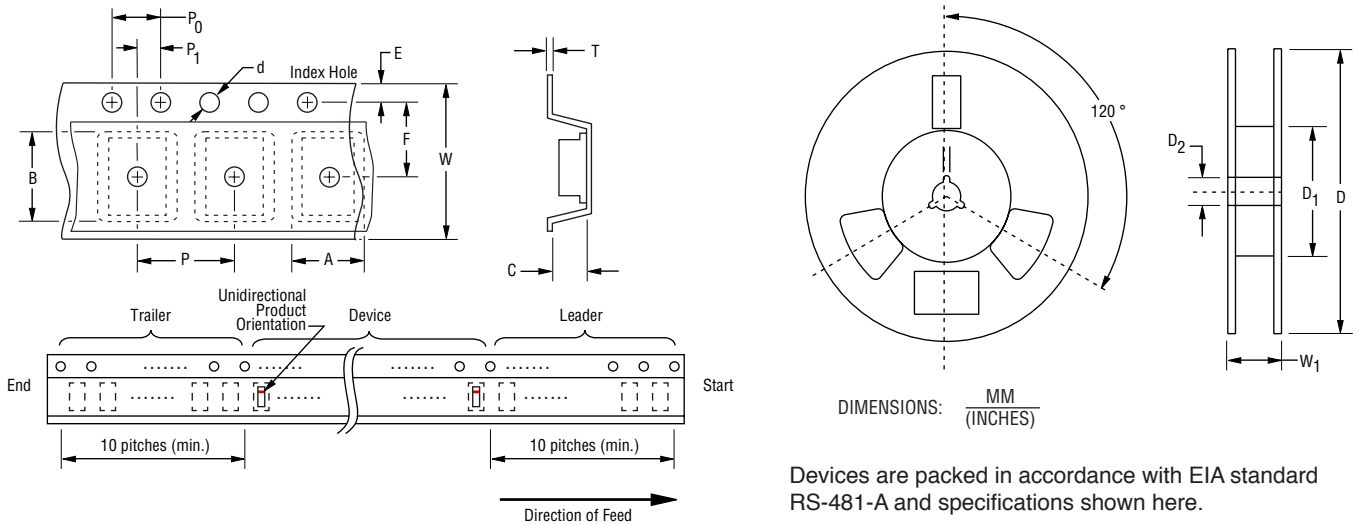
Moisture Sensitivity Level ..... 1  
 ESD Classification (HBM)..... 3B

# P6SMB Transient Voltage Suppressor Diode Series

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## Packaging Information

The product will be dispensed in tape and reel format (see diagram below).



Devices are packed in accordance with EIA standard RS-481-A and specifications shown here.

| Item                   | Symbol         | SMB (DO-214AA)                             |                        |
|------------------------|----------------|--|------------------------|
|                        |                | 7 Inch Reel                                | 13 Inch Reel           |
| Carrier Width          | A              | $\frac{3.67 \pm 0.20}{(0.144 \pm 0.008)}$  |                        |
| Carrier Length         | B              | $\frac{5.60 \pm 0.20}{(0.220 \pm 0.008)}$  |                        |
| Carrier Depth          | C              | $\frac{2.57 \pm 0.20}{(0.101 \pm 0.008)}$  |                        |
| Sprocket Hole          | d              | $\frac{1.50 \pm 0.10}{(0.059 \pm 0.004)}$  |                        |
| Reel Outside Diameter  | D              | $\frac{178}{(7.008)}$                      | $\frac{330}{(12.992)}$ |
| Reel Inner Diameter    | D <sub>1</sub> | $\frac{50.0}{(1.969)}$ MIN.                |                        |
| Feed Hole Diameter     | D <sub>2</sub> | $\frac{13.0 \pm 0.20}{(0.512 \pm 0.008)}$  |                        |
| Sprocket Hole Position | E              | $\frac{1.75 \pm 0.10}{(0.069 \pm 0.004)}$  |                        |
| Punch Hole Position    | F              | $\frac{5.50 \pm 0.05}{(0.217 \pm 0.002)}$  |                        |
| Punch Hole Pitch       | P              | $\frac{8.00 \pm 0.10}{(0.315 \pm 0.004)}$  |                        |
| Sprocket Hole Pitch    | P <sub>0</sub> | $\frac{4.00 \pm 0.10}{(0.157 \pm 0.004)}$  |                        |
| Embossment Center      | P <sub>1</sub> | $\frac{2.00 \pm 0.05}{(0.079 \pm 0.002)}$  |                        |
| Overall Tape Thickness | T              | $\frac{0.30 \pm 0.10}{(0.012 \pm 0.004)}$  |                        |
| Tape Width             | W              | $\frac{12.00 \pm 0.30}{(0.472 \pm 0.012)}$ |                        |
| Reel Width             | W <sub>1</sub> | $\frac{18.4}{(0.724)}$ MAX.                |                        |
| Quantity per Reel      | --             | 500  | 3,000                  |

REV. 03/20

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