



## Features

- Surface Mount SMB package
- Breakdown Voltage: 6.8 to 250 volts
- Power Dissipation: 600 watts
- RoHS compliant\* and halogen free\*\*
- AEC-Q101 compliant\*\*\*

## Applications

- Protection of power buses
- Protection of I/O interfaces
- Overvoltage transient protection
- Telecom, computer, industrial and consumer electronics applications

# P6SMB-Q 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 250 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.

## Additional Information

Click these links for more information:



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

| Parameter                                                                                                        | Symbol           | Value       | Unit  |
|------------------------------------------------------------------------------------------------------------------|------------------|-------------|-------|
| Peak Pulse Power Dissipation (T <sub>P</sub> = 1 ms) (Note 1,2)                                                  | P <sub>PK</sub>  | 600         | Watts |
| Peak Forward Surge Current<br>8.3 ms Single Half Sine Wave Superimposed on Rated Load<br>(JEDEC Method) (Note 3) | I <sub>FSM</sub> | 100         | Amps  |
| Maximum Instantaneous Forward Voltage @ I <sub>PP</sub> = 50 A<br>(For Unidirectional Units Only)                | V <sub>F</sub>   | 3.5         | Volts |
| Operating Temperature Range                                                                                      | T <sub>J</sub>   | -55 to +150 | °C    |
| Storage Temperature Range                                                                                        | T <sub>STG</sub> | -55 to +150 | °C    |

1. Non-repetitive current pulse, per Pulse Waveform graph and derated above T<sub>A</sub> = 25 °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

Series \_\_\_\_\_ P6SMB 15 CA - Q  
 P6SMB= SMB/DO-214AA  
 Breakdown Voltage \_\_\_\_\_  
 6.8 to 250 = 6.8 to 250 V<sub>BR</sub> (Volts)  
 Suffix \_\_\_\_\_  
 A = 5 % Tolerance Unidirectional Device  
 CA = 5 % Tolerance Bidirectional Device  
 AEC-Q101 Suffix \_\_\_\_\_  
 Q = AEC-Q101 Compliant, 13-inch Reel (3000 pcs.)



**WARNING Cancer and Reproductive Harm - [www.P65Warnings.ca.gov](http://www.P65Warnings.ca.gov)**

\* 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.

\*\*\* Q suffix for applications requiring appropriate AEC-Q101 compliance for electronic limiters.

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# P6SMB-Q 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<br>V <sub>BR</sub> (Volts) |      |                          | Working<br>Peak<br>Reverse<br>Voltage | Maximum<br>Reverse<br>Leakage<br>@ V <sub>RWM</sub> | Maximum<br>Clamping<br>Voltage<br>@ I <sub>pp</sub><br>(10/1000 μs) | Maximum<br>Peak<br>Pulse<br>Current<br>(10/1000 μs) | Maximum<br>Clamping<br>Voltage<br>@ I <sub>pp</sub><br>(8/20 μs) | Maximum<br>Peak<br>Pulse<br>Current<br>(8/20 μs) |
|-----------------------|---------|----------------------|---------|----------------------------------------------|------|--------------------------|---------------------------------------|-----------------------------------------------------|---------------------------------------------------------------------|-----------------------------------------------------|------------------------------------------------------------------|--------------------------------------------------|
| Part No.              | Marking | Part No.             | Marking | Min.                                         | Max. | @ I <sub>T</sub><br>(mA) | V <sub>RWM</sub><br>(V)               | I <sub>R</sub><br>(μA)                              | V <sub>C</sub> (V)                                                  | I <sub>pp</sub> (A)                                 | V <sub>C</sub> (V)                                               | I <sub>pp</sub> (A)                              |
| P6SMB6.8A-Q           | 6V8AQ   | P6SMB6.8CA-Q         | 6V8CQ   | 6.45                                         | 7.14 | 10                       | 5.8                                   | 1000                                                | 10.5                                                                | 58.1                                                | 13.7                                                             | 290.5                                            |
| P6SMB7.5A-Q           | 7V5AQ   | P6SMB7.5CA-Q         | 7V5CQ   | 7.13                                         | 7.88 | 10                       | 6.4                                   | 500                                                 | 11.3                                                                | 54                                                  | 15                                                               | 270                                              |
| P6SMB8.2A-Q           | 8V2AQ   | P6SMB8.2CA-Q         | 8V2CQ   | 7.79                                         | 8.61 | 10                       | 7.02                                  | 200                                                 | 12.1                                                                | 50.4                                                | 15.7                                                             | 252.0                                            |
| P6SMB9.1A-Q           | 9V1AQ   | P6SMB9.1CA-Q         | 9V1CQ   | 8.65                                         | 9.55 | 1                        | 7.78                                  | 50                                                  | 13.4                                                                | 45.5                                                | 17.4                                                             | 227.5                                            |
| P6SMB10A-Q            | 10AQ    | P6SMB10CA-Q          | 10CQ    | 9.5                                          | 10.5 | 1                        | 8.55                                  | 10                                                  | 14.5                                                                | 42.1                                                | 18.9                                                             | 210.5                                            |
| P6SMB11A-Q            | 11AQ    | P6SMB11CA-Q          | 11CQ    | 10.5                                         | 11.6 | 1                        | 9.4                                   | 5                                                   | 15.6                                                                | 39.1                                                | 20.3                                                             | 195.5                                            |
| P6SMB12A-Q            | 12AQ    | P6SMB12CA-Q          | 12CQ    | 11.4                                         | 12.6 | 1                        | 10.2                                  | 5                                                   | 16.7                                                                | 36.5                                                | 21.7                                                             | 182.5                                            |
| P6SMB13A-Q            | 13AQ    | P6SMB13CA-Q          | 13CQ    | 12.4                                         | 13.7 | 1                        | 11.1                                  | 1                                                   | 18.2                                                                | 33.5                                                | 23.7                                                             | 167.5                                            |
| P6SMB15A-Q            | 15AQ    | P6SMB15CA-Q          | 15CQ    | 14.3                                         | 15.8 | 1                        | 12.8                                  | 1                                                   | 21.2                                                                | 28.8                                                | 27.6                                                             | 144.0                                            |
| P6SMB16A-Q            | 16AQ    | P6SMB16CA-Q          | 16CQ    | 15.2                                         | 16.8 | 1                        | 13.6                                  | 1                                                   | 22.5                                                                | 27.1                                                | 29.3                                                             | 135.5                                            |
| P6SMB18A-Q            | 18AQ    | P6SMB18CA-Q          | 18CQ    | 17.1                                         | 18.9 | 1                        | 15.3                                  | 1                                                   | 25.5                                                                | 24.2                                                | 33.2                                                             | 121.0                                            |
| P6SMB20A-Q            | 20AQ    | P6SMB20CA-Q          | 20CQ    | 19                                           | 21   | 1                        | 17.1                                  | 1                                                   | 27.7                                                                | 22                                                  | 36                                                               | 110                                              |
| P6SMB22A-Q            | 22AQ    | P6SMB22CA-Q          | 22CQ    | 20.9                                         | 23.1 | 1                        | 18.8                                  | 1                                                   | 30.6                                                                | 19.9                                                | 39.8                                                             | 99.5                                             |
| P6SMB24A-Q            | 24AQ    | P6SMB24CA-Q          | 24CQ    | 22.8                                         | 25.2 | 1                        | 20.5                                  | 1                                                   | 33.2                                                                | 18.4                                                | 43.2                                                             | 92.0                                             |
| P6SMB27A-Q            | 27AQ    | P6SMB27CA-Q          | 27CQ    | 25.7                                         | 28.4 | 1                        | 23.1                                  | 1                                                   | 37.5                                                                | 16.3                                                | 48.8                                                             | 81.5                                             |
| P6SMB30A-Q            | 30AQ    | P6SMB30CA-Q          | 30CQ    | 28.5                                         | 31.5 | 1                        | 25.6                                  | 1                                                   | 41.4                                                                | 14.7                                                | 53.8                                                             | 73.5                                             |
| P6SMB33A-Q            | 33AQ    | P6SMB33CA-Q          | 33CQ    | 31.4                                         | 34.7 | 1                        | 28.2                                  | 1                                                   | 45.7                                                                | 13.3                                                | 59.4                                                             | 66.5                                             |
| P6SMB36A-Q            | 36AQ    | P6SMB36CA-Q          | 36CQ    | 34.2                                         | 37.8 | 1                        | 30.8                                  | 1                                                   | 49.9                                                                | 12.2                                                | 64.9                                                             | 61.0                                             |
| P6SMB39A-Q            | 39AQ    | P6SMB39CA-Q          | 39CQ    | 37.1                                         | 41   | 1                        | 33.3                                  | 1                                                   | 53.9                                                                | 11.3                                                | 70.1                                                             | 56.5                                             |
| P6SMB43A-Q            | 43AQ    | P6SMB43CA-Q          | 43CQ    | 40.9                                         | 45.2 | 1                        | 36.8                                  | 1                                                   | 59.3                                                                | 10.3                                                | 77.1                                                             | 51.5                                             |
| P6SMB47A-Q            | 47AQ    | P6SMB47CA-Q          | 47CQ    | 44.7                                         | 49.4 | 1                        | 40.2                                  | 1                                                   | 64.8                                                                | 9.4                                                 | 84.2                                                             | 47.0                                             |
| P6SMB51A-Q            | 51AQ    | P6SMB51CA-Q          | 51CQ    | 48.5                                         | 53.6 | 1                        | 43.6                                  | 1                                                   | 70.1                                                                | 8.7                                                 | 91.1                                                             | 43.5                                             |
| P6SMB56A-Q            | 56AQ    | P6SMB56CA-Q          | 56CQ    | 53.2                                         | 58.8 | 1                        | 47.8                                  | 1                                                   | 77                                                                  | 7.9                                                 | 100.1                                                            | 39.5                                             |
| P6SMB62A-Q            | 62AQ    | P6SMB62CA-Q          | 62CQ    | 58.9                                         | 65.1 | 1                        | 53                                    | 1                                                   | 85                                                                  | 7.2                                                 | 110.5                                                            | 36.0                                             |
| P6SMB68A-Q            | 68AQ    | P6SMB68CA-Q          | 68CQ    | 64.6                                         | 71.4 | 1                        | 58.1                                  | 1                                                   | 92                                                                  | 6.6                                                 | 119.6                                                            | 33.0                                             |
| P6SMB75A-Q            | 75AQ    | P6SMB75CA-Q          | 75CQ    | 71.3                                         | 78.8 | 1                        | 64.1                                  | 1                                                   | 103                                                                 | 5.9                                                 | 133.9                                                            | 29.5                                             |
| P6SMB82A-Q            | 82AQ    | P6SMB82CA-Q          | 82CQ    | 77.9                                         | 86.1 | 1                        | 70.1                                  | 1                                                   | 113                                                                 | 5.4                                                 | 146.9                                                            | 27.0                                             |
| P6SMB91A-Q            | 91AQ    | P6SMB91CA-Q          | 91CQ    | 86.5                                         | 95.5 | 1                        | 77.8                                  | 1                                                   | 125                                                                 | 4.9                                                 | 162.5                                                            | 24.5                                             |
| P6SMB100A-Q           | 100AQ   | P6SMB100CA-Q         | 100CQ   | 95                                           | 105  | 1                        | 85.5                                  | 1                                                   | 137                                                                 | 4.5                                                 | 178.1                                                            | 22.5                                             |
| P6SMB110A-Q           | 110AQ   | P6SMB110CA-Q         | 110CQ   | 105                                          | 116  | 1                        | 94                                    | 1                                                   | 152                                                                 | 4                                                   | 198                                                              | 20                                               |
| P6SMB120A-Q           | 120AQ   | P6SMB120CA-Q         | 120CQ   | 114                                          | 126  | 1                        | 102                                   | 1                                                   | 165                                                                 | 3.7                                                 | 214.5                                                            | 18.5                                             |
| P6SMB130A-Q           | 130AQ   | P6SMB130CA-Q         | 130CQ   | 124                                          | 137  | 1                        | 111                                   | 1                                                   | 179                                                                 | 3.4                                                 | 232.7                                                            | 17.0                                             |
| P6SMB150A-Q           | 150AQ   | P6SMB150CA-Q         | 150CQ   | 143                                          | 158  | 1                        | 128                                   | 1                                                   | 207                                                                 | 2.9                                                 | 269.1                                                            | 14.5                                             |
| P6SMB160A-Q           | 160AQ   | P6SMB160CA-Q         | 160CQ   | 152                                          | 168  | 1                        | 136                                   | 1                                                   | 219                                                                 | 2.8                                                 | 284.7                                                            | 14.0                                             |
| P6SMB170A-Q           | 170AQ   | P6SMB170CA-Q         | 170CQ   | 162                                          | 179  | 1                        | 145                                   | 1                                                   | 234                                                                 | 2.6                                                 | 304.2                                                            | 13.0                                             |
| P6SMB180A-Q           | 180AQ   | P6SMB180CA-Q         | 180CQ   | 171                                          | 189  | 1                        | 154                                   | 1                                                   | 246                                                                 | 2.5                                                 | 319.8                                                            | 12.5                                             |
| P6SMB200A-Q           | 200AQ   | P6SMB200CA-Q         | 200CQ   | 190                                          | 210  | 1                        | 171                                   | 1                                                   | 274                                                                 | 2.2                                                 | 356.2                                                            | 11.0                                             |
| P6SMB220A-Q           | 220AQ   | P6SMB220CA-Q         | 220CQ   | 209                                          | 231  | 1                        | 185                                   | 1                                                   | 328                                                                 | 1.9                                                 | 426.4                                                            | 9.5                                              |
| P6SMB250A-Q           | 250AQ   | P6SMB250CA-Q         | 250CQ   | 237                                          | 263  | 1                        | 214                                   | 1                                                   | 344                                                                 | 1.8                                                 | 447.2                                                            | 9.0                                              |

### Notes:

1. Suffix 'A' denotes a 5 % tolerance unidirectional device.
2. Suffix 'CA' denotes a 5 % tolerance bidirectional device.

Specifications are subject to change without notice.

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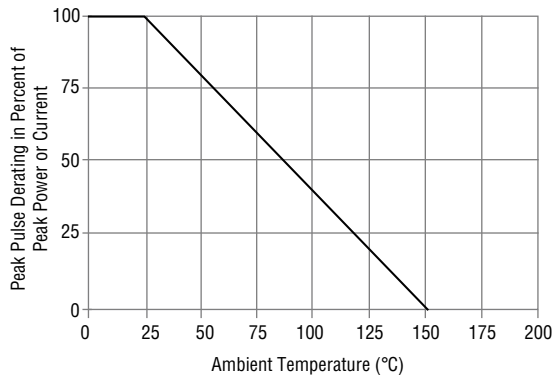
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# P6SMB-Q Transient Voltage Suppressor Diode Series

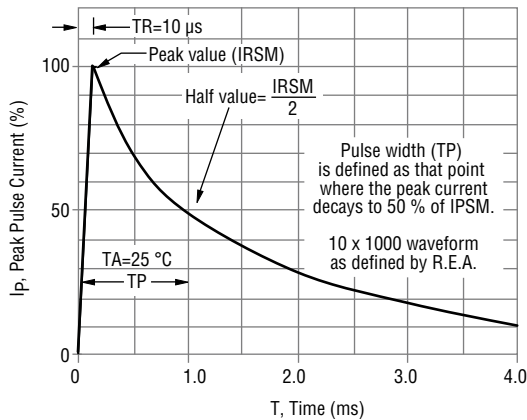
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## Rating & Characteristic Curves

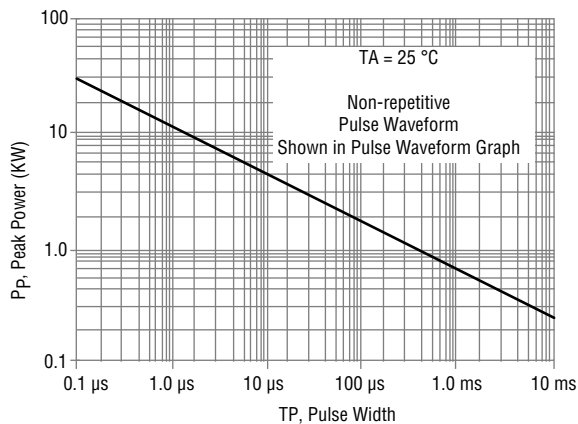
### Pulse Derating Curve



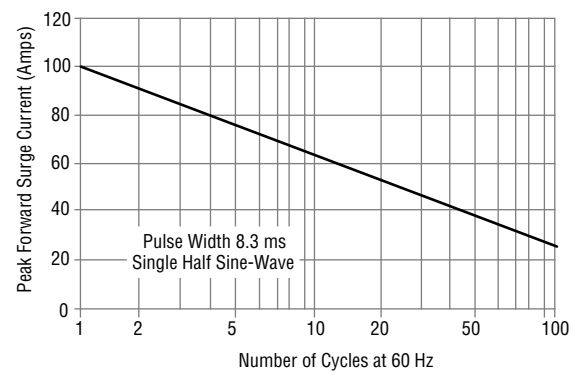
### Pulse Waveform



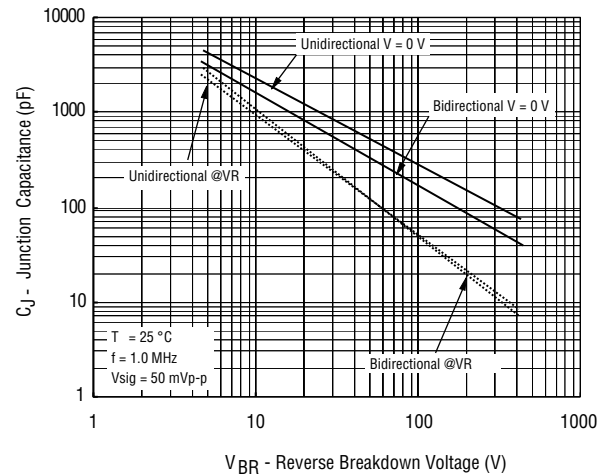
### Pulse Rating Curve



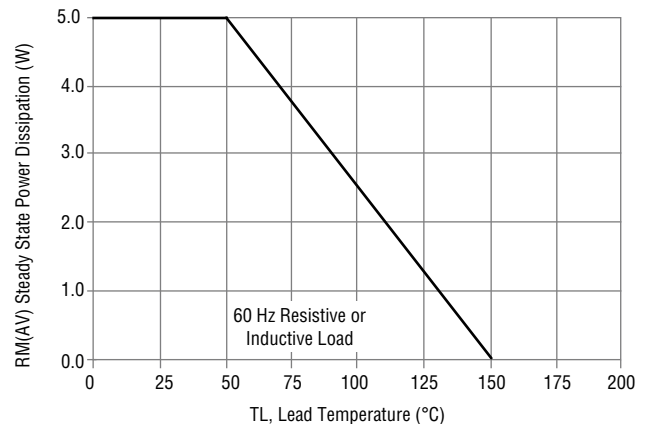
### Maximum Non-Repetitive Surge Current



### Typical Junction Capacitance



### Steady State Power Derating Curve



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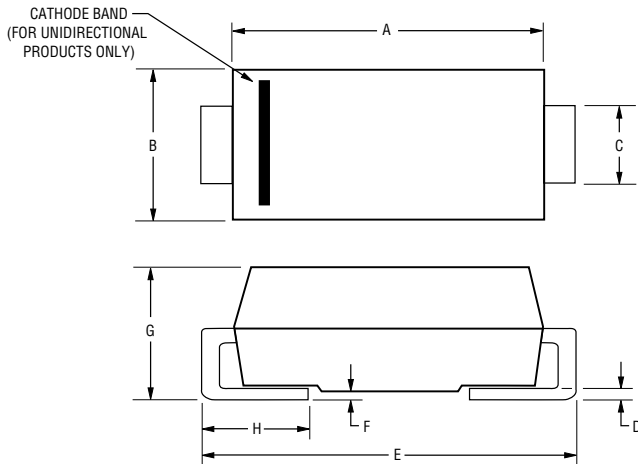
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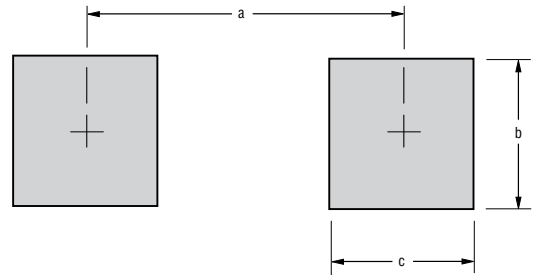
## Product Dimensions



| Dimension | SMB (DO-214AA)                 |
|-----------|--------------------------------|
| A         | 4.06 - 4.57<br>(0.160 - 0.180) |
| B         | 3.30 - 3.94<br>(0.130 - 0.155) |
| C         | 1.95 - 2.20<br>(0.077 - 0.087) |
| D         | 0.15 - 0.31<br>(0.006 - 0.012) |
| E         | 5.21 - 5.59<br>(0.205 - 0.220) |
| F         | 0.203<br>(0.008) MAX.          |
| G         | 2.13 - 2.44<br>(0.084 - 0.096) |
| H         | 0.76 - 1.52<br>(0.030 - 0.060) |

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

## Recommended Footprint



| Dimension | SMB (DO-214AA)  |
|-----------|-----------------|
| a (Max.)  | 2.69<br>(0.106) |
| b (Min.)  | 2.10<br>(0.083) |
| c (Min.)  | 1.27<br>(0.050) |

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

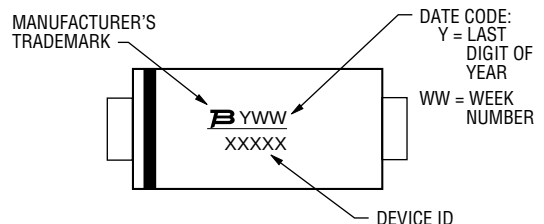
## Physical Specifications

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

## Typical Part Marking



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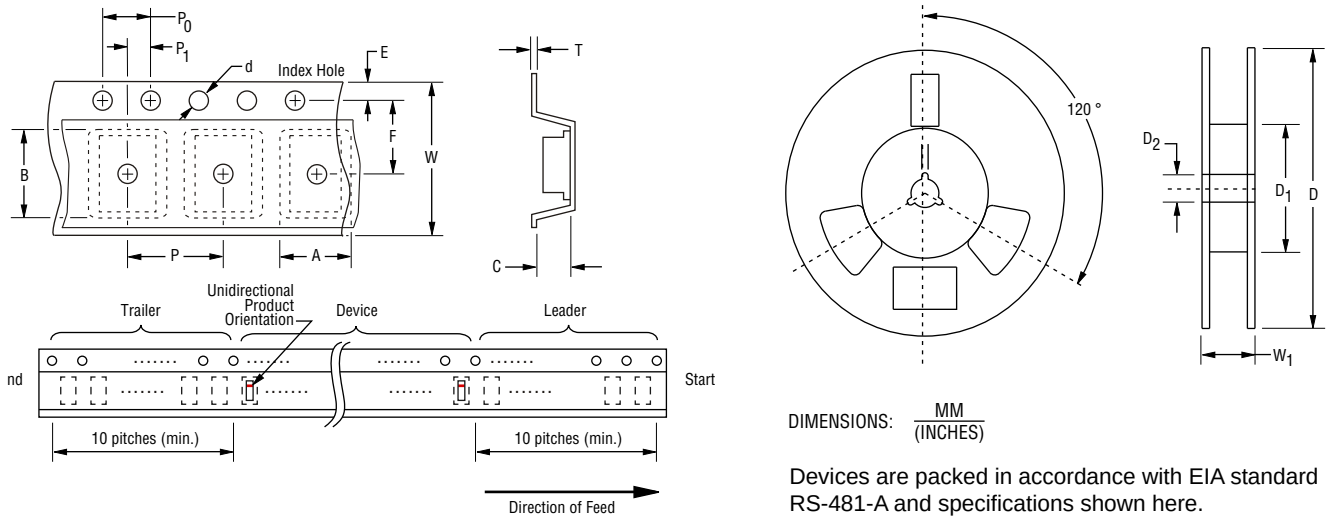
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# P6SMB-Q Transient Voltage Suppressor Diode Series

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## Packaging Information

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



| Item                   | Symbol         | SMB (DO-214AA)                      |
|------------------------|----------------|-------------------------------------|
|                        |                | 13-Inch Reel                        |
| Carrier Width          | A              | $3.67 \pm 0.20$<br>(0.144 ± 0.008)  |
| Carrier Length         | B              | $5.60 \pm 0.20$<br>(0.220 ± 0.008)  |
| Carrier Depth          | C              | $2.57 \pm 0.20$<br>(0.101 ± 0.008)  |
| Sprocket Hole          | d              | $1.50 \pm 0.10$<br>(0.059 ± 0.004)  |
| Reel Outside Diameter  | D              | $330$<br>(12.992)                   |
| Reel Inner Diameter    | D <sub>1</sub> | $50.0$<br>(1.969) MIN.              |
| Feed Hole Diameter     | D <sub>2</sub> | $13.0 \pm 0.20$<br>(0.512 ± 0.008)  |
| Sprocket Hole Position | E              | $1.75 \pm 0.10$<br>(0.069 ± 0.004)  |
| Punch Hole Position    | F              | $5.50 \pm 0.05$<br>(0.217 ± 0.002)  |
| Punch Hole Pitch       | P              | $8.00 \pm 0.10$<br>(0.315 ± 0.004)  |
| Sprocket Hole Pitch    | P <sub>0</sub> | $4.00 \pm 0.10$<br>(0.157 ± 0.004)  |
| Embossment Center      | P <sub>1</sub> | $2.00 \pm 0.05$<br>(0.079 ± 0.002)  |
| Overall Tape Thickness | T              | $0.30 \pm 0.10$<br>(0.012 ± 0.004)  |
| Tape Width             | W              | $12.00 \pm 0.30$<br>(0.472 ± 0.012) |
| Reel Width             | W <sub>1</sub> | $18.4$<br>(0.724) MAX.              |
| Quantity per Reel      | --             | 3000                                |

REV. 10/20

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- Bourns will review and authorize on a case-by-case basis the use of Bourns® standard products which are at least AEC-Q compliant in space-related civil applications (rockets, satellites) with a negotiated cross-waiver and indemnity agreement.

The use and level of testing applicable to Bourns® custom products shall be negotiated on a case-by-case basis by Bourns and the user for which such Bourns® custom products are specially designed. Absent a written agreement between Bourns and the user regarding the use and level of such testing, the above provisions applicable to Bourns® standard products shall also apply to such Bourns® custom products.

Use of Bourns® products or Bourns' technology in military/defense applications must be reviewed with Bourns for compliance with applicable export control laws and embargoes. Users shall not sell, transfer, export or re-export (which includes transfers within a country) any Bourns® products or technology or technical data for use in activities which involve the design, development, production, use or stockpiling of nuclear, chemical or biological weapons or missiles, nor shall they use Bourns® products or technology or technical data in any facility which engages in activities relating to such devices. Further, Bourns® products and Bourns' technology and technical data may not under any circumstance be exported or re-exported to countries subject to international sanctions or embargoes. Bourns® products and technology may not, without prior authorization from Bourns and/or the Government of a country where such product/technology is designed and/or manufactured, be resold, transferred, or re-exported (including within the same country) to any party not eligible to receive commodities, software, and technical data originating in such country.

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