



## Features

- RoHS compliant\* and halogen free\*\*
- DO-214AA (SMB) package
- Standoff Voltage: 12 to 85 volts
- Power Dissipation: 1500 watts
- Typical temperature coefficient:  
DVBR = 0.1 % x VBR @ 25 °C x DT

## Applications

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

# 1.5SMBJ Transient Voltage Suppressor Diode Series

### General Information

Manufacturers 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 Working Peak Reverse Voltage from 12 V up to 85 V and Breakdown Voltage up to 104 V. Typical fast response times are less than 1.0 picosecond 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

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### Agency Recognition

| Description |                                      |
|-------------|--------------------------------------|
| UL          | File Number: <a href="#">E153537</a> |

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

| Parameter  | Symbol           | Value       | Unit  |
|--|------------------|-------------|-------|
| Minimum Peak Pulse Power Dissipation (T <sub>P</sub> = 1 ms) (Note 1,2)  | P <sub>PK</sub>  | 1500        | 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  |
| 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. 8 mm x 8 mm copper pad on each terminal.
3. 8.3 ms Single Half-Sine Wave duty cycle = 4 pulses maximum per minute (unidirectional units only).



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### How to Order

|                              |  |    |        |
|------------------------------|--|----|--------|
| Package                      | 1.5SMBJ  | 12 | CA - H |
| Working Peak Reverse Voltage | 12 = 12 V <sub>RWM</sub> (Volts)   |    |        |
| Suffix                       | A = 5 % Tolerance Unidirectional Device<br>CA = 5 % Tolerance Bidirectional Device |    |        |
| Reel                         | (blank) = 13 inch reel<br>-H = 7 inch reel   |    |        |



**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.

Specifications are subject to change without notice.

Users should verify actual device performance in their specific applications.

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# 1.5SMBJ 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)                  |
| 1.5SMBJ12A            | GEE     | 1.5SMBJ12CA          | BEE     | 13.30                                     | 14.70  | 1                     | 12.0                         | 1.0  | 19.9  | 75.4                                    | 25.9   | 377.0                                |
| 1.5SMBJ13A            | GEG     | 1.5SMBJ13CA          | BEG     | 14.40                                     | 15.90  | 1                     | 13.0                         | 1.0  | 21.5  | 69.8                                    | 28.0   | 349.0                                |
| 1.5SMBJ14A            | GEK     | 1.5SMBJ14CA          | BEK     | 15.60                                     | 17.20  | 1                     | 14.0                         | 1.0  | 23.2  | 64.7                                    | 30.2   | 323.5                                |
| 1.5SMBJ15A            | GEM     | 1.5SMBJ15CA          | BEM     | 16.70                                     | 18.50  | 1                     | 15.0                         | 1.0  | 24.4  | 61.5                                    | 31.7   | 307.5                                |
| 1.5SMBJ16A            | GEP     | 1.5SMBJ16CA          | BEP     | 17.80                                     | 19.70  | 1                     | 16.0                         | 1.0  | 26.0  | 57.7                                    | 33.8   | 288.5                                |
| 1.5SMBJ17A            | GER     | 1.5SMBJ17CA          | BER     | 18.90                                     | 20.90  | 1                     | 17.0                         | 1.0  | 27.6  | 54.4                                    | 35.9   | 272.0                                |
| 1.5SMBJ18A            | GET     | 1.5SMBJ18CA          | BET     | 20.00                                     | 22.10  | 1                     | 18.0                         | 1.0  | 29.2  | 51.4                                    | 38.0   | 257.0                                |
| 1.5SMBJ20A            | GEV     | 1.5SMBJ20CA          | BEV     | 22.20                                     | 24.50  | 1                     | 20.0                         | 1.0  | 32.4  | 46.3                                    | 42.1   | 231.5                                |
| 1.5SMBJ22A            | GEX     | 1.5SMBJ22CA          | BEX     | 24.40                                     | 26.90  | 1                     | 22.0                         | 1.0  | 35.5  | 42.3                                    | 46.2   | 211.5                                |
| 1.5SMBJ24A            | GEZ     | 1.5SMBJ24CA          | BEZ     | 26.70                                     | 29.50  | 1                     | 24.0                         | 1.0  | 38.9  | 38.6                                    | 50.6   | 193.0                                |
| 1.5SMBJ26A            | GFE     | 1.5SMBJ26CA          | BFE     | 28.90                                     | 31.90  | 1                     | 26.0                         | 1.0  | 42.1  | 35.7                                    | 54.7   | 178.5                                |
| 1.5SMBJ28A            | GFG     | 1.5SMBJ28CA          | BFG     | 31.10                                     | 34.40  | 1                     | 28.0                         | 1.0  | 45.4  | 33.1                                    | 59.0   | 165.5                                |
| 1.5SMBJ30A            | GFK     | 1.5SMBJ30CA          | BFK     | 33.30                                     | 36.80  | 1                     | 30.0                         | 1.0  | 48.4  | 31.0                                    | 62.9   | 155.0                                |
| 1.5SMBJ33A            | GFM     | 1.5SMBJ33CA          | BFM     | 36.70                                     | 40.60  | 1                     | 33.0                         | 1.0  | 53.3  | 28.2                                    | 69.3   | 141.0                                |
| 1.5SMBJ36A            | GFP     | 1.5SMBJ36CA          | BFP     | 40.00                                     | 44.20  | 1                     | 36.0                         | 1.0  | 58.1  | 25.9                                    | 75.5   | 129.5                                |
| 1.5SMBJ40A            | GFR     | 1.5SMBJ40CA          | BFR     | 44.40                                     | 49.10  | 1                     | 40.0                         | 1.0  | 64.5  | 23.3                                    | 83.9   | 116.5                                |
| 1.5SMBJ43A            | GFT     | 1.5SMBJ43CA          | BFT     | 47.80                                     | 52.80  | 1                     | 43.0                         | 1.0  | 69.4  | 21.7                                    | 90.2   | 108.5                                |
| 1.5SMBJ45A            | GFV     | 1.5SMBJ45CA          | BFV     | 50.00                                     | 55.30  | 1                     | 45.0                         | 1.0  | 72.7  | 20.6                                    | 94.5   | 103.0                                |
| 1.5SMBJ48A            | GFX     | 1.5SMBJ48CA          | BFX     | 53.30                                     | 58.90  | 1                     | 48.0                         | 1.0  | 77.4  | 19.4                                    | 100.6  | 97.0                                 |
| 1.5SMBJ51A            | GFZ     | 1.5SMBJ51CA          | BFZ     | 56.70                                     | 62.70  | 1                     | 51.0                         | 1.0  | 82.4  | 18.2                                    | 107.1  | 91.0                                 |
| 1.5SMBJ54A            | GGE     | 1.5SMBJ54CA          | BGE     | 60.00                                     | 66.30  | 1                     | 54.0                         | 1.0  | 87.1  | 17.3                                    | 113.2  | 86.5                                 |
| 1.5SMBJ58A            | GGG     | 1.5SMBJ58CA          | BGG     | 64.40                                     | 71.20  | 1                     | 58.0                         | 1.0  | 93.6  | 16.1                                    | 121.7  | 80.5                                 |
| 1.5SMBJ60A            | GGK     |                      |         | 66.70                                     | 73.70  | 1                     | 60.0                         | 1.0  | 96.8  | 15.5                                    | 125.8  | 77.5                                 |
| 1.5SMBJ64A            | GGM     |                      |         | 71.10                                     | 78.60  | 1                     | 64.0                         | 1.0  | 103.0   | 14.6                                    | 133.9  | 73.0                                 |
| 1.5SMBJ70A            | GGP     |                      |         | 77.80                                     | 86.00  | 1                     | 70.0                         | 1.0  | 113.0   | 13.3                                    | 146.9  | 66.5                                 |
| 1.5SMBJ75A            | GGR     |                      |         | 83.30                                     | 92.10  | 1                     | 75.0                         | 1.0  | 121.0   | 12.4                                    | 157.3  | 62.0                                 |
| 1.5SMBJ78A            | GGT     |                      |         | 86.70                                     | 95.80  | 1                     | 78.0                         | 1.0  | 126.0   | 11.9                                    | 163.8  | 59.5                                 |
| 1.5SMBJ85A            | GGV     |                      |         | 94.40                                     | 104.00 | 1                     | 85.0                         | 1.0  | 137.0   | 11.0                                    | 178.1  | 55.0                                 |

**Notes:**

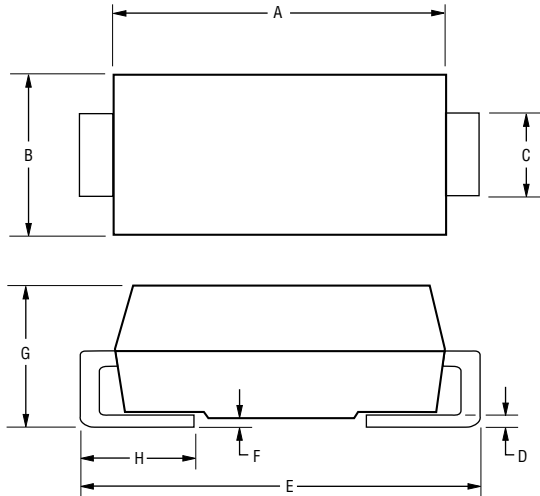
1. Suffix 'A' denotes a 5 % tolerance unidirectional device.
2. Suffix 'CA' denotes a 5 % tolerance bidirectional device.
3. For bidirectional devices with a V<sub>R</sub> of 10 volts or less, the I<sub>R</sub> limit is double.

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The products described herein and this document are subject to specifi

# 1.5SMBJ Transient Voltage Suppressor Diode Series

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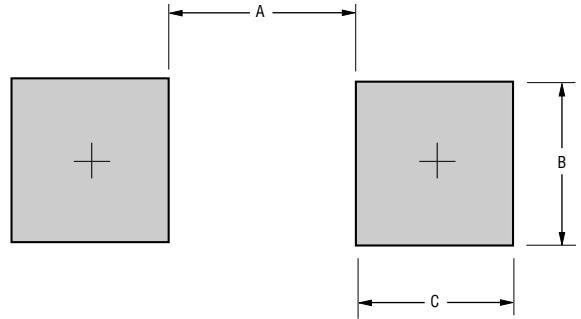
## Product Dimensions



| 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         | $\frac{0.15 - 0.31}{(0.006 - 0.012)}$  |
| E         | $\frac{5.21 - 5.59}{(0.205 - 0.220)}$  |
| F         | $\frac{0.05 - 0.203}{(0.002 - 0.008)}$ |
| G         | $\frac{2.13 - 2.44}{(0.080 - 0.103)}$  |
| H         | $\frac{0.76 - 1.52}{(0.030 - 0.060)}$  |

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

## Recommended Footprint



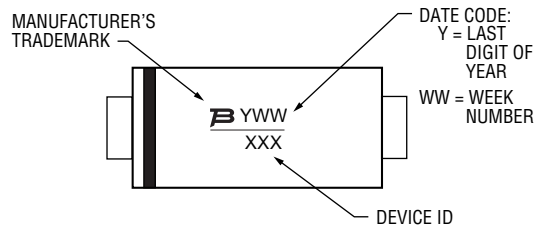
| Dimension | SMB (DO-214AA)         |
|-----------|------------------------|
| A (Max.)  | $\frac{2.69}{(0.106)}$ |
| B (Min.)  | $\frac{2.10}{(0.083)}$ |
| C (Min.)  | $\frac{1.27}{(0.050)}$ |

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  
 Weight .....0.093 grams

## Typical Part Marking

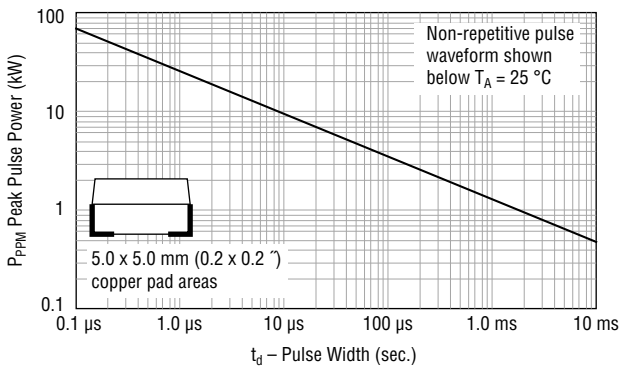


# 1.5SMBJ Transient Voltage Suppressor Diode Series

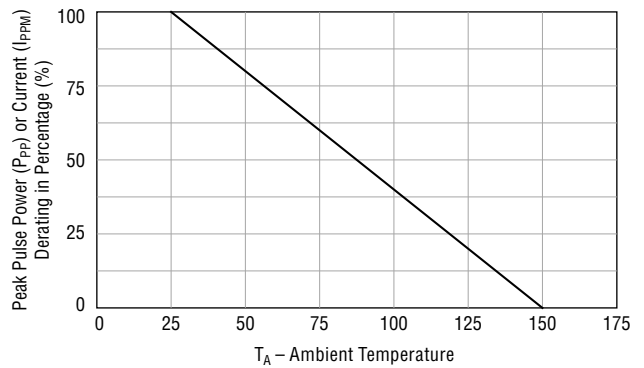
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## Rating & Characteristic Curves

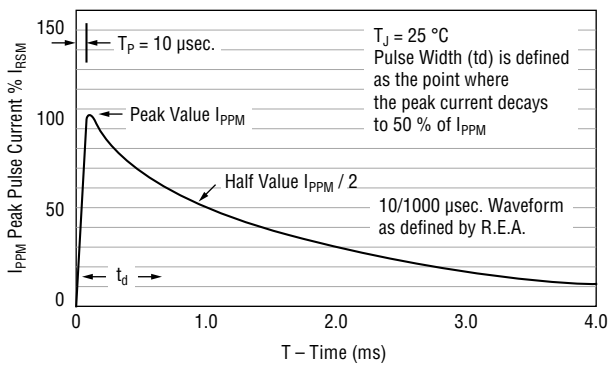
### Peak Pulse Power



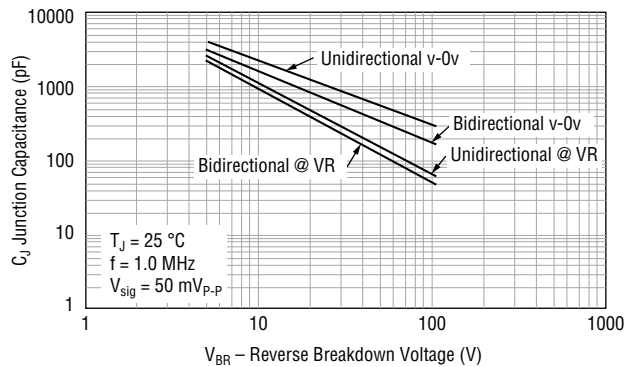
### Pulse Derating Curve



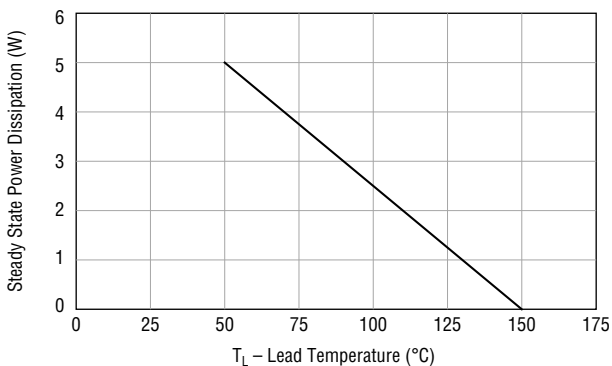
### Pulse Waveform



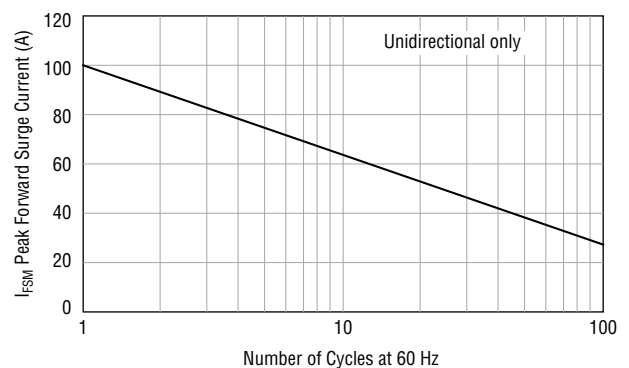
### Typical Junction Capacitance



### Steady State Power Derating Curve



### Maximum Non-repetitive Forward Surge Current



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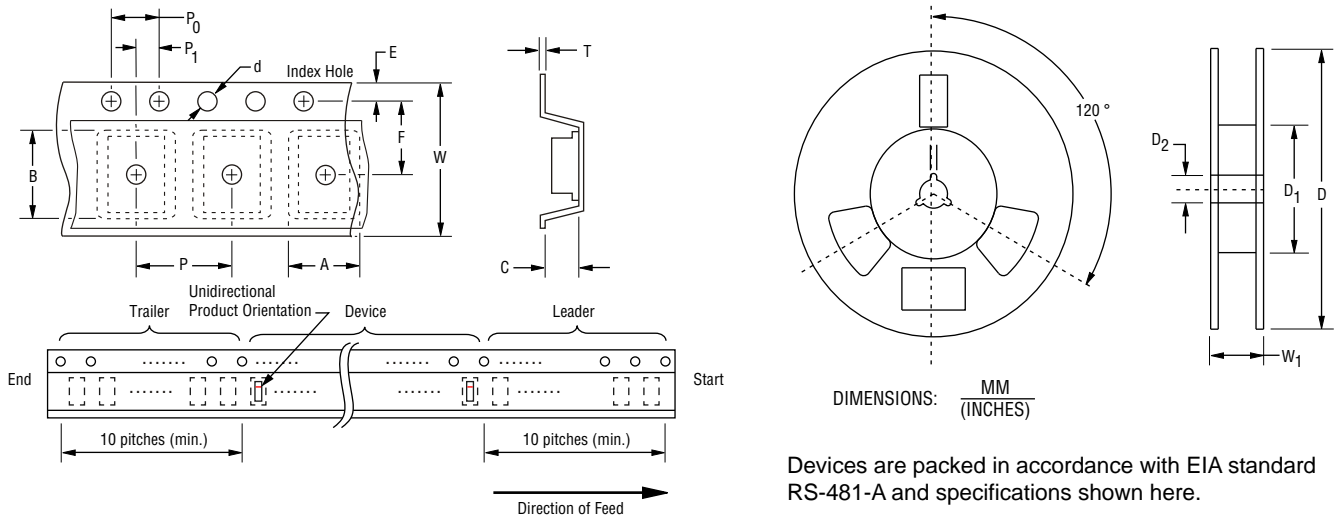
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# 1.5SMBJ Transient Voltage Suppressor Diode Series

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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                  |

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