



## Features

- RoHS compliant\*
- Surface Mount SMA package
- Standoff Voltage: 5.0 to 170 volts
- Power Dissipation: 400 watts

## Applications

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

# SMAJ 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-214AC (SMA) size format. The Transient Voltage Suppressor series offers a choice of Working Peak Reverse Voltage from 5 V up to 170 V and Breakdown Voltage up to 200 V. Typical fast response times are less than 1.0 ns for unidirectional devices and less than 5.0 ns 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.

## 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>    | 400         | 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>   | 40          | Amps  |
| Steady State Power Dissipation @ T <sub>L</sub> = 75 °C  | P <sub>M(AV)</sub> | 1.0         | Watts |
| Maximum Instantaneous Forward Voltage @ I <sub>PP</sub> = 35 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 +175 | °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).
4. Single Phase, Half Wave, 60 Hz, resistive or inductive load. For capacitive load, derate current by 20 %.



### Asia-Pacific:

Tel: +886-2 2562-4117 • Fax: +886-2 2562-4116

### Europe:

Tel: +41-41 768 5555 • Fax: +41-41 768 5510

### The Americas:

Tel: +1-951 781-5500 • Fax: +1-951 781-5700

[www.bourns.com](http://www.bourns.com)

## How to Order

SMAJ 5.0 CA

Package \_\_\_\_\_  
SMAJ = SMA/DO-214AC

Working Peak Reverse Voltage \_\_\_\_\_  
5.0 = 5.0 VRWM (Volts)

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

\*RoHS Directive 2002/95/EC Jan 27 2003 including Annex.  
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# SMAJ 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 Peak Reverse Voltage | Maximum Reverse Leakage @ V <sub>RWM</sub> | Maximum Reverse Voltage @ I <sub>RSM</sub> | Maximum Reverse Surge Current |
|-----------------------|--------------|----------------------|--------------|--|------|-----------------------|------------------------------|--|--|-------------------------------|
| Part Number           | Part Marking | Part Number          | Part Marking | Min.   | Max. | @ I <sub>T</sub> (mA) | V <sub>RWM</sub> (Volts)     | I <sub>R</sub> (μA)                        | V <sub>RSM</sub> (Volts)                   | I <sub>RSM</sub> (Amps)       |
| SMAJ5.0A              | HE           | SMAJ5.0CA            | TE           | 6.40   | 7.00 | 10                    | 5.0                          | 800 / 1600                                 | 9.2  | 43.5                          |
| SMAJ6.0A              | HG           | SMAJ6.0CA            | TG           | 6.67   | 7.37 | 10                    | 6.0                          | 800 / 1600                                 | 10.3                                       | 38.8                          |
| SMAJ6.5A              | HK           | SMAJ6.5CA            | TK           | 7.22   | 7.98 | 10                    | 6.5                          | 500 / 1000                                 | 11.2                                       | 35.7                          |
| SMAJ7.0A              | HM           | SMAJ7.0CA            | TM           | 7.78   | 8.60 | 10                    | 7.0                          | 200 / 400                                  | 12.0                                       | 33.3                          |
| SMAJ7.5A              | HP           | SMAJ7.5CA            | TP           | 8.33   | 9.21 | 1.0                   | 7.5                          | 100 / 200                                  | 12.9                                       | 31.0                          |
| SMAJ8.0A              | HR           | SMAJ8.0CA            | TR           | 8.89   | 9.83 | 1.0                   | 8.0                          | 50 / 100                                   | 13.6                                       | 29.4                          |
| SMAJ8.5A              | HT           | SMAJ8.5CA            | TT           | 9.44   | 10.4 | 1.0                   | 8.5                          | 10 / 20                                    | 14.4                                       | 27.7                          |
| SMAJ9.0A              | HV           | SMAJ9.0CA            | TV           | 10.0   | 11.1 | 1.0                   | 9.0                          | 5 / 10                                     | 15.4                                       | 26.0                          |
| SMAJ10A               | HX           | SMAJ10CA             | TX           | 11.1   | 12.3 | 1.0                   | 10                           | 5 / 10                                     | 17.0                                       | 23.5                          |
| SMAJ11A               | HZ           | SMAJ11CA             | TZ           | 12.2   | 13.2 | 1.0                   | 11                           | 5.0  | 18.2                                       | 22.0                          |
| SMAJ12A               | IE           | SMAJ12CA             | UE           | 13.3   | 14.7 | 1.0                   | 12                           | 5.0  | 19.9                                       | 20.1                          |
| SMAJ13A               | IG           | SMAJ13CA             | UG           | 14.4   | 15.9 | 1.0                   | 13                           | 5.0  | 21.5                                       | 18.6                          |
| SMAJ14A               | IK           | SMAJ14CA             | UK           | 15.6   | 17.2 | 1.0                   | 14                           | 5.0  | 23.2                                       | 17.2                          |
| SMAJ15A               | IM           | SMAJ15CA             | UM           | 16.7   | 18.5 | 1.0                   | 15                           | 5.0  | 24.4                                       | 16.4                          |
| SMAJ16A               | IP           | SMAJ16CA             | UP           | 17.8   | 19.7 | 1.0                   | 16                           | 5.0  | 26.0                                       | 15.3                          |
| SMAJ17A               | IR           | SMAJ17CA             | UR           | 18.9   | 20.9 | 1.0                   | 17                           | 5.0  | 27.6                                       | 14.5                          |
| SMAJ18A               | IT           | SMAJ18CA             | UT           | 20.0   | 22.1 | 1.0                   | 18                           | 5.0  | 29.2                                       | 13.7                          |
| SMAJ20A               | IV           | SMAJ20CA             | UV           | 22.2   | 24.5 | 1.0                   | 20                           | 5.0  | 32.4                                       | 12.3                          |
| SMAJ22A               | IX           | SMAJ22CA             | UX           | 24.4   | 26.9 | 1.0                   | 22                           | 5.0  | 35.5                                       | 11.2                          |
| SMAJ24A               | IZ           | SMAJ24CA             | UZ           | 26.7   | 29.5 | 1.0                   | 24                           | 5.0  | 38.9                                       | 10.3                          |
| SMAJ26A               | JE           | SMAJ26CA             | VE           | 28.9   | 31.9 | 1.0                   | 26                           | 5.0  | 42.1                                       | 9.5                           |
| SMAJ28A               | JG           | SMAJ28CA             | VG           | 31.1   | 34.4 | 1.0                   | 28                           | 5.0  | 45.4                                       | 8.8                           |
| SMAJ30A               | JK           | SMAJ30CA             | VK           | 33.3   | 36.8 | 1.0                   | 30                           | 5.0  | 48.4                                       | 8.3                           |
| SMAJ33A               | JM           | SMAJ33CA             | VM           | 36.7   | 40.6 | 1.0                   | 33                           | 5.0  | 53.3                                       | 7.5                           |
| SMAJ36A               | JP           | SMAJ36CA             | VP           | 40   | 44.2 | 1.0                   | 36                           | 5.0  | 58.1                                       | 6.9                           |
| SMAJ40A               | JR           | SMAJ40CA             | VR           | 44.4   | 49.1 | 1.0                   | 40                           | 5.0  | 64.5                                       | 6.2                           |
| SMAJ43A               | JT           | SMAJ43CA             | VT           | 47.8   | 52.8 | 1.0                   | 43                           | 5.0  | 69.4                                       | 5.7                           |
| SMAJ45A               | JV           | SMAJ45CA             | VV           | 50   | 55.3 | 1.0                   | 45                           | 5.0  | 72.7                                       | 5.5                           |
| SMAJ48A               | JX           | SMAJ48CA             | VX           | 53.3   | 58.9 | 1.0                   | 48                           | 5.0  | 77.4                                       | 5.2                           |
| SMAJ51A               | JZ           | SMAJ51CA             | VZ           | 56.7   | 62.7 | 1.0                   | 51                           | 5.0  | 82.4                                       | 4.9                           |
| SMAJ54A               | RE           | SMAJ54CA             | WE           | 60   | 66.3 | 1.0                   | 54                           | 5.0  | 87.1                                       | 4.6                           |
| SMAJ58A               | RG           | SMAJ58CA             | WG           | 64.4   | 71.2 | 1.0                   | 58                           | 5.0  | 93.6                                       | 4.3                           |
| SMAJ60A               | RK           | SMAJ60CA             | WK           | 66.7   | 73.7 | 1.0                   | 60                           | 5.0  | 96.8                                       | 4.1                           |
| SMAJ64A               | RM           | SMAJ64CA             | WM           | 71.1   | 78.6 | 1.0                   | 64                           | 5.0  | 103  | 3.9                           |
| SMAJ70A               | RP           | SMAJ70CA             | WP           | 77.8   | 86.0 | 1.0                   | 70                           | 5.0  | 113  | 3.5                           |
| SMAJ75A               | RR           | SMAJ75CA             | WR           | 83.3   | 92.1 | 1.0                   | 75                           | 5.0  | 121  | 3.3                           |
| SMAJ78A               | RT           | SMAJ78CA             | WT           | 86.7   | 95.8 | 1.0                   | 78                           | 5.0  | 126  | 3.2                           |
| SMAJ85A               | RV           | SMAJ85CA             | WV           | 94.4   | 104  | 1.0                   | 85                           | 5.0  | 137  | 2.9                           |
| SMAJ90A               | RX           | SMAJ90CA             | WX           | 100  | 111  | 1.0                   | 90                           | 5.0  | 146  | 2.7                           |
| SMAJ100A              | RZ           | SMAJ100CA            | WZ           | 111  | 123  | 1.0                   | 100                          | 5.0  | 162  | 2.5                           |
| SMAJ110A              | SE           | SMAJ110CA            | XE           | 122  | 135  | 1.0                   | 110                          | 5.0  | 177  | 2.3                           |
| SMAJ120A              | SG           | SMAJ120CA            | XG           | 133  | 147  | 1.0                   | 120                          | 5.0  | 193  | 2.0                           |
| SMAJ130A              | SK           | SMAJ130CA            | XK           | 144  | 159  | 1.0                   | 130                          | 5.0  | 209  | 1.9                           |
| SMAJ150A              | SM           | SMAJ150CA            | XM           | 167  | 185  | 1.0                   | 150                          | 5.0  | 243  | 1.6                           |
| SMAJ160A              | SP           | SMAJ160CA            | XP           | 178  | 197  | 1.0                   | 160                          | 5.0  | 259  | 1.5                           |
| SMAJ170A              | SR           | SMAJ170CA            | XR           | 189  | 209  | 1.0                   | 170                          | 5.0  | 275  | 1.4                           |

### Notes:

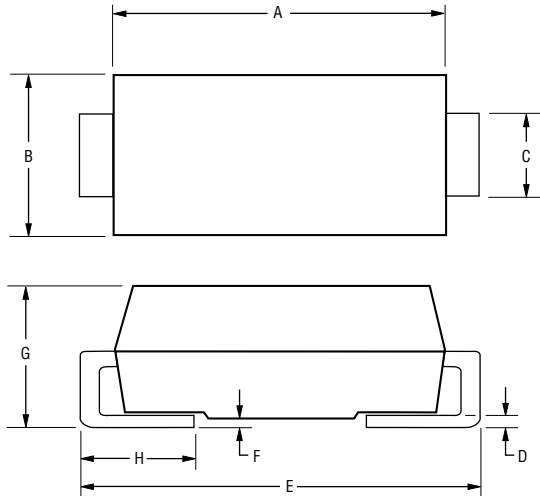
- Suffix 'A' denotes a 5 % tolerance unidirectional device.
- Suffix 'CA' denotes a 5 % tolerance bidirectional device.
- For bidirectional devices with a V<sub>R</sub> of 10 volts or less, the I<sub>R</sub> limit is double.
- For unidirectional devices with a V<sub>F</sub> max. of 3.5 V at an I<sub>F</sub> of 35 A, 0.5 Sine Wave of 8.3 ms Pulse Width.

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# SMAJ Transient Voltage Suppressor Diode Series

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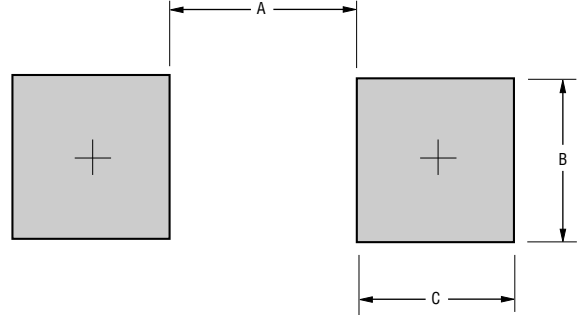
## Product Dimensions



| Dimension | SMA (DO-214AC)                        |
|-----------|---------------------------------------|
| A         | $\frac{4.06 - 4.57}{(0.160 - 0.180)}$ |
| B         | $\frac{2.29 - 2.92}{(0.090 - 0.115)}$ |
| C         | $\frac{1.27 - 1.63}{(0.050 - 0.064)}$ |
| D         | $\frac{0.15 - 0.31}{(0.006 - 0.112)}$ |
| E         | $\frac{4.83 - 5.59}{(0.190 - 0.220)}$ |
| F         | $\frac{0.05 - 0.20}{(0.002 - 0.008)}$ |
| G         | $\frac{2.01 - 2.62}{(0.080 - 0.103)}$ |
| H         | $\frac{0.76 - 1.52}{(0.030 - 0.060)}$ |

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

## Recommended Footprint



| Dimension | SMA (DO-214AC)         |
|-----------|------------------------|
| A (Max.)  | $\frac{2.70}{(0.106)}$ |
| B (Min.)  | $\frac{2.10}{(0.083)}$ |
| C (Min.)  | $\frac{1.27}{(0.050)}$ |

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

## Physical Specifications

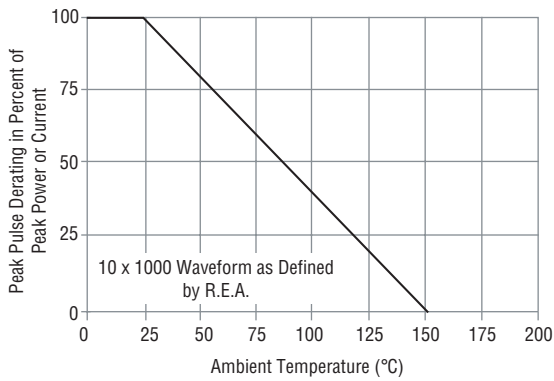
Case .....Molded plastic per UL Class 94V-0  
 Polarity ..... Cathode band indicates unidirectional device  
                     No cathode band indicates bidirectional device  
 Weight .....0.002 ounces / 0.064 grams

# SMAJ Transient Voltage Suppressor Diode Series

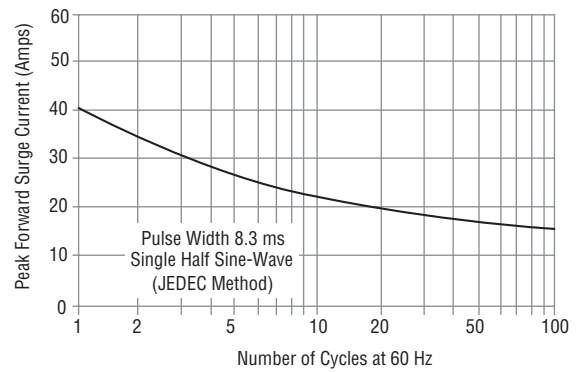
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## Rating & Characteristic Curves

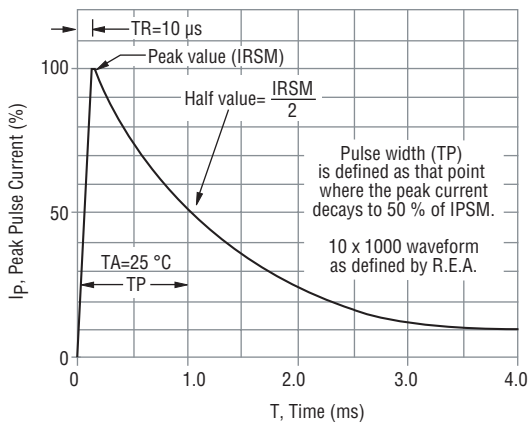
### Pulse Derating Curve



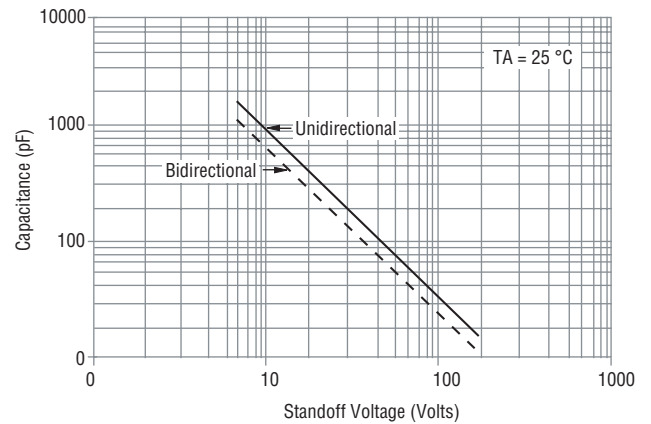
### Maximum Non-Repetitive Surge Current



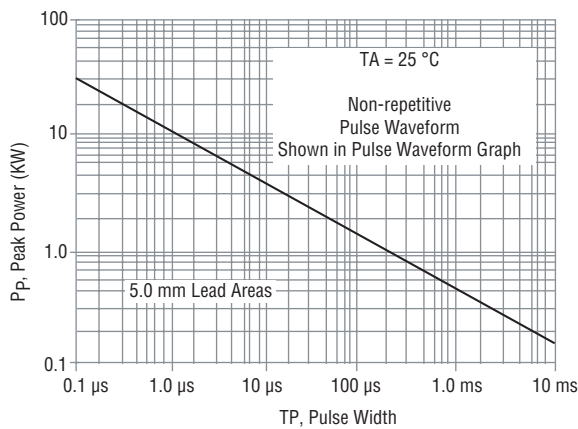
### Pulse Waveform



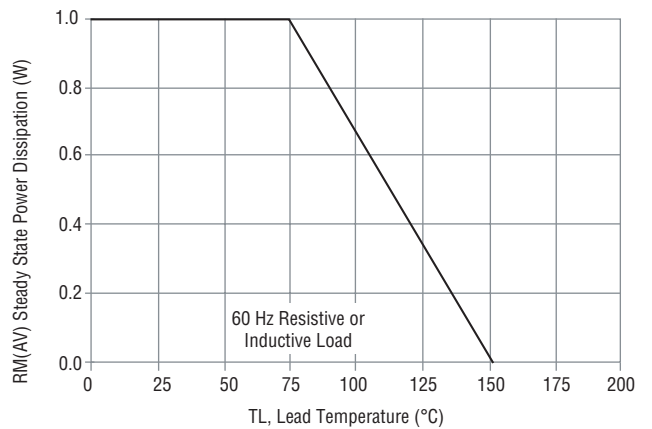
### Typical Junction Capacitance



### Pulse Rating Curve



### Steady State Power Derating Curve



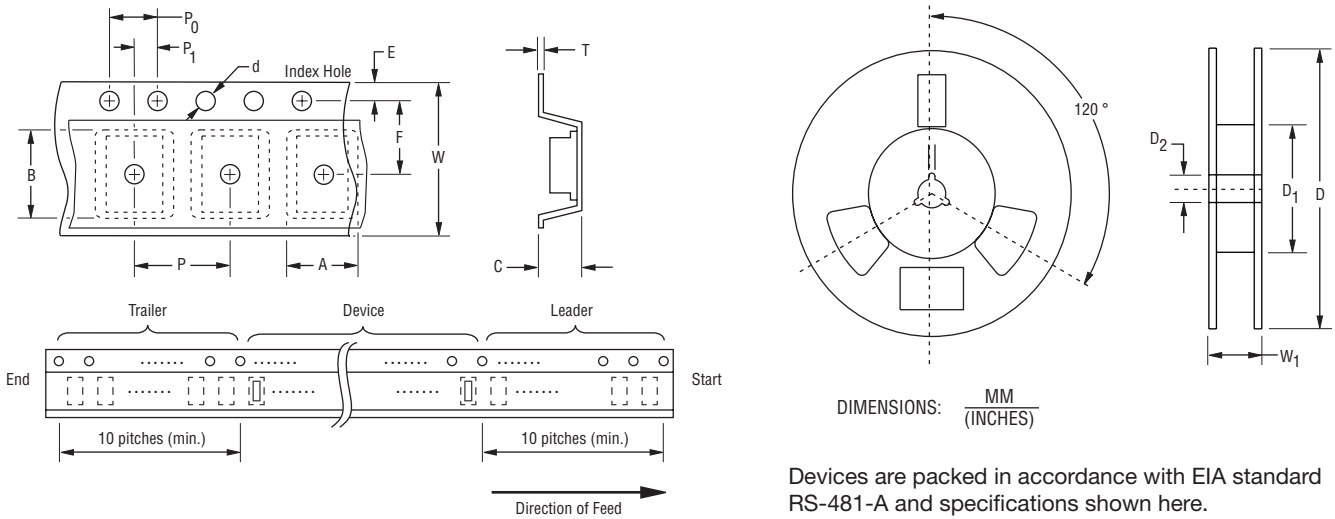
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# SMAJ Transient Voltage Suppressor Diode Series

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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         | SMA (DO-214AC)                             |
|------------------------|----------------|--|
| Carrier Width          | A              | $\frac{2.90 \pm 0.10}{(0.114 \pm 0.004)}$  |
| Carrier Length         | B              | $\frac{5.59 \pm 0.10}{(0.220 \pm 0.004)}$  |
| Carrier Depth          | C              | $\frac{2.36 \pm 0.10}{(0.093 \pm 0.004)}$  |
| Sprocket Hole          | d              | $\frac{1.55 \pm 0.05}{(0.061 \pm 0.002)}$  |
| Reel Outside Diameter  | D              | $\frac{330}{(12.992)}$                     |
| 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              | $\frac{4.00 \pm 0.10}{(0.157 \pm 0.004)}$  |
| 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              | $\frac{12.00 \pm 0.20}{(0.472 \pm 0.008)}$ |
| Reel Width             | W <sub>1</sub> | $\frac{18.4}{(0.724)}$ MAX.                |
| Quantity per Reel      | --             | 5,000                                      |