



# THE DATASHEET OF SMAJ33A-QH





## Features

- Surface Mount SMA package
- Standoff Voltage: 5 to 220 volts
- Power Dissipation: 400 watts
- RoHS compliant\*
- AEC-Q101 compliant\*\*

## Applications

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

# SMAJ-Q Transient Voltage Suppressor Diode Series

### General Information

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 220 V. Typical fast response times are less than 1.0 picosecond from 0 V to 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 (JEDEC Method) (Note 3) | I <sub>FSM</sub> | 40          | 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. Mounted on 5.0 mm<sup>2</sup> (0.03 mm thick) copper pads to each terminal.
3. 8.3 ms Single Half-Sine Wave duty cycle = 4 pulses maximum per minute (unidirectional units only).

### Additional Information

Click these links for more information:



[PRODUCT SELECTOR](#) [TECHNICAL LIBRARY](#) [INVENTORY](#) [SAMPLES](#) [CONTACT](#)

### Agency Recognition

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



### WARNING Cancer and Reproductive Harm

[www.P65Warnings.ca.gov](http://www.P65Warnings.ca.gov)

\*RoHS Directive 2015/863, Mar 31, 2015 and Annex. \*\*\*Q\* part number suffix indicates AEC-Q101 compliance.

Specifications are subject to change without notice. Users should verify actual device performance in their specific applications.

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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 @ I <sub>pp</sub> (10/1000 μs) | Maximum Clamping Voltage @ I <sub>pp</sub> (8/20 μs) | Maximum Peak Pulse Current @ I <sub>pp</sub> (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)                                    |
| SMAJ5.0A-Q            | HEQ     | SMAJ5.0CA-Q          | TEQ     | 6.40                                      | 7.00 | 10                    | 5.0                          | 800  | 9.2   | 43.5  | 12.0   | 217.5  |
| SMAJ6.0A-Q            | HGQ     | SMAJ6.0CA-Q          | TGQ     | 6.67                                      | 7.37 | 10                    | 6.0                          | 800  | 10.3  | 38.8  | 13.4   | 194.0  |
| SMAJ6.5A-Q            | HKQ     | SMAJ6.5CA-Q          | TKQ     | 7.22                                      | 7.98 | 10                    | 6.5                          | 500  | 11.2  | 35.7  | 14.6   | 178.5  |
| SMAJ7.0A-Q            | HMQ     | SMAJ7.0CA-Q          | TMQ     | 7.78                                      | 8.60 | 10                    | 7.0                          | 200  | 12.0  | 33.3  | 15.6   | 166.5  |
| SMAJ7.5A-Q            | HPQ     | SMAJ7.5CA-Q          | TPQ     | 8.33                                      | 9.21 | 1.0                   | 7.5                          | 100  | 12.9  | 31.0  | 16.8   | 155.0  |
| SMAJ8.0A-Q            | HRQ     | SMAJ8.0CA-Q          | TRQ     | 8.89                                      | 9.83 | 1.0                   | 8.0                          | 50   | 13.6  | 29.4  | 17.7   | 147.0  |
| SMAJ8.5A-Q            | HTQ     | SMAJ8.5CA-Q          | TTQ     | 9.44                                      | 10.4 | 1.0                   | 8.5                          | 20   | 14.4  | 27.8  | 18.7   | 139.0  |
| SMAJ9.0A-Q            | HVQ     | SMAJ9.0CA-Q          | TVQ     | 10.0                                      | 11.1 | 1.0                   | 9.0                          | 10   | 15.4  | 26.0  | 20.0   | 130.0  |
| SMAJ10A-Q             | HXQ     | SMAJ10CA-Q           | TXQ     | 11.1                                      | 12.3 | 1.0                   | 10                           | 5  | 17.0  | 23.5  | 22.1   | 117.5  |
| SMAJ11A-Q             | HZQ     | SMAJ11CA-Q           | TZQ     | 12.2                                      | 13.5 | 1.0                   | 11                           | 1.0  | 18.2  | 22.0  | 23.7   | 110.0  |
| SMAJ12A-Q             | IEQ     | SMAJ12CA-Q           | UEQ     | 13.3                                      | 14.7 | 1.0                   | 12                           | 1.0  | 19.9  | 20.1  | 25.9   | 100.5  |
| SMAJ13A-Q             | IGQ     | SMAJ13CA-Q           | UGQ     | 14.4                                      | 15.9 | 1.0                   | 13                           | 1.0  | 21.5  | 18.6  | 28.0   | 93.0   |
| SMAJ14A-Q             | IKQ     | SMAJ14CA-Q           | UKQ     | 15.6                                      | 17.2 | 1.0                   | 14                           | 1.0  | 23.2  | 17.2  | 30.2   | 86.0   |
| SMAJ15A-Q             | IMQ     | SMAJ15CA-Q           | UMQ     | 16.7                                      | 18.5 | 1.0                   | 15                           | 1.0  | 24.4  | 16.4  | 31.7   | 82.0   |
| SMAJ16A-Q             | IPQ     | SMAJ16CA-Q           | UPQ     | 17.8                                      | 19.7 | 1.0                   | 16                           | 1.0  | 26.0  | 15.4  | 33.8   | 77.0   |

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

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# SMAJ-Q Transient Voltage Suppressor Diode Series

# BOURNS®

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

| 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)                  |
| SMAJ17A-Q             | IRQ     | SMAJ17CA-Q           | URQ     | 18.9                                      | 20.9 | 1.0                   | 17                           | 1.0  | 27.6  | 14.5                                    | 35.9   | 72.5                                 |
| SMAJ18A-Q             | ITQ     | SMAJ18CA-Q           | UTQ     | 20.0                                      | 22.1 | 1.0                   | 18                           | 1.0  | 29.2  | 13.7                                    | 38.0   | 68.5                                 |
| SMAJ20A-Q             | IVQ     | SMAJ20CA-Q           | UVQ     | 22.2                                      | 24.5 | 1.0                   | 20                           | 1.0  | 32.4  | 12.3                                    | 42.1   | 61.5                                 |
| SMAJ22A-Q             | IXQ     | SMAJ22CA-Q           | UXQ     | 24.4                                      | 26.9 | 1.0                   | 22                           | 1.0  | 35.5  | 11.3                                    | 46.2   | 56.5                                 |
| SMAJ24A-Q             | IZQ     | SMAJ24CA-Q           | UZQ     | 26.7                                      | 29.5 | 1.0                   | 24                           | 1.0  | 38.9  | 10.3                                    | 50.6   | 51.5                                 |
| SMAJ26A-Q             | JEQ     | SMAJ26CA-Q           | VEQ     | 28.9                                      | 31.9 | 1.0                   | 26                           | 1.0  | 42.1  | 9.5                                     | 54.7   | 47.5                                 |
| SMAJ28A-Q             | JGQ     | SMAJ28CA-Q           | VGQ     | 31.1                                      | 34.4 | 1.0                   | 28                           | 1.0  | 45.4  | 8.8                                     | 59.0   | 44.0                                 |
| SMAJ30A-Q             | JKQ     | SMAJ30CA-Q           | VKQ     | 33.3                                      | 36.8 | 1.0                   | 30                           | 1.0  | 48.4  | 8.3                                     | 62.9   | 41.5                                 |
| SMAJ33A-Q             | JMQ     | SMAJ33CA-Q           | VMQ     | 36.7                                      | 40.6 | 1.0                   | 33                           | 1.0  | 53.3  | 7.5                                     | 69.3   | 37.5                                 |
| SMAJ36A-Q             | JPQ     | SMAJ36CA-Q           | VPQ     | 40  | 44.2 | 1.0                   | 36                           | 1.0  | 58.1  | 6.9                                     | 75.5   | 34.5                                 |
| SMAJ40A-Q             | JRQ     | SMAJ40CA-Q           | VRQ     | 44.4                                      | 49.1 | 1.0                   | 40                           | 1.0  | 64.5  | 6.2                                     | 83.9   | 31.0                                 |
| SMAJ43A-Q             | JTQ     | SMAJ43CA-Q           | VTQ     | 47.8                                      | 52.8 | 1.0                   | 43                           | 1.0  | 69.4  | 5.8                                     | 90.2   | 29.0                                 |
| SMAJ45A-Q             | JVQ     | SMAJ45CA-Q           | VVQ     | 50  | 55.3 | 1.0                   | 45                           | 1.0  | 72.7  | 5.5                                     | 94.5   | 27.5                                 |
| SMAJ48A-Q             | JXQ     | SMAJ48CA-Q           | VXQ     | 53.3                                      | 58.9 | 1.0                   | 48                           | 1.0  | 77.4  | 5.2                                     | 100.6  | 26.0                                 |
| SMAJ51A-Q             | JZQ     | SMAJ51CA-Q           | VZQ     | 56.7                                      | 62.7 | 1.0                   | 51                           | 1.0  | 82.4  | 4.9                                     | 107.1  | 24.5                                 |
| SMAJ54A-Q             | REQ     | SMAJ54CA-Q           | WEQ     | 60  | 66.3 | 1.0                   | 54                           | 1.0  | 87.1  | 4.6                                     | 113.2  | 23.0                                 |
| SMAJ58A-Q             | RGQ     | SMAJ58CA-Q           | WGQ     | 64.4                                      | 71.2 | 1.0                   | 58                           | 1.0  | 93.6  | 4.3                                     | 121.7  | 21.5                                 |
| SMAJ60A-Q             | RKQ     | SMAJ60CA-Q           | WKQ     | 66.7                                      | 73.7 | 1.0                   | 60                           | 1.0  | 96.8  | 4.1                                     | 125.8  | 20.5                                 |
| SMAJ64A-Q             | RMQ     | SMAJ64CA-Q           | WMQ     | 71.1                                      | 78.6 | 1.0                   | 64                           | 1.0  | 103   | 3.9                                     | 133.9  | 19.5                                 |
| SMAJ70A-Q             | RPQ     | SMAJ70CA-Q           | WPQ     | 77.8                                      | 86.0 | 1.0                   | 70                           | 1.0  | 113   | 3.5                                     | 146.9  | 17.5                                 |
| SMAJ75A-Q             | RRQ     | SMAJ75CA-Q           | WRQ     | 83.3                                      | 92.1 | 1.0                   | 75                           | 1.0  | 121   | 3.3                                     | 157.3  | 16.5                                 |
| SMAJ78A-Q             | RTQ     | SMAJ78CA-Q           | WTQ     | 86.7                                      | 95.8 | 1.0                   | 78                           | 1.0  | 126   | 3.2                                     | 163.8  | 16.0                                 |
| SMAJ85A-Q             | RVQ     | SMAJ85CA-Q           | WVQ     | 94.4                                      | 104  | 1.0                   | 85                           | 1.0  | 137   | 2.9                                     | 178.1  | 14.5                                 |
| SMAJ90A-Q             | RXQ     | SMAJ90CA-Q           | WXQ     | 100                                       | 111  | 1.0                   | 90                           | 1.0  | 146   | 2.7                                     | 189.8  | 13.5                                 |
| SMAJ100A-Q            | RZQ     | SMAJ100CA-Q          | WZQ     | 111                                       | 123  | 1.0                   | 100                          | 1.0  | 162   | 2.5                                     | 210.6  | 12.5                                 |
| SMAJ110A-Q            | SEQ     | SMAJ110CA-Q          | XEQ     | 122                                       | 135  | 1.0                   | 110                          | 1.0  | 177   | 2.3                                     | 230.1  | 11.5                                 |
| SMAJ120A-Q            | SGQ     | SMAJ120CA-Q          | XGQ     | 133                                       | 147  | 1.0                   | 120                          | 1.0  | 193   | 2.1                                     | 250.9  | 10.5                                 |
| SMAJ130A-Q            | SKQ     | SMAJ130CA-Q          | XKQ     | 144                                       | 159  | 1.0                   | 130                          | 1.0  | 209   | 1.9                                     | 271.7  | 9.5                                  |
| SMAJ150A-Q            | SMQ     | SMAJ150CA-Q          | XMQ     | 167                                       | 185  | 1.0                   | 150                          | 1.0  | 243   | 1.6                                     | 315.9  | 8.0                                  |
| SMAJ160A-Q            | SPQ     | SMAJ160CA-Q          | XPQ     | 178                                       | 197  | 1.0                   | 160                          | 1.0  | 259   | 1.5                                     | 336.7  | 7.5                                  |
| SMAJ170A-Q            | SRQ     | SMAJ170CA-Q          | XRQ     | 189                                       | 209  | 1.0                   | 170                          | 1.0  | 275   | 1.5                                     | 357.5  | 7.5                                  |
| SMAJ180A-Q            | STQ     | SMAJ180CA-Q          | XTQ     | 201                                       | 222  | 1.0                   | 180                          | 1.0  | 292   | 1.4                                     | 379.6  | 7.0                                  |
| SMAJ200A-Q            | SVQ     | SMAJ200CA-Q          | XVQ     | 224                                       | 247  | 1.0                   | 200                          | 1.0  | 324   | 1.2                                     | 421.2  | 6.0                                  |
| SMAJ220A-Q            | SXQ     | SMAJ220CA-Q          | XXQ     | 246                                       | 272  | 1.0                   | 220                          | 1.0  | 356   | 1.1                                     | 462.8  | 5.5                                  |

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

# SMAJ-Q Transient Voltage Suppressor Diode Series



## Performance Graphs

### Peak Pulse Power Derating Curve



### Maximum Non-Repetitive Surge Current



### Pulse Waveform



### Typical Junction Capacitance



### Pulse Rating Curve



### Steady State Power Derating Curve



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Users should verify actual device performance in their specific applications.

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# SMAJ-Q Transient Voltage Suppressor Diode Series



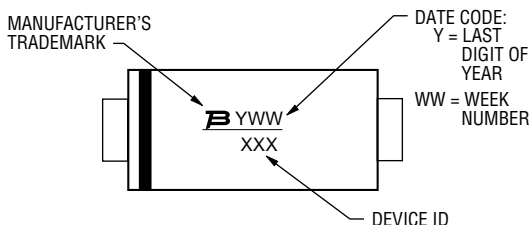
## Product Dimensions



| Dimension | SMA (DO-214AC)                 |
|-----------|--------------------------------|
| A         | 3.99 - 4.50<br>(0.157 - 0.177) |
| B         | 2.54 - 2.79<br>(0.100 - 0.110) |
| C         | 1.25 - 1.65<br>(0.049 - 0.065) |
| D         | 0.15 - 0.31<br>(0.006 - 0.012) |
| E         | 4.93 - 5.28<br>(0.194 - 0.208) |
| F         | 0.203 MAX.<br>(0.008)          |
| G         | 1.98 - 2.29<br>(0.078 - 0.090) |
| H         | 0.76 - 1.52<br>(0.030 - 0.060) |

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

## Typical Part Marking



## Recommended Footprint



| Dimension | SMA (DO-214AC)  |
|-----------|-----------------|
| A (Max.)  | 2.70<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

## How to Order

Package **SMAJ 12 CA - Q**  
 SMAJ = SMA/DO-214AC  
 Working Peak Reverse Voltage \_\_\_\_\_  
 12 = 12 V<sub>RWM</sub> (Volts)  
 Suffix \_\_\_\_\_  
 A = 5 % Tolerance Unidirectional Device  
 CA = 5 % Tolerance Bidirectional Device  
 AEC-Q101 Suffix \_\_\_\_\_  
 Q = AEC-Q101 Compliant, 13-inch Reel  
 QH = AEC-Q101 Compliant, 7-inch Reel  
 (available only for 12 V to 58 V models)

## Environmental Specifications

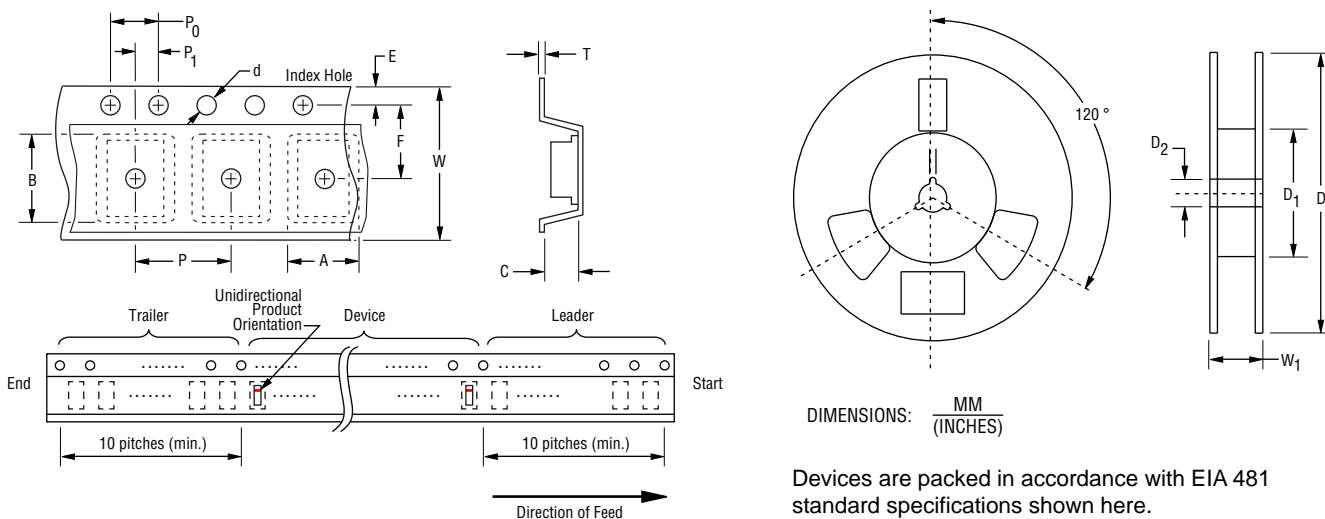
Moisture Sensitivity Level..... 1  
 ESD Classification (HBM).....3B

# SMAJ-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).



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

Devices are packed in accordance with EIA 481 standard specifications shown here.

| Item                   | Symbol         | SMA (DO-214AC)                             |                        |
|------------------------|----------------|--|------------------------|
|                        |                | 7-Inch Reel                                | 13-Inch Reel           |
| Carrier Width          | A              | $\frac{2.90 \pm 0.20}{(0.114 \pm 0.008)}$  |                        |
| Carrier Length         | B              | $\frac{5.50 \pm 0.20}{(0.217 \pm 0.008)}$  |                        |
| Carrier Depth          | C              | $\frac{2.26 \pm 0.20}{(0.089 \pm 0.008)}$  |                        |
| Sprocket Hole          | d              | $\frac{1.50 \pm 0.10}{(0.061 \pm 0.004)}$  |                        |
| 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              | $\frac{4.00 \pm 0.10}{(0.157 \pm 0.004)}$  |                        |
| 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              | $\frac{12.00 \pm 0.30}{(0.472 \pm 0.012)}$ |                        |
| Reel Width             | W <sub>1</sub> | $\frac{18.4}{(0.724)}$ MAX.                |                        |
| Quantity per Reel      | --             | 1,000                                      | 5,000                  |

REV. 03/20

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