



## Features

- RoHS compliant\* and halogen free\*\*
- Surface Mount SMC package
- Breakdown Voltage: 6.8 to 550 volts
- Peak Pulse Power: 1500 watts
- Typical temperature coefficient:  
 $\Delta V_{BR} = 0.1 \% \times V_{BR} @ 25^{\circ}C \times \Delta T$

## Applications

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

# 1.5SMC 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-214AB (SMC) size format. The Transient Voltage Suppressor series offers a choice of Breakdown Voltages from 6.8 V up to 550 V. Typical fast response times are less than 1.0 picosecond for unidirectional devices and less than 5.0 picoseconds for bidirectional devices from 0 V to Minimum Breakdown Voltage.

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

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

| Parameter                                                                                                        | Symbol    | Value       | Unit        |
|------------------------------------------------------------------------------------------------------------------|-----------|-------------|-------------|
| Minimum Peak Pulse Power Dissipation ( $T_P = 1$ ms) (Note 1,2)                                                  | $P_{PK}$  | 1500        | Watts       |
| Peak Forward Surge Current<br>8.3 ms Single Half Sine Wave Superimposed on Rated Load<br>(JEDEC Method) (Note 3) | $I_{FSM}$ | 200         | Amps        |
| Maximum Instantaneous Forward Voltage @ $I_{PP} = 100$ A<br>(For Unidirectional Units Only)                      | $V_F$     | 3.5<br>5.0  | Volts       |
| Operating Temperature Range                                                                                      | $T_J$     | -55 to +150 | $^{\circ}C$ |
| Storage Temperature Range                                                                                        | $T_{STG}$ | -55 to +150 | $^{\circ}C$ |

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

# BOURNS®

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## How to Order

Series \_\_\_\_\_ 1.5SMC 6.8 CA - H

1.5SMC = SMC/DO-214AB

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

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

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

\* RoHS Directive 2002/95/EC Jan. 27, 2003 including annex and RoHS Recast 2011/65/EU June 8, 2011.

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

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# 1.5SMC Transient Voltage Suppressor Diode Series

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

| Unidirectional Device |         | Bidirectional Device |         | Breakdown Voltage $V_{BR}$ (Volts) |       |              | Working Peak Reverse Voltage | Maximum Reverse Leakage @ $V_{RWM}$ | Maximum Reverse Voltage @ $I_{RSM}$ | Maximum Reverse Surge Current |
|-----------------------|---------|----------------------|---------|------------------------------------|-------|--------------|------------------------------|-------------------------------------|-------------------------------------|-------------------------------|
| Part No.              | Marking | Part No.             | Marking | Min.                               | Max.  | @ $I_T$ (mA) | $V_{RWM}$ (V)                | $I_R$ ( $\mu\text{A}$ )             | $V_{RSM}$ (V)                       | $I_{RSM}$ (A)                 |
| 1.5SMC6.8A            | 6V8A    | 1.5SMC6.8CA          | 6V8C    | 6.45                               | 7.14  | 10           | 5.8                          | 1000                                | 10.5                                | 144.8                         |
| 1.5SMC7.5A            | 7V5A    | 1.5SMC7.5CA          | 7V5C    | 7.13                               | 7.88  | 10           | 6.4                          | 500                                 | 11.3                                | 134.5                         |
| 1.5SMC8.2A            | 8V2A    | 1.5SMC8.2CA          | 8V2C    | 7.79                               | 8.61  | 10           | 7.02                         | 200                                 | 12.1                                | 125.6                         |
| 1.5SMC9.1A            | 9V1A    | 1.5SMC9.1CA          | 9V1C    | 8.65                               | 9.5   | 1            | 7.78                         | 50                                  | 13.4                                | 113.4                         |
| 1.5SMC10A             | 10A     | 1.5SMC10CA           | 10C     | 9.5                                | 10.5  | 1            | 8.55                         | 10                                  | 14.5                                | 104.8                         |
| 1.5SMC11A             | 11A     | 1.5SMC11CA           | 11C     | 10.5                               | 11.6  | 1            | 9.4                          | 5                                   | 15.6                                | 97.4                          |
| 1.5SMC12A             | 12A     | 1.5SMC12CA           | 12C     | 11.4                               | 12.6  | 1            | 10.2                         | 5                                   | 16.7                                | 91                            |
| 1.5SMC13A             | 13A     | 1.5SMC13CA           | 13C     | 12.4                               | 13.7  | 1            | 11.1                         | 1                                   | 18.2                                | 83.5                          |
| 1.5SMC15A             | 15A     | 1.5SMC15CA           | 15C     | 14.3                               | 15.8  | 1            | 12.8                         | 1                                   | 21.2                                | 71.7                          |
| 1.5SMC16A             | 16A     | 1.5SMC16CA           | 16C     | 15.2                               | 16.8  | 1            | 13.6                         | 1                                   | 22.5                                | 67.6                          |
| 1.5SMC18A             | 18A     | 1.5SMC18CA           | 18C     | 17.1                               | 18.9  | 1            | 15.3                         | 1                                   | 25.2                                | 60.3                          |
| 1.5SMC20A             | 20A     | 1.5SMC20CA           | 20C     | 19                                 | 21    | 1            | 17.1                         | 1                                   | 27.7                                | 54.9                          |
| 1.5SMC22A             | 22A     | 1.5SMC22CA           | 22C     | 20.9                               | 23.1  | 1            | 18.8                         | 1                                   | 30.6                                | 49.7                          |
| 1.5SMC24A             | 24A     | 1.5SMC24CA           | 24C     | 22.8                               | 25.2  | 1            | 20.5                         | 1                                   | 33.2                                | 45.8                          |
| 1.5SMC27A             | 27A     | 1.5SMC27CA           | 27C     | 25.7                               | 28.4  | 1            | 23.1                         | 1                                   | 37.5                                | 40.5                          |
| 1.5SMC30A             | 30A     | 1.5SMC30CA           | 30C     | 28.5                               | 31.5  | 1            | 25.6                         | 1                                   | 41.4                                | 36.7                          |
| 1.5SMC33A             | 33A     | 1.5SMC33CA           | 33C     | 31.4                               | 34.7  | 1            | 28.2                         | 1                                   | 45.7                                | 33.3                          |
| 1.5SMC36A             | 36A     | 1.5SMC36CA           | 36C     | 34.2                               | 37.8  | 1            | 30.8                         | 1                                   | 49.9                                | 30.5                          |
| 1.5SMC39A             | 39A     | 1.5SMC39CA           | 39C     | 37.1                               | 41    | 1            | 33.3                         | 1                                   | 53.9                                | 28.2                          |
| 1.5SMC43A             | 43A     | 1.5SMC43CA           | 43C     | 40.9                               | 45.2  | 1            | 36.8                         | 1                                   | 59.3                                | 25.6                          |
| 1.5SMC47A             | 47A     | 1.5SMC47CA           | 47C     | 44.7                               | 49.4  | 1            | 40.2                         | 1                                   | 64.8                                | 23.5                          |
| 1.5SMC51A             | 51A     | 1.5SMC51CA           | 51C     | 48.5                               | 53.6  | 1            | 43.6                         | 1                                   | 70.1                                | 21.7                          |
| 1.5SMC56A             | 56A     | 1.5SMC56CA           | 56C     | 53.2                               | 58.8  | 1            | 47.8                         | 1                                   | 77                                  | 19.7                          |
| 1.5SMC62A             | 62A     | 1.5SMC62CA           | 62C     | 58.9                               | 65.1  | 1            | 53                           | 1                                   | 85                                  | 17.9                          |
| 1.5SMC68A             | 68A     | 1.5SMC68CA           | 68C     | 64.6                               | 71.4  | 1            | 58.1                         | 1                                   | 92                                  | 16.5                          |
| 1.5SMC75A             | 75A     | 1.5SMC75CA           | 75C     | 71.3                               | 78.8  | 1            | 64.1                         | 1                                   | 103                                 | 14.8                          |
| 1.5SMC82A             | 82A     | 1.5SMC82CA           | 82C     | 77.9                               | 86.1  | 1            | 70.1                         | 1                                   | 113                                 | 13.5                          |
| 1.5SMC91A             | 91A     | 1.5SMC91CA           | 91C     | 86.5                               | 95.5  | 1            | 77.8                         | 1                                   | 125                                 | 12.2                          |
| 1.5SMC100A            | 100A    | 1.5SMC100CA          | 100C    | 95                                 | 105   | 1            | 85.5                         | 1                                   | 137                                 | 11.1                          |
| 1.5SMC110A            | 110A    | 1.5SMC110CA          | 110C    | 105                                | 116   | 1            | 94                           | 1                                   | 152                                 | 10                            |
| 1.5SMC120A            | 120A    | 1.5SMC120CA          | 120C    | 114                                | 126   | 1            | 102                          | 1                                   | 165                                 | 9.2                           |
| 1.5SMC130A            | 130A    | 1.5SMC130CA          | 130C    | 124                                | 137   | 1            | 111                          | 1                                   | 179                                 | 8.5                           |
| 1.5SMC150A            | 150A    | 1.5SMC150CA          | 150C    | 143                                | 158   | 1            | 128                          | 1                                   | 207                                 | 7.3                           |
| 1.5SMC160A            | 160A    | 1.5SMC160CA          | 160C    | 152                                | 168   | 1            | 136                          | 1                                   | 219                                 | 6.9                           |
| 1.5SMC170A            | 170A    | 1.5SMC170CA          | 170C    | 162                                | 179   | 1            | 145                          | 1                                   | 234                                 | 6.5                           |
| 1.5SMC180A            | 180A    | 1.5SMC180CA          | 180C    | 171                                | 189   | 1            | 154                          | 1                                   | 246                                 | 6.2                           |
| 1.5SMC200A            | 200A    | 1.5SMC200CA          | 200C    | 190                                | 210   | 1            | 171                          | 1                                   | 274                                 | 5.5                           |
| 1.5SMC220A            | 220A    | 1.5SMC220CA          | 220C    | 209                                | 231   | 1            | 185                          | 1                                   | 328                                 | 4.6                           |
| 1.5SMC250A            | 250A    | 1.5SMC250CA          | 250C    | 237                                | 263   | 1            | 214                          | 1                                   | 344                                 | 4.4                           |
| 1.5SMC300A            | 300A    | 1.5SMC300CA          | 300C    | 285                                | 315   | 1            | 256                          | 1                                   | 414                                 | 3.7                           |
| 1.5SMC350A            | 350A    | 1.5SMC350CA          | 350C    | 332                                | 368   | 1            | 300                          | 1                                   | 482                                 | 3.2                           |
| 1.5SMC400A            | 400A    | 1.5SMC400CA          | 400C    | 380                                | 420   | 1            | 342                          | 1                                   | 548                                 | 2.8                           |
| 1.5SMC440A            | 440A    | 1.5SMC440CA          | 440C    | 418                                | 462   | 1            | 376                          | 1                                   | 602                                 | 2.5                           |
| 1.5SMC480A            | 480A    | 1.5SMC480CA          | 480C    | 456                                | 504   | 1            | 408                          | 1                                   | 658                                 | 2.3                           |
| 1.5SMC510A            | 510A    | 1.5SMC510CA          | 510C    | 485                                | 535   | 1            | 434                          | 1                                   | 698                                 | 2.1                           |
| 1.5SMC530A            | 530A    | 1.5SMC530CA          | 530C    | 503.5                              | 556.5 | 1            | 477                          | 1                                   | 725                                 | 2.1                           |
| 1.5SMC540A            | 540A    | 1.5SMC540CA          | 540C    | 513                                | 567   | 1            | 486                          | 1                                   | 740                                 | 2                             |
| 1.5SMC550A            | 550A    | 1.5SMC550CA          | 550C    | 522.5                              | 577.5 | 1            | 495                          | 1                                   | 760                                 | 2                             |

### Notes:

- Suffix 'A' denotes a 5 % tolerance unidirectional device.
- Suffix 'CA' denotes a 5 % tolerance bidirectional device.
- For bidirectional devices with a  $V_R$  of 10 volts or less, the  $I_R$  limit is double.

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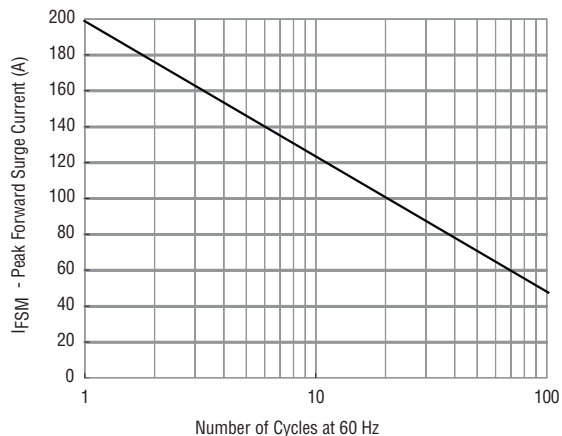
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## Rating & Characteristic Curves

### Pulse Derating Curve



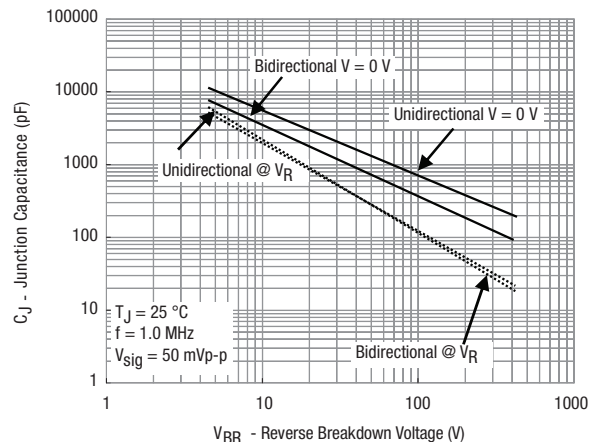
### Maximum Non-Repetitive Surge Current



### Pulse Waveform



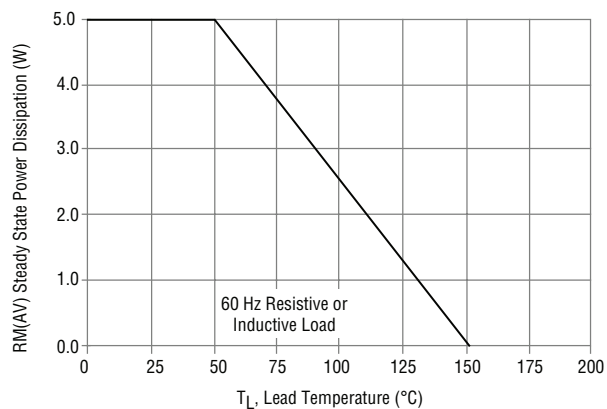
### Typical Junction Capacitance



### Pulse Rating Curve



### Steady State Power Derating Curve



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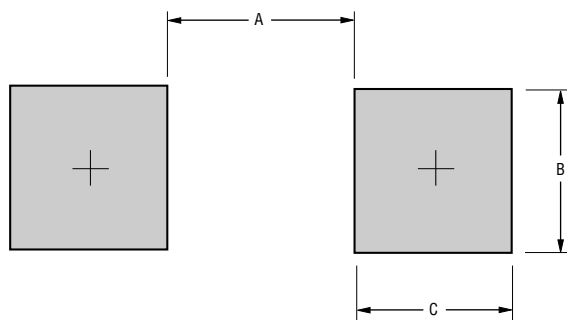
## Product Dimensions



| Dimension | SMC (DO-214AB)                         |
|-----------|----------------------------------------|
| A         | $\frac{6.60 - 7.11}{(0.260 - 0.280)}$  |
| B         | $\frac{5.59 - 6.22}{(0.220 - 0.245)}$  |
| C         | $\frac{2.90 - 3.20}{(0.115 - 0.125)}$  |
| D         | $\frac{7.75 - 8.13}{(0.305 - 0.320)}$  |
| E         | $\frac{0.05 - 0.202}{(0.002 - 0.008)}$ |
| F         | $\frac{2.00 - 2.62}{(0.079 - 0.103)}$  |
| G         | $\frac{0.76 - 1.52}{(0.030 - 0.060)}$  |

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

## Recommended Footprint



| Dimension | SMC (DO-214AB)         |
|-----------|------------------------|
| a (Max.)  | $\frac{4.69}{(0.185)}$ |
| b (Min.)  | $\frac{3.07}{(0.121)}$ |
| c (Min.)  | $\frac{1.52}{(0.060)}$ |

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

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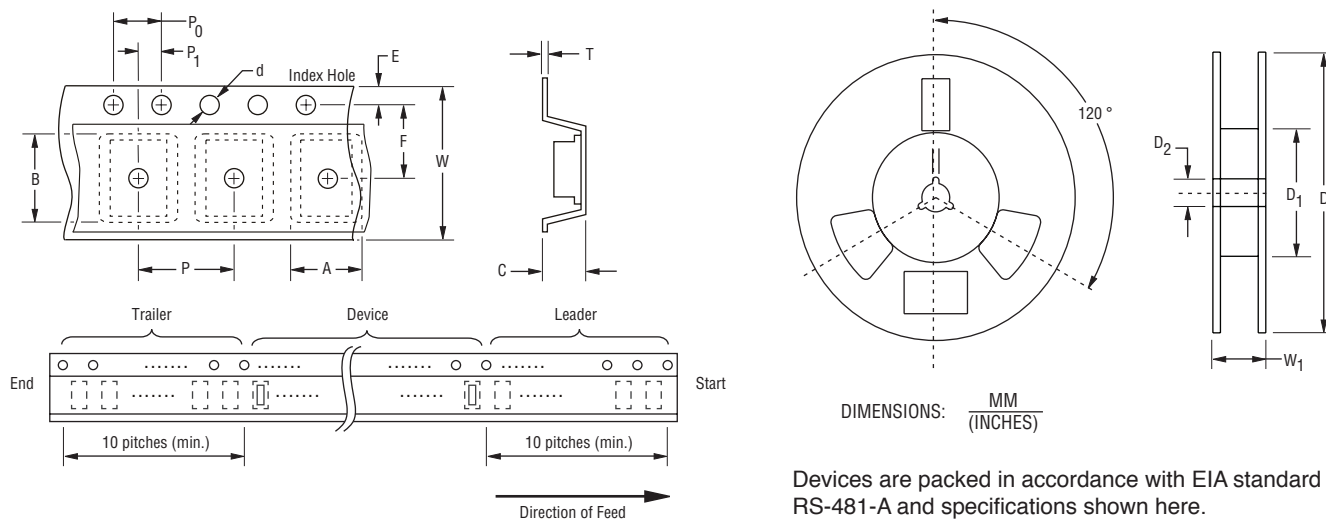
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# 1.5SMC Transient Voltage Suppressor Diode Series

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## Packaging Information

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



| Item                   | Symbol         | SMC (DO-214AB)                                     |                        |
|------------------------|----------------|----------------------------------------------------|------------------------|
|                        |                | 7 Inch Reel                                        | 13 Inch Reel           |
| Carrier Width          | A              | $6.0 \pm 2.0$<br>(0.236 - 0.079)                   |                        |
| Carrier Length         | B              | $8.3 \pm 0.20$<br>(0.327 ± 0.008)                  |                        |
| Carrier Depth          | C              | $2.5 \pm 0.20$<br>(0.098 ± 0.008)                  |                        |
| Sprocket Hole          | d              | $1.50 \pm 0.10$<br>(0.059 ± 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> | $\frac{13.0 + 0.50/-0.20}{(0.512 + 0.020/-0.008)}$ |                        |
| Sprocket Hole Position | E              | $1.75 \pm 0.10$<br>(0.069 ± 0.004)                 |                        |
| Punch Hole Position    | F              | $7.50 \pm 0.10$<br>(0.295 ± 0.004)                 |                        |
| 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> | $2.00 \pm 0.10$<br>(0.079 ± 0.004)                 |                        |
| Overall Tape Thickness | T              | $0.30 \pm 0.10$<br>(0.012 ± 0.004)                 |                        |
| Tape Width             | W              | $16.00 \pm 0.30$<br>(0.630 ± 0.012)                |                        |
| Reel Width             | W <sub>1</sub> | $\frac{22.4}{(0.882)}$ MAX.                        |                        |
| Quantity per Reel      | --             | 500                                                | 3,000                  |

REV. 07/17

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