

# SA5.0C - SA170CA

## BIDIRECTIONAL TRANSIENT VOLTAGE SUPPRESSOR

**V<sub>BR</sub> : 6.8 - 200 Volts**  
**PPK : 500 Watts**

### FEATURES :

- \* 500W surge capability at 1ms
- \* Excellent clamping capability
- \* Low zener impedance
- \* Fast response time : typically less than 1.0 ps from 0 volt to V<sub>BR(min.)</sub>
- \* Typical I<sub>R</sub> less than 1μA above 10V
- \* **Pb / RoHS Free**

### MECHANICAL DATA

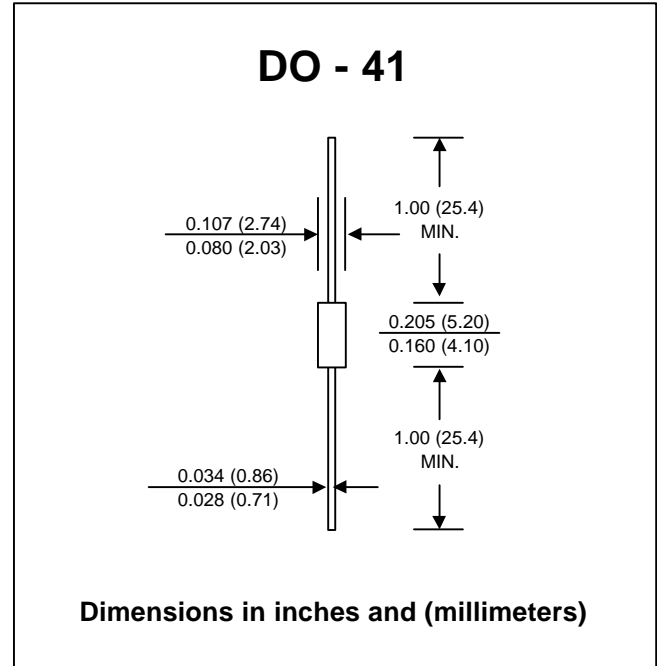
- \* Case : DO-41 Molded plastic
- \* Epoxy : UL94V-O rate flame retardant
- \* Lead : Axial lead solderable per MIL-STD-202, method 208 guaranteed
- \* Mounting position : Any
- \* Weight : 0.339 gram

### DEVICES FOR UNIPOLAR APPLICATIONS

For uni-directional without "C"  
 Electrical characteristics apply in both directions

### MAXIMUM RATINGS

Rating at 25 °C ambient temperature unless otherwise specified.



| Rating  | Symbol   | Value         | Unit |
|---|----------|---------------|------|
| Peak Power Dissipation at Ta = 25 °C, Tp=1ms (Note1)                                  | PPK      | Minimum 500   | W    |
| Steady State Power Dissipation at TL = 75 °C<br>Lead Lengths 0.375", (9.5mm) (Note 2) | Pd       | 3.0           | W    |
| Operating and Storage Temperature Range   | TJ, TSTG | - 65 to + 175 | °C   |

### Note :

(1) Non-repetitive Current pulse, per Fig. 2 and derated above Ta = 25 °C per Fig. 1

## ELECTRICAL CHARACTERISTICS

Rating at 25 °C ambient temperature unless otherwise specified

| TYPE | Breakdown Voltage @ It<br>( Note 1 ) |      |      | Working Peak<br>Reverse<br>Voltage<br>VRWM | Maximum<br>Reverse Leakage<br>@ VRWM<br>IR<br>( $\mu$ A) | Maximum<br>Reverse<br>Current<br>IRSM<br>(A) | Maximum<br>Clamping<br>Voltage @ IRSM<br>VRSM<br>(V) | Maximum<br>Voltage<br>Temperature<br>Variation of VBR<br>(mV / °C) |
|------|--------------------------------------|------|------|--|--|--|--|--|
|      | VBR (V)                              |      | It   |  |  |  |  |  |
|      | Min.                                 | Max. | (mA) | (V)  | ( $\mu$ A)   | (A)  | (V)  | (mV / °C)  |

|         |      |      |     |      |      |      |      |      |
|---------|------|------|-----|------|------|------|------|------|
| SA5.0C  | 6.40 | 7.3  | 10  | 5.0  | 1200 | 52.0 | 9.6  | 5.0  |
| SA5.0CA | 6.40 | 7.25 | 10  | 5.0  | 1200 | 54.3 | 9.2  | 5.0  |
| SA6.0C  | 6.67 | 8.15 | 10  | 6.0  | 1200 | 43.9 | 11.4 | 5.0  |
| SA6.0CA | 6.67 | 7.37 | 10  | 6.0  | 1200 | 48.5 | 10.3 | 5.0  |
| SA6.5C  | 7.22 | 8.82 | 10  | 6.5  | 800  | 40.7 | 12.3 | 5.0  |
| SA6.5CA | 7.22 | 7.98 | 10  | 6.5  | 800  | 44.7 | 11.2 | 5.0  |
| SA7.0C  | 7.78 | 9.51 | 10  | 7.0  | 300  | 37.8 | 13.3 | 6.0  |
| SA7.0CA | 7.78 | 8.60 | 10  | 7.0  | 300  | 41.7 | 12.0 | 6.0  |
| SA7.5C  | 8.33 | 10.2 | 1.0 | 7.5  | 100  | 35.0 | 14.3 | 7.0  |
| SA7.5CA | 8.33 | 9.21 | 1.0 | 7.5  | 100  | 38.8 | 12.9 | 7.0  |
| SA8.0C  | 8.89 | 10.9 | 1.0 | 8.0  | 50   | 33.3 | 15.0 | 7.0  |
| SA8.0CA | 8.89 | 9.30 | 1.0 | 8.0  | 50   | 36.7 | 13.6 | 7.0  |
| SA8.5C  | 9.44 | 11.5 | 1.0 | 8.5  | 10   | 31.4 | 15.9 | 8.0  |
| SA8.5CA | 9.44 | 10.4 | 1.0 | 8.5  | 10   | 34.7 | 14.4 | 8.0  |
| SA9.0C  | 10.0 | 12.2 | 1.0 | 9.0  | 2.0  | 29.5 | 16.9 | 9.0  |
| SA9.0CA | 10.0 | 11.1 | 1.0 | 9.0  | 2.0  | 32.5 | 15.4 | 9.0  |
| SA10C   | 11.1 | 13.6 | 1.0 | 10.0 | 2.0  | 26.6 | 18.8 | 10.0 |
| SA10CA  | 11.1 | 12.3 | 1.0 | 10.0 | 2.0  | 29.4 | 17.0 | 10.0 |
| SA11C   | 12.2 | 14.9 | 1.0 | 11.0 | 1.0  | 24.9 | 20.1 | 11.0 |
| SA11CA  | 12.2 | 13.5 | 1.0 | 11.0 | 1.0  | 27.4 | 18.2 | 11.0 |
| SA12C   | 13.3 | 16.3 | 1.0 | 12.0 | 1.0  | 22.7 | 22.0 | 12.0 |
| SA12CA  | 13.3 | 14.7 | 1.0 | 12.0 | 1.0  | 25.1 | 19.9 | 12.0 |
| SA13C   | 14.4 | 17.6 | 1.0 | 13.0 | 1.0  | 21.0 | 23.8 | 13.0 |
| SA13CA  | 14.4 | 15.9 | 1.0 | 13.0 | 1.0  | 23.2 | 21.5 | 13.0 |
| SA14C   | 15.6 | 19.1 | 1.0 | 14.0 | 1.0  | 19.4 | 25.8 | 14.0 |
| SA14CA  | 15.6 | 17.2 | 1.0 | 14.0 | 1.0  | 21.5 | 23.2 | 14.0 |
| SA15C   | 16.7 | 20.4 | 1.0 | 15.0 | 1.0  | 18.8 | 26.9 | 16.0 |
| SA15CA  | 16.7 | 18.5 | 1.0 | 15.0 | 1.0  | 20.6 | 24.4 | 16.0 |
| SA16C   | 17.8 | 21.8 | 1.0 | 16.0 | 1.0  | 17.6 | 28.8 | 19.0 |
| SA16CA  | 17.8 | 19.7 | 1.0 | 16.0 | 1.0  | 19.2 | 26.0 | 17.0 |
| SA17C   | 18.9 | 23.1 | 1.0 | 17.0 | 1.0  | 16.4 | 30.5 | 20.0 |
| SA17CA  | 18.9 | 20.9 | 1.0 | 17.0 | 1.0  | 18.1 | 27.6 | 19.0 |
| SA18C   | 20.0 | 24.4 | 1.0 | 18.0 | 1.0  | 15.5 | 32.2 | 21.0 |
| SA18CA  | 20.0 | 22.1 | 1.0 | 18.0 | 1.0  | 17.2 | 29.2 | 20.0 |
| SA20C   | 22.2 | 27.1 | 1.0 | 20.0 | 1.0  | 13.9 | 35.8 | 25.0 |
| SA20CA  | 22.2 | 24.5 | 1.0 | 20.0 | 1.0  | 15.4 | 32.4 | 23.0 |
| SA22C   | 24.4 | 29.8 | 1.0 | 22.0 | 1.0  | 12.7 | 39.4 | 28.0 |
| SA22CA  | 24.4 | 26.9 | 1.0 | 22.0 | 1.0  | 14.1 | 35.5 | 25.0 |
| SA24C   | 26.7 | 32.6 | 1.0 | 24.0 | 1.0  | 11.6 | 43.0 | 31.0 |
| SA24CA  | 26.7 | 29.5 | 1.0 | 24.0 | 1.0  | 12.8 | 38.9 | 28.0 |
| SA26C   | 28.9 | 35.3 | 1.0 | 26.0 | 1.0  | 10.7 | 46.6 | 31.0 |
| SA26CA  | 28.9 | 31.9 | 1.0 | 26.0 | 1.0  | 11.9 | 42.1 | 30.0 |
| SA28C   | 31.1 | 38.0 | 1.0 | 28.0 | 1.0  | 9.9  | 50.0 | 35.0 |
| SA28CA  | 31.1 | 34.4 | 1.0 | 28.0 | 1.0  | 11.0 | 45.4 | 31.0 |
| SA30C   | 33.3 | 40.7 | 1.0 | 30.0 | 1.0  | 9.3  | 53.5 | 39.0 |
| SA30CA  | 33.3 | 36.8 | 1.0 | 30.0 | 1.0  | 10.3 | 48.4 | 36.0 |
| SA33C   | 36.7 | 44.9 | 1.0 | 33.0 | 1.0  | 8.5  | 59.0 | 42.0 |
| SA33CA  | 36.7 | 40.6 | 1.0 | 33.0 | 1.0  | 9.4  | 53.3 | 39.0 |

## ELECTRICAL CHARACTERISTICS

Rating at 25 °C ambient temperature unless otherwise specified

| TYPE    | Breakdown Voltage @ $I_t$<br>( Note 1 ) |      | Working Peak<br>Reverse<br>Voltage<br>$V_{RWM}$ | Maximum<br>Reverse Leakage<br>@ $V_{RWM}$<br>$I_R$ | Maximum<br>Reverse<br>Current<br>$I_{RSM}$ | Maximum<br>Clamping<br>Voltage @ $I_{RSM}$<br>$V_{RSM}$ | Maximum<br>Voltage<br>Temperature<br>Variation of $V_{BR}$<br>(mV / °C) |           |
|---------|---|------|---|--|--|---|---|-----------|
|         | $V_{BR}$ (V)                            |      |   |  |  |   |   | $I_t$     |
|         | Min.                                    | Max. | (mA)  | (V)  | ( $\mu$ A)                                 | (A)   | (V)   | (mV / °C) |
| SA36C   | 40.0                                    | 48.9 | 1.0   | 36.0   | 1.0  | 7.8   | 64.3  | 46.0      |
| SA36CA  | 40.0                                    | 44.2 | 1.0   | 36.0   | 1.0  | 8.6   | 58.1  | 41.0      |
| SA40C   | 44.4                                    | 54.3 | 1.0   | 40.0   | 1.0  | 7.0   | 71.4  | 51.0      |
| SA40CA  | 44.4                                    | 49.1 | 1.0   | 40.0   | 1.0  | 7.8   | 64.5  | 46.0      |
| SA43C   | 47.8                                    | 58.4 | 1.0   | 43.0   | 1.0  | 6.5   | 76.7  | 55.0      |
| SA43CA  | 47.8                                    | 52.8 | 1.0   | 43.0   | 1.0  | 7.2   | 69.4  | 50.0      |
| SA45C   | 50.0                                    | 61.1 | 1.0   | 45.0   | 1.0  | 6.2   | 80.3  | 58.0      |
| SA45CA  | 50.0                                    | 55.3 | 1.0   | 45.0   | 1.0  | 6.9   | 72.7  | 52.0      |
| SA48C   | 53.3                                    | 65.1 | 1.0   | 48.0   | 1.0  | 5.8   | 85.5  | 63.0      |
| SA48CA  | 53.3                                    | 58.9 | 1.0   | 48.0   | 1.0  | 6.5   | 77.4  | 56.0      |
| SA51C   | 56.7                                    | 69.3 | 1.0   | 51.0   | 1.0  | 5.5   | 91.1  | 66.0      |
| SA51CA  | 56.7                                    | 62.7 | 1.0   | 51.0   | 1.0  | 6.1   | 82.4  | 61.0      |
| SA54C   | 60.0                                    | 73.3 | 1.0   | 54.0   | 1.0  | 5.2   | 96.3  | 71.0      |
| SA54CA  | 60.0                                    | 66.3 | 1.0   | 54.0   | 1.0  | 5.7   | 87.1  | 65.0      |
| SA58C   | 64.4                                    | 78.7 | 1.0   | 58.0   | 1.0  | 4.9   | 103   | 78.0      |
| SA58CA  | 64.4                                    | 71.2 | 1.0   | 58.0   | 1.0  | 5.3   | 93.6  | 70.0      |
| SA60C   | 66.7                                    | 81.5 | 1.0   | 60.0   | 1.0  | 4.7   | 107   | 80.0      |
| SA60CA  | 66.7                                    | 73.7 | 1.0   | 60.0   | 1.0  | 5.2   | 96.8  | 71.0      |
| SA64C   | 71.1                                    | 86.9 | 1.0   | 64.0   | 1.0  | 4.4   | 114   | 86.0      |
| SA64CA  | 71.1                                    | 78.6 | 1.0   | 64.0   | 1.0  | 4.9   | 103   | 76.0      |
| SA70C   | 77.8                                    | 95.1 | 1.0   | 70.0   | 1.0  | 4.0   | 125   | 94.0      |
| SA70CA  | 77.8                                    | 86.0 | 1.0   | 70.0   | 1.0  | 4.4   | 113   | 85.0      |
| SA75C   | 83.3                                    | 102  | 1.0   | 75.0   | 1.0  | 3.7   | 134   | 101       |
| SA75CA  | 83.3                                    | 92.1 | 1.0   | 75.0   | 1.0  | 4.1   | 121   | 91.0      |
| SA78C   | 86.7                                    | 106  | 1.0   | 78.0   | 1.0  | 3.6   | 139   | 105       |
| SA78CA  | 86.7                                    | 95.8 | 1.0   | 78.0   | 1.0  | 4.0   | 126   | 95.0      |
| SA85C   | 94.4                                    | 115  | 1.0   | 85.0   | 1.0  | 3.3   | 151   | 114       |
| SA85CA  | 94.4                                    | 104  | 1.0   | 85.0   | 1.0  | 3.6   | 137   | 103       |
| SA90C   | 100                                     | 122  | 1.0   | 90.0   | 1.0  | 3.1   | 160   | 121       |
| SA90CA  | 100                                     | 111  | 1.0   | 90.0   | 1.0  | 3.4   | 146   | 110       |
| SA100C  | 111                                     | 136  | 1.0   | 100  | 1.0  | 2.8   | 179   | 135       |
| SA100CA | 111                                     | 123  | 1.0   | 100  | 1.0  | 3.1   | 162   | 123       |
| SA110C  | 122                                     | 149  | 1.0   | 110  | 1.0  | 2.6   | 196   | 148       |
| SA110CA | 122                                     | 135  | 1.0   | 110  | 1.0  | 2.8   | 177   | 133       |
| SA120C  | 133                                     | 163  | 1.0   | 120  | 1.0  | 2.3   | 214   | 162       |
| SA120CA | 133                                     | 147  | 1.0   | 120  | 1.0  | 2   | 193   | 146       |
| SA130C  | 144                                     | 176  | 1.0   | 130  | 1.0  | 2.2   | 231   | 175       |
| SA130CA | 144                                     | 159  | 1.0   | 130  | 1.0  | 2.4   | 209   | 158       |
| SA150C  | 167                                     | 204  | 1.0   | 150  | 1.0  | 1.9   | 268   | 203       |
| SA150CA | 167                                     | 185  | 1.0   | 150  | 1.0  | 2.1   | 243   | 184       |
| SA160C  | 178                                     | 218  | 1.0   | 160  | 1.0  | 1.7   | 287   | 217       |
| SA160CA | 178                                     | 197  | 1.0   | 160  | 1.0  | 1.9   | 259   | 196       |
| SA170C  | 189                                     | 231  | 1.0   | 170  | 1.0  | 1.6   | 304   | 230       |
| SA170CA | 189                                     | 209  | 1.0   | 170  | 1.0  | 1.8   | 275   | 208       |

**Note:**

( 1 )  $V_{BR}$  measured after  $I_t$  applied for 300  $\mu$ s.,  $I_t$  = square wave pulse or equivalent.

## RATING AND CHARACTERISTIC CURVES ( SA5.0C - SA170CA )

FIG.1 - PULSE DERATING CURVE

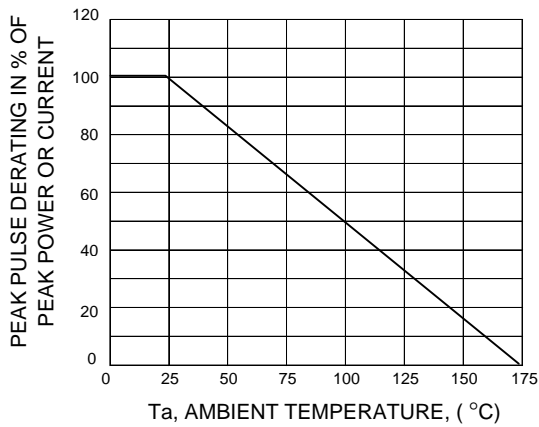


FIG.2 - PULSE WAVEFORM

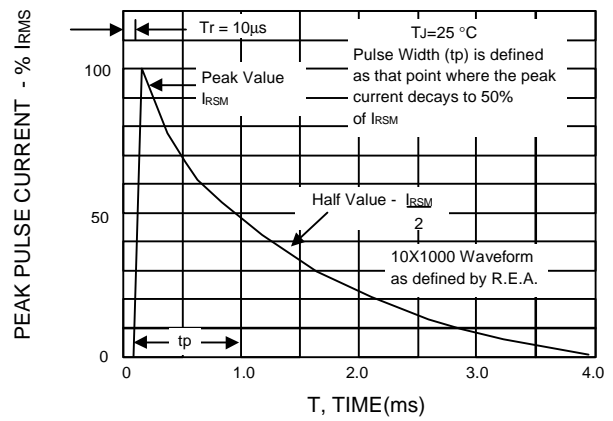


FIG.3 - STEADY STATE POWER DERATING

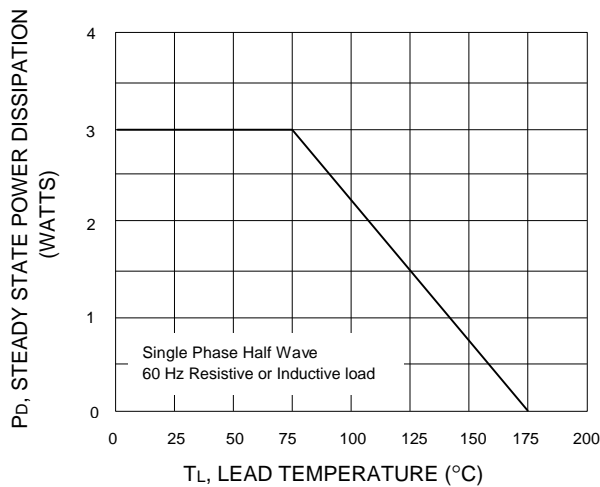


FIG.4 - PULSE RATING CURVE

