



Certificate Number: Q10561

Certificate Number: E17276

# SA5.0 - SA170A

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

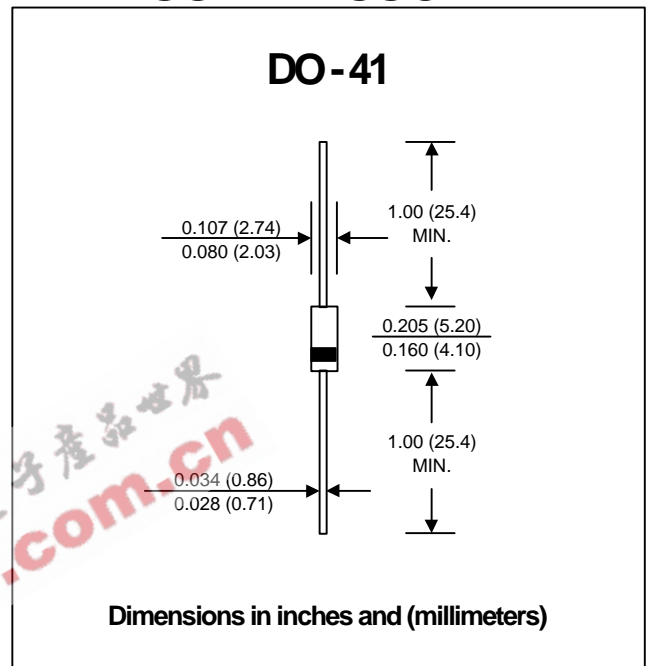
### FEATURES :

- \* 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

### MECHANICAL DATA

- \* Case : DO-41 Molded plastic
- \* Epoxy : UL94V-O rate flame retardant
- \* Lead : Axial lead solderable per MIL-STD-202, method 208 guaranteed
- \* Polarity : Color band denotes cathode end except Bipolar.
- \* Mounting position : Any
- \* Weight : 0.339 gram

## TRANSIENT VOLTAGE SUPPRESSOR



### DEVICES FOR BIPOLAR APPLICATIONS

For bi-directional use C or CA Suffix  
 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)   | P <sub>PK</sub>                   | Minimum 500   | Watts |
| Steady State Power Dissipation at TL = 75 °C<br>Lead Lengths 0.375", (9.5mm) (Note 2)                      | P <sub>D</sub>                    | 3.0           | Watts |
| Peak Forward Surge Current, 8.3ms Single Half Sine-Wave Superimposed on Rated Load (JEDEC Method) (Note 3) | I <sub>FSM</sub>                  | 70            | Amps. |
| Operating and Storage Temperature Range  | T <sub>J</sub> , T <sub>STG</sub> | - 65 to + 175 | °C    |

### Note :

- (1) Non-repetitive Current pulse, per Fig. 5 and derated above Ta = 25 °C per Fig. 1
- (2) Mounted on Copper Leaf area of 1.57 in<sup>2</sup> (40mm<sup>2</sup>).
- (3) 8.3 ms single half sine-wave, duty cycle = 4 pulses per minutes maximum.



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## 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<br>(V) | Maximum<br>Reverse Leakage<br>@ VRWM<br>IR<br>(µA) | 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<br>(mA) |   |  |  |  |  |
|        | Min.                                 | Max. |            |   |  |  |  |  |
| SA5.0  | 6.40                                 | 7.3  | 10         | 5.0   | 600  | 52.0   | 9.6  | 5.0  |
| SA5.0A | 6.40                                 | 7.0  | 10         | 5.0   | 600  | 54.3   | 9.2  | 5.0  |
| SA6.0  | 6.67                                 | 8.15 | 10         | 6.0   | 600  | 43.9   | 11.4   | 5.0  |
| SA6.0A | 6.67                                 | 7.37 | 10         | 6.0   | 600  | 48.5   | 10.3   | 5.0  |
| SA6.5  | 7.22                                 | 8.82 | 10         | 6.5   | 400  | 40.7   | 12.3   | 5.0  |
| SA6.5A | 7.22                                 | 7.98 | 10         | 6.5   | 400  | 44.7   | 11.2   | 5.0  |
| SA7.0  | 7.78                                 | 9.51 | 10         | 7.0   | 150  | 37.8   | 13.3   | 6.0  |
| SA7.0A | 7.78                                 | 8.60 | 10         | 7.0   | 150  | 41.7   | 12.0   | 6.0  |
| SA7.5  | 8.33                                 | 10.2 | 1.0        | 7.5   | 50   | 35.0   | 14.3   | 7.0  |
| SA7.5A | 8.33                                 | 9.21 | 1.0        | 7.5   | 50   | 38.8   | 12.9   | 7.0  |
| SA8.0  | 8.89                                 | 10.9 | 1.0        | 8.0   | 25   | 33.3   | 15.0   | 7.0  |
| SA8.0A | 8.89                                 | 9.83 | 1.0        | 8.0   | 25   | 36.7   | 13.6   | 7.0  |
| SA8.5  | 9.44                                 | 11.5 | 1.0        | 8.5   | 5.0  | 31.4   | 15.9   | 8.0  |
| SA8.5A | 9.44                                 | 10.4 | 1.0        | 8.5   | 5.0  | 34.7   | 14.4   | 8.0  |
| SA9.0  | 10.0                                 | 12.2 | 1.0        | 9.0   | 1.0  | 29.5   | 16.9   | 9.0  |
| SA9.0A | 10.0                                 | 11.1 | 1.0        | 9.0   | 1.0  | 32.5   | 15.4   | 9.0  |
| SA10   | 11.1                                 | 13.6 | 1.0        | 10.0  | 1.0  | 26.6   | 18.8   | 10.0   |
| SA10A  | 11.1                                 | 12.3 | 1.0        | 10.0  | 1.0  | 29.4   | 17.0   | 10.0   |
| SA11   | 12.2                                 | 14.9 | 1.0        | 11.0  | 1.0  | 24.9   | 20.1   | 11.0   |
| SA11A  | 12.2                                 | 13.5 | 1.0        | 11.0  | 1.0  | 27.4   | 18.2   | 11.0   |
| SA12   | 13.3                                 | 16.3 | 1.0        | 12.0  | 1.0  | 22.7   | 22.0   | 12.0   |
| SA12A  | 13.3                                 | 14.7 | 1.0        | 12.0  | 1.0  | 25.1   | 19.9   | 12.0   |
| SA13   | 14.4                                 | 17.6 | 1.0        | 13.0  | 1.0  | 21.0   | 23.8   | 13.0   |
| SA13A  | 14.4                                 | 15.9 | 1.0        | 13.0  | 1.0  | 23.2   | 21.5   | 13.0   |
| SA14   | 15.6                                 | 19.1 | 1.0        | 14.0  | 1.0  | 19.4   | 25.8   | 14.0   |
| SA14A  | 15.6                                 | 17.2 | 1.0        | 14.0  | 1.0  | 21.5   | 23.2   | 14.0   |
| SA15   | 16.7                                 | 20.4 | 1.0        | 15.0  | 1.0  | 18.8   | 26.9   | 16.0   |
| SA15A  | 16.7                                 | 18.5 | 1.0        | 15.0  | 1.0  | 20.6   | 24.4   | 16.0   |
| SA16   | 17.8                                 | 21.8 | 1.0        | 16.0  | 1.0  | 17.6   | 28.8   | 19.0   |
| SA16A  | 17.8                                 | 19.7 | 1.0        | 16.0  | 1.0  | 19.2   | 26.0   | 17.0   |
| SA17   | 18.9                                 | 23.1 | 1.0        | 17.0  | 1.0  | 16.4   | 30.5   | 20.0   |
| SA17A  | 18.9                                 | 20.9 | 1.0        | 17.0  | 1.0  | 18.1   | 27.6   | 19.0   |
| SA18   | 20.0                                 | 24.4 | 1.0        | 18.0  | 1.0  | 15.5   | 32.2   | 21.0   |
| SA18A  | 20.0                                 | 22.1 | 1.0        | 18.0  | 1.0  | 17.2   | 29.2   | 20.0   |
| SA20   | 22.2                                 | 27.1 | 1.0        | 20.0  | 1.0  | 13.9   | 35.8   | 25.0   |
| SA20A  | 22.2                                 | 24.5 | 1.0        | 20.0  | 1.0  | 15.4   | 32.4   | 23.0   |
| SA22   | 24.4                                 | 29.8 | 1.0        | 22.0  | 1.0  | 12.7   | 39.4   | 28.0   |
| SA22A  | 24.4                                 | 26.9 | 1.0        | 22.0  | 1.0  | 14.1   | 35.5   | 25.0   |
| SA24   | 26.7                                 | 32.6 | 1.0        | 24.0  | 1.0  | 11.6   | 43.0   | 31.0   |
| SA24A  | 26.7                                 | 29.5 | 1.0        | 24.0  | 1.0  | 12.8   | 38.9   | 28.0   |
| SA26   | 28.9                                 | 35.3 | 1.0        | 26.0  | 1.0  | 10.7   | 46.6   | 31.0   |
| SA26A  | 28.9                                 | 31.9 | 1.0        | 26.0  | 1.0  | 11.9   | 42.1   | 30.0   |
| SA28   | 31.1                                 | 38.0 | 1.0        | 28.0  | 1.0  | 9.9  | 50.0   | 35.0   |
| SA28A  | 31.1                                 | 34.4 | 1.0        | 28.0  | 1.0  | 11.0   | 45.4   | 31.0   |
| SA30   | 33.3                                 | 40.7 | 1.0        | 30.0  | 1.0  | 9.3  | 53.5   | 39.0   |
| SA30A  | 33.3                                 | 36.8 | 1.0        | 30.0  | 1.0  | 10.3   | 48.4   | 36.0   |
| SA33   | 36.7                                 | 44.9 | 1.0        | 33.0  | 1.0  | 8.5  | 59.0   | 42.0   |
| SA33A  | 36.7                                 | 40.6 | 1.0        | 33.0  | 1.0  | 9.4  | 53.3   | 39.0   |



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## ELECTRICAL CHARACTERISTICS

Rating at = 25 °C ambient temperature unless otherwise specified

| TYPE   | Breakdown Voltage @ It<br>( Note 1 ) |      | Working Peak<br>Reverse<br>Voltage | Maximum<br>Reverse Leakage<br>@ VRWM | Maximum<br>Reverse<br>Current | Maximum<br>Clamping<br>Voltage @ IRSM | Maximum<br>Voltage<br>Temperature<br>Variation of VBR |           |
|--------|--------------------------------------|------|------------------------------------|--------------------------------------|-------------------------------|---------------------------------------|---|-----------|
|        | VBR (V)                              |      |                                    |                                      |                               |                                       |   | VRWM      |
|        | Min.                                 | Max. | (mA)                               | (V)                                  | (µA)                          | (A)                                   | (V)   | (mV / °C) |
| SA36   | 40.0                                 | 48.9 | 1.0                                | 36.0                                 | 1.0                           | 7.8                                   | 64.3  | 46.0      |
| SA36A  | 40.0                                 | 44.2 | 1.0                                | 36.0                                 | 1.0                           | 8.6                                   | 58.1  | 41.0      |
| SA40   | 44.4                                 | 54.3 | 1.0                                | 40.0                                 | 1.0                           | 7.0                                   | 71.4  | 51.0      |
| SA40A  | 44.4                                 | 49.1 | 1.0                                | 40.0                                 | 1.0                           | 7.8                                   | 64.5  | 46.0      |
| SA43   | 47.8                                 | 58.4 | 1.0                                | 43.0                                 | 1.0                           | 6.5                                   | 76.7  | 55.0      |
| SA43A  | 47.8                                 | 52.8 | 1.0                                | 43.0                                 | 1.0                           | 7.2                                   | 69.4  | 50.0      |
| SA45   | 50.0                                 | 61.1 | 1.0                                | 45.0                                 | 1.0                           | 6.2                                   | 80.3  | 58.0      |
| SA45A  | 50.0                                 | 55.3 | 1.0                                | 45.0                                 | 1.0                           | 6.9                                   | 72.7  | 52.0      |
| SA48   | 53.3                                 | 65.1 | 1.0                                | 48.0                                 | 1.0                           | 5.8                                   | 85.5  | 63.0      |
| SA48A  | 53.3                                 | 58.9 | 1.0                                | 48.0                                 | 1.0                           | 6.5                                   | 77.4  | 56.0      |
| SA51   | 56.7                                 | 69.3 | 1.0                                | 51.0                                 | 1.0                           | 5.5                                   | 91.1  | 66.0      |
| SA51A  | 56.7                                 | 62.7 | 1.0                                | 51.0                                 | 1.0                           | 6.1                                   | 82.4  | 61.0      |
| SA54   | 60.0                                 | 73.3 | 1.0                                | 54.0                                 | 1.0                           | 5.2                                   | 96.3  | 71.0      |
| SA54A  | 60.0                                 | 66.3 | 1.0                                | 54.0                                 | 1.0                           | 5.7                                   | 87.1  | 65.0      |
| SA58   | 64.4                                 | 78.7 | 1.0                                | 58.0                                 | 1.0                           | 4.9                                   | 103   | 78.0      |
| SA58A  | 64.4                                 | 71.2 | 1.0                                | 58.0                                 | 1.0                           | 5.3                                   | 93.6  | 70.0      |
| SA60   | 66.7                                 | 81.5 | 1.0                                | 60.0                                 | 1.0                           | 4.7                                   | 107   | 80.0      |
| SA60A  | 66.7                                 | 73.7 | 1.0                                | 60.0                                 | 1.0                           | 5.2                                   | 96.8  | 71.0      |
| SA64   | 71.1                                 | 86.9 | 1.0                                | 64.0                                 | 1.0                           | 4.4                                   | 114   | 86.0      |
| SA64A  | 71.1                                 | 78.6 | 1.0                                | 64.0                                 | 1.0                           | 4.9                                   | 103   | 76.0      |
| SA70   | 77.8                                 | 95.1 | 1.0                                | 70.0                                 | 1.0                           | 4.0                                   | 125   | 94.0      |
| SA70A  | 77.8                                 | 86.0 | 1.0                                | 70.0                                 | 1.0                           | 4.4                                   | 113   | 85.0      |
| SA75   | 83.3                                 | 102  | 1.0                                | 75.0                                 | 1.0                           | 3.7                                   | 134   | 101       |
| SA75A  | 83.3                                 | 92.1 | 1.0                                | 75.0                                 | 1.0                           | 4.1                                   | 121   | 91.0      |
| SA78   | 86.7                                 | 106  | 1.0                                | 78.0                                 | 1.0                           | 3.6                                   | 139   | 105       |
| SA78A  | 86.7                                 | 95.8 | 1.0                                | 78.0                                 | 1.0                           | 4.0                                   | 126   | 95.0      |
| SA85   | 94.4                                 | 115  | 1.0                                | 85.0                                 | 1.0                           | 3.3                                   | 151   | 114       |
| SA85A  | 94.4                                 | 104  | 1.0                                | 85.0                                 | 1.0                           | 3.6                                   | 137   | 103       |
| SA90   | 100                                  | 122  | 1.0                                | 90.0                                 | 1.0                           | 3.1                                   | 160   | 121       |
| SA90A  | 100                                  | 111  | 1.0                                | 90.0                                 | 1.0                           | 3.4                                   | 146   | 110       |
| SA100  | 111                                  | 136  | 1.0                                | 100                                  | 1.0                           | 2.8                                   | 179   | 135       |
| SA100A | 111                                  | 123  | 1.0                                | 100                                  | 1.0                           | 3.1                                   | 162   | 123       |
| SA110  | 122                                  | 149  | 1.0                                | 110                                  | 1.0                           | 2.6                                   | 196   | 148       |
| SA110A | 122                                  | 135  | 1.0                                | 110                                  | 1.0                           | 2.8                                   | 177   | 133       |
| SA120  | 133                                  | 163  | 1.0                                | 120                                  | 1.0                           | 2.3                                   | 214   | 162       |
| SA120A | 133                                  | 147  | 1.0                                | 120                                  | 1.0                           | 2                                     | 193   | 146       |
| SA130  | 144                                  | 176  | 1.0                                | 130                                  | 1.0                           | 2.2                                   | 231   | 175       |
| SA130A | 144                                  | 159  | 1.0                                | 130                                  | 1.0                           | 2.4                                   | 209   | 158       |
| SA150  | 167                                  | 204  | 1.0                                | 150                                  | 1.0                           | 1.9                                   | 268   | 203       |
| SA150A | 167                                  | 185  | 1.0                                | 150                                  | 1.0                           | 2.1                                   | 243   | 184       |
| SA160  | 178                                  | 218  | 1.0                                | 160                                  | 1.0                           | 1.7                                   | 287   | 217       |
| SA160A | 178                                  | 197  | 1.0                                | 160                                  | 1.0                           | 1.9                                   | 259   | 196       |
| SA170  | 189                                  | 231  | 1.0                                | 170                                  | 1.0                           | 1.6                                   | 304   | 230       |
| SA170A | 189                                  | 209  | 1.0                                | 170                                  | 1.0                           | 1.8                                   | 275   | 208       |

**Note:**

- ( 1 ) VBR measured after It applied for 300 µs., It = square wave pulse or equivalent.
- ( 2 ) VF = 3.5 Vmax., IF = 35 Amps. ( 6.8 Volts thru 91 Volts )  
 VF = 5.0 Vmax., IF = 35 Amps. ( 150 Volts thru 200 Volts ) per 1/2 square or equivalent sine wave.  
 PW = 8.3 ms, duty cycle = 4 pulses per minute maximum.

## RATING AND CHARACTERISTIC CURVES ( SA5.0 - SA170A )

FIG.1 - PULSE DERATING CURVE

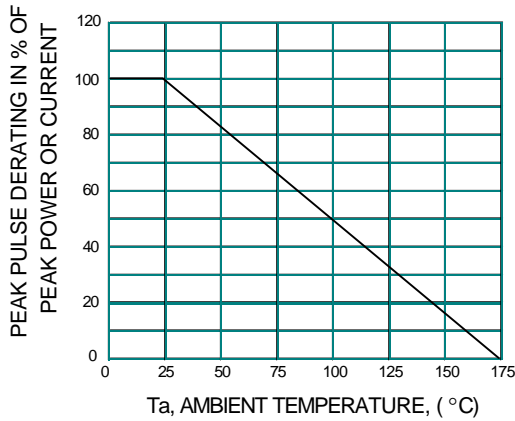


FIG.2 - MAXIMUM NON-REPETITIVE SURGE CURRENT

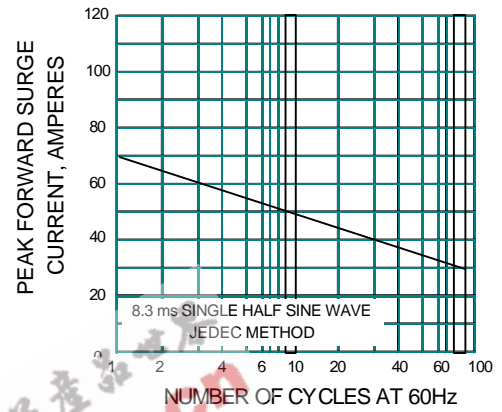


FIG.3 - STEADY STATE POWER DERATING

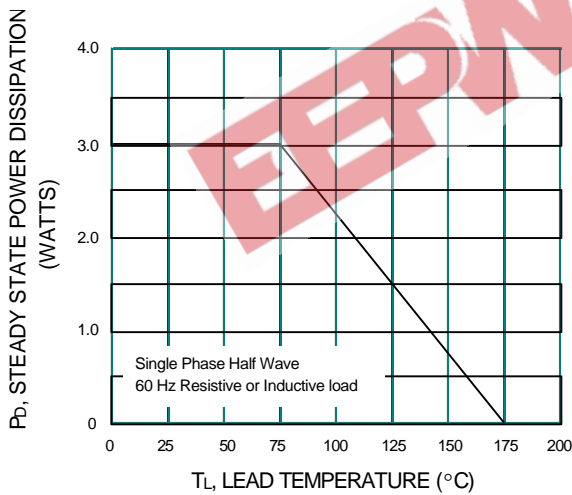


FIG.4 - PULSE RATING CURVE

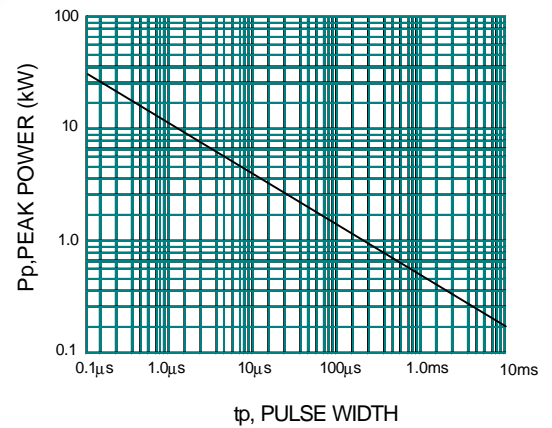


FIG.5 - PULSE WAVEFORM

