

## FEATURES:

- ECONOMICAL SERIES
- AVAILABLE IN BOTH UNIDIRECTIONAL AND BI-DIRECTIONAL CONSTRUCTION
- 5.0 TO 170 STAND-OFF VOLTAGE AVAILABLE
- 500 WATTS PEAK PULSE POWER DISSIPATION
- QUICK RESPONSE

## DESCRIPTION:

This Transient Voltage Suppressor is an economical, molded, commercial product used to protect voltage sensitive components from destruction or partial degradation. The response time of their clamping action is virtually instantaneous ( $1 \times 10^{-12}$  seconds) and they have a peak pulse power rating of 500 watts for 1 ms as depicted in Figure 1 and 2. Microsemi also offers a great variety of other Transient Voltage Suppressor's to meet higher and lower power demands and special applications.

## MAXIMUM RATINGS:

Peak Pulse Power Dissipation at 25°C: 500 Watts

Steady State Power Dissipation: 2.5 Watts at  $T_L = +75^\circ\text{C}$

3/8" Lead Length

$t_{\text{clamping}}$  (0 volts to BV Min.):

Unidirectional  $<1 \times 10^{-12}$  Seconds: Bi-directional  $<5 \times 10^{-9}$  Seconds.

Operating and Storage Temperature:  $-55^\circ$  to  $+175^\circ\text{C}$

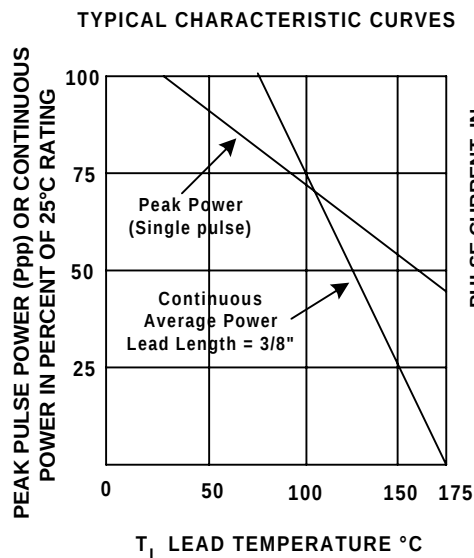


FIGURE 1

DERATING CURVE

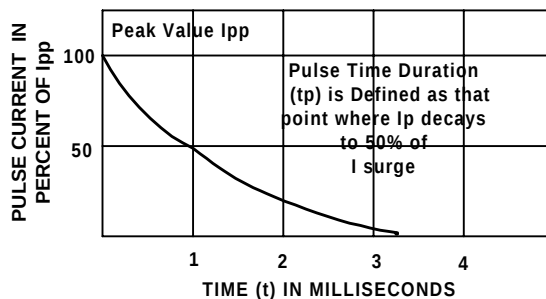
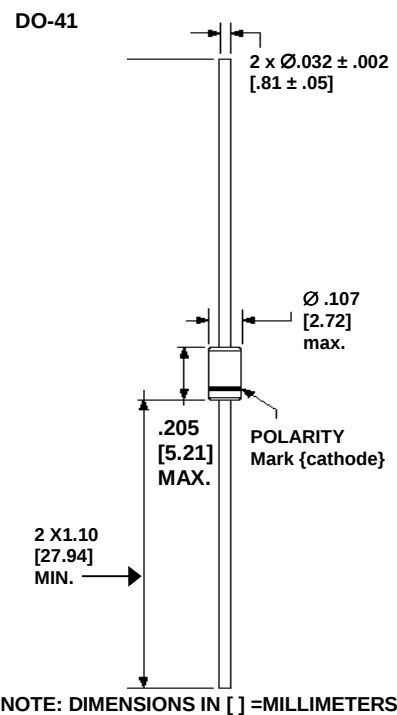


FIGURE 2

PULSE WAVEFORM FOR EXPONENTIAL SURGE



## MECHANICAL CHARACTERISTICS

CASE: Void free transfer molded thermosetting plastic.

FINISH: Readily solderable.

POLARITY: Band denotes cathode. Bi-directional not marked.

WEIGHT: 0.7 gram (Appx.).

MOUNTING POSITION: Any

**SA5.0  
thru  
SA170A**

**5.0 thru 170 volts  
500 Watts  
Transient Voltage  
Suppressors**

**ELECTRICAL CHARACTERISTICS AT 25°C**

| PART<br>NUMBER | BREAKDOWN<br>VOLTAGE V(BR) |              | TEST<br>CURRENT<br>I <sub>T</sub> | RATED<br>STAND<br>OFF<br>VOLTAGE<br>V <sub>WM</sub> | MAX. REVERSE<br>STANDBY<br>CURRENT<br>I <sub>D</sub> @<br>V <sub>WM</sub> | MAX.<br>PEAK<br>REVERSE<br>VOLTAGE<br>V <sub>C</sub> MAX.<br>@ I <sub>PP</sub> | MAX. PEAK<br>PULSE<br>CURRENT<br>I <sub>PP</sub><br>(Figure 2) | MAX.<br>TEMP.<br>COEFFICIENT<br>OF V(BR)<br>-55°C TO<br>175°C<br>α <sub>V(BR)</sub> |
|----------------|----------------------------|--------------|-----------------------------------|-----------------------------------------------------|---------------------------------------------------------------------------|--------------------------------------------------------------------------------|----------------------------------------------------------------|-------------------------------------------------------------------------------------|
|                | MIN.<br>VOLTS              | MAX<br>VOLTS |                                   |                                                     |                                                                           |                                                                                |                                                                |                                                                                     |
| SA5.0          | 6.40                       | 7.30         | 10                                | 5.0                                                 | 600                                                                       | 9.6                                                                            | 52                                                             | .057                                                                                |
| SA5.0A         | 6.40                       | 7.00         | 10                                | 5.0                                                 | 600                                                                       | 9.2                                                                            | 54.3                                                           | .057                                                                                |
| SA6.0          | 6.67                       | 8.15         | 10                                | 6.0                                                 | 600                                                                       | 11.4                                                                           | 43.9                                                           | .059                                                                                |
| SA6.0A         | 6.67                       | 7.37         | 10                                | 6.0                                                 | 600                                                                       | 10.3                                                                           | 48.5                                                           | .059                                                                                |
| SA6.5          | 7.22                       | 8.82         | 10                                | 6.5                                                 | 400                                                                       | 12.3                                                                           | 40.7                                                           | .061                                                                                |
| SA6.5A         | 7.22                       | 7.98         | 10                                | 6.5                                                 | 400                                                                       | 11.2                                                                           | 44.7                                                           | .061                                                                                |
| SA7.0          | 7.78                       | 9.51         | 10                                | 7.0                                                 | 150                                                                       | 13.3                                                                           | 37.8                                                           | .065                                                                                |
| SA7.0A         | 7.78                       | 8.60         | 10                                | 7.0                                                 | 150                                                                       | 12.0                                                                           | 41.7                                                           | .065                                                                                |
| SA7.5          | 8.33                       | 10.2         | 1                                 | 7.5                                                 | 50                                                                        | 14.3                                                                           | 35.0                                                           | .067                                                                                |
| SA7.5A         | 8.33                       | 9.21         | 1                                 | 7.5                                                 | 50                                                                        | 12.9                                                                           | 38.8                                                           | .067                                                                                |
| SA8.0          | 8.89                       | 10.9         | 1                                 | 8.0                                                 | 25                                                                        | 15.0                                                                           | 33.3                                                           | .070                                                                                |
| SA8.0A         | 8.89                       | 9.83         | 1                                 | 8.0                                                 | 25                                                                        | 13.6                                                                           | 36.7                                                           | .070                                                                                |
| SA8.5          | 9.44                       | 11.5         | 1                                 | 8.5                                                 | 5                                                                         | 15.9                                                                           | 31.4                                                           | .073                                                                                |
| SA8.5A         | 9.44                       | 10.4         | 1                                 | 8.5                                                 | 5                                                                         | 14.4                                                                           | 34.7                                                           | .073                                                                                |
| SA9.0          | 10.0                       | 12.2         | 1                                 | 9.0                                                 | 1                                                                         | 16.9                                                                           | 29.5                                                           | .076                                                                                |
| SA9.0A         | 10.0                       | 11.1         | 1                                 | 9.0                                                 | 1                                                                         | 15.4                                                                           | 32.5                                                           | .076                                                                                |
| SA10           | 11.1                       | 13.6         | 1                                 | 10                                                  | 1                                                                         | 18.8                                                                           | 26.6                                                           | .078                                                                                |
| SA10A          | 11.1                       | 12.3         | 1                                 | 10                                                  | 1                                                                         | 17.0                                                                           | 29.4                                                           | .078                                                                                |
| SA11           | 12.2                       | 14.9         | 1                                 | 11                                                  | 1                                                                         | 20.1                                                                           | 24.9                                                           | .081                                                                                |
| SA11A          | 12.2                       | 13.5         | 1                                 | 11                                                  | 1                                                                         | 18.2                                                                           | 27.4                                                           | .081                                                                                |
| SA12           | 13.3                       | 16.3         | 1                                 | 12                                                  | 1                                                                         | 22.0                                                                           | 22.7                                                           | .082                                                                                |
| SA12A          | 13.3                       | 14.7         | 1                                 | 12                                                  | 1                                                                         | 19.9                                                                           | 25.1                                                           | .082                                                                                |
| SA13           | 14.4                       | 17.6         | 1                                 | 13                                                  | 1                                                                         | 23.8                                                                           | 21.0                                                           | .084                                                                                |
| SA13A          | 14.4                       | 15.9         | 1                                 | 13                                                  | 1                                                                         | 21.5                                                                           | 23.2                                                           | .084                                                                                |
| SA14           | 15.6                       | 19.1         | 1                                 | 14                                                  | 1                                                                         | 25.8                                                                           | 19.4                                                           | .086                                                                                |
| SA14A          | 15.6                       | 17.2         | 1                                 | 14                                                  | 1                                                                         | 23.2                                                                           | 21.5                                                           | .086                                                                                |
| SA15           | 16.7                       | 20.4         | 1                                 | 15                                                  | 1                                                                         | 26.9                                                                           | 18.8                                                           | .087                                                                                |
| SA15A          | 16.7                       | 18.5         | 1                                 | 15                                                  | 1                                                                         | 24.4                                                                           | 20.6                                                           | .087                                                                                |
| SA16           | 17.8                       | 21.8         | 1                                 | 16                                                  | 1                                                                         | 28.8                                                                           | 17.6                                                           | .088                                                                                |
| SA6A           | 17.8                       | 19.7         | 1                                 | 16                                                  | 1                                                                         | 26.0                                                                           | 19.2                                                           | .088                                                                                |
| SA17           | 18.9                       | 23.1         | 1                                 | 17                                                  | 1                                                                         | 30.5                                                                           | 16.4                                                           | .090                                                                                |
| SA17A          | 18.9                       | 20.9         | 1                                 | 17                                                  | 1                                                                         | 27.6                                                                           | 18.1                                                           | .090                                                                                |
| SA18           | 20.0                       | 24.4         | 1                                 | 18                                                  | 1                                                                         | 32.2                                                                           | 15.5                                                           | .092                                                                                |
| SA18A          | 20.0                       | 22.1         | 1                                 | 18                                                  | 1                                                                         | 29.2                                                                           | 17.2                                                           | .092                                                                                |
| SA20           | 22.2                       | 27.1         | 1                                 | 20                                                  | 1                                                                         | 35.8                                                                           | 13.9                                                           | .093                                                                                |
| SA20A          | 22.2                       | 24.5         | 1                                 | 20                                                  | 1                                                                         | 32.4                                                                           | 15.4                                                           | .093                                                                                |

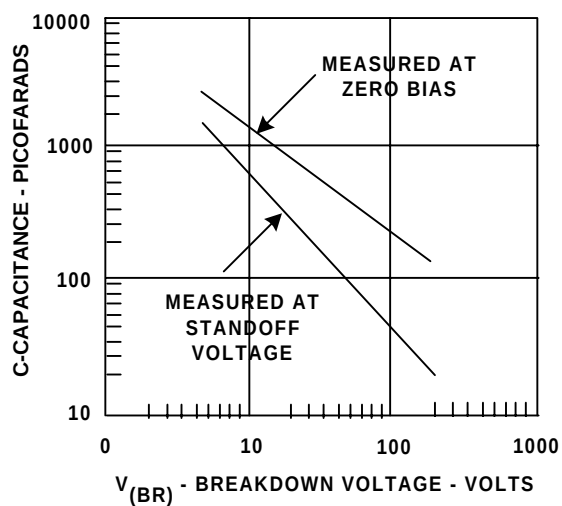
**ELECTRICAL CHARACTERISTICS AT 25°C**

| PART<br>NUMBER | BREAKDOWN<br>VOLTAGE V(BR) |              | TEST<br>CURRENT<br>I <sub>T</sub> | RATED<br>STAND<br>OFF<br>VOLTAGE<br>V <sub>WM</sub> | MAX. REVERSE<br>STANDBY<br>CURRENT<br>I <sub>D</sub> @<br>V <sub>WM</sub> | MAX.<br>PEAK<br>REVERSE<br>VOLTAGE<br>V <sub>C</sub> MAX.<br>@ I <sub>PP</sub> | MAX. PEAK<br>PULSE<br>CURRENT<br>I <sub>PP</sub><br>(Figure 2) | MAX.<br>TEMP.<br>COEFFICIENT<br>OF V(BR)<br>-55°C TO<br>175°C<br>α <sub>V(BR)</sub> |
|----------------|----------------------------|--------------|-----------------------------------|-----------------------------------------------------|---------------------------------------------------------------------------|--------------------------------------------------------------------------------|----------------------------------------------------------------|-------------------------------------------------------------------------------------|
|                | MIN.<br>VOLTS              | MAX<br>VOLTS |                                   |                                                     |                                                                           |                                                                                |                                                                |                                                                                     |
|                |                            |              | mA                                | VOLTS                                               | μ ADC                                                                     | VOLTS                                                                          | AMP                                                            | % / °C                                                                              |
| SA22           | 24.4                       | 29.8         | 1                                 | 22                                                  | 1                                                                         | 39.4                                                                           | 12.7                                                           | .094                                                                                |
| SA22A          | 24.4                       | 26.9         | 1                                 | 22                                                  | 1                                                                         | 35.5                                                                           | 14.1                                                           | .094                                                                                |
| SA24           | 26.7                       | 32.6         | 1                                 | 24                                                  | 1                                                                         | 43.0                                                                           | 11.6                                                           | .096                                                                                |
| SA24A          | 26.7                       | 29.5         | 1                                 | 24                                                  | 1                                                                         | 38.9                                                                           | 12.8                                                           | .096                                                                                |
| SA26           | 28.9                       | 35.3         | 1                                 | 26                                                  | 1                                                                         | 46.6                                                                           | 10.7                                                           | .097                                                                                |
| SA26A          | 28.9                       | 31.9         | 1                                 | 26                                                  | 1                                                                         | 42.1                                                                           | 11.9                                                           | .097                                                                                |
| SA28           | 31.1                       | 38.0         | 1                                 | 28                                                  | 1                                                                         | 50.0                                                                           | 9.9                                                            | .098                                                                                |
| SA28A          | 31.1                       | 34.4         | 1                                 | 28                                                  | 1                                                                         | 45.4                                                                           | 11.0                                                           | .098                                                                                |
| SA30           | 33.3                       | 40.7         | 1                                 | 30                                                  | 1                                                                         | 53.5                                                                           | 9.3                                                            | .099                                                                                |
| SA30A          | 33.3                       | 36.8         | 1                                 | 30                                                  | 1                                                                         | 48.4                                                                           | 10.3                                                           | .099                                                                                |
| SA33           | 36.7                       | 44.9         | 1                                 | 33                                                  | 1                                                                         | 59.0                                                                           | 8.5                                                            | .100                                                                                |
| SA33A          | 36.7                       | 40.6         | 1                                 | 33                                                  | 1                                                                         | 53.3                                                                           | 9.4                                                            | .100                                                                                |
| SA36           | 40.0                       | 48.9         | 1                                 | 36                                                  | 1                                                                         | 64.3                                                                           | 7.8                                                            | .101                                                                                |
| SA36A          | 40.0                       | 44.2         | 1                                 | 36                                                  | 1                                                                         | 58.1                                                                           | 8.6                                                            | .101                                                                                |
| SA40           | 44.4                       | 54.3         | 1                                 | 40                                                  | 1                                                                         | 71.4                                                                           | 7.0                                                            | .101                                                                                |
| SA40A          | 44.4                       | 49.1         | 1                                 | 40                                                  | 1                                                                         | 64.5                                                                           | 7.8                                                            | .101                                                                                |
| SA43           | 47.8                       | 58.4         | 1                                 | 43                                                  | 1                                                                         | 76.7                                                                           | 6.5                                                            | .102                                                                                |
| SA43A          | 47.8                       | 52.8         | 1                                 | 43                                                  | 1                                                                         | 69.4                                                                           | 7.2                                                            | .102                                                                                |
| SA45           | 50.0                       | 61.1         | 1                                 | 45                                                  | 1                                                                         | 80.3                                                                           | 6.2                                                            | .102                                                                                |
| SA45A          | 50.0                       | 55.3         | 1                                 | 45                                                  | 1                                                                         | 72.7                                                                           | 6.9                                                            | .102                                                                                |
| SA48           | 53.3                       | 65.1         | 1                                 | 48                                                  | 1                                                                         | 85.5                                                                           | 5.8                                                            | .103                                                                                |
| SA48A          | 53.3                       | 58.9         | 1                                 | 48                                                  | 1                                                                         | 77.4                                                                           | 6.5                                                            | .103                                                                                |
| SA51           | 56.7                       | 69.3         | 1                                 | 51                                                  | 1                                                                         | 91.1                                                                           | 5.5                                                            | .103                                                                                |
| SA51A          | 56.7                       | 62.7         | 1                                 | 51                                                  | 1                                                                         | 82.4                                                                           | 6.1                                                            | .103                                                                                |
| SA54           | 60.0                       | 73.3         | 1                                 | 54                                                  | 1                                                                         | 96.3                                                                           | 5.2                                                            | .104                                                                                |
| SA54A          | 60.0                       | 66.3         | 1                                 | 54                                                  | 1                                                                         | 87.1                                                                           | 5.7                                                            | .104                                                                                |
| SA58           | 64.4                       | 78.7         | 1                                 | 58                                                  | 1                                                                         | 103.0                                                                          | 4.9                                                            | .104                                                                                |
| SA58A          | 64.4                       | 71.2         | 1                                 | 58                                                  | 1                                                                         | 93.6                                                                           | 5.3                                                            | .104                                                                                |
| SA60           | 66.7                       | 81.5         | 1                                 | 60                                                  | 1                                                                         | 107.0                                                                          | 4.7                                                            | .104                                                                                |
| SA60A          | 66.7                       | 73.7         | 1                                 | 60                                                  | 1                                                                         | 96.8                                                                           | 5.2                                                            | .104                                                                                |
| SA64           | 71.1                       | 86.9         | 1                                 | 64                                                  | 1                                                                         | 114.0                                                                          | 4.4                                                            | .105                                                                                |
| SA64A          | 71.1                       | 78.6         | 1                                 | 64                                                  | 1                                                                         | 103.0                                                                          | 4.9                                                            | .105                                                                                |
| SA70           | 77.8                       | 95.1         | 1                                 | 70                                                  | 1                                                                         | 125.0                                                                          | 4.0                                                            | .105                                                                                |
| SA70A          | 77.8                       | 86.0         | 1                                 | 70                                                  | 1                                                                         | 113.0                                                                          | 4.4                                                            | .105                                                                                |
| SA75           | 83.3                       | 102.0        | 1                                 | 75                                                  | 1                                                                         | 134.0                                                                          | 3.7                                                            | .105                                                                                |
| SA75A          | 83.3                       | 92.1         | 1                                 | 75                                                  | 1                                                                         | 121.0                                                                          | 4.1                                                            | .105                                                                                |

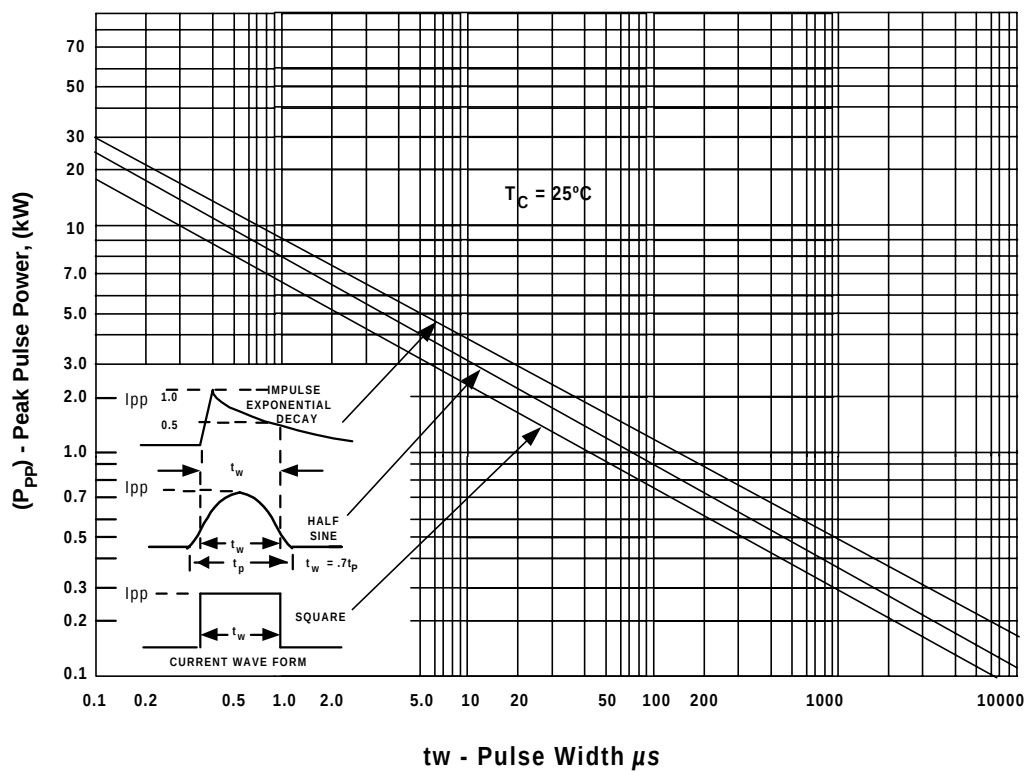
**ELECTRICAL CHARACTERISTICS AT 25°C**

| PART<br>NUMBER | BREAKDOWN<br>VOLTAGE V(BR) |       | TEST<br>CURRENT<br>$I_T$ | RATED<br>STAND<br>OFF<br>VOLTAGE<br>$V_{WM}$ | MAX. REVERSE<br>STANDBY<br>CURRENT<br>$I_D$ @<br>$V_{WM}$ | MAX.<br>PEAK<br>REVERSE<br>VOLTAGE<br>$V_C$ MAX.<br>@ $I_{PP}$ | MAX. PEAK<br>PULSE<br>CURRENT<br>$I_{PP}$<br>(Figure 2) | MAX.<br>TEMP.<br>COEFFICIENT<br>OF $V_{(BR)}$<br>-55°C TO<br>175°C<br>$\alpha_{V(BR)}$ |
|----------------|----------------------------|-------|--------------------------|----------------------------------------------|-----------------------------------------------------------|----------------------------------------------------------------|---------------------------------------------------------|----------------------------------------------------------------------------------------|
|                | MIN.                       | MAX   |                          |                                              |                                                           |                                                                |                                                         |                                                                                        |
|                | VOLTS                      | VOLTS | mA                       | VOLTS                                        | $\mu$ ADC                                                 | VOLTS                                                          | AMP                                                     | % / °C                                                                                 |
| SA78           | 86.7                       | 106.0 | 1                        | 78                                           | 1                                                         | 139.0                                                          | 3.6                                                     | .106                                                                                   |
| SA78A          | 86.7                       | 95.8  | 1                        | 78                                           | 1                                                         | 126.0                                                          | 4.0                                                     | .106                                                                                   |
| SA85           | 94.4                       | 115.0 | 1                        | 85                                           | 1                                                         | 151.0                                                          | 3.3                                                     | .106                                                                                   |
| SA85A          | 94.4                       | 104.0 | 1                        | 85                                           | 1                                                         | 137.0                                                          | 3.6                                                     | .106                                                                                   |
| SA90           | 100.0                      | 122.0 | 1                        | 90                                           | 1                                                         | 160.0                                                          | 3.1                                                     | .107                                                                                   |
| SA90A          | 100.0                      | 111.0 | 1                        | 90                                           | 1                                                         | 146.0                                                          | 3.4                                                     | .107                                                                                   |
| SA100          | 111.0                      | 136.0 | 1                        | 100                                          | 1                                                         | 179.0                                                          | 2.8                                                     | .107                                                                                   |
| SA100A         | 111.0                      | 123.0 | 1                        | 100                                          | 1                                                         | 162.0                                                          | 3.1                                                     | .107                                                                                   |
| SA110          | 122.0                      | 149.0 | 1                        | 110                                          | 1                                                         | 196.0                                                          | 2.6                                                     | .107                                                                                   |
| SA110A         | 122.0                      | 135.0 | 1                        | 110                                          | 1                                                         | 177.0                                                          | 2.8                                                     | .107                                                                                   |
| SA120          | 133.0                      | 163.0 | 1                        | 120                                          | 1                                                         | 214.0                                                          | 2.3                                                     | .107                                                                                   |
| SA120A         | 133.0                      | 147.0 | 1                        | 120                                          | 1                                                         | 193.0                                                          | 2.0                                                     | .107                                                                                   |
| SA130          | 144.0                      | 176.0 | 1                        | 130                                          | 1                                                         | 231.0                                                          | 2.2                                                     | .108                                                                                   |
| SA130A         | 144.0                      | 159.0 | 1                        | 130                                          | 1                                                         | 209.0                                                          | 2.4                                                     | .108                                                                                   |
| SA150          | 167.0                      | 204.0 | 1                        | 150                                          | 1                                                         | 268.0                                                          | 1.9                                                     | .108                                                                                   |
| SA150A         | 167.0                      | 185.0 | 1                        | 150                                          | 1                                                         | 243.0                                                          | 2.1                                                     | .108                                                                                   |
| SA160          | 178.0                      | 218.0 | 1                        | 160                                          | 1                                                         | 287.0                                                          | 1.7                                                     | .108                                                                                   |
| SA160A         | 178.0                      | 197.0 | 1                        | 160                                          | 1                                                         | 259.0                                                          | 1.9                                                     | .108                                                                                   |
| SA170          | 189.0                      | 231.0 | 1                        | 170                                          | 1                                                         | 304.0                                                          | 1.6                                                     | .108                                                                                   |
| SA170A         | 189.0                      | 209.0 | 1                        | 170                                          | 1                                                         | 275.0                                                          | 1.8                                                     | .108                                                                                   |

Note: For Bi-directional construction, indicate a C or CA suffix after the part number, i.e. SA5.0CA



**FIGURE 3**  
TYPICAL CAPACITANCE VS  
BREAKDOWN VOLTAGE



**FIGURE 4**  
PEAK PULSE POWER VS. PULSE TIME