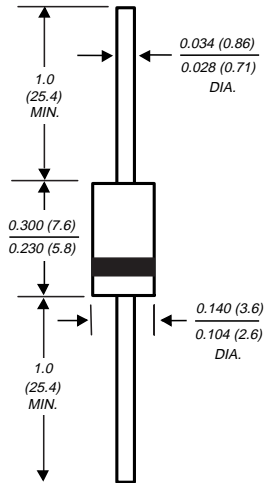


SA5.0 THRU SA170CA

TRANSZORB™ TRANSIENT VOLTAGE SUPPRESSOR
Stand-off Voltage - 5.0 to 170 Volts Peak Pulse Power - 500 Watts

DO-204AC



Dimensions in inches and (millimeters)

FEATURES

- ◆ Plastic package has Underwriters Laboratory Flammability Classification 94V-0
- ◆ Glass passivated junction
- ◆ 500W peak pulse power surge capability with a 10/1000 μ s waveform, repetition rate (duty cycle): 0.01%
- ◆ Excellent clamping capability
- ◆ Low incremental surge resistance
- ◆ Fast response time: typically less than 1.0ps from 0 Volts to $V_{(BR)}$ for uni-directional and 5.0ns for bi-directional types
- ◆ For devices with $V_{(BR)} \geq 10V$, I_D are typically less than 1.0 μ A
- ◆ High temperature soldering guaranteed: 265°C/10 seconds 0.375" (9.5mm) lead length, 5lbs (2.3 kg) tension



MECHANICAL DATA

Case: JEDEC DO-204AC molded plastic body over passivated junction

Terminals: Solder plated axial leads, solderable per MIL-STD-750, Method 2026

Polarity: For uni-directional types the color band denotes the cathode, which is positive with respect to the anode under normal TVS operation

Mounting Position: Any

Weight: 0.015 ounce, 0.4 gram

DEVICES FOR BIDIRECTIONAL APPLICATIONS

For bi-directional use C or CA Suffix. (e.g. SA5.0C, SA170CA).

Electrical characteristics apply in both directions.

MAXIMUM RATINGS AND CHARACTERISTICS

Ratings at 25°C ambient temperature unless otherwise specified

| | SYMBOL | VALUE | UNITS |
|---|-----------------------------------|-------------|-------|
| Peak pulse power dissipation with a 10/1000 μ s waveform (NOTE 1, FIG. 1) | P _{PPM} | Minimum 500 | Watts |
| Peak pulse current with a 10/1000 μ s waveform (NOTE 1) | I _{PPM} | SEE TABLE 1 | Amps |
| Steady state power dissipation at $T_L=75^\circ\text{C}$ lead lengths 0.375" (9.5mm) (NOTE 2) | P _{M(AV)} | 3.0 | Watts |
| Peak forward surge current, 8.3ms single half sine-wave superimposed on rated load, unidirectional only (JEDEC Method) (NOTE 3) | I _{FSM} | 70 | Amps |
| Maximum instantaneous forward voltage at 35A for unidirectional only | V _F | 3.5 | Volts |
| Operating junction and storage temperature range | T _J , T _{STG} | -55 to +175 | °C |

NOTES

- (1) Non-repetitive current pulse, per Fig. 3 and derated above $T_A=25^\circ\text{C}$ per Fig. 2
- (2) Mounted on copper pad area of 1.6 x 1.6" (40 x 40mm) per Fig. 5
- (3) 8.3ms single half sine-wave or equivalent square wave, duty cycle=4 pulses per minute maximum

ELECTRICAL CHARACTERISTICS at (TA=25°C unless otherwise noted) TABLE 1

| Device Type | Breakdown Voltage V _(BR) (Volts) (NOTE 1) | | Test Current at I _r (mA) | Stand-off Voltage V _{WM} (Volts) | Maximum Reverse Leakage at V _{WM} I _D (NOTE3) (μA) | Maximum Peak Pulse Current I _{PPM} (NOTE 2) (Amps) | Maximum Clamping Voltage at I _{PPM} V _c (Volts) | Maximum Temperature Coefficient of V _(BR) (mV / °C) |
|-------------|--|------|--|--|--|--|---|--|
| | MIN | MAX | | | | | | |
| SA5.0 | 6.40 | 7.30 | 10 | 5.0 | 600 | 52.1 | 9.6 | 5.0 |
| SA5.0A | 6.40 | 7.00 | 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 | 37.6 | 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 | 36.8 | 13.6 | 7.0 |
| SA8.5 | 9.44 | 11.5 | 1.0 | 8.5 | 10 | 31.4 | 15.9 | 8.0 |
| SA8.5A | 9.44 | 10.4 | 1.0 | 8.5 | 10 | 34.7 | 14.4 | 8.0 |
| SA9.0 | 10.0 | 12.2 | 1.0 | 9.0 | 5.0 | 29.6 | 16.9 | 9.0 |
| SA9.0A | 10.0 | 11.1 | 1.0 | 9.0 | 5.0 | 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 | 27.5 | 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 | 23.3 | 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 | 21.6 | 23.2 | 14.0 |
| SA15 | 16.7 | 20.4 | 1.0 | 15.0 | 1.0 | 18.6 | 26.9 | 16.0 |
| SA15A | 16.7 | 18.5 | 1.0 | 15.0 | 1.0 | 20.5 | 24.4 | 16.0 |
| SA16 | 17.8 | 21.8 | 1.0 | 16.0 | 1.0 | 17.4 | 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 | 17.1 | 29.2 | 20.0 |
| SA20 | 22.2 | 27.1 | 1.0 | 20.0 | 1.0 | 14.0 | 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 | 22.7 | 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 | 12.9 | 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 | 10.0 | 50.1 | 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 | 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 |
| 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 |

ELECTRICAL CHARACTERISTICS at (T_A=25°C unless otherwise noted) TABLE 1 (Cont'd)

| Device Type | Breakdown Voltage V _(BR) Volts (NOTE 1) | | Test Current at I _T (mA) | Stand-off Voltage V _{WM} (Volts) | Maximum Reverse Leakage at V _{WM} I _D (NOTE3) (μA) | Maximum Peak Pulse Current I _{PPM} (NOTE 2) (Amps) | Maximum Clamping Voltage at I _{PPM} V _C (Volts) | Maximum Temperature Coefficient of V _(BR) (mV / °C) |
|-------------|--|------|--|--|--|--|---|--|
| | MIN | MAX | | | | | | |
| 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 | 65.2 | 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 | 2.6 | 193 | 146 |
| SA130 | 144 | 176 | 1.0 | 130 | 1.0 | 2.2 | 230 | 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 | 257 | 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 |

NOTES

- (1) V_(BR) measured after I_T applied for 300μs. I_T=square wave pulse or equivalent
- (2) Surge current waveform per Fig. 3 and derate per Fig. 2
- (3) For bidirectional types with V_{WM} of 10 Volts and less, the I_D limit is doubled.
- (4) All terms and symbols are consistent with ANSI/IEEE C62.35

RATINGS AND CHARACTERISTIC CURVES SA5.0 THRU SA170CA

FIG. 1 - PEAK PULSE POWER RATING CURVE

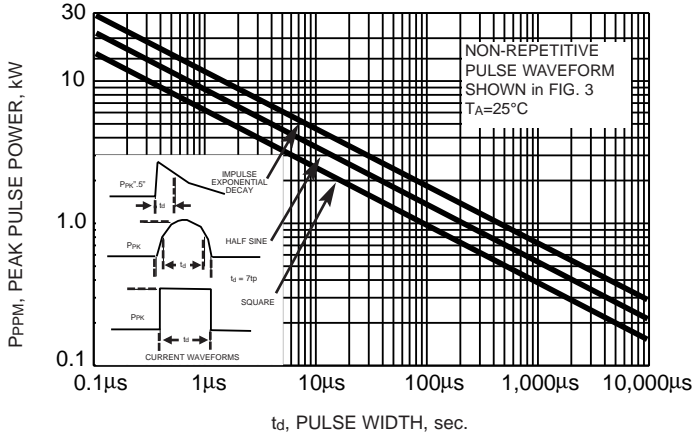


FIG. 2 - PULSE DERATING CURVE

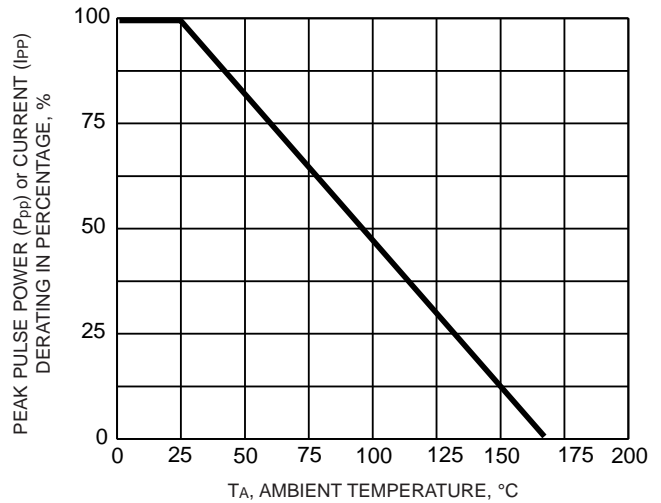


FIG. 3 - PULSE WAVEFORM

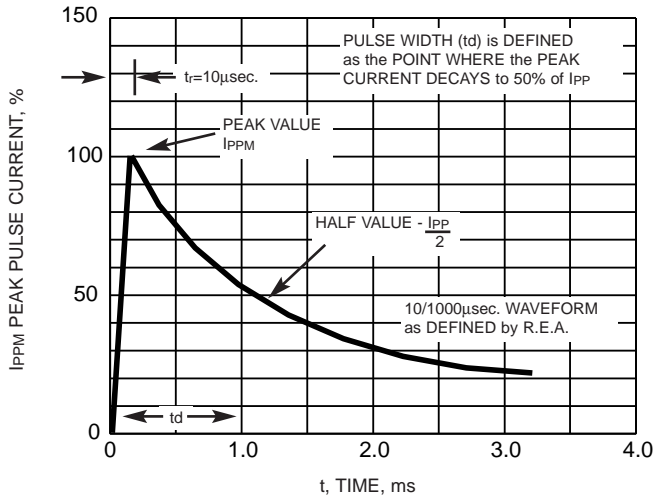


FIG. 4 - MAXIMUM NON-REPETITIVE PEAK FORWARD SURGE CURRENT UNIDIRECTIONAL ONLY

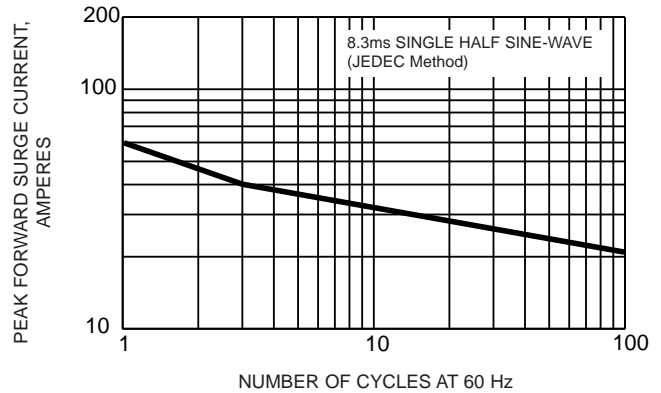


FIG. 5 - STEADY STATE POWER DERATING CURVE

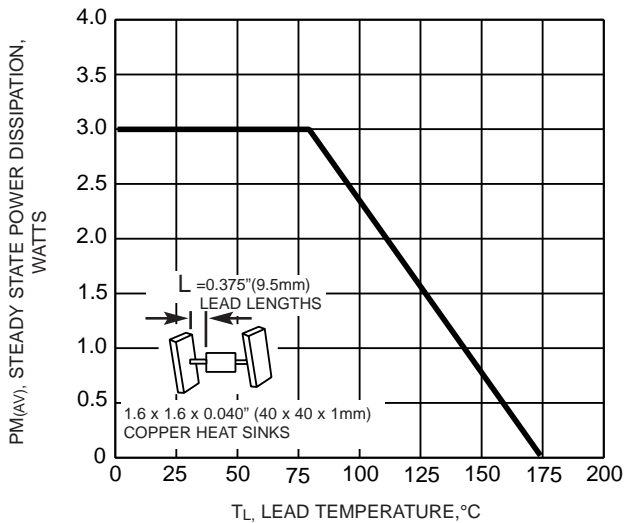
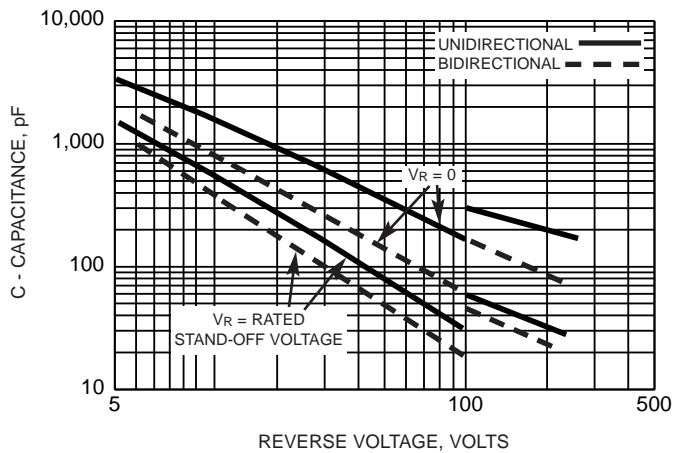


FIG. 6 - CAPACITANCE



RATINGS AND CHARACTERISTIC CURVES SA5.0 THRU SA170CA

FIG. 7 - INCREMENTAL CLAMPING VOLTAGE CURVE UNIDIRECTIONAL

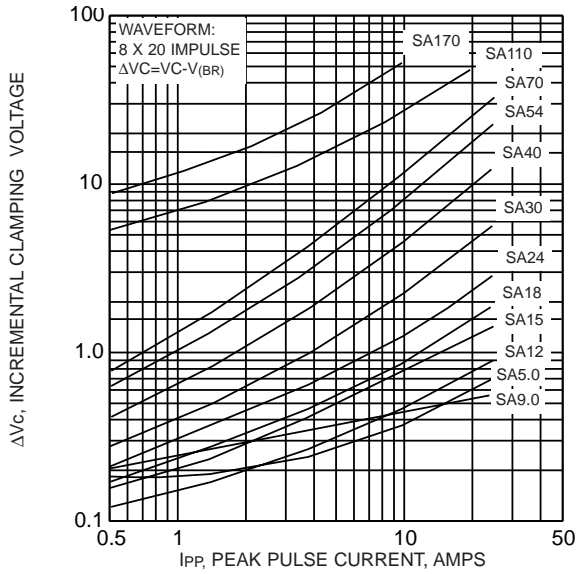


FIG. 8 - INCREMENTAL CLAMPING VOLTAGE CURVE UNIDIRECTIONAL

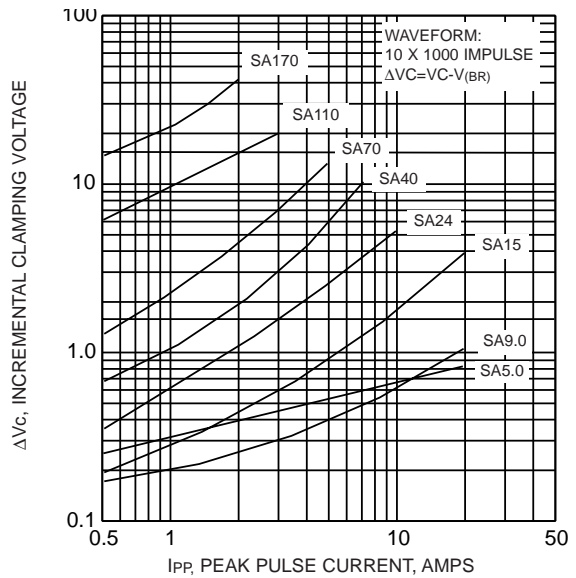


FIG. 9 - INCREMENTAL CLAMPING VOLTAGE CURVE BIDIRECTIONAL

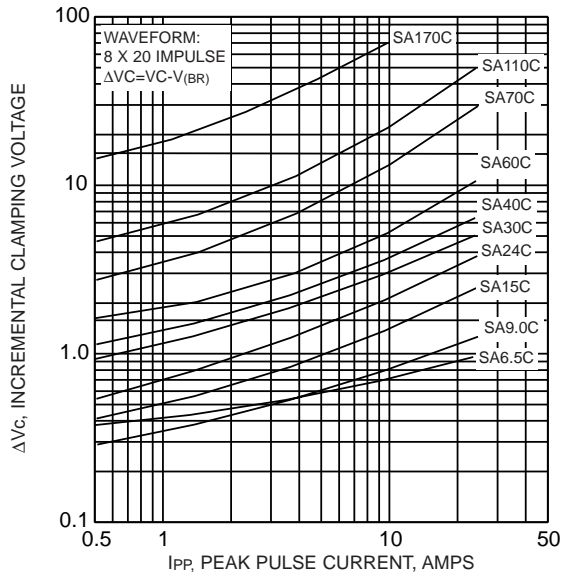
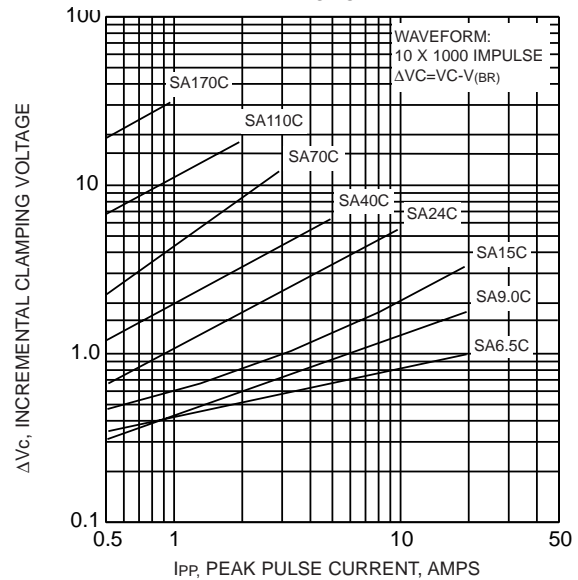


FIG. 10 - INCREMENTAL CLAMPING VOLTAGE CURVE BIDIRECTIONAL



RATINGS AND CHARACTERISTIC CURVES SA5.0 THRU SA170CA

FIG. 11 - TYPICAL INSTANTANEOUS FORWARD VOLTAGE CHARACTERISTICS CURVE

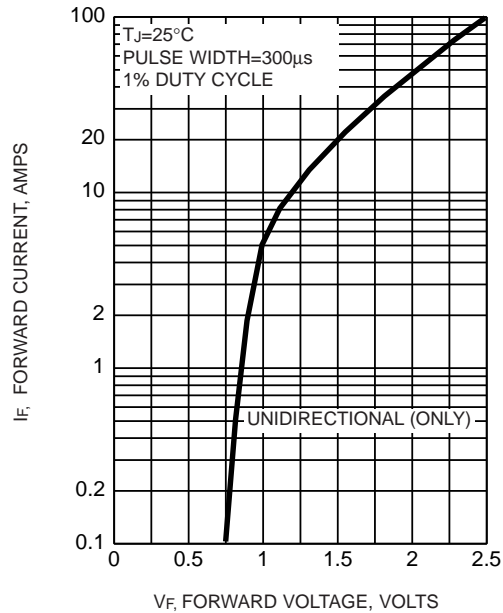
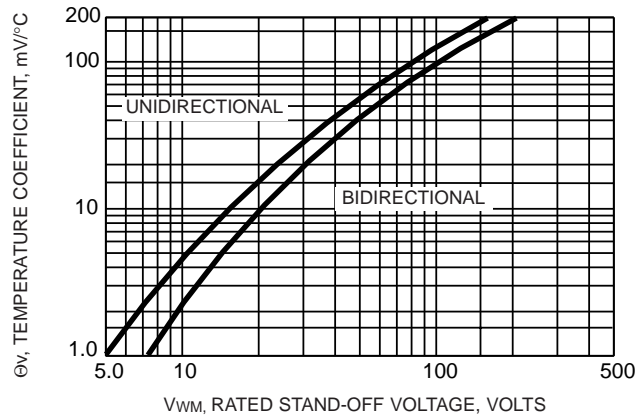


FIG. 12 - BREAKDOWN VOLTAGE TEMPERATURE COEFFICIENT CURVE



APPLICATIONS

This TVS series is a low cost, 500 watt commercial and industrial product for use in applications where space is a premium and where large voltage transients can permanently damage voltage-sensitive components.

The response time of TVS clamping action is 1.0ns for uni-directional and 5.0ns for bi-directional; therefore, they can protect integrated circuits, MOS devices, hybrids, and other voltage-sensitive semiconductor components.