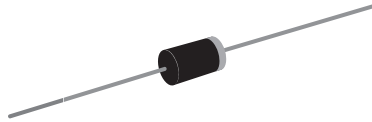


TRANSZORB® Transient Voltage Suppressors



DO-204AC (DO-15)

| PRIMARY CHARACTERISTICS | |
|----------------------------------|----------------|
| V_{WM} | 5.0 V to 170 V |
| P_{PPM} | 500 W |
| P_D | 3.0 W |
| I_{FSM} (uni-directional only) | 70 A |
| T_J max. | 175 °C |

DEVICES FOR BI-DIRECTION APPLICATIONS

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

Electrical characteristics apply in both directions.

FEATURES

- Glass passivated chip junction
- Available in uni-directional and bi-directional
- 500 W peak pulse power capability with a 10/1000 μ s waveform, repetitive rate (duty cycle): 0.01 %
- Excellent clamping capability
- Very fast response time
- Low incremental surge resistance
- Solder dip 260 °C, 40 s
- Component in accordance to RoHS 2002/95/EC and WEEE 2002/96/EC


RoHS
COMPLIANT

TYPICAL APPLICATIONS

Use in sensitive electronics protection against voltage transients induced by inductive load switching and lighting on ICs, MOSFET, signal lines of sensor units for consumer, computer, industrial and telecommunication.

MECHANICAL DATA

Case: DO-204AC, molded epoxy over passivated chip
Molding compound meets UL 94 V-0 flammability rating

Base P/N-E3 - RoHS compliant, commercial grade
Base P/NHE3 - RoHS compliant, high reliability/automotive grade (AEC Q101 qualified)

Terminals: Matte tin plated leads, solderable per J-STD-002 and JESD22-B102

E3 suffix meets JESD 201 class 1A whisker test, HE3 suffix meets JESD 201 class 2 whisker test

Polarity: For uni-directional types the color band denotes cathode end, no marking on bi-directional types

| MAXIMUM RATINGS ($T_A = 25$ °C unless otherwise noted) | | | |
|---|----------------|----------------|------|
| PARAMETER | SYMBOL | VALUE | UNIT |
| Peak pulse power dissipation with a 10/1000 μ s waveform ⁽¹⁾ (Fig. 1) | P_{PPM} | 500 | W |
| Peak pulse current with a 10/1000 μ s waveform ⁽¹⁾ | I_{PPM} | See next table | A |
| Power dissipation on infinite heatsink at $T_A = 75$ °C (Fig. 5) | P_D | 3.0 | W |
| Peak forward surge current, 10 ms single half sine-wave uni-directional only | I_{FSM} | 70 | A |
| Maximum instantaneous forward voltage at 35 A for uni-directional only ⁽²⁾ | V_F | 3.5 | V |
| 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 $T_A = 25$ °C per Fig. 2

(2) 8.3 ms single half sine-wave or equivalent square wave, duty cycle = 4 per minute maximum

| ELECTRICAL CHARACTERISTICS ($T_A = 25\text{ }^\circ\text{C}$ unless otherwise noted) | | | | | | | | |
|--|--|------|-------------------------|--------------------------------|--|---|---|---|
| DEVICE TYPE | BREAKDOWN VOLTAGE V_{BR} AT I_T ⁽¹⁾ (V) | | TEST CURRENT I_T (mA) | STAND-OFF VOLTAGE V_{WM} (V) | MAXIMUM REVERSE LEAKAGE AT V_{WM} I_D ⁽³⁾ (μA) | MAXIMUM PEAK PULSE CURRENT I_{PPM} ⁽²⁾ (A) | MAXIMUM CLAMPING VOLTAGE AT I_{PPM} V_C (V) | MAXIMUM TEMPERATURE COEFFICIENT OF V_{BR} (mV/ $^\circ\text{C}$) |
| | MIN. | MAX. | | | | | | |
| SA5.0 | 6.40 | 7.30 | 10 | 5.0 | 600 | 52.1 | 9.6 | 5.0 |
| SA5.0A ⁽⁴⁾ | 6.4 | 7.07 | 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 | 1.0 | 26.6 | 18.8 | 10 |
| SA10A | 11.1 | 12.3 | 1.0 | 10 | 1.0 | 29.4 | 17.0 | 10 |
| SA11 | 12.2 | 14.9 | 1.0 | 11 | 1.0 | 24.9 | 20.1 | 11 |
| SA11A | 12.2 | 13.5 | 1.0 | 11 | 1.0 | 27.5 | 18.2 | 11 |
| SA12 | 13.3 | 16.3 | 1.0 | 12 | 1.0 | 22.7 | 22.0 | 12 |
| SA12A | 13.3 | 14.7 | 1.0 | 12 | 1.0 | 25.1 | 19.9 | 12 |
| SA13 | 14.4 | 17.6 | 1.0 | 13 | 1.0 | 21.0 | 23.8 | 13 |
| SA13A | 14.4 | 15.9 | 1.0 | 13 | 1.0 | 23.3 | 21.5 | 13 |
| SA14 | 15.6 | 19.1 | 1.0 | 14 | 1.0 | 19.4 | 25.8 | 14 |
| SA14A | 15.6 | 17.2 | 1.0 | 14 | 1.0 | 21.6 | 23.2 | 14 |
| SA15 | 16.7 | 20.4 | 1.0 | 15 | 1.0 | 18.6 | 26.9 | 16 |
| SA15A | 16.7 | 18.5 | 1.0 | 15 | 1.0 | 20.5 | 24.4 | 16 |
| SA16 | 17.8 | 21.8 | 1.0 | 16 | 1.0 | 17.4 | 28.8 | 19 |
| SA16A | 17.8 | 19.7 | 1.0 | 16 | 1.0 | 19.2 | 26.0 | 17 |
| SA17 | 18.9 | 23.1 | 1.0 | 17 | 1.0 | 16.4 | 30.5 | 20 |
| SA17A | 18.9 | 20.9 | 1.0 | 17 | 1.0 | 18.1 | 27.6 | 19 |
| SA18 | 20.0 | 24.4 | 1.0 | 18 | 1.0 | 15.5 | 32.2 | 21 |
| SA18A | 20.0 | 22.1 | 1.0 | 18 | 1.0 | 17.1 | 29.2 | 20 |
| SA20 | 22.2 | 27.1 | 1.0 | 20 | 1.0 | 14.0 | 35.8 | 25 |
| SA20A | 22.2 | 24.5 | 1.0 | 20 | 1.0 | 15.4 | 32.4 | 23 |
| SA22 | 24.4 | 29.8 | 1.0 | 22 | 1.0 | 22.7 | 39.4 | 28 |
| SA22A | 24.4 | 26.9 | 1.0 | 22 | 1.0 | 14.1 | 35.5 | 25 |
| SA24 | 26.7 | 32.6 | 1.0 | 24 | 1.0 | 11.6 | 43.0 | 31 |
| SA24A | 26.7 | 29.5 | 1.0 | 24 | 1.0 | 12.9 | 38.9 | 28 |
| SA26 | 28.9 | 35.3 | 1.0 | 26 | 1.0 | 10.7 | 46.6 | 31 |
| SA26A | 28.9 | 31.9 | 1.0 | 26 | 1.0 | 11.9 | 42.1 | 30 |
| SA28 | 31.1 | 38.0 | 1.0 | 28 | 1.0 | 10.0 | 50.1 | 35 |
| SA28A | 31.1 | 34.4 | 1.0 | 28 | 1.0 | 11.0 | 45.4 | 31 |
| SA30 | 33.3 | 40.7 | 1.0 | 30 | 1.0 | 9.3 | 53.5 | 39 |
| SA30A | 33.3 | 36.8 | 1.0 | 30 | 1.0 | 10.0 | 48.4 | 36 |
| SA33 | 36.7 | 44.9 | 1.0 | 33 | 1.0 | 8.5 | 59.0 | 42 |
| SA33A | 36.7 | 40.6 | 1.0 | 33 | 1.0 | 9.4 | 53.3 | 39 |
| SA36 | 40.0 | 48.9 | 1.0 | 36 | 1.0 | 7.8 | 64.3 | 46 |
| SA36A | 40.0 | 44.2 | 1.0 | 36 | 1.0 | 8.6 | 58.1 | 41 |



| ELECTRICAL CHARACTERISTICS ($T_A = 25\text{ }^\circ\text{C}$ unless otherwise noted) | | | | | | | | |
|--|--|------|-------------------------|--------------------------------|--|---|---|--|
| DEVICE TYPE | BREAKDOWN VOLTAGE V_{BR} AT I_T ⁽¹⁾ (V) | | TEST CURRENT I_T (mA) | STAND-OFF VOLTAGE V_{WM} (V) | MAXIMUM REVERSE LEAKAGE AT V_{WM} I_D ⁽³⁾ (μA) | MAXIMUM PEAK PULSE CURRENT I_{PPM} ⁽²⁾ (A) | MAXIMUM CLAMPING VOLTAGE AT I_{PPM} V_C (V) | MAXIMUM TEMPERATURE COEFFICIENT OF V_{BR} ($\text{mV}/^\circ\text{C}$) |
| | MIN. | MAX. | | | | | | |
| SA40 | 44.4 | 54.3 | 1.0 | 40 | 1.0 | 7.0 | 71.4 | 51 |
| SA40A | 44.4 | 49.1 | 1.0 | 40 | 1.0 | 7.8 | 64.5 | 46 |
| SA43 | 47.8 | 58.4 | 1.0 | 43 | 1.0 | 6.5 | 76.7 | 55 |
| SA43A | 47.8 | 52.8 | 1.0 | 43 | 1.0 | 7.2 | 69.4 | 50 |
| SA45 | 50.0 | 61.1 | 1.0 | 45 | 1.0 | 6.2 | 80.3 | 58 |
| SA45A | 50.0 | 55.3 | 1.0 | 45 | 1.0 | 6.9 | 72.7 | 52 |
| SA48 | 53.3 | 65.2 | 1.0 | 48 | 1.0 | 5.8 | 85.5 | 63 |
| SA48A | 53.3 | 58.9 | 1.0 | 48 | 1.0 | 6.5 | 77.4 | 56 |
| SA51 | 56.7 | 69.3 | 1.0 | 51 | 1.0 | 5.5 | 91.1 | 66 |
| SA51A | 56.7 | 62.7 | 1.0 | 51 | 1.0 | 6.1 | 82.4 | 61 |
| SA54 | 60.0 | 73.3 | 1.0 | 54 | 1.0 | 5.2 | 96.3 | 71 |
| SA54A | 60.0 | 66.3 | 1.0 | 54 | 1.0 | 5.7 | 87.1 | 65 |
| SA58 | 64.4 | 78.7 | 1.0 | 58 | 1.0 | 4.9 | 103 | 78 |
| SA58A | 64.4 | 71.2 | 1.0 | 58 | 1.0 | 5.3 | 93.6 | 70 |
| SA60 | 66.7 | 81.5 | 1.0 | 60 | 1.0 | 4.7 | 107 | 80 |
| SA60A | 66.7 | 73.7 | 1.0 | 60 | 1.0 | 5.2 | 96.8 | 71 |
| SA64 | 71.1 | 86.9 | 1.0 | 64 | 1.0 | 4.4 | 114 | 86 |
| SA64A | 71.1 | 78.6 | 1.0 | 64 | 1.0 | 4.9 | 103 | 76 |
| SA70 | 77.8 | 95.1 | 1.0 | 70 | 1.0 | 4.0 | 125 | 94 |
| SA70A | 77.8 | 86.0 | 1.0 | 70 | 1.0 | 4.4 | 113 | 85 |
| SA75 | 83.3 | 102 | 1.0 | 75 | 1.0 | 3.7 | 134 | 101 |
| SA75A | 83.3 | 92.1 | 1.0 | 75 | 1.0 | 4.1 | 121 | 91 |
| SA78 | 86.7 | 106 | 1.0 | 78 | 1.0 | 3.6 | 139 | 105 |
| SA78A | 86.7 | 95.8 | 1.0 | 78 | 1.0 | 4.0 | 126 | 95 |
| SA85 | 94.4 | 115 | 1.0 | 85 | 1.0 | 3.3 | 151 | 114 |
| SA85A | 94.4 | 104 | 1.0 | 85 | 1.0 | 3.6 | 137 | 103 |
| SA90 | 100 | 122 | 1.0 | 90 | 1.0 | 3.1 | 160 | 121 |
| SA90A | 100 | 111 | 1.0 | 90 | 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) Pulse test: $t_p \leq 50\text{ ms}$
- (2) Surge current waveform per Fig. 3 and derate per Fig. 2
- (3) For bi-directional types with V_{WM} of 10 V and less, the I_D limit is doubled
- (4) For the bi-directional SA5.0CA, the maximum V_{BR} is 7.25 V
- (5) All terms and symbols are consistent with ANSI/IEEE C62.35

| ORDERING INFORMATION (Example) | | | | |
|--------------------------------|-----------------|------------------------|---------------|----------------------------------|
| PREFERRED P/N | UNIT WEIGHT (g) | PREFERRED PACKAGE CODE | BASE QUANTITY | DELIVERY MODE |
| SA5.0A-E3/54 | 0.432 | 54 | 4000 | 13" diameter paper tape and reel |
| SA5.0AHE3/54 ⁽¹⁾ | 0.432 | 54 | 4000 | 13" diameter paper tape and reel |

Note:

(1) Automotive grade AEC Q101 qualified

RATINGS AND CHARACTERISTICS CURVES

($T_A = 25\text{ }^\circ\text{C}$ unless otherwise noted)

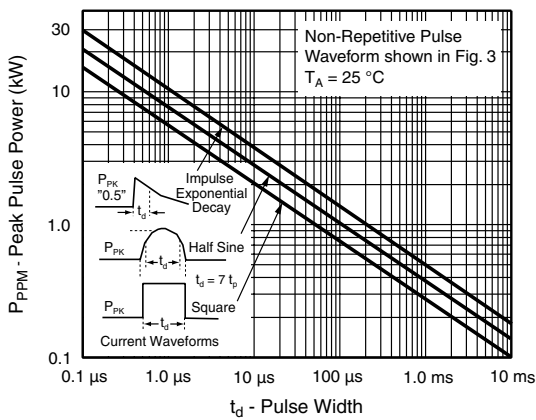


Figure 1. Peak Pulse Power Rating Curve

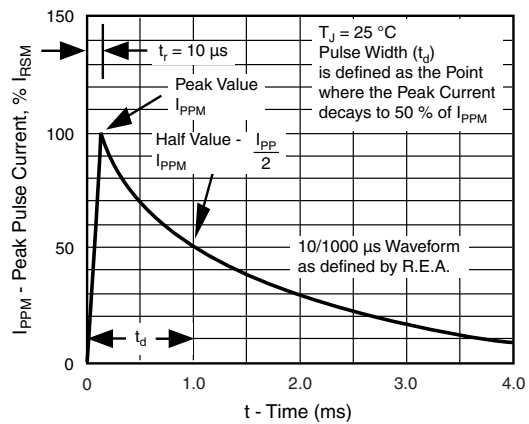


Figure 3. Pulse Waveform

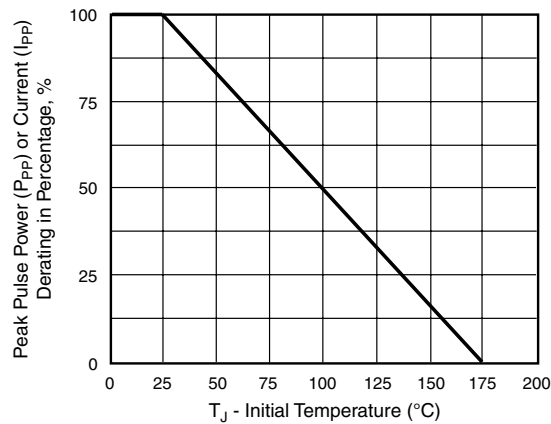


Figure 2. Pulse Derating Curve

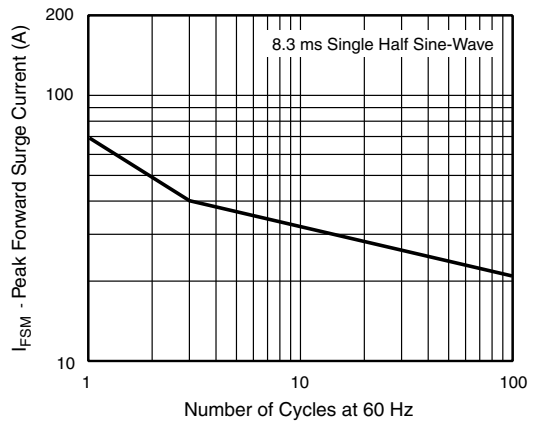


Figure 4. Maximum Non-Repetitive Forward Surge Current Uni-Directional Only

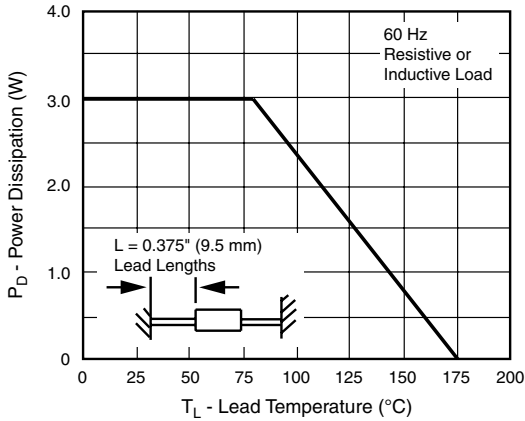


Figure 5. Steady State Power Derating Curve

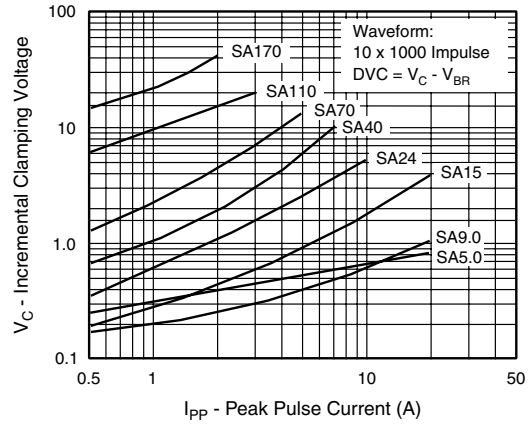


Figure 8. Incremental Clamping Voltage Curve Uni-Directional

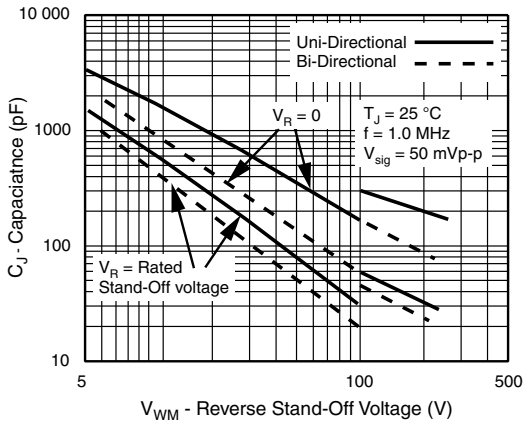


Figure 6. Capacitance

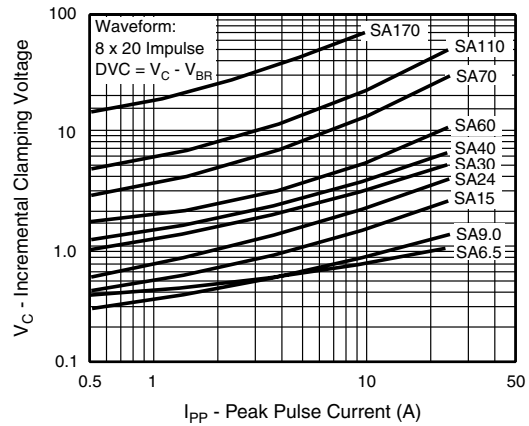


Figure 9. Incremental Clamping Voltage Curve Bi-Directional

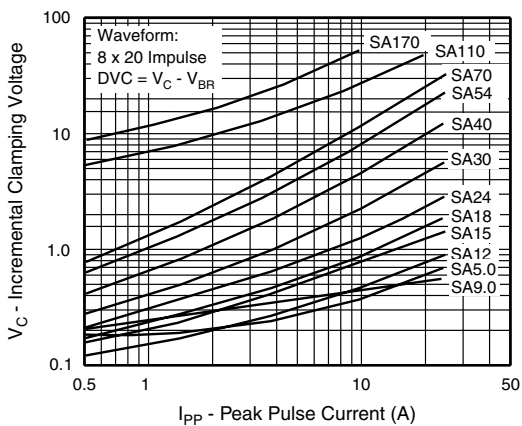


Figure 7. Incremental Clamping Voltage Curve Uni-Directional

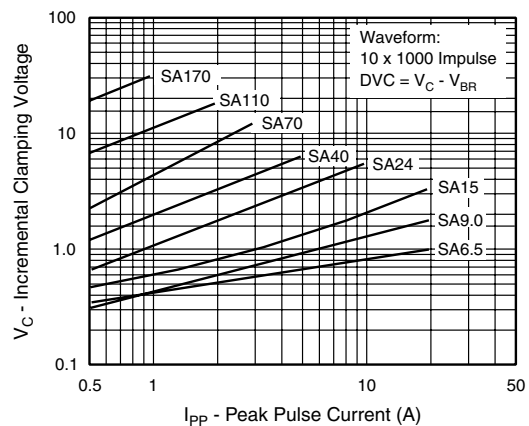


Figure 10. Incremental Clamping Voltage Curve Bi-Directional

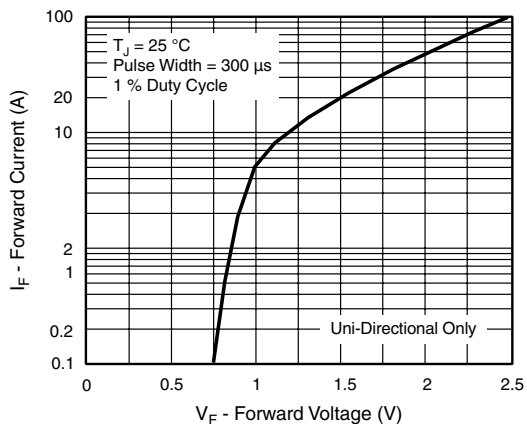


Figure 11. Typical Instantaneous Forward Voltage

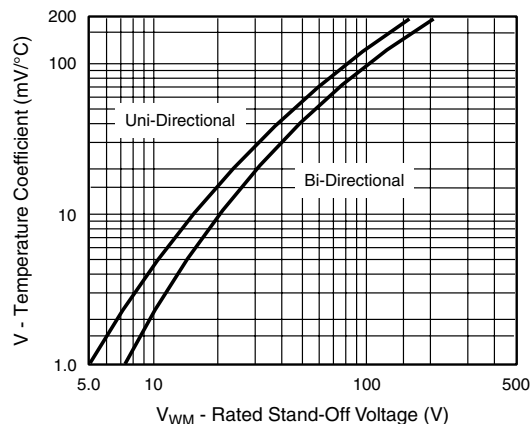
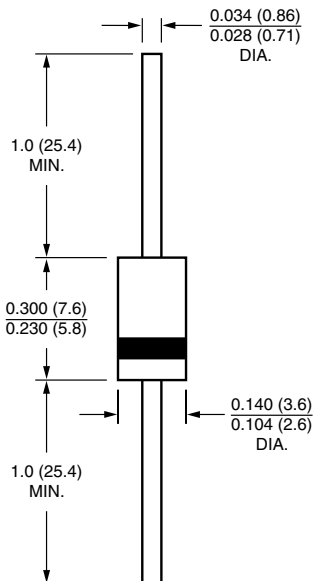


Figure 12. Breakdown Voltage Temperature Coefficient Curve

PACKAGE OUTLINE DIMENSIONS in inches (millimeters)

DO-204AC (DO-15)





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All product specifications and data are subject to change without notice.

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