

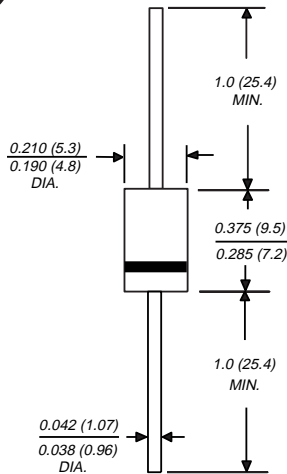
# 1.5KA6.8 THRU 1.5KA43A

## AUTOMOTIVE TRANSIENT VOLTAGE SUPPRESSOR

Breakdown Voltage - 6.8 to 43 Volts Peak Pulse Power - 1500 Watts

### Case Style 1.5KA

PATENTED\*



Dimensions in inches and (millimeters)

\* Patent #'s 4,980,315  
5,166,769  
5,278,094

Available in uni-directional only

### FEATURES

- ◆ Designed for under the hood applications
- ◆ Plastic package has Underwriters Laboratory Flammability Classification 94V-0
- ◆ 1500W peak pulse power surge capability with a 10/1000 $\mu$ s waveform, repetition rate (duty cycle): 0.01%
- ◆ Exclusive patented PAR™ oxide passivated chip construction
- ◆ Excellent clamping capability
- ◆ Low incremental surge resistance
- ◆ Fast response time: typically less than 1.0 ps from 0 Volts to  $V_{(BR)}$  for uni-directional
- ◆ For devices with  $V_{(BR)}\Delta 10V$   $I_D$  are typically less than 1.0 $\mu$ A at  $T_A=150^\circ C$
- ◆ High temperature soldering guaranteed: 300 $^\circ C$ /10 seconds, 0.375" (9.5mm) lead length, 5lbs. (2.3 kg) tension

### MECHANICAL DATA

**Case:** Molded plastic over passivated junction

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

**Polarity:** Color band denotes positive end (cathode)

**Mounting Position:** Any

**Weight:** 0.045 ounce, 1.2 grams

### MAXIMUM RATINGS AND CHARACTERISTICS

Ratings at 25 $^\circ C$  ambient temperature unless otherwise specified.

|  | SYMBOL         | VALUE        | UNITS      |
|--|----------------|--------------|------------|
| Peak pulse power dissipation with a 10/1000 $\mu$ s waveform<br>(NOTE 1, FIG. 1)                                 | PPPM           | Minimum 1500 | Watts      |
| Peak pulse current at $T_A=25^\circ C$ with a 10/1000 $\mu$ s waveform<br>(NOTE 1, FIG. 3)                       | IPPM           | SEE TABLE 1  | Amps       |
| Steady state power dissipation at $T_L=75^\circ C$<br>lead lengths 0.375" (9.5mm) (NOTE 2)                       | PM(AV)         | 5.0          | Watts      |
| Peak forward surge current, 8.3ms single half<br>Sine-wave superimposed on rated load<br>(JEDEC Method) (NOTE 3) | IFSM           | 200          | Amps       |
| Maximum instantaneous forward voltage at 100A (NOTE 3)   | $V_F$          | 3.5          | Volts      |
| Operating junction and storage temperature range   | $T_J, T_{STG}$ | -65 to +185  | $^\circ C$ |

#### NOTES:

- (1) Non-repetitive current pulse, per Fig. 3 and derated above  $T_A=25^\circ C$  per Fig. 2
- (2) Mounted on copper pad area of 0.8 x 0.8" (20 x 20mm) per Fig. 5
- (3) 8.3ms single half sine-wave or equivalent square wave, duty cycle=4 pulses per minutes maximum

**ELECTRICAL CHARACTERISTICS at (T<sub>A</sub>=25°C unless otherwise noted) TABLE 1**

| Device Type | Breakdown Voltage<br>V <sub>(BR)</sub><br>Volts (NOTE 1) |      | Test<br>Current<br>at I <sub>r</sub><br>(mA) | Stand-off<br>Voltage<br>V <sub>WM</sub><br>(Volts) | Maximum<br>Reverse<br>Leakage<br>at V <sub>WM</sub><br>I <sub>D</sub> (μA) | T <sub>J</sub> =150°C<br>Maximum<br>Reverse<br>Leakage<br>at V <sub>WM</sub><br>I <sub>D</sub> (μA) | Peak Pulse<br>Current<br>I <sub>PPM</sub><br>(NOTE 2)<br>(Amps) | Maximum<br>Clamping<br>Voltage at I <sub>PPM</sub><br>V <sub>c</sub> (Volts) | Maximum<br>Temperature<br>Coefficient<br>of<br>V <sub>(BR)</sub><br>(% / °C) |
|-------------|--|------|--|--|--|---|---|--|--|
|             | MIN  | MAX  |  |  |  |   |   |  |  |
| 1.5KA6.8    | 6.12   | 7.48 | 10   | 5.50   | 1000   | 10000   | 139   | 10.8   | 0.057  |
| 1.5KA6.8A   | 6.45   | 7.14 | 10   | 5.80   | 1000   | 10000   | 143   | 10.5   | 0.057  |
| 1.5KA7.5    | 6.75   | 8.25 | 10   | 6.05   | 500  | 5000  | 128   | 11.7   | 0.061  |
| 1.5KA7.5A   | 7.13   | 7.88 | 10   | 6.40   | 500  | 5000  | 133   | 11.3   | 0.061  |
| 1.5KA8.2    | 7.38   | 9.02 | 10   | 6.63   | 200  | 2000  | 120   | 12.5   | 0.065  |
| 1.5KA8.2A   | 7.79   | 8.61 | 10   | 7.02   | 200  | 2000  | 124   | 12.1   | 0.065  |
| 1.5KA9.1    | 8.19   | 10.0 | 1.0  | 7.37   | 50   | 500   | 109   | 13.8   | 0.068  |
| 1.5KA9.1A   | 8.65   | 9.55 | 1.0  | 7.78   | 50   | 500   | 112   | 13.4   | 0.068  |
| 1.5KA10     | 9.00   | 11.0 | 1.0  | 8.10   | 20   | 200   | 100   | 15.0   | 0.073  |
| 1.5KA10A    | 9.50   | 10.5 | 1.0  | 8.55   | 20   | 200   | 103   | 14.5   | 0.073  |
| 1.5KA11     | 9.90   | 12.1 | 1.0  | 8.92   | 5.0  | 50  | 92.6  | 16.2   | 0.075  |
| 1.5KA11A    | 10.5   | 11.6 | 1.0  | 9.40   | 5.0  | 50  | 96.2  | 15.6   | 0.076  |
| 1.5KA12     | 10.8   | 13.2 | 1.0  | 9.72   | 2.0  | 10  | 86.7  | 17.3   | 0.076  |
| 1.5KA12A    | 11.4   | 12.6 | 1.0  | 10.2   | 2.0  | 10  | 89.8  | 16.7   | 0.078  |
| 1.5KA13     | 11.7   | 14.3 | 1.0  | 10.5   | 2.0  | 10  | 78.9  | 19.0   | 0.081  |
| 1.5KA13A    | 12.4   | 13.7 | 1.0  | 11.1   | 2.0  | 10  | 82.4  | 18.2   | 0.081  |
| 1.5KA15     | 13.5   | 16.3 | 1.0  | 12.1   | 2.0  | 10  | 68.2  | 22.0   | 0.084  |
| 1.5KA15A    | 14.3   | 15.8 | 1.0  | 12.8   | 2.0  | 10  | 70.8  | 21.2   | 0.084  |
| 1.5KA16     | 14.4   | 17.6 | 1.0  | 12.9   | 2.0  | 10  | 63.8  | 23.5   | 0.086  |
| 1.5KA16A    | 15.2   | 16.8 | 1.0  | 13.6   | 2.0  | 10  | 66.7  | 22.5   | 0.086  |
| 1.5KA18     | 16.2   | 19.8 | 1.0  | 14.5   | 2.0  | 10  | 56.6  | 26.5   | 0.088  |

**ELECTRICAL CHARACTERISTICS at (T<sub>A</sub>=25°C unless otherwise noted) TABLE 1 (Cont'd)**

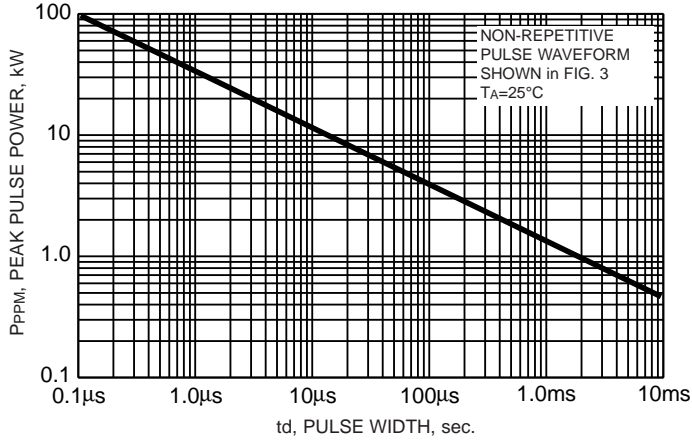
| Device Type | Breakdown Voltage<br>V <sub>(BR)</sub><br>Volts (NOTE 1) |      | Test<br>Current<br>at I <sub>T</sub><br>(mA) | Stand-off<br>Voltage<br>V <sub>WM</sub><br>(Volts) | Maximum<br>Reverse<br>Leakage<br>at V <sub>WM</sub><br>I <sub>D</sub> (μA) | T <sub>J</sub> =150°C<br>Maximum<br>Reverse<br>Leakage<br>at V <sub>WM</sub><br>I <sub>D</sub> (μA) | Peak Pulse<br>Current<br>I <sub>PPM</sub><br>(NOTE 2)<br>(Amps) | Maximum<br>Clamping<br>Voltage at I <sub>PPM</sub><br>V <sub>C</sub> (Volts) | Maximum<br>Temperature<br>Coefficient<br>of<br>V <sub>(BR)</sub><br>(% / °C) |
|-------------|--|------|--|--|--|---|---|--|--|
|             | MIN  | MAX  |  |  |  |   |   |  |  |
| 1.5KA18A    | 17.1   | 18.9 | 1.0  | 15.3   | 2.0  | 10  | 59.5  | 25.2   | 0.088  |
| 1.5KA20     | 18.0   | 22.0 | 1.0  | 16.2   | 2.0  | 10  | 51.5  | 29.1   | 0.090  |
| 1.5KA20A    | 19.0   | 21.0 | 1.0  | 17.1   | 2.0  | 10  | 54.2  | 27.7   | 0.090  |
| 1.5KA22     | 19.8   | 24.2 | 1.0  | 17.8   | 2.0  | 10  | 47.0  | 31.9   | 0.092  |
| 1.5KA22A    | 20.9   | 23.1 | 1.0  | 18.8   | 2.0  | 10  | 49.0  | 30.6   | 0.092  |
| 1.5KA24     | 21.6   | 26.4 | 1.0  | 19.4   | 2.0  | 10  | 43.2  | 34.7   | 0.094  |
| 1.5KA24A    | 22.8   | 25.2 | 1.0  | 20.5   | 2.0  | 10  | 45.2  | 33.2   | 0.094  |
| 1.5KA27     | 24.3   | 29.7 | 1.0  | 21.8   | 2.0  | 10  | 38.4  | 39.1   | 0.096  |
| 1.5KA27A    | 25.7   | 28.4 | 1.0  | 23.1   | 2.0  | 10  | 40.0  | 37.5   | 0.096  |
| 1.5KA30     | 27.0   | 33.0 | 1.0  | 24.3   | 2.0  | 10  | 34.5  | 43.5   | 0.097  |
| 1.5KA30A    | 28.5   | 31.5 | 1.0  | 25.6   | 2.0  | 10  | 36.2  | 41.4   | 0.097  |
| 1.5KA33     | 29.7   | 36.3 | 1.0  | 26.8   | 2.0  | 10  | 31.4  | 47.7   | 0.098  |
| 1.5KA33A    | 31.4   | 34.7 | 1.0  | 28.2   | 2.0  | 10  | 32.8  | 45.7   | 0.098  |
| 1.5KA36     | 32.4   | 39.6 | 1.0  | 29.1   | 2.0  | 10  | 28.8  | 52.0   | 0.099  |
| 1.5KA36A    | 34.2   | 37.8 | 1.0  | 30.8   | 2.0  | 10  | 30.1  | 49.9   | 0.099  |
| 1.5KA39     | 35.1   | 42.9 | 1.0  | 31.6   | 2.0  | 10  | 26.6  | 56.4   | 0.100  |
| 1.5KA39A    | 37.1   | 41.0 | 1.0  | 33.3   | 2.0  | 10  | 27.8  | 53.9   | 0.100  |
| 1.5KA43     | 38.7   | 47.3 | 1.0  | 34.8   | 2.0  | 10  | 24.2  | 61.9   | 0.101  |
| 1.5KA43A    | 40.9   | 45.2 | 1.0  | 36.8   | 2.0  | 10  | 25.3  | 59.3   | 0.101  |

**NOTES:**

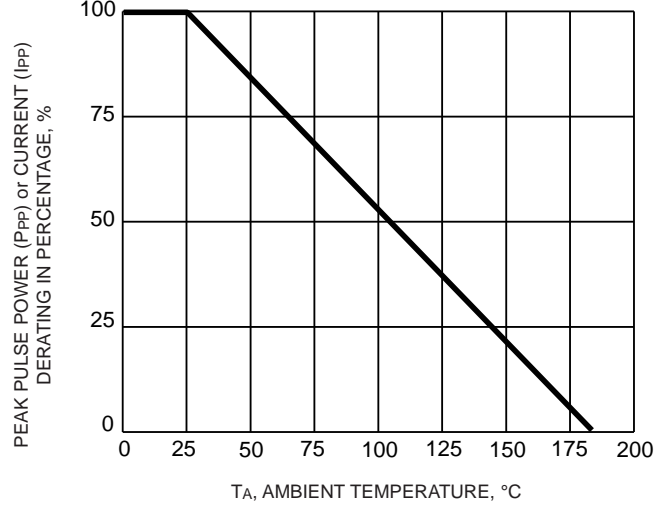
- (1) V<sub>(BR)</sub> measured after I<sub>T</sub> applied for 300μs = square wave pulse or equivalent
- (2) Surge current waveform per Fig. 3 and derate per Fig. 2
- (3) All terms and symbols are consistent with ANSI/IEEE C62.35

# RATINGS AND CHARACTERISTIC CURVES 1.5KA6.8 THRU 1.5KA43A

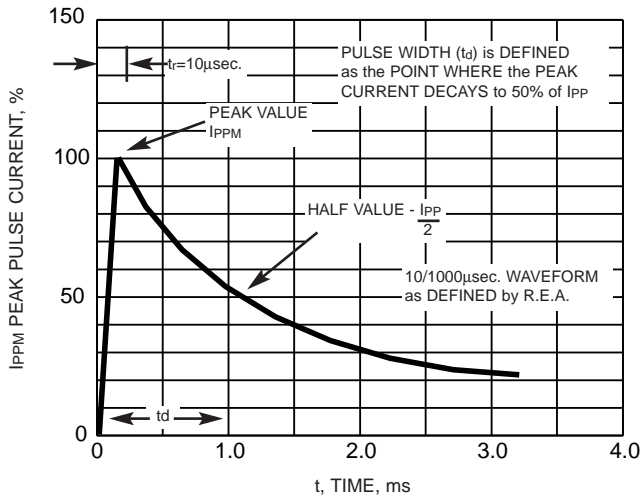
**FIG. 1 - PEAK PULSE POWER RATING CURVE**



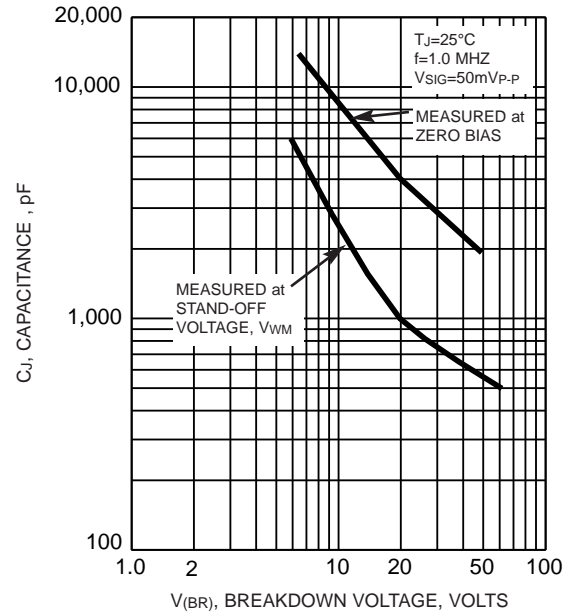
**FIG. 2 - PULSE DERATING CURVE**



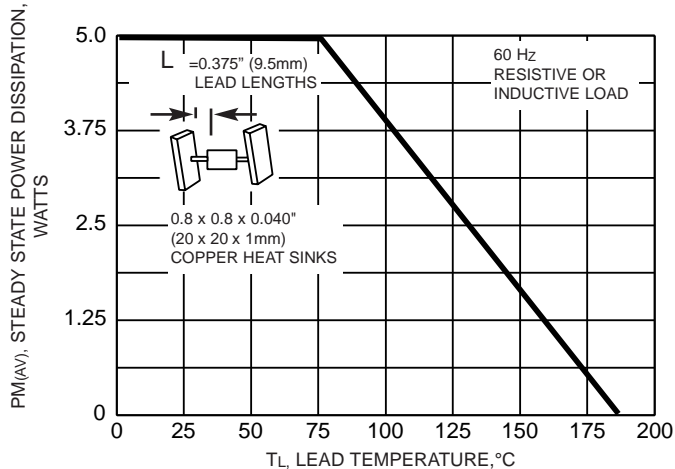
**FIG. 3 - PULSE WAVEFORM**



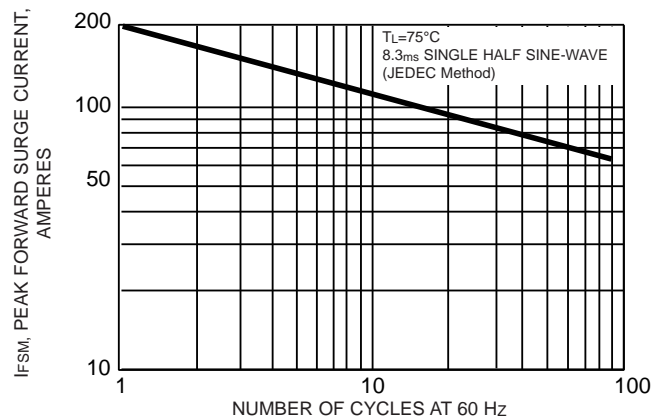
**FIG. 4 - TYPICAL JUNCTION CAPACITANCE UNIDIRECTIONAL**



**FIG. 5 - STEADY STATE POWER DERATING CURVE**



**FIG. 6 - MAXIMUM NON-REPETITIVE FORWARD SURGE CURRENT**



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