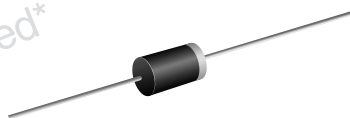


### Automotive Transient Voltage Suppressors

High Temperature Stability and High Reliability Conditions

Patented\*



DO-204AL (DO-41)

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

#### FEATURES

- Patented PAR<sup>®</sup> construction
- Available in uni-directional polarity only
- 400 W peak pulse power capability with a 10/1000  $\mu$ 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, automotive, and telecommunication.

#### MECHANICAL DATA

**Case:** DO-204AL, molded epoxy over passivated junction

Molding compound meets UL 94 V-0 flammability rating

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

HE3 suffix meets JESD 201 class 2 whisker test

**Polarity:** Color band denotes cathode end

#### PRIMARY CHARACTERISTICS

|            |               |
|------------|---------------|
| $V_{BR}$   | 6.8 V to 43 V |
| $P_{PPM}$  | 400 W         |
| $P_D$      | 1.5 W         |
| $I_{FSM}$  | 40 A          |
| $T_J$ max. | 185 °C        |

#### MAXIMUM RATINGS ( $T_A = 25$ °C unless otherwise noted)

| PARAMETER                                                                            | SYMBOL         | VALUE          | UNIT |
|--------------------------------------------------------------------------------------|----------------|----------------|------|
| Peak pulse power dissipation with a 10/1000 $\mu$ s waveform <sup>(1)</sup> (Fig. 1) | $P_{PPM}$      | 400            | W    |
| Peak pulse current with a 10/1000 $\mu$ s waveform <sup>(1)</sup> (Fig. 3)           | $I_{PPM}$      | See next table | A    |
| Power dissipation on infinite heatsink at $T_L = 75$ °C (Fig. 5)                     | $P_D$          | 1.5            | W    |
| Peak forward surge current 8.3 ms single half sine-wave <sup>(2)</sup>               | $I_{FSM}$      | 40             | A    |
| Maximum instantaneous forward voltage at 25 A                                        | $V_F$          | 3.5            | V    |
| Operating junction and storage temperature range                                     | $T_J, T_{STG}$ | - 65 to + 185  | °C   |

#### Notes:

(1) Non-repetitive current pulse, per Fig. 3 and derated above  $T_A = 25$  °C per Fig. 2

(2) All terms and symbols are consistent with ANSI/IEEE C62.35

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

| DEVICE TYPE | BREAKDOWN VOLTAGE $V_{BR}^{(1)}$ AT $I_T$ (V) |      | TEST CURRENT $I_T$ (mA) | STAND-OFF VOLTAGE $V_{WM}$ (V) | MAXIMUM REVERSE LEAKAGE AT $V_{WM}$ $I_D$ ( $\mu\text{A}$ ) | $T_J = 150\text{ }^{\circ}\text{C}$ MAXIMUM REVERSE LEAKAGE AT $V_{WM}$ $I_D$ ( $\mu\text{A}$ ) | MAXIMUM PEAK PULSE SURGE CURRENT $I_{PPM}^{(2)}$ (A) | MAXIMUM CLAMPING VOLTAGE AT $I_{PPM}$ $V_C$ (V) | MAXIMUM TEMPERATURE COEFFICIENT OF $V_{BR}$ ( $\%/^{\circ}\text{C}$ ) |
|-------------|-----------------------------------------------|------|-------------------------|--------------------------------|-------------------------------------------------------------|-------------------------------------------------------------------------------------------------|------------------------------------------------------|-------------------------------------------------|-----------------------------------------------------------------------|
|             | MIN.                                          | MAX. |                         |                                |                                                             |                                                                                                 |                                                      |                                                 |                                                                       |
| P4KA6.8     | 6.12                                          | 7.48 | 10                      | 5.50                           | 300                                                         | 1000                                                                                            | 37.0                                                 | 10.8                                            | 0.057                                                                 |
| P4KA6.8A    | 6.45                                          | 7.14 | 10                      | 5.80                           | 300                                                         | 1000                                                                                            | 38.1                                                 | 10.5                                            | 0.057                                                                 |
| P4KA7.5     | 6.75                                          | 8.25 | 10                      | 6.05                           | 150                                                         | 500                                                                                             | 34.2                                                 | 11.7                                            | 0.060                                                                 |
| P4KA7.5A    | 7.13                                          | 7.88 | 10                      | 6.40                           | 150                                                         | 500                                                                                             | 35.4                                                 | 11.3                                            | 0.061                                                                 |
| P4KA8.2     | 7.38                                          | 9.02 | 10                      | 6.63                           | 50                                                          | 200                                                                                             | 32.0                                                 | 12.5                                            | 0.065                                                                 |
| P4KA8.2A    | 7.79                                          | 8.61 | 10                      | 7.02                           | 50                                                          | 200                                                                                             | 33.1                                                 | 12.1                                            | 0.065                                                                 |
| P4KA9.1     | 8.19                                          | 10.0 | 1.0                     | 7.37                           | 10                                                          | 50                                                                                              | 29.0                                                 | 13.8                                            | 0.068                                                                 |
| P4KA9.1A    | 8.65                                          | 9.55 | 1.0                     | 7.78                           | 10                                                          | 50                                                                                              | 29.9                                                 | 13.4                                            | 0.068                                                                 |
| P4KA10      | 9.00                                          | 11.0 | 1.0                     | 8.10                           | 5.0                                                         | 20                                                                                              | 26.7                                                 | 15.0                                            | 0.073                                                                 |
| P4KA10A     | 9.50                                          | 10.5 | 1.0                     | 8.55                           | 5.0                                                         | 20                                                                                              | 27.6                                                 | 14.5                                            | 0.073                                                                 |
| P4KA11      | 9.90                                          | 12.1 | 1.0                     | 8.92                           | 1.0                                                         | 5.0                                                                                             | 24.7                                                 | 16.2                                            | 0.075                                                                 |
| P4KA11A     | 10.5                                          | 11.6 | 1.0                     | 9.40                           | 1.0                                                         | 5.0                                                                                             | 25.6                                                 | 15.6                                            | 0.075                                                                 |
| P4KA12      | 10.8                                          | 13.2 | 1.0                     | 9.72                           | 1.0                                                         | 5.0                                                                                             | 23.1                                                 | 17.3                                            | 0.076                                                                 |
| P4KA12A     | 11.4                                          | 12.6 | 1.0                     | 10.2                           | 1.0                                                         | 5.0                                                                                             | 24.0                                                 | 16.7                                            | 0.078                                                                 |
| P4KA13      | 11.7                                          | 14.3 | 1.0                     | 10.5                           | 1.0                                                         | 5.0                                                                                             | 21.1                                                 | 19.0                                            | 0.081                                                                 |
| P4KA13A     | 12.4                                          | 13.7 | 1.0                     | 11.1                           | 1.0                                                         | 5.0                                                                                             | 22.0                                                 | 18.2                                            | 0.081                                                                 |
| P4KA15      | 13.5                                          | 16.3 | 1.0                     | 12.1                           | 1.0                                                         | 5.0                                                                                             | 18.2                                                 | 22.0                                            | 0.084                                                                 |
| P4KA15A     | 14.3                                          | 15.8 | 1.0                     | 12.8                           | 1.0                                                         | 5.0                                                                                             | 18.9                                                 | 21.2                                            | 0.084                                                                 |
| P4KA16      | 14.4                                          | 17.6 | 1.0                     | 12.9                           | 1.0                                                         | 5.0                                                                                             | 17.0                                                 | 23.5                                            | 0.086                                                                 |
| P4KA16A     | 15.2                                          | 16.8 | 1.0                     | 13.6                           | 1.0                                                         | 5.0                                                                                             | 17.8                                                 | 22.5                                            | 0.086                                                                 |
| P4KA18      | 16.2                                          | 19.8 | 1.0                     | 14.5                           | 1.0                                                         | 5.0                                                                                             | 15.1                                                 | 26.5                                            | 0.088                                                                 |
| P4KA18A     | 17.1                                          | 18.9 | 1.0                     | 15.3                           | 1.0                                                         | 5.0                                                                                             | 15.9                                                 | 25.5                                            | 0.088                                                                 |
| P4KA20      | 18.0                                          | 22.0 | 1.0                     | 16.2                           | 1.0                                                         | 5.0                                                                                             | 13.7                                                 | 29.1                                            | 0.090                                                                 |
| P4KA20A     | 19.0                                          | 21.0 | 1.0                     | 17.0                           | 1.0                                                         | 5.0                                                                                             | 14.4                                                 | 27.7                                            | 0.090                                                                 |
| P4KA22      | 19.8                                          | 24.2 | 1.0                     | 17.8                           | 1.0                                                         | 5.0                                                                                             | 12.5                                                 | 31.9                                            | 0.092                                                                 |
| P4KA22A     | 20.9                                          | 23.1 | 1.0                     | 18.8                           | 1.0                                                         | 5.0                                                                                             | 13.1                                                 | 30.6                                            | 0.092                                                                 |
| P4KA24      | 21.6                                          | 26.4 | 1.0                     | 19.4                           | 1.0                                                         | 5.0                                                                                             | 11.5                                                 | 34.2                                            | 0.094                                                                 |
| P4KA24A     | 22.8                                          | 25.2 | 1.0                     | 20.5                           | 1.0                                                         | 5.0                                                                                             | 12.0                                                 | 33.2                                            | 0.094                                                                 |
| P4KA27      | 24.3                                          | 29.7 | 1.0                     | 21.8                           | 1.0                                                         | 5.0                                                                                             | 10.2                                                 | 39.1                                            | 0.096                                                                 |
| P4KA27A     | 25.7                                          | 28.4 | 1.0                     | 23.1                           | 1.0                                                         | 5.0                                                                                             | 10.7                                                 | 37.5                                            | 0.096                                                                 |
| P4KA30      | 27.0                                          | 33.0 | 1.0                     | 24.3                           | 1.0                                                         | 5.0                                                                                             | 9.2                                                  | 43.5                                            | 0.097                                                                 |
| P4KA30A     | 28.5                                          | 31.5 | 1.0                     | 25.6                           | 1.0                                                         | 5.0                                                                                             | 9.7                                                  | 41.4                                            | 0.097                                                                 |
| P4KA33      | 29.7                                          | 36.3 | 1.0                     | 26.8                           | 1.0                                                         | 5.0                                                                                             | 8.4                                                  | 47.7                                            | 0.098                                                                 |
| P4KA33A     | 31.4                                          | 34.7 | 1.0                     | 28.2                           | 1.0                                                         | 5.0                                                                                             | 8.8                                                  | 45.7                                            | 0.098                                                                 |
| P4KA36      | 32.4                                          | 39.6 | 1.0                     | 29.1                           | 1.0                                                         | 5.0                                                                                             | 7.7                                                  | 52.0                                            | 0.099                                                                 |
| P4KA36A     | 34.2                                          | 37.8 | 1.0                     | 30.8                           | 1.0                                                         | 5.0                                                                                             | 8.0                                                  | 49.9                                            | 0.099                                                                 |
| P4KA39      | 35.1                                          | 42.9 | 1.0                     | 31.6                           | 1.0                                                         | 5.0                                                                                             | 7.1                                                  | 56.4                                            | 0.100                                                                 |
| P4KA39A     | 37.1                                          | 41.0 | 1.0                     | 33.3                           | 1.0                                                         | 5.0                                                                                             | 7.4                                                  | 53.9                                            | 0.100                                                                 |
| P4KA43      | 38.7                                          | 47.3 | 1.0                     | 34.8                           | 1.0                                                         | 5.0                                                                                             | 6.5                                                  | 61.9                                            | 0.101                                                                 |
| P4KA43A     | 40.9                                          | 45.2 | 1.0                     | 36.8                           | 1.0                                                         | 5.0                                                                                             | 6.7                                                  | 59.3                                            | 0.101                                                                 |

**Notes:**(1) Pulse test:  $t_p \leq 50\text{ ms}$ 

(2) Surge current waveform per Fig. 3 and derated per Fig. 2

(3) 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                    |
|-------------------------------|-----------------|------------------------|---------------|----------------------------------|
| P4KA6.8AHE3/54 <sup>(1)</sup> | 0.336           | 54                     | 5500          | 13" diameter paper tape and reel |

#### Note:

(1) Automotive grade AEC Q101 qualified

### RATINGS AND CHARACTERISTICS CURVES

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

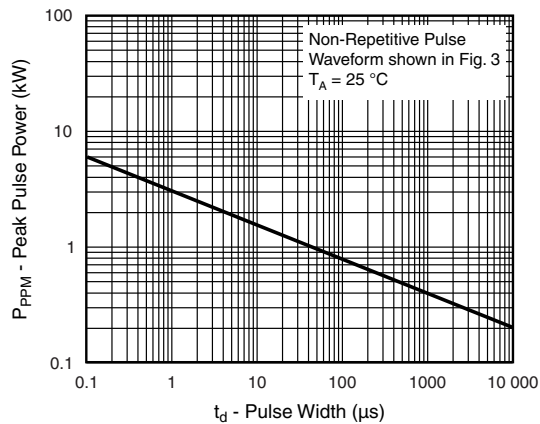


Figure 1. Peak Pulse Power Rating Curve

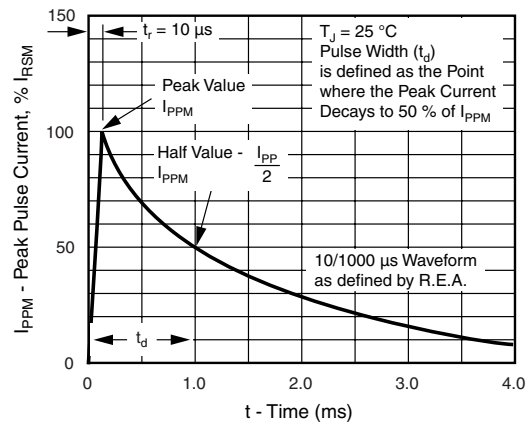


Figure 3. Pulse Waveform

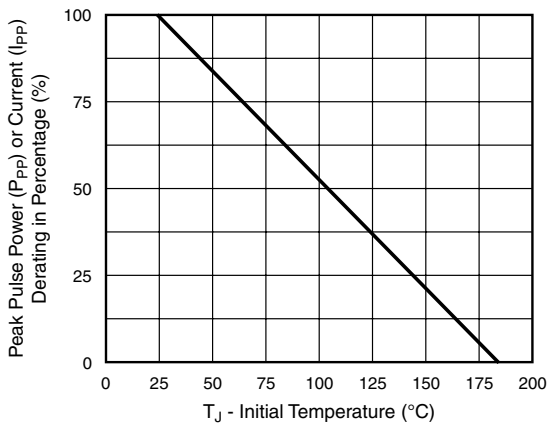


Figure 2. Pulse Power or Current vs. Initial Junction Temperature

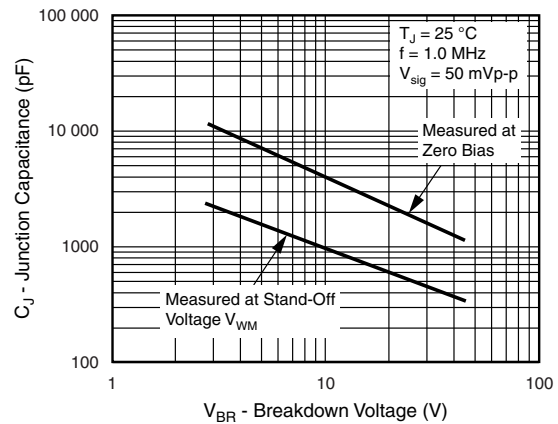


Figure 4. Typical Junction Capacitance

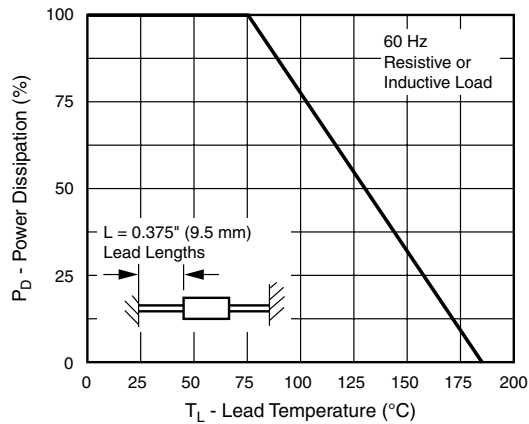


Figure 5. Power Derating Curve

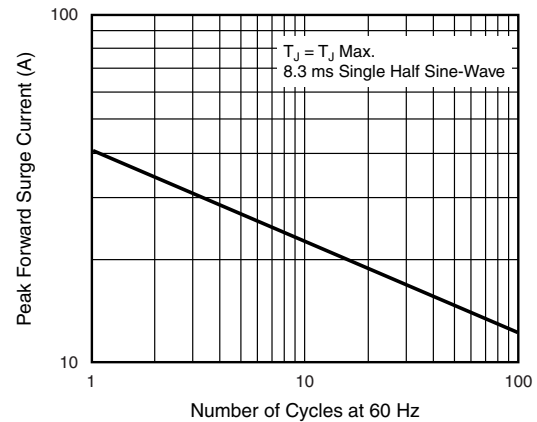
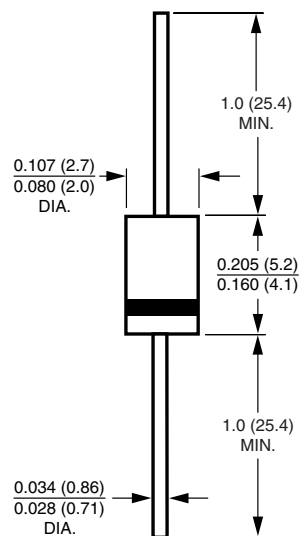


Figure 6. Maximum Non-Repetitive/Peak Forward Surge Current

### PACKAGE OUTLINE DIMENSIONS in inches (millimeters)

#### DO-204AL (DO-41)



Available in uni-directional only



### Disclaimer

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