



## P4KE SERIES TRANSIENT VOLTAGE SUPPRESSORS DIODE



### FEATURES

- \* Plastic package has underwriters laboratory flammability classifications 94V-0
- \* 400W surge capability at 1ms
- \* Excellent clamping capability
- \* Low zener impedance
- \* Fast response time: typically less than 1.0ps from 0 volts to BV min
- \* Typical  $I_R$  less than  $1\mu A$  above 10V

### MECHANICAL DATA

- \* Case: Molded plastic
- \* Terminals: Axial leads, solderable per MIL - STD - 202, Method 208
- \* Polarity: Color band denotes cathode Bidirectional not Mark.
- \* Weight: 0.012 ounce (0.3 grams)

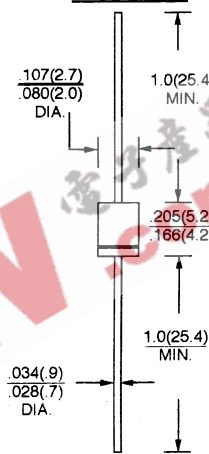
### DEVICES FOR BIPOLAR APPLICATIONS

For Bidirectional use C or CA Suffix for types P4KE6.8 thru types P4KE400  
Electrical characteristics apply in both directions

### VOLTAGE RANGE

6.8 to 400 Volts  
400 Watts Peak Power

### DO-41



Dimensions in inches and (millimeters)

### MAXIMUM RATINGS AND ELECTRICAL CHARACTERISTICS

Rating at 25°C ambient temperature unless otherwise specified.  
Single phase, half wave, 60 Hz, resistive or inductive load.  
For capacitive load, derate current by 20%

| TYPE NUMBER   | SYMBOLS         | VALUE       | UNITS |
|---|-----------------|-------------|-------|
| Peak Power Dissipation at $T_A = 25^\circ C$ , $T_P = 1ms$ (Note 1)   | $P_{PPM}$       | Minimum 400 | Watt  |
| Steady State Power Dissipation at $T_L = 75^\circ C$<br>Lead Lengths .375", 9.5mm (Note 2)                  | $P_D$           | 1.0         | Watt  |
| Peak Forward surge Current, 8.3 ms single half Sine-Wave Superimposed on Rated Load (JEDEC method) (Note 3) | $I_{FSM}$       | 40.0        | Amp   |
| Maximum instantaneous forward voltage at 25A for unidirectional Only (Note 4)                               | $V_F$           | 3.5/5.0     | Volt  |
| Operating and Storage Temperature Range   | $T_j$ $T_{STG}$ | -65 to +150 | °C    |

- NOTE: (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  $1.6 \times 1.6"$  ( $40 \times 40mm$ ) Per Fig 5.  
(3) 8.3ms single half sine-wave or equivalent square wave, duty cycle = 4 pulses per Minutes maximum.  
(4)  $V_F = 3.5V$  Max for Devices  $V(BR) \leq 200V$  and  $V_F = 5.0V$  for Devices  $V(BR) > 200V$ .



## RATINGS AND CHARACTERISTIC CURVES (P4KE SERIES)

FIGURE 1 - PEAK PULSE POWER RATING CURVE

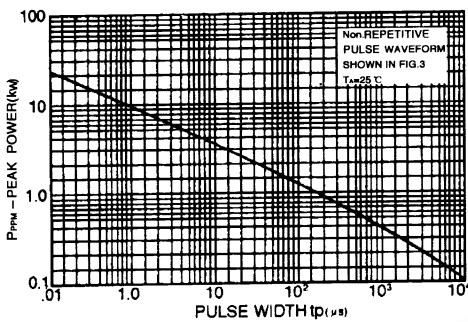


FIGURE 2 - PULSE DERATING CURVE

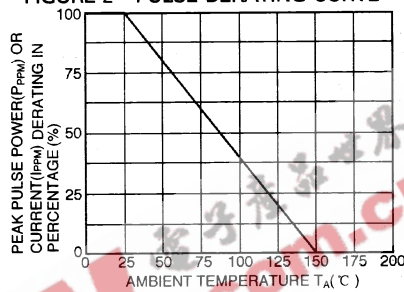


FIGURE 3 - PULSE WAVEFORM

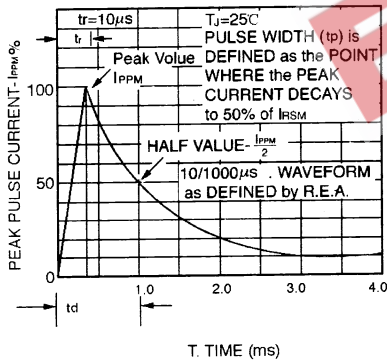


FIGURE 5 - STEADY STATE POWER DERATING CURVE

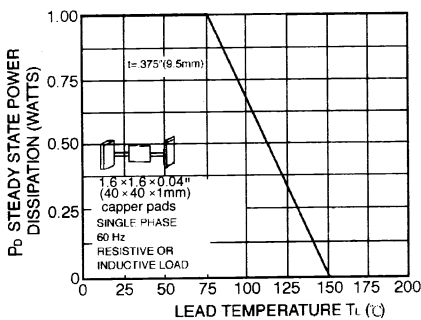


FIGURE 4 - TYPICAL JUNCTION CAPACITANCE UNIDIRECTIONAL

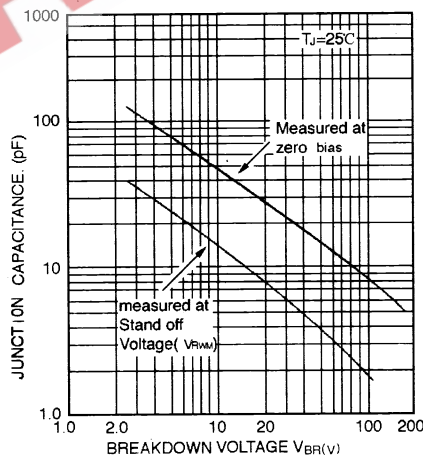
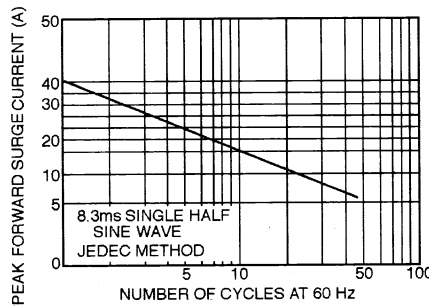


FIGURE 6 - MAXIMUM NON-REPETITIVE FORWARD SURGE CURRENT - UNIDIRECTIONAL ONLY



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

| Device   | Nominal Voltage (Volts) | Breakdown Voltage        |      | $I_T$ (mA) | stand-off Voltage $V_{WM}$ (Volts) | Maximum Reverse Leakage @ $V_{WM}$ $I_D$ ( $\mu\text{A}$ ) (NOTE 3) | Maximum Reverse Surge Current $I_{PPM}$ (NOTE 2) (Amps) | Maximum Reverse Voltage @ $I_{PPM}$ (Clamping Voltage) $V_C$ (Volts) | Maximum Temperature Coefficient of $V(BR)$ ( $\%/^\circ\text{C}$ ) |
|----------|-------------------------|--------------------------|------|------------|------------------------------------|---|---|--|--|
|          |                         | $V(BR)$ (Volts) (Note 1) |      |            |                                    |   |   |  |  |
|          |                         | Min                      | Max  |            |                                    |   |   |  |  |
| P4KE6.8  | 6.8                     | 6.12                     | 7.48 | 10         | 5.50                               | 1000  | 38  | 10.8   | 0.057  |
| P4KE6.8A | 6.8                     | 6.46                     | 7.14 | 10         | 5.80                               | 1000  | 40  | 10.5   | 0.057  |
| P4KE7.5  | 7.5                     | 6.75                     | 8.25 | 10         | 6.05                               | 500   | 36  | 11.7   | 0.061  |
| P4KE7.5A | 7.5                     | 7.13                     | 7.88 | 10         | 6.40                               | 500   | 37  | 11.3   | 0.061  |
| P4KE8.2  | 8.2                     | 7.38                     | 9.02 | 10         | 6.63                               | 200   | 33  | 12.5   | 0.065  |
| P4KE8.2A | 8.2                     | 7.79                     | 8.61 | 10         | 7.02                               | 200   | 35  | 12.1   | 0.065  |
| P4KE9.1  | 9.1                     | 8.19                     | 10.0 | 10         | 7.37                               | 50  | 30  | 13.8   | 0.068  |
| P4KE9.1A | 9.1                     | 8.65                     | 9.55 | 1.0        | 7.78                               | 50  | 31  | 13.4   | 0.068  |
| P4KE10   | 10                      | 9.00                     | 11.0 | 1.0        | 8.10                               | 10  | 28  | 15.0   | 0.073  |
| P4KE10A  | 10                      | 9.50                     | 10.5 | 1.0        | 8.55                               | 10  | 29  | 14.5   | 0.073  |
| P4KE11   | 11                      | 9.90                     | 12.1 | 1.0        | 8.92                               | 5.0   | 26  | 16.2   | 0.075  |
| P4KE11A  | 11                      | 10.5                     | 11.6 | 1.0        | 9.40                               | 5.0   | 27  | 15.6   | 0.075  |
| P4KE12   | 12                      | 10.8                     | 13.2 | 1.0        | 9.72                               | 5.0   | 24  | 17.3   | 0.076  |
| P4KE12A  | 12                      | 11.4                     | 12.6 | 1.0        | 10.2                               | 5.0   | 25  | 16.7   | 0.078  |
| P4KE13   | 13                      | 11.7                     | 14.3 | 1.0        | 10.5                               | 5.0   | 22  | 19.0   | 0.081  |
| P4KE13A  | 13                      | 12.4                     | 13.7 | 1.0        | 11.1                               | 5.0   | 23  | 18.2   | 0.081  |
| P4KE15   | 15                      | 13.5                     | 16.5 | 1.0        | 12.1                               | 5.0   | 19  | 22.0   | 0.084  |
| P4KE15A  | 15                      | 14.3                     | 15.8 | 1.0        | 12.8                               | 5.0   | 20  | 21.2   | 0.084  |
| P4KE16   | 16                      | 14.4                     | 17.6 | 1.0        | 12.9                               | 5.0   | 18  | 23.5   | 0.086  |
| P4KE16A  | 16                      | 15.2                     | 16.8 | 1.0        | 13.6                               | 5.0   | 19  | 22.5   | 0.086  |
| P4KE18   | 18                      | 16.2                     | 19.8 | 1.0        | 14.5                               | 5.0   | 16  | 26.5   | 0.088  |
| P4KE18A  | 18                      | 17.1                     | 18.9 | 1.0        | 15.3                               | 5.0   | 17  | 25.2   | 0.088  |
| P4KE20   | 20                      | 18.0                     | 22.0 | 1.0        | 16.2                               | 5.0   | 14  | 29.1   | 0.090  |
| P4KE20A  | 20                      | 19.0                     | 21.0 | 1.0        | 17.1                               | 5.0   | 15  | 27.7   | 0.090  |
| P4KE22   | 22                      | 19.8                     | 24.2 | 1.0        | 17.8                               | 5.0   | 13  | 31.9   | 0.092  |
| P4KE22A  | 22                      | 20.9                     | 23.1 | 1.0        | 18.8                               | 5.0   | 14  | 30.6   | 0.092  |
| P4KE24   | 24                      | 21.6                     | 26.4 | 1.0        | 19.4                               | 5.0   | 12  | 34.7   | 0.094  |
| P4KE24A  | 24                      | 22.8                     | 25.2 | 1.0        | 20.5                               | 5.0   | 13  | 33.2   | 0.094  |
| P4KE27   | 27                      | 24.3                     | 29.7 | 1.0        | 21.8                               | 5.0   | 11  | 39.1   | 0.096  |
| P4KE27A  | 27                      | 25.7                     | 28.4 | 1.0        | 23.1                               | 5.0   | 11.2  | 37.5   | 0.096  |
| P4KE30   | 30                      | 27.0                     | 33.0 | 1.0        | 24.3                               | 5.0   | 10  | 43.5   | 0.097  |
| P4KE30A  | 30                      | 28.5                     | 31.5 | 1.0        | 25.6                               | 5.0   | 10  | 41.4   | 0.097  |
| P4KE33   | 33                      | 29.7                     | 36.3 | 1.0        | 26.8                               | 5.0   | 9   | 47.7   | 0.098  |
| P4KE33A  | 33                      | 31.4                     | 34.7 | 1.0        | 28.2                               | 5.0   | 9   | 45.7   | 0.098  |
| P4KE36   | 36                      | 32.4                     | 39.6 | 1.0        | 29.1                               | 5.0   | 8   | 52.0   | 0.099  |
| P4KE36A  | 36                      | 34.2                     | 37.8 | 1.0        | 30.8                               | 5.0   | 8.4   | 49.9   | 0.099  |
| P4KE39   | 39                      | 35.1                     | 42.9 | 1.0        | 31.6                               | 5.0   | 7.4   | 56.4   | 0.100  |
| P4KE39A  | 39                      | 37.1                     | 41.0 | 1.0        | 33.3                               | 5.0   | 7.8   | 53.9   | 0.100  |
| P4KE43   | 43                      | 38.7                     | 47.3 | 1.0        | 34.8                               | 5.0   | 6.8   | 61.9   | 0.101  |
| P4KE43A  | 43                      | 40.9                     | 45.2 | 1.0        | 36.8                               | 5.0   | 7.1   | 59.3   | 0.101  |
| P4KE47   | 47                      | 42.3                     | 51.7 | 1.0        | 38.1                               | 5.0   | 6.2   | 67.8   | 0.101  |
| P4KE47A  | 47                      | 44.7                     | 49.4 | 1.0        | 40.2                               | 5.0   | 6.4   | 64.8   | 0.101  |

| Device   | Nominal Voltage (Volts) | Breakdown Voltage                  |       | @ I <sub>T</sub> (mA) | stand - off Voltage V <sub>WM</sub> (Volts) | Maximum Reverse Leakage @ V <sub>WM</sub> I <sub>D</sub> (μA) (NOTE 3) | Maximum Reverse Surge Current I <sub>PPM</sub> (NOTE 2) (Amps) | Maximum Reverse Voltage @ I <sub>PPM</sub> (Clamping Voltage) V <sub>C</sub> (Volts) | Maximum Temperature Coefficient of V <sub>(BR)</sub> (%/°C) |
|----------|-------------------------|------------------------------------|-------|-----------------------|---|--|--|--|---|
|          |                         | V <sub>(BR)</sub> (Volts) (Note 1) |       |                       |   |  |  |  |   |
|          |                         | Min                                | Max   |                       |   |  |  |  |   |
| P4KE51   | 51                      | 45.9                               | 56.1  | 1.0                   | 41.3  | 5.0  | 5.7  | 73.5   | 0.102   |
| P4KE51A  | 51                      | 48.5                               | 53.6  | 1.0                   | 43.6  | 5.0  | 6.0  | 70.1   | 0.102   |
| P4KE56   | 56                      | 50.4                               | 61.6  | 1.0                   | 45.4  | 5.0  | 5.2  | 80.5   | 0.103   |
| P4KE56A  | 56                      | 53.2                               | 58.8  | 1.0                   | 47.8  | 5.0  | 5.4  | 77.0   | 0.103   |
| P4KE62   | 62                      | 55.8                               | 68.2  | 1.0                   | 50.2  | 5.0  | 4.7  | 89.0   | 0.104   |
| P4KE62A  | 62                      | 58.9                               | 65.1  | 1.0                   | 53.0  | 5.0  | 5.0  | 85.0   | 0.104   |
| P4KE68   | 68                      | 61.2                               | 74.8  | 1.0                   | 55.1  | 5.0  | 4.2  | 96.0   | 0.104   |
| P4KE68A  | 68                      | 64.6                               | 71.4  | 1.0                   | 58.1  | 5.0  | 4.5  | 92.0   | 0.104   |
| P4KE75   | 75                      | 67.5                               | 82.5  | 1.0                   | 60.7  | 5.0  | 3.8  | 108.0  | 0.105   |
| 5P4KE75A | 75                      | 71.3                               | 78.8  | 1.0                   | 64.1  | 5.0  | 4.0  | 103.0  | 0.105   |
| P4KE82   | 82                      | 73.8                               | 90.2  | 1.0                   | 66.4  | 5.0  | 3.5  | 118.0  | 0.105   |
| P4KE82A  | 82                      | 77.9                               | 86.1  | 1.0                   | 70.1  | 5.0  | 3.7  | 113.0  | 0.105   |
| P4KE91   | 91                      | 81.9                               | 100.0 | 1.0                   | 73.7  | 5.0  | 3.2  | 131.8  | 0.106   |
| P4KE91A  | 91                      | 86.5                               | 95.50 | 1.0                   | 77.8  | 5.0  | 3.3  | 125.0  | 0.106   |
| P4KE100  | 100                     | 90.0                               | 110.0 | 1.0                   | 81.0  | 5.0  | 2.9  | 144.0  | 0.106   |
| P4KE100A | 100                     | 95.0                               | 105.0 | 1.0                   | 85.5  | 5.0  | 3.0  | 137.0  | 0.106   |
| P4KE110  | 110                     | 99.0                               | 121.0 | 1.0                   | 89.2  | 5.0  | 2.6  | 158.0  | 0.107   |
| P4KE110A | 110                     | 105.0                              | 116.0 | 1.0                   | 94.0  | 5.0  | 2.7  | 152.0  | 0.107   |
| P4KE120  | 120                     | 108.0                              | 132.0 | 1.0                   | 97.2  | 5.0  | 2.4  | 173.0  | 0.107   |
| P4KE120A | 120                     | 114.0                              | 126.0 | 1.0                   | 102.0                                       | 5.0  | 2.5  | 165.0  | 0.107   |
| P4KE130  | 130                     | 117.0                              | 143.0 | 1.0                   | 105.0                                       | 5.0  | 2.2  | 187.0  | 0.107   |
| P4KE130A | 130                     | 124.0                              | 137.0 | 1.0                   | 111.0                                       | 5.0  | 2.3  | 179.0  | 0.107   |
| P4KE150  | 150                     | 135.0                              | 165.0 | 1.0                   | 121.0                                       | 5.0  | 1.9  | 215.0  | 0.108   |
| P4KE150A | 150                     | 143.0                              | 158.0 | 1.0                   | 128.0                                       | 5.0  | 2.0  | 207.0  | 0.108   |
| P4KE160  | 160                     | 144.0                              | 176.0 | 1.0                   | 130.0                                       | 5.0  | 1.8  | 230.0  | 0.108   |
| P4KE160A | 160                     | 152.0                              | 168.0 | 1.0                   | 136.0                                       | 5.0  | 1.9  | 219.0  | 0.108   |
| P4KE170  | 170                     | 153.0                              | 187.0 | 1.0                   | 138.0                                       | 5.0  | 1.7  | 244.0  | 0.108   |
| P4KE170A | 170                     | 162.0                              | 179.0 | 1.0                   | 145.0                                       | 5.0  | 1.8  | 234.0  | 0.108   |
| P4KE180  | 180                     | 162.0                              | 198.0 | 1.0                   | 146.0                                       | 5.0  | 1.6  | 258.0  | 0.108   |
| P4KE180A | 180                     | 171.0                              | 189.0 | 1.0                   | 154.0                                       | 5.0  | 1.7  | 246.0  | 0.108   |
| P4KE200  | 200                     | 180.0                              | 220.0 | 1.0                   | 162.0                                       | 5.0  | 1.4  | 287.0  | 0.108   |
| P4KE200A | 200                     | 190.0                              | 210.0 | 1.0                   | 171.0                                       | 5.0  | 1.51   | 274.0  | 0.108   |
| P4KE220  | 220                     | 198.0                              | 242.0 | 1.0                   | 175.0                                       | 5.0  | 1.2  | 344.0  | 0.108   |
| P4KE220A | 220                     | 209.0                              | 231.0 | 1.0                   | 185.0                                       | 5.0  | 1.3  | 328.0  | 0.108   |
| P4KE250  | 250                     | 225.0                              | 275.0 | 1.0                   | 202.0                                       | 5.0  | 1.1  | 360.0  | 0.110   |
| P4KE250A | 250                     | 237.0                              | 263.0 | 1.0                   | 214.0                                       | 5.0  | 1.2  | 344.0  | 0.110   |
| P4KE300  | 300                     | 270.0                              | 330.3 | 1.0                   | 243.0                                       | 5.0  | 0.97   | 430.0  | 0.110   |
| P4KE300A | 300                     | 285.0                              | 315.0 | 1.0                   | 256.0                                       | 5.0  | 1.0  | 414.0  | 0.110   |
| P4KE350  | 350                     | 315.0                              | 385.0 | 1.0                   | 284.0                                       | 5.0  | 0.83   | 504.0  | 0.110   |
| P4KE350A | 350                     | 332.0                              | 368.0 | 1.0                   | 300.0                                       | 5.0  | 0.87   | 482.0  | 0.110   |
| P4KE400  | 400                     | 360.0                              | 440.0 | 1.0                   | 324.0                                       | 5.0  | 0.73   | 574.0  | 0.110   |
| P4KE400A | 400                     | 380.0                              | 420.0 | 1.0                   | 342.0                                       | 5.0  | 0.76   | 548.0  | 0.110   |

NOTES:

1. V<sub>(BR)</sub> Measured after I<sub>T</sub> applied for 300us. I<sub>T</sub> = Square Wave Pulse or equivalent.
2. Surge Current Waveform per Figure 3 and Derate per Figure 2.
3. For Bipolar types having V<sub>WM</sub> of 10 volts and less, the I<sub>D</sub> limit is doubled.