

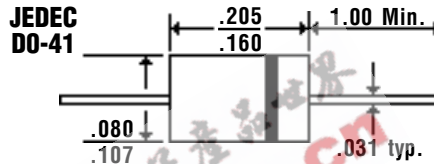
# 6.8V to 400V GPP TRANSIENT VOLTAGE SUPPRESSORS

**P4KE Series**

## Description



## Mechanical Dimensions



## Features

- 400 WATT PEAK POWER PROTECTION
- EXCELLENT CLAMPING CAPABILITY
- FAST RESPONSE TIME
- TYPICAL  $I_r < 1\mu A$  ABOVE 10V
- GLASS PASSIVATED CHIP CONSTRUCTION
- MEETS UL SPECIFICATION 94V-0

| <b>P4KE Series</b>   |            | <i>(For Bi-Polar Applications, See Note 1)</i> | <b>Units</b>   |
|--|------------|--|----------------|
| <b>Maximum Ratings</b>   |            |  |                |
| Peak Power Dissipation... $P_{PK}$<br>$T_p = 1ms$ (Note 5)   | 400 Min.   |  | Watts          |
| Steady State Power Dissipation... $P_D$<br>@ $T_L = 75^\circ C$  | 1          |  | Watts          |
| Non-Repetitive Peak Forward Surge Current... $I_{FSM}$<br>@ Rated Load Conditions, 8.3 ms, 1/2 Sine Wave, Single Phase<br>(Note 3) | 40         |  | Amps           |
| Weight... $G_{RM}$   | 0.30       |  | Grams          |
| Soldering Requirements (Time & Temp)... $S_T$<br>@ $250^\circ C$   | 10 Sec.    |  | Min. to Solder |
| Operating & Storage Temperature Range... $T_J, T_{STRG}$   | -65 to 175 |  | $^\circ C$     |

- NOTES:**
1. For Bi-Directional Applications, Use C or CA. Electrical Characteristics Apply in Both Directions.
  2. Mounted on 40mm<sup>2</sup> Copper Pads.
  3. 8.3 ms, 1/2 Sine Wave, Single Phase Duty Cycle, @ 4 Pulses Per Minute Maximum.
  4.  $V_{BR}$  Measured After  $I_r$ , Applies for 300  $\mu s$ .  $I_T$  = Square Wave Pulse or Equivalent.
  5. Non-Repetitive Current Pulse. Per Fig. 3 and Derated Above  $T_A = 25^\circ C$  Per Fig. 2.

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**Fig. 1 Pulse Rating Curve**



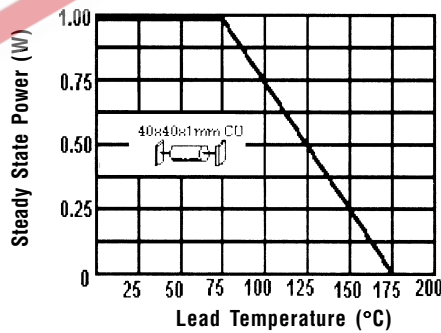
**Fig. 4 Typical Junction Capacitance**



**Fig. 2 Pulse Derating Curve**



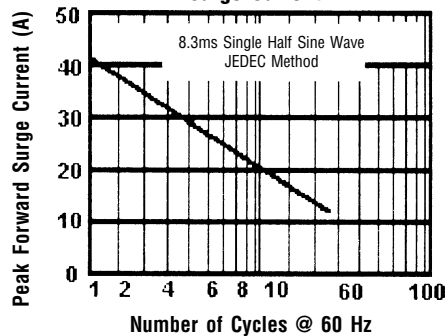
**Fig. 5 Steady State Power Derating**



**Fig. 3 Pulse Waveform**



**Fig. 6 Maximum Non-Repetitive Surge Current**



Ratings at 25 Deg. C ambient temperature unless otherwise specified.

Single Phase Half Wave, 60 Hz Resistive or Inductive Load.

For Capacitive Load, Derate Current by 20%.



## 6.8V to 400V GPP TRANSIENT VOLTAGE SUPPRESSORS

### P4KE Series

| DEVICE    | Breakdown Voltage          |       |                 | Working Peak Reverse Voltage<br>$V_{RWM}$ (V) | Maximum Reverse Leakage<br>@ $V_{RWM}$<br>$I_R$ ( $\mu$ A) | Peak Pulse Current<br>$I_{PPM}$ (A)<br>(Note 2) | Maximum Clamping Voltage<br>@ $I_{PPM}$<br>$V_C$ (V) | Maximum Temperature Coefficient<br>of $V_{BR}$<br>% / $^{\circ}$ C |
|-----------|----------------------------|-------|-----------------|---|--|---|--|--|
|           | $V_{BR}$<br>Volts (Note 1) |       | @ $I_T$<br>(mA) |   |  |   |  |  |
|           | Min.                       | Max.  |                 |   |  |   |  |  |
| P4KE-6.8  | 6.12                       | 7.48  | 10.00           | 5.50  | 1000   | 38.00   | 10.80  | 0.057  |
| P4KE-6.8A | 6.45                       | 7.14  | 10.00           | 5.80  | 1000   | 40.00   | 10.50  | 0.057  |
| P4KE-7.5  | 6.75                       | 8.25  | 10.00           | 6.05  | 500  | 36.00   | 11.70  | 0.061  |
| P4KE-7.5A | 7.13                       | 7.88  | 10.00           | 6.40  | 500  | 37.00   | 11.30  | 0.061  |
| P4KE-8.2  | 7.38                       | 9.02  | 10.00           | 6.63  | 200  | 33.00   | 12.50  | 0.065  |
| P4KE-8.2A | 7.79                       | 8.61  | 10.00           | 7.02  | 200  | 35.00   | 12.10  | 0.065  |
| P4KE-9.1  | 8.19                       | 10.00 | 1.00            | 7.37  | 50.00  | 30.00   | 13.80  | 0.068  |
| P4KE-9.1A | 8.65                       | 9.55  | 1.00            | 7.78  | 50.00  | 31.00   | 13.40  | 0.068  |
| P4KE-10   | 9.00                       | 11.00 | 1.00            | 8.10  | 10.00  | 28.00   | 15.00  | 0.073  |
| P4KE-10A  | 9.50                       | 10.50 | 1.00            | 8.55  | 10.00  | 29.00   | 14.50  | 0.073  |
| P4KE-11   | 9.90                       | 12.10 | 1.00            | 8.92  | 5.00   | 26.00   | 16.20  | 0.075  |
| P4KE-11A  | 10.50                      | 11.60 | 1.00            | 9.40  | 5.00   | 27.00   | 15.60  | 0.075  |
| P4KE-12   | 10.80                      | 13.20 | 1.00            | 9.72  | 5.00   | 24.00   | 17.30  | 0.078  |
| P4KE-12A  | 11.40                      | 12.60 | 1.00            | 10.20   | 5.00   | 25.00   | 16.70  | 0.078  |
| P4KE-13   | 11.70                      | 14.30 | 1.00            | 10.50   | 5.00   | 22.00   | 19.00  | 0.081  |
| P4KE-13A  | 12.40                      | 13.70 | 1.00            | 11.10   | 5.00   | 23.00   | 18.20  | 0.081  |
| P4KE-15   | 13.50                      | 16.50 | 1.00            | 12.10   | 5.00   | 19.00   | 22.00  | 0.084  |
| P4KE-15A  | 14.30                      | 15.80 | 1.00            | 12.80   | 5.00   | 20.00   | 21.20  | 0.084  |
| P4KE-16   | 14.40                      | 17.60 | 1.00            | 12.90   | 5.00   | 18.00   | 23.50  | 0.086  |
| P4KE-16A  | 15.20                      | 16.80 | 1.00            | 13.60   | 5.00   | 19.00   | 22.50  | 0.086  |
| P4KE-18   | 16.20                      | 19.80 | 1.00            | 14.50   | 5.00   | 16.00   | 26.50  | 0.088  |
| P4KE-18A  | 17.10                      | 18.90 | 1.00            | 15.30   | 5.00   | 17.00   | 25.20  | 0.088  |
| P4KE-20   | 18.00                      | 22.00 | 1.00            | 16.20   | 5.00   | 14.00   | 29.10  | 0.090  |
| P4KE-20A  | 19.00                      | 21.00 | 1.00            | 17.10   | 5.00   | 15.00   | 27.70  | 0.090  |
| P4KE-22   | 19.80                      | 24.20 | 1.00            | 17.80   | 5.00   | 13.00   | 31.90  | 0.092  |
| P4KE-22A  | 20.90                      | 23.10 | 1.00            | 18.80   | 5.00   | 14.00   | 30.60  | 0.092  |
| P4KE-24   | 21.60                      | 26.40 | 1.00            | 19.40   | 5.00   | 12.00   | 34.70  | 0.094  |
| P4KE-24A  | 22.80                      | 25.20 | 1.00            | 20.50   | 5.00   | 13.00   | 33.20  | 0.094  |
| P4KE-27   | 24.30                      | 29.70 | 1.00            | 21.80   | 5.00   | 11.00   | 39.10  | 0.096  |
| P4KE-27A  | 25.70                      | 28.40 | 1.00            | 23.10   | 5.00   | 11.20   | 37.50  | 0.096  |
| P4KE-30   | 27.00                      | 33.00 | 1.00            | 24.30   | 5.00   | 10.00   | 43.50  | 0.097  |
| P4KE-30A  | 28.50                      | 31.50 | 1.00            | 25.60   | 5.00   | 10.00   | 41.40  | 0.097  |
| P4KE-33   | 29.70                      | 36.30 | 1.00            | 26.80   | 5.00   | 9.00  | 47.70  | 0.098  |
| P4KE-33A  | 31.40                      | 34.70 | 1.00            | 28.20   | 5.00   | 9.00  | 45.70  | 0.098  |
| P4KE-36   | 32.40                      | 39.60 | 1.00            | 29.10   | 5.00   | 8.00  | 52.00  | 0.099  |
| P4KE-36A  | 34.20                      | 37.80 | 1.00            | 30.80   | 5.00   | 8.40  | 49.90  | 0.099  |
| P4KE-39   | 35.10                      | 42.90 | 1.00            | 31.60   | 5.00   | 7.40  | 56.40  | 0.100  |
| P4KE-39A  | 37.10                      | 41.00 | 1.00            | 33.30   | 5.00   | 7.80  | 53.90  | 0.100  |
| P4KE-43   | 38.70                      | 47.30 | 1.00            | 34.80   | 5.00   | 6.80  | 61.90  | 0.100  |
| P4KE-43A  | 40.90                      | 45.20 | 1.00            | 36.80   | 5.00   | 7.10  | 59.30  | 0.100  |
| P4KE-47   | 42.30                      | 51.70 | 1.00            | 38.10   | 5.00   | 6.20  | 67.80  | 0.100  |
| P4KE-47A  | 44.70                      | 49.40 | 1.00            | 40.20   | 5.00   | 5.00  | 64.80  | 0.100  |



## 6.8V to 400V GPP TRANSIENT VOLTAGE SUPPRESSORS

| DEVICE    | Breakdown Voltage          |        |                 | Working Peak Reverse Voltage<br>$V_{RWM}$ (V) | Maximum Reverse Leakage<br>@ $V_{RWM}$<br>$I_R$ (μA) | Peak Pulse Current<br>$I_{PPM}$ (A)<br>(Note 2) | Maximum Clamping Voltage<br>@ $I_{PPM}$<br>$V_C$ (V) | Maximum Temperature Coefficient<br>of $V_{BR}$<br>% / °C |
|-----------|----------------------------|--------|-----------------|---|--|---|--|--|
|           | $V_{BR}$<br>Volts (Note 1) |        | @ $I_T$<br>(mA) |   |  |   |  |  |
|           | Min.                       | Max.   |                 |   |  |   |  |  |
| P4KE-51   | 45.90                      | 56.10  | 1.00            | 41.30   | 5.00   | 5.70  | 73.50  | 0.102  |
| P4KE-51A  | 48.50                      | 53.60  | 1.00            | 43.60   | 5.00   | 6.00  | 70.10  | 0.102  |
| P4KE-56   | 50.40                      | 61.60  | 1.00            | 45.40   | 5.00   | 5.20  | 80.50  | 0.103  |
| P4KE-56A  | 53.20                      | 58.80  | 1.00            | 47.80   | 5.00   | 5.50  | 77.00  | 0.103  |
| P4KE-62   | 55.80                      | 68.20  | 1.00            | 50.20   | 5.00   | 4.70  | 89.00  | 0.104  |
| P4KE-62A  | 58.90                      | 65.10  | 1.00            | 53.00   | 5.00   | 5.00  | 85.00  | 0.104  |
| P4KE-68   | 61.20                      | 74.80  | 1.00            | 55.10   | 5.00   | 4.30  | 98.00  | 0.104  |
| P4KE-68A  | 64.60                      | 71.40  | 1.00            | 58.10   | 5.00   | 4.60  | 92.00  | 0.105  |
| P4KE-75   | 67.50                      | 82.50  | 1.00            | 60.70   | 5.00   | 3.90  | 108.00   | 0.105  |
| P4KE-75A  | 71.30                      | 78.80  | 1.00            | 64.10   | 5.00   | 4.10  | 103.00   | 0.105  |
| P4KE-82   | 73.80                      | 90.20  | 1.00            | 66.40   | 5.00   | 3.60  | 118.00   | 0.105  |
| P4KE-82A  | 77.90                      | 86.10  | 1.00            | 70.10   | 5.00   | 3.70  | 113.00   | 0.105  |
| P4KE-91   | 81.90                      | 100.00 | 1.00            | 73.70   | 5.00   | 3.20  | 131.80   | 0.106  |
| P4KE-91A  | 86.50                      | 95.50  | 1.00            | 77.80   | 5.00   | 3.40  | 125.00   | 0.106  |
| P4KE-100  | 90.00                      | 110.00 | 1.00            | 81.00   | 5.00   | 2.90  | 144.00   | 0.106  |
| P4KE-100A | 95.00                      | 105.00 | 1.00            | 85.50   | 5.00   | 3.10  | 137.00   | 0.106  |
| P4KE-110  | 99.00                      | 121.00 | 1.00            | 89.20   | 5.00   | 2.70  | 158.00   | 0.107  |
| P4KE-110A | 105.00                     | 116.00 | 1.00            | 94.00   | 5.00   | 2.80  | 152.00   | 0.107  |
| P4KE-120  | 108.00                     | 132.00 | 1.00            | 97.20   | 5.00   | 2.40  | 173.00   | 0.107  |
| P4KE-120A | 114.00                     | 126.00 | 1.00            | 102.00  | 5.00   | 2.50  | 165.00   | 0.107  |
| P4KE-130  | 117.00                     | 143.00 | 1.00            | 105.00  | 5.00   | 2.20  | 187.00   | 0.107  |
| P4KE-130A | 124.00                     | 137.00 | 1.00            | 111.00  | 5.00   | 2.30  | 179.00   | 0.107  |
| P4KE-150  | 135.00                     | 165.00 | 1.00            | 121.00  | 5.00   | 2.00  | 215.00   | 0.108  |
| P4KE-150A | 143.00                     | 158.00 | 1.00            | 128.00  | 5.00   | 2.00  | 207.00   | 0.108  |
| P4KE-160  | 144.00                     | 176.00 | 1.00            | 130.00  | 5.00   | 1.80  | 230.00   | 0.108  |
| P4KE-160A | 152.00                     | 168.00 | 1.00            | 136.00  | 5.00   | 1.90  | 219.00   | 0.108  |
| P4KE-170  | 153.00                     | 187.00 | 1.00            | 138.00  | 5.00   | 1.70  | 244.00   | 0.108  |
| P4KE-170A | 162.00                     | 179.00 | 1.00            | 145.00  | 5.00   | 1.80  | 234.00   | 0.108  |
| P4KE-180  | 162.00                     | 198.00 | 1.00            | 146.00  | 5.00   | 1.60  | 258.00   | 0.108  |
| P4KE-180A | 171.00                     | 189.00 | 1.00            | 154.00  | 5.00   | 1.70  | 246.00   | 0.108  |
| P4KE-200  | 180.00                     | 220.00 | 1.00            | 162.00  | 5.00   | 1.50  | 287.00   | 0.108  |
| P4KE-200A | 190.00                     | 210.00 | 1.00            | 171.10  | 5.00   | 1.53  | 274.00   | 0.108  |
| P4KE-220  | 198.00                     | 242.00 | 1.00            | 175.00  | 5.00   | 1.16  | 344.00   | 0.108  |
| P4KE-220A | 209.00                     | 231.00 | 1.00            | 185.00  | 5.00   | 1.22  | 328.00   | 0.108  |
| P4KE-250  | 225.00                     | 275.00 | 1.00            | 202.00  | 5.00   | 1.11  | 360.00   | 0.110  |
| P4KE-250A | 237.00                     | 267.00 | 1.00            | 214.00  | 5.00   | 1.16  | 344.00   | 0.110  |
| P4KE-300  | 270.00                     | 330.00 | 1.00            | 243.00  | 5.00   | 0.93  | 430.00   | 0.110  |
| P4KE-300A | 285.00                     | 315.00 | 1.00            | 256.00  | 5.00   | 0.97  | 414.00   | 0.110  |
| P4KE-350  | 315.00                     | 385.00 | 1.00            | 284.00  | 5.00   | 0.79  | 504.00   | 0.110  |
| P4KE-350A | 332.00                     | 368.00 | 1.00            | 300.00  | 5.00   | 0.83  | 482.00   | 0.110  |
| P4KE-400  | 360.00                     | 440.00 | 1.00            | 324.00  | 5.00   | 0.70  | 574.00   | 0.110  |
| P4KE-400A | 380.00                     | 420.00 | 1.00            | 342.00  | 5.00   | 0.73  | 548.00   | 0.110  |

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