



# 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)

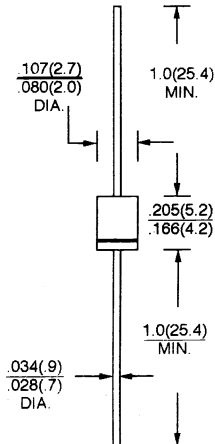
### DEVICES FOR BIPOLAR APPLICATIONS

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 × 40mm) Per Fig5.

(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

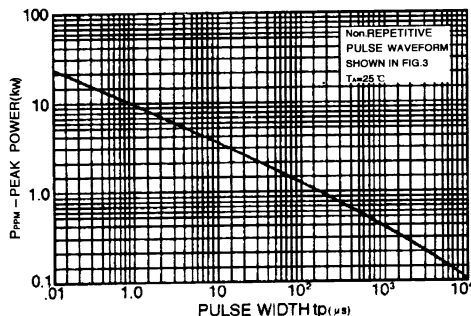


FIGURE 3 – PULSE WAVEFORM

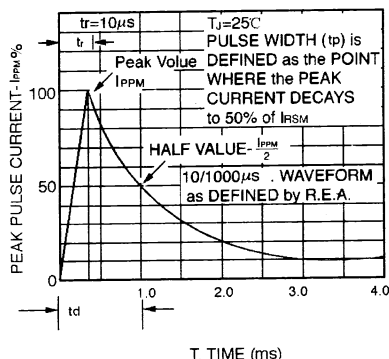


FIGURE 5 – STEADY STATE POWER DERATING CURVE

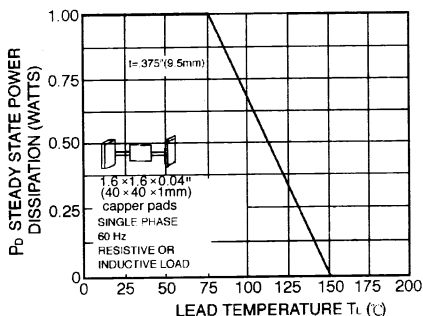


FIGURE 2 – PULSE DERATING CURVE

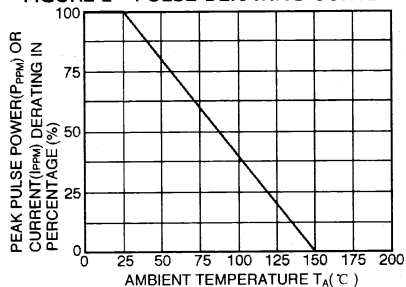


FIGURE 4 – TYPICAL JUNCTION CAPACITANCE UNIDIRECTIONAL

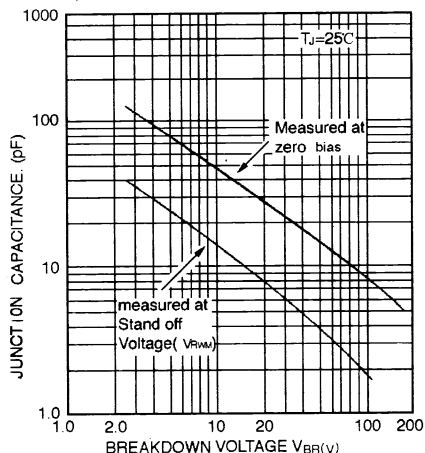
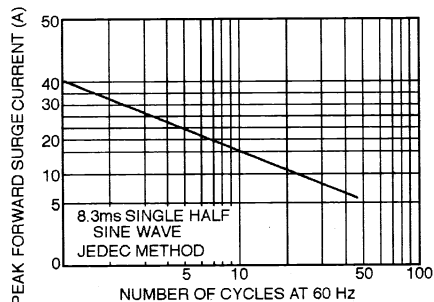


FIGURE 6 – MAXIMUM NON - REPETITIVE FORWARD SURGE CURRENT - UNIDIRECTIONAL ONLY



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

| Device   | Nominal<br>Voltage<br>(Volts) | Breakdown Voltage         |      | I <sub>HT</sub><br>(mA) | stand – off<br>Voltage<br>V <sub>WM</sub><br>(Volts) | Maximum<br>Reverse<br>Leakage<br>@ V <sub>WM</sub><br>I <sub>D</sub> (μA)<br>(NOTE 3) | Maximum<br>Reverse<br>Voltage<br>Surge<br>Current<br>IPPM (NOTE2)<br>(Amps) | Maximum<br>Reverse<br>Voltage<br>@ IPPM<br>(Clamping<br>Voltage)<br>V <sub>C</sub> (Volts) | Maximum<br>Temperature<br>Coefficient<br>of V <sub>BR</sub><br>(%/°C) |
|----------|-------------------------------|---------------------------|------|-------------------------|------------------------------------------------------|---------------------------------------------------------------------------------------|-----------------------------------------------------------------------------|--------------------------------------------------------------------------------------------|-----------------------------------------------------------------------|
|          |                               | V(BR)<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           |       | @ $I_T$ (mA) | stand - off Voltage $V_{WM}$ (Volts) | Maximum Reverse Leakage @ $V_{WM}$ $I_D$ ( $\mu A$ ) (NOTE 3) | Maximum Reverse Surge Current IPPM (NOTE2) (Amps) | Maximum Reverse Voltage @ IPPM (Clamping Voltage) $V_C$ (Volts) | Maximum Temperature Coefficient of $V_{(BR)}$ (%/°C) |
|----------|-------------------------|-----------------------------|-------|--------------|--------------------------------------|---------------------------------------------------------------|---------------------------------------------------|-----------------------------------------------------------------|------------------------------------------------------|
|          |                         | $V_{(BR)}$ (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.  $V_{(BR)}$  Measured after  $I_T$  applied for 300us.  $I_T$  = Square Wave Pulse or equivalent.
2. Surge Current Waveform per Figure 3 and Derate per Figure 2.
3. For Bipolar types having  $V_{WM}$  of 10 volts and less, the  $I_D$  limit is doubled.