

**GPP TRANSIENT VOLTAGE SUPPRESSOR**  
**400 WATT PEAK POWER 1.0 WATT STEADY STATE**

**FEATURES**

- \* Plastic package has underwriters laboratory
- \* Glass passivated chip construction
- \* 400 watt surge capability at 1ms
- \* Excellent clamping capability
- \* Low zener impedance
- \* Fast response time

Ratings at 25 °C ambient temperature unless otherwise specified.

**MAXIMUM RATINGS AND ELECTRICAL CHARACTERISTICS**

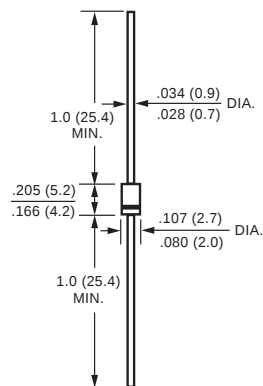
Ratings at 25 °C ambient temperature unless otherwise specified.

Single phase, half wave, 60 Hz, resistive or inductive load,

For capacitive load, derate current by 20%.



**DO-41**



**DEVICES FOR BIPOLAR APPLICATIONS**

For Bidirectional use C or CA suffix for types P4KE6.8 thru P4KE400

Electrical characteristics apply in both direction

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

| RATINGS                                                                                                        | SYMBOL         | VALUE        | UNITS            |
|----------------------------------------------------------------------------------------------------------------|----------------|--------------|------------------|
| Peak Power Dissipation at $T_A = 25^\circ\text{C}$ , $T_P = 1\text{ms}$ ( Note 1 )                             | PPPM           | Minimum 400  | Watts            |
| Steady State Power Dissipation at $T_L = 75^\circ\text{C}$ lead lengths, .375" ( 9.5 mm ) ( Note 2 )           | $P_{M(AV)}$    | 1.0          | Watts            |
| Peak Forward Surge Current, 8.3ms single half sine wave- superimposed on rated load( JEDEC METHOD ) ( Note 3 ) | $I_{FSM}$      | 40           | Amps             |
| Maximum Instantaneous Forward Current at 25A for unidirectional only ( Note 4 )                                | $V_F$          | 3.5/6.5      | Volts            |
| Operating and Storage Temperature Range                                                                        | $T_J, T_{STG}$ | -55 to + 150 | $^\circ\text{C}$ |

NOTES : 1. Non-repetitive current pulse, per Fig.3 and derated above  $T_A = 25^\circ\text{C}$  per Fig.2.

2. Mounted on 1.6 X 1.6" ( 40 X 40mm ) per Fig. 5

3.  $V_F = 3.0\text{V}$  max. for devices of  $V_{(BR)} \leq 200\text{V}$  and  $V_F = 6.5$  Volts max. for devices of  $V_{(BR)} \geq 200\text{V}$ .

# RATING AND CHARACTERISTIC CURVES ( P4KE6.8 THRU P4KE400CA )

FIG. 1 - PEAK PULSE POWER RATING CURVE

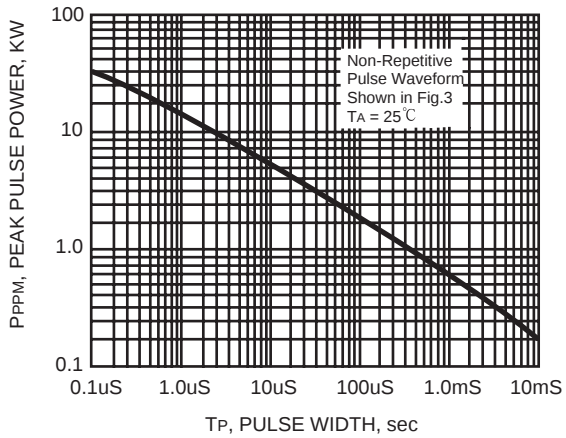


FIG. 2 - PULSE DERATING CURVE

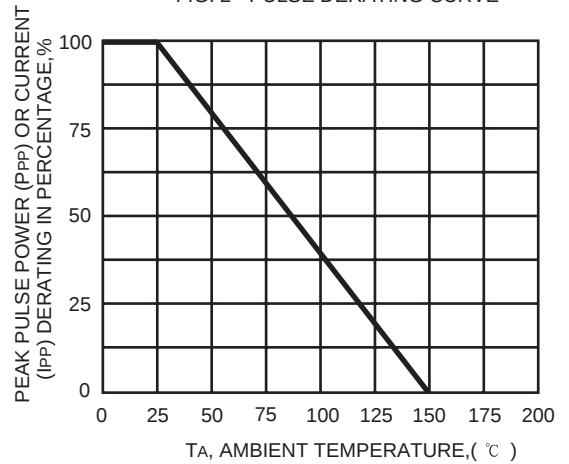


FIG. 3 - PULSE WAVEFORM

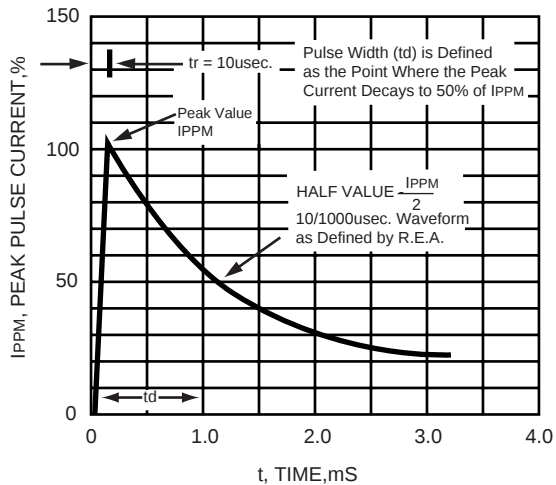
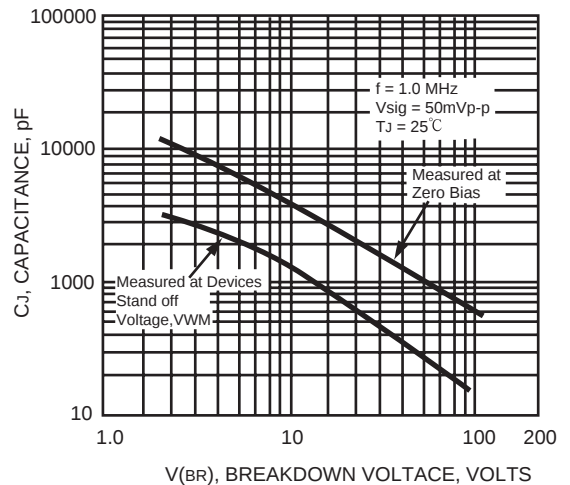


FIG. 4 - TYPICAL JUNCTION CAPACITANCE



# RATING AND CHARACTERISTIC CURVES ( P4KE6.8 THRU P4KE400CA )

FIG. 5 - STEADY STATE POWER DERATING CURVE

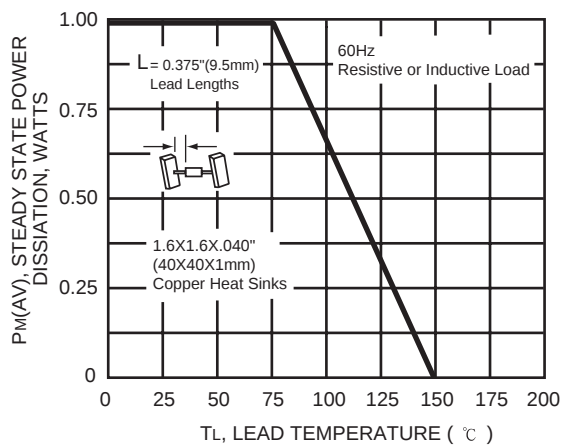


FIG. 6 - MAXIMUM NON-REPETITIVE FORWARD SURGE CURRENT UNIDIRECTIONAL

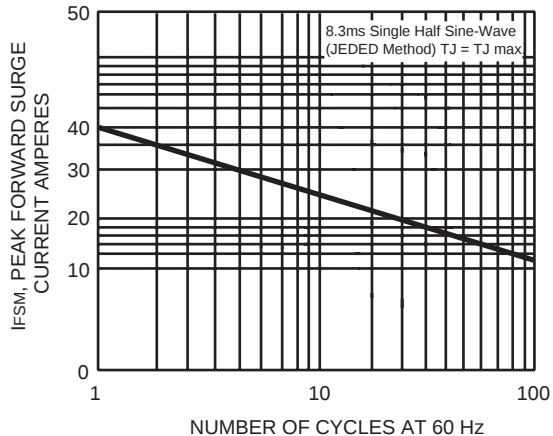
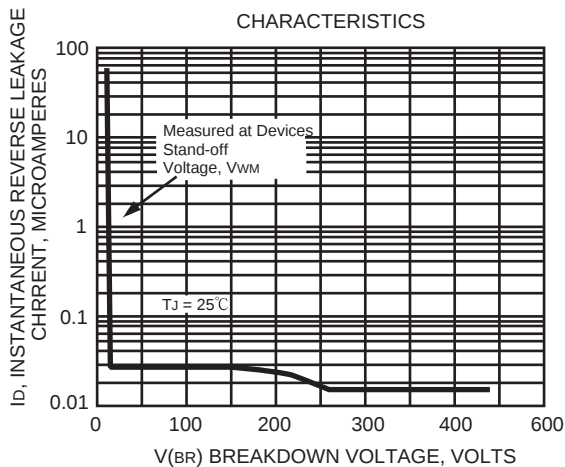


FIG. 7 - TYPICAL REVERSE LEAKAGE CHARACTERISTICS



# TRANSIENT VOLTAGE SUPPRESSORS

400W SERIES TVS DIODES / DO-41 ( CASE 7 ) 400W

| TYPE     | Breakdown Voltage          |      |                         | Reverse Stand off Voltage<br>V <sub>WM</sub><br>(Volts) | Maximum Reverse Leakage at V <sub>WM</sub><br>I <sub>D</sub> (uA) | Maximum Peak Pulse Current<br>I <sub>PPM</sub><br>(Amps) | Maximum Clamping Voltage at I <sub>PPM</sub><br>V <sub>C</sub> (Volts) |
|----------|----------------------------|------|-------------------------|---------------------------------------------------------|-------------------------------------------------------------------|----------------------------------------------------------|------------------------------------------------------------------------|
|          | V <sub>BR</sub><br>(Volts) |      | @I <sub>T</sub><br>(mA) |                                                         |                                                                   |                                                          |                                                                        |
|          | MIN.                       | MAX. |                         |                                                         |                                                                   |                                                          |                                                                        |
| P4KE6.8  | 6.12                       | 7.48 | 10                      | 5.50                                                    | 1000                                                              | 37                                                       | 10.8                                                                   |
| P4KE6.8A | 6.45                       | 7.14 | 10                      | 5.80                                                    | 1000                                                              | 38.1                                                     | 10.5                                                                   |
| P4KE7.5  | 6.75                       | 8.25 | 10                      | 6.05                                                    | 500                                                               | 34.2                                                     | 11.7                                                                   |
| P4KE7.5A | 7.13                       | 7.88 | 10                      | 6.40                                                    | 500                                                               | 35.4                                                     | 11.3                                                                   |
| P4KE8.2  | 7.38                       | 9.02 | 10                      | 6.63                                                    | 200                                                               | 32                                                       | 12.5                                                                   |
| P4KE8.2A | 7.79                       | 8.61 | 10                      | 7.02                                                    | 200                                                               | 33.1                                                     | 12.1                                                                   |
| P4KE9.1  | 8.19                       | 10.0 | 1.0                     | 7.37                                                    | 50                                                                | 29                                                       | 13.8                                                                   |
| P4KE9.1A | 8.65                       | 9.55 | 1.0                     | 7.78                                                    | 50                                                                | 29.9                                                     | 13.4                                                                   |
| P4KE10   | 9.00                       | 11.0 | 1.0                     | 8.10                                                    | 10                                                                | 26.7                                                     | 15.0                                                                   |
| P4KE10A  | 9.50                       | 10.5 | 1.0                     | 8.55                                                    | 10                                                                | 27.6                                                     | 14.5                                                                   |
| P4KE11   | 9.90                       | 12.1 | 1.0                     | 8.92                                                    | 5.0                                                               | 24.7                                                     | 16.2                                                                   |
| P4KE11A  | 10.5                       | 11.6 | 1.0                     | 9.40                                                    | 5.0                                                               | 25.6                                                     | 15.6                                                                   |
| P4KE12   | 10.8                       | 13.2 | 1.0                     | 9.72                                                    | 5.0                                                               | 23.1                                                     | 17.3                                                                   |
| P4KE12A  | 11.4                       | 12.6 | 1.0                     | 10.2                                                    | 5.0                                                               | 24                                                       | 16.7                                                                   |
| P4KE13   | 11.7                       | 14.3 | 1.0                     | 10.5                                                    | 5.0                                                               | 21.1                                                     | 19.0                                                                   |
| P4KE13A  | 12.4                       | 13.7 | 1.0                     | 11.1                                                    | 5.0                                                               | 22                                                       | 18.2                                                                   |
| P4KE15   | 13.5                       | 16.5 | 1.0                     | 12.1                                                    | 5.0                                                               | 18.2                                                     | 22.0                                                                   |
| P4KE15A  | 14.3                       | 15.8 | 1.0                     | 12.8                                                    | 5.0                                                               | 18.9                                                     | 21.2                                                                   |
| P4KE16   | 14.4                       | 17.6 | 1.0                     | 12.9                                                    | 5.0                                                               | 17                                                       | 23.5                                                                   |
| P4KE16A  | 15.2                       | 16.8 | 1.0                     | 13.6                                                    | 5.0                                                               | 17.8                                                     | 22.5                                                                   |
| P4KE18   | 16.2                       | 19.8 | 1.0                     | 14.5                                                    | 5.0                                                               | 15.1                                                     | 26.5                                                                   |
| P4KE18A  | 17.1                       | 18.9 | 1.0                     | 15.3                                                    | 5.0                                                               | 15.9                                                     | 25.2                                                                   |
| P4KE20   | 18.0                       | 22.0 | 1.0                     | 16.2                                                    | 5.0                                                               | 13.7                                                     | 29.1                                                                   |
| P4KE20A  | 19.0                       | 21.0 | 1.0                     | 17.1                                                    | 5.0                                                               | 14.4                                                     | 27.7                                                                   |
| P4KE22   | 19.8                       | 24.2 | 1.0                     | 17.8                                                    | 5.0                                                               | 12.5                                                     | 31.9                                                                   |
| P4KE22A  | 20.9                       | 23.1 | 1.0                     | 18.8                                                    | 5.0                                                               | 13.1                                                     | 30.6                                                                   |
| P4KE24   | 21.6                       | 26.4 | 1.0                     | 19.4                                                    | 5.0                                                               | 11.5                                                     | 34.7                                                                   |
| P4KE24A  | 22.8                       | 25.2 | 1.0                     | 20.5                                                    | 5.0                                                               | 12                                                       | 33.2                                                                   |
| P4KE27   | 24.3                       | 29.7 | 1.0                     | 21.8                                                    | 5.0                                                               | 10.2                                                     | 39.1                                                                   |
| P4KE27A  | 25.7                       | 28.4 | 1.0                     | 23.1                                                    | 5.0                                                               | 10.7                                                     | 37.5                                                                   |
| P4KE30   | 27.0                       | 33.0 | 1.0                     | 24.3                                                    | 5.0                                                               | 9.2                                                      | 43.5                                                                   |
| P4KE30A  | 28.5                       | 31.5 | 1.0                     | 25.6                                                    | 5.0                                                               | 9.7                                                      | 41.4                                                                   |
| P4KE33   | 29.7                       | 36.3 | 1.0                     | 26.8                                                    | 5.0                                                               | 8.4                                                      | 47.7                                                                   |
| P4KE33A  | 31.4                       | 34.7 | 1.0                     | 28.2                                                    | 5.0                                                               | 8.8                                                      | 45.7                                                                   |
| P4KE36   | 32.4                       | 39.6 | 1.0                     | 29.1                                                    | 5.0                                                               | 7.7                                                      | 52.0                                                                   |
| P4KE36A  | 34.2                       | 37.8 | 1.0                     | 30.8                                                    | 5.0                                                               | 8.0                                                      | 49.9                                                                   |
| P4KE39   | 35.1                       | 42.9 | 1.0                     | 31.6                                                    | 5.0                                                               | 7.1                                                      | 56.4                                                                   |
| P4KE39A  | 37.1                       | 41.0 | 1.0                     | 33.3                                                    | 5.0                                                               | 7.4                                                      | 53.9                                                                   |
| P4KE43   | 38.7                       | 47.3 | 1.0                     | 34.8                                                    | 5.0                                                               | 6.5                                                      | 61.9                                                                   |
| P4KE43A  | 40.9                       | 45.2 | 1.0                     | 36.8                                                    | 5.0                                                               | 6.7                                                      | 59.3                                                                   |
| P4KE47   | 42.3                       | 51.7 | 1.0                     | 38.1                                                    | 5.0                                                               | 5.9                                                      | 67.8                                                                   |
| P4KE47A  | 44.7                       | 49.4 | 1.0                     | 40.2                                                    | 5.0                                                               | 6.2                                                      | 64.8                                                                   |
| P4KE51   | 45.9                       | 56.1 | 1.0                     | 41.3                                                    | 5.0                                                               | 5.4                                                      | 73.5                                                                   |
| P4KE51A  | 48.5                       | 53.6 | 1.0                     | 43.6                                                    | 5.0                                                               | 5.7                                                      | 70.1                                                                   |
| P4KE56   | 50.4                       | 61.6 | 1.0                     | 45.4                                                    | 5.0                                                               | 5.0                                                      | 80.5                                                                   |
| P4KE56A  | 53.2                       | 58.8 | 1.0                     | 47.8                                                    | 5.0                                                               | 5.2                                                      | 77.0                                                                   |

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| TYPE     | Breakdown Voltage       |      |                      | Reverse Stand off Voltage<br>V <sub>WM</sub> (Volts) | Maximum Reverse Leakage at V <sub>WM</sub><br>I <sub>D</sub> (uA) | Maximum Peak Pulse Current<br>I <sub>PPM</sub> (Amps) | Maximum Clamping Voltage at I <sub>PPM</sub><br>V <sub>C</sub> (Volts) |
|----------|-------------------------|------|----------------------|------------------------------------------------------|-------------------------------------------------------------------|-------------------------------------------------------|------------------------------------------------------------------------|
|          | V <sub>BR</sub> (Volts) |      | @I <sub>T</sub> (mA) |                                                      |                                                                   |                                                       |                                                                        |
|          | MIN.                    | MAX. |                      |                                                      |                                                                   |                                                       |                                                                        |
| P4KE62   | 55.8                    | 68.2 | 1.0                  | 50.2                                                 | 5.0                                                               | 4.5                                                   | 89.0                                                                   |
| P4KE62A  | 58.9                    | 65.1 | 1.0                  | 53.0                                                 | 5.0                                                               | 4.7                                                   | 85.0                                                                   |
| P4KE68   | 61.2                    | 74.8 | 1.0                  | 55.1                                                 | 5.0                                                               | 4.1                                                   | 98.0                                                                   |
| P4KE68A  | 64.6                    | 71.4 | 1.0                  | 58.1                                                 | 5.0                                                               | 4.3                                                   | 92.0                                                                   |
| P4KE75   | 67.5                    | 82.5 | 1.0                  | 60.7                                                 | 5.0                                                               | 3.7                                                   | 108                                                                    |
| P4KE75A  | 71.3                    | 78.8 | 1.0                  | 64.1                                                 | 5.0                                                               | 3.9                                                   | 103                                                                    |
| P4KE82   | 73.8                    | 90.2 | 1.0                  | 66.4                                                 | 5.0                                                               | 3.4                                                   | 118                                                                    |
| P4KE82A  | 77.9                    | 86.1 | 1.0                  | 70.1                                                 | 5.0                                                               | 3.5                                                   | 113                                                                    |
| P4KE91   | 81.9                    | 100  | 1.0                  | 73.7                                                 | 5.0                                                               | 3.1                                                   | 131                                                                    |
| P4KE91A  | 86.5                    | 95.5 | 1.0                  | 77.8                                                 | 5.0                                                               | 3.2                                                   | 125                                                                    |
| P4KE100  | 90.0                    | 110  | 1.0                  | 81.0                                                 | 5.0                                                               | 2.8                                                   | 144                                                                    |
| P4KE100A | 95.0                    | 105  | 1.0                  | 85.5                                                 | 5.0                                                               | 2.9                                                   | 137                                                                    |
| P4KE110  | 99.0                    | 121  | 1.0                  | 89.2                                                 | 5.0                                                               | 2.5                                                   | 158                                                                    |
| P4KE110A | 105                     | 116  | 1.0                  | 94.0                                                 | 5.0                                                               | 2.6                                                   | 152                                                                    |
| P4KE120  | 108                     | 132  | 1.0                  | 97.2                                                 | 5.0                                                               | 2.3                                                   | 173                                                                    |
| P4KE120A | 114                     | 126  | 1.0                  | 102                                                  | 5.0                                                               | 2.4                                                   | 165                                                                    |
| P4KE130  | 117                     | 143  | 1.0                  | 105                                                  | 5.0                                                               | 2.1                                                   | 187                                                                    |
| P4KE130A | 124                     | 137  | 1.0                  | 111                                                  | 5.0                                                               | 2.2                                                   | 179                                                                    |
| P4KE150  | 135                     | 165  | 1.0                  | 121                                                  | 5.0                                                               | 1.9                                                   | 215                                                                    |
| P4KE150A | 143                     | 158  | 1.0                  | 128                                                  | 5.0                                                               | 1.9                                                   | 207                                                                    |
| P4KE160  | 144                     | 176  | 1.0                  | 130                                                  | 5.0                                                               | 1.7                                                   | 230                                                                    |
| P4KE160A | 152                     | 168  | 1.0                  | 136                                                  | 5.0                                                               | 1.8                                                   | 219                                                                    |
| P4KE170  | 153                     | 187  | 1.0                  | 138                                                  | 5.0                                                               | 1.6                                                   | 244                                                                    |
| P4KE170A | 162                     | 179  | 1.0                  | 145                                                  | 5.0                                                               | 1.7                                                   | 234                                                                    |
| P4KE180  | 162                     | 198  | 1.0                  | 146                                                  | 5.0                                                               | 1.6                                                   | 258                                                                    |
| P4KE180A | 171                     | 189  | 1.0                  | 154                                                  | 5.0                                                               | 1.6                                                   | 246                                                                    |
| P4KE200  | 180                     | 220  | 1.0                  | 162                                                  | 5.0                                                               | 1.4                                                   | 287                                                                    |
| P4KE200A | 190                     | 210  | 1.0                  | 171                                                  | 5.0                                                               | 1.5                                                   | 274                                                                    |
| P4KE220  | 198                     | 242  | 1.0                  | 175                                                  | 5.0                                                               | 1.2                                                   | 344                                                                    |
| P4KE220A | 209                     | 231  | 1.0                  | 185                                                  | 5.0                                                               | 1.2                                                   | 328                                                                    |
| P4KE250  | 225                     | 275  | 1.0                  | 202                                                  | 5.0                                                               | 1.1                                                   | 360                                                                    |
| P4KE250A | 237                     | 263  | 1.0                  | 214                                                  | 5.0                                                               | 1.2                                                   | 344                                                                    |
| P4KE300  | 270                     | 330  | 1.0                  | 243                                                  | 5.0                                                               | 0.93                                                  | 430                                                                    |
| P4KE300A | 285                     | 315  | 1.0                  | 256                                                  | 5.0                                                               | 1.00                                                  | 414                                                                    |
| P4KE350  | 315                     | 385  | 1.0                  | 284                                                  | 5.0                                                               | 0.79                                                  | 504                                                                    |
| P4KE350A | 333                     | 368  | 1.0                  | 300                                                  | 5.0                                                               | 0.83                                                  | 482                                                                    |
| P4KE400  | 360                     | 440  | 1.0                  | 324                                                  | 5.0                                                               | 0.70                                                  | 574                                                                    |
| P4KE400A | 380                     | 420  | 1.0                  | 342                                                  | 5.0                                                               | 0.73                                                  | 548                                                                    |
| P4KE440  | 396                     | 484  | 1.0                  | 356                                                  | 5.0                                                               | 0.63                                                  | 631                                                                    |
| P4KE440A | 418                     | 462  | 1.0                  | 376                                                  | 5.0                                                               | 0.66                                                  | 602                                                                    |

- Notes :
1. V<sub>BR</sub> measured after I<sub>T</sub> applied for 300ms. I<sub>T</sub> = square pulse or equivalent.
  2. For bidirectional use C or CA suffixs for all types (ex. P4KE6.8C,P4KE440CA) electrical characteristics apply in both directions.
  3. For bidirectional types having V<sub>WM</sub> of 10 volts and less, the I<sub>D</sub> limit is doubled.
  4. All devices UL listed file#E211196.