

## Description

The P4KE Automotive Series is designed specifically to protect sensitive electronic equipment from voltage transients induced by lightning and other transient voltage events.

## Features

- Halogen-free
- Rohs compliant
- Typical maximum temperature coefficient  
 $\Delta V_{BR} = 0.1\% \times V_{BR@25^{\circ}C} \times \Delta T$
- Glass passivated Chip junction in DO-41 package
- 400W peak pulse capability at 10x1000μs waveform, repetition rate (duty cycles):0.01%
- Fast response time: typically less than 1.0ps from 0 Volts to BV min
- Excellent clamping capability
- Low incremental surge resistance
- Typical  $I_R$  less than 1μA above 11V
- High temperature soldering guaranteed: 260°C/40 seconds / 0.375", (9.5mm) lead length, 5lbs., (2.3kg) tension
- Plastic package has underwriters laboratory flammability classification 94v-0
- Matte Tin Lead-free plated
- AEC-Q101 qualified.

## Applications

TVS devices are ideal for the protection of I/O interfaces,  $V_{CC}$  bus and other vulnerable circuits used in telecom, computer, industrial and consumer electronic applications.

## Maximum Ratings And Characteristics ( $T_A=25^{\circ}C$ unless otherwise noted)

| Rating   | Symbol         | Value          | Units |
|--|----------------|----------------|-------|
| Peak Pulse Power Dissipation by 10x1000μs test waveform (Fig.1)(Note 1)              | $P_{PPM}$      | 400            | Watts |
| Steady State Power Dissipation on infinite heat sink at $T_L=75^{\circ}C$ (Fig. 5)   | $P_D$          | 1.5            | Watts |
| Peak Forward Surge Current, 8.3ms Single Half Sine Wave Unidirectional only (Note 2) | $I_{FSM}$      | 40             | Amps  |
| Maximum Instantaneous Forward Voltage at 25A for Unidirectional only (Note 3)        | $V_F$          | 3.5/5.0        | V     |
| Operating junction and Storage Temperature Range.                                    | $T_J, T_{STG}$ | -55°C to 175°C | °C    |
| Typical Thermal Resistance Junction to Lead  | $R_{UJL}$      | 60             | °C/W  |
| Typical Thermal Resistance Junction to Ambient                                       | $R_{UJA}$      | 100            | °C/W  |

Notes:

1. Non-repetitive current pulse, per Fig. 3 and derated above  $T_A = 25^{\circ}C$  per Fig. 2.
2. Measured on 8.3ms single half sine wave or equivalent square wave, duty cycle=4 per minute maximum.
3.  $V_F < 3.5V$  for devices of  $V_{BR\_} < 200V$  and  $V_F < 5.0V$  for devices of  $V_{BR\_} > 201V$ .

### Electrical Characteristics

| Type Number |           | Reverse Stand-Off Voltage | Breakdown Voltage@IT |             | Test Current | Maximum Clamping Voltage@IPP | Peak Pulse Current | Reverse Leakage @VRWM |
|-------------|-----------|---------------------------|----------------------|-------------|--------------|------------------------------|--------------------|-----------------------|
| (UNI)       | (BI)      | VRWM(V)                   | VBR MIN.(V)          | VBR MAX.(V) | IT(mA)       | VC(V)                        | IPP(A)             | IR(μA)                |
| P4KE6.8A    | P4KE6.8CA | 5.80                      | 6.45                 | 7.14        | 10           | 10.5                         | 39.0               | 1000                  |
| P4KE7.5A    | P4KE7.5CA | 6.40                      | 7.13                 | 7.88        | 10           | 11.3                         | 36.3               | 500                   |
| P4KE8.2A    | P4KE8.2CA | 7.02                      | 7.79                 | 8.61        | 10           | 12.1                         | 33.9               | 200                   |
| P4KE9.1A    | P4KE9.1CA | 7.78                      | 8.65                 | 9.55        | 1            | 13.4                         | 30.6               | 50                    |
| P4KE10A     | P4KE10CA  | 8.55                      | 9.50                 | 10.50       | 1            | 14.5                         | 28.3               | 10                    |
| P4KE11A     | P4KE11CA  | 9.40                      | 10.50                | 11.60       | 1            | 15.6                         | 26.3               | 1                     |
| P4KE12A     | P4KE12CA  | 10.20                     | 11.40                | 12.60       | 1            | 16.7                         | 24.6               | 1                     |
| P4KE13A     | P4KE13CA  | 11.10                     | 12.40                | 13.70       | 1            | 18.2                         | 22.5               | 1                     |
| P4KE15A     | P4KE15CA  | 12.80                     | 14.30                | 15.80       | 1            | 21.2                         | 19.3               | 1                     |
| P4KE16A     | P4KE16CA  | 13.60                     | 15.20                | 16.80       | 1            | 22.5                         | 18.2               | 1                     |
| P4KE18A     | P4KE18CA  | 15.30                     | 17.10                | 18.90       | 1            | 25.5                         | 16.1               | 1                     |
| P4KE20A     | P4KE20CA  | 17.10                     | 19.00                | 21.00       | 1            | 27.7                         | 14.8               | 1                     |
| P4KE22A     | P4KE22CA  | 18.80                     | 20.90                | 23.10       | 1            | 30.6                         | 13.4               | 1                     |
| P4KE24A     | P4KE24CA  | 20.50                     | 22.80                | 25.20       | 1            | 33.2                         | 12.3               | 1                     |
| P4KE27A     | P4KE27CA  | 23.10                     | 25.70                | 28.40       | 1            | 37.5                         | 10.9               | 1                     |
| P4KE30A     | P4KE30CA  | 25.60                     | 28.50                | 31.50       | 1            | 41.4                         | 9.7                | 1                     |
| P4KE33A     | P4KE33CA  | 28.20                     | 31.40                | 34.70       | 1            | 45.7                         | 9.0                | 1                     |
| P4KE36A     | P4KE36CA  | 30.80                     | 34.20                | 37.80       | 1            | 49.9                         | 8.2                | 1                     |
| P4KE39A     | P4KE39CA  | 33.30                     | 37.10                | 41.00       | 1            | 53.9                         | 7.6                | 1                     |
| P4KE43A     | P4KE43CA  | 36.80                     | 40.90                | 45.20       | 1            | 59.3                         | 6.9                | 1                     |
| P4KE47A     | P4KE47CA  | 40.20                     | 44.70                | 49.40       | 1            | 64.8                         | 6.3                | 1                     |
| P4KE51A     | P4KE51CA  | 43.60                     | 48.50                | 53.60       | 1            | 70.1                         | 5.8                | 1                     |
| P4KE56A     | P4KE56CA  | 47.80                     | 53.20                | 58.80       | 1            | 77.0                         | 5.3                | 1                     |
| P4KE62A     | P4KE62CA  | 53.00                     | 58.90                | 65.10       | 1            | 85.0                         | 4.8                | 1                     |
| P4KE68A     | P4KE68CA  | 58.10                     | 64.60                | 71.40       | 1            | 92.0                         | 4.5                | 1                     |
| P4KE75A     | P4KE75CA  | 64.10                     | 71.30                | 78.80       | 1            | 103.0                        | 4.0                | 1                     |
| P4KE82A     | P4KE82CA  | 70.10                     | 77.90                | 86.10       | 1            | 113.0                        | 3.6                | 1                     |
| P4KE91A     | P4KE91CA  | 77.80                     | 86.50                | 95.50       | 1            | 125.0                        | 3.3                | 1                     |
| P4KE100A    | P4KE100CA | 85.50                     | 95.00                | 105.00      | 1            | 137.0                        | 3.0                | 1                     |
| P4KE110A    | P4KE110CA | 94.00                     | 105.00               | 116.00      | 1            | 152.0                        | 2.7                | 1                     |
| P4KE120A    | P4KE120CA | 102.00                    | 114.00               | 126.00      | 1            | 165.0                        | 2.5                | 1                     |
| P4KE130A    | P4KE130CA | 111.00                    | 124.00               | 137.00      | 1            | 179.0                        | 2.3                | 1                     |
| P4KE150A    | P4KE150CA | 128.00                    | 143.00               | 158.00      | 1            | 207.0                        | 2.0                | 1                     |
| P4KE160A    | P4KE160CA | 136.00                    | 152.00               | 168.00      | 1            | 219.0                        | 1.9                | 1                     |
| P4KE170A    | P4KE170CA | 145.00                    | 162.00               | 179.00      | 1            | 234.0                        | 1.8                | 1                     |
| P4KE180A    | P4KE180CA | 154.00                    | 171.00               | 189.00      | 1            | 246.0                        | 1.7                | 1                     |
| P4KE200A    | P4KE200CA | 171.00                    | 190.00               | 210.00      | 1            | 274.0                        | 1.5                | 1                     |
| P4KE220A    | P4KE220CA | 185.00                    | 209.00               | 231.00      | 1            | 328.0                        | 1.3                | 1                     |
| P4KE250A    | P4KE250CA | 214.00                    | 237.00               | 263.00      | 1            | 344.0                        | 1.2                | 1                     |
| P4KE300A    | P4KE300CA | 256.00                    | 285.00               | 315.00      | 1            | 414.0                        | 1.0                | 1                     |
| P4KE350A    | P4KE350CA | 300.00                    | 332.00               | 368.00      | 1            | 482.0                        | 0.85               | 1                     |
| P4KE400A    | P4KE400CA | 342.00                    | 380.00               | 420.00      | 1            | 548.0                        | 0.75               | 1                     |
| P4KE440A    | P4KE440CA | 376.00                    | 418.00               | 462.00      | 1            | 602.0                        | 0.68               | 1                     |
| P4KE480A    | P4KE480CA | 408.00                    | 456.00               | 504.00      | 1            | 658.0                        | 0.61               | 1                     |
| P4KE510A    | P4KE510CA | 434.00                    | 485.00               | 535.00      | 1            | 698.0                        | 0.57               | 1                     |
| P4KE530A    | P4KE530CA | 477.00                    | 503.50               | 556.50      | 1            | 725.0                        | 0.55               | 1                     |
| P4KE540A    | P4KE540CA | 486.00                    | 513.00               | 567.00      | 1            | 740.0                        | 0.54               | 1                     |
| P4KE550A    | P4KE550CA | 495.00                    | 522.50               | 577.50      | 1            | 760.0                        | 0.52               | 1                     |

For bidirectional type having  $V_R$  of 10 volts and less, the  $I_R$  limit is double.  
 For parts without A, the  $V_{BR}$  is  $\pm 10\%$  and  $V_C$  is 5% higher than with A parts

Figure 1 - Peak Pulse Power Rating

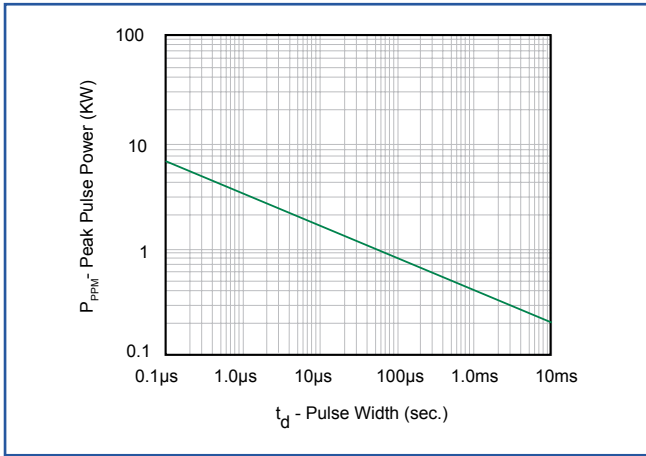


Figure 2 - Pulse Derating Curve

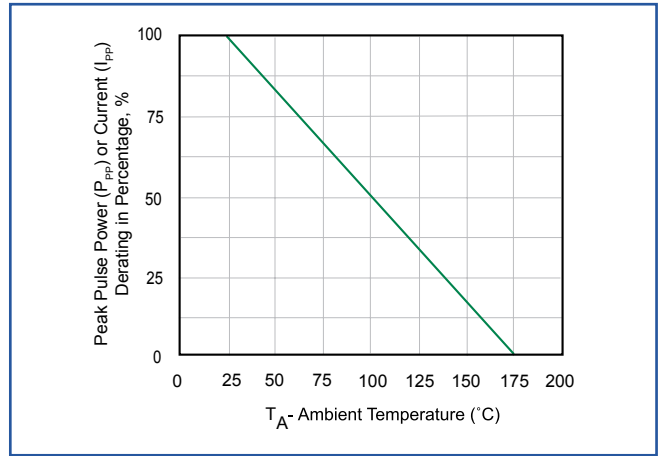


Figure 3 - Pulse Waveform

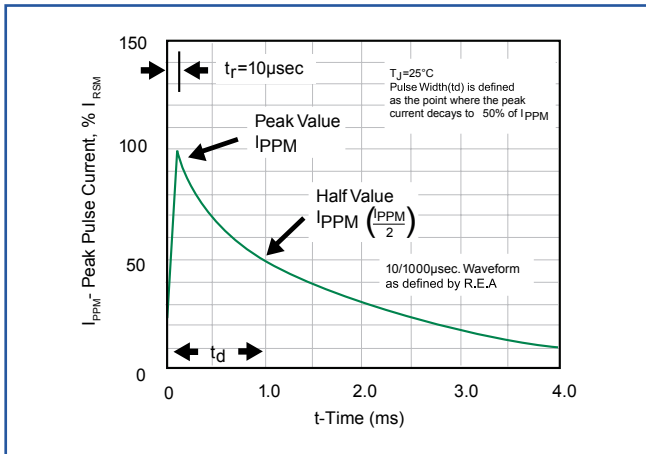


Figure 4 - Typical Junction Capacitance Uni-Directional

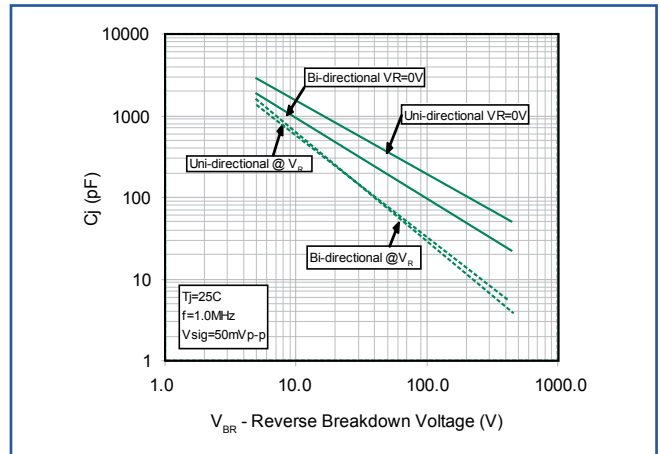


Figure 5 - Steady Pulse Derating Curve

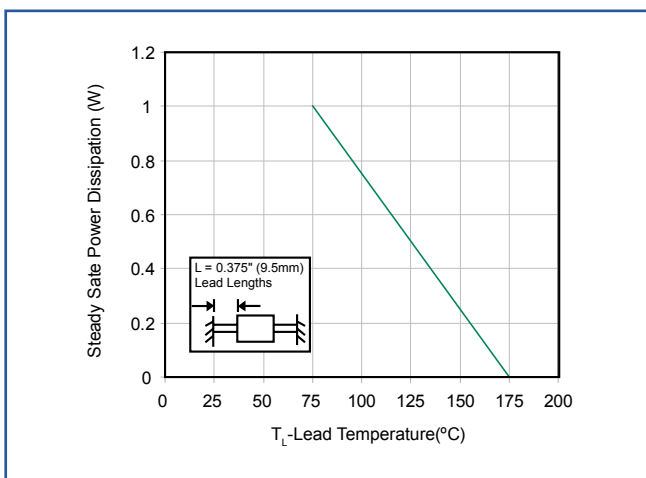
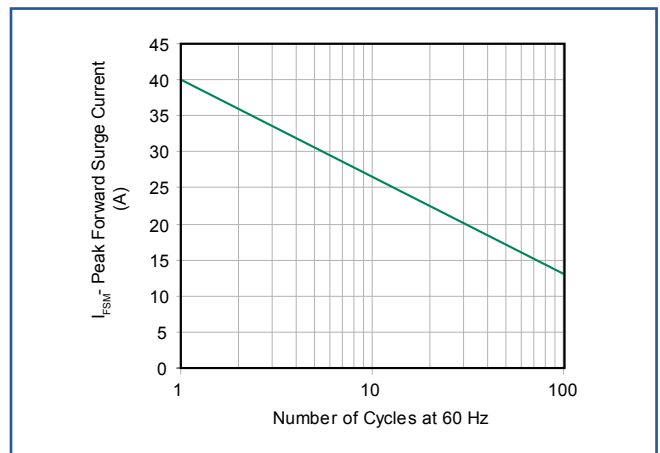
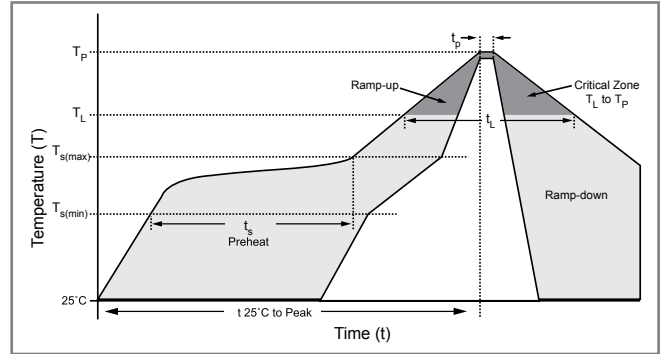


Figure 6 - Maximum Non-Repetitive Peak Forward Surge Current Uni-Directional Only



### Soldering Parameters

|  |                                    |                         |
|--|------------------------------------|-------------------------|
| Reflow Condition                                       |                                    | Lead-free assembly      |
| Pre Heat   | - Temperature Min ( $T_{s(min)}$ ) | 150°C                   |
|  | - Temperature Max ( $T_{s(max)}$ ) | 200°C                   |
|  | - Time (min to max) ( $t_s$ )      | 60 – 180 secs           |
| Average ramp up rate (Liquidus Temp ( $T_L$ ) to peak) |                                    | 3°C/second max          |
| $T_{s(max)}$ to $T_L$ - Ramp-up Rate                   |                                    | 3°C/second max          |
| Reflow   | - Temperature ( $T_L$ ) (Liquidus) | 217°C                   |
|  | - Time (min to max) ( $t_s$ )      | 60 – 150 seconds        |
| Peak Temperature ( $T_p$ )                             |                                    | 260 <sup>+0/-5</sup> °C |
| Time within 5°C of actual peak Temperature ( $t_p$ )   |                                    | 20 – 40 seconds         |
| Ramp-down Rate   |                                    | 6°C/second max          |
| Time 25°C to peak Temperature ( $T_p$ )                |                                    | 8 minutes Max.          |
| Do not exceed  |                                    | 280°C                   |



### Flow/Wave Soldering (Solder Dipping)

|                    |           |
|--------------------|-----------|
| Peak Temperature : | 260°C     |
| Dipping Time :     | 5 seconds |
| Soldering :        | 1 time    |

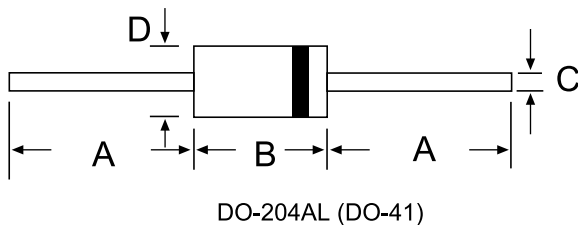
### Physical Specifications

|          |  |
|----------|--|
| Weight   | 0.012oz., 0.3g   |
| Case     | JEDEC DO-204AL (DO-41) molded plastic body over passivated junction. |
| Polarity | Color band denotes the cathode except Bipolar.                       |
| Terminal | Matte Tin axial leads, solderable per JESD22-B102D.                  |

### Environmental Specifications

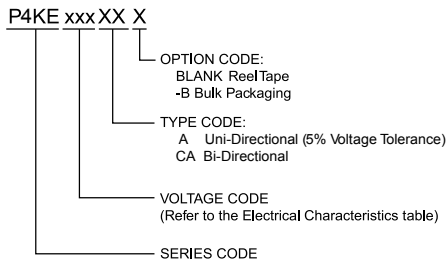
|                    |              |
|--------------------|--------------|
| Temperature Cycle  | JESD22-A104  |
| Pressure Cooker    | JESD 22-A102 |
| High Temp. Storage | JESD22-A103  |
| HTRB               | JESD22-A108  |
| Thermal Shock      | JESD22-A106  |

### Dimensions

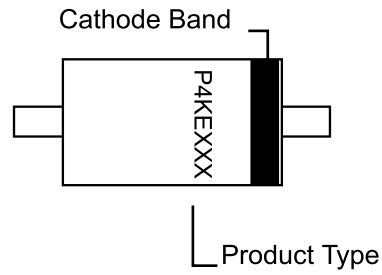


| Dimensions | Inches |       | Millimeters |      |
|------------|--------|-------|-------------|------|
|            | Min    | Max   | Min         | Max  |
| A          | 1.000  | -     | 25.40       | -    |
| B          | 0.160  | 0.205 | 4.10        | 5.20 |
| C          | 0.028  | 0.034 | 0.71        | 0.86 |
| D          | 0.080  | 0.107 | 2.00        | 2.70 |

## Part Numbering System



## Part Marking System



## Packaging

| Part Number | Component Package | Quantity | Packaging Option | Packaging Specification                  |
|-------------|-------------------|----------|------------------|--|
| P4KExxxX    | DO-204AL          | 5000     | Tape & Reel      | EIA STD RS-296E                          |
| P4KExxxXX-B | DO-204AL          | 500      | BOX              | Littelfuse Concord Packing Spec. DM-0016 |

单击下面可查看定价，库存，交付和生命周期等信息

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