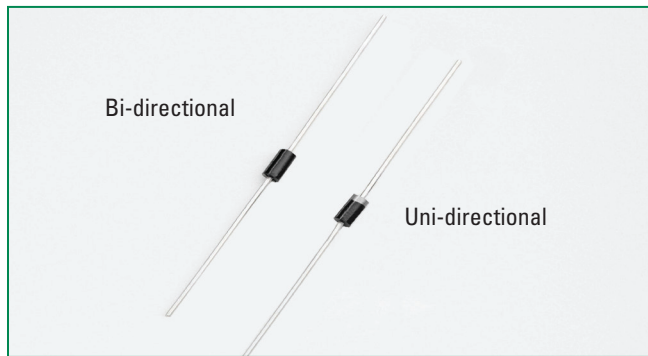


P4KE Series



Agency Approvals

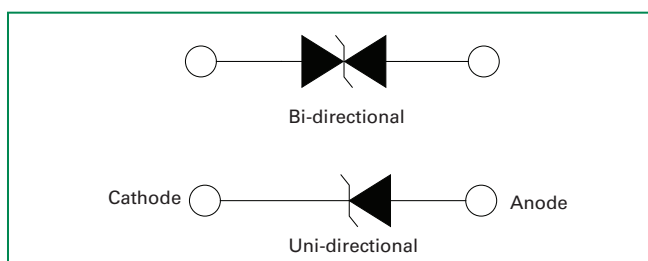
| AGENCY | AGENCY FILE NUMBER |
|--------|--------------------|
| | E230531 |

**Maximum Ratings and Thermal Characteristics
(T_A=25°C unless otherwise noted)**

| Parameter | Symbol | Value | Unit |
|---|-----------------------------------|------------|------|
| Peak Pulse Power Dissipation by 10/1000µs Test Waveform (Fig.2) (Note 1) | P _{PPM} | 400 | W |
| Steady State Power Dissipation on Infinite Heat Sink at T _L =75°C (Fig. 6) | P _D | 1.5 | W |
| Peak Forward Surge Current, 8.3ms Single Half Sine Wave Unidirectional Only (Note 2) | I _{FSM} | 40 | A |
| 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 to 175 | °C |
| Typical Thermal Resistance Junction to Lead | R _{wJL} | 60 | °C/W |
| Typical Thermal Resistance Junction to Ambient | R _{wJA} | 100 | °C/W |

- Notes:**
1. Non-repetitive current pulse, per Fig. 4 and derated above T_A = 25°C per Fig. 3.
 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.

Functional Diagram



Description

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

Features

- V_{BR} @T_J = V_{BR}@25°C x (1 + α T x (T_J - 25)) (α T: Temperature Coefficient)
- Glass passivated chip junction in DO-41 Package
- 400W peak pulse capability at 10/1000µs waveform, repetition rate (duty cycles): 0.01 %
- Fast response time: typically less than 1.0ps from 0 Volts to BV min
- Excellent clamping capability
- Typical failure mode is short from over-specified voltage or current
- Whisker test is conducted based on JEDEC JESD201A per its table 4a and 4c
- IEC-61000-4-2 ESD 15kV(Air), 8kV (Contact)
- ESD protection of data lines in accordance with IEC 61000-4-2 (IEC801-2)
- EFT protection of data lines in accordance with IEC 61000-4-4 (IEC801-4)
- Low incremental surge resistance
- Typical I_R less than 1µA above 13V
- High temperature soldering guaranteed: 260°C/40 seconds / 0.375"/(9.5mm) lead length, 5 lbs., (2.3kg) tension
- Plastic package has underwriters laboratory flammability classification 94V-0
- Matte tin lead-free plated
- Halogen free and RoHS compliant
- 2nd level interconnect is Pb-free per IPC/JEDEC J-STD-609A.01

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.

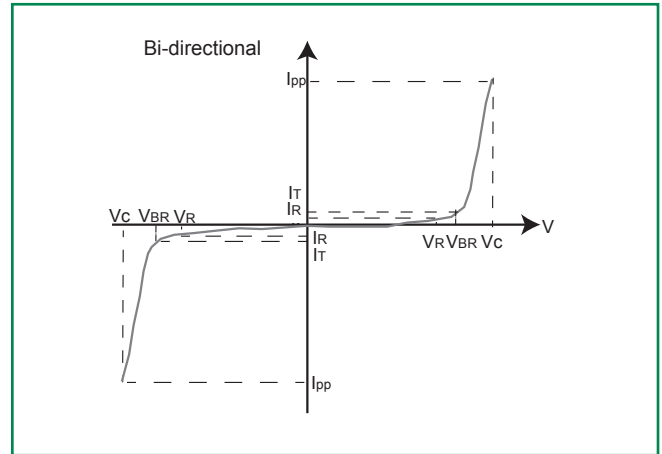
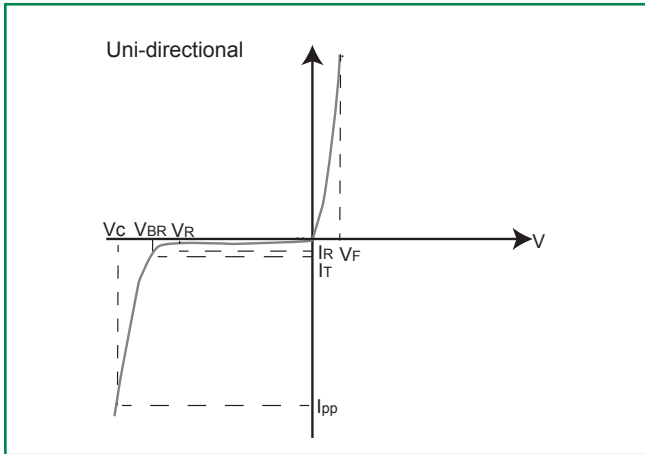
Electrical Characteristics ($T_A=25^\circ\text{C}$ unless otherwise noted)

| Part Number (Uni) | Part Number (Bi) | Reverse Stand off Voltage V_R (Volts) | Breakdown Voltage $V_{BR} @ I_T$ (V) | | Test Current I_T (mA) | Maximum Clamping Voltage $V_C @ I_{pp}$ (V) | Maximum Peak Pulse Current I_{pp} (A) | Maximum Reverse Leakage $I_R @ V_R$ (μA) | Agency Approval  |
|-------------------|------------------|---|--------------------------------------|--------|-------------------------|---|---|---|---|
| | | | MIN | MAX | | | | | |
| P4KE6.8A | P4KE6.8CA | 5.80 | 6.45 | 7.14 | 10 | 10.5 | 39.00 | 1000 | X |
| P4KE7.5A | P4KE7.5CA | 6.40 | 7.13 | 7.88 | 10 | 11.3 | 36.30 | 500 | X |
| P4KE8.2A | P4KE8.2CA | 7.02 | 7.79 | 8.61 | 10 | 12.1 | 33.90 | 200 | X |
| P4KE9.1A | P4KE9.1CA | 7.78 | 8.65 | 9.55 | 1 | 13.4 | 30.60 | 50 | X |
| P4KE10A | P4KE10CA | 8.55 | 9.50 | 10.50 | 1 | 14.5 | 28.30 | 10 | X |
| P4KE11A | P4KE11CA | 9.40 | 10.50 | 11.60 | 1 | 15.6 | 26.30 | 5 | X |
| P4KE12A | P4KE12CA | 10.20 | 11.40 | 12.60 | 1 | 16.7 | 24.60 | 5 | X |
| P4KE13A | P4KE13CA | 11.10 | 12.40 | 13.70 | 1 | 18.2 | 22.50 | 1 | X |
| P4KE15A | P4KE15CA | 12.80 | 14.30 | 15.80 | 1 | 21.2 | 19.30 | 1 | X |
| P4KE16A | P4KE16CA | 13.60 | 15.20 | 16.80 | 1 | 22.5 | 18.20 | 1 | X |
| P4KE18A | P4KE18CA | 15.30 | 17.10 | 18.90 | 1 | 25.5 | 16.10 | 1 | X |
| P4KE20A | P4KE20CA | 17.10 | 19.00 | 21.00 | 1 | 27.7 | 14.80 | 1 | X |
| P4KE22A | P4KE22CA | 18.80 | 20.90 | 23.10 | 1 | 30.6 | 13.40 | 1 | X |
| P4KE24A | P4KE24CA | 20.50 | 22.80 | 25.20 | 1 | 33.2 | 12.30 | 1 | X |
| P4KE27A | P4KE27CA | 23.10 | 25.70 | 28.40 | 1 | 37.5 | 10.90 | 1 | X |
| P4KE30A | P4KE30CA | 25.60 | 28.50 | 31.50 | 1 | 41.4 | 9.90 | 1 | X |
| P4KE33A | P4KE33CA | 28.20 | 31.40 | 34.70 | 1 | 45.7 | 9.00 | 1 | X |
| P4KE36A | P4KE36CA | 30.80 | 34.20 | 37.80 | 1 | 49.9 | 8.20 | 1 | X |
| P4KE39A | P4KE39CA | 33.30 | 37.10 | 41.00 | 1 | 53.9 | 7.60 | 1 | X |
| P4KE43A | P4KE43CA | 36.80 | 40.90 | 45.20 | 1 | 59.3 | 6.90 | 1 | X |
| P4KE47A | P4KE47CA | 40.20 | 44.70 | 49.40 | 1 | 64.8 | 6.30 | 1 | X |
| P4KE51A | P4KE51CA | 43.60 | 48.50 | 53.60 | 1 | 70.1 | 5.80 | 1 | X |
| P4KE56A | P4KE56CA | 47.80 | 53.20 | 58.80 | 1 | 77.0 | 5.30 | 1 | X |
| P4KE62A | P4KE62CA | 53.00 | 58.90 | 65.10 | 1 | 85.0 | 4.80 | 1 | X |
| P4KE68A | P4KE68CA | 58.10 | 64.60 | 71.40 | 1 | 92.0 | 4.50 | 1 | X |
| P4KE75A | P4KE75CA | 64.10 | 71.30 | 78.80 | 1 | 103.0 | 4.00 | 1 | X |
| P4KE82A | P4KE82CA | 70.10 | 77.90 | 86.10 | 1 | 113.0 | 3.60 | 1 | X |
| P4KE91A | P4KE91CA | 77.80 | 86.50 | 95.50 | 1 | 125.0 | 3.30 | 1 | X |
| P4KE100A | P4KE100CA | 85.50 | 95.00 | 105.00 | 1 | 137.0 | 3.00 | 1 | X |
| P4KE110A | P4KE110CA | 94.00 | 105.00 | 116.00 | 1 | 152.0 | 2.70 | 1 | X |
| P4KE120A | P4KE120CA | 102.00 | 114.00 | 126.00 | 1 | 165.0 | 2.50 | 1 | X |
| P4KE130A | P4KE130CA | 111.00 | 124.00 | 137.00 | 1 | 179.0 | 2.30 | 1 | X |
| P4KE150A | P4KE150CA | 128.00 | 143.00 | 158.00 | 1 | 207.0 | 2.00 | 1 | X |
| P4KE160A | P4KE160CA | 136.00 | 152.00 | 168.00 | 1 | 219.0 | 1.90 | 1 | X |
| P4KE170A | P4KE170CA | 145.00 | 162.00 | 179.00 | 1 | 234.0 | 1.80 | 1 | X |
| P4KE180A | P4KE180CA | 154.00 | 171.00 | 189.00 | 1 | 246.0 | 1.70 | 1 | X |
| P4KE200A | P4KE200CA | 171.00 | 190.00 | 210.00 | 1 | 274.0 | 1.50 | 1 | X |
| P4KE220A | P4KE220CA | 185.00 | 209.00 | 231.00 | 1 | 328.0 | 1.30 | 1 | |
| P4KE250A | P4KE250CA | 214.00 | 237.00 | 263.00 | 1 | 344.0 | 1.20 | 1 | |
| P4KE300A | P4KE300CA | 256.00 | 285.00 | 315.00 | 1 | 414.0 | 1.00 | 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 | 451.00 | 503.50 | 556.50 | 1 | 725.0 | 0.55 | 1 | |
| P4KE540A | P4KE540CA | 460.00 | 513.00 | 567.00 | 1 | 740.0 | 0.54 | 1 | |
| P4KE550A | P4KE550CA | 468.00 | 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

I-V Curve Characteristics



- P_{PPM} Peak Pulse Power Dissipation** – Max power dissipation
- V_R Stand-off Voltage** – Maximum voltage that can be applied to the TVS without operation
- V_{BR} Breakdown Voltage** – Maximum voltage that flows through the TVS at a specified test current (I_T)
- V_C Clamping Voltage** – Peak voltage measured across the suppressor at a specified I_{ppm} (peak impulse current)
- I_R Reverse Leakage Current** – Current measured at V_R
- V_F Forward Voltage Drop for Uni-directional**

Ratings and Characteristic Curves ($T_A = 25^\circ\text{C}$ unless otherwise noted)

Figure 1 - TVS Transients Clamping Waveform

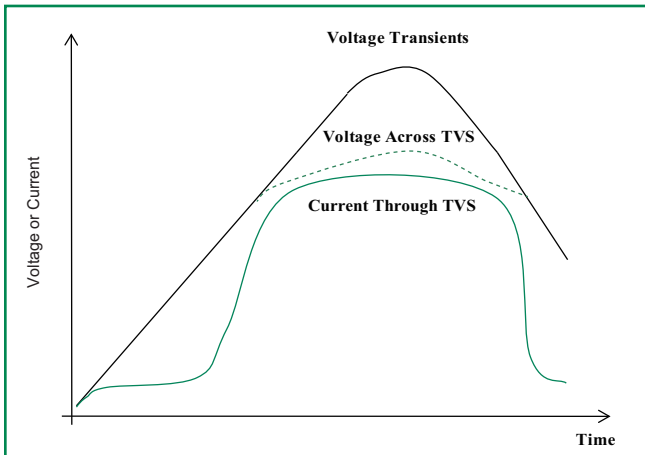
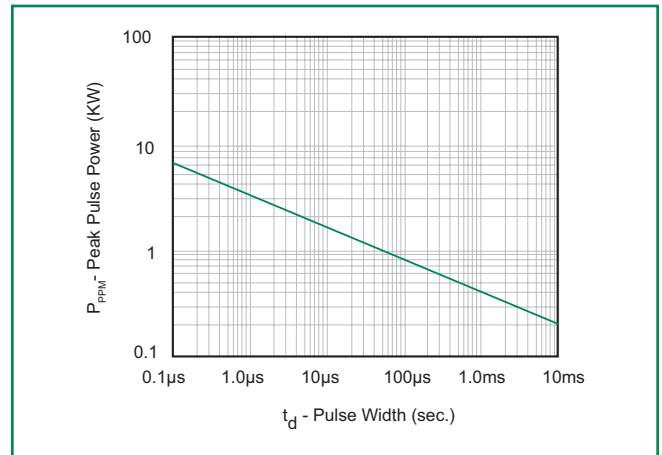


Figure 2 - Peak Pulse Power Rating



continues on next page.

Ratings and Characteristic Curves ($T_A=25^\circ\text{C}$ unless otherwise noted) (Continued)

Figure 3 - Pulse Derating Curve

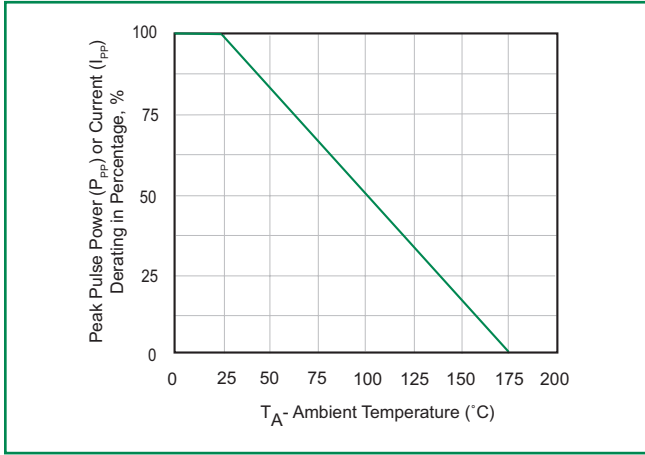


Figure 4 - Pulse Waveform

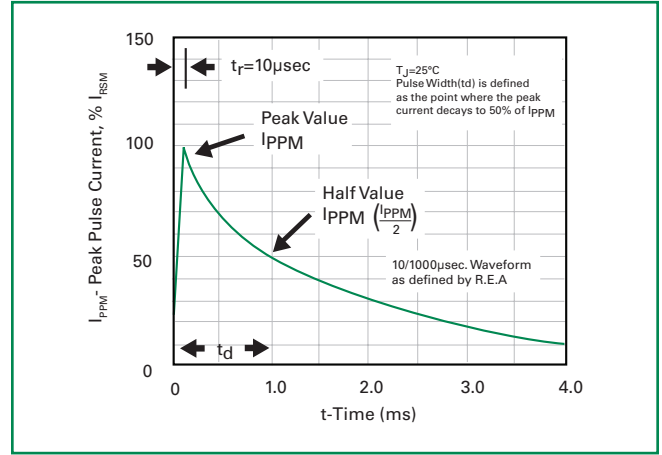


Figure 5 - Typical Junction Capacitance Uni-Directional

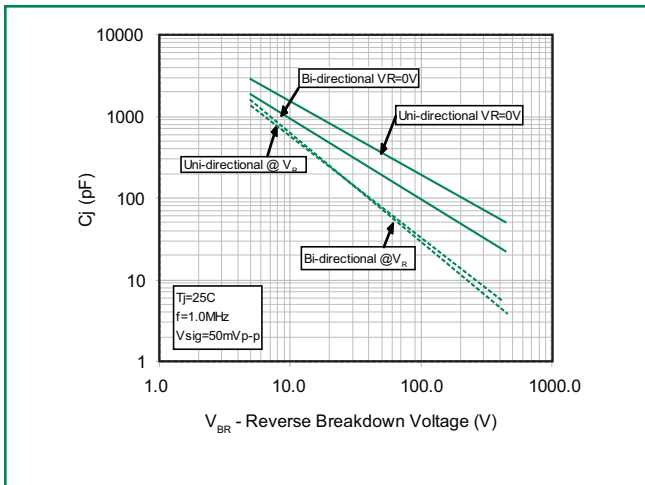


Figure 6 - Steady Pulse Derating Curve

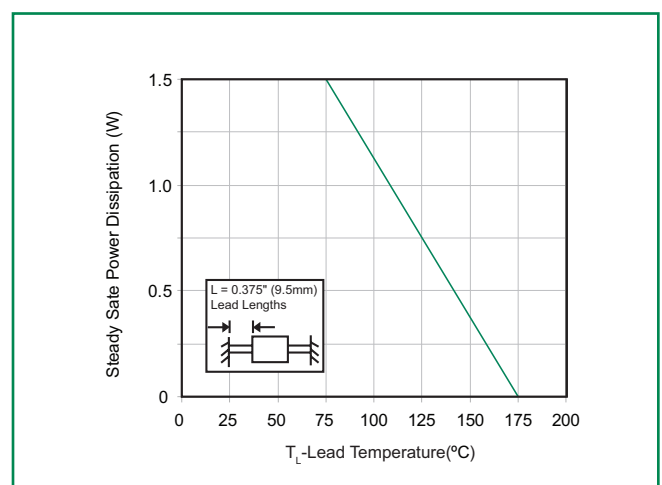
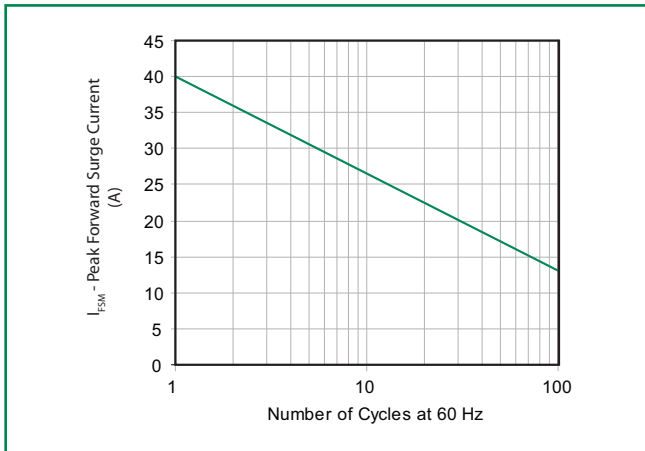
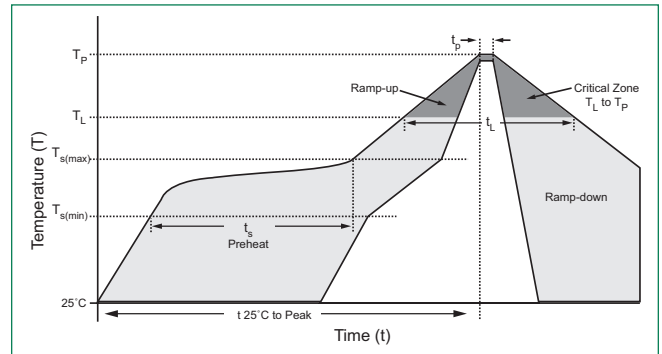


Figure 7 - Maximum Non-Repetitive Peak Forward Surge Current Uni-Directional Only



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 ^{+0/-5} °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 |

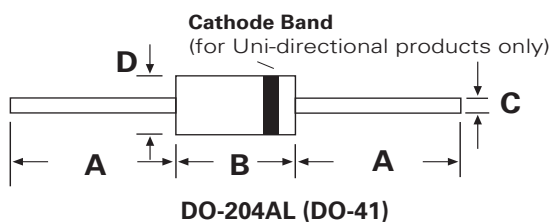
Physical Specifications

| | |
|-----------------|--|
| 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-B102. |

Environmental Specifications

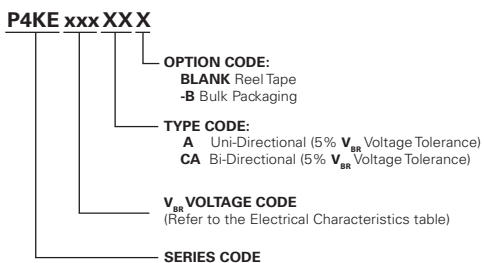
| | |
|----------------------------|-------------|
| High Temp. Storage | JESD22-A103 |
| HTRB | JESD22-A108 |
| Temperature Cycling | JESD22-A104 |
| H3TRB | JESD22-A101 |
| RSH | JESD22-B106 |

Dimensions

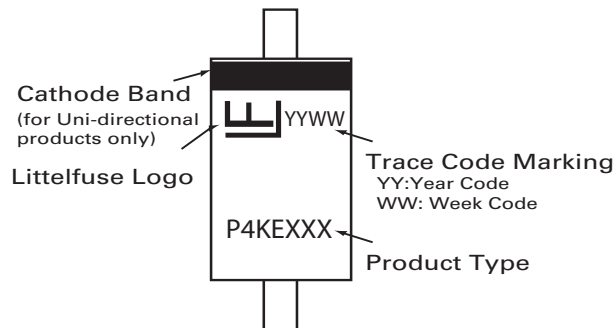


| Dimensions | Inches | | Millimeters | |
|------------|--------|-------|-------------|------|
| | Min | Max | Min | Max |
| A | 1.000 | - | 25.40 | - |
| B | 0.160 | 0.205 | 4.10 | 5.20 |
| C | 0.028 | 0.034 | 0.71 | 0.86 |
| D | 0.080 | 0.107 | 2.00 | 2.70 |

Part Numbering System



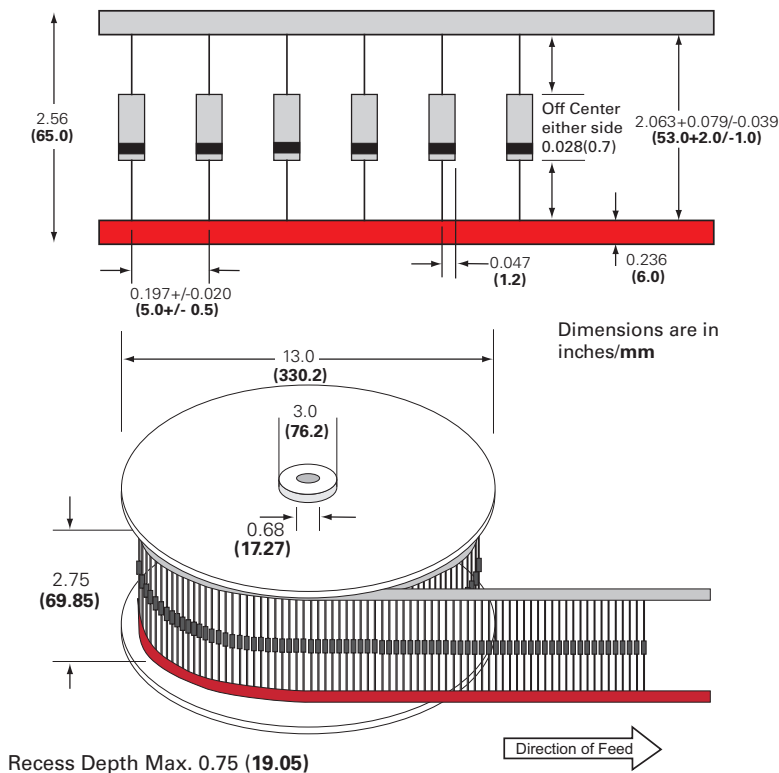
Part Marking System



Packaging

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

Tape and Reel Specification



X-ON Electronics

Largest Supplier of Electrical and Electronic Components

Click to view similar products for [ESD Suppressors / TVS Diodes](#) category:

Click to view products by [Littelfuse](#) manufacturer:

Other Similar products are found below :

[NTE4902](#) [P4SMAJ15A](#) [P4SMAJ26A](#) [SMAJ400CA-TP](#) [TGL34-47CA](#) [ESDAULC45-1BF4](#) [SM1605E3/TR13](#) [SMF20A-TP](#) [P4SMAJ12A](#)
[CPDUR24V-HF](#) [CPDQC5V0USP-HF](#) [CPDQC5V0-HF](#) [MPLAD30KP45CAE3](#) [MMBZ27VCLQ-7-F](#) [MMAD1108/TR13](#) [MPLAD30KP24A](#)
[ACPDQC5V0R-HF](#) [DFLT170A-7](#) [NTE4900](#) [NTE4926](#) [NTE4938](#) [SMF22A-TP](#) [SMF12A-TP](#) [SLVU2.8-TP](#) [SMLJ6.5CA-TP](#) [SMAJ6.5CA-](#)
[TP](#) [MMAD1108E3/TR13](#) [D5V0M1U2LP3-7](#) [SMAJ400A-TP](#) [AOZ8811DT-03](#) [AOZ8831DI-05](#) [AOZ8831DT-03](#) [SMAJ188CA](#) [3SMC33CA](#)
[BK](#) [CPDQC3V3C-HF](#) [CPDQC12VE-HF](#) [MPLAD30KP170CA](#) [82357120100](#) [5.0SMLJ15CA-TP](#) [5KP18A-TP](#) [P6KE8.2A-TP](#)
[MPLAD30KP43CAE3](#) [SMAJ43A-TP](#) [D5V0F6U8LP33-7](#) [TVS5501V10MUT5G](#) [5.0SMLJ24CA-TP](#) [SMAJ110CA-TP](#) [MPLAD15KP75CAE3](#)
[MMAD1103e3/TR13](#) [DFLT40AQ-7](#)