

Axial Lead Transient Voltage Suppressors (TVS)

15KP Series 17 To 280 V 15000W

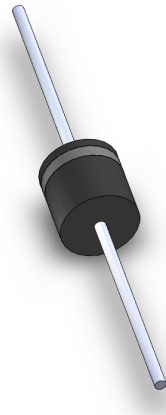
Description

The 15KP series is designed specifically to protect sensitive electronic equipment from voltage transients induced by lightning and other transient voltage events.

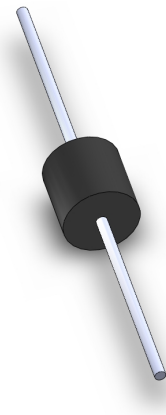
Features

- u Glass passivated chip junction in P600 Package
- u Low leakage
- u Uni and Bidirectional unit
- u Excellent clamping capability
- u 15000W Peak power capability at 10 × 1000µs waveform Repetition rate (duty cycle):0.01%
- u Fast response time: typically less than 1.0ps from 0 Volts to V_{BR} min
- u Typical I_R less than 2µA above 40V.
- u High Temperature soldering: 260°C/40 seconds at terminals
- u Typical maximum temperature coefficient $\Delta V_{BR} = 0.1\% \times V_{BR}@25^\circ\text{C} \times \Delta T$
- u Plastic package has Underwriters Laboratory Flammability 94V-0
- u Matte tin lead-free Plated
- u Halogen free and RoHS compliant
- u Typical failure mode is short from over-specified voltage or current
- u Whisker test is conducted based on JEDEC JESD201A per its table 4a and 4c
- u IEC-61000-4-2 ESD 15kV(Air), 8kV (Contact)
- u ESD protection of data lines in accordance with IEC 61000-4-2 (IEC801-2)
- u EFT protection of data lines in accordance with IEC 61000-4-4 (IEC801-4)

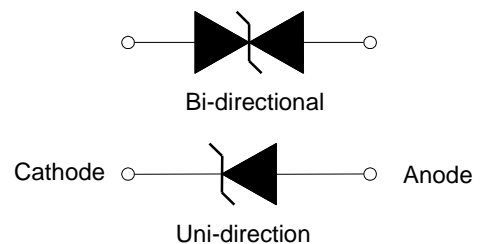
Uni-directional



Bi-directional



Functional Diagram



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

| Parameter | Symbol | Value | Unit |
|--|----------------|----------------|------------------|
| Peak Pulse Power Dissipation with a 10/1000µs waveform (Fig.1)(Note 1), (Note 2) | P_{PPM} | 15000 | Watts |
| Peak Pulse Current with a 10/1000µs waveform.(Note1, Fig.3) | I_{PP} | See Next Table | Amps |
| Power Dissipation on Infinite Heat Sink at $T_L=75^\circ\text{C}$ | $P_{M(AV)}$ | 8.0 | Watt |
| Peak Forward Surge Current, 8.3ms Single Half Sine Wave (Note 3) | I_{FSM} | 500 | Amps |
| Operating junction 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 5.0mm x 5.0mm (0.03mm thick) Copper Pads to each terminal.
3. 8.3ms single half sine-wave, or equivalent square wave, Duty cycle = 4 pulses per minutes maximum.
4. $V_F < 3.5\text{V}$ for $V_{BR} < 200\text{V}$ and $V_F < 6.5\text{V}$ for $V_{BR} > 201\text{V}$.

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Electrical Characteristics (T_A=25°C unless otherwise noted)

| Part Number | | Reverse Stand-Off Voltage V _{RWM} (V) | Breakdown Voltage V _{BR} (V) @I _T | | 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 _{RWM} (μA) |
|-------------|-----------|--|---|--------|----------------------------------|--|--|---|
| Uni | Bi | | MIN | MAX | | | | |
| 15KP17A | 15KP17CA | 17 | 18.99 | 20.79 | 50 | 29.3 | 515.4 | 5000 |
| 15KP18A | 15KP18CA | 18 | 20.11 | 22.01 | 50 | 30.9 | 488.7 | 5000 |
| 15KP20A | 15KP20CA | 20 | 22.34 | 24.46 | 20 | 34.3 | 440.2 | 1500 |
| 15KP22A | 15KP22CA | 22 | 24.57 | 26.91 | 10 | 37.1 | 407.0 | 500 |
| 15KP24A | 15KP24CA | 24 | 26.81 | 29.35 | 5 | 40.7 | 371.0 | 150 |
| 15KP26A | 15KP26CA | 26 | 29.04 | 31.80 | 5 | 44.0 | 343.2 | 50 |
| 15KP28A | 15KP28CA | 28 | 31.28 | 34.24 | 5 | 47.5 | 317.9 | 25 |
| 15KP30A | 15KP30CA | 30 | 33.51 | 36.70 | 5 | 50.7 | 297.8 | 15 |
| 15KP33A | 15KP33CA | 33 | 36.90 | 40.40 | 5 | 54.7 | 276.1 | 2 |
| 15KP36A | 15KP36CA | 36 | 40.20 | 44.00 | 5 | 59.8 | 252.5 | 2 |
| 15KP40A | 15KP40CA | 40 | 44.70 | 48.90 | 5 | 65.8 | 229.5 | 2 |
| 15KP43A | 15KP43CA | 43 | 48.00 | 52.60 | 5 | 69.8 | 216.3 | 2 |
| 15KP45A | 15KP45CA | 45 | 50.30 | 55.00 | 5 | 72.8 | 207.4 | 2 |
| 15KP48A | 15KP48CA | 48 | 53.60 | 58.70 | 5 | 77.7 | 194.3 | 2 |
| 15KP51A | 15KP51CA | 51 | 57.00 | 62.40 | 5 | 82.9 | 182.1 | 2 |
| 15KP54A | 15KP54CA | 54 | 60.30 | 66.00 | 5 | 87.7 | 172.2 | 2 |
| 15KP58A | 15KP58CA | 58 | 64.80 | 70.90 | 5 | 93.8 | 161.0 | 2 |
| 15KP60A | 15KP60CA | 60 | 67.00 | 73.40 | 5 | 97.4 | 155.0 | 2 |
| 15KP64A | 15KP64CA | 64 | 71.50 | 78.30 | 5 | 104.2 | 144.9 | 2 |
| 15KP70A | 15KP70CA | 70 | 78.20 | 85.60 | 5 | 113.6 | 132.9 | 2 |
| 15KP75A | 15KP75CA | 75 | 83.80 | 91.70 | 5 | 122.0 | 123.8 | 2 |
| 15KP78A | 15KP78CA | 78 | 87.10 | 95.40 | 5 | 126.1 | 119.7 | 2 |
| 15KP85A | 15KP85CA | 85 | 94.90 | 104.00 | 5 | 137.6 | 109.7 | 2 |
| 15KP90A | 15KP90CA | 90 | 100.50 | 110.10 | 5 | 145.6 | 103.7 | 2 |
| 15KP100A | 15KP100CA | 100 | 111.70 | 122.30 | 5 | 161.3 | 93.6 | 2 |
| 15KP110A | 15KP110CA | 110 | 122.90 | 134.50 | 5 | 178.6 | 84.5 | 2 |
| 15KP120A | 15KP120CA | 120 | 134.00 | 146.80 | 5 | 192.3 | 78.5 | 2 |
| 15KP130A | 15KP130CA | 130 | 145.20 | 159.00 | 5 | 208.3 | 72.5 | 2 |
| 15KP150A | 15KP150CA | 150 | 167.60 | 183.50 | 5 | 241.9 | 62.4 | 2 |
| 15KP160A | 15KP160CA | 160 | 178.70 | 195.70 | 5 | 258.6 | 58.4 | 2 |
| 15KP170A | 15KP170CA | 170 | 189.90 | 207.90 | 5 | 272.7 | 55.4 | 2 |
| 15KP180A | 15KP180CA | 180 | 201.10 | 220.10 | 5 | 288.5 | 52.3 | 2 |
| 15KP200A | 15KP200CA | 200 | 223.40 | 244.60 | 5 | 319.1 | 47.3 | 2 |
| 15KP220A | 15KP220CA | 220 | 245.70 | 269.10 | 5 | 428.6 | 42.2 | 2 |
| 15KP240A | 15KP240CA | 240 | 268.10 | 293.50 | 5 | 384.6 | 39.3 | 2 |
| 15KP260A | 15KP260CA | 260 | 290.40 | 318.00 | 5 | 416.7 | 36.2 | 2 |
| 15KP280A | 15KP280CA | 280 | 312.80 | 342.40 | 5 | 454.5 | 33.2 | 2 |

Note:

- For Bi-Directional devices having V_R of 30 volts and under, the I_R limit is double

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

Figure 1 - Peak Pulse Power Rating Curve

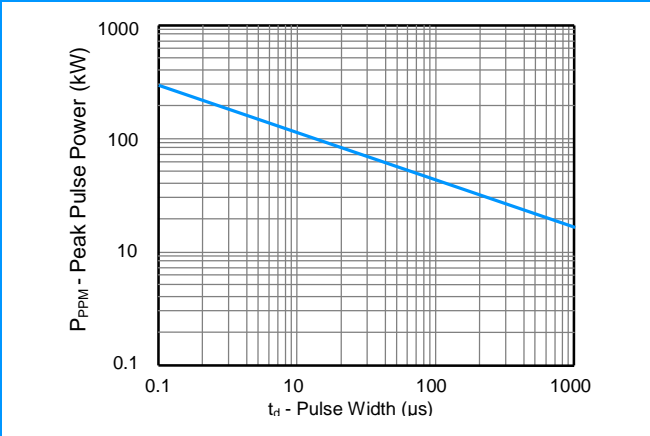


Figure 2 - Pulse Derating Curve

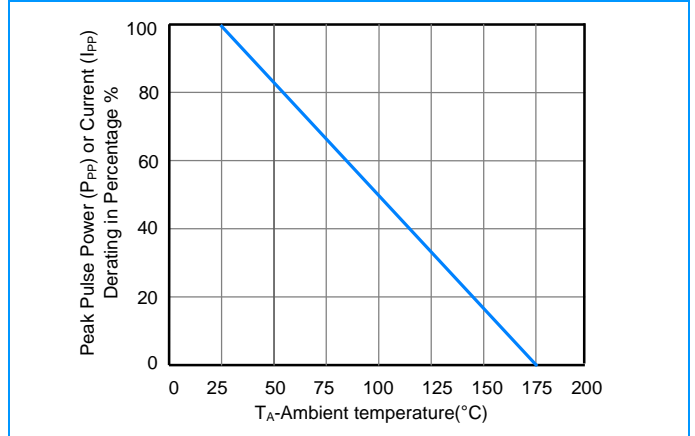


Figure 3 - Pulse Waveform

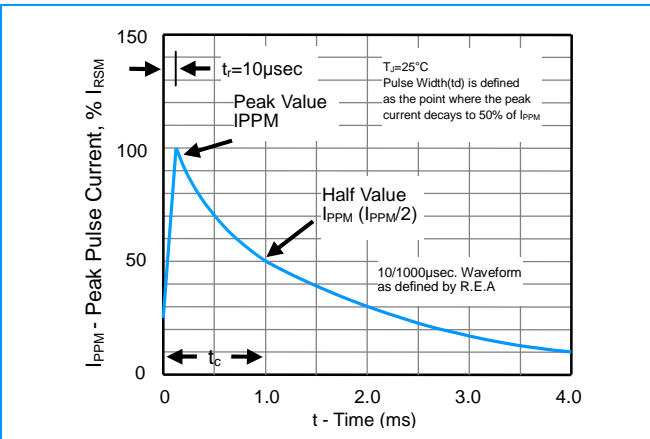


Figure 4 - Typical Junction Capacitance

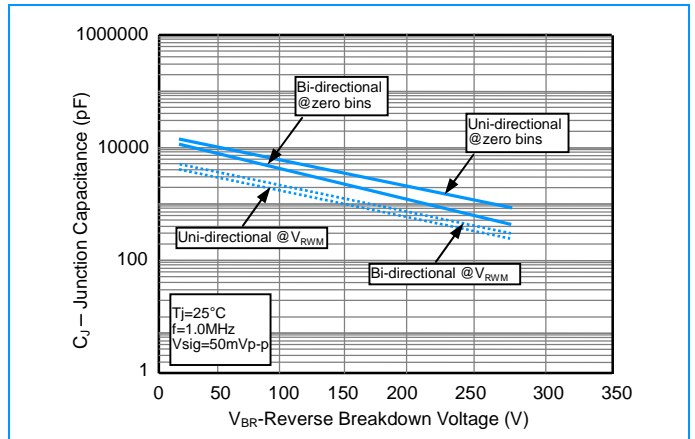


Figure 5 - Steady State Power Derating Curve

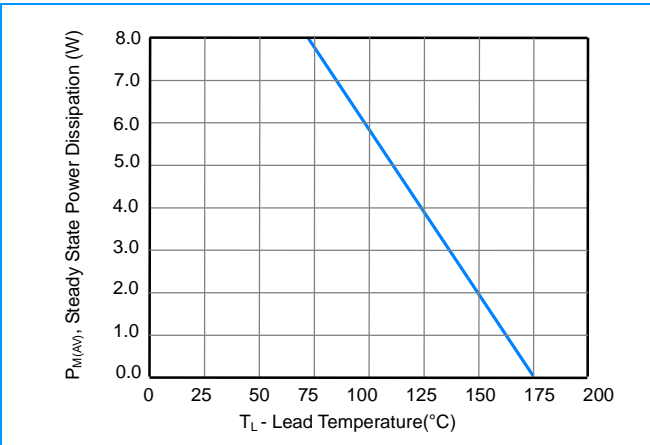
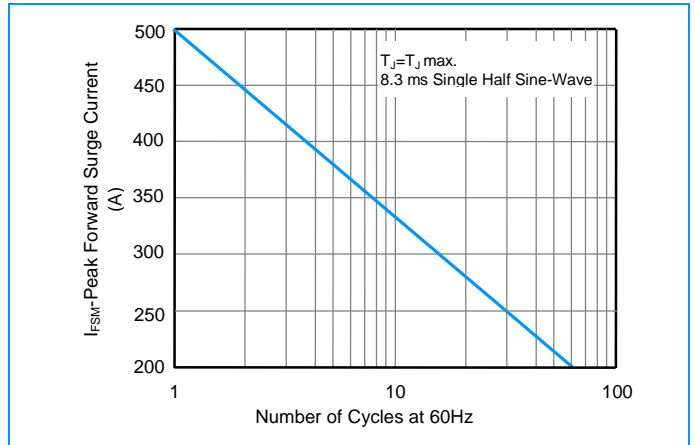


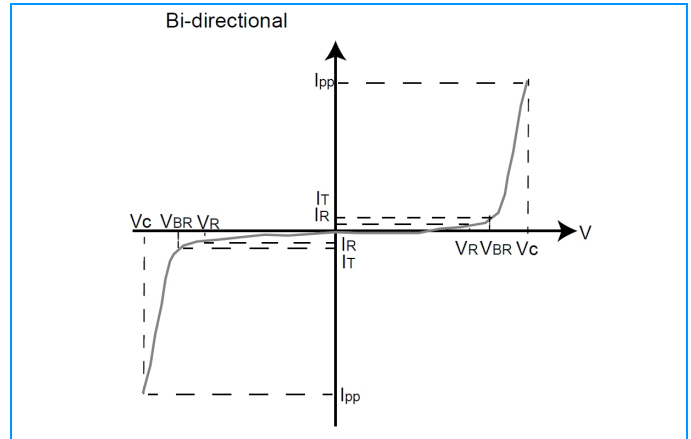
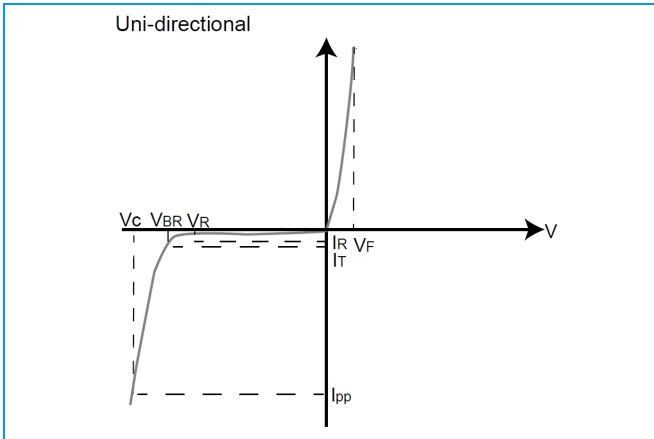
Figure 6 - Maximum Non-Repetitive Surge Current



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I-V Curve Characteristics



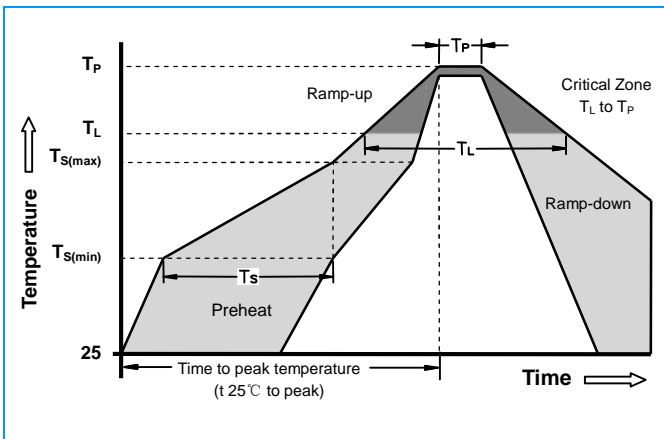
Physical Specifications

| | |
|-----------------|--|
| Weight | 0.07 ounce, 2.1gram |
| Case | JEDEC R-6/P600 Molded Plastic over glass passivated junction |
| Polarity | Color band denotes cathode except Bipolar |
| Terminal | Matte Tin-plated leads, Solderable per JESD22-B102D |

Environmental Specifications

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

Soldering Parameters

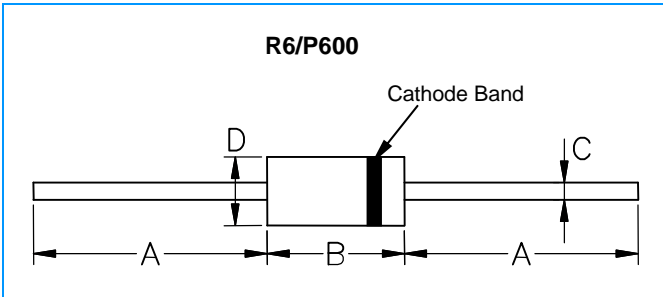


| | | |
|---|------------------------------------|--------------------|
| Reflow Condition | | Lead-free assembly |
| Pre Heat | -Temperature Min ($T_{s(min)}$) | 150°C |
| | -Temperature Max ($T_{s(max)}$) | 200°C |
| | - Time (min to max) (t_s) | 60 -180 Seconds |
| Average ramp up rate (Liquidus Temp 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 |

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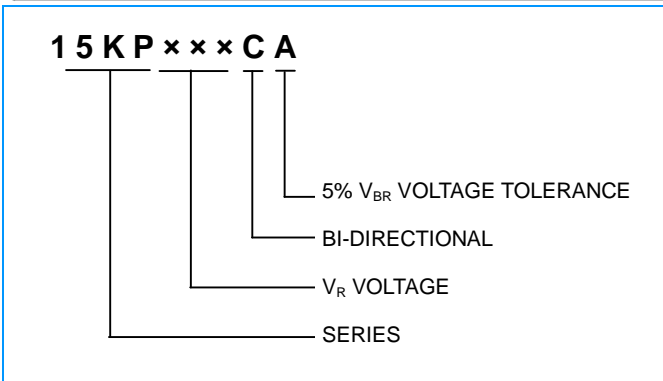
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Dimensions



| Dimensions | Inches | | Millimeters | |
|------------|--------|-------|-------------|------|
| | Min | Max | Min | Max |
| A | 1.000 | - | 25.40 | - |
| B | 0.340 | 0.360 | 8.64 | 9.14 |
| C | 0.048 | 0.052 | 1.22 | 1.32 |
| D | 0.340 | 0.360 | 8.64 | 9.14 |

Part Numbering



Packaging

| Part Number | Component Package | Quantity | Packaging Option |
|-------------|-------------------|----------|------------------|
| 15KPXXXXX | R6/P600 | 200 | Box |

Packaging Dimensions Unit: Inches (Millimeters)

