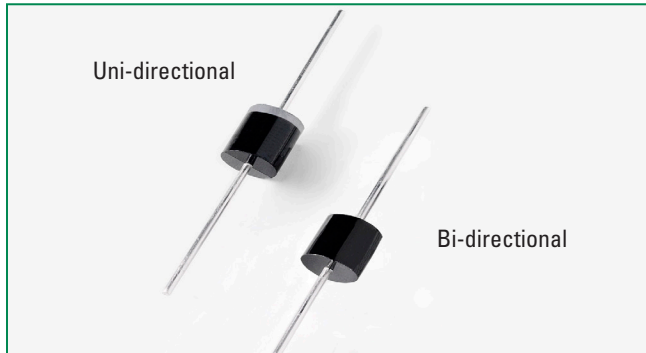


30KPA-HRA Series



Agency Approvals

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

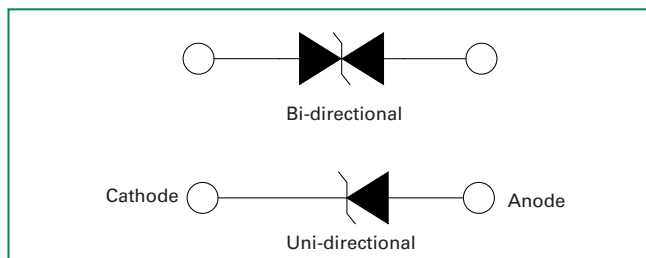
Maximum Ratings and Thermal Characteristics ($T_A=25^{\circ}\text{C}$ unless otherwise noted)

| Parameter | Symbol | Value | Unit |
|--|-----------------------|------------|----------------------|
| Peak Pulse Power Dissipation by 10/1000 μs Test Waveform (Fig.2) (Note 1) | P_{PPM} | 30000 | W |
| Steady State Power Dissipation on Infinite Heat Sink at $T_L=75^{\circ}\text{C}$ | P_D | 8.0 | W |
| Peak Forward Surge Current, 8.3ms Single Half Sine Wave Unidirectional Only (Note 2) | I_{FSM} | 400 | A |
| Operating Junction and Storage Temperature Range | T_J, T_{STG} | -55 to 175 | $^{\circ}\text{C}$ |
| Typical Thermal Resistance Junction to Lead | R_{WJL} | 8.0 | $^{\circ}\text{C/W}$ |
| Typical Thermal Resistance Junction to Ambient | R_{WJA} | 40 | $^{\circ}\text{C/W}$ |

Notes:

1. Non-repetitive current pulse, per Fig. 4 and derated above T_J (initial) $=25^{\circ}\text{C}$ per Fig 3.
2. Measured on 8.3ms single half sine wave or equivalent square wave, duty cycle=4 per minute maximum.

Functional Diagram



Descriptions

The 30KPA-HRA High Reliability Series is designed specifically to protect sensitive electronic equipment from voltage transients induced by lightning and other transient voltage events.

Features

- 30000W peak pulse capability at 10/1000 μs waveform, repetition rate (duty cycles):0.01%
- Glass passivated chip junction in P600 package
- 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 30kV(Air), 30kV (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 2 μA when $V_{\text{BR min}} > 73\text{V}$
- High temperature to reflow soldering guaranteed: 260 $^{\circ}\text{C}/10\text{sec}$ / 0.375", (9.5mm) lead length, 5 lbs., (2.3kg) tension
- $V_{\text{BR}} @ T_J = V_{\text{BR}} @ 25^{\circ}\text{C} \times (1 + \alpha T \times (T_J - 25))$ (α T: Temperature Coefficient, typical value is 0.1%)
- Plastic package is flammability rated V-0 per Underwriters Laboratories
- Lead-free matte tin plated package
- Halogen free and RoHS compliant
- Pb-free E3 means 2nd level interconnect is Pb-free and the terminal finish material is tin(Sn) (IPC/ JEDEC J-STD-609A.01)


Notes:

1. For RTCA/DO-160G testing results, please see tables in the last section of this datasheet

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} (Volts) @ I_T | | Test Current I_T (mA) | Maximum Peak Pulse Current I_{PP} (A) | Maximum Reverse Leakage I_R @ V_R (μA) | Maximum Clamping Voltage V_C @ I_{PP} (V) | Agency Approval  |
|-------------------|------------------|---|--|--------|-------------------------|---|---|---|---|
| | | | MIN | MAX | | | | | |
| 30KPA28A-HRA | 30KPA28CA-HRA | 28 | 31.28 | 34.41 | 50 | 606.0 | 5000 | 50.0 | X |
| 30KPA30A-HRA | 30KPA30CA-HRA | 30 | 33.51 | 36.86 | 50 | 548.9 | 5000 | 55.2 | X |
| 30KPA33A-HRA | 30KPA33CA-HRA | 33 | 36.90 | 40.59 | 50 | 517.9 | 5000 | 58.5 | X |
| 30KPA36A-HRA | 30KPA36CA-HRA | 36 | 40.20 | 44.22 | 50 | 490.3 | 5000 | 61.8 | X |
| 30KPA39A-HRA | 30KPA39CA-HRA | 39 | 43.60 | 47.96 | 20 | 450.9 | 2000 | 67.2 | X |
| 30KPA42A-HRA | 30KPA42CA-HRA | 42 | 46.90 | 51.59 | 10 | 420.8 | 1000 | 72.0 | X |
| 30KPA43A-HRA | 30KPA43CA-HRA | 43 | 48.00 | 52.80 | 10 | 415.1 | 1000 | 73.0 | X |
| 30KPA45A-HRA | 30KPA45CA-HRA | 45 | 50.30 | 55.33 | 5 | 391.5 | 250 | 77.4 | X |
| 30KPA48A-HRA | 30KPA48CA-HRA | 48 | 53.60 | 58.96 | 5 | 371.3 | 150 | 81.6 | X |
| 30KPA51A-HRA | 30KPA51CA-HRA | 51 | 57.00 | 62.70 | 5 | 350.7 | 50 | 86.4 | X |
| 30KPA54A-HRA | 30KPA54CA-HRA | 54 | 60.30 | 66.33 | 5 | 331.5 | 20 | 91.4 | X |
| 30KPA58A-HRA | 30KPA58CA-HRA | 58 | 64.80 | 71.28 | 5 | 327.9 | 20 | 92.4 | X |
| 30KPA60A-HRA | 30KPA60CA-HRA | 60 | 67.00 | 73.70 | 5 | 297.1 | 15 | 102.0 | X |
| 30KPA64A-HRA | 30KPA64CA-HRA | 64 | 71.50 | 78.65 | 5 | 291.3 | 10 | 104.0 | X |
| 30KPA66A-HRA | 30KPA66CA-HRA | 66 | 73.70 | 81.07 | 5 | 283.2 | 2 | 107.0 | X |
| 30KPA70A-HRA | 30KPA70CA-HRA | 70 | 78.20 | 86.02 | 5 | 278.0 | 2 | 109.0 | X |
| 30KPA71A-HRA | 30KPA71CA-HRA | 71 | 79.30 | 87.23 | 5 | 271.7 | 2 | 111.5 | X |
| 30KPA72A-HRA | 30KPA72CA-HRA | 72 | 80.40 | 88.44 | 5 | 265.8 | 2 | 114.0 | X |
| 30KPA75A-HRA | 30KPA75CA-HRA | 75 | 83.80 | 92.18 | 5 | 253.8 | 2 | 119.4 | X |
| 30KPA78A-HRA | 30KPA78CA-HRA | 78 | 87.10 | 95.81 | 5 | 234.9 | 2 | 129.0 | X |
| 30KPA84A-HRA | 30KPA84CA-HRA | 84 | 93.80 | 103.18 | 5 | 217.7 | 2 | 139.2 | X |
| 30KPA90A-HRA | 30KPA90CA-HRA | 90 | 100.50 | 110.55 | 5 | 207.0 | 2 | 146.4 | X |
| 30KPA96A-HRA | 30KPA96CA-HRA | 96 | 107.20 | 117.92 | 5 | 194.2 | 2 | 156.0 | X |
| 30KPA102A-HRA | 30KPA102CA-HRA | 102 | 113.90 | 125.29 | 5 | 183.0 | 2 | 165.6 | X |
| 30KPA108A-HRA | 30KPA108CA-HRA | 108 | 120.60 | 132.66 | 5 | 172.9 | 2 | 175.2 | X |
| 30KPA120A-HRA | 30KPA120CA-HRA | 120 | 134.00 | 147.40 | 5 | 155.9 | 2 | 194.4 | X |
| 30KPA132A-HRA | 30KPA132CA-HRA | 132 | 147.40 | 162.14 | 5 | 142.3 | 2 | 213.0 | X |
| 30KPA144A-HRA | 30KPA144CA-HRA | 144 | 160.80 | 176.88 | 5 | 135.8 | 2 | 223.2 | X |
| 30KPA150A-HRA | 30KPA150CA-HRA | 150 | 167.60 | 184.36 | 5 | 129.8 | 2 | 233.4 | X |
| 30KPA156A-HRA | 30KPA156CA-HRA | 156 | 174.30 | 191.73 | 5 | 123.7 | 2 | 245.0 | X |
| 30KPA160A-HRA | 30KPA160CA-HRA | 160 | 178.70 | 196.57 | 5 | 120.0 | 2 | 252.6 | X |
| 30KPA168A-HRA | 30KPA168CA-HRA | 168 | 187.70 | 206.47 | 5 | 111.2 | 2 | 272.4 | X |
| 30KPA170A-HRA | 30KPA170CA-HRA | 170 | 189.90 | 208.89 | 5 | 110.2 | 2 | 275.0 | X |
| 30KPA180A-HRA | 30KPA180CA-HRA | 180 | 201.10 | 221.21 | 5 | 104.3 | 2 | 290.4 | X |
| 30KPA198A-HRA | 30KPA198CA-HRA | 198 | 221.20 | 243.32 | 5 | 94.7 | 2 | 319.8 | X |
| 30KPA216A-HRA | 30KPA216CA-HRA | 216 | 241.30 | 265.43 | 5 | 86.9 | 2 | 348.6 | X |
| 30KPA240A-HRA | 30KPA240CA-HRA | 240 | 268.10 | 294.91 | 5 | 78.3 | 2 | 387.0 | X |
| 30KPA258A-HRA | 30KPA258CA-HRA | 258 | 288.20 | 317.02 | 5 | 72.8 | 2 | 416.4 | X |
| 30KPA260A-HRA | 30KPA260CA-HRA | 260 | 290.40 | 319.44 | 5 | 72.8 | 2 | 416.0 | X |
| 30KPA270A-HRA | 30KPA270CA-HRA | 270 | 301.60 | 331.76 | 5 | 69.5 | 2 | 436.2 | X |
| 30KPA280A-HRA | 30KPA280CA-HRA | 280 | 312.80 | 344.08 | 5 | 65.3 | 2 | 464.0 | X |
| 30KPA288A-HRA | 30KPA288CA-HRA | 288 | 321.70 | 353.87 | 5 | 64.5 | 2 | 469.9 | X |
| 30KPA300A-HRA | 30KPA300CA-HRA | 300 | 334.00 | 367.40 | 5 | 62.0 | 2 | 484.0 | X |

Note:

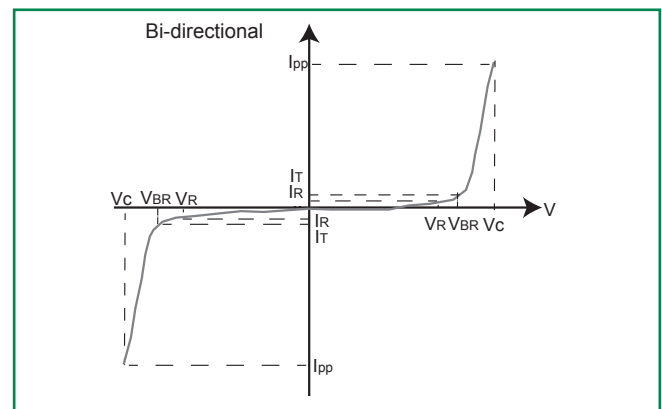
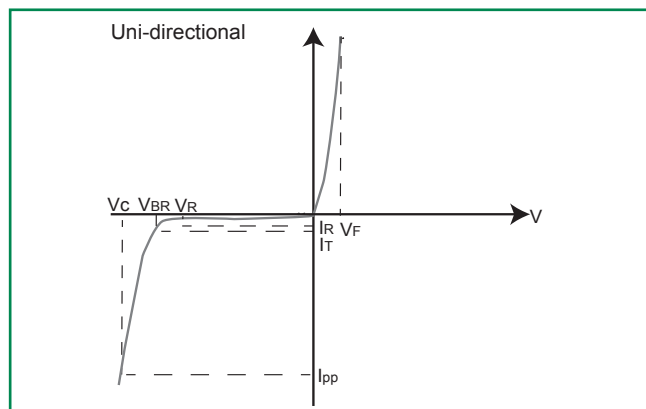
1. For bidirectional type having V_R of 60 volts and less, the I_R limit is double.

Screen Process

| | |
|--|-----------------------------------|
| 100% Vision Inspection | MIL-STD-750 method 2074 |
| 100% High Temperature Storage Life (168hrs,175°C) | MIL-STD-750 method 1031 |
| 100% Temperature Cycle Test (-55 to150°C, 20 cycles, dwell time 15 min) | MIL-STD-750 method 1051 |
| 100% Surge Test (2x) | MIL-STD-750 method 4066 |
| 100% HTRB 150°C Bias=VR(80% breakdown voltage, 96hrs, and each direction at 96 hrs for Bi-directional products) | MIL-STD-750 method 1038 |
| Final Electrical Test(100% 3 sigma limit, 100% dynamic test and PAT limit) | MIL-STD-750 method 4016.4021.4011 |

Note: Up-screen program can be specified by customer's request via contacting Littelfuse service

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 though the TVS at a specified test current (I_T)

V_C Clamping Voltage – Peak voltage measured across the TVS 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) (Continued)

Figure 1 - TVS Transients Clamping Waveform

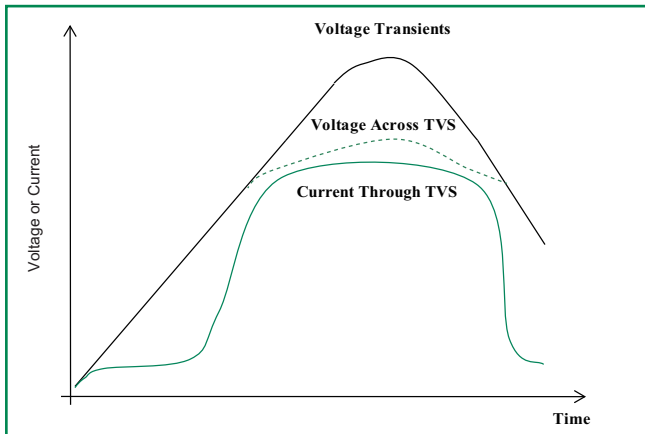


Figure 2 - Peak Pulse Power Rating Curve

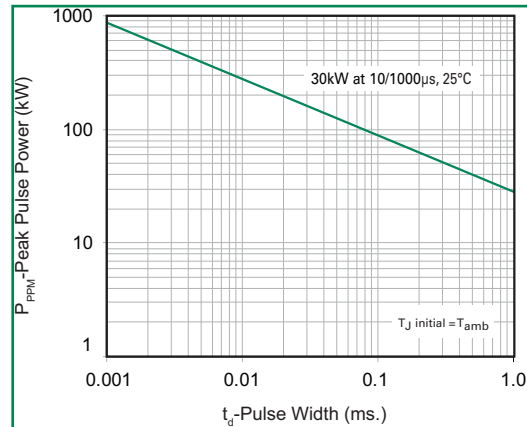


Figure 3 - Peak Pulse Power Derating Curve

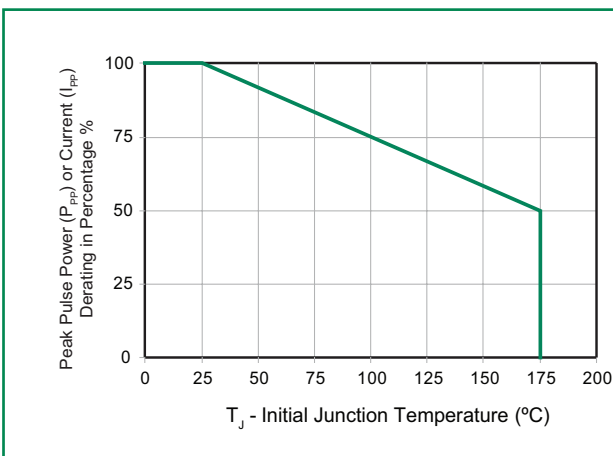


Figure 4 - Pulse Waveform

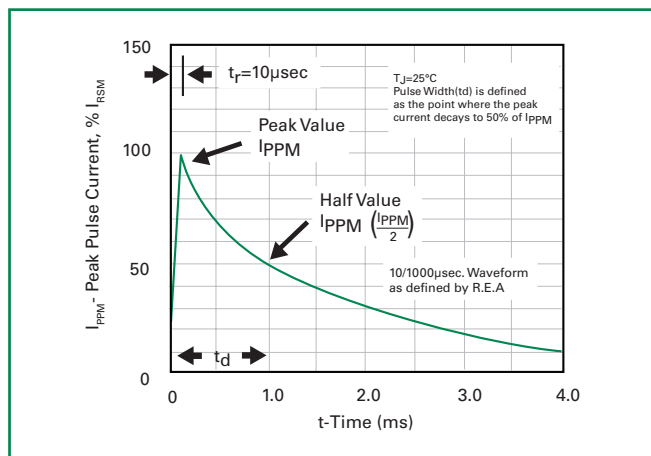


Figure 5 - Typical Junction Capacitance

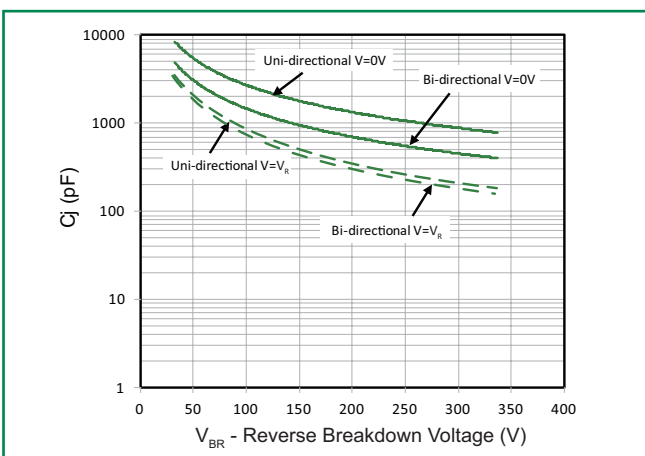
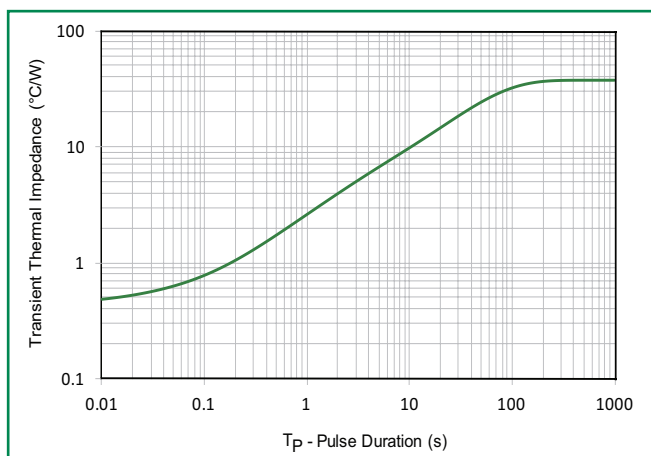


Figure 6 - Typical Transient Thermal Impedance



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

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

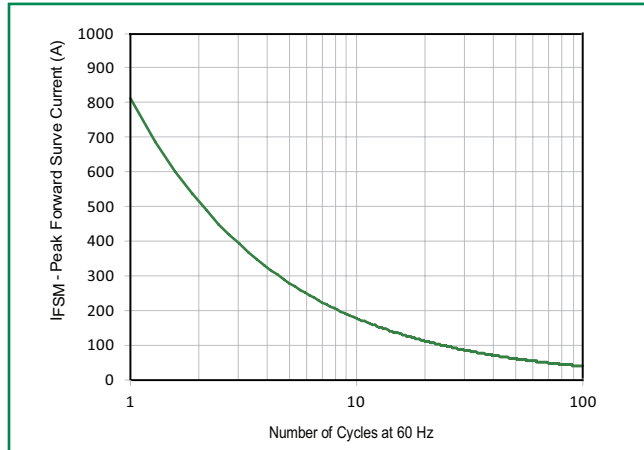
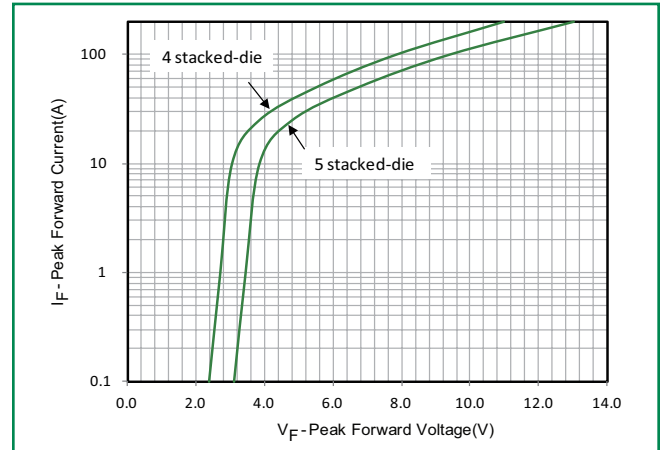


Figure 8 - Peak Forward Voltage Drop vs Peak Forward Current (Typical Values)



Physical Specifications

| | |
|-----------------|--|
| Weight | 0.07oz., 2.5g |
| Case | P600 molded plastic body over passivated junction. |
| Polarity | Color band denotes the cathode except Bipolar. |
| Terminal | Matte Tin axial leads, solderable per JESD22-B102. |

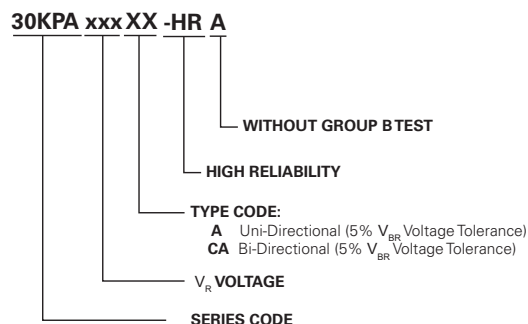
Environmental Specifications

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

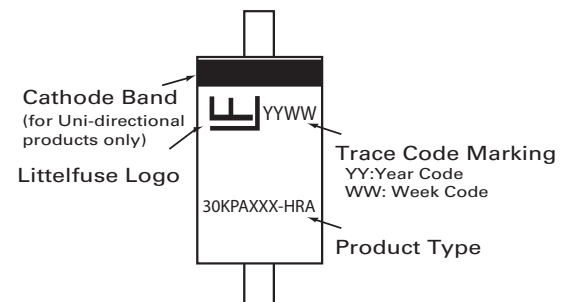
Packing Options

| Part Number | Component Package | Quantity | Packaging Option | Packaging Specification |
|----------------|-------------------|----------|------------------|-------------------------|
| 30KPAxxxXX-HRA | P600 | 800 | Tape & Reel | EIA STD RS-296 |

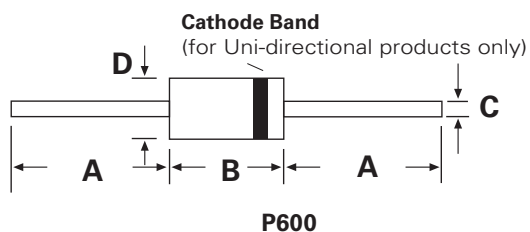
Part Numbering System



Part Marking System

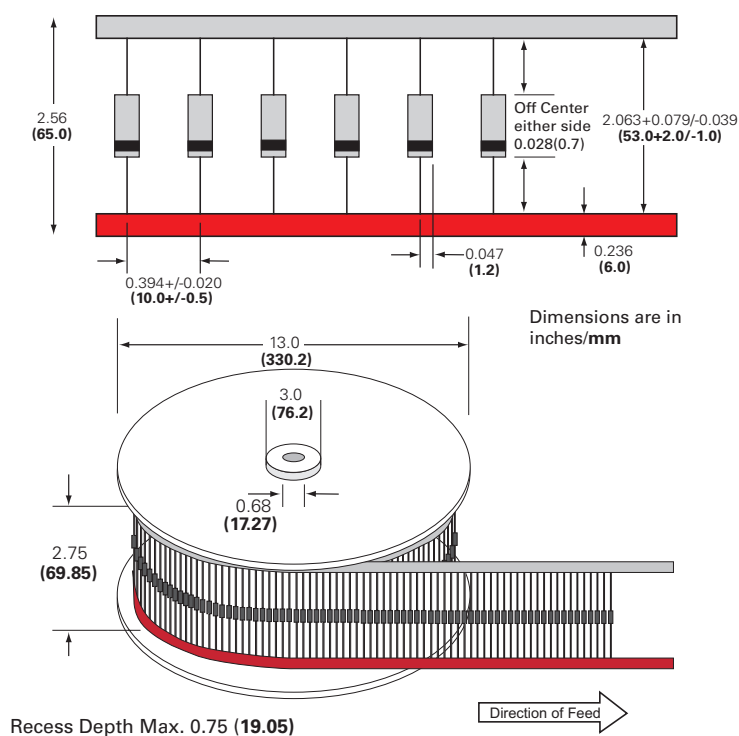


Dimensions

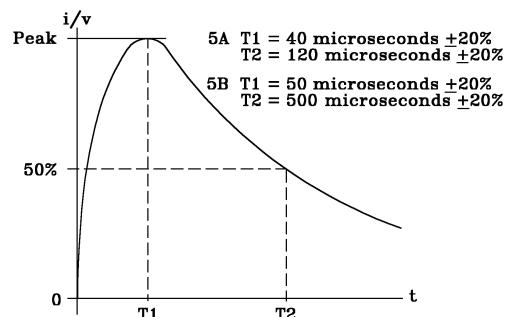
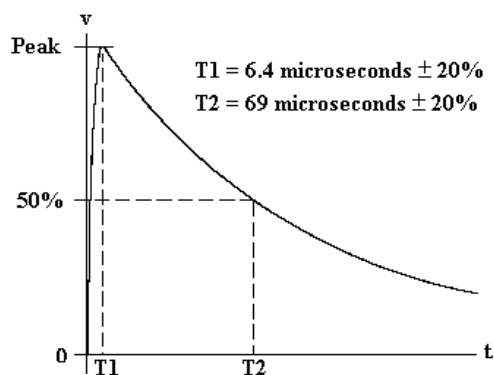


| Dimensions | Inches | | Millimeters | |
|------------|--------|-------|-------------|------|
| | Min | Max | Min | Max |
| A | 1.000 | - | 25.40 | - |
| B | 0.340 | 0.360 | 8.60 | 9.10 |
| C | 0.048 | 0.052 | 1.22 | 1.32 |
| D | 0.340 | 0.360 | 8.60 | 9.10 |

Tape and Reel Specification



RTCA/DO-160G Wave 4 and Wave 5



Pin Injection Protection Per RTCA/DO-160G

| Part Number (Uni) | Part Number (Bi) | 25C | | | | | | 70C | | | | | | 120C | | | | | |
|-------------------|------------------|-------------------|------|------|--------------------|------|-------|-------------------|------|------|--------------------|------|-------|-------------------|------|------|--------------------|------|-------|
| | | Wave 4 (6.4/69us) | | | Wave 5a (40/120us) | | | Wave 4 (6.4/69us) | | | Wave 5a (40/120us) | | | Wave 4 (6.4/69us) | | | Wave 5a (40/120us) | | |
| | | L3 | L4 | L5 | L3 | L4 | L5 | L3 | L4 | L5 | L3 | L4 | L5 | L3 | L4 | L5 | L3 | L4 | L5 |
| | | 60A | 150A | 320A | 300A | 750A | 1600A | 60A | 150A | 320A | 300A | 750A | 1600A | 60A | 150A | 320A | 300A | 750A | 1600A |
| 30KPA28A-HRA | 30KPA28CA-HRA | pass | pass | pass | pass | pass | pass | pass | pass | pass | pass | pass | - | pass | pass | pass | pass | pass | - |
| 30KPA30A-HRA | 30KPA30CA-HRA | pass | pass | pass | pass | pass | pass | pass | pass | pass | pass | pass | - | pass | pass | pass | pass | pass | - |
| 30KPA33A-HRA | 30KPA33CA-HRA | pass | pass | pass | pass | pass | - | pass | pass | pass | pass | pass | - | pass | pass | pass | pass | pass | - |
| 30KPA36A-HRA | 30KPA36CA-HRA | pass | pass | pass | pass | pass | - | pass | pass | pass | pass | pass | - | pass | pass | pass | pass | pass | - |
| 30KPA39A-HRA | 30KPA39CA-HRA | pass | pass | pass | pass | pass | - | pass | pass | pass | pass | pass | - | pass | pass | pass | pass | pass | - |
| 30KPA42A-HRA | 30KPA42CA-HRA | pass | pass | pass | pass | pass | - | pass | pass | pass | pass | pass | - | pass | pass | pass | pass | pass | - |
| 30KPA43A-HRA | 30KPA43CA-HRA | pass | pass | pass | pass | pass | - | pass | pass | pass | pass | pass | - | pass | pass | pass | pass | pass | - |
| 30KPA45A-HRA | 30KPA45CA-HRA | pass | pass | pass | pass | pass | - | pass | pass | pass | pass | pass | - | pass | pass | pass | pass | pass | - |
| 30KPA48A-HRA | 30KPA48CA-HRA | pass | pass | pass | pass | pass | - | pass | pass | pass | pass | pass | - | pass | pass | pass | pass | pass | - |
| 30KPA51A-HRA | 30KPA51CA-HRA | pass | pass | pass | pass | pass | - | pass | pass | pass | pass | pass | - | pass | pass | pass | pass | pass | - |
| 30KPA54A-HRA | 30KPA54CA-HRA | pass | pass | pass | pass | pass | - | pass | pass | pass | pass | pass | - | pass | pass | pass | pass | pass | - |
| 30KPA58A-HRA | 30KPA58CA-HRA | pass | pass | pass | pass | pass | - | pass | pass | pass | pass | pass | - | pass | pass | pass | pass | pass | - |
| 30KPA60A-HRA | 30KPA60CA-HRA | pass | pass | pass | pass | pass | - | pass | pass | pass | pass | pass | - | pass | pass | pass | pass | pass | - |
| 30KPA64A-HRA | 30KPA64CA-HRA | pass | pass | pass | pass | pass | - | pass | pass | pass | pass | pass | - | pass | pass | pass | pass | pass | - |
| 30KPA66A-HRA | 30KPA66CA-HRA | pass | pass | pass | pass | pass | - | pass | pass | pass | pass | pass | - | pass | pass | pass | pass | pass | - |
| 30KPA70A-HRA | 30KPA70CA-HRA | pass | pass | pass | pass | pass | - | pass | pass | pass | pass | pass | - | pass | pass | pass | pass | pass | - |
| 30KPA71A-HRA | 30KPA71CA-HRA | pass | pass | pass | pass | pass | - | pass | pass | pass | pass | pass | - | pass | pass | pass | pass | pass | - |
| 30KPA72A-HRA | 30KPA72CA-HRA | pass | pass | pass | pass | pass | - | pass | pass | pass | pass | pass | - | pass | pass | pass | pass | pass | - |
| 30KPA75A-HRA | 30KPA75CA-HRA | pass | pass | pass | pass | pass | - | pass | pass | pass | pass | pass | - | pass | pass | pass | pass | pass | - |
| 30KPA78A-HRA | 30KPA78CA-HRA | pass | pass | pass | pass | pass | - | pass | pass | pass | pass | pass | - | pass | pass | pass | pass | pass | - |
| 30KPA84A-HRA | 30KPA84CA-HRA | pass | pass | pass | pass | - | - | pass | pass | pass | pass | - | - | pass | pass | pass | pass | pass | - |
| 30KPA90A-HRA | 30KPA90CA-HRA | pass | pass | pass | pass | - | - | pass | pass | pass | pass | - | - | pass | pass | pass | pass | pass | - |
| 30KPA96A-HRA | 30KPA96CA-HRA | pass | pass | pass | pass | - | - | pass | pass | pass | pass | - | - | pass | pass | pass | pass | pass | - |
| 30KPA102A-HRA | 30KPA102CA-HRA | pass | pass | pass | pass | - | - | pass | pass | pass | pass | - | - | pass | pass | pass | pass | pass | - |
| 30KPA108A-HRA | 30KPA108CA-HRA | pass | pass | pass | pass | - | - | pass | pass | pass | pass | - | - | pass | pass | pass | pass | pass | - |
| 30KPA120A-HRA | 30KPA120CA-HRA | pass | pass | pass | pass | - | - | pass | pass | pass | pass | - | - | pass | pass | pass | pass | pass | - |
| 30KPA132A-HRA | 30KPA132CA-HRA | pass | pass | pass | pass | - | - | pass | pass | pass | pass | - | - | pass | pass | pass | pass | pass | - |
| 30KPA144A-HRA | 30KPA144CA-HRA | pass | pass | pass | pass | - | - | pass | pass | pass | pass | - | - | pass | pass | pass | pass | pass | - |
| 30KPA150A-HRA | 30KPA150CA-HRA | pass | pass | pass | pass | - | - | pass | pass | pass | pass | - | - | pass | pass | pass | pass | pass | - |
| 30KPA156A-HRA | 30KPA156CA-HRA | pass | pass | pass | - | - | - | pass | pass | pass | - | - | - | pass | pass | pass | - | - | - |
| 30KPA160A-HRA | 30KPA160CA-HRA | pass | pass | pass | - | - | - | pass | pass | pass | - | - | - | pass | pass | pass | - | - | - |
| 30KPA168A-HRA | 30KPA168CA-HRA | pass | pass | pass | - | - | - | pass | pass | pass | - | - | - | pass | pass | pass | - | - | - |
| 30KPA170A-HRA | 30KPA170CA-HRA | pass | pass | pass | - | - | - | pass | pass | pass | - | - | - | pass | pass | pass | - | - | - |
| 30KPA180A-HRA | 30KPA180CA-HRA | pass | pass | pass | - | - | - | pass | pass | pass | - | - | - | pass | pass | pass | - | - | - |
| 30KPA198A-HRA | 30KPA198CA-HRA | pass | pass | pass | - | - | - | pass | pass | pass | - | - | - | pass | pass | pass | - | - | - |
| 30KPA216A-HRA | 30KPA216CA-HRA | pass | pass | pass | - | - | - | pass | pass | pass | - | - | - | pass | pass | pass | - | - | - |
| 30KPA240A-HRA | 30KPA240CA-HRA | pass | pass | pass | - | - | - | pass | pass | - | - | - | - | pass | pass | pass | - | - | - |
| 30KPA258A-HRA | 30KPA258CA-HRA | pass | pass | pass | - | - | - | pass | pass | - | - | - | - | pass | pass | pass | - | - | - |
| 30KPA260A-HRA | 30KPA260CA-HRA | pass | pass | pass | - | - | - | pass | pass | - | - | - | - | pass | pass | pass | - | - | - |
| 30KPA270A-HRA | 30KPA270CA-HRA | pass | pass | pass | - | - | - | pass | pass | - | - | - | - | pass | pass | pass | - | - | - |
| 30KPA280A-HRA | 30KPA280CA-HRA | pass | pass | pass | - | - | - | pass | pass | - | - | - | - | pass | pass | pass | - | - | - |
| 30KPA288A-HRA | 30KPA288CA-HRA | pass | pass | pass | - | - | - | pass | pass | - | - | - | - | pass | pass | pass | - | - | - |
| 30KPA300A-HRA | 30KPA300CA-HRA | pass | pass | pass | - | - | - | pass | pass | - | - | - | - | pass | pass | pass | - | - | - |

Note:

1. L1 = Level1, L2 = Level 2, L3 = Level 3, L4 = Level 4, L5 = Level 5

Mouser Electronics

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