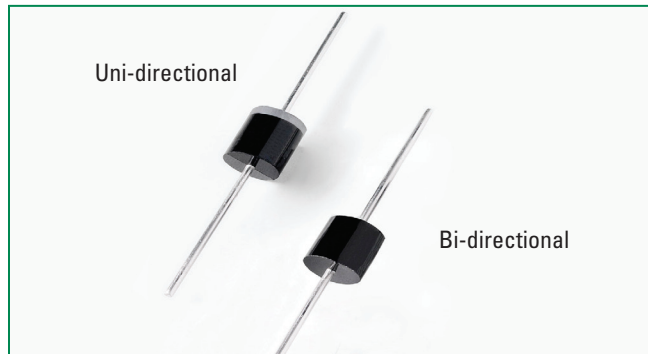


## 30KPA Series



### Agency Approvals

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

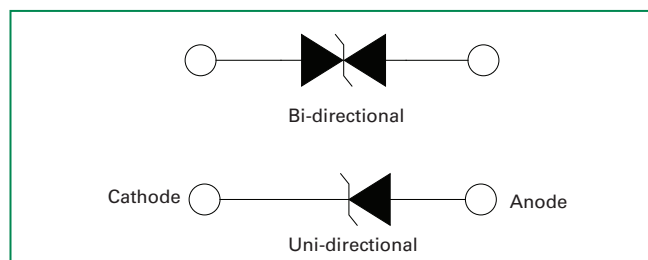
### Maximum Ratings and Thermal Characteristics (T<sub>A</sub>=25°C unless otherwise noted)

| Parameter                                                                             | Symbol                            | Value      | Unit |
|---------------------------------------------------------------------------------------|-----------------------------------|------------|------|
| Peak Pulse Power Dissipation by 10/1000µs Test Waveform (Fig.2) (Note 1)              | P <sub>PPM</sub>                  | 30000      | W    |
| Steady State Power Dissipation on Infinite Heat Sink at T <sub>L</sub> =75°C (Fig. 5) | P <sub>D</sub>                    | 8.0        | W    |
| Peak Forward Surge Current, 8.3ms Single Half Sine Wave Unidirectional Only (Note 2)  | I <sub>FSM</sub>                  | 400        | A    |
| Operating Junction and Storage Temperature Range                                      | T <sub>J</sub> , T <sub>STG</sub> | -55 to 175 | °C   |
| Typical Thermal Resistance Junction to Lead                                           | R <sub>wJL</sub>                  | 8.0        | °C/W |
| Typical Thermal Resistance Junction to Ambient                                        | R <sub>wJA</sub>                  | 40         | °C/W |

#### Notes:

1. Non-repetitive current pulse, per Fig. 4 and derated above T<sub>A</sub> = 25°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 Series is designed specifically to protect sensitive electronic equipment from voltage transients induced by lightning and other transient voltage events.

### Features

- V<sub>BR</sub> @T<sub>J</sub>=V<sub>BR</sub>@25°C × (1 + α T × (T<sub>J</sub> - 25))  
(α T: Temperature Coefficient)
- Glass passivated chip junction in P600 package
- 30000W 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<sub>R</sub> less than 2µA above 73V
- 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-O
- 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<sub>CC</sub> bus and other vulnerable circuits used in telecom, computer, industrial and consumer electronic applications.

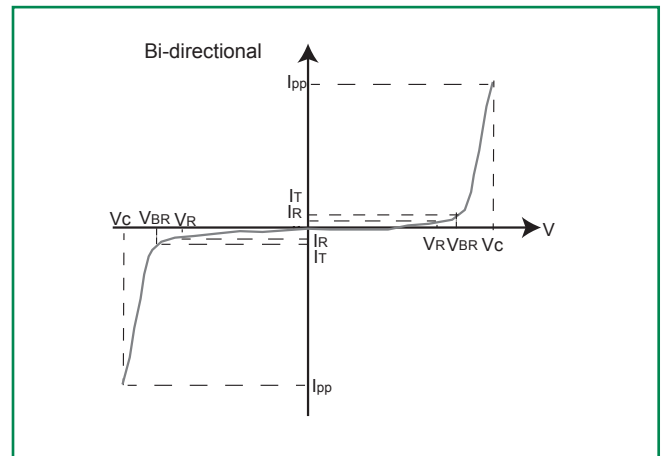
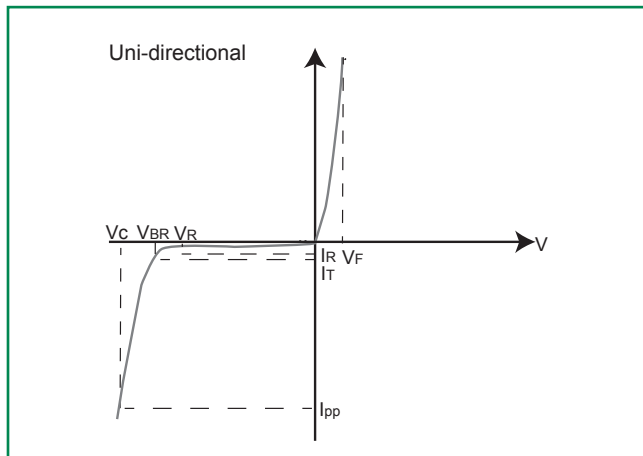
### Electrical Characteristics (T<sub>A</sub>=25°C unless otherwise noted)

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

For bidirectional type having V<sub>RWM</sub> of 60 volts and less, the I<sub>R</sub> limit is double.

For parts without A, the V<sub>BR</sub> is + 10% and V<sub>C</sub> is 5% higher than with A parts.

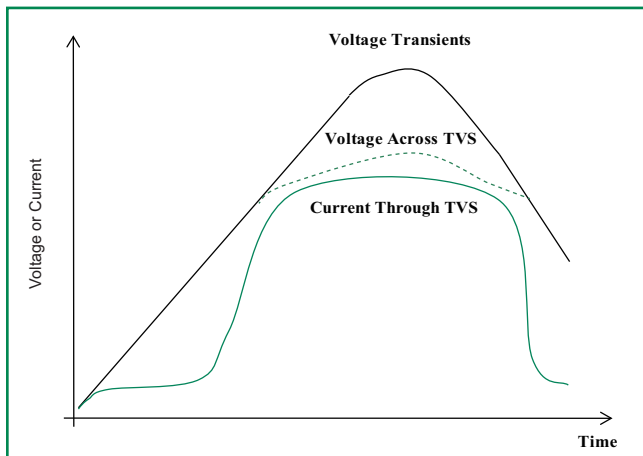
## I-V Curve Characteristics



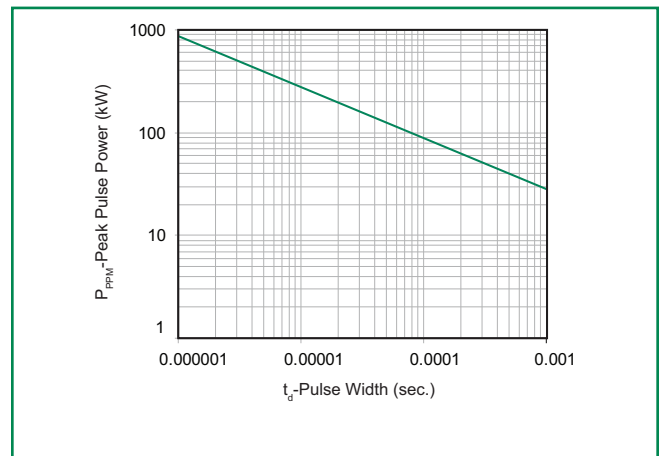
- P<sub>PPM</sub> Peak Pulse Power Dissipation** – Max power dissipation
- V<sub>R</sub> Stand-off Voltage** – Maximum voltage that can be applied to the TVS without operation
- V<sub>BR</sub> Breakdown Voltage** – Maximum voltage that flows through the TVS at a specified test current (I<sub>T</sub>)
- V<sub>C</sub> Clamping Voltage** – Peak voltage measured across the suppressor at a specified I<sub>ppm</sub> (peak impulse current)
- I<sub>R</sub> Reverse Leakage Current** – Current measured at V<sub>R</sub>
- V<sub>F</sub> Forward Voltage Drop for Uni-directional**

## Ratings and Characteristic Curves (T<sub>A</sub>=25°C unless otherwise noted)

**Figure 1 - TVS Transients Clamping Waveform**



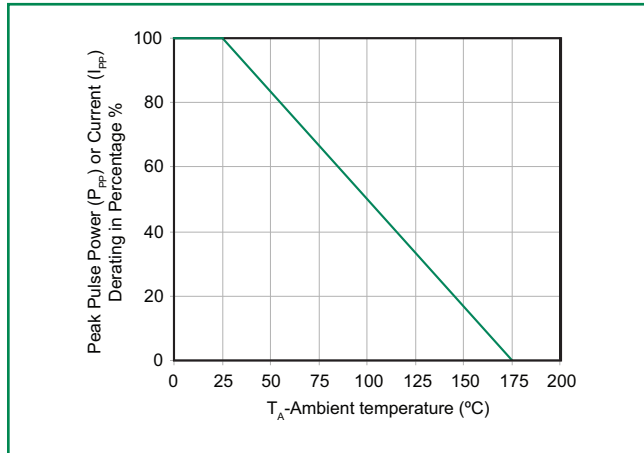
**Figure 2 - Peak Pulse Power Rating Curve**



continues on next page.

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

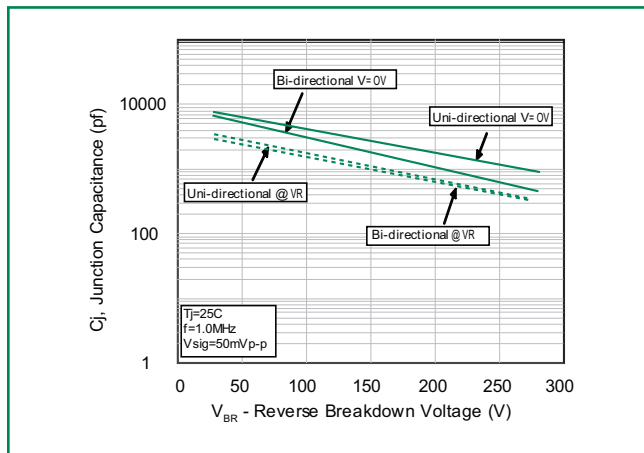
**Figure 3 - Pulse Derating Curve**



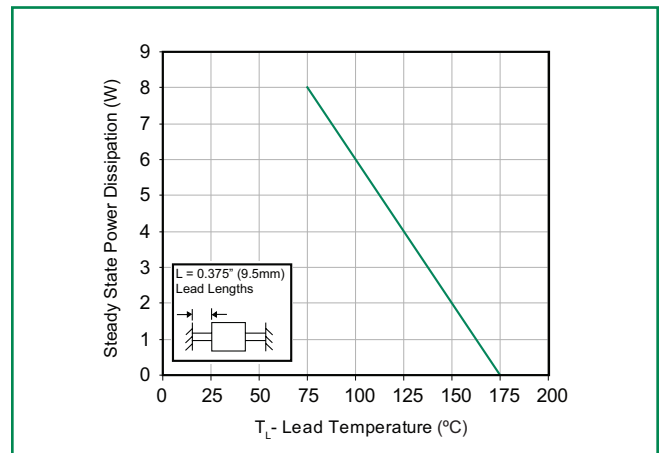
**Figure 4 - Pulse Waveform**



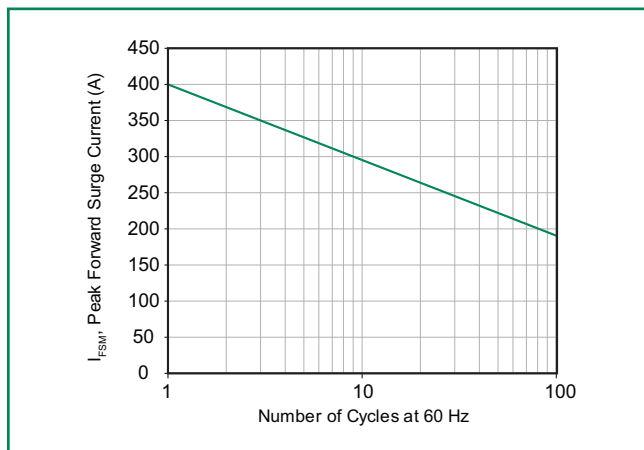
**Figure 5 - Typical Junction Capacitance**



**Figure 6 - Steady State Power Derating Curve**

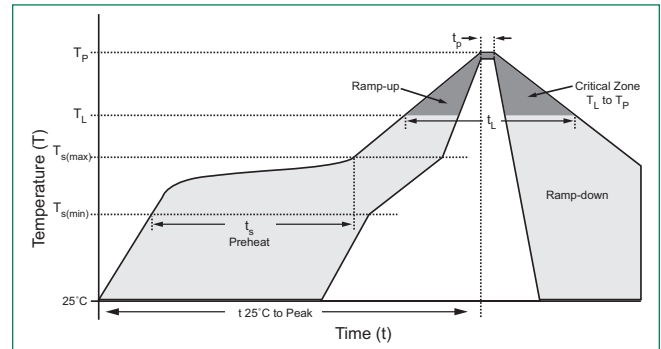


**Figure 7 - Maximum Non-Repetitive Peak Forward Surge Current**



### 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)

|                           |            |
|---------------------------|------------|
| <b>Peak Temperature :</b> | 265°C      |
| <b>Dipping Time :</b>     | 10 seconds |
| <b>Soldering :</b>        | 1 time     |

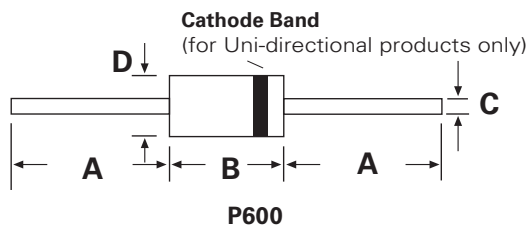
### Physical Specifications

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

### Environmental Specifications

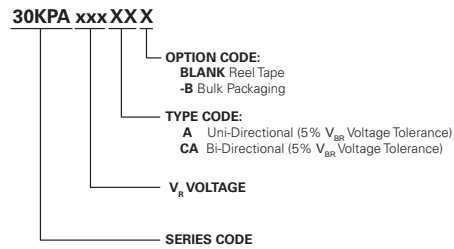
|                            |             |
|----------------------------|-------------|
| <b>High Temp. Storage</b>  | JESD22-A103 |
| <b>HTRB</b>                | JESD22-A108 |
| <b>Temperature Cycling</b> | JESD22-A104 |
| <b>H3TRB</b>               | JESD22-A101 |
| <b>RSH</b>                 |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

### Dimensions

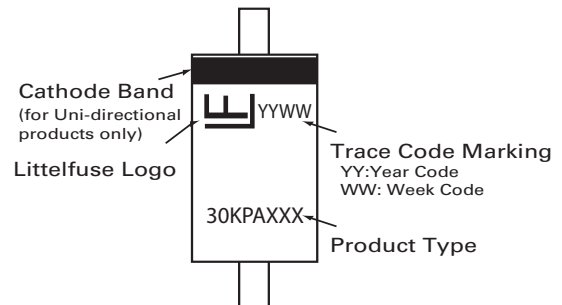


| Dimensions | Inches |       | Millimeters |      |
|------------|--------|-------|-------------|------|
|            | Min    | Max   | Min         | Max  |
| A          | 1.000  | -     | 25.40       | -    |
| B          | 0.340  | 0.360 | 8.60        | 9.10 |
| C          | 0.048  | 0.052 | 1.22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

### Part Numbering System



### Part Marking System



### Packing Options

| Part Number  | Component Package | Quantity | Packaging Option | Packaging Specification |
|--------------|-------------------|----------|------------------|-------------------------|
| 30KPAxxxXX   | P600              | 800      | Tape & Reel      | EIA STD RS-296          |
| 30KPAxxxXX-B | P600              | 100      | Bulk             | Littelfuse Spec.        |

### Tape and Reel Specification

