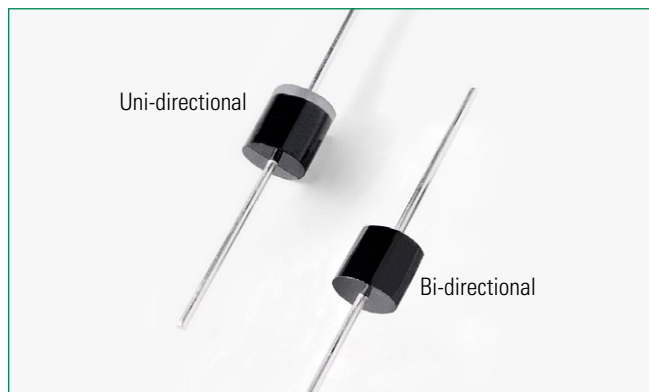




# THE DATASHEET OF 30KPA96CA

### 30KPA 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 $\mu\text{s}$ Test Waveform (Fig.2)(Note 1)  | $P_{PPM}$       | 30         | kW                 |
| 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                                          | $R_{\theta JL}$ | 8.0        | $^\circ\text{C/W}$ |
| Typical Thermal Resistance Junction to Ambient                                       | $R_{\theta JA}$ | 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.

#### Descriptions

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

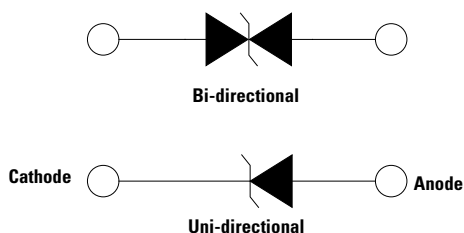
#### Features

- 30kW peak pulse capability at 10/1000 $\mu\text{s}$  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
- EFT protection of data lines in accordance with IEC 61000-4-4
- Low incremental surge resistance
- Typical  $I_R$  less than 2 $\mu\text{A}$  when  $V_{BR}$  min>73V
- High temperature to reflow soldering guaranteed: 260 $^\circ\text{C}$ /40sec / 0.375", (9.5mm) lead length, 5 lbs., (2.3kg) tension
- $V_{BR} @ T_J = V_{BR} @ 25^\circ\text{C} \times (1 + \alpha T \times (T_J - 25))$  ( $\alpha$  T: Temperature Coefficient, typical value is 0.1 %)
- UL Recognized epoxy meeting flammability rating V-0
- Matte tin lead-free plated
- 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)

#### Applications

TVS components 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.

#### Functional Diagram



#### Additional Information



Datasheet



Resources



Samples

# TVS Diode

## Axial Leaded – 30000W > 30KPA series

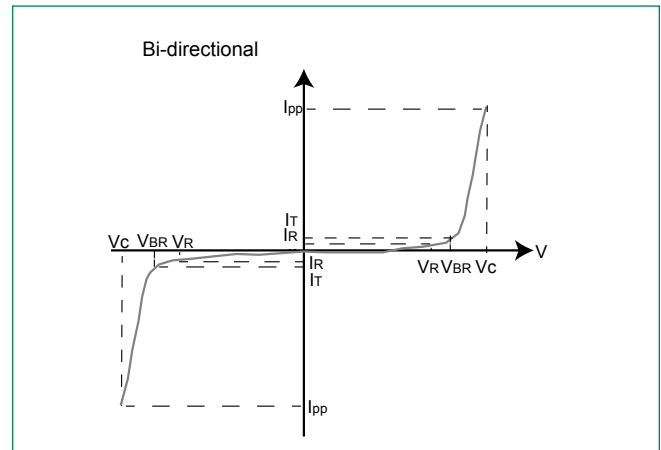
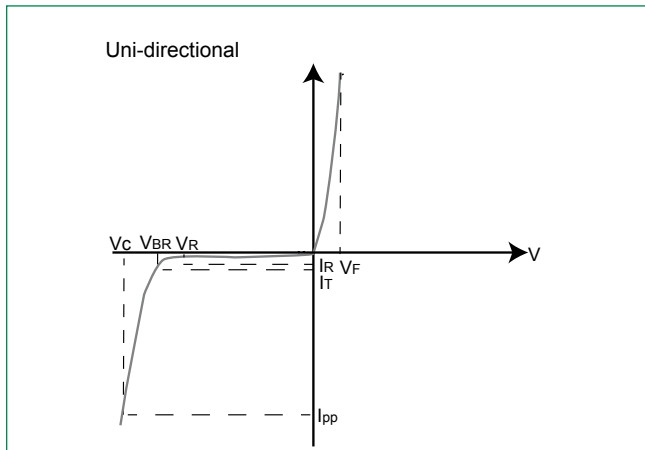
### Electrical Characteristics (T<sub>A</sub>=25°C unless otherwise noted)

| 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> (μ A) | Maximum Clamping Voltage V <sub>C</sub> @ I <sub>PP</sub> (V) | Agency Recognition  |
|-------------------|------------------|--------------------------------------------------|------------------------------------------------------------|--------|----------------------------------|------------------------------------------------|---------------------------------------------------------------|---------------------------------------------------------------|--------------------------------------------------------------------------------------------------------|
|                   |                  |                                                  | 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                                                                                                      |
| 30KPA320A         | 30KPA320CA       | 320                                              | 357.40                                                     | 391.40 | 5                                | 57.2                                           | 2                                                             | 530.0                                                         | -                                                                                                      |
| 30KPA350A         | 30KPA350CA       | 350                                              | 391.00                                                     | 428.10 | 5                                | 53.4                                           | 2                                                             | 567.0                                                         | -                                                                                                      |
| 30KPA360A         | 30KPA360CA       | 360                                              | 402.10                                                     | 440.30 | 5                                | 47.3                                           | 2                                                             | 640.0                                                         | -                                                                                                      |

For bidirectional type having V<sub>RWM</sub> of 60 volts and less, the I<sub>S</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, the parts without A are currently available, but not recommended for new designs. The parts with A are preferred.

## 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 TVS 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

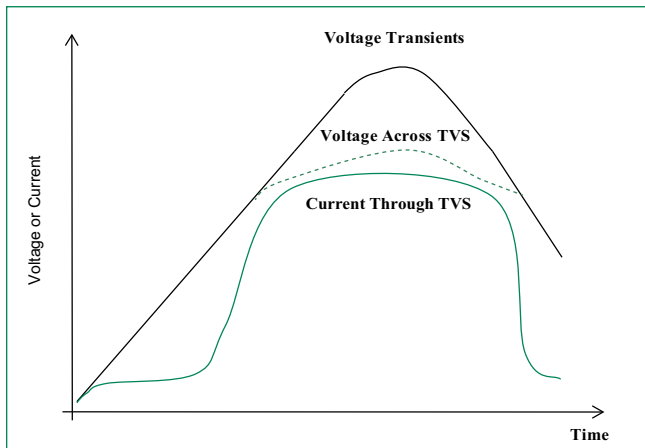
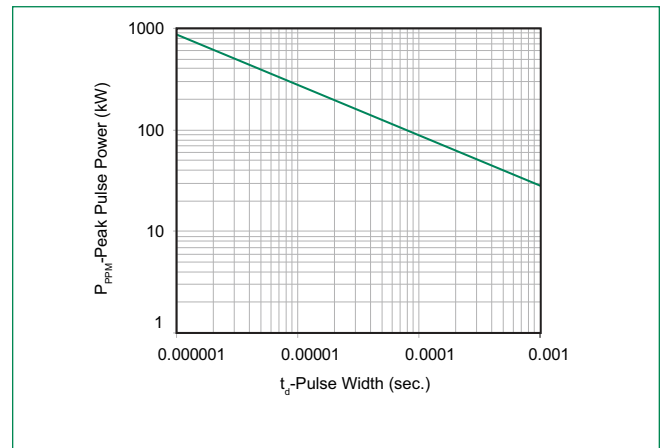


Figure 2 - Peak Pulse Power Rating Curve



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

**Figure 3 - Peak Pulse Power Derating Curve**

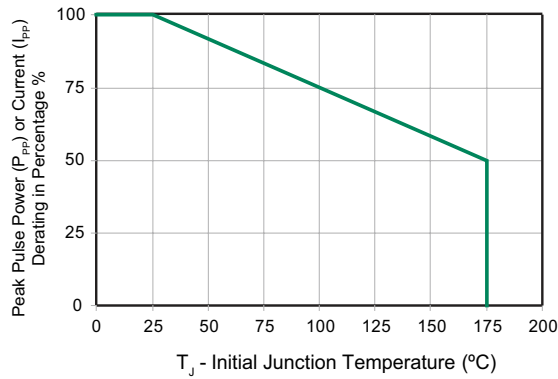


**Figure 4 - Pulse Waveform**

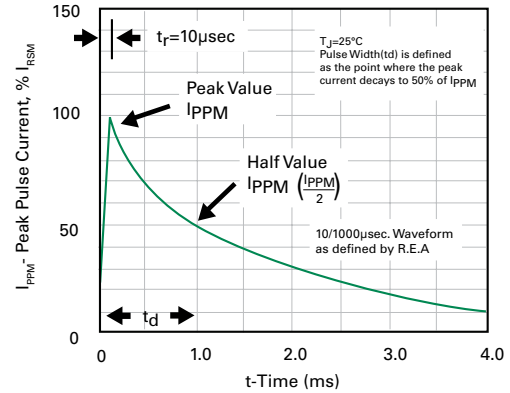


**Figure 5 - Typical Junction Capacitance**

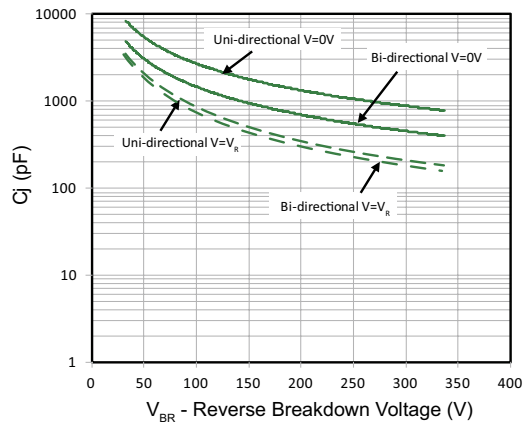


**Figure 6 - Typical Transient Thermal Impedance**

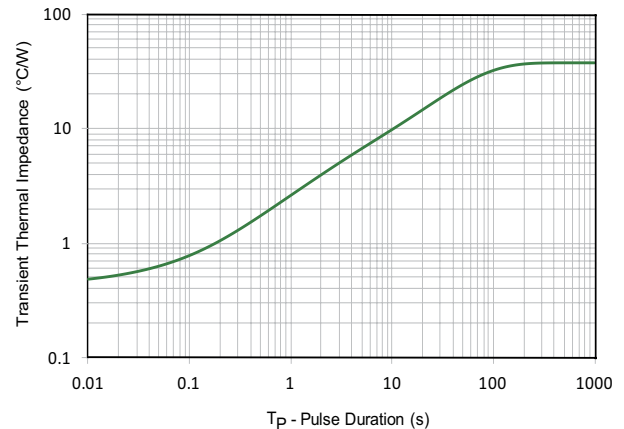


**Figure 7 - Maximum Non-Repetitive Peak Forward Surge Current Uni-Directional Only**

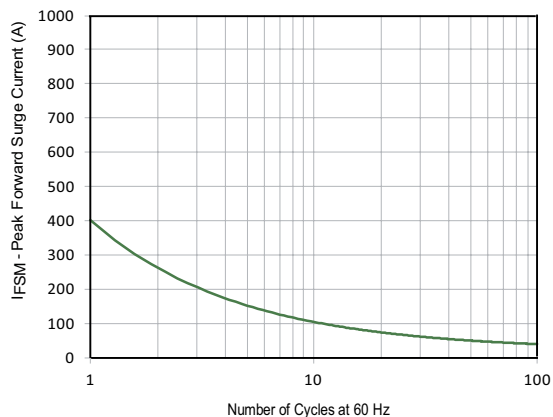
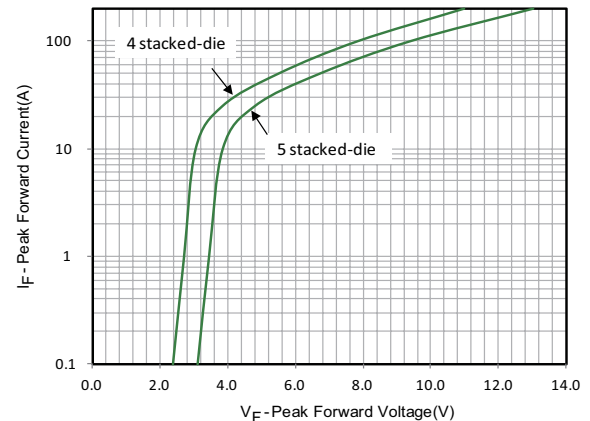
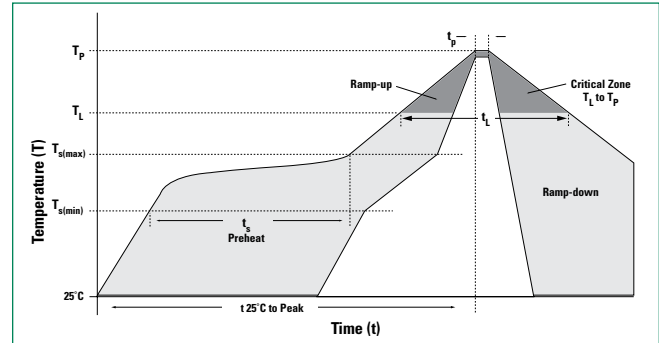


**Figure 8 - Peak Forward Voltage Drop vs Peak Forward Current (Typical Values)**



### Soldering Parameters

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



### Flow/Wave Soldering (Solder Dipping)

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

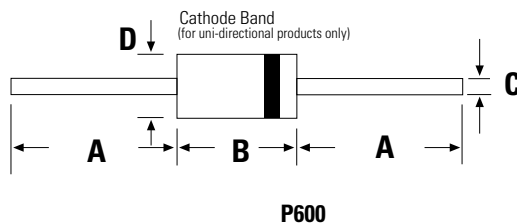
### Physical Specifications

|                 |                                                    |
|-----------------|----------------------------------------------------|
| <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

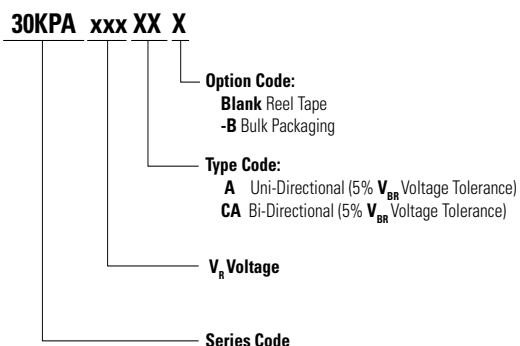
|                            |             |
|----------------------------|-------------|
| <b>High Temp. Storage</b>  | JESD22-A103 |
| <b>HTRB</b>                | JESD22-A108 |
| <b>Temperature Cycling</b> | JESD22-A104 |
| <b>H3TRB</b>               | JESD22-A101 |
| <b>RSH</b>                 |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

### Dimensions

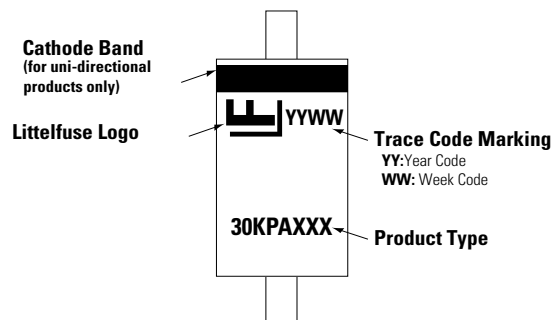


| Dimensions | Inches |       | Millimeters |      |
|------------|--------|-------|-------------|------|
|            | Min    | Max   | Min         | Max  |
| A          | 1.000  | -     | 25.40       | -    |
| B          | 0.340  | 0.360 | 8.60        | 9.10 |
| C          | 0.048  | 0.054 | 1.22        | 1.36 |
| D          | 0.340  | 0.360 | 8.60        | 9.10 |

### Part Numbering System



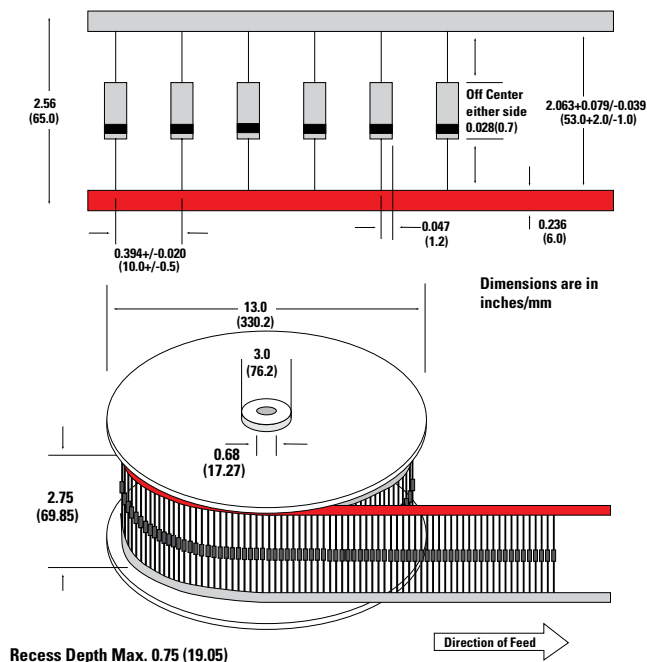
### Part Marking System



### 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



## Looking for pricing, stock, or lifecycle information?

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