

## Transient Voltage Suppressors (TVS) Data Sheet

### Features

- Glass passivated junction
- Low zener impedance
- Excellent clamping capability
- 600W peak pulse power capability at 10/1000 $\mu$ s waveform, repetition rate (duty cycle): 0.01%
- Fast response time
- Typical  $I_R$  less than 1 $\mu$ A above 12V.
- High Temperature soldering guaranteed: 265 $^{\circ}$ C/10 seconds/.375", (9.5mm) lead length, 5lbs (2.3kg) tension
- Plastic package has underwriters laboratory flammability 94V-0
- Meets MSL level 1, per J-STD-020.
- Safety certification: UL: E244458



### Mechanical Data

- Case: JEDEC DO-15 Moulded plastic
- Terminal: Axial leads, solderable per MIL-STD-750, Method 2026
- Polarity: Color band denotes cathode except bi-directional models
- Mounting Position: Any
- Weight: 0.42g

### Applications

- I/O interface
- AC/DC power supply
- Low frequency signal transmission line (RS232, RS485, etc.)

### Maximum Ratings and Characteristics

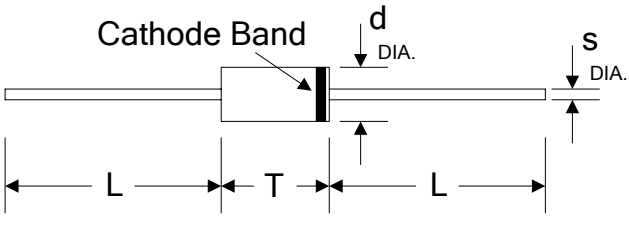
Ratings at 25 $^{\circ}$ C ambient temperature unless otherwise specified.

| Rating  | Symbol          | Value       | Units          |
|---|-----------------|-------------|----------------|
| Peak pulse power dissipation at 10/1000 $\mu$ s waveform (Note1, Fig.1)   | $P_{PPM}$       | Minimum 600 | Watts          |
| Peak pulse current of at 10/1000 $\mu$ s waveform (Note 1, Fig.3)   | $I_{PPM}$       | See Table   | Amps           |
| Steady state power dissipation at $T_L=75^{\circ}$ C (Fig.5)  | $P_{M(AV)}$     | 5.0         | Watts          |
| Peak forward surge current, 8.3ms single half sine-wave superimposed on rated load, (JEDEC Method) (Note2, Fig.6) | $I_{FSM}$       | 100         | Amps           |
| Operating junction and Storage Temperature Range.   | $T_J, T_{STG}$  | -55 to +175 | $^{\circ}$ C   |
| Typical thermal resistance junction to lead   | $R_{\theta JL}$ | 20          | $^{\circ}$ C/W |
| Typical thermal resistance junction to ambient  | $R_{\theta JA}$ | 75          | $^{\circ}$ C/W |

Notes: 1. Non-repetitive current pulse, per Fig.3 and derated above  $T_A=25^{\circ}$ C per Fig.2.

2. 8.3ms single half sine-wave, or equivalent square wave, duty cycle=4 pulses per minutes maximum.

**Dimensions (DO-204AC/DO-15)**

|  | Symbol | Millimeters |       | Inches |       |
|---|--------|-------------|-------|--------|-------|
|   |        | Min.        | Max.  | Min.   | Max.  |
|   | L      | 25.40       | -     | 1.000  | -     |
|   | T      | 5.80        | 7.60  | 0.230  | 0.300 |
|   | d      | 2.60        | 3.60  | 0.104  | 0.140 |
| s   | 0.71   | 0.86        | 0.028 | 0.034  |       |

**Electrical Characteristics ( $T_A=25^\circ\text{C}$ )**

| Part Number    |               | Reverse Stand-Off Voltage | Breakdown Voltage @ $I_T$ | Test Current | Maximum Clamping Voltage @ $I_{PP}$ | Peak Pulse Current | Reverse Leakage @ $V_{RWM}$ |
|----------------|---------------|---------------------------|---------------------------|--------------|-------------------------------------|--------------------|-----------------------------|
| Unidirectional | Bidirectional | $V_{RWM}(V)$              | $V_{BR}(V)$               | $I_T(mA)$    | $V_C(V)$                            | $I_{PP}(A)$        | $I_R(\mu A)$                |
| P6KE6.8A       | P6KE6.8CA     | 5.80                      | 6.45~7.14                 | 10           | 10.5                                | 58.1               | 1000                        |
| P6KE7.5A       | P6KE7.5CA     | 6.40                      | 7.13~7.88                 | 10           | 11.3                                | 54.0               | 500                         |
| P6KE8.2A       | P6KE8.2CA     | 7.02                      | 7.79~8.61                 | 10           | 12.1                                | 50.4               | 200                         |
| P6KE9.1A       | P6KE9.1CA     | 7.78                      | 8.65~9.55                 | 1            | 13.4                                | 45.5               | 50                          |
| P6KE10A        | P6KE10CA      | 8.55                      | 9.50~10.50                | 1            | 14.5                                | 42.1               | 10                          |
| P6KE11A        | P6KE11CA      | 9.40                      | 10.50~11.60               | 1            | 15.6                                | 39.1               | 5                           |
| P6KE12A        | P6KE12CA      | 10.20                     | 11.40~12.60               | 1            | 16.7                                | 36.5               | 5                           |
| P6KE13A        | P6KE13CA      | 11.10                     | 12.40~13.70               | 1            | 18.2                                | 33.5               | 1                           |
| P6KE15A        | P6KE15CA      | 12.80                     | 14.30~15.80               | 1            | 21.2                                | 28.8               | 1                           |
| P6KE16A        | P6KE16CA      | 13.60                     | 15.20~16.80               | 1            | 22.5                                | 27.1               | 1                           |
| P6KE18A        | P6KE18CA      | 15.30                     | 17.10~18.90               | 1            | 25.2                                | 24.2               | 1                           |
| P6KE20A        | P6KE20CA      | 17.10                     | 19.00~21.00               | 1            | 27.7                                | 22.0               | 1                           |
| P6KE22A        | P6KE22CA      | 18.80                     | 20.90~23.10               | 1            | 30.6                                | 19.9               | 1                           |
| P6KE24A        | P6KE24CA      | 20.50                     | 22.80~25.20               | 1            | 33.2                                | 18.4               | 1                           |
| P6KE27A        | P6KE27CA      | 23.10                     | 25.70~28.40               | 1            | 37.5                                | 16.3               | 1                           |
| P6KE30A        | P6KE30CA      | 25.60                     | 28.50~31.50               | 1            | 41.4                                | 14.7               | 1                           |
| P6KE33A        | P6KE33CA      | 28.20                     | 31.40~34.70               | 1            | 45.7                                | 13.3               | 1                           |
| P6KE36A        | P6KE36CA      | 30.80                     | 34.20~37.80               | 1            | 49.9                                | 12.2               | 1                           |
| P6KE39A        | P6KE39CA      | 33.30                     | 37.10~41.00               | 1            | 53.9                                | 11.3               | 1                           |
| P6KE43A        | P6KE43CA      | 36.80                     | 40.90~45.20               | 1            | 59.3                                | 10.3               | 1                           |

**Electrical Characteristics (T<sub>A</sub>=25°C)**

| Part Number    |               | Reverse Stand-Off Voltage | Breakdown Voltage @I <sub>T</sub> | Test Current        | Maximum Clamping Voltage @I <sub>PP</sub> | Peak Pulse Current  | Reverse Leakage @V <sub>RWM</sub> |
|----------------|---------------|---------------------------|-----------------------------------|---------------------|---|---------------------|-----------------------------------|
| Unidirectional | Bidirectional | V <sub>RWM</sub> (V)      | V <sub>BR</sub> (V)               | I <sub>T</sub> (mA) | V <sub>C</sub> (V)                        | I <sub>PP</sub> (A) | I <sub>R</sub> (μA)               |
| P6KE47A        | P6KE47CA      | 40.20                     | 44.70~49.40                       | 1                   | 64.8                                      | 9.4                 | 1                                 |
| P6KE51A        | P6KE51CA      | 43.60                     | 48.50~53.60                       | 1                   | 70.1                                      | 8.7                 | 1                                 |
| P6KE56A        | P6KE56CA      | 47.80                     | 53.20~58.80                       | 1                   | 77.0                                      | 7.9                 | 1                                 |
| P6KE62A        | P6KE62CA      | 53.00                     | 58.90~65.10                       | 1                   | 85.0                                      | 7.2                 | 1                                 |
| P6KE68A        | P6KE68CA      | 58.10                     | 64.60~71.40                       | 1                   | 92.0                                      | 6.6                 | 1                                 |
| P6KE75A        | P6KE75CA      | 64.10                     | 71.30~78.80                       | 1                   | 103.0                                     | 5.9                 | 1                                 |
| P6KE82A        | P6KE82CA      | 70.10                     | 77.90~86.10                       | 1                   | 113.0                                     | 5.4                 | 1                                 |
| P6KE91A        | P6KE91CA      | 77.80                     | 86.50~95.50                       | 1                   | 125.0                                     | 4.9                 | 1                                 |
| P6KE100A       | P6KE100CA     | 85.50                     | 95.00~105.00                      | 1                   | 137.0                                     | 4.5                 | 1                                 |
| P6KE110A       | P6KE110CA     | 94.00                     | 105.00~116.00                     | 1                   | 152.0                                     | 4.0                 | 1                                 |
| P6KE120A       | P6KE120CA     | 102.00                    | 114.00~126.00                     | 1                   | 165.0                                     | 3.7                 | 1                                 |
| P6KE130A       | P6KE130CA     | 111.00                    | 124.00~137.00                     | 1                   | 179.0                                     | 3.4                 | 1                                 |
| P6KE150A       | P6KE150CA     | 128.00                    | 143.00~158.00                     | 1                   | 207.0                                     | 2.9                 | 1                                 |
| P6KE160A       | P6KE160CA     | 136.00                    | 152.00~168.00                     | 1                   | 219.0                                     | 2.8                 | 1                                 |
| P6KE170A       | P6KE170CA     | 145.00                    | 162.00~179.00                     | 1                   | 234.0                                     | 2.6                 | 1                                 |
| P6KE180A       | P6KE180CA     | 154.00                    | 171.00~189.00                     | 1                   | 246.0                                     | 2.5                 | 1                                 |
| P6KE200A       | P6KE200CA     | 171.00                    | 190.00~210.00                     | 1                   | 274.0                                     | 2.2                 | 1                                 |
| P6KE220A       | P6KE220CA     | 185.00                    | 209.00~231.00                     | 1                   | 328.0                                     | 1.9                 | 1                                 |
| P6KE250A       | P6KE250CA     | 214.00                    | 237.00~263.00                     | 1                   | 344.0                                     | 1.8                 | 1                                 |
| P6KE300A       | P6KE300CA     | 256.00                    | 285.00~315.00                     | 1                   | 414.0                                     | 1.5                 | 1                                 |
| P6KE350A       | P6KE350CA     | 300.00                    | 332.00~368.00                     | 1                   | 482.0                                     | 1.3                 | 1                                 |
| P6KE400A       | P6KE400CA     | 342.00                    | 380.00~420.00                     | 1                   | 548.0                                     | 1.1                 | 1                                 |
| P6KE440A       | P6KE440CA     | 376.00                    | 418.00~462.00                     | 1                   | 602.0                                     | 1.04                | 1                                 |
| P6KE480A       | P6KE480CA     | 408.00                    | 456.00~504.00                     | 1                   | 658.0                                     | 0.9                 | 1                                 |
| P6KE510A       | P6KE510CA     | 434.00                    | 485.00~535.00                     | 1                   | 698.0                                     | 0.9                 | 1                                 |
| P6KE530A       | P6KE530CA     | 450.00                    | 503.50~556.50                     | 1                   | 725.0                                     | 0.8                 | 1                                 |
| P6KE540A       | P6KE540CA     | 459.00                    | 513.00~567.00                     | 1                   | 740.0                                     | 0.8                 | 1                                 |
| P6KE550A       | P6KE550CA     | 467.00                    | 522.50~577.50                     | 1                   | 760.0                                     | 0.8                 | 1                                 |
| P6KE600A       | P6KE600CA     | 512.00                    | 570.00~630.00                     | 1                   | 828.0                                     | 0.75                | 1                                 |

Notes: For bidirectional type having V<sub>RWM</sub> of 10V and less, the I<sub>R</sub> limit is double.

**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 Dissipation Derating Curve**



**Figure 6. Maximum Non-Repetitive Forward Surge Current Uni-Directional Only**



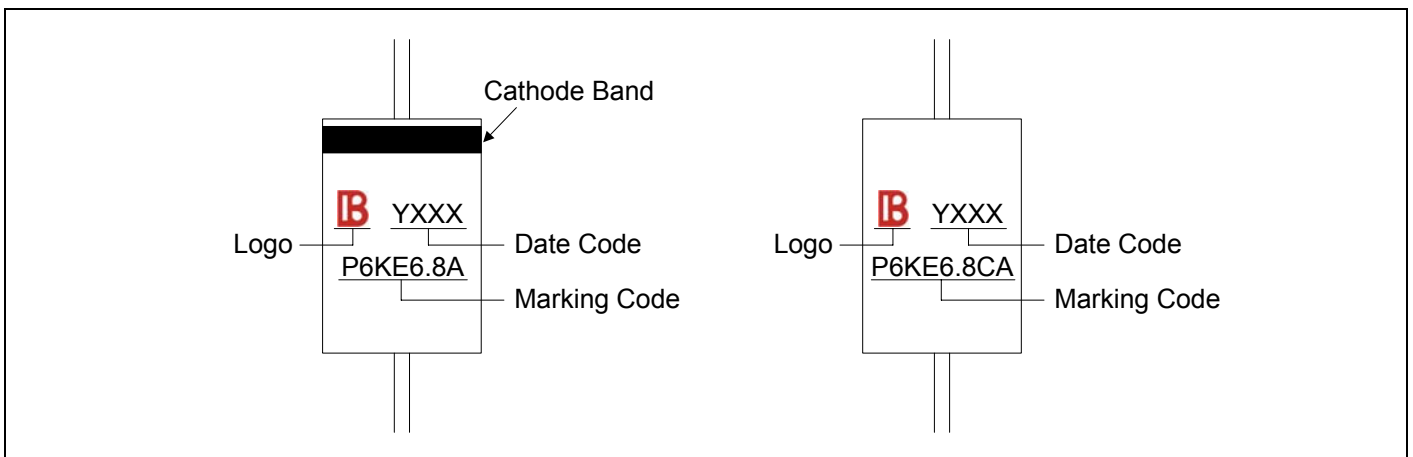
**Recommended Soldering Conditions**

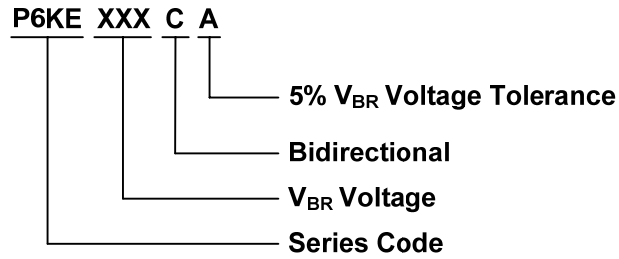
Wave Soldering



| Item             | Conditions |
|------------------|------------|
| Peak Temperature | 265°C      |
| Dipping Time     | 10 seconds |
| Soldering        | 1 time     |

**Marking Code**





**Packaging**

| Tape        |                   | Symbol | Dimension (mm) |
|-------------|-------------------|--------|----------------|
|             |                   | A      | 5.0±0.5        |
|             |                   | B      | 53.0±1.0       |
|             |                   | Z      | 1.2Max.        |
|             |                   | T      | 6.0±0.4        |
|             |                   | E      | 0.8Max.        |
|             |                   | L1-L2  | 1.0Max.        |
|             |                   |        |                |
| <p>Box</p>  |                   | L      | 250.0±5.0      |
|             |                   | W      | 75.0±5.0       |
|             |                   | H      | 114.0±5.0      |
|             | Quantity: 2000PCS |        |                |
| <p>Reel</p> |                   | D      | 330.0±3.0      |
|             |                   | D0     | 16.4±2.0       |
|             |                   | D1     | 86.0±2.0       |
|             |                   | W1     | 76.0±3.0       |
|             | Quantity: 4000PCS |        |                |

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