

## Transient Voltage Suppressors (TVS) Data Sheet

### Features

- Glass passivated junction
- Low incremental surge resistance.
- Excellent clamping capability
- 5000W peak pulse power capability at 10/1000 $\mu$ s waveform, repetition rate (duty cycle): 0.05%
- Fast response time
- Typical  $I_R$  less than 2 $\mu$ A above 10V.
- 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: Moulded plastic over glass passivated junction
- Terminal: Plated Axial leads, solderable per MIL-STD-750, Method 2026
- Polarity: Color band denotes cathode except bi-directional models
- Mounting Position: Any
- Weight: 2.10g

### 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 5000 | 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)  | $P_{M(AV)}$     | 8.0          | Watts          |
| Peak forward surge current, 8.3ms single half sine-wave superimposed on rated load, (JEDEC Method) (Note2, Fig.6) | $I_{FSM}$       | 400          | Amps           |
| Operating junction and Storage Temperature Range.   | $T_J, T_{STG}$  | -55 to +150  | $^{\circ}$ C   |
| Typical thermal resistance junction to lead   | $R_{\theta JL}$ | 8            | $^{\circ}$ C/W |
| Typical thermal resistance junction to ambient  | $R_{\theta JA}$ | 40           | $^{\circ}$ 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 (P600)**

| Symbol | Millimeters |      | Inches |       |
|--------|-------------|------|--------|-------|
|        | Min.        | Max. | Min.   | Max.  |
| L      | 25.40       | -    | 1.000  | -     |
| T      | 8.60        | 9.10 | 0.340  | 0.360 |
| d      | 8.60        | 9.10 | 0.340  | 0.360 |
| s      | 1.19        | 1.32 | 0.047  | 0.052 |

**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)               |
| 5KP5.0A        | 5KP5.0CA      | 5.0                       | 6.40~7.00                         | 50                  | 9.2                                       | 554.3               | 5000                              |
| 5KP6.0A        | 5KP6.0CA      | 6.0                       | 6.67~7.37                         | 50                  | 10.3                                      | 495.1               | 5000                              |
| 5KP6.5A        | 5KP6.5CA      | 6.5                       | 7.22~7.98                         | 50                  | 11.2                                      | 455.4               | 2000                              |
| 5KP7.0A        | 5KP7.0CA      | 7.0                       | 7.78~8.60                         | 50                  | 12.0                                      | 425.0               | 1000                              |
| 5KP7.5A        | 5KP7.5CA      | 7.5                       | 8.33~9.21                         | 5                   | 12.9                                      | 395.3               | 250                               |
| 5KP8.0A        | 5KP8.0CA      | 8.0                       | 8.89~9.83                         | 5                   | 13.6                                      | 375.0               | 150                               |
| 5KP8.5A        | 5KP8.5CA      | 8.5                       | 9.44~10.40                        | 5                   | 14.4                                      | 354.2               | 50                                |
| 5KP9.0A        | 5KP9.0CA      | 9.0                       | 10.00~11.10                       | 5                   | 15.4                                      | 331.2               | 20                                |
| 5KP10A         | 5KP10CA       | 10.0                      | 11.10~12.30                       | 5                   | 17.0                                      | 300.0               | 15                                |
| 5KP11A         | 5KP11CA       | 11.0                      | 12.20~13.50                       | 5                   | 18.2                                      | 280.2               | 2                                 |
| 5KP12A         | 5KP12CA       | 12.0                      | 13.30~14.70                       | 5                   | 19.9                                      | 256.3               | 2                                 |
| 5KP13A         | 5KP13CA       | 13.0                      | 14.40~15.90                       | 5                   | 21.5                                      | 237.2               | 2                                 |
| 5KP14A         | 5KP14CA       | 14.0                      | 15.60~17.20                       | 5                   | 23.2                                      | 219.8               | 2                                 |
| 5KP15A         | 5KP15CA       | 15.0                      | 16.70~18.50                       | 5                   | 24.4                                      | 209.0               | 2                                 |
| 5KP16A         | 5KP16CA       | 16.0                      | 17.80~19.70                       | 5                   | 26.0                                      | 196.2               | 2                                 |
| 5KP17A         | 5KP17CA       | 17.0                      | 18.90~20.90                       | 5                   | 27.6                                      | 184.8               | 2                                 |
| 5KP18A         | 5KP18CA       | 18.0                      | 20.00~22.10                       | 5                   | 29.2                                      | 174.7               | 2                                 |
| 5KP20A         | 5KP20CA       | 20.0                      | 22.20~24.50                       | 5                   | 32.4                                      | 157.4               | 2                                 |
| 5KP22A         | 5KP22CA       | 22.0                      | 24.40~26.90                       | 5                   | 35.5                                      | 143.7               | 2                                 |
| 5KP24A         | 5KP24CA       | 24.0                      | 26.70~29.50                       | 5                   | 38.9                                      | 131.1               | 2                                 |
| 5KP26A         | 5KP26CA       | 26.0                      | 28.90~31.90                       | 5                   | 42.1                                      | 121.1               | 2                                 |

**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)               |
| 5KP28A         | 5KP28CA       | 28.0                      | 31.10~34.40                       | 5                   | 45.4                                      | 112.3               | 2                                 |
| 5KP30A         | 5KP30CA       | 30.0                      | 33.30~36.80                       | 5                   | 48.4                                      | 105.4               | 2                                 |
| 5KP33A         | 5KP33CA       | 33.0                      | 36.70~40.60                       | 5                   | 53.3                                      | 95.7                | 2                                 |
| 5KP36A         | 5KP36CA       | 36.0                      | 40.00~44.20                       | 5                   | 58.1                                      | 87.8                | 2                                 |
| 5KP40A         | 5KP40CA       | 40.0                      | 44.40~49.10                       | 5                   | 64.5                                      | 79.1                | 2                                 |
| 5KP43A         | 5KP43CA       | 43.0                      | 47.80~52.80                       | 5                   | 69.4                                      | 73.5                | 2                                 |
| 5KP45A         | 5KP45CA       | 45.0                      | 50.00~55.30                       | 5                   | 72.7                                      | 70.2                | 2                                 |
| 5KP48A         | 5KP48CA       | 48.0                      | 53.30~58.90                       | 5                   | 77.4                                      | 65.9                | 2                                 |
| 5KP51A         | 5KP51CA       | 51.0                      | 56.70~62.70                       | 5                   | 82.4                                      | 61.9                | 2                                 |
| 5KP54A         | 5KP54CA       | 54.0                      | 60.00~66.30                       | 5                   | 87.1                                      | 58.6                | 2                                 |
| 5KP58A         | 5KP58CA       | 58.0                      | 64.40~71.20                       | 5                   | 93.6                                      | 54.5                | 2                                 |
| 5KP60A         | 5KP60CA       | 60.0                      | 66.70~73.70                       | 5                   | 96.8                                      | 52.7                | 2                                 |
| 5KP64A         | 5KP64CA       | 64.0                      | 71.10~78.60                       | 5                   | 103.0                                     | 49.5                | 2                                 |
| 5KP70A         | 5KP70CA       | 70.0                      | 77.80~86.00                       | 5                   | 113.0                                     | 45.1                | 2                                 |
| 5KP75A         | 5KP75CA       | 75.0                      | 83.30~92.10                       | 5                   | 121.0                                     | 42.1                | 2                                 |
| 5KP78A         | 5KP78CA       | 78.0                      | 86.70~95.80                       | 5                   | 126.0                                     | 40.5                | 2                                 |
| 5KP85A         | 5KP85CA       | 85.0                      | 94.40~104.00                      | 5                   | 137.0                                     | 37.2                | 2                                 |
| 5KP90A         | 5KP90CA       | 90.0                      | 100.00~111.00                     | 5                   | 146.0                                     | 34.9                | 2                                 |
| 5KP100A        | 5KP100CA      | 100.0                     | 110.00~123.00                     | 5                   | 162.0                                     | 31.5                | 2                                 |
| 5KP110A        | 5KP110CA      | 110.0                     | 122.00~135.00                     | 5                   | 177.0                                     | 28.8                | 2                                 |
| 5KP120A        | 5KP120CA      | 120.0                     | 133.00~147.00                     | 5                   | 193.0                                     | 26.4                | 2                                 |
| 5KP130A        | 5KP130CA      | 130.0                     | 144.00~159.00                     | 5                   | 209.0                                     | 24.4                | 2                                 |
| 5KP150A        | 5KP150CA      | 150.0                     | 167.00~185.00                     | 5                   | 243.0                                     | 21.0                | 2                                 |
| 5KP160A        | 5KP160CA      | 160.0                     | 178.00~197.00                     | 5                   | 259.0                                     | 19.7                | 2                                 |
| 5KP170A        | 5KP170CA      | 170.0                     | 189.00~209.00                     | 5                   | 275.0                                     | 18.5                | 2                                 |
| 5KP180A        | 5KP180CA      | 180.0                     | 201.00~222.00                     | 5                   | 292.0                                     | 17.5                | 2                                 |
| 5KP190A        | 5KP190CA      | 190.0                     | 211.00~233.00                     | 5                   | 310.0                                     | 16.5                | 2                                 |
| 5KP200A        | 5KP200CA      | 200.0                     | 224.00~247.00                     | 5                   | 329.2                                     | 15.5                | 2                                 |
| 5KP210A        | 5KP210CA      | 210.0                     | 237.00~263.00                     | 5                   | 349.5                                     | 14.6                | 2                                 |
| 5KP220A        | 5KP220CA      | 220.0                     | 246.00~272.00                     | 5                   | 371.1                                     | 13.7                | 2                                 |
| 5KP250A        | 5KP250CA      | 250.0                     | 277.00~306.00                     | 5                   | 425.0                                     | 12.0                | 2                                 |

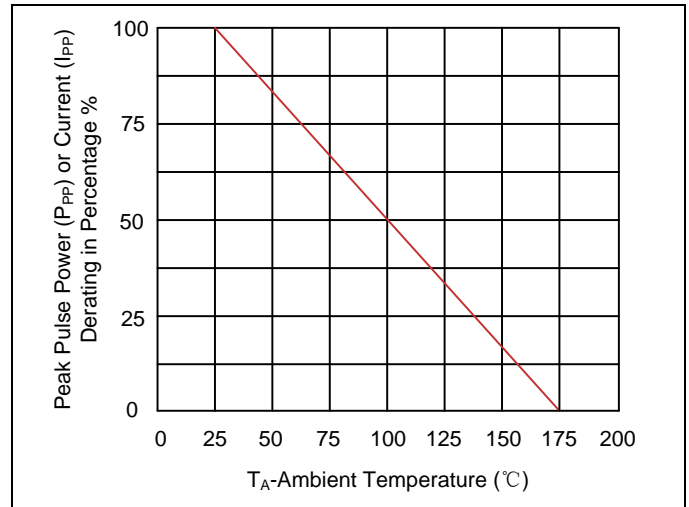
Notes: For bidirectional type having V<sub>RWM</sub> of 10V and less, the I<sub>R</sub> limit is double.

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

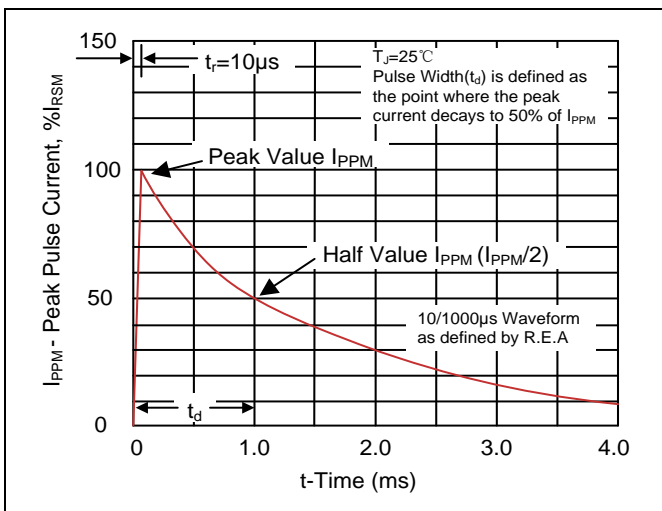
**Figure 1. Peak Pulse Power Rating Curve**



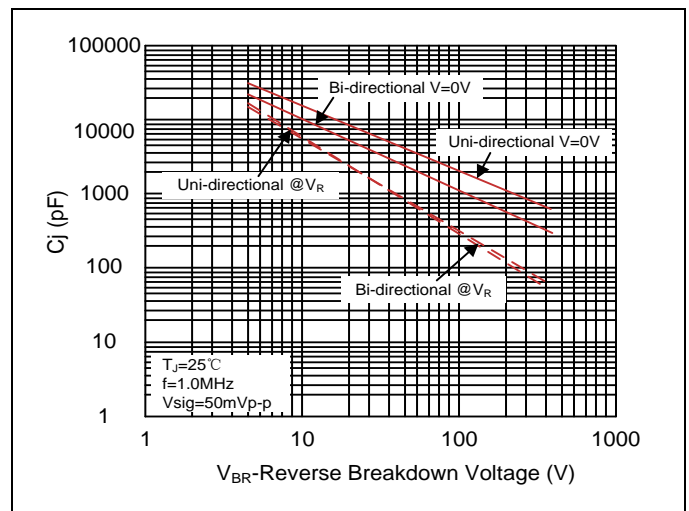
**Figure 2. Pulse Derating Curve**



**Figure 3. Pulse Waveform**



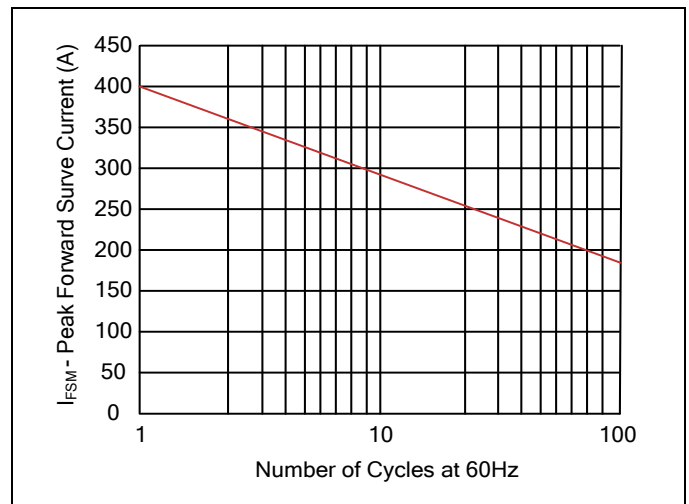
**Figure 4. Typical Junction Capacitance**



**Figure 5. Steady State Power Dissipation Derating Curve**

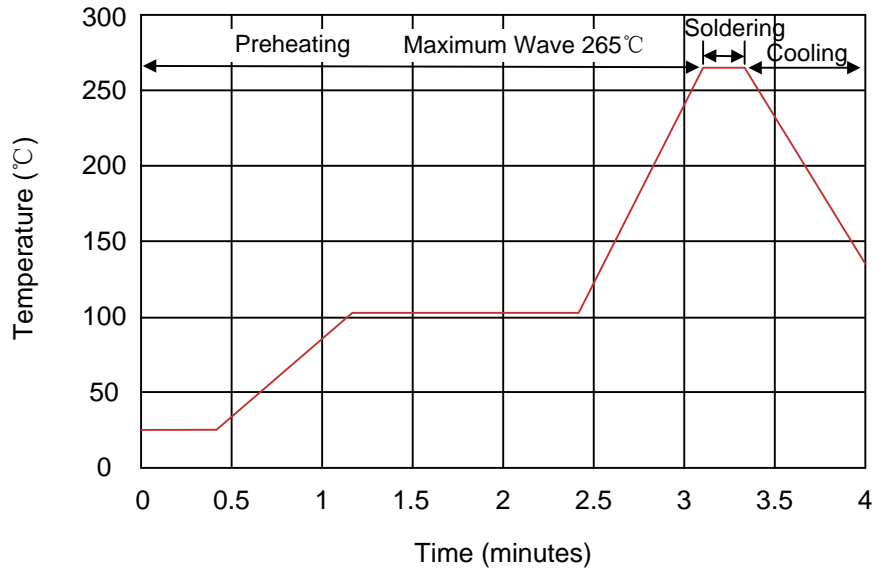


**Figure 6. Maximum Non-Repetitive Forward Surge Current Uni-Directional Only**



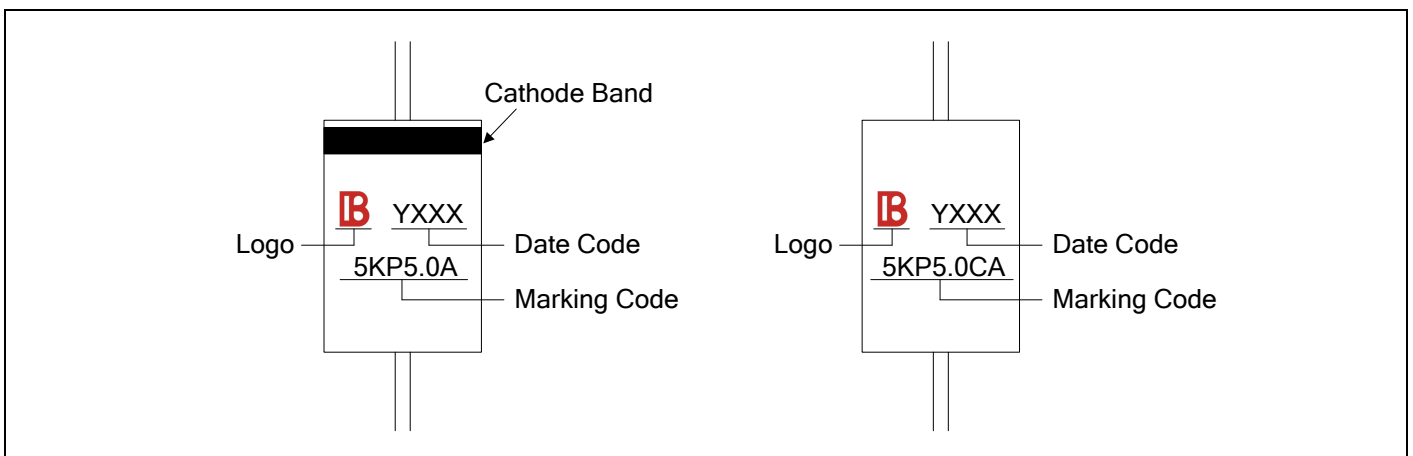
## Recommended Soldering Conditions

### Wave Soldering

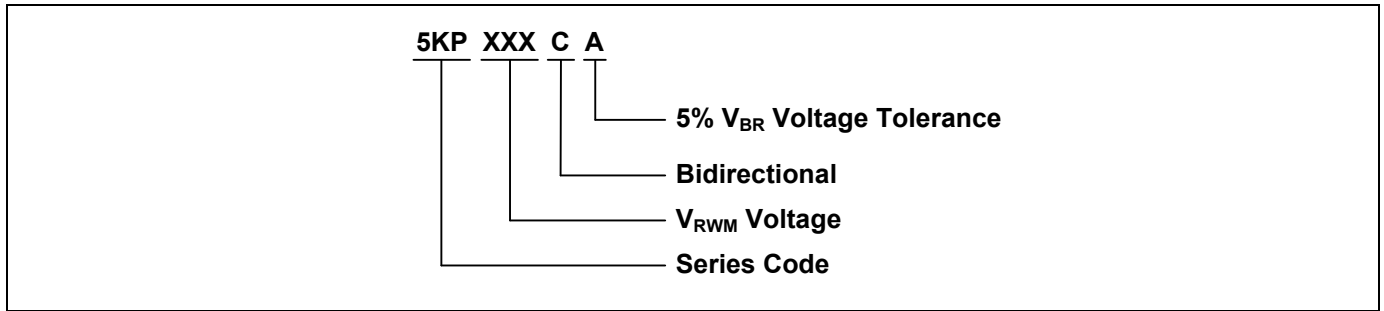


| Item             | Conditions |
|------------------|------------|
| Peak Temperature | 265°C      |
| Dipping Time     | 10 seconds |
| Soldering        | 1 time     |

## Marking Code



**Part Number Code**



**Ordering Code for Different Package**

Box package: Add suffix “/B” at the end of the part number, such as 5KP15A-AT/B

Reel package: Add suffix “/TR13” at the end of the part number, such as 5KP100CA-AT/TR13

**Packaging**

|      |  | Symbol           | Dimension (mm) |
|------|--|------------------|----------------|
| Tape |  | A                | 10.0±0.5       |
|      |  | B                | 53.0±1.0       |
|      |  | Z                | 1.2Max.        |
|      |  | T                | 6.0±0.4        |
|      |  | E                | 0.8Max.        |
|      |  | L1-L2            | 1.0Max.        |
|      |  | L                | 250.0±5.0      |
| Box  |  | W                | 75.0±5.0       |
|      |  | H                | 114.0±5.0      |
|      |  | Quantity: 300PCS |                |
| Reel |  | D                | 330.0±3.0      |
|      |  | D0               | 16.4±2.0       |
|      |  | D1               | 86.0±2.0       |
|      |  | W1               | 76.0±3.0       |
|      |  | Quantity: 800PCS |                |

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