

## Transient Voltage Suppressors (TVS) Data Sheet

### Features

- Glass passivated junction
- Low incremental surge resistance.
- Excellent clamping capability
- 3000W peak pulse power capability at 10/1000 $\mu$ s waveform, repetition rate (duty cycle): 0.01%
- 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: 2.02g

### Applications

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

### Maximum Ratings and Characteristics

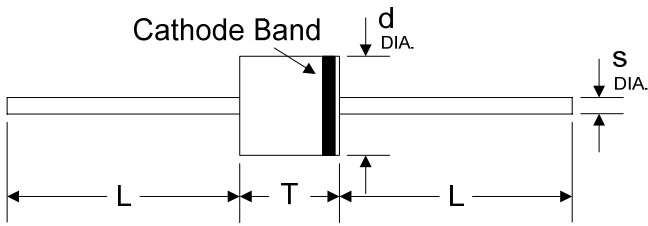
Ratings at 25 $^{\circ}$ C ambient temperature unless otherwise specified.

| Rating                                                                                                            | Symbol          | Value        | Units          |
|-------------------------------------------------------------------------------------------------------------------|-----------------|--------------|----------------|
| Peak pulse power dissipation at 10/1000 $\mu$ s waveform (Note1, Fig.1)                                           | $P_{PPM}$       | Minimum 3000 | 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)                                                      | $P_{M(AV)}$     | 7.0          | Watts          |
| Peak forward surge current, 8.3ms single half sine-wave superimposed on rated load, (JEDEC Method) (Note2, Fig.6) | $I_{FSM}$       | 300          | Amps           |
| Operating junction and Storage Temperature Range.                                                                 | $T_J, T_{STG}$  | -55 to +175  | $^{\circ}$ C   |
| Typical thermal resistance junction to lead                                                                       | $R_{\theta JL}$ | 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 ( $T_A=25^{\circ}\text{C}$ )**

| 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 | $V_{RWM}(V)$              | $V_{BR}(V)$               | $I_T(mA)$    | $V_C(V)$                            | $I_{PP}(A)$        | $I_R(\mu A)$                |
| 3KP5.0A        | 3KP5.0CA      | 5.0                       | 6.40~7.00                 | 10           | 9.2                                 | 326.1              | 5000                        |
| 3KP6.0A        | 3KP6.0CA      | 6.0                       | 6.67~7.37                 | 10           | 10.3                                | 291.3              | 5000                        |
| 3KP6.5A        | 3KP6.5CA      | 6.5                       | 7.22~7.98                 | 10           | 11.2                                | 267.9              | 2000                        |
| 3KP7.0A        | 3KP7.0CA      | 7.0                       | 7.78~8.60                 | 10           | 12.0                                | 250.0              | 1000                        |
| 3KP7.5A        | 3KP7.5CA      | 7.5                       | 8.33~9.21                 | 1            | 12.9                                | 232.6              | 250                         |
| 3KP8.0A        | 3KP8.0CA      | 8.0                       | 8.89~9.83                 | 1            | 13.6                                | 220.6              | 150                         |
| 3KP8.5A        | 3KP8.5CA      | 8.5                       | 9.44~10.40                | 1            | 14.4                                | 208.3              | 50                          |
| 3KP9.0A        | 3KP9.0CA      | 9.0                       | 10.00~11.10               | 1            | 15.4                                | 194.8              | 20                          |
| 3KP10A         | 3KP10CA       | 10.0                      | 11.10~12.30               | 1            | 17.0                                | 176.5              | 15                          |
| 3KP11A         | 3KP11CA       | 11.0                      | 12.20~13.50               | 1            | 18.2                                | 164.8              | 2                           |
| 3KP12A         | 3KP12CA       | 12.0                      | 13.30~14.70               | 1            | 19.9                                | 150.8              | 2                           |
| 3KP13A         | 3KP13CA       | 13.0                      | 14.40~15.90               | 1            | 21.5                                | 139.5              | 2                           |
| 3KP14A         | 3KP14CA       | 14.0                      | 15.60~17.20               | 1            | 23.2                                | 129.3              | 2                           |
| 3KP15A         | 3KP15CA       | 15.0                      | 16.70~18.50               | 1            | 24.4                                | 123.0              | 2                           |
| 3KP16A         | 3KP16CA       | 16.0                      | 17.80~19.70               | 1            | 26.0                                | 115.4              | 2                           |
| 3KP17A         | 3KP17CA       | 17.0                      | 18.90~20.90               | 1            | 27.6                                | 108.7              | 2                           |
| 3KP18A         | 3KP18CA       | 18.0                      | 20.00~22.10               | 1            | 29.2                                | 102.7              | 2                           |
| 3KP20A         | 3KP20CA       | 20.0                      | 22.20~24.50               | 1            | 32.4                                | 92.6               | 2                           |
| 3KP22A         | 3KP22CA       | 22.0                      | 24.40~26.90               | 1            | 35.5                                | 84.5               | 2                           |
| 3KP24A         | 3KP24CA       | 24.0                      | 26.70~29.50               | 1            | 38.9                                | 77.1               | 2                           |
| 3KP26A         | 3KP26CA       | 26.0                      | 28.90~31.90               | 1            | 42.1                                | 71.3               | 2                           |

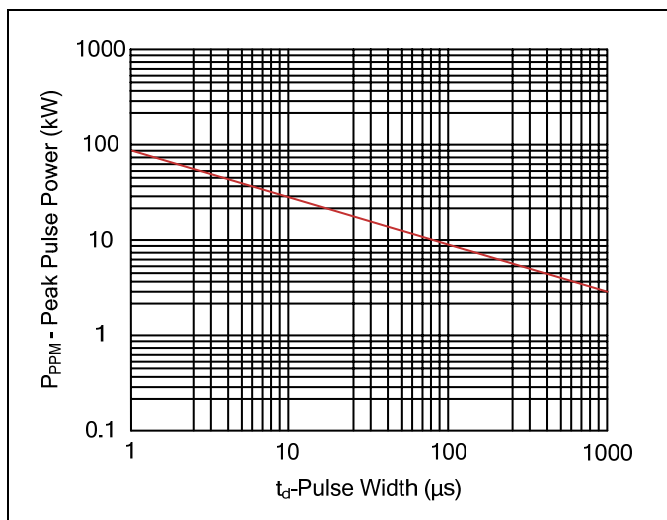
**Electrical Characteristics ( $T_A=25^{\circ}\text{C}$ )**

| 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 | $V_{RWM}(V)$              | $V_{BR}(V)$               | $I_T(mA)$    | $V_C(V)$                            | $I_{PP}(A)$        | $I_R(\mu A)$                |
| 3KP28A         | 3KP28CA       | 28.0                      | 31.10~34.40               | 1            | 45.4                                | 66.1               | 2                           |
| 3KP30A         | 3KP30CA       | 30.0                      | 33.30~36.80               | 1            | 48.4                                | 62.0               | 2                           |
| 3KP33A         | 3KP33CA       | 33.0                      | 36.70~40.60               | 1            | 53.3                                | 56.3               | 2                           |
| 3KP36A         | 3KP36CA       | 36.0                      | 40.00~44.20               | 1            | 58.1                                | 51.6               | 2                           |
| 3KP40A         | 3KP40CA       | 40.0                      | 44.40~49.10               | 1            | 64.5                                | 46.5               | 2                           |
| 3KP43A         | 3KP43CA       | 43.0                      | 47.80~52.80               | 1            | 69.4                                | 43.2               | 2                           |
| 3KP45A         | 3KP45CA       | 45.0                      | 50.00~55.30               | 1            | 72.7                                | 41.3               | 2                           |
| 3KP48A         | 3KP48CA       | 48.0                      | 53.30~58.90               | 1            | 77.4                                | 38.8               | 2                           |
| 3KP51A         | 3KP51CA       | 51.0                      | 56.70~62.70               | 1            | 82.4                                | 36.4               | 2                           |
| 3KP54A         | 3KP54CA       | 54.0                      | 60.00~66.30               | 1            | 87.1                                | 34.4               | 2                           |
| 3KP58A         | 3KP58CA       | 58.0                      | 64.40~71.20               | 1            | 93.6                                | 32.1               | 2                           |
| 3KP60A         | 3KP60CA       | 60.0                      | 66.70~73.70               | 1            | 96.8                                | 31.0               | 2                           |
| 3KP64A         | 3KP64CA       | 64.0                      | 71.10~78.60               | 1            | 103.0                               | 29.1               | 2                           |
| 3KP70A         | 3KP70CA       | 70.0                      | 77.80~86.00               | 1            | 113.0                               | 26.5               | 2                           |
| 3KP75A         | 3KP75CA       | 75.0                      | 83.30~92.10               | 1            | 121.0                               | 24.8               | 2                           |
| 3KP78A         | 3KP78CA       | 78.0                      | 86.70~95.80               | 1            | 126.0                               | 23.8               | 2                           |
| 3KP85A         | 3KP85CA       | 85.0                      | 94.40~104.00              | 1            | 137.0                               | 21.9               | 2                           |
| 3KP90A         | 3KP90CA       | 90.0                      | 100.00~111.00             | 1            | 146.0                               | 20.5               | 2                           |
| 3KP100A        | 3KP100CA      | 100.0                     | 111.00~123.00             | 1            | 162.0                               | 18.5               | 2                           |
| 3KP110A        | 3KP110CA      | 110.0                     | 122.00~135.00             | 1            | 177.0                               | 16.9               | 2                           |
| 3KP120A        | 3KP120CA      | 120.0                     | 133.00~147.00             | 1            | 193.0                               | 15.5               | 2                           |
| 3KP130A        | 3KP130CA      | 130.0                     | 144.00~159.00             | 1            | 209.0                               | 14.4               | 2                           |
| 3KP150A        | 3KP150CA      | 150.0                     | 167.00~185.00             | 1            | 243.0                               | 12.3               | 2                           |
| 3KP160A        | 3KP160CA      | 160.0                     | 178.00~197.00             | 1            | 259.0                               | 11.6               | 2                           |
| 3KP170A        | 3KP170CA      | 170.0                     | 189.00~209.00             | 1            | 275.0                               | 10.9               | 2                           |
| 3KP180A        | 3KP180CA      | 180.0                     | 201.00~222.00             | 1            | 292.0                               | 10.3               | 2                           |
| 3KP190A        | 3KP190CA      | 190.0                     | 211.00~233.00             | 1            | 308.0                               | 9.7                | 2                           |
| 3KP200A        | 3KP200CA      | 200.0                     | 224.00~247.00             | 1            | 324.0                               | 9.3                | 2                           |
| 3KP210A        | 3KP210CA      | 210.0                     | 237.00~263.00             | 1            | 340.0                               | 8.8                | 2                           |
| 3KP220A        | 3KP220CA      | 220.0                     | 246.00~272.00             | 1            | 356.0                               | 8.4                | 2                           |

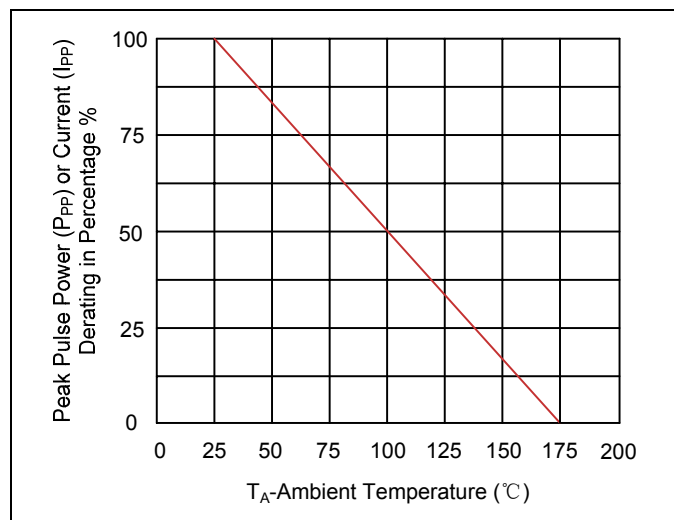
Notes: For bidirectional type having  $V_{RWM}$  of 10V and less, the  $I_R$  limit is double.

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

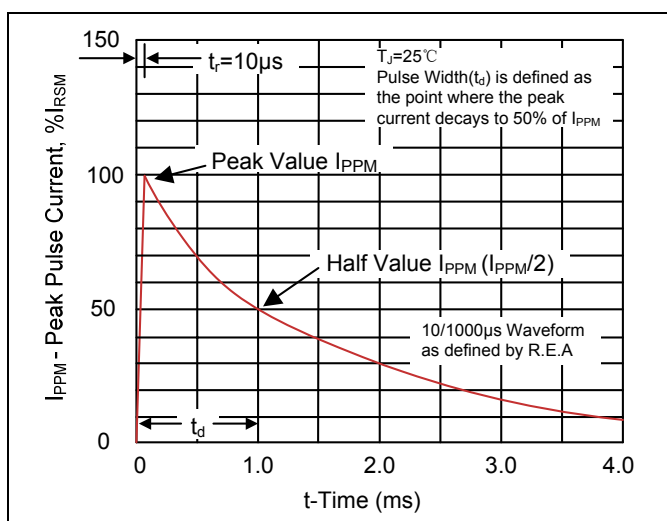
**Figure 1. Peak Pulse Power Rating Curve**



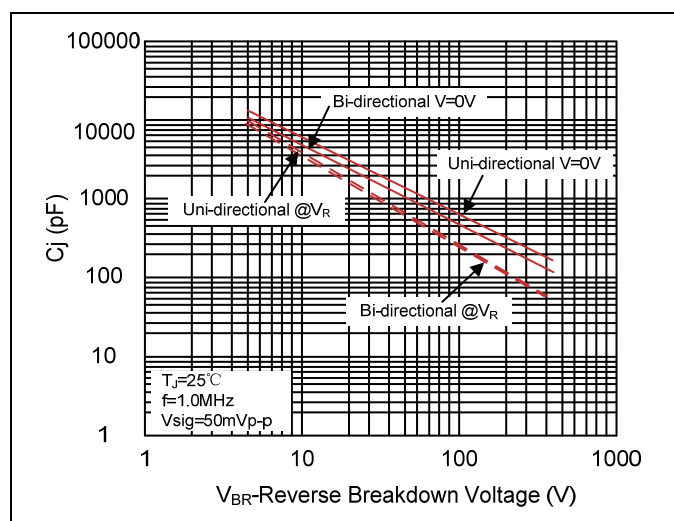
**Figure 2. Pulse Derating Curve**



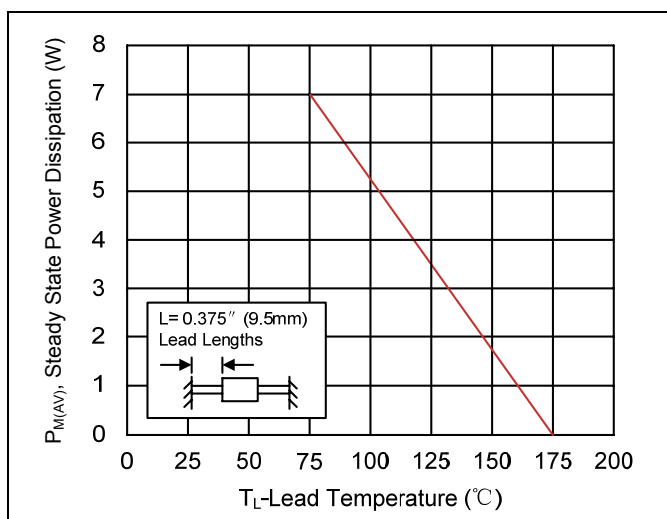
**Figure 3. Pulse Waveform**



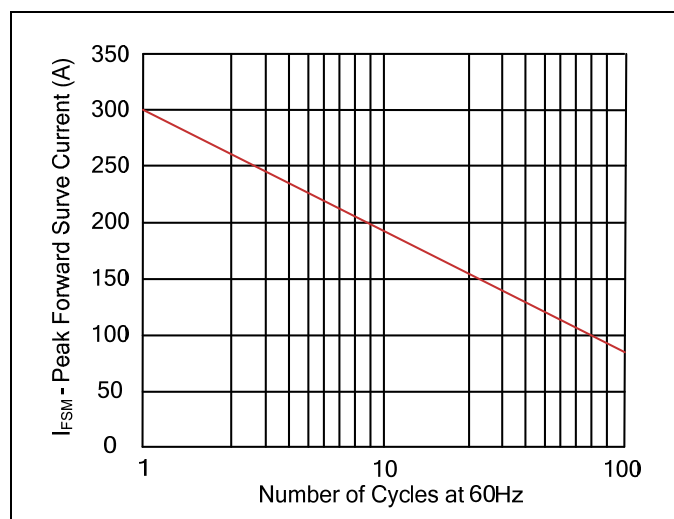
**Figure 4. Typical Junction Capacitance**



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

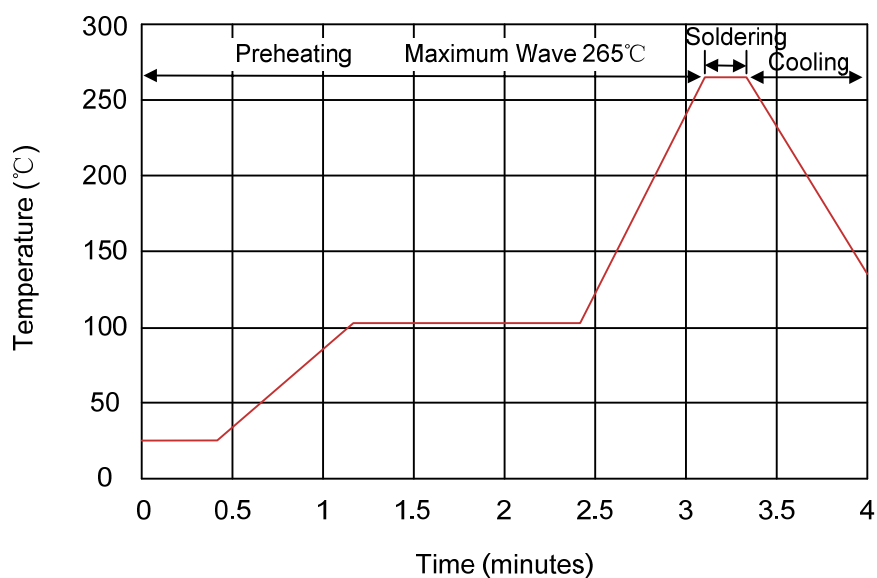


**Figure 6. Maximum Non-Repetitive Forward Surge Current Uni-Directional Only**



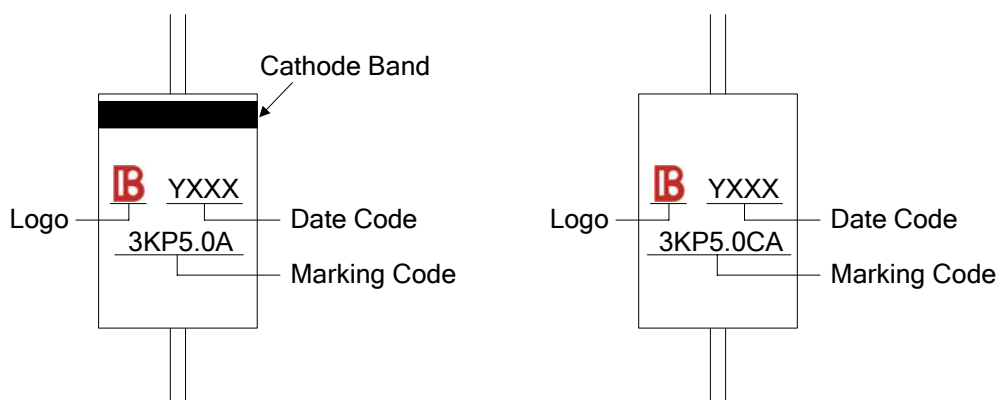
## Recommended Soldering Conditions

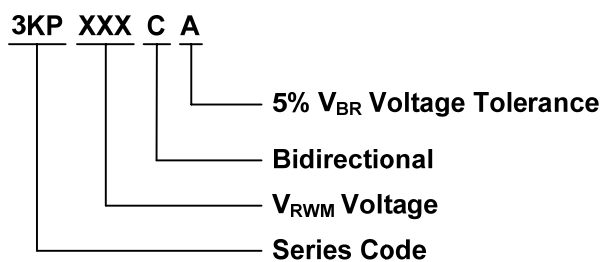
### Wave Soldering



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

### Marking Code





## Packaging

| Tape | Symbol           | Dimension (mm) |
|------|------------------|----------------|
|      | A                | 10.0±0.5       |
|      | B                | 53.0±1.0       |
|      | Z                | 1.2Max.        |
|      | T                | 6.0±0.4        |
|      | E                | 0.8Max.        |
|      | L1-L2            | 1.0Max.        |
| Box  | L                | 250.0±5.0      |
|      | 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 |                |

