

## Transient Voltage Suppressors (TVS) Data Sheet

### Features

- Glass passivated junction
- Low incremental surge resistance.
- Excellent clamping capability
- 5000W peak pulse power capability at 10/1000μs waveform, repetition rate (duty cycle): 0.05%
- Fast response time
- Typical  $I_R$  less than 2μA above 10V.
- High Temperature soldering guaranteed: 265°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

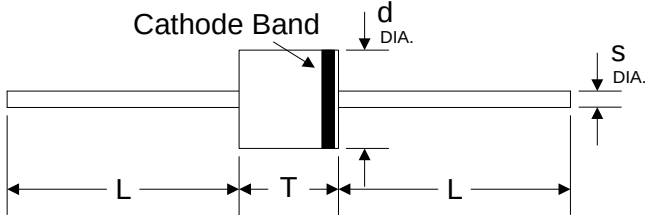
Ratings at 25°C ambient temperature unless otherwise specified.

| Rating                                                                                                            | Symbol          | Value        | Units |
|-------------------------------------------------------------------------------------------------------------------|-----------------|--------------|-------|
| Peak pulse power dissipation at 10/1000μs waveform (Note1, Fig.1)                                                 | $P_{PPM}$       | Minimum 5000 | Watts |
| Peak pulse current of at 10/1000μs waveform (Note 1, Fig.3)                                                       | $I_{PPM}$       | See Table    | Amps  |
| Steady state power dissipation at $T_L=75^\circ\text{C}$ (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  | °C    |
| Typical thermal resistance junction to lead                                                                       | $R_{\theta JL}$ | 8            | °C/W  |
| Typical thermal resistance junction to ambient                                                                    | $R_{\theta JA}$ | 40           | °C/W  |

Notes: 1. Non-repetitive current pulse, per Fig.3 and derated above  $T_A=25^\circ\text{C}$  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 | $V_{RWM}(V)$              | $V_{BR}(V)$               | $I_T(mA)$    | $V_C(V)$                            | $I_{PP}(A)$        | $I_R(\mu A)$                |
| 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                           |

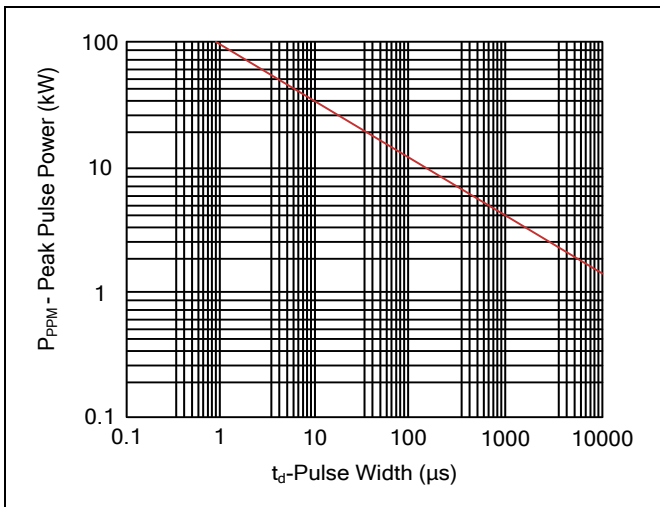
**Electrical Characteristics ( $T_A=25^{\circ}\text{C}$ )**

| 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 | $V_{RWM}(V)$              | $V_{BR}(V)$               | $I_T(mA)$    | $V_C(V)$                            | $I_{PP}(A)$        | $I_R(\mu A)$                |
| 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                           |

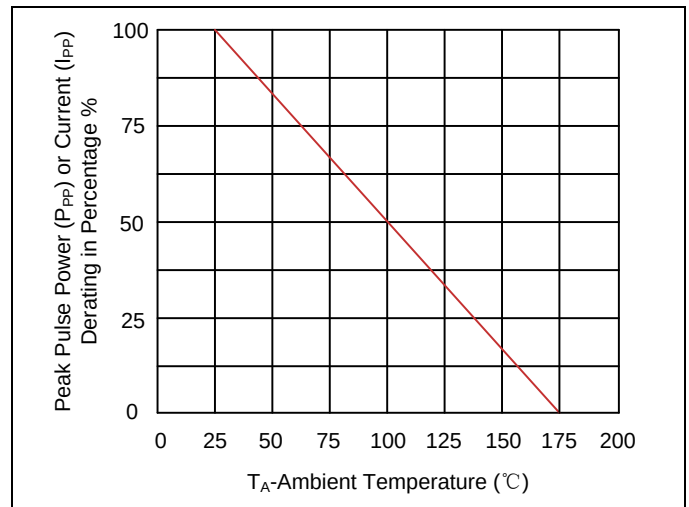
Notes: For bidirectional type having  $V_{RWM}$  of 10V and less, the  $I_R$  limit is double.

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

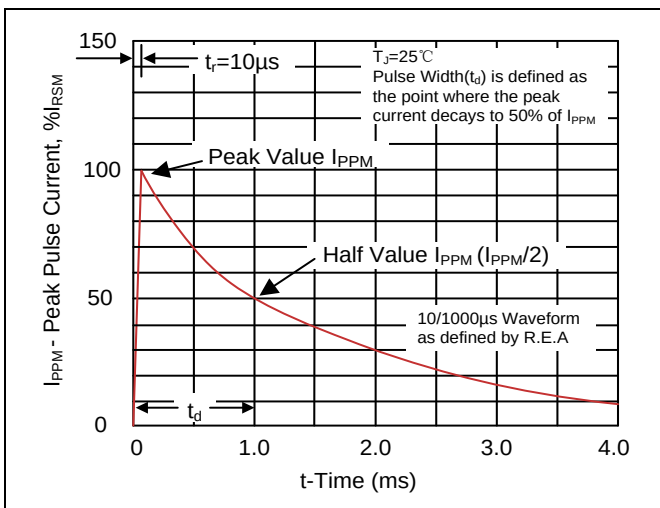
**Figure 1. Peak Pulse Power Rating Curve**



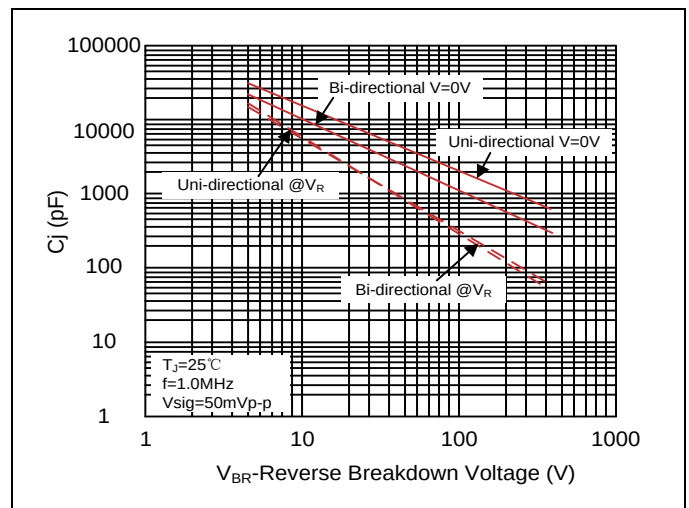
**Figure 2. Pulse Derating Curve**



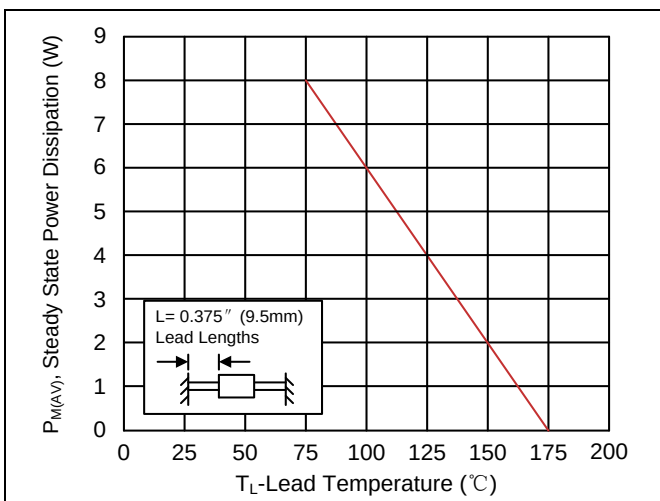
**Figure 3. Pulse Waveform**



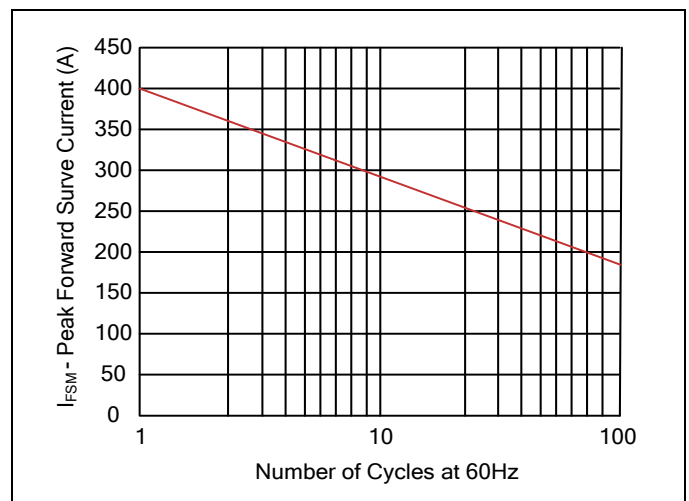
**Figure 4. Typical Junction Capacitance**



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

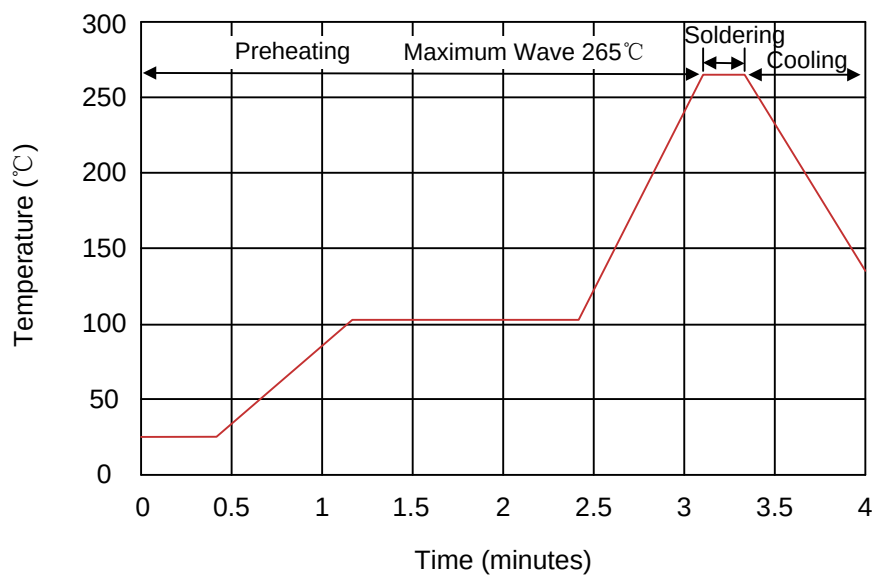


**Figure 6. Maximum Non-Repetitive Forward Surge Current Uni-Directional Only**



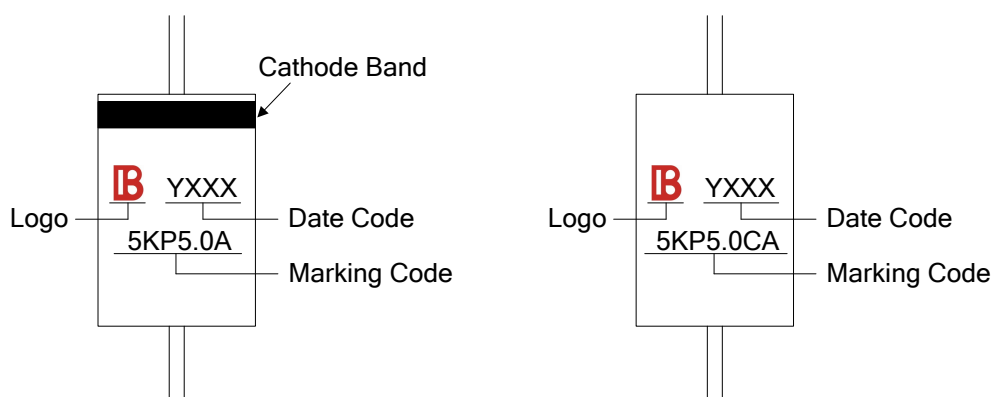
## Recommended Soldering Conditions

### Wave Soldering

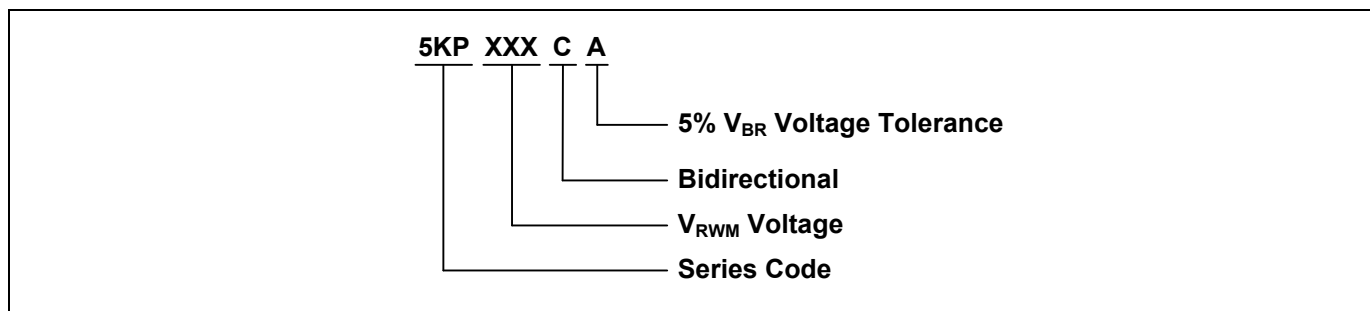


| Item             | Conditions |
|------------------|------------|
| Peak Temperature | 265°C      |
| Dipping Time     | 10 seconds |
| Soldering        | 1 time     |

## Marking Code



## 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

| 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 |                |
|      |  |                  |                |