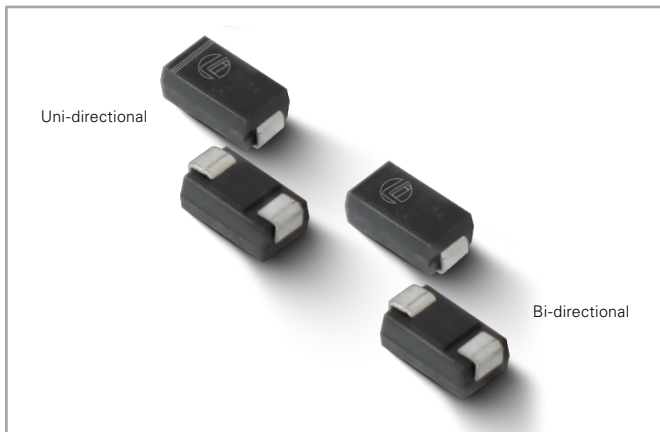


# P6SMAJ Series

## Surface Mount – 600W



## Description

The P6SMAJ series is designed specifically to protect sensitive electronic equipment from voltage transients induced by lightning and other transient voltage events.

## Features

- 600W peak pulse power capability at 10/1000 $\mu$ s waveform, repetition rate (duty cycles):0.01%
- Excellent clamping capability
- Typical  $I_R$  less than 1 $\mu$ A when  $V_B$  min>10V
- Surface mount footprint for compact PCB layout
- Low profile package
- Typical failure mode due to exceeding maximum ratings is a short circuit condition
- Whisker test conducted based on Table 4a and 4c of JEDEC JESD201A
- ESD protection of data lines in accordance with IEC 61000-4-2, 30kV(Air), 30kV (Contact)
- EFT protection of data lines in accordance with IEC 61000-4-4
- Built-in strain relief
- Fast response time: typically less than 1.0ps from 0V to  $V_B$  min
- High temperature to reflow soldering guaranteed: 260 $^{\circ}$ C/20~40sec.
- $V_B @ T_J = V_B @ 25^{\circ}$ C  $\times (1 + \alpha T_x (T_J - 25))$  ( $\alpha$  T:Temperature Coefficient, typical value is 0.1%)
- Meet MSL level1, per J-STD-020, LF maximum peak of 260 $^{\circ}$ C
- 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)

## Additional Information



Resources



Accessories



Samples

## Maximum Ratings and Thermal Characteristics

( $T_A=25$  C unless otherwise noted)

| Parameter  | Symbol          | Value      | Unit           |
|--|-----------------|------------|----------------|
| Peak Pulse Power Dissipation by 10/1000 $\mu$ s Waveform(Fig.1)(Note 1),(Note 2) -Single Die Parts | $P_{PPM}$       | 600        | W              |
| Power Dissipation on Infinite Heat Sink at $T_L=50^{\circ}$ C                                      | $P_D$           | 5          | W              |
| Peak Forward Surge Current, 8.3ms Single Half Sine Wave (Note 3)                                   | $I_{FSM}$       | 60         | A              |
| Maximum Instantaneous Forward Voltage at 25A for Unidirectional Only                               | $V_F$           | 3.5        | V              |
| Operating Temperature Range  | $T_J$           | -55 to 150 | $^{\circ}$ C   |
| Storage Temperature Range  | $T_{STG}$       | -55 to 150 | $^{\circ}$ C   |
| Typical Thermal Resistance Junction to Lead  | $R_{\theta JL}$ | 30         | $^{\circ}$ C/W |
| Typical Thermal Resistance Junction to Ambient   | $R_{\theta JA}$ | 120        | $^{\circ}$ C/W |

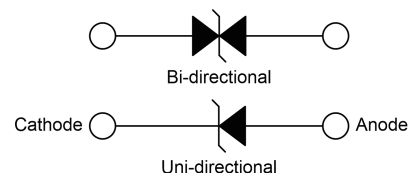
### Notes:

1. Non-repetitive current pulse, per Fig.3 and derated above  $T_J$ (initial) =25 $^{\circ}$ C per Fig.2.
2. Mounted on 5.0x5.0mm copper pad to each terminal.
3. Measured on 8.3ms single half sine wave or equivalent square wave for unidirectional device only.

## Applications

TVS devices 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



# P6SMAJ Series

## Surface Mount – 600W

### Electrical Characteristics ( $T_A=25^\circ\text{C}$ unless otherwise noted)

| Part Number |             | Device Marking Code |     | Reverse Stand-Off Voltage | Breakdown Voltage @ $I_T$ |                        | Test Current     | Maximum Clamping Voltage @ $I_{PP}$ | Peak Pulse Current | Reverse Leakage @ $V_R$ |
|-------------|-------------|---------------------|-----|---------------------------|---------------------------|------------------------|------------------|-------------------------------------|--------------------|-------------------------|
| Uni.        | Bi.         | Uni.                | Bi. | $V_R(V)$                  | $V_{B\text{ Min.}}(V)$    | $V_{B\text{ Max.}}(V)$ | $I_T(\text{mA})$ | $V_C(V)$                            | $I_{PP}(A)$        | $I_R(\mu A)$            |
| P6SMAJ5.0A  | P6SMAJ5.0CA | KE                  | AE  | 5.0                       | 6.40                      | 7.00                   | 10               | 9.2                                 | 65.3               | 800                     |
| P6SMAJ6.0A  | P6SMAJ6.0CA | KG                  | AG  | 6.0                       | 6.67                      | 7.37                   | 10               | 10.3                                | 58.3               | 800                     |
| P6SMAJ6.5A  | P6SMAJ6.5CA | KK                  | AK  | 6.5                       | 7.22                      | 7.98                   | 10               | 11.2                                | 53.6               | 500                     |
| P6SMAJ7.0A  | P6SMAJ7.0CA | KM                  | AM  | 7.0                       | 7.78                      | 8.60                   | 10               | 12.0                                | 50.0               | 200                     |
| P6SMAJ7.5A  | P6SMAJ7.5CA | KP                  | AP  | 7.5                       | 8.33                      | 9.21                   | 1                | 12.9                                | 46.6               | 100                     |
| P6SMAJ8.0A  | P6SMAJ8.0CA | KR                  | AR  | 8.0                       | 8.89                      | 9.83                   | 1                | 13.6                                | 44.2               | 50                      |
| P6SMAJ8.5A  | P6SMAJ8.5CA | KT                  | AT  | 8.5                       | 9.44                      | 10.40                  | 1                | 14.4                                | 41.7               | 20                      |
| P6SMAJ9.0A  | P6SMAJ9.0CA | KV                  | AV  | 9.0                       | 10.00                     | 11.10                  | 1                | 15.4                                | 39.0               | 10                      |
| P6SMAJ10A   | P6SMAJ10CA  | KX                  | AX  | 10.0                      | 11.10                     | 12.30                  | 1                | 17.0                                | 35.3               | 5                       |
| P6SMAJ11A   | P6SMAJ11CA  | KZ                  | AZ  | 11.0                      | 12.20                     | 13.50                  | 1                | 18.2                                | 33.0               | 1                       |
| P6SMAJ12A   | P6SMAJ12CA  | LE                  | BE  | 12.0                      | 13.30                     | 14.70                  | 1                | 19.9                                | 30.2               | 1                       |
| P6SMAJ13A   | P6SMAJ13CA  | LG                  | BG  | 13.0                      | 14.40                     | 15.90                  | 1                | 21.5                                | 28.0               | 1                       |
| P6SMAJ14A   | P6SMAJ14CA  | LK                  | BK  | 14.0                      | 15.60                     | 17.20                  | 1                | 23.2                                | 25.9               | 1                       |
| P6SMAJ15A   | P6SMAJ15CA  | LM                  | BM  | 15.0                      | 16.70                     | 18.50                  | 1                | 24.4                                | 24.6               | 1                       |
| P6SMAJ16A   | P6SMAJ16CA  | LP                  | BP  | 16.0                      | 17.80                     | 19.70                  | 1                | 26.0                                | 23.1               | 1                       |
| P6SMAJ17A   | P6SMAJ17CA  | LR                  | BR  | 17.0                      | 18.90                     | 20.90                  | 1                | 27.6                                | 21.8               | 1                       |
| P6SMAJ18A   | P6SMAJ18CA  | LT                  | BT  | 18.0                      | 20.00                     | 22.10                  | 1                | 29.2                                | 20.6               | 1                       |
| P6SMAJ20A   | P6SMAJ20CA  | LV                  | BV  | 20.0                      | 22.20                     | 24.50                  | 1                | 32.4                                | 18.6               | 1                       |
| P6SMAJ22A   | P6SMAJ22CA  | LX                  | BX  | 22.0                      | 24.40                     | 26.90                  | 1                | 35.5                                | 16.9               | 1                       |
| P6SMAJ24A   | P6SMAJ24CA  | LZ                  | BZ  | 24.0                      | 26.70                     | 29.50                  | 1                | 38.9                                | 15.5               | 1                       |
| P6SMAJ26A   | P6SMAJ26CA  | ME                  | CE  | 26.0                      | 28.90                     | 31.90                  | 1                | 42.1                                | 14.3               | 1                       |
| P6SMAJ28A   | P6SMAJ28CA  | MG                  | CG  | 28.0                      | 31.10                     | 34.40                  | 1                | 45.4                                | 13.3               | 1                       |
| P6SMAJ30A   | P6SMAJ30CA  | MK                  | CK  | 30.0                      | 33.30                     | 36.80                  | 1                | 48.4                                | 12.4               | 1                       |
| P6SMAJ33A   | P6SMAJ33CA  | MM                  | CM  | 33.0                      | 36.70                     | 40.60                  | 1                | 53.3                                | 11.3               | 1                       |
| P6SMAJ36A   | P6SMAJ36CA  | MP                  | CP  | 36.0                      | 40.00                     | 44.20                  | 1                | 58.1                                | 10.4               | 1                       |
| P6SMAJ40A   | P6SMAJ40CA  | MR                  | CR  | 40.0                      | 44.40                     | 49.10                  | 1                | 64.5                                | 9.3                | 1                       |
| P6SMAJ43A   | P6SMAJ43CA  | MT                  | CT  | 43.0                      | 47.80                     | 52.80                  | 1                | 69.4                                | 8.7                | 1                       |
| P6SMAJ45A   | P6SMAJ45CA  | MV                  | CV  | 45.0                      | 50.00                     | 55.30                  | 1                | 72.7                                | 8.3                | 1                       |
| P6SMAJ48A   | P6SMAJ48CA  | MX                  | CX  | 48.0                      | 53.30                     | 58.90                  | 1                | 77.4                                | 7.8                | 1                       |
| P6SMAJ51A   | P6SMAJ51CA  | MZ                  | CZ  | 51.0                      | 56.70                     | 62.70                  | 1                | 82.4                                | 7.3                | 1                       |
| P6SMAJ54A   | P6SMAJ54CA  | NE                  | DE  | 54.0                      | 60.00                     | 66.30                  | 1                | 87.1                                | 6.9                | 1                       |
| P6SMAJ58A   | P6SMAJ58CA  | NG                  | DG  | 58.0                      | 64.40                     | 71.20                  | 1                | 93.6                                | 6.5                | 1                       |

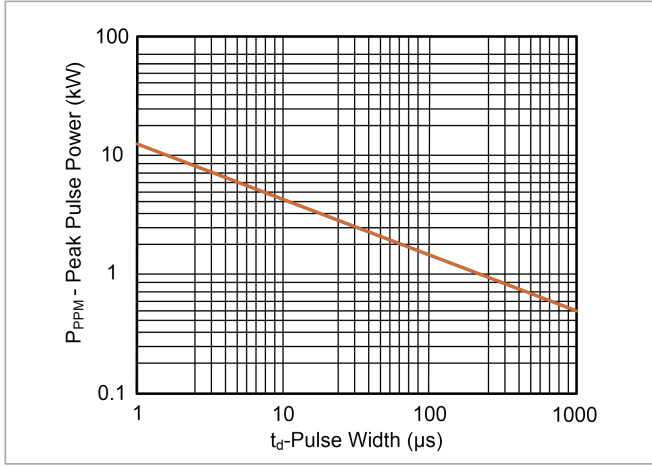
**Notes:**For bidirectional type having  $V_R$  of 10 volts and less, the  $I_R$  limit is double. $V_B @ T_A = V_B @ 25^\circ\text{C} \times (1 + \alpha T \times (T_A - 25))$  ( $\alpha T$ : Temperature Coefficient)

# P6SMAJ Series

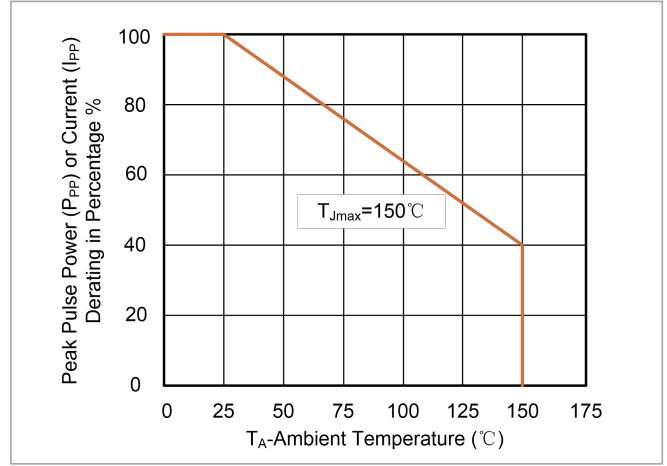
## Surface Mount – 600W

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

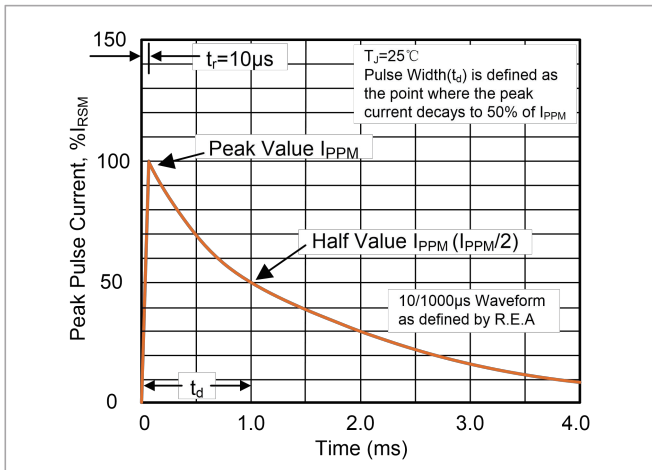
**Figure 1:**  
Peak Pulse Power Rating Curve



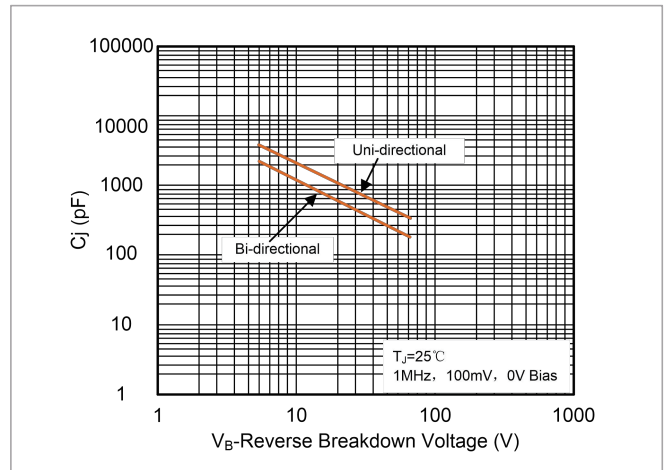
**Figure 2:**  
Pulse Derating Curve



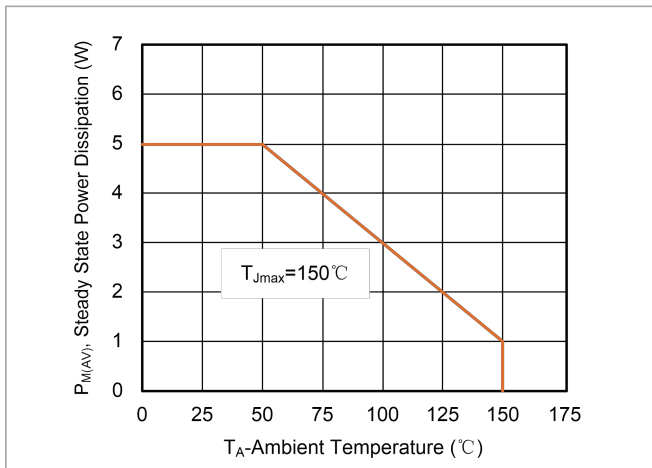
**Figure 3:**  
Pulse Waveform



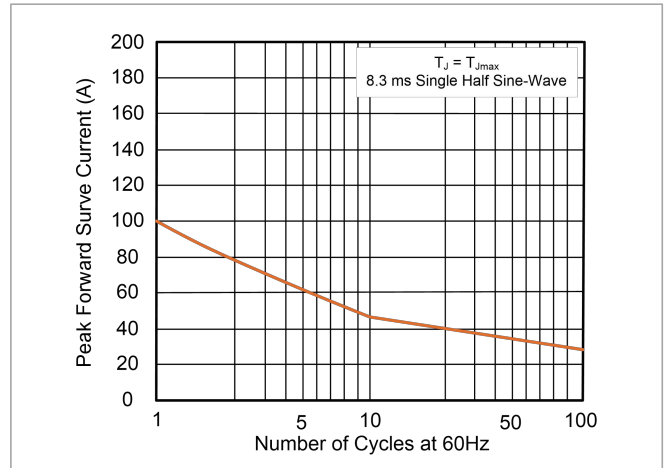
**Figure 4:**  
Typical Junction Capacitance



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



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

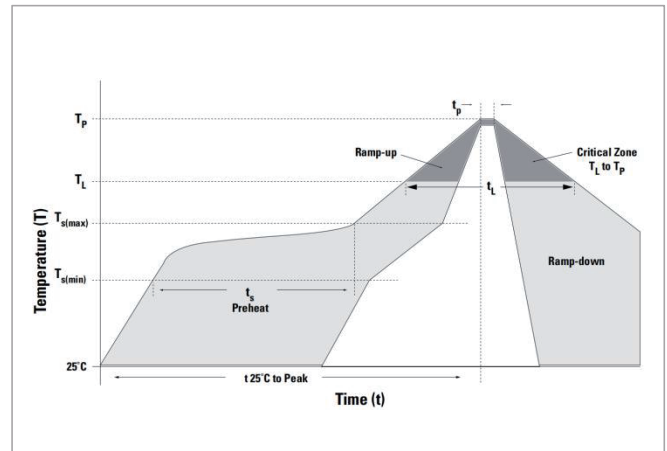


# P6SMAJ Series

## Surface Mount – 600W

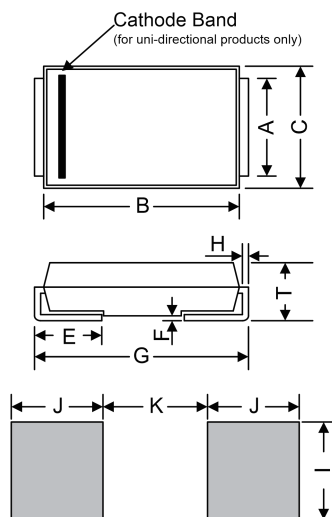
### Soldering Parameters

|  |                                   |                    |
|--|-----------------------------------|--------------------|
| <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_L</math>) to peak <math>T_{S\ max}</math>) to <math>T_L</math>-Ramp-up Rate</b> |                                   | 3°C/second max.    |
| <b>Reflow</b>  | -Temperature ( $T_L$ ) (Liquidus) | 217°C              |
|  | -Time (min to max) ( $t_L$ )      | 60-150 seconds     |
| <b>Peak Temperature (<math>T_P</math>)</b>   |                                   | 260°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</b>   |                                   | 8 minutes max.     |
| <b>Do not exceed</b>   |                                   | 260°C              |



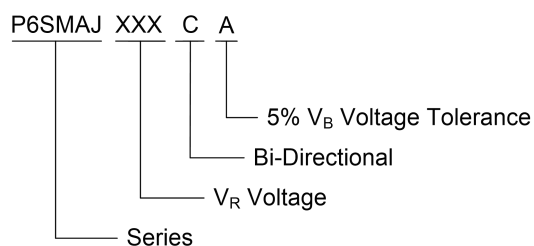
### Dimensions

#### DO-214AC (SMA)

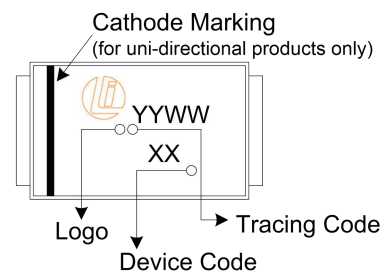


| Symbol   | Millimeters |       | Inches |       |
|----------|-------------|-------|--------|-------|
|          | Min.        | Max.  | Min.   | Max.  |
| <b>A</b> | 1.250       | 1.650 | 0.049  | 0.065 |
| <b>B</b> | 3.990       | 4.600 | 0.157  | 0.181 |
| <b>C</b> | 2.400       | 2.790 | 0.095  | 0.110 |
| <b>E</b> | 0.780       | 1.520 | 0.030  | 0.060 |
| <b>F</b> | -           | 0.203 | -      | 0.008 |
| <b>G</b> | 4.800       | 5.280 | 0.189  | 0.208 |
| <b>H</b> | 0.152       | 0.305 | 0.006  | 0.012 |
| <b>T</b> | 1.900       | 2.290 | 0.075  | 0.090 |
| <b>I</b> | 1.800       | -     | 0.070  | -     |
| <b>J</b> | 2.100       | -     | 0.082  | -     |
| <b>K</b> | -           | 2.300 | -      | 0.090 |

### Part Numbering System



### Part Marking System



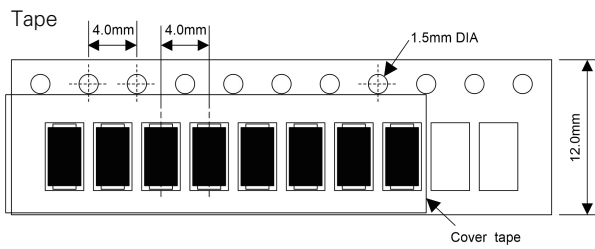
# P6SMAJ Series

## Surface Mount – 600W

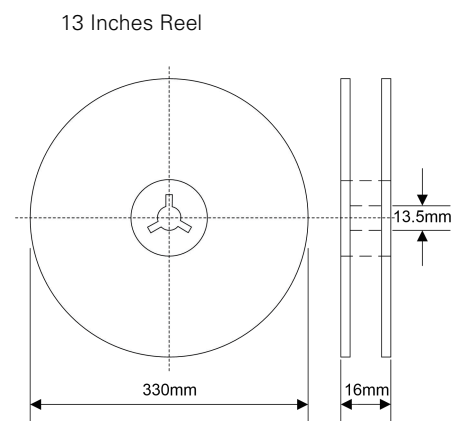
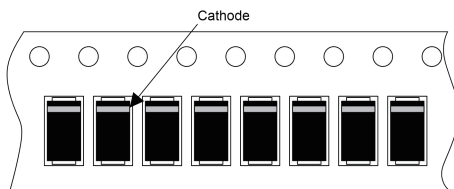
### Packaging Options

| Part number | Component Package | Quantity | Packaging Option                 | Packaging Specification |
|-------------|-------------------|----------|----------------------------------|-------------------------|
| P6SMAJxxxXX | DO-214AC          | 5000     | Tape & Reel - 12mm tape/13" reel | EIA STD RS-481          |

### Tape and Reel Specification



For Uni-Devices



Quantity: 5000pcs/reel

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