

## Transient Voltage Suppressors (TVS) Data Sheet

### Features

- Glass passivated junction
- Low zener impedance
- Excellent clamping capability
- 5000W peak pulse power capability at 10/1000μs waveform, repetition rate (duty cycle):0.01%
- Fast response time
- Typical  $I_R$  less than 1μA above 11V.
- Plastic package has underwriters laboratory flammability 94V-0
- Meets MSL level 1, per J-STD-020.
- AEC-Q101 Qualified

### Mechanical Data

- Case: JEDEC DO-214AB Moulded plastic
- Terminal: solderplated, solderable per MIL-STD-750, Method 2026
- Polarity: Color band denotes cathode except bi-directional models
- Mounting Position: Any

### 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.4)                                         | $P_{M(AV)}$     | 6.5          | Watts |
| Peak forward surge current, 8.3ms single half sine-wave superimposed on rated load, (JEDEC Method) (Note2) | $I_{FSM}$       | 300          | Amps  |
| Operating junction and Storage Temperature Range.                                                          | $T_J, T_{STG}$  | -55 to +150  | °C    |
| Typical thermal resistance junction to lead                                                                | $R_{\theta JL}$ | 15           | °C/W  |
| Typical thermal resistance junction to ambient                                                             | $R_{\theta JA}$ | 75           | °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 (DO-214AB/SMC)

| Symbol | Millimeters |      | Inches |       |
|--------|-------------|------|--------|-------|
|        | Min.        | Max. | Min.   | Max.  |
| L      | 6.60        | 7.71 | 0.260  | 0.280 |
| D      | 5.59        | 6.22 | 0.220  | 0.245 |
| D1     | 2.9         | 3.20 | 0.114  | 0.126 |
| T      | 7.75        | 8.13 | 0.305  | 0.320 |
| T1     | 0.76        | 1.52 | 0.030  | 0.060 |
| d      | -           | 0.20 | -      | 0.008 |
| H      | 2.06        | 2.62 | 0.079  | 0.103 |

### Electrical Characteristics (TA=25°C)

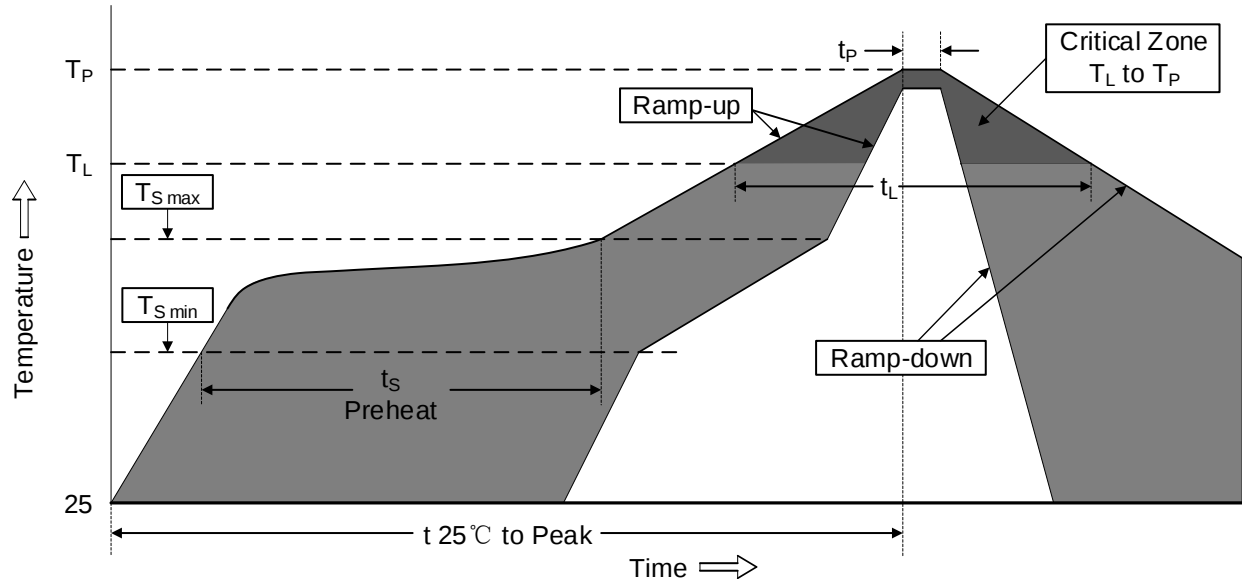
| Part Number    |                | Device Marking Code |      | Reverse Stand-Off Voltage | Breakdown Voltage @I <sub>T</sub> | Test Current        | Maximum Clamping Voltage@ I <sub>PP</sub> | Peak Pulse Current  | Reverse Leakage @V <sub>RWM</sub> |
|----------------|----------------|---------------------|------|---------------------------|-----------------------------------|---------------------|-------------------------------------------|---------------------|-----------------------------------|
| Unidirectional | Bidirectional  | UNI                 | BI   | 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)               |
| 5.0SMDJ11A-AR  | 5.0SMDJ11CA-AR | 5PEN                | 5BEN | 11.0                      | 12.2~13.5                         | 10                  | 18.2                                      | 274.7               | 800                               |
| 5.0SMDJ12A-AR  | 5.0SMDJ12CA-AR | 5PEP                | 5BEP | 12.0                      | 13.3~14.7                         | 10                  | 19.9                                      | 251.3               | 800                               |
| 5.0SMDJ13A-AR  | 5.0SMDJ13CA-AR | 5PEQ                | 5BEQ | 13.0                      | 14.4~15.9                         | 10                  | 21.5                                      | 232.6               | 500                               |
| 5.0SMDJ14A-AR  | 5.0SMDJ14CA-AR | 5PER                | 5BER | 14.0                      | 15.6~17.2                         | 10                  | 23.2                                      | 215.5               | 200                               |
| 5.0SMDJ15A-AR  | 5.0SMDJ15CA-AR | 5PES                | 5BES | 15.0                      | 16.7~18.5                         | 1                   | 24.4                                      | 204.9               | 100                               |
| 5.0SMDJ16A-AR  | 5.0SMDJ16CA-AR | 5PET                | 5BET | 16.0                      | 17.8~19.7                         | 1                   | 26.0                                      | 192.3               | 50                                |
| 5.0SMDJ17A-AR  | 5.0SMDJ17CA-AR | 5PEU                | 5BEU | 17.0                      | 18.9~20.9                         | 1                   | 27.6                                      | 181.2               | 20                                |
| 5.0SMDJ18A-AR  | 5.0SMDJ18CA-AR | 5PEV                | 5BEV | 18.0                      | 20.0~22.1                         | 1                   | 29.2                                      | 171.2               | 10                                |
| 5.0SMDJ20A-AR  | 5.0SMDJ20CA-AR | 5PEW                | 5BEW | 20.0                      | 22.2~24.5                         | 1                   | 32.4                                      | 154.3               | 5                                 |
| 5.0SMDJ22A-AR  | 5.0SMDJ22CA-AR | 5PEX                | 5BEX | 22.0                      | 24.4~26.9                         | 1                   | 35.5                                      | 140.8               | 5                                 |
| 5.0SMDJ24A-AR  | 5.0SMDJ24CA-AR | 5PEZ                | 5BEZ | 24.0                      | 26.7~29.5                         | 1                   | 38.9                                      | 128.5               | 5                                 |
| 5.0SMDJ26A-AR  | 5.0SMDJ26CA-AR | 5PFE                | 5BFE | 26.0                      | 28.9~31.9                         | 1                   | 42.1                                      | 119.0               | 5                                 |
| 5.0SMDJ28A-AR  | 5.0SMDJ28CA-AR | 5PFG                | 5BFG | 28.0                      | 31.1~34.4                         | 1                   | 45.4                                      | 110.0               | 5                                 |
| 5.0SMDJ30A-AR  | 5.0SMDJ30CA-AR | 5PFK                | 5BFK | 30.0                      | 33.3~36.8                         | 1                   | 48.4                                      | 103.0               | 5                                 |
| 5.0SMDJ33A-AR  | 5.0SMDJ33CA-AR | 5PFM                | 5BFM | 33.0                      | 36.7~40.6                         | 1                   | 53.3                                      | 93.9                | 5                                 |
| 5.0SMDJ36A-AR  | 5.0SMDJ36CA-AR | 5PFP                | 5BFP | 36.0                      | 40.0~44.2                         | 1                   | 58.1                                      | 86.1                | 5                                 |
| 5.0SMDJ40A-AR  | 5.0SMDJ40CA-AR | 5PFR                | 5BFR | 40.0                      | 44.4~49.1                         | 1                   | 64.5                                      | 77.6                | 5                                 |
| 5.0SMDJ43A-AR  | 5.0SMDJ43CA-AR | 5PFT                | 5BFT | 43.0                      | 47.8~52.8                         | 1                   | 69.4                                      | 72.1                | 5                                 |
| 5.0SMDJ45A-AR  | 5.0SMDJ45CA-AR | 5PFV                | 5BFV | 45.0                      | 50.0~55.3                         | 1                   | 72.7                                      | 68.8                | 5                                 |
| 5.0SMDJ48A-AR  | 5.0SMDJ48CA-AR | 5PFX                | 5BFX | 48.0                      | 53.3~58.9                         | 1                   | 77.4                                      | 64.7                | 5                                 |
| 5.0SMDJ51A-AR  | 5.0SMDJ51CA-AR | 5PFZ                | 5BFZ | 51.0                      | 56.7~62.7                         | 1                   | 82.4                                      | 60.7                | 5                                 |

## Electrical Characteristics (TA=25°C)

| Part Number    |                 | Device Marking Code |      | Reverse Stand-Off Voltage | Breakdown Voltage @IT | Test Current        | Maximum Clamping Voltage@<br>I <sub>PP</sub> | Peak Pulse Current  | Reverse Leakage @ V <sub>RWM</sub> |
|----------------|-----------------|---------------------|------|---------------------------|-----------------------|---------------------|----------------------------------------------|---------------------|------------------------------------|
| Unidirectional | Bidirectional   | UNI                 | BI   | 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)                |
| 5.0SMDJ54A-AR  | 5.0SMDJ54CA-AR  | 5PGE                | 5BGE | 54.0                      | 60.0~66.3             | 1                   | 87.1                                         | 57.5                | 2                                  |
| 5.0SMDJ58A-AR  | 5.0SMDJ58CA-AR  | 5PGG                | 5BGG | 58.0                      | 64.4~71.2             | 1                   | 93.6                                         | 53.5                | 2                                  |
| 5.0SMDJ60A-AR  | 5.0SMDJ60CA-AR  | 5PGK                | 5BGK | 60.0                      | 66.7~73.7             | 1                   | 96.8                                         | 51.7                | 2                                  |
| 5.0SMDJ64A-AR  | 5.0SMDJ64CA-AR  | 5PGM                | 5BGM | 64.0                      | 71.1~78.6             | 1                   | 103.0                                        | 48.6                | 2                                  |
| 5.0SMDJ70A-AR  | 5.0SMDJ70CA-AR  | 5PGP                | 5BGB | 70.0                      | 77.8~86.0             | 1                   | 113.0                                        | 44.3                | 2                                  |
| 5.0SMDJ75A-AR  | 5.0SMDJ75CA-AR  | 5PGR                | 5BGR | 75.0                      | 83.3~92.1             | 1                   | 121.0                                        | 41.4                | 2                                  |
| 5.0SMDJ78A-AR  | 5.0SMDJ78CA-AR  | 5PGT                | 5BGT | 78.0                      | 86.7~95.8             | 1                   | 126.0                                        | 39.7                | 2                                  |
| 5.0SMDJ85A-AR  | 5.0SMDJ85CA-AR  | 5PGV                | 5BGV | 85.0                      | 94.4~104              | 1                   | 137.0                                        | 36.5                | 2                                  |
| 5.0SMDJ90A-AR  | 5.0SMDJ90CA-AR  | 5PGX                | 5BGX | 90.0                      | 100~111               | 1                   | 146.0                                        | 34.3                | 2                                  |
| 5.0SMDJ100A-AR | 5.0SMDJ100CA-AR | 5PGZ                | 5BGZ | 100.0                     | 111~123               | 1                   | 162.0                                        | 30.9                | 2                                  |
| 5.0SMDJ110A-AR | 5.0SMDJ110CA-AR | 5PHE                | 5BHE | 110.0                     | 122~135               | 1                   | 177.0                                        | 28.3                | 2                                  |
| 5.0SMDJ120A-AR | 5.0SMDJ120CA-AR | 5PHG                | 5BHG | 120.0                     | 133~147               | 1                   | 193.0                                        | 26.0                | 2                                  |
| 5.0SMDJ130A-AR | 5.0SMDJ130CA-AR | 5PHK                | 5BHK | 130.0                     | 144~159               | 1                   | 209.0                                        | 24.0                | 2                                  |
| 5.0SMDJ140A-AR | 5.0SMDJ140CA-AR | 5PHL                | 5BHL | 140.0                     | 155~171               | 1                   | 227.0                                        | 22.0                | 2                                  |
| 5.0SMDJ150A-AR | 5.0SMDJ150CA-AR | 5PHM                | 5BHM | 150.0                     | 167~185               | 1                   | 243.0                                        | 20.6                | 2                                  |
| 5.0SMDJ160A-AR | 5.0SMDJ160CA-AR | 5PHP                | 5BHP | 160.0                     | 178~197               | 1                   | 259.0                                        | 19.3                | 2                                  |
| 5.0SMDJ170A-AR | 5.0SMDJ170CA-AR | 5PHR                | 5BHR | 170.0                     | 189~209               | 1                   | 275.0                                        | 18.2                | 2                                  |

### Recommended Soldering Conditions

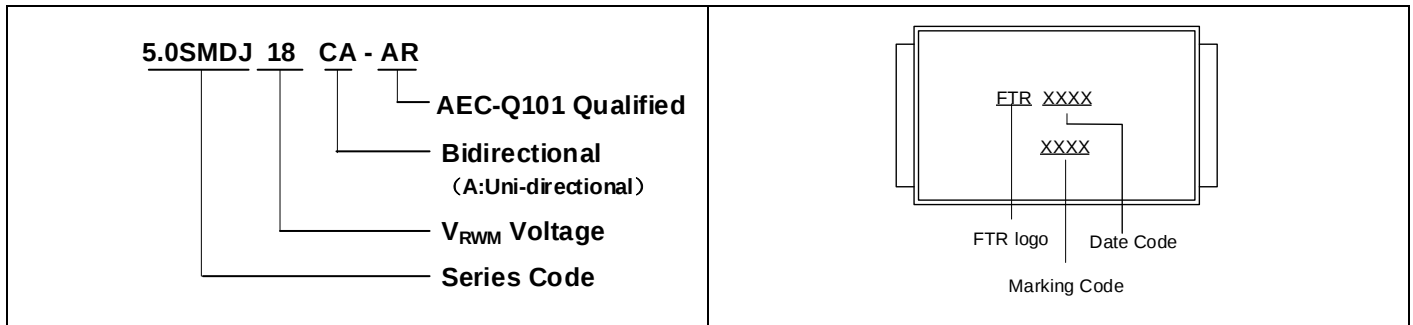
#### Reflow Soldering



#### Recommended Conditions

| Profile Feature                                                                                                                                                                          | Pb-Free Assembly                 |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------|
| Average ramp-up rate (T <sub>L</sub> to T <sub>P</sub> )                                                                                                                                 | 3°C/second max.                  |
| Preheat <ul style="list-style-type: none"> <li>-Temperature Min (T<sub>S min</sub>)</li> <li>-Temperature Max (T<sub>S max</sub>)</li> <li>-Time (min to max)( t<sub>S</sub>)</li> </ul> | 150°C<br>200°C<br>60-180 seconds |
| T <sub>S max</sub> to T <sub>L</sub> <ul style="list-style-type: none"> <li>-Ramp-up Rate</li> </ul>                                                                                     | 3°C/second max.                  |
| Time maintained above: <ul style="list-style-type: none"> <li>-Temperature (T<sub>L</sub>)</li> <li>-Time (t<sub>L</sub>)</li> </ul>                                                     | 217°C<br>60-150 seconds          |
| Peak Temperature (T <sub>P</sub> )                                                                                                                                                       | 260°C                            |
| Time within 5°C of actual Peak Temperature (t <sub>P</sub> )                                                                                                                             | 20-40 seconds                    |
| Ramp-down Rate                                                                                                                                                                           | 6°C/second max.                  |
| Time 25°C to Peak Temperature                                                                                                                                                            | 8 minutes max.                   |

### Partnumber code



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

Figure 1. Peak Pulse Power Rating Curve

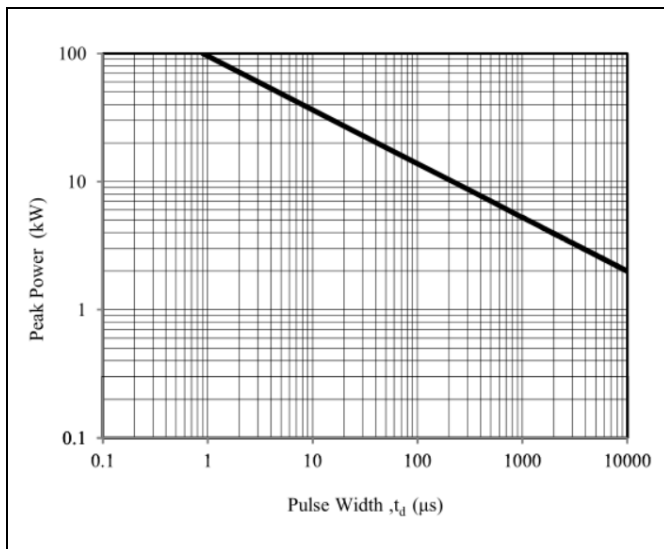


Figure 2. Pulse Derating Curve

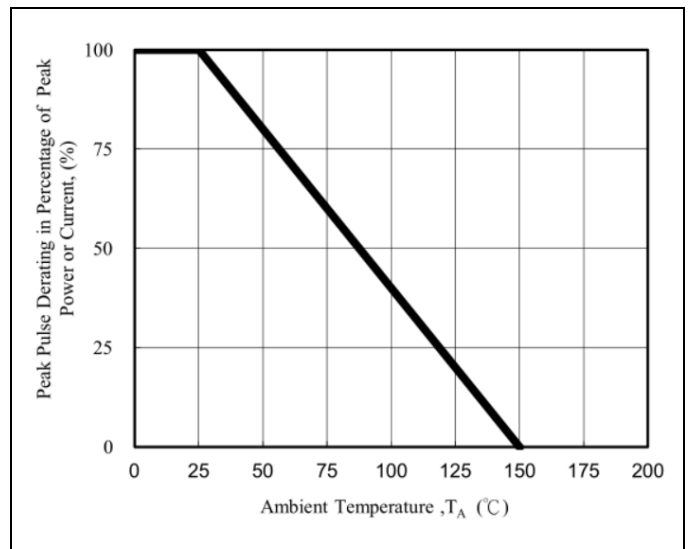


Figure 3. Pulse Waveform

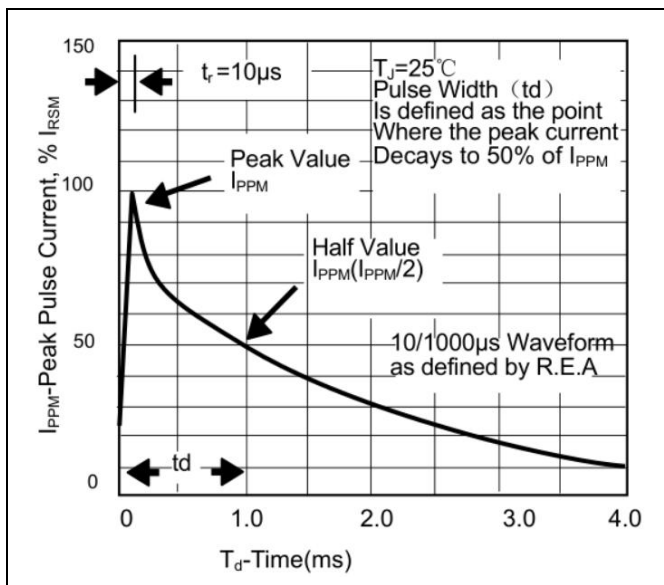
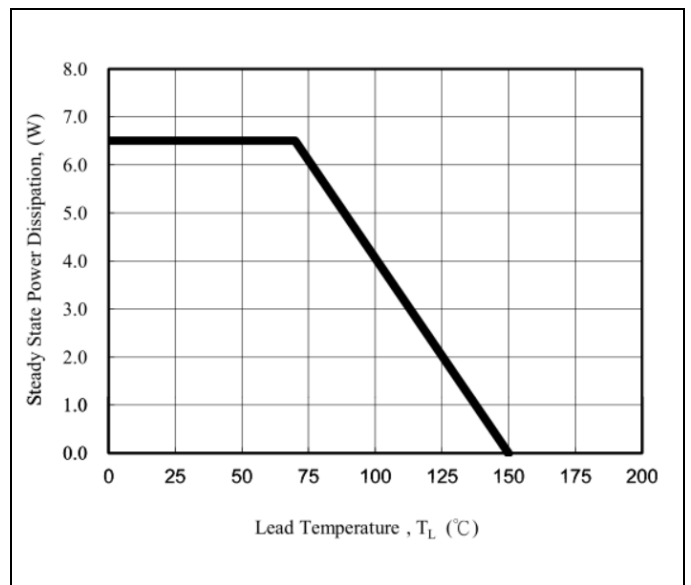


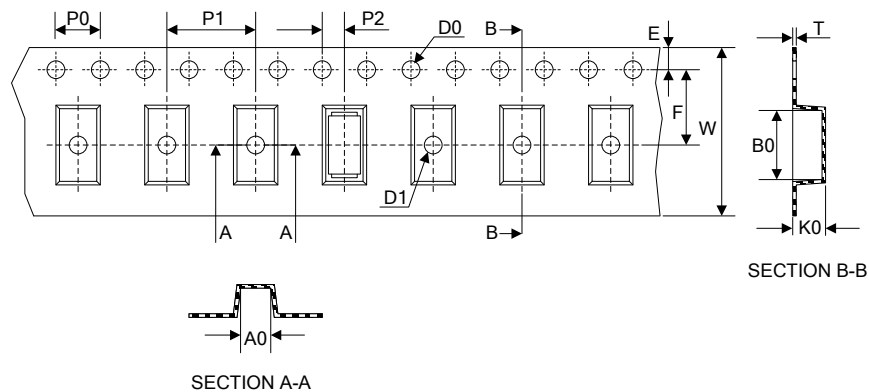
Figure 4. Steady State Power Dissipation Derating Curve



### Packaging

| Tape              | Symbol | Dimension (mm) |
|-------------------|--------|----------------|
|                   | W      | 16.00±0.10     |
|                   | P0     | 4.00±0.10      |
|                   | P1     | 8.00±0.10      |
|                   | P2     | 2.00±0.10      |
|                   | D0     | Φ1.55±0.10     |
|                   | E      | 1.75±0.10      |
|                   | F      | 7.50±0.10      |
|                   | A0     | 6.05±0.1       |
|                   | B0     | 8.31±0.1       |
| Reel              | K0     | 2.54±0.1       |
|                   | T      | 0.25±0.1       |
|                   | D5     | Φ330.0±2.0     |
|                   | D6     | Φ13.5±0.5      |
|                   | H      | 2.5±1.0        |
|                   | W2     | 20.0±2.0       |
| Quantity: 3000PCS |        |                |

Tape



Reel

