

Transient Voltage Suppressors (TVS) Data Sheet

Features

- Glass passivated junction
- Low zener impedance
- Excellent clamping capability
- 1500W peak pulse power capability at 10/1000 μ s waveform, repetition rate (duty cycle):0.01%
- Fast response time
- Typical I_R less than 1 μ A above 13V.
- Plastic package has underwriters laboratory flammability 94V-0
- Meets MSL level 1, per J-STD-020.

Mechanical Data

- Case: JEDEC DO-201Moulded plastic
- Terminal: Axial leads, 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 $^{\circ}$ C ambient temperature unless otherwise specified.

| Rating | Symbol | Value | Units |
|--|-----------------|-----------------|----------------|
| Peak pulse power dissipation at 10/1000 μ s waveform (Note1, Fig.1) | P_{PPM} | Minimum 1500 | Watts |
| Peak pulse current of at 10/1000 μ s waveform (Note 1, Fig.3) | I_{PPM} | See Table | Amps |
| Steady state power dissipation at $T_L=75^{\circ}$ 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} | 200 | Amps |
| Operating junction and Storage Temperature Range. | T_J, T_{STG} | -55 to +150 | $^{\circ}$ C |
| Maximum instantaneous forward voltage @ 50A forunidirectional only (Note3) | V_F | 3.5/5.0 | V |
| Typical thermal resistance junction to lead | $R_{\theta JL}$ | 15 | $^{\circ}$ C/W |
| Typical thermal resistance junction to ambient | $R_{\theta JA}$ | 75 | $^{\circ}$ 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.

3. $V_F = 3.5$ V for devices of V (BR) < 220V, and $V_F = 5.0$ Volt max. for devices of V (BR) >220V

Dimensions (DO-201)

| 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 (T_A=25°C)

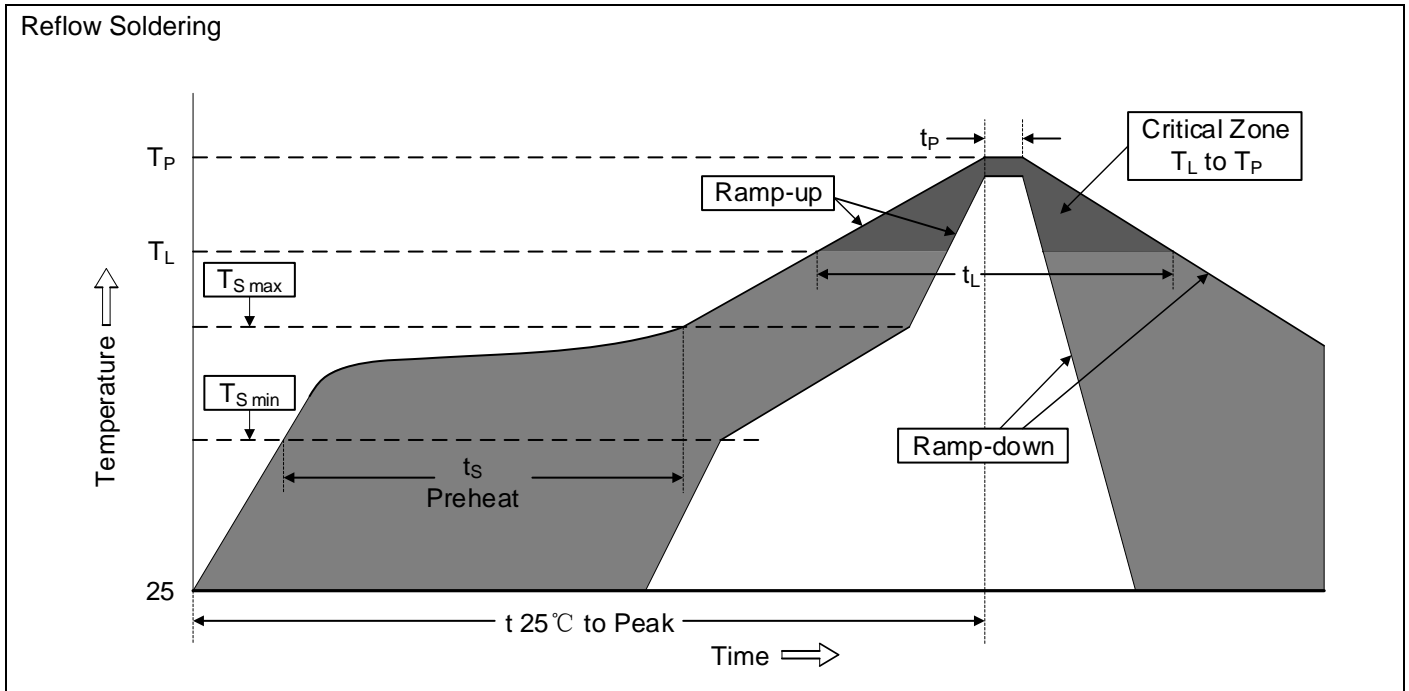
| Part Number | | Device Marking Code | | Reverse Stand-Off Voltage | Breakdown Voltage @I _T | Test Current | Maximum Clamping Voltage@I _{PP} | Peak Pulse Current | Reverse Leakage @V _{RWM} |
|----------------|---------------|---------------------|------|---------------------------|-----------------------------------|---------------------|--|---------------------|-----------------------------------|
| Unidirectional | Bidirectional | UNI | BI | V _{RWM} (V) | V _{BR} (V) | I _T (mA) | V _C (V) | I _{PP} (A) | I _R (μA) |
| 1.5SMC6.8A | 1.5SMC6.8CA | 6V8A | 6V8C | 5.80 | 6.45~7.14 | 10 | 10.5 | 144.8 | 1000 |
| 1.5SMC7.5A | 1.5SMC7.5CA | 7V5A | 7V5C | 6.40 | 7.13~7.88 | 10 | 11.3 | 134.5 | 500 |
| 1.5SMC8.2A | 1.5SMC8.2CA | 8V2A | 8V2C | 7.02 | 7.79~8.61 | 10 | 12.1 | 125.6 | 200 |
| 1.5SMC9.1A | 1.5SMC9.1CA | 9V1A | 9V1C | 7.78 | 8.65~9.55 | 1 | 13.4 | 113.4 | 50 |
| 1.5SMC10A | 1.5SMC10CA | 10A | 10C | 8.55 | 9.5~10.5 | 1 | 14.5 | 104.8 | 10 |
| 1.5SMC11A | 1.5SMC11CA | 11A | 11C | 9.40 | 10.5~11.6 | 1 | 15.6 | 97.4 | 5 |
| 1.5SMC12A | 1.5SMC12CA | 12A | 12C | 10.2 | 11.4~12.6 | 1 | 16.7 | 91.0 | 5 |
| 1.5SMC13A | 1.5SMC13CA | 13A | 13C | 11.1 | 12.4~13.7 | 1 | 18.2 | 83.5 | 5 |
| 1.5SMC15A | 1.5SMC15CA | 15A | 15C | 12.8 | 14.3~15.8 | 1 | 21.2 | 71.7 | 1 |
| 1.5SMC16A | 1.5SMC16CA | 16A | 16C | 13.6 | 15.2~16.8 | 1 | 22.5 | 67.6 | 1 |
| 1.5SMC18A | 1.5SMC18CA | 18A | 18C | 15.3 | 17.1~18.9 | 1 | 25.2 | 60.3 | 1 |
| 1.5SMC20A | 1.5SMC20CA | 20A | 20C | 17.1 | 19.0~21.0 | 1 | 27.7 | 54.9 | 1 |
| 1.5SMC22A | 1.5SMC22CA | 22A | 22C | 18.8 | 20.9~23.1 | 1 | 30.6 | 49.7 | 1 |
| 1.5SMC24A | 1.5SMC24CA | 24A | 24C | 20.5 | 22.8~25.2 | 1 | 33.2 | 45.8 | 1 |
| 1.5SMC27A | 1.5SMC27CA | 27A | 27C | 23.1 | 25.7~28.4 | 1 | 37.5 | 40.5 | 1 |
| 1.5SMC30A | 1.5SMC30CA | 30A | 30C | 25.6 | 28.5~31.5 | 1 | 41.4 | 36.7 | 1 |
| 1.5SMC33A | 1.5SMC33CA | 33A | 33C | 28.2 | 31.4~34.7 | 1 | 45.7 | 33.3 | 1 |
| 1.5SMC36A | 1.5SMC36CA | 36A | 36C | 30.8 | 34.2~37.8 | 1 | 49.9 | 30.5 | 1 |
| 1.5SMC39A | 1.5SMC39CA | 39A | 39C | 33.3 | 37.1~41.0 | 1 | 53.9 | 28.2 | 1 |
| 1.5SMC43A | 1.5SMC43CA | 43A | 43C | 36.8 | 40.9~45.2 | 1 | 59.3 | 25.6 | 1 |
| 1.5SMC47A | 1.5SMC47CA | 47A | 47C | 40.2 | 44.7~49.4 | 1 | 64.8 | 23.5 | 1 |
| 1.5SMC51A | 1.5SMC51CA | 51A | 51C | 43.6 | 48.5~53.6 | 1 | 70.1 | 21.7 | 1 |

Electrical Characteristics (T_A=25°C)

| 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 _{RWM} |
|----------------|---------------|---------------------|------|---------------------------|------------------------------------|---------------------|--|---------------------|------------------------------------|
| Unidirectional | Bidirectional | UNI | BI | V _{RWM} (V) | V _{BR} (V) | I _T (mA) | V _C (V) | I _{PP} (A) | I _R (μA) |
| 1.5SMC56A | 1.5SMC56CA | 56A | 56C | 47.8 | 53.2~58.8 | 1 | 77.0 | 19.7 | 1 |
| 1.5SMC62A | 1.5SMC62CA | 62A | 62C | 53.0 | 58.9~65.1 | 1 | 85.0 | 17.9 | 1 |
| 1.5SMC68A | 1.5SMC68CA | 68A | 68C | 58.1 | 64.6~71.4 | 1 | 92.0 | 16.5 | 1 |
| 1.5SMC75A | 1.5SMC75CA | 75A | 75C | 64.1 | 71.3~78.8 | 1 | 103.0 | 14.8 | 1 |
| 1.5SMC82A | 1.5SMC82CA | 82A | 82C | 70.1 | 77.9~86.1 | 1 | 113.0 | 13.5 | 1 |
| 1.5SMC91A | 1.5SMC91CA | 91A | 91C | 77.8 | 86.5~95.5 | 1 | 125.0 | 12.2 | 1 |
| 1.5SMC100A | 1.5SMC100CA | 100A | 100C | 85.5 | 95~105 | 1 | 137.0 | 11.1 | 1 |
| 1.5SMC110A | 1.5SMC110CA | 110A | 110C | 94.0 | 105~116 | 1 | 152.0 | 10.0 | 1 |
| 1.5SMC120A | 1.5SMC120CA | 120A | 120C | 102 | 114~126 | 1 | 165.0 | 9.2 | 1 |
| 1.5SMC130A | 1.5SMC130CA | 130A | 130C | 111 | 124~137 | 1 | 179.0 | 8.5 | 1 |
| 1.5SMC150A | 1.5SMC150CA | 150A | 150C | 128 | 143~158 | 1 | 207.0 | 7.3 | 1 |
| 1.5SMC160A | 1.5SMC160CA | 160A | 160C | 136 | 152~168 | 1 | 219.0 | 6.9 | 1 |
| 1.5SMC170A | 1.5SMC170CA | 170A | 170C | 145 | 162~179 | 1 | 234.0 | 6.5 | 1 |
| 1.5SMC180A | 1.5SMC180CA | 180A | 180C | 154 | 171~189 | 1 | 246.0 | 6.2 | 1 |
| 1.5SMC200A | 1.5SMC200CA | 200A | 200C | 171 | 190~210 | 1 | 274.0 | 5.5 | 1 |
| 1.5SMC220A | 1.5SMC220CA | 220A | 220C | 185 | 209~231 | 1 | 328.0 | 4.6 | 1 |
| 1.5SMC250A | 1.5SMC250CA | 250A | 250C | 214 | 237~263 | 1 | 344.0 | 4.4 | 1 |
| 1.5SMC300A | 1.5SMC300CA | 300A | 300C | 256 | 285~315 | 1 | 414.0 | 3.7 | 1 |
| 1.5SMC350A | 1.5SMC350CA | 350A | 350C | 300 | 333~368 | 1 | 482.0 | 3.2 | 1 |
| 1.5SMC400A | 1.5SMC400CA | 400A | 400C | 342 | 380~420 | 1 | 548.0 | 2.8 | 1 |
| 1.5SMC440A | 1.5SMC440CA | 440A | 440C | 376 | 418~462 | 1 | 602.0 | 2.5 | 1 |
| 1.5SMC480A | 1.5SMC480CA | 480A | 480C | 408 | 456~504 | 1 | 658.0 | 2.3 | 1 |
| 1.5SMC510A | 1.5SMC510CA | 510A | 510C | 434 | 485~535 | 1 | 698.0 | 2.1 | 1 |
| 1.5SMC530A | 1.5SMC530CA | 530A | 530C | 450 | 503~556 | 1 | 725.0 | 2.1 | 1 |
| 1.5SMC540A | 1.5SMC540CA | 540A | 540C | 459 | 513~567 | 1 | 740.0 | 2.0 | 1 |
| 1.5SMC550A | 1.5SMC550CA | 550A | 550C | 467 | 523~577 | 1 | 760.0 | 2.0 | 1 |

Notes: For bidirectional type having VRWM of 10V and less, the IR limit is double.

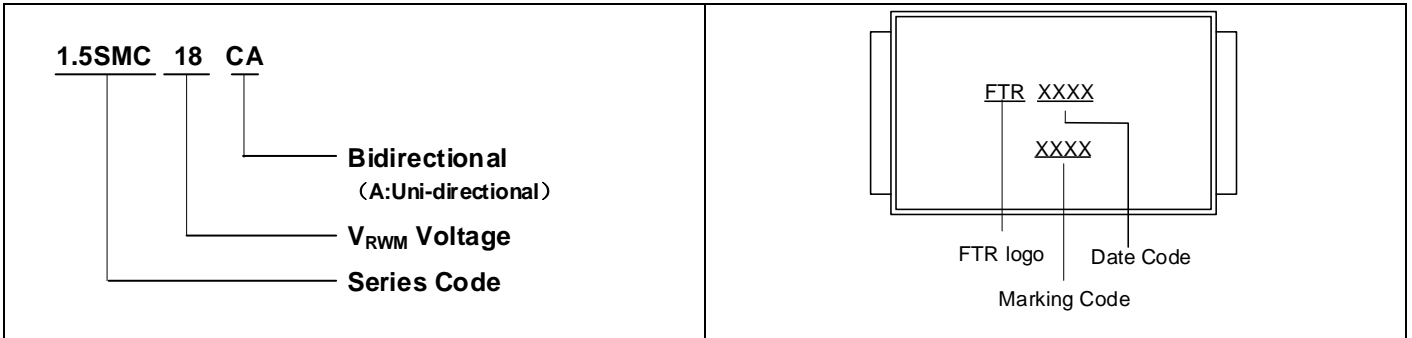
Recommended Soldering Conditions



Recommended Conditions

| Profile Feature | Pb-Free Assembly |
|--|------------------|
| Average ramp-up rate (T_L to T_P) | 3°C/second max. |
| Preheat | |
| -Temperature Min ($T_{S\min}$) | 150°C |
| -Temperature Max ($T_{S\max}$) | 200°C |
| -Time (min to max) (t_s) | 60-180 seconds |
| $T_{S\max}$ to T_L | |
| -Ramp-up Rate | 3°C/second max. |
| Time maintained above: | |
| -Temperature (T_L) | 217°C |
| -Time (t_L) | 60-150 seconds |
| Peak Temperature (T_P) | 260°C |
| Time within 5°C of actual Peak Temperature (t_p) | 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

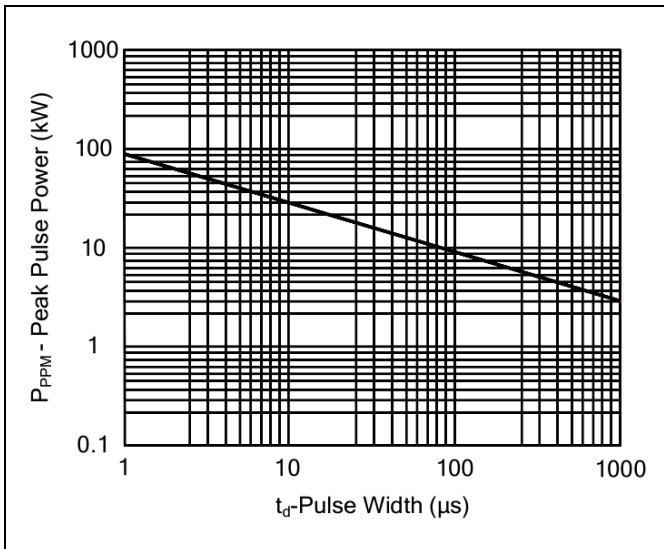


Figure 2. Pulse Derating Curve

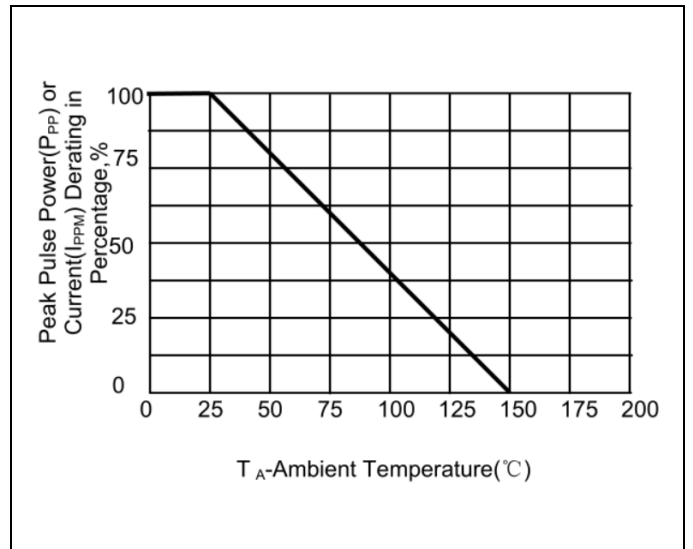


Figure 3. Pulse Waveform

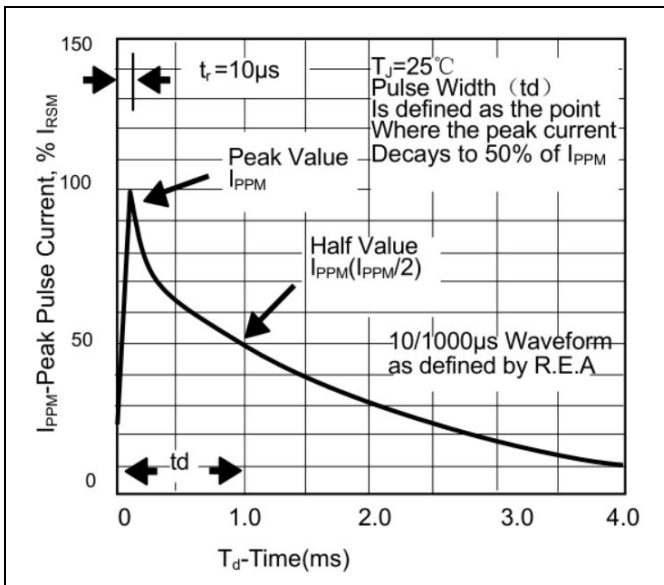
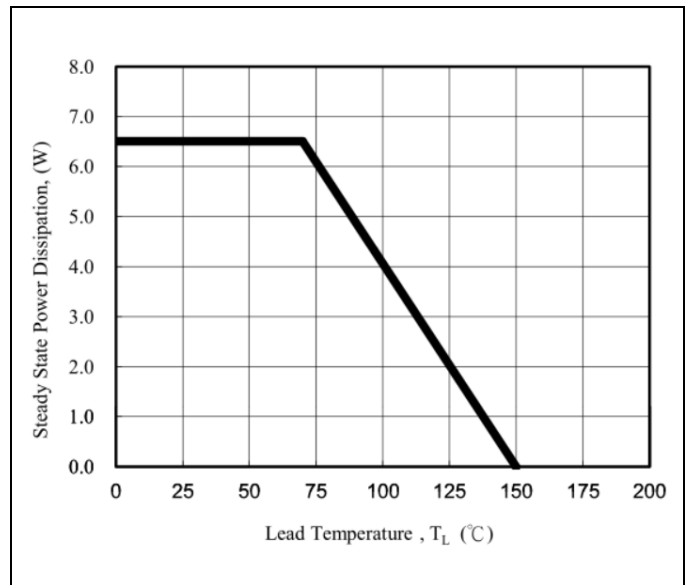
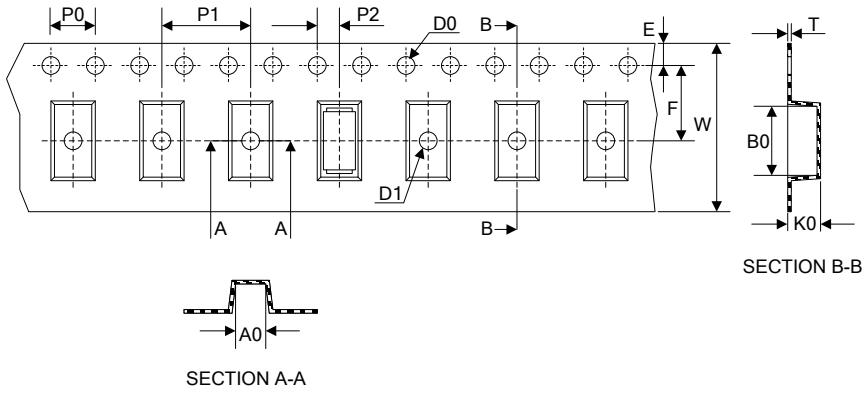
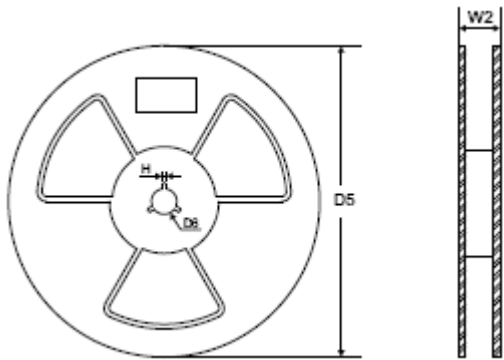


Figure 4. Steady State Power Dissipation Derating Curve



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 | |
| | 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 | | | |