

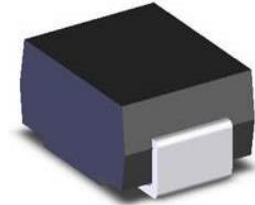
P4SMA Series Datasheet

Description

The P4SMA series is designed specifically to protect sensitive electronic equipment from voltage transients induced by lightning and other transient voltage events. For surface mounted applications in order to optimize board space.

Features

- Halogen free and RoHS compliant
- Low profile package
- Built-in strain relief Design
- Low inductance
- Excellent clamping capability
- 400W peak pulse power capability at 10/1000 μ s waveform, repetition rate (duty cycle): 0.01%
- Fast response time: typically less than 1.0ps from 0V to VB min
- Typical IR less than 1 μ A above 10V devices
- Peak 260 $^{\circ}$ C high temperature Reflow Soldering withstanding
- Meet MSL level1, per J-STD-020
- IEC-61000-4-2 ESD 30kV(Air), 30kV (Contact)
- Unit Weight: 0.07g/PCS



Applications

TVS components are ideal for the protection of I/O Interfaces, VCC bus and other vulnerable circuits used in telecom, computer, Industrial and consumer electronic applications.

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, Note2, Fig.1) | P _{PPM} | Minimum 400 | 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 _A =50 $^{\circ}$ C (Fig.5) | P _{M(AV)} | 3.3 | Watts |
| Maximum Instantaneous Forward Voltage at 25A for Unidirectional Only | V _F | 3.5/5.0 | V |
| Peak forward surge current, 8.3ms single half sine-wave superimposed on rated load, (JEDEC Method) (Note3, Fig.6) | I _{FSM} | 60 | Amps |
| Operating junction and Storage Temperature Ranges. | T _J , T _{STG} | -55 to +150 | $^{\circ}$ C |
| Typical thermal resistance junction to lead | R _{θJL} | 30 | $^{\circ}$ C/W |
| Typical thermal resistance junction to ambient | R _{θJA} | 120 | $^{\circ}$ C/W |

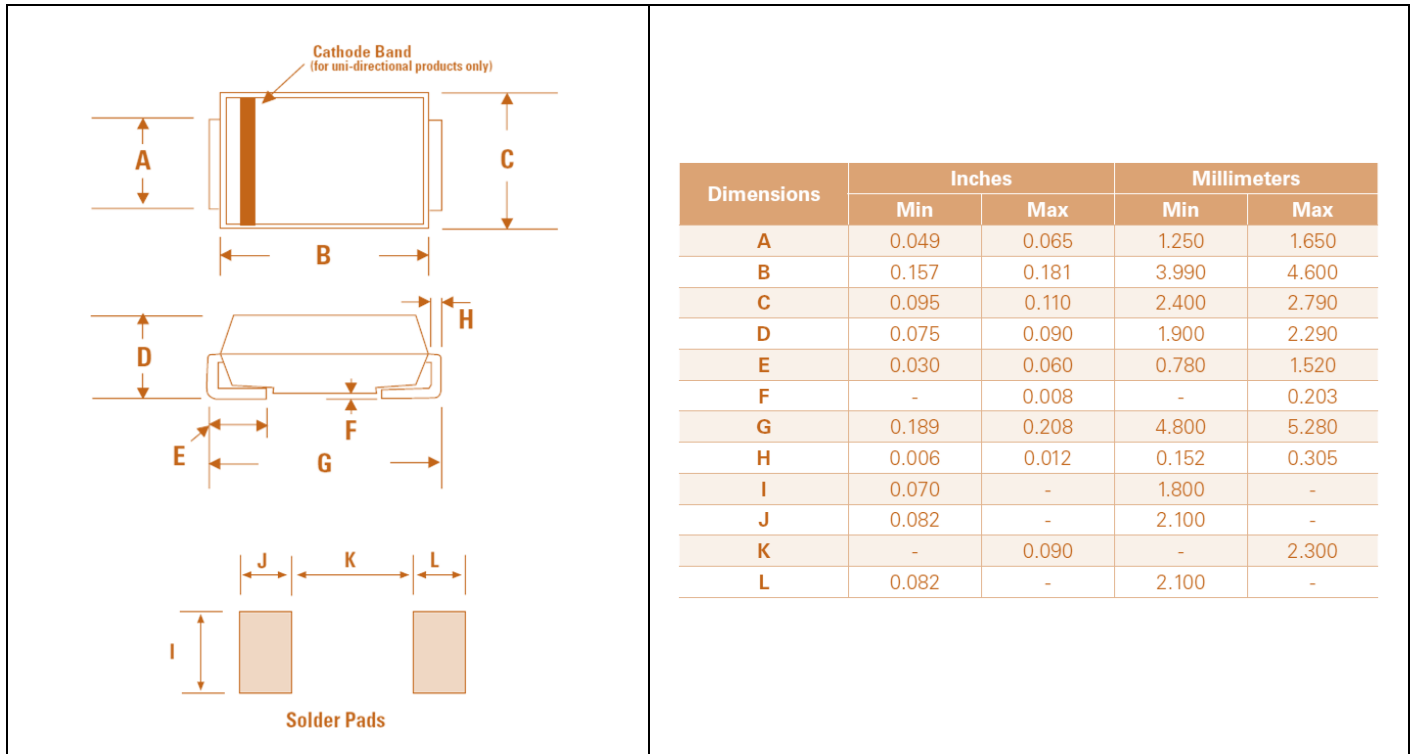
Notes: 1. Non-repetitive current pulse, per Fig.3 and Derating above T_A=25 $^{\circ}$ C per Fig.2.

2. Each terminal is surface Mounted on the 5.0mm \times 5.0mm (0.03mm thick) copper pads.

3. 8.3ms single half sine-wave or equivalent square wave, duty cycle=4 pulses per minutes maximum.

4. V_F < 3.5V for single die parts and V_F < 5.0V for stacked-die parts.

Dimensions (SMA/DO-214AC)



Electrical Characteristics (TA=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 _R |
|-------------|------------|---------------------|------|---------------------------|-----------------------------------|--------|---------------------|---|---------------------|---------------------------------|
| Uni | Bi | UNI | BI | V _R (V) | Min(V) | Max(V) | I _T (mA) | V _C (V) | I _{PP} (A) | I _R (μA) |
| P4SMA6.8A | P4SMA6.8CA | 6V8A | 6V8C | 5.80 | 6.45 | 7.14 | 10 | 10.5 | 39.0 | 1000 |
| P4SMA7.5A | P4SMA7.5CA | 7V5A | 7V5C | 6.40 | 7.13 | 7.88 | 10 | 11.3 | 36.3 | 500 |
| P4SMA8.2A | P4SMA8.2CA | 8V2A | 8V2C | 7.02 | 7.79 | 8.61 | 10 | 12.1 | 33.9 | 200 |
| P4SMA9.1A | P4SMA9.1CA | 9V1A | 9V1C | 7.78 | 8.65 | 9.55 | 1 | 13.4 | 30.6 | 50 |
| P4SMA10A | P4SMA10CA | 10A | 10C | 8.55 | 9.50 | 10.50 | 1 | 14.5 | 28.3 | 10 |
| P4SMA11A | P4SMA11CA | 11A | 11C | 9.40 | 10.50 | 11.60 | 1 | 15.6 | 26.3 | 5 |
| P4SMA12A | P4SMA12CA | 12A | 12C | 10.20 | 11.40 | 12.60 | 1 | 16.7 | 24.6 | 5 |
| P4SMA13A | P4SMA13CA | 13A | 13C | 11.10 | 12.40 | 13.70 | 1 | 18.2 | 22.5 | 1 |
| P4SMA15A | P4SMA15CA | 15A | 15C | 12.80 | 14.30 | 15.80 | 1 | 21.2 | 19.3 | 1 |
| P4SMA16A | P4SMA16CA | 16A | 16C | 13.60 | 15.20 | 16.80 | 1 | 22.5 | 18.2 | 1 |
| P4SMA18A | P4SMA18CA | 18A | 18C | 15.30 | 17.10 | 18.90 | 1 | 25.2 | 16.1 | 1 |
| P4SMA20A | P4SMA20CA | 20A | 20C | 17.10 | 19.00 | 21.00 | 1 | 27.7 | 14.8 | 1 |
| P4SMA22A | P4SMA22CA | 22A | 22C | 18.80 | 20.90 | 23.10 | 1 | 30.6 | 13.4 | 1 |
| P4SMA24A | P4SMA24CA | 24A | 24C | 20.50 | 22.80 | 25.20 | 1 | 33.2 | 12.3 | 1 |
| P4SMA27A | P4SMA27CA | 27A | 27C | 23.10 | 25.70 | 28.40 | 1 | 37.5 | 10.9 | 1 |
| P4SMA30A | P4SMA30CA | 30A | 30C | 25.60 | 28.50 | 31.50 | 1 | 41.4 | 9.9 | 1 |
| P4SMA33A | P4SMA33CA | 33A | 33C | 28.20 | 31.40 | 34.70 | 1 | 45.7 | 9.0 | 1 |

Electrical Characteristics (TA=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 _R |
|-------------|------------|---------------------|------|---------------------------|-----------------------------------|--------|---------------------|---|---------------------|---------------------------------|
| Uni | Bi | UNI | BI | V _R (V) | Min(V) | Max(V) | I _T (mA) | V _C (V) | I _{PP} (A) | I _R (μA) |
| P4SMA36A | P4SMA36CA | 36A | 36C | 30.80 | 34.20 | 37.80 | 1 | 49.9 | 8.2 | 1 |
| P4SMA39A | P4SMA39CA | 39A | 39C | 33.30 | 37.10 | 41.00 | 1 | 53.9 | 7.6 | 1 |
| P4SMA43A | P4SMA43CA | 43A | 43C | 36.80 | 40.90 | 45.20 | 1 | 59.3 | 6.9 | 1 |
| P4SMA47A | P4SMA47CA | 47A | 47C | 40.20 | 44.70 | 49.40 | 1 | 64.8 | 6.3 | 1 |
| P4SMA51A | P4SMA51CA | 51A | 51C | 43.60 | 48.50 | 53.60 | 1 | 70.1 | 5.8 | 1 |
| P4SMA56A | P4SMA56CA | 56A | 56C | 47.80 | 53.20 | 58.80 | 1 | 77.0 | 5.3 | 1 |
| P4SMA62A | P4SMA62CA | 62A | 62C | 53.00 | 58.90 | 65.10 | 1 | 85.0 | 4.8 | 1 |
| P4SMA68A | P4SMA68CA | 68A | 68C | 58.10 | 64.60 | 71.40 | 1 | 92.0 | 4.5 | 1 |
| P4SMA75A | P4SMA75CA | 75A | 75C | 64.10 | 71.30 | 78.80 | 1 | 103.0 | 4.0 | 1 |
| P4SMA82A | P4SMA82CA | 82A | 82C | 70.10 | 77.90 | 86.10 | 1 | 113.0 | 3.6 | 1 |
| P4SMA91A | P4SMA91CA | 91A | 91C | 77.80 | 86.50 | 95.50 | 1 | 125.0 | 3.3 | 1 |
| P4SMA100A | P4SMA100CA | 100A | 100C | 85.50 | 95.00 | 105.0 | 1 | 137.0 | 3.0 | 1 |
| P4SMA110A | P4SMA110CA | 110A | 110C | 94.00 | 105.0 | 116.0 | 1 | 152.0 | 2.7 | 1 |
| P4SMA120A | P4SMA120CA | 120A | 120C | 102.00 | 114.0 | 126.0 | 1 | 165.0 | 2.5 | 1 |
| P4SMA130A | P4SMA130CA | 130A | 130C | 111.00 | 124.0 | 137.0 | 1 | 179.0 | 2.3 | 1 |
| P4SMA150A | P4SMA150CA | 150A | 150C | 128.00 | 143.0 | 158.0 | 1 | 207.0 | 2.0 | 1 |
| P4SMA160A | P4SMA160CA | 160A | 160C | 136.00 | 152.0 | 168.0 | 1 | 219.0 | 1.9 | 1 |
| P4SMA170A | P4SMA170CA | 170A | 170C | 145.00 | 162.0 | 179.0 | 1 | 234.0 | 1.8 | 1 |
| P4SMA180A | P4SMA180CA | 180A | 180C | 154.00 | 171.0 | 189.0 | 1 | 246.0 | 1.7 | 1 |
| P4SMA200A | P4SMA200CA | 200A | 200C | 171.00 | 190.0 | 210.0 | 1 | 274.0 | 1.5 | 1 |
| P4SMA220A | P4SMA220CA | 220A | 220C | 185.00 | 209.0 | 231.0 | 1 | 328.0 | 1.3 | 1 |
| P4SMA250A | P4SMA250CA | 250A | 250C | 214.00 | 237.0 | 263.0 | 1 | 344.0 | 1.2 | 1 |
| P4SMA300A | P4SMA300CA | 300A | 300C | 256.00 | 285.0 | 315.0 | 1 | 414.0 | 1.0 | 1 |
| P4SMA350A | P4SMA350CA | 350A | 350C | 300.00 | 332.0 | 368.0 | 1 | 482.0 | 0.9 | 1 |
| P4SMA400A | P4SMA400CA | 400A | 400C | 342.00 | 380.0 | 420.0 | 1 | 548.0 | 0.8 | 1 |
| P4SMA440A | P4SMA440CA | 440A | 440C | 376.00 | 418.0 | 462.0 | 1 | 602.0 | 0.7 | 1 |
| P4SMA480A | P4SMA480CA | 480A | 480C | 408.00 | 456.0 | 504.0 | 1 | 658.0 | 0.6 | 1 |
| P4SMA510A | P4SMA510CA | 510A | 510C | 434.00 | 485.0 | 535.0 | 1 | 698.0 | 0.6 | 1 |
| P4SMA530A | P4SMA530CA | 530A | 530C | 450.00 | 503.5 | 556.5 | 1 | 725.0 | 0.6 | 1 |
| P4SMA540A | P4SMA540CA | 540A | 540C | 459.00 | 513.0 | 567.0 | 1 | 740.0 | 0.5 | 1 |
| P4SMA550A | P4SMA550CA | 550A | 550C | 467.00 | 522.5 | 577.5 | 1 | 760.0 | 0.5 | 1 |

Ratings and Characteristic Curves (Ta=25°C unless otherwise noted)

Figure 1. Peak Pulse Power Rating Curve

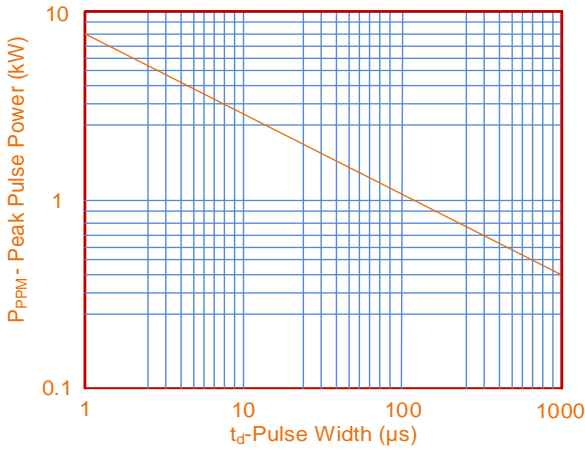


Figure 2. Pulse Derating Curve

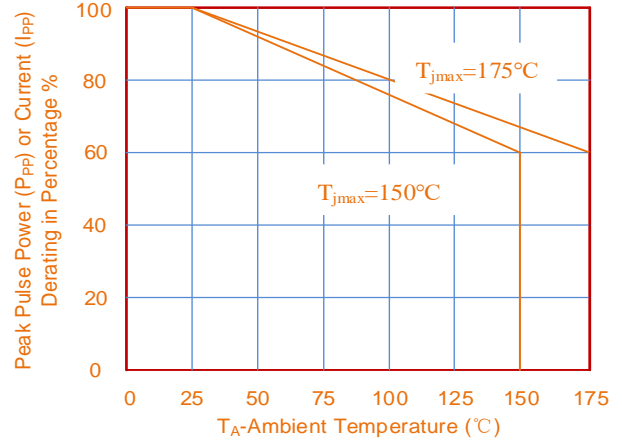


Figure 3. Pulse Waveform

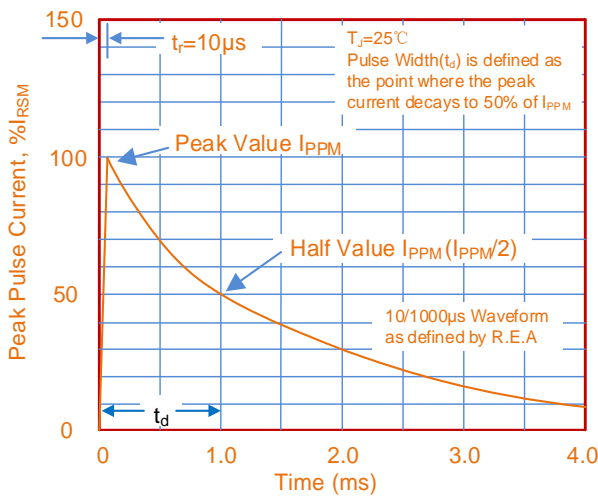


Figure 4. Typical Junction Capacitance

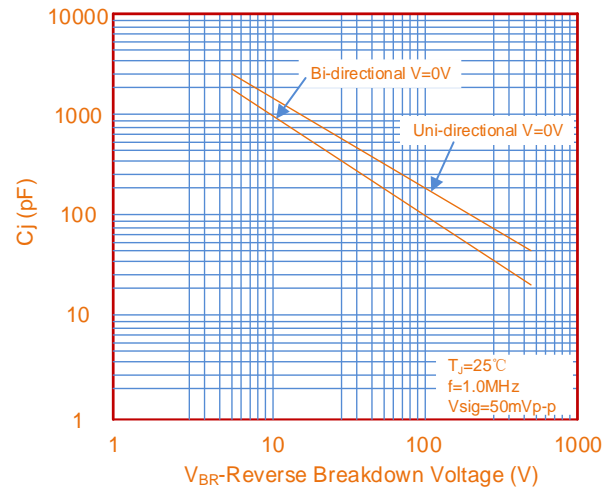


Figure 5. Steady State Power Dissipation Derating Curve

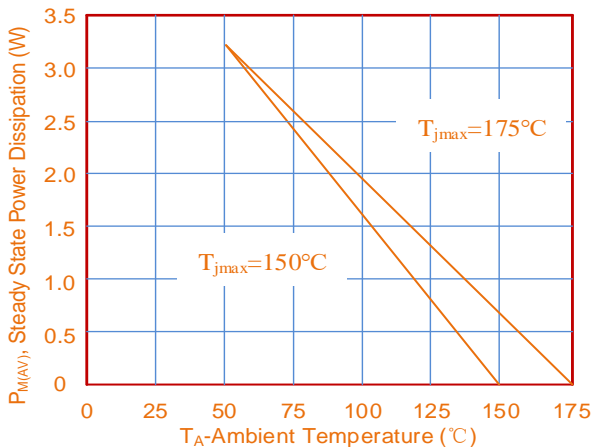
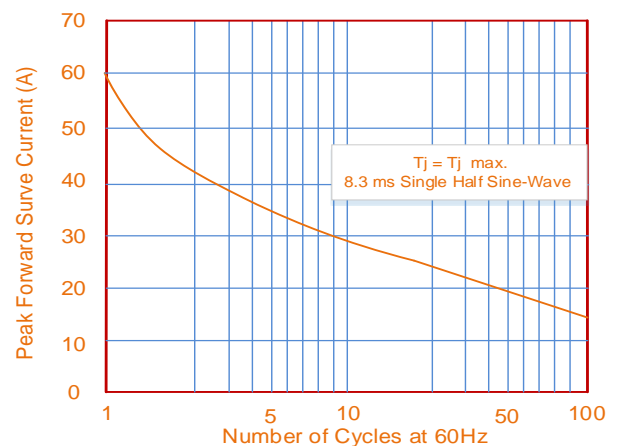
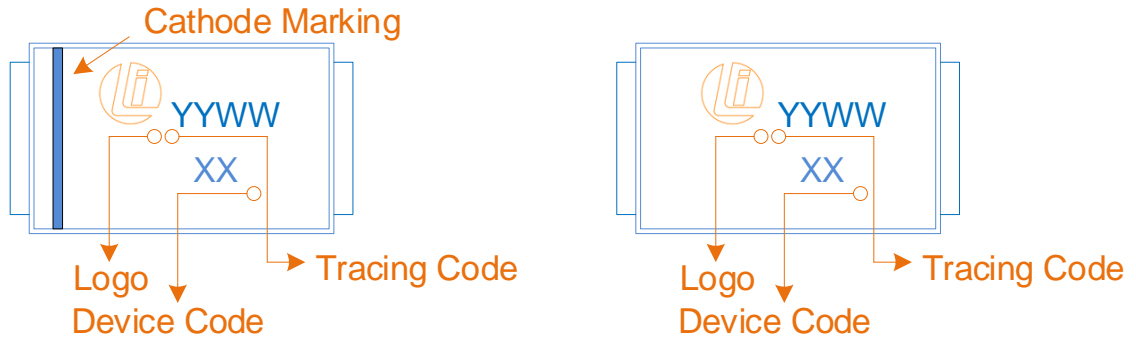


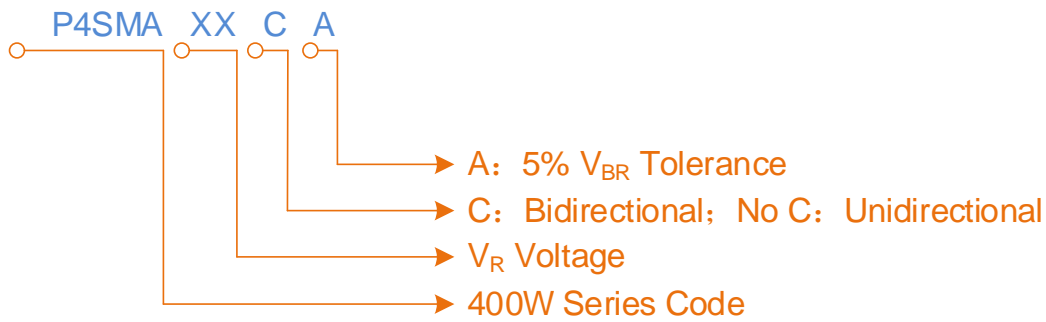
Figure 6. Maximum Non-Repetitive Forward Surge Current Uni-Directional Only



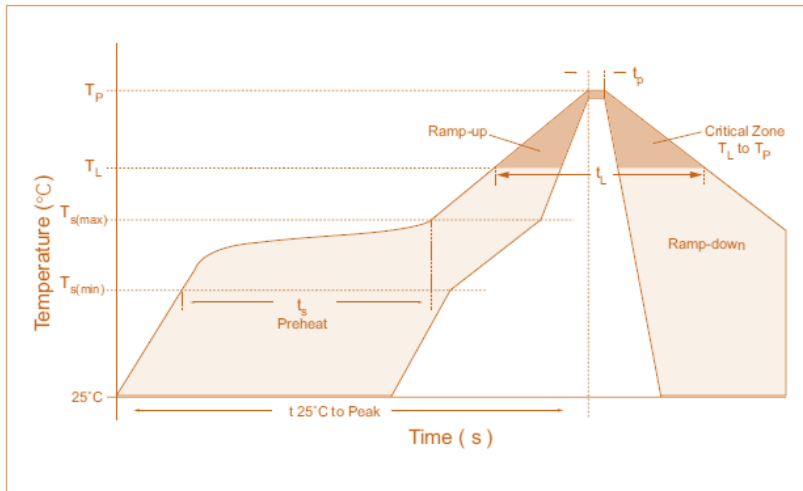
Marking Code



Part Number Code

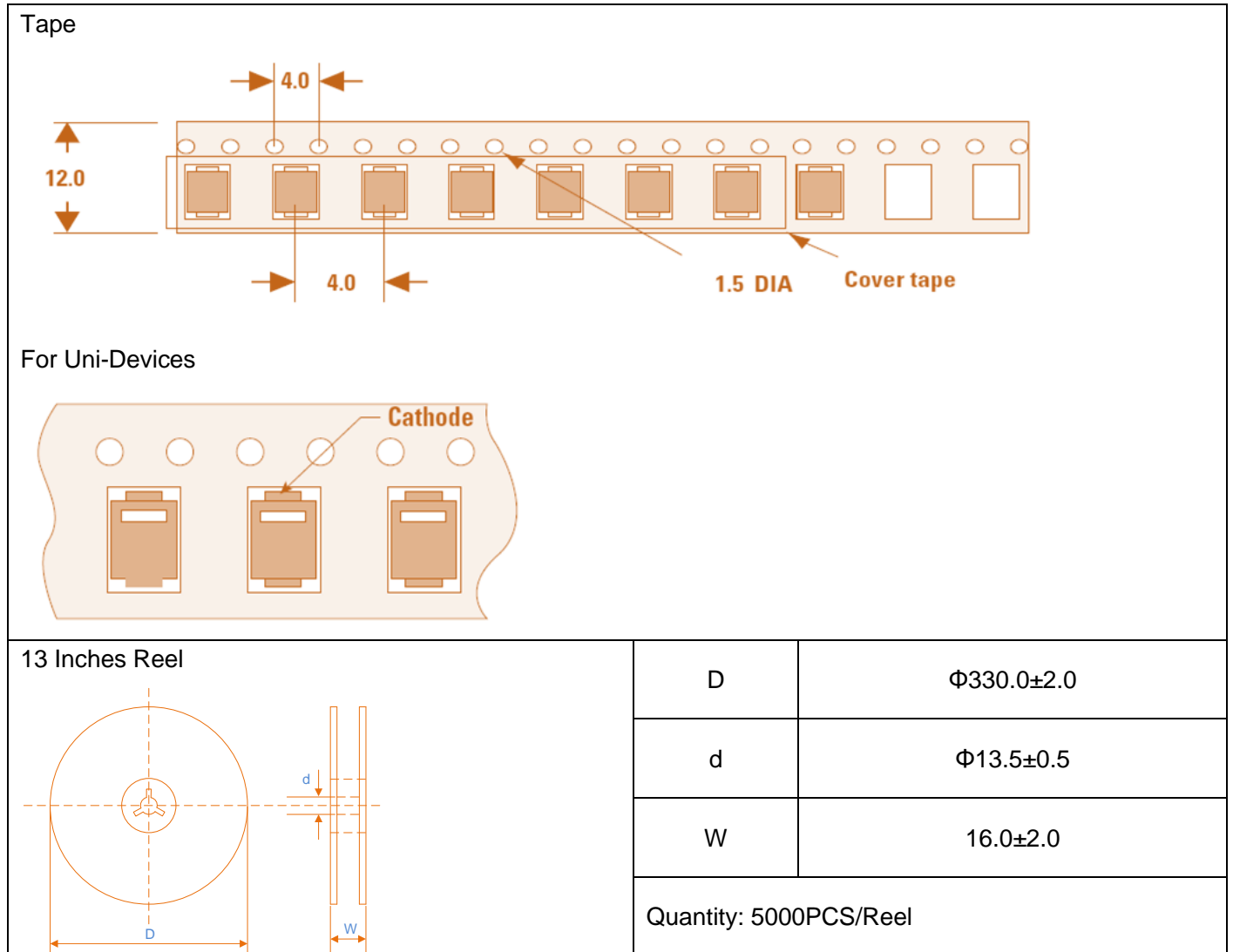


Soldering Parameters



| Reflow Condition | | Lead-free Soldering |
|--|------------------------------------|---------------------|
| Pre Heat | - Temperature Min ($T_{s(min)}$) | 150°C |
| | - Temperature Max ($T_{s(max)}$) | 200°C |
| | - Time (min to max) (t_s) | 60 – 180 secs |
| Average ramp up rate (Liquidus Temp (T_A) to peak) | | 3°C/second max |
| $T_{s(max)}$ to T_A - Ramp-up Rate | | 3°C/second max |
| Reflow | - Temperature (T_A) | 217°C |
| | - Time (min to max) (t_s) | 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 (T_P) | | 8 minutes Max. |
| Do not exceed Temperature | | 260°C |

Packaging Specification



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