

ASEMB

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ESD Sensitive



3.2 x 2.5 x 0.85 mm

RoHS/RoHS II Compliant

MSL Level = 1

### Features

- Low Power Consumption <10mA
- Exceptional Stability +/- 10ppm Over Temp. at -40 to +105°C
- Compact QFN Plastic Packaging

### Applications

- CCD Clock for VTR Camera
- Equipment Connected to PCs
- Low Profile Equipment
- Computers and Peripherals
- Portable Electronics
- Consumer Electronics
- Vibrant, Shock-Prone & Humid Environments for Industrial Equipment
- Demanding Military & Automotive Electronics

### Common Key Electrical Specifications

| Parameters                      | Min.                                                                    | Typ. | Max.          | Units | Notes       |
|---------------------------------|-------------------------------------------------------------------------|------|---------------|-------|-------------|
| Frequency Range:                | 1.0                                                                     |      | 150           | MHz   |             |
| Operating Temperature:          | 0                                                                       |      | +70           | °C    | See options |
| Storage Temperature:            | -55                                                                     |      | +150          | °C    |             |
| Overall Frequency Stability*:   | -50                                                                     |      | +50           | ppm   | See options |
| Supply Voltage (Vdd):           | +1.8 ~ +3.3                                                             |      |               | V     |             |
| Output Load:                    |                                                                         |      | 15, 25, or 40 | pF    | See options |
|                                 | 10                                                                      |      |               | kΩ    |             |
| Symmetry:                       | 45                                                                      |      | 55            | %     | @1/2Vdd     |
| Startup Time:                   |                                                                         | 1.5  | 3.0           | ms    |             |
| Disable Time:                   |                                                                         | 20   | 100           | ns    |             |
| Disable Stand-by Current:       |                                                                         |      | 15            | uA    |             |
| Tri-state Function (Stand-by) : | "1" (VIH≥0.75*Vdd) or Open:<br>Oscillation<br>"0" (VIL<0.25*Vdd) : Hi Z |      |               | V     |             |
| Aging:                          | -5.0                                                                    |      | +5.0          | ppm   | First year  |

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Key Electrical Specifications - Vdd = 1.8V

| Parameters                   |                     | Min.    | Typ. | Max.    | Units | Notes               |
|------------------------------|---------------------|---------|------|---------|-------|---------------------|
| Supply Current<br>(no load): | 1.0 to 39.9999MHz   |         | 5    | 15      | mA    | CL=0pF              |
|                              | 40.0 to 79.9999MHz  |         | 6    | 15      | mA    | RL=∞                |
|                              | 80.0 to 124.9999MHz |         | 7    | 15      | mA    | T=25°C              |
|                              | 125.0 to 150MHz     |         | 8    | 15      | mA    | (Standard CL: 15pF) |
|                              | 1.0 to 39.9999MHz   |         | 6    | 15      | mA    | CL=0pF              |
|                              | 40.0 to 79.9999MHz  |         | 7    | 15      | mA    | RL=∞                |
|                              | 80.0 to 124.9999MHz |         | 8    | 15      | mA    | T=25°C              |
|                              | 125.0 to 150MHz     |         | 9    | 15      | mA    | (CL option: 25pF)   |
|                              | 1.0 to 39.9999MHz   |         | 7    | 15      | mA    | CL=0pF              |
|                              | 40.0 to 79.9999MHz  |         | 8    | 15      | mA    | RL=∞                |
|                              | 80.0 to 124.9999MHz |         | 9    | 15      | mA    | T=25°C              |
|                              | 125.0 to 150MHz     |         | 10   | 15      | mA    | (CL option: 40pF)   |
| Output Voltage:              | V <sub>OH</sub>     | 0.8*Vdd |      |         | V     | CL=15, 25, 40pF     |
|                              | V <sub>OL</sub>     |         |      | 0.2*Vdd | V     |                     |
| Rise Time:<br>Fall Time:     | Tr                  |         | 1.8  | 3.0     | ns    | CL=15pF; T=25°C     |
|                              | Tf                  |         | 1.0  | 3.0     | ns    | 20%/80%*VDD         |
|                              | Tr                  |         | 1.5  | 3.0     | ns    | CL=25pF; T=25°C     |
|                              | Tf                  |         | 1.2  | 3.0     | ns    | 20%/80%*VDD         |
|                              | Tr                  |         | 1.4  | 3.0     | ns    | CL=40pF; T=25°C     |
|                              | Tf                  |         | 1.1  | 3.0     | ns    | 20%/80%*VDD         |
| Cycle to Cycle Jitter:       |                     |         | 60   |         | ps    | F=100MHz            |
| Period Jitter RMS:           |                     |         | 10   |         | ps    | F=100MHz            |



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# INDUSTRIAL GRADE PLASTIC PACKAGE ULTRA MINIATURE PURE SILICON™ SMD CLOCK OSCILLATORS

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3.2 x 2.5 x 0.85 mm

RoHS/RoHS II Compliant

MSL Level = 1

## Key Electrical Specifications - Vdd = 2.5V

| Parameters                   |                     | Min.    | Typ. | Max.    | Units | Notes                                           |
|------------------------------|---------------------|---------|------|---------|-------|-------------------------------------------------|
| Supply Current<br>(no load): | 1.0 to 39.9999MHz   |         | 6    | 15      | mA    | CL=0pF<br>RL=∞<br>T=25°C<br>(Standard CL: 15pF) |
|                              | 40.0 to 79.9999MHz  |         | 7    | 15      | mA    |                                                 |
|                              | 80.0 to 124.9999MHz |         | 8    | 15      | mA    |                                                 |
|                              | 125.0 to 150MHz     |         | 9    | 15      | mA    |                                                 |
|                              | 1.0 to 39.9999MHz   |         | 7    | 15      | mA    | CL=0pF<br>RL=∞<br>T=25°C<br>(CL option: 25pF)   |
|                              | 40.0 to 79.9999MHz  |         | 8    | 15      | mA    |                                                 |
|                              | 80.0 to 124.9999MHz |         | 9    | 15      | mA    |                                                 |
|                              | 125.0 to 150MHz     |         | 10   | 15      | mA    |                                                 |
|                              | 1.0 to 39.9999MHz   |         | 8    | 16      | mA    | CL=0pF<br>RL=∞<br>T=25°C<br>(CL option: 40pF)   |
|                              | 40.0 to 79.9999MHz  |         | 9    | 16      | mA    |                                                 |
|                              | 80.0 to 124.9999MHz |         | 10   | 16      | mA    |                                                 |
|                              | 125.0 to 150MHz     |         | 11   | 16      | mA    |                                                 |
| Output Voltage:              | V <sub>OH</sub>     | 0.8*Vdd |      |         | V     | CL=15, 25, 40pF                                 |
|                              | V <sub>OL</sub>     |         |      | 0.2*Vdd | V     |                                                 |
|                              | V <sub>OH</sub>     | 0.9*Vdd |      |         | V     | CL=40pF                                         |
|                              | V <sub>OL</sub>     |         |      | 0.1*Vdd | V     |                                                 |
| Rise Time:<br>Fall Time:     | Tr                  |         | 1.0  | 2.0     | ns    | CL=15pF; T=25°C<br>20%/80%*VDD                  |
|                              | Tf                  |         | 0.9  | 2.0     | ns    |                                                 |
|                              | Tr                  |         | 1.1  | 2.0     | ns    | CL=25pF; T=25°C<br>20%/80%*VDD                  |
|                              | Tf                  |         | 0.9  | 2.0     | ns    |                                                 |
|                              | Tr                  |         | 1.0  | 2.0     | ns    | CL=40pF; T=25°C<br>20%/80%*VDD                  |
|                              | Tf                  |         | 0.9  | 2.0     | ns    |                                                 |
| Cycle to Cycle Jitter:       |                     |         | 50   |         | ps    | F=100MHz                                        |
| Period Jitter RMS:           |                     |         | 5    |         | ps    | F=100MHz                                        |

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MSL Level = 1

## Key Electrical Specifications - Vdd = 3.3V

| Parameters                   |                     | Min.    | Typ. | Max.    | Units | Notes                                           |
|------------------------------|---------------------|---------|------|---------|-------|-------------------------------------------------|
| Supply Current<br>(no load): | 1.0 to 39.9999MHz   |         | 7    | 15      | mA    | CL=0pF<br>RL=∞<br>T=25°C<br>(Standard CL: 15pF) |
|                              | 40.0 to 79.9999MHz  |         | 8    | 15      | mA    |                                                 |
|                              | 80.0 to 124.9999MHz |         | 9    | 15      | mA    |                                                 |
|                              | 125.0 to 150MHz     |         | 10   | 15      | mA    |                                                 |
|                              | 1.0 to 39.9999MHz   |         | 8    | 16      | mA    | CL=0pF<br>RL=∞<br>T=25°C<br>(CL option: 25pF)   |
|                              | 40.0 to 79.9999MHz  |         | 9    | 16      | mA    |                                                 |
|                              | 80.0 to 124.9999MHz |         | 10   | 16      | mA    |                                                 |
|                              | 125.0 to 150MHz     |         | 11   | 16      | mA    |                                                 |
|                              | 1.0 to 39.9999MHz   |         | 8    | 16      | mA    | CL=0pF<br>RL=∞<br>T=25°C<br>(CL option: 40pF)   |
|                              | 40.0 to 79.9999MHz  |         | 9    | 16      | mA    |                                                 |
|                              | 80.0 to 124.9999MHz |         | 10   | 16      | mA    |                                                 |
|                              | 125.0 to 150MHz     |         | 11   | 16      | mA    |                                                 |
| Output Voltage:              | V <sub>OH</sub>     | 0.8*Vdd |      |         | V     | CL=15pF                                         |
|                              | V <sub>OL</sub>     |         |      | 0.2*Vdd | V     |                                                 |
|                              | V <sub>OH</sub>     | 0.9*Vdd |      |         | V     | CL=25, 40pF                                     |
|                              | V <sub>OL</sub>     |         |      | 0.1*Vdd | V     |                                                 |
| Rise Time:<br>Fall Time:     | Tr                  |         | 1.0  | 2.0     | ns    | CL=15pF; T=25°C<br>20%/80%*VDD                  |
|                              | Tf                  |         | 0.9  | 2.0     | ns    |                                                 |
|                              | Tr                  |         | 1.0  | 2.0     | ns    | CL=25pF; T=25°C<br>20%/80%*VDD                  |
|                              | Tf                  |         | 0.9  | 2.0     | ns    |                                                 |
|                              | Tr                  |         | 0.8  | 2.0     | ns    | CL=40pF; T=25°C<br>20%/80%*VDD                  |
|                              | Tf                  |         | 0.8  | 2.0     | ns    |                                                 |
| Cycle to Cycle Jitter:       |                     |         | 50   |         | ps    | F=100MHz                                        |
| Period Jitter RMS:           |                     |         | 5    |         | ps    | F=100MHz                                        |



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Absolute Maximum Ratings

| Item            | Min. | Max.    | Units | Condition |
|-----------------|------|---------|-------|-----------|
| Supply Voltage  | -0.3 | +4.0    | V     |           |
| Input Voltage   | -0.3 | Vdd+0.3 | V     |           |
| Junction Temp.  |      | +150    | °C    |           |
| Storage Temp.   | -55  | +150    | °C    |           |
| Soldering Temp. |      | +260    | °C    | 40sec max |
| ESD             |      |         | V     |           |
| HBM             |      | 4,000   |       |           |
| MM              |      | 200     |       |           |
| CDM             |      | 1,500   |       |           |



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MSL Level = 1

Options and Part Identification (left blank if standard)

ASEMB -  MHz -   -  -

| Frequency in MHz                                        |
|---------------------------------------------------------|
| e.g. 14.3181 MHz<br>(Maximum 4 digits<br>after decimal) |

| Operating Temp.    |
|--------------------|
| Blank: 0°C ~ +70°C |
| E: -20°C ~ +70°C   |
| L: -40°C ~ +85°C   |
| X: -40°C ~ +105°C  |

| Overall Freq. Stability |
|-------------------------|
| C: ±50ppm (STD)         |
| Y: ±10ppm               |
| R: ±25 ppm              |

| Output Load |
|-------------|
| Blank: 15pF |
| 25: 25pF    |
| 40: 40pF    |

| Packaging            |
|----------------------|
| Blank: 110pcs / Tube |
| T: 1,000pcs / reel   |



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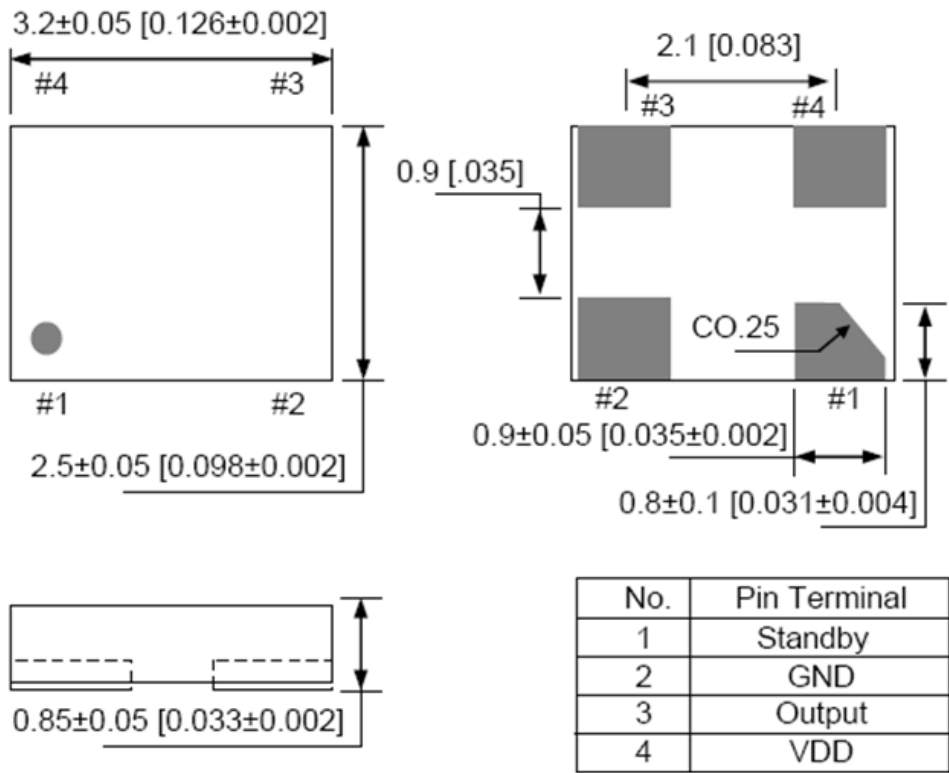


3.2 x 2.5 x 0.85 mm

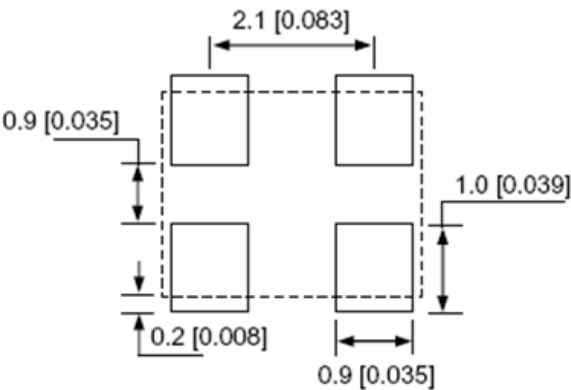
RoHS/RoHS II Compliant

MSL Level = 1

Mechanical Dimensions



Recommended Land Pattern



Note: Recommend using an approximately 0.01uF bypass capacitor between PIN 2 and 4.

Dimensions: mm(inches)

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Reflow Profile [JEDEC J-STD-020]

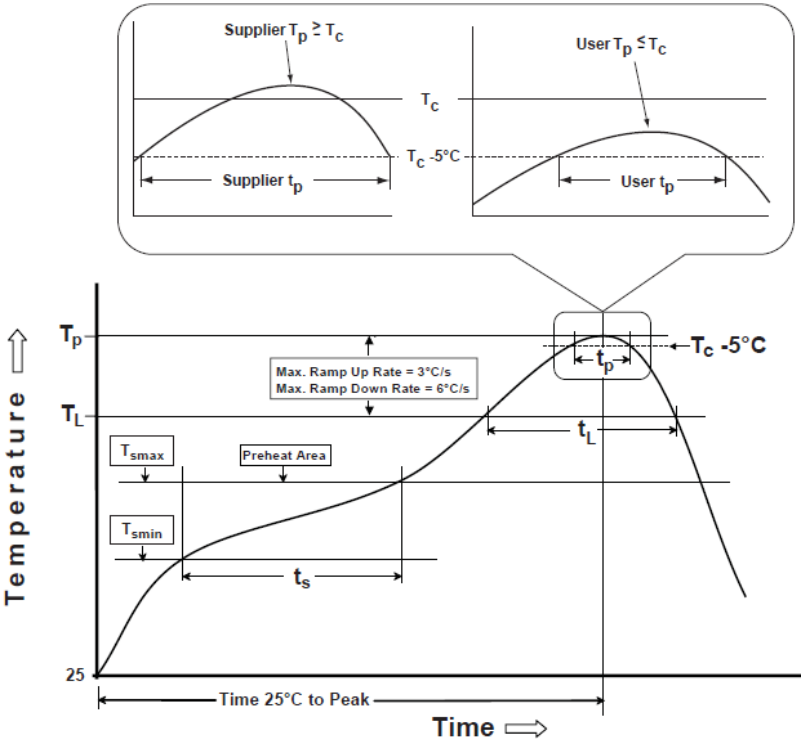


Table 1  
SnPb Eutectic Process  
Classification Temperatures (T<sub>c</sub>)

| Package Thickness | Volume mm <sup>3</sup> <350 | Volume mm <sup>3</sup> ≥350 |
|-------------------|-----------------------------|-----------------------------|
| <2.5 mm           | 235 °C                      | 220 °C                      |
| ≥2.5 mm           | 220 °C                      | 220 °C                      |

Table 2  
Pb-Free Process  
Classification Temperatures (T<sub>c</sub>)

| Package Thickness | Volume mm <sup>3</sup> <350 | Volume mm <sup>3</sup> 350-2000 | Volume mm <sup>3</sup> >2000 |
|-------------------|-----------------------------|---------------------------------|------------------------------|
| <1.6 mm           | 260 °C                      | 260 °C                          | 260 °C                       |
| 1.6 mm - 2.5 mm   | 260 °C                      | 250 °C                          | 245 °C                       |
| >2.5 mm           | 250 °C                      | 245 °C                          | 245 °C                       |

| Profile Feature                                                                                   | Sn-Pb Eutectic Assembly | Pb-Free Assembly |
|---------------------------------------------------------------------------------------------------|-------------------------|------------------|
| Preheat / soak                                                                                    |                         |                  |
| Temperature minimum (T <sub>smin</sub> )                                                          | 100°C                   | 150°C            |
| Temperature maximum (T <sub>smax</sub> )                                                          | 150°C                   | 200°C            |
| Time (T <sub>smin</sub> to T <sub>smax</sub> ) (t <sub>s</sub> )                                  | 60 - 120 sec.           | 60 - 120 sec.    |
| Average ramp-up rate (T <sub>smax</sub> to T <sub>p</sub> )                                       | 3°C/sec. max            | 3°C/sec. max     |
| Liquidous temperature (T <sub>L</sub> )                                                           | 183°C                   | 217°C            |
| Time at liquidous (t <sub>L</sub> )                                                               | 60 - 150 sec.           | 60 - 150 sec.    |
| Peak package body temperature (T <sub>p</sub> )*                                                  | see Table 1             | see Table 2      |
| Time (t <sub>p</sub> )** within 5°C of the specified classification temperature (T <sub>c</sub> ) | 20 sec.                 | 30 sec.          |
| Ramp-down rate (T <sub>p</sub> to T <sub>smax</sub> )                                             | 6°C/sec. max            | 6°C/sec. max     |
| Time 25°C to peak temperature                                                                     | 6 min. max              | 8 min. max       |
| Reflow cycles                                                                                     | 2 max                   | 2 max            |

\*Tolerance for peak profile temperature (T<sub>p</sub>) is defined as a supplier minimum and a user maximum.  
\*\*Tolerance for time at peak profile temperature (t<sub>p</sub>) is defined as supplier minimum and a user maximum.

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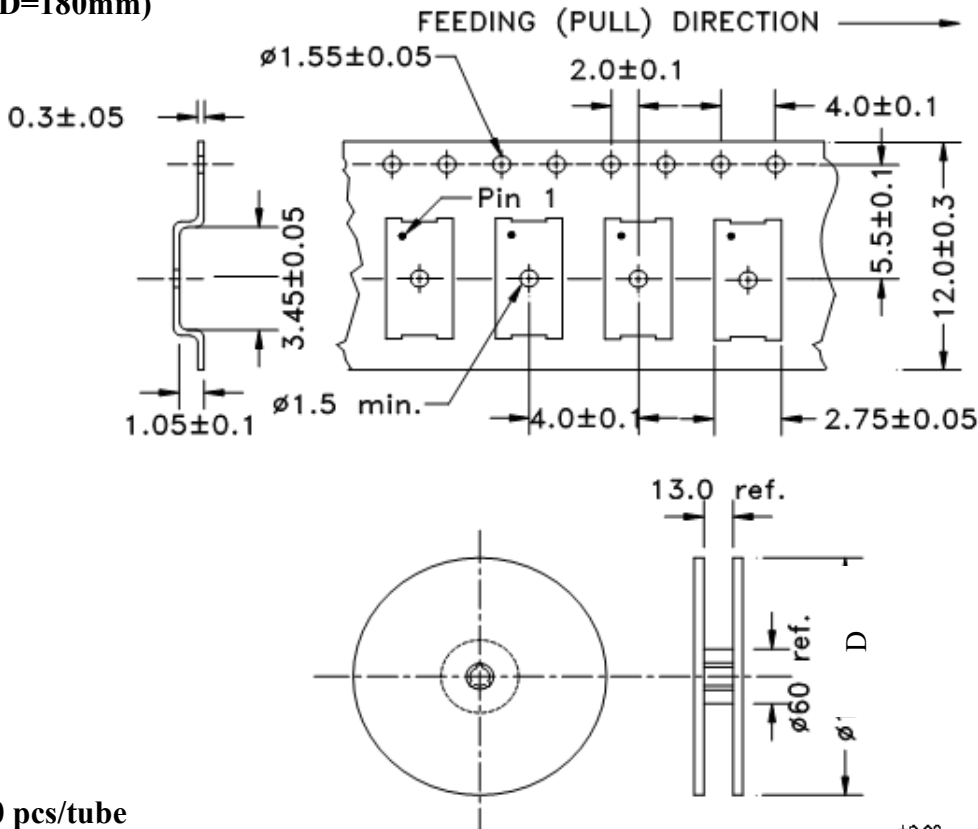
3.2 x 2.5 x 0.85 mm

RoHS/RoHS II Compliant

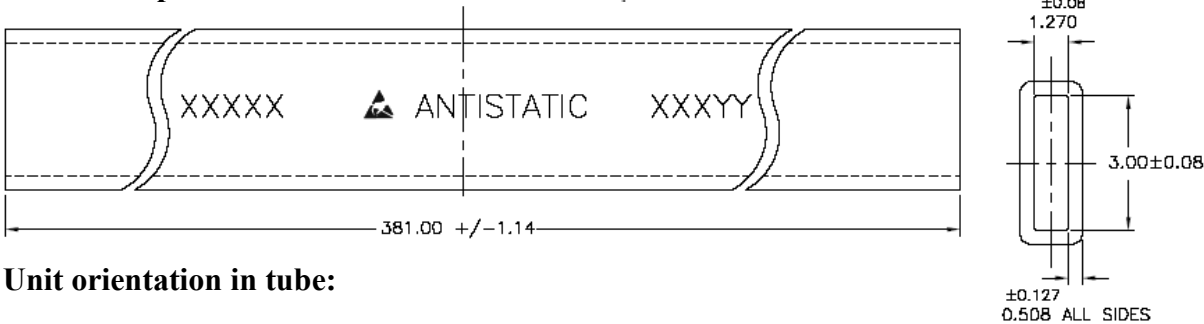
MSL Level = 1

Packaging

T= 1,000pcs/reel (D=180mm)



Tube: 110 pcs/tube



Unit orientation in tube:



Dimensions: mm

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