

# PERFORMANCE PLASTIC PACKAGE ULTRA MINIATURE PURE SILICON™ CLOCK OSCILLATORS

ASDMP Series

Moisture Sensitivity Level – MSL 1



RoHS/RoHS II compliant

ASDMP



2.5 x 2.0 x 0.85 mm

## FEATURES:

- Ultra Miniature Pure Silicon™ Clock Oscillator
- High Performance MEMS Technology by Discera
- Low Power Consumption for high speed communication
- Exceptional Stability Over Temp. at -40 to +85°C, ±15ppm
- Extended Automotive Grade Temp. stability at -55 to +125°C, ±25ppm
- MIL-STD-883 shock and vibration compliant
- Durable QFN Plastic Compact Packaging
- Standby or Disable Tri-state function
- Low jitter (Period jitter RMS and Phase jitter RMS)
- High power supply noise reduction, -50dBc

## APPLICATIONS:

- Storage Area Networks (SATA, SAS, Fiber Channel)
- Passive Optical Networks (EPON, 10G-EPON, GPON, 10G-PON)
- Ethernet (1G, 10GBASE-T, KR/LR/SR, FCoE)
- PCI Express
- Display port

## STANDARD SPECIFICATIONS:

### Common Key Electrical Specifications – CMOS, LVPECL, LVDS, and HCSL

| Parameters                           |        | Minimum                                                                  | Typical | Maximum  | Units | Notes                              |
|--------------------------------------|--------|--------------------------------------------------------------------------|---------|----------|-------|------------------------------------|
| Frequency Range                      | CMOS   | 2.3000*                                                                  |         | 170.0000 | MHz   | -20 ~ +70°C<br>-40 ~ +85°C         |
|                                      | CMOS   | 3.3000*                                                                  |         | 170.0000 |       | -40 ~ +105°C<br>-55 ~ +125°C       |
|                                      | LVPECL | 2.3000*                                                                  |         | 460.0000 |       | Commercial, Industrial temp. range |
|                                      | LVDS   | 2.3000*                                                                  |         | 460.0000 |       | Commercial, Industrial temp range  |
|                                      | HCSL   | 2.3000*                                                                  |         | 460.0000 |       | Commercial, Industrial temp. range |
| Operating Temperature                |        | -20                                                                      |         | +70      | °C    | See options                        |
| Storage Temperature                  |        | -55                                                                      |         | +150     | °C    |                                    |
| Overall Frequency Stability          |        | -50                                                                      |         | +50      | ppm   | See options                        |
| Supply Voltage (Vdd)                 |        | +2.25                                                                    |         | +3.6     | V     |                                    |
| Startup Time                         |        |                                                                          |         | 5        | ms    |                                    |
| Enable Time                          |        |                                                                          |         | 20       | ns    | STD (Tri-state)                    |
|                                      |        |                                                                          |         | 5        | ms    | PD option (Power Down)             |
| Disable Time                         |        |                                                                          |         | 5        | ns    |                                    |
| Disable Current                      |        |                                                                          | 20      | 22       | mA    | STD (Tri-state)                    |
|                                      |        |                                                                          |         | 0.095    |       | PD option (Power Down)             |
| Tri-state Function (Standby/Disable) |        | "1" (VIH ≥ 0.75*Vdd) or Open: Oscillation<br>"0" (VIL < 0.25*Vdd) : Hi Z |         |          | V     | 40kΩ pull-up resistor embedded     |
| Aging                                |        | -5.0                                                                     |         | +5.0     | ppm   | First year                         |

\* For 2.3000MHz ≤ F0 ≤ 9.9999MHz, 6-8 weeks lead-time applies

### Key Electrical Specifications – CMOS

| Parameters                                 |                 | Minimum             | Typical | Maximum             | Units | Notes                 |
|--------------------------------------------|-----------------|---------------------|---------|---------------------|-------|-----------------------|
| Supply Current (I <sub>dd</sub> )          |                 |                     | 31      | 35                  | mA    | CL=15pF, 125MHz       |
| Output Logic Level                         | V <sub>OH</sub> | 0.9*V <sub>dd</sub> |         |                     | V     | I=±6mA                |
|                                            | V <sub>OL</sub> |                     |         | 0.1*V <sub>dd</sub> | V     |                       |
| Rise Time                                  | Tr              |                     | 1.1     | 2.0                 | ns    | CL=15pF               |
| Fall Time                                  | Tf              |                     | 1.3     | 2.0                 | ns    | 20% to 80%            |
| Duty Cycle                                 |                 | 45                  |         | 55                  | %     |                       |
| Integrated Phase Jitter (J <sub>PH</sub> ) |                 |                     | 0.30    | 2                   | ps    | 200kHz ~ 20MHz@125MHz |
|                                            |                 |                     | 0.38    | 2                   |       | 100kHz ~ 20MHz@125MHz |
|                                            |                 |                     | 1.70    | 2                   |       | 12kHz ~ 20MHz@125MHz  |
| Period Jitter RMS (J <sub>PER</sub> )      |                 |                     | 3.0     |                     | ps    |                       |

REVISED: 06.11.2018

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## Key Electrical Specifications – LVPECL

| Parameters                             |          | Minimum       | Typical | Maximum       | Units | Notes                         |
|----------------------------------------|----------|---------------|---------|---------------|-------|-------------------------------|
| Supply Current ( $I_{dd}$ )            |          |               | 56.5    | 58            | mA    | RL=50Ω                        |
| Output Logic Level                     | $V_{OH}$ | $V_{dd}-1.08$ |         |               | V     | RL=50Ω                        |
|                                        | $V_{OL}$ |               |         | $V_{dd}-1.55$ | V     |                               |
| Peak to Peak Output Swing ( $V_{pp}$ ) |          |               | 800     |               | mV    | Single ended                  |
| Rise Time                              | $T_r$    |               | 250     |               | ps    | RL=50Ω , CL=0pF<br>20% to 80% |
| Fall Time                              | $T_f$    |               | 250     |               |       |                               |
| Duty Cycle                             |          | 48            |         | 52            | %     | Differential                  |
| Integrated Phase Jitter ( $J_{PH}$ )   |          |               | 0.25    | 2             | ps    | 200kHz ~ 20MHz<br>@156.25MHz  |
|                                        |          |               | 0.38    | 2             |       | 100kHz ~ 20MHz<br>@156.25MHz  |
|                                        |          |               | 1.70    | 2             |       | 12kHz ~ 20MHz<br>@156.25MHz   |
| Period Jitter RMS ( $J_{PER}$ )        |          |               | 2.5     |               | ps    |                               |

## Key Electrical Specifications – LVDS

| Parameters                               |       | Minimum | Typical | Maximum | Units | Notes                         |
|------------------------------------------|-------|---------|---------|---------|-------|-------------------------------|
| Supply Current ( $I_{dd}$ )              |       |         | 29      | 32      | mA    | RL=100Ω                       |
| Output Offset Voltage ( $V_{OS}$ )       |       | 1.125   |         | 1.4     | V     | RL=100Ω differential          |
| Delta Offset Voltage ( $\Delta V_{OS}$ ) |       |         |         | 50      | mV    |                               |
| Peak to Peak Output Swing ( $V_{pp}$ )   |       |         | 350     |         | mV    | Single ended                  |
| Rise Time                                | $T_r$ |         | 200     |         | ps    | RL=50Ω , CL=2pF<br>20% to 80% |
| Fall Time                                | $T_f$ |         | 200     |         |       |                               |
| Duty Cycle                               |       | 48      |         | 52      | %     | Differential                  |
| Integrated Phase Jitter ( $J_{PH}$ )     |       |         | 0.28    | 2       | ps    | 200kHz ~ 20MHz<br>@156.25MHz  |
|                                          |       |         | 0.40    | 2       |       | 100kHz ~ 20MHz<br>@156.25MHz  |
|                                          |       |         | 1.70    | 2       |       | 12kHz ~ 20MHz<br>@156.25MHz   |
| Period Jitter RMS ( $J_{PER}$ )          |       |         | 2.5     |         | ps    |                               |

## Key Electrical Specifications – HCSL

| Parameters                             |          | Minimum | Typical | Maximum | Units | Notes                         |
|----------------------------------------|----------|---------|---------|---------|-------|-------------------------------|
| Supply Current ( $I_{dd}$ )            |          |         | 40      | 42      | mA    | RL=50Ω                        |
| Output Logic Level                     | $V_{OH}$ | 0.725   |         |         | V     | RL=50Ω                        |
|                                        | $V_{OL}$ |         |         | 0.1     | V     |                               |
| Peak to Peak Output Swing ( $V_{pp}$ ) |          |         | 750     |         | mV    | Single ended                  |
| Rise Time                              | $T_r$    | 200     |         | 400     | ps    | RL=50Ω , CL=2pF<br>20% to 80% |
| Fall Time                              | $T_f$    | 200     |         | 400     |       |                               |
| Duty Cycle                             |          | 48      |         | 52      | %     | Differential                  |
| Integrated Phase Jitter ( $J_{PH}$ )   |          |         | 0.25    | 2       | ps    | 200kHz ~ 20MHz<br>@156.25MHz  |
|                                        |          |         | 0.37    | 2       |       | 100kHz ~ 20MHz<br>@156.25MHz  |
|                                        |          |         | 1.70    | 2       |       | 12kHz ~ 20MHz<br>@156.25MHz   |
| Period Jitter RMS ( $J_{PER}$ )        |          |         | 2.5     |         | ps    |                               |

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## Absolute Maximum Ratings

| Item            | Minimum | Maximum      | Unit | Condition |
|-----------------|---------|--------------|------|-----------|
| Supply Voltage  | -0.3    | +4.0         | V    |           |
| Input Voltage   | -0.3    | $V_{dd}+0.3$ | V    |           |
| Junction Temp.  |         | +150         | °C   |           |
| Storage Temp.   | -55     | +150         | °C   |           |
| Soldering Temp. |         | +260         | °C   | 40sec max |
| ESD             |         |              | V    |           |
| HBM             |         | 4,000        |      |           |
| MM              |         | 400          |      |           |
| CDM             |         | 1,500        |      |           |

## PART IDENTIFICATIONS:

### Programmed Orders (Quantity > 1,000pcs)

ASDMP  -  MHz -   -

| Output Type |
|-------------|
| C: CMOS     |
| LP: LVPECL  |
| LV: LVDS    |
| HC: HCSL    |

| Frequency in MHz                                         |
|----------------------------------------------------------|
| e.g. 156.2500 MHz<br>(Maximum 4 digits<br>after decimal) |

| Operating Temp.      |
|----------------------|
| Blank: -20°C ~ +70°C |
| L: -40°C ~ +85°C     |
| X: -40°C ~ +105°C    |
| Z**: -55°C ~ +125°C  |

| Overall Freq. Stability |
|-------------------------|
| Blank: ±50ppm           |
| Y: ±10ppm*              |
| R: ±25 ppm              |

| Tri-state (Pin 1) |
|-------------------|
| Blank: Tri-state  |
| PD: Power Down    |

| Packaging                           |
|-------------------------------------|
| Blank***: Tube<br>(140pcs / Tube)   |
| T: Tape & Reel<br>(1kpcs / reel)    |
| T3: Tape & Reel<br>(3kpcs / reel)   |
| T5: Tape & Reel<br>(5kpcs / reel)   |
| T10: Tape & Reel<br>(10kpcs / reel) |

\* Temp option L, X or -20°C ~ +70°C, only

\*\* CMOS output only

\*\*\* For Quick turn-around programmable orders < 1000pcs: Due to the immediate availability of stock and the qty of the order, the parts may be delivered as BULK: Cut Tape, Loose parts in Antistatic Bag or in Tube(s). The MOQ per the series will still apply for Tube packaging.

### Un-Programmed Orders

Blank un-programmed oscillators are available for quick turn engineering requirements. Please call ABRACON for more information.

ASDMP  - BLANK -   -

| Output Type |
|-------------|
| C: CMOS     |
| LP: LVPECL  |
| LV: LVDS    |
| HC: HCSL    |

| Operating Temp.      |
|----------------------|
| Blank: -20°C ~ +70°C |
| L: -40°C ~ +85°C     |
| X: -40°C ~ +105°C    |
| Z**: -55°C ~ +125°C  |

| Overall Freq. Stability |
|-------------------------|
| Blank: ±50ppm           |
| Y: ±10ppm*              |
| R: ±25 ppm              |

| Tri-state (Pin 1) |
|-------------------|
| Blank: Tri-state  |
| PD: Power Down    |

| Packaging                        |
|----------------------------------|
| Blank: Tube (140pcs / Tube)      |
| T: Tape & Reel (1kpcs / reel)    |
| T3: Tape & Reel (3kpcs / reel)   |
| T5: Tape & Reel (5kpcs / reel)   |
| T10: Tape & Reel (10kpcs / reel) |

\* Temp option L, X or -20°C ~ +70°C, only

\*\* CMOS output only

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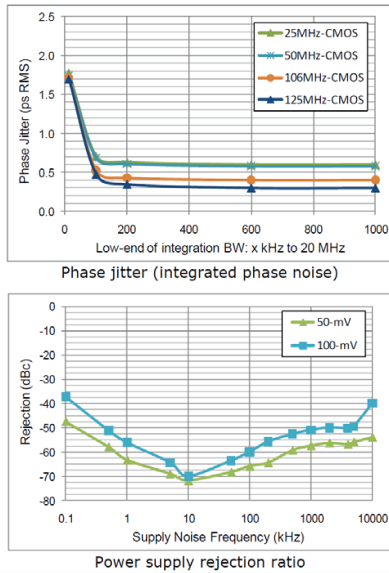
RoHS/RoHS II compliant

ASDMP

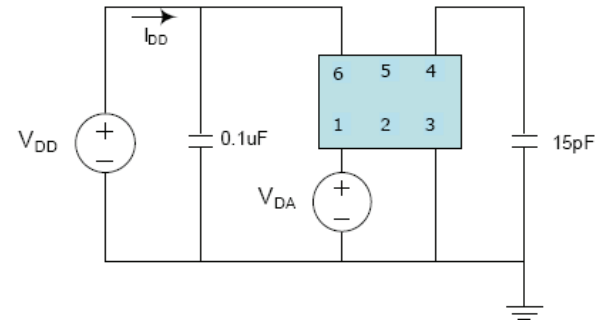


2.5 x 2.0 x 0.85 mm

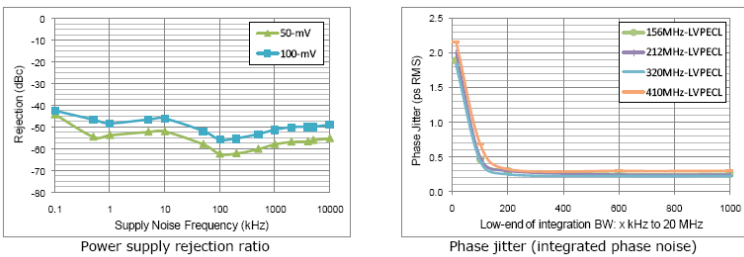
## CMOS OUTPUT:



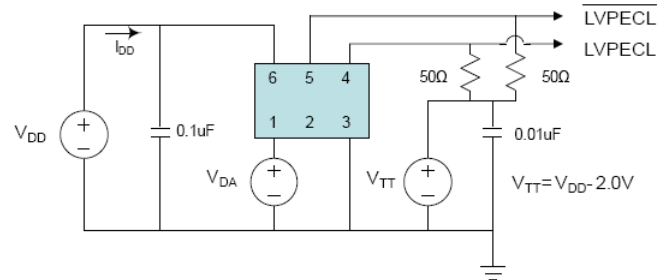
## TEST CIRCUIT:



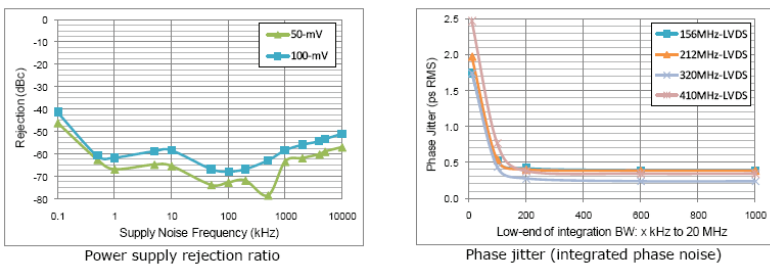
## LVPECL OUTPUT:



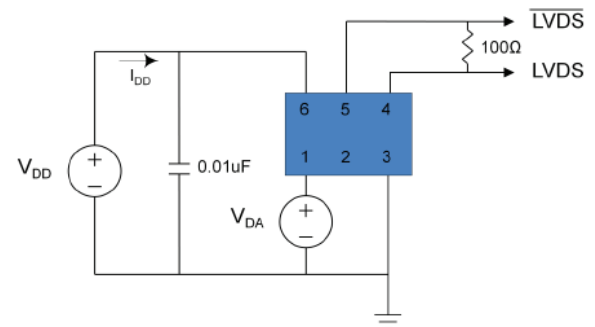
## TEST CIRCUIT:



## LVDS OUTPUT:



## TEST CIRCUIT:



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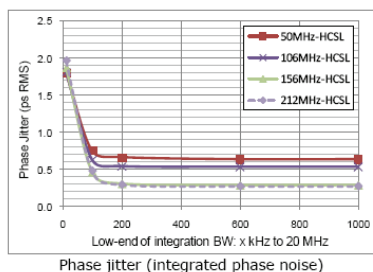
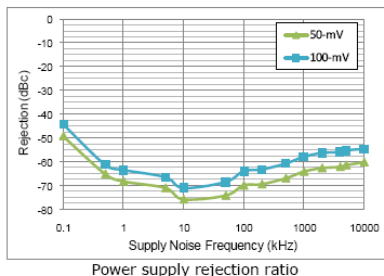
RoHS/RoHS II compliant

ASDMP

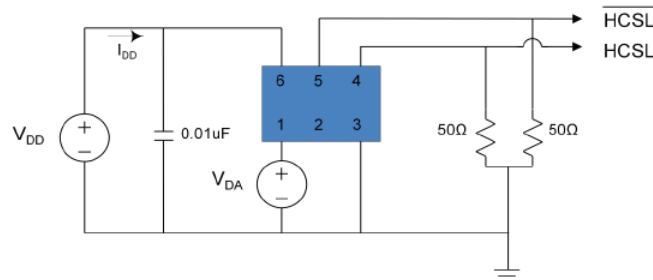


2.5 x 2.0 x 0.85 mm

## HCSL OUTPUT:

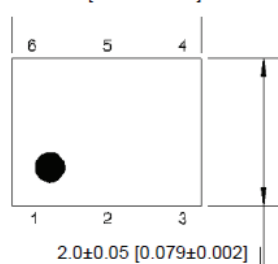


## TEST CIRCUIT:



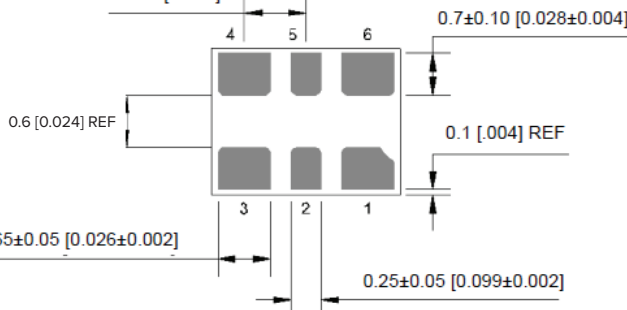
## OUTLINE DRAWING:

2.5±0.05 [0.098±0.002]



2.0±0.05 [0.079±0.002]

0.825 [ .032 ]



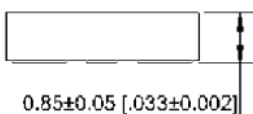
0.6 [0.024] REF

0.7±0.10 [0.028±0.004]

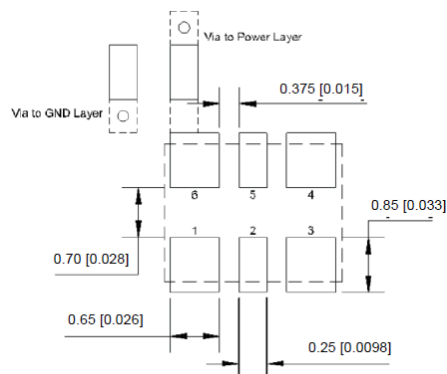
0.1 [ .004 ] REF

0.65±0.05 [0.026±0.002]

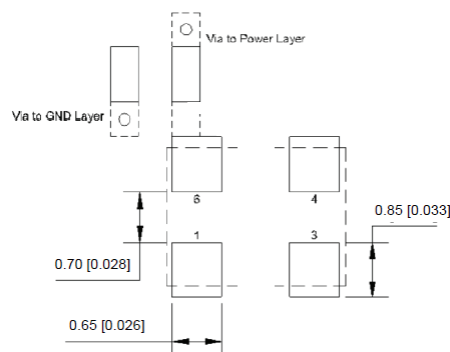
0.25±0.05 [0.099±0.002]



0.85±0.05 [0.033±0.002]



Recommended Land Pattern for LVPECL, LVDS, HCSL



Recommended Land Pattern for CMOS

| Pin # | Function                                 |
|-------|------------------------------------------|
| 1     | Tri-state                                |
| 2     | NC                                       |
| 3     | GND                                      |
| 4     | Output                                   |
| 5     | NC (CMOS)<br>Output (LVPECL, LVDS, HCSL) |
| 6     | Vdd                                      |

Note: Recommend using an approximately 0.01uF bypass capacitor between PIN 6 and 3.

Dimensions: mm (inches)

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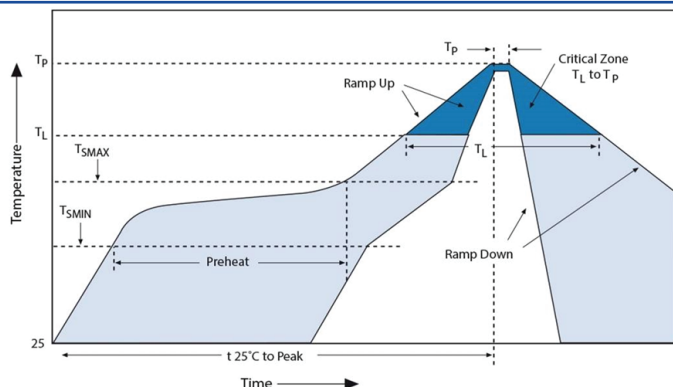
RoHS/RoHS II compliant

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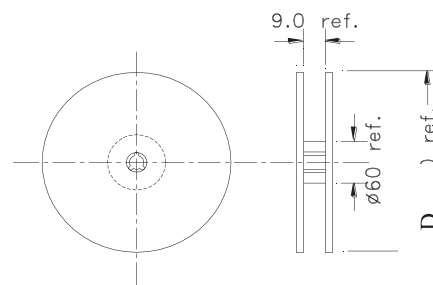
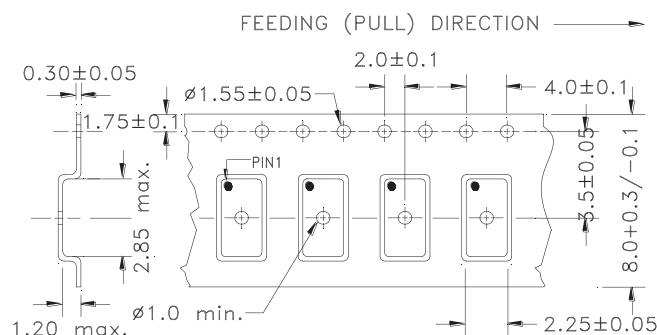
## REFLOW PROFILE:



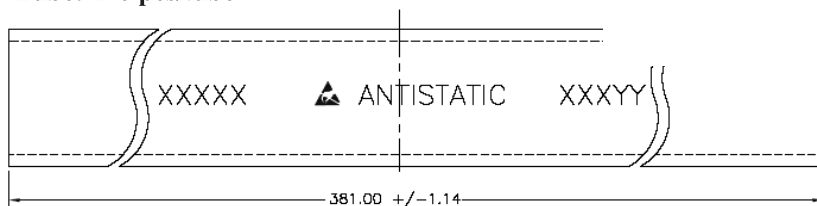
| Zone | Description    | Temperature                               | Time          |
|------|----------------|-------------------------------------------|---------------|
| 1    | Preheat / Soak | $T_{SMIN} \sim T_{SMAX}$<br>150°C ~ 200°C | 60 ~ 180 sec. |
| 2    | Reflow         | $T_L$<br>217°C                            | 60 ~ 150 sec. |
| 3    | Peak heat      | $T_P$<br>255°C ~ 260°C                    | 40 sec. MAX.  |

## TAPE & REEL:

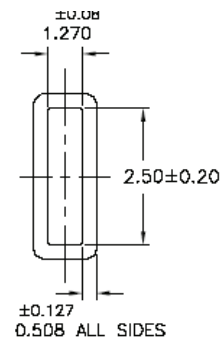
T= 1,000pcs/reel (D=180mm)  
T3= 3,000pcs/reel (D=180mm)  
T5= 5,000pcs/reel (D=330mm)  
T10= 10,000pcs/reel (D=330mm)



Tube: 140 pcs/tube



Unit orientation in tube:



Dimensions: mm

**ATTENTION:** Abracon LLC products are COTS – Commercial-Off-the-Shelf products; suitable for Commercial, Industrial and, where designated, Automotive Applications. Abracon's products are not specifically designed for Military, Aviation, Aerospace, Life dependent Medical applications or any application requiring high reliability where component failure could result in loss of life and/or property. For applications requiring high reliability and/or presenting an extreme operating environment, written consent and authorization from Abracon LLC is required. Please contact Abracon LLC for more information.

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