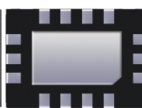


# LOW JITTER PIN CONFIGURABLE LVDS-CMOS DUAL OUTPUT ULTRA MINIATURE PURE SILICON™ CLOCK OSCILLATOR

ASEMDLC



Life Size   
3.2 x 2.5 x 0.85 mm

**ASEMDLC**



RoHS/RoHS II compliant

Moisture Sensitivity Level – MSL 1

## FEATURES:

- Ultra Miniature Pure Silicon™ Clock Oscillator
- Pin Configurable LVDS-CMOS Dual output
- Low Jitter (Period Jitter RMS 2.5ps typical)
- Low Integrated Phase Jitter 2ps max
- Excellent Shock & Vibration Immunity

## APPLICATIONS:

- Consumer Electronics
- Storage Area Networks
- SATA, SAS, Fibre Channel
- Passive Optical Networks
- EPON, 10G-EPON, GPON, 10G-PON
- Ethernet
- 1G, 10GBASE-T/KR/LR/SR, and FCoE
- PCI Express

Low Jitter  
Pin Configurable  
LVDS-CMOS Dual Output  
3G MEMS

## STANDARD SPECIFICATIONS:

### Pre-programmed Output Frequency Configuration

| Ordering Info             | Freq (MHz)               | Freq Select Bits [FS2, FS1, FS0] – Default is [111] |       |        |     |     |     |     |            |
|---------------------------|--------------------------|---|-------|--------|-----|-----|-----|-----|------------|
|                           |                          | 000   | 001   | 010    | 011 | 100 | 101 | 110 | <b>111</b> |
| Frequency Configuration 1 | f <sub>OUT1</sub> (LVDS) | 148.5   | 74.25 | 156.25 | 150 | 125 | 125 | 100 | <b>100</b> |
|                           | f <sub>OUT2</sub> (CMOS) | 74.25   | 74.25 | 125    | 125 | 25  | 50  | 50  | <b>75</b>  |
| Custom Configuration      | f <sub>OUT1</sub>        | Contact Abracon for customized configurations       |       |        |     |     |     |     |            |
|                           | f <sub>OUT2</sub>        |   |       |        |     |     |     |     |            |

Frequency select bits [FS2, FS1, FS0] are weakly tied high so if left floated, the default setting will be [111] and the device will output the associated frequency highlighted in Bold. If other frequency combinations are required, please contact Abracon for customized configuration. Please see the configurable frequency range in the section 2.0

### Key Electrical Specifications

| Parameters                                | Minimum  | Typical | Maximum | Units | Notes   |                                   |
|---|--|---------|---------|-------|---|-----------------------------------|
| Configurable frequency range              | LVDS   | 2.3     |         | 460   | MHz   | Commercial, Industrial temp range |
|   | CMOS   | 2.3     |         | 170   |   |                                   |
| Operating Temperature                     | -20  |         | +70     | °C    | See options   |                                   |
| Storage Temperature                       | -55  |         | +150    | °C    |   |                                   |
| Overall Frequency Stability* <sup>1</sup> | -50  |         | +50     | ppm   | See options   |                                   |
| Supply Voltage (V <sub>dd</sub> )         | +2.25  |         | +3.6    | V     |   |                                   |
| Startup Time                              |  |         | 5       | ms    |   |                                   |
| Enable Time                               |  |         | 20      | ns    |   |                                   |
| Disable Time                              |  |         | 5       | ns    |   |                                   |
| Disable Current                           |  | 21      | 23      | mA    |   |                                   |
| Tri-state Function (Standby/Disable)      | "1" (VIH ≥ 0.75*V <sub>dd</sub> ) or Open: Oscillation<br>"0" (VIL < 0.25*V <sub>dd</sub> ) : Hi Z |         |         | V     | 40kΩ pull-up resistor embedded                                      |                                   |
| Aging                                     | -5.0   |         | +5.0    | ppm   | First year  |                                   |
| Supply Current (I <sub>dd</sub> )         |  | 49      |         | mA    | LVDS output: RL=100Ω, F01=125MHz<br>CMOS output: CL=15pF, F02=75MHz |                                   |

\*1. Frequency stability includes frequency variations due to initial tolerance, temp. and power supply voltage

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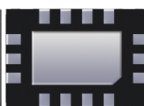


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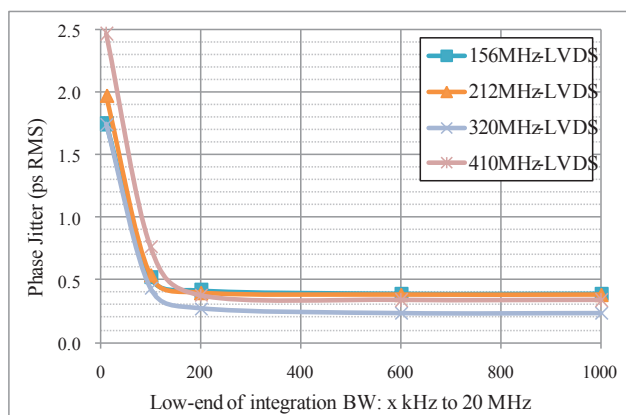
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## Key Electrical Specifications (continued)

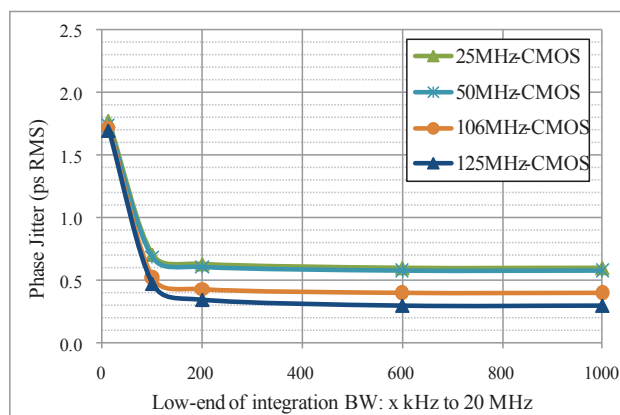
| LVDS Output (Fout1)                        |    | Minimum | Typical | Maximum | Units | Notes                         |
|--|----|---------|---------|---------|-------|-------------------------------|
| Output Offset Voltage                      |    | 1.125   |         | 1.40    | V     | RL=100 Ω, Differential        |
| Delta Offset Voltage                       |    |         |         | 50      | mV    |                               |
| Peak to Peak Output Swing                  |    |         | 350     |         | mV    | Single-Ended                  |
| Rise Time                                  | Tr |         | 200     | 350     | ps    | RL=50 Ω, CL=2pF               |
| Fall Time                                  | Tf |         | 200     | 350     | ps    | 20% to 80%                    |
| Duty Cycle                                 |    | 48      |         | 52      | %     | Differential                  |
| Period Jitter RMS (J <sub>PER</sub> )      |    |         | 2.5     |         | ps    | F01= 125MHz                   |
| Integrated Phase Jitter (J <sub>PH</sub> ) |    |         | 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  |

| CMOS Output (Fout2)                        |                 | Minimum             | Typical | Maximum             | Units | Notes                      |
|--|-----------------|---------------------|---------|---------------------|-------|----------------------------|
| 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> |       |                            |
| 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                  | %     |                            |
| Period Jitter RMS (J <sub>PER</sub> )      |                 |                     | 3.0     |                     | ps    | F01= 125MHz                |
| Integrated Phase Jitter (J <sub>PH</sub> ) |                 |                     | 0.30    | 2                   | ps    | 200kHz ~ 20MHz,<br>@125MHz |
|  |                 |                     | 0.38    | 2                   |       | 100kHz ~ 20MHz,<br>@125MHz |
|  |                 |                     | 1.70    | 2                   |       | 12kHz ~ 20MHz,<br>@125MHz  |

## PHASE JITTER



LVDS



CMOS

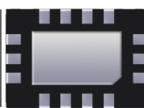
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ASEMDLC



Life Size 3.2 x 2.5 x 0.85 mm

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RoHS/RoHS II compliant

## ABSOLUTE MAXIMUM RATINGS

| Item            | Minimum | Maximum              | Unit | Condition |
|-----------------|---------|----------------------|------|-----------|
| Supply Voltage  | -0.3    | +4.0                 | V    |           |
| Input Voltage   | -0.3    | V <sub>dd</sub> +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                |      |           |

## OPTIONS AND PART IDENTIFICATION:

ASEMDLC -  -  -

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

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

| Packaging                      |
|--------------------------------|
| Blank*: Tube (110pcs / Tube)   |
| T: Tape & Reel (1kpcs / reel)  |
| T3: Tape & Reel (3kpcs / reel) |
| T5: Tape & Reel (5kpcs / reel) |

\* 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.

| Frequency Combination         | Freq (MHz)               | Freq Select Bits [FS2, FS1, FS0] – Default is [111] |       |        |     |     |     |     |            |
|-------------------------------|--------------------------|---|-------|--------|-----|-----|-----|-----|------------|
|                               |                          | 000   | 001   | 010    | 011 | 100 | 101 | 110 | 111        |
| <b>Standard Configuration</b> | f <sub>OUT1</sub> (LVDS) | 148.5   | 74.25 | 156.25 | 150 | 125 | 125 | 100 | <b>100</b> |
|                               | f <sub>OUT2</sub> (CMOS) | 74.25   | 74.25 | 125    | 125 | 25  | 50  | 50  | <b>75</b>  |
| Custom Configuration          | f <sub>OUT1</sub>        | Contact Abracon for customized configurations       |       |        |     |     |     |     |            |
|                               | f <sub>OUT2</sub>        |   |       |        |     |     |     |     |            |

Default condition: Frequency select bits [FS2, FS1, FS0] are all left floated. FS2, FS1, FS0 are pulled high [111]  
Frequency combination and default frequency is customized upon request. Please contact Abracon for the frequency combinations.

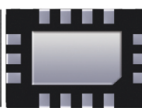
## CONFIGURABLE CMOS OUTPUT STRENGTH (TR/TF)

CMOS Output (Tr/Tf) are configurable by the control pins OS2, OS1 and OS0. The combinations are described in the table below.

|         | Output Drive Strength Bits<br>[OS2, OS1, OS0] - Default [111] |     |     |     |     |     |     |            |
|---------|---|-----|-----|-----|-----|-----|-----|------------|
|         | 000   | 001 | 010 | 011 | 100 | 101 | 110 | 111        |
| Tr (ns) | 2.1   | 1.7 | 1.6 | 1.4 | 1.3 | 1.3 | 1.2 | <b>1.1</b> |
| Tf (ns) | 2.5   | 2.4 | 2.4 | 2   | 1.8 | 1.6 | 1.3 | <b>1.3</b> |

# LOW JITTER PIN CONFIGURABLE LVDS-CMOS DUAL OUTPUT ULTRA MINIATURE PURE SILICON™ CLOCK OSCILLATOR

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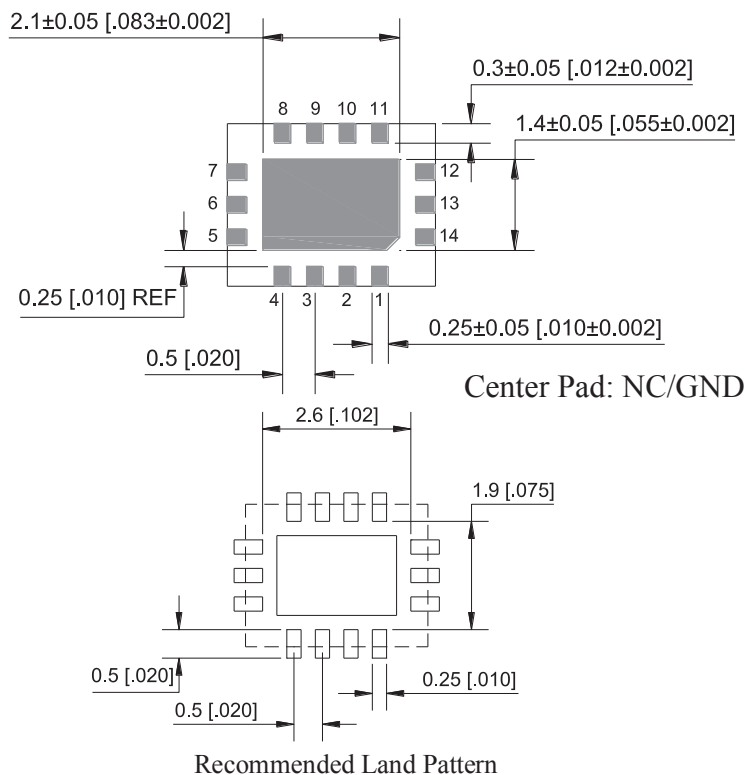
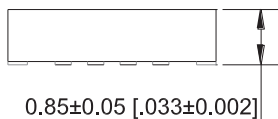
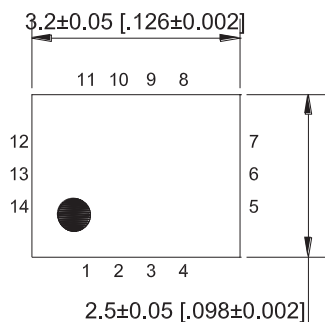


Life Size   
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## MECHANICAL DIMENSIONS

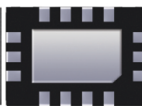


| Pin No. | Pin Name | Pin Type | Description  |
|---------|----------|----------|--|
| 1       | Enable   | I        | Enables outputs when high and disables (tri-state) them when low   |
| 2       | NC       | NA       | Leave unconnected or grounded                                      |
| 3       | OS0      | I        | Least significant bit for output drive strength selection for CMOS |
| 4       | GND      | Power    | Ground   |
| 5       | FS0      | I        | Least significant bit for frequency selection                      |
| 6       | FS1      | I        | Middle bit for frequency selection                                 |
| 7       | FS2      | I        | Most significant bit for frequency selection                       |
| 8       | Output1+ | O        | Positive LVDS Output 1   |
| 9       | Output1- | O        | Negative LVDS Output 1   |
| 10      | OS1      | I        | Middle bit for output drive strength selection for CMOS            |
| 11      | Output 2 | O        | CMOS output  |
| 12      | VDD2     | Power    | Power Supply 2 for CMOS Output                                     |
| 13      | VDD      | Power    | Power Supply   |
| 14      | OS2      | I        | Most significant bit for output drive strength selection for CMOS  |

Dimensions: mm (inches)

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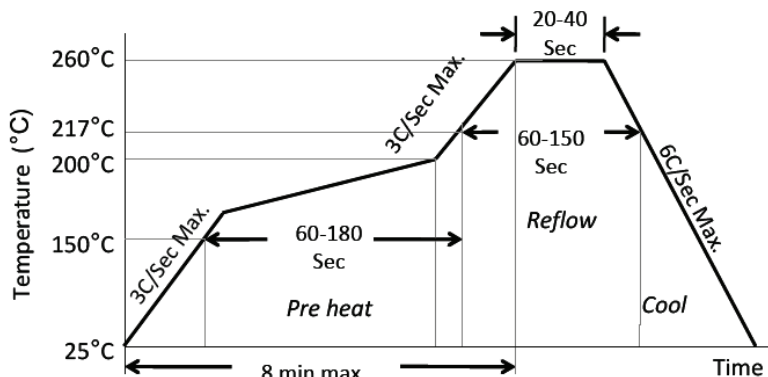
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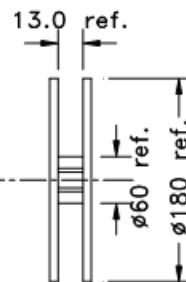
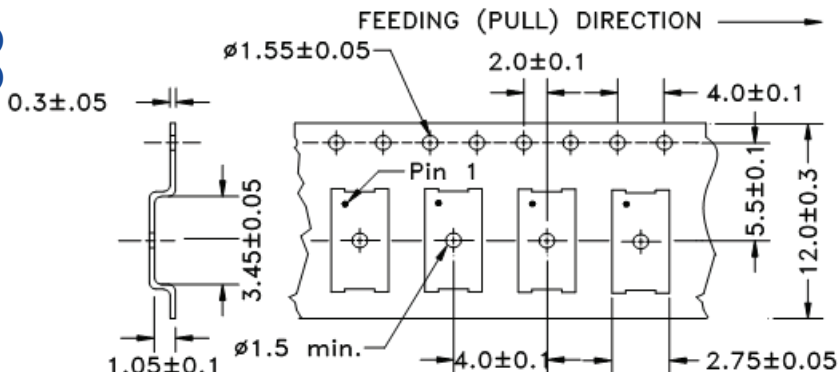
## REFLOW PROFILE



|                                   |              |
|-----------------------------------|--------------|
| Ramp-Up Rate (200°C to Peak Temp) | 3°C/Sec Max. |
| Preheat Time 150°C to 200°C       | 60-180 Sec   |
| Time maintained above 217°C       | 60-150 Sec   |
| Peak Temperature                  | 255-260°C    |
| Time within 5°C of actual Peak    | 20-40 Sec    |
| Ramp-Down Rate                    | 6°C/Sec Max. |
| Time 25°C to Peak Temperature     | 8 min Max.   |

## REFLOW PROFILE

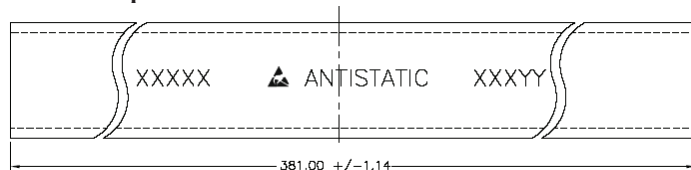
T= 1,000pcs/reel (D=180mm)  
T3= 3,000pcs/reel (D=180mm)  
T5= 5,000pcs/reel (D=330mm)



Unit orientation in tube:



Tube: 110 pcs/tube



Dimensions: mm

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