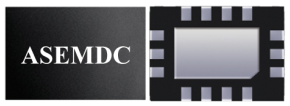
# LOW JITTER PIN CONFIGURABLE DUAL CMOS OUTPUT ULTRA MINIATURE PURE SILICON™ CLOCK OSCILLATOR

**ASEMDC**

**Moisture Sensitivity Level – MSL 1**

RoHS Compliant




3.2 x 2.5 x 0.85 mm

## FEATURES:

- Ultra Miniature Pure Silicon™ Clock Oscillator
- Pin Configurable Dual CMOS output
- Low Jitter (Period Jitter RMS 3ps typical)
- Low Integrated Phase Jitter 2ps max
- Tight Stability +/-10ppm -40 to +85C
- 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
- HD/SD/SDI Video & Surveillance
- PCI Express

**Low Jitter Pin Configurable Dual CMOS 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 | **111** |
| Frequency Configuration 1 | $f_{OUT1}$ | 27 | 25 | 50 | 40 | 27 | 24 | 24 | **24** |
| | $f_{OUT2}$ | 24 | 125 | 125 | 25 | 48 | 50 | 54 | **27** |
| Frequency Configuration 2 | $f_{OUT1}$ | 106.25 | 100 | 125 | 100 | 156.25 | 156.25 | 125 | **156.25** |
| | $f_{OUT2}$ | 25 | 100 | 50 | 50 | 25 | 125 | 25 | **156.25** |
| Custom Configuration | $f_{OUT1}$ | Contact Abracon for customized configurations | | | | | | | |
| | $f_{OUT2}$ | | | | | | | | |

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 | | 10 | ----- | 170 | MHz | Commercial, Industrial temp range |
| | | 10 | ----- | 100 | | Automotive temp range |
| Operating Temperature | | -20 | ----- | +70 | °C | See options |
| Storage Temperature | | -55 | ----- | +150 | °C | |
| Overall Frequency Stability*1 | | -50 | ----- | +50 | ppm | See options |
| Supply Voltage (Vdd) | | +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*Vdd) or Open: Oscillation "0" (VIL<0.25*Vdd) : Hi Z | | | V | 40kΩ pull-up resistor embedded |
| Aging | | -5.0 | ----- | +5.0 | ppm | First year |
| Supply Current ($I_{dd}$) | | ----- | 32 | ----- | mA | CL=15pF, 125MHz |
| Output Logic Level | $V_{OH}$ | 0.9*$V_{dd}$ | ----- | | V | I=±6mA |
| | $V_{OL}$ | ----- | ----- | 0.1*$V_{dd}$ | | |
| Rise Time | Tr | ----- | 1.1 | 2.0 | ns | CL=15pF |
| Fall Time | Tf | ----- | 1.4 | 2.0 | ns | 20%/80%*VDD |
| Duty Cycle | | 45 | ----- | 55 | % | |

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



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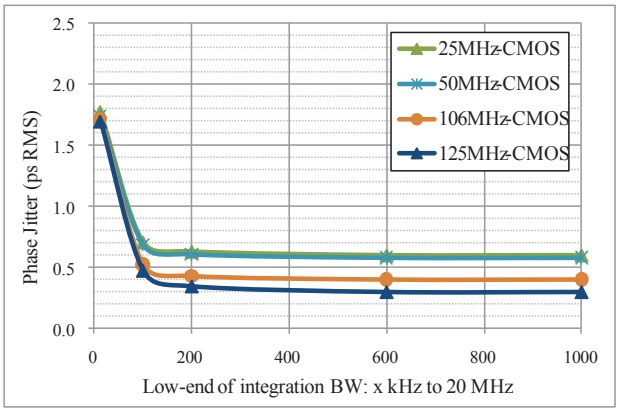
3.2 x 2.5 x 0.85 mm

## Key Electrical Specifications (continued)

| Parameters | Minimum | Typical | Maximum | Units | Notes |
|---|---|---|---|---|---|
| Period Jitter RMS ($J_{PER}$) | ----- | 3.0 | ----- | ps | F01=F02= 125MHz |
| Integrated Phase Jitter ($J_{PH}$) | ----- | 0.30 | 2 | ps | 200kHz ~ 20MHz, 125MHz |
| | ----- | 0.38 | 2 | | 100kHz ~ 20MHz, 125MHz |
| | ----- | 1.70 | 2 | | 12kHz ~ 20MHz, 125MHz |

## PHASE JITTER




## 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 | | 200 | | |
| CDM | | 1,500 | | |

## OPTIONS AND PART IDENTIFICATION:

**(left blank if standard)**

ASEMDC□-□-□-□

| Frequency Combination (See table below) |
|---|
| 1: Cfg. 1 |
| 2: Cfg. 2 |

| 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 |

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

*-20°C ~ +70°C, option L, or X only

| Frequency Combination | Freq (MHz) | Freq Select Bits [FS2, FS1, FS0] – **Default is [111]** | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | 000 | 001 | 010 | 011 | 100 | 101 | 110 | **111** |
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| | $f_{OUT2}$ | 25 | 100 | 50 | 50 | 25 | 125 | 25 | **156.25** |
| Custom Configuration | $f_{OUT1}$ | Contact Abracon for customized configurations | | | | | | | |
| | $f_{OUT2}$ | | | | | | | | |

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.



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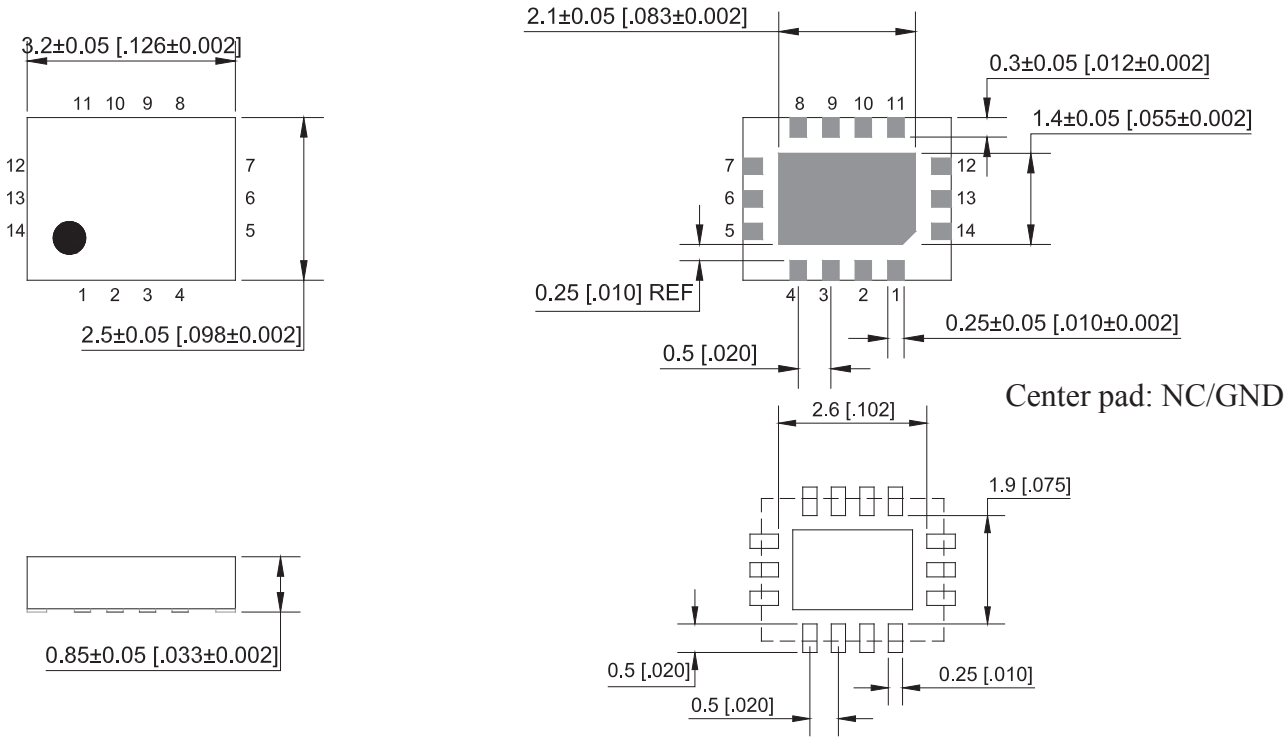
## CONFIGURABLE OUTPUT STRENGTH (Tr/Tf)

Output (Tr/Tf) are configurable by the control pins OxS1 and OxS0. The combinations are described in the table below. (O1S1 and O1S0 are for output 1. O2S1 and O2S0 are for output 2)

| | Output Drive Strength Bits [O1S1, O1S0], [O2S1, O2S0] - Default [11] | | | |
|---|---|---|---|---|
| | 00 | 01 | 10 | **11** |
| Tr (ns) | 1.6 | 1.4 | 1.2 | **1.1** |
| Tf (ns) | 2.4 | 2.2 | 1.5 | **1.4** |

## MECHANICAL DIMENSIONS




Recommended Land Pattern

| 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 | O2S0 | I | Least significant bit for output drive strength selection for Output 2 |
| 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 | Fout1 | O | CMOS output 1 |
| 9 | O1S0 | I | Least significant bit for output drive strength selection for output 1 |
| 10 | O1S1 | I | Most significant bit for output drive strength selection for output 1 |
| 11 | Fout2 | O | CMOS output 2 |
| 12 | VDD2 | Power | Power Supply for Output 2 |
| 13 | VDD | Power | Power Supply |
| 14 | O2S1 | I | Most significant bit for output drive strength selection for output 2 |

**Dimensions: mm (inches)**



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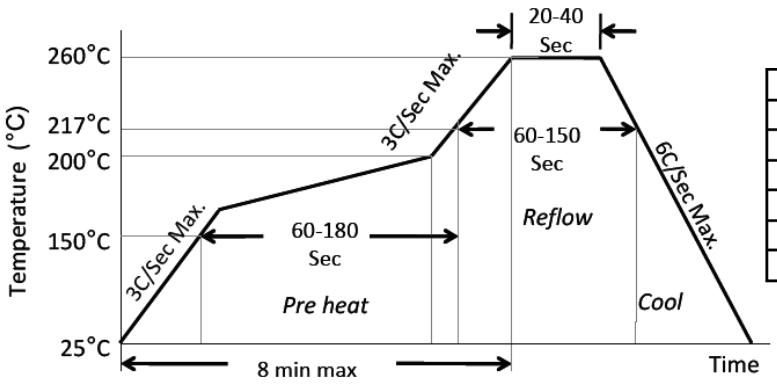
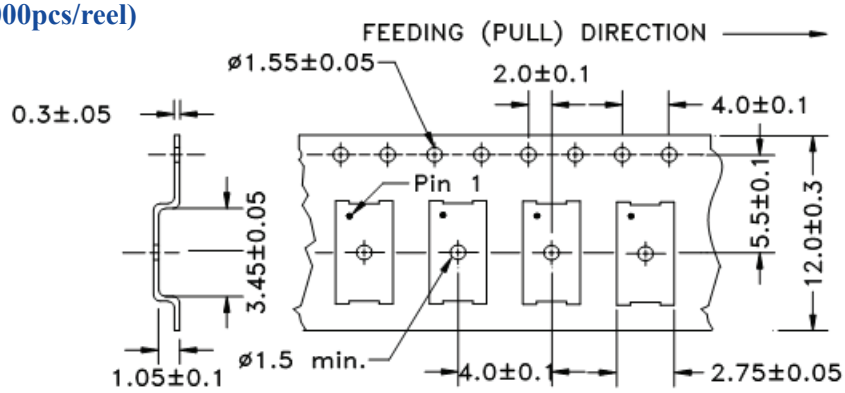
## REFLOW PROFILE

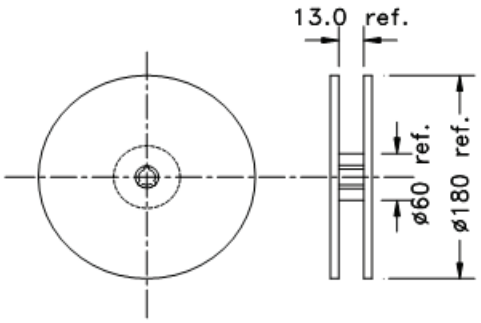



| | |
|---|---|
| Ramp-Up Rate (200°C to Peak Temp) | 3°C/Sec Max. |
| Preheat Time 150°C to 200°C | 60-180 Sec |
| Time maintained above 217°C | 60-150 Sec |
| Peak Temperature | 255-260°C |
| Time within 5°C of actual Peak | 20-40 Sec |
| Ramp-Down Rate | 6°C/Sec Max. |
| Time 25°C to Peak Temperature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

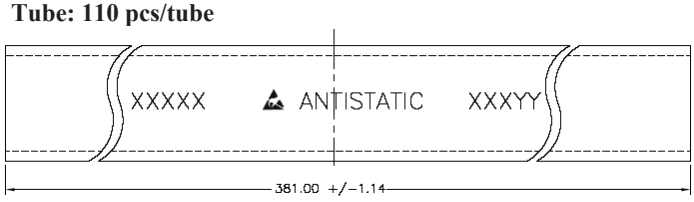
## REFLOW PROFILE

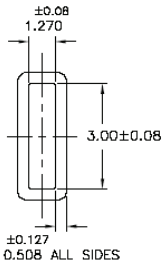
**T= Tape and reel (1,000pcs/reel)**




**Tube: 110 pcs/tube**




**Unit orientation in tube:**

**Dimensions: mm**

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