

# PERFORMANCE PLASTIC PACKAGE ULTRA MINIATURE PURE SILICON™ CLOCK OSCILLATOR

ASEMP



Life Size   
3.2 x 2.5 x 0.85 mm

ASEMP

Moisture Sensitivity Level – MSL 1



RoHS  
Compliant

Low Jitter  
High Performance  
3G MEMS Technology!

## 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
- Available in 50kG Shock Resistance Configuration upon request
- 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)
- HD/SD/SDI Video & Surveillance
- PCI Express
- Display port

## STANDARD SPECIFICATIONS:

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

| Parameters                           | Minimum   | Typical | Maximum | Units   | Notes                          |                                   |
|--------------------------------------|---|---------|---------|---------|--------------------------------|-----------------------------------|
| Frequency Range                      | CMOS  | 10.000  | -----   | 170.000 | MHz                            | Commercial, Industrial Temp range |
|                                      | CMOS  | 10.000  | -----   | 100.000 |                                | Automotive -55 ~ +125°C           |
|                                      | LVPECL  | 10.000  | -----   | 460.000 |                                | Commercial, Industrial Temp range |
|                                      | LVDS  | 10.000  | -----   | 460.000 |                                | Commercial, Industrial Temp range |
|                                      | HCSL  | 10.000  | -----   | 460.000 |                                | 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      |                                |                                   |
| Stand-by Current                     | -----   | 20      | 22      | mA      | STD (Tri-state)                |                                   |
| Disable Current                      | -----   | -----   | 0.095   |         | PD option (Power Down)         |                                   |
| Tri-state Function (Standby/Disable) | "1" (VIH≥0.7 5*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                     |                                   |

### 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                                  | -----           | 1.1                 | 2.0                 | ns    | CL=15pF<br>20%/80%*VDD |
| Fall Time                                  | -----           | 1.3                 | 2.0                 | ns    |                        |
| 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    |                        |

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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%/80%*VDD |
| 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%/80%*VDD |
| 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   |                                |
| Peak to Peak Output Swing ( $V_{pp}$ ) | -----    | 750     | -----   | mV    | Single ended                   |
| Rise Time                              | $T_r$    | 200     | -----   | ps    | RL=50Ω , CL=2pF<br>20%/80%*VDD |
| Fall Time                              | $T_f$    | 200     | -----   |       |                                |
| 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 <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              |         | 200                  |      |           |
| CDM             |         | 1,500                |      |           |

## OPTIONS AND PART IDENTIFICATION: (Left Blank if Standard)

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

ASEMP  -  MHz -  -  -

| Output Type | Frequency in MHz                                      | Operating Temp.  | Overall Freq. Stability                   | Tri-state (Pin 1)                  | Packaging  |
|-------------|---|--|---|------------------------------------|--|
| C: CMOS     | e.g. 156.2500 MHz<br>(Maximum 4 digits after decimal) | Blank: -20°C ~ +70°C<br>L: -40°C ~ +85°C<br>X**: -40°C ~ +105°C<br>Z**: -55°C ~ +125°C | Blank: ±50ppm<br>Y: ±10ppm*<br>R: ±25 ppm | Blank: Tri-state<br>PD: Power Down | Blank: Tube (110pcs / Tube)<br>T: Tape & Reel (1kpcs / reel)<br>T3: Tape & Reel (3kpcs / reel)<br>T5: Tape & Reel (5kpcs / reel) |

\* Temp option L, 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 and our low cost portable programmer are available for quick turn engineering requirements.

Please call ABRACON or visit MEMSpeed Pro II site <http://www.abracon.com/memspeedpro/MEMSpeedProFlyerII.pdf> for more information.

ASEMP  - BLANK -  -  -

| Output Type                                   | Operating Temp.  | Overall Freq. Stability                   | Tri-state (Pin 1)                  | Packaging  |
|---|--|---|------------------------------------|--|
| C: CMOS<br>LP: LVPECL<br>LV: LVDS<br>HC: HCSL | Blank: -20°C ~ +70°C<br>L: -40°C ~ +85°C<br>X**: -40°C ~ +105°C<br>Z**: -55°C ~ +125°C | Blank: ±50ppm<br>Y: ±10ppm*<br>R: ±25 ppm | Blank: Tri-state<br>PD: Power Down | Blank: Tube (110pcs / Tube)<br>T: Tape & Reel (1kpcs / reel)<br>T3: Tape & Reel (3kpcs / reel)<br>T5: Tape & Reel (5kpcs / reel) |

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

\*\* CMOS output only

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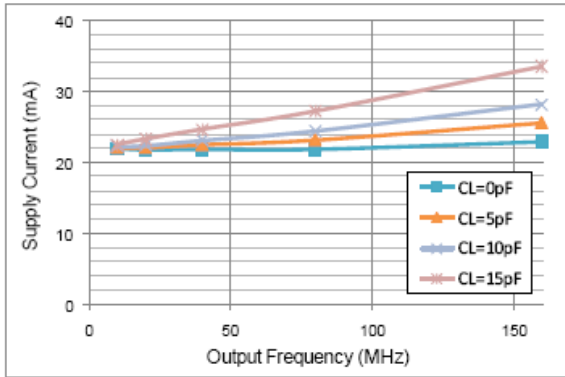
ASEMP

**RoHS**  
Compliant

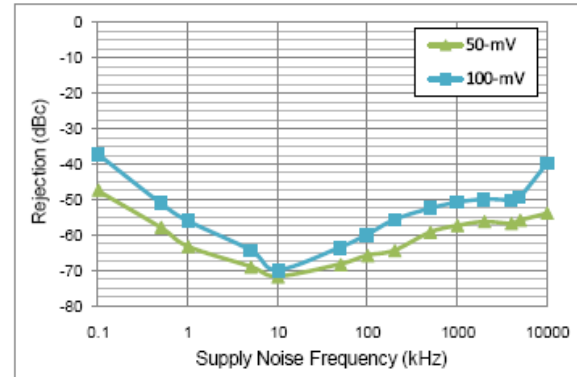
## NOMINAL PERFORMANCE PARAMETERS

(Unless specified otherwise: T=25° C, VDD=3.3 V)

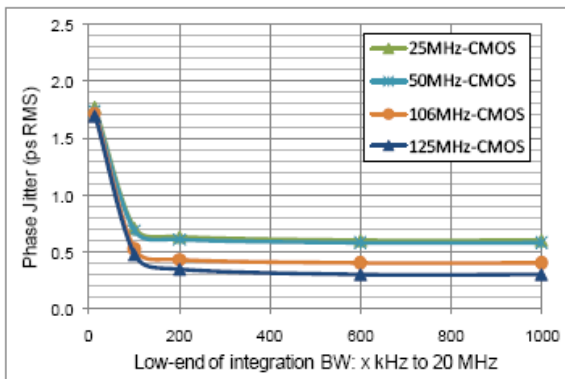
### CMOS OUTPUT



Supply current over freq

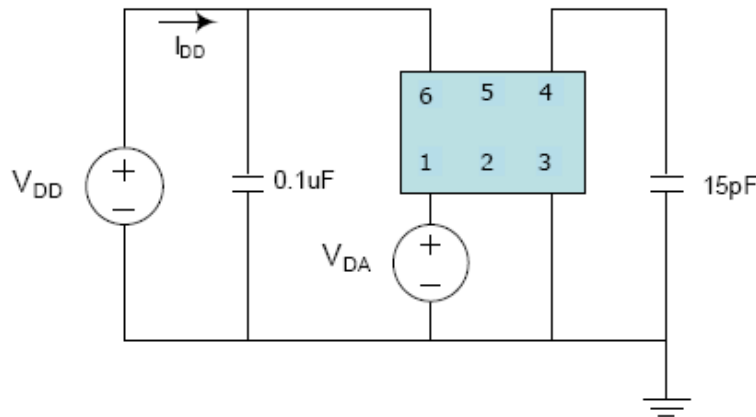


Power supply rejection ratio



Phase jitter (integrated phase noise)

### Test Circuit



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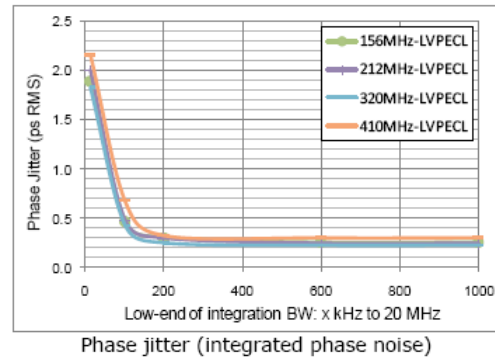
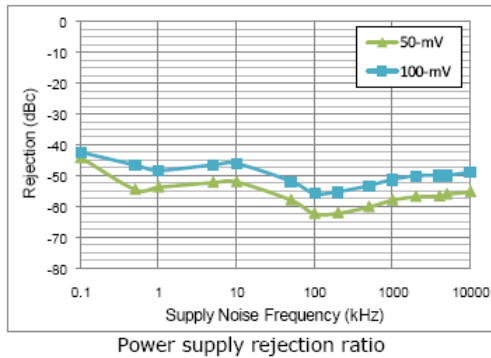


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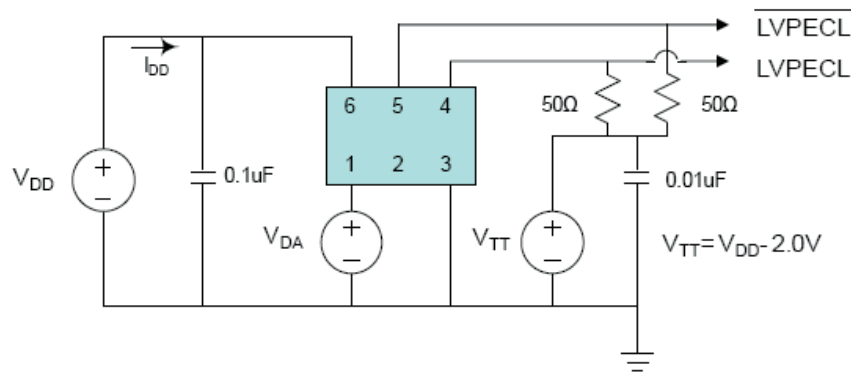
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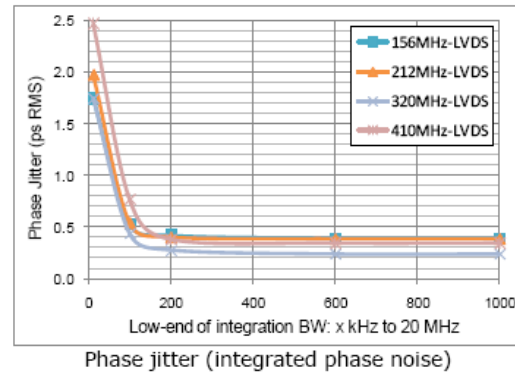
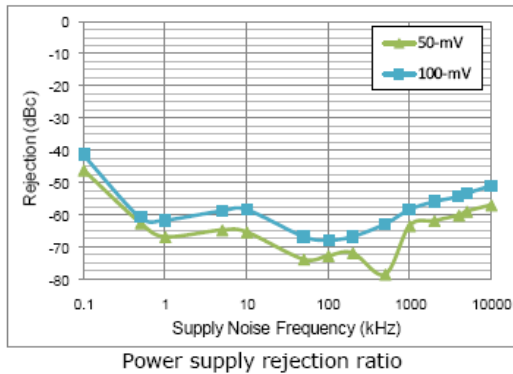
## LVPECL OUTPUT



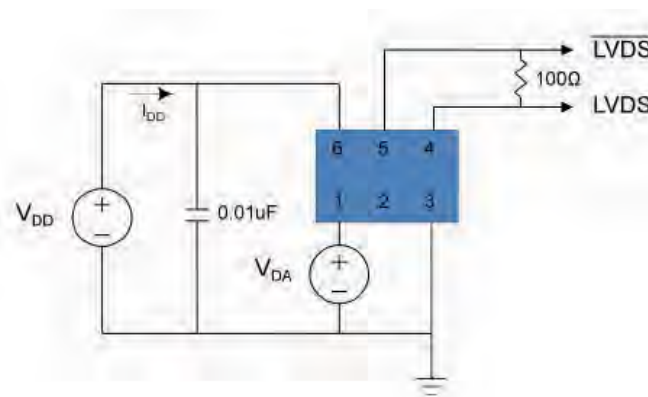
## Test Circuit



## LVDS OUTPUT



## Test Circuit



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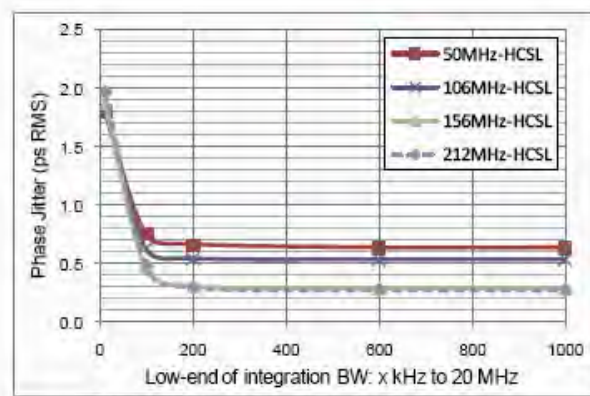
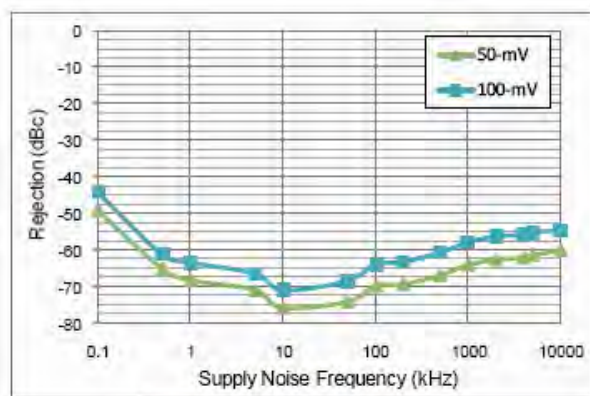
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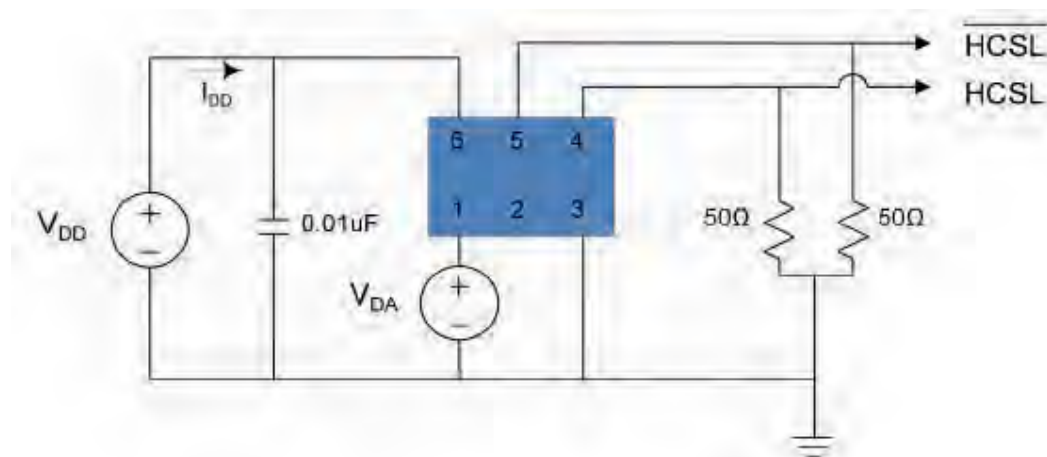


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Compliant

## HCSSL OUTPUT



## Test Circuit



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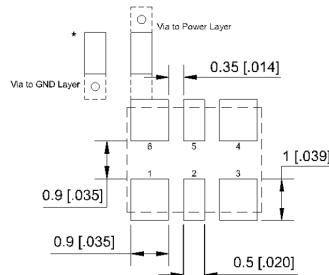
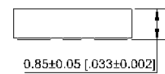
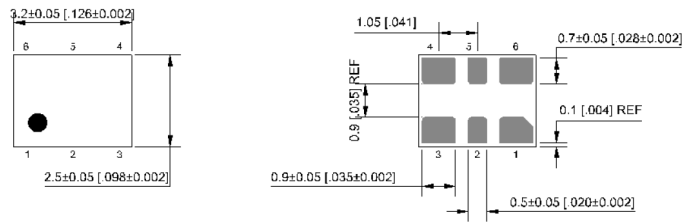


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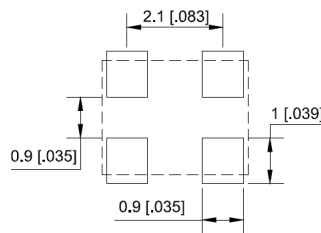
## OUTLINE DIMENSIONS:



Recommended Land Pattern for LVPECL, LVDS, HCSL

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

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

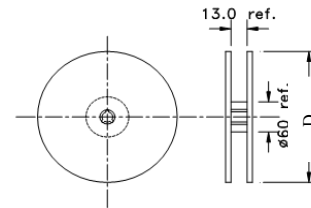
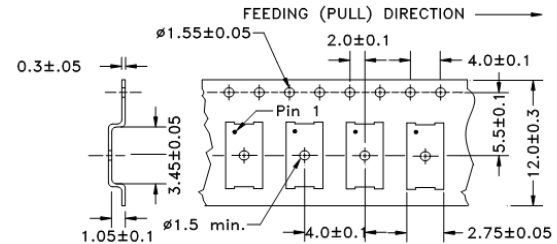


Recommended Land Pattern for CMOS

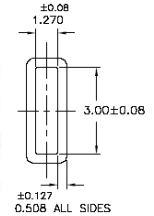
Dimensions: mm (inches)

## TAPE AND REEL:

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



Tube: 110 pcs/tube

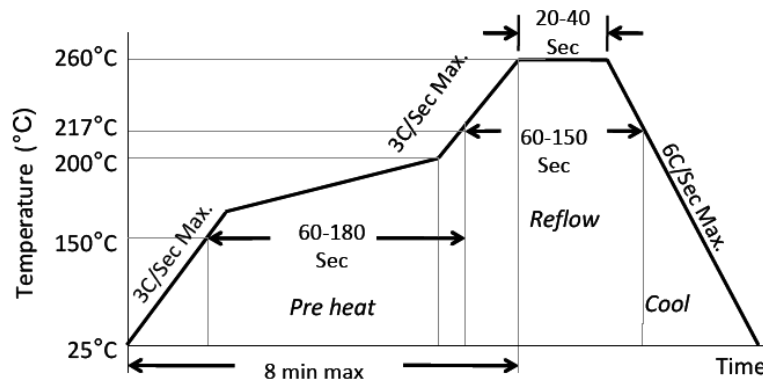


Unit orientation in tube:



Dimensions: mm

## REFLOW PROFILE:



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