

# PERFORMANCE PLASTIC PACKAGE ULTRA MINIATURE PURE SILICON™ CLOCK OSCILLATORS

ASDMP

Request Samples



Check Inventory



ESD Sensitive



2.5 x 2.0 x 0.85 mm

RoHS/RoHS II Compliant

MSL Level = 1

## Features

- 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

## Key Electrical Specifications - CMOS, LVPECL, LVDS, and HCSL

| Parameters                           |        | Min.                                                                    | Typ. | Max.     | 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:<br>Oscillation<br>"0" (VIL<0.25*Vdd) : Hi Z |      |          | V     | 40kΩ pull-up resistor embedded     |
| Aging                                |        | -5.0                                                                    |      | +5.0     | ppm   | First year                         |



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## Key Electrical Specifications - CMOS

| Parameters                                 |                 | Min.                | Typ. | Max.                | 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:                                 | T <sub>r</sub>  |                     | 1.1  | 2.0                 | ns    | CL=15pF               |
| Fall Time:                                 | T <sub>f</sub>  |                     | 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    |                       |

## Key Electrical Specifications - LVPECL

| Parameters                                   |                 | Min.                  | Typ. | Max.                  | Units | Notes                         |
|----------------------------------------------|-----------------|-----------------------|------|-----------------------|-------|-------------------------------|
| Supply Current (I <sub>dd</sub> )            |                 |                       | 56.5 | 58                    | mA    | RL= 50Ω                       |
| Output Logic Level                           | V <sub>OH</sub> | V <sub>dd</sub> -1.08 |      |                       | V     | RL= 50Ω                       |
|                                              | V <sub>OL</sub> |                       |      | V <sub>dd</sub> -1.55 | V     |                               |
| Peak to Peak Output Swing (V <sub>pp</sub> ) |                 |                       | 800  |                       | mV    | Single ended                  |
| Rise Time:                                   | T <sub>r</sub>  |                       | 250  |                       | ps    | RL=50Ω , CL=0pF<br>20% to 80% |
| Fall Time:                                   | T <sub>f</sub>  |                       | 250  |                       |       |                               |
| Duty Cycle                                   |                 | 48                    |      | 52                    | %     | Differential                  |
| Integrated Phase Jitter (J <sub>PH</sub> )   |                 |                       | 0.25 | 2                     | ps    | 200kHz ~ 20MHz@156.25MHz      |
|                                              |                 |                       | 0.38 | 2                     |       | 100kHz ~ 20MHz@156.25MHz      |
|                                              |                 |                       | 1.70 | 2                     |       | 12kHz ~ 20MHz@156.25MHz       |
| Period Jitter RMS (J <sub>PER</sub> )        |                 |                       | 2.5  |                       | ps    |                               |



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Key Electrical Specifications - LVDS

| Parameters                                   |                | Min.  | Typ. | Max. | Units | Notes                         |
|----------------------------------------------|----------------|-------|------|------|-------|-------------------------------|
| Supply Current (I <sub>dd</sub> )            |                |       | 29   | 32   | mA    | RL= 100Ω                      |
| Output Offset Voltage (V <sub>OS</sub> )     |                | 1.125 |      | 1.4  | V     | RL= 100Ω differential         |
| Delta Offset Voltage (ΔV <sub>OS</sub> )     |                |       |      | 50   | mV    |                               |
| Peak to Peak Output Swing (V <sub>pp</sub> ) |                |       | 350  |      | mV    | Single ended                  |
| Rise Time:                                   | T <sub>r</sub> |       | 200  |      | ps    | RL=50Ω , CL=2pF<br>20% to 80% |
| Fall Time:                                   | T <sub>f</sub> |       | 200  |      |       |                               |
| Duty Cycle                                   |                | 48    |      | 52   | %     | Differential                  |
| Integrated Phase Jitter (J <sub>PH</sub> )   |                |       | 0.28 | 2    | ps    | 200kHz ~<br>20MHz@156.25MHz   |
|                                              |                |       | 0.40 | 2    |       | 100kHz ~<br>20MHz@156.25MHz   |
|                                              |                |       | 1.70 | 2    |       | 12kHz ~<br>20MHz@156.25MHz    |
| Period Jitter RMS (J <sub>PER</sub> )        |                |       | 2.5  |      | ps    |                               |

Key Electrical Specifications - HCSL

| Parameters                                   |                 | Min.  | Typ. | Max. | Units | Notes                         |
|----------------------------------------------|-----------------|-------|------|------|-------|-------------------------------|
| Supply Current (I <sub>dd</sub> )            |                 |       | 40   | 42   | mA    | RL= 50Ω                       |
| Output Logic Level                           | V <sub>OH</sub> | 0.725 |      |      | V     | RL= 50Ω                       |
|                                              | V <sub>OL</sub> |       |      | 0.1  | V     |                               |
| Peak to Peak Output Swing (V <sub>pp</sub> ) |                 |       | 750  |      | mV    | Single ended                  |
| Rise Time:                                   | T <sub>r</sub>  | 200   |      | 400  | ps    | RL=50Ω , CL=2pF<br>20% to 80% |
| Fall Time:                                   | T <sub>f</sub>  | 200   |      | 400  |       |                               |
| Duty Cycle                                   |                 | 48    |      | 52   | %     | Differential                  |
| Integrated Phase Jitter (J <sub>PH</sub> )   |                 |       | 0.25 | 2    | ps    | 200kHz ~<br>20MHz@156.25MHz   |
|                                              |                 |       | 0.37 | 2    |       | 100kHz ~<br>20MHz@156.25MHz   |
|                                              |                 |       | 1.70 | 2    |       | 12kHz ~<br>20MHz@156.25MHz    |
| Period Jitter RMS (J <sub>PER</sub> )        |                 |       | 2.5  |      | ps    |                               |



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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              |      | 400     |       |           |
| CDM             |      | 1,500   |       |           |



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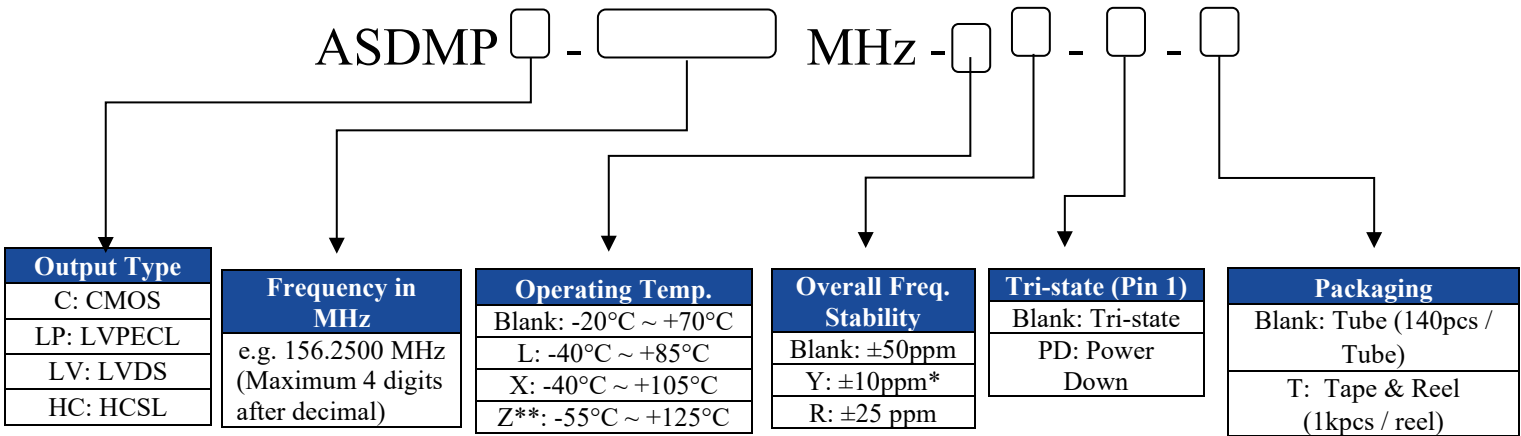
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Options and Part Identification



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

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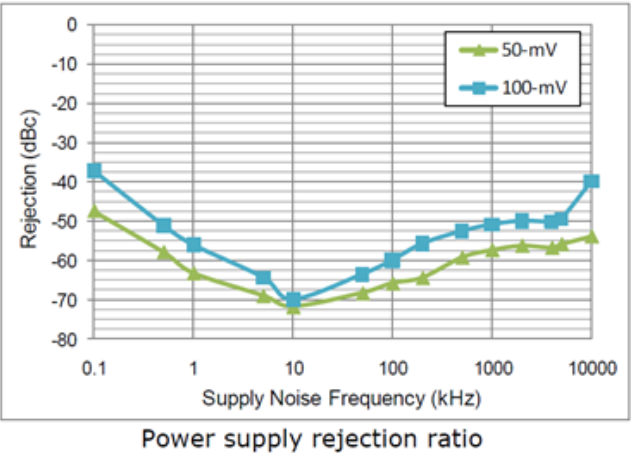
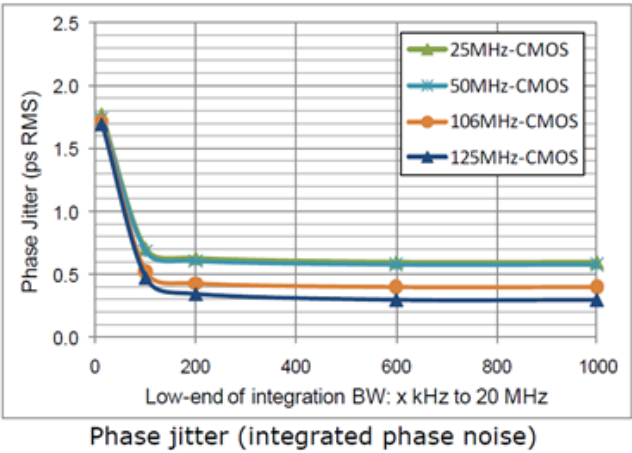
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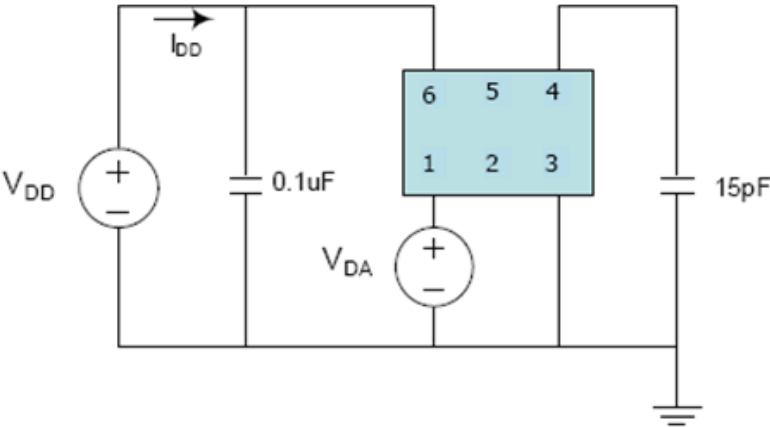
2.5 x 2.0 x 0.85 mm  
RoHS/RoHS II Compliant  
MSL Level = 1

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

CMOS output



Test Circuit



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**ESD Sensitive**

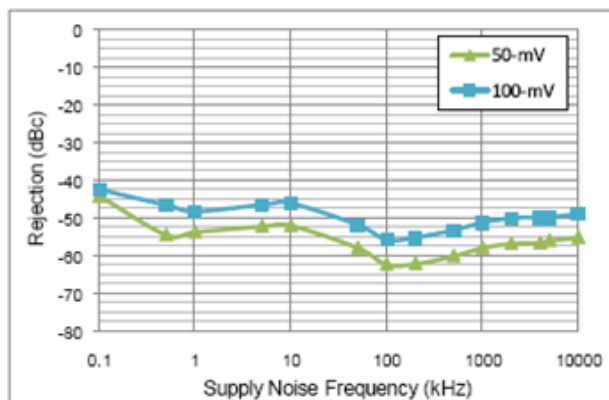


**2.5 x 2.0 x 0.85 mm**

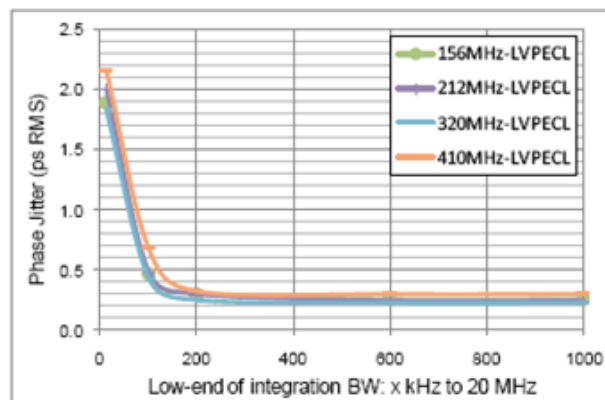
## RoHS/RoHS II Compliant

**MSL Level = 1**

## LVPECL output

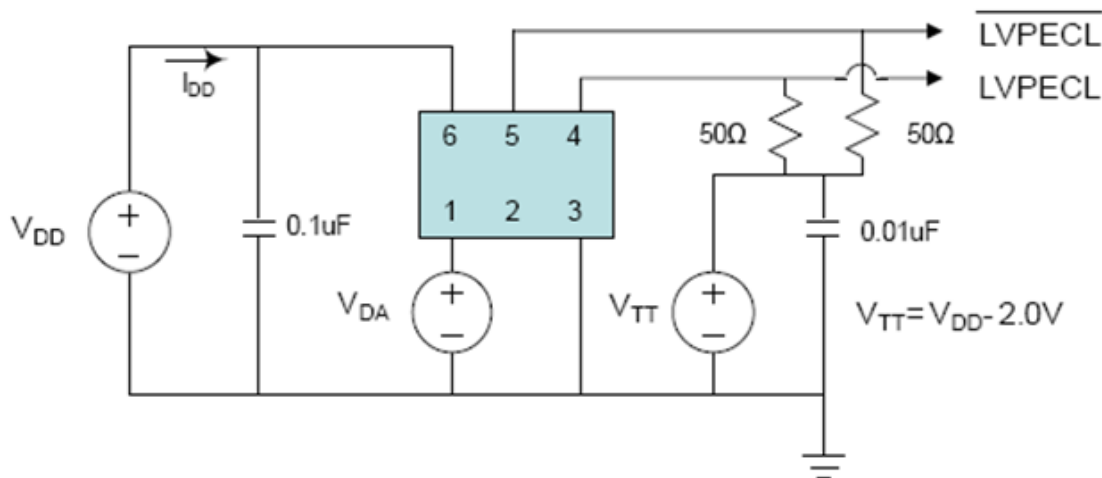


Power supply rejection ratio



Phase jitter (integrated phase noise)

### Test Circuit



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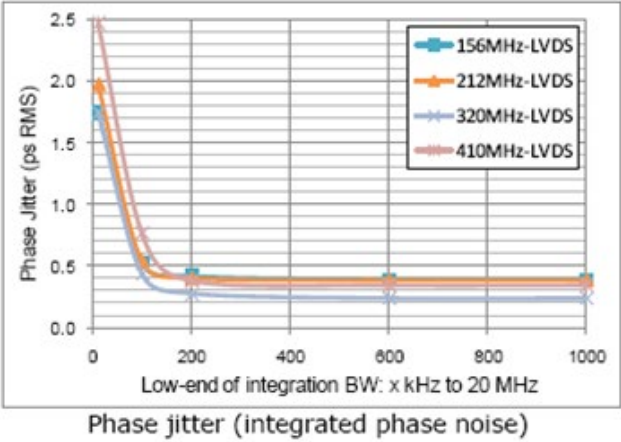
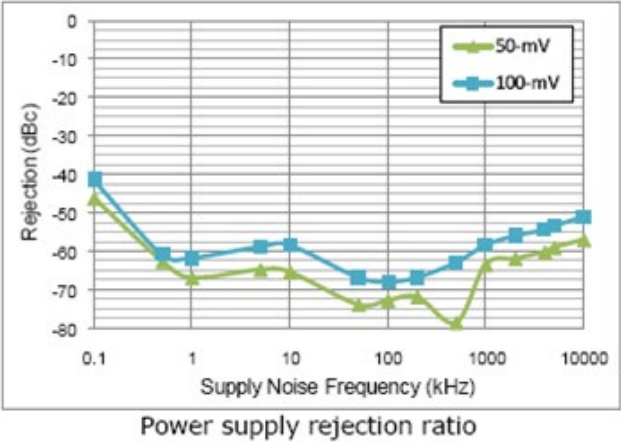


2.5 x 2.0 x 0.85 mm

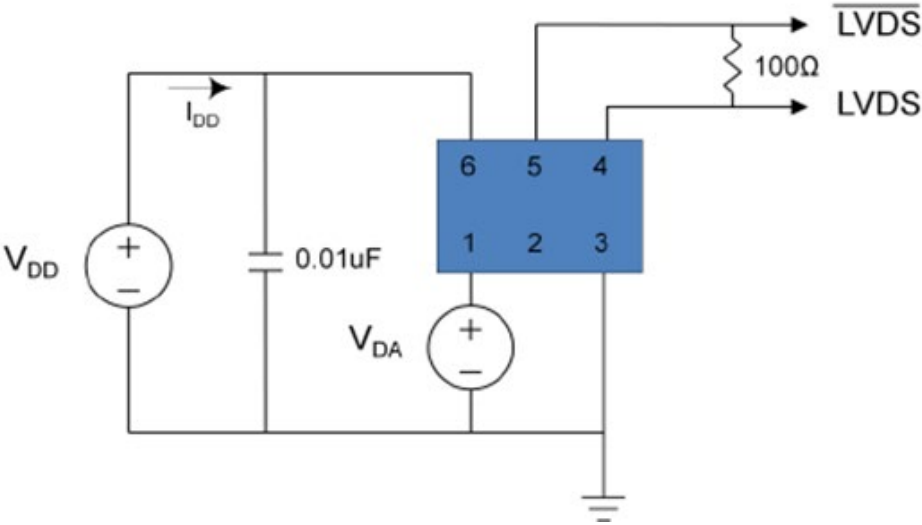
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MSL Level = 1

LVDS output



Test Circuit



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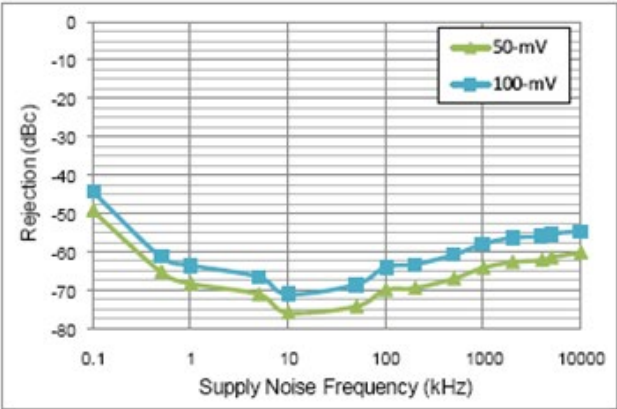


2.5 x 2.0 x 0.85 mm

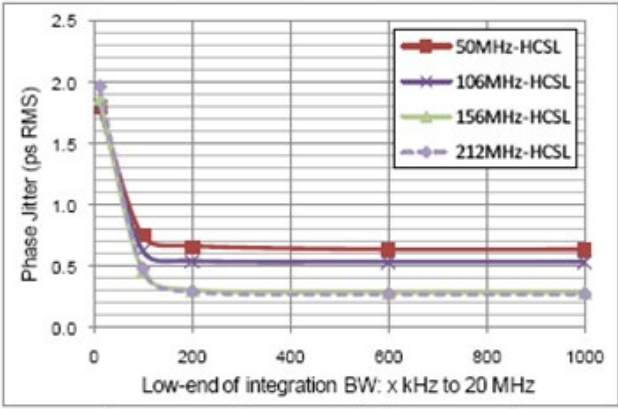
RoHS/RoHS II Compliant

MSL Level = 1

HCSL output

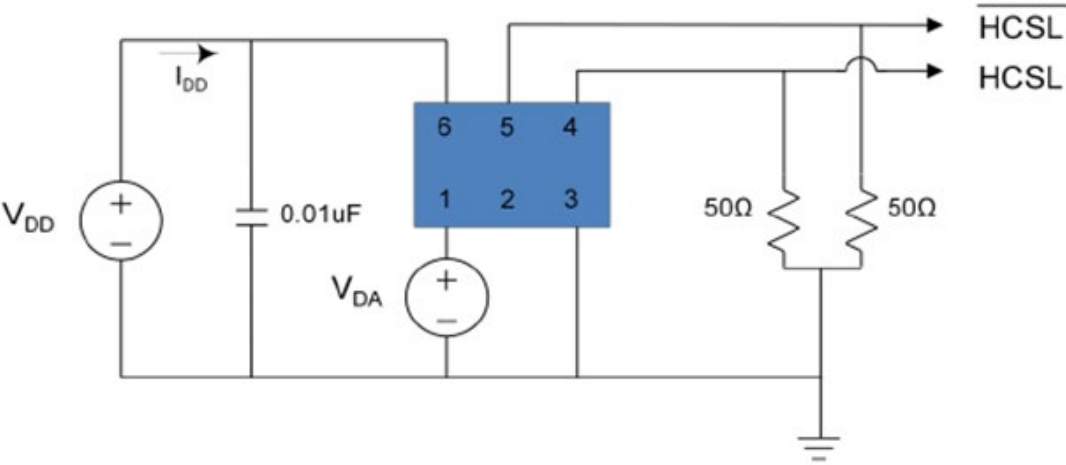


Power supply rejection ratio



Phase jitter (integrated phase noise)

Test Circuit



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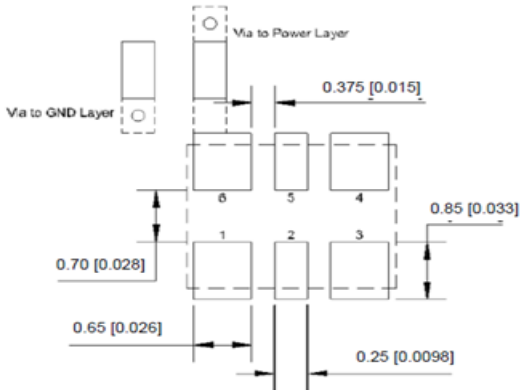
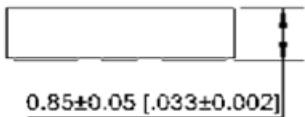
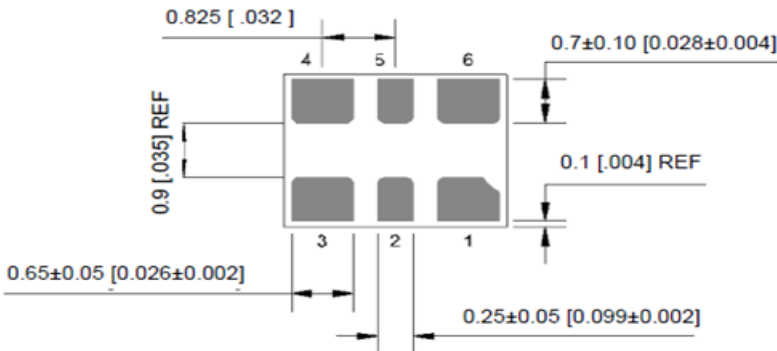
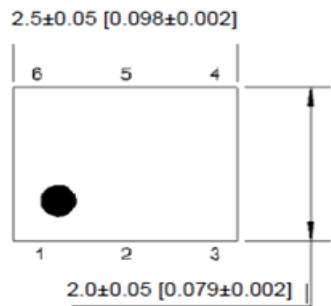


2.5 x 2.0 x 0.85 mm

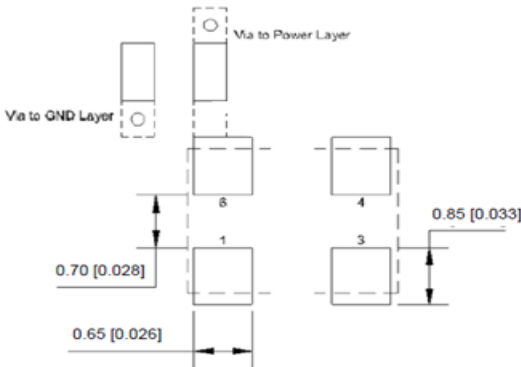
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MSL Level = 1

Mechanical Dimensions



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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Reflow Profile [JEDEC J-STD-020]

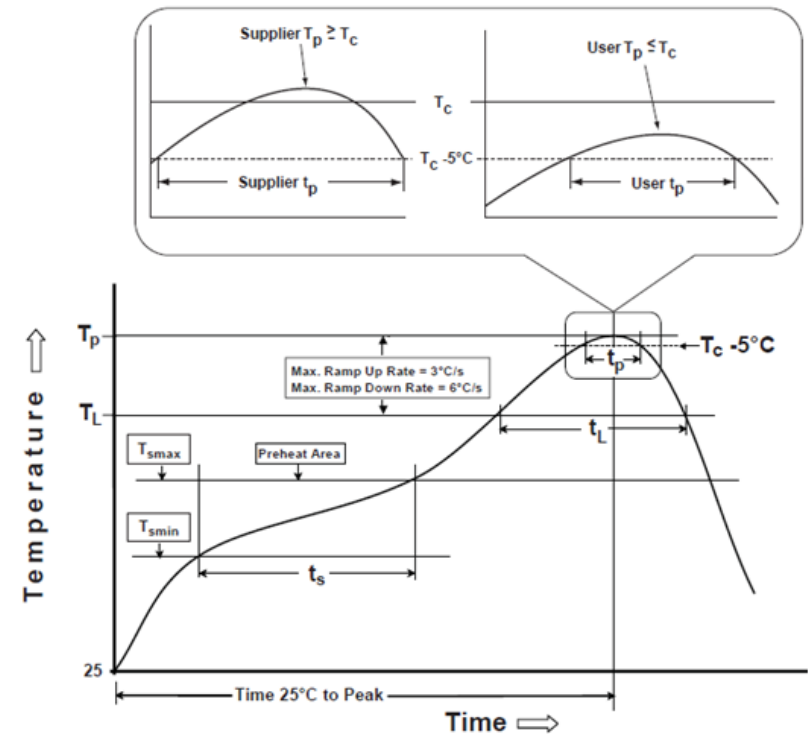


Table 1  
SnPb Eutectic Process  
Classification Temperatures (T<sub>c</sub>)

| 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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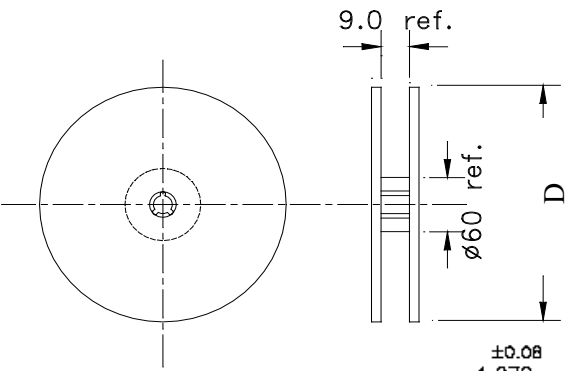
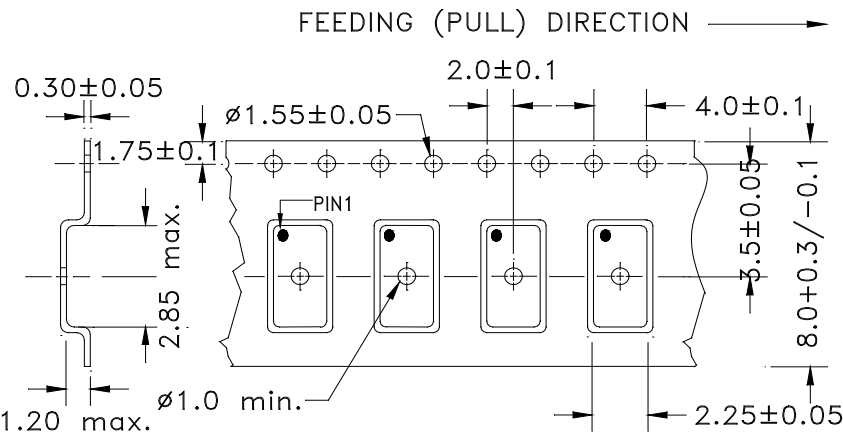
2.5 x 2.0 x 0.85 mm

RoHS/RoHS II Compliant

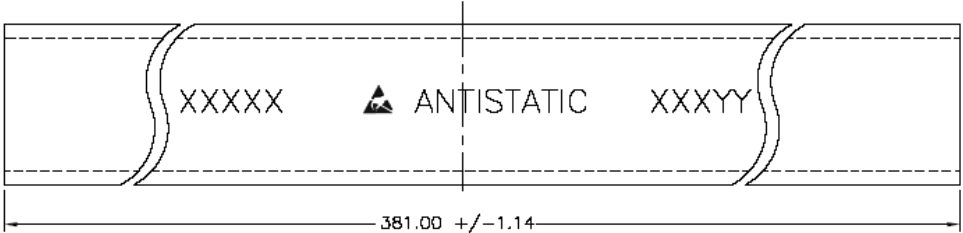
MSL Level = 1

Packaging

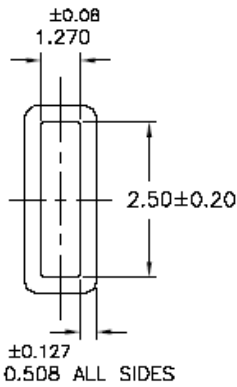
T= 1,000pcs/reel (D=180mm)



Tube: 140 pcs/tube



Unit orientation in tube:



Dimensions: mm

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