

Pin Description

| Pin# | Pin Name | Type | | Description |
|-----------------------------------|------------------|--------|--------------------|---|
| 1, 3, 5, 7, 8, 17, 18, 20, 22, 24 | CLK0~9 | Output | | Clock Outputs |
| 2, 6, 19, 23 | V _{DDO} | Power | | Output Power Supplier |
| 15, 26 | GND | Power | | Output Ground |
| 4, 9, 16, 21, 25, 32 | GNDO | Power | | Core Ground |
| 10 | V _{DD} | Power | | Core Power Supplier |
| 11 | XIN | Input | | Crystal interface |
| 12 | XOUT | Output | | Crystal interface |
| 13 | IN0 | Input | Pull-down | REF0 Diff or Single End |
| 14 | IN0# | Input | Pull-up/ Pull-down | REF0 Diff, When IN0 is single end ref clock0 and IN0# internal bias as V _{dd} /2 |
| 27 | IN1# | Input | Pull-up/ Pull-down | REF1 Diff, When IN1 is single end ref clock1 and IN1# internal bias as V _{dd} /2 |
| 28 | IN1 | Input | Pull-down | REF1 Diff or Single End |
| 30, 29 | IN_SEL[0:1] | Input | Pull-down | IN-SEL[0:1] select XTAL, REF1 and REF0 input |
| 31 | ENABLE | Input | | Active High Output Enable |

Input Mode Selection Logic

| IN_SEL0 | IN_SEL1 | Selected Input |
|---------|---------|-------------------------|
| 1 | 1 | XTAL |
| 0 | 1 | XTAL |
| 1 | 0 | REF1 Diff or Single End |
| 0 | 0 | REF0 Diff or Single End |

Input/Output Operation State

| Input State | Output State |
|----------------------------------|--------------|
| IN[0:1], IN[0:1]# open | Logic Low |
| IN[0:1], IN[0:1]# both to ground | Logic Low |
| IN[0:1]=High, IN[0:1]# =Low | Logic High |
| IN[0:1]=Low, IN[0:1]# =High | Logic Low |

Output Mode Selection

| ENABLE | Output CLK0~9 |
|--------|----------------|
| GND | High-impedance |
| VDD | Enabled |

Power Supply DC Characteristics ($V_{DD}/V_{DDO} = 3.3V \pm 5\%$, $T_A = -40^{\circ}C$ to $85^{\circ}C$)

| Symbols | Parameters | Test Conditions | Min. | Typ | Max. | Units |
|-----------|-----------------------|-----------------|-------|-----|-------|-------|
| V_{DD} | Core Supply Voltage | | 3.135 | 3.3 | 3.465 | V |
| V_{DDO} | Output Supply Voltage | | 3.135 | 3.3 | 3.465 | V |
| I_{DD} | Power Supply Current | ENABLE = '0' | | | 32 | mA |
| I_{DDO} | Output Supply Current | ENABLE = '0' | | | 1 | mA |

Power Supply DC Characteristics ($V_{DD}/V_{DDO} = 2.5V \pm 5\%$, $T_A = -40^{\circ}C$ to $85^{\circ}C$)

| Symbols | Parameters | Test Conditions | Min. | Typ | Max. | Units |
|-----------|-----------------------|-----------------|-------|-----|-------|-------|
| V_{DD} | Core Supply Voltage | | 2.375 | 2.5 | 2.625 | V |
| V_{DDO} | Output Supply Voltage | | 2.375 | 2.5 | 2.625 | V |
| I_{DD} | Power Supply Current | ENABLE = '0' | | | 15 | mA |
| I_{DDO} | Output Supply Current | ENABLE = '0' | | | 0.7 | mA |

Power Supply DC Characteristics ($V_{DD} = 3.3V \pm 5\%$, $V_{DDO} = 2.5V \pm 5\%$, $T_A = -40^{\circ}C$ to $85^{\circ}C$)

| Symbols | Parameters | Test Conditions | Min. | Typ | Max. | Units |
|-----------|-----------------------|-----------------|-------|-----|-------|-------|
| V_{DD} | Core Supply Voltage | | 3.135 | 3.3 | 3.465 | V |
| V_{DDO} | Output Supply Voltage | | 2.375 | 2.5 | 2.625 | V |
| I_{DD} | Power Supply Current | ENABLE = '0' | | | 29 | mA |
| I_{DDO} | Output Supply Current | ENABLE = '0' | | | 0.6 | mA |

Power Supply DC Characteristics ($V_{DD} = 3.3V \pm 5\%$, $V_{DDO} = 1.8V \pm 0.2V$, $T_A = -40^{\circ}C$ to $85^{\circ}C$)

| Symbols | Parameters | Test Conditions | Min. | Typ | Max. | Units |
|-----------|-----------------------|-----------------|-------|-----|-------|-------|
| V_{DD} | Core Supply Voltage | | 3.135 | 3.3 | 3.465 | V |
| V_{DDO} | Output Supply Voltage | | 1.6 | 1.8 | 2.0 | V |
| I_{DD} | Power Supply Current | ENABLE = '0' | | | 29 | mA |
| I_{DDO} | Output Supply Current | ENABLE = '0' | | | 0.4 | mA |

Power Supply DC Characteristics ($V_{DD} = 3.3V \pm 5\%$, $V_{DDO} = 1.5V \pm 0.15V$, $T_A = -40^{\circ}C$ to $85^{\circ}C$)

| Symbols | Parameters | Test Conditions | Min. | Typ | Max. | Units |
|-----------|-----------------------|-----------------|-------|-----|-------|-------|
| V_{DD} | Core Supply Voltage | | 3.135 | 3.3 | 3.465 | V |
| V_{DDO} | Output Supply Voltage | | 1.35 | 1.5 | 1.65 | V |
| I_{DD} | Power Supply Current | ENABLE = '0' | | | 29 | mA |
| I_{DDO} | Output Supply Current | ENABLE = '0' | | | 0.3 | mA |

Power Supply DC Characteristics ($V_{DD} = 2.5V \pm 5\%$, $V_{DDO} = 1.8V \pm 0.2V$, $T_A = -40^\circ C$ to $85^\circ C$)

| Symbols | Parameters | Test Conditions | Min. | Typ | Max. | Units |
|-----------|-----------------------|-----------------|-------|-----|-------|-------|
| V_{DD} | Core Supply Voltage | | 2.375 | 2.5 | 2.625 | V |
| V_{DDO} | Output Supply Voltage | | 1.6 | 1.8 | 2.0 | V |
| I_{DD} | Power Supply Current | ENABLE = '0' | | | 13 | mA |
| I_{DDO} | Output Supply Current | ENABLE = '0' | | | 0.4 | mA |

Power Supply DC Characteristics ($V_{DD} = 2.5V \pm 5\%$, $V_{DDO} = 1.5V \pm 0.15V$, $T_A = -40^\circ C$ to $85^\circ C$)

| Symbols | Parameters | Test Conditions | Min. | Typ | Max. | Units |
|-----------|-----------------------|-----------------|-------|-----|-------|-------|
| V_{DD} | Core Supply Voltage | | 2.375 | 2.5 | 2.625 | V |
| V_{DDO} | Output Supply Voltage | | 1.35 | 1.5 | 1.65 | V |
| I_{DD} | Power Supply Current | ENABLE = '0' | | | 13 | mA |
| I_{DDO} | Output Supply Current | ENABLE = '0' | | | 0.3 | mA |

Single-Ended DC Characteristics ($T_A = -40^{\circ}\text{C}$ to 85°C)

| Symbols | Parameters | Test Conditions | Min. | Typ | Max. | Units |
|-----------|--|---|------|-----|----------------|----------|
| V_{IH} | Input High Voltage | $V_{DD} = 3.3\text{V} \pm 5\%$ | 2 | | $V_{DD} + 0.3$ | V |
| | | $V_{DD} = 2.5\text{V} \pm 5\%$ | 1.7 | | $V_{DD} + 0.3$ | V |
| V_{IL} | Input Low Voltage | $V_{DD} = 3.3\text{V} \pm 5\%$ | -0.3 | | 0.8 | V |
| | | $V_{DD} = 2.5\text{V} \pm 5\%$ | -0.3 | | 0.7 | V |
| V_{OH} | Output High Voltage ($I_{OH} = -8\text{mA}$) | $V_{DDO} = 3.3\text{V} \pm 5\%$ ⁽¹⁾ | 2.6 | | | V |
| | | $V_{DDO} = 2.5\text{V} \pm 5\%$ | 2 | | | V |
| | | $V_{DDO} = 2.5\text{V} \pm 5\%$ ⁽¹⁾ | 1.8 | | | V |
| | | $V_{DDO} = 1.8\text{V} \pm 0.2\text{V}$ ⁽¹⁾ | 1.5 | | | V |
| | | $V_{DDO} = 1.5\text{V} \pm 0.15\text{V}$ ⁽¹⁾ | 1.0 | | | V |
| | Output High Voltage ($I_{OH} = -12\text{mA}$) | $V_{DDO} = 3.3\text{V} \pm 5\%$ ⁽¹⁾ | 3.0 | | | V |
| | | $V_{DDO} = 2.5\text{V} \pm 5\%$ | 2.0 | | | V |
| | | $V_{DDO} = 1.8\text{V} \pm 0.2\text{V}$ ⁽¹⁾ | 1.5 | | | V |
| | | $V_{DDO} = 1.5\text{V} \pm 0.15\text{V}$ ⁽¹⁾ | 1.0 | | | V |
| | | | | | | |
| V_{OL} | Output Low Voltage ($I_{OH} = 8\text{mA}$) | $V_{DD} = 3.3\text{V} \pm 5\%$ ⁽¹⁾ | | | 0.5 | V |
| | | $V_{DDO} = 2.5\text{V} \pm 5\%$ | | | 0.5 | V |
| | | $V_{DDO} = 1.8\text{V} \pm 0.2\text{V}$ ⁽¹⁾ | | | 0.4 | V |
| | | $V_{DDO} = 1.5\text{V} \pm 0.15\text{V}$ ⁽¹⁾ | | | 0.35 | V |
| | Output Low Voltage ($I_{OL} = 12\text{mA}$) | $V_{DDO} = 3.3\text{V} \pm 5\%$ ⁽¹⁾ | | | 0.25 | V |
| | | $V_{DDO} = 2.5\text{V} \pm 5\%$ | | | 0.25 | V |
| | | $V_{DDO} = 1.8\text{V} \pm 0.2\text{V}$ ⁽¹⁾ | | | 0.3 | V |
| | | $V_{DDO} = 1.5\text{V} \pm 0.15\text{V}$ ⁽¹⁾ | | | 0.35 | V |
| R_{OUT} | Output Impedence | $V_{DDO} = 3.3\text{V} \pm 5\%$ | 7 | | 10 | Ω |
| | | $V_{DDO} = 1.8\text{V} \pm 5\%$ | 12 | 17 | 20 | Ω |

Notes:

1. Outputs terminated with 50Ω to $V_{DDO}/2$. See Parameter Measurement section, "Load Test Circuit" diagrams.

Differential input DC Characteristics ($T_A = -40^{\circ}\text{C}$ to 85°C)

| Symbols | Parameters | | Test Conditions | Min. | Typ | Max. | Units |
|-----------|---|----------------------|---|------|-----|-------------------------|---------------|
| I_{IH} | Input High Current | IN[0:1], IN[0:1]# | $V_{DD} = V_{IN} = 3.465\text{V}$ or 2.625V | | | 100 | μA |
| I_{IL} | Input Low Current | IN[0:1] | $V_{DD} = 3.465\text{V}$ or 2.625V $V_{IN} = 0\text{V}$ | -1 | | | μA |
| | | IN[0:1]# | $V_{DD} = 3.465\text{V}$ or 2.625V $V_{IN} = 0\text{V}$ | -50 | | | μA |
| V_{PP} | Peak-to-Peak Input Voltage ⁽¹⁾ | | $V_{DD} = 3.3\text{V}$ | 0.25 | | 1.3 | V |
| | | | $V_{DD} = 2.5\text{V}$ | 0.25 | | 1.3 | |
| V_{CMR} | Common Mode Input Voltage (1,2) | | $V_{DD} = 3.3\text{V}$ | 0.5 | | $V_{DD} - 1.35\text{V}$ | V |
| | | | $V_{DD} = 2.5\text{V}$ | 0.5 | | $V_{DD} - 0.85\text{V}$ | |

Notes:

- V_{IL} should not be less than -0.3V .
- Common mode voltage is defined as V_{IH} .

3.3V Absolute Maximum Ratings (Above which the useful life may be impaired. For user guidelines only, not tested.)

| | |
|--|--------------------------------|
| Storage Temperature..... | -65°C to +150°C |
| V _{DD} , V _{DDO} Voltage | -0.5V to +3.6V |
| Output Voltage (max. 4.6V) | -0.5V to V _{DD} +0.5V |
| Input Voltage (max 4.6V)..... | -0.5V to V _{DD} +0.5V |

Note:

Stresses greater than those listed under MAXIMUM RATINGS may cause permanent damage to the device. This is a stress rating only and functional operation of the device at these or any other conditions above those indicated in the operational sections of this specification is not implied. Exposure to absolute maximum rating conditions for extended periods may affect reliability.

AC Characteristics (Over Operating Range: V_{DD}/V_{DDO} = 3.3V ± 5%, T_A = -40° to 85°C)

| Parameters | Description | | Test Conditions ⁽¹⁾ | Min. | Typ | Max. | Units |
|--------------------------------|------------------------------------|--|---|------|------|------|--------|
| f _{MAX} | Output Frequency | Using External Crystal | | 10 | | 50 | MHz |
| | | Using External Clock Source ⁽²⁾ | | DC | | 200 | |
| odc | Output Duty Cycle | | 125MHz | 45 | | 55 | % |
| t _{sk(o)} | Output Skew ⁽³⁾ | | | | | 80 | ps |
| t _{jit(Ø)} | RMS Phase Jitter (Random) | | 25MHz crystal @ (Integration Range: 100Hz-1MHz) | | 0.05 | | ps |
| t _{jit(additive)} | Additive RMS Phase Jitter (Random) | | 125MHz reference input @ (Integration Range: 12kHz-20MHz) | | 0.05 | | ps |
| t _R /t _F | Output Rise/Fall Time | | 20% to 80% | 200 | | 800 | ps |
| t _{EN} | Output Enable Time ⁽⁴⁾ | ENABLE | | | | 5 | cycles |
| t _{DIS} | Output Disable Time ⁽⁴⁾ | ENABLE | | | | 5 | cycles |
| MUX _{isolation} | MUX Isolation | | 155.52MHz | | 64 | | dB |

Notes:

1. Unless noted otherwise, all parameters are tested with xtal @ f ≤ F_{xtal_max}; outputs are terminated @ 50Ω to V_{DDO}/2, see waveforms.
2. Diff external clock source is driving IN0/IN0# and IN1/IN1# input. IN0/IN1 can be single end ref clock when IN0# /IN1# set as V_{DD}/2
3. Identical conditions: loading, transitions, supply voltage, temperature, package type and speed grade.
4. These parameters are guaranteed, but not tested. Max delay is 4 cycles. Min. setup time = 3ns.

2.5V Absolute Maximum Ratings (Above which the useful life may be impaired. For user guidelines only, not tested.)

| | |
|--|--------------------------------|
| Storage Temperature..... | -65°C to +150°C |
| V _{DD} , V _{DDO} Voltage | -0.5V to +3.6V |
| Output Voltage (max. 4.6V) | -0.5V to V _{DD} +0.5V |
| Input Voltage (max 4.6V)..... | -0.5V to V _{DD} +0.5V |

Note:

Stresses greater than those listed under MAXIMUM RATINGS may cause permanent damage to the device. This is a stress rating only and functional operation of the device at these or any other conditions above those indicated in the operational sections of this specification is not implied. Exposure to absolute maximum rating conditions for extended periods may affect reliability.

AC Characteristics (Over Operating Range: V_{DD}/V_{DDO} = 2.5V ± 5%, T_A = -40° to 85°C)

| Parameters | Description | | Test Conditions ⁽¹⁾ | Min. | Typ | Max. | Units |
|--------------------------------|------------------------------------|--|---|------|------|------|--------|
| f _{MAX} | Output Frequency | Using External Crystal | | 10 | | 50 | MHz |
| | | Using External Clock Source ⁽²⁾ | | DC | | 200 | |
| odc | Output Duty Cycle | | 125MHz | 45 | | 55 | % |
| t _{sk(o)} | Output Skew ⁽³⁾ | | | | | 80 | ps |
| t _{jit(Ø)} | RMS Phase Jitter (Random) | | 25MHz @ (Integration Range: 100Hz-1MHz) | | 0.06 | | ps |
| t _{jit(additive)} | Additive RMS Phase Jitter (Random) | | 125MHz @ (Integration Range: 12kHz-20MHz) | | 0.05 | | ps |
| t _R /t _F | Output Rise/Fall Time | | 20% to 80% | 200 | | 800 | ps |
| t _{EN} | Output Enable Time ⁽⁴⁾ | ENABLE | | | | 5 | cycles |
| t _{DIS} | Output Disable Time ⁽⁴⁾ | ENABLE | | | | 5 | cycles |
| MUX _{isolation} | MUX Isolation | | 155.52MHz | | 63 | | dB |

Notes:

1. Unless noted otherwise, all parameters are tested with xtal @ f ≤ F_{xtal_max}; outputs are terminated @ 50Ω to V_{DDO}/2, see waveforms.
2. Diff external clock source is driving IN0/IN0# and IN1/IN1# input. IN0/IN1 can be single end ref clock when IN0# /IN1# set as V_{DD}/2
3. Identical conditions: loading, transitions, supply voltage, temperature, package type and speed grade.
4. These parameters are guaranteed, but not tested. Max delay is 4 cycles. Min. setup time = 3ns.

AC Characteristics (Over Operating Range: $V_{DD} = 3.3V \pm 5\%$, $V_{DDO} = 2.5V \pm 5\%$, $T_A = -40^\circ$ to $85^\circ C$)

| Parameters | Description | | Test Conditions ⁽¹⁾ | Min. | Typ | Max. | Units |
|----------------------|------------------------------------|--|---|------|------|------|--------|
| f_{MAX} | Output Frequency | Using External Crystal | | 10 | | 50 | MHz |
| | | Using External Clock Source ⁽²⁾ | | DC | | 200 | |
| odc | Output Duty Cycle | | 125MHz | 45 | | 55 | % |
| $t_{sk(o)}$ | Output Skew ⁽³⁾ | | | | | 80 | ps |
| $t_{jit(\emptyset)}$ | RMS Phase Jitter (Random) | | 25MHz @ (Integration Range: 100Hz-1MHz) | | 0.05 | | ps |
| $t_{jit(additive)}$ | Additive RMS Phase Jitter (Random) | | 125MHz @ (Integration Range: 12kHz-20MHz) | | 0.05 | | ps |
| t_R/t_F | Output Rise/Fall Time | | 20% to 80% | 200 | | 800 | ps |
| t_{EN} | Output Enable Time ⁽⁴⁾ | ENABLE | | | | 5 | cycles |
| t_{DIS} | Output Disable Time ⁽⁴⁾ | ENABLE | | | | 5 | cycles |
| $MUX_{isolation}$ | MUX Isolation | | 155.52MHz | | 62 | | dB |

Notes:

1. Unless noted otherwise, all parameters are tested with xtal @ $f \leq F_{xtal_max}$; outputs are terminated @ 50Ω to $V_{DDO}/2$, see waveforms.
2. Diff external clock source is driving IN0/IN0# and IN1/IN1# input. IN0/IN1 can be single end ref clock when IN0# /IN1# set as $V_{DD}/2$
3. Identical conditions: loading, transitions, supply voltage, temperature, package type and speed grade.
4. These parameters are guaranteed, but not tested. Max delay is 4 cycles. Min. setup time = 3ns.

AC Characteristics (Over Operating Range: $V_{DD} = 3.3V \pm 5\%$, $V_{DDO} = 1.8V \pm 0.2V$, $T_A = -40^\circ$ to $85^\circ C$)

| Parameters | Description | | Test Conditions ⁽¹⁾ | Min. | Typ | Max. | Units |
|----------------------|------------------------------------|--|---|------|------|------|--------|
| f_{MAX} | Output Frequency | Using External Crystal | | 10 | | 50 | MHz |
| | | Using External Clock Source ⁽²⁾ | | DC | | 200 | |
| odc | Output Duty Cycle | | 125MHz | 45 | | 55 | % |
| $t_{sk(o)}$ | Output Skew ⁽³⁾ | | | | | 80 | ps |
| $t_{jit(\emptyset)}$ | RMS Phase Jitter (Random) | | 25MHz @ (Integration Range: 100Hz-1MHz) | | 0.06 | | ps |
| $t_{jit(additive)}$ | Additive RMS Phase Jitter (Random) | | 125MHz @ (Integration Range: 12kHz-20MHz) | | 0.05 | | ps |
| t_R/t_F | Output Rise/Fall Time | | 20% to 80% | 200 | | 900 | ps |
| t_{EN} | Output Enable Time ⁽⁴⁾ | ENABLE | | | | 5 | cycles |
| t_{DIS} | Output Disable Time ⁽⁴⁾ | ENABLE | | | | 5 | cycles |
| $MUX_{isolation}$ | MUX Isolation | | 155.52MHz | | 58 | | dB |

Notes:

1. Unless noted otherwise, all parameters are tested with x_{tal} @ $f \leq F_{xtal_max}$; outputs are terminated @ 50Ω to $V_{DDO}/2$, see waveforms.
2. Diff external clock source is driving IN0/IN0# and IN1/IN1# input. IN0/IN1 can be single end ref clock when IN0# /IN1# set as $V_{DD}/2$
3. Identical conditions: loading, transitions, supply voltage, temperature, package type and speed grade.
4. These parameters are guaranteed, but not tested. Max delay is 4 cycles. Min. setup time = 3ns.

AC Characteristics (Over Operating Range: $V_{DD} = 3.3V \pm 5\%$, $V_{DDO} = 1.5V \pm 0.15V$, $T_A = -40^\circ$ to $85^\circ C$)

| Parameters | Description | | Test Conditions ⁽¹⁾ | Min. | Typ | Max. | Units |
|--------------------------------|------------------------------------|--|---|------|------|------|--------|
| f _{MAX} | Output Frequency | Using External Crystal | | 10 | | 50 | MHz |
| | | Using External Clock Source ⁽²⁾ | | DC | | 200 | |
| odc | Output Duty Cycle | | 125MHz | 45 | | 55 | % |
| t _{sk(o)} | Output Skew ⁽³⁾ | | | | | 80 | ps |
| t _{jit(Ø)} | RMS Phase Jitter (Random) | | 25MHz @ (Integration Range: 100Hz-1MHz) | | 0.07 | | ps |
| t _{jit(additive)} | Additive RMS Phase Jitter (Random) | | 125MHz @ (Integration Range: 12kHz-20MHz) | | 0.05 | | ps |
| t _R /t _F | Output Rise/Fall Time | | 20% to 80% | 200 | | 900 | ps |
| t _{EN} | Output Enable Time ⁽⁴⁾ | ENABLE | | | | 5 | cycles |
| t _{DIS} | Output Disable Time ⁽⁴⁾ | ENABLE | | | | 5 | cycles |
| MUX _{isolation} | MUX Isolation | | 155.52MHz | | 53 | | dB |

Notes:

1. Unless noted otherwise, all parameters are tested with xtal @ $f \leq F_{xtal_max}$; outputs are terminated @ 50Ω to $V_{DDO}/2$, see waveforms.
2. Diff external clock source is driving IN0/IN0# and IN1/IN1# input. IN0/IN1 can be single end ref clock when IN0# /IN1# set as $V_{DD}/2$
3. Identical conditions: loading, transitions, supply voltage, temperature, package type and speed grade.
4. These parameters are guaranteed, but not tested. Max delay is 4 cycles. Min. setup time = 3ns.

AC Characteristics (Over Operating Range: $V_{DD} = 2.5V \pm 5\%$, $V_{DDO} = 1.8V \pm 0.2V$, $T_A = -40^\circ$ to $85^\circ C$)

| Parameters | Description | | Test Conditions ⁽¹⁾ | Min. | Typ | Max. | Units |
|----------------------|------------------------------------|--|---|------|------|------|--------|
| f_{MAX} | Output Frequency | Using External Crystal | | 10 | | 50 | MHz |
| | | Using External Clock Source ⁽²⁾ | | DC | | 200 | |
| odc | Output Duty Cycle | | 125MHz | 45 | | 55 | % |
| $t_{sk(o)}$ | Output Skew ⁽³⁾ | | | | | 80 | ps |
| $t_{jit(\emptyset)}$ | RMS Phase Jitter (Random) | | 25MHz @ (Integration Range: 100Hz-1MHz) | | 0.06 | | ps |
| $t_{jit(additive)}$ | Additive RMS Phase Jitter (Random) | | 125MHz @ (Integration Range: 12kHz-20MHz) | | 0.05 | | ps |
| t_R/t_F | Output Rise/Fall Time | | 20% to 80% | 200 | | 900 | ps |
| t_{EN} | Output Enable Time ⁽⁴⁾ | ENABLE | | | | 5 | cycles |
| t_{DIS} | Output Disable Time ⁽⁴⁾ | ENABLE | | | | 5 | cycles |
| $MUX_{isolation}$ | MUX Isolation | | 155.52MHz | | 59 | | dB |

Notes:

1. Unless noted otherwise, all parameters are tested with xtal @ $f \leq F_{xtal_max}$; outputs are terminated @ 50Ω to $V_{DDO}/2$, see waveforms.
2. Diff external clock source is driving IN0/IN0# and IN1/IN1# input. IN0/IN1 can be single end ref clock when IN0# /IN1# set as $V_{DD}/2$
3. Identical conditions: loading, transitions, supply voltage, temperature, package type and speed grade.
4. These parameters are guaranteed, but not tested. Max delay is 4 cycles. Min. setup time = 3ns.

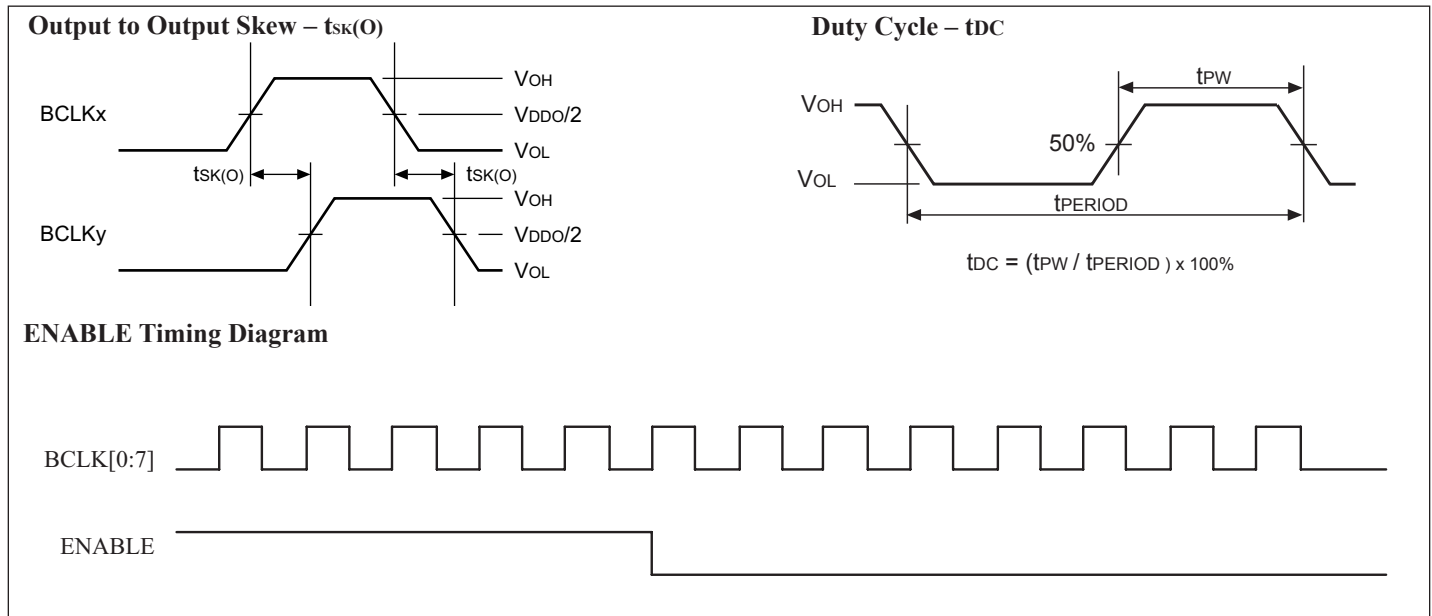
AC Characteristics (Over Operating Range: $V_{DD} = 2.5V \pm 5\%$, $V_{DDO} = 1.5V \pm 0.15V$, $T_A = -40^\circ$ to $85^\circ C$)

| Parameters | Description | | Test Conditions ⁽¹⁾ | Min. | Typ | Max. | Units |
|--------------------------------|------------------------------------|--|---|------|------|------|--------|
| f _{MAX} | Output Frequency | Using External Crystal | | 10 | | 50 | MHz |
| | | Using External Clock Source ⁽²⁾ | | DC | | 200 | |
| odc | Output Duty Cycle | | 125MHz | 45 | | 55 | % |
| t _{sk(o)} | Output Skew ⁽³⁾ | | | | | 80 | ps |
| t _{jit(Ø)} | RMS Phase Jitter (Random) | | 25MHz @ (Integration Range: 100Hz-1MHz) | | 0.08 | | ps |
| t _{jit(additive)} | Additive RMS Phase Jitter (Random) | | 125MHz @ (Integration Range: 12kHz-20MHz) | | 0.05 | | ps |
| t _R /t _F | Output Rise/Fall Time | | 20% to 80% | 200 | | 900 | ps |
| t _{EN} | Output Enable Time ⁽⁴⁾ | ENABLE | | | | 5 | cycles |
| t _{DIS} | Output Disable Time ⁽⁴⁾ | ENABLE | | | | 5 | cycles |
| MUX _{isolation} | MUX Isolation | | 155.52MHz | | 55 | | dB |

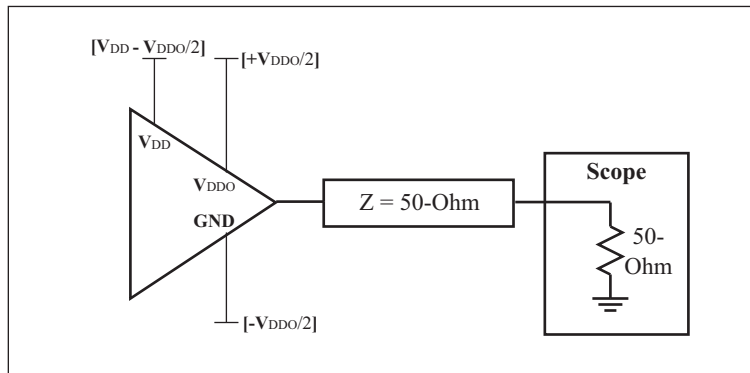
Notes:

1. Unless noted otherwise, all parameters are tested with xtal @ $f \leq F_{xtal_max}$; outputs are terminated @ 50Ω to $V_{DDO}/2$, see waveforms.
2. Diff external clock source is driving IN0/IN0# and IN1/IN1# input. IN0/IN1 can be single end ref clock when IN0# /IN1# set as $V_{DD}/2$
3. Identical conditions: loading, transitions, supply voltage, temperature, package type and speed grade.
4. These parameters are guaranteed, but not tested. Max delay is 4 cycles. Min. setup time = 3ns.

Waveforms



AC Test Circuit Load



Note:

$V_{DD}/V_{DD0} = 1.8V \pm 0.2V,$
 $2.5V \pm 5\%,$
 $3.3V \pm 5\%$

Crystal Characteristic (link to "<http://www.pericom.com/products/timing/crystals/index.php>" for more detailed and different size crystal specifications)

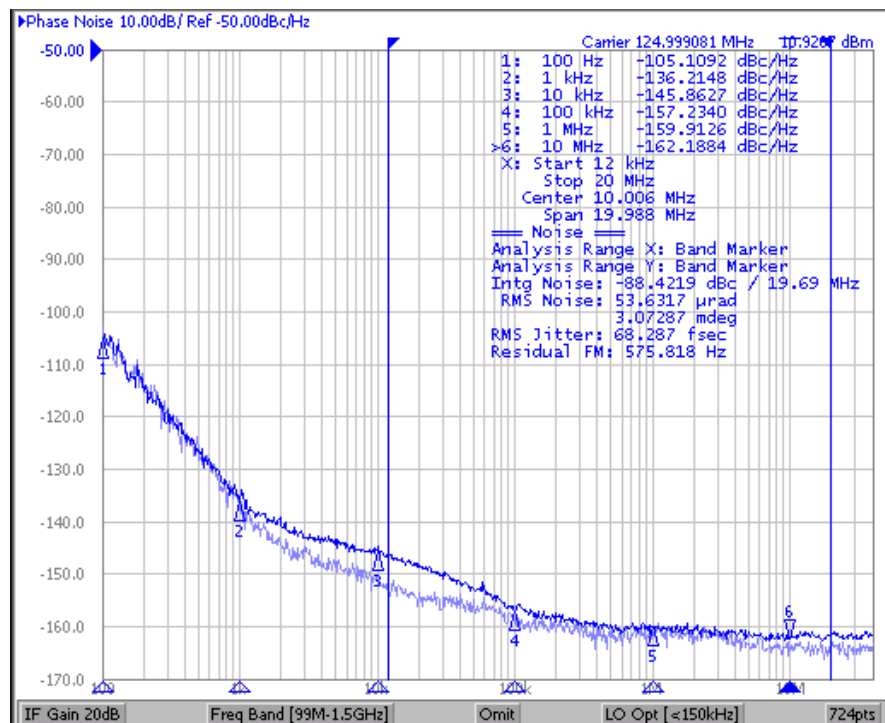
| Parameters | Description | Min | Typ | Max. | Units |
|--------------------|------------------------------|-------------|-----|------|-------|
| OSCMODE | Mode of Oscillation | Fundamental | | | |
| FREQ | Frequency | 10 | 25 | 50 | MHz |
| ESR ⁽¹⁾ | Equivalent Series Resistance | 30 | | 50 | Ohm |
| CLOAD | Load Capacitance | | 18 | | pF |
| CSHUNT | Shunt Capacitance | | | 7 | pF |
| DRIVE level | | | | 1 | mW |

Note: 1. ESR value is dependent upon frequency of oscillation

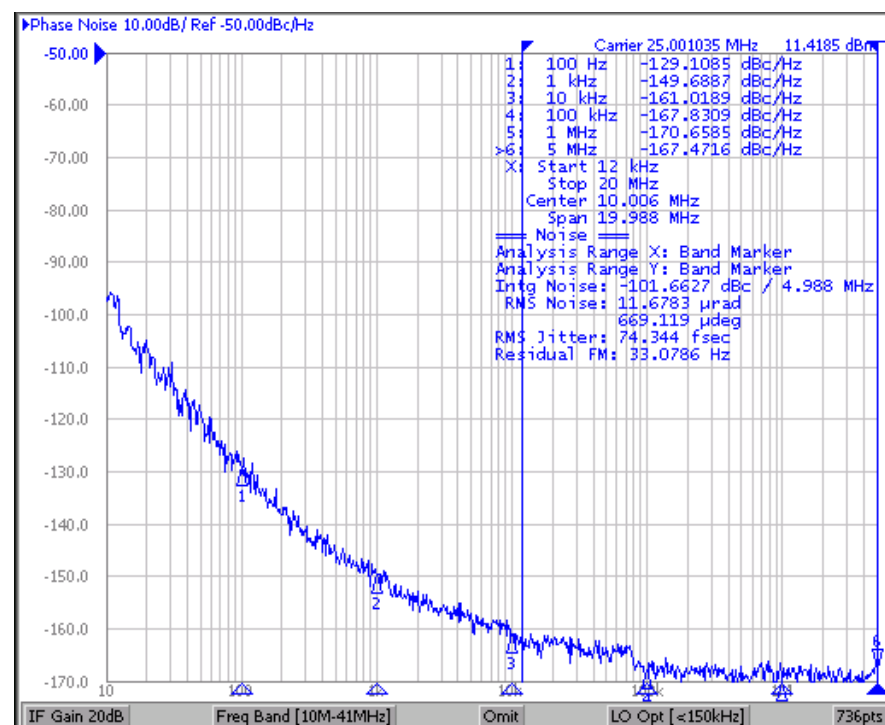
Phase Noise and Additive Jitter

Output phase noise (Dark Blue) vs Input Phase noise (light blue)

Additive jitter is calculated at ~47fs RMS (12kHz to 20MHz). Additive jitter = $\sqrt{(\text{Output jitter}^2 - \text{Input jitter}^2)}$



Oscillator Phase Jitter



Application Information

Wiring the differential input to accept single ended levels

Figure 1 shows how the differential input can be wired to accept single ended levels. The reference voltage $V_{REF} = V_{DD}/2$ is generated by the bias resistors R1, R2 and C1. This bias circuit should be located as close as possible to the input pin. The ratio of R1 and R2 might need to be adjusted to position the V_{REF} in the center of the input voltage swing. For example, if the input clock swing is only 2.5V and $V_{DD} = 3.3V$, V_{REF} should be 1.25V and $R1/R2 = 0.609$.

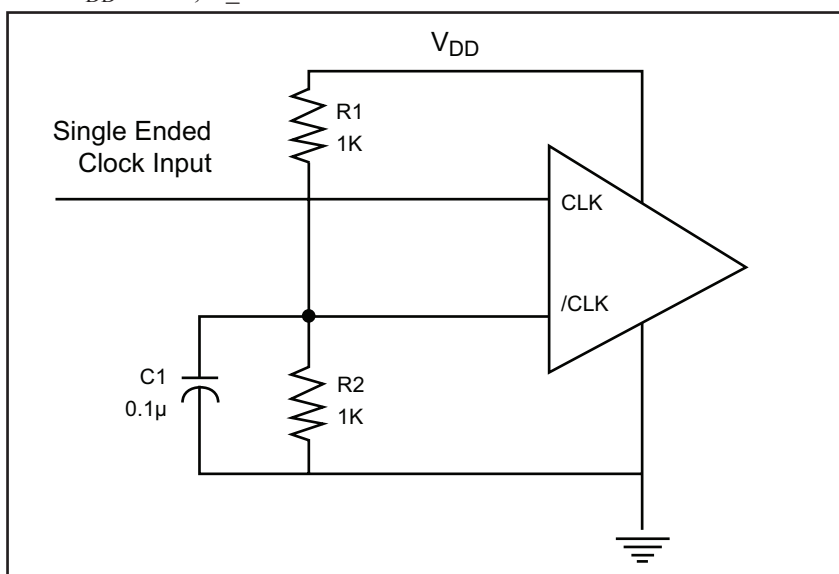
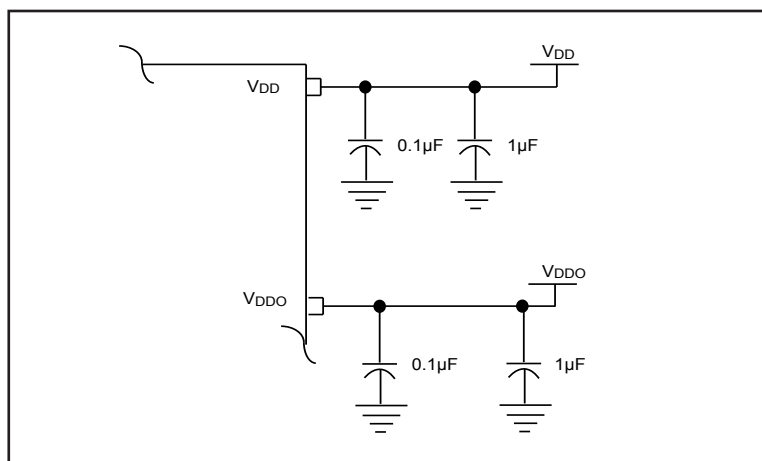


Figure 1. Single-ended input to Differential input device

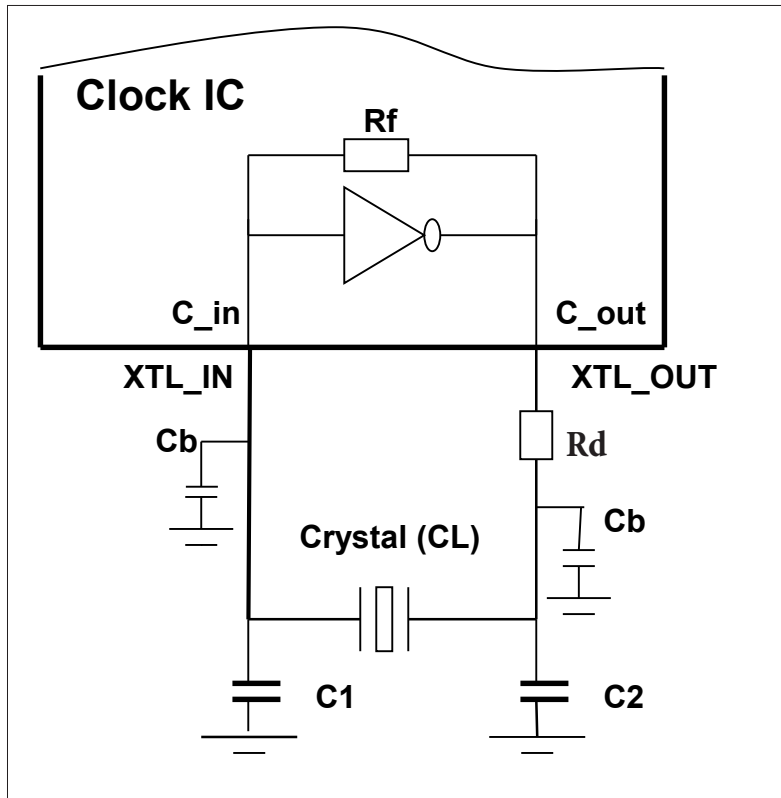
Power Supply Filtering Techniques

As in any high speed analog circuitry, the power supply pins are vulnerable to random noise. To achieve optimum jitter performance, power supply isolation is required. All power pins should be individually connected to the power supply plane through vias, 0.1μF and 1μF bypass capacitors should be used for each pin.



Application Notes

Clock IC Crystal loading cap. design guide



CL =crystal spec. loading cap.

C_in/out = (3~5pF) of IC pin cap.

Cb = PCB trace (2~4pF)

C1,C2 = load cap. of design

Rd = 50 to 100ohm drive level limit
(Optimized for 25MHz 18pf XTAL
without Rd)

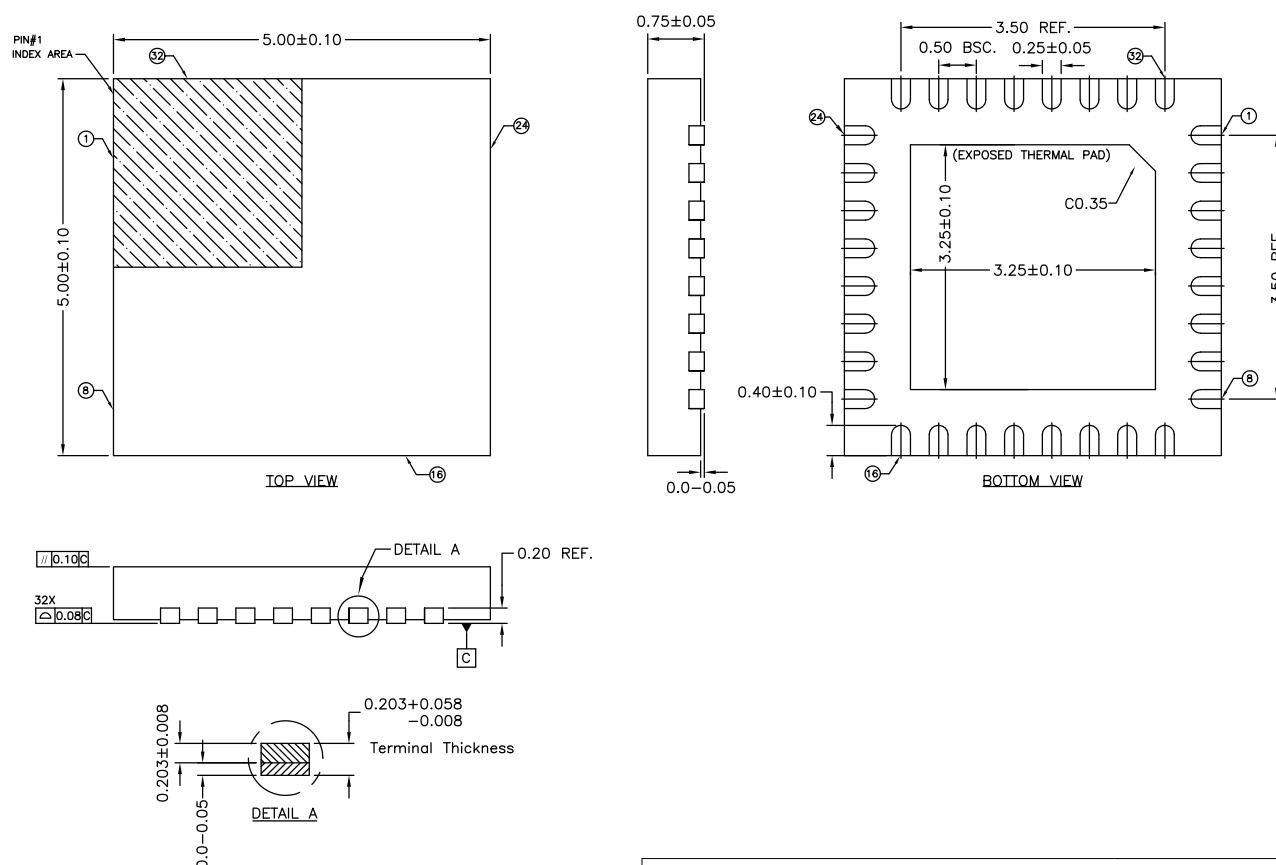
Design guide: $C1=C2=2 * CL - (Cb + C_{in/out})$ to meet target +/-ppm < 20 ppm

Example1: Select CL=18 pF crystal, $C1=C2=2*(18pF) - (4pF+5pF)=27pF$, check datasheet too

Example2: For higher frequency crystal ($\Rightarrow 20MHz$), can use formula $C1=C2=2*(CL-6)$, can do fine tune of C1, C2 for more accurate ppm if necessary

Thermal Information

| Symbol | Description | Condition | |
|---------------|--|-----------|-----------|
| Θ_{JA} | Junction-to-ambient thermal resistance | Still air | 44.7 °C/W |
| Θ_{JC} | Junction-to-case thermal resistance | | 21.7 °C/W |



Notes:

1. ALL DIMENSIONS ARE IN mm. ANGLES IN DEGREES.
2. COPLANARITY APPLIES TO THE EXPOSED PAD AS WELL AS THE TERMINALS.
3. REFER JEDEC MO-220.
4. THERMAL PAD SOLDERING AREA (MESH STENCIL DESIGN IS RECOMMENDED)
5. THIS PAD IS FOR DEVICE: **PI6C49X0210**.



DATE: 05/15/13

DESCRIPTION: 32-contact, Thin Quad Flat No-Lead (TQFN)

PACKAGE CODE: ZH32

DOCUMENT CONTROL #: PD-2070HW

REVISION: B

Note:

- For latest package info, please check: <http://www.pericom.com/products/packaging/mechanicals.php>

Ordering Information^(1,2,3)

| Ordering Code | Package Code | Package Description |
|-----------------|--------------|-------------------------------|
| PI6C49X0210ZHIE | ZH | Pb-Free and Green 32-pin TQFN |

Notes:

1. Thermal characteristics can be found on the company web site at www.pericom.com/packaging/
2. E = Pb-free and Green
3. X suffix = Tape/Reel