

OD-P Type High Frequency and Ultra Low Noise

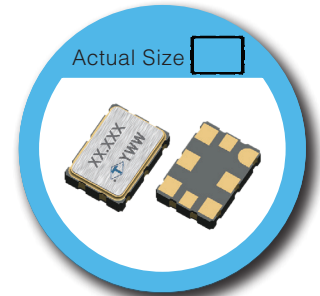
7.0 x 5.0mm Quad Frequency SMD Crystal Oscillator

FEATURE

- Any Frequency Quad Frequency Selectable.
- Low Power Supply Voltage: 3.3, 2.5 and 1.8V Supply Options
- Clock Output: LVPECL, LVDS, CML, HCSL and LVCMOS
- Output Frequency Support from 15MHz to 2.1GHz
- Ultra Low Noise, Phase Jitter < 300 fs (Typical: 150 fs at 12kHz to 20MHz Frequency Offsets)
- Tri-state Enable / Disable Mode.
- Temperature Range: -40 to 85°C
- Pb-free/RoHS Compliant

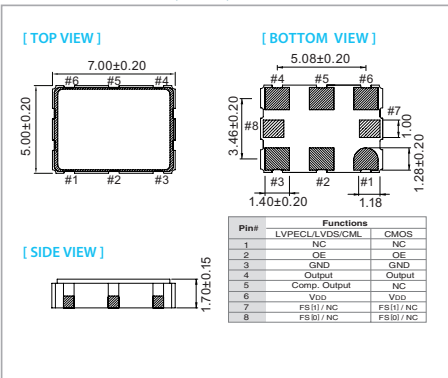
TYPICAL APPLICATION

- SONET/SDH, Gigabit Ethernet
- Storage Area Networking (SAN)
- SD/HD Video
- FPGA Clock Generation

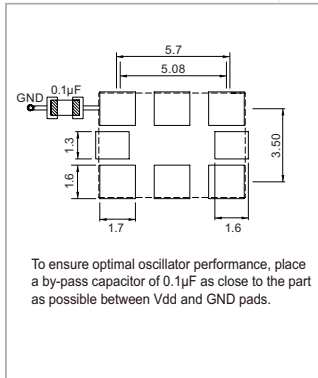


RoHS Compliant

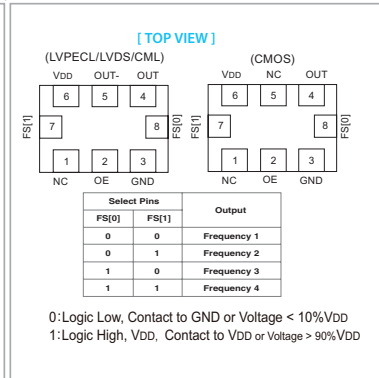
DIMENSION (mm)



SOLDER PAD LAYOUT(mm)



PIN ASSIGNMENTS



ELECTRICAL SPECIFICATION

| Parameter | LVPECL | | | | unit | |
|-------------------------------------|---|-----------|-----------|-----------|-----------|--------|
| | 3.3V | | 2.5V | | | |
| | Min. | Max. | Min. | Max. | | |
| Supply Voltage Variation (VDD) ±10% | VDD-10% | VDD+10% | VDD-10% | VDD+10% | V | |
| Frequency Range | 15 | 2100 | 15 | 2100 | MHz | |
| Standard Frequency | 155.52, 156.25, 187.5, 212.5, 250, 312.5, 622.08, 805.664, 873.515MHz | | | | | |
| Supply Current | - | 110 | - | 95 | mA | |
| Output Level | Output High | VDD-1.165 | VDD-0.8 | VDD-1.165 | VDD-0.8 | V |
| | Output Low | VDD-2.0 | VDD-1.55 | VDD-2.0 | VDD-1.55 | |
| Transition Time (20%-80%) | Rise Time / Fall Time | - | 0.35 | - | 0.35 | nSec |
| | | | | | | |
| Duty Cycle | 45 | 55 | 45 | 55 | % | |
| Startup Time | - | 8 | - | 8 | mSec | |
| Tri-State Mode (Input to Pin 2) | Enable | 0.7-VDD | - | 0.7 x VDD | - | V |
| | Disable | - | 0.3 x VDD | - | 0.3 x VDD | |
| Standby Current | - | 110 | - | 95 | mA | |
| Phase Noise | Typ. | | Typ. | | | |
| | Max. | | Max. | | | |
| At VDD=3.3V, Fout=873.515MHz | 1kHz offset | -106 | - | -106 | - | dBc/Hz |
| | 10kHz offset | -115 | - | -115 | - | |
| | 100kHz offset | -123 | - | -123 | - | |
| | 1MHz offset | -133 | - | -133 | - | |
| | 20MHz offset | -150 | - | -150 | - | |
| RMS Phase Jitter (12kHz to 20MHz) | 150 | 300 | 150 | 300 | fs | |
| Period Jitter | - | 50 | - | 50 | ps | |

Note: not all combination of options are available. Other specifications may be available upon request.

Specifications subject to change without notice.

| Parameter | LVDS | | | | | | unit | |
|--|--|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|--------|
| | 3.3V | | 2.5V | | 1.8V | | | |
| | Min. | Max. | Min. | Max. | Min. | Max. | | |
| Supply Voltage Variation (V _{DD}) ±5% | - | - | - | - | 1.71 | 1.89 | V | |
| Supply Voltage Variation (V _{DD}) ±10% | 3.63 | 2.97 | 2.25 | 2.75 | - | - | | |
| Frequency Range | 15 | 2100 | 15 | 2100 | 15 | 2100 | MHz | |
| Standard Frequency | 155.52, 156.25, 187.5, 212.5, 312.5, 622.08, 805.664, 873.515MHz | | | | | | | |
| Supply Current | - | 90 | - | 80 | - | 70 | mA | |
| Output Level | Output High | - | 1.6 | - | 1.6 | - | 1.6 | V |
| | Output Low | 0.9 | - | 0.9 | - | 0.9 | - | |
| Transition Time (20%-80%) | Rise Time / Fall Time | - | 0.35 | - | 0.35 | - | 0.35 | nSec |
| | | | | | | | | |
| Duty Cycle | 45 | 55 | 45 | 55 | 45 | 55 | % | |
| Startup Time | - | 8 | - | 8 | - | 8 | mSec | |
| Tri-State Mode (Input to Pin 2) | Enable | 0.7 x V _{DD} | - | 0.7 x V _{DD} | - | 0.7 x V _{DD} | - | V |
| | Disable | - | 0.3 x V _{DD} | - | 0.3 x V _{DD} | - | 0.3 x V _{DD} | |
| Standby Current | - | 90 | - | 80 | - | 70 | mA | |
| Phase Noise | Typ. | Max. | Typ. | Max. | Typ. | Max. | | |
| At V _{DD} =3.3V, F _{out} =873.515MHz | 1kHz offset | -106 | - | -106 | - | -106 | - | dBc/Hz |
| | 10kHz offset | -115 | - | -115 | - | -115 | - | |
| | 100kHz offset | -123 | - | -123 | - | -123 | - | |
| | 1MHz offset | -133 | - | -133 | - | -133 | - | |
| | 10MHz offset | -150 | - | -150 | - | -150 | - | |
| RMS Phase Jitter (12kHz to 20MHz) | 150 | 300 | 150 | 300 | 150 | 300 | fs | |
| Period Jitter | - | 50 | - | 50 | - | 50 | ps | |

| Parameter | CML | | | | | | unit | |
|--|--|------------------------|-----------------------|------------------------|-----------------------|------------------------|-----------------------|--------|
| | 3.3V | | 2.5V | | 1.8V | | | |
| | Min. | Max. | Min. | Max. | Min. | Max. | | |
| Supply Voltage Variation (V _{DD}) ±5% | - | - | - | - | 1.71 | 1.89 | V | |
| Supply Voltage Variation (V _{DD}) ±10% | 3.63 | 2.97 | 2.25 | 2.75 | - | - | | |
| Frequency Range | 15 | 2100 | 15 | 2100 | 15 | 2100 | MHz | |
| Standard Frequency | 155.52, 156.25, 187.5, 212.5, 312.5, 622.08, 805.664, 873.515MHz | | | | | | | |
| Supply Current | - | 90 | - | 80 | - | 70 | mA | |
| Output Level | Output High | V _{DD} -0.085 | V _{DD} | V _{DD} -0.085 | V _{DD} | V _{DD} -0.085 | V _{DD} | V |
| | Output Low | V _{DD} -0.6 | V _{DD} -0.32 | V _{DD} -0.6 | V _{DD} -0.32 | V _{DD} -0.6 | V _{DD} -0.32 | |
| Transition Time (20%-80%) | Rise Time / Fall Time | - | 0.35 | - | 0.35 | - | 0.35 | nSec |
| | | | | | | | | |
| Duty Cycle | 45 | 55 | 45 | 55 | 45 | 55 | % | |
| Startup Time | - | 8 | - | 8 | - | 8 | mSec | |
| Tri-State Mode (Input to Pin 2) | Enable | 0.7 x V _{DD} | - | 0.7 x V _{DD} | - | 0.7 x V _{DD} | - | V |
| | Disable | - | 0.3 x V _{DD} | - | 0.3 x V _{DD} | - | 0.3 x V _{DD} | |
| Standby Current | - | 90 | - | 80 | - | 70 | mA | |
| Phase Noise | Typ. | Max. | Typ. | Max. | Typ. | Max. | | |
| At V _{DD} =3.3V, F _{out} =873.515MHz | 1kHz offset | -107 | - | -107 | - | -107 | - | dBc/Hz |
| | 10kHz offset | -117 | - | -117 | - | -117 | - | |
| | 100kHz offset | -125 | - | -125 | - | -125 | - | |
| | 1MHz offset | -135 | - | -135 | - | -135 | - | |
| | 10MHz offset | -150 | - | -150 | - | -150 | - | |
| RMS Phase Jitter (12kHz to 20MHz) | 150 | 300 | 150 | 300 | 150 | 300 | fs | |
| Period Jitter | - | 50 | - | 50 | - | 50 | ps | |

| Parameter | HCSSL | | | | | | Unit | |
|--|----------------|-----------------------|-----------------------|----------------------|-----------------------|---------------------|-----------------------|--------|
| | 3.3V | | 2.5V | | 1.8V | | | |
| | Min. | Max. | Min. | Max. | Min. | Max. | | |
| Supply Voltage Variation (V _{DD})±10% | 3.63 | 2.97 | 2.25 | 2.75 | 1.71 | 1.89 | V | |
| Frequency Range | 15 | 700 | 15 | 700 | 15 | 700 | MHz | |
| Supply Current | - | 115 | - | 100 | - | 94 | mA | |
| Output Level | Output High | 0.66 | 1.15 | 0.66 | 1.15 | 0.66 | 1.15 | V |
| | Output Low | 0 | 0.15 | 0 | 0.15 | 0 | 0.15 | V |
| Transition Time (20% - 80%) | Rise Time | - | 0.4 | - | 0.4 | - | 0.4 | nSec |
| | Fall Time | - | 0.4 | - | 0.4 | - | 0.4 | nSec |
| Duty Cycle | 45 | 55 | - | 55 | 45 | 55 | % | |
| Startup Time | - | 8 | - | 8 | - | 8 | mSec | |
| Tri-State mode (Input to Pin 2) | Enable | 0.7 x V _{DD} | - | 0.7x V _{DD} | - | 0.7xV _{DD} | - | V |
| | Disable | - | 0.3 x V _{DD} | - | 0.3 x V _{DD} | - | 0.3 x V _{DD} | V |
| Stand by Current | - | 115 | - | 100 | - | 94 | mA | |
| Output Load | 50 ohms to GND | | | | | | | |
| Phase Noise | Typ. | Max. | Typ. | Max. | Typ. | Max. | | |
| At V _{DD} =3.3V, f _{out} =873.515MHz | 1kHz offset | -87 | - | -87 | - | -87 | - | dBc/Hz |
| | 10kHz offset | -110 | - | -110 | - | -110 | - | |
| | 100kHz offset | -127 | - | -127 | - | -127 | - | |
| | 1MHz offset | -138 | - | -138 | - | -138 | - | |
| | 10MHz offset | -153 | - | -153 | - | -153 | - | |
| RMS Phase Jitter (12KHz to 20MHz) | 150 | 300 | 150 | 300 | 150 | 300 | fs | |
| Period Jitter | - | 50 | - | 50 | - | 50 | ps | |

Note: not all combination of options are available. Other specifications may be available upon request.

| Parameter | CMOS | | | | | | unit |
|--|---|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|------|
| | 3.3V | | 2.5V | | 1.8V | | |
| | Min. | Max. | Min. | Max. | Min. | Max. | |
| Supply Voltage Variation (V _{DD}) ±5% | – | – | – | – | 1.71 | 1.89 | V |
| Supply Voltage Variation (V _{DD}) ±10% | 3.63 | 2.97 | 2.25 | 2.75 | – | – | |
| Frequency Range | 15 | 250 | 15 | 250 | 15 | 250 | MHz |
| Standard Frequency | 106.25, 125, 133.33, 150, 155.52, 156.25, 187.5, 212.5MHz | | | | | | |
| Supply Current | – | 90 | – | 80 | – | 70 | mA |
| Output Level | Output High | 0.9 X V _{DD} | – | 0.9 X V _{DD} | – | 0.9 X V _{DD} | V |
| | Output Low | – | 0.1X V _{DD} | – | 0.1X V _{DD} | – | |
| Transition Time (20%-80%) | Rise Time / Fall Time | – | 1.2 | – | 1.5 | – | nSec |
| Duty Cycle | F _{out} <100MHz | 45 | 55 | 45 | 55 | 45 | % |
| | F _{out} >100MHz | 40 | 60 | 40 | 60 | 40 | |
| Startup Time | | – | 8 | – | 8 | – | mSec |
| Tri-State Mode (Input to Pin 2) | Enable | 0.7 x V _{DD} | – | 0.7 x V _{DD} | – | 0.7 x V _{DD} | V |
| | Disable | – | 0.3 x V _{DD} | – | 0.3 x V _{DD} | – | |
| Period Jitter | | – | 100 | – | 100 | – | mA |

FREQ. STABILITY vs. TEMP. RANGE

| Temp. (°C) | ppm | ±20 | ±25 | ±30 | ±50 |
|------------|-----|-----|-----|-----|-----|
| -20~+70 | | △ | ○ | ○ | ○ |
| -40~+85 | | X | △ | ○ | ○ |

* ○: Available △:Conditional X: Not available

* Inclusive of calibration @ 25 °C, operating temperature range, input voltage variation, load variation, aging (1st year), shock, and vibration