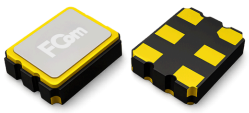
# FCom Crystal Oscillator

## Series FCO-3L

### Differential Oscillator 3.2×2.5 mm



## Feature

- Output Frequency up to 220MHz
- Very low phase jitter: 0.15 pS, typ. RMS from 12kHz - 20MHz
- Tri-state enable/disable

## Application

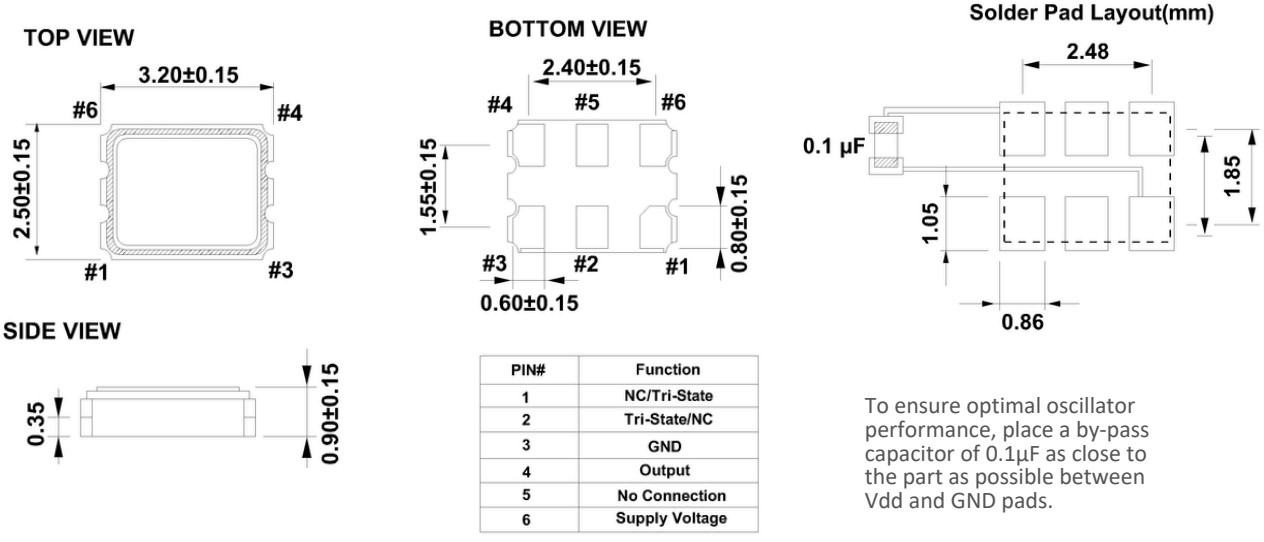
- 10Gbit Ethernet, Fiber Channel
- Storage Area Network, SONET
- Enterprise Servers, Telecom
- Reference Clocks for ADC and DAC

## ELECTRICAL SPECIFICATIONS

| Parameters | | Symbol | LVPECL | | | | Units | Notes | |
|---|---|---|---|---|---|---|---|---|---|
| | | | 3.3V | | 2.5V | | | | |
| | | | Min. | Max. | Min. | Max. | | | |
| Frequency Range | | F | 13.5~220 | | | | MHz | | Test condition<br>Ambient temperature：25 ± 5°C<br>Relative humidity：40% ~ 70% |
| Standard Frequency | | F(ST) | 100, 125, 156.25 | | | | MHz | | |
| Supply Current | | Icc | - | 55 | - | 55 | mA | | |
| Transition Time | Rise Time | Tr | - | 0.6 | - | 0.6 | nSec | Measured from 20% ~ 80% | |
| | Fall Time | Tf | - | 0.6 | - | 0.6 | | | |
| Output Level | | VoH | 2.215 | 2.42 | 1.415 | 1.64 | V | Output High | |
| | | VoL | 1.49 | 1.68 | 0.69 | 0.88 | V | Output Low | |
| Tri-State Mode | | VIH | 70% Vdd | - | 70% Vdd | - | V | Enable | |
| | | VIL | - | 30% Vdd | - | 30% Vdd | V | Disable | |
| Phase Noise | | PN | Typ. | Max. | Typ. | Max. | dBc/Hz | At VDD=3.3V, fout=156.25MHz | |
| 10 kHz | | | -143 | | -145 | | | | |
| 100 kHz | | | -151 | - | -154 | | | | |
| 1 MHz | | | -155 | - | -155 | | | | |
| RMS Phase Jitter | 13.5MHz~80MHz | PJ | - | 1 | - | 1 | pSec | Integrated 12 kHz~20MHz @ 3.3V | |
| | 80MHz~220MHz | | - | 0.3 | - | 0.3 | | | |
| Duty Cycle | | TH/T | 45 ~ 55 | | | | % | | |
| Stand by Current | | Icc(ST) | - | 30 | - | 30 | μA | | |
| Output Load | | RL | 50Ω, VDD – 2V | | | | / | | |
| Start-up Time | | Tosc | 10 | | | | mSec | Max | |
| Aging | | ppm/yr | ±3 | | | | ppm/yr | 1st. Year at 25°C | |

**Note : The table shows common spec. if you have special spec. requirement , please feel free to contact our salesperson.**

## DIMENSION(mm)




| PIN# | Function |
|---|---|
| 1 | NC/Tri-State |
| 2 | Tri-State/NC |
| 3 | GND |
| 4 | Output |
| 5 | No Connection |
| 6 | Supply Voltage |

To ensure optimal oscillator performance, place a by-pass capacitor of 0.1μF as close to the part as possible between Vdd and GND pads.

| Parameters | Symbol | LVDS | | | | | | Units | Notes | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | 3.3V | | 2.5V | | 1.8V | | | | |
| | | Min. | Max. | Min. | Max. | Min. | Max. | | | |
| Frequency Range | F | 13.5~220 | | | | | | MHz | | Test condition<br>Ambient temperature: 25 ± 5°C<br>Relative humidity: 40% ~ 70% |
| Standard Frequency | F(ST) | 100, 125, 156.25 | | | | | | MHz | | |
| Supply Current | Icc | - | 35 | - | 30 | - | 20 | mA | | |
| Transition Time | Tr | - | 0.3 | - | 0.3 | - | 0.5 | nSec | Measured from 20% ~ 80% | |
| | Tf | - | 0.3 | - | 0.3 | - | 0.5 | | | |
| Output Level | Vdiff | 0.24 | 0.45 | 0.24 | 0.45 | 0.24 | 0.45 | | VOD, OUT-OUTN | |
| | VoH | - | 1.6 | - | 1.6 | - | 1.6 | V | | |
| | VoL | 0.9 | - | 0.9 | - | 0.9 | - | V | | |
| Tri-State Mode | VIH | 70% Vdd | - | 70% Vdd | - | 70% Vdd | - | V | Enable | |
| | VIL | - | 30% Vdd | - | 30% Vdd | - | 30% Vdd | V | Disable | |
| Phase Noise | PN | Typ. | Max. | Typ. | Max. | Typ. | Max. | dBc/Hz | At VDD=3.3V, fout=156.25MHz | |
| 10 kHz | | -145 | | -145 | | -142 | | | | |
| 100 kHz | | -153 | - | -153 | | -150 | | | | |
| 1 MHz | | -155 | - | -155 | | -153 | | | | |
| RMS Phase Jitter | PJ | - | 0.3 | - | 0.3 | - | 0.3 | pSec | Integrated 12 kHz~20 MHz @ 3.3V | |
| Duty Cycle | TH/T | 45 ~ 55 | | | | | | % | | |
| Stand by Current | Icc(ST) | 10 | | | | | | µA | Max | |
| Output Load | RL | 100Ω (Between OUT & OUTN) | | | | | | Ω | | |
| Start-up Time | Tosc | - | 5 | - | 5 | - | 10 | mSec | | |
| Aging | ppm/yr | ±3 | | | | | | ppm/yr | 1st. Year at 25°C | |

**Note : The table shows common spec. if you have special spec. requirement , please feel free to contact our salesperson.**

| Parameters | Symbol | HCSL | | | | | | Units | Notes | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | 3.3V | | 2.5V | | 1.8V | | | | |
| | | Min. | Max. | Min. | Max. | Min. | Max. | | | |
| Frequency Range | F | 100~135 | | | | | | MHz | | Test condition<br>Ambient temperature: 25 ± 5°C<br>Relative humidity: 40% ~ 70% |
| Standard Frequency | F(ST) | 100, 125 | | | | | | MHz | | |
| Supply Current | Icc | - | 42 | - | 42 | - | 30 | mA | | |
| Transition Time | Tr | - | 0.6 | - | 0.6 | - | 0.6 | nSec | Measured from 20% ~ 80% | |
| | Tf | - | 0.6 | - | 0.6 | - | 0.6 | | | |
| Output Level | VoH | 0.6 | 0.9 | 0.6 | 0.9 | 0.55 | 1.0 | V | | |
| | VoL | -0.15 | 0.15 | -0.15 | 0.15 | -0.15 | 0.15 | V | | |
| Tri-State Mode | VIH | 70% Vdd | - | 70% Vdd | - | 70% Vdd | - | V | Enable | |
| | VIL | - | 30% Vdd | - | 30% Vdd | - | 30% Vdd | V | Disable | |
| Phase Noise | PN | Typ. | Max. | Typ. | Max. | Typ. | Max. | dBc/Hz | At VDD=3.3V, fout=156.25MHz | |
| 10 kHz | | -145 | | -145 | | -142 | | | | |
| 100 kHz | | -153 | - | -153 | | -150 | | | | |
| 1 MHz | | -155 | - | -155 | | -153 | | | | |
| RMS Phase Jitter | PJ | - | 0.3 | - | 0.3 | - | 0.3 | pSec | Integrated 12 kHz~20 MHz @ 3.3V | |
| Duty Cycle | TH/T | 45 ~ 55 | | | | | | % | | |
| Stand by Current | Icc(ST) | 10 | | | | | | µA | Max | |
| Output Load | RL | 50 to GND | | | | | | Ω | | |
| Start-up Time | Tosc | - | 10 | - | 10 | - | 10 | mSec | | |
| Aging | ppm/yr | ±3 | | | | | | ppm/yr | 1st. Year at 25°C | |

**Note : The table shows common spec. if you have special spec. requirement , please feel free to contact our salesperson.**

## FREQ. STABILITY vs. TEMP. RANGE

| ppm / Temp.(°C) | ± 25 | ± 50 |
|---|---|---|
| @-20~70°C | ○ | ○ |
| @-40~85°C | ○ | ○ |
| @-40~105°C | × | ○ |
| @-40~125°C | × | △ |

○: Available △: Conditional ×: Not available

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