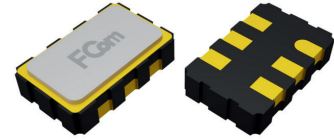


# FCom Differential Output OSC

## Series FCO-5L

SMD Differential Output Crystal Oscillator 5.0×3.2 mm



### Feature

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

### Application

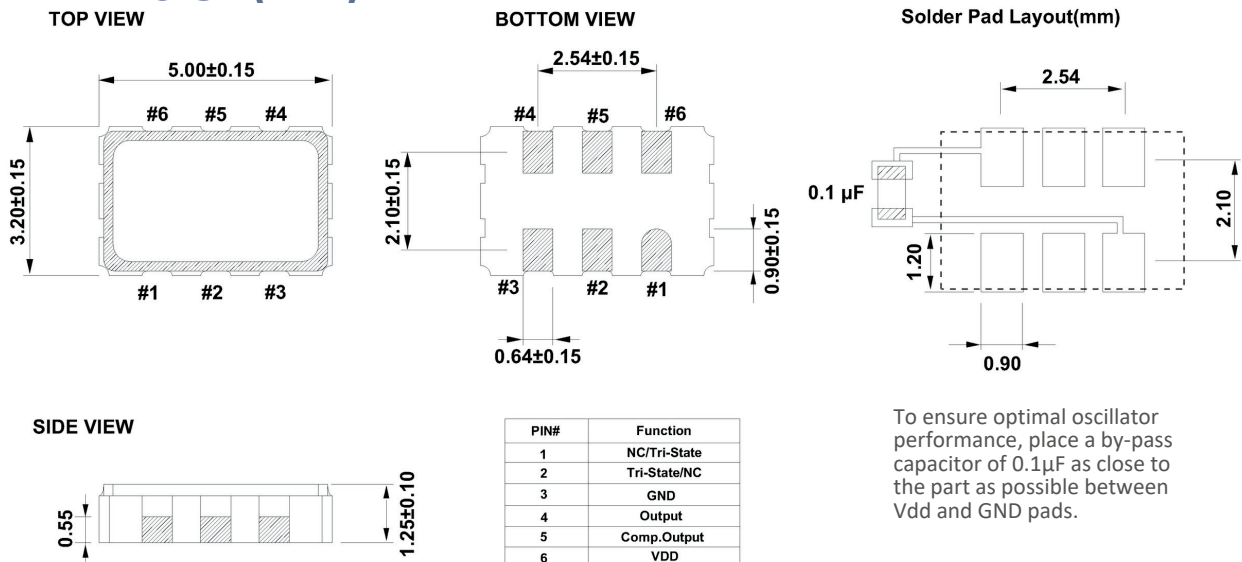
- 10Gbit Ethernet, Fiber Channel
- Storage Area Network, SONET
- Enterprise Servers, Telecom
- Reference Clocks for ADC and DAC

### 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><br>Ambient temperature :<br>25 ± 5°C<br><br>Relative humidity :<br>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<br>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,<br>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~20 MHz<br>@ 3.3V |                                                                                                 |
|                    | 80MHz~220MHz  |         | -                | 0.3     | -       | 0.3     |        |                                    |                                                                                                 |
| Duty Cycle         |               | TH/T    | 45 ~ 55          |         |         |         | %      |                                    |                                                                                                 |
| Stand by Current   |               | Icc(ST) | -                | 10      | -       | 10      | 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)



| 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><br>Ambient temperature : 25 ± 5°C<br><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><br>Ambient temperature :<br>25 ± 5°C<br><br>Relative humidity :<br>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<br>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

| Temp.(°C) \ ppm | ± 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.