# LO213 Series

## Low Power Dual Mode EMI Reduction Oscillator

### Features

- FCC approved EMI attenuation
- Proprietary Low EMI Phase Modulated SaΦ ic™ Oscillator
- Dual Mode Clock Output : Low phase jitter clock or Low EMI clock
- RoHS compliant & Pb free
- AEC-Q100 G1

- Frequency range 20MHz ~ 40MHz
- Supply voltage 1.62V ~ 3.63V
- CMOS output
- Operating temperature -40~125ºC
- SMD seam sealing ceramic package 2.5mm x 2.0mm

### Electrical Specifications

| Item | Specification |
|---|---|
| Frequency | 20MHz ~ 40MHz |
| Supply Voltage (VDD) | 1.8V ~ 3.3V [1], ±10% |
| Output Type | CMOS |
| Output Load | 15 pF |
| Oscillation Mode | Fundamental |
| Frequency Stability | ±50 ppm [1] [2] [3] |
| Operation Temperature Range | -40ºC ~ 125ºC [1] |
| Storage Temperature Range | -55ºC ~ 125ºC |
| Output Voltage Low ($V_{OL}$) <br> @ VDD = 3.3V, $I_{OL}$ = 12mA <br> @ VDD = 1.8V, $I_{OL}$ = 4mA | 0.2VDD Max. |
| Output Voltage High ($V_{OH}$) <br> @ VDD = 3.3V, $I_{OH}$ = -12mA <br> @ VDD = 1.8V, $I_{OH}$ = -4mA | 0.8VDD Min. |
| Rise(Tr) / Fall(Tf) Time [4] | 6 ns Max. |
| Dynamic Supply Current [5] | 2.5mA EN=High / 4.0mA EN=Low |
| Duty Cycle [6] | 45% ~ 55% |
| Start-Up Time | 1 ms Max. |
| Phase Jitter (12kHz~5MHz) | 0.5 ps Max. [3][5] |
| Aging (at 25ºC) | ±3 ppm/year Max. |
| Modulation Output Clock Mode | Pin 1 selectable |

[1] Ordering options

[2] Inclusive of frequency tolerance at 25°C, variations over operating temperature, supply voltage, load and 1st year aging at 25°C.

[3] Modulation output clock mode is disabled.

[4] Tr measure between 10% to 90%, Tf measure between 90% to 10% at 15pF load and $V_{DD}$ 1.8V~3.3V

[5] Measure at 24MHz, $V_{DD}$ 1.8V
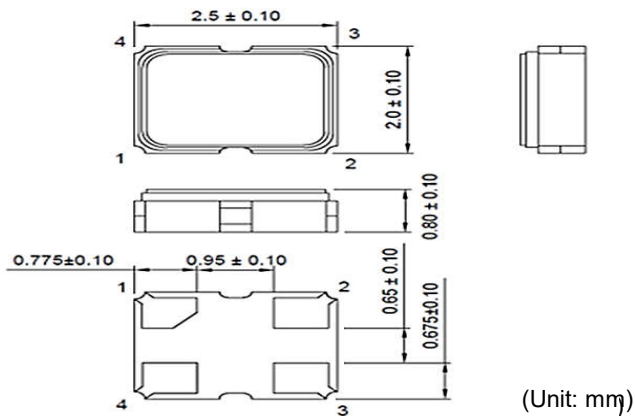
[6] Measure at $V_{DD}$ /2

## Modulation Output Deviation [7], [8]

| Frequency (MHz) | Deviation range (%) @25ºC | | |
| --- | --- | --- | --- |
| | VDD 1.8V | VDD 2.5V | VDD 3.3V |
| 20 | ± 0.38 | ± 0.22 | ± 0.17 |
| 24 | ± 0.42 | ± 0.27 | ± 0.19 |
| 25 | ± 0.45 | ± 0.28 | ± 0.20 |
| 27 | ± 0.50 | ± 0.29 | ± 0.23 |

[7] The deviation range can vary by ±20% over voltage and temperature.

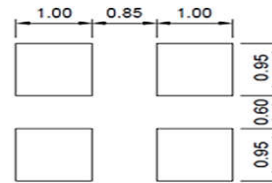[8] Modulation output mode is enabled, contact us for available frequencies and deviation range.

## Dimensions



**Pad Function**
1 EN
2 GND
3 OUTPUT
4 VDD

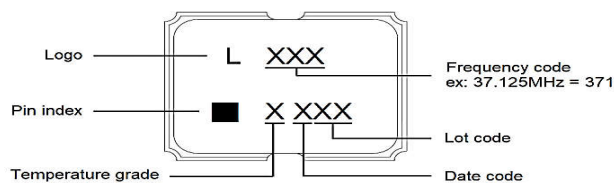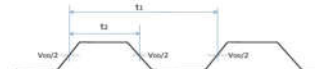**Suggested Layout**

(Unit: mm)

## Pin Definition

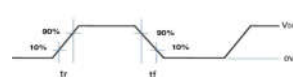| Pin# | Symbol | Functionality |
| --- | --- | --- |
| 1 | EN | Modulation Output Clock Mode Enable Pin<br>H (Logic "1") : Disable<br>L (Logic "0") : Enable<br>Internal pull-high resistor |
| 2 | GND | System ground reference |
| 3 | OUTPUT | Oscillator output |
| 4 | VDD | System power supply |

## Marking



Logo
Pin index
Temperature grade

L XXX
Frequency code
ex: 37.125MHz = 371
Lot code
Date code

### Duty Cycle Timing

### Output Rise/Fall Timing

| Temperature grade | Temperature range | Frequency stability (ppm) |
| --- | --- | --- |
| A | -40ºC ~ 125ºC | ±50 |

## Schematics
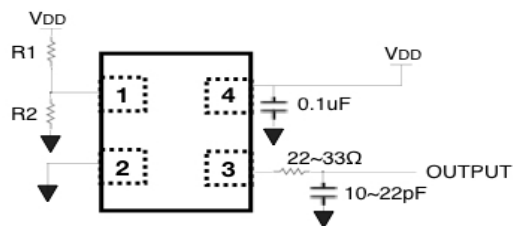


Non-modulated clock output when R1 = NC or 4.7KΩ , R2 = NC

Modulated clock output when R1 = NC & R2 = 0Ω
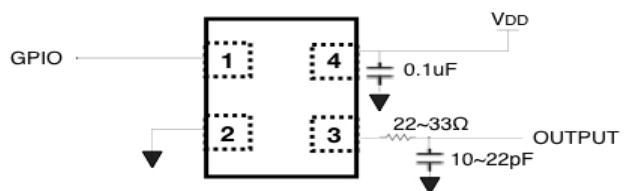
Non-modulated clock output when GPIO = High

Modulated clock output when GPIO = Low

## Ordering Information

**LO213    A  -  24.576M  -  50  -  C**

**Product series**

**Operating temperature range**
A : -40~125°C

**Frequency in Hz**

**Frequency stability**
50: +/-50ppm

**Supply voltage**
A : 3.3V
B : 2.5V
C : 1.8V