Low Noise Oscillator series

LNO 5000 B3 OCSO @ 5000 MHz

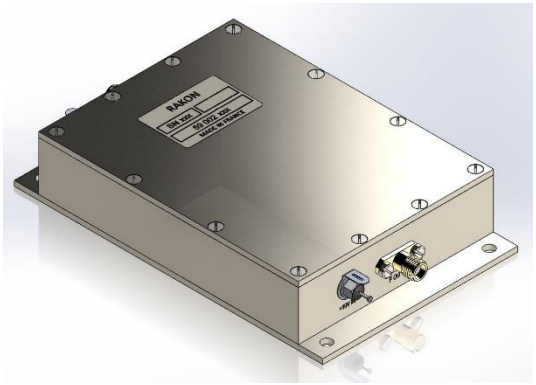
Specific request can be addressed to RAKON hirel@rakon.com

Product Description

LNO 5000 B3 is a low noise oscillator generating an output signal at 5000 MHz.

It is composed by an OCSO (Oven Controlled SAW Oscillator) at 500 MHz fundamental frequency, followed by a frequency multiplier x10. It can optionally include a PLL to be phase locked on an external 10MHz reference.

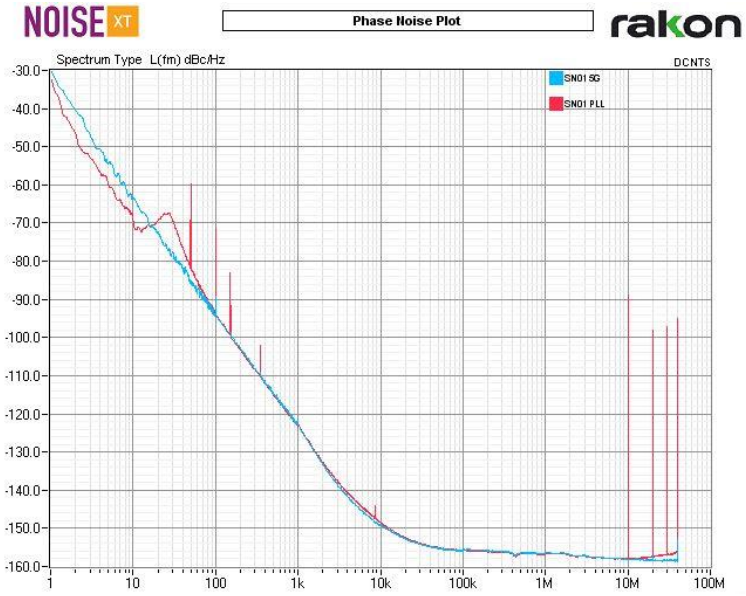
LNO 5000 B3 is designed for routine environment (test equipment, shelter, ground based military equipment ...). It is available in a 120.7mm x 76.2mm x 23.3mm package.



Features

Excellent phase noise performance (typical values) :

- -123 dBc/Hz @ 1 kHz offset
- -148 dBc/Hz @ 10 kHz offset
- -157dBc/Hz noise floor



Applications

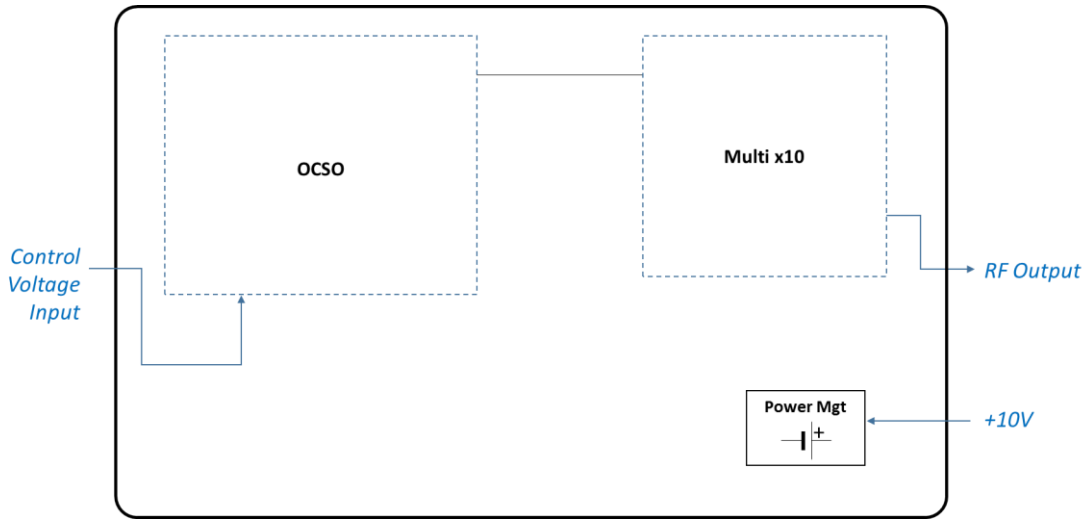
- Instrumentation (test equipment, simulator)
- Ground based military equipment as per MIL-PRF-28800F, Class 3
- Clock for high speed ADC

Technical Description

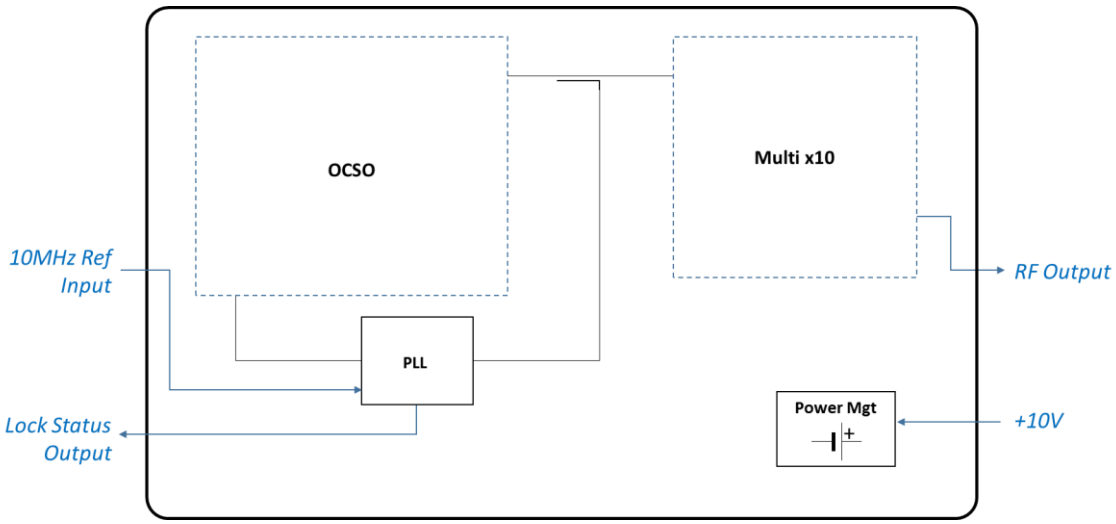
LNO 5000 B3 is available in two different versions :

- Standard version : in this case, it is a VC-OCSO (Voltage Controlled, Oven Controlled SAW Oscillator) that can be used either in free run mode, or controlled by an external DC voltage.
- PLL version : in this case, the unit needs an external 10 MHz reference to operate, and the output signal is phase-locked to this reference.

Standard version block diagram



PLL version block diagram



Specifications

1.0 Environmental conditions

Line	Parameter	Test Condition	Min	Max	Unit
1.1	Operating temperature range		0	+50	°C
1.2	Storage temperature range		-40	+85	°C
1.3	Shock	As per MIL-PRF-28800F, Class 3, test equipment			
1.4	Random vibration	As per MIL-PRF-28800F, Class 3, test equipment			

2.0 Electrical interface

Line	Parameter	Test Condition	Operating Range	Absolute Maximum	Unit
2.1	Supply voltage	Pin 2	+10 ± 0.2	0 to +15	VDC
2.2	Load impedance	Pin 3, 50Ω all phases	< 1.3:1	-	VSWR
Standard version					
2.3	Control input voltage	Pin 1	+2 to +8	-0.3 to +10	VDC
2.4	Control input impedance	Pin 1	> 10	-	kΩ
PLL version					
2.5	Reference input frequency	Pin 1	10 ± 0.00001	-	MHz
2.6	Reference input level	Pin 1, sine wave, 50 Ω source and load	+5 to +10	< +12	dBm
2.7	Lock status	Pin 4	Open drain		

3.0 Performances

Line	Parameter	Test Condition	Typ. Value	Guaranteed	Unit
3.1	Nominal output frequency	Definition	5000		MHz
3.2	Output power	Sine wave into 50 Ω load	-	+5 ± 2	dBm
3.3	Output impedance	At 5000 MHz	-	< 2.0:1	VSWR
Standard version					
3.4	Output frequency calibration	Factory calibration @25°C, no control input (free run)	±0.2	< ±0.5	ppm
3.5	Output frequency stability	All causes (temperature and load)	-	< ±2	ppm
3.6	Long term stability	After 30 days of continuous operation 1st year 10 years	 - -	 < ±1 < ±6	 ppm ppm
3.7	Frequency tuning	For full control input operating range	±6	> ±4	ppm
3.8	Tuning slope	Positive	2	1.5 to 3	ppm/V

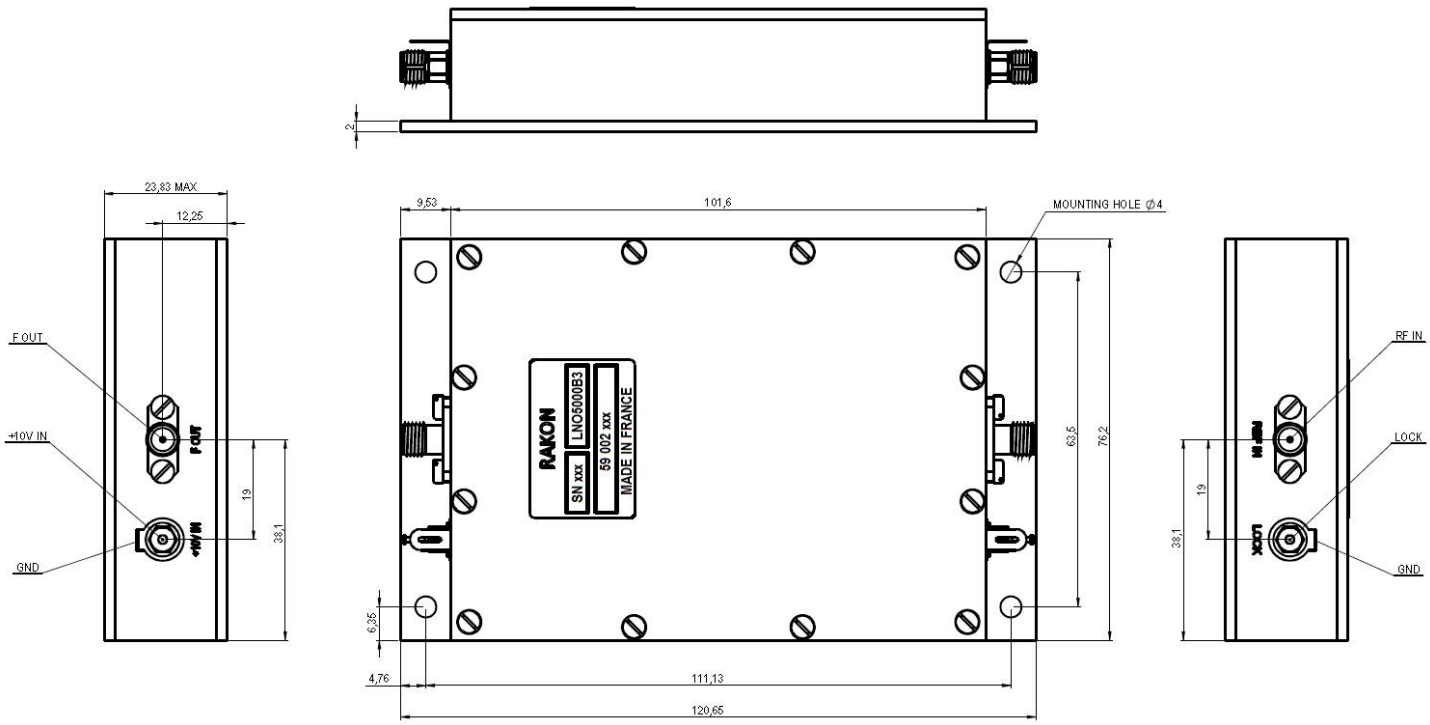
3.9	Steady state power consumption	@25 °C (calm air)	4.5	< 6	W
3.10	Warm-up power consumption		9	< 9.5	W
3.11	Warm-up time	±1 ppm with reference to frequency reached after 1 hour of continuous operation	-	< 5	minutes
PLL version					
3.12	Loop bandwidth	Internal	40	< 50	Hz
3.13	Steady state power consumption	@25 °C (calm air)	5	< 6.5	W
3.14	Warm-up power consumption		9.5	< 10	W
3.15	Warm-up time	Lock status ON	-	< 2	minutes

4.0 Single side band phase noise (PN)

Line	Parameter	Test Condition	Typ. Value	Guaranteed	Unit
4.1	PN power density @ 1 kHz offset	Static conditions, at 25°C (guaranteed values on full temperature range)	-121	< -118	dBc/Hz
4.2	PN power density @ 10 kHz offset		-146	< -143	dBc/Hz
4.3	PN power density @ 1 MHz offset		-157	< -154	dBc/Hz
4.4	Harmonic distortion	Sub-harmonics, 2^{nd} and 3^{rd} harmonics	-50	< -40	dBc
4.5	Spurious	Other than harmonic distortion	-90	< -80	dBc
4.6	Full offset range jitter	From 10 Hz to 100 MHz	100	< 200	fs
4.7	Broadband jitter	From 10 kHz to 40 MHz	5	< 10	fs

5.0 Mechanical features

Outline in mm, nominal values (general tolerances : ±0.15mm).



6.0 Pin description

Line	Name	Type	Description
6.1	REF IN	SMA jack	Standard version : DC control voltage input PLL version : 10 MHz reference input
6.2	F OUT	SMA jack	5000 MHz output signal
6.3	+10V IN	Feed-thru	Power supply (+)
6.4	GND	Lug	Mechanical and electrical ground (-)
6.5	LOCK	Feed-thru	Standard version : not used PLL version : Lock status Lock OFF -> '0' Lock ON -> 'HiZ', pull-up limited to 3.6V
6.6	GND	Lug	Mechanical and electrical ground (-)