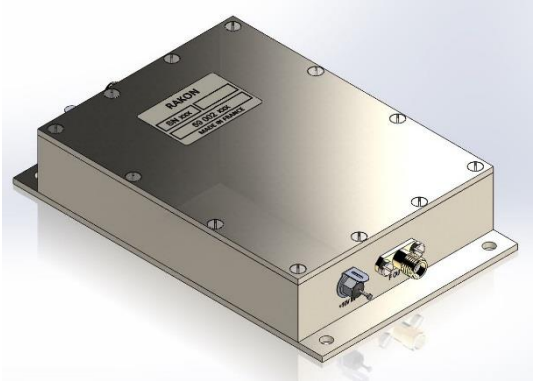
Low Noise Oscillator series

LNO 10000 B3 OCSO @ 10 GHz

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

Product Description

LNO 10000 B3 is a low noise oscillator generating an output signal at 10 GHz, phase-lockable on an external 10 MHz reference.



It is composed by an OCSO (Oven Controlled SAW Oscillator) at 500 MHz fundamental frequency, followed by a frequency multiplier x20. Three operating modes are available, through Control Input signal:

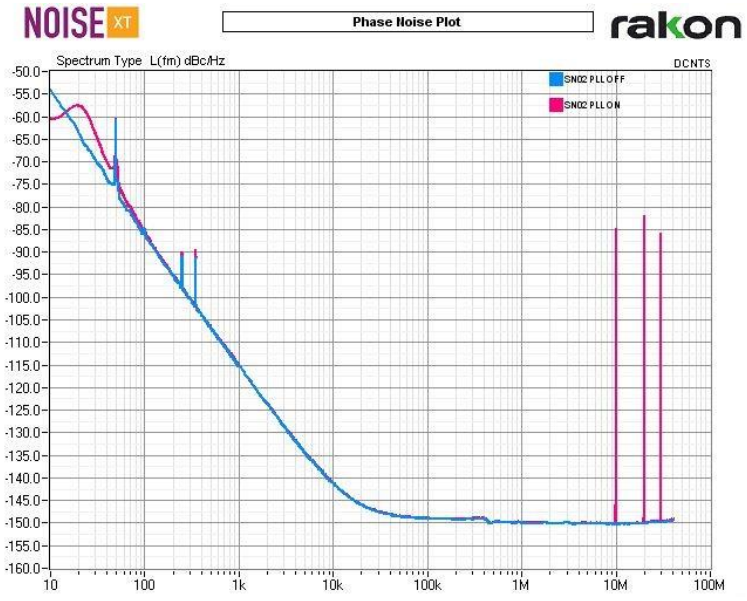
- Free running Control Input = Not connected
- Voltage controlled Control Input = DC Voltage
- Phase Lock Loop Control Input = 10 MHz Ref

LNO 10000 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) :

- -115 dBc/Hz @ 1 kHz offset
- -140 dBc/Hz @ 10 kHz offset
- -151 dBc/Hz noise floor



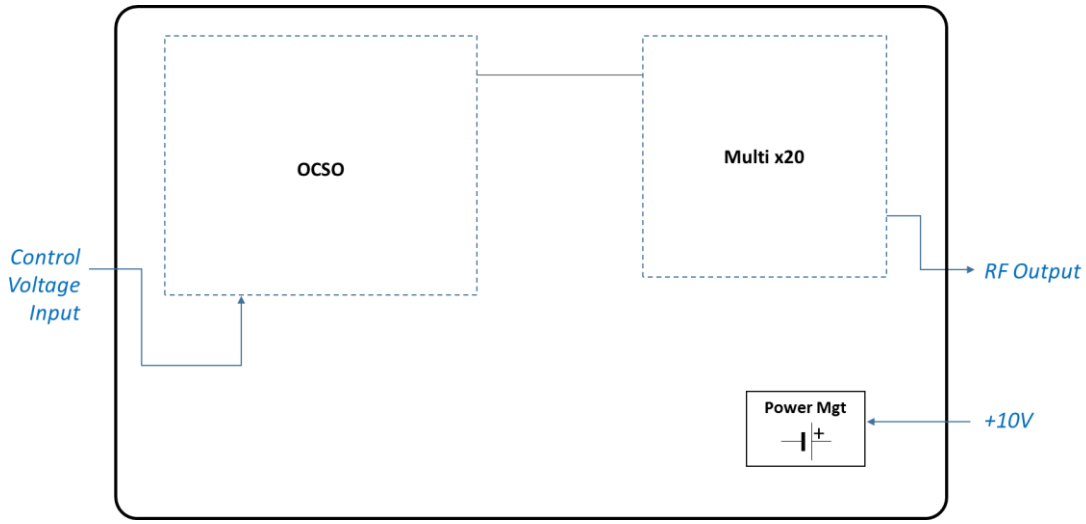
Applications

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

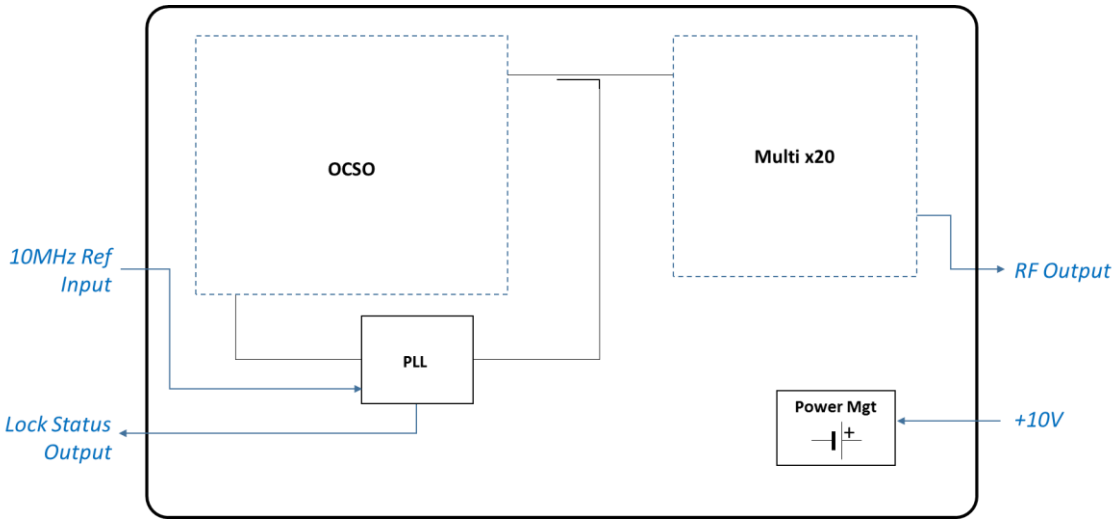
Technical Description

The operating mode is set automatically depending on the Control Input signal. If a 10MHz reference input is detected at the input, the internal PLL is switched on and the output signal is phase-locked to this reference. Otherwise, the module works as 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.

Voltage controlled operating mode



PLL operating mode



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
2.3	Control input	Pin 1 DC voltage External reference	+1 to +8 10 ± 0.00001	-0.3 to +10 -	VDC MHz
2.4	Lock status	Pin 4	Open drain		

3.0 Performances

Line	Parameter	Test Condition	Typ. Value	Guaranteed	Unit
3.1	Nominal frequency	Definition	10 000		MHz
	Free running mode	***Control Input not connected***			
3.2	Frequency calibration	Initial calibration @ 25°C	±0.2	< ±0.5	ppm
3.3	Frequency stability	All causes (temperature and load)	-	< ±2	ppm
3.4	Long term stability	After 30 days of continuous operation 1st year 10 years	 - -	 < ±1 < ±3	ppm
	Voltage controlled mode	***Control Input with DC voltage***			
3.5	Tuning voltage	At Control Input	+1 to +8		V
3.6	Frequency tuning	Monotone	±5	> ±4	ppm
3.7	Slope	Positive slope	1.5	1.1 to 2	ppm/V

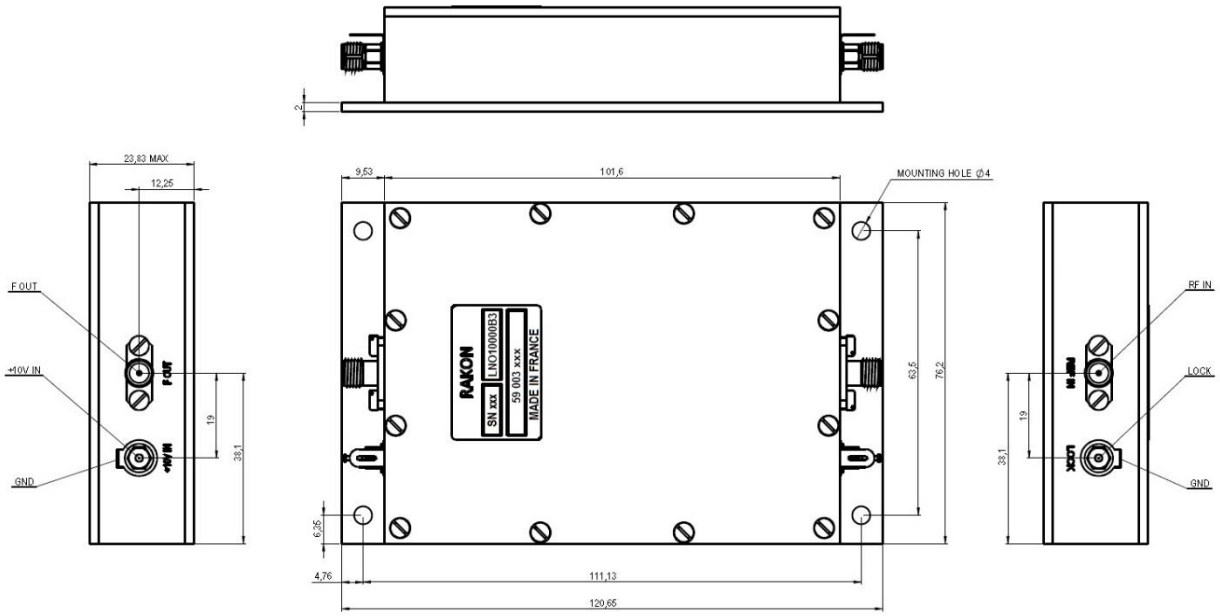
	PLL mode	***Control Input with 10MHz reference***			
3.8	Nominal Control Input frequency	Definition	10		MHz
3.9	Frequency stability	All causes	= Reference stability		
3.10	Input level	50Ω source & load	+5 to +10		dBm
3.11	Loop bandwidth		40	-	Hz
	All modes	***Common specifications***			
3.12	Warm-up power consumption	Worst case (PLL mode)	10.5	< 11	W
3.13	Steady state power consumption	@ 25 °C (calm air)	5	< 7.5	W
3.14	Warm-up time	±1 ppm with reference to frequency reached after 1 hour of continuous operation	-	< 2	minutes
3.15	Output power	Sine wave into 50 Ω load	-	+6 ±2	dBm
3.16	Output impedance	At 10 000 ± 1MHz	-	< 2.0:1	VSWR

4.0 Single side band phase noise (PN) and time jitter

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)	-115	< -110	dBc/Hz
4.2	PN power density @ 10 kHz offset		-140	< -136	dBc/Hz
4.3	PN power density @ 1 MHz offset		-151	< -148	dBc/Hz
4.4	Harmonic distortion	Sub-harmonics, 2nd and 3rd harmonics	-50	< -40	dBc
4.5	Spurious	Other than harmonic distortion	-80	< -75	dBc
4.6	Full offset range jitter	From 10 Hz to 100 MHz	300	< 400	fs
4.7	Broadband jitter	From 10 kHz to 40 MHz	10	< 20	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	10 GHz 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'
6.6	GND	Lug	Mechanical and electrical ground (-)