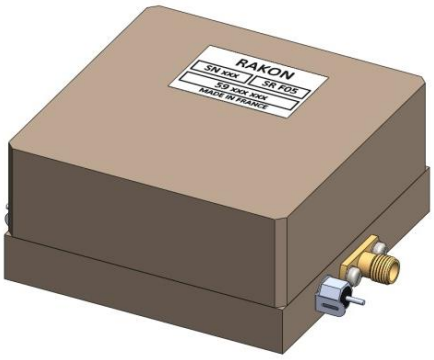
Low Noise Oscillator series

LNO 500 D1 OCSO @ 500 MHz

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

Product Description

LNO 500 D1 is a low noise and low G vibration isolated OCVCSO (Oven Controlled Voltage Controlled SAW Oscillator) at 500 MHz, phase-lockable on an external 10 MHz reference.



LNO 500 D1 provides excellent phase noise performance, and is specially designed for airborne environment. The SAW oscillator is suspended with vibration and shock absorbers included.

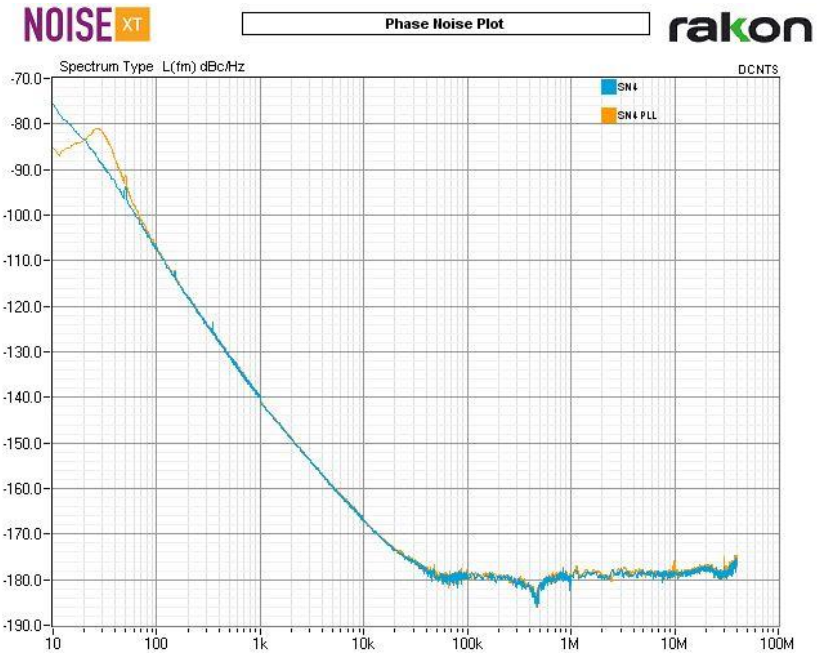
LNO 500 D1 is available in a 70mm x 70mm x 35mm package.

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 Reference

Features

- Excellent phase noise performance (typical value in free running) :
  - - 142 dBc/Hz @ 1 kHz offset
  - - 167 dBc/Hz @ 10 kHz offset
  - – 178 dBc/Hz noise floor



- BIT Status: Ready or Alarm

Applications

- Airborne radars

Specifications

1.0 Environmental conditions

Line	Parameter	Test Condition	Typ. Value	Guaranteed	Unit
1.1	Operating temperature range		-40 to +70		°C
1.2	Storage temperature range		-40 to +85		°C
1.3	Shock	Half sine 30 g 11 ms			
1.4	Random vibration	0.02 g^2/Hz within [10 to 350Hz] 0.005 g^2/Hz within [1 to 2 kHz]			
1.5	G sensitivity	@10Hz vibration frequency, each axis	5.10^{-10}	< 2.10^{-9}	/g
1.6	Humidity	93 % RH at 60 °C			
1.7	Low pressure & temperature	120 hPa within [-40 to 55 °C]			
1.8	Constant acceleration	18 g all directions			

2.0 Electrical interface

Line	Parameter	Test Condition	Typ. Value	Guaranteed	Unit
2.1	Supply voltage	Pin 2	+10 ± 0.2		V
2.2	Load impedance	Pin 1, 50Ω all phases	-	< 1.3:1	VSWR
2.3	Control Input	Pin 4	+1 to +8 or 10		V MHz
2.4	BIT status	Pin 3	Open collector		

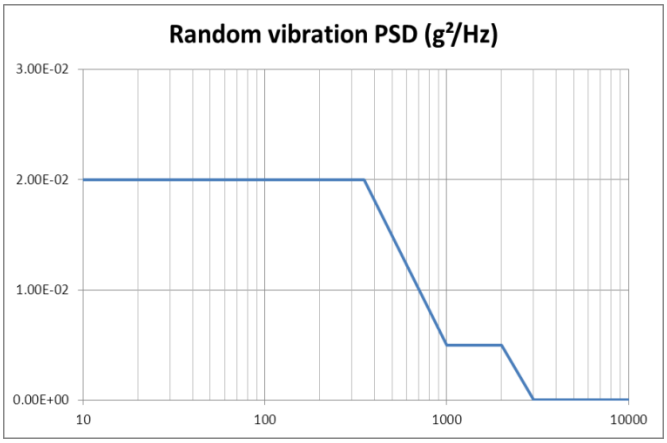
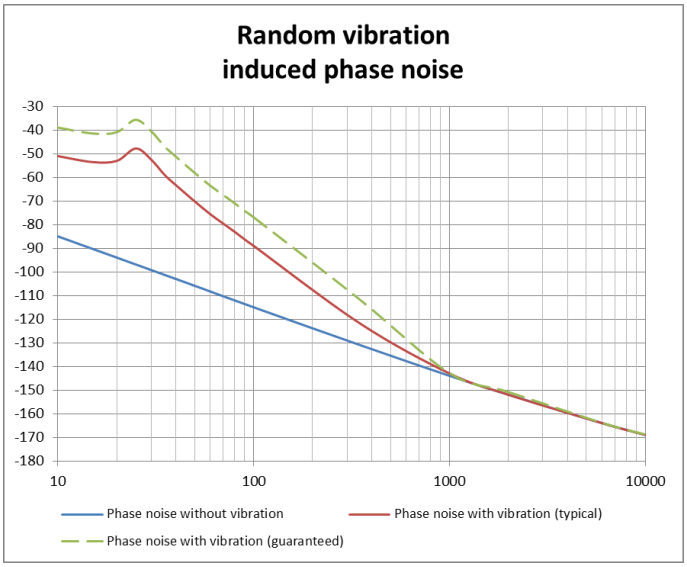
3.0 Performances

Line	Parameter	Test Condition	Typ. Value	Guaranteed	Unit
3.1	Nominal frequency	Definition	500		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 & load)	-	< ±2	ppm
3.4	Long term stability	After 30 days of continuous operation 1st year 10 years	 - -	 < ±1 < ±6	 ppm 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	±6	> ±5	ppm
3.7	Slope	Positive slope	-	1.4 to 2.5	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	+10 to +13		dBm
3.11	Input waveform	Square waveform edge	-	> 100	mV/ns
3.12	Loop bandwidth		50	-	Hz
3.13	Harmonics suppression	10MHz harmonics	-100	< -60	dBc
	All modes	***Common specifications***			
3.14	Power consumption	Warm-up	9.5	< 10	W
3.15	Power consumption	25 °C (calm air)	3	< 3.5	W
3.16	Warm-up time	±1 ppm with reference to frequency reached after 1 hour of continuous operation at 25 °C	-	< 5	minutes
3.17	Output power	Sine wave into 50 Ω load	-	+10 ±1	dBm
3.18	Output impedance	At 500 ± 1MHz	-	< 2.0:1	VSWR

4.0 Single side band phase noise (PN)

Line	Parameter	Test Condition	Typ. Value	Guaranteed	Unit
	In static environment				
4.1	PN power density @ 1 kHz offset	Typical at 25°C, guaranteed on full temperature range, all modes	-142	< -138	dBc/Hz
4.2	PN power density @ 10 kHz offset		-167	< -164	dBc/Hz
4.3	PN power density @ 1 MHz offset		-178	< -176	dBc/Hz
4.4	Harmonic distortion	Second and third harmonics	-40	< -30	dBc
4.5	Harmonic distortion	Non-harmonics		< -80	dBc

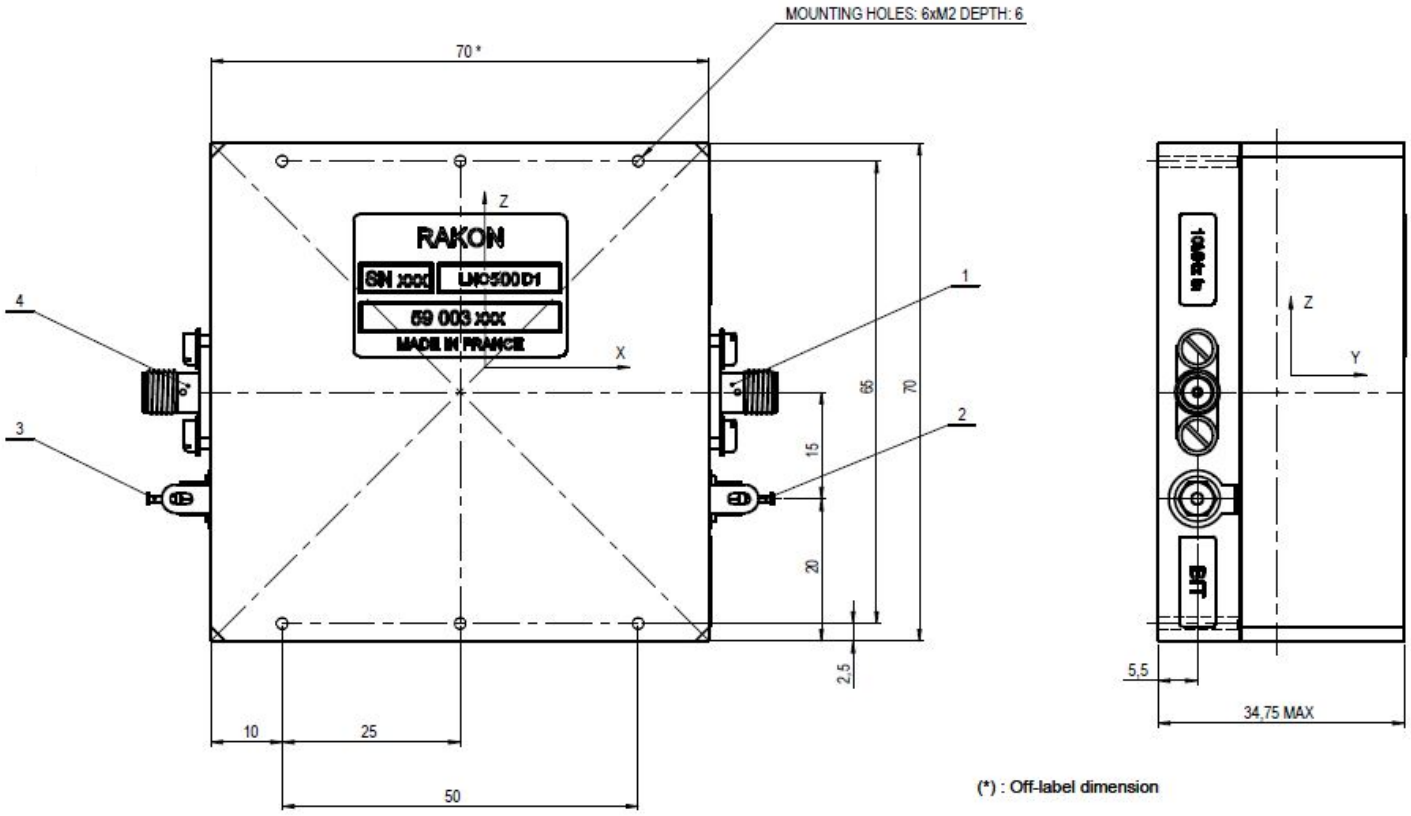
	In dynamic environment (free running mode)	
4.6	With the following random vibration spectrum (ref. 1.4):  The Single Side Band Phase Noise in dynamic environment is as described below :  	

5.0 BIT output

Line	Parameter	Test Condition	Typ. Value	Guaranteed	Unit
5.1	Oscillator ready	In PLL mode, this signal reflects PLL locking state	'Hi Z'		
5.2	Alarm		'0'		

6.0 Mechanical features

Outline in mm, nominal values (general tolerances : ±0.20mm).



7.0 Pin description

Line	Pin number	Name	Description
7.1	1	500MHz OUT	500MHz output signal
7.2	2 + lug	+10V	Supply voltage (2) & ground (lug)
7.3	3 + lug	BIT	BIT logic output signal (3) & ground (lug)
7.4	4	10MHz IN	Control voltage or 10MHz reference input