

Specific request can be addressed to RAKON [hirel@rakon.com](mailto:hirel@rakon.com)

### Product Description

LNO 320 D1 is a low noise and low G vibration isolated OCVCSO (Oven Controlled Voltage Controlled SAW Oscillator) at 320 MHz, phase-lockable on an external 10 MHz reference.

LNO 320 D1 provides excellent phase noise performance, and is specially designed for airborne environment. The core oscillator is internally suspended on shock absorbers.

LNO 320 D1 is available in a 70mm x 70mm x 35mm package.

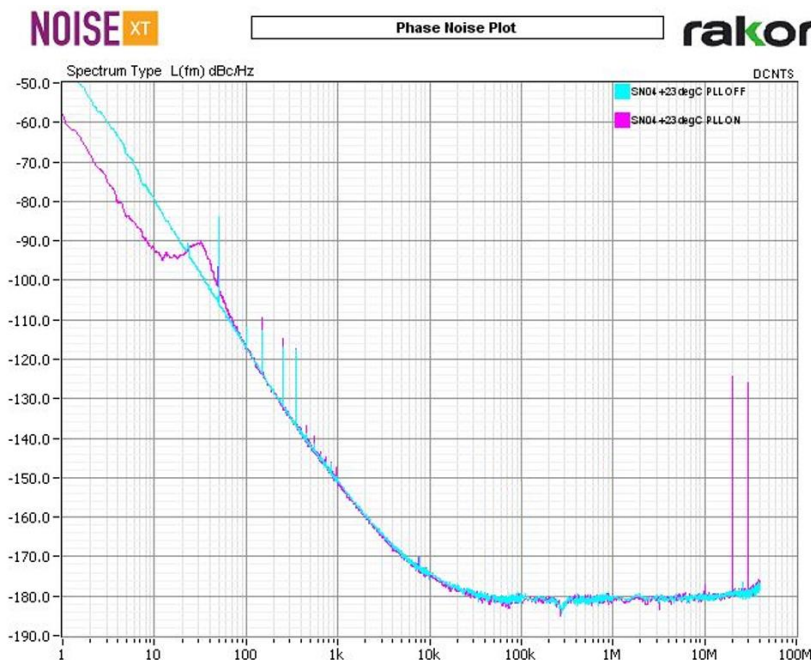
Three operating modes are available, through Control Input signal:

- 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) :
  - -172 dBc/Hz @ 10kHz 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	Standard Extended (-002 suffix)	-40 to +70 -40 to +80		°C
1.2	Storage temperature range		-55 to +95		°C
1.3	Shock	Half sine 30g 11ms			
1.4	Random vibration	0.02 g <sup>2</sup> /Hz within [10 to 350Hz] 0.005 g <sup>2</sup> /Hz within [1 to 2 kHz]			
1.5	G sensitivity	@10Hz vibration frequency, each axis	0.5	< 1	ppb/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	18g 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	+2 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	320		MHz
	<b>Free running mode</b>	<b>Control Input not connected</b>			
3.2	Frequency calibration	Initial calibration @ 25°C	±0.2	< ±0.5	ppm
3.3	Frequency stability	All causes temperature & load Standard temp range Extended temp range	- -	< ±2 < ±2.5	ppm
3.4	Long term stability	After 30 days of continuous operation 1 <sup>st</sup> year 10 years	- -	< ±1 < ±6	ppm
	<b>Voltage controlled mode</b>	<b>Control Input with DC voltage</b>			
3.5	Tuning voltage	At Control Input	+2 to +8		V
3.6	Frequency tuning	Monotone	±6	> ±5	ppm
3.7	Slope	Positive slope	-	1.5 to 3	ppm/V

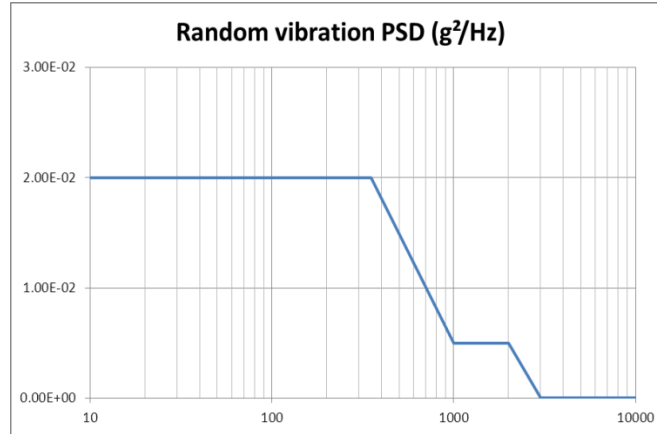
	<i>PLL mode</i>	<i>Control Input with 10MHz reference</i>			
3.8	Nominal Control Input frequency	Definition	10		MHz
3.9	Frequency stability	All causes	= Reference stability		
3.10	Input level	50Ω source & load	+10 to +13		dBm
3.11	Input waveform	Square waveform edge	-	> 100	mV/ns
3.12	Loop bandwidth		50	-	Hz
3.13	Harmonics suppression	10MHz harmonics	-100	< -60	dBc
	<i>All modes</i>	<i>Common specifications</i>			
3.14	Warm-up power consumption		9.5	< 10	W
3.15	Steady state power consumption	@ 25 °C (calm air)	3	< 3.5	W
3.16	Warm-up time	@ -40C : ±2 ppm with reference to frequency reached after 1 hour of continuous operation	-	< 5	minutes
3.17	Output power	Sine wave into 50 Ω load	-	+10 ±1	dBm
3.18	Output impedance	At 320 ± 1MHz	-	< 2.0:1	VSWR

#### 4.0 Single side band phase noise (PN)

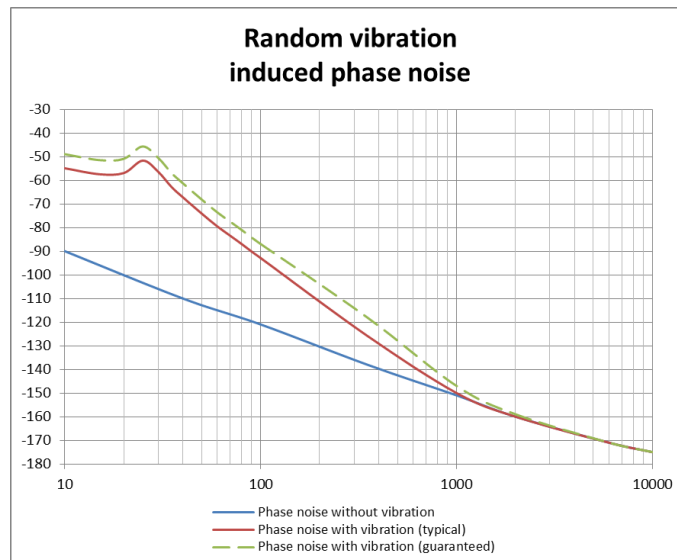
Line	Parameter	Test Condition	Typ. Value	Guaranteed	Unit
<i>In static environment (free running mode)</i>					
4.1	PN power density @ 1 kHz offset	Static conditions, at 25°C (guaranteed values on full temperature range)	-152	< -146	dBc/Hz
4.2	PN power density @ 10 kHz offset		-172	< -168	dBc/Hz
4.3	PN 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 :

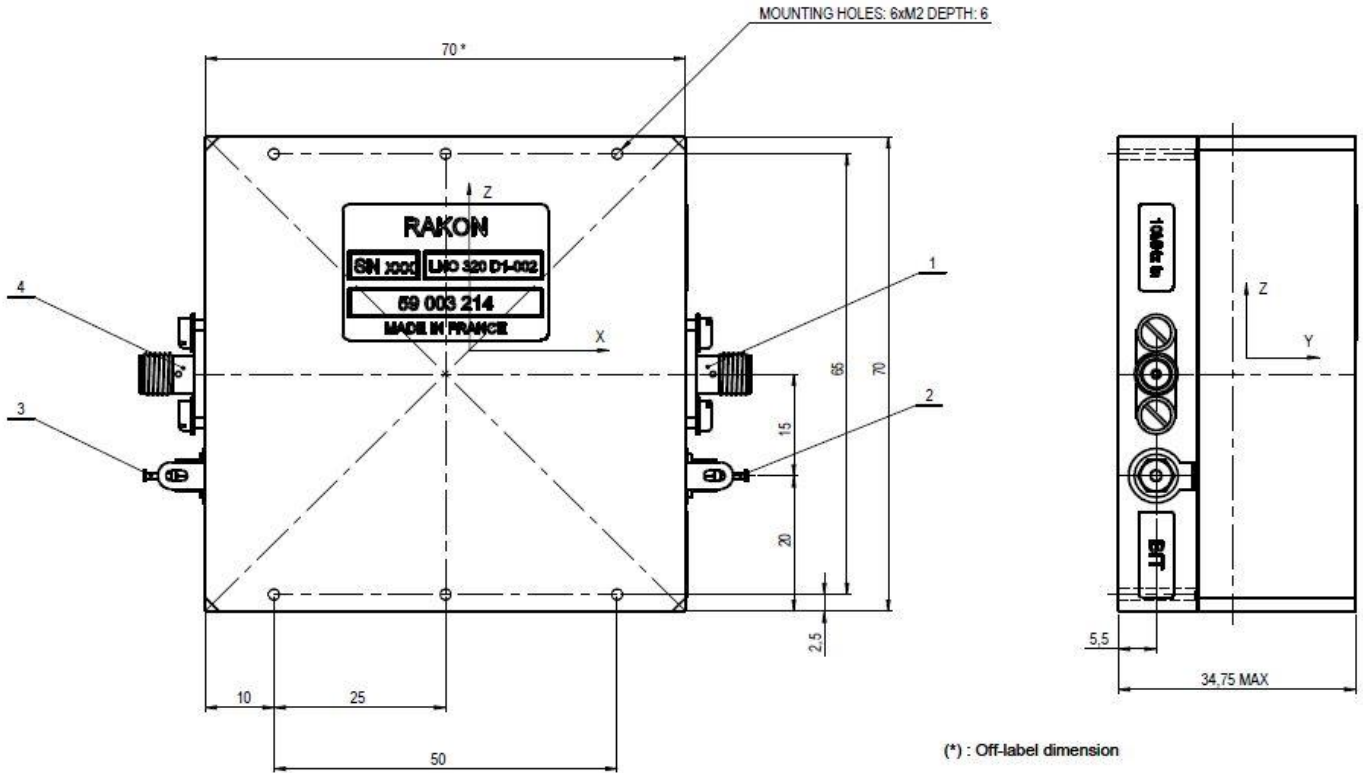


## 5.0 BIT output

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 :  $\pm 0.20\text{mm}$ ).



## 7.0 Pin description

Line	Pin number	Name	Description
7.1	1	320MHz OUT	320MHz 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