LNO100SAD

The LNO100SAD is a high reliability, ultra low noise, Oven-Controlled Crystal Oscillator (OCXO) offering output frequencies from 80 to 125 MHz. As part of Rakon's Low Noise OCXO (LNO) series, it is specifically engineered to meet the stringent phase noise requirements of demanding airborne applications. At 100 MHz, the LNO100SAD achieves a phase noise floor as low as -172 dBc/Hz.

Leveraging Rakon's proprietary technologies, the LNO100SAD features a compact package with integrated shock absorbers for enhanced mechanical resilience. It delivers excellent acceleration stability and a low *g*-sensitivity of ≤0.5 ppb/*g*, making it an ideal solution for missions involving random vibration, where performance and footprint are critical.

Features

- Frequency: 80 to 125 MHz
- Guaranteed low phase noise @100 MHz:
  1 kHz offset: -163 dBc/Hz
  100 kHz offset: -178 dBc/Hz
- Low *g*-sensitivity 0.5 ppb/*g*
- Supply voltage: 12 V
- Frequency stability vs temperature: ±0.5 ppm
- Ageing: ±1.8 ppm/10 years

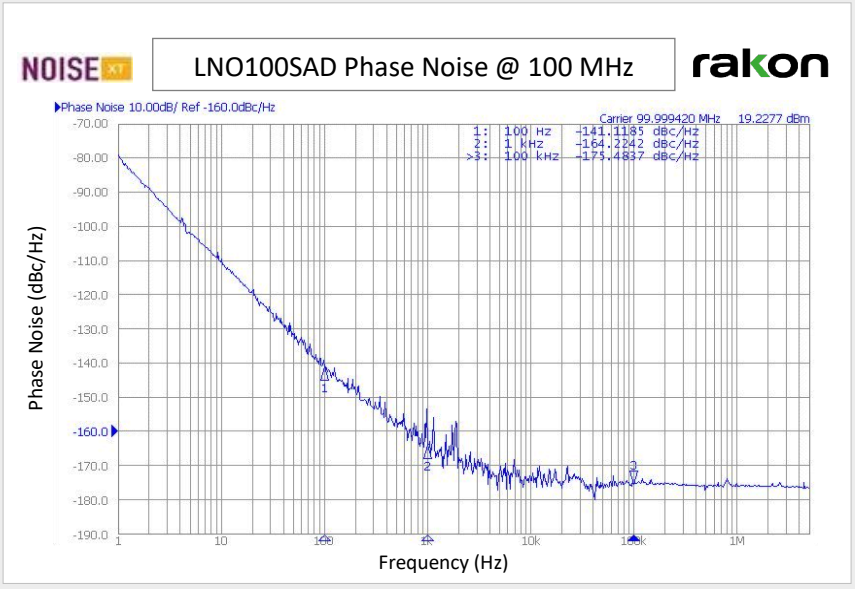
Applications

- Airborne military equipment
- Radar
- Military communications

Package / Weight

96 x 80 x 35 mm / 350 g

Phase Noise

Parameter	Condition / Remarks
LNO100SAD Phase Noise - Typical value @100 MHz	
Guaranteed static phase noise (Min)	

Frequency (MHz)	100 Hz	1 kHz	10 kHz	100 kHz	Unit
100	-132	-160	-170	-172	dBc/Hz

Environmental Conditions

Parameter	Condition / Remarks	Min.	Typ.	Max.	Unit
Operating temperature (T_{OP})	Option A Option B	-20 -40	25 25	70 85	°C
Switch-on temperature (T_{SO})	-	-40	-	85	°C
Non-operating temperature (T_{NOP})	-	-55	-	125	°C
Relative humidity	as defined by MIL-STD-810G Method 507 Procedure I				
Random vibration	as defined by MIL-STD-810G, Method 514.6, Category 7_C-17				
Shocks	as defined by MIL-STD-810G, Method 516.6, Procedure I (20g peak / 11ms / sawtooth)				

Electrical Interface

Parameter	Condition / Remarks	Min.	Typ.	Max.	Unit
Power supply (V_{CC})	-	11.4	12	12.6	V
RF load impedance	-	45	50	55	Ω

Performances

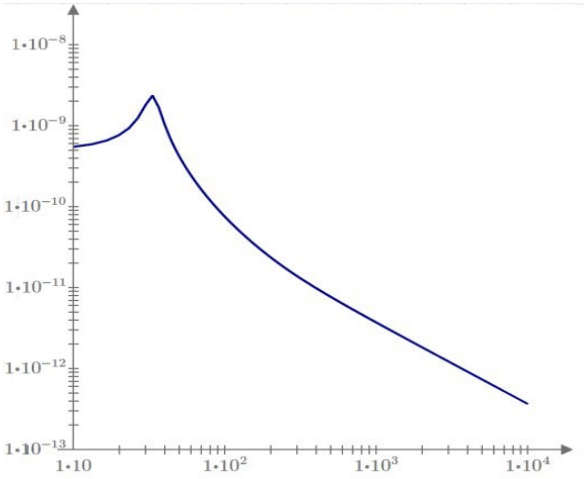
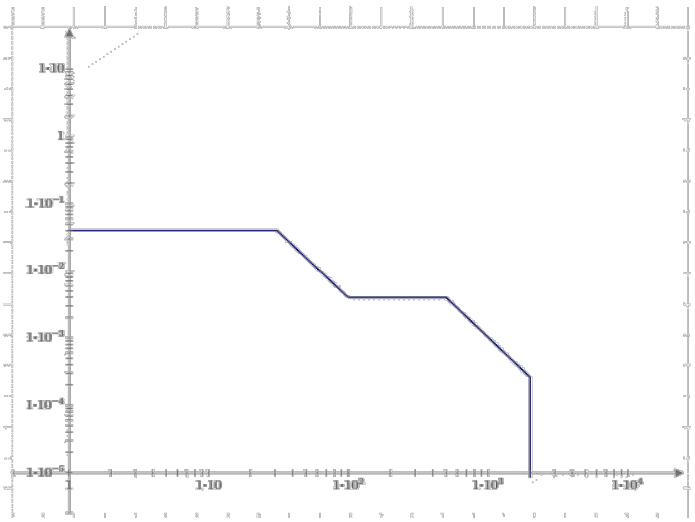
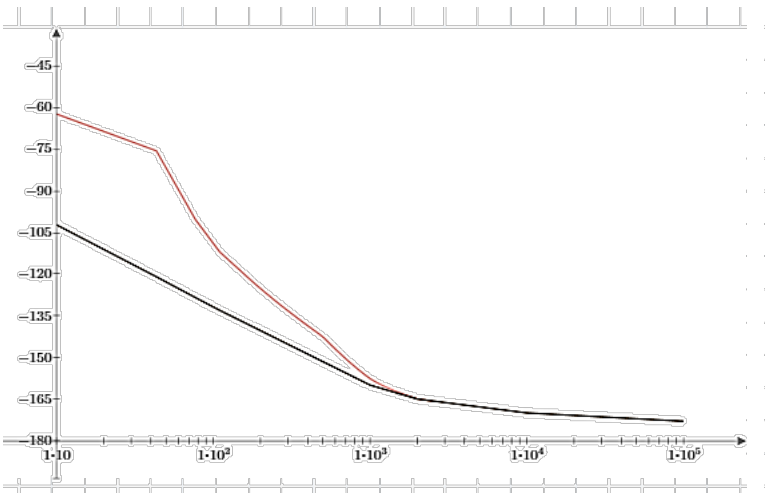
Parameter	Condition / Remarks	Min.	Typ.	Max.	Unit
Nominal frequency (Fn)	Standard Fn: 80, 100, 120 MHz	80	100	125	MHz
Initial frequency accuracy	@25°C, the control voltage range is providing to reach the initial frequency accuracy at shipment	-	-	±0.5	ppm
Frequency stability vs temperature (FvT)	Option A: -20°C to 70°C / Temperature slope 1°C/min Option B: -40 to 85°C / Temperature slope 1°C/min	- -	±0.1 ±0.5	±0.25 ±1	ppm
Frequency variation vs supply voltage	@ V_{CC} ±5% / @ 25°C	-	-	±0.05	ppm
Frequency stability vs load	@ ±10% variation of load / @25°C	-	-	±0.05	ppm
Frequency warm-up	Time to be within the initial frequency accuracy compared to frequency after 1 hour	-	-	10	mn
g-sensitivity[1, 2]	Static 10 Hz offset 30 Hz offset (close to the resonance) 100 Hz offset 1000 Hz offset	-	-	±0.5 ±0.6 ±2 ±0.08 ±0.005	ppb/*g*
Long-term stability (ageing)[3]	1st year 10 years	- -	±0.2 ±1	±0.5 ±1.6	ppm
Allan deviation	Tau = 1s Tau = 10s	- -	- -	5E-11 5E-10	-
Output level (Sinewave)	Option A Option B	10 17	- -	13 20	dBm
Voltage Standing Wave Ratio (VSWR)	Fn ±1 MHz	-	-	2:1	-
Hamonic level	Bandwidth from DC to 10 x Fn	-	-	-25	dBc
Non-harmonic level (spurious)	Bandwidth from DC to 5 GHz	-	-100	-90	dBc
Warm-up input power	-	5	6	-	W
Steady-state supply power	@ 25°C	-	2	3	W

[1] LNOs with lower *g*-sensitivity can be provided on specific request

[2] The *g*-sensitivity sanction is done by calculation

[3] The projected change for 1 year or other periods is not calculated as per as MIL-PRF-55310. The fit calculation is based on measurement during 30 days minimum; the measurements obtained are fitted using the method of least squares to function defined in MIL-PRF-55310. The projected total frequency change for one year is determined by using this.

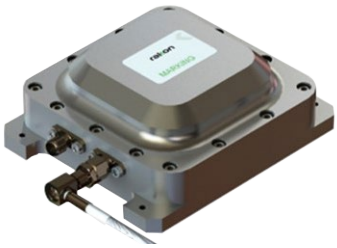
Key Frequency Parameter Performances and Measurements

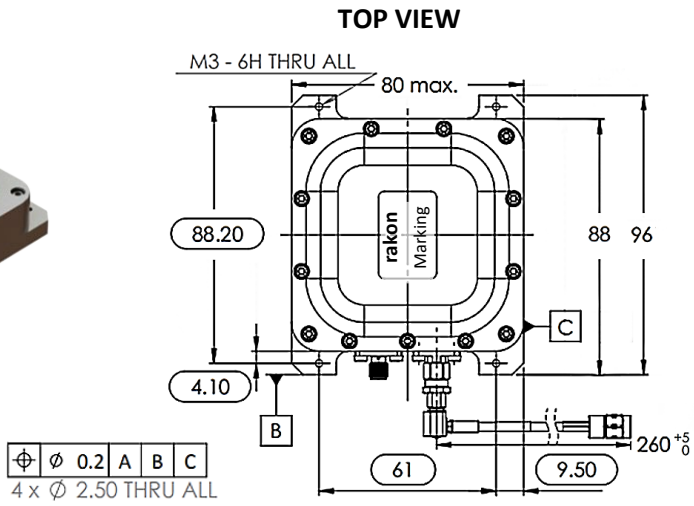
Parameter	Performances and Measurements
Figure 1: g-sensitivity	
Figure 2: Spectrum of random vibration (DO-160G / B4)	
Figure 3: Phase noise curves @ 100 MHz under random vibration	

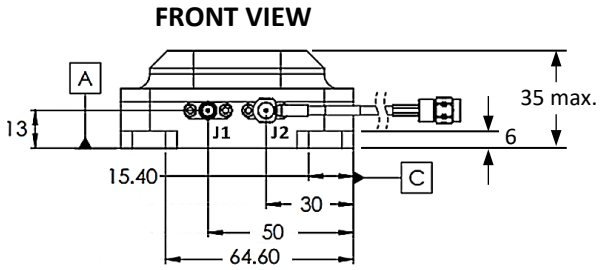
Model Outline and Pin Connections

Parameter	Package	Pin #	Connections	
Package and pin connection	CON1 Size: 96 x 80 x 35 mm	J1	F_{OUT}	Frequency output
		J2	V_{CC}	Supply voltage

Model outline







NOTE:
- Units are in mm
- General tolerance is ±0.2 mm.

STEP file

LNO100SAD 3D model

To open or view the STP file, you will need to import it into one of the following software programs: Autodesk Fusion 360, CATIA, SolidWorks, Solid Edge, TurboCAD, Kubotek KeyCreator, FreeCAD, ABViewer, ShareCAD, or eMachineShop.

Ordering Part Example

LNO100SA D CON1 A A 12 100M000000

Product Series
LNO = Low Noise OCXO
100 = Fn option 80 to 125 MHz
SA = Shock Absorbers

Application Grade
D = Harsched environments with non-visible shock

Package Type
CON1 = SMA-SMA

RF Level
A = 13 dBm; B = 20 dBm

Temperature Stability
A = -20°C to 70°C, ±0.25ppm
B = -40°C to 85°C, ±1ppm

Supply Voltage*
12 = 12V

Frequency (Fn)**
100M000000 = 100 MHz

* Supply voltage 15V available on request.
** Standard frequencies: 80, 100, 120 MHz.