

16 May 2017

Crystal-Based Low Noise Master Oscillator (LNMO)

Space Low Noise & Performance Source

The LNMO is a cost-effective, high-performance master crystal oscillator. It's designed with long-lifetime, high-reliability technology for advanced space applications.

Key Features

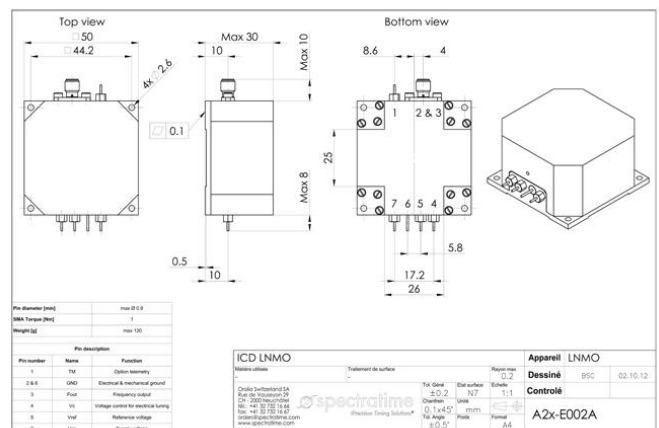
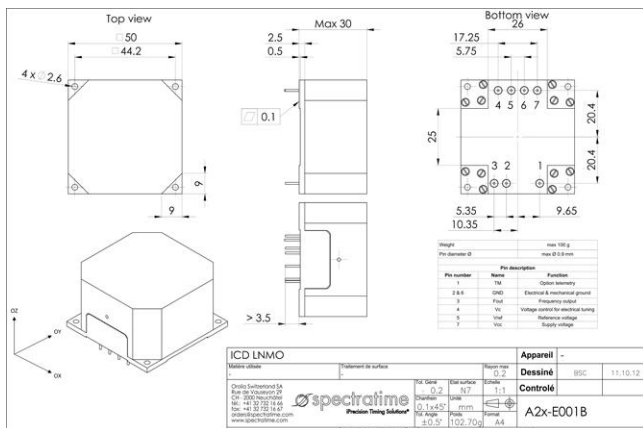
- Very small mass and volume
- Low noise
- Low power consumption
- Low temperature sensitivity
- Excellent short and long term stability
- Fast warm-up
- Wide operating temperature
- Pre-adjusted frequency and/or voltage controlled
- Frequency Range: 5MHz to 40MHz
- Supply voltage: 12V or 15V
- Rad tolerant up to 100krad



Applications

- Navigation
- GPS receivers
- Down and Up Converters
- Transponders
- FGU
- Board Calculator
- Synthesizer
- SAR

LNMO external dimensions (2 versions available)



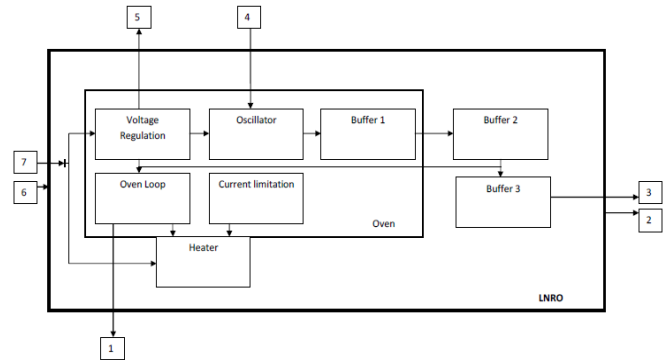
SPECIFICATIONS

Type		A2x-S001 at 10MHz		
Parameter	Value			
Dimensions	50x50x30 mm			
Output signal frequency	10 MHz*			
Frequency long term stability, 1st year	< ±3x10 ⁻⁸ / year			
Average ageing per day after 1 month	< ±1x10 ⁻¹⁰ / day			
Frequency long term stability, years after	< ±1x10 ⁻⁸ / year			
Frequency short term stability	< 1x10 ⁻¹² (0.1-10 s)			
Frequency stability over full temp. range	< ± 1x10 ⁻⁹			
Frequency adjustment	> ± 2.5 Hz			
SSB phase noise assuming 10MHz carrier	ULN (dBc/Hz)	LN (dBc/Hz)	Standard (dBc/Hz)	
	1 Hz	< -110	< -105	< -100
	10 Hz	< -140*	< -135*	< -130*
	100 Hz	< -150*	< -145	< -140
	1000 Hz	< -160	< -155	< -150
10000 Hz	< -168	< -165	< -160	
* Subject to export control (end user statement required)				
Output signal level	7 dBm ± 1 Up to 10 dBm on request			
Output impedance	50 Ω ± 10%			
Harmonics	-40 dBc			
Spurious signals	-120 dBc			
Power consumption during warm-up	Standard	Fast		
	4W	6W		
Nominal power consumption	1.5 W			
Maximum power consumption in operation	2.5 W			
Volume	< 75 cm ³			
Power supply	12 V	15V		
	Standard	Fast		
Warm-up time (accuracy < ±2x10 ⁻⁸ at 25°C)	10 minutes	5 minutes		
	Standard	Fast		
Mass	100 gr			

Type		A2x-S001 at 10MHz	
Parameter	Value		
Connection: Power, RF Output, Control voltage, Ref Voltage, TM	7 solderable pins or 5 solderable pins +SMA		
Mechanical interface	flat base plate		
Mechanical fixation	4 x M2 screw		
Max. base plate operating temperature	70 °C	60°C	50°C
Min. base plate operating temperature	-30°C	-20°C	0°C
Storage temperature	-40 to 85 °C		
First natural resonance	> 800 Hz		
Random Vibration tested, with axis perpendicular to the mounting plane.	20 - 100 Hz	+9dB/oct	
	100- 500 Hz	1 (1.5) g ² /Hz**	
	500- 2000 Hz	-6 dB/oct	
Duration	60 (180) sec/axis**		
Random Vibration tested, with axis parallel to the mounting plane.	20 - 1000 Hz	0.14(0.22) g ² /Hz**	
	1000 - 2000 Hz	-6 dB/oct	
	Duration	60 (120) sec/axis**	
Sinusoidal vibration	5 - 20 Hz	11 mm 0-peak	
	20 - 100 Hz	25 g	
Sweep rate	2(1) oct/min.**		
Life time / MTBF	15 years/9 Mio hrs		
Pressure sensitivity vacuum to atmosphere (thermal effect)	< ±5 x 10 ⁻⁸ @25°C		

* Other frequencies (5 MHz to 40 MHz) and related specifications available upon request.
** Values in brackets only applicable for qualification testing

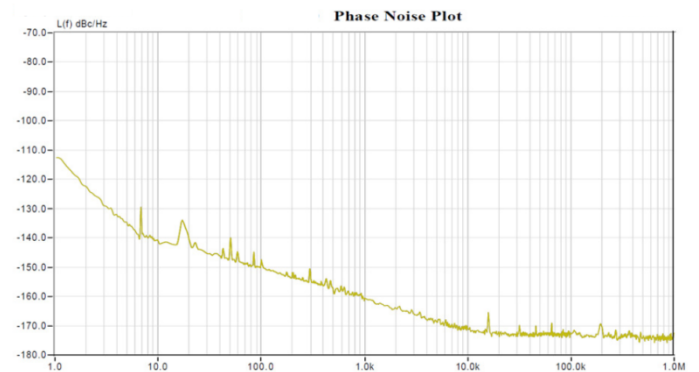
FUNCTIONAL BLOCK DIAGRAM OF THE LNMO



- 1- Optional telemetry output
- 2- RF GND output
- 3- RF output
- 4- Control voltage input
- 5- Voltage reference output
- 6- Supply GND input
- 7- Supply Voltage input

Typical LNMO Phase Noise

LNMO Phase noise at 10MHz



LNMO Phase noise at 5 MHz

