



# LN72

## Low Noise Rubidium Oscillator

### KEY FEATURES

- Disciplines to 1PPS Input
- Very Low Phase Noise
- Very Stable 5 or 10 MHz Output
- Low Cost
- CMOS Alarm Signal Indication When Rb Oscillator Loses Lock
- Meets UMTS and CDMA Frequency Requirements Without an External Reference or Routine Calibration

### INTRODUCTION

Symmetricom's LN72 is designed for rubidium controlled time and frequency systems that require low phase noise. The height and footprint are designed to accommodate 2-slot VME applications. It is easy to integrate into a system, requiring only one input supply voltage and allowing direct plug-in onto another circuit board. The oscillator package uses surface-mount technology and has decreased temperature sensitivity.

### LN72 TECHNOLOGY

Suitable applications are telecom networks such as digital cellular/PCS base stations, SONET/SDH digital network timing, etc.

Linked with a GPS receiver, the LN72 provides the necessary timing requirements for CDMA cellular and PCS systems. The low temperature coefficient and excellent frequency stability extend holdover performance when the GPS signals are not available. The LN72 is designed for long operating periods without maintenance (long life Rb lamp). The design provides a stable frequency with a good short and long term stability, and excellent spur performance. The LN72 provides a 5V CMOS-compatible alarm signal derived from the basic physics operation that indicates when output frequency of the rubidium oscillator is outside roughly  $\pm 5E-8$  of absolute frequency offset.



The LN72 low noise rubidium oscillator

## LN72 Specifications

### ELECTRICAL SPECIFICATIONS

• Output/Frequency/Waveform:	5 or 10 MHz sine wave	
• Output level:	<b>@ 10 MHz</b> +9 dBm ±1.5 dBm	<b>@ 5 MHz</b> +7 dBm ±1.5 dBm
• Output impedance:	50Ω	
• Phase noise (SSB): (typical) 1 Hz 10 Hz 100 Hz 1000 Hz 10 kHz	<b>@ 10 MHz</b> <-100 dBc/Hz <-130 dBc/Hz <-145 dBc/Hz <-150 dBc/Hz <-155 dBc/Hz	<b>@ 5 MHz</b> <-100 dBc/Hz <-132 dBc/Hz <-145 dBc/Hz <-148 dBc/Hz <-150 dBc/Hz
• Spurs:	<b>@ 10 MHz</b>	<b>@ 5 MHz</b>
Harmonic:	<-60 dBc	<-40 dBc
Non-harmonic:	<-80 dBc	<-80 dBc
• Aging		
Monthly (after 1 month):	≤5E-11/month ≤5E-10/year	
• Frequency accuracy at shipment:	±5E-11 (25°C)	
• Frequency retrace:	<±2.5E-11 (after 24 hrs power on @ 25°C & up to 48 hrs power off)	
• Short term stability		
t=1 sec:	<1.4E-11	
t=10 sec:	<0.8E-11	
t=100 sec:	<0.25E-11	
• Control range		
With digital input:	±1E-6 with granularity of 1E-12 (recommended operational mode)	
With analog input:	±6.5E-9, 0-5 V into 5 kΩ	
• Warm-Up:	(@ 25°C); Time to Lock: <6 min	
• Input:	Disciplined to 1PPS using learning algorithm or user defined settings (option).	
• Input voltage range:	+14.25 to 32 Vdc	
• Voltage sensitivity:	.72E-11/V (over input voltage range)	
• Input power, quiescent:	+24Vdc <17W @ 25°C; 27 W max. at turn-on	
• Status monitor		
Analog:	VCXO volts, lamp volts, (20 kΩ impedance, filtered)	
Digital:	LOCK monitor: 5V CMOS load	
Lock:	0V to 50 mV (within ±5E -8)	
Unlock:	4.2 to 4.7V	

### ENVIRONMENTAL SPECIFICATIONS

- Operating temperature: -20°C to +65°C
- Temperature coefficient: (0°C to 50°C) <3E-10
- Storage temperature: -55°C to +85°C
- Altitude
  - Operating: -200 ft to 40,000 ft
  - Non-operating: -200 ft to 70,000 ft
- Magnetic field sensitivity,dc (±2 GAUSS): <±4E-11/GAUSS
- Relative humidity: 3-95% non-condensing; meet or exceed Telcordia; GR-63-CORE Issue 1, October 1995, section 4.1.2.; Complies with MIL-STD-810F Method 507.4
- EMI: Compliant to FCC Part 15 Class B (conducted and radiated emissions) and complies with EN55022B emissions (radiated and conducted) and EN50082-1 (immunity).
- Vibration and shock: Random non-op MIL-STD-810F, Method 514.5 Procedure 1, Shock non-op tested to MIL-STD-810F, Method 516.5 Procedure 1 @25G 1/2 sine 5ms; 3 inputs in each of 6 orthogonal axis.

### PHYSICAL SPECIFICATIONS

- Weight: 1.5 lbs (.675 kg) max
- Size: 4.0" W x 6.5" L x 1.5" H  
(10.16 cm x 16.51 cm x 3.81 cm)
- Warranty: 1 year
- Extended warranty: Consult factory

*Note: Consult factory for application support, test reports or special requirements. Values typical unless otherwise noted.*

Connector	Type	Pin	Description
	Input	1, 2	24 VDC Input
15 pin D-sub filtered connector	Input	3, 4	GND
		5	RX
		6	TX
	Input	7	1 PPS In
	Output	8	Lock (signal is low when the rubidium oscillator is locked)
		9	Service (signal is low when the unit is operating within normal spec.range)
	Output	10	1 PPS Out
	Output	11	Not used
	Output	12	Not used
	Input	13	Frequency Control
Output	14	Not used	
Output	15	ACMOS Frequency	
SMA connector	Output	J2	10 or 5 MHz Sine Out
SMA connector*	I/O	J3	ACMOS Signal Out (Standard)

\*A special configuration in accordance with a customer requirement.



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