



X72

Precision Rubidium Oscillator

KEY FEATURES

- Disciplines to 1 PPS Input
- Ultra-Compact Size Enables Almost Any Application
- Full Temperature Spectrum Performance (-40°C to +85°C)
- Low Power Operation at Either +5V or +10 to +32V
- Multiple Flexible Output Frequencies and Characteristics
- Command, Control & Monitoring via Symmetricom's Serial Interface Protocol

APPLICATIONS

- GSM and UMTS Stability Over the Lifetime of Your Network Without Costly Re-Calibration
- Stratum 2 Performance for Central Office Caliber Sync Anywhere in the Network
- Ideal Performance for Rigors of CDMA and WCDMA Networks

INTRODUCTION

Symmetricom's innovative rubidium atomic oscillator, the X72®, reflects significant advances in physics miniaturization and integration. X72's ultra-compact size, low power consumption, and full-spectrum temperature operation make rubidium performance accessible to almost any synchronization application, from telecom networks to hand-held test and measurement devices.

The X72 technology, with full operating temperature range, marks a new standard for precision atomic references. Symmetricom's breakthrough physics integrated with the inherently stable characteristics of rubidium atom oscillation, enable X72 to maintain excellent frequency control at extreme temperatures.

A complete range of output frequencies and characteristics are available to meet the needs of any network environment. X72 can be disciplined to a precision 1 PPS reference input such as GPS, and it can operate by itself as a precision stand-alone reference. X72's outputs also include a 1 PPS.

The X72 can communicate through its serial port to provide dynamic frequency control and selection and to enable or disable outputs. X72 can be queried for such information as

serial number, operating hours, operating temperature, event history, self-test and other performance indicators.

The X72 breaks the barriers that previously limited the use of rubidium atomic stability. With its superior performance, reduced size and dramatically reduced cost, the X72 makes rubidium's well known stability and precision available to almost any application at quartz prices.



FIG.1 The X72 rubidium atomic oscillator.

X72 Specifications

ELECTRICAL SPECIFICATIONS

- Frequency outputs:

Output 1 Derived Sine	Output 2 Master XO*	Output 3 Derived Square Wave*	Output 4 1 PPS*
5, 10, 15 MHz	60 MHz	5, 10, 15 MHz	yes
13 MHz	52 MHz	13 MHz	yes
10.24 MHz	61.44 MHz	2.048 MHz	yes
10.29 MHz	61.76 MHz	1.544 MHz	yes

* digital

NOTE: the X72 provides 4 outputs. Typical factory settings are shown above. Other standard telecom frequencies are available. All outputs are programmable to enabled or disabled.

- Sine output: (for 10 MHz output)

Power: 7.8 dBm ± 10% into 50 ohms

Phase noise:	1 Hz	<-72 dBc/Hz
	10 Hz	<-90 dBc/Hz
	100 Hz	<-128 dBc/Hz
	1 kHz	<-140 dBc/Hz
	10 kHz	<-148 dBc/Hz

Spurious:

Harmonic: <-60 dBc

Non-harmonic: <-60 dBc

- Digital outputs: 5V AC MOS

Jitter: <10 ps RMS

- Stability: $t=1$ second <3E-11

[Allan deviation] $t=10$ second <1E-11

$t=100$ second <3E-12

- Accuracy at shipment: <±5E-11 (25°C), typical

- Retrace: <±2E-11 (on-off-on: 24 h, 48 h, 12 h @ 25°C)

- Control range:

With digital input: ±1E-6 with granularity of 1E-12.

With analog input: ±1.5E-9, 0-5 V into 5 k ohms

- Warm-up time:

Time to lock: 5 minutes (accuracy at lock <5E-8)

Time to <1E-9: 7.5 minutes

- Supply voltages: +5 Vdc ±10% or 10 to 32 V

Warm-up: 17 W max (+85°C to -40°C)

Operating: 15 W @ -40°C, 10 W @ 25°C, 5 W @ 85°C baseplate

- Voltage coefficient:

04.95V - 05.05V: magnitude (df/f) <3E-11 pp;

10.00V - 32.00V: magnitude (df/f) <3E-11 pp

- Emissions/susceptibility: meets applicable CE and FCC requirements when used with shielded interface cable

- Test/status:

Built-in self-test (BIST)

ACMOS: Service / fault-unlock

Serial: SSIP

- Application profiles:

Aging	Daily ¹	Monthly ²	Yearly	Temperature Coefficient ³	Temperature Range	Performance
AP1	±1.2E-11	±5E-11	±5E-10	<1E-10 over -40 to 85°C	-40 to 85°C baseplate	High performance
AP2	±1.2E-11	±5E-11	±5E-10	<3E-10 over 0 to 50°C	-40 to 85°C baseplate	Meets aging and tempco of Symmetricom LPRO
AP3	±4E-11	±3E-10	±1E-9	<3E-9 over -40 to 85°C	-40 to 85°C baseplate	Meets GSM specification, <5E-8 over 20 years

1: after 1 day of operation 2: after 1 month of operation 3: tempco could be positive or negative

- Reliability: Benign, ground: MTBF: 527,000 hrs @ 40°C

ENVIRONMENTAL SPECIFICATIONS

- Operating temperature: -40°C to +85°C baseplate
- Magnetic field sensitivity: dc (±2 Gauss) <±4E-11/Gauss
- Humidity: GR-CORE-63, <5 to 95%, RH non-condensing
- Vibration (operating): GR-CORE-63, 4.5.2/4, locked to 1.0 g
- Storage and transport:
 - Temperature: -55°C to +100°C
 - Shock/vibration: GR-CORE-63 4.4.1 to 1.5 g

PHYSICAL SPECIFICATIONS

- Weight: 8.75 oz (250 g)
- Size: 3.5"L X 3.0"W X 0.70"H (89mm x 76mm x 17.7mm)
- Volume: 7.6 in.³ (124 ml)
- Warranty: Electronics: 1 year; Rb lamp & cell: 20 years

Notes: Consult factory for application support, test reports or special requirements. SSIP is the Symmetricom's Serial Interface Protocol. Values are typical, at 25°C baseplate and nominal voltage.

Technical specifications subject to change without notice. Contact Symmetricom for latest information.

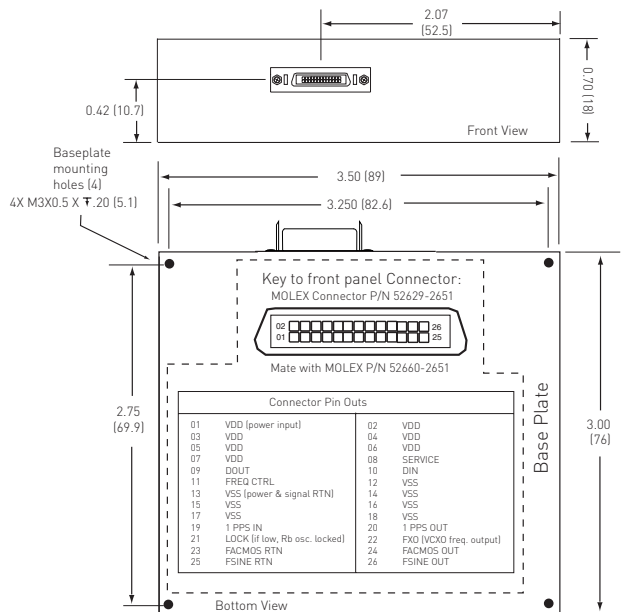


FIG.2 X72 connector diagram



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