



PRECISION RUBIDIUM OSCILLATOR

Revolutionary Rubidium Oscillator



Breakthroughs

- Ultra-compact size enables almost any application (0.70 in x 3.00 in x 3.50 in) (17.7 mm x 76 mm x 89 mm)
- Full temperature spectrum performance (+85°C to -40°C)
- Low power operation at either +5V or +10 to +32V
- X72® provides Rubidium atomic stability at cost comparable to quartz



Benefits

- GSM and TDMA stability over the lifetime of your network without costly re-calibration
- Stratum 2 performance for Central Office caliber sync any where in the network
- Ideal performance for rigors of CDMA and WCDMA networks
- Multiple flexible output frequencies and characteristics
- Command, control & monitoring via Datum's Serial Interface Protocol

X72® is Datum's innovative, new Rubidium atomic oscillator, reflecting 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 handheld test & measurement devices.

X72®'s full operating temperature range marks a new standard for precision atomic references. Datum's breakthrough physics integration matched 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.

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.

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



datum

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Features

Electrical Specifications

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

Frequency Outputs:	Output 1	Output 2	Output 3	Output 4
	Derived Sine	Master XO*	Derived Square Wave*	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 $\pm$ 10% into 50 Ω
- **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:

- **Jitter:** <10 ps RMS

Stability:

(Allan Deviation)

t=1 second	<3E-11
t=10 second	<1E-11
t=100 second	<3E-12

Accuracy At Shipment:

< $\pm$ 5E-11 (25°C), typical

Retrace:

< $\pm$ 2E-11 (on-off-on: 24 h, 48 h, 12 h @ 25°C)

Control Range:

With digital input: $\pm$ 1E-6 with granularity of 1E-12
With analog input: $\pm$ 1.5E-9, 0-5 V into 5 k Ω

Warm-Up Time:

- **Time to Lock:** 5 minutes (accuracy at lock <5E-8)
- **Time to <1E-9:** 7.5 minutes

Supply Voltages:

- **Warmup:** +5 Vdc $\pm$ 10% or 10 to 32 V
- **Operating:** 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: DSIP

Reliability

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

Application Profiles:

	Aging			Temperature Coefficient ³	Temperature Range	Performance
	Daily ¹	Monthly ²	Yearly			
AP1	$\pm$ 1.2E-11	$\pm$ 5E-11	$\pm$ 5E-10	<1E-10 over -40 to 85°C	-40 to 85°C baseplate	High Performance
AP2	$\pm$ 1.2E-11	$\pm$ 5E-11	$\pm$ 5E-10	<3E-10 over 0 to 50°C	-40 to 85°C baseplate	Meets Aging and tempco of Datum LPRO
AP3	$\pm$ 4E-11	$\pm$ 3E-10	$\pm$ 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

Environmental Specifications

Operating Temperature: -40°C to +85°C baseplate

Magnetic Field Sensitivity: dc ($\pm$ 2 Gauss) < $\pm$ 4E-11/Gauss

Humidity: GR-CORE-63, <5 to 90%, 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
(89 mm x 76 mm x 17.7 mm)

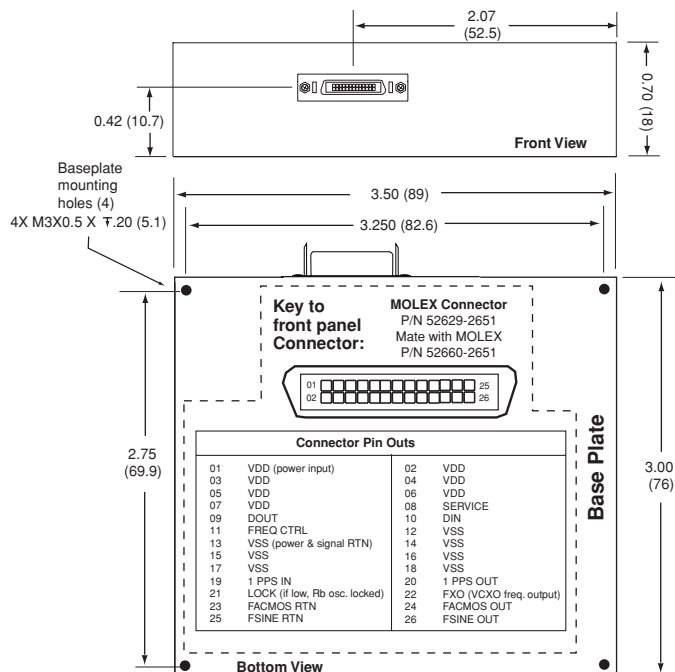
Volume: 7.6 in.³ (124 ml)

Warranty:

Electronics: 1 year; Rb lamp & cell: 20 years

Notes: Consult factory for application support, test reports or special requirements. DSIP is the Datum Serial Interface Protocol.

Values are typical, at 25°C baseplate and nominal voltage.



Authorized International Distributor: Rock Electronic Co., Ltd.
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This product is covered by the following U.S. patents: 5,457,430 and 5,489,821.
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the World Wide Web at <http://www.datum.com> for continuously updated product specifications, news and information.