

# Low Noise Rubidium Oscillator Module

## Features

- Sine wave or CMOS/TTL output
- Short term stability  $2 \times 10^{-12}$  at 100sec
- Accuracy  $5 \times 10^{-11}$
- Phase noise -115dBc at 1Hz
- 100 times less drift than OCXOs
- Low power consumption
- Compatible with 50Ω or 75Ω load



## Description

The E10-LN Low Noise Rubidium Oscillator Module is a sub miniature atomic clock combined with 'active noise filter' technology. This rubidium oscillator has 100x less drift than OCXO's. With short term stability of  $2 \times 10^{-12}/s$  @ 100s this rubidium oscillator provides significant improvement in performance over other rubidium components.

## Applications

- Where sizes are restricted this 'breakthrough' low noise rubidium oscillator will enable new applications
- Extended holdover for CDMA, WiMAX and LTE base stations
- Higher stability and low phase noise communication and surveillance applications
- Compact designs and portable and mobile applications
- Production Test Reference for instrumentation
- Microwave Test Bench or Test solution

## Related products

- **E10-Y** : Low Noise Desktop & Bench top Frequency reference 4 or 8 outputs
- **E10-P** : Desktop & Bench top Frequency reference 1 to 4 outputs
- **A1000**: 1U 19" rack mount up to 12 output, frequencies 1 to 100MHz
- **A10-M**: 2U 19" rack mount up to 24 output, frequencies 1 to 100MHz

## E10-LN Specification

### Outputs *See options*

10MHz	+7dBm ( $\pm 2$ dBm) into 50 Ohms, 0.5V <sub>rms</sub> (Specify for 75Ω load)
Connector	SMA

### Frequency Stability *Allan Deviation*

Frequency	Options A	Options B
	10MHz	10MHz
$\tau = 1s$	$\leq 2 \times 10^{-12}$	$\leq 7 \times 10^{-13}$
$\tau = 10s$	$\leq 5 \times 10^{-12}$	$\leq 1 \times 10^{-12}$
$\tau = 100s$	$\leq 7 \times 10^{-12}$	$\leq 2 \times 10^{-12}$

### Phase Noise (SSB)

Frequency	Options 1	Options 2	Options 3
	10MHz	10MHz	10MHz
1Hz	-110 dBc	-113 dBc	-115 dBc
1Hz	-135 dBc	-138 dBc	-140 dBc
100Hz	-145 dBc	-152 dBc	-154 dBc
1 kHz	-155 dBc	-155 dBc	-155 dBc
10KHz	-158 dBc	-158 dBc	-160 dBc

### Harmonics

	<-30dBc	Option C <-45dBc
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### Spurious

100 KHz BW	<-100dBc	<-100dBc
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### Aging (After 30 days)

Frequency	10MHz	Option D
<i>Per day</i>	$5 \times 10^{-12}$	$3 \times 10^{-12}$
<i>Per Month</i>	$5 \times 10^{-11}$	$3 \times 10^{-11}$
<i>Per Year</i>	$5 \times 10^{-10}$	$3 \times 10^{-10}$

### Frequency accuracy

Accuracy at shipping  $5 \times 10^{-11}$

### Frequency retrace

After 1 hours of continues operation  $3 \times 10^{-11}$

### Frequency Adjustment

Mechanical	$\pm 2 \times 10^{-9}$	Option H
Electrical	$\pm 5 \times 10^{-9}$	Control voltage 0 to +5V

### Warm up time

<5 minutes, time to lock  
<6 minutes to  $1 \times 10^{-9}$  at room temperature 25°C

**Included with shipment:** Calibration certificate, Certificate of Conformance, product test sheet and 24 month warranty.

### Environmental

<i>Temperature :</i>	Operating	-40°C +60°C
	Storage	-40°C +90°C
<i>Temp stability :</i>	Standard	-20°C +60°C < $0.3 \times 10^{-9}$
	Option E	-30°C +65°C $0.3 \times 10^{-9}$
	Option F	-50°C +65°C $0.5 \times 10^{-9}$

*Relative humidity :* 94% non-condensing

*Magnetic Field sensitivity :*  $5 \times 10^{-12}$  Gauss

*Atmospheric pressure :*  $1 \times 10^{-13}$  Per mbar

*Approximate MTBF :* 100,000 Hrs, Stationary

*Dimensions without cover* 101 x 60.5 x 34mm LWH

*Dimensions with cover* 101 x 60.5 x 37mm LWH

### Power supply

*DC power:* +12 to +15V

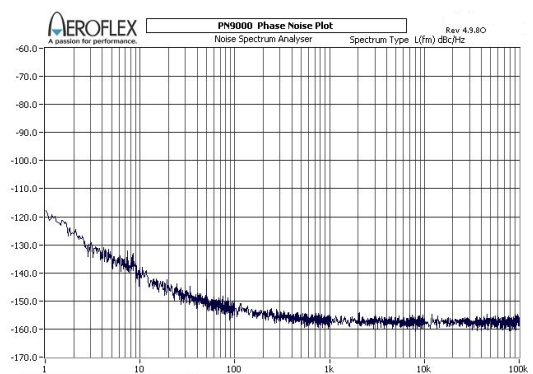
*Power consumption:* 22W Max at start (25°C)  
6W at steady state

### Data output & monitoring

RS232, 9600 baud rate

### Built-in options

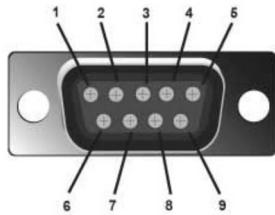
- Option 05:** TTL Output
- Option 06:** 1PPS Output
- Option 18:** Extended warranty to 3 years
- Option 20:** Discipline to external GPS 1PPS or 10MHz input
- Option 42:** Low noise floor -170dBc at 10KHz
- Option 75:** Add internal battery, up to 4 hours of battery life.  
[See E10-Y](#)



E10-LN Phase Noise (10MHz)

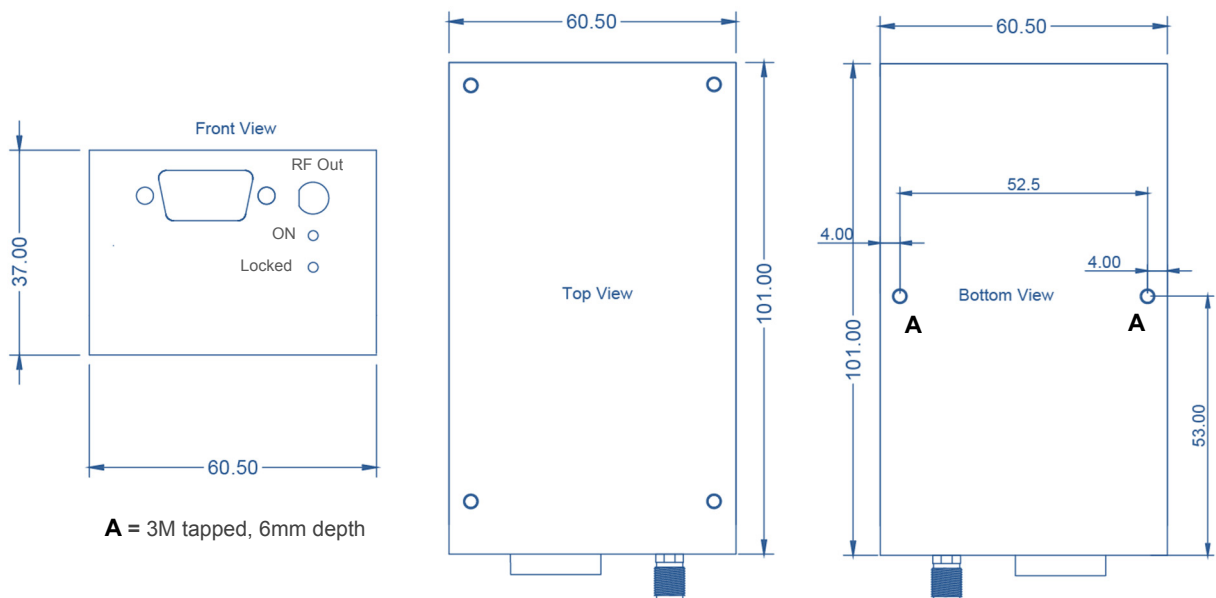
Contact us to configure this product to meet your requirement.  
Designed and manufactured in the U.K.

## Pin Connections



Pin No.	Function	Description
1	Lock Status	OFF: locked, ON: not locked
2	RXD	Serial data receive
3	TXD	Serial data transmit
4	Power Supply	Input power supply between +12 to 15V
5	GND	Ground
6	GND	Ground
7	Frequency adjustment	Apply 0-5 volt to adjust the frequency
8	Voltage reference	+5V supply voltage to be used for frequency adjustment
9	Not used	Not used

## Outline Drawing / Enclosure



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