

# Low Noise Rubidium Oscillator Module

## Features

- Sine wave or CMOS/TTL output
- Frequency range 5MHz to 100MHz
- Accuracy  $5 \times 10^{-11}$
- Phase noise -115dBc at 1Hz
- Phase-locks to external 1PPS
- 1 $\mu$  sec. holdover per 24hrs
- Compatible with 50 $\Omega$  or 75 $\Omega$  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  $6 \times 10^{-13}/s$  @ 1000s this rubidium oscillator provides significant improvement in performance over other rubidium components.

## Applications

- 4G, 5G & NTP Time Reference
- 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

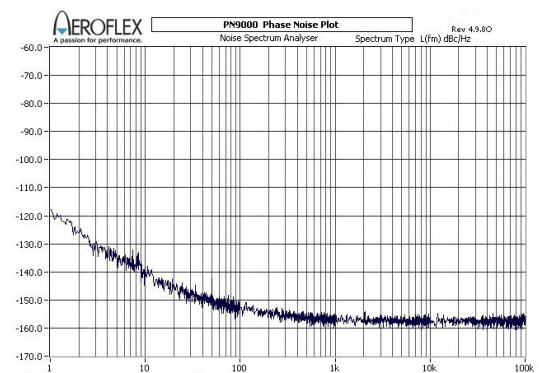
**E10-LN Specification**

Outputs <i>See options</i>			
10MHz	+8dBm ( $\pm 2$ dBm) into 50 Ohms, 0.5V <sub>rms</sub> (Specify for 75Ω load)		
Connector	SMA		
Frequency Stability <i>Allan Deviation</i>			
	Options A	Options B	Options C
Frequency	10MHz	10MHz	10MHz
$\tau = 1s$	$\leq 2 \times 10^{-12}$	$\leq 7 \times 10^{-13}$	$\leq 5 \times 10^{-13}$
$\tau = 10s$	$\leq 5 \times 10^{-12}$	$\leq 1 \times 10^{-12}$	$\leq 7 \times 10^{-13}$
$\tau = 100s$	$\leq 6 \times 10^{-12}$	$\leq 2 \times 10^{-12}$	$\leq 7 \times 10^{-13}$
$\tau = 1000s$	$\leq 4 \times 10^{-12}$	$\leq 1 \times 10^{-12}$	$\leq 6 \times 10^{-13}$
Phase Noise (SSB)			
	Options 1	Options 2	Options 3
Frequency	10MHz	10MHz	10MHz
1Hz	-110 dBc	-113 dBc	<-115 dBc
10Hz	-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		Option C	
	<-30dBc	<-45dBc	
Spurious			
100 KHz BW	<-100dBc		<-100dBc
Aging (After 30 days)		Option D	
Frequency	10MHz		
<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	$\pm 2 \times 10^{-9}$	<b>Option H</b>	
Electrical	$\pm 5 \times 10^{-9}$	Control voltage 0 to +5V	
Warm up time			
8 minutes, time to lock			
7 minutes to $5 \times 10^{-10}$ 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 +70°C
	Storage	-40°C +90°C
<i>Temp stability :</i>	Standard	-20°C +65°C <0.3x10 <sup>-9</sup>
	<b>Option E</b>	-40°C +65°C <0.5x10 <sup>-9</sup>
	<b>Option F</b>	-20°C +70°C <0.3x10 <sup>-9</sup>
	<b>Option G</b>	-40°C +70°C <0.5x10 <sup>-9</sup>
<i>Relative humidity :</i>	94% non-condensing	
<i>Magnetic Field sensitivity :</i>	5x10 <sup>-12</sup> Gauss	
<i>Atmospheric pressure :</i>	1x10 <sup>-13</sup> Per mbar	
<i>Approximate MTBF :</i>	100,000 Hrs, Stationary	
<i>Dimensions without cover</i>	101 x 60.5 x 34mm LWH	
<i>Dimensions with cover</i>	101 x 60.5 x 37mm LWH	
Power supply		
<i>DC power:</i>	+12 to +15V	
<i>Power consumption:</i>	22W Max at start (25°C) 6W at steady state	
Data output & monitoring		
RS232, 9600 baud rate		
Built-in options		

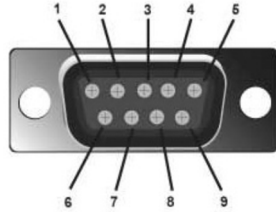
- Option 05:** TTL Output or CMOS
- Option 18:** Extended warranty to 3 years
- Option 42:** Low noise floor -170dBc at 10KHz
- Option 75:** Add internal battery, up to 4 hours of battery life.  
**See E10-Y**



E10-LN Phase Noise at 10MHz

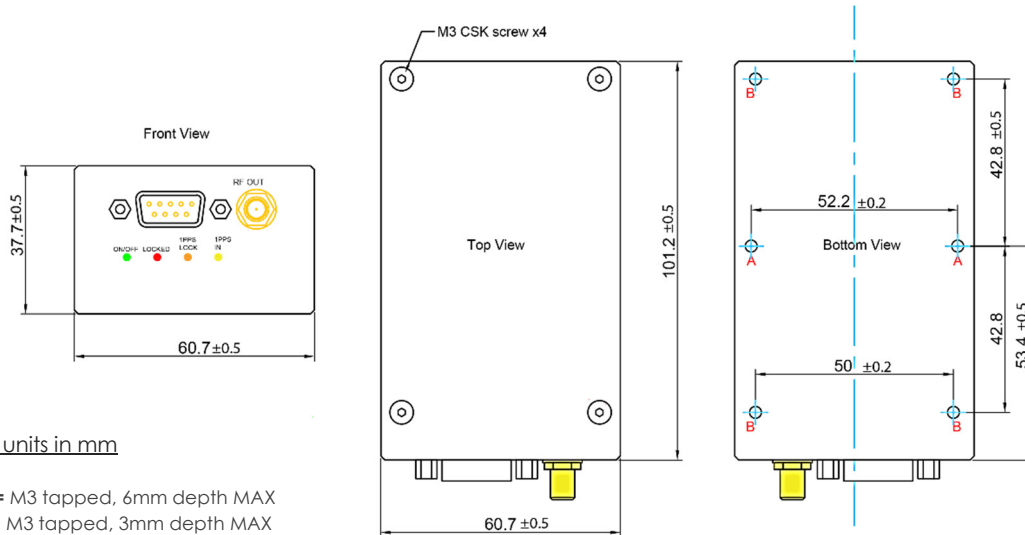
Contact us to configure this product to meet your requirement.  
**Designed and manufactured in the U.K.**

## Pin Connections



Pin No.	Function	Description
1	10MHz Lock Status	OFF: locked, ON: not locked
2	RXD (PLL)	Serial data receive
3	TXD (PLL)	Serial data transmit
4	Power Supply	Input power supply between +12V
5	GND	Ground
6	1PPS Lock status	1PPS DPLL OFF: locked, ON: not locked
7	1PPS Output	1PPS Output
8	GND	Ground
9	1PPS Input	Phase lock to external 1PPS input

## Outline Drawing / Enclosure



All units in mm

- A** = M3 tapped, 6mm depth MAX
- B** = M3 tapped, 3mm depth MAX

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