

Rubidium Clock

AR40A

COMMERCIAL RUBIDIUM ATOMIC FREQUENCY STANDARD

Key Features

Output Frequency:	10MHz (other frequency opt.)
Low Aging:	5×10^{-10} per year
Temperature:	-5°C to $+50^{\circ}\text{C} \pm 1 \times 10^{-10}$
Supply Options:	15VDC, 28VDC
Power consumption:	9W @ 15VDC steady state
Fast Warm-up:	5Min to 5×10^{-10} (Opt.)
Digital Frequency Control:	$< 1 \times 10^{-12}$ steps over; $> 1 \times 10^{-6}$ range (Opt.)
Holdover	OCXO Hold Over
High Reliability	MTBF > 1,400,000 hrs @ 25°C
Extremely Small:	77x77x35.6 mm



Description

AR40A is an extremely small, very high performance Atomic Rubidium Frequency Standard designed to operate reliably in demanding applications and harsh environment.

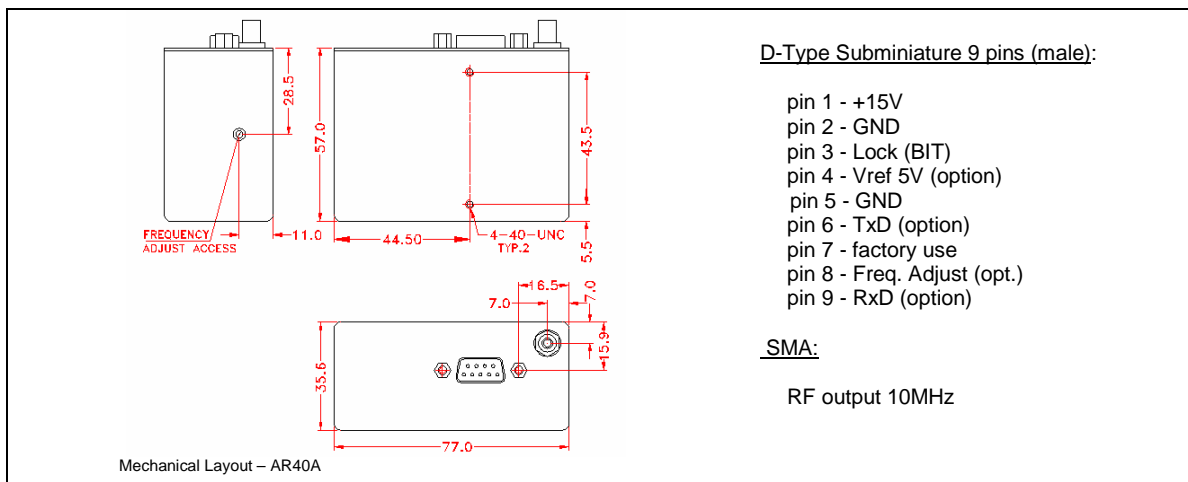
AR60A includes a high performance Oven Controlled Crystal Oscillator (OCXO) that is locked to the Rubidium Atomic Resonance using a sophisticated digital FLL (Frequency Lock Loop) thus maintaining its very high stability and accuracy.

The unit contains a micro-processor which optimizes its performance vs. external disturbances. (e.g. at a very high temperature or shock). In addition, a built-in synthesizer allows a very fine digital frequency control over a wide range (option).

The unit is a perfect replacement for larger and more expensive units available in the market today, as well as for high precision oscillators.

Applications

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| <ul style="list-style-type: none"> ❖ Test Equipment ❖ Scientific Equipment ❖ Calibration | <ul style="list-style-type: none"> ❖ Telecommunications ❖ Secure communication ❖ TV Stations | <ul style="list-style-type: none"> ❖ Cellular Phone Base Stations ❖ Mobile Radio ❖ Internet and more. |
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SPECIFICATIONS

All specs are at room temperature, quiescent conditions, sea level ambient unless otherwise specified.

Parameter	Standard Version AR40A-00 (*)	Options (**)
Output Frequency	10MHz, sine wave, +(12±2) dBm / 50Ω	TTL, CMOS, 5MHz
Stability:		
Long Term (Aging):	< 1 x 10 ⁻⁹ / year (after 3 months operation) < 5 x 10 ⁻¹⁰ / year (2nd year)	< 5 x 10 ⁻¹⁰ / year
Short Term (Allan Dev.):	< 3 x 10 ⁻¹¹ @ 1sec < 3 x 10 ⁻¹² @ 100sec	< 1.5 x 10 ⁻¹¹ @ 1sec < 2 x 10 ⁻¹² @ 100sec
Phase Noise: dBc / Hz	@ Frequency	Phase Noise
	10Hz	<- 95
	100Hz	<- 130
	1000Hz	<- 140
	10000Hz	<- 145
Harmonics:	<- 50 dBc	
Spurious:	<- 75 dBc at ± 1.5 MHz from carrier	<- 90 dB (10MHz ± 1MHz)
Warm-up:	4 min to lock 7.5 min to 5x10 ⁻¹⁰	3.5min to lock 5 min to 5x10 ⁻¹⁰
Supply Voltage:	15Vdc ±5%	18Vdc to 36Vdc with external power supply
Supply Current:	Steady state: ~0.6A @ 15Vdc	Steady state: ~0.4A @ 28Vdc
	Warm-up (<6min): ~1.7 A @ 15Vdc	Warm-up (<6min.): ~1A @ 28Vdc
Stability / Temperature:	±3x10 ⁻¹⁰ max. over -20°C to +65°C	a) Standard option: -20°C to +74°C (base plate) with degradation above 71°C. b) -40°C to +77°C (base plate), contact factory. c) ±5x10 ⁻¹¹ / -20°C to +71°C, contact factory
Storage Temp:	-40°C to +80°C	
Frequency Adjust:	Mechanical: ±3x10 ⁻⁹ Trimmer 10 turns.	Electrical: ±2x10 ⁻⁹ min/ 0 to 10VDC
		Digital: <1x10 ⁻¹² steps / >1x10 ⁻⁶ range Included in this option: Software for PC
Connectors:	D-Type Subminiature 9 pins (male): see below SMA: 10MHz	
Dimensions:	77 x 77 x 39.6 mm	77 x 77 x 36.5 mm
Weight:	260g max.	
Magnetic Field Sensitivity:	<5x10 ⁻¹¹ /gauss worst axis	
Vibrations:	Random: 3.0grms, 20 to 500Hz (with some degradation in performance)	5.7grms, 10 min per axis (Contact factory for details)
Shock:	20g half sine, 11ms, momentary offset <1x10 ⁻⁹	
Hold-Over Mode:	If lock is lost, the internal OCXO continues to provide an output frequency with the last saved frequency and with the very good stability of an OCXO.	
Reliability:	>1,400,000 hrs @ 25°C, G.B. , >108,000 hrs @ 60°C, G.B. per MIL HDBK-217F	
Accuracy at Shipment:	5x10 ⁻¹¹	
Built In Test (Bit)	Detects > 97% of all failures. "1"=High Impedance=Unlock / "0"=Short to Ground=Ok (Lock)	

(*) All specs are at room temperature quiescent conditions, unless otherwise specified

(**) Some combinations of options are not available