

# Rubidium Frequency Standard

## AR61A-08

### Full Military Qualifications/ Low Temp. Radiation Hardening

#### Key Features

- ❖ MIL-E-5400 and MIL-STD -810F
- ❖ Low phase noise under vibration
- ❖ Wide temperature range -54°C to +71°C (95°C Emergency)
- ❖ Radiation Hardening
- ❖ 26VDC per MIL-STD-704D
- ❖ Vibrations: MIL-STD-810F
- ❖ Shock: 15g
- ❖ Humidity: 100% Sealed Enclosure
- ❖ EMI/RFI: MIL-STD-461E
- ❖ Fast Warm Up < 3.8 min to lock at -55°C
- ❖ Altitude: 50,000 ft
- ❖ Low Power: 10W @ steady state
- ❖ MTBF: > 150,000 hours @ 50°C, AIC
- ❖ 82.5 x 82.5 x 114.3 mm (3.25 x 3.25 x 4.5 inch)
- ❖ 2.2Kg / 4.6 lbs
- ❖ Excellent for Airborne applications

#### Introduction

**AR61A-08** is a very high performance Rubidium Frequency Standard, designed to operate reliably in demanding application and harsh environment. It performs over a very wide temperature range, provides high stability, even under sever vibration and very fast warm-up, even at -54 °C. The unit meets or exceeds the most severe military requirements. This rugged unit is especially useful in airborne applications as well as mobile ground operation. The AR61A-08 also includes a microprocessor, which optimizes its performance vs. external disturbances. It has a unique holdover mode, which keeps the internal OCXO running with the last memorized frequency when lock is lost. In addition, a built in synthesizer allows a very fine digital frequency control over a wide range.

#### Applications

- ❖ Secure Communication
- ❖ ELINT Receivers
- ❖ Electronic warfare
- ❖ Field Calibration
- ❖ Telemetry Test Fields
- ❖ Radar, Bi-Static Radar
- ❖ C4I (Command, Control, Communications, Computer & Intelligence)

## SPECIFICATION

All specs are at room temperature, quiescent conditions, sea level ambient unless otherwise specified  
Some combinations of options are not available

Outputs	
<b>Frequency</b>	5MHz, Square wave

Output Performance			
<b>Accuracy</b>	±5E-11 @ Shipping		
<b>Long Term Stability</b> (Aging)	4E-11 / month		
	3.6 E-10 / year		
<b>Short Term Stability</b> (Allan Deviation)	3E-11 @ 1 sec		
	1E-11 @ 10 sec		
	3E-12 @ 100 sec		
<b>Waveform</b>	Square wave		
<b>Output Level</b>	+1.3 Vp-p to +2.25 Vp-p / 50Ω load (50 ohm + 2%), Duty Cycle (D.C.) 50+5% without DC voltage.		
<b>Phase Noise</b> dBc / Hz from Carrier	<u>Frequency</u>	<u>Quiescent</u>	<u>Vibration</u>
	1Hz	≤ -80	≤ -70
	10Hz	≤ -115	≤ -85
	100Hz	≤ -140	≤ -103
	300Hz	≤ -148	≤ -116
	1000Hz	≤ -150	≤ -130
	100KHz (Floor)	≤ -153	≤ -153
<b>Non-Harmonic Distortion</b> dBc / Hz from Carrier	100Hz to 100KHz	≤ -138	≤ -130
	100 KHz to 3MHz	≤ -80	≤ -80
<b>Warm-Up Stability</b>	To lock, @ -54°C, 3.8 minutes To 5E-10 @ -54°C, 10 minutes		

Power Supply		
<b>Input Voltage</b>	23.4 to 28.6 VDC (MIL-STD-704D) typ. 26VDC	
<b>Power</b>	Warm-up @-55°C	161 W Peak Max @ 27.3V
	@Steady State	<20W @ 26 VDC, 25°C <28 W @-54°C

Environmental			
		Operating	None Operating
Temperature (MIL-E-5400 Class 2)	Temperature	-54°C to +71°C	-57°C to +95°C
	Stability Over Temperature	±5E-10	
	Emergency Temperature	95°C 30 minutes Intermittent	
Altitude	Test in accordance with MIL-STD-810, Method 500.4, Procedure II. Up to 50,000ft		Test in accordance with MIL-STD-810, Method 500.4, Procedure I.
Acceleration	N/A		18 G forward, 6.1 G side, 11 G up, 12 G down, 2.7 G aft
Explosive Decompression:	Test in accordance with MIL-STD-810, Method 500.4, Procedure III, except in Step 1, the module is operating.		Test in accordance with MIL-STD-810, Method 500.4, and Procedure III.
Radiation	Contact factory for more details		
Humidity:	MIL-E-5400	Up to 100%, including condensation	
Random Vibration	Units: x E-3 g <sup>2</sup> /Hz @ 10 Hz      3.36 @ 30 Hz      0.84 @ 50 Hz      0.088 @ 100 Hz     0.051 @ 500 Hz     0.030 @ 1000 Hz    0.012 @ 2000 Hz    0.005      Total: 0.24 grms		
Mechanical Shock (Including Shock Mount)	Test in accordance with MIL-STD-810, Method 516.5, Procedure I.		
Explosive Atmosphere	MIL-STD-810, Method 511.4, Procedure I.		
Vibration	Test in accordance with MIL-STD-810, Method 514.5, Procedure I, and duration of 1 hour per axis in each of three mutually perpendicular axes.		Test in accordance with MIL-STD-810, Method 514.5, Procedure I, and duration of 2 hours per axis in each of three mutually perpendicular axes.
Fungus	Show no signs of fungal growth after prolonged exposure to fungus growth as encountered in tropical climates		
Acoustic Noise:	MIL-STD-810, Method 515.5, Total SPL 140dB		
EMI/RFI	MIL-STD-461E	RE102, CS101, CS114, CS115, CS116	

Dimensions & Weight		
Size:	Inches, nom, h/w/d	3.25 / 3.25 / 4.5
	cm, h/w/d	8.25 / 8.25 / 11.43
Weight/Volume:	Lbs./cubic inches	4.6 max / 47..5
	Kg/cubic cm	2.2 max / 779

Unit Diagnostics, Control and Calibration	
BIT Output	Composite Lock (98 %)
	No-Fault Logic Level – 0/1 TTL Compatible
Frequency Trim Range	3E-9
Setting Resolution	2E-11
Digital Frequency adjust	Digital Frequency adjusts via TxD RxD, <E-12 steps, >1E-6 range.

Reliability	
Reliability	MIL-HDBK-217F Airborne Inhabited Cargo (AIC).
	150,000 hours @ 50°C ambient temp
	114,000 hours @ 60°C ambient temp.
	80,000 hours @ 71°C ambient temp