

## Description

Abracón's AR50LC embedded Rubidium Oscillator offers the latest technology that provides exceptional performance including excellent accuracy, short term stability and frequency stability. The Abracón AR50LC is available with either a sinewave or CMOS output and with a supply voltage of +5Vdc or +12Vdc, with extended range up to +18Vdc. Additional features of this series include lock monitor output and voltage control function to support a wide range of applications.

## Features

- Output Frequency 10MHz
- Low phase noise high precision atomic clock
- Excellent short-term stability
- Operating Supply Voltage: +5Vdc, +12Vdc
- Ultra-tight frequency tolerance  $\pm 0.05$  ppb
- Temp stability available to 0.3ppb (-20°C to +65°C)
- Sinewave or CMOS Output
- REACH/RoHS II Compliant | MSL N/A
- ESD Sensitive

## Typical Applications

- Satellite Timing and Frequency
- Oil and Gas Exploration
- GPS Receiver
- Telecommunication Infrastructure
- 4G/LTE/CDMA/EMTS
- Test and Measurement
- Underwater Sensor Systems
- Mining and Seismic Research

## Electrical Specifications [Note 1]

Parameters	Min.	Typ.	Max.	Units	Notes
Frequency Output		10		MHz	
Supply Voltage (Vdd) <small>[Note 2]</small>	12	12.5 to 15	+18	Vdc	Option A
	4.9	5.0	+5.1	Vdc	Option B
Input Power (warm-up)		18		W	
Input Power (steady-state)		6		W	
Warm-up time to $\pm 0.5$ ppb accuracy			8	minutes	
Operating Temperature Range	-20		+65	°C	See options
Storage Temperature Range	-40		+90	°C	
Initial Frequency Tolerance at time of shipment			$\pm 0.05$	ppb	@+25°C
Frequency Stability over Operating Temperature Range (in still air)		$\pm 0.2$	$\pm 0.3$	ppb	See options
Aging per day		5E-12			After 30 days
Aging per month		5E-11			After 30 days
Aging per year		5E-10			After 30 days
Warm-up time to lock			6	minutes	
Retrace			$\pm 0.03$	ppb	after 1 hour of continuous operation
<b>Output Waveform</b>	<b>Sinewave</b>				
Output Power	+8	+10	+12	dBm	
Output Load		50		$\Omega$	
Spectral Purity, Spurious			-70	dBc	100kHz BW
Spectral Purity, Harmonics			-30	dBc	
<b>Output Waveform</b>	<b>CMOS</b>				
Output Logic High (VOH)	2.97			Vdc	
Output Logic Low (VOL)			0.33	Vdc	
Duty Cycle	40	50	60	%	
Rise/Fall time			10	nS	
Output Load			15	pF	

Note 1: All measurements guaranteed at +25°C unless otherwise specified.

Note 2: The +12Vdc version can be powered up with any VDD value in the range of +12Vdc to +18Vdc.

Note 3: The application should maintain thermal stability to obtain optimum performance. The use of a heat sink or copper plate under the device should be avoided. Device mounting should allow for a minimum of 1mm clearance from the printed circuit board.

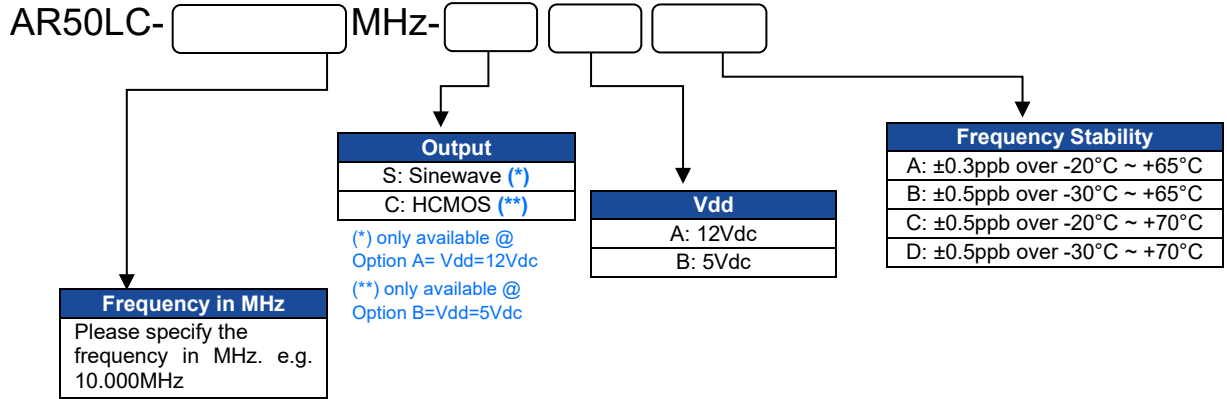
**Electrical Specifications** *continued* <sup>[Note 1]</sup>

Parameters	Min.	Typ.	Max.	Units	Notes
<b>Electrical Frequency Adjustment</b>					
Control Voltage	0		5	Vdc	
Frequency Pull Range	±4.0			ppb	Option A=Vdd=12Vdc
	±2.0			ppb	Option B=Vdd=5Vdc
Frequency Pull Slope	Positive				
Control Voltage Port Impedance		10		kΩ	
<b>Lock Monitor</b>					
Warm-up time to lock			6	minutes	
Lock Monitor Output Logic High	4.0			Vdc	Unlocked
Lock Monitor Output Logic Low			0.5	Vdc	Locked
<b>Phase Noise</b>					
SSB Phase Noise (Output Waveform= Sinewave)		-95		dBc/Hz	@10Hz offset
		-126		dBc/Hz	@100Hz offset
		-135		dBc/Hz	@1kHz offset
		-145		dBc/Hz	@10kHz offset
		-145		dBc/Hz	@100kHz offset
SSB Phase Noise (Output Waveform= CMOS)		-95		dBc/Hz	@10Hz offset
		-125		dBc/Hz	@100Hz offset
		-135		dBc/Hz	@1kHz offset
		-140		dBc/Hz	@10kHz offset
		-140		dBc/Hz	@100kHz offset
<b>Allan Deviation</b>					
Allan Deviation (Output Waveform= Sinewave)		2E-11	5E-11		τ=1s
		8E-12	2E-11		τ=10s
		3E-12	7E-11		τ=100s
Allan Deviation (Output Waveform= CMOS)		3E-11	5E-11		τ=1s
		9E-12	2E-11		τ=10s
		5E-12	7E-11		τ=100s

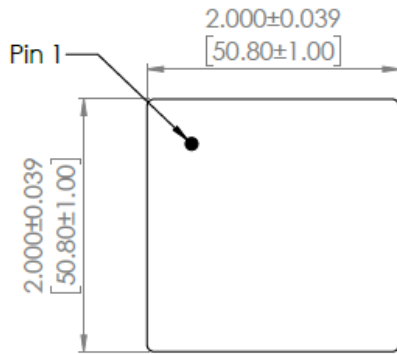
**Environmental and Mechanical**

Parameters	Description
Mechanical Shock	IEC 60068-2-27, Test Ea: Acceleration of 50G peak amplitude for 11ms duration
Vibration	IEC 60068-2-06, Test Fc: 10Hz-55Hz 1.5mm displacement, 55Hz-500Hz 10G
EMI	Compliant to FCC Part 15, Class B
Relative humidity	94% non-condensing
Magnetic Field sensitivity	2x10 <sup>-12</sup> Gauss
Atmospheric pressure	-60m to 4000m 1x10 <sup>-13</sup> Per mbar
Approximate MTBF	100,000 Hours, Stationary
Weight	< 200 grams

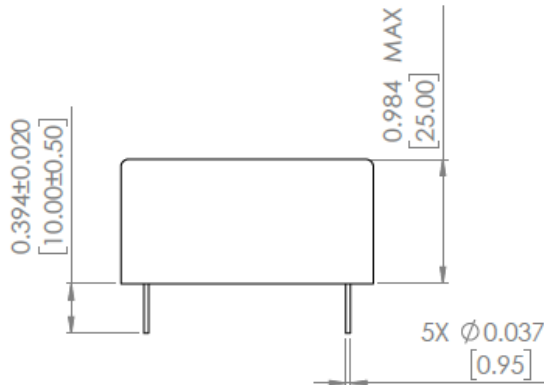
**Part Identification**



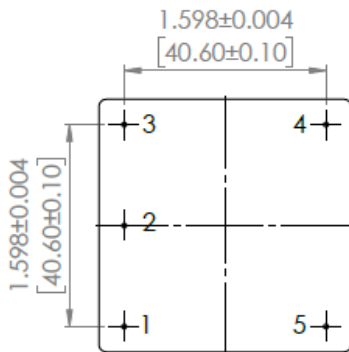
**Mechanical Dimensions**



**TOP VIEW**



**FRONT VIEW**



**BOTTOM VIEW**

Pin #	Function
1	Input frequency control
2	Lock monitor output
3	Output signal
4	Ground
5	Power supply input

**Dimensions: inches [mm]**