

## ROM9070PA

The ROM9070PA uses Rakon’s market-leading proprietary Mercury+™ technology, delivering the world’s smallest and lowest power OCXO for Radio applications. This product family achieves  $\pm 10$  ppb frequency stability over  $-40$  to  $95^\circ\text{C}$ , with short term ageing less than 1 ppb/day and frequency slope as low as  $0.1$  ppb/ $^\circ\text{C}$ . Low-g sensitivity and extended operating temperature options are available on request. Using Rakon’s innovative high-Q quartz crystals, ROM9070PA offers superior close-in phase noise performance, enabling Remote Radio Head PLLs to use a single reference clock to meet both network synchronisation requirements and air interface requirements.

Mercury+™ ASIC-OCXOs enable lower Total Cost of Ownership of customer equipment through improved reliability. With a small  $9 \times 7$  mm form factor and few discrete components, a ROM9070PA consumes only 0.4 W at room temperature and has faster warm up times than traditional OCXOs.

### Features

- Miniature SC-cut OCXO with fast warm up time
- Superior close-in phase noise with high-Q crystal
- $< 1\%$  VCO linearity
- Patented tilt compensation for lifetime performance
- Ultra-reliable OTP memory programming
- Lower customer Total Cost of Ownership through VLSI ASIC-integration

### Applications

- Base Stations
- 5G RRH
- Small Cells
- Microwave transmission systems

9.7 x 7.5 x 3.9 mm



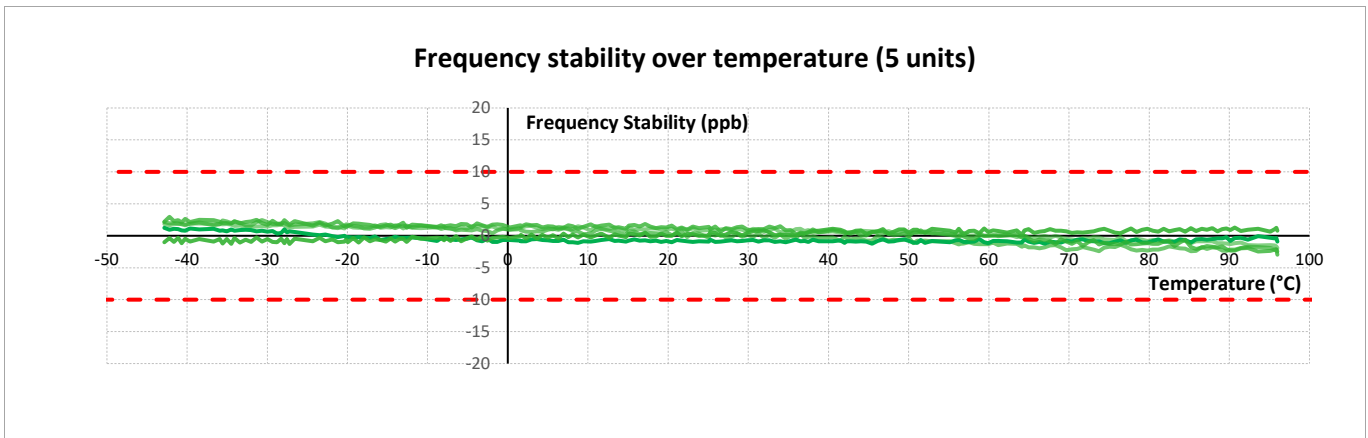
## 1.0 Standard Specifications

Parameter	Min.	Typ.	Max.	Unit	Test Condition / Description
Nominal frequency (Fn)		10 – 50		MHz	Standard frequencies: 10, 19.2, 20, 25, 25.6, 30.72, 38.4, 50 MHz
Frequency calibration			$\pm 0.2$	ppm	Initial accuracy at $25^\circ\text{C} \pm 2^\circ\text{C}$
Reflow shift			$\pm 0.2$	ppm	Pre to post reflow $\Delta F$ (measured $\geq 60$ minutes after reflowing)
Operating temperature range	-40		+95	$^\circ\text{C}$	Operating temperatures up to $105^\circ\text{C}$ are available on request
Frequency stability temperature			$\pm 20$ $\pm 10$	ppb	In still air. Reference to $(F_{\text{MAX}} + F_{\text{MIN}})/2$ $\pm 20$ ppb (Vc), $\pm 10$ ppb (Fixed frequency)
Frequency slope $\Delta F/\Delta T$ in still air		$\pm 0.1$	$\pm 0.5$	ppb/ $^\circ\text{C}$	Temperature ramp $\leq 1^\circ\text{C}/\text{minute}$
Supply voltage stability		$\pm 5$		ppb	$\pm 2\%$ variation, reference to frequency at 3.3V
Load sensitivity		$\pm 5$		ppb	$\pm 10\%$ variation, reference to frequency at 15pF
Warm-up time		15	60	sec	Time needed for frequency to be within $\pm 20$ ppb reference to frequency after 1 hour, at $25^\circ\text{C}$ . Parameter is frequency, assembly and operating history dependent
Long term stability (Ageing)		1	0.3 1.5	ppb ppm ppm	Per day, after 30 days of continuous operation First year 10 years
Supply voltage (Vcc)		2.7 – 5		V	$\pm 5\%$
Input power		1200 400	1500 440	mW	Warm up Steady state in still air at $25^\circ\text{C}$
Control voltage (Vc) <sup>1</sup>	0.25	1.25	2.25	V	

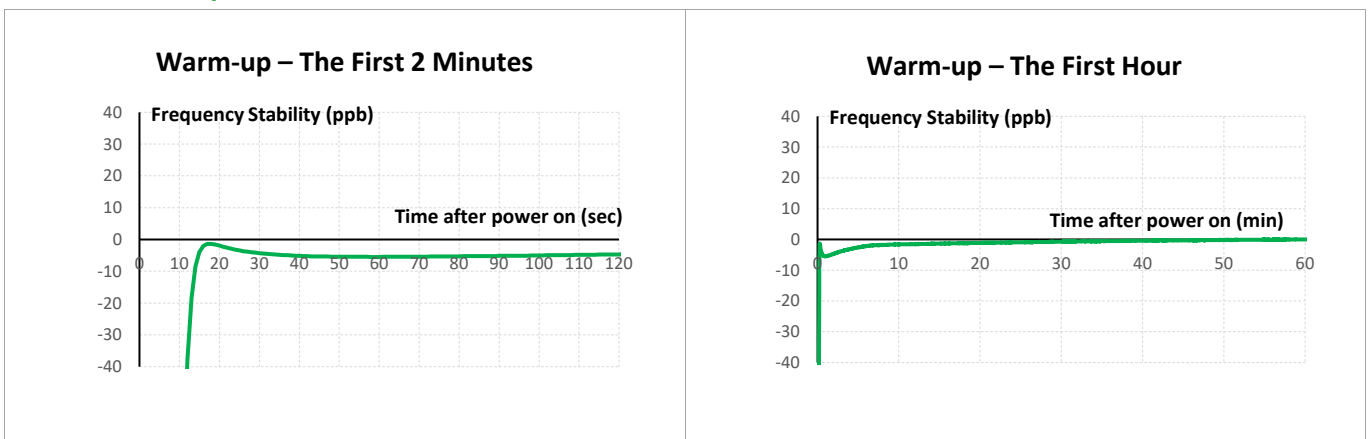
<sup>1</sup> The GND of the control voltage (Vc) needs to be connected directly to pin 2 (GND) as ground lead impedance may cause performance degradation.

Parameter	Min.	Typ.	Max.	Unit	Test Condition / Description				
Frequency tuning	±1.9		±3.3	ppm	Reference to the frequency at Vc=1.25 V				
Linearity			1	%	Deviation from straight line curve fit				
Oscillator output	Regulated CMOS output (1.0, 1.8, 2.5V) or standard CMOS (options)								
SSB Phase Noise (Typical value at 25°C)	Frequency	1 Hz	10 Hz	100 Hz	1 kHz	10 kHz	100 kHz	1 MHz	Unit
	19.2 MHz	-80	-110	-138	-154	-159	-160	-161	dBc/Hz
	30.72 MHz	-73	-105	-133	-153	-158	-160	-161	
	38.4 MHz	-70	-102	-132	-150	-155	-157	-159	

## 2.0 Frequency Stability over Temperature @ 30.72 MHz



## 3.0 Warm-up Time @ 19.2 MHz



## 4.0 Model Outline and Recommended Pad Layout

**NOTE:**

- Unit: mm
- Plastic cover, FR4 base
- Finish 0.05 ~ 0.13  $\mu\text{m}$  Gold over 3 ~ 6  $\mu\text{m}$  Nickel.

Pin	Connections
1*	Control Voltage (Vc) / Do not connect (GND optional)
2	GND
3	Output
4	Supply Voltage (Vcc) for correct operation decouple the supply voltage with a 10 $\mu\text{F}$ capacitor close to the oscillator
* Depending on detail specification	

## 5.0 3D Model

Parameter	Remarks
Package size	9.7 x 7.5 x 3.9 mm
STEP file	<a href="#">ROM9070PA 3D model</a> To open or view the STP file, you will need to import it into one of the following software programs: Autodesk Fusion 360, CATIA, SolidWorks, Solid Edge, TurboCAD, Kubotek KeyCreator, FreeCAD, ABViewer, ShareCAD, or eMachineShop.