

NEW Low SWaP-C Miniaturized Rb Oscillator

The mRO-50 Ruggedized is a breakthrough microwave optical double resonance (MODR) low SWaP-C Miniaturized Rubidium Oscillator designed to meet the latest commercial, military and aerospace requirements where time stability and power consumption are critical.

It provides a one day holdover below 1 µs and a retrace below 1E-10 in a form factor (50,8 x 50,8 x 20mm) that takes up only 51 cc of volume (about one-third of the volume compared to standard rubidiums) and consumes only 0.5W of power, which is about ten times less than existing solutions with similar capabilities.

Applications

The mRO-50 Ruggedized Oscillator provides accurate frequency and precise time synchronization to mobile applications, such as military radio-pack systems in GNSS denied environments. Its wide-ranging operating temperature of -40°C to +80°C is also ideal for UAVS and underwater applications.

Applications: Military comms, Radars, Low Earth Orbit, Electronic Warfare, Airborn and Avionics, UAV/UGV/USV/UUV and other harsh environments.

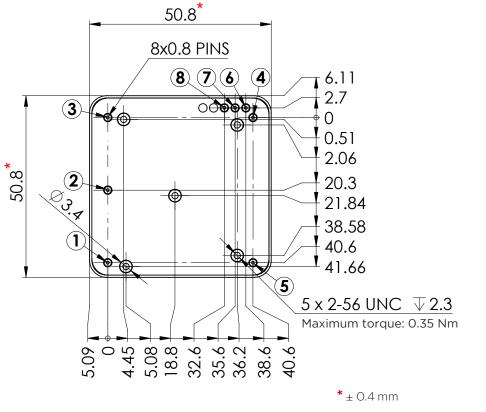
Safran Electronics & Defense is with you every step of the way, building in the intelligence that gives you a critical advantage in observation, decisionmaking and guidance.



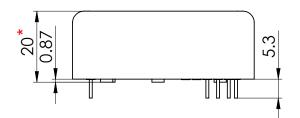
Technical Specifications

Package:

(all dimensions in mm)



All other quotes are ± 0.2 mm



Pin Layout:

- 1 Frequency Adjust (Analog +1,5V +/-1V)
- 2 GND
- 3 10MHz square output (0-3V)
- 4 GND
- 5 Power 5V or 3.3V depending on model
- 6 /LOCK (Bit)
- 7 TxD
- 8 RxD

Patent numbers:

China : ZL 2014 8 0075019.0 USA : 10,191,452 B2 EU : 3102983 Japan : JP 6416921

ELECTRICAL

Туре	mRO-50 Ruggedized	
	Standard version	Options
Frequency	10 MHz	
Frequency change within operating temperature range	≤ 6 x 10 ⁻ⁱ⁰ over -40°C to +80°C	
Linear drift measured over minimum 14 days After 3 months operations :	< 1 x 10 ⁻¹¹ / day	(option code A) < 5 x 10 ⁻¹² / day
Short term stability 1 sec 10 sec 100 sec	$\leq 6 \times 10^{-11}$ $\leq 1.9 \times 10^{-11}$ $\leq 6 \times 10^{-12}$	(option code S) $\leq 4 \times 10^{-11}$ $\leq 1.3 \times 10^{-11}$ $\leq 4 \times 10^{-12}$
Phase noise (10 MHz) in dBc/Hz 1 Hz 10 Hz 100 Hz 1000 Hz 10000 Hz	≤ -66 ≤ -95 ≤ -120 ≤ -135 ≤ -140	(option code S) ≤ -70 ≤ -97 ≤ -120 ≤ -135 ≤ -140
Frequency retrace (in stable temperature, gravity, pressure and magnetic field conditions)	$< 1 \times 10^{-10}$ within 1 h after 24 h off	
Warm-up time	Lock < 2 minutes at over the full temperature range	
Analog frequency adjustment (+1,5V +/-1V) For stable operation, an external voltage shall be applied (cf. the user manual of the mRO-50 RUG for electrical scheme)	1,6 x 10 $^{\circ}$ (± 20%) peak to peak (for supply 3,3V or 5V)	
Digital frequency adjustment range with serial RS-232 port.	Fine: $\pm 2 \times 10^{-9}$ (resolution: 2,5 x 10 ⁻¹²) $\pm 20\%$ Coarse: $\pm 1 \times 10^{-7}$ (resolution: 1.24 x 10 ⁻⁹)	
Output level	Square wave 0-3V	
Spurious $f_0 \pm 100 \text{kHz}$	<-80dBc	
Supply voltage Max Power Supply Ripple	5V < 50 mV peak to peak (from 1Hz to 1MHz frequency band)	3.3V (option code 3.3 V) < 5 mV peak to peak (from 1Hz to 1 MHz frequency band)
Input power @ 25°C	<0.57W steady state 2.5W start-up	<0.5W steady state 1,7W start-up
Lock Indicator Unlocked Locked	> 3 V < 0.4 V	·
Communication with serial RS-232 port	Rx and Tx signals are idles at low level (to invert polarity use option COMSTD)	

ENVIRONMENTAL

Туре	mRO-50 Ruggedized
Magnetic field sensitivity	< 1,3 x 10 ⁻¹⁰ / Gauss
Storage Temperature	- 55°C to + 105°C
Operating Temperature	-40°C to +80°C (maximum temperature of the thermal chamber with air flow around unit)
Overall Environment Effects Altitude (qualification ongoing) Vibration, Shocks (qualification ongoing)	Meets or exceeds: MIL-STD-810H, Method 500.6 MIL-STD-810H, Method 514.8 Annexe E general exposure 7.7g _{RMS} , (no loss of lock) MIL-STD-202, 50g, 11 ms, half sine
Humidity (qualification ongoing)	MIL-STD-810H, Method 507.6 35°C, 95% relative humidity
g-tip-over test	2 x 10 ⁻¹⁰ / g on worst sensitive axis

PHYSICAL

Туре	mRO-50 Ruggedized
Size	50.8 x 50.8 x 20 mm (± 0.4 mm) 2" x 2" x 0.787"
Weight	80 g max. 2.82 oz. max.
Volume	< 52 cc

MBTF

Туре	mRO-50 Ruggedized
Cell lifetime / MTBF	10 years / 155860 hours at +25°C

MORE ON APPLICATIONS

The Spectratime mRO-50 Ruggedized design has been improved to reduce power consumption and size to meet the latest requirements necessary to support various levels of military and commercial applications.





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