ELECTRONICS & DEFENSE

MRO-50 RUGGEDIZED

OVERVIEW

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Spotlights on mRO-50 Ruggedized

Low SWaP-C Mini-Rubidium Oscillator

The mRO-50 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 1Qs and a retrace below 1E-10 in a form factor takes up only 51 cc of volume (about one-third of the volume compared to standard rubidiums) and consumes only 0.36W of power, which is about ten times less than existing solutions with similar capabilities.

Key Features

Frequency Stability - ADEV

1s	<4E-11 (Option S)
100s	<4E-12 (Option S)

Phase Noise (SSB)

10Hz	<-97 (Option S)
100Hz	<-120 (Option S)
1KHz	<-135 (Option S)

Aging (After 30 days)

Per day	<(option A) 5E-12 / day

Operating Temp -40°C to +80°C

DC power 0.45W @5V
and 0.36W @3.3V (option)

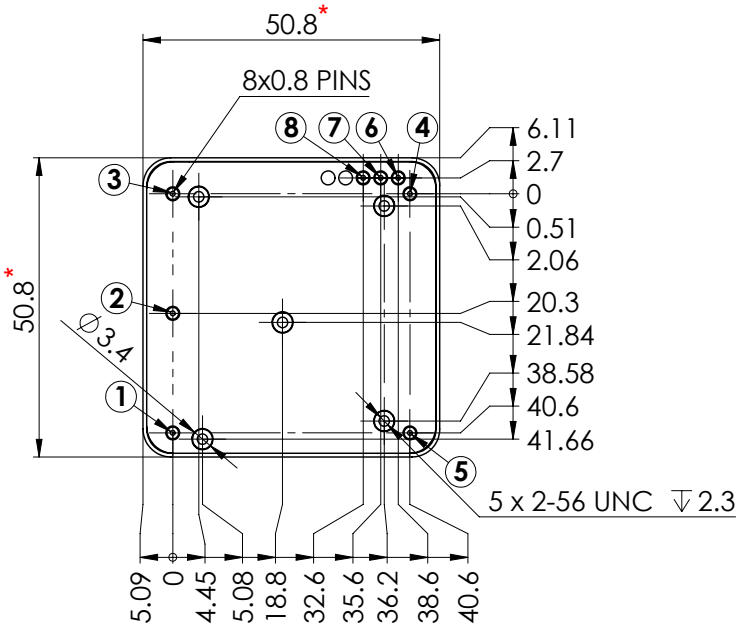
Cell lifetime/MTBF

10 years/155860 hours at +25°C

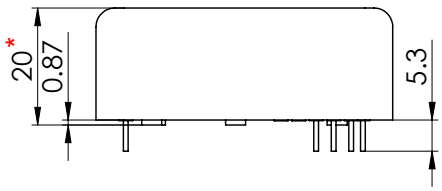
Vibration 7.7 grms/axsis per MIL-STD-810, Fig 514.7E-1, Category 24

Schock MIL-STD-202-G, Test condition A, 50g, 11ms, half sine

Warm up time < 2 min



± 0.4 mm
All other quotes are ± 0.2 mm



Applications

The mRO-50 Miniaturized Rubidium 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.

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

Benefits for Military Applications

Fast, accurate GNSS lock for positioning data

Military GNSS-based systems use very long pseudo random codes for signal recognition. These codes prevent civilian GNSS devices from detecting military codes and their positioning data. The disadvantage of lengthy codes is the amount of time necessary for military systems to decrypt them (up to two minutes).

With the new mRO-50 technology, detection time can be reduced to seconds.

Accurate timing and synchronization for radio transmission

Most modern radios operate by transmitting data in small packets. If many users in a group such as an infantry platoon are communicating, differing times are allocated to the radios to allow transmission on the same frequency (TDMA). The data packets have guard bands that protect individual packets from overlapping. This timing feature ensures communications, even if all of the radios are not synchronized.

With the new mRO-50 technology, guard bands will be reduced and thus allow at least twice the level of information to be transmitted.

Precise time stamping, inertial navigation, and waveform synchronization for UAVs

UAV sensor payloads typically use a clock synchronized to GNSS. When that signal is lost, the mRO-50 provides a “holdover” function to maintain precision for extended periods of GNSS denial. UAVs also rely on Inertial Navigation Systems (INS) in the absence of GNSS. The high stability of the atomic clock with mRO-50 as the INS time base reduces the time integration error drift during extended GNSS outages. Accurate clocks are also needed in UAV communications: high-density encrypted waveforms have been employed to transmit and receive UAVs control data as their sensor payloads have advanced from still photos to video, and to video integrated with infrared.

The new mRO-50 technology enables the constant synchronization and stabilization of those waveforms.

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