

Spotlights on mRO-50 Ruggedized

Low SWaP-C Mini-Rubidium 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 μ s 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 0.36W of power, which is about ten times less than existing solutions with similar capabilities.



Miniature, Low SWaP-C, ultra-portable high precision & performance Atomic Frequency Source

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° to +80°C

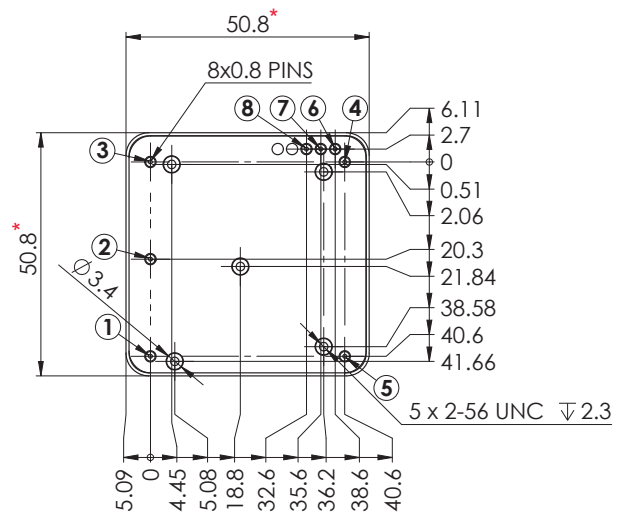
DC power 0.45W @5V
and 0.36W @3.3V (option)

Cell lifetime/MTBF 10 years/155860 hours at +25°C

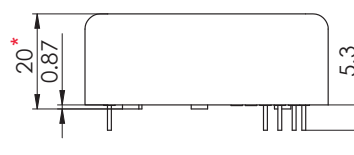
Vibration 7.7 grms/axis per MIL-STD-810, Fig 514.7E-1, Category 24

Shock MIL-STD-202G, Test Condition A, 50g, 11 ms, half sine

Warm up time < 2 min



* ± 0.4 mm
All other quotes are ± 0.2 mm



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° to +80°C is also ideal for UAVs and underwater applications.

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

Benefits For Military Applications

Fast, accurate GNSS lock for positioning data for harsh environments

Military GNSS receivers offer accuracy, integrity, anti-jamming, anti-spoofing, M-code & Selective Availability Anti-spoofing Module (SAASM) functionalities, for fast-moving, demanding combat environments of both ground and maritime platforms.

This rugged and highly customizable device combines a GNSS receiver, inertial measurement technology and high-performance timing oscillators to provide resilient PNT even in GNSS-degraded and denied environments.

The new mRO-50 Ruggedized technology will improve time reacquisition, system integrity and anti-jamming performances.

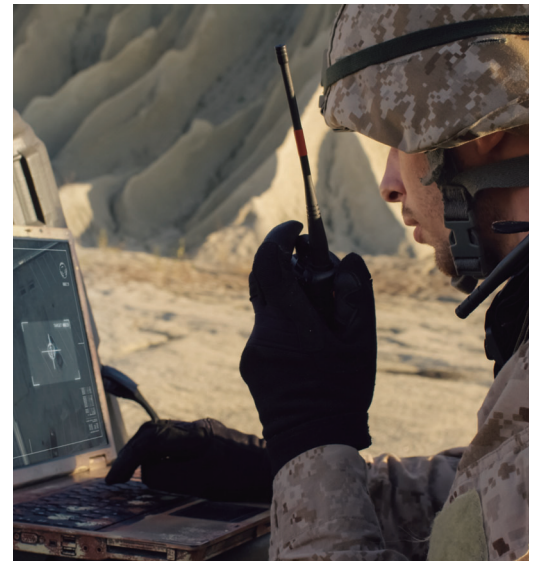


Accurate timing and synchronization for radio transmission

Radio TDMA systems that require free running synchronization over hours or while in radio silent sleep mode (known as emissions control or EMCON) with faster frequency hopping used to prevent soldiers from being interfered and detected, are concerned about long term holdover and low power.

Further, the transmitted packets have guard bands that protect individual packets from overlapping while ensuring communications, even if all of the radios are not synchronized. Smaller/fewer guard bands leaves room for more data at higher rates to be transmitted.

With the lowest power consumption and warm-up time in the miniature atomic clock market, the mRO-50 allows for extended mission times with faster frequency hopping as well as the ability to network at higher data rates largely due to a reduction in the size of the “guard bands”



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.

