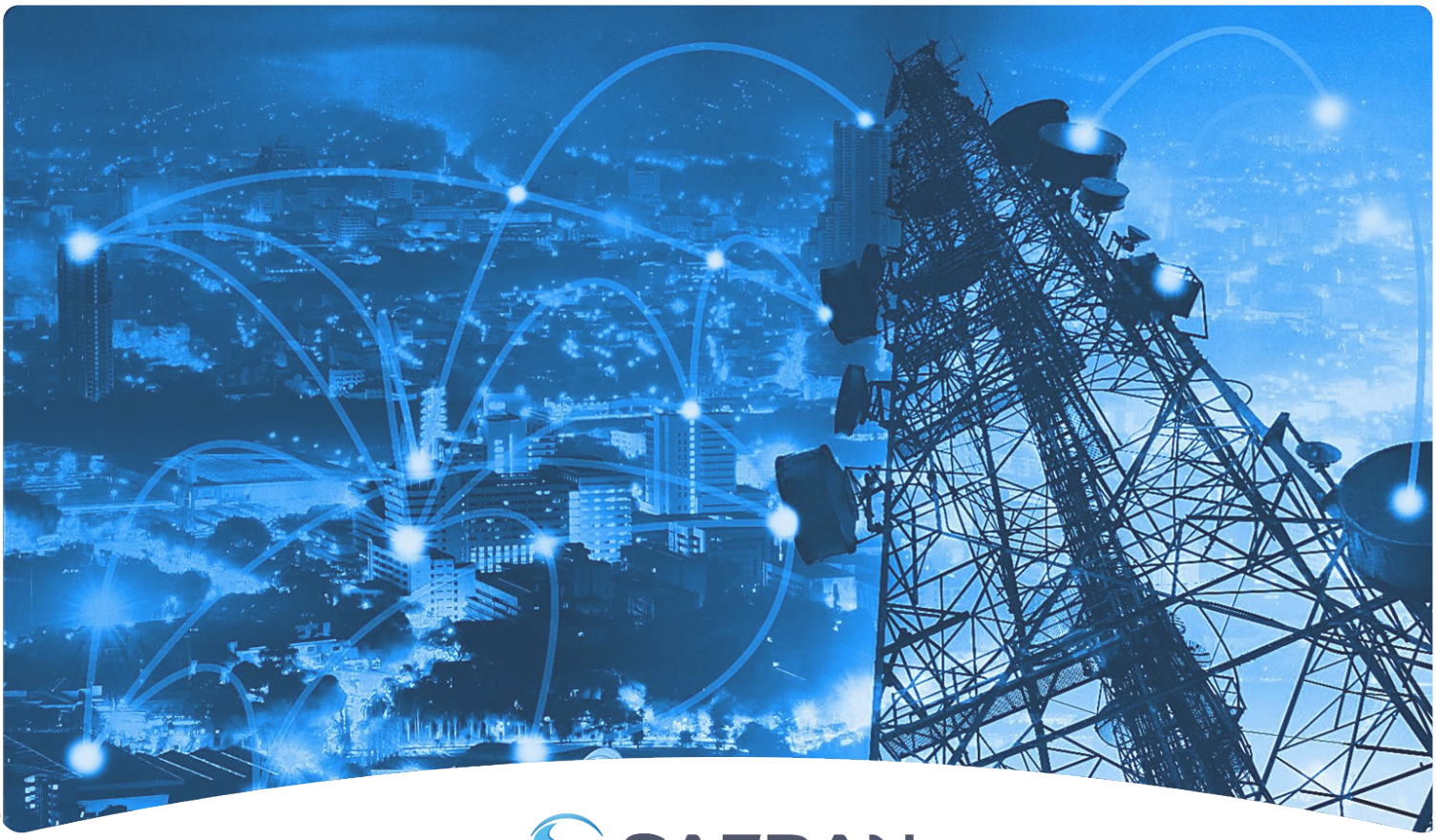
MIRA™

Miniature **R**ubidium **A**tomic clock

MAIN FEATURES

- High frequency stability miniature Rubidium atomic clock
- High performance integrated function
- Holdover <500ns within 24 hrs at fix temperature
- PPS disciplining
- Low SWaP (Size, Weight, Power) features.
- Low profile, reduced height to 16mm, ultra-portable packaging
- RoHS and REACH compliant
- Operating temperature: -20°C to +70°C (standard version), -40°C to +80°C (Ruggedized version)



SAFRAN

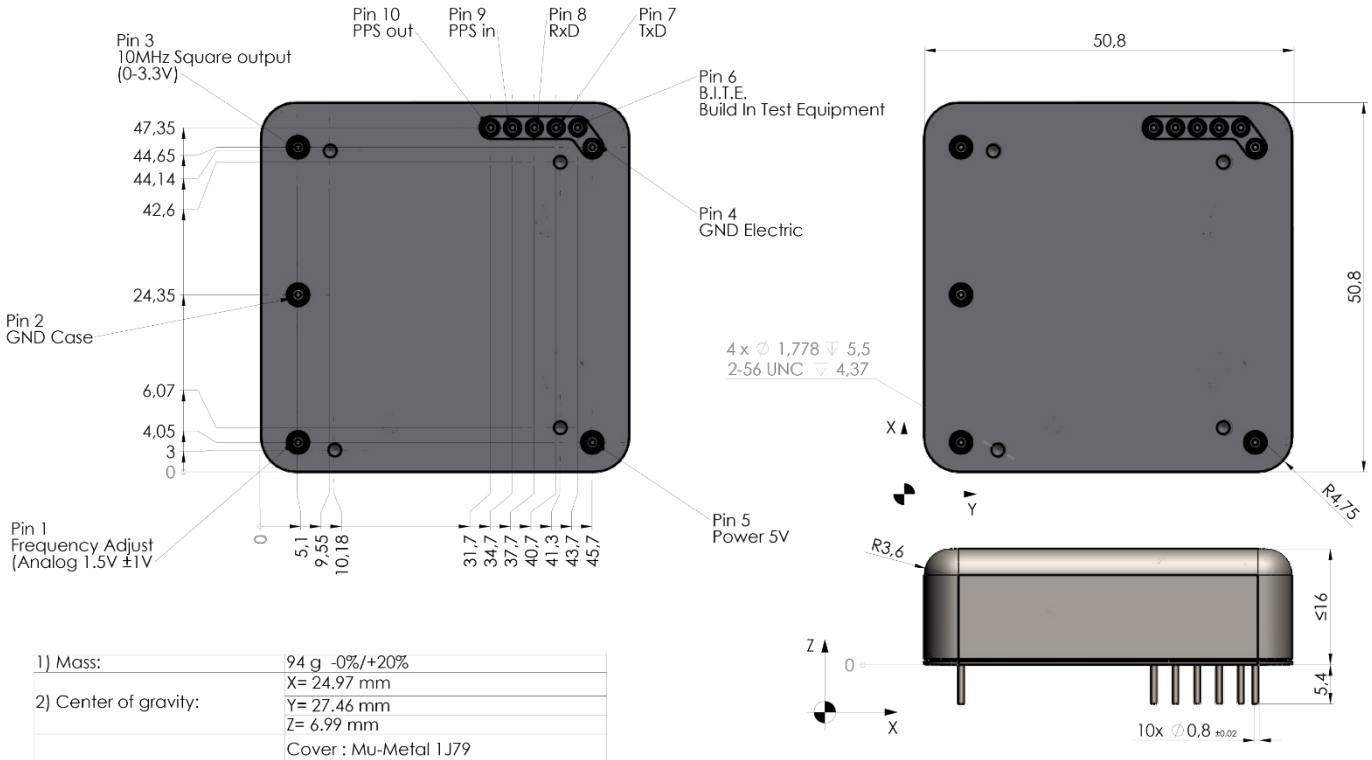
MIRA™

Micro Rubidium Atomic clock

SOLUTION

- Standard clock for industrial applications, Ruggedized clock for toughest applications.
- High stability frequency source.
- Telecom & mobile network synchronization.
- Military airborne, ground, mobile and unmanned radio communications.
- Oil & gas sensor-based exploration.
- Instrumentation.
- Portable & battery-sensitive applications.
- GPS/GNSS-based applications.

Package:
all dimensions in mm



1) Mass:	94 g -0%/+20%
2) Center of gravity:	X= 24.97 mm
	Y= 27.46 mm
	Z= 6.99 mm
4) Material:	Cover : Mu-Metal 1J79
	Base : Inox AISI 304
	Pin : Kovar 4J29 + Plating
7) Bottom Surface:	2466mm²
8) Interface roughness:	Ra 1.6

TECHNICAL SPECIFICATIONS

ELECTRICAL

Type	MIRA™	
	Standard version	**Ruggedized version**
Frequency	10 MHz	
Frequency change within operating temperature range	1E-10 peak-to-peak, <5E-12 / °C (TBC) over -20°C to +70°C	1E-10 peak-to-peak, <5E-12 / °C (TBC) over -40°C to +80°C
Linear drift measured over minimum 14 days After 3 months operations*	≤5E-12 / day	
Short term stability* 1 sec 10 sec 100 sec 1 000 sec 10 000 sec	 ≤ 4E-11 ≤ 1.3E-11 ≤ 4E-12 ≤ 3E-12 (typical) ≤ 5E-12 (typical)	
Phase noise (10 MHz) in dBc/Hz* 1 Hz 10 Hz 100 Hz 1000 Hz 10000 Hz	 ≤ -70 ≤ -97 ≤ -120 ≤ -135 ≤ -140	
Frequency retrace*	< 1E-10	
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 manual of the MIRA for electrical scheme)	± 5.4E-9 (± 20%) peak to peak	
Digital frequency adjustment range with serial RS-232 port.	Fine: ± 8.1E-9 (resolution 2.5E-13) ± 20% Coarse: ± 1E-7 (resolution 1.24E-9)	
Output level	Square wave 0-3V	
Spurious f_0 ± 100kHz	< -80dBc	
Supply voltage Max Power Supply Ripple	5V < 50 mV peak to peak (from 1Hz to 1 MHz frequency band)	
Input power @ 25°C	0.5W steady state 2.5W start-up 1.5W steady state, using high performance function 5W start up, using high performance function	
B.I.T.E. Indicator Alarm No Alarm	 > 2.7V (unloaded) < 0.4V	
Communication with serial RS-232 port	Rx and Tx signals are idle at low level (to invert polarity use option COMSTD)	

ENVIRONMENTAL**

Type	MIRA™	
Magnetic field sensitivity	< 1E-10/ Gauss, range [-1;+1] Gauss	
Storage Temperature	- 55°C to + 105°C	
Operating Temperature	- 20°C to + 70°C	- 40°C to + 80°C
	(maximum temperature of the thermal chamber with air flow around unit)	
Altitude	Meets MIL-STD-810H, Method 500.6 40 000 ft	Max 70,000 ft
Vibration	MIL-STD-810H, Method 514.8 annex C 4 gRMS	7.7 gRMS
Shocks	MIL-STD-202 30g, 11 ms, half sinus	50g, 11ms, half sinus
Acceleration		Load factor of 12g during 1mn in any axis or direction
Humidity	MIL-STD-810H, Method 507.6 35°C, 95% relative humidity	DO160G, section 6 65°C, 95%
g-tip-over test	2E-10/g on worst sensitive axis	
MTBF	MIL-HDBK-217F Notice 2 >150 000 h Ground Begnin at 40°C	Same to standard + >40 000 FH for ARW50 environment

*in stable temperature, gravity, pressure and magnetic field conditions

**pass/fail criteria = no loss of lock. Each one tested independently (no combination of environmental tests)

DISCIPLINING

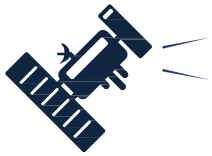
Type	MIRA™
PPSREF Level	CMOS 0 - 3V
PPSOUT Output Level Voltage Current	CMOS 0 - 3V 20mA sink/source (50Ω serial resistor)
PPSOUT Duty cycle programmable pulse width	100 ns/step from 0 to 1 s
PPSOUT to PPSREF Sync Error due to hardware delay	<50 ns No PPSRef noise, ± 1°C temp fluctuations
PPSOUT to PPSREF programmable delay	100ns/step from 0 to 1 s
PPSOUT Holdover Time Stability After one day disciplining Temperature window	< 500ns / 24 hr (Target) Within ± 0.2°C
Digital loop time constant	10s to 100,000s

PHYSICAL

Type	MIRA™
Size	50.8 x 50.8 x 16 mm (+/- 0.1mm) 2" x 2" x 0.63"
Weight	94 g 0/+20% 3.98 oz max
Volume	< 42 cc

MORE ON APPLICATIONS

MIRA™ has been designed to meet the highest requirements necessary to support various levels of military and commercial applications.



AEROSPACE

- GNSS operation through interference
- Low Earth Orbit satellite missions

MILITARY

- Military communication systems
- Key Infrastructure Emergency Vehicles
- Radars
- Aircraft and UAVs

COMMERCIAL

- Secured telecom
- Underwater geological applications
- Autonomous cars
- Aircrafts

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