

*Rubidium Atomic Frequency Standard (RAFS)*

## High Precision & Performance Source



*RAFS Core Module*

**Navigation | Space**

**Applications**

**Product Characteristics:**

- Volume 2 liters
- Thermal sensitivity over -10°C to 15°C  $< \pm 5 \times 10^{-14} / ^\circ\text{C}$
- Stability  $< 5 \times 10^{-14} / 10'000\text{sec}$
- Long term stability  $< 3 \times 10^{-10} / \text{year}$
- Power supply range 23V to 33V
- Output frequency 10MHz

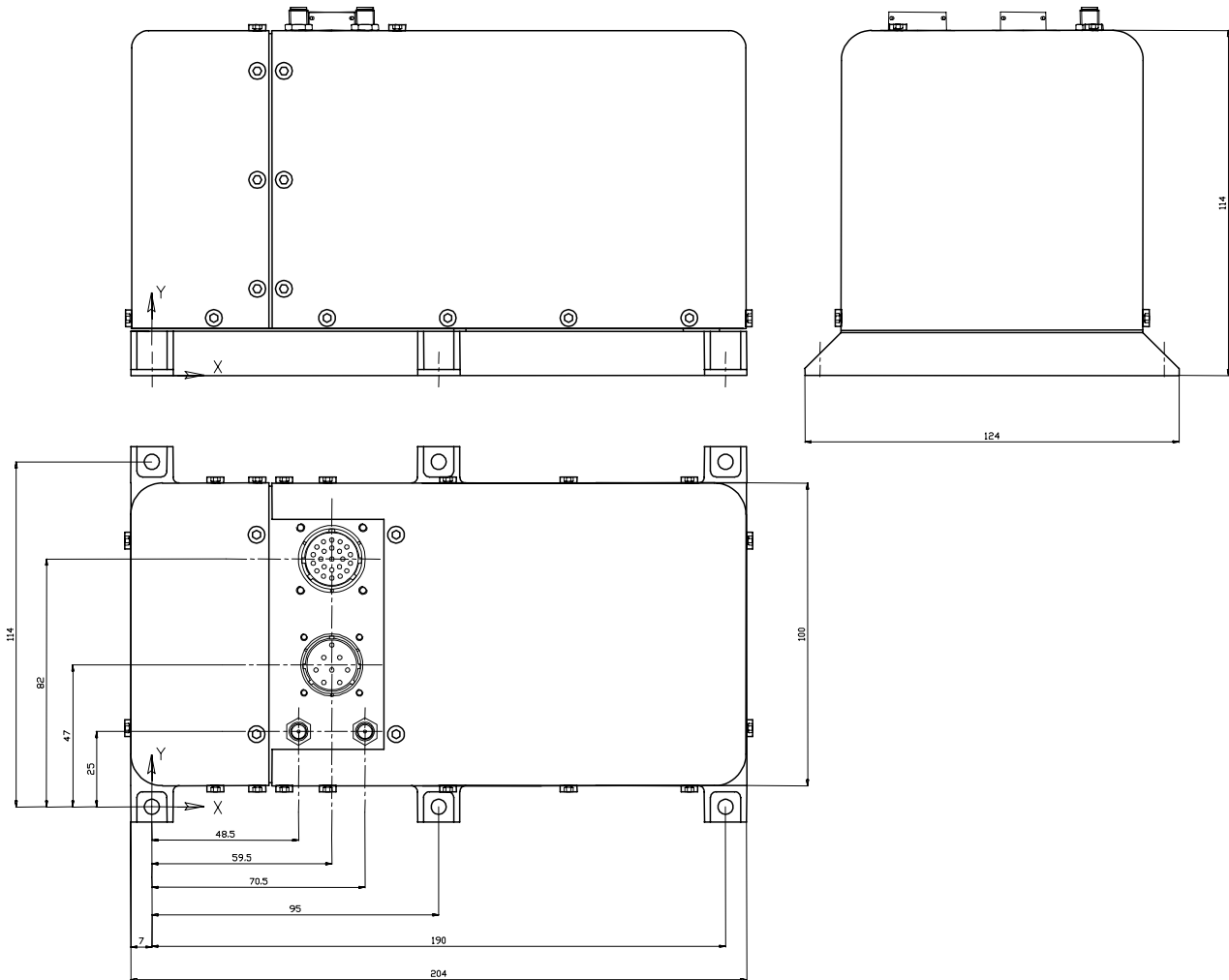
**Main Features:**

- Very low temperature sensitivity
- Excellent short term stability
- Small volume
- Rb lamp extended life expectancy (>20 years)

**Main Applications:**

- Navigation satellites
- Military communication satellites
- Tracking and guidance control
- Advanced low orbit digital communication sat.

**Package:** (all dimensions in millimeters)



**SPECIFICATIONS**

Ref.	Parameter	Requirement value	Unit
4.	PERFORMANCE REQUIREMENTS		
4.2	Frequency (sine) Main Auxiliary	10.00 10.00	MHz MHz
4.3	Frequency accuracy (after commissioning phase)	$\leq 5 \times 10^{-10}$	
4.4.1	Freq. Stab Short Term 1 sec 10 sec 100 sec 1000 sec 10000 sec (drift removed) flicker floor	$5 \times 10^{-12}$ $1.5 \times 10^{-12}$ $5 \times 10^{-13}$ $1.5 \times 10^{-13}$ $5 \times 10^{-14}$ $3 \times 10^{-14}$	
4.4.2	Freq. Stab Long Term	$3 \times 10^{-10}$	Per year
4.5	Outputs Signal Level	13 ±1	dBm
4.6	Return loss (nominal output impedance 50 Ω)	20	dB
4.7.1	Spurious Signals (band +/- 200KHz) Outside	< -80 < -60	dB dB
4.7.1	Harmonics	< -30	dBc
4.7.2	Phase Noise (TBD MHz) 1Hz 10 Hz 100 Hz 1000 Hz 10000 Hz 100000 Hz	-90 -120 -130 -140 -145 -145	dBc dBc dBc dBc dBc dBc
5	PHYSICAL REQUIREMENTS		
5.1	Envelope and dimensions	L=204 W=114 H=100	mm mm mm
5.2	Mass	3.4	Kg
5.7	Stiffness	> 100	Hz
6	OPERATIONAL REQUIREMENTS		
6.2.1	Design Lifetime	12	Years
7	INTERFACE REQUIREMENTS		
7.1	ELECTRICAL POWER INTERFACE		
7.1.2	Normal Power Line Voltage	23 to 33	V
7.2	TM/TC INTERFACE		
7.2.4	TC List RAFS ON RAFS OFF	HLC HLC	
7.2.5	TM List RAFS ON/OFF RAFS Lock Indication RAFS Rb Light RAFS Rb Signal I/P Main Bus Voltage Main Bus Current TCB Temperature EPC Temperature	Relay/Switch Relay/Switch 0-5 0-5 0-5 0-5 NTC NTC	V V V V
7.3	STRUCTURAL & MECHANICAL INTERFACES		
7.3.3	Surface Finish-Flatness		

Ref.	Parameter	Requirement value	Unit
	Overall contact area	< 0.2	mm
	Local flatness	< 0.1/100	mm/mm
	Roughness	< 3.2	µm
7.3.5	Interconnections		
	RF outputs	SMA	
	TM/TC Interface	MS27508EF35SA	
	Power Interface	MS27508E10F99P	
7.4	ENVIRONMENTAL & THERMAL INTERFACE		
7.4.3	Interface Heat Flux	<0.3	W/cm <sup>2</sup>
7.4.4	Power dissipation		
	During warm-up	< 55	W
	During nominal operation	< 35	W
7.4.5	Temperature limits		
	Operating	-5 to +10	°C
	Short-term variation	<= +/- 1	°C
	Acceptance	-10 to +15	°C
	Qualification	-15 to + 20	°C
	Cold start	-21	°C
	Non-operating	-15 to + 70	°C
9.	PRODUCT ASSURANCE TECHNICAL REQUIREMENTS		
9.2.3	Reliability target over 12 years	0.90	
10.2	IN ORBIT ENVIRONMENTS		
10.2.1	Vacuum level	10 <sup>-5</sup>	mbar
10.2.2	Magnetic field	< +/- 0.5	Gauss
11.5.1	Radiation Environment.	MEO orbit	