

IMASER 3000

SMART ACTIVE HYDROGEN MASER CLOCK



The iMaser 3000 clock is a state-of-the-art, high-performance and smart maser, integrating intelligent functionality in a compact, cost-effective and maintenance-free package. It utilizes the latest maser technologies and active/sleep mode of operations for extended lifetime.

The field lifetime of the iMaser is over 40 years, and maser clocks deployed since 1982 are still working perfectly today.

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

State-of-The-Art Performance & Features

Swiss Quality & Technology

- . Ceramic Cavity technology
- . Technology solutions for higher stability performance
- . Durable Teflon & Bulb Coating technology for over 20 years lifetime
- . Remote Distance control & monitoring for higher reliability & maintenance-free operation

Ultra High Frequency Stability

- . Allan deviation (1Hz bandwidth):

1 s **$6 \cdot 10^{-14}$**

1'000 s $1.5 \cdot 10^{-15}$

10'000 s $1 \cdot 10^{-15}$

Low Phase Noise (5MHz)

- . **-132 dBc/Hz @ 1Hz**

High Electromagnetic Compliance

- . **CE** compliant
- . EN 55032 Class B & EN 61000-4 (NEW Standard 2022)

Advanced Features

- . Cavity Tuning allows a long term drift better than $2 \cdot 10^{-16}$ /day
- . Distance control, remote Ethernet monitoring & Self-diagnostics (Alarms)

Warranty/Maintenance

- . 2 years
- . Catalog of maintenance contracts (Platinum, Gold Silver, Bronze, Basic Monitoring)

Lifetime

- . >20 years



Key Applications

- Ground segment of space station/facility
- Radio telescope techniques : VLBI, SLR
- Precise Time station/facility :
Navigation/GNSS
- Time keeping & precision time scales
- Frequency reference source

Technical Specifications

FREQUENCY STABILITY

Allan Deviation (1 Hz BW)				
1Hz bandwidth	Standard	Option LN	Option ST	Option UST
1 s	1.5·10 ⁻¹³	1·10 ⁻¹³	8·10 ⁻¹⁴	6·10 ⁻¹⁴
10 s	2·10 ⁻¹⁴	2·10 ⁻¹⁴	1.8·10 ⁻¹⁴	1.5·10 ⁻¹⁴
100 s	5·10 ⁻¹⁵	5·10 ⁻¹⁵	4·10 ⁻¹⁵	4·10 ⁻¹⁵
1 ks	2·10 ⁻¹⁵	2·10 ⁻¹⁵	2·10 ⁻¹⁵	1.5·10 ⁻¹⁵
10 ks	2·10 ⁻¹⁵	1.5·10 ⁻¹⁵	1.2·10 ⁻¹⁵	1·10 ⁻¹⁵

PHASE NOISE (BW=0.5 Hz)

Output	5 MHz		10 MHz		100 MHz	
Hz	Standard [dBc/Hz]	Option LN/ST/UST	Standard [dBc/Hz]	Option LN/ST/UST	Standard [dBc/Hz]	Option LN/ST/UST
1	-118	-130/-131/-132	-112	-124	-92	-102/-102/-102
10	-135	-142/-142/-148	-129	-136	-105	-113/-116/-117
100	-145	-152/-152/-158	-139	-147	-115	-125/-125/-127
1k	-152	-156/-156/-159	-146	-151	-125	-148
10k	-155	-156/-158/-159	-149	-153	-145	-154
100k	-155	-156/-158/-160	-149	-153	-145	-155

ENVIRONMENTAL

	Standard	Option	[unit]	Option code
Temperature sensitivity [°C]	<5·10 ⁻¹⁵	<8·10 ⁻¹⁶	/°C	HCB
Phase sensitivity to temperature between sine outputs	<10	<2	ps/°C	HCB
Magnetic sensitivity	<5·10 ⁻¹⁴	<1·10 ⁻¹⁴	/G	MS
Frequency sensitivity to vibration*	<1·10 ⁻⁹	<5·10 ⁻¹⁰	/g	LN/ST/UST
Power source sensitivity:	<1·10 ⁻¹⁵	<1·10 ⁻¹⁵	/V	

OUTPUTS

	Standard	Option	Option	Option code
5 MHz	2			
10 MHz	0	2	4	O2/O4
100 MHz	2			
1 PPS	1	2	4	PPS2/PPS4

5 / 10 / 100 MHz			[unit]	
Level (50 Ω)	+13	±1.5	dBm	
Isolation between RF output ports	>	85	dB	
Spectral purity	<	-45	dBc	2nd harm.
Spurious	<	-70	dBc	

1 PPS TIMING	Output	Sync Input	[unit]	Rem
Amplitude	>2.3	>2.3	V	50 Ω/TTL
Pulse width	100 μs	>100	ns	
Rise/fall time	<2 ns	<1	μs	
Jitter	<25 ps	<1	μs	
User settable		40	ns/step	

POWER

	Nominal		[unit]	Rem
AC	110-220	85-135 176-264	V	50-60Hz
DC	24	22-30	V	4 A typical
Power	100	30-220	W	Standby-Operation Warm up
Battery	24V	0.25	hours	BATi
Battery pack	24V	15	hours	BAT1
2 nd pack	24V	32	hours	BAT2

ADVANCED FEATURES

- Remote Ethernet monitoring: LAN HTTP, FTP, open source thru Windows, Linux or Mac
- Distance control & distance maintenance (DC)
- Cavity Tuning, Long term drift: 2·10⁻¹⁶/day** (CT)

* Sized by the Ultra Stable Oscillator acceleration sensitivity.

** Typically achieved within ±0.1 °C/day ambient temperature or with ±0.5 °C/day the HCB ultra-low temperature sensitivity and CT SmarTuning options after a long period of continuous, undisturbed operation.

CONTROL

- Frequency resolution 1.6·10⁻¹⁷
- Frequency tuning range 1·10⁻⁸

ELECTROMAGNETIC COMPLIANCE

- CE compliance
- EN 55032 Class B
- EN 60950-1 :2001+a11 :2004
- EN 61000-4

MECHANICAL

- Size (WxDxH) 60x80x91 cm 23.7x31.5x35.9 "
- Weight 120 kg / 265 lbs (Depends on options), 41 kg / 90 lb per battery pack

WARRANTY/MAINTENANCE

- 2 years
- Catalog of maintenance contracts (Platinum, Gold Silver, Bronze, Basic Monitoring)

LIFETIME

- >20 years

ORDERING information

- Instructions iMaser3000 / xx / xx / xx

Options

(xx - option codes)

LN/ST/UST	Low Noise OCXO/(Ultra) best Short Term
HCB	Active Heater-Cooler-Box (climatic chamber)
MS	Magnetic Sensitivity
O2/O4	2/4 10MHz outputs
PPS2/PPS4	2/4 x1PPS outputs
BATx	Battery pack (IATA Approved)
CT	Cavity tuning
DC	Distance control
FAT	Factory Acceptance Test
SAT	Site Acceptance Test
Delivery	Delivery according to Incoterms 2020
Training	Dedicated on site or remote training
Installation	On site installation
Examples:	iMaser3000/BAT2/O4/ST/RE

**POWERED
BY TRUST**



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