

30

YEARS OF LEADERSHIP IN MASER CLOCK TECHNOLOGY

iMaser 3000™

SMART ACTIVE HYDROGEN MASER CLOCK

State-of-The-Art Performance & Features



Swiss Quality & Technology

- Ceramic Cavity technology for lowest thermal sensitivity ($<8 \cdot 10^{-16}/^{\circ}\text{C}$)
- Sensitivity in temperature change technology for higher stability performance
- Durable Teflon & Bulb Coating technology for over 20-year lifetime
- Remote Distance control & monitoring for higher reliability & maintenance-free operation

Ultra High Frequency Stability


- Allan deviation (1Hz bandwidth):

1 s	$7.0 \cdot 10^{-14}$	(new option 2018)
1'000 s	$2 \cdot 10^{-15}$	
10'000 s	$1.2 \cdot 10^{-15}$	
Long term	$2 \cdot 10^{-16}$	

Low Phase Noise (5MHz)

- -131 dBc/Hz @ 1Hz (new option 2018)

High Electromagnetic Compliance

-  compliance per ISO 17025,
- EN 55022 Class B, EN 55024 & EN 61326-1

Advanced Features

- Auto cavity SmarTuning™ capability
- Distance control, monitoring & self-diagnostics

Warranty

- 2 years, extendable to 5 or 7 years

Lifetime

- >20 years

Key Applications

- VLBI
- SLR
- Deep space tracking
- Navigation
- Frequency reference source
- Time keeping & precision time scales
- GNSS satellite monitoring & geodesy



iMaser™ 3000 Specifications

FREQUENCY STABILITY

Allan Deviation				
1Hz bandwidth	Standard*	LN*	ULN*	ST*
1 s	$1.5 \cdot 10^{-13}$	$1.2 \cdot 10^{-13}$	$1 \cdot 10^{-13}$	$7.0 \cdot 10^{-14}$
10 s	$2 \cdot 10^{-14}$	$2 \cdot 10^{-14}$	$2 \cdot 10^{-14}$	$1.8 \cdot 10^{-14}$
100 s	$5 \cdot 10^{-15}$	$5 \cdot 10^{-15}$	$5 \cdot 10^{-15}$	$4 \cdot 10^{-15}$
1 ks	$2 \cdot 10^{-15}$	$2 \cdot 10^{-15}$	$2 \cdot 10^{-15}$	$2 \cdot 10^{-15}$
10 ks	$2 \cdot 10^{-15}$	$1.2 \cdot 10^{-15}$	$1.2 \cdot 10^{-15}$	$1.2 \cdot 10^{-15}$

PHASE NOISE

Output Hz	5 MHz		10 MHz		100 MHz	
	Standard [dBc/Hz]	Option LN/ULN/ST	Standard [dBc/Hz]	Option LN/ULN/ST	Standard [dBc/Hz]	Option LN/ULN/ST
1	-118	-130/-130/-131	-112	-123	-92	-100
10	-135	-142	-129	-135	-105	-113
100	-145	-152	-139	-145	-115	-122
1k	-152	-156	-146	-150	-125	-148
10k	-155	-156/-158/-160	-149	-150	-145	-151
100k	-155	-156/-158/-160	-149	-150	-145	-151

ENVIRONMENTAL

	Standard	Option	[unit]	Option code
Temperature sensitivity [°C]	$<5 \cdot 10^{-15}$	$<8 \cdot 10^{-16}$	/°C	(HCB)
Phase sensitivity to temperature between sine outputs	<10	<2	ps/°C	(HCB)
Magnetic sensitivity	$<5 \cdot 10^{-14}$	$<1 \cdot 10^{-14}$	/G	(MS)
Frequency sensitivity to vibration	$<1 \cdot 10^{-9}$	$<5 \cdot 10^{-10}$	/g	(ULN/ST)
Power source sensitivity:	$<1 \cdot 10^{-15}$	$<1 \cdot 10^{-15}$	/V	

OUTPUTS

5 MHz	10 MHz	100 MHz	1 PPS	Opt code
2	0	2	1	Standard
	2			(O2)
	4			(O4)
			2	(PPS2)

	5 / 10 / 100 MHz	[unit]	
Level (50 Ω)	+12	±1	dBm
Isolation	>	80	dB
Spectral purity	<	-40	dBc
Spurious	<	-70	dBc

1 PPS TIMING	Output	Sync Input	[unit]	Rem
Amplitude	2.5	2.5	V	50 Ω/TTL
Pulsewidth	100 μs	>100	ns	
Rise time	<4 ns	<1	μs	
Jitter	<40 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	3 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 (RE)
- Remote Distance Ethernet controls & distance maintenance (DC)
- Auto cavity Tuning™, Long term drift: $2 \cdot 10^{-16}$ /day** (CT)

* Achieved with the advanced LowSensitivity™ in temperature change technology, providing an ultra-low temperature sensitivity of up to $<8 \cdot 10^{-16}$ /°C

** 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 6.4·10⁻¹⁵ 1·10⁻¹⁶ (CT)
- Frequency tuning range $\pm 3 \cdot 10^{-8}$

ELECTROMAGNETIC COMPLIANCE

- CE compliance per ISO 17025,
- EN 55022 Class B, EN 55024 & EN 61326-1

MECHANICAL

- Size (WxDxH) 60x80x91 cm
23.7x31.5x35.9"
- Weight 100 kg / 220 lb
40 kg / 88 lb per battery pack

WARRANTY

- 2 years on site
- Extendable to 5 or 7 years (W5 / W7)

LIFETIME

- >20 years

ORDERING information

- Instructions iMaser3000 / xx / xx / xx

Options

(xx – option codes)

LN/ULN/ST

VLBI

HCB

MS

O2/O4

PPS2

BATx

CT

RE

DC

Wx

(Ultra) Low Noise OCXO / best Short Term recommended option for VLBI
Active Heater-Cooler-Box
Extra Magnetic shield
2/4 10MHz outputs
2 x1PPS outputs
Battery pack (IATA Approved)
Cavity tuning
Remote Ethernet control
Remote Distance control & maintenance
Extension of warranty

Examples: iMaser3000/BAT2/O4/ULN/RE/W5



©T4Science

swissmaser@t4science.com +41.32.731.8008

Europe Headquarters

www.T4Science.com

Data is subject to change without prior notice. V18/04/20