

40

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 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

- Auto cavity SmarTuning™ new generation (NEW 2022)
- Distance control, Remote monitoring & Self-diagnostics

Warranty/Maintenance

- 2 years
- Extendable yearly

Lifetime

- >20 years

Key Applications

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



iMaser™ 3000 Specifications

FREQUENCY STABILITY

Allan Deviation (1 Hz BW)				
1Hz bandwidth	Standard*	Option LN*	Option ST	Option UST*
1 s	$1.5 \cdot 10^{-13}$	$1 \cdot 10^{-13}$	$8 \cdot 10^{-14}$	$6 \cdot 10^{-14}$
10 s	$2 \cdot 10^{-14}$	$2 \cdot 10^{-14}$	$1.8 \cdot 10^{-14}$	$1.5 \cdot 10^{-14}$
100 s	$5 \cdot 10^{-15}$	$5 \cdot 10^{-15}$	$4 \cdot 10^{-15}$	$4 \cdot 10^{-15}$
1 ks	$2 \cdot 10^{-15}$	$2 \cdot 10^{-15}$	$2 \cdot 10^{-15}$	$1.5 \cdot 10^{-15}$
10 ks	$2 \cdot 10^{-15}$	$1.5 \cdot 10^{-15}$	$1.2 \cdot 10^{-15}$	$1 \cdot 10^{-15}$

PHASE NOISE (BW=0.5 Hz)

Output Hz	5 MHz		10 MHz		100 MHz	
	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]	$<5 \cdot 10^{-15}$	$<8 \cdot 10^{-16}$	/°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	LN/ST/UST
Power source sensitivity:	$<1 \cdot 10^{-15}$	$<1 \cdot 10^{-15}$	/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	>	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
- Remote Distance Ethernet controls & distance maintenance
- Auto cavity Tuning™, Long term drift: $2 \cdot 10^{-16}$ /day** (RE/DC) (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 $1.6 \cdot 10^{-17}$
- Frequency tuning range $1 \cdot 10^{-8}$

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 100 kg / 220 lb
41 kg / 90 lb per battery pack

WARRANTY/MAINTENANCE

- 2 years
- Extendable to yearly to Platinum/Gold/Silver/Bronze

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	Extra Magnetic shield
O2/O4	2/4 10MHz outputs
PPS2/PPS4	2/4 x1PPS outputs
BATx	Battery pack (IATA Approved)
CT	Cavity tuning
RE/DC	Remote Ethernet and 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

