

Evergreen-30 (EG-30)

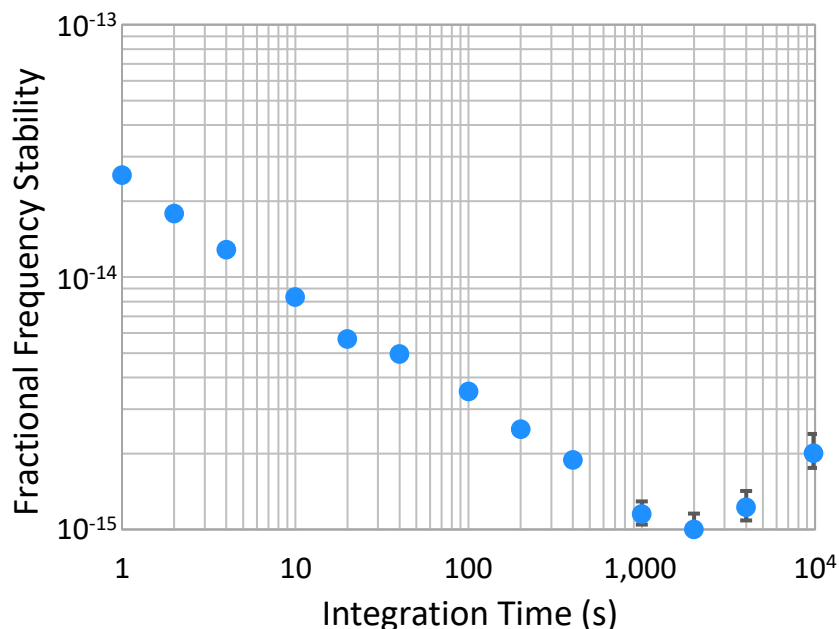
Rackmount Optical Clock



All-in-one solution for microwave and optical timekeeping

Evergreen-30 is a turnkey, high-performance iodine optical clock in a rackmount package. Pairing precision optical spectroscopy with a robust frequency comb produces microwaves with superior phase noise and short-term stability versus microwave clocks. EG-30 leverages the inherent environmental insensitivity of molecular iodine to provide excellent long-term performance. The unique combination of performance, environmental immunity, and size supports applications including VLBI, GNSS resilience, data center synchronization, coherent radar, quantum computing, and optical metrology.

Optical outputs provide an unmodulated 1064 nm wavelength reference and 1560 nm frequency comb light to extend clock stability to additional spectral regions.



Features

- Instability 2.5×10^{-14} at 1 s; 5×10^{-15} at 1 d
- Ultralow phase noise microwaves
- 100 MHz, 10 MHz, 5 MHz, and 1 PPS
- 1064 nm CW and 1560 nm comb output
- Low environmental sensitivity
- 3U 19-inch rackmount package
- Automated operation
- Vacuum- and cavity free-design



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SPECIFICATIONS AT 25°C

Allan Deviation – All outputs (Overlapping ADEV; No drift removal)	τ (s)	Typical	Maximum
	1	2.5×10^{-14}	4×10^{-14}
	10	8×10^{-15}	1.3×10^{-14}
	10^2	2.5×10^{-15}	4×10^{-15}
	10^3	1.2×10^{-15}	4×10^{-15}
	10^4	3×10^{-15}	6×10^{-15}
	10^5	5×10^{-15}	10^{-14}
Drift Rate (Uncompensated)	$< 4 \times 10^{-15}$ /day (Typical)		
Retrace (4-hours off, same conditions)	$< 2 \times 10^{-14}$ (Typical)		

ENVIRONMENTAL SENSITIVITY

Temperature	$< 2 \times 10^{-14}$ /°C
Magnetic Field	$< 10^{-14}$ /G
Orientation	$< 2 \times 10^{-14}$ /g; Operational in any orientation

MICROWAVE OUTPUTS

Outputs (Sine Wave)	5, 10, and 100 MHz; +13 dBm Typical			
Phase Noise (Typical, dBc/Hz)	Offset	5 MHz	10 MHz	100 MHz
	1 Hz	Available mid-2025	-124	-106
	10 Hz		-142	-127
	100 Hz		-154	-143
	1 kHz		-162	-153
	10 kHz		-168	-160
	100 kHz		-169	-160
Frequency Adjustment	< 10 ⁻¹⁷ step, 10 ⁻⁹ range, drift compensation feature			

CW LASER OUTPUT

Center Wavelength	1064.490 nm (Vacuum)
Output Power	0.5 mW; No modulation on output
Optical Frequency Setpoint	281,630,061.800 ± 0.5 MHz; Fixed and factory set

FREQUENCY COMB OUTPUT

Center Wavelength	1560 ± 1 nm
Output Power	0.5 mW
Bandwidth / Repetition Rate	> 20 nm FWHM / 200 MHz



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PPS OUTPUT AND SYNC

Amplitude	2.5 V into 50 Ω (Input and Output)
Pulse Width	20 μ s (user adjustable)
Rise/Fall Time	3 ns
Pulse delay/advance	Up to 0.5 s (user adjustable)
Jitter	< 25 ps
Synchronization to PPS Input	< 5 ns

CHASSIS AND INTERFACE

Volume	29 L (17"×5.2"×20"); 3U rackmount
Power	110 – 120 V _{AC} , 50 – 63 Hz
Weight	20 kg
Microwave and PPS connectors	SMA, 50 Ω
Optical Connectors	FC/APC, PM980 fiber, PM1550 fiber
Laser Safety	IEC 60825-1, Class 1
Control and Telemetry	Touchscreen, Ethernet port, REST API, Web GUI
Mounting	19" rackmount kit included

OPERATING PARAMETERS

Operating Temperature	18 – 35 °C (Non-condensing)
Power Consumption	80 W at 25 °C after 30-minute warm-up

MODEL

EG-30-LN-OPT	Optical outputs included
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