

The purest HF to X-band reference source available

Based on a whispering gallery mode of a cryogenically cooled sapphire crystal, Quantx's **Cryoclock** is an ultra-low phase-noise oscillator that produces extremely stable signals from HF to X-band.

Key features and benefits:

- **World-leading close-to-carrier phase noise**
Phase noise < -102 dBc/Hz (10.6 GHz) and < -135 dBc/Hz (100 MHz) @ 1 Hz offset
- **Ultra-high stability up to 10,000 seconds**
Fractional frequency stability of 6×10^{-16} @ 1 s and 1×10^{-14} @ 10,000 s (at 10.6 GHz)
- **Broad range of output frequencies**
Ultra-low-noise frequency synthesis from 12 GHz to 10 MHz and 1 PPS, and customisable on request
- **Closed-system cryogenic cooling**
Continuous operation with low maintenance cycle of 20,000 hours

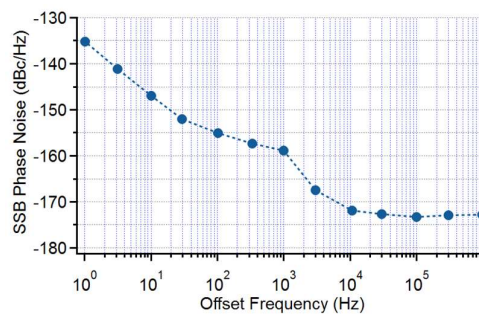


Applications:

- Over-the-horizon Defence radars
- Trapped ion quantum computing
- GNSS satellite monitoring and geodesy
- Deep-space tracking and VLBI
- Ultra-precise laboratory reference
- Local oscillator for atomic clocks

Phase noise (for selected output frequencies)

Output	10.6 GHz		1.0 GHz		100 MHz	
Offset (Hz)	Typ. (dBc/Hz)	Max (dBc/Hz)	Typ. (dBc/Hz)	Max (dBc/Hz)	Typ. (dBc/Hz)	Max (dBc/Hz)
1	-102	-97	-116	-110	-135	-130
10	-115	-110	-129	-125	-146	-140
100	-120	-115	-133	-128	-154	-149
1,000	-130	-127	-142	-137	-158	-152
10,000	-135	-130	-149	-145	-172	-167
100,000	-138	-133	-150	-145	-172	-167



The purest HF to X-band reference source available

Frequency stability (for selected output frequencies)

Output	10.6 GHz		1.0 GHz		100 MHz	
Averaging time (s)	ADEV (Typ.)	ADEV (Max)	ADEV (Typ.)	ADEV (Max)	ADEV (Typ.)	ADEV (Max)
1	6×10^{-16}	3×10^{-15}	8×10^{-16}	4×10^{-15}	1×10^{-15}	4×10^{-15}
10	6×10^{-16}	3×10^{-15}	7×10^{-16}	3×10^{-15}	7×10^{-16}	3×10^{-15}
100	8×10^{-16}	3×10^{-15}	9×10^{-16}	3×10^{-15}	9×10^{-16}	3×10^{-15}
1,000	1×10^{-15}	7×10^{-15}	2×10^{-15}	7×10^{-15}	2×10^{-15}	7×10^{-15}
10,000	4×10^{-15}	1×10^{-14}	4×10^{-15}	1×10^{-14}	6×10^{-15}	1×10^{-14}

Ordering information

Part #: CRYOCLOCK-XXX-F1-P1-F2-P2-...Fn-Pn-PPS

XXX = Connector type (e.g. SMA, BNC, etc)
Fn = Output frequencies (12 GHz to 10 MHz)
Pn = Corresponding output power in dBm;
Omit final -PPS if 1 PPS output not required

(Example for 8 dBm@10.6 GHz, 10dBm@10 GHz,
10 dBm@10 MHz, and 1 PPS SMA outputs
Part #: CRYOCLOCK-XXX)

1PPS output (optional)

	Output
Amplitude (50 Ω LVTTTL)*	2.5 V (peak-peak)
Pulse width*	20 μs
Time synchronisation resolution	10 ns

*Amplitude and pulse width customisable on request

Other specifications **

Power consumption (peak)	7.0 kW @ 50 Hz (3-phase***)
Cooling method	Water (forced air option available)
Weight (approx.)	80 kg (+ compressor 110 kg)
Dimensions (approx.)	1 m × 1 m × 1 m Compressor: 0.6 m × 0.5 m × 0.5 m
Environmental temperature	+15°C to +30°C
Warranty	1 year on-site or 12,000 hours

**Currently in design-engineering phase to significantly reduce size, weight and power of the oscillator. Specifications subject to change.

***Single phase power option is also available



QuantX Labs reserves the rights to change this document at any time without notice.