

# Disciplined Oscillator *Options*

## For GPS-Synchronized Time & Frequency Modules

**EndRun's Precision Timing Modules (Ninja and RTM3205) can be upgraded with various oscillators to improve holdover accuracy, short-term stability, and phase noise.** While the basic Ninja Precision Timing Module has a high-performance temperature-compensated crystal oscillator (HP-TCXO), the RTM3205 does not. Both modules can be configured with one of the oven-controlled crystal oscillators (OCXOs). For state-of-the-art, industry-leading performance, the oscillators are individually characterized and hand-selected. We guarantee our OCXOs are free of sudden frequency steps - an industry exclusive.

### KEY BENEFITS

- Industry-leading Phase Noise
- Industry-leading Short-Term Stability
- No Frequency Steps (OCXOs)
- Improved Holdover Accuracy



### OCXO Options

The OCXO options are: Medium-Stability (MS), High-Stability (HS), and Ultra-Stable (US). These proprietary OCXOs feature SC-cut crystals for fast warmup, low ageing and phase noise. By using premium, high-Q 5 MHz crystals and a frequency doubler, 5 and 10 MHz outputs are provided with exceptional close-in phase noise performance, stability, and deliver state-of-the-art long term ageing.

Relative to the HP-TCXO (Ninja only), the cost-effective MS-OCXO provides two orders-of-magnitude improvement in temperature stability, ageing, short-term stability and phase noise performance. The HS-OCXO has additional stability and phase noise performance. The US-OCXO provides industry-leading close-in phase noise, and provides sinewave outputs with the highest spectral purity

for demanding applications such as satellite communications, signal intelligence, and radar. For optimal oscillator stability, these Precision Timing Modules can be configured with the [Real-Time Ionospheric Corrections \(RTIC\) Option](#). RTIC enhances the mid- and long-term stability by measuring and compensating for ionospheric delays in real-time.

### Oscillator Options - Summary Performance Data

	HP-TCXO*	MS-OCXO	HS-OCXO	US-OCXO
<b>Temp Stability</b>	$1 \times 10^{-6}$	$4 \times 10^{-9}$	$1 \times 10^{-9}$	$5 \times 10^{-10}$
<b>Temp. Range °C</b>	0 to +70	0 to +70	0 to +70	0 to +70
<b>Ageing Rate/Year</b>	$1 \times 10^{-6}$	$3 \times 10^{-8}$	$3 \times 10^{-8}$	$3 \times 10^{-8}$
<b>Allan Deviation @ 1 sec</b>	$1.0 \times 10^{-10}$	$3.0 \times 10^{-12}$	$1.0 \times 10^{-12}$	$6.0 \times 10^{-13}$
<b>10 sec</b>	$4.0 \times 10^{-11}$	$3.9 \times 10^{-12}$	$1.3 \times 10^{-12}$	$6.0 \times 10^{-13}$
<b>100 sec</b>	$4.0 \times 10^{-11}$	$3.0 \times 10^{-12}$	$1.7 \times 10^{-12}$	$8.5 \times 10^{-13}$
<b>1k sec</b>	$4.0 \times 10^{-12}$	$2.0 \times 10^{-12}$	$1.5 \times 10^{-12}$	$8.0 \times 10^{-13}$
<b>10k sec</b>	$4.0 \times 10^{-13}$	$4.0 \times 10^{-13}$	$4.0 \times 10^{-13}$	$4.0 \times 10^{-13}$
<b>100k sec</b>	$6.0 \times 10^{-14}$	$6.0 \times 10^{-14}$	$6.0 \times 10^{-14}$	$6.0 \times 10^{-14}$
<b>Phase Noise dBc/Hz:</b>	<b>10MHz</b>	<b>10 / 5MHz</b>	<b>10 / 5MHz</b>	<b>10 / 5MHz</b>
<b>1 Hz</b>	-70	-95 / -100	-105 / -110	-110 / -115
<b>10 Hz</b>	-100	-120 / -130	-130 / -135	-135 / -140
<b>100 Hz</b>	-130	-135 / -140	-140 / -145	-148 / -152
<b>1 kHz</b>	-140	-145 / -150	-150 / -155	-152 / -155
<b>10 kHz</b>	-145	-145 / -150	-150 / -155	-153 / -155
<b>100 kHz</b>	-145	-145 / -150	-150 / -155	-153 / -155

NOTE: OCXO phase noise specifications are guaranteed with Low-Phase-Noise Option. HP-TCXO phase noise specifications are typical.

\* The High-Performance TCXO (HP-TCXO) is not available in the RTM3205.

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