

Ten64

DATA SHEET

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The VM Photonics **Ten64** is a single frequency continuous-wave solid-state laser providing up to 400 mW output power at a wavelength of 1064 nm.

In a unique combination of the well established non-planar ring oscillator cavity design (Nd:YAG NPRO) with our completely new development of ultra low-noise electronics, the **Ten64** exhibits a significantly improved laser noise performance compared to previously available products.

The result is a continuous-wave single mode, ultra-stable, and narrow linewidth output laser field with a free running relative power noise below -140 dB/Hz ($1 \times 10^{-7} / \sqrt{\text{Hz}}$). An additional internal power noise suppression system can be activated to reduce the noise down to even -160 dB/Hz ($1 \times 10^{-8} / \sqrt{\text{Hz}}$). The frequency noise from 1 Hz to 10kHz is below $2 \text{ kHz} / f \text{ Hz } \sqrt{\text{Hz}}$. The **Ten64** also offers an operating mode with lower output power, which further reduces the laser frequency noise (see last page of this datasheet).



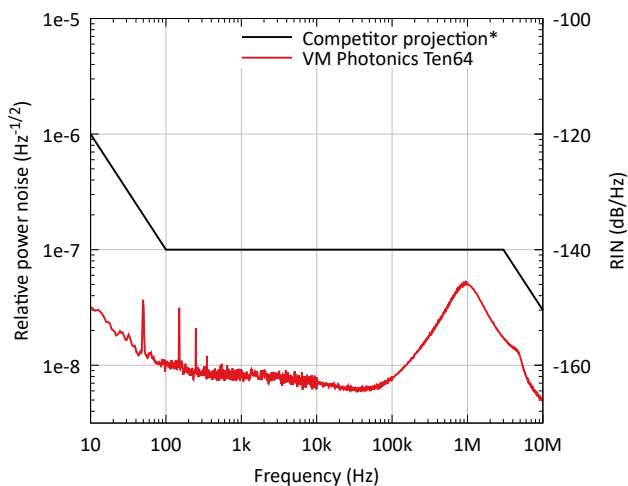
The Ten64 is the next generation laser source and perfectly suited for demanding applications in:

- Gravitational wave detection, e.g. low noise seed laser for high power amplifiers
- Quantum optics, e.g. squeezed light generation
- Pump source for non-linear processes, e.g. second harmonic generation (SHG) and optical parametric amplifiers (OPA, OPO)
- Quantum metrology
- Dark matter research with optical resonators
- Stabilization to iodine atomic transitions and reference cavities

Typical Parameters	Value	Unit
Output power	400	mW
Output power - low noise mode (LN mode)	250	mW
Wavelength	1064	nm
Linewidth	<1	kHz
Output polarization	linear	p-pol
Polarisation extension ratio	>18	dB
Higher order transversal mode content relative to TEM ₀₀	< 2	%
Thermal tuning coefficient	3	GHz/K
Thermal tuning range (mode hop free)	> 6	GHz
External input thermal tuning bandwidth	100	mHz
PZT tuning coefficient	~ 3	MHz/V
PZT tuning range	100	MHz
PZT tuning bandwidth	>20	kHz
Beam waist size (radius)	160	μm
Beam waist position (measured from shutter → inside the laser head)	-14	cm

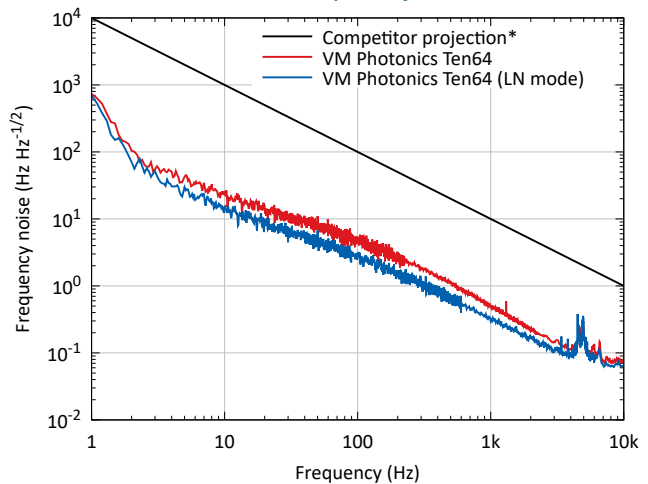
Laser head dimensions	15.5 cm x 12.8 cm x 8.7 cm
Output beam	Emission at 5 cm beam height
Laser control box	19 inch, 2 height units, passive cooling (no fan)
Umbilical cord	3 m long cable, longer cables are optionally available
Mains power supply	230V / 50Hz or 115V / 60Hz, 120W
Safety	Integrated mechanical laser shutter and electronic interlock
Diagnostics	Analog or digital diagnostic output ports are optionally available
Optimized Iodine stabilization temperature tuning range optionally available	

Relative power noise



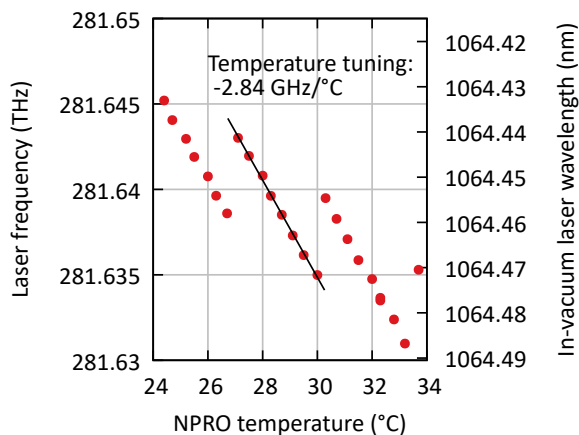
Typical relative power noise (RPN) of the **Ten64** measured with an independent out-of-loop photodetector.

Laser frequency noise



Typical frequency noise of the **Ten64**, determined via a beat measurement with a second **Ten64**.

Thermal wavelength tuning



Measurement of the absolute laser frequency and typical laser frequency thermal tuning range of the **Ten64**.

On request also higher temperatures tuning ranges, e.g. optimized for Iodine stabilization, are available.

Figures derived from the publication:

„Characterization of non-planar ring oscillators at a wavelength of 1064nm for high precision metrology“

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Rev. Sci. Instrum. 96, 113001 (2025)

<https://doi.org/10.1063/5.0298918>

*Both measurements are shown in comparison to the NPRO lasers used in gravitational wave detectors and characterized in this publication: "Automatic laser beam characterization of monolithic Nd:YAG nonplanar ring lasers," P. Kwee and B. Willke, Appl. Opt. 47, 6022-6032 (2008) <https://opg.optica.org/ao/abstract.cfm?URI=ao-47-32-6022>