matrIQ-Laser™ 1000 Series
Tunable Laser Source

SPEC SHEET

matrIQ-Laser™ 1000 Series is a Continuous Wave (CW), tunable laser source offering high-power output, narrow 100 kHz linewidth and 0.01 pm resolution tunability.

Its stackable, space-saving design and simple, intuitive software controls make it a perfect choice for the optical lab or test bench.
**Full tunability across C band or L band**
Ideal for telecommunications applications; full coverage of DWDM channels.

**Smarter calibration for enhanced power uniformity**
Minimise inter-channel power variance with enhanced power uniformity between channels.

**0.01 pm tuning resolution**
Tune to anywhere within C or L band with a high 0.01pm tuning resolution.

**Narrow 100 kHz linewidth**
High stability 100kHz linewidth makes it an ideal candidate for some of the most demanding applications, such as coherently modulated high-speed communications.

**Up to 16.5 dBm of power**
High-power options provide as high as +16.5 dBm (44.7 mW) output power.

**Polarization maintaining output**
The slow axis of polarization is aligned with the output connector key as per industry standards. The user may choose to use polarization maintaining (PM) fiber or standard singlemode fiber (SMF).

**Compact and flexible form factor**
Housed in a compact and robust metallic case, its small footprint helps you utilize your bench space.

**USB and Ethernet operation**
Connect with USB or Ethernet for simple setup and operation. Configure multiple units with individual IP addresses for multi-unit setups.

**Excellent measurement correlation with our optical PXI modules**
Shared product architecture lets you validate your system and test requirements in the lab with matriQ-Laser, and scale up to high-volume automated production testing with the LaserPXIe module.

**Simple, intuitive operation with cohesionUI**
cohesionUI makes it simple to control matriQ-Laser from your PC or mobile device. Its cutting-edge design offers a sleek modern interface, cross device compatibility, customizable views and remote network access.
Target Applications

- Stable local oscillator for coherent receivers
- WDM network loading
- General purpose stable light source for telecom and physics
- Amplifier testing
- Polarization maintaining output ideal for polarization sensitive experiments and testing

Whisper Mode: Dither Suppression (Optional)

matriQ-Laser 1000 Series instruments come with optional whisper mode. This feature enables the user to temporarily disable the laser control frequency dither, which is useful for applications that require the narrowest linewidth.

All Coherent Solutions tunable lasers adhere to the OIF standard Micro Integrable Tunable Laser Assemblies (μITLA) Implementation Agreement and utilise the standard dithering method for frequency stability.

Ultra Compact & Portable Design

Our matriQ range of compact USB and Ethernet instruments are designed to be portable and versatile, without sacrificing performance.

With a stackable and well-balanced design, they make it easy to stack vertically and save valuable bench space.
Superior Power Accuracy & Cross-Channel Uniformity

The matrIQ-Laser provides advanced calibration for flat power response, ideal for applications including coherent / Orthogonal Frequency-Division Multiplexing (OFDM) transmission and WDM networks.

Typical ITLA Lasers

This graph illustrates the typical output power accuracy of standard ITLA lasers. The output power of each is recorded using a NIST traceable optical power meter. Measurements from each laser are taken at 10 different wavelengths for 7 different power settings. The data is taken from random sample of 12 lasers.

Mean error (abs) = 0.25 dB
Pk-Pk error = 1.38 dB

matriQ-Laser with Power Calibration

This graph illustrates the results of the same measurements, when the lasers are integrated into the matrIQ-Laser. The output power is now within 0.2dB across the entire range.

Mean error (abs) = 0.03 dB
Pk-Pk error = 0.20 dB

Configurations

Choose the model that suits your application.
cohesionUI graphical user interface makes it simple to control matrIQ instruments from your PC or mobile device. Its cutting-edge design offers a sleek modern interface, cross device compatibility, customizable views and remote network access.

LabVIEW™ Soft Front Panels

matrIQ products come with fully functional LabVIEW™ drivers for a quick and easy integration into your automated control codes.

Not a user of LabVIEW?
Our instruments support SCPI commands that you can send and receive from other programming languages such as MATLAB, Python and C++.

Also Available in PXI

matrIQ optical test instruments are also available in PXI form factor. Our innovative PXI modules are used by customers in fully-integrated test and measurement systems, reducing complexity, lowering the cost of test and accelerating time to market.

With up to four tunable lasers per single-slot PXIe module, we offer the highest density footprint for multi-channel testing; up to 68 tunable laser channels can be populate in a single PXIe mainframe. To see the full range visit www.coherent-solutions.com/PXI.
Cost-effective optical test instruments in a compact and versatile design.

**matrIQ™ Series**

**Compact USB/Ethernet Instruments**

**matrIQ-Laser™ 1000 Series**
**Tunable Laser Source**
Continuous Wave (CW), tunable laser source offering high-power output, narrow 100 kHz linewidth and 0.01 pm resolution tunability.

**matrIQ-Laser™ 1200 Series**
**DFB Laser Source**
Highly customizable DFB laser source available in a wide range of wavelengths and powers.

**matrIQ-OSA™**
**Optical Spectrum Analyzer**
Compact grating-based optical spectrum analyzer available in a range of wavelengths for fast spectral analysis of sources, amplifiers, transceivers and passive optical components.

**matrIQ-Switch™**
**Automated Optical Switch**
Fast and repeatable MEMs-based optical switch with low insertion loss and high-durability. Available in a range of configurations in single-mode or multi-mode.

**matrIQ-O2ETM**
**Optical-to-electrical Converter**
Compact high-bandwidth, broadband optical-to-electrical converter with 1 or 2 channels, AC or DC coupling, and various conversion gain and operating wavelength ranges.

**matrIQ-VQA™**
**Variable Optical Attenuator**
Fast attenuation speed, low insertion loss and in-built power meter. Available in a range of wavelengths for wide range of applications.

**matrIQ-Power™ 1400 Series**
**Optical Power Meter**
Fast monitoring of signal power from -60 to +10 dBm and a broad wavelength range of 750 – 1700 nm.

**matrIQ-Power™ 1500 Series**
**Optical Power Meter with Analog Output**
Logarithmic analog output plus convenient digital optical power readout. -60 to +10 dBm power monitoring across 750 – 1700 nm wavelength range.

**matrIQ-EDFA™**
**Erbium-Doped Fiber Amplifier**
High power Erbium-Doped Fiber Amplifier for signal power amplification in C and L bands with various control modes, including automatic gain control.

**matrIQ-Doppler™**
**Photonic Doppler Velocimeter**
Purpose-built module for Photonic Doppler Velocimetry (PDV). A circulator, two VOAs and a passive coupler all built into one compact module.
## Technical Specifications

### General Specifications

<table>
<thead>
<tr>
<th>Connectivity</th>
<th>USB and Ethernet</th>
</tr>
</thead>
<tbody>
<tr>
<td>Optical connector type</td>
<td>FC/PC, FC/APC, SC/PC, SC/APC</td>
</tr>
<tr>
<td>Number of channels</td>
<td>1, 2 or 4</td>
</tr>
<tr>
<td>Dimensions (HxWxD)</td>
<td>45 x 114 x 212 mm</td>
</tr>
<tr>
<td>Weight</td>
<td>~ 1.1 kg</td>
</tr>
<tr>
<td>Operating temperature range</td>
<td>5 °C to 45 °C</td>
</tr>
<tr>
<td>Storage temperature range</td>
<td>~40 °C to 70 °C</td>
</tr>
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</table>

### Model Number

<table>
<thead>
<tr>
<th></th>
<th>1001 / 1051</th>
<th>1002 / 1052</th>
<th>1003 / 1053</th>
<th>1004 / 1054</th>
</tr>
</thead>
<tbody>
<tr>
<td>Operating frequency range</td>
<td>191.1 - 196.25 THz</td>
<td>186.0 - 191.1 THz</td>
<td>191.1 - 196.25 THz</td>
<td></td>
</tr>
<tr>
<td>Operating wavelength range</td>
<td>1527.605 - 1568.773 nm</td>
<td>1568.773 - 1611.787 nm</td>
<td>1527.605 - 1568.773 nm</td>
<td></td>
</tr>
<tr>
<td>Laser type</td>
<td>Thermally tuned external cavity</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Step frequency tuning resolution (wavelength)</td>
<td>100 MHz (1 pm)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Step tuning time</td>
<td>&lt; 25 s</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Fine frequency tuning resolution</td>
<td>1 MHz (0.01 pm)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Linewidth (FWHM), instantaneous</td>
<td>&lt; 100 kHz</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Side-mode suppression ratio</td>
<td>40 dB (55 dB Typical)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Frequency linearity (wavelength)</td>
<td>± 1.5 GHz (± 13 pm)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Frequency uncertainty (wavelength)</td>
<td>± 2.5 GHz (± 22 pm)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Frequency stability (wavelength)</td>
<td>± 0.3 GHz (± 3 pm) over 24 hours</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Maximum optical output power</td>
<td>13 dBm</td>
<td>15 dBm</td>
<td>13 dBm</td>
<td>16.5 dBm</td>
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<tr>
<td>Minimum optical output power</td>
<td>8 dBm</td>
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</tr>
<tr>
<td>Optical power uncertainty after calibration</td>
<td>± 0.6 dB</td>
<td></td>
<td></td>
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<tr>
<td>Power stability</td>
<td>± 0.1 dB over 24 hours</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Output power tuning resolution</td>
<td>0.01 dB</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Power flatness, peak-to-peak</td>
<td>± 0.25 dB over entire wavelength range</td>
<td></td>
<td></td>
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</tr>
<tr>
<td>Polarization extinction ratio</td>
<td>&gt; 18 dB at the PM fiber output</td>
<td></td>
<td></td>
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</tr>
<tr>
<td>Relative intensity noise RIN (for 13 dBm)</td>
<td>~140 dB/Hz (10 MHz − 40 GHz)</td>
<td></td>
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<td></td>
</tr>
<tr>
<td>Power monitoring</td>
<td>Built-in</td>
<td></td>
<td></td>
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<table>
<thead>
<tr>
<th>Specification</th>
<th>1005 / 1055</th>
<th>1007 / 1057</th>
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<tbody>
<tr>
<td>Operating frequency range</td>
<td>186.0 - 191.1 THz</td>
<td>Ch 1: 191.1 - 196.25 THz Ch 2: 186.0 - 191.1 THz</td>
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<td>(wavelength)(^2)</td>
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<td>± 0.3 GHz (± 3 pm) over 24 hours</td>
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</tr>
<tr>
<td>Maximum optical output power</td>
<td>15.4 dBm</td>
<td>13 dBm</td>
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<tr>
<td>Minimum optical output power</td>
<td>8 dBm</td>
<td></td>
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<tr>
<td>Optical power uncertainty after</td>
<td>± 0.6 dB</td>
<td></td>
</tr>
<tr>
<td>calibration(^4)</td>
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**SPECS AS OF FEBRUARY 2020**

Notes:

1. Specifications are valid at 23 °C ± 3 °C.
2. Varies slightly according to wavelength.
3. The laser uses a small FM dithering as part of its wavelength locking mechanism. The instantaneous linewidth is measured in 1 ms (integration time). Option -1099 allows the user to control when dithering is enable or disabled. Without option -1099, dithering is always on and applies a slowly moving back-and-forth adjustment of the center wavelength (+/- 48 MHz at 888 Hz) all while maintaining an instantaneous linewidth of <100kHz.
4. At maximum output power.
5. Wavelength is an approximation. Laser is controlled in frequency.
6. When changes to the tuning wavelength are required the unit disables the output power as per industry standards. These sources are designed to be used in dense wavelength division multiplexing (DWDM) applications. In order to not interfere with adjacent channels which may be near the unit’s wavelength while doing precision tuning, the power is maintained off until the new tuning target is reached. The precision tuning and power disabling actions require a finite amount of time to execute, and this time may vary depending on the amount of change required when moving between set values dictated by the user.
7. Model includes whisper mode control.
Instrument Dimensions

Rear Panel Connections

Ordering Information

LaserMatrIQ -XXXX - X - XX

Model number
1001 = 1527 to 1568 nm, 8 - 13 dBm
1002 = 1527 - 1568 nm, 8 - 15 dBm
1003 = 1568 - 1611 nm, 8 - 13.5 dBm
1004 = 1527 - 1568 nm, 8 - 16.5 dBm
1005 = 1568 - 1611 nm, 8 - 15.4 dBm
1007 = Ch 1: 1527 - 1568 nm, Ch 2: 1568 - 1611 nm, 8 - 13.5 dBm
1051 = Model 1001 with whisper mode
1052 = Model 1002 with whisper mode
1053 = Model 1003 with whisper mode
1054 = Model 1004 with whisper mode
1055 = Model 1005 with whisper mode
1057 = Model 1007 with whisper mode

Number of channels
1 = 1 Channel
2 = 2 Channels
4 = 4 Channels

Connector type
FC = FC/PC
FA = FC/APC
SC = SC/PC
SA = SC/APC

Product Warranty
This product comes with a 3 year warranty.

About Coherent Solutions
Coherent Solutions is a world-leader in photonics test and measurement. Our portfolio of benchtop and modular test instruments is rapidly expanding to meet the needs of scientists, engineers and manufacturers around the world. No matter where you are, we'll work with you to solve complex problems with simple, intuitive solutions.

To find out more, get in touch with us today.

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