

# Laser

## 1000 SERIES TUNABLE LASER SOURCE

SPECIFICATION SHEET

AVAILABLE IN PXI

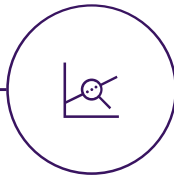
AVAILABLE IN MatriQ

The 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.



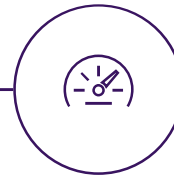
**Full tunability across C and or L band**

Ideal for telecommunications applications; full coverage of DWDM channels.



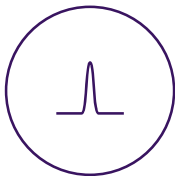
**0.01 pm tuning resolution**

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



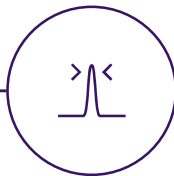
**Up to +16.5 dBm of power**

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



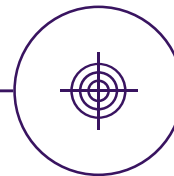
**Narrow 100 kHz linewidth**

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



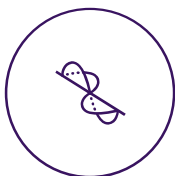
**Whisper mode**

Enjoy stable, dither-free, narrow linewidths for short-term measurements.



**Smarter calibration for enhanced power uniformity**

Minimise inter-channel power variance with enhanced power uniformity between channels.



**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).



**1, 2 or 4 lasers in a single instrument**

Achieve high channel density with up to 68 channels in an 18-slot PXI chassis or 4 channels in the MatrIQ benchtop instrument.



**Seamless PXI integration**

Take advantage of PXI's integrated triggering and synchronization capabilities across electrical and optical instruments.

## TARGET APPLICATIONS

- Coherent optical transceiver development and testing
- Optical component development and testing:
  - Optical splitters
  - Optical couplers
  - Optical Demultiplexers / Multiplexers
  - Optical modulators
  - Optical resonators
  - MEMs testing
  - Bragg Filter testing
- Fiber optic transmission testing
- Local oscillator for Tx and Rx coherent transceivers
- WDM / DWDM channel loading stress test
- Silicon photonic wafer waveguide testing
- EDFA optical amplifier testing
- Photonic Doppler Velocimetry (PDV) laser source
- Interferometry (broad field: includes medical imaging via interferometry, Mach-Zehnder instruments)
- High Performance Computing (HPC) with optical PIC-based semiconductors: channel loading
- General purpose stable light source for telecom and physics

## WHISPER MODE

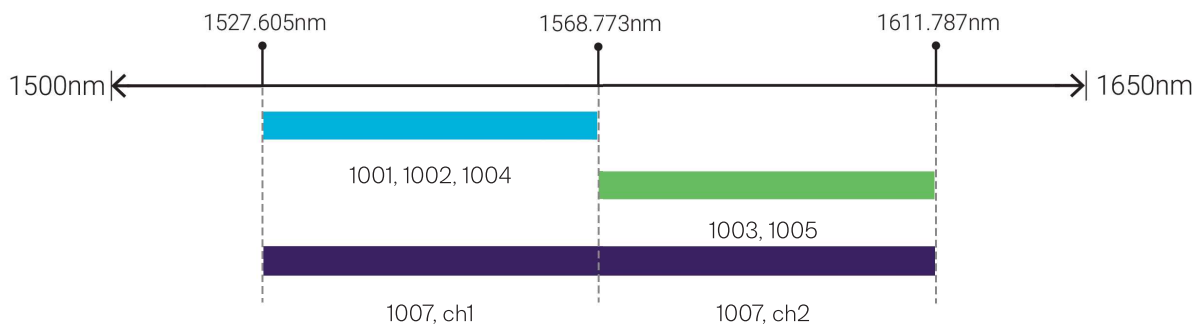
### Dither suppression (Optional)

The Laser 1000 Series comes with an 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. Disabling the frequency dither disables the laser frequency and power regulation and may cause them to drift over time. The whisper mode is only intended to be used over a short time, typically less than 10 minutes.

All Quantifi Photonics tunable lasers adhere to the OIF standard Micro Integrable Tunable Laser Assemblies ( $\mu$ ITLA) Implementation Agreement and utilise the standard dithering method for frequency stability.

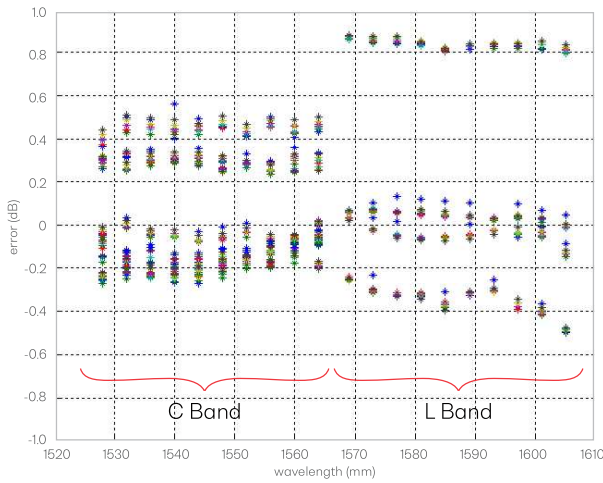
## VERSATILE CONFIGURATIONS

Choose the model that suits your application.



# The Laser 1000 Series has superior power accuracy & cross-channel uniformity.

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



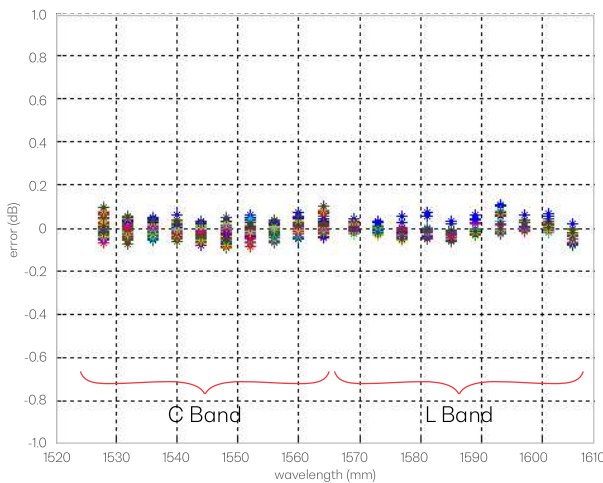
## TYPICAL ITLA LASERS

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 = 1.038 dB**



## LASER 1000 SERIES WITH POWER CALIBRATION

This graph illustrates the results of the same measurements, using the same lasers, integrated into the LaserPXle and calibrated using our standard production calibration process

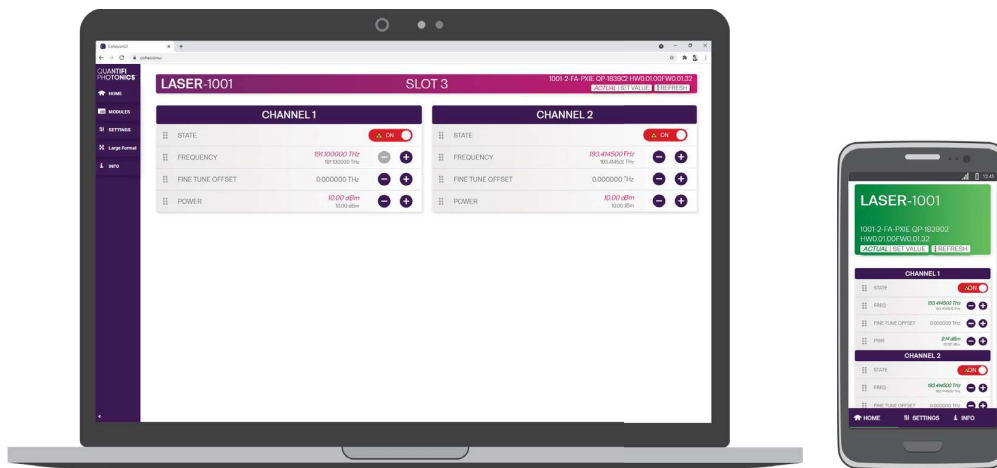
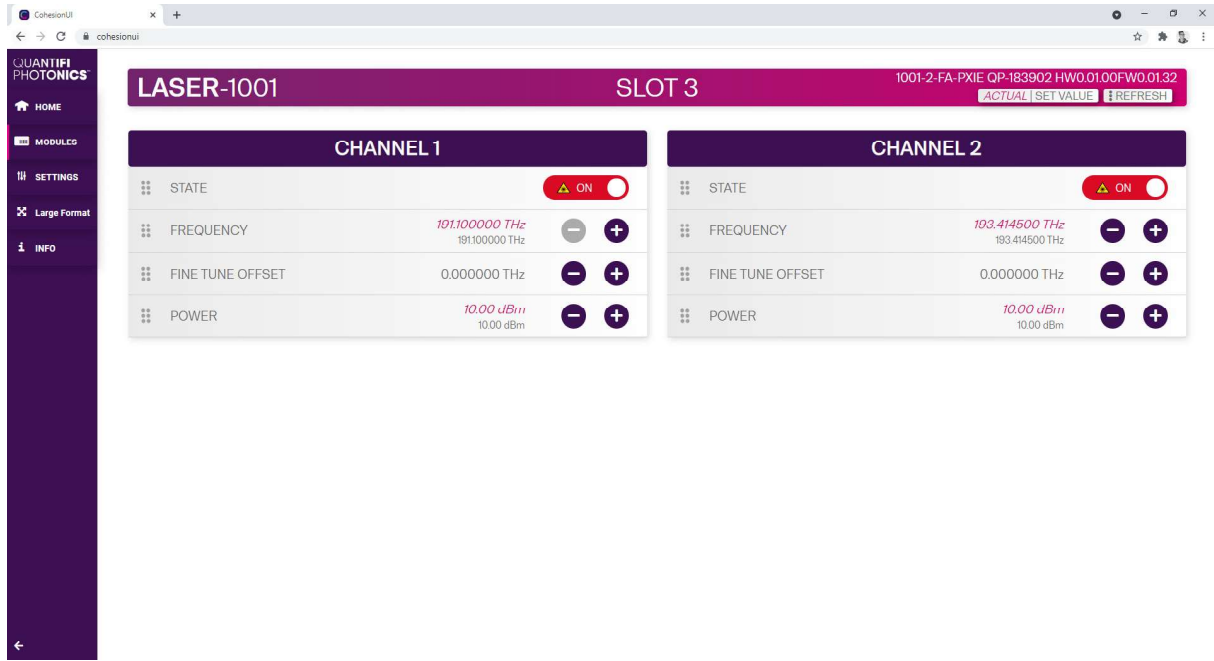
When the Laser 1000 series is controlled via COHESIONUI the Pk-Pk error across the entire sample range is reduced from >1 dB to 0.2 dB.

**Mean error (abs) = 0.03 dB**

**Pk-Pk error = 0.20 dB**

# Simple, intuitive control with COHESIONUI™

COHESIONUI makes it simple to control our PXI or MatriQ instruments from a PC, tablet or smartphone. Its cutting-edge design offers a sleek modern interface, cross device compatibility, customizable views and remote network access.



## CHOOSE YOUR FORM FACTOR

### PXIe – MODULAR

Our expanding range of PXIe optical test solutions are used by customers in mixed-signal test and measurement systems, reducing complexity, lowering the cost of test and accelerating time to market.

- Multi vendor, open standard with over 2500 PXI modules available
- Advanced timing and synchronization capabilities across instruments
- Low latency, high performance processing and fast data throughput
- Design and build scalable, high channel count systems
- Small footprint and lower power consumption



### MATRIQ – COMPACT & PORTABLE

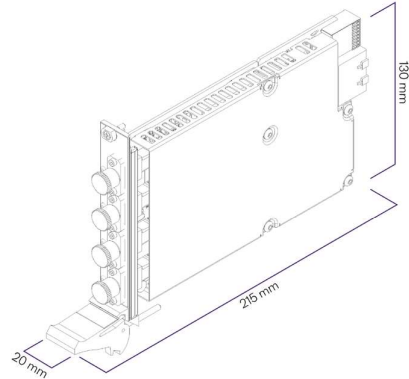
The MATRIQ series provides the same high-performance test capabilities of our PXIe modules in an compact benchtop design. MATRIQ instruments are simple to setup and easy to operate, making them the perfect choice for your optical lab or test bench.

- Same performance and control as our PXIe modules
- Plug and play with USB or Ethernet connectivity
- Control via the web-based GUI, COHESIONUI or SCPI commands
- Compact and portable design saves benchtop space



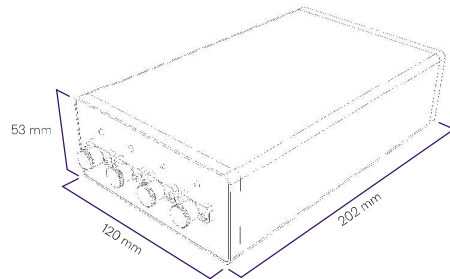
## LASER 1000 SERIES DIMENSIONS

### PXI - MODULAR

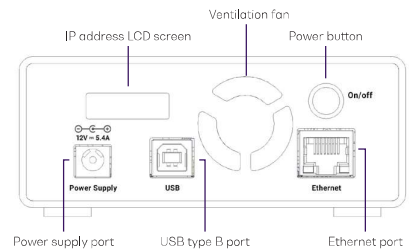


LASER-1001-4-FC-PXIE

### MATRIQ - COMPACT & PORTABLE



LASER-1001-4-FC-MTRQ



## LASER 1000 SERIES TECHNICAL SPECIFICATIONS

General Specifications	PXI	MATRIQ
Bus connection	PXle	USB and Ethernet
Optical connector type	FC/PC, FC/APC, SC/PC, SC/APC	FC/PC, FC/APC, SC/PC, SC/APC
Number of channels	1, 2 or 4	1, 2 or 4
Slot count	1	-
Dimensions (HxWxD)	130 x 20 x 215 mm   5.1 x 0.8 x 8.5 inches	53 x 120 x 202 mm   2.1 x 4.7 x 8.0 inches
Weight	~ 1 kg   ~ 2.2 lbs	~ 1.1 kg   ~ 2.4 lbs
Operating temperature range	5 °C to 45 °C   41 °F to 113 °F	5 °C to 45 °C   41 °F to 113 °F
Storage temperature range	-40 °C to 70 °C   -40 °F to 158 °F	-40 °C to 70 °C   -40 °F to 158 °F

Power Specifications	PXI	MATRIQ
AC input voltage range	Please refer to the latest PXI Express Hardware Specifications published by the PXI Systems Alliance.	90 to 264 VAC
AC input current		1.3A (115Vac), 0.9A (230Vac)
AC frequency range		47 to 63 Hz
DC output voltage		12V
DC output current max		5.41A
Dimensions (LxWxH)		4.58 x 2.06 x 1.23" (116.3 x 52.4 x 31.3 mm)

Model Number	1001 / 1051 <sup>7</sup>	1002 / 1052 <sup>7</sup>	1001 / 1051 <sup>7</sup>	1002 / 1052 <sup>7</sup>
Operating frequency range	191.1 - 196.25 THz		191.1 - 196.25 THz	
Operating wavelength range <sup>5</sup>	1527.605 - 1568.773 nm		1527.605 - 1568.773 nm	
Laser type	Thermally tuned external cavity		Thermally tuned external cavity	
Step frequency tuning resolution (wavelength) <sup>2</sup>	100 MHz (1 pm)		100 MHz (1 pm)	
Step tuning time <sup>6</sup>	< 25 s		< 25 s	
Fine frequency tuning resolution <sup>2</sup>	1 MHz (0.01 pm)		1 MHz (0.01 pm)	
Linewidth (FWHM), instantaneous <sup>3</sup>	< 100 kHz		< 100 kHz	
Side-mode suppression ratio	40 dB (55 dB Typical)		40 dB (55 dB Typical)	
Frequency linearity (wavelength) <sup>2</sup>	± 1.5 GHz (± 13 pm)		± 1.5 GHz (± 13 pm)	
Frequency uncertainty (wavelength) <sup>2</sup>	± 2.5 GHz (± 22 pm)		± 2.5 GHz (± 22 pm)	
Frequency stability (wavelength) <sup>2</sup>	± 0.3 GHz (± 3 pm) over 24 hours		± 0.3 GHz (± 3 pm) over 24 hours	
Maximum optical output power	+ 13 dBm	+ 15 dBm	+ 13 dBm	+ 15 dBm



## LASER 1000 SERIES TECHNICAL SPECIFICATIONS

Minimum optical output power	+ 8 dBm	+ 8 dBm
Optical power uncertainty after calibration <sup>4</sup>	± 0.6 dB	± 0.6 dB
Power stability	± 0.1 dB over 24 hours	± 0.1 dB over 24 hours
Output power tuning resolution	0.01 dB	0.01 dB
Power flatness, peak-to-peak	± 0.25 dB over entire wavelength range	± 0.25 dB over entire wavelength range
Polarization extinction ratio	> 18 dB at the PM fiber output	> 18 dB at the PM fiber output
Relative intensity noise RIN (for 13 dBm)	-140 dB/Hz (10 MHz – 40 GHz)	-140 dB/Hz (10 MHz – 40 GHz)
Power monitoring	Built-in	Built-in

Model Number	1003 / 1053 <sup>7</sup>	1004 / 1054 <sup>7</sup>	1003 / 1053 <sup>7</sup>	1004 / 1054 <sup>7</sup>
Operating frequency range	186.0 - 191.1 THz		191.1 - 196.25 THz	
Operating wavelength range <sup>5</sup>	1568.773 - 1611.787 nm		1527.605 - 1568.773 nm	
Laser type	Thermally tuned external cavity		Thermally tuned external cavity	
Step frequency tuning resolution (wavelength) <sup>2</sup>	100 MHz (1 pm)		100 MHz (1 pm)	
Step tuning time <sup>6</sup>	< 25 s		< 25 s	
Fine frequency tuning resolution <sup>2</sup>	1 MHz (0.01 pm)		1 MHz (0.01 pm)	
Linewidth (FWHM), instantaneous <sup>3</sup>	< 100 kHz		< 100 kHz	
Side-mode suppression ratio	40 dB (55 dB Typical)		40 dB (55 dB Typical)	
Frequency linearity (wavelength) <sup>2</sup>	± 1.5 GHz (± 13 pm)		± 1.5 GHz (± 13 pm)	
Frequency uncertainty (wavelength) <sup>2</sup>	± 2.5 GHz (± 22 pm)		± 2.5 GHz (± 22 pm)	
Frequency stability (wavelength) <sup>2</sup>	± 0.3 GHz (± 3 pm) over 24 hours		± 0.3 GHz (± 3 pm) over 24 hours	
Maximum optical output power	+ 13 dBm	+ 16.5 dBm	+ 13 dBm	+ 16.5 dBm
Minimum optical output power	+ 8 dBm		+ 8 dBm	
Optical power uncertainty after calibration <sup>4</sup>	± 0.6 dB		± 0.6 dB	
Power stability	± 0.1 dB over 24 hours		± 0.1 dB over 24 hours	
Output power tuning resolution	0.01 dB		0.01 dB	
Power flatness, peak-to-peak	± 0.25 dB over entire wavelength range		± 0.25 dB over entire wavelength range	
Polarization extinction ratio	> 18 dB at the PM fiber output		> 18 dB at the PM fiber output	
Relative intensity noise RIN (for 13 dBm)	-140 dB/Hz (10 MHz – 40 GHz)		-140 dB/Hz (10 MHz – 40 GHz)	
Power monitoring	Built-in		Built-in	

## LASER 1000 SERIES TECHNICAL SPECIFICATIONS

Model Number	1005 / 1055	1007 / 1057 <sup>7</sup>	1005 / 1055	1007 / 1057 <sup>7</sup>
Operating frequency range	186.0 - 191.1 THz	Ch 1: 191.1 - 196.25 THz Ch 2: 186.0 - 191.1 THz	186.0 - 191.1 THz	Ch 1: 191.1 - 196.25 THz Ch 2: 186.0 - 191.1 THz
Operating wavelength range <sup>5</sup>	1568.773 - 1611.787 nm	Ch 1: 1527.605 - 1568.773 nm Ch 2: 1568.773 - 1611.787 nm	1568.773 - 1611.787 nm	Ch 1: 1527.605 - 1568.773 nm Ch 2: 1568.773 - 1611.787 nm
Laser type	Thermally tuned external cavity		Thermally tuned external cavity	
Step frequency tuning resolution (wavelength) <sup>2</sup>	100 MHz (1 pm)		100 MHz (1 pm)	
Step tuning time <sup>6</sup>	< 25 s		< 25 s	
Fine frequency tuning resolution <sup>2</sup>	1 MHz (0.01 pm)		1 MHz (0.01 pm)	
Linewidth (FWHM), instantaneous <sup>3</sup>	< 100 kHz		< 100 kHz	
Side-mode suppression ratio	40 dB (55 dB Typical)		40 dB (55 dB Typical)	
Frequency linearity (wavelength) <sup>2</sup>	± 1.5 GHz (± 13 pm)		± 1.5 GHz (± 13 pm)	
Frequency uncertainty (wavelength) <sup>2</sup>	± 2.5 GHz (± 22 pm)		± 2.5 GHz (± 22 pm)	
Frequency stability (wavelength) <sup>2</sup>	± 0.3 GHz (± 3 pm) over 24 hours		± 0.3 GHz (± 3 pm) over 24 hours	
Maximum optical output power	+ 15.4 dBm	+ 13 dBm	+ 15.4 dBm	+ 13 dBm
Minimum optical output power	+ 8 dBm		+ 8 dBm	
Optical power uncertainty after calibration <sup>4</sup>	± 0.6 dB		± 0.6 dB	
Power stability	± 0.1 dB over 24 hours		± 0.1 dB over 24 hours	
Output power tuning resolution	0.01 dB		0.01 dB	
Power flatness, peak-to-peak	± 0.25 dB over entire wavelength range		± 0.25 dB over entire wavelength range	
Polarization extinction ratio	> 18 dB at the PM fiber output		> 18 dB at the PM fiber output	
Relative intensity noise RIN (for 13 dBm)	-140 dB/Hz (10 MHz - 40 GHz)		-140 dB/Hz (10 MHz - 40 GHz)	
Power monitoring	Built-in		Built-in	

### SPECS AS OF AUGUST 2021

#### 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. At minimum power that model can handle. Higher output power may increase tuning time. 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.

## ORDERING INFORMATION

LASER - **XXXX** - **X** - **XX** - **PXIE**  
LASER - **XXXX** - **X** - **XX** - **MTRQ**

### 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

### Connector type

**FC** = FC/PC  
**FA** = FC/APC  
**SC** = SC/PC  
**SA** = SC/APC

### Number of channels

**1** = 1 Channel  
**2** = 2 Channels  
**4** = 4 Channels

## WARRANTY INFORMATION

This product comes with a standard 1 year warranty.

## EXTENDED WARRANTIES AND CALIBRATION PLANS

With an Extended Warranty and Calibration Plan you can spend more time focused on your priorities and less time worrying about maintenance.

Over time and with regular use, all optical parts and connectors require re-calibration and maintenance to guarantee accurate and reliable performance.

Add a 3 or 5 year Extended Warranty at the time of purchase.

### Guarantee peak performance

Ensure your equipment is operating at its best for reliable and accurate results.

### Lower cost of ownership

Lock in savings and maximise your budget with a lower cost of ownership.

### Peace of mind

Spend less time worrying about maintenance and more on generating results.

## CALIBRATION PLANS FOR ADDITIONAL DISCOUNTS

Order a Calibration Plan when you purchase your Quantifi Photonics' test instruments and qualify for additional discounts.

### 10% Discount

On calibrations ordered at the time of purchase.

### 25% Discount

Add on an extended warranty and receive a 25% discount on calibrations.

With an instrument calibration performed by Quantifi Photonics technicians you receive.

- Comprehensive calibration to factory specifications.
- End-to-end inspection to ensure all instrument functions are working and connectors are clean.
- Firmware, software and documentation updates.
- Certificate of Calibration which includes detailed test results.

We recommend Quantifi Photonics optical instruments are re-calibrated every 12 months.

## How to purchase

Contact your Quantifi Photonics sales representative about our Extended Warranty or Calibration Plans or email [sales@quantifiphotonics.com](mailto:sales@quantifiphotonics.com).

Extended Warranties and Calibration Plans must be ordered at the time of purchase and are available only for Quantifi Photonics' products. The 25% calibration discount only applies to calibrations while the product is covered by the Extended Warranty period.

Our portfolio of optical and electrical test modules is rapidly expanding to meet a wide range of customer requirements and applications.

#### Tunable Laser Sources

Versatile telecom laser sources with full tunability across C or L bands. Narrow 100 kHz linewidth, up to 16.5 dBm of power, optional whisper mode to disable frequency dither.

#### Erbium-Doped Fiber Amplifier (EDFA)

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

#### Fixed Wavelength Laser Sources

Highly customizable DFB or FP laser sources available in a wide range of wavelengths and powers. Models support SMF, MMF and PMF.

#### Variable Optical Attenuator (VOA)

Fast attenuation speed with low insertion loss and built-in power monitoring. Operates in fixed attenuation or constant output power modes. Models support SMF, MMF and PMF.

#### Optical Power Meters

Fast terminating or inline monitoring of optical signal power from -60 to +10 dBm across 750 – 1700 nm wavelengths. Model with logarithmic analog output for applications such as silicon photonics fiber alignment.

#### Optical Spectrum Analyzer (OSA)

Low cost, fast spectral measurement in a compact module with built-in analysis including SMSR, OSNR and spectral width. Targeted wavelengths for specific applications in O band, C band and L band.

#### Optical-to-Electrical Converter

High bandwidth, broadband O-to-E converter. Available in a range of configurations; choose from 1 or 2 channels, AC or DC coupling and various conversion gain and operating wavelength ranges.

#### Bit Error Rate Tester (BERT)

2 or 4-channel Pulse Pattern Generator and Error Detector at rates up to 29 Gbps for the design, characterization and production of optical transceivers and opto-electrical components.

#### Pulse Pattern Generator (PPG)

4 channel Pulse Pattern Generator from 0.3 to 30 Gbps for high-density multichannel applications. With integrated clock synthesizer and programmable de-emphasis and CTLE processor.

#### Optical Switch

Proven reliability and fast switching time. Wide variety of switch configurations: 1x4, 1x16, 16x16 and more. Models support SMF, MMF and PMF.

#### Polarization Controller & Scrambler

High-speed automated polarization control with broad wavelength coverage from 1260nm to 1650nm, low insertion loss and back reflection. Full remote control via intuitive GUI, LabVIEW or SCPI.

#### Photonic Doppler Velocimeter (PDV)

Purpose-built module for Photonic Doppler Velocimetry (PDV). A circulator, two VOAs and a passive coupler all built into one compact module.

#### Passive Component Integration

Integrate passive optical components of your choice such as WDM couplers, splitters, band-pass filters, PM beamsplitters and circulators. Models support SMF, MMF and PMF.

#### Passive Component Storage

Protect and store your own passive fiber optic components such as splitters, connector adaptor patchcords, WDM couplers, and isolators in one handy module.

PXI – TEST MODULES

MATRIQ – TEST MODULES

We provide these products as PXIe modules and compact MATRIQ benchtop instruments.

See our website for more details  
[quantifiphotonics.com/products](https://www.quantifiphotonics.com/products)

# Test. Measure. Solve.

Quantifi Photonics is transforming the world of photonics test and measurement. Our portfolio of optical and electrical test instruments is rapidly expanding to meet the needs of engineers and scientists around the globe. From enabling ground-breaking experiments to driving highly efficient production testing, you'll find us working with customers to solve complex problems with experience and innovation.

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

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PHOTONICS™**