QUANTIFI PHOTONICS®
A Teradyne Company

Laser

1000 SERIES
TUNABLE LASER SOURCE

SPECIFICATION SHEET

AVAILABLE IN PXI

AVAILABLE IN MATRIQ

quantifiphotonics.com

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

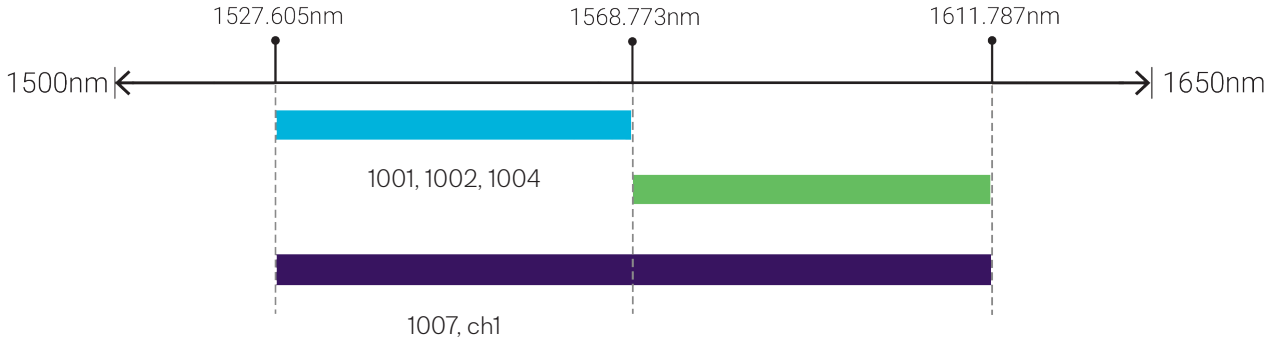
Dither suppression (Optional)

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 (µITLA) Implementation Agreement and utilise the standard dithering method for frequency stability.

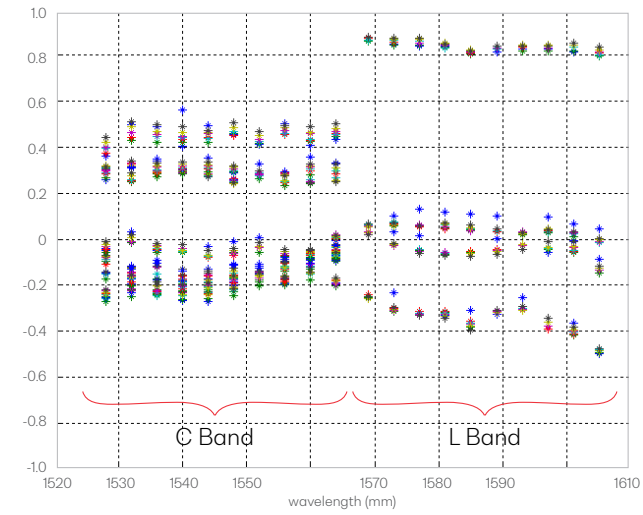
VERSATILE CONFIGURATIONS

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.



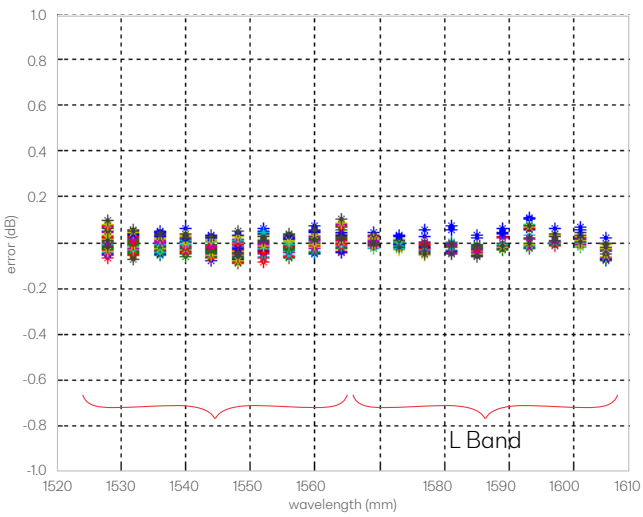
TYPICAL ITLA LASERS

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 LaserPXIe and calibrated using our standard production calibration process

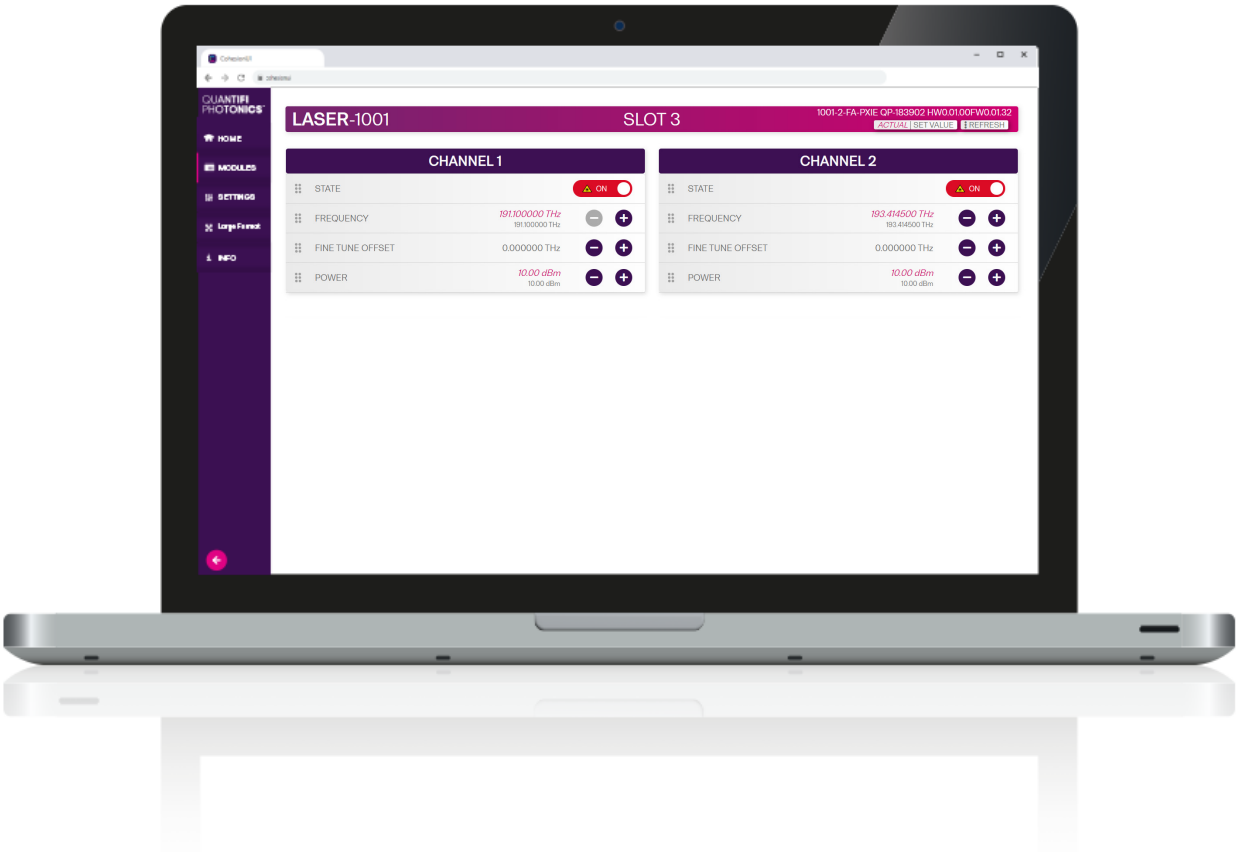
When the Laser 1000 series is controlled via COHESIONUI the Pk-Pk error across the entire sample range is reduced from >1 dB to 0.2 dB.

Mean error (abs) = 0.03 dB

Pk-Pk error = 0.20 dB

Simple, intuitive control with COHESION**UI**™

Cohesion**UI** 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

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

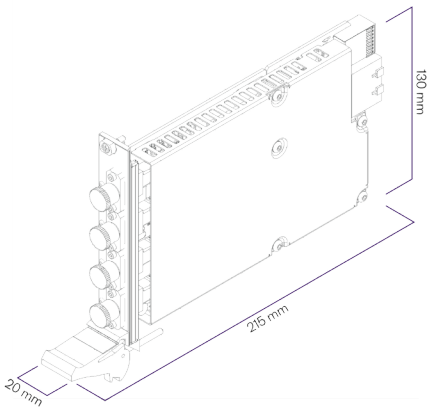
The MATRIQ series provides the same high-performance test capabilities of our PXIe modules in an compact benchtop design. MATRIQ instruments are simple to setup and easy to operate, making them the perfect choice for your optical lab or test bench.

- 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

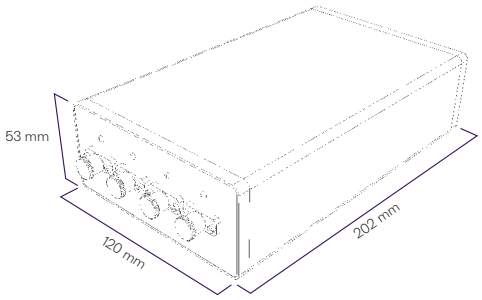
PXI – MODULAR

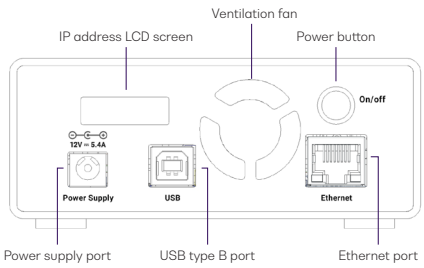
LASER-1001-4-FC-PXIE



MATRIQ – COMPACT & PORTABLE

LASER-1001-4-FC-MTRQ





General Specifications	PXI	MATRIQ
Bus connection	PXIe	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 40 °C | 41 °F to 104 °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.	100 to 240 VAC
AC input current		1.3 A (115 VAC), 0.9 A (230 VAC)
AC frequency range		47 to 63 Hz
DC output voltage		12 V
DC output current max		5.41 A
Dimensions (LxWxH)		4.58 x 2.06 x 1.23" (116.3 x 52.4 x 31.3 mm)

Model Number	1001 / 1051[7]	1002/ 1052[7]	1001 / 1051[7]	1002/ 1052[7]
Operating frequency range	191.1 - 196.25 THz		191.1 - 196.25 THz	
Operating wavelength range[5]	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)[2]	100 MHz (1 pm)		100 MHz (1 pm)	
Step tuning time[6]	< 25 s		< 25 s	
Fine frequency tuning resolution[2]	1 MHz (0.01 pm)		1 MHz (0.01 pm)	
Linewidth (FWHM), instantaneous[3]	< 100 kHz		< 100 kHz	
Side-mode suppression ratio	40 dB (55 dB Typical)		40 dB (55 dB Typical)	
Frequency linearity (wavelength)[2]	± 1.5 GHz (± 13 pm)		± 1.5 GHz (± 13 pm)	
Frequency uncertainty (wavelength)[2]	± 2.5 GHz (± 22 pm)		± 2.5 GHz (± 22 pm)	
Frequency stability (wavelength)[2]	± 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

Minimum optical output power	+ 8 dBm	+ 8 dBm
Optical power uncertainty after calibration[4]	± 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[7]**	**1004 / 1054[7]**	**1003 / 1053[7]**	**1004 / 1054[7]**
Operating frequency range	186.0 - 191.1 THz	191.1 - 196.25 THz	186.0 - 191.1 THz	191.1 - 196.25 THz
Operating wavelength range[5]	1568.773 - 1611.787 nm	1527.605 - 1568.773 nm	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)[2]	100 MHz (1 pm)		100 MHz (1 pm)	
Step tuning time[6]	< 25 s		< 25 s	
Fine frequency tuning resolution[2]	1 MHz (0.01 pm)		1 MHz (0.01 pm)	
Linewidth (FWHM), instantaneous[3]	< 100 kHz		< 100 kHz	
Side-mode suppression ratio	40 dB (55 dB Typical)		40 dB (55 dB Typical)	
Frequency linearity (wavelength)[2]	± 1.5 GHz (± 13 pm)		± 1.5 GHz (± 13 pm)	
Frequency uncertainty (wavelength)[2]	± 2.5 GHz (± 22 pm)		± 2.5 GHz (± 22 pm)	
Frequency stability (wavelength)[2]	± 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[4]	± 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	1005 / 1055[7]	1007 / 1057[7]	1005 / 1055[7]	1007 / 1057[7]
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[5]	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)[2]	100 MHz (1 pm)		100 MHz (1 pm)	
Step tuning time[6]	< 25 s		< 25 s	
Fine frequency tuning resolution[2]	1 MHz (0.01 pm)		1 MHz (0.01 pm)	
Linewidth (FWHM), instantaneous[3]	< 100 kHz		< 100 kHz	
Side-mode suppression ratio	40 dB (55 dB Typical)		40 dB (55 dB Typical)	
Frequency linearity (wavelength)[2]	± 1.5 GHz (± 13 pm)		± 1.5 GHz (± 13 pm)	
Frequency uncertainty (wavelength)[2]	± 2.5 GHz (± 22 pm)		± 2.5 GHz (± 22 pm)	
Frequency stability (wavelength)[2]	± 0.3 GHz (± 3 pm) over 24 hours		± 0.3 GHz (± 3 pm) over 24 hours	
Maximum optical output power	+ 15 dBm	+ 13 dBm	+ 15 dBm	+ 13 dBm
Minimum optical output power	+ 8 dBm		+ 8 dBm	
Optical power uncertainty after calibration[4]	± 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 APRIL 2023

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). Models with dither mode (105X) allow the user to control when dithering is enabled or disabled. Without the dither option, 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 dBm
1004 = 1527 - 1568 nm, 8 - 16.5 dBm
1005 = 1568 - 1611 nm, 8 - 15 dBm
1007 = Ch 1: 1527 - 1568 nm, Ch 2: 1568 - 1611 nm, 8 - 13 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

This product comes with a standard 1 year warranty.

EXTENDED WARRANTIES AND CALIBRATION PLANS

With an **extended warranty and calibration plan** you'll spend more time focused on your priorities and less time worrying about maintenance.

Add a **3 or 5 year extended warranty** when you purchase your Quantifi Photonics instruments.

Guarantee performance

Ensure your equipment is operating at the best it can be for reliable and accurate results.

Lower cost of ownership

Lock in savings and maximise your testing budget with a lower base 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 purchasing your Quantifi Photonics instruments and get 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.

Over time and with regular use, all optical parts and connectors require re-calibration and maintenance to guarantee accurate and reliable performance. We recommend Quantifi Photonics optical instruments are re-calibrated every 12 months. 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

How to do I **secure my extended warranty or calibration plan**?

Contact your Quantifi Photonics sales representative or email **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 & electro-optical test modules is rapidly expanding to meet a wide range of customer requirements and applications.

For more details visit **quantifiphotonics.com/products**

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.

Fixed Wavelength Laser Sources

Highly-customizable DFB or FP laser sources available in a wide range of wavelengths and powers up to 24 dBm. Supports SMF, MMF and PMF.

Swept, Tunable Continuous Wave Laser

Swept, tunable continuous wave (CW) laser source with 0.01 dB power stability and 400 nm/s high-speed scan rate for R&D and production testing.

Superluminescent Diode Broadband Light Source

Super-luminescent LED light source with high output power, large bandwidth and low spectral ripple and various wavelengths.

Erbium-Doped Fibre 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.

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. 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.

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)

Cost-effective, spectral measurement in a compact module with built-in analysis for: SMSR, OSNR & spectral width. Targeted wavelengths for specific applications in O band, C band & 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.

Digital Sampling Oscilloscope (DSO)

Digital equivalent-time sampling oscilloscope (DSO) with high-quality precision timebase and low jitter mode, available in 1 or 2 channels in a compact benchtop instrument.

Bit Error Rate Tester (BERT)

4 or 8-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.

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.

Optical Switch

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

Photocurrent Amplifier

Versatile photodiode amplifier to measure photocurrent in photonic integrated circuit (PIC) applications. Digital and analog measurement.

Passive Component Integration

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

Test.
Measure.
Solve.™

Quantifi Photonics provides test solutions to help customers unlock scalable and cost-effective high-volume manufacturing of photonic integrated circuits (PICs), co-packaged optics and pluggable optics. The company's portfolio includes a wide range of photonic test instruments, and digital sampling oscilloscopes, available as benchtop or the industry-standard PXI format to support cost-effective, high-throughput design verification testing and high-volume manufacturing.

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

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