QUANTIFI PHOTONICS®

A Teradyne Company

PHOTONICS SOLUTIONS

General-Purpose Photonic Applications

Quantifi Photonics designs and manufactures a broad range of instruments that are well-suited for general-purpose photonics testing. The typical photonics test set up comprises the following elements:

Device-Under-Test (DUT)

The DUT can be a wafer, a die, or a packaged part, with a specific optical function such as an array of
ring resonators, or laser diodes, or a more complete integrated optical transceiver function.

Stimulus (light in)

A stimulus is required to activate the device, which can be a polarized light beam of a certain wavelength, or a swept wavelength laser to present the whole spectrum of interest. In some cases,
an electrical stimulus may be required to activate the desired test mode.

Control

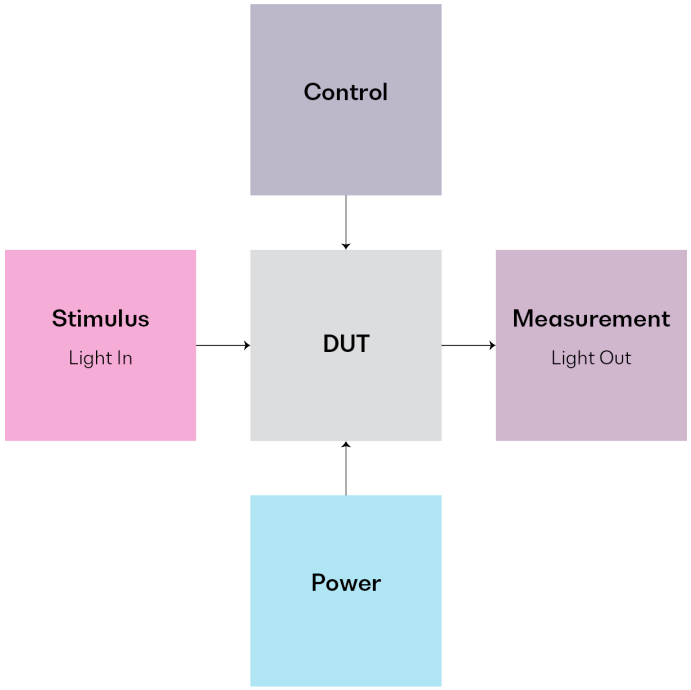
There typically is a need to control the DUT, either to just initialize it or to step through the device settings for optimization purposes. For instance in case of the broadly adopted Common Management Interface Specification (CMIS) interface a low speed I2C is chosen to accomplish this task.

Power

The device needs to be powered with the proper power supply lines to be able to operate as intended, and in addition certain bias voltages may be required for the desired operation.

Measurement (light out)

This can cover optical power levels to test waveguide quality and alignment, the optical spectrum of lasers or wavelength multiplexers and filters, all the way to high-speed signal eye diagram measurements such as TDECQ, AOP, ER, and jitter.









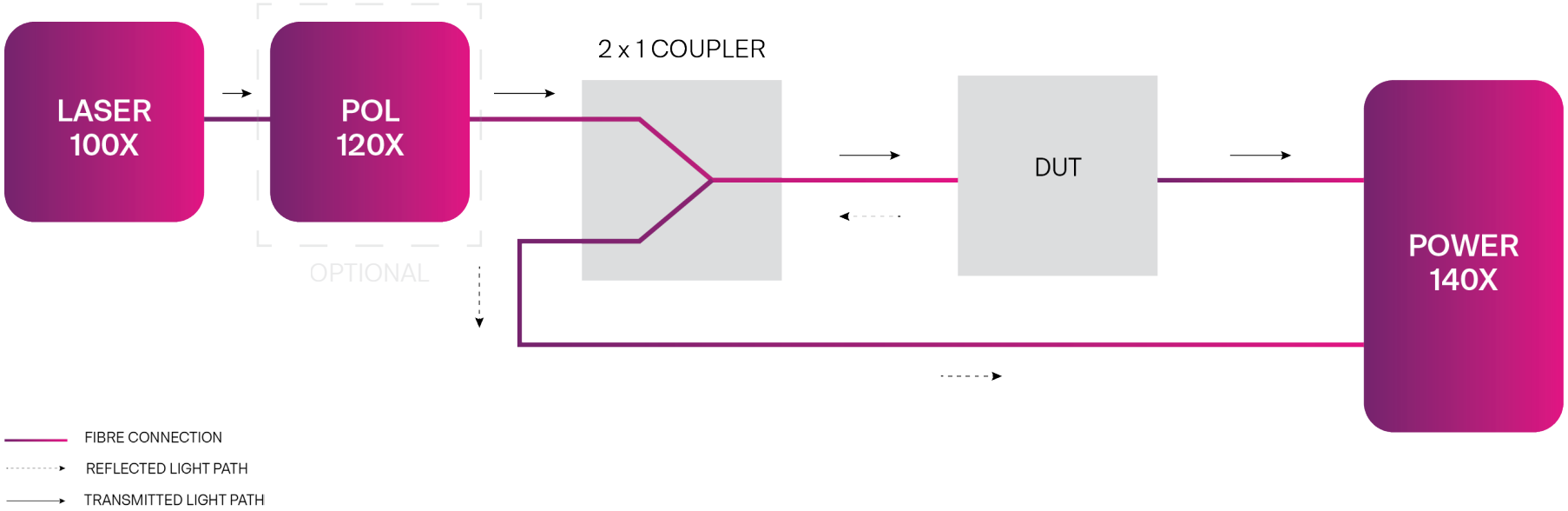




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INSERTION / RETURN LOSS MEASUREMENT

Quantifi Photonics' Laser Sources and Optical Power Meters allow for an easily-scalable Insertion and Return Loss testing system. A multi-channel DUT system can be built from only 2 modules, but with up to 4 channels per laser and power meter module. A polarization controller can be used to depolarize the light for enhanced accuracy.



INSTRUMENTS USED



LASER-10XX



POWER-140X



POL-120X

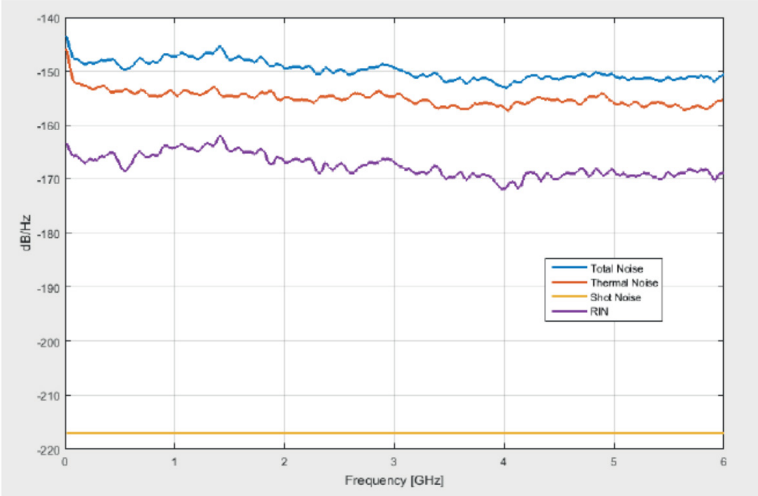
RELATIVE INTENSITY NOISE (RIN) MEASUREMENT

Quantifi Photonics' Optical-to-Electrical converters allow customers to use existing electrical RF Spectrum Analyzers to perform this critical laser measurement.



FIBRE CONNECTION

ELECTRICAL CONNECTION



RIN measurement example from a ITLA laser.

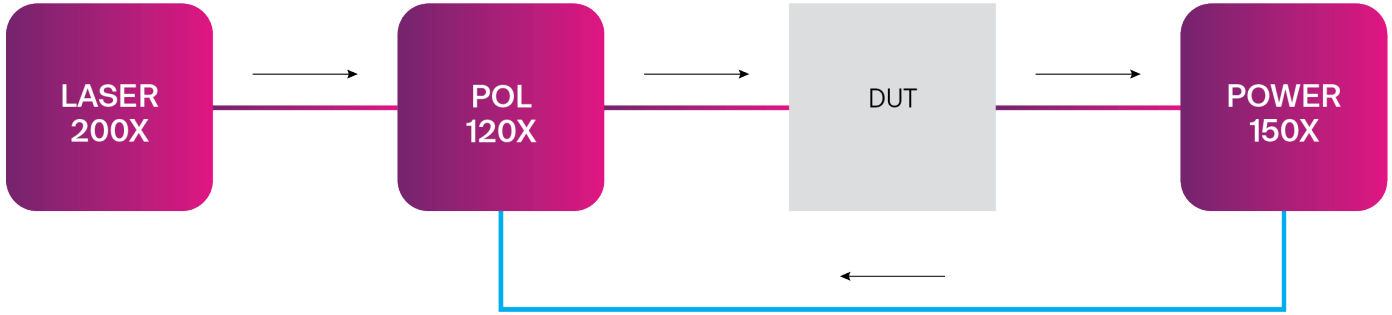
INSTRUMENTS USED



O2E-140X

WAVELENGTH/POLARIZATION DEPENDENT LOSS (WDL/PDL)

Quantifi Photonics' Laser-2000 and Pol-1200 product lines allow customers to rapidly cover a wide range and wavelengths and the entire Poincare sphere of polarization states. Real-time feedback from the Power-1500 to the Pol-1200 allows PDL to scan and lock to minimum- and maximum-power polarization states in tens of milliseconds.



FIBRE CONNECTION

ELECTRICAL CONNECTION

INSTRUMENTS USED



LASER-200X



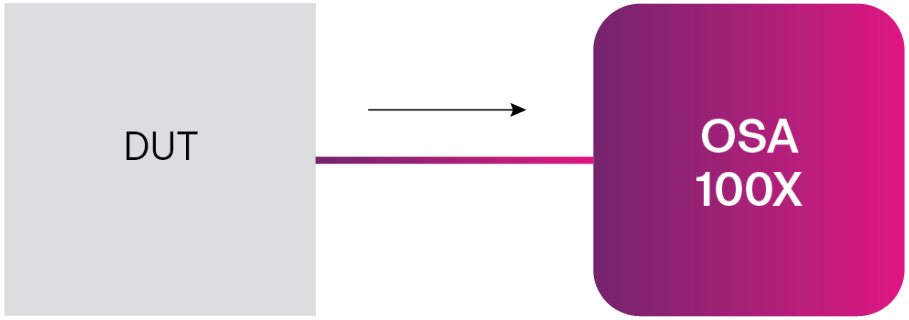
POL-120X

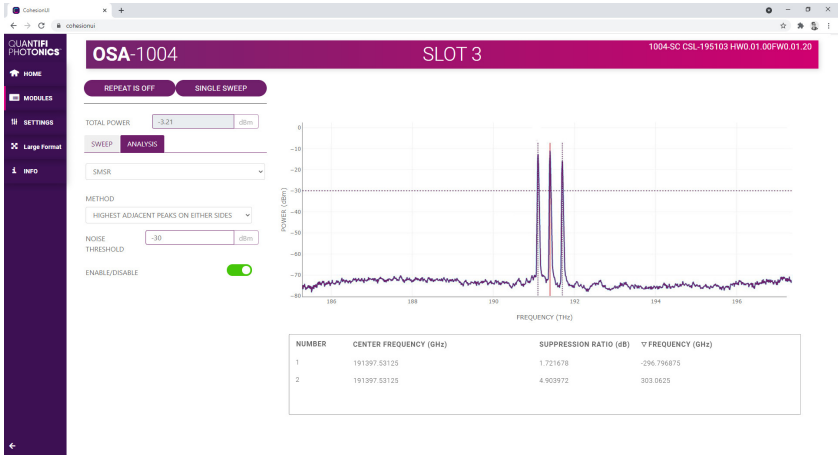


POWER-150X

LASER SPECTRUM MEASUREMENT

Laser spectrum measurements with Quantifi Photonics' Optical Spectrum Analyzers have built-in SMSR measurement - facilitating spec compliant measurements.





SMSR measured with CohesionUI software

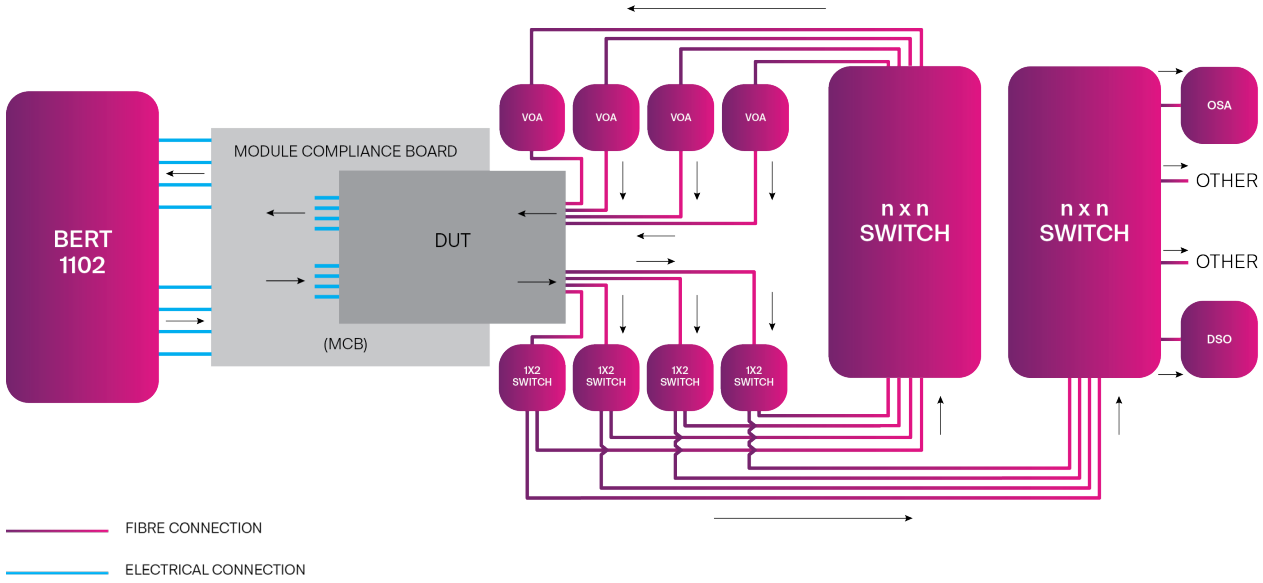
INSTRUMENTS USED

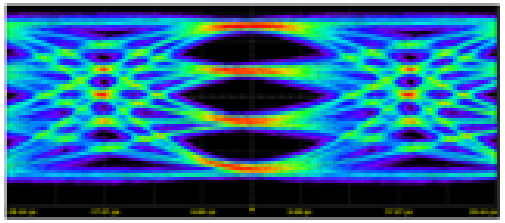


OSA-100X

TRANSCEIVER TESTING

Optical transceivers need to be tested thoroughly before being deployed in the field. The below setup characterizes the receiver sensitivity of all Tx Rx pairs and enables the full eye diagram and spectrum analysis of all Tx channels.





28 Gbaud (56 Gbps) PAM4

INSTRUMENTS USED



BERT-1102



SWITCH-1XXX



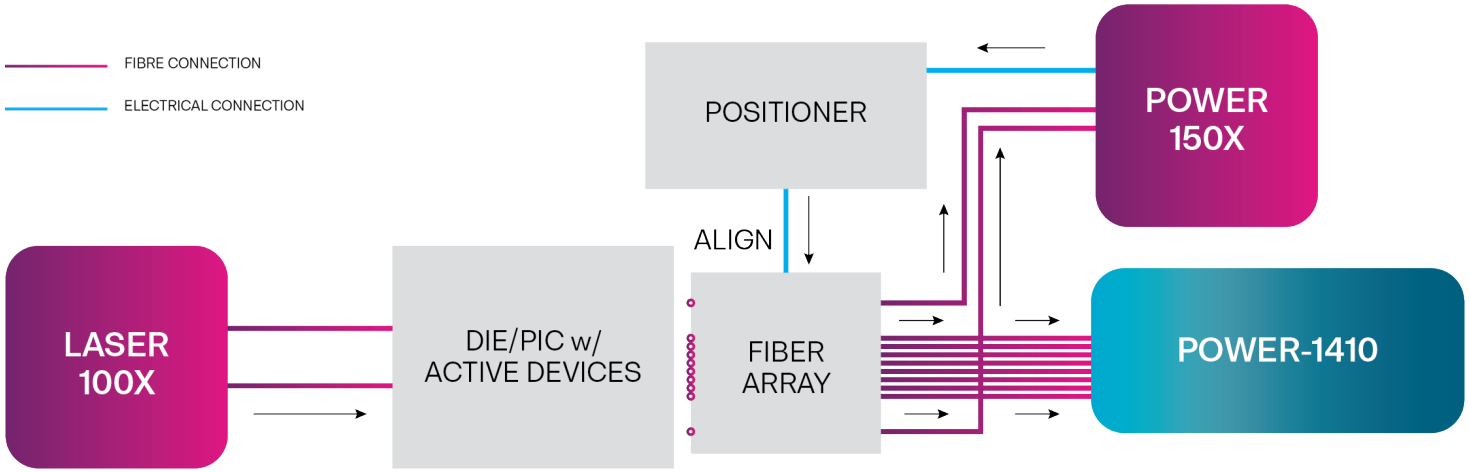
OSA-100X



VOA-1XXX

DIE/PIC MULTI-CHANNEL ACTIVE ALIGNMENT & VALIDATION

The Power-1410 allows for unparalleled channel density, fitting up to 288 parallel channels into a 1U rack-mountable instrument to enable quick validation of ultrahigh-density optical interconnects. The Power-1500 series includes an analog electrical output to provide feedback to prober motion controllers, to facilitate finding the first light from a wafer and to align the fiber array to the die.



INSTRUMENTS USED



LASER-100X



POWER-150X



POWER-1410

PRODUCT PORTFOLIO

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 laser platform. Select required wavelength, power and fiber type for a customized solution.

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.

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.

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 connector types.

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 Switch



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

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.

Bit Error Rate Tester (BERT)



4 or 8-channel Pulse Pattern Generator and Error Detector at rates up to 28 Gbps for the design, characterization and production of optical transceivers and opto-electrical components.

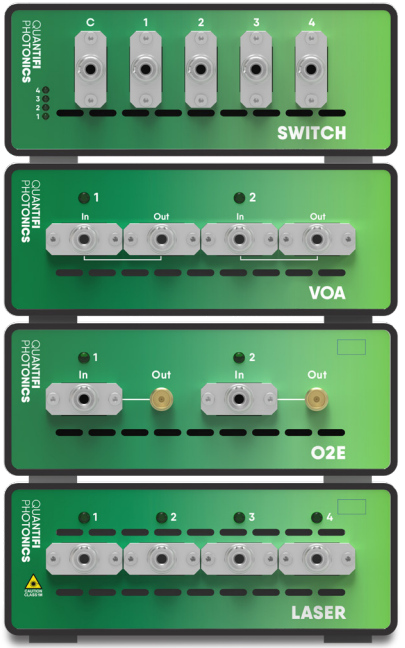
Passive Component Integration



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.

MATRIQ: COMPACT, PORTABLE & STACKABLE

The MATRIQ Series offers cost-effective photonic test capabilities in an ultra-compact benchtop design.



Plug and play with USB or Ethernet connectivity

The MATRIQ platform offers the user both Ethernet and USB connectivity and the rear LCD panel conveniently displays the unit's IP address to instantly access the GUI.

Customized IP addresses

Use the default IP address, or set up DHCP or static IP addresses for either local control or network accessible control and configure multiple units with individual IP addresses for multi-unit setups.

Robust and reliable performance

Conforms to temperature/vibration/clean room specifications for hassle-free integration into existing infrastructure.



Need a scalable solution?

Most of our MATRIQ benchtop instruments are also available as PXI modules. PXI is an open, easy-to-scale platform and is ideal for automated high-channel-count testing.

Ask us for more information about our integrated optical and electro-optical test capabilities on the PXI platform.

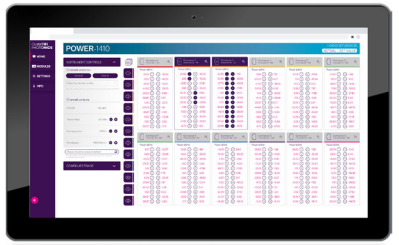
INTUITIVE SOFTWARE, DESIGNED FOR THE USER

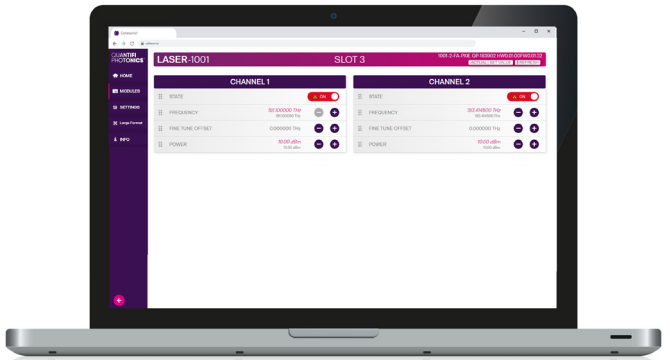
CohesionUI™ is an innovative web-based user interface for a consistent, easy-to-use experience across all products.

- A single, seamless software interface
- Multi-device support
- Programmable with SCPI commands in common application environments like LabVIEW and MATLAB, or preferred programming languages: BASIC, C, C++, Python, etc









LASER SOURCES

Versatile telecom-grade laser sources with full tunability across O, S, C and L bands, & highly-customizable continuous wave fixed wavelength sources.

Suitable for:

- Fiber-optic communications
- Coherent optical transceiver development
- Optical component testing and characterization
- Silicon photonics
- WDM / DWDM channel loading stress testing
- Photonic Doppler Velocimetry (PDV)
- General-purpose light sources for optics and physics labs



Step tunable (C + L band)

Fixed-wavelength (DFP or FP)

Swept tunable (400 nm/s)

Series	Channels	Type	Output Power	Wavelength	Linewidth	Scanning Resolution	Form Factor
1000	1, 2 or 4	Step	+16.5 dBm	1527.6 - 1611.7 nm	100 kHz	0.01 pm	PXIe, MATRIQ
1100	1, 2 or 4	Fixed	+5.7 dBm	850 nm	-	Fixed wavelength	PXIe, MATRIQ
1200	1, 2 or 4	Fixed DFB	+16 dBm	850 - 1550 nm	-	Fixed wavelength	PXIe, MATRIQ
2000	1	Swept	+13 ~ +16 dBm	1250 - 1350 nm, 1350 - 1450 nm & 1520 - 1620 nm	350 MHz	10 pm	PXIe

SLED SOURCES

Super-luminescent LED light source with high output power, large bandwidth and low spectral ripple. Various wavelength models to address applications in the telecom and datacom markets.

Suitable for:

- Passive component characterization (PIC)
- White light interferometry
- Optical Coherence tomography



Large bandwidth

Various wavelength ranges

Stable wavelength spectrum output

Model	Channels	Center Wavelength	Wavelength Range	Output Power	Spectral Density	Fiber	Form Factor
1002	1, 2 or 4	1310 nm	1280 - 1340 nm	+15 dBm	> -8 dBm/nm	SMF 9/125 um	PXIe, MATRIQ
1003	1, 2 or 4	1550 nm	1510 - 1590 nm	+12 dBm	> -12 dBm/nm	SMF 9/125 um	PXIe, MATRIQ
1004	1, 2 or 4	1600 nm	1570 - 1630 nm	+9 dBm	> -15 dBm/nm	SMF 9/125 um	PXIe, MATRIQ
1011	2	1310 & 1550 nm	1280 - 1340 & 1510 - 1590 nm	+11 dBm	> -12 dBm/nm	SMF 9/125 um	PXIe, MATRIQ
1301	1, 2 or 4	1300 nm	1260 - 1330 nm	+10 dBm	> -8 dBm/nm	PMF 8/125 um	PXIe, MATRIQ

OPTICAL SPECTRUM ANALYZERS

Low cost, fast spectral measurement in a compact module providing spectral and power analysis in targeted models with wavelength ranges covering O band, C band and L band. An essential tool for characterization of wavelength-dependent active and passive components and systems.



Suitable for:

- Power and wavelength measurements
- High-resolution spectral analysis
- WDM Channel monitoring
- Optical Signal to Noise Ratio (OSNR) measurements
- Side-mode Suppression Ratio (SMSR) measurements

Grating-based

Good wavelength repeatability

High dynamic range

Model	Channels	Fiber	Dynamic Range	Wavelength	Resolution BW	Form Factor
1001	1	9/125 um	60 dB	1265 - 1355 nm	200 pm	PXIe, MATRIQ
1002	1	9/125 um	60 dB	1355 - 1445 nm	210 pm	PXIe, MATRIQ
1004	1	9/125 um	60 dB	1525 - 1615 nm	240 pm	PXIe, MATRIQ
1005	1	9/125 um	60 dB	1510 - 1570 nm	170 pm	PXIe, MATRIQ
1006	1	9/125 um	60 dB	1520 - 1565 nm	120 pm	PXIe, MATRIQ
1008	1	9/125 um	60 dB	1565 - 1625 nm	170 pm	PXIe, MATRIQ

OPTICAL POWER METERS

Fast terminating or inline monitoring and datalogging of optical power from -60 to +20 dBm across 750 – 1700 nm wavelengths. Models offer analog output and high channel counts for parallel-testing applications.



Suitable for:

- Fiber optic manufacturing
- Automated test systems
- Silicon photonics and CPO development and manufacturing
- Laser source testing and characterization
- General-purpose R&D and production tool
- The Power 1500 Series offers logarithmic analog output which is ideal for electro-mechanical positioning during active fiber alignment in silicon photonics applications

Analog logarithmic amplifier

Data logging capability

Broad power and wavelength ranges

Series	Channels	Sensitivity	Wavelength	Log-Amp	Data-logging	Output	Form Factor
1400	2 or 4	-60 ~ +10 dBm	750 – 1700 nm	Yes	Yes	N/A	PXIe, MATRIQ
1410	24 ~ 288	-60 ~ +10 dBm	1250 – 1650 nm	Yes	Yes	N/A	EPIQ
1500	2	-60 ~ +10 dBm	750 – 1700 nm	Yes	Yes	Electrical	PXIe, MATRIQ
1600	2	-50 ~ +20 dBm	800 – 900 nm & 1260 – 1650 nm	Yes	Yes	Optical	PXIe, MATRIQ

VARIABLE OPTICAL ATTENUATORS

MEMS-based variable optical attenuators with fast attenuation speed, low insertion loss and built-in power monitoring. Operate in fixed attenuation or constant output power modes and supports various optical fiber types.



Suitable for:

- Transceiver stress testing
- Receiver sensitivity testing
- Loss simulation
- Optical power budget analysis
- Instrument power calibration

Built in power monitoring capability

Wide coverage of operational wavelengths

Power stability <0.005dB RMS

Series	Channels	Fiber	Attenuation Range	Wavelength	Optical Power Meter	Data Logging	Form Factor
1000	2	SMF	>46 dB	1260 – 1550 nm	Yes	Yes	PXIe, MATRIQ
1100	2	MMF	53 dB	800 – 900 nm	Yes	Yes	PXIe, MATRIQ
1300	2	PMF	>40 dB	1520 – 1570 nm	Yes	Yes	PXIe, MATRIQ

OPTICAL SWITCHES

MEMS-based technology offers proven reliability and fast switching time. Over 25 models of switch configurations available with wide wavelength coverage from 800 to 1650 nm and supporting SM, MM, and PM optical fiber types.



Suitable for:

- Automated sequential testing
- Optical component manufacturing
- High-channel count test systems
- Transceiver manufacturing
- General-purpose R&D and production tool

High repeatability

Wide coverage of operational wavelengths

bi-directional control

Series	Channels	Fiber	Configurations	Wavelength	# of Switches	Insertion Loss	Form Factor
1000	1 ~ 16	SMF	Single, Duplex, Quad, Cross-over	1260 – 1650 nm	1, 2 or 4	<1.2 dB	PXIe, MATRIQ
1100	1 ~ 16	MMF (50)	Single, Duplex, Quad, Cross-over	800 – 1420 nm	1, 2 or 4	<1.2 dB	PXIe, MATRIQ
1200	8 ~ 16	SMF	Grid	1260 – 1650 nm	1, 2 or 4	<1.2 dB	PXIe, MATRIQ
1300	1 ~ 16	PMF	Single, Cross-over	1250 – 1590 nm	1, 2 or 4	<1.5 dB	PXIe, MATRIQ
1400	1 ~ 16	MMF (62.5)	Single, Duplex, Quad	800 – 1420 nm	1, 2 or 4	<1.6 dB	PXIe, MATRIQ

POLARIZATION CONTROLLERS - SCRAMBLERS

High-speed software-controlled polarization control and polarization scrambling with broad wavelength coverage, low insertion loss and back reflection. Ideal for polarization dependent testing procedures in high-volume manufacturing environments.



Suitable for:

- PDL measurement of DUT
- ICR parameter testing
- Silicon photonics device testing
- Polarization dependent testing
- General-purpose R&D and production tool

High speed operation

low insertion loss

Full software control

Model	Fiber	Functions	Scan/Optimize Time	Wavelength	Speed	Insertion Loss	Form Factor
1000	SMF 9/125 um	Controller, Scrambler, Manual	-	1260 - 1650 nm	100 rad/sec	<0.2 dB	PXIe, MATRIQ
1200	SMF 9/125 um	Controller, Scrambler, Manual	50 ms	1260 - 1360 nm & 1530 - 1565 nm	500 krad/sec	<1.3 dB	PXIe

OPTICAL-TO-ELECTRICAL CONVERTERS

High bandwidth, broadband optical-to-electrical 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. Optical-electrical converters are typically used with an oscilloscope or digitizer to analyze the quality of an incoming optical signal.



Suitable for:

- Optical signal eye diagram measurement
- Relative intensity noise (RIN) measurement
- Modulation depth measurement
- Extinction ratio measurement
- Precision timing/triggering
- Frequency response measurement of devices

Various wavelength ranges

Up to 50 GHz bandwidth

Amplified RF output

Series	Bandwidth	Fiber	Conversion Gain	Wavelength Range	RF Coupling	Channels	Form Factor
1000	9.5 GHz	62.5/125 um	430 V/W	750 – 1650 nm	DC	1 - 2	PXIe, MATRIQ
1100	25 GHz	9/125 um	900 V/W	950 – 1650 nm	AC	1 - 2	PXIe, MATRIQ
1200	35 GHz	50/125 um	100 V/W	800 – 1650 nm	DC	1 - 2	PXIe, MATRIQ
1300	50 GHz	9/125 um	90 V/W	1200 – 1650 nm	DC	1 - 2	PXIe, MATRIQ
1400	9 GHz	62.5/125 um	10 kV/W	750 – 1650 nm	AC	1 - 2	PXIe, MATRIQ

PULSE PATTERN GENERATION – BERT

High-density pulse pattern generation (PPG) and bit error detection (BERT) with built-in clock synthesizer up to 28 GBaud NRZ and PAM4 for the design, characterization and production test of optical transceivers and opto-electrical components. These instruments are used to test the quality of signal/data transmission of single components or complete systems.



NRZ / PAM4 **NRZ or PAM4 formats**

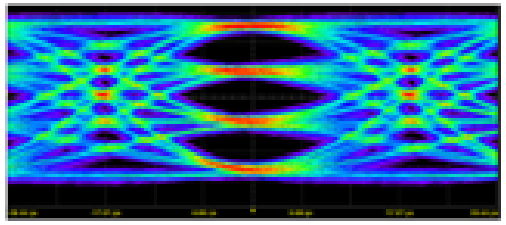
Built-in clock recovery

Internal clock synthesizer

Suitable for:

- Optical or electrical transceiver testing
- Active optical cable testing
- High speed SerDes, clock-data-recovery, and laser-driver testing and characterization
- General purpose 28 GBaud PPG (NRZ and PAM4)
- Ideal for 400G transceiver testing (1102)

Model	Channels	Speed	Data Coding
1005	4	1.25 – 14.50 Gb/s	NRZ
1102	8	1.25-28.125 Gbps NRZ, 15-56.25 Gbps PAM4	NRZ, PAM4



28 Gbaud (56 Gbps) PAM4

TEST

MEASURE

SOLVE

QUANTIFI PHOTONICS®

A Teradyne Company

We love solving test and measurement problems, so talk to our sales engineers to find the right solution for you. Contact us at **sales@quantifiphotonics.com.**

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