OMA

OPTICAL MODULATION ANALYZER

SPECIFICATION SHEET

quantifiphotonics.com

Get the most out of your investment with Tektronix oscilloscope's scalable architecture. Use the stack as a single 70 GHz OMA system today then use it as four independent oscilloscopes tomorrow.

Built-in narrow linewidth tunable laser

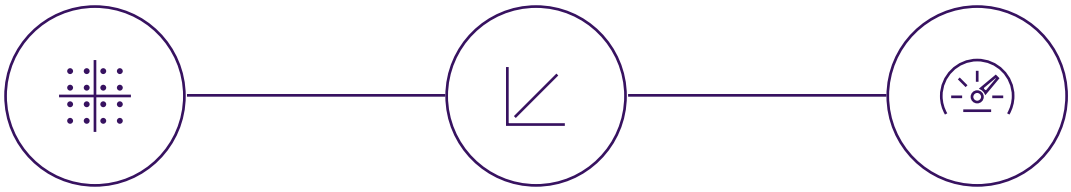
IQRX comes with a built-in narrow 25 KHz instantaneous linewidth laser, making it perfect for coherent modulation formats that require high phase stability.

VISIQ™ - feature-rich OMA software

VISIQ's superior user interface offers comprehensive visualization for ease-of- use combined with the power of MATLAB®.

Multi-system configuration

Simultaneously displays data from multiple OMAs at same or different wavelengths, simplifying multi-channel measurements.



Full characterization of coherent modulation formats

Complete coherent signal analysis for polarization-multiplexed QPSK, QAM, differential BPSK/QPSK, and other advanced modulation formats.

Dual polarization measurement

IQRX houses polarization selective hardware to characterize polarization multiplexed signals. LO input, signal input and internal laser outputs all use polarization maintaining (PM) fiber for the highest versatility.

High-performance, low-noise coherent receiver

IQRX is the gold standard coherent receiver with market-leading performance. It is designed and built using the highest-performing discrete fiber optic components to provide superior fidelity measurement of coherently modulated signals.

Superchannel measurement made simple

Superchannel configuration allows you to define number of channels, channel frequency, and channel modulation format.

19 inch rack mountable

IQRX can be paired with the rack mount brackets for easy mounting in any 19 inch rack.

AMAZING FLEXIBILITY

The industry's most flexible OMA system

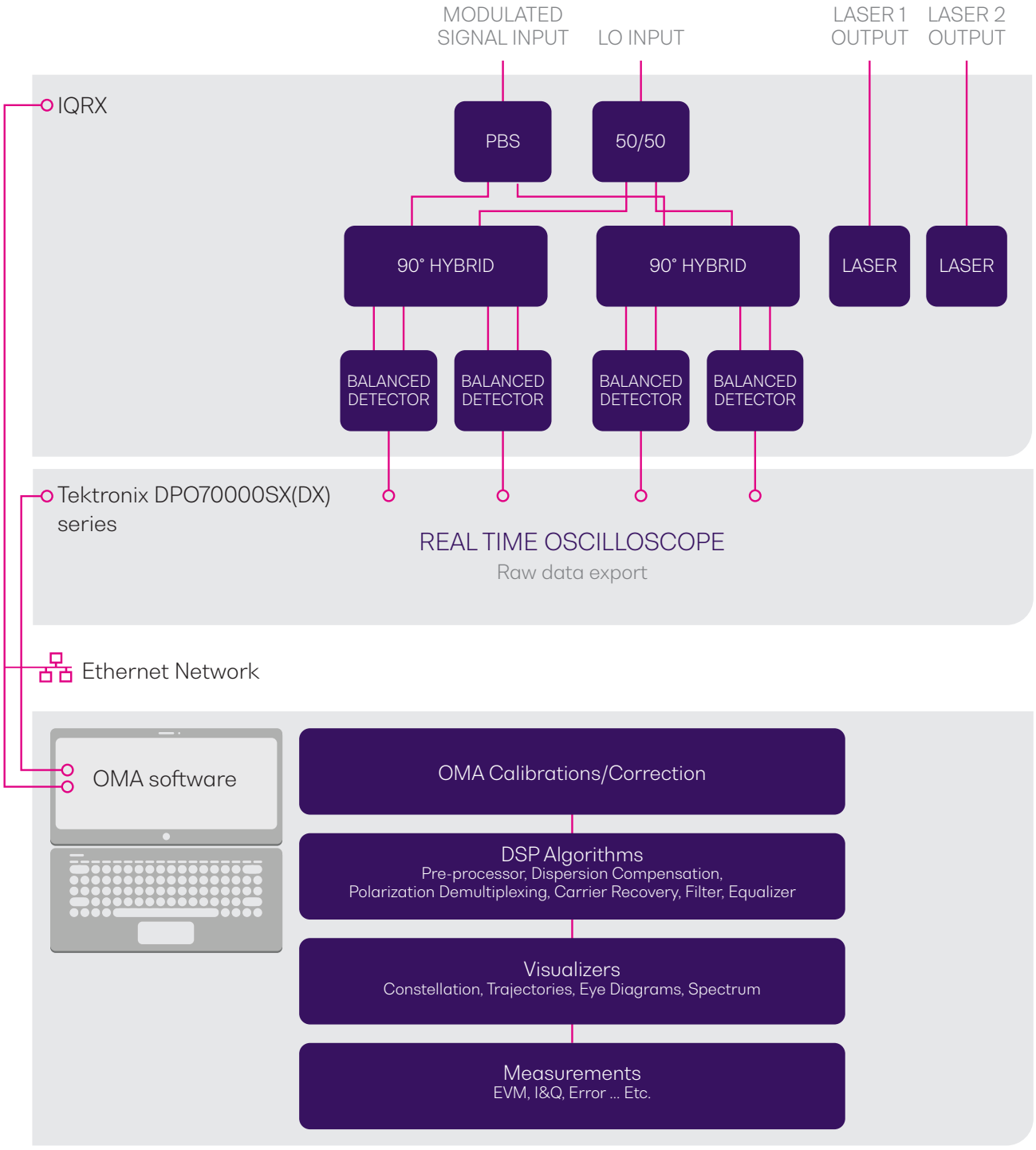
Whether you are working with 100G coherent transceivers or 1 Terabit long haul communication systems, our OMA can be configured to suit your exact requirements.

- Up to 70GHz of system bandwidth
- Characterize 400ZR and 800ZR signals up to 140GBaud
- Supports single and dual polarization PSK and QAM formats
- Visual signal analysis using constellation and eye diagrams
- Performance parameter measurement including EVM, BER, Bias errors and more
- Two built-in narrow linewidth tunable lasers for receiver hardware self-calibration

TARGET APPLICATIONS

- Coherent DSP development
- Coherent transmitter testing
- Custom modulation format development
- Mil / Aero communications R&D

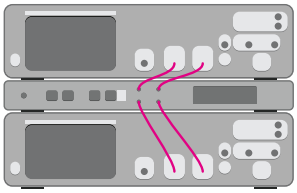
OMA SCHEMATIC DIAGRAM



A SCALABLE SYSTEM THAT GROWS WITH YOUR NEEDS

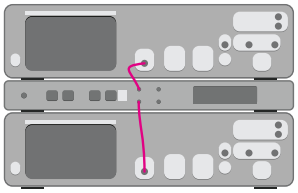
100 G testing

Use four 33 GHz channels for dual-polarization signals.



"Peek" at 400 G signals

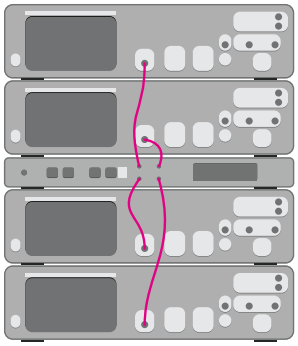
By simply switching to 70 GHz inputs at 200 GS/s, single polarization signals up to 140 GBaud.



Enable higher signal analysis without addition-al investment.

Full 400 G/800 G analysis

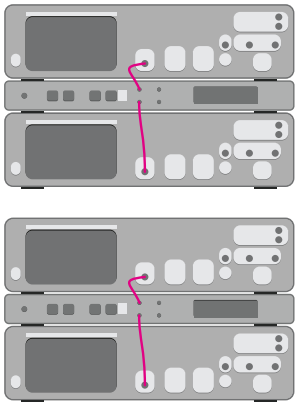
Full dual-polarization 140 GBaud analysis.



Upgrade to higher signal analysis with existing hardware and minimal investment.

Two test systems for 400 G/800 G analysis

Single-polarization 140 GBaud analysis.



Double capacity.

SCALABLE CONFIGURATION TO MATCH YOUR REQUIREMENTS

Max Baud Rate / System Bandwidth

26 GBaud dual pol	32 GBaud dual pol	46 GBaud dual pol	66 GBaud dual pol	100 GBaud dual pol	140 GBaud dual pol
13 GHz BW	16 GHz BW	23 GHz BW	33 GHz BW	50 GHz BW	70 GHz BW

Configuration: Coherent Receiver

IQRX-1002

IQRX-1004

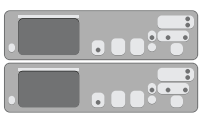
Configuration Scope: (Bandwidth upgradable)

DP071304SX

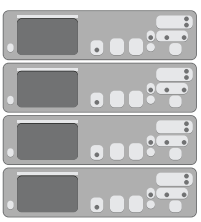
DP071604SX

DP072304SX

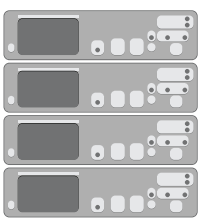
DPS73308SX



2x DPS75004SX

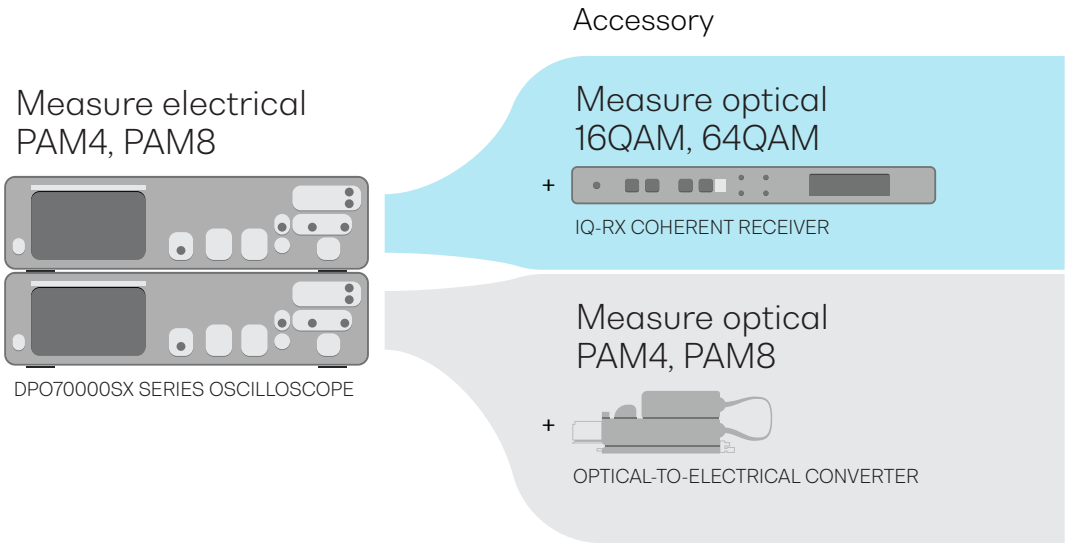


2x DPS77004SX



Thanks to the modular architecture of DPO70000SX series oscilloscopes, you can decouple some of the oscilloscopes to use for direct measurement, when not in use as an OMA system.

Coherent & PAM4/NRZ Solutions



The VISIQ Optical Modulation Analysis (OMA) software provides an ideal platform for research and testing of coherent optical systems.

VISIQ is designed to make coherent signal analysis and DSP optimization as simple as possible. It features an intuitive user-interface that reduces the learning curve for new users, while still providing the ability for advanced users to fully customize the signal processing algorithms.

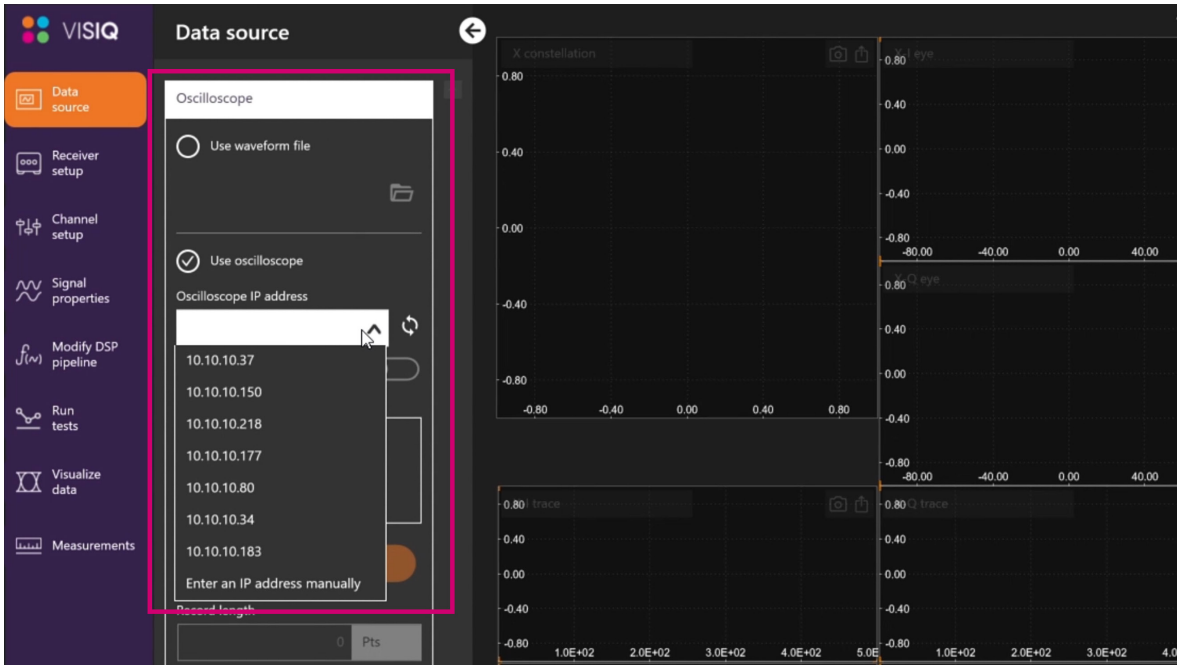
Easy-to-use, intuitive GUI

The modern user interface provides an intuitive presentation of the configuration & analysis workflow to make the coherent DSP simple to understand and use.

1. Show/hide system menu
2. Configuration menu
3. Configuration control panel
4. Data acquisition control
5. Visualization area
6. Analysis measurements table
7. Signal summary panel
8. Connection status

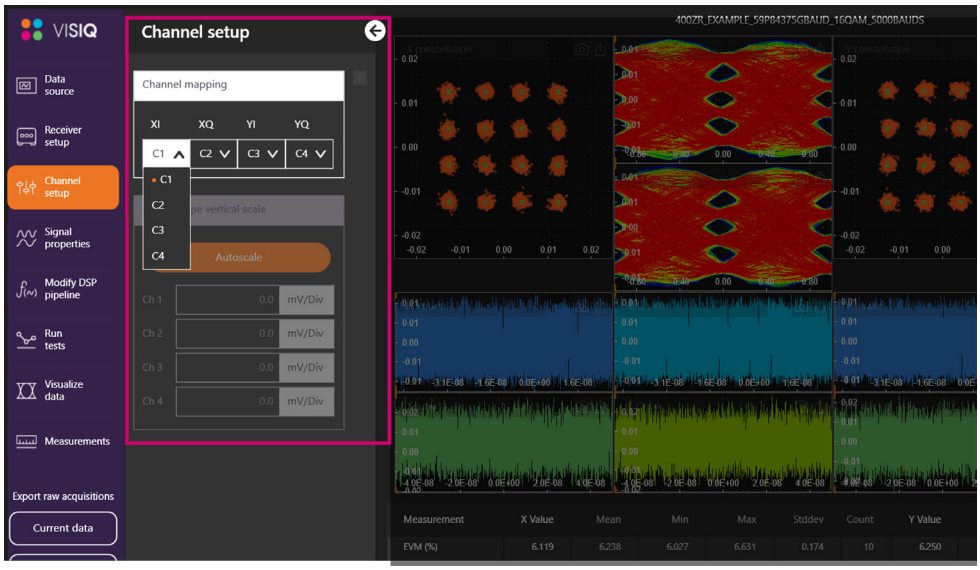
Auto-discovery of hardware

VISIQ automatically discovers compatible coherent receiver and oscilloscope hardware on the USB or ethernet network for a hassle-free setup.



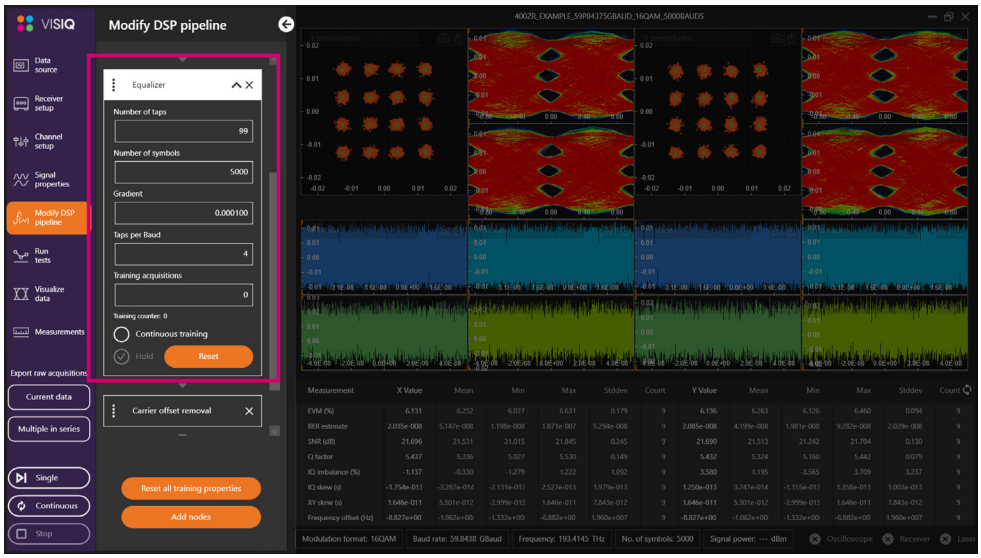
Integrated hardware control

Control oscilloscopes, coherent receivers and the internal lasers within VISIQ's software interface, so you do not need to switch between multiple software applications.



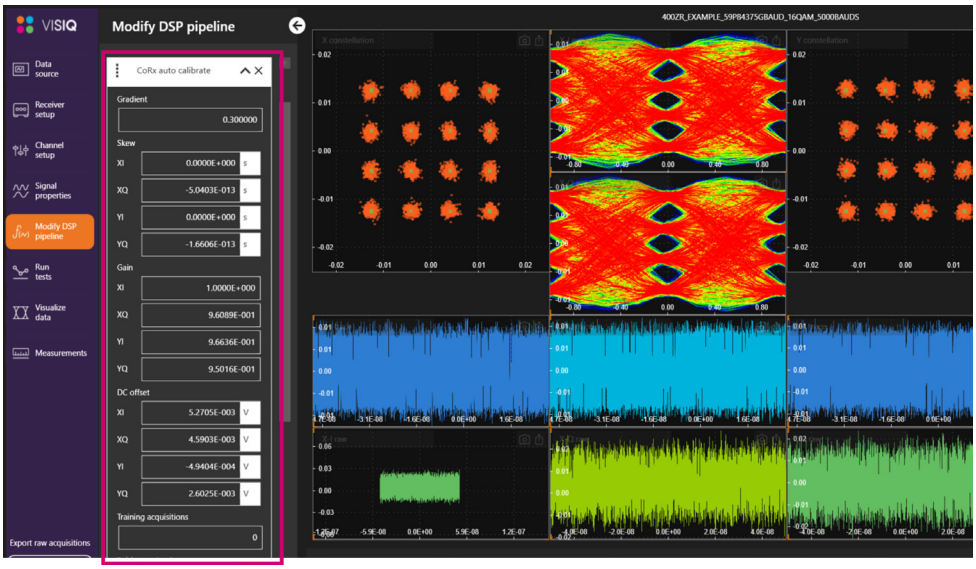
Powerful adaptive equalizers

The advanced equalizer algorithm can be set to train over multiple iterations to test the boundaries of DSP signal optimization and boost test efficiency.



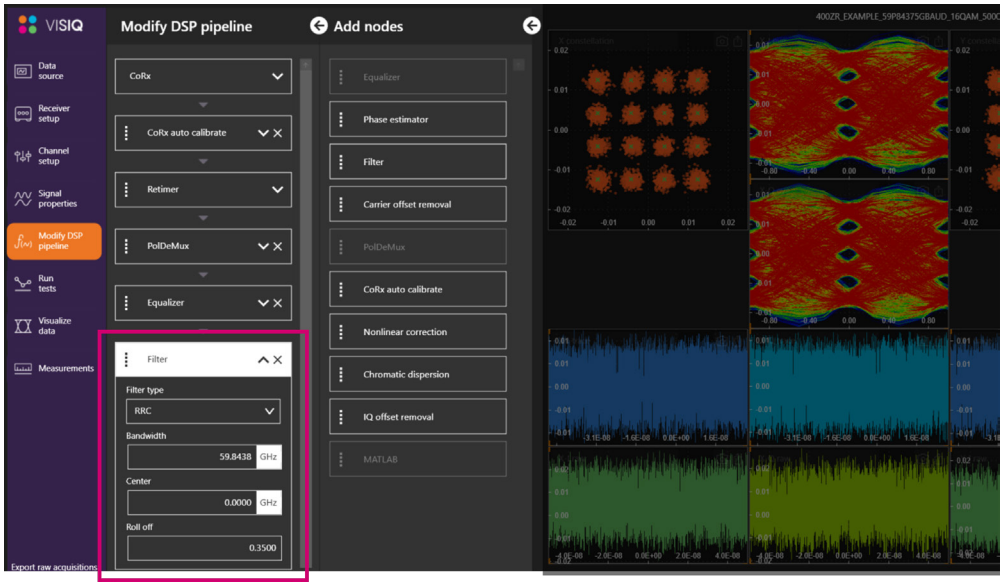
Dynamic CoRx auto-calibration

Automatic receiver calibration algorithm detects receiver IQ skew, gain imbalance and DC offset from the measured signal to remove them on-the-fly. This ensures that the OMA hardware calibration is always finely tuned so that every measurement is accurate and repeatable.



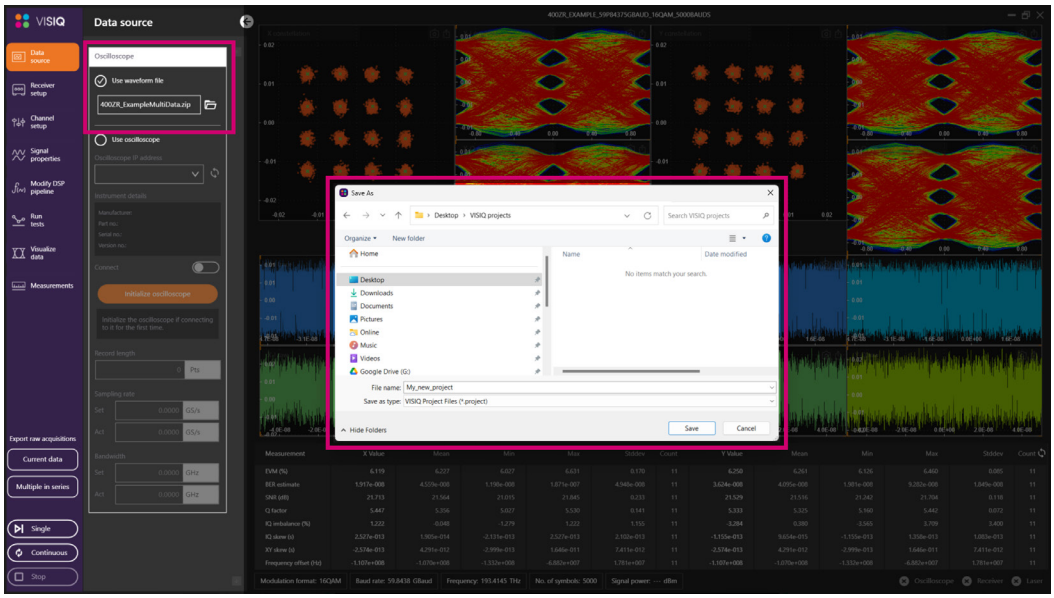
On-the-fly adjustment of DSP parameters

Modify DSP parameters while running in continuous acquisition mode for instant feedback. Use VISIQ as an educational tool where you can instantly see the impact of each functional DSP node to aide users' understanding.



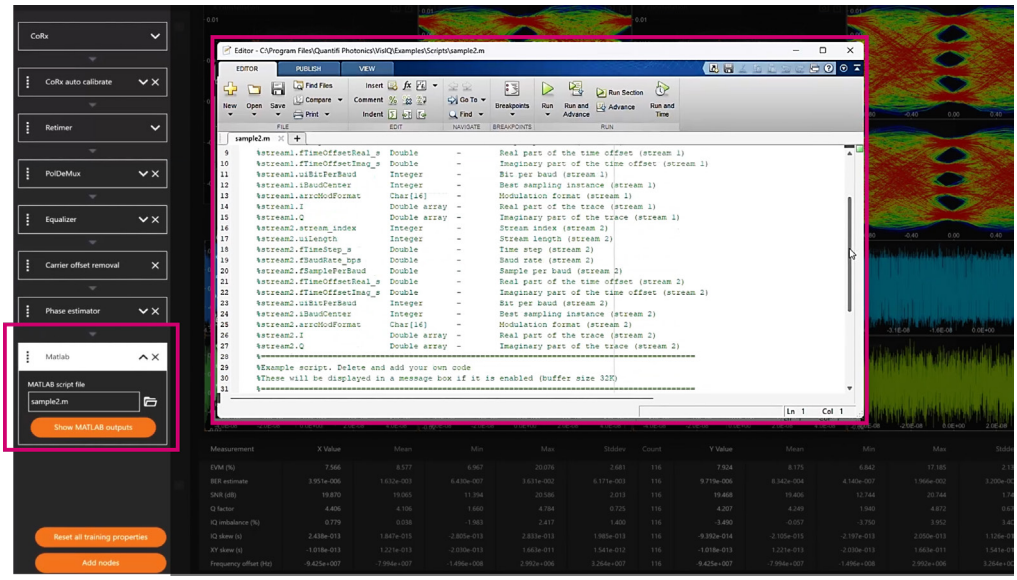
Save, recall and replay measurements

Conveniently save projects, graphs or series of raw waveforms and play them back for offline processing. Playing back saved waveforms allows full reconfiguration of DSP for future troubleshooting or sharing of measurement with others.



Modular MATLAB integration

Import your own MATLAB algorithm into the reconfigurable nodal DSP pipeline, giving you the freedom to place your code anywhere within the DSP chain. Replace just one functional DSP node, or bring in the whole DSP code. With the flexible placement of custom MATLAB node within the pipeline, the possibilities are endless.



Supports SCPI and gRPC remote control

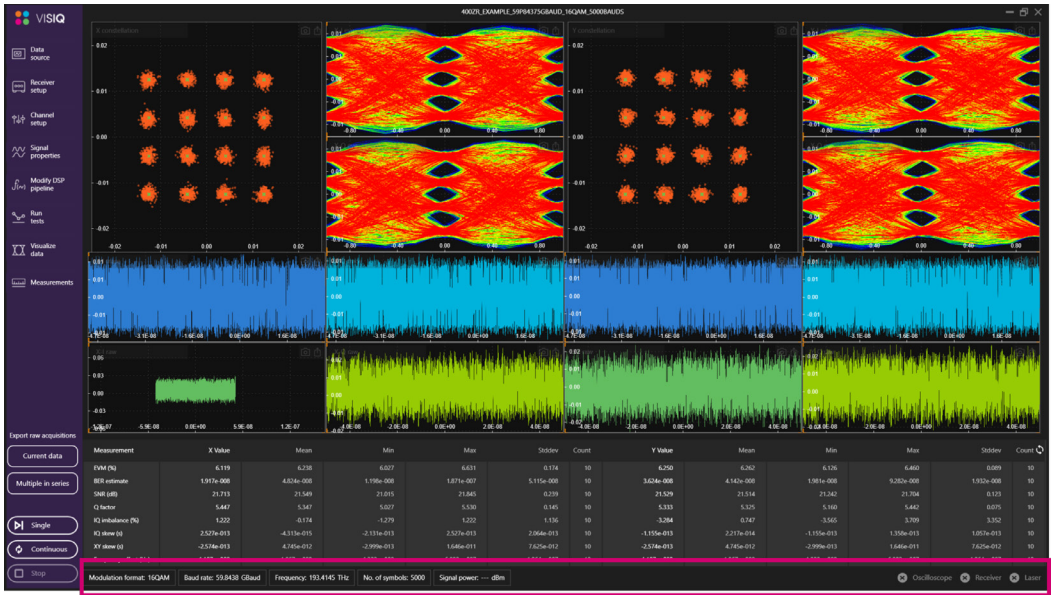
In addition to the intuitive GUI, VISIQ supports test automation via SCPI and gRPC command interfaces.

Command	:PROJect:SOURce:DATA:SIGNal:BAUDrate?	Summary >>
Syntax	:PROJect:SOURce:DATA:SIGNal:BAUDrate?[<wsp><SET|UNIT|STEP|ACT|ALL>]	
Description	Query the Baud rate of the signal	
Parameters	None: Returns the currently set value in the default unit	
	SET: Returns the currently set value in the default unit	
	UNIT: Returns the measurement unit	
	STEP: Returns the resolution/step size of settable values. STEP = 1 allows values of 1, 2, 3. STEP = 0.1 allows values of 1.1, 1.2, 1.3 etc.	
	ACT: Returns the currently set value in the default unit	
	ALL: Returns all the above parameters in a comma-separated string: **<SET>**, **<UNIT>**, **<STEP>**, **<ACT>**	
Response	A single value, or a comma-separated array of values	
Example	:PROJ:SOUR:DATA:SIGN:BAUD? -> 59843750000.000000	

Command	:PROJect:SOURce:DATA:SIGNal:BAUDrate	Summary >>
Syntax	:PROJect:SOURce:DATA:SIGNal:BAUDrate<wsp><value>	
Description	Set the Baud rate of the signal	
Parameters	**<value>**: Sets this value	
Response	N/A	
Example	:PROJ:SOUR:DATA:SIGN:BAUD 59843750000 :PROJ:SOUR:DATA:SIGN:BAUD 59843750 KBAUD :PROJ:SOUR:DATA:SIGN:BAUD 59843.75 MBAUD :PROJ:SOUR:DATA:SIGN:BAUD 59.84375 GBAUD	

Screenshot-friendly signal summary

The signal summary bar enables an effective documentation by recording key signal information in every screen capture.



OMA TECHNICAL SPECIFICATIONS

General Specifications	IQRX
Dimensions (H x W x D)	44.1 x 440 x 528 mm | 1.74 x 17.32 x 20.79 inch
Weight	~ 9.2 kg | ~ 20.3 lbs
Operating temperature range	5 °C to 45 °C | 41 °F to 113 °F
Storage temperature range	-40 °C to 70 °C | -40 °F to 158 °F

Model Number	IQRX-1002	IQRX-1004
Operating wavelength range	1527 to 1630 nm	
Number of polarizations	2	
RF outputs	4: Xi, Xq, Yi, Yq	
Optical connector type	FC/PC, FC/APC	
Coherent receiver RF connector type	2.4 mm female	1.85 mm female
Photodetector bandwidth (-3 dB)[1]	> 45 GHz (Typical)	> 70 GHz (Typical)
RF impedence	50 ohms	
Low frequency cutoff	0 Hz	
Damage level external LO input	+ 25 dBm	
Damage level signal input	+ 25 dBm	
Polarization extinction ratio LO input	> 20 dB	

System Specifications	IQRX-1002 + DPO73304SX 33GHZ OSCILLOSCOPES	IQRX-1004 + DPO77002SX 70GHZ OSCILLOSCOPES
Maximum detectable symbol rate	66 GBaud	140 GBaud
System bandwidth [2]	33 GHz	70 GHz
Oscilloscope sensitivity range	62.5 mVfs to 6 Vfs	100 mVfs to 300 mVfs
Record length (standard)	62.5 M/Ch	62.5 M/Ch
Extended record length (optional)	1 G/Ch	1 G/Ch
Oscilloscope sample rate	100 GS/s	200 GS/s
ADC resolution	8 bits	8 bits
Relative skew after correction [2]	< ± 0.5 ps	< ± 0.5 ps
Quadrature error after correction [2]	< ± 0.5°	< ± 0.5°
EVM noise floor [3]	1.3% (Typical) at 2.5GHz, 1.8% (Typical) at 10GHz	1.3% (Typical) at 2.5 GHz, 1.8% (Typical) at 10 GHz
Image suppression ratio [3]	> 40 dB	> 40 dB

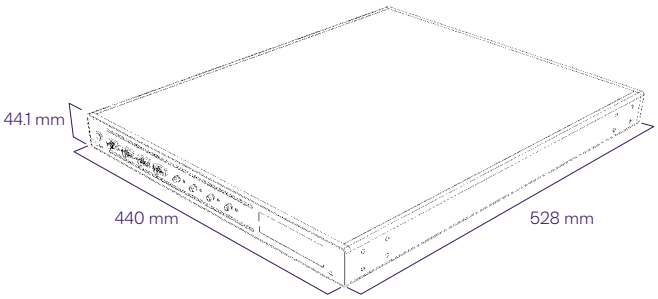
OMA TECHNICAL SPECIFICATIONS

Internal Laser Specifications	IQRX-1002	IQRX-1004
Number of internal lasers	2	
Maximum optical CW output power	+ 15.0 dBm	
Minimum optical CW output power	+ 8 dBm	
Internal laser wavelength tuning range	1527.60 to 1568.70 nm	
Minimum wavelength step	~1 ppm	
Minimum frequency step	100 MHz	
Tuning time/sweep speed	< 30 s	
Absolute wavelength accuracy	10 ppm	
Linewidth (short term)	< 100 kHz, 25 kHz (Typical)	
Sidemode Suppression Ratio (SMSR)	55 dB (Typical)	
Relative Intensity Noise (RIN)	- 145 dB/Hz (10 MHz to 40 GHz)	

Notes
All specifications are subject to change without notice.

1. Bandwidth of individual photodetectors in balanced pair.
2. When paired with DPO70000SX series oscilloscopes. Digitally compensated.
3. Test conditions: Dual polarization, 13GHz channel bandwidth, 2.5GHz or 10GHz frequency offset, 13.5dBm LO input power, 8.0dBm signal input power, Viterbi & Viterbi phase estimation.

Instrument dimensions



Rear panel connections

SYSTEM REQUIREMENTS

- Operating system: Microsoft Windows® 10 (64-bit)
- Processor: Intel® CoreTM i5 or faster CPU
- Memory: 8 GB or greater

Note: VISIQ offers MATLAB custom code integration. In order to use this feature, a licensed copy of MATLAB must be installed on the PC.

ORDERING INFORMATION

IQRX - **XXXX** - **XX**

Model number
1002 = 45 GHz Photodetector bandwidth, C+L-Band
1004 = 70 GHz Photodetector bandwidth, C+L-Band

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

EPIQ - **XXXX**

9001 = A set of **rack mountable plates/brackets - 2 x front brackets, 2 x rear brackets, 2 x rear plates**, with all required screws & nuts. **16 x M4x16 counter-sunk** screws, **8 x M6** screws & nuts and **4 x M5** screws & nuts.

OMA software

VISIQ - **XXXX** - **X/XX**

Version number

1001

License type

P	=	Perpetual license, single user
A	=	Annual license, single user
AR	=	Annual license, single user, renewal
AA	=	Annual license, single user, additional seat

Individual oscilloscopes

DPO77002SX = ATI performance oscilloscope with 1 Ch x 70 GHz, 200 GS/s or 2 Ch x 33 GHz, 100 GS/s
DPO75902SX = ATI performance oscilloscope with 1 Ch x 59 GHz, 200 GS/s or 2 Ch x 33 GHz, 100 GS/s
DPO75002SX = ATI performance oscilloscope with 1 Ch x 50 GHz, 200 GS/s or 2 Ch x 33 GHz, 100 GS/s
DPO73304SX = Digital phosphor oscilloscope with 2 Ch x 33 GHz, 100 GS/s or 4 Ch x 23 GHz, 50 GS/s
DPO72304SX = Digital phosphor oscilloscope with 2 Ch x 23 GHz, 100 GS/s or 4 Ch x 23 GHz, 50 GS/s

Multi-unit systems

DPS77004SX = 70GHz ATI Performance Oscilloscope System: 2 Ch x 70 GHz, 200 GS/s or 4 Ch x 33 GHz, 100 GS/s
DPS75904SX = 59GHz ATI Performance Oscilloscope System: 2 Ch x 59 GHz, 200 GS/s or 4 Ch x 33 GHz, 100 GS/s
DPS75004SX = 50GHz ATI Performance Oscilloscope System: 2 Ch x 50 GHz, 200 GS/s or 4 Ch x 33 GHz, 100 GS/s
DPS73308SX = 33GHz Digital Phosphor Oscilloscope System: 4 Ch x 33 GHz, 100 GS/s or 8 Ch x 23 GHz, 50 GS/s

WARRANTY INFORMATION

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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