QUANTIFI PHOTONICS®
A Teradyne Company

Doppler

MODULAR PHOTONIC DOPPLER VELOCIMETRY

SPECIFICATION SHEET

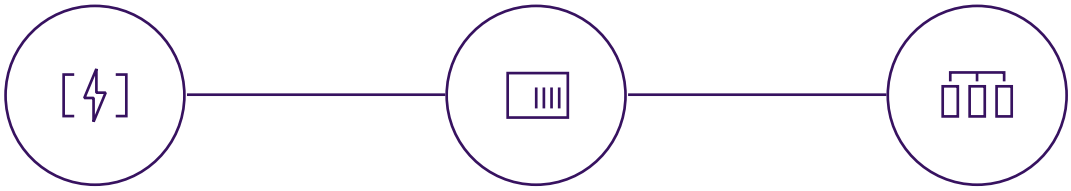
AVAILABLE IN PXI

AVAILABLE IN MATRIQ

quantifiphotonics.com

Velocity measurement of fast-moving materials is essential to a growing number of scientific and technical fields including shock physics, the study of material properties, hypervelocity impact testing, detonics and shock wave experiments.

The Quantifi Photonics Doppler combines the key optical components for Photonic Doppler Velocimetry (PDV) measurements in a compact instrument to enable streamlined high channel count PDV test setups.



Accurate control and measurement of target, probe and reference power.

All of your optical power management in a single-slot PXIe module. This purpose built Doppler instrument streamlines your PDV test setup.

Drastically reduce the footprint of your test setup.

Replace the stack full of bulky individual optical test instruments with one small instrument and save valuable lab space.

Easily build scalable, multi-channel systems

Combine with our Laser and O2E modules and fit up to 8-channels in a single 18-slot PXIe chassis.

Generate reliable, repeatable measurements.

Minimise the number of manual optical connections for reliable and repeatable measurements.

Simple, intuitive operation with COHESIONUI™.

COHESIONUI makes it simple to control the Doppler instrument from your PC or mobile device.

Versatile configuration.

Supports traditional homodyne and frequency-shifted heterodyne PDV testing.

TARGET APPLICATIONS

- Study of material properties and impact response using shock physics.
- Replacement for Velocity Interferometer System for Any Reflector (VISAR) with an integrated fiber-based system.
- Measure velocities in dynamic experiments with high temporal precision.

A COMPLETE PDV MEASUREMENT SOLUTION

Combine the Doppler with the Laser and O2E to build a streamlined PDV test system. All you need to add is an optical probe and digitizer or oscilloscope with suitable bandwidth for the application.

LASER
Tunable Laser Source

Available in PXI
Available in MATRIQ

- Continuous Wave tunable laser source offering high-power output, narrow 100kHz linewidth and 0.01 pm resolution tunability.
- Whisper Mode is an optional feature to remotely disable frequency dither on each laser.

DOPPLER
Photonic Doppler Velocimeter

Available in PXI
Available in MATRIQ

- Available in standard and power-controlled models.
- Power meter, variable optical attenuator and coupler all in one compact, space saving unit.

O2E
Optical-to-Electrical Converter

Available in PXI
Available in MATRIQ

- High-bandwidth, broadband optical-to-electrical converter with 1 or 2 channels, AC or DC coupling, and various conversion gain and operating wavelength ranges.
- Built-in amplifier eliminates the need for additional RF amplifier for significant cost savings per channel.

FIGURE 1

Figure 1 represents the configuration of the Doppler 1001 in PXI or MATRIQ form. It incorporates many of the key fiber optical components required to accurately condition the target and the reference laser and to mix the probe with the reference.

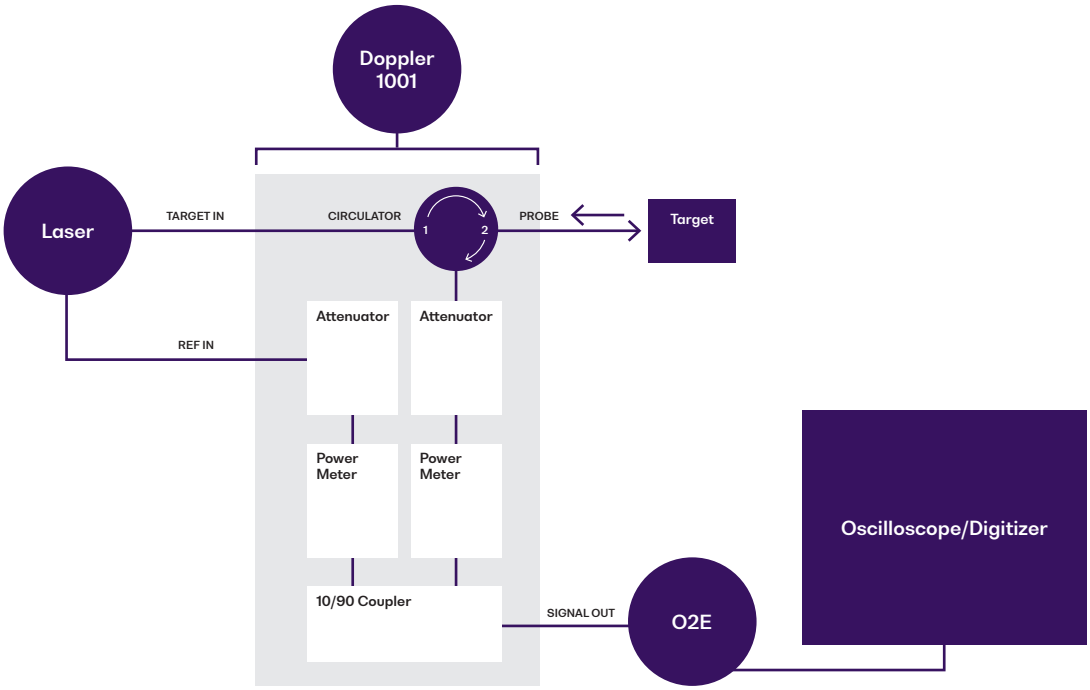
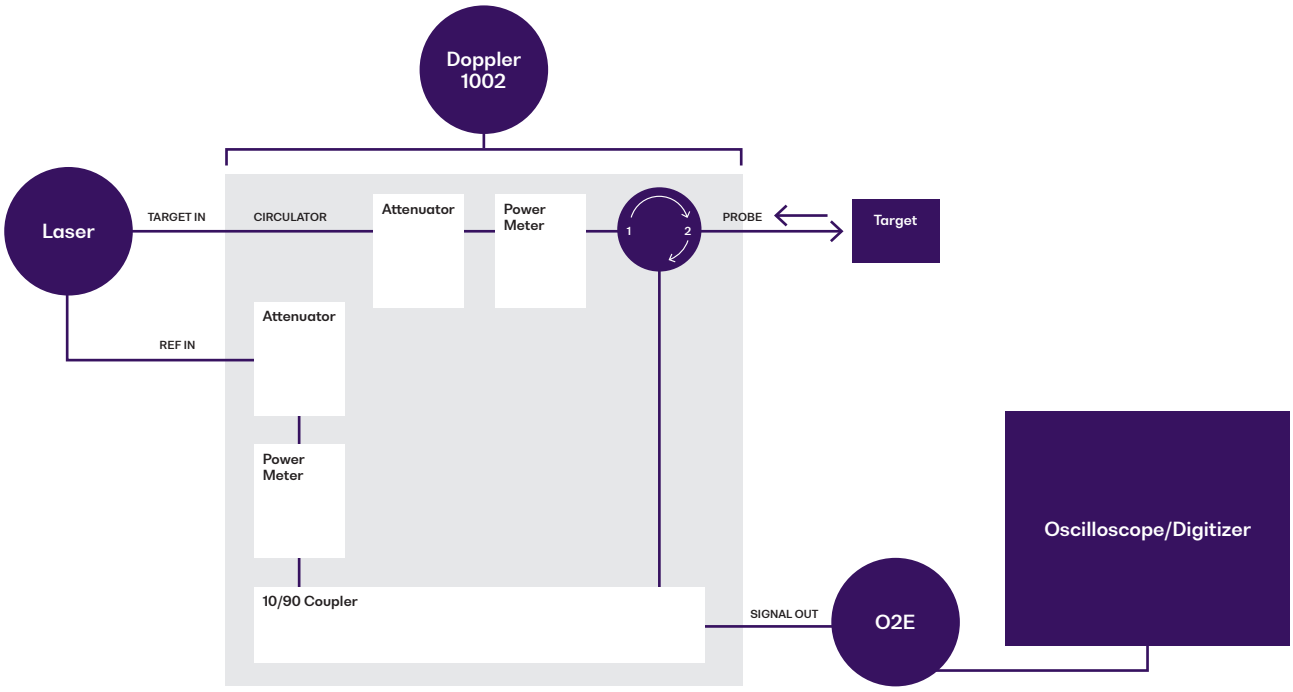


FIGURE 2

Figure 2 represents an alternative configuration of the Doppler instrument. The DOPPLER 1002 places the target input attenuator and power meter before the circulator. With the power control before the probe, this reduces the optical power transmitted to the probe and the DUT which may be desirable in some circumstances.



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

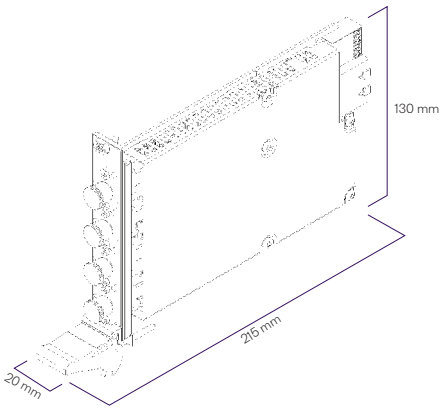
MATRIQ – COMPACT & PORTABLE

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

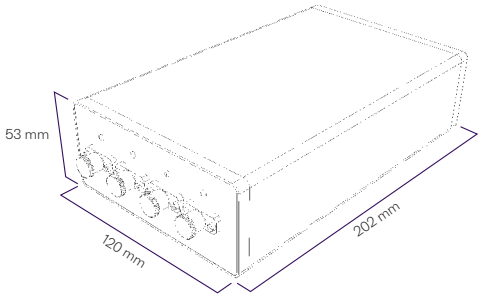
PXI – MODULAR

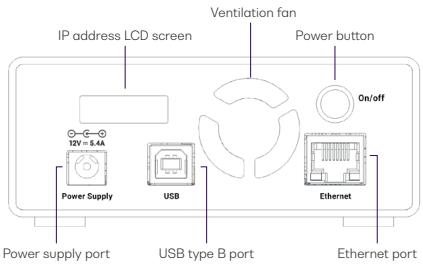
DOPPLER-1001-1-FC-PXIE



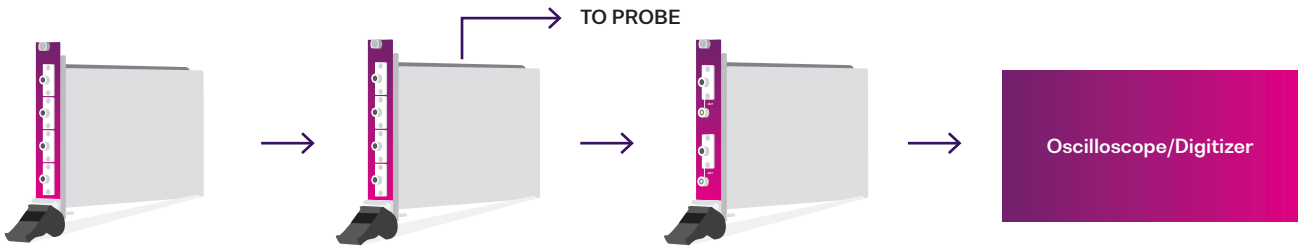
MATRIQ – COMPACT & PORTABLE

DOPPLER-1001-1-FC-MTRQ

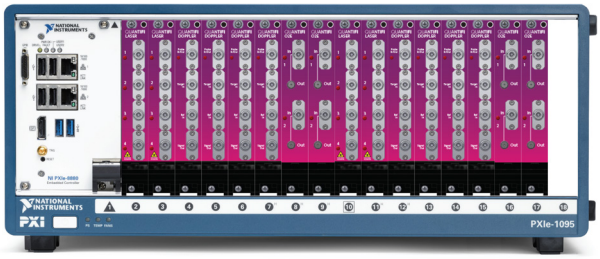




The diagram below shows an example configuration of an 8-channel Doppler setup. It consists of four Laser 1002 laser sources (Target and Reference), and eight Doppler 1001 modules. The output of the Doppler 1001 module is sent to a four high channel and high bandwidth O2E 1101 where the probe and reference laser beat. The electrical beat signal is then digitized with an oscilloscope.



4 x Laser-1002 | 8 x Doppler-1001 | 4 x O2E-1101



8-channel PDV system in a single 18-slot chassis

DOPPLER TECHNICAL SPECIFICATIONS

General Specifications	PXI	MATRIQ
Bus connection	PXIe	USB and Ethernet
Slot count	1	-
Optical connector type	FC/PC, SC/PC, FC/APC, SC/APC	FC/PC, SC/PC, FC/APC, SC/APC
Number of channels	2	2
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.	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	1002	1001	1002
Wavelength	1520 to 1650 nm		1520 to 1650 nm	
Probe output operating range	-50 to +20 dBm		-50 to +20 dBm	
Reference output operating range	-60 to +10 dBm		-60 to +10 dBm	
Damage level	+23 dBm		+23 dBm	
Insertion loss[3] target input to probe output	< 3 dB	< 5 dB	< 3 dB	< 5 dB
Insertion loss[3] probe input to output	< 5 dB	< 3 dB	< 5 dB	< 3 dB
Insertion loss[3] reference input to output	< 14 dB	< 14 dB	< 14 dB	< 14 dB
Wavelength dependent loss	< 0.02 dB/nm		< 0.02 dB/nm	
Return loss[3]	> 45 dB		> 45 dB	
Circulator Directivity	> 45 dB		> 45 dB	
Warm-up time	< 20 minutes		< 20 minutes	

Attenuator	1001	1002	1001	1002
Calibration wavelength	1550 nm		1550 nm	
Attenuation range typical[5]	> 46 dB		> 46 dB	
Attenuation range guaranteed[5]	> 40 dB		> 40 dB	
Resolution	0.01 dB		0.01 dB	
Attenuation speed	0.1 to 1000 dB/s		0.1 to 1000 dB/s	

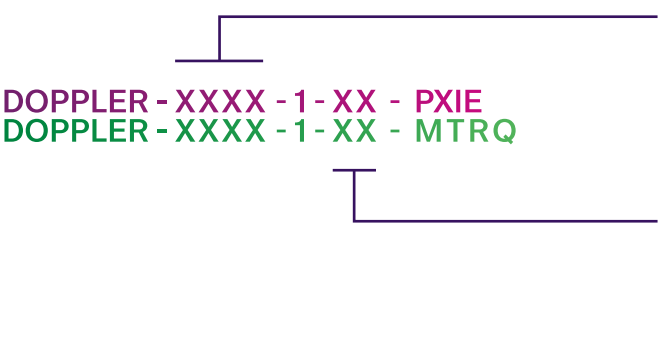
DOPPLER TECHNICAL SPECIFICATIONS

Power Meter	1001	1002	1001	1002
Calibration wavelength	1550 nm		1550 nm	
Polarization dependent responsivity [2,3]	< 0.2 dB		< 0.2 dB	
Linearity[2,5]	± 0.1 dB		± 0.1 dB	
Total uncertainty[2,3,5]	± 0.34 dB (Typical); ± 0.55 dB (Max)		± 0.34 dB (Typical); ± 0.55 dB (Max)	
Averaging time	100 µs to 10 s		100 µs to 10 s	
Resolution	0.01 dB		0.01 dB	
Data logging	1 to 1024 per channel		1 to 1024 per channel	

Notes

1. Specifications are valid at 23 °C ± 3 °C
2. + 10dBm to -40dBm, 23 °C
3. Excluding connectors
4. At calibration wavelengths

ORDERING INFORMATION



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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