QUANTIFI PHOTONICS™

IQTX

COHERENT MODULATION TRANSMITTER

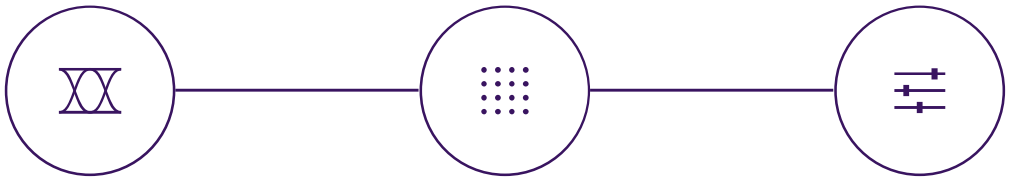
SPECIFICATION SHEET

wavetel
a simac group company

quantifiphotonics.com

The ideal ‘golden’ optical signal source

Generating and controlling phase modulated optical signals is easy with the IQTX. The IQTX is referred to as a ‘Golden’ reference optical signal source because of its high repeatability and reliability. Its high bandwidth of 40 GHz ensures high quality optical signal generation, making it the ideal optical signal source for coherent communications applications.



High-quality signal generation

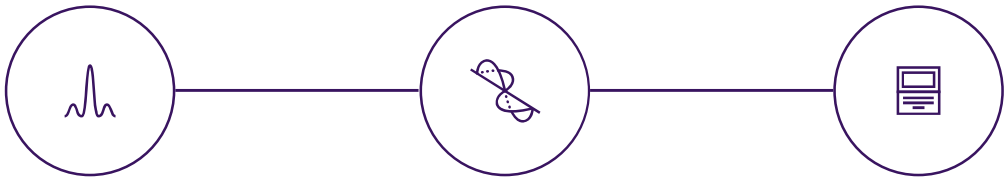
With bandwidth of up to 40 GHz, generate baud rates up to 80 GBaud. 40 GHz bandwidth is perfect for 600 Gbps signals based on 56 GBaud 64QAM modulation format.

Generate 16QAM & more

The IQTX uses high bandwidth linear RF amplifiers to enable generation of any multi-level optical modulation formats when used with RF Arbitrary Waveform Generators (AWG).

High performance ABC

Modulation format and data independent Automatic Bias Controller tracks and compensates for any bias drifts so you can set and forget.



Narrow linewidth laser

The built-in tunable laser with a narrow 100 KHz linewidth and 15 dBm of output power is an ideal laser source for coherent modulation formats. You can also use your own laser if preferred.

Dual polarization emulator

Single polarization models come with an emulated dual polarization generator which optically multiplexes a time delayed copy of the single polarization signal.

Effective & user-friendly GUI

COHESIONUI™ provides simple set up and full software control. Automatically discover compatible instruments on the Local Area Network and control the IQTX from the comfort of your own desk.

Versatile configuration

Supports full dual polarization, emulated dual polarization or single polarization

USB and Ethernet operation

Connect with USB and/or Ethernet for simple setup and operation.

FEATURES

- Choose from 11 GHz, 20 GHz, 23 GHz or 40 GHz of bandwidth
- Pattern independent Automatic Bias Control
- High repeatability and reliability of optimized optical signals
- Inbuilt narrow linewidth tunable laser
- Perfect for M-QAM, M-PSK and custom modulation formats
- Intuitive and user-friendly GUI
- Complete remote control capability
- Capable of supporting Baud rates beyond 64 GBaud

PATTERN-INDEPENDENT AUTOMATIC BIAS CONTROLLER

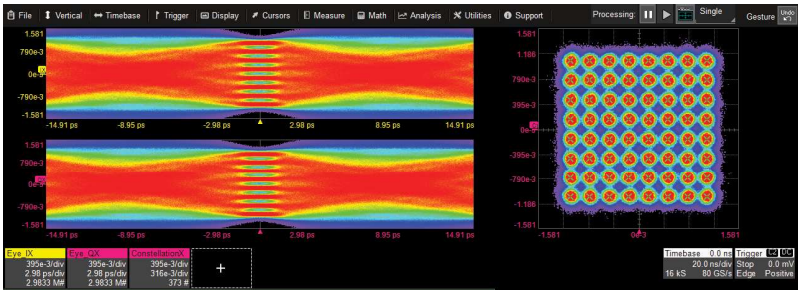
The built-in Automatic Bias Control (ABC) makes it easy for engineers to quickly generate optimized signals. The ABC's high stability ensures that bias points are maintained at the desired location and allows engineers to work with Arbitrary modulation formats including M-QAM, M-PSK, etc.

Our dedicated software for ABC offers complete remote operation capability allowing the user to control the setup. These features make the Quantifi Photonics' IQTX a superb plug-and-play R&D optical signal generator.

Samples of signals generated with the IQTX

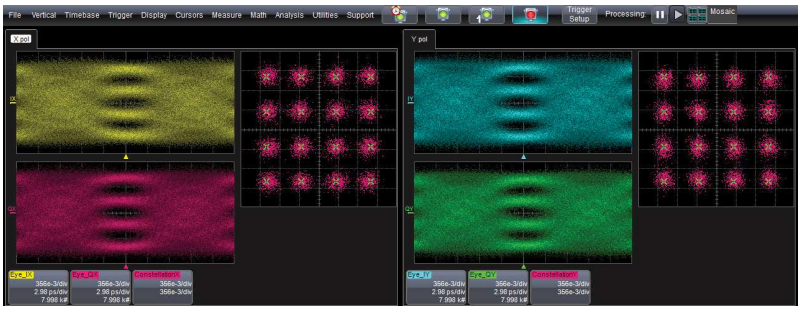
56GBaud 64QAM

Generated using 92GSa/s AWG and 40GHz Dual Polarization IQTX. 6.2% EVM



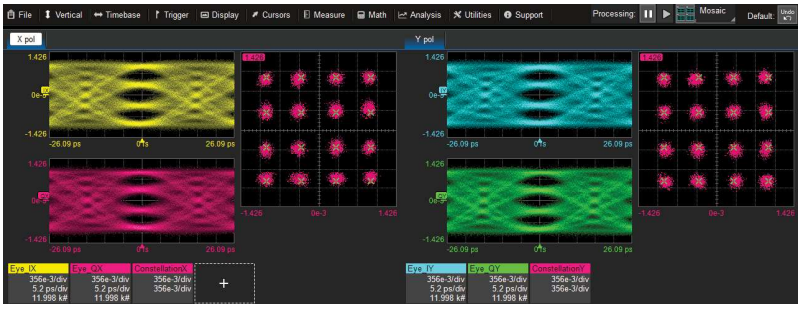
56GBaud 16QAM

Generated using a 3-bit PowerDAC and 40GHz Dual Polarization IQTX. 9.5% EVM



32GBaud 16QAM

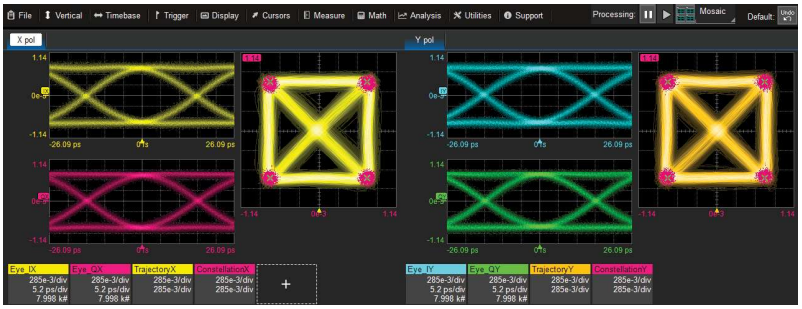
Generated using a 65GSa/s AWG and 26GHz Single Polarization IQTX with Dual Polarization Emulator. 6.7% EVM



Samples of signals generated with the IQTX

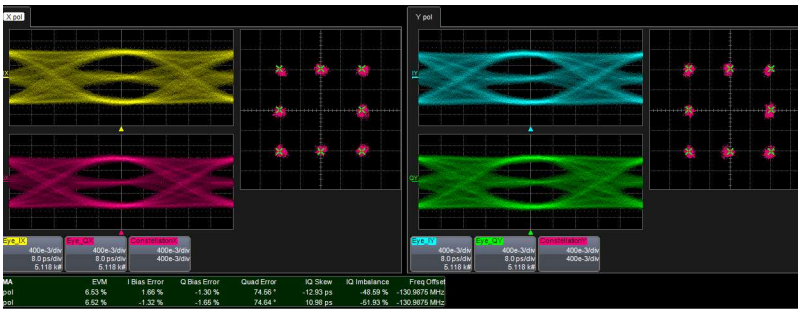
32 GBaud QPSK

32GBaud QPSK generated using a 65GSa/s AWG and 26GHz Single Polarization IQTX with Dual Polarization Emulator. 6.8% EVM



21 GBaud DP-8QAM

High quality DP-8QAM signal at 21 GBaud. EVM ~ 6.53%



21 GBaud BPSK

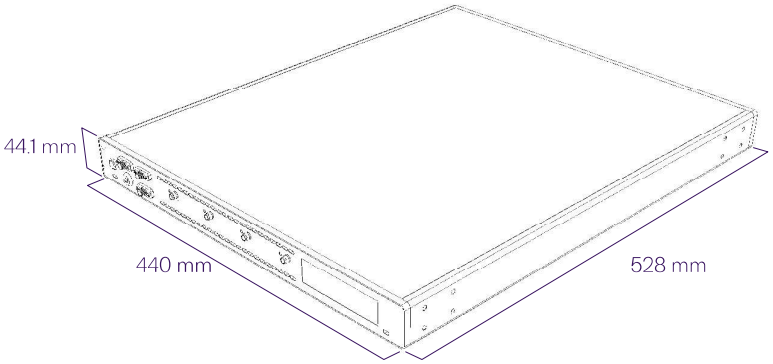
High quality BPSK signal at 21 GBaud. EVM ~ 7.31%

EXAMPLE APPLICATIONS

Optical communication R&D engineers need to be able to quickly and cost-effectively generate high-bandwidth optical signals such as 56 GBaud DP-QPSK to support development in fields such as:

- Coherent receiver design verification and testing
- 400G, 600G coherent system development using multi-leveled modulation formats such as 16QAM and 64QAM
- Stable and repeatable DP-QPSK or DP-16QAM signal generation for ICR Testing
- Cost effective DWDM channel loading by modulating multiple carriers

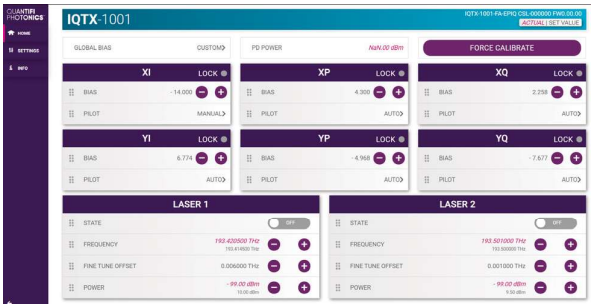
Dimensions & Panel Connections



INTUITIVE GUI

Intuitive user interface for more flexibility in modulator bias control

IQSignal-Manager is the dedicated bias control software to adjust individual bias settings or select automatic optimization, which lets you quickly and effortlessly generate optimized QPSK or QAM signals.



Single polarization with dual polarization emulator.

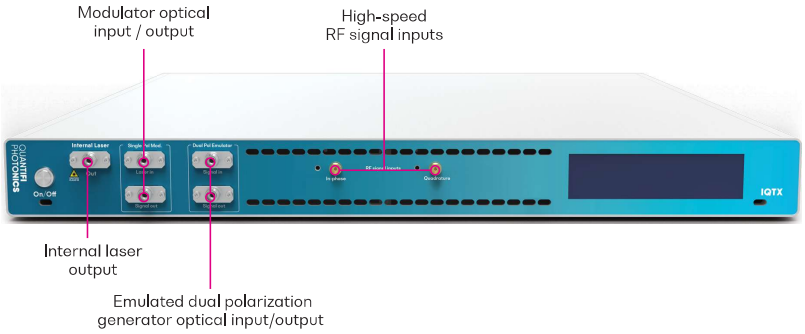
The single polarization IQTX is a cost-effective solution - generating emulated dual-polarization phase modulated signals with just two RF input channels.

The emulated dual-polarization IQTX can generate dual-polarization phase modulated signals by optically polarization multiplexing a delayed copy of the single-polarization modulated signal. The two RF inputs can be driven by differential outputs of a single channel data source.

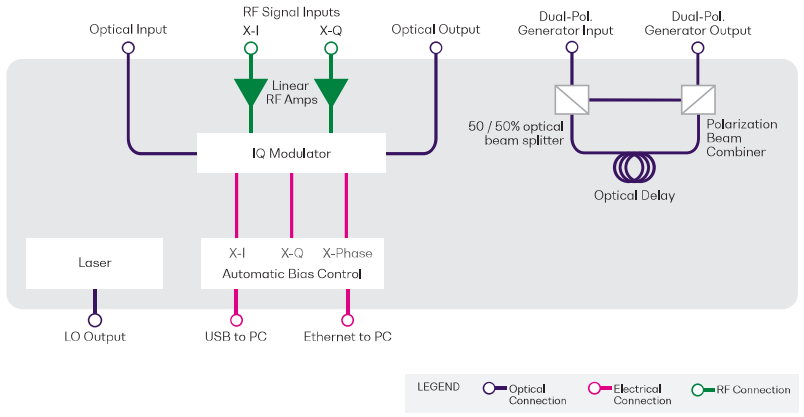
So with the emulated dual-polarization generator you can create DP-QPSK signals using two differential outputs of a single channel PPG - significantly reducing costs in applications which do not require independent data.

Standard features

- 20 GHz or 11 GHz of system bandwidth
- Emulated dual-polarization generator
- High bandwidth of up to 20 GHz (typical)
- 2 x high speed RF signal inputs
- Automatic Bias Control via the dedicated software controller
- Built-in C-band narrow linewidth tunable laser
- High bandwidth linear RF amplifiers



1100 Series Schematic Diagram



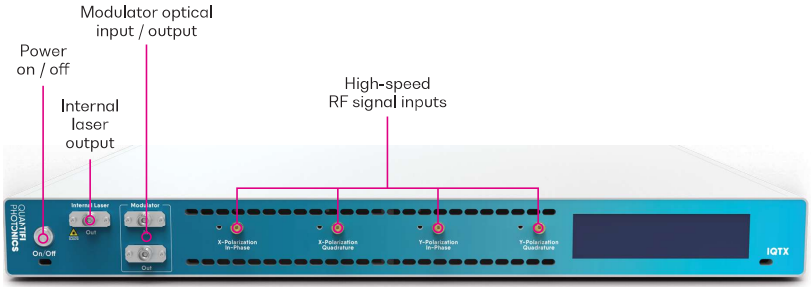
Full Dual Polarization

The dual-polarization IQTX is a leader in its class; providing more capability, more flexibility and greater ease of use.

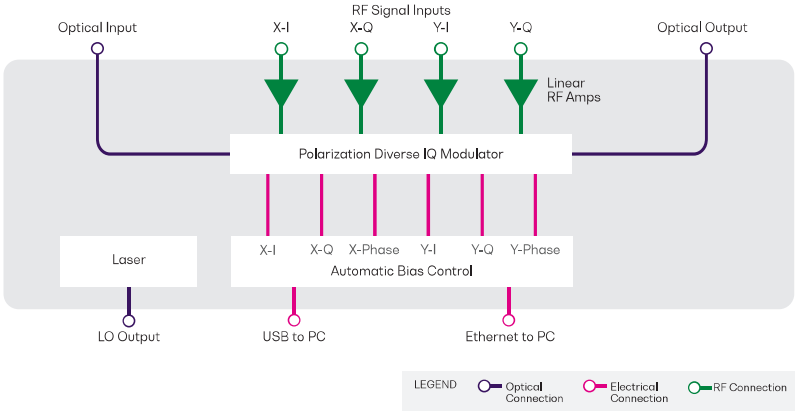
For applications requiring loading and transmission of true data, the dual-polarization IQTX provides capability to transmit independent data on all four tributary RF channels. The full dual-polarization IQTX is compatible with any 4 channel PPG or AWG; and a wide range of options are available to optimize your investment.

Standard Features

- 40 GHz, 23 GHz or 11 GHz of system bandwidth
- 4 x high speed RF signal inputs
- Automatic Bias Control via the dedicated software controller
- Built-in C-band narrow linewidth tunable laser
- Automatic software modulator bias control
- High bandwidth linear RF amplifiers



1200 Series Schematic Diagram



General Specifications	IQTX
PC interface	USB 2.0, Ethernet
Operating system requirements	Windows 7, 8 or 10 (32 or 64 bit)
Dimensions (H x W x D)	44.1 x 440 x 528 mm | 1.7 x 17.3 x 20.8 inches
Weight	~7.8 kg | 17.2 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

IQTX 1100 Series - Emulated dual polarization

Modular specifications	1101	1102
Modulator type	Single-polarization $LiNbO_3$ IQ Modulator	Single-polarization $LiNbO_3$ IQ Modulator
Wavelength range	1528 to 1612 nm	1528 to 1612 nm
Insertion loss[5]	< 8.0 dB	< 8.0 dB
DC extinction ratio	> 20 dB	> 20 dB
Maximum optical input power	13 dBm	13 dBm
Input optical connector type	PM FC/PC, PM FC/APC	PM FC/PC, PM FC/APC
Output optical connector type	PM FC/PC, PM FC/APC	PM FC/PC, PM FC/APC
RF bandwidth	11 GHz (Typical)	20 GHz (Typical)
Low frequency cutoff	< 100 kHz	< 40 kHz
Number of RF inputs	2	2
RF connector type RF	2.92 mm female	2.92 mm female
RF Vpi @1GHz	200 mV (Typical)	200 mV (Typical)
Maximum RF input voltage	800 mV	500 mV

Dual polarization emulator	1101	1102
Insertion loss	< 2dB	< 2dB

ABC Specifications	1101	1102
Supported modulation formats	Any coherent modulation format	Any coherent modulation format
Bias control options	Automatic and manual control for individual biases	Automatic and manual control for individual biases
Maximum bias voltage range	28 V	28 V
Number of bias control channels	6	6
Startup time until settled	< 3 minutes (< 1 minute Typical)	< 3 minutes (< 1 minute Typical)
Quadrature error	Averaged mean < ± 0.3°, Standard deviation > 24 hours: < 2°	Averaged mean < ± 0.3°, Standard deviation > 24 hours: < 2°
ABC impact on EVM	< 1%	< 1%

Laser Specifications	1101	1102
Tunable laser type	Thermally tuned External Cavity Diode Laser (ECDL)	Thermally tuned External Cavity Diode Laser (ECDL)
Tunable frequency range	1530 to 1565 nm	1530 to 1565 nm
Frequency tuning resolution (wavelength) [2]	1 MHz (~0.01 pm)	1 MHz (~0.01 pm)
Tuning time	< 25 s	< 25 s
Maximum output power	+ 15 dBm	+ 15 dBm
Optical power uncertainty after calibration [2]	± 0.4 dB	± 0.4 dB
Power stability over 24 hours	± 0.03 dB (Typical)	± 0.03 dB (Typical)
Power flatness over entire wavelength range	± 0.25 dB	± 0.25 dB
Output power tuning resolution	0.01 dB	0.01 dB
Power monitoring	Built-in	Built-in
Polarization extinction ratio at the PM fiber output	> 20 dB	> 20 dB
Relative intensity noise RIN (for 13 dBm)	-145 dB/Hz (10 MHz - 40 GHz)	-145 dB/Hz (10 MHz - 40 GHz)
Linewidth (FWHM), instantaneous [4]	< 100 kHz (25 kHz Typical)	< 100 kHz (25 kHz Typical)
Side-mode suppression ratio	40 dB (55 dB Typical)	40 dB (55 dB Typical)
Relative frequency accuracy [4]	± 1.5 GHz	± 1.5 GHz
Absolute frequency accuracy [4]	± 2.5 GHz	± 2.5 GHz
Frequency stability (wavelength) over 24 hours [3]	± 0.3 GHz (± 3 pm)	± 0.3 GHz (± 3 pm)

IQTX 1200 Series - Full dual polarization

Modulator Specifications	1201	1202	1203
Modulator type	$LiNbO_3$ IQ Modulator	$LiNbO_3$ IQ Modulator	$LiNbO_3$ IQ Modulator
Wavelength range	1528 to 1612 nm	1528 to 1612 nm	1528 to 1612 nm
Insertion loss[5]	< 10 dB	< 10 dB	< 10 dB
DC extinction ratio	> 20 dB	> 20 dB	> 20 dB
Maximum optical input power	+ 18 dBm	+ 18 dBm	+ 16 dBm
Input optical connector type	PM FC/PC, PM FC/APC	PM FC/PC, PM FC/APC	PM FC/PC, PM FC/APC
Output optical connector type	PM FC/PC, PM FC/APC	PM FC/PC, PM FC/APC	SMF FC/PC, SMF FC/APC
RF bandwidth	11 GHz (Typical)	23 GHz (Typical)	40 GHz (Typical)
Low frequency cutoff	< 100 kHz	< 40 kHz	< 60 kHz
Number of RF inputs	4	4	4
RF connector type RF	2.92 mm female	2.92 mm female	1.85 mm female
RF Vpi @1GHz	200 mV (Typical)	200 mV (Typical)	200 mV (Typical)
Maximum RF input voltage	800 mV	500 mV	500 mV

ABC Specifications	1201	1202	1203
Supported modulation formats	Any coherent modulation format	Any coherent modulation format	Any coherent modulation format
Bias control options	Automatic and manual control for individual biases	Automatic and manual control for individual biases	Automatic and manual control for individual biases
Maximum bias voltage range	28 V	28 V	28 V
Number of bias control channels	6	6	6
Startup time until settled	< 3 minutes (< 1 minute Typical)	< 3 minutes (< 1 minute Typical)	< 3 minutes (< 1 minute Typical)
Quadrature error	Averaged mean: < ± 0.3°, Standard deviation: > 24 hours: < 2°	Averaged mean: < ± 0.3°, Standard deviation: > 24 hours: < 2°	Averaged mean: < ± 0.3°, Standard deviation: > 24 hours: < 2°
ABC impact on EVM	< 1%	< 1%	< 1%

Laser Specifications	1201	1202	1203
Tunable laser type	Thermally tuned External Cavity Diode Laser (ECDL)	Thermally tuned External Cavity Diode Laser (ECDL)	Thermally tuned External Cavity Diode Laser (ECDL)
Tunable frequency range	1530 to 1565 nm	1530 to 1565 nm	1530 to 1565 nm
Frequency tuning resolution (wavelength) [2]	1 MHz (~0.01 pm)	1 MHz (~0.01 pm)	1 MHz (~0.01 pm)
Tuning time	< 25 s	< 25 s	< 25 s
Maximum output power	+ 15 dBm	+ 15 dBm	+ 15 dBm
Optical power uncertainty after calibration [2]	± 0.4 dB	± 0.4 dB	± 0.4 dB
Power stability over 24 hours	± 0.03 dB (Typical)	± 0.03 dB (Typical)	± 0.03 dB (Typical)
Power flatness over entire wavelength range	± 0.25 dB	± 0.25 dB	± 0.25 dB
Output power tuning resolution	0.01 dB	0.01 dB	0.01 dB
Power monitoring	Built-in	Built-in	Built-in
Polarization extinction ratio at the PM fiber output	> 20 dB	> 20 dB	> 20 dB
Relative intensity noise RIN (for 13 dBm)	-145 dB/Hz (10 MHz - 40 GHz)	-145 dB/Hz (10 MHz - 40 GHz)	-145 dB/Hz (10 MHz - 40 GHz)
Linewidth (FWHM), instantaneous [3]	< 100 kHz (25 kHz Typical)	< 100 kHz (25 kHz Typical)	< 100 kHz (25 kHz Typical)
Side-mode suppression ratio	40 dB (55 dB Typical)	40 dB (55 dB Typical)	40 dB (55 dB Typical)
Relative frequency accuracy [4]	± 1.5 GHz	± 1.5 GHz	± 1.5 GHz
Absolute frequency accuracy [4]	± 2.5 GHz	± 2.5 GHz	± 2.5 GHz
Frequency stability (wavelength) over 24 hours [4]	± 0.3 GHz (± 3 pm)	± 0.3 GHz (± 3 pm)	± 0.3 GHz (± 3 pm)

Notes

1. Specifications are valid at 23 °C ± 3 °C.
2. At maximum output power.
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).
4. Varies slightly according to wavelength.
5. At maximum transmission bias setting.

ORDERING INFORMATION

IQTX **- XXXX - XX - EPIQ**

Model number
1101 = Emulated Dual Polarization 11 GHz
1102 = Emulated Dual Polarization 20 GHz
1201 = Full Dual Polarization 11 GHz
1202 = Full Dual Polarization 23 GHz
1203 = Full Dual Polarization 40 GHz

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

WARRANTY INFORMATION

This product comes with a standard 1 year warranty.

An optional 3 or 5 year extended warranties are also available, please discuss with your sales representative at the time of purchase.

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 optimal solutions.

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

General Enquiries sales@quantifiphotonics.com
Technical Support support@quantifiphotonics.com
Phone +64 9 478 4849
North America +1-800-803-8872

quantifiphotonics.com

wavetel
a simac group company

Contact in France :
WAVETEL RENNES | PARIS | LARMOR-PLAGE | LANNION
Espace du Ter - 13 Boulevard Jean Monnet - 56260 LARMOR-PLAGE
+33(0)2 99 14 69 65 - sales@wavetel.fr - www.wavetel.fr

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