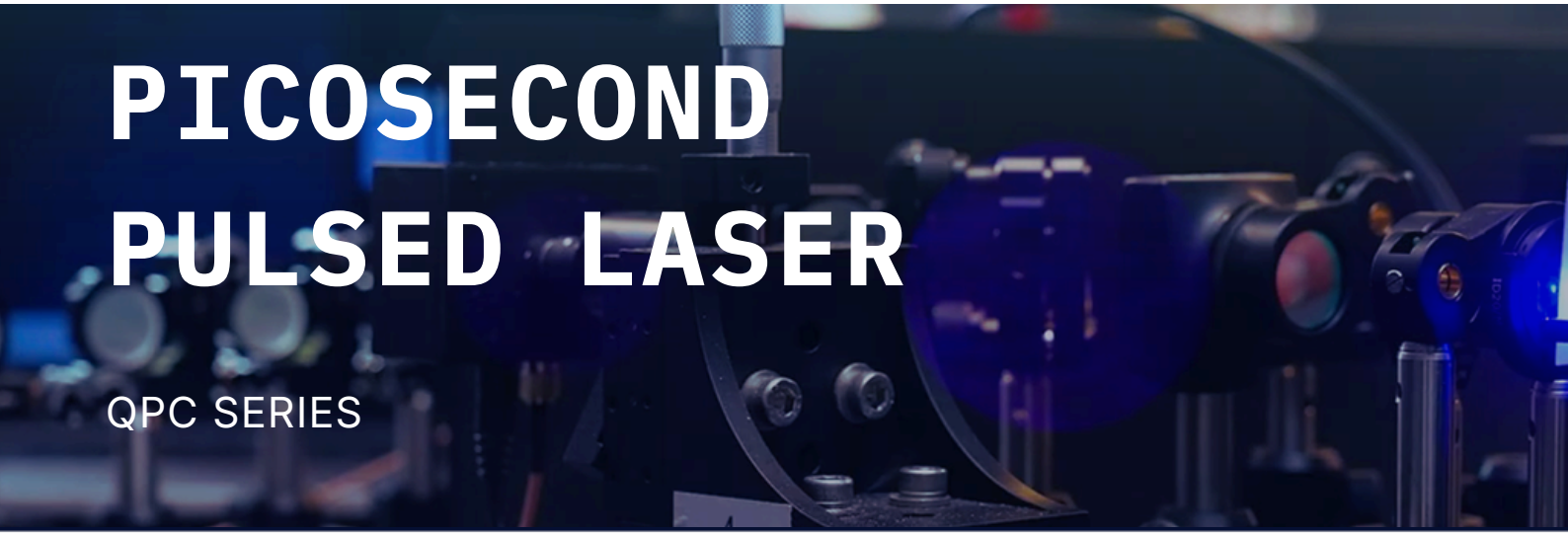
QUBITRIUM



PICOSECOND PULSED LASER

QPC SERIES

The QPC Series is a gain-switched picosecond pulsed laser source designed for quantum optics and high-speed photonics characterization.

FEATURES

- Short Pulse Width
- Configurable Internal Repetition Rate
- On-Device Frequency Scaling
- Precise Synchronization Delays
- Wide Range External Triggering
- Low Energy Footprint
- Flexible Output Configurations

APPLICATIONS

- Quantum Key Distribution
- Quantum Communication
- Weak Coherent Source
- Quantum Research
- Single Photon Detector Characterization
- Quantum Optics Experiments
- Time-Correlated Single Photon Counting
- Fluorescence Lifetime Measurements
- Hanbury Brown & Twiss(HBT) Measurements
- LIDAR and Time of Flight Measurement
- Optical Synchronization & Trigger Generation

The QPC Series is a gain-switched picosecond pulsed laser source designed for high-precision applications in quantum optics and photonic research. Operating at a central wavelength of 783.5 nm with a spectral linewidth of 3.582 nm, the system delivers optical pulses as narrow as 388 ps. The device features a flexible internal repetition rate configurable between 100 kHz and 50 MHz, with integrated hardware scaling options of ÷10 and ÷100 for rapid frequency adjustment. Supporting both external TTL triggering up to 70 MHz and dedicated trigger-out synchronization, the QPC series is optimized for Quantum Key Distribution (QKD), Time-Correlated Single-Photon Counting (TCSPC), and LIDAR systems. The series is available in both fiber-coupled and free-space output configurations to meet diverse experimental requirements.

KEY ADVANTAGES

- **Precision Pulse Timing:** Delivers narrow optical pulse widths of 388 ps with fixed delays for trigger-in (10.5 ns) and trigger-out (8.2 ns), ensuring high-precision synchronization for time-resolved measurements
- **Flexible Repetition Rates:** Features a customizable internal repetition rate ranging from 100 kHz to 50 MHz, with hardware-selectable frequency dividers (÷10 and ÷100) for versatile operation
- **Wide Trigger Compatibility:** Supports external TTL triggering from 1 kHz up to 70 MHz, allowing for integration with existing laboratory timing electronics.
- **Optimized for Quantum Applications:** Specifically designed for Quantum Key Distribution (QKD) and single-photon detector characterization with available weak coherent pulse (WCP) solutions up to 70 Mphotons/s.
- **Versatile Output Styles:** Offers both fiber-coupled and free-space optical output options to accommodate various experimental setups and optical paths.
- **Low Power Consumption:** Operates with a typical power consumption of 0.348 W at 50 MHz, making it an efficient solution for space applications.

QPC SERIES (PICOSECOND PULSED LASER) TECHNICAL SPECIFICATIONS			
Description	**Condition**	**Min**	**Typical**
Wavelength	Customizable		785±10 nm
Peak Power	10MHz, 785 λ		10,4 mW
Average Power	10MHz, 785 λ		4,05 mW
Power Consumption	50MHz, 785 λ	0.06 W	0.348 W (Max.0.438 W)
Optical Pulse Width	10MHz, 785 λ		388 ps
Repetition Rate (Internal)	Customizable (Max.50 MHz)	0.5 MHz	50 MHz
Spectral Linewidth			3.582 nm
Central Wavelength			783.5 nm
Delay between trigger-in and optical pulse			10.5 ns
Delay between optical pulse and trigger-out			8.2 ns
External Trigger			TTL, SMA 50 ohm, variable from 1 kHz – 70 MHz
Trigger Out			TTL, SMA, 5 ns, 0-4V
Optical Output Options			Fiber/Free Space
Supply Voltage			6 V
Supply Current	50MHz, 785 λ	10mA	58 mA (Max.72 mA)

The QPC Series is a high-precision gain-switched picosecond pulsed laser designed for advanced quantum and photonic applications. It provides a typical central wavelength of 783.5 nm with a spectral linewidth of 3.582 nm, delivering narrow optical pulses of 388 ps. A key feature of the system is its flexible repetition rate management; the internal rate is customizable between 100 kHz and 50 MHz, with physical device buttons allowing users to quickly toggle between ÷10 and ÷100 frequency scaling (e.g., scaling 50 MHz down to 5 MHz or 500 kHz). The device ensures stable synchronization through fixed timing delays—10.5 ns from trigger-in to pulse and 8.2 ns from pulse to trigger-out—while maintaining efficient operation with a typical power consumption of 0.348 W at maximum frequency. Supporting both fiber and free-space outputs, the series is optimized for integration into complex experimental setups

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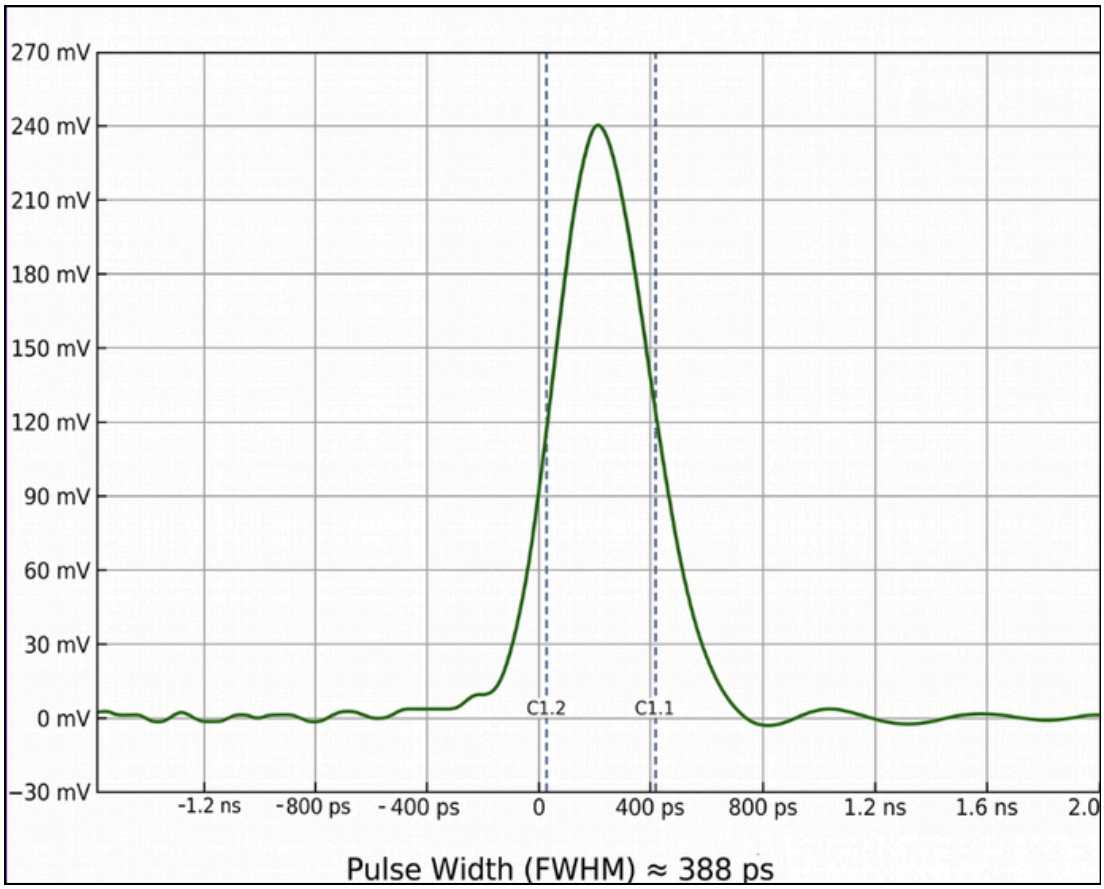
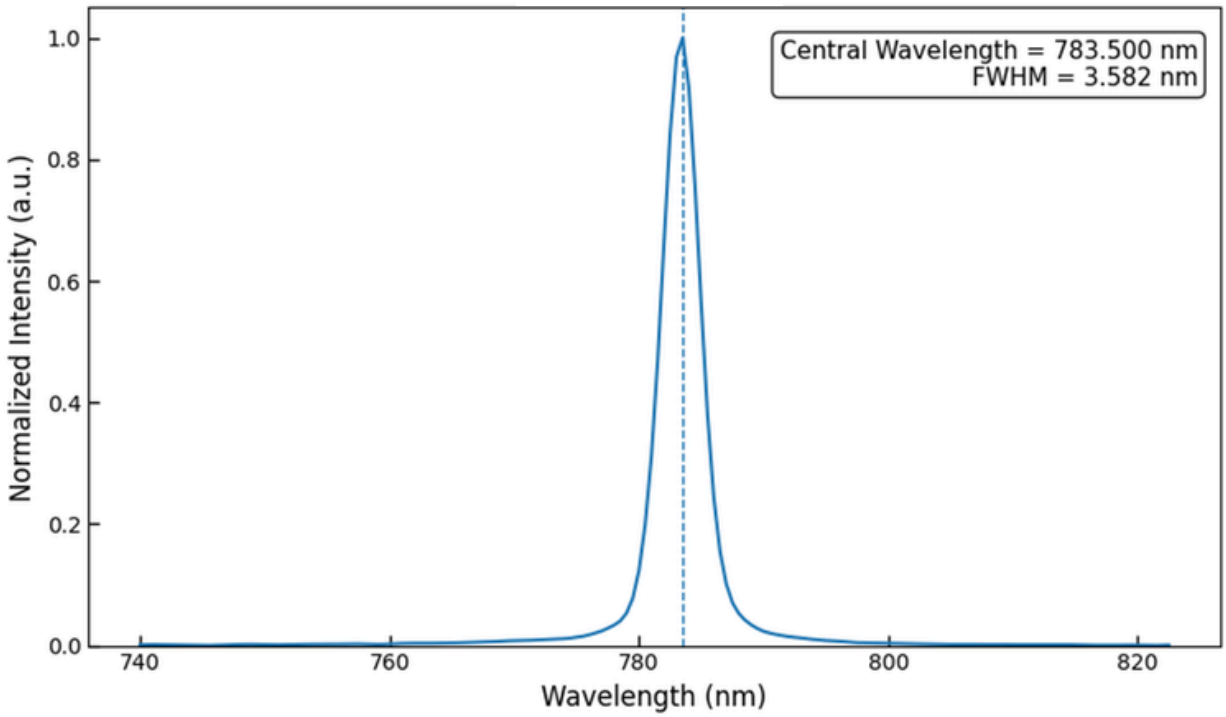
Optical Pulse Width



Optical Spectrum



Optical Pulse Width Profile
The temporal profile demonstrates the gain-switching performance of the QPC series, showcasing a clean picosecond pulse with a Full Width at Half Maximum (FWHM) of approximately 388 ps. (observed with 2GHz photodetector) This narrow pulse width ensures high-precision timing resolution for applications such as TCSPC and quantum communication.

Optical Spectrum Analysis
The optical spectrum measurement confirms a stable and well-defined output with a central wavelength at 783.5 nm. The narrow spectral linewidth (FWHM) of 3.582 nm ensures high spectral purity and compatibility with wavelength-sensitive optical components in quantum optics research.

OPERATING STRUCTURE

- Connect the unit to a stable 6 V DC power supply via the designated input port.
- Choose between the Internal Repetition Rate (selectable from 10 kHz to 50 MHz) or provide a 70 MHz maximum external TTL signal through the 50 ohm SMA input.
- Utilize the decade-division feature by selecting a primary frequency; the system will automatically provide the chosen rate and two lower decade-divided options (e.g., selecting 50 MHz yields additional 5 MHz and 500 kHz outputs).
- Use the Trigger Out SMA port (4 V TTL) to synchronize external measurement equipment, such as SPADs or Time Taggers.

CAUTION: Any attempt to open the sealed enclosure or modify the internal optical and electronic circuitry will void the manufacturer's warranty.

CAUTION: Do not interrupt the connection during configuration or use unauthorized software, as the device is specifically optimized for the provided GUI and Windows OS.

ORDERING INFORMATION

WAVELENGTH RANGE
785
520
405
1550

PULSED LASER STYLE
F=FIBER
S=FREE SPACE

PRODUCT
P= PICOSECOND PULSED LASER

Q P C 0 7 8 5 F X X

COMPANY PREFIX
Q=QUBITRIUM

GRADES
C=COMMERCIAL

REVISION

The QPC Series product nomenclature is designed to provide a clear and modular identification for each laser configuration. While the standard ordering information lists common wavelengths such as 785 nm, 520 nm, 405 nm, and 1550 nm, the system architecture is fully customizable to support any specific wavelength required by the user's application. Each part number defines the core characteristics of the device, including the Company Prefix (Q), Product Type (P), and Commercial Grade (C), followed by the specific four-digit wavelength designation, output style (Fiber or Free Space), and the current revision status.

RELATED PRODUCTS

To complete your quantum optics or timing measurement setup, the following Qubitrium products are fully compatible with the QPC Series:

QEC Series Entangled Photon Sources: High-rate photon pair sources that serve as the primary signal input for entanglement distribution and Bell-state analysis.

Qubitrium QDC-V series Single Photon Detectors: High-precision, compact detection modules optimized for visible and telecommunications wavelength ranges

Qubitrium QubitCore Integrated QKD Systems: Comprehensive Quantum Key Distribution solutions for secure communication research and network integration.

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