



TIME TAGGER UNIT

QTC SERIES



The QTC Series, is a high-performance, customizable time-tagging module designed for demanding quantum optics and quantum information applications

FEATURES

- Picosecond-Level Resolution
- Customizable Channel Configuration
- High Count Rates
- Flexible Interface Support
- Compact and Robust Design
- Flexible Output Options
- Broad Input Compatibility
- Space-Ready Architecture

APPLICATIONS

- Quantum Key Distribution
- Quantum Optics
- Information Technology
- Quantum Communication
- LIDAR and Optical Range Finding
- Quantum Sensing
- Photon Correlation Measurements

The QTC Series, is a high-performance, customizable time-tagging module designed for demanding quantum optics and quantum information applications. It delivers picosecond-level timing resolution with flexible channel configurations, enabling precise timestamping of photon detection events and electronic pulses. The QTC Series is available in versions optimized for both terrestrial laboratory use (C-Grades) and space-qualified applications (S-Grades), addressing the needs of ground-based quantum systems as well as space-based quantum communication and sensing missions. With support for high single and coincidence count rates, a compact form factor, and configurable interfaces, the QTC Series is well-suited for quantum communication, photon correlation measurements, and advanced quantum experiments.

KEY ADVANTAGES

- High Timing Precision:** Captures the most sensitive events with picosecond resolution, critical for quantum optics applications
- Modular Configurability:** Allows customization of various parameters, from channel count to communication interfaces, tailored to the user's project
- Space and Terrestrial Compatibility:** Delivers the same high-performance architecture for both standard laboratory (C-Series) and space-qualified (S-Series) missions.
- High Data Throughput:** Prevents data loss during intense data streams by supporting very high single and coincidence count rates
- Ready-to-Use Compatibility:** Can be quickly integrated into existing optical setups with its compact form factor and standard Windows OS support.
- User-Centric Interface:** The QTC Series comes with a user-friendly and intuitive graphical user interface (GUI) designed for real-time monitoring and data collection.



QTC SERIES (TIME TAGGER UNIT) TECHNICAL SPECIFICATIONS

Description	Condition	Min	Typical
Number of Channels	Customizable		8
Minimum Bin Width Size (Resolution)	Depending on Resolution		100 ps
Minimum Time Between Two Consecutive Pulses		5 ns	
Sensing Edge			Rising
Minimum Input Pulse Width	CMOS	2 ns	5 ns
Maximum Count Rate	Singles		70 M count/s
	Coincidences	4 M event/s	
Interface	Customizable		USB 2.0/3.0/SPI/ETHERNET
Operating System			Windows
Input Connector	Customizable		MMCX/SMA
Supply Voltage		6 V	

- The module delivers a typical timing resolution (minimum bin width) of 100 ps, enabling precise event discrimination.
- Engineered for high-speed data acquisition, the series supports a maximum count rate of 70 M count/s for single events and 4 M event/s for coincidences.
- The device typically features 8 channels, which can be customized to meet specific experimental setups.
- It supports multiple communication interfaces, including USB 2.0/3.0, SPI, and Ethernet, alongside customizable input connectors such as MMCX and SMA.
- Designed for precision, the module features a Rising sensing edge, a minimum input pulse width of 5 ns (Typical), and a minimum time between consecutive pulses of 5 ns.
- The series operates on a 6 V supply voltage and is fully compatible with Windows operating systems.

OPERATING STRUCTURE

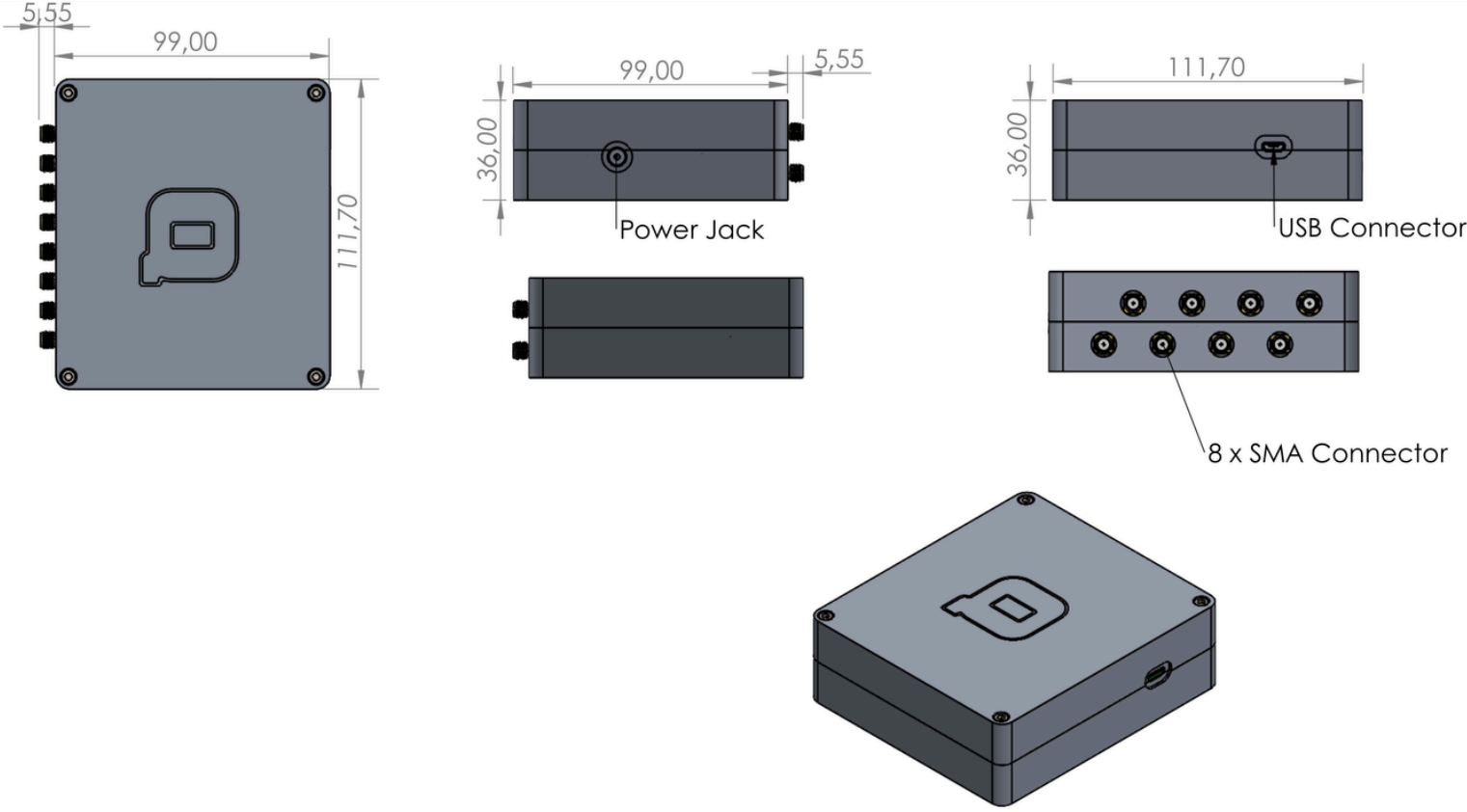
- The module operates with a stable 6 V DC supply voltage.
- The device is designed for CMOS level signals with a typical minimum pulse width of 5 ns and a Rising sensing edge.
- Ensure that all input signals are connected via the specified MMCX or SMA connectors and that the communication interface (USB, Ethernet, or SPI) is properly seated to maintain data throughput.
- To ensure accurate timestamping, a minimum time of 5 ns must be maintained between two consecutive pulses.
- The hardware is optimized for Windows operating systems and should be interfaced through the provided GUI for real-time monitoring and configuration.
- As a high-precision instrument containing sensitive electronics, the module must be handled at an ESD-safe workstation to prevent damage from electrostatic discharge.

OPERATING CONDITIONS					
Description		Condition	Min	Typical	Max
Operating Temperature				20±5 °C	
Storage Temperature			10°C		40°C
Storage Humidity		Non-condensing	5%		95%
Operating Humidity		Non-condensing	15%		85%

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

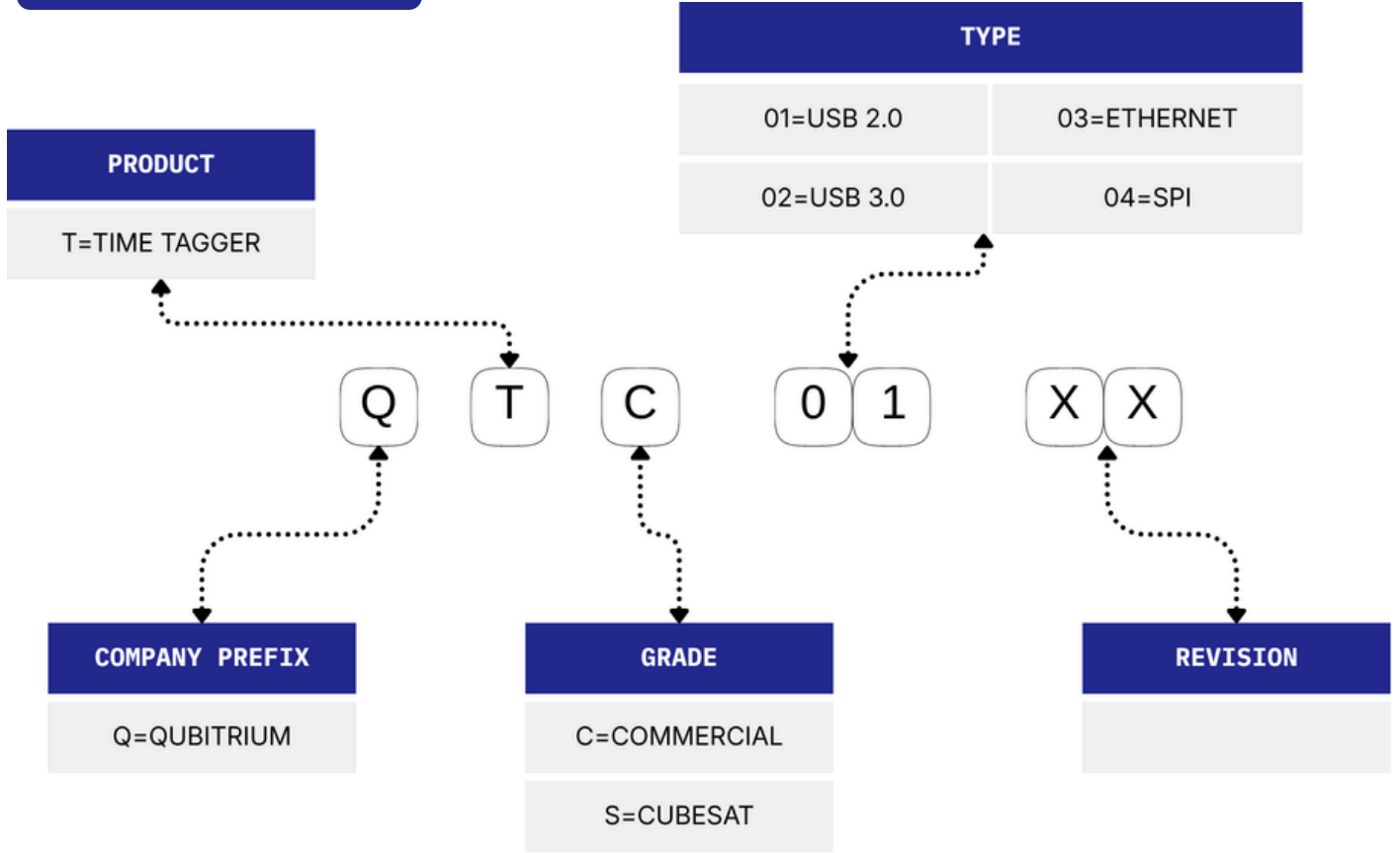
CAUTION: Do not interrupt the connection during configuration or use unauthorized software, as the device is specifically optimized for the provided GUI and Windows OS.



MECHANICAL DRAWINGS

The QTC Series is housed in a precision-machined aluminum enclosure designed to provide high structural integrity and effective thermal management for sensitive timing electronics. The module features a compact form factor with external dimensions of 111.70 x 99 x 36mm. For high-density signal acquisition, the device is equipped with 8 x SMA Connectors on the front panel, alongside a dedicated USB Connector for high-speed data transfer and a Power Jack for stable DC supply. The robust mechanical build, weighing approximately 390g, ensures reliable performance in both laboratory setups and portable quantum applications.

ORDERING INFORMATION



Depending on the scope of their project, users can select between the Commercial grade for high-precision laboratory research or the CubeSat grade for missions requiring low power consumption and durability in harsh conditions. Regarding the data transfer interface, the system can be configured with USB 2.0, USB 3.0, Ethernet, or SPI options to ensure seamless integration with the project infrastructure. Each unit is supported by specific revision codes that allow for the tracking of hardware updates and technical improvements, providing users with a highly customized and traceable timing solution.

RELATED PRODUCTS

To complete your quantum optics or timing measurement setup, the following Qubitrium products are fully compatible with the QTC 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.

