



QUANTUM RECEIVING MODULE

QRC SERIES



The QRC Series, a high-performance Quantum Receiving Module specifically designed for entanglement-based communication and BBM92 protocol implementations.

FEATURES

Modular Configuration
Multi-Wavelength Support
High-Precision Analysis Bench
Low Power Consumption
Space-Ready Design
Robust Mechanical Interface

APPLICATIONS

Quantum Key Distribution (QKD)
Entanglement Distribution
Satellite-to-Ground Links
Quantum Sensing & Metrology
Quantum Optics Experiments
Space-Based Payloads



The QRC Series, a high-performance Quantum Receiving Module specifically designed for entanglement-based communication and BBM92 protocol implementations. The series offers a modular architecture that allows users to configure the module for specific operational roles and spectral requirements. Optimized for integrated quantum systems, the module features a low average power consumption of 2 W, making it ideal for both complex laboratory setups and power-sensitive space missions. The system is fully compatible with entangled photon sources operating via Spontaneous Parametric Down-Conversion (SPDC) and can be tailored for a broad wavelength range from visible to near-infrared.

KEY ADVANTAGES

- 🔑 **Modular Architecture:** Offers a highly flexible naming and configuration system that allows for precise selection of operational roles and wavelength ranges.
- 🔑 **Dual-Role Versatility:** The hardware can be specifically optimized at the factory to function as either Alice for signal preparation or Bob for advanced polarization analysis.
- 🔑 **Low Power Consumption:** Operates with a typical average power consumption of only 2 W, ensuring thermal stability and energy efficiency in restricted environments.
- 🔑 **Multi-Spectral Compatibility:** Supports a broad range of quantum-critical wavelengths including 780 nm, 842 nm, 550 nm, and 1550 nm.
- 🔑 **Space-Qualified Design:** The CubeSat (S) grade is engineered with a compact mechanical footprint, specifically for seamless integration into small satellite quantum payloads.
- 🔑 **Integrated Precision Optics:** Features a pre-aligned internal optical bench with four silicon SPDs, eliminating the need for complex external polarization setups.

OPERATING STRUCTURE

- Connect a stable 6 V DC power source to each receiving module to ensure reliable operation of the internal single-photon detectors.
- Connect the signal and idler fibers from the QEC Series Entangled Photon Source to the input ports of the Alice and Bob receiving modules.
- Link the Trigger Output ports of both receiving modules to the input channels of the Qubitrium QTC Time Tagger using MMCX or SMA cables.
- Confirm that the module configured as Alice (QRC-A) and the module configured as Bob (QRC-B) are correctly positioned according to the BBM92 protocol requirements.
- Connect the QTC Time Tagger to a processing unit via USB to perform real-time key sifting and coincidence analysis.
- Operate the modules within the specified temperature range to maintain the alignment of the precision internal optical bench.

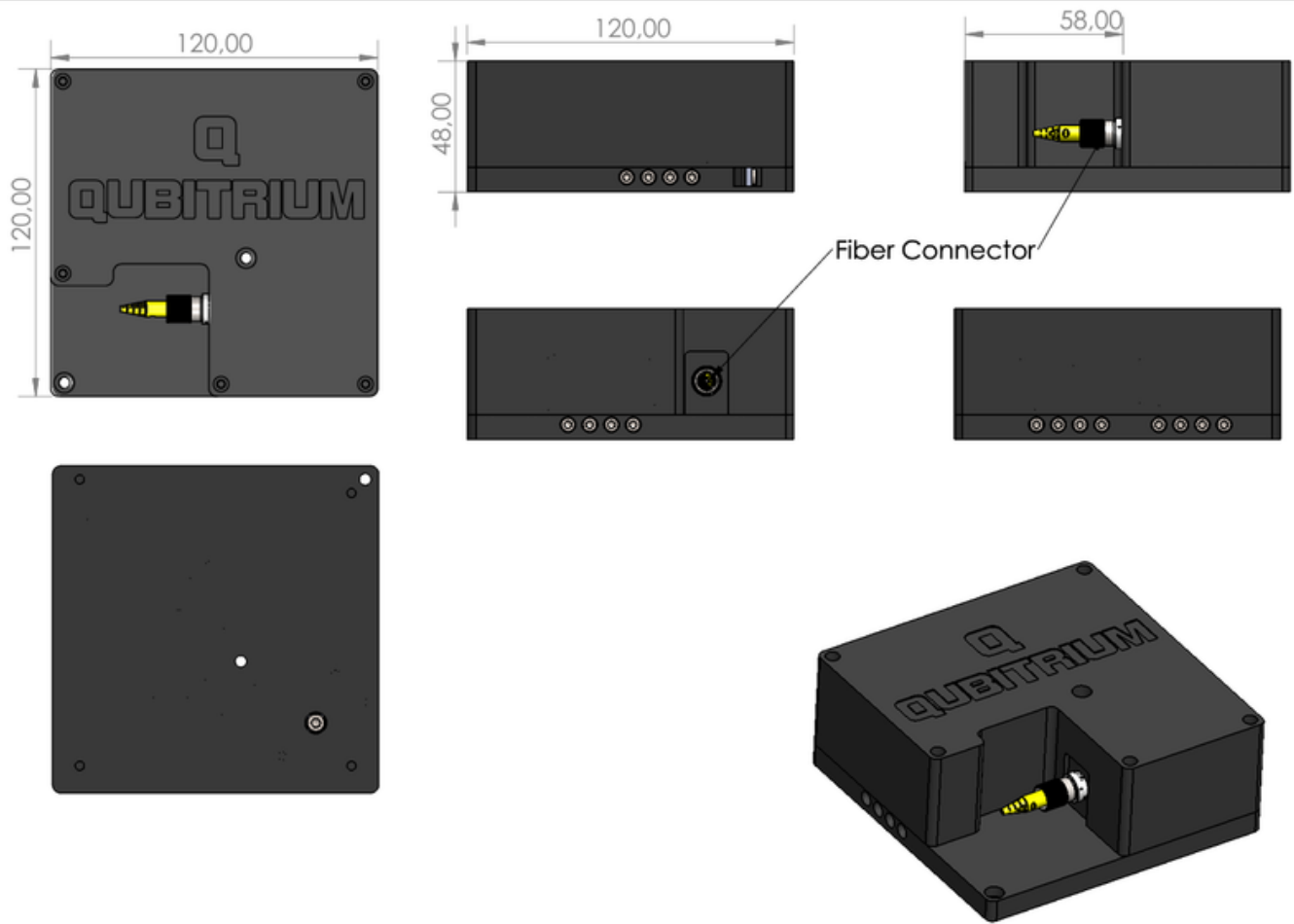
OPERATING CONDITIONS				
Description	Condition	Min	Typical	Max
Operating Temperature			20±5 °C	
Storage Temperature		10°C		40°C
Storage Humidity	Non-condensing	5%		95%
Operating Humidity	Non-condensing	15%		85%

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

CAUTION: This module contains highly sensitive single-photon detectors and integrated electronics that are susceptible to damage from electrostatic discharge.

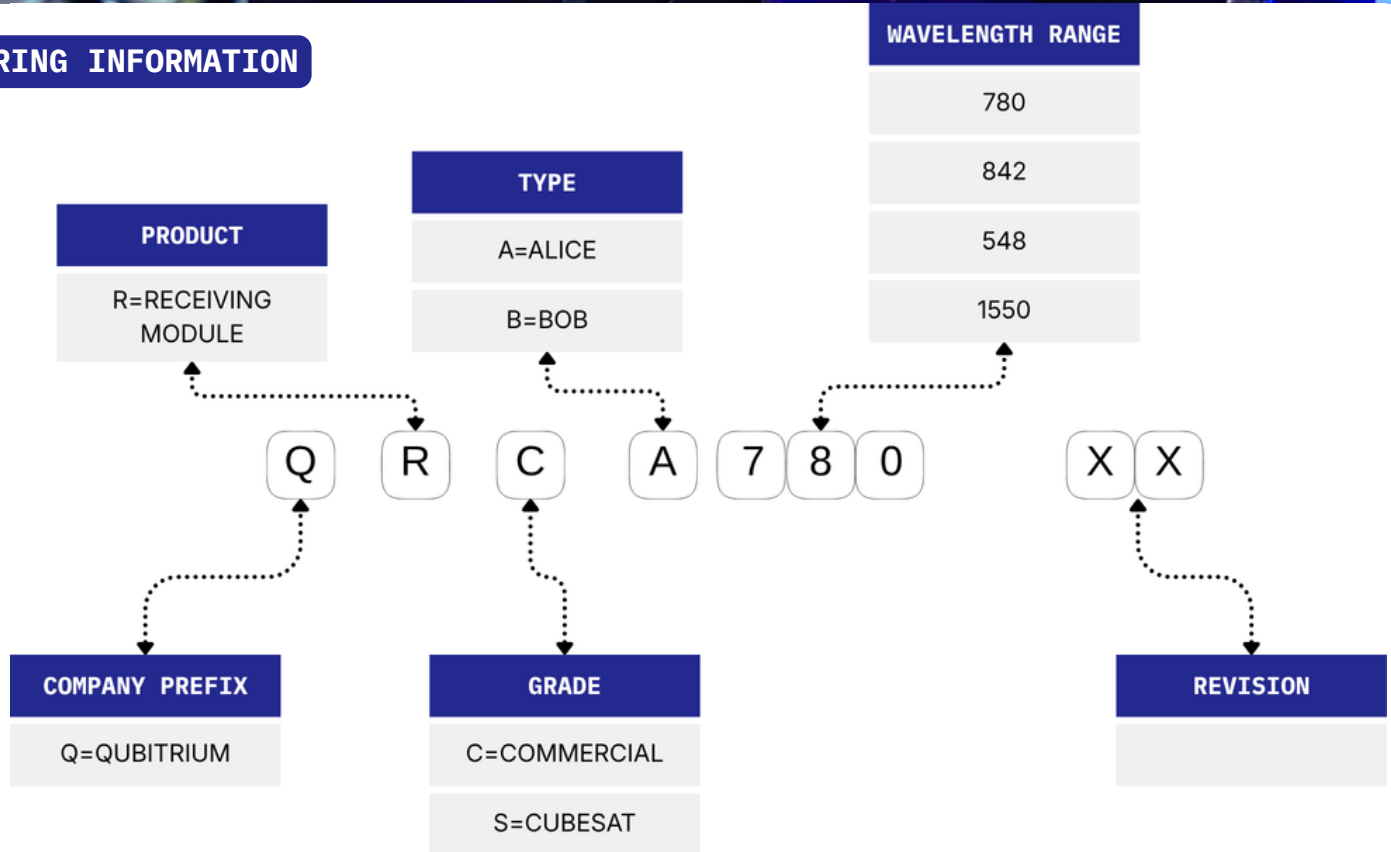


MECHANICAL DRAWINGS



The QRC Series receiving module is housed in a high-quality, dark-anodized aluminium enclosure specifically engineered to provide a robust and thermally stable environment for sensitive internal quantum optics. Featuring a precision-machined square footprint of 120 mm x 120 mm and a low-profile height of 48 mm, the unit is optimized for seamless and stable integration into standard laboratory optical tables or compact system racks. A critical design element is the specialized Fiber Connector, which is strategically recessed 58 mm from the side edge to ensure secure, low-loss optical coupling while simultaneously protecting the connection point from external physical impacts. The side panels are equipped with dedicated ports for electrical trigger outputs and power supply integration, facilitating organized cable management for complex BBM92 protocol setups.

ORDERING INFORMATION



The QRC Series features a highly modular ordering system designed to meet the diverse requirements of quantum communication projects. Each product code begins with the QUBITRIUM (Q) prefix and the Receiving Module (R) identifier, followed by a selection of Commercial (C) or space-qualified CubeSat (S) grades to suit different operational environments. Users can precisely define the module's functional role as either Alice (A) or Bob (B) and select from four standardized wavelength ranges: 780 nm, 842 nm, 548 nm, or 1550 nm. This comprehensive coding structure ensures that every module is factory-optimized for specific spectral and protocol needs, with a dedicated Revision (XX) suffix for full hardware traceability.

RELATED PRODUCTS

To complete your quantum optics or timing measurement setup, the following Qubitrium products are fully compatible with the QRC 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 QTC series Time Tagger: High-performance time-to-digital converters optimized for multi-channel photon arrival time stamping with picosecond resolution.

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

