



InGaAs PHOTON DETECTOR

QDC-T SERIES

The QDC-T Series is a high-performance InGaAs Single-Photon Detector (SPD) specifically engineered for near-infrared quantum technologies, covering the vital telecom range from 1000 nm to 1650 nm.

FEATURES

- High Photon Detection Efficiency
- Low Dark Count Rate
- Versatile Operation Modes
- Sub-Nanosecond Timing
- Flexible Fiber Interface
- Low Power Consumption
- Space-Ready Architecture
- Enhanced Power Efficiency

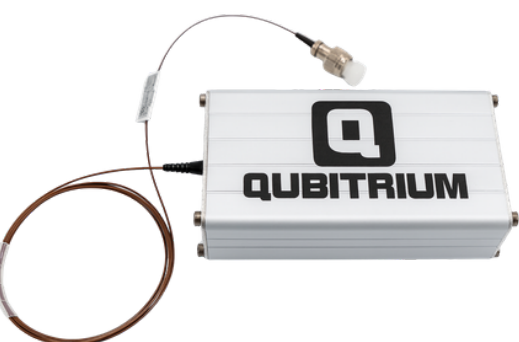
APPLICATIONS

- Satellite Applications
- Quantum Network Node
- Satellite Quantum Comms
- Adaptive Optics
- Quantum Communication
- NIR Spectroscopy

The QDC-T Series is a high-performance InGaAs Single-Photon Detector specifically engineered for near-infrared quantum technologies, covering the vital telecom range from 1000 nm to 1650 nm. Optimized for low dark count rates (DCR) and sub-nanosecond timing jitter, the series enables reliable single-photon detection for applications such as Quantum Key Distribution (QKD), photon counting, and quantum sensing. The detector operates primarily in continuous-wave (CW) mode with optional gated operation, providing a standard TTL output for seamless system integration. Available in both terrestrial laboratory and space-qualified versions, the QDC-T series offers a robust solution for ground-based experiments and spaceborne quantum communication platforms.

KEY ADVANTAGES

- High Sensitivity:** The low dark count rate allows for the detection of extremely weak signals in long-distance quantum links
- High Dynamic Range:** Capable of handling up to 8 Mcounts/s before saturation, providing reliable performance in varying light conditions
- System Integration Ease:** The standard 2.5 V output pulse and 5 V input make it highly compatible with modern electronic control units.
- Optimized Recovery:** Customizable dead time (typically 100 ns) allows users to balance high count rates with minimal afterpulsing
- Space-Optimized Payload Integration:** With a lightweight mass of only 350 g and a compact design, the module is ideal for size and weight-constrained satellite payloads.



QDC-T (SINGLE PHOTON DETECTOR) TECHNICAL SPECIFICATIONS

Description	Condition	Min	Typical	Max
Supply Voltage			5 V	
Supply Current		15 mA	250 mA	1000 mA
Operation Mode	CW/Gated		CW	
Power Consumption	Standard Operation		2 W	
Active Area	Diameter		16 μ m	
Wavelength Range		1000 nm		1650 nm
Dark Count		500 counts/s		5000 counts/s
Output Pulse Width			35 ns	
Output Pulse Amplitude			2.5 V	
Timing Resolution (jitter)	@100k counts/s		0.3 ns	
Count Rate Before Saturation			5 Mcounts/s	8 Mcounts/s
Photon Detection Efficiency	@1550 nm	10%	15%	20%
Dead Time	Customizable	50 ns	100 ns	
Excess Bias Voltage	Adjustable			
Output Connector	SMA/MMCX (Customizable)		50 Ω SMA	
Input Type	Fiber (SMF/MF)			
Dimensions			100 mm x 50 mm x 30 mm	
Weight			350 g	

The QDC-T Series offers exceptional spectral sensitivity covering the full telecom C-band and L-band, with peak efficiency specifically optimized for the 1550 nm window. Its electrical architecture is designed for efficiency, operating with a stable 5 V supply voltage and maintaining a standard power consumption of only 2 W. In terms of timing precision, the module delivers a jitter of 0.3 ns at 100k counts/s, which is critical for ensuring high-fidelity coincidence analysis in quantum networks. The detector also boasts a wide dynamic range, supporting a count rate of up to 8 Mcounts/s before reaching saturation. To optimize recovery speed and minimize afterpulsing, it features a customizable dead time, typically set at 100 ns. All these features are housed in a compact 100 x 50 x 30 mm enclosure with a total mass of 350 g, utilizing high-quality 50 ohm SMA or MMCX connectors for reliable data output.

OPERATING STRUCTURE

- Connect a stable 5 V DC power source to the dedicated power jack; the module typically draws 250 mA (up to 1000 mA peak) during standard operation.
- Link the Single Mode (SMF) or Multi-Mode (MMF) fiber to the input port, ensuring the signal is within the optimized 1000 nm to 1650 nm telecom range.
- The detector functions in Continuous-Wave mode by default, with an optional Gated mode available for specific synchronized pulse applications.
- Each photon detection event generates a 2.5 V amplitude pulse with a 35 ns width, accessible via the 50 ohm SMA or MMCX output connectors.
- For high-fidelity results, ensure the count rate remains below the 8 Mcounts/s saturation limit to maintain the 0.3 ns timing resolution.
- The system features a customizable dead time, typically factory-set at 100 ns to effectively balance the maximum count rate and afterpulsing probability.
- The unit is delivered with an optimized excess bias voltage, which can be fine-tuned via the internal trimpot to adjust detection efficiency between 10% and 20% at 1550 nm.

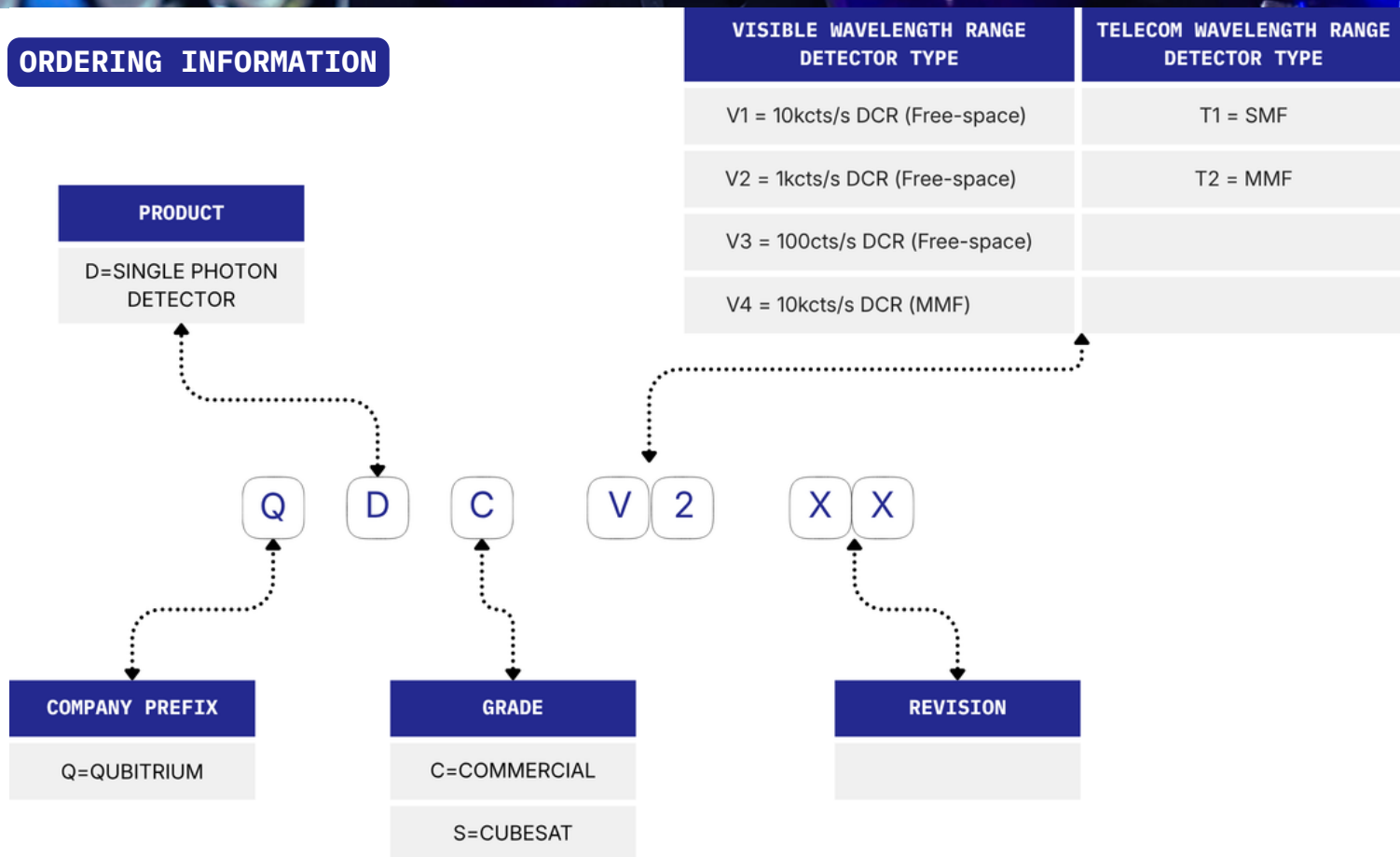
OPERATING CONDITIONS				
Description	Condition	Min	Typical	Max
Operating Temperature	Ambient	+18°C	+22°C	+26°C
Storage Temperature		-20°C		+85°C
Storage Humidity	(Non-condensing)	5%		95%
Operating Humidity	(Non-condensing)	15%		95%

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

CAUTION: For long-term storage, ensure the protective cap is firmly attached to the optical input to prevent dust accumulation. Additionally, the module should be kept inside an anti-static (ESD-safe) bag to protect sensitive internal electronics from electrostatic discharge.



ORDERING INFORMATION



The QDC-T Series offers a streamlined ordering structure specifically designed for high-performance telecom-range detection. Every product code starts with the QUBITRIUM (Q) prefix and the Single Photon Detector (D) identifier, followed by the choice of Commercial (C) or CubeSat (S) grades to match the operational environment. For InGaAs-based telecom applications, users can select the Telecom Wavelength Range (T), which offers two distinct coupling interfaces: T1 for Single Mode Fiber and T2 for Multi-Mode Fiber integration. This systematic coding, finalized with a Revision (XX) suffix, ensures that each detector is factory-optimized for specific fiber connectivity and mission-critical performance requirements.

RELATED PRODUCTS

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

Qubitrium QTC series Time Tagger: High-performance time-to-digital converters optimized for multi-channel photon arrival time stamping with picosecond resolution

Qubitrium QLC series Laser Driver Circuits: Specialized current and temperature controllers designed for stable and low-noise photon generation.

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

