Quanfluence Single Photon Detector

Datasheet

Model: SPD1550

High-performance single photon detection at telecom wavelengths

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QUANFLUENCE

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Product Overview

The Quanfluence Single Photon Detector (SPD) is a high-performance photonic instrument designed to reliably detect extremely weak light signals at the single-photon level.

It combines precision, robustness, and affordability, making advanced photon detection accessible beyond specialized research labs. Optimized for telecom-wavelength applications, it delivers high detection efficiency, low noise, and stable operation, enabling dependable performance in applications such as quantum communication, quantum sensing, quantum random number generation, LIDAR/ToF, low level light measurement and advanced photonics experiments.

With its compact design and cost-effective architecture, the Quanfluence SPD offers a practical, scalable solution for organizations seeking cutting-edge single-photon detection without the expense of complex systems.

Features and Benefits

FEATURE	BENEFIT
TELECOM WAVELENGTH OF OPERATION	Seamless integration with standard optical fiber networks and telecom grade components.
HIGH DETECTION RATE	Support faster data acquisition and higher throughput, enabling the capture of more photon events in less time and thus improving overall system performance
LOW DARK COUNT	Reduces false detections caused by noise, resulting in higher measurement accuracy, especially with extremely weak optical signals
HIGH QUANTUM EFFICIENCY	Improved system sensitivity, thus reducing the need for higher optical power or longer measurement times
	Provides precise timing control and simplifies system integration by eliminating the need for external gating electronics, while enabling users to optimize performance for different applications and noise conditions.

INTERNAL GATE GENERATION WITH FINE GATE WIDTH CONTROL	

Overview And Applications

Overview

The Quanfluence Single Photon Detector is a SPAD (single photon avalanche diode) device that plays a critical role in systems and experiments where the detection of extremely weak optical signals is essential. The avalanche photo diode, central to the SPD, converts incident photons into measurable electrical signals. Operating at telecom wavelengths with low noise and precise timing control, it serves as a reliable detection element across quantum, photonics, and sensing applications.

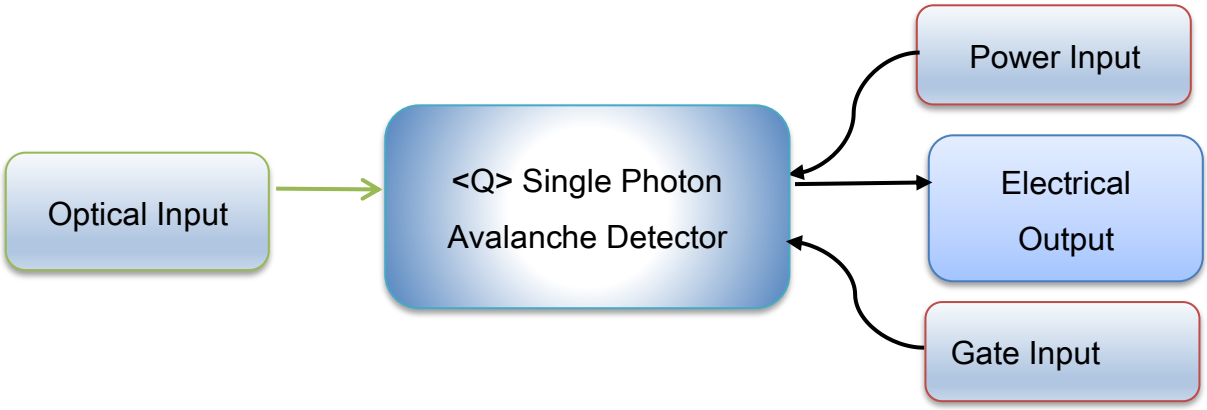


Figure 1: Block diagram of the Quanfluence SPD

Applications

Quantum Communications (Including QKD)

In quantum communication systems, the SPD functions as the receiver-side photon detection module, responsible for detecting individual photons transmitted over optical fiber. In Quantum Key Distribution (QKD), for example, the detector identifies photon arrival events corresponding to encoded quantum states, enabling secure key generation. The low dark

count rate minimizes false detections, while precise internal gating ensures accurate time synchronization with transmitted pulses, improving link reliability over long fiber distances.

For example, detection of single-photon pulses arriving from a remote QKD transmitter over standard telecom fiber.

LiDAR (Light Detection and Ranging)

LiDAR is an active remote sensing technology that uses pulsed laser light to measure precise distances and create high-resolution, 3D models of environments. By calculating the time it takes for light pulses to travel from a sensor to objects and back, it provides accurate spatial data for applications in autonomous driving, aerial mapping, forestry, archaeology, defence. SPDs in LiDAR enable ultra-sensitive, long-range 3D imaging, capable of detecting single photons with picosecond resolution for all these mentioned applications. The SPD allows for imaging through obscurants (foliage/fog), underwater 3D mapping, and deep-space target identification, often exceeding 100 km ranges

Quantum Sensing and Precision Measurement

In quantum sensing and metrology setups, the SPD acts as a high-sensitivity measurement tool for detecting weak optical signals that carry information about a physical parameter such as time, phase, or loss. Its high detection rate enables faster data collection, while low noise improves measurement accuracy. The detector is particularly useful in time-correlated photon counting and low-light-level measurement systems.

For example, measuring photon arrival times in time-of-flight or correlation-based sensing experiments.

Advanced Photonics and Quantum Optics Research

For laboratory research and in academic environments, the Quanfluence SPD serves as a core detection element in experiments involving pulsed lasers, attenuated light sources, or fiber-coupled optical setups. Internal gate generation with fine control allows the detector to be precisely synchronized with laser pulses, reducing background noise and simplifying experimental configurations. This makes it suitable for studying photon statistics, optical losses, and timing behavior in photonic systems.

For example, detecting single-photon events generated from a pulsed laser source in a quantum optics experiment.

Optical Component and System Characterization

The SPD can be used as a diagnostic and characterization tool for evaluating optical components such as attenuators, filters, fibers, and sources operating in the telecom band. By detecting very low light levels, it enables accurate assessment of insertion loss, leakage, and signal integrity in photonic systems. Its stable operation supports repeatable and reliable measurements during system testing.

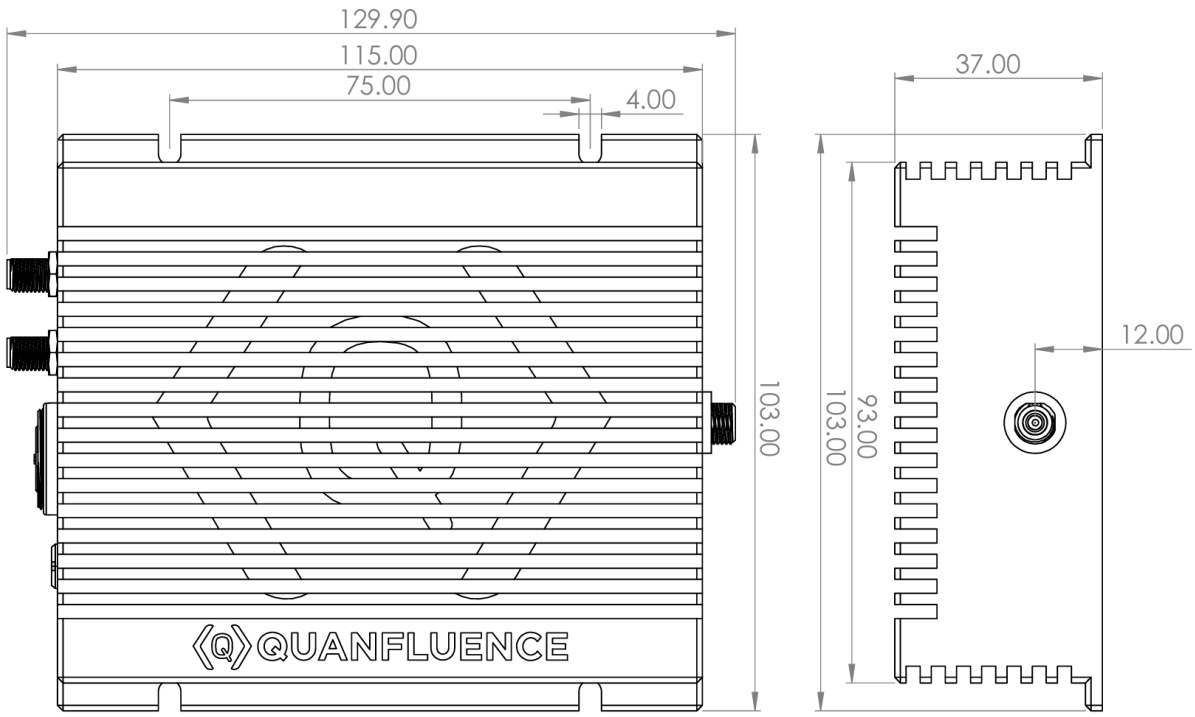
For example, characterizing the attenuation and loss performance of fiber-optic components under low-light conditions

Product Specifications

PARAMETER	SPECIFICATIONS	NOTES
WAVELENGTH RANGE	1100nm to 1600nm	Range of wavelengths
QUANTUM EFFICIENCY	20% typical	Photon detection probability rate
DARK COUNT RATE	0.5kHz typical	At 1550nm with 10MHz gate
AFTER-PULSING RATIO	3% typical	10% maximum
COUNT RATE BEFORE SATURATION	100MHz typical	Maximum linear detection rate
GATING INPUT	TTL/LVTTL level	External detector activation trigger
GATE PULSE WIDTH	2ns typical	Programmable (<1ns to >5ns)
OUTPUT PULSE LEVEL	LVTTL	Low voltage digital logic output
OUTPUT PULSE WIDTH	10ns	Programmable up to 50ns

OUTPUT TYPE	50Ω terminated SMA	Impedance matched coaxial output
DC POWER INPUT	5V	Standard low voltage DC supply
POWER CONSUMPTION	8W	Typical
OPTICAL INPUT	FC/PC	Fiber-coupled optical input

Product Dimensions



Additional Information

The Quanfluence Single Photon Detector is covered by a limited warranty against defects in materials and workmanship under normal use and operating conditions. Warranty terms and duration are specified at the time of purchase.

For more information get in touch with us at info@quanfluence.com