

Redefining Measurement

ID281 Superconducting Nanowire

Single-Photon Detector with 80% Quantum Efficiency and Fastest Electronics

IDQ's ID281 series detection system consists of a superconducting nanowire detector combined with high-performance electronics and reliable cryogenic system. The system operates at 0.8 K and offers impressive performance such as 80% quantum efficiency, count rate up to 15 MHz, dark counts <100 Hz, jitter below 50 ps (FWHM) and no afterpulsing.

The complete system is plug and play and includes: cryocooler, stable and adjustable bias current sources, cryogenic amplification stage, discriminators and counters. It comes with the best-in-class control and timing electronics: 1 GHz counters, 20 ps time resolution and fast data transfer rate (100 Mcps).

Our superconducting nanowire single-photon detectors can also be integrated in your own cryogenic system: the ID281 comes with everything that is necessary to install it in your own cryostat; including electronics, software, feed-throughs, cryogenic cables and connectors.



Key Features

- ▶ Detection range: 400-2500 nm
- ▶ Free-running operation
- ▶ Best-in-class quantum efficiency: 80%
- ▶ Jitter: 50 ps (FWHM)
- ▶ Low dark count rate: <100 Hz
- ▶ 15 MHz maximum count rate
- ▶ Closed-cycle cryostat
- ▶ 1 to 8 channels per cryostat
- ▶ Agile control and data recording electronics

Applications

- ▶ Quantum Key Distribution
- ▶ Single-photon source characterization
- ▶ Eye-safe laser ranging (LIDAR)
- ▶ Singlet oxygen measurement
- ▶ Photoluminescence
- ▶ Fluorescence lifetime measurement
- ▶ Fibre optics characterization
- ▶ Failure analysis of electronics circuits
- ▶ Quantum computing & Quantum optics

SUPERCONDUCTING NANOWIRE

Detector Specifications

Parameter	Min	Typical	Max	Units
Wavelength range	400		2500	nm
Optical fibre type		SMF		
Efficiency range at 1550nm	75	80		%
Dark count rate at 0.8K			100	Hz
Maximum count rate		15		MHz
Jitter (FWHM)		50		ps
Pulse width		adjustable		
Output connector		SMA		
Operating temperature		0.8		K
Dimensions		13 x 20 x 25		mm
Optical connector		FC/PC		



Cryostat Specifications

Parameter	Min	Typical	Max	Units
Cooling temperature		0.8		K
Number of channels	1		8	
Compressor type		Air-cooled or water-cooled		
Flextubes length		3		m
Cooling time		16		hours
Dimensions				
- Cryostat		63x30x30		cm
- Compressor		50x40x50		cm

Customisations

Customised SNSPD with better performances:

- ▶ Quantum efficiency > 80% at specific wavelength (400-2500 nm)
- ▶ Dark count rate below 1 Hz
- ▶ <30 ps FWHM timing resolution
- ▶ MMF fibre coupling

Electronics



The Time Controller performs the functions of a number of devices: time-to-digital converter, coincidence counter, delay generator, pattern generator, counter and discriminator. This is complemented by a 10 Gbps link to the host computer for fast data transfers, by auxiliary analog and digital I/O for interfacing with external devices.

- ▶ Timestamping and histogramming
- ▶ Delay generation with multi-hit ability
- ▶ Pattern generation
- ▶ High-speed counter
- ▶ High precision discriminator
- ▶ Synchronise devices for up to 64 channels
- ▶ 4 input channels (-5 V to 5 V in 1 mV steps)
- ▶ 4 output channels (NIM + LVTTTL)
- ▶ High timing resolution (20 ps FWHM)
- ▶ Fast data transfer to a PC (100 Mcps)
- ▶ 1 GHz counters