

Redefining Measurement

ID281 Superconducting nanowire system

Turnkey multi-channel solution with timing electronics and control software

The ID281 is IDQ's ultimate combination of high-performance single-photon detection, simple and robust cryogenics, best-in-class time-tagging and control electronics.

Push the limit of your application to new heights with Swiss made SNSPDs combining high detection efficiency, low jitter, low noise and short recovery time.

The detectors (from 2 up to 16) are integrated in an automated closed-cycle and compact 0.8 K cryostat providing ease-of-use and unrivalled temperature stability for long-term performance.

The system comes with our Time Controller ID900 for high-speed and high-resolution time-tagging, as well as the possibility to control your experiment. You can process and display your data quickly with its built-in realtime processing tools. Get the best results out of your application.



Key Features

- ▶ Long-term reliable and stable performances
- ▶ High system detection efficiency : up to 90%
- ▶ Low dark count rate (as low as 1 Hz)
- ▶ Short recovery time and latch-free operation, even at high count rates
- ▶ Low jitter (as low as 20 ps)
- ▶ Automated standalone 0.8 K cryostat
- ▶ Integrated control, discrimination and time-tagging electronics

New

- ▶ High-speed detection: up to 200 MHz detection rate
- ▶ Photon-number resolution
- ▶ Up to 16 channels

Applications

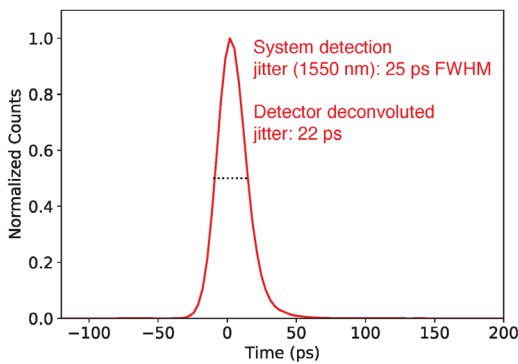
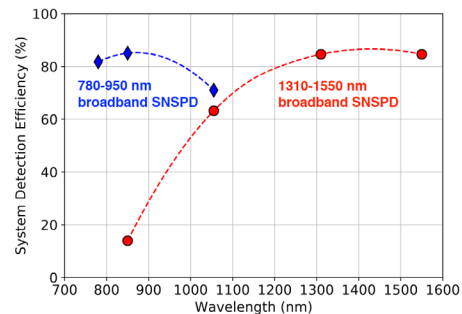
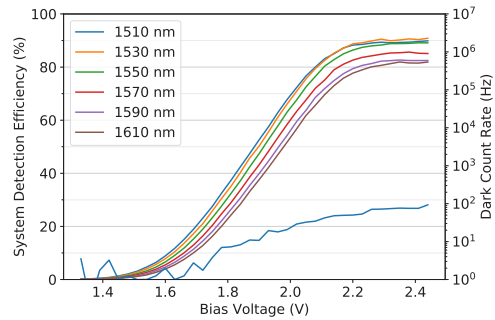
- ▶ QKD and quantum communication
- ▶ Quantum optics and computing
- ▶ Single-photon source characterisation
- ▶ Fluorescence lifetime measurements
- ▶ Failure analysis of integrated circuits
- ▶ VIS, NIR and MIR spectroscopy

High-performance single-photon detection

The ID281 detectors combine the best performances that superconducting nanowires can provide

HIGH EFFICIENCY & LOW NOISE

- ▶ System detection efficiency up to 90% (at 1550, 1310, 780, 850, 950 nm and +)
- ▶ Broadband efficiency detectors:
 - >80% from 1310 to 1550 nm
 - >80% from 780 to 950 nm
 - >80% from 950 to 1064 nm
- ▶ Standard low dark count rate (DCR):
 - < 100 Hz (1310 to 1550 nm)
 - < 5 Hz (950 to 1064 nm)
 - < 1 Hz (780 to 950 nm)
- ▶ Ultra low DCR option (1550 nm) : < 10 Hz or < 1 Hz
- ▶ Options:
 - Polarisation-insensitive efficiency : > 70%
 - Multimode fiber coupling : contact us for more information

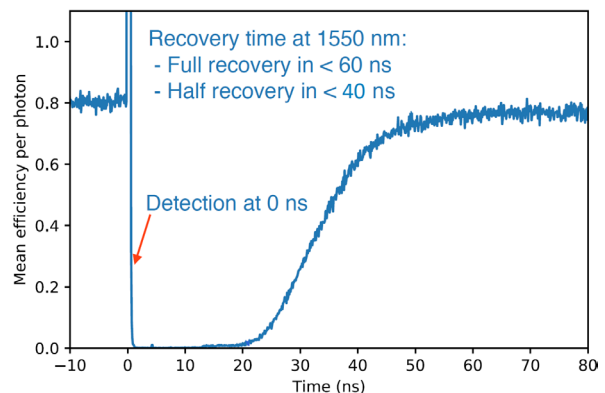


LOW TIME JITTER

- ▶ Standard jitter (FWHM):
 - < 40 ps (1550 nm)
 - < 30 ps (780-950 nm)
- ▶ Ultra-low jitter option:
 - <30 ps (1550 nm)
 - <20 ps (780-950 nm) upon request

SHORT RECOVERY TIME

- ▶ Standard recovery time (50% recovery):
 - 60 ns (1310-1550 nm), 30 ns (780-1064 nm)
- ▶ Shorter recovery time option:
 - 40 ns (1310-1550 nm), 20 ns (780-1064 nm)

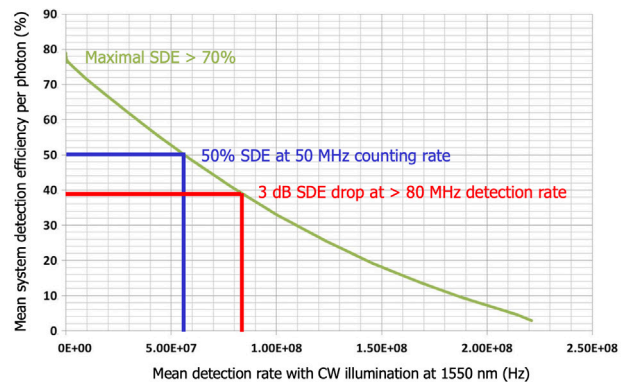


High-performance single-photon detection

The ID281 detectors combine the best performances that superconducting nanowires can provide

HIGH-SPEED & PNR SNSPDs (PRELIMINARY SPECIFICATIONS)

- ▶ >70% nominal system detection efficiency (SDE) at 1550 nm, other wavelengths upon request
- ▶ < 100 Hz DCR at 1550 nm, 60 ps jitter
- ▶ Efficiency reduction minimized at high count rates
- ▶ Photon-number resolution (PNR) capability with a single channel use in the cryostat
- ▶ Patent-pending technology



AUTONOMOUS CRYOGENICS AT 0.8 K

- ▶ Up to 16 channels in a single cryostat with cryogenic pre-amplifiers
- ▶ 12 hours cooldown time
- ▶ 0.8 K base temperature with 5 mK stability
- ▶ 24-100 hours runtime at 0.8 K
- ▶ Software controlled cryostat operation
- ▶ Fully automated operation by software
- ▶ Automated vacuum pump control option
- ▶ Low maintenance

ID900 TIME CONTROLLER BUILT-IN DATA PROCESSING

- ▶ Time-tagging and realtime histogram display
- ▶ Internal FPGA-based processing (coincidence, conditional outputs, etc)
- ▶ Delay generation with multi-hit capability
- ▶ Pattern generation
- ▶ High-speed (1 GHz) counters
- ▶ Precise discriminators (-2 V to 2 V in 1 mV steps)
- ▶ 4 input channels
- ▶ 4 output channels (NIM or LVTTTL)
- ▶ High timing resolution: 8 ps RMS (20 ps FWHM) and 13 ps bin width



The ID900 Time Controller, included in the ID281 system, allows to get the most out of the detectors and to control your application. It combines discriminators, counters, time-to-digital converters (time-tagging), delay and pattern generators. It also allows you to fully characterise your detectors using its built-in processing capability and visual interface.

Specifications

Detectors	
System detection efficiency	≥ 85%
Optimisation wavelengths	from 780 to 1625 nm
Broadband detection efficiency	> 80% over min 100 nm
Dark count rate (a,b)	< 1 to < 100 Hz
Recovery Time (a,c)	from 30 to 60 ns
Maximum detection rate (a)	20 to 50 MHz
Jitter (FWHM) (b)	20 to 40 ps
Output pulse width, voltage	> 5 ns, > 100 mV
Design working temperature (d)	0.8 K
Detector package dimensions	13 x 20 x 25 mm
Fibre type (a)	Singlemode fibre, multimode option upon request

Cryostat	
Optical and coaxial channels	1-16
Base temperature	0.8 K
Minimum runtime at 0.8 K (e)	24 to 100 hours, configurable
Temperature stability	5 mK
Cooldown time	12 hours
Compressor Type	Air or water-cooled
Flexlines length	3 m (more upon request)
Dimensions	
- Cryostat	53 x 30 x 30 cm
- Compressor (air-cooled)	50 x 40 x 50 cm

a. Wavelength dependent, call for details.

b. Lower values available upon request.

c. Time for the efficiency to recover 50% of the maximum efficiency after a detection.

d. The detectors can be operated at 2.5 K but the specifications are impacted. Call for details.

e. Programmable automatic temperature recycling between runtime periods at 0.8K

Use cases

ID281 Superconducting nanowire technology used to perform QKD over record-breaking distance of 421 km

<https://www.idquantique.com/quantum-key-distribution-qkd-achieved-over-record-421-km/>

ID281 SNSPD Selected by Arianegroup

<https://www.idquantique.com/idq-single-photon-technologies-arianegroup/>

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