

ID281 Superconducting Nanowire Series

" The very best in single photon detection, with ultra stable performance "

SWISS MADE

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Push your photonic experiments and applications to new heights with our Swiss-made superconducting nanowire single-photon detectors (SNSPDs), combining incredibly high detection efficiency, timing precision, low noise and fast recovery time.

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

Get the best out of your photonic experiments and applications with the ID281 Superconducting Nanowire Series today.

# APPLICATIONS

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

### **KEY FEATURES**

IDO

- Near-perfect detection efficiency: can exceed 95%
- Ultra-low noise: as low as < 1 cps dark count rate

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- **Superb precision with built-in cryogenic amplifiers:** as low as < 25 ps timing jitter
- Mix and match up to 16 detectors, upgrade any time
- Continuous system operation
- **Reliable and robust performance**, with worldwide round-the-clock technical support included
- Hardware-based true latch-free operation at any detection rate
- **High count rates:** ultrafast detectors with maximum detection rates above 100 Mcps

#### **OPTIONAL:**

- Self-contained rack-mounted systems
- Advanced time-tagging, coincidence filtering and delay/pulse generation

### NEW

- Detectors with > 80% system detection efficiency and > 1 cps dark count rate at 1550 nm
- High efficiency at < 600 nm and > 2  $\mu$ m
- New detector designs for improved photon-number resolution and ultrafast detection

### **DETECTORS FOR ANY OCCASION**

### Endless options, always great performance



designs.

# Broad-spectrum near-ideal detection efficiency

High system detection efficiency (SDE) across hundreds of nanometres

**Superb precision** 

**SNSPDs** 

See the best single-photon

detection timing jitter with



100% 75% 50% 25% 0%  $10^{2}$  $10^{3}$  $10^{2}$  $10^{1}$ 

SDE and dark count rate measurement of

bias current, tested at 1550 nm.

an ID281 SNSPD, as a function of the applied

#### Ultra-low noise

Negligible detector dark counts in the SNSPDs' cryogenic environment

# Ultrafast single-photon counting

Parallel and Multi-Pixel designs to beat the photon pile-up effect Timing jitter measurement of an ID281 SNSPD, at 1550 nm, recorded with an ID1000 Time Controller. The raw FWHM of 24.4 ps includes all instrument jitter contributions, such that the real FWHM of the SNSPD is less than 22.3 ps.



Recovery time measurement of an ID281 Parallel SNSPD, tested at 1550 nm.

# PHOTON NUMBER-RESOLVING (PNR) DETECTION

Discriminate multi-photon states with Parallel or Multi-Pixel SNSPDs

# THE ID281 SYSTEM

ID281 SNSPDs are integrated in an automated and compact closed-cycle cryostat, providing ease-of-use and continuous system operation, with latchfree detection by design.

In a single ID281 system, mix and match up to 16 detectors, available in a range of specifications customizable to each user.



### ID281 SO SOrption

- Full catalogue of SNSPDs, lowest jitter possible
- Extended system lifetime
- Even longer periods between maintenance

### ID281 CO Continous Operation

- True 24/7 continuous operation
- High-speed and low-jitter SNSPDs



IDQ



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- 1. Standard single pixel for excellent overall performance
- 2. Polarization-intensitive spirals
- 3, 4. Interleaved Parallel and Multi-Pixel devices for ultrafast counting and photon-number resolution

### A COMPLETE PACKAGE

- Rack mounting customization for safety and mobility
- ID281 Control Box for plugand-play operation



## **ID1000 TIME CONTROLLER SERIES**

Each ID281 system optionally includes our Time Controller Series, for high-speed and high-resolution time-tagging, letting you react to and control your experiment in real time.

- All-in-one time-tagger & pulse generator
- Record up to 300 Mcps unique detection timestamps per device, with 1 ps precision
- Multi-device synchronisation for over 64 input channels



# SPECIFICATIONS

#### DETECTORS

Peak system detection efficiency (SDE)	80% to 95% (or better)	
Detector wavelengths	< 500 nm to > 2000 nm	
Broadband detection efficiency <sup>(1)</sup>	High SDE over > 100 nm range	
Maximum dark count rate <sup>(1)</sup>	< 500 nm to 950 nm: < 5 cps to < 1 cps 950 nm to 1300 nm: < 20 cps to < 1 cps 1300 nm to > 1600 nm: < 100 cps to < 1 cps	
Maximum detection rate <sup>(1) (2)</sup>	Standard SNSPDs: > 30 Mcps (recovery time typ. < 30 ns) Parallel SNSPDs: > 100 Mcps (recovery time < 10 ns) Multi-Pixel SNSPDs: > 1 Gcps across all pixels	
Timing jitter (FWHM) <sup>(3)</sup>	< 25 ps to < 40 ps (typ. < 30 ps)	
Output pulse width, voltage	> 5 ns, > 100 mV	
Fibre type (1) (4)	Single mode fibre	
CRYOSTAT		
Cryostat Model	ID281 SO (5)	ID281 CO <sup>(6)</sup>
Detector base temperature	< 1 K	> 2 K
Runtime at base temperature	≥ 24 hours <sup>(5)</sup>	Indefinitely <sup>(6)</sup>
Number of detector channels	1 to 16	
Cryostat dimensions	63 cm x 45 cm x 30 cm	

(1) Detector specifications are wavelength-dependent, please contact us for further information.

(2) Recovery time defined as the time for the detection efficency to recover 50% of the maximum after a detection event. Call us for details about the interplay between detection rate and efficiency.

(3) Timing jitter varies depending on detection wavelength, detector design, and detector composition. Lower jitter values can be prioritised on request.(4) Multimode fibre coupling is available upon request.

(5) The ID281 SO (SOrption) system achieves the highest SNSPD performance, with longer system lifetimes, compared to the ID281 CO system. Automated operation of the ID281 SO system gives indefinite continuous operation with a scheduled helium condensation cycle every day.

(6) The ID281 CO (Continuous Operation) system achieves true uninterrupted and indefinite SNSPD operation, while still reaching the performance listed in the specifications table above.



WORLD HEADQUARTERS

#### **ID QUANTIQUE SA**

Rue Eugène-Marziano 25 1227 Acacias/Geneva Switzerland

www.idquantique.com | info@idquantique.com

### SALES OFFICES AND ENGINEERING LABS

Boston, MA

USA

Switzerland Geneva South Korea SungNam-si