

SWISS QUANTUM

Redefining Measurement ID220 Infrared Single-Photon Detector

Cost-Effective Module for Asynchronous Single-Photon Detection at Telecom Wavelengths

The ID220-FR brings a major breakthrough for single-photon detection in free-running mode at telecom wavelengths. It provides a cost-effective solution for applications in which asynchronous photon detection is essential. The cooled InGaAs/ avalanche photodiode and associated InP electronics have been specially designed for achieving low dark count and afterpulsing rates in free-running mode. The module can operate at three detection probability levels of 10%, 15% and 20% with a deadtime that can be set between 1µs and 25 µs. Arrival time of photons is reflected by a 100ns LVTTL pulse available at the SMA connector with a timing resolution as low as 250 ps at 20% efficiency. A simple USB interface allows the user to set the efficiency level and the deadtime. A standard FC/PC connector is provided as optical input. The ID220-FR comes with a +12 V 60 W adapter.



Key Features

- Asynchronous detection mode (free-running)
- 10%-15%-20% photon detection probabilities
- 1 μs-25 μs adjustable deadtime
- Timing resolution as low as 250 ps
- Low dark and afterpulsing rates
- SMF or MMF62.5 or MMF100 optical input
- 100 ns LVTTL output pulse at SMA connector
- Pelletier cooler -50°C
- Software included

Applications

- Quantum optics, quantum cryptography
- Fibre optics characterization
- Single-photon source characterization
- Failure analysis of electronic circuits
- Eye-safe laser ranging (LIDAR)
- Spectroscopy, Raman spectroscopy
- Photoluminescence
- Singlet oxygen measurement
- Fluorescence, fluorescence life time

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INFRARED SINGLE-PHOTON DETECTOR

Specifications

Parameter		Min	Typical	Max	Units	
Wavelength range 1		900		1700	nm	
Optical fibre type 2		SMF o	or MMF62.5 or M	MMF100		
Efficiency range calibrated at λ =1.55 µm.			10, 15 or 20		%	
Dark count rate (10 µs deadtime) 3						
SMF	10% / 15% / 20% efficiency less than		1/2.5/5	kHz		
MMF62.5	10% / 15% / 20% efficiency less than		1.2/3/6	kHz		
MMF100	10% / 15% / 20% efficiency less than		1.2/3/6	kHz		
Timing resolution (FWHM)						
10% 15% 20% efficiency			400 / 300 / 250)	ps	
Deadtime range		1		25	μs	
Deadtime step			1		μs	
Detection output pulse		LVTTL / 100ns width				
Output connector			SMA			
Operating temperature		+10		+30	°C	
Dimensions LxWxH			230x110x120		mm	
Weight			2.5		kg	
Optical connector			FC/PC			
60 W AC/DC	+12 V green power adapter					
Input voltage		90~2	264 VAC - 135~3	70VDC		
Frequency range			47~63 Hz			
AC current		1.4A	/115VAC 1A/23	OVAC		
Cooling time			5		min	

Software

The ID220-FR comes with a software that allows the user to set the efficiency level and the deadtime through a simple USB interface.

The module can also operate disconnected from the PC. The settings are reloaded upon each power up.

e Running Single F	Photon Detector		L IDQ
eneral infos			
roduct name:	id220-FR-SMF	Software version:	May 14 2012 14:45:31
erial number:	1205001K010	Hardware version:	50
ettings			
etector Efficiency:	10 % •	DeadTime (µs):	20 🗘
tual value			
EC Power:	10.6W	Bias voltage:	0.00V
hotodiode temperature:	-48.01°C	Bias current:	(0.06 %)
ooler temperature:	30.12*C	Threshold:	-20.0mV

Efficiency versus wavelength

Supplied Accessories

- ▶ 60W AC/DC +12 V green power adapter
- Power cable
- 1.8 m USB cable
- Optical fibre cleaner
- ▶ 1 m SMF or MMF FC/PC optical patch cord
- User guide on USB key

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Single Mode Fibre SMF28, Numerical Aperture = 0.14

Multi Mode Fibre with a 62.5 μm core diameter, Numerical Aperture = 0.275

Multi Mode Fibre with a 100 µm core diameter, Numerical Aperture = 0.29



Ordering Information

ID220-FR-SMF:	
ID220-FR-MMF62.5:	
ID220-FR-MMF100:	

Detector module with singlemode fibre input Detector module with 62.5 μm multi-mode fibre input Detector module with 100 μm multi-mode fibre input

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INFRARED SINGLE-PHOTON DETECTOR

In contrast with usual gated operation of detectors based on InGaAs/InP avalanche photodiodes (APDs), the ID220-FR operates in free-running (asynchronous) mode. The APD is biased above its breakdown voltage in the so-called Geiger mode. Upon photon absorption, the photon arrival time is reflected by the rising edge of a 100 ns width LVTTL pulse at the output. The ID220-FR has been designed for providing a fast avalanche quenching, thus limiting the afterpulsing rate. This allows the operation at reasonably short deadtimes of values that can be optimized depending on the applications and the efficiency level.



Accessory - Optional Pulse Shaper



IDQ provides as an option a pulse shaper (A-PPI-D) which can be used with devices requiring negative input pulses. The leading edge of the ID220 output pulse is converted into a sharp negative pulse with typical amplitudes of 1.4 V for a 50 Ω load and 2.5 V for a high impedance load. The pulse shaper comes with two SMA/BNC adapters.







Typical output pulse of an ID220 equipped with a A-PPI-D pulse shaper in high impedance load.

Accessory - Optimal SMA Electrical Cable



To connect your ID220 to other devices, such as the pulse shaper (A-PPI-D) or certain acquisition card (SPC-130 from Becker & Hickl), IDQ recommends this SMA Male / SMA Male Cable. SMA Male means Female body (inside threads) with Male inner pin

Ordering information: idacc-SMA-SMA-1m

SMA Male to SMA Male electrical Cable 1m

Accessory - Metallic Optical Fibre



The standard optical patchcord can be transparent. Unwanted photons from the ambient environment can pass by the cladding of the fibre and so perturbate your measurement.

The metallic jacket fiber is delivered with FC/PC connectors

Ordering information: IDACC-SMF-Steel-2m IDACC-MMF-Steel-2m

SMF28 fibre and length 2m. core diameter 62.5 μm and length 2m

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