Redefining Measurement

ID221 Infrared Single-Photon Detector

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

The ID221-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/InP avalanche photodiode and associated 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 150 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 ID221-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 150 ps
- Low dark and afterpulsing rates
- SMF or MMF62.5 optical input
- 100 ns LVTTL output pulse at SMA connector
- Peltier 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

努美科技 SPECTRAL SCIENCE
T 010-6236 2608
T 019-6202 9100
info@nmerry.com
www.nmerry.com

INFRARED SINGLE-PHOTON DETECTOR

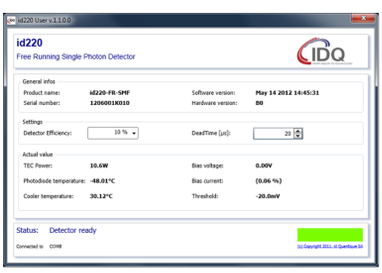
Specifications

Parameter		Min	Typical	Max	Units
Wavelength range	1	900		1700	nm
Optical fibre type	2	SMF or MMF62.5			
Efficiency range calibrated at λ=1.55 µm.			10, 15 or 20		%
DCR Max @10 µs deadtime (SMF/MMF)	3		@ 10% / 15% / 20% efficiency		
ID221-STD			1.2/ 3/ 6		kHz
ID221-ULN			0.8/ 1.5/ 3		kHz
Timing resolution (FWHM) at 20% efficiency			150		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			90~264 VAC - 135~370VDC		
Frequency range			47~63 Hz		
AC current			1.4A/115VAC 1A/230VAC		
Cooling time			5		min

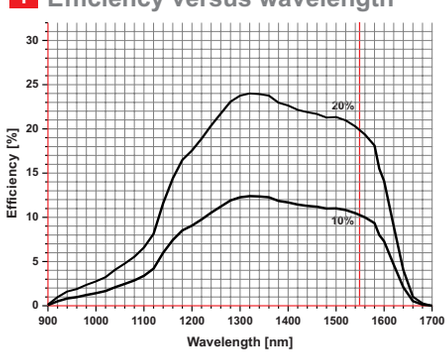
Software

The ID221-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.



1 Efficiency versus wavelength



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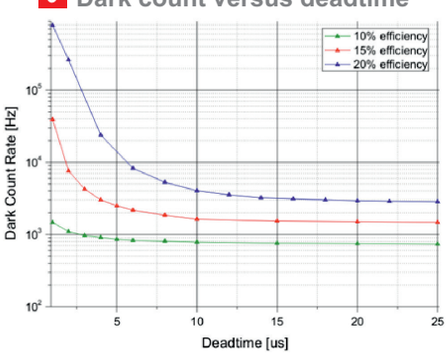
Single Mode Fibre SMF28,
Numerical Aperture = 0.14

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

3 Dark count versus deadtime



Supplied Accessories

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

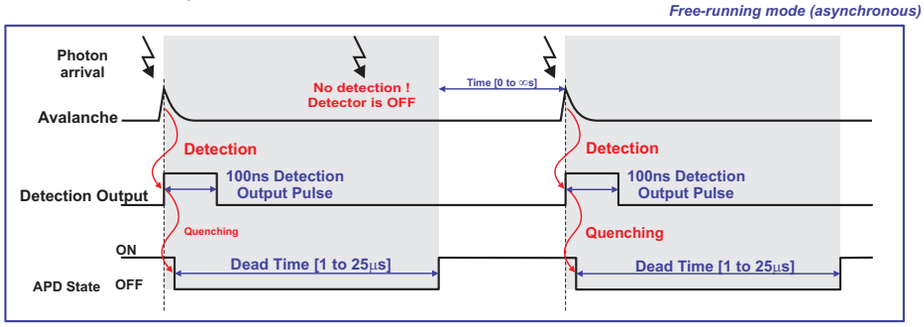
Ordering Information

ID221-FR-SMF:	Detector module with singlemode fibre input
ID221-FR-MMF62.5:	Detector module with 62.5 µm multi-mode fibre input

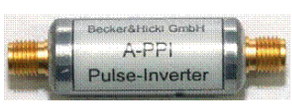
INFRARED SINGLE-PHOTON DETECTOR

In contrast with usual gated operation of detectors based on InGaAs/InP avalanche photodiodes (APDs), the ID221-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 ID221-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.

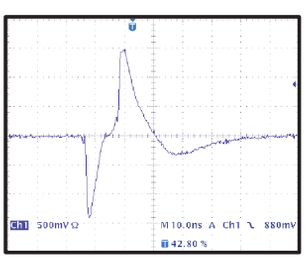
Free-running mode (asynchronous)



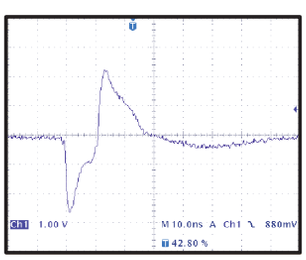
Accessory - Optional Pulse Shaper



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 ID221 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.

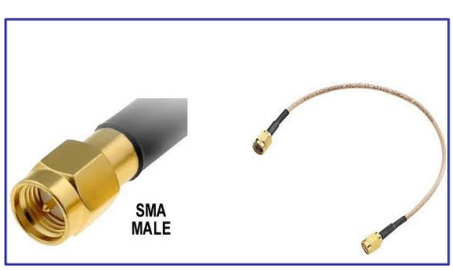


Typical output pulse of an ID221 equipped with a A-PPI-D pulse shaper in 50 Ω load.



Typical output pulse of an ID221 equipped with a A-PPI-D pulse shaper in high impedance load.

Accessory - Optimal SMA Electrical Cable



To connect your ID221 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

Optical Patch Cord - Metallic Fibre Optic Cable

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