

INFRARED SINGLE-PHOTON COUNTER

ID220: 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/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 1us and 25us. Arrival time of photons is reflected by a 100ns LVTTTL pulse available at the SMA connector with a timing resolution as low as 250ps 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 +12V 60W adapter.



KEY FEATURES

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

APPLICATIONS

- Quantum optics, quantum cryptography
- Fiber 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



Photonic Solutions Ltd Unit 2.2, Quantum Court, Research Avenue South, HWU Research Park, Edinburgh, EH14 4AP, UK, Tel: +44 (0)131 664 8122
Email sales@photronicsolutions.co.uk Web www.photronicsolutions.co.uk

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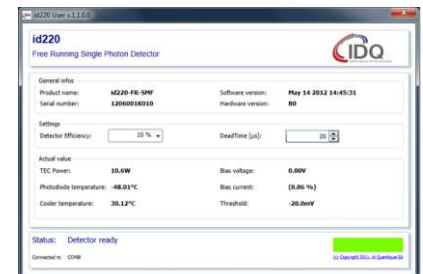
SPECIFICATIONS

Parameter	Min	Typical	Max	Units
Wavelength range	1	900	1700	nm
Optical fiber type	2	SMF or MMF62.5 or MMF100		
Efficiency range calibrated at $\lambda=1.55 \mu\text{m}$.		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		LVTTTL / 100ns width		
Output connector		SMA		
Operating temperature	+10		+30	$^{\circ}\text{C}$
Dimensions LxWxH		230x110x120		mm
Weight		2.5		kg
Optical connector		FC/PC		
60W AC/DC +12V 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

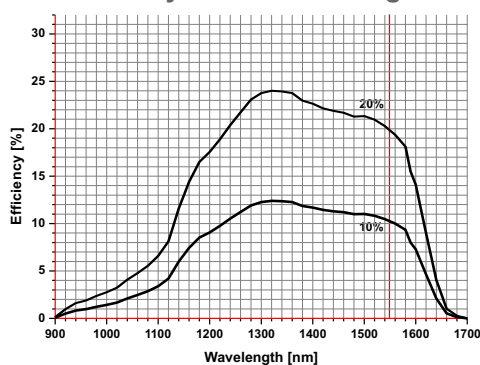
SOFTWARE

The 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.



1 Efficiency versus wavelength



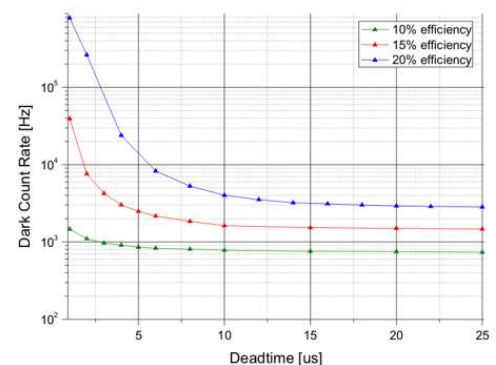
2

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

3 Dark count versus deadtime



SUPPLIED ACCESSORIES

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

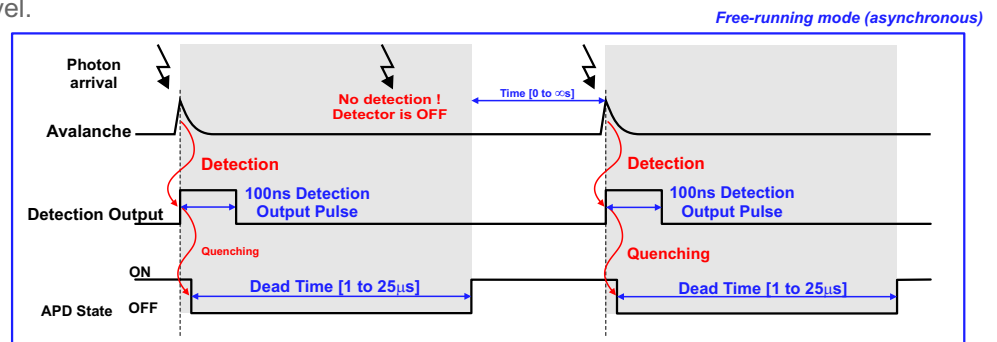
ORDERING INFORMATION

- | | |
|-------------------|--|
| ID220-FR-SMF: | Detector module with single mode fiber input |
| ID220-FR-MMF62.5: | Detector module with 62.5 μm multi-mode fiber input |
| ID220-FR-MMF100: | Detector module with 100 μm multi-mode fiber input |

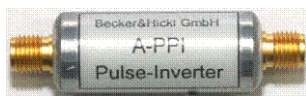
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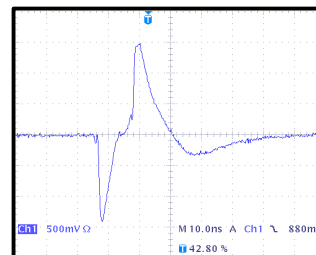
In contrast with usual gated operation of detectors based on InGaAs/InP avalanche photodiodes (APDs), the ID220-FR operates in free-running (asynchronous) mode. The APD is biased above its breakdown voltage in the so-called Geiger mode. Upon photon absorption, the photon arrival time is reflected by the rising edge of a 100ns width LVTTTL 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.



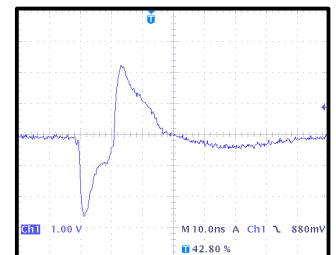
ACCESSORY - OPTIONAL PULSE SHAPER



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 1.4V for a 50Ω load and 2.5V 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 50Ω load.



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

ACCESSORY - OPTIONAL 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 fiber and so perturbate your measurement. The metallic jacket fiber is delivered with FC/PC connectors

Ordering information:
iDACC-SMF-Steel-2m SMF28 fiber and length 2m.
iDACC-MMF-Steel-2m core diameter 62.5µm and length 2m