Redefining Measurement
ID Qube Series - NIR Free-Running version
Asynchronous Single-Photon Detection at Telecom Wavelengths

COMPACT & COST-EFFECTIVE

The ID Qube NIR Free-Running 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 such as photon correlation or time of flight measurements. Moreover it is especially suited for applications such as Lidar where compactness is strongly required.

The detector offers a gate input port connector dedicated to avoid saturation or undesired detections. The cooled InGaAs/InP avalanche photodiode and associated electronics have been specially designed to achieve low dark count and afterpulsing rates in free-running mode.

The device is available in free-space, SMF or MMF (62.5 µm) fibre-coupled version.

Applications

📡	Quantum communication
⚛	Quantum physics and optics
📈	Time of flight measurement (OTDR, LIDAR)
🔬	Fluorescence Lifetime measurements

Key Benefits

|	
€	Compact & cost-effective
🗲	Optimised for free-running operations
✛	Ultra low noise (800 cps at 10%)
⏱	Low jitter (150 ps)

Free-running mode at telecom wavelengths

The ID Qube has been especially designed to achieve low dark count and afterpulsing rates in free-running mode.

The ID Qube NIR Free-Running can operate at three detection probability levels of 10%, 15% and 20% with a deadtime between 1 µs and 25 µs. The arrival time of photons is reflected by a 100 ns 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.

EFFICIENCY

The calibration is carefully made in house using equipement calibrated by the swiss metrology institute (METAS).
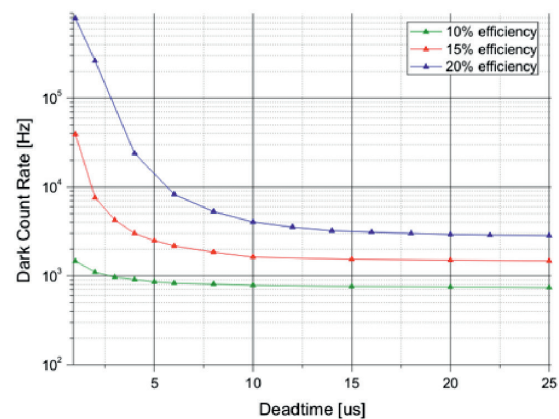
Efficiency versus wavelength
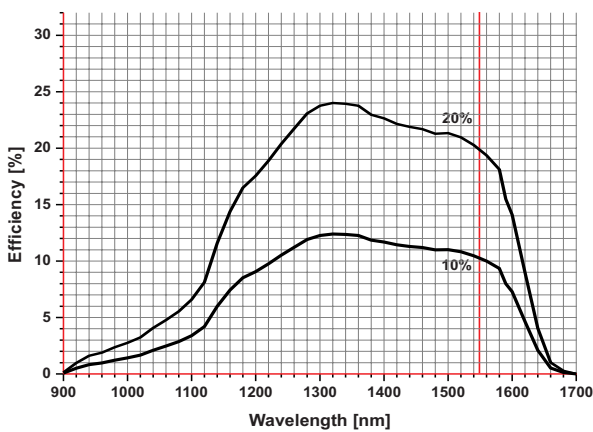
DARK COUNT RATE

The dark count rate strongly depends 2 settings: efficiency and deadtime. By playing with the 2 settings, it is possible to optimize efficiency, afterpulsing and dark count rate for each dedicated experiment.

**Dark count versus deadtime**
(for illustration only)

LOW JITTER

The jitter of a SPAD strongly improves with its quantum efficiency as shown on the curve below. The ID Qube NIR Free-Running offers a best-in-class jitter of 150 ps at 20% efficiency at 1550 nm. The here below represented jitter figures may vary from diode to diodes. Note that the 25% efficiency setting is only available with the ID Qube NIR Gated version.
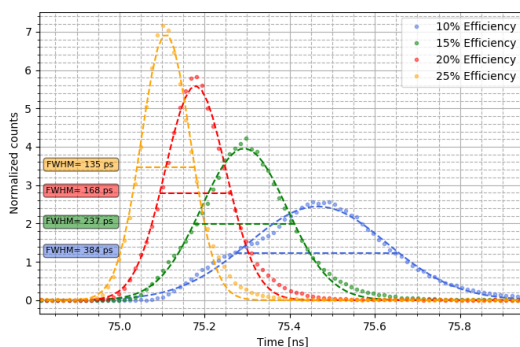
COMPACT

The ID Qube is very small and suited for applications such as LiDAR where compactness is strongly required.


95 mm
95 mm
95 mm
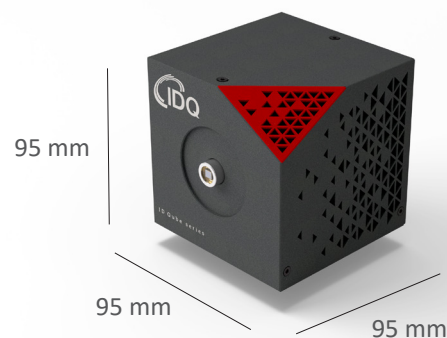
Compact

The ID Qube is specially suited for applications such as Lidar where compactness is strongly required.

PRINCIPLE OF OPERATIONS

In contrast with usual gated operations of detectors based on InGaAs/InP avalanche photodiodes (APDs), the ID Qube-NIR-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 ID Qube NIR Free-Running has been designed to provide 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)
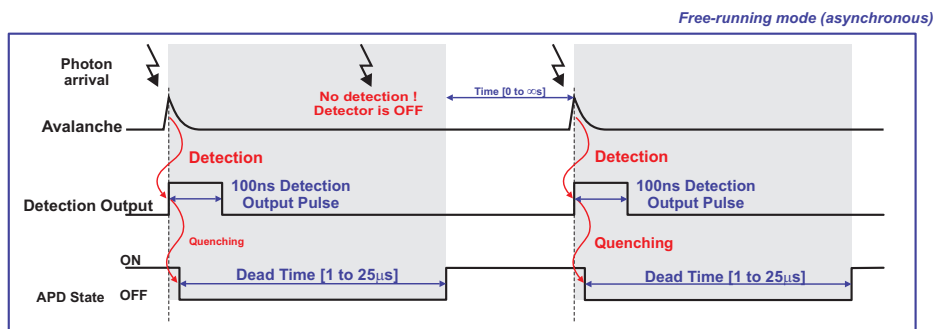
USER FRIENDLY SOFTWARE

The ID Qube NIR Free-Running comes with an intuitive 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.

BUNDLE ID900 TIME CONTROLLER

Take your experiment a step further. Operate the ID Qube with the ID900 Time Controller, IDQ's central platform which combines the functionalities of a time-tagger, delay and pattern generator .

It is even possible to generate conditional pulses thanks to the unique computing capabilities of the Time Controller.

The ID Qube Series exists in 2 versions: ID Qube NIR Free-running and ID Qube NIR Gated

More info: www.idquantique.com

PRELIMINARY SPECIFICATIONS

Parameter				Units
Wavelength range	900 - 1700			nm
Deadtime range	0.1 - 100			µs
Deadtime step	100			ns
Output pulse voltage	LVTTL / NIM			
Output pulse width	100			ns
Optical fibre coupling	SMF, MMF62.5 or free-space			
Efficiency range calibrated at λ=1.55 µm	10, 15 or 20			%
Timing resolution (FWHM) at 20% efficiency	150			ps
Dark count rate at (efficiency)	10	15	20	%
STD	1.2	3	6	kHz
LN	0.8	1.5	3	kHz
Gate-in max frequency	TBD			
Gate-in min pulse duration	1			ns
Gate-in voltage range	-2 to 2			V
Gate-in coupling	DC			
Gate-in threshold voltage range	-2 to 2			V
Gate-in threshold voltage resolution (steps)	1			mV
Output connector	SMA			
Optical connector	FC/PC pigtail			
Operating Temperature	+10 to +35			°C
Dimensions	95 x 95 x 95			mm
Weight	1			kg
Cooling time	5			min
Power supply				
Input voltage	90~264VAC - 135~370VDC			
Frequency range	47~63			Hz
AC current	1.4A / 115VAC 1A / 230VAC			

Supplied Accessories
60W AC/DC +12 V green power adapter
Power cable
1.8 m USB cable
Optical fibre cleaner
User guide on USB key

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