IDQ
FROM VISION TO TECHNOLOGY

NEW

with NEW devices and NEW grades

REDEFINING PRECISION

id100 SERIES

SINGLE-PHOTON DETECTORS FOR VISIBLE LIGHT WITH BEST-IN-CLASS TIMING ACCURACY

IDQ's *id100 series* consists of compact and affordable single-photon detector modules with best-in-class timing resolution and state-of-the-art dark count rate based on a reliable silicon avalanche photodiode sensitive in the visible spectral range. The *id100 series* detectors come as:

- free-space modules, the *id100-20* and *id100-50* with a 20µm and respectively a 50µm diameter photosensitive area,
- fiber-coupled modules, the *id100-SMF20, d100-MMF50 and the id100-MMF100* coming with a standard FC/PC optical input.

The modules are available in three dark count grades, with dark count rate as low as 2Hz.

With a timing resolution as low as 40ps and a remarkably short dead time of 45ns, these modules outperform existing commercial detectors in all applications requiring single-photon detection with high timing accuracy and stability up to count rates of at least 10MHz.

KEY FEATURES

- Best-in-class timing resolution (40ps)
- Low dead time (45ns)
- Small IRF shift at high count rates
- Standard and Ultra-Low Noise grades
- Peak photon detection at λ = 500nm
- Active area diameter of 20µm or 50µm
- Free-space or fiber coupling
- Not damaged by strong illumination
- No bistability

APPLICATIONS

- Time correlated single photon counting (TCSPC)
- Fluorescence and luminescence detection
- Single molecule detection, DNA sequencing
- Fluorescence correlation spectroscopy
- Flow cytometry, spectrophotometry
- Quantum cryptography, quantum optics
- Laser scanning microscopy
- Adaptive optics

光技術をサポートする
株式会社オプトサイエンス
http://www.optoscience.com

東京本社 〒160-0014 東京都新宿区内藤町１番地 内藤町ビルディング
TEL:03(3356)1064 FAX:03(3356)3466 E-mail:info@optoscience.com
大阪支店 〒532-0011 大阪市淀川区西中島7-7-2 新大阪ビル西館
TEL:06(6305)2064 FAX:06(6305)1030 E-mail:osk@optoscience.com
名古屋営業所 〒450-0002 名古屋市中村区名駅2-37-21 東海ソフトビル
TEL:052(569)6064 FAX:052(569)8064 E-mail:ngo@optoscience.com

IDQ
FROM VISION TO TECHNOLOGY

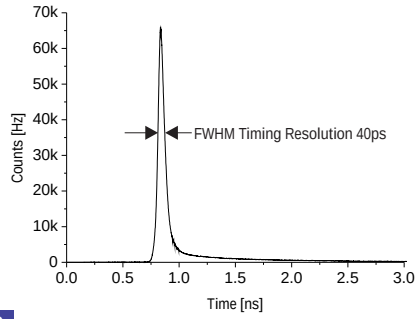
SPECIFICATIONS

Parameter	Min	Typical	Max	Units
Wavelength range	350		900	nm
Timing resolution [FWHM] 1 2 1		40	60	ps
Single-photon detection probability (SPDE) 3				
at 400nm	15	18		%
at 500nm	30	35		%
at 600nm	20	25		%
at 700nm	15	18		%
at 800nm	5	7		%
at 900nm	3	4		%
Afterpulsing probability 4			3	%
Output pulse width 5	9	10	15	ns
Output pulse amplitude 5 3 5	1.5	2	2.5	V
Deadtime 6		45	50	ns
Maximum count rate (pulsed light) 7		20		MHz
Supply voltage 4	5.6	6	6.5	V
Supply current		100	150	mA
Storage temperature	-40		70	°C
Cooling time			5	s

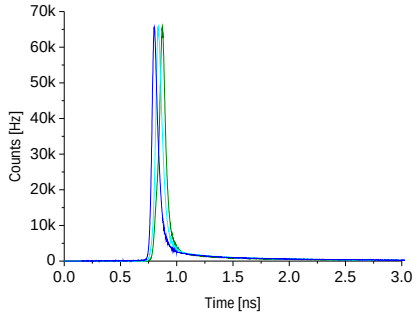
Dark count rate: IDQ´s modules are available in three grades: **Regular**, **Standard** and **Ultra-Low Noise**, depending on dark count rate specifications.

	Active Area Diameter	TE cooled	Regular	Standard	Ultra-Low Noise
id100-20	20 µm	yes	< 200Hz	< 60Hz	< 2Hz
id100-SMF20	6 NEW	yes			
id100-50	50 µm	yes	NEW < 200Hz	< 80Hz	< 20Hz
id100-MMF50	7	yes			
id100-MMF100	8 NEW	yes			

1 Timing Resolution

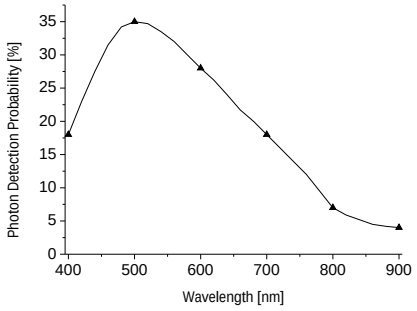


2 IRF Shift with Output Count Rate

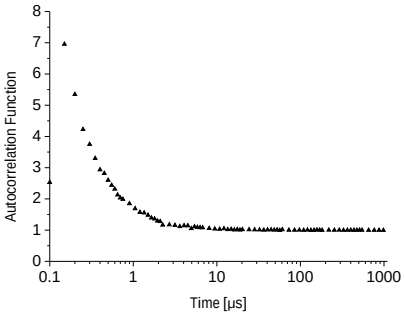


Extremely low shift of instrument response function with output count rate (less than 70ps from 10kHz to 8MHz).

3 Photon Detection Probability versus λ

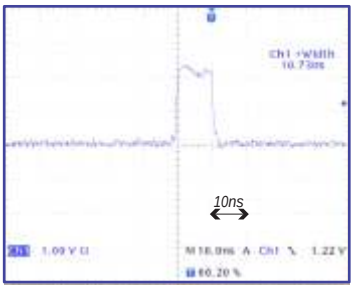


4 Afterpulsing



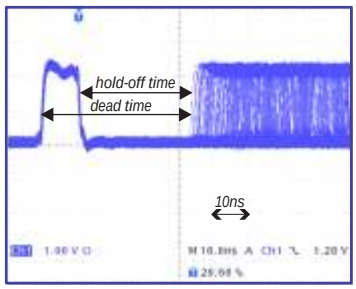
Typical autocorrelation function of a constant laser signal, recorded at a count rate of 10kHz.

5 Output Pulse



Typical pulse of 2V amplitude and 10ns width observed at the output of an *id100* terminated with 50Ω load. Recommended trigger level: 1V. For timing applications, triggering on rising edge is recommended to take full advantage of the detector´s timing resolution.

6 Dead Time

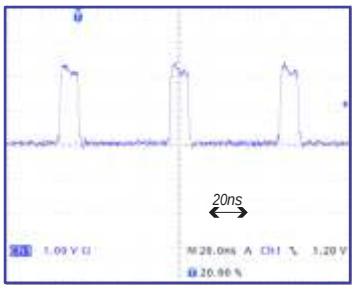


Measurement obtained with an oscilloscope in infinite persistance mode: the dead time consists of the output pulse width and the hold-off time during which

1. Optimal timing resolution is obtained when incoming photons are focused on the photosensitive area.
2. The *id100* is free of indicating LEDs to maintain complete darkness during measurements.
3. The detector output is designed to avoid distorsion and ringing when driving a 50Ω load.
4. Universal network adapter provided (110/220V).
5. See on page 4 the A-PPI-D pulse shaper for negative input equipment compatibility.
6. The *id100-SMF20* comes with a single mode fiber optimized to your operating wavelength NEW
7. The *id100-MMF50* comes with a 50/125µm multi-mode fiber optimized for visible spectral range with 0.22 numerical aperture. The coupling efficiency is larger than 80%.
8. The *id100-MMF100* comes with a 100/140µm multi-mode fiber optimized for visible spectral range with 0.22 numerical aperture. The coupling efficiency is larger than 50%. NEW

ID Quantique SA
Chemin de la Marbrerie 3
1227 Carouge/Geneva
Switzerland
T +41 22 301 83 71
F +41 22 301 83 79
info@idquantique.com
www.idquantique.com

7 Maximum Count Rate - Pulsed Light



The short dead time of the *id100* allows operation at very high repetition frequencies, up to 20MHz.

MOUNTING OPTIONS

The *id100 series* comes with different mounting options:

- Use mounting brackets supplied with the module using screws with diameters up to 4mm.
- Use a standard optical post holder (not supplied)using the M4 thread located on the bottom side of the *id100-20 & id100-50* detectors.
- Use the C-MOUNT adapter to add optical elements in front of the detector (*id100-20 & id100-50* only).

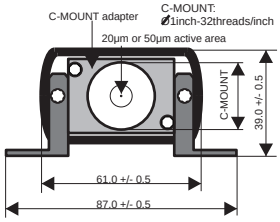
PRINCIPLE OF OPERATION

The id100 consists of an avalanche photodiode (APD) and an active quenching circuit integrated on the same silicon chip. The chip is mounted on a thermo-electric cooler and packaged in a standard TO5 header with a transparent window cap. A thermistor is used to measure temperature. The APD is operated in Geiger mode, i.e. biased above breakdown voltage. A high voltage supply used to bias the diode is provided by a DC/DC converter. The quenching circuit is supplied with +5V. The module output pulse indicates the arrival of a photon with high timing resolution. The pulse is shaped using a hold-off time circuit and sent to a 50Ω output driver. All internal settings are preset for optimal operation at room temperature.

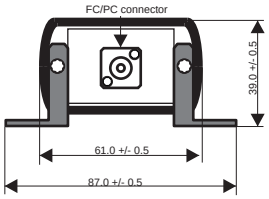
In the fiber-coupled version, a fiber pigtail with FC/PC connector is coupled to the detector.

DIMENSIONAL OUTLINE (in mm)

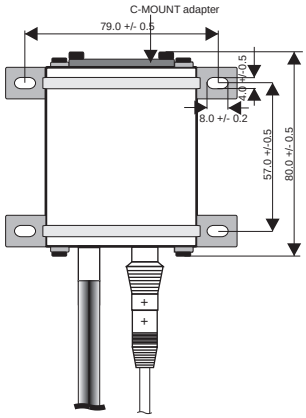
***id100-20 / id100-50* Front View**



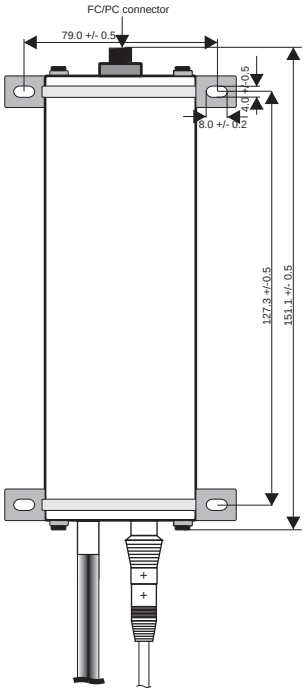
***id100-SMF20* Front View**
***id100-MMF50* Front View**
***id100-MMF100* Front View**



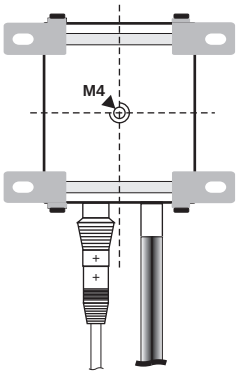
***id100-20 / id100-50* Top View**



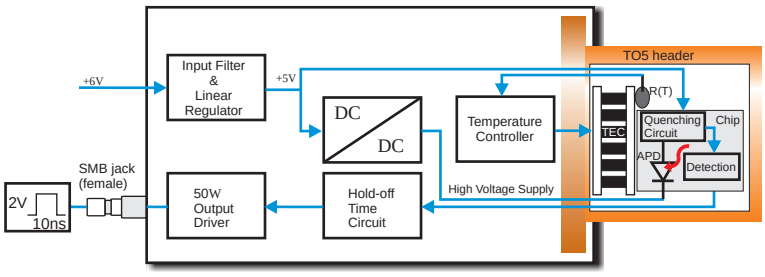
id100-SMF20 Top View
id100-MMF50 Top View
id100-MMF100 Top View



***id100-20 / id100-50* Bottom View**

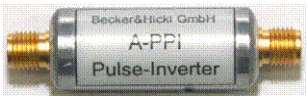


BLOCK DIAGRAM

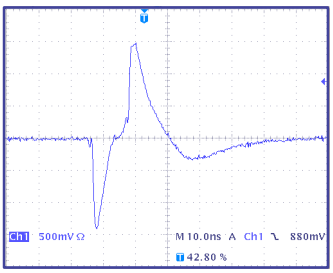


ID Quantique SA
Chemin de la Marbrerie 3
1227 Carouge/Geneva
Switzerland
T +41 22 301 83 71
F +41 22 301 83 79
info@idquantique.com
www.idquantique.com

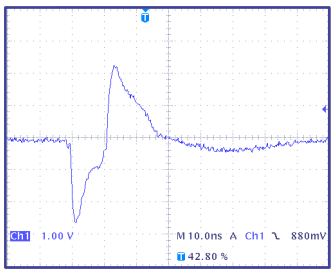
ACCESSORY - OPTIONAL PULSE SHAPER



IDQ provides as an option a pulse shaper (A-PPI-D) which can be used with equipments requiring negative input pulses. The id100 output pulse leading edge is converted in a sharp negative pulse of typical amplitudes 1.4V in 50Ω load and 2.5V in high impedance load. The pulse shaper is delivered with two SMA/BNC adapters.



Typical output pulse of an id100 equipped with a A-PPI-D pulse shaper in 50Ω load.



Typical output pulse of an id100 equipped with a A-PPI-D pulse shaper in high impedance load.

id101 SERIES - THE WORLD´S SMALLEST PHOTON COUNTER

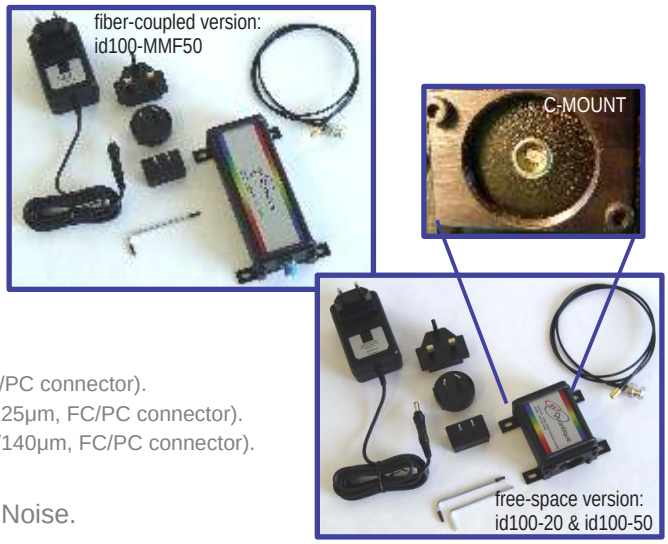
For large-volume OEM applications, IDQ offers the *id101 series,* consisting of a standard TO5 - 8pins optoelectronic package with a CMOS silicon chip (single photon avalanche diode and fast active quenching circuit) mounted on top of a thermoelectric cooler. A thermistor is available for temperature monitoring and control. An evaluation board is available upon request. When properly biased, the performance is comparable with that of the *id100-50*. IDQ's engineering team offers technical support to simplify integration. A fiber coupled version, the *id101-MMF50*, is also available. See the *id101* datasheet for more information.

OTHER PRODUCTS

id101	Miniature single-photon detector for the visible spectral range (see above)
id150	Monolithic linear array of single-photon detectors for the visible range
id210	Single-photon detector for telecom wavelengths
id300	Short pulse laser source
id400	Single photon counting module for the 900-1150nm spectral range
Quantis	Quantum Random Number Generator
Clavis^2	Quantum Key Distribution System for R&D
Cerberis	Layer 2 encryptor with Quantum Key Distribution
Centauris	Layer 2 encryptor

SUPPLIED ACCESSORIES

- Mounting brackets (4x)
- C-Mount adapter (except for fiber couple devices)
- Coaxial cable (1m, BNC-SMB)
- Power supply with universal input plugs
- Operating guide
- Angled 2.5mm hexagonal key to remove C-Mount adapter
- Angled T10 Torx key to remove mounting brackets



ORDERING INFORMATION

id100-20-XXX	Photon counter with 20µm active area.
id100-50-XXX	Photon counter with 50µm active area.
id100-SMF20-XXX	Photon counter with singlemode fiber pigtail (FC/PC connector).
id100-MMF50-XXX	Photon counter with multimode fiber pigtail (50/125µm, FC/PC connector).
id100-MMF100-XXX	Photon counter with multimode fiber pigtail (100/140µm, FC/PC connector).

Select dark count grade:
XXX = REG for Regular; STD for Standard; ULN for Ultra-Low Noise.

ID Quantique SA
Chemin de la Marbrerie 3
1227 Carouge/Geneva
Switzerland
T +41 22 301 83 71
F +41 22 301 83 79
info@idquantique.com
www.idquantique.com