



QD800c-fQ

► Single Photon Detection Module

Description

QD800c-fQ series of Single Photon Counting Modules offers a unique combination of low dark count rates, very low jitter and a **fast quenching circuit** in a miniature package. The special mechanical design allows a flexible combination with existing systems in the laboratory. Incoming photons generate corresponding electrical pulses which may be conveniently read out at the digital output.

Features

- Low dark rates
- Very low jitter
- Fast quenching circuit
- High detection efficiency (400 nm to 1000 nm)
- Digital output pulse (2 V) at SMA connector
- Single 5 V DC supply operation
- Compatible with third party adapters

Applications

- Quantum optics, quantum cryptography
- Fiber optics characterization
- Time Correlated Single Photon Counting (TCSPC)
- Fluorescence, fluorescence life time spectroscopy, Raman spectroscopy
- Single photon source characterization
- Eye-safe laser ranging (lidar)
- Time-of-flight measurements (ranging)
- Time-resolved fluorescence spectroscopy
- Fluorescence Lifetime Imaging (FLIM)
- Fluorescence Correlation Spectroscopy (FCS)
- Fluorescence Lifetime Correlation Spectroscopy (FLCS)
- Single molecule spectroscopy
- Optical Time Domain Reflectometry (OTDR)
- Optical tomography





Maximum Ratings

Parameter	Symbol	Values		Unit
		Min.	Max.	
Supply voltage	V_S	4.5	5.2	V
Operating temperature	T_{OPR}	0	+ 40	°C
Storage temperature	T_{STG}	- 20	+ 70	°C
Count rate			10	MCounts/s

Electro-Optical Characteristics

Parameter	Symbol	Values			Unit
		min.	Typ.	Max.	
Active diameter	d		500		μm
Responsivity at 830 nm	S_λ		128		A/W
Quantum efficiency at 830 nm	η_λ		77		%
Dark count rate *1	QD800c-fQ-500			500	Counts/s
	QD800c-fQ-50			50	Counts/s
	QD800c-fQ-20			20	Counts/s
Timing resolution	t_S		300		ps
Dead time range	t_D		90		ns
Output pulse amplitude (into 50 Ohm)			2.0		V
Digital out – T-OK *2		0		3.3	V
Analog out – Tmp *3		0		1.5	V
Supply voltage	V_S	4.8	5.0	5.2	V
Supply current	I_S		230		mA

*1 Dark count rate at -20°C and 5% photon detection probability (830 nm, ambient temperature of 22°C).

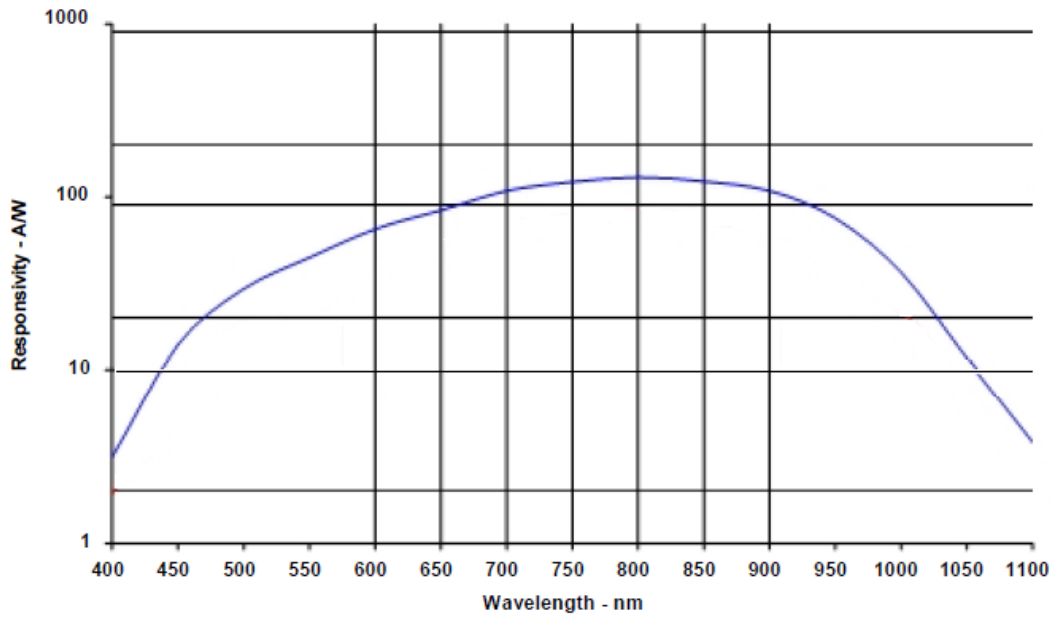
*2 If the temperature is sufficiently low (Tmp = set point), T-OK goes high

*3 The voltage of the analog out Tmp represents the temperature of the SPAD. See diagram below.

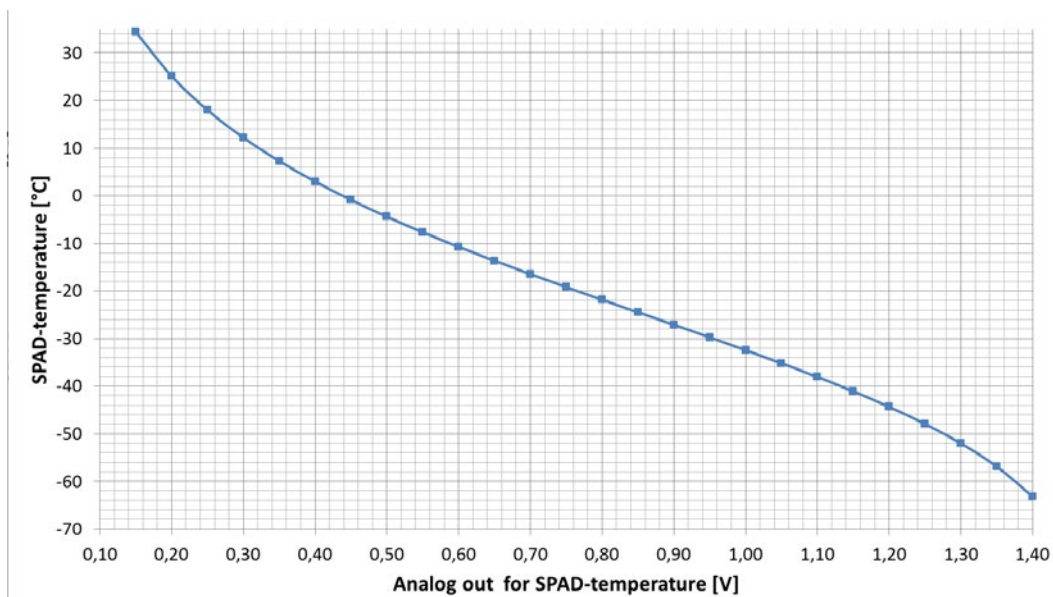


Performance Characteristics

Typical Spectral responsivity



Temperature diagram

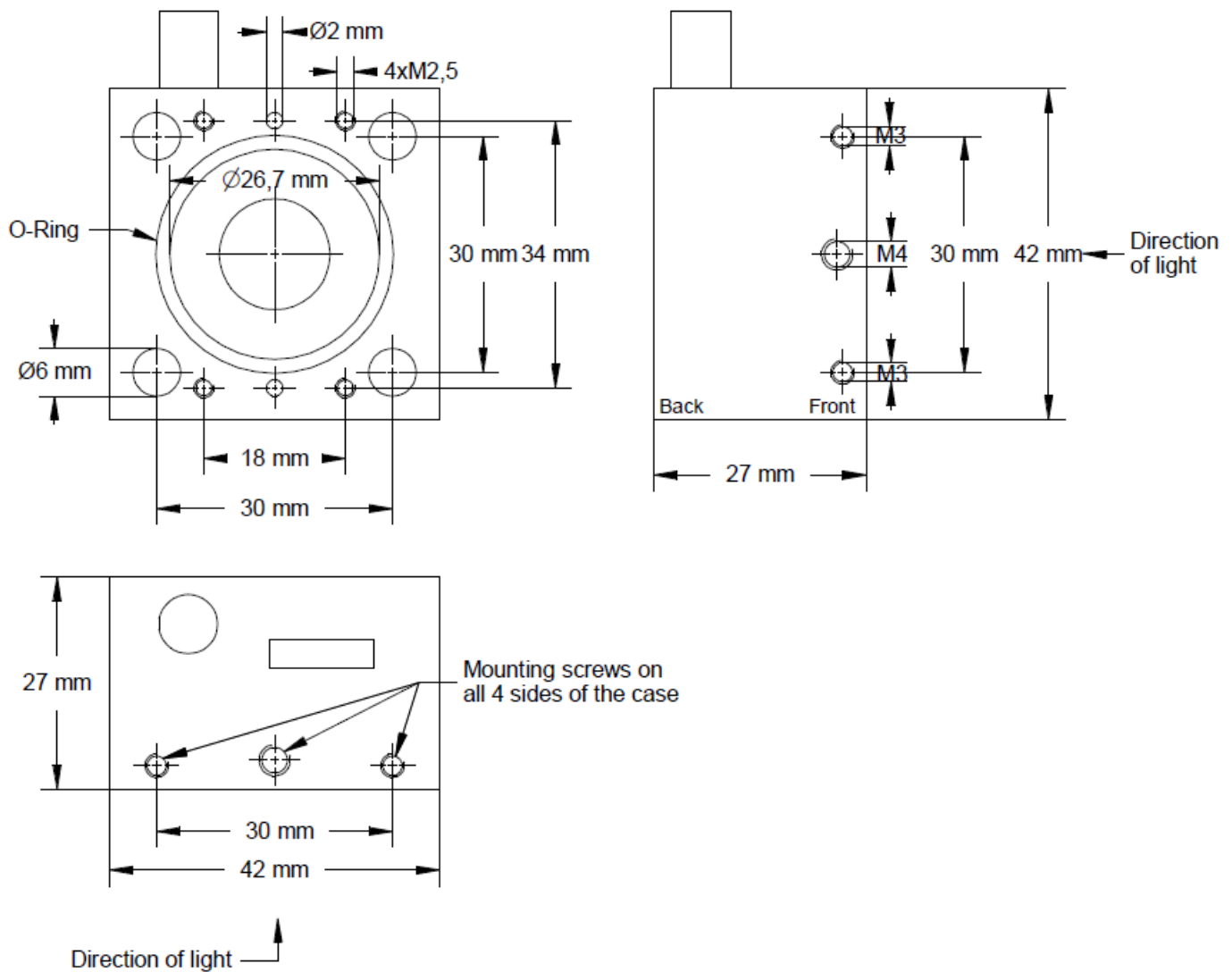


See also formula on page 5



Outline Dimensions

QD800c-fQ



all dimensions in mm



Connector Description

SMA connector:

Output Pulse: 2V on 50 Ohm (positive edge)

5-pole board connector:



... Power in (+5V DC, 500mA)
... Power Ground



... Analog Output (Tmp) 0-1,5V (represents the temperature of the SPAD. See formula below)
... Analog Ground
... Digital Input (+5V disables the SPAD bias voltage)
... Digital Output (T-OK): Output is high if the temperature is sufficient low (Tmp = set point)

(Connector plug: 2pol. Molex 51021-0200, 4pol. Molex 51021-0400)

Temperature formula:

$$T[^\circ\text{C}] = 3200 / \ln(U[\text{V}] * 296594 / (1,5 - U[\text{V}])) - 273,15$$

Adjustments procedure:

The SPAD temperature (Tmp) and the quantum efficiency (QE) can be adjusted with two potentiometers.

Step 1: adjust Temp anti clockwise (decrease temperature) until the desired temperature is achieved.

Step 2: adjust QE clockwise (increasing QE) until the desired dark count rate or detection efficiency is achieved

Factory settings:

Tmp ... -20°C (Temp Analog Output = 1,16V)

QE ... set to the dark count rate according to the part number extension 500, 50, 20 Counts/s

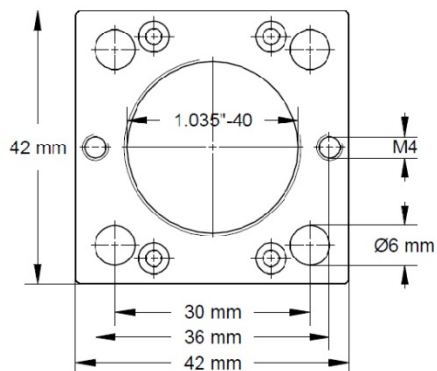


Accessories

Lens holder adapter

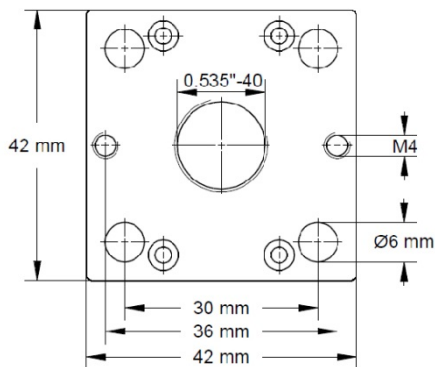
ADAPT-C-SM1

Roithner LaserTechnik GmbH



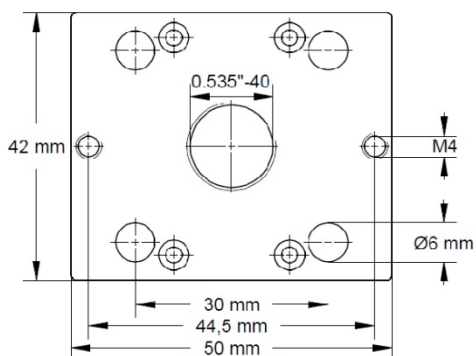
ADAPT-C-SM05

Roithner LaserTechnik GmbH



ADAPT-C-SM05-P

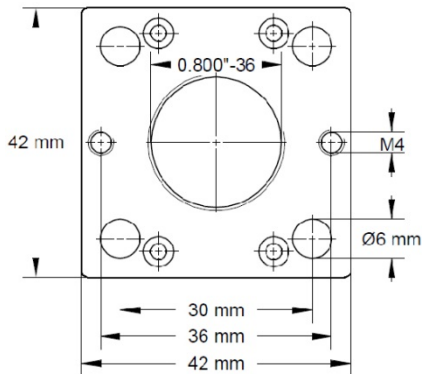
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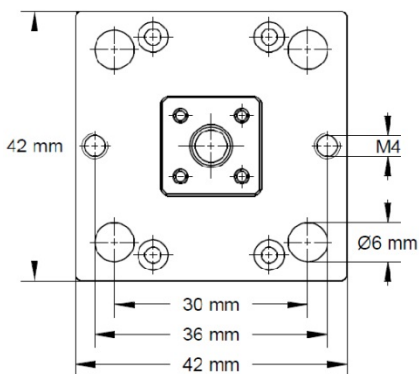
Accessories

ADAPT-C-RMS Roithner Laser Technik GmbH



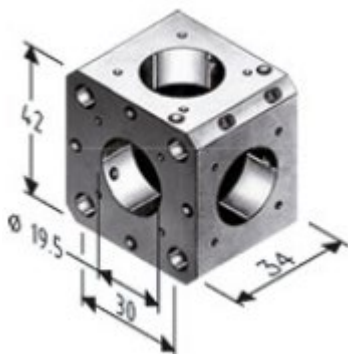
FC/PC fiber adapter

ADAPT-C-FC Roithner Laser Technik GmbH



Multicube® System

48MC-SM-19.5 Schäfter+Kirchhoff GmbH

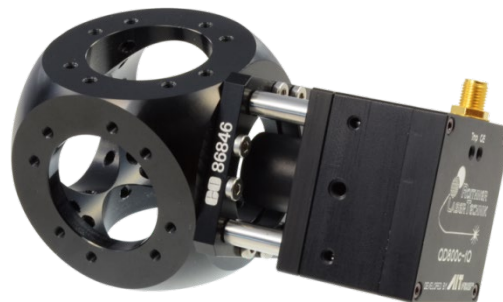
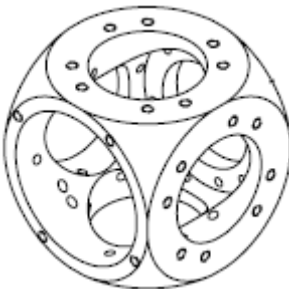




Accessories

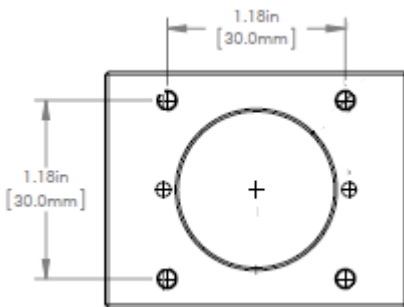
Cage System Spheres

#85-624	Cage Sphere with (5) 30mm Ports and (1) 43mm Port	Edmund Optics Inc.
#85-846	Cage System Adapter Plate	Edmund Optics Inc.



30 mm Cage Cube

C4W	4-Way Mounting Cage Cube	Thorlabs Inc.
C6W	30 mm Cage Cube: 6 mm Through Holes	Thorlabs Inc.



Holder on Mounting Base

BA3/M	Mounting Base, 50 mm x 75 mm x 10 mm	Thorlabs Inc.
PH2	Post Holder, Spring-Loaded Thumbscrew	Thorlabs Inc.
TR30/M	Optical Post, SS, M4 Setscrew, M6 Tap	Thorlabs Inc.





Order Information

Part No.	Timing Resolution	Dead Time Range	Dark Count Rate	Availability
QD800c-fQ-500	300 ps	90 ns	<500 counts/s	available
QD800c-fQ-50	300 ps	90 ns	<50 counts/s	available
QD800c-fQ-20	300 ps	90 ns	<20 counts/s	available
QD800c-fQ-TSC-20	300 ps	90 ns	<20 counts/s	Q4/2015
QD800c-fQ-TSC-10	300 ps	90 ns	<10 counts/s	Q4/2015
QD800c-fQ-TSC-5	300 ps	90 ns	<5 counts/s	Q4/2015
QD800c-fQ-QSC-4	300 ps	90 ns	<4 counts/s	Q1/2016
QD800c-fQ-QSC-2	300 ps	90 ns	<2 counts/s	Q1/2016
QD800c-fQ-QSC-1	300 ps	90 ns	<1 counts/s	Q1/2016
QD800c-fQ-IJ-200	100 ps	90 ns	<500 counts/s	Q2/2016
QD800c-fQ-IJ-50	100 ps	90 ns	<50 counts/s	Q2/2016
QD800c-fQ-IJ-20	100 ps	90 ns	<20 counts/s	Q2/2016

→ Do not hesitate to ask for special features: office@roithner-laser.com

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