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QD800-pQ

Single Photon Detection Module

Description

QD800-pQ series of Single Photon Counting Modules offers a unique combination of low dark count rates and very low jitter 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
- High detection efficiency (400 nm to 1000 nm)
- digital output pulse (0,4V) at SMA connector
- Single 5 V DC supply operation
- 42x42 mm (w_xh) package suitable with „multicube"

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

DEVELOPED IN COOPERATION WITH IQI Vienna

LICENSED THROUGH... AIT AUSTRIAN INSTITUTE OF TECHNOLOGY

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Technical Specifications

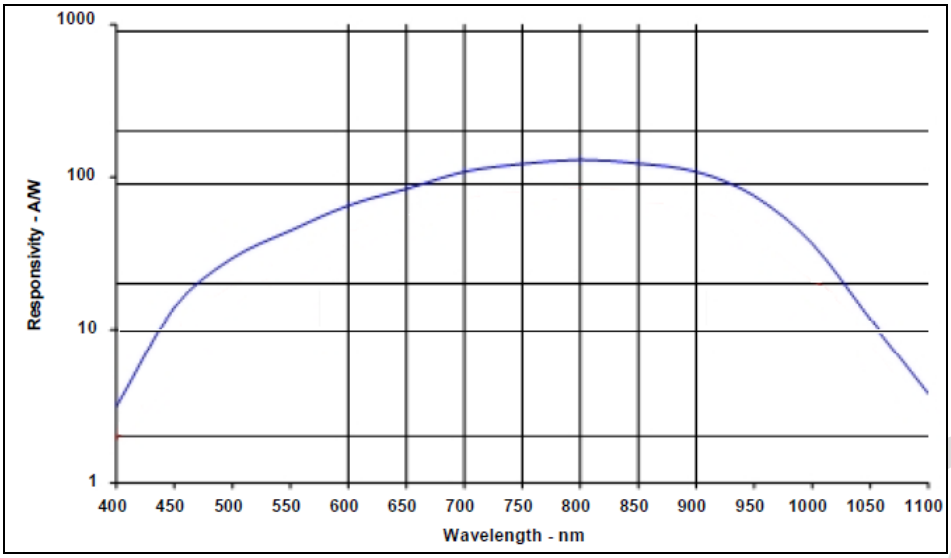
	Min	Typ	Max	Unit
Spectral range	400		1000	nm
Responsivity @ 900 nm @ 830 nm		 108 128		 A/W
Quantum efficiency: @ 900 nm @ 830 nm		 60 77		 %
Dark count rate [1] - QD800-pQ-500 - QD800-pQ-50 - QD800-pQ-20			 500 50 20	 Counts/s
Timing resolution		100		ps
Dead time range		3		us
Output pulse amplitude (into 50 Ohm)		0,4		V
Digital out – T-OK [2]	0		3,3	V
Analog out –Temp [3]	0		1,5	V
Supply voltage	4,8	5	5,2	V
Supply current		230		mA

1) Dark count rate at 5% photon detection probability 3 (830 nm, ambient temperature of 22°C).
2) If the temperature reaches the set point, T-OK goes high.
3) The voltage of the analog out Temp represents the temperature of the SPAD. See diagram below.

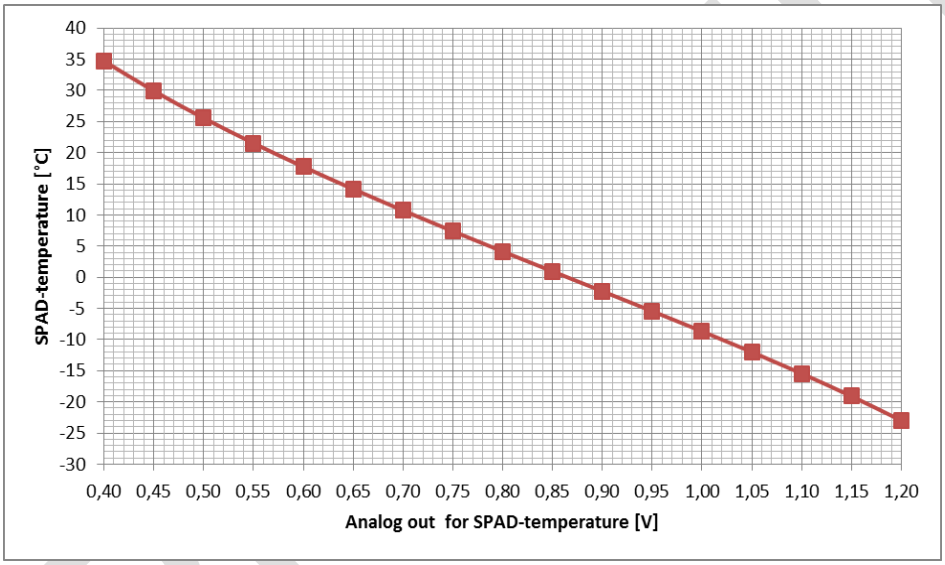
Absolute Maximum Ratings

	Min	Typ	Max	Unit
Supply voltage	4,5	5	5,2	V
Operating temperature	0		40	°C
Storage temperature	-20		70	°C
Count rate			10	MCounts/s

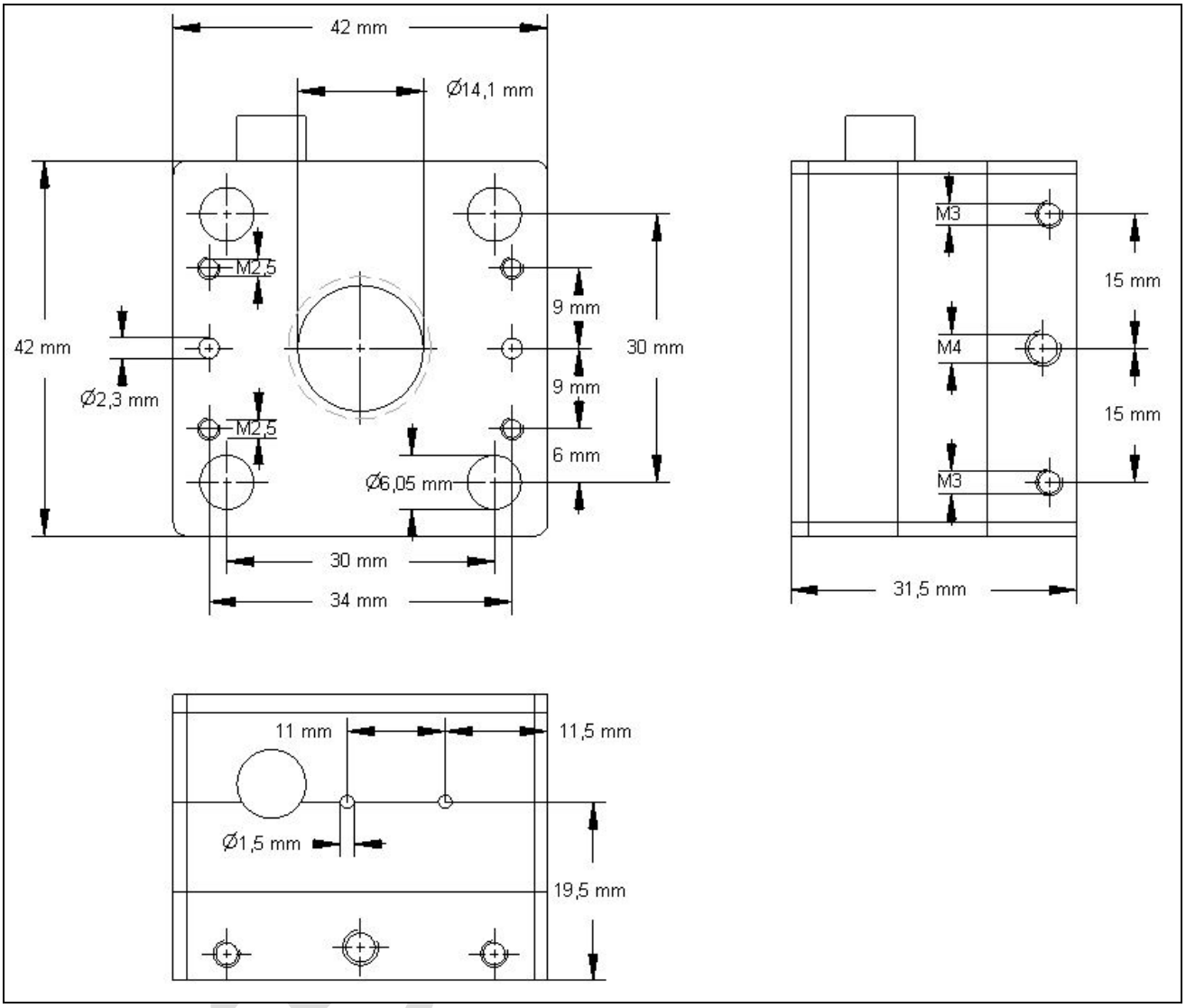
Typical spectral responsivity



Temperature diagram



Outline Dimensions



Connector Description

SMA connector:
Output Pulse: 0,4V on 50 Ohm (positive edge)

5-pole board connector:
(Molex 22-03-5055)

T-OK	… Digital Output LVTTL (Low if the SPAD temperature has not reached the set point)
AGND	… Analog Ground
Temp	… Analog Output 0-1,5V (represents the temperature of the SPAD. See formula below)
GND	…Power Ground
+5V	…Power in (+5V DC)

Formula:
T[°C] = 3200/ln((U[V]*89877 / (1,5 - U[V]) - 273,15

Adjustments procedure:
The SPAD temperature and the overvoltage can be adjusted with two potentiometers.
Step 1: adjust Pot-T clockwise until the desired Temperature is achieved.
Step 2: adjust Pot-HV clockwise until the desired dark count rate or detection efficiency is achieved

Factory settings:
Pot-T … -20° (Temp Analog Output = 1,16V)
Pot-HV … dark count rate accordingly to the device extension 500, 50, 20 Counts/s