

Low Light Level (L³D) Detectors & Modules

For Analytical, Life Science & Biomedical Applications



Single Photon Counting Modules – SPCM

Applications

- Particle sizing
- Confocal microscopy
- Photon correlation spectroscopy
- Quantum cryptography
- Astronomical observation
- Optical range finding
- Adaptive optics
- Ultra-sensitive fluorescence

Features and Benefits

- Peak photon detection efficiency at 650 nm: 70 % typical
- Active area: 180 µm diameter
- Gated output
- Single +5V supply
- FC receptacle option for fiber coupling
- Adapter brackets for cage or tube optical component holders available
- EU RoHS compliant
- 4-channel array module available
- Customization available upon request

Product Description

The SPCM-AQRH is a self-contained module that detects single photons of light over the 400 nm to 1100 nm wavelength range - a range and sensitivity that often outperforms a photomultiplier tube. The SPCM-AQRH uses a unique silicon avalanche photodiode (SLiK) with a circular active area that achieves a peak photon detection efficiency of more than 65 % at 650 nm over a 180 µm diameter. The photodiode is both thermoelectrically cooled and temperature controlled, ensuring stabilized performance despite ambient temperature changes.

Count speeds exceeding 40 million counts per second (Mc/s) are achieved by the SPCM-AQRH-WX module. There is a "dead time" of 22 ns between pulses.

As each photon is detected, a TTL pulse of 2.2 Volts (minimum) high into a 50 Ohm load and 10ns wide is output at the rear BNC connector. Other values for the dead time and pulse width are available as indicated on product data sheet.

The module is designed to give a linear performance at a case temperature between 5° C and 40° C.

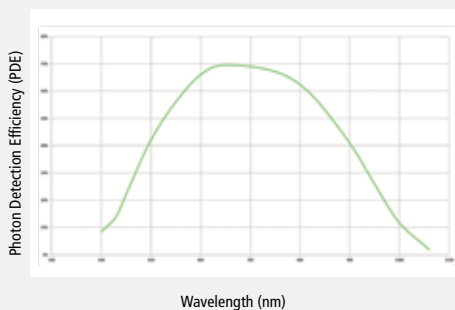
The SPCM is also available in the following formats:

- 4 channel array SPCM-AQ4C,
- Timing resolution enhanced SPCM-AQRH-XX-TR,
- NIR optimized SPCM-NIR-XX.

This series of photon counting modules are designed and built to be fully compliant with the EMC Directive 2014/30/ZU, and restriction of the use of certain Hazardous Substances in electrical and electronic equipment (RoHS).

Graph 1

Characteristics SPCM Series



Product Table

Single Photon Counting Modules – SPCM

Part Number	Photo Sensitive Diameter	Maximum Dark Count Rate	Photon Detection Efficiency @ 650 nm	Max. Count Rate before Saturation	Dead Time ⁴	Pulse Width ⁵
Unit	mm	c/s	%	c/s	ns	ns
SPCM-AQRH-10	0.18	1500	65	40M	22	10
SPCM-AQRH-11	0.18	1000	65	40M	22	10
SPCM-AQRH-12	0.18	500	65	40M	22	10
SPCM-AQRH-13	0.18	250	65	40M	22	10
SPCM-AQRH-14	0.18	100	65	40M	22	10
SPCM-AQRH-15	0.18	50	65	40M	22	10
SPCM-AQRH-16	0.18	25	65	40M	22	10
SPCM-AQRH-XX-TR¹	0.18	100-1500	65	40M	22	10
SPCM-NIR-XX¹	0.18	100-1500	75	40M	22	10
SPCM-AQ4C	fibered	500	60	>2M/channel	50	30
C30902SH-TC²	0.475	2500	>5	-	-	-
C30902SH-DTC³	0.475	350	>5	-	-	-

1. XX=dark count rates as per standard AQRH series above

2. C30902SH-TC @ 0°C operation

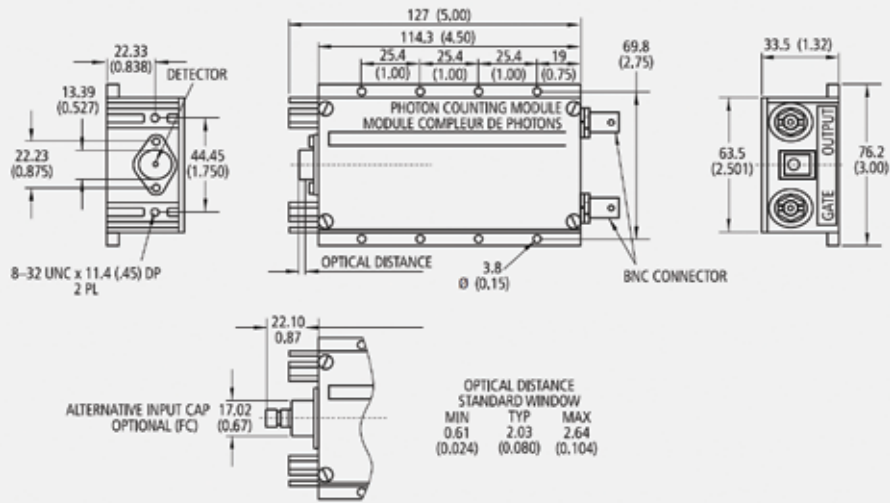
3. C30902SH-DTC @ -20°C operation

4. Option for 28ns & 35ns dead time available

5. Option for 18ns & 28ns pulse width available

Figure 1

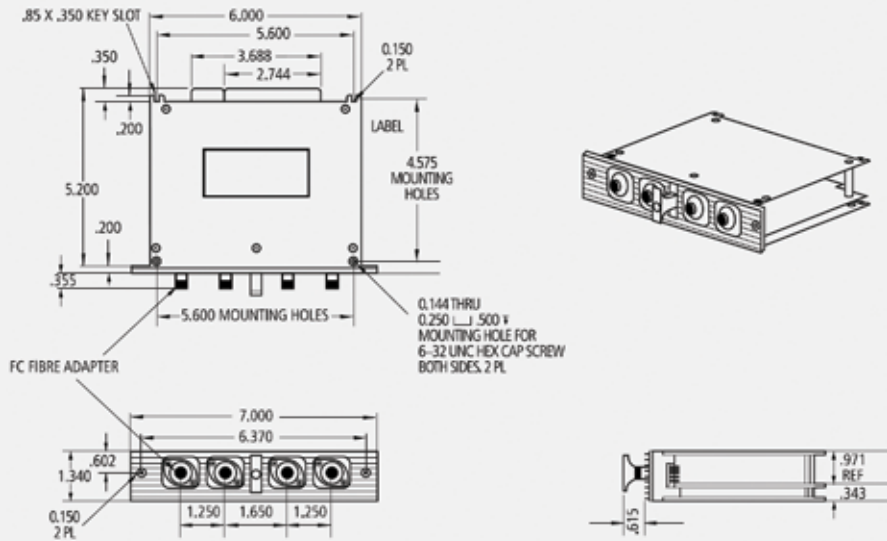
Mechanical Dimensions of the SPCM-AQRH Series



Dimensions in mm

Figure 2

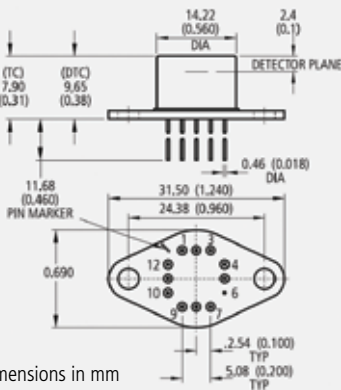
Mechanical Dimensions of the SPCM-AQ4C



Dimensions in inches

Figure 3

Package Drawing – TO-8 Flange



Dimensions in mm

Distributor

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