SPCM-AQRH-XX-TR

Timing Resolution Optimized Single Photon Counting Module

Key Features

- Timing resolution <250ps
- Peak photon detection efficiency (PDE) @ 650 nm: 75% typical
- Active area: 180 µm
- Gated output
- Single +5 V supply
- RoHS-compliant
- Linearity over high count rate

Applications

- Time correlated single photon counting
- Fluorescence lifetime imaging microscopy
- Ultra-sensitive fluorescence lifetime measurements
- Quantum Cryptography
- Photon correlation spectroscopy
- Optical range finding
- Particle sizing
- Adaptive optics

Excelitas Technologies' SPCM-AQRH-XX-TR is a Single Photon Counting Module of the most recent product generation, specifically selected and performance-optimized for timing resolution.

The SPCM-AQRH-XX-TR uses a specially selected SliK™ silicon avalanche photodiode with timing resolution better than 250 ps while maintaining peak photon detection efficiency (PDE) of more than 75% at 650 nm over a 180 µm diameter active area. While some performance parameters like dead-time and dynamic range are traded off against the optimized timing performance, other performance parameters of the standard SPCM-AQRH, such as outstanding uniformity, overload protection, temperature stability and linearity, are still part of this new timing optimized module.

This fast timing enhanced device is designed to support applications in time correlated single photon counting (TCSPC), fluorescence lifetime measurements and fluorescence lifetime imaging microscopy (FLIM).

Excelitas' series of photon counting modules are designed and built to be fully compliant with the European Union Directive 2002/95EEC – Restriction of the use of certain Hazardous Substances in Electrical and Electronic equipment (RoHS).

Table 1. Absolute Maximum Ratings

Supply voltage [1]	5.5 V
Maximum count rate	Maximum count rate can be sustained if case temperature is maintained within limit specified limits.
Peak light intensity	10^4 photons per pulse and pulse width < 1 ns
Case temperature [3]	-20°C/+70°C storage, +5°C /+70°C operating

Table 2. Specifications of SPCM-AQRH-XX-TR, @ 22 ºC, all models; unless otherwise indicated [1]

Parameter	Min	Typ	Max	Unit
Active area (diameter) at minimum PDE	170	180		µm
Photon detection efficiency (PDE) (without FC adaptor)[2] at: 650 nm 830 nm		 75 50		 % %
Dark Count SPCM-AQRH-10 SPCM-AQRH-11 SPCM-AQRH-12 SPCM-AQRH-13 SPCM-AQRH-14 SPCM-AQRH-15			1500 1000 500 250 100 50	Counts / second
Single photon timing resolution (at 825 nm)[2,3] Contact factory for optimized timing below 200 ps and at other wavelengths		225	250	ps
Dead time (count rate below 5M/c) Other values can be factory set		60		ns
Output count rate before saturation		12		Mc/s
Linearity correction factor at 200 Kc/s 1 Mc/s 5 Mc/s 10 Mc/s		1 1.02 1.16 1.40		
Afterpulsing probability		1.0	3.0	%

(1) For other performance characteristics, refer to Operating Instructions, product notes and specifications listed on the standard SPCM-AQRH data sheet.

(2) See Figure 1 for timing resolution vs. photon detection efficiency curve.

(3) Timing resolution is measured using a 10 um diameter light spot, at 825 nm, case temperature at 22°C. For timing resolution requirements measured with a larger spot size, or at different wavelength, please contact Excelitas.

Table 3. SPCM Ordering Guide

SPCM - AQRH - XX - TR

Timing resolution optimization selection

Dark count selection

10 – Dark count <1500 c/s
11 – Dark count <1000 c/s
12 – Dark count < 500 c/s
13 – Dark count < 250 c/s
14 – Dark count < 100 c/s
15 – Dark count < 50 c/s

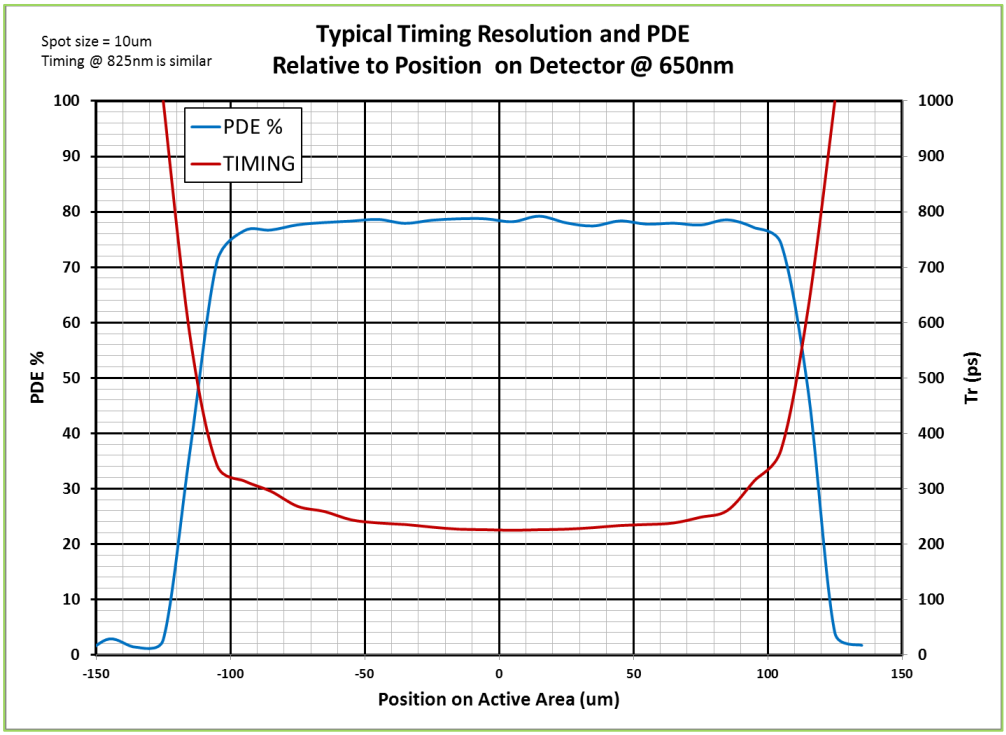

Figure 1: Typical timing resolution & PDE relative to position of detector chip @ 650 nm

Warranty

A standard 12-month warranty following shipment applies. Any warranty is null and void if the module case has been opened. Warranty is null and void if the module input exceeds 5.5V or the polarity of the +5V supply is reversed.

Individual Module Test Data

Each module is supplied with test data indicating the module's actual dark count, dead time, pulse width, photon detection efficiency @ 630 nm, timing resolution, and linearity correction factor.

About Excelitas Technologies

Excelitas Technologies is a global technology leader focused on delivering innovative, customized solutions to meet the detection, lighting, and other high-performance technology needs of OEM customers.

From analytical instrumentation to clinical diagnostics, medical, industrial, safety and security, and aerospace and defense applications, Excelitas Technologies is committed to enabling our customers' success in their end-markets. Excelitas Technologies has approximately 3,000 employees in North America, Europe and Asia, serving customers across the world.

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