SPCM-NIR

NIR-Optimized Single Photon Counting Module

Excelitas Technologies' SPCM-NIR is a Single Photon Counting Module specifically selected and performance-optimized for the near infra-red wavelength spectrum.

The SPCM-NIR uses a specially selected SLiK silicon avalanche photodiode with peak single photon detection efficiency typically better than 73% while maintaining uniformity over a 180µm diameter active area. This module achieves enhanced red and NIR sensitivity while maintaining such other performance parameters of the standard SPCM-AQRH, such as outstanding uniformity, overload protection, temperature stability and linearity.

This NIR spectrum enhanced device is designed to support long range LIDAR, quantum communication and microscopy, as well as many other applications.

Excelitas' series of photon counting modules are designed and built to be fully compliant with the European Union Directive 2015/863/EU – Restriction of Hazardous Substances in Electrical and Electronic equipment (RoHS).

Key Features

- Peak photon detection efficiency (PDE) @ 780nm: 70% typical
- Active area: 180 µm
- Gated output
- Single +5 V supply
- RoHS-compliant
- Linearity over high count rate

Applications

- LIDAR
- Quantum Cryptography
- Photon correlation spectroscopy
- Astronomical observation
- Optical range finding
- Adaptive optics
- Ultra-sensitive fluorescence
- Particle sizing
- Microscopy and imaging

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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	Maximum 10^4 photons per pulse, pulse width < 1 ns
Case temperature [3]	-20°C/+70°C storage, +5°C /+70°C operating

Table 2. Specifications of SPCM-NIR, @ 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) at [2]:				
780 nm	64	70		%
800 nm	62	68		%
850 nm	54	58		%
900 nm	41	45		%
Dark Count SPCM-NIR-W0			1500	
SPCM-NIR-W1			1000	Counts / second
SPCM-NIR-W2			500	
SPCM-NIR-W3			250	
SPCM-NIR-W4			100	
Single photon timing resolution (at 825 nm)[3]		350		ps
Dead time (count rate below 5M/c) Other values can be factory set		See table 3A below	40	ns
Output count rate before saturation[4]	12	37		Mc/s
Linearity correction factor at 200 Kc/s		1		
1 Mc/s		1.02		
5 Mc/s		1.16		
10 Mc/s		1.40		
20 Mc/s		2.35		
25 Mc/s		3.32		
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)   Minimum photon detection efficiency (PDE) measured and recorded at specific wavelength, refer to Table 3, Ordering Guide.

(3)   For timing resolution enhanced module, consult Product Brief for SPCM-AQRH-TR series.

(4)   Output count rate before saturation is dependent upon the chosen pulse width and dead times. See the standard SPCM-AQRH datasheet for the options available.

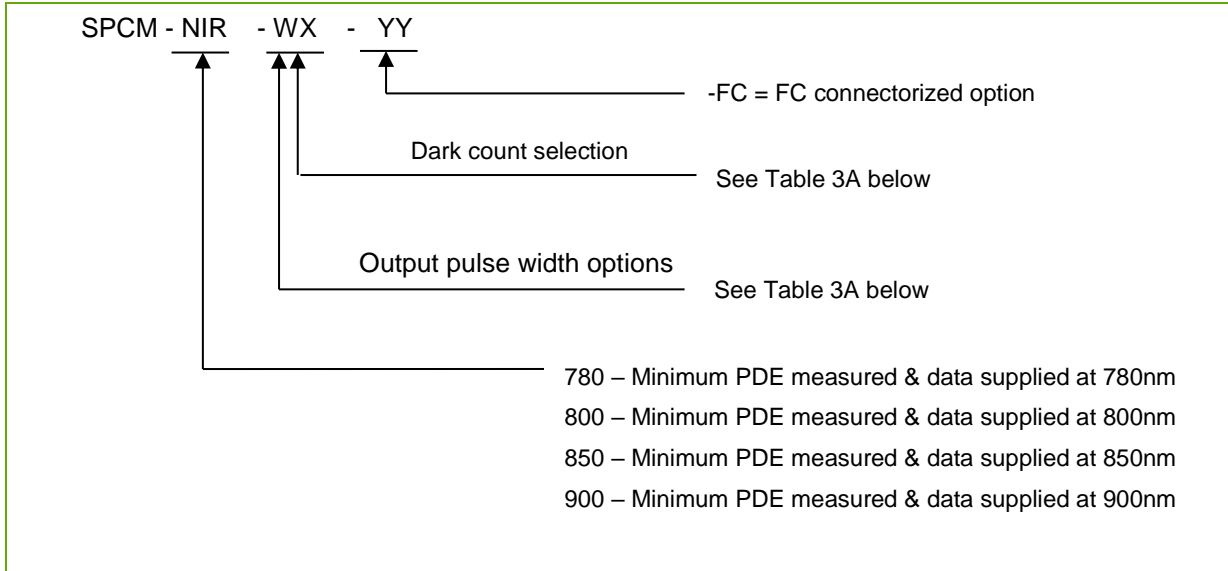# NIR-Optimized Single Photon Counting Module

Table 3. Ordering Guide

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SPCM - NIR  - WX  -  YY
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- -FC = FC connectorized option

Dark count selection — See Table 3A below

Output pulse width options — See Table 3A below

780 – Minimum PDE measured & data supplied at 780nm
800 – Minimum PDE measured & data supplied at 800nm
850 – Minimum PDE measured & data supplied at 850nm
900 – Minimum PDE measured & data supplied at 900nm

Table 3A. Part Number Selection Guide

Order Part#	W - Output Pulse Options			X - Dark Count Rates				
WX-YY	Output Pulse Width (ns)	Dead Time (ns)	Output Pulse Height (V)	-W0	-W1	-W2	-W3	-W4
SPCM-NIR-1X	10	22	2.2	≤1500 cps	≤1000cps	≤500pcs	≤250pcs	≤100cps
SPCM-NIR-2X	18	28	2.2	≤1500 cps	≤1000cps	≤500pcs	≤250pcs	≤100cps
SPCM-NIR-3X	28	35	2.2	≤1500 cps	≤1000cps	≤500pcs	≤250pcs	≤100cps
SPCM-NIR-4X	10	22	4.4	≤1500 cps	≤1000cps	≤500pcs	≤250pcs	≤100cps
SPCM-NIR-5X	18	28	4.4	≤1500 cps	≤1000cps	≤500pcs	≤250pcs	≤100cps
SPCM-NIR-6X	28	35	4.4	≤1500 cps	≤1000cps	≤500pcs	≤250pcs	≤100cps

Example: SPCM-780-43 = 10ns output pulse width, 22ns dead time, 4.4V output pulse height, dark count < 250cps, PDE measured at 780nm

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Figure 1. Typical Photon Detection Efficiency (PDE) vs. Wavelength

SPCM-NIR Typical Detection Efficiency
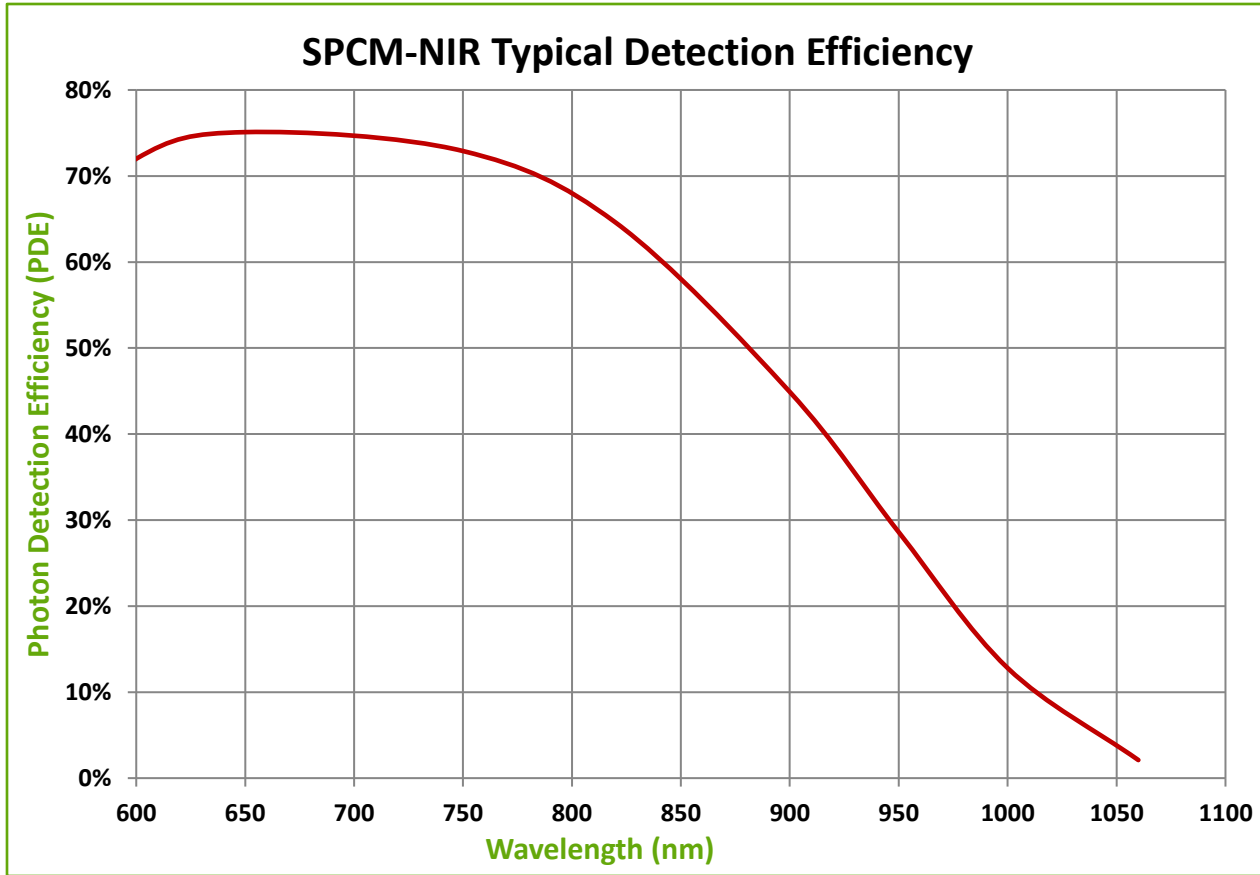
Warranty

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 at the chosen wavelength per Ordering Guide, and linearity correction factor.

RoHS Compliance

This series of SPCM modules is designed and built to be fully compliant with the European Union Directive 2015/863/EU – Restriction of the use of certain Hazardous Substances (RoHS) in Electrical and Electronic equipment.

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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 5,000 employees in North America, Europe and Asia, serving customers across the world.

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