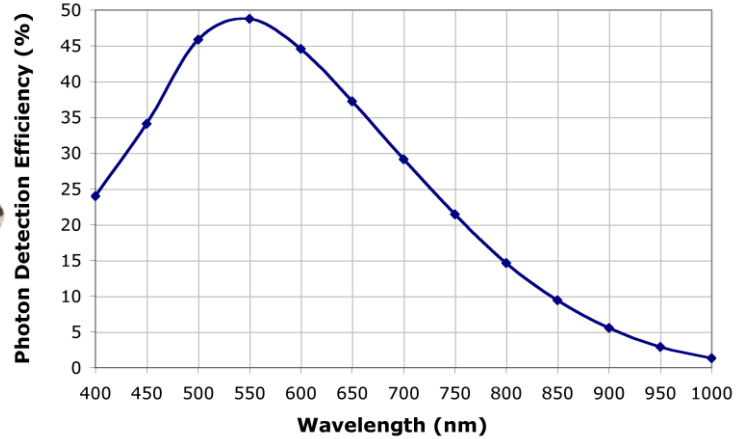




# PDM Series



The PDM series photon counting detector modules are all solid-state instruments. They have high photon detection efficiency and generate a TTL output pulse per detected photon with better than 50ps FWHM photon timing resolution. Versions with optical FC connector to couple to SingleMode and MultiMode fibers are available.

- ▶ **High Photon Detection Efficiency**  
up to 49% @ 550nm
- ▶ **Best-in class Timing Accuracy**  
< 50ps FWHM
- ▶ **Low Dark Count Rate**  
as low as 1 cps, depending on detector diameter
- ▶ **High performance uniformity**  
across detector area

## MODULE FEATURES

- 20µm, 50µm and 100µm active sensing area diameter
- Window and Fiber Receptacle versions available
- Available in different Grade depending on Dark Counts specifications
- Peltier-cooled
- FC connector with coupling efficiency  $\geq 80\%$
- Low power consumption
- Robust and low cost

## BIOMEDICAL APPLICATION

- Confocal Microscopy
- Single Molecule Spectroscopy
- Ultra-Sensitive Fluorescence
- Time-correlated single photon counting
- DNA & Drug Discovery

## INDUSTRIAL APPLICATION

- Particle Sizing
- Optical testing of integrated circuits
- Metrology by Time of Flight measurements

## QUANTUM APPLICATION

- Quantum Cryptography
- Single-photon source characterisation

## ASTRONOMY APPLICATION

- Optical Range Finding, LIDAR & LADAR
- Astronomy Observations & Adaptive Optics

## Overview

The PDM photon counting detector series are all solid-state instruments that detect light from 375nm to 1000nm wavelength range. They have a peak photon detection efficiency of 49% at 550nm and generate a TTL output pulse per detected photon. With fast-timing option (additional circuit board installed) they provide better than 50ps FWHM photon timing resolution.

The excellent photon detection efficiency and superior timing resolution is obtained through the use of custom epitaxial silicon Single Photon Avalanche Diodes (SPAD) and integrated Active Quenching Circuits (iAQC), specifically designed and optimized for photon counting applications.

The SPAD is thermoelectrically cooled and its temperature controlled, ensuring stabilized performance despite ambient temperature changes. Low-noise SPAD and low-power iAQC make the PDM ideal for portable equipment and all applications requiring low power consumption.

The iAQC includes a fast gating option which gates off the detector, by simply applying an external TTL signal. This built-in gating function can be used for viewing a signal that occurs only in a small timeframe window, or in application with very weak signal and higher background noise.

Count speeds exceeding 12 million counts per second can be achieved by the PDM series (20 million counts per second available upon request). The photon count decreases at higher incoming light levels. The count at which the output rate starts to decrease is called the saturation point. The module is fully protected against light overload.

The PDM series has an "FC" fiber receptacle pre-aligned to the optical detector. The fiber / GRIN will function through the complete wavelength, guaranteeing a photon detection efficiency of at least 80% of that quoted for the window modules.

## Specifications

### Specifications @ 25°C and 5V overvoltage

	Min	Typ	Max	Units
<b>Photon Detection Efficiency</b> @ 400nm @ 550nm @ 650nm	21 45 34	24 49 37		%
<b>Single Photon Timing Resolution</b> TTL Counting Output NIM Timing Output (additional internal circuit board required)		35	250 50	ps (FWHM)
<b>After-pulsing probability</b>	0.1		3	%
<b>Dead Time</b>		77		ns
<b>Supply Voltage</b>	unregulated DC, any value 5V ~ 12V			
<b>TTL Output</b> Pulse rise and fall times Output pulse duration Gating input Supply input connector	< 2ns on 10pF load 20ns typical 5V CMOS control (0V, detector off) Standard 3.5mm supply socket			

Designed and built compliant with the European Union Directive 2011/65/CE (also known as RoHS 2)

## Grades Specifications

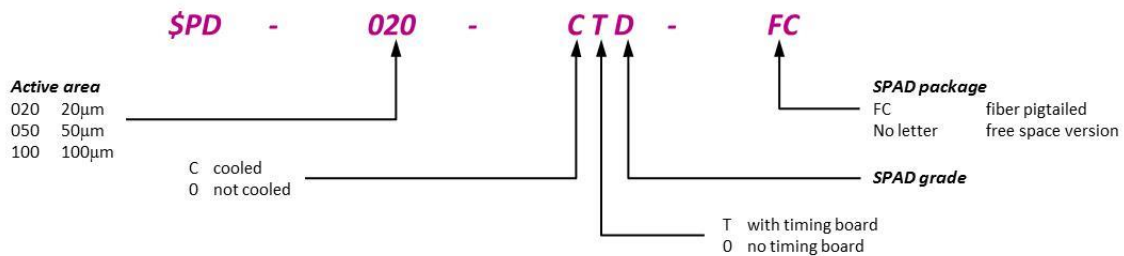
Grade Active Area Diameter	Dark Counts (cps)					
	A < 500	B < 250	C < 100	D < 50	E < 25	F < 5
20µm					√	√
50µm		√	√	√	√	
100µm	√	√	√	√	√	

**Not cooled module with high dark counts can be supplied to meet special OEM requirements**

## FC table guideline

Fiber Active Area Diameter	SM Core: Cladding: 125 µm Outer: 1.8 mm Numerical Aperture: 0.20	SM & MM Core: ≤ 62.5 µm Cladding: 125 µm Outer: 1.8 mm Numerical Aperture: ≤ 0.275	SM & MM Core: ≤ 105 µm Cladding: 140 µm Outer: 1.8 mm Numerical Aperture: ≤ 0.29
20µm	√		
50µm	√	√	
100µm	√	√	√

## Ordering Information



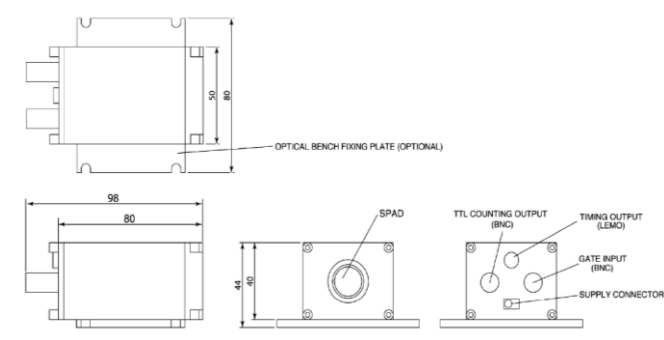
Products can be ordered directly from Micro Photon Devices or its representatives. For a complete list of representatives, visit our website at [www.micro-photon-devices.com](http://www.micro-photon-devices.com).

Custom designed products are available upon request.

# Mechanical drawing

## Window version:

## FC Version:



(all measures in mm)

## Accessories list

These accessories are not provided with the module, but can be purchased separately.

Part Number	Description	Details
\$MAC001	Cable Lemo 00 - SMA 3m	
\$MAC002	Lemo 00 - BNC adaptor	
\$MAC003	12V 15W universal wall mount power supply	
\$MAC004	Main plug Europe type for power supply	
\$MAC005	Main plug US/JP type for power supply	
\$MAC006	Main plug UK / Ireland type for power supply	
\$MAC007	Main plug Australian type for power supply	
\$MAC008	Lemo 00 - SMA adaptor	
\$MAC009	Optical Table Universal Adaptor	

## Warranty

A standard 24-month warranty following shipment applies. Any warranty is null and void if the module case has been opened or if the absolute maximum ratings are exceeded.