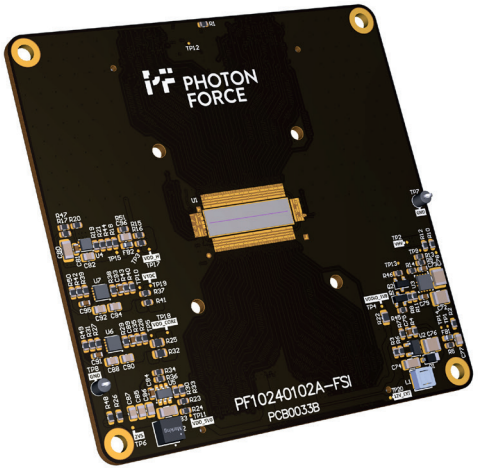
PF1D-1024 Linear Time-Correlated Single-Photon Counting SPAD Array

PF1D-1024F-STA

available with microlenses (MLA)



The PF1D-1024 comprises a single-photon sensitive linear sensor with ps timing resolution and a throughput of close to half a million frames per second of time-stamped photon arrival data.

Powered by a 12V supply and connected to the host via PCIe, our multi-platform driver enables easy integration with your analysis software.

Features

- 1024 macropixel SPAD array (1024 x 16 SPADs layout)
- Time-resolved and photon counting modes
- In-pixel TDC with 140ps timing resolution and fast FWHM instrument response function (IRF)
- Gated functionality
- Ultra-low median dark count rate
- 968kfps transfer to PC
- Sync input from light source (user programmable)
- Sync output to e.g. light source (user programmable frequency)
- Inputs accepted from scanning systems to form higher resolution images

Applications

- Time-resolved spectroscopy
- LiDAR and 3D imaging (inc. Non-line of sight and imaging through obscurants)
- Quantum
- Flow cytometry
- Biomedical imaging/sensing

Specifications

Sensor Dimensions

Array size	1024 macro-pixels
Macro pixel	1 - 16 SPADs selectable
Array dimensions	16 x 0.25mm
Pixel pitch	15.68µm
Optical fill factor	36% (without MLA)
Effective fill factor with microlens array	tbd

Optical/Electrical Performance

Photon detection probability	See graph below, right
Dark count rate (per SPAD)	23 cps median (at 30°C) 90% of SPADs <36cps
Optical/Electrical crosstalk	~8.7% at Vex = 5V
Instrument Response Function (IRF)	300ps FWHM

Photon Counting Mode

Photon counting	13 bit in-pixel 16 bit in firmware
Max. count rate per pixel	tbd

Time Correlated Mode

Temporal bin	~140ps
Temporal range	140ps - 6.5µs
Maximum laser sync frequency	100MHz
Laser sync input amplitude	TTL
Laser sync output amplitude	3.3V

Readout & Control

Raw data streaming rate to PC	968kfps (16-bit)
Inter-frame dead time	<50ns
X/Y scanner sync input signals	Pixel, line and frame clock
Exposure sync signals	Blanking (3.3V / 5V input) Frame count reset

Operating Conditions

Temperature range	10-30°C
Humidity	≤ 70%
Indoor/Outdoor	Indoor only
Power supply	12V, 1.5A
AC/DC adapter voltage input	100-240V AC, 50/60Hz
Power consumption	2.5W typical, 7.5W max.

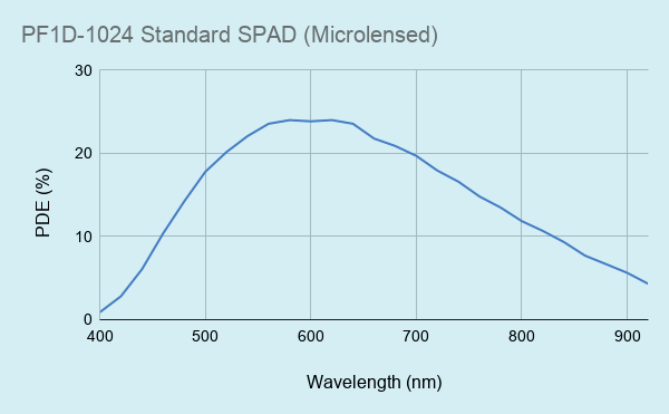
Miscellaneous

Weight	~500g
Packed weight	2kg

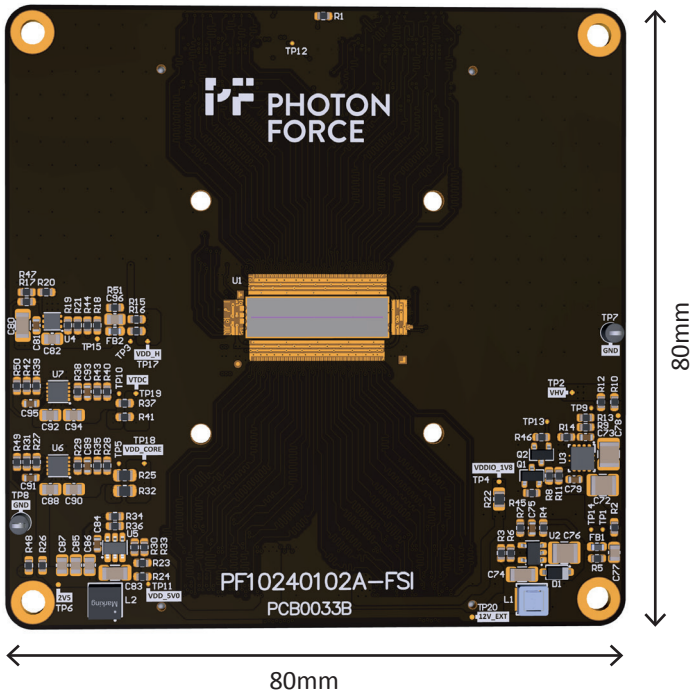
Software

User GUI
Matlab and Python wrappers for high speed data collection, Driver compatible with C++, LabVIEW and other languages for integration with customers' workflow

Photon Detection Efficiency vs. Wavelength



PF1D-1024 Module Dimensions



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