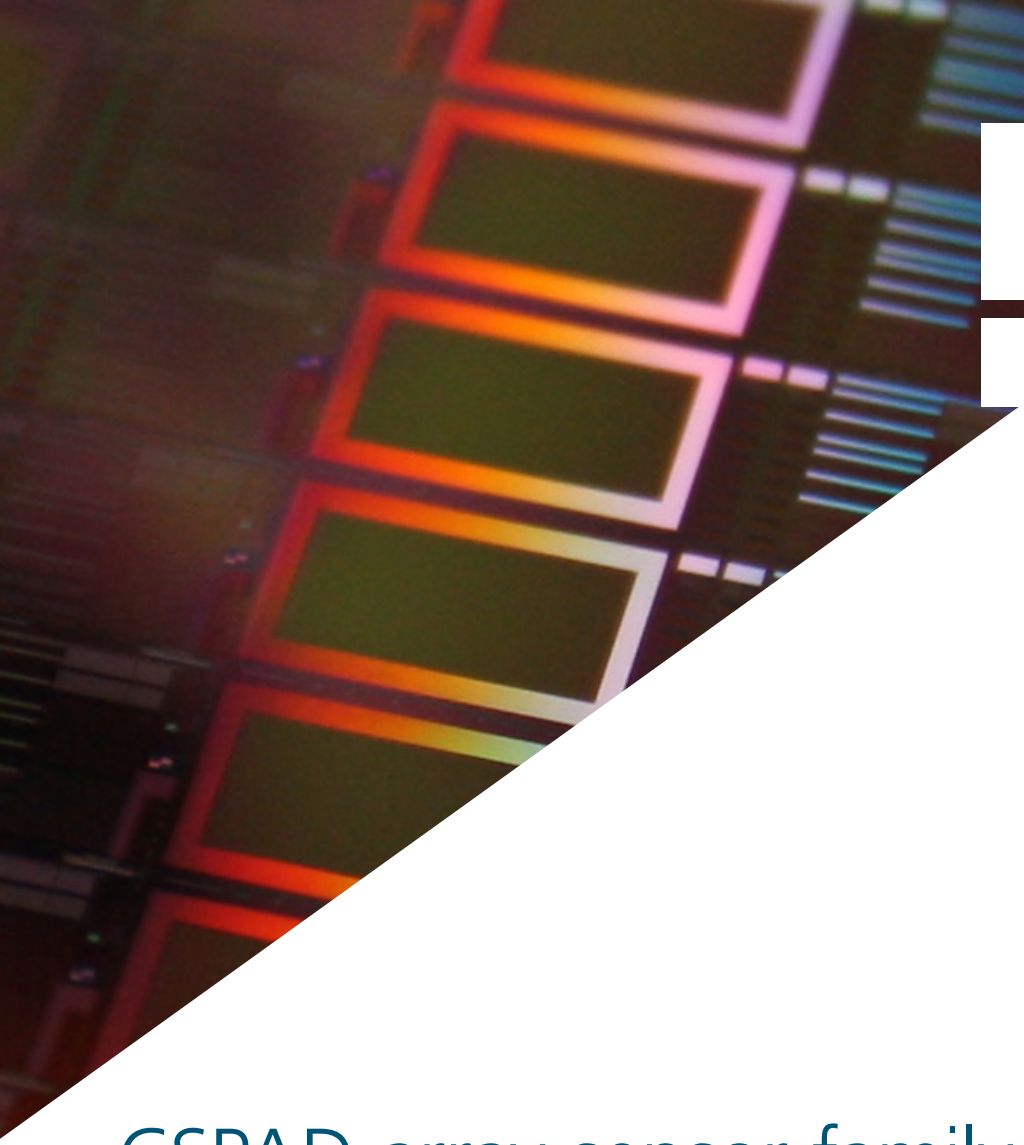

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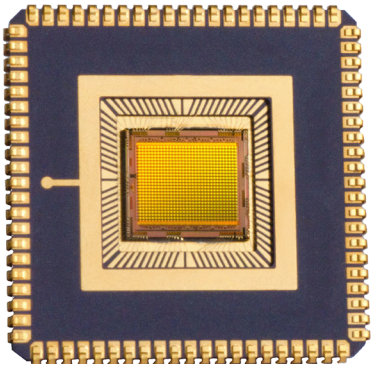

CSPAD array sensor family

Specifications

The 2D array sensors **CSPAD alpha** and **CSPAD3k** are the latest members of the CSPAD sensor family developed by Fraunhofer IMS. They combine the low-noise CMOS-integrated Single-Photon Avalanche Diodes (CSPADs) with wafer bonding technology and Backside-Illumination (BSI) to achieve single-photon sensitivity with high spatial and temporal resolution.

The main features are:

- Photon **timing** and **counting** mode
- Optional on-chip spherical microlens array (MLA)
- Adaptive **background light suppression** by variable coincidence
- **In-pixel** time-to-digital converters (TDC) with continuous monitoring

Technology

- 0.35 µm CMOS
- Backside-Illumination
- 3D-Integration
- Wafer-to-Wafer Bonding

Sensors

		Value	Unit
Chip dimensions		10250 x 9200	µm
Array size		8320 x 6240	µm
Pixel size		130 x 130	µm
Resolution | CSPAD alpha	Counting mode	64 x 48	px
	Timing mode	32 x 24	px
Resolution | CSPAD3k	Counting mode	64 x 48	px
	Timing mode	64 x 48	px
SPADs per pixel		4	SPAD
SPAD diameter		14	µm
Fill factor		without MLA | 3.7	%
		with MLA | 25	%
Framerate | CSPAD alpha		26	kHz
Framerate | CSPAD3k		13	kHz

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for more information

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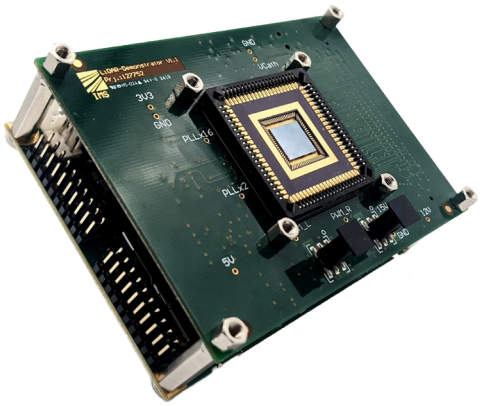

CSPAD array sensor family

Easy handling of our sensors allows our evaluation board solution to use a 12 V power supply, providing plug-and-play functionality. The sensors are connected via USB 2.0 by a LabView application file, which provides insight into pixel histograms, allows changing modes, and visualizes the data in different plots. Two delayable trigger signals are provided to control light emitters. The required interface information is also available for custom setup.

Single SPAD

	Value	Unit
Breakdown voltage	23	V
Operation voltage	30	V
Photon detection probability	@ 500 nm | 15	%
	@ 905 nm | 2	%
Dead time	20	ns
Dark count rate	6.5-65	Hz/µm²

TDC

	Value	Unit
Temporal resolution	< 420	ps
Full scale range	1.28	µs
Raw data length	13	Bit

Contact and further information

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