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WIDE*PIX*® 5x5

Version 1.0 - Datasheet

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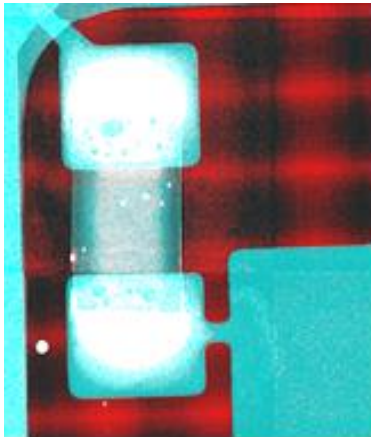

The large area imaging detector **WIDE*PIX* 5x5** with resolution of 1280 x 1280 pixels i.e. 1.63Mpixels and continuously sensitive surface is composed of a row of detector tiles. Each tile consists of a single Timepix hybrid detector (256 x 256 pixels) with an edgeless silicon or CdTe sensor. Thus, the whole area of the WIDEPIX5x5 device is fully sensitive without insensitive gaps. Each pixel has integrated digital counter that counts number of particles e.g. X-ray photons. The particle counting principle assures a noiseless detection with no additional noise due to image integration or readout. The noiseless detection allows getting X-ray images with very high contrast and broad dynamic range. Therefore, even structure of low attenuating objects, such as plastic or soft tissue, is imaged with a high contrast.

The Timepix technology allows setting of energy discrimination threshold. This feature allows obtaining multi-energy-channel "color" radiographs where different materials are identified and imaged in colors (similar to color photography). The minimum energy threshold is typically better than 5 keV.

The intrinsic spatial resolution of the camera is defined by the pixel size, which is 55 μm. The pixels situated on the border of tiles are 2.5 times larger in one direction. The corner pixels of tiles are 2.5 times larger in both directions.

The camera is connected to the controlling computer via USB 2.0 cable. The readout time is 200 ms per frame resulting in maximum speed of 5 frames per second.

Main Features:

• Readout chip type.................................. Timepix
• Sensor material…………………………....300, 500 μm thick Si or 1000 μm thick CdTe
• Pixel size ....55 x 55 μm
• Sensor resolution....................................1280 x 1280 pixels
• Dynamic range in one frame ....11 810[1]
• Interface...USB 2.0
• Maximum frame rate……..........................5 fps
• Dimensions ....130 x 103 x 54 mm
• Weight ....3300 g
• Dark Current……………………………...none

[1] A final picture can be created as a sum of individual images. Therefore, the dynamic range is limited only by the measurement time.

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Device Parameters
Operating Conditions

Symbol	Parameter	Min	Typ	Max	Units	Comment
TA	Ambient Temperature Range	0	30	40	°C	Max with heat sink
Φ	Humidity			60	%	Not condensing
	IP Code		IP50			

Family Parameters
T_A = 25°C, USB voltage V_{CC} = 24V

Symbol	Parameter	WidePIX 5x5	Units	Comment
V_{CC}	Supply Voltage	20/24/26	V	Min/Typ /Max
I_{CC}	Supply Current (V_{CC} = 24V)	1000	mA	Typ
P	Power Dissipation	26	W	Max
	Sensitive Area	71.5 x 71.5	mm	
	Detector Resolution	1280 x 1280	Pixels	
	Frame Rate	5	fps	
	Readout Time	200	ms	
	Weight	3300	g	

Sensor parameters
T_A = 25°C

Symbol	Parameter	Si			CdTe	Units	Comment
	Thickness	100	300	1000	1000	μm	
	Bias Voltage	50	200	500	-500	V	Max
	Calibrated in X-ray Energy Range	yes	yes	yes	yes	keV	See chart below
	Energy resolution (σ @ 23 keV)	0.5			1.1	keV	
	Detectable energy range	5 to 60			5 to 600	keV	

X-ray attenuation in Silicon and CdTe

- 0.3 mm of Silicon
- 0.5 mm of Silicon
- 1 mm of Silicon
- 1 mm of CdTe

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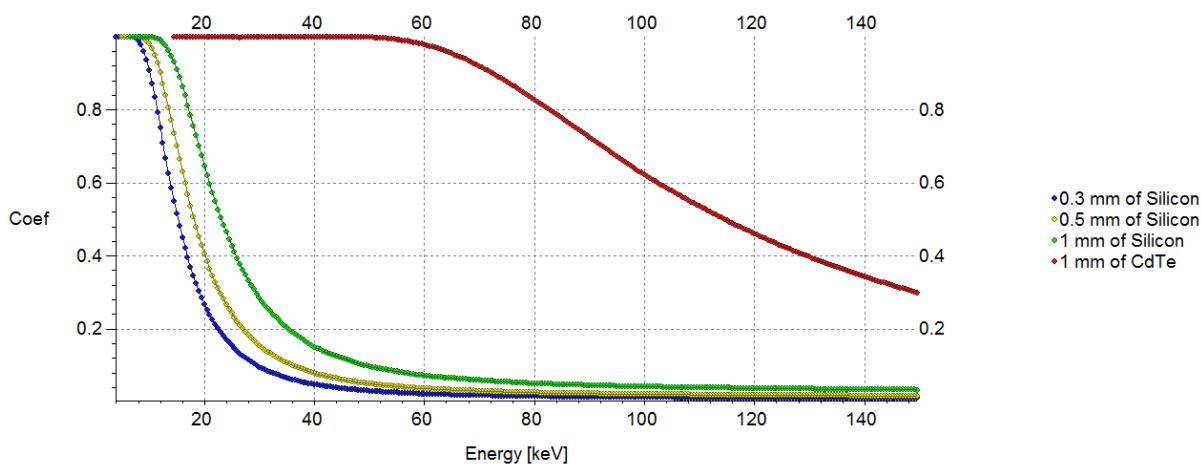
Device Description

+24VDC connector

Main power supply (via standard M8 connector with 3 female contacts). Connect after plugging USB connector.

USB connector

USB type mini B, Standard USB 2.0 Hi-Speed, In IP68 protection.

Synchronization interface

Connector Two 4-pin M8 connectors (female for outputs and male for input) serve as synchronization interface, allowing to synchronize **WIDE*PIX*5x5** detector with external processes. Four signals are available:
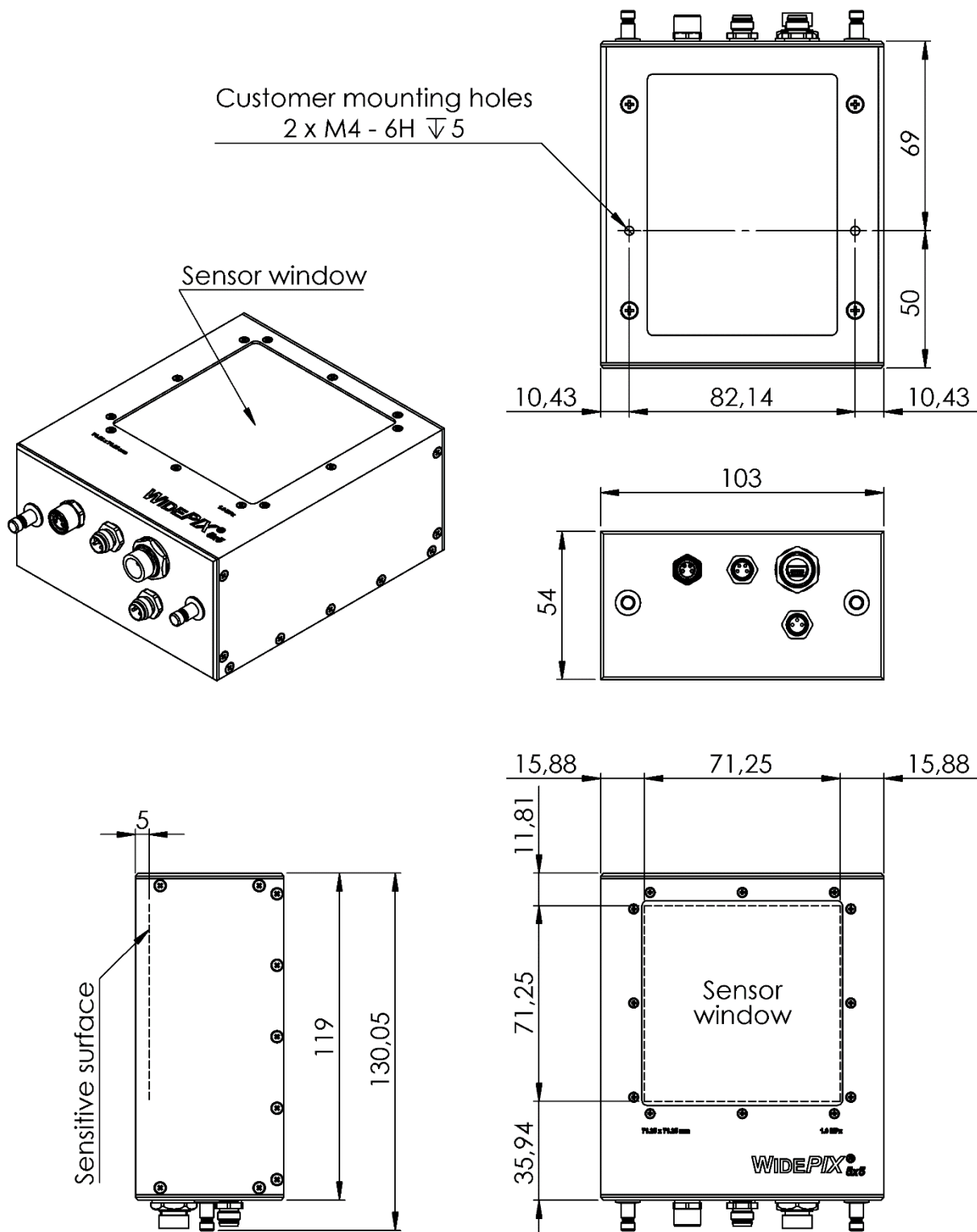
- Ready in – measurement is not possible, when signal at logical zero
- Trigger in – logical zero starts shutter (measurement)
- Ready out – logical one if device is ready to for new shutter
- Trigger out – mirrors shutter (logical zero when shutter is active)

All signals are TTL compatible and 5V tolerant. For detailed description see **Synchronization Guide**.

Sync. Outputs (M8-4 Female)		Sync. Inputs (M8-4 Male)	
Pin	Signal	Pin	Signal
1	Gnd	1	Gnd
2	Ready out	2	Ready out
3	Trigger out	3	Trigger out
4	Reserved	4	Reserved

Water cooling interface

It is mandatory to cool down detector when in operation. **WIDE*PIX*5x5** uses water connectors that allow for quick disconnection/reconnection. Mating connector is included as standard accessories and has to be attached to 4x6mm plastic hose.

Mechanical Dimensions

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Customer mounting holes
2 x M4 - 6H ⟱ 5

Sensor window

69

50

10,43   82,14   10,43

103

54

15,88   71,25   15,88

11,81

5

Sensitive surface

119   130,05

71,25

35,94

Sensor
window

WIDE**PIX** 5x5

All dimensions are in mm.

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Warning

Do not touch sensor surface!

Instructions for safe use.
To avoid malfunction or damage to your **WIDE*PIX* 5x5** please
observe the following:

- Do not expose to water, moisture **WIDE*PIX* 5x5** is dust protected only.

- Do not open **WIDE*PIX* 5x5** case. Detectors wire-bonding connections may be irreversibly damaged.

- Do not operate detector when not properly water cooled. Otherwise detector temperature may rise above specified range.

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