

# **WIDEPIX<sup>®</sup> 2(1)x5**

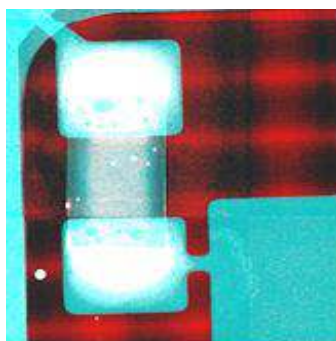
**Version 2.3**

**Datasheet**

## General description

The large area imaging detector **WIDEPIX<sub>2(1)x5</sub>** with resolution of 512 (256) x 1280 pixels i.e. 0.64 (0.32) Mpixels 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 **WIDEPIX<sub>2(1)x5</sub>** device is fully sensitive. 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 arrangement of tiles in the row is very advantageous for larger object imaging. The **WIDEPIX<sub>1x5</sub>** moreover supports a hardware based Time-Delayed-Integration mode for online (continuous) scanning applications. Both devices are suitable for CT scanners, which can take advantage of large sensitive area without any gaps.



The Timepix technology allows setting of energy threshold. This feature allows obtaining multichannel "color" radiographs where different materials are identified and imaged in different colors (similar to color photography). This feature requires getting of several (at least two) subsequent snapshots with different settings of the energy threshold. 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  $\mu\text{m}$ . 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 50 (25) ms per frame resulting in maximal speed of 20 (40) frames per second.

### Main Features

Feature	WIDEPIX <sub>1x5</sub>	WIDEPIX <sub>2x5</sub>
Sensor material	300, 500, 675 $\mu\text{m}$ thick Si or 1000 $\mu\text{m}$ thick CdTe	
Readout chip type	Timepix	
Pixel size	55 x 55 $\mu\text{m}$	
Sensor resolution	256 x 1280 pixels	512 x 1280 pixels
Dynamic range in one frame	11 810 <sup>1</sup>	
Time-Delayed-Integration mode	YES	NO
Dark Current	none	
Interface	USB 2.0	
Maximum frame rate	40 fps	20 fps
Dimensions	189 (213 with connectors) x 60 x 40 mm	
Weight	1700 g	1800 g

<sup>1</sup> This value corresponds to the depth of counter in pixels. A higher number of counts are measured by summing multiple images. Thus, an arbitrary dynamic range could be achieved.

# Device Parameters

## Operating Conditions

Symbol	Parameter	Min	Typ	Max	Units	Comment
T <sub>A</sub>	Ambient temperature range	0	30	40	°C	Max with heat sink
Φ	Humidity			60	%	Not condensing
	IP Code		IP50			

## Family parameters

T<sub>A</sub> = 25°C, V<sub>CC</sub> = 24V

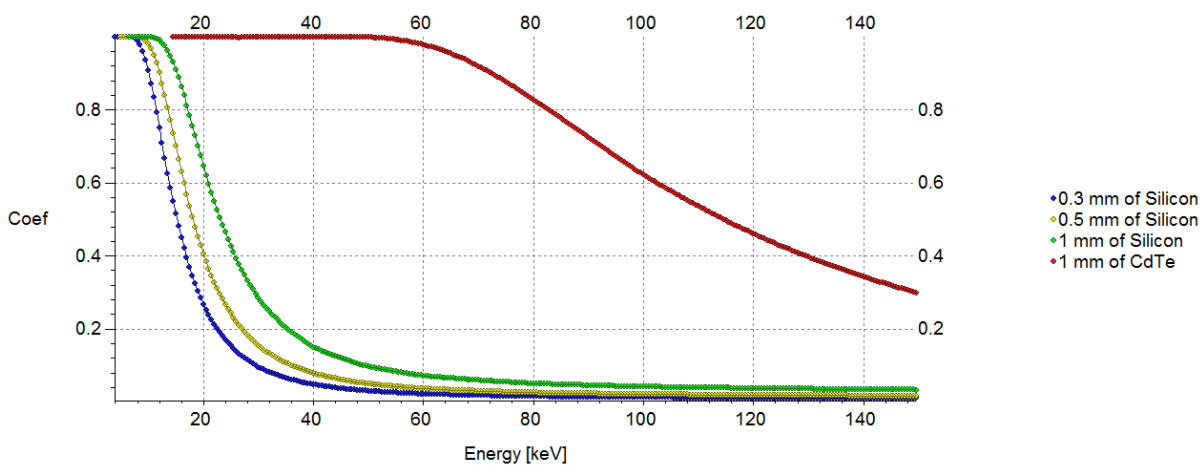
Symbol	Parameter	WidePIX 1x5	WidePIX 2x5	Units	Comment
V <sub>CC</sub>	Supply Voltage	20/24/26		V	Min/Typ/Max
I <sub>CC</sub>	Supply Current (V <sub>CC</sub> = 24V)	220	420	mA	Typ
P	Power Dissipation	6	11	W	Max
	Sensitive Area	71.5 x 14.1	71.5 x 28.2	mm	
	Detector Resolution	256 x 1280	512 x 1280	Pixels	
	Frame Rate	40	20	fps	
	Readout Time	25	50	ms	
	Weight	1700	1800	g	

## Sensor parameters

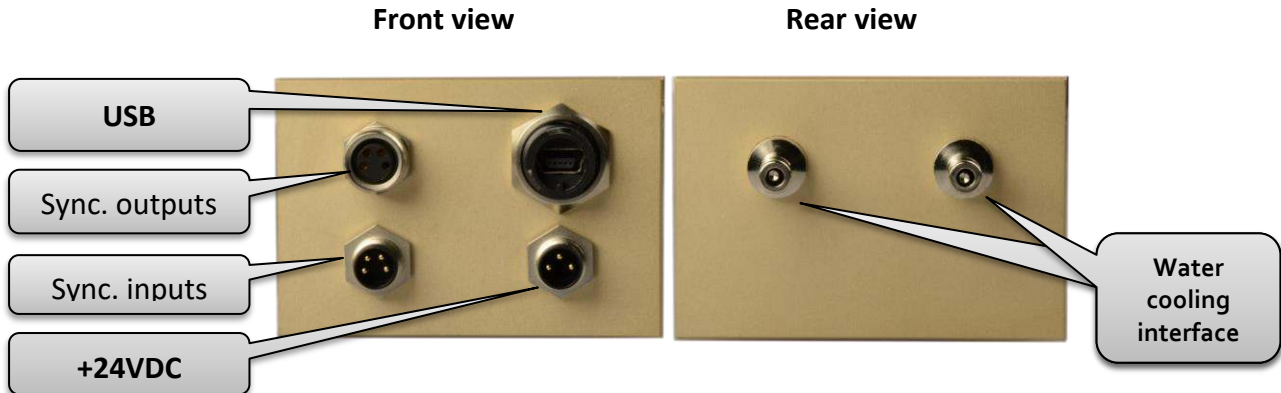
T<sub>A</sub> = 25°C

Symbol	Parameter	Si			CdTe	Unit	Comment
	Thickness	100	300	1000	1000	μm	
	Bias Voltage	50	200	500	-500	V	Max
	Calibrated in X-ray Energy Range						see chart below
	Energy resolution						
	Detectable energy range	5 to 60			5 to 600	keV	

X-ray attenuation in Silicon and CdTe



## 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

Two 4-pin M8 connectors (female for outputs and male for input) serve as synchronization interface, allowing to synchronize **WIDEPIX<sub>2(1)x5</sub>** 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)

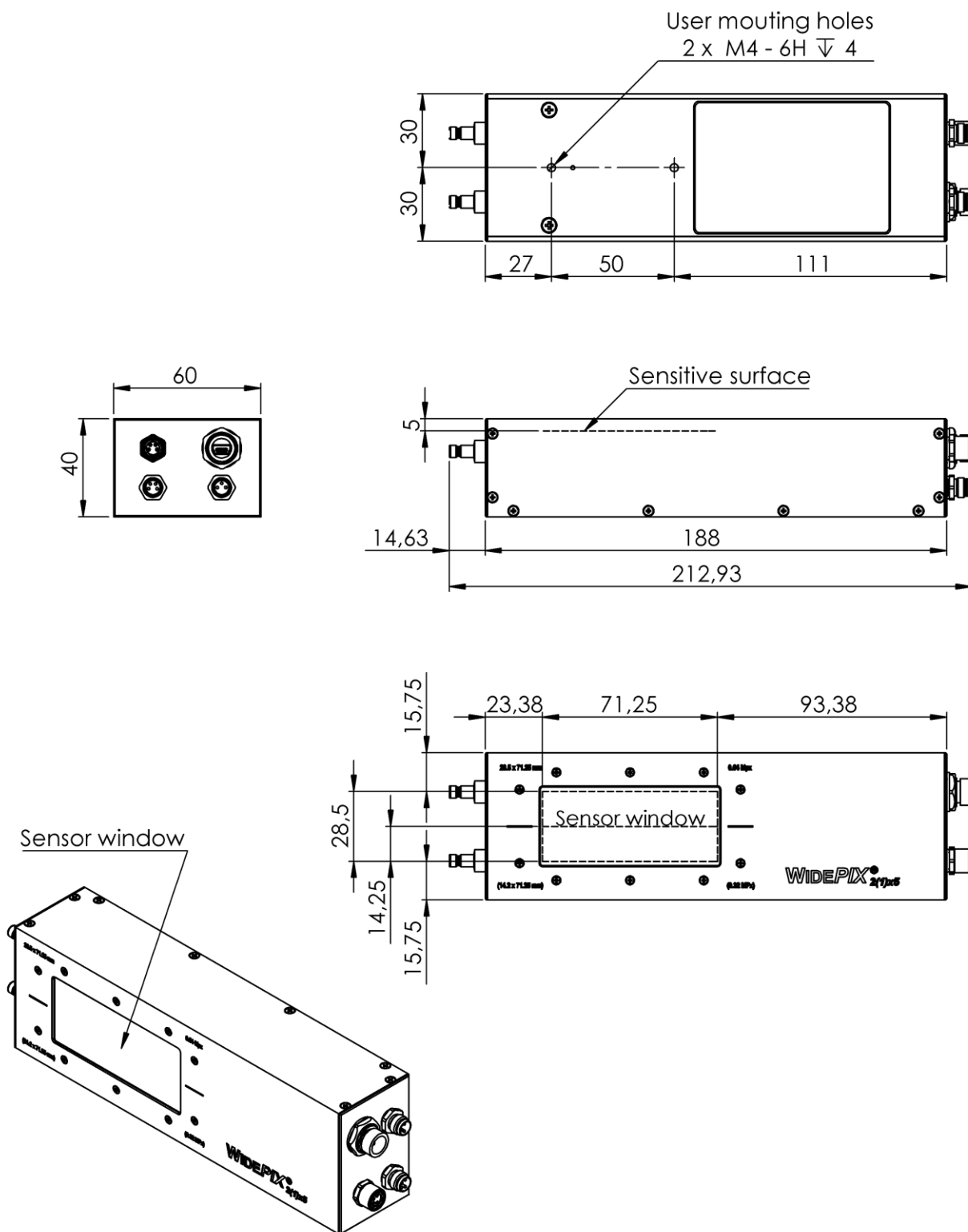
All signals are TTL compatible and 5V tolerant. For detailed description see **Synchronization Guide**.

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

### Water cooling interface

It is mandatory to cool down detector when in operation. **WIDEPIX<sub>2(1)x5</sub>** 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.

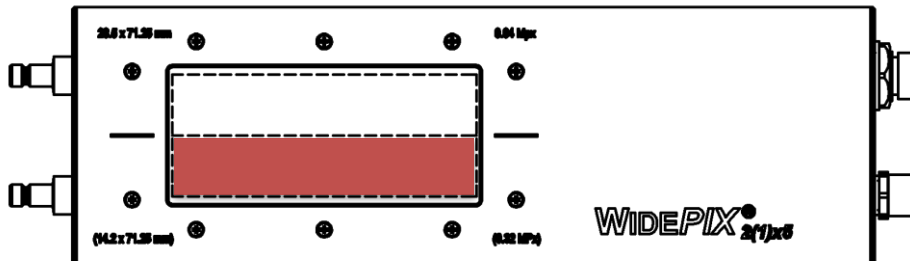
# Mechanical Dimensions



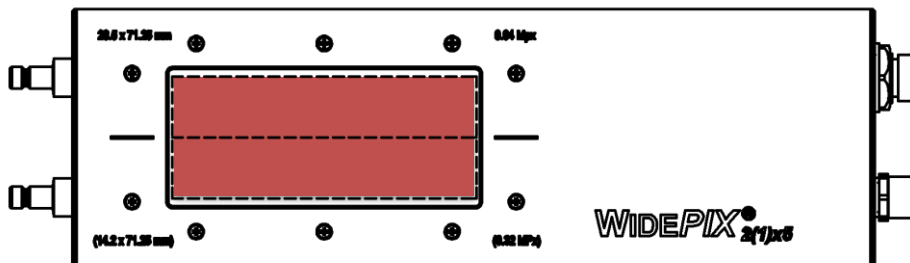
All dimensions are in mm

# Sensitive area

Sensitive area for WIDEPIX<sub>1x5</sub>



Sensitive area for WIDEPIX<sub>2x5</sub>



# Warning

## Instructions for safe use

To avoid malfunction or damage to your WIDEPIX<sub>2(1)x5</sub> please obey the following:

- Do **not** expose to water or moisture, WIDEPIX<sub>2(1)x5</sub> is dust protected only.
- Do **not** open WIDEPIX<sub>2(1)x5</sub> case. Detector wire-bonding connections may be irreversibly damaged.
- Do **not** operate detector when not properly water cooled. Otherwise detector temperature may rise above the specified range.

# Copyright

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