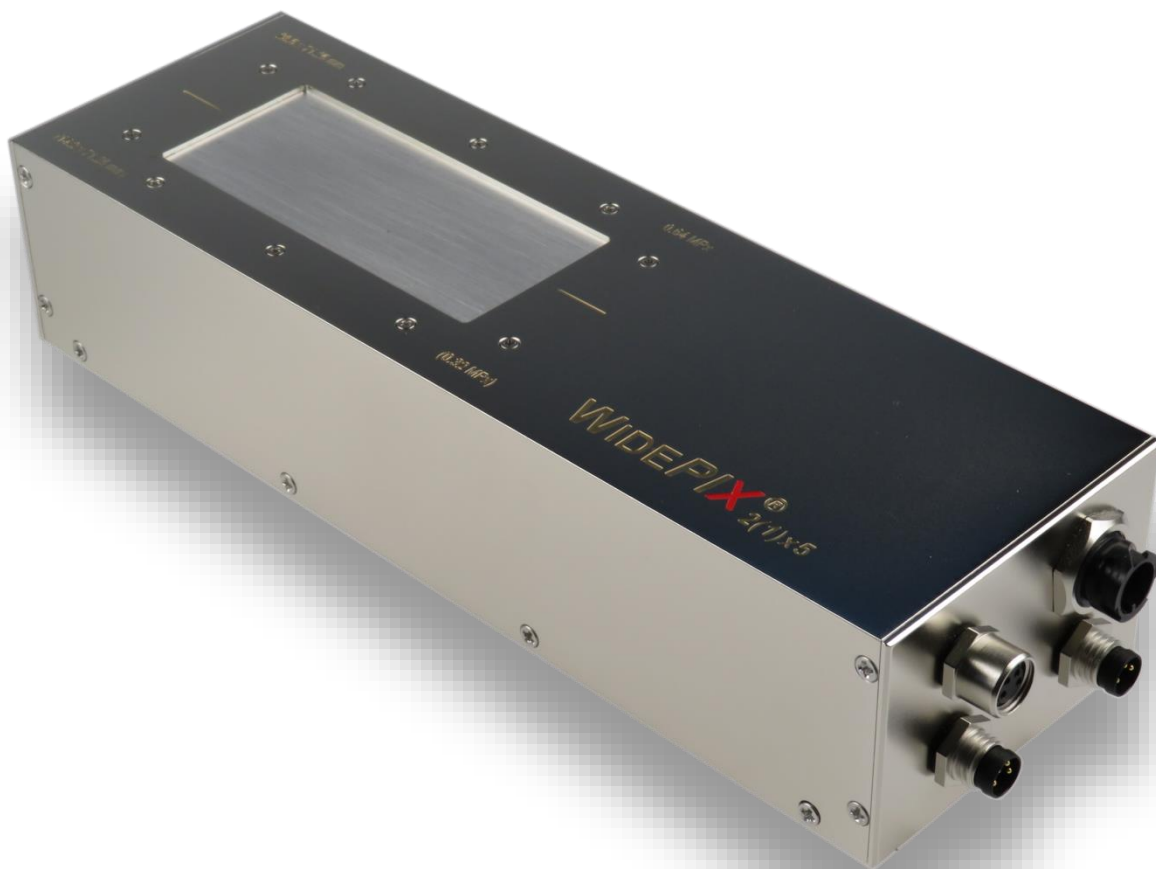

WIDEPIX[®] 2(1)x5

Datasheet

Model No.: W25xRS-Xxx170307
W25xRS-Xxx181119



General features

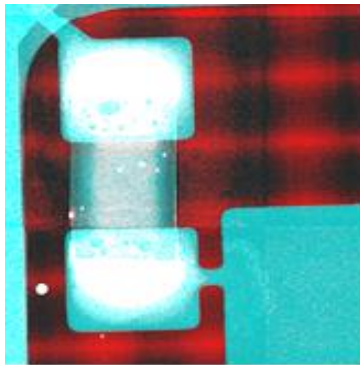
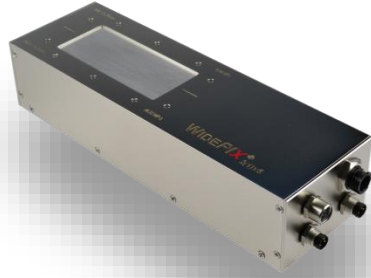


Illustration of multichannel "color" radiographs where different materials are identified and imaged in different colors

The large area imaging detector **WIDEPIX_{2(1)x5}** 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_{2(1)x5}** 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_{2(1)x5}** 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 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 50 (25) ms per frame resulting in maximal speed of 20 (40) frames per second.

Main Features

- Readout chip type TimePIX
- Pixel size 55 x 55 µm
- Sensor resolution 512 (256) x 1280 pixels
- Dynamic range in one frame 11 082¹
- Dark current none
- Interface USB 2.0 (Full-Speed)
- Maximum frame rate 20 (40) fps
- Dimensions 213 x 60 x 40 mm
- Weight 1800 g

¹ 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 _A	Temperature Range	0	30	40	°C	
Φ	Humidity		55	60	%	Not condensing
	IP Code		IP50			

Family parameters

T_A = 25°C, V_{CC} = 24V

Symbol	Parameter	WidePIX 1x5	WidePIX 2x5	Units	Comment
V _{CC}	Supply Voltage	20/24/26		V	Min/Typ/Max
I _{CC}	Supply Current (V _{CC} = 24V)	400	700	mA	Typ
P	Power dissipation	9	16	W	Max
A	Sensor Area	71.5 x 14.1	71.1 x 28.2	mm	
	Detector Resolution	1280 x 256	1280 x 512	Pixels	
f	Frame Rate	40	20	fps	
T _{READ}	Readout Time ²	25	50	ms	
m	Weight	1700	1800	g	

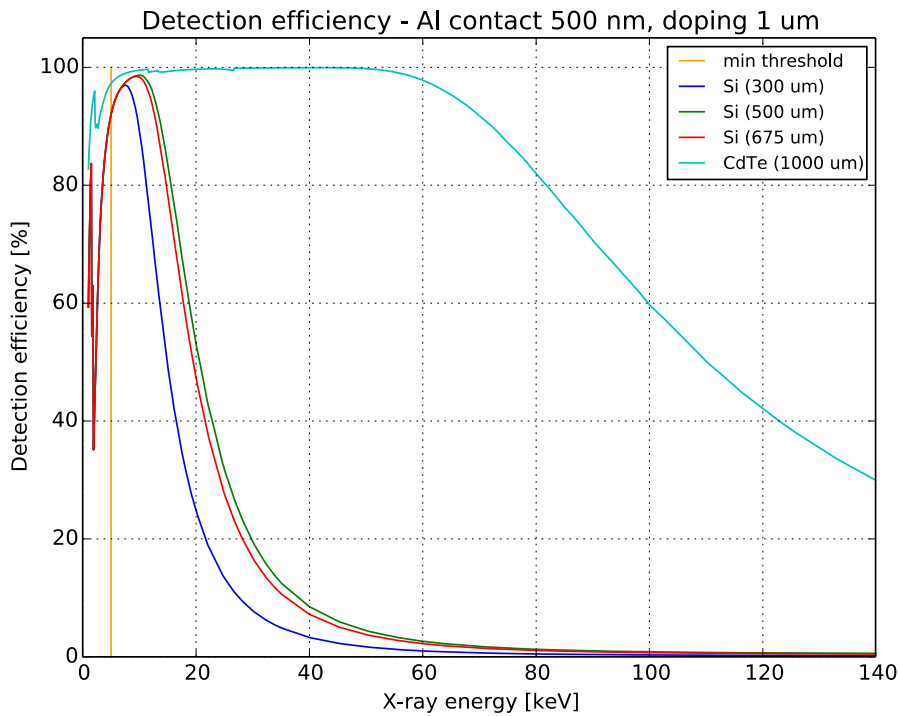
² During Readout time (or Dead time), no charge is collected from the sensor.



Sensor parameters

T_A = 25°C

Symbol	Parameter	Si			CdTe	Units	Comment
		100	300	1000			
	Thickness	100	300	1000	1000	μm	
V _{bias}	Bias Voltage	50	200	500	-500	V	Max
σ	Energy resolution of energy discrimination threshold (σ @ 23 keV)	0.5				keV	
σ	Energy resolution of energy discrimination threshold (σ @ 60 keV)	0.6				keV	
σ	Energy resolution in full spectral mode (σ @ 23 keV)	0.7				keV	
σ	Energy resolution in full spectral mode (σ @ 60 keV)	1.0				keV	
	Typical detectable energy range for X-rays4	5 to 60			5-600	keV	See chart below
	Pixel size	55				μm	

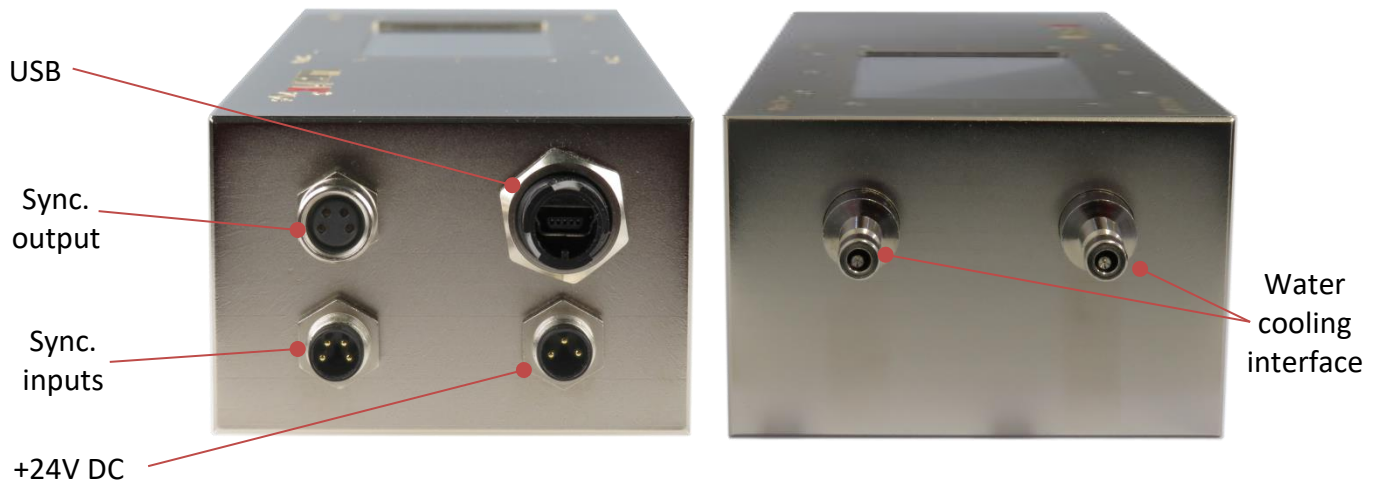


Modes of readout chip operation

Type	Mode	Precision	Description
Frame (reading all pixels)	Event	13bit/frame	1 output image: Number of Events per pixel
	ToT	13bit/frame	1 output image: Sum of all Energies deposited in given pixel(Time Over Threshold)
	ToA	13bit/frame	1 output image: Time of arrival of first event in given pixel



Device description



USB connector

USB type A, Standard USB 2.0 Full-Speed, in IP68 protection.

+24VDC connector

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

Synchronization interface

Two 4-pin M8 connectors (female for outputs and male for input) serve as synchronization interface, allowing to synchronize **WIDEPIX_{2(1)x5}** 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)

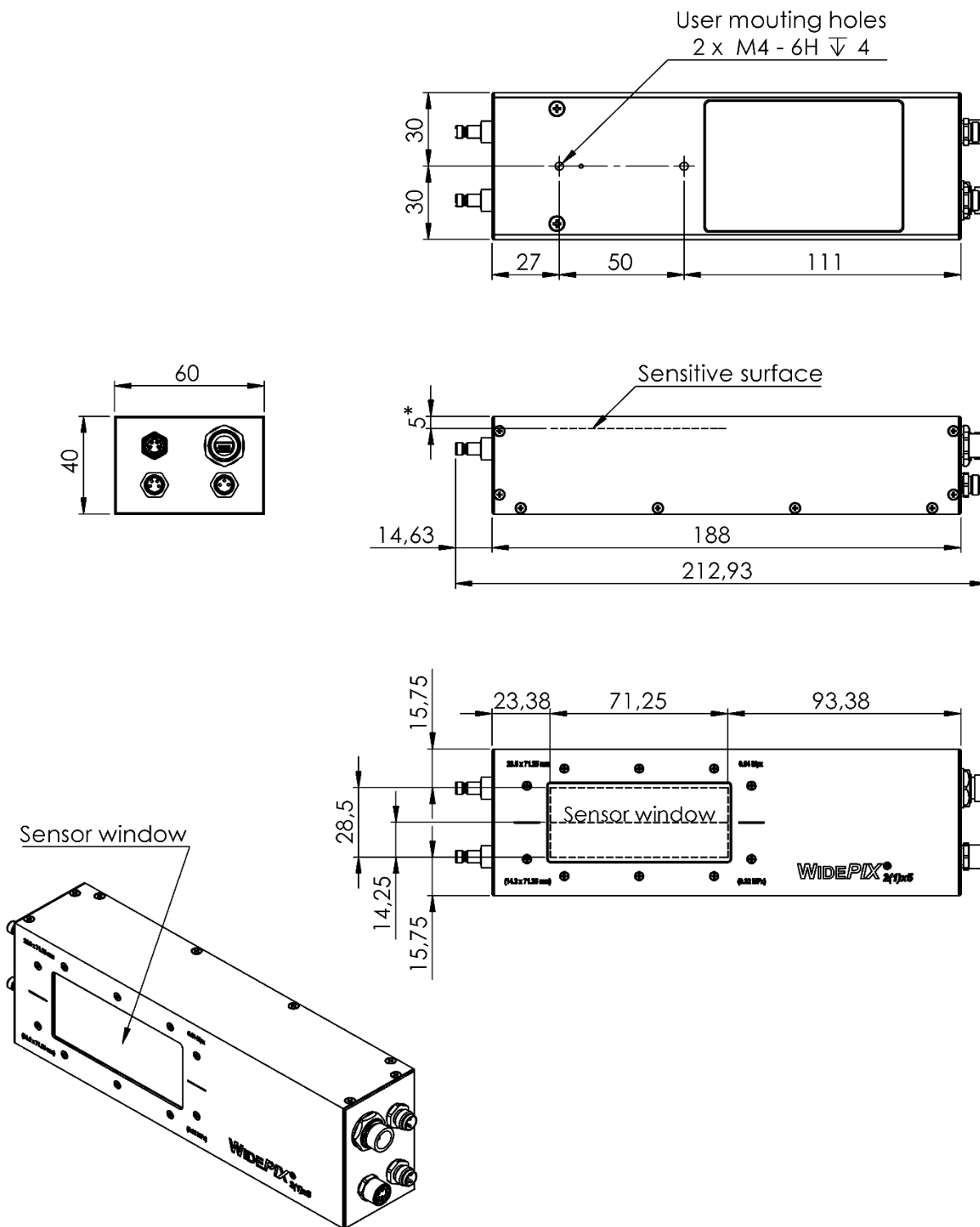
All signals are TTL compatible and 5V tolerant. For detailed description see **Synchronization Guide**.

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

Water cooling interface

It is mandatory to cool down detector when in operation. **WIDEPIX_{2(1)x5}** 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



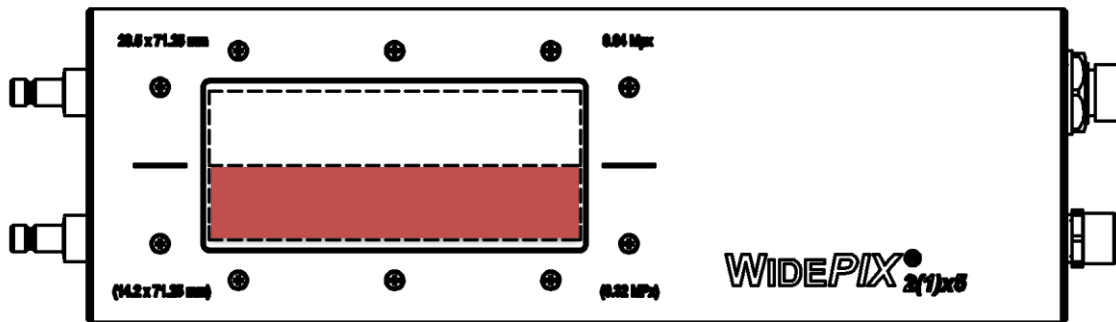
All dimensions are in mm.

* Sensitive surface distance from top of the box may vary depending on actual sensor thickness.

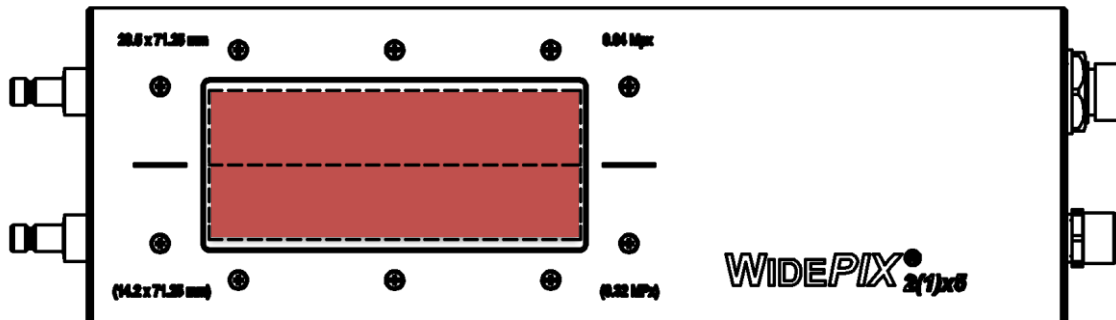


Sensitive area

Sensitive area for **WIDEPIX_{1x5}**



Sensitive area for **WIDEPIX_{2x5}**



Product/Model number codes

- W251RS-XE1yymmdd – 1 row, Si edgeless sensor, thickness 100 µm
- W251RS-XE3yymmdd – 1 row, Si edgeless sensor, thickness 300 µm
- W251RS-XEAyymmdd – 1 row, Si edgeless sensor, thickness 1000 µm
- W251RS-XCAyymmdd – 1 row, CdTe sensor, thickness 1000 µm
- W252RS-XE1yymmdd – 2 rows, Si edgeless sensor, thickness 100 µm
- W252RS-XE3yymmdd – 2 rows, Si edgeless sensor, thickness 300 µm
- W252RS-XEAyymmdd – 2 rows, Si edgeless sensor, thickness 1000 µm
- W252RS-XCAyymmdd – 2 rows, CdTe sensor, thickness 1000 µm

Model Number Codes

Example:

W25 2RS - X C A 170307

Device name:

W25 – WidePIX 1(2)x5

Device modification:

1RS – 1x5 Timepix chips

2RS – 2x5 Timepix chips

Sensor type:

E – Edgeless silicon

C – CdTe

Sensor thickness:

1 – 100 µm

3 – 300 µm

A – 1000 µm

Device version date:

YY MM DD

Release history

Date	Changes
17/11/02	Model number codes added, datasheet version
17/11/24	Power consumption updated
18/04/20	New Datasheet format
18/08/22	Synchronization interface updated, Sensitive area for WidePIX 1x5
19/02/05	New versions, USB board



Warning

Do not touch sensor surface!

Instructions for safe use

To avoid malfunction or damage to your **WIDEPIX_{2(1)x5}** please obey the following:

- Do not expose to water or moisture, **WIDEPIX_{2(1)x5}** is dust protected only.
- Do not open **WIDEPIX_{2(1)x5}** 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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