

ANNEX 1 TECHNICAL DESCRIPTION OF THE OFFERED PERFORMANCE

ADVAPIX TPX3 modules were designed with special emphasis to performance and versatility which is often required in a scientific experimental work. They contain latest CERN detector Timepix3 for particle tracking and imaging. The fast modules with Si or CdTe pixel detectors Timepix3 can be used in different configurations such as stack of several layers or tiling to cover larger area. Each module contains single Timepix3 device with ultra-fast sparse data readout to acquire up to 40 Mhits per second. A separate USB 3.0 channel for each device assures fast read-out of the whole modular system. The sensor type and thickness is of customer's choice.

ADVAPIX TPX3 can be used in a variety of applications such as energy resolved radiography (X-rays, neutrons, ions), particle tracking, time-of-flight imaging, multilayer Compton camera and many other. The sensors can be adapted for neutron imaging by deposition of converter layers. Recording individual hits together with advanced data processing allows increasing the spatial resolution in some applications to units of microns or even sub-micrometric level (for ions).

Compared to the older Timepix chip the Timepix3 detector offers 6 times better time resolution, 2 times better energy resolution, 2 times lower minimum energy threshold, zero dead time and 10x faster data transfer.

Main Features:

Readout chip type	Timepix3
Pixel size	.55 x 55 μm
Sensor resolution	256 x 256 pixels
Time resolution	.1,6 ns
• Power	External or via second USB 3.0
Interface	.USB 3.0 (Super-Speed)
Maximum readout speed	.40 million pixels / s
Dimensions	125 x 79 x 25.5 mm
Weight	. 503 q

ADVAPIX TPX3 meets all the required criteria stated in Technical requirements for a pixel radiation detector.







ANNEX 2

TECHNICAL SPECIFICATIONS

Device Parameters

Operating Conditions

Symbol	Parameter	Min	Тур	Max	Units	Comment
TA	Temperature Range	0	50	70	°C	a
Φ	Humidity			60	%	Not condensing

Electrical Specification

 $T_A = 25$ °C, USB voltage $V_{CC} = 4.8V$

Symbol	Parameter	Min	Тур	Max	Units	Comment
Vcc	Supply Voltage	4.0	5.0	5.5	V	
Icc	Supply Current					
Icc1	Chip disabled		800	1500	mA	
P1	Power Dissipation			2.5	W	
I/O Conn. Inp	ut CMOS (pin 4,6,8,10)					
VINL	Voltage Low	0		1.15	V	
VINH	Voltage High	2.15		3.3	V	
I/O Conn. Inp	ut LVDS (pin 3,5,7,9)					
VIN	Voltage Range	0		2.5	V	
VINDIFF	Differential Voltage	250		600	mA	
Bias Voltage	Source for Sensor Diode					
VBIAS	Bias Voltage	0		±450	V	Polarity is sensor dependent

Performance Characteristics for Timepix3

Symbol	Parameter	Min	Тур	Max	Units	Comment
f	Hit-rate			40	MPixels/s	with USB 3.0 cable
	Data rate			2.4	Gbit/s	with USB 3.0 cable
T _{READ}	Frame Readout Time		33		ms	with USB 3.0 cable
dT	Time resolution	1.56			ns	
FREAD	Read-out frequency		320		MHz	1/2 of maximum ROC freq



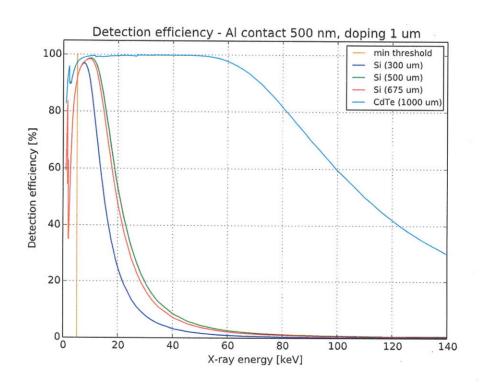




Sensor parameters

 $T_A = 25$ °C

Symbol	Parameter	Si				CdTe	Units	Comment
	Thickness	100	300	500	675	1000	μm	
σ	Energy resolution of energy discrimination threshold (σ @ 23 keV)	0.5				1.1	keV	
σ	Energy resolution of energy discrimination threshold (σ @ 60 keV)		0	.6		1.5	keV	
σ	Energy resolution in full spectral mode (σ @ 23 keV)	0.7				3.0	keV	
 Energy resolution in full spectral mode (σ @ 60 keV) Typical detectable energy range for X-rays² Pixel size 	1.0			3.6	keV			
		1.0			3 to 600	keV	See chart below	
	Pixel size	55			55	μm		





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