ONYX 1412-X

Flat Panel Detector

High-speed high-resolution 6.6 MP X-ray detector

Features and Benefits

- **CMOS Active Pixel Sensor technology for intrinsic low noise, small pitch, and fast readout**
- **Active area 14 cm × 12 cm**
- **2768 × 2376 (6.6M) pixels**
- **50 µm pixel size**
- **67 fps max frame rate**
- **10 GbE data interface**
- **16-bit data output**
- **High resolution CsI scintillator on Fiber Optic Plate**

Applications

- **PCB & final assembly**
- **Semiconductor & packaged die**
- **Battery Inspection**

ONYX 1412-X is a performance-leading X-ray detector comprising a proprietary 2768 × 2376 active pixel sensor array of 50 × 50 µm pixels. This detector consists of a high-speed, low-noise, radiation-tolerant, 14 × 12 cm, 6.6M pixel CMOS image sensor, with a directly deposited high-resolution CsI scintillator on Fibre Optic Plate. The highly configurable sensor is accessed through a software interface, connected via a 10 GbE SFP+ hardware interface.

Following on from the market leading vM2428 detector family, ONYX 1412-X has been re-engineered from the ground up to underpin the next generation of world class X-ray imagers with a performance and feature set to meet the most demanding high-resolution and high-throughput X-ray applications. The CMOS sensor exhibits excellent linearity, best-in-class low noise performance, and high dynamic range.

A unique feature of the sensor includes the column-selectable dual sensitivity modes to enable flexible operation in high, low, and mixed flux applications. In addition, the sensor has programmable integration and region-of-interest modes that can be changed on-the-fly (frame to frame), and a range of highly tuneable non-destructive read-out modes.

General	
Sensor technology	CMOS APS
Pixel size	50 µm
Pixel count	2768 × 2376 Usable pixel area 2768 x 2337
Pixel resolution	6.6 MP
Active area	14 × 12 cm
Max frame rate full res	67 fps
Scintilllator	Columnar CsI
Imaging data	
Hardware interface	10 GbE
Image processing	16-bit
Max data rate	7.2 Gb/s @ 67 fps
Imaging modes	
Pixel sensitivity modes	2
Column-selectable sensitivity	Yes
Non-destructive read-out	Yes
Correlated double sampling	Yes via firmware
Programmable regions-of-interest	Yes
Global reset	Yes
Hardware trigger input	Yes
Power & mechanical	
Power supply	24 V_{dc}
Power consumption	30W @ max frame rate
External dimensions	178 × 203 × 49 mm
Weight	2.5kg
Temperature Range	
Operating Temperature	+10C to +35C
Storage Temperature	-10C to +50C

ONYX-1412 X **Flat Panel Detector**

Performance

Symbol	Parameter	Min.	Typ.	Max.	Units
Sensor key performance parameteres					
e_{rms}	Pixel referred noise, electrons rms		54 (HS) 39 (CDS†) 410 (HFW)	TBD	e_{rms}
MFW	Maximum Full Well	TBD	108 (HS) 108 (CDS) 1485 (HFW)		k e
DR_{HS}	Dynamic Range, High Sensitivity (HS) mode		66.1		dB
DR_{CDS}	Dynamic Range, HS mode with CDS		68.9		dB
DR_{HFW}	Dynamic Range, High Full Well (HFW) mode		71.1		dB
INL	Non-linearity, 0-90% of DR		0.1% TBC	1.2%	
QE	Quantum Efficiency at 540nm wavelength		50		%
t_{int}	Integration time	2µs	30ms	TBD	
FPS	Frame rate, full frame (option dependent)		34	67	fps
FPS_{ROI}	Frame rate (16 row Region of Interest)		4000	8000	fps
	ADC native digitization		14	15	bits
	Output resolution (15 bit on-sensor ADC, 16-bit with oversampling)		14	16	bits
	Noise floor equivalent		2.1 nGy RMS (RQA5, 300 µm CsI)		
Power and trigger					
	Power supply, normal		24		V
	Input voltage, absolute maximum	6		26	V
	Thermal design power (mode dependent)		20 TBC	35 TBD	W
	Input trigger and output trigger		0-5V, isolated		

† *Correlated double sampling available on S option only* ‡ *Leakage typically doubles / halves every 8˚C. Cool the detector for improved performance*

For more information, speak with your Nordson representative or contact your Nordson regional office

Nordson Test & Inspection Europe, SEA, Africa
ti-sales-eu@nordson.com

Nordson Test & Inspection Americas
ti-sales-us@nordson.com

Nordson Test & Inspection China
ti-sales-cn@nordson.com

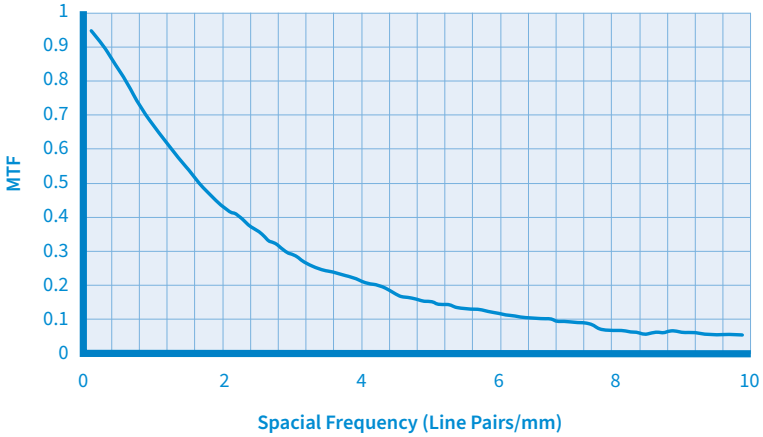
Nordson Test & Inspection Japan
ti-sales-jp@nordson.com

Nordson Test & Inspection Singapore
ti-sales-eu@nordson.com

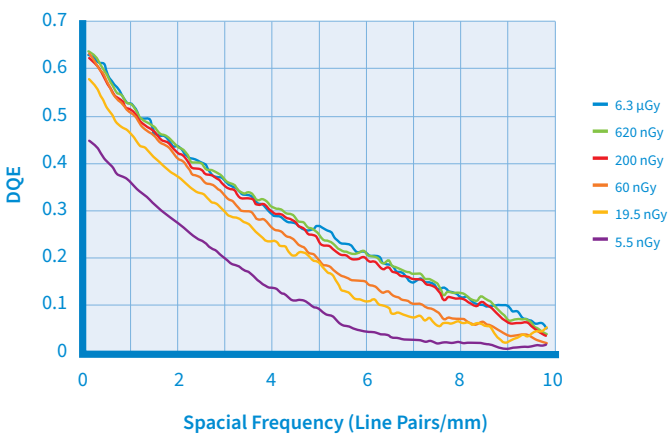
Nordson Test & Inspection Taiwan
ti-sales-tw@nordson.com

Nordson Test & Inspection Korea
ti-sales-korea@nordson.com

Onyx 1412 MTF
Industrial (300 µm CsI) scintillator



Onyx 1412 DQE, RQA5
Industrial (300 µm CsI) scintillator



Tested to BS EN 62220-1-3 (2008) in 2021 at the National Physical Laboratory, UK

Nordson
TEST & INSPECTION