

CMOS X-RAY DETECTORS for Industrial Non-Destructive Testing



Large-area detectors

Teledyne DALSA Industrial X-Ray Detectors

X-Ray Solutions for Non-Destructive Testing

Teledyne DALSA offers a complete portfolio of innovative CMOS and CCD X-Ray detectors tailored specifically to meet the demanding and diverse needs of non-destructive testing (NDT) applications. Our innovative and reliable products offer solutions for all types of industrial applications.





CMOS X-Ray Advantages

HIGH IMAGE QUALITY AND LOW DOSE

• The very low noise of the CMOS material and the proprietary active pixel architecture of Teledyne DALSA's CMOS detectors ensure improved signal-to-noise ratio (SNR) with respect to the a-Si-based and even other CMOS-based competing products.

HIGH SPEED IMAGING

 Enabled by high-speed electronics and the high electron mobility of the crystalline silicon material, CMOS detectors set an industry benchmark for speed at full resolution, while remaining lag- and artifact-free. Frame rates of >100fps are achievable.

HIGH RESOLUTION

• Our advanced pixel design is responsible for the very high fill factor (80-90%), even at small pixel sizes of 50-100µm. The small pixel pitch combined with proprietary optical stack give rise to high spatial resolution (or MTF) performance.

INNOVATIVE DESIGN

• Our sixth-generation proprietary technology enables radiation hard pixel design, with adjustable saturation dose levels that make our detectors suitable for all industrial applications.

LONG LIFETIME

• The high integration level of our CMOS design reduces the number of discrete components and interconnects, thus significantly improving the product reliability. The built-in radiation-hardness of our detectors enables long operating lifetime and less frequent calibration routines.



Portfolio of Industrial CMOS X-Ray Detectors



Features

- HIGH RESOLUTION
- WIDE ENERGY RANGE
- LOW POWER CONSUMPTION
- CHOICE OF SCINTILLATOR
- STANDARD DATA INTERFACE
- ROBUST MECHANICAL DESIGN



Shad-o-Box[™] HS Product Family

The Shad-o-Box HS product family of digital X-Ray detectors utilizes a fast and reliable Gigabit Ethernet interface and offers users a high-speed, high-performance x-ray imaging experience. The detectors in this product line are capable of frame rates up to 50 fps, and communicate via a standard Cat6e data cable over lengths up to 100m. The products are available with different scintillator options to address a range of resolution and sensitivity requirements, making this detector an ideal choice for industrial inspection, biomedical, and scientific X-Ray imaging applications.

Standard models in a range of pixel and detector sizes



SHAD-O-BOX HS FAMILY SPECIFICATIONS

PARAMETER	UNIT	SHAD-O-BOX 512 HS	SHAD-O-BOX 1024 HS	SHAD-O-BOX 1280 HS	SHAD-O-BOX 688 HS	SHAD-O-BOX 1548 HS	SHAD-O-BOX 3K HS	SHAD-O-BOX 6K HS
GENERAL								
TECHNOLOGY		CMOS ACTIVE PIXEL	CMOS ACTIVE PIXEL	CMOS ACTIVE PIXEL	CMOS ACTIVE PIXEL	CMOS ACTIVE PIXEL	CMOS ACTIVE PIXEL	CMOS ACTIVE PIXEL
PIXEL PITCH	[µm]	135	135	100	99	99	49.5	49.5
PIXEL CAPACITY MODES	[#]	2	2	1	2	2	1	1
ACTIVE AREA	[mm]	104X69	104X138	128X128	102X68	102X153	114X64	114X146
RESOLUTION	[pxl]	768X512	768X1024	1280X1280	1032X688	1032X1548	2304X1300	2304X2940
BANDWIDTH								
DATA INTERFACE	[-]	GigE	GigE	GigE	GigE	GigE	GigE	GigE
ADC CONVERSION	[bits]	14	14	14	14	14	14	14
FRAME RATE - 1X1 (GIGE)	[fps]	35	35	30	50	30	22	11
POWER CONSUMPTION								
POWER SUPPLY	[Vdc]	68	68	1113	1025	1025	1025	1025
POWER CONSUMPTION	[W]	10	10	10	10	10	10	10
ACTIVE COOLING	[y/n]	NO	NO	NO	NO	NO	NO	NO
INTEGRATION								
FOOTPRINT (WXHXT)	[mm]	200X150X35	200X150X35	200X189X35	200X150X35	200X150X35	200X150X35	200X150X35
WEIGHT	[kg]	3.5	3.5	3.5	3.5	3.5	3.5	3.5
EXTERNAL INTERFACE MODULE	[y/n]	NO	NO	NO	NO	NO	NO	NO
ENVIRONMENTAL								
OPERATIONAL TEMPERATURE	[°C]	0+40	0+40	0+40	0+40	0+40	0+40	0+40
STORAGE TEMPERATURE	[°C]	-10+55	-10+55	-10+55	-10+55	-10+55	-10+55	-10+55
HUMIDITY	[% R.H.]	1080	1080	1080	1080	1080	1080	1080
X-RAY RANGE	[kV]	10225	10225	10225	10225	10225	10225	10225



Rad-icon[™] Large-Area Detectors

Utilizing Teledyne DALSA's proprietary CMOS active pixel technology, the Rad-icon family of real-time CMOS X-Ray detectors is the industry's first to exceed the low-dose performance of image intensified detectors, setting new industry benchmarks in DQE, low power dissipation and radiation lifetime.

RAD-ICON FAMILY SPECIFICATIONS

PARAMETER	UNIT	RAD-ICON 1520	RAD-ICON 2022	RAD-ICON 3030
GENERAL				
GENERAL TECHNOLOGY PIXEL PITCH PIXEL CAPACITY MODES ACTIVE AREA RESOLUTION BANDWIDTH DATA INTERFACE AAC CONVERSION FRAME RATE - 1X1 (GIGE) POWER CONSUMPTION POWER CONSUMPTION ACTIVE COOLING INTEGRATION FOOTPRINT (WXHXT) WEIGHT	(µm) [#] [mm] [pxl] [bits] [fps] [Vdc] [W] [Vdc] [W] [V/n]	CMOS ACTIVE PIXEL 99 2 153X204 1548X2064 GigE 14 20 10.25 12 NO 229X204X36 3.5	CMOS ACTIVE PIXEL 99 2 204X221 2064X2236 CameraLink 14 30 10.25 15 NO 292X237X59 5	CMOS ACTIVE PIXEL 99 2 307X307 3096X3096 CameraLink 14 30 0 10.25 18 NO 2 377X329X59 8
EXTERNAL INTERFACE MODULE	[y/n]	NO	NO	NO
OPERATIONAL TEMPERATURE STORAGE TEMPERATURE HUMIDITY X-RAY RANGE	[°C] [°C] [% R.H.] [kV]	0+40 -10+50 10 TO 80 10.225	0+40 -10+50 10 TO 80 10225	0+40 -10+50 10 TO 80 10225





Remote RadEye[™] Modules

The Remote RadEye X-Ray sensor module provides the ultimate flexibility in design and product options for the most complex imaging applications. Our unique detector design separates the X-Ray sensor module from its supporting electronics: the module is mounted on a detachable cable enabling easy installation into tight spaces or on gantry systems. Choose among five different sensor modules, paired with one of three electronic modules offering a choice of LVDS, USB or Ethernet interfaces.

REMOTE RADEYE FAMILY SPECIFICATIONS

PARAMETER	UNIT	RADEYE1	RADEYE2	RADEYE4	RADEYE HR	RADEYE200
GENERAL						
TECHNOLOGY		CMOS ACTIVE PIXEL				
PIXEL PITCH	[µm]	48	48	48	20	96
PIXEL CAPACITY MODES	[#]	1	1	1	1	1
ACTIVE AREA	[mm]	24.6X49.2	49.3X49.2	98.6X49.2	33.0X24.9	98.4X96.0
RESOLUTION	[pxl]	512X1024	1024X1024	2048X1024	1650X1246	1024X1000
BANDWIDTH						
DATA INTERFACE	[-]	ANALOG	ANALOG	ANALOG	DIRECT USB	ANALOG
ADC CONVERSION	[bits]	14	14	14	12	14
FRAME RATE	[fps]	2.7	2.7	2.7	-	0.75
POWER CONSUMPTION						
POWER SUPPLY	[Vdc]	6.5	6.5	6.5	5V (USB)	6.5
POWER CONSUMPTION	[W]	<5W	<5W	<5W	<1W	<5W
ACTIVE COOLING	[y/n]	NO	NO	NO	NO	NO
INTEGRATION						
FOOTPRINT (WXHXT)	[mm]	109X41X24	111X78X22	132X129X22	50X40X12.7	180X128X22
WEIGHT (SENSOR HEAD)	[kg]	0.3	0.8	1	0.2	1
WEIGHT (CAMERA MODULE)	[kg]	1.7	1.7	1.7	NA	1.7
EXTERNAL INTERFACE MODULE	[y/n]	YES	YES	YES	NO	YES
ENVIRONMENTAL						
OPERATIONAL TEMPERATURE	[°C]	0+50	0+50	0+50	0+50	0+50
STORAGE TEMPERATURE	[°C]	-10+65	-10+65	-10+65	-10+65	-10+65
HUMIDITY	[% R.H.]	1080	1080	1080	1080	1080
X-RAY RANGE	[kV]	5160	5160	5160	5160	5160

RadEye HR RadEve1 RadEye RadEye 200 RadEye2





BOTTLE CAP



Line Scan X-Ray Detectors

Teledyne DALSA's line scan detectors, Argus and Shad-o-Scan, are based on the analog CCD Time Delay Integration (TDI) line scan technology. TDI line scan delivers an unmatched combination of sensitivity and peed by accumulating multiple exposures of the same (moving) object, effectively increasing the integration time available to capture the incident X-Ray quanta. The object motion must be synchronized with the exposures to ensure a crisp image.

LINE SCAN FAMILY SPECIFICATIONS

PARAMETER	UNIT	ARGUS-CEPH		SHAD-U-SCAN 8K
GENERAL				
TECHNOLOGY			CCD TDI	
PIXEL PITCH	[µm]		27	
ACTIVE AREA	[mm]		220X7	
RESOLUTION	[pxl]	8	3160X256	
BANDWIDTH				
DATA INTERFACE	[-]	GigE		CameraLink
ADC CONVERSION	[bits]		16	
LINE RATE - 2X2	[kHz]		2	
POWER CONSUMPTION				
POWER SUPPLY	[Vdc]		12	
POWER CONSUMPTION	[W]		15	
ACTIVE COOLING	[y/n]		NO	
INTEGRATION				
FOOTPRINT (WXH)	[mm]	254X84X46		292X60X40
HOUSING		OPEN		ENCLOSED
WEIGHT	[kg]	0.7		1
EXTERNAL INTERFACE MODULE	[y/n]		NO	
ENVIRONMENTAL				
OPERATIONAL TEMPERATURE	[°C]		+10+40	
STORAGE TEMPERATURE	[°C]		0+60	
HUMIDITY	[% R.H.]		10 TO 80	
X-RAY RANGE	' [KV]		10225	







World-Class Capability... Design, Engineering and Manufacture

LEADING PROVIDER AND PREFERRED PARTNER

Image Sensor Product Solutions in Professional and Mid-Range segments

- Human Vision
- Medical/Dental X-Ray
- Non-Destructive Testing
- Industrial & Scientific X-Ray

35+ YEARS EXPERIENCE

Design, Development and Manufacturing

- CCD & CMOS Image Sensors
- X-Ray Detectors
- Chipset & Application Reference Designs
- Customer Applications Support



www.teledynedalsa.com

For more detailed product information please visit: www.teledynedalsa.com/ndt or contact us at sales.rad-icon@teledynedalsa.com

AMERICAS

3400 Garrett Drive Santa Clara, CA USA 95054

Tel: 408-736-6000

Fax: 408-736-6001

EUROPE

High Tech Campus 27 (M/S 14) 5656 AE Eindhoven The Netherlands

Tel: +31 40 2599000 Fax: +31 40 2599005

ASIA PACIFIC

Ikebukuro East 13F 3-4-3 Higashi Ikebukuro Toshima-ku, Tokyo Japan 170-0013

Tel: +81 3-5960-6353 Fax: +81 3-5960-6354 Shanghai Industrial Investment Building Room G, 20F, 18 North Cao Xi Road Shanghai, China 200030

Tel: +86-21-64279081 Fax: +86-21-64699430