

CMOS X-RAY DETECTORS

for Industrial Non-Destructive Testing

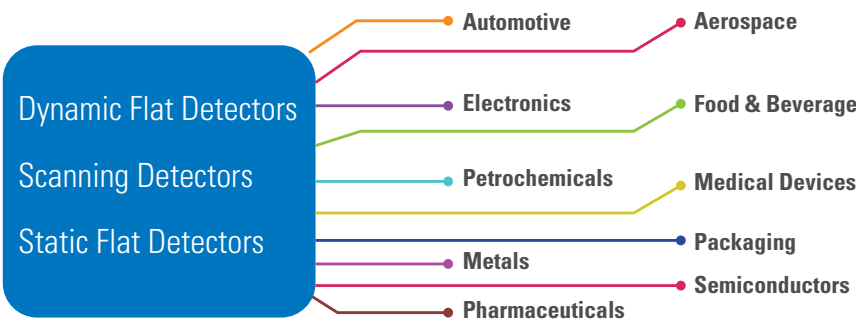


COMMITTED TO PEOPLE. DRIVEN BY INNOVATION.

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

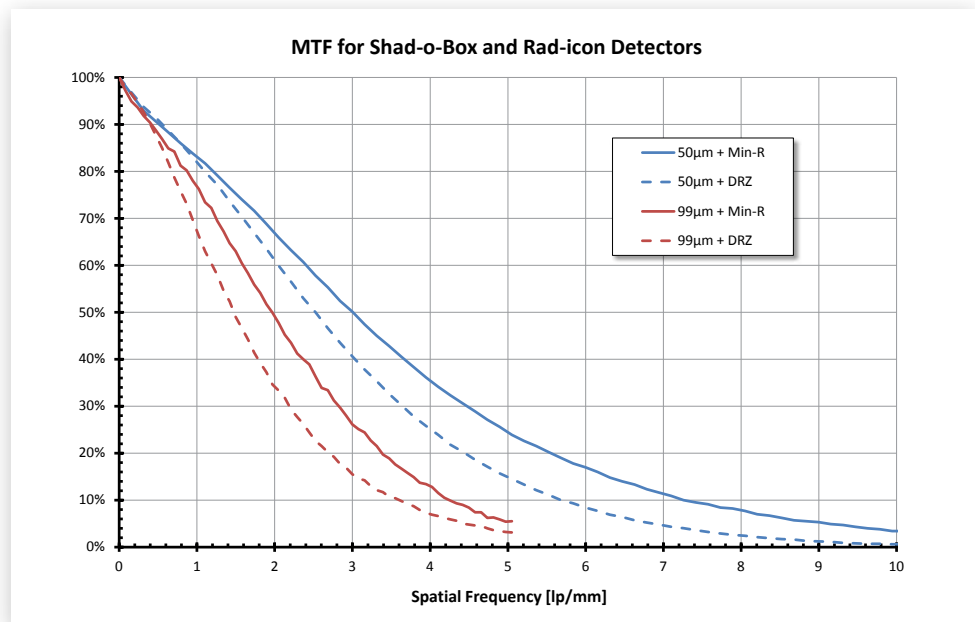
- The high integration level of our CMOS design reduces the number of discrete components and interconnects, thus significantly improving the product reliability. The built-in radiation-hardness of our detectors enables long operating lifetime and less frequent calibration routines.

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

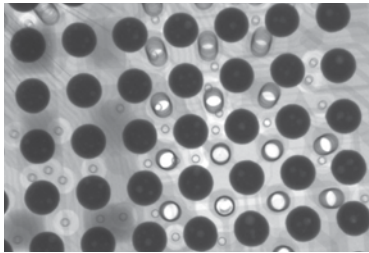


Rad-ICON™ Large-Area Detectors

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

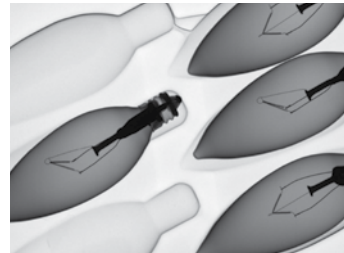
| PARAMETER | UNIT | RAD-ICON 1520 | RAD-ICON 2022 | RAD-ICON 3030 |
|---------------------------|----------|-------------------|-------------------|-------------------|
| GENERAL | | | | |
| TECHNOLOGY | | CMOS ACTIVE PIXEL | CMOS ACTIVE PIXEL | CMOS ACTIVE PIXEL |
| PIXEL PITCH | [µm] | 99 | 99 | 99 |
| PIXEL CAPACITY MODES | [#] | 2 | 2 | 2 |
| ACTIVE AREA | [mm] | 153X204 | 204X221 | 307X307 |
| RESOLUTION | [pxl] | 1548X2064 | 2064X2236 | 3096X3096 |
| BANDWIDTH | | | | |
| DATA INTERFACE | [-] | GigE | CameraLink | CameraLink |
| ADC CONVERSION | [bits] | 14 | 14 | 14 |
| FRAME RATE - 1X1 (GIGE) | [fps] | 20 | 30 | 30 |
| POWER CONSUMPTION | | | | |
| POWER SUPPLY | [Vdc] | 10..25 | 10..25 | 10..25 |
| POWER CONSUMPTION | [W] | 12 | 15 | 18 |
| ACTIVE COOLING | [y/n] | NO | NO | NO |
| INTEGRATION | | | | |
| FOOTPRINT (WXHXT) | [mm] | 229X204X36 | 292X237X59 | 377X329X59 |
| WEIGHT | [kg] | 3.5 | 5 | 8 |
| EXTERNAL INTERFACE MODULE | [y/n] | NO | NO | NO |
| ENVIRONMENTAL | | | | |
| OPERATIONAL TEMPERATURE | [°C] | 0..+40 | 0..+40 | 0..+40 |
| STORAGE TEMPERATURE | [°C] | -10..+50 | -10..+50 | -10..+50 |
| HUMIDITY | [% R.H.] | 10 TO 80 | 10 TO 80 | 10 TO 80 |
| X-RAY RANGE | [kV] | 10..225 | 10..225 | 10..225 |



BALL GRID ARRAY



CHECK VALVE



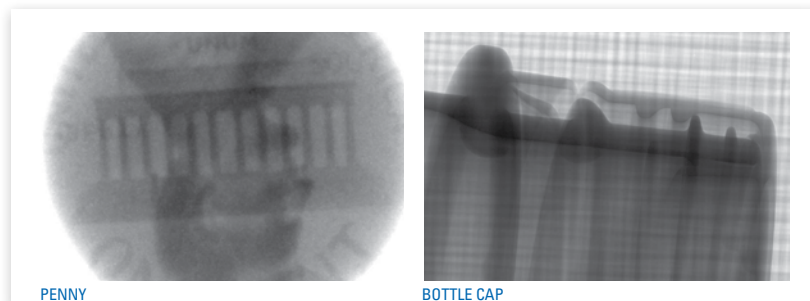
LIGHT BULBS

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 | CMOS ACTIVE PIXEL | CMOS ACTIVE PIXEL | CMOS ACTIVE PIXEL | 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.] | 10..80 | 10..80 | 10..80 | 10..80 | 10..80 |
| X-RAY RANGE | [kV] | 5..160 | 5..160 | 5..160 | 5..160 | 5..160 |

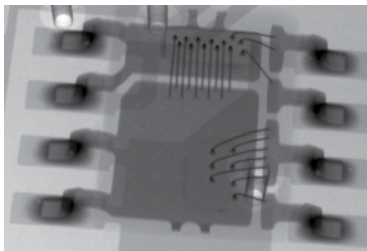


Line Scan X-Ray Detectors

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 speed 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-O-SCAN 8K |
|---------------------------|-------------------|------------|----------------|
| GENERAL | | | |
| TECHNOLOGY | | | CCD TDI |
| PIXEL PITCH | [μm] | | 27 |
| ACTIVE AREA | [mm] | | 220X7 |
| RESOLUTION | [pxl] | | 8160X256 |
| 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] | | 10..225 |



LEAD FRAME WITH WIREBONDS



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LEADING PROVIDER AND PREFERRED PARTNER

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- Chipset & Application Reference Designs
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www.teledynedalsa.com

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