TELEDYNE DALSA
Everywhereyoulook™
Part of the Teledyne Imaging Group

# Shad-o-Scan™ 1501/3001/4501 Datasheet

CMOS X-Ray Detectors

## Key Features

- Radiation hardened CMOS technology ensures long lifetime
- 14-bit digital real-time output
- 99 µm pixel size
- 5G Ethernet interface
- Energy range 10-225 kV
- High speed (up to 50 m/min)
- Low power consumption (no active cooling required)
- On-board pixel correction
- D-TDI (Digital Time Delay Integration)
- Ready-to-run software and drivers

## Typical Applications

- Non-destructive testing (NDT)
- Electronics inspection (2D/3D)
- Food inspection
- Scientific imaging

# Shad-o-Scan Scanning X-Ray Detectors: Ultimate Sensitivity and Resolution

## Overview

With the release of the Shad-o-Scan 1501/3001/4501, Teledyne DALSA introduces a new family of scanning x-ray detectors specifically designed for the challenging requirements of high-performance industrial and scientific x-ray scanning applications. The Shad-o-Scan detectors leverage Teledyne DALSA's advanced CMOS image sensing technology, which delivers high-speed, low-dose x-ray images and yields higher image quality than other scanning devices.

The Shad-o-Scan xx01 product family consists of 3 models up to 45 cm, a 99 µm pixel size, a high-speed, real-time image transfer via a 5G Ethernet interface, 14 bits digitization and SDK's, drivers and programming support. The camera interface allows easy access to features such as adjusting the frame rate, single and multiple frame acquisitions, and control of advanced timing modes.

## Software

Each Shad-o-Scan detector ships with Teledyne DALSA's CamExpert software and an Ethernet driver. The software is compatible with Windows 7, 8 and 10. Check with your sales representative for compatibility with other Windows versions or with the Linux operating system. The detector can be connected on a network, but for optimal performance a dedicated network adapter is highly recommended.

For writing custom applications to acquire images from the camera, we recommend using **Teledyne DALSA's Sapera Essential or the Sapera LT SDK** (free download at http://www.teledynedalsa.com).

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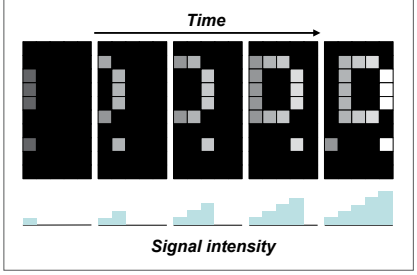
## Specifications

| Detector Specifications | Shad-o-Scan 1501 | Shad-o-Scan 3001 | Shad-o-Scan 4501 |
|---|---|---|---|
| Active Area Length | 152 mm | 304 mm | 456 mm |
| Resolution | 1536 x 64 pixels | 3072 x 64 pixels | 4608 x 64 pixels |
| Pixel Size | 99 µm | | |
| Pixel Binning Mode | 1x1 / 1x2 / 2x2 / 4x4 | | |
| ROI Readout | Programmable | | |
| Maximum Scanning speed[1] | Up to 50 m/min | | |
| Digitalization | 14 bits (16384 levels) | | |
| Image Lag | <0.1% | | |
| Non-Linearity (10..90%FS) | <1.5% | | |
| Typical Dynamic Range | 72 dB | | |
| X-Ray Sensor Lifetime Dose | > 10 kGy | | |
| **Camera Specifications** | | | |
| Supply Voltage (DC) | +15 V | | |
| Power Consumption (max) | 21 W | | |
| Data and Control Interface | 5GigE Ethernet | | |
| Trigger Connector | TTL | | |
| On-board Calibration | Yes | | |
| Digital Time Delay Integration (D-TDI) | Yes | | |
| **General Specifications** | | | |
| Operating Temperature | 0 to 40°C | | |
| Storage Temperature | -10 to +55°C | | |
| Humidity (non-condensing) | 10 to 80% R.H. | | |
| Weight[2] | < 5 kg | | |
| Ingress Protection Class | IP..... | IP69K | |

(1) 8 lines read-out mode
(2) depends on detector model

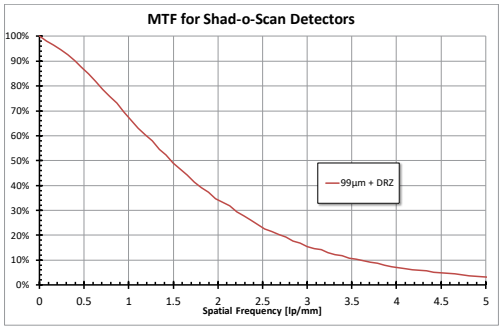
**Digital TDI Functionality**




# Resolution & Sensitivity

The Shad-o-Scan detectors are designed to work with x-ray sources operating at a wide range of beam energy settings. X-ray energies as low as 10-15 kV can be detected. The cameras can be used with x-ray energies as high as 225 kV, although we recommend the use of additional shielding and/or collimation at higher energies in order to protect the sensor element and electronics from damage.

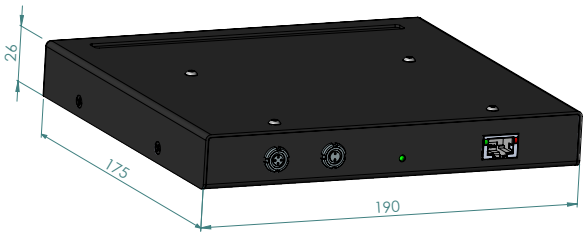
The pixel spacing determines the limiting resolution of the sensor. The actual Modulation Transfer Function (MTF) of the detector depends on the type of scintillator that is installed, as well as the binning mode selected. A thicker phosphor screen will produce more signal, but at the expense of high-frequency contrast. Typical MTF curves for the standard scintillator option is shown in the graph below.



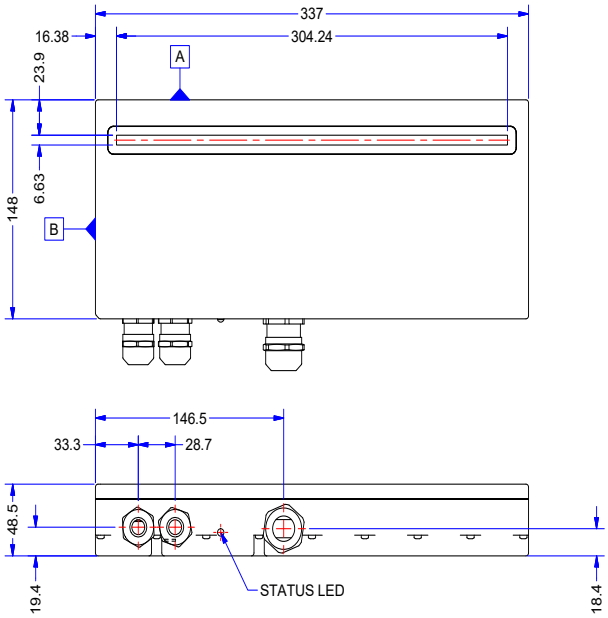

| Typical Sensitivity [1] [ADU/µGy] | Low Setting | High Setting |
|---|---|---|
| DRZ-Std | 16.2 | 77.5 |
| | | |

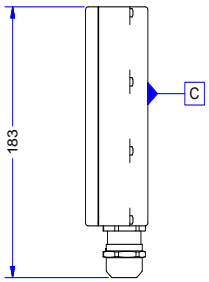
(1) W target, 80kV, no filtration

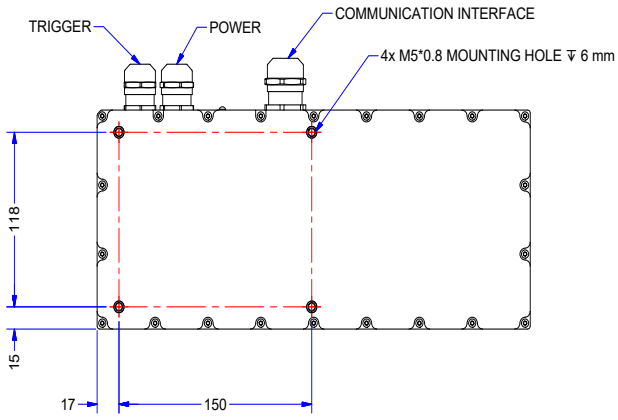
# Mechanical Drawing 1501 Model




# Mechanical Drawing 3001 Model



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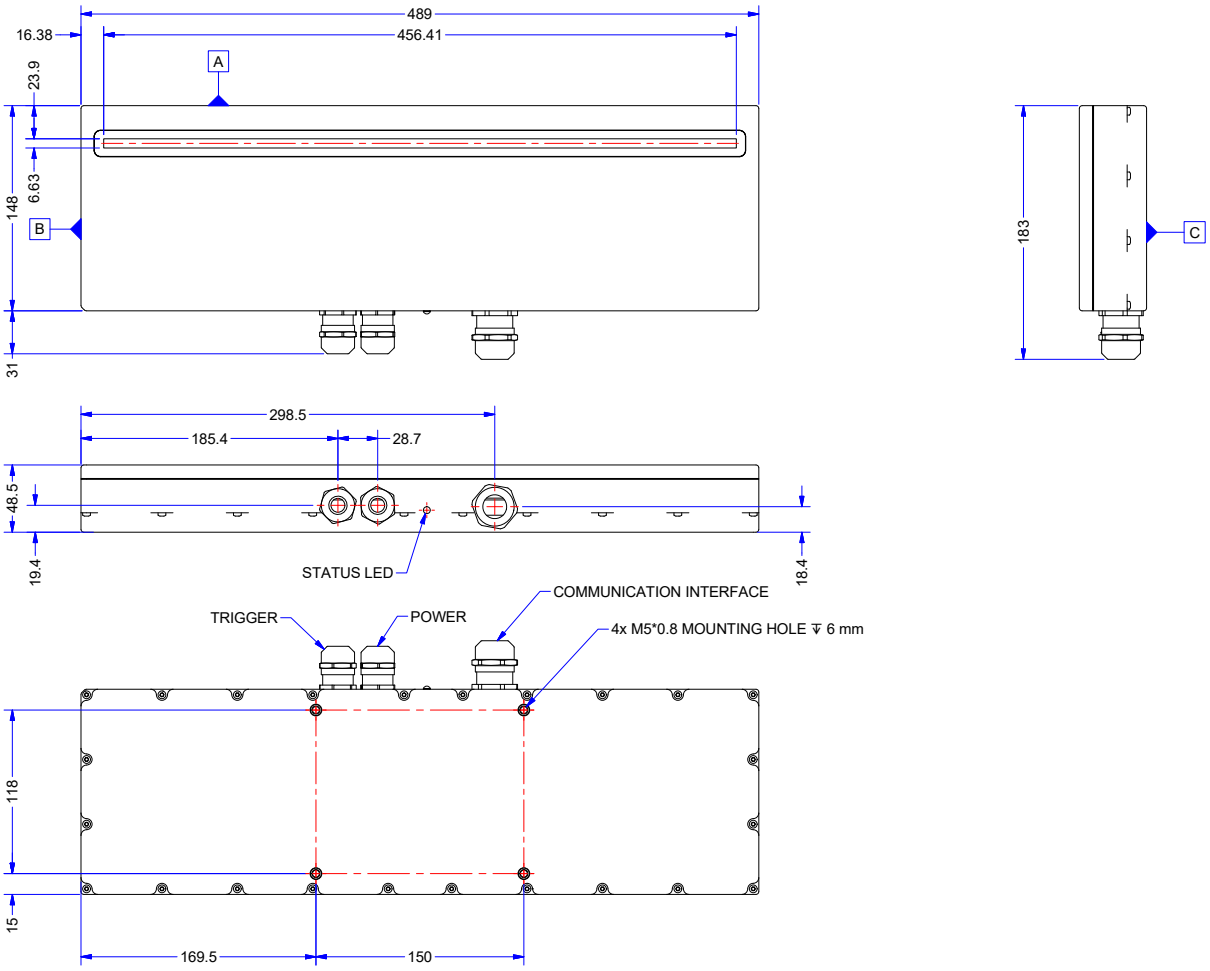
## Mechanical Drawing 4501 Model




## Ordering Information

All Shad-o-Scan detectors are shipped with a universal input power supply (90-264V, 50-60Hz) and a power cable. Please contact your nearest sales representative for additional options.

| P/N | Description |
|---|---|
| SB1681-02 | Shad-o-Scan 1501 with DRZ-Std Scintillator |
| SB1661-02 | Shad-o-Scan 3001 with DRZ-Std Scintillator |
| SB1671-02 | Shad-o-Scan 4501 with DRZ-Std Scintillator |

## Contact Information

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