

Digital Detector and Controller

Direct-to-Digital Image Capture System

Featuring . . .



The Hologic DirectRay® digital image capture system uses an amorphous selenium (a-Se) coating on a non-tiled Thin-Film Transistor (TFT) matrix to capture full-size, high resolution radiographic images. DirectRay images have been proven equivalent to the highest quality screen-film images over the full range of general radiographic examinations.

The DirectRay detector captures x-ray photons and converts them directly into electronic signals without the use of intensifying screens or scintillators. The result is a spectacularly detailed image, uncompromised by light scatter. Light scatter is an inherent problem in computed radiography,

screen-film and most digital image capture technologies. The DirectRay imaging system consists of the detector and a separate detector controller.

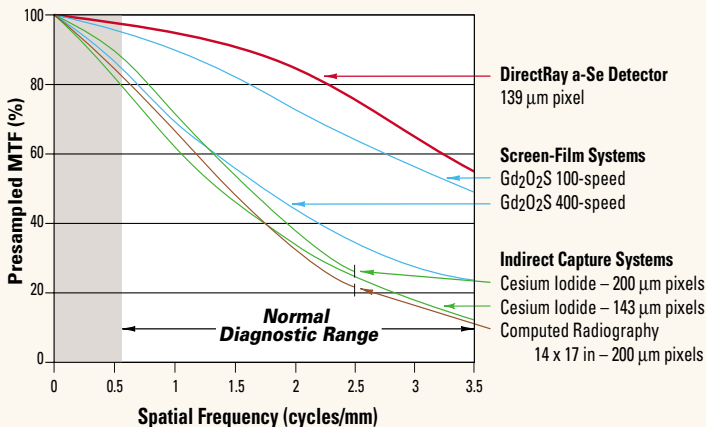
Imaging system specifications

- 3.6 cycles /mm Nyquist frequency $DQE(0) > 45\%$
- Wide dynamic range
 - captures 14 bits
 - 0.05 to 20 mR linear response (70 kVp, 21 mm Al)



Cutaway view showing the amorphous selenium x-ray absorber coating on the non-tiled thin-film transistor matrix and associated readout electronics.

Modulation Transfer Function (MTF)



Detective Quantum Efficiency (DQE)

Cycles per mm (normal diagnostic range)	DirectRay a-Se detector 139 µm pixel	Screen-film system 400 speed	Computed Radiography 14x17 in. cassette	CsI detector 143 µm pixel	CsI detector 200 µm pixel
0.5	46%	32%	15%	52%	62%
1.0	45%	29%	11%	43%	56%
1.5	42%	25%	7%	33%	49%
2.0	37%	22%	5%	22%	38%
2.5	32%	18%	3%	15%	25%
3.0	26%	15%	*	10%	*
3.5	20%	13%	*	7%	*
Measurement conditions	DN 5 70 kVp, 21 mm Al	70 kVp, 1mm Al 0.5 mm Cu	141 kVp, 19 mm Al 5 µGy	DN 5 70 kVp, 2.5 µGy	75 kVp, 20 mm Al

* Outside the limits of the detector



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Detector specifications

- Selenium (a-Se) semi-conductor x-ray absorber coating over amorphous silicon (a-Si) Thin-Film Transistor (TFT)
- Non-tiled amorphous silicon (a-Si) TFT detector matrix
- X-ray energy range: medical to high energy applications
- Nominal active image area of 14 x 17 inches/35 x 43 cm. Rectangular format makes it easier to output soft and hard copy images without the need for minimizing or cropping
- Physical dimensions (WxHxD) of 18.4 x 18.4 x 1.7 inches/46.7 x 46.7 x 4.3 cm
- Solid state. No moving parts
- 19 lb/8.6 kg weight
- Detector pixel
 - 139 μm pitch
 - active element size of 129 μm x 129 μm
 - effective fill factor 100%
- Cable length to controller
 - maximum 95 feet/28.5 m with disconnect at 10 feet/3.0 m
- Detector exterior
 - scratch and wear resistant
 - dark finish resistant to 10% bleach solution, glutaraldehyde and other antibacterial cleaners
 - sealed from liquids and body fluids, but not submersible

Controller specifications

- Controller software
 - acquires and processes captured image data
 - calibrates detector and corrects for gain and offset variations
 - communicates with host system controller
- Built-in diagnostic software tracks error conditions in digital detector and controller reducing downtime and time to repair
- Timing specifications
 - Exposure window: 1 second (default) programmable
 - Preview time: approximately 12 seconds
- Physical dimensions (WxHxD) of 19.5 x 14.9 x 3.7 inches/49.5 x 37.8 x 9.4 cm
- 16.3 lb/7.3 kg weight
- Supports worldwide power standards

Code compliance

- UL listed
- CE mark

Recommended system environment

- Designed to operate under standard HVAC conditions
 - operating temperature range: 50 to 95° F (10 to 35 °C) with ambient airflow across the back surface
- Altitude (entire system)
 - maximum of 10,000 feet/3,000 m for operation
- From 10 to 80% non-condensing relative humidity
- Static load maximum of 39 lb/18 kg applied to the front surface over a nominal 4 x 4 inch/10 x 10 cm area
- Vibration maximum of 0.5 G RMS



Direct Radiography Corp.

600 Technology Drive
Newark, DE 19702
T: 302-631-2700
F: 302-731-7438
www.hologic.com

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