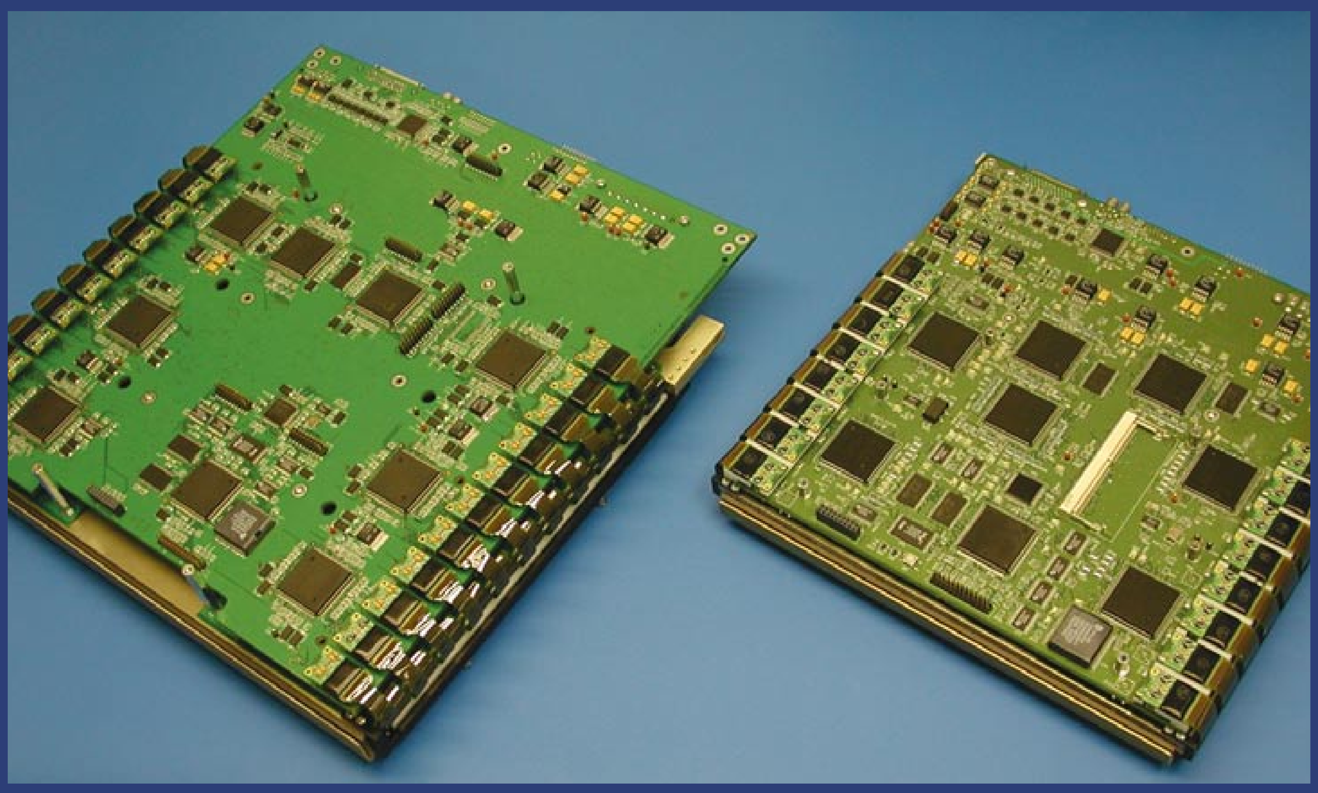
Planmed

Planmed Nuance Full Field Digital Mammography

The real-time amorphous selenium (α-Se) Flat Panel Detector (FPD) technology overview

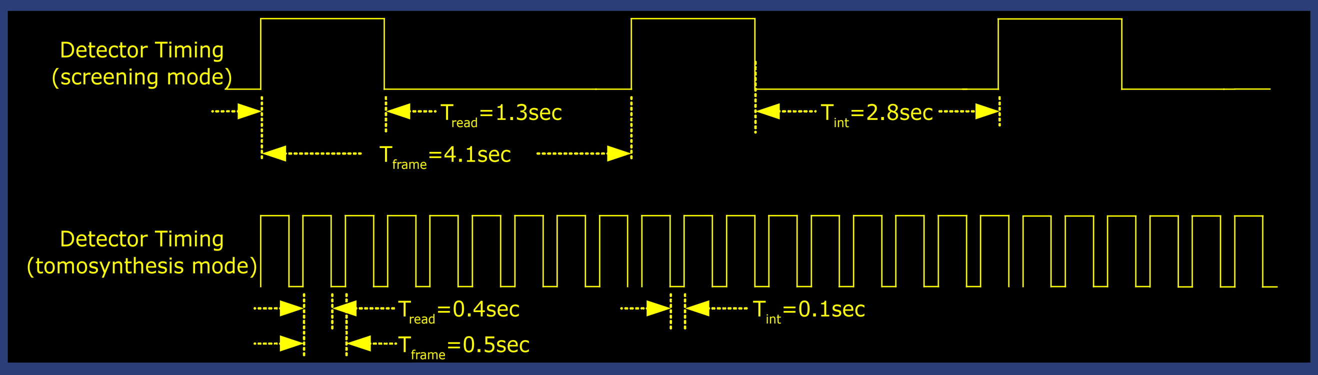
Detector is derived from the same technology employed in a fluoroscopic detector, which is capable of imaging at 30 frames per second. The thickness of the selenium structure is 200µm, and the pixel size of the detector is 85µm. The 2816x3584 or 2016x2816 array is connected to custom readout ASIC's and scan drivers through tape-automated bonding (TAB) technology. The selenium layer used in the real-time detector uses unipolar-conducting blocking layers to create a p-i-n structure, which allows image charged to reach their corresponding collection electrodes, and prevents the injection of leakage charge from the collection electrodes into the selenium.[1]



2816x3584 *23.9 cm x 30.5 cm*   *2016x2816* *17.4 cm x 23.9 cm*

Screening, Diagnostic and Advanced Applications

Two mode of operations are defined for this detector,one for screening and diagnostic, one for tomosynthesis. There are two primary differences between the modes of operation,frame rate and the dynamic range. For the screening the read-out time is 1.3s and for the tomosynthesis 0.4s. Quantum noise is limited down to 0.2mR.[1]



Screening and diagnostic mode: 1 frame per every 5.4s, dynamic range 1200:1

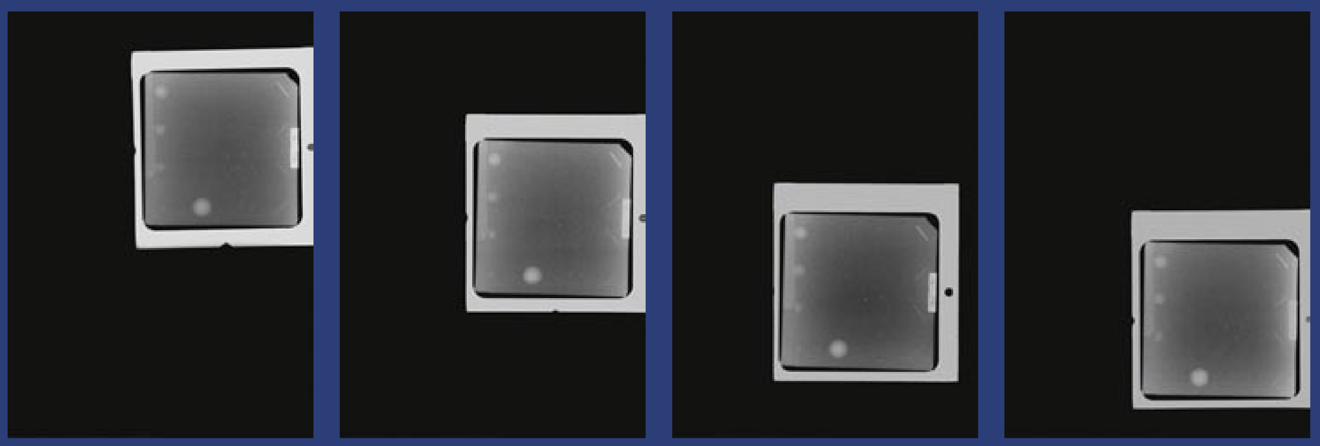
Tomosynthesis mode: 2 frames per 1.0s, dynamic range 800:1

Anatomically Adaptable Automatic Exposure Control (AEC) for amorphous selenium (α-Se) Full Field Digital Mammography (FFDM) system

The Automatic Exposure Control (AEC) operation is based on a principle where the imaging chain components are all modeled into the system software. Based on the detected object composition together with the other imaging parameters the amount of signal produced by the amorphous selenium flat panel is exactly calculated and the desired dose of the exposure on the detector is thereby reached accurately. The AEC consists of 48 individual detectors that cover a selenium flat panel area. It is therefore able to measure a well representative sample of the tissue to be exposed and adjust the exposure parameters optimal for the tissue composition. Optimal image quality and dose requires anatomically adjusted imaging parameters, which presents the true breast tissue composition taking account in all different glandular tissue in the breast. Based on the detected object composition together with the other imaging parameters the amount of signal produced by the selenium flat panel is exactly calculated, and the desired image quality and dose is reached accurately.[3]

No ghosting artefacts

The phantom was placed on the surface of the detector and imaged with a 26kVp, 100mAs exposure, which translates to exposure of 1100mR to the detector, and an exposure to the detector underneath the phantom of around 33mR (including scatter). Thirty seconds later, the phantom was moved to a new location, which partially overlapped the previous position, and re-imaged with the same technique. The edge of the ACR phantom presents a very high contrast object which can render a ghost. This process was repeated four times. No ghosting artifacts could be seen in any of the four images.[2]



References

1. Loustauneau V, Bissonnette M, Cadieux S, Hansroul M, Masson E, Savard S, Polischuk B, Lehtimäki M
"Imaging performance of a clinical selenium flat-panel detector for advanced applications in full-field digital mammography"
Medical Imaging 2003 Proceedings of SPIE Vol. 5030, 2003

2. Loustauneau V, Bissonnette M, Cadieux S, Hansroul M, Masson E, Savard S, Polischuk B
"Ghosting comparison for large-area selenium detectors suitable for mammography and general radiography"
Medical Imaging 2004 Proceedings of SPIE Vol. 5368, 2004

3. Varjonen M, Strömmer P
"Anatomically adaptable automatic exposure control (AEC) for amorphous selenium (α-Se) full field digital mammography (FFDM) system"
Accepted for presentation and publication in Medical Physics Session and Medical Imaging 2006 Proceedings of SPIE Vol. 6142, 2006

works in progress