

AbstractID: 8491 Title: Advances in sub-second CT scanning with a 64-row amorphous silicon flat panel imager

Purpose: To increase the data acquisition speed and detection limits of amorphous silicon flat panels for use in a low cost multidetector-row CT (MDCT) scanner with diagnostic image quality.

Methods and Materials: A bench-top sub-second flat panel (FP) multidetector-row CT system has been developed using three 64-row FP detectors. Each FP is 30 cm x 3.3 cm in active area with 576 x 64 pixels that are 0.52 mm per side. A high degree of parallel processing is used to speed the data acquisition from the panels. Dynamic gain operation of the ASIC readout amplifiers has been used to improve noise performance over the previous fixed gain mode. The system has been tested with various detachable scintillators and scans of performance and anthropomorphic phantoms are compared with their diagnostic MDCT scans.

Results: The 64-row FP MDCT system can achieve full rotation 660 projection scans in 1 seconds. A 0.3 second partial rotation scan can be achieved with 32 rows by row binning. The image quality of 20 cm diameter performance phantom scans is comparable to a commercial MDCT scanner with similar technique/dose. Medium sized body scans are nearly comparable except for slight artifacts due to panel overlaps and lag. Large body phantom scans have improved with increased dynamic range provided by the readout ASICs dynamic gain mode.

Conclusion: The results indicate the potential for FP MDCT to be used as a less expensive and less complex alternative to crystalline silicon detectors on MDCT scanners. There is pressure to increase the number of MDCT rows beyond 64 in cardiac imaging to achieve single organ coverage in one scan rotation. The use of larger area FP detectors to achieve greater than 256 rows exists and the sub second speed can be achieved with compensations and a high degree of parallel processing.