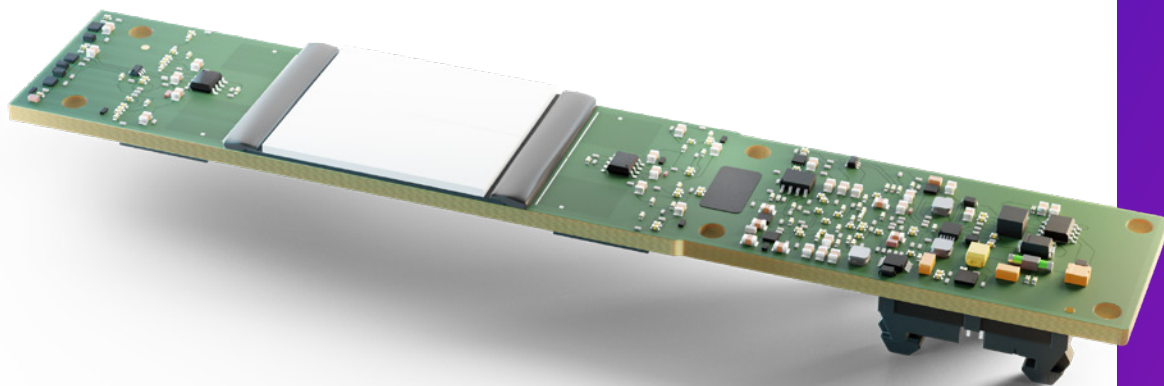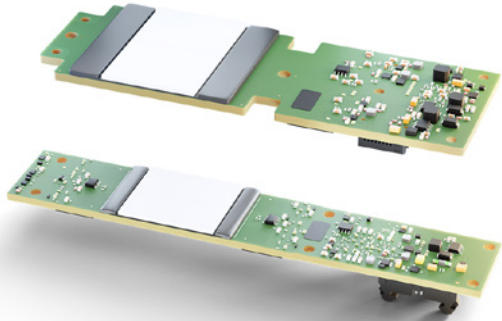# X-ACE

Off-the-shelf medical CT detector series

DT

- **Sets a new industry standard as the first off-the-shelf detector series optimized for value and mainstream medical CT systems**

- **Built on a well-proven platform that features the highest integration level**

- **Streamlines multi-slice system designs and detector integration**

- **Speeds up the time-to-market**

- **Brings total cost savings**

- **Provides superior image quality with low doses at fast scanning speeds**

- **Features robust structure, and reliable mechanical and electrical interfaces**

- **Available also as a subsystem with software development kit**

The X-ACE product family is the industry's first standard detector series optimized for value and mainstream medical CT (computed tomography) imaging needs. It is available as 16-slice and 32-slice detector modules with 20 mm anatomical coverage. It provides high image quality with low doses at fast scanning speeds for enhanced patient safety and experience. The 16-slice detector is also available in HD version, enabling 10 or 20 mm anatomical coverage at the isocenter.

The X-ACE series is built on the well-proven and modular platform, covering a wide imaging area. It features the highest level of integration, as a scintillator, a photodiode, analog-to-digital converters (ADC) and a field programmable gate array (FPGA) are assembled to a single printed circuit board (PCB). As a benefit, this means simplified system designs, straightforward integration, minimized risks, a streamlined supply chain, and detector solutions that are mechanically robust and digitally enhanced. This brings notable total cost savings and speeds up the time-to-market of advanced CT systems in the highly competitive medical imaging market.

State of the art performance of the X-ACE series is enabled by a pixelated, ultra-fast ceramic scintillator, coupled with a high-performance frontside-illuminated (FSI) photodiode. The scintillator is made of high-light-output and medical grade GOS (Gadolinium Oxysulfide) compound. The characteristics of the most sensitive and ultra-low dark current photodiode are enabled by utilizing a unique FSI photodiode manufacturing process. A 24-bit ADC provides fast, low noise, and high-resolution analog to digital conversion. Furthermore, the detector boards feature an adjustable full-scale range. The solution is compatible with an X-Link digital LVDS interface.

To facilitate system design and integration, world-class engineering support and customer evaluation units are available. Furthermore, complete subsystems, including the detectors, a data combiner board, required software libraries and accessories, are available. For slip-ring based systems, an associated adapter board is also available.
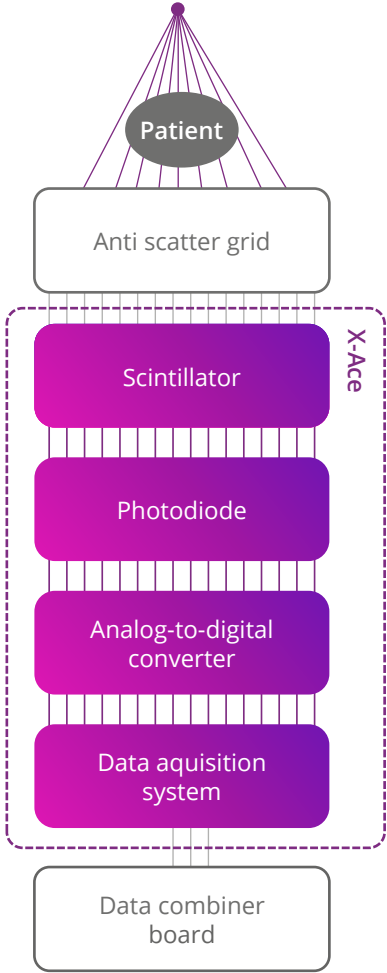
Key features

- Scintillator, photodiode, ADC, and FPGA on a single PCBA
- High-light-output, ultra-fast medical-grade GOS scintillator
- Highly sensitivity, ultra-low dark current FSI photodiode
- Low noise, high resolution 24-bit ADC
- Adjustable integration time 200 µs to 100 ms
- No charge loss sampling
- 20 mm anatomical coverage at the isocenter
- Digital LVDS interface
- Adjustable full-scale range – 6.25 to 150 pC

Applications

- Medical CT imaging

Technical specifications of X-ACE detector modules

Product	X-ACE 16	X-ACE 16 HD	X-ACE 32
Number of pixels in Z-axis (data output)	16	16	32
Number of pixels in X-axis	48	48	32
Number of output channels	768	768	1024
Pixel pitch in Z-axis (mm)	2.00	1.00 / 2.00	1.12
Pixel pitch in X-axis (mm)	1.08	1.08	1.06
Anatomical coverage in iso-center (mm)	20		
Scintillator material	GOS		
Scintillator thickness (mm)	1.4		
AD conversion	24-bit		
Adjustable FSR (pC)	6.25, 12.5, 25, 37.5, 50, 75, 100, 150		
Adjustable integration time	200 µs – 100 ms		

Subsystem configurations with X-DCB2

X-DCB2 is a next generation data acquisition and readout board for X-ray detector subsystems. It enables shorter development time and speeds up time to market by providing a full subsystem together with the detector modules and required software for system integration.

X-DCB2 reads the image data from detector modules, processes the data and sends the digital image data to a host computer. Connection from detector modules to X-DCB2 are enabled with X-link, utilizing synchronous high-speed LDVS communication. Connection from X-DCB2 to the host computer is available with Gigabit Ethernet, SFP+ optical fiber or with a CameraLink interface. An associated adapter board for CameraLink is available for slip-ring applications to enable image data and command data transfer between rotating and non-rotating part of the system.

DT provides a graphical user interface application X-view2 for basic controls and image acquisition. DT proprietary software library X-LIB is available for developers for full system integration.

Example subsystem configurations

Feature	X-ACE 16 and 16 HD subsystems	X-ACE 32 subsystem
Number of X-Link segments	6	
Detector cards for each X-Link segment	8	
Maximum number of detector cards	48	
Minimum view time	400 us (with 48 detector boards)	550 us (with 48 detector boards)
Maximum throughput	2.5 Gbps	
Supported data interface	CameraLink/Optical SFP+	
Other interfaces	ABZ encoder, command, power input	
Voltage input	12–24V +/- 10%	
Power consumption	<20 Watt	
G-force	20 G	
Mechanical dimensions	X-DCB2: 247 mm (L) x 120 mm (W) x 30 mm (H) Camera link adapter: 155.93 mm (L) x 116.6 mm (W) x 31.1 mm (H)	
Operating temperature	10 to 50 Celsius degrees	
Operating humidity	10–80% RH (non-condensing)	

X-DCB2 data combiner board   **CT slip ring**   **X-DCB2 CL adapter**   **PC**

X-DCB2 data combiner board

X-DCB2 adapter

Detection Technology