X-Card ME3

Multi-energy X-ray detector board

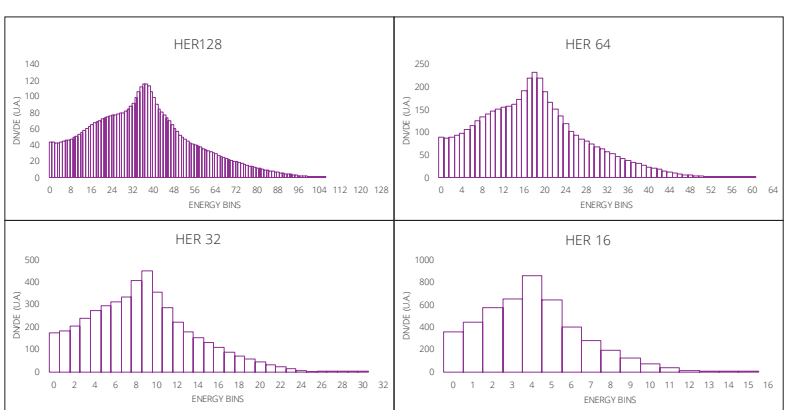
- Extremely precise material discrimination capability even for materials with similar atomic compositions
  - Improves identification of all solid and liquid materials
  - Reduces false alarm rate
  - Speeds up passenger throughput at security checkpoints
  - Makes material flow analysis more accurate in production lines
- Energy bins easily configurable to optimize spectral information for the analysis' algorithms
- Improved spatial resolution enhances shape recognition in security systems
- Compensation of semiconductor crystal instabilities to reduce the warm up time
- Count rate optimized for security applications
- Modular and easily scalable platform
- All system building blocks available, including high-speed readout electronics
- Powers the most demanding X-ray line-scanning applications

X-Card ME3 is a stand-alone multi-energy detector board designed for linear X-ray imaging systems. It powers a variety of security and industrial applications that require state-of-the-art material discrimination capability yet cost-effective architectures in comparison with multi-view and CT systems. For example, it is an ideal solution for meeting the requirements of the EDS CBS C2 standard, making it possible to keep laptops and other personal electronics in the hand luggage during the scan.

X-Card ME3 provides up to 128 energy levels enabling extremely precise material discrimination of materials even when they have similar atomic compositions. This improves identification of all solid and liquid materials, reduces the false alarm rate, speeds up passenger throughput at security checkpoints, and provides more accurate material flow analysis in production lines. The energy bins are easily configurable to optimize spectral information for the analysis algorithms.

X-Card ME3 comes with carefully selected direct conversion semiconductor material operating at room temperature, and a unique digital signal processing chain. This provides high-performance spectroscopic single photon counting capability that enables the most accurate material discrimination.

X-Card ME3 is based on a modular and easily scalable platform. A complete, application-optimized detector subsystem can be built by combining a number of these photon-counting detectors and readout electronics, which enables real-time photon counting and precise photon energy measurement. The detector board contains a 10 cm long array of 128 pixels with a pitch of 800 µm, and can be daisy-chained to a number of different system configurations.



Example of X-Card ME3 spectra. Output for the four HER acquisition modes.

Key features

- CdTe semiconductor detector element
- 128 pixels per module
- Two detector read-out modes: 1x1 or 2x1 to balance spatial resolution and enhance contrast
- Two spectroscopic acquisition modes from 20 to 160 keV
  - High energy resolution (HER) mode for 16, 32, 64 and 128 energy bins
  - Energy bins mode for configurable energy bins from 2 to 8
- Real-time digital signal processing enables reliable spectroscopic imaging
- Raw energy spectrum calibrated in the energy domain
- Daisy chaining of up to 30 modules forming a 300 cm linear detector array with a single X-IM ME3 interface module
- Diagnostic modes for system configuration and monitoring
- Thermal drift compensation
- Resistant to humidity and temperature changes
- SW kit available to support easy integration
  - Windows or Linux compatible API (application programming interface)
  - Test tool
  - SDK (Software development kit)

Applications

- Screening of carry-on and checked-in baggage, parcels, mail, air cargo, and persons.
- Product safety and quality inspection, material sorting and process control in a variety of industries.

Key characteristics

Parameter	X-CARD ME	X-CARD ME3 XC
Product code	3000027267	3000029815
Sensor type	CdTe semiconductor crystals	
Number of pixels	128	
Intrinsic pixel pitch	0.8 mm	
Crystal thickness	2 mm	
Counting period	0.5 ms to 100 ms / line (step 10 µs)	
Detector binning	1x1 (0.8 mm pitch) or 2x1 (1.6 mm pitch)	
Energy range	20–160 keV	
Number of energy bins	Up to 128	
Linearity	≥ 86% @ 2•106 counts/s/pix	
Saturation	5.0•106 counts/s/pix	> 7.0•106 counts/s/pix
Energy resolution	7.7 KeV @ 60 keV (105 counts/pix/s)	
Adjacent defective pixels	0	
Non adjacent defective pixels	3 (2.3 %)	
Overall uniformity	> -10% < 5%	
Detector element length	128 pixels / 102.3 mm	
Mechanical dimensions	34 mm x 220 mm x 103.5 mm	
Weight	0.70 kg	
Operational voltage and power	48 VDC	
Power consumption per module	28 W	35 W
X-ray tube voltage Vp range	Up to 160 kVp	
EMC compliance	EN 61326-1, EN 61000-4-2, EN 61000-4-3	
RoHS compliance	Yes	
Operational temperature and humidity	0°C to +40°C, 5-95% RH non-condensing	
Storage temperature	-20°C to +60°C	

Mechanical dimensions

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Detection Technology