Readout electronics for CUBE-based SDDs

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KETEK already has launched the combination of Silicon Drift Detectors with the CUBE ASIC as FET replacement, which provides considerable improvement concerning throughput, spectroscopic characteristics and reduced cooling requirement.

For the last two years significant progress has been achieved regarding the readout of CUBE-based Silicon Drift Detectors with established KETEK electronic modules. Hence the advanced spectroscopic performance capabilities of the CUBE chip can be utilized in customized OEM spectrometer designs.

Typical applications can be covered by a wide variety of signal processing components specifically engineered for operation with the CUBE ASIC readout:

The product line starts with the miniaturized VIAMP preamplifier, typically used in handheld applications. In addition to the analogue signal conditioning section, the VIAMP electronics include all necessary filter circuits as well as voltage derivation for the specific SDD and ASIC power supplies. For vacuum-operation the compact AXAS-C is recommended, which also includes features like electronically adjustable biasing and differential output.

The product portfolio is complemented with the midrange and high-end systems AXAS-D and AXAS-M comprising high voltage supply, TEC controller and digital signal processing. Besides the highly integrated VIAMP, all AXAS platforms are equipped with the CUBE-PA, a new plug-in device of the VICO family, which contains the main functionality to operate the ASIC. KETEK also offers this approved preamplifier to OEMs for custom-specific development.

All units are fully interoperable and allow easy substitution of existing FET-based SDDs, which benefits the OEM customers with reduced time-to-market.

The excellent spectroscopic performance of the CUBE SDDs, recorded under laboratory conditions, could accurately be reproduced with the new electronics family, even in harsh industrial environments. Some obtained reference values are listed below, more detailed plots will be presented within the poster:

- 125 eV Mn-Ka FWHM @ 2 µs digital peaking time
- <140 eV Mn-Ka FWHM @ 0.1 µs digital peaking time
- FWHM loss from 1kcps to 100kcps: <1 eV
- <135 ev @ 0°C chip temperature
- Peak/Background ratio > 20,000