

All-new Electronic System for Combination with Silicon Drift Detector Preamplifiers

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A Silicon Drift Detector (SDD) is ideal to combine high resolutions and very short measurement times. An essential contribution to achieve maximum performance comes from the electronic system which powers the SDD and from the Digital Pulse Processor (DPP) in changeable ambient conditions. Therefore KETEK renewed its versatile OEM electronic system (VICO-AV/-DV 2.0) for the combination with the proven VIAMP module (VITUS SDD + AMPLIFIER PCB) modules.

Downscaling, power efficiency and flexible integration are some of the main goals for current developments on the market. Following this, the PCB area was reduced by almost 60%, the maximum power consumption could be decreased by over 40% and the main settings are now accessible via software.

A single power supply with wide input range, between +5V and +12V, is sufficient to power up the complete spectrometer including the unprecedented small PCB, which generates the positive and negative supply for the preamplifier. Moreover it contains the high voltage supply for depletion of the detector and an efficient thermoelectric cooler (TEC) controller, which stabilizes the detector temperature at the desired target value. In order to reduce the variant diversity, the VICO-AV/-DV 2.0 can be combined with all KETEK SDDs featuring the new cooling technology. As a result, the detectors can be operated at Peltier hot side temperatures of up to +70°C, still achieving stable chip temperatures down to -50°C.

In applications with critical thermal budget the heat dissipation of all electronic devices has to be minimized. Thus only switched-mode power supplies are used on the VICO-AV/-DV 2.0 to reduce power loss. Further, effective filtering is crucial for excellent spectroscopic performance down to 100ns peaking time. First measurements with a 20mm² SDD revealed an energy resolution of the Manganese K-alpha line (FWHM) better than 136eV at -35°C chip temperature and 0.1µs peaking time. At optimal conditions (2µs, -55°C chip temperature) the energy resolution gets lower than 126eV.

Another new feature is the possibility to set and readout various parameters via software interface. Besides the current system status like hardware/software revision, power state, PCB temperatures and TEC current/voltage, also the SDD temperature can be set and read back. Especially for mobile applications, an easy to implement power-save-mode allows to increase the battery lifetime significantly.

KETEKs state-of-the-art DPP2 is available as an option which transforms the analog VICO-AV 2.0 into the fully digital VICO-DV 2.0. All relevant DPP2 operation parameters can be set via software (high-speed USB 2.0 or RS-232 interface).