OVERVIEW

The DXP Mercury packages a high speed digital pulse processors in a compact desktop box with built-in power supply. Peaking times range from 0.1 to 160 µs with a maximum output (at the shortest peaking time) of up to 1Mcps into the spectrum. The DXP Mercury has excellent noise performance suitable for high resolution spectroscopy over an extended energy range 0.1-100 keV and beyond, using either a single detector or multi-element detector arrays. The Mercury processors offer computer control over all amplifier and spectrometer settings including gains, peaking times, and pileup inspection criteria.

The trapezoidal digital filters achieve significantly enhanced throughputs at comparable energy resolutions when compared to analog systems. Energy resolution is nearly independent of count rate up to maximum throughput (63% dead-time). The full computer interface allows all data collection and calibration operations to be automated. Data can be saved in either a full spectrum of up to 16K channels or in up to 32 regions of interest (ROIs), and passed to the host computer without interrupting data collection.

The DXP Mercury operates with a wide range of Reset type preamplifiers of either polarity. Several timing modes are offered, including fast scanning with full MCA readout or multiple ROIs. The onboard memory manager gives full access to the data even during data collection. For deadtimeless operation with fast scanning, the memory can be organized into two independent blocks, allowing readout of one block while the other is being filled. Peak readout speeds across the USB2 interface exceed 16 MB/sec.

APPLICATIONS

- **X-ray Spectroscopy:**
  High resolution spectroscopy with singe or quad SDDs.

- **X-ray Microanalysis:**
  Fast mapping operation for SEM and other scanning applications.

- **Synchrotron beamline research:**
  High rate continuous data collection for XAFS.

- **Embedded OEM Applications:**
  Available as a stand-alone box or OEM card.
SPECIFICATIONS

Analog Inputs
• BNC connector.
• One preamplifier input with jumper-selectable gain:
  0db (x1) with 10kΩ impedance, ± 4V range.
  6dB atten. (1/2 gain) with 600Ω impedance, ± 8V range.
• Works with reset type preamplifiers of either polarity.

Digital Inputs (TTL)
• Each module has a pair of BNC connectors programmed for one of the following functions:
  Gate: Suppresses data collection when asserted.
  Allows synchronized multi-channel data acquisition.
  Sync: Logic input to control time resolved data collection, such as scanning.

Hard-wired Data Outputs
• Front panel 25-way connector with ROI, ICR and Live-Time TTL outputs.
• Up to 14 ROIs plus trigger and livetime outputs.
• Auxiliary digital lines can be configured for special applications.

Digital Controls
• Gain: 100x range, controlled by 16-bit DAC.
  Preamplifier gain range from 0.1 to 10 mV/keV at standard settings. Automated multi-channel gain setting and calibration.
• Filtering: Peaking times from 0.1 to 160µs. Adjustable flat top to eliminate ballistic deficit effects.
• Pileup: Fast channel filter time, pulse detection threshold, and fast channel pile up may be set independently to optimize performance. (Pulse-pair resolution typ.<100 ns).
• Data collection: MCA limits, bin widths, ROIs.

Software Data Outputs
• Spectrum: Up to 16384 (16K) channels (32 bits deep).
• ROIs: Up to 32 ROI regions can be defined.
• Timing: Multiple spectra or sets of ROIs can be stored; continuous operation using dual-bank memory.
• Statistics: All values required for pileup correction are available; livetime, realtime, input events, output events.
• Diagnostics: ADC trace, baseline distribution and history.

Interface
• High-Speed USB2.
• Peak USB2 transfer rate exceeds 16 MB/sec.

SAMPLE PERFORMANCE

SOFTWARE

XIA provides ProSpect, a software package primarily intended for setting up and optimizing the Mercury processor, for performing basic data acquisition and storage functions, and for generating configuration files for use by other control packages. Handel, a comprehensive set of C libraries, simplifies integration of DXP Mercury control into existing data collection software. Several alternative control packages are available, either commercially or as open-source from National Laboratory groups.

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