



SII NanoTechnology USA Inc.

PI-Spec Software & Digital Pulse Processor

The SIINT Digital Pulse Processor (DPP) is designed for energy dispersive x-ray analysis using our family of detector products. Intended for laboratory or industrial x-ray applications, the SIINT DPP provides everything necessary for our Vortex[®] X-Ray Detectors, incorporating one spectrometer channel, detector bias voltage, preamplifier and thermoelectric cooler power supplies all in a compact package. Available processor peaking times range from 0.25 to 80 μ s. The PI-SPEC software offers complete computer control over the system. The SIINT DPP significantly increases throughput with virtually no deterioration of the performance compared to typical analog systems for comparable energy resolution, but at a lower cost. Used with SIINT Vortex[®] detectors, the output count rate can reach 600,000 cps at 0.25 μ s.

Hardware Specification (DPP)

Input (Analog)

The signal input has been optimized for use with the Vortex[®] family of detectors.

Interface

USB: Version 2.0 up to 1.2 MB/s data transfer.

Digital Controls (Set via USB2.0 Port)

Gain: 80X range controlled by 16 bit DAC. For use with x-rays up to 50 keV or more and preamplifiers with gains nominally in the 0.1 to 10.0 mV/keV range.

Shaping: Triangular/Trapezoidal. Peaking time and gap (flattop) time set independently: 0.25 - 80 μ s in small steps. Adjustable gap time may be used to eliminate ballistic deficit effects.

Data Outputs (via USB2.0 Port)

Spectrum: Up to 8192 channels standard, 24 bits deep. Other: Collection livetime; total counts; pileup rejected counts; baseline statistics.

Bias Outputs: Pre-amplifier power supply
Thermoelectric cooler power supply
Four detector bias voltages (adjustable)

Spectrometer Performance

Resolution: Comparable to best analog units with excellent light element performance.

Count Rate: >1,000,000 cps incoming count rate (ICR), > 600,000 cps output count rate (OCR).

Throughput: The digital filter processing allows optimal throughput for a given peaking time.

Pileup Inspection: Pulse-pair resolution typically better than 200 ns after tuning to optimize performance on an application specific basis.

Deadtime Correction

Accurate ICR and livetime outputs allow area of reference peak to be corrected to better than $\pm 0.5\%$ accuracy from 0 to 120,000

cps at 4 μ s peaking time. Peak Stability with Rate: < 0.05%, up to four times the point of maximum throughput!

Software

Basic control software (PI-Spec) is provided; a compact dynamic link library (VTXDLL) is available that facilitates and enables the host to develop their own control software.

Features

User friendly software for spectra acquisition and manipulation.

Single unit replaces shaping amplifier, multi-channel analyzer, and high voltage and preamplifier supplies at significantly reduced cost.

Digital trapezoidal filtering, with programmable peaking times between 0.25 and 80 μ s.

High precision, internal gain control and tight pileup inspection criteria.

Accurate input count rate (ICR) and livetime reporting for precise deadtime corrections.

All digital control is implemented through a standard USB2.0 port.

Physical Specifications

Power Requirements:

110 V at 0.2 A 50/60 Hz or
220 V at 0.1 A 50/60 Hz.

Dimensions: approx 10.0"W
x 8.0"D x 5.0" H

Weight: 11.5 lbs.

The PI-Spec interactive graphical user interface is an intuitive window-style interface that provides the user with straightforward access to various functions to acquire or analyze the spectral data. A single window provides spectral display and acquisition controls with a tool bar at the top of the screen for instant access to the frequently used functions.

Features

Basic spectrum acquisition software designed and optimized to work with the SIINT DPP.

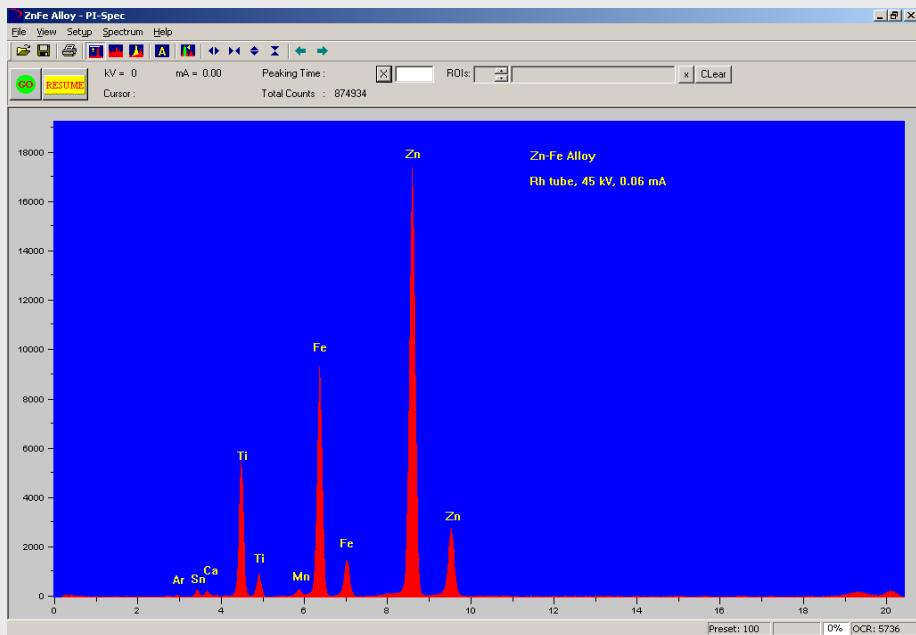
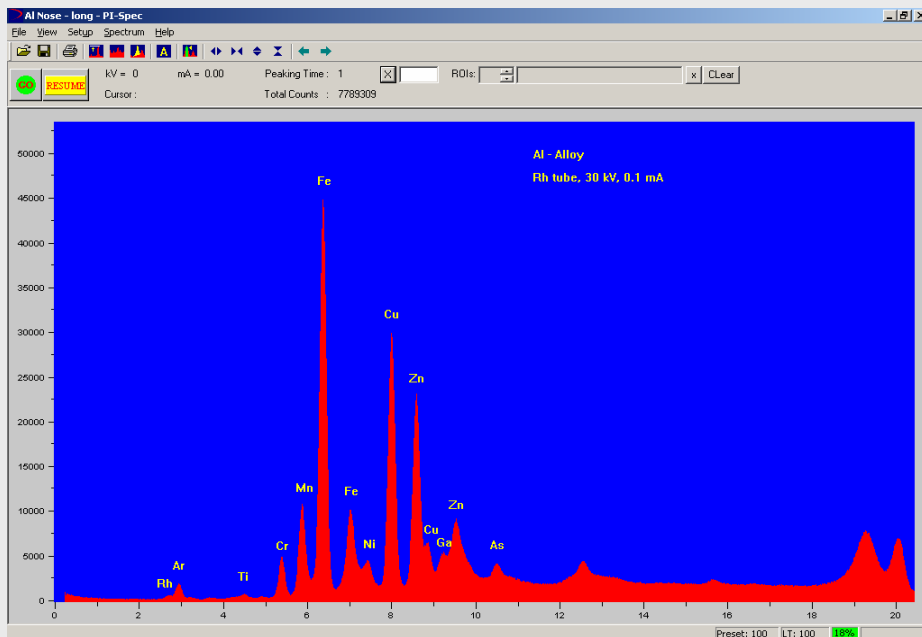
Can acquire, open/save, export/import, overlay and view spectra or manipulate, annotate, clipboard-copy and print a spectrum.

Can evaluate peak resolutions and get ROI (region of interest) counts through manual or unattended operations. Up to 10 ROIs can be conveniently defined with mouse drags.

Automatic energy calibration with a button click.

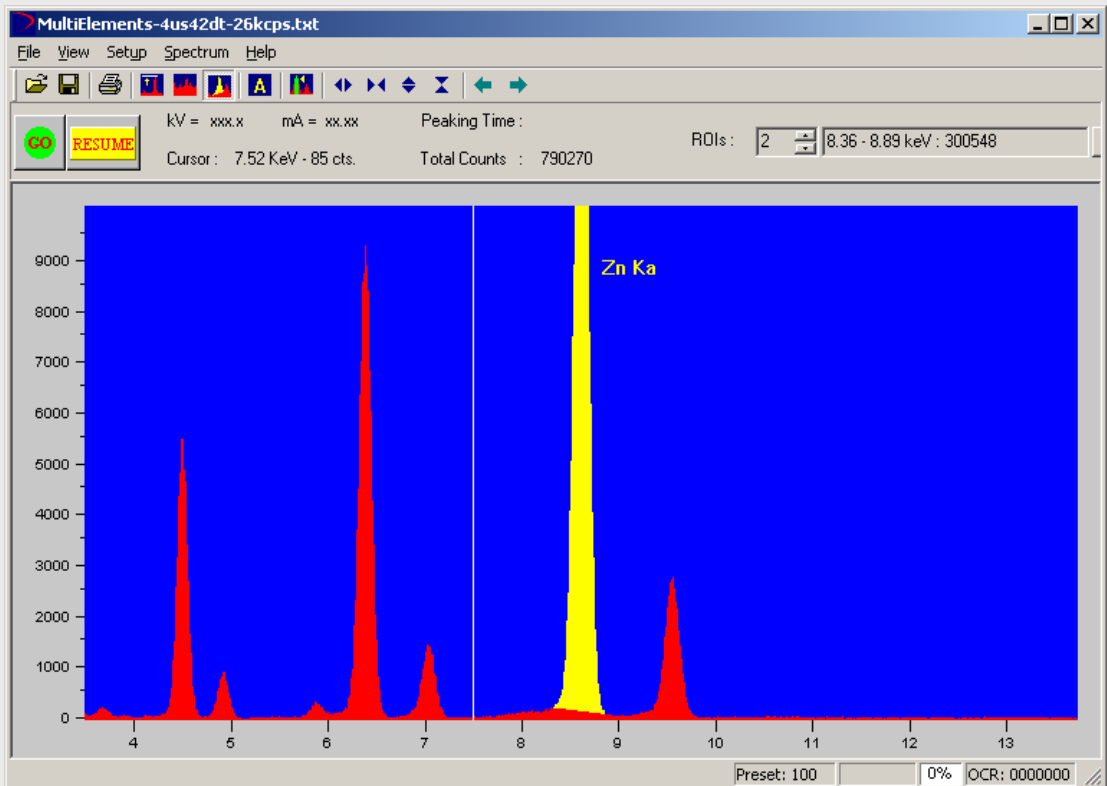
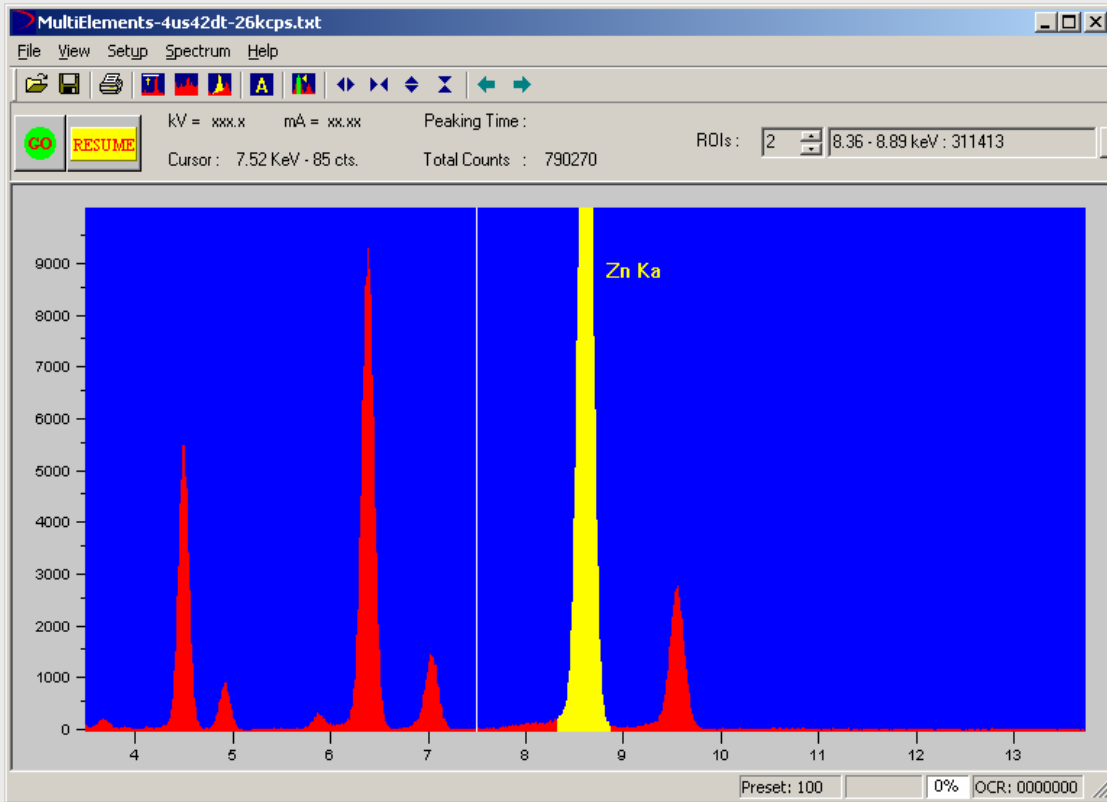
Client software can control this software through simple Windows messages to set up acquisition parameters, start/stop acquisitions and save the acquired spectra.

Export function saves the acquired spectrum in text (ASCII) format so that it can be opened by other software for further application specific processing.



CONVENIENT ROI HANDLING

Up to 10 ROIs can be conveniently defined using mouse drags. The user can edit and navigate through all the ROIs defined. All the relevant ROI information is displayed during the navigation. The ROI intensities can be displayed as raw or net. The net ROI intensity is background-subtracted intensities. The background correction uses the straight-line model through both the ROI bounds.

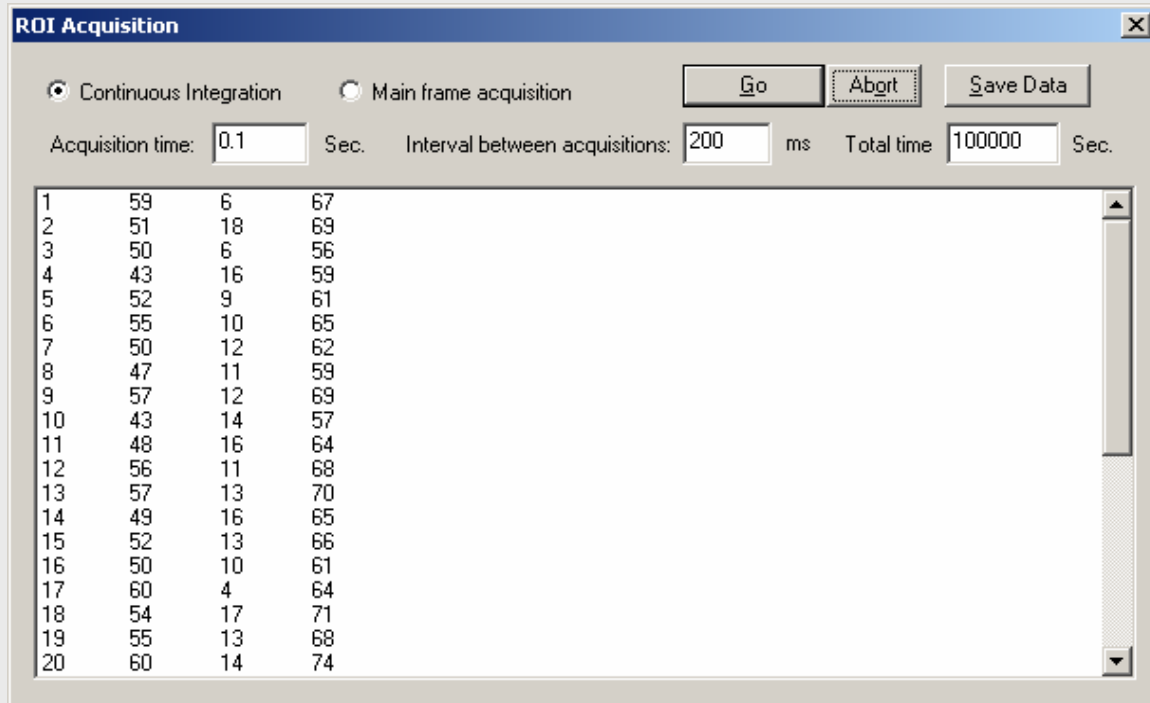


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CONTINUOUS ROI ACQUISITION

Raw or net intensity data of up to 10 predefined ROIs can be acquired simultaneously. The acquisition time can be as short as 0.01 second (10 μ s). This feature is especially useful in cases where a continuous scan using very short dwell time is needed. One can, for example, get multiple diffraction patterns in just one shot of scan. The use of high throughput Vortex[®] detectors makes this feature even more attractive. Below shows the user interface of this function, where 3 ROI intensity data are acquired every 0.1 second. The data acquired can be saved into a text file which can be opened and processed later with Microsoft Excel.



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VTXDLL DYNAMIC-LINK LIBRARY

Dedicated Dynamic-Link Library serving as an interface between the user software and the SIINT Digital Pulse Processor (DPP).

The objectives are to encapsulate, or wrap up, the otherwise complicated DPP setup procedures, making the third party software transparent to the DPP. It handles all kinds of communication and spectrum acquisition needs through only 12 functions.

This library also optimizes the DPP's performance under widely varying conditions especially with the Vortex[®] family of detectors.

The user software can assume a shortcut, interfacing with the DPP, without prior knowledge about the latter.

The source code of a sample host interface program (VTXDRV) is provided to facilitate users in developing their own control software.

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