

## Vortex<sup>®</sup> and Vortex-EX<sup>®</sup> Silicon Drift X-Ray Detectors



Vortex<sup>®</sup> and Vortex-EX<sup>®</sup> silicon drift x-ray detectors (SDD) feature the largest single element, active area (~50 mm<sup>2</sup>) available of its kind. Vortex<sup>®</sup> detectors are produced from high purity silicon using state of the art CMOS production technology. They feature excellent resolution (<136 eV FWHM is typical) and high count rate capability. At a very short peaking time of 0.25  $\mu$ s, an output count rate of 600 kcps is achieved. A unique feature of these detectors is their ability to process high count rates with virtually zero loss in resolution and no peak shift with count rate.

### Typical Applications:

- ◆ X-ray fluorescence (XRF) spectroscopy – both bulk and micro-fluorescence
- ◆ X-ray diffraction (XRD)
- ◆ Synchrotron radiation applications.
- ◆ Process control

The Vortex<sup>®</sup> is cooled by a thermoelectric cooler (TEC) device and can be thermally cycled as frequently as needed without any degradation in detector performance. Cool down times are typically less than 3 minutes.

The Vortex<sup>®</sup> x-ray spectroscopy system includes a detector unit and control box which includes power supplies for the detector and TEC, a digital pulse processor (DPP), and our PI-SPEC software.

The complete detector also contains a charge-sensitive preamplifier and temperature stabilization system, which eliminates concerns of varying ambient temperature. There are no moving parts, which prevents any loss in energy resolution due to vibration.

### Features:

Large area single element silicon drift detector (50 mm<sup>2</sup>).

Superb energy resolution.

Detector temperature stabilization.

Small compact package for minimum vibration.

Advanced vacuum system ensures limitless temperature cycles.

Additional sizes are available under special contracts.

Digital pulse processor (DPP)

# VORTEX<sup>®</sup> and VORTEX-EX<sup>®</sup>

## SILICON DRIFT X-RAY DETECTOR SPECTROMETER

### Detector:

Material	Silicon
Active Area	50 mm <sup>2</sup> (nominal)
Thickness	350 µm (nominal)

### Window:

Material	Beryllium
Thickness	25 µm (alternatives available)

### Energy Resolution (FWHM) @ 5.9 keV:

	Typical	Maximum
@ 12 µs Peaking Time	<136 eV	140 eV
@ 4 µs Peaking Time	<145 eV	150 eV
@ 1 µs Peaking Time	<165 eV	178 eV
@ 0.25 µs Peaking Time	<230 eV	250 eV

### Preamplifier:

Type	Charge sensitive, 2 mV/keV
Signal polarity	Positive
Reset	Electrical, <1 µs duration

### Cooling:

Thermoelectric

### Power Consumption:

Nominal Voltage	110/230 V (switchable)
Power Supply and Detector	40 W max

### Physical Specifications:

	Vortex <sup>®</sup>	Vortex-60EX <sup>®</sup>	Vortex-90EX <sup>®</sup>
Detector package weight	680 g	900 g	950 g
Length	181 mm (33 mm probe)	227 mm (60 mm probe)	241 mm (90 mm probe)
Height x width	62 x mm 62 mm	62 mm x 62 mm	64 mm x 64 mm
Cable standard length	3 m	3 m	3 m

US Patent Number 6,455,858

### Digital Pulse Processor\* (DPP):

#### Digital Controls:

Gain	16-Bit DAC
Peaking Time	0.25 - 64 µs
Preset Time	Up to 1717 s

#### Data Output:

Spectrum Size	1024, 2048, 4096 or 8192 channels
Channel Size	10, 20 Or 40 eV

**Integral Non-linearity:** 0.1% of full-scale output

**Deadtime Correction:** better than ± 0.5% accuracy from 0 to 120,000 cps at 4 µs peaking time

DPP PCB occupies same card rack as Vortex<sup>®</sup> power supply and is powered internally.

#### Power Consumption (Additional):

DPP	3.2 W
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### Software

#### PI-SPEC software\*

Allows user to acquire, manipulate spectra. Pentium III or later with 64 MB memory and 30 MB available disk space.

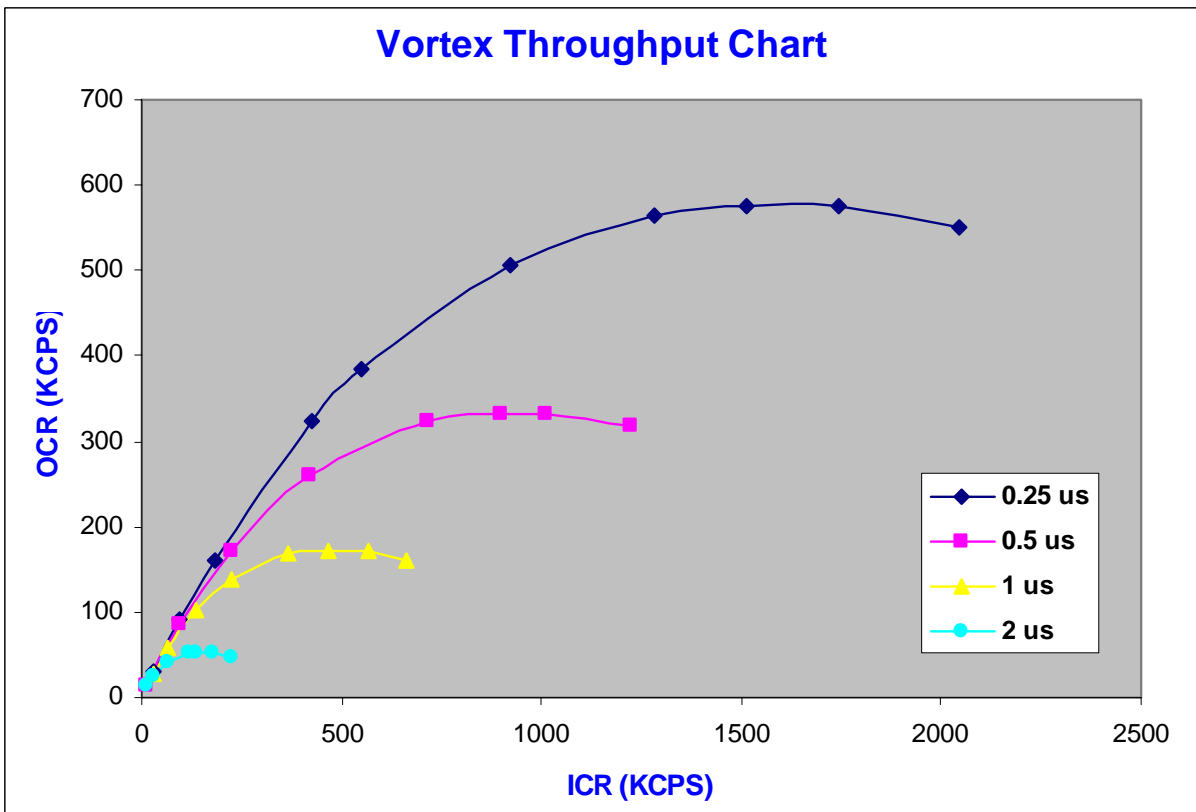
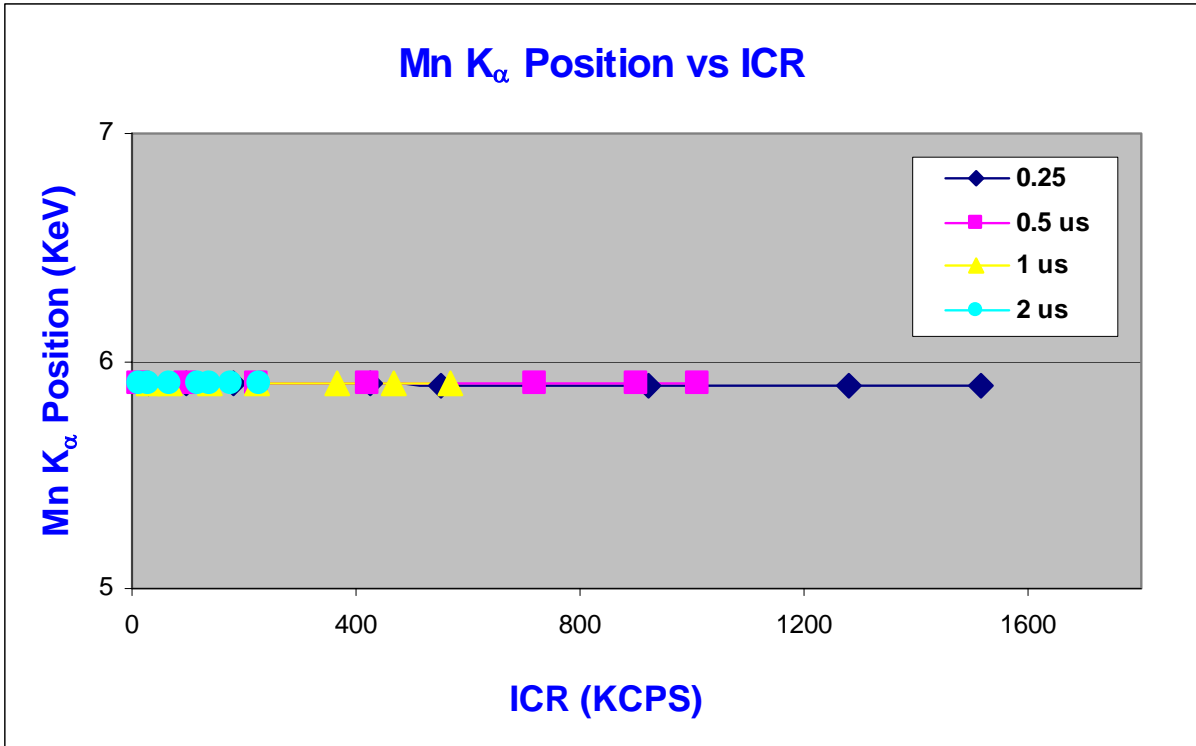
#### VTXDLL package\*

Dynamic-Link Library to facilitate host software communication with the DPP. Pentium III or later with 64 MB memory and 30 MB available disk space.

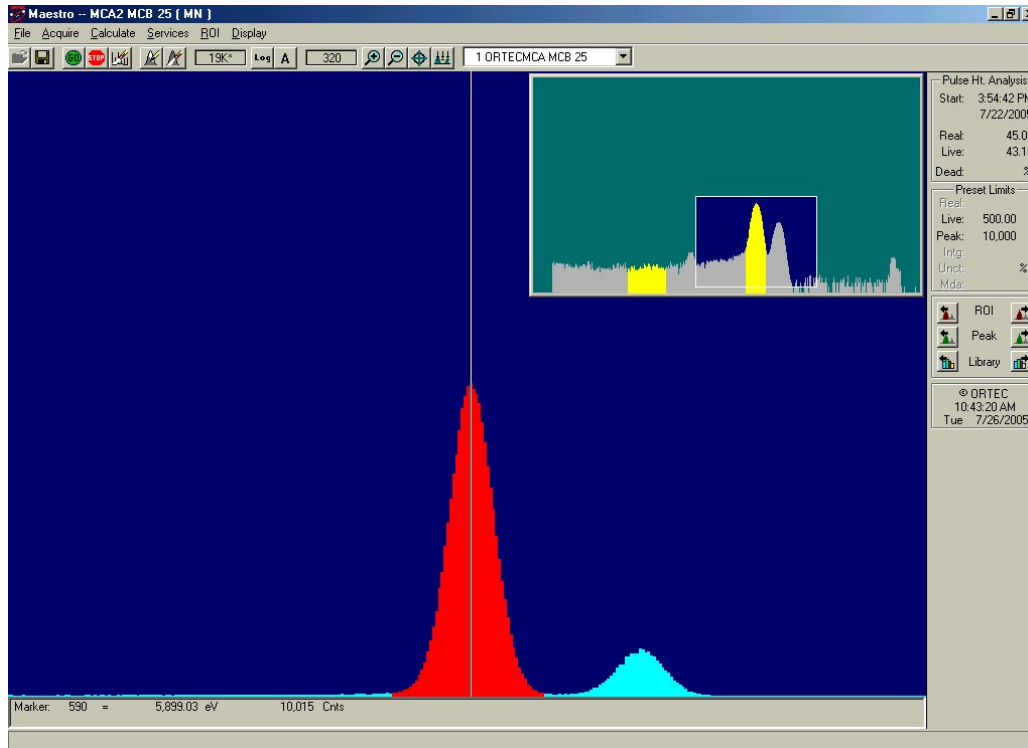
\*Requires a standard USB2.0 port.

All specifications subject to change without notice in accordance with our drive for continuous improvement.

# VORTEX<sup>®</sup> and VORTEX-EX<sup>®</sup>

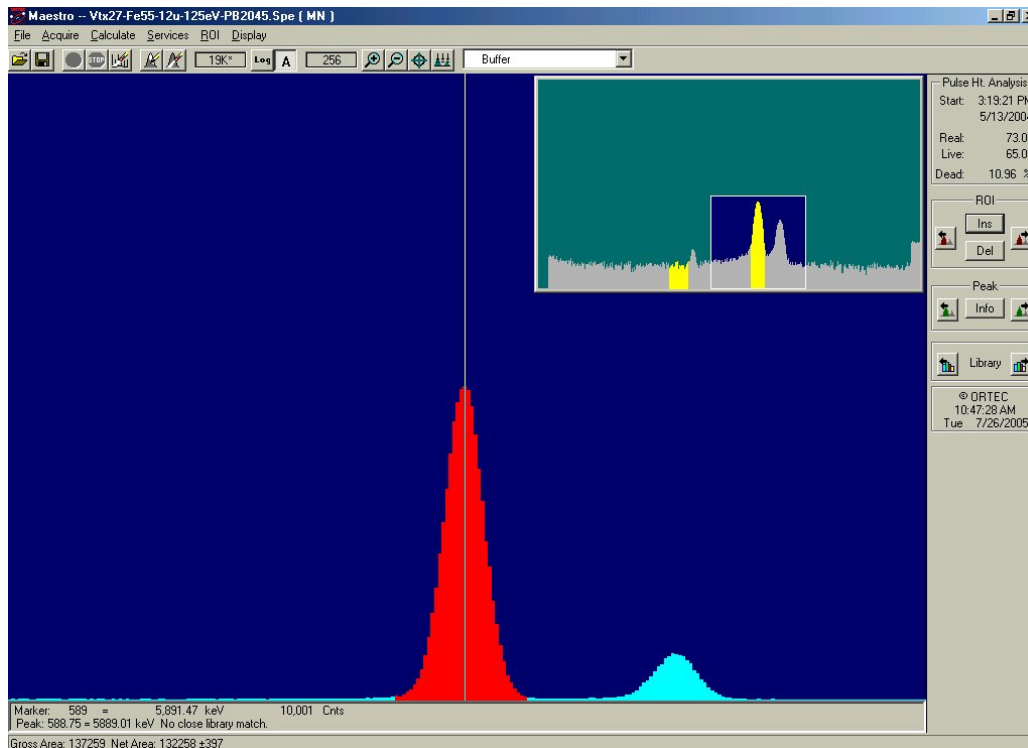


# VORTEX<sup>®</sup> and SII NanoTechnology USA Inc. VORTEX-EX<sup>®</sup>



**<sup>55</sup>Fe spectrum**  
collected with the Vortex<sup>®</sup>  
at 6  $\mu$ s peaking time.

**FWHM =125 eV @ 6 keV**



**<sup>55</sup>Fe spectrum**  
collected with the Vortex<sup>®</sup>  
at 0.25  $\mu$ s peaking time.

**FWHM =178 eV @ 6 keV**

**SII**   
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