

Vortex-EM™ Silicon Drift X-Ray Detector



Vortex-EM™ silicon drift X-ray detectors feature the largest active area single element detector (50 mm²) available of its kind. Vortex-EM™ detectors are produced from high purity silicon using state-of-the-art CMOS production technology. They feature excellent energy resolution (<136 eV FWHM at Mn K_α is typical) and high count rate capability. At a peaking time of 0.25 μs, 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 energy resolution and no peak shift with count rate.

Typical Applications:

- ◆ X-ray fluorescence (XRF) spectroscopy – both bulk and micro-fluorescence
- ◆ X-ray diffraction (XRD)
- ◆ Micro-analysis for SEM and TEM
- ◆ Synchrotron radiation applications
- ◆ Process control
- ◆ Fast X-ray mapping

The Vortex-EM™ is cooled by a thermoelectric cooler (TEC) 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-EM™ X-ray spectroscopy system includes a detector unit and control box, which includes power supplies for the detector and TEC, a digital pulse processor with PI-SPEC Software.

The complete detector also contains a charge-sensitive preamplifier and temperature stabilization system, which eliminates concerns of varying ambient temperature.

Features:

Extended probe (300 mm).

Large area, single-element silicon drift detector (~50 mm²).

Superb energy resolution.

Detector temperature stabilization.

Additional sizes are available under special contracts.

Small and compact package for minimum vibration.

Digital pulse processor (DPP) with PI-SPEC Software.

VORTEX-EM™

SILICON DRIFT X-RAY DETECTOR SPECTROMETER

Detector

| | |
|---------------------|------------------------------|
| Crystal Material | Silicon |
| Crystal Active Area | 50 mm ² (nominal) |
| Crystal Thickness | 350 μm (nominal) |

Window

| | |
|----------|--------------|
| Material | Thin polymer |
|----------|--------------|

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

| | |
|-------------------------|------------------------------|
| Detector package weight | Vortex-EM™ 3,375 g |
| Length | 550 mm (probe is 300 mm) |
| Height x width | 114 mm x 102 mm |
| Cable standard length | 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® power supply and is powered internally.

Power Consumption (Additional)

| | |
|-----|-------|
| DPP | 3.2 W |
|-----|-------|

Software

PI-SPEC software*

Allows user to acquire and 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.

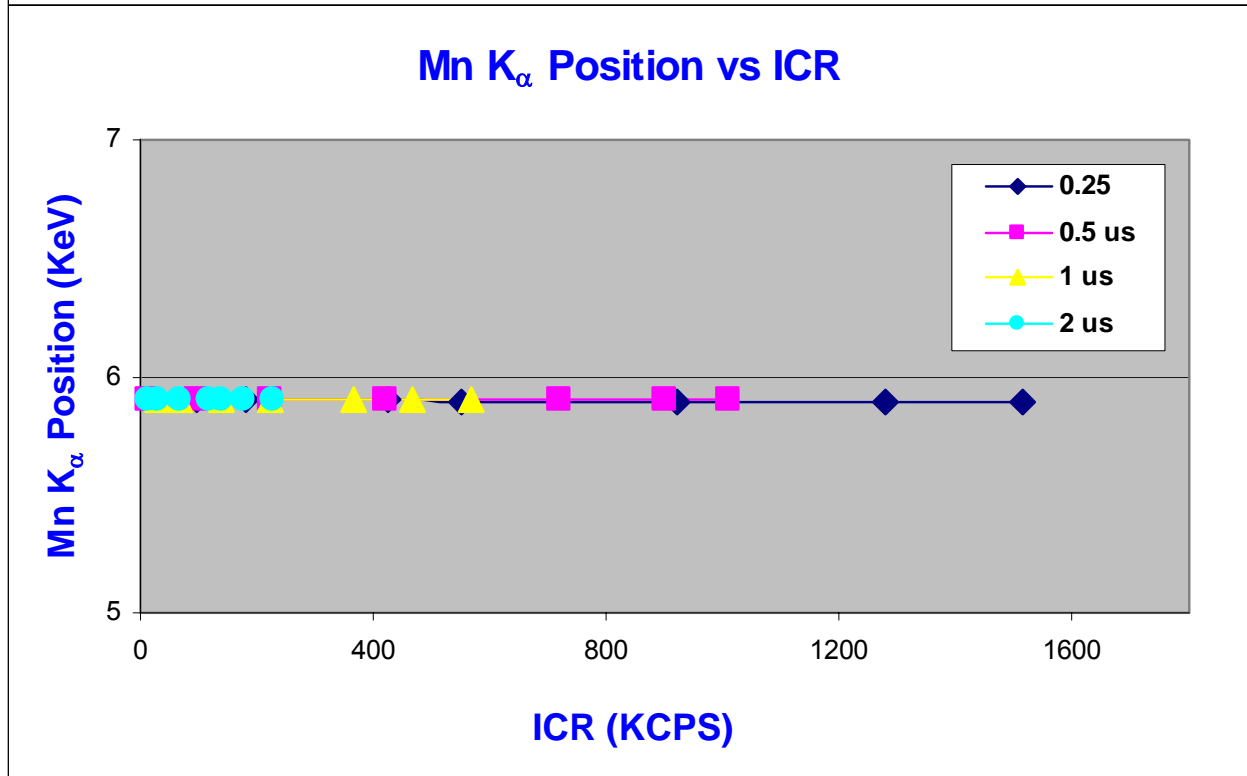
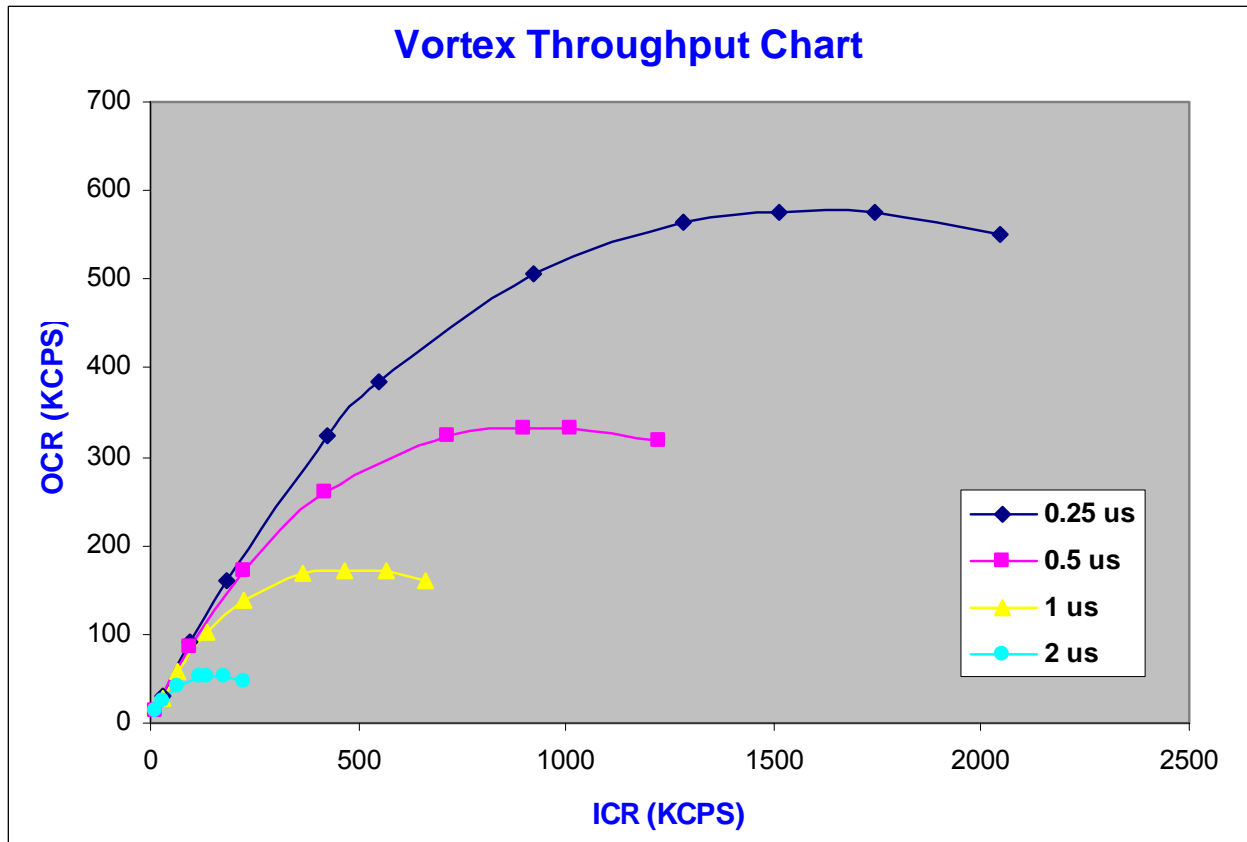
*Requires a standard USB2.0 port.

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

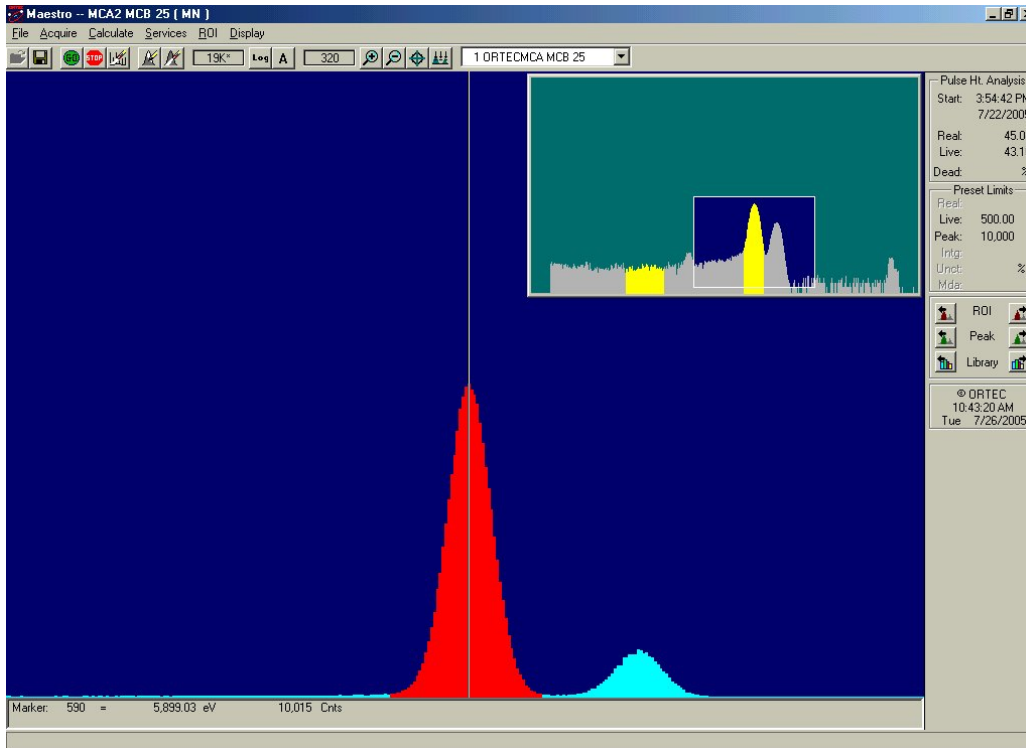
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VORTEX-EM™

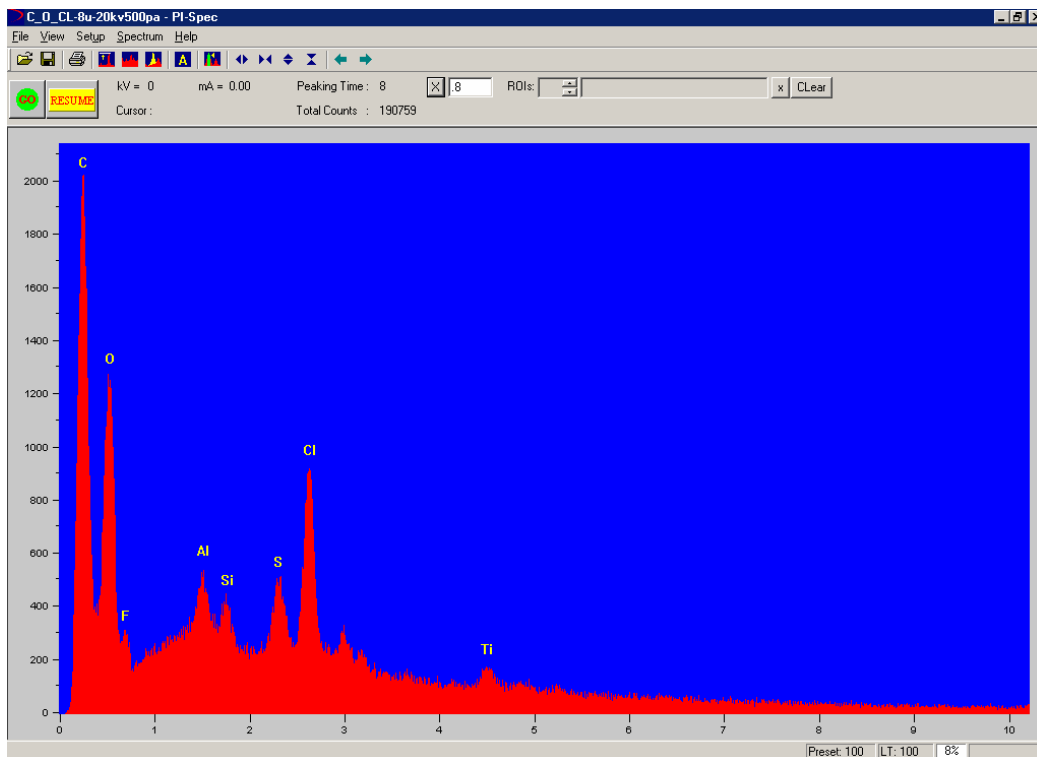


VORTEX-EM™



⁵⁵Fe spectrum:
collected with the Vortex
at 6 μ s peaking time.

FWHM =125 eV @ 6 keV



**Electron
Microscope
Spectrum:**

C, O, Cl Sample,
20 kV / 500 pA,
8 μ s Processor
Peaking Time.