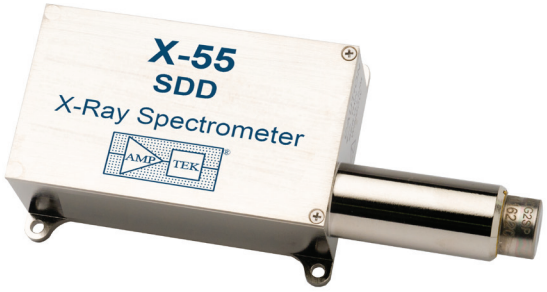
Complete X-Ray Spectrometer

X-55

ADVANCED INFORMATION ONLY

Features

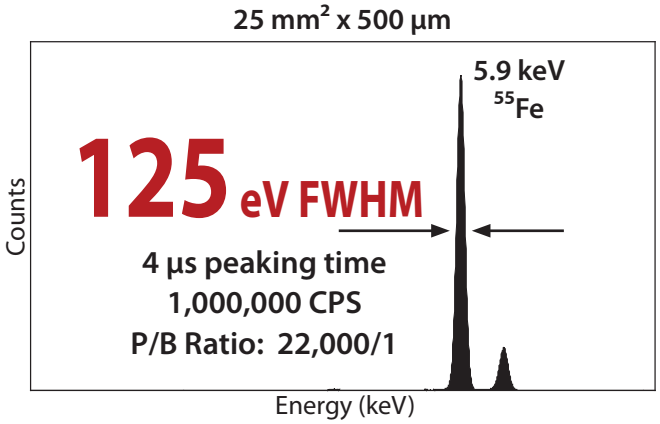
- Includes: Detector, Preamplifier, Power supplies,DPP, and Communication
- For use with Si-PIN, SDD and FAST SDD®

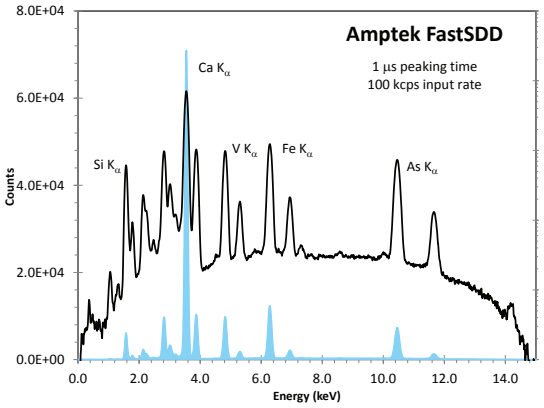


Overview

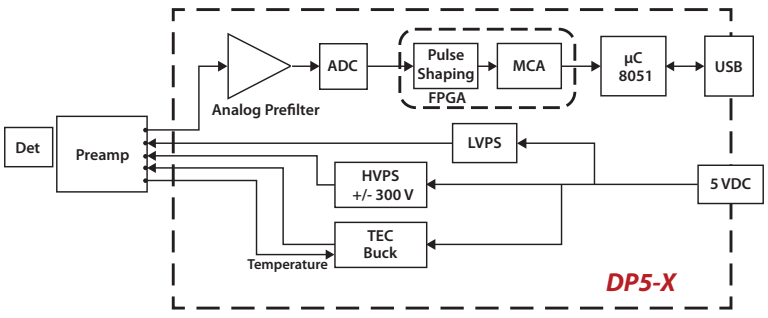
The X-55 is the smallest complete X-ray spectrometer on the market. The size of Amptek's XR100 (the industry standard detector and preamplifier), it contains the detector, preamplifier, and also a high performance digital pulse processor and all power supplies. It has all the capability of the X-123 in a package the size of the XR100. The mounting holes and envelope are identical to that of the XR100, so that the X-55 Complete Spectrometer can be dropped in the space that previously had only the detector and preamp. This reduces system size and also reduces cabling complexity and simplifies grounding and shielding.

The X-55 can be provided with any of Amptek's FastSDD® (25 mm2 or 70 mm2), standard SDD, or SiPIN (6 mm2, 13 mm2, or 25 mm2) detectors. It includes Amptek's new DP5-X digital pulse processor, with all the capabilities of the DP5: a resolution as low at 124 eV FWHM at 5.89 keV, an output count rate over 1 Mcps, etc. The power supplies are all switching regulators for high efficiency. The X-55 supports USB and RS232 communications, using the same protocol (FW6) as Amptek's other DP5 products, and is compatible with software already developed for the DP5.





Block Diagram



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AMPTEK INC. sales@amptek.com www.amptek.com

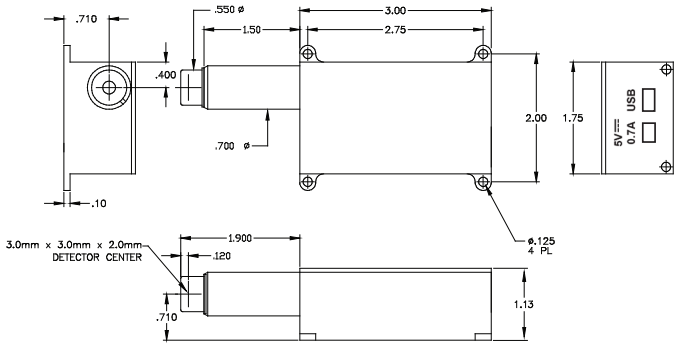
AMETEK® MATERIALS ANALYSIS DIVISION

SPECIFICATIONS

The key signal processing, MCA, and communications specifications are largely the same as the other products in Amptek's DP5 family. Please refer to the "User Manual for the DP5 Product Family" for more complete documentation and discussion.

Pulse Processor	
Full Scale	10 to 80 keV full scale energy for Amptek detectors. 1000 mV ADC input full scale.
Gain	Coarse gains of 4 and 14, fine gain with 13 bit resolution, software selectable
Pulse Shape	Trapezoidal
Peaking Time	Software selectable between 0.05 and 102 µs, e to semi-Gaussian shaping times of 0.02 to 45 µs.
Flat Top	63 software selectable values for each peaking time (depends on the peaking time), > 0.05 µs.
Baseline Restoration	Asymmetric, 16 software selectable slew rate settings
Fast Channel Peaking Time	0.05, 0.1, 0.2, 0.4, 0.8 µs (80 MHz) and 4x at 20 MHz
Fast Channel Pulse Pair Resolving Time	T_{fast} plus pulse risetime
Dead Time Per Pulse	1.05 times the $T_{peak} + T_{flat}$. No conversion time.
Maximum Count Rate	8 x 10^6 sec^{-1} (periodic). Output count rate of 1.4 x 10^6 sec^{-1} for a random input of 3.8 x 10^6 sec^{-1} (80 MHz)
Pulse Selection Options	Pile-up rejection, risetime discrimination, gate
Multichannel Analyzer	
Number of channels	256, 512, 1024, 2048, 4096, or 8192 channels.
Bytes per channel	3 bytes (24 bits) - 16.7M counts
Acquisition Time	10 ms to 466 days
Conversion Time	None
Presets	Time, total counts, counts in ROI, counts in channel
MCS Timebase	10 ms/channel to 300 s/channel
External MCA Controls	Gate input: Pulses accepted only when gated on by external logic. Input can be active high or active low. Software controlled.
Operating Modes	
MCA mode	Most common operating mode. The DPP acquires a pulse height spectrum, using the MCA in the FPGA, and reads this to the computer, over one of the interfaces, one software request. Readout intervals usually range from 0.1 s to a few seconds.
Counting mode	By reading only the status packet over one of the interfaces, one can obtain the input and output count rates at much shorter intervals than the entire spectrum can be read. Requires custom software.
Other modes	Supports List Mode and SCA Mode.

Communications	
USB 2.0 full speed (12 Mbps)	
RS-232 at 115.2k or 57.6k baud	
Hardware	
Microprocessor	Silicon Labs 8051F340 (8051-compatible core)
ADC	12 bit, 80 MHz
Firmware	Signal processing is programmed via firmware, which can be upgraded in the field.
Power	
Nominal Input	@ +5 VDC: 700 mA (3.5 W) typical at full cooling 500 mA (2.5 W) typical with lighter cooling loads
Input Voltage Range	4 V to 9 V
Typical Input Current	4 V (@ 0.9 A) to 9 V (@ 0.4 A)
Regulator frequencies	All but HVPS > 1 MHz; HVPS: 60 kHZ
Power Source	External supply
Connectors	
Power	
USB	Standard USB Mini jack
Mechanical Dimensions	
Case size	3.00 x 1.75 x 1.13 in (7.7 x 4.4 x 2.9 cm)



All dimensions are in inches except as noted

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AMPTEK INC. 14 DeAngelo Drive, Bedford, MA 01730-2204 USA
+1 781 275-2242 Fax: +1 781 275-3470 sales@amptek.com **www.amptek.com**

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