TechnoAP

2016年度

量子ビームサイエンスフェスタ

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弊社は茨城県ひたちなか市に拠点を置き

放射線・物理計測用モジュールや検出器など

自社で設計・開発・製造・販売する

国内でも数少ない精密測定機器メーカーです。

放射光施設や放射線に関連した研究を行う

大学や施設などから数多くの引き合いを頂いており

市場のニーズを反映した新製品の開発や

さまざまな課題に対し積極的に取り組んでおります。

4element SDD for X-ray

TechnoAP

NEW

XSDD50-04-25

Window-less

JAPAN MADE

For Soft X-ray

Measurable from low energy region to hundreds of eV

65mm² collimated to 50mm²

Surface of Detector
Angle degrees 25

Count Rate
1Mcps or more

Energy Resolution

- 244eV@5.9keV Mn Kα
  Peaking Time: 0.25μs
- 130eV@5.9keV Mn Kα
  Peaking Time: 1μs

4element SDD system for X-ray

TechnoAP

NEW

XSDD50-04-25

JAPAN MADE

検出器
背面部分

Function

- Histogram
- List-mode
- Wave
- **FAST Output**
- **ROI-SCA Output**
- **Quick-Scan**

Data measurement device

APU504GbE

4CH 100Msps 14bit

APU504GbE

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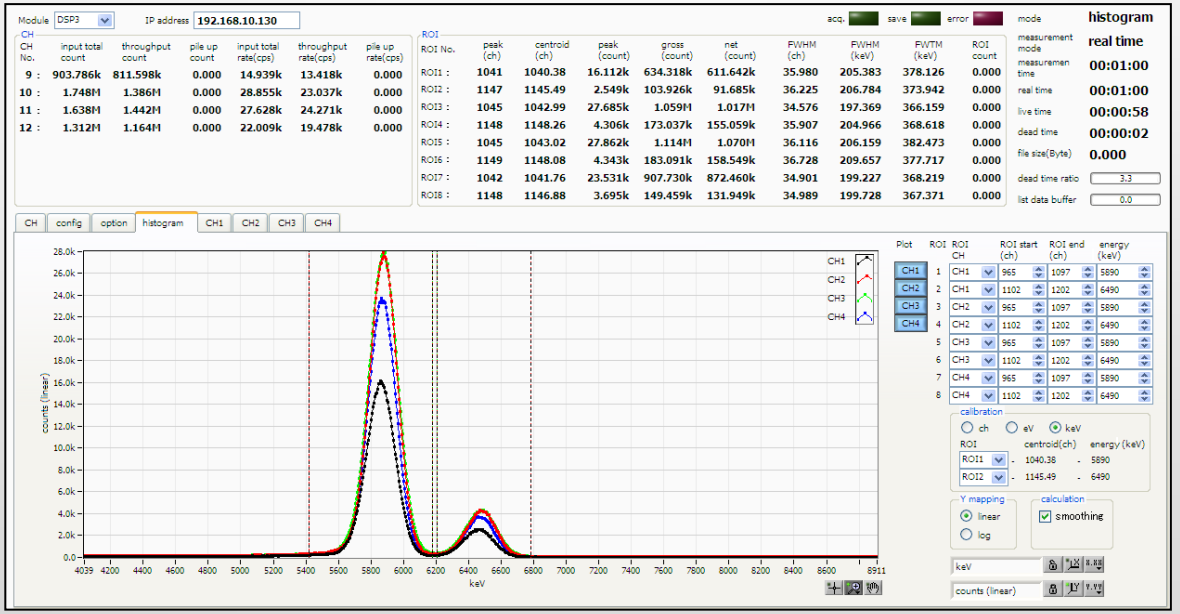
4CH 100Msps 14bit

Quick-Scanモードとは、時間分解測定を行うもので外部トリガタイミング（最小10ms）間隔でその間のヒストグラムデータをPC側に送信し、PC側で連続してHDDにデータを保存するモードです。

QXAFS測定に最適です。

Quick-Scanデータ例

Event#1	CH1 4096ch	CH2 4096ch	CH3 4096ch	CH4 4096ch
Event#2	CH1 4096ch	CH2 4096ch	CH3 4096ch	CH4 4096ch
:				
Event#N	CH1 4096ch	CH2 4096ch	CH3 4096ch	CH4 4096ch



データ収集用アプリケーション画面

(185eV@5.9keV　ピーキングタイム0.25μs)

APN504X GbE for Quick XAFS

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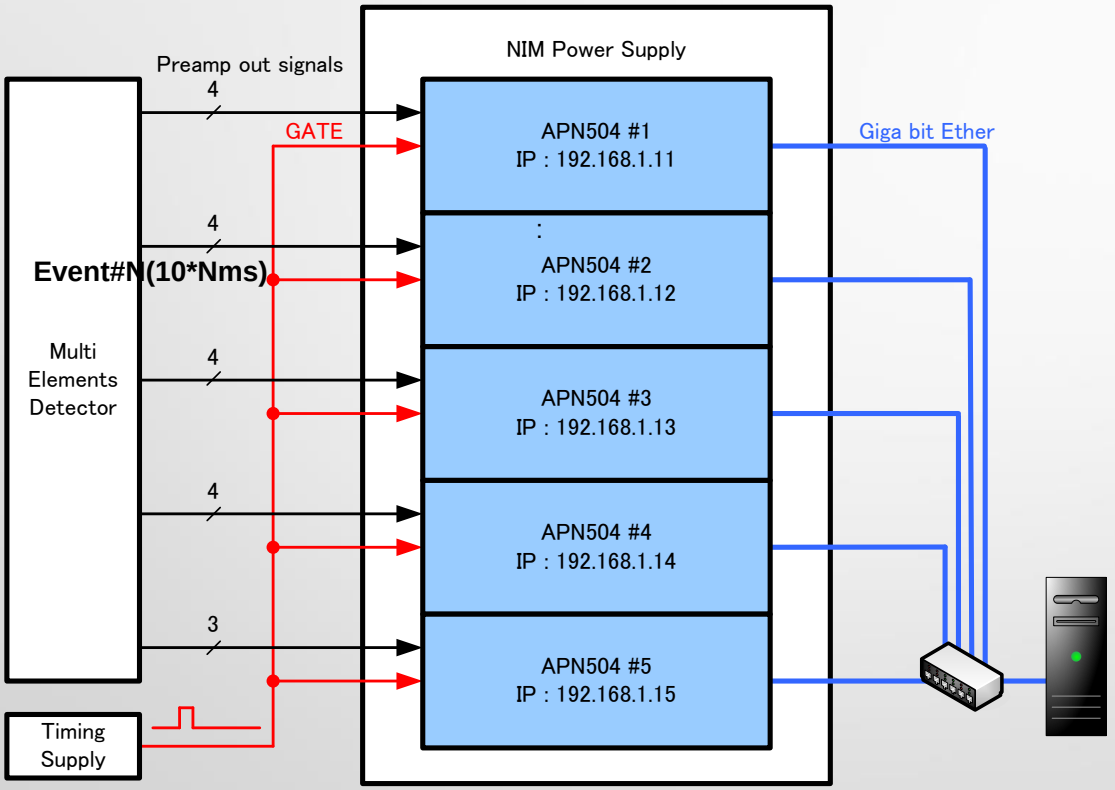
- Quick scan **10ms(min.) interval**
  4096ch * 16bit *4CH / Event
- Interface Giga bit Ether TCP/IP and UDP



APN504XGbE

APN504X GbE for Quick XAFS

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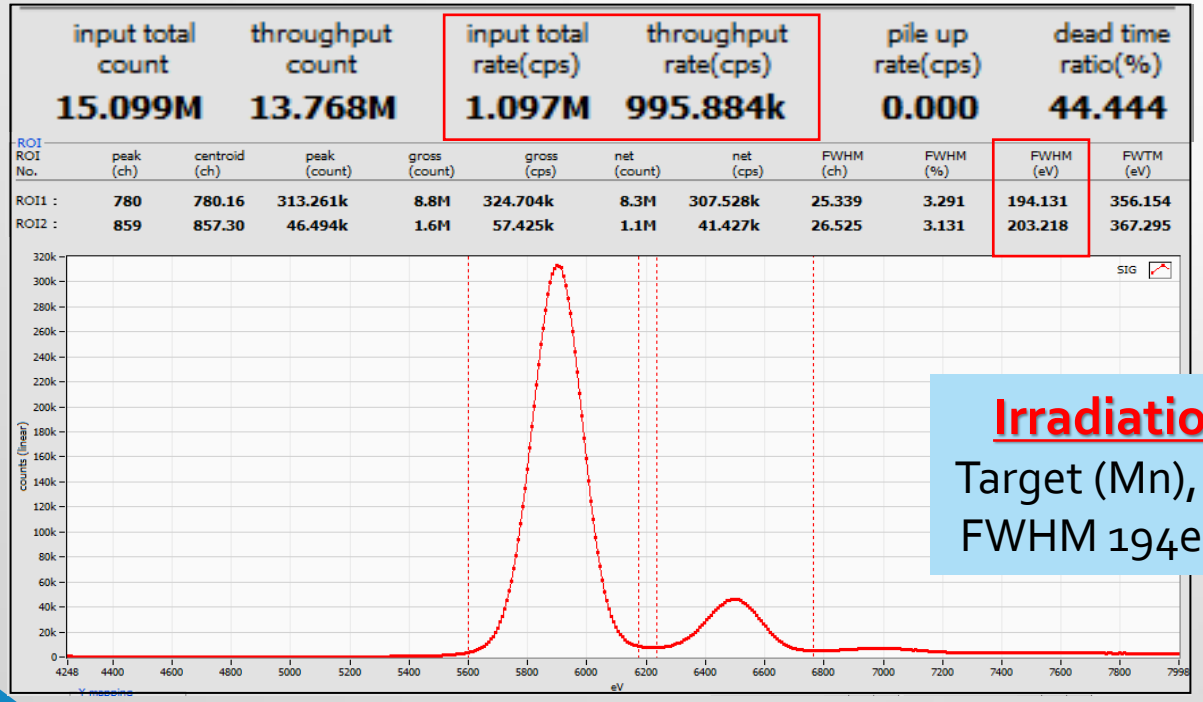
- **Data format**

Event#1(10ms)	CH1 4096ch	CH2 4096ch	CH3 4096ch	CH4 4096ch
Event#2(20ms)	CH1 4096ch	CH2 4096ch	CH3 4096ch	CH4 4096ch
	CH1 4096ch	CH2 4096ch	CH3 4096ch	CH4 4096ch



Irradiation Test on Synchrotron

Target (Mn), ICR 1.1Mcps, OCR 1.0Mcps,
FWHM 194eV@5.9keV MnKα 0.15μsPT

7 element SDD system for fluorescence X-ray

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- Element area
  455mm² (65mm² x 7 elements)
- Effective area
  350mm² (65mm² Collimated to 50mm² x 7 elements)
- Function
  Histogram, List, Waveform, ROI-SCA
- ADC
  4CH 100Msps 14bit
- Energy Resolution
  244eV@5.9keV MnK α
  Peaking time 0.25µs, 1000kOCR
- Power Supply for SDD
  -200V, ±5V, +3.3V
- Interface
  Ethernet (TCP/IP)

DSP modules & Power supply

XSDD50-07

7 element SDD system for fluorescence X-ray

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Module DSP2 IP address 192.168.100.131 acq. save error

CH

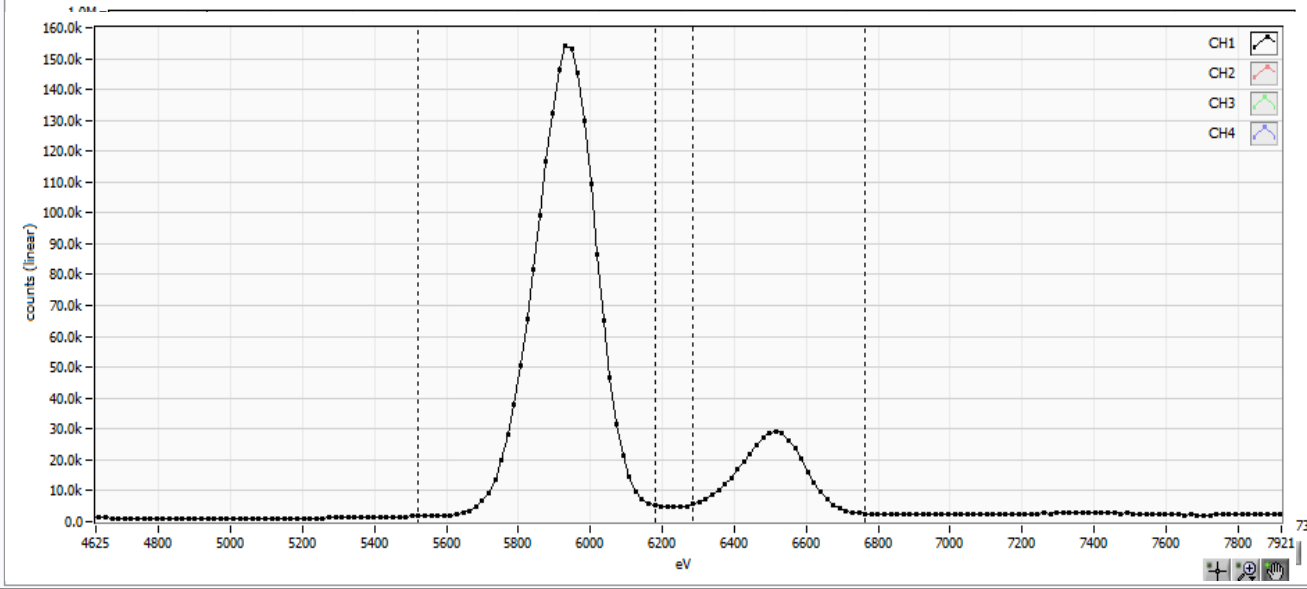
CH No.	input total count	throughput count	input total rate(cps)	throughput rate(cps)	pile up rate(cps)	dead time ratio(%)
5 :	3.902M	3.804M	401.831k	392.133k	0	21.3
6 :	0	0	0	0	0	0.0
7 :	0	0	0	0	0	0.0
8 :	0	0	0	0	0	0.0

ROI

ROI No.	peak (ch)	centroid (ch)	peak (count)	gross (count)	net (count)	FWHM (ch)	FWHM (eV)	FWTM (eV)
ROI1 :	323	322.76	148.443k	1.758M	1.635M	10.545	185.591	344.886
ROI2 :	356	356.34	28.066k	422.539k	281.950k	11.034	194.200	359.791
ROI3 :	646	643.28	4.316k	136.299k	33.250k	15.201	267.533	578.436
ROI4 :	1006	986.45	1.080k	37.704k	31.442	4.244	74.686	0.000
ROI5 :	0	0.00	0.000	0.000	0.000	0.000	0.000	0.000
ROI6 :	0	0.00	0.000	0.000	0.000	0.000	0.000	0.000
ROI7 :	0	0.00	0.000	0.000	0.000	0.000	0.000	0.000
ROI8 :	0	0.00	0.000	0.000	0.000	0.000	0.000	0.000

mode high rate hist
measurement mode real time
measuremen time 00:00:10
real time 00:00:10
live time 00:00:08
dead time 00:00:02
file size(Byte) 0.000
dead time ratio 21.3
list data buffer 0.0

CH | config | histogram | CH1 | CH2 | CH3 | CH4



Plot	ROI	ROI CH	ROI start (ch)	ROI end (ch)	energy (eV)
CH1	1	CH1	300	338	5899
CH2	2	CH1	341	382	6490
CH3	3	CH1	621	666	5899
CH4	4	CH1	964	1007	6490
	5	none	1	4095	5899
	6	none	1	4095	6490
	7	none	1	4095	5899
	8	none	1	4095	6490

calibration: ch / eV / keV

ROI	centroid(ch)	energy (eV)
ROI1	322.76	5899
ROI2	356.34	6490

Y mapping: linear / log
calculation: smoothing
eV
counts (log)

400k ICR 185eV@5.9keV, Peaking Time 0.25µs

Digital Signal Processing for X-ray

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- Energy resolution
  [SSD with 19 elements]
  139eV@5.9keV, 6μs Peaking Time
  144eV@5.9keV, 4μs Peaking Time
  250eV@5.9keV, 0.25μs Peaking Time
  [SDD]
  125eV@5.9keV, 2μs Peaking Time
- Throughput
  Over 1Mcps
- Mode
  Histogram, List
- Option
  TTL output of ROI-SCA

Measurements boards
for 19 elements of SSD

APV8004X

Digital Signal Processing for X-ray

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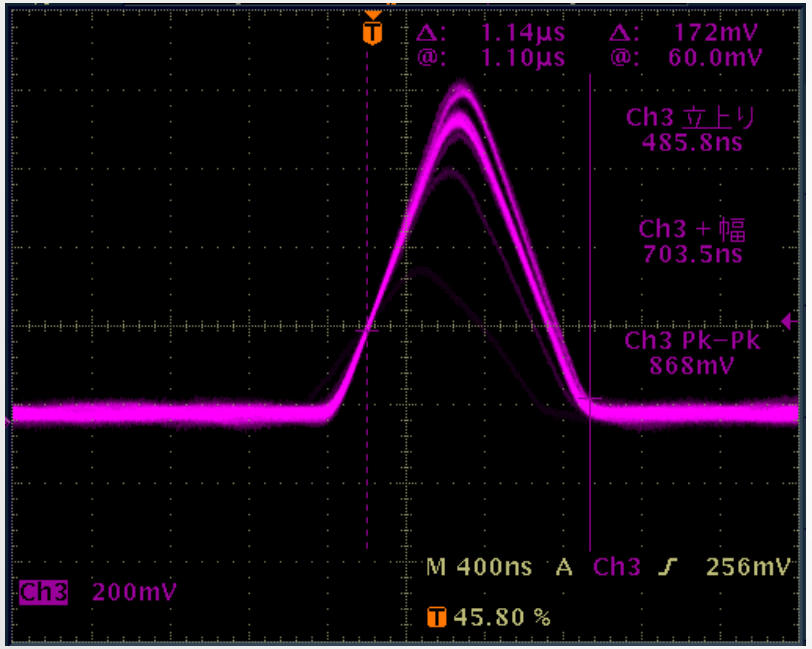
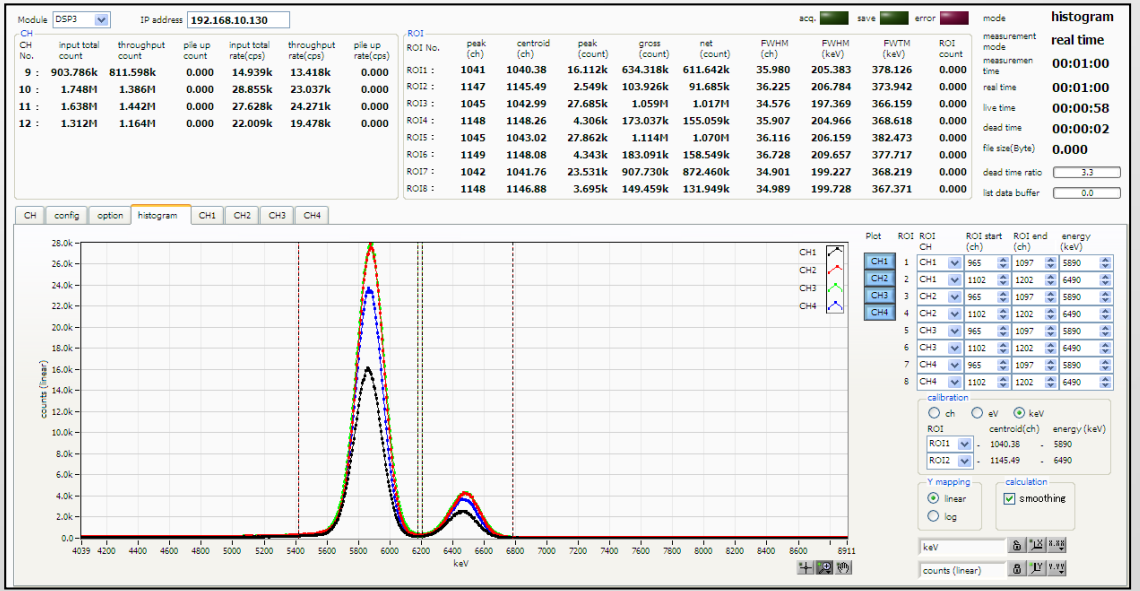


Trapezoidal filter

Screenshot of Application



APV8016 Digital Signal Processor

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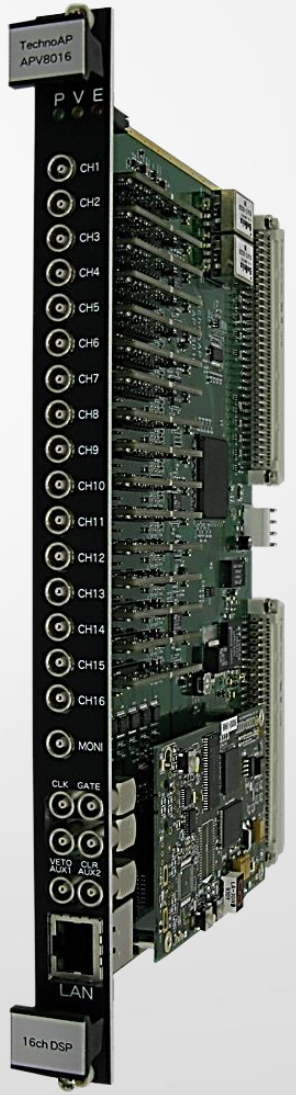
Analog Input	16CH, Input Impedance 1kΩ, LEMOoo series connector
ADC	Sampling 100MSPS, Resolution 14bit, Input range ±1V
Coarse Gain	x2, x4, x10, x20 *Setting by PC
Fine Gain	x0.5～x1.5 *Setting by PC
ADC GAIN	8K, 4K, 2K, 1K, 512, 256ch
Trapezoidal Filter	0.1～12μs（0.01step）
Digital Signal Processing	Baseline Restorer, Pileup Rejecter, and CFD etc. All parameter can set by PC.
External terminal	Output filter waveform, Input clock, Input GATE, Input VETO, Input clear, 2 CH for function enhancement
Interface	TCP/IP or UDP, 100BaseT
External dimensions	VME6U 20(W) x262(H) x187(D) Unit 300(W) x56(H) x335(D)
Total weight	VME6U About 470g Unit About 3300g



APV8016

APV8016 Digital Signal Processor

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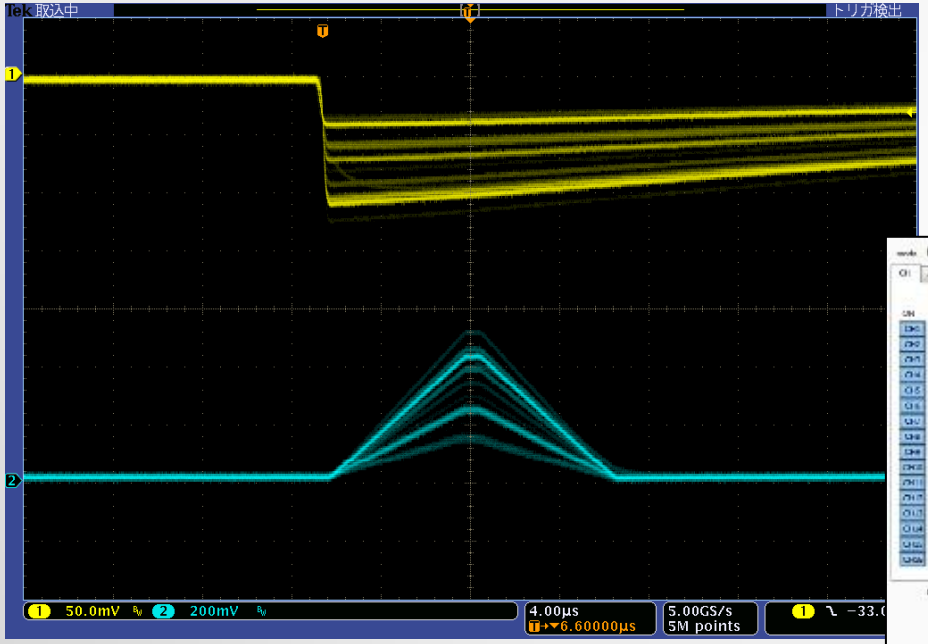
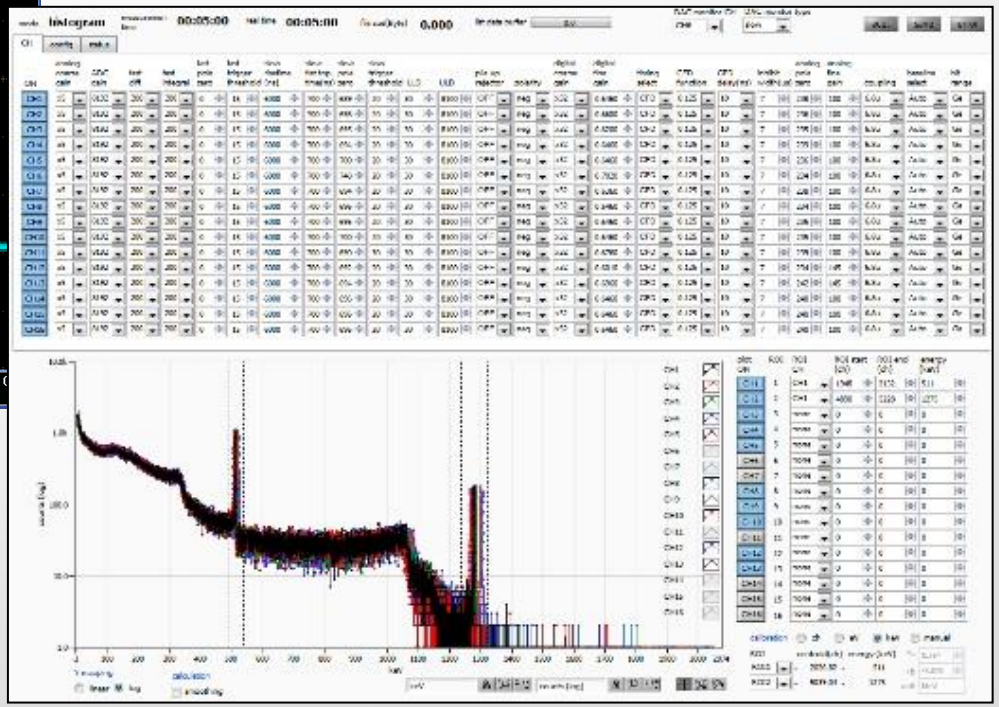


Application

Histogram Mode



Outputted DAC

Upper : Preamp

Lower: Trapezoidal Filter

APV8016 Digital Signal Processor

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- Resolution
  - [Energy] 1.70 keV @ 1.33 MeV,
  - [Time] Resolution 0.625 ns (minimum unit)
- Throughput
  - 100kcps and over
- Mode
  - Histogram, List, Waveform
  - Maximum transfer rate of the List mode160Kcps (using 1 CH)
- Multifunction
  - Spectroscopy amp, Timing filter amp, CFD,
  - Input and Filter waveform output DAC
- Option
  - Coincidence, Rise Wave
- Software
  - Application and Instruction manual of Hard and Software

APV8016 Digital Signal Processor

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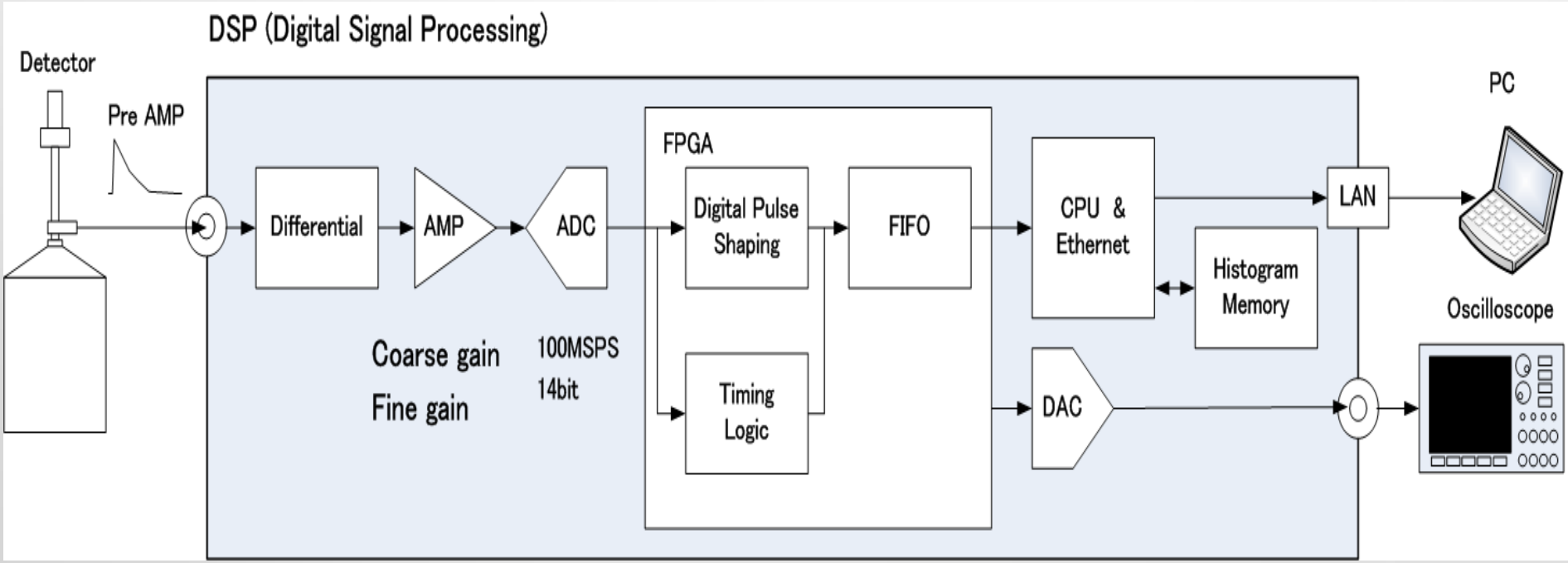

4element SDD for X-ray

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Detector	SDD detector 50mm², Window-less or AP3.3
All element area	260mm² (65mm² x 4 element)
Active area	200mm² (65mm² collimated to 50mm² x 4 element)
Function	Histogram, List, Waveform, ROI-SCA
ADC Sampling	4CH 100MSPS 14bit
Energy Resolution	244eV@5.9keV MnKα (Peaking time 0.25μs, 1000kOCR)
SDD Power	-200V, ±5V, +3.3V
Throughput	Max 150kcps: 2us Peaking time Max 1000kcps: 0.15us Peaking time
Interface	Ethernet (TCP/IP)
Power Supply	NIM-BIN Support, VME Power Supply
Option	Z-axis movement mechanism, UHV bulb etc.
Vacuum capable	$<10^{-3}$ Pa
Flange type	ICF114
Accessory	Application and Manual

XSDD50-04

4element SDD for X-ray

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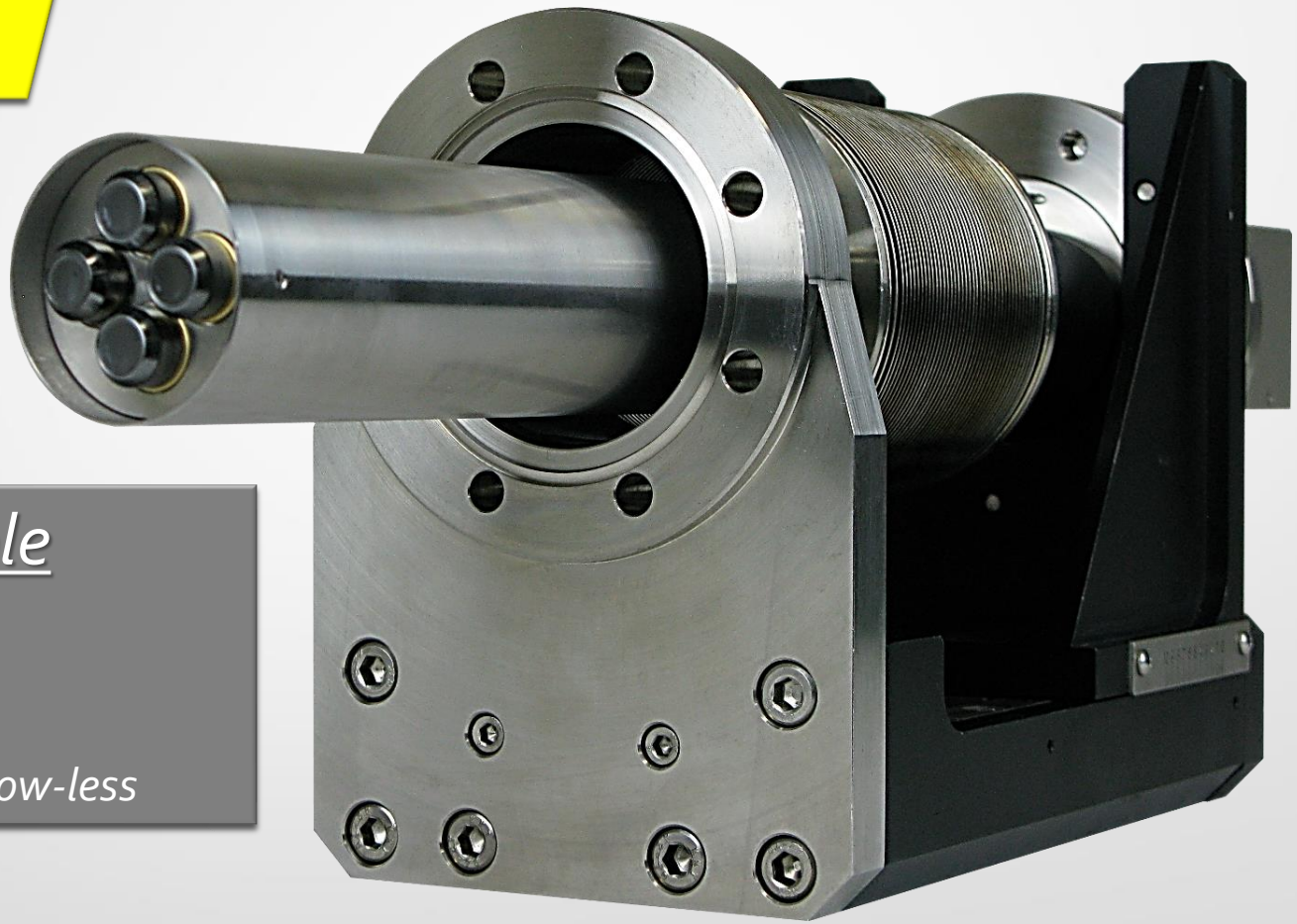
XSDD50-04



Detector selectable

- Active Area
  30mm² or 50mm²
- Window
  Be,　AP3.3,　Window-less

【Use cases】

Transport with bellows corresponding to the vacuum

4element SDD for X-ray

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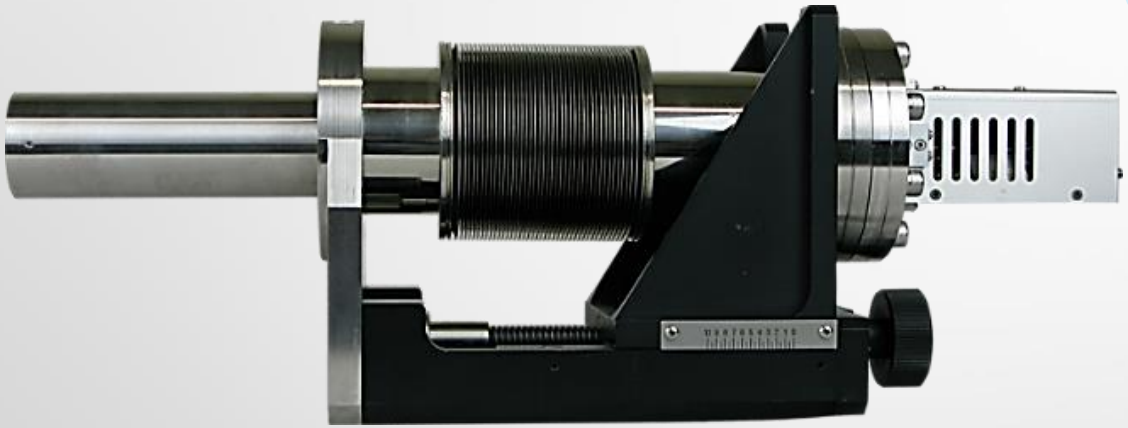
XSDD50-04



【Use cases】

Transport with bellows corresponding to the vacuum

Recommendable Measurement Module

APN504XGbE

High-Speed ADC

（100MHz・14Bit）

Digital signal processing by

Highly-integrated FPGA

Measurement Data

- **Histogram**
- **List**
- **Quick Scan**

Single element SDD for X-ray

TechnoAP

Detector	SDD detector 50mm², Window-less or AP3.3
Element Area	65mm²
Active Area	65mm² collimated to 50mm²
Function	Histogram, List, Waveform, ROI-SCA
ADC Sampling	100MSPS 14bit
Energy Resolution	125eV@5.9keV 2us Peaking time 150eV@5.9keV 0.15us Peaking time
SDD Power	-200V, ±5V, +3.3V
Throughput	Max 150kcps: 2us Peaking time Max 1000kcps: 0.15us Peaking time
Interface	Ethernet (TCP/IP)
Power Supply	NIM-BIN Support, VME Power Supply
Option	Z-axis movement mechanism, UHV bulb etc.
Vacuum capable	$<10^{-3}$ Pa
Flange type	ICF70
Accessory	Application and Manual

XSDD50-01WL

Single element SDD for X-ray

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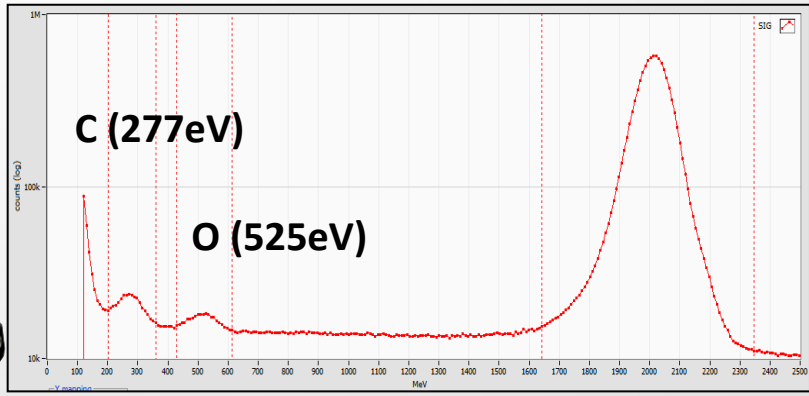
XSDD50-01WL

Detector selectable

- Active Area
  30mm² or 50mm²
- Window
  Be, AP3.3, Window-less

Spectrum of Soft X-ray



【Use cases】

Gate valve and Angle valve Transport
with bellows corresponding to the vacuum

Single element SDD for X-ray

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XSDD50-01WL

【Use cases】

Gate valve and Angle valve Transport
with bellows corresponding to the vacuum

Recommendable

Measurement Module

APU101X

DIGITAL SPECTROSCOPY

within

- *1CH HV Power Supply*
- *Pre-amp Power*
- *MCA*

APU101 X-ray spectra meter

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- Detector type
  - **SDD, SSD**
- Throughput
  - **Over 1Mcps**
- Power supply
  - **HV(+/-4000V), Preamp**
- Energy resolution
  - **[SSD]**
    - **139eV@5.9keV PT6us**
    - **250eV@5.9keV PT0.5us**
  - **[SDD]**
    - **125eV@5.9keV PT2μs**
    - **145eV@5.9keV PT0.5μs**
- Interface
  - **TCP/IP**

Front

Rear

APU101

APN101X X-ray spectra meter

TechnoAP

- Detector type
  - **SDD, SSD**
- Throughput
  - **Over 1Mcps**
- Power supply
  - **HV(+/-4000V), Preamp**
- Energy resolution
  - **[SSD]**
    - **139eV@5.9keV PT6us**
    - **250eV@5.9keV PT0.5us**
  - **[SDD]**
    - **125eV@5.9keV PT2μs**
    - **145eV@5.9keV PT0.5μs**
- Interface
  - **TCP/IP**

APN101X

APV8102-14 MWPSAGb

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- ADC
  - 2CH, 14bit, 1GHz Synchronism Sampling
- Memory
  - 1GB (512MB+512MB) × 2
- Time Resolution
  - Coarse: 2ns | Fine: 7.8ps
- Throughput
  - 1Mcps or more / CH
- Analyze Mode
  - Waveform acquisition, List (TDC+QDC etc.)
- Analyze Functions
  - (Digital) CFD, TDC, DC, PSA etc.
- Interface
  - 1000BASE-T (over 1M List event)

APV8102-14

APV8102-14 MWPSAGb

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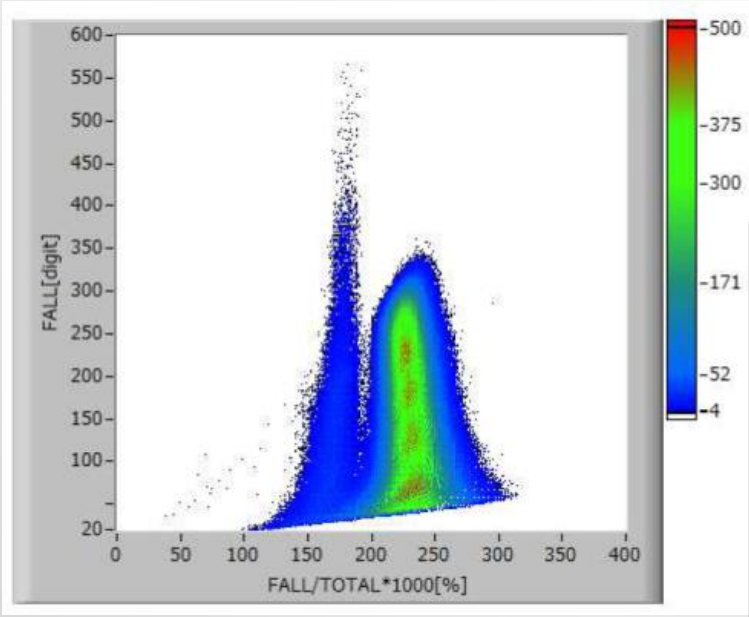
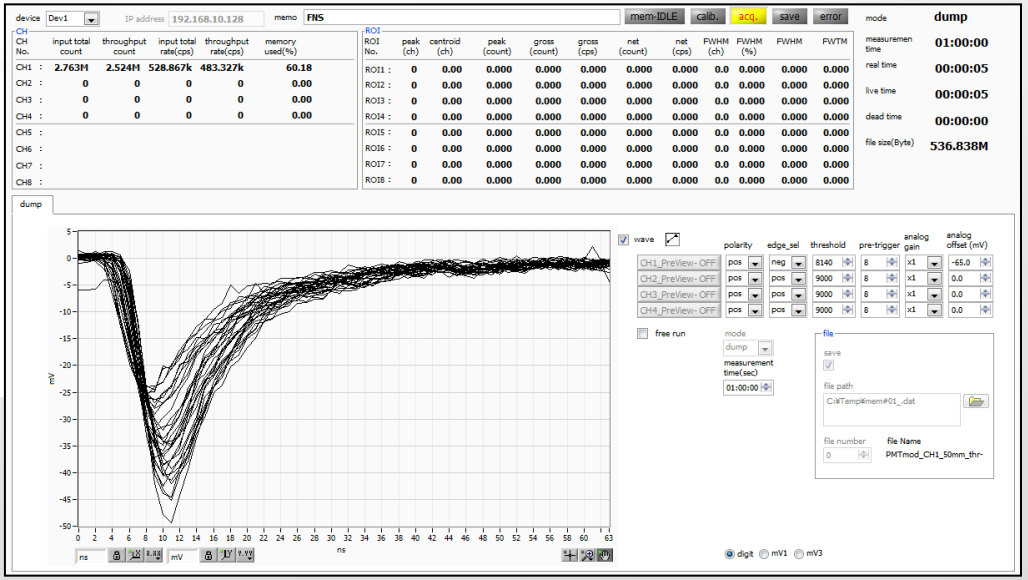
Discrimination of γ and neutron

(Vertical axis: Waveform fall time integral calculus level
Horizontal axis: Fall time integral calculus level
/ All waveform integral calculus level)



*Capable number of channel change may occur
due to the signal processing custom and selected options.



Application Waveform acquisition

APV8102-14 MWPSAGb

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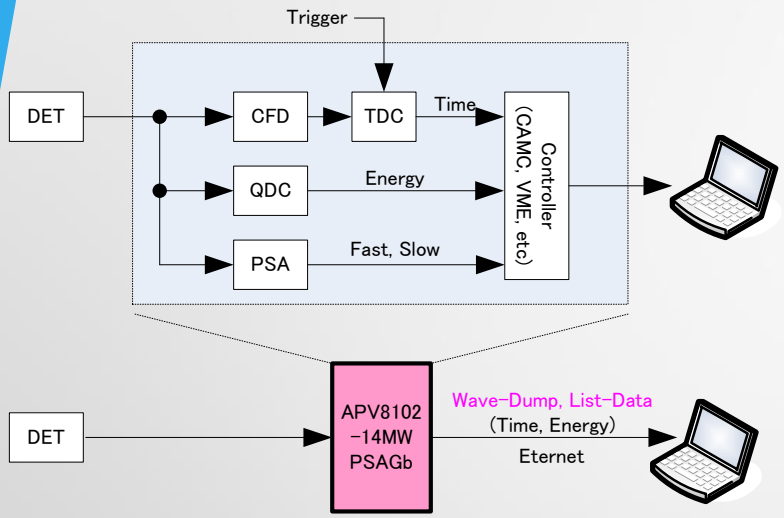

Unified functions of each modules

Analog signal input type	PMT anode signal, Fast-NIM signal etc.
Analog signal input range	±3V (Z_{in}:50Ω, GAIN x 1) (LEMO connector x 2) *Customizable maximum ±4V capable
Analog offset adjustment	±2V (12bit) *Customizable ±20mV to±4V capable
Analog gain switch	X 1 / x 3 *Customizable under input range limit x 10 capable
Analog signal rise time	Under 1ns (@Gain x 1)
Outside in/output signal terminal (TTL level)	CLK input, CLK output, GATE input, VETO input CLR input, OR output (LEMO connector x 6) *Customizable switch in/output signal
Interface	Ethernet (TCP/IP) 1000BASE-T
Dimension and Weight	VME1width 20mm(W) x 262mm(H) x 187mm(D), 540g
Environmental conditions	Temperature 5 to 25℃
Electricity consumption	+5V(2.5A), +12V(0.6A), -12V(0.3A)
Accessory	Application and Manual

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USB-MCA4

USB bus power, List of 4CH corresponding MCA

- Channel
  - 4CH
- Static Dead Time
  - 1.5μs
- Throughput
  - 50kcps and more
- ADC Gain
  - 16384, 8192, 4096, 2048, 1024, 512ch
- Mode
  - Spectrum, List
- Power
  - USB bus power
- Body
  - Lightweight, Compact aluminum case
- Interface
  - USB2.0
- Data transfer
  - List data 100kcps/sec and more
- Software
  - Driver & Application

APG7400A

USB-MCA4

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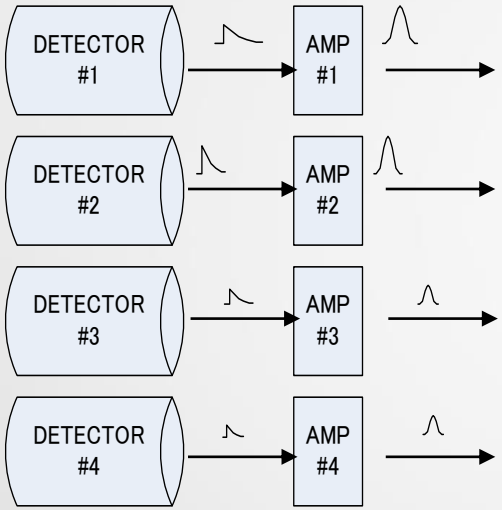
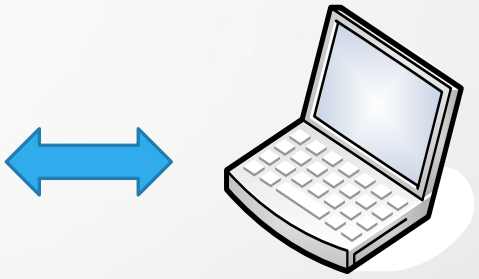
General configuration example





USB Data（Spectrum, List）
USB bus power

LIST Data

Event #1	Empty(4bit)	Time(44bit)	CH(2bit)	PHA(14bit)
Event #2	Empty(4bit)	Time(44bit)	CH(2bit)	PHA(14bit)
	:			
Event #N	Empty(4bit)	Time(44bit)	CH(2bit)	PHA(14bit)

* Data Size 8Byte/Event, Time 4ons/bit

KD-3052 PSD System

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^{3}He-PSD System

GATENET

*Multi PSD detector use

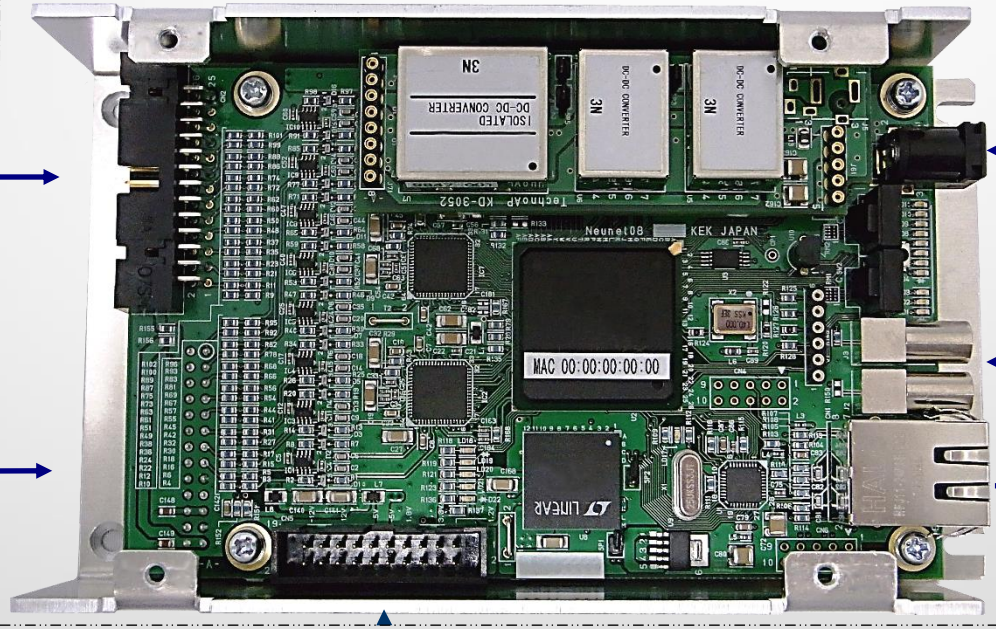
Ethernet

^{3}He-PSD
8 tubes / 1 Set

AMP97

PSD board

NEUNET08



Power Supply ＋5V

To Signal

PC

Another Power Supply Acceptable

*Setting: ±12v, ±5V, 3.3V, 1.8V, 1.2V

KD-3052 PSD System

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High Energy Accelerator Research Organization developed this board.
This is based on technical specification [KENS-DAQ-012]
which Bee Beans Technologies (BBT) Co., Ltd. shows.
We have a regular license from BBT and produce it.

The neutron scientific facilities (KENS) of High Energy Accelerator Research Organization develop an experiment to realize structure analysis and this of the material as one of the neutron dispersion studies and a measuring system.
This measuring system is called **NEUNET** system
(Neutron Position Sensitive Model Detector System).
This data handling board is used for this **NEUNET** system.

NUENET

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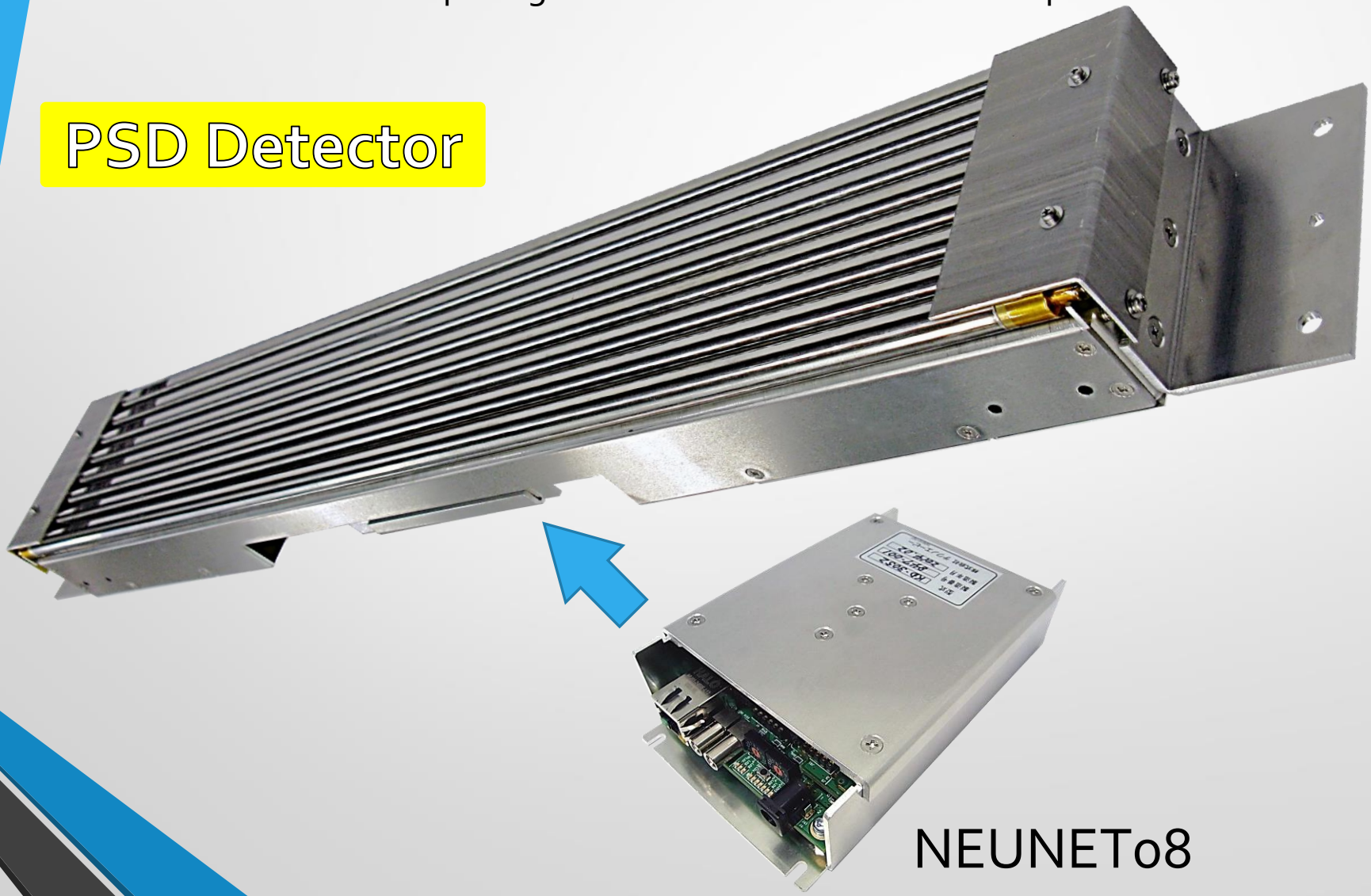
Analog Digital Convertor Processing and Data Processing board
for Output signal of ^{3}He Position Sensitive Proportional Counter

PSD Detector



NEUNET08

NUENET

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ITEM	SPECIFICATION
Product Name / Model	Date processing board for Neutron / Model: KD-3052
Analog Input Signal	Differential Signal, Negative Unipolar Pulse, 0 ~ -1.0v *Input impedance: 100Ω
To Input Signal	TTL / Positive Logic Pulse, Input Impedance: 1kΩ Pulse Width: > ons, Rise Time: > 20ns
Input Connector	Connector for Power Supply: DC Plug ϕ5.5 x ϕ2.1 Connector for To signal: LEMO 00 type Connector for Analog signal: HIF3BA-26PA-2.54DS *MIL Standard
External Dimensions	150(W) x 93(D) x38(H) *Storable to the PSD detector box of ½ inch x 600 x 8 tubes
Power Supply	Operating by power supply of the board: 5V / 2.2A *AMP97 and PSD detector board are used by In-house product Another Power Supply Setting: ±12v, ±5V, 3.3V, 1.8V, 1.2V
Environmental Condition	Temperature: 0~50° C Maximum humidity: 80% (No dew condensation)

OUTLINE

TechnoAP

[Business lineup]

(1) Sales of radiation measuring instrument and radiation counter.
(2) Development of radiation measuring device and radiation counter.
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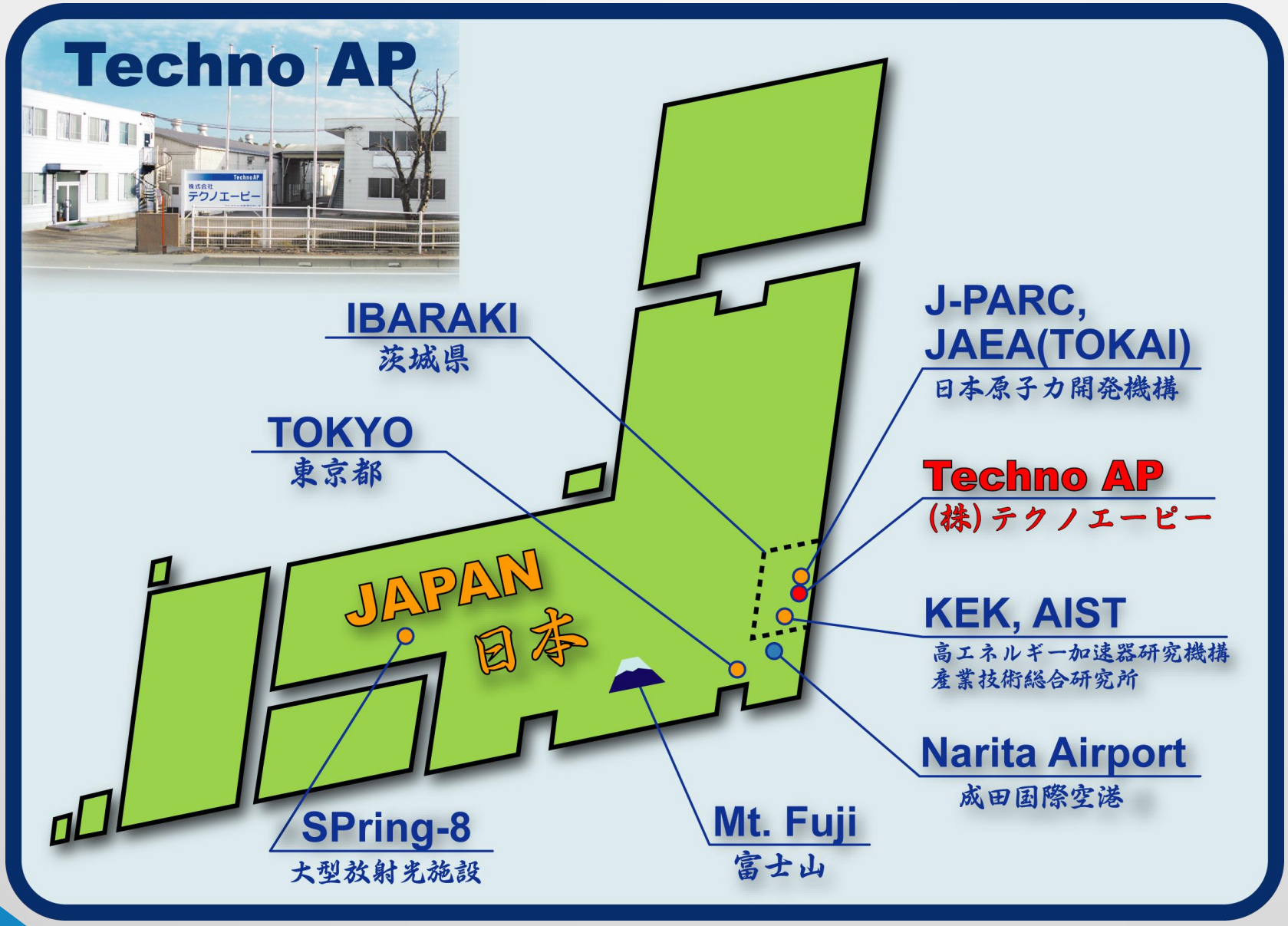
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