Quad MCA with 32k ADC resolution

Fast signal con-- version with more than 1 Million events per sec on each input.

1-4 - input MCA with 32k resolution, > 1 M events / sec on each channel, MCS mode, RTC (option), eight 125 MHz Scalers (option). Digital Pole Zero Filter and Trapezoidal Pulse Shaper. Scope mode for monitoring input signal wave forms.

Description:

The MCA4A series is a family of USB-connected, software controlled Multichannel Analyzers. The design is capable of converting incoming analog pulses (PHA mode) on up to 4 channels at virtually no conversion induced dead-time. Pulse Height Analysis can be performed using different fitting algorithms optimized for different input pulse forms and shaping times. A digital Pole Zero Filter and Trapezoidal Pulse Shaper enables to even process typical Pre-Amplifier signals. PHA data is transferred via the USB 3.0 interface in list-mode at a max. rate of >1 M events / sec on each input.

Four continuously every 8 ns sampling 16 bit ADCs with **extraordinary stability** enable **32k resolution** for PHA mode. The availabilty of the simultaneous usage of the oscilloscope (Scope) mode together with a Fast Fourier Transformation (FFT) and software pulse height analysis allows for an easy setup and evaluation of the experiment. The PHA data can be tagged with the 8 digital I/O bits and also with the 8ns Real Time Clock. A set of eight 125MHz 48bit Counter/Scalers (option) is also provided. In Multiscaling (MCS, option) mode the internal memory is used to accumulate spectra of up to 16M bins. An automatic sequential mode allows to acquire up to 65536 sequential spectra – each with a presettable number of sweeps – with no deadtime between each cycle or synchronized with an external signal. The maximum count rate is 400 MHz, Dwelltime is 30 ns for one STOP input or 60ns for two STOP inputs.
An 8 bit digital I/O port provides controlling external devices or to react on additional external signals. It can be used as 8 TAG bits that are sampled with 2.5 µsec. The "GO-LINE" compatibility allows to synchronize start and stop of the experiment across many measurement devices.
The 32 bit or 64 bit MPANT Windows Software is able to handle 6 MCA4A providing up to 24 MCA channels. In-field upgrade options enable upgrading of MCS mode, more MCA channels, 8 ns RTC time tagging, Scalers, and multiparameter coincidences for 2 or 4 ADCs including Replay of list files.

Pulser test spectrum @ 32k resolution. Expanded view shows lines with width of ~ 2 ch FWHM.
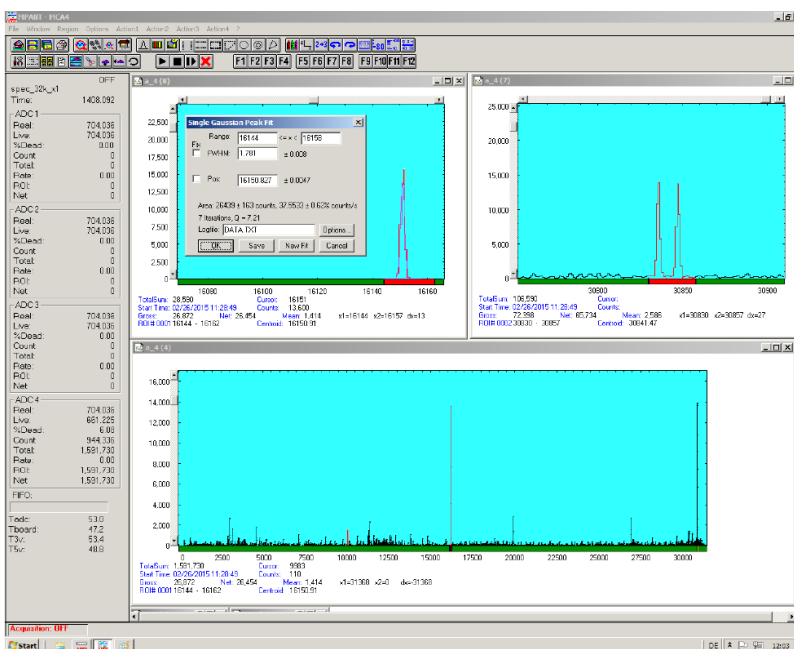
Applications:

- Nuclear- and X-ray spect-roscopy
- LIDAR
- Mössbauer Spectroscopy
- Dynamic Desorption Studies
- Cross-correlation measurements
- Scanning Mass Spectro--scopy
- Fluorescence Lifetime Studies
- Time-correlated Single Photon and Ion Counting
- Laser induced chemical reactions
- Portable Spectrum Analysis
- Setup of experiments in High-Energy Physics
- OEM-applications
- Remote Spectrum Acquisition

Features

- Complete versatile MCA data acquisition system
- Several operating modes:
  - PHA (pulse height analysis) using 1 to 4 inputs
  - Digital Pole-Zero filter and Trapezoidal filter for positive and negative preamplifier signals
  - SVA (sampled voltage analysis) mode
  - SCOPE mode using 1 to 4 inputs (32..262µs)
  - FFT mode using 1 to 4 inputs (0..62.5MHz)
  - Simultaneous SCOPE / FFT / PHA usage
  - MCS (multichannel scaling) using 1 or 2 inputs (option)
- 4 on board 125MHz sampling, virtually dead-time-less pulse height analyzing 16 bit ADCs
- >1 M PHA events per second on each channel
- ADC resolution 32k/16k(64k), optional 2k, 4k, 8k
- 4 ADC buffer memories allow storage of up to 8 analogue pulses (depending on pulse widths) each providing virtually dead-time-less data acquisition
- Several optimized pulse height analysis fitting algorithms (absolute maximum, for Gaussian pulses, for flat-top pulses, future kinds optional)
- ADC input range switchable 10V, 8V, 2.5V, 2V unipolar or bipolar ±5V,±4V,±1.25V,±1V
- GATE inputs and SCA outputs
- External Clock and RTC Reset inputs
- Optional eight 125 MHz 48bit scalers, 2 are presettable, optional up/down counting controlled by individual gate inputs
- Easy experimental setup due to

- simultaneous SCOPE, FFT, PHA data acquisition possibility, internal test pulser
- Digital stabilizer for gain and zero stabilization
- Sum spectrum shifted according to individual calibrations enables forming a super-detector
- MCS mode offers two inputs with programmable (fast/slow NIM, rising/falling edge) discriminators
  - individual treshold adjustable for Start and Stop inputs -2V … +2V
  - Maximum MCS count rates of 400MHz
  - Dwell time from 30ns for 1 input and 60 ns for 2 inputs up to 781 h in steps of 10 ns or external
  - No dead-time between channels, no double counting, no end-of-sweep dead-time
  - Automatic sequential mode for up to 65536 sequential MCS spectra
  - On board MCS memory (16M x 32bit)
- 8 bit digital I/O lines can be used as 8 TAG bits, sampled with 2.5 µsec
- 4 Single Channel Analyzer (SCA) outputs, software programmable for several SYNC signals
- GO-LINE compatible with other FAST products
- Available in various configurations, options in-the-field upgradable
- 1 ms real time clock (RTC) tagging standard,
- 8 ns RTC optional for each ADC
- Dualparameter coincidence mode optional
- Four parameter coincidence mode including Replay of list files optional
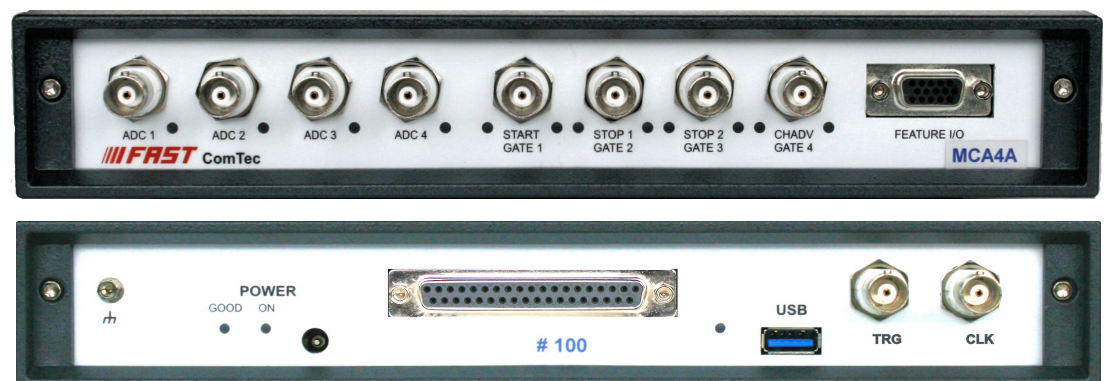
Specifications

PHA (SVA) mode:

ADC: 4x 125MHz continuously sampling, Software programmable ULD, LLD and THRESHOLD

ADC inputs: 4x BNC, ZIN > 1kΩ, 0...+10V / ±5V range, other ranges settable by jumpers: 0...+8V / ±4V, 0...+2.5V / ±1.25V, 0...+2V / ±1V

GATE input: 4 x BNC, ZIN = 50Ω or ZIN = 4.7kΩ pullup (+3.3V) or pull-down, (TTL), coincidence or anticoincidence in Gate mode, +/- edge sensitive when used as sampling input for **SVA**

Memory: 32k ADC sample buffer memory (segmentable in up to 8 segments) for virtually dead- time-less pulse height analysis (each input)

List-mode storage of analyzed PHA data

Max. rate: > 1 M events per sec on each input without loss

Time Tags: Each input pulse tagged with 1ms or **RTC** with 8ns time resolution (option)

Real- / Live-Time counter: 1 ms resolution, presettable, one for each input channel

8 bit digital I/O lines: external control / sample-changer, status Optional as 8 TAG inputs, sampled with 2.5 µsec.

MCS mode:

MCS inputs: START, STOP 1 & 2, Channel Advance MCS inputs: 4x BNC, ZIN = 50Ω or ZIN = 4.7kΩ pull-up (+3.3V) or pull-down, seperately adjustable thresholds -2V .. +2V, 400 MHz max

On board histogramming memory: 16M x32bit

Dwell time modes: software selectable internal, or external channel advance

Dwell time / bin: 30 ns for 1 and 60 ns for 2 inputs...781h settable in steps of 10 ns. (2^{48} x 10 ns)

Dead-time between time bins: zero

End-of-sweep dead-time: 10ns

Spectrum length: up to 16M time bins

Sweep Counter: 48 bit, presettable

Sequential mode: 1...65536 spectra with no dead- time between each cycle or synchronized with external signal

8 bit digital I/O lines: for external control / sample- changer, status

Connectors:

Analog signal inputs: 4x BNC

GATE / MCS inputs: 4x BNC

FEATURE I/O: 15 pin high density, female D-SUB (Analog Ground, 8 bit Digital I/O, GO-Line, 4x SCA)

12V Supply: 2.1mm center pin (rear panel)

USB 3.0: (rear panel) Type A

Ext. Clock / RTC Reset: 2x BNC (rear panel)

Scalers: D-SUB 37 (rear panel)

Power Requirements:
+11...+14V / 15W power supply enclosed

Physical: aluminum case,
260mm x 275mm x 48mm, 1.7 kg

Shipping case:
420mm x 320mm x 160mm, 3.4 kg

Order Information

Model	Description	Order No.
MCA4A	Multichannel Analyzer (4ch)+dual fast MCS, int. ADC, MPANT Software; USB 3.0	MCA4A
MCA4A-MPA2	2 channel multiparameter, incl. 2 RTC, MPANT Software; USB 3.0	MCA4AM2
MCA4A-MPA4	4 channel multiparameter, incl. 4 RTC, MPANT Software; USB 3.0, Replay+Ex	MCA4AM4
MCA4A-GOLD	MCA4A-MPA4 + dual fast MCS, OV,CNT,UPDN,TAG,DLL	MCA4AG
MCA4A-1	Multichannel Analyzer (1ch), int. ADCs (32k), MPANT Software; USB 3.0	MCA4A1
MCA4A-2	Multichannel Analyzer (2ch), int ADCs (32k), MPANT Software; USB 3.0	MCA4A2
MCA4A-3	Multichannel Analyzer (3ch), int. ADCs (32k), MPANT Software; USB 3.0	MCA4A3
MCA4A-4	Multichannel Analyzer (4ch), int ADCs (32k), MPANT Software; USB 3.0	MCA4A4
MCA4Aopt-RTC	RTC for one ADC channel, included in MCA4A-MPA2/4	MCA4ARTC
MCA4Aopt-MCS	2ch fast MCS, 30/60ns dwell time option MCA4A-x, included in MCA4A	MCA4AMCS
MCA4Aopt-TAG	TAG bit input, 8 bit, stored with ADC data at time of input threshold crossing	MCA4ATAG
MCA4OV	OPTION oven controlled oscillator for MCA4A	MCA4AOV
MCA4CNT	Counter / Scaler option for MCA4A, 48 bit, 8 channels, 2 are presettable	MCA4CNT
MCA4UPDN	Up- and downcounting option controlled by individual gate, requires MCA4CNT	MCA4UPDN
MCA4ADLL	DLL for LabVIEW/"C"/Visual Basic (32 + 64 bit) for MCA4A	MCA4AS1
MCA4ARepl-Ex	Replay software for MPA data	MCA4AS3
MCA4A-MPASW2	Multi parameter software for 2 channels, included in MCA4A-MPA2	MCA4AS4
MCA4A-MPASW4	Multi parameter software for 4 channels, included in MCA4A-MPA4	MCA4AS5
MCA4Aupgrade	Additional cost for in-field upgrade (+ price difference of versions involved)	MCA4Aup
MCA4Aup-opt	Additional cost for 1/2ch → 4ch hardware (upgrade possibility → 3,4 ADC ch)	MCA4Auo