



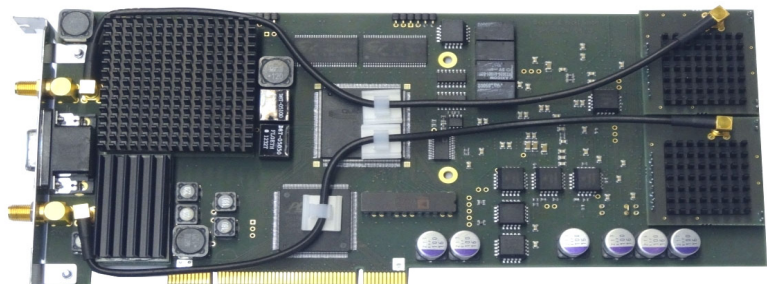
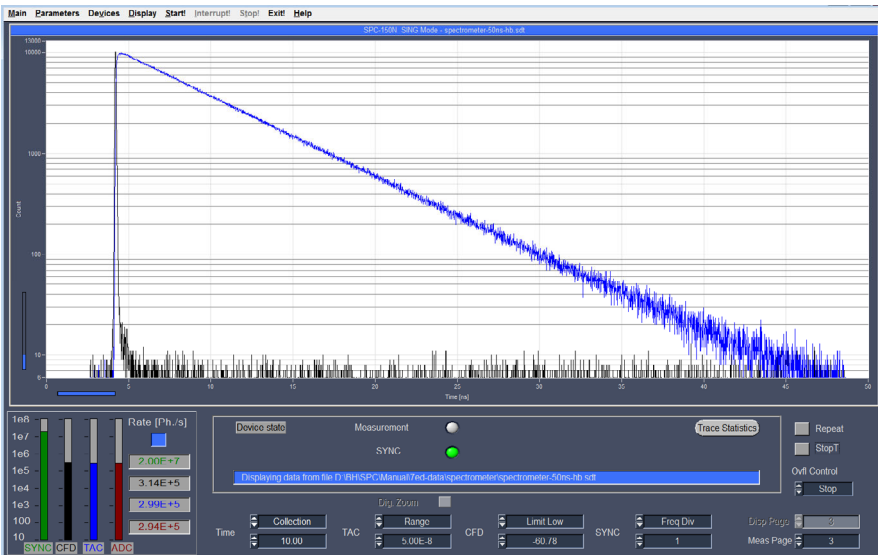
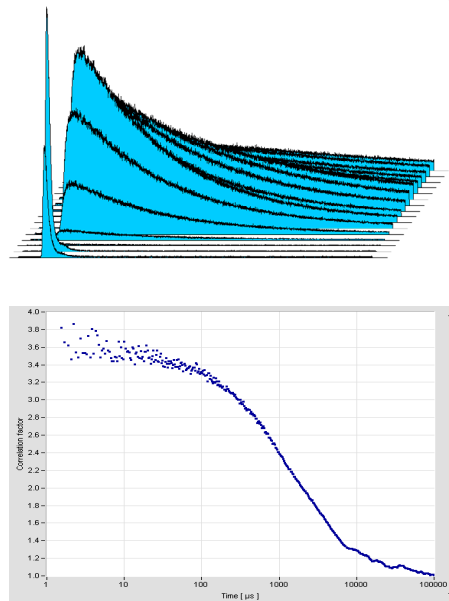
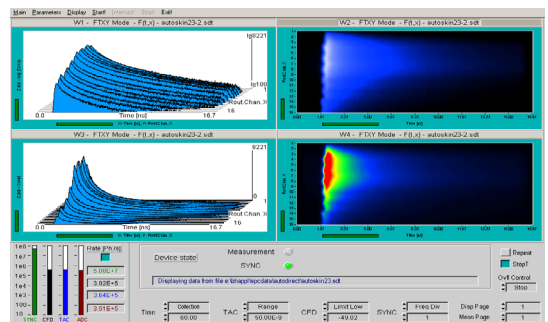
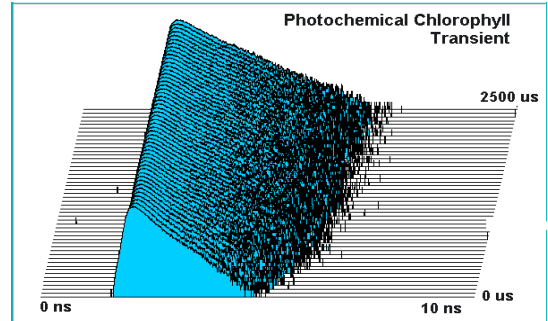
TCSPC Module

SPC-130 EMN

General-Purpose Time-Correlated Single Photon Counting Module

- Improved version of SPC-130 EM TCSPC module
- Input discriminator bandwidth 4 GHz
- Improved resolution for ultra-fast detectors
- 20 ps fwhm IRF width with HPM-100-06 detector
- Time channel width down to 813 fs
- Electrical time resolution (jitter) 6.6 ps fwhm / 2.5 ps rms
- Sub-ps low-frequency timing wobble
- Ultra-high sensitivity
- Multi-detector / multi-wavelength capability
- High-speed on-board data acquisition
- Photon distribution and parameter-tag modes
- Unlimited sequential recording of curves or images
- Reversed start/stop
- Saturated count rate 10 MHz
- Total useful recorded count rate up to 5 MHz
- Dead time <100 ns

- Standard fluorescence decay experiments
- Simultaneous fluorescence / phosphorescence decay
- Diffuse optical tomography
- Multi-wavelength lifetime experiments
- Transient fluorescence lifetime effects
- Fibre-based systems for in-vivo TCSPC
- Fluorescence correlation
- Anti-bunching experiments
- Single-molecule spectroscopy



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Covered by patents DE 43 39 784 and DE 43 39 787



TCSPC Module

SPC-130 EMN

Photon Channel (Start Input)

Principle
 Discriminator Input Bandwidth
 Time Resolution (FWHM / RMS, electr.)
 Variance in time of IRF maximum
 Optimum Input Voltage Range
 Min. Input Pulse Width
 Threshold
 Zero Cross Adjust

Constant Fraction Discriminator (CFD)
 4 GHz
 6.6 ps / 2.5 ps
 <1 ps over 50 seconds
 - 30 mV to - 500 mV
 200 ps
 0 to - 250 mV
 - 100 mV to + 100 mV

Synchronisation Channel (Stop Input)

Principle
 Discriminator Input Bandwidth
 Optimal Input Voltage Range
 Min. Input Pulse Width
 Threshold
 Frequency Range
 Frequency Divider
 Zero Cross Adjust

Constant Fraction Discriminator (CFD)
 4 GHz
 - 30 mV to - 500 mV
 200 ps
 0 to -250 mV
 0 to 150 MHz
 1-2-4
 -100 mV to + 100 mV

Time-to-Amplitude Converter / ADC

Principle
 TAC Range
 Biased Amplifier Gain
 Biased Amplifier Offset
 Time Range incl. Biased Amplifier
 min. Time / Channel
 ADC Principle
 Diff. Nonlinearity

Ramp Generator / Biased Amplifier
 50 ns to 5 us
 1 to 15
 0 to 50% of TAC Range
 3.3 ns to 5 us
 813 fs
 Flash ADC with Error Correction
 < 0.5% rms, typ. <1% peak-peak

Data Acquisition (Histogram Mode)

Method
 Online display
 Dead Time
 Saturated count rate
 Sustained count rate
 Maximum useful count rate (50% loss)
 max. Number of Curves in Memory
 Number of Time Channels / Curve
 max. Counts / Channel
 Overflow Control
 Collection Time
 Display Interval Time
 Repeat Time
 Curve Control (Internal sequencing)
 Curve Control (Routing)
 Count Enable Control
 External event markers
 Experiment Trigger

on-board 2-dimensional histogramming process
 Decay curves (waveforms)
 100 ns, independent of computer speed
 10 MHz
 10 MHz
 5 MHz
 65536 16384 4096 1024 256 64
 4 16 64 256 1024 4096
 $2^{16}-1$
 none / stop / repeat and correct
 0.1 us to 100,000 s
 0.1 us to 100,000 s
 0.1 us to 100,000 s
 Programmable Hardware Sequencer
 4 bit, TTL
 1 bit, TTL
 4 bit, TTL
 TTL

Data Acquisition (FIFO / Parameter-Tag Mode)

Method
 Online display
 FCS calculation
 Number of counts of decay/waveform recording
 Dead Time
 Saturated count rate, peak
 Sustained count rate (bus transfer limited)
 Output Data Format (ADC / Macrotimer / Routing)
 FIFO buffer Capacity (photons)
 Macro Timer Resolution, internal clock
 Macro Timer Resolution, clock from SYNC input
 Curve Control (external Routing)
 Count Enable Control
 Experiment trigger

Time and wavelength tagging of individual photons and continuous writing to disk
 Decay functions, FCS, Cross-FCS, PCH, MCS traces
 Multi-tau algorithm, online calculation and online fit
 unlimited
 100 ns
 10 MHz
 typ. 4 MHz
 12 / 12 / 4
 2 M
 50ns, 12 bit, overflows marked by MTOF entry in data stream
 10ns to 100ns, 12 bit, overflows marked by MTOF entry in data stream
 4 bit TTL
 1 bit TTL
 TTL

Operation Environment

Computer System
 Bus Connectors
 Used PCI Slots
 Power Consumption
 Dimensions

PC Pentium, multi-core CPU recommended
 PCI
 1
 approx. 15 W from +5V, 0.7 W from +12V
 240 mm x 130 mm x 15 mm

Related Literature

W. Becker, The bh TCSPC Handbook, 7th edition. 860 pages, 1150 references. Available on www.becker-hickl.com. Contact bh for printed copies.

International Sales Representatives



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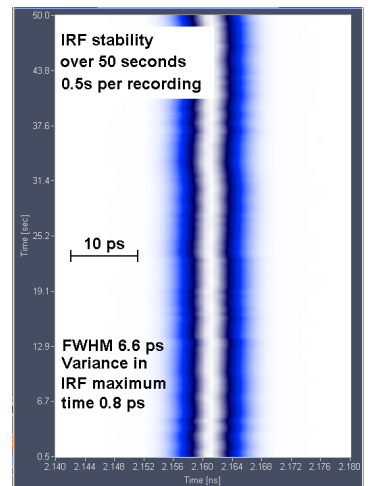
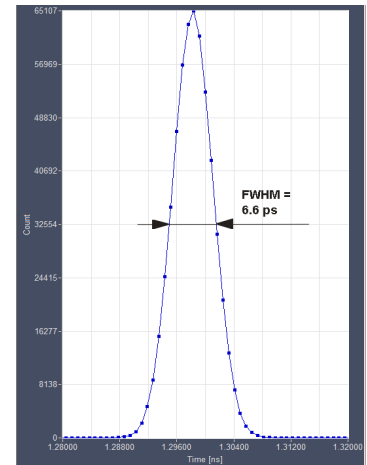
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25 years experience in multi-dimensional TCSPC. More than 1800 TCSPC systems worldwide.