

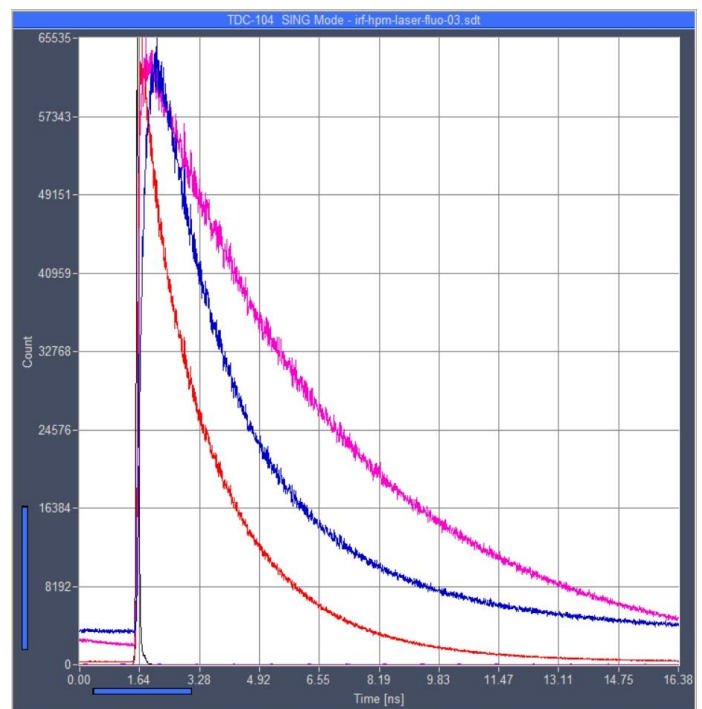
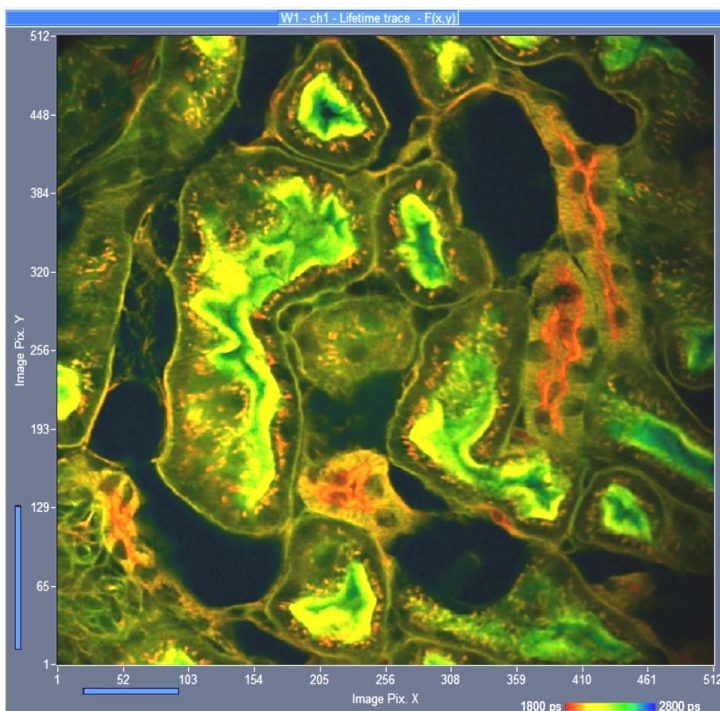
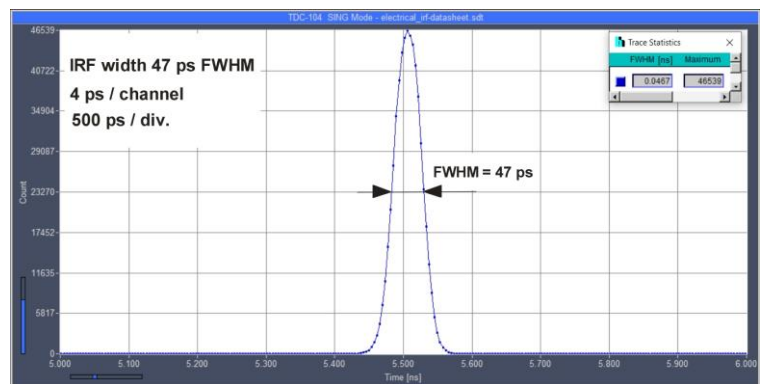


3-Channel Time-Correlated Single Photon Counting Module

- Three parallel TCSPC / FLIM channels
- One synchronisation / reference channel
- High discriminator input bandwidth
- Excellent timing stability
- Low dead time
- High peak count rate

- Recording of optical waveforms
- Fast-acquisition FLIM
- Excitation-multiplexed FLIM
- Multi-wavelength FLIM
- Photon time and parameter tagging

- Fluorescence decay measurement
- Anti-bunching experiments
- Molecular Imaging
- FRET experiments
- Metabolic imaging
- fNIRS and NIRS experiments
- Single-molecule spectroscopy
- Fluorescence correlation



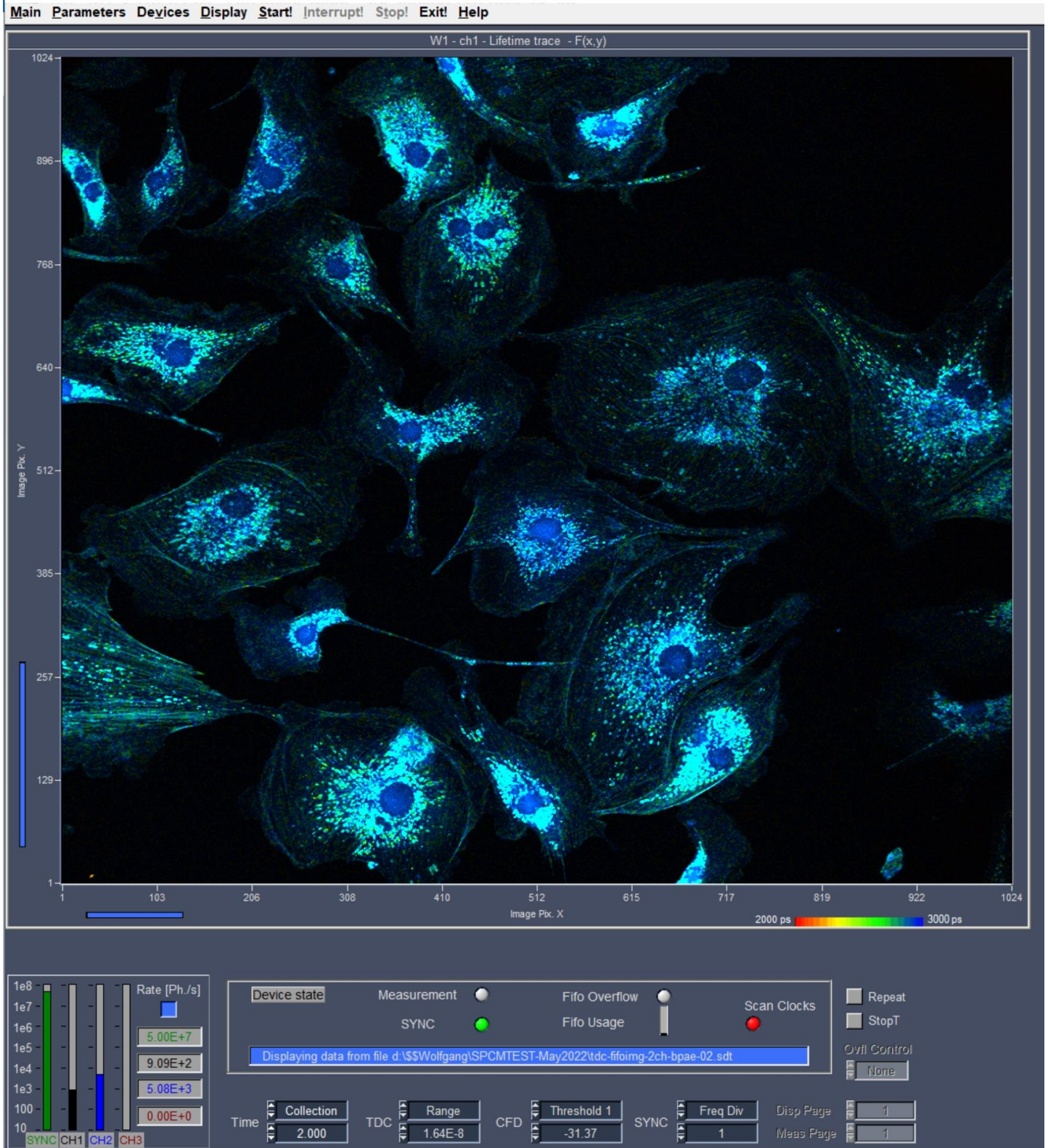
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SPT-QC-104

TCSPC / FLIM Module

Dual-Channel FLIM with bh DCS-120 Confocal Scanning System, Invitrogen BPAE Sample,

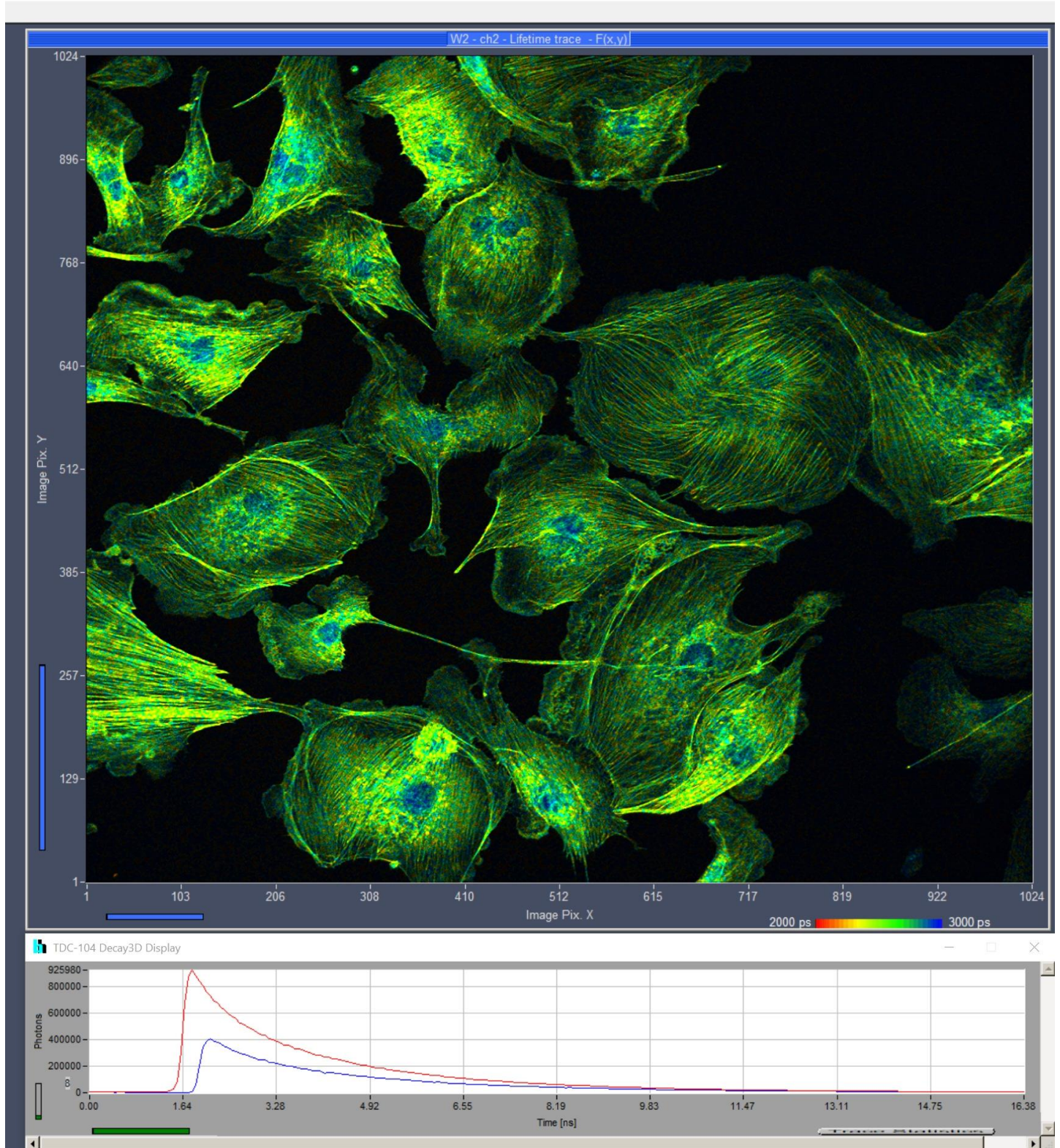




SPC-QC-104

TCSPC / FLIM Module

Excitation 480 nm, Detection 490 nm to 560 nm and 560 nm to 650 nm, 1024 x 1024 pixels





SPC-QC-104

TCSPC / FLIM Module

Photon Channels

Principle
 Discriminator Input Bandwidth
 Optimum Input Voltage Range
 Min. Input Pulse Width
 Threshold
 Zero Cross Adjust

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

Synchronisation Channel

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

Constant Fraction Discriminator (CFD)
 4 GHz
 - 30 mV to - 500 mV
 200 ps
 0 to - 250 mV
 -100 mV to + 100 mV
 0 to 120 MHz
 1 - 2 - 4
 ± 128 ns

Time-Measurement Circuitry

Principle
 IRF Width, FWHM
 RMS Timing Jitter
 Time Range, at 4096 time channels
 Min. Time / Channel
 Timing stability, range 16 ns, over 10 minutes
 Diff. Nonlinearity
 Dead Time

Time-to-Digital Converter
 < 40 ps, FWHM
 < 20 ps, RMS
 16 ns to 68 us
 4 ps
 <5 ps RMS
 < 1 % RMS
 8 ns

Data Acquisition (Histogram Modes)

Method
 Peak Count Rate, each channel
 Saturated count rate, continuous
 Max. Counts / Time Channel (Counting Depth)
 Max. No. of Time Channels
 Overflow Control
 Collection Time
 Display Interval Time
 Repeat Time
 Synchronisation with Scanning (Scan Sync IN Mode)
 Routing
 Count Enable
 Experiment Trigger

on-board multi-dimensional hardware histogramming process
 120 MHz
 40 MHz
 2^{16}_1
 65,536
 none / stop / repeat and correct
 0.1 us to 100,000 s
 10 ms to 100,000 s
 0.1 us to 100,000 s
 pixel, line and frame clocks from scanning device
 4 bit TTL
 1 bit TTL
 TTL

Data Acquisition (FIFO / Parameter-Tag Mode)

Method
 Online Display
 FCS Calculation
 Number of Counts of Decay / Waveform Recording
 Peak Count Rate
 Sustained Count Rate (Bus-Transfer Limited)
 Max. Counts / Time Channel (Counting Depth)
 Max. No. of Time Channels
 On-board FIFO Buffer Capacity (Photons)
 Macro Timer Resolution, Internal Clock
 Routing
 External Event Markers
 Experiment Trigger

Parameter-tagging of individual photons, continuous writing to disk
 Decay function, FCS, Cross-FCS, PCH, MCS traces
 Multi-tau algorithm, online calculation and online fit
 unlimited
 120 MHz
 8 MHz
 unlimited
 4096
 1,750,000
 2 ns, overflows marked by MTOF entry in data stream
 4 bit, TTL/CMOS
 4 bit, TTL/CMOS
 TTL/CMOS

Data Acquisition, FIFO Imaging

Method
 Online Display
 Synchronisation with Scanner
 Routing / Wavelength / Laser-Multiplexing Channels
 Image Format, 1 Image per Channel
 No. of Time Channels
 No. of Pixels

Buildup of images from time- and wavelength tagged data
 Intensity images or lifetime images
 Decay curves in regions of interest
 via Frame Clock, Line Clock, and Pixel Clock pulses
 1 to 16

16	64	256	1024
4096 x 4096	2048 x 2048	1024 x 1024	512 x 512

Operation Environment

Operating System
 Bus Connector (Slot type)
 Total Power Consumption
 Dimensions

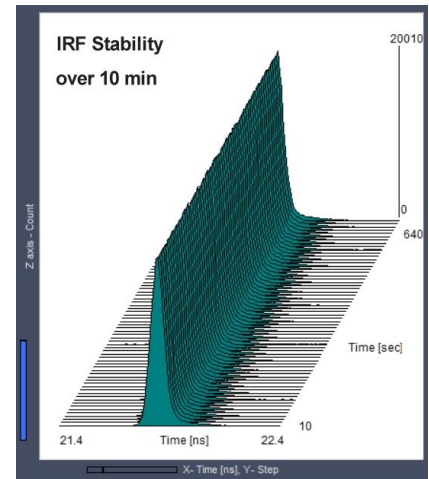
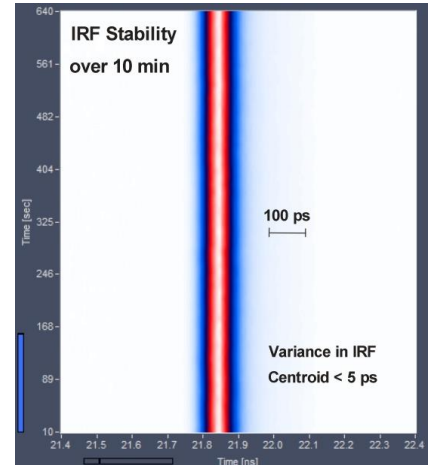
Windows 10, Windows 11
 PCI-ex
 approx. 12 W from +12V
 205 mm x 110 mm x 15 mm

Related Products

SPC-180N, SPC-180NX, SPC-180NXX TCSPC modules, HPM-100 hybrid detectors, DCC-100PCIe detector controller
 BDS-SM ps diode lasers, BDS-MM picosecond diode lasers, SPCImage NG data analysis software

Related Literature

W. Becker, The bh TCSPC Handbook, 9th edition (2021). 950 pages, available on <https://www.becker-hickl.com>. Please contact bh for printed copies.
 The bh TCSPC Technique, Principles and Applications. Overview brochure, 27 pages. Available on <https://www.becker-hickl.com>



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