

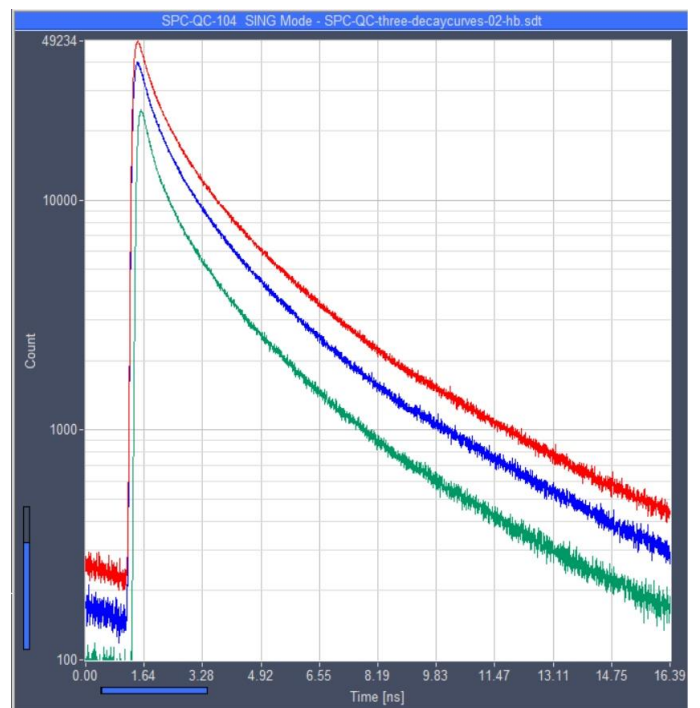
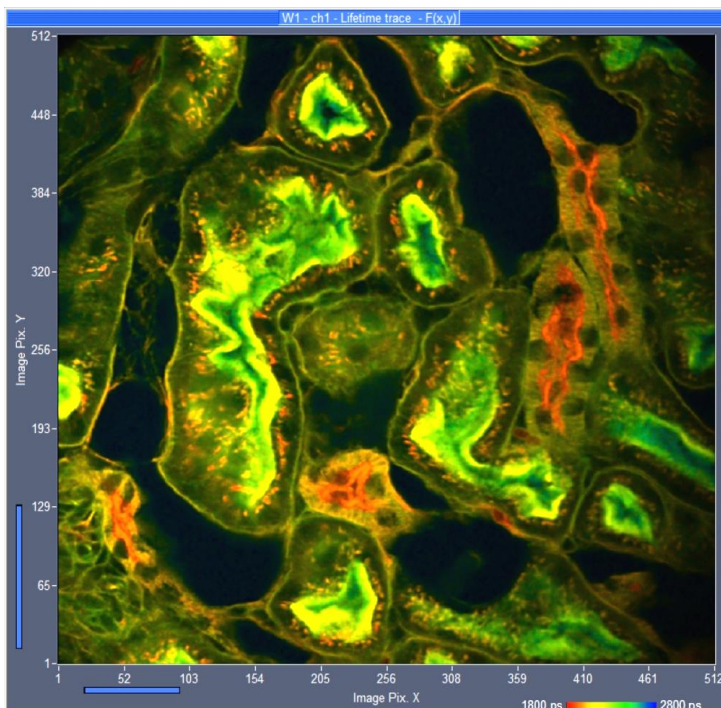
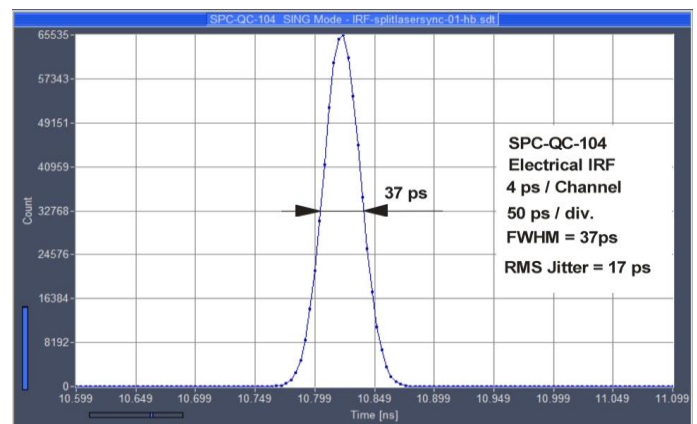
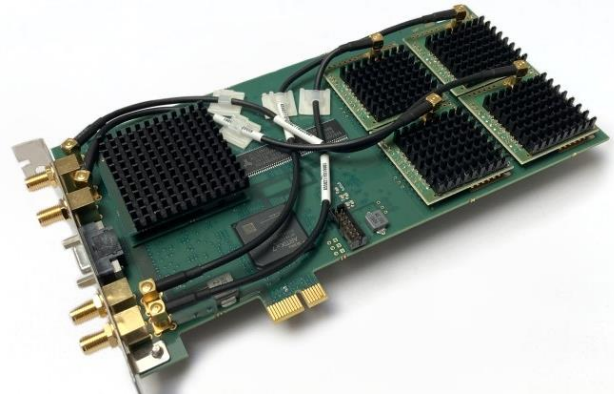


3 / 4 Channel Time-Correlated Single Photon Counting Module

Three parallel TCSPC / FLIM channels plus
One synchronisation / reference channel or
Four absolute-timing channels
Ultra-high discriminator 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
LIDAR
Anti-bunching experiments
Molecular Imaging
FRET experiments
Metabolic imaging
fNIRS and NIRS experiments
Single-molecule spectroscopy
Fluorescence correlation



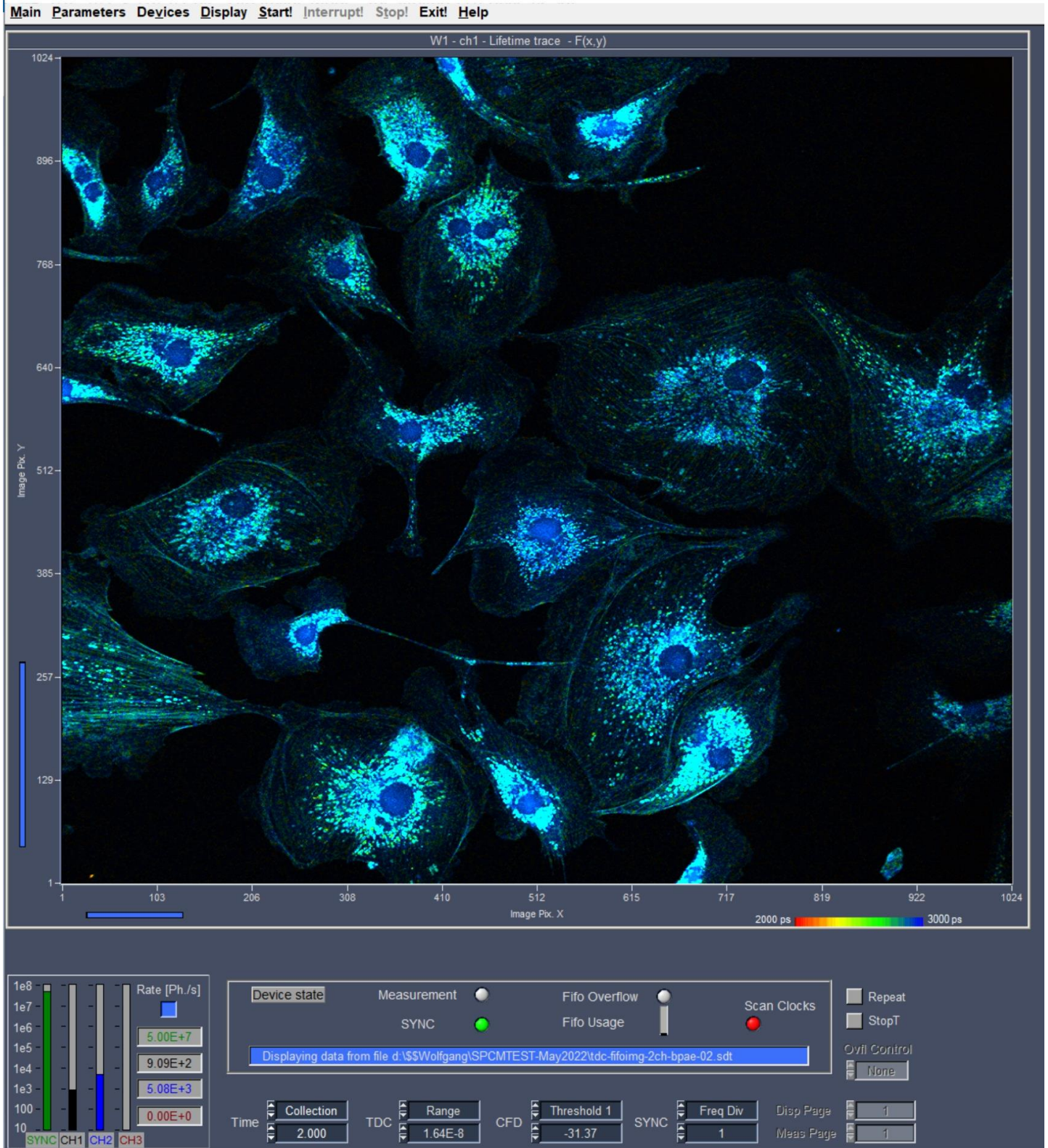
Becker & Hickl GmbH
Nunsdorfer Ring 7-9
12277 Berlin, Germany
Tel. +49 30 212 80 02-0
Fax. +49 30 212 80 02-13
email: info@becker-hickl.com
https://www.becker-hickl.com



SPT-QC-104

TCSPC / FLIM Module

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

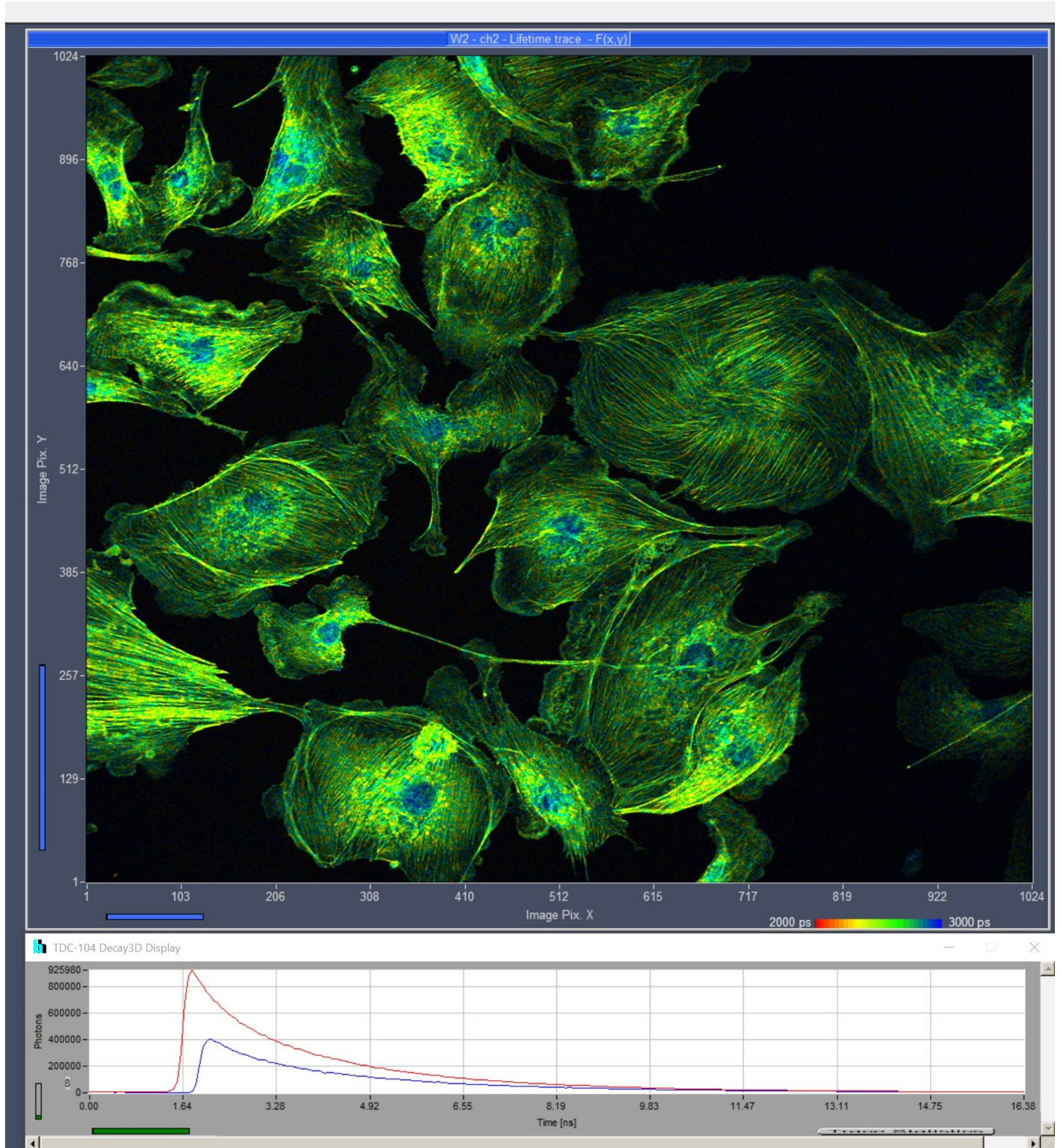




SPC-QC-104

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

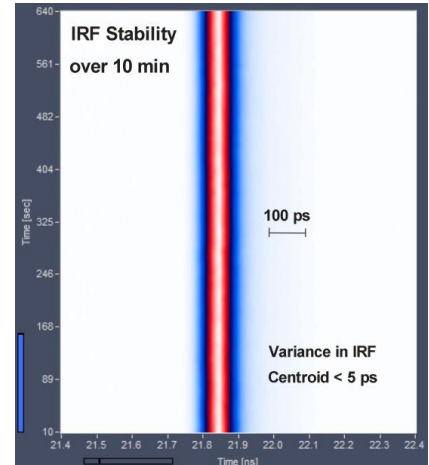
No. of channels	3 or 4
Principle	Constant Fraction Discriminator (CFD)
Discriminator Input Bandwidth	4 GHz
Optimum Input Voltage Range	-30 mV to -500 mV
Min. Input Pulse Width	200 ps
Threshold	0 to -500 mV
Zero Cross Adjust	-100 mV to +100 mV

Synchronisation Channel / Fourth Photon Channel

Principle	Constant Fraction Discriminator (CFD)
Discriminator Input Bandwidth	4 GHz
Optimal Input Voltage Range	-30 mV to -500 mV
Min. Input Pulse Width	200 ps
Threshold	0 to -500 mV
Zero Cross Adjust	-100 mV to +100 mV
Frequency Range	0 to 120 MHz
SYNC Frequency Divider	1 - 2 - 4

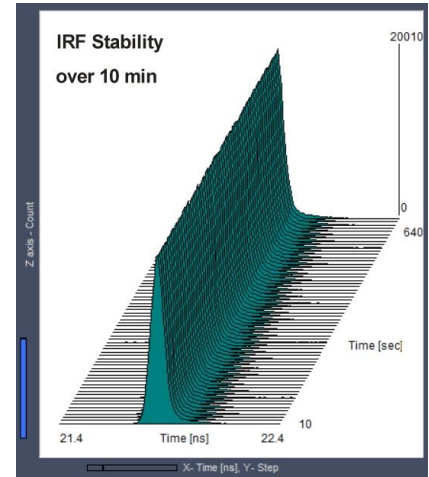
Time-Measurement Circuitry

Principle	Time-to-Digital Converter
IRF Width, FWHM	< 39 ps, FWHM
RMS Timing Jitter	< 18 ps, RMS
Time Range, at 4096 time channels	16 ns to 68 us
Min. Time / Channel	4 ps
Timing stability, range 16 ns, over 10 minutes	< 5 ps RMS
Diff. Nonlinearity	< 1 % RMS
Dead Time	8 ns



Data Acquisition (Histogram Modes)

Method	on-board multi-dimensional hardware histogramming process
Peak Count Rate, each channel	120 MHz
Saturated count rate, continuous	40 MHz
Max. Counts / Time Channel (Counting Depth)	2 ¹⁸ -1
Max. No. of Time Channels	65,536
Overflow Control	none / stop / repeat and correct
Collection Time	0.1 us to 100,000 s
Display Interval Time	10 ms to 100,000 s
Repeat Time	0.1 us to 100,000 s
Synchronisation with Scanning (Imaging Mode)	pixel, line and frame clocks from scanning device
Routing	4 bit TTL
Count Enable	1 bit TTL
Experiment Trigger	TTL



Data Acquisition (FIFO / Parameter-Tag and Absolute-Time Mode)

Method	Parameter-tagging of individual photons, continuous writing to disk
Online Display	Decay function, FCS, Cross-FCS, PCH, MCS traces
FCS Calculation	Multi-tau algorithm, online calculation and online fit
Number of Counts of Decay / Waveform Recording	unlimited
Peak Count Rate	120 MHz
Sustained Count Rate (Bus-Transfer Limited)	10 MHz
Max. Counts / Time Channel (Counting Depth)	unlimited
Max. No. of Time Channels	4096
On-board FIFO Buffer Capacity (Photons, per Channel)	750,000
Macro Timer Resolution, Internal Clock	2 ns, overflows marked by MTOF entry in data stream
Routing	4 bit, TTL/CMOS
External Event Markers	4 bit, TTL/CMOS
Experiment Trigger	TTL/CMOS

Data Acquisition, FIFO Imaging

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

No. of Time Channels	16	64	256	1024
No. of Pixels	4096 x 4096	2048 x 2048	1024 x 1024	512 x 512

Operation Environment

Operating System	Windows 10, Windows 11
Bus Connector (Slot type)	PCI-ex
Total Power Consumption	approx. 12 W from +12V
Dimensions	205 mm x 110 mm x 15 mm

Related Products

SPC-QC-004 three/four-channel TCSPC module, 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

SPC-QC-104, user manual. 92 pages, available on <https://www.becker-hickl.com>
 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>

International Sales Representatives



US:
Boston Electronics Corp
 tcspc@boselec.com
 www.boselec.com



UK:
Photonic Solutions PLC
 sales@psplc.com
 www.psplc.com



Japan:
Tokyo Instruments Inc.
 sales@tokyoinst.co.jp
 www.tokyoinst.co.jp



China:
DynaSense Photonics Co. Ltd.
 info@dyna-sense.com
 www.dyna-sense.com