



HPM-100-40/42

High Speed Hybrid Detectors for TCSPC

GaAsP cathodes, excellent detection efficiency

HPM-100-40: 250 to 720 nm

HPM-100-42: 300 to 850 nm

Instrument response function 120 ps FWHM

Clean response, no tails or secondary peaks

No afterpulsing

Excellent dynamic range of fluorescence decay measurement

Internal generators for PMT operating voltages

Power supply and control via bh DCC-100 card

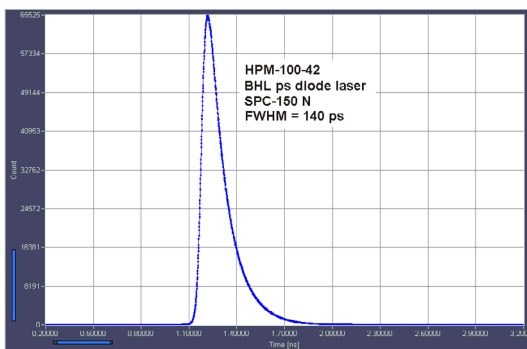
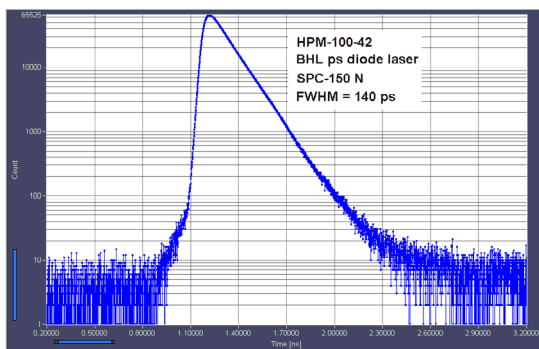
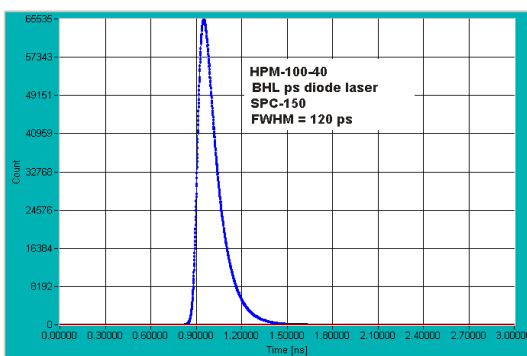
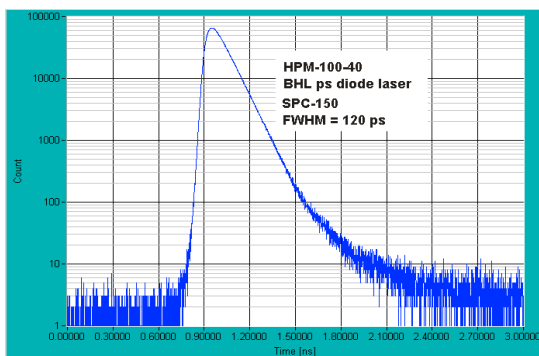
Overload shutdown

Direct interfacing to all bh TCSPC systems



The HPM-100 module combines a Hamamatsu R10467 GaAsP hybrid PMT tube with the preamplifier and the generators for the PMT operating voltages in one compact housing. The principle of the hybrid PMT in combination with the GaAsP cathode yields excellent timing resolution, a clean TCSPC instrument response function, high detection quantum efficiency, and extremely low afterpulsing probability. The virtual absence of afterpulsing results in a substantially increased dynamic range for fluorescence decay recordings. FCS curves obtained with the HPM-100 detectors are free of the typical afterpulsing peak.

The HPM-100 module is operated via the bh DCC-100 detector controller of the bh TCSPC systems. The DCC-100 provides for power supply, gain control, and overload shutdown. The HPM-100 interfaces directly to all bh SPC or Simple Tau TCSPC systems. It is available with standard C-mount adapters, adapters for the bh DCS-120 confocal scanning FLIM system, and adapters for the NDD and BIG ports of the Zeiss LSM 710/780/880 laser scanning microscopes.

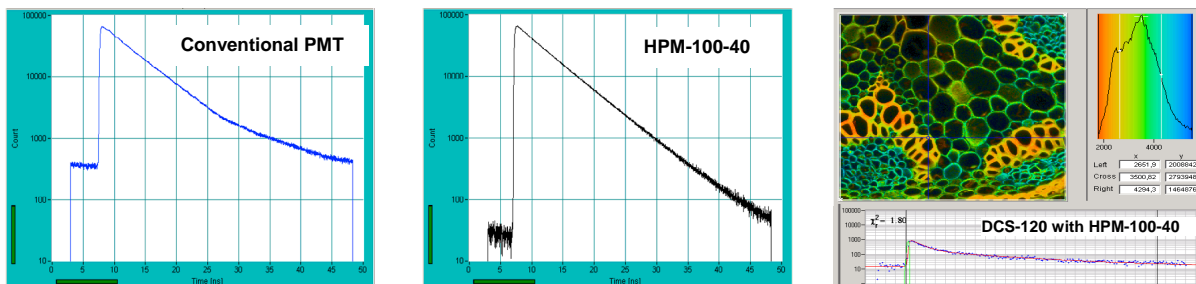


Becker & Hickl GmbH
Nahmitzer Damm 30
12277 Berlin
Tel. +49 / 30 / 787 56 32
Fax. +49 / 30 / 787 57 34
<http://www.becker-hickl.com>
email: info@becker-hickl.com



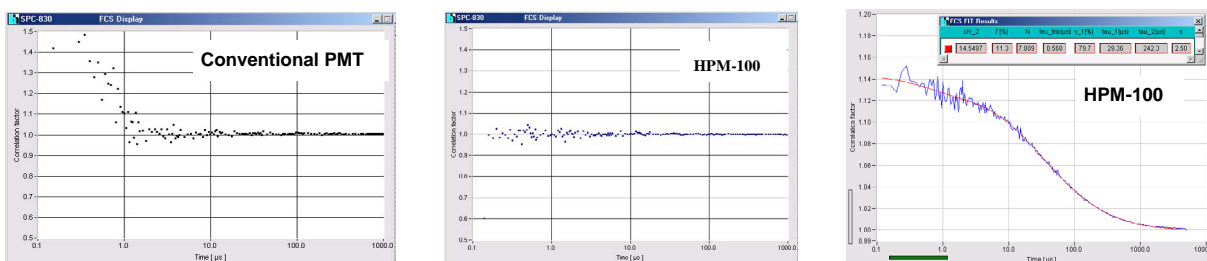
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Absence of afterpulsing improves dynamic range of fluorescence decay measurements



Left: Fluorescence decay recorded with conventional PMT. The background is dominated by afterpulsing. Middle: The only source of background in the HPM is thermal emission of the photocathode. The dynamic range is substantially larger. Right: The lower background improves lifetime accuracy and lifetime contrast in FLIM measurements.

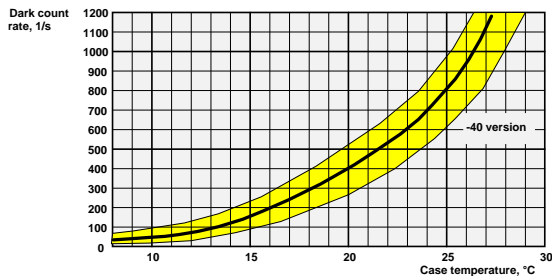
Fluorescence correlation measurements are free of afterpulsing peak



Left: Autocorrelation of continuous light signal of 10 kHz count rate, conventional GaAsP PMT. Middle: Autocorrelation of continuous light signal of 10 kHz count rate, HPM-100 module. The curve is flat down to the dead time of the TCSPC module. Right: FCS curve of fluorescein solution, HPM-100 module.

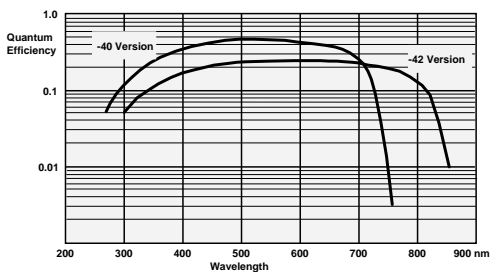
Dark count rate vs. temperature

Typical values and range of variation



Detection quantum efficiency vs. wavelength

After Hamamatsu specifications, APD voltage 95% of breakdown voltage



Specifications, typical values

- Wavelength Range
- Detector Quantum efficiency, at 500 nm
- Dark Count rate, $T_{\text{sease}} = 22^\circ\text{C}$
- Cathode Diameter
- TCSPC IRF width (Transit Time Spread)
- Single Electron Response Width
- Single Electron Response Amplitude
- Output Polarity
- Output Impedance
- Max. Count Rate (Continuous)
- Overload shutdown at
- Detector Signal Output Connector
- Power Supply (from DCC-100 Card)
- Dimensions (width x height x depth)
- Optical Adapters

HPM-100-40	HPM-100-42
250 to 720 nm ¹⁾	300 to 820 nm ¹⁾
45% ¹⁾	22% ¹⁾
560 s ⁻¹	800 s ⁻¹
	3 mm
	120 to 140 ps, FWHM ²⁾
	850 ps, FWHM
	50 mV, $V_{\text{apd}} 95\%$ of V_{max}
	negative
	50 Ω
	10 MHz
	>15 MHz
	SMA
	+12 V, +5 V, -12V
	60 mm x 90 mm x 170 mm
	C-Mount, DCS-120, LSM 710/780/880 NDD and BIG port

1) according to Hamamatsu specifications
2) varies with cathode type and manufacturing lot

International Sales Representatives



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



Photonic Solutions Ltd
Tel: 0131 664 8122
Fax: 0131 449 7301
Email: sales@photronicsolutions.co.uk
Web: www.photronicsolutions.co.uk



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