

HPM-100-50

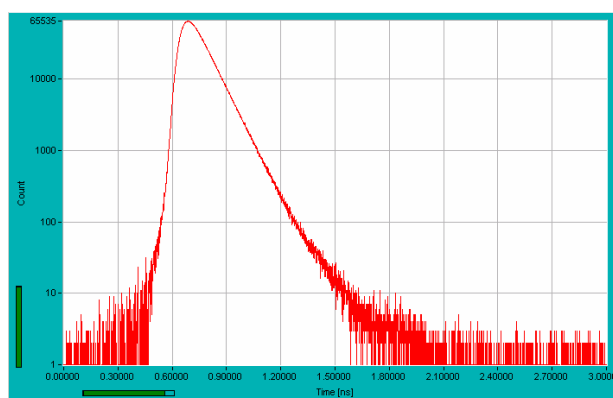
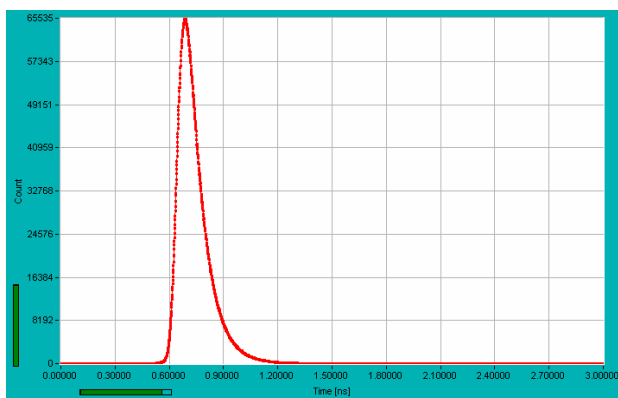
High Speed Hybrid Detector for TCSPC

- GaAs cathode: Excellent detection efficiency
- Sensitive up to 900 nm
- Instrument response function 130 ps FWHM
- Clean response, no tails or secondary peaks
- No afterpulsing background
- Excellent dynamic range of TCSPC measurements
- 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-100-50 module combines a Hamamatsu R10467-50 GaAs hybrid detector tube with the preamplifier and the generators for the tube operating voltages in one compact housing. The principle of the hybrid detector in combination with the GaAs cathode yields excellent timing resolution, a clean TCSPC instrument response function, high detection quantum efficiency up to NIR wavelengths, and extremely low afterpulsing probability. The absence of afterpulsing results in a substantially increased dynamic range of TCSPC measurements. The HPM-100-50 is therefore an excellent detector for NIR fluorescence decay measurements and time-domain diffuse optical tomography.

The HPM-100-50 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 ports of the Zeiss LSM 710 NLO multiphoton laser scanning microscopes.



Instrument response function. Left linear scale, right logarithmic scale. FWHM is 130 ps.



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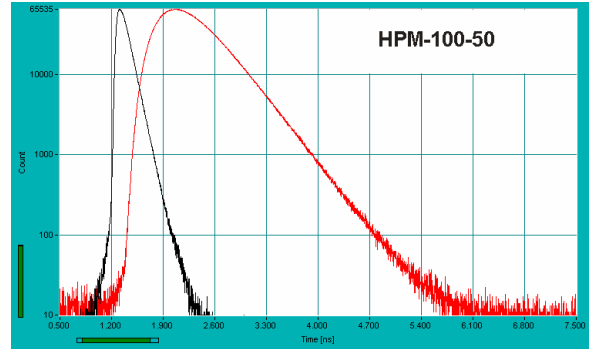
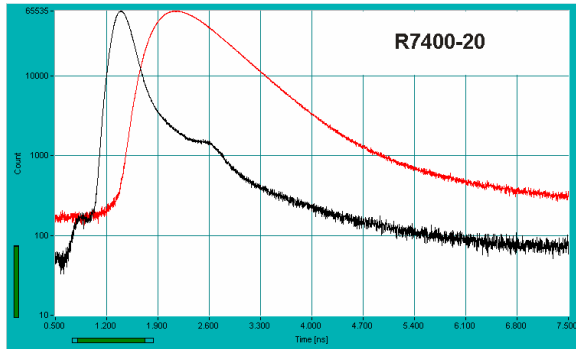
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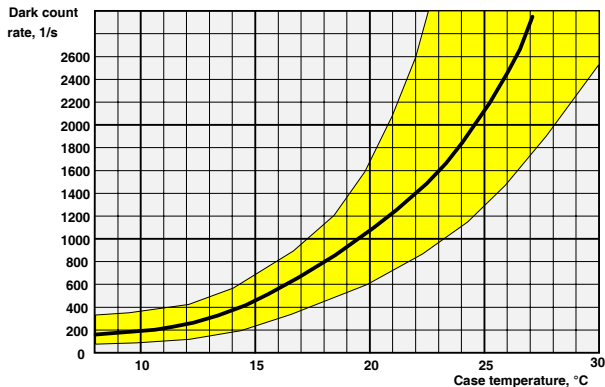
Absence of afterpulsing improves dynamic range of TCSPC measurement



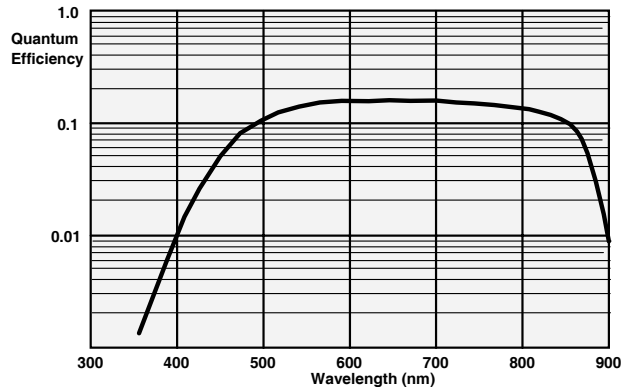
Photon migration curves (red) and IRF (black) recorded with conventional PMT (left) and HPM-100-50 (right). The background signal of the conventional NIR PMT is dominated by afterpulsing. Late photons are lost in the background. Right: The HPM-100-50 is free of afterpulsing. The only background is the thermal emission of the photocathode. The dynamic range is substantially higher than for the conventional PMT.

Dark count rate vs. temperature

Typical values and range of variation



Detection quantum efficiency vs. wavelength



Specifications, typical values

Wavelength Range	400 nm to 900 nm
Detector Quantum efficiency, at 600 nm	15 %
Dark Count rate, $T_{\text{case}} = 22^{\circ}\text{C}$	500 to 3000 s^{-1}
Cathode Diameter	3 mm
TCSPC IRF width (Transit Time Spread)	130 ps, FWHM
Single Electron Response Width	850 ps, FWHM
Single Electron Response Amplitude	50 mV, $V_{\text{apd}} 95\%$ of V_{max}
Output Polarity	negative
Output Impedance	50 Ω
Max. Count Rate (Continuous)	> 10 MHz
Overload shutdown at	>15 MHz
Detector Signal Output Connector	SMA
Power Supply (from DCC-100 Card)	+ 12 V, +5 V, -12V
Dimensions (width x height x depth)	60 mm x 90 mm x 170 mm
Optical Adapters	C-Mount, DCS-120, LSM 710 NDD port

Related products: HPM-100-40 hybrid detector module, 300 to 700 nm, 45% quantum efficiency

Literature: [1] The HPM-100-50 hybrid detector module: Increased dynamic range for DOT. Application note, www.becker-hickl.com
 [2] The HPM-100-40 hybrid detector. Application note, www.becker-hickl.com

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