

Synapse EM

Spectroscopy EMCCD Camera

OSD-SY-03

ELEMENTAL ANALYSIS
FLUORESCENCE
GRATINGS & OEM SPECTROMETERS
OPTICAL COMPONENTS
FORENSICS
PARTICLE CHARACTERIZATION
RAMAN
SPECTROSCOPIC ELLIPSOMETRY
SPR IMAGING

EMCCD for low-light and ultrafast spectroscopy

Key Features and Benefits

- **1600 × 200 or 1600 × 400 EMCCD sensor**
16 × 16 μm pixel size for high spectral resolution
- **25.6 × 3.2 mm or 25.6 × 6.4 mm image area**
Ideal for high-speed or multi-track spectroscopy
- **Back- and front-illuminated**
BIQX Technology with enhanced QE below 450 nm
- **Deep thermoelectric cooling**
Air or liquid circulation to minimize dark current
- **Dual readout modes**
EMCCD or CCD for a broad range of light conditions
- **Readout rates up to 3 MHz**
Acquires more than 1600 spectra per second
- **Single fused-silica vacuum window**
Minimizes reflection losses from UV to near-IR

Spectral rate⁽¹⁾ 1613 spectra/s max.

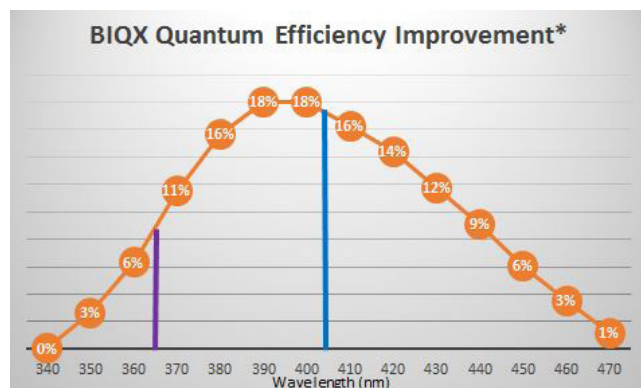
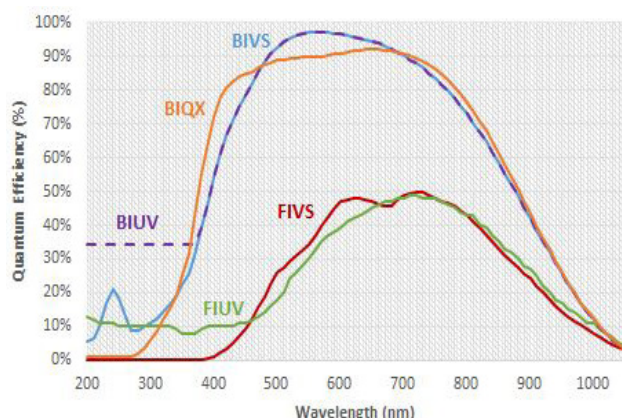
Dark current⁽²⁾ < 0.002 e⁻/pixel/s

Readout noise < 1 e⁻ in EM mode

Non-linearity⁽³⁾ < 0.75%

Key Applications

- Raman spectroscopy
- SERS, TERS
- Multi-track spectroscopy
- Transient spectroscopy
- Single-molecule spectroscopy



Synapse EM-BIQX provides enhanced QE for UV Raman laser line

*Compared to conventional back-illuminated sensor

Synapse EM Specifications

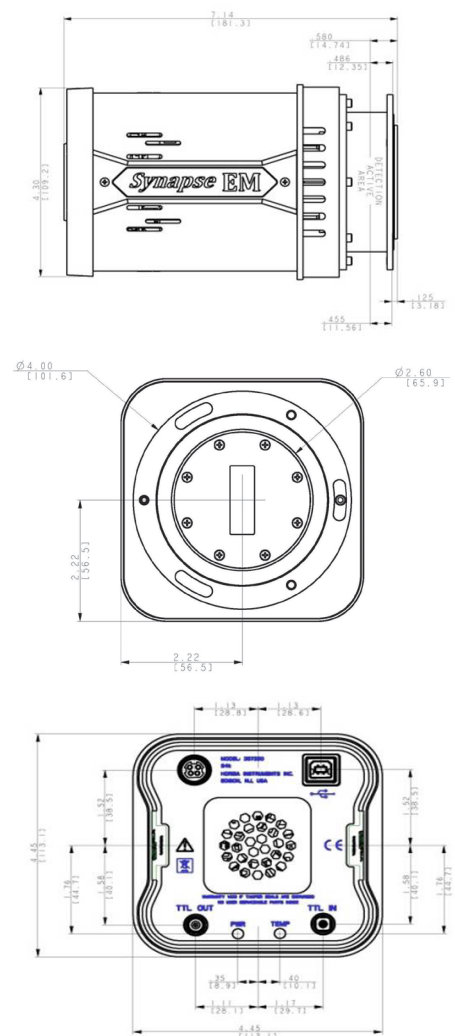
Sensor	Front-illuminated (FI), back-illuminated (BI), scientific grade 1		
Active pixels	1600 × 200	1600 × 400	
Pixel size	16 μm × 16 μm		
Image area	25.6 mm × 3.2 mm	25.6 mm × 6.4 mm	
Output node well capacity			
High Sensitivity mode	300,000 e ⁻		
Electron Multiplying mode	1,300,000 e ⁻		
Register Well Depth			
High Sensitivity mode	450,000 e ⁻		
Electron Multiplying mode	800,000 e ⁻		
Non-linearity (measured at all speeds per camera)	< 0.75%		
Readout Noise (e ⁻): Typ. (Max)	50 kHz	1 MHz	3 MHz
High Sensitivity mode: EM off	2.7 (5)	6.1 (9)	8.5 (12)
Electron Multiplying mode: EM off	8.0 (15)	23 (35)	38 (50)
Electron Multiplying mode: EM on	< 1	< 1	< 1
Dark Current at -60°C (e ⁻ /pixel/s)			
FI	< 0.002		
BI	< 0.01		
Maximum spectra per second			
Full vertical bin	616	376	
ROI mode 20 rows	1475	1475	
ROI mode 8 rows	1613	1613	
Software-adjustable gain (e ⁻ /count)			
High Sensitivity mode	Selectable from 0.6 to 4.0		
Electron Multiplying mode	Selectable from 3.6 to 25		
Electron multiplier gain	1 to 1000, software-controlled		
Digitization	16-bit ADC		
Vertical shift rates	4.9, 9.6, 19 software-selectable ⁽⁴⁾		
Cooling at +20°C			
Air-cooled	-60°C (guaranteed)		
Liquid-cooling recirculator	-75°C (typical)		
Power requirements			
AC-DC power supply (provided)	AC input 90-264 VAC, 47-63 Hz DC output +9 V, 6.44 A maximum		

(1) Region Of Interest (ROI) mode 8 rows

(2) Measured at -60°C

(3) Measured at all read-out speeds for each camera

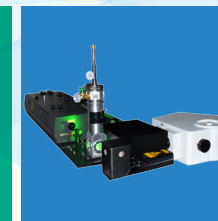
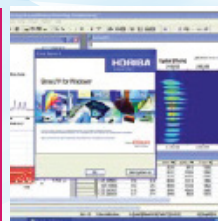
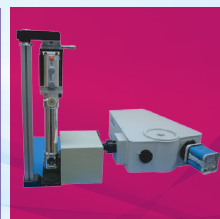
(4) Some decrease in CTE may be observed at faster speeds.



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info.sci@horiba.com

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