2026

EHD-NIRII-640B-U3 in Vivo NIR-II Camera

EHD imaging GmbH

20.1.2026

EHD-NIRII-640B-U3 in Vivo Imaging NIR-II Camera

The EHD-NIRII-640B-U3 is a next-generation NIR-II imaging camera featuring a ¾" InGaAs image sensor covering the 900–1700 nm spectral band. The camera is equipped with an efficient TEC cooling system capable of achieving cooling below room temperature by 50 °C, significantly reducing dark current to an ultra-low level of 193.909 e⁻ in MCG mode. Through a USB 3.2 Gen 2x1 interface, it achieves 10 Gbps high-speed data transmission, with 512 MB onboard buffer ensuring data transfer stability.

Key Features

- Utilizes an InGaAs image sensor, covering 900–1700 nm NIR-II band
- Resolution 640×512 (0.33 MP), pixel size 15 µm × 15 µm
- 3/4-inch sensor format (12.29 mm diagonal), compact design
- Global shutter, eliminating motion distortion
- Three conversion gain modes (HCG/MCG/LCG), flexibly adapting to different applications
- Powerful TEC cooling, cooling differential up to 50 °C
- Ultra-low dark current: only 193.909 e⁻ in MCG mode
- USB 3.2 Gen 2x1 interface, supporting 10 Gbps high-speed transmission
- 512 MB (4 Gb) large-capacity onboard buffer
- Complete GPIO interface: optically isolated input/output
- Wide exposure time range: 16 µs to 5 s
- Supports 8-bit/16-bit data output
- Low power design: 8.4 W (TEC OFF) / <16 W (TEC ON)
- Standard C-mount, easy optical system integration
- Supports Windows/Linux dual platforms, provides complete SDK

Specifications

Model	EHD-NIRII-640B-U3
Sensor	InGaAs
Shutter Type	Global Shutter
Color Type	Monochrome
Resolution	0.33MP (640x512)
Sensor Size	9.6mm x 7.68mm
Sensor Diagonal	1/1.3” (12.29mm)
Pixel Size	15µm x 15µm

Performance Specifications

Frame Rate	TBD @ 640x512
Bit Depth	8/16-bit
Dynamic Range	55.8 dB (HCG); 58.1 dB (MCG); 58.3 dB (LCG)
Sensitivity	TBD

Interface Specifications

GPIO	1× optically isolated input, 1× optically isolated output, 2× non-isolated I/O
Lens Mount	C-Mount
Data Interface	USB 3.0
Power Supply	19VDC / 4.74A

Physical Specifications

Dimensions	137.8 mm × 100 mm × 100 mm
Weight	TBD

Environmental Specifications

Operating Temperature	-30 °C to +45 °C
Operating Humidity	0-95%
Storage Temperature	-40 °C to +60 °C
Storage Humidity	0-95%

Additional Specifications

Operating System	Windows / Linux
Certifications	CE / FCC

EHD imaging GmbH – Zum Rennplatz 15 – D-49401 Damme (Germany)
Tel: +49-5491-2090 – Email: info@ehdimaging.de – Web: www.ehd.de – Shop: www.ehd-imaging.de

What is NIR-II imaging?

NIR-II imaging refers to imaging within the 900–1700 nm band. Compared with visible light and NIR-I (700–900 nm), NIR-II offers deeper tissue penetration, lower scattering, and reduced autofluorescence, making it ideal for biomedical deep-tissue imaging, in vivo studies, and material defect detection.

How does NIR-II imaging differ from SWIR imaging?

- **Spectral range:** NIR-II typically covers 900–1700 nm, while SWIR (short-wave infrared) spans 900–2500 nm.
- **Sensor type:** NIR-II primarily uses InGaAs sensors; SWIR may use standard or extended InGaAs sensors.
- **Applications:** NIR-II focuses on biomedical imaging, while SWIR is widely used in industrial inspection, semiconductors, and agriculture.
- **Imaging depth:** NIR-II can reach centimeter-level penetration in biological tissue; SWIR excels in specific material inspections.
- **Cost:** NIR-II cameras are generally more cost-effective; extended-band SWIR cameras are relatively more expensive.

Why do sNIRII cameras require TEC cooling?

InGaAs sensors generate higher dark current and thermal noise at room temperature. TEC cooling lowers the sensor temperature by 40–50 °C, dramatically reducing dark current (halving for every 7 °C drop) and improving SNR—critical for long exposures and weak-signal detection in fluorescence imaging and spectroscopy.

How should I use among HGC, MCG, an LCG gain modes?

- **HCG (High Conversion Gain):** lowest read noise, ideal for ultra-weak signals such as single-molecule fluorescence.
- **MCG (Medium Conversion Gain):** balances noise and dynamic range for general imaging use.
- **LCG (Low Conversion Gain):** maximizes full-well capacity and dynamic range for high-contrast or strong-signal scenes.

Select the appropriate mode based on signal strength and dynamic range requirements.

Typical Scenarios

In Vivo Vascular Imaging

Harness deep penetration of NIR-II to capture vascular networks 10–20 mm deep. Inject NIR-II dyes like ICG for real-time observation of blood flow, microcirculation, and vascular lesions—vital in cardiovascular research.

Tumor Labeling and Detection

Targeted NIR-II probes label tumors, enabling precise intraoperative margin visualization. Compared with traditional methods, NIR-II offers superior contrast and deeper penetration for more accurate resections.

Lymphatic Tracing

Subcutaneous or peri-tumoral injections of NIR-II tracers allow real-time lymphatic mapping and sentinel node identification—highly valuable in cancer metastasis diagnostics and lymphedema management.

Cerebral Vascular Imaging

NIR-II imaging penetrates skull bone to monitor cerebral vasculature without craniotomy, providing non-invasive, real-time insight into stroke, ischemia, and related conditions.

Semiconductor Inspection

Silicon transparency in NIR-II allows inspection of internal wafer defects, cracks, and impurities. NIR-II penetrates thicker wafers than visible inspection, revealing deeper flaws.

Quantum Dot Fluorescence Imaging

NIR-II quantum dots offer exceptional photostability and quantum yield for long-term in vivo tracking. Surface functionalization enables targeted imaging of specific cells, tissues, or molecules and monitoring of drug delivery.