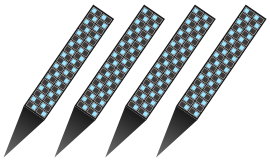
XDAQ™ AIO

PRO DESIGNED TO DO MORE

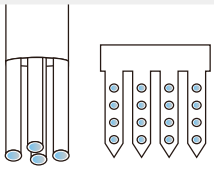
Updated Gen2 Design

- Optimized Hardware, Firmware, API
- Fast, Low Latency Interface
- Better Signal, All Electrically Isolated Ports
- Powerful, Still Portable
- Neuropixels Out-of-box



State-of-the-Art Neuropixels Support

Seamlessly integrated support for both Neuropixels 1.0 and 2.0, enabling high-density recordings of up to 3,072 channels per unit.



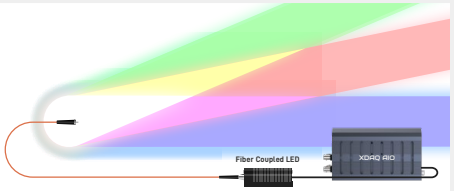
High-Channel Passive Probe Compatibility

Capture EEG, ECoG, LFP, and action potentials through a wide range of silicon probes or microwires—supporting up to 256 channels per cable and 1,024 channels per box.

Built-in Electrical Stimulation

Delivers up to 64 channels per cable and 128 channels per unit—fully integrated for streamlined, high-fidelity neural stimulation.

All in One Hardware.

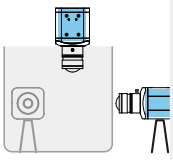


Integrated Optogenetics

Built-in 4-channel high-power driver for precise, reliable optical stimulation—no external hardware required.

Robust I/O, HARP-Compatible, and Scalable

Each XDAQ features 32 digital I/O pairs and 8 ADC/DAC pairs. HARP-compatible as a master, it integrates with existing HARP systems and links effortlessly with other XDAQ.

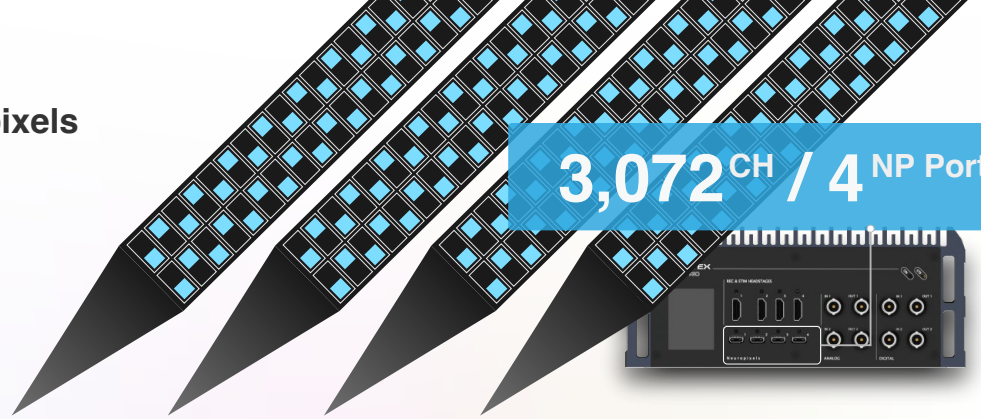


Guaranteed Synchronized Behavior Video Capture

AIO's onboard video engine precisely aligns neural and video data by embedding neural timestamps into video frame metadata. Supports multiple high-speed cameras (>120 FPS) for multi-angle monitoring or standard cameras for multi-animal monitoring.

NeuroNexus 640 Avis Drive, Suite 200, Ann Arbor, MI, 48108 | Phone: +1.734.913.8858 | sales@neuronexus.com KONTEX

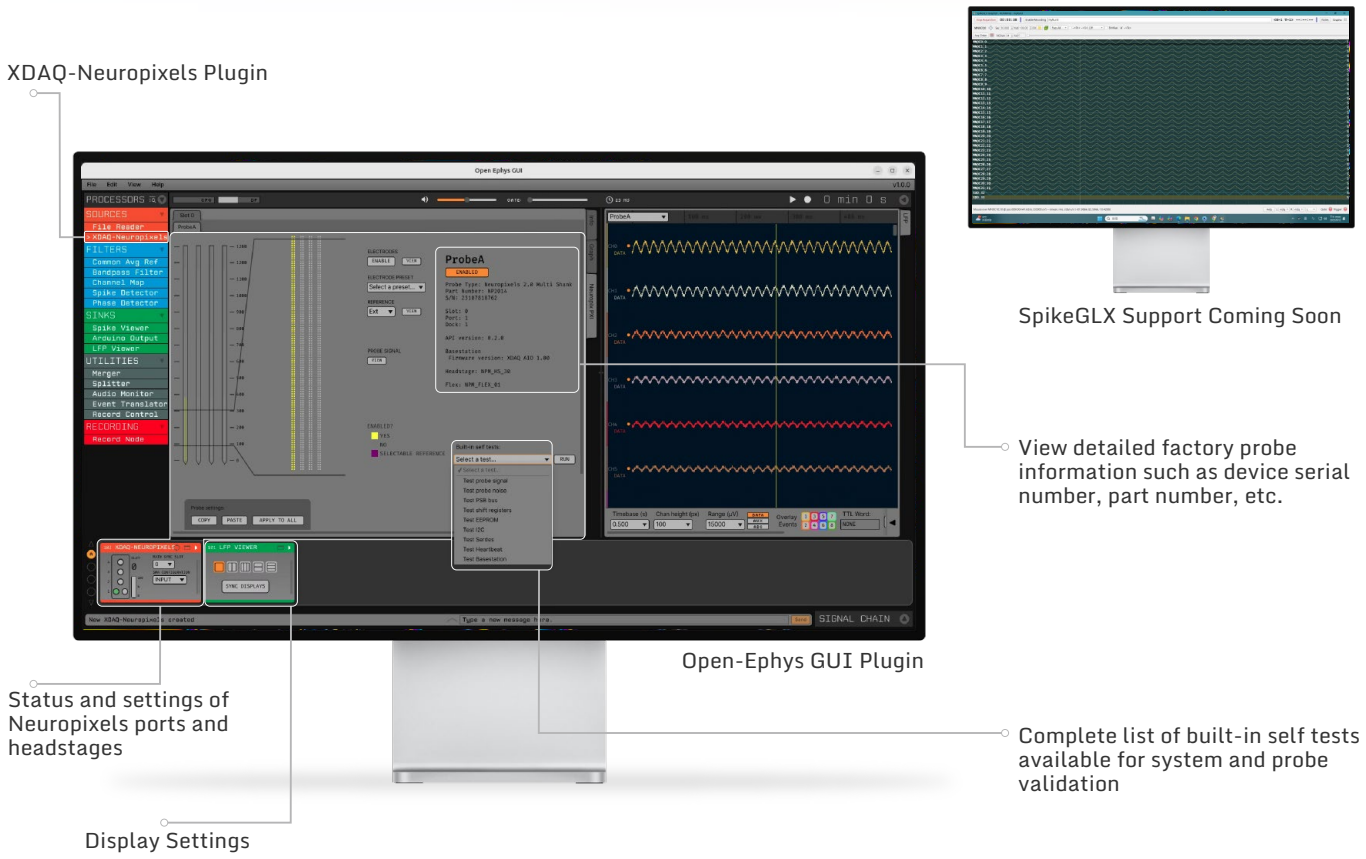
State-of-the-Art Neuropixels (NP Mode)



XDAQ delivers seamless, native integration with Neuropixels 1.0 and 2.0, supporting high-density recordings of up to 4 probes and 3,072 channels per system. Its high-speed Thunderbolt interface ensures powerful, low-latency performance for real-time analysis and closed-loop neuroscience applications.

Fully compatible with standard imec headstages and cables, XDAQ eliminates the need for QBSC cards and PXI enclosures—simplifying setup and reducing system complexity. The XDAQ AIO offers all the functionality of OneBox, while delivering expanded performance and enhanced flexibility for advanced research needs.

Fully Ported, Opensource Application



We provide Open Ephys plugins for XDAQ with Intan & Neuropixels support, enabling seamless integration of the XDAQ ecosystem with Open Ephys and full access to its powerful probe management features.

Fullspec Passive Probe Recording (XR Mode)

1024 CH Total
16 Headstages
Record Type
X3R/X6R
RHD Compatible

Capture EEG, ECoG, LFP, and action potentials using a wide range of silicon probes or microwires.

Advanced Electrical Stimulation (XSR Mode)

128 CH Total
8 Headstages
Stim-Record Type
X3SR
RHS Compatible

Deliver constant-current stimulation and record from the same amplifiers. A unique feature of XDAQ ONE and AIO systems enables switchable VStim compliance levels, providing up to 40% additional peak current—optimizing performance, especially when using high-impedance electrodes.

Recording Capability

When Paired with XR(RHD) Headstages

16-bit, 30kS/s/ch

±5 mV	input range
2.4 µVrms	input-referred noise
15 µV	min detectable signal

On-chip DSP high pass filter

100- 20 kHz	upper cut off filter
0.1-500 Hz	lower cut off filter

in-situ impedance measurement

Stimulation Capability

When Paired with XSR(RHS) Headstages

Switchable rec/stim amplifier
Constant current driver
- 10nA - 2.55 mA
- 14V compliance

Flexible stimuli, 33 µs step
- Biphasic
- Triphasic
- Burst

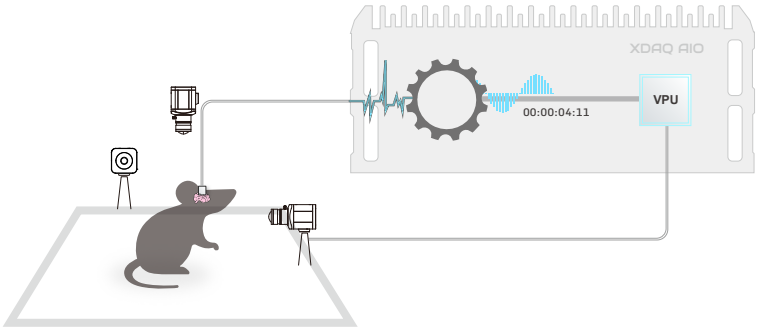
Mode-Specific Architecture for Precision and Flexibility

XDAQ AIO supports a range of probe types through distinct operating modes— XR, XSR, and NP — each tailored for specific experimental needs. In XSR Mode, the number of active recording channels is directly tied to the number of electrical stimulation channels available. For example, the model (SKU: XDAQ-AIO) provides up to 128 channels of switchable stimulation and recording in XSR Mode, even though it supports up to 1024 recording channels in XR Mode.

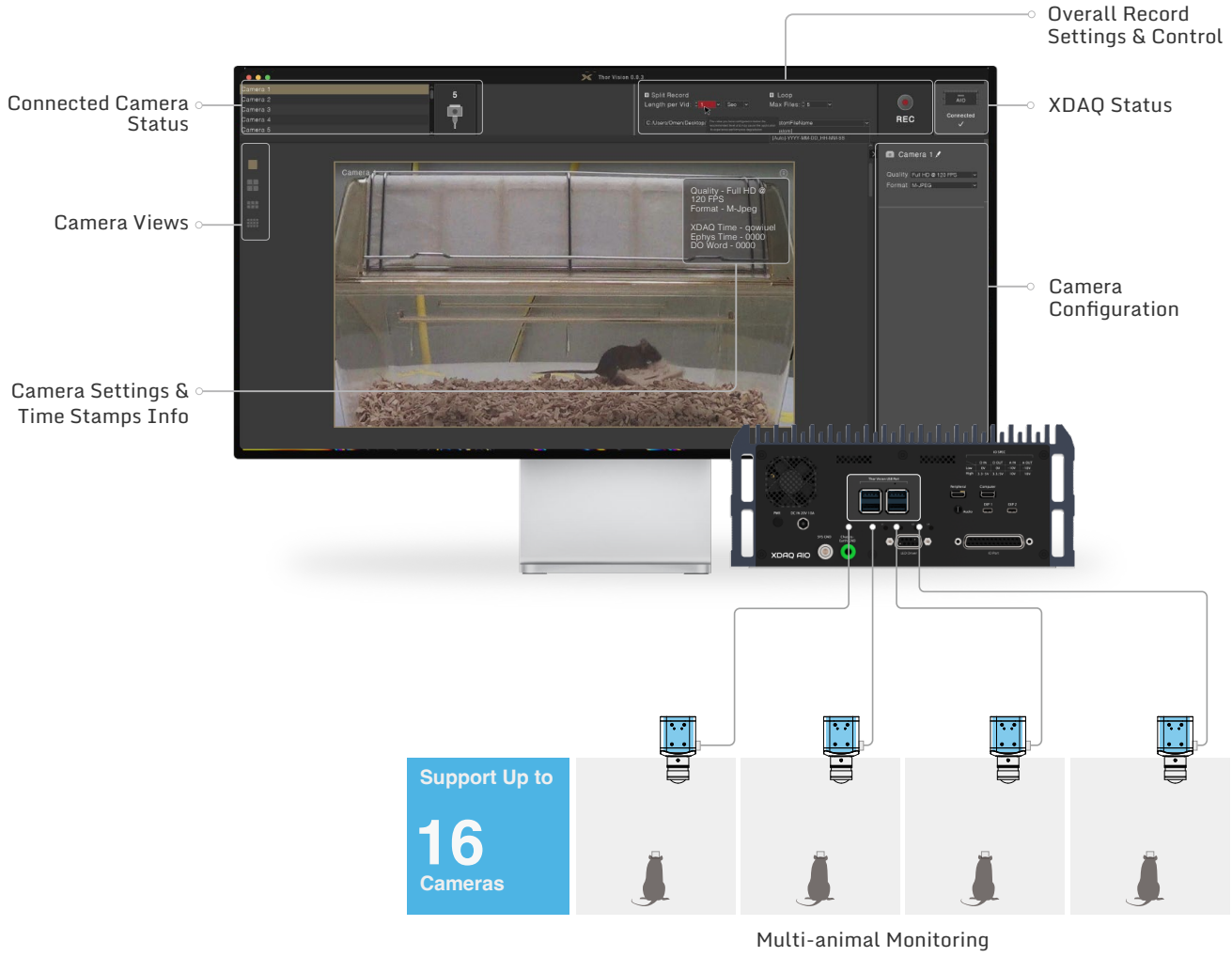
At present, headstages and probes across XR, XSR, and NP Modes cannot be operated simultaneously within a single XDAQ system. XDAQ users may switch between modes based on experimental requirements, but mixing modes in the same session is not supported. However, multiple XDAQ systems can be deployed in parallel — each running a different mode — and synchronized precisely using the XDAQ SyncServer, enabling complex, multimodal experimental designs.

Powerful Multi-Camera Video Capture System

AIO features an integrated video system that ensures precise alignment between neural and video data by embedding neural timestamps directly into each video frame's metadata. This guarantees frame-level synchronization with neural recordings.



High-speed, Multi-angle Monitoring



Multi-animal Monitoring

ThorVision, our custom-developed video control software, enables intuitive camera management and efficient video capture. Both the source code and API library are available to support user-driven customization and integration.

ThorVision is optimized for multi-camera acquisition, with validated support for simultaneous recording from up to 16 cameras. High-frame-rate capture is also supported, tested up to 640 FPS—ideal for behaviorally rich or fast-paced experiments.

AIO supports UVC-compliant cameras with MJPG and H.265 output formats, offering potential compatibility with a broad range of off-the-shelf camera solutions. For users requiring a validated and fully integrated option, ThorCam—KonteX's versatile, high-performance industrial camera—is available as a turnkey solution.

Complete, Validated Ecosystem

A comprehensive suite of off-the-shelf and customizable peripherals designed to support a wide range of neuroscience and electrophysiology research applications.

EIB & Adapter

Off-the-shelf adapters for seamless integration with popular open-source platforms and commercial probes.

Validation Tool

A suite of tools including brainwave-compliant signal generators, stimulation pulse validators, and impedance test loads to verify system integrity and ensure experimental reproducibility.

Commutator

Low-noise, cost-effective, and stress-tested motorized commutators compatible with both Neuropixels and Intan ecosystems.

A non-motorized version is also available for the Intan platform.

Cable

Optimized, cost-effective cabling solutions designed to reduce the long-term cost of in vivo experiments across Neuropixels and conventional probe technologies.

IO and Headstage Expansion

Modular expansion options to increase digital I/O channels, support additional independent headstages (for large scale electrophysiology monitoring), or enable multiple XDAQ systems to operate in synchronized tandem.

New: HARP Adapter now available.

MEA Interface

Cost-effective MEA accessory suite featuring a moisture-resistant design and microscopy access window for seamless XDAQ integration. The customizable headstage supports both stimulation and recording, and is compatible with a variety of MEA configurations.

Model Comparison

CORE2

ONE+

AIO

	CORE2		ONE+		AIO	
	Base	Max	Base	Max	Base	Max
Recording Only (XR Mode)	512ch		512ch	1024ch	1024ch	
Rec+Stimulation (XSR Mode)	16ch	32ch	64ch	128ch	128ch	
#Neuropixels[1] (NP Mode)		2-port		4-Port	4-Port	
Integrated Video Processor					Yes	
Optogenetics LED Driver					4ch	
#of Animal Monitored[2]						
Recording Only Experiment	8		8	16	16	
Rec+Stimulation Experiment	1	2	4	8	8	
Single Cable Passive Probe						
Recording Only Experiment	128ch		256ch		256ch	
Rec+Stimulation Experiment[3]	16ch	32ch	32ch	64ch	32ch	64ch
Synchronized GPIO[4]						
Digital In (2.2-5.5V Logic High)	7ch	31ch	8ch	32ch	8ch	32ch
Digital Out (BNC 3.3, 5V configurable) (DB25: 3.3V)	7ch	31ch	8ch	32ch	8ch	32ch
ADC (16bit ±10V)	1ch	7ch	2ch	8ch	2ch	8ch
DAC (16bit ±10V)	1ch	7ch	2ch	8ch	2ch	8ch
Stimulation Compliance Voltage	±7V		±7V +10 -4V +4 -10V		±7V +10 -4V +4 -10V	
Communication	Thunderbolt 3					
Latency (roundtrip)	<1ms					
Software	Open-Ephys, XDAQ-RHX, Radiens					
OS	Win, MacOS, Linux					
PC Power Supply	15W		60W		60W	
Dimension (mm)	190x158x72		227x190x94		227x190x94	
Weight (g)	900		2810		3045	

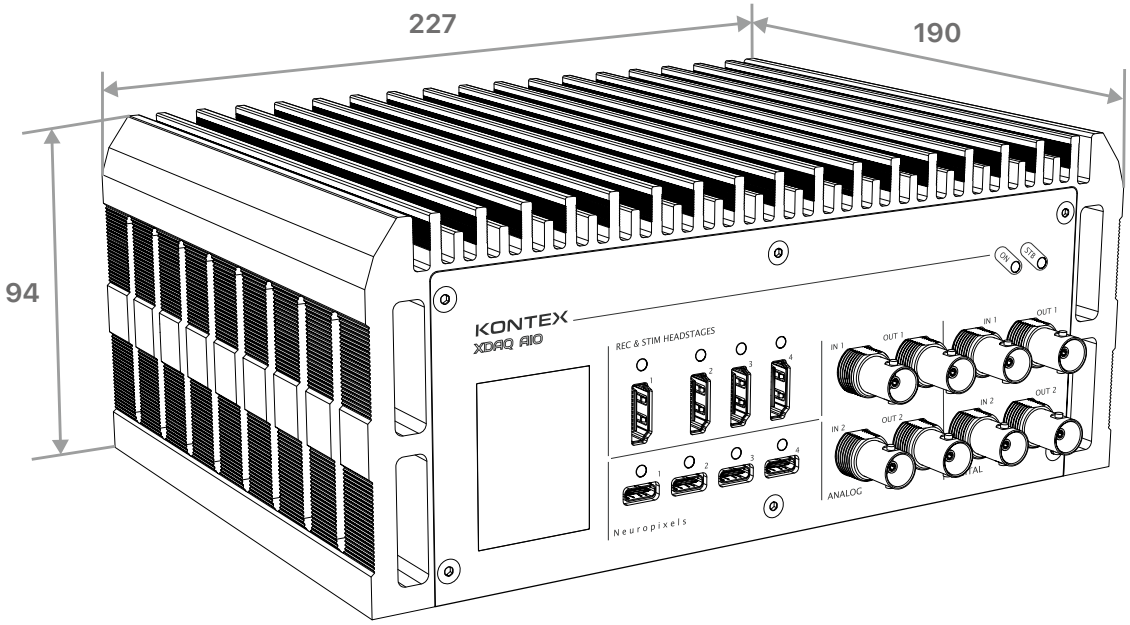
1. Neuropixels functionality (NP Mode) can be configured independently of XR or XSR Modes, which support passive probes. These modes can be added later via a firmware license upgrade, offering flexibility as research needs evolve.
2. Monitoring multiple animals requires the Port Expander, which provides each animal with an independent, isolated amplifier circuit.
3. Adpt-SR64 adapter is required to drive 64ch X3SR64 headstage.
4. IO Expander is required to increase the IO support.
5. Latency may vary with OS.

XDAQ™ AIO Specifications

	XR Mode[1]	XSR Mode[2]	NP Mode[3]	
Neural Acquisition			NP 1.0	NP2.0
Channel Count	1024ch	128ch	1536ch	3072ch
Sampling Rate	1 - 30kHz		AP: 30 kHz LFP: 2.5kHz	30kHz
A/D Resolution	16-bit		10-bit	12-bit
Input Range	±5mV		±5mV	10 mV(ppk)
Input-referred Noise (RMS)	2.4 µV typical		AP: 5.9 µV typical LFP: 9.2 µV typical	AP: 6.8 µV typical LFP: 5 µV typical
Hardware Filter	Upper Cutoff: 100 - 20 kHz Lower Cutoff: 0.1 - 500 Hz		AP: 0.3-10 kHz LFP: 0.5-500 Hz	0.5 - 10 kHz
Electrical Stimulation				
Channel Count		128ch		
Stim Magnitude, Type		10n to 2.55mA, constant current		
Stim Pulse		Biphasic, Triphasic, Burst	Biphasic, Triphasic	
Stim time resolution		33 µs		
Compliance		±7V, -4 to +10V, -10 to +4V		
Synchronized GPIO				
Digital In (2.2 - 5.5V Logic High)	8ch onboard | 32ch expandable			
Digital Out (BNC 3.3, 5V configurable) (DB25: 3.3V)	8ch onboard | 32ch expandable			
ADC (16bit, ± 10 V)	2ch onboard | 8ch expandable			
DAC (16bit, ± 10 V)	2ch onboard | 8ch expandable			
Connector & Port				
Headstage Port (Electrically isolated)	4X HDMI Type A		4X USB-C	
Peripheral & System				
GPIO	8X BNC Connectors, 1X D-Sub25 Connector			
Video System	4X USB Type A, UVC camera			
Optogenetics LED Driver	1X D-Sub9 Connector			
Audio Monitoring	1X 3.5mm Jack			
IO Expansion	2X HDMI Type D			
Communication	2X Thunderbolt 3 (USB-C Connector)			
Power	1X DC Jack(2.5mm, 5525) 20V 10A			
Ground Terminals	1X Chasis GND, 1X Digital GND			
Dimension (mm)	227x190x94			
Weight (g)	3045			
Software	OpenEphys XDAQ™ plugin, XDAQ-RHX, Radiens	XDAQ-RHX, Radiens	OpenEphys XDAQ™ Neuropixels plugin	

1. XR mode acquisition specifications are based on Intan Technologies' RHD2000 series IC. In case of any discrepancies, the manufacturer's specifications shall take precedence.
2. The acquisition and stimulation specifications for XSR Mode are based on Intan Technologies' RHS2000 series IC. In case of any discrepancies, the manufacturer's specifications shall take precedence.
3. NP mode acquisition specifications are derived from IMEC's Neuropixels 1.0 and 2.0 electrode. In case of any discrepancies, the manufacturer's specifications shall take precedence.

Dimensions



Unit: mm
Weight: 3045g

Flexible Headstage Compatibility

Easily adapt to your workflow: use KonteX's ultrasmall implantable headstages and cost-effective accessories, or connect Intan headstages from any vendor using ready-to-use adapters.

Integrated Optogenetics Stimulation

Built-in 4-channel high-power driver (1A, 16bit) for precise, synchronized optical stimulation—no external hardware required.

Compatible with existing LED light sources from commercial vendors such as Thorlab, Plexon and etc.

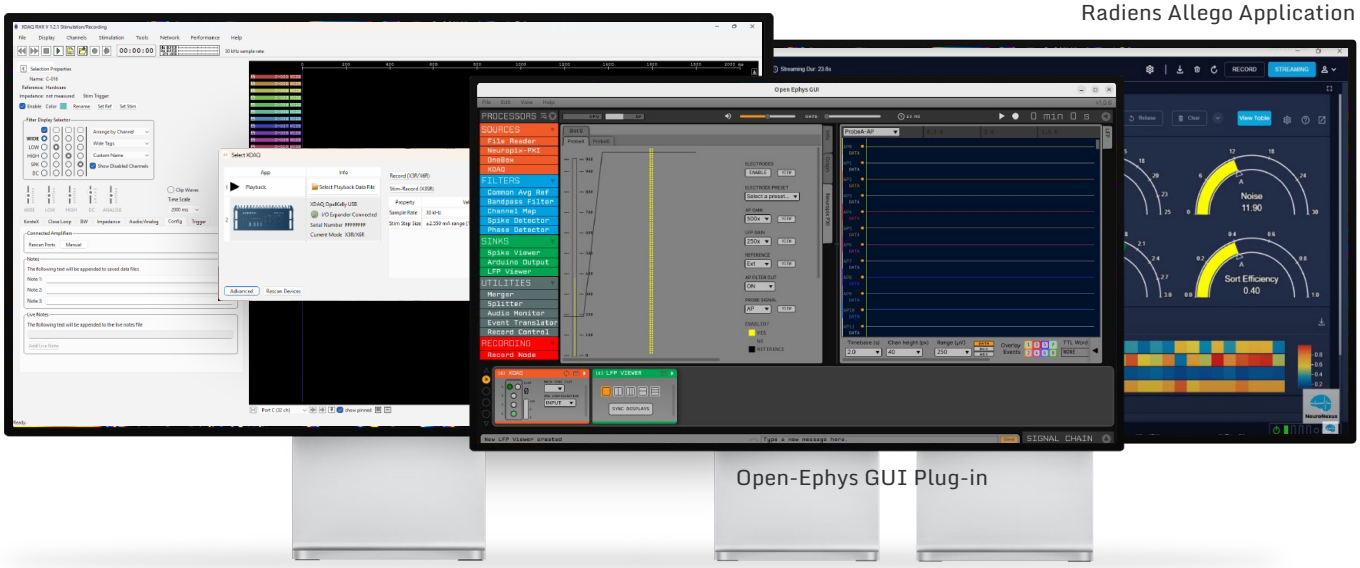
XDAQ Software Compatibility

The complete XDAQ line is compatible with open-source applications such as the OpenEphys GUI and Intan's RHX software. Support for SpikeGLX is currently in development and will be available soon. For users seeking a more refined user experience, the Allego suite from NeuroNexus offers an intuitive and feature-rich alternative. XDAQ API library and example files are also available for advanced users who wish to leverage XDAQ's high-speed Thunderbolt interface to develop custom closed-loop applications.

Software Resources

Opensource XDAQ-RHX Application

Radiens Allego Application



Open-Ephys GUI Plug-in