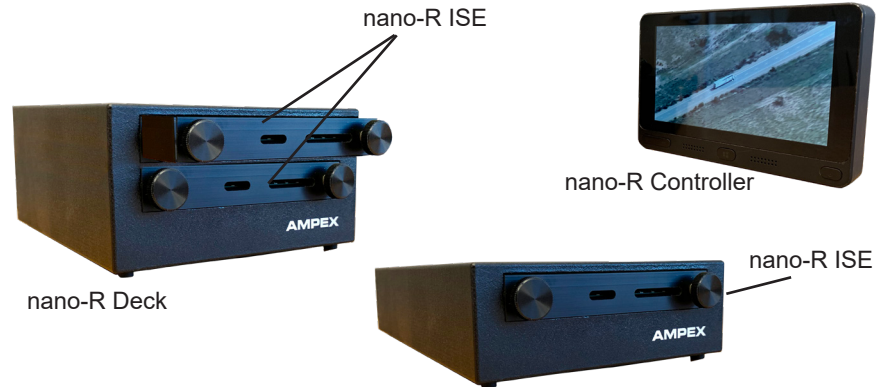# nano-RISE™ Recording System

AMPEX

Features

- Revolutionary New System Design
- Modular, Extensible Architecture
- "All-in-One" Processor & Storage Module
- Up to 2 Video Channels per Module
- USB "Type C" Connectivity
- Integrated 5 Inch Smart Display Available
- "Best-in-Class" Video Encoding
- Integrated Information Assurance

nano-R ISE

nano-R Controller

nano-R Deck

nano-R ISE

System Description

The Ampex nano-RISE™ family of data storage systems creates a revolutionary new concept in affordable recording and data processing for rugged environments, including manned and unmanned vehicle applications.

The innovative nano-R ISE is the modular solution in the nano-RISE family. It consists of three parts: nano-R Intelligent Storage Elements (ISEs), which are rugged, removable modules that take the place of traditional removable memory bricks; the nano-R Deck, into which ISEs are inserted; and the nano-R Controller, a detachable touchscreen handset.

The nano-R ISEs are the core of the system and are what makes the nano-RISE concept revolutionary. They are inserted into the nano-R Deck and work in conjunction with other ISEs in the Deck, with each ISE providing standalone or collaborative capabilities. Each ISE can include storage, a processor, and a video encoder, or other specialty devices. Each ISE has intelligence to encode, format, store, stream, and share up to two channels of HD video while acting as a file server. Additional channels can be easily supported by adding extra ISE modules to the nano-R Deck, with the overall system being able to manage the storage elements as separate data stores, redundant copies, or a span providing more space or specialized capabilities like machine learning for onboard data analytics or onboard cyber security. Inherently, the nano-R ISE is easier to protect in terms of cyber security and information assurance because all the system's intelligence is embedded in the removable ISE modules.

The nano-R ISE connects to the outside world with a single USB Type C connector. This single, rugged, durable connection can carry a 10Gb/s USB 3.1 interface, two video channels (or one UHD dual-link channel), and can deliver enough power to support the ISE with plenty of room for future enhancements. When dismounted, a commercially available cable can connect the module to a Notebook or PC.

The nano-R ISE video interface connects over the Type C connector using the DisplayPort standard. Unlike older interfaces like VGA and HDMI, DisplayPort is packetized and scalable. The Type C carries two "links" which can be combined to provide more bandwidth, and as the signal is packetized, multiple video channels can be carried on a single link with audio and metadata. Other video signals (HD-SDI, DVI-D, etc) are converted to DisplayPort as part of the mounting mechanism, the nano-R Deck.

The video signals utilize encoding technology from Delta Digital Video to produce MISB-compliant video streams, which can be recorded and/or streamed over a network.

System Components†

nano-R ISE:
- CPU & Encoder
- Linux (Red Hat Compatible) OS
- Zero, One or Two Video Channels

nano-R Deck:
- Power Supply and Connectors
- Network Interfaces
- Video Input Converters
- Input Options: HD-SDI, DVI-D, and others
- Variants: 1, 2 or more ISE slices
- Panel Mount & Base Mount

nano-R Controller:
- 5 Inch Diagonal Smart Display
- Windows 10 or Android
- Detachable
- Umbilical or Wireless/Battery Use

The nano-R Deck is the hub for the nano-R ISE system. The nano-R Deck contains the power supply, the USB to network interface and an embedded switch, the video conversion logic, and slots for one or more nano-R ISE modules. The ability to add multiple ISE modules to a single nano-R Deck gives users the ability to add specialized capability with each ISE tailored to various mission needs. For example, a 2-channel solution would need one nano-R ISE module, while a 4-channel solution would require two ISE components. Onboard, video data analytics via machine learning can be added with an ISE dedicated to Ampex's BLUE IQ machine learning algorithms. Users can add control system cyber security with an ISE equipped with Ampex's BLUE Sentry security package.

The final component of the system is the nano-R Controller. This is a detachable touch-screen handset that can run Windows 10 or Android, and provides a convenient mechanism to monitor and control the system. When running Windows, commodity software can be used to view embedded KLV metadata within the video streams. The nano-R Controller can be detached and used remotely through WiFi and an optional battery. Additional display and control options are available for the nano-R system to interface with existing installations. Contact Ampex for details.

Specifications nano-R ISE†

CPU	Dual Core Low Power Intel® System On Chip E3805
Memory	2GB
Storage	None to 1TB
Operating System	Linux (Red Hat Compatible)
Video Interfaces	Two DisplayPort (with Audio, Metadata)
Expansion & Download	USB 3.0
Weight	< 10 lbs*
Power	< 5 Watts*

Specifications: nano-R Deck†

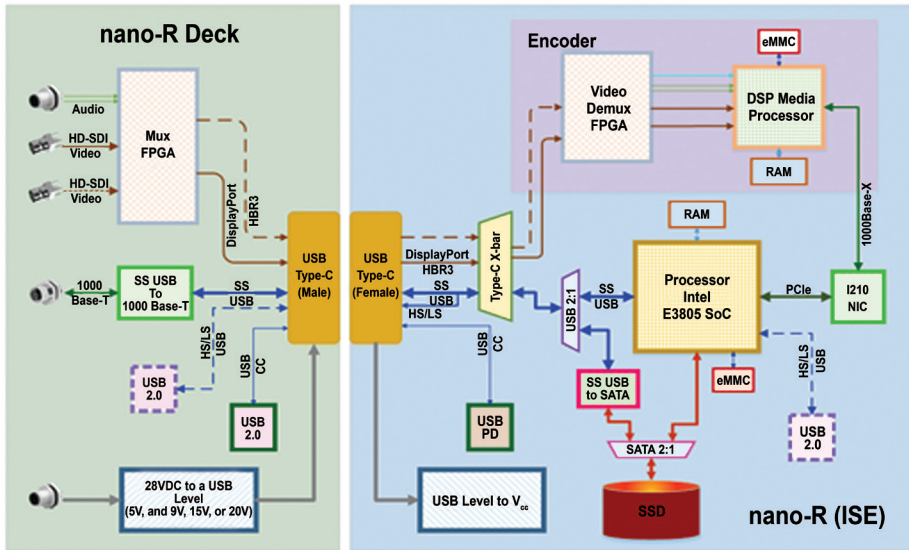|	
Video Inputs	Various, 1080p30/1080p60, Variants for HD-SDI, DVI-D, others
	Note: 1080p60 signals require one dedicated ISE per interface
Intelligence Storage Element (ISE)	Variants for one or two
Network Interfaces	1000Base-T (with embedded switch for two ISE variants)
Power Supply	28VDC per MIL-STD-704

Dimensions

Single ISE Variant (2 channel)	2⅝" x 4⅞" x 8" (HWD) (67mm x 124mm x 203mm)
Dual ISE Variant (4 channel)	4" x 4⅞" x 8" (HWD) (102mm x 124mm x 203mm)

Specifications: nano-R Controller†

CPU	Intel® Atom Z-Series
Display	5" Multi-touch 1280x720
OS	Windows 10, Android 5.1 "Lollipop"
Temperature	Operating: 0°C to +45°C Non-operating: -10°C to +60°C

* Typical recording system configuration

nano-R Controller