ASSURED ®
SYSTEMS

NEOUSYS
TECHNOLOGY

In-vehicle Computing

NRU-51V+/ NRU-51V

Rugged NVIDIA® Jetson Orin™ NX/ Xavier™ NX GMSL2 Camera Sensor Hub for Autonomous Vehicles and Teleoperation

Key Features

· **Powered by NVIDIA® Jetson Orin™ NX or Xavier™ NX SOM bundled with JetPack 5.1.1**
· **Rugged -25°C to 60°C fanless operation**
· **Support 4x GMSL2 automotive cameras via FAKRA Z connectors**
· **1x 10GBASE-T 10Gb and 1x 1GBASE-T 1Gb Ethernet port**
· **2x mini-PCIe sockets for WiFi/ GNSS/ NVMe/ CAN modules**
· **1x M.2 3042/ 3052 B key socket for 4G/ 5G mobile communication**
· **1x isolated CAN 2.0, 1x configurable RS232/ 422/ 485 port, and 1x GPS PPS input**
· **8V to 35V wide-range DC input with built-in ignition power control**

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Introduction

NRU-51V series is a rugged Jetson Orin™ NX/ Xavier™ NX computer supporting GMSL2 cameras that can act either as a sensor hub or a perception unit for ADAS, teleoperation, autonomous mobile robots, and autonomous vehicles.

By supporting GMSL2 automotive cameras, they enable NRU-51V+ with greater vision capability by taking advantage of advanced features such as IP67 waterproof, high dynamic range (120dB HDR), auto white balance (AWB), and LED flicker mitigation (LFM). NRU-51V+ can obtain high-quality images with minimal latency regardless of lighting conditions, from bright sunny days to pitch-black nights. Moreover, it has a unique synchronization mechanism capable of acquiring images from four GMSL2 cameras simultaneously within microseconds channel-to-channel skew. It can further accept GPS PPS signal to align image data with LIDAR or synchronize cameras on other systems.

Thanks to the great power efficiency of NVIDIA® Jetson Orin NX™ NX SOM, NRU-51V+ delivers 100 TOPS inference performance in its 25W power package. Users can transfer raw camera images through its built-in 10GBASE-T Ethernet to another GPU server for perception processing, but also leverage its significant TOPS for real-time object or ROI detection. For teleoperation applications, users can utilize its hardware H.264/265 video codec, to encode video streams from four GMSL2 cameras in real-time and transmit the live video feed to a driver at a remote location via 5G telecommunication with minimum latency.

The combination of GMSL2 interface and Jetson Orin™ NX makes NRU-51V+ much more than just a simple edge AI computer. With greater vision brought by automotive cameras plus I/O interfaces such as 10GbE, CAN 2.0, and M.2 for 5G broadband, NRU-51V+ plays a central role in a moving platform, as a sensor hub for ADAS, a perception unit for AGV/ AMR, or a teleoperation controller for off-highway vehicles.

Specifications

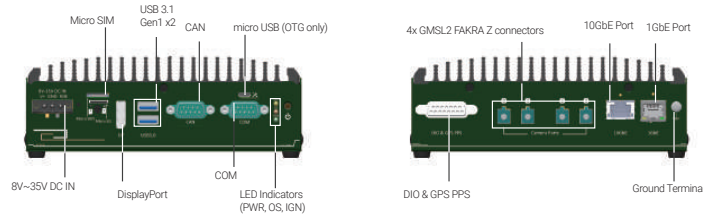|	NRU-51V+-JON8/ NRU-51V+-JON16	NRU-51V-NX8/ NRU-51V-NX16
System Core		
Processor	NVIDIA® Jetson Orin™ NX system-on-module (SOM), comprising NVIDIA® Ampere GPU and ARM Cortex CPU	NVIDIA® Jetson Xavier™ NX system-on-module (SOM), comprising NVIDIA® Volta GPU and Carmel CPU
Memory	8GB/ 16GB LPDDR5 @ 3200 MHz on SOM	8GB/ 16GB LPDDR4x (Xavier NX 8GB/ 16GB) @ 1600/ 1866 MHz on SOM
eMMC	N/A	16GB eMMC 5.1 on SOM
Bundled JetPack Version	JetPack 5.1.1	JetPack 4.6.1
Panel I/O Interface		
GMSL2 Camera	4x GMSL2 FAKRA Z connectors, supporting 4x 1920x1080 @ 30 FPS camera input	
Ethernet Port	1x 10GBASE-T 10GbE port with screw-lock 1x 1GBASE-T 1GbE port with screw-lock	
USB	2x USB 3.1 Gen1 ports (total 5 Gbps shared with M.2 B key) 1x micro USB (OTG only)	
Video Port	1x DisplayPort, supporting 3840x2160 at 60Hz	
Serial Port	1x hardware configurable RS-232/ 422/ 485 port	
CAN Bus	1x isolated CAN 2.0 port	
Isolated DIO	1x GPS PPS input, 3-CH isolated DI and 4-CH isolated DO	
Ground Terminal	1x M4 ground terminal for chassis ESD shielding	

	NRU-51V+-JON8/ NRU-51V+-JON16	NRU-51V-NX8/ NRU-51V-NX16
Internal I/O Interface		
Mini PCI Express	**With Orin NX** 1x full-size mini PCI Express socket (PCIe + USB 2.0) for M.2 M 2242 NVMe with adapter for storage 1x full-size mini PCI Express socket (PCIe + USB 2.0) for GNSS, V2X, or CAN	**With Xavier NX** 1x full-size mini PCI Express socket (PCIe + USB 2.0) for WiFi, NVMe storage 1x full-size mini PCI Express socket (USB 2.0) for GNSS, V2X, or CAN
M.2	1x 3042/3052 M.2 B key (USB 3.1 Gen 1 + USB 2.0) for 4G/5G module with dual SIM support (1x front-accessible, 1x internal)	
Power Supply		
DC Input	1x 3-pin pluggable terminal block for 8V to 35V DC input and ignition power control (V+/ GND/ IGN)	
Mechanical		
Dimension	173 mm (W) x 144 mm (D) x 60 mm (H)	
Weight	1.4kg	
Mounting	Wall-mount bracket (optional)	
Environmental		
Operating Temperature	-25°C to 60°C fanless operation (15W TDP mode)* -25°C to 70°C fanless operation (15W TDP mode, without 10GbE transmission)* -25°C to 70°C with optional fan kit (15W TDP mode)*	
Storage Temperature	-40°C to 85°C	
Humidity	10% to 90%, non-condensing	
Vibration	Operating, MIL-STD-810H, Method 516.8, Procedure I	
Shock	Operating, MIL-STD-810H, Method 514.8, Category 4	
EMC	CE/FCC Class A, according to EN 55032 & EN 55035	

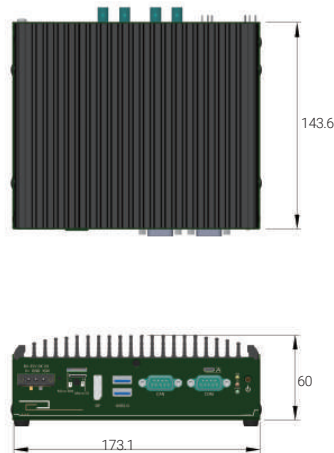· For sub-zero and over 60°C operating temperature, a wide temperature SD card / NVMe is required.

Last updated: 30 - Jan 2024

ASSURED SYSTEMS

NRU-51V+/ NRU-51V

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Appearance

Dimensions

143.6

60

173.1

Ordering Information

Model No.	Product Description
NRU-51V+-JON8	Rugged NVIDIA® Jetson Orin™ NX(8GB) GMSL2 Camera Sensor Hub with 128GB M.2 2242 M NVMe
NRU-51V+-JON16	Rugged NVIDIA® Jetson Orin™ NX(16GB) GMSL2 Camera Sensor Hub with 128GB M.2 2242 M NVMe
NRU-51V+-JONANO8	Rugged NVIDIA® Jetson Orin™ Nano(8GB) GMSL2 Camera Sensor Hub with 128GB M.2 2242 M NVMe
NRU-51V+-JONANO4	Rugged NVIDIA® Jetson Orin™ Nano(4GB) GMSL2 Camera Sensor Hub with 128GB M.2 2242 M NVMe
NRU-51V-NX8	Rugged NVIDIA® Jetson Xavier™ NX(8GB) GMSL2 Camera Sensor Hub
NRU-51V-NX16	Rugged NVIDIA® Jetson Xavier™ NX(16GB) GMSL2 Camera Sensor Hub

Optional Accessories

AC-IMX390-H60	Sony IMX390 CMOS sensor camera; 1920x1080 @ 30fps; LFM; HFOV 63.9°; IP67+IP69K; -40°C to 85°C operating temperature; male FAKRA connector; active alignment; without lens cap	AC-AR0233-H120-60FPS	Onsemi AR0233 CMOS sensor camera; 1920x1080 @ 60fps; LFM; HFOV 118°; IP67; -40°C to 70°C operating temperature; male FAKRA connector
AC-IMX390-H120	Sony IMX390 CMOS sensor camera; 1920x1080 @ 30fps; LFM; HFOV 120.6°; IP67+IP69K; -40°C to 85°C operating temperature; male FAKRA connector; active alignment; without lens cap	AC-AR0233-H190-60FPS	Onsemi AR0233 CMOS sensor camera; 1920x1080 @ 60fps; LFM; HFOV 196°; IP67; -40°C to 70°C operating temperature; male FAKRA connector; without lens cap
AC-IMX390-H190	Sony IMX390 CMOS sensor camera; 1920x1080 @ 30fps; LFM; HFOV 186°; IP67+IP69K; -40°C to 85°C operating temperature; male FAKRA connector; active alignment; without lens cap	PA-60W-OW	60W AC/ DC power adapter 12V/ 5A; cord end terminals for terminal block, operating temperature: -30 to 60°C
AC-AR0233-H60	Onsemi AR0233 CMOS sensor camera; 1920x1080 @ 30fps; LFM; HFOV 60°; IP67; -40°C to 85°C operating temperature; male FAKRA connector	PA-120W-OW	120W AC/ DC power adapter 20V/ 6A; 18AWG/ 120cm; cord end terminals for terminal block, operating temperature: -30 to 70°C
AC-AR0233-H120	Onsemi AR0233 CMOS sensor camera; 1920x1080 @ 30fps; LFM; HFOV 118°; IP67; -40°C to 85°C operating temperature; male FAKRA connector	Wmkit-NRU-50	Wall mount kit for NRU-50 series, including wall mount brackets and screws
AC-AR0233-H190	Onsemi AR0233 CMOS sensor camera; 1920x1080 @ 30fps; LFM; HFOV 196°; IP67; -40°C to 85°C operating temperature; male FAKRA connector; without lens cap	AccsyBx-FAN-NRU-50	Fan kit for NRU-50 series, including 92x92mm fan, fan frame, fan cable cover, and screws
AC-AR0233-H60-60FPS	Onsemi AR0233 CMOS sensor camera; 1920x1080 @ 60fps; LFM; HFOV 60°; IP67; -40°C to 70°C operating temperature; male FAKRA connector	Tpkit-NRU-50	3 pcs of 30x30x2 mm thermal pad for mPCIe modules with the max component height between 1.3 mm and 2.4 mm, and M.2 B key modules with the max component height between 0.7 mm and 2.0 mm
		FK-FF-CABLE-7M	7M FAKRA cable for cameras with male FAKRA connector; the waterproof end is black
		FK-FF-CABLE-15M	15M FAKRA cable for cameras with male FAKRA connector; the waterproof end has heat shrink tube

All specifications and photos are subject to change without prior notice

Assured Systems

Assured Systems is a leading technology company with over 1,500 regular clients in 80 countries, deploying over 85,000 systems to a diverse customer base in 12 years of business. We offer high-quality and innovative rugged computing, display, networking and data collection solutions to the embedded, industrial, and digital-out-of-home market sectors.

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