waveshare Orin Nano

Waveshare Jetson AGX Orin Developer Kit Instruction Manual

1. Introduction and Overview

The Waveshare Jetson AGX Orin Developer Kit is a high-performance, power-efficient platform designed for advanced robotics and edge AI applications. It features an NVIDIA Jetson AGX Orin module with options for 32GB/64GB memory, delivering up to 275 TOPS of AI performance. This kit is ideal for developing multiple concurrent AI inference pipelines and running the NVIDIA AI software stack, enabling solutions for manufacturing, logistics, retail, service, agriculture, smart city, healthcare, and life sciences.

The Jetson AGX Orin provides 8X the performance of its predecessor, Jetson AGX Xavier, within the same compact form factor and compatible pinouts. It integrates an NVIDIA Ampere architecture GPU, Arm Cortex-A78AE CPU, and next-generation deep learning and vision accelerators. High-speed interfaces, faster memory bandwidth, and multi-mode sensor support ensure robust performance for demanding AI applications.

Image 1.1: Waveshare Jetson AGX Orin Developer Kit, top-down view.

2. Package Contents

Upon unboxing your Waveshare Jetson AGX Orin Developer Kit, please verify that all components listed below are present:

- Jetson AGX Orin Developer Kit (main unit)
- Power Adapter
- USB Type-C to Type-A Cable
- Getting Started Booklet (or similar documentation)

Image 2.1: Contents of the Waveshare Jetson AGX Orin Developer Kit package.

3. Setup Instructions

The Jetson AGX Orin Developer Kit comes pre-flashed with Linux, simplifying the initial setup process. Follow these steps to get started:

1. Connect a monitor to the DisplayPort (DP) connector on the back of the developer kit.
2. Connect a USB keyboard and mouse to the available USB Type-A ports.
3. Connect the power adapter to the barrel jack power connector on the back of the kit and plug it into a power outlet. The kit will power on automatically.
4. Upon first boot, you will be prompted to configure basic system settings, including a username, password, and Wi-Fi network connection.
5. After initial setup, you can install the latest JetPack SDK and other necessary software from the internet. A system reboot may be required after software installation.

For a visual guide to the product and its features, please refer to the video below:

Video 3.1: Product Overview of the Jetson AGX Orin Developer Kit, detailing its components and basic setup.

Image 3.2: The Jetson AGX Orin Developer Kit, highlighting its server-class AI performance.

4. Operating Instructions

Once the initial setup is complete and the necessary software is installed, the Jetson AGX Orin Developer Kit is ready for operation. The kit runs on a Linux-based operating system, providing a familiar environment for developers.

- **Software Development:** Utilize the NVIDIA AI software stack, including JetPack SDK, CUDA-X, and various application frameworks, to develop and deploy AI models.
- **Connectivity:** Leverage the multiple USB ports, 10 Gigabit Ethernet, and wireless networking capabilities to connect peripherals, sensors, and integrate with other systems.
- **Expansion:** The kit supports various expansion options, including PCIe slots and M.2 connectors, allowing for custom hardware integration and increased functionality.
- **Power Management:** The system is designed for power efficiency. Refer to NVIDIA documentation for optimal power modes and performance tuning for your specific applications.

Image 4.1: Side view of the Jetson AGX Orin Developer Kit, illustrating its various ports and connectors.

5. Maintenance

To ensure the longevity and optimal performance of your Waveshare Jetson AGX Orin Developer Kit, adhere to the following maintenance guidelines:

- **Keep Clean:** Regularly clean the exterior of the device with a soft, dry cloth. Ensure ventilation openings are free from dust and debris to prevent overheating.
- **Proper Ventilation:** Operate the kit in a well-ventilated area. Avoid placing it in enclosed spaces or on soft surfaces that may block airflow.
- **Software Updates:** Keep the operating system and JetPack SDK updated to the latest versions to benefit from performance improvements, bug fixes, and security patches.
- **Environmental Conditions:** Operate the device within recommended temperature and humidity ranges. Avoid extreme conditions that could damage internal components.

6. Troubleshooting

If you encounter issues with your Waveshare Jetson AGX Orin Developer Kit, consider the following troubleshooting steps:

- **No Power:** Verify that the power adapter is securely connected to both the kit and a working power outlet. Check the power indicator light on the device.
- **No Display:** Ensure the monitor is correctly connected to the DisplayPort and is powered on. Try a different cable or monitor if available.
- **System Unresponsive:** If the system becomes unresponsive, press and hold the power button for several seconds to force a shutdown, then restart the device. Use the Force Recovery button if standard

rebooting fails.

- **Software Issues:** For software-related problems, ensure all drivers and SDK components are up-to-date. Consult NVIDIA's official Jetson developer forums and documentation for specific error messages or issues.
- **Peripheral Detection:** If a connected peripheral (e.g., camera, sensor) is not detected, ensure it is properly connected and its drivers are installed.

7. Specifications

Detailed technical specifications for the Waveshare Jetson AGX Orin Developer Kit:

Feature	Description
AI Performance	275 TOPS
GPU	NVIDIA Ampere architecture with 2048 NVIDIA® CUDA® cores and 64 tensor cores
CPU	12-core Arm Cortex-A78AE v8.2 64-bit CPU, 3MB L2 + 6MB L3
DL Accelerator	2x NVDLA v2.0
Vision Accelerator	PVA v2.0
Memory	32GB/64GB 256-bit LPDDR5, 204.8 GB/s
Storage	64GB eMMC 5.1
Video Encode	2x 4K60 | 4x 4K30 | 8x 1080p60 | 16x 1080p30 (H.265)
Video Decode	1x 8K30 | 3x 4K60 | 7x 4K30 | 11x 1080p60 | 22x 1080p30 (H.265)
Camera	16 lane MIPI CSI-2 connector
PCIe	x16 PCIe slot; Lower x8 PCIe Gen4
RJ45	Up to 10 GbE
M.2 Key M	x4 PCIe Gen 4
M.2 Key E	x1 PCIe Gen 4, USB 2.0, UART, I2S
USB Type-C	2x USB 3.2 Gen2 with USB-PD support
USB Type-A	2x USB 3.2 Gen2, 2x USB 3.2 Gen1
USB Micro-B	USB 2.0
DisplayPort	DisplayPort 1.4a (+MST)
microSD slot	UHS-1 cards up to SDR104 mode

Feature	Description
Other	40-pin header (I2C, GPIO, SPI, CAN, I2S, UART, DMIC), 12-pin automation header, 10-pin audio panel header, 10-pin JTAG header, 4-pin fan header, 2-pin RTC battery backup connector, DC power jack, Power, Force Recovery, and Reset buttons
Dimensions	110mm x 110mm x 71.65mm (Height includes feet, carrier board, module, and thermal solution)

Specifications

	JETSON AGX ORIN MODULE
AI Performance	275 TOPs
GPU	NVIDIA Ampere architecture with 2048 NVIDIA® CUDA® cores and 64 tensor cores
CPU	12-core Arm Cortex-A78AE v8.2 64-bit CPU 3MB L2 + 6MB L3
DL Accelerator	2x NVDLA v2.0
Vision Accelerator	PVA v2.0
Memory	32GB/64GB 256-bit LPDDR5 204.8 GB/s
Storage	64GB eMMC 5.1
Video Encode	2x 4K60 | 4x 4K30 | 8x 1080p60 | 16x 1080p30 (H.265)
Video Decode	1x 8K30 | 3x 4K60 | 7x 4K30 | 11x 1080p60 | 22x 1080p30 (H.265)
	REFERENCE CARRIER BOARD
Camera	16 lane MIPI CSI-2 connector
PCIe	x16 PCIe slot: Lower x8 PCIe Gen4
RJ45	Up to 10 GbE
M.2 Key M	x4 PCIe Gen 4
M.2 Key E	x1 PCIe Gen 4, USB 2.0, UART, I2S
USB Type-C	2x USB 3.2 Gen2 with USB-PD support
USB Type-A	2x USB 3.2 Gen2 2x USB 3.2 Gen1
USB Micro-B	USB 2.0
DisplayPort	DisplayPort 1.4a (+MST)
microSD slot	UHS-1 cards up to SDR104 mode
Other	40-pin header (I2C, GPIO, SPI, CAN, I2S, UART, DMIC) 12-pin automation header 10-pin audio panel header 10-pin JTAG header 4-pin fan header 2-pin RTC battery backup connector DC power jack Power, Force Recovery, and Reset buttons
Dimensions	110mm x 110mm x 71.65mm (Height includes feet, carrier board, module, and thermal solution)

Image 7.1: Visual representation of the detailed specifications for the Jetson AGX Orin Developer Kit.

8. Warranty Information

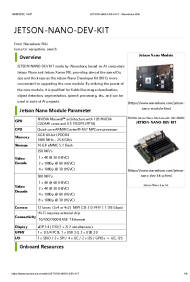
This Waveshare product is covered by a standard limited warranty against manufacturing defects. For specific warranty terms, duration, and claim procedures, please refer to the warranty card included in your product packaging or visit the official Waveshare website. Keep your proof of purchase for warranty validation.

9. Support

For further assistance, technical support, or to access additional resources, please refer to the following:

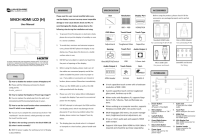
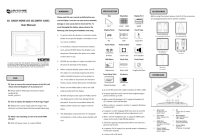
- **Online User Manual:** A detailed online user manual is available on the Waveshare official website.
- **NVIDIA Jetson Developer Resources:** For comprehensive documentation, tutorials, and community support related to the Jetson platform and JetPack SDK, visit the official NVIDIA Jetson developer website.
- **Contact Waveshare:** For product-specific inquiries or hardware support, please contact Waveshare customer service through their official channels.

Related Documents - Orin Nano

	Waveshare Jetson Nano Dev Kit: Overview, Setup, and Resources A comprehensive guide to the Waveshare Jetson Nano Developer Kit, covering its overview, hardware specifications, software setup using SDK Manager, camera configuration, and troubleshooting.
	Waveshare JetRacer Pro AI Kit Assembly Manual and User Guide Comprehensive assembly manual and user guide for the Waveshare JetRacer Pro AI Kit, detailing package contents, step-by-step assembly instructions, user guidance, and FAQs for the AI-powered robot car.
	IMX219-170 Camera User Guide for Jetson Nano and Compute Module A guide to using the IMX219-170 camera with Jetson Nano and Raspberry Pi Compute Modules, including hardware connection, software setup, and troubleshooting.

[Waveshare 10.4HP-CAPQLED: 10.4-inch QLED Touchscreen Display (1600x720)]

Discover the Waveshare 10.4HP-CAPQLED, a versatile 10.4-inch QLED capacitive touchscreen with 1600x720 resolution. This display is compatible with Raspberry Pi, Jetson Nano, and PCs, offering excellent visual performance and multi-touch capabilities via HDMI and USB.

	[Waveshare 5-inch HDMI LCD (H) User Manual: Setup and Connection Guide] Comprehensive user manual for the Waveshare 5-inch HDMI LCD (H) display. Learn how to connect, configure, and use this 800x480 capacitive touchscreen with Raspberry Pi, Jetson Nano, and PCs. Includes specifications, accessories, and troubleshooting tips.
	[Waveshare 10.1-inch HDMI LCD (G) User Manual: Setup, Specs, and Connections] Explore the Waveshare 10.1-inch HDMI LCD (G) with Case. This user manual covers essential specifications, safety warnings, connection guides for Raspberry Pi, Jetson Nano, and PCs, and answers common questions.