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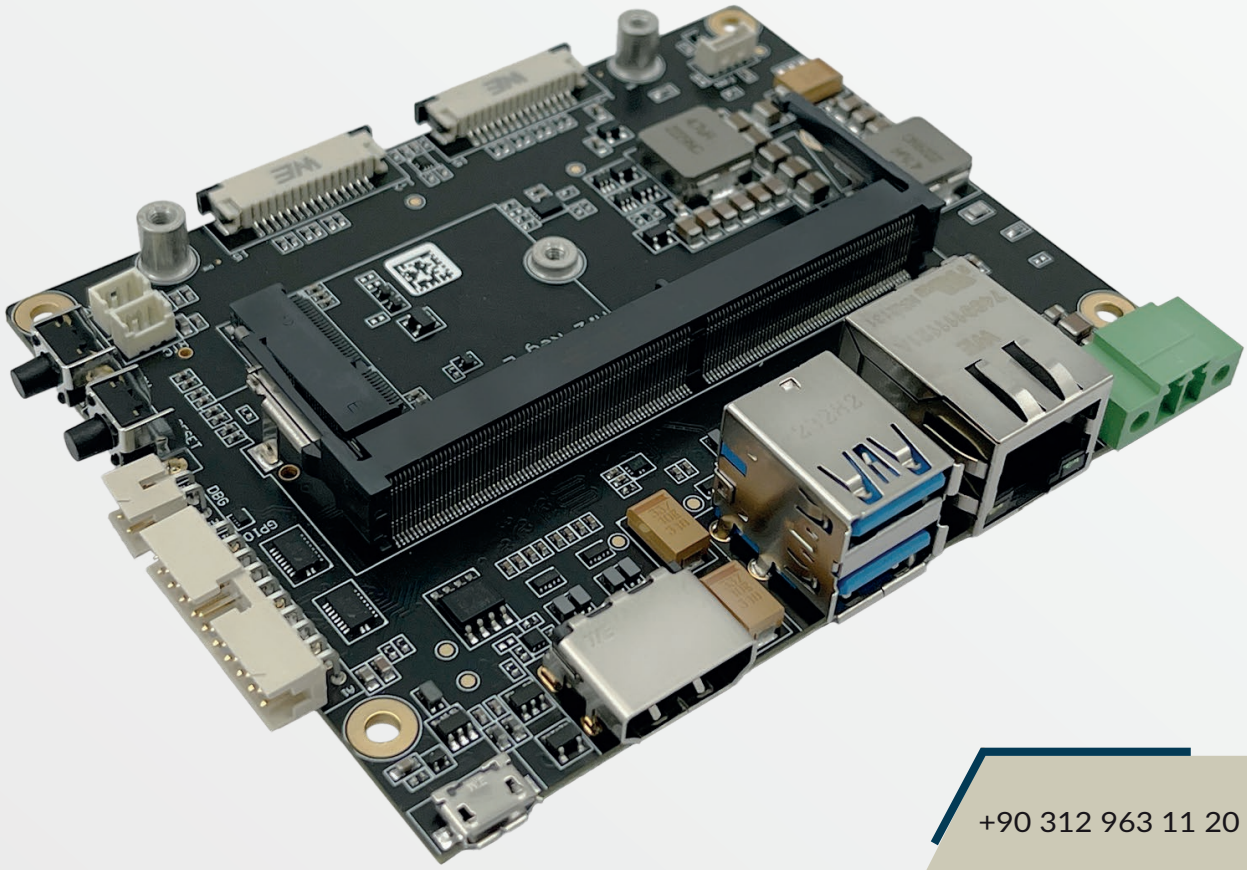
ONX101 Carrier Board

User Manual



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Content

Preface Disclaimer

The information contained in this user manual, including but not limited to any product specification is subject to change without notice. OmniWise assumes no liability for any damages incurred directly or indirectly from any technical or typographical errors or omissions contained herein or for discrepancies between the product and the user manual.

Technical Support
If you experience the difficulty after reading this manual and/or using the product, please contact the reseller from which you purchased the product. In most cases, the reseller can help you with the product installation and the difficulty you encountered. In case the reseller is not able to resolve your problem, our highly capable global technical support team can certainly assist you. Our technical support section is available 24 hours a day and 7 days a week through our website.

Limited Product Warranty

OmniWise provides two-year product warranty. Should this product, in OmniWise's opinion, fail to be in the good working order during the warranty period, OmniWise will, at its option, repair or replace it at no charge, provided that the product has not been subjected to abuse, misuse, accident, disaster, or non-OmniWise authorized modification or repair.

You may obtain the warranty service by delivering this product to an authorized OmniWise business partner or to OmniWise along with the proof of purchase. Product returned to OmniWise must be pre-authorized by OmniWise with an RMA (Return Material Authorization) number marked on the outside of the package and sent prepaid, insured, and packaged for the safe shipment. OmniWise will return the product by prepaid shipment service.

The limited product warranty is only valid over the serviceable life of the product. This is defined as the period during which all components are available. Should the product prove to be irreparable, OmniWise reserves the right to substitute an equivalent product if available or to retract the product warranty if no replacement is available.

The above product warranty is the only warranty authorized by OmniWise. Under no circumstances will OmniWise be liable in any way for any damages, including any lost profits, lost savings, or other incidental or consequential damages arising out of the use of, or inability
to use, such product.

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ESD Warning

Electronic components and circuits are sensitive to Electrostatic Discharge (ESD). When handling any circuit board assemblies including OmniWise products, it is recommended that ESD safety precautions be observed. ESD safe best practices can include, but are not limited to:

1. Leave the circuit board in the antistatic package until it is ready to be installed.

2. Use a grounded wrist strap when handling the circuit board. At a minimum, you need to touch a grounded metal object to dissipate any static charge, which may be present on you.

3. Avoid handling the circuit board in the carpeted areas.

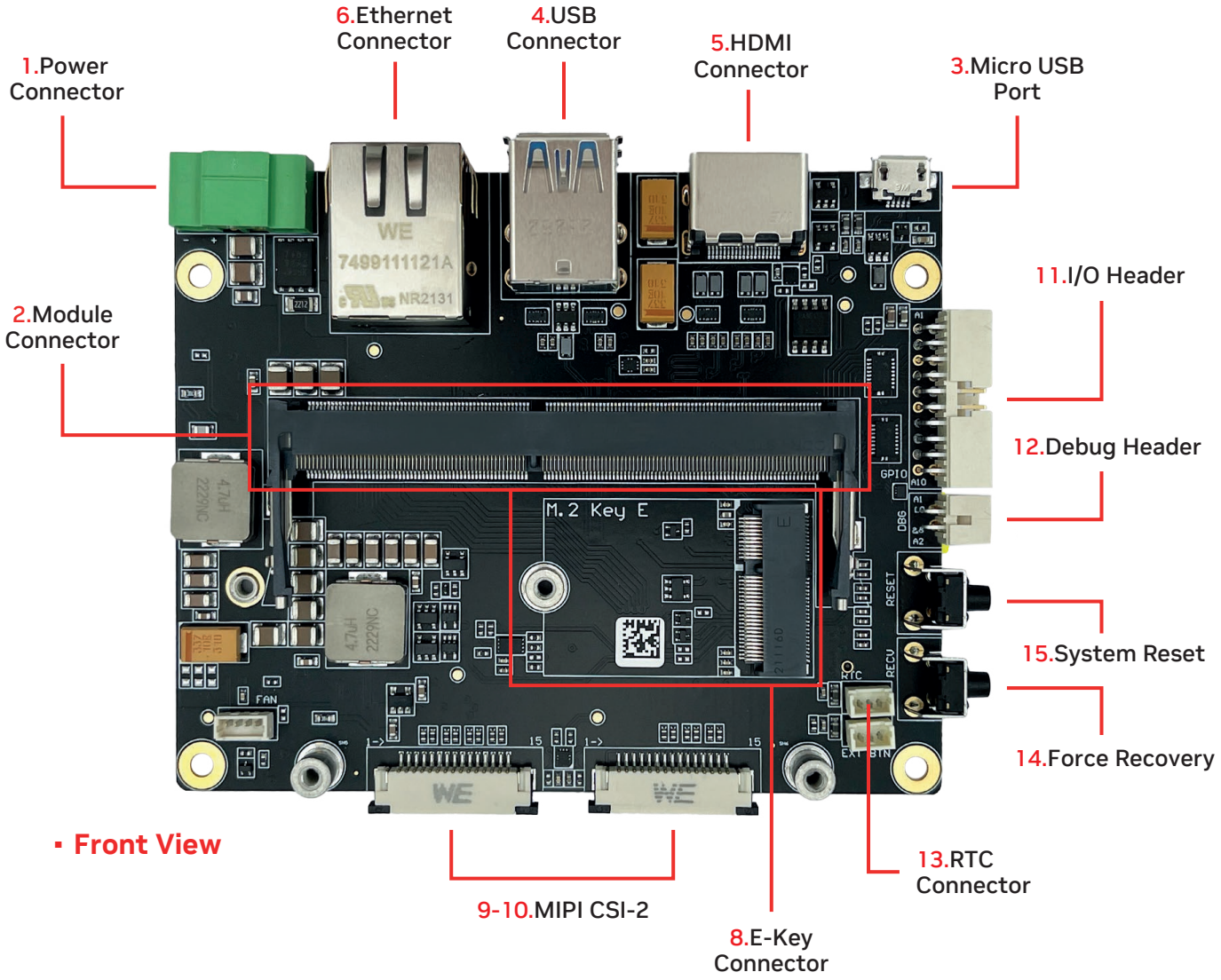
4. Handle the board by the edges and avoid the contact with the components.

5. Only handle the circuit boards in ESD safe areas, which may include ESD floor and/or table mats, wrist strap stations, and ESD safe lab coats.

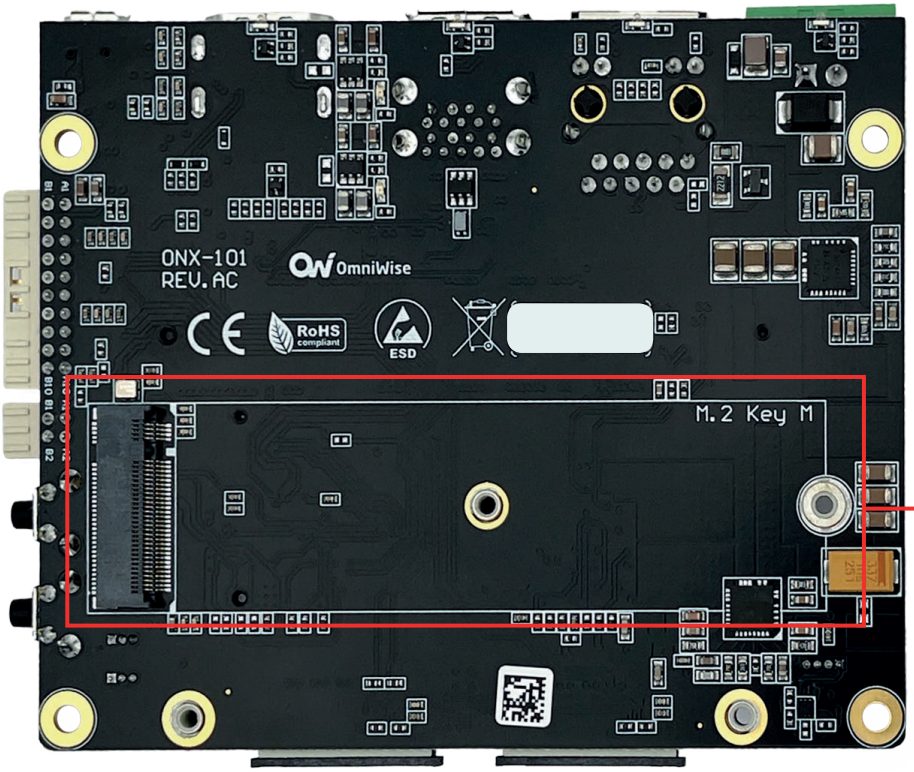
Revision	***Date***	***Updates***
Version 1.0	June, 23, 2025	1st Released

TECHNICAL SPECIFICATIONS

Module Support	NVIDIA Jetson Orin Nano- NVIDIA Jetson Orin NX
Module Compatibility	NVIDIA Jetson Orin Nano 4GB, NVIDIA Jetson Orin Nano 8GB, NVIDIA Jetson Orin NX 8GB, NVIDIA Jetson Orin NX 16GB
USB	2x USB 3.0, 1x USB 2.0 Micro B for Recovery
MIPI Camera Input	2x 2-lane MIPI CSI-2 15 Pinn FPC 1mm Pitch Connector (Raspberry Pi v2 Camera)
Storage	1x M.2 M-Key Connector
Ethernet	1x 10/100/1000 Base-T
Wifi & Bluetooth	1x M.2 E-Key – 2230
GPIO	1x 3.3V UART, 1x I2C bus 2x SPI bus, 4x GPIO
Debug Connector	1x UART for Debug
Display Output	1x HDMI 2.0 Type A
RTC Battery Connector	3-Pin RTC Battery Connector
Fan Connector	4-Pin Fan Connector
Power Configuration	1x 9-36V DC Input Power Connector: OQ0215510000G Term Block Header 2 Pos 3.5mm
Input Power	9V-36V DC Input
Dimensions	80mm x 100mm
Operating Temperature	-25°C ...+85°C
Warranty and Support	2 Year Warranty and Free Support



▪ **Front View**



▪ **Back View**

Detailed Feature Description

Power Connector Decription

The NVIDIA® Jetson Orin Nano™/NVIDIA® Jetson Orin™ NX Sirius AI Box implements a Terminal Block Header that accepts a +9-36V, 4A+ power supply.

Power Connector		
Location	1.	
Type	2 Position Terminal Block Header, Male Pins, Shrouded (4 Side) 0.138" (3.50mm) 90°, Right Angle Through Hole	
Carrier Connector	Part Number: OQ0215510000G Manufacturer: Amphenol Anytek	
Mating Connector		

Module Connector Decription

The NVIDIA Jetson Orin Nano™/NVIDIA® Jetson Orin™ NX processor and chipset are implemented on the Jetson Orin Nano™/Jetson Orin™ NX Module. This connects to the NVIDIA® Jetson Orin Nano™/NVIDIA® Jetson Orin™ NX AI Camera Platform via a TE Connectivity DDR4 SODIMM 260 Pin connector.

Power Connector		
Location	2.	
Type	TE Connectivity DDR4 SODIMM 260 Pin	
Carrier Connector	Part Number: 2309413-1 Manufacturer: TE Connectivity	
Mating Connector	Jetson Orin Nano/Jetson Orin NX Module	

Micro USB Port Decription

The NVIDIA® Jetson Orin Nano™/NVIDIA® Jetson Orin™ NX Sirius AI Box implements a USB2.0 Micro-AB connector to allow host mode access to the module or OTG flashing of the module.

USB2.0 Micro-AB Connector		
Location	3.	
Type	OTG Connector	
Carrier Connector	Part Number: 629105136821 Manufacturer: Würth Elektronik	
Mating Connector	Micro USB	
Pinout	USB - micro B USB 2.0 Receptacle Connector 5 Position Surface	

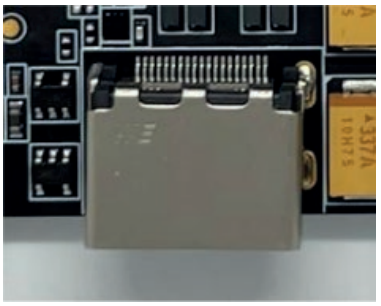
USB Connector Decription

USB 3.0 Type-A Connector for peripherals (Mouse, keyboard etc.).

USB 3.0 Type-A Connector		
Location	4.	
Type	USB 3.0 x 2 Connector	
Carrier Connector	Part Number: 692141030100 Manufacturer: Würth Elektronik	
Mating Connector	USB 3.0 Type-A	
Pinout	Refer to USB 3.0 Type-A Pinout	

HDMI Connector Decription

The NVIDIA Jetson Orin Nano™/NVIDIA® Jetson Orin™ NX module will output video via the HDMI connector.

HDMI Connector		
Location	5.	
Type	HDMI 2.0 Receptable Connector	
Carrier Connector	Part Number: 685119134923 Manufacturer: Würth Elektronik	
Mating Connector	HDMI Cable	
Pinout	Refer to HDMI Standart	

Ethernet Connector Decription

The NVIDIA Jetson Orin Nano™/NVIDIA® Jetson Orin™ NX module will allow internet communication via the RJ-45 ethernet connector. (Non-PoE)

Ethernet Connector		
Location	6.	
Type	RJ-45 Ethernet Connector	
Carrier Connector	Part Number: 7499111121A Manufacturer: Würth Elektronik	
Mating Connector	RJ45	
Pinout	Standart RJ45	

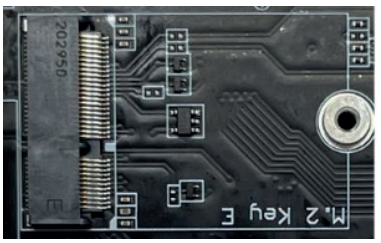
M-Key Connector Description

The NVIDIA® Jetson Orin Nano™/NVIDIA® Jetson Orin ™ NX ONX-101 implements an M.2 M-Key for SSD Module.

Ethernet Connector		
Location	7.	
Type	M.2 M-Key Connector	
Carrier Connector	Part Number: SM3ZS067U310AMR1200 Manufacturer: JAE Electronics	
Mating Connector	NVME M.2 M Key 2280 SSD	
Pinout	Refer to M.2 M Standart	

E-Key Connector Description

The NVIDIA® Jetson Orin Nano™/NVIDIA® Jetson Orin™ NX ONX-101 implements an M.2 2230 E-Key for WiFi/Bluetooth Module.

Ethernet Connector		
Location	8.	
Type	M.2 E-Key Connector	
Carrier Connector	Part Number: 2199119-4 Manufacturer: TE Connectivity	
Mating Connector	Intel AC8265 Wifi&Bluetooth	
Pinout	Refer to M.2 E Standart	

MIPI CSI-2 Connector

The NVIDIA Jetson Orin Nano™/NVIDIA® Jetson Orin™ NX module will allow 2-Lane MIPI video input via the FPC connector.

MIPI CSI-2 Connectors		
Location	9.	
Type	Horizontal Connector 15 Pin	
Carrier Connector	Part Number: 68611514122 Manufacturer: Würth Elektronik	

Pin 1	GND
Pin 2	CSI0_DATA0_N
Pin 3	CSI0_DATA0_P
Pin 4	GND
Pin 5	CSI0_DATA1_N
Pin 6	CSI0_DATA1_P
Pin 7	GND
Pin 8	CSI0_CLK_N
Pin 9	CSI0_CLK_P
Pin 10	GND
Pin 11	CSI0_PWDN
Pin 12	CSI0_MCLK
Pin 13	CSI0_I2C_SCL
Pin 14	CSI0_I2C_SDA
Pin 15	3V3

MIPI CSI-2 Connector

The NVIDIA Jetson Orin Nano™/NVIDIA® Jetson Orin™ NX module will allow 2-Lane MIPI video input via the FPC connector.

MIPI CSI-2 Connectors		
Location	10.	
Type	Horizontal Connector 15 Pin	
Carrier Connector	Part Number: 68611514122 Manufacturer: Würth Elektronik	
Pin 1	GND	
Pin 2	CSI1_DATA0_N	
Pin 3	CSI1_DATA0_P	
Pin 4	GND	
Pin 5	CSI1_DATA1_N	

Pin 6	CSI1_DATA1_P	
Pin 7	GND	
Pin 8	CSI1_CLK_N	
Pin 9	CSI1_CLK_P	
Pin 10	GND	
Pin 11	CSI1_PWDN	
Pin 12	CSI1_MCLK	
Pin 13	CSI1_I2C_SCL	
Pin 14	CSI1_I2C_SDA	
Pin 15	3V3	

I/O Header

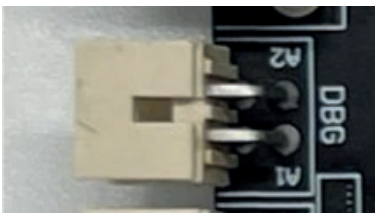
The Sirius AI Box implements a 98464-G61-20ULF Connector to allow access for additional GPIO and interfaces.

I/O Header		
Location	11.	
Type	20pin Connector, 2mm Pitch	
Carrier Connector	Part Number: 98464-G61-20ULF Manufacturer: Amphenol ICC (FCI)	
Mating Connector	69307-020LF Connector	
Pinout		

Description	Signal Name	Pins		Signal Name	Description
I2C Serial Clock	GPIO_I2C_SCL	1	11	GPIO_I2C_SDA	I2C Serial Data
UART Transmit	GPIO_UART_TXD_LS	2	12	GPIO_UART_RXD_LS	UART Receiver
GPIO9	GPIO_09_LS	3	13	GPIO_SPI0_MOSI_LS	SPI0 Transmit
SPI0 Clock	GPIO_SPI0_SCK_LS	4	14	GPIO_SPI0_MISO_LS	SPI0 Receive
SPI0 Chip Select	GPIO_SPI0_CS_N_LS	5	15	GPIO_SPI1_CS_N_LS	SPI1 Chip Select
3.3V Power Out	3V3	6	16	3V3	3.3V Power Out
SPI1 Receive	GPIO_SPI1_MISO_LS	7	17	GPIO_SPI1_SCK_LS	SPI1 Serial Clock
SPI1 Transmit	GPIO_SPI1_MOSI_LS	8	18	GPIO13_LS	GPIO13
GPIO07	GPIO_07_LS	9	19	GPIO01_LS	GPIO01
Signal Ground	GND	10	20	GND	Signal Ground

Debug Header

The Sirius AI Box implements a 98464-G61-04LF Connector to allow access Debug

Debug Header		
Location	12.	
Type	Connector Header Through Hole, Right Angle 4 position 0.079" (2.00mm)	
Carrier Connector	Part Number: 98464-G61-04LF Manufacturer: Amphenol ICC (FCI)	
Mating Connector	Amphenol ICC (FCI): 90311-004LF	
Pinout		

Description	Signal Name	Pins		Signal Name	Description
UART Receive	DBG_UART _RXD_LS	1	3	3V3	3.3V Power Out
UART Transmit	DBG_UART _TXD_LS	2	4	GND	Signal Ground

RTC Connector Description

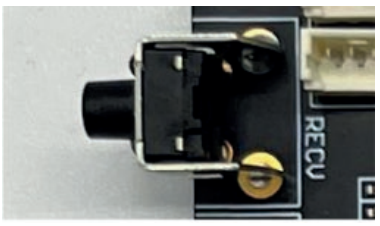
ONX-101 implements a 3 Position Würth Elektronik Male Vertical Shrouded Header for an RTC Battery.

3-Pin RTC Battery Connector		
Location	13.	
Type	Würth Elektronik 3 Position 1.25mm Connector	
Carrier Connector	Part Number: 653003114822 Manufacturer: Würth Elektronik	
Mating Connector	Würth Elektronik: 653003113322	
Pinout		

Description	
Pin 1	RTC Battery Input
Pin 2	GND
Pin 3	RTC Battery Input

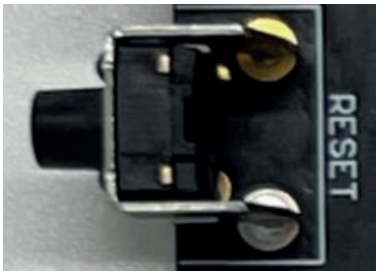
Force Recovery Button

The NVIDIA® Jetson Orin Nano™/NVIDIA® Jetson Orin™ NX, Sirius AI Box implements a button for recovery of the platform.

Button		
Location	14.	
Type	Button	
Carrier Connector	Part Number: PTS645VL58-2 LFS Manufacturer: C&K	
Pinout	Force_Recovery_N	

System Reset Button

The NVIDIA® Jetson Orin Nano™/NVIDIA® Jetson Orin™ NX, Sirius AI Box implements a button for reset of the platform.

HDMI Connector		
Location	15.	
Type	Button	
Carrier Connector	Part Number: PTS645VL58-2 LFS Manufacturer: C&K	
Pinout	System_Reset_N	

Installation

1. Ensure all external system power supplies are off and disconnected.
2. Install the NVIDIA® Jetson Orin Nano™/NVIDIA® Jetson Orin™ NX Module into the DDR4 260 Pin SODIMM Connector (J2). Be sure to follow the manufacturer's directions for proper installation of mounting hardware, heatsink/heatspreader, and any other applicable requirements from the manufacturer.
3. Install the necessary cables for your application. At a minimum these would include:
    a. Power cable to the input power connector
    b. HDMI video display cable
    c. Keyboard and Mouse via USB (a hub may be required for multiple devices)
4. Connect the Power Cable of the +9V-36V Power Supply into the Terminal Block Header

Recovery Mode Procedure

1. Connect the carrier board to the host computer using a micro-USB cable.
2. Power on the carrier board.
3. Press and hold both the Reset and Force Recovery buttons simultaneously for 2-3 seconds.
4. Release the Reset button first, followed by the Force Recovery button after 3 seconds.
5. Open a terminal on the host computer and run the command: lsusb
6. If a line displaying Nvidia Corp. appears in the terminal output, the kit has successfully entered recovery mode.

JetPack 5.1.3 (35.5.0) Installation Procedure

1. Navigate to Jetson Linux R35.5.0.
2. Download the Driver Package (BSP) and Sample Root Filesystem files.
3. Once the downloads are complete, copy both files into a directory of your choice.
4. Extract the Driver Package with the command:
    tar xf Jetson_Linux_R35.5.0_aarch64.tbz2
5. Navigate to the root filesystem directory:
    cd Linux_for_Tegra/rootfs
6. Extract the Sample Root Filesystem:
    sudo tar xpf
    ../../Tegra_Linux_Sample-Root-Filesystem_R35.5.0_aarch64.tbz2
7. Navigate back to the Linux_for_Tegra directory:
    cd ..
8. Apply the binaries:
    sudo ./apply_binaries.sh

9. Run the prerequisite script:
   sudo ./tools/l4t_flash_prerequisites.sh
10. Navigate one level up from the Linux_for_Tegra directory:
    cd ..
11. At this point, ensure you are in the directory above Linux_for_Tegra.
12. Download and prepare the additional Driver Package:
    Download the file by using the command below:
    wget
    http://download.comarge.com/omniwise/orin-nx/ONX101_5_1_3.zip
    Unzip the file:
    unzip ONX101_5_1_3.zip
    Apply the binary:
    chmod u+x orin_nx_replace_files.sh
    sudo ./orin_nx_replace_files.sh
13. Navigate back to the Linux_for_Tegra directory:
    cd Linux_for_Tegra
14. Start the flash process with the following command:
    sudo ./tools/kernel_flash/l4t_initrd_flash.sh --external-device nvme0n1p1 -c tools/kernel_flash/flash_l4t_external.xml -p "-c bootloader/t186ref/cfg/flash_t234_qspi.xml" --showlogs --network usb0 p3509-a02+p3767-0000 internal

JetPack 6.0 (36.3) Installation Procedure

1. Navigate to Jetson Linux R36.3.
2. Download the Driver Package (BSP) and Sample Root Filesystem files.
3. Once the downloads are complete, copy both files into a directory of your choice.
4. Extract the Driver Package with the command:
   tar xf Jetson_Linux_R36.3.0_aarch64.tbz2
5. Navigate to the root filesystem directory:
   cd Linux_for_Tegra/rootfs
6. Extract the Sample Root Filesystem:
   sudo tar xpf
   ../../Tegra_Linux_Sample-Root-Filesystem_R36.3.0_aarch64.tbz2
7. Navigate back to the Linux_for_Tegra directory:
   cd ..
8. Apply the binaries:
   sudo ./apply_binaries.sh
9. Run the prerequisite script:
   sudo ./tools/l4t_flash_prerequisites.sh
10. Navigate one level up from the Linux_for_Tegra directory:
    cd ..

11. At this point, ensure you are in the directory above Linux_for_Tegra.
12. Download and prepare the additional Driver Package:
    Download the file by using the command below:
    wget
    http://download.comarge.com/omniwise/orin-nx/ONX101_6_0.zip
    Unzip the file:
    unzip ONX101_6_0.zip
    Apply the binary:
    chmod u+x orin_nx_replace_files.sh
    sudo ./orin_nx_replace_files.sh
13. Navigate back to the Linux_for_Tegra directory:
    cd Linux_for_Tegra
14. Start the flash process with the following command:
    sudo ./tools/kernel_flash/l4t_initrd_flash.sh --external-device nvme0n1p1 -c tools/kernel_flash/flash_l4t_t234_nvme.xml -p "-c bootloader/generic/cfg/flash_t234_qspi.xml" --showlogs --network usb0 p3509-a02+p3767-0000 internal

Thermal Details

Sirius AI Box has an operating Temperature Range of -25 °C to +85°C. The NVIDIA® Jetson Orin Nano™ / NVIDIA® Jetson Orin™ NX Module works with different temperature ranges which is shown in the table below.

NVIDIA ® Jetson Orin Nano™ / Orin™ NX	Value
Maximum Orin SoC operating temperature	T.SoC = 99°C
Orin SoC shutdown temperature	T.SoC = 105°C

Current Consumption Details

The following values are given at 25 °C.

NVIDIA ® Jetson Orin Nano™	Value
NVIDIA® Jetson Orin Nano™ Module, Passive Cooling, Idle, Ethernet, Mouse and Keyboard plugged in	7W
NVIDIA® Jetson Orin Nano™ Module, Passive Cooling, MAXN mode, CPU-stressed, GPU-stressed, Ethernet, Mouse and Keyboard plugged in	15W
NVIDIA ® Jetson Orin™ NX	Value
NVIDIA® Jetson Orin™ NX Module, Passive Cooling, Idle, Ethernet, Mouse and Keyboard plugged in	10W
NVIDIA® Jetson Orin™ NX Module,	25W
Passive Cooling, 15W- 6 core mode, CPU-stressed, GPU-stressed, Ethernet, Mouse and Keyboard plugged in	

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