

User Manual



Aicotek NVIDIA Jetson AGX THOR AI BOX AIPC-631

AICOTEK

Empowering the world with AI solutions

NVIDIA Jetson AGX THOR AI BOX

AIPC-631 User Manual

Revision History	Changes	Date
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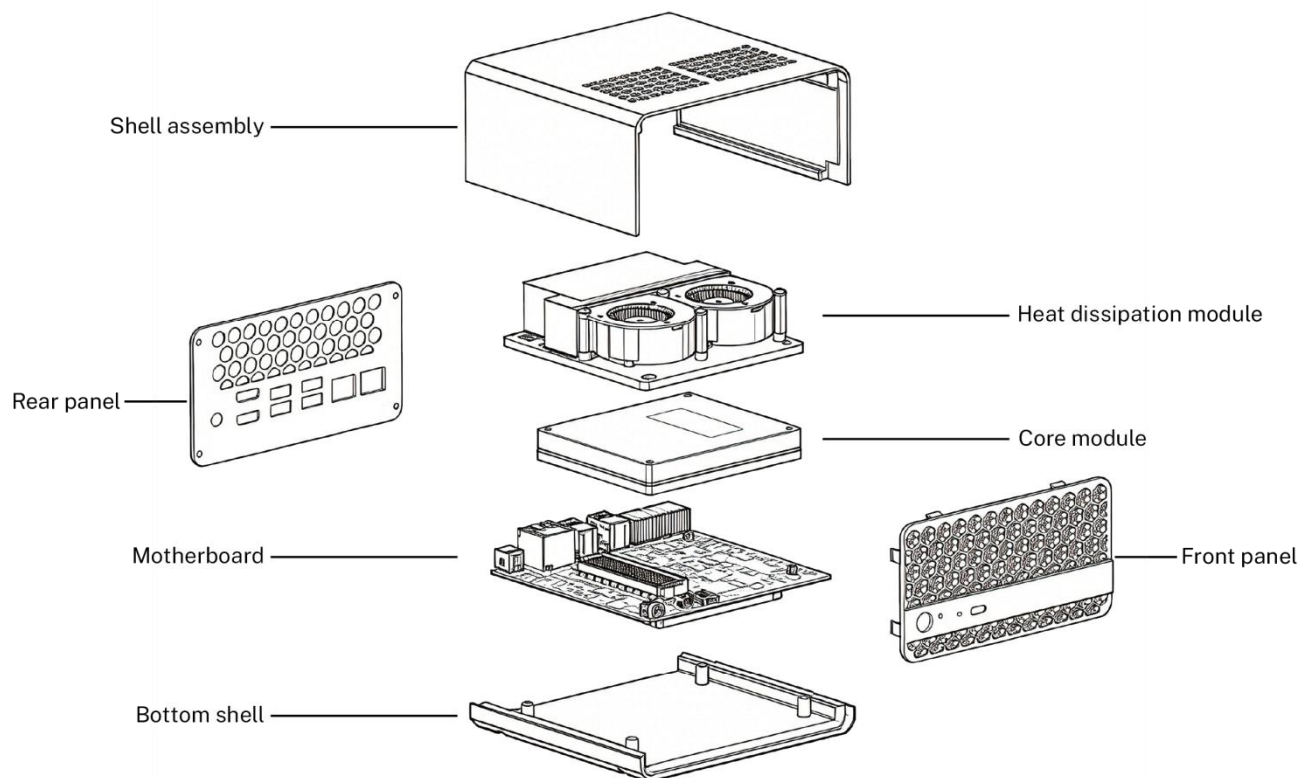
Safety Precautions

- (1) Please read and follow the safety precautions before you are going to use it.
- (2) Pay attention to the labels on the product.
- (3) Make sure to use in an environment that meets the design specifications, otherwise, malfunction or partial damage caused by non-compliance with relevant regulations is not covered under the product quality guarantee.
- (4) Please unplug the power cord and do not use liquids to clean the PC.
- (5) Please keep the PC in a safe space to prevent it from falling and damaging its components.
- (6) Please keep the power cord in a safe location to avoid causing personal injury.
- (7) Please do not bundle control wires, communication cables and power wires together, it would be better to keep a distance of at least 100mm between them to avoid mutual interference.
- (8) It is recommended to use wires with isolation, especially in environments with severe electromagnetic interference.
- (9) Please disconnect it from the power socket if the PC is not used for a long time.
- (10) Please make sure that no liquids enter the device to avoid the risk of fire or short circuit.
- (11) Please disconnect the power cord before opening the computer case.
- (12) Please clean the dust regularly.
- (13) Please ask for technical support and return the PC to RMA:
 - The power cord or plug is damaged;
 - Liquid has entered the interior of the PC;
 - PC doesn't work;
 - PC is damaged;
 - Physical damage on the PC.

Chapter 1 System Overview

1.1 System Introduction

The Estone AIPC-631 workstation is equipped with NVIDIA Thor T5000/T4000 modules, specifically designed for on-premises deployment and inference of generative AI, large language models, and multimodal agents (such as OpenClaw). Featuring efficient thermal management and stable power delivery, the system ensures sustained high computational performance. With abundant high-speed interfaces and flexible expansion capabilities, it meets demanding data throughput requirements, making it an ideal high-performance platform for AI research, intelligent content creation, and complex model inference at the edge.



1.2 Product Specifications

Model Name		AIPC-631
System	CPU	T4000: 12-core Arm® Neoverse®-V3AE 64-bit, T5000: 14-core Arm® Neoverse®-V3AE 64-bit
	GPU	T4000: 1536-core NVIDIA Blackwell architecture GPU with 64 fifth-gen Tensor Cores Multi-Instance GPU (MIG) with 6 TPCs, T5000: 2560-core NVIDIA Blackwell architecture GPU with 96 fifth-gen Tensor Cores Multi-Instance GPU (MIG) with 10 TPCs
	NPU	T4000: 1200 Sparse FP4 TFLOPs, 600 Sparse/300 Dense FP8 TFLOPs, T5000: 2070 Sparse FP4 TFLOPs, 1035 Sparse/500 Dense FP8 TFLOPs
	Memory	T4000: 64GB, T5000: 128GB
	Storage	1 x M.2 M Key 2280 NVMe
	LAN	2 x RJ45, 10GbE
	Expansion	1 x M.2 E Key 2230 (for WiFi5/6)
	Display	2 x HDMI 2.1 output, Up to 4096 x 2160@60Hz
	USB	4 x USB3.2 Gen1 Type-A, 1 x USB3.2 Gen1 Type-C
	Button	1 x Power button, 1 x Recovery
	Watchdog	255 levels of programmable seconds per minute
OS	OS Support	Ubuntu24.04 (Jetpack7.1)
Power	Input Voltage	19V DC IN
Mechanical	Dimensions	130x125x75mm (5.1x4.9x3.0 in)
	Net Weight	1.3kg (2.9lb)
Environment	Operating Temperature	-20~40℃ (-4~104 °F)
	Relative Humidity	10%~90% (non-condensing)
	Vibration	With SSD solid-state drive: Operating state, 2Grs@5~500Hz,IEC 60068-2-64
	Shock	With SSD solid-state drive: working state, 15G@11ms half sine wave
	EMC	CE FCC
Options	Model	Model1: T4000, 1200TOPS, 70W, Model2: T5000, 2070TOPS, 130W
	Storage	M.2 2280 NVMe 236GB, 512GB, 1TB, 2TB
	WiFi & Bluetooth	AP12275_M2P

1.3 External I/O

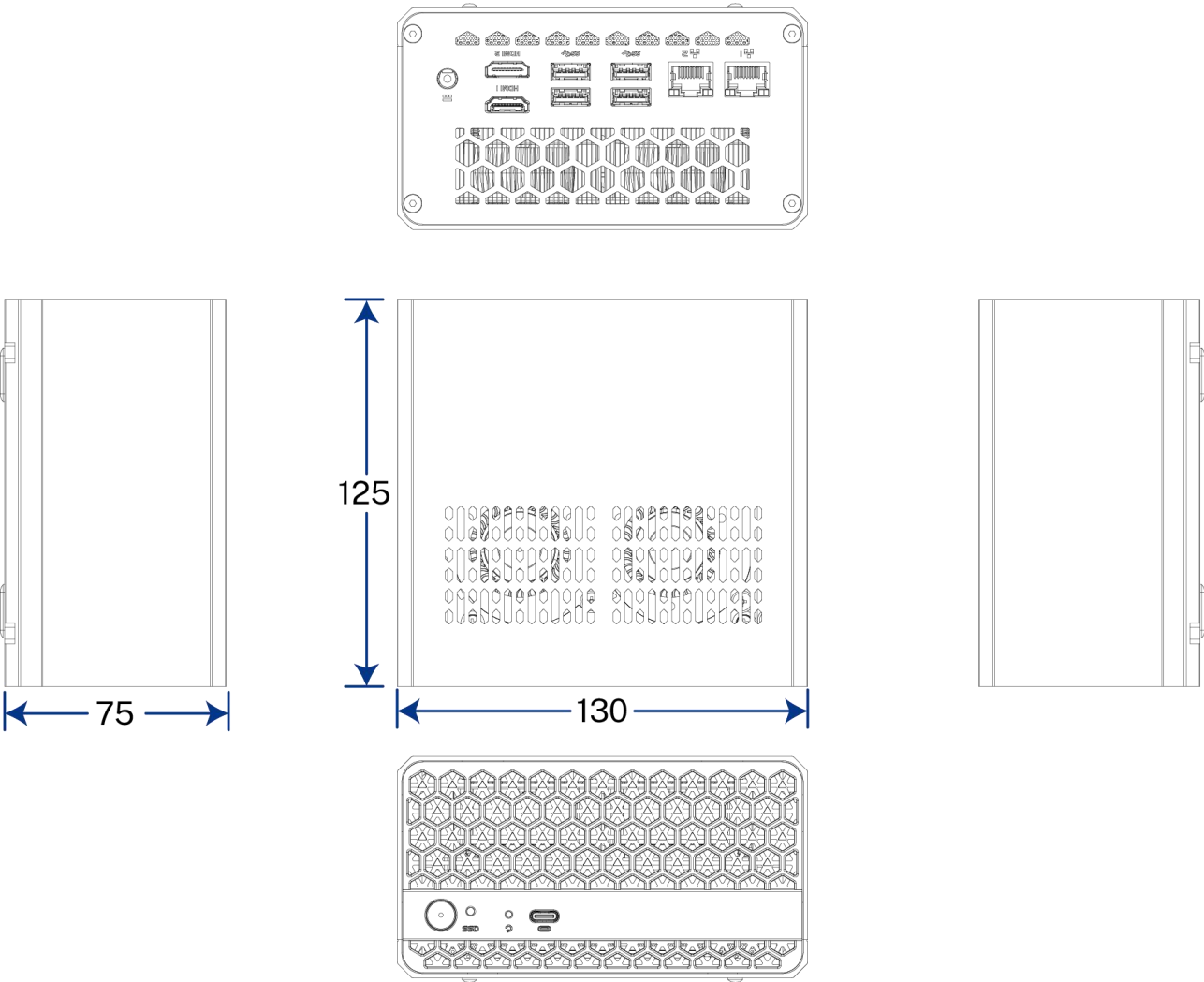


1	Power Button	5	2 x RJ45, 10GbE
2	SSD LED	6	4 x USB3.0 Type A
3	Recovery	7	2 x HDMI, 4K@60Hz
4	1 x USB3.0 Type-C	8	19V DC IN

Recovery: When the device is not powered on, press and hold the Recovery button to power on again, and release it after 5 seconds to enter the burning mode.

1.4 Dimensions

Unit: mm



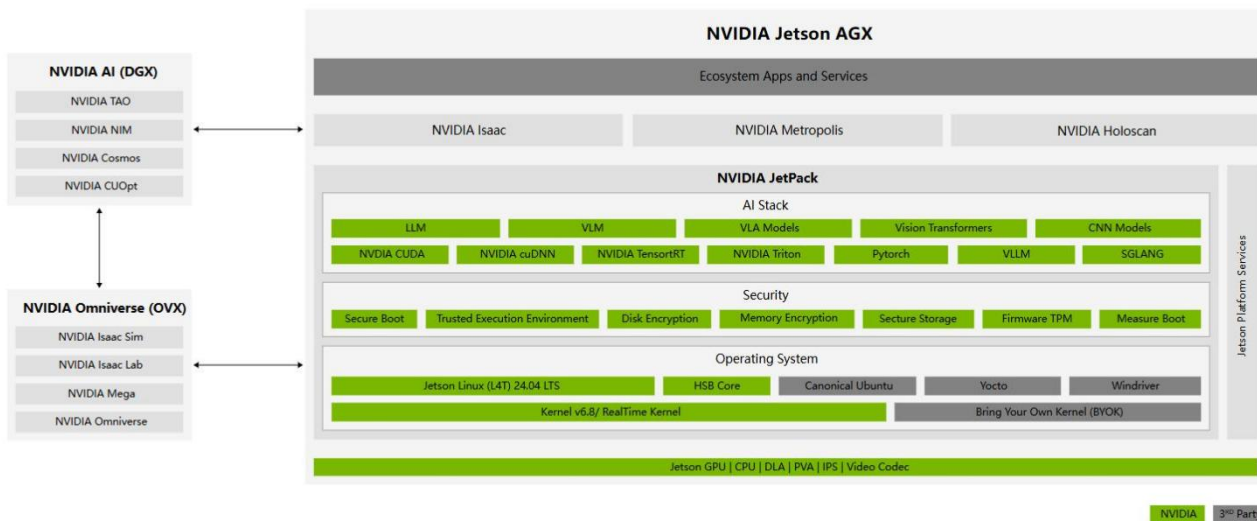
Chapter 2 Software Development Guide

2.1 Overview

This document is intended to provide guidance for the software development of NC-7552. It is applicable to the NPCS 7552 Ubuntu24.04 system software platform.

2.2 Software framework

2.2.1 Jetson software ecosystem diagram



Based on the NVIDIA JetPack SDK, it provides Jetson Linux, developer tools, as well as the CUDA-X acceleration library and other NVIDIA technologies.

JetPack provides end-to-end acceleration for your AI applications, leveraging NVIDIA TensorRT and cuDNN to accelerate AI inference, CUDA for general-purpose computing, VPI for computer vision and image processing, Jetson Linux API for multimedia acceleration, and libArgus and V4l2 for camera processing acceleration.

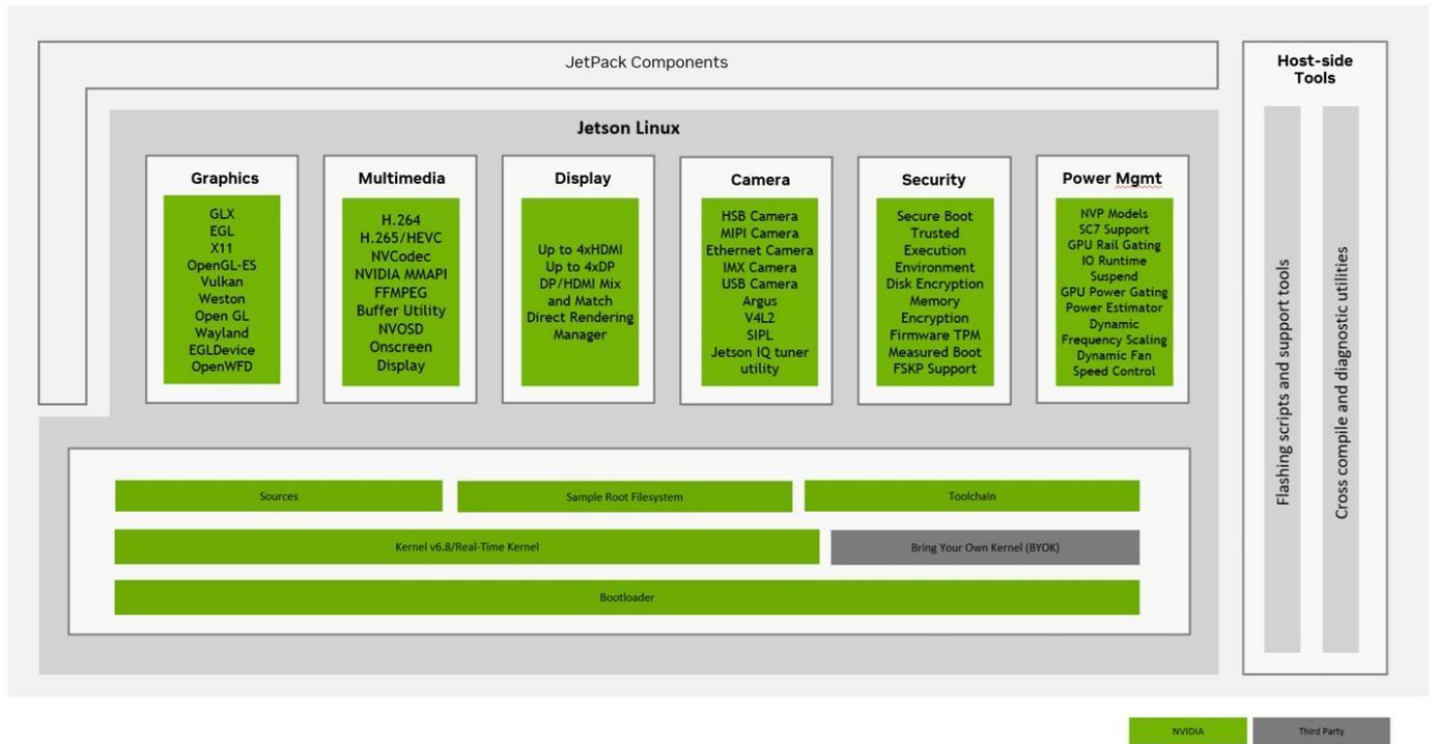
JetPack also includes the NVIDIA Container Runtime, enabling cloud-native technologies and workflows at the edge. By containerizing your AI applications and using cloud-native technologies for large-scale management, we can revolutionize your software development and deployment experience.

Jetson Linux provides your application with the Linux kernel, bootloader, NVIDIA drivers, flash utilities, sample file systems, and a toolchain tailored for the Jetson platform. It also incorporates security features, wireless update capabilities, and more.

For more information, please refer to the official NVIDIA link:
(<https://developer.nvidia.com/embedded/develop/software>)

2.2.2 AIPC-631 software framework diagram

Below is the software architecture diagram of the AIPC-631 system, from bottom to top: UEFI, Linux kernel (or RT Linux kernel), Ubuntu base file system + vendor BSP middleware, and NVIDIA JetPack CUDA software package.



For instructions on the use of middleware such as nvidia Multimedia (Gstreamer, V412), TensorRT, and cuDNN, please refer to (Jetson Software Architecture - NVIDIA Jetson Linux Developer Guide). The control of peripheral hardware (Ethernet, MCU, etc.) can be learned through the [BSP Module] section.

2.3 AGX Thor Module Description

2.3.1 SOM Module Description

SOM (System on Module, System Module) is a highly integrated embedded computing module, specifically developed and designed for edge computing, AI inference and intelligent devices.

System Number	VID/PID	SOM model	Power consumption
3834-0008	0955 : 7026	NVIDIA Jetson AGX thor (128GB)	Max. Power 120W

2.3.2 Module information confirmation method

(1) The method of querying within the AIBOX system:

```
root@scs-agx-thor:/# i2ctransfer -f -y 1 w1@0x50 0x14 r19 | xxd -r -c 30 | tr
' ' '\n'

699-13834-0008-400
```

(2) Query method based on the PC Host end:

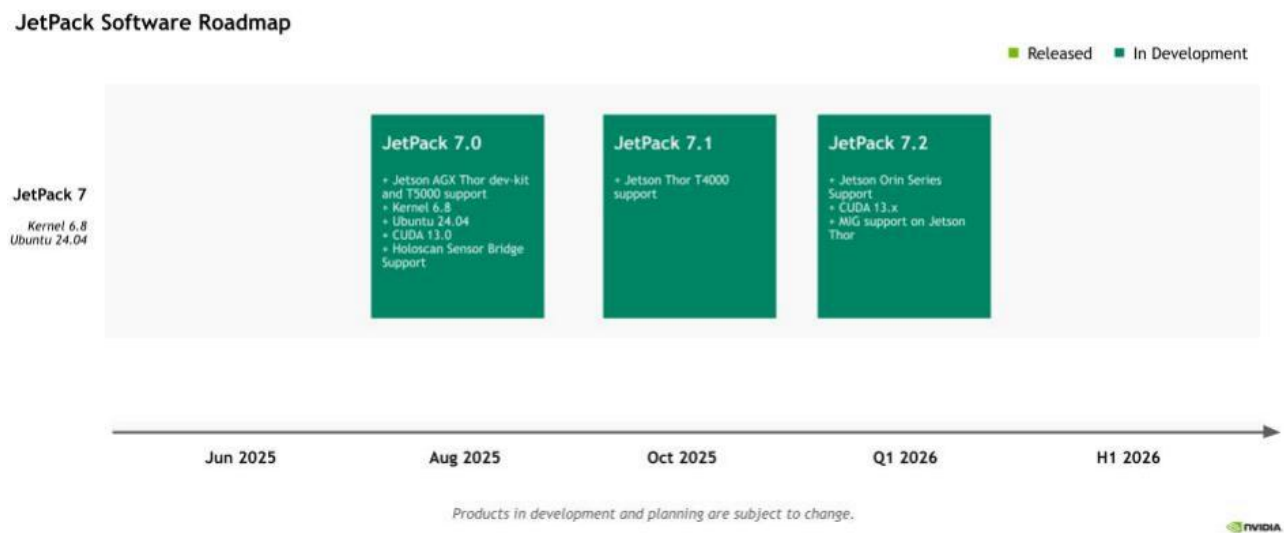
Refer to "Enter Flashing Mode" to put AIBOX into flashing mode, and then run the following command on the Linux system of the PC to view:

```
User@Ubuntu:~$ lsusb

Bus 002 Device 001: ID 1d6b:0003 Linux Foundation 3.0 root hub
Bus 001 Device 003: ID 8087:0033 Intel Corp.
Bus 001 Device 126: ID 0955:7026 NVidia Corp.
Bus 001 Device 001: ID 1d6b:0002 Linux Foundation 2.0 root hub
```

2.4 Software Version diagram

2.4.1 Software version diagram



Currently, the desktop system pre-installed on AIPC-631 is Ubuntu24.04. The corresponding nvidia JetPack version can be found in the above roadmap.

Jetpack7 detailed nvidia official component description please refer to the link:
<https://developer.nvidia.com/embedded/jetpack/downloads>

2.4.2 Check the Jetpack version

```
robot@scs-agx-thor:~$ sudo jtop

jtop 4.4.0 - (c) 2026, Raffaello Bonghi [raffaello@rnext.it]
Website: https://rnext.it/jetson_stats

Platform                               Serial Number: [s]XX CLICK TO READ XXX]
Machine: aarch64                       Hardware
System: Linux                          Model: NVIDIA Jetson AGX Thor Developer Kit
Distribution: Ubuntu 24.04 Noble Numbat 699-level Part Number: 699-13834-0008-400 G.5
Release: 6.8.12-rt-tegra                P-Number: p3834-0008
Python: 3.12.3                          Module: NVIDIA Jetson AGX Thor (Developer kit)
                                           SoC: tegra264
Libraries                               CUDA Arch BIN: 13.0
CUDA: 13.0.48                           L4T: 38.2.1
cuDNN: 9.12.0.46                         Jetpack: 7.0
TensorRT: 10.13.3.9                     Hostname: scs-agx-thor
VPI: 4.0.0~r5                             Interfaces
Vulkan: 1.4.304                           eth0: 192.168.9.58
OpenCV: 4.8.0 with CUDA: NO               eth1: 192.168.1.101
                                           docker0: 172.17.0.1

1ALL 2GPU 3CPU 4MEM 5ENG 6CTRL 7INFO 0uit
```

2.4.3 Check the internal software version

The internal software version is the software version number maintained by our company. It can be obtained by running the following command in the terminal system:

```
robot@scs-agx-thor:~$ cat /etc/edge-release

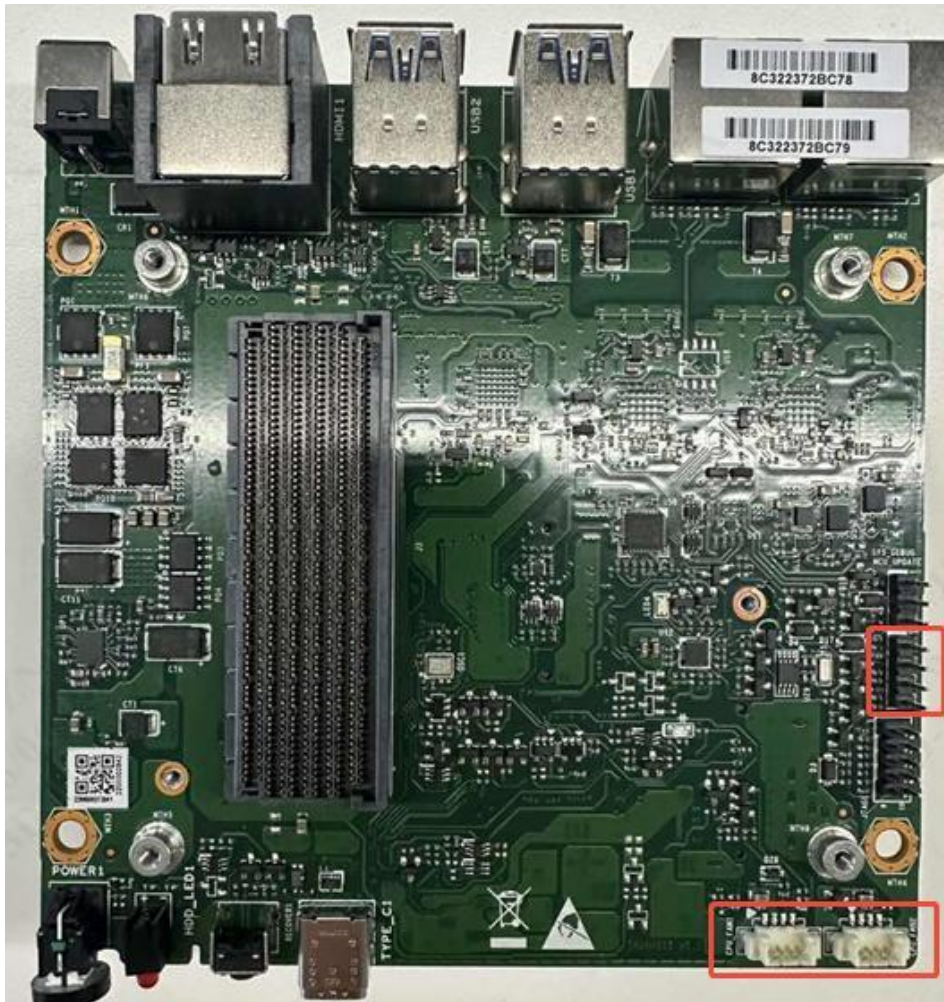
W638-U24-V4.0B-2025102417
```

2.5 Motherboard port

The front of the motherboard:

An MCU firmware upgrade interface,

Two CPU fan control connectors



MUC firmware
local upgrade interface

CPU fan control

Back of the motherboard:
M.2 M Key 2280 for SSD,
M.2 E Key 2230 for WiFi



2.6 BPS Module

2.6.1 Ethernet

The AIPC-631 is equipped with two 10G Ethernet ports. The network card names corresponding to LAN1-LAN2 are eth1-eth2. The link control and IP management are handled by the NetworkManager of the standard Ubuntu system.

Ethernet static IP Settings

Users can set the static IP of the Ethernet or allocate IP via DHCP by editing the file system files /etc/net/interfaces. After configuration, the system will take effect upon restart.

The following is an example of setting eth1 to the DHCP IP allocation mode and eth2 to the static IP 192.168.2.1 by modifying /etc/network/interfaces.

```
# interfaces(5) file used by ifup(8) and ifdown(8)
```

```
auto eth1
```

```
iface eth0 inet dhcp
```

```
auto eth2
```

```
iface eth1 inet static
```

```
address 192.168.2.1
```

```
netmask 255.255.255.0
```

```
mtu 9000
```

For a 10G network card, setting the mtu to 9000 can optimize the ultimate performance.

It should be noted that in /etc/network/interfaces, the "#" sign and description cannot be added after valid lines; otherwise, the Settings will become invalid. The following is a demonstration of the error.

```
# interfaces(5) file used by ifup(8) and ifdown(8)

auto eth1

iface eth1 inet dhcp #static
address 172.31.60.54
netmask 255.255.255.0
```

MAC address burning

The method for burning the MAC address of the network port can be found in the description of the cat /etc/net/burne/readme.txt file in the system.

2.6.2 MCU Module

The MCU module realizes functions such as timed on/off of the equipment, power-on startup, and watchdog. Users can set the timed on/off of the device through the tools that come with the MCU. They can set whether the device will automatically turn on when external power is connected to the DCIN or can only be turned on manually by pressing the power button. They can also enable the hardware watchdog to make the device automatically restart when the software feeding the dog exceeds the time limit.

2.6.2.1 The MCU Settings enable the hardware watchdog

Users can enable the system hardware watchdog through the following commands. After enabling the watchdog, when an abnormal system failure occurs, the watchdog will reset the system.

```
root@scs-agx-thor:/home/nvidia/firmware_update# jspmcu -h
```

```
USAGE: This tool is used to read or set spirit function
```

```
-p :Auto Poweron      : 0: power off  1: power on
-a :Alarm Poweron     : 0: off        1: on
-w :Wake on Lan       : 0: off        1: on
-d :watchdog          : 0: off        1: on(start from poweron)
-t :watchdog time      : 0: 12s 1: 15s  2: 18s  3: 21s
-u :update mcu firmware : (-u path)
-f :force update (ignore version)
-i :get mcu infomation
```

```
root@scs-agx-thor:/home/nvidia/firmware_update# jspmcu -d 1
```

```
jsp mcu vid: 3f  pid: 80  version: 5
```

```
root@scs-agx-thor:/home/nvidia/firmware_update# jspmcu -i
```

```
jsp mcu vid: 3f  pid: 80  version: 5
```

```
jsp power Loss      control----->0
```

```
jsp alarm on        control----->1
```

```
jsp wake on lan     control----->1
```

```
jsp watchdog       control----->1
```

```
jsp watchdog Time control----->3
```

```
root@scs-agx-thor:/home/nvidia/firmware_update#
```

2.6.2.2 Press the MCU Settings button to power on

By default, the MCU supports booting up after an external power supply is powered on. Users can operate through commands to set the jsp power Loss value to 0 to prevent the AIBOX from booting up when powered on. The following is the schematic operation command process.

```
root@scs-agx-thor:/home/nvidia/firmware_update# jspmcu -h
USAGE: This tool is used to read or set spirit function

-p :Auto Poweron      : 0: power off  1: power on
-a :Alarm Poweron     : 0: off        1: on
-w :Wake on Lan       : 0: off        1: on
-d :watchdog          : 0: off        1: on(start from poweron)
-t :watchdog time     : 0: 12s 1: 15s  2: 18s  3: 21s
-u :update mcu firmeare : (-u path)
-f :force update (ignore version)
-i :get mcu infomation

root@scs-agx-thor:/home/nvidia/firmware_update# jspmcu -p 0
jsp mcu vid: 3f  pid: 80  version: 5

root@scs-agx-thor:/home/nvidia/firmware_update# jspmcu -i
jsp mcu vid: 3f  pid: 80  version: 5

jsp power Loss      control----->0
jsp alarm on        control----->1
jsp wake on lan     control----->0
jsp watchdog        control----->1
jsp watchdog Time   control----->3
root@scs-agx-thor:/home/nvidia/firmware_update#
```

2.6.2.3 The MCU Settings support network wake-up

Network wake-up refers to the function that when the AIBOX is turned off, it can be powered on and enter the system by sending magic packets through other nodes in the local area network.

Users can enable network wake-up through the following command process.

```
root@scs-agx-thor:/home/nvidia/firmware_update# jspmcu -h
USAGE: This tool is used to read or set spirit function

-p :Auto Poweron      : 0: power off  1: power on
-a :Alarm Poweron     : 0: off        1: on
-w :Wake on Lan       : 0: off        1: on
-d :watchdog          : 0: off        1: on(start from poweron)
-t :watchdog time     : 0: 12s 1: 15s  2: 18s  3: 21s
-u :update mcu firmware : (-u path)
```

```
-f :force update (ignore version)
-i :get mcu information

root@scs-agx-thor:/home/nvidia/firmware_update# jspmcu -w 1
jsp mcu vid: 3f  pid: 80  version: 5

root@scs-agx-thor:/home/nvidia/firmware_update# jspmcu -i
jsp mcu vid: 3f  pid: 80  version: 5

jsp power Loss      control----->0
jsp alarm on        control----->1
jsp wake on lan    control----->1
jsp watchdog        control----->1
jsp watchdog Time   control----->3
```

2.6.2.4 Online update of MCU firmware

The MCU supports online firmware update under the system.

The command is: `/firmware_update < firmware package >`.

The following is an illustration of the operation command process.

```
root@scs-agx-thor:/home/nvidia/firmware_update#  
<_update# ./firmware_update MS51-application-V06.bin  
is not in loader mode  
success switch to loader mode  
[=====] 100%  
Firmware upgrade completed successfully.
```

2.6.3 TCM Module

The AIPC-631 comes with a default secure encryption chip for data encryption and decryption, signature verification, and true random number generation.

The system software is directly compatible with the `tpm2-tools` tool of the Ubuntu standard. Users can provide hardware performance computing operations for data by calling the standard interface of `tpm2-tools`.

Operation example of the command to read an 8-byte true random number:

```
root@scs-agx-thor:/# tpm2_getrandom --hex 8 | xargs -I {} echo {}  
4ceea9b47ec1c64e  
root@scs-agx-thor:/# tpm2_getrandom --hex 8 | xargs -I {} echo {}  
679e5c7268d30022  
root@scs-agx-thor:/# tpm2_getrandom --hex 8 | xargs -I {} echo {}  
6d6b69c5b5c45f2b
```

2.6.4 WiFi Module AP Mode

The wifiap-utils_4.x.x_arm64.deb Soft AP support package provided by our company is placed in the current directory. The user can install it by running the following command while the machine is connected to the network (the purpose is to install the dependent packages) :

```
root@scs-agx-thor:/# sudo apt -y install ./wifiap-utils_4.x.x_arm64.deb
```

After installing the support package, determine the working status of Soft AP by querying the kwfapd service:

```
root@scs-agx-thor:/home/nvidia# systemctl status kwfapd
● kwfapd.service - wifi AP daemon
   Loaded: loaded (/etc/systemd/system/kwfapd.service; enabled; preset: enabl>
   Active: active (running) since Tue 2025-12-16 20:18:17 CST; 13h ago
 Main PID: 2597 (hostapd)
    Tasks: 1 (limit: 150285)
  Memory: 9.3M (peak: 9.7M)
     CPU: 1.896s
   CGroup: /system.slice/kwfapd.service
          └─2597 hostapd -dd -t -B /etc/hostapd/hostapd.conf -f /var/log/hos>
```

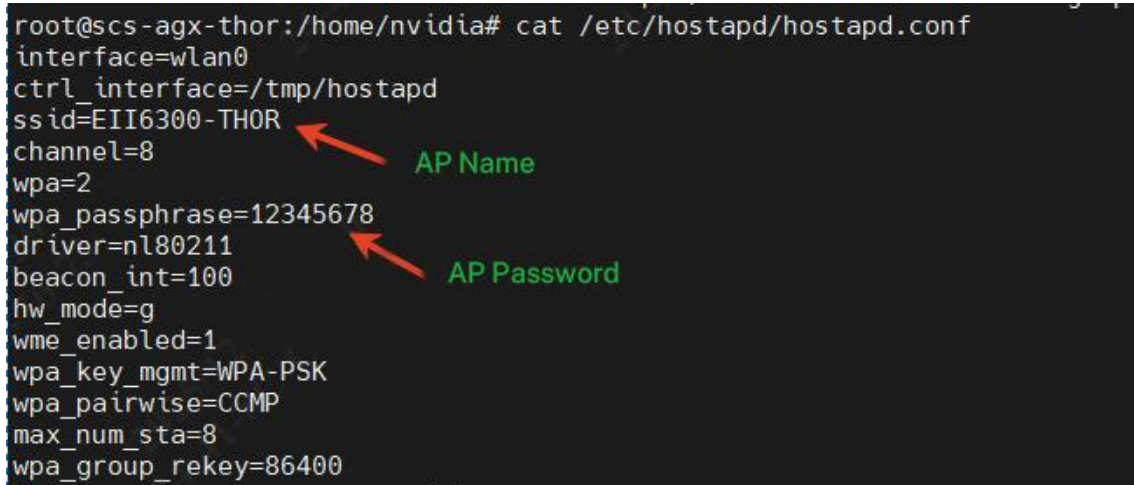
```
Dec 17 09:49:50 scs-agx-thor systemd[1]: /etc/systemd/system/kwfapd.service:7: >
Dec 17 09:51:25 scs-agx-thor systemd[1]: /etc/systemd/system/kwfapd.service:7: >
Dec 17 09:53:01 scs-agx-thor systemd[1]: /etc/systemd/system/kwfapd.service:7: >
Dec 17 09:54:36 scs-agx-thor systemd[1]: /etc/systemd/system/kwfapd.service:7: >
Dec 17 09:56:12 scs-agx-thor systemd[1]: /etc/systemd/system/kwfapd.service:7: >
Dec 17 09:57:47 scs-agx-thor systemd[1]: /etc/systemd/system/kwfapd.service:7: >
Dec 17 09:59:23 scs-agx-thor systemd[1]: /etc/systemd/system/kwfapd.service:7: >
Dec 17 10:00:58 scs-agx-thor systemd[1]: /etc/systemd/system/kwfapd.service:7: >
Dec 17 10:02:34 scs-agx-thor systemd[1]: /etc/systemd/system/kwfapd.service:7: >
Dec 17 10:04:09 scs-agx-thor systemd[1]: /etc/systemd/system/kwfapd.service:7: >
```

If it prompts "active (running) ", it indicates that the service is working properly.

After installing the Soft AP support package, Wi-Fi AP mode is directly supported without configuration. The default Soft AP name is "E16300-THOR", the password is "12345678", and the gateway IP is "192.168.50.1".

Users can by editing the/etc/hostapd/hostapd. Conf file modification AP name or password, modified restart the system to take effect.

```
root@scs-agx-thor:/home/nvidia# cat /etc/hostapd/hostapd.conf
interface=wlan0
ctrl_interface=/tmp/hostapd
ssid=EII6300-THOR
channel=8
wpa=2
wpa_passphrase=12345678
driver=nl80211
beacon_int=100
hw_mode=g
wme_enabled=1
wpa_key_mgmt=WPA-PSK
wpa_pairwise=CCMP
max_num_sta=8
wpa_group_rekey=86400
```



Anomaly investigation

In case of any abnormality, the system logs will be collected through the following command and provided to our company for further analysis.

```
root@scs-agx-thor:/# journalctl > journal_wifiap.txt
```

SoftAP and STA coexist

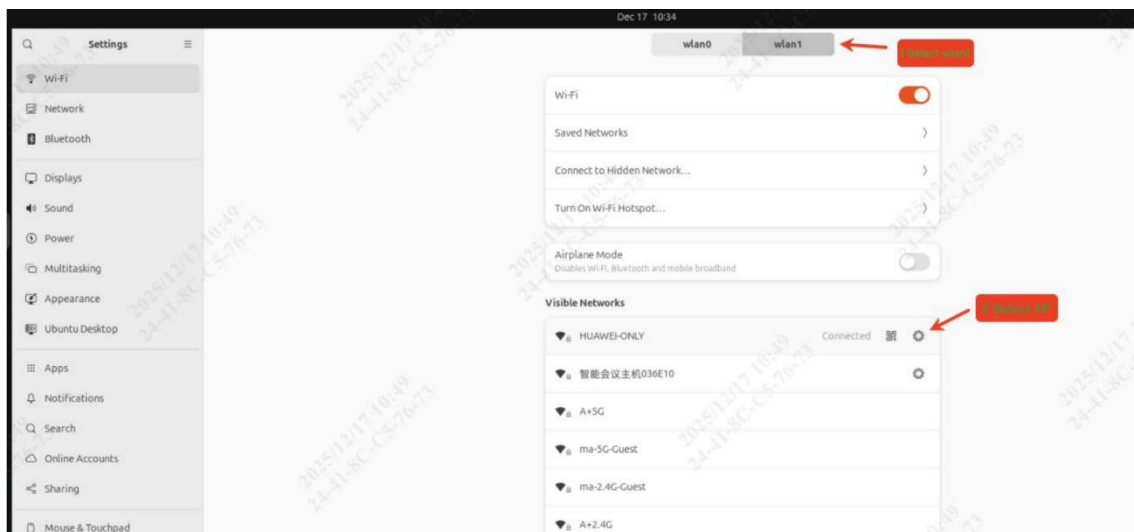
The coexistence of Wi-Fi Soft AP and STA modes requires the support of Wi-Fi drivers. Wi-Fi drivers that support dual-mode coexistence will create two wlan network cards in the system, and the Soft AP and STA modes correspond to the network card nodes wlan0 and wlan1 respectively.

```
root@scs-agx-thor:/home/nvidia# ifconfig wlan0; ifconfig wlan1

wlan0: flags=4163<UP,BROADCAST,RUNNING,MULTICAST>  mtu 1500
    inet 192.168.50.1  netmask 255.255.255.0  broadcast 192.168.50.255
    ether 40:d9:5a:7b:6e:32  txqueuelen 1000  (Ethernet)
    RX packets 0  bytes 0 (0.0 B)
    RX errors 0  dropped 9  overruns 0  frame 0
    TX packets 13  bytes 1311 (1.3 KB)
    TX errors 0  dropped 0 overruns 0  carrier 0  collisions 0

wlan1: flags=4163<UP,BROADCAST,RUNNING,MULTICAST>  mtu 1500
    inet 192.168.9.123  netmask 255.255.255.0  broadcast 192.168.9.255
    inet6 fe80::355f:c388:de1e:118  prefixlen 64  scopeid 0x20<link>
    ether 42:d9:5a:7b:6e:32  txqueuelen 1000  (Ethernet)
    RX packets 83  bytes 12746 (12.7 KB)
    RX errors 0  dropped 165  overruns 0  frame 0
    TX packets 76  bytes 8156 (8.1 KB)
    TX errors 0  dropped 0 overruns 0  carrier 0  collisions 0
```

The Soft AP support package implements the Soft AP function through wlan0, while wlan1 is used to implement the STA function. Users can connect to third-party wireless routers through wlan1, thereby achieving dual-mode coexistence.



2.6.5 Buzzer

Software device node

```
/dev/input/by-path/platform-buzzer-event  
/dev/input/by-path/platform-bus@0:buzzer-event
```

Users can start the beep by calling the `xosal_beep` interface in the "System conventional Interfaces" section of the "API Interface Description", or implement their own interface by referring to the demonstration code of `buzz_test.c`.

2.7 API Interface Description

Users can invoke and link the interfaces described in this section by installing the xosal-dev-vx.x.x.deb interface support package provided by our company.

2.7.1 System conventional interface

Basic definition

The system's regular interface is used to set and obtain the system time, modify the system time zone, adjust the system volume, and adjust the screen backlight, etc.

Return value list

Macro	Numerical value	Notes
XOSAL_RET_OK	0	Successful execution
XOSAL_RET_ERR_PARA	-(0xA000+1)	Invalid input parameter
XOSAL_RET_ERR_OPEN_DEV	-(0xA000+2)	Opening failure
XOSAL_RET_ERR_IOCTL_DEV	-(0xA000+3)	The ioctl operation failed
XOSAL_RET_ERR_SYS	-(0xA000+4)	System error

xosal_set_locale

Prototype	int xosal_set_locale(char *zone_info)	
Function	Set the system time zone	
Parameter	zone_info [Input]	Time zone string, please refer to [Appendix 1]
Return	See [Return Value Table]	

xosal_set_time

Prototype	int xosal_set_time(int *in_time)	
Function	Set the system time	
Parameter	in_time [Input]	Time zone string, please refer to [Appendix 1]
		A pointer to the buffer pointing to the input time
		in_time[0] years
		in_time[1] month
		in_time[2] day
		in_time[3] hour
		in_time[4] minutes
		in_time[5] seconds
Return	See [Return Value Table]	

xosal_get_time

Prototype	int xosal_get_time(int *out_time)	
Function	Get the system time	
Parameter	in_time [out]	Time zone string, please refer to [Appendix 1]
		A pointer to the buffer that outputs the time
		out_time[0] years
		out_time[1] month
		out_time[2] day
		out_time[3] hour
		out_time[4] minutes
		out_time[5] seconds
		out_time[6] week
Return	See [Return Value Table]	

xosal_beep

Prototype	int xosal_beep(int freq, int delayMs)	
Function	Start the buzzer to beep	
Parameter	freq [input]	Frequency of bee call
	DelayMs [input]	Duration of beeping
Return	See [Return Value Table]	

xosal_set_alarm

Prototype	int xosal_set_alarm(int day, int hour, int minute, int second)	
Function	Set the time for the system to start	
Parameter	day [input]	Set date
	hour [input]	Set hour
	minute [input]	Set minute
	second [input]	Set second
Return	See [Return Value Table]	

2.8 Software debugging

To facilitate users' quick access to the device and conduct debugging, AIPC-631 provides three access methods: usb adb, network ssh, and DEBUG serial port.

2.8.1 USB ADB mode

After the device enters the system, the user only needs to use a Type-C cable (the data cable of an android phone) to connect the device to the Linux PC, and then execute the adb shell command in the terminal session of the Linux PC to access the file system of the box.

```
User@Ubuntu:~$ adb shell
root@scs-agx-thor:/# ls
bin                etc                lost+found        proc              sbin.usr-is-merged  tmp
bin.usr-is-merged  home              media             root             snap                usr
boot              lib               mnt              run              srv                var
dev               lib.usr-is-merged  opt              sbin             sys
```

root@scs-agx-thor:/#

2.8.2 Ethernet SSH mode

When the device has established a connection in the local area network via Wi-Fi or Ethernet, users can access the file system of the device via ssh client. The following is an example of access with the terminal ip of 192.168.9.58. The default username and password for the terminal system are both "robot". By default, no password is set for the root user. Users need to set the root user password by themselves through the "sudo passwd root" command.

```
User@Ubuntu:~$ ssh robot@192.168.9.58
robot@192.168.9.58's password:
Welcome to Ubuntu 24.04.3 LTS (GNU/Linux 6.8.12-rt-tegra aarch64)

 * Documentation:  https://help.ubuntu.com
 * Management:    https://landscape.canonical.com
 * Support:       https://ubuntu.com/pro

This system has been minimized by removing packages and content that are
not required on a system that users do not log into.

To restore this content, you can run the 'unminimize' command.

Expanded Security Maintenance for Applications is not enabled.

149 updates can be applied immediately.
66 of these updates are standard security updates.
To see these additional updates run: apt list --upgradable

Enable ESM Apps to receive additional future security updates.
See https://ubuntu.com/esm or run: sudo pro status

Last login: Tue Oct 28 20:06:17 2025 from 192.168.9.110
robot@scs-agx-thor:~$
```

2.8.3 DEBUG interface mode

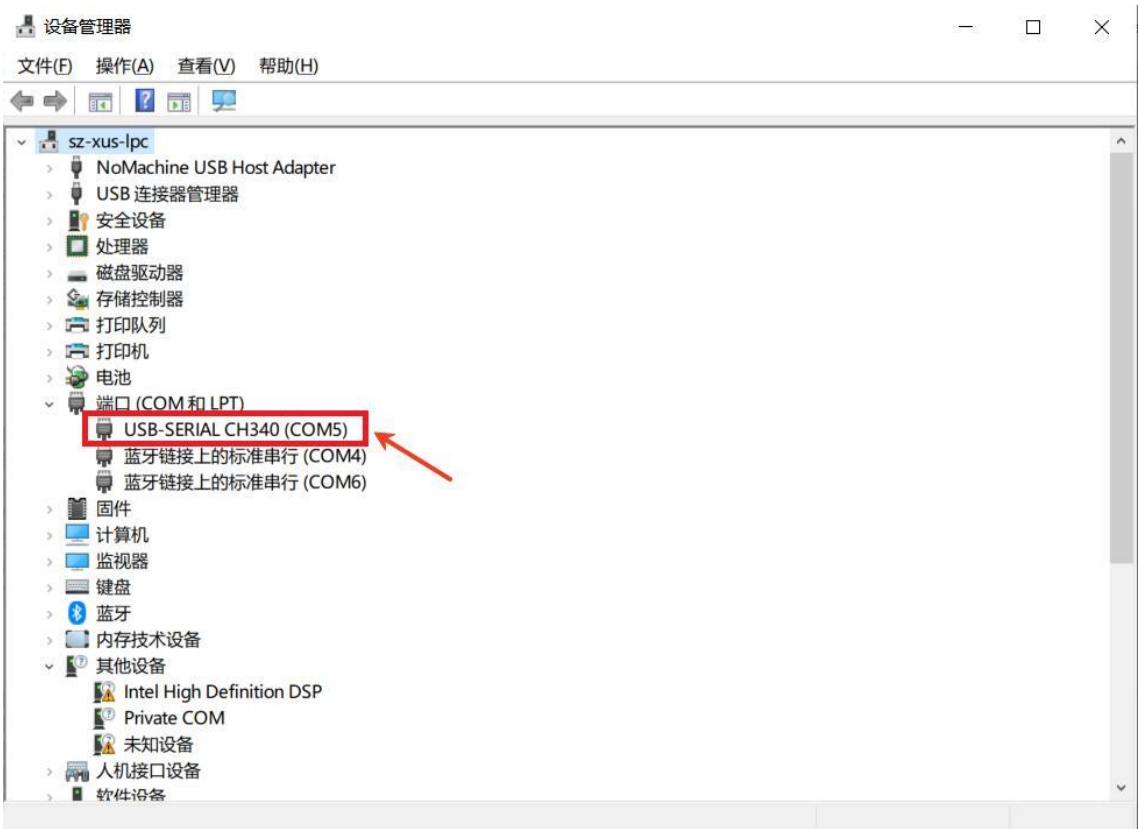
This method is often used to capture abnormal serial port logs when the terminal is powered on but does not enter the system. Generally, it is not recommended for use.

2.8.3.1 Preparations for the PC end.

First, prepare a data cable that converts USB to TTL serial port.

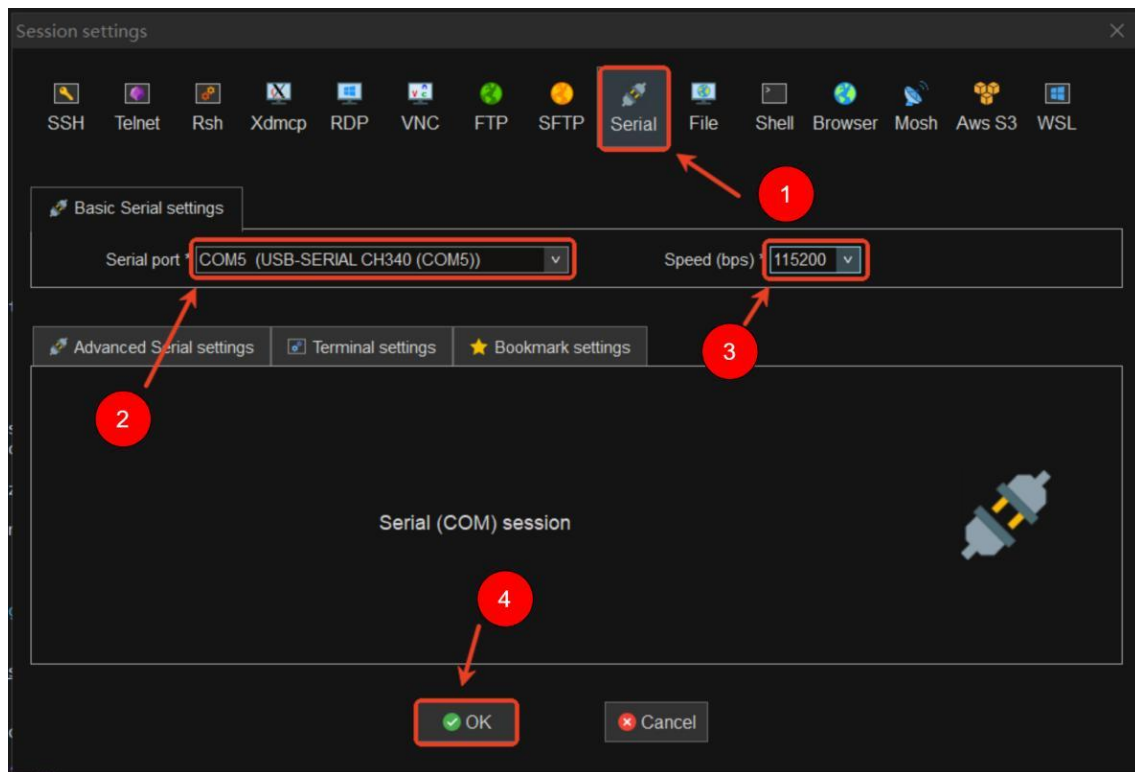


Connect the USB port of the adapter board to the PC, install the driver of this adapter cable on the PC end, and make sure that the device can be found in Windows Device Manager.



Install serial port tools such as MobaXterm on the PC.

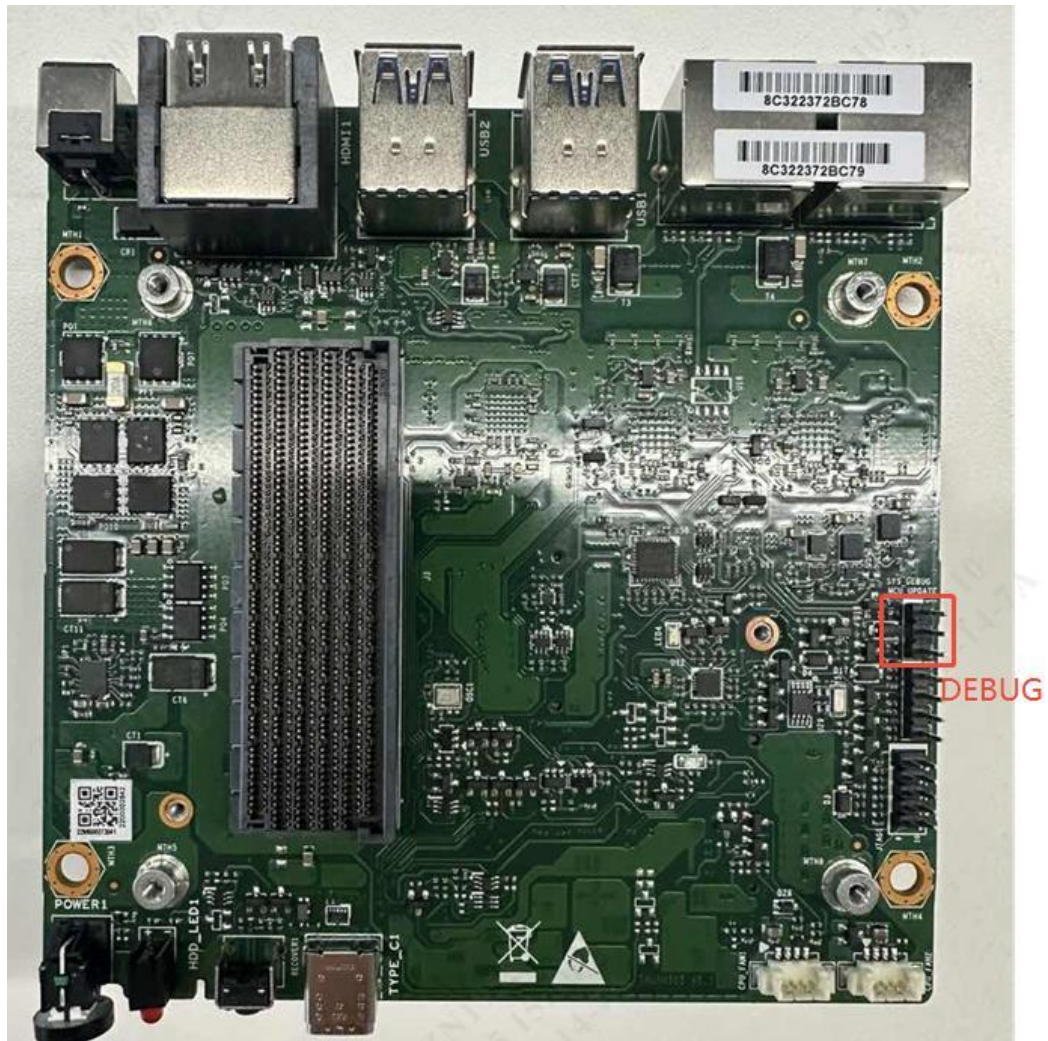
Select the corresponding serial port device and set the baud rate to 115200.



2.8.3.2 Preparations for the motherboard

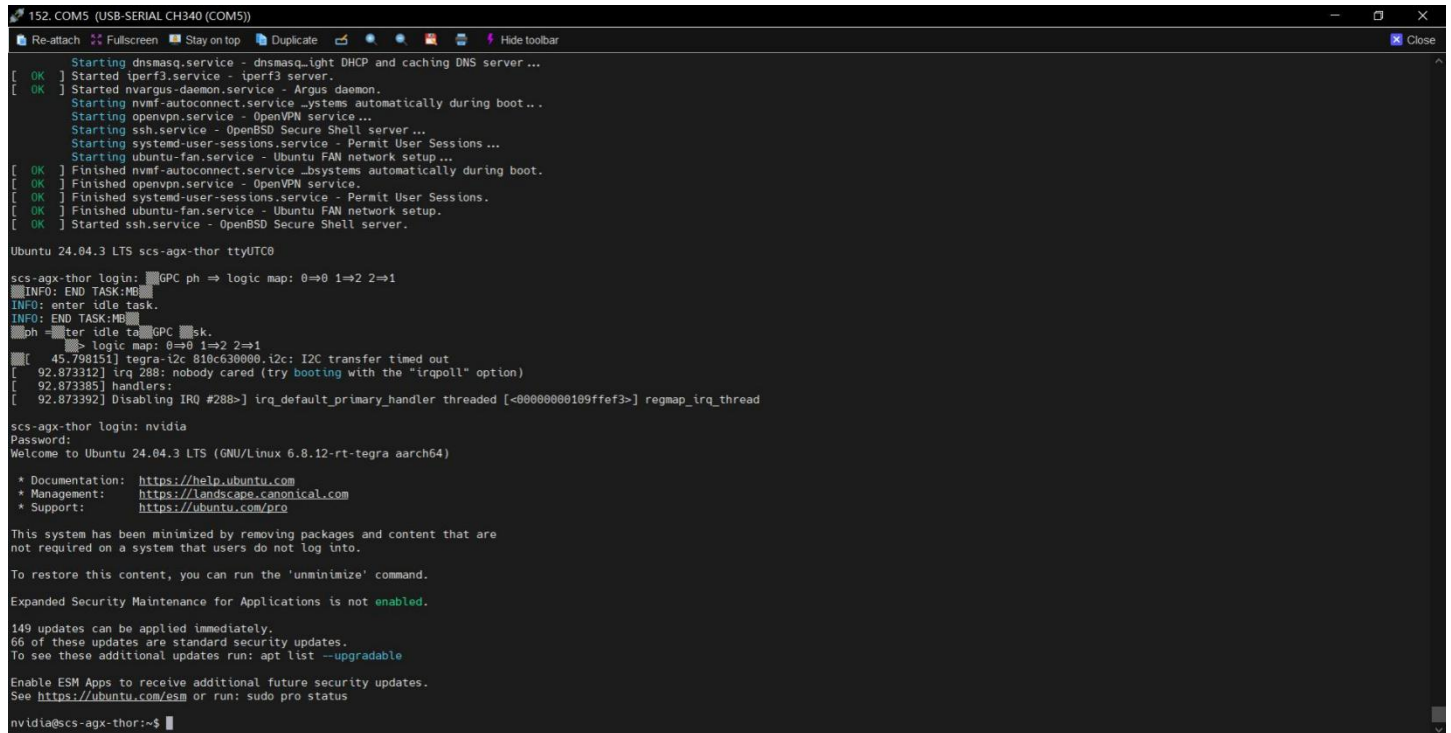
First, remove the device board and find the three pins marked with the red arrow next to the DEBUG screen.

From top to bottom, the three pins are respectively connected to GND, RXD, and TXD of the USB-to-TTL module.



2.8.3.3 Start command interaction

After the data cable connection is completed, you can access the terminal file system through commands in the PC serial port interaction tool session (such as MobaXterm). The login username and password for the tty session are both robot.



```

152. COM5 (USB-SERIAL CH340 (COM5))
Re-attach  Fullscreen  Stay on top  Duplicate  Hide toolbar  Close

[ OK ] Starting dnsmasq.service - dnsmasq-ight DHCP and caching DNS server ...
[ OK ] Started iperf3.service - iperf3 server.
[ OK ] Started nvargus-daemon.service - Argus daemon.
Starting nvmmf-autoconnect.service _systems automatically during boot...
Starting openvpn.service - OpenVPN service...
Starting ssh.service - OpenBSD Secure Shell server...
Starting systemd-user-sessions.service - Permit User Sessions...
Starting ubuntu-fan.service - Ubuntu FAN network setup...
[ OK ] Finished nvmmf-autoconnect.service _bsystems automatically during boot.
[ OK ] Finished openvpn.service - OpenVPN service.
[ OK ] Finished systemd-user-sessions.service - Permit User Sessions.
[ OK ] Finished ubuntu-fan.service - Ubuntu FAN network setup.
[ OK ] Started ssh.service - OpenBSD Secure Shell server.

Ubuntu 24.04.3 LTS scs-agx-thor ttyUTC0
scs-agx-thor login: GPC ph => logic map: 0=>0 1=>2 2=>1
INFO: END TASK:MB
INFO: enter idle task.
INFO: END TASK:MB
ph = ter idle ta GPC sk.
=> logic map: 0=>0 1=>2 2=>1
[ 45.798151] tegra-i2c 810c630000.i2c: I2C transfer timed out
[ 92.873312] irq 288: nobody cared (try booting with the "irqpoll" option)
[ 92.873385] handlers:
[ 92.873392] Disabling IRQ #288] irq_default_primary_handler threaded [<00000000109ffef3>] regmap_irq_thread

scs-agx-thor login: nvidia
Password:
Welcome to Ubuntu 24.04.3 LTS (GNU/Linux 6.8.12-rt-tegra aarch64)

 * Documentation:  https://help.ubuntu.com
 * Management:    https://landscape.canonical.com
 * Support:       https://ubuntu.com/pro

This system has been minimized by removing packages and content that are
not required on a system that users do not log into.

To restore this content, you can run the 'unminimize' command.

Expanded Security Maintenance for Applications is not enabled.

149 updates can be applied immediately.
66 of these updates are standard security updates.
To see these additional updates run: apt list --upgradable

Enable ESM Apps to receive additional future security updates.
See https://ubuntu.com/esm or run: sudo pro status

nvidia@scs-agx-thor:~$
  
```

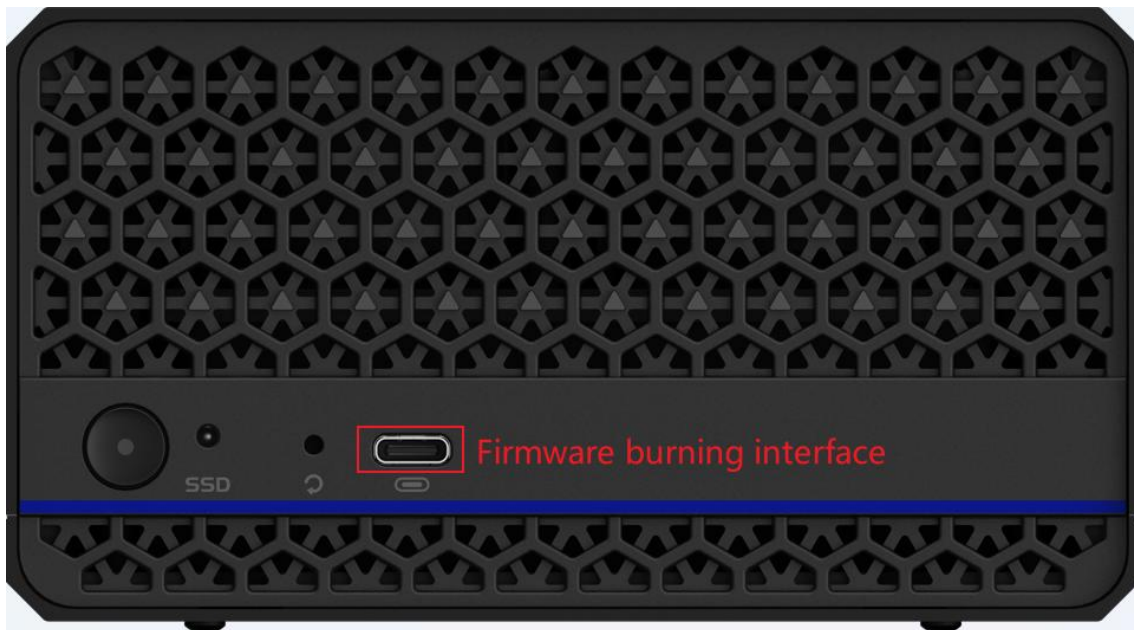
2.9 Firmware burning

2.9.1 Preparatory work

Type-c cable (android phone data cable)

A PC pre-installed with Ubuntu18.04 or Ubuntu20.04

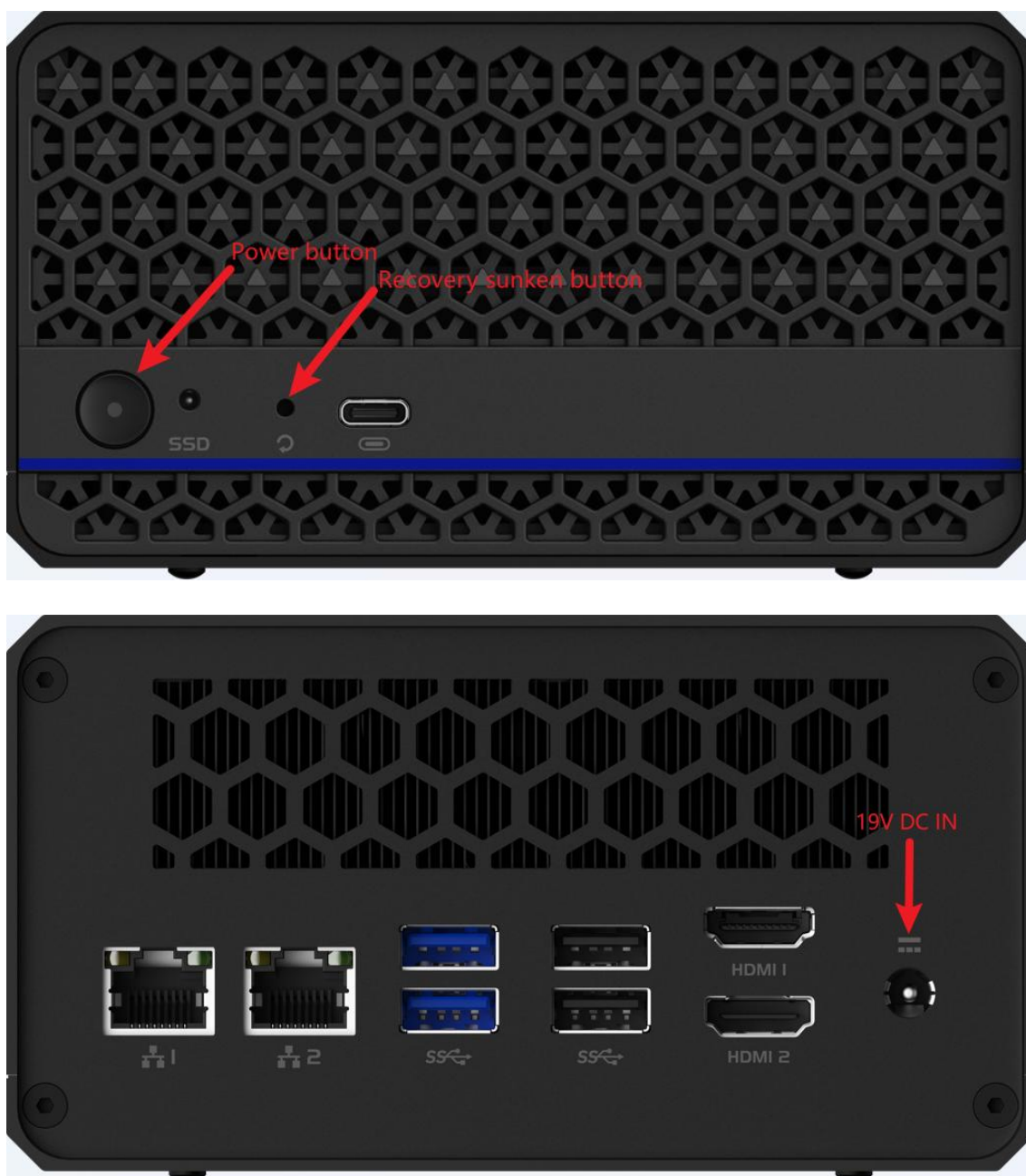
2.9.2 Communication connection



Connect the AIPC-631 to the PC via a Type-C cable. The Type-C port of the data cable is connected to the AIPC-631, and the Type-A port at the other end of the data cable is connected to the PC.

(Data cables with both ends being Type-C are not supported for the time being.)

2.9.3 Enter the flashing mode



Press and hold the RECOVERY pin (provided by yourself), then power on the NPC-7522 through the 19V DC-IN port (special note: For the power mode that does not automatically start upon power-on, you need to insert the DC-IN and then press the "Power Button" to power on). After that, you can run the following command on the PC to confirm whether the AIBOX has entered the flashing mode:

```
User@Ubuntu:~$ lsusb  
  
Bus 002 Device 001: ID 1d6b:0003 Linux Foundation 3.0 root hub  
  
Bus 001 Device 003: ID 8087:0033 Intel Corp.  
  
Bus 001 Device 126: ID 0955:7026 NVidia Corp.  
  
Bus 001 Device 001: ID 1d6b:0002 Linux Foundation 2.0 root hub
```

If a new device of "0955:7026 NVidia Corp "is discovered, it indicates that the box has entered the flashing mode; otherwise, it means the box is not in the flashing mode and steps [2.9.2] [2.9.3] need to be completed again.

2.9.4 Start flashing the machine

The following example shows the flashing command operation for the firmware package E116300-U24-V4.0B-2025102214.zip.

First, extract the firmware directory "out" via unzip, then cd to the "out" directory, and finally start the flashing by running the flashing script "depart_download.sh".

```
User@Ubuntu:~$ unzip E116300-U24-V4.0B-2025102214.zip
User@Ubuntu:~$ cd ./out/
User@Ubuntu:~$ ./depart_download.sh
```

The bottom end log of successful burning is as follows, with the prompt "Flashing finished Successfully!!" The entire process took approximately 826 seconds (13 minutes).

```
cwd =
/home/xusan/ssd/project/eii-6300/orig-sdk/sdk/jetson_thor/Linux_for_Tegra/u
nified_flash/out/bsp_images/flash_workspace/flash-images
[flash_bsp_jetson-t264_die0]: [executeShellCommand(163)] : [ 96%]
/tmp/resize2fs
[100%] /tmp/resize2fs
/home/xusan/ssd/project/eii-6300/orig-sdk/sdk/jetson_thor/Linux_for_Tegra/u
nified_flash/out/bsp_images/tools/flashtools/flash/resize2fs: 1 file pushed.
12.7 MB/s (67672 bytes in 0.005s)

[flash_bsp_jetson-t264_die0]: [executeShellCommand(156)] : command =
/home/xusan/ssd/project/eii-6300/orig-sdk/sdk/jetson_thor/Linux_for_Tegra/u
nified_flash/out/bsp_images/tools/flashtools/flash/adb -s
2U1TS931800000205060 shell /tmp/wr_sh.sh /tmp/resize2fs -fFp /dev/block/loop0
cwd =
/home/xusan/ssd/project/eii-6300/orig-sdk/sdk/jetson_thor/Linux_for_Tegra/u
nified_flash/out/bsp_images/flash_workspace/flash-images
[flash_bsp_jetson-t264_die0]: [executeShellCommand(163)] : resize2fs 1.47.0
(5-Feb-2023)
Resizing the filesystem on /dev/block/loop0 to 61815881 (4k) blocks.
```

```

The filesystem on /dev/block/loop0 is now 61815881 (4k) blocks long.

EXITCODE=0

[flash_bsp_jetson-t264_die0]: [AdbShell(325)] : EXITCODE = 0
[flash_bsp_jetson-t264_die0]: [executeShellCommand(156)] : command =
/home/xusan/ssd/project/eii-6300/orig-sdk/sdk/jetson_thor/Linux_for_Tegra/u
nified_flash/out/bsp_images/tools/flashtools/flash/adb -s
2UITS931800000205060 shell /tmp/wr_sh.sh sync
cwd =
/home/xusan/ssd/project/eii-6300/orig-sdk/sdk/jetson_thor/Linux_for_Tegra/u
nified_flash/out/bsp_images/flash_workspace/flash-images
[flash_bsp_jetson-t264_die0]: [executeShellCommand(163)] :
EXITCODE=0

[flash_bsp_jetson-t264_die0]: [AdbShell(325)] : EXITCODE = 0
[flash_bsp_jetson-t264_die0]: [executeShellCommand(156)] : command =
/home/xusan/ssd/project/eii-6300/orig-sdk/sdk/jetson_thor/Linux_for_Tegra/u
nified_flash/out/bsp_images/tools/flashtools/flash/adb -s
2UITS931800000205060 shell /tmp/wr_sh.sh /tmp/losetup -d /dev/block/loop0
cwd =
/home/xusan/ssd/project/eii-6300/orig-sdk/sdk/jetson_thor/Linux_for_Tegra/u
nified_flash/out/bsp_images/flash_workspace/flash-images
[flash_bsp_jetson-t264_die0]: [executeShellCommand(163)] :
EXITCODE=0

[flash_bsp_jetson-t264_die0]: [AdbShell(325)] : EXITCODE = 0
[flash_bsp_jetson-t264_die0]: [resizeFilesystem(904)] : done

```

```
[flash_bsp_jetson-t264_die0]: [FlashImages(3237)] : flashExcept return code -
None

[flash_bsp_jetson-t264_die0]: [flashFirmware(343)] :      in flashFirmware
[flash_bsp_jetson-t264_die0]: [flashFirmware(354)] :  This is a 14t Run,
Skipping FW flashing

[flash_bsp_jetson-t264]: start time  = 1765882725.555917
[flash_bsp_jetson-t264]: end time  = 1765883552.310996
[flash_bsp_jetson-t264]: Total Time = 826.7550790309906
[flash_bsp_jetson-t264]: Image Flashing took 826.7550790309906
[flash_bsp_jetson-t264]: Flashing finished Successfully!!

~/ssd/project/eii-6300/orig-sdk/sdk/jetson_thor/Linux_for_Tegra

Flashing finish

Cleaning up...

Keeping working dir at
/home/xusan/ssd/project/eii-6300/orig-sdk/sdk/jetson_thor/Linux_for_Tegra/t
emp_initrdflash/bootloader0 and /tmp/tmp.YBXea07POU

Log is saved to Linux_for_Tegra/initrdlog/flash_1-10_0_20251216-185845.log
```

2.9.5 Brush machine abnormal resolution

- Confirm that the box has entered the flashing mode.
- The host system to be burned must be ubuntu18.04 or ubuntu20.04, and it cannot be a virtual machine system. Virtual machines may have compatibility or stability issues with USB drivers, which could cause abnormal interruptions during the burning process.
- The time from entering recovery to the completion of system flashing should not exceed 30 minutes; otherwise, it will trigger the mcu dog feeding timeout, causing the machine to restart.
- During the firmware burning process, do not run adb command operations in other terminals; otherwise, it will cause the burning to be interrupted.
- Check if the machine fan is working properly. If it doesn't rotate, the machine may restart due to overheating of the som.
- Check if the Type-C port being burned is securely connected. During the burning process, if the Type-C cable shakes, it may cause abnormal burning.

2.10 Capture the serial port log

When the device fails to enter the system after being powered on, it may involve capturing the serial port log to analyze the cause of the anomaly. Please refer to the content of "DEBUG Port Mode" in the "Software Debugging" section to collect the logs of serial port output.

Appendix

FAQ

- How to install pytorch in Jetpack7?

Answer: Install docker through the following shell script, and then install the docker image provided by Nvidia officially. The image is already pre-installed with pytorch.

More Nvidia official test data refer to (https://elinux.org/Jetson/L4T/Jetson_AI_Stack#Stress_Test)

```
#!/bin/bash

set -e

sudo apt-get update

sudo apt-get install -y ca-certificates curl

sudo install -m 0755 -d /etc/apt/keyrings

sudo curl -fsSL https://download.docker.com/linux/ubuntu/gpg -o /etc/apt/keyrings/docker.asc

sudo chmod a+r /etc/apt/keyrings/docker.asc

echo \

"deb [arch=$(dpkg --print-architecture) signed-by=/etc/apt/keyrings/docker.asc] https://download.docker.com/linux/ubuntu
\

$(. /etc/os-release && echo "${UBUNTU_CODENAME:-$VERSION_CODENAME}" ) stable" | \

sudo tee /etc/apt/sources.list.d/docker.list > /dev/null

sudo apt-get update

sudo apt-get install -y docker-ce docker-ce-cli containerd.io docker-buildx-plugin docker-compose-plugin

# nvidia-container

curl -fsSL https://nvidia.github.io/libnvidia-container/gpgkey | sudo gpg --dearmor -o
/usr/share/keyrings/nvidia-container-toolkit-keyring.gpg \
```

```
&& curl -s -L https://nvidia.github.io/libnvidia-container/stable/deb/nvidia-container-toolkit.list | \
sed 's#deb https://#deb [signed-by=/usr/share/keyrings/nvidia-container-toolkit-keyring.gpg] https://#g' | \
sudo tee /etc/apt/sources.list.d/nvidia-container-toolkit.list

sudo apt-get update

sudo apt install -y jq

jq -n --indent 4 '{"runtimes": {"nvidia": {"args": [], "path": "nvidia-container-runtime"}}}' > daemon.json && \
sudo mv daemon.json /etc/docker/daemon.json

sudo systemctl daemon-reload && sudo systemctl restart docker

sudo usermod -aG docker $USER

newgrp docker

docker pull nvcr.io/nvidia/pytorch:25.09-py3

docker run --gpus all --ipc=host --ulimit memlock=-1 --ulimit stack=67108864 --runtime=nvidia -it --privileged 8cd4d4cfc0dd
/bin/bash
```

- How to maximize the power consumption of SOM?

Answer: Obtain the test files provided by our company: resnet50-v1-12.engine and start.sh, place them in the same directory of the A1BOX file system, and then run ./start.sh to start the load test, and then run sudo jtop to observe the changes in power consumption.



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