



AMR-S100 User Manual

Document revision 1

- 0 Introduction
- 1 System overview
- 2 Installation and wiring
- 3 Installed OS and default settings
- 4 Technical support port
- 5 Approved Part List for ordering

0. Introduction

- **General description**

AMR-S100 is an Edge AI Computing with NVIDIA Jetson AGX Orin dedicated to industrial environment.

Advantech's AMR-S100 offers a production-ready solution for companies transitioning NVIDIA Isaac Perceptor from prototype to production.

Additionally, Advantech's ROS 2 Suite enables remote control, hardware monitoring, security management, and more. Watch the video to learn more!

- **Features**

NVIDIA® Jetson AGX Orin SOM 32GB/64GB

Wide range DC power input (9 - 36 V)

-25 ~ 60°C operating temperature range

Supports 8 x GMSL cameras with Fakra-Z connectors

Pre-loaded Ubuntu 20.04 image, JetPack 6.0 SDK

IEC 61000-6-2 / IEC 61000-6-4 Certificate

- **Clarification of Notation Note:**

This type of paragraph calls the reader's attention to a notice or related theme.

IMPORTANT: This type of paragraph highlights a procedure, adjustment etc., which can cause a damage or improper function of the equipment if not performed correctly and may not be clear at first sight.

WARNING: This type of paragraph highlights a procedure, adjustment etc., which can cause a damage or improper function of the equipment if not performed correctly and may not be clear at first sight.

Example: This type of paragraph contains information that is used to illustrate how a specific function works.

- **About this guide**

This manual contains important instructions about AMR-S100 that shall be fulfilled during the installation and maintenance. This manual provides general information how to install and use AMR-S100.

- **Certifications Declaration of Conformity**

CE

The product(s) described in this manual complies with all applicable European Union (CE) directives if it will have a CE marking. For computer systems to remain CE compliant, only CE-compliant parts may be used. Maintaining CE compliance also requires proper cable and cabling techniques.

FCC

This product will comply with FCC Part15B, Class A.

This device complies with requirements in part 15 of the FCC rules. Operation is subject to the following two conditions:

- (1) This device may not cause harmful interference. And
- (2) This device must accept any interference received, including interference that may cause undesired operation.

UL

This product will be Listed by UL. Representative samples of this product have been evaluated by UL and meet applicable safety standards.

CAUTION! To prevent shock, do not remove cover. No user serviceable parts inside. Refer servicing to qualified personnel.

This product is intended to be supplied by a Listed Power Adapter, rated 9-36Vdc, 230W Max and -25~60 degree C minimum and LPS, if need further assistance, please contact ADVANTECH CO LTD for further information.

The product intended for vertical use only.

1. System Overview

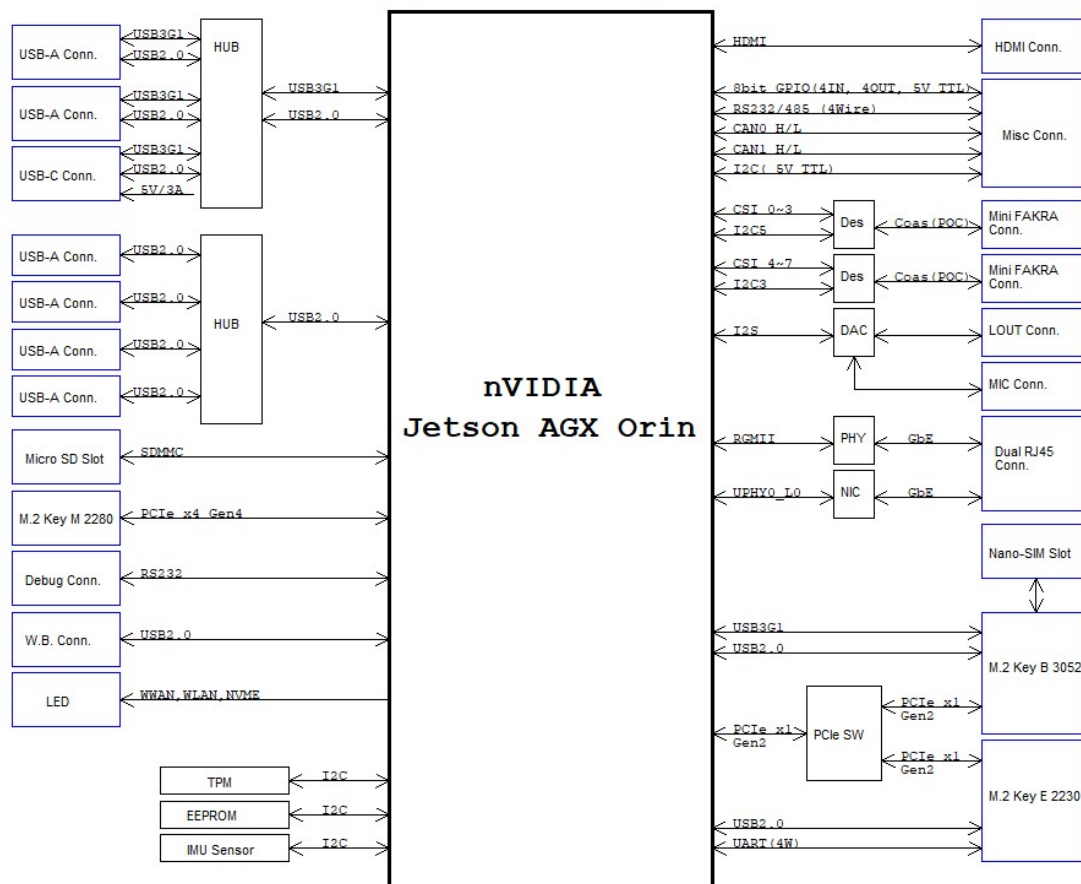
- Hardware specification

Model no.	Items	DMS-SR24-00A1	DMS-SR24-00A2
NVIDIA Jetson Module	NVIDIA Jetson Series	Jetson AGX Orin 32GB	Jetson AGX Orin 64GB
	CPU	8-core Arm® Cortex®-A78AE v8.2 64-bit CPU 2MB L2 + 4MB L3	12-core Arm® Cortex®-A78AE v8.2 64-bit CPU 3MB L2 + 6MB L3
	CPU Max Frequency	2.2 GHz	2.2 GHz
	GPU	1792-core NVIDIA ampere architecture GPU with 56 tensor cores	2048-core NVIDIA ampere architecture GPU with 64 tensor cores
	GPU Max Frequency	930MHz	1.3 GHz
	AI Performance	200 TOPS	275 TOPS
	Module Power	15 - 40 W	15W - 60W
	Built-in Memory	32GB 256-bit LPDDR5,204.8GB/s	64GB 256-bit LPDDR5, 204.8GB/s
	Built-in Storage	64GB eMMC 5.1	
Others	TPM 2.0	ST/ST33HTPH2E32	
Sensors	6-Axis Sensor (IMU)	Bosch BMI088 (on GMSL board) or ST_ISM330DLC (on carrier board)	
	Magnetometer	Bosch BMM350 (on GMSL board)	
	Barometer	Bosch BMP 390 (on GMSL board)	
BSP	OS	JetPack 6.0	
I/O	Power Switch	1 x Power ON/OFF Button	
	USB	2 x USB 3.2 Type A + 1 x USB 3.2 Type C,4 x USB 2.0	
	OTG USB (Internal)	1 x Micro USB	
	Serial	RS-232/485 (4 wires)	Optional: 2 x RS-232/485(4 Wires)
	GPIO	5V TTL level 4 x DI, 4 x DO (default)	
	CAN Bus	2 x CAN	
	I2C	1 x I2C	
	Display	1 x HDMI	
	GMSL Camera Support	Support 8 ports GMSL cameras by 2 x mini Fakra-Z connectors Reserve connector (CSI interface) for GMSL board	
	GMSL Deserializer IC	MAX96712B	
	Audio	Line-out; mic-in	
	Ethernet	2 x Gigabit Ethernet (10/100/1000 Mbps), one port supports PTP	
Expansion	LTE (WWAN)	1 x M.2 3052 B-Key with SIM slot	
	WLAN	1 x M.2 2230 E-Key	
	Storage	1 x MicroSD slot	
		1 x M.2 2280 M-Key (NVMe, PCIe x4 GEN 4)	
Power	Power Input	Supports DC in 9~36 V	

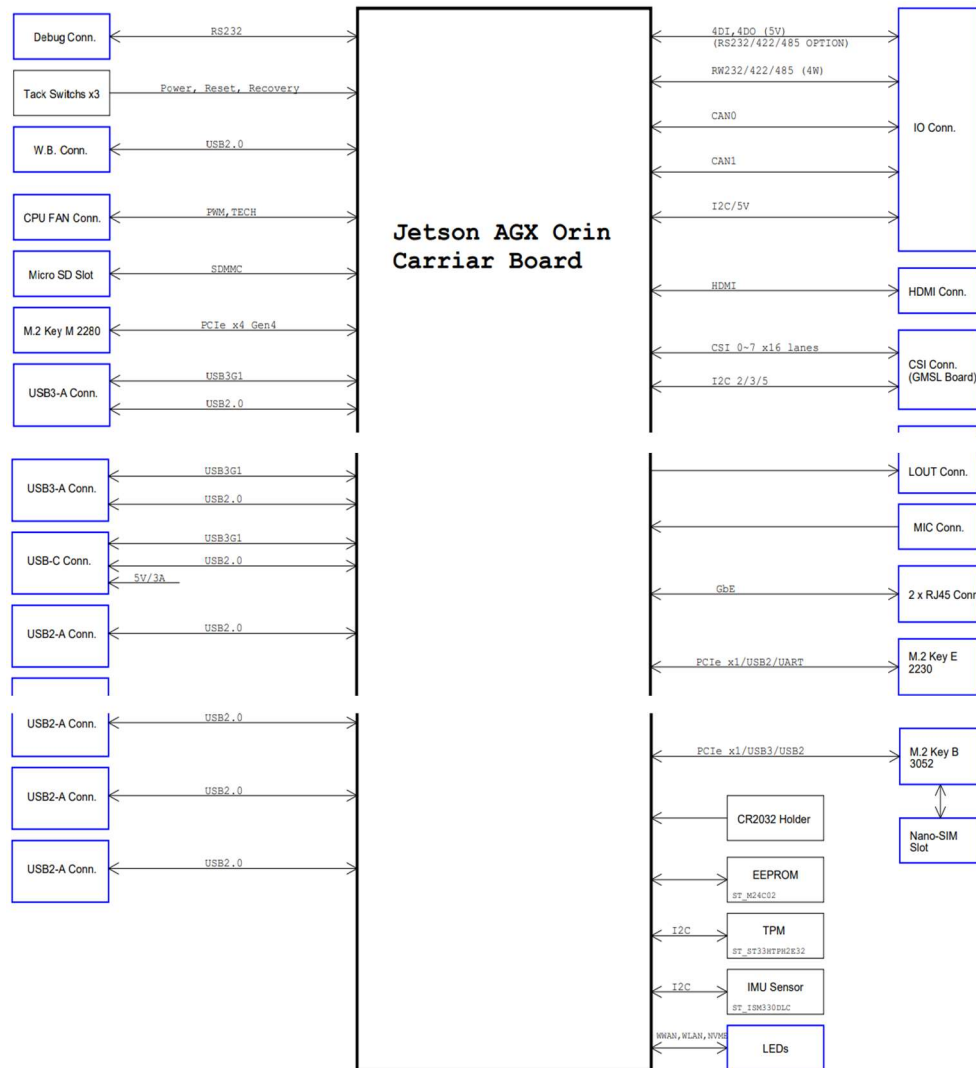
Model	Items	DMS-SR24-00A1	DMS-SR24-00A2
LED	LED Indicator	1 x power, 1 x storage, 1 x Wi-Fi, 1 x WWAN	
Environment	Operating Temperature	-25 ~ 60°C (50°C with Wi-Fi/LTE)	
	Storage Temperature	-40 ~ 70°C	
	Humidity	95%RH @ 40°C (non-condensing)	
	Shock	IEC 60068-2-27:2008 testing procedures Operating: Half sine wave 30G 11ms	
	Vibration	IEC 60068-2-64:2008 testing procedures Operating: 3Grms @ 5 ~ 500Hz	
Mechanical	Dimensions (W x L x H)	195 x 156.85 x 78 mm (tolerance:±1mm)	
	Weight	3.7 kg with packing	
	Mounting	Wall mount by mounting bracket	
Certifications	EMC	CE,FCC part 15B Class A EN IEC 61000-6-2;EN IEC 61000-6-4 EN 55032 (EMI for ITE) ;EN 55035 (EMC for ITE)	
	Safety	UL 62368-1 3rd CB IEC 62368-1 3rd CE LVD EN 62368-1 2 nd Compliance with IEC 61010-1	

- System Block Diagram

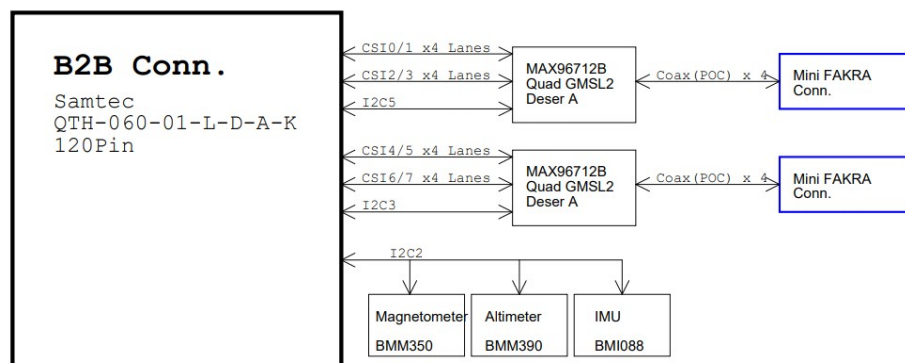
System Block Diagram



- Carrier Board Block Diagram



- GMLS Board Block Diagram



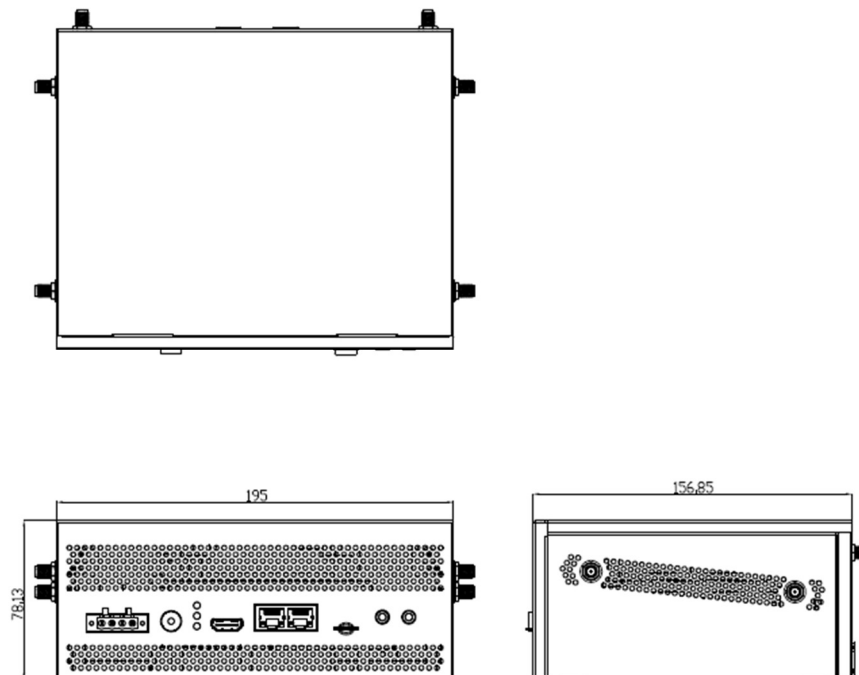
- Outlook and Dimension

-Top view (Font/Rear)

-Bottom view

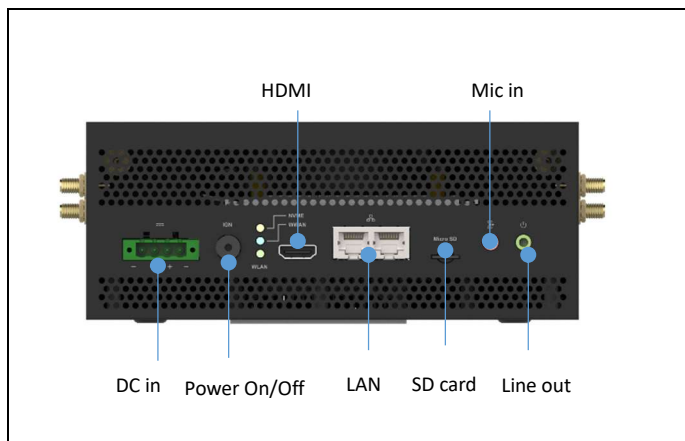


-Dimension



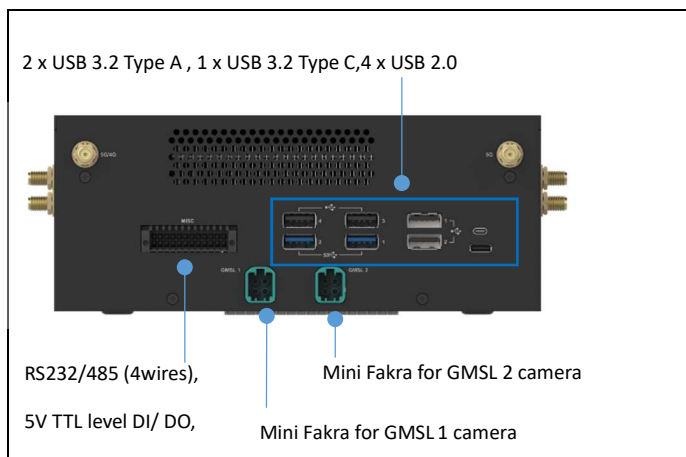
2. Installation and wiring

- Front View



No.	Interface output Name	Description
1	DC Power Input	4-pin DC power input terminal for DC +9~36V Pin 1: - Pin 2: + Pin 3: + Pin 4: -
2	Power on/off	1x Power Switch
3	LED indicator x 4	1x NVMe 1x WWAN 1x WLAN 1x Power
4	HDMI	1x HDMI
5	LAN 1	1x GbE LAN RJ-45
6	LAN 2	1x GbE LAN RJ-45
7	SD card	1x Micro SD Card
8	Mic in	1x Mic in connector
9	Line out	1x Line out connector

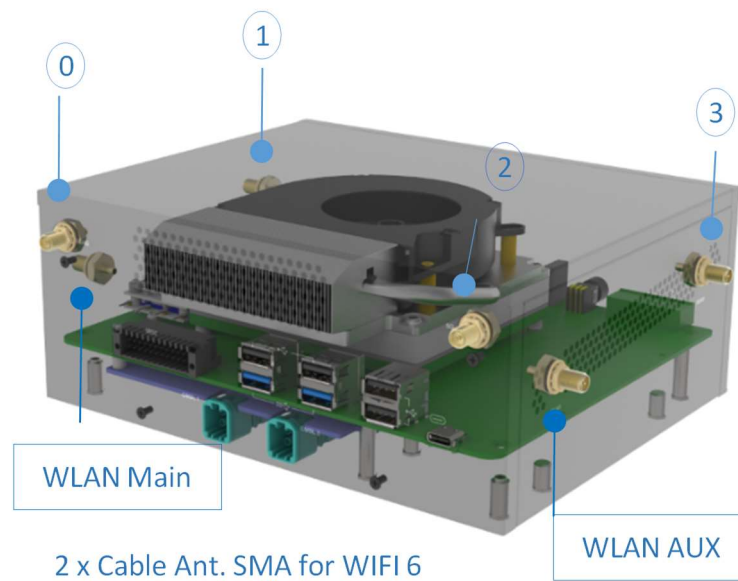
- Rear View



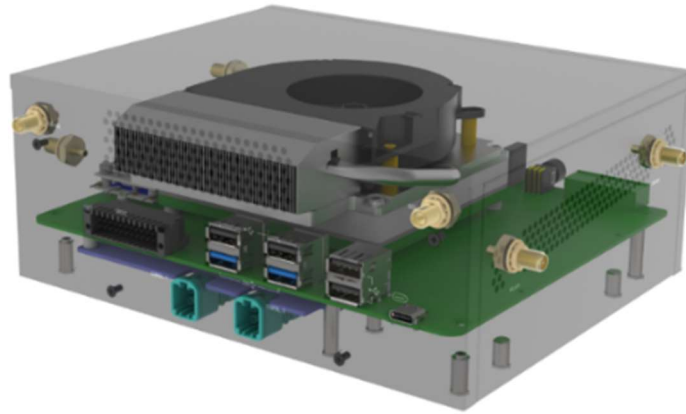
No.	Interface output Name	Description
1	Miscellaneous IO	1x RS232/RS485 (4 w/5V TTL), 8bit GPIO, 2x CAN, I2C(5V)
2	Mini Fakra 1	for GMLS camera 1x4 GMSL cameras
3	Mini Fakra 2	for GMLS camera 1x4 GMSL cameras
4	USB 2.0	USB 2.0 Type A
5	USB 2.0	USB 2.0 Type A
6	USB 2.0	USB 2.0 Type A
7	USB 2.0	USB 2.0 Type A
8	USB 3.2	USB 3.2 Type A
9	USB 3.2	USB 3.2 Type A
10	USB 3.2	USB 3.2 Type C

- RF and wiring

4 x Cable Ant. SMA for 5G



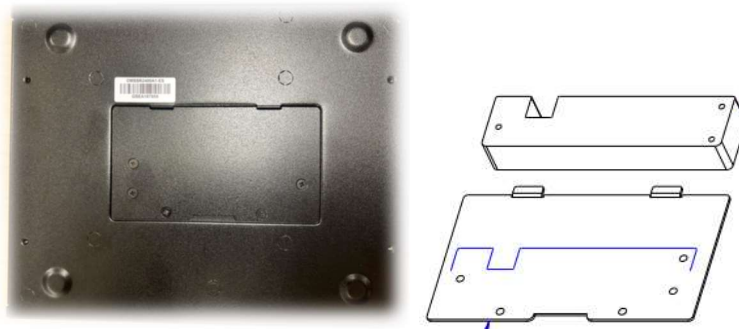
- Thermal Solution



- 5000 RPM CPU Fansink,
- Shock 50G 6ms

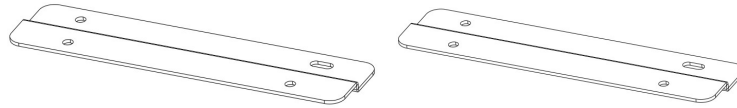
- Storage expansion

- Open the door at bottom chassis to insert NVMe SSD with heatsink



- Mounting kit

- Wall mount plate * 2 pcs



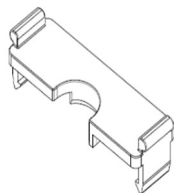
- Screw * 4 pcs for wall mount plate



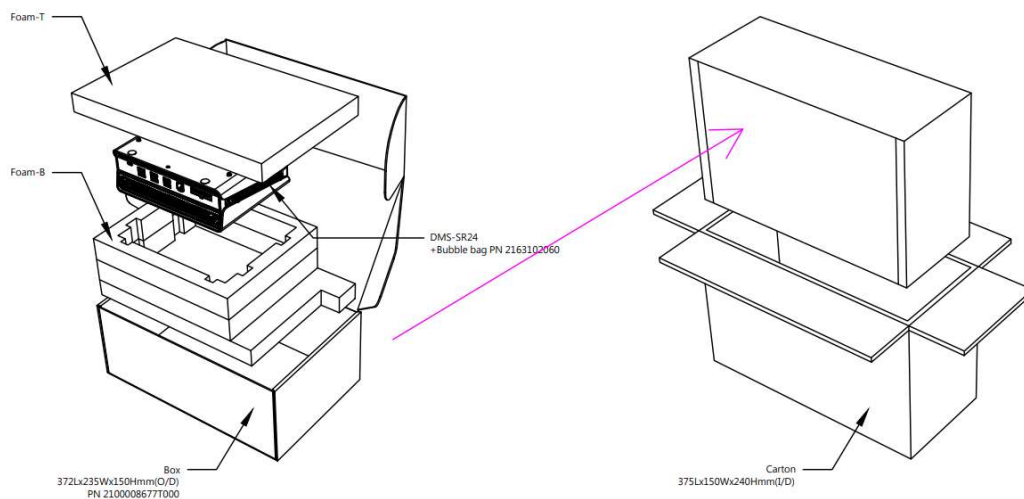
- 5G clip * 1 pcs



- WiFi clip * 1 pcs



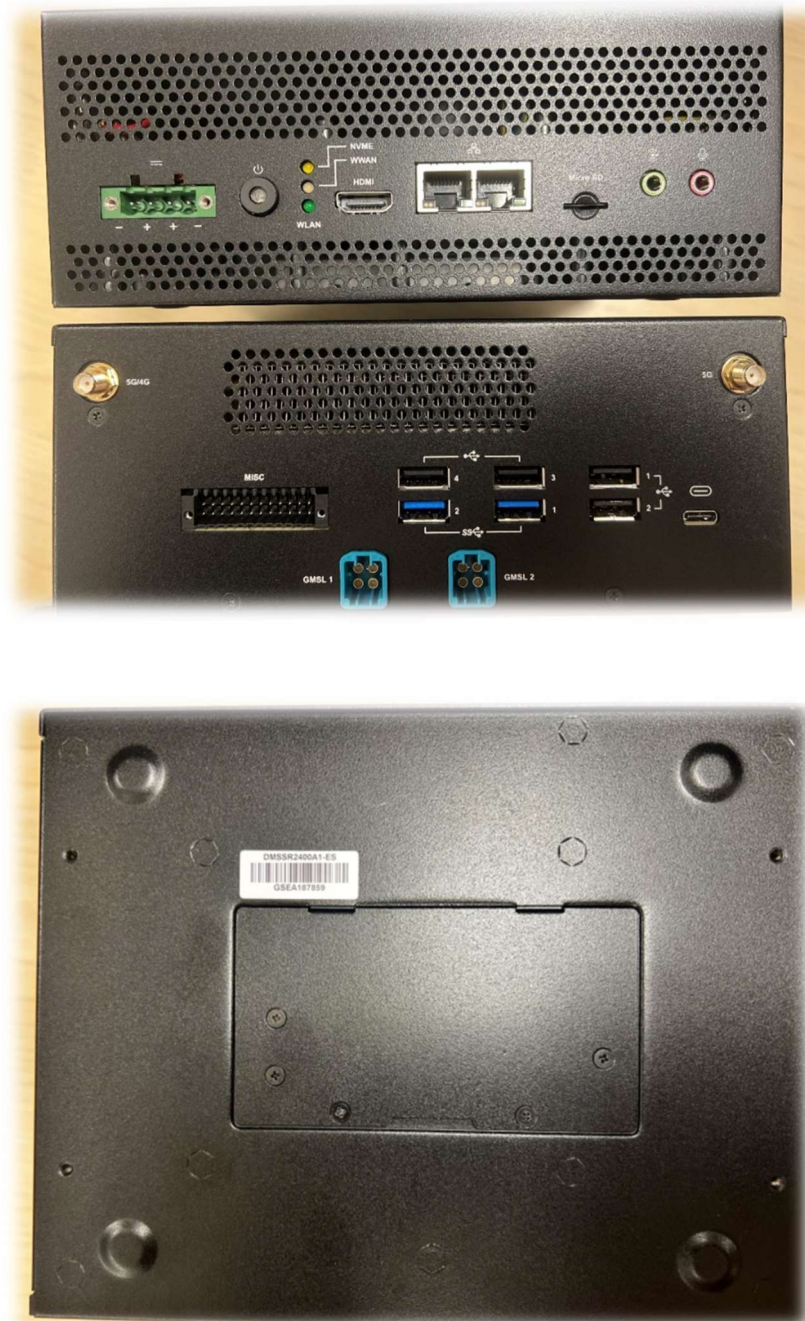
- Packing exploration



3. Installed OS and default settings

The following is installed on AMR-S100

Sample Photo



OS information

```

=====
-- -- --
-- -- --
=====
OS: Ubuntu 22.04 jammy
Kernel: aarch64 Linux 5.15.136-tegra
Uptime: 42m
Shell: bash 5.1.16
Disk: 20G / 54G (38%)
CPU: ARM Cortex-A78AE @ 12x 2.2016GHz
GPU: Orin (nvgpu)
RAM: 2859MiB / 62841MiB
Nova Config: hawk-4_owl-4
Nova Version: 1.3.1
Jetpack: 6.0+b106
=====

```

RTC

```

root@localhost:/home/ubuntu# hwclock -r
1970-01-02 18:47:12.425282+00:00

```

Micro SD

```

mmcblk1 179:96 0 29.7G 0 disk
├─mmcblk1p1 179:97 0 128M 0 part /media/ubuntu/boot
├─mmcblk1p2 179:98 0 28.8G 0 part /media/ubuntu/rootfs
├─mmcblk1p3 179:99 0 48M 0 part
├─mmcblk1p4 179:100 0 1K 0 part
├─mmcblk1p5 179:101 0 8M 0 part /media/ubuntu/misc
└─mmcblk1p6 179:102 0 768M 0 part /media/ubuntu/cache

```

EEPROM

```

root@localhost:/home/ubuntu# i2cdetect -y -r 0
 0  1  2  3  4  5  6  7  8  9  a  b  c  d  e  f
00: -- -- -- -- -- -- -- -- -- -- -- -- -- --
10: -- -- -- -- -- -- -- -- -- -- -- -- -- --
20: -- -- -- -- -- -- -- -- -- -- -- -- 2e --
30: -- -- -- -- -- -- -- -- -- -- -- -- -- --
40: -- -- -- -- -- -- -- -- -- -- -- -- -- --
50: UU -- -- -- -- -- -- 57 -- -- -- -- -- --
60: -- -- -- -- -- -- -- -- -- -- -- -- -- --
70: -- -- -- -- -- -- -- -- -- -- -- -- -- --
root@localhost:/home/ubuntu# i2cset -y -f 0 0x57 0x44 0x55
root@localhost:/home/ubuntu# i2cget -y -f 0 0x57 0x44
0x55
root@localhost:/home/ubuntu#

```

IMU sensor

```

root@localhost:/home/ubuntu# i2cdetect -y -r 7
 0  1  2  3  4  5  6  7  8  9  a  b  c  d  e  f
00: -- -- -- -- -- -- -- -- -- -- -- -- -- --
10: -- -- -- -- -- -- -- -- -- -- -- -- -- --
20: -- -- -- -- -- -- -- -- -- -- -- -- -- --
30: -- -- -- -- -- -- -- -- -- -- -- -- -- --
40: -- -- -- -- -- -- -- -- -- -- -- -- -- --
50: -- -- -- -- -- -- -- -- -- -- -- -- -- --
60: -- -- -- -- -- -- -- -- 6b -- -- -- -- --
70: -- -- -- -- -- -- -- -- -- -- -- -- -- --

```

LAN, eth0/ eth1

```
root@localhost:/home/ubuntu# ifconfig
eth0: flags=4099<UP,BROADCAST,MULTICAST> mtu 1466
    ether 3c:6d:66:0c:19:13 txqueuelen 1000 (Ethernet)
    RX packets 0 bytes 0 (0.0 B)
    RX errors 0 dropped 0 overruns 0 frame 0
    TX packets 0 bytes 0 (0.0 B)
    TX errors 0 dropped 0 overruns 0 carrier 0 collisions 0

eth1: flags=4099<UP,BROADCAST,MULTICAST> mtu 1500
    ether 00:00:00:00:00:05 txqueuelen 1000 (Ethernet)
    RX packets 0 bytes 0 (0.0 B)
    RX errors 0 dropped 0 overruns 0 frame 0
    TX packets 0 bytes 0 (0.0 B)
    TX errors 0 dropped 0 overruns 0 carrier 0 collisions 0
    device interrupt 32 base 0xd000

lo: flags=73<UP,LOOPBACK,RUNNING> mtu 65536
    inet 127.0.0.1 netmask 255.0.0.0
    inet6 ::1 prefixlen 128 scopeid 0x10<host>
    loop txqueuelen 1000 (Local Loopback)
    RX packets 781 bytes 55439 (55.4 KB)
    RX errors 0 dropped 0 overruns 0 frame 0
    TX packets 781 bytes 55439 (55.4 KB)
    TX errors 0 dropped 0 overruns 0 carrier 0 collisions 0
```

UART1

```
root@localhost:/home/ubuntu# stty -F /dev/ttyTHS1 speed 115200 raw -echo
9600
root@localhost:/home/ubuntu# cat /dev/ttyTHS1 &
[1] 9858
root@localhost:/home/ubuntu# echo "1234" > /dev/ttyTHS1
root@localhost:/home/ubuntu# 1234
```

CAN0/1

```
root@localhost:/home/ubuntu# modprobe can
root@localhost:/home/ubuntu# modprobe can-dev
root@localhost:/home/ubuntu# modprobe mttcan
root@localhost:/home/ubuntu# ip link set can0 type can bitrate 500000
root@localhost:/home/ubuntu# ip link set can0 up
root@localhost:/home/ubuntu# ip link set can1 type can bitrate 500000
root@localhost:/home/ubuntu# ip link set can1 up
root@localhost:/home/ubuntu# candump can1 &
[2] 15190
root@localhost:/home/ubuntu# cansend can0 123#abcdabcd
root@localhost:/home/ubuntu#   can1 123   [4] AB CD AB CD

root@localhost:/home/ubuntu# candump can0 &
[3] 15936
root@localhost:/home/ubuntu# cansend can1 123#abcdabcd
root@localhost:/home/ubuntu#   can1 123   [4] AB CD AB CD
    can0 123   [4] AB CD AB CD
```

I2C2 / detect 3f

```
root@localhost:/home/ubuntu# i2cdetect -y -r 1
    0  1  2  3  4  5  6  7  8  9  a  b  c  d  e  f
00:  --  --  --  --  --  --  --  --  --  --  --  --  --  --  --
10:  --  --  --  --  --  --  --  --  18  --  --  --  --  --  --
20:  --  --  --  --  --  --  --  --  --  --  --  --  --  --  --
30:  --  --  --  --  --  --  --  --  --  --  --  --  --  3f  --
40:  UU  UU  --  --  --  --  --  --  --  --  --  --  --  --  --
50:  50  --  --  --  --  --  --  --  --  --  --  --  --  --  --
60:  --  --  --  --  --  --  --  --  UU  --  --  --  --  --  --
70:  --  --  --  --  --  --  76  --  --  --  --  --  --  --  --
root@localhost:/home/ubuntu#
```

TPM 2.0 / detect 2e

```
root@localhost:/home/ubuntu# i2cdetect -y -r 0
    0  1  2  3  4  5  6  7  8  9  a  b  c  d  e  f
00:  --  --  --  --  --  --  --  --  --  --  --  --  --  --  --  --
10:  --  --  --  --  --  --  --  --  --  --  --  --  --  --  --  --
20:  --  --  --  --  --  --  --  --  --  --  --  --  --  2e  --  --
30:  --  --  --  --  --  --  --  --  --  --  --  --  --  --  --  --
40:  --  --  --  --  --  --  --  --  --  --  --  --  --  --  --  --
50: UU  --  --  --  --  --  57  --  --  --  --  --  --  --  --  --  --
60:  --  --  --  --  --  --  --  --  --  --  --  --  --  --  --  --
70:  --  --  --  --  --  --  --  --  --  --  --  --  --  --  --  --
root@localhost:/home/ubuntu#
```

I2C_GPIO

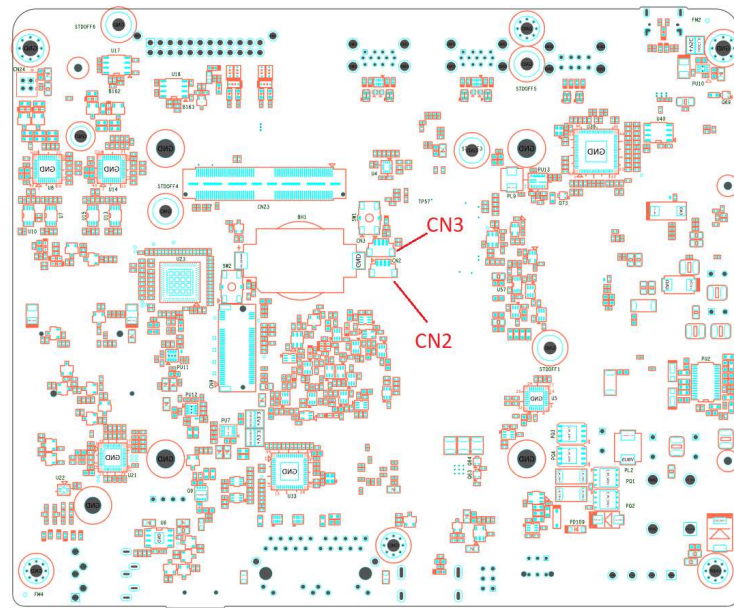
```
root@localhost:/home/ubuntu# i2cset -y -f 8 0x20 0x07 0xf0
root@localhost:/home/ubuntu# i2cset -y -f 8 0x20 0x03 0x0f
root@localhost:/home/ubuntu# i2cget -y -f 8 0x20 0x01
0xff
root@localhost:/home/ubuntu# i2cset -y -f 8 0x20 0x03 0x00
root@localhost:/home/ubuntu# i2cget -y -f 8 0x20 0x01
0x00
```

AUDIO

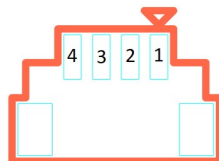
```
numid=1298,iface=MIXER,name='CVB-RT LOUT MIX DAC L1 Switch'X DAC L1 Switch" "on"
; type=BOOLEAN,access=rw-----,values=1me="CVB-RT LOUT MIX DAC L1 Switch" "on"
numid=1299,iface=MIXER,name='CVB-RT LOUT MIX DAC R1 Switch'X DAC R1 Switch" "on"
; type=BOOLEAN,access=rw-----,values=1me="CVB-RT LOUT MIX DAC R1 Switch" "on"
; values=on
ubuntu@localhost:~$ amixer cset name="CVB-RT RECMIXL BST1 Switch" 1
numid=1242,iface=MIXER,name='CVB-RT RECMIXL BST1 Switch'
; type=BOOLEAN,access=rw-----,values=1
; values=on
ubuntu@localhost:~$ amixer cset name="CVB-RT RECMIXR BST1 Switch" 1
numid=1248,iface=MIXER,name='CVB-RT RECMIXR BST1 Switch'
; type=BOOLEAN,access=rw-----,values=1
; values=on
ubuntu@localhost:~$ amixer cset name="CVB-RT RECMIXL BST2 Switch" 1
numid=1241,iface=MIXER,name='CVB-RT RECMIXL BST2 Switch'
; type=BOOLEAN,access=rw-----,values=1
; values=on
ubuntu@localhost:~$ amixer cset name="CVB-RT RECMIXR BST2 Switch" 1
numid=1247,iface=MIXER,name='CVB-RT RECMIXR BST2 Switch'
; type=BOOLEAN,access=rw-----,values=1
; values=on
ubuntu@localhost:~$ arecord -f cd -D hw:1 -d 5 test.wav
Recording WAVE 'test.wav' : Signed 16 bit Little Endian, Rate 44100 Hz, Stereo
ubuntu@localhost:~$ aplay -D hw:1,0 test.wav
```

4. Technical support port

- Location CN2, CN3, CN6 on carrier board

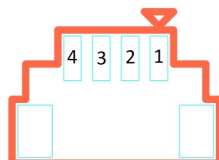


- OTG USB (CN3)



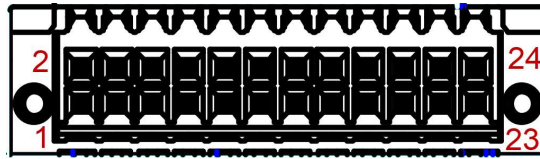
PIN	Descript
1	+V5
2	D-
3	D+
4	GND

- Debug console RS-232 (CN2)



PIN	Descript
1	-
2	GND
3	TX
4	RX

- Miscellaneous IO (CN6)



PIN	Descript		PIN	Descript
1	CAN0 H		2	CAN1 H
3	CAN0 L		4	CAN1 L
5	GND		6	GND
7	I2C2 SCL **		8	GND
9	I2C2 SDA **		10	GPIO 7 (IN) *
11	+V5		12	GPIO 6 (IN) *
13	X	TX#(RS485)	14	GPIO 5 (IN) *
15	COM0 TX (RS232)**	TX(RS485)	16	GPIO 4 (IN) *
17	COM0 RX (RS232)**	RX(RS485)	18	GPIO 3 (OUT) *
19	X	RX#(RS485)	20	GPIO 2 (OUT) *
21	COM0 CTS(RS232)**	X	22	GPIO 1 (OUT) *
23	COM0 RTS(RS232)**	X	24	GPIO 0 (OUT) *

* GPIO0~7 TTL +5V level, Default GPIO0~3 output, GPIO4~7 input.

** COM0 Support RS232/485, default RS232.

*** I2C2 +5V level.

5.Approved Part List for ordering

- Power supply and cables

Power Adaptor & Power Cord	
Part Number	Description
96PSA-A230W24P4-3	AC/DC adapter, DC 24 V 230 W, -20 ~ 60°C
1702002600	Power cable 3-pin 183 cm, (USA)
1702002605	Power cable 3-pin 183 cm, (EU)
1702031801	Power cable 3-pin 183 cm, (UK)
1700029019-01	Power cable 3-pin 180 cm, PSE / BSMI

- M.2 2280 NVME SSD

M.2 2280 NVME SSD	
Part Number	Description
SQF-C8MV4-480GDEEE	SQF 930-D NVMe M.2 2280 SSD (OPAL) 480G 3D TLC (BiCS5) (-40~85°C)
96FD80-P512-TS	KIOXIA 512GB PCI-E SSD TLC 0~70°C
SQF-C8MV2-512GDEFE	SQF 730-D 512G 3D TLC BiCS5 (-40~85°C)
SQF-C8MV4-2TDEDM	SQF 720-D PCIe/NVMe Gen.3 M.2 2280 OPAL 2T 3D TLC BiCS5 (-20~85°C)
SQF-C8MV4-2TDEDE	SQF 720-D PCIe/NVMe Gen.3 M.2 2280 OPAL 2T 3D TLC BiCS5 (-40~85°C)
SQF-C8MV4-2TDEFM	SQF 730-D PCIe/NVMe Gen.4 M.2 2280 OPAL 2T 3D TLC BiCS5 (-20~85°C)

- M.2 2230 E key WiFi module & Antenna

M.2 2230 E key WiFi module & Antenna	
Part Number	Description
968DD00377	WiFi 6 + BT (RTL8852BE) -30~75°C
1751000342-01	Antenna for WiFi, 2pcs per unit (WLAN)
AIW-170BQ	Wi-Fi 6E+BT 5.3 (WCN6856) -40 ~ 85°C

- M.2 3052 B key LTE module & Antenna

Part Number	Description
AIW-356DQ-N01	5G Sub6+GNSS M.2 3052 Key B, USB only (USA) normal - 30~75°C extend -40 ~ 85°C
AIW-356DQ-E01	5G Sub6+GNSS M.2 3052 Key B, USB only (EU) normal - 30~75°C extend -40 ~ 85°C
AIW-356DQ-JK1	5G Sub6+GNSS M.2 3052 Key B, USB only (JP) normal - 30~75°C extend -40 ~ 85°C
AIW-356DQ-C01	5G Sub6+GNSS M.2 3052 Key B, USB only (China) normal - 30~75°C extend -40 ~ 85°C
AIW-357DK-G2U	5G Sub6+GNSS M.2 3052 Key B, USB only (Global) normal - 30~75°C extend -40 ~ 85°C
1750009372-01	Antenna for 5G, 4pcs per unit No. 0 ~4 (WWAN)