

MS-C9ZA
Personal Computer
User Guide

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Preface

Disclaimer

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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, with the click [here](#). For more contact information, you may find it in the section of MSI Global Offices.

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Revision History

Revision	Date	Updates
V1	Aug 04, 2026	1 st Released

Product Warranty

Please refer to [Support | Warranty And Rma Services | MSI](#)

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ESD Warning

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

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.

Safety Precaution:

1. All cautions and warnings on the device should be noted.
2. For safety consideration, do NOT open the device if not a qualified service staff.
3. Place the device on a solid surface during installation to prevent falls.
4. Keep the device away from humidity.
5. Do NOT leave this device in an un-controlled environment with temperatures beyond the device's permitted storage temperature to avoid damage.
6. All adaptors and cables supplied by MSI are verified. Do NOT use any others not supplied by MSI to avoid any malfunction or fires.
7. Make sure the power source matches the power rating of the device.
8. Place the power cord where people cannot step on it. Do not put anything on the power cord.
9. Always completely disconnect the power while the device is not usage or idle for a long time.
10. Disconnect the device from any AC supply before cleaning. While cleaning, use a damp cloth instead of liquid or spray detergents.
11. Make sure the device is installed near a power outlet and easy for accessible.

12. Do not cover the openings on the device to ensure optimal heat dissipation.
13. Watch out the heatsink or heat spreader of the device when the system is running.
14. Never pour any liquid into the openings. This could cause fire or electric shock.
15. The static electricity should be noted while installing any internal components. Consider to use a grounding wrist strap and put all electronic parts in static-shielded containers.

If the following situations occur, please contact our service personnel:

- (1) The device is dropped or damaged
- (2) Damaged power cord or plug
- (3) Exposure to moisture
- (4) Liquid intrusion into the device
- (5) Any obvious signs of damage displayed on the device
- (6) Device is not working as expected or in a manner as described in this manual

1.0 Introduction

C9ZA provide HDMI video output, two USB 3.2 ports, two GbE RJ-45 ports 20-pin expansion header, and one USB 2.0 type C port for recovery.

1.1 Product Specifications

Model	C9ZA	
Type	Carrier board	
NVIDIA GPU SoC Module Compatibility	NVIDIA® Jetson Orin NX module NVIDIA® Jetson Orin NANO module	
Networking	2x GbE RJ-45 (Option PoE x1) 1xM.2. key E 2230 for Wi-Fi	
Display Output	1x HDMI 4Kp60 for Orin NX 1x HDMI 4Kp30 for Orin Nano	
Temperature	Operating temperature: -40°C~85°C Storage temperature -40°C~85°C Relative humidity 40°C @ 95%, Non-Condensing	
MIPI Camera Inputs	2x 4 lane MIPI CSI-2, 22 pin FPC 0.5mm Pitch Connector	
USB	2x USB 3.2 Type-A 1x USB 2.0 type C for recovery	
Storage	1x M.2 key M 2280 for SSD	
Misc	20 pins: 2x I2C, 2x UART, 4x GPIOs, 1xCAN TPM2.0	
Expansion	802.3AF PSE board(optional) OOB board(optional) 5G Daughter Board(optional)	
Power requirement	Voltage	DC 12~24V
	Current	DC IN Jack on board: 10A Max
		ATX 4pin: 10A Max
Power Cord	US/JP/EU/UK/TW/AU/CN power cord (optional)	
Fan Module	Heat sink with fan (optional)	
Buttons	Power and Recovery	
RTC Battery	Support RTC battery and Battery Life Monitoring by MCU	
Dimensions	W:120mm x L:90mm; Weight: 125 g	
Certifications	CE, FCC, VCCI, KC (TBD)	

Model	C9ZASOXP/C9ZASONP
Type	BOX PC
NVIDIA GPU SoC Module Compatibility	NVIDIA® Jetson Orin NANO module

Networking	2x GbE RJ-45 (Option PoE x1) 1xM.2. key E 2230 for Wi-Fi	
Display Output	1x HDMI 4Kp30 for Orin Nano	
Temperature	Operating temperature: -25°C~60°C Storage temperature -40°C~85°C Relative humidity 40°C @ 95%, Non-Condensing	
MIPI Camera Inputs	2x 4 lane MIPI CSI-2, 22 pin FPC 0.5mm Pitch Connector	
USB	2x USB 3.2 Type-A 1x USB 2.0 type C for recovery	
Storage	1x M.2 key M 2280 for SSD	
Misc	20 pins: 2x I2C, 2x UART, 4x GPIOs, 1xCAN TPM2.0	
Expansion	802.3AF PSE board(optional) OOB board(optional) 5G Daughter Board(optional)	
Power requirement	Voltage	DC 12~24V
	Current	DC IN Jack on board: 10A Max
		ATX 4pin: 10A Max
Power adapter/Power Cord	19V/4.73A adapter and US/JP/EU/UK/TW/AU/CN power cord (optional)	
Fan Module	Fanless solution	
Buttons	Power and Recovery	
RTC Battery	Support RTC battery and Battery Life Monitoring by MCU	
Dimensions	W:126mm x L:96mm x H:73.9mm (W:162mm with mounting ears); Weight: Around 1kg (Normal mode)	
Certifications	CE, FCC, VCCI, KC	

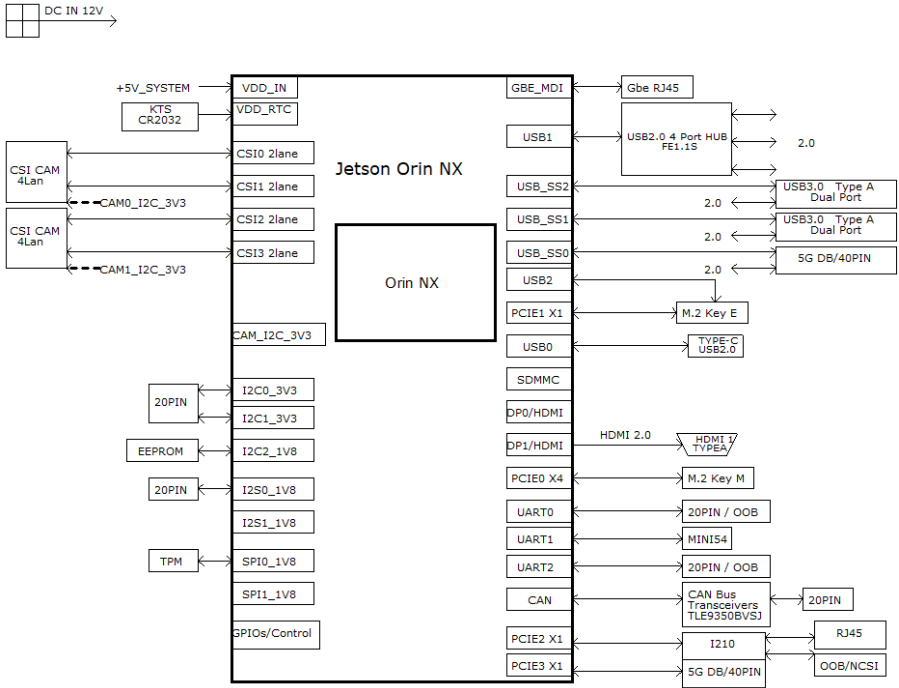
1.2 Accessory

Item	C9ZAS
------	-------

NVIDIA® Jetson	NVIDIA® Jetson Orin Nano
Power Cord	US
MIPI Camera (internal I/O)	● For 22 pin MIPI connector 1. raspberry pi imx219 & imx477 (V2) 2. Manufacturer: APPRO.PHO • B-04: IMX179(8M)MIPI, 1080P(30fps) • C-04: IMX290(2M)MIPI, 1080P(30fps) • C-05: IMX290(2M)+ISP(YUV), 1080P(30fps)

2.0 Product Overview

2.1 Block Diagram



2.2 Front View and Back View of BOX PC

Left view



Right view



Top view



Front view

Rear view





Bottom view



Other Switches and Jumpers

Other switches and jumpers listed on the boards but not mentioned in this manual are reserved for internal use by MSI. They are not open to the client application.

4.0 Installation

4.1 Let the JETSON Orin NANO initiate recovery mode

You have to keep pressing “Recovery” button and then power on the NVIDIA Jetson board to initiate recovery mode. When connecting a NVIDIA Jetson box to a Linux PC via a USB type-C to USB cable, you can check kernel messages with `dmesg` command in the Linux PC. Once you see these similar messages in the kernel messages, this means that the NVIDIA Jetson board is in the recovery mode.

```
[24685.229129] usb 1-7: Product: APX
```

```
[24685.229132] usb 1-7: Manufacturer: NVIDIA Corp
```

4.3 Using the commands below in the Linux PC to start re-flashing BSP

```
$ sudo tar zxvf <BSP_tarball_filename>.tar.gz
```

```
# where <BSP_tarball_filename> is the BSP tarball file name for your target device.
```

```
$ cd JetPack_xxx/Linux_for_Tegra
```

```
$ ./setup.sh
```

```
$ ./install.sh
```

Note: sudo is required to extract the BSP.

5.0 Software

This section describes BSP's features for C9ZA

1. Support optional M.2 WI-Fi/Bluetooth modules (Intel® Wi-Fi 6E AX210), the manager UI of AX210 Wi-Fi/Bluetooth is located on the upper-right corner of Ubuntu desktop. It can be also controlled by nmcli/hcitol uncommand line.
2. Power Mode Power mode can be modified by the UI on the upper-right corner of Ubuntu or the following commands.

```
# get current power mode
$ sudo /usr/sbin/nvpmode -q
# setup power mode

# where <x> is power mode number, please refer to (>=
r36.x.x)

https://docs.nvidia.com/jetson/archives/r36.4.3/DeveloperGuide/
SD/PlatformPowerAndPerformance/JetsonOrinNanoSeriesJetson
OrinNxSeriesAndJetsonAgxOrinSeries.html#power-mode-contr
ols for more information
$ sudo nvpmode -m <x>
```

* Current default power mode:
C9ZASOXP: 15W (2)

3. RTC Battery

The following command can get RTC battery voltage.

```
$ sudo avt tool -a | grep -oP "AIN5.*\[[^\]]*"
```

4. Fan Speed

The following commands can get PWM fan information.

```
# get current speed setting of PWM Fan (0 ~ 255)
$ cat /sys/devices/platform/pwm-fan/hwmon/hwmon<x>/pwm1

# get Fan RPM value
$ cat /sys/devices/platform/bus@0/39c0000.tachometer/hwmon/hwmon<y>/rpm
```

* Where <x> and <y> are dynamic hwmon indexes, with x = 1 and y = 3.

5. MIPI CSI Camera

There are 2x 2-lane and 1x 4-lane MIPI CSI camera supported on C9ZAS, for current supported products type are listed as below:

* IMX219 (2-lane)

* IMX477 (2-lane)
 * IMX179 (2-lane)
 * IMX290 (2-lane)
 * IMX290ISP (2-lane)

Test Command:

> Raspberry pi v2:

* Please follow the settings below first:

1. Set the power mode to maximize at 25W.
2. Follow the settings in the Release Notes, and maximize the ISP & VI clock.

No	width	height	framerate
0	3264	2464	21
1	3264	1848	28
2	1920	1080	30
3	1640	1232	30
4	1280	720	60

```
$ gst-launch-1.0 nvarguscamerasrc sensor-id=0 ! 'video/x-raw(memory:NVMM), width=(int)3280, height=(int)2464, format=(string)NV12, framerate=(fraction)21/1' ! queue ! nvvidconv ! xvimagesink -e
```

```
$ gst-launch-1.0 nvarguscamerasrc sensor-id=0 ! 'video/x-raw(memory:NVMM), width=(int)3280, height=(int)1848, format=(string)NV12, framerate=(fraction)28/1' ! queue ! nvvidconv ! xvimagesink -e
```

```
$ gst-launch-1.0 nvarguscamerasrc sensor-id=0 ! 'video/x-raw(memory:NVMM), width=(int)1920, height=(int)1080, format=(string)NV12, framerate=(fraction)30/1' ! queue ! nvvidconv ! xvimagesink -e
```

```
$ gst-launch-1.0 nvarguscamerasrc sensor-id=0 ! 'video/x-raw(memory:NVMM), width=(int)1640, height=(int)1232, format=(string)NV12, framerate=(fraction)30/1' ! queue ! nvvidconv ! xvimagesink -e
```

```
$ gst-launch-1.0 nvarguscamerasrc sensor-id=0 ! 'video/x-raw(memory:NVMM), width=(int)1280, height=(int)720, format=(string)NV12, framerate=(fraction)60/1' ! queue ! nvvidconv ! xvimagesink -e
```

Multiple:

```
$ gst-launch-1.0 nvarguscamerasrc sensor-id=0 ! 'video/x-raw(memory:NVMM), width=(int)3264, height=(int)2464, format=(string)NV12, framerate=(fraction)21/1' ! queue ! nvvidconv ! xvimagesink -e & gst-launch-1.0 nvarguscamerasrc sensor-id=1 sensor-mode=0 ! 'video/x-raw(memory:NVMM), width=(int)3264, height=(int)2464, format=(string)NV12, framerate=(fraction)21/1' ! queue ! nvvidconv ! xvimagesink -e &
```

> Raspberry pi v2 (imx477):

No	width	height	framerate
0	3840	2160	30
1	1920	1080	60

```
$ gst-launch-1.0 -e nvarguscamerasrc sensor-id=0 ! 'video/x-raw(memory:NVMM),width=3840,height=2160,framerate=30/1' ! queue ! nvvidconv ! fpsdisplaysink video-sink='xvimagesink' sync=false
```

```
$ gst-launch-1.0 -e nvarguscamerasrc sensor-id=0 ! 'video/x-raw(memory:NVMM),width=1920,height=1080,framerate=60/1' ! queue ! nvvidconv ! fpsdisplaysink video-sink='xvimagesink' sync=false
```

Multiple:

```
$ gst-launch-1.0 nvarguscamerasrc sensor-id=0 ! "video/x-raw(memory:NVMM),width=1920,height=1080,framerate=60/1" ! nvvidconv ! xvimagesink -e & gst-launch-1.0 nvarguscamerasrc sensor-id=1 ! "video/x-raw(memory:NVMM),width=1920,height=1080,framerate=60/1" ! nvvidconv ! xvimagesink -e &
```

> IMX179 :

No	width	height	framerate
0	3280	2464	15
1	1920	1080	30
2	3280	1698	30
3	2096	1084	30
4	1640	1232	30
5	820	616	30
6	820	616	60

```
$ gst-launch-1.0 nvarguscamerasrc sensor-id=0 ! 'video/x-raw(memory:NVMM), width=(int)3280, height=(int)2464, format=(string)NV12, framerate=(fraction)15/1' ! queue ! nvvidconv ! xvimagesink -e
```

```
$ gst-launch-1.0 nvarguscamerasrc sensor-id=0 ! 'video/x-raw(memory:NVMM), width=(int)1920, height=(int)1080, format=(string)NV12, framerate=(fraction)30/1' ! queue ! nvvidconv ! xvimagesink -e
```

```
$ gst-launch-1.0 nvarguscamerasrc sensor-id=0 ! 'video/x-raw(memory:NVMM), width=(int)3280, height=(int)1698, format=(string)NV12, framerate=(fraction)30/1' ! queue ! nvvidconv ! xvimagesink -e
```

```
$ gst-launch-1.0 nvarguscamerasrc sensor-id=0 ! 'video/x-raw(memory:NVMM), width=(int)2096, height=(int)1084, format=(string)NV12, framerate=(fraction)30/1' ! queue ! nvvidconv ! xvimagesink -e
```

```
$ gst-launch-1.0 nvarguscamerasrc sensor-id=0 ! 'video/x-raw(memory:NVMM), width=(int)1640, height=(int)1232, format=(string)NV12, framerate=(fraction)30/1' ! queue ! nvvidconv ! xvimagesink -e
```

```
$ gst-launch-1.0 nvarguscamerasrc sensor-id=0 ! 'video/x-raw(memory:NVMM), width=(int)820, height=(int)616, format=(string)NV12, framerate=(fraction)30/1' ! queue ! nvvidconv ! xvimagesink -e
```

```
$ gst-launch-1.0 nvarguscamerasrc sensor-id=0 ! 'video/x-raw(memory:NVMM), width=(int)820, height=(int)616, format=(string)NV12, framerate=(fraction)60/1' ! queue ! nvvidconv ! xvimagesink -e
```

> IMX290 :

No	width	height	framerate
----	-------	--------	-----------

0	1948	1096	30
---	------	------	----

1	1948	1096	60
---	------	------	----

```
$ gst-launch-1.0 nvarguscamerasrc sensor-id=0 ! 'video/x-raw(memory:NVMM), width=(int)1948, height=(int)1096, format=(string)NV12, framerate=(fraction)30/1' ! queue ! nvvidconv ! xvimagesink -e
```

```
$ gst-launch-1.0 nvarguscamerasrc sensor-id=0 ! 'video/x-raw(memory:NVMM), width=(int)1948, height=(int)1096, format=(string)NV12, framerate=(fraction)60/1' ! queue ! nvvidconv ! xvimagesink -e
```

> IMX290ISP :

No	width	height	framerate
----	-------	--------	-----------

0	1920	1080	25/30/50/60
---	------	------	-------------

1	1280	960	25/30/50/60
---	------	-----	-------------

2	1280	720	25/30/50/60
---	------	-----	-------------

0	800	600	25/30/50/60
---	-----	-----	-------------

1	640	480	25/30/50/60
---	-----	-----	-------------

2	640	360	25/30/50/60
---	-----	-----	-------------

```
$ gst-launch-1.0 v4l2src io-mode=4 device=/dev/video0 do-timestamp=true ! 'video/x-raw, width=1920, height=1080, framerate=60/1, format=UYVY' ! queue ! xvimagesink sync=false
```

```
$ gst-launch-1.0 v4l2src io-mode=4 device=/dev/video0 do-timestamp=true ! 'video/x-raw, width=1280, height=960, framerate=30/1, format=UYVY' ! queue ! xvimagesink sync=false
```

```
$ gst-launch-1.0 v4l2src io-mode=4 device=/dev/video0 do-timestamp=true ! 'video/x-raw, width=1280, height=720, framerate=30/1, format=UYVY' ! queue ! xvimagesink sync=false
```

```
$ gst-launch-1.0 v4l2src io-mode=4 device=/dev/video0 do-timestamp=true ! 'video/x-raw, width=800, height=600, framerate=30/1, format=UYVY' ! queue ! xvimagesink sync=false
```

```
$ gst-launch-1.0 v4l2src io-mode=4 device=/dev/video0 do-timestamp=true ! 'video/x-raw, width=640, height=480, framerate=30/1, format=UYVY' ! queue ! xvimagesink sync=false
```

```
$ gst-launch-1.0 v4l2src io-mode=4 device=/dev/video0 do-timestamp=true ! 'video/x-raw, width=640, height=360, framerate=30/1, format=UYVY' ! queue ! xvimagesink sync=false
```

6. CAN Bus

There is one CAN Bus for C9ZAS, see the following command for usage.

(1) Enable and set up CAN Bus

```
# 1. Enable CAN Bus
$ sudo modprobe can
$ sudo modprobe can-raw
$ sudo modprobe mttcan
# 2. Setup CAN Bus
$ sudo ip link set can0 type can bitrate 500000 dbitrates 2000000 berr-reporting on fd
on restart-ms 100
$ sudo ip link set can0 up
```

(2) Receive and Send

```
# Receive
$ candump can0

# Send
$ cansend can0 <can frame>
```

* where:

<can_frame> is CAN Bus frame message, see `cansend --help` for more detail.

7. GPIO usage

To control the GPIOs on the 20-pin I/O, you must first set their direction.

Chip.0 line.4 controls B7 and B8, while Chip.0 line.41 controls B9 and B10.

(1) Output

Set B7 high for 10 seconds.

```
$ sudo su
$ avt_tool -G 0 4 1
$ sudo gpioset --mode=time --sec=10 0 50=1
```

Note: When PH.07 is set as output, PI.01 can only be used as an output.

(2) Input

Get B7 value.

```
$ sudo su
$ avt_tool -G 0 4 0
$ sudo gpioread 0 50
# 1: HIGH, 0: LOW
```

(3) Disable

```
$ sudo pkill_avt_gpio
```

5.1 Force Recovery Mode

USB 3.1 / Jetson platform port of C9ZA can be used to re-program NVIDIA® Jetson Orin NX by using the other host system running NVIDIA Jetpack, as the procedure described below.

- 1. Power off the system. Ensure the system power must be completely OFF, instead of staying in suspend mode or the sleep mode.
- 2. Connect a USB cable from Jetson platform USB port to the other host system which will be used to re-program the new system file into NVIDIA® Jetson Orin NX
- 3. Press and hold down Force Recovery Button and then power on the carrier board.
- 4. After three seconds, release the Force Recovery Button.
- 5. NVIDIA® Orin NX will show up on the USB list of the host system as a new NVIDIA target device.

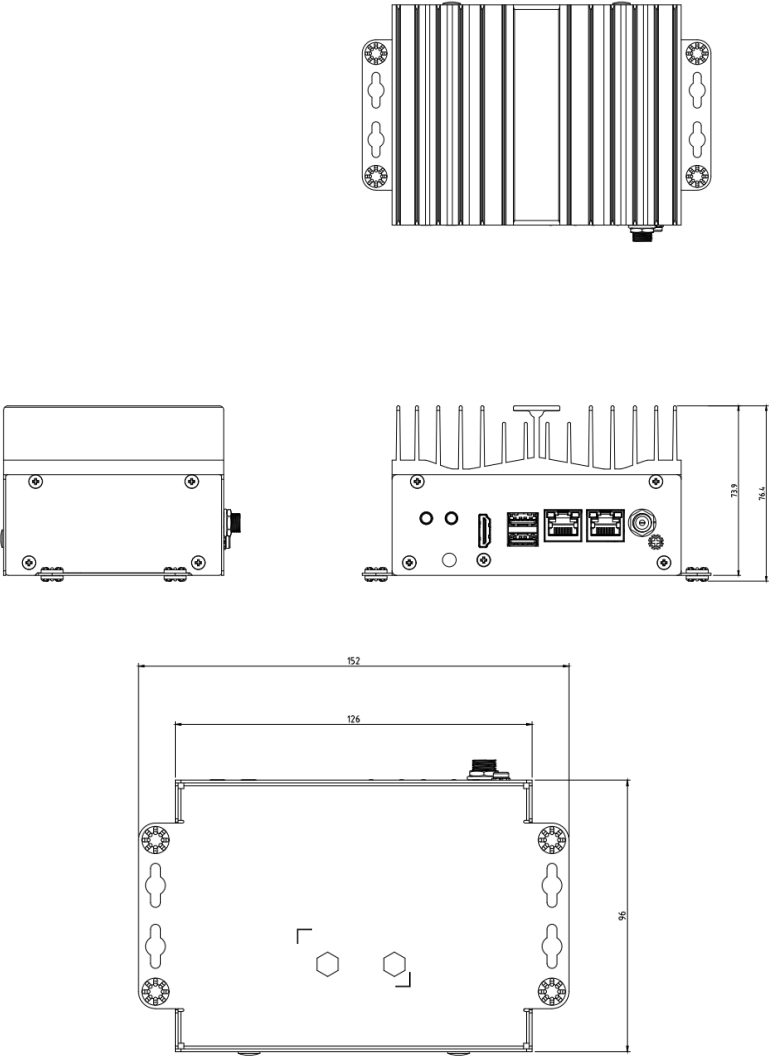
After the system software is updated successfully, please ensure to power off the system. A clean power-on will then revert Jetson platform port back to the host mode.

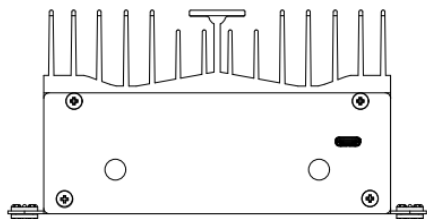
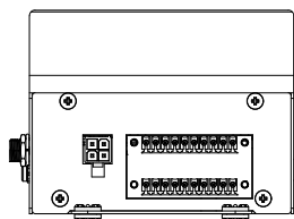
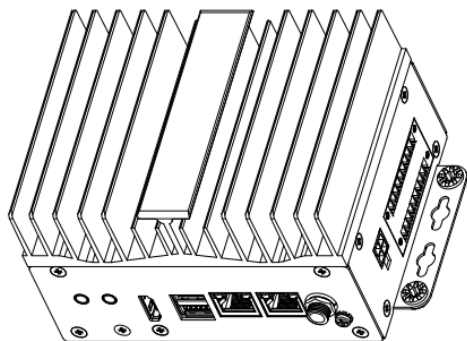
5.3 Power Consumption

Item Description	Power Consumption
Theoretical Maximum System Power Consumption	C9ZA Power Consumption: 4.8W(standby) to 48W (full loading). The condition is connected to USB3.2 device*2, LAN *1, SSD 256G*1, WIFI AX210*1, HDMI*1, with CPU/ GPU super mode full loading. (maximum power consumption up to 90W based on adapter)
Typical System Power Consumption	The power consumption under the normal operating mode is depending on the application software running with NVIDIA® Jetson Orin

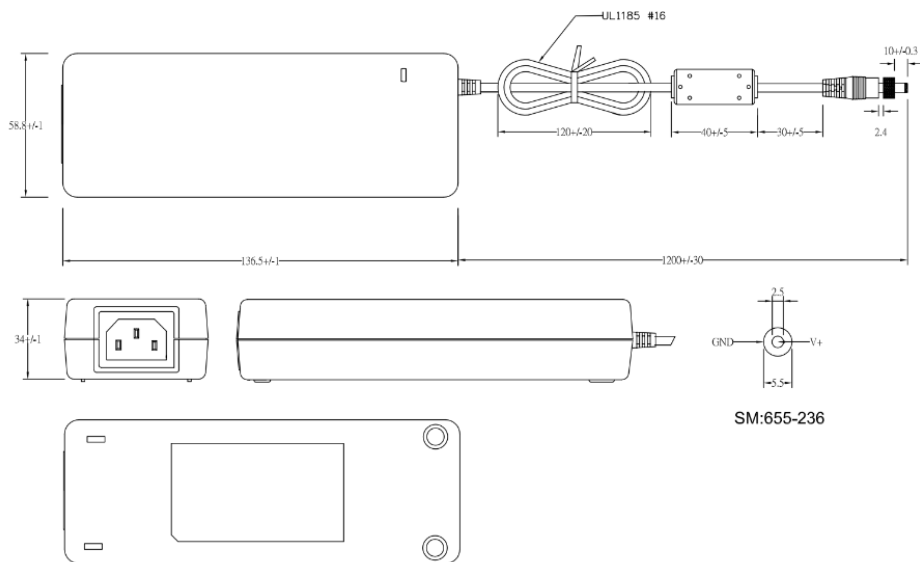
6.0 Dimension Drawings

6.1 Dimension Drawing of C9ZAS BOX PC





Power Adapter 041312GOYANW (for Super Mode)



064APOWBR2-IPD (US version)

