eBOX560-900-FL Series

Embedded System

User's Manual

RoHS

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Safety Precautions

Before getting started, please read the following important safety precautions.

1. The eBOX560-900-FL does not come with an operating system which must be loaded first before installation of any software into the computer.

2. Be sure to ground yourself to prevent static charge when installing any internal components. Use a wrist grounding strap and place all electronic components in any static-shielded devices. Most electronic components are sensitive to static electrical charge.

3. Disconnect the power cord from the eBOX560-900-FL prior to making any installation. Be sure both the system and all external devices are turned OFF. Sudden surge of power could ruin sensitive components. Make sure the eBOX560-900-FL is properly grounded.

4. Make sure the voltage of the power source is correct before connecting it to any power outlet.

5. Turn Off system power before cleaning. Clean the system using a cloth only. Do not spray any liquid cleaner directly onto the screen.

6. Do not leave equipment in an uncontrolled environment where the storage temperature is below -40℃ or above 80℃ as it may damage the equipment.

7. Do not open the system's back cover. If opening the cover for maintenance is a must, only a trained technician is allowed to do so. Integrated circuits on computer boards are sensitive to static electricity. To avoid damaging chips from electrostatic discharge, observe the following precautions:

   - Before handling a board or integrated circuit, touch an unpainted portion of the system unit chassis for a few seconds. This will help discharge any static electricity on human body.

   - When handling boards and components, wear a wrist grounding strap available from most electronic component stores.

8. Note!! Caution with touch! eBOX560-900-FL will be hot when it's on.

Classification

1. Degree of production against electric shock: not classified
2. Degree of protection against ingress of water: IP40
3. Equipment not suitable for use in the presence of a flammable anesthetic mixture with air, oxygen or nitrous oxide.
4. Mode of operation: Continuous

General Cleaning Tips

Please keep the following precautions in mind while understanding the details fully before and during any cleaning of the computer and any components within.

A piece of dry cloth is ideal to clean the device.
1. Be cautious of any tiny removable components when using a vacuum cleaner to absorb dirt on the floor.
2. Turn the system off before clean up the computer or any components within.
3. Avoid dropping any components inside the computer or getting circuit board damp or wet.
4. For cleaning, be cautious of all kinds of cleaning solvents or chemicals which may cause allergy to certain individuals.
5. Keep foods, drinks or cigarettes away from the computer.

Cleaning Tools:

Although many companies have created products to help improve the process of cleaning computer and peripherals, users can also use house hold items accordingly for cleaning. Listed below are items available for cleaning computer or computer peripherals.

Pay special attention to components requiring designated products for cleaning as mentioned below.

● Cloth: A piece of cloth is the best tool to use when rubbing up a component. Although paper towels or tissues can be used on most hardware as well, it is recommended to use a piece of cloth.

● Water or rubbing alcohol: A piece of cloth may be somewhat moistened with water or rubbing alcohol before being rubbed on the computer. Unknown solvents may be harmful to plastic parts.

● Absorb dust, dirt, hair, cigarette and other particles outside of a computer can be one of the best methods of cleaning a computer. Over time these items may restrict the airflow in a computer and cause circuitry to corrode.

● Cotton swabs: Cotton swaps moistened with rubbing alcohol or water are applicable to reach areas in keyboard, mouse and other areas.

● Foam swabs: If possible, it is better to use lint free swabs such as foam swabs.
  .

【Note】: *It is strongly recommended that customer should shut down the system before start to clean any single components.*

Please follow the steps below:
1. Close all application programs;
2. Close operating software;
3. Turn off power switch;
4. Remove all devices;
5. Pull out power cable.

Scrap Computer Recycling

If the computer equipment's needs the maintenance or are beyond repair, we strongly recommended that you should inform your Axiomtek distributor as soon as possible for the suitable solution. For the computers that are no longer useful or no longer working well, please contact your Axiomtek distributor for recycling and we will make the proper arrangement.

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CHAPTER 1
INTRODUCTION

This chapter contains general information and detailed specifications of the eBOX560-900-FL. The Chapter 1 includes the following sections:

- General Description
- System Specifications
- Dimensions
- I/O Outlets
- Packing List
- Model List

1.1   General Description

The eBOX560-900-FL is an embedded system with NVIDIA$^®$ JETSON™ TX2 supercomputer on a module to support Linux Ubuntu 16.04 or 18.04, suitable for the most endurable operation.

It features fanless design with full feature I/O, one 8GB 128-bit LPDDR4@1866 MHz memory, and enhanced system dependability by built-in Watchdog Timer.

- **Features**

    1. NVIDIA$^®$ JETSON™ TX2 with Pascal™, 256 CUDA cores GPU

    2. High AI computing performance for GPU-accelerated processing

    3. Ideal for intelligent edge applications

    4. Compact size with NVMe supported

    5. JetPack 4.2.1 ready

● **Reliable and Stable Design**

The eBOX560-900-FL adopts the advanced fanless system and supporting the NVMe through M.2 interface, which makes it especially suitable for AI computing environments, best for industrial automation, GPU-accelerated processing and smart city applications.

● **JetPack 4.2.1 Supported**

The eBOX560-900-FL supports JetPack 4.2.1. NVIDIA JetPack SDK is the most comprehensive solution for building AI applications.

JetPack 4.2.1 is the latest production release supporting Jetson AGX Xavier, Jetson TX2 series modules, Jetson TX1, and Jetson Nano. It bundles all the Jetson platform software, including TensorRT, cuDNN, CUDA Toolkit, VisionWorks, GStreamer, and OpenCV, all built on top of L4T with LTS Linux kernel.

● **O.S. Supported**

The eBOX560-900-FL supports both of Linux Ubuntu 16.04 and Linux Ubuntu 18.04.

● **Various Storage devices supported**

For storage device, the eBOX560-900-FL supports one M.2 2280 M-Key with PCI-Express 2.0 x4 Interface (support NVMe SSD), and an onboard 32GB eMMC (via JETSON™ TX2).

1.2 System Specifications

1.2.1 Product Specification

● **CPU Board**
  ■ NVIDIA® JETSON™ TX2

● **CPU**
  ■ HMP Dual Denver 2/2 MB L2 + Quad ARM® A57/2 MB L2

● **GPU**
  ■ NVIDIA® Pascal™, 256 CUDA cores

● **Storage**
  ■ 32GB eMMC onboard
  ■ One M.2 2280 M-Key with PCI-Express 2.0 x4 Interface to support optional NVMe

● **System Memory**
  ■ One 8GB 128-bit LPDDR4 @ 1866 MHz onboard

● **WLAN & WWAN**
  ■ 802.11ac WLAN, Bluetooth onboard
  ■ 3G/LTE supports through optional mini PCIe module

1.2.2 I/O System

- **One HDMI 2.0 for display** (HDMI 2.0 Resolution: up to 4096 x 2160@60Hz)

- **Two RJ-45 connectors for 10/100/1000 Base-T Ethernet ports** (NVIDIA® + Intel® I210-IT)

- **One USB 2.0 connector**

- **One full-size PCI Express Mini Card slot (USB + PCI Express signal)**

    ※ **PCIe signal is designed by jumper selection, is supports either PCIe of mini PCIe connector or LAN Intel® I210-IT. For more details, please refer to section 3.2.2: PCIe Signal Selection (JP3)**

- **Two Indicators LEDs (System Power, Storage)**

- **Four SMA type connector openings for Antenna**

- **One 12 VDC Power jack connector**

1.2.3   System Specification

- **Watchdog Timer**
    - Support the watchdog timer embedded in NVIDIA® JETSON™ TX2

- **Power Supply**
    - Input : 12VDC

- **Operation Temperature**
    - -10℃~+50℃ (-14°F~+122°F)

- **Humidity**
    - 10% ~ 95% (non-condensation)

- **Vibration Endurance**
    - 3Grm w/ SSD Storage (5-500Hz, X, Y, Z directions)

- **Weight**
    - 0.8 kg(1.76lb) without package
    - 1.5 kg(3.31lb) with package

- **Dimensions**
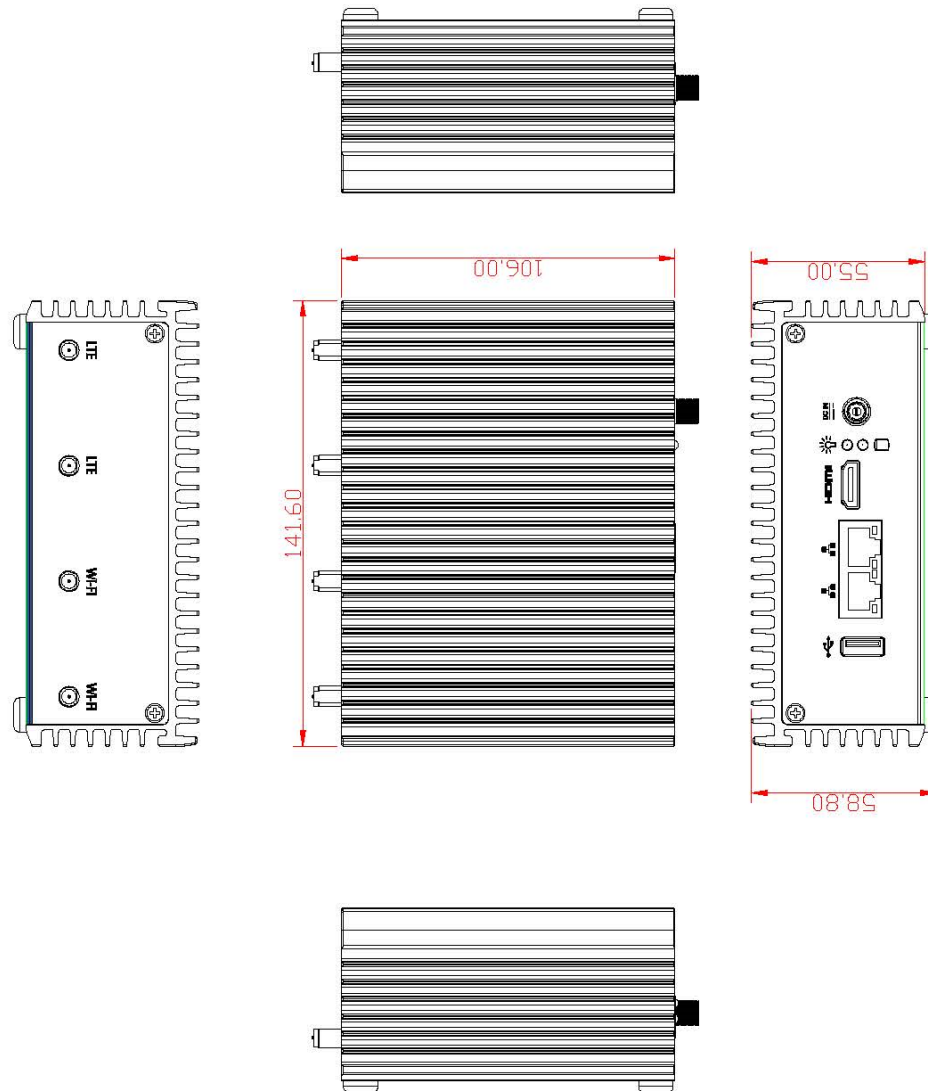   - 141.6 mm(5.57") (W) x 106 mm(4.17") (D) x 55 mm(2.17") (H)

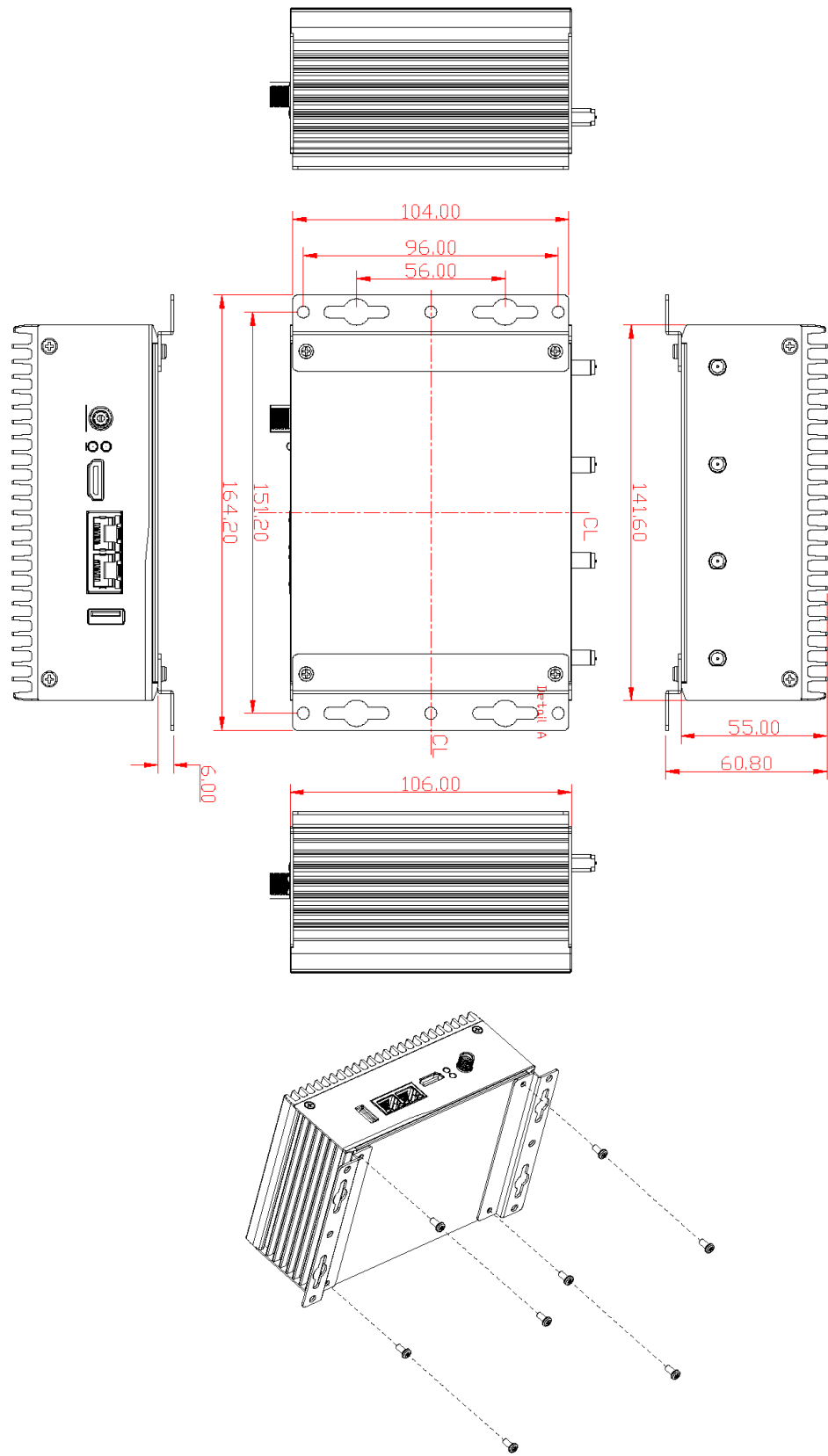*Note: All specifications and images are subject to change without notice.*

1.3 Dimensions

The following diagrams show you dimensions and outlines of the eBOX560-900-FL.

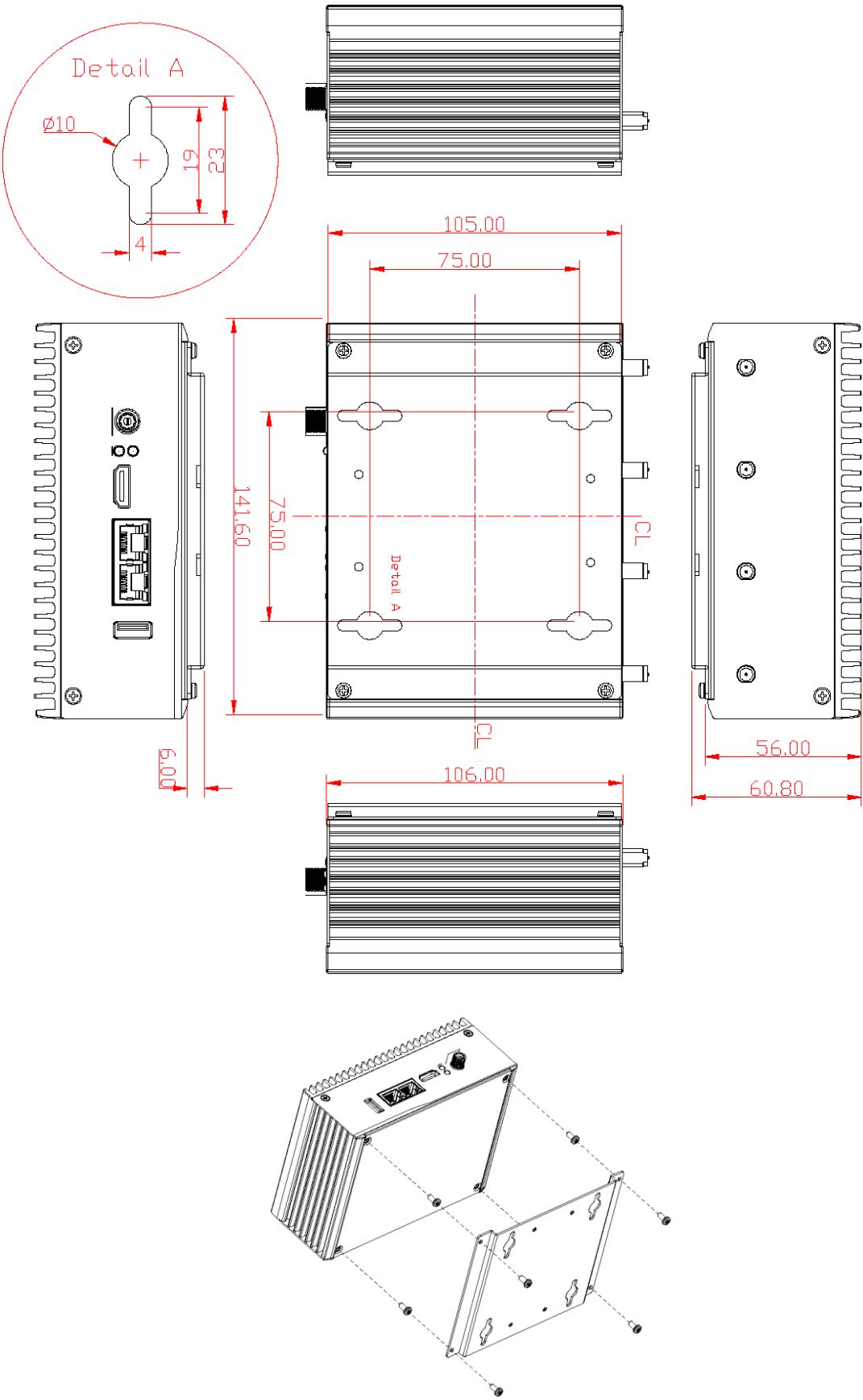## 1.3.1 System Dimension

1.3.2 Wall mount Bracket Dimension

1.3.3   Din-rail mount Bracket Dimension
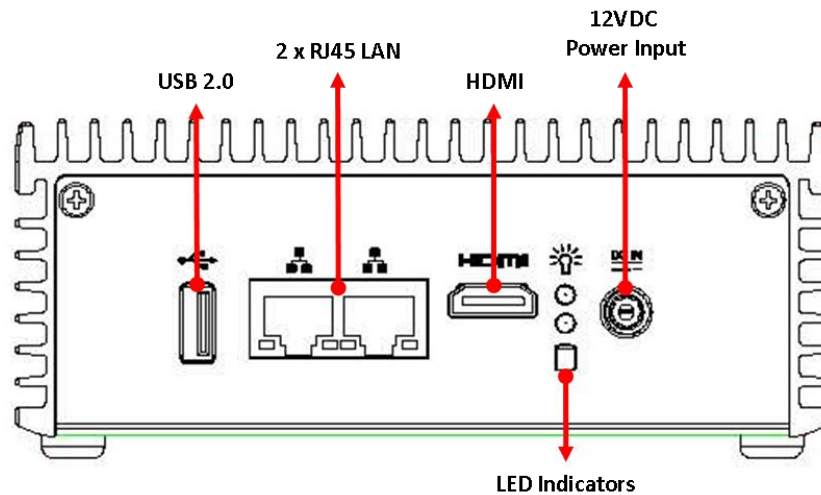

722C9000300E
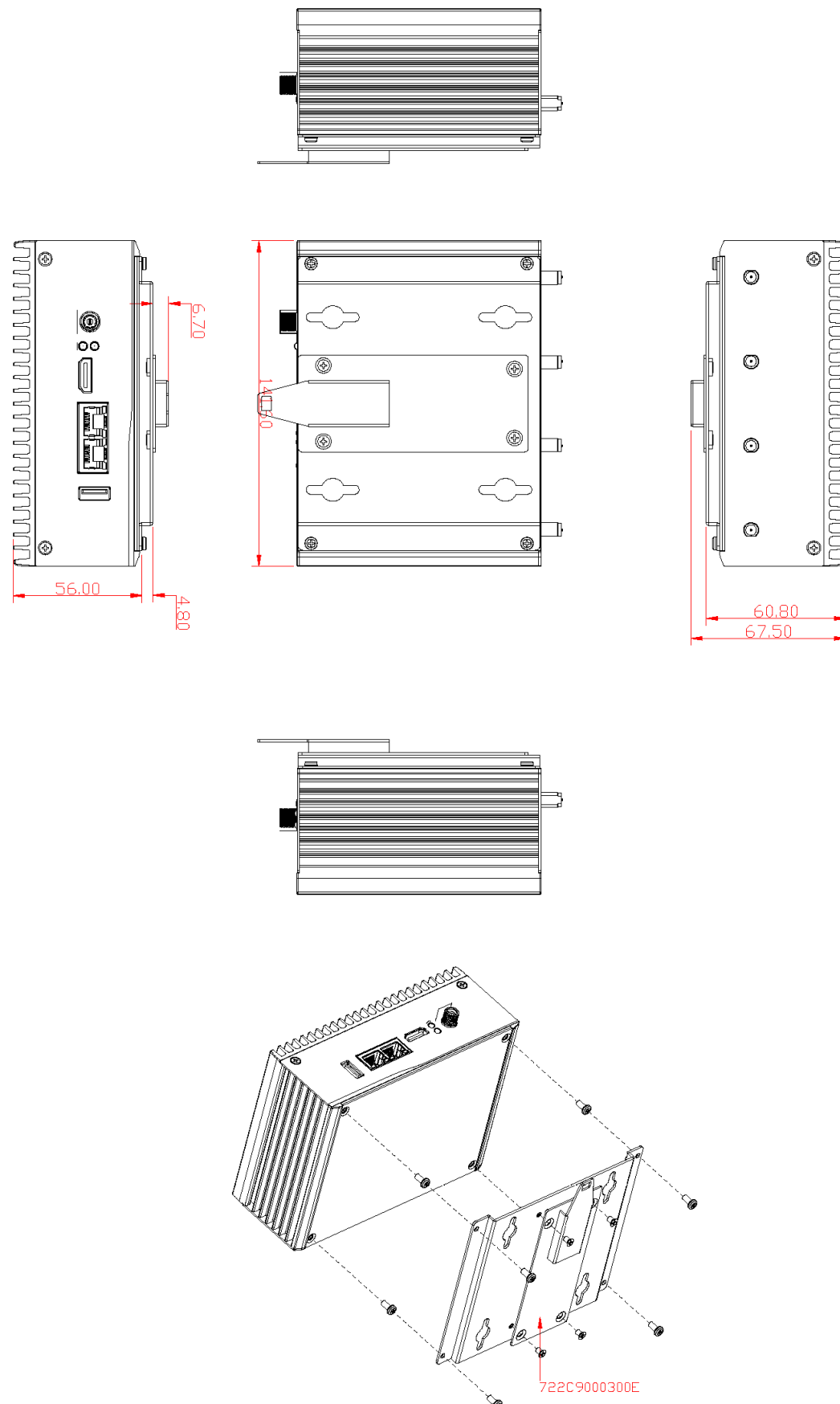
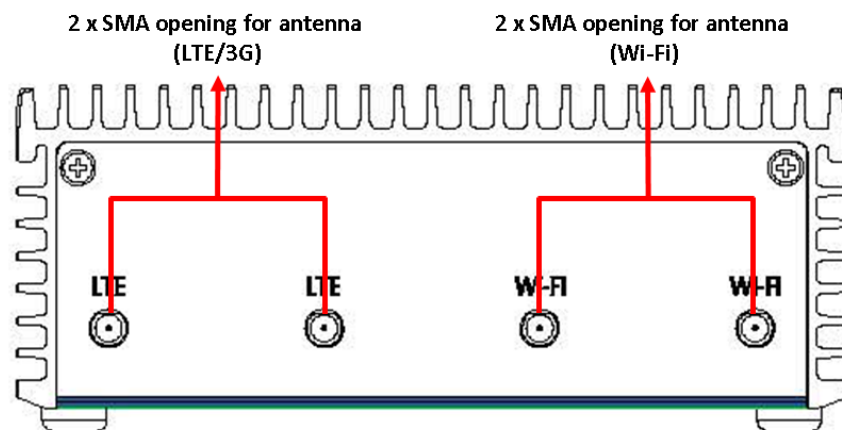## 1.3.4 VESA mount Bracket Dimension

1.4 I/O Outlets

The following figures show you I/O outlets on front view of the eBOX560-900-FL.

● **Front View drawing**

● **Rear View drawing**

1.5   Packing List

The package bundled with your eBOX560-900-FL should contain the following items:

- **eBOX560-900-FL System Unit x 1**
- **eBOX560-900-FL Quick Installation Guide x 1**
- **Screws Pack x 1**
- **Antennas for WLAN / WWAN x 2**
- **Optional 12VDC / 60W AC to DC Adapter**
- **Optional Power cord**

※ Regarding the Jetpack 4.2.1 image & product manual, please download them from Axiomtek official website.

1.6   Model List

eBOX560-900-FL-DC	Fanless Embedded System with NVIDIA® JETSON™ TX2, 1 HDMI 2.0, 2 GbE LANs and 1 USB 2.0 (w/o power adapter and power cord)

If you cannot find this package or any items are missing, please contact Axiomtek distributors immediately.

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CHAPTER 2
HARDWARE INSTALLATION

The eBOX560-900-FL is convenient for your various hardware configurations, such as SSD (Solid State Drive) and PCI Express Mini Card modules. The chapter 2 will show you how to install the hardware.

2.1   Installing the PCI Express Mini Card

Step 1   Turn off the system, and unplug the power adaptor.

Step 2   Turn the system upside down to locate screws at the bottom side as red marked and loosen four screws.
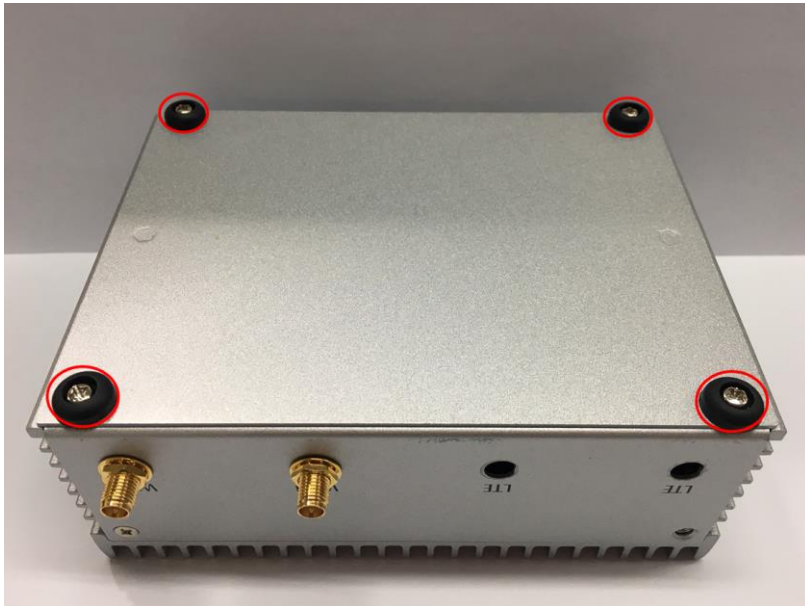
Step 3   Remove the bottom cover.

Step 4   Locate the PCI Express mini card slot on the board.

Step 5 **Holding the PCI Express mini card at a 45 degree angle up from horizontal, slowly insert the golden fingers into the PCI Express slot until it is fully inserted in.**

Step 6 **Press it down gently, but firmly, and then secure the PCI Express mini card to the carrier by tightening up the one M2*5L Phillips pan head screw to the marked position.**

2.2   Installing LTE Antenna Cable

Step 1   **Take the Antenna kit out of its box. And turn off the system, and unplug the power adaptor.**

Step 2   **Turn the system upside down to locate screws at the bottom side as red marked and loosen four screws.**

Step 3   **Install the Mini PCIe card into the Mini PCIe slot and affix it with a screw. For more details, please refer to section 2.1: Installing the PCI Express Mini Card.**

Step 4   Remove the Hex nut and washer from the Antenna cable.
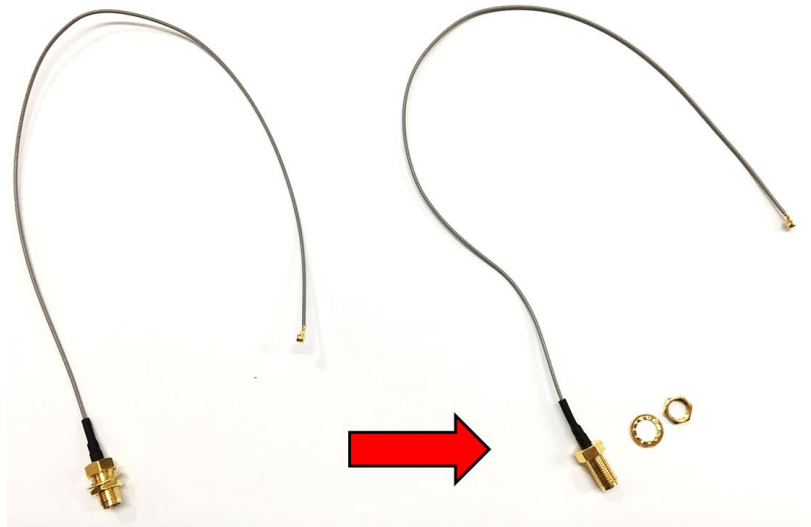
Step 5   Install the antenna cable connector through the opening at the back of the chassis.

Step 6 Put the washer and Hex nut into the antenna cable connector, and tighten it up.

Step 7   Connect the antenna cable to the PCI Express mini card.

2.3   Installing the M.2 2280 M-Key SSD Module

Step 1   Turn off the system, and unplug the power adaptor.

Step 2   Turn the system upside down to locate screws at the bottom side as red marked and loosen four screws.
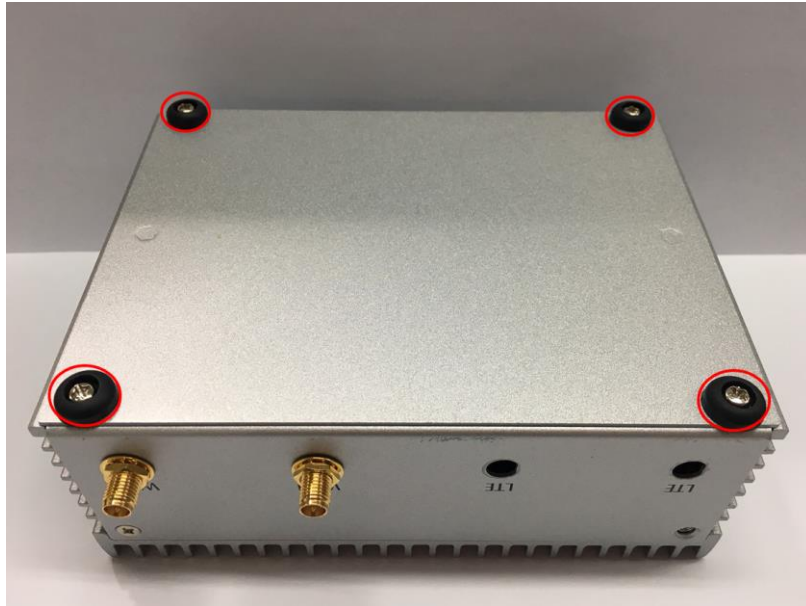
Step 3   Remove the bottom cover.

Step 4   Locate the M.2 2280 M-Key slot on the board.

Step 5   Holding the M.2 2280 M-Key SSD card at a 30 degree angle up from horizontal, slowly insert the golden fingers into the M.2 2280 M-Key slot until it is fully inserted in.

Step 6 **Press it down gently, but firmly, and then secure the M.2 2280 M-Key SSD card to the carrier by tightening up the one M3*4L Phillips flat head screw to the marked position.**

CHAPTER 3
JUMPER SETTING & CONNECTOR

Proper jumper settings configure the **eBOX560-900-FL** to meet your application purpose. We are here with listing a summary table of all jumpers and default settings for onboard devices, respectively.

3.1   Jumper & Connector Location

SBC87900 Top View

SBC87900 Bottom View

SBC87900 Rear View
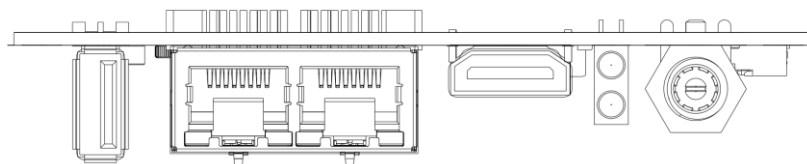
✎ *Note: We strongly recommended that you should not modify any unmentioned jumper setting without Axiomtek FAE's instruction. Any modification without instruction might cause system to become damage.*
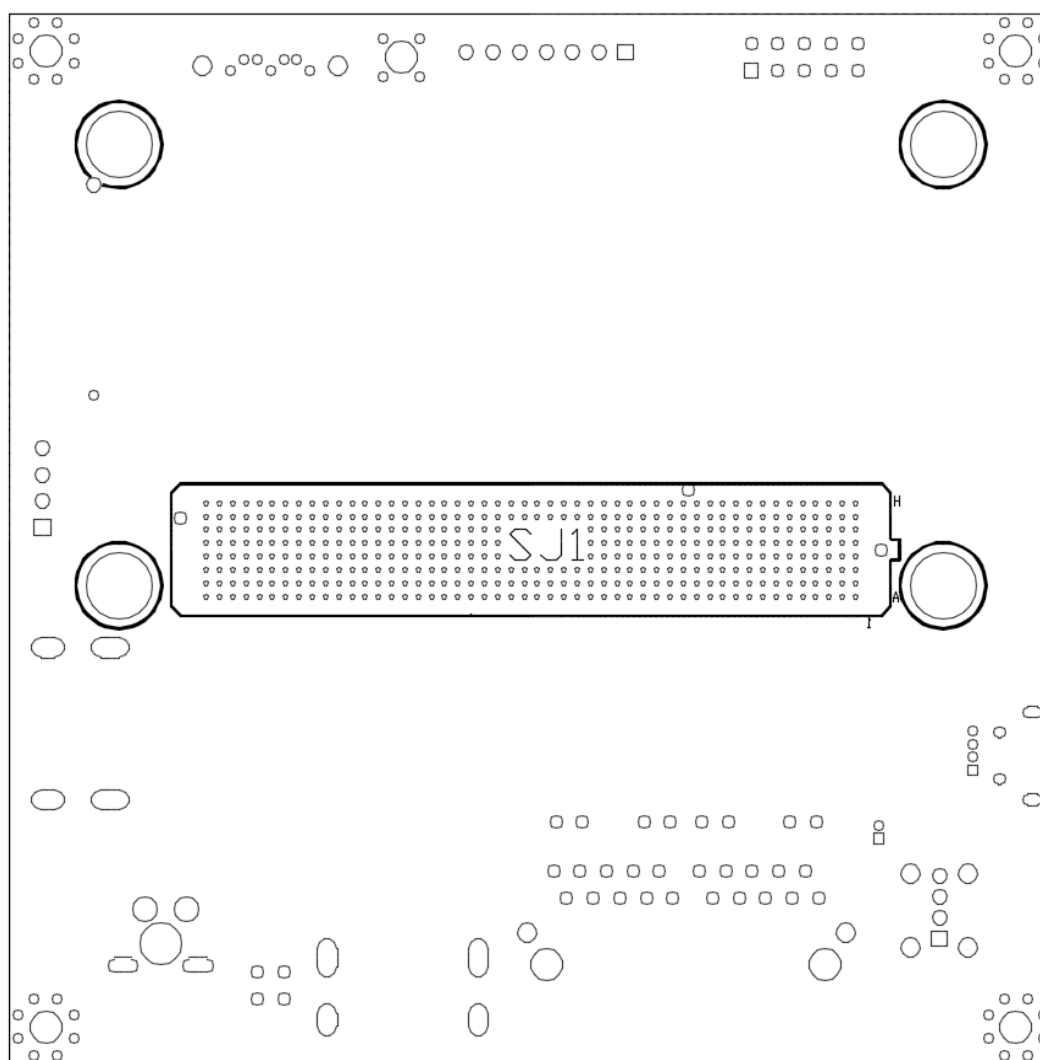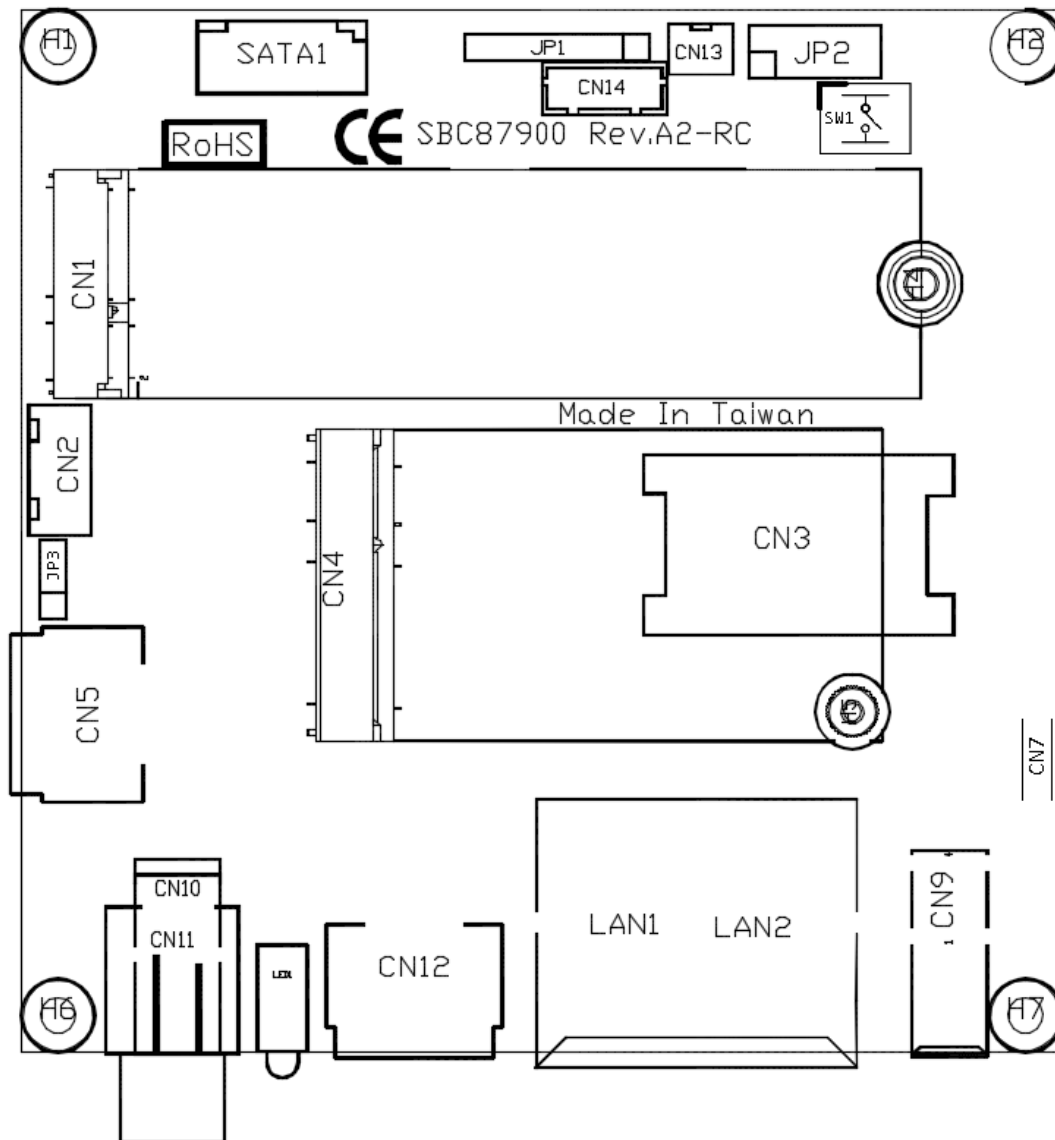
3.2   Jumper Setting Summary

Proper jumper settings configure the eBOX560-900-FL to meet your application purpose. We are herewith listing a summary table of all jumpers and default settings for onboard devices, respectively.

SBC87900:

Jumper & Switch	Descriptions		Settings
JP2	Other Settings	Sleep	1-2 Close
		Force Recovery	3-4 Close
		Auto Power On	5-6 Close
		Power Button	7-8 Close
		Reset	9-10 Close
JP3	PCIe Signal Selection Default: Enable LAN Intel® I210-IT		2-3 Close

Note: How to setup Jumpers

The illustration shows how to set up jumpers. When the jumper cap is placed on pins, the jumper is "close", if not, that means the jumper is "open".

[Open]   [Closed]   [Pin1-2 Closed]

3.2.1   Other Settings (JP2)

The JP2 allows you to select the power mode as following table.

Pin	Description
1-2	Sleep Pin1-Pin2 Short: Sleep Pin1-Pin2 Open: Normal Operation (Default)
3-4	Force Recovery Pin3-Pin4 Short: Force Recovery Pin3-Pin4 Open: Normal Operation (Default)
5-6	Auto Power On Pin5-Pin6 Short: Auto Power on (Default) Pin5-Pin6 Open: Power on by power button
7-8	Power Button. Short Pin7-Pin8 for power on.
9-10	Reset. Short Pin9-Pin10 for system reset.

3.2.2   PCIe Signal Selection (JP3)

PCIe signal can be selected by JP3 to mini PCIe connector or LAN Intel[®] I210-IT.

Pin	Description
1-2	Enable PCIe signal for mini PCIe connector
2-3	Enable LAN Intel[®] I210-IT (Default)

3.3   Connectors

Connectors connect the board with other parts of the system. Loose or improper connection might cause problems. Make sure all connectors are properly and firmly connected. Here is a summary table shows you all connectors and button on the **eBOX560-900-FL** Series.

External Connectors / Buttons	PCB Location	Section
M.2 2280 M-Key NVMe SSD	CN1	3.3.1
SIM Card Slot	CN3	3.3.2
PCI-Express Mini Card Connector	CN4	3.3.3
Micro USB 2.0 On-The-Go Connector	CN7	3.3.4
Ethernet Port	CN8	3.3.5
USB 2.0 Connector	CN9	3.3.6
DC Jack with Screw	CN11	3.3.7
HDMI Connector	CN12	3.3.8
Digital I/O	CN14	3.3.9
Debug Port Connector	JP1	3.3.10
Force Recovery Mode	SW1	3.3.11
CMOS Battery Interface	BAT1	3.3.12

3.3.1   M.2 2280 M-Key NVMe SSD (CN1)

The eBOX560-900-FL comes with one M.2 2280 M-Key NVM Express SSD for storage.

Pin	Signal	Pin	Signal
1	GND	2	+3.3V
3	GND	4	+3.3V
5	PERn3	6	NC
7	PERp3	8	NC
9	GND	10	DAS/DSS#
11	PETn3	12	+3.3V
13	PETp3	14	+3.3V
15	GND	16	+3.3V
17	PERn2	18	+3.3V
19	PERp2	20	NC
21	GND	22	NC
23	PETn2	24	NC
25	PETp2	26	NC
27	GND	28	NC
29	PERn1	30	NC
31	PERp1	32	NC
33	GND	34	NC
35	PETn1	36	NC
37	PETp1	38	DEVSLP
39	GND	40	NC
41	PERn0	42	NC
43	PERp0	44	NC
45	GND	46	NC
47	PETn0	48	NC
49	PETp0	50	PERST#
51	GND	52	CLKREQ#
53	REFCLKN	54	PEWAKE#
55	REFCLKP	56	NC
57	GND	58	NC
59	Connector Key	60	Connector Key
61	Connector Key	62	Connector Key
63	Connector Key	64	Connector Key
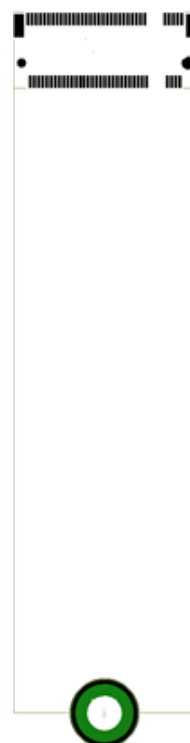
Pin	Signal	Pin	Signal
65	Connector Key	66	Connector Key
67	NC	68	SUSCLK
69	PEDET	70	+3.3V
71	GND	72	+3.3V
73	GND	74	+3.3V
75	GND		

3.3.2 SIM Card Slot (CN3)

The eBOX560-900-FL includes one SIM slot on the bottom side of the system for inserting SIM Card. It is mainly used in 3G/LTE wireless network application on CN3.

Pin	Signal
1	PWR
2	RST
3	CLK
4	NC
5	GND
6	VPP
7	I/O
8	NC

3.3.3 PCI-Express Mini Card Connector (CN4)

The eBOX560-900-FL supports a full-size PCI-Express Mini Card slots. CN4 is applying to either PCI-Express or USB 2.0 signal, and complies with PCI-Express Mini Card Spec. V1.2. PCIe signals can be selected by JP3. Please refer to Jumper Setting section.

Pin	Signal	Pin	Signal
1	WAKE#	2	+3.3VSB
3	No use	4	GND
5	No use	6	+1.5V
7	CLKREQ#	8	No use
9	GND	10	No use
11	REFCLK-	12	No use
13	REFCLK+	14	No use
15	GND	16	No use
17	No use	18	GND
19	No use	20	W_DISABLE#
21	GND	22	PERST#
23	PE_RXN3/ SATA_RXP	24	+3.3VSB
25	PE_RXP3/ SATA_RXN	26	GND
27	GND	28	+1.5V
29	GND	30	SMB_CLK
31	PE_TXN3/ SATA_TXN	32	SMB_DATA
33	PE_TXP3/ SATA_TXP	34	GND
35	GND	36	USB_D8-
37	GND	38	USB_D8+
39	+3.3VSB	40	GND
41	+3.3VSB	42	No use
43	GND	44	No use
45	No use	46	No use
47	No use	48	+1.5V
49	No use	50	GND
51	No use	52	+3.3VSB
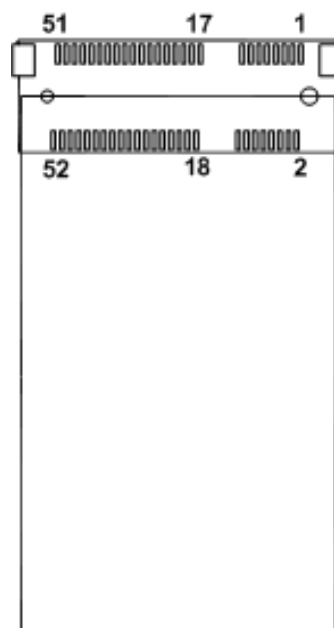
3.3.4 Micro USB 2.0 On-The-Go Connector (CN7)

USB On-The-Go, often abbreviated USB OTG, is a specification that allows USB devices such as digital audio players or mobile phones to act as a host, allowing other USB devices like a USB flash drive, mouse, or keyboard to be attached to them. Unlike conventional USB systems, USB OTG systems can drop the hosting role and act as normal USB devices when attached to another host.
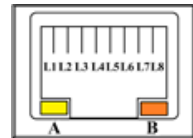
Pin	Signal
1	USB_5V_Power
2	D-
3	D+
4	ID
5	GND
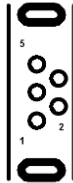
3.3.5 Ethernet Ports (CN8)

The eBOX560-900-FL comes with two RJ-45 connectors; LAN1 (NVIDIA® JETSON™ TX2) and LAN2 (Intel® I210-IT). Ethernet connection can be established by plugging one end of the Ethernet cable into this RJ-45 connector and the other end (phone jack) to a 1000/100/10 Base-T hub.

Pin	1000 Base-T	100/10 Base-T	Description
L1	BI_DA+	TX+	Bidirectional or Transmit Data+
L2	BI_DA-	TX-	Bidirectional or Transmit Data-
L3	BI_DB+	RX+	Bidirectional or Receive Data+
L4	BI_DC+	N.C.	Bidirectional or Not Connected
L5	BI_DC-	N.C.	Bidirectional or Not Connected
L6	BI_DB-	RX-	Bidirectional or Receive Data-
L7	BI_DD+	N.C.	Bidirectional or Not Connected
L8	BI_DD-	N.C.	Bidirectional or Not Connected
A	LAN1: Speed LED: - 1000M : Yellow LAN2: Active Link LED: Yellow Off: No link Blinking: Data activity detected		
B	LAN1: Speed LED: - 100M / 10M: Green / OFF LAN2: Speed LED: - 1000M: Orange - 100M / 10M: Green / OFF		

3.3.6 USB2.0 Connector (CN9)

The Universal Serial Bus connectors are compliant with USB 2.0 (480Mbps), and ideally for installing USB peripherals such as keyboard, mouse, scanner, etc.
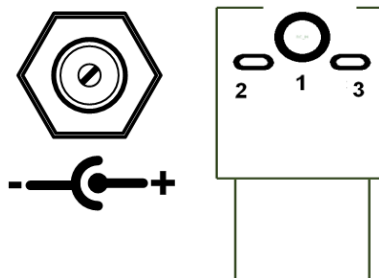
Pin	Signal
1	USB_PWR3
2	USB_PN6
3	USB_PP6
4	GND
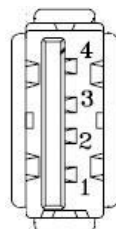
3.3.7 DC Power Jack w/ Screw (CN11)

The CN11 is a DC jack with screw. Firmly insert at least 60W adapter into this connector. Loose connection may cause system instability and make sure all components/devices are properly installed before connecting.
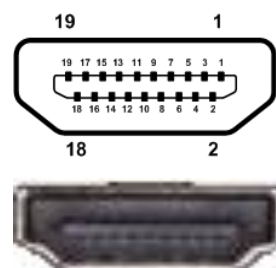
Pin	Signal
1	12V
2	GND
3	GND

3.3.8 HDMI Connector (CN12)

The HDMI (High-Definition Multimedia Interface) is a compact digital interface which is capable of transmitting high-definition video and high-resolution audio over a single cable.

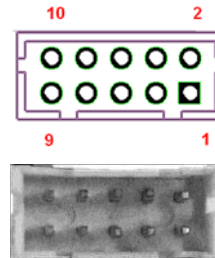| Pin	Signal	Pin	Signal
1	HDMI DATA2+	2	GND
3	HDMI DATA2-	4	HDMI DATA1+
5	GND	6	HDMI DATA1-
7	HDMI DATA0+	8	GND
9	HDMI DATA0-	10	HDMI Clock+
11	GND	12	HDMI Clock-
13	N.C.	14	N.C.
15	HDMI SCL	16	HDMI SDA
17	GND	18	+5V
19	HDMI_HTPLG		

3.3.9   Digital I/O Connector (CN14) (Optional)

The eBOX560-900-FL supports one 8-Channel digital I/O connector by option.

The digital I/O is controlled via software programming.

Pin	Signal	Pin	Signal
1	DIO01	2	DIO08
3	DIO02	4	DIO07
5	DIO03	6	DIO06
7	DIO04	8	DIO05
9	+5V	10	GND

3.2.10 Debug Port Connector (JP1)

The JP1 is UART interface (UART Port0) for debug port when developing software.

Pin	Signal
1	+5V
2	+3.3V
3	TX
4	RX
5	RTS#
6	CTS#
7	GND

3.3.11 Force Recovery Mode (SW1)

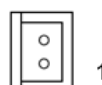It will make NVIDIA® JETSON™ TX2 to force recovery mode when push SW1.

Push Button	Description
SW1	Force Recovery Mode
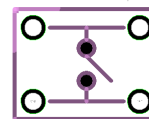
3.3.12 CMOS Battery Interface (BAT1)

This connector is for CMOS battery interface..

Pin	Signal
1	+3.3V
2	GND

CHAPTER 4
JETPACK BSP FLASH METHOD

This chapter provides users with a detailed description of how to flash NVIDIA Jetpack BSP for eBO560-900-FL, the user could follow the below instruction to install or reinstall Jetpack BSP by themselves.
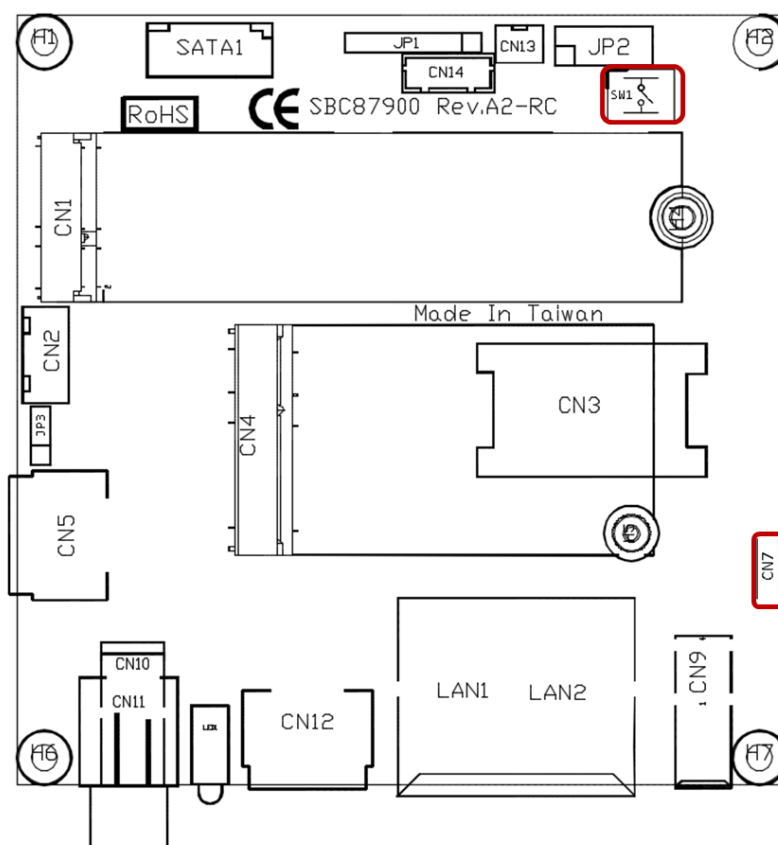

IMAGE FLASH METHOD:

Please prepare a Linux host system running x86_64 Ubuntu v16.04.

Step 1 eBOX560-900-FL connection as follows:
- Connect a USB cable from the Linux host system to the Micro USB port which located on CN7 as the above picture.
- Connect an HDMI monitor to eBOX560-900-FL.

Step 2 Please prepare your image file from Axiomtek or download it from FTP.
Untar the files and assemble the root file system with the command below:

   sudo tar xpf imagefilename

【Note】: *Please type your full image name instead of imagefilename*

Step 3 Start flash Jetpack BSP:
- Press and hold the SW1 and plug in the power cable for eBOX560-900-FL to enter recovery mode, and release the SW1, once the eBOX560-900-FL has entered recovery mode.
- Press hotkey: Ctl+Alt+T at the host to enter to the terminal window
- Key the command at the host: **cd Linux_for_Tegra**
- Key the command at the host: **sudo ./flash.sh –r jetson-tx2 mmcblk0p1**

- The flashing procedure takes approximately 10 minutes or more. Upon completion, eBOX560-900-FL would automatically reboot.

【Note】: *Please open the command prompt window on the host system which is connected to eBOX560-900-FL.*

Step 4 Congratulations, you have successfully installed it on eBOX560-900-FL.

The default login credentials are:

Username: nvidia   Password: nvidia