AVerAI for AI at the Edge

AVerAI Box PC EN713-AAE9-1PC

Designed for NVIDIA® Jetson Nano™ Module

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Preface

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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 function 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 AVerMedia Global Offices.

Contact Enquiry

For more information of our products, pricing, and order placement, please fill in our inquiry form here, we will contact you within 24 hours.

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Revision History

Revision	Date	Updates
1.00	09/09/2019	Initial release

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ESD Warning

Electronic components and circuits are sensitive to Electrostatic Discharge (ESD). When handling any circuit board assemblies including AVerMedia AVerAI 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.

1.0 Introduction

AVerMedia AVerAI Box PC EN713-AAE9-1PC is a fully featured Box PC developed for NVIDIA® Jetson Nano™ module. It is specifically designed to have eight 10/100Mb Ethernet ports with PoE (PSE, Power Sourcing Equipment) support.

Operating with NVIDIA® Jetson Nano™ module, EN713-AAE9-1PC can process eight channels of 1080p30 video stream, which makes it the perfect choice in building the high performance AI edge computing platform for the intelligent video analytics applications.

EN713-AAE9-1PC has the dimensions of 175mm (L) x 190mm (W) x 80mm (H), which can fit to the commercial and industrial application. And it can operate in the temperature range from 0℃ to 45℃. AVerAI EN713-AAE9-1PC provides not only the access to a great list of latest interfaces on Nano™ module but also 1x RS-485 interface, 1x micro controller unit (MCU), and 1x RTC battery as the function enrichment.

AVerMedia AVerAI Box PC EN713-AAE9-1PC consists of the carrier board EN713-AAE9-000, the fanless chassis designed with AVerMedia AVerCooler technology, and NVIDIA® Jetson Nano™ module. EN713-AAE9-1PC can also accommodate an optional hard disk drive (HDD).

1.1 Product Specifications

Product Name	Major Name	EN713-AAE9
	Sub-Name	-1PC
Product Type	Fanless/Fan/Carrier Board	Fanless Box PC
Core	System on Module (SoM)	Fully support NVIDIA® Jetson Nano™
Front I/O	HDMI 2.0 Output	1x HDMI 2.0a/b Type-A supports maximum resolution 3840x2160 at 60Hz
	USB 2.0	1x USB 2.0 Micro-B for recovery
	USB 3.0	2x USB 3.0 Type-A
	10/100/1000 BASE-T Ethernet	1x GbE RJ-45
		8 PoE ports support (8x 10/100 MbE RJ-45 PSE, Power Sourcing Equipment, IEEE 802.3 AT/AF with power budget)
	Micro SD	N/A

	SATA Rev. 3.1	1x
	Audio	1x Mic-in, 1x Speaker-out
	CAN Bus	N/A
	RS-485	1x RS-485 Euroblock (3 pins)
	Expansion Header	40 pins (2x 20 Header) with 1x 3.3V UART2, 2x SPI, 1x I2S, 2x I2C
	Power Button	1x with a RGB tri-color LED
	Recovery Button	1x with a RGB tri-color LED
Back I/O	Wi-Fi	IEEE 802.11a/b/g/n/ac dual-band 2x2 MIMO (Optional, by using Wi-Fi Mini-PCIe card)
	Antenna	2x SMA female connector (Optional)
Internal PCIe Sockets	M.2 M key 2280	Alternative option: 1x M.2 key B 3042 (for LTE module)
	Mini-PCIe	Alternative option: 1x Mini-PCIe Gen2 x 1 (for Wi-Fi/BT card, or capture card: 1x C353 for HDMI 1080p30 / 1x CM313B for 3G-SDI 1080p30 / 1x C351 for composite)
MCU	MCU Power Function	Automatically turn on system when the power input is connected
	Watch Dog	RTC battery life monitor
Power	Power Input	(Optional) 54V/2A for PoE (PSE, IEEE 802.3 AT/AF with power budget) (12V/5A to Jetson Nano)
Environment	Operating Temperature	0℃ ~ 45℃
	Storage Temperature	-20℃ ~ 85℃
	Relative Humidity	40 ℃ @ 95%, Non-Condensing
	Vibration during Operation	With Desk/Wall/Din Rail Mount: 3 Grms, IEC 60068-2-64, random vibration, 5 ~ 500 Hz, 1 hr/axis
	Shock During Operation	30G, IEC60068-2-27, half sine, 11m duration
Physical Characteristics	Dimension	L:175mm x W:190mm x H:80mm (W:220mm with mounting ears)
	Weight	2.75Kg
	Thermal Solution	AVerCooler technology
	Mounting	Desk/Wall/Din Rail Mount
System	Operating System	Linux for Tegra (L4T) File system: Ubuntu 16.04, kernel version 4.9
	System on Module (SoM)	Fully support NVIDIA® Jetson Nano™
	SoM Power Consumption	5W ~ 25W
	Temperature Range	-25℃ ~ 80℃
	Memory	4GB 4ch x 16-bit LPDDR4 | 1600MHz

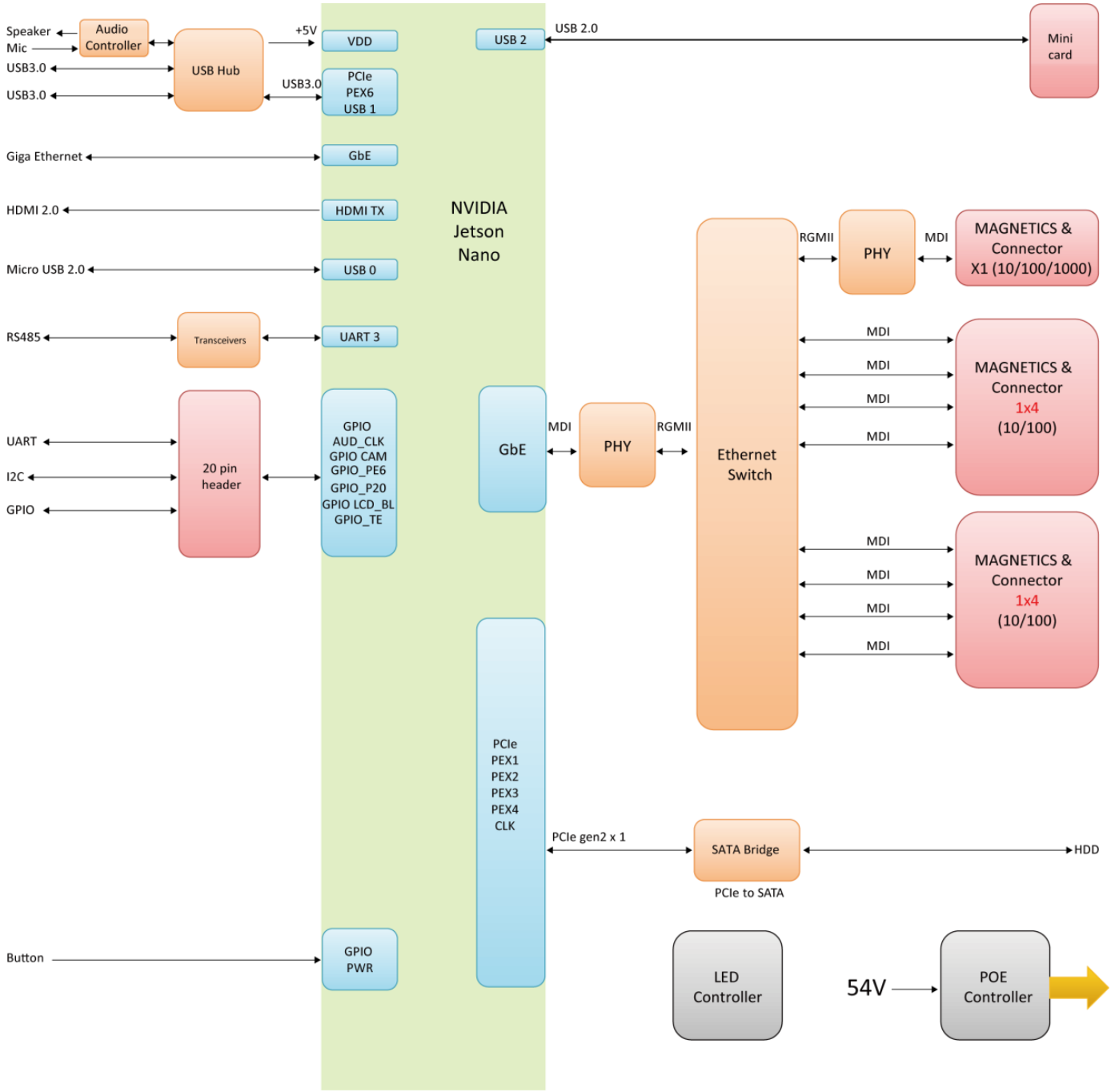
	GPU	Maxwell 128-core
	FLOPS (fp16)	512 GFLOPS
	CPU Complex	ARM® Cortex® A57 MPCore (Quad-Core) Processor with NEON Technology.
	Maximum Operating Frequency	1.43GHz
	Storage	16GB eMMC v5.1
	Video Encode	Maximum throughput: 2160p30 (H.265) | 2160p30 (H.264) | 2160p30 (WEBM VP8)
	Video Decode	Maximum throughput: 2160p60 (H.265) | 2160p60 (H.264) | 2160p60 (WEBM VP9)
Regulation	EMC	CE, FCC Class A, KC, VCCI
	Safety	CE, KC

1.2 SKU (Part) Numbers and Ordering Information

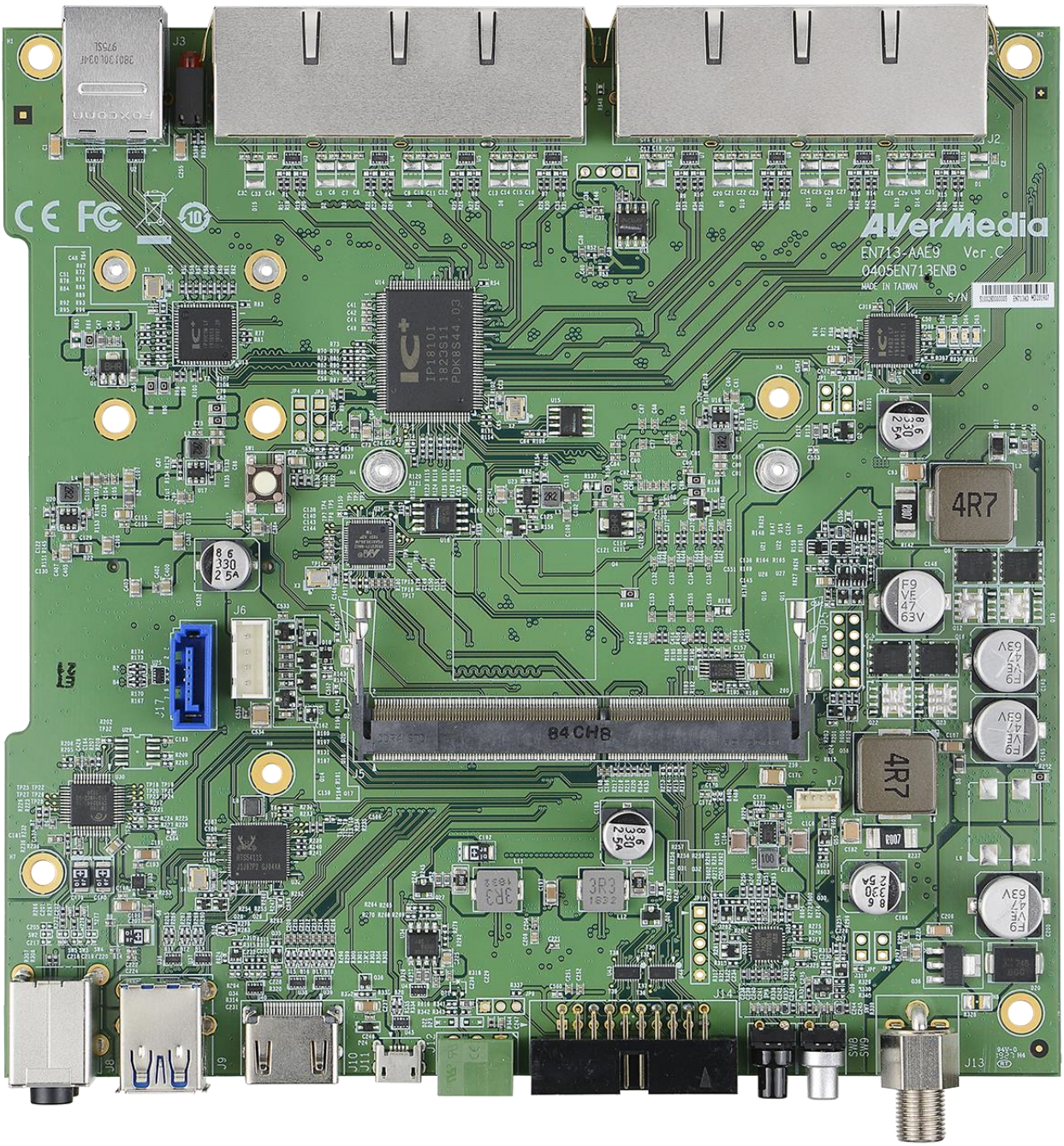
SKU Number	Nano™ Module	Fanless Chassis w/ AVerCooler Technology	HDD	HDD Cable	Power Adapter	Power Cord
EN713-AAE9-1PC	Installed	Installed	N/A	N/A	N/A	N/A
Seagate ST14000VE0008	N/A	N/A	Provided by order	N/A	N/A	N/A
064ASATA-BV3	N/A	N/A	N/A	Provided by order	N/A	N/A
041318GOUANL	N/A	N/A	N/A	N/A	Universal	N/A
064APOWERBRX-IPD (TW version)	N/A	N/A	N/A	N/A	N/A	Provided by order
064APOWERBR2-IPD (US version)	N/A	N/A	N/A	N/A	N/A	Provided by order
064APOWERBRW-IPD (UK version)	N/A	N/A	N/A	N/A	N/A	Provided by order
064APOWERBR5-IPD (EU version)	N/A	N/A	N/A	N/A	N/A	Provided by order
064APOWERBSL (JP version)	N/A	N/A	N/A	N/A	N/A	Provided by order
064APOWERBR4-IPD (CN version)	N/A	N/A	N/A	N/A	N/A	Provided by order

2.0 Product Overview

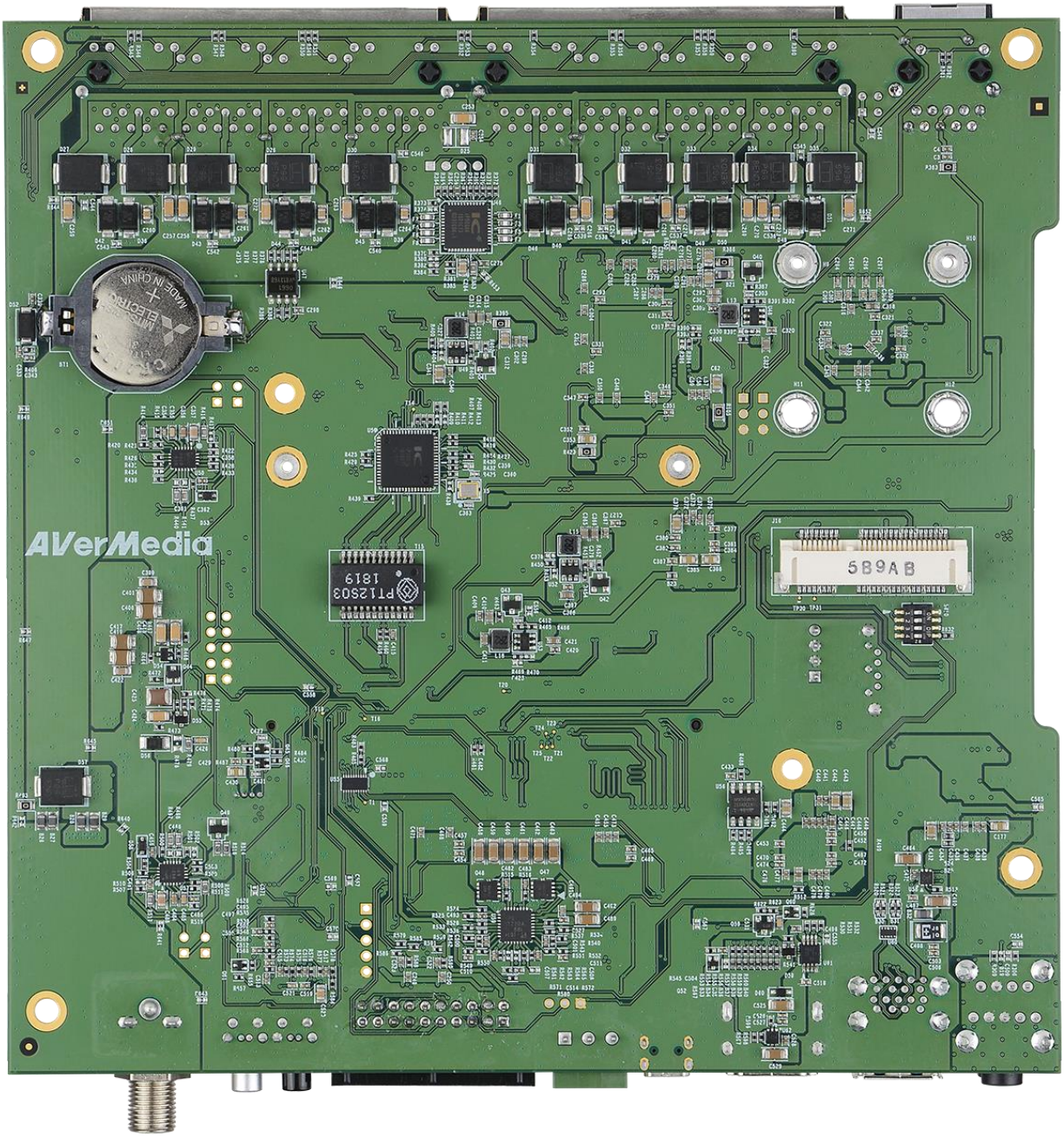
2.1 Block Diagram



2.2 Top View of Carrier Board



2.3 Bottom View of Carrier Board



2.4 Front View and Rear View of Box PC

2.5 Connector Summary

Designation	Description
J1	RJ45 10/100Mb 4-port Ethernet connector with POE support
J2	RJ45 10/100Mb 4-port Ethernet connector with POE support
J3	RJ45 1Gb single-port Ethernet connector
J5	260-pin SODIMM connector for NVIDIA® Jetson Nano™ module
J6	SATA power wafer
J7	Fan wafer
J8	Mic and speaker connector
J9	USB 3.1 Gen 1 2-port connector with 900mA x2
J10	HDMI video output connector
J11	OTG/USB micro-type connector
J12	RS485 connector
J13	54VDC power jack
J14	20-pin header UART console for debug, I2C, GPIO
J16	Mini card connector for USB only
J17	SATA connector
BT1	RTC battery connector

The above listed connectors are located on the carrier board, and most of them are accessible from the front panel and the rear panel of Box PC EN713-AAE9-1PC, where the names of the associated connectors are printed.

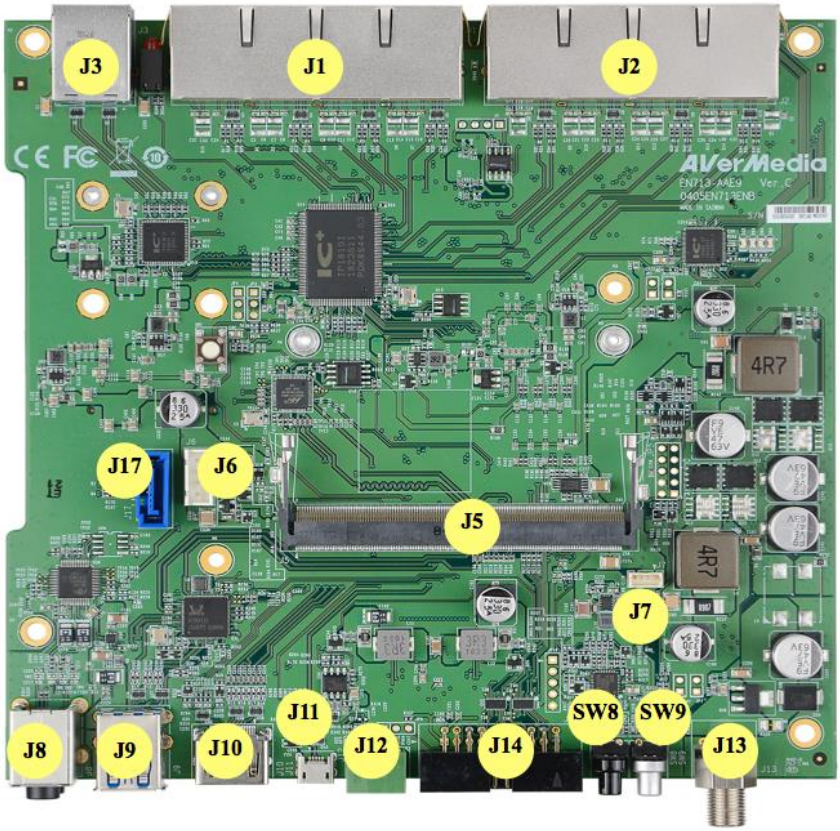
2.6 Switch Summary

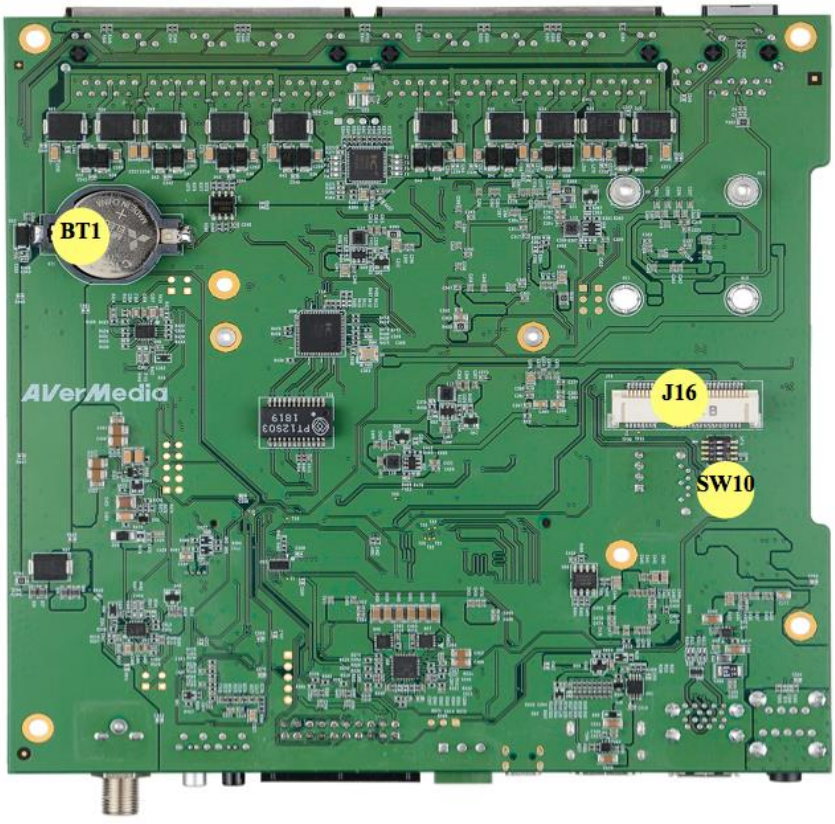
Designation	Description
SW8	Recovery button
SW9	Power on button
SW10	4-pin DIP switch with four sets of setting as defined in Section 3.20.

The above listed switches are located on the carrier board. SW8 and SW9 are accessible from the front panel and the rear panel of Box PC EN713-AAE9-1PC, where the names of Recovery and Power are printed.

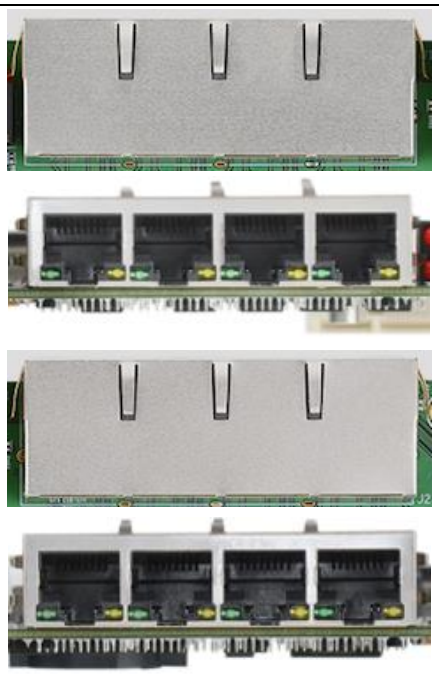
3.0 Feature Description

3.1 Connector and Switch Locations





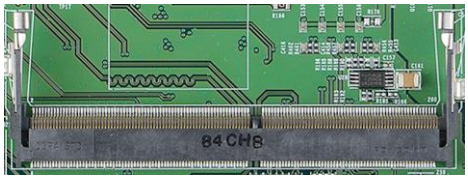
3.2 10/100Mb 4-Port Ethernet Connectors

Function	10/100Mb 4-port Ethernet connectors, used to connect IP cameras and/or the network switches.	
Location	J1 and J2	
Type Description	4-pin (12-36) RJ45 with integrated magnetics for PoE application	
Manufacturer and Part Number	CHAMPWAY, CWJ46614AENL	
Mating Connector	Any standard 10/100Mb Ethernet mating connector can be applicable.	
Pinout	Comply with Ethernet standards.	
Remarks	POE support is enabled on J1 and J2.	

3.3 1Gb Single-Port Ethernet Connector

Function	1Gb single-port Ethernet connector, used to connect to the host system.	
Location	J3	
Type Description	8-pin RJ45 with integrated magnetics	
Manufacturer and Part Number	FOXCONN, JFM38013-0L03-4F-BX3	
Mating Connector	Any standard 1Gb Ethernet mating connector can be applicable.	
Pinout	Comply with Ethernet standards.	
Remarks	None	

3.4 260-Pin SODIMM Connector

Function	Used to mount with and connect to NVIDIA® Jetson Nano™ module.	
Location	J5	
Type Description	260-pin SODIMM connector	
Manufacturer and Part Number	FOXCONN, ASAA826-EASB0-7H	
Mating Connector	SODDR4 9.2 standard	
Pinout	Please refer to NVIDIA Jetson Nano System-on-Module datasheet for the pinout details.	
Remarks	None	

3.5 SATA Power Wafer and SATA Connector

Function	3.5mm surveillance hard drive	
Location	J6 (on the left) and J17 (on the right)	
Type Description	SATA HDD power (on the left) and signal (on the right) connector	
Manufacturer and Part Number	J6: PINREX, 753-81-04TW00 J7: FOXCONN, LE18077-Z54B-4H	
Mating Connector	4-pin wafer and SATA 3.0 connector	
Pinout	J6: Pin Number / Description 1 / 5V Power 2 / GND 3 / GND 4 / 12V Power J7: Please refer to SATA 3.0 standard	
Remarks	None	

3.6 Fan Wafer

<table>
<tr><td>Function</td><td>Fan power and control wafer</td><td rowspan="6">  </td></tr>
<tr><td>Location</td><td>J7</td></tr>
<tr><td>Type Description</td><td>1*4 pin wafer with 1.25 mm pitch</td></tr>
<tr><td>Manufacturer and Part Number</td><td>Joint Tech,
A1250WV-04PNLNT1N00B</td></tr>
<tr><td>Mating Connector</td><td>Joint Tech,
A1250 series housing</td></tr>
<tr><td>Pinout</td><td><table><tr><th>Pin Number</th><th>Description</th></tr><tr><td>1</td><td>GND</td></tr><tr><td>2</td><td>5V Power</td></tr><tr><td>3</td><td>TACH from fan to module</td></tr><tr><td>4</td><td>PWM from module to fan</td></tr></table></td></tr>
<tr><td>Remarks</td><td colspan="2">None</td></tr>
</table>

3.7 Mic and Speaker Connector

<table>
<tr><td>Function</td><td>Mic and speaker jack</td><td rowspan="5">  </td></tr>
<tr><td>Location</td><td>J8</td></tr>
<tr><td>Type Description</td><td>3.5 mm miniature jack</td></tr>
<tr><td>Manufacturer and Part Number</td><td>JKCR, PJD-035-87HAB</td></tr>
<tr><td>Mating Connector</td><td>2 or 3 conductors type plug</td></tr>
<tr><td>Pinout</td><td>Mic input (on the top) and speaker output (on the bottom)</td></tr>
<tr><td>Remarks</td><td colspan="2">None</td></tr>
</table>

3.8 USB 3.1 Gen 1 2-Port Connector

<table>
<tr><td>Function</td><td>USB 3.1 Gen 1 device connector</td><td rowspan="5">  </td></tr>
<tr><td>Location</td><td>J9</td></tr>
<tr><td>Type Description</td><td>2-port USB Type-A female connector</td></tr>
<tr><td>Manufacturer and Part Number</td><td>CHAMPWAY,
CU3B-AFR15U-096H</td></tr>
<tr><td>Mating Connector</td><td>Any USB standard Type-A interface cable or device.</td></tr>
<tr><td>Pinout</td><td>Please refer to USB 3.1 Gen 1 standard.</td></tr>
<tr><td>Remarks</td><td colspan="2">Support 900mA x2</td></tr>
</table>

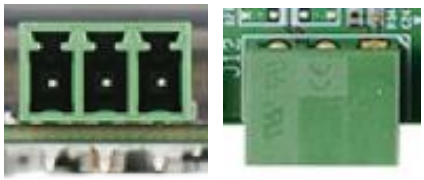
3.9 HDMI Video Output Connector

Function	HDMI Type-A TX connector	
Location	J10	
Type Description	HDMI Type-A female connector	
Manufacturer and Part Number	Compupack, ACNHM220028-001	
Mating Connector	Any HDMI standard Type-A interface cable or device.	
Pinout	Please refer to HDMI standard.	
Remarks	None	

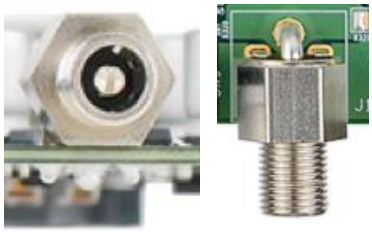
3.10 OTG/USB Micro-Type Connector

Function	OTG programming recovery	
Location	J11	
Type Description	USB Micro-type female connector	
Manufacturer and Part Number	Fullglory, FG-MCB-111440	
Mating Connector	Any USB standard Micro-type interface cable or device.	
Pinout	Please refer to USB Micro-type standard.	
Remarks	None	

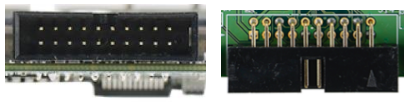
3.11 RS485 Connector

Function	RS485 interface from Jetson Nano module UART control	
Location	J12	
Type Description	3-pin terminal block	
Manufacturer and Part Number	DECA, ME030-38103T	
Mating Connector	Combination with the plug terminal block from DECA	
Pinout	Pin Number / Description 1 / GND 2 / B 3 / A	
Remarks		

3.12 54VDC Power Jack

<table>
<tr><td>Function</td><td>54V DC power input</td><td rowspan="6">  </td></tr>
<tr><td>Location</td><td>J13</td></tr>
<tr><td>Type Description</td><td>2.5 mm power jack</td></tr>
<tr><td>Manufacturer and Part Number</td><td>JKCR, DCD-020-105B</td></tr>
<tr><td>Mating Connector</td><td>Any 2.5mm power plug cable</td></tr>
<tr><td>Pinout</td><td>
<table>
<tr><th>Pin Number</th><th>Description</th></tr>
<tr><td>3</td><td>GND</td></tr>
<tr><td>1</td><td>54V Power</td></tr>
<tr><td>2</td><td>GND</td></tr>
</table>
</td></tr>
<tr><td>Remarks</td><td colspan="2">None</td></tr>
</table>

3.13 20-Pin Header

<table>
<tr><td>Function</td><td>UART console for debug, I2C, GPIO</td><td rowspan="6">  </td></tr>
<tr><td>Location</td><td>J14</td></tr>
<tr><td>Type Description</td><td>2.54 mm pitch 2*10 header</td></tr>
<tr><td>Manufacturer and Part Number</td><td>COXOC, 302AE20PGAR003</td></tr>
<tr><td>Mating Connector</td><td>Any 2.5mm pitch DuPont wire</td></tr>
<tr><td>Pinout</td><td>
<table>
<tr><th>Pin #</th><th>Description</th><th>Description</th><th>Pin #</th></tr>
<tr><td>1</td><td>3V Power</td><td>5V Power</td><td>2</td></tr>
<tr><td>3</td><td>GND</td><td>GND</td><td>4</td></tr>
<tr><td>5</td><td>I2C1_SDA</td><td>UART2_TXD</td><td>6</td></tr>
<tr><td>7</td><td>I2C1_SCL</td><td>UART2_RXD</td><td>8</td></tr>
<tr><td>9</td><td>I2C0_SDA</td><td>GND</td><td>10</td></tr>
<tr><td>11</td><td>I2C0_SCL</td><td>GPIO</td><td>12</td></tr>
<tr><td>13</td><td>GPIO</td><td>GPIO</td><td>14</td></tr>
<tr><td>15</td><td>GPIO</td><td>GPIO</td><td>16</td></tr>
<tr><td>17</td><td>GPIO</td><td>GPIO</td><td>18</td></tr>
<tr><td>19</td><td>GPIO</td><td>GPIO</td><td>20</td></tr>
</table>
</td></tr>
<tr><td>Remarks</td><td colspan="2">None</td></tr>
</table>

3.14 Mini Card Connector

Function	LTE or Wi-Fi Module	
Location	J16	
Type Description	Mini-Card for USB	
Manufacturer and Part Number	FOXCONN, AS0B221-S68Q-7H	
Mating Connector	Any Mini-Card standard interface device.	
Pinout	Please refer to Mini-Card standard for the pinout details.	
Remarks	Support USB 2.0 only, not PCIe	

3.15 RTC Battery Connector

Function	RTC battery for module	
Location	BT1	
Type Description	RTC holder and RTC battery	
Manufacturer and Part Number	Holder: LOTES, AAA-BAT-054-P06 RTC Battery: MITSUBISHI, CR2032 3V	
Mating Connector	Any CR2032 3V battery	
Pinout	Pin Number / Description 1 / 3V Power 2 / GND	
Remarks	Please be reminded to pay the proper attention on the polarity of this 3V battery, when it is being replaced. The correct placement is to keep the "+" mark on the battery outward, as shown in the above photo.	

3.16 Recovery Button

Function	Force recovery	
Location	SW8	
Type Description	Button with R, G, B LED	
Manufacturer and Part Number	N/A	
Mating Connector	N/A	
Pinout	N/A	
Remarks	None	

3.17 Power on Button

Function	Power control button	
Location	SW9	
Type Description	Button with R, G, B LED	
Manufacturer and Part Number	N/A	
Mating Connector	N/A	
Pinout	N/A	
Remarks	The green light on LED is activated when the board is powered on.	

3.18 4-Pin DIP Switch

Function	Optional function selection	
Location	SW10	
Type Description	4 SPST DIP switch	
Manufacturer and Part Number	N/A	
Mating Connector	N/A	
Pinout	Please refer to the following table.	

Remarks

SW10	Default (OFF)	ON
S1	Fan PWM controller	Fan always on
S2	Auto power on	Auto power on disabled
S3	RS-485 normal mode	RS-485 terminal mode
S4	Test mode off	Test mode on (for the factory use)

3.19 Other Switches and Jumpers

Other switches and jumpers, such as SW1, JP3, JP4, and JP5, etc. marked on the printed circuit board of EN713-AAE9-000 carrier board, are reserved for the internal use by AVerMedia. They are not open to the client application.

4.0 Installation

1. Check and ensure all the external system power supplies are turned off.
2. Install the necessary cables for the application. The cables can include the following ones. For the additional information of these mentioned cables, please refer to 8.0 Accessory Drawings in this manual.
   - Power cable to the input power connector (J13), DC 54V IN.
   - HDMI video display cable to HDMI video output connector (J10), HDMI OUT.
   - Mouse and keyboard cables to USB connectors (J9), USB 3.0.
3. Connect the power cable to the power adapter.
4. Turn on the power adapter. (Please be reminded NOT to power on the system by plugging in the live power.)

5.0 Software

For L4T (Linux for Tegra) BSP support and the other software support associated with NVIDIA® Jetson Nano™ module, please click the link here to contact our technical support function.

6.0 Force Recovery Mode

OTG/USB 3.1 port (J11) of EN713-AAE9-1PC can be used to re-program NVIDIA® Jetson Nano™ module 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 the suspend mode or the sleep mode.
2. Connect a USB cable from OTG USB port to the other host system which will be used to re-program the new system file into NVIDIA® Jetson Nano™ module.
3. Press and hold down Recovery button (SW8) and then power on BOX PC.
4. After three seconds, release Recovery button.
5. NVIDIA® Jetson Nano™ module will show up on the USB list of the host system as a new NVIDIA target device.

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

7.0 Power Consumption

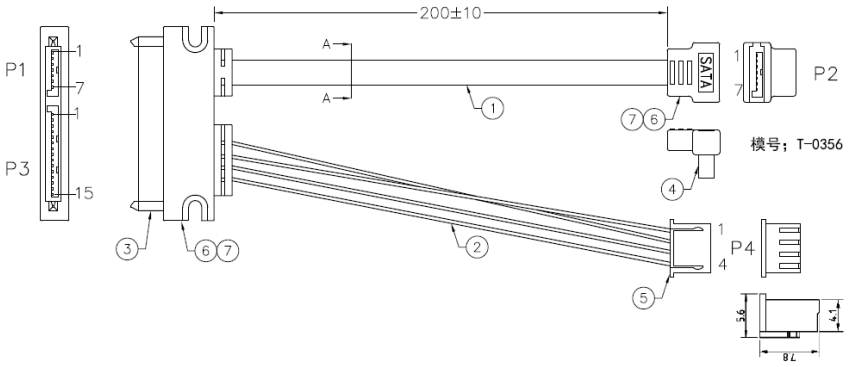
Item Description		Power Consumption
Theoretical Maximum System Power Consumption		54V, 150.0W
Typical System Power Consumption	Idle mode: Nano module ON. HDMI display, USB keyboard, and USB mouse are activated.	54V, 15.0W
	Suspend mode: Nano module is in the suspend mode.	54V, 8.0W
	Normal operating mode:	The power consumption under normal operating mode depends on the application software running with NVIDIA® Jetson Nano™ module on Box PC.

8.0 Accessory Drawings

8.1 HDD and HDD Cable

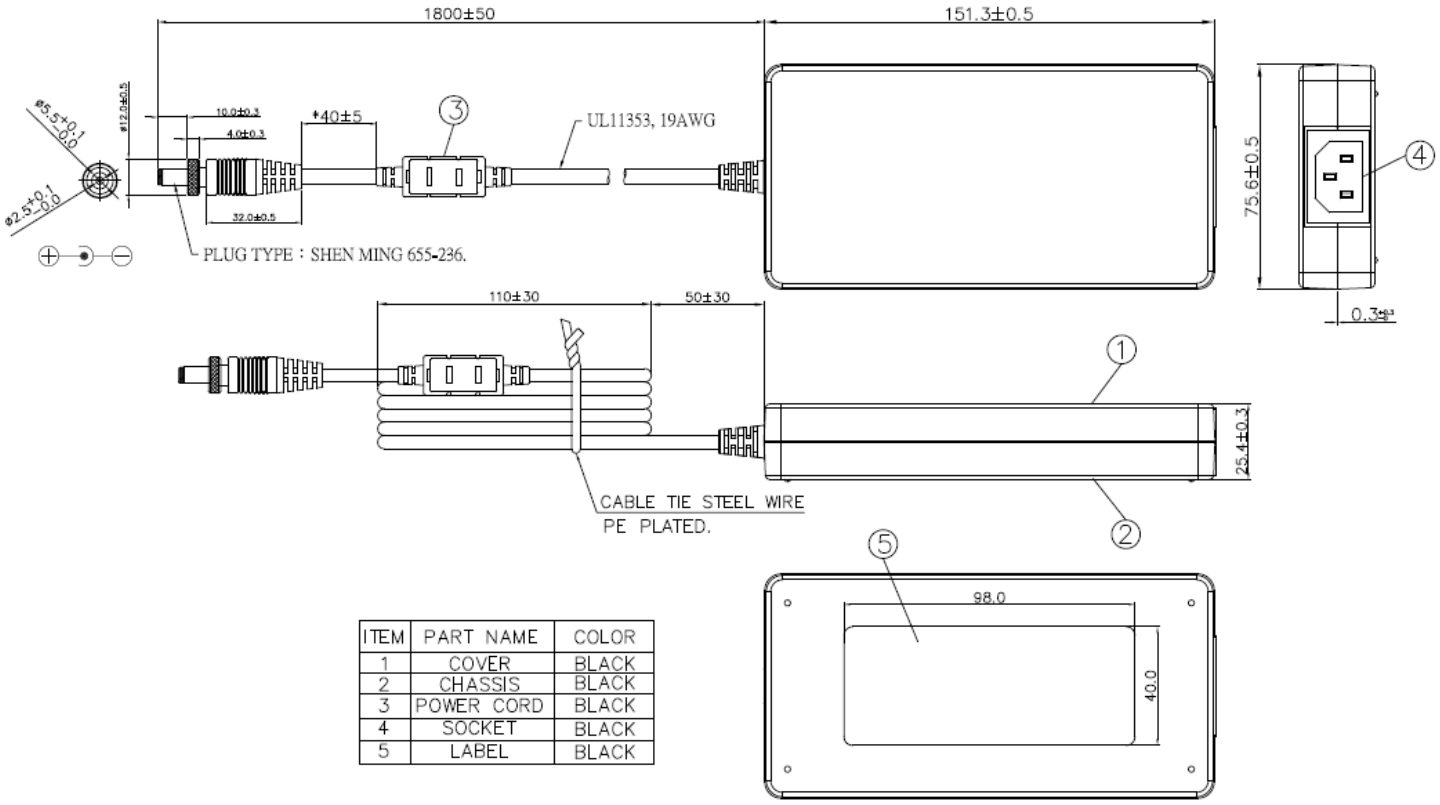
The optional hard disk drive (HDD) used with this Box PC is Seagate® ST14000VE0008. Please kindly refer to Seagate® official website for the detailed information related to the dimension drawings and the cable connection of ST14000VE0008.

HDD Cable 064ASATA-BV3



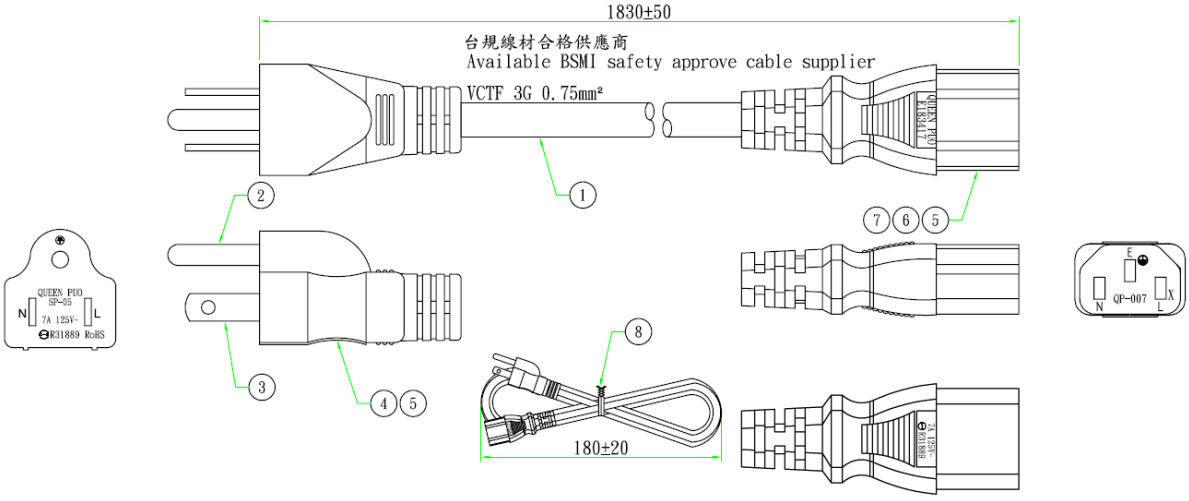
8.2 Power Adapter and Power Cord

Power Adapter 041318GOUANL

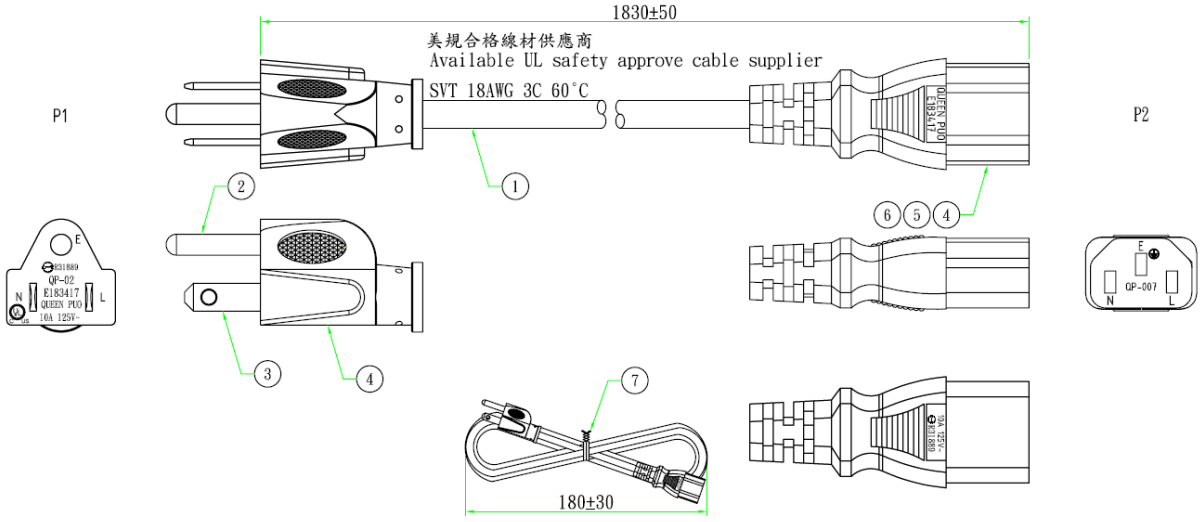


ITEM	PART NAME	COLOR
1	COVER	BLACK
2	CHASSIS	BLACK
3	POWER CORD	BLACK
4	SOCKET	BLACK
5	LABEL	BLACK

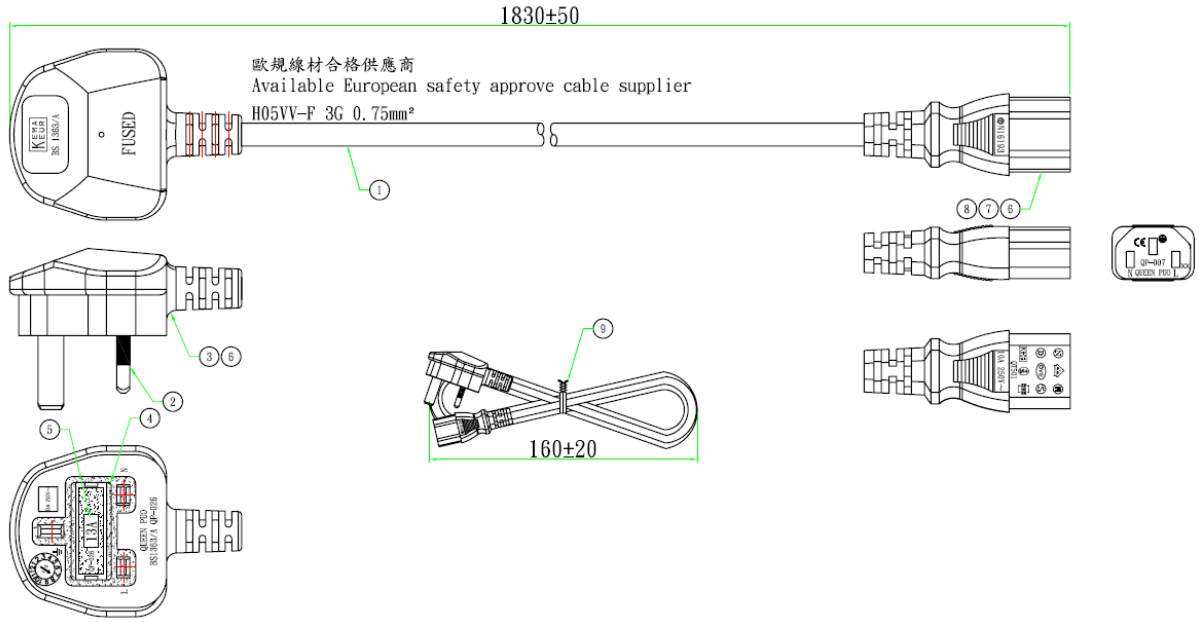
Power Cord 064APOWERBRX-IPD (TW version)



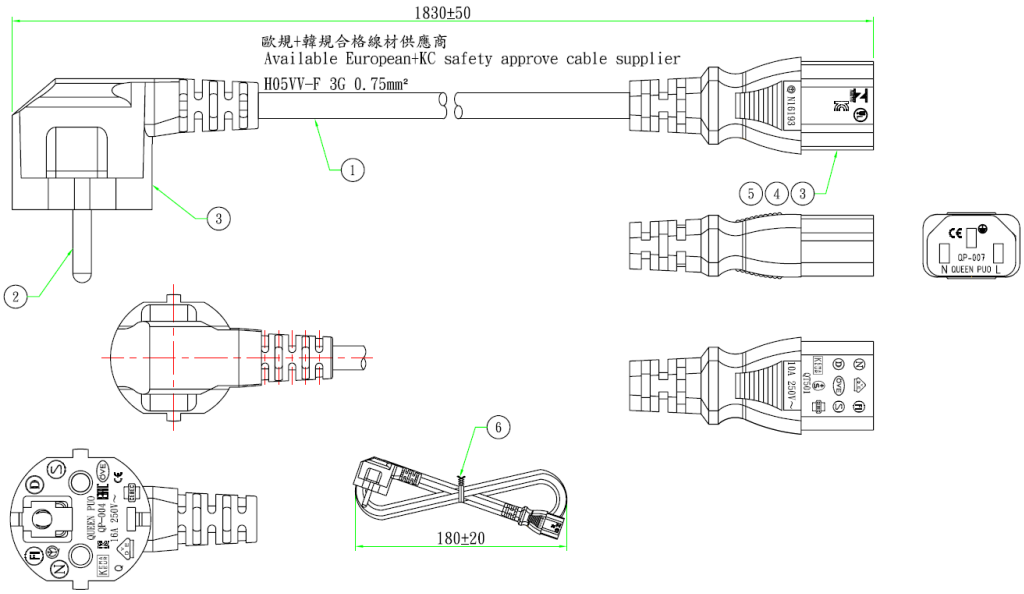
Power Cord 064APOWERBR2-IPD (US version)



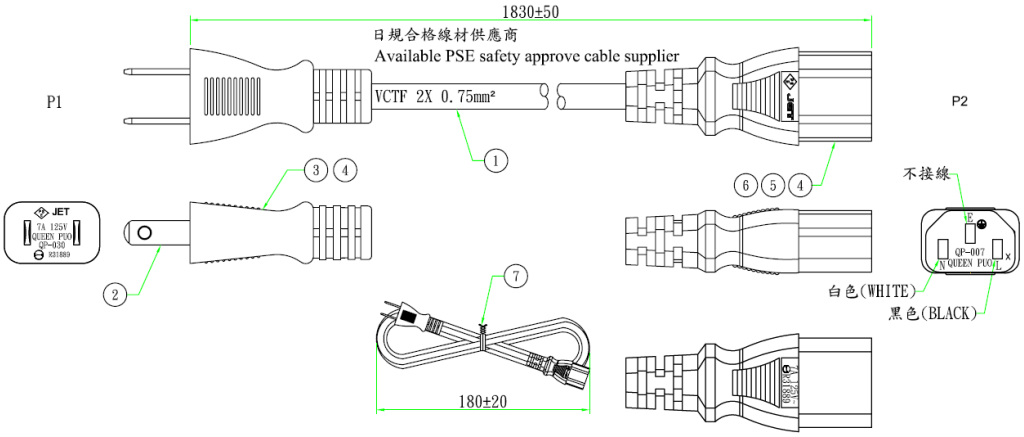
Power Cord 064APOWERBRW-IPD (UK version)



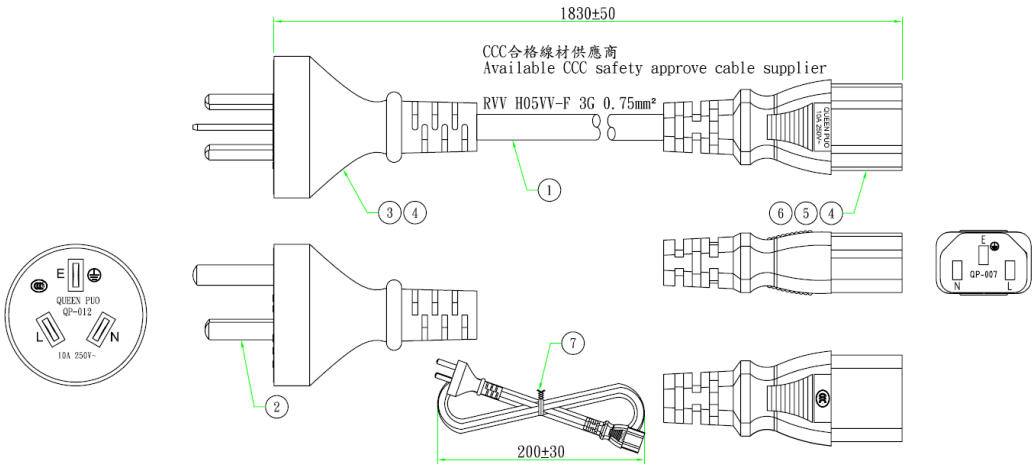
Power Cord 064APOWERBR5-IPD (EU version)



Power Cord 064APOWERBSL (JP version)

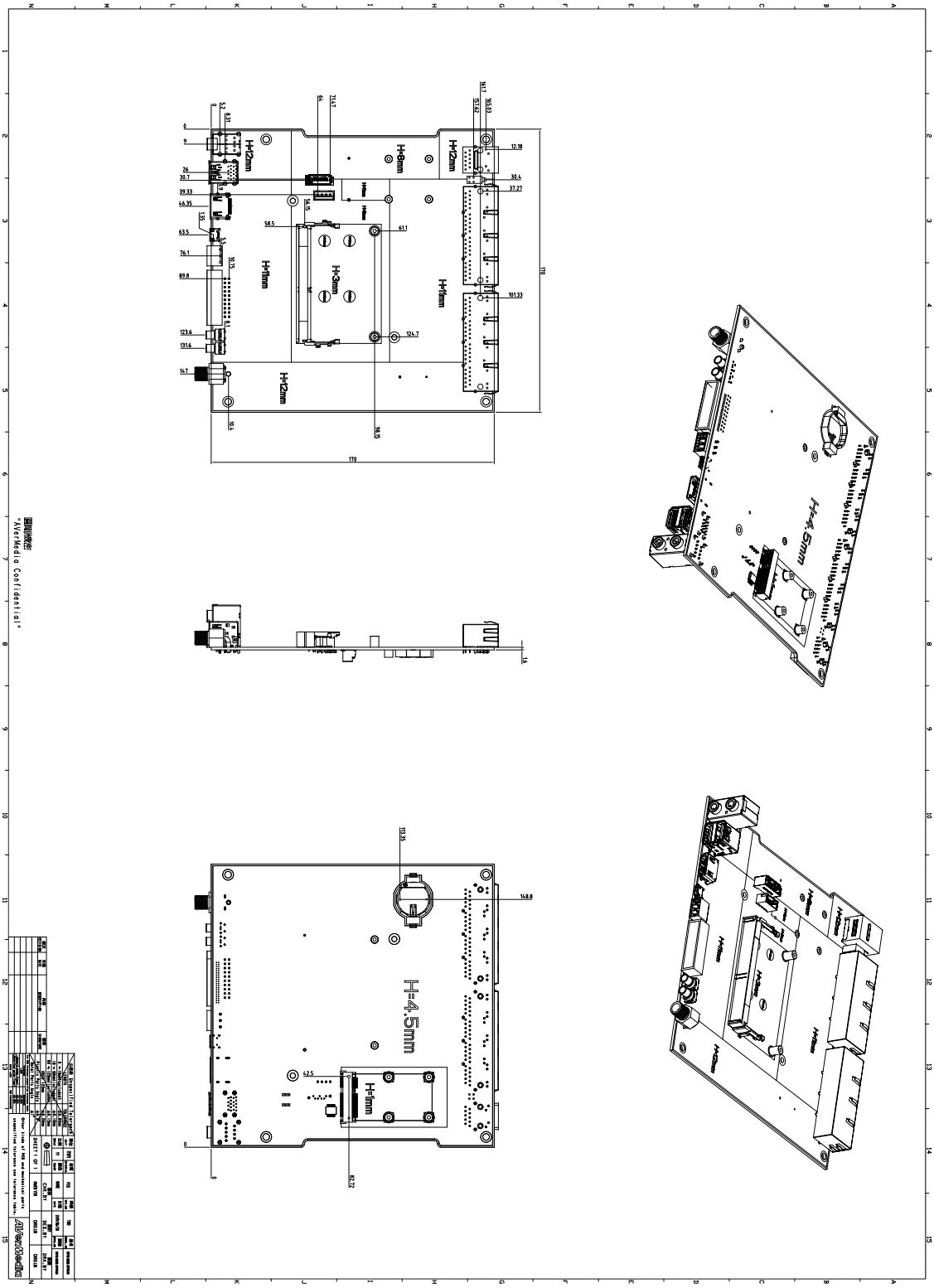


Power Cord 064APOWERBR4-IPD (CN version)

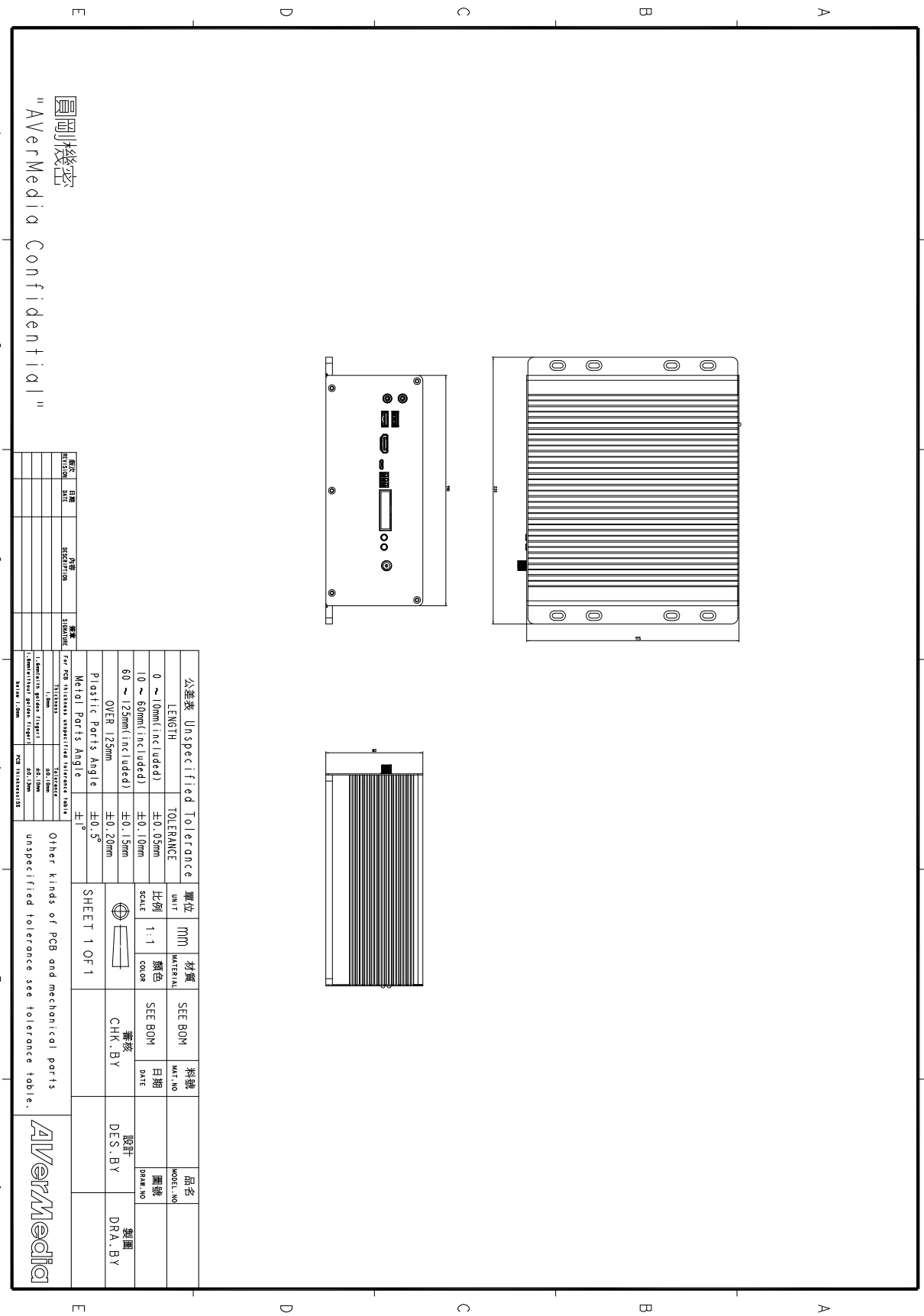


9.0 Dimension Drawings and Assembly Drawings

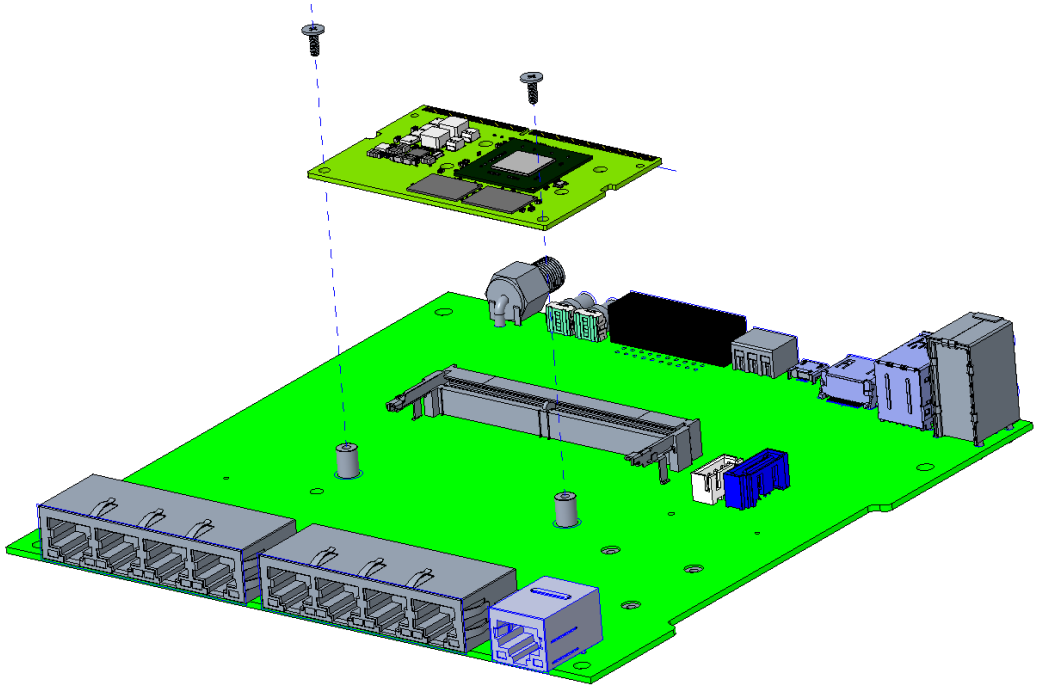
9.1 Dimension Drawing of Carrier Board



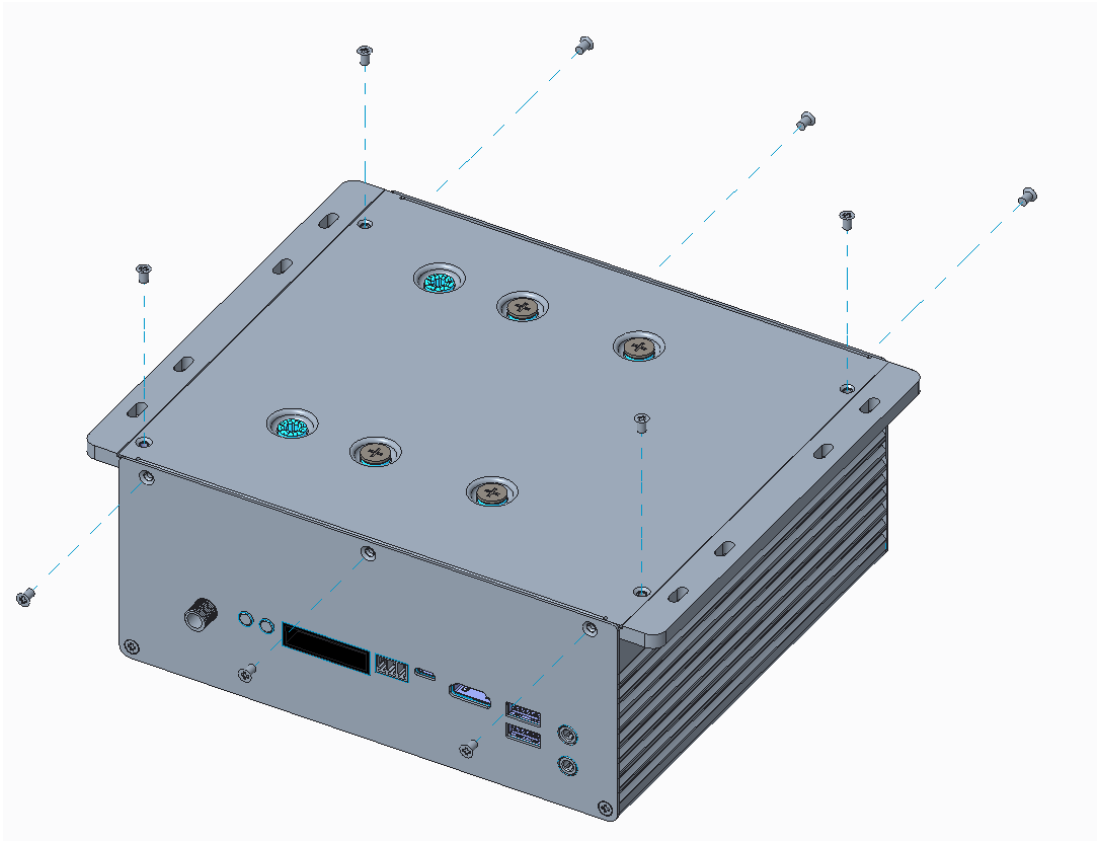
9.2 Dimension Drawing of Box PC



9.3 Assembly Drawing of Carrier Board and NVIDIA® Jetson Nano™ Module

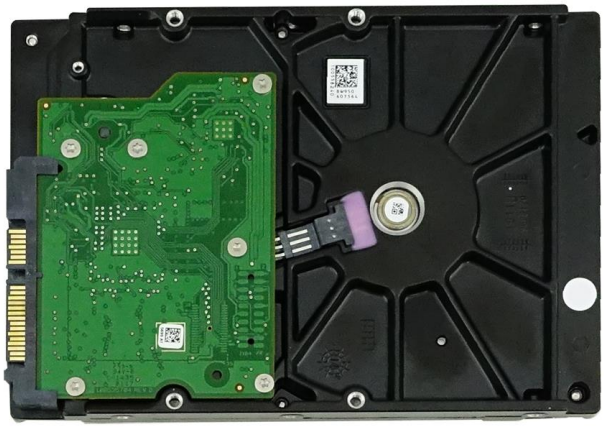


9.4 Assembly Drawing of Box PC, HDD, and HDD Cable

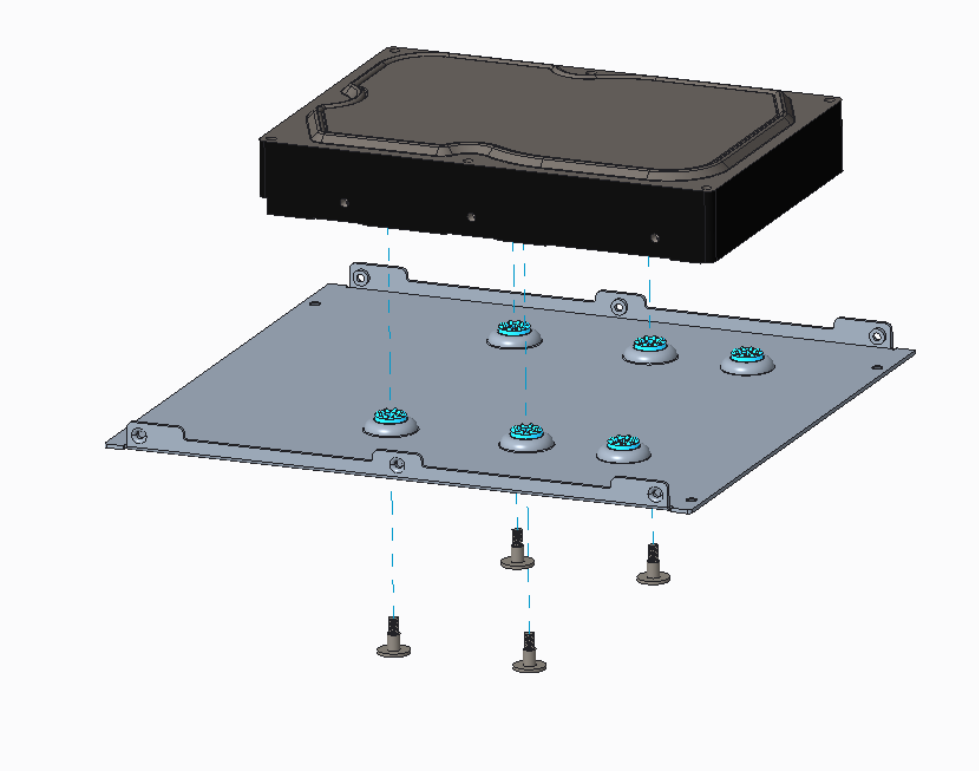


(Remove the mounting screws of the bottom plate from the chassis)

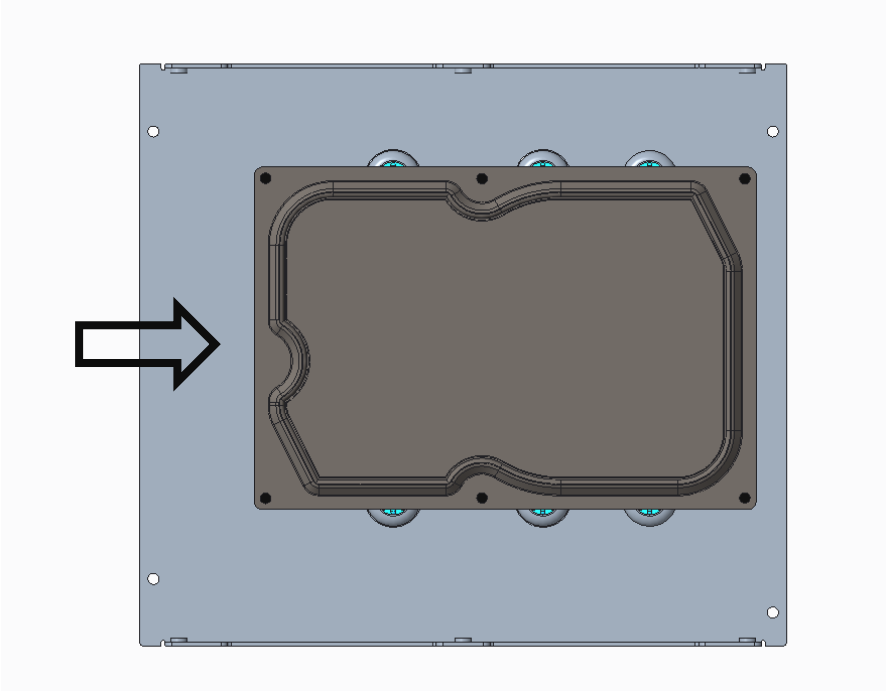
(Bottom plate)



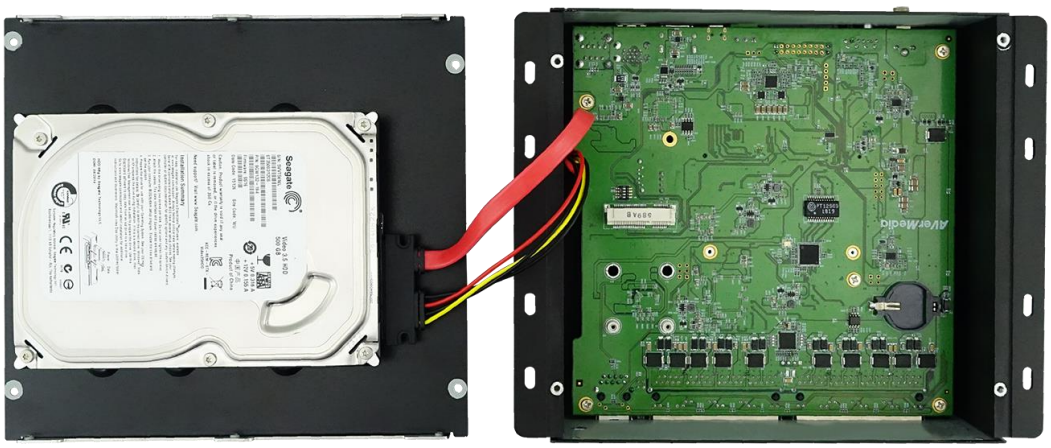
(HDD example)



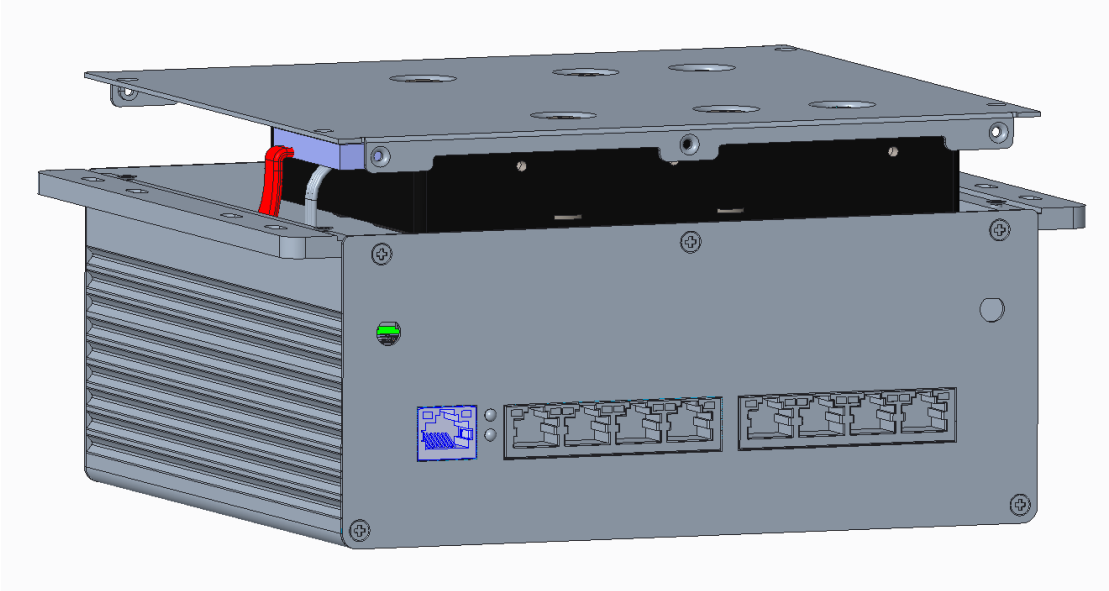
(Mount the bottom plate with HDD)



(The arrow is used to show the direction to plug HDD cable to HDD.)



(The assembly of the bottom plate with HDD, HDD cable, and Box PC)



(Mount the assembly of the bottom plate with HDD into Box PC)