EC3020 series

Supports NVIDIA® Jetson Orin™ NX and Nano Module

User's Manual

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iBASE

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Compliance

CE

This product has passed CE testing for environmental specifications and limits, in accordance with the directives of the European Union (EU). If users modify and/or install additional devices in this equipment, the CE declaration of conformity may no longer apply.

FC

This product has been tested and found to comply with the limits for a Class B device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses, and can radiate radio frequency energy. If not installed and used in accordance with the manufacturer's instructions, it may cause harmful interference to radio communications.

WEEE

This product must not be disposed of as regular household waste, in accordance with the EU Directive on Waste Electrical and Electronic Equipment (WEEE – 2012/19/EU). Instead, it should be taken to an appropriate municipal recycling collection point. Please check local regulations for the proper disposal of electronic products.

Green IBASE

This product complies with RoHS 2 restrictions, which prohibit the use of certain hazardous substances in electrical and electronic equipment. The following substances must not exceed the specified concentrations:

- Hexavalent chromium: 100 ppm
- Poly-brominated biphenyls (PBBs): 1,000 ppm
- Poly-brominated diphenyl ethers (PBDEs): 1,000 ppm
- Cadmium: 100 ppm
- Mercury: 1,000 ppm
- Lead: 1,000 ppm
- Bis(2-ethylhexyl) phthalate (DEHP): 1,000 ppm
- Butyl benzyl phthalate (BBP): 1,000 ppm
- Dibutyl phthalate (DBP): 1,000 ppm

  Diisobutyl phthalate (DIBP): 1,000 ppm

Important Safety Information

Carefully read the precautions before using the device.

Environmental conditions:

• Place the device horizontally on a stable and solid surface to prevent it from falling and causing serious damage.
• Leave plenty of space around the device and do not block the ventilation openings.
• Slots and openings on the chassis are provided for ventilation. Do not block or cover these openings. Make sure to leave sufficient space around the device for proper ventilation. NEVER INSERT OBJECTS OF ANY KIND INTO THE VENTILATION OPENINGS.

Care for your IBASE products:

• Before cleaning the device, turn it off and unplug all cables, including the power cable, as a small amount of electrical current may still be present.
• Use neutral cleaning agents or diluted alcohol to clean the device chassis with a cloth. Then wipe the chassis with a dry cloth.
• Vacuum dust using a computer vacuum cleaner to prevent air vents or slots from becoming clogged.

WARNING

Attention during use:

• Do not place heavy objects on top of the device.
• Operate this device using the type of power indicated on the marking label. If you are unsure of the available power type, consult your distributor or local power company.
• Do not walk on the power cord or allow anything to rest on it.
• If you use an extension cord, make sure that the total ampere rating of the products plugged into the extension cord does not exceed its limits.**Avoid**

Disassembly

Do not disassemble, repair, or modify the device. Disassembly, modification, or any attempt at repair may generate hazards and cause damage to the device, bodily injury, or property damage, and will void any warranty.

CAUTION

Danger of explosion if the internal lithium-ion battery is replaced with an incorrect type. Replace only with the same or an equivalent type recommended by the manufacturer. Dispose of used batteries according to the manufacturer's instructions.

Warranty Policy

• IBASE standard products:
24-month (2-year) warranty from the date of shipment. If the shipment date cannot be verified, the product serial number may be used to determine the approximate shipping date.
• Third-party parts:
12-month (1-year) warranty from the delivery date for third-party parts not manufactured by IBASE, such as CPU, memory, HDD, power adapter, panel, and touchscreen.
＊ Products that fail due to misuse, accident, improper installation, or unauthorized repair will be treated as out of warranty, and customers will be billed for repair and shipping charges.

Technical Support & Services

1. Visit the IBASE website at www.ibase.com.tw to find the latest product information.
2. If you require further assistance from your distributor or sales representative, prepare the following information and provide a detailed description of the issue:
   • Product model name
   • Product serial number
   • Detailed description of the problem
   • Error messages in text or screenshots, if applicable
   • Peripheral configuration
   • Software in use (including OS and application software with version numbers)
3. If repair service is required, visit the IBASE website to complete the RMA form or contact your distributor or sales representative.

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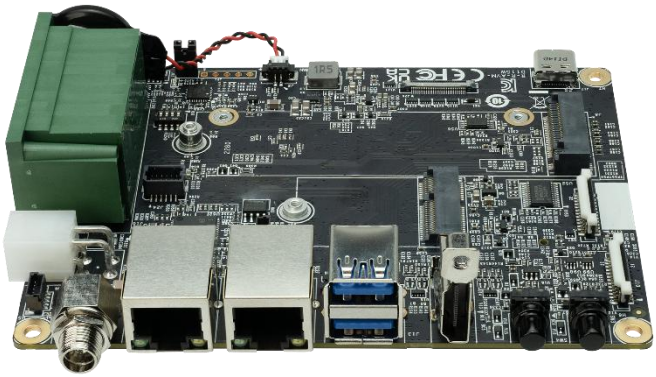
Chapter 1
General Information

The information provided in this chapter includes:

- Introduction
- Features
- EC3020 Carrier Board Specifications
- EC3020 Specifications
- Block Diagram
- Optional Accessories
- System Appearance

1.1 Introduction

The IBASE EC3020 series is a fully featured carrier board and box PC designed for use with NVIDIA® Jetson Orin™ NX and Jetson Orin™ Nano modules. It enables access to a wide range of the latest interfaces supported by these NVIDIA® modules.
The system offers HDMI video output, two USB 3.2 ports, two GbE RJ-45 ports, a 20-pin expansion terminal block, and a USB 2.0 Type-C port for recovery purposes.
With the powerful NVIDIA® Jetson Orin™ NX and Orin™ Nano modules and rich I/O functionality, the IBASE EC3020 series is an ideal solution for building compact, high-performance AI edge computing platforms, particularly for intelligent video analytics applications.



1.2 Features

- NVIDIA® Jetson Orin™ NX module or Orin™ Nano module compatibility
- 2x GbE RJ-45, 1x M.2 Key E 2230 for Wi-Fi
- 1x HDMI 4Kp60 (Orin NX) or 4Kp30 (Orin Nano)
- 2x 4-lane MIPI CSI-2 camera inputs (22-pin FPC 0.5mm pitch connector)
- 2x USB 3.2 Type-A, 1x USB 2.0 Type-C (for recovery)
- 1x M.2 Key M 2280 for SSD
- Expansion header:
  20-pin: 2x I2C, 2x UART, 4x GPIOs, 1x CAN (EU terminal block), TPM 2.0
  10-pin: Supports OOB management via OOB module
  40-pin wafer: optional 5G functions via daughter board
  2x 6-pin: optional PSE board, support 802.3 af
- Daughter board support: PSE Board, OOB Module, 5G Daughter Board
- Power requirement: DC 12 ~24V, 10A max (DC IN Jack or ATX 4-pin)
- Power cord options: US/JP/EU/UK/TW/AU/CN
- Thermal solution: Heat sink with optional fan
- Power and Recovery buttons
- RTC battery support with battery life monitoring by MCU
- Dimensions: W: 126mm x L: 96mm x H: 74mm, Weight: 1 Kg
- Certifications: CE, FCC, VCCI, KC
  Operating temperature:-25°C ~ 60 °C

1.3 EC3020 Carrier Board Specifications

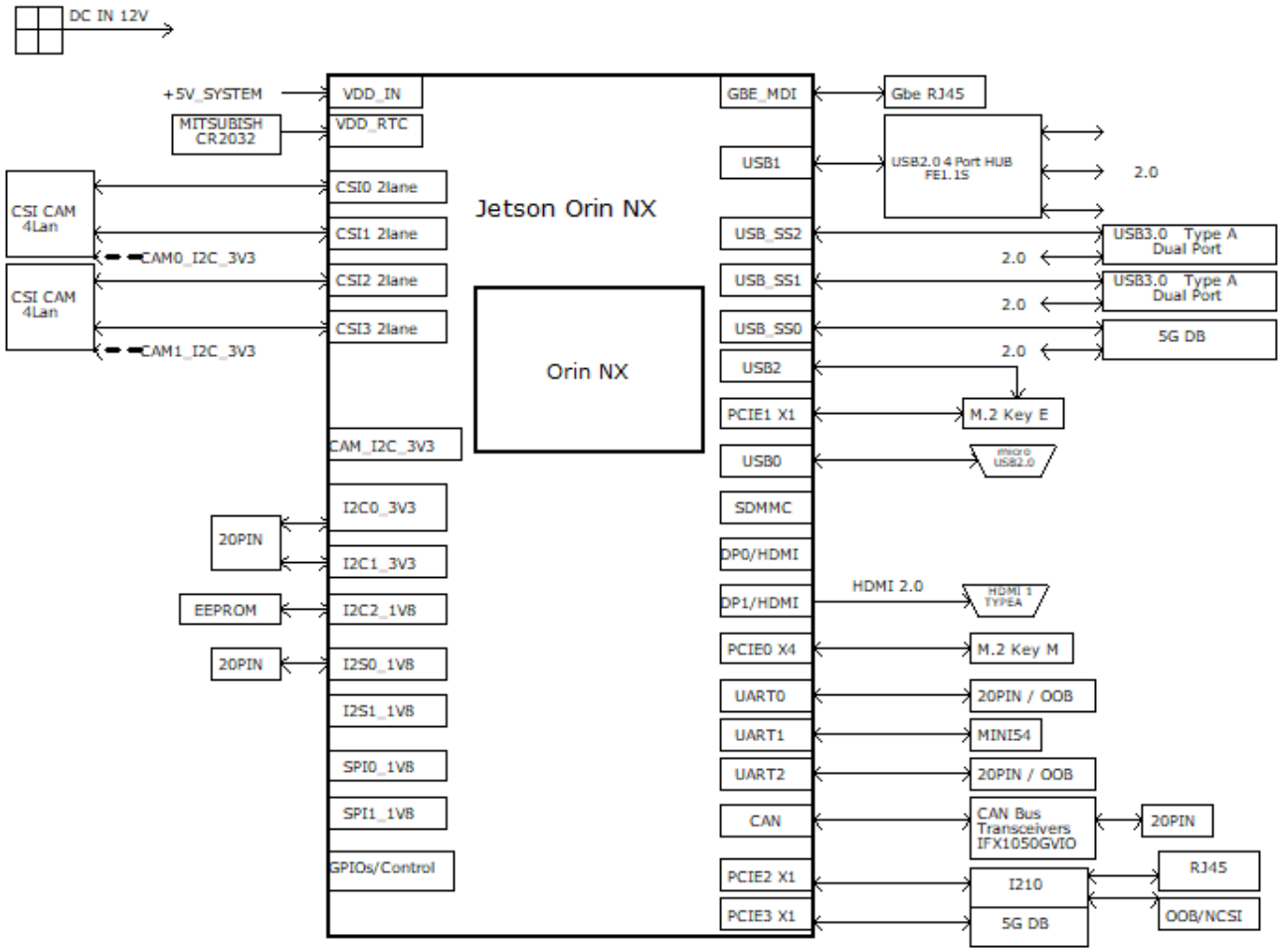
Type	Carrier board
NVIDIA GPU SoC Module Compatibility	NVIDIA® Jetson Orin™ NX module NVIDIA® Jetson Orin™ NANO module
Networking	2x GbE RJ-45 1xM.2. key E 2230 for wifi
Display Output	1x HDMI 4Kp60 for Orin NX 1x HDMI 4Kp30 for Orin Nano
Temperature	Operating temperature -40°C~85°C Option -40°C~ 60°C (PSE 802.3AF) (TBD) Storage temperature -40°C ~ 85°C Relative humidity 40 °C @ 95%, Non-Condensing
USB	2x USB 3.2 Type-A 1x USB 2.0 type C for recovery
Storage	1xM.2. key M 2280 for SSD
Expansion Header (EU terminal block)	20-pin: 2x I2C, 2x UART, 4x GPIOs, 1x CAN (EU terminal block)*** 10-pin: Supports OOB management via OOB module 40-pin wafer: Supports5G card functions via daughter board
Daughter Board (Optional)	PSE Board/OOB Module/5G Daughter Board
Power requirement	Voltage: DC 12~24V Current : DC IN Jack on board: 10A Max Current : ATX 4pin: 10A Max
Power Cord	US/JP/EU/UK/TW/AU/CN
Thermal solution	Heat sink with fan (optional)
Buttons	Power and Recovery
RTC Battery	Support RTC battery and Battery Life Monitoring by MCU
Dimensions	120mm x 90mm(4.72” x 3.54”)
Weight	125 g
Certifications	CE, FCC, VCCI, KC

***When equipped with the OOB module, 2x UART will be unavailable.

1.4 EC3020 Specifications

Type	Fanless Box PC
NVIDIA GPU SoC Module Compatibility	NVIDIA® Jetson Orin™ NX module NVIDIA® Jetson Orin™ NANO module
Networking	2x GbE RJ-45 1xM.2. key E 2230 for wifi
Display Output	1x HDMI 4Kp60 for Orin NX 1x HDMI 4Kp30 for Orin Nano
Temperature	Operating temperature -25°C~60°C Option -40°C~ 40°C (PSE 802.3AF) (TBD) Storage temperature -40°C ~ 85°C Relative humidity 40 °C @ 95%, Non-Condensing
USB	2x USB 3.2 Type-A 1x USB 2.0 type C for recovery
Storage	1xM.2. key M 2280 for SSD
Expansion Header (EU terminal block)	20-pin: 2x I2C, 2x UART, 4x GPIOs, 1x CAN (EU terminal block) 10-pin: Supports OOB management via OOB module 40-pin wafer: Supports 5G/ card functions via daughter board
Daughter Board (Optional)	PSE Board/OOB Module/5G Daughter Board
Power requirement	Voltage : DC 12~24V Current : DC IN Jack on board: 5A Max ATX 4pin: 5A Max
Power Cord	US/JP/EU/UK/TW/AU/CN
Thermal solution	Fanless solution
Buttons	Power and Recovery
RTC Battery	Support RTC battery and Battery Life Monitoring by MCU
Dimensions	126mm x 96mm x 73.9mm (4.96” x 3.78” x 2.91”)
Weight	1 kg
Certifications	CE, FCC, VCCI, KC

1.5 Block Diagram



1.6 Optional Accessories

Accessories

- **Power Cord**
  - Available in 7 regional variants: EU, JP, TW, US, CN, UK, AU
- **MIPI Camera (Internal I/O, 22-pin MIPI connector)**
  - Raspberry Pi Cameras:
    - v2 IMX219 & IMX477
  - APPRO.PHO Cameras:
    - B-04: IMX179 (8M) MIPI, 1080P (30fps)
    - C-04: IMX290 (2M) MIPI, 1080P (30fps)
    - C-05: IMX290 (2M) + ISP (YUV), 1080P (30fps)

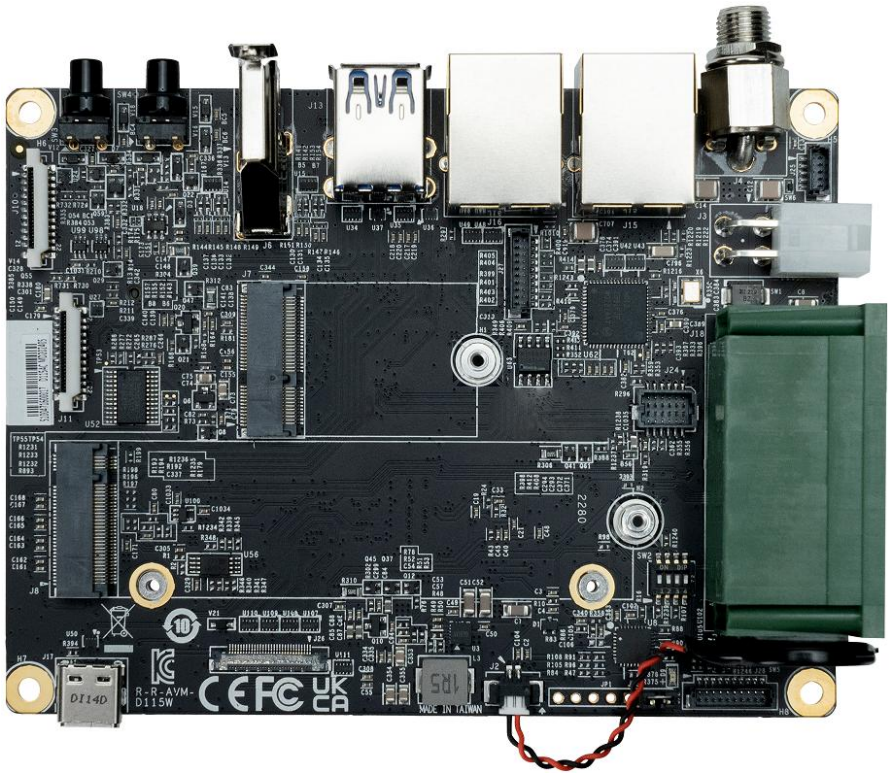
Additional Information

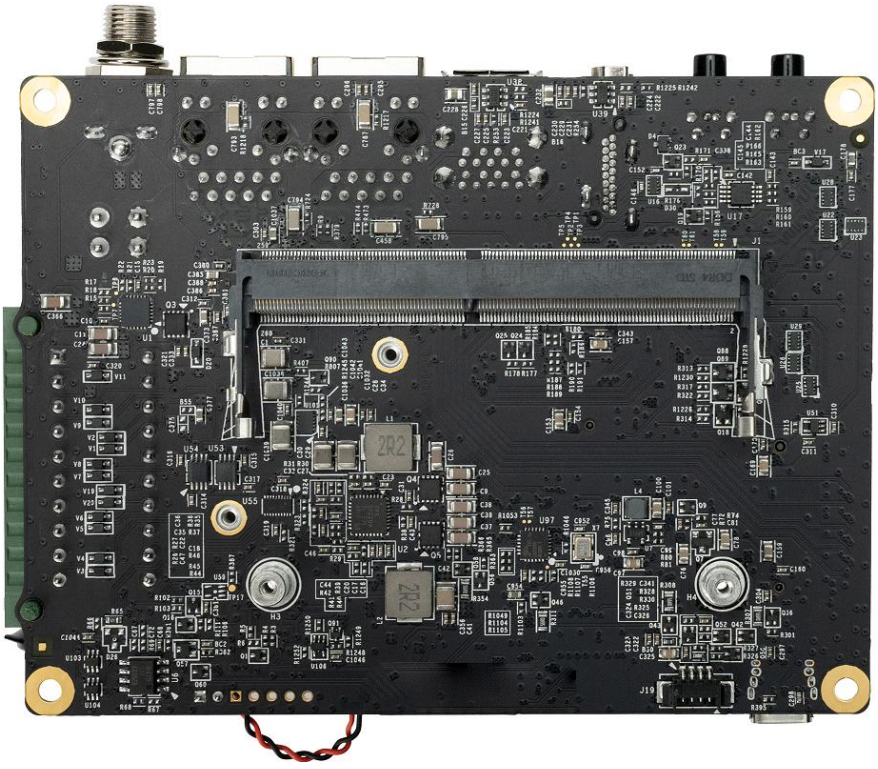
- **Base Items**: EC3020 series
- **Compatibility**: NVIDIA® Jetson Orin™ NX or Orin™ Nano

All specifications are subject to change without prior notice.

1.7 Product View

Front View and Back View of Carrier board



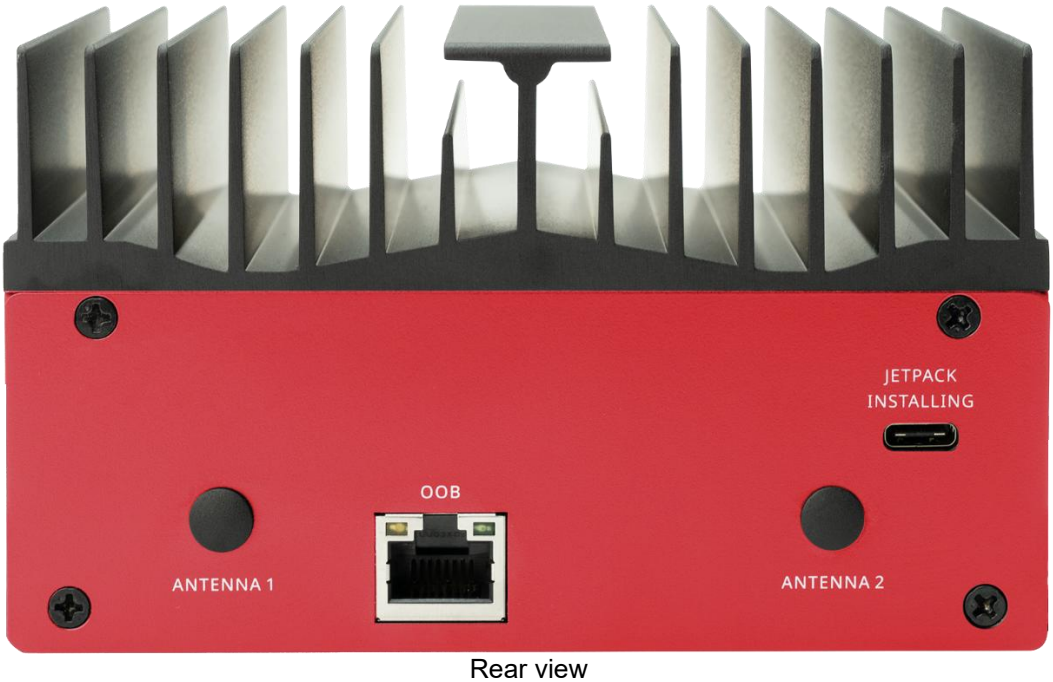


Front View and Three-Quarter View of EC3020

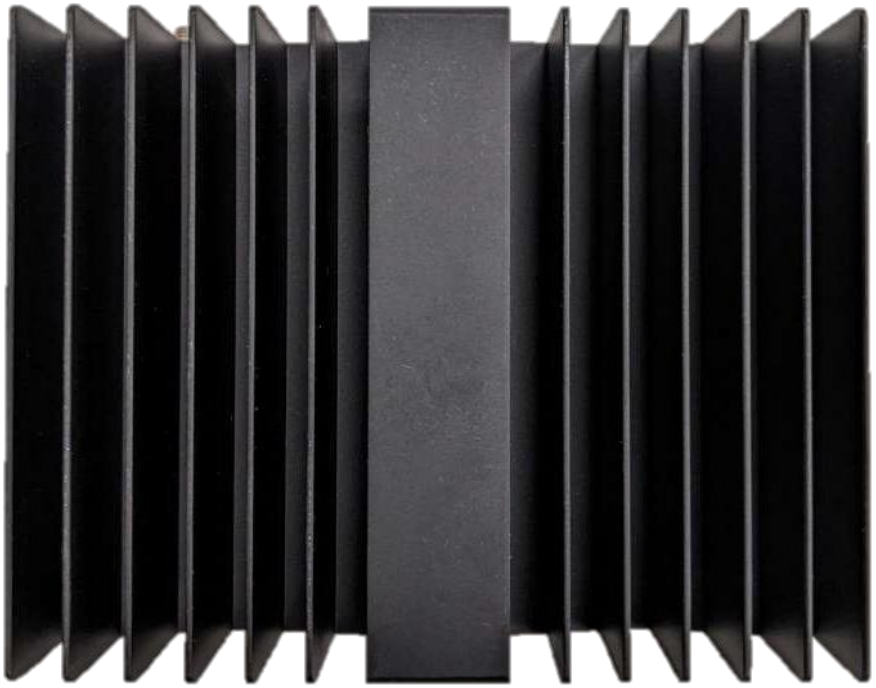
Left view

Right view

Front view



Rear view



Top view

Bottom view

Chapter 2
Hardware Configuration

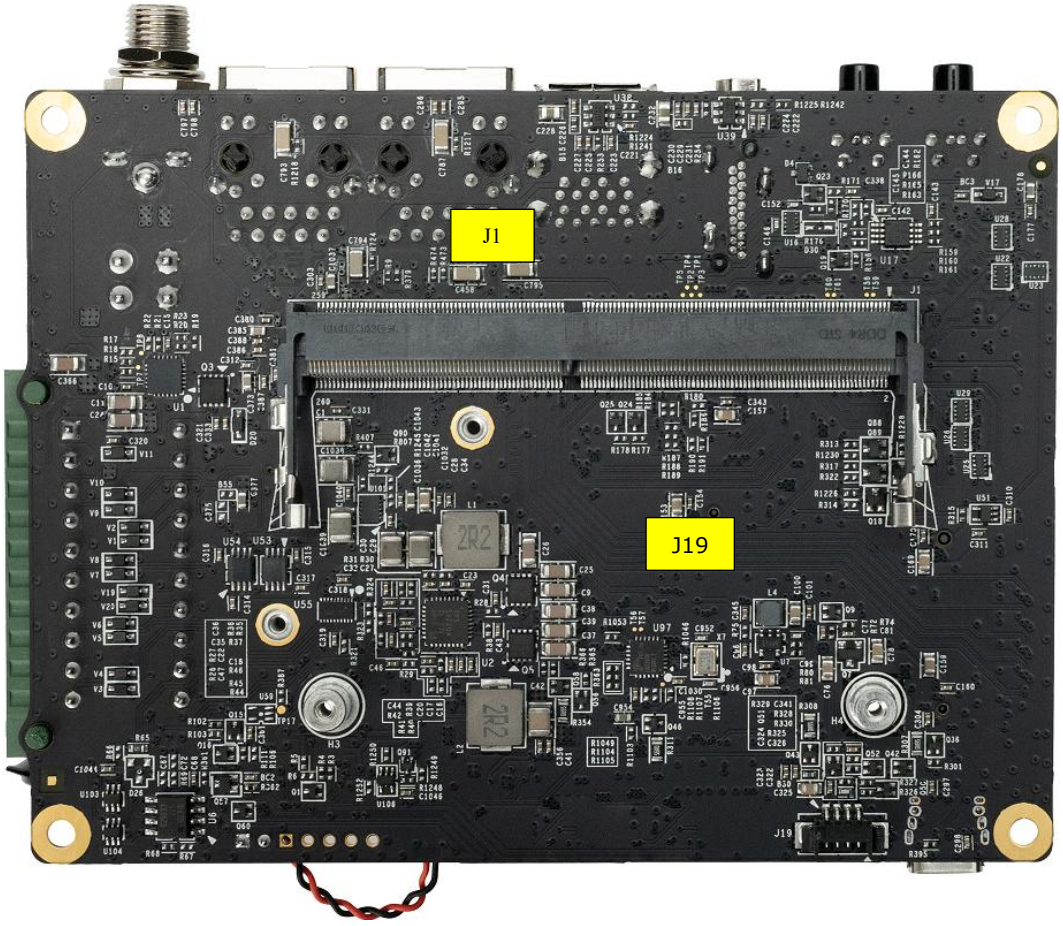
The information provided in this chapter includes:

- Connectors Location

2.1 Connectors Location

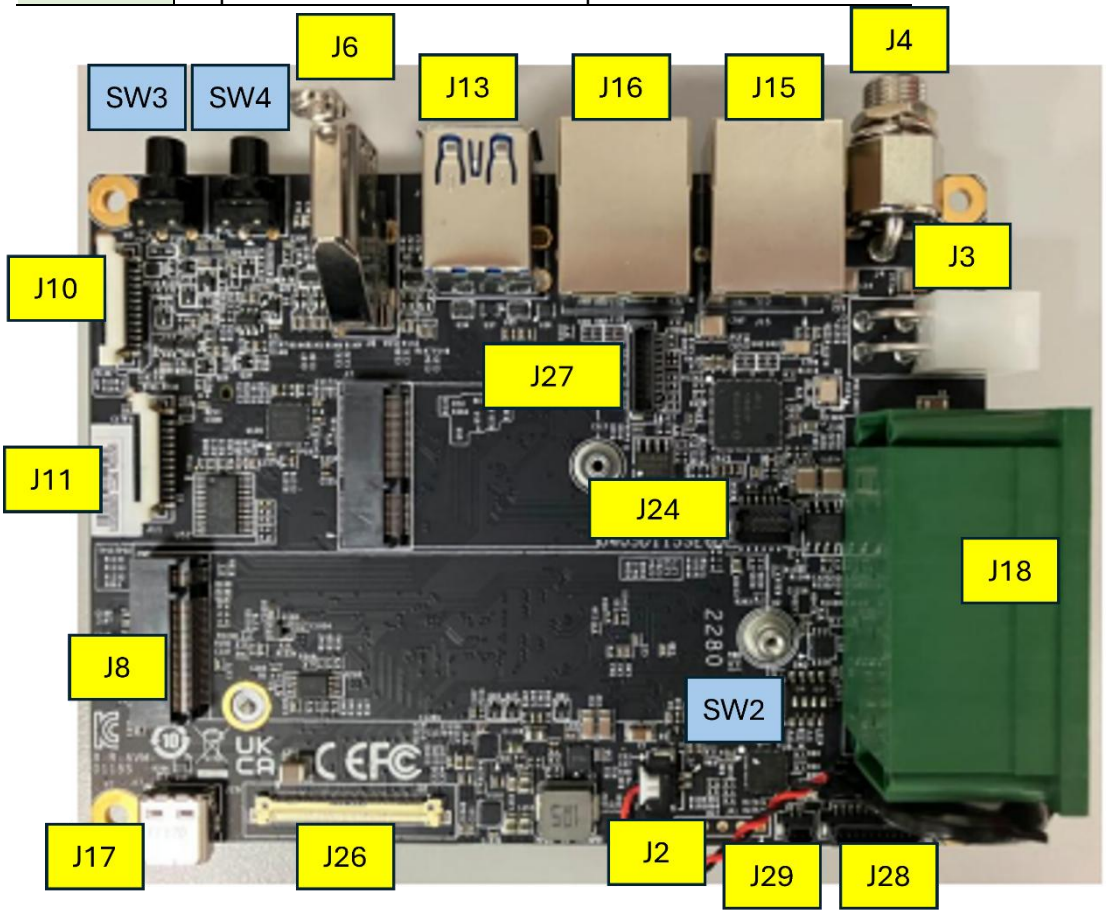
2.1.1 Top View Interface

J1	SO-DIMM 260-pin 90° SMD Socket(H-9.2mm)
J19	Fan Wafer



2.1.2 Bottom View Interface

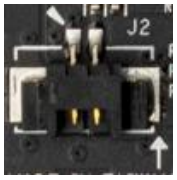
J2	External RTC Battery wafer
J3	Input Power – 4.2mm Pitch 90° ATX Power 4P
J4	OD 5.5/2.5 DC Jack with Lock
J6	HDMI Type-A Vertical Side Connector with lock (Female)
J7	M.2 E-Key Socket
J8	M.2 M-Key Socket
J10	FPC connector for 4-lane MIPI CSI-2
J11	FPC connector for 4-lane MIPI CSI-2
J13	USB 3.2 Gen2 Dual Port Type A Connector
J15	Gigabit Ethernet Connector w/LEDs
J16	Gigabit Ethernet Connector w/LEDs (PSE Option)
J17	USB type C
J18	20-pin Expansion Terminal Block
SW2	DIP switch #1 (Mode)
SW3	Power Button w/LEDs
SW4	Recovery Button w/LEDs
J24	PSE Board Connector (Maximum 15W)
J26	5G Board Connector #2 (Signal)
J27	OOB Board Connector #1 (NC-SI)
J28	OOB Board Connector #2 (OOB for basic function)
J29	Expansion connector for external power button



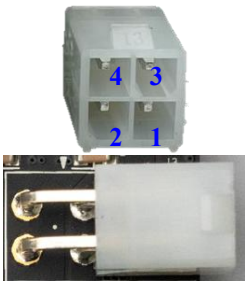
2.1.3 Jetson Module Connector

Function	Provide connection with NVIDIA® Jetson SOM	
Location	J1	
Type	SOCKET_DDR4 SO-DIMM_260PIN_90°	
Manufacturer and Part Number	Foxconn ASAA826-EASB0-7H	
Mating Connector	NVIDIA® Jetson Orin NX/Orin Nano	
Pinout	Please refer to NVIDIA Jetson System-on-Module datasheet for pinout details.	
Remarks	https://developer.nvidia.com/embedded/downloads	

2.1.4 RTC Battery Connector

Function	RTC Battery for Module	
Location	J2	
Type	1.25mm wire-to-board header 02P Type	
Manufacturer and Part Number	宏致_ACES 50271-00201-001	
Mating Connector	Molex 51021-8602	
Pinout	Pin # / Description PIN1 / GND PIN2 / 3V Power	
Remarks	RTC Battery: KTS CR2032 3V	

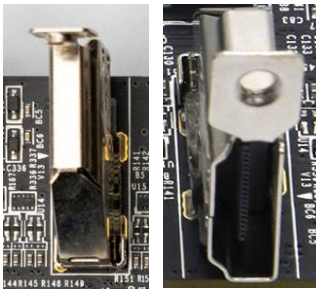
2.1.5 ATX 4P

Function	ATX 4P	
Location	J3	
Type	WAFER_2*2PIN	
Manufacturer and Part Number	FPWD-42R2-04NAT	
Mating Connector	Power Plug Cable	
Pinout	Pin Number / Description 1 / GND 2 / GND 3 / 9-24V Power 4 / 9-24V Power	
Remarks	None	

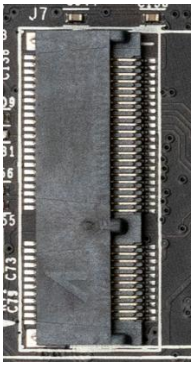
2.1.6 DC Power Jack

Function	DC Power Input	
Location	J4	
Type	2.5 mm Power Jack	
Manufacturer and Part Number	JKCR, DCD 020 105B	
Mating Connector	Any 2.5mm power plug cable	
Pinout	N/A	
Remarks	NA	

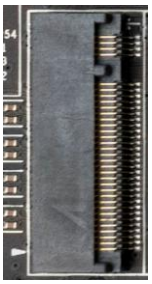
2.1.7 HDMI Output

Function	HDMI Output Connector	
Location	J6	
Type	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	

2.1.8 M.2 E key 2230

Function	M.2 E key	
Location	J7	
Type	SOCKET_M.2-KEY E_75PIN_90°_SMD	
Manufacturer and Part Number	ACES 51750-0750P-005	
Mating Connector	Any M.2 E key 2230 card standard interface device.	
Pinout	Please refer to M.2 E key card standard for the pinout details.	
Remarks	PCIe related@PCIe1(PCIe C1@0x14100000) & USB signal supported only Supports PCIe Gen4 x1 & USB 2.0 for Orin NX Supports PCIe Gen3 x1 & USB 2.0 for Orin Nano	

2.1.9 M.2 M key 2280

Function	M.2 M key	
Location	J8	
Type	SOCKET_M.2-KEY M_75PIN_90°_SMD	
Manufacturer and Part Number	ACES 51757-0750C-012_P0.5㎜-H5.5㎜	
Mating Connector	Any M.2 M key 2280 card standard interface device.	
Pinout	Please refer to M.2 M key card standard for the pinout details.	

Remarks	PCIe related signal supported only @PCIe0(PCIe C4@0x14160000) Supports PCIe Gen4 x4 for Orin NX Supports PCIe Gen3 x4 for Orin Nano

2.1.10 MIPI CSI-2 DPHY Lanes

Function	MIPI Camera Module Connector	
Location	J10 , J11	
Type	ZIF FPC Conn._22PIN_0.5㎜_90°	
Manufacturer and Part Number	ACES 50554-02241-003	
Mating Connector	4 Lane MIPI CSI-2 camera connector (22Pin)	

Pinout

J10

PIN#	Description	PIN#	Description
Pin1	+3V3_MIPI	Pin12	CSI1_D0_N
Pin2	CAM0_I2C_SDA	Pin13	GND
Pin3	CAM0_I2C_SCL	Pin14	CSI0_CLK_P
Pin4	GND	Pin15	CSI0_CLK_N
Pin5	CAM0_MCLK	Pin16	GND
Pin6	CAM0_PWDN_LS	Pin17	CSI0_D1_P
Pin7	GND	Pin18	CSI0_D1_N
Pin8	CSI1_D1_P	Pin19	GND
Pin9	CSI1_D1_N	Pin20	CSI0_D0_P
Pin10	GND	Pin21	CSI0_D0_N
Pin11	CSI1_D0_P	Pin22	GND

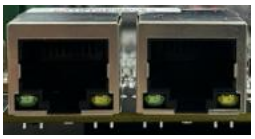
J11

PIN#	Description	PIN#	Description
Pin1	+3V3_MIPI	Pin12	CSI3_D0_N
Pin2	CAM1_I2C_SDA	Pin13	GND
Pin3	CAM1_I2C_SCL	Pin14	CSI2_CLK_P
Pin4	GND	Pin15	CSI2_CLK_N
Pin5	CAM1_MCLK	Pin16	GND
Pin6	CAM1_PWDN_LS	Pin17	CSI2_D1_P
Pin7	GND	Pin18	CSI2_D1_N
Pin8	CSI3_D1_P	Pin19	GND
Pin9	CSI3_D1_N	Pin20	CSI2_D0_P
Pin10	GND	Pin21	CSI2_D0_N
Pin11	CSI3_D0_P	Pin22	GND

2.1.11 USB 3.2 Gen 2 Type-A Connector #1 , #2

Function	USB 3.2 Gen 2 Type-A Connector #1 #2	
Location	J13	
Type	Dual-port USB 3.2 Gen 2 Type-A female connector	
Manufacturer and Part Number	冠泰, CU3B-AFR15U-096H	
Mating Connector	Any USB 3.2 standard Type-A interface cable or device.	
Pinout	Please refer to USB 3.2 Gen 2 standard.	
Remarks	Dual port within same connector(J13) share currents up to 2A Each port of J13 has full 10Gbps bandwidth available	

2.1.12 Gigabit Ethernet Connector

Function	1Gb single-port Ethernet connector, used to connect to the host system.	 
Location	J15, J16	
Type	RJ45 with integrated magnetics	
Manufacturer and Part Number	建倚, MJ45-111QC4A-GY-S307 1G-LEFT(G)+RIGHT(Y)-DOWN	
Mating Connector	Any standard 1Gb Ethernet mating connector can be applicable.	
Pinout	Comply with Ethernet standards	

<table>
<tr><td>LED indicator</td><td>

J16

<table>
<tr><th colspan="2">Activity LED (left)</th><th colspan="2">Link/Speed LED (right)</th></tr>
<tr><th>Status</th><th>Description</th><th>Status</th><th>Description</th></tr>
<tr><td>Yellow Blinking</td><td>Data transmission or receiving is occurring</td><td>Green</td><td>PSE Ready</td></tr>
<tr><td>Off</td><td>No data transmission or receiving is occurring</td><td>Off</td><td>without PSE
  </td></tr>
</table>

J15

<table>
<tr><th colspan="2">Activity LED (left)</th><th colspan="2">Link/Speed LED (right)</th></tr>
<tr><th>Status</th><th>Description</th><th>Status</th><th>Description</th></tr>
<tr><td>Yellow Blinking</td><td>Data transmission or receiving is occurring</td><td>Green</td><td>1000M</td></tr>
<tr><td>Off</td><td>No data transmission or receiving is occurring</td><td>Off</td><td>100M</td></tr>
</table>

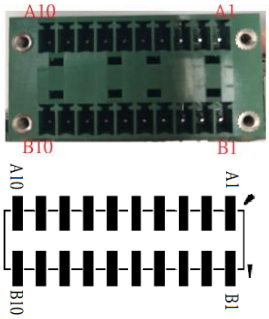
</td></tr>
<tr><td>Remarks</td><td>J15 is via I210 Ethernet controller and J16 is directly from NVIDIA Jetson SOM.
PSE (Maximum 15W) Option: J16</td></tr>
</table>

2.1.13 USB Type C Connector

Function	BSP Installation as recovery mode	
Location	J17	
Type	JACK_USB_C TYPE(F)_90°_PIP-L1.45㎜	
Manufacturer and Part Number	ACES, 57988-0240D-001	
Mating Connector	Any USB Type C standard interface cable or device.	
Pinout	Please refer to USB Type C standard.	
Remarks	USB2.0 Only (Device Mode)	

2.1.14 20-Pin GPIO Expansion

Function	General-Purpose Input/Output
Location	J18
Type	Expansion I/O Connector
Manufacturer and Part Number	ME252-35020-1
Mating Connector	20-Pin GPIO expansion

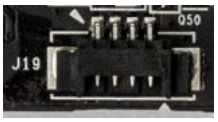


Pinout

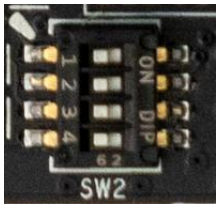
Address	Pin Name	20-pin Index (Devkit Index)		Pin Name	Address
	5V	A1	B1	3V3	
	GND	A2	B2	GND	
/dev/ttyTCU0	UART2_TXD_3V3	A3	B3	I2C1_SDA	/dev/i2c-7
	UART2_RXD_3V3	A4	B4	I2C1_SCL	
	GND	A5	B5	I2C0_ID_SDA	/dev/i2c-1
/dev/ttyTHS1	UART0_TXD_3V3	A6	B6	I2C0_ID_SCL	
	UART0_RXD_3V3	A7	B7	I2S0_SCLK_LS	gpio398
can0 (Native CAN)	CANL0	A8	B8	I2S0_SDOUT_LS	gpio399
	CANH0	A9	B9	I2S0_SDIN_LS	gpio400
	N/A	A10	B10	I2S0_LRCK_LS	gpio401

Remarks	GPIO uses 3.3V

2.1.15 Fan Power Connector

Function	Fan Power Connector	
Location	J19	
Type	WAFER_1*4PIN_1.25㎜_90°	
Manufacturer and Part Number	ACES 50271-0040N-001_BLACK	
Mating Connector	ACES 50276-004H0H0-001	
Pinout	Pin # / Description PIN 1 / GND PIN 2 / +5V Power PIN 3 / FAN_TACH PIN 4 / FAN_PWM	
Remarks	None	

2.1.16 DIP Switch #1 (Mode)

Function	Fan PWM Controller/Auto Power On	
Location	SW2	
Type	4 SPST DIP Switch	
Manufacturer and Part Number	Diptronics IN OFF-Switching 0.025A/24VDC	
Pinout		
Remarks	Default SW2 all OFF	

Pos. No	Description	Switch ON	Switch Off
1	Power ON mode	Always Power Enable	Always Power Disable
2	CAN0_Terminal	W/ 120ΩTerminal	W/O 120ΩTerminal
3	Power-Up / Start-up Control	"PWB Mode" - Power Button Press Required	"AT Mode" - Automatic Start-up Enabled
4	Fan Control	FAN Always ON (full speed running)	FAN PWM Enabled (SW Controlled)

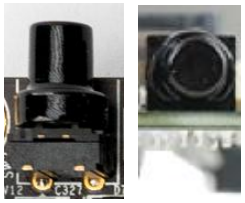
2.1.17 DIP Switch #5 (OOB)

Function	OOB UART/IO UART
Location	SW5
Type	2 SPST DIP switch
Manufacturer and Part Number	Diptronics IN OFF-Switching 0.025A/24VDC
Pinout	
Remarks	Default SW5 all OFF

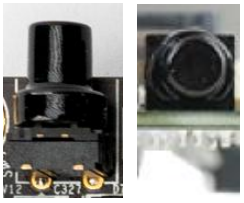
Position No.	Position Description	Switch ON	Switch OFF
1(SW1)	UART0	OOB	IO
2(SW2)	UART2	OOB	IO

2.1.18 Power Button

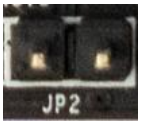
Function	Power Button
Location	SW3
Type	Button
Manufacturer and Part Number	Champway, LS67AK-NBR-A-R2KA9
Pinout	N/A
Remarks	• When EC3020 is in "Button Power Mode," pressing the button will initiate the boot-up sequence. • When EC3020 is ON, pressing the button will display the Power Off GUI. If no operation is performed, the system will automatically power off in 60 seconds. • When EC3020 is ON, holding the button for more than 5 seconds will force a full system power down.



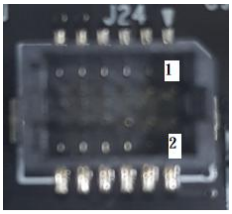
2.1.19 Recovery Button

Function	Recovery button	
Location	SW4	
Type	Button	
Manufacturer and Part Number	Champway, LS67AK-NBR-A-R2KA9	
Pinout	N/A	
Remarks	• No function during normal operation. • The SOM will enter recovery mode when held down during power ON	

2.1.20 WDT Header

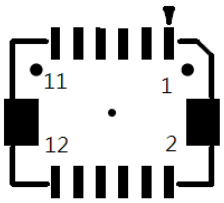
Function	WDT Function	
Location	JP2	
Type	HEADER_PIN_1*2PIN_2.54㎜_180°_DIP	
Manufacturer and Part Number	頻銳_210-81-02GB01	
Pinout	Pin 1,2 / Description Open / WDT enable Short / WDT disable	
Remarks	None	

2.1.21 PSE Board Connector

Function	PSE Board Connector.	
Location	J24	
Type	WAFER_2*6PIN_1㎜_180°_SMD	
Manufacturer and Part Number	ACES 50238-01241-001	

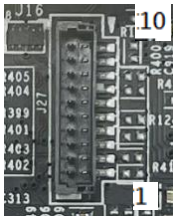
Pinout

PIN#	Description	PIN#	Description
Pin1	VDD	Pin2	GND
Pin3	VDD	Pin4	GND
Pin5	54V	Pin6	SYS_RST*
Pin7	54V	Pin8	I2C1_SCL *
Pin9	54_N	Pin10	I2C1_SDA
Pin11	I2C1_SDA	Pin12	3V3_STANDBY

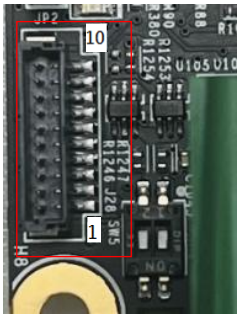


Remarks	For optional PSE board VDD is following DC_IN voltage LED_PSE low active, indicate PSE link is ready

2.1.22 OOB Board Connector #1 (NC-SI)

Function	OOB Board Connector #1 (NC-SI)	
Location	J27	
Type	WAFER_1*10PIN_1㎜_180°_SMD	
Manufacturer and Part Number	ACES 50228-01071-001	
Mating Connector	ACES 50233-010H0H0-001	
Pinout	PIN# / Description	
	Pin1 / NC_SI_TXD0	
	Pin2 / NC_SI_TXD1	
	Pin3 / NC_SI_TX_EN	
	Pin4 / GND	
	Pin5 / NC_SI_CLK_IN	
	Pin6 / GND	
	Pin7 / NC_SI_RXD0	
	Pin8 / NC_SI_RXD1	
	Pin9 / NC_SI_CRS_DV	
	Pin10 / GND	
Remarks	For optional OOB board via RJ45 J15(I210 NC-SI)	

2.1.23 OOB Board Connector #2 (Signal & Power) (Ver.B)

Function	OOB Board Connector #2 (signal & power)	
Location	J28	
Type	WAFER_1*10PIN_1㎜ _180°_SMD	
Manufacturer and Part Number	ACES 50228-01071-001	
Mating Connector	ACES 50233-010H0H0-001	
Pinout	PIN# / Description	
	Pin1 / GND	
	Pin2 / NC	
	Pin3 / UART2_RX (Debug UART)	
	Pin4 / UART2_TX (Debug UART)	
	Pin5 / UART0_RX (Auto-link)	
	Pin6 / UART0_TX (Auto-link)	
	Pin7 / VDD_CVM_GP	
	Pin8 / SYS_RST_AI	
	Pin9 / BUTTON_PWR_ON_ MCU	
	Pin10 / +5V_STANDBY	
Remarks	For optional OOB board	

2.1.24 5G Board Connector #1 (Power)

Function	5G Board Connector #1 (Power)	
Location	J25	
Type	WAFER_1*5PIN_1㎜ _180°_SMD	
Manufacturer and Part Number	ACES 50228-00571-001	
Mating Connector	ACES 50233-005H0H0-001	
Pinout	PIN# / Description	
	Pin1 / DC	
	Pin2 / DC	
	Pin3 / CARRIER_PWR_ON	
	Pin4 / GND	
	Pin5 / GND	
Remarks	For optional 5G daughter board, power only(9-24V)	

2.1.25 5G Board Connector #2 (Signal)

Function	5G Board Connector #2 (signal)			
Location	J26			
Type	WAFER_30PIN_0.4㎜_90°_SMD			
Manufacturer and Part Number	I-PEX 20455-040E-12			
Mating Connector	I-PEX 20453-240T-03			
Pinout	PIN#	Description	PIN#	Description
	Pin1	VDD	Pin21	GND
	Pin2	VDD	Pin22	USB3_DP
	Pin3	VDD	Pin23	USB3_DNUSB_DSP3_SSRX_N
	Pin4	VDD	Pin24	GND
	Pin5	VDD	Pin25	NC
	Pin6	VDD	Pin26	NC
	Pin7	GND	Pin27	GNDP
	Pin8	GND	Pin28	PCIE3_TX0_P
	Pin9	GNSS_CTRL	Pin29	PCIE3_TX0_N
	Pin10	AIRPLANE_CTRL	Pin30	GND
	Pin11	LTE_PWR	Pin31	NC
	Pin12	PCIE_WAKEN	Pin32	NC
	Pin13	PCIE3_CLKREQ	Pin33	GND
	Pin14	PCIE3_CLKREQ	Pin34	PCIE3_RX0_P
	Pin15	GND	Pin35	PCIE3_RX0_N
	Pin 16	USB3_SSTX_P	Pin36	GND
	Pin 17	USB3_SSTX_N	Pin37	PCIE3_CLK_P
	Pin 18	GND	Pin38	PCIE3_CLK_N
	Pin 19	USB3_SSRX_P	Pin39	GND
	Pin20	USB_DSP3_DP	Pin40	5G_RST
Remarks	For optional 5G daughter board Supports USB3.2 & USB 2.0 & PCIe Gen3 x1			

Other Switches and Jumpers

Switches and jumpers that are present on the board but not documented in this manual are reserved for internal use by IBASE only and must not be modified or used by customers.

Chapter 3
Getting Started

The information provided in this chapter includes:

- System Setup & Power On
- BSP Setup Instructions

Let the Jetson Orin™ NX and Orin™ Nano initiate recovery mode
Using the commands below in the Linux PC to start re-flashing BSP

3.1 Recovery Preparation (Cables and Power)

1. Ensure all external system power supplies are turned off.
2. Connect a USB Type-C cable from the EC3020 Jetson platform connector to the host Linux PC.
3. Locate the Recovery button on the system and prepare to press and hold it.
4. Connect the power cord to the EC3020 box PC.

3.2 Entering Recovery Mode

1. Press and hold the Recovery button.
2. While holding the Recovery button, power on the EC3020 system.
3. Continue holding the Recovery button for several seconds, then release it.

When the EC3020 is connected to a Linux PC via a USB Type-C cable, you can verify recovery mode by running the following command on the host PC:
dmesg
If the system is in recovery mode, messages similar to the following will appear:
[24685.229129] usb 1-7: Product: APX
[24685.229132] usb 1-7: Manufacturer: NVIDIA Corp

3.3 BSP Setup and Re-flashing

BSP (Board Support Package) file name:
EC3020_..*.tar.gz
If you require the BSP download link, please contact your IBASE FAE.
Default BSP login credentials:
Username: nvidia
Password: nvidia
If you experience difficulties accessing the BSP download, visit https://www.ibase.com/professional/download or contact technical support at https://www.ibase.com/professional/technical_support or eusupport@ibase.com.
Before re-flashing the BSP, back up all important data on the system.
To start BSP re-flashing on the Linux host PC, run the following commands:
$ sudo tar zxvf <BSP_tarball_filename>.tar.gz
$ cd JetPack_xxx/Linux_for_Tegra
$ sudo ./install.sh
Note: Sudo privileges are required to extract and install the BSP.
For detailed BSP flashing procedures specific to Jetson Orin NX or Orin Nano, please contact IBASE technical support via the IBASE website.

Chapter 4
BSP Package / Re-flashing

The information provided in this chapter includes:
- BSP package information
- BSP features and usage notes
- Recovery mode usage for BSP re-flashing

4.1 BSP Package Information

This section describes BSP features and software-related functions for EC3020.

1. M.2 Wi-Fi / Bluetooth
   The EC3020 supports optional M.2 Wi-Fi/Bluetooth modules (Intel® Wi-Fi 6E AX210). The AX210 Wi-Fi/Bluetooth management UI is located in the upper-right corner of the Ubuntu desktop.

2. Power Mode
   Power mode can be modified via the Ubuntu desktop UI or by using the following commands:

```
# get current power mode
$ sudo nvpmodel -q
# setup power mode
# where <x> is the power mode number, please refer to (<= r32.7.x)

https://docs.nvidia.com/jetson/archives/l4t-archived/l4t-3261/index.html#page/Tegra%20Linux%20Driver%20Package%20Development%20Guide/power_management_jetson_xavier.html# and (>= r35.1)
https://docs.nvidia.com/jetson/archives/r35.1/DeveloperGuide/text/SD/PlatformPowerAndPerformance/JetsonOrinNxSeriesAndJetsonAgxOrinSeries.html?highlight=nvpmodel#supported-modes-and-power-efficiency for more information
$ sudo nvpmodel -m <x>
```

   * Current default power mode:

   EC3020 : 15W (2)

3. RTC Battery
   The following command display RTC battery voltage.

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

4. Fan Speed
   The following commands display 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/39c0000.tachometer/hwmon/hwmon<y>/rpm
```

   * Where <x> and <y> are dynamic hwmon indexes

5. MIPI CSI Camera
   There are 2x 2-lane and 1x 4-lane MIPI CSI camera supported on the EC3020. The currently supported products type are listing as below:
   * IMX219 (2-lane)
   * IMX477 (2-lane): IMX477 requires a hardware modification in order to work with Jetson Platforms. Please refer to https://developer.ridgerun.com/wiki/index.php/Raspberry_Pi_HQ_camera_IMX477_Linux_driver_for_Jetson#Compatibility_with_NVIDIA.C2.AEJetson.E2.84.A2_Platforms
   * IMX179 (2-lane)

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

Test commands:

> 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' ! nvvidconv ! xvimagesink -e &

> Raspberry pi v3 (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 EC3020, see the following command for usage.

(1) Enable and setup 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 dbitrate 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

(1) Output

```
$ sudo su
$ gpio_id=483
$ echo $gpio_id > /sys/class/gpio/export
$ cat /sys/kernel/debug/gpio | grep 483
# show gpio-483 PZ.05 status

$ gpio_index=PZ.05
$ echo out > /sys/class/gpio/$gpio_index/direction
$ echo 1 > /sys/class/gpio/$gpio_index/value      # set HIGH
$ echo 0 > /sys/class/gpio/$gpio_index/value      # set LOW
```

(2) Input

```
$ sudo su
$ gpio_id=483
$ echo $gpio_id > /sys/class/gpio/export
$ cat /sys/kernel/debug/gpio | grep 483

$ gpio_index=PZ.05
$ echo in > /sys/class/gpio/$gpio_index/direction
$ cat /sys/class/gpio/$gpio_index/value        # 1: HIGH,    0: LOW
```

(3) Disable

```
$ sudo su
$ gpio_id=483
$ echo $gpio_id >/sys/class/gpio/unexport
```

For L4T (Linux for Tegra) BSP support and the other software support associated with NVIDIA® Jetson Orin NX, please visit IBASE website to contact our technical support function. (https://www.ibase.com/tw/)

4.2 Put Jetson into Recovery Mode

The USB Type-C Jetson platform port on the EC3020 can be used to re-program the NVIDIA® Jetson Orin NX using a host system running NVIDIA JetPack.

1. Power off the system completely. Ensure the system is fully powered down and not in suspend or sleep mode.
2. Connect a USB cable from the Jetson platform USB port to the host system.
3. Press and hold the Recovery button, then power on the system.
4. After approximately three seconds, release the Recovery button.
5. The NVIDIA® Jetson Orin NX will appear as a new NVIDIA target device on the host system.

After the BSP update is completed successfully, power off the system.
A clean power-on restores the Jetson platform USB port to normal host mode.

Chapter 5
System Management (Optional)

The information provided in this chapter includes:

- OOB software setting
- Power consumption

5.1 OOB Software Settings

Please refer to Getting Started with Allxon Remote Management Service
For more Allxon support, see https://www.allxon.com or contact them at service@allxon.com.

5.2 Power Consumption

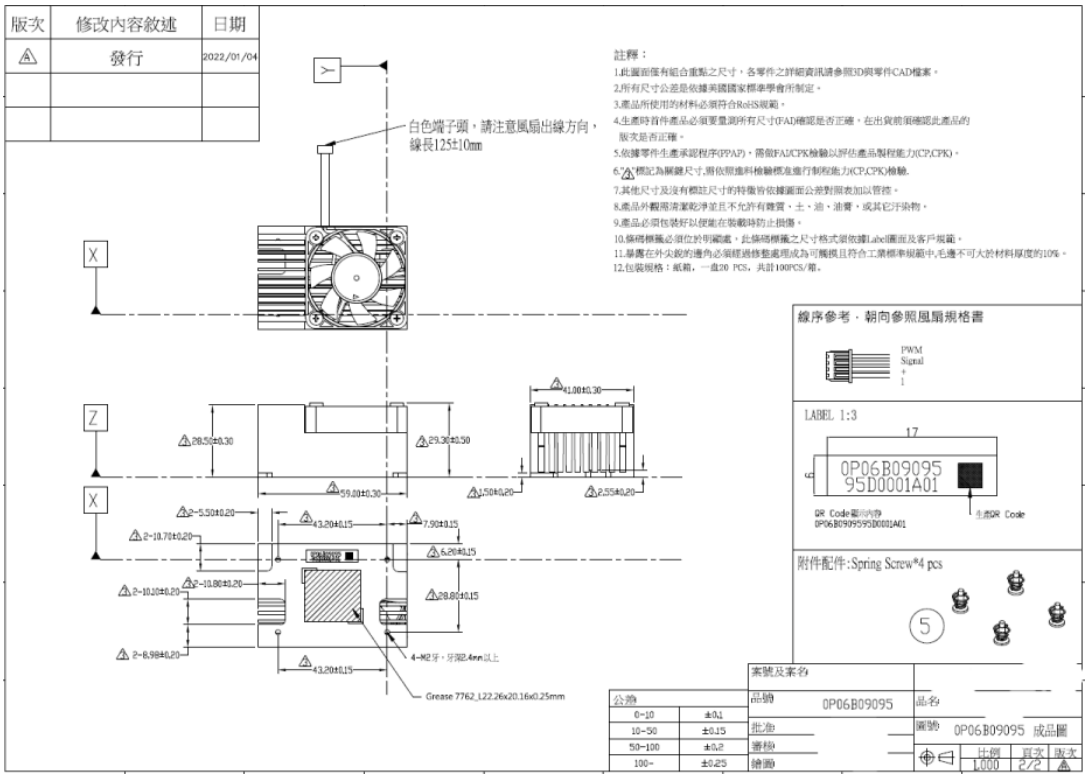
Item	Power Consumption
Theoretical Maximum System Power Consumption	● EC3020 Power Consumption: 4.8W(standby) to 38W(full) The condition is connected to USB3.0 device*2, USB 2.0 device*1, LAN *1, SSD 256G*1,WIFI 9260*1, HDMI*1, with CPU/ GPU full loading. (maximum power consumption up to 60W based on adapter)
Typical System Power Consumption	The power consumption under the normal operating mode is depending on the application software running with NVIDIA® Jetson Orin NX

Chapter 6
Dimensions

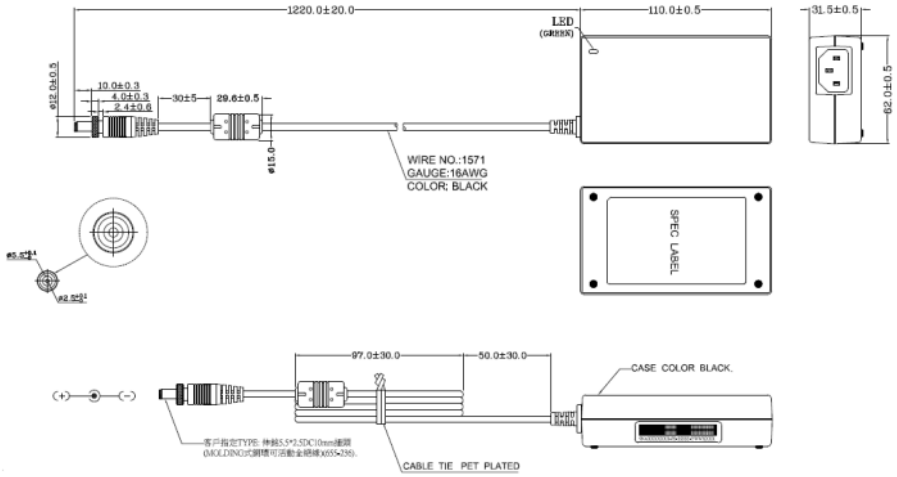
- Adapter/Power Cord Drawing
- Dimension Drawing of Carried Board
- Dimension Drawing of EC3020

6.1 Adapter/ Power Cord

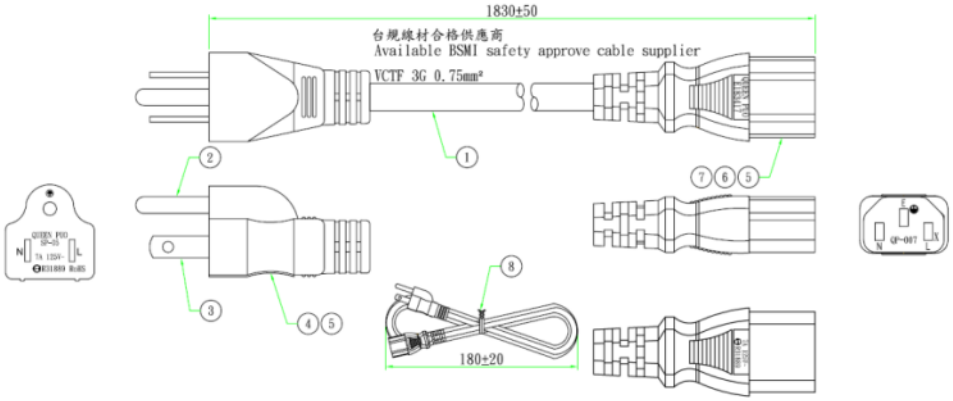
- ◆ Fan Module for Orin NX/Orin Nano
- ■ Rated Voltage: 5V
- ■ Operating Voltage Range: 3.5V~5.5V
- ■ Rated Speed: 7000RPM±10%
  - ◆ (Testing Speed After Continuous 3 Minute Operation At Ambient Temperature Of 25℃)
- ■ Life Expectancy: 70,000hours at 40℃ (WITH 15~65% RH)
- ■ Bearing Type: Two Ball



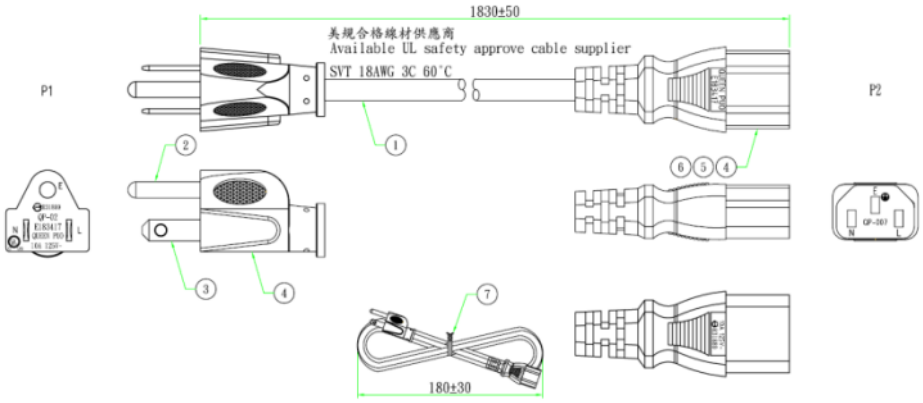
◆ Power Adapter



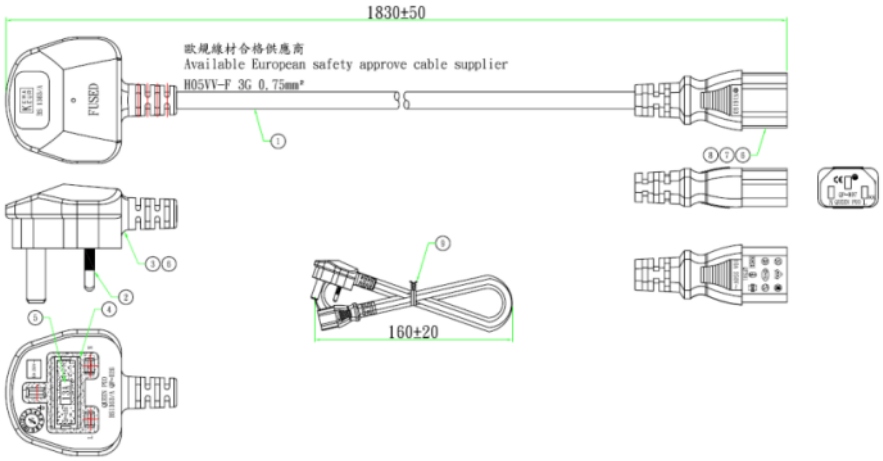
Power cord TW version



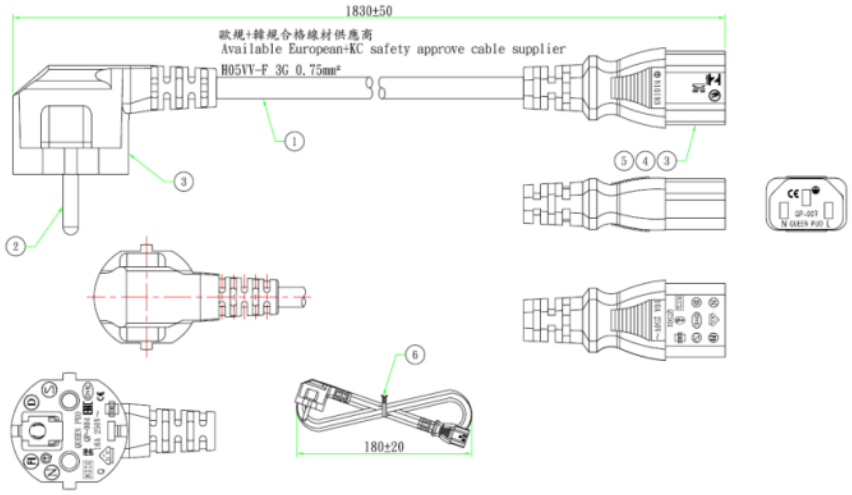
Power cord US version



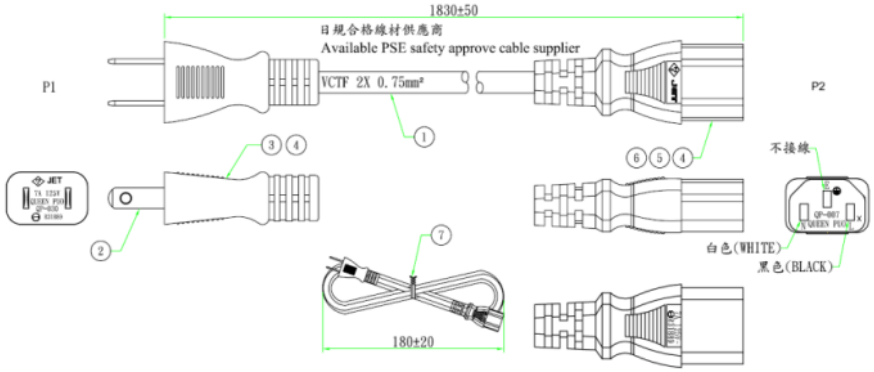
Power cord UK version



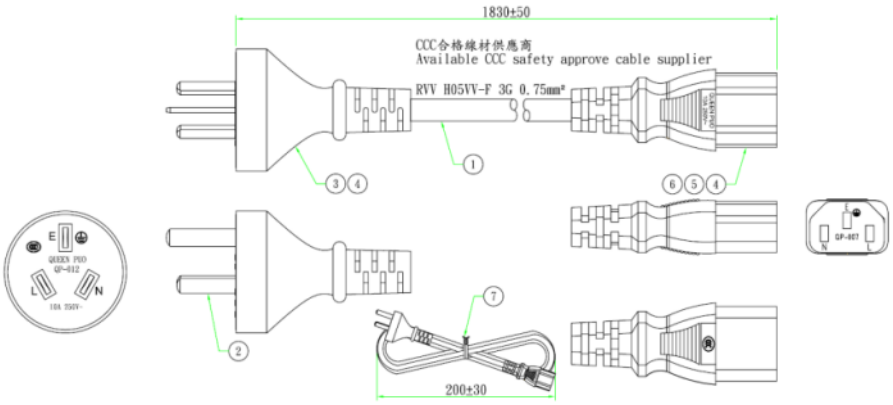
Power cord EU version



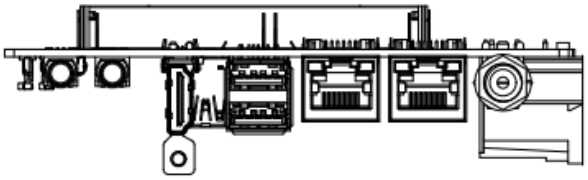
064APOWERBSL (JP version)

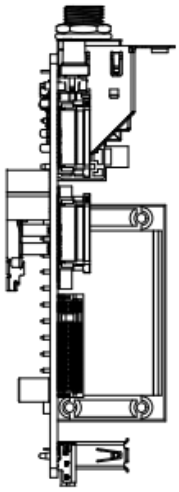


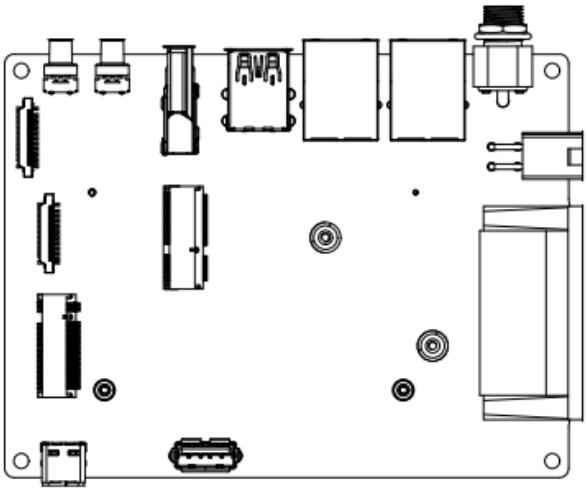
064APOWERBR4-IPD (CN version)

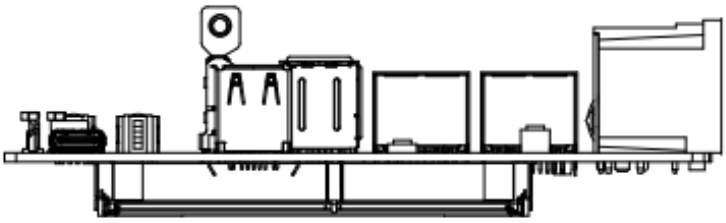


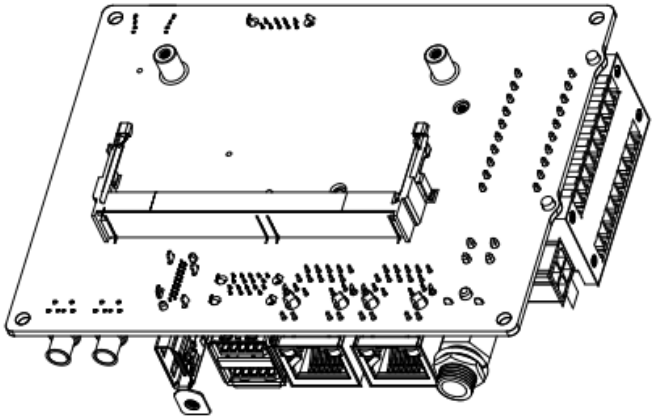
6.2 Dimensions and Drawings of Carrier Board

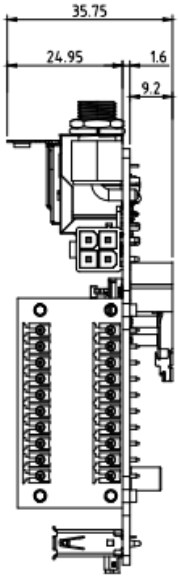


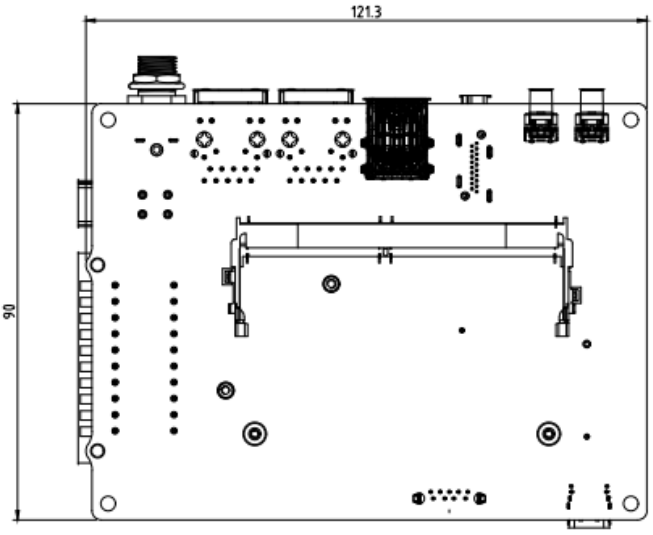









35.75
24.95
1.6
9.2


121.3
90

6.3 Dimensions and Drawing of EC3020 Fanless Box PC