
AEC-2001/ AEC-4001

NVIDIA® Jetson Orin™ Nano/ NX AI Embedded Computer

User's Manual

Version 1.0

Date:

P/N:



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Revision History

Version	Release Time	Description
1.0	2026.07	Initial release

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I. Preface

All Rights Reserved.

The information in this document is subject to change without prior notice in order to improve the reliability, design and function. It does not represent a commitment on the part of the manufacturer.

Under no circumstances will the manufacturer be liable for any direct, indirect, special, incidental, or consequential damages arising from the use or inability to use the product or documentation, even if advised of the possibility of such damages.

This document contains proprietary information protected by copyright. All rights are reserved. No part of this document may be reproduced by any mechanical, electronic, or other means in any form without prior written permission of the manufacturer.

Declaration of Conformity

CE

The CE symbol on the computer indicates that it is in compliance with the directives of the Union European (EU). A certificate of compliance is available by contacting technical support.

This product has passed the CE test for environmental specifications when shielded cables are used for external wiring. We recommend the use of shielded cables. This kind of cable is available from ARBOR. Please contact your local supplier for ordering information.

Warning

This is a class A product. In a domestic environment this product may cause radio interference in which case the user may be required to take adequate measures.

FCC Class A

This device complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions:

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

NOTE:

This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense.

RoHS

ARBOR Technology Corp. certifies that all components in its products are in compliance and conform to the European Union's Restriction of Use of Hazardous Substances in Electrical and Electronic Equipment (RoHS) Directive 2002/95/EC.

The above-mentioned directive was published on 2/13/2003. The main purpose of the directive is to prohibit the use of lead, mercury, cadmium, hexavalent chromium, polybrominated biphenyls (PBB), and polybrominated diphenyl ethers (PBDE) in electrical and electronic products. Member states of the EU are to enforce by 7/1/2006.

ARBOR Technology Corp. hereby states that the listed products do not contain unintentional additions of lead, mercury, hex chrome, PBB or PBDB that exceed a maximum concentration value of 0.1% by weight or for cadmium exceed 0.01% by weight, per homogenous material.

Homogenous material is defined as a substance or mixture of substances with uniform composition (such as solders, resins, plating, etc.) Lead-free solder is used for all terminations (Sn(96-96.5%), Ag(3.0-3.5%) and Cu (0.5%)).

SVHC / REACH

To minimize the environmental impact and take more responsibility to the earth we live, Arbor hereby confirms all products comply with the restriction of SVHC (Substances of Very High Concern) in (EC) 1907/2006 (REACH – Registration, Evaluation, Authorization, and Restriction of Chemicals) regulated by the European Union.

All substances listed in SVHC < 0.1% by weight (1000 ppm)

Important Safety Instructions

Read these safety instructions carefully

1. Read all cautions and warnings on the equipment.
2. Place this equipment on a reliable surface when installing. Dropping it or letting it fall may cause damage.
3. Make sure the correct voltage is connected to the equipment.
4. For pluggable equipment, the socket outlet should be near the equipment and should be easily accessible.
5. Keep this equipment away from humidity.
6. The openings on the enclosure are for air convection and protect the equipment from overheating. DO NOT COVER THE OPENINGS.
7. Position the power cord so that people cannot step on it. Do not place anything over the power cord.
8. Never pour any liquid into opening. This may cause fire or electrical shock.

-
9. Never open the equipment. For safety reasons, the equipment should be opened only by qualified service personnel.
 10. If one of the following situations arises, get the equipment checked by service personnel.
 - a. The power cord or plug is damaged.
 - b. Liquid has penetrated into the equipment.
 - c. The equipment has been exposed to moisture.
 - d. The equipment does not work well, or you cannot get it to work according to the user's manual.
 - e. The equipment has been dropped or damaged.
 - f. The equipment has obvious signs of breakage.
 11. Keep this User's Manual for later reference.

Warning

The Box PC and its components contain very delicately Integrated Circuits (IC). To protect the Box PC and its components against damage caused by static electricity, you should always follow the precautions below when handling it:

1. Disconnect your Box PC from the power source when you want to work on the inside.
2. Use a grounded wrist strap when handling computer components.
3. Place components on a grounded antistatic pad or on the bag that came with the Box PC, whenever components are separated from the system.

Replacing Lithium Battery

Incorrect replacement of the lithium battery may lead to a risk of explosion.

The lithium battery must be replaced with an identical battery or a battery type recommended by the manufacturer.

Do not throw lithium batteries into the trash can. It must be disposed of in accordance with local regulations concerning special waste.

Technical Support

If you have any technical difficulties, please consult the user's manual first at:

<https://arbor-technology.com>

Please do not hesitate to e-mail our customer service when you still cannot find out the answer:

E-mail: info@arbor.com.tw

Warranty

This product is warranted to be in good working order for a period of one year from the date of purchase. Should this product fail to be in good working order at any time during this period, we will, at our option, replace or repair it at no additional charge except as set forth in the following terms. This warranty does not apply to products damaged by misuse, modifications, accident or disaster.

Vender assumes no liability for any damages, lost profits, lost savings or any other incidental or consequential damage resulting from the use, misuse of, or inability to use this product. Vendor will not be liable for any claim made by any other related party.

Vendors disclaim all other warranties, either expressed or implied, including but not limited to implied warranties of merchantability and fitness for a particular purpose, with respect to the hardware, the accompanying product's manual(s) and written materials, and any accompanying hardware. This limited warranty gives you specific legal rights.

Return authorization must be obtained from the vendor before returned merchandise will be accepted. Authorization can be obtained by calling or faxing the vendor and requesting a Return merchandise Authorization (RMA) number. Returned goods should always be accompanied by a clear problem description.

II. Introduction

2.1. Specifications

CPU	• 6-core Arm® Cortex®-A78AE v8.2 64-bit CPU (AEC-2001/ AEC-4001-08) • 8-core Arm® Cortex®-A78AE v8.2 64-bit CPU (AEC-4001-16)
Memory	LPDDR5X DRAM • 8GB (AEC-2001-08; AEC-4001-08) • 16GB (AEC-4001-16)
GPU	1024-core NVIDIA Blackwell™ GPU with 32 Tensor Cores
Storage	1 x NVMe M.2 Key M 2280 128GB SSD installed, optional up to 1TB SSD
I/O	
USB Port	• 1 x USB 2.0 port w/ USB Type C recovery • 4 x USB 3.2 Gen1 ports w/ Type A connector
LAN	1 x GbE port w/ RJ-45 connector
Expansion Bus	• 1 x M.2 M-Key 2280 Socket (for NVMe SSD) • 1 x M.2 E-Key 2230 Socket (for WiFi module) • 1 x CAN 2.0 (3-pin terminal block) • 1 x OOB supported (Optional)
Video Port	1 x HDMI 2.0, 3840 x 2160 4K @30Hz

Environmental	
Operating Temp.	-25°C to 65°C, with 0.63 m/s air flow (25W TDP Fan mode)
Storage Temp.	-40°C to 85°C
Operating Humidity	5 ~ 95% (non-condensing)
Vibration	Operating, MIL-STD-810H, Method 516.8, Procedure I (TBA)
Shock	Operating, MIL-STD-810G, Method 514.6, Procedure I, Category 4 (TBA)
Qualification	
Certification	CE, FCC
Power Requirement	DC 12V – 54V with DC jack (AEC-2001/ AEC-4001)
Power Consumption	TBD
Mechanical	
Button	1 x Power Button, 1 x Force Recovery Button
Antenna	Antenna holes for WiFi
Mounting	Wall mount
Weight	1.25kg
Dimensions(W x D x H)	180 x 96 x 60.9mm
OS Support	
System	Ubuntu/ NVIDIA Jetpack 6.2
Ordering Information	
AEC-2001-08	Jetson Orin Nano 8GB LPDDR5X BOX PC
AEC-4001-08	Jetson Orin NX 8GB LPDDR5X BOX PC
AEC-4001-16	Jetson Orin NX 16GB LPDDR5X BOX PC

2.2. System Overview

2.2.1. Features

- Small form factor NVIDIA® Jetson Orin Nano/ NX supports up to 157 TOPS AI performance.
- Advanced NVIDIA® Ampere™ architecture with NVIDIA® CUDA® core and 32 Tensor cores.
- Supports multiple WiFi/ BT/ GPRS/ UMTS connections.
- DC 12V - 54V wide range power input.

2.2.2. About this manual

This manual is meant for the experienced users and integrators with hardware knowledge of personal computers. If you are not sure about the description in this manual, consult your vendor before further handling.

We recommend that you keep one copy of this manual for the quick reference for any necessary maintenance in the future. Thank you for choosing ARBOR products.

2.2.3. Overview

The Arbor AEC-2001/ AEC-4001 is an Arm-base Edge AI Computing System.

Powered by the NVIDIA® Jetson NX/ Nano platform, featuring a 1024-core NVIDIA® Ampere™ architecture GPU with 32 Tensor cores and maximum 8-core Arm® A78AE V8.2 64-bit CPU, the AEC-2001/ AEC-4001 delivers best-in-class capabilities, such as up to 157 TOPS AI performance, power efficiency, any rugged configuration.

This makes it ideally suited for advanced Edge AI applications, including medical Imaging, High-speed AOI, Mobile Robots and any AIoT / Industry 4.0 applications. The AEC-2001/ AEC-4001 is equipped with I/O interfaces, including GbE LAN ports, USB 3.2 ports, UART ports, CAN. Furthermore, it offers seamless wireless connectivity options with M.2 Key E slot and storage capabilities through the M.2 Key M PCIe4 NVMe SSD slots. With support for operating temperature from -25°C to 65°C, 12V to 54V wide range DC-in, the Arbor AEC-2001/ AEC-4001 brings small size and easy deployment of AI vision and industrial applications.

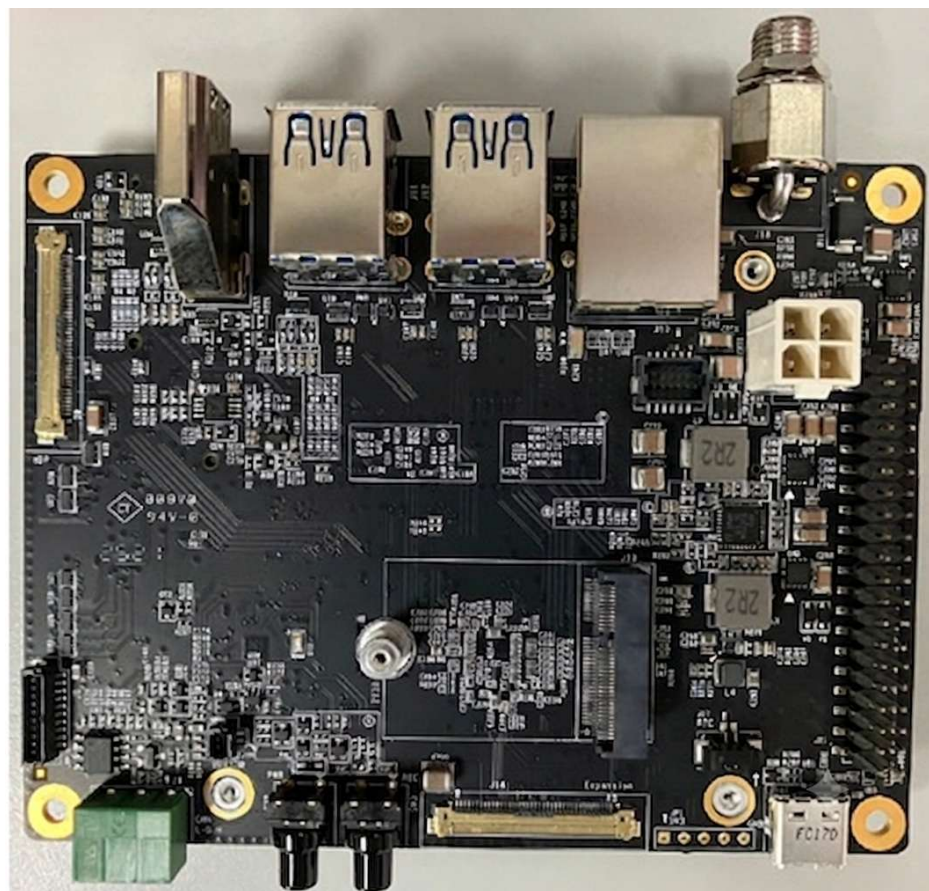
2.2.4. Inside the Package

Upon opening the package, carefully inspect the contents. If any of the items is missing or appears damaged, contact your local dealer or distributor. The package should contain the following items:

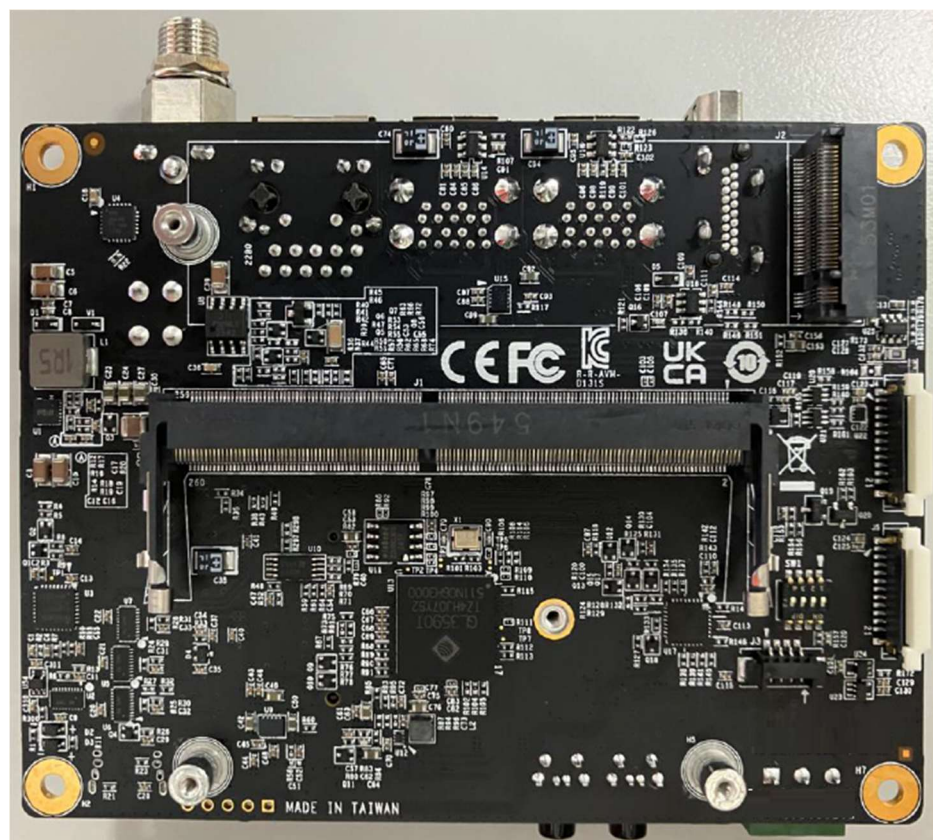
- 1 X AEC-2001 (or AEC-4001)
- 1 x 19V/ 90W power adapter
- US Power cord
- EU power cord

III. Board connector & Jumper Locations

3.1. Top View of Carrier board



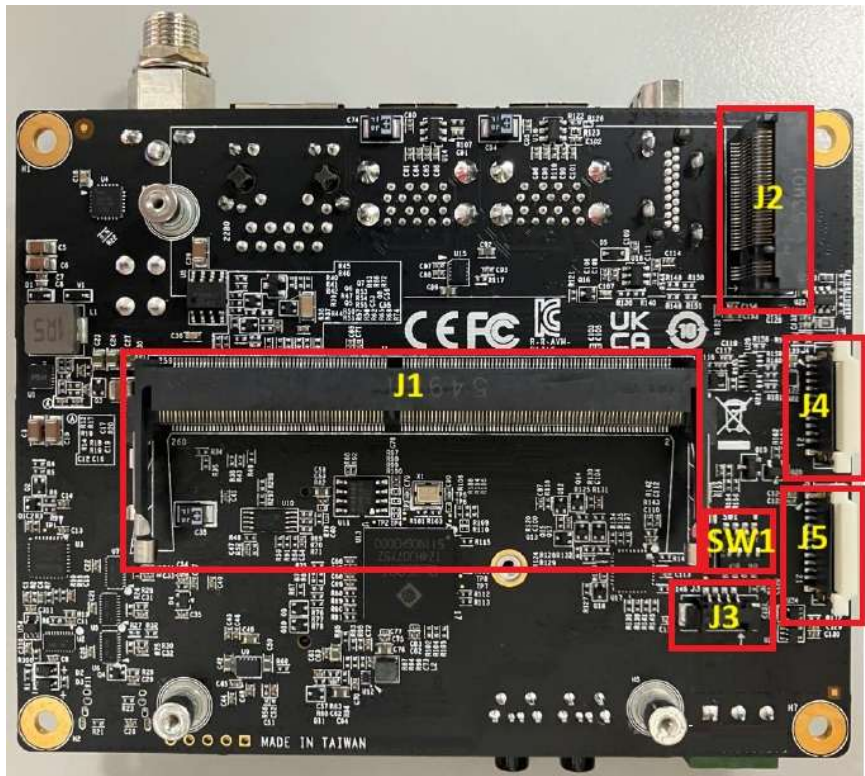
3.2. Bottom View of Carrier board



3.3. Connector Summary

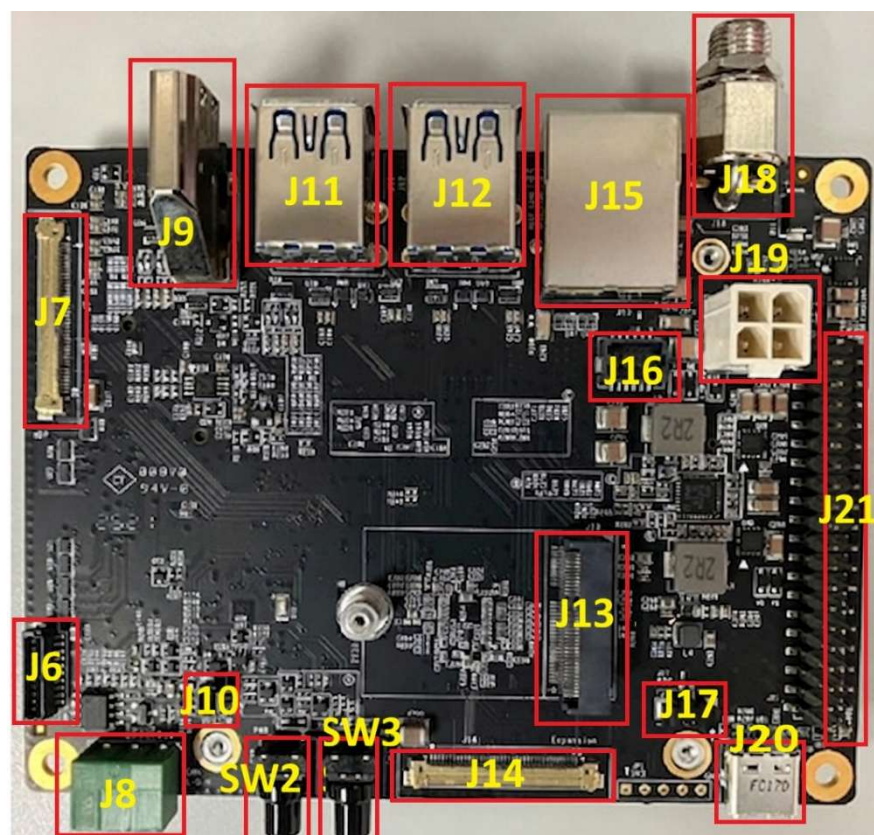
Bottom View Interface

J1	SO-DIMM 260-pin 90° SMD Socket(H-9.2mm)
J2	M.2 M-Key Socket
J3	Fan Wafer
J4	FPC connector for 4-lane MIPI CSI-2
J5	FPC connector for 4-lane MIPI CSI-2
SW1	DIP switch



Top View Interface

J6	OOB board connector
J7	0.5mm pitch I-PEX connector for optional DP board
J8	CAN bus 3-pin terminal block with transceiver
J9	HDMI output Type-A Vertical side connector (Female)
J10	Expansion connector for external power button
J11	USB 3.2 Dual Port Type A connector
J12	USB 3.2 Dual Port Type A connector
J13	N.2 E-key socket
J14	0.5mm pitch I-PEX connector for optional 5G board
J15	Gigabit Ethernet Connector w/ LEDs (PSE optional)
J16	PSE board connector (Max. 15W)
J17	External RTC Battery wafer
J18	OD 5.5/ 2.5 DC Jack with Lock
J19	ATX 4-pin (Molex Mini-fit compatible)
J20	USB Type C connector
J21	2.54mm pitch 40-pin Expansion
SW2	Power Button w/ LEDs
SW3	Recovery Button w/ LEDs



3.4. Feature Description

3.4.1. Jetson module connector

Function	Provide connection with NVIDIA® Jetson Orin™ NX module
Location	J1
Description	SOCKET_DDR4 SO-DIMM 260PIN_90°
Manufacturer 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

3.4.2. M.2 M key 2280

Function	M.2 M key
Location	J2
Description	Socket_M.2-Key M_75pin_90°_SMD
Manufacturer Part number	FOXCONN 2E0BC21-S85BM-7H_P0.5mm-H8.5mm
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) Support PCIe Gen4 x4 for Orin NX Support PCIe Gen3 x4 for Orin Nano

3.4.3. Fan connector

Function	Fan connector																						
Location	J3																						
Description	Wafer 1x4 pin 1.25mm 90°																						
Manufacturer Part number	ACES 50271-0040N-001																						
Mating Connector	ACES 50276-004H0H0-001																						
Pinout	<table><tr><th>Pin #</th><th>Description</th><th>Module Pin #</th><th>Description</th></tr><tr><td>1</td><td>GND</td><td>-</td><td>Ground</td></tr><tr><td>2</td><td>+5V</td><td>-</td><td>Power, 5V</td></tr><tr><td>3</td><td>Fan_Tach</td><td>208</td><td>Input_5V</td></tr><tr><td>4</td><td>Fan_pwm</td><td>230</td><td>Output_5V</td></tr></table>			Pin #	Description	Module Pin #	Description	1	GND	-	Ground	2	+5V	-	Power, 5V	3	Fan_Tach	208	Input_5V	4	Fan_pwm	230	Output_5V
Pin #	Description	Module Pin #	Description																				
1	GND	-	Ground																				
2	+5V	-	Power, 5V																				
3	Fan_Tach	208	Input_5V																				
4	Fan_pwm	230	Output_5V																				
Remarks	None																						

3.4.4. MIPI CSI-2 DPHY lanes

Function	MIPI camera module connector			
Location	J4, J5			
Description	ACES ZIF FPC Conn._22PIN_0.5mm_90°			
Manufacturer Part number	ACES 50554-02241-003			
Mating Connector	FPC Cable (22-pin)			
Pinout	J4			
	Pin #	Description	Module Pin #	Description
	1	+3.3V_System	-	Power, 3.3V
	2	I2C_CAM0_SDA	215	Bidir, 3.3V
	3	I2C_CAM0_SCL	213	Output_3.3V
	4	GND	-	Ground
	5	CAM0_MCLK	116	Output, 1.8V
	6	CAM0_PWDN_LS	114	Output, 3.3V
	7	GND	-	Ground
	8	CSI1_D1_P	17	Input, MIPI
	9	CSI1_DI_N	15	Input, MIPI
	10	GND	-	Ground
	11	CSI1_D0_P	5	Input, MIPI
	12	CSI1_D0_N	3	Input, MIPI
	13	GND	-	Ground
	14	CSIO_CLK_P	12	Input, MIPI
	15	CSIO_CLK_N	10	Input, MIPI
	16	GND	-	Ground
	17	CSIO_D1_P	18	
	18	CSIO_D1_N	16	
	19	GND	-	Ground
	20	CSIO_D0_P	6	Input, MIPI
	21	CSIO_D0_N	4	Input, MIPI
	22	GND	-	Ground

	J5			
	Pin #	Description	Module Pin #	Description
	1	+3.3V_System	-	Power, 3.3V
	2	I2C_CAM1_SDA	215	Bidir, 3.3V
	3	I2C_CAM1_SCL	213	Output_3.3V
	4	GND	-	Ground
	5	CAM1_MCLK	116	Output, 1.8V
	6	CAM1_PWDN_LS	114	Output, 3.3V
	7	GND	-	Ground
	8	CSI3_D1_P	17	Input, MIPI
	9	CSI3_DI_N	15	Input, MIPI
	10	GND	-	Ground
	11	CSI3_D0_P	5	Input, MIPI
	12	CSI3_D0_N	3	Input, MIPI
	13	GND	-	Ground
	14	CSI2_CLK_P	12	Input, MIPI
	15	CSI2_CLK_N	10	Input, MIPI
	16	GND	-	Ground
	17	CSI2_D1_P	18	
	18	CSI2_D1_N	16	
	19	GND	-	Ground
	20	CSI2_D0_P	6	Input, MIPI
	21	CSI2_D0_N	4	Input, MIPI
	22	GND	-	Ground
Remarks	I2C_CAM0 & I2C_CAM1 connect to an I2C mux controlled by CAM_I2C of module			

3.4.5. OOB board Connector (for optional OOB board)

Function	OOB board connector			
Location	J6			
Description	WAFER_1*10PIN_1mm_180°_SMD			
Manufacturer Part number	ACES 50228-01071-001			
Mating Connector	ACES 50233-010H0H0-001			
Pinout	Pin #	Description	Module Pin #	Description
	1	GND	-	Ground
	2	NC	-	-
	3	UART2_RX (Debug UART)	238	Input, 3.3V
	4	UART2_TX (Debug UART)	236	Output, 3.3V
	5	UART1_RX (Auto-link)	205	Input, 3.3V
	6	UART1_TX (Auto-link)	203	Output, 3.3V
	7	SOM_PWR_GOOD	-	Input, 3.3V
	8	SYS_RST	239	Output, 3.3V
	9	BUTTON_PWR	240	Input, 3.3V
	10	+5V_STANDBY	-	Power, 5V
Remarks	For optional OOB board			

3.4.6. DP board connector (for optional DP daughter board)

Function	DP board connector																																																																																															
Location	J7																																																																																															
Description	WAFER_40PIN_0.mm_90°_SMD																																																																																															
Manufacturer Part number	I-PEX 20455-040E-12																																																																																															
Mating Connector	I-PEX 20453-240T-03																																																																																															
Pinout	<table><tr><th>Pin #</th><th>Description</th><th>Module Pin #</th><th>Description</th></tr><tr><td>1</td><td>NC</td><td>-</td><td>-</td></tr><tr><td>2</td><td>GND</td><td>-</td><td>Ground</td></tr><tr><td>3</td><td>DP1_TXD3_N</td><td>81</td><td>Output</td></tr><tr><td>4</td><td>DP1_TXD3_P</td><td>83</td><td>Output</td></tr><tr><td>5</td><td>GND</td><td></td><td>Ground</td></tr><tr><td>6</td><td>DP1_TXD2_N</td><td>75</td><td>Output</td></tr><tr><td>7</td><td>DP1_TXD2_P</td><td>77</td><td>Output</td></tr><tr><td>8</td><td>GND</td><td>-</td><td>Ground</td></tr><tr><td>9</td><td>DP1_TXD1_N</td><td>69</td><td>Output</td></tr><tr><td>10</td><td>DP1_TXD1_P</td><td>71</td><td>Output</td></tr><tr><td>11</td><td>GND</td><td>-</td><td>Ground</td></tr><tr><td>12</td><td>DP1_TXD0_N</td><td>63</td><td>Output</td></tr><tr><td>13</td><td>DP1_TXD0_P</td><td>65</td><td>Output</td></tr><tr><td>14</td><td>GND</td><td>-</td><td>Ground</td></tr><tr><td>15</td><td>DP1_AUX_P</td><td>100</td><td>Bidir</td></tr><tr><td>16</td><td>DP1_AUX_N</td><td>98</td><td>Bidir</td></tr><tr><td>17</td><td>GND</td><td>-</td><td>Ground</td></tr><tr><td>18</td><td>LCD_VCC</td><td>-</td><td>Power, 3.3V</td></tr><tr><td>19</td><td>LCD_VCC</td><td>-</td><td>Power, 3.3V</td></tr><tr><td>20</td><td>LCD_VCC</td><td>-</td><td>Power, 3.3V</td></tr><tr><td>21</td><td>LCD_VCC</td><td>-</td><td>Power, 3.3V</td></tr><tr><td>22</td><td>NC</td><td>-</td><td>-</td></tr></table>				Pin #	Description	Module Pin #	Description	1	NC	-	-	2	GND	-	Ground	3	DP1_TXD3_N	81	Output	4	DP1_TXD3_P	83	Output	5	GND		Ground	6	DP1_TXD2_N	75	Output	7	DP1_TXD2_P	77	Output	8	GND	-	Ground	9	DP1_TXD1_N	69	Output	10	DP1_TXD1_P	71	Output	11	GND	-	Ground	12	DP1_TXD0_N	63	Output	13	DP1_TXD0_P	65	Output	14	GND	-	Ground	15	DP1_AUX_P	100	Bidir	16	DP1_AUX_N	98	Bidir	17	GND	-	Ground	18	LCD_VCC	-	Power, 3.3V	19	LCD_VCC	-	Power, 3.3V	20	LCD_VCC	-	Power, 3.3V	21	LCD_VCC	-	Power, 3.3V	22	NC	-	-
	Pin #	Description	Module Pin #	Description																																																																																												
	1	NC	-	-																																																																																												
	2	GND	-	Ground																																																																																												
	3	DP1_TXD3_N	81	Output																																																																																												
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	13	DP1_TXD0_P	65	Output																																																																																												
	14	GND	-	Ground																																																																																												
	15	DP1_AUX_P	100	Bidir																																																																																												
	16	DP1_AUX_N	98	Bidir																																																																																												
	17	GND	-	Ground																																																																																												
	18	LCD_VCC	-	Power, 3.3V																																																																																												
	19	LCD_VCC	-	Power, 3.3V																																																																																												
	20	LCD_VCC	-	Power, 3.3V																																																																																												
	21	LCD_VCC	-	Power, 3.3V																																																																																												
22	NC	-	-																																																																																													

	23	GND	-	Ground
	24	GND	-	Ground
	25	GND	-	Ground
	26	GND	-	Ground
	27	DP1_HPDP	96	Input
	28	BL_GND		Ground
	29	BL_GND		Ground
	30	BL_GND		Ground
	31	BL_GND		Ground
	32	BL_EN	222	Output, 3.3V
	33	BL_PWM	228	Output, 3.3V
	34	NC	-	-
	35	NC	-	-
	36	BL_PWR	-	Output 12-24V
	37	BL_PWR	-	Output 12-24V
	38	BL_PWR	-	Output 12-24V
	39	BL_PWR	-	Output 12-24V
	40	NC	-	-
Remarks	For optional DP board LCD_VCC is 3.3V, can be et to 5V by HW BOM selecting BL_PWR is following DC_In voltage BL_PWM & J21.33 (GPIO13) recommend not to be used at same time			

3.4.7. CAN Bus 3-pin terminal block with transceiver

Function	CAN Bus 3-pin terminal block with transceiver										
Location	J8										
Description	TERMINAL BLOCK_1*3PIN_90°_DIP										
Manufacturer Part number	DECA SwitchLab Inc. ME030-38103T										
Mating Connector	DECA SwitchLab Inc. MC420-38103Z										
Pinout											
	<table><tr><td>Pin #</td><td>Description</td></tr><tr><td>1</td><td>CANH</td></tr><tr><td>2</td><td>GND</td></tr><tr><td>3</td><td>CANL</td></tr></table>			Pin #	Description	1	CANH	2	GND	3	CANL
	Pin #	Description									
	1	CANH									
	2	GND									
3	CANL										
Remarks	None										

3.4.8. HDMI OUTPUT

Function	HDMI output connector
Location	J9
Description	HDMI Type-A female connector
Manufacturer Part number	EDL TECHNOLOGY CO. HM-FVD480B
Mating Connector	Any HDMI standard Type-A interface cable or device.
Pinout	Please refer to HDMI standard .
Remarks	None

3.4.9. Expansion connector for external button

Function	External Power button			
Location	J10			
Description	WAFER_1*2PIN_1mm_180°_SMD			
Manufacturer Part number	ACES 50228-00271-001			
Mating Connector	ACES 50233-002H0H0-001			
Pinout				
	Pin #	Description	Module Pin #	Description
	1	Button_pwr	240	Input, 3.3V
	2	GND	-	Ground
Remarks	For optional external power button			

3.4.10. USB 3.2 Dual Port Type A Connector

Function	USB 3.2 Dual Port Type A Connector
Location	J11, J12
Description	Dual-port USB 3.2 Type-A female connector
Manufacturer Part number	Champway CU3B-AFR15U-096H
Mating Connector	Any Standard Type-A interface cable or device.
Pinout	Please refer to USB 3.2 standard.
Remarks	Dual port within same connector(J11 & J12) share currents up to 2A Each port of J11 has full 10Gbps bandwidth available. Both ports within J12 are from HUB GL3590T, shares 10Gbps bandwidth wth J14

3.4.11. M.2 M key 2230

Function	M.2 E key
Location	J13
Description	SOCKET_M.2-KEY E_75PIN_90°_SMD
Manufacturer Part number	ACES 51748-07502-005_P0.5mm-H8.5mm
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 Support PCIe Gen4 x1 & USB 2.0 for Orin NX Support PCIe Gen3 x1 & USB 2.0 for Orin Nano

3.4.12. Expansion 5G Board Connector (for optional 5G Daughter Board)

Function	5G Board Connector																																																																																		
Location	J14																																																																																		
Description	WAFER_40PIN_0.5mm_90°_SMD																																																																																		
Manufacturer Part number	I-PEX 20455-040E-12																																																																																		
Mating Connector	I-PEX 20453-240T-03																																																																																		
Pinout	<table><tr><th>Pin #</th><th>Description</th><th>Module Pin #</th><th>Description</th></tr><tr><td>1</td><td>VDD</td><td>-</td><td rowspan="6">Power, 12-24V</td></tr><tr><td>2</td><td>VDD</td><td>-</td></tr><tr><td>3</td><td>VDD</td><td>-</td></tr><tr><td>4</td><td>VDD</td><td>-</td></tr><tr><td>5</td><td>VDD</td><td>-</td></tr><tr><td>6</td><td>VDD</td><td>-</td></tr><tr><td>7</td><td>GND</td><td>-</td><td>Ground</td></tr><tr><td>8</td><td>GND</td><td>-</td><td>Ground</td></tr><tr><td>9</td><td>GNSS_CTRL</td><td>105</td><td>Output, 1.8V</td></tr><tr><td>10</td><td>AIRPLANE_CTRL</td><td>103</td><td>Output, 1.8V</td></tr><tr><td>11</td><td>LTE_PWR</td><td>223</td><td>Output, 3.3V</td></tr><tr><td>12</td><td>PCIE_WAKEN</td><td>179</td><td>Input, 3.3V</td></tr><tr><td>13</td><td>PCIE2_CLKREQ</td><td>221</td><td>Input, 3.3V</td></tr><tr><td>14</td><td>PCIE2_RST</td><td>219</td><td>Output, 3.3V</td></tr><tr><td>15</td><td>GND</td><td>-</td><td>Ground</td></tr><tr><td>16</td><td>USB3_SSTX_P</td><td>59</td><td>Output, USB3.2</td></tr><tr><td>17</td><td>USB3_SSTX_N</td><td>57</td><td>Output, USB3.2</td></tr><tr><td>18</td><td>GND</td><td>-</td><td>Ground</td></tr><tr><td>19</td><td>USB3_SSRX_P</td><td>53</td><td>Input, USB3.2</td></tr><tr><td>20</td><td>USB3_SSRX_N</td><td>51</td><td>Input, USB3.2</td></tr></table>				Pin #	Description	Module Pin #	Description	1	VDD	-	Power, 12-24V	2	VDD	-	3	VDD	-	4	VDD	-	5	VDD	-	6	VDD	-	7	GND	-	Ground	8	GND	-	Ground	9	GNSS_CTRL	105	Output, 1.8V	10	AIRPLANE_CTRL	103	Output, 1.8V	11	LTE_PWR	223	Output, 3.3V	12	PCIE_WAKEN	179	Input, 3.3V	13	PCIE2_CLKREQ	221	Input, 3.3V	14	PCIE2_RST	219	Output, 3.3V	15	GND	-	Ground	16	USB3_SSTX_P	59	Output, USB3.2	17	USB3_SSTX_N	57	Output, USB3.2	18	GND	-	Ground	19	USB3_SSRX_P	53	Input, USB3.2	20	USB3_SSRX_N	51	Input, USB3.2
	Pin #	Description	Module Pin #	Description																																																																															
	1	VDD	-	Power, 12-24V																																																																															
	2	VDD	-																																																																																
	3	VDD	-																																																																																
	4	VDD	-																																																																																
	5	VDD	-																																																																																
	6	VDD	-																																																																																
	7	GND	-	Ground																																																																															
	8	GND	-	Ground																																																																															
	9	GNSS_CTRL	105	Output, 1.8V																																																																															
	10	AIRPLANE_CTRL	103	Output, 1.8V																																																																															
	11	LTE_PWR	223	Output, 3.3V																																																																															
	12	PCIE_WAKEN	179	Input, 3.3V																																																																															
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	14	PCIE2_RST	219	Output, 3.3V																																																																															
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	18	GND	-	Ground																																																																															
	19	USB3_SSRX_P	53	Input, USB3.2																																																																															
20	USB3_SSRX_N	51	Input, USB3.2																																																																																

	21	GND	-	Ground
	22	USB3_DP	117	Bidir, USB2.0
	23	SUB3_DN	115	Bidir, USB2.0
	24	GND	-	Ground
	25	PCIE2_TX1_N	64	Output, PCIe
	26	PCIE2_TX1_P	66	Output, PCIe
	27	GND	-	Ground
	28	PCIE2_TX0_P	48	Output, PCIe
	29	PCIE2_TX0_N	46	Output, PCIe
	30	GND	-	Ground
	31	PCIE_RX1_P	58	Input, PCIe
	32	PCIE_RX1_N	60	Input, PCIe
	33	GND	-	Ground
	34	PCIE_RX0_P	42	Input, PCIe
	35	PCIE_RX0_N	40	Input, PCIe
	36	GND	-	Ground
	37	PCIE2_CLK_P	54	Output, PCIe
	38	PCIE2_CLK_N	52	Output, PCIe
	39	GND	-	Ground
	40	5G_RST	225	Output, 3.3V
Remarks	For 5G Board VDD is following DC_IN voltage USB signal is from HUB GL3590T, shares 10Gbps bandwidth with J12 PCIe related signal @PCIe2 (PCIe C7@0x141e0000) Support PCIe Gen4 x2 for Orin NX & PCIe Gen3 x2 for Orin Nano			

3.4.13. Gigabit Ethernet Connector

Function	1Gb single-port Ethernet connector, used to connect to the host system.			
Location	J15			
Description	RJ45 with integrated magnetics (1G-LEFT(G)+RIGHT(Y)-DOWN)			
Manufacturer Part number	Contact Technology MJ45-111QC4A-GY-S307			
Mating Connector	Any standard 1Gb Ethernet mating connector can be applicable.			
Pinout	Comply with Ethernet standards.			
LED indicator				
	Activity LED (Yellow)		Link/ Speed LED (Green)	
	Status	Description	Status	Description
	Yellow Blinking	Data transmission or receiving is occurring	Solid Green	PSE Ready
	OFF	No data transmission or receiving is occurring	OFF	W/O PSE
Remarks	directly from NVIDIA Jetson SOM PSE(Maximum 15W) Option.			

3.4.14. PSE Board Connector (for optional PSE board)

Function	PSE Board Connector																																																							
Location	J16																																																							
Description	WAFER_2*6PIN_1mm_180°_SMD																																																							
Manufacturer Part number	ACES 50238-01241-001																																																							
Mating Connector	ACES 50247-012H0H1-001																																																							
Pinout	<table><tr><th>Pin #</th><th>Description</th><th>Module Pin #</th><th>Description</th></tr><tr><td>1</td><td>VDD</td><td>-</td><td>Power, 12-24V</td></tr><tr><td>2</td><td>GND</td><td>-</td><td>Ground</td></tr><tr><td>3</td><td>VDD</td><td>-</td><td>Power, 12-24V</td></tr><tr><td>4</td><td>GND</td><td>-</td><td>Ground</td></tr><tr><td>5</td><td>54V</td><td>-</td><td>Power In, 54V+</td></tr><tr><td>6</td><td>SYS_RST</td><td>239</td><td>Bidir, 3.3V</td></tr><tr><td>7</td><td>54V</td><td>-</td><td>Power In, 54V+</td></tr><tr><td>8</td><td>I2C1_SCL</td><td>189</td><td>Output, 3.3V</td></tr><tr><td>9</td><td>54_N</td><td>-</td><td>Power In, 54V-</td></tr><tr><td>10</td><td>I2C1_SDA</td><td>191</td><td>Bidir, 3.3V</td></tr><tr><td>11</td><td>LED_PSE</td><td>-</td><td>Input, 3.3V</td></tr><tr><td>12</td><td>+3.3V_STANDBY</td><td>-</td><td>Power Out, 3.3V</td></tr></table>				Pin #	Description	Module Pin #	Description	1	VDD	-	Power, 12-24V	2	GND	-	Ground	3	VDD	-	Power, 12-24V	4	GND	-	Ground	5	54V	-	Power In, 54V+	6	SYS_RST	239	Bidir, 3.3V	7	54V	-	Power In, 54V+	8	I2C1_SCL	189	Output, 3.3V	9	54_N	-	Power In, 54V-	10	I2C1_SDA	191	Bidir, 3.3V	11	LED_PSE	-	Input, 3.3V	12	+3.3V_STANDBY	-	Power Out, 3.3V
	Pin #	Description	Module Pin #	Description																																																				
	1	VDD	-	Power, 12-24V																																																				
	2	GND	-	Ground																																																				
	3	VDD	-	Power, 12-24V																																																				
	4	GND	-	Ground																																																				
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	6	SYS_RST	239	Bidir, 3.3V																																																				
	7	54V	-	Power In, 54V+																																																				
	8	I2C1_SCL	189	Output, 3.3V																																																				
	9	54_N	-	Power In, 54V-																																																				
	10	I2C1_SDA	191	Bidir, 3.3V																																																				
	11	LED_PSE	-	Input, 3.3V																																																				
12	+3.3V_STANDBY	-	Power Out, 3.3V																																																					
Remarks	VDD is following DC_IN voltage LED_PSE low active, indicate PSE link is ready.																																																							

3.4.15. RTC Battery Connector

Function	RTC battery for module															
Location	J17															
Description	WAFER_1*2PIN_1.25mm_90°															
Manufacturer Part number	ACES 50271-00201-001															
Mating Connector	ACES 50276-002H0H0-001 Molex 51021-8602															
Pinout	<table><tr><td>Pin #</td><td>Description</td><td>Module Pin #</td><td>Description</td></tr><tr><td>1</td><td>GND</td><td>-</td><td>Ground</td></tr><tr><td>2</td><td>RTC_BAT</td><td>235</td><td>Power, 3V</td></tr></table>				Pin #	Description	Module Pin #	Description	1	GND	-	Ground	2	RTC_BAT	235	Power, 3V
	Pin #	Description	Module Pin #	Description												
	1	GND	-	Ground												
2	RTC_BAT	235	Power, 3V													
Remarks	RTC Battery: KTS, CR2032_3V															

3.4.16. DC POWER JACK

Function	DC Power input with lock
Location	J18
Description	JACK_DC POWER_D2.5mm_90°_DIP
Manufacturer Part number	JKCR DCD-020-105B
Mating Connector	Any OD 2.5mm power plug
Pinout	NA
Remarks	None

3.4.17. ATX 4pin (Molex Mini-Fit compatible)

Function	DC Power input			
Location	J19			
Description	WAFER_2x2PIN_4.5mm_90°_DIP			
Manufacturer Part number	PINREX 740-81-04TW00			
Mating Connector	Follow ATX 4pin plug or molex mini fit plug			
Pinout	Pin #	Description	Pin #	Description
	1	GND	3	12 – 54V Power
	2	GND	4	12 – 54V Power
Remarks	None			

3.4.18. USB type C connector

Function	BSP Installation as recovery mode
Location	J20
Description	JACK_USB3.1_C TYPE(F)_90°_PIP-L1.45mm
Manufacturer Part number	ACES 57988-0240D-001
Mating Connector	Any Standard Type-C interface cable or device.
Pinout	Please refer to USB 3.2 Type-C standard
Remarks	USB 2.0 Only (Device Mode)

3.4.19. 2.54mm pitch 40-pin Expansion

Function	General-purpose input/ output
Location	J21
Description	HEADER_PIN_2*20PIN_2.54mm_180°_SMD
Manufacturer Part number	PINREX 212-92-20GBEL
Mating Connector	Any 2.54mm pitch housing
Remarks	Refer to follow tables

Pin#	Signal Name	Module Pin #	Type/ Direction (Note 5)	Pin Drive or Power Pin Max Current	Power-on Default	Notes
1	+3V3_SYSTEM	-	Power	1A	-	1
2	+5V_SYSTEM	-	Power	1A	-	1
3	I2C1_SDA	191	Bidir OD	+/- 2mA	Z	2
4	+5V_SYSTEM	-	Power	1A	-	1
5	I2C1_SCL	189	Bidir OD	+/- 2mA	Z-	2
6	GND	-	Ground	-	-	-
7	GPIO09_LS	211	Bidir	+/- 20uA	Pd	3
8	UART1_TXD_LS	203	Output	+/- 24mA	Pd	4
9	GND	-	Ground	-	-	-
10	UART1_RXD_LS	205	Input	+/- 24mA	Pd	4
11	UART1_RTX_LS	207	Output	+/- 24mA	Pd	4
12	I2S0_SCLK_LS	199	Bidir	+/- 20uA	Pd	3
13	SPI1_SCK_LS	106	Bidir	+/- 20uA	Pd	3
14	GND	-	Ground	-	-	-
15	GPIO12_LS	218	Bidir	+/- 20uA	Z	3
16	SPI1_CS1_LS	112	Bidir	+/- 20uA	Z	3
17	+3V3_SYSTEM	-	Power	1A	-	1
18	SPI1_CS0_LS	110	Bidir	+/- 20uA	Z	3
19	SPI0_MOSI_LS	89	Bidir	+/- 20uA	Pd	3
20	GND	-	Ground	-	-	-
21	SPI0_MISO_LS	93	Bidir	+/- 20uA	Pd	3
22	SPI1_MISO_LS	108	Bidir	+/- 20uA	Pd	3
23	SPI0_SCK_LS	91	Bidir	+/- 20uA	Pd	3
24	SPI0_CS0_LS	95	Bidir	+/- 20uA	z	3
25	GND	-	Ground	-	-	-
26	SPI0_CS1_LS	97	Bidir	+/- 20uA	Z	3
27	I2C0_ID_SDA	187	Bidir OD	+/- 2mA	Z	2
28	I2C0_ID_SCL	185	Bidir OD	+/- 2mA	Z	2
29	GPIO01_LS	118	Bidir	+/- 20uA	Pd	3
30	GND	-	Ground	-	-	-
31	GPIO11_LS	216	Bidir	+/- 20uA	Pd	3
32	GPIO07_LS	206	Bidir	+/- 20uA	Z	3
33	GPIO13_LS	228	Bidir	+/- 20uA	Z	3
34	GND	-	Ground	-	-	-
35	I2S0_LRCK_LS	197	Bidir	+/- 20uA	Pd	3
36	UART1_CTS_LS	209	Input	+/- 24mA	Pd	4
37	SPI1_MOSI_LS	104	Bidir	+/- 20uA	Pd	3
38	I2S0_SDIN_LS	195	Bidir	+/- 20uA	Pd	3
39	GND	-	Ground	-	-	-
40	I2S0_SDOUT_LS	193	Bidir	+/- 20uA	pd	3

Notes:

1. This is current capability per power pin.
2. These pins are connected to the SoC directly. They are open-drain (either pulled up or driven low by the SoC when configured as outputs). The max drive that meets the data sheet VOL is ± 2 mA.
3. These pins connect to TI TXB0108 level translators. Due to the design of these devices, the output drivers are very weak, so they can be overdriven by another connected device output for bidirectional support.
4. These pins connect to TI SN74LVC2T45 with H/W direction-control. The direction is unidirectional if these are configured as GPIOs.
5. In the Type/Dir column, directions indicate H/W ability, Birdir mean direction is controlled by S/W setting signal function.
6. All signals on the 40-pin header are 3.3V levels.

3.4.20. Power Control Button

Function	Power control button
Location	SW2
Description	Button
Manufacturer Part number	Champway LS67AK-NBR-A-R2KA9
Pinout	NA
Remarks	• When the Carrier Board is in "PWB Mode," pressing the button will initiate the boot-up sequence. • When the carrier board 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 the carrier board is ON, holding the button for more than 5 seconds will force a full system power down.

3.4.21. Force Recovery Button

Function	Force recovery
Location	SW3
Description	Button
Manufacturer Part number	Champway LS67AK-NBR-A-R2KA9
Pinout	NA
Remarks	- No function during normal operation - The SOM will enter recovery mode when held down during power ON.

3.4.22. Dip Switch button

Function	Fan PWM controller/ Auto Power on
Location	SW1
Description	4 SPST DIP switch
Manufacturer Part number	DIPTRONICS DHN-04F-T-Q-T/R IN OFF-SWITCHING 0.025A*24VDC

Pin #	Description	Switch ON	Switch OFF
1	Power ON mode	Always Power on	Always Power Disable
2	CAN0_Terminal	w/ 120ohm Terminal	w/o 120ohm Terminal
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)

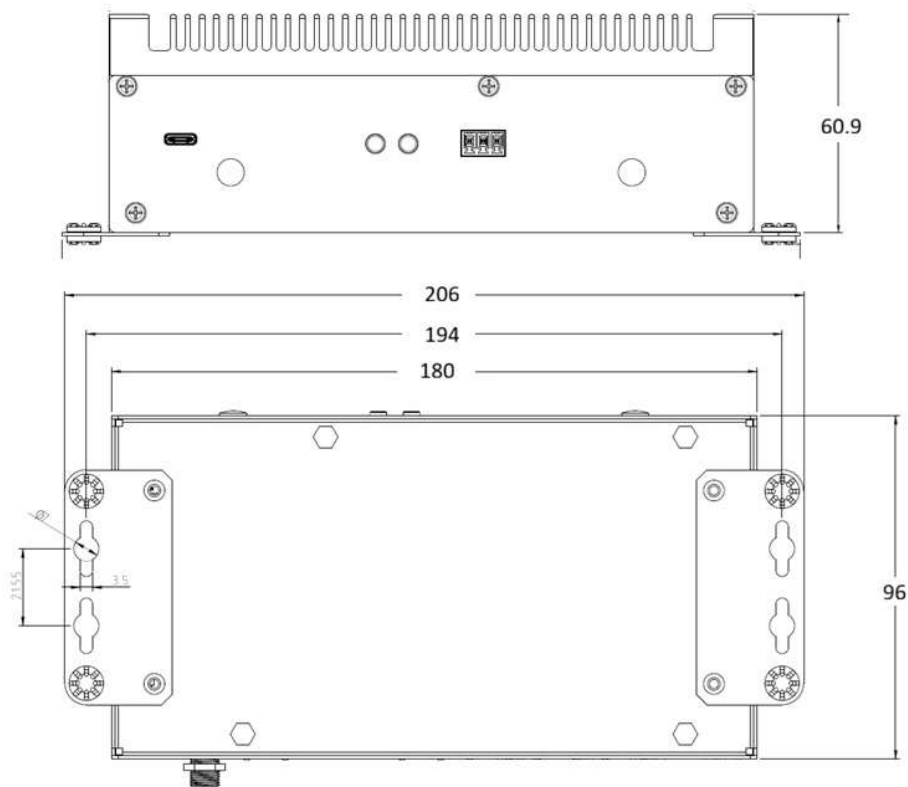
Remarks	None
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Other Switches and Jumpers

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

IV. Engine of the Computer

4.1. Dimensions



Unit: mm

4.2. I/O & Functions

AEC-2001/ AEC-4001 provides HDMI video output, USB 3.2 ports, GbE RJ-45 ports, and USB port for recovery.

Operating with NVIDIA® Jetson Orin NX/ Nano module and the rich I/O functions. AEC-2001/ AEC-4001 is the perfect choice in building a compact, high performance AI Edge Computing platform for the intelligent video analytic applications.

4.3. Front View



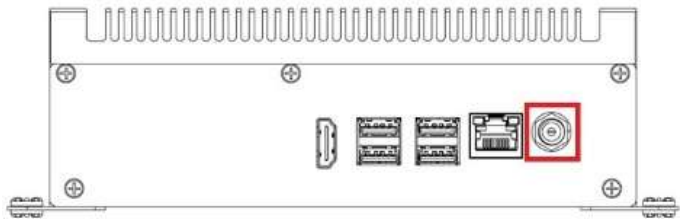
4.4. Rear View



The Power Button is a non-latched switch. To power on the system, press the power button. To power off the system, you can either command shutdown by OS operation, or just simply press the power button.

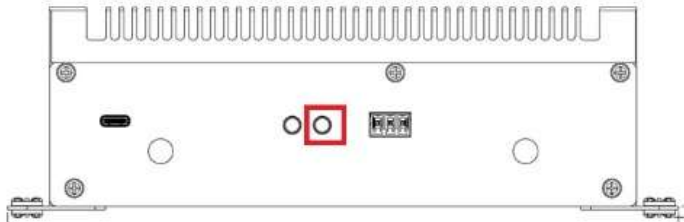
4.5. Connectors

4.5.1. DC-IN connector

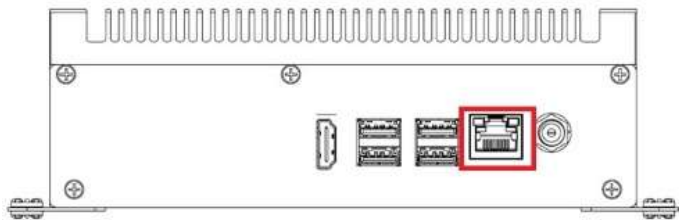


Power adapter in DC jack.

4.5.2. Power On button



4.5.3. LAN connector



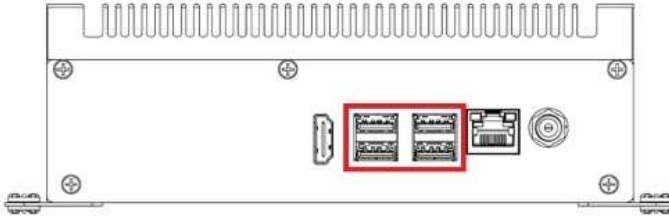
The pin-out of LAN is listed as follows:

Pin No.	10/100/1000Mbps
1	MDI0_P
2	MDI0_N
3	MDI1_P
4	MDI2_P
5	MDI2_N
6	MDI1_N
7	MDI3_P
8	MDI3_N

The LAN port is supported by standard RJ-45 connector with LED indicators to present Active / Link/ Speed status of the connection.

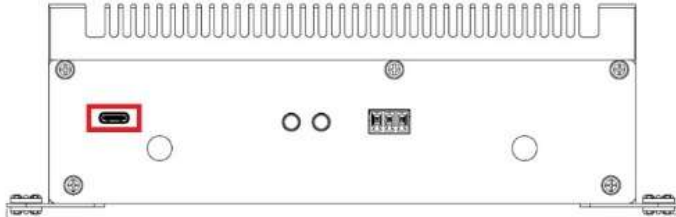
LED Location	LED Color	10Mbps	100Mbps	1000Mbps
Right	Green	Off	Solid Green	Solid Orange
Left	Yellow	Twinkling Yellow	Twinkling Yellow	Twinkling Yellow

4.5.4. USB 3.2 ports



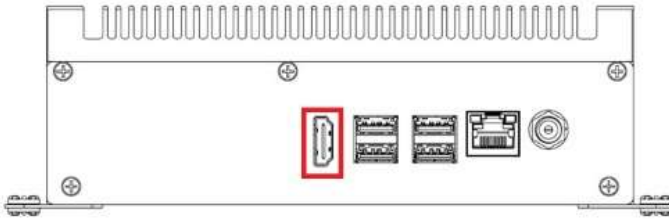
There are 4 USB 3.2 connectors available supporting up to 5Gb per second data rate in the front panel of AEC-2001/ AEC-4001. It is also compliant with the requirements of Super Speed (SS). High Speed (HS), Full Speed (FS) and Low Speed (LS).

4.5.5. USB Type C connector



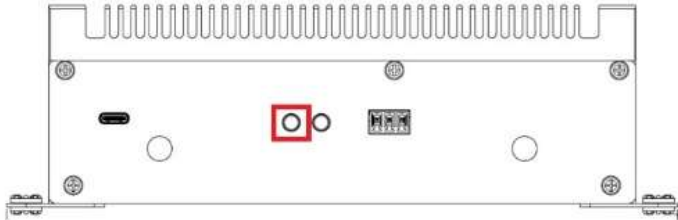
The AEC-2001/ AEC-4001 USB Recovery mode provides an alternate boot device (USB). In this mode, the system is connected to a host system and boots over USB. This is used when a new image needs to be flashed. USB0 must be available to use as USB Device for USB Recovery Mode.

4.5.6. HDMI ports



Onboard HDMI ports support HDMI V2.1 interface, connection supports up to 3840 x 2160 @30Hz.

4.5.7. Force Recovery Button



Press the Button enter Force Recovery Mode. Button is held down while either system is first powered on, or by pressing & releasing reset button while Recovery button is pressed.

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