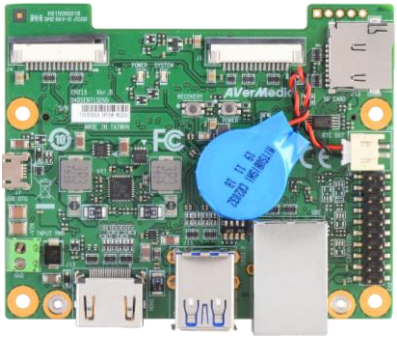
AVerAI EN715 Carrier Board and Box PC

Designed for NVIDIA® Jetson Nano™ / Xavier NX



AVerMedia Technologies, Inc.
No. 135, Jian 1st Rd., Zhonghe Dist., New Taipei City 23585, Taiwan
Tel: 886-2-2226-3630
Fax: 886-2-3234-4842
Sales and Marketing: Contact
Technical Support: Professional User

Table of Contents

Preface

Disclaimer

The information contained in this user manual, including but not limited to any product specification is subject to change without notice. AVerMedia assumes no liability for any damages incurred directly or indirectly from any technical or typographical errors or omissions contained herein or for discrepancies between the product and the user manual.

Technical Support

If you experience the difficulty after reading this manual and/or using the product, please contact the reseller from which you purchased the product. In most cases, the reseller can help you with the product installation and the difficulty you encountered.

In case the reseller is not able to resolve your problem, our highly capable global technical support team can certainly assist you. Our technical support section is available 24 hours a day and 7 days a week through our website, with the click here. For more contact information, you may find it in the section of 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.

Download User Manual

Please click the link here to download the file of this user manual from AVerMedia website.

Revision History

Revision	Date	Updates
Version 1.0	May 15, 2020	Release user manual

AVerMedia Global Offices

Headquarters

Taiwan Office

No. 135, Jian 1st Rd., Zhonghe Dist., New Taipei City 23585,Taiwan
Tel: +886-2-2226-3630
Fax: +886-2-3234-4842
Sales & Marketing: Contact
Technical Support: Home users / Professional users

The Americas

USA Office

4038 Clipper Ct. Fremont, CA 94538
Tel: (510) 403-0006
Fax: (510) 403-0022
Sales & Marketing: Contact
Technical Support: Home users / Professional users

Brazil Office

Sales & Marketing: Contact
Technical Support: Home users / Professional users

Latin America Office

Sales & Marketing: Contact
Technical Support: Home users / Professional users

Europe

Head Office EU

AVT Solutions GmbH
Hanauer Landstrasse 291 B 60314 Frankfurt Hessen Germany
: technicalsupport_120
Technical Support: Home users / Professional users

Russia Office

Sales & Marketing: Contact
Technical Support: Home users / Professional users
Professional Solutions Support Tel:
+7 (925) 834-0310

Spain Office

AVerMedia Europe Group
Ronda de Poniente no. 4 segundo H
28760 Tres cantos, Madrid
Spain:
: technicalsupport_120
Sales & Marketing: Contact
Technical Support: Home users / Professional users

Asia-Pacific

China Office

Room 1510, No.488, Hitech Plaza, South Wuning Rd., Jingan District, Shanghai, China
Tel: +86-021-5298 7985
Fax: +86-021-5298 7981
Sales & Marketing: Contact
Technical Support: Home users / Professional users

India Office

Sales & Marketing: Contact
Technical Support: Home users / Professional users

Japan Office

6F,Kojimachi Syuei Bldg,4-3-13 Kudan-minami, Chiyoda-ku, Tokyo ,102-0074, Japan
Sales & Marketing: Contact
Technical Support: Home users / Professional users

Thailand Office

Sales & Marketing: Contact
Technical Support: Home users / Professional users

Korea Office

Sales & Marketing: Contact
Technical Support: Home users / Professional users

Vietnam Office

5F, No. 596 Nguyen Dinh Chieu St., Ward 3, District 3, HCM City, Vietnam
Tel: +84-28-22 539 211
Fax: +84-28-22 539 210
Sales & Marketing: Contact
Technical Support: Home users / Professional users

Limited Product Warranty

AVerMedia provides the one-year product warranty. Should this product, in AVerMedia's opinion, fail to be in the good working order during the warranty period, AVerMedia will, at its option, repair or replace it at no charge, provided that the product has not been subjected to abuse, misuse, accident, disaster, or non-AVerMedia authorized modification or repair.

You may obtain the warranty service by delivering this product to an authorized AVerMedia business partner or to AVerMedia along with the proof of purchase. Product returned to AVerMedia must be pre-authorized by AVerMedia with an RMA (Return Material Authorization) number marked on the outside of the package and sent prepaid, insured, and packaged for the safe shipment. AVerMedia will return the product by prepaid shipment service.

The limited product warranty is only valid over the serviceable life of the product. This is defined as the period during which all components are available. Should the product prove to be irreparable, AVerMedia reserves the right to substitute an equivalent product if available or to retract the product warranty if no replacement is available.

The above product warranty is the only warranty authorized by AVerMedia. Under no circumstances will AVerMedia be liable in any way for any damages, including any lost profits, lost savings, or other incidental or consequential damages arising out of the use of, or inability to use, such product.

Copyright Notice

Trademark Acknowledgement

AVerMedia acknowledges all the trademarks, registered trademarks, and/or copyrights referred to in this document as the property of their respective owners. Not listing all possible trademarks or copyright acknowledgments does not constitute the lack of acknowledgment to the rightful owners of the trademarks and copyrights mentioned in this document.

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 EN715 includes three fully featured carrier boards and one associated Box PC's which is all developed for NVIDIA® Jetson Nano™ (Version B01) / Xavier™ NX modules. AVerAI EN715 provides not only the access to a great list of latest interfaces on Xavier™ NX modules but also one RJ-45 interface and one RTC battery as the function enrichment.

EN715 provides one 4Kp60 HDMI video output, two USB 3.0 ports, one GbE RJ-45 port, 20-pins GPIO expansion, and one Micro-B USB 2.0 port for recovery. It also comes with a single-mold PCB terminal block module for easy power connection.

Operating with NVIDIA® Jetson Nano™ / Xavier™ NX module and the rich I/O functions, AVerAI EN715 is the perfect choice in building a compact, high performance AI edge computing platform for the intelligent video analytics applications.

1.1 Product Specifications

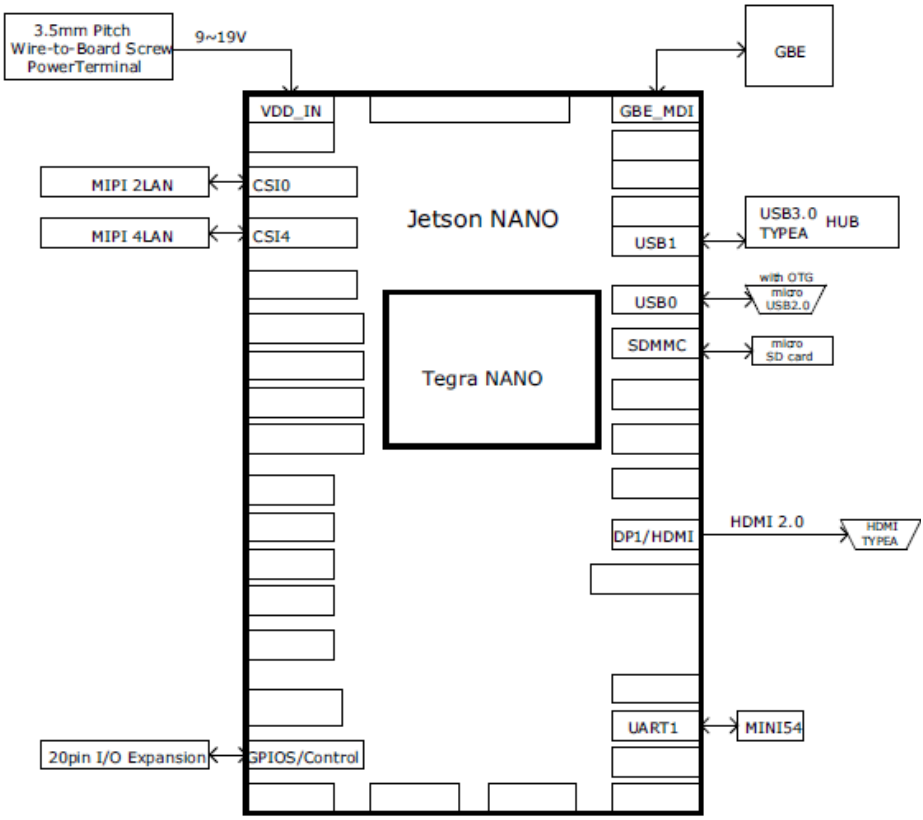
Model	EN715-BBC3	EN715-BBC2
Compatibility	NVIDIA® Jetson Nano™ (Version B01)/Xavier™ NX module	
Networking	1x GbE RJ-45	
Display Output	3840 x 2160 at 60Hz	
Temperature	Operating temperature 0℃~70℃ Storage temperature -40℃ ~ 85℃ Relative humidity 40 ℃ @ 95%, Non-Condensing	
MIPI Camera Inputs	-2x 2 lane MIPI CSI-2, 15 pin FPC 1mm Pitch Connector -1x 4 Lane MIPI CSI-2, 36 pin FPC 1mm Pitch Connector	-2x 2 lane MIPI CSI-2, 15 pin FPC 1mm Pitch Connector
USB	1x USB 2.0 Micro-B for recovery 2x USB 3.0 Type-A	
Storage	1x micro-SD card slot	
GPIO Expansion	20 pins: 2x I2C, 1x UART, 9x GPIOs	
Input Power	3.5mm Screw Terminal; 9V~19V is recommended.	
Buttons	Power and Recovery	
RTC Battery	Support RTC battery and Battery Life Monitoring by MCU	
Dimension/ Weight	W: 87mm x L: 70.6mm x H: 27.3mm (3.43” x 2.78” x 1.07”), Weight: 70g	
Accessory	DC Jack Power Extension Cable (5.5 x 2.5mm x 30cm)	
Certifications	CE, FCC, KC	

1.2 OPTION ACCESSORY

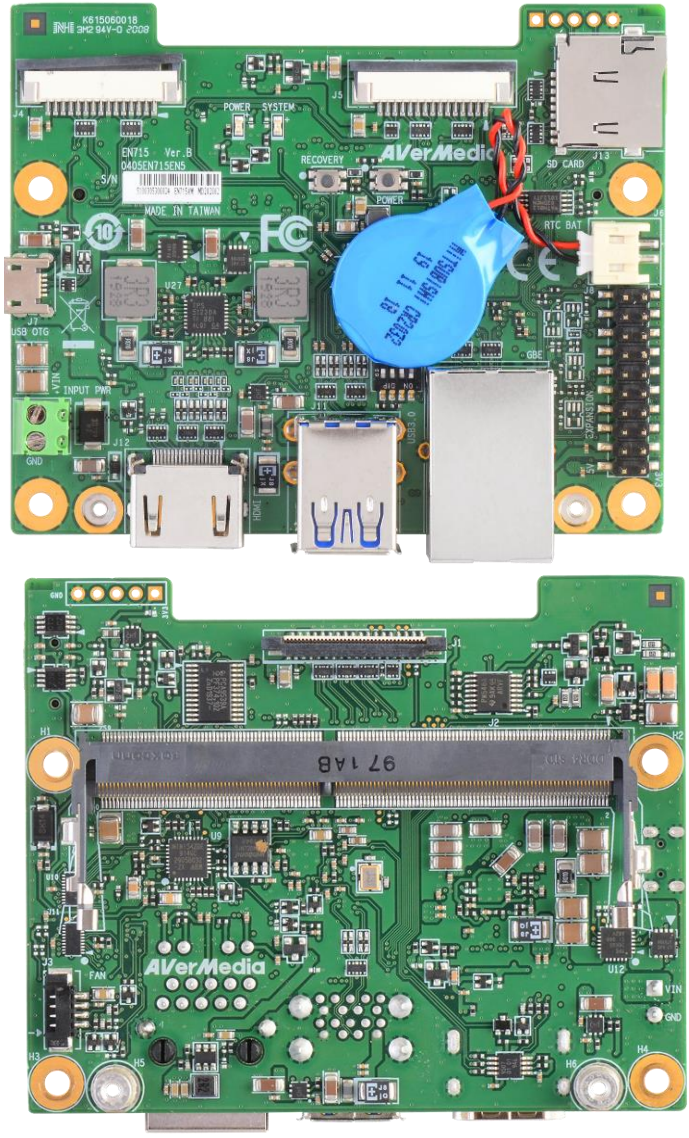
Item	EN715-BBC3	EN715-BBC2
NVIDIA® Jetson	Nano™ (Version B01) / Xavier NX	
Fan Module	-Heat sink with Fan (Dimension: 56 x 40.8 x 20 mm) for Jetson Nano™ (Version B01) -Heat sink with Fan (Dimension: 59 x 40.8 x 30 mm) for Xavier™ NX module	
AC Adaptor	12V, 5A	
Power cord	EU/JP/TW/US/CN/UK	
MIPI Camera	Camera Module Manufacturer: APPRO.PHO – For 15 pin MIPI connector B-04: IMX179(8M)MIPI, 1080P(30fps) C-04: IMX290(2M)MIPI, 1080P(30fps) C-05: IMX290(2M)+ISP(YUV), 1080P(30fps) – For 36 pin MIPI connector B-03: IMX334(4K) MIPI, 4K(30/60fps) B-13: IMX334(4K)+ISP(YUV) , 4K(30fps) A-03: IMX290(FHD) V-by-One® HS, 1080P(60fps) A-06: IMX334(4K) V-by-One® HS x1, 4K(30fps)	

2.0 Product Overview

2.1 Block Diagram



2.2 Front View and Back View of EN715



2.3 Front View and Three-Quarter View of EN715 BoxPC

2.4 Connector Summary

PCB Code	Designation	Description
EN715-BBC2	J1	N/A
	J2	SO-DIMM socket for NVIDIA® Jetson Nano™ and Jetson™ XavierNX module
	J3	Fan Power connector
	J4	2 Lane MIPI CSI-2 camera connector
	J5	2 Lane MIPI CSI-2 camera connector
	J6	RTC battery connector
	J7	USB 2.0 Micro-B
	J8	20-pin GPIO expansion
	J9	Power connector
	J10	Gigabit Ethernet connector
	J11	USB 3.1 Gen 1 Type-A connectors
	J12	HDMI 2.0 connector
	J13	Micro SD card slot

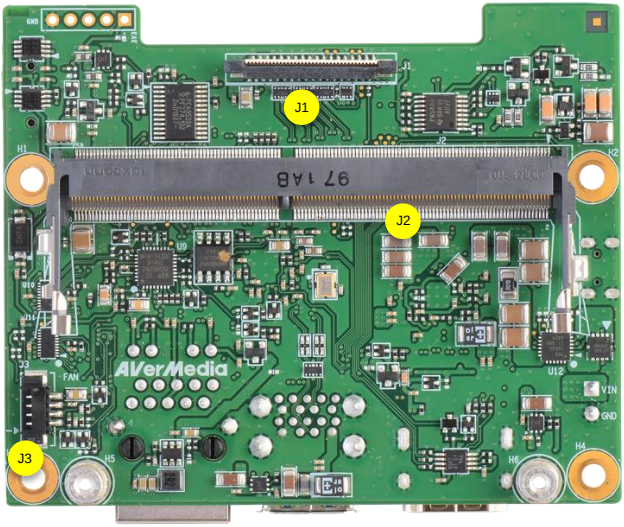
PCB Code	Designation	Description
EN715-BBC3	J1	4 Lane MIPI CSI-2 camera connector
	J2	SO-DIMM socket for NVIDIA® Jetson Nano™ and Jetson™XavierNX module
	J3	Fan Power connector
	J4	2 Lane MIPI CSI-2 camera connector
	J5	2 Lane MIPI CSI-2 camera connector
	J6	RTC battery connector
	J7	USB 2.0 Micro-B
	J8	20-pin GPIO expansion
	J9	Power connector
	J10	Gigabit Ethernet connector
	J11	USB 3.1 Gen 1 Type-A connectors
	J12	HDMI 2.0 connector
	J13	Micro SD card slot

2.5 Switch Summary

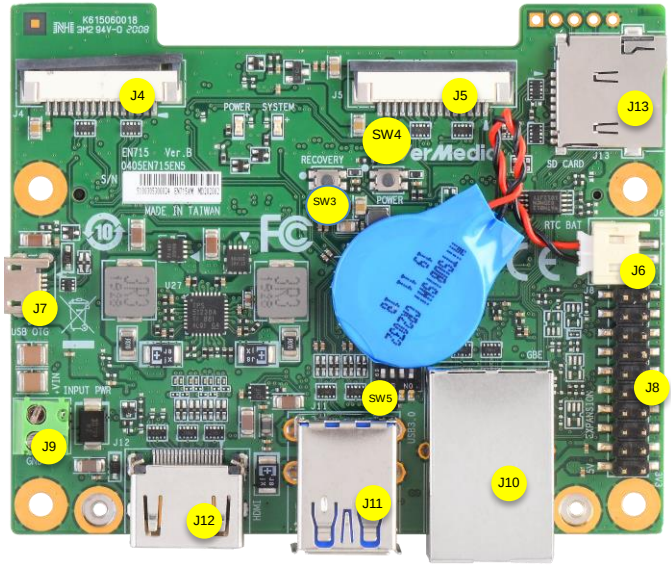
Designation	Description
SW3	RECOVERY button
SW4	POWER on button
SW5	Fan PWM controller/Auto Power on

3.0 Feature Description

3.1 Connector and Switch Locations



SW3



3.2 SerDes (V-by-One® HS)

Function	MIPI camera module connector	
Location	J1	
Type Description	WAFER_1*36PIN_0.5㎜_180°	
Manufacturer and Part Number	PINREX 979-44-93610A_ZIF FPC	
Mating Connector	4 Lane MIPI CSI-2 camera connector (36PIN)	

PIN OUT

PIN#	Description	PIN#	Description
PIN 1	+5V MIPI	PIN 19	GND
PIN 2	+5V MIPI	PIN 20	CSI4_D2_P
PIN 3	+1V8	PIN 21	CSI4_D3_N
PIN 4	+3.3V MIPI	PIN 22	GND
PIN 5	+3.3V MIPI	PIN 23	N/A
PIN 6	+3.3V MIPI	PIN 24	N/A
PIN 7	GND	PIN 25	N/A
PIN 8	CSI4_D0_P	PIN 26	MIPI4_PWDN
PIN 9	CSI4_D0_N	PIN 27	CSI4_I2C_SDA
PIN 10	GND	PIN 28	CSI4_I2C_SCL
PIN 11	CSI_4_CLK_P	PIN 29	GND
PIN 12	CSI_CLK_N	PIN 30	N/A
PIN 13	GND	PIN 31	N/A
PIN 14	GND	PIN 32	N/A
PIN 15	CSI4_D1_N	PIN 33	N/A
PIN 16	GND	PIN 34	GND
PIN 17	CSI4_D2_P	PIN 35	CAM4_MCLK
PIN 18	CSI4_D3_P	PIN 36	GND

3.3 Jetson™ Nano/NX Module Connector

Function	Provide connection with NVIDIA® Jetson Nano™ / Xavier™ NX	
Location	J2	
Type Description	SOCKET_DDR4 SO-DIMM_260PIN_90°	
Manufacturer and Part Number	Foxconn ASAA826-EASB0-7H	
Mating Connector	NVIDIA® Jetson Nano™(Version B01) / Xavier™ NX module	
Pinout	Please refer to NVIDIA Jetson Nano™ / Xavier™ NX and AGX Xavier™ System-on-Module datasheet for pinout details.	
Remarks	https://developer.nvidia.com/ embedded/downloads	

3.4 Fan Power connector

Function	Fan Power Connector	
Location	J3	
Type Description	WAFER_1*4PIN_1.25㎜_90°	
Manufacturer and Part Number	ACES 50271-0040N-001_BLACK	
Pinout	Pin # / Description PIN 1 / GND PIN 2 / Power +5V PIN 3 / FAN_TACH PIN 4 / FAN_PWM	
Remarks	None	

3.5 MIPI CSI-2 DPHY Lanes

Function	MIPI camera module connector
Location	J4 , J5
Type Description	WAFER_15PIN_1㎜_90°
Manufacturer and Part Number	CHAMPWAY AFA07-S15FCA-HF_FPC ZIF-LOWER
Mating Connector	2 Lane MIPI CSI-2 camera connector (15Pin)

Pinout

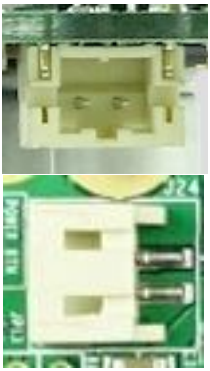
J4

PIN#	Description	PIN#	Description
Pin1	GND	Pin9	CSI0_CLK_P
Pin2	CSI0_D0_N	Pin10	GND
Pin3	CSI0_D0_P	Pin11	MIPI2_PWDN
Pin4	GND	Pin12	CAM2_MCLK
Pin5	CSI0_D1_N	Pin13	CSI0_I2C_SCL
Pin6	CSI0_D1_P	Pin14	CSI0_I2C_SDA
Pin7	GND	Pin15	+3V3_MIPI
Pin8	CSI0_CLK_N		

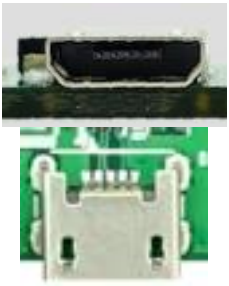
J5

PIN#	Description	PIN#	Description
Pin1	GND	Pin9	CSI2_CLK_P
Pin2	CSI2_D0_N	Pin10	GND
Pin3	CSI2_D0_P	Pin11	MIPI2_PWDN
Pin4	GND	Pin12	CAM2_MCLK
Pin5	CSI2_D1_N	Pin13	CSI2_I2C_SCL
Pin6	CSI2_D1_P	Pin14	CSI2_I2C_SDA
Pin7	GND	Pin15	+3V3_MIPI
Pin8	CSI2_CLK_N		

3.6 RTC Battery Connector

Function	RTC battery for module	
Location	J6	
Type Description	2.0mm wire-to-board header 02P type	
Manufacturer and Part Number	Pinrex, 721-94-02TWR9	
Mating Connector	Tyu, TU2001HNO-02	
Pinout	Pin # / Description PIN1 / 3V Power PIN2 / GND	
Remarks	RTC Battery: MITSUBISHI, CR2032 3V	

3.7 OTG/USB Micro-Type Connector

Function	OTG programming recovery	
Location	J7	
Type Description	USB micro-type B 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	

3.8 20-Pin GPIO expansion

Function	General-purpose input/output）	
Location	J8	
Type Description	2x I2C, 1x UART, 9x GPIOs	
Manufacturer and Part Number	光桀_PHPME006-100ARRH	
Mating Connector	20-Pin GPIO expansion	

Pinout

Pin #	Description
PIN1	3V3
PIN2	5V
PIN3	GND
PIN4	GND
PIN5	I2C1_SDA
PIN6	UART2_TXD_3V3
PIN7	I2C1_SCL
PIN8	UART2_RXD_3V3
PIN9	ID_I2C_SDA
PIN10	GND
PIN11	ID_I2C_SCL
PIN12	SPI1_SCK_LS (GPIO 14)
PIN13	I2S0_SCLK_LS (GPIO 79)
PIN14	SPI1_MISO_LS (GPIO 13)
PIN15	I2S0_SDOUT_LS (GPIO 78)
PIN16	SPI1_MOSI_LS (GPIO 12)
PIN17	I2S0_SDIN_LS (GPIO 77)
PIN18	SPI1_CS0_LS (GPIO 15)
PIN19	I2S0_LRCK_LS (GPIO 76)
PIN20	SPI1_CS1_LS (GPIO 232)

3.9 Power Supply Connector

Function	Power Supply	
Location	J9	
Type Description	Socket_Terminal Block_1*2PIN_90°	
Manufacturer and Part Number	DECA MB332-350M02	
Mating Connector	DC 5.5 x 2.5 mm Power cable	
Pinout	PIN# / Description / Color #1 / 12V / Red #2 / GND / Black	
Remarks	None	

3.10 Gigabit Ethernet Connector

Function	1Gb Ethernet connector, used to connect to the host system.	
Location	J10	
Type Description	RJ45 8P8C single-port with LED	
Manufacturer and Part Number	Champway, 8188D-B514-00200	
Mating Connector	Any RJ45 plug with Cat5, Cat5e, Cat6 type cabling.	
Pinout	Comply with Ethernet standards.	
Remarks	None	

3.11 USB 3.1 Gen 1 Type-A Connector #1 and #2

Function	USB 3.1 Gen 1 Type-A connector #1 & #2	
Location	J11	
Type Description	Dual-port USB 3.1 Gen 1 Type-A female connector	
Manufacturer and Part Number	Foxconn, UEA1112C-4HK1-4H	
Mating Connector	Any USB 3.1 standard Type-A interface cable or device.	
Pinout	Please refer to USB 3.1 Gen 1 standard.	
Remarks	None	

3.12 HDMI OUTPUT

Function	HDMI output connector	 
Location	J12: HDMI	
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	

3.13 Optional Function Selection

Function	Fan PWM controller/Auto Power on	
Location	SW5	
Type Description	4 SPST DIP switch	
Manufacturer and Part Number	DIPTRONICS IN OFF-SWITCHING 0.025A/24VDC	

Pinout

SW	Description	ON
S1	Fan PWM controller	Fan always on
S2	N/A	N/A
S3	Auto power on	Auto power on disabled
S4	Test mode off	Test mode on (for factory use)

Remark	None

3.14 Micro SD Card Slot

Function	Micro SD Card	
Location	J13	
Type Description	SOCKET_MICRO SD CARD_9PIN_90°_SMD	
Manufacturer and Part Number	Fullglory, FG-0011BAAS09A	
Pinout	Refer to MicroSD card standard	
Remark	None	

3.15Other Switches and Jumpers

Other switches and jumpers listed on the boards but not mentioned in this manual 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 NVIDIA® Jetson Nano™ / Xavier™ NX module onto the SO-DIMM connector (J2). Check and be sure to follow the manufacturer's instructions for the proper installation of the mounting hardware, heat sink or heat spreader, fan, and any other applicable requirements from the associated manufacturers.
3. 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 Cable Assembly in this manual.
   - Power cable to the PCB terminal block module on the carrier board.
   - HDMI video display cable to HDMI video output connector (J12).
   - Mouse and keyboard cables to USB connectors (J11).
   - MicroSD card to MicroSD card slot (J13)
4. Connect the included power cable to the PCB terminal block module.
5. Connect the power cable to the power adapter.
6. Turn on the power adapter. (Please be reminded NOT to power on the system by plugging in a live power.)

4.1 BSP Setup Instructions

BSP (board support package) file: EN715-R1.0.*.4.*.tar.gz
https://drive.google.com/drive/folders/11DBr14jZCZTtk8zJ-BormrY-cY8PIFeg
Default login username/password of the BSP is nvidia/nvidia

If you have difficulties to access the BSP download link, please visit AVerMedia website at https://www.avermedia.com/professional/download, or contact technical support at https://www.avermedia.com/professional/technical_support or e-mail us at eusupport@avermedia.com for further assistance.

BSP Installation steps for NVIDIA Jetson board: (Important Note: Please backup your personal files before re-flashing BSP)
After you download the BSP file and put the file in a Linux PC, please refer to the steps below to re-flash BSP.

1. Let the JETSON Nano Xavier NX board initiate recovery mode.
You have to keep pressing "Recovery" button and then power on the NVIDIA Jetson board to initiate recovery mode.

When connecting a NVIDIA Jetson board to a Linux PC via a MicroUSB to USB cable, you can check kernel messages with `dmesg` command in the Linux PC.
Once you see these messages in the kernel messages, this means that the NVIDIA Jetson board is in the recovery mode.
[24685.229129] usb 1-7: Product: APX
[24685.229132] usb 1-7: Manufacturer: NVIDIA Corp

2. Using the commands below in the Linux PC to start re-flashing BSP.
$ **sudo** tar zxvf EN715-R1.0.*.4.*.tar.gz
$ cd JetPack_*.**/Linux_for_Tegra
$ **sudo** ./flash.sh Jetson-nano-emmc mmcblk0p1

Note: sudo is required to re-flash the BSP.

5.0 Software

For L4T (Linux for Tegra) BSP support and the other software support associated with NVIDIA® Jetson NanoTM / Xavier™ NX module, please visit Avermedia website to contact our technical support function. (https://www.avermedia.com/tw/support/contact)

6.0 Force Recovery Mode

USB 3.l/OTG port of EN715 can be used to re-program NVIDIA® Jetson Nano™ / Xavier™ NX 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™ / Xavier™ NX module.
3. Press and hold down Force Recovery Button and then power on the carrier board.
4. After three seconds, release Force Recovery Button.
5. NVIDIA® Jetson Nano™ / Xavier™ NX 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.

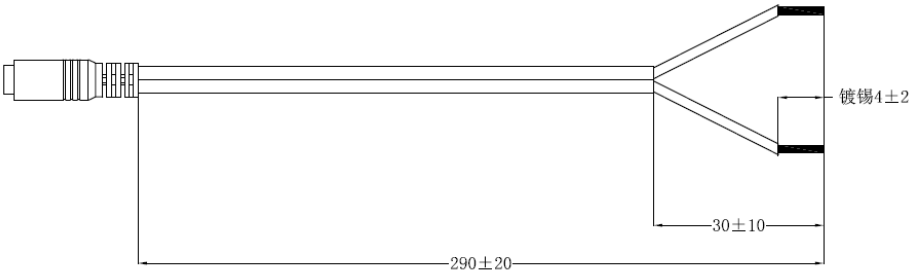
7.0 Power Consumption

Item Description	Power Consumption
Theoretical Maximum System Power Consumption	60W
Typical System Power Consumption	The power consumption under the normal operating mode is depending on the application software running with NVIDIA® Jetson Nano™ Xavier NX module on the carrier board or in the box PC's.

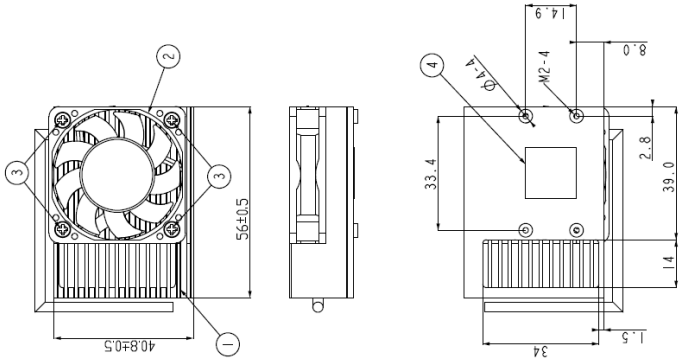
8.0 Option Accessory Drawings

8.1 Power Cable, Fan Module and Adapter and Power Cord

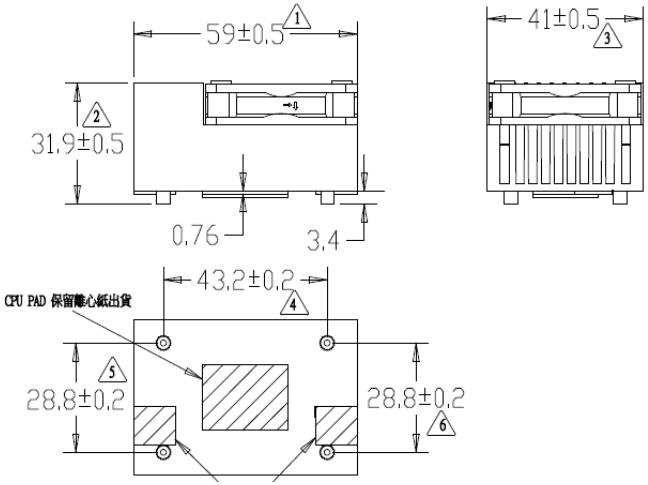
Part Number 064APOWERBXS



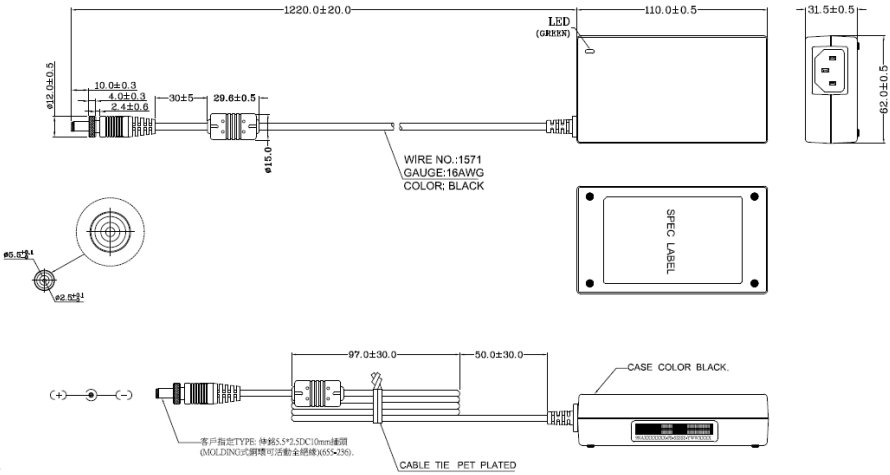
Nano Fan Module (Option)



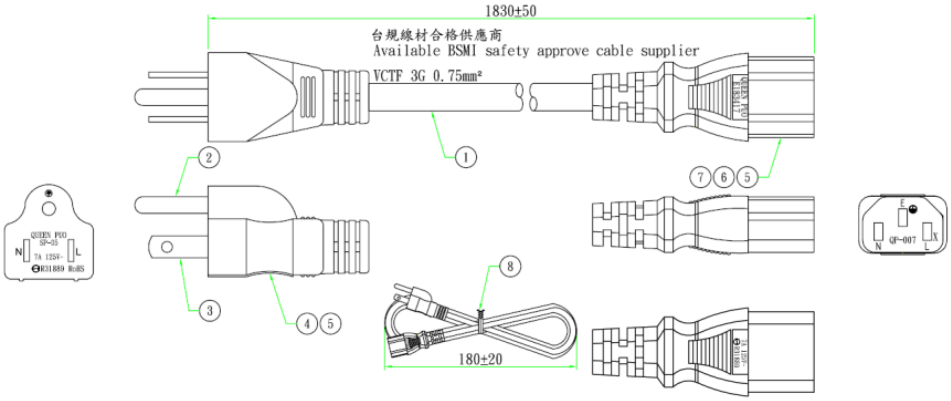
Nano & Xavier NX Module (Option)



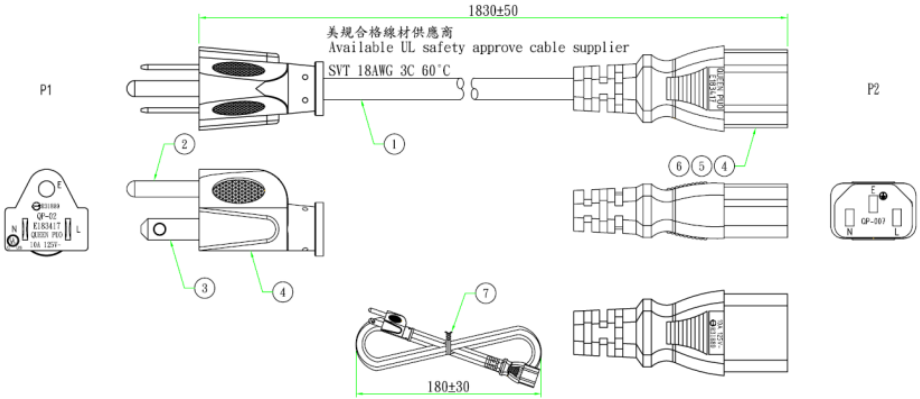
Power Adapter 04131HGOUANK



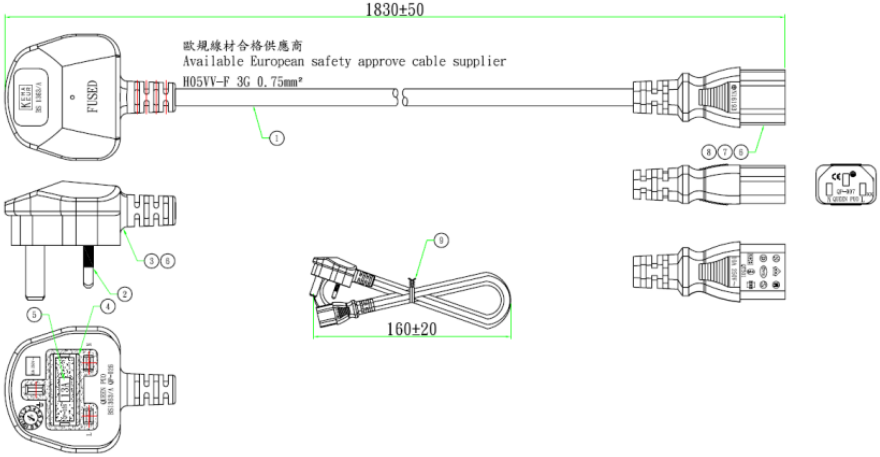
64APOWERBRX-IPD (TW version)



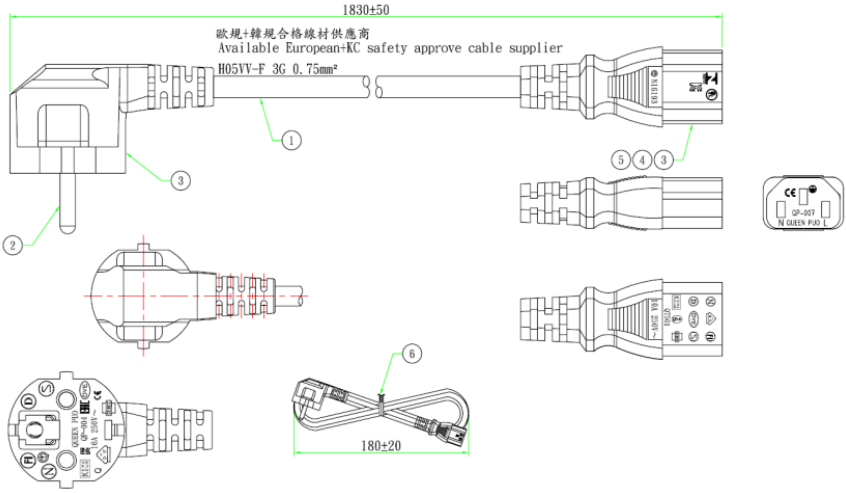
064APOWERBR2-IPD (US version)



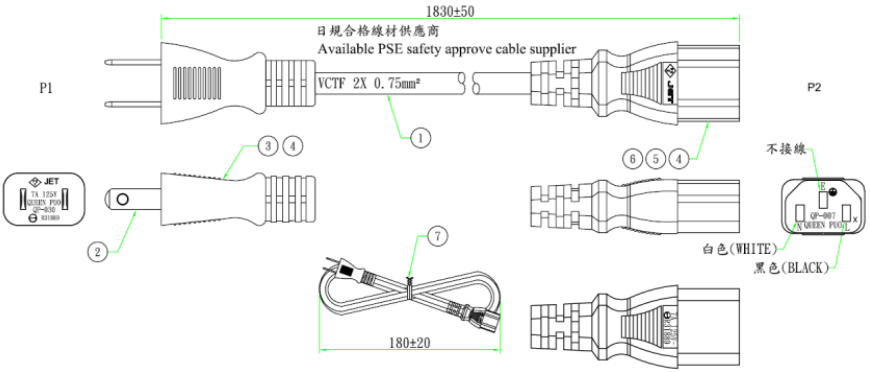
064APOWERBRW-IPD (UK version)



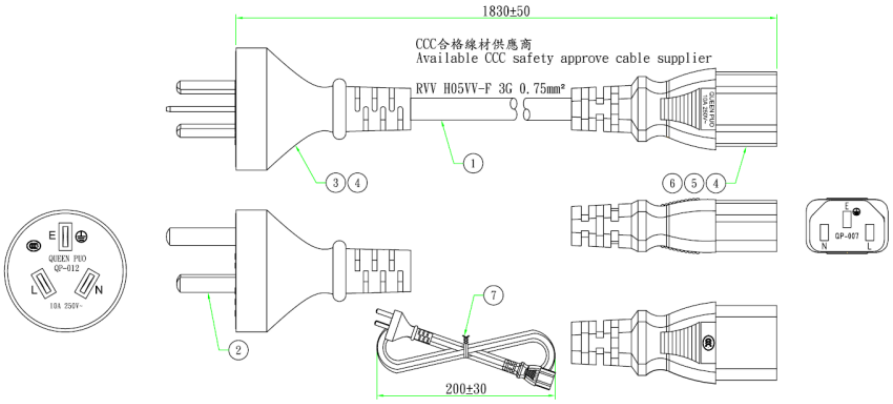
064APOWERBR5-IPD (EU version)



064APOWERBSL (JP version)

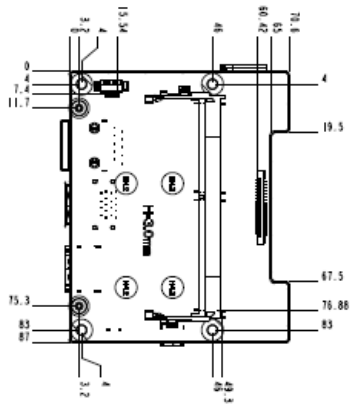


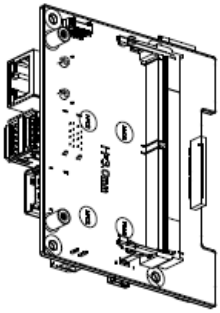
064APOWERBR4-IPD (CN version)

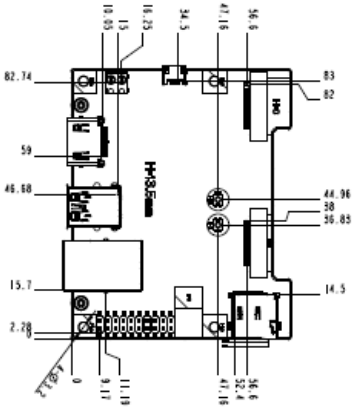


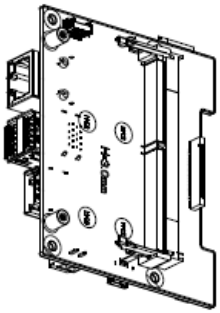
9.0 Dimension Drawings and Assembly Drawings

9.1 Dimension Drawings of EN715









9.2 Dimension Drawing of EN715 Box PC