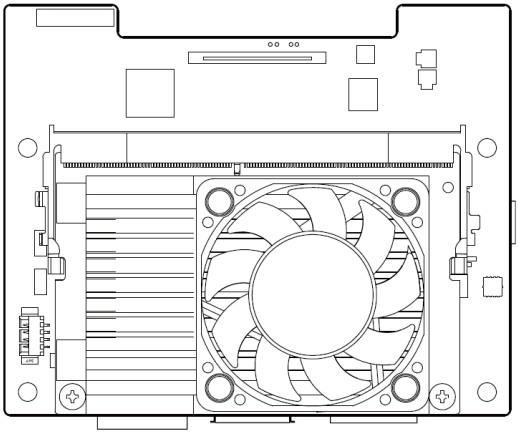
AVerMedia D111NX / D111NO

Engineering kit

User Manual

Equip NVIDIA® Jetson Xavier™ NX / Nano™ module



Revision	Date	Updates
Version 1.0	May 16, 2022	1st Released
Version 1.1	Oct 31 2022	Update Safety Precaution:
Version 1.2	Nov 21 2023	Update 2.2 Front View and Back View of Carrier board

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0.0 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/ 7 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.

Copyright Notice

Limited Product Warranty

AVerMedia provides the two-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.

It is not recommended to disassemble the box PC, which will impact the warranty. 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.

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ESD Warning

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

Safety Precaution:

1. All cautions and warnings on the device should be noted.
2. For safety consideration, do NOT open the device if not a qualified service stuff.
3. Place the device on a solid surface during installation to prevent falls.
4. Keep the device away from humidity.
5. Do NOT leave this device in an un-controlled environment with temperatures beyond the device's permitted storage temperature to avoid damage.
6. All adaptors and cables supplied by AVerMedia are verified. Do NOT use any others not supplied by AVerMedia to avoid any malfunction or fires.
7. Make sure the power source matches the power rating of the device.

8. Place the power cord where people cannot step on it. Do not put anything on the power cord.
9. Always completely disconnect the power while the device is not usage or idle for a long time.
10. Disconnect the device from any AC supply before cleaning. While cleaning, use a damp cloth instead of liquid or spray detergents.
11. Make sure the device is installed near a power outlet and easy for accessible.
12. Do not cover the openings on the device to ensure optimal heat dissipation.
13. Watch out the heatsink or heat spreader of the device when the system is running.
14. Never pour any liquid into the openings. This could cause fire or electric shock.
15. The static electricity should be noted while installing any internal components. Consider to use a grounding wrist strap and put all electronic parts in static-shielded containers.

If the following situations occur, please contact our service personnel:

(1) The device is dropped or damaged

(2) Damaged power cord or plug

(3) Exposure to moisture

(4) Liquid intrusion into the device

(5) Any obvious signs of damage displayed on the device

(6) Device is not working as expected or in a manner as described in this manual

1.0 Introduction

AVerMedia AVerMedia D111NX / D111NO include fully featured carrier board which is all developed for NVIDIA® Jetson Xavier NX / Nano modules. AVerMedia D111NX / D111NO provide not only the access to a great list of latest interfaces on NVIDIA® Jetson Xavier NX / Nano modules but also one RJ-45 interface and one RTC battery as the function enrichment.

D111NX / D111NO provides one 4Kp60 HDMI video output, two USB 3.0 ports, one GbE RJ-45 port, 20-pin GPIO expansion, and one USB 2.0 Micro-B port for recovery.

Operating with NVIDIA® Jetson Xavier NX / Nano and the rich I/O functions, AVerMedia D111NX / D111NO are the perfect choice in building a compact, high performance AI edge computing platform for the intelligent video analytics applications.

1.1 Product Specifications

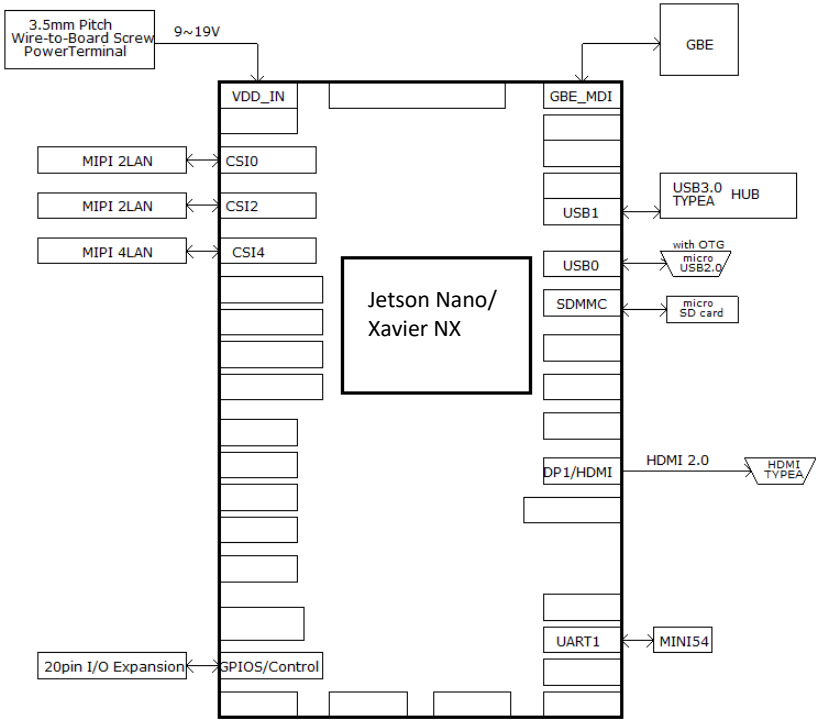
Model	D111NX / D111NO
Compatibility	Apply to NVIDIA® Jetson Xavier NX / Nano modules
Networking	1x GbE RJ-45
Display Output	1 x HDMI output 3840 x 2160 at 60Hz
Temperature	Operating temperature 0℃~70℃ Storage temperature -40℃ ~ 85℃ Relative humidity 40 ℃ @ 95%, Non-Condensing
MIPI Camera Inputs (internal I/O)	2x 2 Lane MIPI CSI-2, 15 pin FPC 1mm Pitch Connector 1x 4 Lane MIPI CSI-2, 36 pin FPC 0.5mm 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 (internal I/O)	20 pin: 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: 58.2mm (3.43” x 2.78” x 2.29”); Weight: 175g
Accessory	12V/5A adapter and power cord (optional)
Certifications	CE, FCC, KC

1.2 Optional accessories

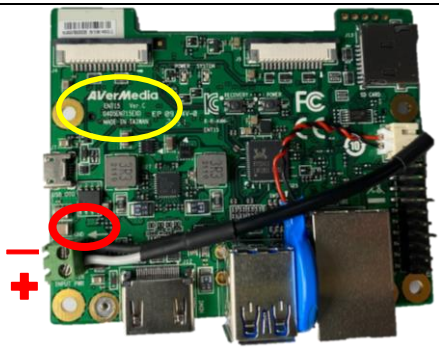
Item	D111NX / D111NO
Power cord	US/ UK/ EU/ KR/ AU/ JP/ TW
MIPI Camera (internal I/O)	For 15 pin MIPI connector: 1.raspberry pi camera v2 2.Manufacturer: APPRO.PHO ■ B-04: IMX179(8M)MIPI, 1080P(30fps) ■ C-04: IMX290(2M)MIPI, 1080P(30fps) ■ C-05: IMX290(2M)+ISP(YUV), 1080P(30fps) For 36 pin MIPI connector: 1.Manufacturer: APPRO.PHO ■ B-03: IMX334(4K) MIPI, 4K(30fps) ■ A-06: IMX334(4K) V-by-One® HS x1, 4K(30fps)

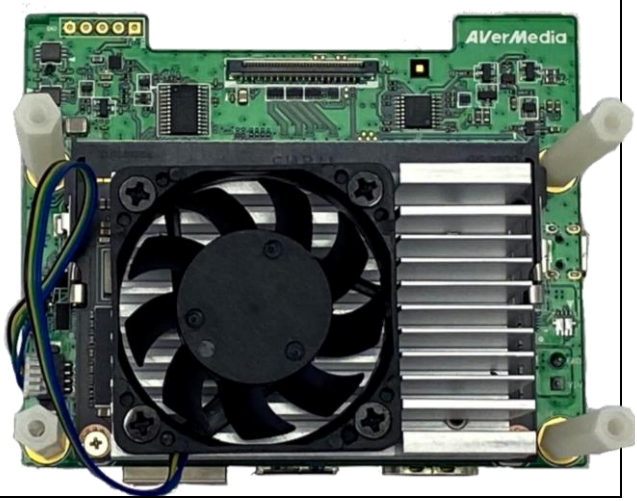
2.0 Product Overview

2.1 Block Diagram



2.2 **Front View and Back View of Carrier board**

Front View Install cable (Ver.C) ● Black cable connect to “-“ (GND) ● White cable connect to “+”	
Front View Install cable (Ver.B) ● White cable connect to “+” ● Black cable connect to “-“ (GND)	

Back View	

2.3 Connector Summary

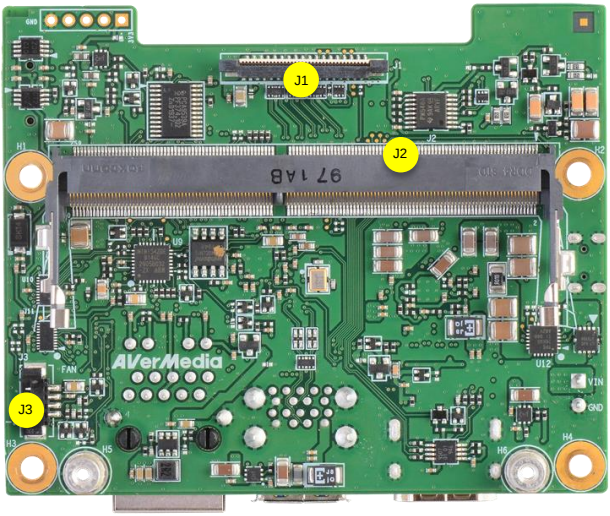
PCB Code	Designation	Description
D111NX/ D111NO	J1	4 Lane MIPI CSI-2 camera connector
	J2	SO-DIMM socket for NVIDIA® Jetson Xavier NX / NANO module
	J3	Fan Power connector
	J4	2 Lane MIPI CSI-2 camera connector
	J5	2 Lane MIPI CSI-2 camera connector
	J6	RTC battery connector
	J7	USB 2.0 Micro-B
	J8	20-pin GPIO expansion
	J9	Power Supply Connector
	J10	Gigabit Ethernet connector
	J11	USB 3.1 Gen 1 Type-A connectors
	J12	HDMI 2.0 connector
	J13	Micro SD card slot

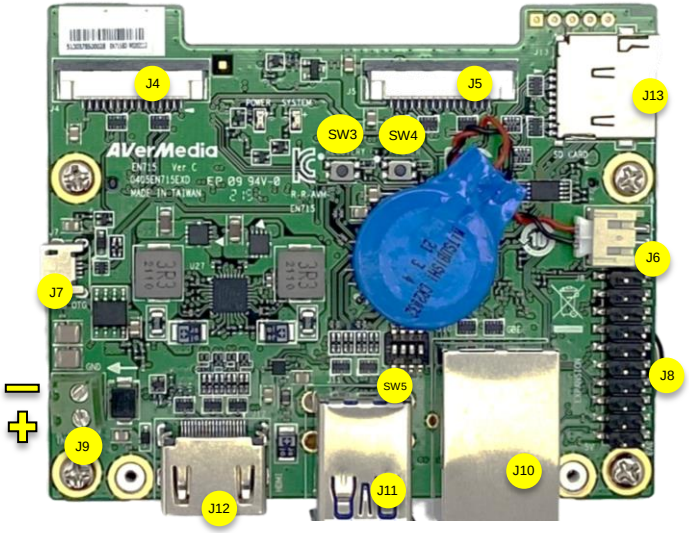
2.4 Switch Summary

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

3.0 Feature Description

3.1 Connector and Switch Locations





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 Number	Signal	Pin Number	Signal
1	5V	2	5V
3	1.8V	4	3.3V
5	3.3V	6	3.3V
7	GND	8	CSI4_D0_P
9	CSI4_D0_N	10	GND
11	CSI4_CLK_P	12	CSI4_CLK_N
13	GND	14	CSI4_D1_P
15	CSI4_D1_N	16	GND
17	CSI4_D2_P	18	CSI4_D2_N
19	GND	20	CSI4_D3_P
21	CSI4_D3_N	22	GND
23	N/A	24	N/A
25	N/A	26	MIPI4_PWDN
27	CSI4_I2C_SDA	28	CSI4_I2C_SCL
29	GND	30	N/A
31	N/A	32	N/A
33	N/A	34	GND
35	CAM4_MCLK	36	GND

3.3 Jetson module Connector

Function	Provide connection with NVIDIA® Jetson Xavier NX / NANO modules	
Location	J2	
Type Description	SOCKET_DDR4 SO-DIMM_260PIN_90°	
Manufacturer and Part Number	Foxconn ASAA826-EASB0-7H	
Mating Connector	NVIDIA® Jetson Nano/ Xavier NX	
Pinout	Please refer to NVIDIA Jetson 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

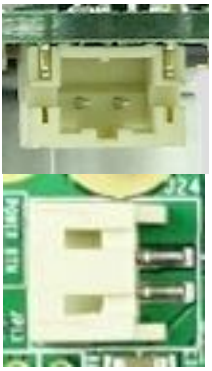
J4

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		

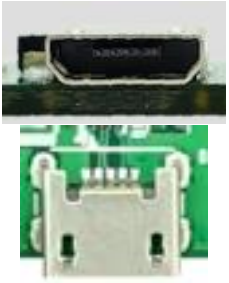
J5

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 USB Micro-Type Connector

Function	USB 2.0 MICRO-B 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	光榮_PHPME006-100ARRH	
Mating Connector	20-Pin GPIO expansion	

Pinout

D111NX

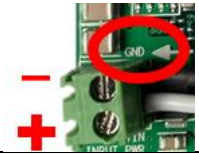
Address	Pin Name	20-pin index		Pin Name	Address
	+3V3	1	2	+5V	
	GND	3	4	GND	
/dev/i2c-8	I2C1_SDA	5	6	UART2_TXD	/dev/ttyTCU0 Debug Console
	I2C1_SCL	7	8	UART2_RXD	
/dev/i2c-1	I2C0_SDA	9	10	GND	
	I2C0_SCL	11	12	SPI1_SCK	gpio480 Bidirection
gpio445 Bidirection	I2S0_SCLK	13	14	SPI1_MISO	gpio481 Bidirection
gpio446 Bidirection	I2S0_DOUT	15	16	SPI1_MOSI	gpio482 Bidirection
gpio447 Bidirection	I2S0_DIN	17	18	SPI1_CS0	gpio483 Bidirection
gpio448 Bidirection	I2S0_FS	19	20	SPI1_CS1	gpio484 Bidirection

D111NO

Address	Pin Name	20-Pin Index		Pin Name	Address
	+3V3	1	2	+5V	
	GND	3	4	GND	
/dev/i2c-1	I2C1_SDA	5	6	UART2_TXD_3V3	Debug Console
	I2C1_SCL	7	8	UART2_RXD_3V3	/dev/ttyS0
/dev/i2c-0	I2C0_SDA	9	10	GND	
	I2C0_SCL	11	12	SPI1_SCK	gpio14
gpio79	I2S0_SCLK	13	14	SPI1_MISO	gpio13
gpio78	I2S0_DOUT	15	16	SPI1_MOSI	gpio12
gpio77	I2S0_DIN	17	18	SPI1_CS0	gpio15
gpio76	I2S0_FS	19	20	SPI1_CS1	gpio232

Remarks	GPIO uses 3.3V

3.9 Power Supply Connector

Function	Power Supply Connector	
Location	J9	
Type Description	Socket_Terminal Block_1*2PIN_90°	
Manufacturer and Part Number	DECAMB332-350M02	
Mating Connector	DC 120 x 2.5mm Power cable	
Pinout	PIN# / Description / Color #1 / GND / Black #2 / 12V / White	
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	Default S1 on

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	

3.15 Other 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. Plug a cable to the Micro USB2.0 port.
3. Press and hold the Recover button.
4. Connect to an AC power outlet.

4.1 BSP Setup Instructions

BSP (board support package) file: EN715-R1.0.*.tar.gz for D111NO
BSP (board support package) file: EN715-NX-R1.0.*.tar.gz for D111NX
https://www.avermedia.com/professional/download/d111nx#ans_part|

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 AVerMedia |download, or contact technical support at https://www.avermedia.com/professional/technical_support or e-mail us at contact@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 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 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

1. Decompress by root	sudo tar zxvf EN715-R1.0.*.tar.gz (for D111NO) sudo tar zxvf EN715-NX-R1.0.*.tar.gz (for D111NX)
2.Enter L4T directory	cd JetPack_*.**/Linux_for_Tegra
3.Connect a Jetson platform and a host PC(*) through a Micro USB to USB Cable	*The host PC must be a physical Ubuntu 18.04 PC with x64 CPU, not a virtual machine or Jetson platform.
4.(optional)Select one profile for MIPI CSI camera; if don't select MIPI CSI camera, default is 2x raspberry_pi_v2	sudo ./setup.sh
5. Enter the recovery mode	power off -> press recovery button -> power on -> wait 2 seconds -> release recovery button
6. Start to flash BSP	a. Use default user account. (user_name/password: nvidia) sudo ./install.sh b. Create other user name and password as default user sudo ./install.sh --create_default_account
7.Flash more modules (speed up)	sudo ./install.sh -r

5.0 Software

For L4T (Linux for Tegra) BSP support and the other software support associated with NVIDIA® Jetson Xavier NX / Nano , please visit AVerMedia website to contact our technical support function. (https://professional.avermedia.com/contact/poc_request/)

6.0 Force Recovery Mode

USB 2.0 port of D111NX / D111NO can be used to re-program NVIDIA® Jetson Xavier NX / NANO 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 USB 2.0 MICRO-B port to the other host system which will be used to re-program the new system file into NVIDIA® Jetson Xavier NX / Nano 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 Xavier NX / Nano 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 reverting USB 2.0 MICRO-B port back to the host mode.

7.0 Power Consumption

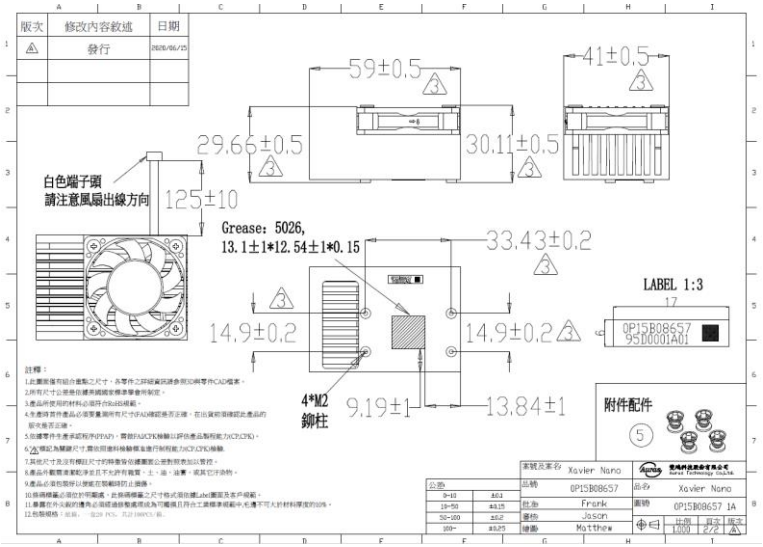
Item Description	Power Consumption
Theoretical Maximum System Power Consumption	Maximum power consumption of D111NX is about 26W; Maximum power consumption of D111NO is about 14W. The condition is connected to HDMI and RJ45 with CPU/ GPU full loading. (maximum power consumption up to 60W based on adapter)
Typical System Power Consumption	The power consumption under the normal operating mode is depending on the application software running with NVIDIA® Jetson Xavier NX / Nano.

8.0 Accessory Drawings

8.1 Fan Module/ Adapter/ Power Cord

Fan Module for NANO

- Rated Voltage: 5V
- Operating Voltage Range: 4V~5.5V
- Rated Speed: 6000RPM±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



Fan Module for Xavier NX

- Rated Voltage: 5V
- Operating Voltage Range: 4V~5.5V
- Rated Speed: 6000RPM±10%
  (Testing Speed After Continuous 3 Minute Operation At Ambient Temperature Of 25℃)
- Life Expectancy: 70,000hours at 40℃ (WITH 15~65% RH)
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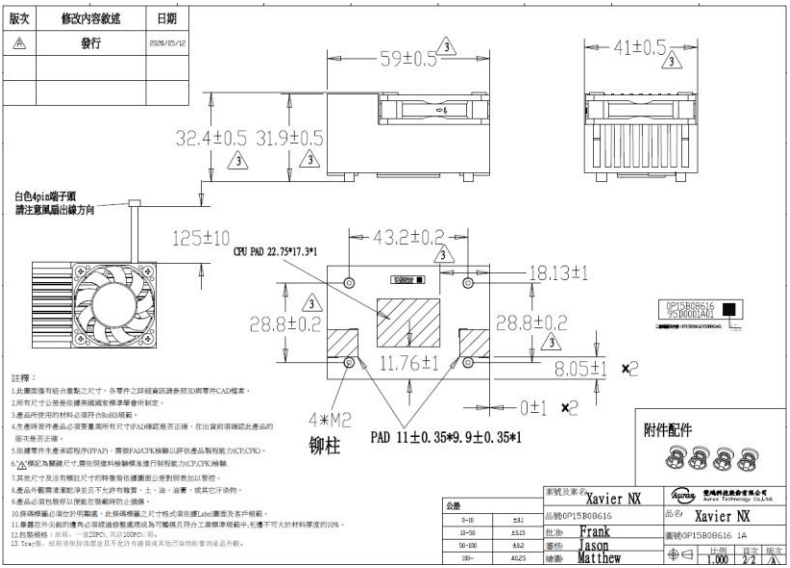
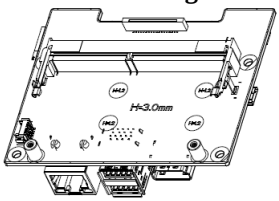
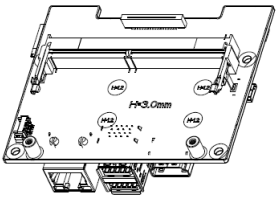
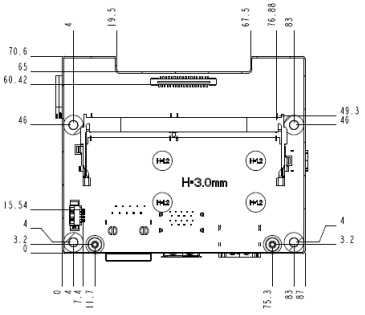


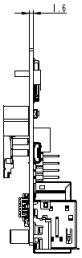
9.0 Dimension Drawings and Assembly Drawings

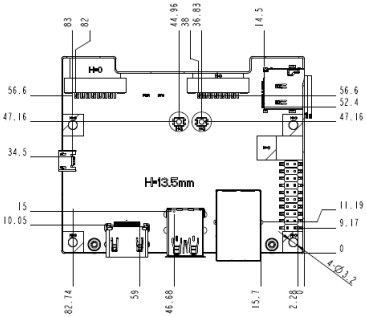
9.1 Dimension Drawings of carrier board











9.2 Dimension Drawing of Input/Output