DLAP-301 Series

DLAP-301-JNX / DLAP-301-Nano
Edge Inference System

User's Manual



Manual Rev.: 1.0

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Part No: 50M-00044-1000

LEADING EDGE COMPUTING

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Revision History

Revision	Release Date	Description of Change(s)
1.0	2021-09-23	Initial Release

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Preface

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Conventions

Take note of the following conventions used throughout this manual to make sure that users perform certain tasks and instructions properly.



Additional information, aids, and tips that help users perform tasks.



Information to prevent ***minor*** physical injury, component damage, data loss, and/or program corruption when trying to complete a task.

Informations destinées à prévenir les blessures corporelles mineures, les dommages aux composants, la perte de données et/ou la corruption de programme lors de l'exécution d'une tâche.



Information to prevent ***serious*** physical injury, component damage, data loss, and/or program corruption when trying to complete a specific task.

Informations destinées à prévenir les blessures corporelles graves, les dommages aux composants, la perte de données et/ou la corruption de programme lors de l'exécution d'une tâche spécifique.

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Table of Contents

Revision History ii

Preface iii

List of Tables vii

List of Figures ix

1 Introduction 1

1.1 Features 1
1.2 Specifications 2
1.3 Functional Block Diagram 4
1.4 Mechanical Dimensions 5
1.5 External Layout 6
1.6 Pin Definitions 8
1.6.1 Ethernet GbE Connectors 8
1.6.2 Power over Ethernet (PoE) 10
1.6.3 USB 3.0 Connectors 11
1.6.4 GPIO Connector 12
1.6.5 12 Volt DC Connector 13
1.6.6 Power Button 13
1.6.7 Extended Power Remote Connector 14
1.6.8 COM Port (Serial Port) 15
1.6.9 HDMI Connectors 16
1.6.10 USB 2.0 OTG Connector 16

2 Getting Started 17

2.1 Unpacking Checklist 17
2.2 Cooling Considerations 17
2.3 Removing the Chassis Cover 18
2.4 Installing a Mini PCIe Wi-Fi or LTE Module 19

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2.5 Connecting DC Power 21
2.6 Power Mode Switch 22

3 Using the System 23
3.1 Software Configuration 23
3.2 System Recovery 24
3.3 DIO Configuration 25

Important Safety Instructions 27

Getting Service 29

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List of Tables

Table 1-1: Specifications 2
Table 1-2: Front Panel I/O Connectors & Controls 6
Table 1-3: Rear Panel I/O Connectors 7
Table 1-4: RJ-45 GbE Pin Definition 9
Table 1-5: RJ45 PoE Connector Pin Definition 11
Table 1-6: USB 3.0 Pin Definition 11
Table 1-7: GPIO Pin Definition 12
Table 1-8: 12 Volt DC Connector Pin Definition 13
Table 1-9: Remote Power Connector Pin Definition 14
Table 1-10: RS-232/485 Connector Pin Definition 15
Table 1-11: HDMI Connector Pin Definition 16
Table 1-12: USB 2.0 OTG Connector Pin Information 16
Table 2-1: Power Mode Switch Jumper Settings 22

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List of Figures

Figure 1-1: Functional Block Diagram 4
Figure 1-2: Front View Dimensions 5
Figure 1-3: Side View Dimensions 5
Figure 1-4: Front Panel I/O Connectors & Controls 6
Figure 1-5: Rear Panel I/O Connectors 7
Figure 2-1: Power Mode Switch Jumpers 22
Figure 3-1: Successful Client/Host Connection 24

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1 Introduction

ADLINK's DLAP-301 Series Edge Inference System leverages the power of NVIDIA® Jetson™ Nano and AGX NX modules to deliver artificial intelligence (AI) at the edge. The DLAP-301 Edge AI Platforms with integrated NVIDIA JETSON Nano/AGX NX accelerate deep learning workloads for object detection, recognition, and classification which are suitable for industrial embedded applications such as medical image processing, logistics automation, autonomous vehicles, smart retail, and AI NVR.

This fanless system provides a wide variety of industrial I/O and visual inferencing capabilities in a compact size. The DLAP-301 supports 8 ports of Power over Ethernet (PoE) for video streams. In addition, it supports HDMI display output, one GbE port, three USB 3.0 ports (plus a USB 2.0 OTG port for software updates), two COM ports, 8-bit GPIO, one 2.5" SSD drive for additional storage, and a Mini PCIe slot and USIM socket to support wireless communications such as Wi-Fi, LoRA, and 3G/4G LTE.

1.1 Features

- Deep learning acceleration with NVIDIA® Jetson™ Xavier NX/Nano
- 6-core NVIDIA Carmel ARM® v8.2 64-bit CPU
- 384-core NVIDIA Volta™ GPU with 48 Tensor Cores
- 8x PoE ports for IP cameras
- HDMI, 8-bit digital input/output, 2x COM, 3x USB, 1x GbE for uplink
- Easy to maintain 2.5" SATA storage
- 12V DC input, AC adapter, AC-DC board

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1.2 Specifications

	DLAP-301-Nano	DLAP-301-Nano-L	DLAP-301-JNX
System Core			
Processor	Jetson Nano		Jetson NX
Memory	4GB		8GB
eMMC	16GB		
Display Output			
Graphic Output	1x HDMI 2.0		
Front I/O			
USB 3.0	1x Type-A		
USB 2.0	OTG		
HDMI	1 vertical HDMI connector		
Rear I/O			
Ethernet	1x GbE		
PoE	8x PoE (15W each, 10/100 Ethernet)		
USB 3.0	2x Type-A		
Serial Port	2x COM		
DIO	4x input / 4x output		
Internal I/O			
Expansion Socket	1x full Mini PCIe		
Storage Devices			
SATA Extension	2.5" SATA SSD		
Power Requirements			
DC Input	12V DC-input		
AC Input	1. AC adapter 2. AC to DC board (reserved connector only)		
Fail Reset	Reset/recovery button		
Power LED Indicator	Power Button		
Remote Power Switch	Molex 4-pin 3.00mm pitch Micro-Fit 3.0 header		

Table 1-1: Specifications

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	DLAP-301-Nano	DLAP-301-Nano-L	DLAP-301-JNX
Mechanical			
Dimensions	210mm x 170mm x 55mm		
Weight	Gross 2.5 KG / Net 2.0 KG		
Mounting	Wall mount / DIN rail		
Environmental			
Operating Temperature	-20°C to 70°C	0°C to 50°C	-20°C to 70°C
Operating Humidity	95% @40°C (non-condensing)		
Storage Temperature	-40°C to 85°C		
Vibration	Operating: 5Grms, 5 to 500 Hz, 3 axes w/ SSD		
Shock	Operating: 100G, half sine 11 ms duration w/ SSD		
ESD	Contact +/- 4kV, Air +/- 8kV		
EMC	CE & FCC class B, (EN61000-6-4/-6-2)		
Safety	UL/CB compliance (62368)		
Operating System Support			
Linux	Linux for Tegra 18.04		

Table 1-1: Specifications

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1.3 Functional Block Diagram

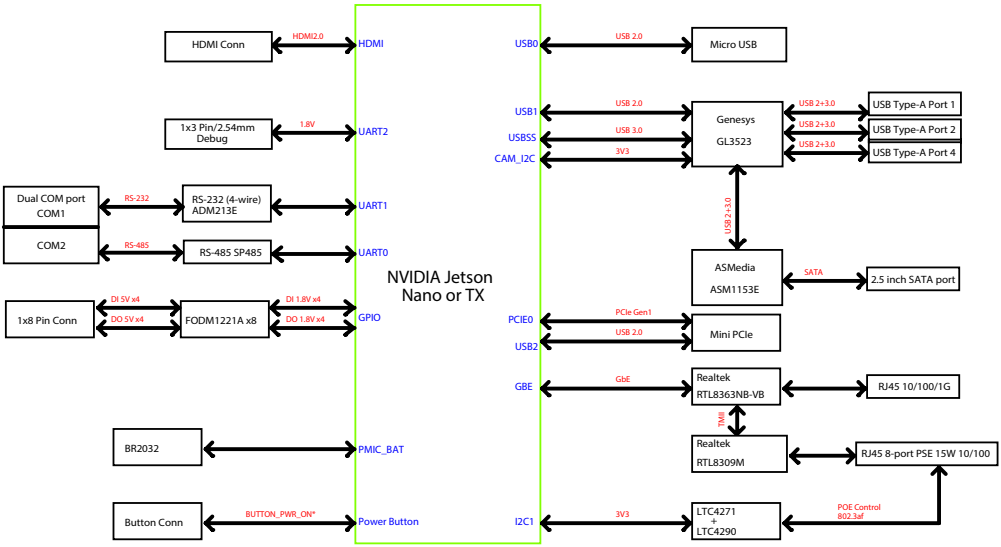


Figure 1-1: Functional Block Diagram

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1.4 Mechanical Dimensions

All dimensions shown in millimeters (mm).

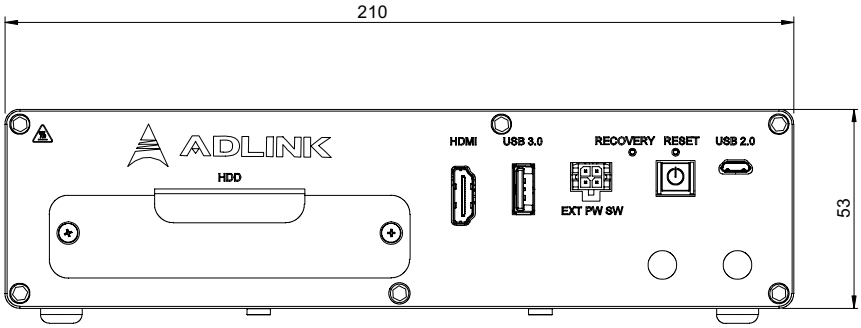


Figure 1-2: Front View Dimensions

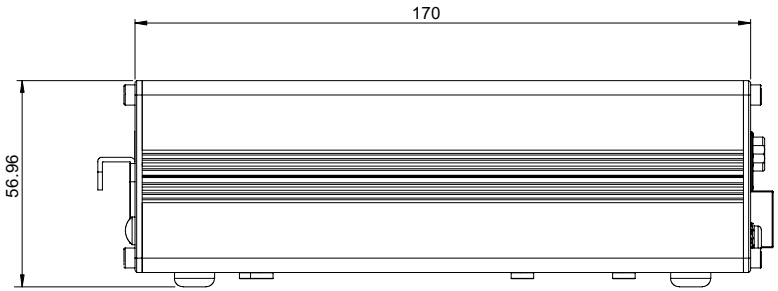


Figure 1-3: Side View Dimensions

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1.5 External Layout

Front Panel

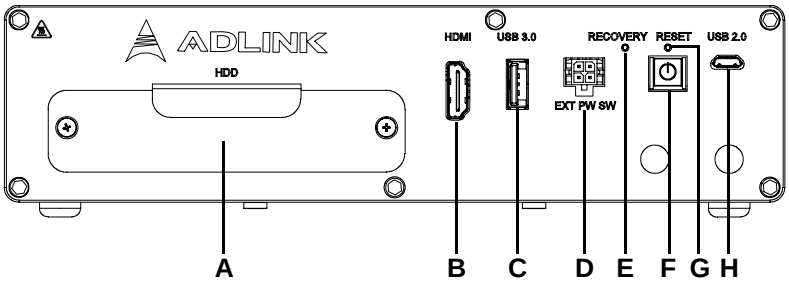


Figure 1-4: Front Panel I/O Connectors & Controls

Item	Name	Description
A	2.5” SATA drive	Removable 2.5” SATA bay for SATA HDD/SSD
B	HDMI port	HDMI 2.0
C	USB 3.0	USB 3.2 Gen1 x1 Type-A
D	Extended Power Switch	Molex 4-pin 3.00mm pitch Micro-Fit 3.0 header supports a remote power switch
E	Recovery button	Press this button to force the system into recovery mode. See **Section 3.2 System Recovery**.
F	Power button	The power button is a non-latched push button with a blue LED power indicator. If the system is powered off when the button is pressed, the system powers up and the blue LED lights up. If the system hangs, pressing and holding the button continuously for 5 seconds performs a hard shutdown on the system.
G	Reset button	The reset button executes a hard reset on the system.
H	USB 2.0	USB 2.0 OTG (Micro USB)

Table 1-2: Front Panel I/O Connectors & Controls

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Rear Panel

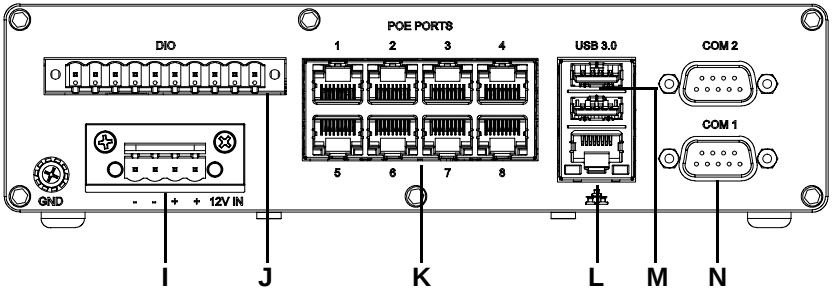


Figure 1-5: Rear Panel I/O Connectors

Item	Name	Description
I	DC jack	12V DC connector See **Section 1.6.6 Power Button**
J	DIO	8-bit DIO connector
K	PoE connector	8x 10/100M PoE ports supporting 15W each
L	GbE connector (LAN 1)	GbE from NVIDIA® Jetson™ module
M	USB 3.0	2x USB 3.2 Gen1 x1 Type-A
N	Serial port	COM port (DB-9 connector) COM1: RS-232 COM2: RS-485

Table 1-3: Rear Panel I/O Connectors

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1.6 Pin Definitions

1.6.1 Ethernet GbE Connectors

One Gigabit Ethernet port on the rear panel supports an NVIDIA® Jetson™ Xavier Nx/ Nano LAN connector via Realtek switch controller that provides:

- Full-duplex and half-duplex operation with IEEE 802.3x flow control and backpressure
- IEEE 802.1Q VLAN support
- IVL, SVL, and IVL/SVL support
- Spanning Tree Port Behavior supporting:
  - IEEE 802.1w Rapid Spanning Tree
  - IEEE 802.1s Multiple Spanning Tree with up to 16 Spanning Tree instances
- IEEE 802.1x Access Control Protocol supporting:
  - Port-Based Access Control
  - MAC-Based Access Control
- IEEE 802.1ad Stacking VLAN support
- IEEE 802.3az Energy Efficient Ethernet (EEE) support

LAN LED connection speed color indicators:

Item	Active & Link (Right LED)	Speed (Left LED)
10Mbps	Yellow (Blinking)	N/A
100Mbps	Yellow (Blinking)	N/A
1000Mbps	Yellow (Blinking)	Green

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The following table provides details for the RJ-45 GbE pin connections.

Pin #	10BASE-T/ 100BASE-TX	1000BASE-T
1	TX+	LAN_TX0+
2	TX-	LAN_TX0-
3	RX+	LAN_TX1+
4	—	LAN_TX2+
5	—	LAN_TX2-
6	RX-	LAN_TX1-
7	—	LAN_TX3+
8	—	LAN_TX3-

Table 1-4: RJ-45 GbE Pin Definition

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1.6.2 Power over Ethernet (PoE)

The DLAP-301 system supports 8 PoE ports to provide 48V DC at 15W on each port. The 8 Ethernet ports support 10/100M connectivity through a Realtek controller to provide:

- IEEE 802.3/802.3u compatibility
- Built-in high efficiency SRAM for packet buffer, with 2K-entry lookup table
- 2048 byte maximum packet length
- Flow control fully supported
- Half duplex: Back pressure flow control
- Full duplex: IEEE 802.3x flow control
- (T)MII/RMII interface connection to external MAC or PHY support
- (T)MII/RMII interface connection to external MAC or PHY via 2 modes supporting:
  - PHY mode (T)MII for router applications
  - MAC mode (T)MII for Home PNA or other PHY applications
- IEEE 802.1p Traffic Re-marking support
- 16-entry ACL for advanced application support
- IGMP v1/v2/v3 and MLD v1/v2 snooping support
- IEEE 802.1x support
- IEEE 802.1D support

LAN LED connection speed color indicators:

Item	Active & Link (Right LED)	Speed (Left LED)
10Mbps	Green (Blinking)	N/A
100Mbps	Green (Blinking)	N/A

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The following table provides details for the RJ45 PoE pin connections.

Pin #	10BASE-T/ 100BASE-TX
1	TX+
2	TX-
3	RX+
4	—
5	—
6	RX-
7	—
8	—

Table 1-5: RJ45 PoE Connector Pin Definition

1.6.3 USB 3.0 Connectors

The USB 3.2 Gen1 x1 Type-A connectors are compatible with SuperSpeed, Hi-Speed, Full speed, and Low speed USB devices, suitable for USB peripherals including USB cameras.

Pin #	Signal Name
1	USB3.0_P5VA
2	USB2_CMAN
3	USB2_CMAP
4	GND
5	USB3A_CMRXN
6	USB3A_CMRXP
7	GND
8	USB3A_CMTXN
9	USB3A_CMTXP

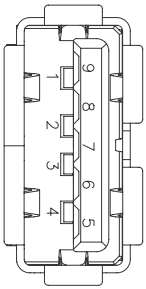


Table 1-6: USB 3.0 Pin Definition

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1.6.4 GPIO Connector

The DLAP-301 system supports digital I/O through a 10-pin terminal block. The following table provides details for the GPIO pin connections.



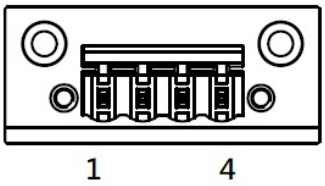
Pin	Signal Name
1	DI4_5V
2	DI3_5V
3	DI2_5V
4	DI1_5V
5	DIO_GND
6	DIO_GND
7	DO4_5V
8	DO3_5V
9	DO2_5V
10	DO1_5V

Table 1-7: GPIO Pin Definition

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1.6.5 12 Volt DC Connector

The system requires a DC power source with a 4-pin terminal block.

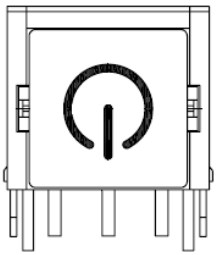


Pin	Signal
1	(-)
2	(-)
3	(+)
4	(+)

Table 1-8: 12 Volt DC Connector Pin Definition

1.6.6 Power Button

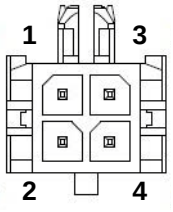
The power button is a non-latched push button with a blue LED power indicator. If the system is powered off when the button is pressed, the system powers up and the blue LED lights up. If the system hangs, pressing and holding the button continuously for 5 seconds performs a hard shutdown on the system.



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1.6.7 Extended Power Remote Connector

The DLAP-301 supports a remote power switch via a Molex 4-pin 3.00mm pitch Micro-Fit 3.0 header.



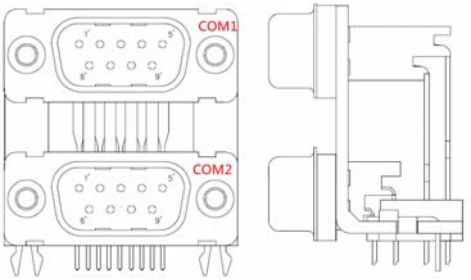
Pin	Signal
1	GND
2	PWR_BTN_LED_C
3	PWR_BTN_REMOTE
4	Pull up (P_5V_A_DIO)

Table 1-9: Remote Power Connector Pin Definition

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1.6.8 COM Port (Serial Port)

The DLAP-301 supports two serial ports. COM1 supports RS-232 and COM2 supports RS-485.



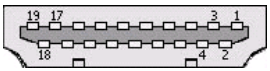
Pin	RS-232	RS-485
1	NC	RS485_DN
2	RXDA_DB9	RS485_DP
3	TXDA_DB9	NC
4	NC	NC
5	GND	GND
6	NC	NC
7	RTSA#_DB9	NC
8	CTSA#DB9	NC
9	NC	NC

Table 1-10: RS-232/485 Connector Pin Definition

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1.6.9 HDMI Connectors

The rear panel supports HDMI 2.0.



Pin #	Signal	Pin #	Signal
1	TMDS Data2+	2	TMDS Data2 Shield
3	TMDS Data2–	4	TMDS Data1+
5	TMDS Data1 Shield	6	TMDS Data1–
7	TMDS Data0+	8	TMDS Data0 Shield
9	TMDS Data0–	10	TMDS Clock+
11	TMDS Clock Shield	12	TMDS Clock–
13	CEC	14	Reserved
15	SCL	16	SDA
17	DDC/CEC Ground	18	+5 V Power
19	Hot Plug Detect		

Table 1-11: HDMI Connector Pin Definition

1.6.10 USB 2.0 OTG Connector

The DLAP-301 supports a USB 2.0 OTG Micro USB Type-B connection for system recovery.

Pin	Signal	Description
1	VCC_USBDev	USB device power
2	USB_D1_n	Universal Serial Bus Port 1 / USB-Client differential pair
3	USB_D1_p	
4	USB_ID	USB ID pin
5	GND_USBDev	USB GND

Table 1-12: USB 2.0 OTG Connector Pin Information

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2 Getting Started

2.1 Unpacking Checklist

Before unpacking, check the shipping carton for any damage. If the shipping carton and/or contents are damaged, inform your dealer immediately. Retain the shipping carton and packing materials for inspection. Obtain authorization from your dealer before returning any product to ADLINK. Ensure that the following items are included in the package.

- DLAP-301 unit
- Screw pack
- Terminal block for DC input
- Remote power control cable
- Wall mount kit (plus optional DIN rail kit if applicable)

2.2 Cooling Considerations

All heat-generating components of the DLAP-301 are located on the top side of the system. These components directly contact the heat sink via thermal pads to dissipate heat. To maximize efficiency of heat dissipation, maintain a minimum of 2 inches (5cm) clearance from the top of the DLAP-301.

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2.3 Removing the Chassis Cover

To access the DLAP-301's internal components, remove the heat-sink as follows.

1. On the front panel, remove all nuts.



2. Remove the front panel, heatsink and SATA drive bay.



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2.4 Installing a Mini PCIe Wi-Fi or LTE Module

Use the following steps to install a Mini PCIe Wi-Fi or LTE module.

1. Remove the SATA drive bracket.



2. Insert the Mini PCIe Wi-Fi module into the indicated slot at an angle.



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3. Press down on the module until it is seated, then secure it to the board using two M2.5-P-head-L5 screws (not provided).
4. Attach the wires and antennas that came with your Wi-Fi kit.
5. Reassemble the SATA drive bracket, front panel, and heat-sink.

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2.5 Connecting DC Power



Before providing DC power to the DLAP-301, ensure the voltage and polarity provided are compatible with the DC input. Improper input voltage and/or polarity can be responsible for system damage.

Avant de connecter le PC DLAP-301 à une source de courant continu, veuillez vous assurer de la polarité de la tension conformément à l'entrée CC du PC. Une tension et/ou une polarité incorrectes peuvent causer des dommages irréversibles sur le système.

DC power sources must comply with ES1 circuits as well as the following:

- IEC 62368-1, IEC 60950-1, and UL 62368-1
- Output voltage: 12V DC
- Output current: 20A minimum
- TMA: 50°C minimum

The DLAP-301 DC power input connector uses V+, V- pins and accepts a 12V DC input. Customers may optionally order a DC power adapter from ADLINK:

- DC plug with lock (Part No. 31-62164-1010-A0)
- Power adapter cable (Part No. 30-21714-0000-A0)

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2.6 Power Mode Switch

The DLAP-301 supports an extended remote power button. Switch jumper CN25202 to set the power button as remote.

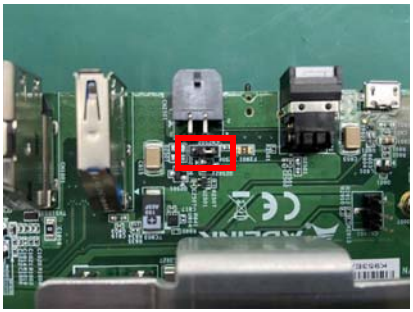


Figure 2-1: Power Mode Switch Jumpers

Jumper	Auto Power On
1-2	Power button (Default)
2-3	Remote control

Table 2-1: Power Mode Switch Jumper Settings

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3 Using the System

3.1 Software Configuration

The DLAP-301 ships with a customized NVIDIA Linux for Tegra (L4T) image pre-installed. The latest version of this custom L4T image and other relevant files are available on our website.

For the DLAP-301-JNX:

https://www.adlinktech.com/Products/Deep_Learning_Accelerator_Platform_and_Server/Inference_Platform/DLAP-301-JNX

For the DLAP-301-Nano:

https://www.adlinktech.com/Products/Deep_Learning_Accelerator_Platform_and_Server/Inference_Platform/DLAP-301-Nano

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3.2 System Recovery

You will need a Linux host PC (Ubuntu is recommended) in order to flash your client device with a new system image. Complete the following steps on the client before performing the host PC steps.

Client (DLAP-301):

1. Connect the OTG cable to the USB 2.0 port.
2. Press the reset and recovery buttons at the same time.
3. Press the power switch.
4. Release the reset button.
5. Release the recovery button.

Host PC:

1. Install Python 2.7, python-minimal (or equivalent packages) and qemu-user-static on the host PC.
2. Connect the host PC to the client via OTG cable.
3. Open a terminal on the host PC and run this command:

   ```
   # lsusb
   ```

4. Look for “NVidia Corp.” in the output (an example is circled in red in the screenshot below). If found, the host PC recognizes the client and you may proceed. If not, double-check the OTG cable connection and perform troubleshooting as needed until the client is recognized.

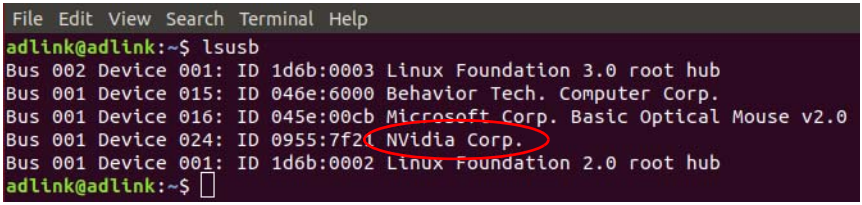


Figure 3-1: Successful Client/Host Connection

5. Run the following command in the directory that contains your downloaded L4T file:

   ```
   # sudo ./nvmflash.sh
   ```

6. Allow the update to complete.

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3.3 DIO Configuration

Use these commands to access DIO control.

*: Port 1-4

To write to a specific digital output port:

low

$echo 0 > /sys/class/adlink_DIO/DO_*

high

$echo 1 > /sys/class/adlink_DIO/DO_*

To read from a specific digital input port:

$cat /sys/class/adlink_DIO/DI_*

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Important Safety Instructions

For user safety, please read and follow all instructions, Warnings, Cautions, and Notes marked in this manual and on the associated device before handling/operating the device, to avoid injury or damage.

S'il vous plaît prêter attention stricte à tous les avertissements et mises en garde figurant sur l'appareil , pour éviter des blessures ou des dommages.

- Read these safety instructions carefully.
- Keep the User's Manual for future reference.
- Read the Specifications section of this manual for detailed information on the recommended operating environment.
- The device can be operated at an ambient temperature of 55ºC.
- When installing/mounting or uninstalling/removing device, or when removal of a chassis cover is required for user servicing:
  - Turn off power and unplug any power cords/cables.
  - Reinstall all chassis covers before restoring power.
- To avoid electrical shock and/or damage to device:
  - Keep device away from water or liquid sources.
  - Keep device away from high heat or humidity.
  - Keep device properly ventilated (do not block or cover ventilation openings).
  - Always use recommended voltage and power source settings.
  - Always install and operate device near an easily accessible electrical outlet.
  - Secure the power cord (do not place any object on/over the power cord).
  - Only install/attach and operate device on stable surfaces and/or recommended mountings.
- If the device will not be used for long periods of time, turn off and unplug it from its power source
- Never attempt to repair the device, which should only be serviced by qualified technical personnel using suitable tools

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- A Lithium-type battery may be provided for uninterrupted backup or emergency power.



Risk of explosion if battery is replaced with one of an incorrect type; please dispose of used batteries appropriately.
Risque d'explosion si la pile est remplacée par une autre de type incorrect. Veuillez jeter les piles usagées de façon appropriée.

- The device must be serviced by authorized technicians when:
  - The power cord or plug is damaged.
  - Liquid has entered the device interior.
  - The device has been exposed to high humidity and/or moisture.
  - The device is not functioning or does not function according to the User's Manual.
  - The device has been dropped and/or damaged and/or shows obvious signs of breakage.
- Disconnect the power supply cord before loosening the thumbscrews and always fasten the thumbscrews with a screwdriver before starting the system up.
- It is recommended that the device be installed only in a server room or computer room where access is:
  - Restricted to qualified service personnel or users familiar with restrictions applied to the location, reasons therefor, and any precautions required.
  - Only afforded by the use of a tool or lock and key, or other means of security, and controlled by the authority responsible for the location.

	**BURN HAZARD** Touching this surface could result in bodily injury. To reduce risk, allow the surface to cool before touching. ***RISQUE DE BRÛLURES*** *Ne touchez pas cette surface, cela pourrait entraîner des blessures.* *Pour éviter tout danger, laissez la surface refroidir avant de la toucher.*

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Getting Service

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