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Adnacom AUS324

USB 3.2 Gen 2 Extender with 4 USB Ports

User's Guide

Contents

1 Terminology

Table 1-1. Common Terms Used in the User's Guide.

Term	Description
AOC	Active optical cable
xN	A PCIe link with "N" lanes
EMI	Electromagnetic Interference
ESD	Electrostatic Discharge
Gbps	Gigabit per second
Gb/s	Gigabit per second
PCIe Gen 3	PCIe 8 GT/s
PCIe Lane	A set of differential signal pairs, one pair for transmission and one pair for reception
LC	LC stands for Lucent Connector. The LC is a small form-factor fiber optic connector.
PCIe Link	The collection of two ports and their interconnecting lanes. A link is a dual-simplex communications path between two components.
NC	Not connected
OS	Operating system
PCIe	Interconnect standard for PCI Express cards
QSFP	Quad Small Form-factor Pluggable
RMA	Return Material Authorization
USB 3.2 Gen 1	The nominal signaling data rate for the Gen 1 physical layer is 5 Gbps
USB 3.2 Gen 2	The nominal signaling data rate for the Gen 2 physical layer is 10 Gbps

2 Applicable and Reference Documents

2.1 Reference Documents

RD-1: H14 Datasheet. Adnacom Inc., https://adnacom.com.

RD-2: H18 Datasheet. Adnacom Inc., https://adnacom.com.

RD-3: AUS324 Datasheet. Adnacom Inc., https://adnacom.com.

2.2 Applicable Documents

AD-1: Universal Serial Bus 3.2 Specification, Revision 1.0. USB-IF, https://usb.org/.

AD-2: PCI Express Base Specification, Revision 3.0. PCI-SIG, https://pcisig.com.

AD-3: SFF-8436. QSFP+ 4x 10 Gb/s Pluggable Transceiver, Revision 4.9. SFF Committee.

3 System Description

3.1 Overview

The Adnacom AUS324 is a USB 3.2 Gen 2 extender that supports USB 3.2 Gen 2 (10 Gb/s) and Gen 1 (5 Gb/s), 2.0, and 1.1 devices. The system consists of an Adnacom PCIe host adapter and a USB324 remote unit connected by a fiber optic cable. The system uses a PCIe bus extension over a fiber-optic cable and standard USB host controllers located in the remote unit. The remote unit contains 2 AsMedia ASM3142 USB 3.2 Gen 2 host controllers and a PCIe fiber-optic interface. The system is intended for high-performance USB applications and utilizes the full bandwidth of 2 ASM3142 controllers. The system can operate with QSFP transceivers or active optical cables (AOCs). The H14 host adapter interfaces one USB324 unit. The H18 host adapter can interface one or two USB324 units. The system diagrams are shown in Figure 3-1 and Figure 3-2.

Figure 3-1. AUS324 with H14 Host Adapter.

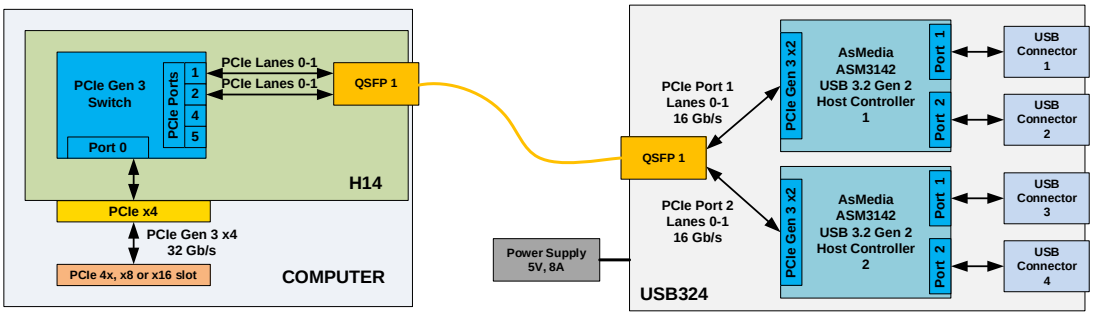
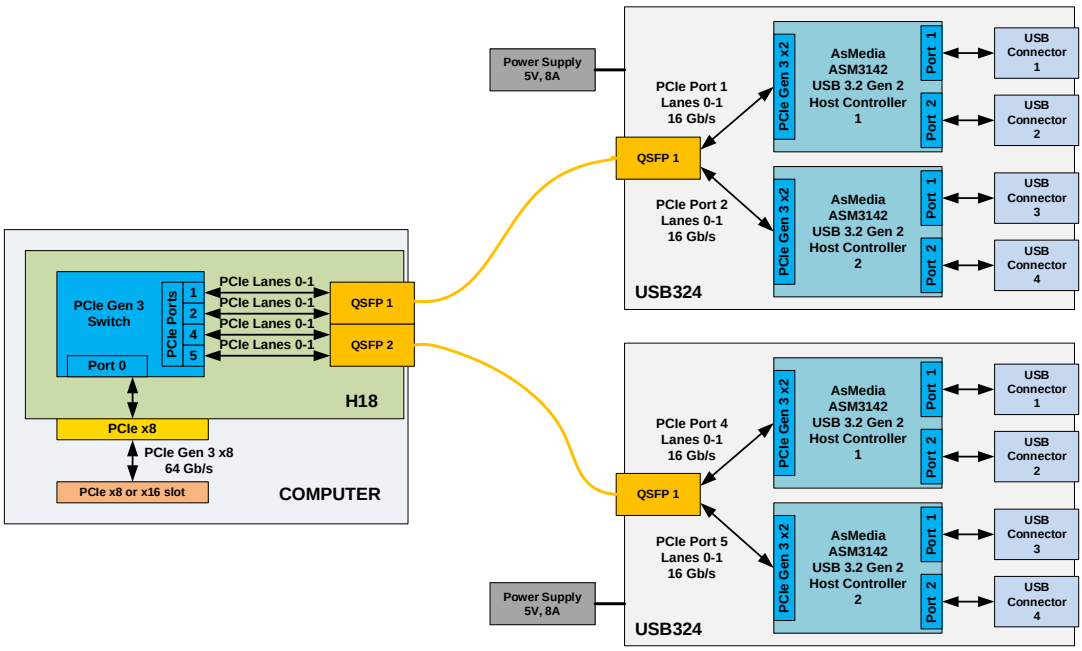


Figure 3-2. AUS324 with H18 Host Adapter.



3.2 Recommended Transceivers and Cables

For information on tested cable lengths and measured data transfer rates, please visit the AUS324 product webpage: https://adnacom/aus324/.

3.2.1 Active Optical Cables

Table 3-1. Tested AOC.

Manufacturer	Part Number	Description
Finisar	FCCN410QD3C10	Reliable operation
Fiber Store	QSFP-AO10	Reliable operation
Others		Some cables may not work reliably. Other cables must be tested before using them in the production environment.

3.2.2 Optical Transceivers

The AUS324 can operate with standard multimode and single mode QSFP transceivers. The transceivers should consume less than 1.5 W to keep their temperature within recommended operating conditions. If transceivers consume more than 1.5 W, heatsinks should be installed on the QSFP cages. The transceiver's power consumption and case temperature can be verified using the web interface described in section 9.

Table 3-2. Tested Transceivers.

Manufacturer	Part Number	Description
Finisar	FTL4C1QL2C	Reliable operation
Fiber Store	QSFP-LX4-40G	Reliable operation
10Gtek	ALQ10-IR4-02 ALQ10-LR4-10	Reliable operation

3.2.3 LC-LC Cables

Multimode and single mode LC-LC duplex cables can be used with single mode QSFP transceivers with LC connectors. The QSFP transceivers multiplex and demultiplex 4 PCIe Gen 3 lanes into a single LC-LC duplex cable using Coarse Wavelength Division Multiplexing (CWDM). A single LC-LC duplex cable supports a 32 Gb/s data rate. The recommended multimode cable types are OM3 and OM4. The recommended maximum cable lengths for different cable types are shown in Table 3-3. System performance depends on the cable length. For further information, visit https://adnacom.com/aus324/.

Table 3-3. Recommended Maximum Length for LC-LC Cables.

Cable Type	Typical Length
Multimode OM1 62.5/125 µm	40 m
Multimode OM2 50/125 µm	100 m
Multimode OM3 50/125 µm	350 m
Multimode OM4 50/125 µm	550 m
Single Mode OS1 9/125 µm	1 km
Single Mode OS2 9/125 µm	1 km

4 System Operation

4.1 USB Bandwidth Allocation

To achieve the maximum USB data rate, the required device bandwidth must be allocated between USB ports and host controllers, as described in this section. The USB324 unit contains two independent ASM3142 USB host controllers, as shown in Figure 3-1. USB ports 1 and 2 are connected to host controller 1, and USB ports 3 and 4 are connected to host controller 2. Each controller is connected to the computer over a PCIe Gen 3 x2 link supporting 16 Gb/s bandwidth. Thus, each host controller operates at full throughput. The 16 Gb/s PCIe link bandwidth is shared between 2 USB ports of each host controller. Therefore, each USB controller can interface simultaneously one USB 3.2 Gen 2 device at a full USB 3.2 Gen 2 signaling data rate of 10 Gb/s and one USB 3.2 Gen 1 device at a full signaling data rate of 5 Gb/s. If two USB 3.2 Gen 2 devices are connected to the same host controller, the available 16 Gb/s bandwidth is shared between 2 connected devices using standard arbitration rules. The PCIe bandwidth is not shared between 2 host controllers.

4.2 USB324 Power Control Modes

Table 4-1. USB324 Power Control Modes.

Mode	S1.1	Description
1	OFF	The USB324 is turned ON and OFF automatically when the computer is turned ON and OFF
2	ON	The USB324 is always ON

Note: Disconnection of the fiber optic cable or cycling the USB324 power supply during operation requires a computer restart.

5 System Installation

5.1 Installation Recommendations

ESD Warning: The electronic parts are sensitive to electrostatic discharges. Please use an electrostatic wrist strap and/or conductive mat when executing the steps below.

5.2 Preparing Your Computer

- The H14 and H18 cards do not support overclocking. Please make sure that the PCI Express clock frequency is set to either the default value or 100 MHz in the BIOS.
- The optical transceivers used in the system do not support PCI Express link power management. Therefore, disabling all power management features on the computer is recommended. The step-by-step instructions for Windows 7, 8, and 10 can be found at https://adnacom.com/aus324. For other OSs, please consult your OS documentation, and if you need additional assistance, please contact the OS vendor.

5.3 Installing the H14 or H18 Host Adapter Card

- Power off the host computer and unplug its power cord.
- Remove the computer's cover.
- Identify a PCIe slot on the motherboard that can accommodate x4 or x8 cards.
- Configure the H14 or H18 card using the DIP switch settings described in Table 7-2 or Table 8-2.
- Remove the metal bracket for the slot you have selected.
- Insert the H14 or H18 card into the identified PCIe slot by pushing on it gently. Secure the card to the computer chassis using a screw.
- There should be sufficient airflow to keep the PCIe card temperature below the maximum limit.
- Connect the power cord and verify that the red standby LED is ON when the computer is OFF. If the standby LED is OFF, there is no +3.3Vaux voltage on the PCI slots. Check the BIOS settings to enable the voltage or reset the BIOS settings to the default values. In Dell computers, +3.3Vaux is enabled by selecting BIOS Settings->Power Management->Deep Sleep Control->Disabled.

5.4 Installing the USB324 Unit

- Place the USB324 unit near the USB devices.
- Connect the power supply cable.
- Set the required power control mode described in section 4.2.

5.5 Installing QSFP Transceivers and Connecting Fiber Optic Cables

- Install QSFP transceivers or an AOC.
- If QSFP transceivers are used, connect the host adapter and USB324 with a fiber optic cable.

5.6 Turning on the System for the First Time

- Power on the computer and verify the installation, as indicated in section 6. All drivers are

included in the Windows 10 and Linux operating systems. If the drivers are not installed when the system is powered for the first time, the computer requires one or two restarts.

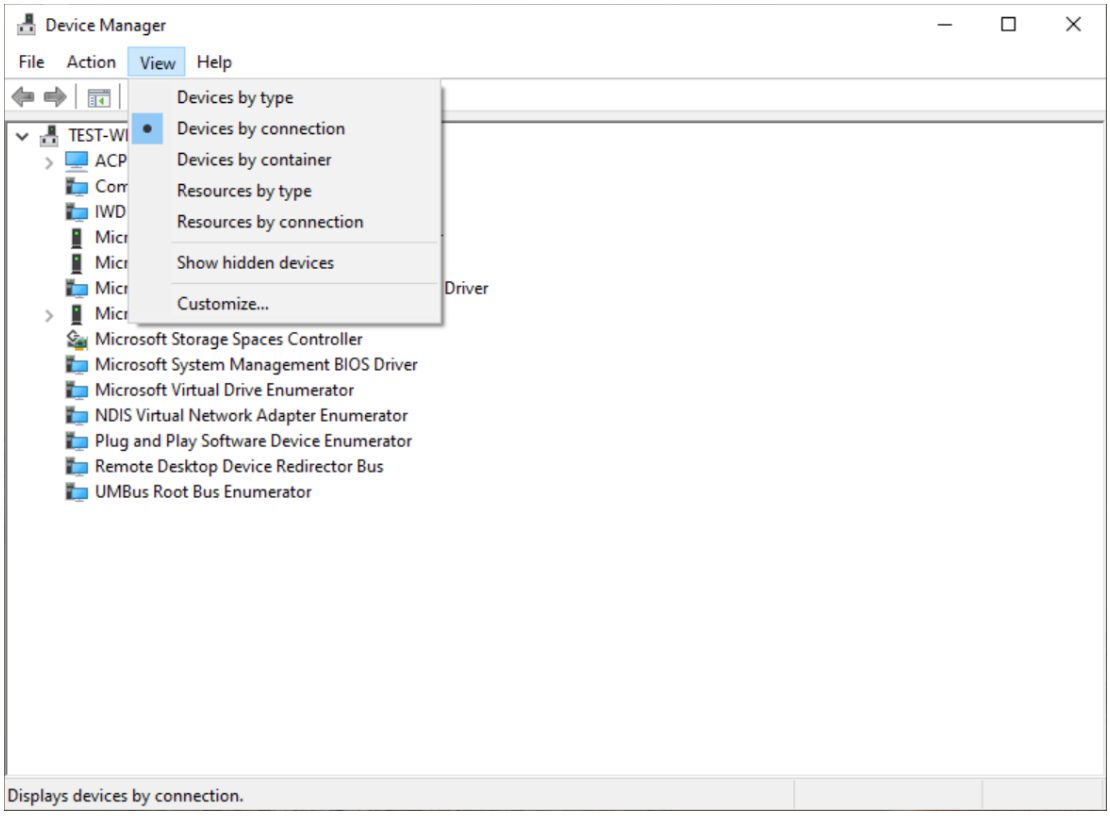
5.7 Connecting USB Devices

- Install software required to operate the USB devices.
- The USB devices can be connected or disconnected at any time as with any USB port.
- Check that the device is detected and installed correctly in the operating system.

6 System Functionality Verification

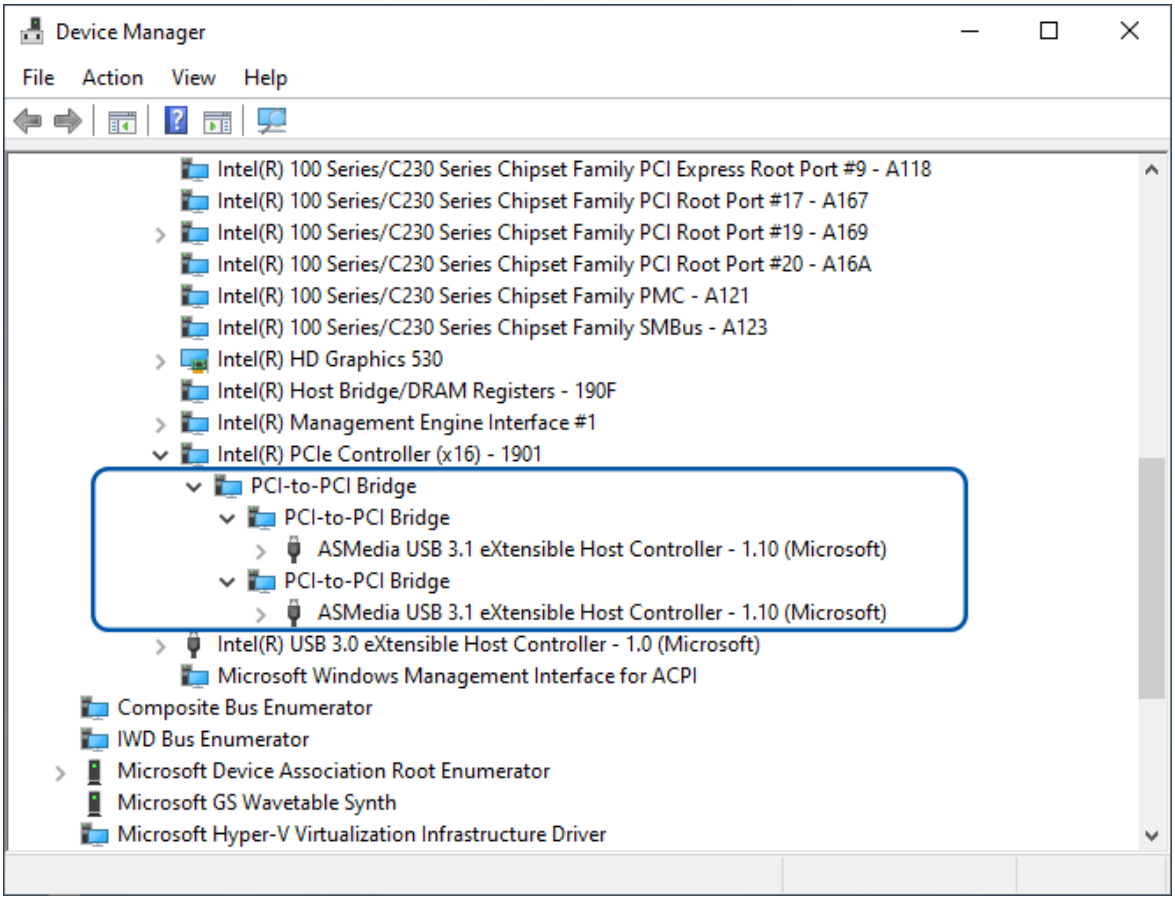
To verify a successful installation, use the **Device Manager**. In the **Device Manager,** click on the **View** menu and select **View Devices by Connection.**

Figure 6-1. Device Manager.



To see if your installation is successful, click on the arrow to the left of the **ACPI** to open it, then within **PCI Bus,** check the lines containing the words "**PCI Express Root**" or "**PCI standard PCI-to-PCI bridge**." Under one of the lines, you should see three PCI-to-PCI bridges and two AsMedia USB 3.1 Host Controllers, as shown in Figure 6-2.

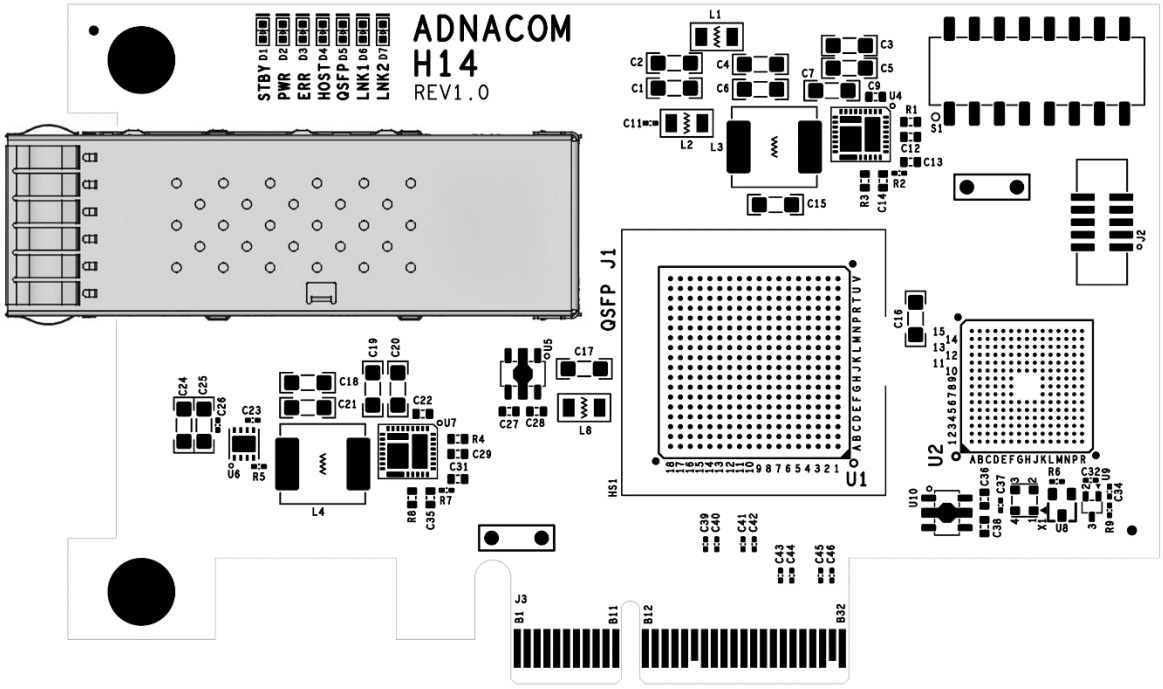
Figure 6-2. AUS324 System with H14 View in Device Manager.



7 H14 PCIe Host Adapter

7.1 H14 Drawing

Figure 7-1. H14 Drawing.



7.2 H14 Cable Interface

Table 7-1. H14 PCIe Cable Interface.

Number of PCIe Ports	Port Number	Port Width	PCIe Lanes	QSFP	QSFP TX/RX
1	1	x4	0–3	1	1–4
2	1	x2	0–1	1	1–2
	2	x2	0–1	2	3–4

7.3 H14 S1 DIP Switch Description

Table 7-2. H14 DIP Switch.

<table>
<tr><th>Switch</th><th>Description</th><th>Default</th></tr>
<tr><td>1</td><td>Cable Interface Configuration<table><tr><th>S1.1</th><th>Configuration</th></tr><tr><td>OFF</td><td>1 port x4</td></tr><tr><td>ON</td><td>2 ports x2</td></tr></table>Note: The USB324 works with the S1.1=ON configuration.</td><td>ON</td></tr>
<tr><td>2</td><td>Reserved</td><td>OFF</td></tr>
<tr><td>3</td><td>Gen 2 Cable Interface
OFF – Gen 3
ON – Gen 2. Set for Gen 2 ports or to limit the cable interface speed.</td><td>OFF</td></tr>
<tr><td>4</td><td>Optical Reset
OFF – Disabled
ON – Enabled. The lasers are turned OFF during the computer reset.
Note: Optical reset must be enabled for the USB324 adapter.</td><td>ON</td></tr>
<tr><td>5</td><td>Hot Plug Enable
OFF – Hot Plug is disabled
ON – Hot Plug is enabled</td><td>ON</td></tr>
<tr><td>6</td><td>Wake Enable
OFF – Wake is disabled
ON – Wake is enabled
Note: The wake signal is not used with the USB324 adapter.</td><td>OFF</td></tr>
<tr><td>7</td><td>H14 Configuration
OFF – Host adapter
ON – Remote adapter</td><td>OFF</td></tr>
<tr><td>8</td><td>Reserved</td><td>OFF</td></tr>
</table>

7.4 H14 LEDs Description

Table 7-3. H14 LEDs.

LED	Color	Description
D1	Red	**Standby Status:** ON – Standby mode OFF – The computer power supply is ON, or PCIe 3.3V AUX power is OFF.
D2	Green	**Computer Power Status:** ON – The computer power supply is ON. OFF – The computer power supply is OFF.
D3	Red	**Error Status:** Reserved
D4	Blue	**Host Link Status:** The status described in Table 7-4
D5	Green	**QSFP 1 Status:** The status described in Table 7-5
D6	Blue	**Remote Link 1 Status:** Port 1 link status described in Table 7-4
D7	Green	**Remote Link 2 Status:** Port 2 link status described in Table 7-4

Table 7-4. PCIe Link Status.

PCIe Link LED	Description
OFF	Link is Down
Blinking, 0.5 sec ON, 0.5 sec OFF (1 Hz)	Link is Up, 2.5.0 GT/s
Blinking, 0.25 sec ON, 0.25 sec OFF (2 Hz)	Link is Up, 5.0 GT/s
ON	Link is Up, 8.0 GT/s

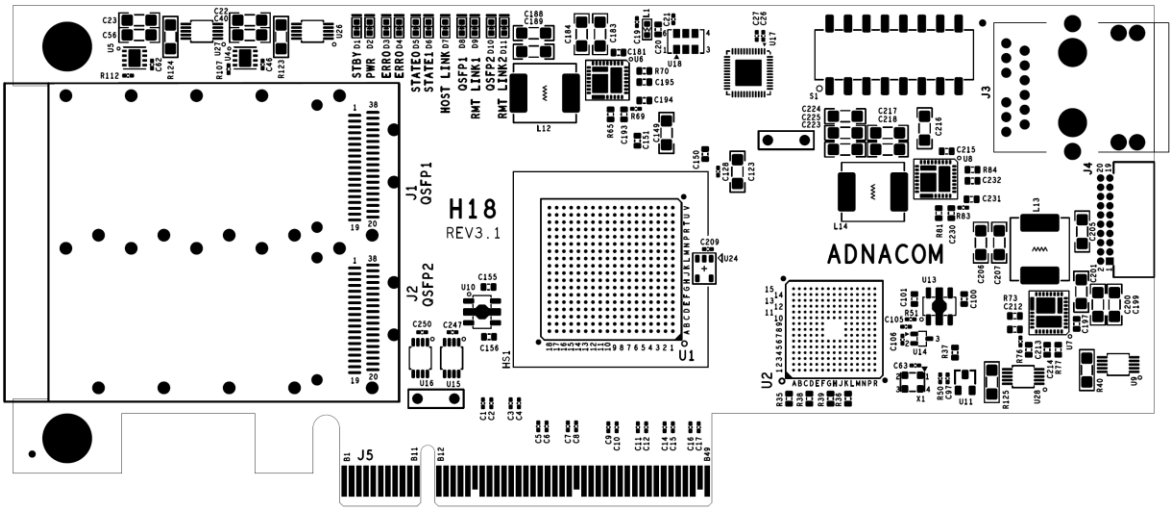
Table 7-5. QSFP Status.

QSFP LED	Description
OFF	QSFP is not powered
Blinking, 0.25 sec ON, 0.25 sec OFF (2 Hz)	Received optical power is below the worst-case receiver sensitivity
ON	Transmitter and receiver are ON

8 H18 PCIe Host Adapter

8.1 H18 Drawing

Figure 8-1. H18 Drawing.



8.2 H18 Cable Interface

Table 8-1. H18 PCIe Cable Interface.

Number of PCIe Ports	Port Number	Port Width	PCIe Lanes	QSFP	QSFP TX/RX
1	1	x8	0-3	1	1-4
			4-7	2	1-4
2	1	x4	0-3	1	1-4
	2	x4	0-3	2	1-4
4	1	x2	0-1	1	1-2
	2	x2	0-1		3-4
	3	x2	0-1	2	1-2
	4	x2	0-1		3-4

8.3 H18 S1 DIP Switch Description

Table 8-2. H18 DIP Switch.

<table>
<tr><th>Switch</th><th>Description</th><th>Default</th></tr>
<tr><td>1
2</td><td>Cable Interface Configuration
<table>
<tr><th>S1.1</th><th>S1.2</th><th>Configuration</th></tr>
<tr><td>OFF</td><td>OFF</td><td>1 port x8</td></tr>
<tr><td>ON</td><td>OFF</td><td>2 ports x4</td></tr>
<tr><td>OFF</td><td>ON</td><td>4 ports x2 (2 ports per QSFP)</td></tr>
<tr><td>ON</td><td>ON</td><td>Reserved</td></tr>
</table>
Note: The USB324 works with the S1.1=OFF, S1.2=ON configuration.</td><td>OFF
ON</td></tr>
</table>

Switch	Description	Default
3	**Gen 2 Cable Interface** OFF – Gen 3 ON – Gen 2. Set for Gen 2 ports or to limit the cable interface speed	OFF
4	**Optical Reset** OFF – Disabled ON – Enabled. The lasers are turned OFF during the computer reset. **Note:** Optical reset must be enabled for the USB324 adapter.	ON
5	**Hot Plug Enable** OFF – Hot Plug is disabled ON – Hot Plug is enabled	ON
6	**Wake Enable** OFF – Wake is disabled ON – Wake is enabled **Note:** The wake signal is not used with the USB324 adapter.	OFF
7	Reserved	OFF
8	**IP Configuration** OFF – Static IP address 198.168.100.101 ON – User's IP Configuration described in section 10.2	OFF

8.4 H18 LEDs Description

Table 8-3. H18 LEDs.

LED	Color	Description
D1	Red	**Standby Status:** ON – standby mode OFF – the computer power supply is ON, or PCIe 3.3V AUX power is OFF
D2	Green	**Computer Power Status:** ON – the computer power supply is ON OFF – the computer power supply is OFF
D3 D4	Red	**Error Status:** Reserved
D5 D6	Green	**Status:** **One and two ports configurations:** Reserved **Four ports configuration:** D5 – Port 2 link status described in Table 7-4 D6 – Port 4 link status described in Table 7-4
D7	Blue	**Host Link Status:** The status described in Table 7-4
D8	Green	**QSFP 1 Status:** The status described in Table 7-5
D9	Blue	**Remote Link 1 Status:** Port 1 link status described in Table 7-4
D10	Green	**QSFP 2 Status:** The status described in Table 7-5

LED	Color	Description
D11	Blue	**Remote Link 2 Status:** **One port configuration:** The status is the same as the Remote Link 1 status if QSFP 2 is connected to the remote device **Two ports configuration:** Port 2 link status described in Table 7-4 **Four ports configuration:** Port 3 link status described in Table 7-4

8.5 H18 Connectors Description

Table 8-4. H18 Connectors.

Designator	Description
J1	QSFP 1 connector
J2	QSFP 2 connector
J3	Ethernet connector
J4	Test connector. Factory only.

9 USB324 Remote Unit

9.1 USB324 Drawings

Figure 9-1. USB324 Front Panel.

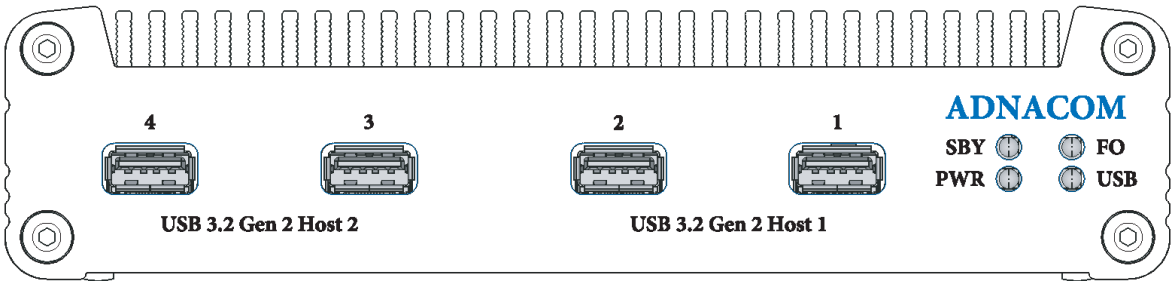
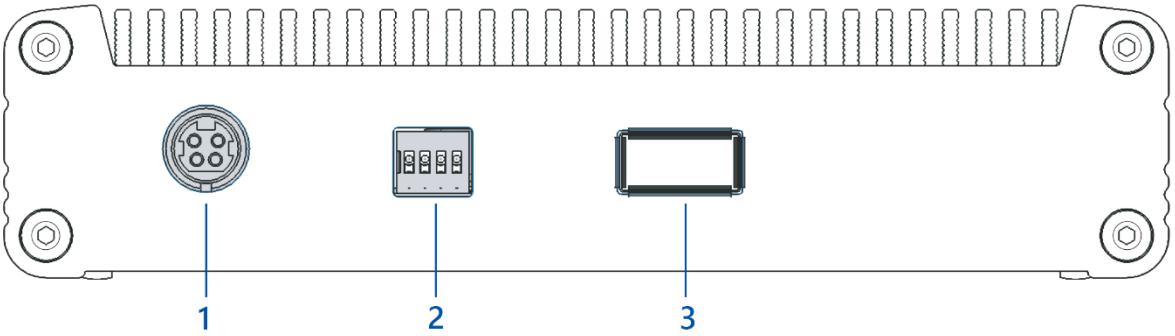


Figure 9-2. USB324 Rear Panel.



9.2 USB324 Connectors

Table 9-1. USB324 Front Panel.

#	Description
1	Port 1 of USB Host Controller 1
2	Port 2 of USB Host Controller 1
3	Port 1 of USB Host Controller 2
4	Port 2 of USB Host Controller 2

Table 9-2. USB324 Rear Panel.

#	Description
1	Power: 5 V, 8 A Mating connector: Kycon KPPX-4P or equivalent Pins 1, 2: Ground Pins 3, 4: +5 V
3	QSFP

9.3 USB324 LEDs Description

Table 9-3. USB324 LEDs.

LED	Color	Description
SBY	Red	**Standby Status:** ON – Standby mode OFF – USB324 is ON, or the power supply is OFF.
PWR	Green	**Power Status:** ON – USB324 is ON. OFF – USB324 is OFF.
FO	Green	**QSFP 1 Status:** The status described in Table 7-5
USB	Green	**USB Connectors Power Status:** ON – The power on all USB connectors is good. Blinking N times with a 1-second pause – power failure. N – The failed USB port number. The status is displayed sequentially for all failed ports.

9.4 USB324 DIP Switch Description

Table 9-4. H18 DIP Switch.

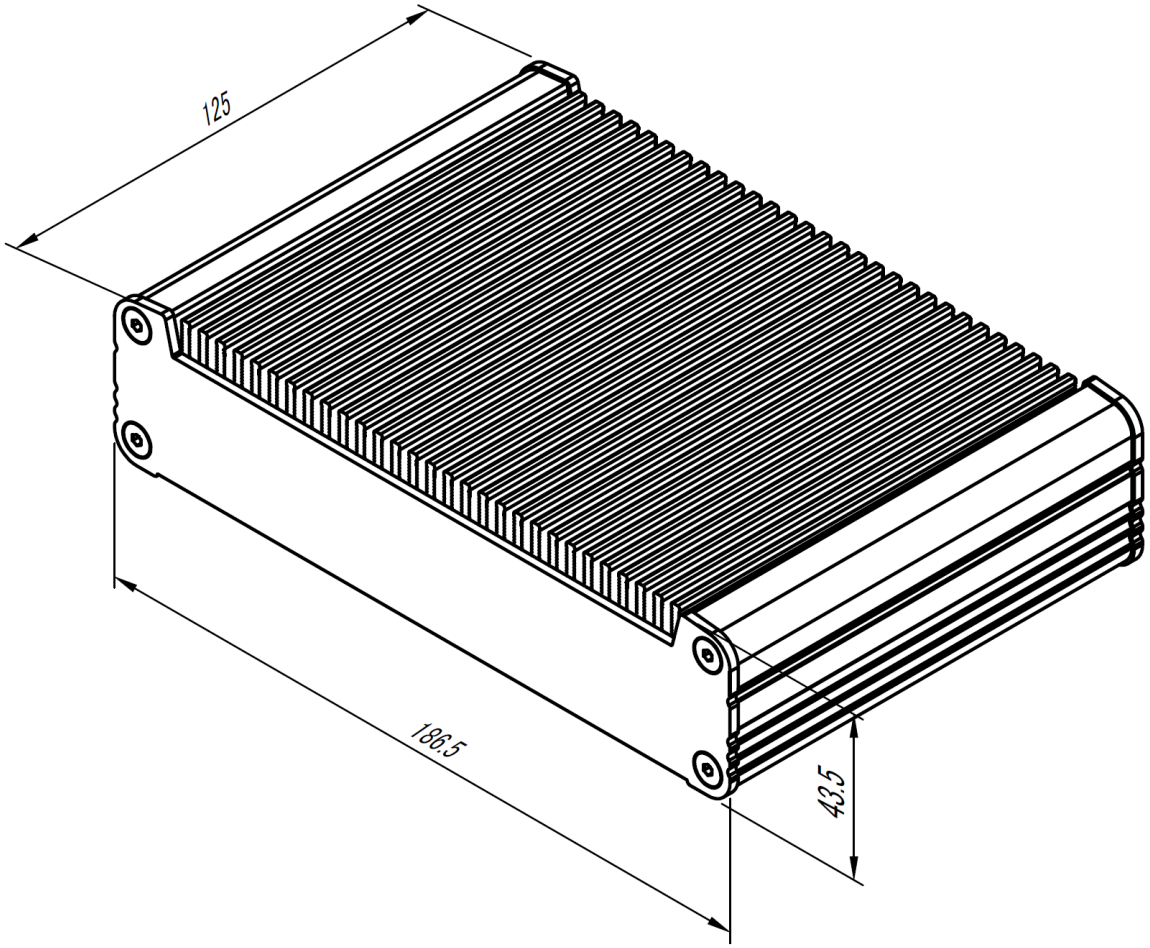
Switch	Description	Default
1	**USB324 Power Mode:** OFF – Automatic power ON and OFF controlled by the computer. ON – Power is always ON.	OFF
2	Reserved	OFF
3	Reserved	OFF
4	Reserved	OFF

9.5 USB324 Mechanical

9.5.1 USB324 Dimensions

All dimensions are specified in mm.

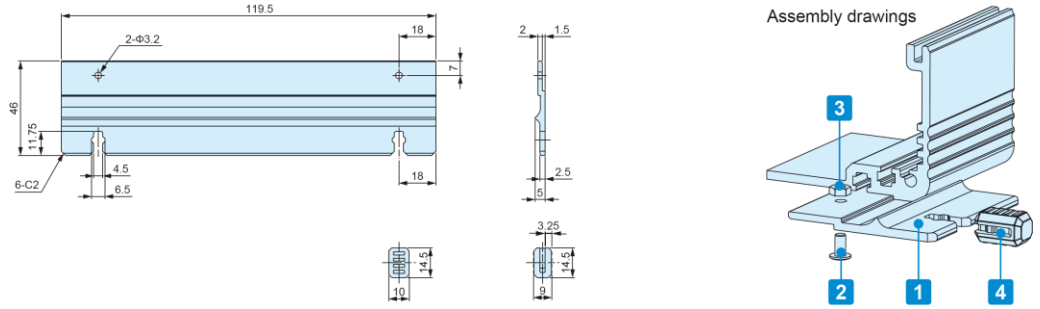
Figure 9-3. USB324 Dimensions.



9.5.2 Wall Mounting Brackets

Optional wall mounting brackets can be ordered separately. The bracket-kit drawing and its content are shown in Figure 9-4.

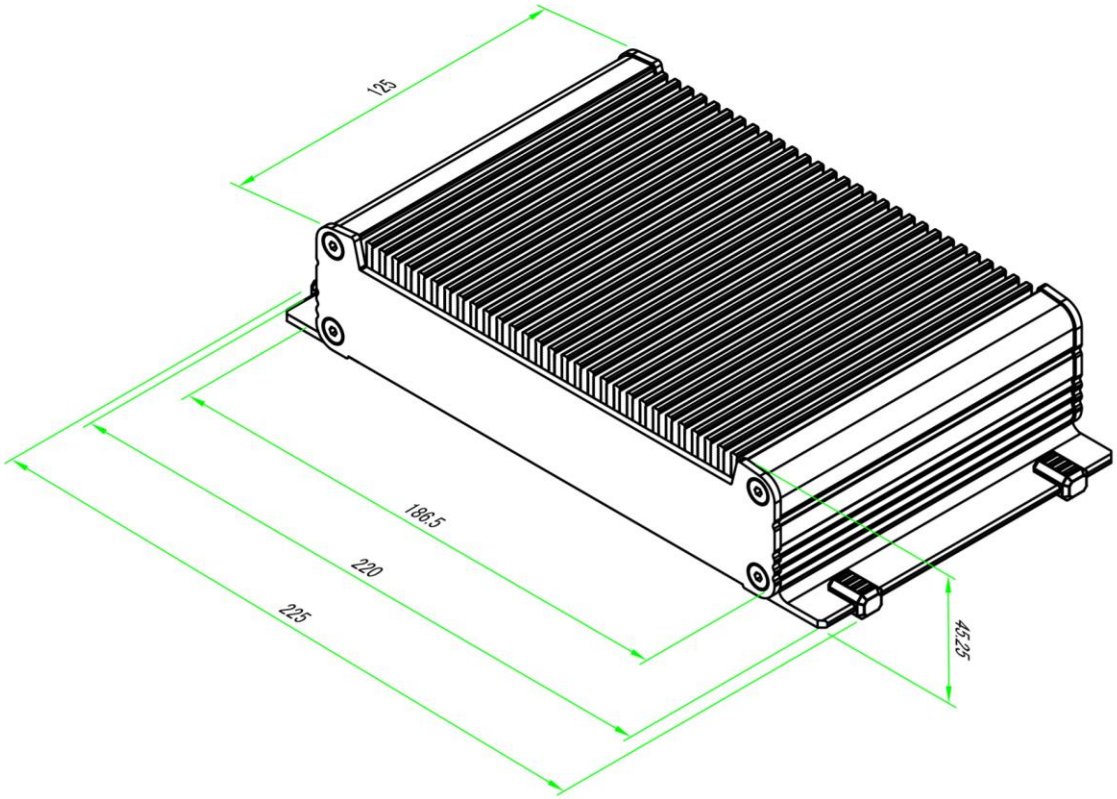
Figure 9-4. USB324 Wall Mounting Kit.



Components

No.	Part name	Pcs	Material	Color / Finish
1	Bracket	2	Extruded aluminium A6063S-T5	Silver Anodized
2	Screw	4	Steel M3-6	Black trivalent chromate
3	Nut	4	Steel	Black trivalent chromate
4	Rubber feet	4	Silicone	Black

Figure 9-5. USB324 Dimensions with Brackets.

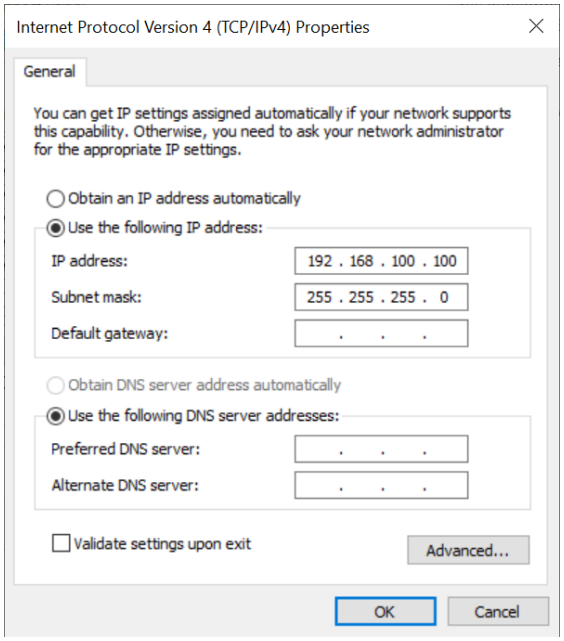


10 Web Interface

10.1 Overview

The H18 has an Ethernet connector that is used to connect to the embedded web servers via a standard Ethernet cable. The web interface allows monitoring of the board status, provides diagnostic information if problems occur, and is used to upgrade the firmware. The IP addresses can be static default, static user-programmable, or assigned by a DHCP server. The computer network adapter configuration for the default IP address is shown in Figure 10-1.

Figure 10-1. Computer Network Adapter Configuration.



10.2 IP Address Configuration

The H18 IP addresses can be changed to operate on a user's network.

10.2.1 Default IP Address: S1.8 = OFF

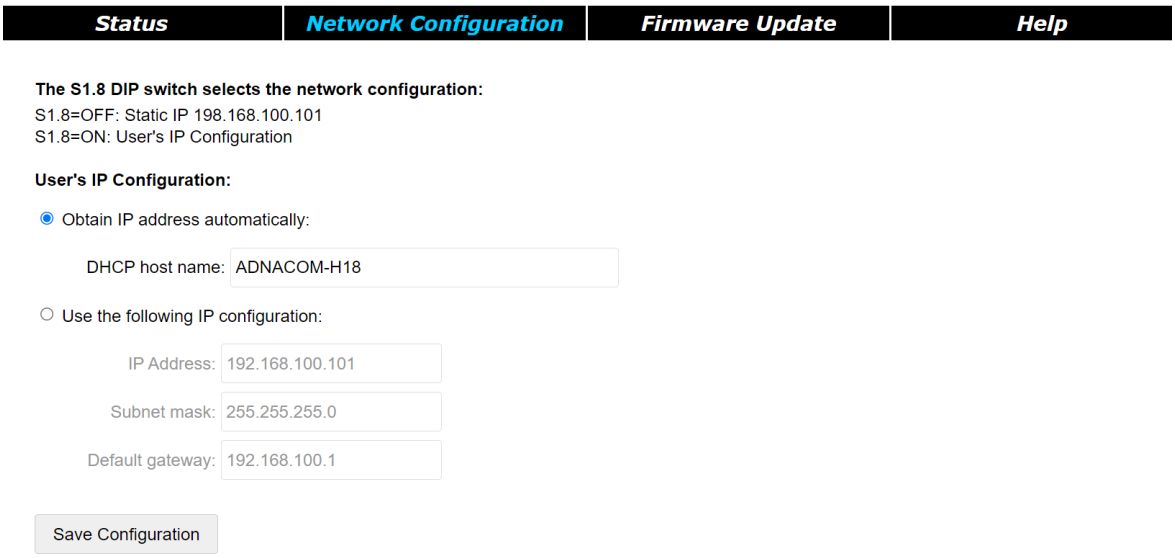
The default static IP address is selected by setting S1.8 = OFF.

H18 IP Address: 192.168.100.101

10.2.2 User's IP Address: S1.8 = ON

The user's configuration is selected by setting S1.8 = ON and configuring the IP settings via the Network Configuration page shown in Figure 10-2. The user's IP address can be static or assigned by a DHCP server. When the DHCP server assigns the IP address, the website is accessed using the programmed DHCP hostname: for instance, http://ADNACOM-H18. The DHCP name is not case-sensitive.

Figure 10-2. IP Address Configuration.



10.3 H18 Web Site IP: 192.168.100.101

10.3.1 Overview

The website consists of 4 pages: Status, Network Configuration, Firmware Upgrade, and Help, as shown in Figure 10-3.

Figure 10-3. H18 Web Site.

Adnacom H18

Status | **Network Configuration** | **Firmware Update** | **Help**

CONFIGURATION

HW Rev	FW Rev	Serial Number	PCIe Switch
000-00	3.1.1	4C-0A-3D-00-10-00	PEX8718

DIP Switch

S1	S2	S3	S4	S5	S6	S7	S8
OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF

QSFP

QSFP	Present	Port	PCIe Lanes	Vendor	Part Number	Serial Number	Technology
1	Yes	1	0-3	FINISAR CORP	FCCN410QD3C10	W0RAA5B	850 nm VCSEL
2	Yes	1	4-7	FINISAR CORP	FCCN410QD3C10	W0RAA4Z	850 nm VCSEL

Cable

Port	Max Speed	Max Width
1	Gen3	8

Computer

Port	Max Speed	Max Width
0	Gen3	x8

STATUS

Cable

Port	Link	Speed	Width	Link Up	Remote	Remote Up	Recovery	Rx Error	Bad TLP	Bad DLL	Width Retrain	Link Down
1	Up	Gen3	x8	0 ms	ON	1.021 s	1	0	0	0	0	0

Computer

Port	Link	Speed	Width
0	Up	Gen3	x8

Running Status

Power	Time	Since Reset	Reset	Reset Length	PCIe Enum Time
Good	00:01:34	00:01:34	1	509 ms	30.043 s

H18

Time	State	T PEX	T CPU	V +12V	I +12V	V +3.3Vaux	I +3.3Vaux
00:02:28	ON	42° C	27° C	11.94 V	0.601 A	3.28 V	0.140 A

QSFP

QSFP	Power	State	Tx	Rx	LoS Count	Temp	Vcc	Icc	Rx1	Rx2	Rx3	Rx4	Start-Up	I2C Error
1	3.3V	ON	ON	Good	0	23° C	3.35 V	0.197 A	737 µW	668 µW	668 µW	676 µW	447 ms	0
2	3.3V	ON	ON	Good	0	23° C	3.35 V	0.201 A	661 µW	655 µW	655 µW	679 µW	448 ms	0

H18 Power Supplies

3.3V	QSFP1 3.3V	QSFP2 3.3V	CPU 1.8V	PEX 1.8V	PEX 0.9V	PEX 0.9VA
3.37 V	3.35 V	3.35 V	1.79 V	1.77 V	0.90 V	0.90 V

10.3.2 Status Page

10.3.2.1 Configuration

Table 10-1. Board Information.

Field	Description
HW REV	The board assembly revision
FW REV	The board firmware revision

Field	Description
Serial Number	The serial number of the board used in the PCIe switch configuration space and as the MAC address
PCIe Switch	PEX8718 – PCIe switch part number

Table 10-2. DIP Switch.

Field	Description
S1-S8	The DIP switch status

Table 10-3. QSFP Configuration.

Field	Description
QSFP	The QSFP number on the board
Present	The presence status
Port	The PCIe switch port number connected to the QSFP
PCIe Lanes	The PCIe lane numbers connected to the QSFP
Vendor	The QSFP vendor name
Part Number	The QSFP part number
Serial Number	The QSFP serial number
Technology	The QSFP technology as defined in the QSFP specification.

Table 10-4. Cable Interface Configuration.

Field	Description
Port	The PCIe switch port number connected to the QSFP
Max Speed	The maximum speed supported by the H18
Max Width	The maximum width supported by the H18. The width depends on the number of installed QSFPs.

Table 10-5. Computer Interface Configuration.

Field	Description
Port	The PCIe switch port number connected to the PCIe slot
Max Speed	The maximum speed supported by the H18
Max Width	The maximum width supported by the H18.

10.3.2.2 Status

Table 10-6. Cable Interface Status.

Field	Description
Port	The PCIe switch port number connected to the QSFP
Link	The link status
Speed	The negotiated speed
Width	The negotiated width
Link Up	The time from the reset de-assertion to link up
Remote	The remote device status. Valid only for optical cables
Remote UP	The time from the reset de-assertion to remote ON. The remote should be on before the PCIe enumeration starts. Otherwise, the remote will not be visible by the computer.

Field	Description
Recovery	The recovery state counter. The counter is used to evaluate the link quality. It should not count during the operation. A slow increment is acceptable.
Rx Error	The receiver error counter. The counter is used to evaluate the link quality. It should not change during the operation. A slow increment is acceptable.
Bad TLP	The bad TLP counter. The counter is used to evaluate the link quality. It should not change during the operation. A slow increment is acceptable.
Bad DLL	The bad DLL counter. The counter is used to evaluate the link quality. It should not change during the operation. A slow increment is acceptable.
Width Retrain	The number of times the H18 tried to retrain the link to the maximum width. The link must train before the PCIe enumeration starts.
Link Down	The link down counter. The counter shows how many times the link went down after restart. If the link is down, it requires either the computer restart or PCIe bus rescan to resume the operation.

Table 10-7. Computer Interface Status.

Field	Description
Port	The PCIe switch port number connected to the PCIe slot
Link	The link status
Speed	The negotiated speed
Width	The negotiated width

Table 10-8. Running Status.

Field	Description
Power	The power supply status
Time	The time since the computer power-up
Since Reset	The time since the last reset
Reset	The number of resets since the computer power-up
Reset Length	The length of the last reset pulse
PCIe Enum Time	The time from the last reset to the start of the PCIe switch enumeration. This time must be longer than the time required to turn on the remote device.

Table 10-9. H18 Status.

Field	Description
Time	The elapsed time from powering the H18 in the computer slot by the +3.3Vaux voltage
State	The H18 state
T PEX	The PCIe switch junction temperature. The maximum operating junction temperature is 110^0 C.
T CPU	The junction temperature of the supervisory CPU. Maximum Tj = 125^0 C
V +12V	The +12V slot voltage
I +12V	The +12V slot current
V +3.3Vaux	The +3.3Vaux slot voltage
I +3.3Vaux	The +3.3Vaux slot current

Table 10-10. QSFP Status.

Field	Description
QSFP	The QSFP number on the board
Power	The power supply type powering the QSFP
State	The QSFP state
Tx	The transmitter status
Rx	The receiver status
LoS Counter	The Loss of Signal counter from the last reset
Temp	The internal QSFP temperature
Vcc	The internal QSFP voltage
Icc	The QSFP current
Rx1-Rx4	The measured Rx power
Start-Up	The QSFP initialization time
I2C Error	The number of I2C errors since the last reset

Table 10-11. H18 Internal Power Supplies.

Field	Description
3.3V	The 3.3V power supply voltage
QSFP1 3.3V	The QSFP 1 3.3V power supply voltage measured on the connector
QSFP2 3.3V	The QSFP 2 3.3V power supply voltage measured on the connector
CPU 1.8V	The CPU 1.8V power supply voltage
PEX 1.8V	The PCIe switch 1.8V power supply voltage
PEX 0.9V	The PCIe switch digital 0.9V power supply voltage
PEX 0.9VA	The PCIe switch analog 0.9V power supply voltage

11 Troubleshooting

11.1 Overview

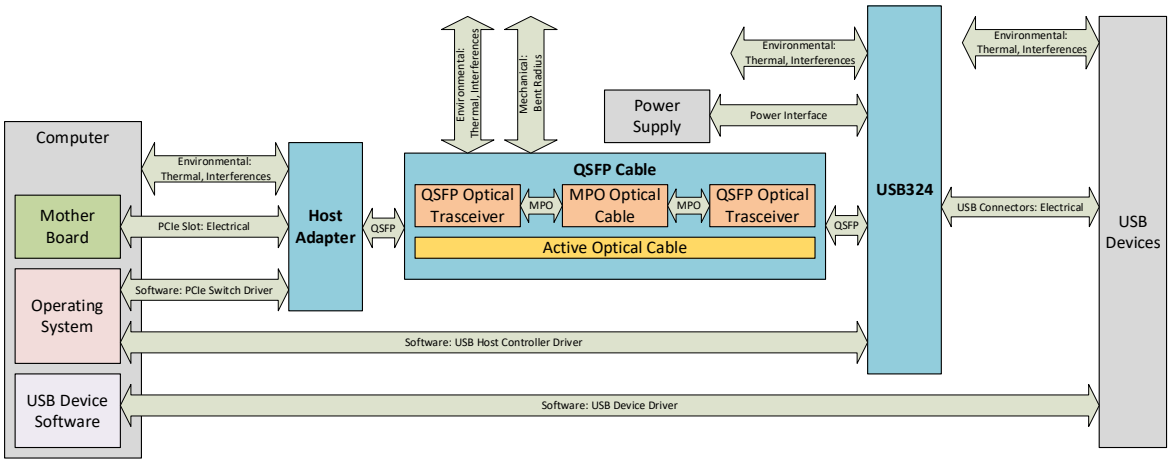
The goal of troubleshooting is to find and fix a problem that prevents the system from operating as the application requires. The recommended troubleshooting principles are as follows:

1. Identify the problem: What exactly is not working?
2. Establish a theory of probable cause: What part of the system could cause such failure, or what has changed since the last time the system operated properly?
3. Test the theory: Replace the component that may cause the problem or change its state. Change only one thing at a time.
4. Verify the system functionality. If the problem is fixed, continue to step 5. Otherwise, revert changes made in step 3 and return to step 2.
5. Document the findings, actions, and outcomes.

11.2 System Context Diagram

The AUS324 extension consists of the following components: a computer, a host adapter, a QSFP cable, a USB324 unit, and USB devices connected to the USB324. The AUS324 components and their interfaces are shown in Figure 11-1. These components and interfaces should be analyzed, changed, and tested during troubleshooting.

Figure 11-1. AUS324 System Context Diagram.



11.3 Troubleshooting Algorithm

11.3.1 Identify Problem

Describe the problem in detail and analyze the system components and interfaces to identify the most probable component or interface causing the problem. If the problem is real and most likely caused by the AUS324 system, continue to the next section. Otherwise, consult the documentation of other components and request technical support from their manufacturers.

11.3.2 Review Operating and Installation Instructions

The operation and installation instructions are provided in sections 4 and 5, respectively. If the system is installed correctly, remove the host adapter from the computer and install it step-by-step, as described in the following sections.

11.3.3 Verify Computer and USB Devices

After the host adapter is removed from the computer, connect the USB devices to the computer USB connectors and verify that the computer and USB devices operate correctly.

11.3.4 Verify Host Adapter

Install the host adapter into the computer without the QSFP cable. Verify that the red standby LED is ON when the computer is OFF. If the standby LED is OFF, that indicates that there is no +3.3Vaux voltage on the PCIe slot. Check the BIOS settings to enable the voltage or reset the BIOS settings to default values. In DELL computers, +3.3Vaux is enabled by setting BIOS Settings-> Power Management->Deep Sleep Control->Disabled.

Turn on the computer and verify that the host adapter is visible to the computer software, as described in section 6. If the host adapter is not visible, use the status LEDs to identify the problem. The H18 has a web interface described in section 10, which provides detailed information about the H18 status and PCIe slot voltages.

If the host adapter does not operate correctly, try to install it into a different slot or another computer if available. If it looks like a host adapter failure, continue to section 13.

If no problem with the host adapter is identified, turn off the computer and continue to the next section.

11.3.5 Verify QSFP Cable

Attach the cable to the QSFP connector. Use the QSFP LED status to confirm that the transceiver is detected by the card.

If an H18 is used, use the web interface to verify that the H18 detects the cable and that the H18 correctly displays the cable parameters. The H18 reads the cable configuration and status via an I2C interface. There should be no I2C errors detected, and the QSFP state should be ON.

If a problem with the cable is identified, try a different cable or transceiver. The list of recommended cables is provided in sections 3.2.1 and 3.2.3.

If no problem with the cable is identified, turn off the computer and continue to the next section.

11.3.6 Verify USB324 Unit

Attach the cable to the USB324 QSFP connector. Turn on the USB324 power supply and then the computer. Use the status LEDs described in section 9 to identify a problem.

If an H18 is used, use the web interface to verify the QSFP cable and PCIe link status. If a problem with the cable is identified, try a different cable or transceiver.

If it looks like a USB324 failure, continue to section to section 13.

If the USB324 is visible in the Device Manager as described in section 6, continue to the next section.

11.3.7 Verify USB Devices

Connect USB devices and verify that devices are detected and installed properly in the operating system. Check the Device Manager that there are no problems with the device drivers.

If the problem is not resolved, contact technical support as described in section 13.

12 Products Design Disclaimer

The Adnacom products are designed according to USB and PCI Express specifications listed in their respective datasheets. Hence, they should work with any USB devices and drivers compliant with those USB and PCI Express specifications. Adnacom can only provide limited support with third-party USB device installations. Please go to 13 Customer Support to contact our support team.

13 Customer Support

For the latest Customer Support information, please visit our website at https://adnacom.com/. When contacting us, please make sure to include all the information below and describe your problem in detail to help us understand your problem better.

1) Full name
2) Company name
3) Phone number
4) Email address
5) Product model number
6) Product serial number
7) Computer make/model
8) OS and version
9) Make/model of PCIe cards installed
10) LEDs' statuses on all boards
11) A detailed description of the problem
12) Screenshots of web status pages

14 Warranty

All of the Adnacom system components are warranted against defects in materials and workmanship for one year from the date of shipment. Adnacom repairs or replaces (at its option), at no charge, any item(s) found to be defective during the warranty period. This warranty includes parts and labor. Proof of purchase is required for any warranty work. The warranty provided herein does not cover defects caused by the owner's failure to follow the User's Guide; owner's modification of the product; owner's abuse, misuse, or negligent acts; or power failure or surges, fire, flood, accident, actions of third parties, or other events outside reasonable control. To return defective items, an RMA number must be obtained from Adnacom and marked on the outside of the package before any item(s) is(are) accepted for warranty work. The returned item(s) must be packaged in a manner similar to the manner that it (they) was(were) received. Failure to do so will void the warranty. After obtaining the RMA number and properly packaging the defective item(s), please ship the package to the address indicated on our website https://adnacom.com/. Please make sure the package label indicates the RMA number provided.

Except as specified above, Adnacom makes no warranties, express or implied, and specifically disclaims any warranty of merchantability or fitness for a particular purpose. Customers' right to recover damages caused by fault or negligence on the part of Adnacom is limited to the amount paid by the customer. Adnacom is not liable for damages resulting from loss of data, profits, use of products, or incidental or consequential damages, even if advised of the possibility thereof.