1 DESCRIPTION

The BLU-PCI is a professional PCI-Express sound card designed for Harman BLU link network audio systems.

Providing 32 or 64 channels of BLU Link audio for both playback and record.

The half-height PCI Express card format allows use in 2U servers facilitating increased density for high channel count audio applications.

2 FEATURES

- 64 channels (48kHz) or 32 channels (96kHz) of BLU link audio play and record

- Intercard Sync to support exactly aligned channels of ASIO audio across multiple BLU-PCI cards

- User configurable WDM devices of 1, 2, 4 or 8 channels

- Half height PCI Express card format

- Up to 4 cards in one system

- Windows 10, 8.x, 7, Server 2012/2008 software drivers available

3 SPECIFICATIONS

DIGITAL INPUT/OUTPUT	
Type	BLU Link
Connector	RJ-45
Sample Rates	48 and 96kHz
SIGNAL PROCESSING	
DSP	Texas Instruments TMS320DM8147 floating point DSP @ 600MHz
Memory	64MB
Audio Formats	16 bit signed PCM 32 bit signed PCM
GENERAL	
Bus	X1 PCI-Express.
Dimensions	PCI short-length form factor – 4.5" x 2.75" x 0.6" (114mm x 70mm x 15mm)
Weight	8 oz (227g) max
Operating Temperature	0C to 70C
Power Requirements	+3.3V@1.5A

4 REVISIONS

Date	Description
2 March, 2016	First publication
10 October 6, 2017	Updated BLU-Link Config and channel count info

5   CONTENTS

6   HARDWARE INSTALLATION

This section explains how to install one or more AudioScience adapters in a computer.
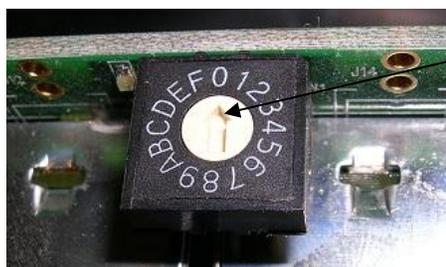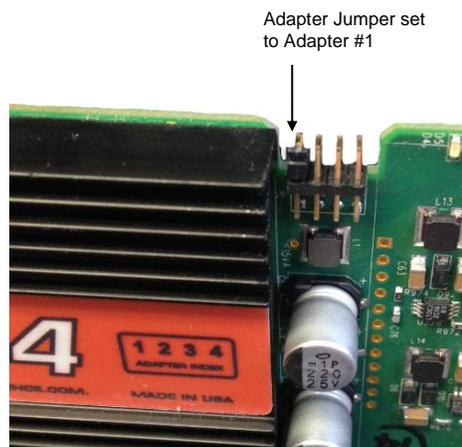
6.1   Setting Adapter Index – One Adapter in the PC

1. Make sure your computer is turned off.

2. PCI adapters should be installed in any empty PCI slot and PCIe adapters should be installed in any x1 (or greater) PCIe slot.

3. Make sure the adapter jumper is set to adapter index #1, the factory default. For a new card no changes need to be made. For an AudioScience adapter from another installation, check that it is set to adapter index #1.

Depending on the adapter family, there are different ways of setting the adapter index.

For ASI5000 and ASI6000 families, there is an adapter jumper that must be set. The left most position represents adapter index #1.

Adapter Jumper set to Adapter #1

For ASI5300, ASI6300, ASI8700, and ASI8900 families, there is a rotary switch.

NOTE: Position 0 (zero) represents adapter #1, position 1 is adapter #2, etc.

Adapter Index switch set to Adapter #1

4. Turn on the computer and let it boot. Under Windows, a dialog box will pop up informing you that the computer has detected a new Multimedia Audio card. Cancel out of this dialog box and proceed to the software installation section of this datasheet.

6.1.1   Setting Adapter Index - Two or More Adapters in the PC

1. Make sure your computer is turned off.

2. PCI adapters should be installed in any empty PCI slots and PCIe adapters should be installed in any x1 (or greater) PCIe slots. Different adapter types can coexist in the same computer; for example, an ASI6416 and ASI8921 will work correctly if installed in the same PC. Different adapter types still require unique adapter index numbers.

3. Each adapter in the PC needs to have its adapter jumper/rotary switch position set to unique numbers. For example if you are installing two adapters, the first one would be set to adapter index #1 and the second to adapter index #2.

3.1. For ASI5000 and ASI6000 families, the position to the right of index #1, when jumpered, represents adapter index #2. The next position represents #3, and the rightmost position, when jumpered, represents #4.

3.2. For ASI5300, ASI6300, ASI8700, and ASI8900 families, rotate the rotary switch to indicate what position is required.

7   SOFTWARE INSTALLATION

AudioScience makes audio adapters and drivers for various operating systems. Enhancements to an adapter's utility come from the integrators software that uses the audio driver to implement sophisticated audio playback and recording functions.

7.1   Drivers for Windows 10, 7, Server 2008, Server 2012

Typically, drivers are not included with the hardware and will need to be downloaded from the AudioScience website. They can be found here: http://www.audioscience.com/internet/download/win_drivers.htm

The first step is to determine what type of driver is needed for your operating system. Drivers are available for 32-bit and 64-bit Windows systems.

Driver 3.10 and later present the user with three install options during installation:
- Install Standard PCI/PCIe Driver.
- Install Standard + Network Audio Driver.
- Remove all driver components

Traditional installs should select the first of these options. Users of AudioScience CobraNet and AVB products should select the second option with the "+Network Audio Driver." in the text.

7.1.1   Combo Driver

The Combo driver installs WDM devices by default and presents an option to "Install legacy 32-bit WAVE driver" in case your application requires it. Download the file named ASICOMBO_xxxxxx.EXE from www.audioscience.com and run it (_xxxxxx is the version number). After the EXE has run, reboot your computer and the audio adapter will be operational. If the cover is off the computer, one can see one or two blinking LEDs on top of the card indicating its DSP is running and communicating with the driver.

Verify that the adapter is running using ASIControl (see ASIControl section in this document).

7.1.2   ASIO

All AudioScience drivers also install an ASIO driver interface. It is installed by default.

7.1.3   Driver Failure

In the event that an adapter's driver fails to load correctly, the OS's event viewer should be checked. The event log is accessed from the Administrative Tools applet in Windows Control Panel under Event Viewer. The Windows Logs\System view should be selected.

If two or more adapters are installed in the same system, the first thing to check is that the adapters were assigned unique adapter numbers. If issues persist, please email support@audioscience.com.

7.2   Drivers for Linux

The latest Linux driver can be downloaded from the AudioScience website – www.audioscience.com

7.3   Applications for Windows

AudioScience provides ASIControl for adapter set-up and configuration.
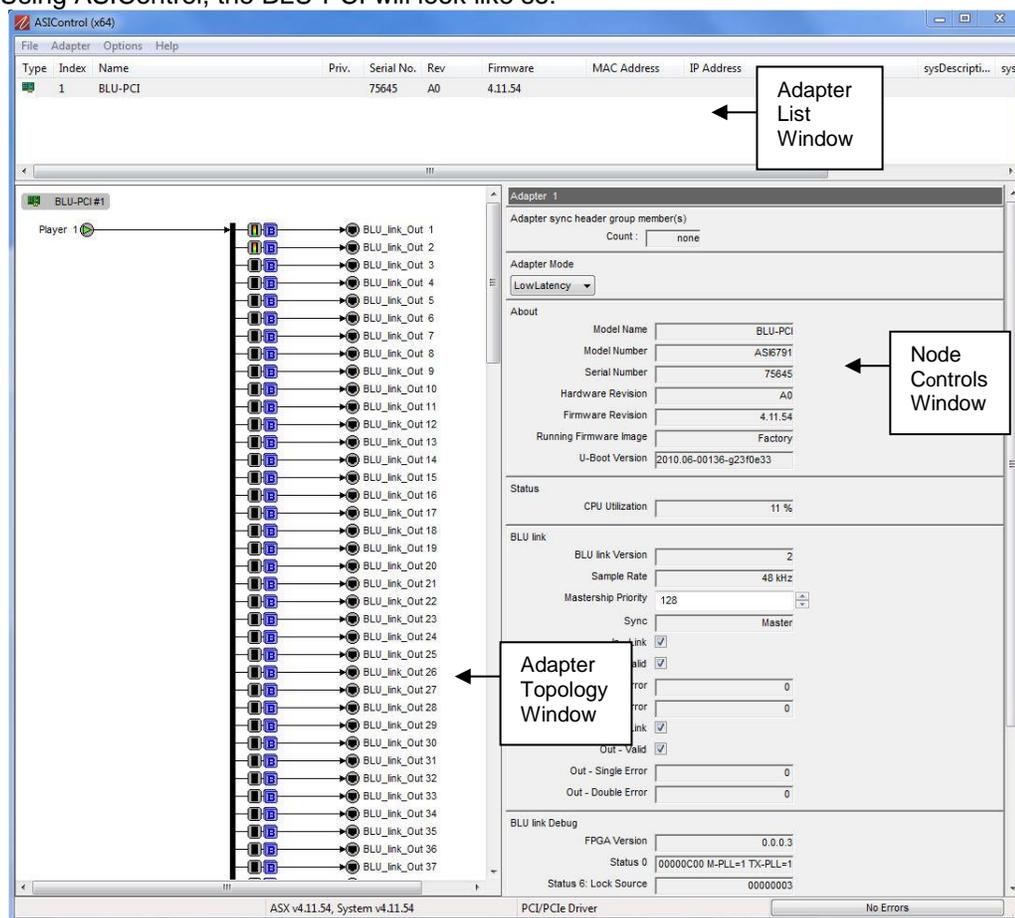
7.3.1   ASIControl

All Windows drivers install an AudioScience application called ASIControl that can be used to setup and verify functionality of adapters. ASIControl provides a common interface for users across all driver types.

From the Windows Start menu, navigate to Start→Programs→AudioScience and run the ASIControl program.

8 OPERATION USING ASICONTROL

Using ASIControl, the BLU-PCI will look like so:

9 USER INTERFACE

9.1 ASIControl Layout

ASIControl consists of three main windows: the adapter list in the top portion of the window, the adapter topology view on the left hand side, and the node control list on the right hand side.

9.1.1 Adapter List Window

The top portion of ASIControl shows a list of all the adapters that the application has found. By default, only bus based (i.e. PCI and/or PCI Express) adapters will be shown. If the network portion of the driver is installed (by selecting "Install Standard + Networked Audio Driver" after running the driver installer) and "Local PCI(e) + Networked adapters" is selected from ASIControl's Options→Configure adapter interface, then AudioScience and other third party CobraNet devices will be shown.

Adapters are listed in order of adapter index. For bus-based adapters, this is determined by the adapter index jumper on the card. For AudioScience CobraNet devices this is calculated from the unit's MAC address. Third party CobraNet devices are listed last as they have no AudioScience index.

9.1.2 Adapter Topology Window

The left hand side of ASIControl contains the topology view of the adapter. It is essentially a block diagram of the device showing the available physical inputs and outputs on the right hand side of the black, vertical 'bus' line. On the left hand side of the bus line, bus-based adapters show player and recorder streams, while CobraNet adapters show their network connections.

Each of the inputs and outputs is referred to as a node and each Node contains one or more controls. The topology shows each control as a small icon. A non-exhaustive list of nodes follows:

Line In	Player	CobraNet In
Line Out	Recorder	CobraNet Out
AES/EBU In	Tuner	
AES/EBU Out	Clock Source In	

Hovering the mouse over a particular node will highlight it. Clicking on a node will bring up the controls resident on that node in the right hand control list.

There is an adapter node in the top left corner of the topology window. Clicking on this will show adapter-specific controls and properties on the right hand side. Not all adapters have all nodes.

9.1.3   Node Controls Window

The right hand side of ASIControl shows the controls associated with the selected node in the topology view. The controls are arranged, from top to bottom, in order of audio signal flow, i.e. the audio signal can be viewed as entering the node at the top control and leaving at the bottom control. Controls may be used to either manipulate the audio as it passes through the node, or report back control status information.

For a comprehensive listing of controls and how to operate ASIControl, please see the ASIControl manual available from www.audioscience.com and also installed by the driver. Not all adapters have all controls.

The section below lists some common and any specific controls, as seen in ASIControl, for this adapter.

9.2   Controls

Selecting the appropriate mode from the list using the dropdown arrow changes the Adapter_Mode setting. A reboot is necessary after changing adapter mode. The mode setting is saved to the adapter's EEPROM.
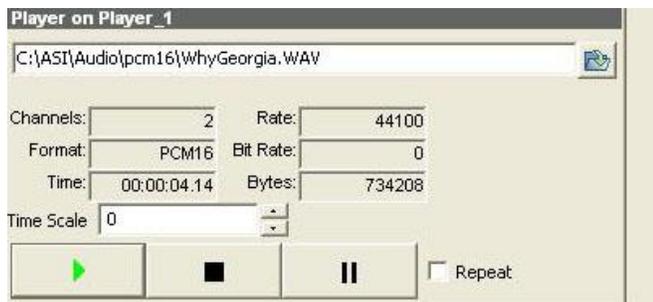
The ASI BLU-PCI only supports Low Latency.

9.2.1   Low Latency

This mode supports a single multichannel audio stream enabling live sound processing in ASIO and Core Audio applications. See the Low Latency Mode datasheet for further information.

9.3   Player

The Player control supports playback of an audio file from the computer's hard drive.

9.3.1   Interface

Figure 1. A player in ASIControl.

The first line of static text contains the selected playback file. Below the filename is the file information; playback time and playback bytes, the timescale select options, the player control buttons and the file repeat option.

9.3.2   How To Play a File

The first step in playing a file is to select the file to play. Use the **file icon button** to navigate to the desired file. After opening the file, the complete filename, including the path, will appear immediately to the left of the file open icon. At this point the file information is also filled in so that it contains the following fields: **Channels**, **Rate**, **Format**, and **Bit Rate**. Most of these are self-explanatory. The **Rate** refers to the sample rate of the audio recorded in the file. The **Bit Rate** applies only to MPEG compression and is set to 0 for all other formats.

At this point the percentage time scaling without pitch shift can be set if desired. The default of 0 indicates that time scaling is disabled. The valid range of settings is +/- 20 percent.

The **Repeat** check box indicates whether the file should be played again after playback has completed. It can be set either before playback has begun, or while playback is underway.

The file is now ready to be played. To start playback press the **play button**. At this point the **Time** and **Bytes** fields report playback time and the number of bytes of the file that have been played.

Once playback has started the **stop** and **pause buttons** can be used to stop or pause the playback.

9.3.3   Using embedded sine wave generator

Manually typing in a filename of "~" and pressing play will cause a full-scale 1 kHz sine wave to be played at 48 kHz. The format of the filename string is: "~w, c,f,a,m,s,t".

w	= **w**aveform = SINE (default=SINE)
c	= **c**hannels = 1…8 (default = 2)
f	= **f**requency = 1000 for 1kHz (default=1000)
a	= **a**mplitude = -1 for -1dBFs (default=0dBFS, i.e. full scale)
m	= channel **m**ask = 10 for left only, 01 for right only, 11 for stereo, etc. (default=1 for all channels)
t	= sample **t**ype = (PCM8, PCM16, PCM24, PCM32, FLOAT32) (default=FLOAT32)
s	= **s**ample rate = positive integer (default=48000) [validity depends on adapter]

Defaults can be used if the complete string is not specified, i.e.
"~" becomes "~wSINE,c2,f1000,a0,m11,s48000,tFLOAT32"

Any subset of the options may be specified, the remaining options will be set to the defaults. e.g. "~f500" = 500Hz stereo sine wave at 0dBFS, 48kHz sample rate.

9.3.4   Developer

9.3.4.1   Windows APIs

Wave – waveOutOpen(), waveOutWrite(), waveOutClose() etc.
HPI – Output stream functions documented [here](#).
ASX – ASX Player control functions documented [here](#).
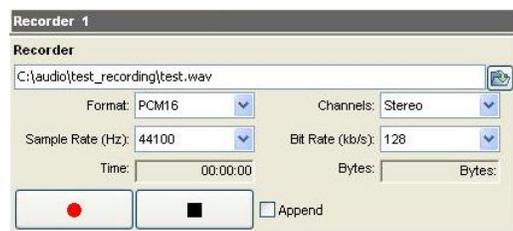**DirectSound** – TBD.

9.3.4.2   Linux APIs

HPI – TBD

9.4   Recorder

The Recorder control supports recording of an audio file.

9.4.1   Interface

A recorder in ASIControl.

The first box contains the name given to the recorded file and the location where it is to be saved. Below that is the file information, the record time and record bytes, the recorder control buttons and the file Append option.

9.4.2   How To Record a File

The first step in recording a file is to have audio coming into the adapter. This can be from a line-in or from one of the players in ASIControl. See appropriate sections in this datasheet to accomplish this. Next, the new file needs a name and place to be saved, or an existing audio file can be selected to be overwritten or appended to. Use the **file icon button** to navigate to the location to create the file and to give it a name, or to open a previously

recorded file to overwrite or append to it. Next, from the dropdown arrows, select the number of "**Channels"**, the "**Sample Rate"**, the "**Format"**, and the "**Bitrate"** that the file should be recorded in.

Check the **Append** checkbox to save the audio to the end of an already existing file.

The file is now ready to be recorded. To start recording, press the **record button**. At this point the "**Time'** and "**Bytes'** fields report record time and the number of bytes of the file that have been recorded.

Once recording has started the **stop** and **pause buttons** can be used to stop or pause the playback.

9.4.3   Developer

9.4.3.1   Windows APIs
Wave – use waveInOpen(), waveInStart() etc.
HPI – use HPI_InStreamxxx() functions.
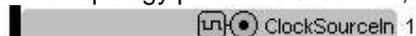**ASX** – use ASX_Recorder_xxx() functions.

9.4.3.2   Linux APIs
HPI – use HPI_InStreamxxx() functions.
ASX – use ASX_Recorder_xxx() functions.

9.5   ClockSourceIn
In the topology pane of ASIControl, click on Clock Source 1

and in the node pane, select where the adapter is to get its clock source from using the Clock Source dropdown list, as well as the sample rate to use if clocking from adapter.

Note that for CobraNet and Livewire devices, the sample rate is fixed at 48kHz.

9.5.1   Interface

Clock Source information as seen in ASIControl.

Local Rate:
Select from the dropdown list the supported rates of the adapter.

Clock Source:
From the dropdown list, select the source for the adapter's clocking. Selections, depending on the adapter, include:
- Local – adapter rate is used; select a supported sample rate in Local Rate dropdown list
- Word – Word clock from Word clock BNC connector on digital cable loom (or BOB1024)
- WordHeader – Word clock from header on adapter (ASI61xx only)
- AES/EBU Sync – AES/EBU Sync from AES/EBU Sync XLR connector on digital cable loom (or BOB1024)
- AES/EBU In 1-4 – rate taken from specific digital input
- AES/EBU Auto – rate taken from first valid digital input; looks at digital input 1 first, then up to digital input 4
- Blu link

Adapter Rate:
Displays the current adapter operating rate

10 BLU LINK

AudioScience BLU link connections can be setup via the BLU link Configuration utility. This utility is installed along with the driver and is used to configure the sample rate, channel count and input/output channel assignments.
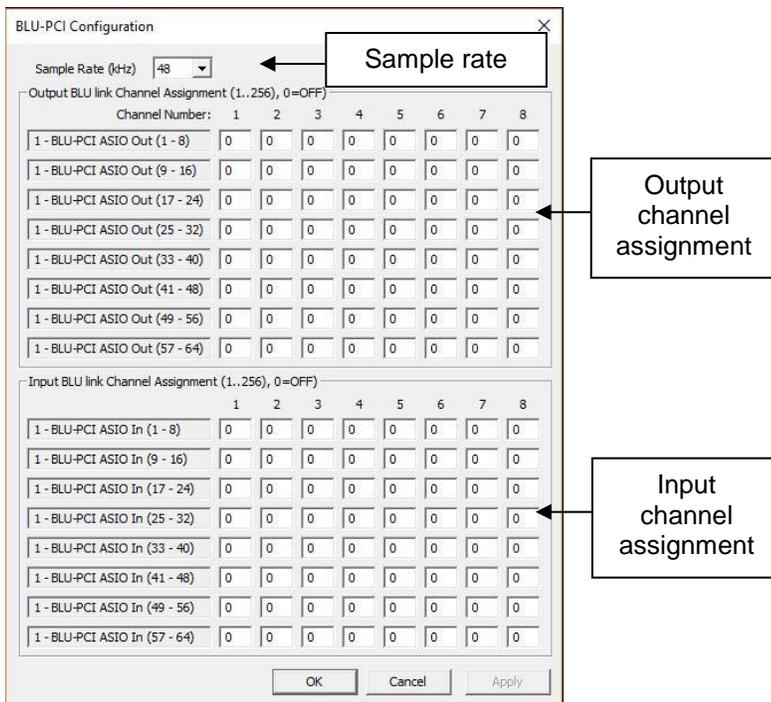
10.1 BLU link Configuration utility

You can access the BLU-PCI Configuration utility from the Driver Settings app in the AudioScience folder on your start menu.

Once you have the Drivers Settings app open, click the BLU link tab and click the BLU link Configuration button to start the utility.
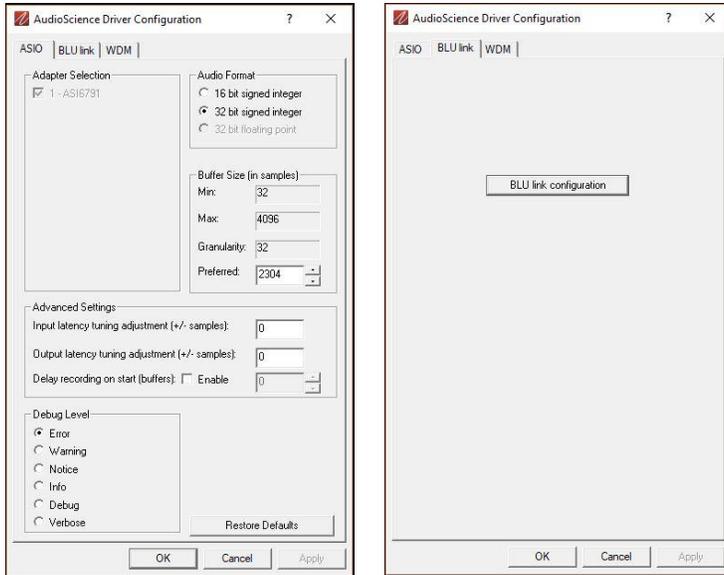
The utility which looks similar to this:

Figure 2 BLU link Configuration utility

1.1.1 Sample rate settings

The top section of the BLU link configuration utility is where the sample rate can be set. The Sample Rate (kHz) dropdown allows you to choose between the different sample rates available for your adapter.

Note: Any changes to this section will require a system reboot before the changes will go into effect.

10.1.1 Output Channel assignment

The Output BLU link Channel Assignment section provides a quick and easy way to setup your output channels. Simply select the output channel you wish to configure and enter the channel number you want to output on. Pressing either the Tab or Enter keys on your keyboard will move you to the next output channel in the grid where it will automatically enter the next available channel number in the box, making it very simple to enter consecutive channels for your outputs. When you have made all your channel assignments click the Apply button to apply the changes and keep the utility open, or the OK button to save your changes and exit the configuration window.

10.1.2 Input Channel assignment

The Input BLU link Channel Assignment section works in exactly the same fashion as the output section above but applies to the BLU link inputs.

10.2 Channel counts and available devices

The number of available devices and their configuration options will be dependent upon the number of channels you assign to each device. You can change this setting from the WDM tab of the Driver Settings app

The "Channels per WDM device" drop down allows you to change the number of channels assigned to each WDM device in Windows. Changing this value will update the "Number of WDM devices" information box where you will be able to see the number of devices you will get based on your chosen channel value. The values assigned here will apply to both the WDM and ASIO drivers.

Setting this value to 1 will result in 64 one channel devices in Windows.
Setting this value to 2 will result in 32 two channel devices in Windows.
Setting this value to 4 will result in 16 four channel devices in Windows.
Setting this value to 8 will result in 8 eight channel devices in Windows.

Note: Any changes to this tab will require a system reboot before the changes will go into effect.

<end>