Audial

D/A CONVERTER

S5b

USER MANUAL

Revision 0, June 2024

This manual comprises introducing information on the use and performance of this device. For more information, please refer to the Audial website, or send your questions to info@audialonline.com.

IMPORTANT!

1. This manual is a guide only.

2. Do not expose this device to rain or moisture, excessive heat, or mechanical force.

3. Use this device exclusively with specified voltages.

4. Unplug the device from the wall outlet during a lightning storm.

The lightning flash with arrowhead symbol within an equilateral triangle is intended to alert the user to the presence of uninsulated "dangerous voltage" within the product's enclosure that may be of sufficient magnitude to constitute a risk of electric shock to persons.

The exclamation point within an equilateral triangle is intended to alert the user to the presence of important operating and maintenance (servicing) instructions in the literature accompanying the product.

STARTING WITH S5b

Audial S5b is a reference quality, TDA1541A based non-oversampling D/A converter. It is easy to use, and it requires no special maintenance or care. It achieves claimed technical performance (distortion, frequency response, etc) right from the start, however it needs a couple of weeks of burning in to perform its best in subjective terms.

Please note that the TDA1541A D/A converter chip is a classic TTL chip architecture, which dissipates somewhat more power than it is usual for devices of this kind these days. Hence it is not recommended to leave the S5b permanently powered up. On the other hand, that is not needed, either. Once the S5b passes its initial burning in, it is generally enough to have it powered up for about half an hour before critical listening.

The S5b front plate includes the push-button mains switch, IR remote control sensor, five white LED input indicators, and input selector (rotary encoder). Every S5b supports remote control operation, however the remote control unit, which works also with other Audial devices, is sold optionally.

All the connectors, as well as the A-link input mode switch and S/PDIF PLL mode switch, are located on the back plate.

DIGITAL INPUTS AND OUTPUT

The S5b has five inputs: USB, S/PDIF electrical, S/PDIF optical, LVDS I2S, and A-link.

The S5b **USB** input stage operates as an asynchronous (master) USB device, with two low jitter master clocks for D/A conversion. A 22.5792 MHz works with 44.1/88.2/176.4/352.8 kHz, and 24.576 MHz works with 48/96/192/384 kHz audio sampling frequencies. This way the unit achieves a clean clocking scheme, and all the audio clock signals in the system are generated only by frequency dividing, and not by using PLL synthesizers.

The USB stage also provides galvanic decoupling between the USB and D/A stage, thus also separating the PC from audio circuits.

The USB stage can employ either two- or four-channel firmware. The firmware can be user changed, both from two to four, or four to two channels, by loading the appropriate file from the Windows control panel, and it can be also reverted to the factory state. Audial S5b users can download these files and find detailed instructions on the Audial website S5b page, https://www.audialonline.com/s5.

The S5b D/A stage always converts the first two channels to the analog signal, available at analog outputs, while possible USB third and fourth channels are decoded and output as Philips simultaneous data serial PCM protocol, at the A-link output connector. Consequently, two S5b DACs, with an HDMI cable connecting this output to another S5b DAC A-link input, make a four channel USB DAC.

The **S/PDIF** electrical input is the real 75 Ohm **BNC**, transformer coupled input. The ground of the S/PDIF line is coupled to the DAC ground by a 0.1 uF capacitor. With both electrical and optical S/PDIF sources, the S5b supports sampling frequencies up to 96 kHz.

It is highly recommended to use also a real 75 Ohm interface for S/PDIF coaxial connection, including the real 75 Ohm BNC plugs. Regardless of what you might be told from time to time, the RCA can not meet this requirement, and achieve optimal performance. In terms of functionality, this BNC input will anyhow normally work with all S/PDIF sources with RCA connectors.

S/PDIF receiver uses a PLL to lock to the source, and thus retrieve the sampling clock from it, and it can lock either to the S/PDIF data or the preamble. The **PLL mode switch** is located at the back plate. The change of PLL mode requires a reset to take effect. This is achieved by turning the DAC off, and waiting for about 10 seconds, before powering it on again. This switch affects both BNC and optical input performance.

The I2S input uses the **I2S LVDS** (Low Voltage Differential Signaling) standard, initially set by PS Audio, with the following pinout at the HDMI connector.

1: DATA-
2: GND
3: DATA+
4: BCK+
5: GND
6: BCK-
7: WS-
8: GND
9: WS+
10: N/C
11: GND
12 - 16: N/C
17: GND
18, 19: N/C

The inputs are high impedance nodes, with no termination, and with 1.2 VDC offset (typical). Please note that the signals here are carried in their "raw" PCM form, so this input, even though it uses an HDMI connecter, is not compatible with HDMI protocol.

The **A-link** is a similar PCM direct connection, specified by Audial, which uses an HDMI connector, but with single-and signals with native CMOS/TTL levels. Please note that the signals here are also carried in their "raw" PCM form, and again not compatible with HDMI protocol. Detailed A-link specifications are available on the Audial website.

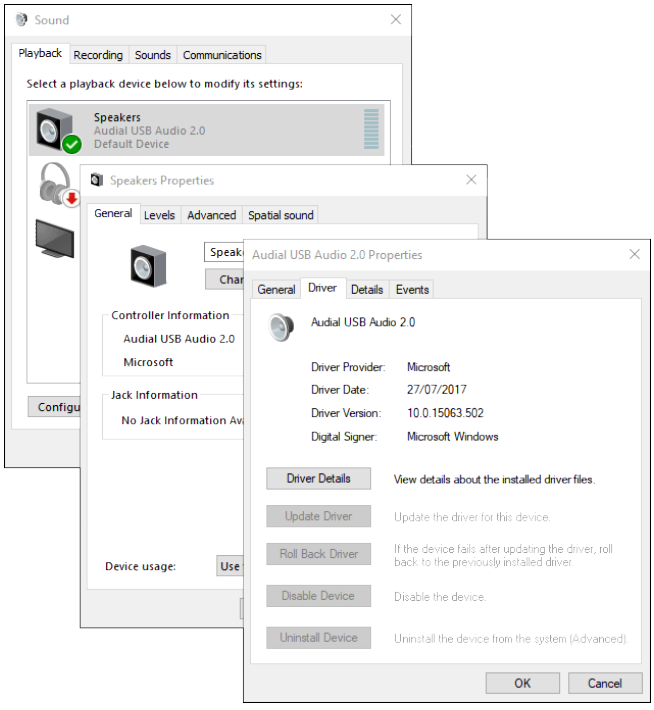
The S5b A-link input can accept either I2S or Philips simultaneous data protocol, as set by the switch beside the input itself. As opposed to the S/PDIF PLL mode switch, this switch change is effective immediately and does not need a reset.

USB AUDIO CLASS 2.0

Audial S5b USB stage employs USB Audio Class 2.0 definitions.

Mac OS X and Linux are natively USB Audio Class 2.0 compliant for many years now, and this device hence does not require a special driver when used with Mac OS X or Linux.

Since September 2017, Windows 10 (1703) also supports USB Audio Class 2.0 definitions, so the S5B acts as a plug-and-play device with recent Windows 10 and Windows 11 versions. Once it is connected to a PC running Windows 10 or 11, a small window will pop up in the bottom right corner of the screen, reporting the initial connection routine. Once this process is finished, the DAC can be found as a playback audio device, available in the system.

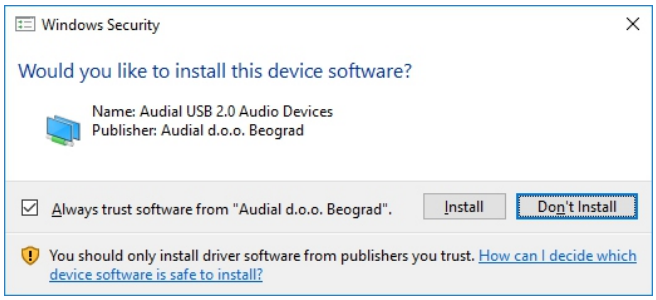


DEDICATED WINDOWS DRIVER

In addition, Audial provides a dedicated Windows driver for this device, which is still necessary with earlier Windows versions. This driver also provides additional functionality such as ASIO interface, buffer length control, or firmware update, and it can be generally preferred soundwise

Audial S5b users can download this driver at Audial website, https://www.audialonline.com/s5. Driver version 1.26 works with Windows XP, Vista, 7, 8, 8.1, 10 and 11. Later driver version 2.10 however improves on compatibility with later PC systems, and can be installed on Windows 7, 8, 8.1, 10 and 11, however it supports only a stereo operation. All driver versions are compatible with both 32 and 64-bit Windows.

To install the driver, please unzip the provided file, and run setup.exe. The installation window will pop up, and at one stage you will be asked to connect the device. Also, during this process, and according to your Windows security settings, you might be asked a couple of times to allow the installation, and please do so. These windows will look like this.



Once the installation is complete, you can configure your settings by using the control panel, available in Windows Start Menu -> Audial.

ANALOG AUDIO OUTPUTS

Audial S5b DAC regularly has one pair of capacitivelly coupled RCA outputs. Optionally, another pair of transformer coupled outputs can be added, and this can be either RCA or XLR.

Please note that the capacitive coupling, which implies the grounds of two devices tied together, and transformer coupling, which keeps two grounds separate, require different approaches to the system earth grounding. Typically, transformers need the grounds connected to the earth on both sides, whereas more than one earth in the system that uses capacitive coupling may cause ground loops, and increase the noise.

At its back plate, the S5b also includes the connection to its chassis/earth ground. This connector can help proper system grounding and/or earthing, or it can be used to connect the shield of the interconnect cable (similarly to XLR pin 1).

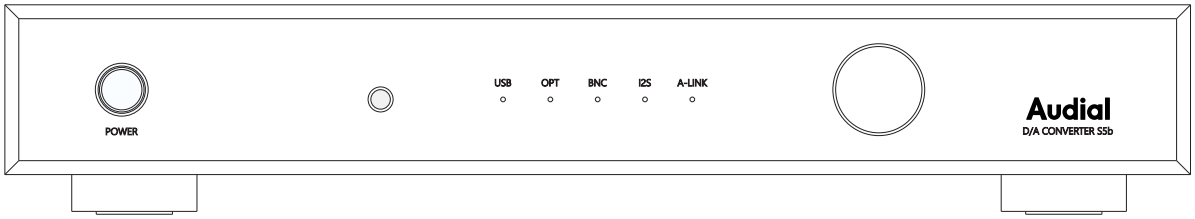
MAINS CABLE

The S5b may (and may not) be shipped with the industry standard grade mains cable. It is however generally recommended to use high quality, preferably solid core cables, wherever possible in the audio system, and this suggestion applies to the mains cable too.

WARRANTY

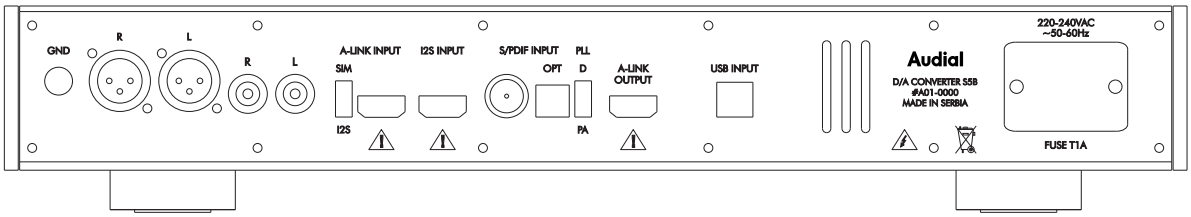
Audial claims proper working of this product for two years. Audial is obliged to correct any malfunction within this period, at no charge, either by competent repair service, or by swapping the sold unit with the new one.

For the units sold directly by Audial, the invoice is also a guarantee certificate. Since Audial maintains its own database of directly sold units, the original buyers in most cases won't need it. The warranty is still fully transferrable from the original to the subsequent owner(s), however in this case we will probably ask for the invoice.



S5b front plate

From left to right:
Push-button power switch, remote control sensor, input LED indicators, input rotary encoding switch.



S5b back plate

From left to right:
GND terminal, optional transfomers coupled XLR outputs (can be also transformers coupled RCA),
RCA outputs (capacitors coupled), A-link input with mode switch, I2S LVDS input,
S/PDIF electrical (BNC) and S/PDIF optical (Toslink) inputs with PLL mode switch,
A-link output from USB input, USB input connector, mains connector.

SPECIFICATIONS

INPUTS:
- USB 2.0, supports 2.0 Class Definitions for Audio Devices, asynchronous operation; Fs max 384 kHz; 2- or 4-channel operation, with 3rd & 4th channel available at A-link output (PCM direct digital with HDMI connector) *
- S/PDIF electrical, 75 Ohm BNC; Fs max 96 kHz
- S/PDIF optical (»Toslink»); Fs max 96 kHz
- I2S LVDS; Fs max 96 kHz
- A-link, supports I2S up to Fs 96 kHz, and Philips simultaneous data protocol up to Fs 384 kHz *

OUTPUTS:
Unbalanced RCA, capacitors coupled, 2.1 V RMS
Optional transformer coupled balanced XLR, or transformer coupled RCA, 2.1 V RMS

OUTPUT IMPEDANCE:
Capacitors coupled outputs: 3.5 Ohm @ 20 kHz, 10 Ohm @ 1 kHz (23.5 uF)
Transformers coupled outputs: 30 Ohm, 20Hz-20kHz

FREQUENCY RESPONSE:
Sin(x)/x equivalent:
@ fS=44.1kHz: -3.2dB @ 20kHz
@ fS=88.2kHz: -0.8dB @ 20kHz
@ fS=192kHz: -0.2dB @ 20kHz
@ fS=384kHz: -0.05dB @ 20kHz

TRANSIENT RESPONSE: Clean with no overshoot or ringing **

ABSOLUTE PHASE: Correct

HARMONIC DISTORTION (@ 1kHz): **
0.003% @ -6dBFS (I/V dominated)
0.9% @ -60dBFS(D/A dominated)

INTERMODULATION DISTORTION (CCIR): 0.006% **

MAINS VOLTAGE: 220-240VAC/50-60Hz, or 110-120VAC/50-60Hz, or 100 VAC/50-60Hz

POWER CONSUMPTION: 12 W, typical

DIMENSIONS (W x D x H): 426 x 280 x 73 mm, including feet, but excluding knob and connectors

WEIGHT: Approx. 7Kg

* - For A-link pinout and voltage specifications, please visit
https://www.audialonline.com/community/topic/a-link-pcm-i2s-direct-specifications/.
** - For performance graphs, please visit https://www.audialonline.com/s5 .