

UAC-EVO I

User manual

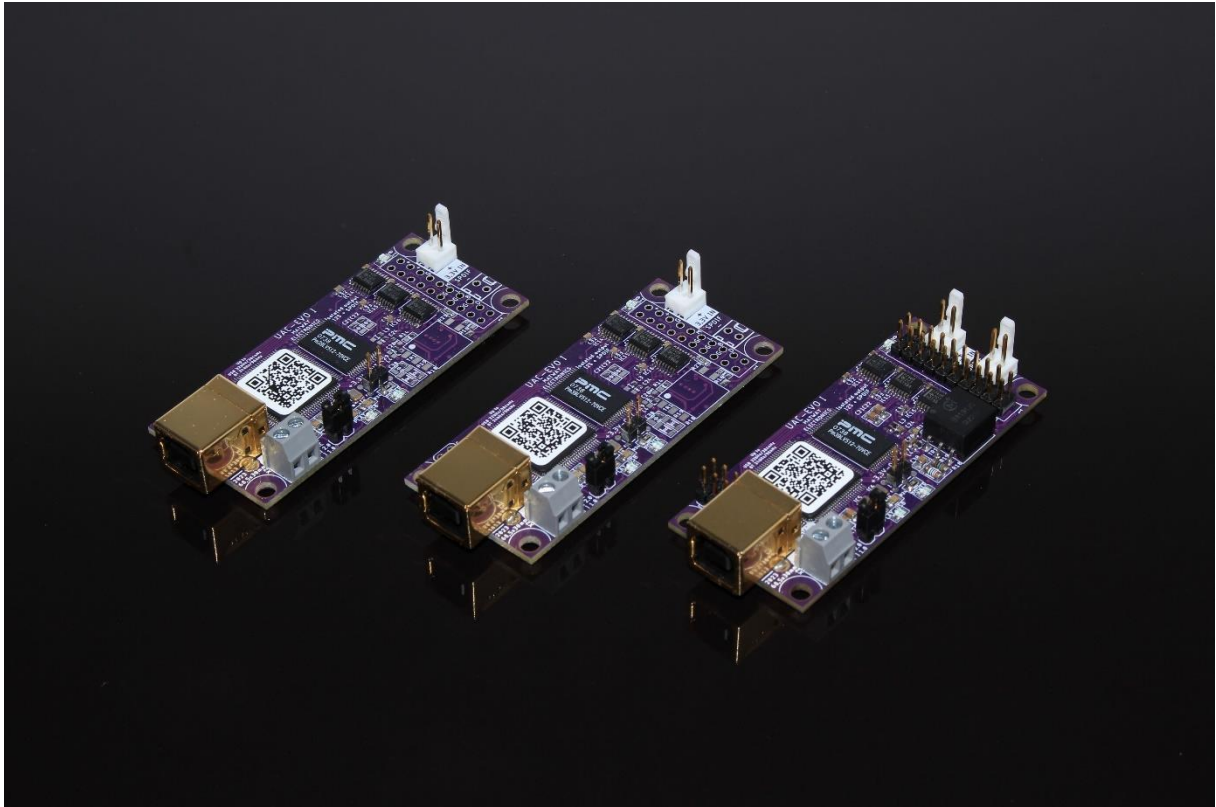


Photo. 1 Ready UAC-EVO I module

13022024 v1.0

MATWAY ELECTRONICS 2023

Note – this manual contains bookmarks – you can conveniently navigate through specific points – however we recommend reading the whole content

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1. PCB Preview

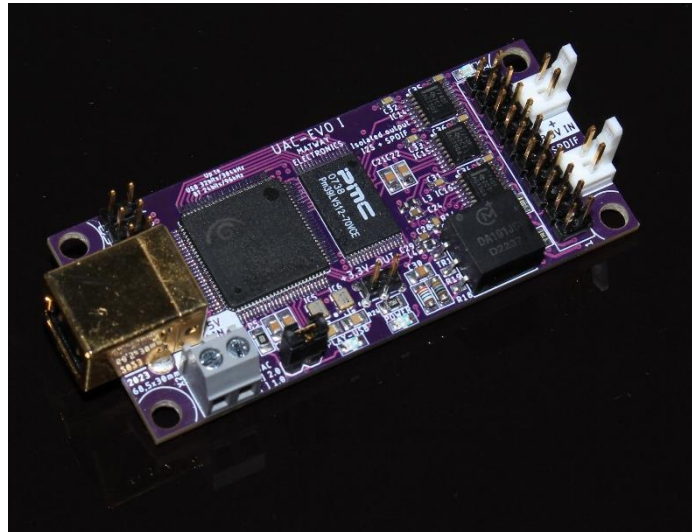


Photo. 2 PCB Preview – TOP (USB+BT / I2S + SPDIF version)



Photo. 3 PCB Preview – BOTTOM (USB+BT / I2S + SPDIF version)

2. PCB Parameters

- 4-layer PCB,
- Copper thickness 35[μm],
- Laminate thickness 1.6[mm],
- Purple solder mask,
- Dimensions 68.50x30mm,

3. Dimensions

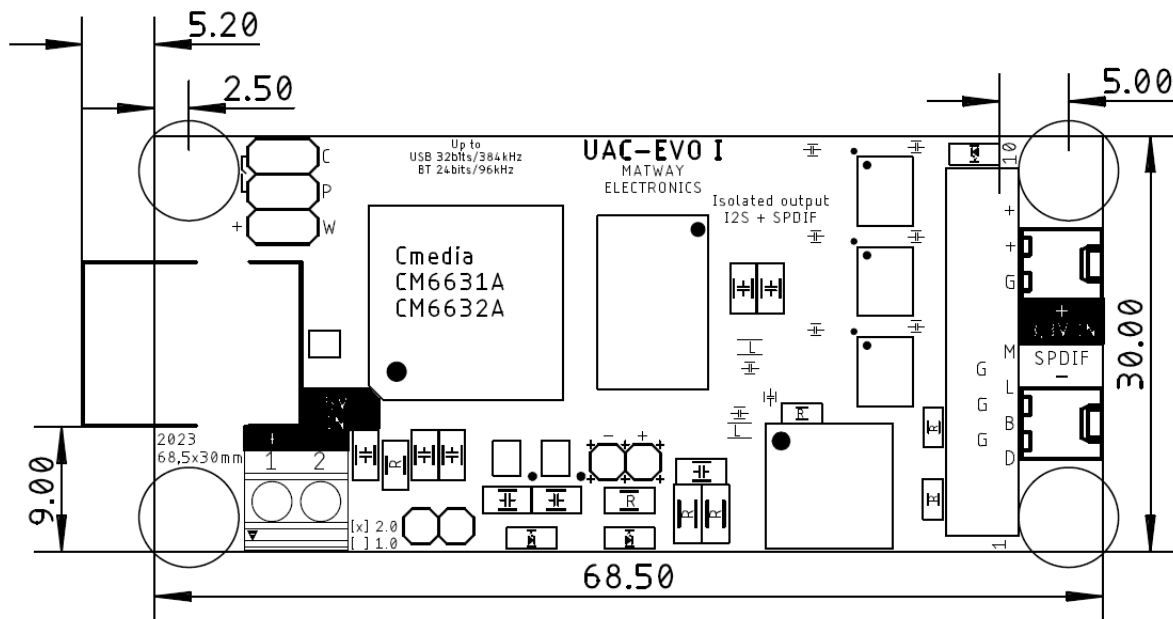


Photo. 4 PCB dimensions - in [mm].

4. Features

4.1. USB

- a) Processor – CM6631A/6632A
(depending on a chip availability, same parameters)
- b) Generators:
49.152MHz NDK NZ2520SDA - Ultra Low Phase Noise Type
45.158MHz NDK NZ2520SDA – Ultra Low Phase Noise Type
(22.5792MHz and 24.5760MHz are overclocked from main generators)
- c) USB Specification:
USB 2.0 HighSpeed
UAC 1.0 for Windows XP and UAC 2.0 for newer systems

Driverless support for all systems:

Windows

Linux (including Raspberry)

MAC

Android (OTG, above Android 5.0)

Additionally you can download ASIO drivers for UAC-EVO I module <https://asio4all.org/>

Install and select ASIO in the player settings (for Windows 10/11)

- d) Audio:

UAC 1.0		UAC 2.0	
Resolution bits	Sampling [kHz]	Resolution bits	Sampling [kHz]
16	44.1	16-32	44.1
16	48		48
16	88.2		88.2
16	96		96
16	176.4		176.4
16	192		192
24	44.1		352.8
24	48		384
24	88.2		
24	96		

Table 1 Resolution and sampling - depending on UAC 1.0 or 2.0 mode

- e) Output – I2S
LVCMOS standard
- f) USB Protection
Built-in CMF filter with ESD protection and EMI suppression
RC filter for USB shield
- g) Software- **.3lite** (kusy.audio)

4.2. Bluetooth

- a) Processor – CSR8675, Bluetooth 5.0 version.
For Audio - changing *Bluetooth* to higher/newer versions e.g. 5.2 or 5.3 will not benefit the sound quality.
- b) Generator:
24.576MHz NDK NZ2520SDA – Ultra Low Phase Noise Type
The upsampler is enabled within the module. If your transmitter (e.g. phone) has an older Bluetooth version, the module will automatically switch to 48[kHz]. Therefore regardless of the source, there is only one sampling at the output = the same MCLK
- c) Supported codecs:
AAC
SBC
AptX
AptX-HD
- d) Audio
Up to 24bit / 48[kHz]
- e) Output – I2S
LVCMOS standard
- f) Software – [MATWAY ELECTRONICS](https://www.matwayelectronics.com)

4.3. SPDIF – Built-in connection.

- a) Transceiver – WM8804.
- b) **SPDIF** Output:
24bits/44.1-192 [kHz]
sampling rate depends on the source settings:
 - for USB, change in the system settings,
 - for Bluetooth, it is always 48[kHz].
- c) Output isolation on the transformer
- d) Power supply – separate filters and chokes for PVDD and DVDD.

The output data depends on the end use scenario:

- 1) Play music via USB – at the SPDIF output you will have the data from a USB source
- 2) Play music via Bluetooth – at the SPDIF output you will have the data from the Bluetooth source

5. Packing

Dedicated boxes for the UAC-EVO I. Inside you can find the UAC-EVO I converter in a protective antistatic bag. Additionally you can find QR code which contains:

- device name,
- serial number,
- website address.

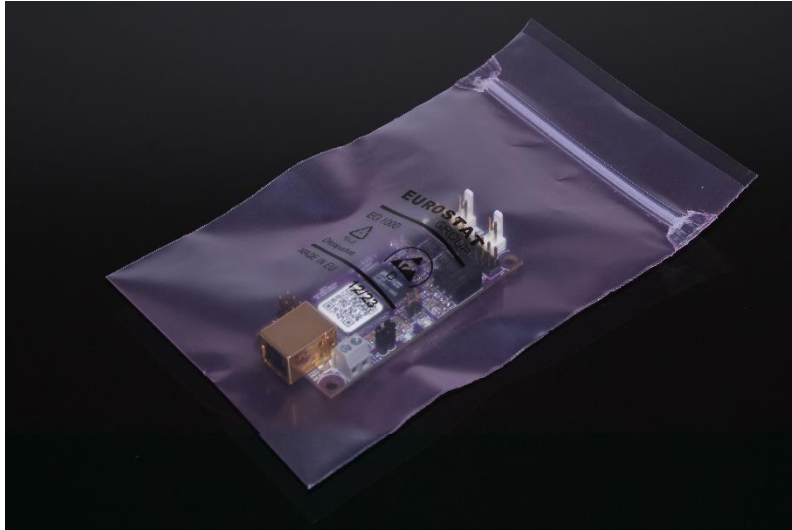


Photo 5 Converter in a protective antistatic bag



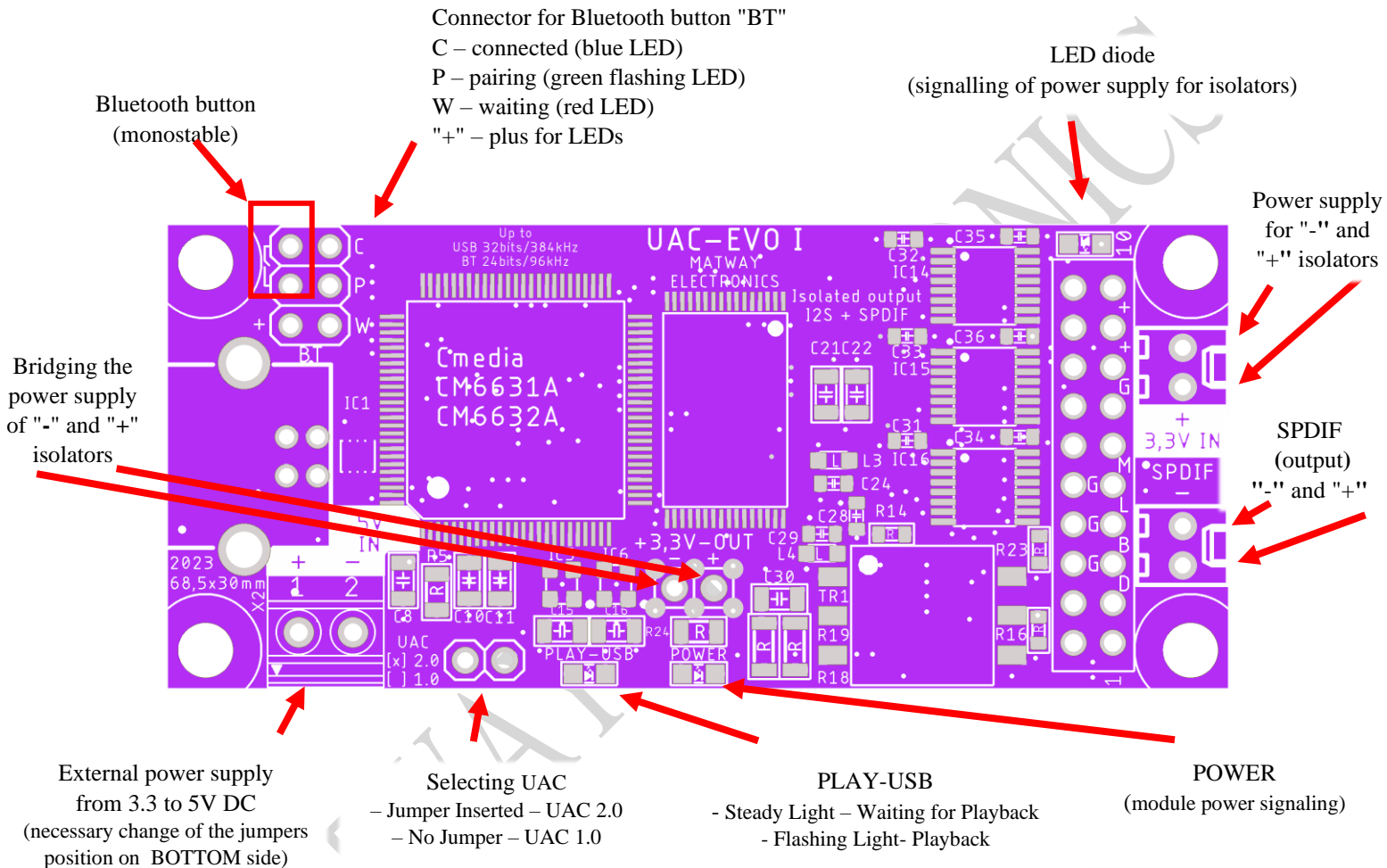
Photo 6 Dedicated box for UAC-EVO I

6. Electrical specification

Powering the UAC-EVO I module	Value	Unit
Supply voltage - USB	5	[V] DC
Current draw when playing via USB 32bits/384kHz No BT module (USB/I2S version)	65	[mA] DC
Maximum current draw of the USB module 32bits/384kHz – inactive, playing BT – active – playing SPDIF – active (USB + BT / I2S + SPDIF version) + Bluetooth button	140	[mA] DC
Power supply for isolators (from the module output)	Value	Unit
Supply voltage	3,3	[V] DC
Current draw	10	[mA] DC
Outputs – signal level	Value	Unit
I2S, F0, F1, F2, F3 LVCMOS Signals Standards	3.3 ± 0.3	[V] DC
SPDIF impedance 75[Ω]	1	[V _{pp}] DC

Table 2 Electrical Parameters of the UAC-EVO I Module

7. Description of the components UAC-EVO I



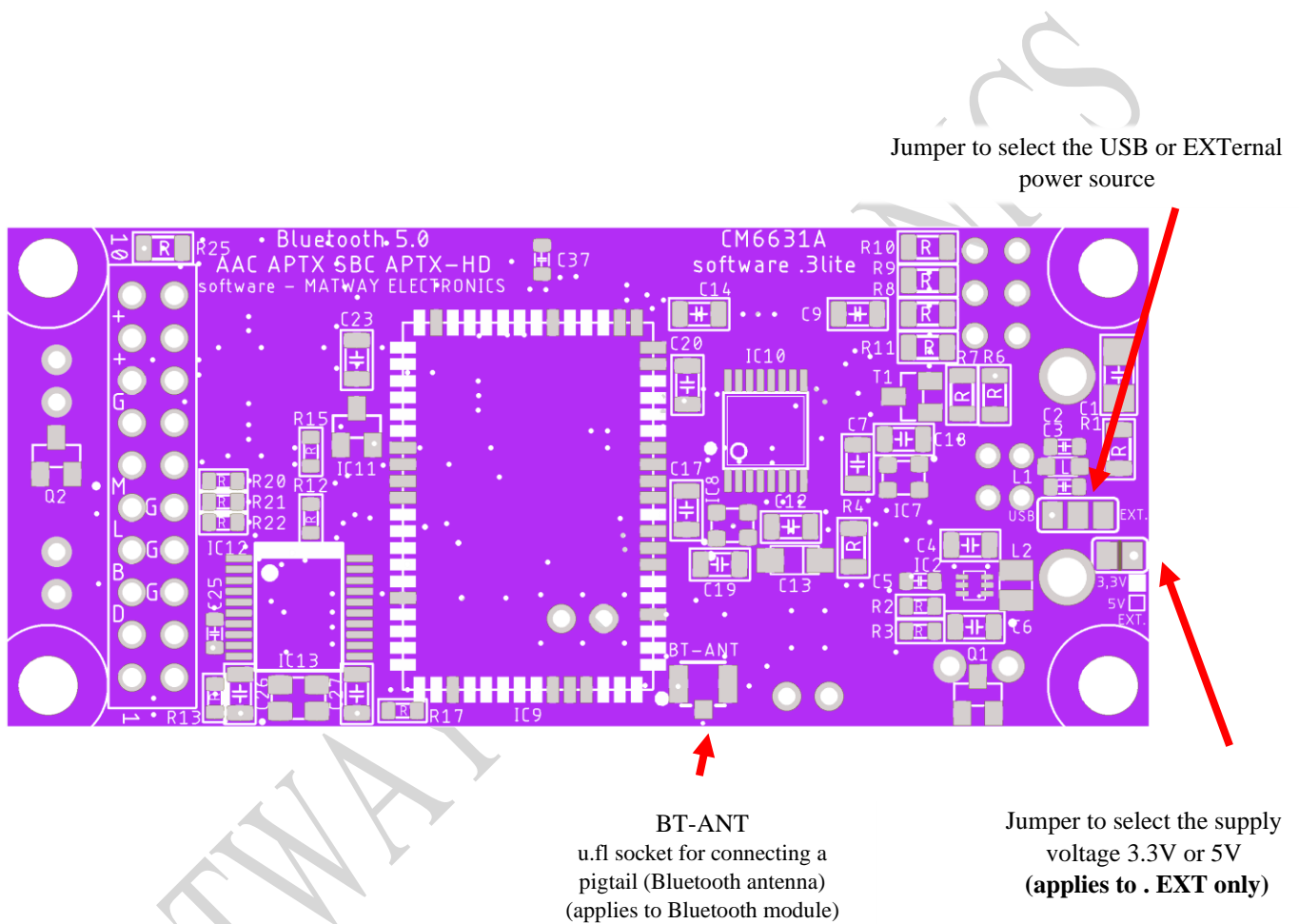


Photo. 8 UAC-EVO I module – components description BOT

7.1. Description of the output connector

20. F3	10. 3.3V
19. F2	9. 3.3V
18. F1	8. GND
17. F0	7. DSD_ON
16. DSD	6. MCLK
15. GND	5. LRCLK
14. GND	4. BCLK
13. GND	3. DATA
12. -	2. -
11. MUTE	1. PLUG

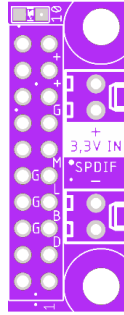


Photo. 9a Output connector - TOP view

10. 3.3V	20. F3
9. 3.3V	19. F2
8. GND	18. F1
7. DSD_ON	17. F0
6. MCLK	16. DSD
5. LRCLK	15. GND
4. BCLK	14. GND
3. DATA	13. GND
2. -	12. -
1. PLUG	11. MUTE

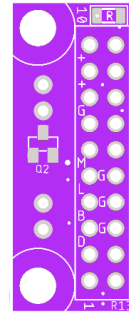


Photo. 7b Output connector - BOT view

Pin	Name	Type	Description
1	PLUG*	Output	Set high (1) when USB is connected to the source
2	-	-	Not connected
3	DATA	Output	I2S DATA
4	BCLK	Output	I2S BCLK
5	LRCLK	Output	I2S LRCLK/FSCLK
6	MCLK	Output	I2S MCLK
7	DSD_ON*	Output	Set high (1) during detection
8	GND	Output	Ground
9	3.3V	Output	In the case of bridging the power supply of isolators up to 20mA
10	3.3V	Output	In the case of external power supply of isolators – the limitation is the external power supply
11	MUTE*	Output	Set high (1) during sampling
12	-	-	Not connected
13	GND	Output	Ground
14	GND	Output	Ground
15	GND	Output	Ground
16	DSD*	Output	Set low (0) for DSD64, set high (1) for DSD128
17	F0	Output	Sampling signaling
18	F1	Output	Sampling signaling
19	F2	Output	Sampling signaling
20	F3	Output	Sampling signaling

***Features will be available in the future.** The update for CM6631A/CM6632A software will be available – all you need is a USB cable and provided application (with the instructions on how-to). Without these pins, i.e. PLUG, DSD_ON, MUTE, DSD, the module operates correctly (PCM, I2S support). These are just "add-ons".

7.2. Description of the power connector

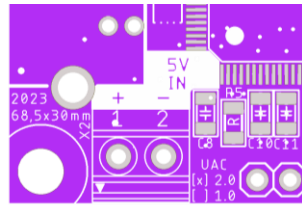


Fig. 8 Power connector X2

Originally, the converter is powered from the USB socket. However, there is an option of powering the converter from an external power supply, e.g. [a two-stage power supply for the LM317 + LT3045 digital part](#). To do this, you need to re-solder the connectors from the power source selection (USB/EXT.) and select the supply voltage of 3.3V or 5V. An external power supply with a current of no less than 250mA (this is with a small reserve, we do not take the responsibility for the quality of workmanship of power supplies other than MATWAY ELECTRONICS, hence the higher current for safety).

In addition, the X2 connector has reverse polarity protection. You won't burn it by connecting the power supply the other way around. The protection without a voltage drop.

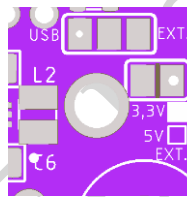


Photo. 10 Jumpers for power supply selection and voltage selection

If you want to use an external power supply – short-circuit the middle pad with the right EXT:



Photo. 11 Selection of USB/EXT power source.

If you want to connect an external power supply with a voltage of 3.3V, you need to short-circuit the following jumper:

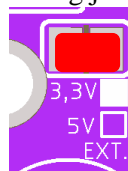


Photo. 12 Selection of supply voltage from an external source

If you want to connect a 5V power supply, leave the solder bridge jumper empty! Otherwise, connecting a 5V power supply with the jumper set to 3.3V will burn the circuit!

All modifications to the system are carried out at your own risk!

It is possible to prepare the module for an external power supply and purchase a ready-made set.

7.2.1. USB power supply or .EXT?

USB Power Supply (USB)

- a) Convenience – all you need is a USB cable to power the converter (USB and Bluetooth)
- b) In case the converter is connected to the streamer, if the streamer works 24/7 without turning off – the converter will also work. If you have a version with Bluetooth – the button will also be lit
- c) In case you want to listen via Bluetooth only – you need to turn on the power source from USB (computer, streamer, Raspberry Pi and others)

Description of the built-in power supply system in section 7

External power supply (.EXT)

- a) By connecting for example the aforementioned power supply to the digital part - [Two-stage power supply for the digital part of the LM317 + LT3045](#) we gain:
 - in case of 5V version, - **three-stage** voltage regulation (LM317 + LT3045 + converter chip)
 - in case of 3.3V version – two-stage voltage regulation (LM317+LT3045), which also has a soft-start function of the power supply, just like the built-in power supply system on the converter
 - interference removed from the source (compared to USB),
- b) Independence of power supply from the USB sound source – if you want to play audio via Bluetooth – just turn on dedicated power supply and enjoy the sound
- c) By turning the external power supply off – the converter stops working – nothing lights up. The streamer can still work.

7.3. Bluetooth button

There is a dedicated button for the UAC-EVO I converter with the Bluetooth version – with Bluetooth engraving and RGB backlighting.

The following buttons are available:

- fi12mm, black, metal front, illuminated ring with mounted 70cm leads
- fi19mm, black and silver, plastic front, illuminated center
- fi19mm, black and silver, metal front, illuminated center and ring



Photo. 13 Available Bluetooth buttons

For fi19mm buttons, connectors with 60cm leads are available



Photo. 14 Connector for fi19mm buttons with RGB backlight + 60cm pinouts

7.3.1. Connecting the Bluetooth button

- a) Originally crimped plugin (possibility to choose a ready-made plugin when purchasing the module):

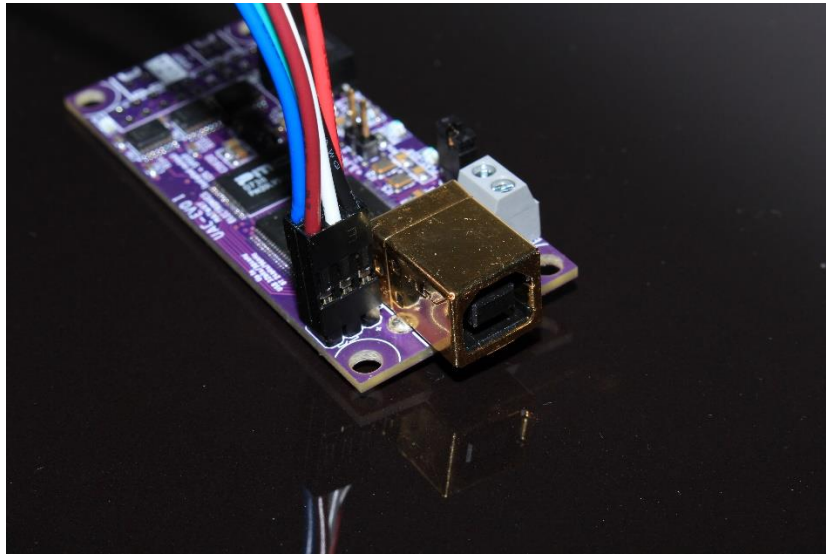


Photo. 15 Connecting the Bluetooth button

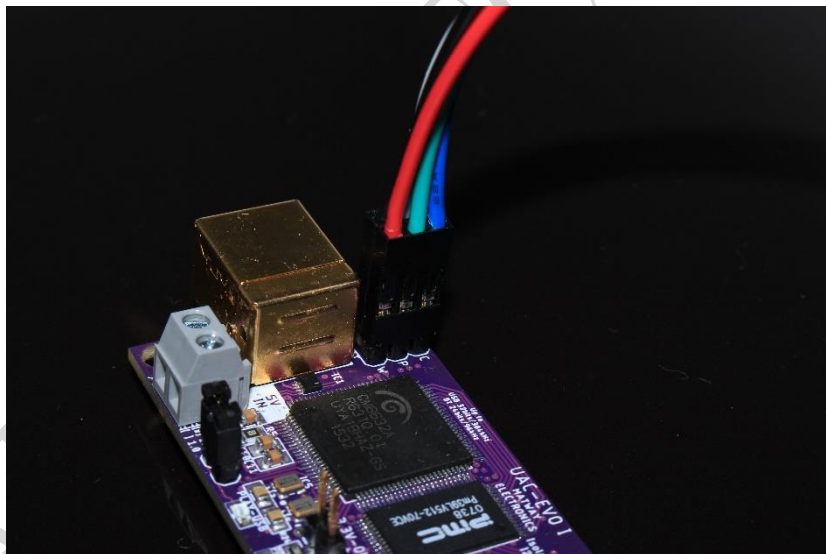


Photo. 16 Connecting the Bluetooth button

b) DIY and tips using a dedicated connector fi19mm or a dedicated button fi12mm with pins:

- The wire, due to the thicker insulation, cannot be crimped as it should be done correctly (the insulation blocks the passage of the pin to the plug):

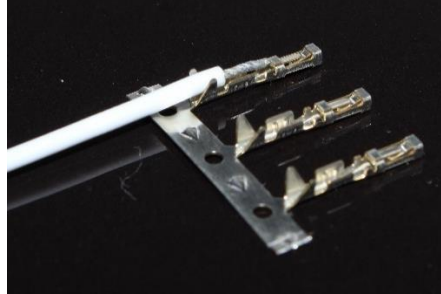


Photo. 17 Cable inserted too deep

- Move the wire back – insulation in front of the pin and crimp it this way:

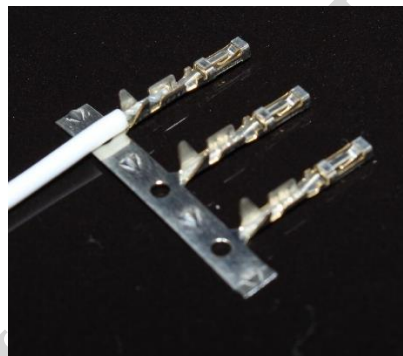


Photo. 18 Cable inserted correctly

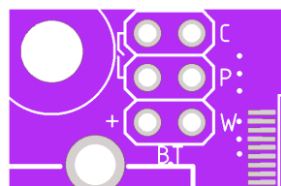


Photo. 19 BT Connector

"+" – black

Button – white

Button – cherry

C – connected – blue

P – pairing – green

W – waiting – red

7.4. Bluetooth Antenna

The socket from the Bluetooth antenna is located on the other side of the module. The correct connection of the pigtail cable will be 'heard' after a characteristic "click". The connection does not require the use of a lot of force – if you feel a lot of resistance – check if you aim correctly.

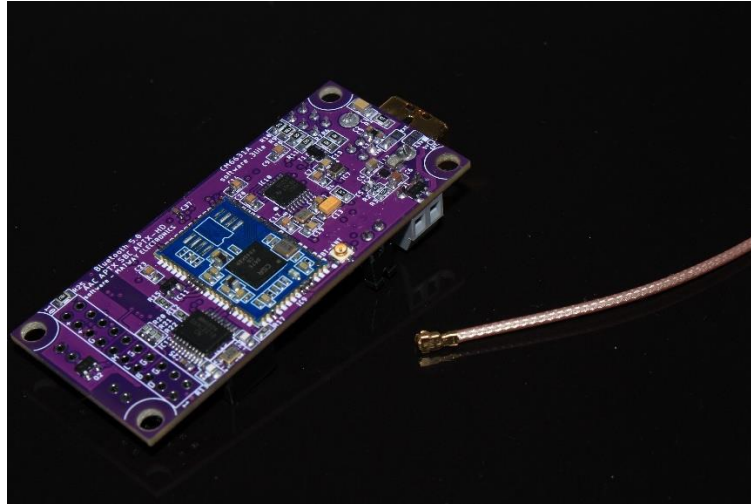


Photo. 20 Before connecting the pigtail cord

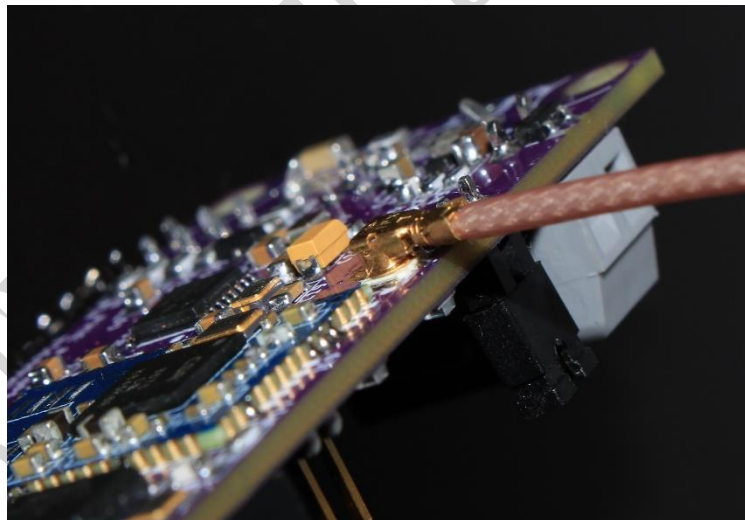


Photo. 21 Proper connection of the pigtail cord

8. Built-in power supply

In the UAC-EVO I module you will find a system that has:

- a) Current protection
- b) Short-circuit protection
- c) Built-in soft start – smooth start of the power supply to the converter
- d) Thermal protection

Obviously, we can omit the built-in power supply, which has already been described in section 6.2.

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9. Built-in isolators

The UAC-EVO I converter has built-in isolators for all signals F0...F3 and I2S, so we do not have to worry about ground loops.

In the **visualization** below, we can see what the **approximate** separation on the PCB looks like. As we can see, in order for the isolators to work properly (as well as the converter) they need to be powered from the output side. From the input side (USB/Bluetooth) they are powered from USB or externally (. EXT).

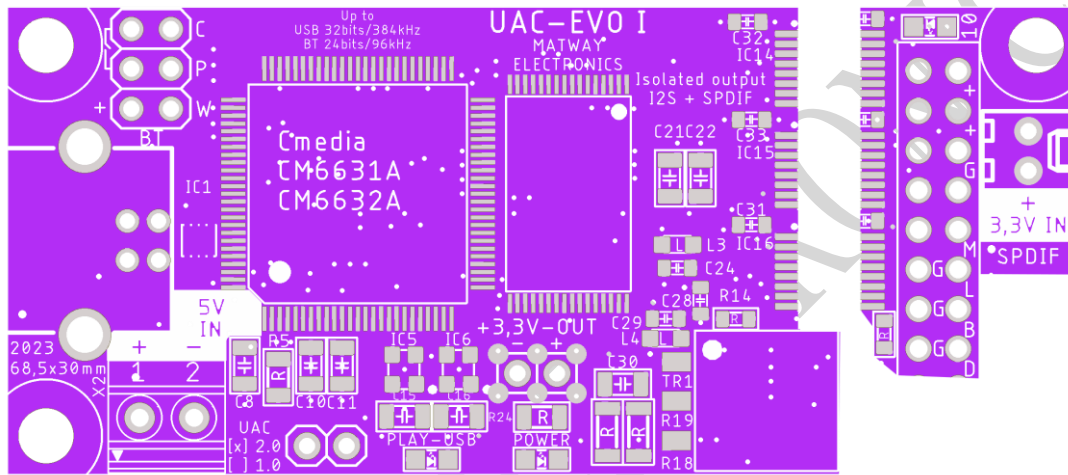


Photo. 22 PCB Insulation Preview Visualization

Connect the power supply to the "3.3V IN" connector – connect in there a power supply of the voltage 3.3V and a current of no less than 20mA. The current draw of the isolators is 8mA.

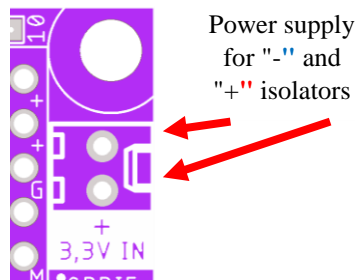


Photo. 23 Isolators power connector on the outside (3.3V IN)

In addition, the connector has protection against the reverse polarity of the power supply, without voltage drop. Nothing will happen if you connect the power supply the other way around.

The correct power connection for isolators can be recognized by the lit LED:

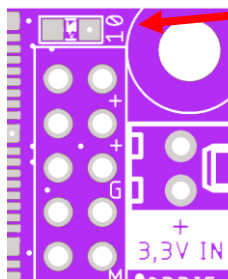


Photo. 24 LED indicating the power supply of isolators

If you have insulation on the DAC PCB, we can bridge the power supply of the isolators using 2 wires. You will use the "+3.3V-OUT" connector:

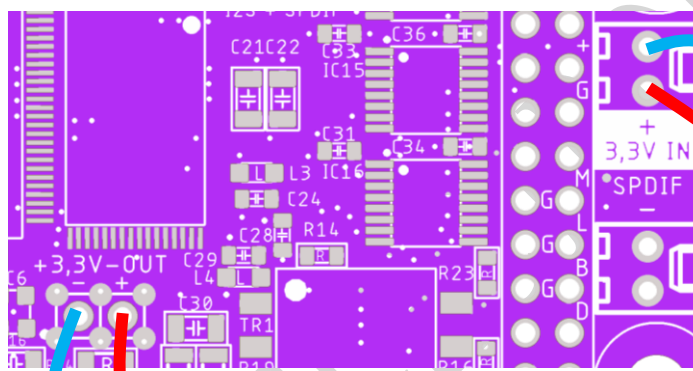


Photo. 25 Bridging the power supply of isolators

Note – if you use SPDIF only – you do not need to bridge/power the isolators. The SPDIF isolation is on the transformer side. By using SPDIF, the module will operate properly without supplying power to the isolators from the output side.

10. Basic installation of the module – connectors and jumpers.

When you buy the module, you get soldered:

- BT connector (in the case of the Bluetooth version)
- "+3.3V OUT" connector (each version)
- X2 connector (external power supply, each version)
- UAC jumper (choice of UAC 1.0 or 2.0 – for all USB combinations)
- power jumper set to USB, 5V

Using the USB+BT/I2S + SPDIF version as an example:

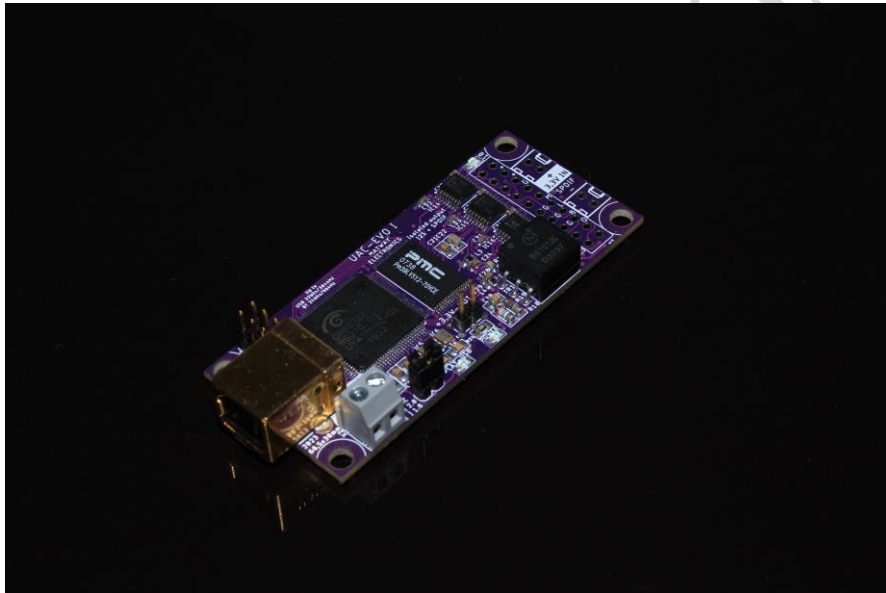


Photo. 26 Example of originally mounted connectors for USB+BT/I2S + SPDIF version

For self-assembly:

- 2x10pin connector – output (each version)
- "3.3V IN" connector – power supply for isolators (plug, socket, 2 pins), (each version)
- "SPDIF" connector – (plug, socket, 2 pins), (for version with SPDIF)

If anyone would like to make changes – please contact me "Ask about the product" to arrange the details and check the lead time. Some DACs will not allow the installation of Bluetooth connectors (6pin) and 3.3V OUT as per example in the Photo.24. The assembly is done as follows – Bluetooth – from the other side, 3.3V out – angled connector. The easiest way is to send an e-mail to the store's website, describe the DAC model, send a photo and the appropriate module will be prepared.

11. First run

11.1. USB

When connected to a source, e.g. a PC with Windows, the module will automatically install the converter software. After correct detection, you should see:

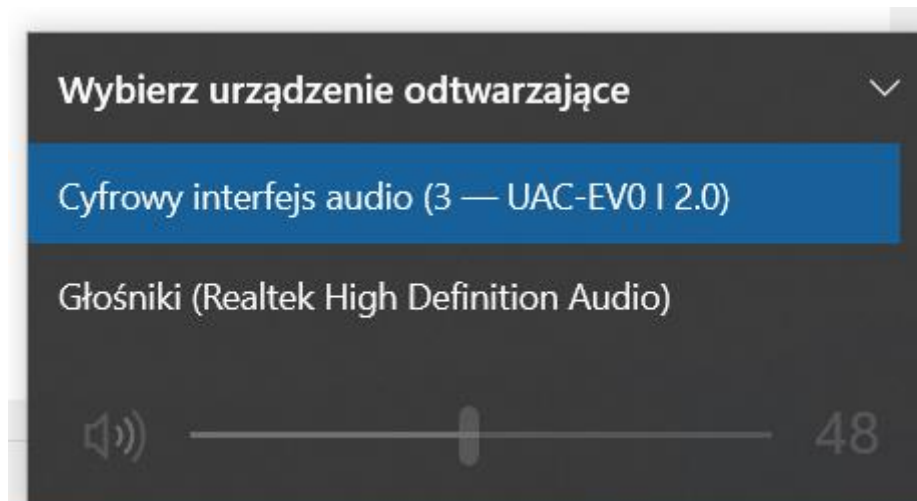


Photo. 27 UAC 2.0 view of the module

The "3" at the beginning doesn't matter. The "2.0" at the end indicates the UAC mode of the converter. For UAC 1.0 (jumper removed) it will be:

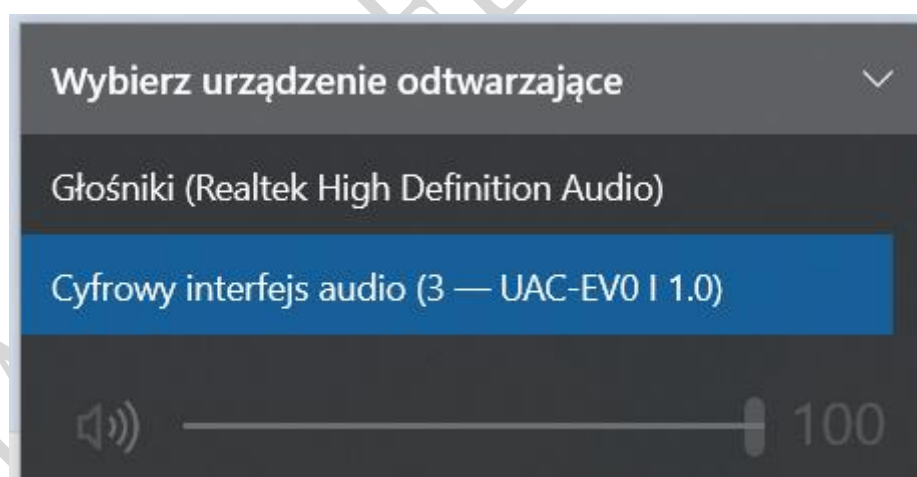


Photo. 28 View of the module in UAC 1.0 mode

Format selection for UAC 2.0:

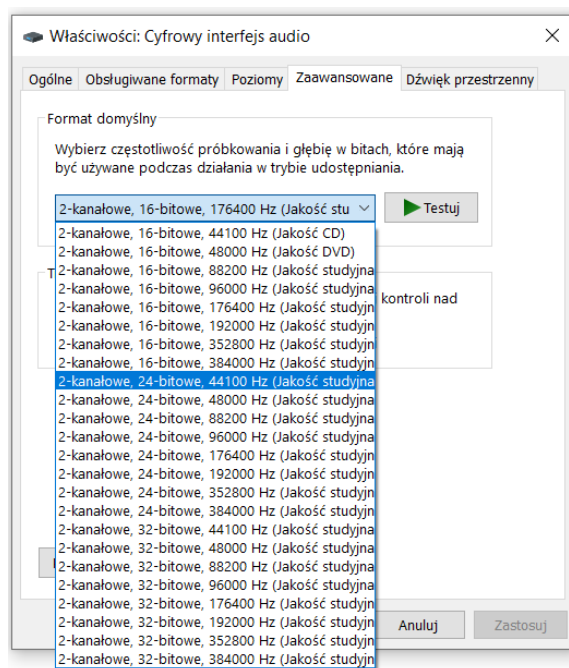


Photo. 29 List of available audio formats for UAC 2.0

The first time you start and select 32bits/384kHz, you may get a message that the device does not support this format. Go to the "Surround Sound" tab and select "Off"

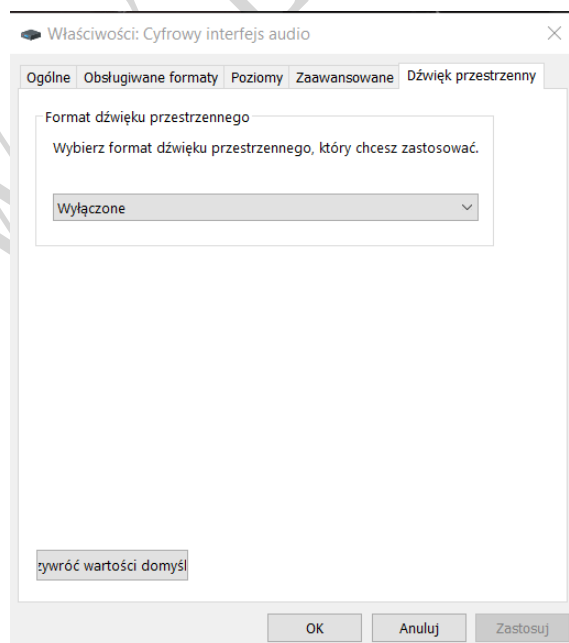


Photo. 30 Turn off surround sound

11.2. Bluetooth

- 1) Connect the button from Bluetooth
- 2) Connect the antenna
- 3) Connect the power supply
- 4) The LED on the button will flash green – pairing mode is active.
- 5) Search, for example, on the phone, for the name "UAC-EVO I" (or with the note we chose in the order)
- 6) Click pairing
If the LED has stopped flashing and turned red – we did not pair the device in time. We need to double-click the button to enter pairing mode again.
- 7) Ready. The LED on the button will stop flashing and turn solid blue – connected mode.

The maximum number of paired devices is 8 – you can clear the list of paired devices. Press the button for more than 10 seconds, the red LED will flash 10 times indicating that you have entered the delete mode. After completing this step, you need to reconnect the power supply (if the module has not entered pairing mode by itself) and add the sources again (e.g. phone). If the list of paired devices is reset, the module will automatically enter pairing mode after a power cycle (disconnecting and connecting the power)

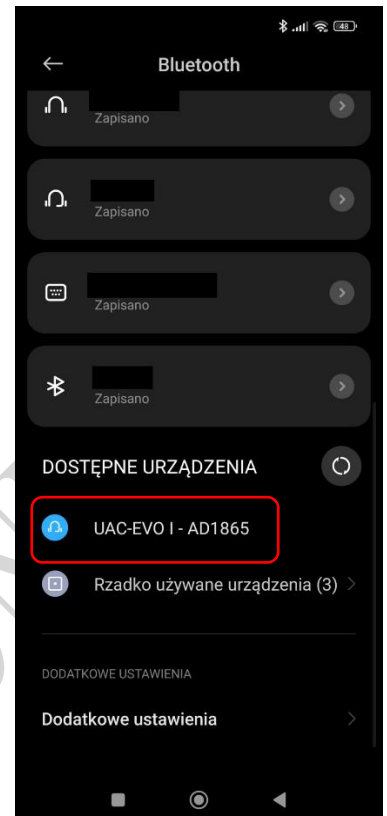


Photo. 31 Pairing process, module with dedicated name "AD1865" - DAC, where UAC-EVO I is located.

Subsequent start-ups if we have one or more paired devices:

- power on,
- Bluetooth module searches for the last connected device (e.g. phone) and connects with it (if successfully connects - the blue LED will light up),
- if there is no recently connected device nearby, it goes into standby mode (the red LED will light up),
- at this point, we can click the button twice to activate pairing (the green LED will start flashing) or we just enter the phone settings, Bluetooth > connection and click on the module,
- if there is no new device available for pairing, the Bluetooth module will go into standby mode after 2 minutes (the red LED will light up).

If you lose the connection with the Bluetooth module - e.g. you have left the house, then when you come back, if you are within the range of the Bluetooth module, you will be automatically re-connected - you have 60 seconds to do so.

Pairing mode has been added for security reasons. No outsider will connect to the module until we enter pairing mode, which is active for 2 minutes.

11.3. USB/Bluetooth Switching

The UAC-EVO I converter has automatic switching between USB and Bluetooth. It takes place after you connect to the Bluetooth module.

Switching to USB currently using Bluetooth:

- a) Disabling Bluetooth in the transmitter – UAC-EVO I will automatically switch to USB
- b) Entering the transmitter settings – disconnecting from the UAC-EVO I, the module will automatically switch to USB

11.4. SPDIF

The SPDIF output is ready when power is connected to the module ("POWER" LED indication). The output data changes automatically when you switch from USB to Bluetooth and from Bluetooth to USB.

Please remember that it is an output – transport.

12. Comparison of UAC-EVO I versions

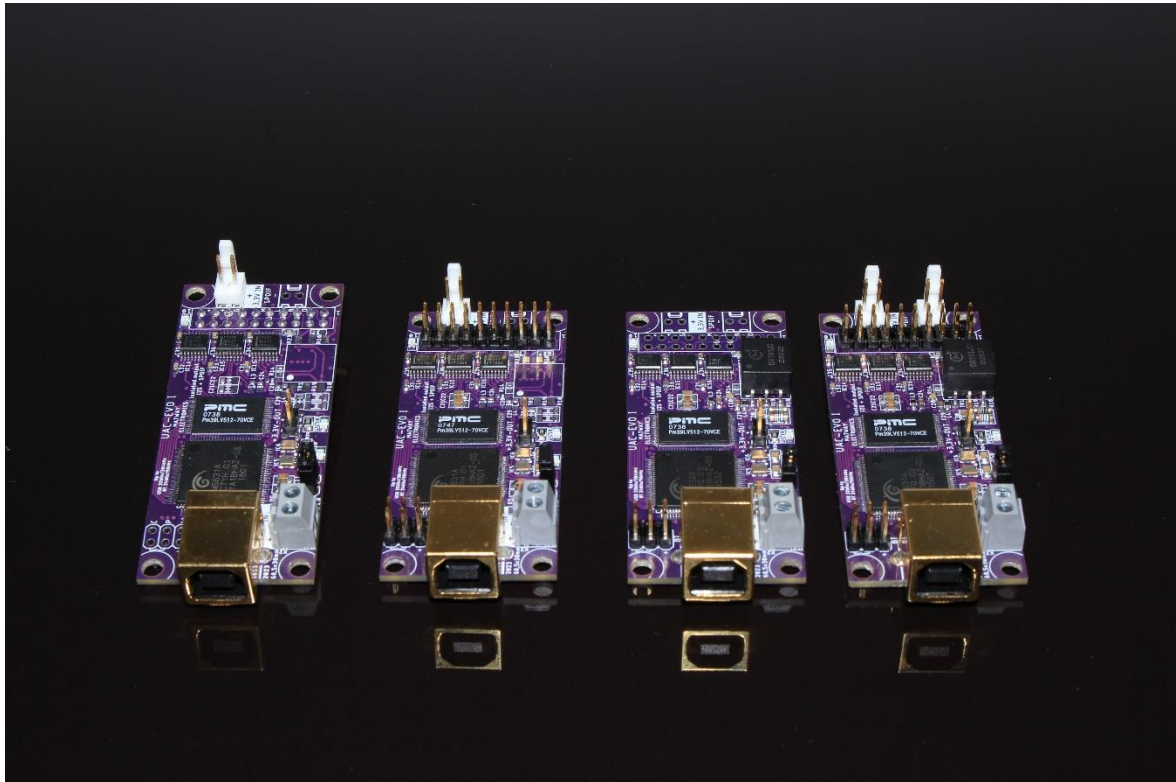


Photo. 32 From left to right - USB/I2S ; USB+BT/I2S ; 2x USB+BT/I2S+SPDIF

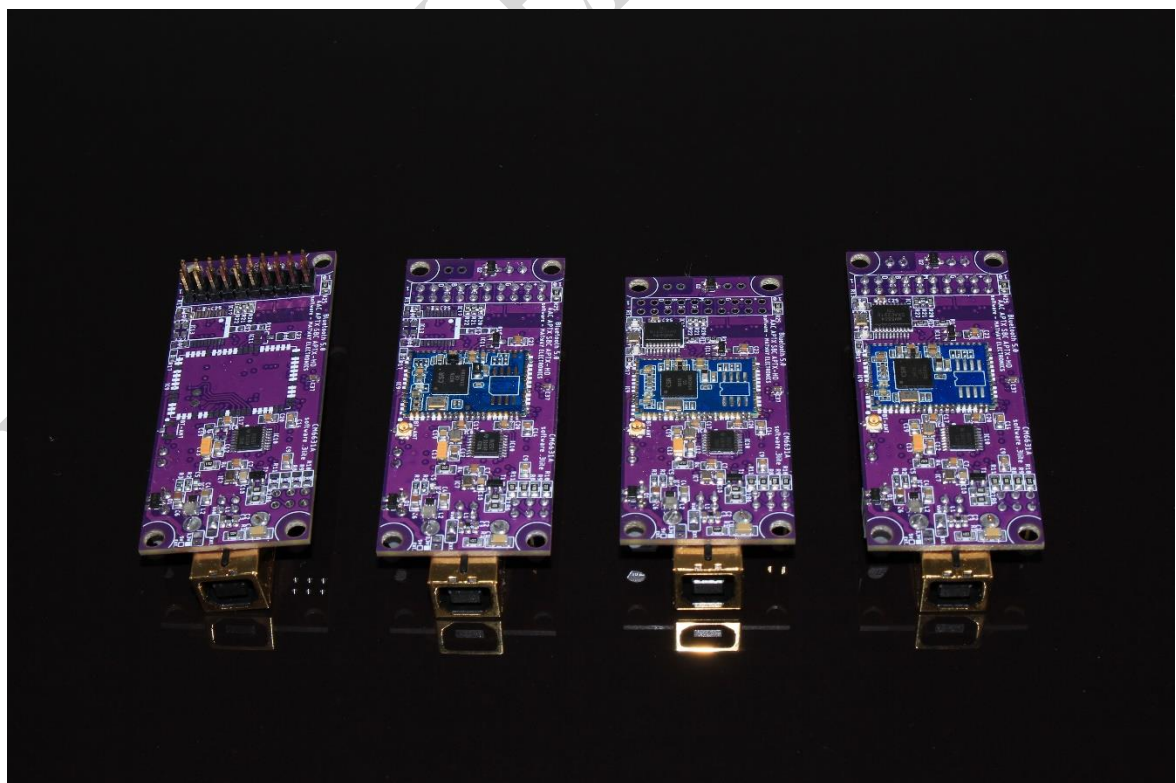


Photo. 33 From left to right - USB/I2S ; USB+BT/I2S ; 2x USB+BT/I2S+SPDIF

13. Comparison of UAC-EVO I with other converters

	USB Audio	Amanero	Amanero version with SPDIF	UAC-EVO I
PCB 2/4 layer 4 layer - maintaining the correct impedance of I2S and USB	2	2	4	4
USB protection (ESD)	NO	YES without power line for regular diodes	YES without power line for regular diodes	YES dedicated circuit for USB
CMF USB Filter EMI Reduction	NO	NO	NO	YES
USB Power Supply	YES	YES	YES	YES
External power supply (bypass USB power)	NO	NO	NO	YES convenient ARK connector
SPDIF Output	YES	NO	YES	YES
Filter and choke on WM8804 power supply Separately for PVDD/DVDD	-	-	NO shared	YES
Isolated SPDIF output	NO	NO	NO	YES transformer
Isolated I2S output	NO	NO	NO	YES
Bluetooth	NO	NO	NO	YES
Gold-plated USB socket (better contact)	YES	YES Contacts only	YES Contacts only	YES the entire socket and contacts

Table 3 Comparison of selected USB converters

14. Version History

- 1) UAC-EVO I 13022024 v1.0 – first official EN version

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