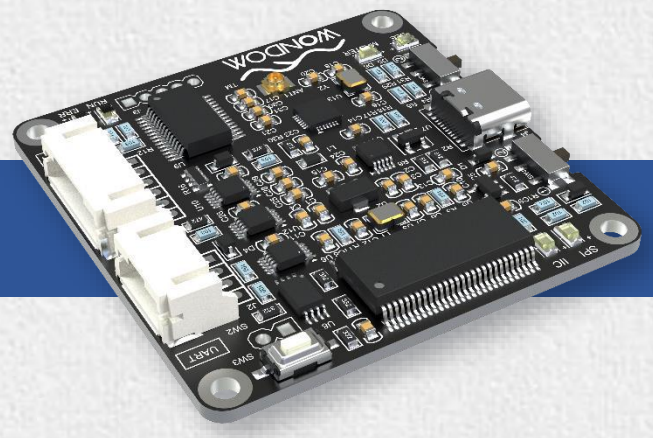
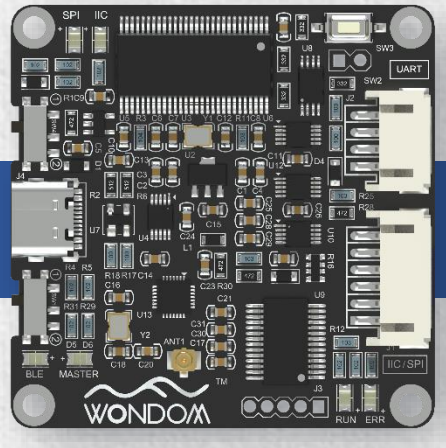
WONDOM Audio Technology

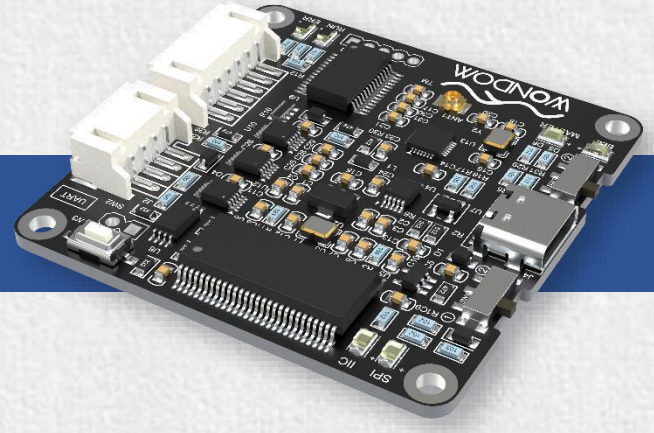
WONDOM ICP5 User Guide

IN-CIRCUIT PROGRAMMER FOR PROGRAMMING & PC UI - ICP5

By Sure Electronics Co., Ltd.







Revision History

Revision	Description	Date
V1.0	WONDOM ICP5 PCB version – V100	10-Sept-2021
V1.01	WONDOM ICP5 PCB version – V100 (USB Driver Added)	8-Oct-2021
V1.02	WONDOM ICP5 PCB version – V100 (PC UI Updated)	10-Nov-2021
V2.00	WONDOM ICP5 PCB version – V200 (JAB5 PC UI Updated)	8-Oct-2022
V2.01	WONDOM ICP5 PCB version – V200 (JAB3, JAB3+, JAB4 PC UI Updated)	14-Feb-2022
V2.02	WONDOM ICP5 PCB version – V3.1 (PC UI Updated)	1-Sept-2025

Contents

We cover the following contents in this document. You can click on the title to skip to corresponding chapter.

ICP5 Introduction

SigmaStudio Programming

PC UI for JAB2/JAB2+

PC UI with for ADAU DSP Product

APM2, JAB3, JAB3+, JAB4, JAB5, WDSP2.4U, BDSP2.4U

Overview

ICP5 - Multi-Purpose In-Circuit Programmer

For use with WONDOM products integrated with DSP, providing various functions as programming with SigmaStudio and PC UI control. In addition, ICP5 supports online Firmware Upgrade. Owing to the equipped auto-identification system, ICP5 can recognize the target products automatically once they are connected.

Online Upgrade

Update ICP5 by your side for use with more products

Programming

On-board self-boot EEPROM for operating with Analog Devices, Inc., SigmaStudio™

PC UI Control

Integrated with USB UART for PC UI Control

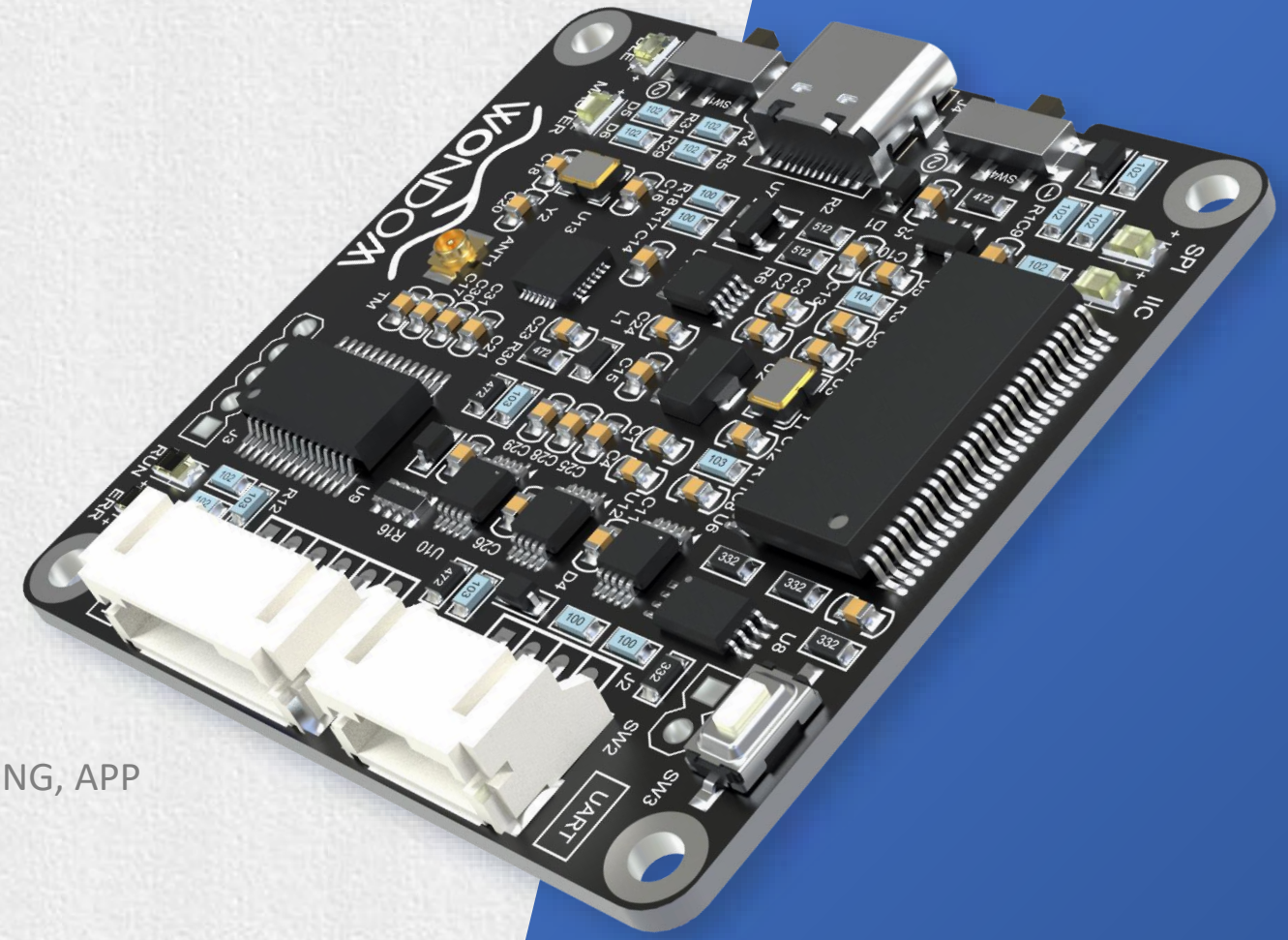
Applicable Products

Model	Brief Description	SS Programming	PC UI Control
APM2	ADAU1701 DSP kernel board	Y	Y
WDSP2.4U	WONDOM ADAU1701 2-IN 4OUT DSP Preamp	Y	Y
BDSP2.4U	BerryBak ADAU1701 2-IN 4OUT DSP Preamp	Y	Y
JAB2v2	2.0 / 0.1 Audio amplifier board with DSP & BT 5.0	N	Y
JAB2+	2.0 / 0.1 Audio amplifier board with DSP & BT TWS	N	Y
JAB3	2.0 / 0.1 Audio amplifier board with ADAU1701 DSP	Y	Y
JAB3+	2.0 / 0.1 Audio amplifier board with ADAU1701 DSP & BT 5.0	Y	Y
JAB4	4.0 / 2.1 / 2.0 / 0.2 30W Audio amplifier board with ADAU1701 DSP & BT	Y	Y
JAB5	4.0 / 2.1 / 2.0 / 0.2 100W Audio amplifier board with ADAU1701 DSP & BT	Y	Y

WONDOM Audio Technology

Introduction of

ICP5 Programmer



ICP5

IN-CIRCUIT PROGRAMMER FOR SIGMASTUDIO PROGRAMMING, APP CONTROL & PC UI CONTROL

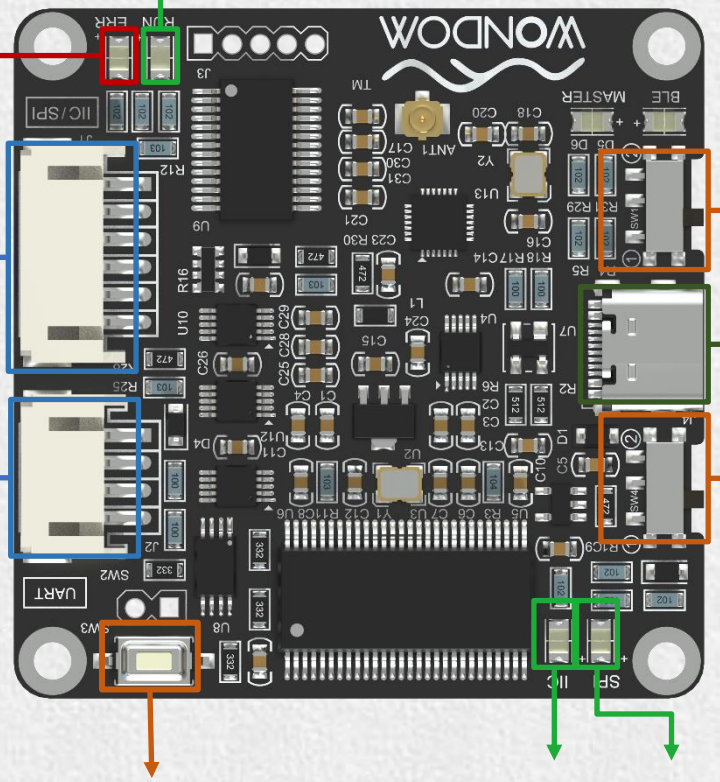
Interface Definition

RUN
Power LED indicator

ERROR
Error LED indicator

J1, PH-6Pos Connection Port
For connection with WONDOM products integrated with Analog DSP

J2, PH-4Pos Connection Port
For connection with WONDOM products integrated with other DSP



SW3, Bootloader Start Switch
For ICP5 firmware upgrade

IIC **SPI**

SW1
Control Mode Switch

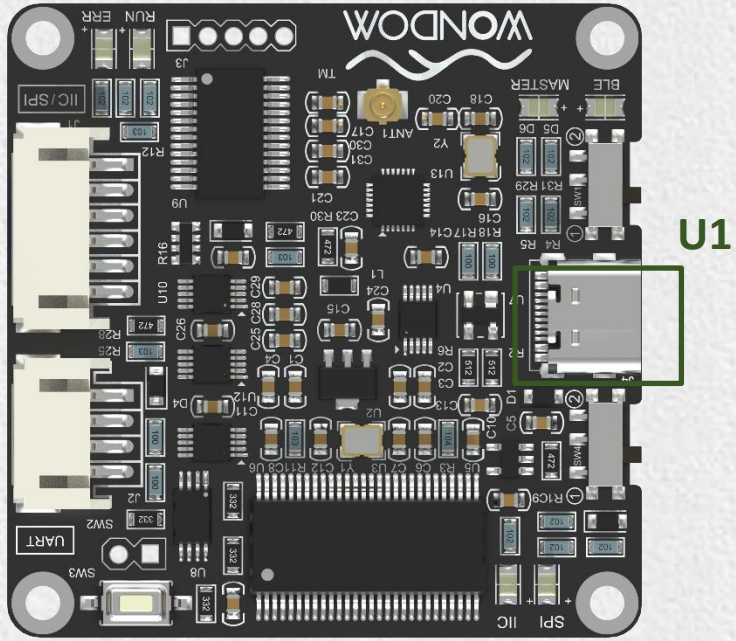
SW1	MODE	FUNCTION
①	USBi	SigmaStudio Programming
②	Remote	PC UI / APP Control

U1, USB Type-C Port
1) DC5V power supply
2) Communication with computer

SW4
USBi Mode Switch

SW4	MODE	FUNCTION
①	SPI	For WONDOM Products with ADAU1452
②	IIC	For WONDOM Products with ADAU1701

Power Supply

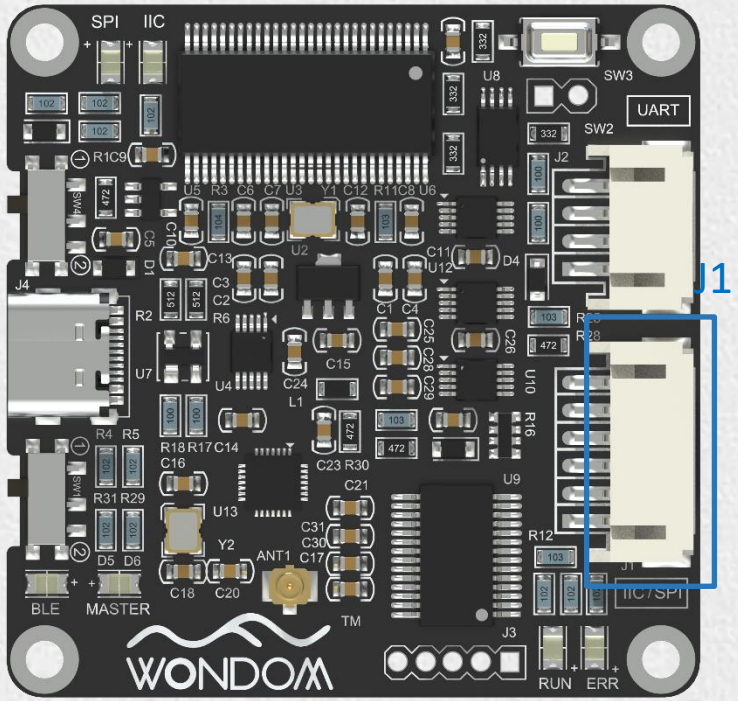


U1, DC5V power supply

A USB Type-C port is used for power of ICP5.
In addition to power, this USB port supports communication with the computer for programming or PC UI control after connection.

Once ICP5 is connected with target products through the PH-6Pos or PH-4Pos connection port, ICP5 will be powered by the target products directly. There is no need to connect with an extra power supply.

Connection Port

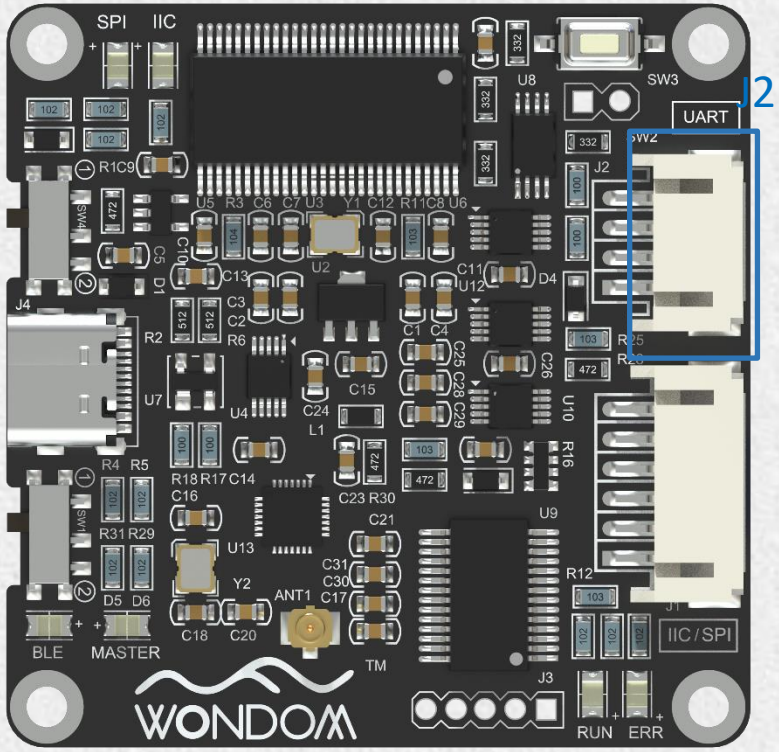


J1, PH-6Pos-Connection Port

J1, the PH-6Pos-connector, adopting I2C / SPI communication protocol, is used for connection with **WONDOM products that are integrated with Analog ADAU1701 DSP and later ADAU1452 DSP**.

ICP5 is equipped with automatic identification system, which means, it will identify the target product once it is connected.

Connection Port

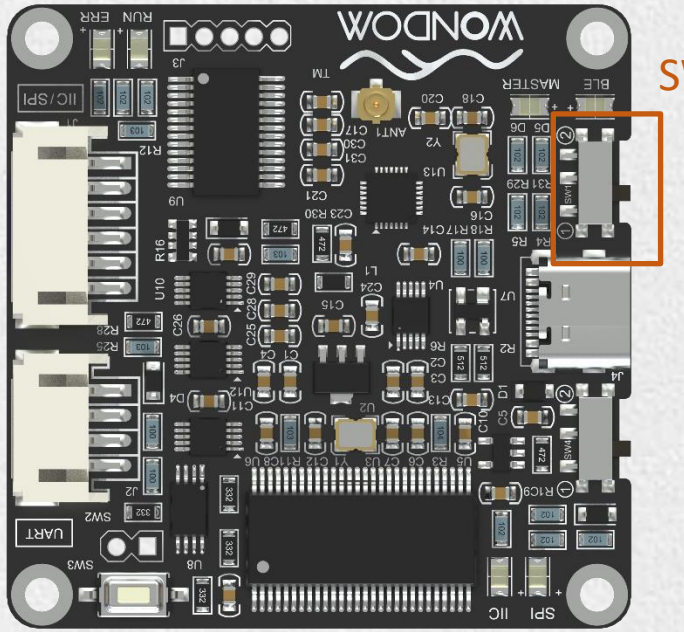


J2, PH-4Pos-Connection Port

J2, the PH-4Pos-connector, adopting UART communication protocol, is used for connection with WONDOM products integrated with other DSP chips, for now there is only JAB2v2.

Since the DSP used is not from Analog, it will not support programming with SigmaStudio.

Control Switch



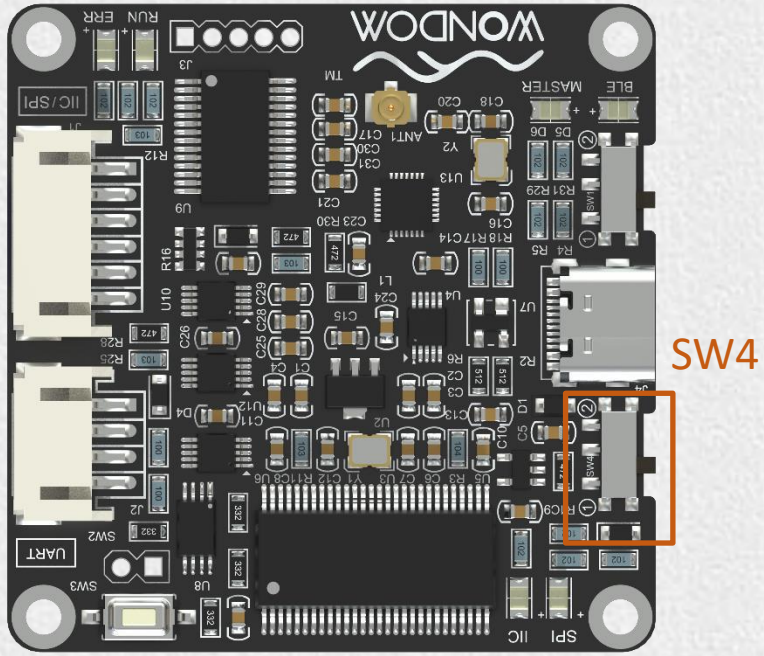
SW1, Control Mode Switch

SW1 is a control mode switch between SigmaStudio programming and user interface control (APP control & PC UI control).

SW1	MODE	FUNCTION
①	USBi	SigmaStudio Programming
②	Remote	APP Control / PC UI Control

If you want SigmaStudio programming function, you need to set SW1 at ① **“USBi”**;
If you want APP / PC UI control, you need to set SW1 at ② “Remote”.

Firmware Upgrade



SW4	MODE	FUNCTION
①	SPI	For WONDOM Products with ADAU1452
②	IIC	For WONDOM Products with ADAU1701

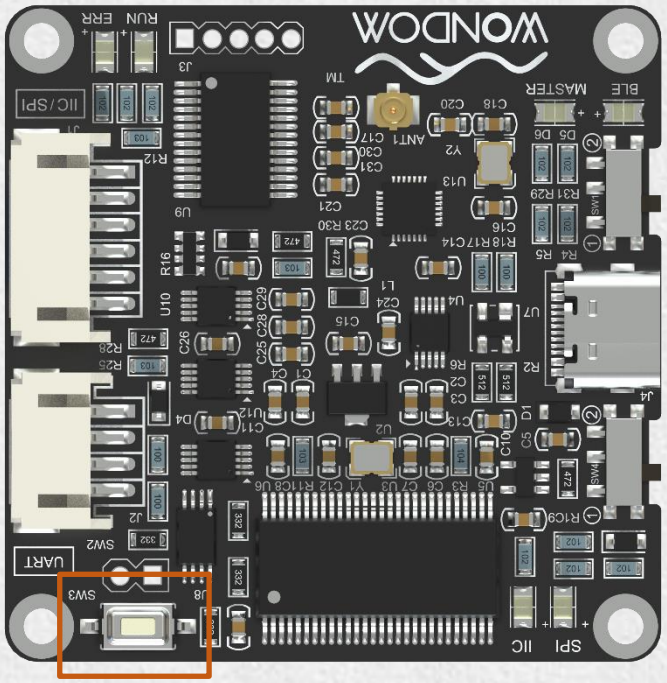
SW4, USBi Mode Switch

As mentioned before, besides current products with ADAU1701 DSP, we will develop products with ADAU1452 in future.

WONDOM products with ADAU1701 DSP communicates with SigmaStudio via I2C, while products with ADAU1452 plans to communicate with SigmaStudio via SPI. Therefore, we leave the switch for future use with ADAU1452 products.

Therefore, besides setting SW1 at ① “USBi”, we need to set SW4 as well before programming.
Set SW4 at ② “IIC” when you want to program products integrated with ADAU1701;
Set SW4 at ① “SPI” when you want to program products integrated with ADAU1452.

Firmware Upgrade



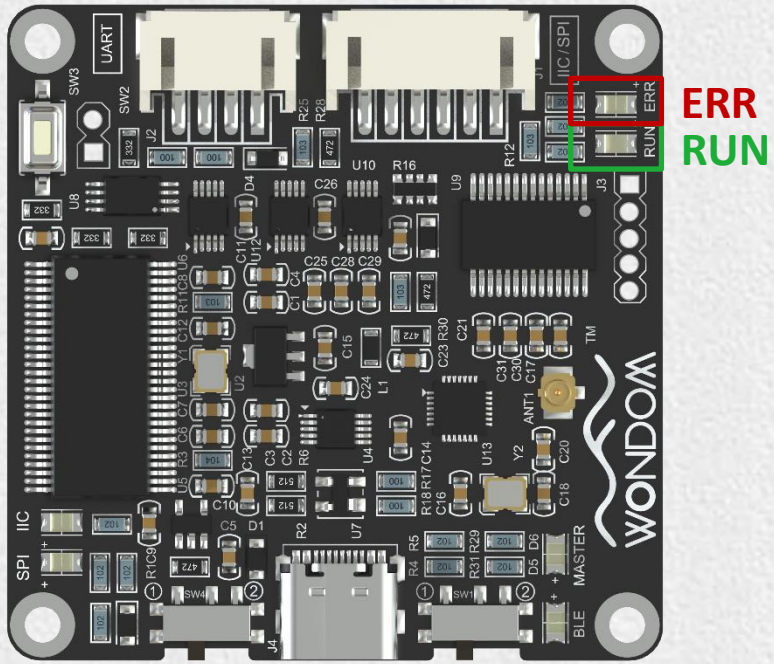
SW3, Firmware upgrade switch

SW3 is a Bootloader start switch, which is provided to upgrade the firmware program on the ICP5 so that it can be used with various DSP products.

ICP5 needs online firmware upgrade if it’s used with a target product for the first time.

As for the details, please refer to “Firmware Update” part.

LED Indicator



RUN Indicator

When power on, this indicator will be ON in green;

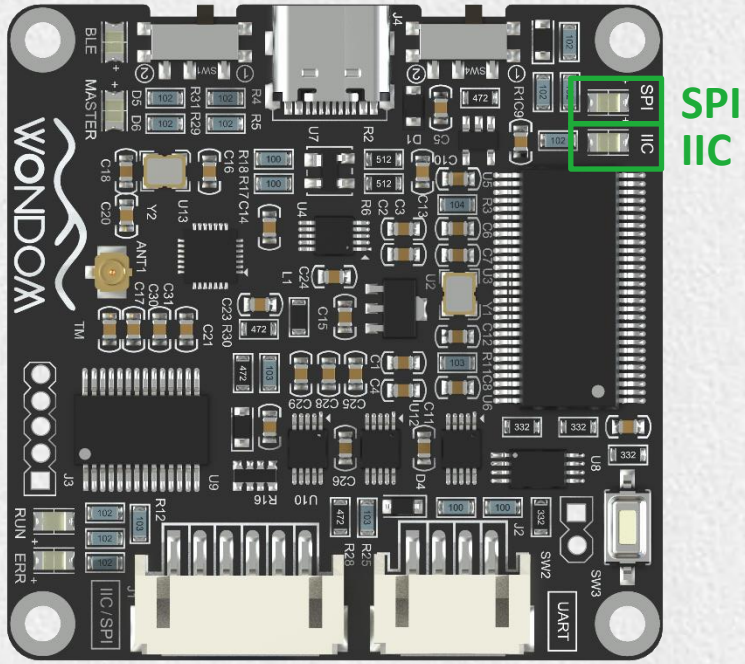
When power off, this indicator will be OFF;

When ICP5 is in BootLoader mode, this indicator will blink.

ERROR Indicator

This error indicator is red and it will be ON when there is problem in hardware connection problem, or the firmware in ICP5 doesn’t match with the connected target product.

LED Indicator



IIC Indicator

This indicator is green.

When SW1 is set at ① “USBi” and SW4 is set at ② “IIC”, this indicator will be ON.

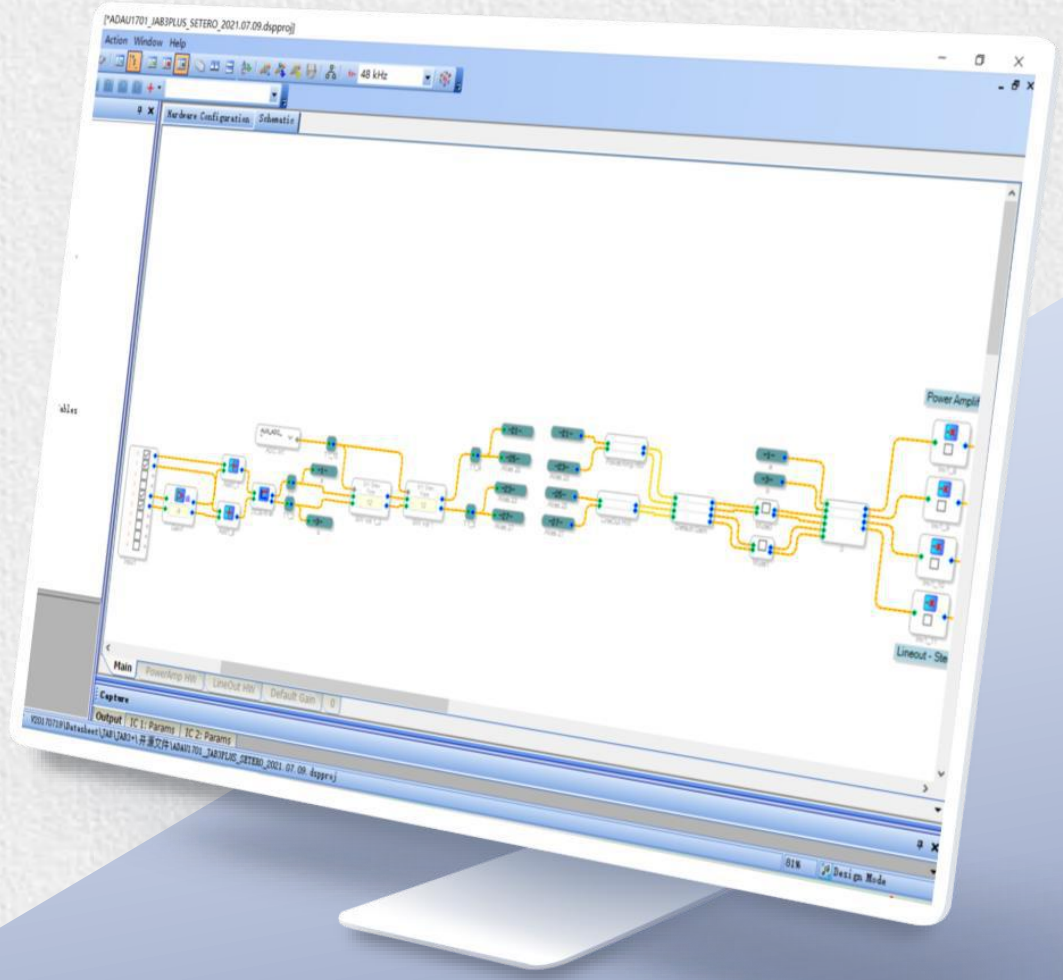
SPI Indicator

This indicator is green.

When SW1 is set at ① “USBi” and SW4 is set at ① “SPI”, this indicator will be ON.

WONDOM Audio Technology

How to achieve **SigmaStudio programming** with WONDOM ICP5?



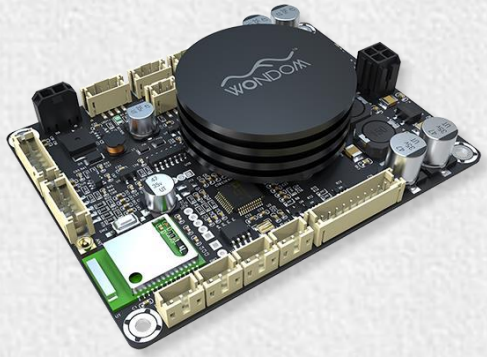
ICP5

IN-CIRCUIT PROGRAMMER FOR SIGMASTUDIO PROGRAMMING, APP CONTROL & PC UI CONTROL

Checklist

Before starting, please make sure you have the following items on hand.

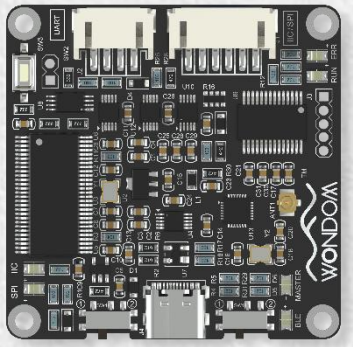
1 WONDOM Products Integrated with ADAU1701



Here we will use JAB3+ as an example to explain how to connect.

2 Analog Devices, Inc. SigmaStudio™

3 WONDOM ICP5 with a 6-pin cable

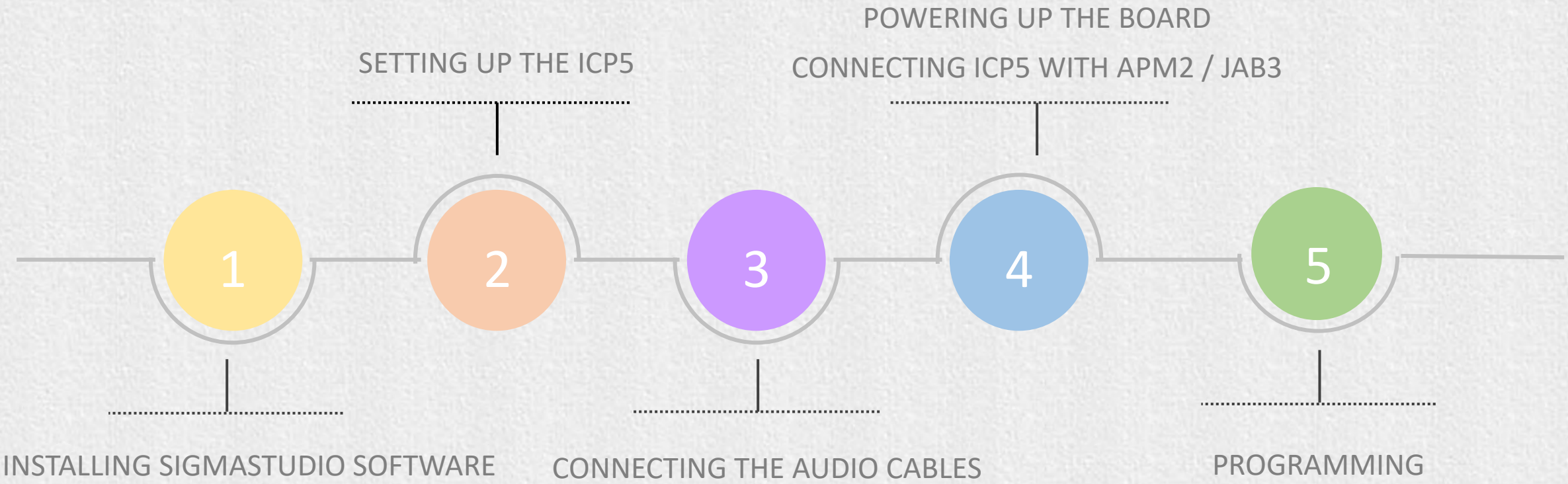


4 Accessories

Speakers
Cables
Phone
...

Steps

Be sure to follow these connection steps.



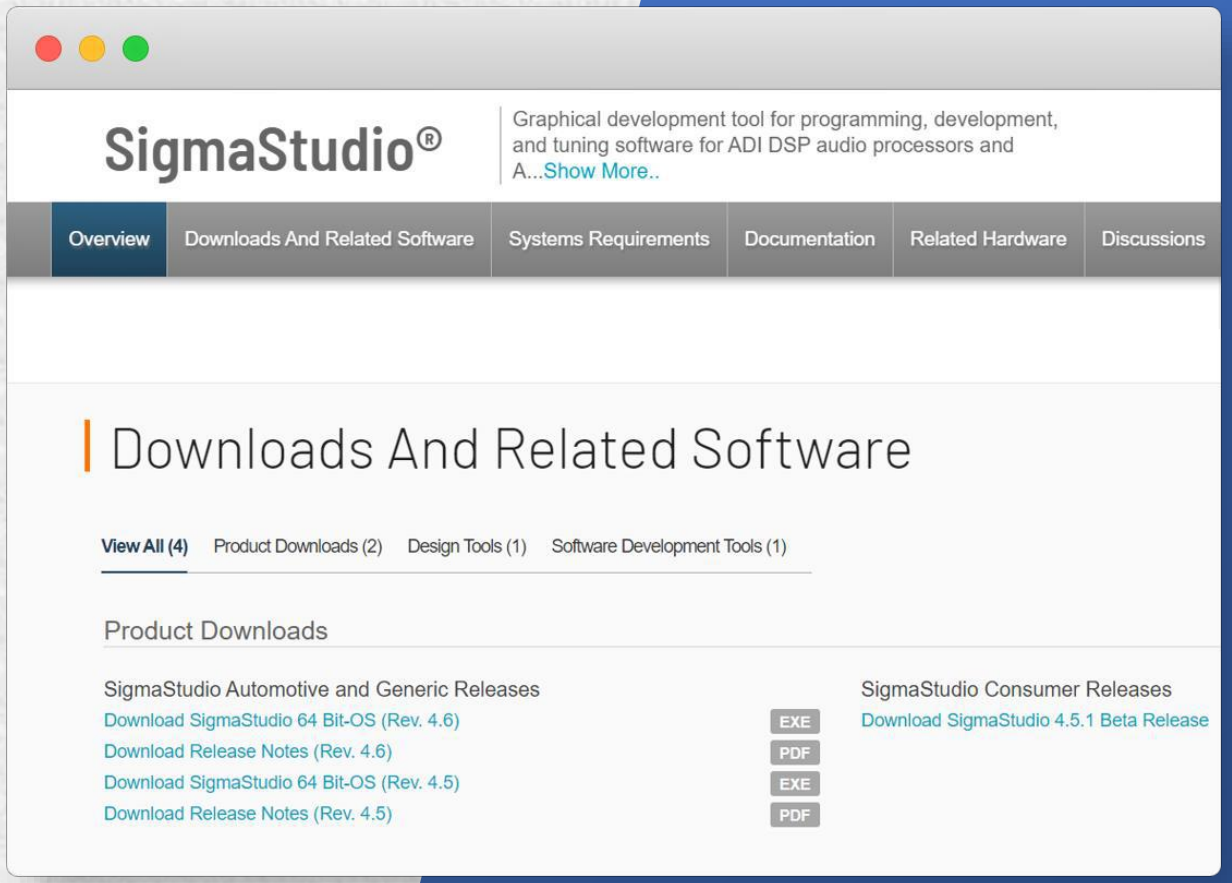
Installing SigmaStudio

1.Open the downloaded zip file and extract the files to your computer. Alternately, insert the SigmaStudio CD into the PC optical drive and select the SigmaStudio folder.

https://www.analog.com/en/design-center/evaluation-hardware-and-software/software/ss_sigst_02.html#software-overview

2.Install Microsoft . NET Framework version 2.0, if it has not been previously installed. To do so, double-click “dotnetfx.exe”.

3.Double-click “setup.exe” and following the prompts. A computer restart is not required.



Setting up ICP5

2. Set Switches on ICP5

Since we want to realize SigmaStudio programming function, we need to set SW1 of ICP5 at ① “USBi” at first.

SW1	MODE	FUNCTION
①	**USBi**	**SigmaStudio Programming**
②	Remote	APP Control / PC UI Control

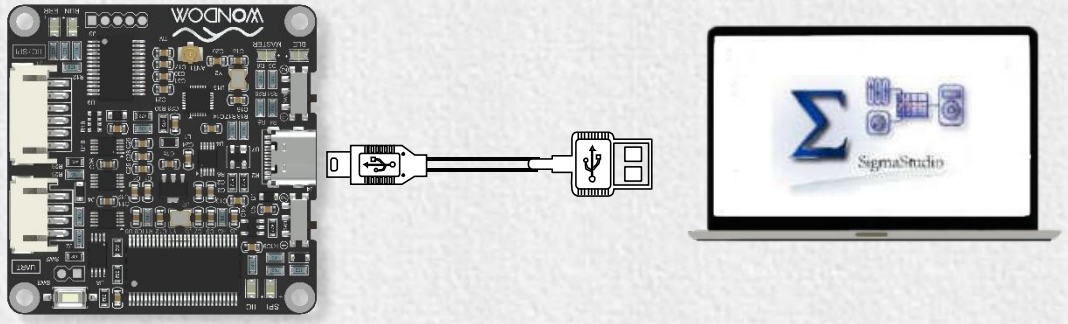
As the target product is JAB3+, whose DSP chip is ADAU1701, we need to set SW4 at ② “IIC”.

SW4	MODE	FUNCTION
①	SPI	For WONDOM Products with ADAU1452
②	**IIC**	**For WONDOM Products with ADAU1701**

3. Connect ICP5 to computer

Do not connect ICP5 with target product now.

Connect ICP5 to the computer with a Type-C cable.



After connection, run SigmaStudio software and create a new project.

Setting up ICP5

3. Check if ICP5 is successfully recognized

Select “USBi” from the list on the left and drag it to the blank area on the right. Repeat the action to move “ADAU1701” and “E2Prom” to the right. Complete the logic connection.

We have made a Basic SigmaStudio programming guide. You can click HERE to have a reference.

After We need to check whether the ICP5 is recognized by the computer.

If the underpainting of the “USB” turns green, it represents the ICP5 is successfully recognized. See figure 1.

If it turns orange, it means ICP5 is not recognized. Please check the switches and reconnect the ICP5 until it turn green.

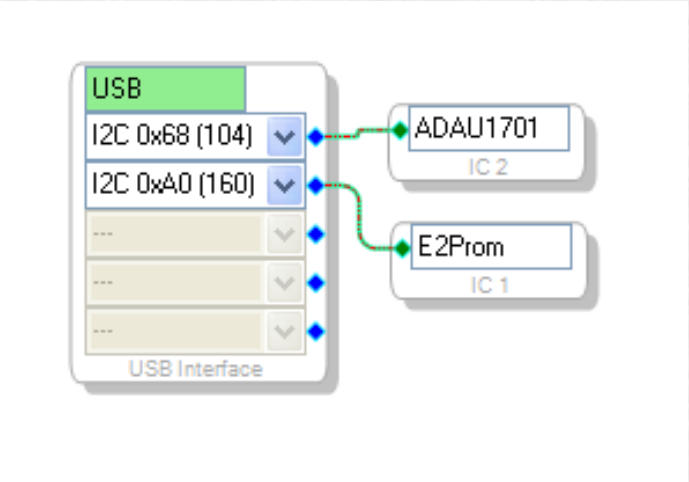


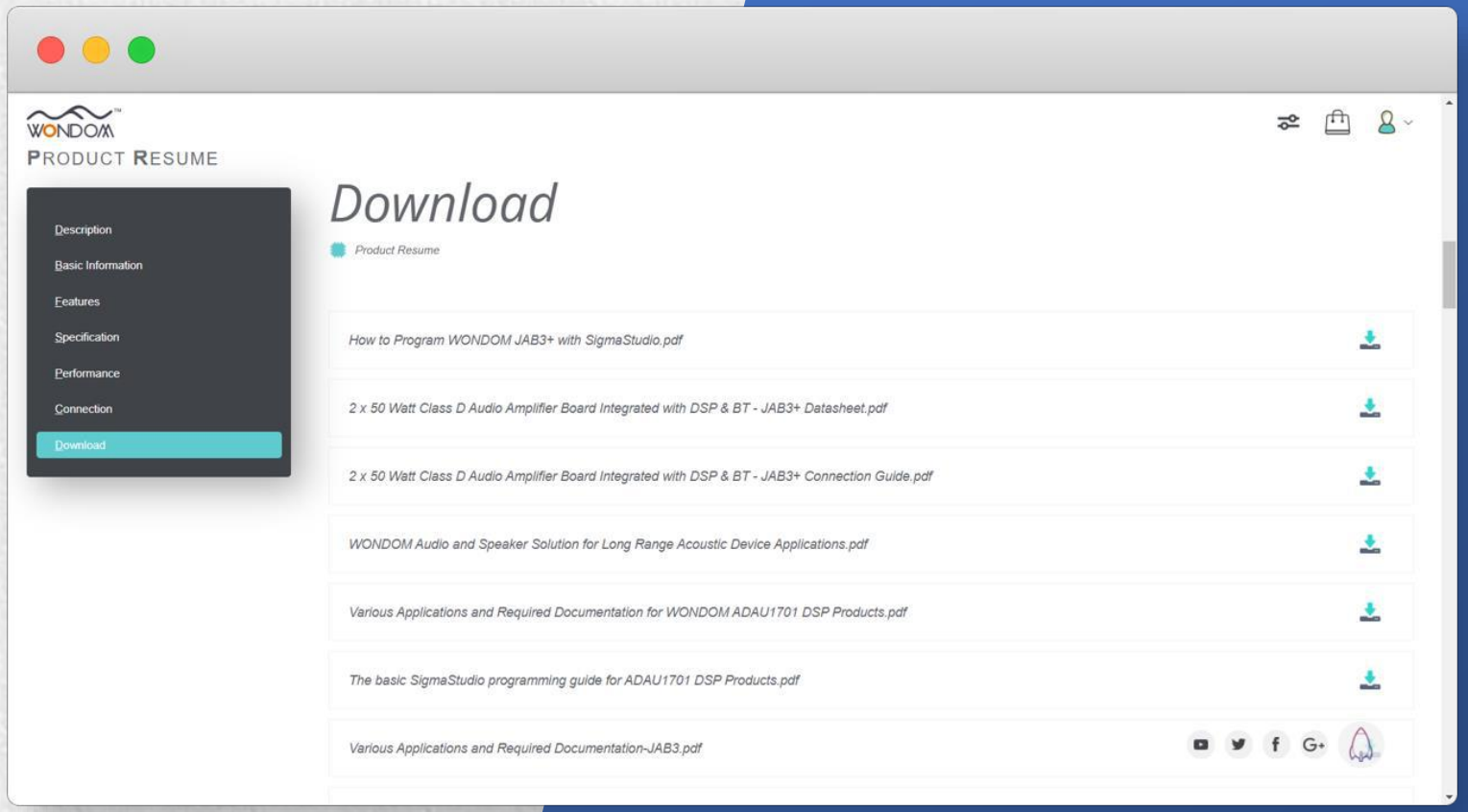
Figure 1

Connecting Audio Cables

Connecting with speakers to play music when programming can help us monitor in real time if the playback audio meet your requirements. Then you can adjust parameters accordingly.

As for connection, please refer to datasheet or connection guide of each product. You can find the files in the detailed page of products.

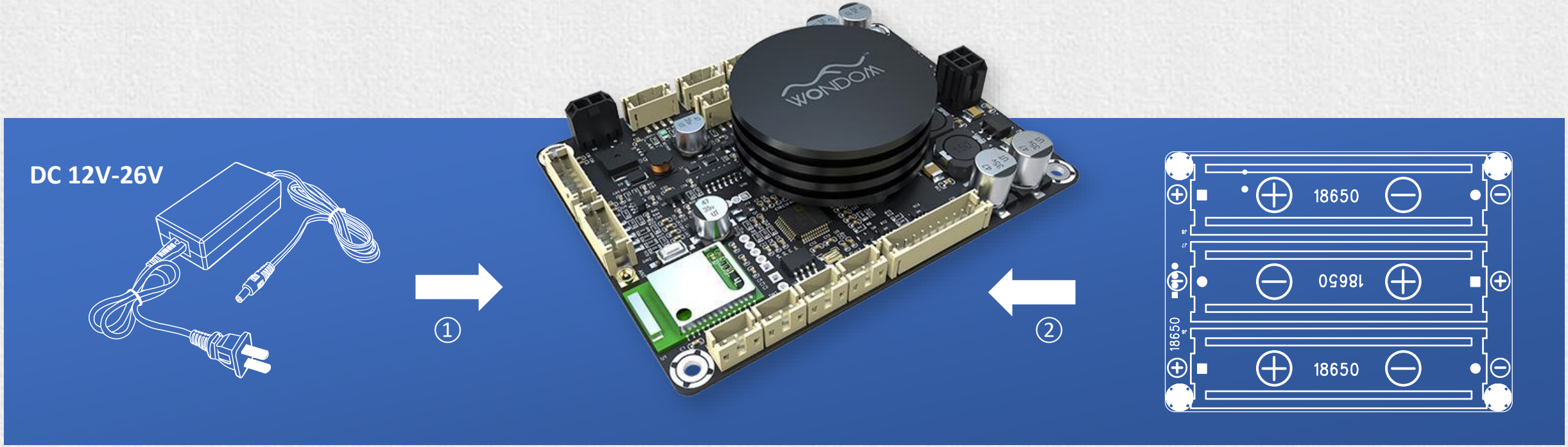
If you use ICP5 with APM2 for programming, make sure the SW1 of APM2 is set at ① “RUN”.



Powering up the board

After connecting with audio cables, it’s time to power up the audio system.
Please power the target products with power supply within the recommended range. Otherwise, boards may be damaged permanently.

After powering up, we can connect ICP5 with JAB3+ through a PH-6Pos cable.
Everything is done. We can start programming now.



Demo Program

It’s highly suggested to program based on our open-sourced original program.

You can download them in the following table.

Products	Demo Program	Document you may need
APM2	APM2_DemoProgram	APM2 Demo Program Explanation
JAB3 - Mono	JAB3_DemoProgram_MONO	JAB3 I2S Input & Output
JAB3 - Stereo	JAB3_DemoProgram_STEREO	
JAB3+ - Mono	JAB3+_Mono_ADAU1701_DEMOProgram	JAB3+ Demo Program Explanation
JAB3+ - Stereo	JAB3+_Stereo_ADAU1701_DEMOProgram	
JAB4	JAB4_ADAU1701_DEMOProgram	-
JAB5	JAB5_ADAU1701_DEMOProgram	JAB5 Demo Program Explanation

Online Debugging

If you are a greener in programming, you can take our Basic programming guide as a reference.

During Programming process, we can make use of online debug mode to observe the effects.

The step is as follows.
Click “Link Compile Connect” (see figure 2) and you will find “Ready: Compiled” in the lower right corner of your computer. Then click the “Link Compile Download” (see figure 3) and you will find “Active: Compiled” in the lower right corner of your computer.

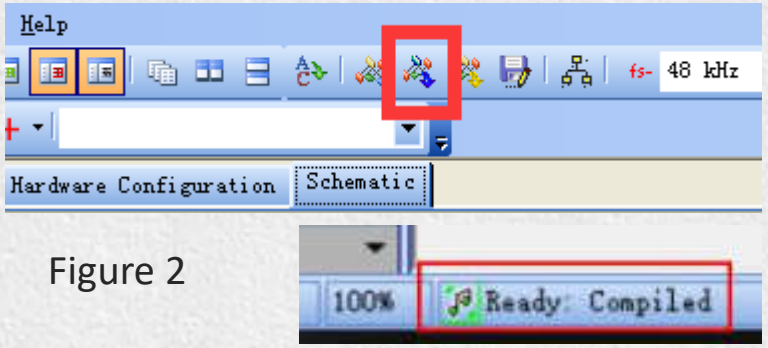


Figure 2

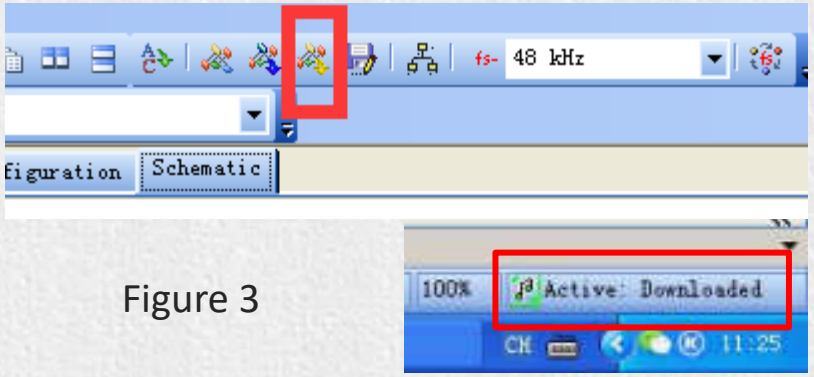


Figure 3

Please note, this is online debug mode, that means, the program will be lost once you re-power on.
If you want to run the program offline, you need to write the program into ADAU1701.

Program Writing

To write program into ADAU1701, please do as follows.
Enter “Hardware Configure” page and right-click the “ADAU1701”, then select “Write Latest Compilation to E2PBOM” to download the program (see figure 4). you will see a prompt window, choose the “I2C” on the right and click “OK” (see figure 5).

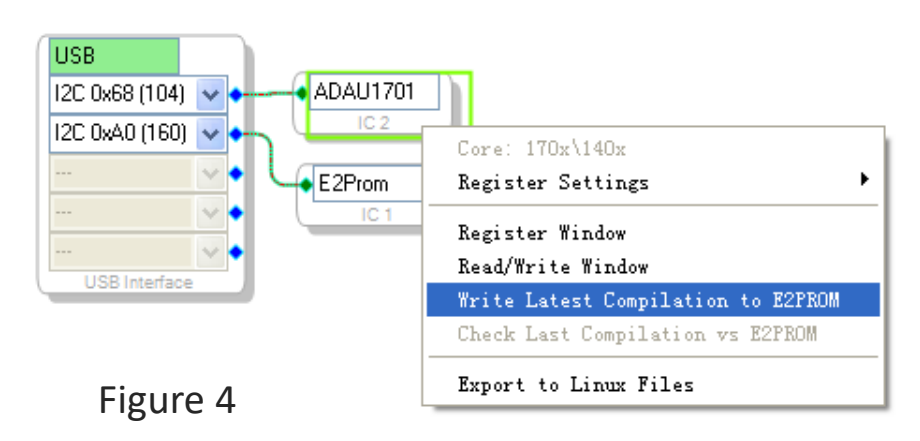
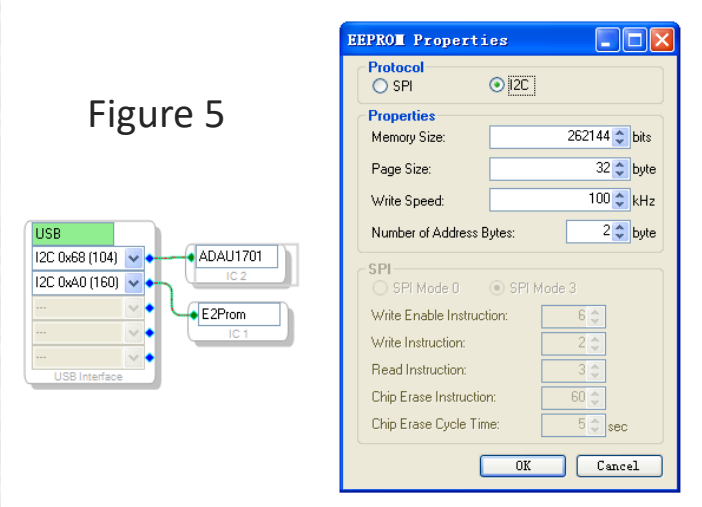


Figure 4



If it shows “Design Mode” in the lower right corner, you need to click “Link Compile Download” at first. When it shows “Active: Compiled”, you can move on to write program into ADAU1701.

TROUBLE SHOOTING

TROUBLE	HOW TO SOLVE
ICP5 cannot be recognized by PC	➢ Make sure you have updated firmware for ICP5 ➢ Make sure the Type-C cable is of good quality and supports data communication ➢ Make sure ICP5 is not connected to target device when connected to PC
Cannot writing the program into target product successfully	➢ Make sure the ICP5 be recognized by PC ➢ **Make sure the SW1 of ICP5 is at ① (USBi) and the SW4 on ICP5 is set at ② (IIC) (If the target product is APM2, make sure SW1 on APM2 is set at** ① (RUN) as well **)** ➢ **Make sure it shows "Active: Downloaded" in the lower right corner in SigmaStudio**
Target device cannot work normally (cannot play music) under powering condition when connected with ICP5	➢ Make sure the connection steps are correct and check the input/output cables ➢ Disconnect with ICP5 and re-power target products ➢ Make sure the SW1 on APM2 is set at ① (RUN) (Not applicable to other products)

NOTES

The connection sequences for PC UI and SigmaStudio are different:

1.For SigmaStudio

First connect the ICP5 to the PC, then power on the ADAU1701 series product, and finally connect the ICP5 to the ADAU1701 product.

2.For PCUI Miumax

First connect the ICP5 to the ADAU1701 series product, then power on the ADAU1701 series product, and finally connect the ICP5 and ADAU1701 product as a whole to the PC.

Please refer to the detailed descriptions below for specific operating steps.

Steps for Sigma-Studio Programming:

1)Please set the SW1 and SW4 switches to the 'USBi' and 'IIC' positions respectively.

2)Connect the programming board to the PC to ensure successful recognition by SigmaStudio.Do not connect ICP with the target product at this stage.

3)Please keep the programming board connected to the computer.

4)Power up the target products integrated with DSP.

5)Connect the programming board to the target products.

6)Ready for programming.

Please follow the steps and proceed one by one.

Original Firmware Restore

Original programs would be required if you want all functions of our products integrated with ADAU1701 DSP. You may want to restore original firmware in some cases.
Below are original firmware for your download.

Products	Original Firmware for Restore Factory Settings
APM2	APM2_Original_Firmware_V2.0
JAB3 - Mono	JAB3_Mono_Original_Firmware_V2.0
JAB3 - Stereo	JAB3_Stereo_Original_Firmware_V2.0
JAB3+ - Mono	JAB3+_Mono_Original_Firmware
JAB3+ - Stereo	JAB3+_Stereo_Original_Firmware
JAB4	JAB4_Original_Firmware
JAB5	JAB5_Original_Firmware

Original Firmware Restore

1. Right click the “E2Prom” (see Figure 6) and click “Read/Write Window”. You will see the following interface (Figure 7).

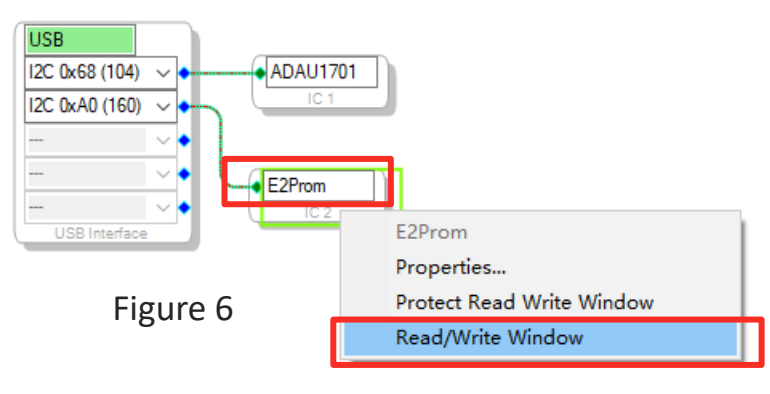


Figure 6

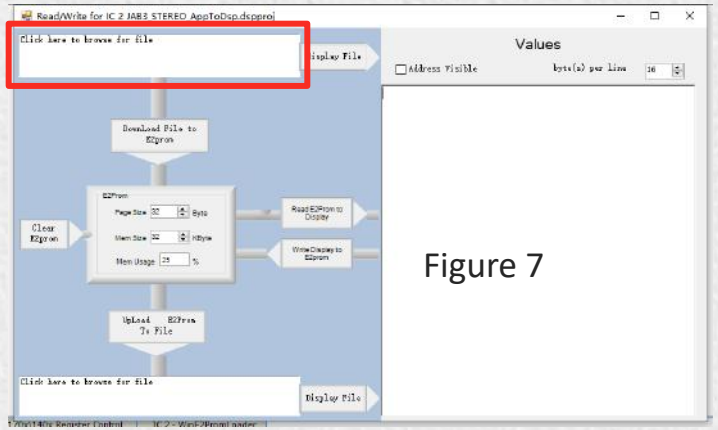


Figure 7

2. Click ‘Click here to browse for file’ and select firmware file (Figure 8). Then click “Display File“ like Figure 9.

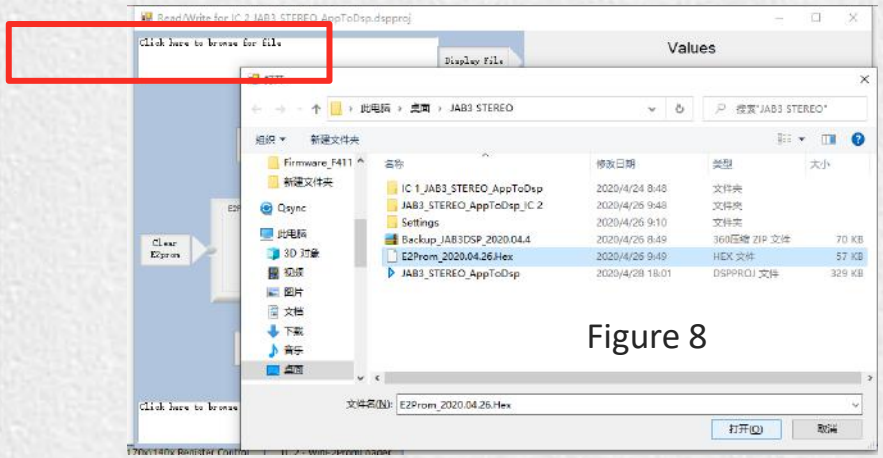


Figure 8

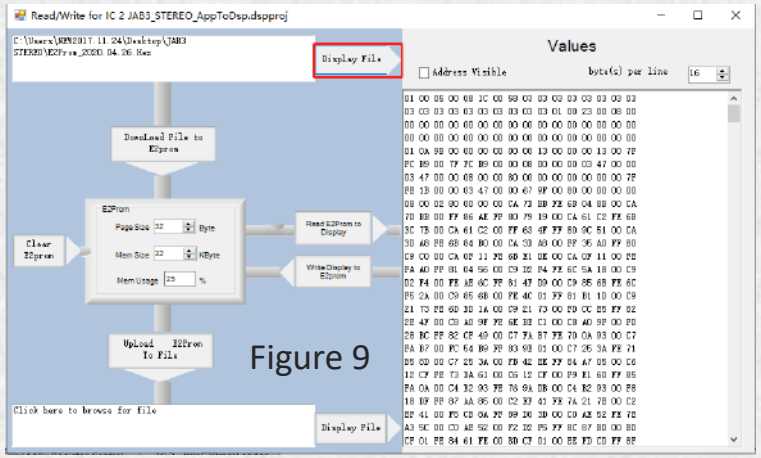


Figure 9

Original Firmware Restore

3. Click ‘Write Display to E2prom’ then click ‘OK’ of the prompt box (Figure 10).

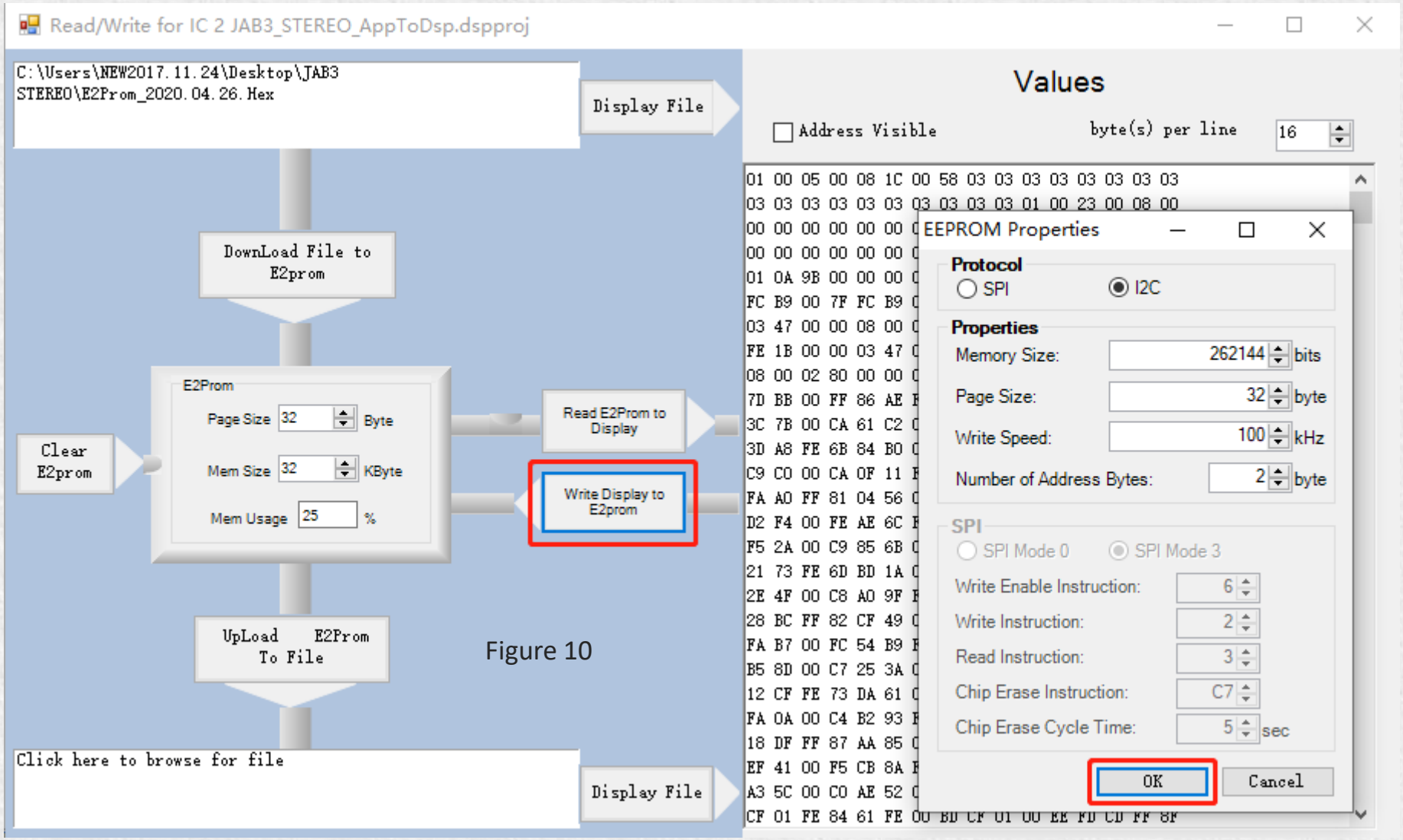


Figure 10

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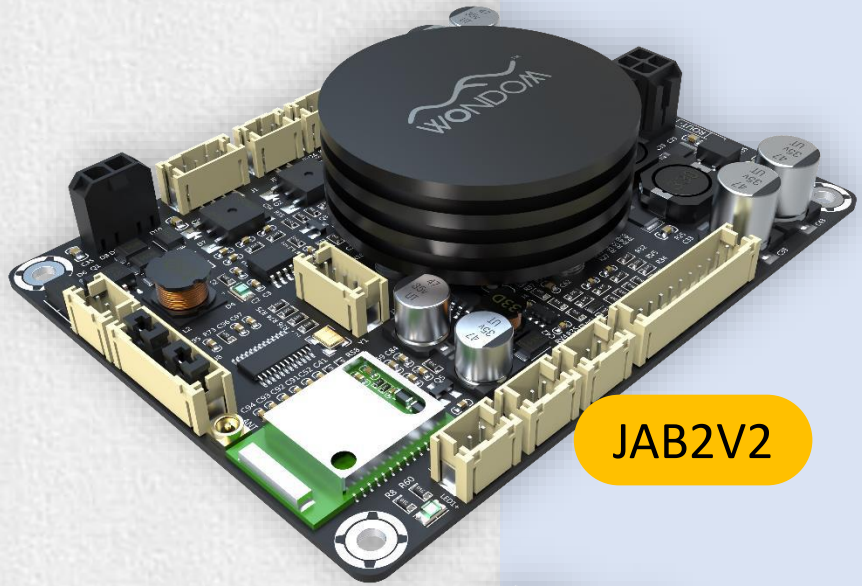
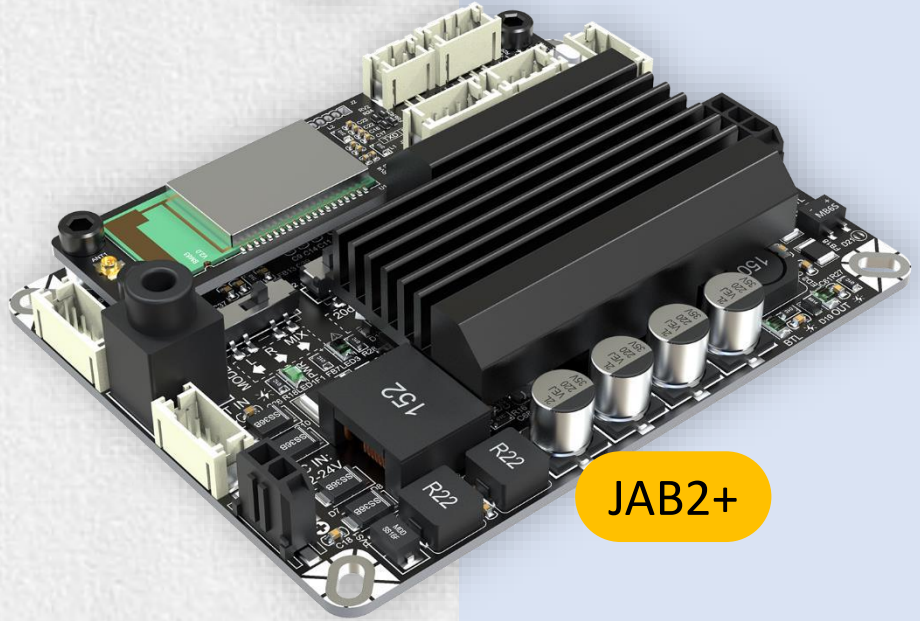
Video Tutorial

How to Realize **PC UI Control of JAB2 / JAB2+** with WONDOM ICP5?





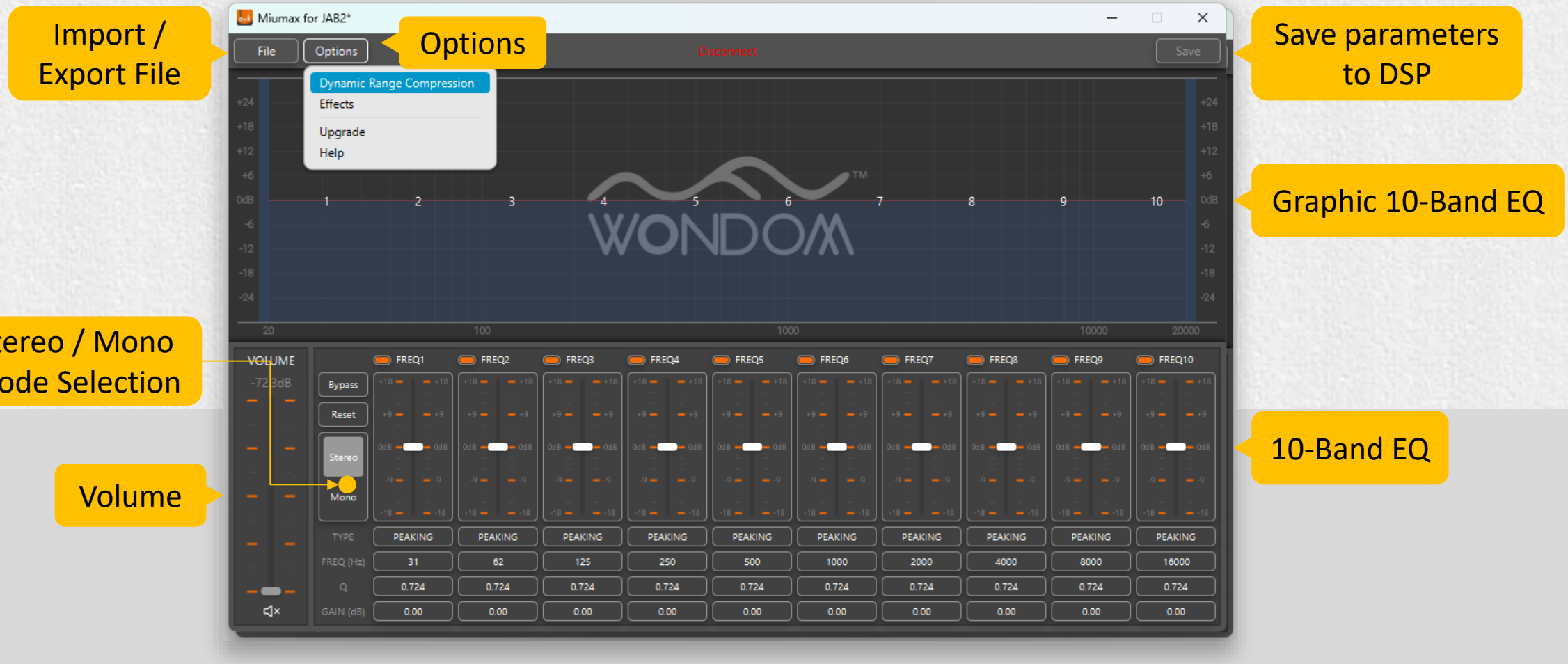
ICP5

IN-CIRCUIT PROGRAMMER FOR SIGMASTUDIO PROGRAMMING, APP CONTROL & PC UI CONTROL

Step 1 - Download PC UI

First, download and install the PC UI Miumax for JAB2. Please note that the JAB2 / JAB2+ doesn't support separate channel adjustment.

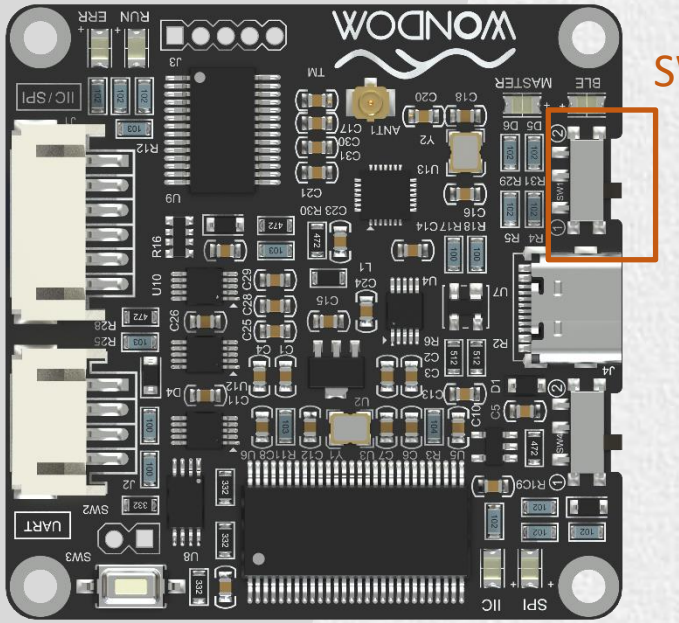
Download link: http://files.sure-electronics.com/download/Miumax_for_JAB2-v2.0.zip



Step 2 – ICP5 Upgrade

ICP5 needs different firmware for use with different products. There is no firmware in ICP5 in default. Therefore, we need to update firmware in ICP5 for the first use with a target product.

There is no need to update firmware next time you use ICP5 with the same target product, except that you use it with a different product for PC UI control.



ICP5 SW1 Setting

Since we want to realize PC UI function, we need to set **SW1 of ICP5 at ② "Remote"** at first.
(The picture is just for reference.)

As for SW4, it doesn't matter where it is set at when we want PC UI control and SW1 is set at ② "Remote" .

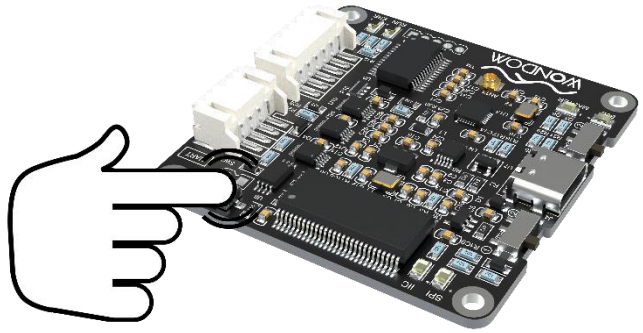
SW1	MODE	FUNCTION
①	USBi	SigmaStudio Programming
②	**Remote**	**APP Control / PC UI Control**

Step 2 – ICP5 Upgrade

We need to enter BootLoader mode for firmware update. Please do not connect ICP5 with any products now.

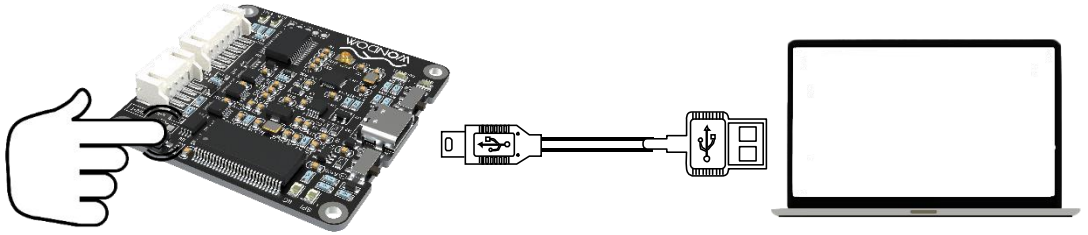
1. Press and hold on SW3 on ICP5

We need to press and hold on SW3 on ICP5.
Please do not connect anything to ICP5 now.



2. Connect ICP5 to computer

Connect ICP5 to computer with Type-C cable when holding on SW3.
When you see “RUN” indicator blinking, it means ICP5 has entered BootLoader mode. You can release SW3 now.

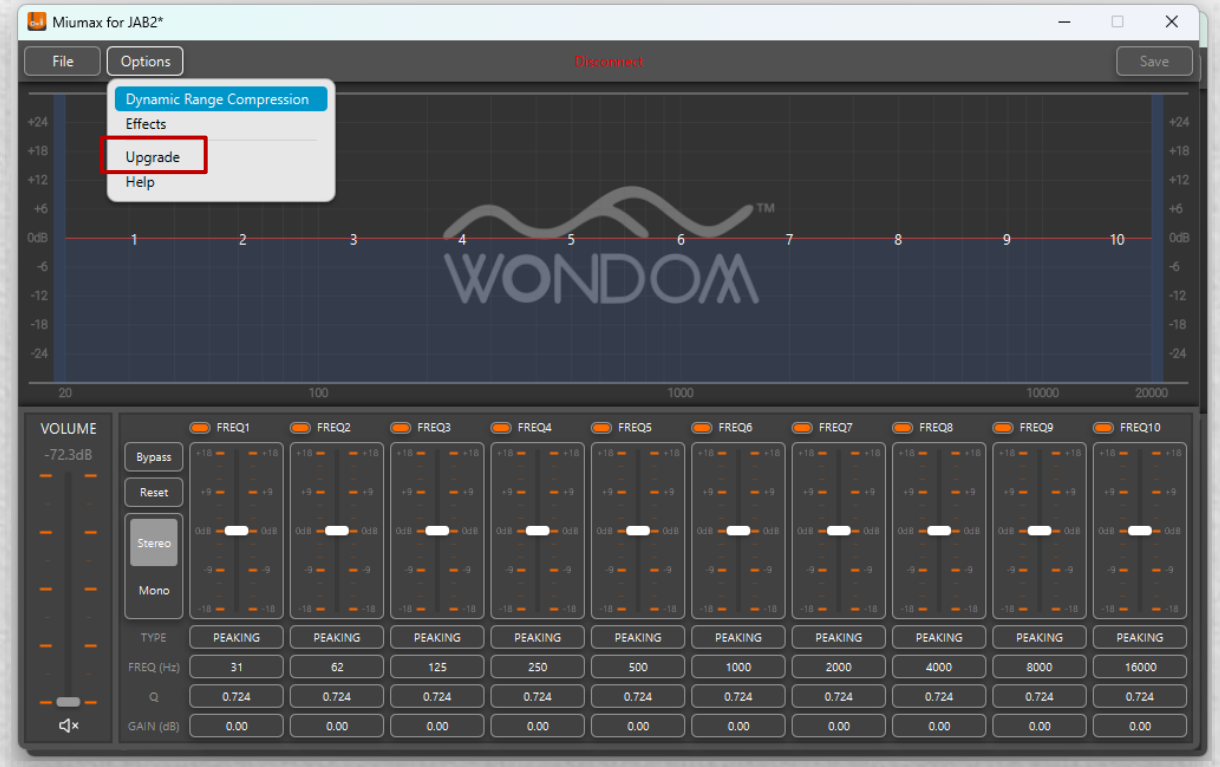


Step 2 – ICP5 Upgrade

3. Upgrade

Run downloaded PC UI for JAB2 / JAB2+.

Click “Options” - “Upgrade” in the upper left corner. The software will automatically update the firmware.



4. Disconnect ICP5

After the update is done, “RUN” indicator will turn from blinking to ON. Disconnect the ICP5 form the PC once done.

Trouble Shooting

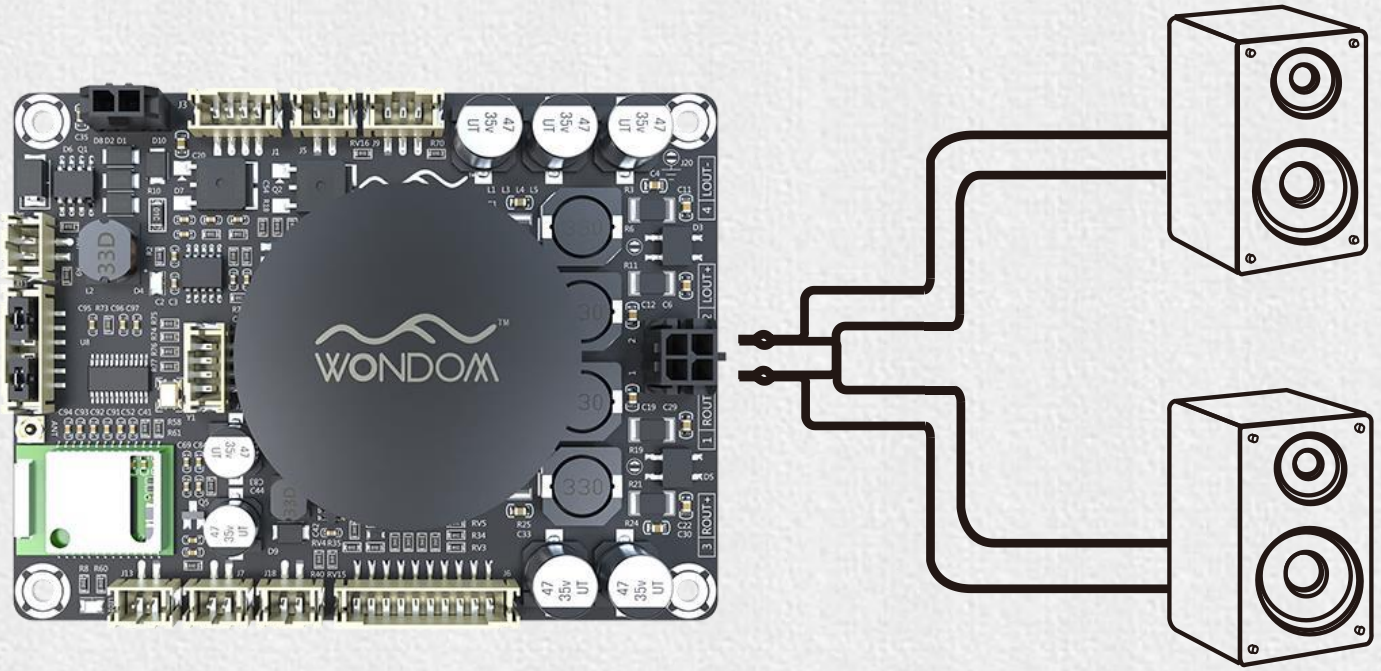
If the ICP5 can’t be recognized by the PC UI, please kindly install the USB driver below and try again.

Download USB Driver Here

It’s compatible with Win 7, Win 10 and Win 11 systems.

Step 3 – Build Audio System

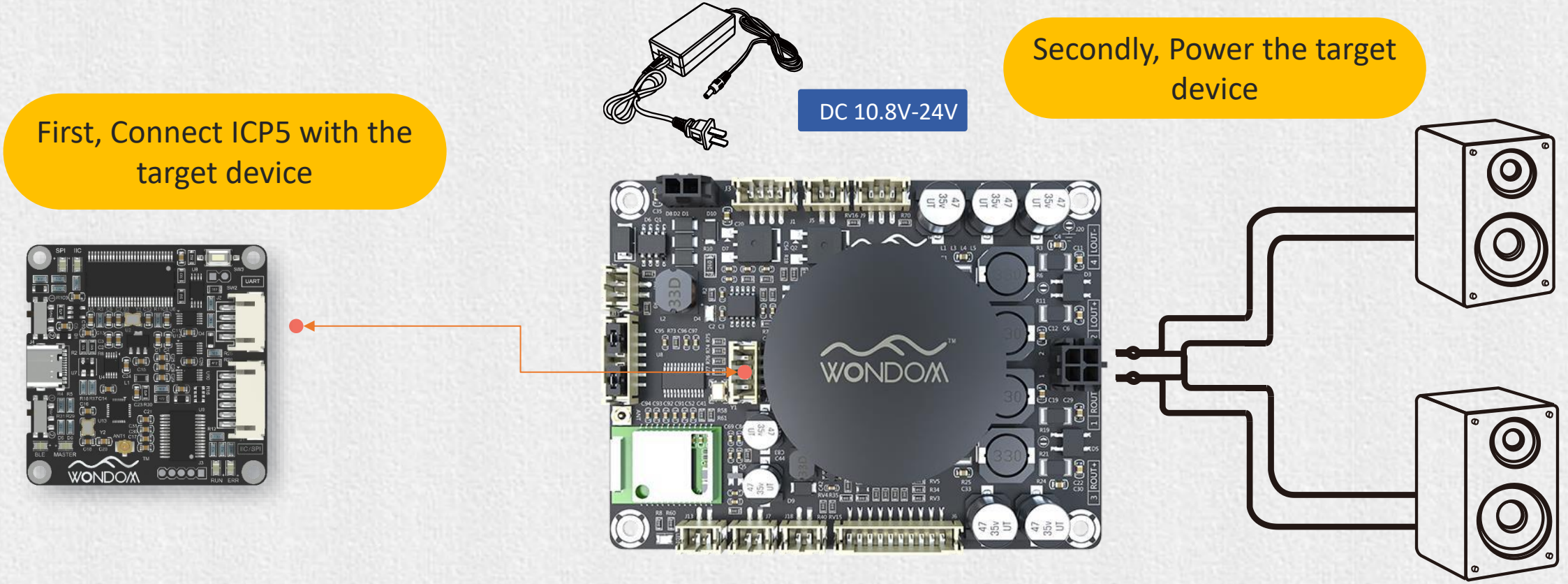
Build a desired audio system with the target product. We will take JAB2v2 as an example.
Please do not power the target device now.



Step 4 – Connect ICP5 & Power Up

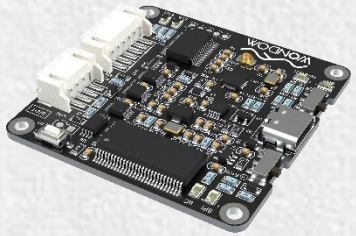
Use the PH-4Pos cable to connect the ICP5 with the JAB2 / JAB2+, then power up the entire system. Do not play music now.

If there is connection error or the firmware in ICP5 doesn't match the target device, "ERROR" indicator will be ON in red.

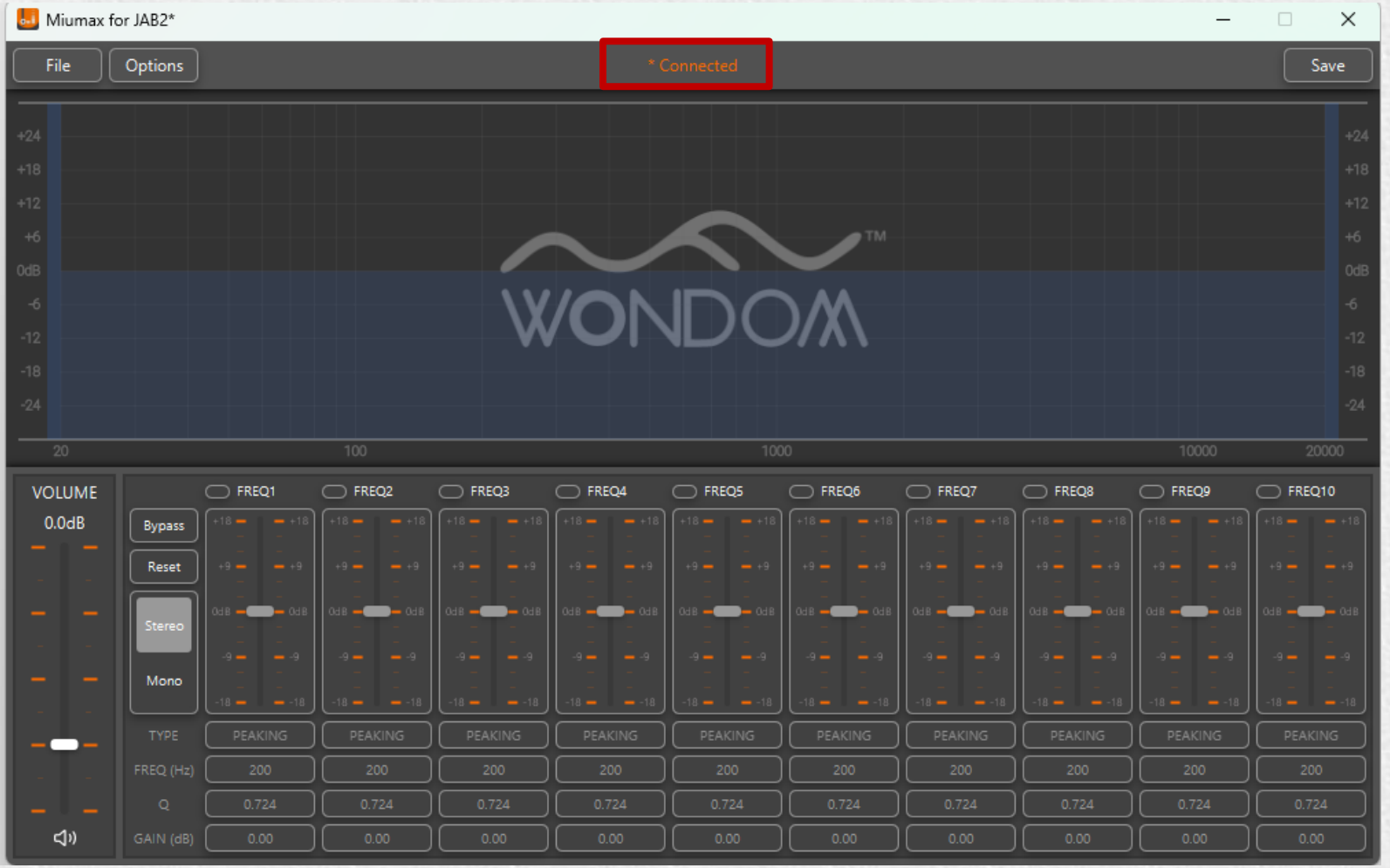


Step 5 – Re-connect ICP5 to PC

Re-connect the ICP5 to your computer. If it shows “connected”, it means the connection is successful.

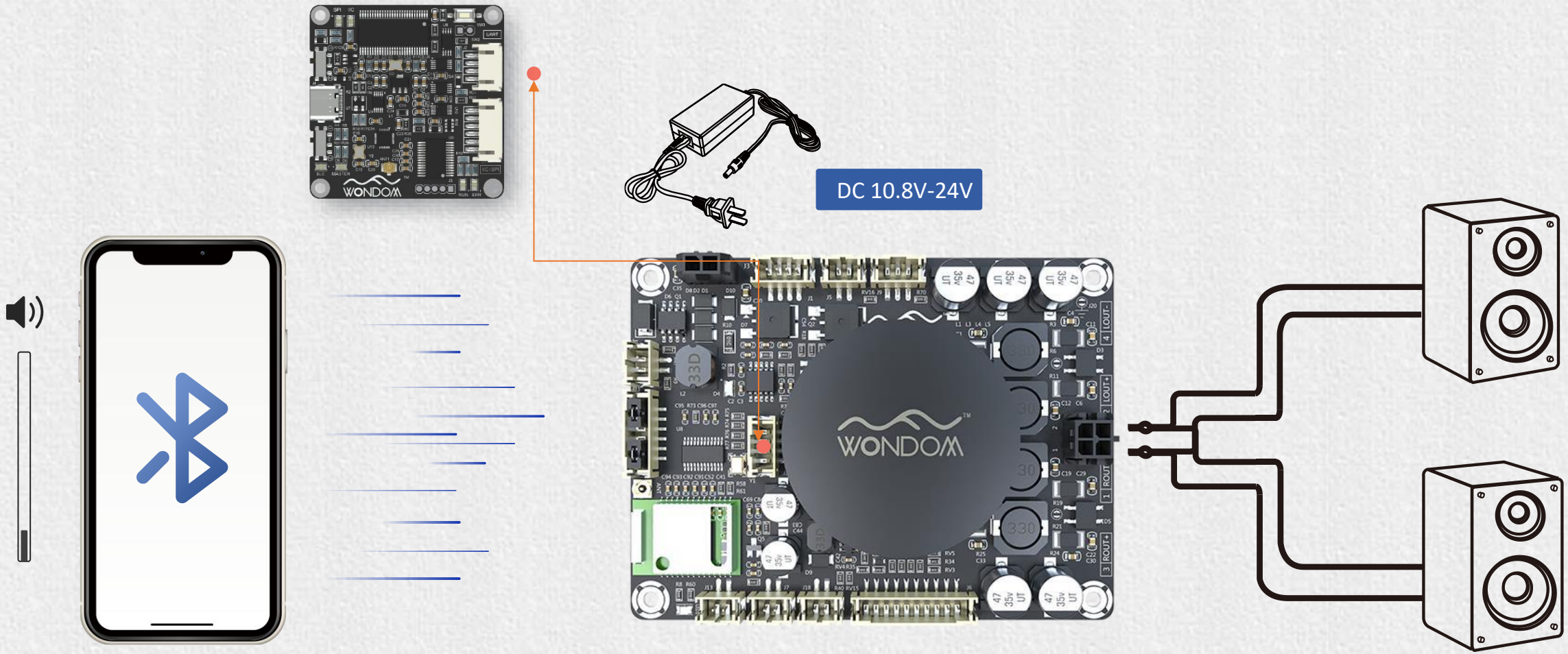


Thirdly, Re-connect the ICP5 to the PC



Step 6 – Adjust Parameters

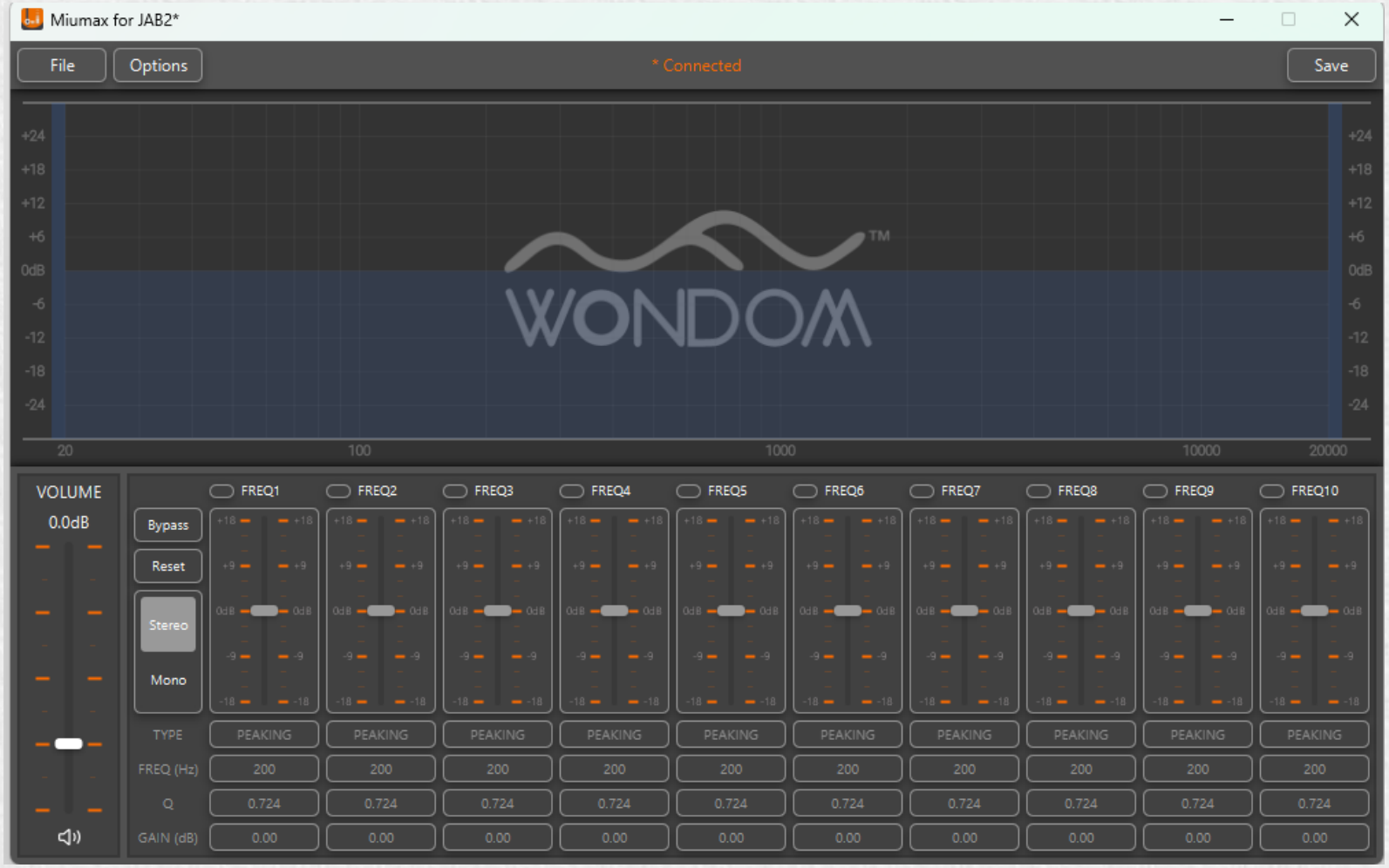
To avoid any unexpected damage to your speaker, turn the volume of the audio source down to a low level before connecting to the JAB2/JAB2+ to play music. Then, you can adjust audio parameters properly. Please adjust slightly.



Step 7 – Save Parameters

When the adjustments are done, click “SAVE” to write the parameters into the JAB2 / JAB2+ DSP.

After saving, you can disconnect the ICP5 with the JAB2 / JAB2+.



Save parameters to DSP

NOTES

The connection sequences for PC UI and SigmaStudio are different:

1.For SigmaStudio

First connect the ICP5 to the PC, then power on the ADAU1701 series product, and finally connect the ICP5 to the ADAU1701 product.

2.For PCUI Miumax

First connect the ICP5 to the ADAU1701 series product, then power on the ADAU1701 series product, and finally connect the ICP5 and ADAU1701 product as a whole to the PC.

Please refer to the detailed descriptions below for specific operating steps.

Steps for PCUI Miumax(JAB2,JAB2+):

1)Download the PC UI for the target product. **Set SW1 of ICP5 at ② Remote**

2)Connect ICP5 to the PC for firmware upgrade. Do not connect ICP5 withthe target product at this stage.

3)Disconnect ICP5 from the PC.

4)Connect the ICP5 with the target device (Do not power up at this stage).

5)Power up the entire system.

6)Connect the ICP5 back to the PC.

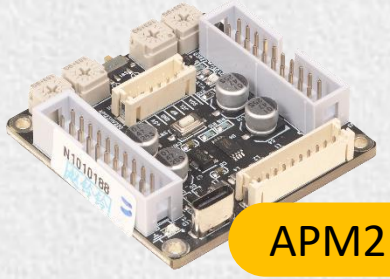
7)Ready for PC UI control.

Please follow the steps and proceed one by one.

WONDOM
WONDOM Audio Technology

How to Realize
PC UI Control of ADAU DSP Products
with WONDOM ICP5?

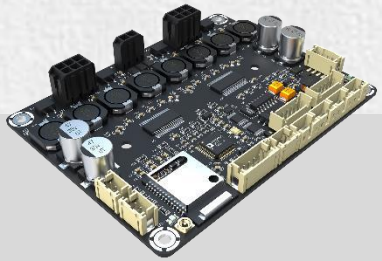
Video Tutorial


APM2

WDSP2.4U

JAB3

JAB3+


JAB4

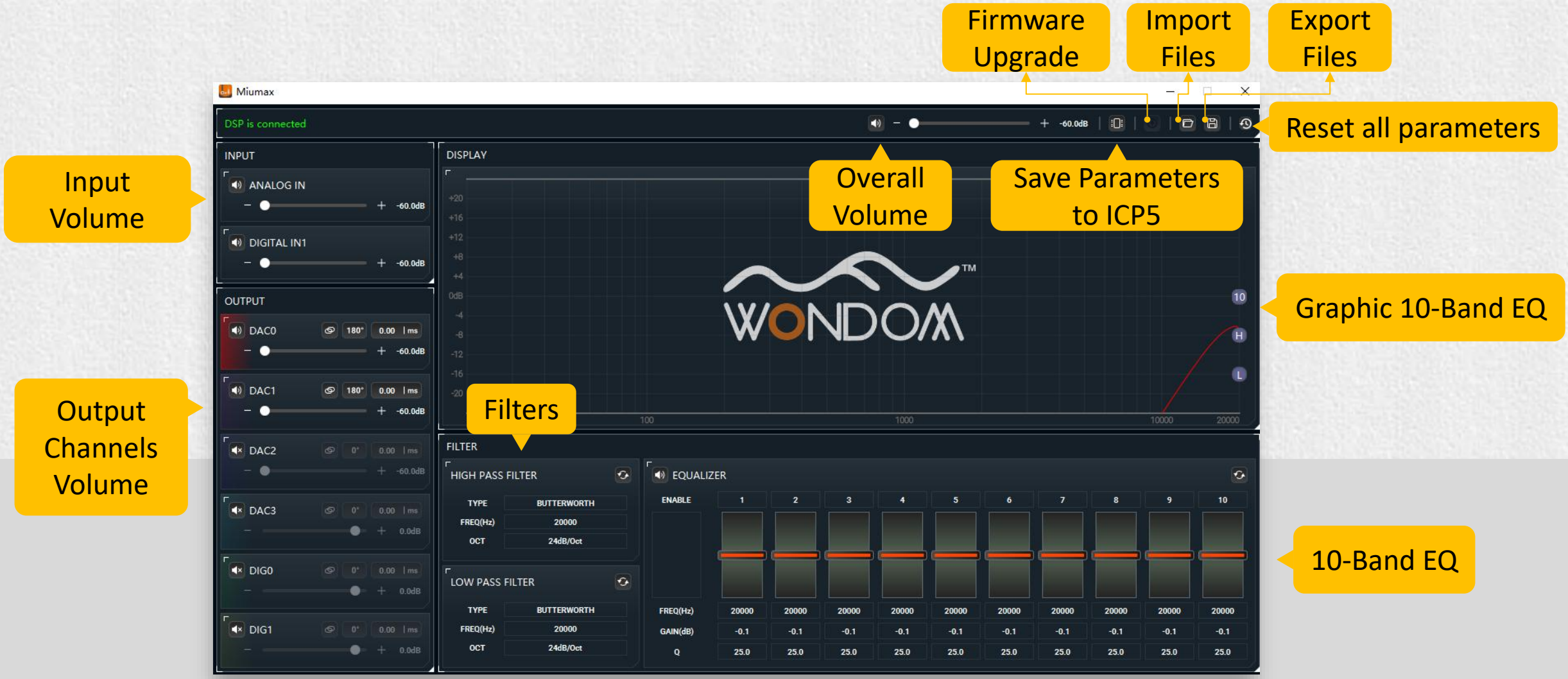

JAB5

BDSP2.4U

Step 1 - Download PC UI

First, download and install the PC UI Miumax for ADAU1701. The channels can be adjusted independently.

Download link: http://files.sure-electronics.com/download/Miumax_Setup_v2.0.0.1.zip



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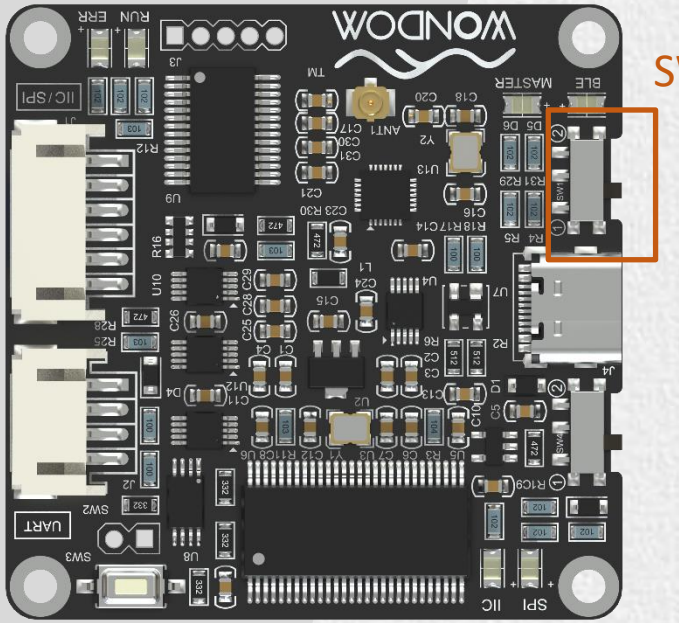

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SW1	MODE	FUNCTION
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Step 2 – ICP5 Upgrade

We need to enter BootLoader mode for firmware update.

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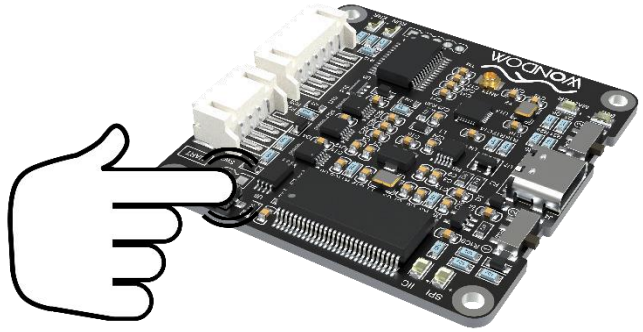
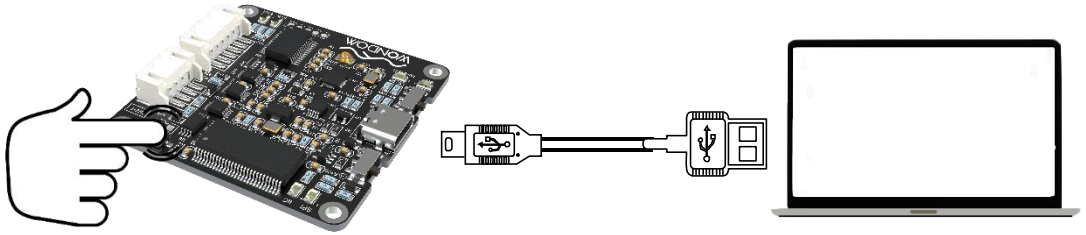
Please do not connect anything to ICP5 now.



2. Connect ICP5 to computer

Connect ICP5 to computer with Type-C cable when holding on SW3.
When you see “RUN” indicator blinking, it means ICP5 has entered BootLoader mode. You can release SW3 now.



Step 2 – ICP5 Upgrade

3. Upgrade

Run downloaded PC UI for ADAU DSP products.

Click “Firmware Upgrade” icon in the upper right corner.

The software will automatically update the firmware.

4. Disconnect ICP5

After the update is done, “RUN” indicator will turn from blinking to ON. Disconnect the ICP5 form the PC once done.

Trouble Shooting

If the ICP5 can’t be recognized by the PC UI, please kindly install the USB driver below and try again.

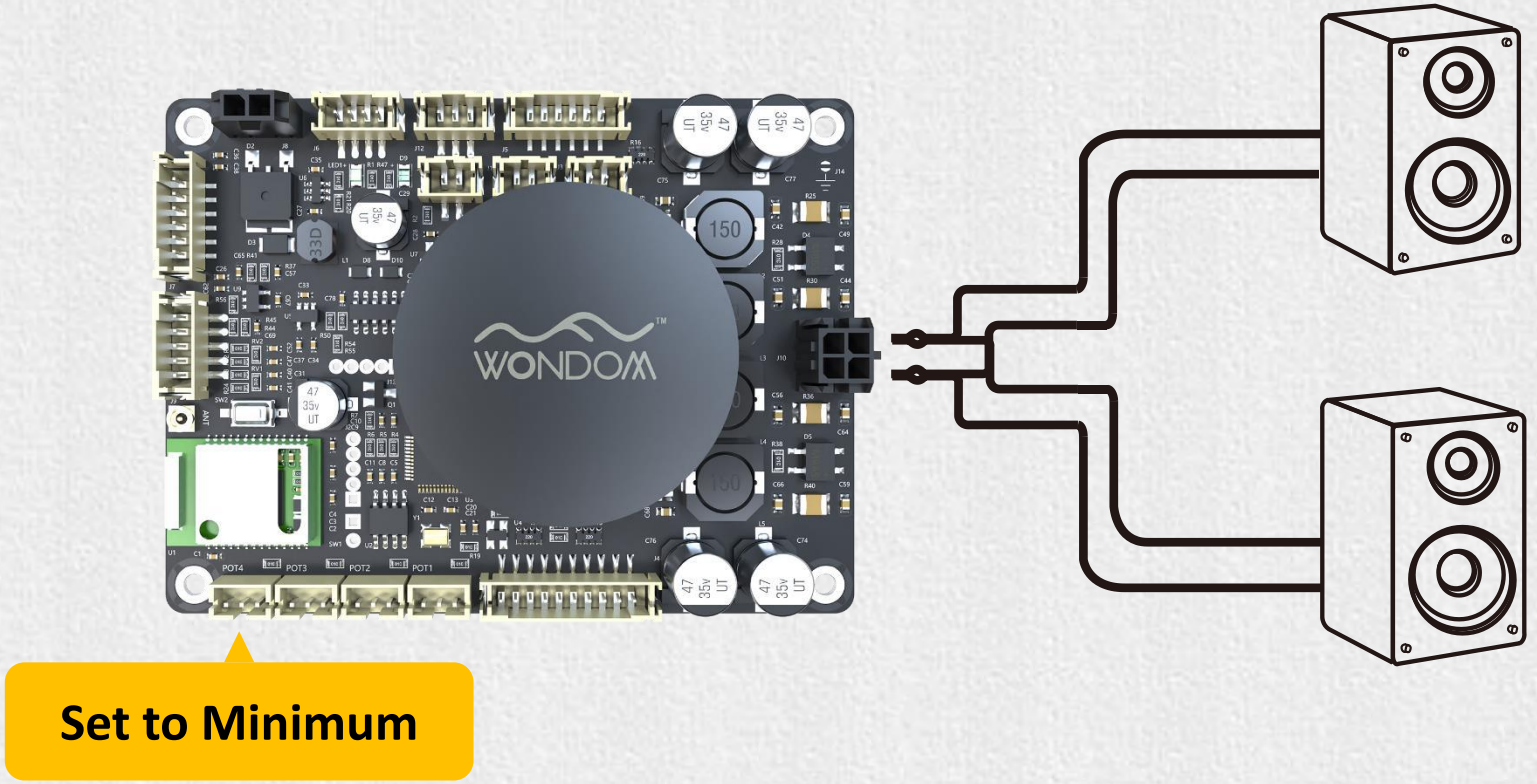
Download USB Driver Here

It’s compatible with Win 7, Win 10 and Win 11 systems.

Step 3 – Build Audio System

Build a desired audio system with the target product. We will take JAB3+ as an example.
Please do not power the target device now.

For products integrated with ADAU DSP, before connecting to the ICP5 for software control, it is recommended to **set the volume to the minimum level using the overall volume potentiometer (POT4).** If a master volume potentiometer is not available, you may short-circuit Pin 1 and Pin 2 of the overall volume port (POT4) as an alternative.



Step 4 – Connect ICP5 & Power Up

Use the PH-6Pos cable to connect the ICP5 with the target device, then power up the entire system. Do not play music now.

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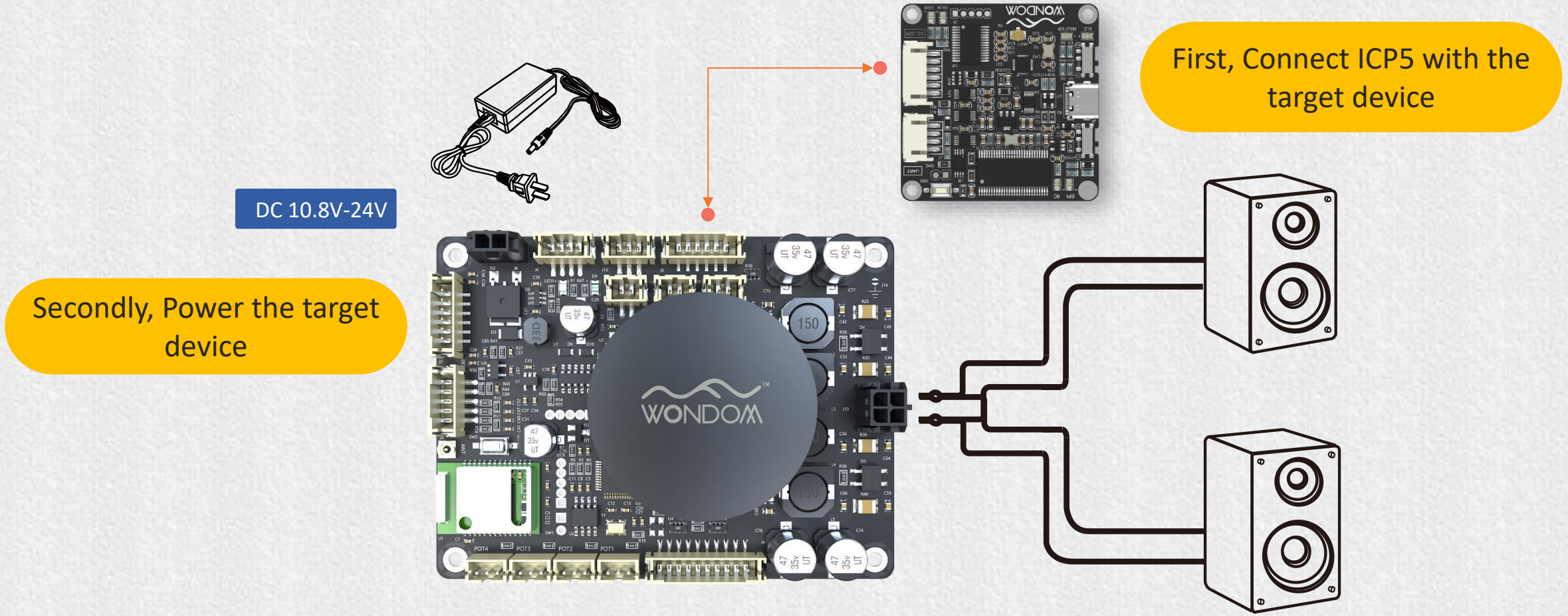

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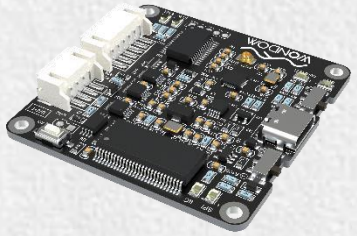
Re-connect the ICP5 to your computer. If it shows “connected”, it means the connection is successful.



Thirdly, Re-connect the ICP5 to the PC

Step 6 – Reset Parameters

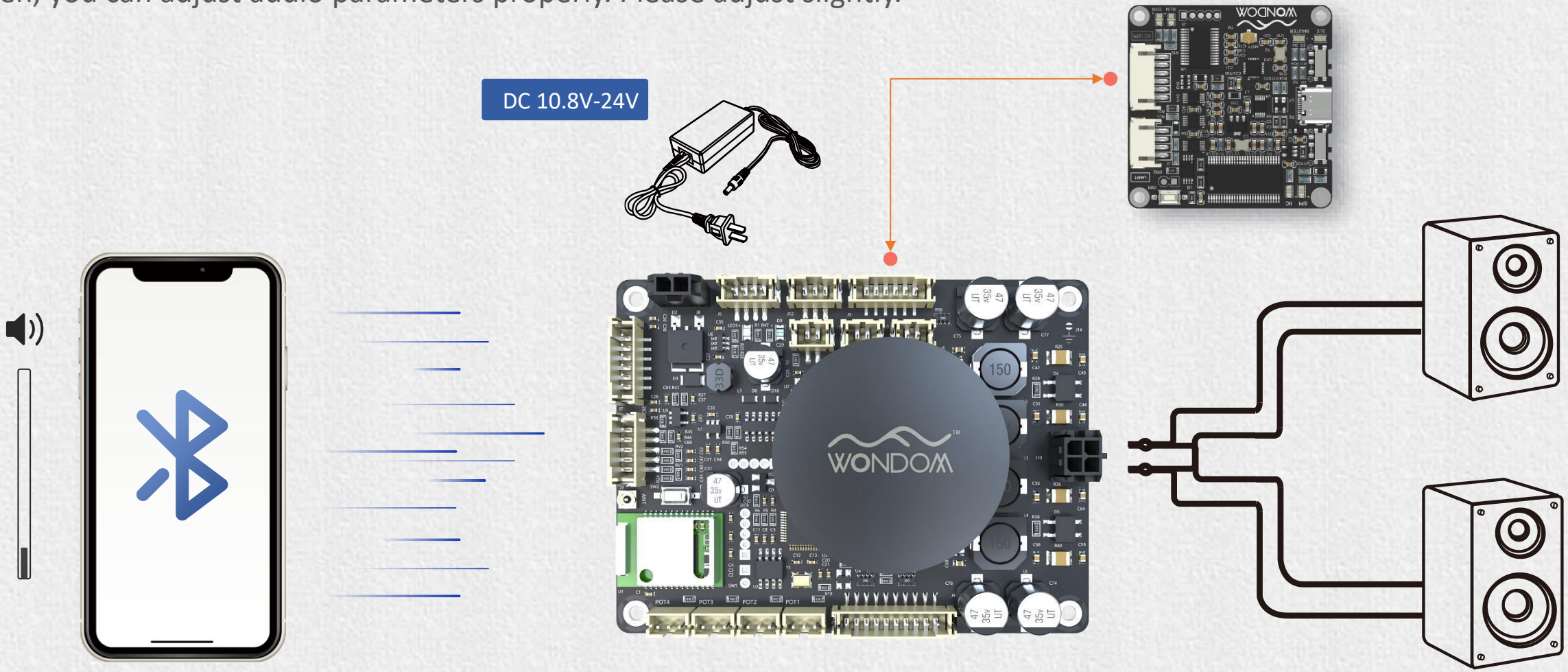
Click the “Reset” icon to reset all the parameter in the software. To avoid unexpected damage, please do not play music when resetting.

Step 7 – Adjust Parameters

After resetting the parameters, connect to your audio source to play music.

We suggest setting the volume to a suitable level. It’s not suggested to be in a high level.

Then, you can adjust audio parameters properly. Please adjust slightly.



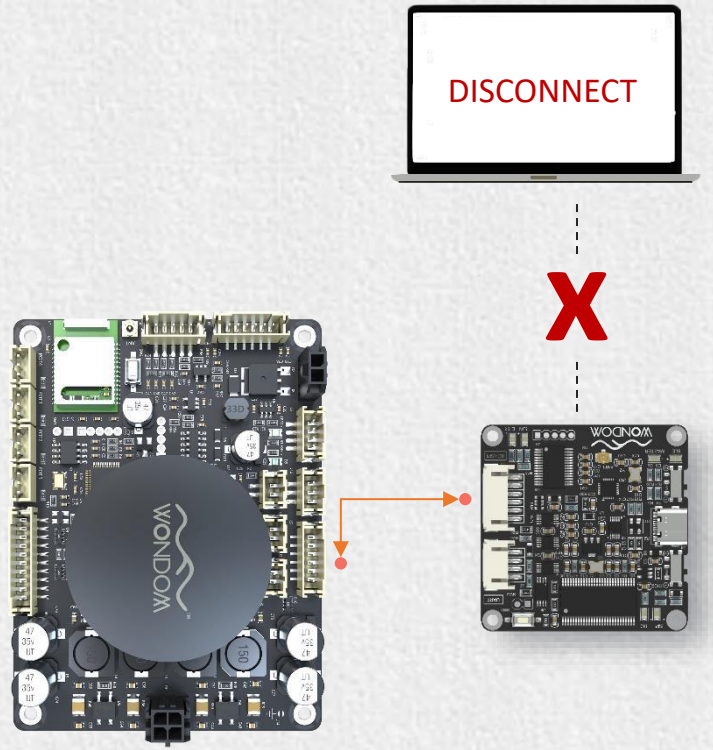
Step 8 – Save Parameters

When the adjustments are done, click “SAVE” to write the parameters. The parameters will be saved to the ICP5.

After successful saving, please disconnect the ICP5 with the PC.

Save parameters to ICP5

The parameters are saved in ICP5. So, the ICP5 needs to be connected to the target device.



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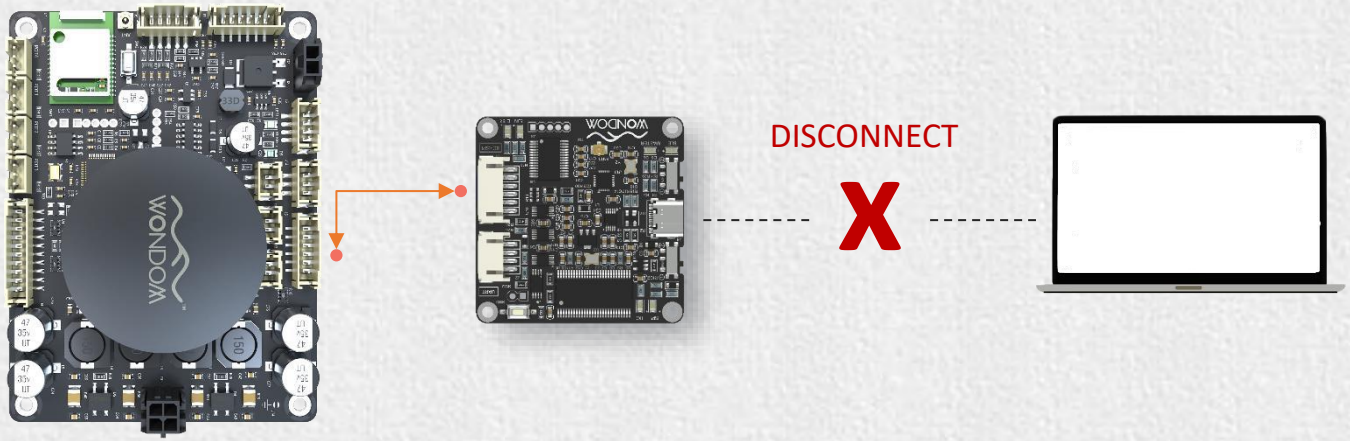

Power-off Memory

All the parameters adjustment will be recorded in ICP5 even if it's powered off. That means, once you connect ICP5 with the target device, the kept parameters will be loaded and function to target device.

NOTES

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First connect the ICP5 to the PC, then power on the ADAU1701 series product, and finally connect the ICP5 to the ADAU1701 product.

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2)Connect ICP5 to the PC for firmware upgrade. Do not connect ICP5 withthe target product at this stage.

3)Disconnect ICP5 from the PC.

4)Connect the ICP5 with the target device (Do not power up at this stage).

5)Set the volume to the minimum level, then power up the entire system.

6)Connect the ICP5 back to the PC.

7)Ready for PC UI control.

Please follow the steps and proceed one by one.