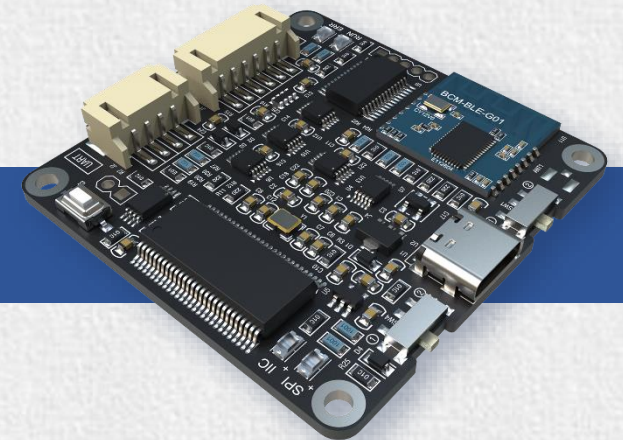
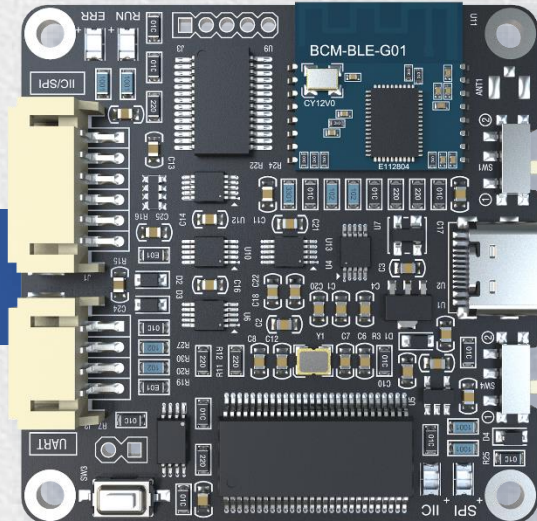
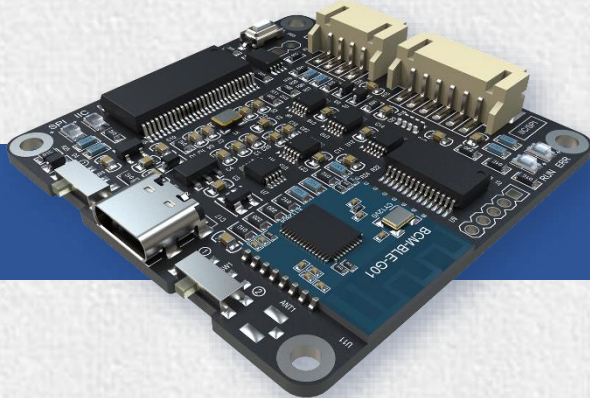




WONDOM ICP5 User Guide

IN-CIRCUIT PROGRAMMER FOR PROGRAMMING, APP CONTROL & PC UI - ICP5

By Sure Electronics Co., Ltd.



Revision History

Revision	Description	Date
V1.0	WONDOM ICP5 PCB version – V100	10-Sept-2021

Overview

ICP5 - Multi-Purpose In-Circuit Programmer

For use with WONDOM products integrated with DSP, providing various functions as programming with SigmaStudio, APP control 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.



Programming

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



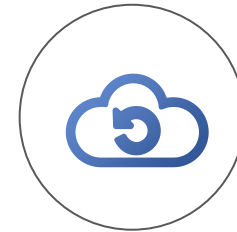
APP Control

Integrated with
Bluetooth BLE for APP
control



PC UI Control

Integrated with USB
UART for PC UI
Control



Online Update

Update ICP5 by
your side for use
with more products

Applicable Products

Model	Brief Description	Programming	APP Control	PC UI Control
APM2	ADAU1701 DSP kernel board	Y	Y (End of Jul, 2022)	Y (End of Nov)
JAB2v2	2.0 / 0.1 Audio amplifier board with DSP & BT 5.0	N	N	Y
JAB3	2.0 / 0.1 Audio amplifier board with ADAU1701 DSP	Y	Y (End of Jun, 2022)	Y (Mid-Nov)
JAB3+	2.0 / 0.1 Audio amplifier board with ADAU1701 DSP & BT 5.0	Y	Y (End of May, 2022)	Y (End of Oct)
JAB4	4.0 / 2.1 / 2.0 / 0.2 30W Audio amplifier board with ADAU1701 DSP & BT 5.0	Y	Y (End of Apr, 2022)	Y (Mid-Oct)
JAB5	4.0 / 2.1 / 2.0 / 0.2 100W Audio amplifier board with ADAU1701 DSP & BT 5.0	Y	Y (End of Mar, 2022)	Y (End of Sep)

N represents for NOT AVAILABLE; Y represents for AVAILABLE.

Y in red means that it's in plan and you can see the estimated release date.

Contents

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



ICP5 Introduction



Programming



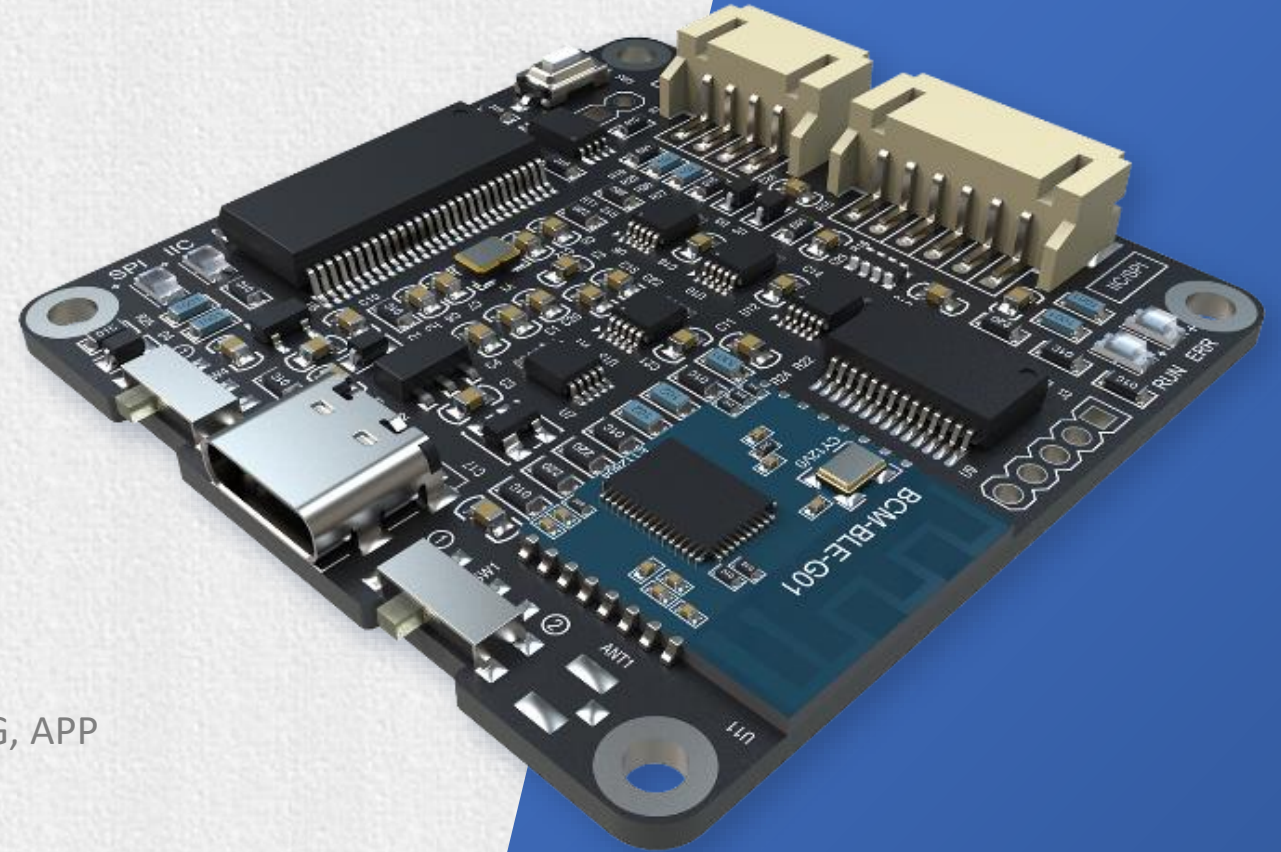
PC UI Control



APP Control



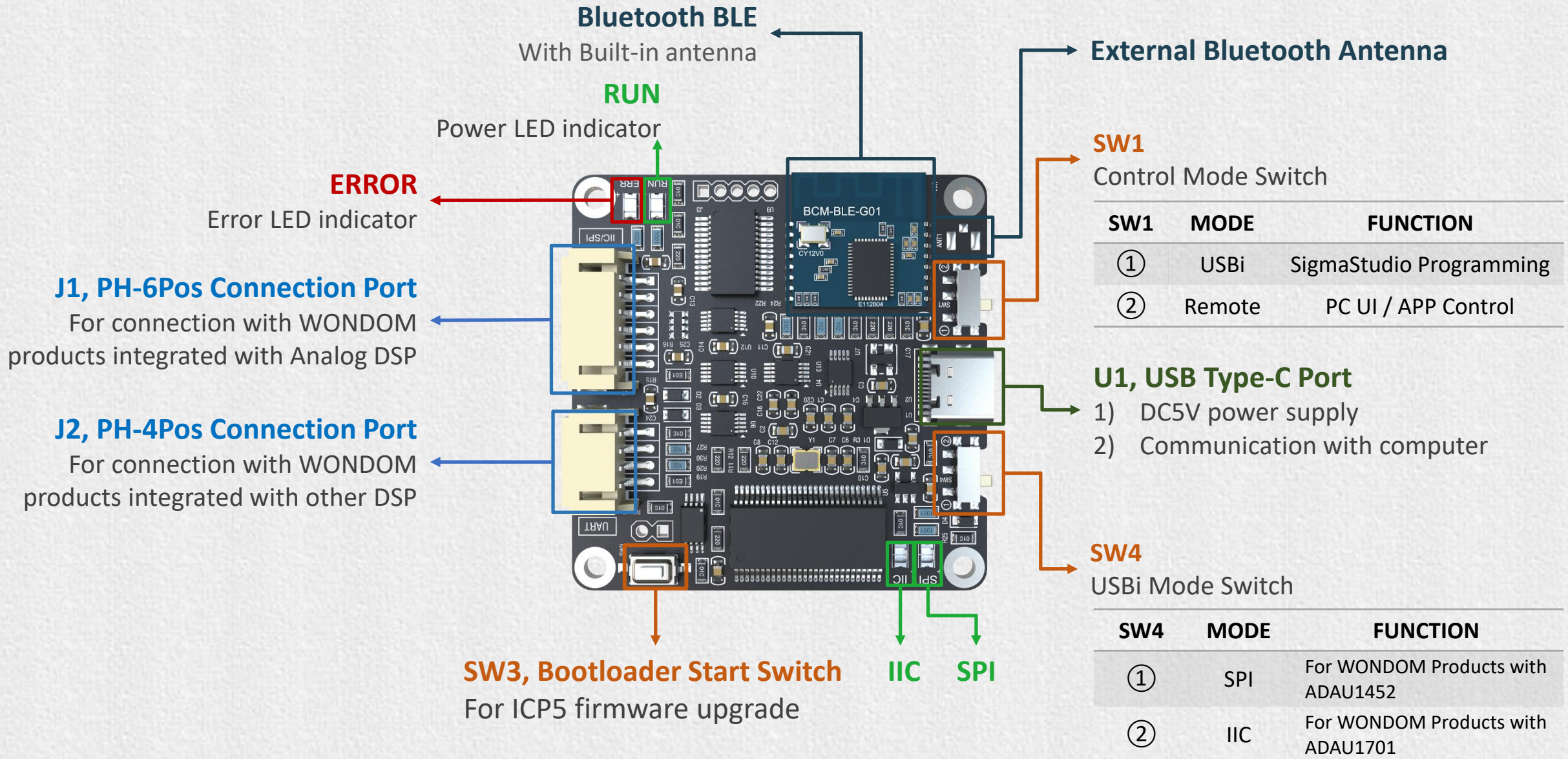
Introduction of **ICP5 Programmer**



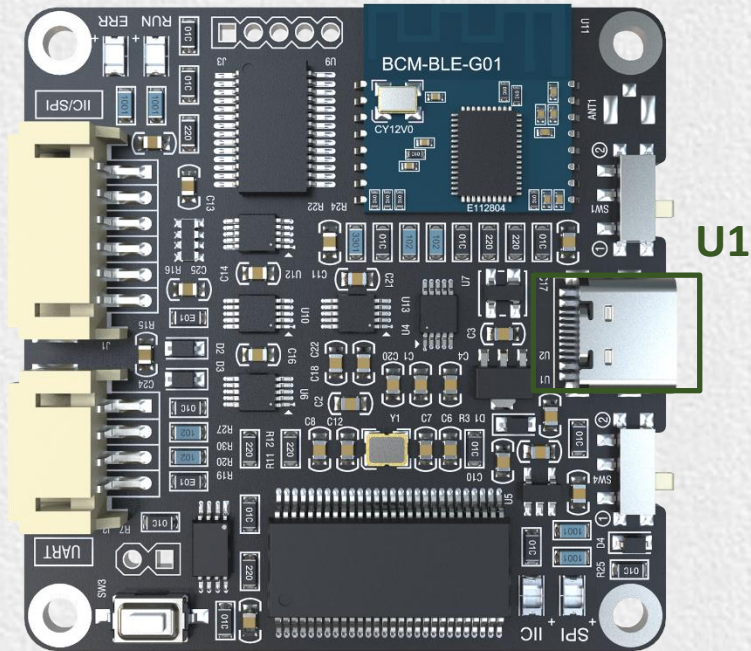
ICP5

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

Interface Definition



Power Supply

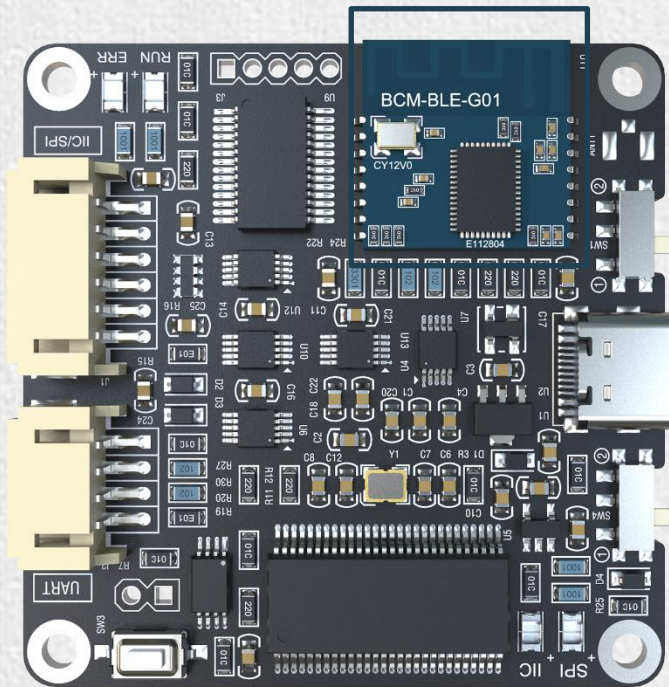


U1, DC5V power supply

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.

Bluetooth Module



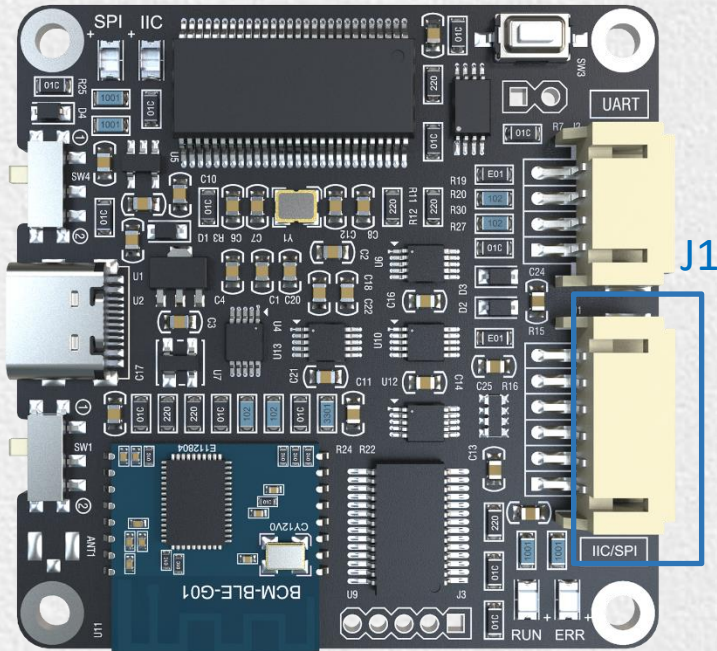
Bluetooth BLE Module

ICP5 is integrated with high performance Bluetooth BLE module, which are for APP control with target products.

For now, there is no APP available for use with ICP5.

We will develop APPs in the near future.

Connection Port

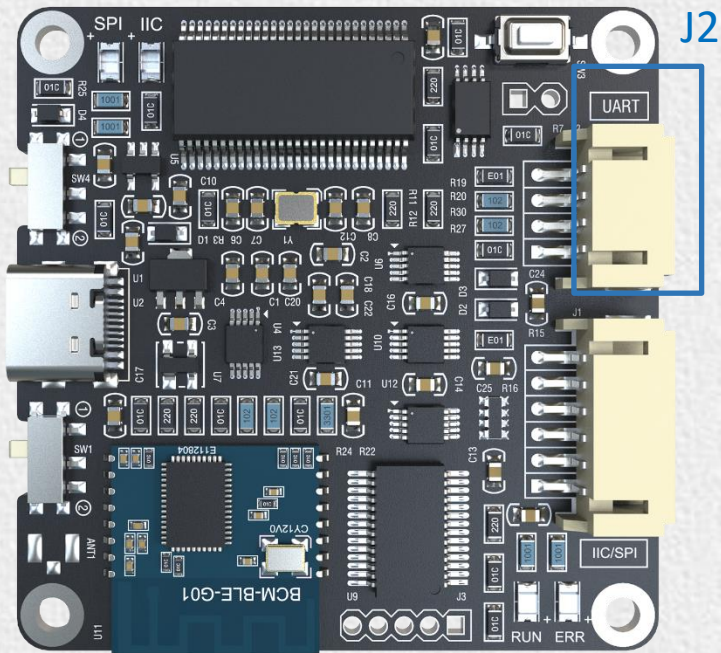


J1, PH-6Pos-Connection Port

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

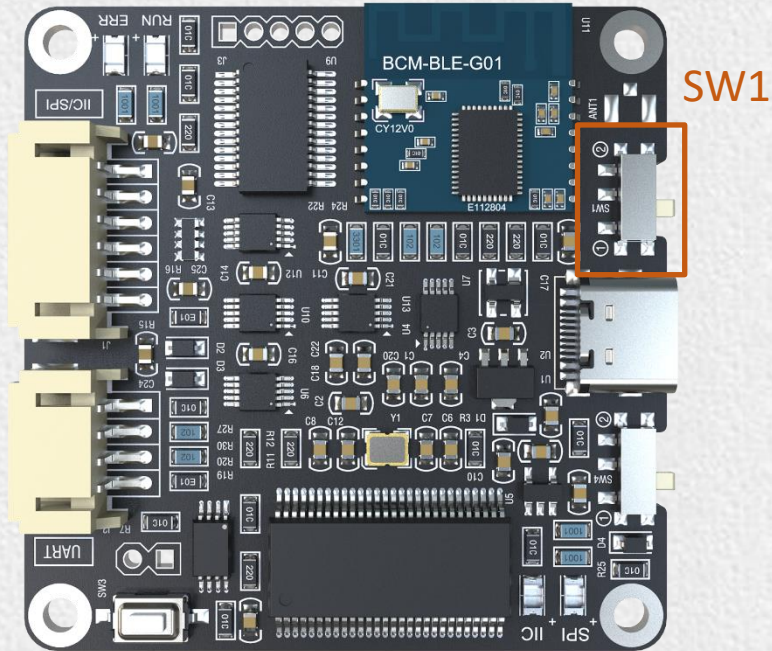


J2, PH-4Pos-Connection Port

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, USBi Mode Switch

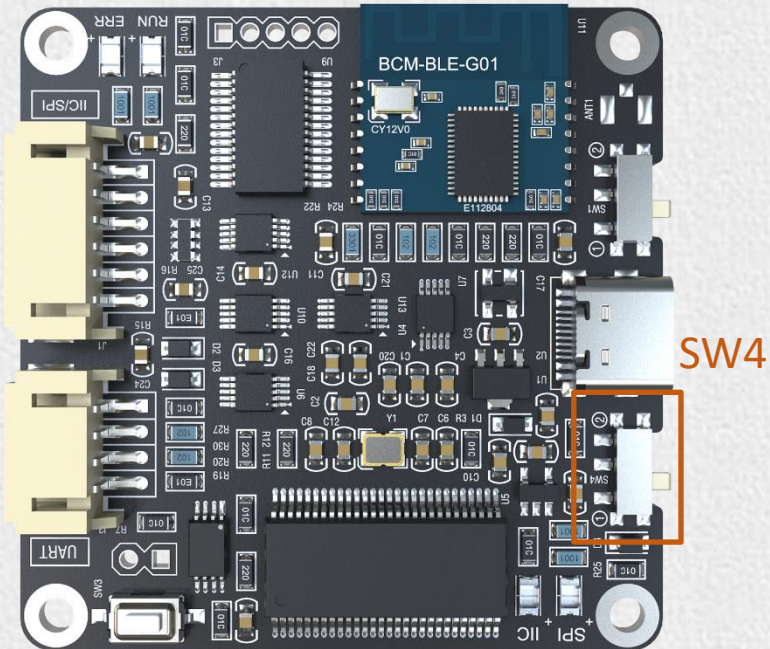
As mentioned before, besides current products with ADAU1701 DSP, we will develop products with ADAU1452 in future.

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.

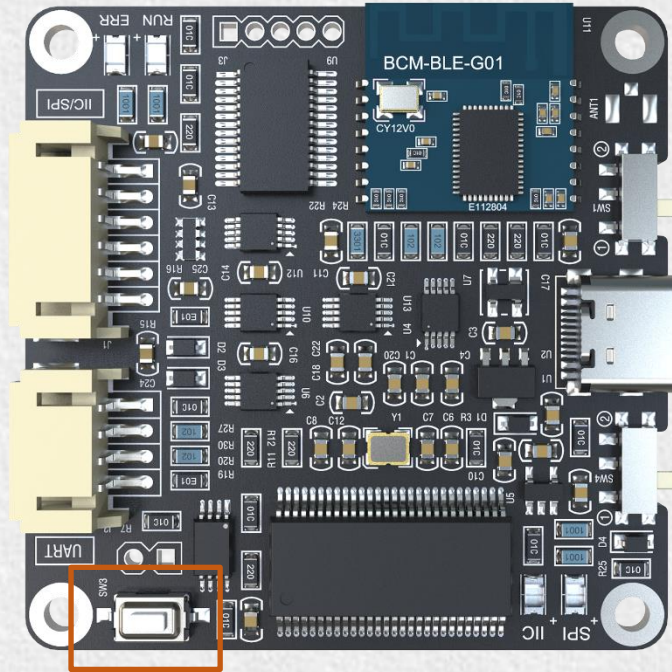
Set SW4 at ② “IIC” when you want to program products integrated with ADAU1701;

Set SW4 at ① “SPI” when you want to program products integrated with ADAU1452.



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

Firmware Upgrade



SW3

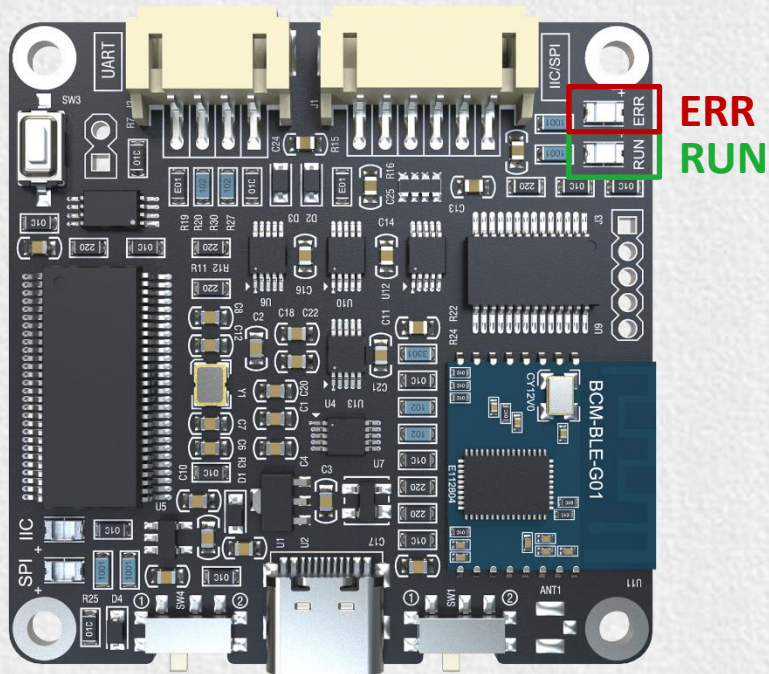
SW3, Firmware upgrade switch

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

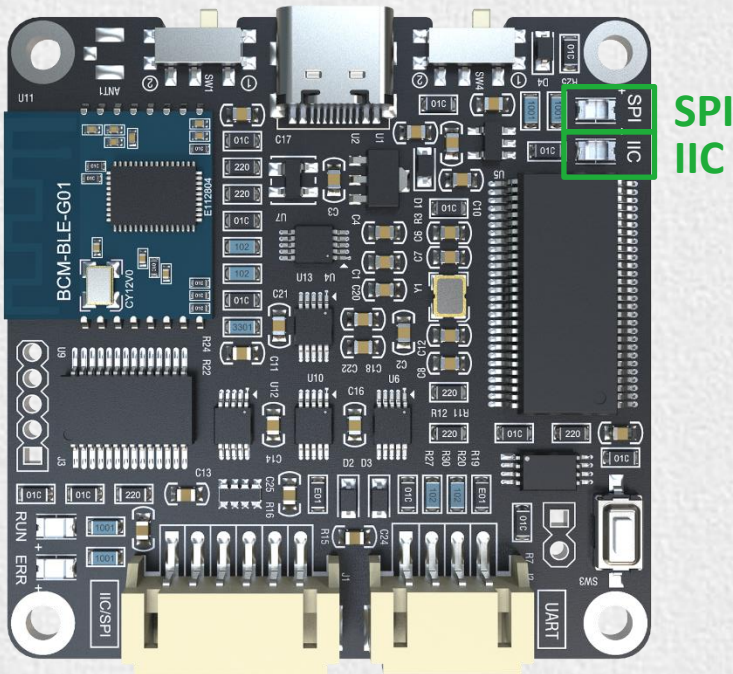
This indicator is green.

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.

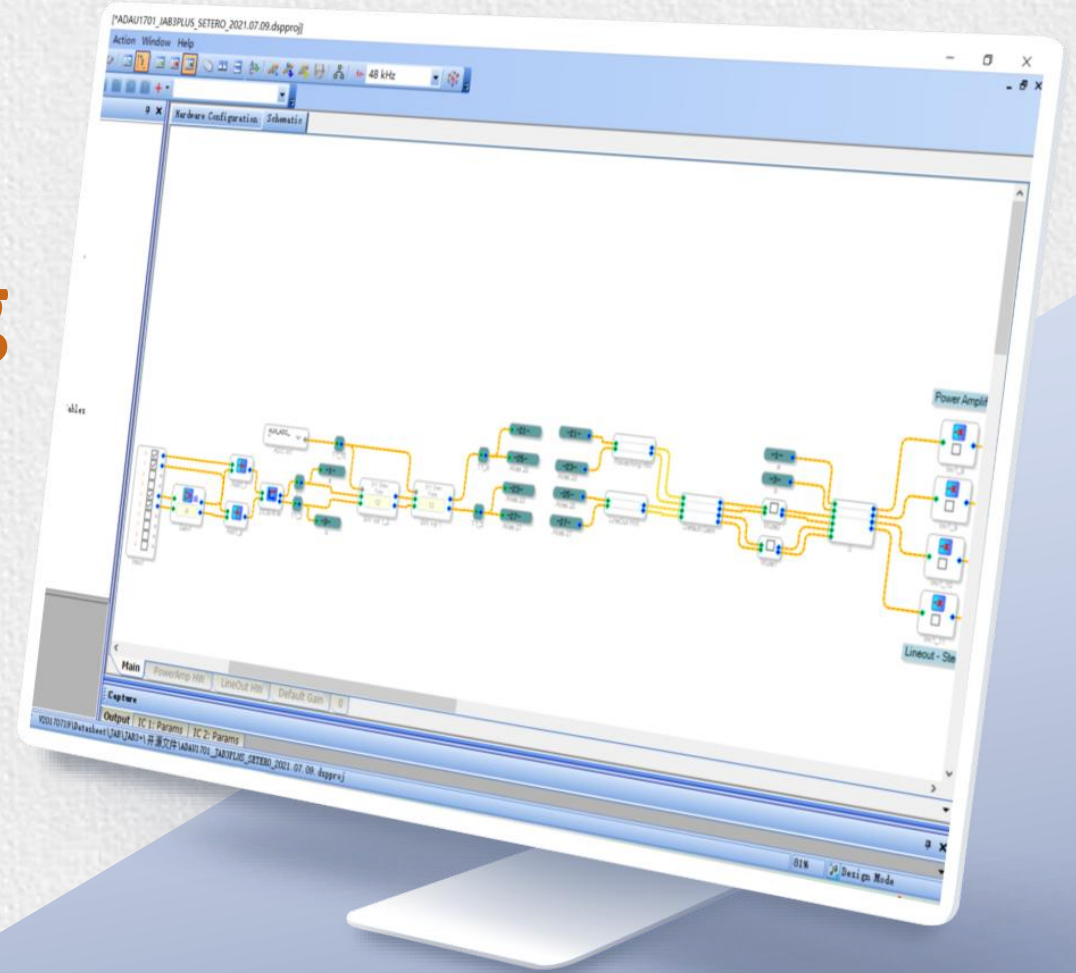
When SW1 is set at ① “USBi” and SW4 is set at ① “SPI”, this indicator will be ON.



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

ICP5

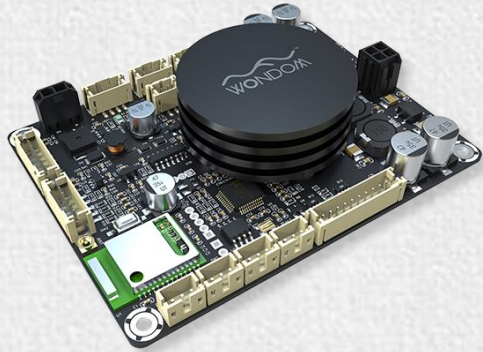
IN-CIRCUIT PROGRAMMER FOR SIGMASTUDIO PROGRAMMING, APP CONTROL & PC UI CONTROL



Checklist

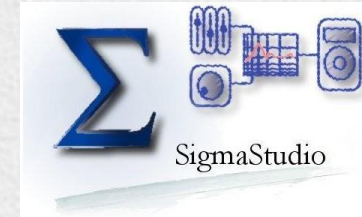
Before starting, please make sure you have the following items on hand.

1 WONDOM Products Integrated with ADAU1701

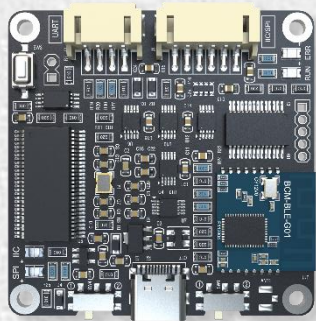


Here we will use JAB3+ as an example to explain how to connect.

2 Analog Devices, Inc. SigmaStudio™



3 WONDOM ICP5 with a 6-pin cable

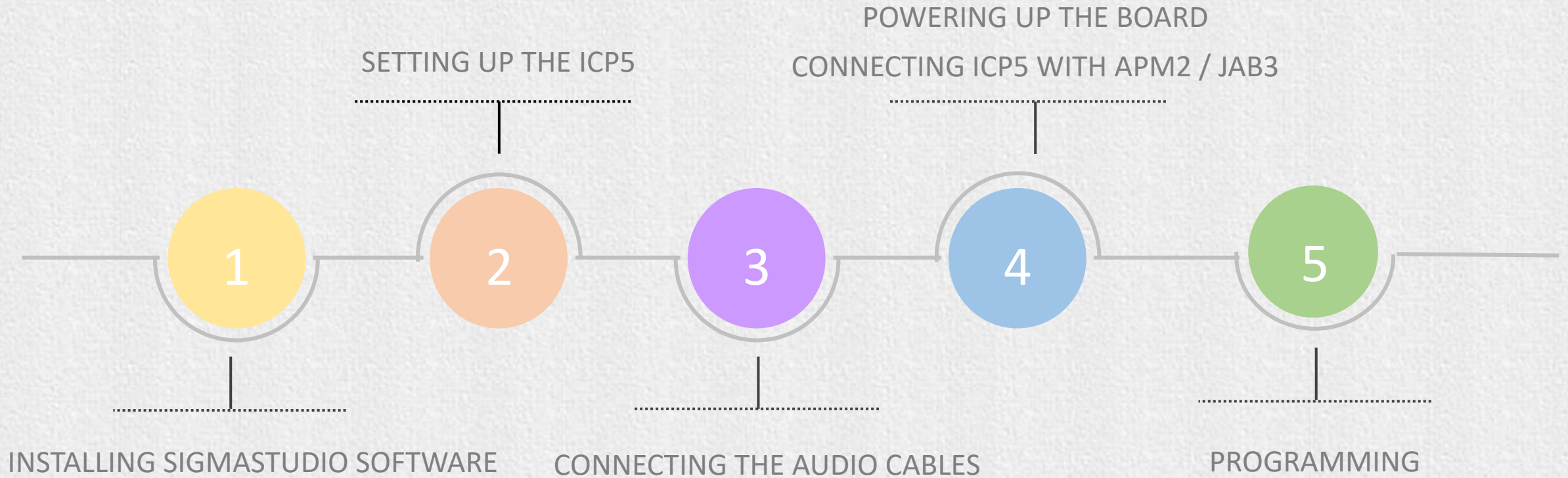


4 Accessories

Speakers
Cables
Phone
...

Steps

Be sure to follow these connection steps.



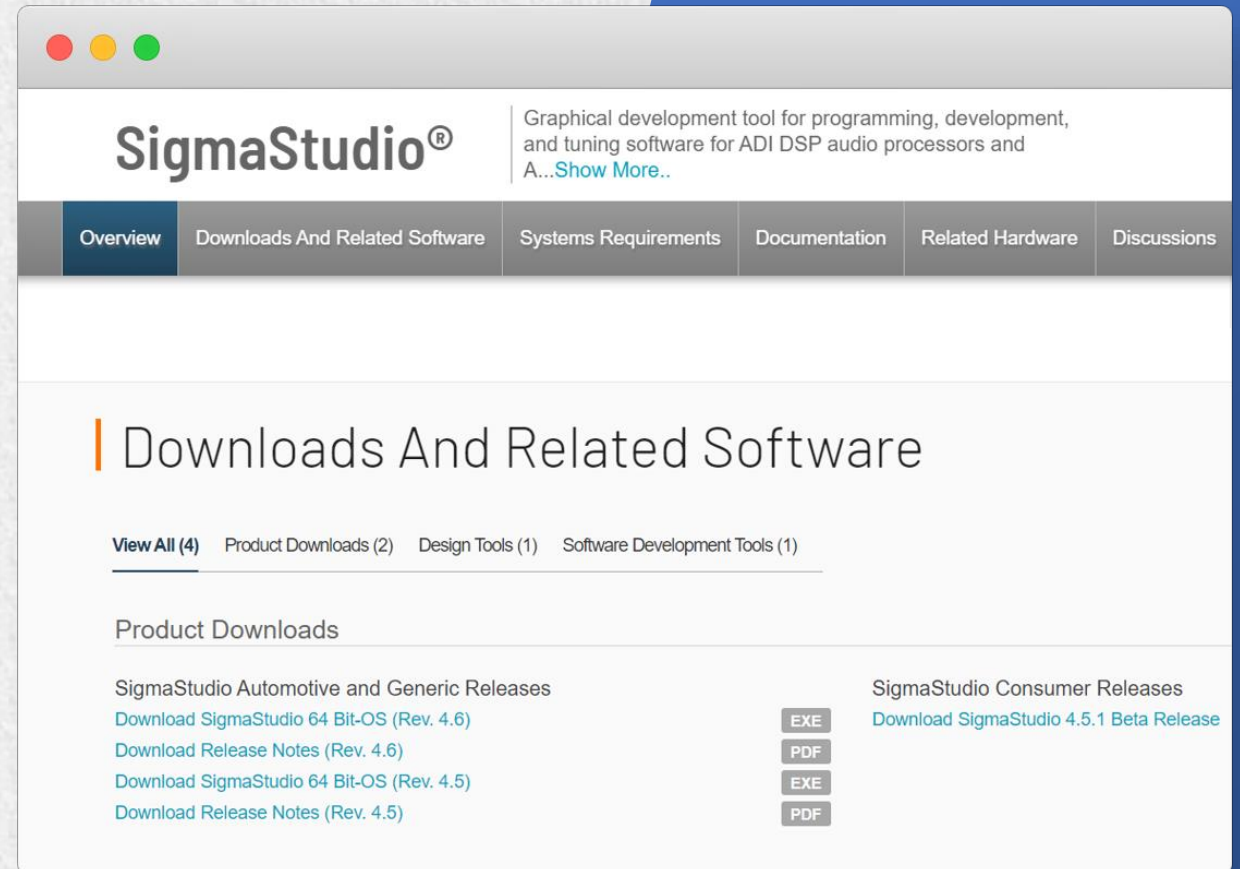
Installing SigmaStudio

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

1. Set Switches on ICP5

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

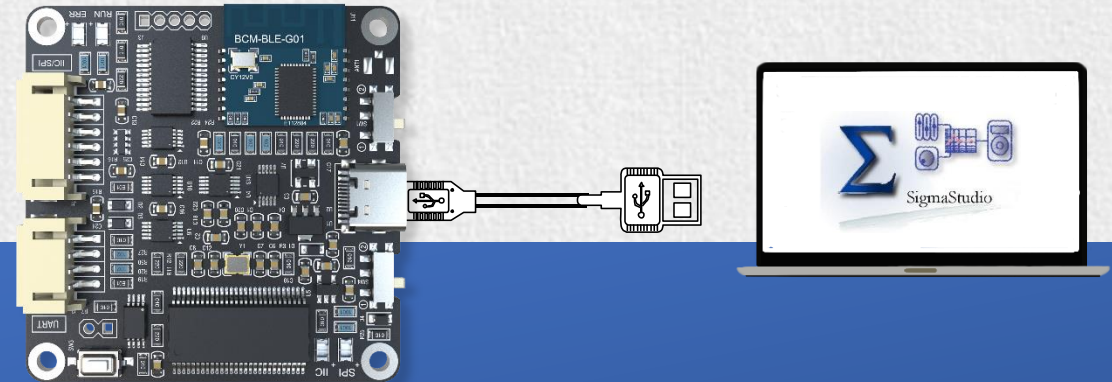
SW1	MODE	FUNCTION
①	USBi	SigmaStudio Programming
②	Remote	APP Control / PC UI Control

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

2. 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.

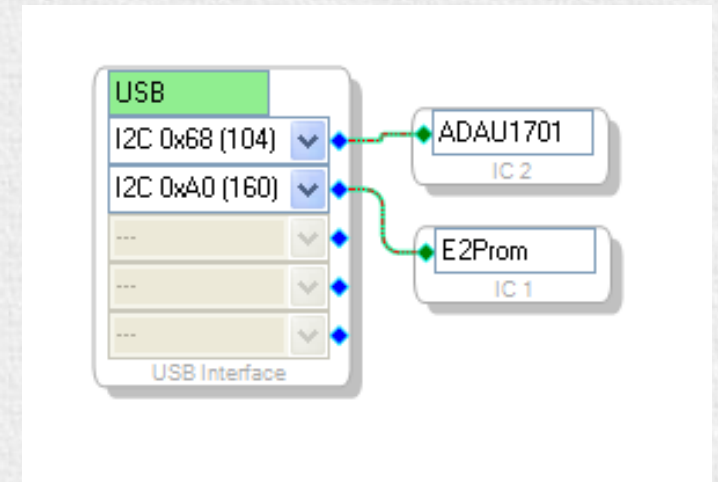


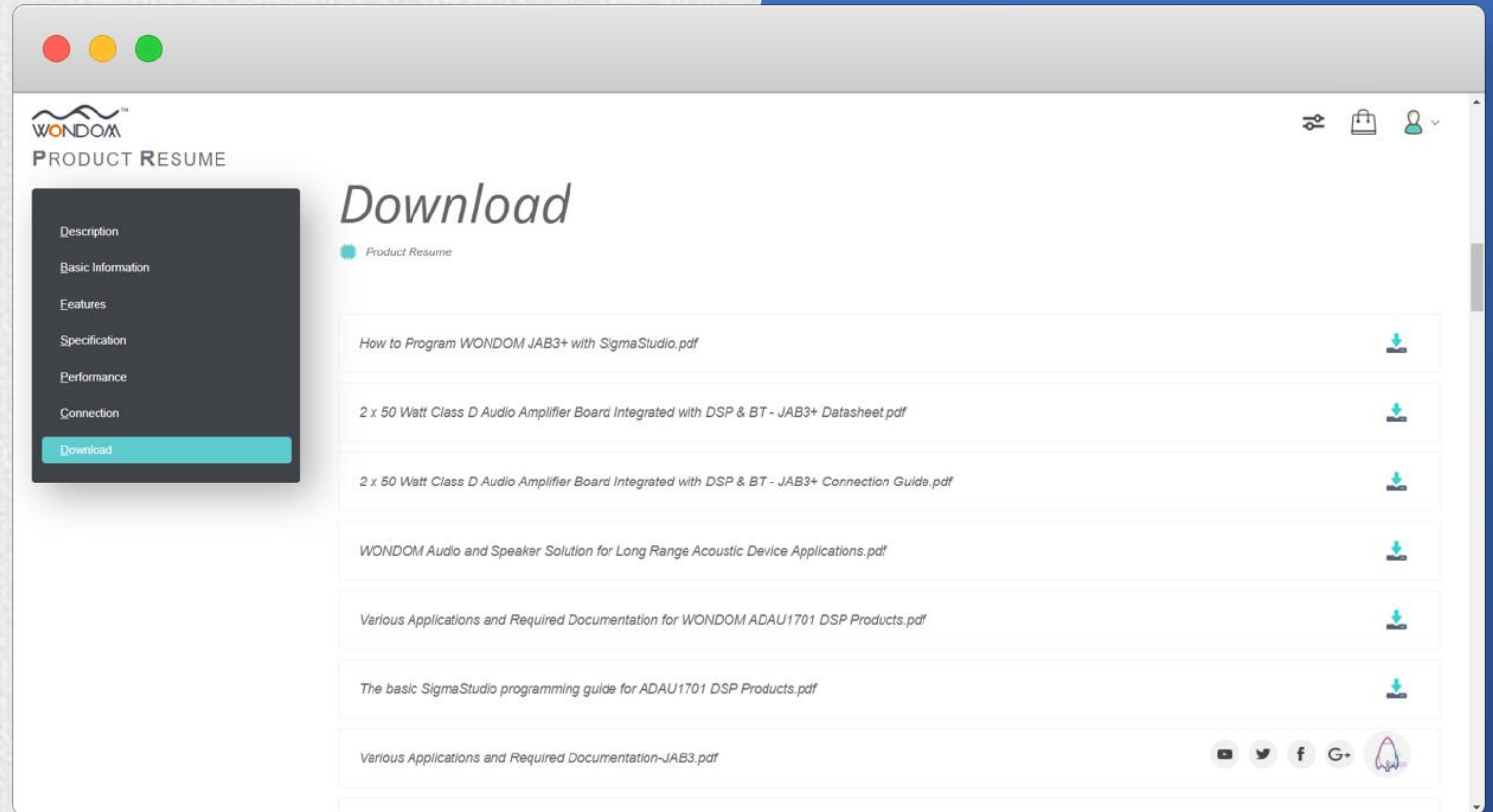
Figure 1

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”.



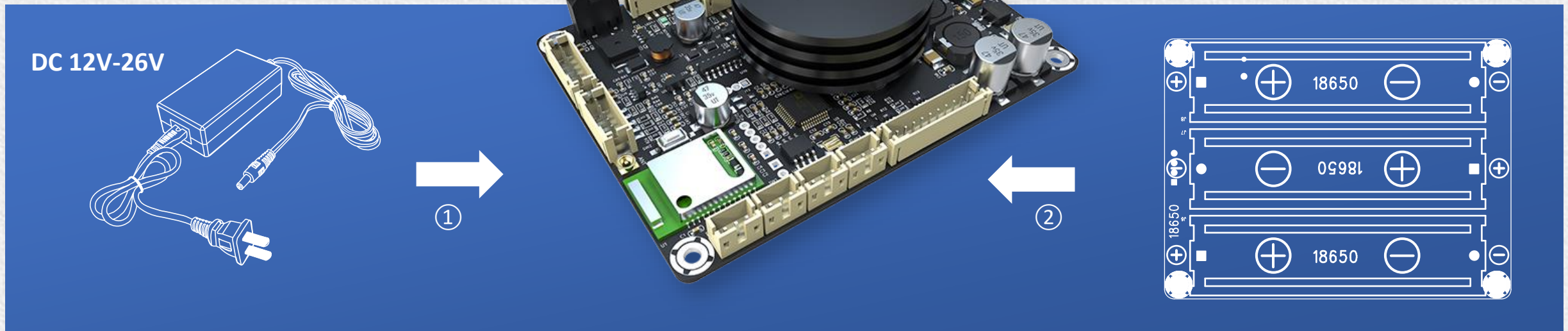
Powering up the board

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.



Original 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_SigmaStudio.dspproj	Download
JAB3 - Mono	JAB3_SigmaStudio_MONO.dspproj	Download
JAB3 - Stereo	JAB3_SigmaStudio_STEREO.dspproj	
JAB3+	JAB3+_Stereo_ADAU1701_DEMOProgram.dspproj	Download
JAB4	JAB4_ADAU1701_DEMOProgram.dspproj	-
JAB5	JAB5_ADAU1701_DEMOProgram.dspproj	Download

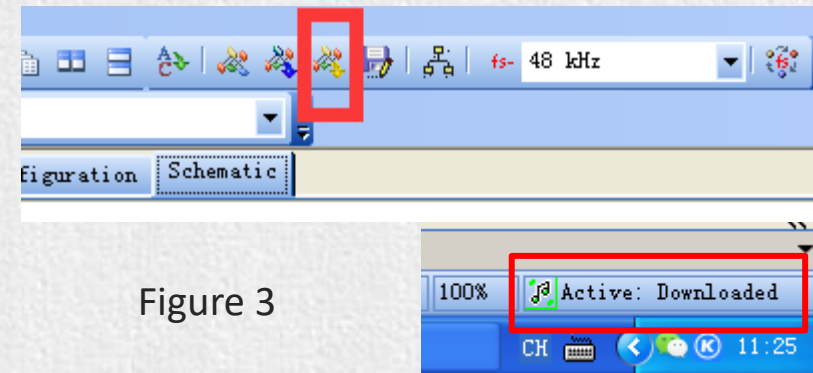
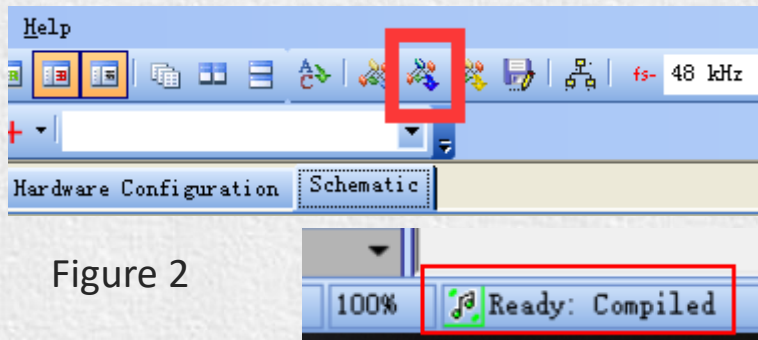
Online Debugging

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.



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).

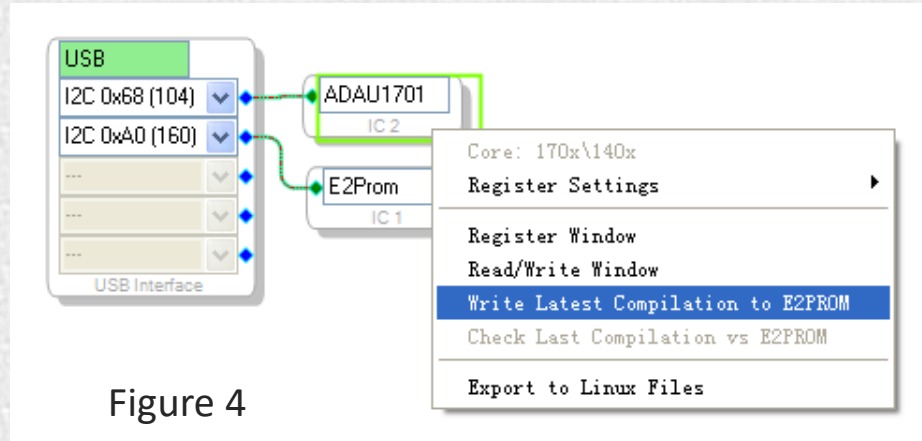


Figure 4

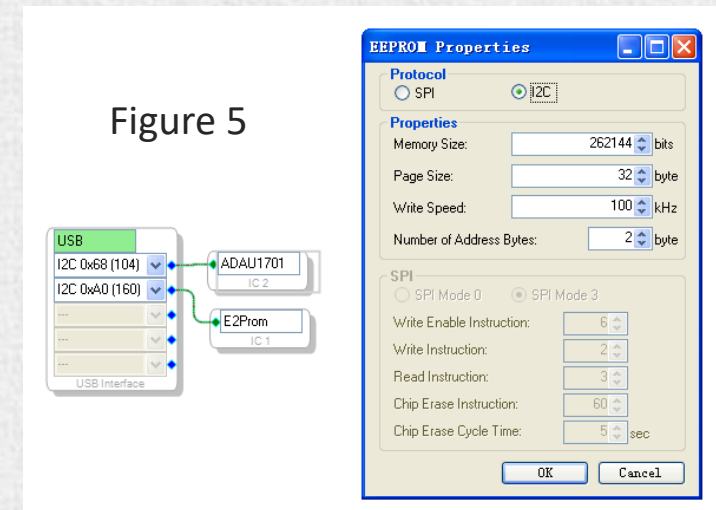
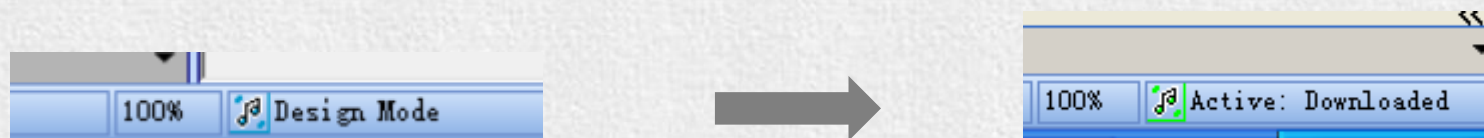


Figure 5

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.



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+

[JAB3+_Original_Firmware](#)

JAB4

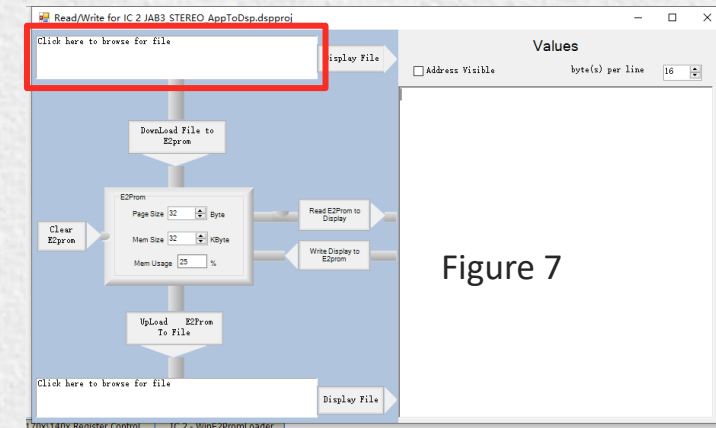
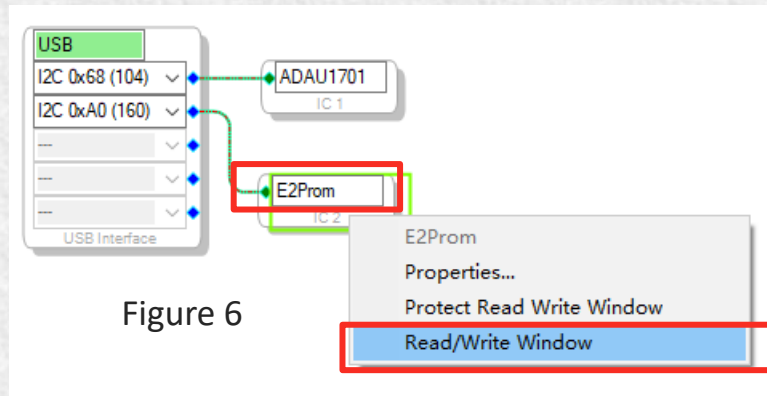
[JAB4_Original_Firmware](#)

JAB5

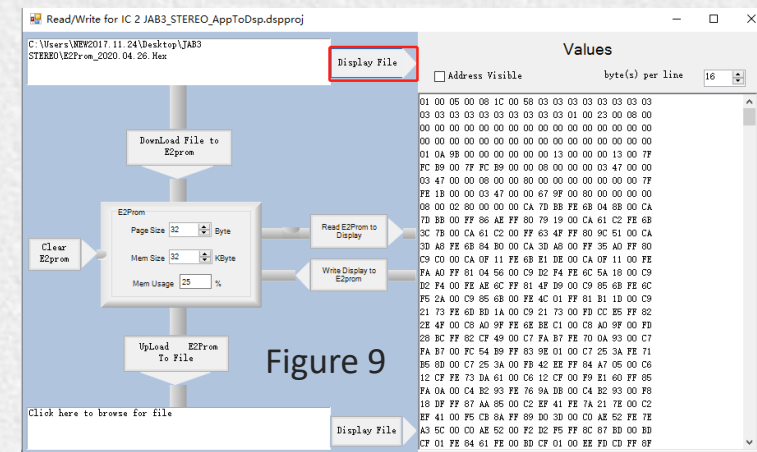
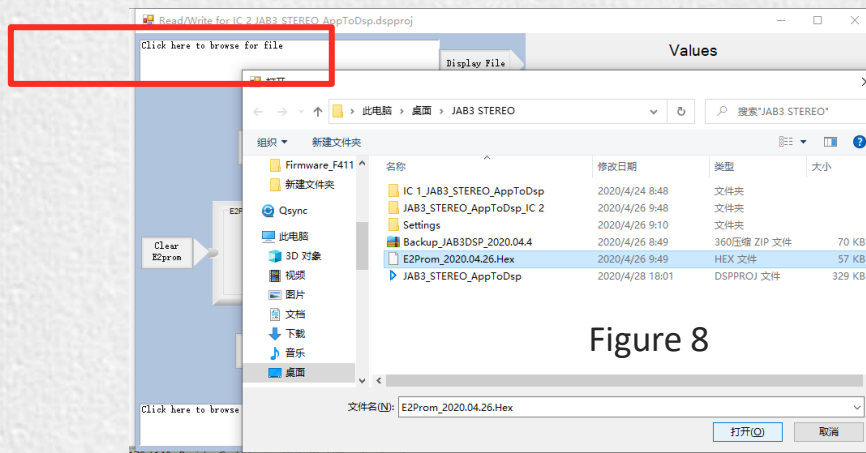
[JAB5_Original_Firmware](#)

Original Firmware Restore

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



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



Original Firmware Restore

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

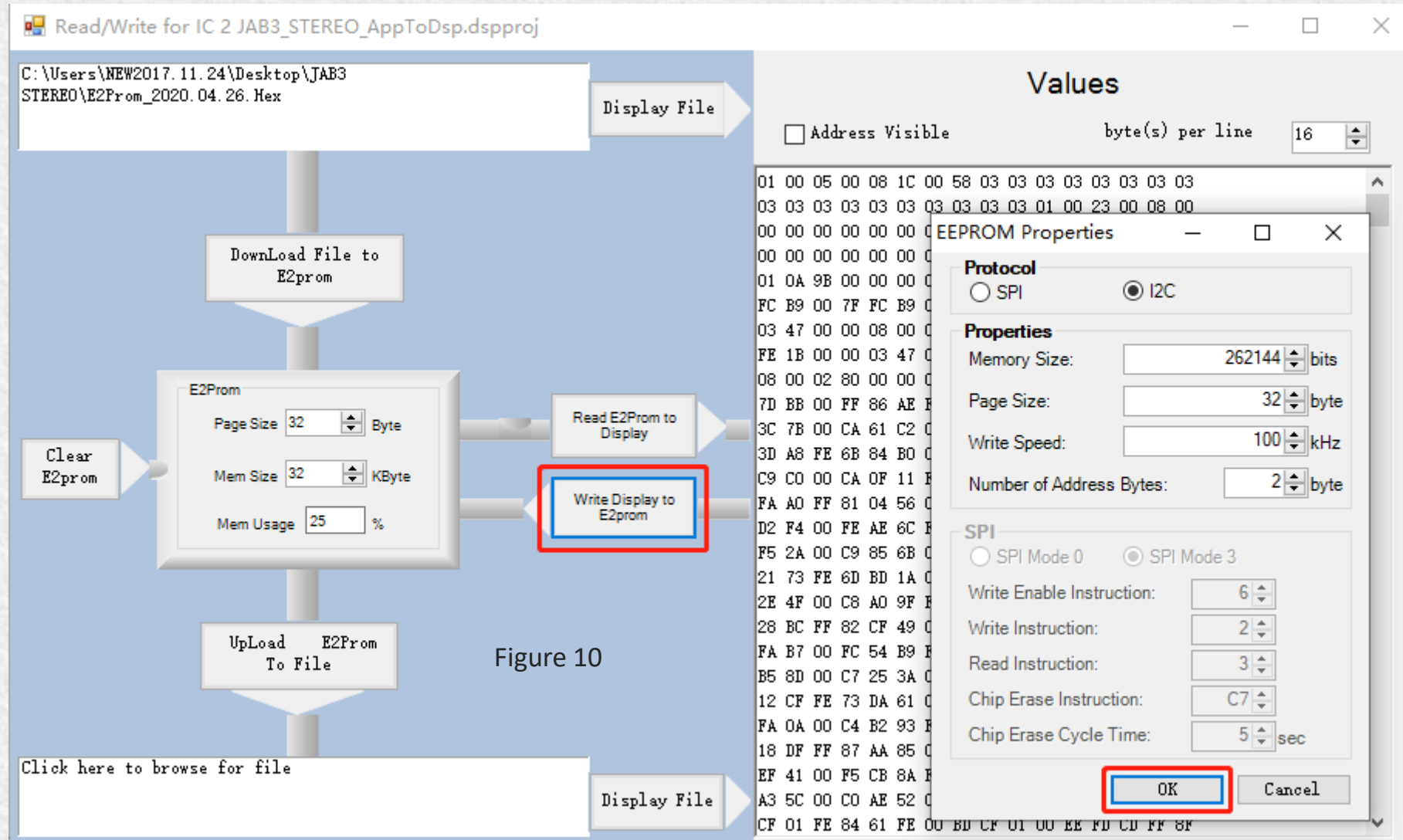


Figure 10

TROUBLE SHOOTING

TROUBLE	HOW TO SOLVE
ICP5 cannot be recognized by PC	<ul style="list-style-type: none">➤ 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	<ul style="list-style-type: none">➤ 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	<ul style="list-style-type: none">➤ 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)



How to Realize **PC UI Control** with WONDOM ICP5?

ICP5
IN-CIRCUIT PROGRAMMER FOR SIGMASTUDIO PROGRAMMING, APP
CONTROL & PC UI CONTROL



PC UI Software

We need to download corresponding PC UI for controlling different products.

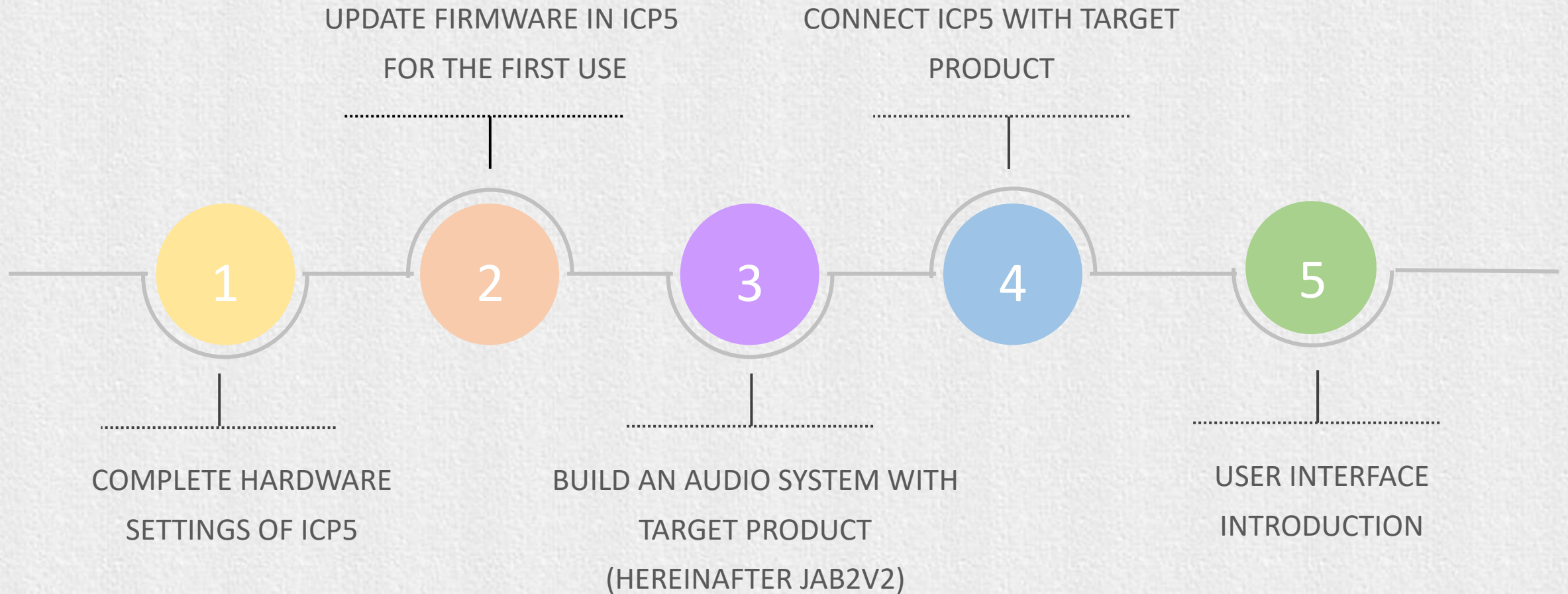
For now, we have only released PC UI for JAB2v2. Here is the download link.

[http://store.sure-electronics.com/images/documents/Miumax For JAB2 Setup.zip](http://store.sure-electronics.com/images/documents/Miumax_For_JAB2_Setup.zip)

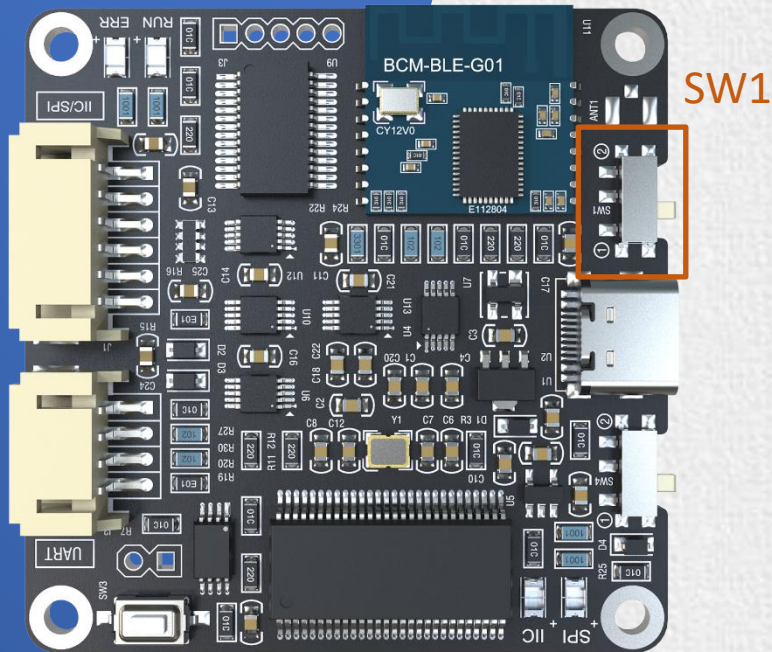
We are working hardly on promoting the releasement of PC UI for other products. You can check estimated release date in the right table.

Model	Matched PC UI
APM2	Y (End of Nov)
JAB2v2	Y
JAB3	Y (Mid-Nov)
JAB3+	Y (End of Oct)
JAB4	Y (Mid-Oct)
JAB5	Y (End of Sep)

CONTENTS



ICP5 Settings



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

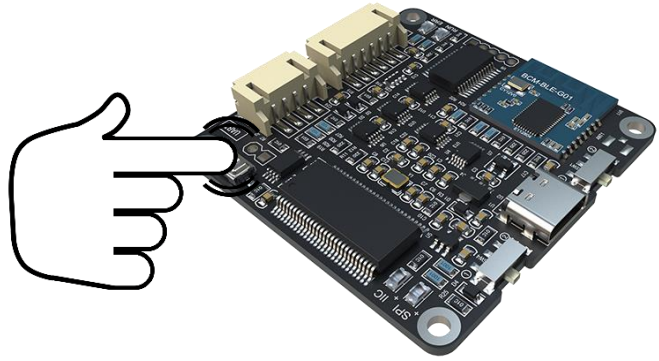
Firmware Update

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.

We need to enter BootLoader mode for firmware update.

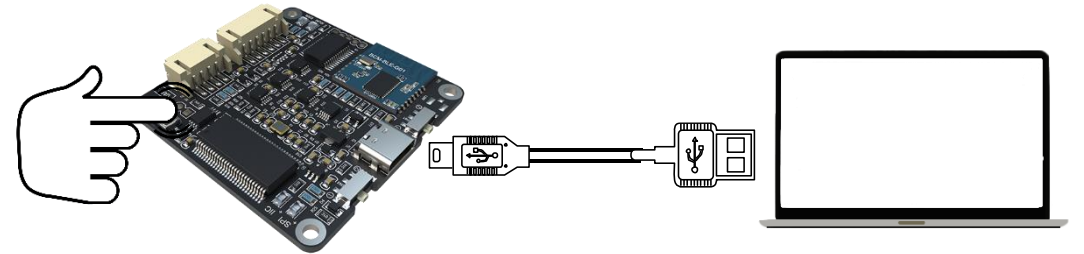
1. Press and hold on SW3 on ICP5

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.



Firmware Update

3. Firmware Update

Run downloaded PC UI.

Click “Firmware Update” in the upper right corner.

The software will automatically update the firmware for controlling JAB2v2 into ICP5.

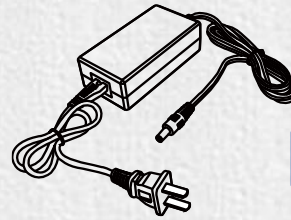
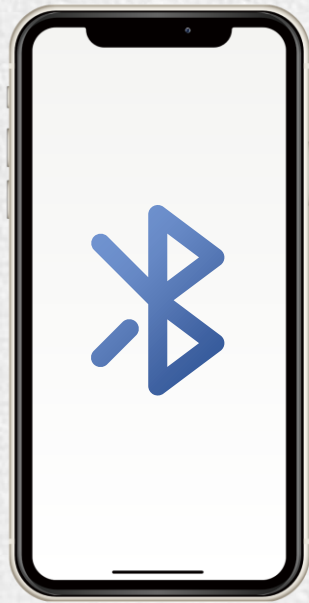
After the update is done, “RUN” indicator will turn from blinking to ON.

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.

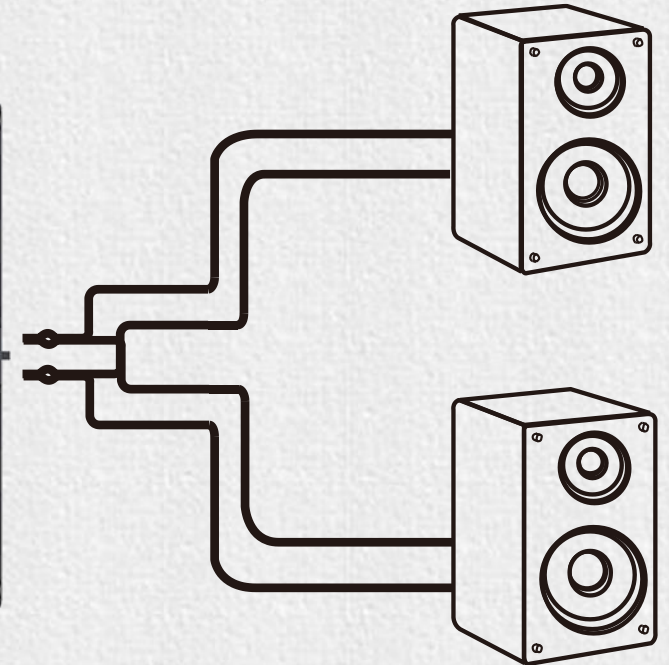
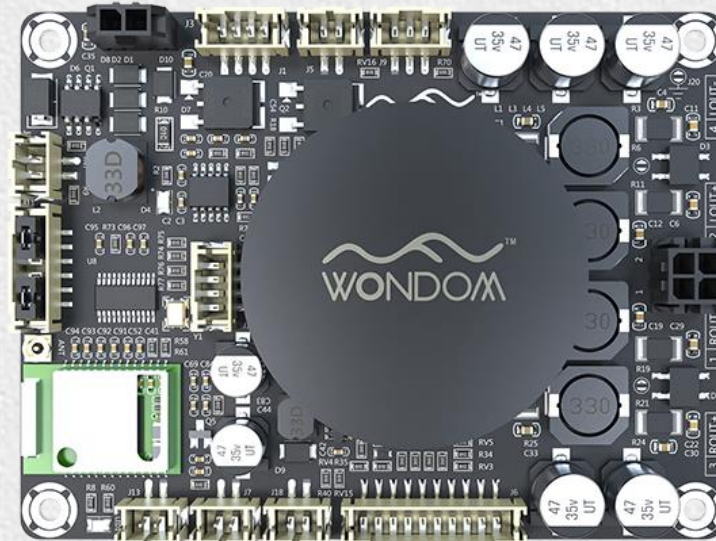


Audio System

Build a desired audio system with the target product. Once connection is done, power up the system.



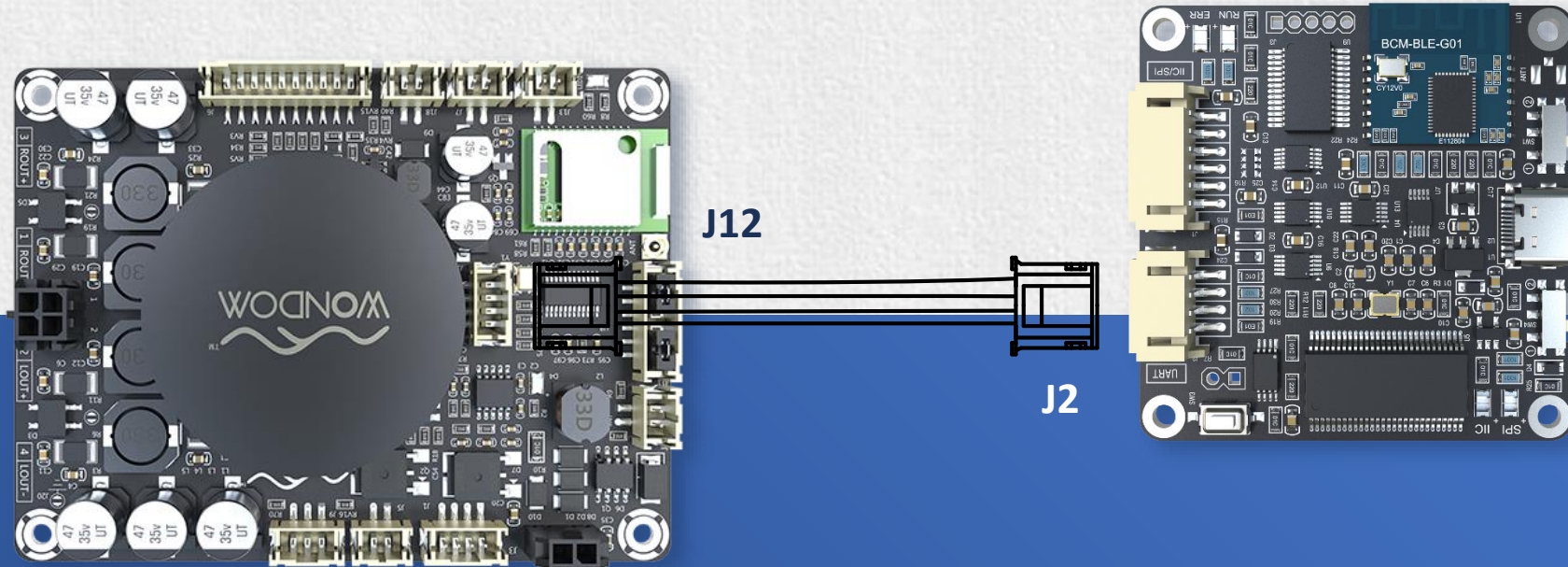
DC 10.8V-24V



Connect ICP5

Connect ICP5 with the target product.

The DSP chip in JAB2v2 is not from analog, so we connect it with ICP5 through PH-4Pos connector. If there is connection error or the firmware in ICP5 doesn't match the target device, "ERROR" indicator will be ON in red.



PC UI Control

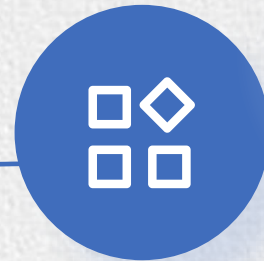
We can start PC UI control then.



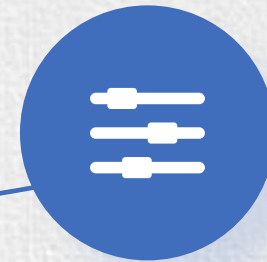
Frequency



Volume

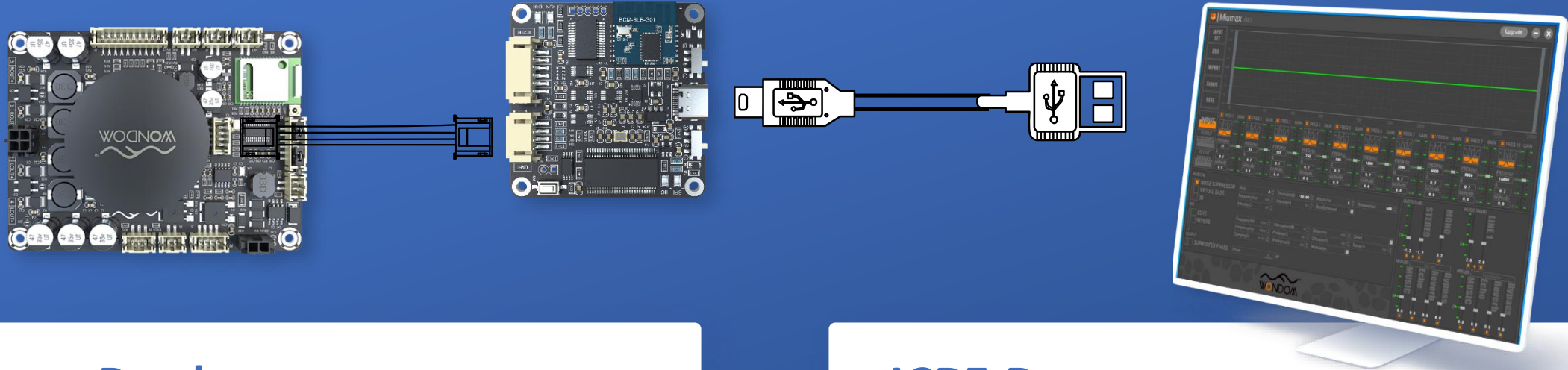


Output Mode



EQ

Power-off Memory



Target Product

If the target product is JAB2, it will keep the parameters once you click “Save” in the software.

If the target products are products with ADAU1701 DSP, the parameters won’t be kept. That means, once the product is disconnected with ICP5, it won’t be affected by the adjustments in PC UI.

ICP5 Programmer

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.



How to achieve **APP Control** with WONDOM ICP5?

ICP5

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

There is no APP available for ICP5.
We will working on development of APP right after all the PC UIs been released.

The estimated date is as follow.

Model	Matched PC UI
APM2	Y (End of Jul, 2022)
JAB2v2	N
JAB3	Y (End of Jun, 2022)
JAB3+	Y (End of May, 2022)
JAB4	Y (End of Apr, 2022)
JAB5	Y (End of Mar, 2022)