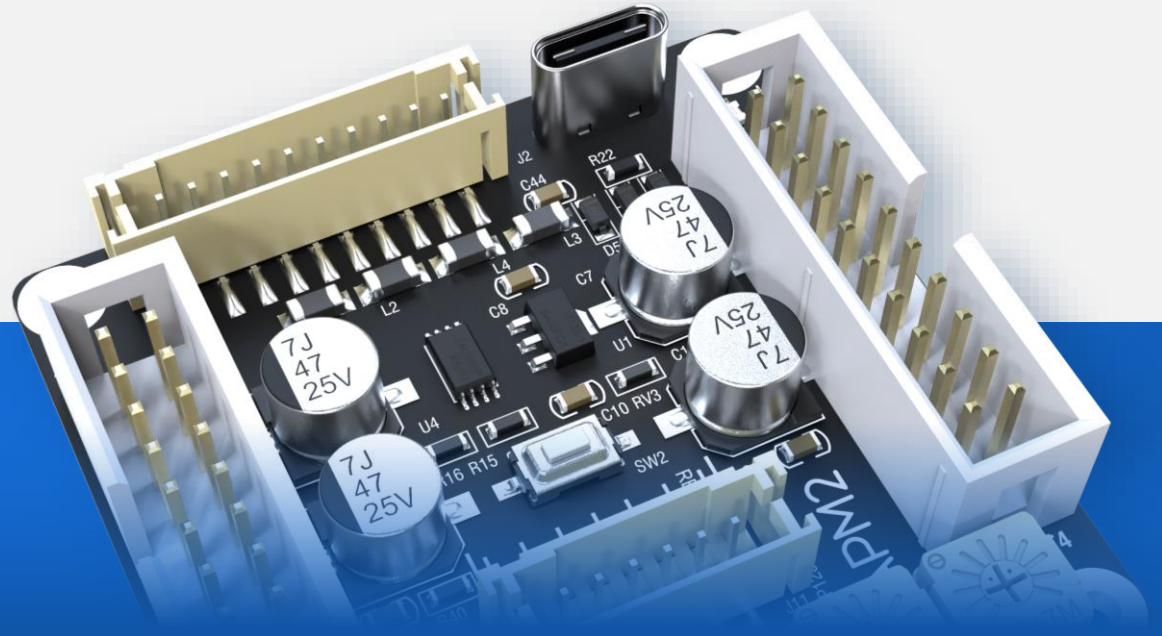
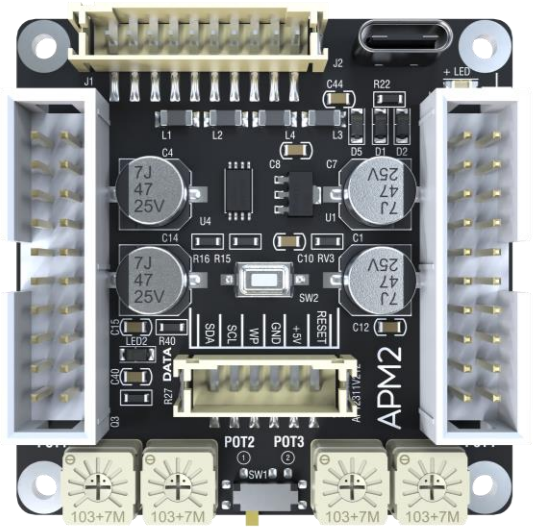
The Correspondence of APM2 Hardware & DSP Program

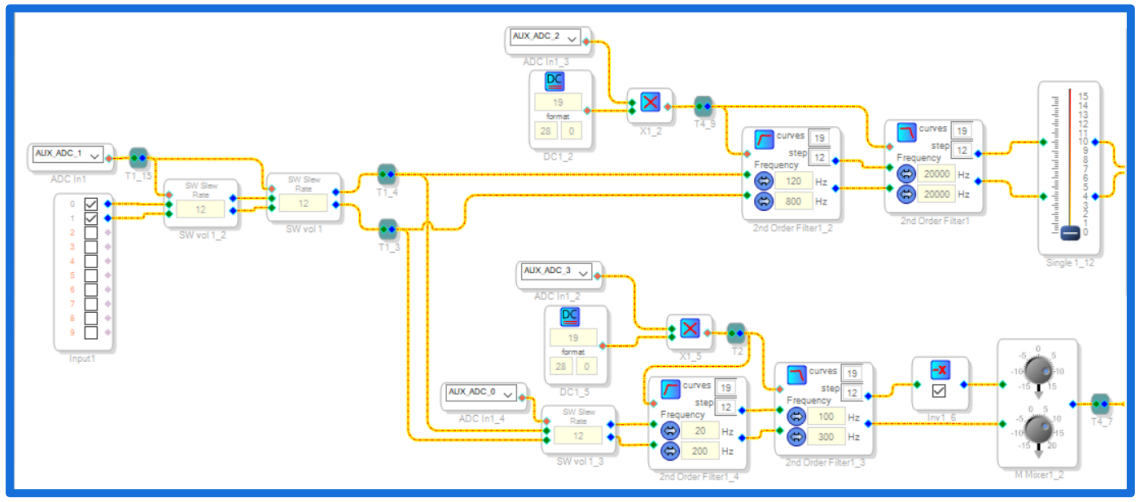


Overview

APM2 is the kernel board based on ADAU1701 DSP, which can provide 2-in, 3-out after connection with the interface extension board APM3, suitable for audio 2.1 system and digital crossover applications. Thanks to the integrated debug port, APM2 supports programming through SigmaStudio, which improves the flexibility and expandability. You can program APM2 with original USBi, or WONDOM in-circuit programmer – ICP series.

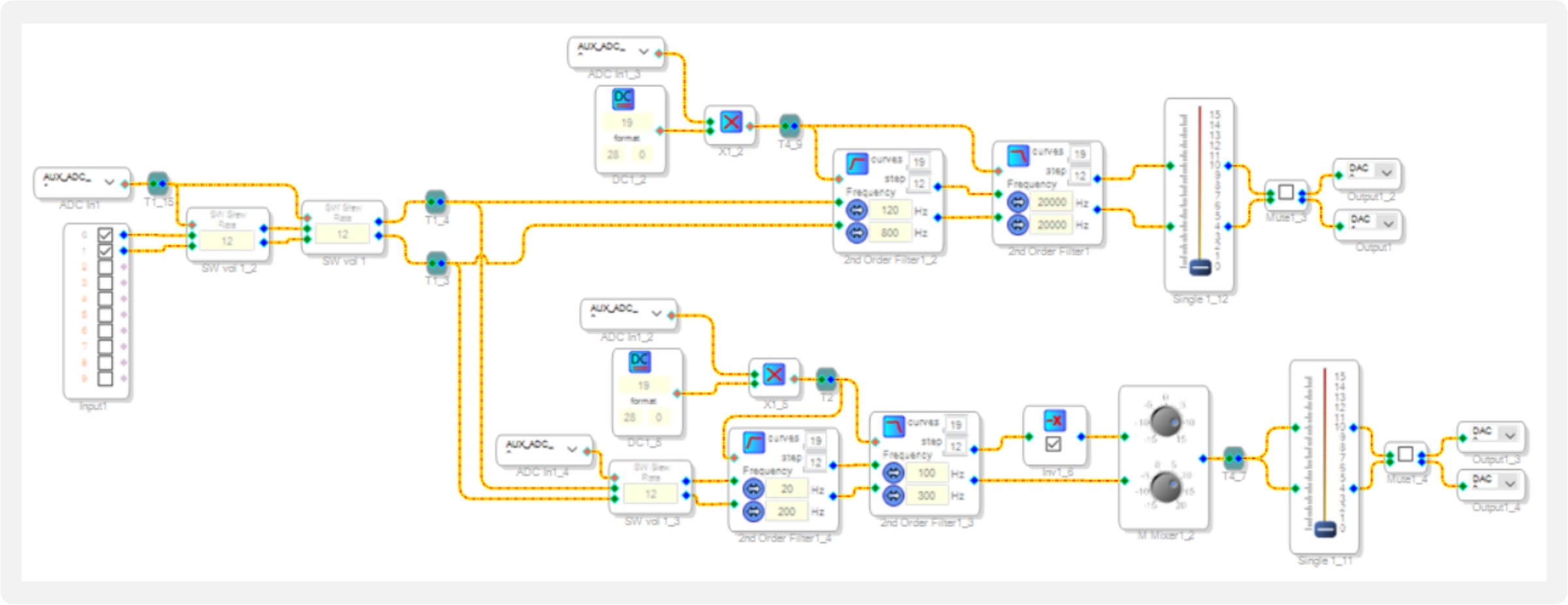
For customers convenient connection and operation, we developed APM2 with various hardware resources like audio input, output and control, on the basis of ADAU1701's resources. We need to know the correspondence relationship of APM2 hardware and DSP software, along with the remaining available resources of ADAU1701 for better further development of APM2.



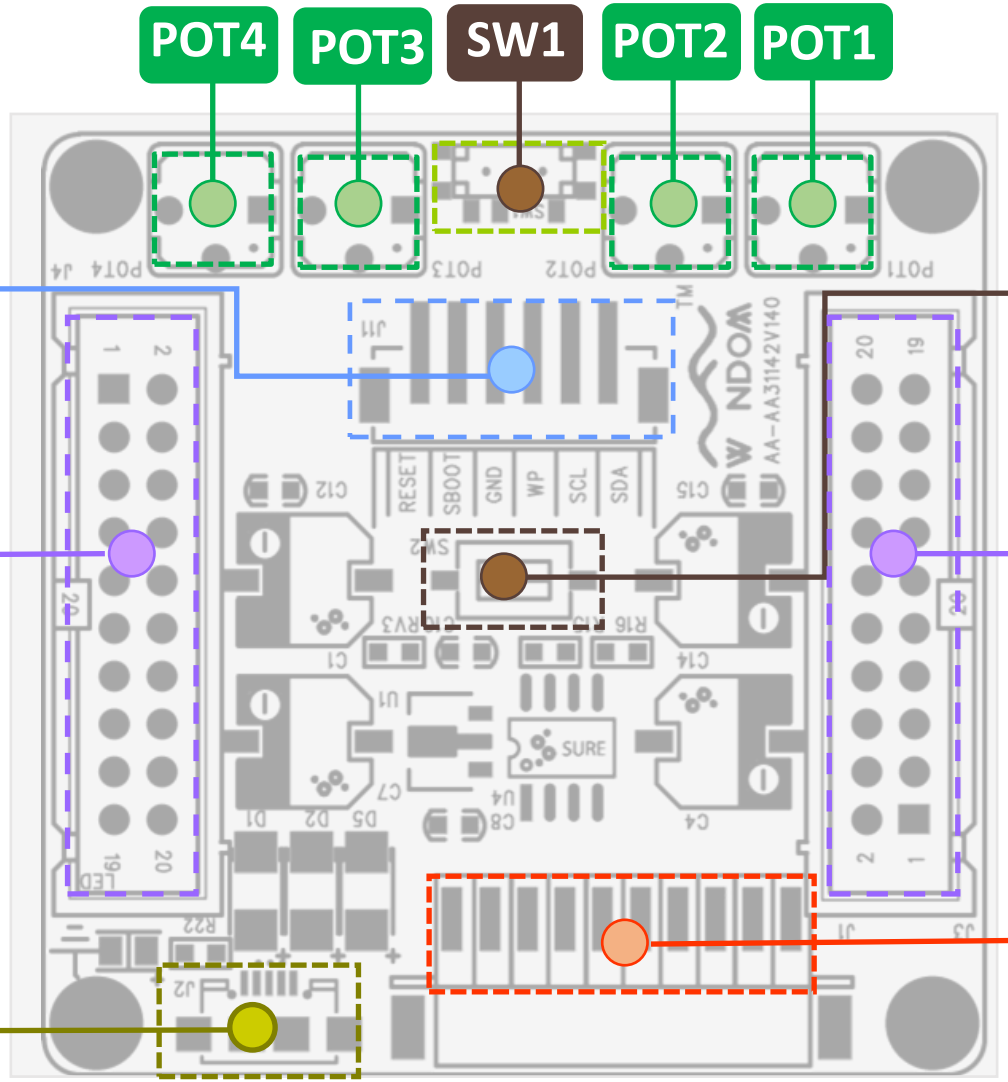


Correspondence Relationship

To make it easier and clearer for your understanding, we will make use of the open-sourced demo program to explain the correspondence relationship of APM2 hardware and ADAU1701 program. You can download the program HERE.



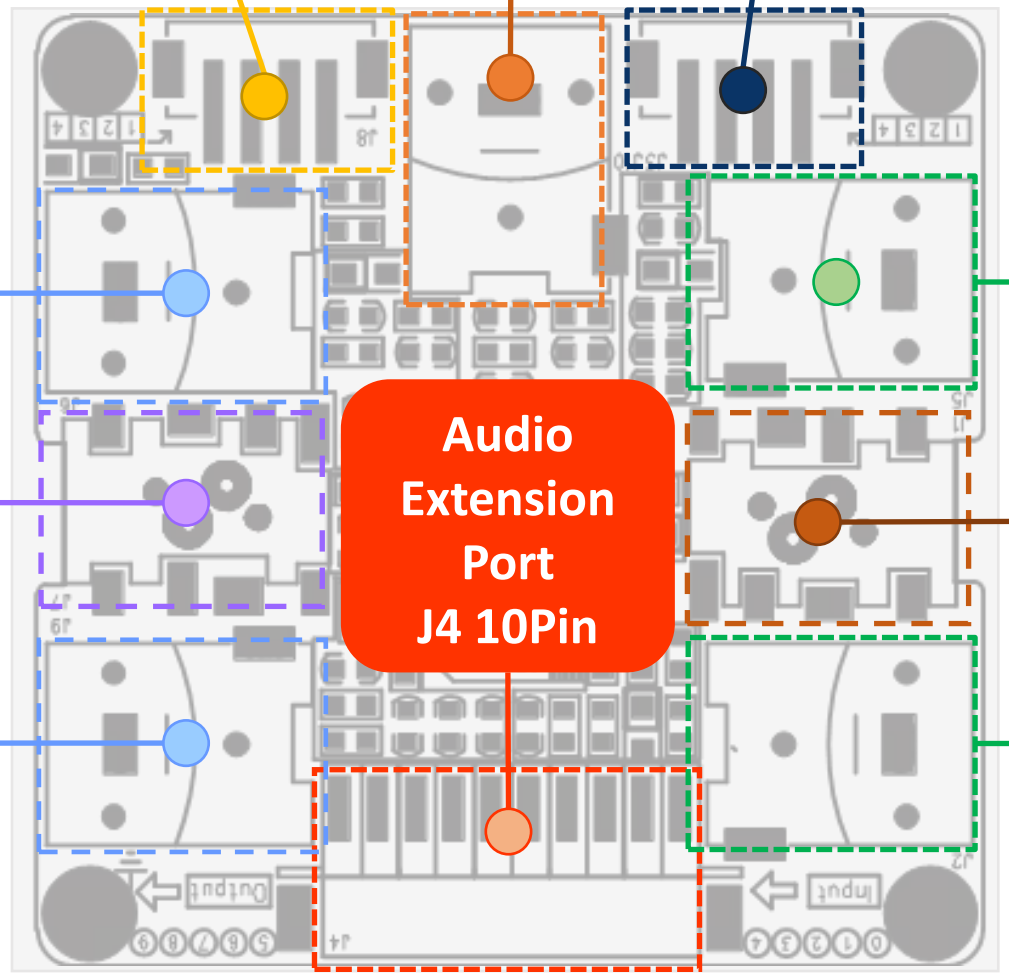
APM2 Interfaces



APM3 Interfaces

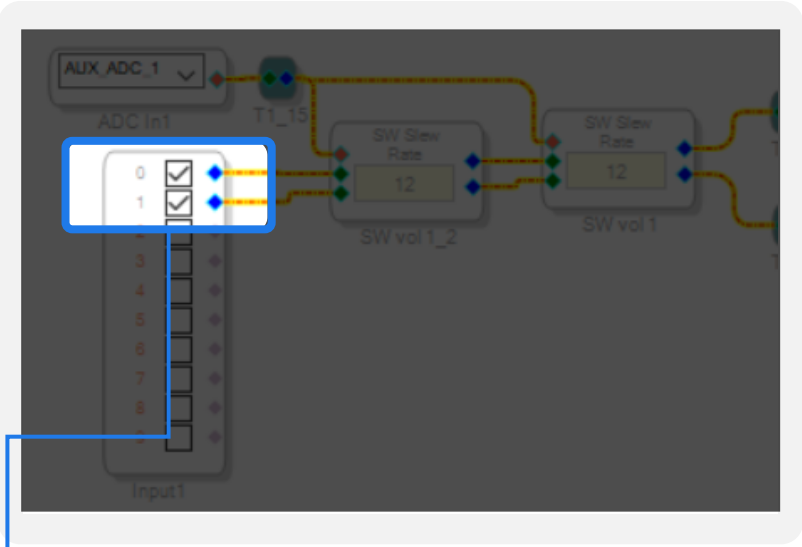
The stereo output (RCA, headphone & line output) of APM3 is connected in parallel. They cannot be used at the same time.

The stereo input (RCA, 3.5mm aux in & line input) of APM3 is connected in parallel. They cannot be used at the same time.



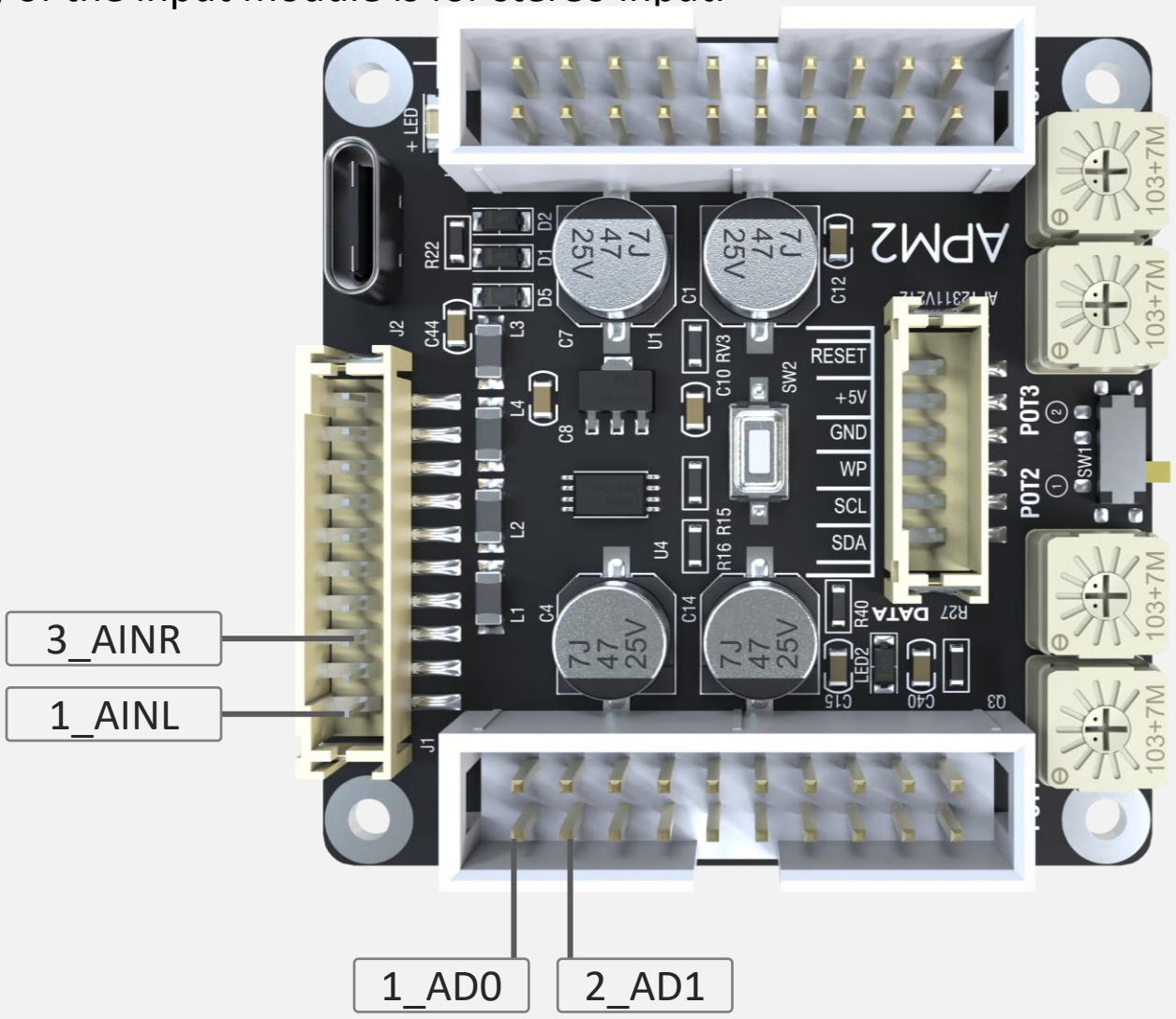
Audio Input

APM2 supports stereo analog input, which in hardware is pin 1 (AINL) & pin 3 (AINR) of J1, and pin 1 (AD0) & pin 2 (AD1). In the demo program, the 0 (ADC_IN0) and 1(ADC_IN1) of the input module is for stereo input.



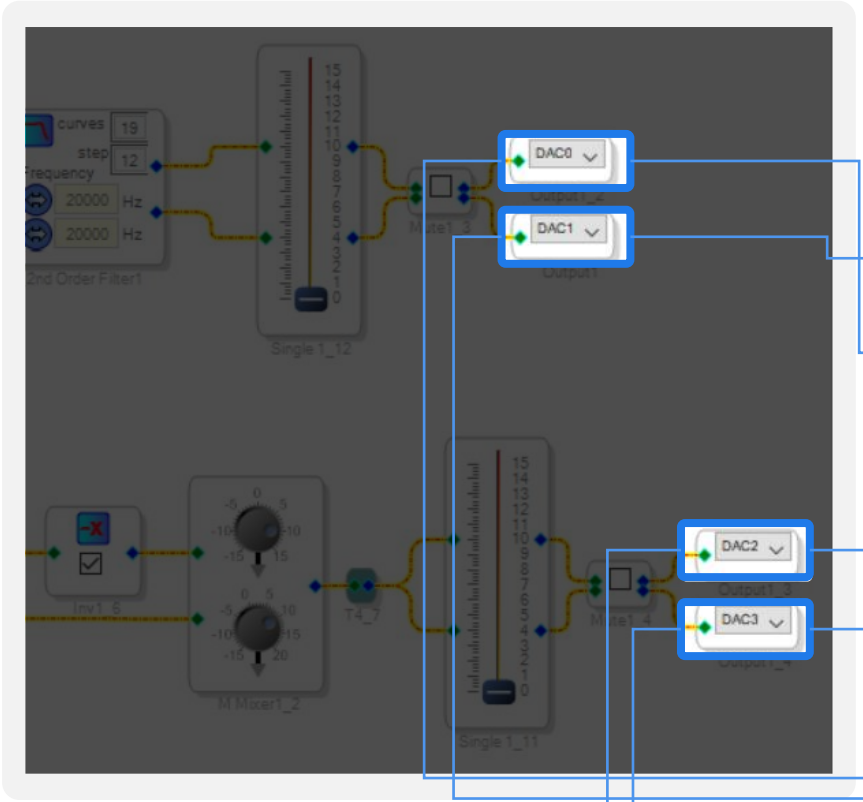
Analog Input

0 (ADC_IN0) and 1 (ADC_IN1) of the input module is for analog input.



Audio Output

APM2 supports 2-in, 4-out. The output in hardware is pin 5, 6, 7, 8 (OUTR1, OUTL1, OUTR2, OUTL2) of J1 and OR1, OL1, OR2, OL2 pin of J3, which is separately corresponded to DAC0, DAC1, DAC2, DAC3 output module in the program. APM3 interface extension board only supports 2-in, 3-out.

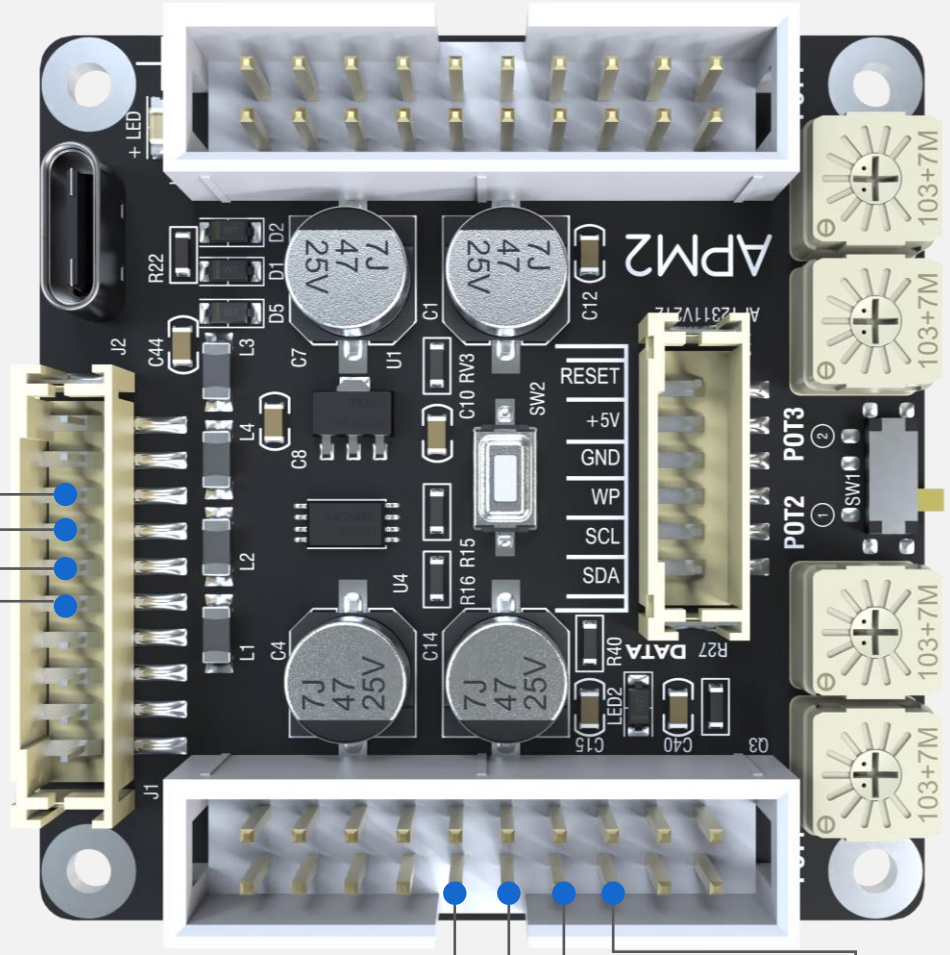


8_OUTL2

7_OUTR2

6_OUTL1

5_OUTR1

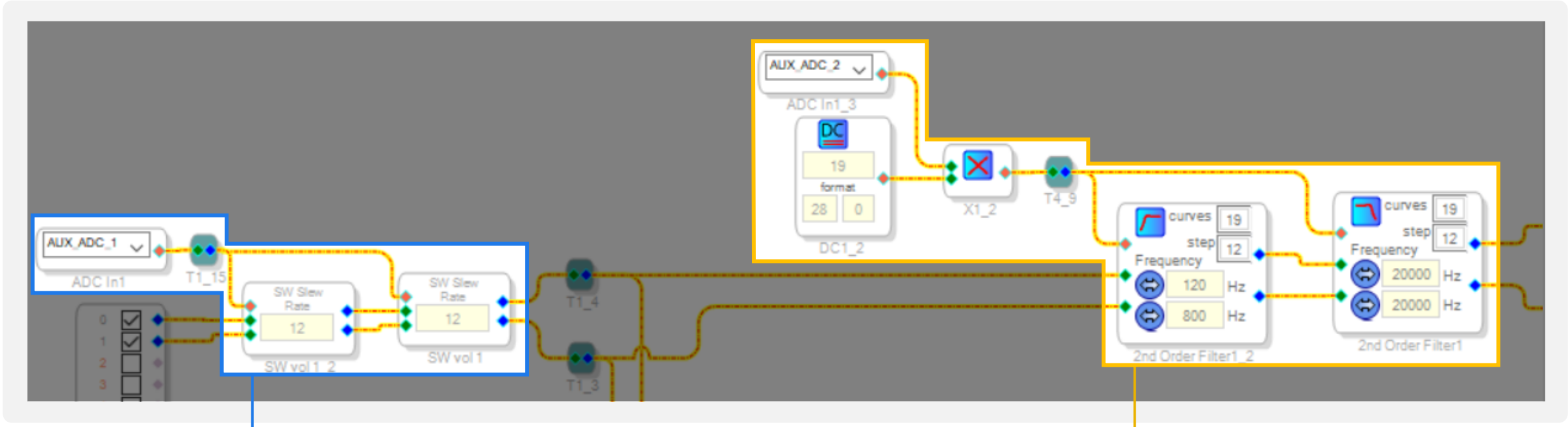


There are no coupling capacitors in the output pin of J3.

OR1 OL1 OR2 OL2

Potentiometers

There are four on-board potentiometers on APM3, which can be used to adjust the gain and cut-off frequency of audio system. The mapping relationship is as follows.



POT4

AUX_ADC_1 (MP2) --> POT4

Overall Gain Adjustment

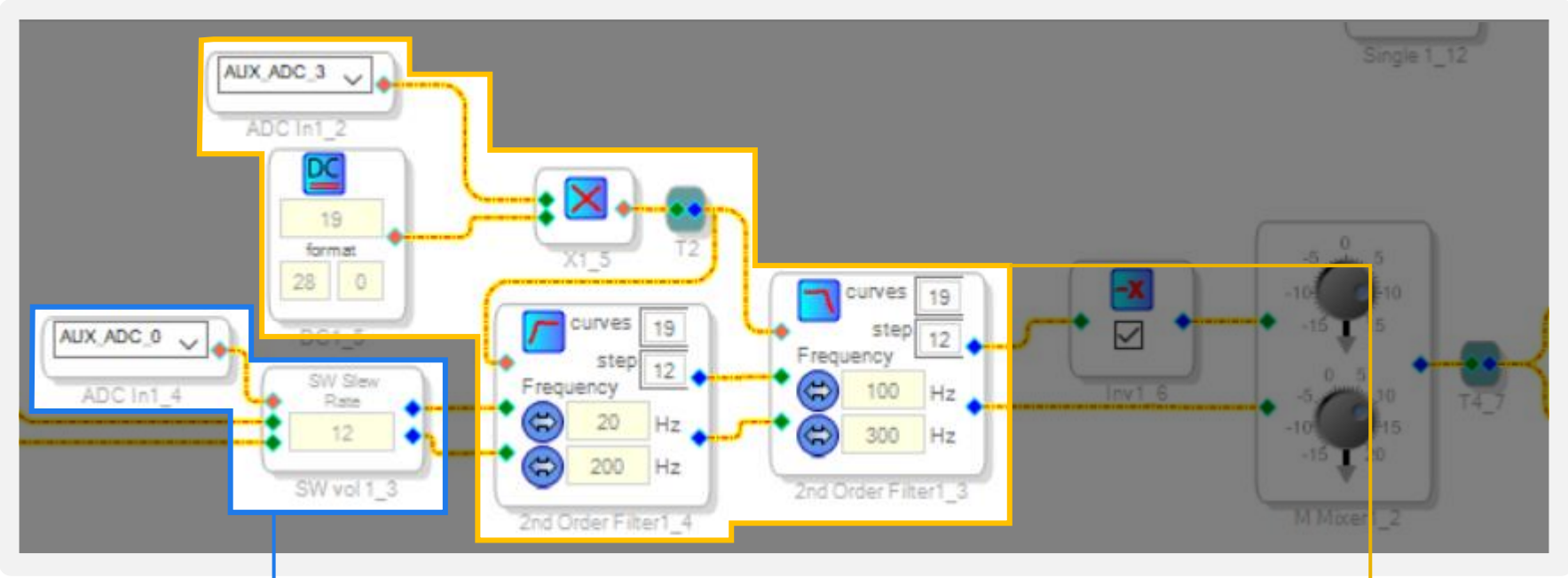
POT3

AUX_ADC_2 (MP3) --> POT3

Cut-off Frequency of Treble

Potentiometers

There are four on-board potentiometers on APM3, which can be used to adjust the gain and cut-off frequency of audio system. The mapping relationship is as follows.



POT1

AUX_ADC_0 (MP9) --> POT1

Bass Gain Adjustment

POT2

AUX_ADC_3 (MP8) --> POT2

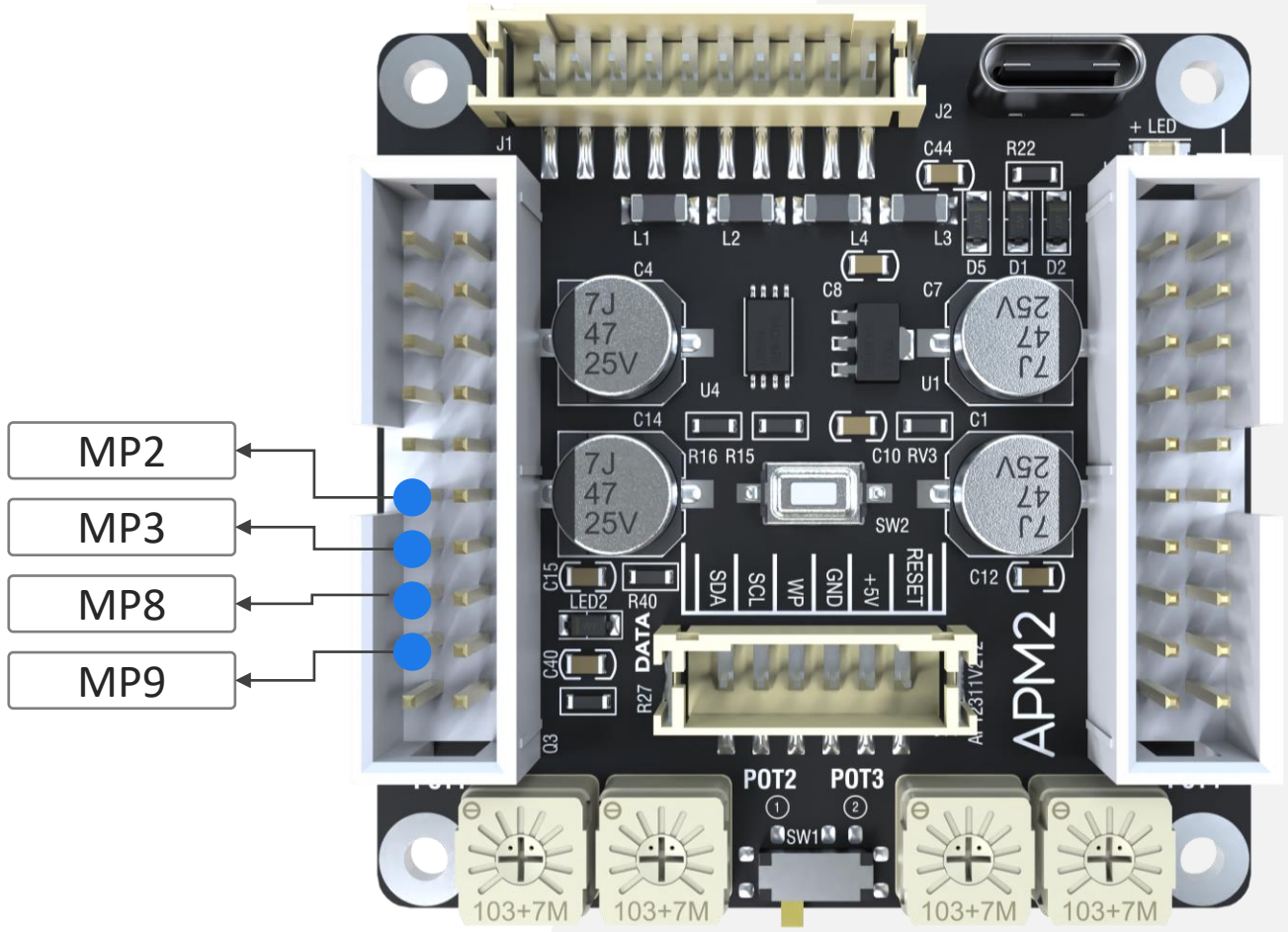
Cut-off Frequency of Bass

Potentiometers

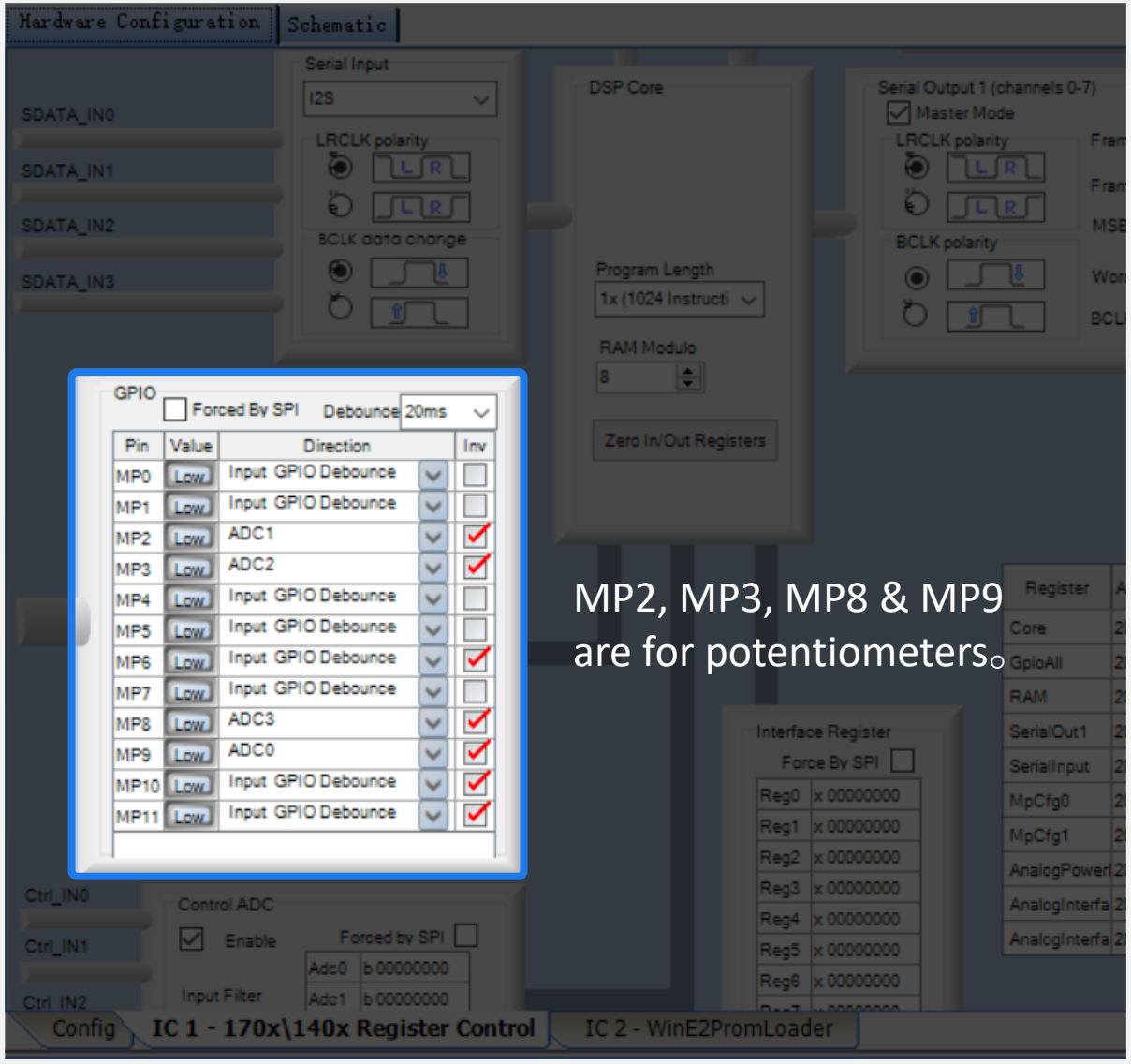
If you want external potentiometers, you can lead out MP2, MP3, MP8, MP9 of J3.

Lead out +3.3V, GND and corresponding pin of the potentiometer for an external control.

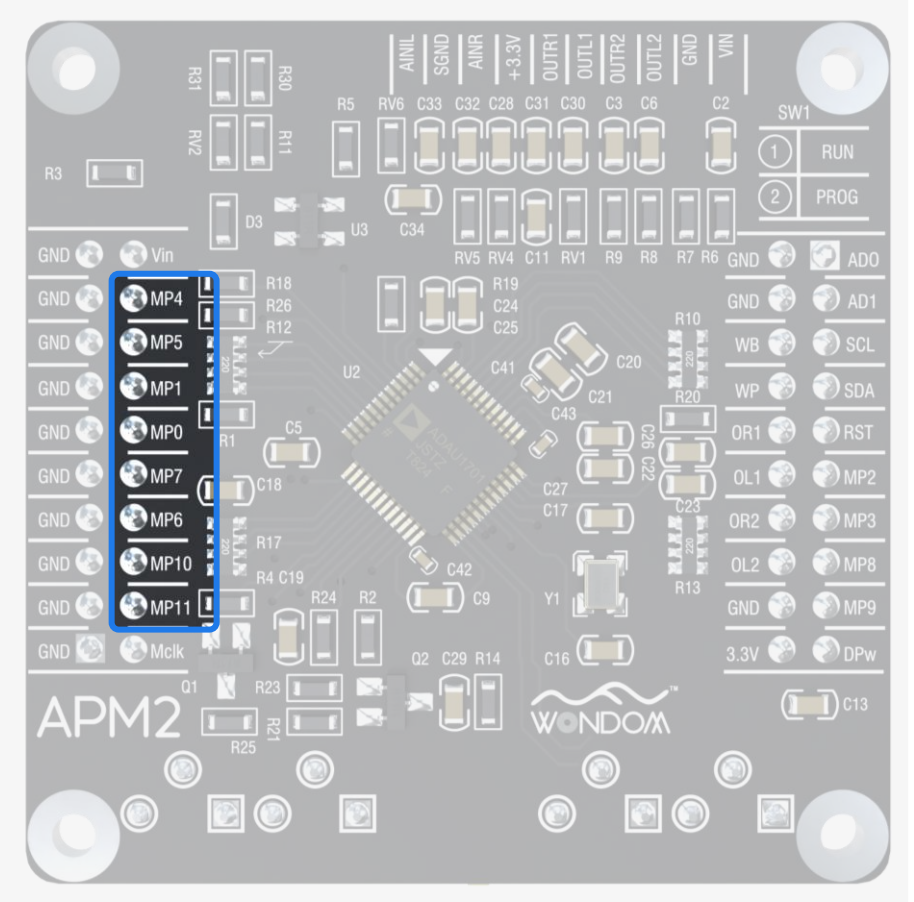
Please note, if you want to adjust audio parameters through the external potentiometers, you need to set the on-board potentiometers at the maximum value at first.



Extension Port



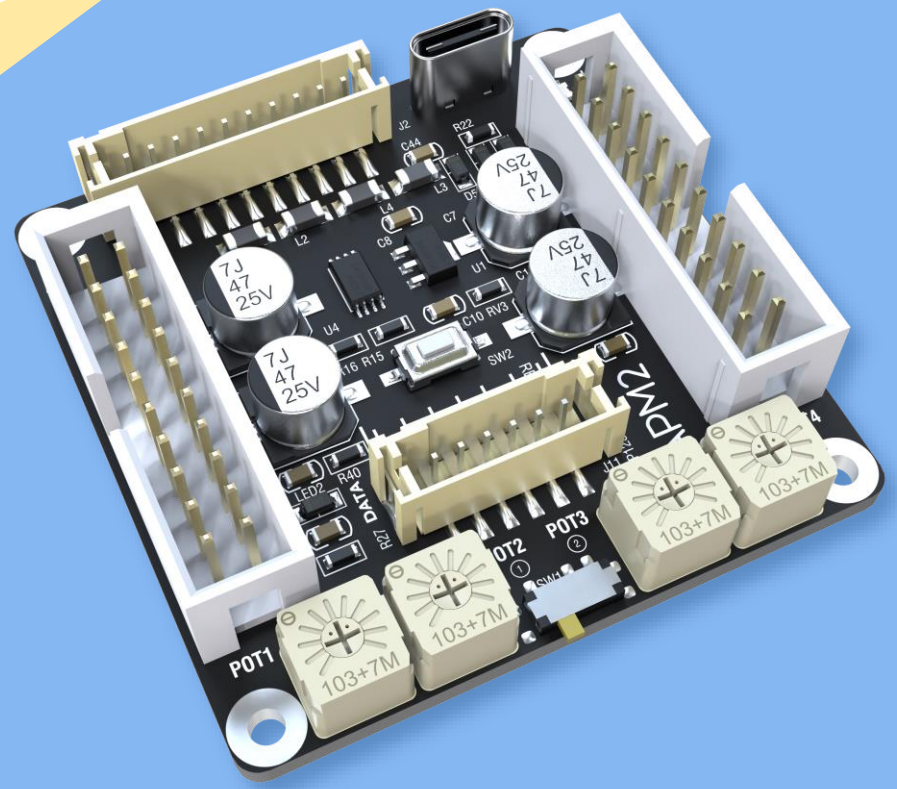
There are two 20-pin extension ports on APM3. 。MP0, MP1, MP4-MP7, MP10 and MP11 are still available for further development.



APM2 I2S Input & Output

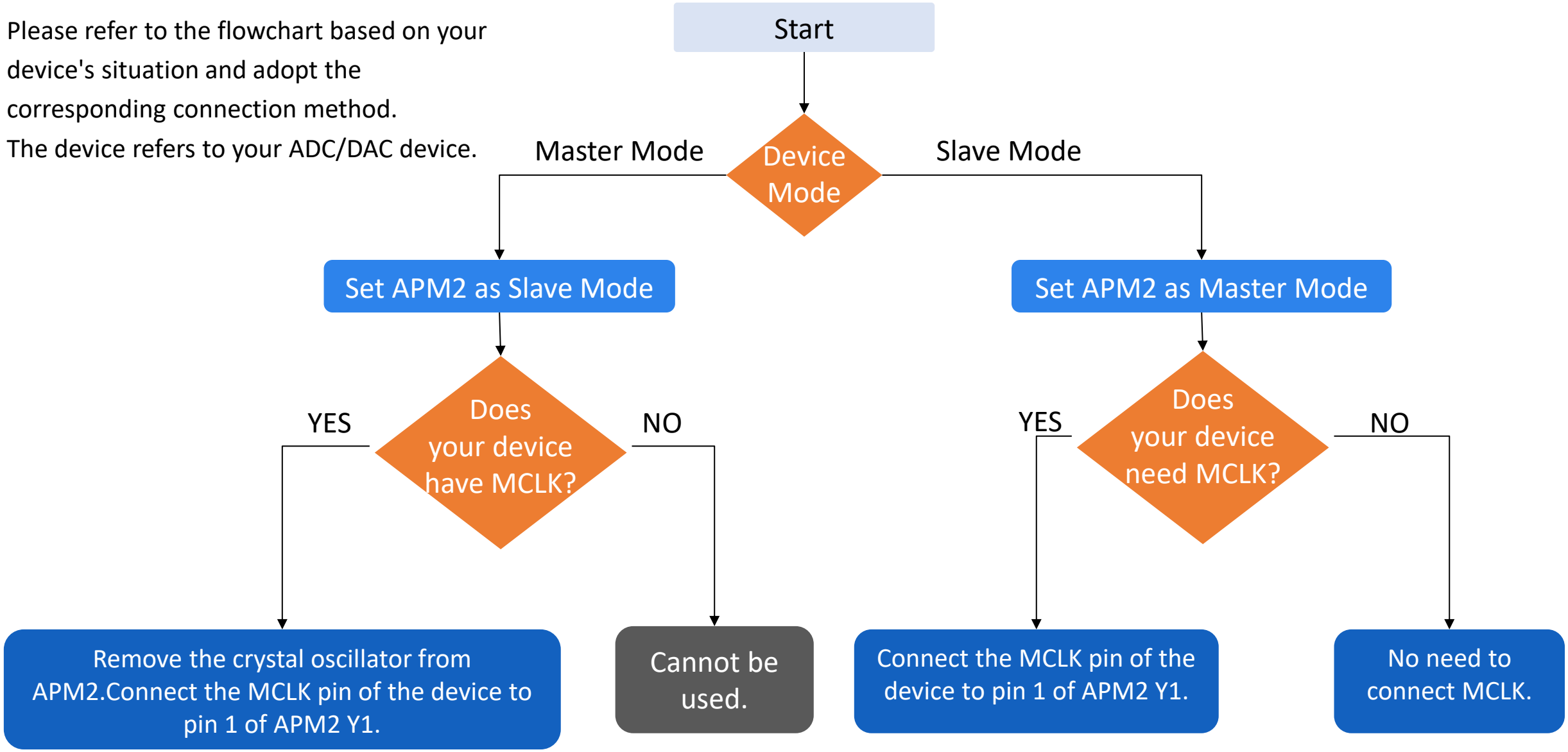
When mentioning I2S input and output, we need to identify the master-slave mode of the device and consider the configuration of MCLK.

Therefore, the first step in implementing I2S input or output is to determine the master-slave mode and how MCLK should be configured based on your device. You can perform a self-check using the chart below.

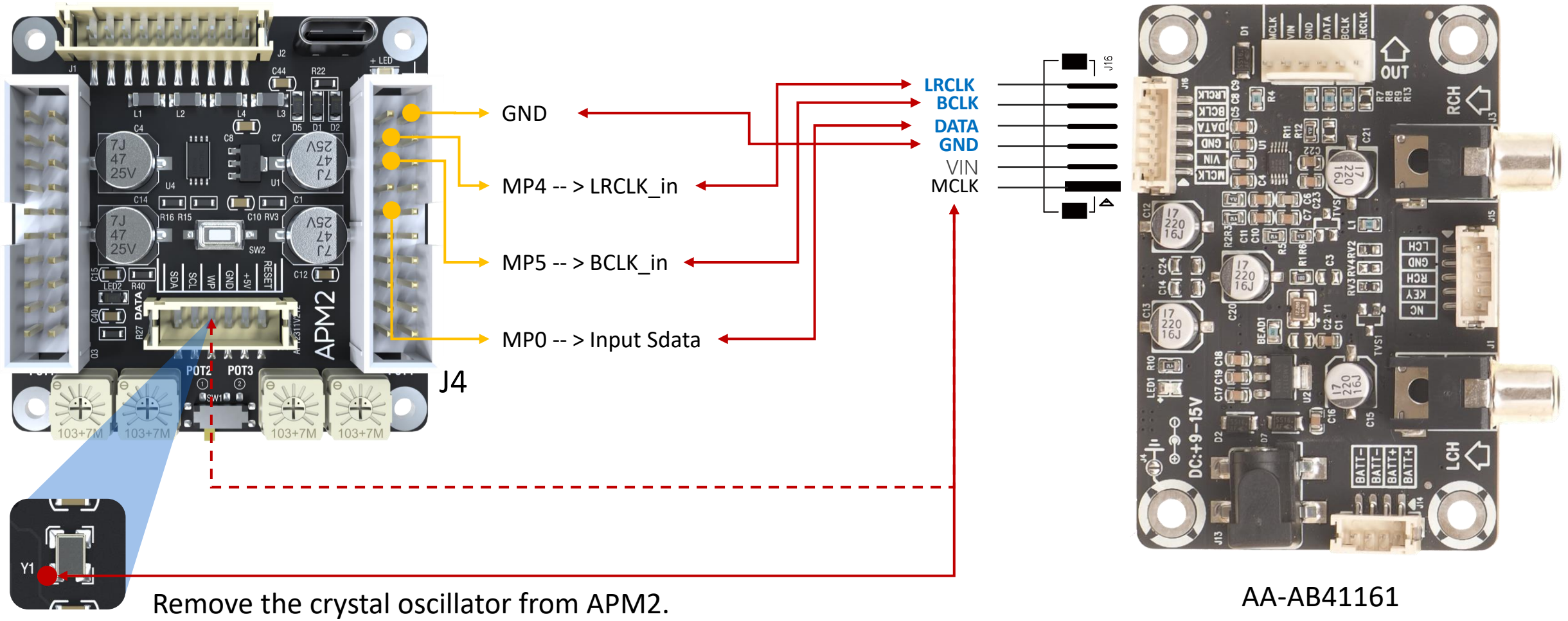


Mode & MCLK Configuration

Please refer to the flowchart based on your device's situation and adopt the corresponding connection method.
The device refers to your ADC/DAC device.



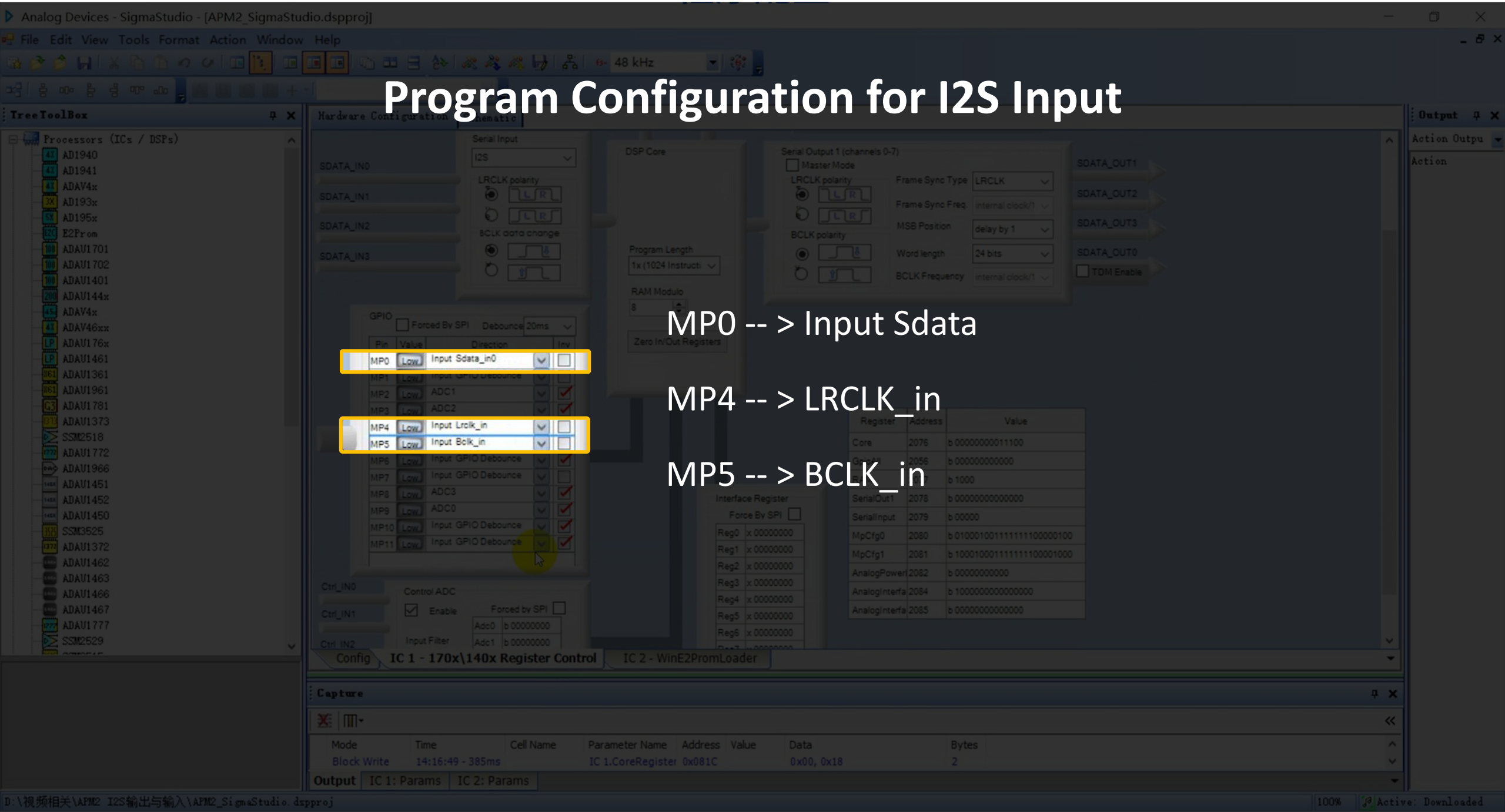
Connection Diagram for I2S Input



Remove the crystal oscillator from APM2.
Connect the MCLK pin of the device to pin 1 of APM2 Y1.

AA-AB41161
CS5343 Analog to I2S
Decode Board

Program Configuration for I2S Input

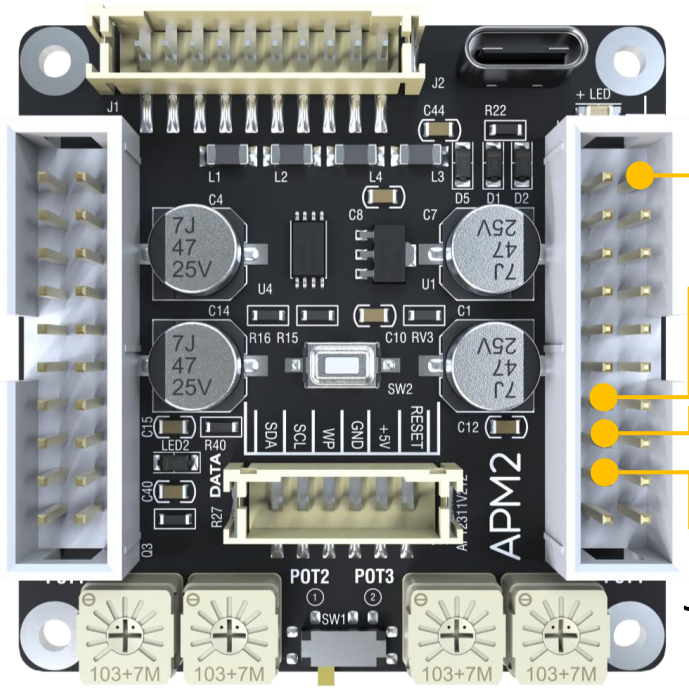


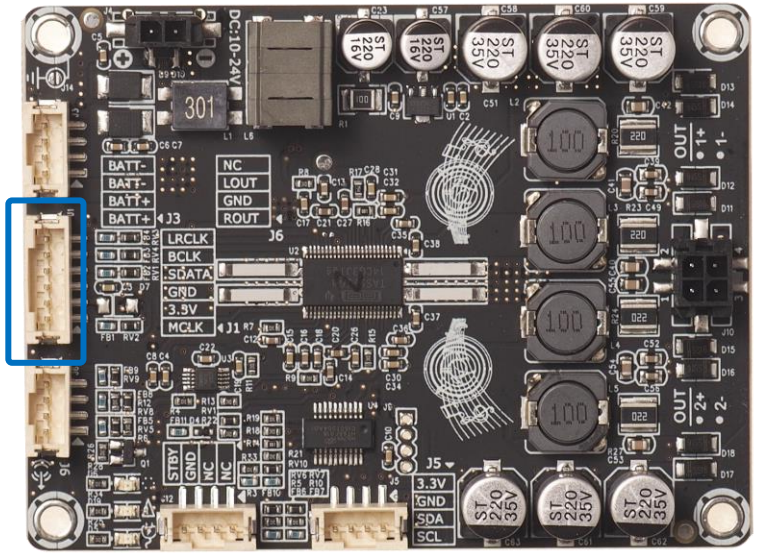
MP0 -- > Input Sdata

MP4 -- > LRCLK_in

MP5 -- > BCLK_in

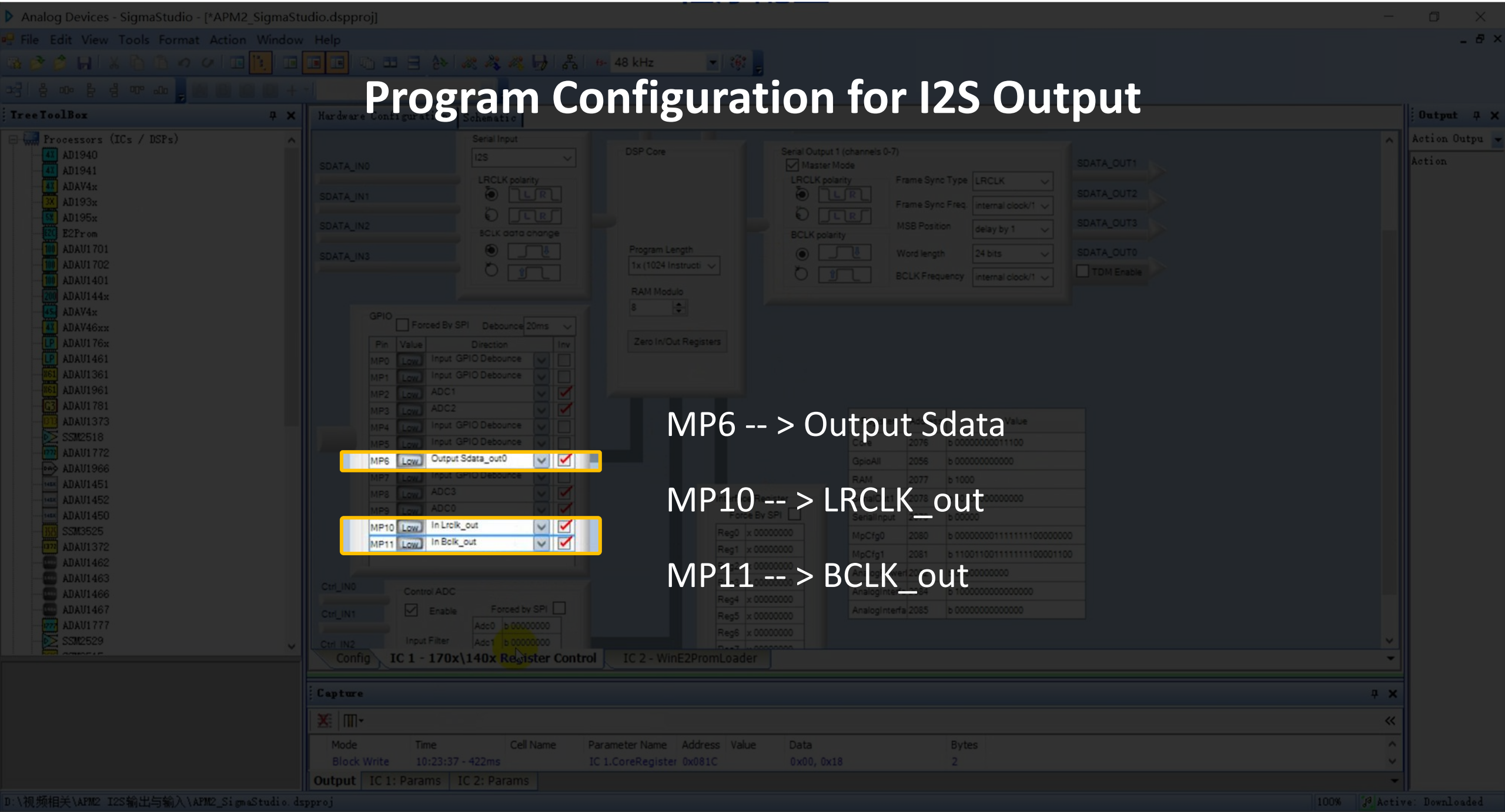
Connection Diagram for I2S Output





DIPO1 (AA-AB32255)
2 x 30W - TAS5756

Program Configuration for I2S Output



MP6 -- > Output Sdata

MP10 -- > LRCLK_out

MP11 -- > BCLK_out

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