NAU88C22 Demo Board
User Manual

The PCB name: EVB-NAU88C22YG_V1.0

Ordering P/N: NL-NAU88C22

For additional information or questions, please contact: Nuvoton Technology Corporation.

www.nuvoton.com

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1 OVERVIEW

The NAU88C22 is a low power, high quality CODEC for portable and general purpose audio applications. In addition to precision 24-bit stereo ADCs and DACs, this device integrates a broad range of additional functions to simplify implementation of complete audio system solutions. The NAU88C22 includes drivers for speaker, headphone, and differential or stereo line outputs, and integrates preamps for stereo differential microphones, significantly reducing external component requirements. Also, a fractional PLL is available to accurately generate any audio sample rate for the CODEC using any commonly available system clock from 8MHz through 33MHz.

2 INTRODUCTION

The NAU88C22 Demo Board is designed to allow a thorough evaluation of the audio codec.

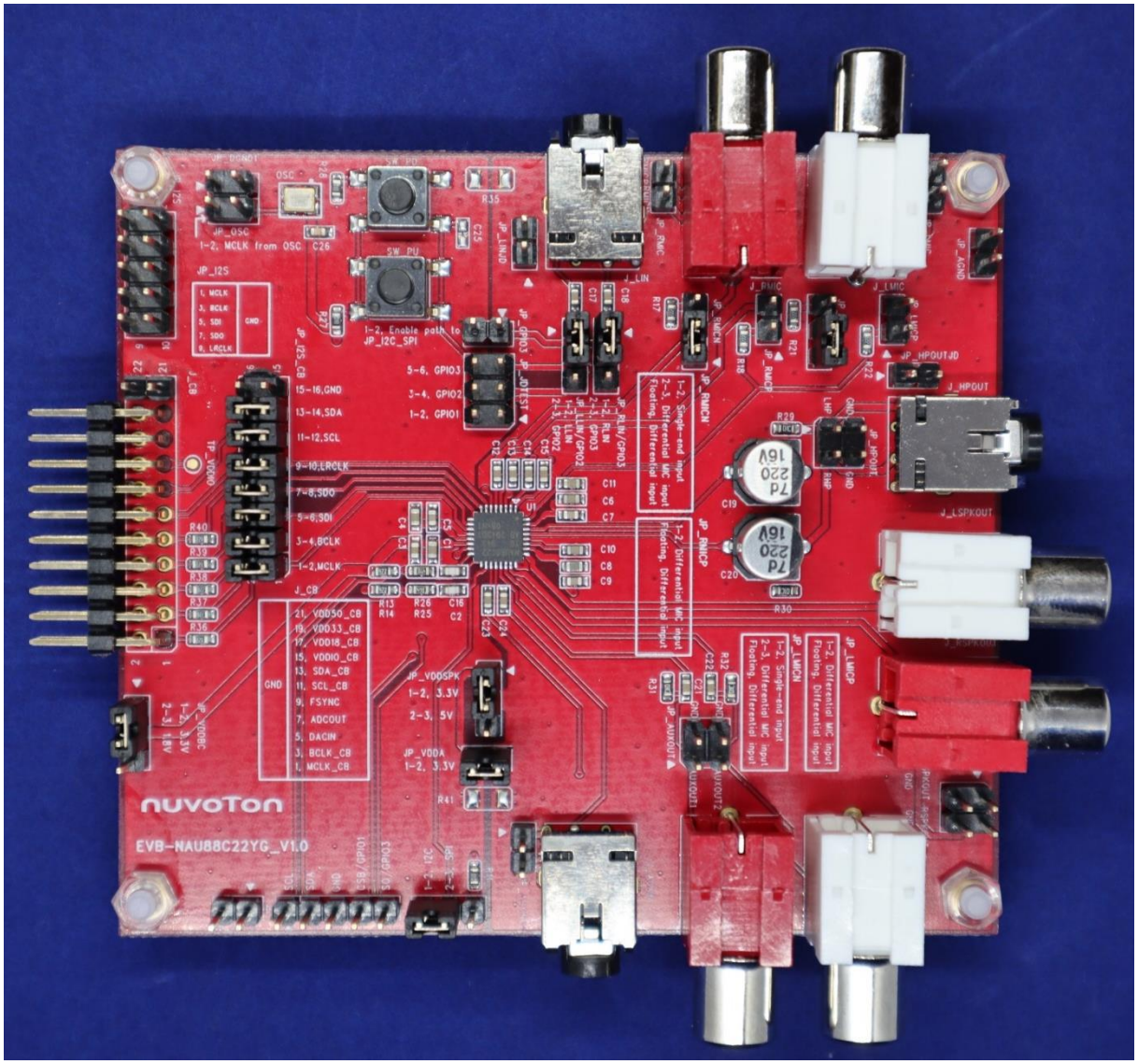


Figure 2-1 NAU88C22 Demo Board

2.1 Top View

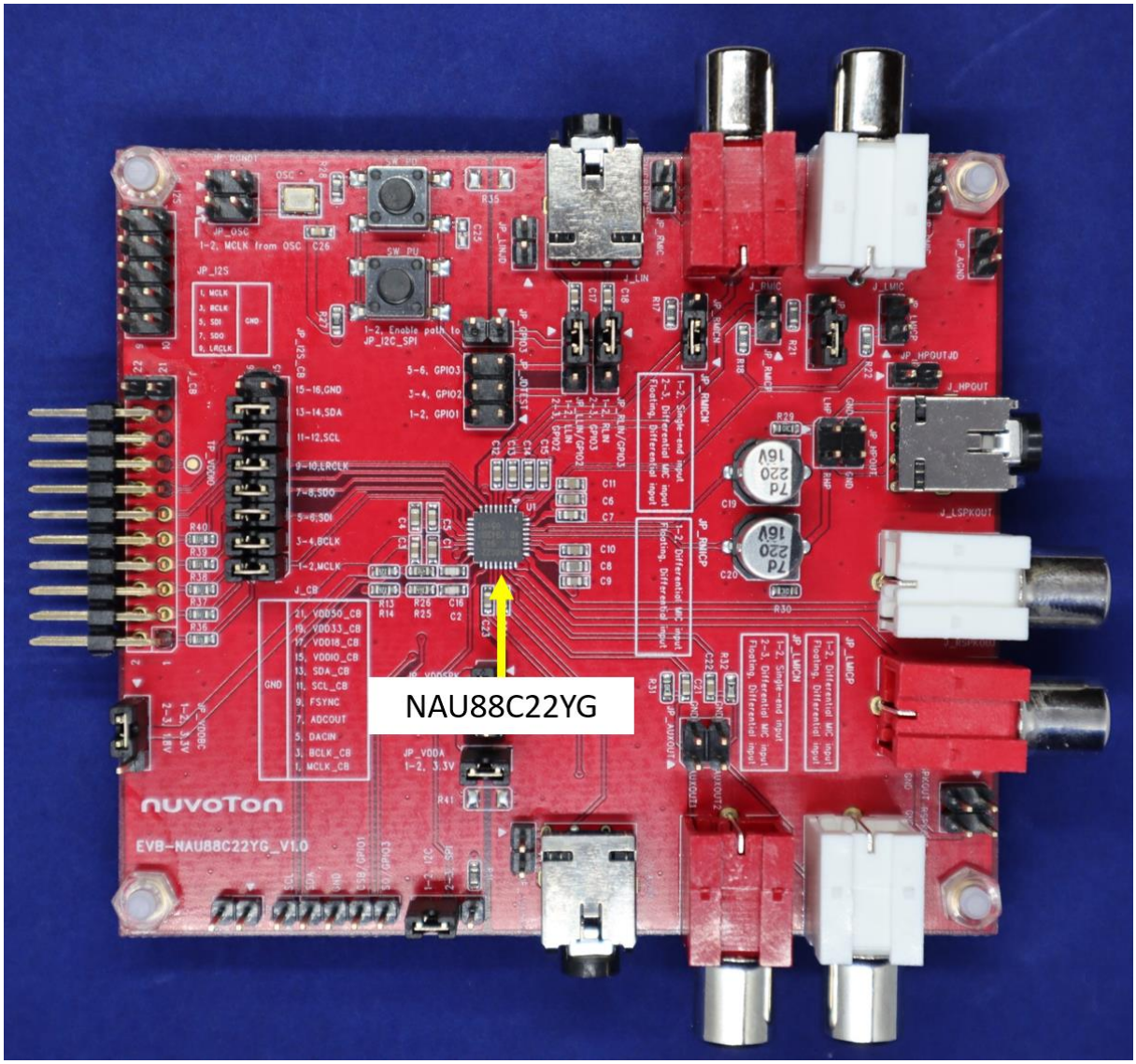


Figure 2.1-1 Top View

Name	Description
NAU88C22YG	Audio CODEC

Table 2.1-1 Main Components

2.2 Input / Output

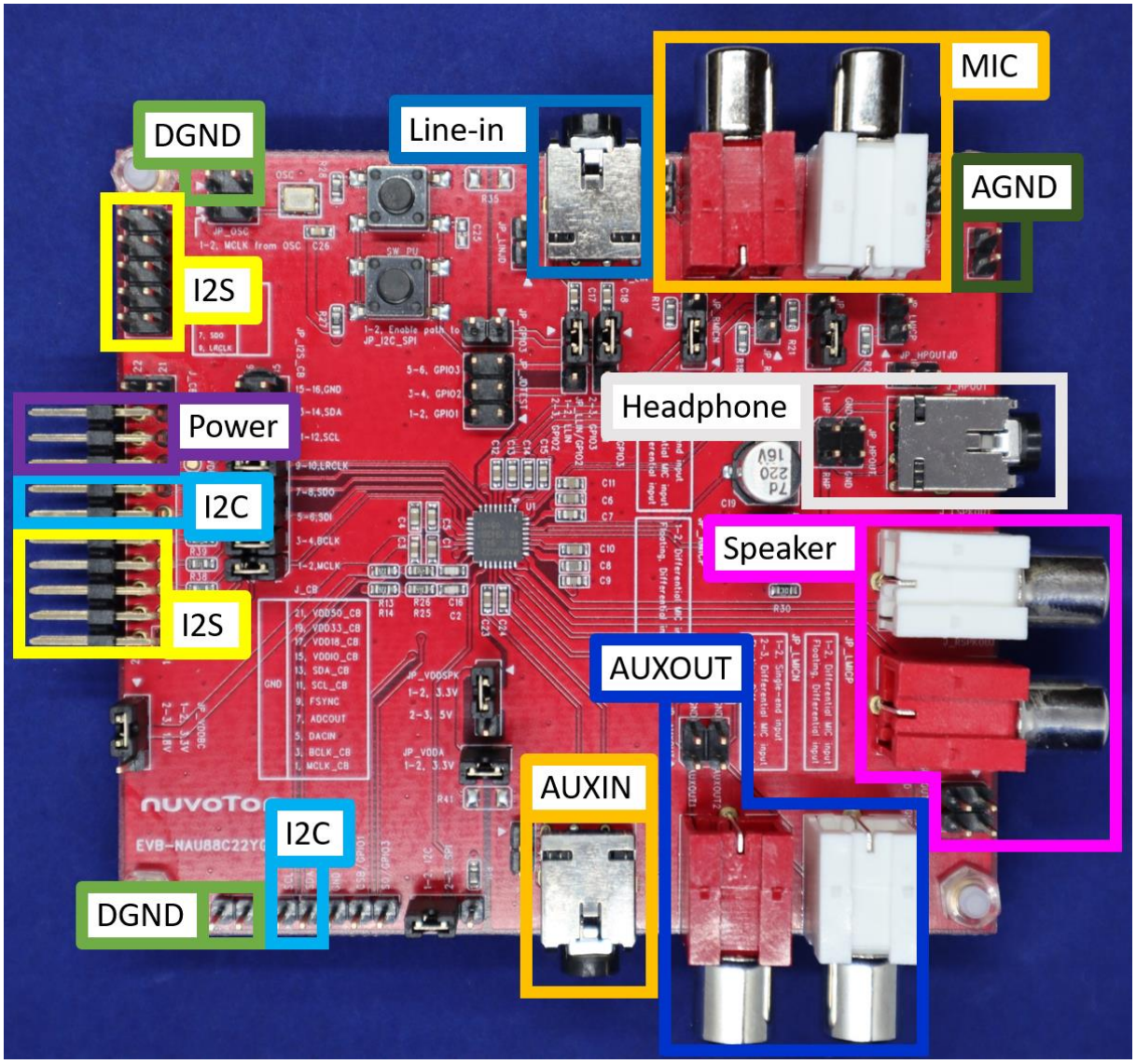


Figure 2.2-1 Input / Output

<table>
<tr><th>Name</th><th>Description</th></tr>
<tr><td>J_CB</td><td>
<table>
<tr><td>Pin 1</td><td rowspan="5">I2S Interface</td><td>MCLK, Master Clock</td></tr>
<tr><td>Pin 3</td><td>BCLK, Bit Clock</td></tr>
<tr><td>Pin 5</td><td>DACIN</td></tr>
<tr><td>Pin 7</td><td>ADCOUT</td></tr>
<tr><td>Pin 9</td><td>FS ,Frame Sync</td></tr>
</table>
<table>
<tr><td>Pin 11</td><td rowspan="2">I2C Interface</td><td>SDA</td></tr>
<tr><td>Pin 13</td><td>SCL</td></tr>
<tr><td>Pin15</td><td rowspan="4">Power.
Provide power to Demo board.</td><td>VDDIO</td></tr>
<tr><td>Pin 17</td><td>VDD1.8</td></tr>
<tr><td>Pin 19</td><td>VDD3.3</td></tr>
<tr><td>Pin 21</td><td>VDD5</td></tr>
</table>
</td></tr>
<tr><td>JP_I2S</td><td>These pins can also be I2S interface
<table>
<tr><td>Pin 1</td><td>MCLK, Master Clock</td></tr>
<tr><td>Pin 3</td><td>BCLK, Bit Clock</td></tr>
<tr><td>Pin 5</td><td>DACIN</td></tr>
<tr><td>Pin 7</td><td>ADCOUT</td></tr>
<tr><td>Pin 9</td><td>FS ,Frame Sync</td></tr>
</table>
</td></tr>
<tr><td>JP_I2C_SPI</td><td>Pin1 and Pin2 are I2C interface.
In addition, this connector can be an SPI interface.
<table>
<tr><td>Pin 1</td><td>SDL</td></tr>
<tr><td>Pin 2</td><td>SCA</td></tr>
<tr><td>Pin 3</td><td>GND</td></tr>
<tr><td>Pin 4</td><td>CSB/GPIO1</td></tr>
<tr><td>Pin 5</td><td>RLIN/GPIO3</td></tr>
</table>
</td></tr>
<tr><td>MIC</td><td>Microphone input.</td></tr>
<tr><td>Headphone</td><td>Headphone output.</td></tr>
<tr><td>Speaker</td><td>Speaker out.</td></tr>
<tr><td>AUXIN</td><td>Auxiliary input.</td></tr>
<tr><td>AUXOUT</td><td>Auxiliary output.</td></tr>
</table>

Table 2.2-1 Input / Output

2.3 Jumpers

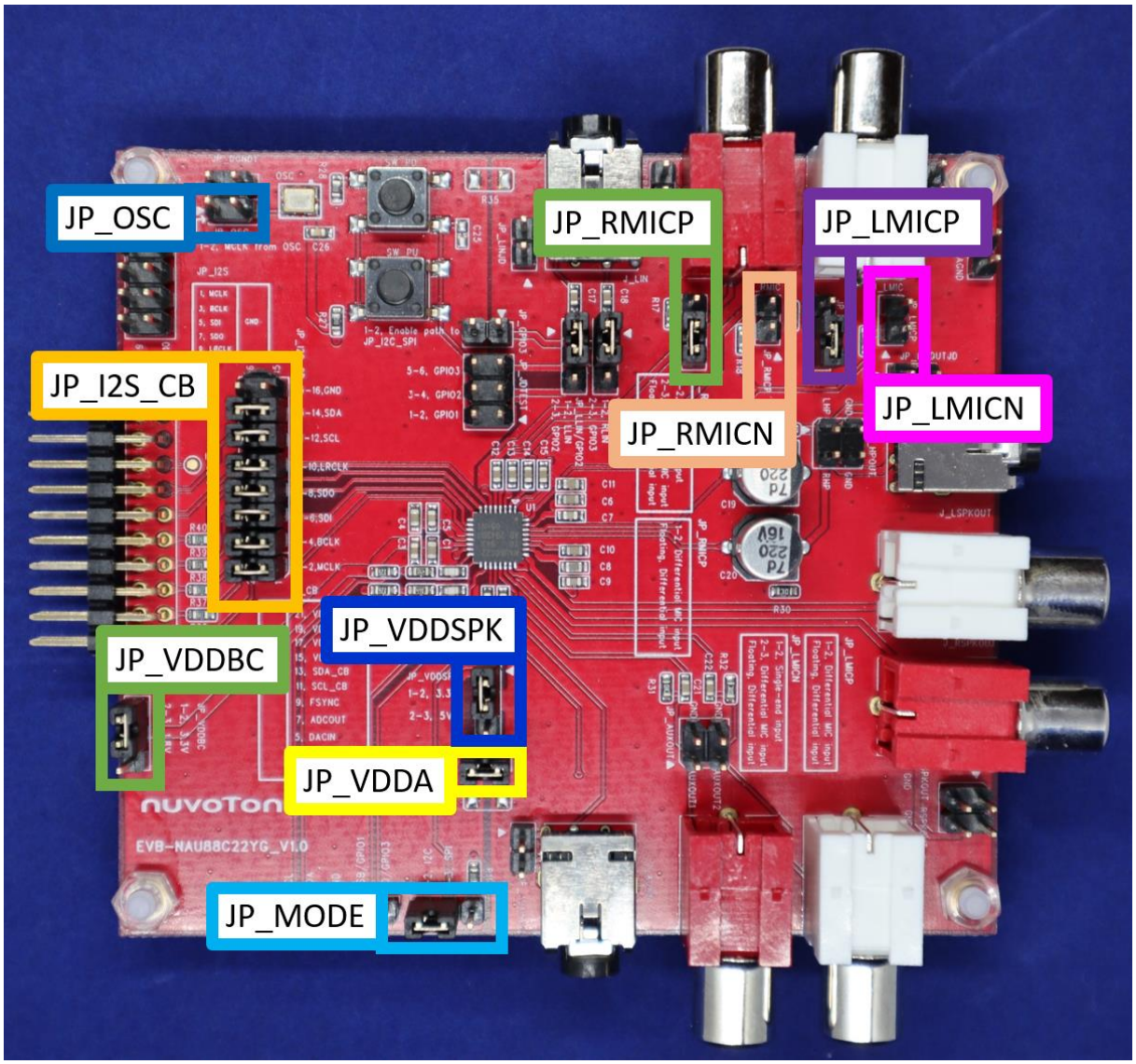
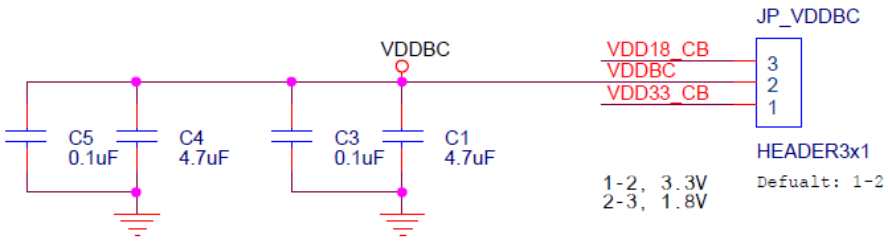
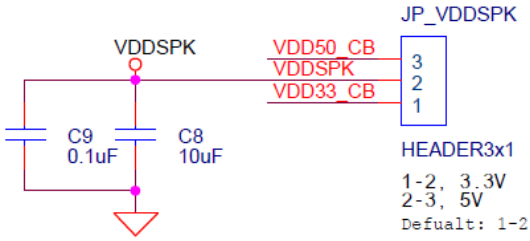
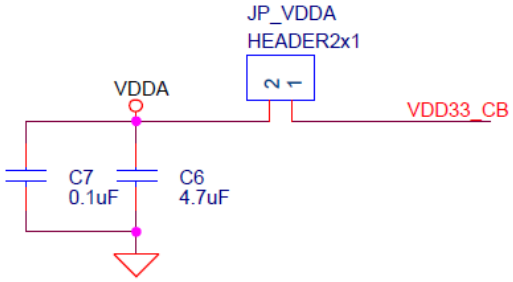


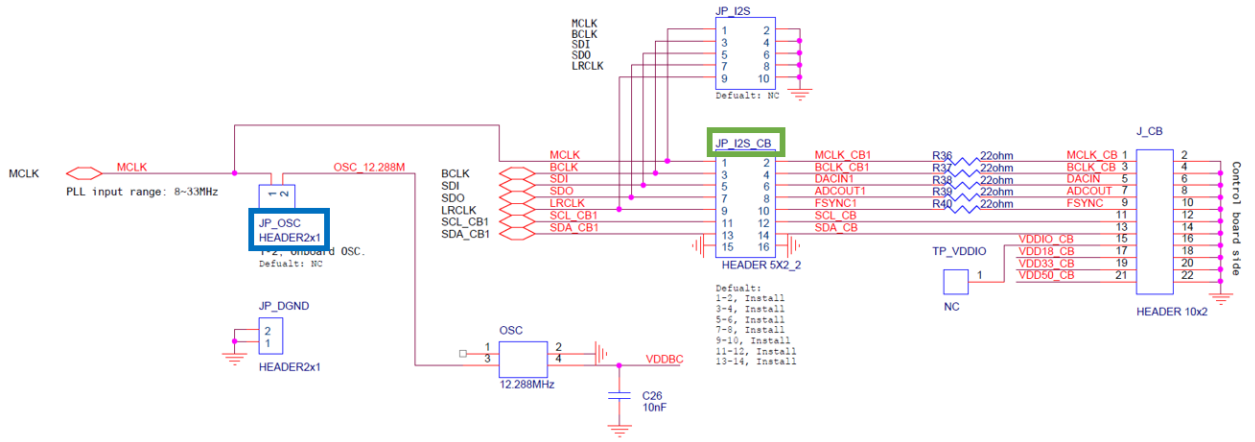
Figure 2.3-1 Jumpers

<table>
<tr><th>Name</th><th>Pin definition</th><th>Description</th></tr>
<tr><td>JP_VDDBC</td><td>VDDB and VDDC voltage selection</td><td>


<table>
<tr><td>Short</td><td>1-2 (default)</td><td>2-3</td></tr>
<tr><td>VDDBC</td><td>VDDBC uses voltage of 3.3V</td><td>VDDBC uses voltage of 3.3V</td></tr>
</table>
</td></tr>
<tr><td>JP_VDDSPK</td><td>Speaker power supply voltage selection</td><td>


<table>
<tr><td>Short</td><td>1-2 (default)</td><td>2-3</td></tr>
<tr><td>VDDSPK</td><td>VDDSPK uses voltage of 3.3V</td><td>VDDSPK uses voltage of 5V</td></tr>
</table>
</td></tr>
<tr><td>JP_VDDA</td><td>VDDA power source selection</td><td>


<table>
<tr><td></td><td>Short (default)</td><td>Open</td></tr>
<tr><td>VDDA</td><td>Using power from JP_I2S_CB</td><td>Can use external power to connect to pin2</td></tr>
</table>
</td></tr>
</table>

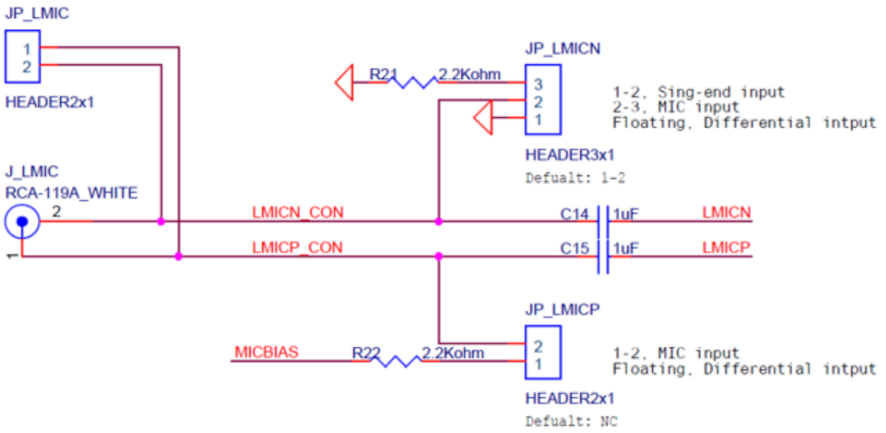


JP_I2S_CB — I2C and I2S signal selection

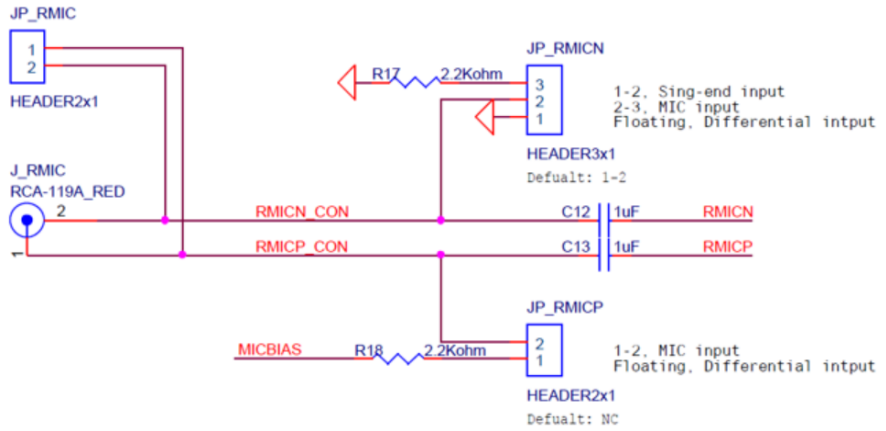
	Short (default)	Open
Pin 1-2 MCLK	Using signal from J_CB	Can use external signal to connect to pin1
Pin 3-4 BCLK		Can use external signal to connect to pin3
Pin 5-6 SDI		Can use external signal to connect to pin5
Pin 7-8 SDO		Can use external signal to connect to pin7
Pin 9-10 LRCLK		Can use external signal to connect to pin9
Pin 11-12 SCL		Can use external signal to connect to pin11
Pin 13-14 SDA		Can use external signal to connect to pin13
Pin 15-16 GNG		

JP_OSC — Onboard OSC selection

	Short	Open (default)
VDDA	MCLK signal source is Onboard OSC Note：If you want to use Onboard OSC, you need to make sure that J_CB has no signal input, or open JP_I2S_CB pin1-2	MCLK signal source is JP_I2S_CB

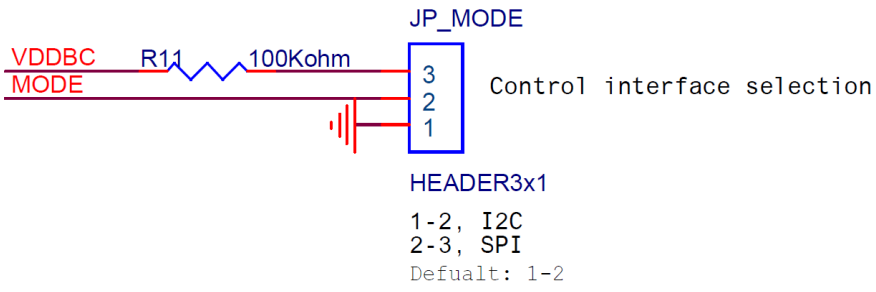
<table>
<tr><td>JP_LMICP</td><td rowspan="2">Left Mic channel source selection</td><td rowspan="2"> 

<table>
<tr><td></td><td>Short</td><td>Open (default)</td></tr>
<tr><td>JP_LMICP</td><td>MIC input</td><td>Differential intput</td></tr>
</table>

<table>
<tr><td></td><td>Short 1-2 (default)</td><td>Short 2-3</td><td>Open</td></tr>
<tr><td>JP_LMICN</td><td>Sing-end input</td><td>MIC input</td><td>Differential intput</td></tr>
</table>
</td></tr>
<tr><td>JP_LMICN</td></tr>
<tr><td>JP_RMICP</td><td rowspan="2">Right Mic channel source selection</td><td rowspan="2"> 

<table>
<tr><td></td><td>Short</td><td>Open (default)</td></tr>
<tr><td>JP_LMICP</td><td>MIC input</td><td>Differential intput</td></tr>
</table>

<table>
<tr><td></td><td>Short 1-2 (default)</td><td>Short 2-3</td><td>Open</td></tr>
<tr><td>JP_LMICN</td><td>Sing-end input</td><td>MIC input</td><td>Differential intput</td></tr>
</table>
</td></tr>
<tr><td>JP_RMICN</td></tr>
</table>

<table>
<tr>
<td>JP_MODE</td>
<td>Control interface selection</td>
<td>


<table>
<tr><th></th><th>Short (default)</th><th>Open</th></tr>
<tr><td>VDDA</td><td>Using power from JP_I2S_CB</td><td>Can use external power to connect to pin2</td></tr>
</table>
</td>
</tr>
</table>

Table 2.3-1 Jumpers

2.4 Schematic

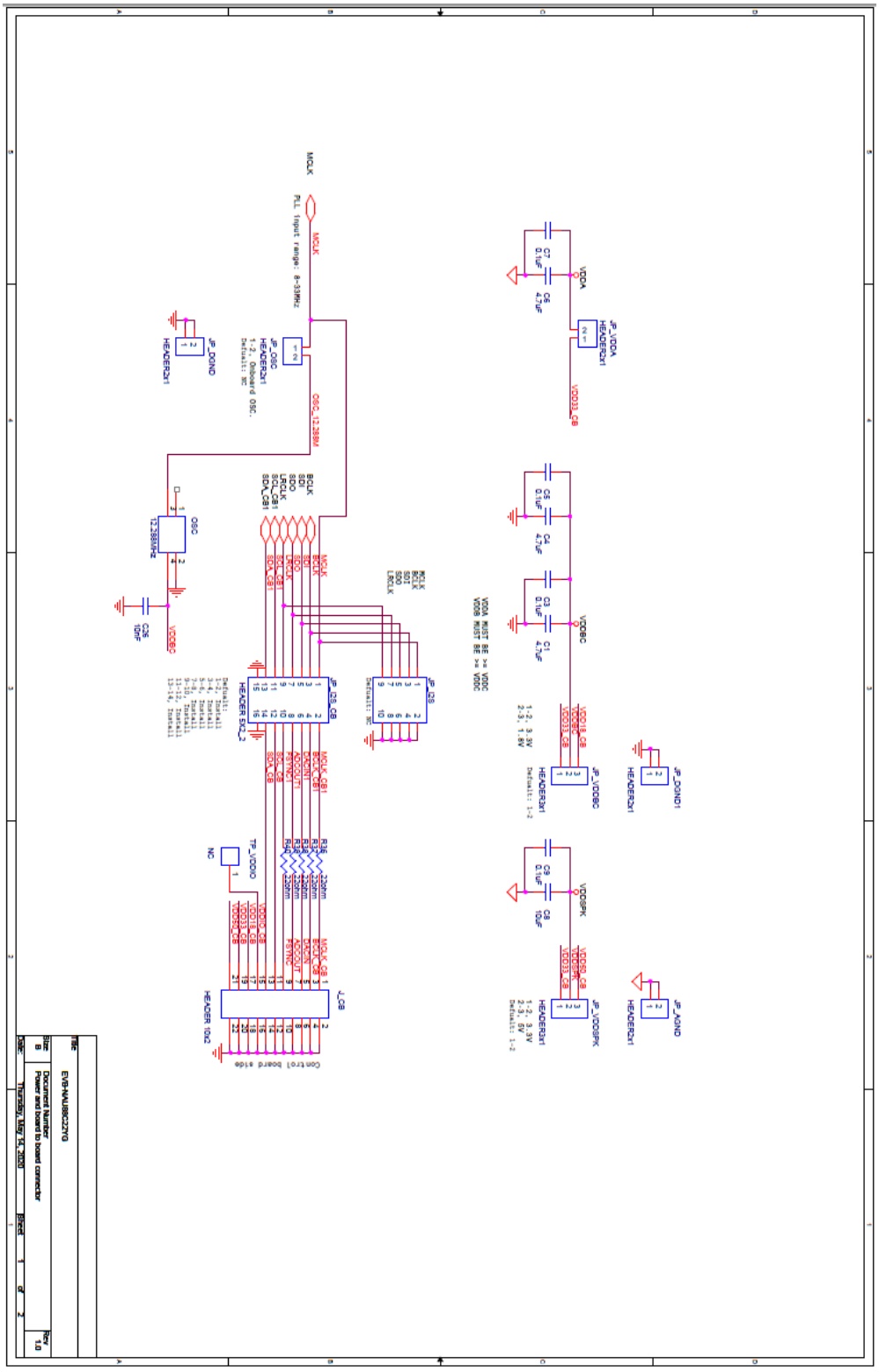


Figure 2.4-1 Schematic (page 1)

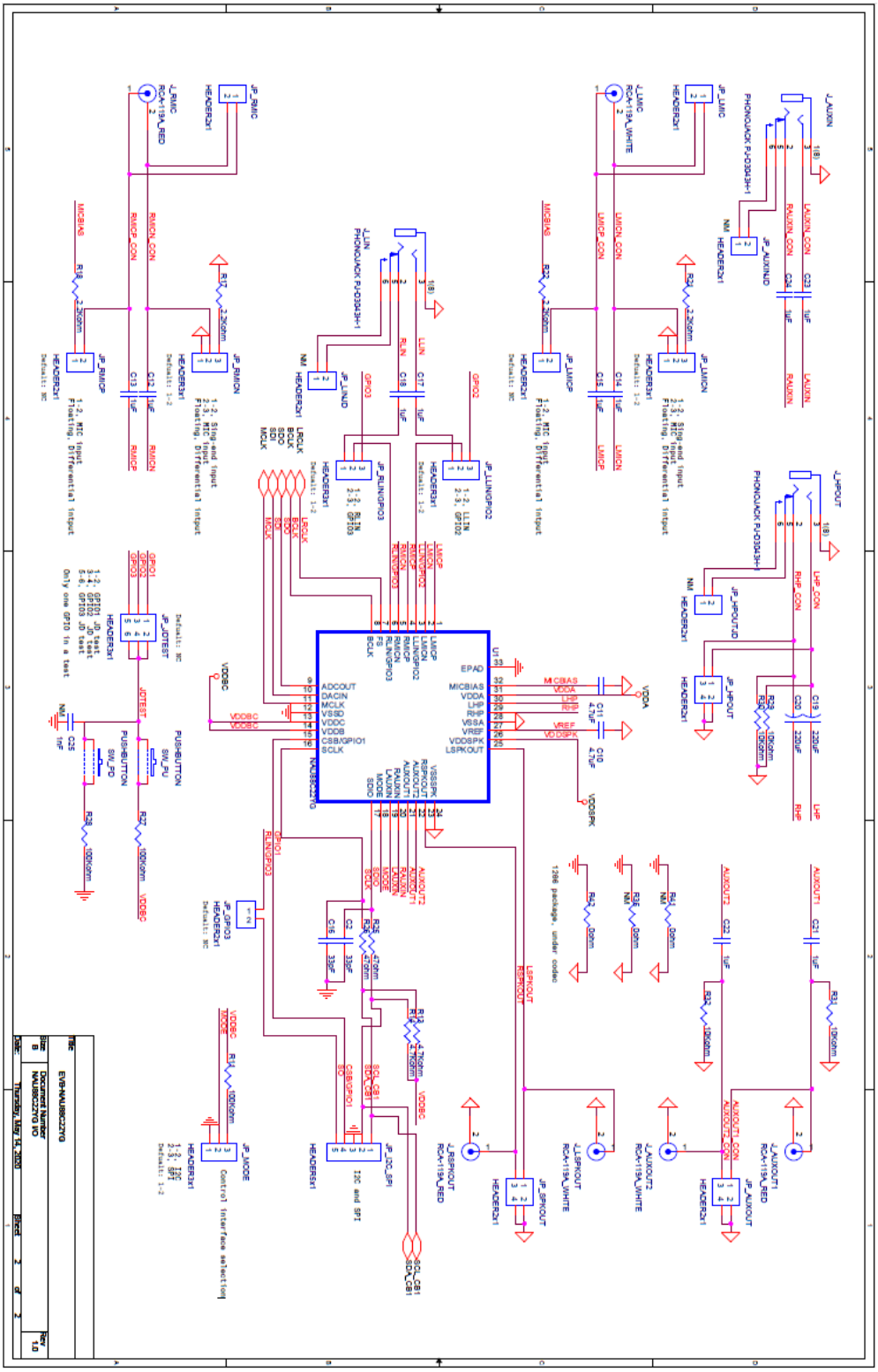


Figure 2.4-2 Schematic (page 2)

2.5 Bare Board

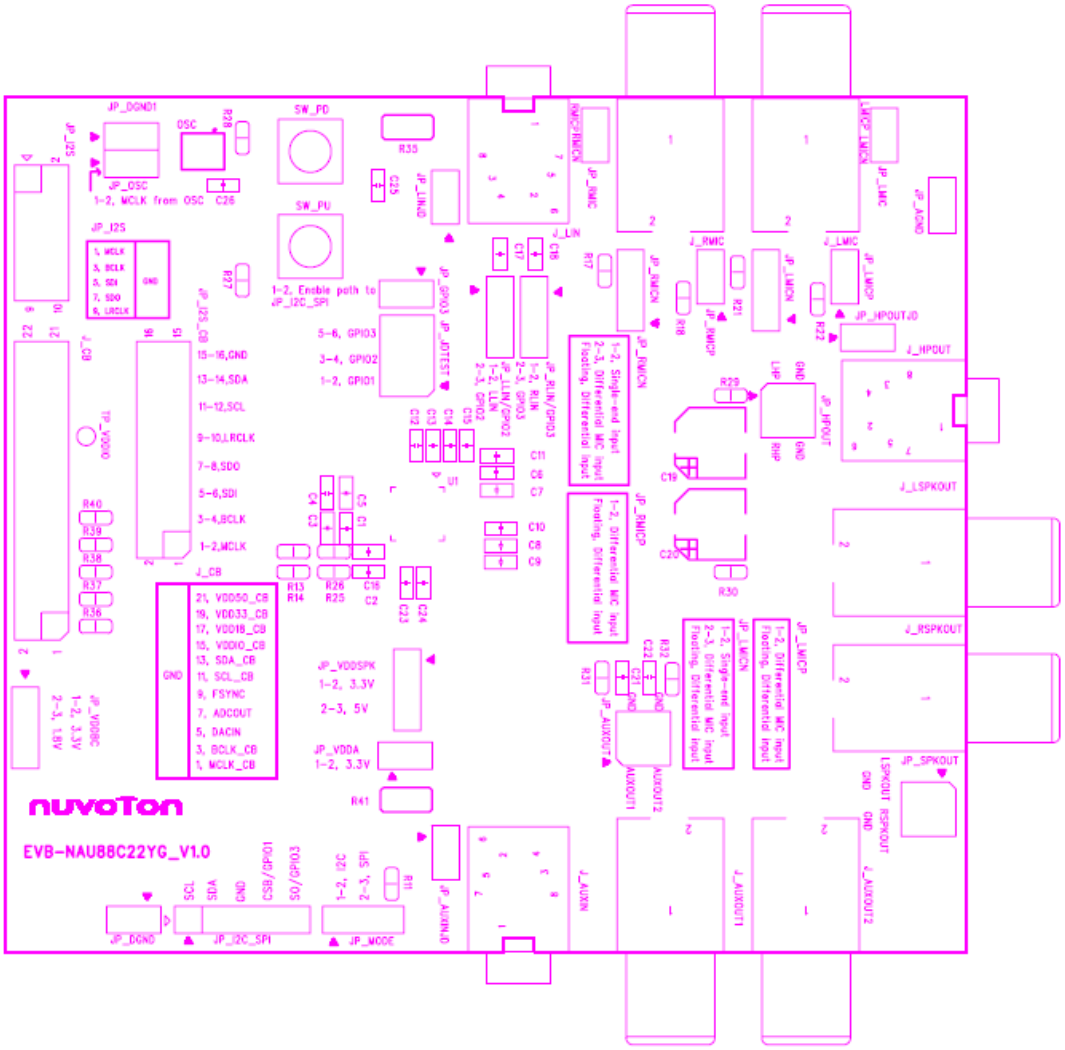


Figure 2.5-1 Top View of Bare Board

3 CONNECTED TO AUDIO CONTROL BOARD

If there is Nuvoton's Audio Control Board, NAU88C22 Demo Board can be used with Audio Control Board (USB_I2C_I2S_Control_Board_V1.1). When the Audio Control Board is connected to the NAU88C22 Demo Board, the PC or USB host can use the GUI to control the NAU88C22 Demo Board and know the status of the NAU88C22 Demo Board.

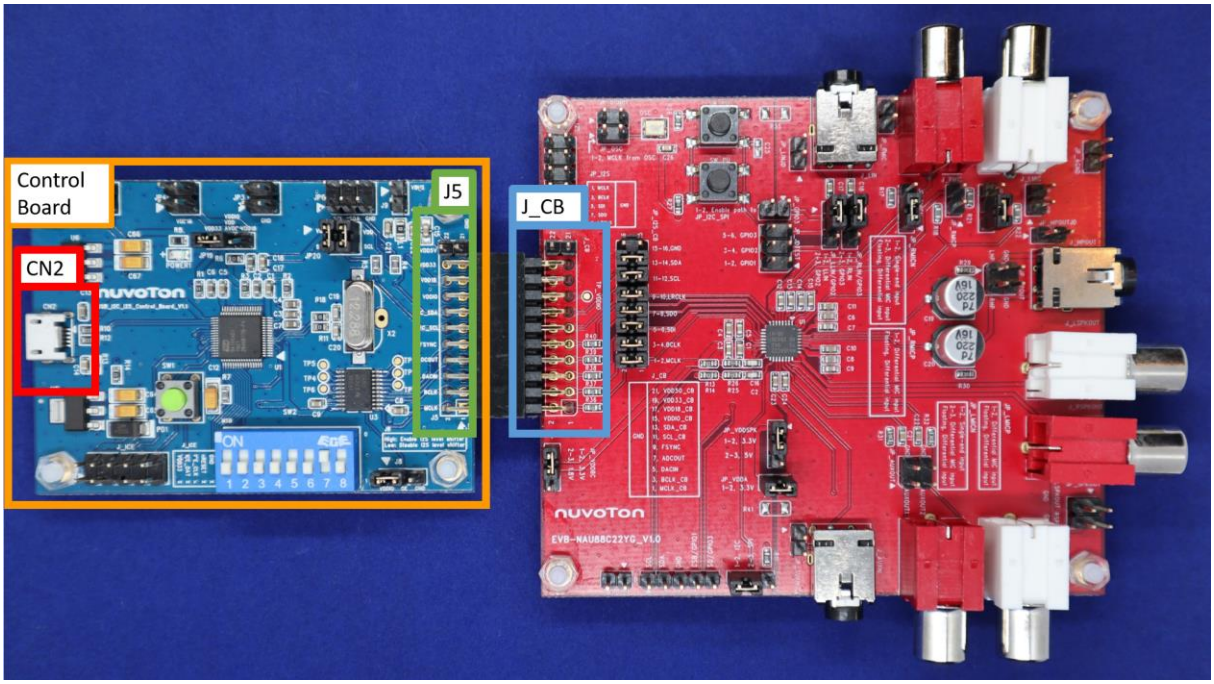


Figure 3-1 Connection Audio Control Board

Signal path:

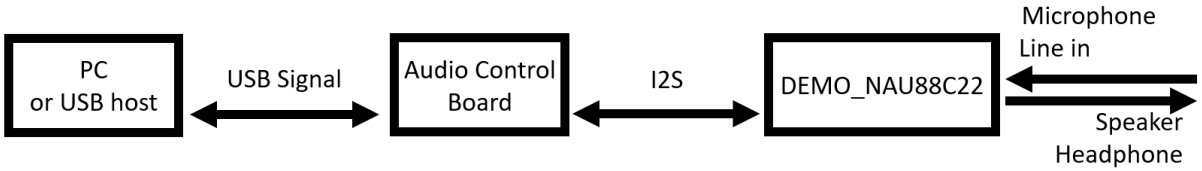


Figure 3-2 Signal Path

Board setting SOP:

Reference Figure 3-1

Step1: Connect J_CB of the NAU88C22 Demo Board to J5 of the Audio Control Board.

Step2: Connect CN2 of the Audio Control Board to PC or USB host via USB cable.

4 APPLICATION

4-1 SPI

3-wire

a. JP_MODE 2-3 short

4-wire

a. JP_MODE 2-3 short
b. JP_GPIO3 1-2 short (for 4-wire SPI)
c. JP_RLIN/GPIO3 NC (for 4-wire SPI)

4-2 RMICP and RMICN

Differential input

a. JP_RMICN NC
b. JP_RMICP NC

Single-end input

a. JP_RMICN 1-2 short
b. JP_RMICP NC

MIC input

a. JP_RMICN 2-3 short
b. JP_RMICP 1-2 short

4-3 LMICP and LMICN

Differential input

a. JP_LMICN NC
b. JP_LMICP NC

Single-end input

a. JP_LMICN 1-2 short
b. JP_LMICP NC

MIC input

a. JP_LMICN 2-3 short

b. JP_LMICP 1-2 short

4-4 Line level input

a. JP_LLIN/GPIO2 1-2 short

b. JP_RLIN/GPIO3 1-2 short

4-5 MCLK

MCLK from control board

a. JP_OSC NC

b. JP_I2S_CB 1-2 short

External MCLK

a. JP_OSC NC and the pin1 is the input for external clock source

b. JP_DGND is the GND for the external clock source

Onboard OSC(12.288MHz)

a. JP_OSC 1-2 short

b. JP_I2S_CB 1-2 NC

5 REVISION HISTORY

Date	Revision	Description
2021.05.25	1.0	1st version release

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