# AKD4492-SB-TypeS
## AK4492 Evaluation Board Rev.2

## 1. General Description

AKD4492-SB-TypeS is the best evaluation board for audio solution to need high quality sound and area saving, such as Hi-Fi audio solution for smartphone, high end portable audio equipment and USB-DAC. The AKD4492-SB-TypeS is equipped with 32 bit DAC AK4492, audio-only PLL AK8157A and LPF visceral headphone amplifer AK4205. Therefore the board is possible to drive headphone with ultra low distortion and ultra low noise. Moreover AK1110, 5V LDO designated for the DAC, can realize good characteristics and high quality sound. The AKD4492-SB-TypeS has digital audio interfaces. They can interface to digital audio systems via optical or coaxial connector.

■ **Ordering Guide**

AKD4492-SB-TypeS -- Evaluation board composed of AK4492, AK4205, AK8157A and AK1110.
（Control software and Power supply cable includes in this package.）

## 2. Function

- **SPDIF is accepted by Digital Audio Interface (AK4118A).**
- **I2S data and DSD data is inputted directly through the 10-pins header for the external digital input interface.**
- **AK4492-SB has AK8157A(PLL for audio) for application processor of smartphone.**
- **Easy control is possible because of the PIC micro controller for the device control on the board.**
- **Only single power supply +3.7V can operate AKD4492-SB-TypeS because of LDO and DCDC on the board.**
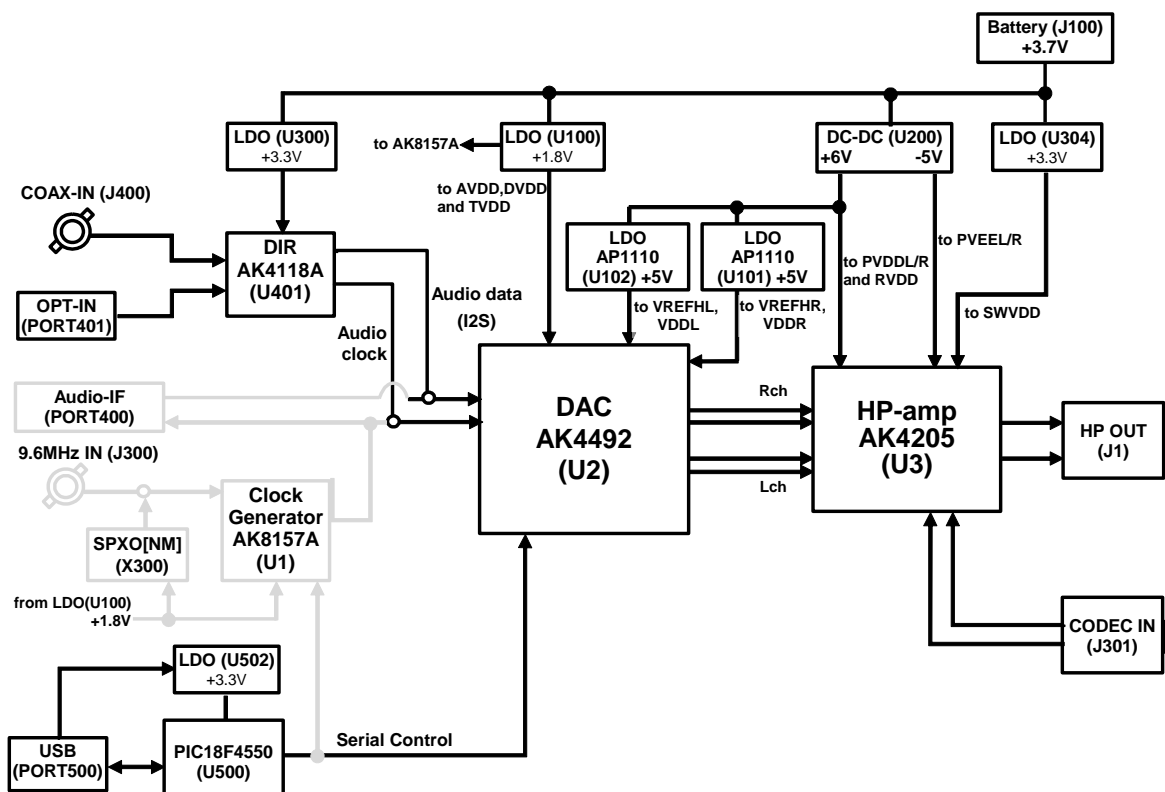
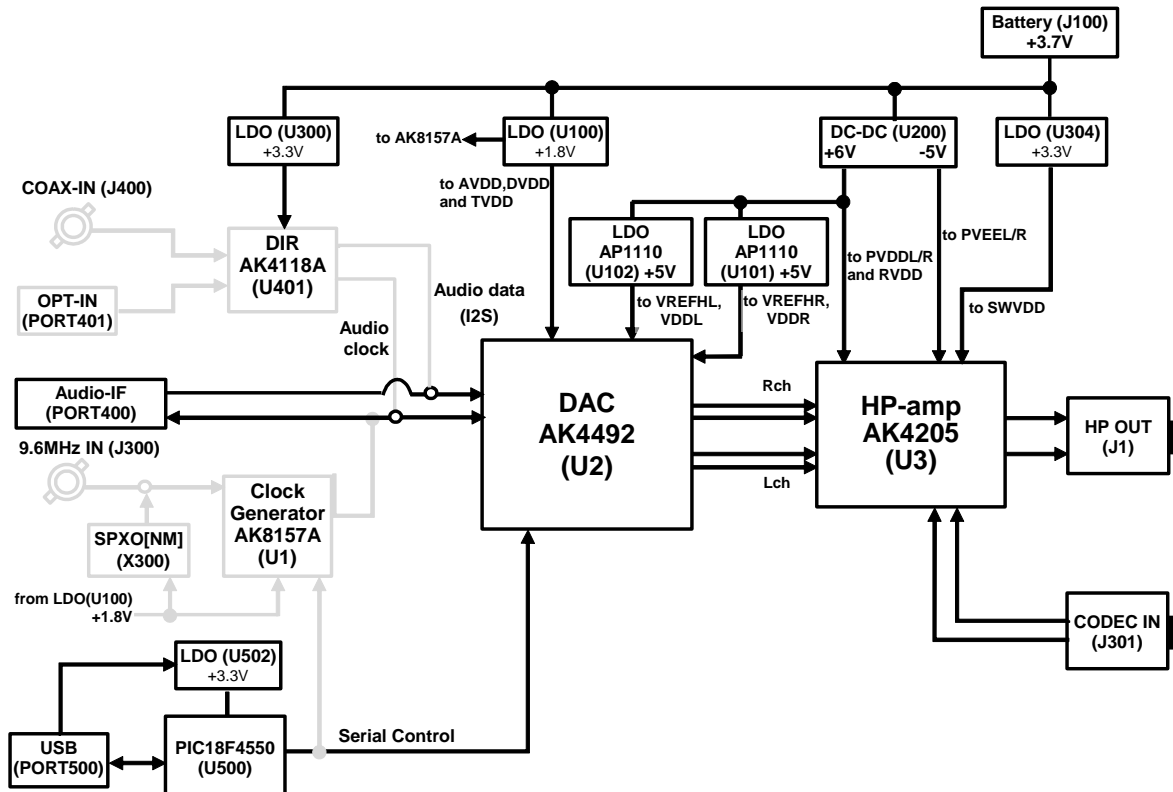Figure 1. AKD4492-SB-TypeS  Block Diagram(AK8157A isn't used, SPDIF inputs)

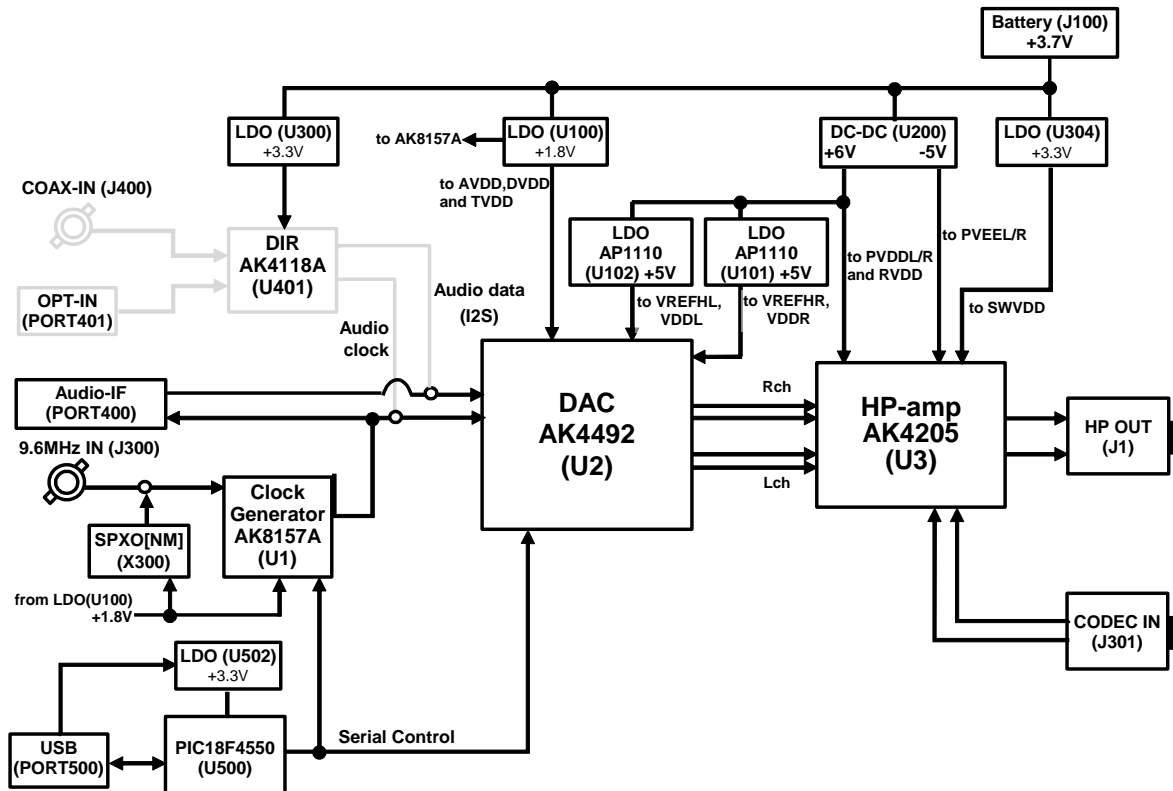Figure 2. AKD4492-SB-TypeS Block Diagram (External PCM inputs)



Figure 3. AKD4492-SB-TypeS Block Diagram (AK8157A is used, and external PCM inputs)

# 3. Table of Contents

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## 4. Evaluation Board

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■ **Board Diagram**



Figure 4. AKD4492-SB-TypeS Board View

■ **Component explanation**

(1) AK4118A (U401)
AK4118A is Digital Audio I/F Transceiver.
When evaluating the sound quality, using AK4118A with SPDIF signal.

(2) AK8157A(U1)
AK8157A is Audio Clock Generator.
When 9.6MHz clock inputs for application processor of smartphone, the device supplies MCLK, BICK and LRCK for PCM. When using this device, SDATA synchronized with BICK and LRCK from AK8157A must be inputted to AK4492 externally.

(3) AK4492(U2)
AK4492 is the small PKG 32 bit DAC, supporting latest digital format, and realizing ultra low distortion and ultra low noise. It is the main device on this board.

(4) AK4205(U3)
AK4205 is the headphone amplifer realizing ultra low distortion and ultra low noise. It includes the analog switch for Hi-Fi. Moreover including the gain setting resister and LPF, it is possible to reduce the mounting area.

(5) AK1110(U101, U102)

AK1110 is LDO of two outputs and low noise and high PSRR.

It is used for an analog power supply of AK4492, it contributes to an electrical characteristic and the sound quality greatly.

(6) LDO, DC-DC (U100, U200, U300, U302, U304, U502)

This is the power supply IC for the AKD4492-SB-TypeS.

Table 1. Operation voltage range of J100 power supply connector

| Parts No. | Device | Output Voltage | Comments |
|---|---|---|---|
| U100 | LDO | 1.8V | AK8157A/AK4492 Power supply |
| U200 | DC-DC | +6V / -5V (Adjustment by control software) | AK1110/AK4205 Power supply |
| U300 | LDO | 3.3V | AK4118A Power supply |
| U302 | LDO | 1.8V | PDN control |
| U304 | LDO | 3.3V | AK4205 (SWVDD) Power supply |
| U502 | LDO | 3.3V | PIC Power supply |

(7) Power supply, GND connector (J100)

This is the terminal for supplying the power to the entire board. Please see the table below about voltage to be applied.

Table 2. Operation voltage range of J100 power supply connector

| Pin | Pin Name | Min | Typ | Max | Comments |
|---|---|---|---|---|---|
| 1 | +3.7V | 3.4V | 3.7V | 5V | Must be connected |
| 2 | GND | - | GND | - | Must be connected |

(8) SPDIF input connector (J400 / BNC Connector, PORT401 / Optical connector )

SPDIF signal inputs to the AK4118A.

It depends on JP400 which is available J400(BNC connector) or PORT401.

Please see the Figure 5 about detail.

(9) Analog output terminal (J1 / 3.5mm stereo mini jack)

It is the connector for analog single end output. Connect headphone or earphone to J1.

(10) Analog input terminal (J301 / 3.5mm stereo mini jack)

It is the connector for analog single end input.

AK4205 is equipped with the analog switch. Ak4205 is selecting an audio signal from Ak4492 or from J301.

Audio signal input is usually used by less than 2Vrms.

Table 3. Ak4205 is selecting an audio signal

| SW304-2 [SEL] | mode | Audio signal |
|---|---|---|
| ON ("H") | Hi-Fi Path | From AK4492 |
| OFF ("L") | CODEC Path | From J301 |

(11) 10 pin header for external digital input output (PORT400 / 2.54mm pitch 10 pin header)
PORT400 is external digital input output port. When evaluated by using PCM signal input or DSD signal input, using of port400.

Table 4. Pin assignment of PORT400

| Pin | I/O | Function | Pin | I/O | Function |
|-----|-----|----------|-----|-----|----------|
| 1 | I | MCLK | 2 | P | GND |
| 3 | I/O | BICK/DCLK | 4 | P | GND |
| 5 | I/O | LRCK/DSDR | 6 | P | GND |
| 7 | I | SDATA/DSDL | 8 | P | GND |
| 9 | NC | - | 10 | P | GND |

Please see the " 5.OPERATION SEQUENCE , 2).Evaluation mode " about detail.

(12) USB port for device control (PORT500 / USB micro-B)
It is the USB port to control AK4492, AK8157A and positive and negative 2-output DC-DC.
Please see the " 5.OPERATION SEQUENCE , 4). USB I/F (Serial control) " about detail.

(13) SPDIF input connector select jumper  (JP400 )
It is the jumper to switch the two kinds of connector for SPDIF input to AK4118A.
Please see Figure 6 about detail.

(14) Function control port of AK4205 (PORT300 / 2.54mm pitch 4 pin header)
It is the port to input the signal for control function of AK4205.
※**When using this port, turn off the switch1,2 of SW304.**

Table 5. Pin assignment of PORT300

| Pin | I/O | Function | Pin | I/O | Function |
|-----|-----|----------|-----|-----|----------|
| 1 | I | MUTEN | 2 | P | GND |
| 3 | I | SEL | 4 | P | GND |

(15) Function setting switch (SW304, SW400)
It is the switch to evaluate AK4118A and the function of AK4205.
SW304 controls the mute function of AK4205 output and switching the path if analog switch in AK4205.
SW400 selects the Master clock for AK118A when using SPDIF input.

[SW304] : AK4205 setting

Table 6. SW304 Setting

| No. | Name | ON ("H") | OFF ("L") | Default |
|-----|------|----------|-----------|---------|
| 1 | MUTEN | Normal Operation | MUTE State | H |
| 2 | SEL | Hi-Fi Path | CODEC Path | H |

[SW400] : AK4118A setting

Table 7. SW400 Setting

| No. | Name | ON ("H") | OFF ("L") | Default |
|-----|------|----------|-----------|---------|
| 1 | OCKS1 | Master Clock setting for AK4118A | | H |
| 2 | OCKS0 | Refer to Table 8. | | L |

Table 8. Master Clock Setting

| Mode | OCKS1 | OCKS0 | MCKO1 | fs (max) | |
|------|-------|-------|-------|----------|---|
| 0 | L | L | 256fs | 96kHz | |
| 1 | L | H | 256fs | 96kHz | |
| 2 | H | L | 512fs | 48kHz | < Default > |
| 3 | H | H | 128fs | 192kHz | |

(16) Power down/up toggle switch (SW300, SW301, SW302, SW303)
It is the switch to power up/down the each device (AK4492, AK8157A, LDO, DC-DC).
See the table below about the each switch. About power up sequence, see the " 5.OPERATION SEQUENCE , 3).
Power supply " about detail.
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Table 9.Toggle switch for power up

| Name. | Devices | ON ("H") | OFF ("L") | Default |
|-------|---------|----------|-----------|---------|
| SW300 | AK4118A | | | L |
| SW301 | U100 | | | L |
| SW302 | AK4492, AK8157A | Power-up | Power-down | L |
| SW303 | U200 | | | L |

| 5. OPERATION SEQUENCE |
|---|

■ **OPERATION SEQUENCE**

**1). Wiring of the board**
**2). Evaluation mode**
**3). Power supply**
**4). USB I/F (Serial control)**


**1). Wiring if the board**

➢ **Power wiring**
A power supply connects a power supply cable to J100 connector and supplies it.
A connector which corresponds to a PH connector of JST (B2B-PH-K-S or S2B-PH-K-S) can connect J100.

Table 10. Power wiring

| Connector Name | Pin No. | Voltage | Using | Comments | Default Setting |
|---|---|---|---|---|---|
| J100 | 1 | +3.4V to +5V | for LDO(DC-DC) input | Must be connected | +3.7V |
|  | 2 | 0V | GND | Must be connected | 0V |

➢ **Output signal wiring**
J1 connects to headphone, earphones or a cable of 3.5mm stereo mini plug.

➢ **Digital input IF wiring**
Digital input signal port is J300, J400, PORT300, PORT400 and PORT401.
Please see the " 2). Evaluation mode " about detail.

➢ **USB control wiring**
Connect PORT500 (USB micro- B) connector to a PC with USB cable.
This board can be controlled using software.
Please see the " 6. CONTROL SOFTWARE MANUAL " about control software detail.

### 2). Evaluation mode

There is an input method of 3 kinds of digital signal in this board.

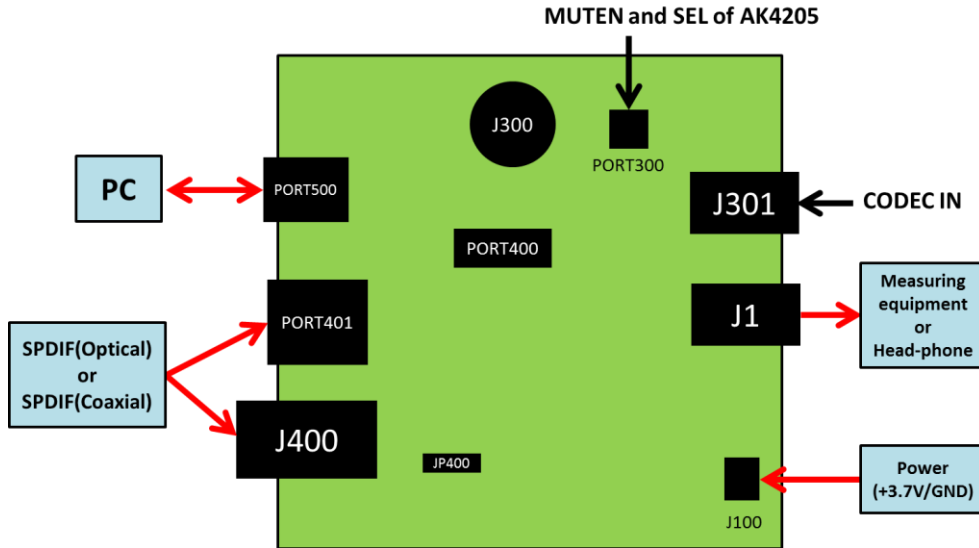### A) Evaluation using the SPDI signal input.  <Default>



Figure 5. The connection diagram when evaluated by using SPDIF signal input.

When evaluated by using SPDIF signal input, the input must be set to J400 or PORT401.
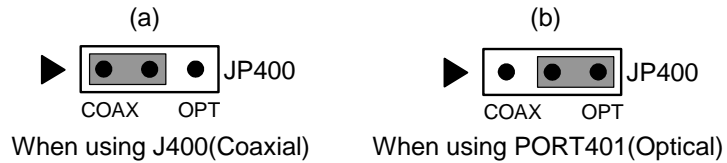


Figure 6. SPDIF input PORT select

When evaluated by using SPDIF signal input, the Soldering Jumper should be set to the following.

Table 11. Soldering Jumper Setting

| Soldering Jumper | Setting | Default | Soldering Jumper | Setting | Default |
|---|---|---|---|---|---|
| CL1 | open | open | CL301 | open | open |
| CL2 | short | short | CL302 | short | short |
| CL3 | open | open | CL400 | short | short |
| CL4 | open | open | CL401 | short | short |
| CL5 | short | short | CL402 | short | short |
| CL200 | short | short | CL403 | short | short |
| CL201 | short | short | CL404 | open | open |
| CL202 | short | short | CL405 | open | open |
| CL203 | short | short | CL406 | open | open |
| CL300 | open | open | CL407 | open | open |

**B) Evaluation using the external clock (PCM or DSD).**



Figure 7. The connection diagram when evaluated by using PORT400.

External clock (PCM or DSD) supply from PORT400.

Table 12. Pin assignment of PORT400

| Pin | I/O | Function | Pin | I/O | Function |
|-----|-----|----------|-----|-----|----------|
| 1 | I | MCLK | 2 | P | GND |
| 3 | I | BICK/DCLK | 4 | P | GND |
| 5 | I | LRCK/DSDR | 6 | P | GND |
| 7 | I | SDATA/DSDL | 8 | P | GND |
| 9 | - | NC | 10 | P | GND |

When evaluated by using external clock input, AK4118A does not use. SW300 is setting to "L".
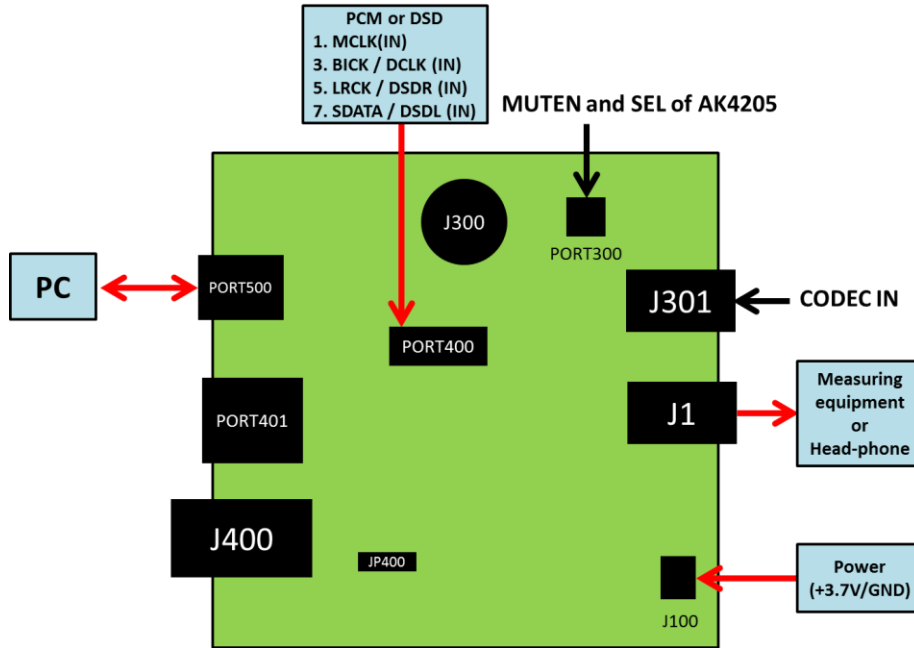When evaluated by using external clock input, the Soldering Jumper should be set to the following.

Table 13. Soldering Jumper Setting

| Soldering Jumper | Setting | Default | Soldering Jumper | Setting | Default |
|------------------|---------|---------|------------------|---------|---------|
| CL1 | open | open | CL301 | open | open |
| CL2 | short | short | CL302 | short | short |
| CL3 | open | open | CL400 | open | short |
| CL4 | open | open | CL401 | open | short |
| CL5 | short | short | CL402 | open | short |
| CL200 | short | short | CL403 | open | short |
| CL201 | short | short | CL404 | short | open |
| CL202 | short | short | CL405 | short | open |
| CL203 | short | short | CL406 | short | open |
| CL300 | open | open | CL407 | short | open |

**C) Evaluation using the AK815A.**
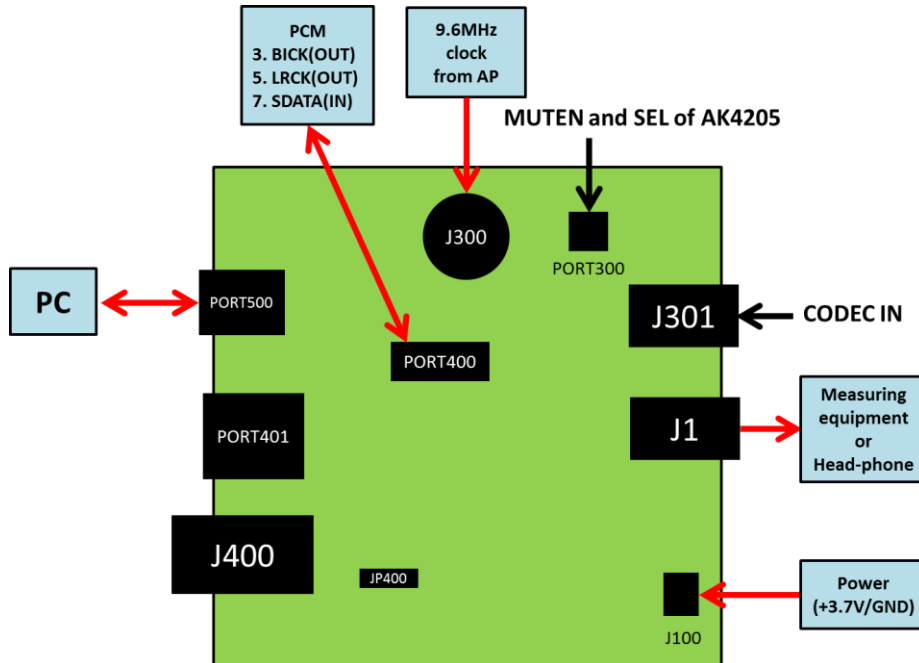


Figure 8. The connection diagram when evaluated by using PORT400.

When evaluated by using the AK8157A, the AK8157A must supply external clock(9.6MHz) from J300.
BICK and LRCK are output from AK8157A. SDATA inputs must be synchronized with BICK and LRCK.

Table 14. Pin assignment of PORT400

| Pin | I/O | Function | Pin | I/O | Function |
|-----|-----|----------|-----|-----|----------|
| 1 | - | Not used | 2 | P | GND |
| 3 | O | BICK | 4 | P | GND |
| 5 | O | LRCK | 6 | P | GND |
| 7 | I | SDATA | 8 | P | GND |
| 9 | - | NC | 10 | P | GND |

When evaluated by using the AK8157A, AK4118A does not use. SW300 is setting to "L".
When evaluated by using the AK8157A, the Soldering Jumper should be set to the following.

Table 15. Soldering Jumper Setting

| Soldering Jumper | Setting | Default | Soldering Jumper | Setting | Default |
|------------------|---------|---------|------------------|---------|---------|
| CL1 | short | open | CL301 | short | open |
| CL2 | short | short | CL302 | open | short |
| CL3 | short | open | CL400 | open | short |
| CL4 | short | open | CL401 | open | short |
| CL5 | short | short | CL402 | open | short |
| CL200 | short | short | CL403 | open | short |
| CL201 | short | short | CL404 | short | open |
| CL202 | short | short | CL405 | short | open |
| CL203 | short | short | CL406 | short | open |
| CL300 | open | open | CL407 | open | open |

### 3). Power supply

Before supplying a power supply, SW300, SW301, SW302 and SW303 are setting to OFF("L").
Please supply a power supply at first.
SW is setting by the next step.
  1st:  SW301 is setting to ON("H").
  2nd:  SW303 is setting to ON("H").
  3rd:  SW302 is setting to ON("H").
  4th:  SW300 is setting to ON("H").


[SW300]：AK4118A Reset control.  It must be set to "H" during operation.
             After power-up, the AK4118A must be reset once.
             To reset the AK4118A, set the SW300 toggle switch to "L" and power down the AK4118A.
             Then, release the power-down by setting back the SW300 to "H".

[SW301]：U100(1.8V LDO) Reset control.  It must be set to "H" during operation.
             After power-up, U100 must be reset once.
             To reset the U100, set the SW301 toggle switch to "L" and power down the U100.
             Then, release the power-down by setting back the SW301 to "H".

[SW302]：AK4492 and AK8157A Reset control.  It must be set to "H" during operation.
             After power-up, the AK4492 and AK8157A must be reset once.
             To reset the AK4492 and AK8157A, set the SW302 toggle switch to "L" and power down the
             AK4492 and AK8157A.
             Then, release the power-down by setting back the SW302 to "H".

[SW303]：U200(DC-DC) Reset control.  It must be set to "H" during operation.
             After power-up, U200 must be reset once.
             To reset the U200, set the SW303 toggle switch to "L" and power down the U200.
             Then, release the power-down by setting back the SW303 to "H".
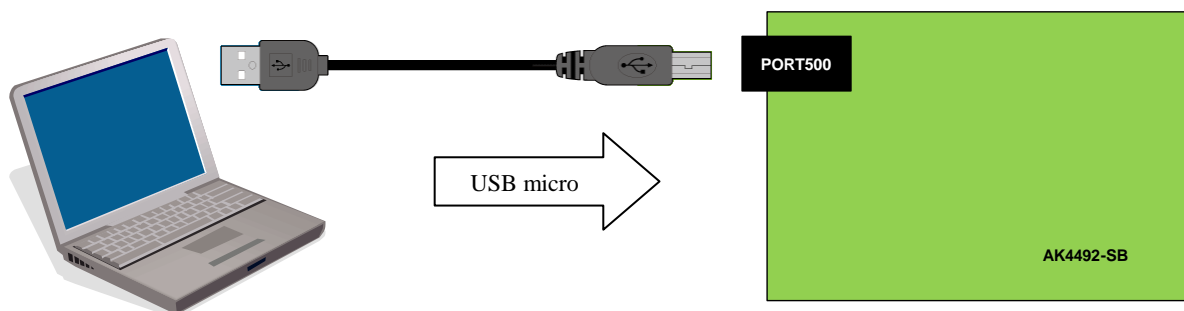

### 4). USB I/F (Serial control)

The AKD4492-SB-TypeS  should be controlled via a USB port with a PC. Connect PORT500 (USB micro- B)
connector to a PC with USB cable. The control software is included in the AKD4492-SB-TypeS package.
 (Note 1)

Note 1. The board which can be connected with a PC is one board only.
           It does not operate if two or more boards are connected.

| 6. CONTROL SOFTWARE MANUAL |
|---|

## ■ Setup of the Evaluation Board and Control Software

1. Set an AKD4492-SB-TypeS properly.
2. Connect AKD4492-SB-TypeS to PC with USB cable.
3. USB control recognized HID (Human Interface Device) on the PC.
   When it can't be recognized correctly, connect AKD4492-SB-TypeS to PC with USB cable.
4. Double-click the icon "akd4492-SB-1p0.exe" to open the control program.
   When the screen does not display "AKDUSBIF-B" at bottom left, reconnect the PC and the USB cable, and push the [Port Reset] button.
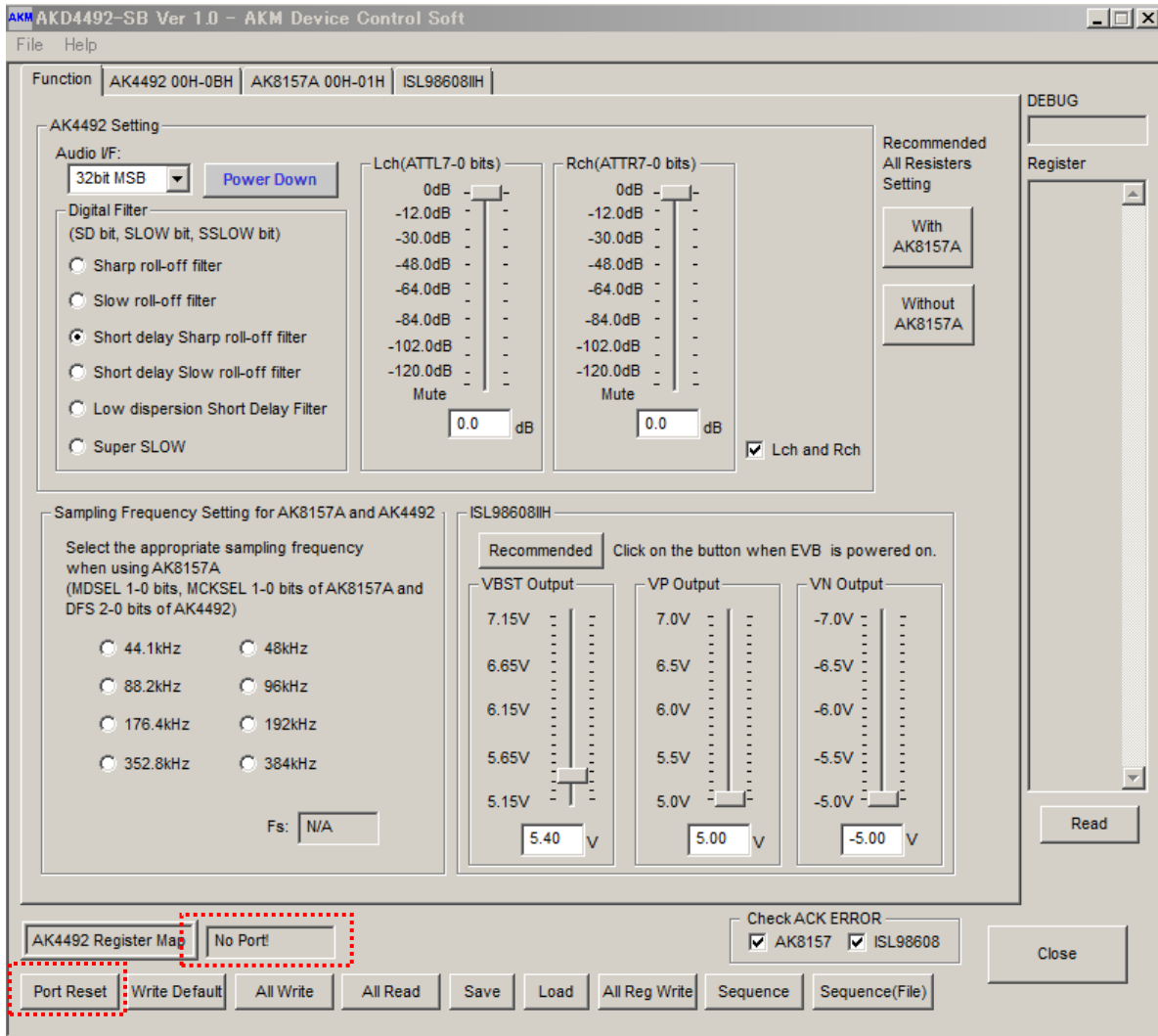5. Being evaluation by following the procedure below.



Figure 9. Control Software Window

■ **Operation Overviews**

Function and Register map are controlled by this control software. These controls may be selected by the upper tabs.

Frequently used Buttons, such as the register initializing button "Write Default", are located outside of the switching tab window.

1.[Port Reset]: Resets the connection to USB port on the main board.
Click this button when connecting USB cable after the control software set up.

2.[Write Default]: Register Initialization.
When the device is reset by a hardware reset, use this button to initialize the registers.

3.[All Write]: Executes write commands for all registers displayed.

4.[All Read]: Executes read commands for all registers displayed.

5.[Save]: Save Address of Register" dialog box pops up.

6.[Load]: Executes data write from a saved file.

7.[All Reg Write]: "All Reg Write" dialog box pops up.

8.[Sequence]: "Sequence" dialog box pops up.

9.[Sequence (File)]: "Sequence (File)" dialog box pops up.

10.[Read]: Reads current register settings and displays to the register area (on the right of the main window).
This is different from [All Read] button as it does not reflect to the register map.
It only displays register values in hexadecimal numbers.

11.[Recommended]: DC-DC output become the recommended voltage. (VBST = 6.3V, VP = 6V, VN = -5V)

## ■ Tab Functions

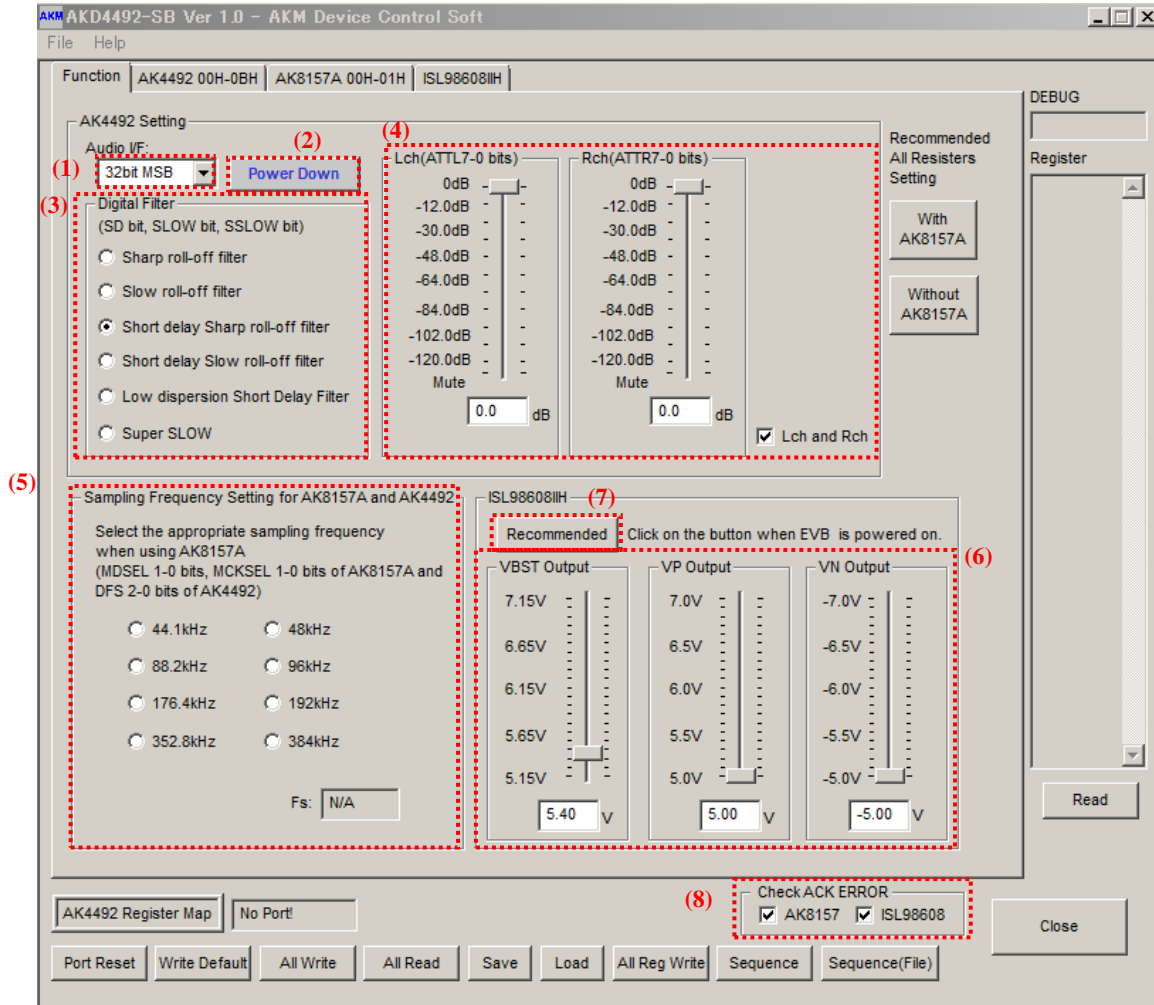## 1. [Function] Tab: Function Control



Figure 10. [Function] Window

### ◆ Sound control setting of AK4492

For more information refer to the datasheet of the AK4492.

(1) Audio Interface Format selected by combo box.

- ・ 16-bit LSB justified
- ・ 20-bit LSB justified
- ・ 24-bit MSB justified
- ・ 24-bit $I^2$S Compatible
- ・ 24-bit LSB justified
- ・ 32-bit LSB justified
- ・ 32-bit MSB justified
- ・ 32-bit $I^2$S Compatible

(2) Internal Timing Reset button

- ・ {Power Down} All registers are not initialized.
- ・ {Power Up}     Normal Operation

(3) The sound quality can be selected by changing radio buttons of the following digital filters setting.
For more information about the digital filter characteristics, refer to the datasheet of the AK4492.

- Sharp roll-off filter
- Slow roll-off filter
- Short delay Sharp roll-off filter
- Short delay Slow roll-off filter
- Low dispersion Short delay Filter
- Super SLOW

(4) Volume Control by Slider
The volume can also be changed by slider.
When a value is input in the edit box, the slider is moved to the value that selected by the edit box.
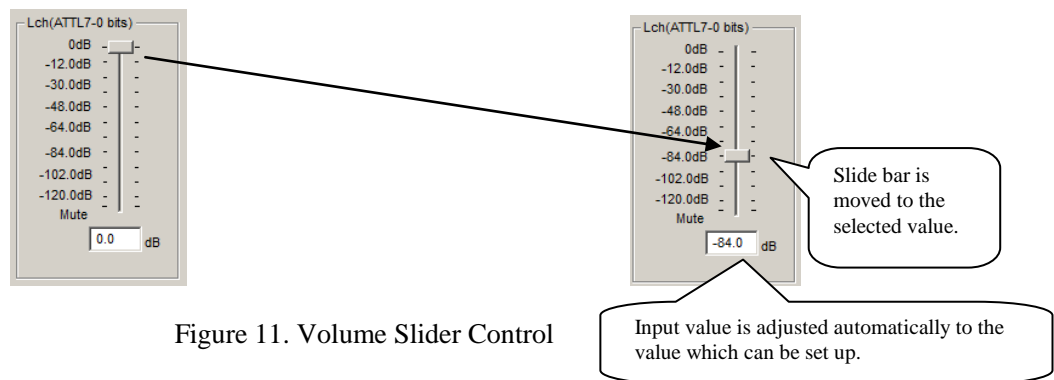Use the mouse or arrow keys on the keyboard for fine tuning.

Figure 11. Volume Slider Control

◆ **Sampling Frequency(LRCK) setting of AK8157A and AK4492**

(5) Sampling Frequency(LRCK) Setting for AK8157A and AK4492.
Sampling frequency(fs) can be selected by changing radio buttons of the following "fs" setting.

- 44.1kHz
- 48kHz
- 88.2kHz
- 96kHz
- 176.4kHz
- 192kHz
- 352.8kHz
- 384kHz

◆ **Power Supply setting of ISL98608IIH**

(6) VBST, VP and VN Control by Slider
VBST regulator can be programmed from +5.15V to +7.15V.
VP regulator can be programmed from +5V to +7V.
VN regulator can be programmed from -7V to -5V.

**\*VBST is VBST > VP and VBST > |VN |.**

(7)  The VBST, VP and VN output are recommended setting when "Recommended" button is clicked.
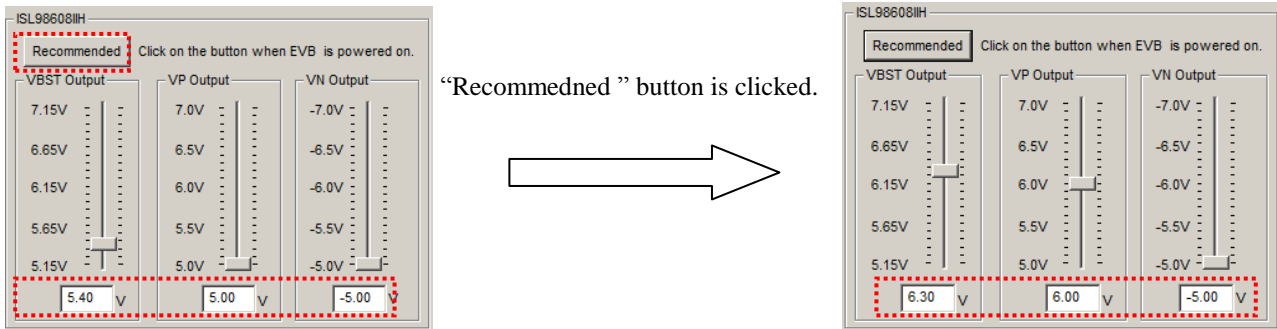(VBST Output = 6.3V, VP Output = 6.0V, VN Output = -5.0V)
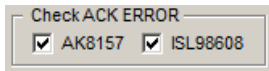


"Recommedned" button is clicked.

Figure 12. The VBST, VP and VN output are recommended setting

◆ **Other setting**

(8)  Check ACK ERROR



[Checked]: Error message will appear when AK8157/ISL98608IIH did not generate an acknowledge.
[No checked]: Error message will not appear when AK8157/ISL98608IIH did not generate an acknowledge.
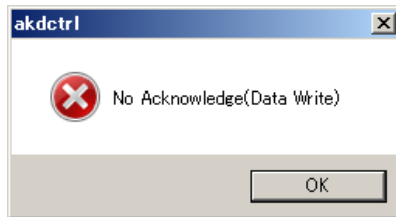


Figure 13. Error message

## 2. [AK4492], [AK8157A], [ISL98608IIH] Tab: Register Map

This tab is for register read and write.

Each bit on the register map is a push-button switch. The register is updated by mouse operation.
Button Down indicates "1" and the bit name is shown in red (when read-only the name is shown in dark red).
Button Up indicates "0" and the bit name is shown in blue (when read-only the name is shown in gray)

Grayed out registers are Read-Only registers. They cannot be controlled.

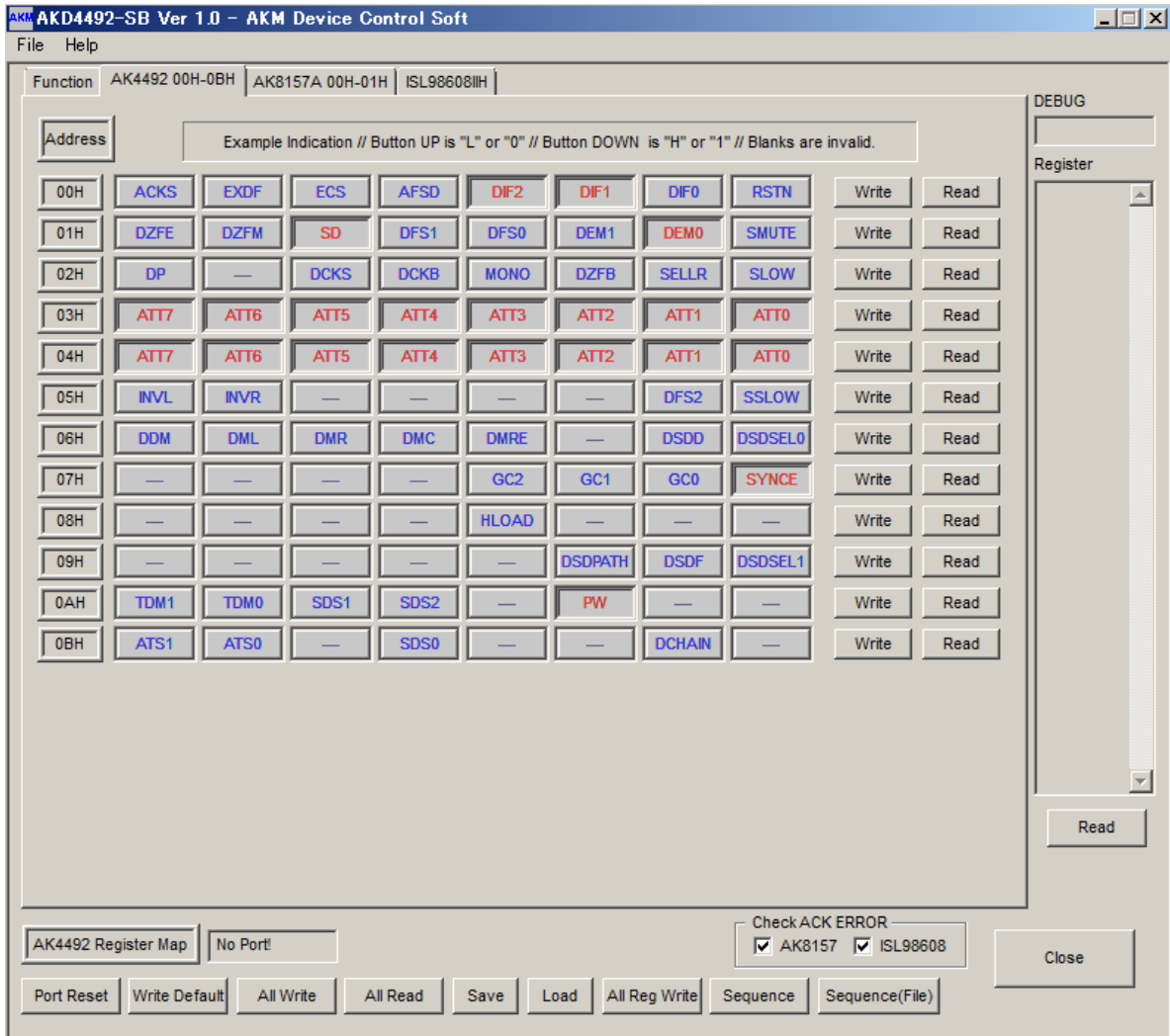The registers which are not defined on the datasheet are indicated as "---".



Figure 14. REG Window

## 2.1 [Write]: Data Wirte Dialog Box

Select the [Write] button located on the right of the each corresponding address when changing two or more bits on the same address simultaneously.

Click the [Write] button for the register pop-up dialog box shown below.

When the checkbox is checked("✓" is the sign mean "checked"), the data will become "1".
When the checkbox is not checked, the data will become "0".
There is the dialog corresponding to each register.

Click [OK] to write the set values to the registers, or click [Cancel] to cancel this setting.
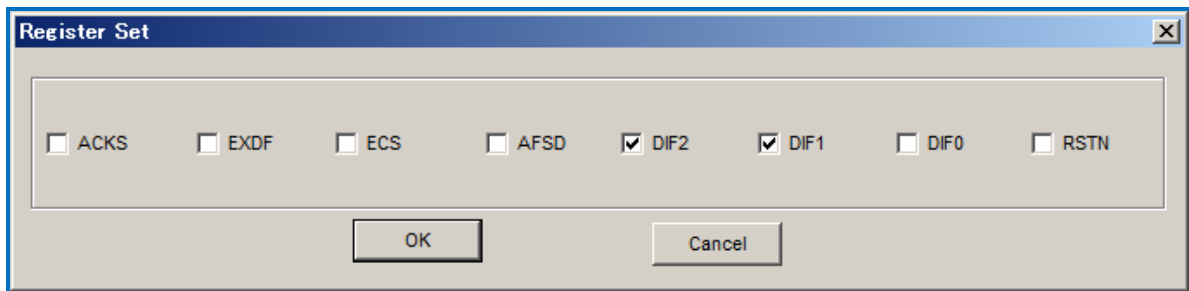


Figure 15. Register Set Window

## 2.2 [Read]: Data Read Dialog Box (I2C-bus Control Mode Only)

Click the [Read] button located on the right of the each corresponding address to execute a register read.

After finishing to read each register, the current register value will be displayed in register window.

Button Down indicates "1" and the bit name is shown in red (when read-only the name is shown in dark red).
Button Up indicates "0" and the bit name is shown in blue (when read-only the name is shown in gray).

## ■ Register setting of AK4492, AK8157A and ISL98608IIH



Figure 16. Script Window of Control Soft

Push the "Load" button and select the program file (file name is "For checking sound quality.akr") .
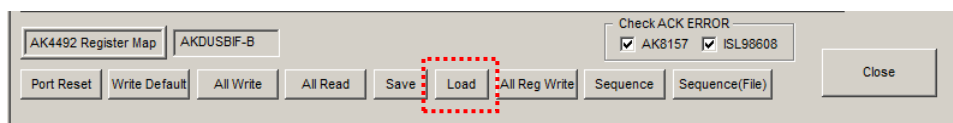When program file is selected, it's executed automatically.
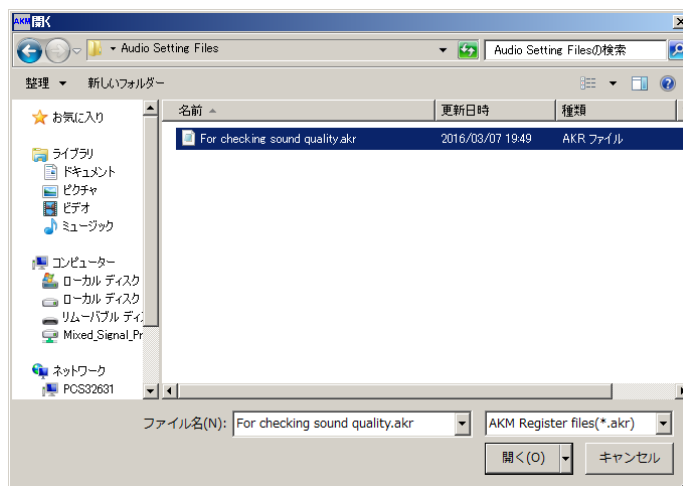


Figure 17. Program file select window (example)

■ **Dialog Boxes**

### 1. [Save]: [Save Address of Register] Dialog Box

Click the [Save] button in the main window for save address setting dialog box.
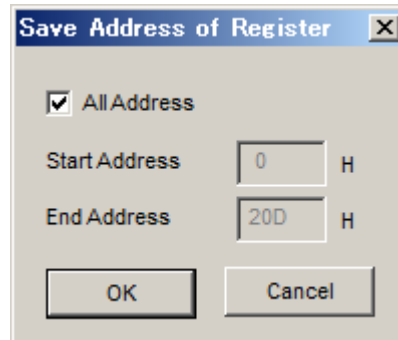


Figure 18. [Save] Window

| | |
|---|---|
| [All Address] check box | : When the [All Address] checkbox is checked, all register settings will be saved. |
| [Start Address] edit box | : When the [All Address] check box is not checked, set starts register address to save. |
| [End Address] edit box | : When the [All Address] check box is not checked, set end register address to save. |
| [OK] button | : Selects a file to save and saves register settings. |
| [Cancel] button | : Cancel and finish this process. |

Note 2. XXH address shows the address of the AK4492 . 1XXH address shows the address of the AK8157A.
2XXH address shows the address of the ISL98608.

## 2. [All Reg Write]: [All Register Write] Dialog Box

Click the [All Reg Write] button in the main window to open register setting file window show below.
Register setting files saved by the [Save] button may be applied.

Figure 19. All Reg Write Window

[Open (left)] button      : Selects a register setting file (*.akr).
[Write] button           : Executes register write with selected file setting.
[Help] button            : Opens a help window.
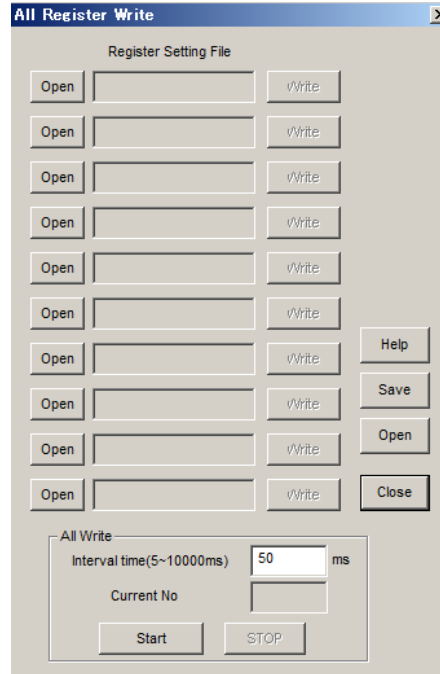[Save] button            : Saves a register setting file assignment. File name is "*.mar".
[Open (right)] button    : Opens a saved register setting file assignment "*. mar".
[Close] button           : Closes the dialog box and finish the process.
[All Write] flame         : Executes all register write.
                            Selected files are executed in descending order.
[Start] button           : Start the register writing.
[Stop] button            : Stop the register writing.
[Interval time] edit box: Set interval time to start next register setting file. (5msec ~ 10,000msec)
[Current No] edit box    : The file number which is being processed is displayed. (File number is assigned 1-10
                            from top to bottom.)


### ~ Operating Suggestions ~

1. Files saved by the [Save] button and opened by the [Open] button on the right of the dialog "*.mar" should be
   stored in the same folder.
2. Then register settings are changed by the [Save] button in the main window, re-read the file to reflect new
   register settings.

### 3. [Sequence]: [Sequence] Dialog Box

Click the [Sequence] button to open register sequence setting dialog box shown below.
Register sequence can be set in this dialog box.
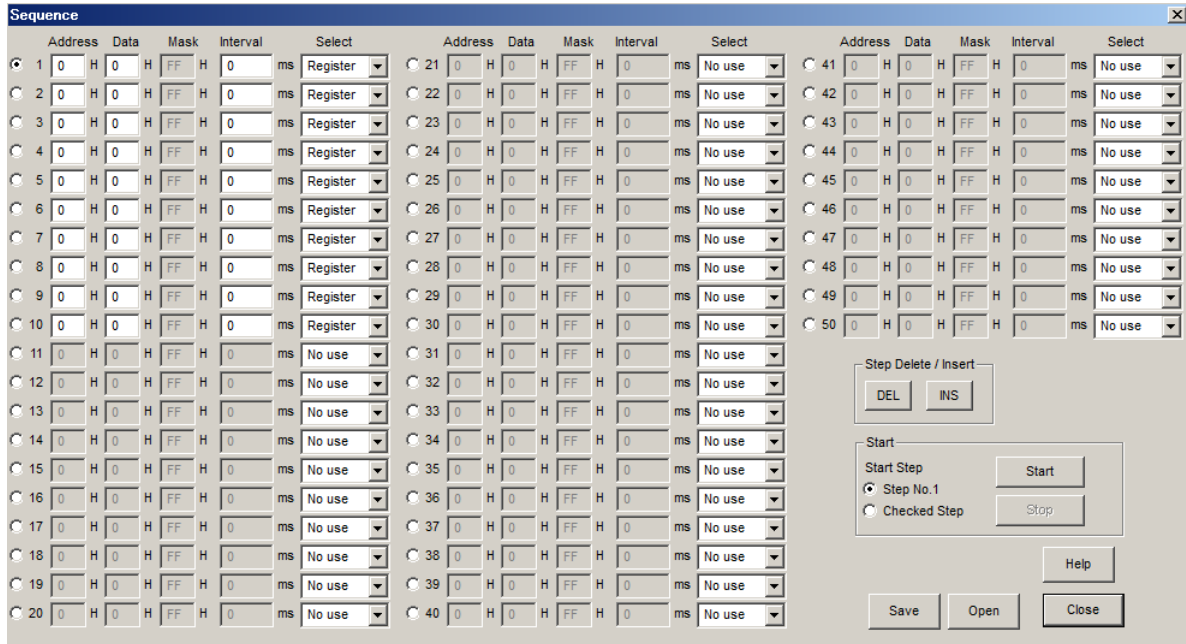


Figure 20. Sequence Window

### ~ Sequence Setting ~

Set register sequence according to the following process.

1. Select a command

   Use [Select] pull-down box to choose commands.
   Corresponding boxes will be valid.

   < Select items>
   ・No use          : Not using this address
   ・Register        : Register write
   ・Reg_Mask        : Register write (Masked)
   ・Interval        : Takes an interval
   ・Stop            : Pauses the sequence
   ・End             : Ends the sequence

2.  Input sequence

[Address]   : Data address
[Data]    : Write data
[Mask]       : Mask
   This value "ANDed" with the write data becomes the input data. The bits which corresponding Mask bit = "0" are not changed. At this time, data read is not executed, and the storage data of this software is used. "Write Default" must be executed after power up the AK4633 or when the AK4633 is reset by the PDN pin since the storage data and register values are different.
   This is the actual write data.
   When Mask = 0x00, current setting is hold.
   When Mask = 0xFF, the 8bit data which is set in the [Data] box is written.
   When Mask = 0x0F, lower 4bit data which is set in the [Data] box is written.
   Upper 4bit is hold to current setting.
[Interval]    : Interval time

Valid boxes for each process command are shown below.
   ・No use         : None
   ・Register           : [ Address ], [ Data ], [ Interval ]
   ・Reg_Mask         : [ Address ], [ Data ], [ Mask ], [ Interval ]
   ・Interval       : [ Interval ]
   ・Stop           : None
   ・End            : None

## ~ Control Buttons ~

Functions of Control Button are shown below.

   [DEL] button       : Checked step is deleted.
   [INS] button       : The last deleted step is inserted to checked step.
   [Start Step] select: Select start step.
      No.1 Step      : Start from No.1 step.
      Checked Step: Start from checked step.
   [Start] button     : Executes the sequence.
   [Stop] button      : Stops the sequence.
   [Help] button      : Opens a help window.
   [Save] button      : Saves sequence settings as a file. The file name is "*.aks".
   [Open] button      : Opens a sequence setting file "*.aks".
   [Close] button     : Closes the dialog box and finishes the process.

## ~ Stop of the Sequence ~

When "Stop" is selected in the sequence, the process is paused at this step and restart step number is checked. It starts again from the checked step by clicking the [Start] button. When the process at the end of sequence is finished, "Step No.1" of [start step] is selected automatically..

## 4. [Sequence(File)]:[Sequence(File)]  Dialog Box

Click the [Sequence(File)] button to open sequence setting file dialog box shown below.
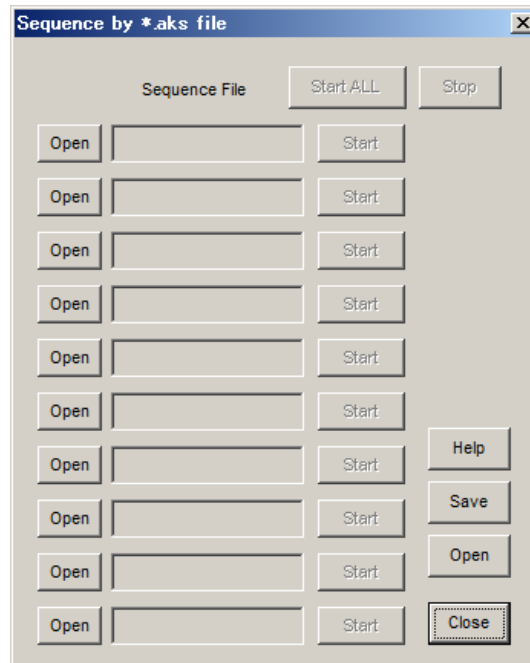Files saved in the "Sequence setting dialog" can be applied in this dialog.


Figure 21. Sequence(File) Window

[Open (left)] button      : Opens a sequence setting file (*.aks).
[Start] button            : Executes the sequence by the setting of selected file.
[Start All] button        : Executes all sequence settings.
                            Selected files are executed in descending order.
[Stop] button             : Stops the sequence process.
[Help] button             : Opens a help window.
[Save] button             : Saves a sequence setting file assignment. The file name is "*.mas".
[Open (right)] button     : Opens a saved sequence setting file assignment "*. mas".
[Close] button            : Closes the dialog box and finishes the process.


### ~ Operating Suggestions ~

1. Those files saved by [Save] button and opened by [Open] button on the right of the dialog "*.mas" should be stored in the same folder.
2. When "Stop" is selected in the sequence, the process will be paused and a pop-up message will appear. Click "OK" to continue the process.


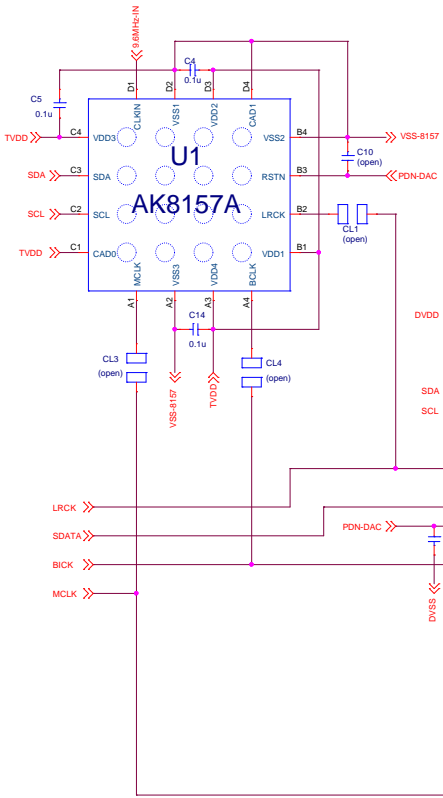Figure 22. Sequence Pause Window

## 7. REVISION HISTORY

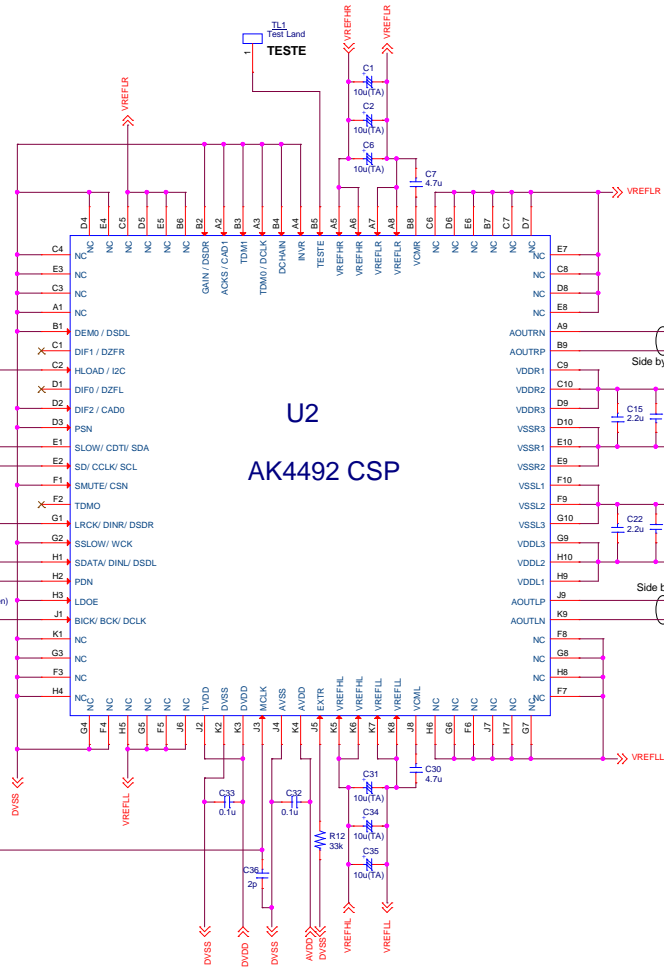| Date (yy/mm/dd) | Manual Revision | Board Revision | Reason | Page | Contents |
|---|---|---|---|---|---|
| 16/11/09 | KM125000 | 2 | First edition | - | - |

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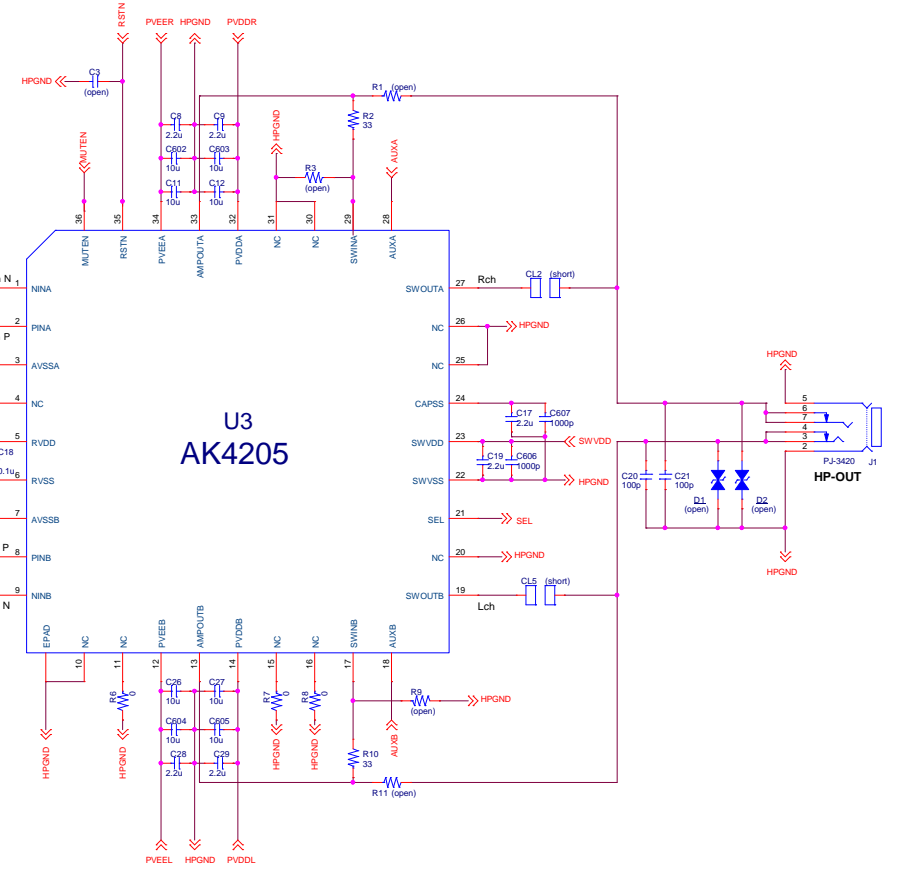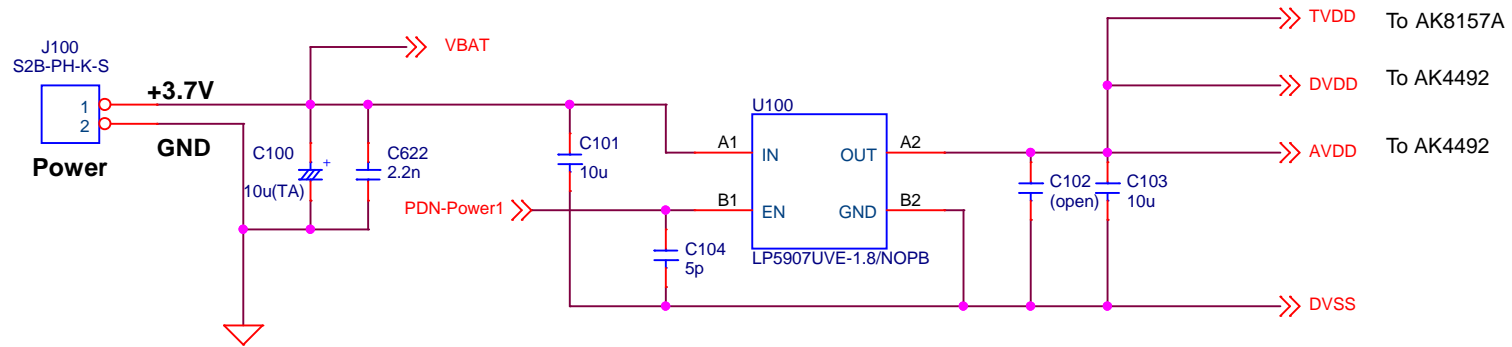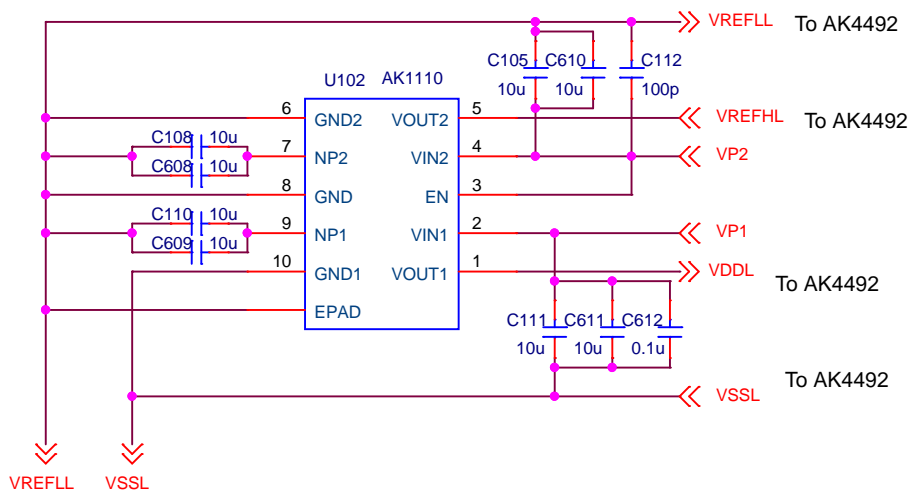
PLL for Audio Clock

32bit DAC

HP-Amp and Analog Switch

U1
AK8157A

U2
AK4492 CSP

U3
AK4205

- 28 -

# 1.8 V for Hi-Fi Digital

J100
S2B-PH-K-S

**+3.7V**

1
2

**GND**

**Power**

VBAT

C100
10u(TA)

C622
2.2n

C101
10u

PDN-Power1

U100

A1 | IN | OUT | A2
B1 | EN | GND | B2

LP5907UVE-1.8/NOPB

C104
5p

C102
(open)

C103
10u

TVDD → To AK8157A

DVDD → To AK4492

AVDD → To AK4492

DVSS

# 5.0V for Hi-Fi Analog of Lch

U102  AK1110

6 | GND2 | VOUT2 | 5
7 | NP2 | VIN2 | 4
8 | GND | EN | 3
9 | NP1 | VIN1 | 2
10 | GND1 | VOUT1 | 1
| EPAD |

C108 10u
C608 10u

C110 10u
C609 10u

C105  C610  C112
10u    10u    100p

C111  C611  C612
10u    10u    0.1u

VREFLL → To AK4492
VREFHL → To AK4492
VP2
VP1
VDDL → To AK4492
VSSL → To AK4492

VREFLL   VSSL

# 5.0V for Hi-Fi Analog of Rch

U101  AK1110

6 | GND2 | VOUT2 | 5
7 | NP2 | VIN2 | 4
8 | GND | EN | 3
9 | NP1 | VIN1 | 2
10 | GND1 | VOUT1 | 1
| EPAD |

C107 10u
C613 10u

C109 10u
C614 10u

C106  C615  C114
10u    10u    100p

C113  C616  C617
10u    10u    0.1u

VREFLR → To AK4492
VREFHR → To AK4492
VP2
VP1
VDDR → To AK4492
VSSR → To AK4492

VREFLR   VSSR

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Title
**AKD4492-SB**

Size
A4

Document Number
**Hi-Fi LDO**

Rev
2

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# 6.0V and -5.0V DCDC for Hi-Fi HP-Amp



PDN-Power2

CL200
(short)
PVEEL

PVEER

C200
5p

C201
1000p

C202
10u

PGND

C203
10u

U200
ISL98608IIH

SCL

SDA

VBAT

C207
10u

C618
10u

L200
2.2u

C208
10u

C206
5p

PDN-Power2

C204
1000p

C205
22u

PGND

CL201
(short)
PVDDL

PVDDR

CL202
(short)
RVDD

CL203
5.1ohm
VP1

VP2

PGND

PGND

- 30-
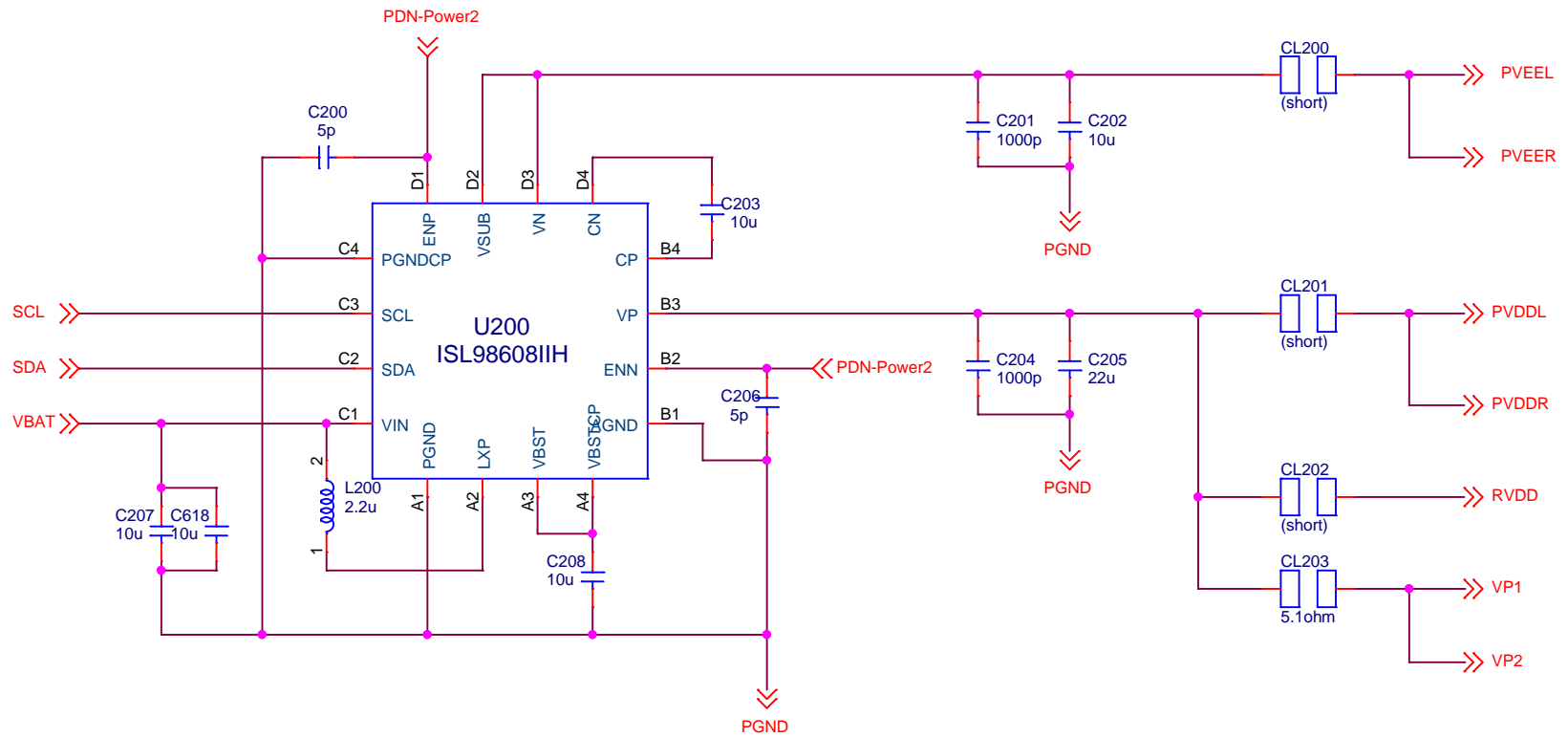
| | |
|---|---|
| Title | AKD4492-SB |

| Size | Document Number | Rev |
|---|---|---|
| A4 | Hi-Fi DCDC | 2 |

Date: Wednesday, November 09, 2016   Sheet   3   of   6

VBAT

C301 22u(TA)
C300 0.1u
C305 5p

U300 LP5907MFX-3.3
1 VIN  VOUT 5
2 GND
3 EN   NC 4

C302 0.1u
C303
C304 22u(TA)
C304 (open)

D3VDD
D3VSS

D3VDD
D300 HSU119
R300 10k
SW300
C306 0.1u
C307 (open)
C310 22u(TA)
C311 0.1u
L  H
PDN-DIR
D3VSS

U301 TC74HC14AF
1  1A  1Y  2
3  2A  2Y  4
5  3A  3Y  6
9  4A  4Y  8
11 5A  5Y  10
13 6A  6Y  12
14 VCC
7  GND

R302 0   PDN-DIR

D18VDD
D301 HSU119
R301 10k
SW301
C308 0.1u
C309 (open)
L  H
PDN-Pow1
3A
PDNVSS

VBAT

C312 22u(TA)
C313 0.1u
C317 5p

U302 LP5907MFX-1.8
1 VIN  VOUT 5
2 GND
3 EN   NC 4

C314 0.1u
C315
C316 (open)
22u(TA)

D18VDD
PDNVSS

D18VDD
D302 HSU119
R303 10k
SW302
C318 0.1u
C319 (open)
C320 22u(TA)
C321 0.1u
L  H
PDN-DAC
PDNVSS

U303 TC74HC14AF
1  1A  1Y  2
3  2A  2Y  4
5  3A  3Y  6
9  4A  4Y  8
11 5A  5Y  10
13 6A  6Y  12
14 VCC
7  GND

3A
5A
R305 0   PDN-DAC
R306 0   PDN-Power1
R307 0   PDN-Power2

D18VDD
D303 HSU119
R304 10k
SW303
C322 0.1u
C323 (open)
L  H
PDN-Pow2
5A
PDNVSS

R308 4.7k   RSTN
C515 10u
HPGND

VBAT
U304 LP5907UVE-3.3/NOPB
A1 IN   OUT A2
B1 EN   GND B2
C513 10u
C326 0.1u
C330 5p
C327 0.1u
C514 10u
C329 (open)
SWVDD
HPGND

HPGND
SWVDD
PORT300  4pin Header
SW304  A6E-2104-N  ON
MUTEN  SEL
MUTEN  SEL
R520 10k   SEL
R521 10k   MUTEN
R309 47k
R310 47k
C518 0.1u
C519 0.1u
HPGND

J300 9.6MHz IN
1 2
3
4
5
X300 NZ2520SD-9.600000M(1.8V)
2 GND STAND-BY 1
3 OUTPUT VCC 4
CL300 (open)
TVDD
CL301 (open)
CL302 (short)
C331 0.1u
C332 22u(TA)
9.6MHz-IN
VSS-8157

AUXA
AUXB
R311 (open)
R312 (open)
5 6 7 4 3 2
PJ-3420  J301
CODEC-IN
HPGND

D3VSS  PDNVSS  USBGND  VSS-8157  DVSS  VSSL  VSSR  VREFLL  VREFLR  HPGND  PGND

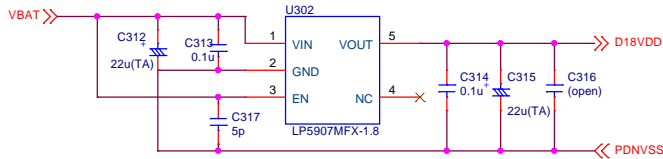**Respective GNDs should be shorted by L4 Layer.**
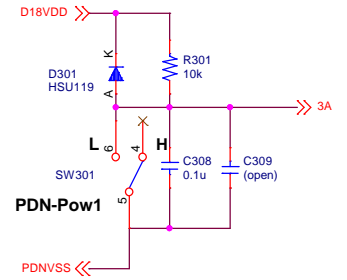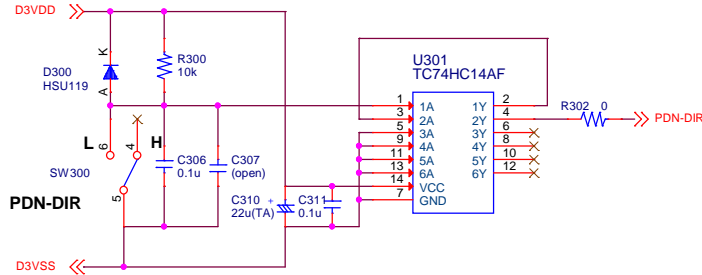
**Non-Hi-Fi  Other  Circuit**

-31-

Title: AKD4492-SB
Size A3
Document Number: Other
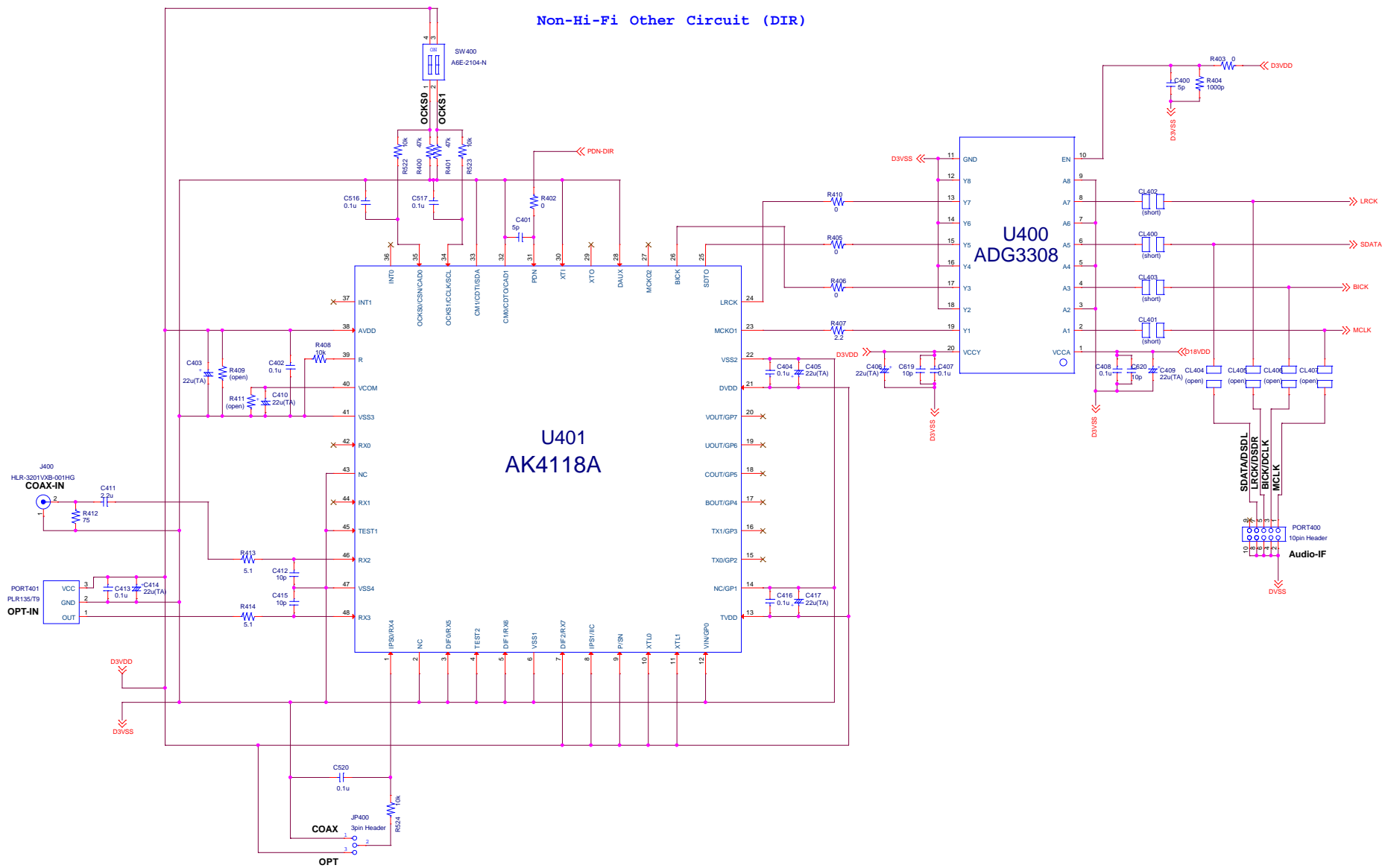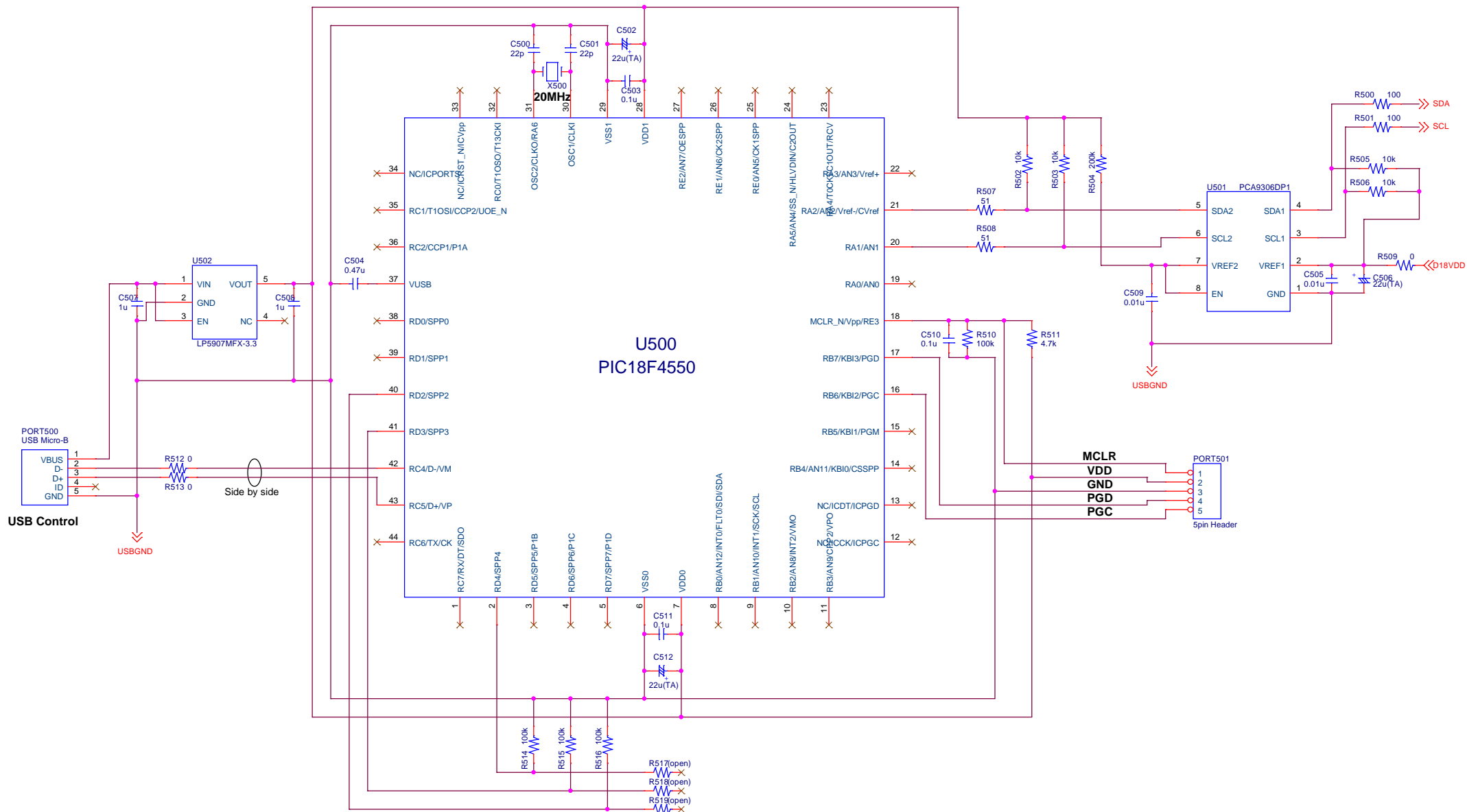Rev 2
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# Non-Hi-Fi Other Circuit (DIR)



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# Non-Hi-Fi Other Circuit (PIC)



Schematic diagram of the Non-Hi-Fi Other Circuit based on a PIC18F4550 microcontroller (U500).

Key components and labels visible in the schematic:

- **U500 PIC18F4550** — main microcontroller
- **U502 LP5907MFX-3.3** — voltage regulator
- **U501 PCA9306DP1** — level translator
- **X500 20MHz** — crystal oscillator
- **PORT500 USB Micro-B** — USB Control
- **PORT501 5pin Header** — MCLR, VDD, GND, PGD, PGC

Capacitors: C500 22p, C501 22p, C502 22u(TA), C503 0.1u, C504 0.47u, C505 0.01u, C506 22u(TA), C507 1u, C508 1u, C509 0.01u, C510 0.1u, C511 0.1u, C512 22u(TA)

Resistors: R500 100, R501 100, R502 10k, R503 10k, R504 200k, R505 10k, R506 10k, R507 51, R508 51, R509 0, R510 100k, R511 4.7k, R512 0, R513 0, R514 100k, R515 100k, R516 100k, R517(open), R518(open), R519(open)

Net labels: SDA, SCL, D18VDD, USBGND

Notes: "Side by side", "USB Control"

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