



# AKD4683-B

## AK4683 Evaluation Board Rev.0

**FEATURE**

AKD4683-B is an evaluation board for AK4683, a single chip 24bit CODEC that has two channels of ADC and four channels of DAC with internal DIR, DIT. This board has interfaces with AKM's evaluation boards for A/D converter and D/A converter and makes easy to evaluate AK4683. Also this board has the digital audio interface and then achieves the interface with digital audio systems via opt-connector or RCA connector.

■ **Ordering guide**

AKD4683-B --- AK4683 Evaluation Board

10 wire flat cable for connection with printer port of PC (IBM-AT compatible machine), control software for AK4683, driver for control software on Windows 2000/XP are packed with this.

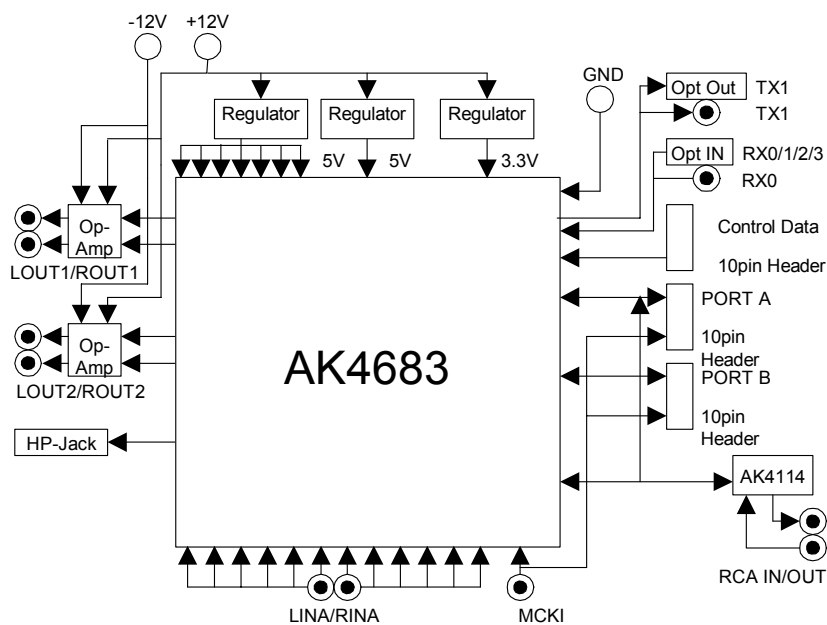
Control software does not work on Windows NT

Windows 2000/XP needs an installation of driver.

Windows 95/98/ME does not need an installation of driver.

**FUNCTION**

- On-board clock generator (use AK4114)
- Compatible with 2 types of digital audio interface
  - Optical output/input and RCA input/output
  - 10pin header for interface with external data source (x2)
- RCA connector for clock input with external clock source
- 10pin header for register control



(Note) AK4114 has DIR, DIT and X'tal oscillator.

Figure 1. AKD4683-B Block Diagram

(\* Circuit diagram and PCB layout are attached at the end of this manual.)

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|--------------------------------|
| <b>EVALUATION BOARD MANUAL</b> |
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### ■ Operating sequence

#### (1) Set up power supply lines.

|         |                 |
|---------|-----------------|
| [+12V]  | (Orange) = +12V |
| [-12V]  | (Blue) = -12V   |
| [AVSS1] | (Black) = 0V    |
| [AVSS2] | (Black) = 0V    |
| [DVSS]  | (Black) = 0V    |
| [PVSS]  | (Black) = 0V    |
| [HVSS]  | (Black) = 0V    |
| [DGND]  | (Black) = 0V    |

Each supply line should be distributed from the power supply unit.

#### (2) Set up evaluation mode and jumper pins. (Refer to the following item.)

#### (3) Connect cables. (Refer to the following item.)

#### (4) Power on.

The AK4683 should be reset once bringing PDN (SW3) “L” upon power-up.

#### (5) Set up control software registers. (Refer to the following item.)

### ■ Evaluation modes

#### (1) DAC with internal DIR

##### 1. Connection of connector

In case of digital input through RX0, optical connector PORT5 (TORX176) or RCA connector J14 (RX0) are available. In case of digital input through RX1, RX2 or RX3, only the optical connector PORT5 is available.

##### 2. Setting of jumper pin

RX0 and RX1-3 should not select optical connector at the same time.

In case of digital input through RX1, RX2 or RX3, set jumpers JP32 (RX1), JP34 (RX2) or JP36 (RX3) as Table 2. Set unused channels to GND.

| Connector       | JP33 (RX0) | Default |
|-----------------|------------|---------|
| Optical (PORT5) | OPT        |         |
| RCA (J14)       | RCA        |         |

Table 1. Set-up of RX0

| Input | JP32 (RX1) | JP34 (RX2) | JP36 (RX3) |
|-------|------------|------------|------------|
| RX1   | OPT        | GND        | GND        |
| RX2   | GND        | OPT        | GND        |
| RX3   | GND        | GND        | OPT        |

Table 2. Set-up of RX1, RX2, and RX3

### 3. Setting of toggle switch

Set SW1 (AK4114-PDN) to OFF.

#### (2) ADC with internal DIT

##### 1. Connection of connector

For digital output, optical connector PORT3 (TOTX176) or RCA connector J13 (TX1) are available.

##### 2. Setting of jumper pin

JP30 (TX1) controls digital output (optical connector PORT3 or RCA connector J13).

| Connector       | JP30(TX) | Default |
|-----------------|----------|---------|
| Optical (PORT3) | OPT      |         |
| RCA (J13)       | RCA      |         |

Table 3. Set-up of TX

### 3. Setting of toggle switch

Set SW1 (AK4114-PDN) to OFF.

#### (3) DAC with external DIR

##### 1. Connection of connector

For digital input, RCA connector J10 (AK4114-RX0) is available.

##### 2. Setting of jumper pin

Setting of interface signal of PORTA/PORTB: AK4114 (U5) is as follows.  
(Default input of PORTA is SDTIA1.)

| PORT  | JP22<br>(BICKA) | JP24<br>(OLRCKA) | JP16<br>(ILRCKA) | JP17<br>(SDTIA1) | JP19<br>(SDTIA2) | JP20<br>(SDTIA3) |
|-------|-----------------|------------------|------------------|------------------|------------------|------------------|
| PORTA | Short           | Open             | Short            | DIR              | GND              | GND              |
| PORTB | Open            | Open             | Open             | GND              | GND              | GND              |

Table 4. Set-up of AK4114 interface (1/2)

| PORT  | JP27<br>(BICKB) | JP28<br>(LRCKB) | JP25<br>(SDTIB) | JP21<br>(MCLK-SEL) | JP29<br>(MCLK) | JP15<br>(XTIA) | JP23<br>(SDTO) |
|-------|-----------------|-----------------|-----------------|--------------------|----------------|----------------|----------------|
| PORTA | Open            | Open            | GND             | MCKO1              | Open           | Open           | SDTOA          |
| PORTB | Short           | Short           | DIR             | MCKO1              | Open           | Open           | SDTOB          |

Table 5. Set-up of AK4114 interface (2/2)

### 3. Setting of toggle switch

Set SW1 (AK4114-PDN) to ON.

### 4. Setting of DIP switch

Set SW2 (PORTA-DIR/4683): 2pin (DIF1) to OFF.

## (4) ADC with external DIT

## 1. Connection of connector

For digital output, RCA connector J11 (AK4114-TX1) is available.

## 2. Setting of jumper pin

Setting of interface signal of PORTA/PORTB: AK4114 (U5) is as follows.

| PORT  | JP22<br>(BICKA) | JP24<br>(OLRCKA) | JP16<br>(ILRCKA) | JP17<br>(SDTIA1) | JP19<br>(SDTIA2) | JP20<br>(SDTIA3) |
|-------|-----------------|------------------|------------------|------------------|------------------|------------------|
| PORTA | Short           | Short            | Open             | GND              | GND              | GND              |
| PORTB | Open            | Open             | Open             | GND              | GND              | GND              |

Table 6. Set-up of AK4114 interface (1/2)

| PORT  | JP27<br>(BICKB) | JP28<br>(LRCKB) | JP25<br>(SDTIB) | JP21<br>(MCLK-SEL) | JP29<br>(MCLK) | JP15<br>(XTIA) | JP23<br>(SDTO) |
|-------|-----------------|-----------------|-----------------|--------------------|----------------|----------------|----------------|
| PORTA | Open            | Open            | GND             | Open               | Open           | Short          | SDTOA          |
| PORTB | Short           | Short           | GND             | Open               | Open           | Short          | SDTOB          |

Table 7. Set-up of AK4114 interface (2/2)

## 3. Setting of toggle switch

Set SW1 (AK4114-PDN) to ON.

## 4. Setting of DIP switch

Set SW2 (PORTA-DIR/4683): 4pin (CM0) to ON.

## (5) Internal loop back (Analog input → ADC → DAC → Analog output)

## 1. Connection of connector

For analog input, RCA connector J3 (LINA)/ J6 (RINA) are available.

For analog output, RCA connector J1 (LOUT1)/ J4 (ROUT1), J2 (LOUT2)/ J5 (ROUT2) are available.

## 2. Setting of jumper pin

| Input      | JP1 (LIN1)/<br>JP7 (RIN1) | JP2 (LIN2)/<br>JP8 (RIN2) | JP3 (LIN3)/<br>JP9 (RIN3) | JP4 (LIN4)/<br>JP10 (RIN4) | JP5 (LIN5)/<br>JP11 (RIN5) | JP6 (LIN6)/<br>JP12 (RIN6) |
|------------|---------------------------|---------------------------|---------------------------|----------------------------|----------------------------|----------------------------|
| LIN1/ RIN1 | LINA/ RINA                | Open                      | Open                      | Open                       | Open                       | Open                       |
| LIN2/ RIN2 | Open                      | LINA/ RINA                | Open                      | Open                       | Open                       | Open                       |
| LIN3/ RIN3 | Open                      | Open                      | LINA/ RINA                | Open                       | Open                       | Open                       |
| LIN4/ RIN4 | Open                      | Open                      | Open                      | LINA/ RINA                 | Open                       | Open                       |
| LIN5/ RIN5 | Open                      | Open                      | Open                      | Open                       | LINA/ RINA                 | Open                       |
| LIN6/ RIN6 | Open                      | Open                      | Open                      | Open                       | Open                       | LINA/ RINA                 |

(Default)

Table 8. Set-up of LINA/RINA

| Input      | JP1 (LIN1)/<br>JP7 (RIN1) | JP2 (LIN2)/<br>JP8 (RIN2) | JP3 (LIN3)/<br>JP9 (RIN3) | JP4 (LIN4)/<br>JP10 (RIN4) | JP5 (LIN5)/<br>JP11 (RIN5) | JP6 (LIN6)/<br>JP12 (RIN6) |
|------------|---------------------------|---------------------------|---------------------------|----------------------------|----------------------------|----------------------------|
| LIN1/ RIN1 | LINB/ RINB                | Open                      | Open                      | Open                       | Open                       | Open                       |
| LIN2/ RIN2 | Open                      | LINB/ RINB                | Open                      | Open                       | Open                       | Open                       |
| LIN3/ RIN3 | Open                      | Open                      | LINB/ RINB                | Open                       | Open                       | Open                       |
| LIN4/ RIN4 | Open                      | Open                      | Open                      | LINB/ RINB                 | Open                       | Open                       |
| LIN5/ RIN5 | Open                      | Open                      | Open                      | Open                       | LINB/ RINB                 | Open                       |
| LIN6/ RIN6 | Open                      | Open                      | Open                      | Open                       | Open                       | LINB/ RINB                 |

Table 9. Set-up of LINB/RINB

3. Setting of toggle switch

Set SW1 (AK4114-PDN) to OFF.

■ Register control

AKD4683-B can be controlled via the printer port (parallel port) of IBM-AT compatible PC. Connect PORT4 (uP-I/F) to PC by 10-line flat cable packed with this. Take care of the direction of connector. There is a mark at pin#1. The pin layout of PORT4 is as Figure 2.

| Mode          | SW2 8 |
|---------------|-------|
| 4-wire Serial | L     |
| I2C           | H     |

Table 10. Set-up of Parallel mode and Serial mode

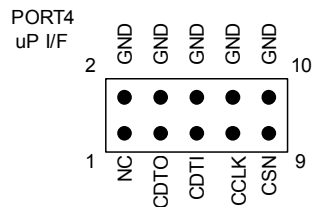


Figure 2. PORT4 pin layout

Control software is packed with this evaluation board. Software operation procedure is included in evaluation board manual.

## ■ Set-up DIP switch (SW2)

| No. | Name  | ON ("H")   | OFF ("L")                  | Default |
|-----|-------|--|----------------------------|---------|
| 1   | DIF0  | Setting of AK4114 Audio Interface Format<br>(Refer Table 12.)          |                            | OFF     |
| 2   | DIF1  |  |                            | ON      |
| 3   | DIF2  |  |                            | ON      |
| 4   | CM0   | Selection of AK4114 Clock Mode (Clock Source)<br>(Refer Table 13.)     |                            | OFF     |
| 5   | CM1   |  |                            | OFF     |
| 6   | OCKS0 | Selection of AK4114 Master Clock Output frequency<br>(Refer Table 14.) |                            | OFF     |
| 7   | OCKS1 |  |                            | OFF     |
| 8   | I2C   | I <sup>2</sup> C-bus control mode                                      | 4-wire serial control mode | OFF     |

Table 11. Set up modes of AK4114 (U5) and AK4683 (U1)

| Mode | DIF2 | DIF1 | DIF0 | DAUX                    | SDTO                    | LRCK |     | BICK     |     |
|------|------|------|------|-------------------------|-------------------------|------|-----|----------|-----|
|      |      |      |      |                         |                         |      | I/O |          | I/O |
| 0    | 0    | 0    | 0    | 24bit, Left justified   | 16bit, Right justified  | H/L  | O   | 64fs     | O   |
| 1    | 0    | 0    | 1    | 24bit, Left justified   | 18bit, Right justified  | H/L  | O   | 64fs     | O   |
| 2    | 0    | 1    | 0    | 24bit, Left justified   | 20bit, Right justified  | H/L  | O   | 64fs     | O   |
| 3    | 0    | 1    | 1    | 24bit, Left justified   | 24bit, Right justified  | H/L  | O   | 64fs     | O   |
| 4    | 1    | 0    | 0    | 24bit, Left justified   | 24bit, Left justified   | H/L  | O   | 64fs     | O   |
| 5    | 1    | 0    | 1    | 24bit, I <sup>2</sup> S | 24bit, I <sup>2</sup> S | L/H  | O   | 64fs     | O   |
| 6    | 1    | 1    | 0    | 24bit, Left justified   | 24bit, Left justified   | H/L  | I   | 64-128fs | I   |
| 7    | 1    | 1    | 1    | 24bit, I <sup>2</sup> S | 24bit, I <sup>2</sup> S | L/H  | I   | 64-128fs | I   |

&lt;Default&gt;

Table 12. AK4114 Audio Interface Format

| Mode | CM1 | CM0 | UNLOCK | PLL | X'tal      | Clock source | SDTO |
|------|-----|-----|--------|-----|------------|--------------|------|
| 0    | 0   | 0   | -      | ON  | ON (Note1) | PLL          | RX   |
| 1    | 0   | 1   | -      | OFF | ON         | X'tal        | DAUX |
| 2    | 1   | 0   | 0      | ON  | ON         | PLL          | RX   |
|      |     |     | 1      | ON  | ON         | X'tal        | DAUX |
| 3    | 1   | 1   | -      | ON  | ON         | X'tal        | DAUX |

&lt;Default&gt;

Table 13. AK4114 Clock Mode (Clock Source)

| No. | OCKS1 | OCKS0 | MCKO1 | MCKO2 | X'tal | fs (max) |
|-----|-------|-------|-------|-------|-------|----------|
| 0   | 0     | 0     | 256fs | 256fs | 256fs | 96 kHz   |
| 1   | 0     | 1     | 256fs | 128fs | 256fs | 96 kHz   |
| 2   | 1     | 0     | 512fs | 256fs | 512fs | 48 kHz   |
| 3   | 1     | 1     | 128fs | 64fs  | 128fs | 192 kHz  |

&lt;Default&gt;

Table 14. AK4114 Master Clock Output Frequency

## ■ Toggle switch

[SW3] (PDN): Switch for power down reset of AK4683 (U1). Keep "H" during operation of AK4683 (U1). Power down reset of AK4683 will be done by setting SW3 (PDN) to "L" once, after power on.

[SW1] (AK4114-PDN): Switch for power down reset of AK4114 (U5). Keep "H" during operation of AK4114 (U5). Power down reset of AK4114 (U5) will be done by setting SW1 to "L" once, after power on.

## ■ LED indication

[LE1] (INT): LED for output of AK4683 (U1): INT. It turns on when output of AK4683 (U1): INT is "H".

[LED1] (ERF): LED for output of AK4114 (U5): INT0. It turns on when output of AK4114 (U5): INT0 is "H".

### ■ Set up Jumper pins

| Jumper          | Evaluation Mode |       |       |       |       |
|-----------------|-----------------|-------|-------|-------|-------|
|                 | 1               | 2     | 3     | 4     | 5     |
| JP1 (LIN1)      | LINA            | LINA  | LINA  | LINA  | LINA  |
| JP2 (LIN2)      | Open            | Open  | Open  | Open  | Open  |
| JP3 (LIN3)      | Open            | Open  | Open  | Open  | Open  |
| JP4 (LIN4)      | Open            | Open  | Open  | Open  | Open  |
| JP5 (LIN5)      | Open            | Open  | Open  | Open  | Open  |
| JP6 (LIN6)      | Open            | Open  | Open  | Open  | Open  |
| JP7 (RIN1)      | RINA            | RINA  | RINA  | RINA  | RINA  |
| JP8 (RIN2)      | Open            | Open  | Open  | Open  | Open  |
| JP9 (RIN3)      | Open            | Open  | Open  | Open  | Open  |
| JP10 (RIN4)     | Open            | Open  | Open  | Open  | Open  |
| JP11 (RIN5)     | Open            | Open  | Open  | Open  | Open  |
| JP12 (RIN6)     | Open            | Open  | Open  | Open  | Open  |
| JP15 (XTIA)     | Open            | Open  | Open  | Short | Open  |
| JP16 (ILRCKA)   | Short           | Short | Short | Open  | Short |
| JP17 (SDTIA1)   | GND             | GND   | DIR   | GND   | GND   |
| JP19 (SDTIA2)   | GND             | GND   | GND   | GND   | GND   |
| JP20 (SDTIA3)   | GND             | GND   | GND   | GND   | GND   |
| JP21 (MCLK-SEL) | Open            | Open  | MCKO1 | Open  | Open  |
| JP22 (BICKA)    | Short           | Short | Short | Short | Short |
| JP23 (SDTO)     | SDTOA           | SDTOA | SDTOA | SDTOA | SDTOA |
| JP24 (OLRCKA)   | Open            | Open  | Open  | Short | Open  |
| JP25 (SDTIB)    | GND             | GND   | GND   | GND   | GND   |
| JP27 (BICKB)    | Open            | Open  | Open  | Open  | Open  |
| JP28 (LRCKB)    | Open            | Open  | Open  | Open  | Open  |
| JP29 (MCLK)     | Open            | Open  | Open  | Open  | Open  |
| JP30 (TX)       | OPT             | OPT   | OPT   | OPT   | OPT   |
| JP32 (RX1)      | GND             | GND   | GND   | GND   | GND   |
| JP33 (RX0)      | OPT             | OPT   | OPT   | OPT   | OPT   |
| JP34 (RX2)      | GND             | GND   | GND   | GND   | GND   |
| JP35 (GND)      | Short           | Short | Short | Short | Short |
| JP36 (RX3)      | GND             | GND   | GND   | GND   | GND   |

(Default)

**■ Set up control software registers**

After the reset, setting example files are available as follows in CD-ROM to set registers in each evaluation modes.

## Evaluation Mode 1

ADC/DAC: ak4683\_adc\_dac\_mode1.akr  
DIR/DIT: ak4683\_dir\_dit\_mode1.akr

## Evaluation Mode 2

ADC/DAC: ak4683\_adc\_dac\_mode2.akr  
DIR/DIT: ak4683\_dir\_dit\_mode2.akr

## Evaluation Mode 3

ADC/DAC: ak4683\_adc\_dac\_mode3.akr  
DIR/DIT: ak4683\_dir\_dit\_mode3.akr

## Evaluation Mode 4

ADC/DAC: ak4683\_adc\_dac\_mode4.akr  
DIR/DIT: ak4683\_dir\_dit\_mode4.akr

## Evaluation Mode 5

ADC/DAC: ak4683\_adc\_dac\_mode5.akr  
DIR/DIT: ak4683\_dir\_dit\_mode5.akr

■ Analog Input Circuit

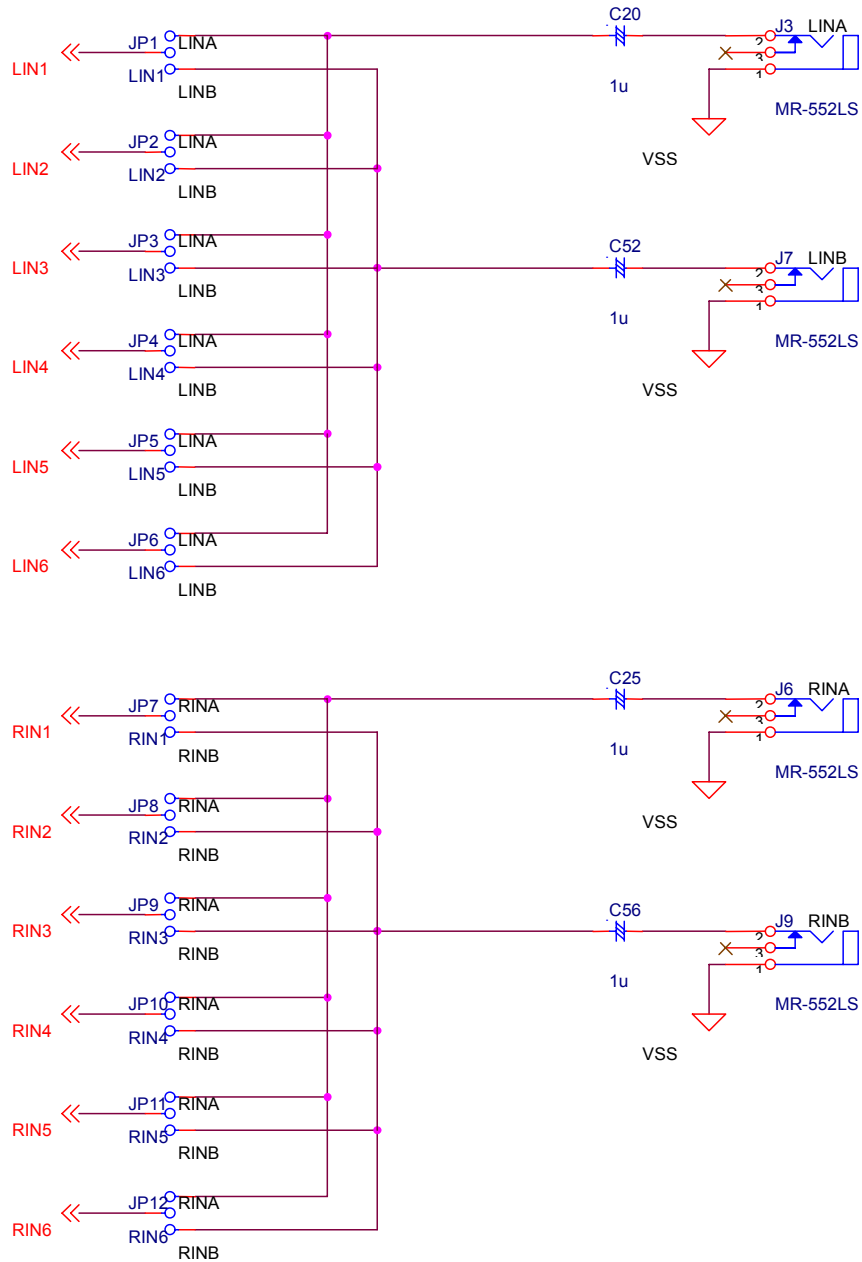


Figure 3. Analog Input Circuit

For analog input, RCA connector: J3 (LINA), J6 (RINA), J7 (LINB), J9 (RINB) are available to use. Analog inputs are single-ended and input ranges of each channel are nominally 6.1Vpp@5V (R1~R12=47kΩ, R=14,15=24kΩ).

■ Analog Output Circuit

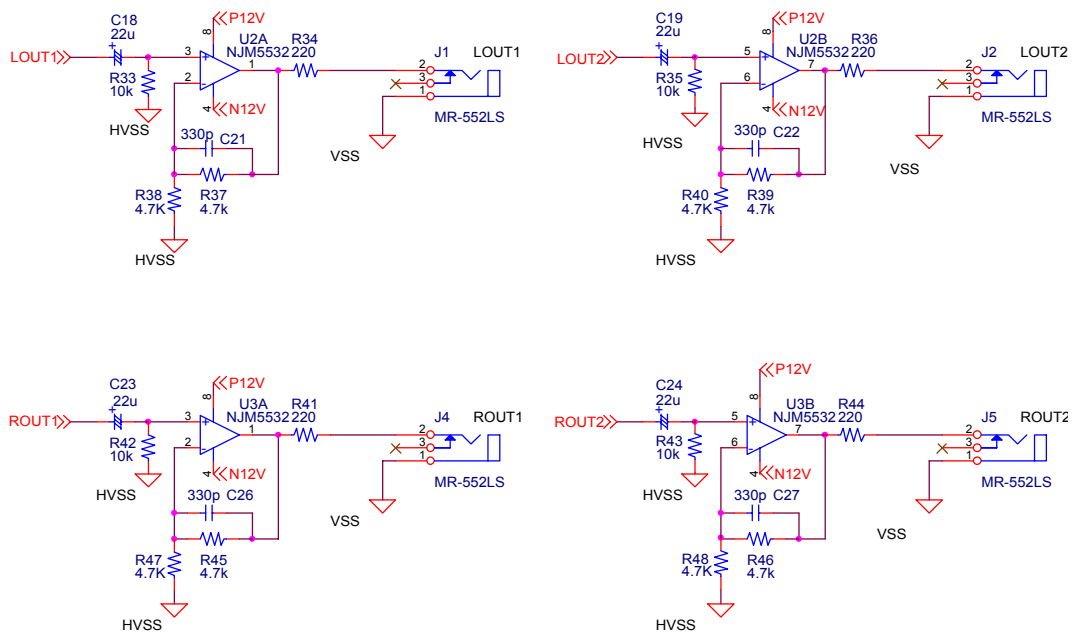


Figure 4. Analog Output Circuit

For analog output, RCA connector: J1 (LOUT1), J4 (ROUT1), J2 (LOUT2), J5 (ROUT2) are available to use. Analog outputs are single-ended and output ranges of each channel are nominally 3.0Vpp@5V. Output range: AOUT is proportional to AVDD2 (AOUT=0.6 x AVDD2=0.6 x 5=3.0).

■ Digital Input Circuit (Internal DIR)

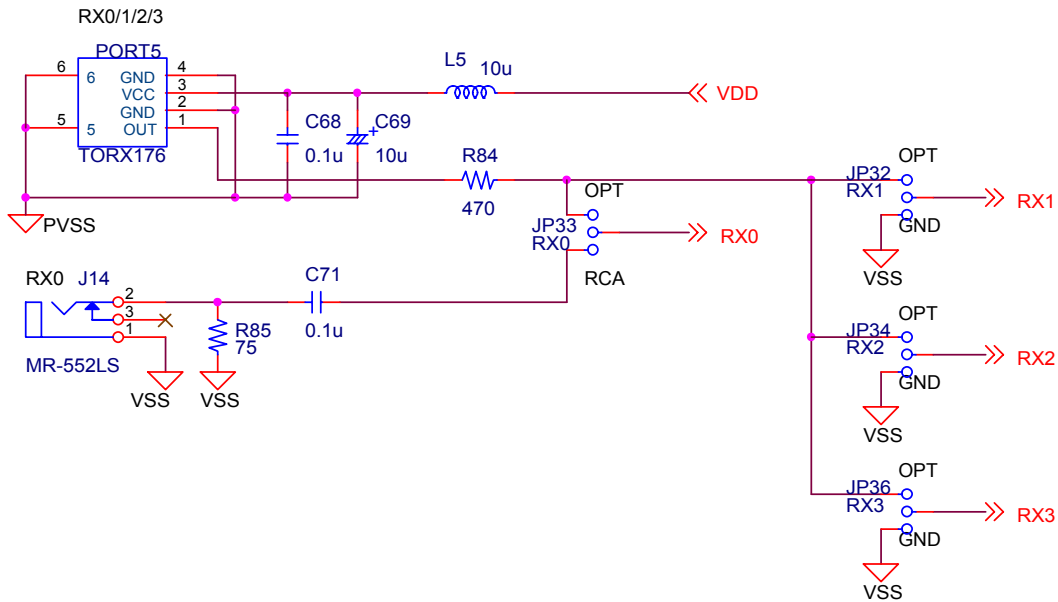


Figure 5. Digital Input Circuit (Internal DIR)

In case of input through RX0, optical connector PORT5 (TORX176) or RCA connector J14 (RX0) are available.  
 In case of input through RX1, RX2 or RX3, only the optical connector PORT5 is available.  
 Digital input: RX0, RX1, RX2 and RX3 is available to select overwriting IPS10 bit of control register (Addr=03H) of AK4683: DIR/DIT part by control software.

■ Digital Input Circuit (External DIR: PORT A)

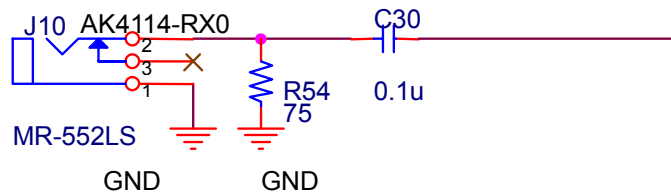


Figure 6. Digital Input Circuit (External DIR)

For digital input, RCA connector: J10 (AK4114-RX0) is available.

■ Digital Output Circuit (Internal DIT)

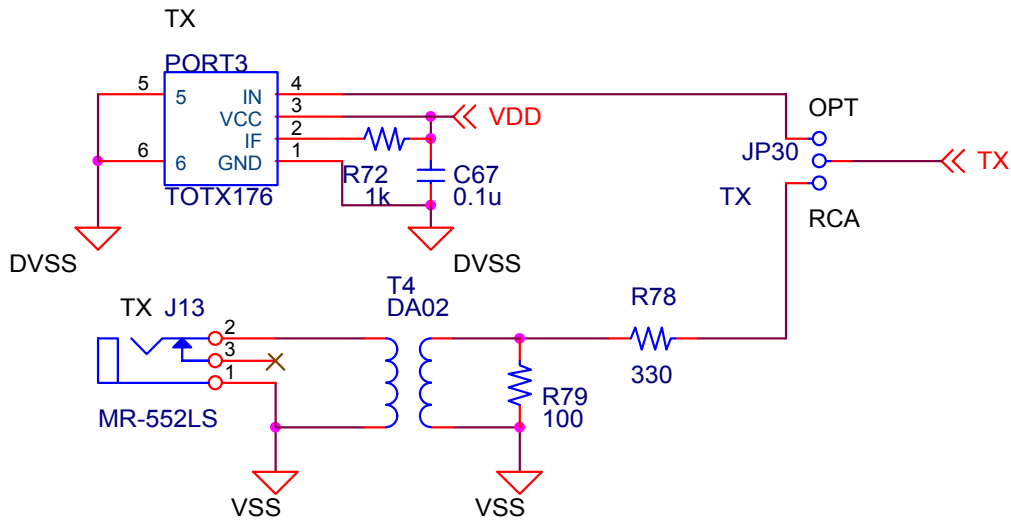


Figure 7. Digital Output Circuit (Internal DIT)

For digital output, optical connector PORT3 (TOTX176) or RCA connector J13 (TX1) are available.

■ Digital Output Circuit (External DIT)

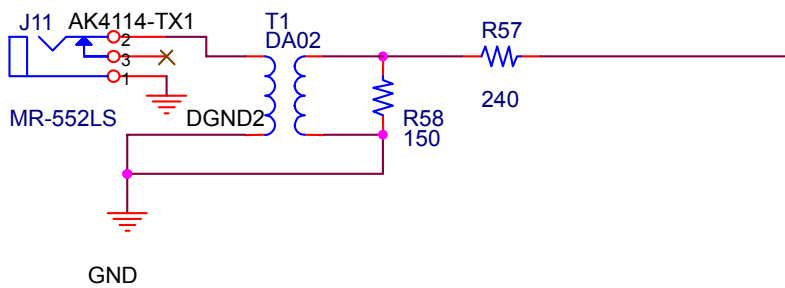


Figure 8. Digital Output Circuit (External DIT)

For digital output, RCA connector: J11 (AK4114-TX1) is available.

■ Headphone Output Circuit

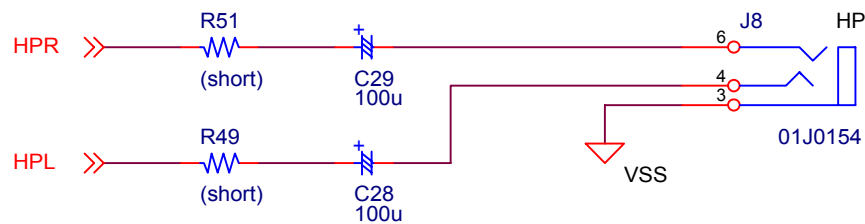


Figure 9. Headphone Output Circuit

For headphone output, stereo mini jack J8 (HP) are available.

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| <b>Control Software Manual</b> |
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### ■ Set-up of evaluation board and control software

1. Set up the AKD4683-B according to previous term.
2. Connect IBM-AT compatible PC with AKD4683-B by 10-line type flat cable (packed with AKD4683-B). Take care of the direction of 10pin header. (Please install the driver in the CD-ROM when this control software is used on Windows 2000/XP. Please refer "Installation Manual of Control Software Driver by AKM device control software". In case of Windows95/98/ME, this installation is not needed. This control software does not operate on Windows NT.)
3. Insert the CD-ROM labeled "AKD4683-B Evaluation Kit" into the CD-ROM drive.
4. Access the CD-ROM drive, and double-click the icon of "akd4683-b\_adc\_dac.exe" and "akd4683-b\_dir\_dit.exe", and set up the control program.
  - akd4683-b\_adc\_dac.exe: AK4683 ADC/DAC control program
  - akd4683-b\_dir\_dit.exe: AK4683 DIR/DIT control program
5. Then evaluate according to the follows.

### ■ Operation flow

Keep the following flow.

1. Set up the control program according to explanation above.
2. Click "Port Reset" button.

### ■ Explanation of each buttons

1. [Port Reset]: Set up the USB interface board (AKDUSBIF-A).
2. [Write default]: Initialize the registers.
3. [All Write]: Write all registers data that is currently displayed.
4. [Function1]: Dialog to write data by keyboard operation.
5. [Function2]: Dialog to write data by keyboard operation.
6. [Function3]: The sequence of register setting can be set and executed.
7. [Function4]: The sequence that is created on [Function3] can be assigned to buttons and executed.
8. [Function5]: The register setting that is created by [SAVE] function on main window can be assigned to buttons and executed.
9. [SAVE]: Save the current register setting.
10. [OPEN]: Write the saved values to all register.
11. [Write]: Dialog to write data by mouse operation.

### ■ Indication of data

Input data is indicated on the register map. Red letter indicates "H" or "1" and blue one indicates "L" or "0". Blank is the part that is not defined in the datasheet.

## ■ Explanation of each dialog

### 1. [Write Dialog]: Dialog to write data by mouse operation

There are dialogs corresponding to each register.

Click the [Write] button corresponding to each register to set up the dialog. If you check the check box, data becomes “H” or “L”. If not, “0” or “1”.

When writing the input data to register, click [OK] button. If not, click [Cancel] button.

### 2. [Function1 Dialog]: Dialog to write data by keyboard operation

Address Box: Input registers address in 2 figures of hexadecimal.

Data Box: Input registers data in 2 figures of hexadecimal.

When writing the input data to register, click [OK] button. If not, click [Cancel] button.

### 3. [Function2 Dialog]: Dialog to evaluate ATT

This is a dialog corresponding to address: 0CH, 0DH, 0EH, 0FH, 10H, and 11H of AK4683.

Address Box: Input registers address in 2 figures of hexadecimal.

Start Data Box: Input starts data in 2 figures of hexadecimal.

End Data Box: Input end data in 2 figures of hexadecimal.

Interval Box: Data is written to register by this interval.

Step Box: Data changes by this step.

Mode Select Box:

With checking this check box, data reaches end data, and returns to start data.

[Example] Start Data = 00, End Data = 09

Data flow: 00 01 02 03 04 05 06 07 08 09 09 08 07 06 05 04 03 02 01 00

Without checking this check box, data reaches end data, but does not return to start data.

[Example] Start Data = 00, End Data = 09

Data flow: 00 01 02 03 04 05 06 07 08 09

When writing the input data to register, click [OK] button. If not, click [Cancel] button.

## **4. [Save] and [Open]**

### **4-1. [Save]**

Save the current register setting data to the file. The extension of file name is “.akr”.

(Operation flow)

- (1) Click [Save] Button.
- (2) Set the file name and push [Save] Button. The extension of file name is “.akr”.

### **4-2. [Open]**

The register setting data saved to the file by [Save] is written to register. The file type is the same as [Save].

(Operation flow)

- (1) Click [Open] Button.
- (2) Select the file (\*.akr) and Click [Open] Button.

### 5. [Function3 Dialog]

The sequence of register setting can be set and executed.

(1) Click [F3] Button.

Set the control sequence.

Set the address, Data and Interval time. Set “-1” to the address of the step where the sequence should be paused.

(3) Click [Start] button. Then this sequence is executed.

The sequence is paused at the step of Interval="-1". Click [START] button, the sequence restarts from the paused step. This sequence can be saved and opened by [Save] and [Open] button on the [Function3] window. The extension of file name is “aks”.

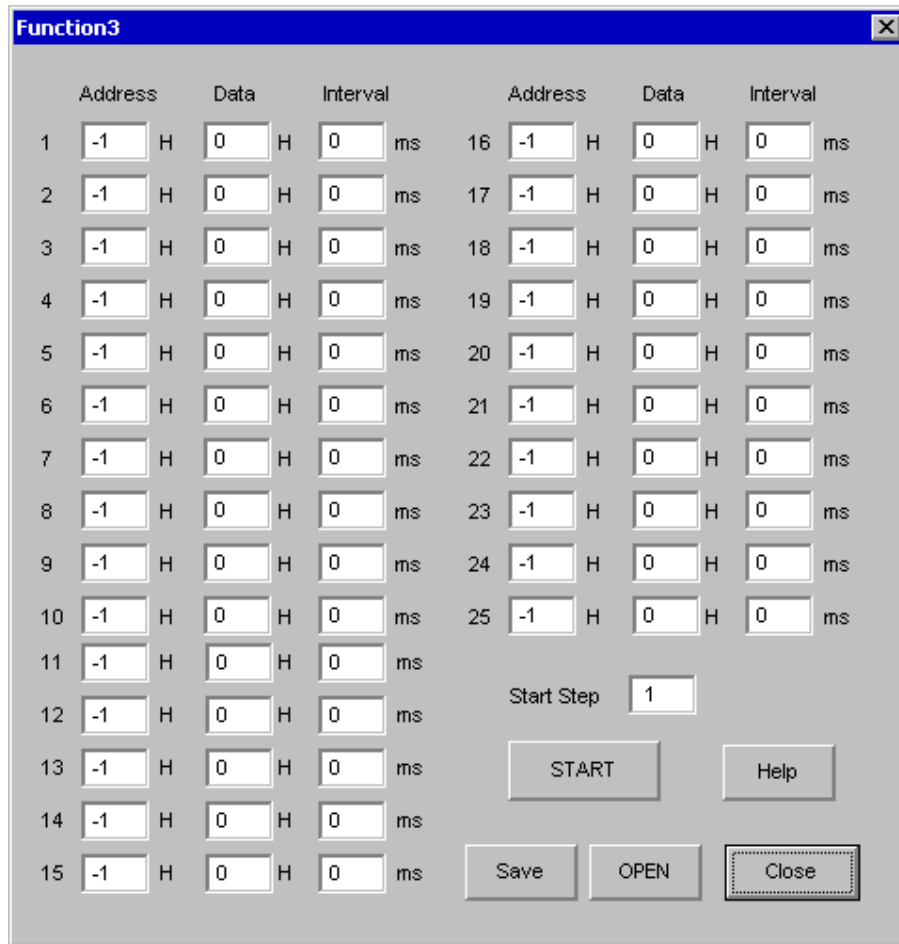


Figure 1. Window of [F3]

### 6. [Function4 Dialog]

The sequence that is created on [Function3] can be assigned to buttons and executed. When [F4] button is clicked, the window as shown in Figure 2 opens.

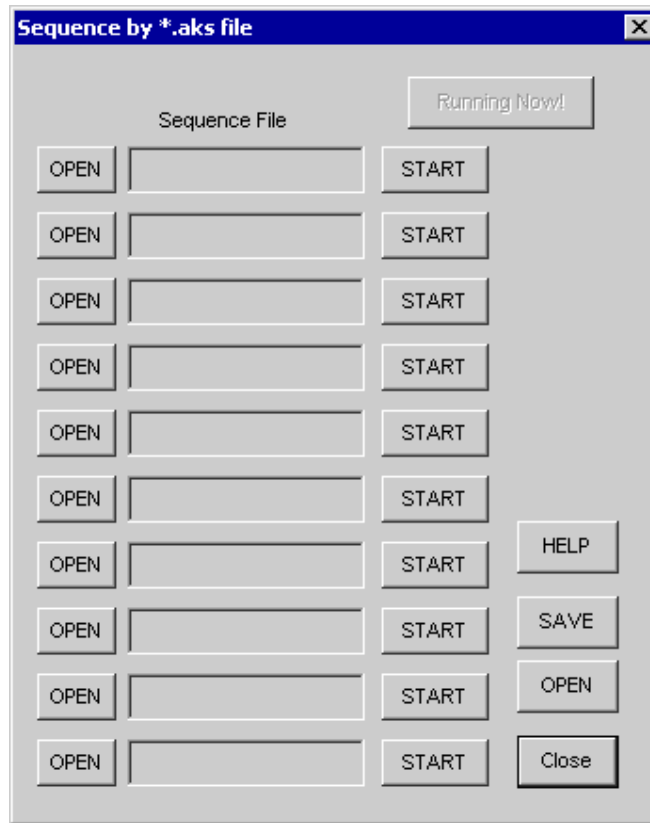


Figure 2. [F4] window

### 6-1. [OPEN] buttons on left side and [START] buttons

(1) Click [OPEN] button and select the sequence file (\*.aks).

The sequence file name is displayed as shown in Figure 3.

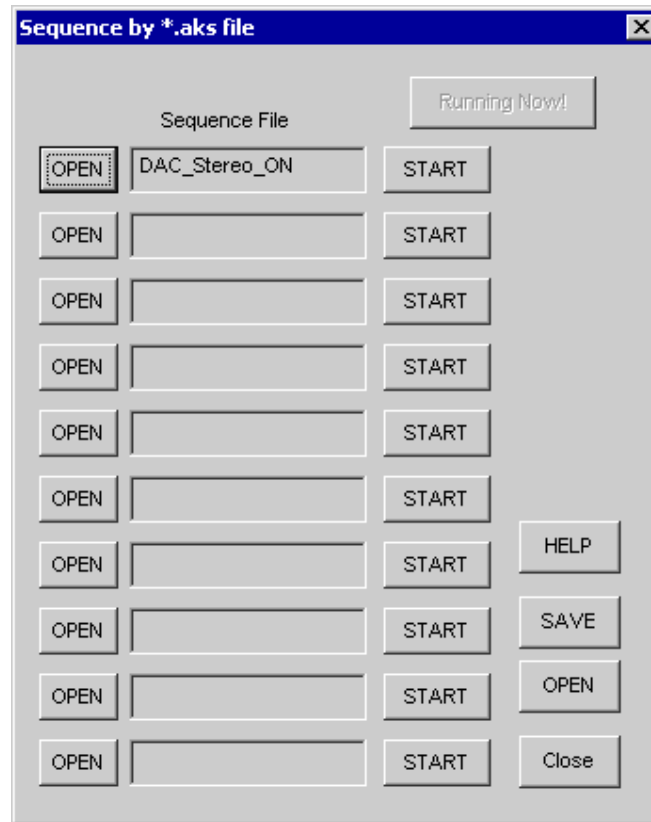


Figure 3. [F4] window(2)

(2) Click [START] button, then the sequence is executed.

### 6-2. [SAVE] and [OPEN] buttons on right side

[SAVE]: The sequence file names can assign be saved. The file name is \*.ak4.

[OPEN]: The sequence file names assign that are saved in \*.ak4 are loaded.

### 6-3. Note

(1) [Function4] doesn't support the pause function of sequence function.

(2) All files need to be in same folder used by [SAVE] and [OPEN] function on right side.

(3) When the sequence is changed in [Function3], the file should be loaded again in order to reflect the change.

## 7. [Function5 Dialog]

The register setting that is created by [SAVE] function on main window can be assigned to buttons and executed. When [F5] button is clicked, the following window as shown in Figure 4opens.

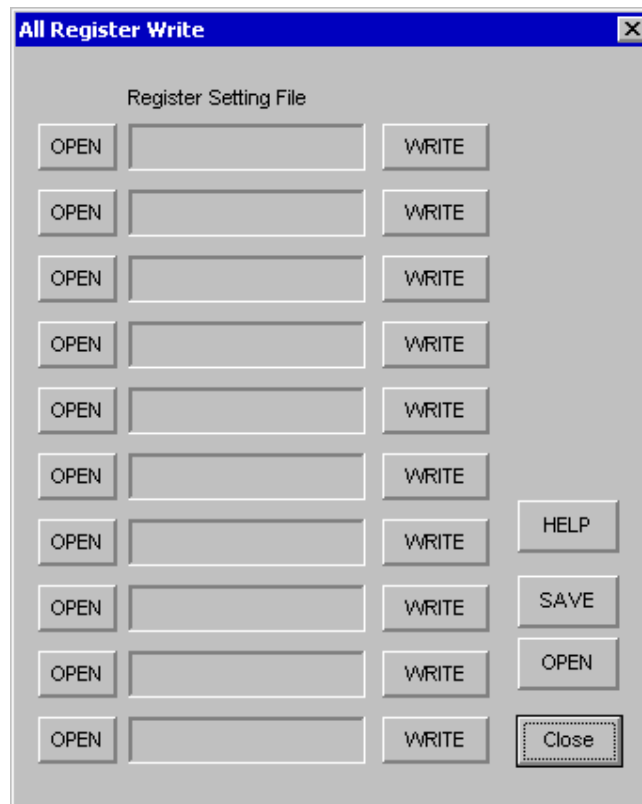


Figure 4. [F5] window

### 7-1. [OPEN] buttons on left side and [WRITE] button

- (1) Click [OPEN] button and select the register setting file (\*.akr).
- (2) Click [WRITE] button, then the register setting is executed.

### 7-2. [SAVE] and [OPEN] buttons on right side

[SAVE]: The register setting file names assign can be saved. The file name is \*.ak5.

[OPEN]: The register setting file names assign that are saved in \*.ak5 are loaded.

### 7-3. Note

- (1) All files need to be in same folder used by [SAVE] and [OPEN] function on right side.
- (2) When the register setting is changed by [Save] Button in main window, the file should be loaded again in order to reflect the change.

|                       |
|-----------------------|
| <b>Measure Result</b> |
|-----------------------|

## 1) ADC part

## [Measurement condition]

- Measurement unit: Audio Precision
- MCLK : 256fs (fs=48kHz, 96kHz)
- BICK : 64fs
- fs : 48kHz, 96kHz
- BW : 20Hz~20kHz (fs=48kHz), 20Hz~40kHz (fs=96kHz)
- Bit : 24bit
- Power Supply : AVDD1=AVDD2=DVDD=PVDD= TVDD=HVDD =5V,
- Interface : Internal DIT (fs=48kHz, 96kHz)
- Temperature : Room Temp

fs=48kHz

| Parameter | Input signal | Measurement filter | Results  |
|-----------|--------------|--------------------|----------|
| S/(N+D)   | 1kHz, -0.5dB | 20kLPF             | 91.5 dB  |
| DR        | 1kHz, -60dB  | 20kLPF             | 98.9 dB  |
| DR        | 1kHz, -60dB  | 20kLPF, A-weighted | 101.6 dB |
| S/N       | No signal    | 20kLPF             | 99.0 dB  |
| S/N       | No signal    | 20kLPF, A-weighted | 101.9 dB |

fs=96kHz

| Parameter | Input signal | Measurement filter | Results  |
|-----------|--------------|--------------------|----------|
| S/(N+D)   | 1kHz, -0.5dB | fs/2               | 92.9 dB  |
| DR        | 1kHz, -60dB  | fs/2               | 98.0 dB  |
| DR        | 1kHz, -60dB  | 20kLPF, A-weighted | 103.1 dB |
| S/N       | No signal    | fs/2               | 98.0 dB  |
| S/N       | No signal    | 20kLPF, A-weighted | 103.1 dB |

## 2) DAC part

## [Measurement condition]

- Measurement unit: Audio Precision
- MCLK : 256fs (fs=48kHz, 96kHz), 128fs (fs=192kHz)
- BICK : 64fs
- fs : 48kHz, 96kHz, 192kHz
- BW : 20Hz~20kHz (fs=48kHz), 20Hz~40kHz (fs=96kHz), 20Hz~40kHz (fs=192kHz)
- Resolution : 24bit
- Power Supply : AVDD1=AVDD2=DVDD=PVDD= TVDD=HVDD=5V
- Interface : Internal DIR (48kHz, 96kHz, 192kHz)
- Temperature : Room Temp

fs=48kHz

| Parameter | Input signal | Measurement filter | Results  |
|-----------|--------------|--------------------|----------|
| S/(N+D)   | 1kHz, 0dB    | 20kLPF             | 98.0 dB  |
| DR        | 1kHz, -60dB  | 20kLPF             | 103.7 dB |
| DR        | 1kHz, -60dB  | 22kLPF, A-weighted | 105.8 dB |
| S/N       | “0” data     | 20kLPF             | 103.4 dB |
| S/N       | “0” data     | 22kLPF, A-weighted | 106.0 dB |

fs=96kHz

| Parameter | Input signal | Measurement filter | Results  |
|-----------|--------------|--------------------|----------|
| S/(N+D)   | 1kHz, 0dB    | 40kLPF             | 96.5 dB  |
| DR        | 1kHz, -60dB  | 40kLPF             | 102.0 dB |
| DR        | 1kHz, -60dB  | 22kLPF, A-weighted | 105.8 dB |
| S/N       | “0” data     | 40kLPF             | 101.0 dB |
| S/N       | “0” data     | 22kLPF, A-weighted | 106.0 dB |

fs=192kHz

| Parameter | Input signal | Measurement filter | Results  |
|-----------|--------------|--------------------|----------|
| S/(N+D)   | 1kHz, 0dB    | 40kLPF             | 96.8 dB  |
| DR        | 1kHz, -60dB  | 40kLPF             | 102.5 dB |
| DR        | 1kHz, -60dB  | 22kLPF, A-weighted | 105.8 dB |
| S/N       | “0” data     | 40kLPF             | 101.2 dB |
| S/N       | “0” data     | 22kLPF, A-weighted | 105.8 dB |

1.ADC

(ADC fs=48kHz)

AK4683 FFT fs=48kHz, -0.5dB input  
AVDD1=AVDD2=DVDD=PVDD=TVDD=HVDD=5V

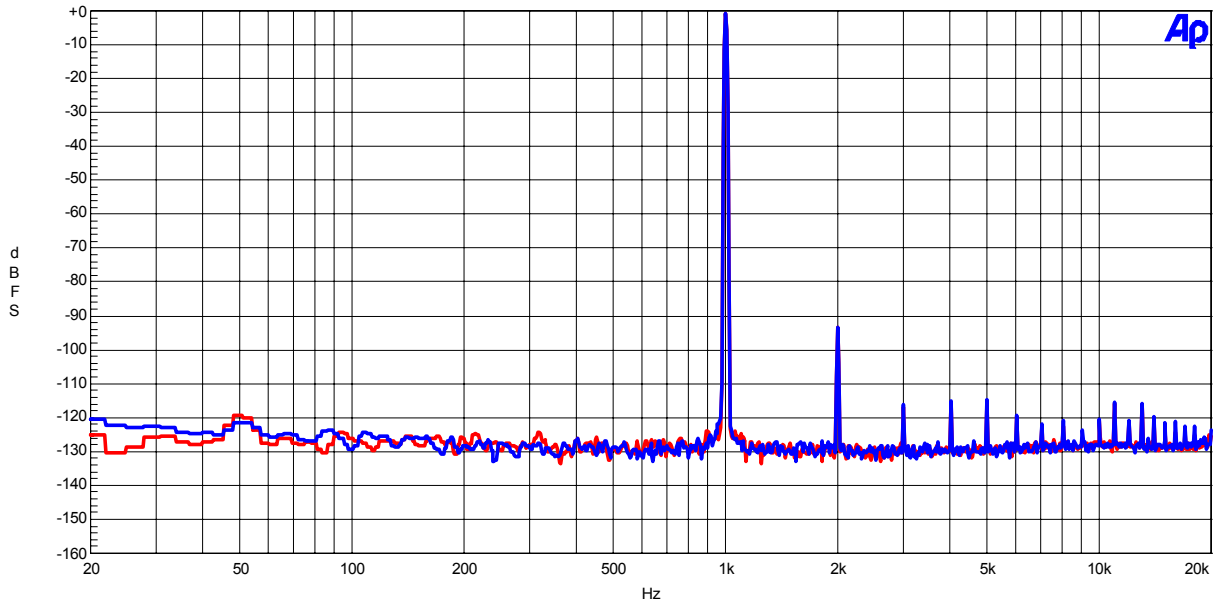


Figure 10. FFT(Input Frequency =1kHz,Input Level=-0.5dBFS)

AK4683 FFT fs=48kHz, -60dB input  
AVDD1=AVDD2=DVDD=PVDD=TVDD=HVDD=5V

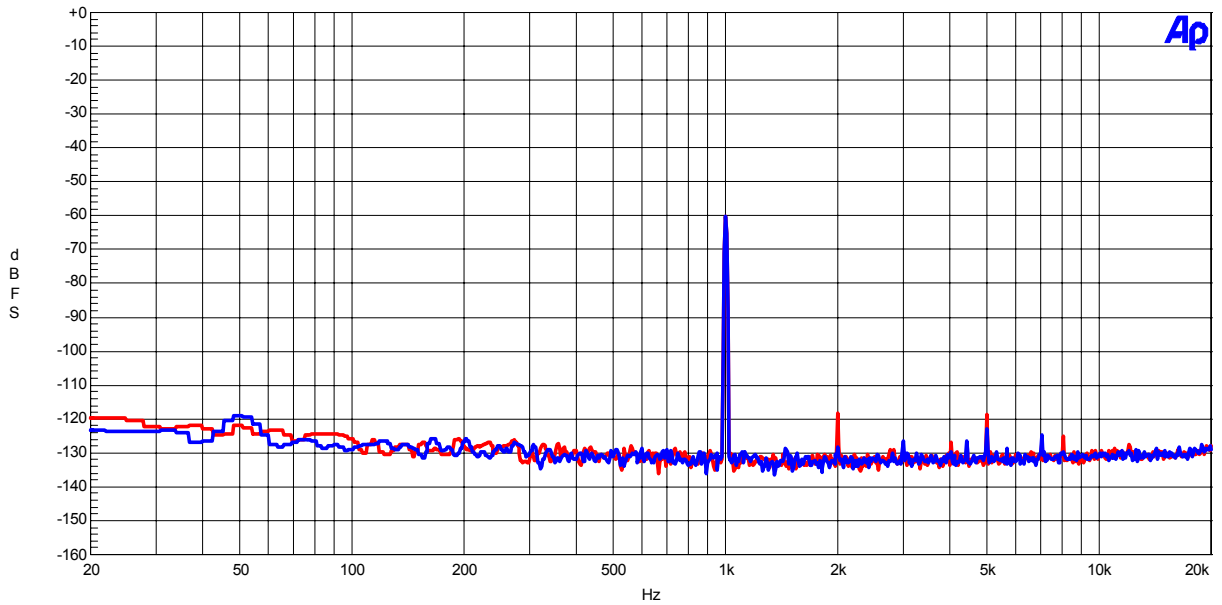


Figure 11. FFT(Input Frequency =1kHz,Input Level=-60dBFS)

(ADC fs=48kHz)

AK4683 FFT fs=48kHz, No signal input  
AVDD1=AVDD2=DVDD=PVDD=TVDD=HVDD=5V

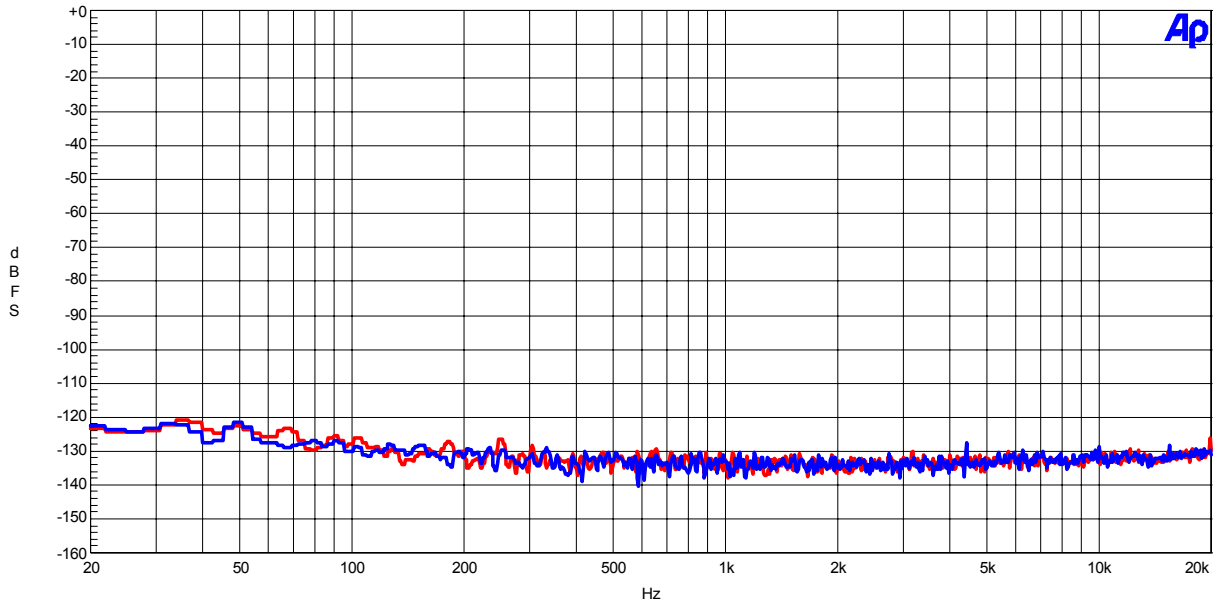


Figure 12. FFT(noise floor)

AK4683 THD+N vs Input Level fs=48kHz  
AVDD1=AVDD2=DVDD=PVDD=TVDD=HVDD=5V

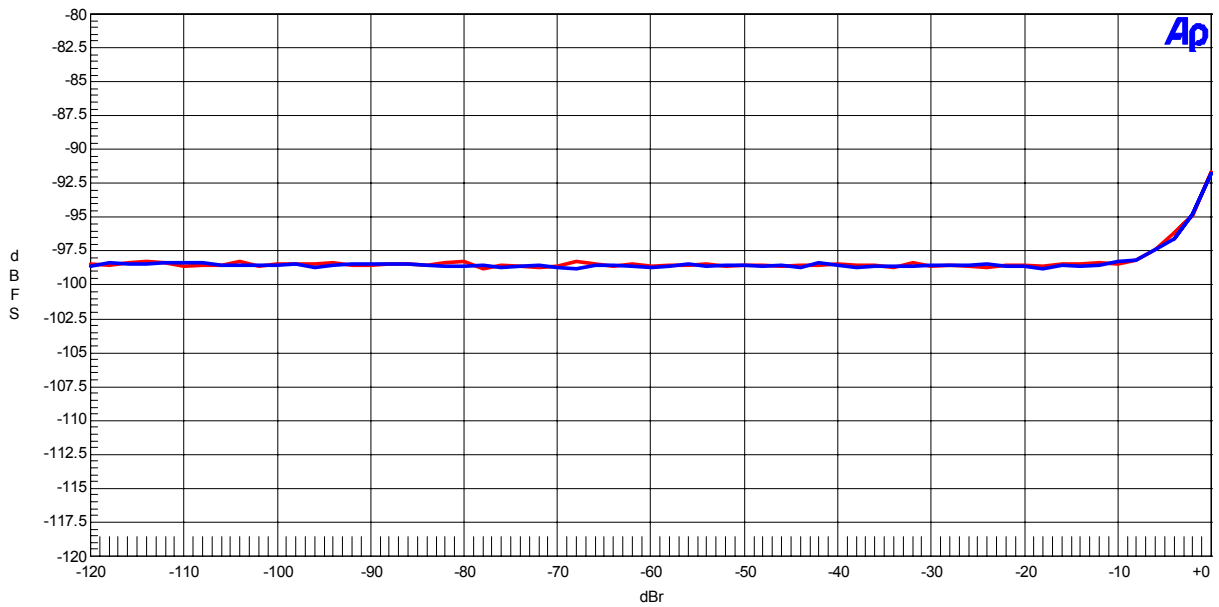


Figure 13. THD + N vs Input Level (Input Frequency =1kHz)