

AKD4665A-A

AK4665A Evaluation board Rev.1

GENERAL DESCRIPTION

AKD4665A-A is an evaluation board for the AK4665A, 20bit CODEC with built-in Input PGA and Headphone Amplifier. The AKD4665A-A can evaluate A/D converter and D/A converter separately in addition to loopback mode (A/D → D/A). AKD4665A-A also has the digital audio interface and can achieve the interface with digital audio systems via opt-connector.

■ Ordering guide

AKD4665A-A	--- Evaluation board for AK4665A (Cable for connecting with printer port of IBM-AT, compatible PC and control software are packed with this. This control software does not support Windows NT.)
------------	---

FUNCTION

- DIT/DIR with optical input/output
- RCA connector for an external clock input
- 10pin Header for serial control mode

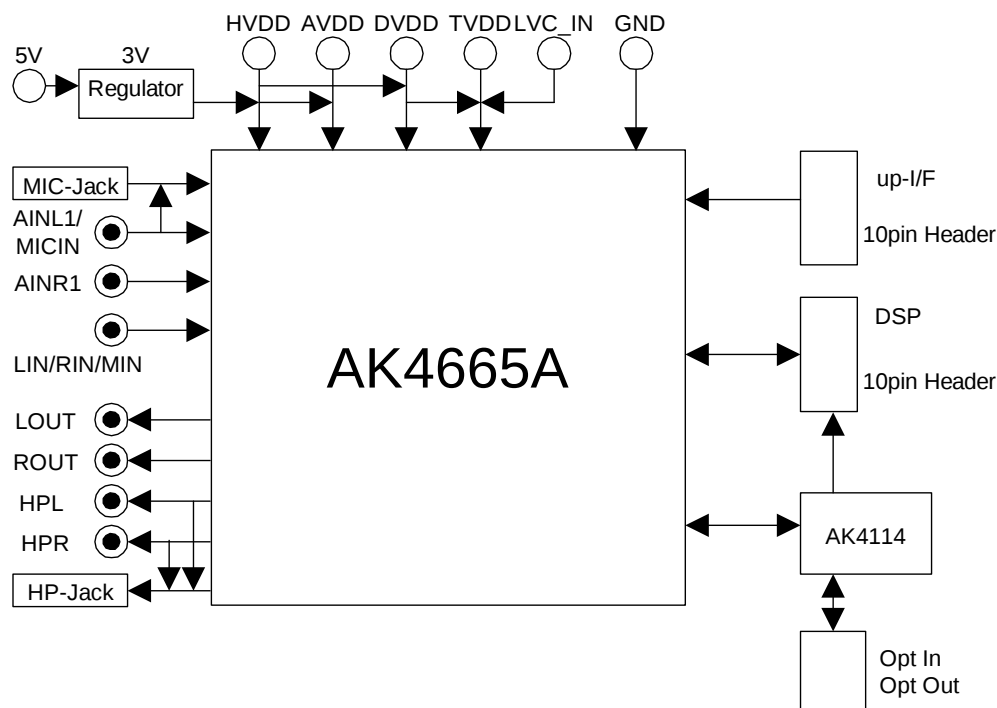


Figure 1. AKD4665A-A Block Diagram

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

Evaluation Board Manual

■ Operation sequence

1) Set up the power supply lines.

1-1) When AVDD, DVDD, HVDD, TVDD and LVC are supplied from the regulator. (AVDD, DVDD, HVDD, TVDD and LVC_IN jack should be open.). See “**Other jumper pins set up** (page 5)”. <default>

[REG]	(red)	= 5V	
[HVDD]	(orange)	= open	: 3V is supplied to HVDD of AK4665A from regulator.
[AVDD]	(orange)	= open	: 3V is supplied to AVDD of AK4665A from regulator.
[DVDD]	(orange)	= open	: 3V is supplied to DVDD of AK4665A from regulator.
[TVDD]	(blue)	= open	: 3V is supplied to TVDD of AK4665A from regulator.
[LVC_IN]	(blue)	= open	: 3V is supplied to logic block of LVC from regulator.
[VD_IN]	(orange)	= 2.7 ~ 3.6V	: for other logic (typ. 3V)
[AGND]	(black)	= 0V	: for analog ground
[DGND]	(black)	= 0V	: for logic ground

1-2) When AVDD, DVDD, HVDD, TVDD and LVC are not supplied from the regulator. (AVDD, DVDD, HVDD, TVDD and LVC jack should be junction.) See “**Other jumper pins set up** (page 5)”.

[REG]	(red)	= “REG” jack and JP2 should be open.
[HVDD]	(orange)	= 2.6 ~ 3.6V : for HVDD of AK4665A (typ. 3V)
[AVDD]	(orange)	= 2.6 ~ 3.6V : for AVDD of AK4665A (typ. 3V)
[DVDD]	(orange)	= 2.6 ~ 3.6V : for DVDD of AK4665A (typ. 3V)
[TVDD]	(blue)	= 1.6 ~ 3.6V : for TVDD of AK4665A (typ. 3V)
[LVC_IN]	(blue)	= 1.65 ~ 5.5V: for logic block of LVC (typ. 3V)
[VD_IN]	(orange)	= 2.7 ~ 3.6V : for other logic (typ. 3V)
[AGND]	(black)	= 0V : for analog ground
[DGND]	(black)	= 0V : for logic ground

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

AVDD and DVDD each must be same voltage level, and TVDD and LVC_IN each too.

2) Set up the evaluation mode, jumper pins and DIP switches. (See the followings.)

3) Power on.

The AK4665A and AK4114 should be reset once bringing SW1, 2 “L” upon power-up.

■ Evaluation mode

In case of AK4665A evaluation using AK4114, same audio interface format should be set for both AK4665A and AK4114. About AK4665A’s audio interface format, refer to datasheet of AK4665A. About AK4114’s audio interface format, refer to Table 2 in this manual.

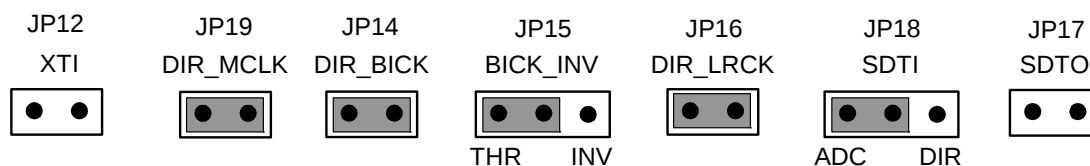
Applicable Evaluation Mode

- (1) Evaluation of loop-back mode (Default)
- (2) Evaluation of using DIR of AK4114 (opt-connector)
- (3) Evaluation of using DIT of AK4114 (opt-connector)
- (4) All interface signals including master clock are fed externally.

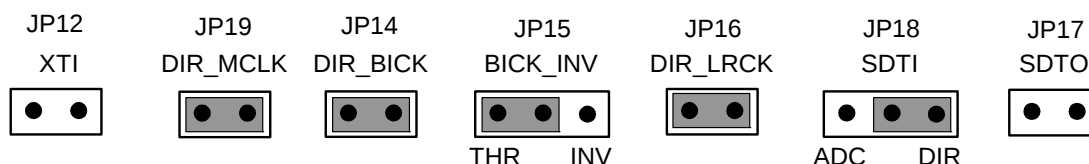
(1) Evaluation of loop-back mode (Default)

Nothing should be connected to PORT3. PORT1(TORX141), or X'tal mode of the AK4114 is used.

When an external clock through an RCA connector (J10: MCLK) is supplied, short JP12 (XTI). JP13 (EXT) and R28 should be properly selected in order to match the output impedance of the clock generator. Then X'tal(X1) and capacitance (C35,C36) should be removed.

**(2) Evaluation of using DIR of AK4114 (opt-connector)**

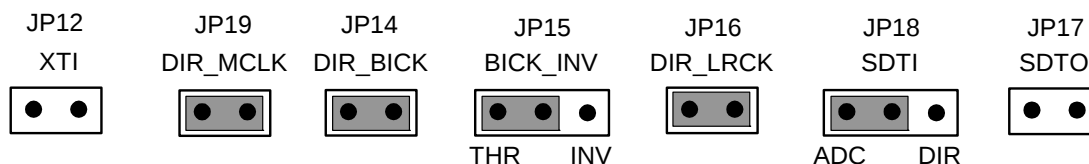
PORT1(TORX141), is used. DIR generates MCLK, BICK, LRCK and SDTI from the received data through optical connector (TORX141). Used for the evaluation using CD test disk. Nothing should be connected to PORT3.

**(3) Evaluation of using DIT of AK4114 (opt-connector)**

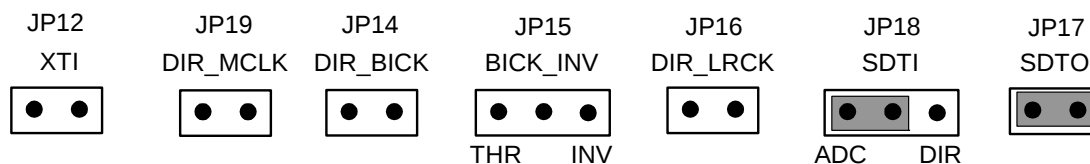
PORT1(TORX141) and PORT2(TOTX141), or X'tal mode of the AK4114 and PORT2(TOTX141) is used. DIT generates audio bi-phase signal from received data and which is output through optical connector (TOTX141). It is possible to connect AKM's D/A converter evaluation boards on the digital-amplifier which equips DIR input.

Nothing should be connected to PORT3.

When an external clock through a RCA connector (J10: MCLK) is supplied, short JP12 (XTI). JP13 (EXT) and R28 should be properly selected in order to match the output impedance of the clock generator. Then X'tal(X1) and capacitance (C35,C36) should be removed.

**(4) All interface signals including master clock are fed externally.**

When all interface signals through PORT3 are supplied, the jumper pins should be set to the following.



■ DIP Switch set up

[SW2] (MODE) : Mode Setting of AK4114
ON is “H”, OFF is “L”.

No.	Name	Default	ON (“H”)	OFF (“L”)
1	DIF0	OFF	AK4114 Audio Format Setting See Table 2	
2	DIF1	OFF		
3	DIF2	ON		
4	CM0	OFF	Clock Operation Mode select See Table 3	
5	OCKS1	OFF	Master Clock Frequency Select See Table 4	

Table 1. Mode Setting for AK4114

Mode	Setting for AK4114 Audio Interface Format					Register setting for AK4665A Audio Interface Format	
	DIF2	DIF1	DIF0	DAUX	SDTO	DIF1	DIF0
0	0	0	0	24bit, Left justified	16bit, Right justified	0	0
2	0	1	0	24bit, Left justified	20bit, Right justified	0	1
4	1	0	0	24bit, Left justified	24bit, Left justified	1	0
5	1	0	1	24bit, I ² S	24bit, I ² S	1	1

Default

Table 2. Setting for AK4114 Audio Interface Format

SW2-#4 (CM0)	Clock Mode	Clock source	SDTO
OFF	PLL Mode	PORT1 (TORX141)	RX (Optical)
ON	X'tal Mode	X1 (X'tal) or J10 (RCA)	DAUX (ADC)

Default

Table 3. Clock Operation Mode select

SW2-#5 (OCKS1)	PLL Mode	X'tal Mode
OFF	256fs	256fs
ON	512fs	512fs

Default

Table 4. Master Clock Frequency Select

■ Other jumper pins set up

1. JP1 (GND) : Analog ground and Digital ground
 OPEN : Separated.
 SHORT : Common. (The connector “DGND” can be open.) <Default>
2. JP3 (REG) : HVDD of the AK4665A
 OPEN : HVDD is supplied from “HVDD ” jack.
 SHORT : HVDD is supplied from the regulator (“HVDD” jack should be open). < Default >
3. JP3 (AVDD_SEL) : AVDD of the AK4665A
 OPEN : AVDD is supplied from “AVDD ” jack.
 SHORT : AVDD is supplied from “HVDD” (“AVDD” jack should be open). < Default >
4. JP4 (DVDD_SEL) : DVDD of the AK4665A
 OPEN : DVDD is supplied from “DVDD ” jack. < Default >
 SHORT : DVDD is supplied from “HVDD” (“DVDD” jack should be open).

5. JP6 (TVDD_SEL), JP7 (LVC_SEL):

JP6	JP7	TVDD is supplied from	Logic block of LVC is supplied from	Note
OPEN	OPEN	“TVDD” jack	“LVC_IN” jack	-
OPEN	TVDD	“TVDD” jack	“TVDD” jack	“LVC_IN” jack should be open.
OPEN	VD	“TVDD” jack	“VD_IN” jack	“LVC_IN” jack should be open.
SHORT	OPEN	“DVDD”	“LVC_IN” jack	“TVDD” jack should be open.
SHORT	TVDD	“DVDD”	“TVDD”	“TVDD” and “LVC_IN” jack should be open.
SHORT	VD	“DVDD”	“VD” jack	TVDD” and “LVC_IN” jack should be open.

<Default>

Table 5. JP6 (TVDD_SEL), JP7 (LVC_SEL) select

6. JP5 (MPWR) : Connection between MPWR pin and MICIN pin of the AK4665A
 OPEN : MPWR is not connected to MICIN.
 SHORT : MPWR is connected to MICIN. < Default >

■ The function of the toggle SW

[SW1] (DIR) : Power control of AK4114. Keep “H” during normal operation.
Keep “L” when AK4114 is not used.

[SW3] (PDN) : Power control of AK4665A. Keep “H” during normal operation.

■ Indication for LED

[LED1] (ERF): Monitor INT0 pin of the AK4114. LED turns on when some error has occurred to AK4114.

■ Serial Control

The AK4665A can be controlled via the printer port (parallel port) of IBM-AT compatible PC. Connect PORT4 (CTRL) with PC by 10 wire flat cable packed with the AKD4665A-A

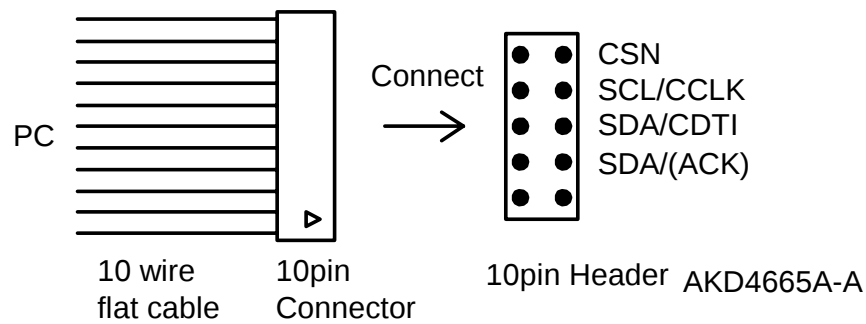


Figure 2. Connect of 10 wire flat cable

■ Analog Input / Output Circuits

(1) Input Circuits

a) MIC/AINL1/AINR1 Input Circuit

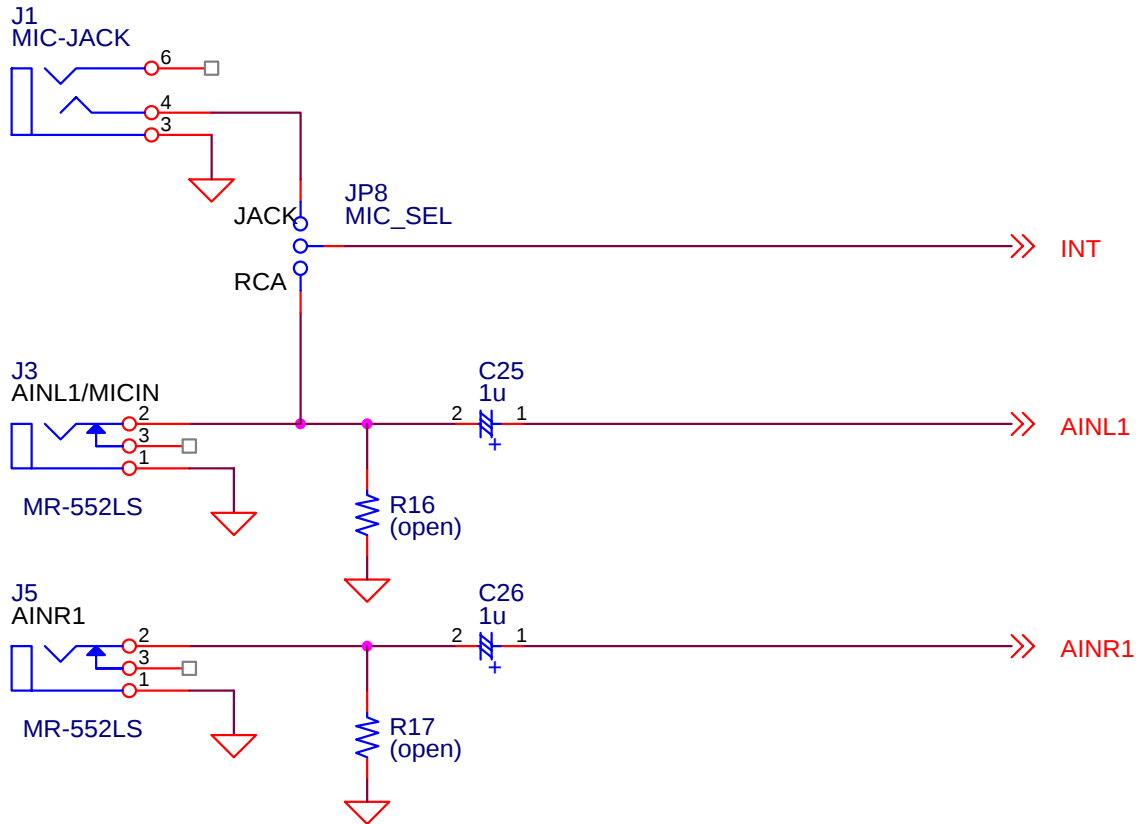
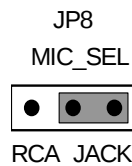
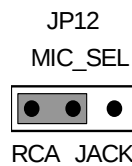


Figure 3. MIC/AINL1/AINR1 Input Circuit

(a-1) Analog signal is input to MICIN pin via J1 (MIC-JACK) connector.



(a-2) Analog signal is input to MICIN pin via J3 (AINL1/MICIN) connector.



b) LIN/RIN/MIN Input Circuit

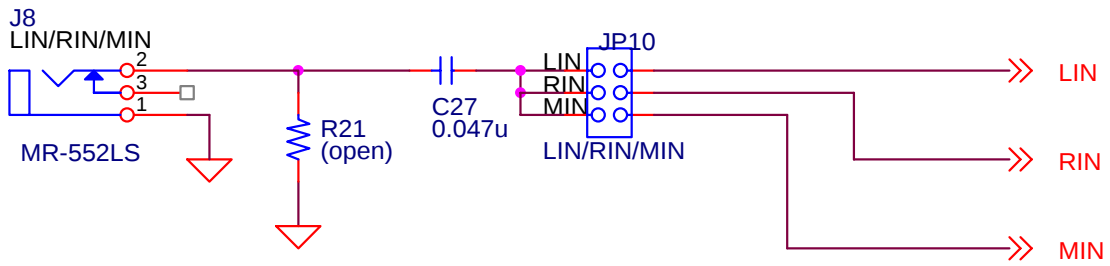


Figure 4. LIN/RIN/MIN Input Circuit

(2) Output Circuits

a) LOUT/ROUT Output Circuit

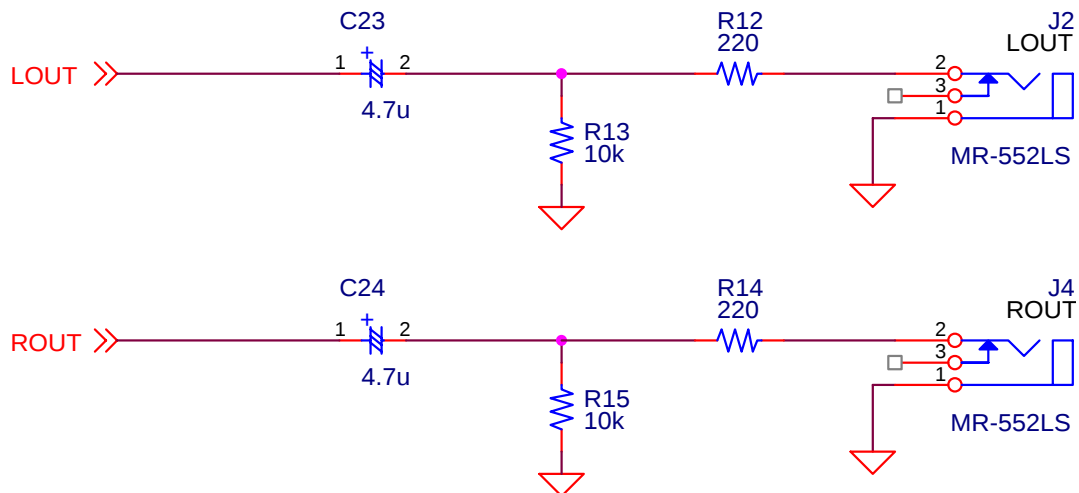


Figure 5. LOUT/ROUT Output Circuit

b) HPL/HPR Output Circuit

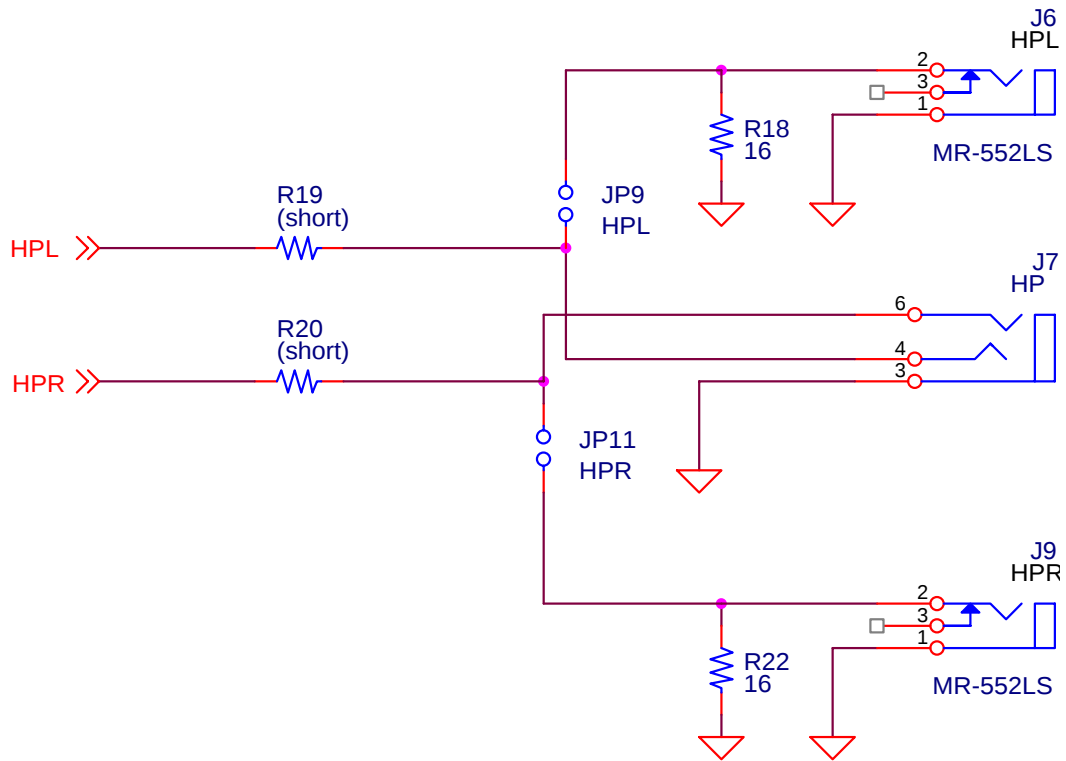
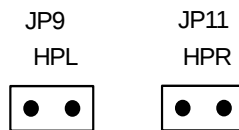
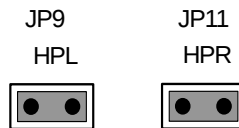


Figure 6. HPL/HPR Output Circuit

(b-1) HPL and HPR pins are outputted from J7 (mini jack).



(b-2) HPL and HPR pins are outputted from J6 and J9.



* AKM assumes no responsibility for the trouble when using the above circuit examples.

2. Control Software Manual

■ Set-up of evaluation board and control software

1. Set up the AKD4665A-A according to previous term.
2. Connect IBM-AT compatible PC with AKD4665A-A by 10-line type flat cable (packed with AKD4665A-A). 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 “AKD4665A-A Evaluation Kit” into the CD-ROM drive.
4. Access the CD-ROM drive and double-click the icon of “akd4665a-a.exe” to set up the control program.
5. Then please 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.
3. Click “Write default” button

■ Explanation of each buttons

- | | |
|----------------------|---|
| 1. [Port Reset] : | Set up the USB interface board (AKDUSBIF-A) when using the board. |
| 2. [Write default] : | Initialize the register of the AK4665A. |
| 3. [All Write] : | Write all registers 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 "1". If not, "L" or "0".

If you want to write the input data to the AK4665A, 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.

If you want to write the input data to the AK4665A, click [OK] button. If not, click [Cancel] button.

3. [Function2 Dialog] : Dialog to evaluate DATT

There are dialogs corresponding to register of 05h, 0Ah, 0Bh and 0Ch.

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 the AK4665A by this interval.

Step Box: Data changes by this step.

Mode Select Box:

If you check 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

If you do not check 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

If you want to write the input data to the AK4665A, click [OK] button. If not, click [Cancel] button.

4. [SAVE] and [OPEN]

4-1. [SAVE]

All of current register setting values displayed on the main window are saved to the file. The extension of file name is “akr”.

<Operation flow>

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

4-2. [OPEN]

The register setting values saved by [SAVE] are written to the AK4665A. 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.

(2) 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”.

The screenshot shows the 'Function3' dialog window. It contains a table with 25 rows, each representing a step in a sequence. Each row has columns for 'Address', 'Data', and 'Interval'. The 'Address' column contains '-1' for all steps. The 'Data' column contains 'H' for all steps. The 'Interval' column contains '0' for all steps. Below the table, there is a 'Start Step' field with the value '1'. At the bottom right, there are four buttons: 'START', 'Help', 'Save', and 'OPEN'. A 'Close' button is also present at the bottom right.

	Address	Data	Interval		Address	Data	Interval		
1	-1	H	0	ms	16	-1	H	0	ms
2	-1	H	0	ms	17	-1	H	0	ms
3	-1	H	0	ms	18	-1	H	0	ms
4	-1	H	0	ms	19	-1	H	0	ms
5	-1	H	0	ms	20	-1	H	0	ms
6	-1	H	0	ms	21	-1	H	0	ms
7	-1	H	0	ms	22	-1	H	0	ms
8	-1	H	0	ms	23	-1	H	0	ms
9	-1	H	0	ms	24	-1	H	0	ms
10	-1	H	0	ms	25	-1	H	0	ms
11	-1	H	0	ms					
12	-1	H	0	ms					
13	-1	H	0	ms					
14	-1	H	0	ms					
15	-1	H	0	ms					

Start Step: 1

Buttons: START, Help, Save, OPEN, Close

Figure 7. Window of [F3]

6. [Function4 Dialog]

The sequence file (*.aks) saved by [Function3] can be listed up to 10 files, assigned to buttons and then executed. When [F4] button is clicked, the window as shown in Figure 8 opens.

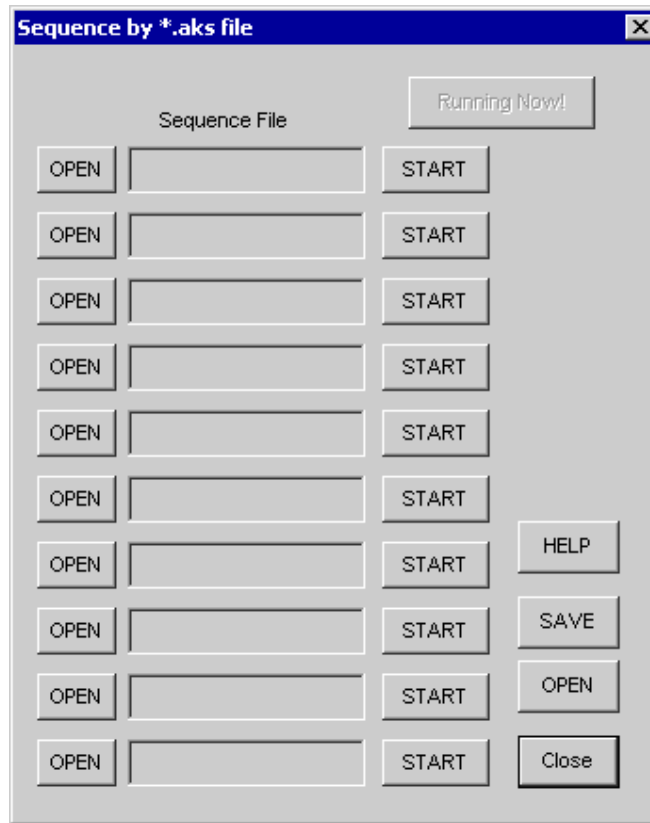


Figure 8. [F4] window

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

(1) Click [OPEN] button and select the sequence file (*.aks) saved by [Function3].

The sequence file name is displayed as shown in Figure 9. (In case that the selected sequence file name is "DAC_Stereo_ON.aks")

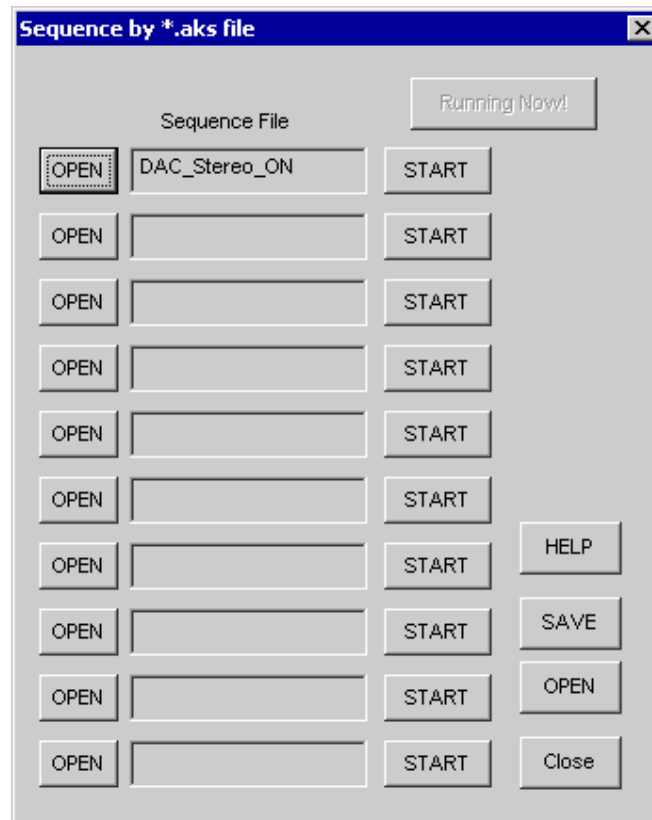


Figure 9. [F4] window(2)

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

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

[SAVE] : The name assign of sequence file displayed on [Function4] window can be saved to the file. The file name is "*.ak4".

[OPEN] : The name assign of sequence file(*.ak4) saved by [SAVE] is loaded.

6-3. Note

(1) This function doesn't support the pause function of sequence function.

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

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

7. [Function5 Dialog]

The register setting file(*.akr) saved by [SAVE] function on main window can be listed up to 10 files, assigned to buttons and then executed. When [F5] button is clicked, the window as shown in Figure 10 opens.

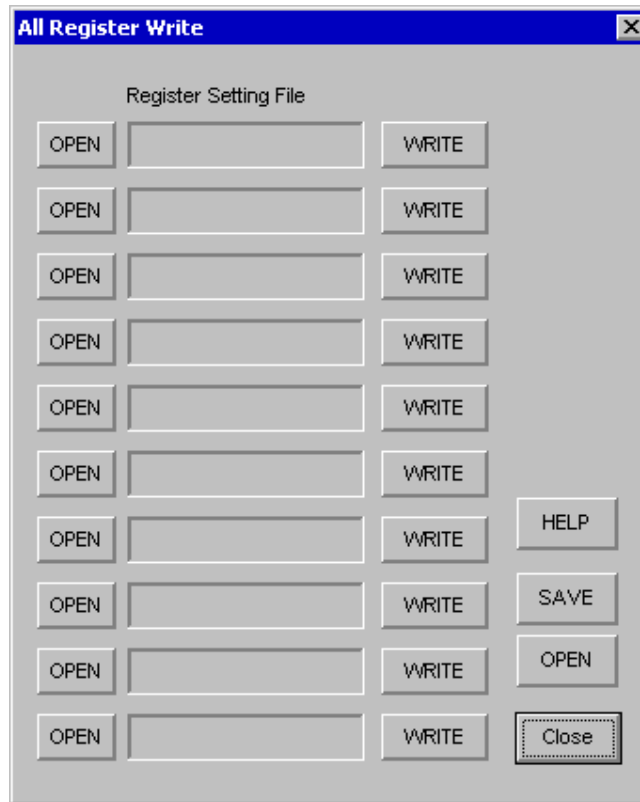


Figure 10. [F5] window

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

- (1) Click [OPEN] button and select the register setting file (*.akr).

The register setting file name is displayed as shown in Figure 11. (In case that the selected file name is "DAC_Output.akr")

- (2) Click [WRITE] button, then the register setting is executed.

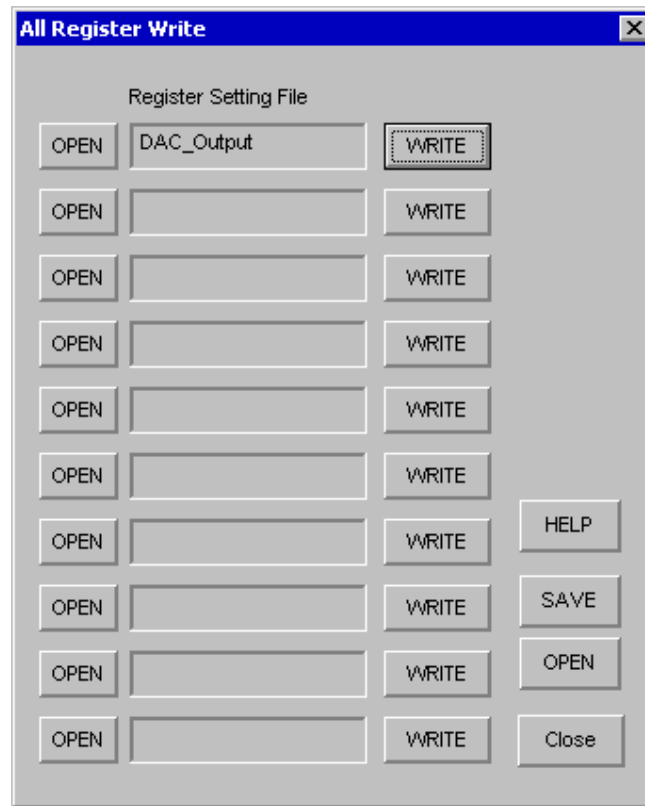


Figure 11. [F5] windows(2)

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

[SAVE] : The name assign of register setting file displayed on [Function5] window can be saved to the file. The file name is “*.ak5”.

[OPEN] : The name assign of register setting file(*.ak5) saved by [SAVE] is loaded.

7-3. Note

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

MEASUREMENT RESULTS

[Measurement condition]

- Measurement unit : Audio Precession System Two Cascade
- MCLK : 11.2896MHz
- BICK : 64fs
- fs : 44.1kHz
- Bit : 20bit
- Power Supply : AVDD = DVDD = HVDD = TVDD = 3.0V
- Measurement Filter : 10Hz ~ 20kHz
- Temperature : Room

Parameter	Result (Lch / Rch)	Unit
MIC-Amp: (MICIN pin → ADC)		
THD+N (-1dBFS Output)	-90.6 / -90.4	dB
D-Range (-60dB Output, A-weighted)	93.4 / 93.4	dB
S/N (A-weighted)	93.4 / 93.4	dB

Parameter	Result (Lch / Rch)	Unit
Analog Input Characteristics: (AINL1/AINR1 pins → ADC → IVOL), IVOL=0dB, ALC1= OFF		
THD+N (-1dBFS Output)	-91.6 / -91.2	dB
D-Range (-60dB Output, A-weighted)	94.5 / 94.5	dB
S/N (A-weighted)	94.6 / 94.6	dB

Parameter	Result (Lch / Rch)	Unit
Headphone-Amp: (DAC → HPL/HPR pins), RL=16Ω, HPG bit = "0", ATTL7-0=ATTR7-0 bits=0dB		
THD+N (0dBFS Output)	-58.7 / -58.7	dB
D-Range (-60dB Output, A-weighted)	88.4 / 88.2	dB
S/N (A-weighted)	88.5 / 88.2	dB

Parameter	Result (Lch / Rch)	Unit
Stereo Line Output: (DAC → LOUT/ROUT pins), ATTL7-0 = ATTR7-0 = ATTS3-0 bits = 0dB		
THD+N (0dBFS Output)	-84.5 / -84.1	dB
D-Range (-60dB Output, A-weighted)	88.7 / 88.4	dB
S/N (A-weighted)	88.8 / 88.5	dB

PLOT DATA**1.ADC (AINL1/AINR1 → ADC) PLOT DATA**

AKM

AKD4665 ADC(mic) THD+N vs.Input Level (fs=44.1kHz, fin=1kHz)

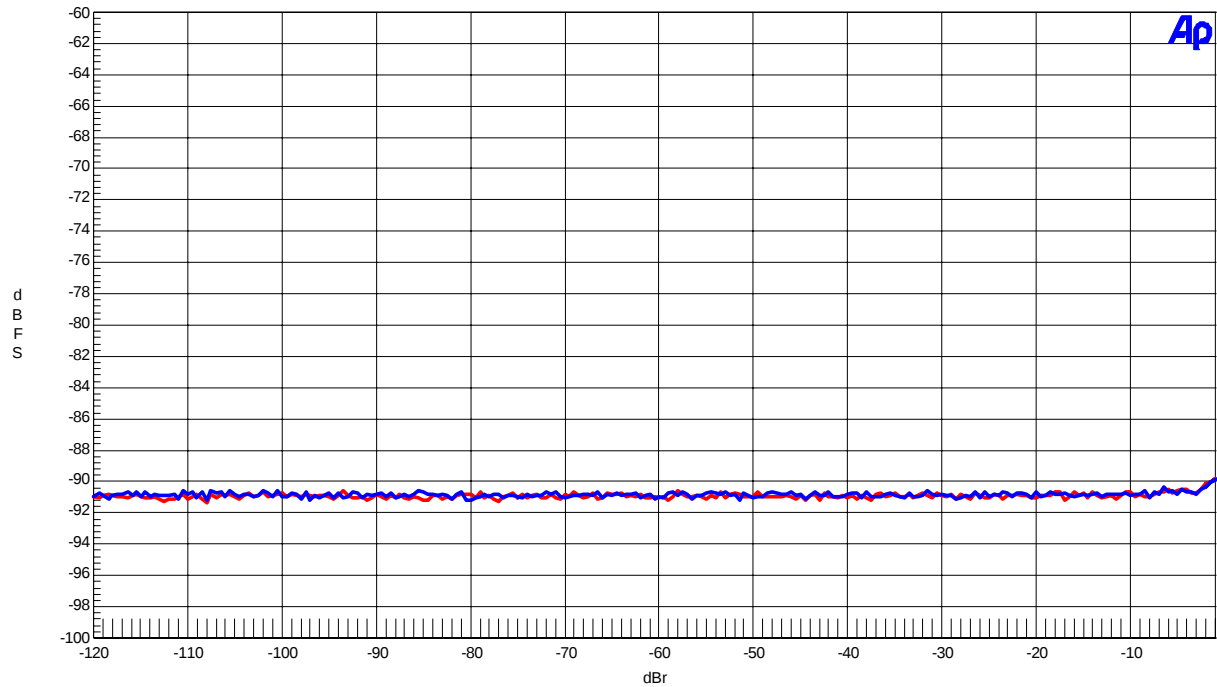


Figure 12. THD+N vs. Input Level

AKM

AK4665 ADC(AIN) THD+N vs. Input Frequency (fs=44.1kHz, Input=-1dB)

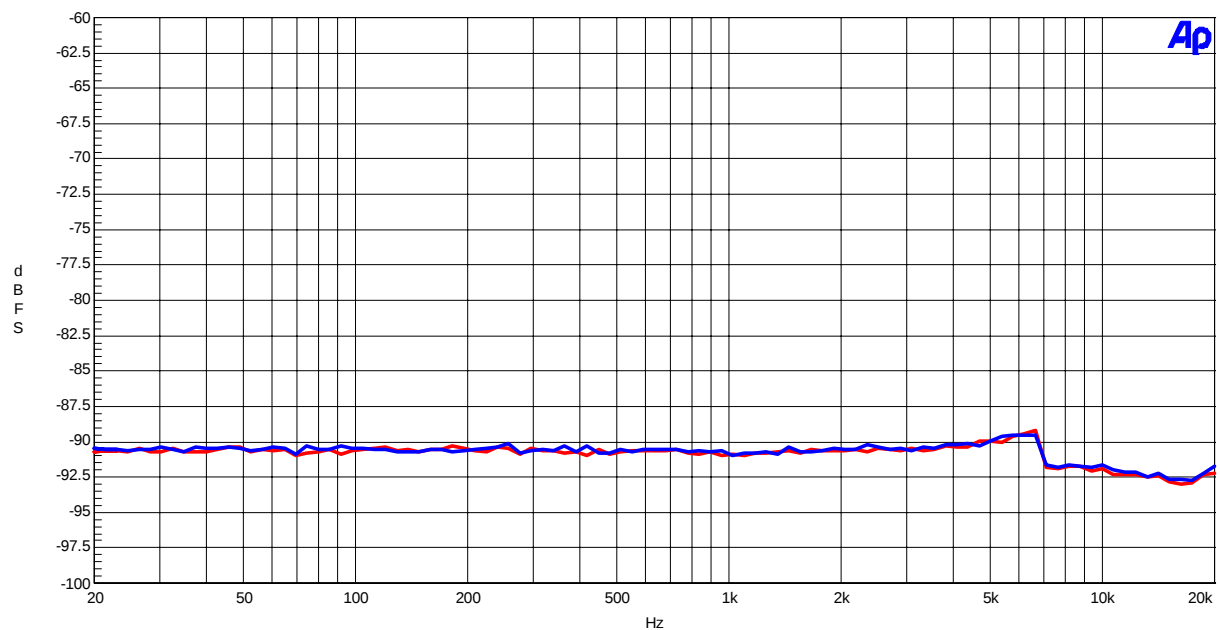


Figure 13. THD+N vs. Input Frequency (Input Level = -1dBFS)

AKM

AK4665 ADC(AIN) Linearity (fs=44.1kHz, fin=1kHz)

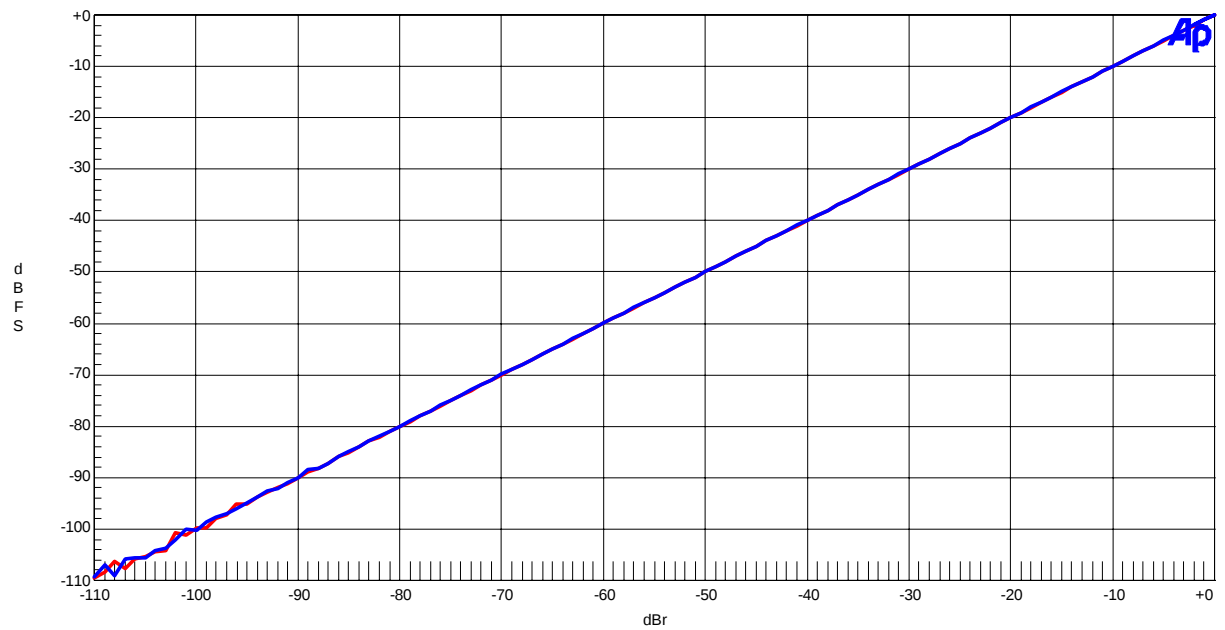


Figure 14. Linearity

AKM

AK4665 ADC(AIN) Frequency Response (fs=44.1kHz, Input=-1dB)

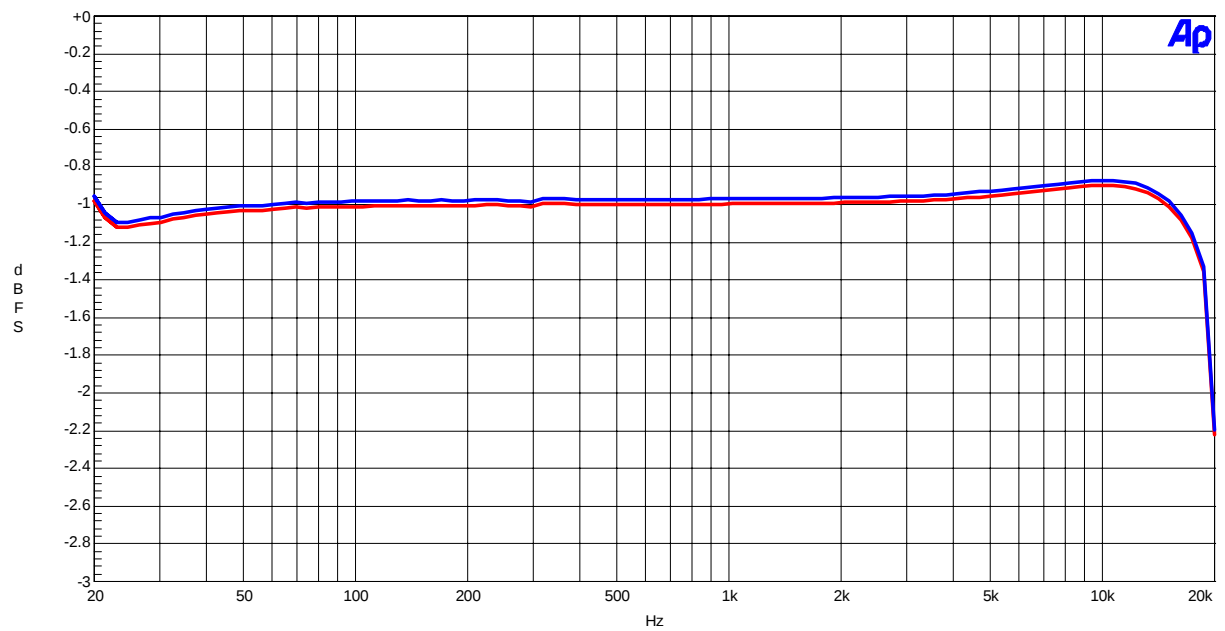


Figure 15. Frequency Response

AKM

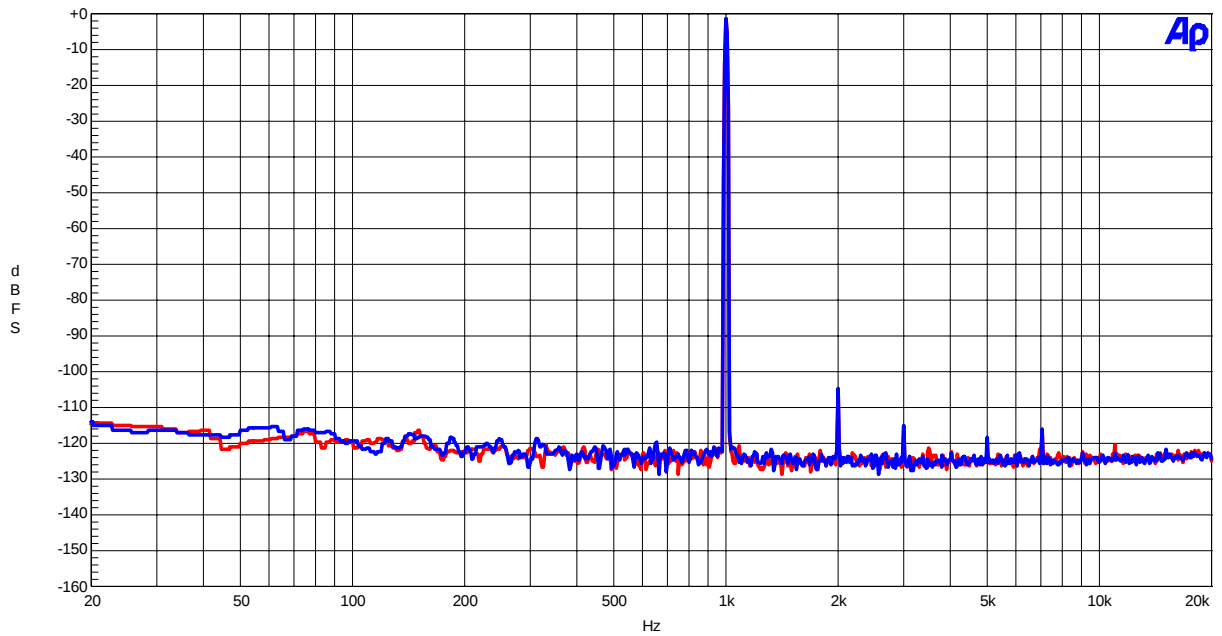
AK4665 ADC(AINL1/AINR1) FFT (fs=44.1kHz, fin=1kHz, Input=-1dB)
FFT point=16384, Avg=8

Figure 16. FFT Plot (Input level=-1dBFS)

AKM

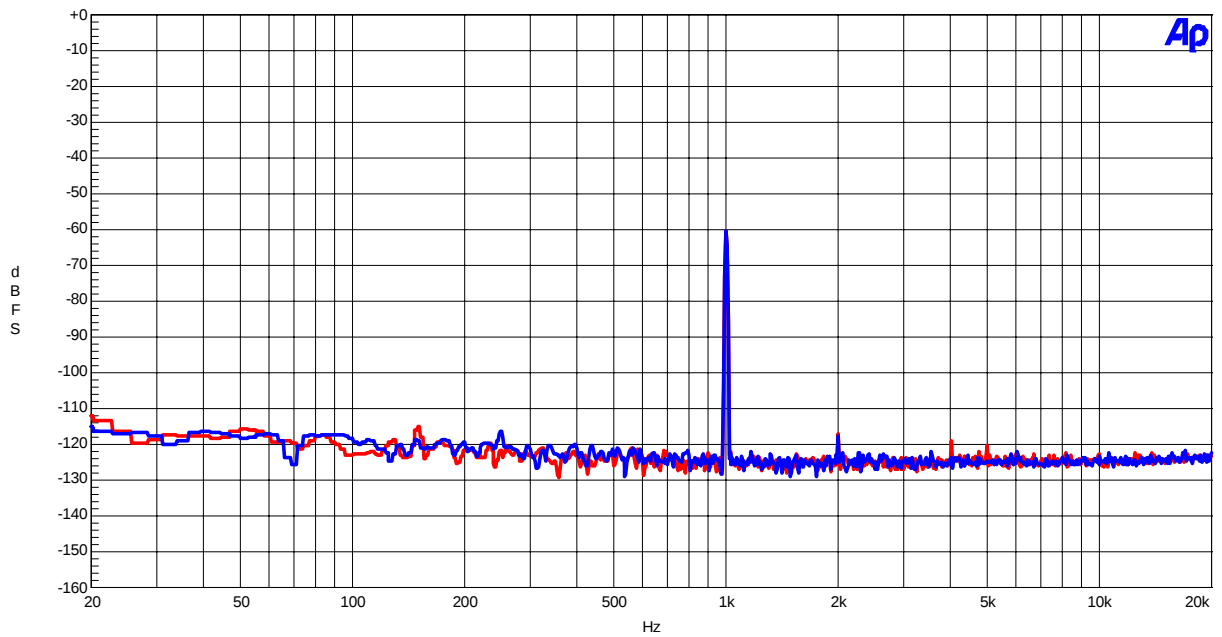
AK4665 ADC(AINL1/AINR1) FFT (fs=44.1kHz, fin=1kHz, Input=-60dB)
FFT point=16384, Avg=8

Figure 17. FFT Plot (Input level=-60dBFS)

AKM

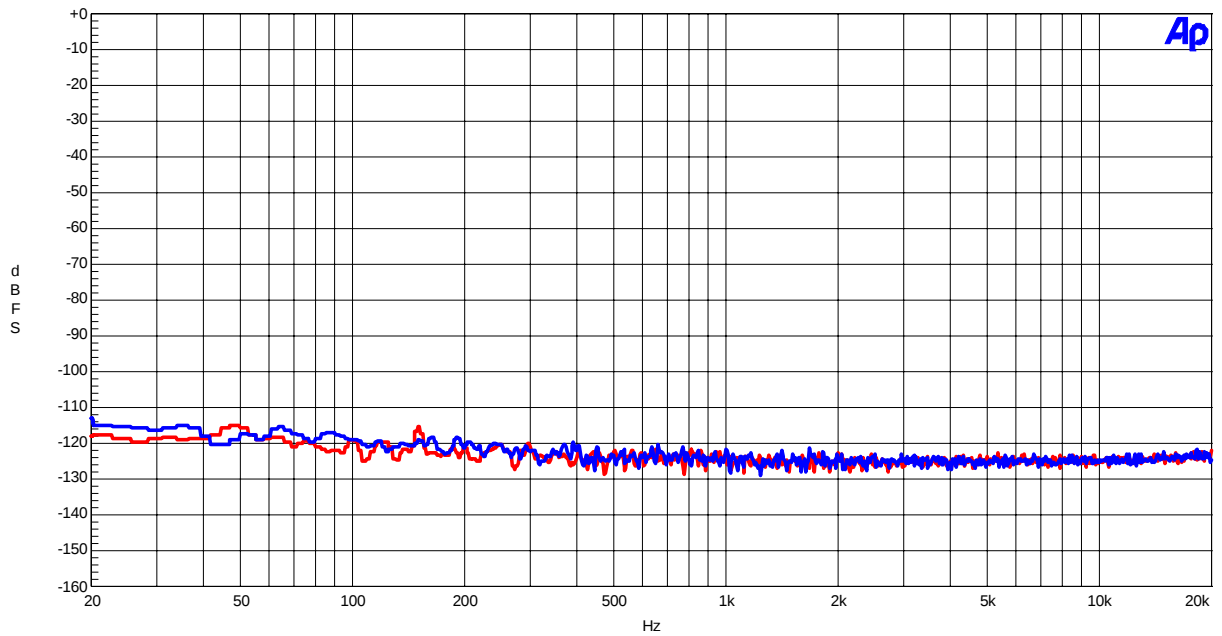
AK4665 ADC(AINL1/AINR1) FFT (fs=44.1kHz, Input=no signal)
FFT point=16384, Avg=8

Figure 18. FFT Plot (no signal input)

AKM

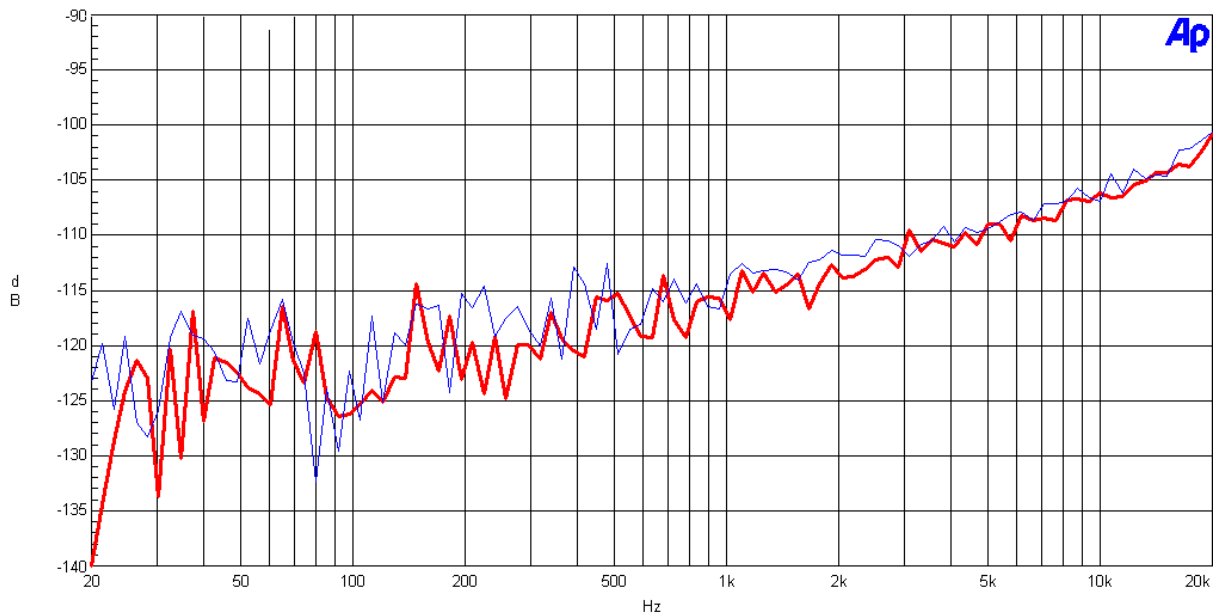
AK4665 ADC(AINL1/AINR1) Crosstalk (fs=44.1kHz, Input=-1dB)
RED:Rch-->Lch, Blue:Lch-->Rch

Figure 19. Crosstalk

2. DAC (DAC → LOUT/ROUT) PLOT DATA

AKM

AK4665 DAC(LINEOUT) THD+N vs. Input Level (fs=44.1kHz, input=0dB)

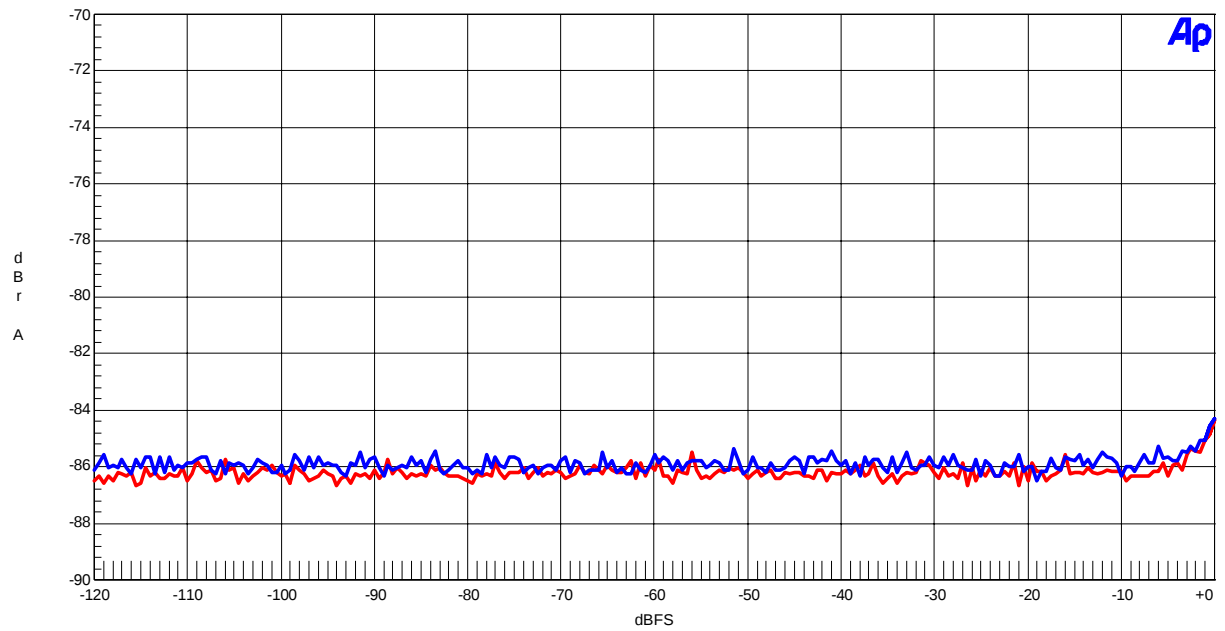


Figure 20. THD+N vs. Input Level

AKM

AK4665 DAC(LINEOUT) THD+N vs. Input Frequency (fs=44.1kHz, input=0dB)

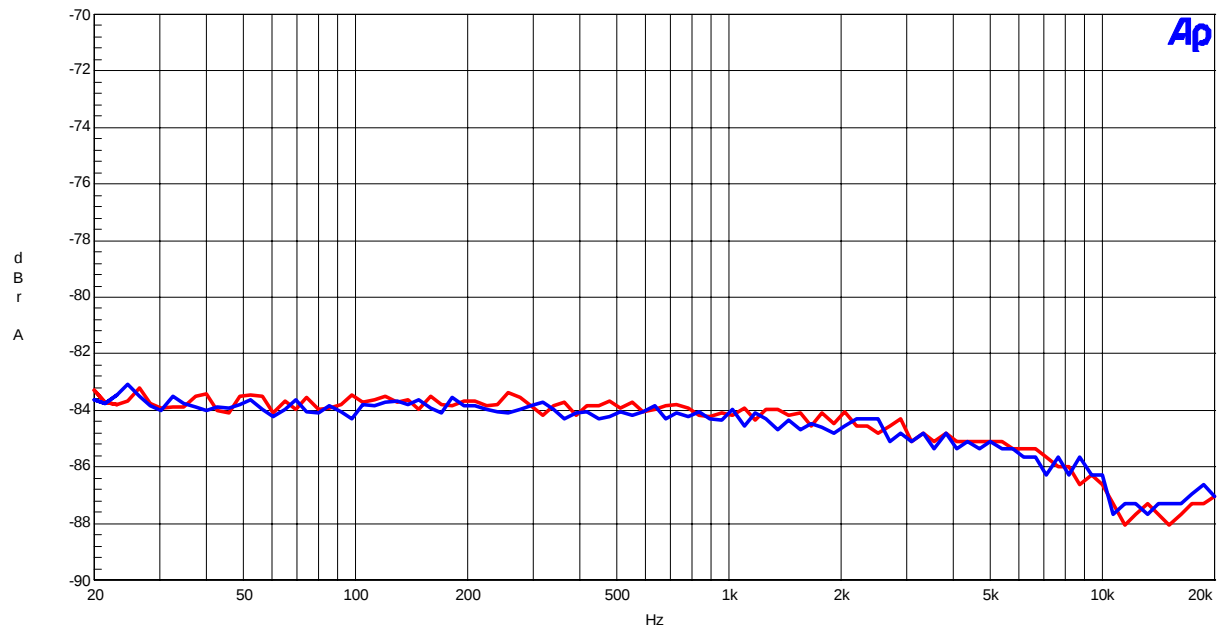


Figure 21. THD+N vs. Input Frequency (Input Level = 0dBFS)

AKM

AK4665 DAC(LINEOUT) Linearity (fs=44.1kHz, input=0dB)

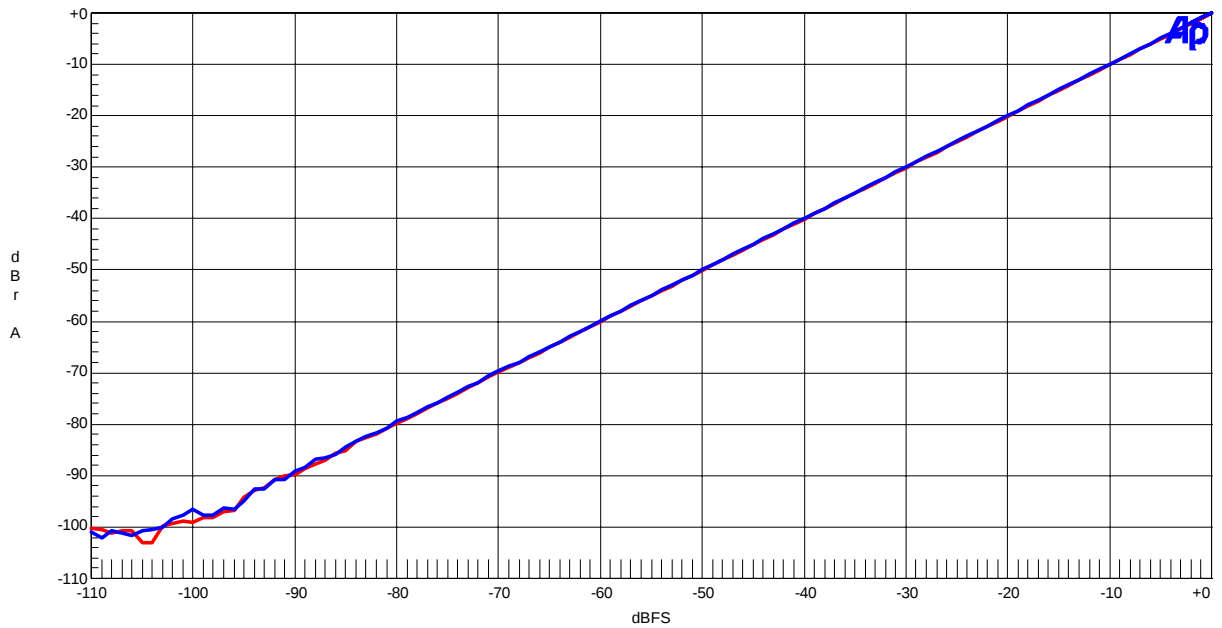


Figure 22. Linearity

AKM

AKD4665 DAC(LINEOUT) Frequency Response (fs=44.1kHz, Input=0dB)

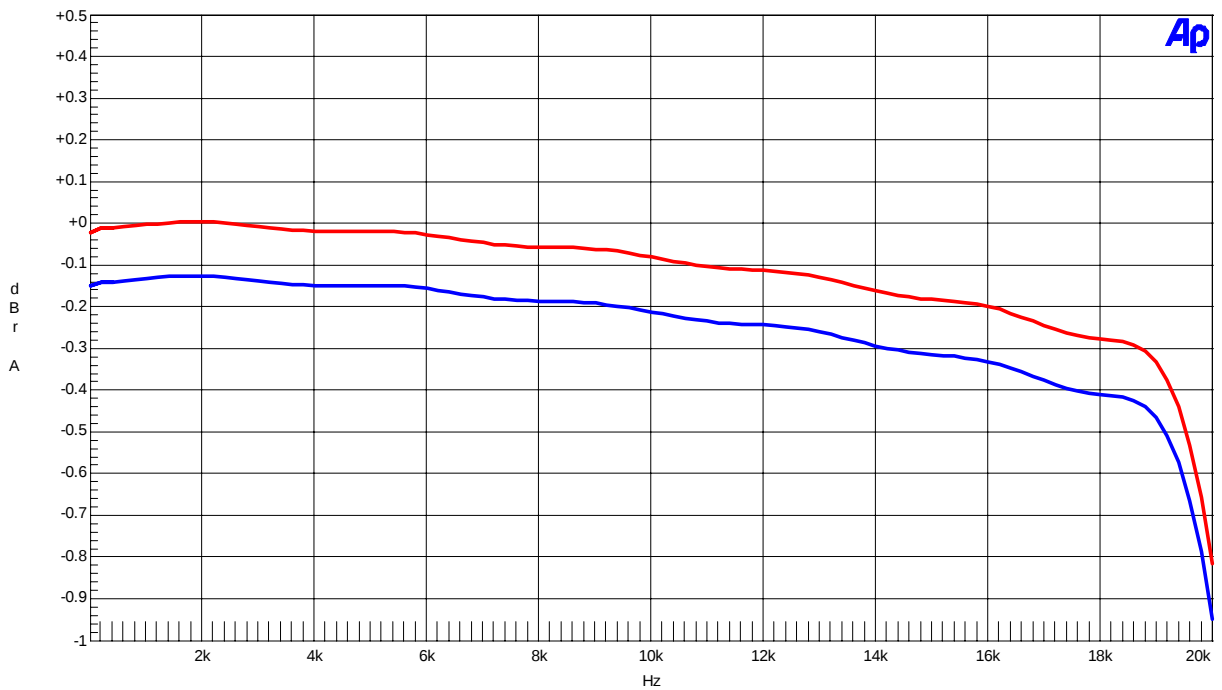


Figure 23. Frequency Response

AKM

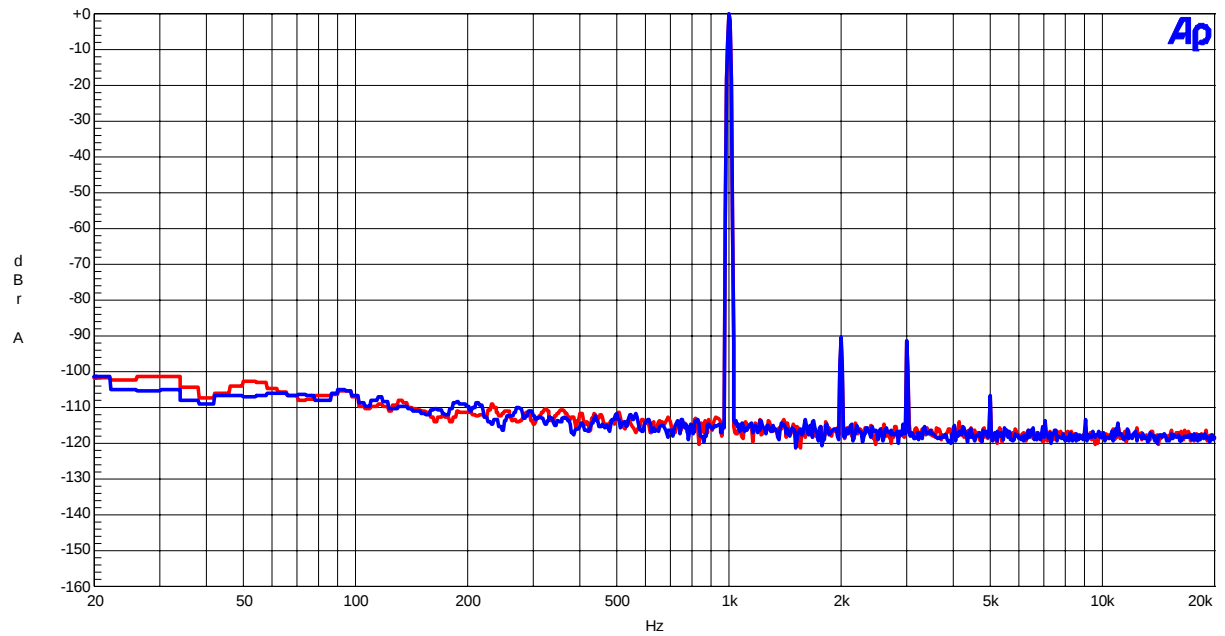
AK4665 DAC(LINEOUT) FFT (fs=44.1kHz, fin=1kHz, Input=0dB)
FFT point=16384, Avg=8

Figure 24. FFT Plot (Input level=0dBFS)

AKM

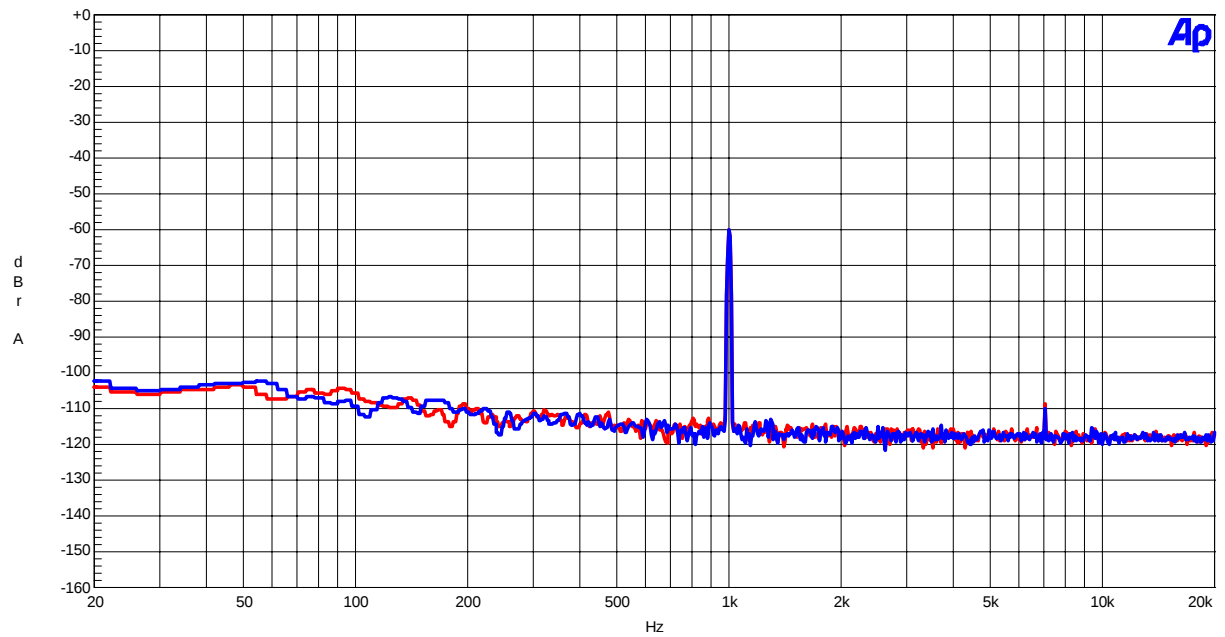
AK4665 DAC(LINEOUT) FFT (fs=44.1kHz, fin=1kHz, Input=-60dB)
FFT point=16384, Avg=8

Figure 25. FFT Plot (Input level=-60dBFS)

AKM

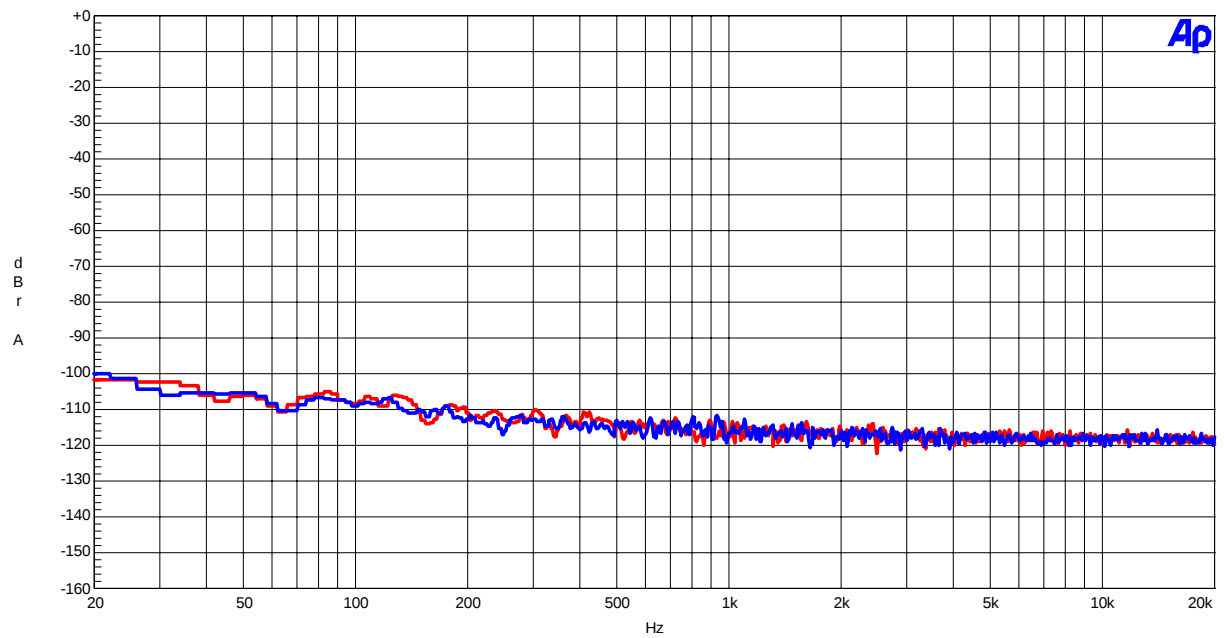
AK4665 DAC(LINEOUT) FFT (fs=44.1kHz, Input=no data)
FFT point=16384, Avg=8

Figure 26. FFT Plot (no data input)

AKM

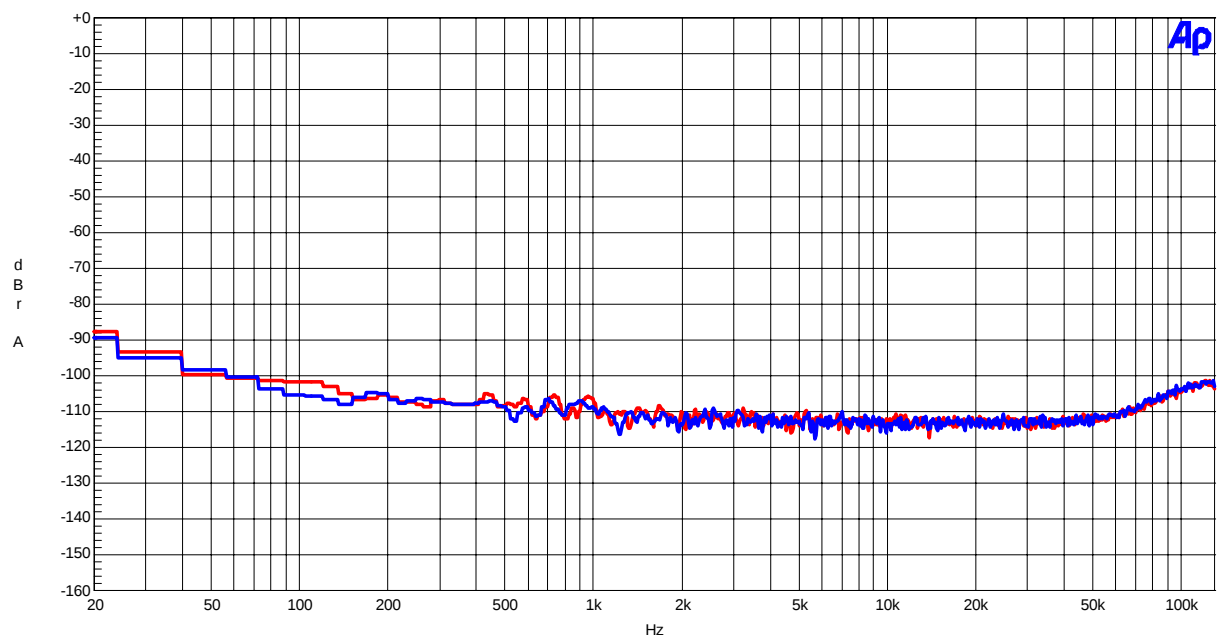
AK4665 DAC(LINEOUT) Out band noise (fs=44.1kHz, Input=no data)
FFT point = 16384, Avg = 8

Figure 27. Out band noise (no data input)

AKM

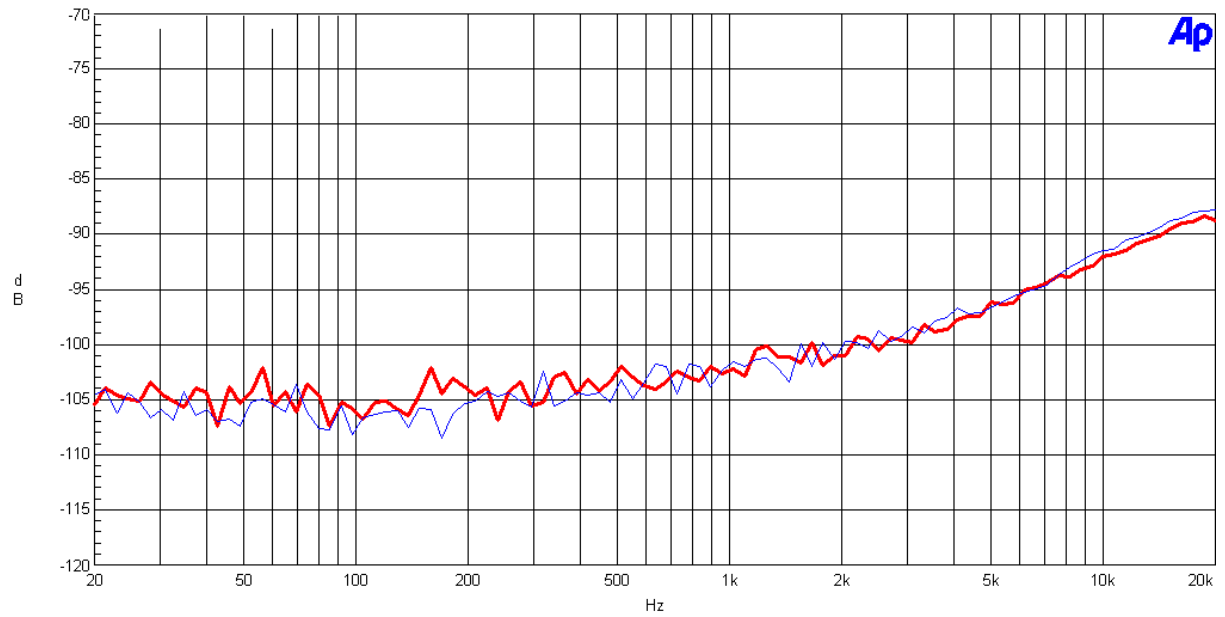
AK4665 DAC(LINEOUT) Crosstalk (fs=44.1kHz, Input=0dB)
RED:Rch-->Lch, Blue:Lch-->Rch

Figure 28. Crosstalk

3. DAC (DAC → HPL/HPR) PLOT DATA

AKM

AKD4665 DAC(HP) THD+N vs. Input Level (fs=44.1kHz, fin=1kHz)

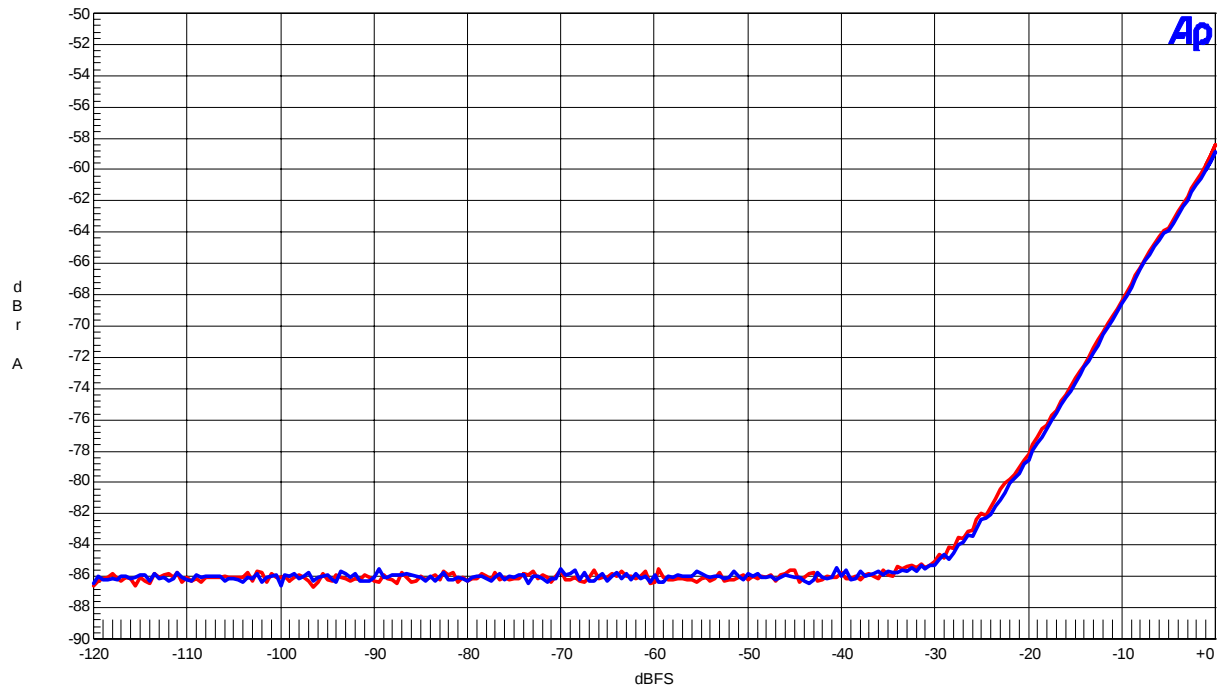


Figure 29. THD+N vs. Input Level

AKM

AK4665 DAC(HP) Input Frequency (fs=44.1kHz, Input=0dB)

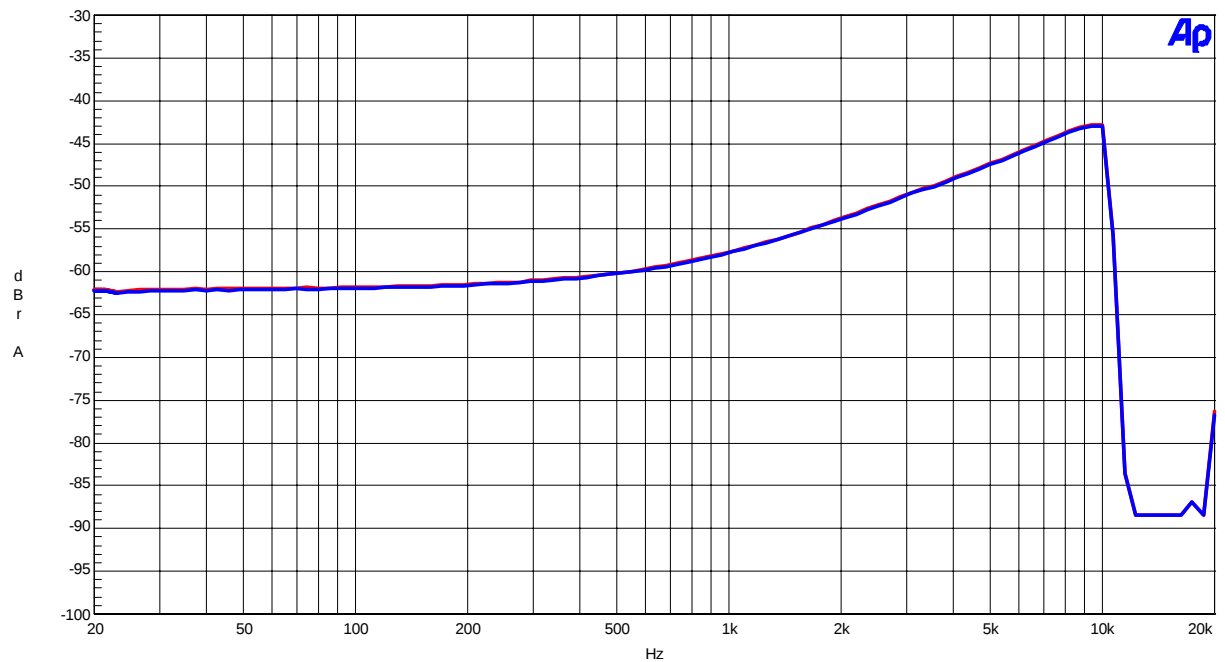


Figure 30. THD+N vs. Input Frequency (Input Level = 0dBFS)

AKM

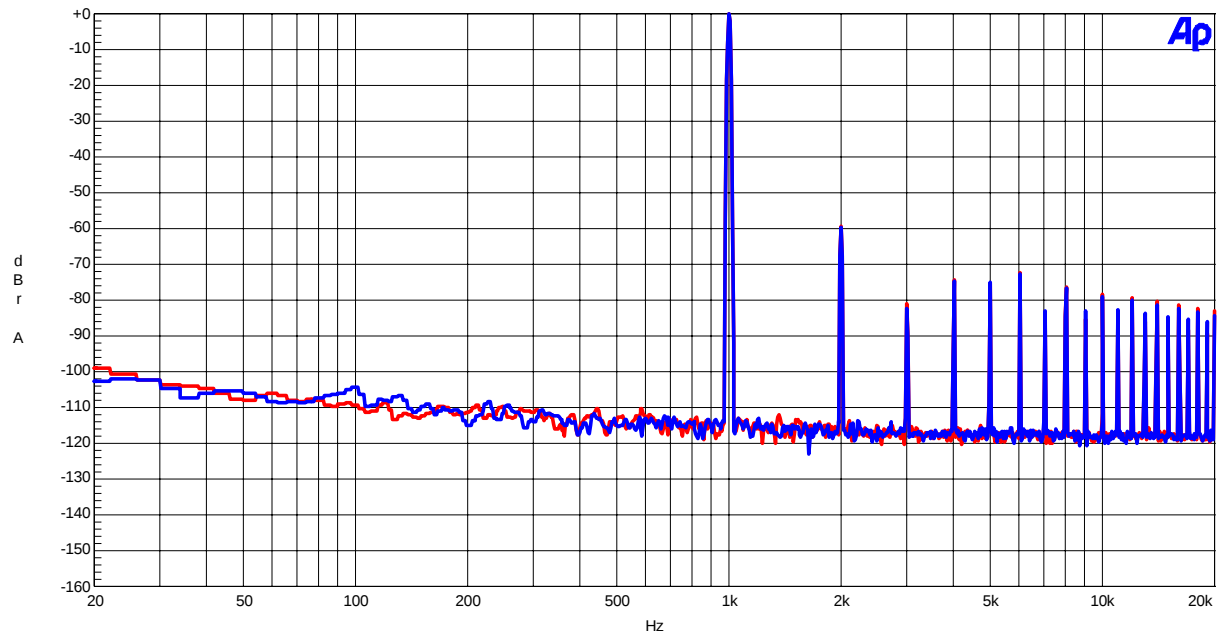
AK4665 DAC(HP) FFT (fs=44.1kHz, fin=1kHz, Input=0dB)
FFT point=16384, Avg=8

Figure 31. FFT Plot (Input level=0dBFS)

AKM

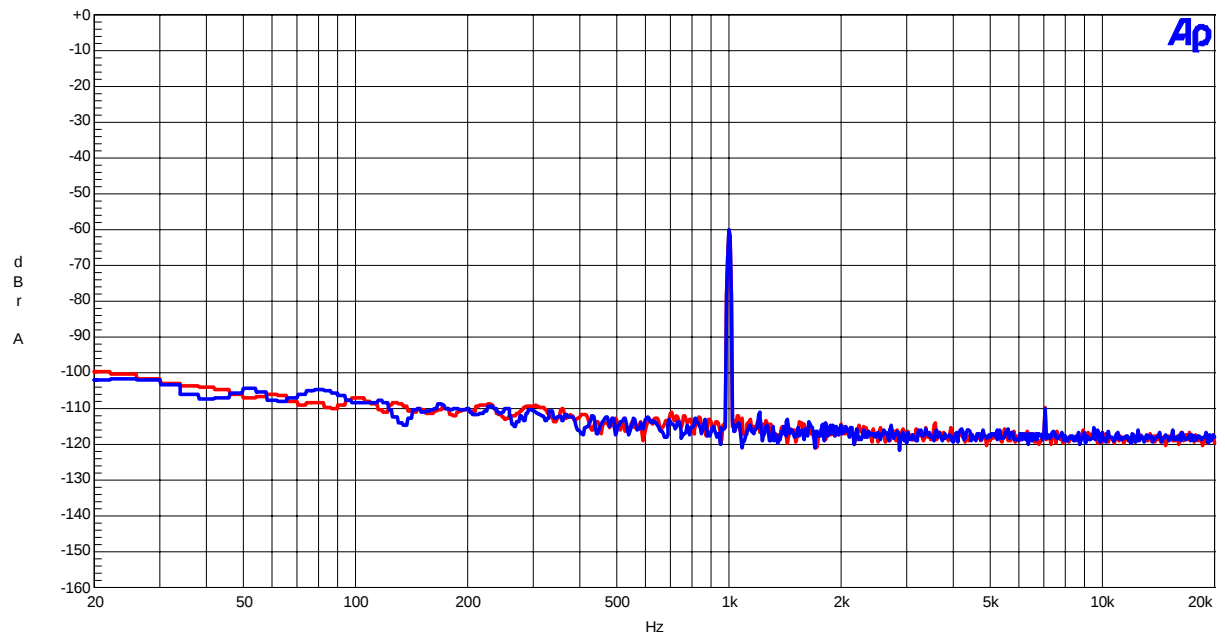
AK4665 DAC(HP) FFT (fs=44.1kHz, fin=1kHz, Input=0dB)
FFT point=16384, Avg=8

Figure 32. FFT Plot (Input level=-60.0dBFS)

AKM

AK4665 DAC(HP) FFT (fs=44.1kHz, Input=no data)
 FFT point=16384, Avg=8

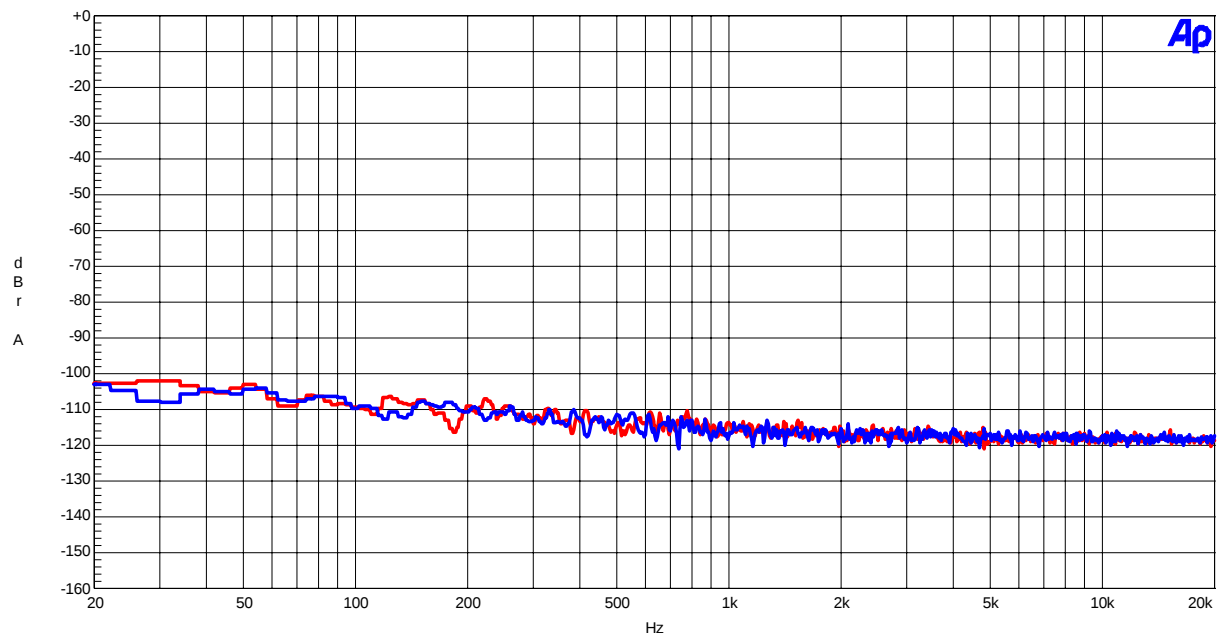


Figure 33. FFT Plot (no data input)

AKM

AK4665 DAC(HP) Crosstalk (fs=44.1kHz, Input=0dB)
 RED:Rch-->Lch, Blue:Lch-->Rch

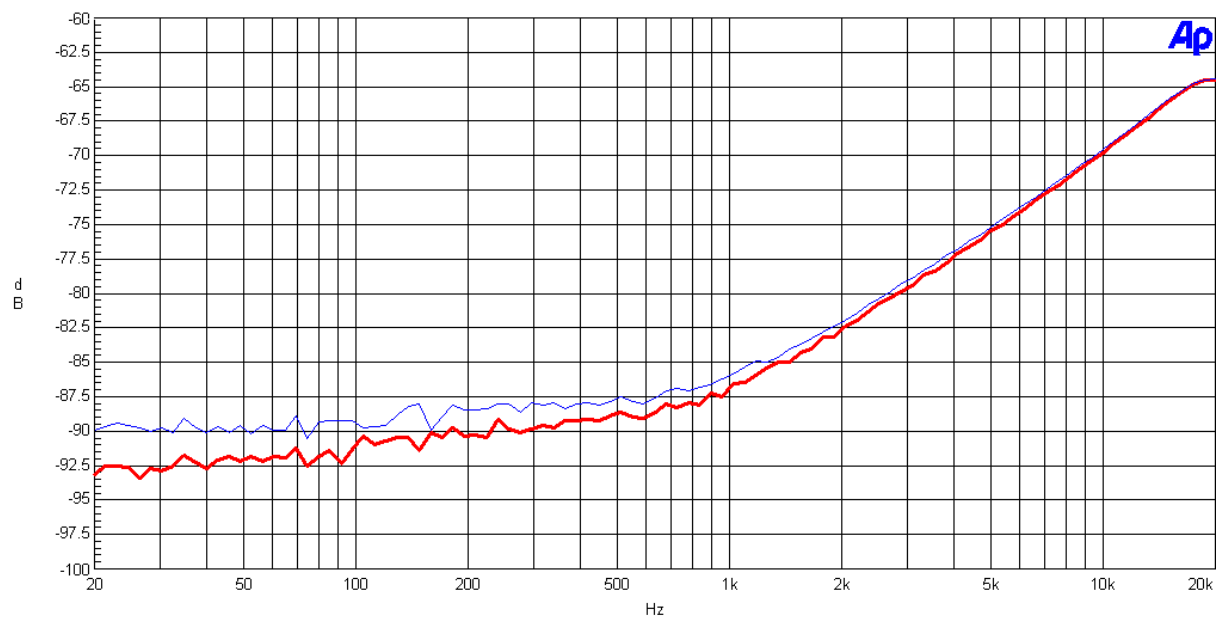
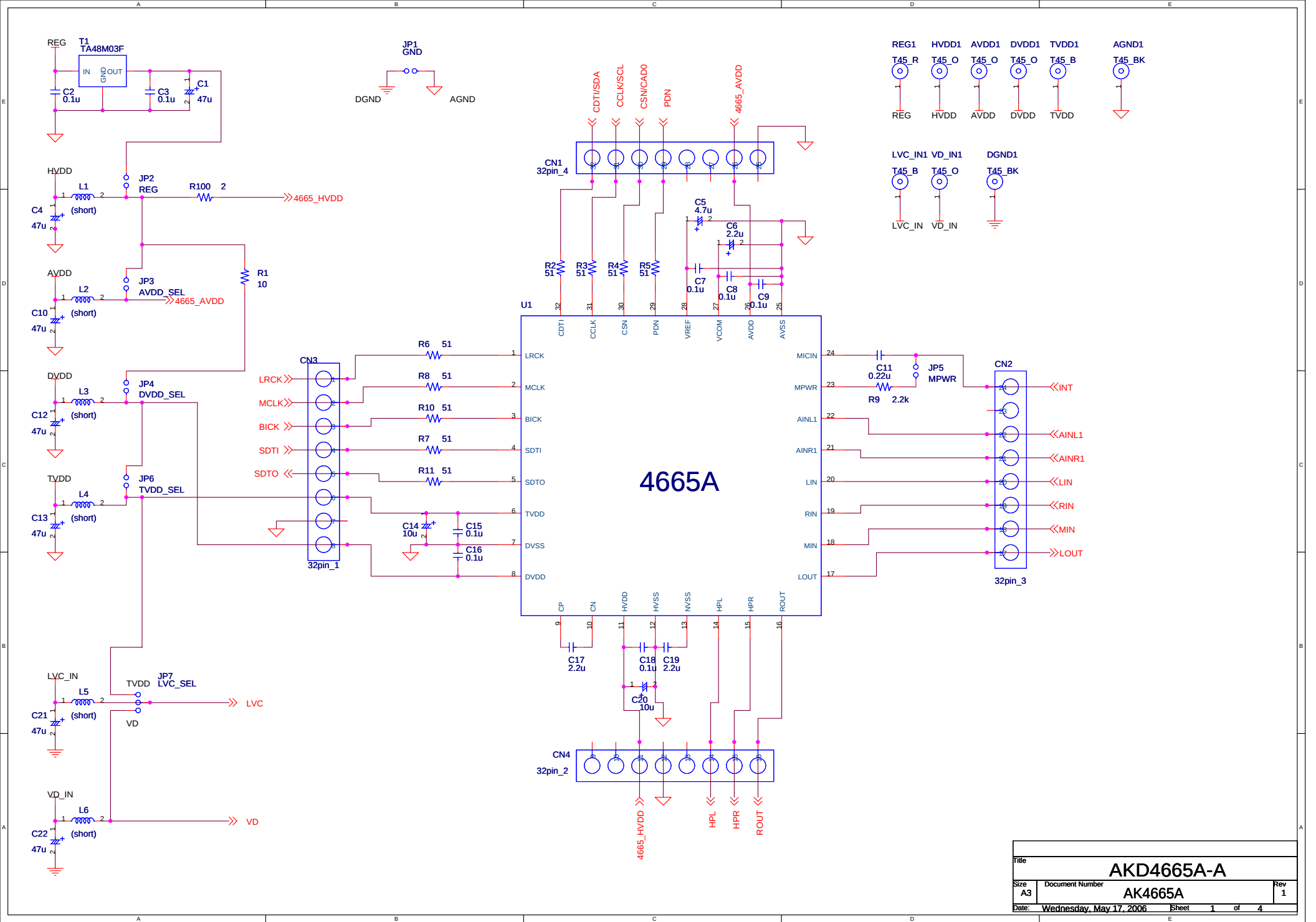


Figure 34. Crosstalk

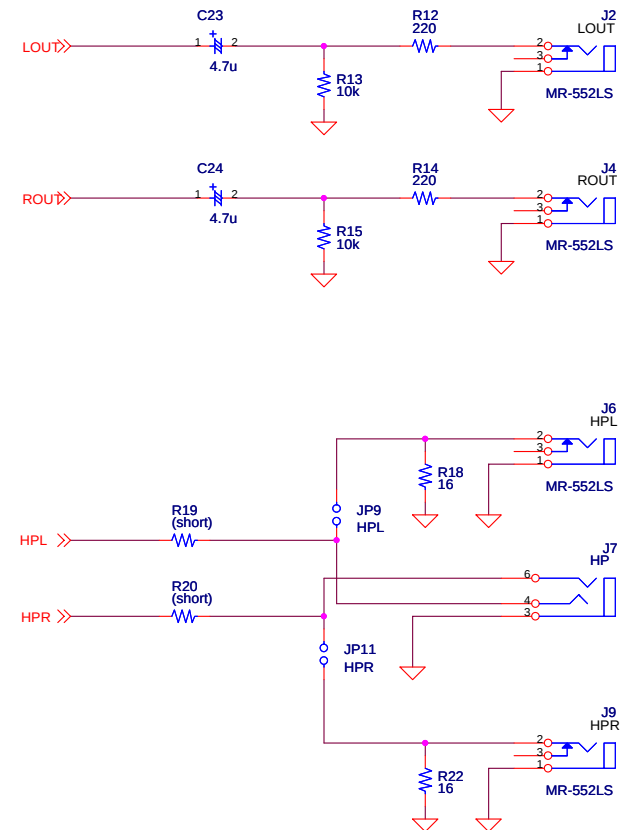
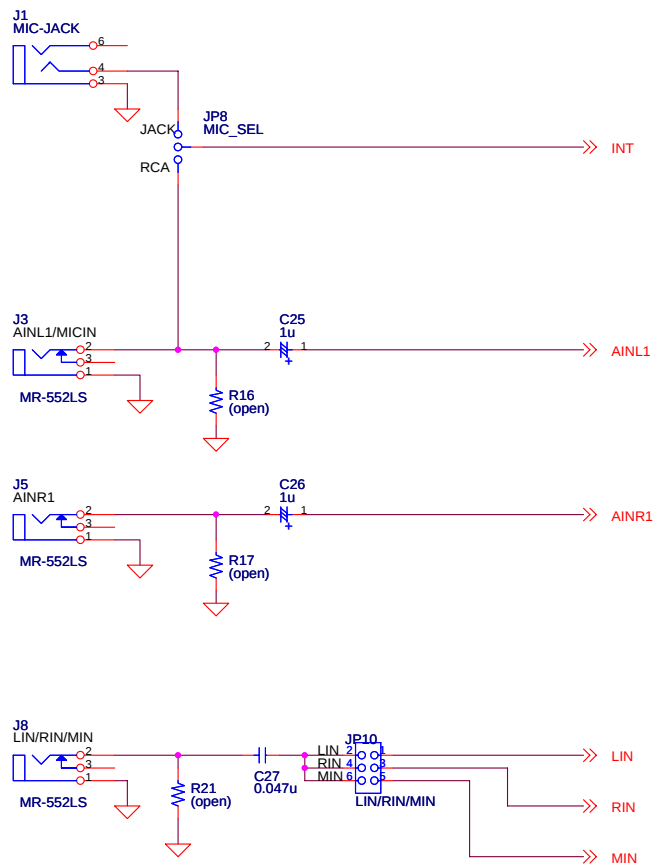
Revision History				
Date (YY/MM/DD)	Manual Revision	Board Revision	Reason	Contents
05/12/19	KM082200	0	First Edition	
06/05/17	KM082201	1	Circuit change	A 2Ω resistor was inserted at HVDD line in series.

IMPORTANT NOTICE

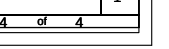
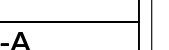
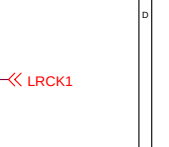
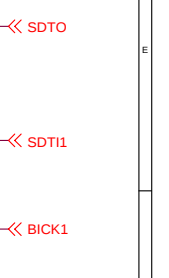
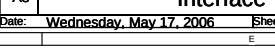
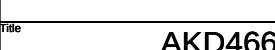
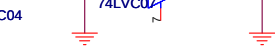
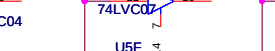
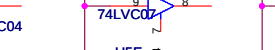
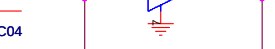
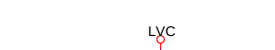
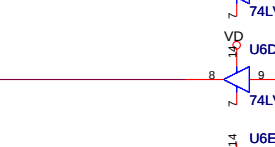
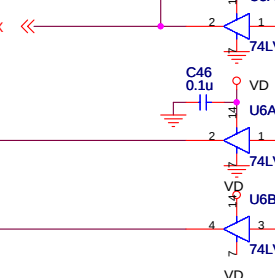
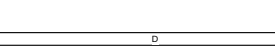
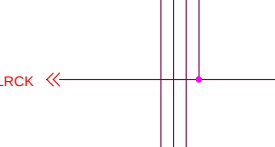
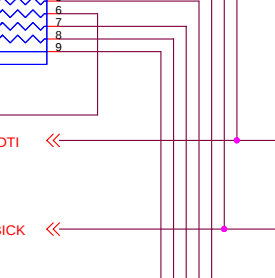
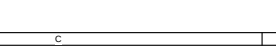
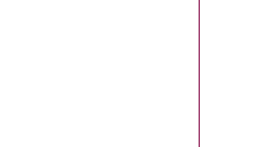
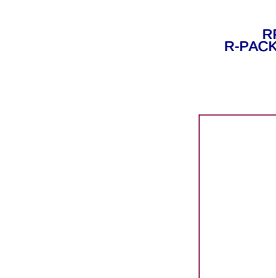
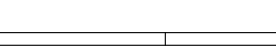
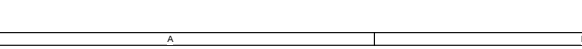
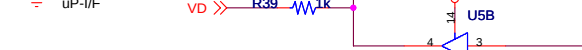
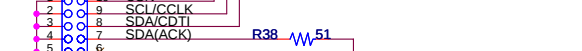
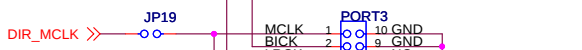
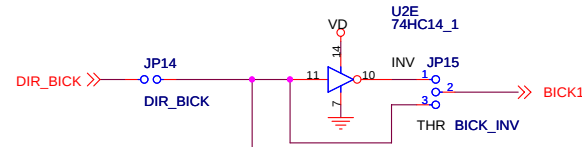
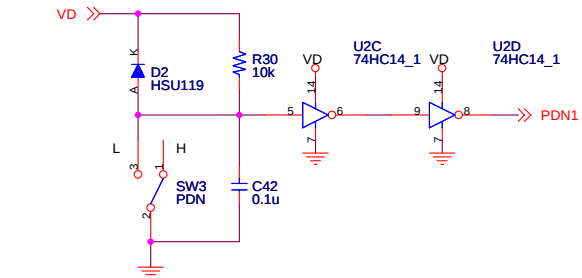
- These products and their specifications are subject to change without notice. Before considering any use or application, consult the Asahi Kasei Microsystems Co., Ltd. (AKM) sales office or authorized distributor concerning their current status.
- AKM assumes no liability for infringement of any patent, intellectual property, or other right in the application or use of any information contained herein.
- Any export of these products, or devices or systems containing them, may require an export license or other official approval under the law and regulations of the country of export pertaining to customs and tariffs, currency exchange, or strategic materials.
- AKM products are neither intended nor authorized for use as critical components in any safety, life support, or other hazard related device or system, and AKM assumes no responsibility relating to any such use, except with the express written consent of the Representative Director of AKM. As used here:
 - (a) A hazard related device or system is one designed or intended for life support or maintenance of safety or for applications in medicine, aerospace, nuclear energy, or other fields, in which its failure to function or perform may reasonably be expected to result in loss of life or in significant injury or damage to person or property.
 - (b) A critical component is one whose failure to function or perform may reasonably be expected to result, whether directly or indirectly, in the loss of the safety or effectiveness of the device or system containing it, and which must therefore meet very high standards of performance and reliability.
- It is the responsibility of the buyer or distributor of an AKM product who distributes, disposes of, or otherwise places the product with a third party to notify that party in advance of the above content and conditions, and the buyer or distributor agrees to assume any and all responsibility and liability for and hold AKM harmless from any and all claims arising from the use of said product in the absence of such notification.



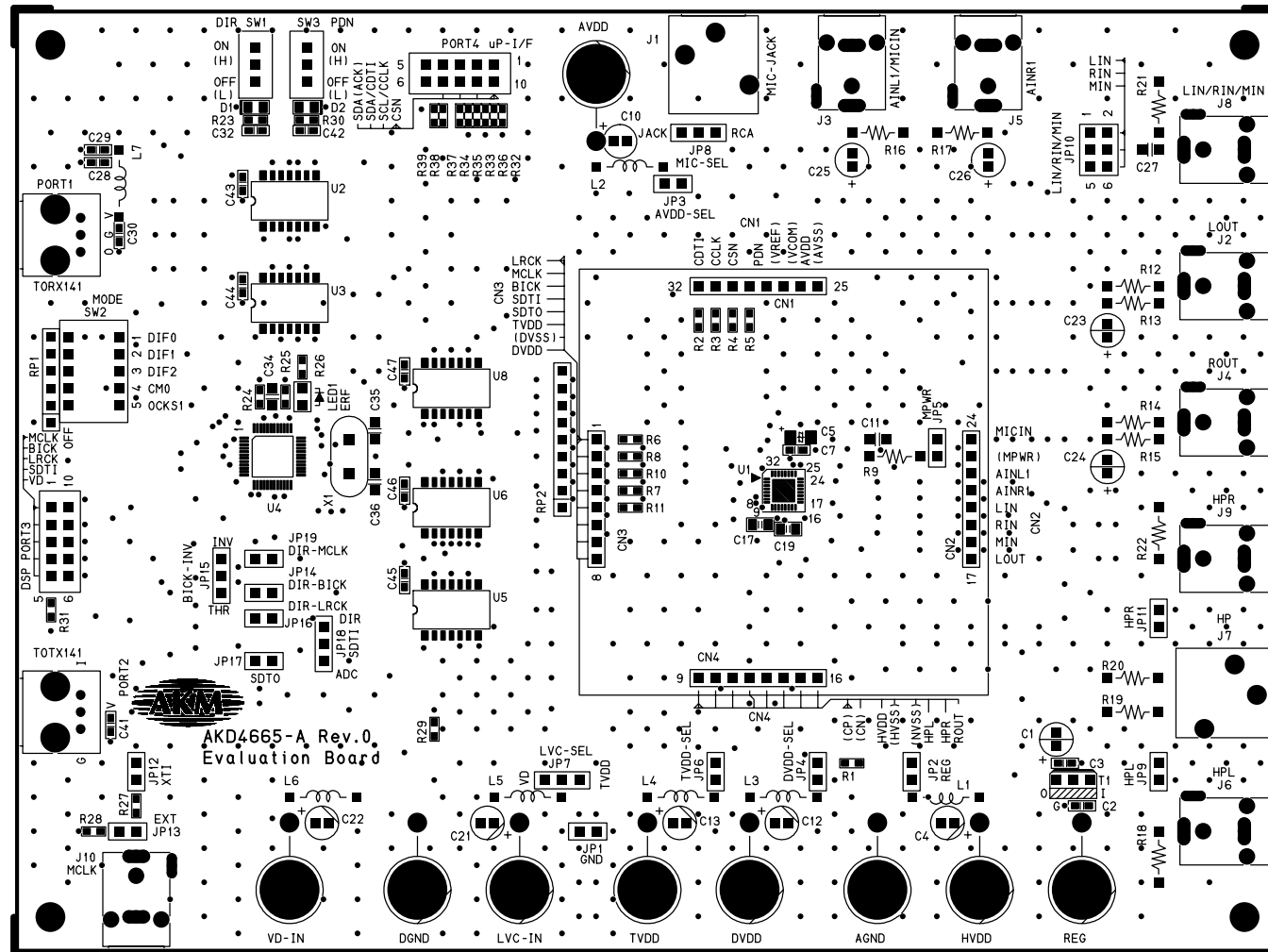
Title			
AKD4665A-A			
Size	Document Number	Rev	
A3	AK4665A	1	
Date:	Wednesday, May 17, 2006	Sheet	1 of 4



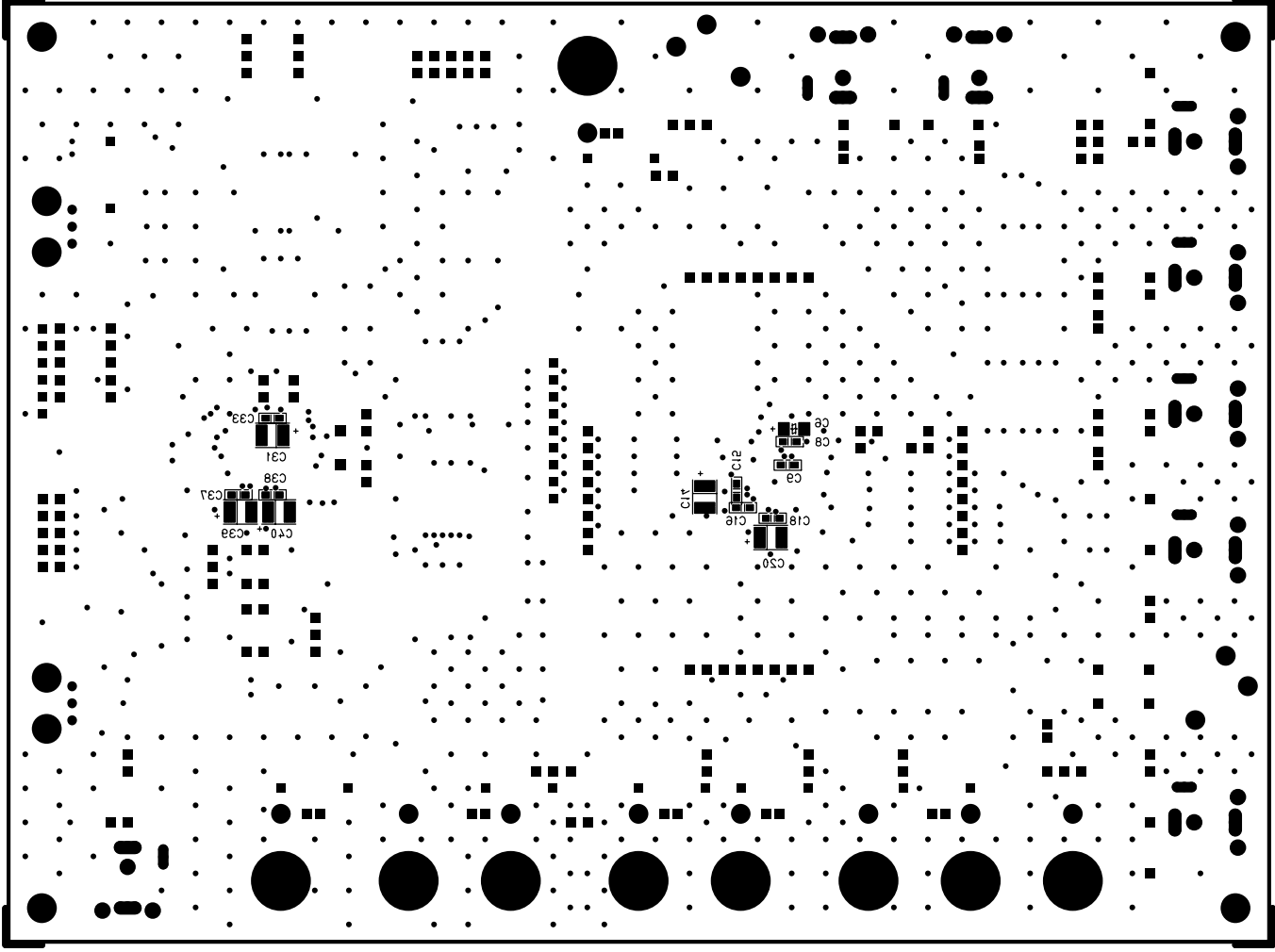
Title			
AKD4665A-A			
Size	Document Number		Rev
A3	ANALOG		1
Date:	Wednesday, May 17, 2006	Sheet	2 of 4



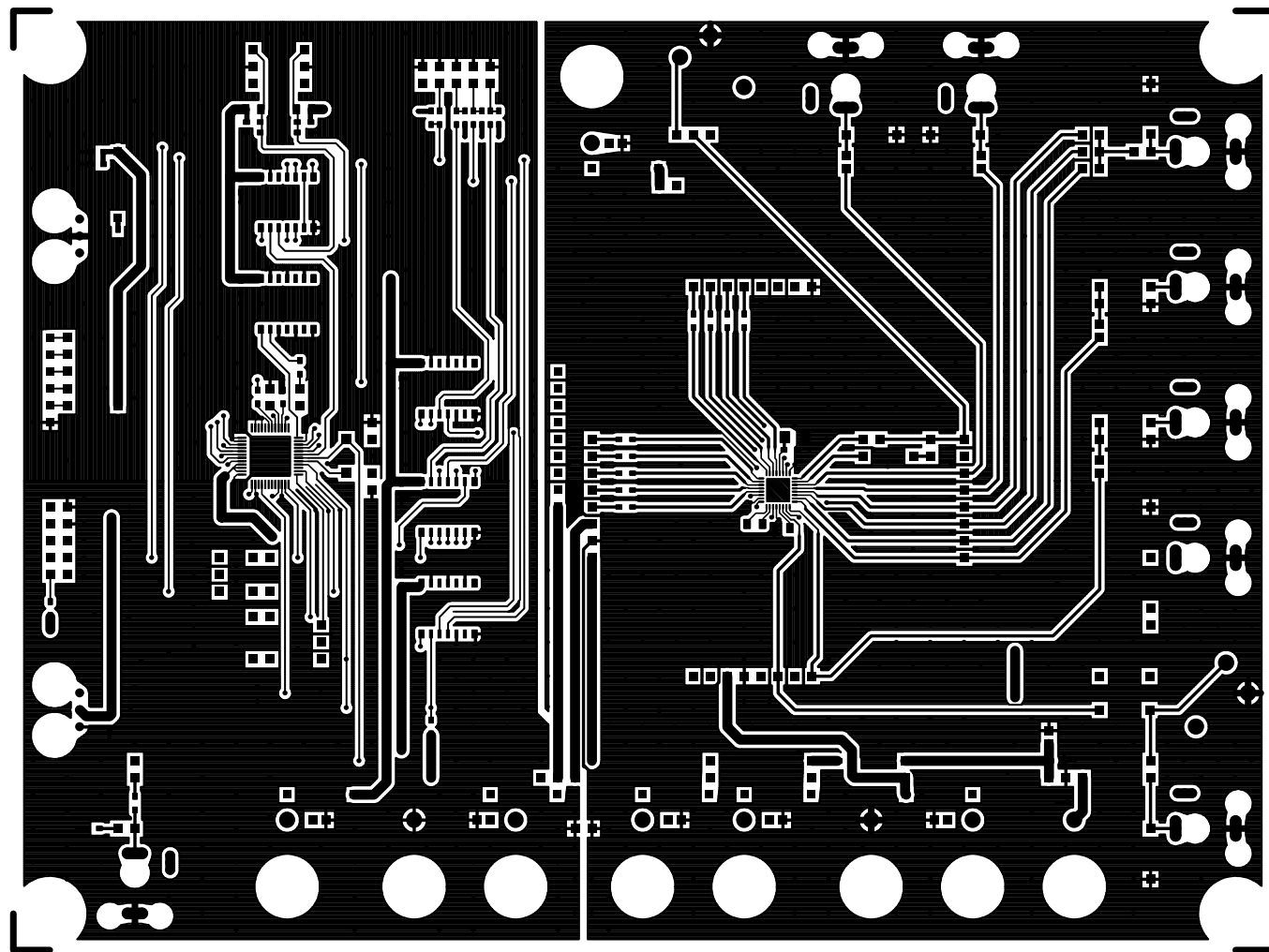
Title			
AKD4665A-A			
Size	Document Number	Interface	
A3			Rev 1
Date:	Wednesday, May 17, 2006	Sheet	4 of 4



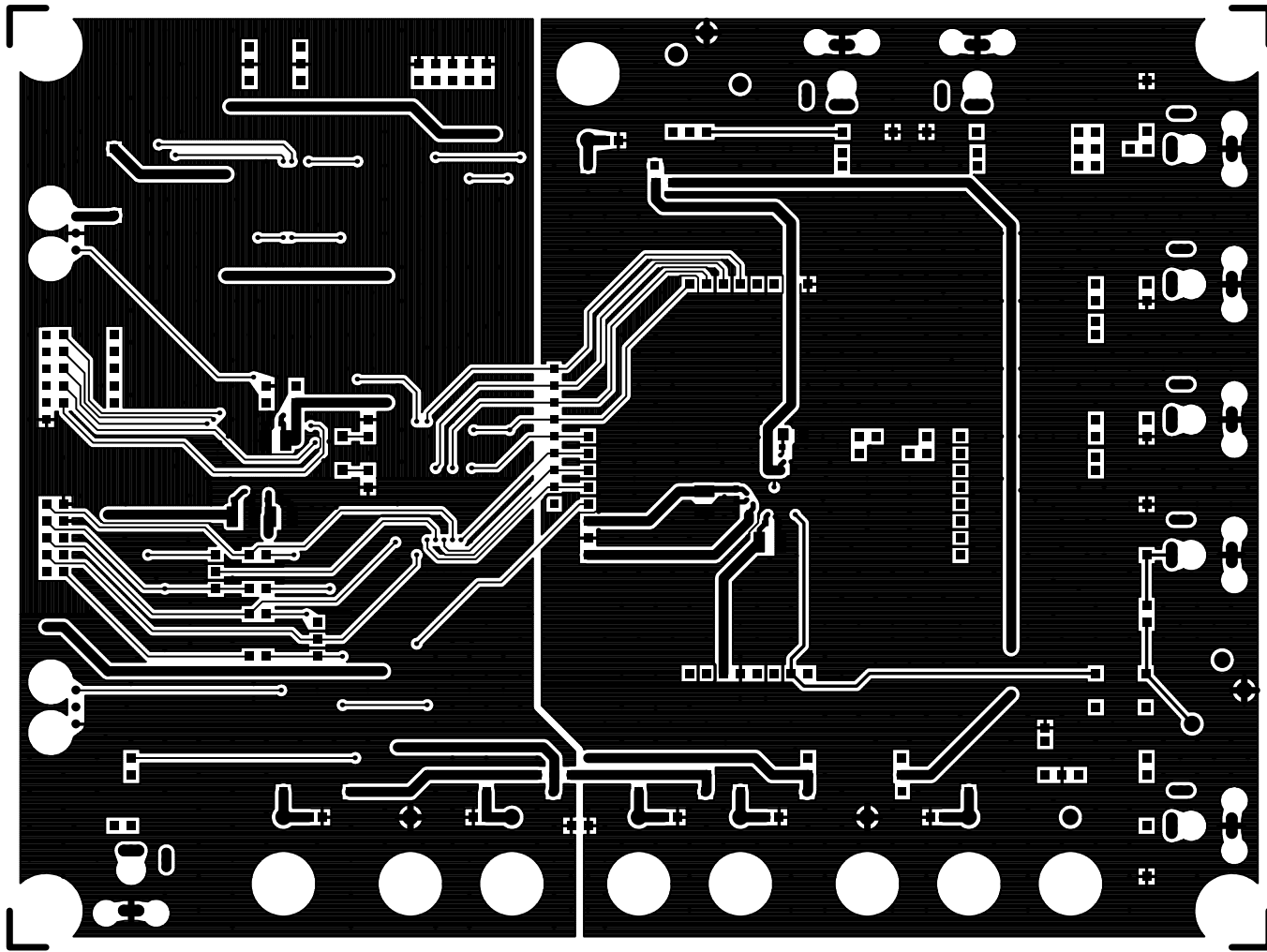
AKD4665-A L1 SILK



AKD4662-A 12 SILK



AKD4665-A L1



AKD4002-A TS