AKD4554-E
Evaluation board Rev.0 for AK4554

GENERAL DESCRIPTION

AKD4554-E is an evaluation board for the portable digital audio 16bit A/D and D/A converter, AK4554. The AKD4554-E can evaluate A/D converter and D/A converter separately in addition to loopback mode (A/D → D/A). The A/D section can be evaluated by interfacing with AKM's DAC evaluation boards directly. The AKD4554 has the interface with AKM's ADC evaluation boards. Therefore, it's easy to evaluate the D/A section. The AKD4554-E also has the digital audio interface and can achieve the interface with digital audio systems via opt-connector.

■ Ordering guide

AKD4554 -E --- Evaluation board for AK4554

FUNCTION

- **Compatible with 2 types of interface**
  - **Direct interface with AKM's A/D & D/A converter evaluation boards**
  - **DIT/DIR with optical input/output**

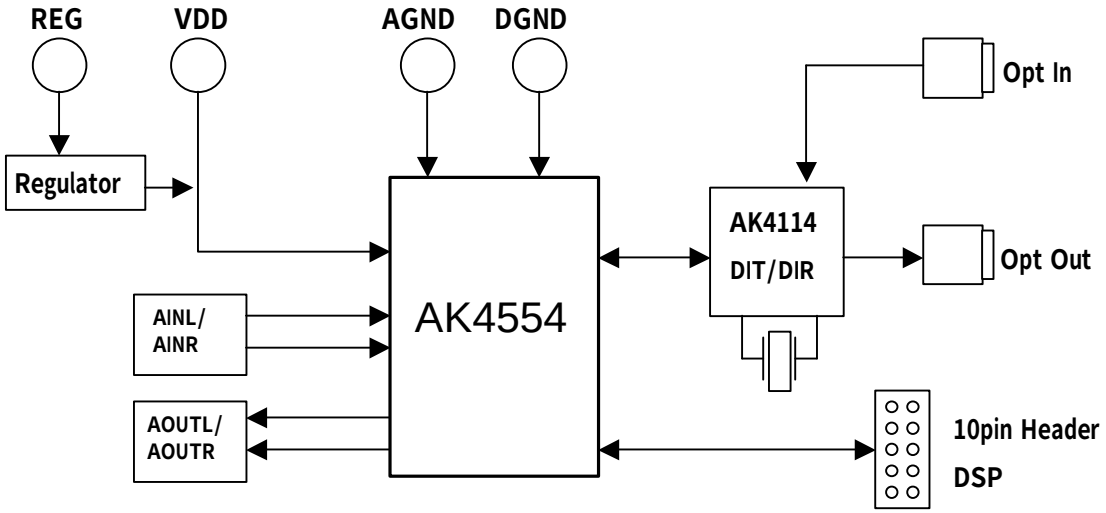


Figure 1. AKD4554-E Block Diagram

* 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.

[VDD] (Orange) = 1.6 ~ 3.6V : for VDD of AK4554
[REG] (Red) = 5.0V : for regulator
[AGND] (Black) = 0V : for analog ground (including VSS of AK4554)
[DGND] (Black) = 0V : for logic ground

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

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

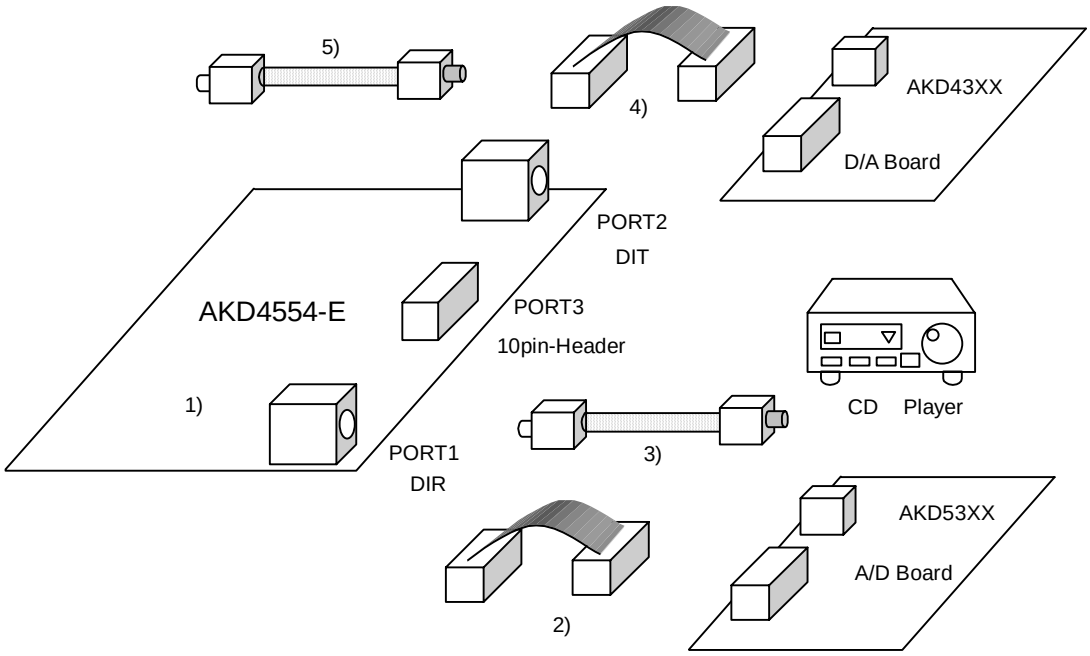
3) Power on.

The AK4554 should be reset once bringing SW2 (PDN) “OFF” upon power-up.

■ Evaluation mode

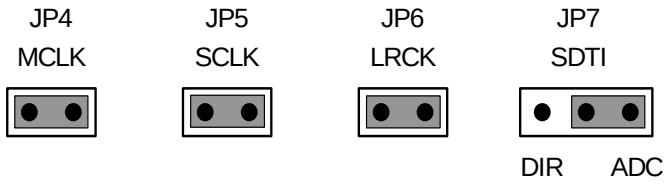
Applicable Evaluation Mode

1) Evaluation of loopback mode (default)
2) Evaluation of D/A using A/D converted data
3) Evaluation of D/A using DIR (Optical Link)
4) Evaluation of A/D using D/A converted data
5) Evaluation of A/D using DIT (Optical Link)
6) All interface signals including master clock are fed externally.



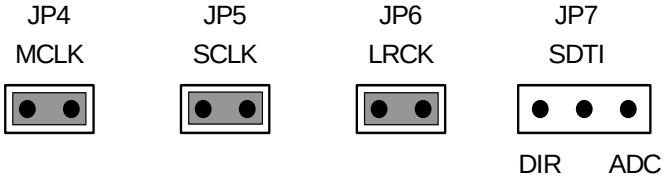
1) Evaluation of loopback mode. (default)

Nothing should be connected to PORT1/PORT3.



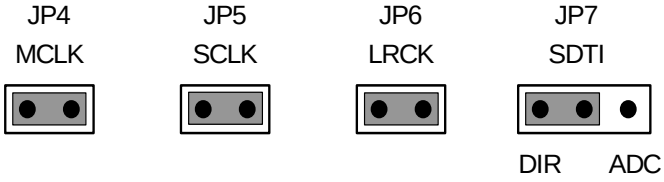
2) Evaluation of D/A using A/D converted data.

D/A part can be evaluated by connecting with AKM's A/D evaluation boards via PORT3.
Nothing should be connected to PORT1



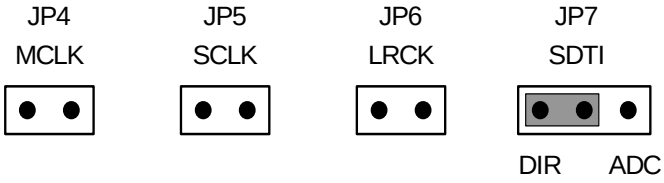
3) Evaluation of D/A using DIR. (Optical link)

PORT1 (TORX141) is used. DIR generates MCLK, SCLK, LRCK and SDATA from the received data through optical connector (TORX141). Used for the evaluation using CD test disk. Nothing should be connected to PORT2/PORT3.



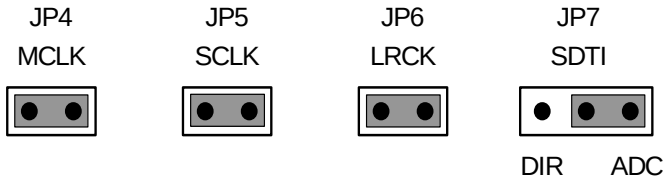
4) Evaluation of A/D using D/A converted data.

A/D part can be evaluated by connecting with AKM's D/A evaluation boards via PORT3.
Nothing should be connected to PORT1.



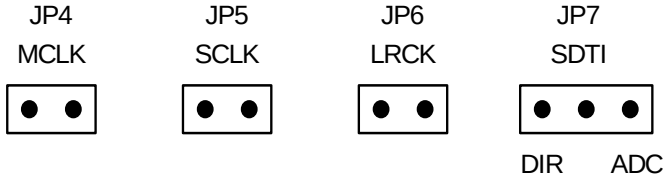
5) Evaluation of A/D using DIT. (Optical link)

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.



6) All interfacing signals (MCLK, SCLK, LRCK) are fed from the external circuit through PORT3.

Under the following set-up, all external signals needed for the AK4554 to operate could be fed through PORT3.



■ DIP switch set up

Upper-side is “ON” (“H”) and lower side is “OFF” (“L”).

[SW1]: Set up the AK4554 and AK4114.

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SW No.	SW Name	Mode
1	DIF2, 0	AK4554 and AK4114 Audio Format Setting Always OFF.
2	DEM1	Set up the de-emphasis of AK4554
3	DEM0	(See table 2)
4	NC	No use

Table 1. DIPswitch set-up of AK4114

DEM1 (SW1-#2)	DEM0 (SW1-#3)	Mode
OFF	OFF	44.1kHz
OFF	ON	OFF
ON	OFF	48kHz
ON	ON	32kHz

Table 2. DIPswitch set up of de-emphasis

■ Other jumper pins set up

[JP1] (GND): Connection between AGND and DGND
open: Both grounds are separated on board.<default>
short: Both grounds are connected on board.

[JP2] (REG): Select to regulator
open: On-board regulator is not used. <default>
short: On-board regulator is used.(The connector "VDD" can be open.)

[JP3] (PWR): Pull up power supply select for SDTO.
VDD: Connected to VDD of AK4554. <default>
D3V: Supplied from regulator (3V).

■ The function of the toggle SW.

Upper-side is "ON" and lower side is "OFF".

[SW2] (PDN): Resets the AK4554 and AK4114. Keep "ON" during normal operation.

■ Indication for LED

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

■ Input Circuit

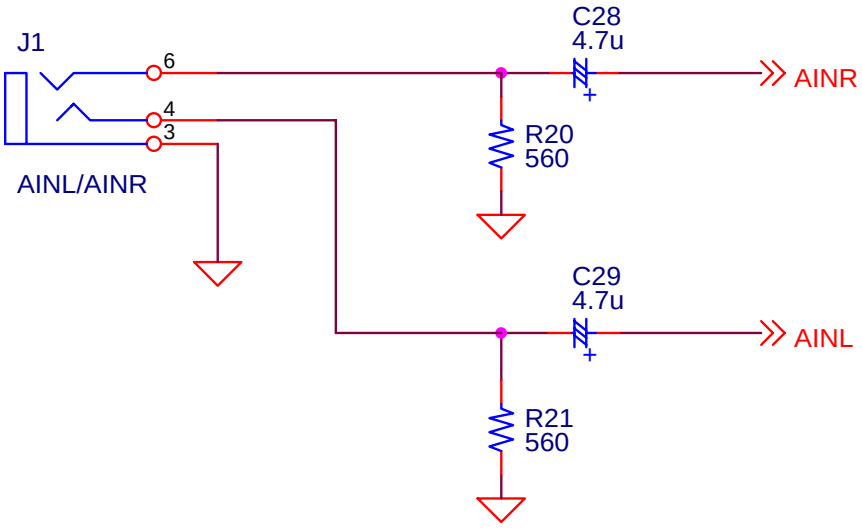

Figure 2. Input circuit on board

■ Output Circuit

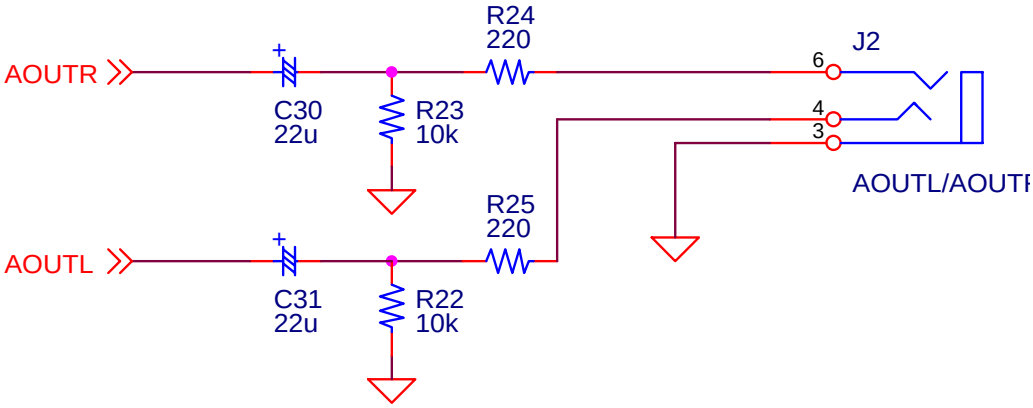

Figure 3. Output circuit on board

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

MEASUREMENT RESULTS

[Measurement condition]

- Measurement unit : Audio Precision, System two
- MCLK : 256fs
- SCLK : 64fs
- fs : 44.1kHz
- Bit : 16bit
- Power Supply : VDD = VP = 2.5V, VD = 5V
- Interface : DIT/DIR
- Temperature : Room

1. ADC

VDD	Parameter	Measured Filter	AINL	AINR
2.5V	S/(N+D) (-0.5dBFS)	20kHz LPF	80.9 dB	81.0 dB
	D-Range (-60dBFS)	20kLPF + A-weighted	89.4 dB	89.2 dB
	S/N (0 data)	20kLPF + A-weighted	89.3 dB	89.2 dB

2. DAC

VDD	Parameter	Measured Filter	AOUTL	AOUTR
2.5V	S/(N+D) (0dBFS)	20kHz LPF	84.5 dB	84.5 dB
	D-Range (-60dBFS)	22kLPF + A-weighted	91.6 dB	91.7 dB
	S/N (0 data)	22kLPF + A-weighted	91.9 dB	92.1 dB

3.PLOT DATA
3-1 ADC

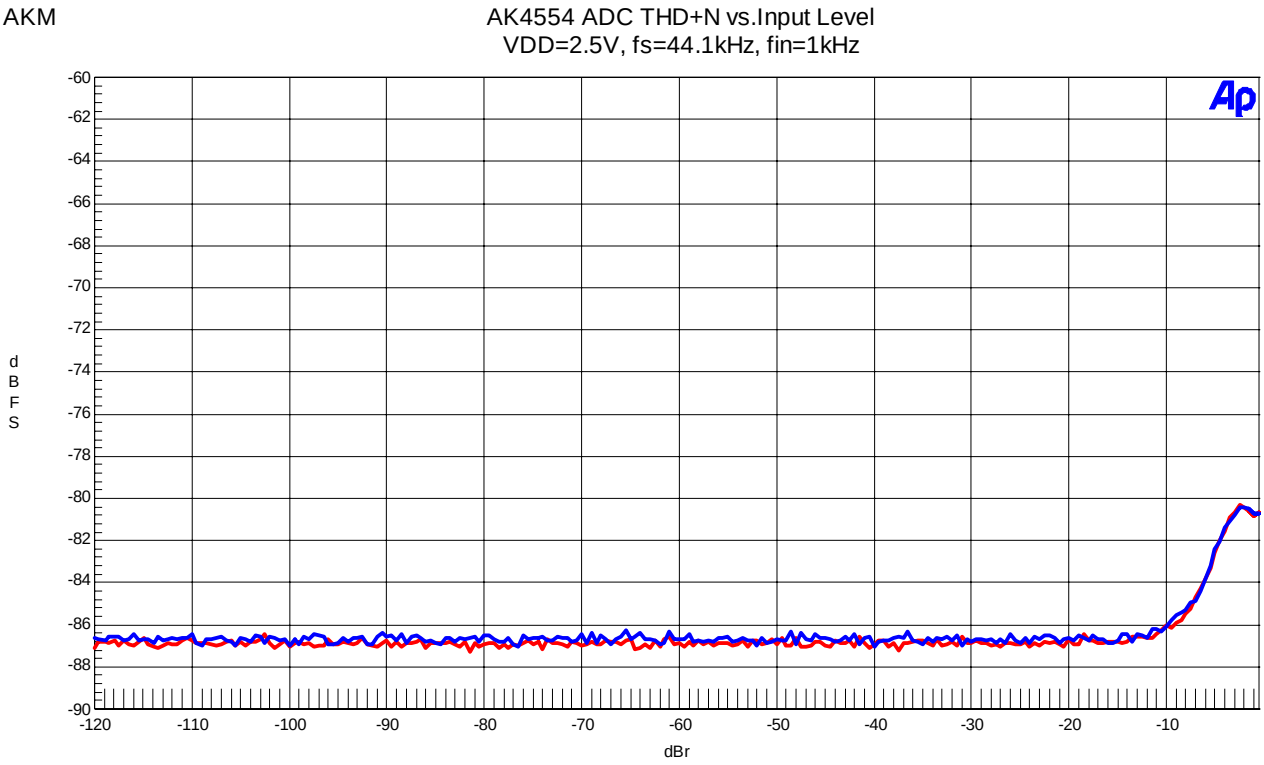

Fig. 1 THD+N vs. Input Level

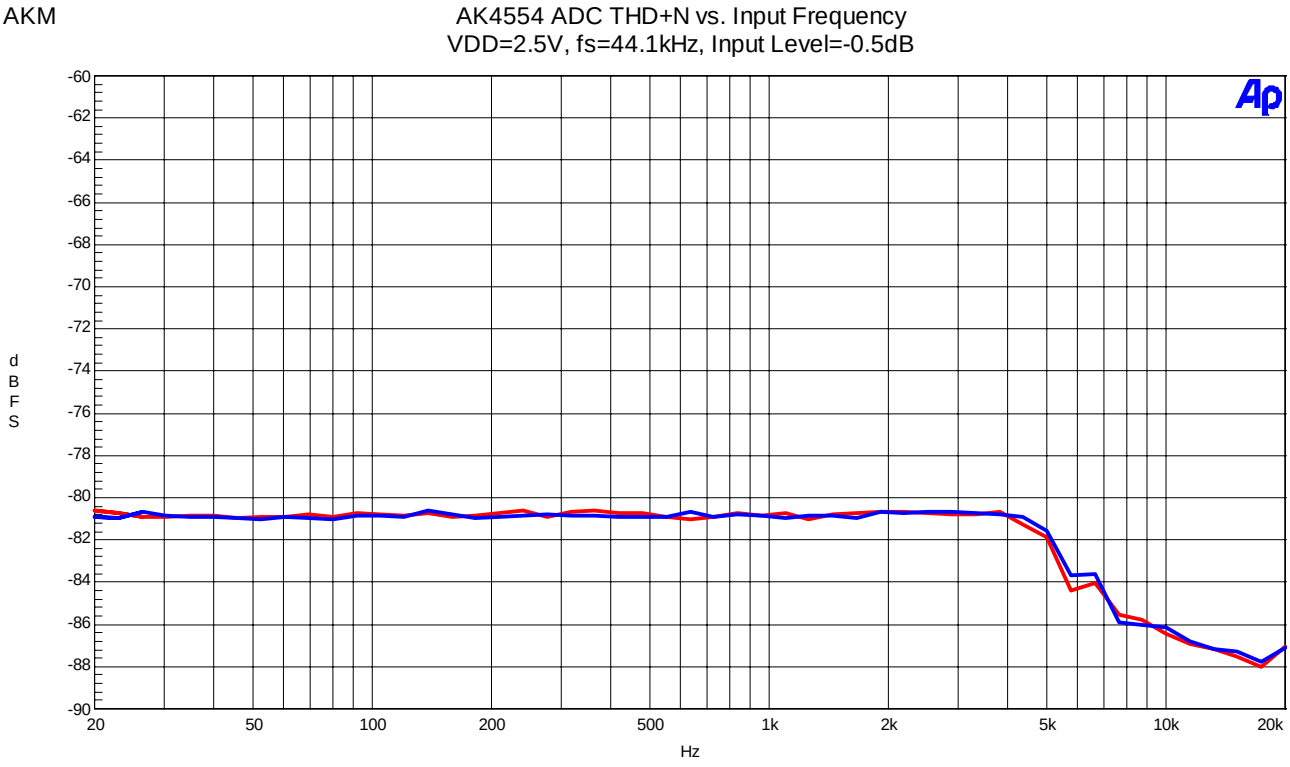

Fig.2 THD+N vs. Input Frequency

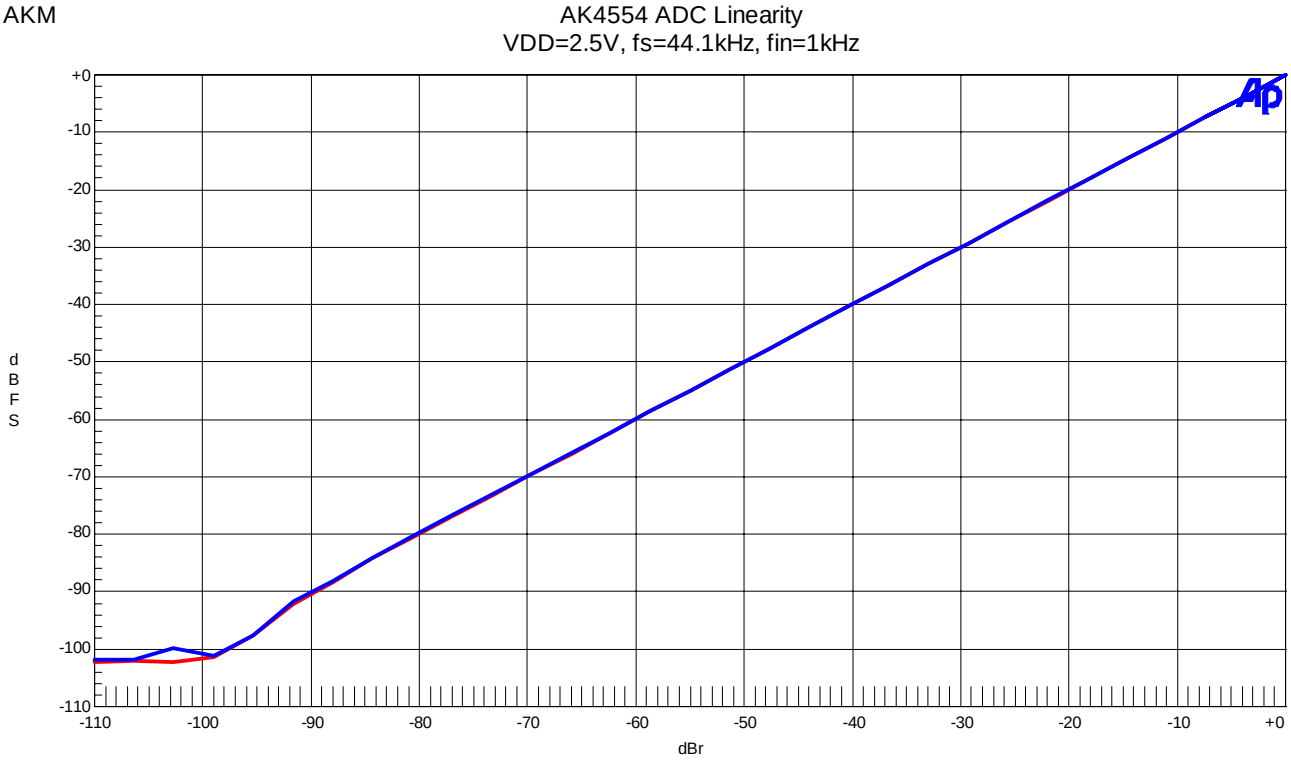

Fig.3 Linearity

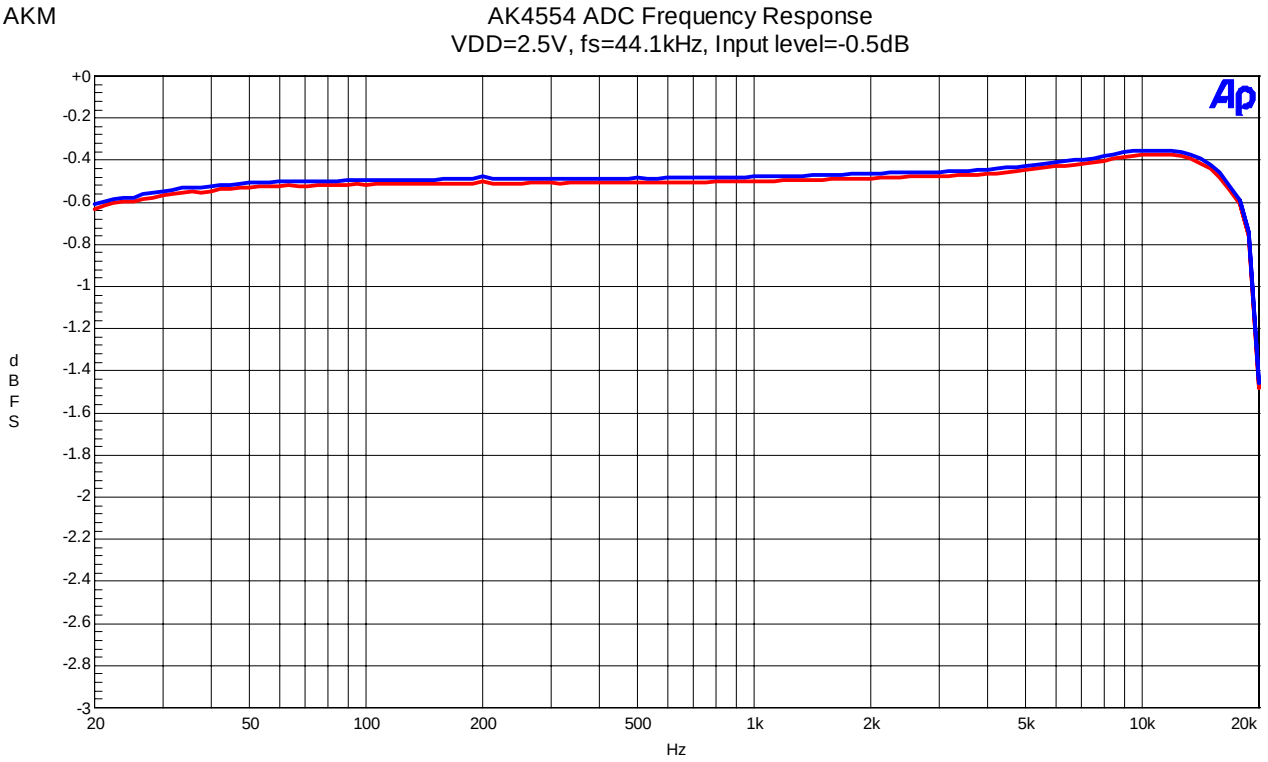

Fig.4 Frequency Response

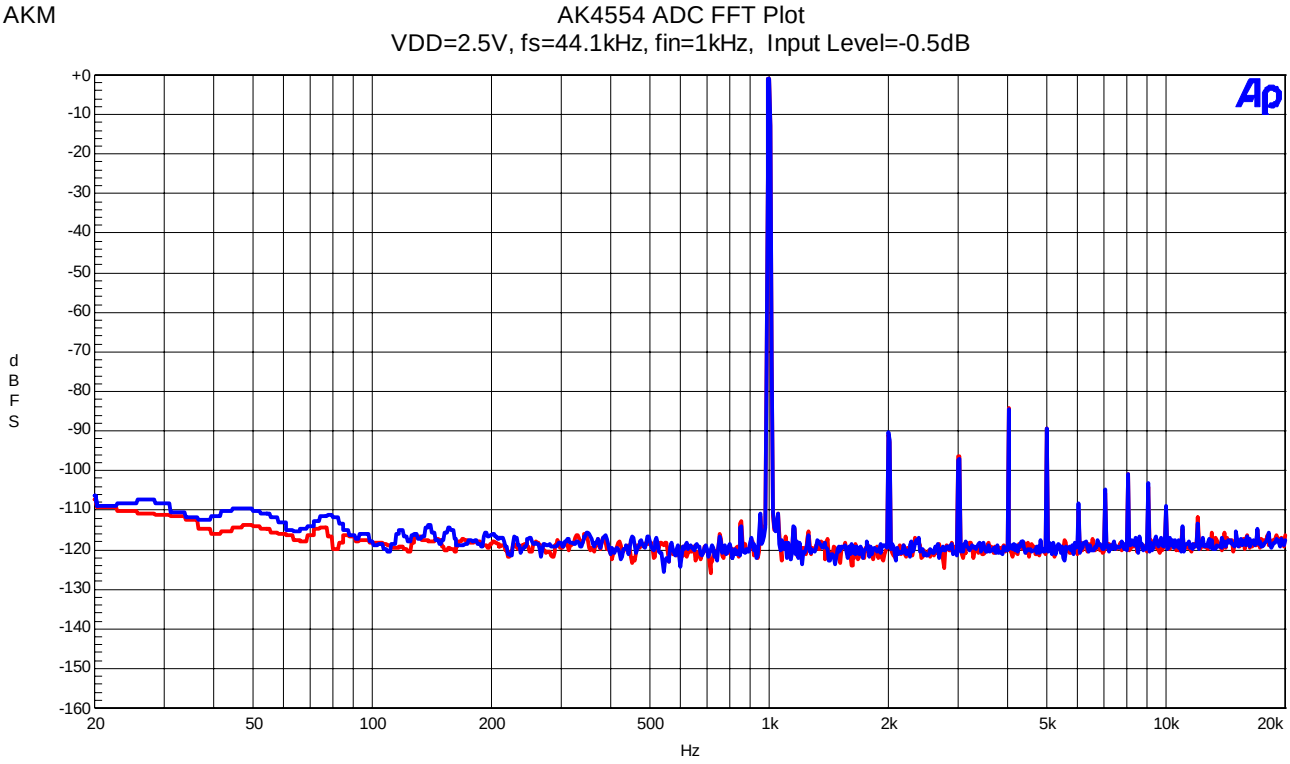

Fig.5 FFT Plot (Input Level = -0.5dB)

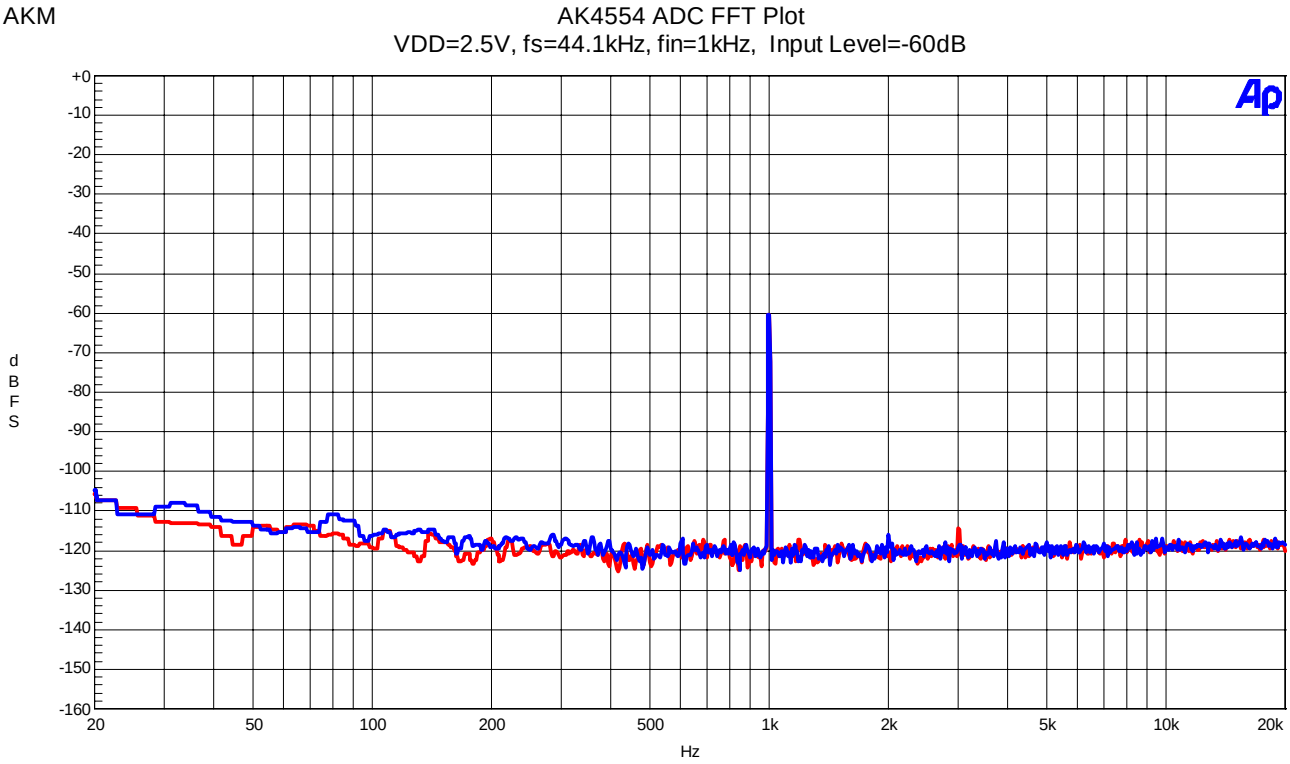

Fig.6 FFT Plot (Input Level = -60dB)

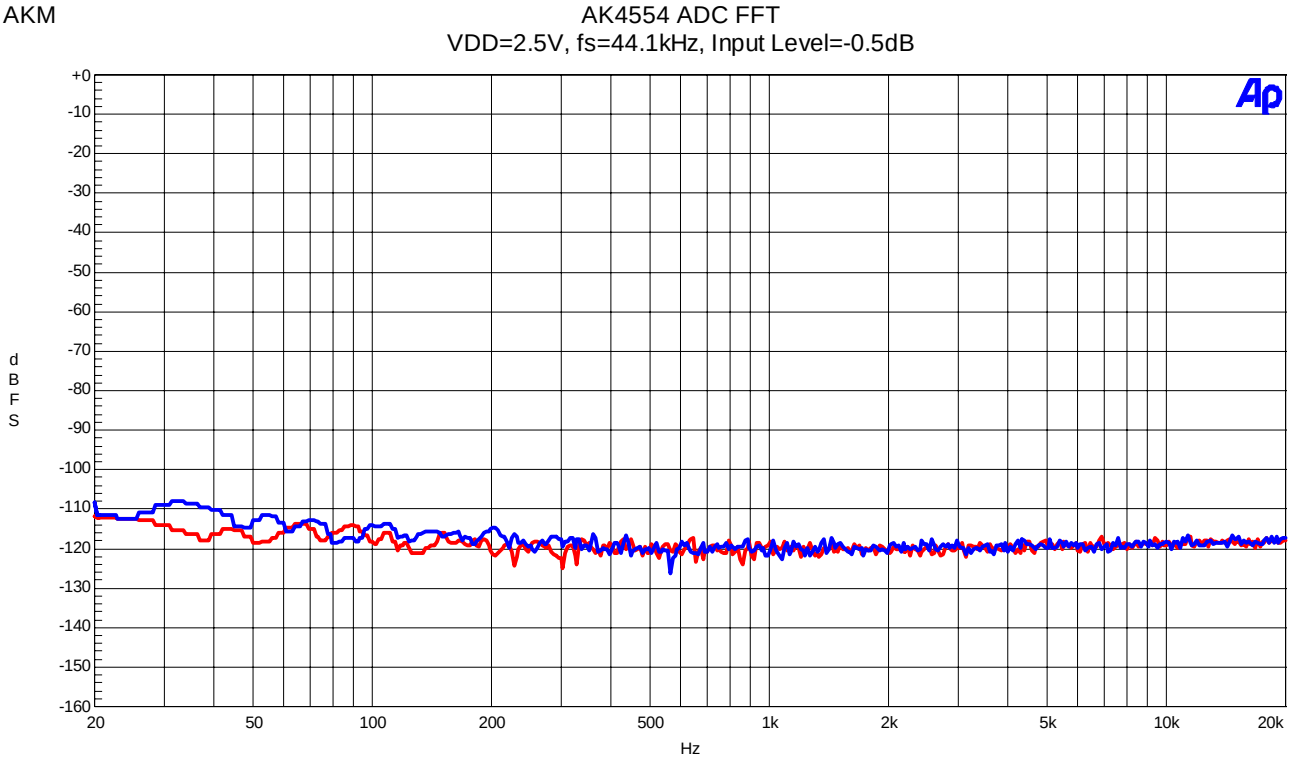

Fig.7 FFT Plot (no signal)

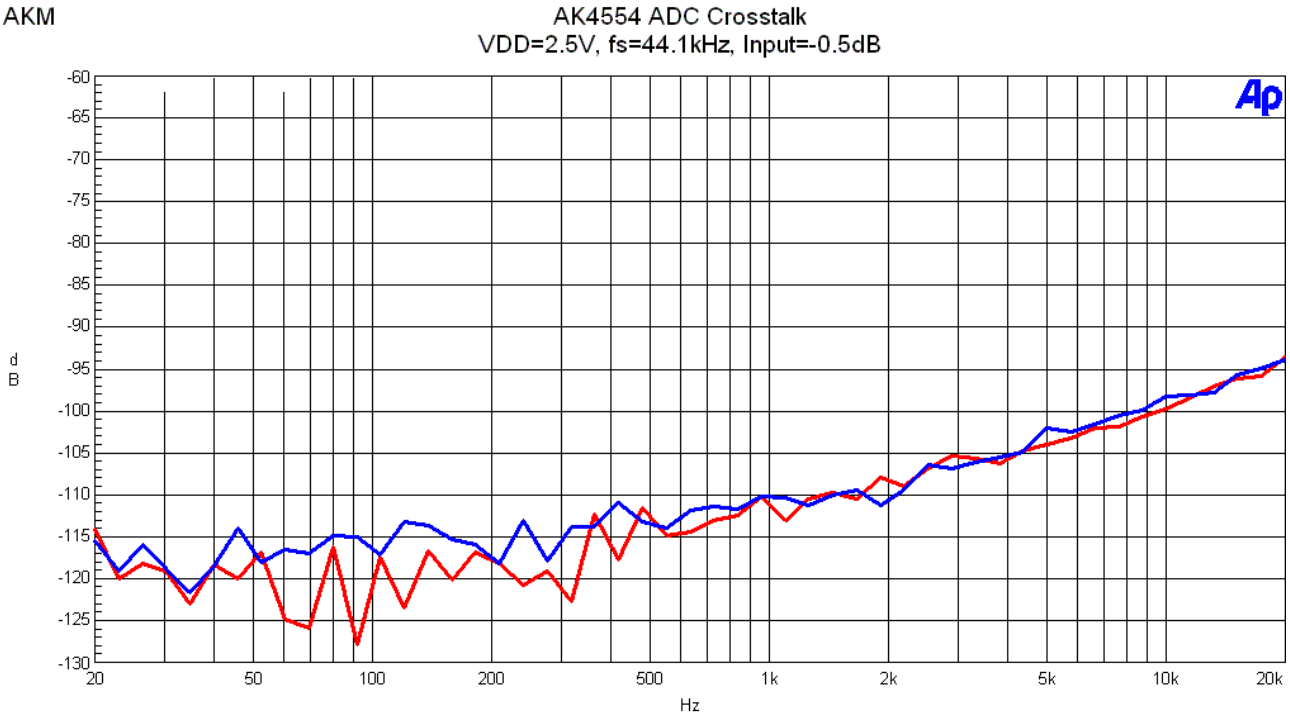

Fig.8 Crosstalk (red : L--->R, blue : R--->L)

3-2. DAC

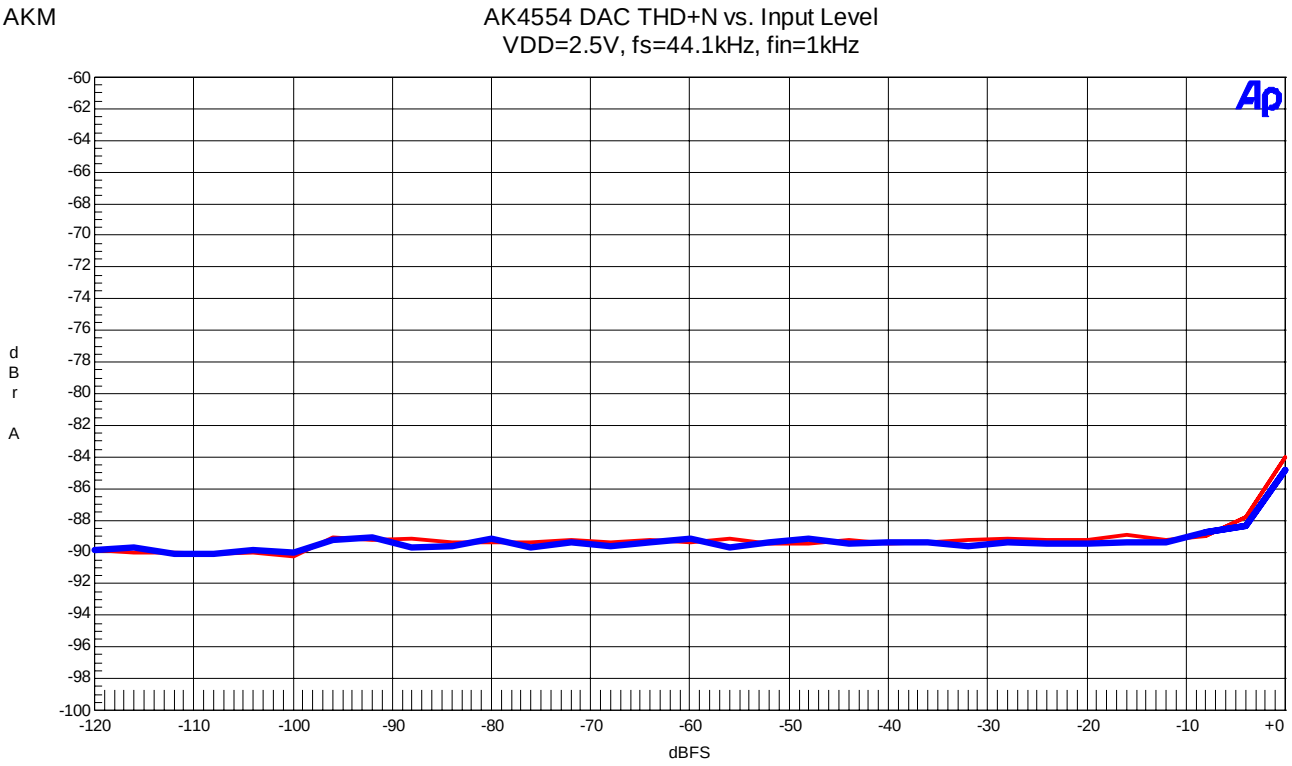

Fig.9 THD+N vs. Input Level

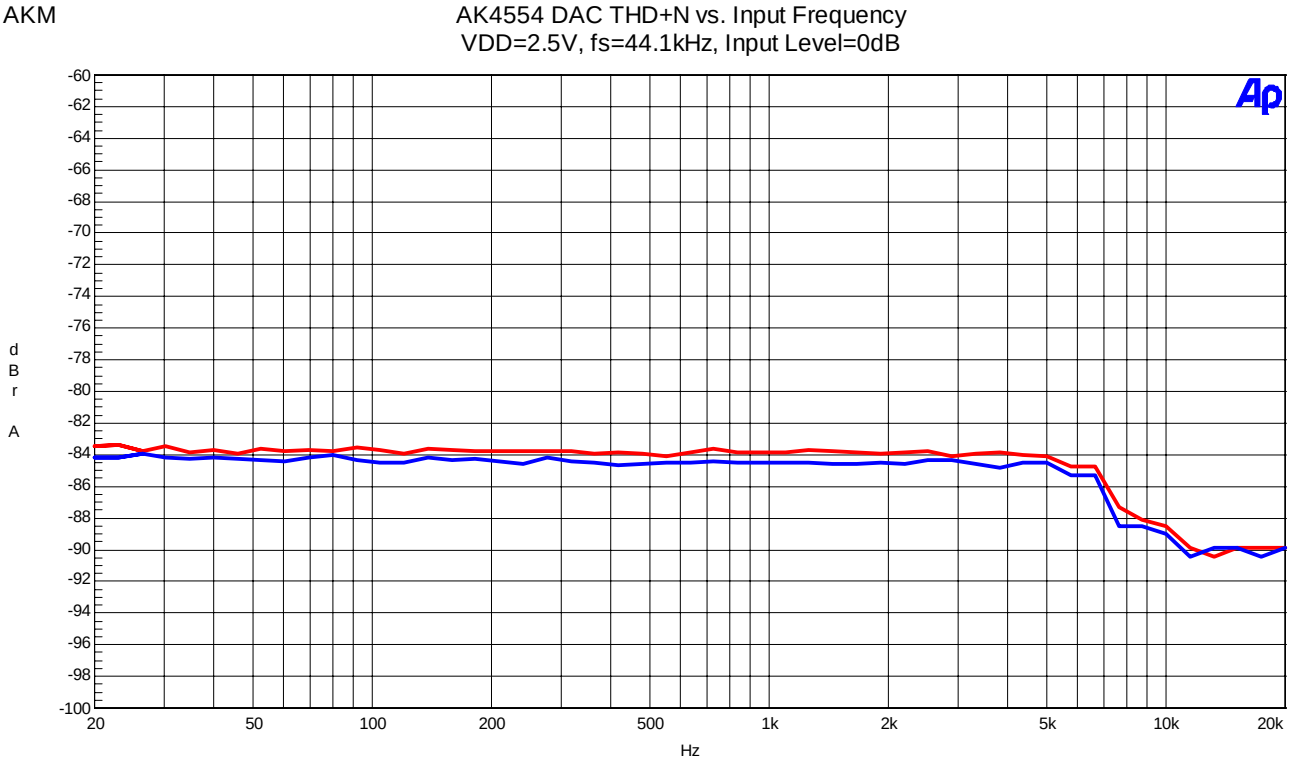

Fig.10 THD+N vs. Input Frequency

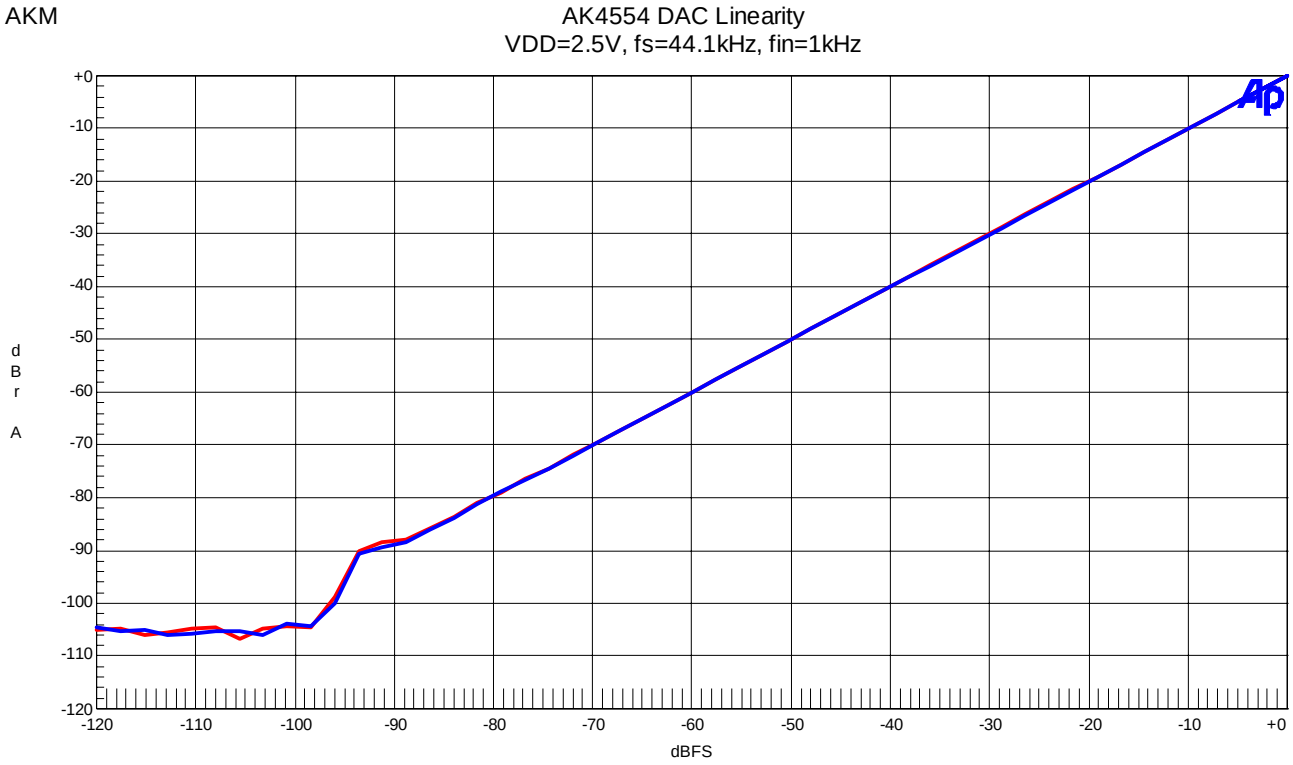

Fig.11 Linearity

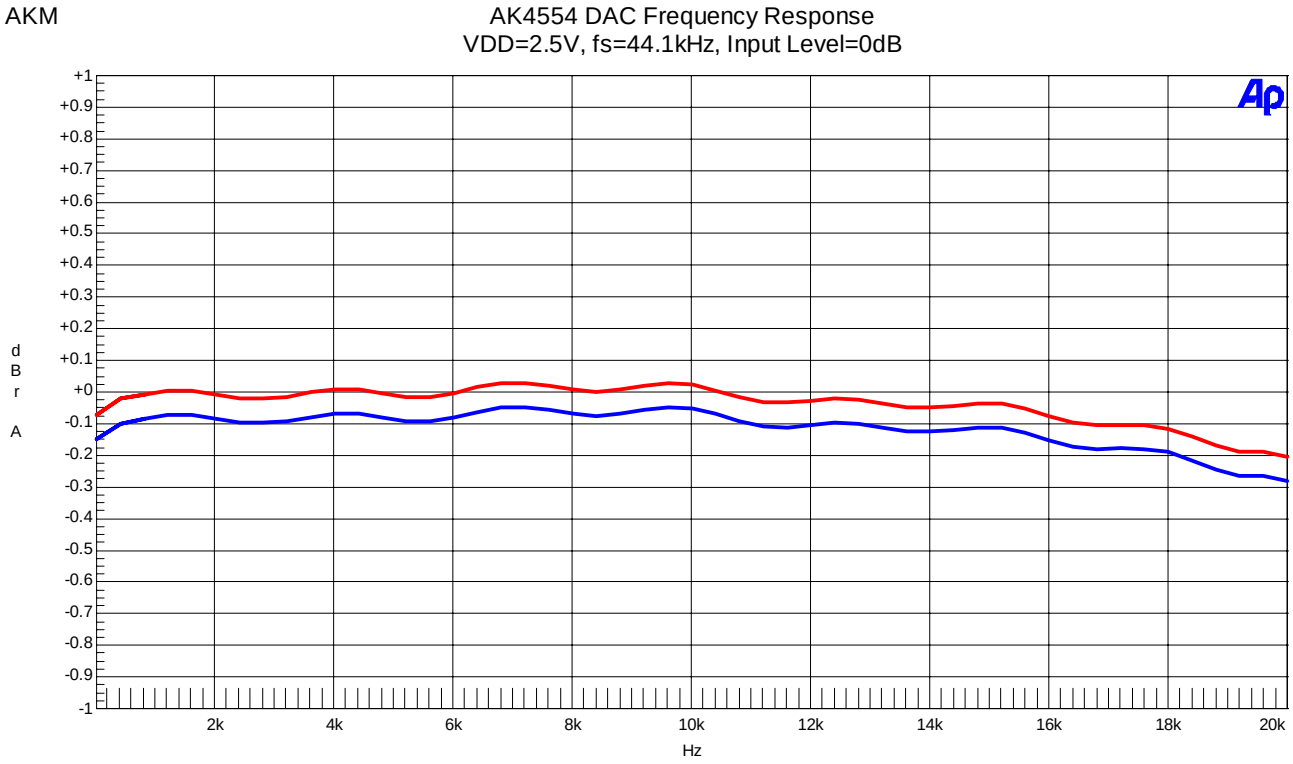

Fig.12 Frequency Response

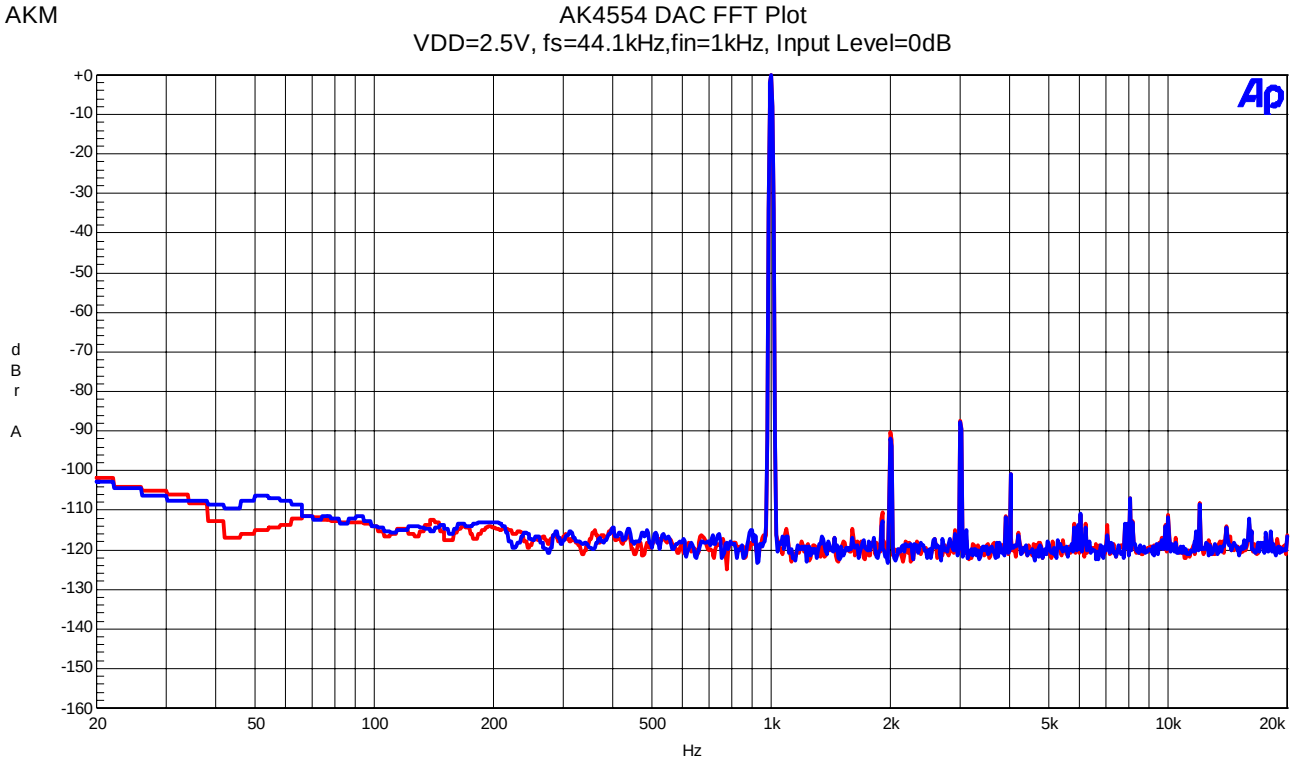

Fig.13 FFT Plot (Input Level = 0dB)

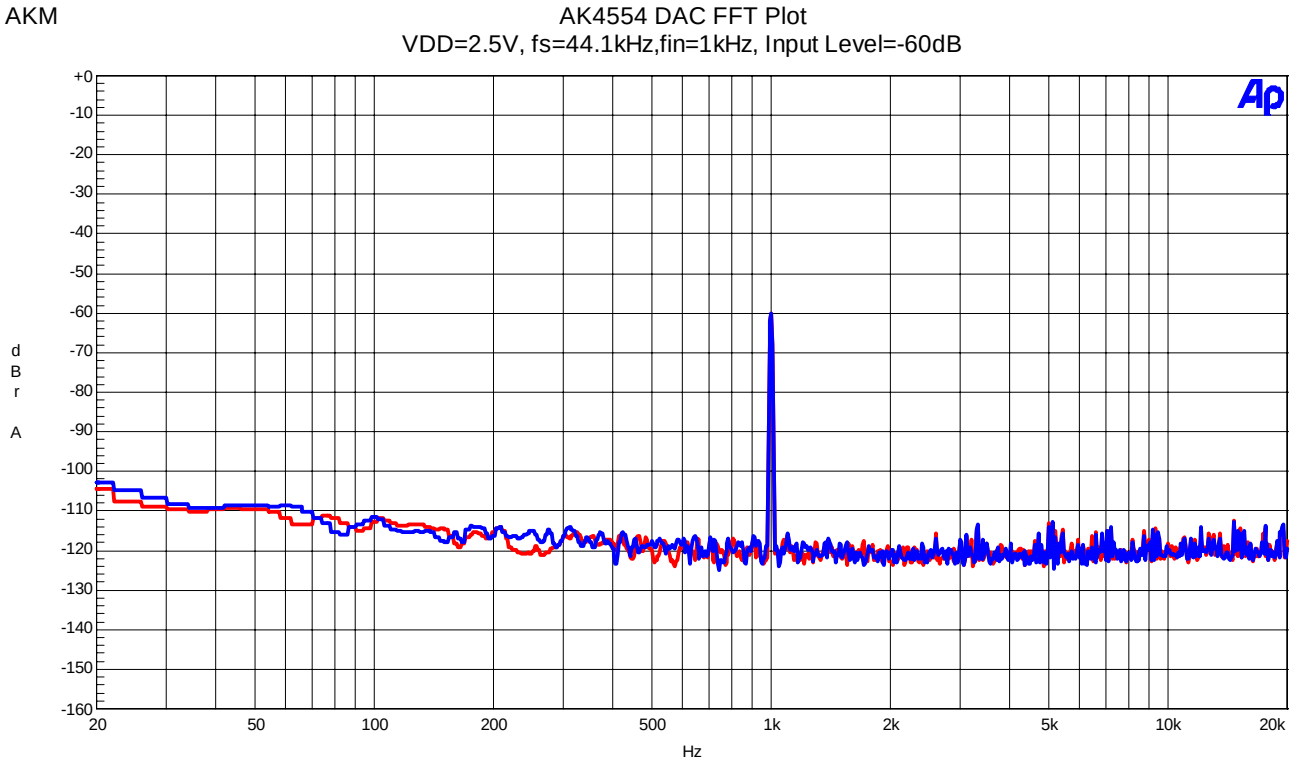

Fig.14 FFT Plot (Input Level = -60dB)

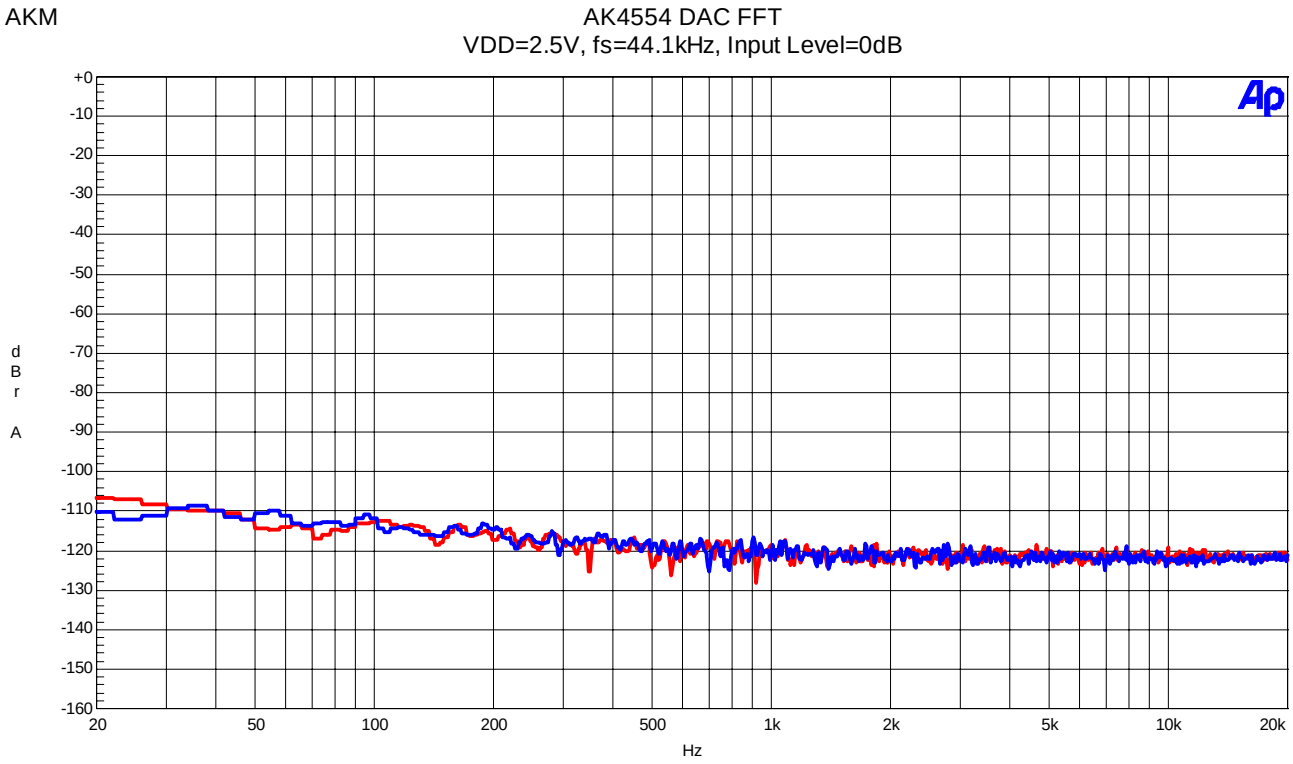

Fig.15 FFT Plot (no data)

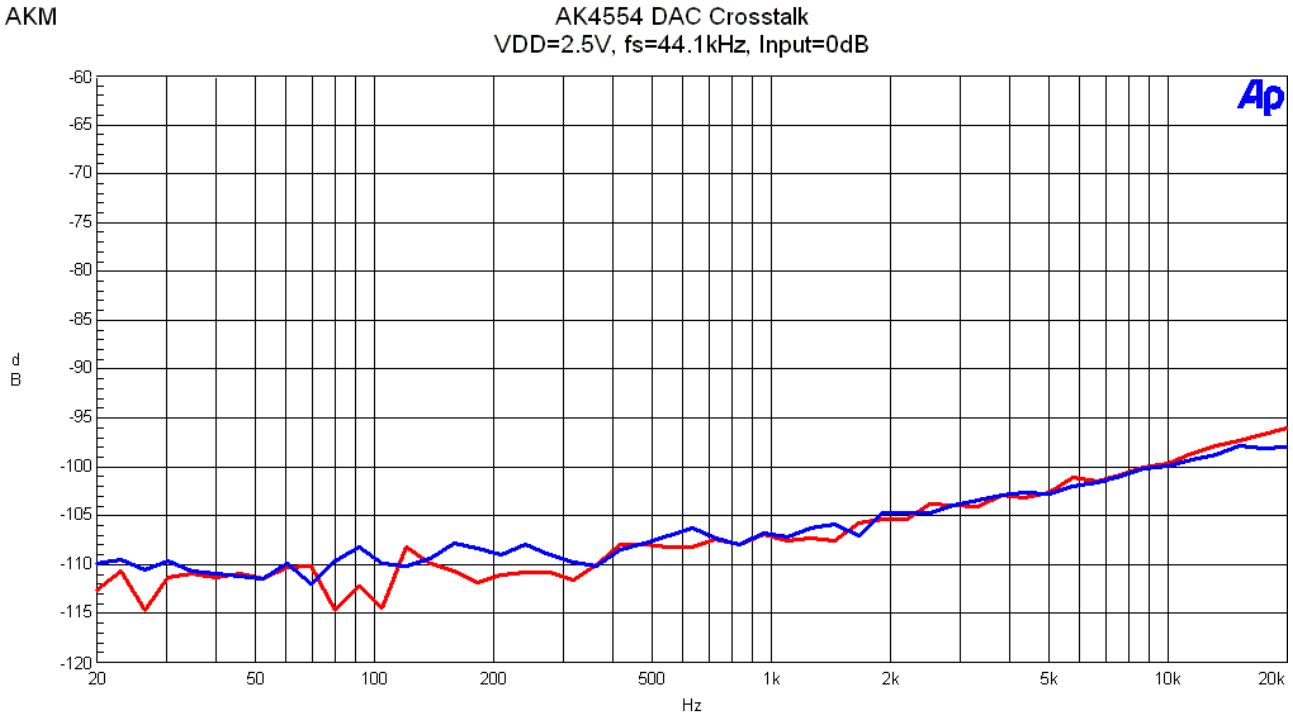

Fig.16 Crosstalk (red : L--->R, blue : R--->L)

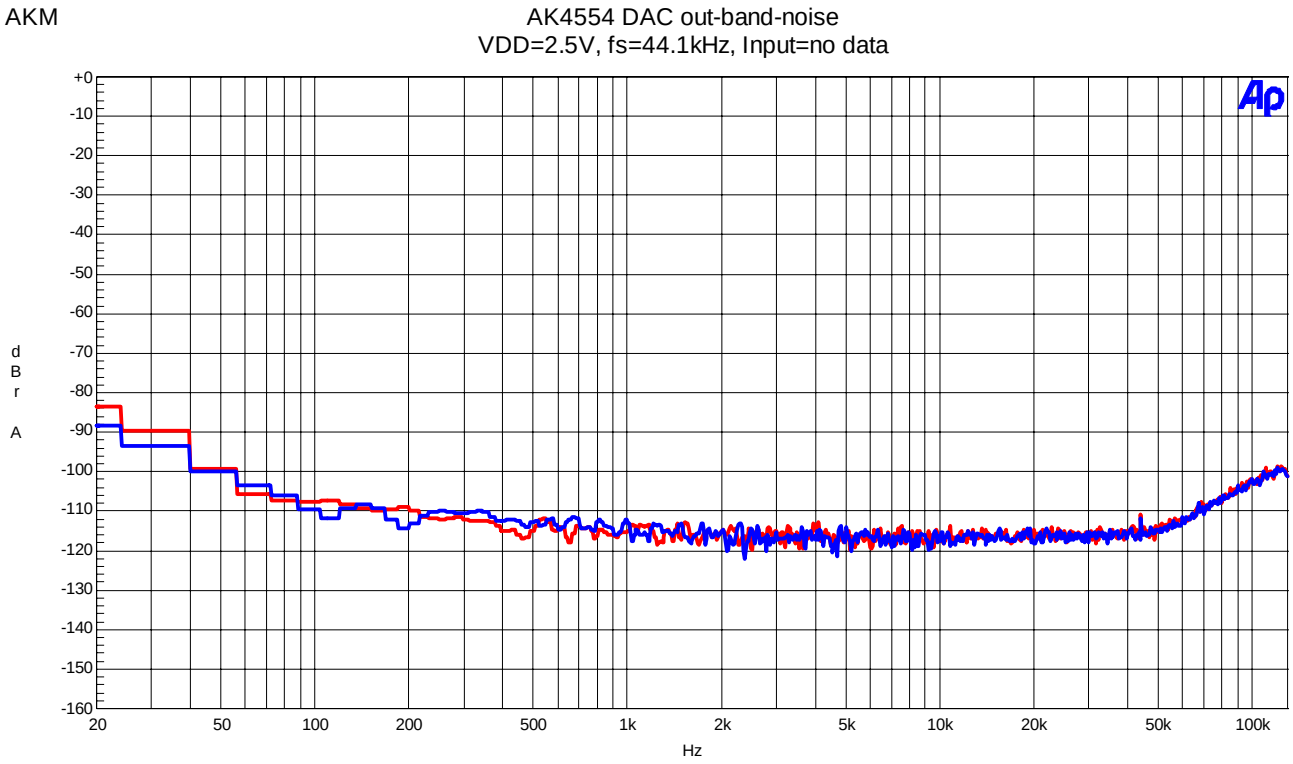

Fig.17 Out band noise

Revision History

Date (YY/MM/DD)	Manual Revision	Board Revision	Reason	Contents
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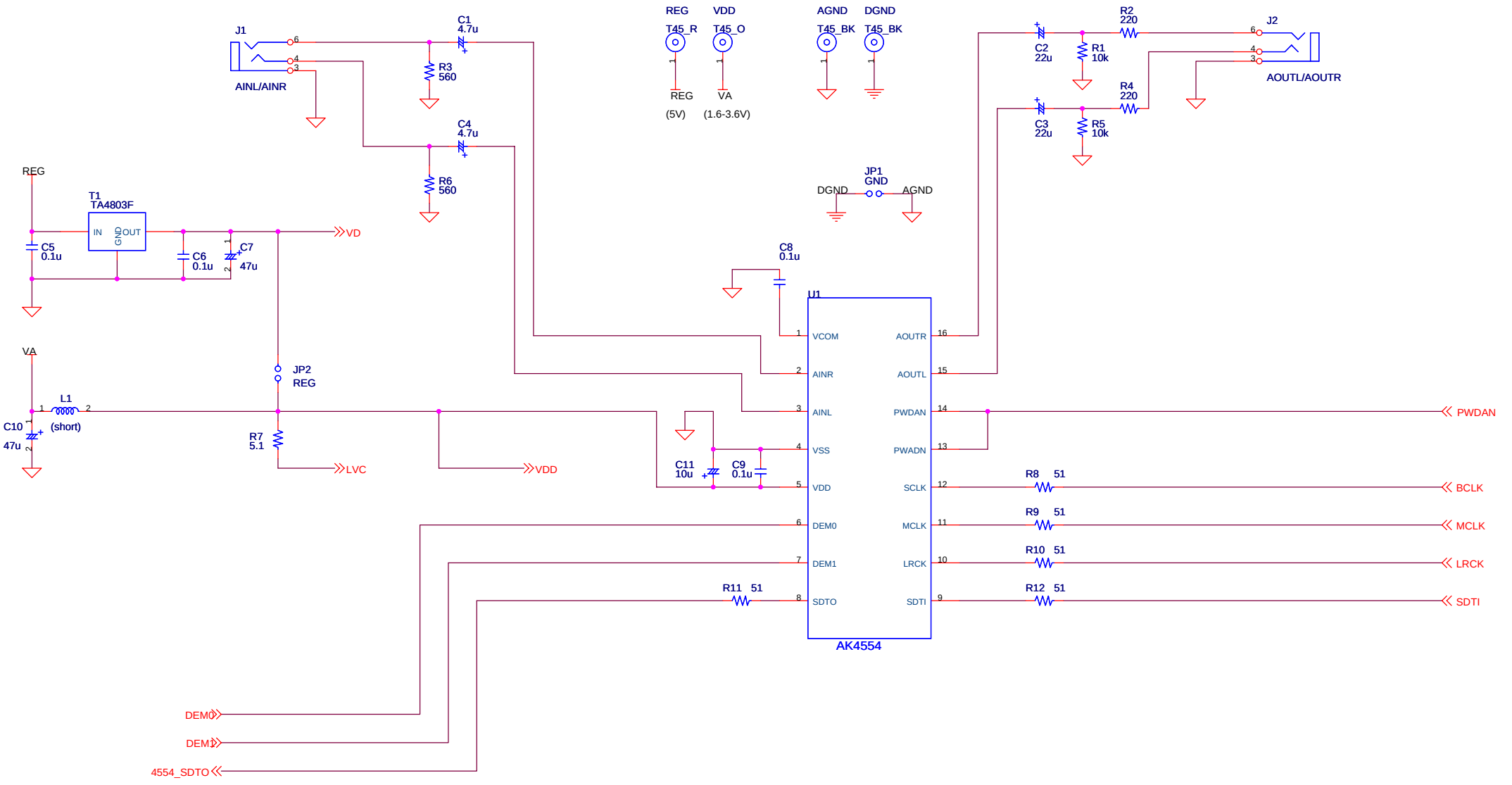

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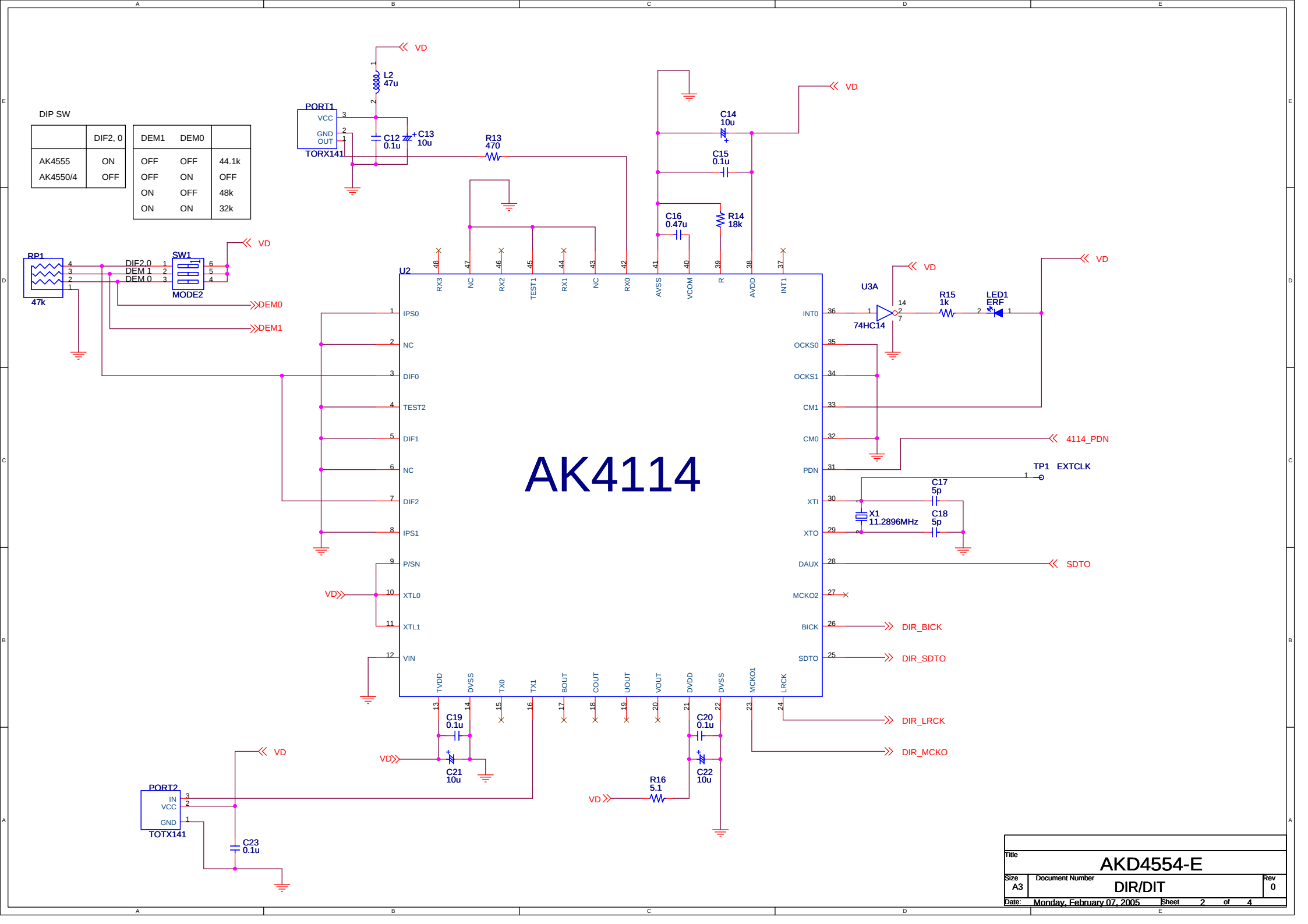
Date: Monday, February 28, 2005	Sheet 1 of 4	



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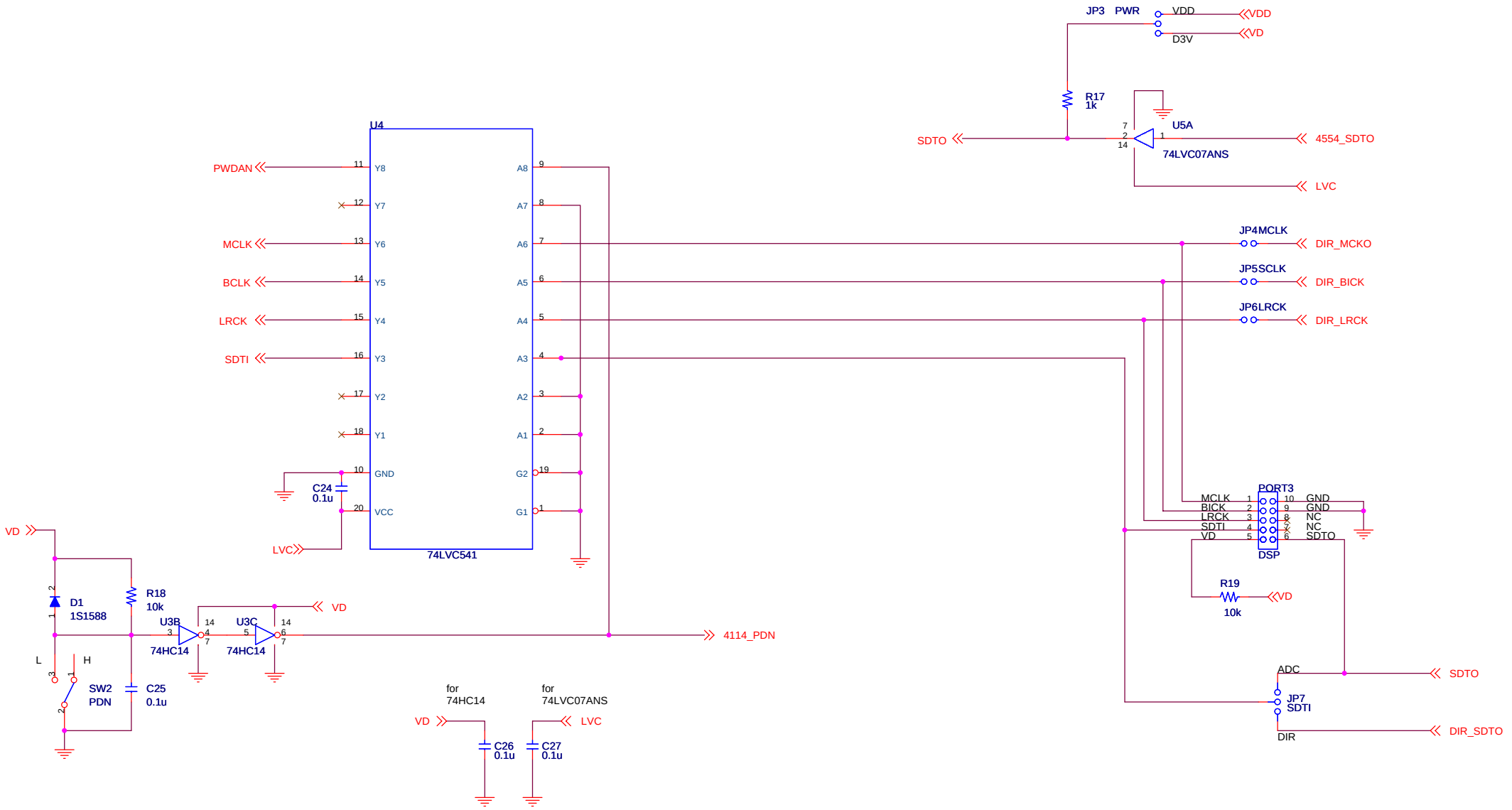

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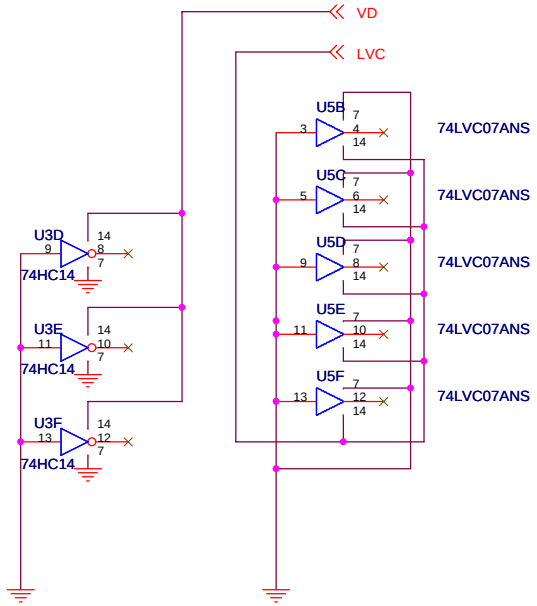

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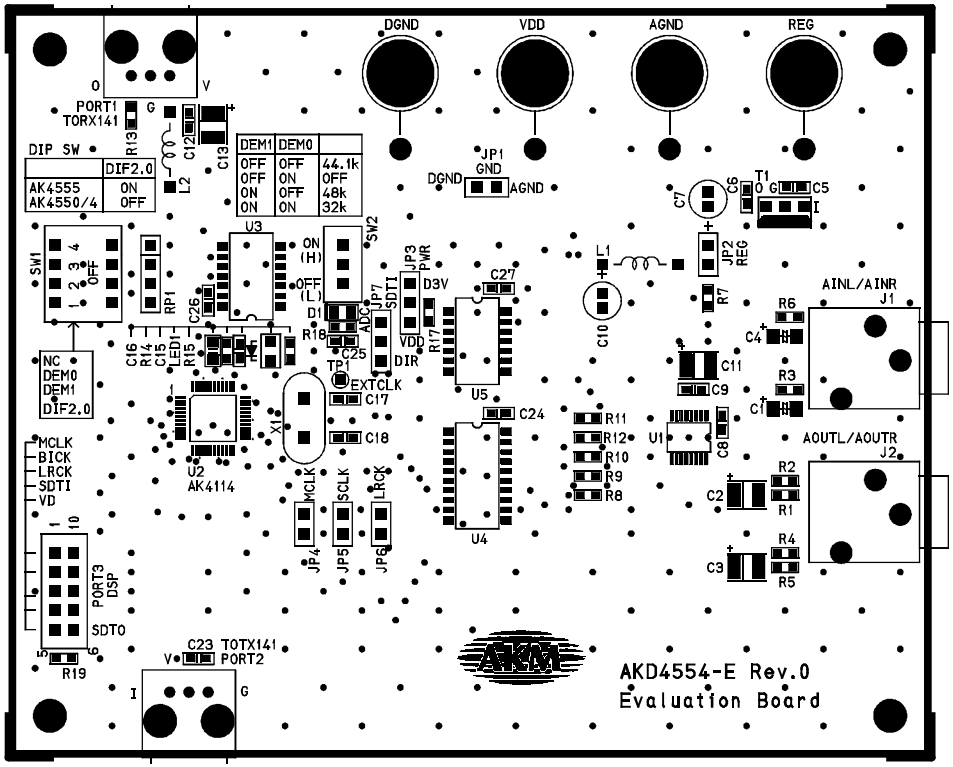
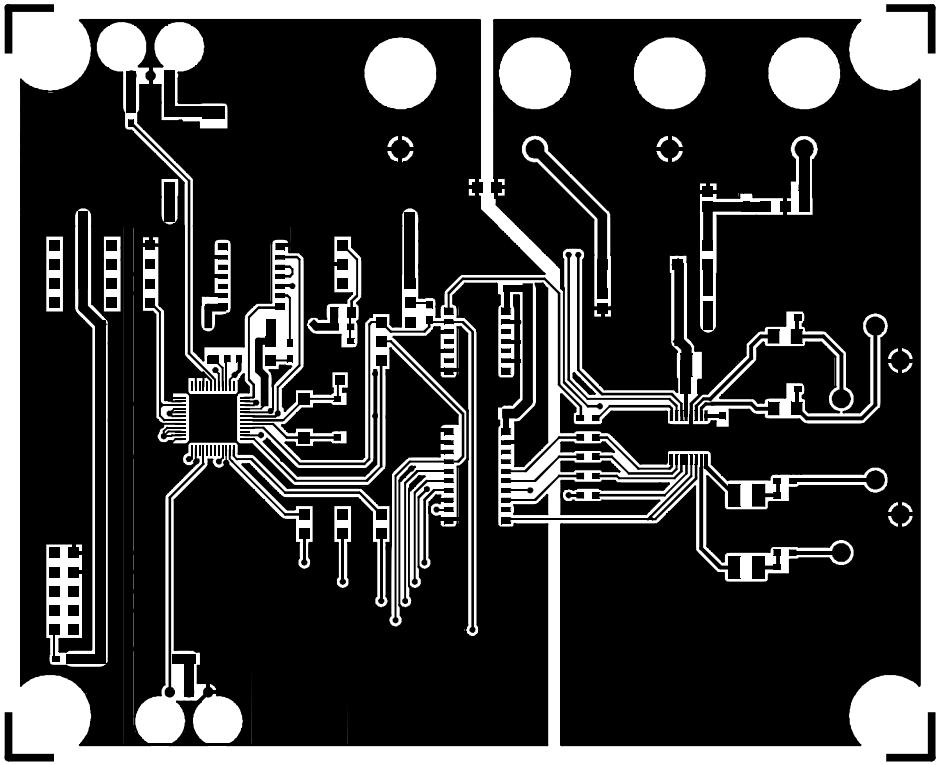


AKD4554-E L1 SILK

AKD4554-E L2 SILK



AKD4554-E L1

AKD4554-E L2