AKD4380
Evaluation board Rev.A for AK4380

GENERAL DESCRIPTION

The AKD4380 is an evaluation board for AK4380, which is 96kHz sampling 24BitΔΣDAC.
AKD4380 has the interface with AKM's wave generator using ROM data and with AKM's A/D converter evaluation boards. Therefore, it is easy to evaluate the AK4380. The AKD4380 also has the digital audio interface and can achieve the interface with digital audio systems via opt-connector or RCA connector.

■ **Ordering guide**

AKD4380 --- Evaluation board for AK4380

FUNCTION

- **Compatible with 2 types of interface**
  - **-Direct interface with AKM's A/D converter evaluation boards (539X,535X) ,and direct interface with a signal generator (AKD43XX)**
  - **- On-board CS8414 as DIR which accepts optical or RCA input.**
- **BNC connector for an external clock input by 10 pin Hearder.**

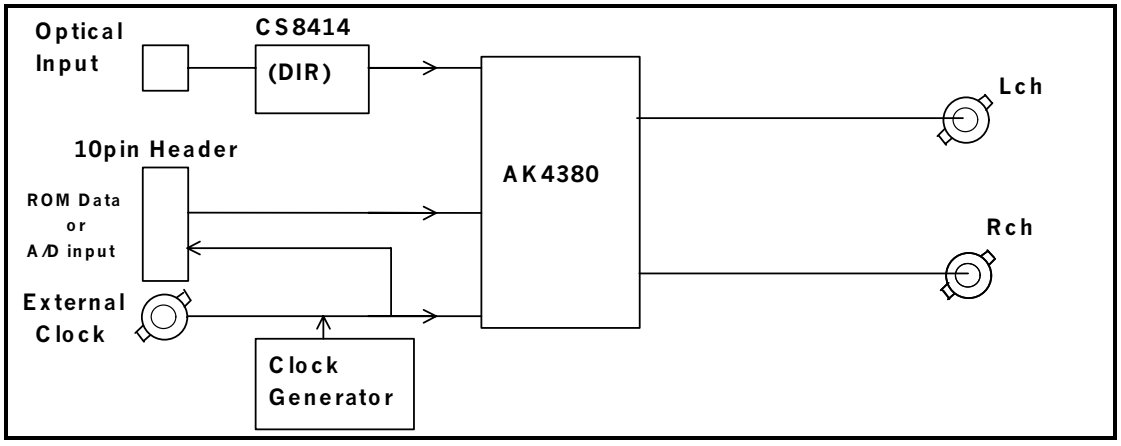


Figure 1. AKD4380 Block Diagram

■ Analog output

Analog signal is output through BNC connectors on the board. And the output level of AK4380 is 3.45Vpp.

■ Operation sequence

1) Set up the power supply lines.
   [VA] (red) = 4.5 ~ 5.5V
   [VD] (red) = 4.5 ~ 5.5V
   [AGND] (black) = 0V
   [DGND] (black) = 0V

   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 AK4380 should be reset once bringing upon power-up

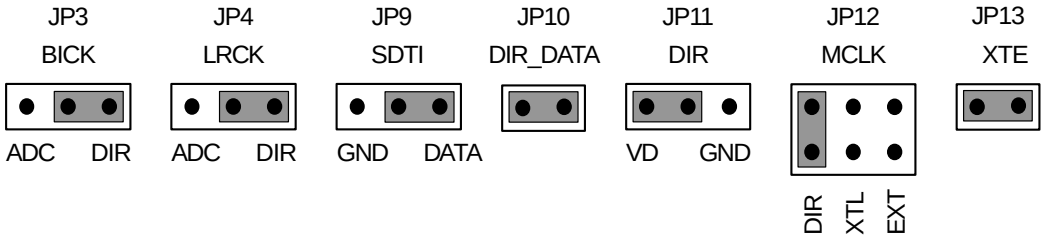
■ Evaluation mode

Applicable evaluation modes

1) DIR (Optical Link and RCA) (default)
2) Using ROM data (AK43XX)
3) Using AKM's evaluation board for ADC
4) Feeding all signals from external

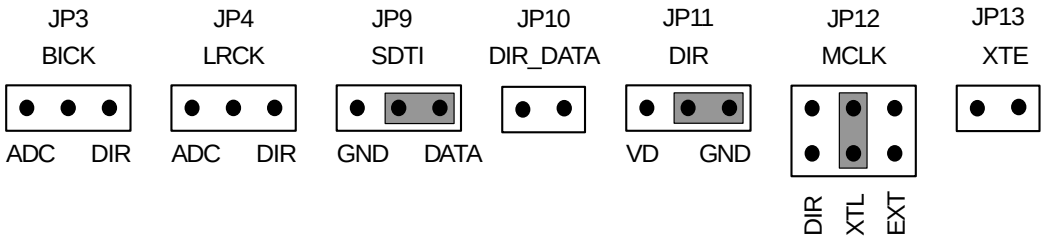
1) DIR(Optical Link)

PORT3(TORX176) or J3(RCA) is used. All clock are supplied from CS8414(DIR). DIR generates MCLK, BICK, LRCK and SDATA from the received data through optical connector (TORX176) or RCA connector. Used for the evaluation using CD test disk. Nothing should be connected to PORT2. In case of using optical connector (TORX176), select "OPT" on JP14(DIR/RX). In case of using RCA connector, select "RX".



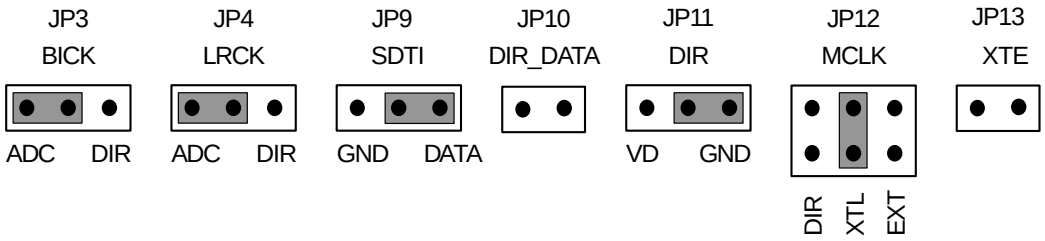
2) Ideal sine wave generated by ROM data

Connect the AKD43XX with PORT2(ADC/ROM). AKD4380 sends MCLK to AKD43XX, and receives LRCK, BICK and SDATA. In case of using external master clock through a BNC connector, select "BNC" on JP12(MCLK) and short JP13(XTE).



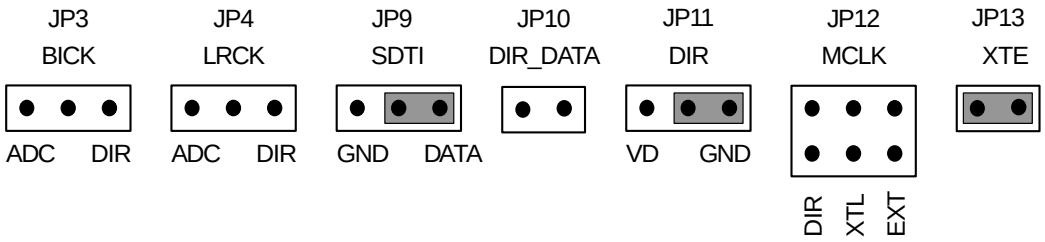
3) Using AKM's evaluation board for ADC

To evaluate AK4380 with analog input, the AKM's evaluation board for ADC can be used. MCLK, BICK and LRCK are supplied from clock generator on the AKD4380, and analog signal is A/D converted and send to AKD4380 through PORT2(ADC/ROM). In case of using external master clock through a BNC connector, select "BNC" on JP12(MCLK) and short JP13(XTE).



4) Feeding all signals from external

Under the following set-up, all external signals can be fed through POTR2.



■ Clock (MCLK,BICK,LRCK) set up

In case of using evaluation mode 1), JP9,10 and 17 should be set up as follows.
They need no care for other evaluation mode.

MCLK	JP5 (X_MCLK)	JP8 (X_LRCK)	BICK	JP7 (X_BICK)	
128fs	256/128	LR_128	32fs 64fs	64fs/32fs 128fs/64fs	
256fs	256/128	LR_256/512	32fs 64fs 128fs	32fs 64fs/32fs 128fs/64fs	default
512fs	512	LR_256/512	32fs 64fs 128fs	32fs 64fs/32fs 128fs/64fs	

Table 1. Clock set up

■ DIP switch set up

[SW4](MODE1): No.1 to 2 set the mode of AK4380 and No.3 to 5 set the mode of CS8414.

No.	Pin	OFF	ON
1	DFS0	Normal speed	Double speed
2	DIF0	24bit, MSB justified	I2S
3	M2	Digital interface format of CS8414 (See table 4.) (Note)	
4	M1		
5	M0		

Table 2. SW3 set-up

(Note: M2-0 should be selected at only evaluation mode 1.
In other mode, these should be "OFF".)

Mode	Format	3 DIF0	4 DIF1	5 DIF2	6 M2	7 M1	8 M0	JP6 BICK2	
0	16bit, LSB justified	0	0	0	1	0	1	THR	
1	20bit, LSB justified	1	0	0	-	-	-	-	
2	24bit, MSB justified	0	1	0	0	0	0	INV	
3	I2S	1	1	0	0	1	0	THR	default
4	24bit, LSB justified	0	0	1	-	-	-	-	

Table 3. Digital interface format set-up (1=ON, 0=OFF)
(CS8414 does not correspond to 20/24bit LSB justified format.)

■ Other jumper pins set up

[JP1] (GND): Analog ground and digital ground
open: separated <default>
short: AGND and DGND are connected.
[JP2] (DZF) Mute circuit
ON: Used . Analog output are muted when DZF="H".
OFF: Not used. <default>
[JP6] (BICK_ PHASE): Phase of BCLK
THR: BICK is coincides with AK4380. <default>
INV: BICK is inverted.

■ The function of the toggle SW.

[SW1](PDN): Resets the AK4380. Keep "H" during normal operation.
[SW2](SMUTE): Soft mute of AK4380. Bring "H" when using soft mute.
[SW3](P/S): H: parallel mode.
L: serial mode.

■ Indication for LED

[LED1] (VERF): Monitor VERF pin of the CS8414. LED turns on when some error has occurred to CS8414.
[LED2]: (PREM): Indicate whether the input data of CS8414 is pre-emphasized or not.

■ Serial control mode

The AK4380 can be controlled via the printer port (parallel port) of IBM-AT compatible PC. Connect PORT1(up-I/F) with PC by 10-line flat cable packed with the AKD4380.

Take care of the direction of connector. There is a mark at 1pin.
The pin layout of PORT1 is as Figure 2.

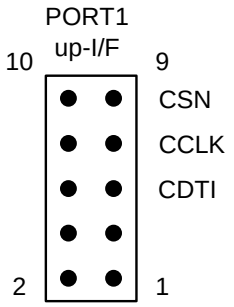


Figure 2. PORT1 pin layout

MEASUREMENT RESULTS

[Measurement condition]

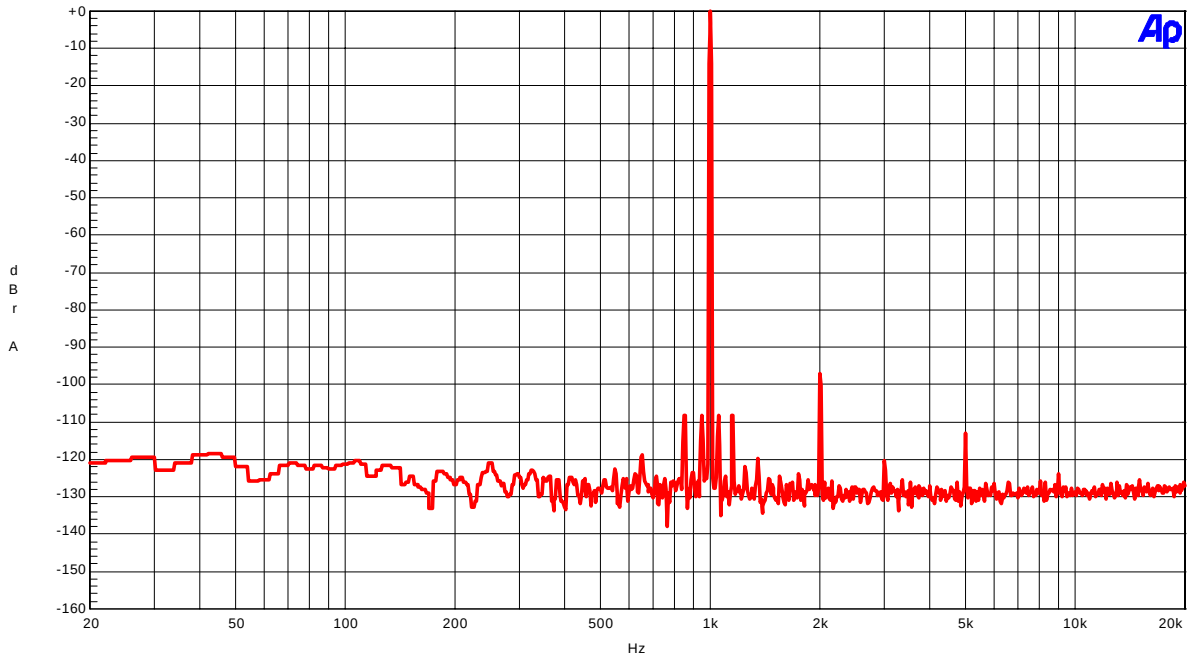
- Measurement unit: Audio Precision System Two Cascade
- MCLK : 256fs
- BICK : 64fs
- fs : 44.1kHz, 96kHz
- BW : 10Hz~20kHz (fs=44.1kHz), 10Hz~40kHz (fs=96kHz)
- Bit : 24bit
- Power Supply : VDD=5V
- Interface : DIR (fs=44.1kHz, 96kHz)
- Temperature : Room

Parameter	Input signal	Measurement filter	fs=44.1kHz
S/(N+D)	1kHz, 0dB	20kLPF	94.0dB
DR	1kHz, -60dB	22kLPF	97.2dB
		22kLPF, A-weighted	100.0dB
S/N	no signal	22kLPF	97.2dB
		22kLPF, A-weighted	100.0dB

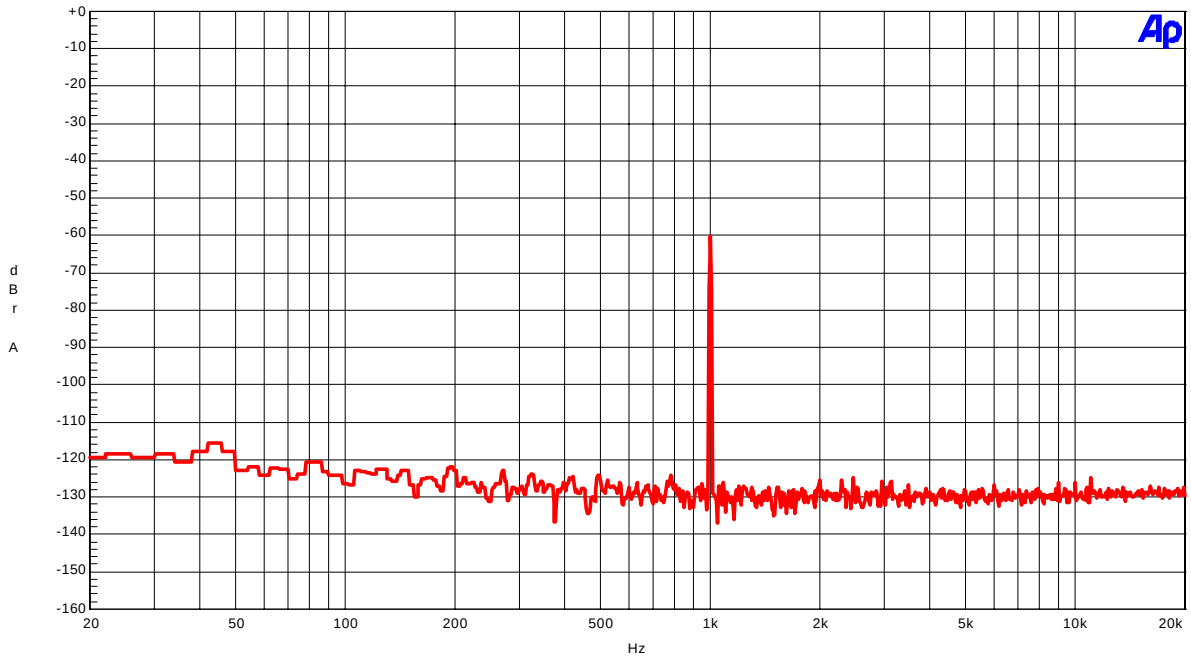
Parameter	Input signal	Measurement filter	fs=96kHz
S/(N+D)	1kHz, 0dB	40kLPF	92.3dB
DR	1kHz, -60dB	40kLPF	94.5dB
		22kLPF, A-weighted	97.2dB
S/N	no signal	40kLPF	94.5dB
		22kLPF, A-weighted	97.2dB

(fs=44.1kHz)

AKM AK4380 Rev.A FFT (Input=0dBFS, fin=1kHz)

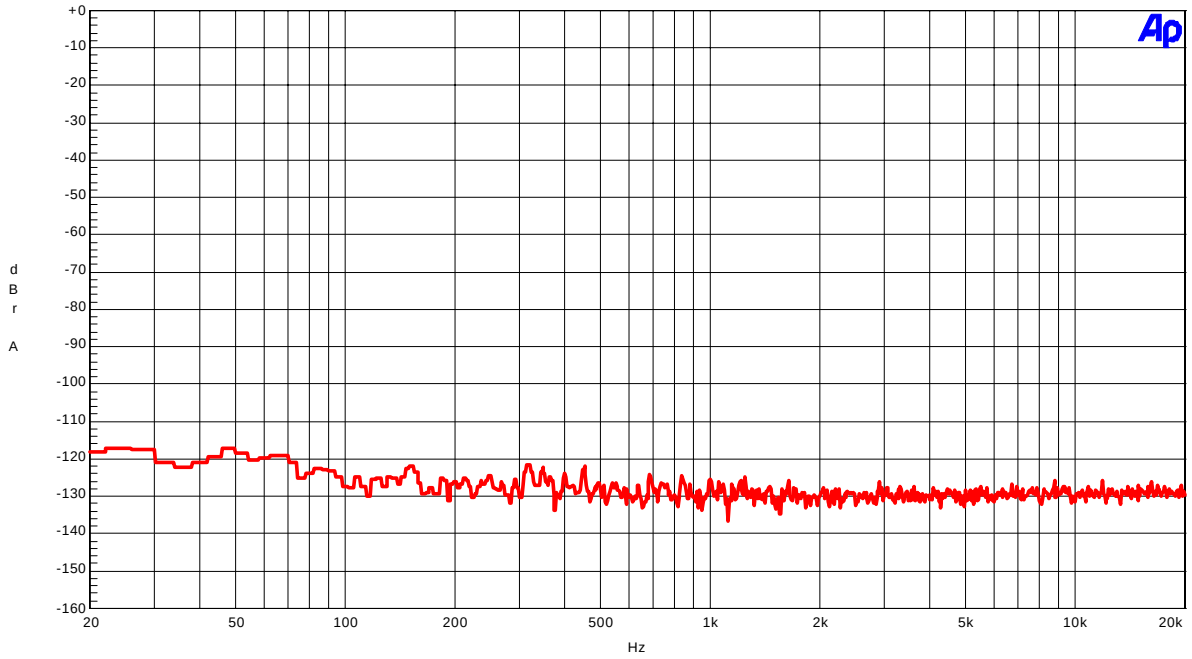


AKM AK4380 Rev.A FFT (Input=-60dBFS, fin=1kHz)

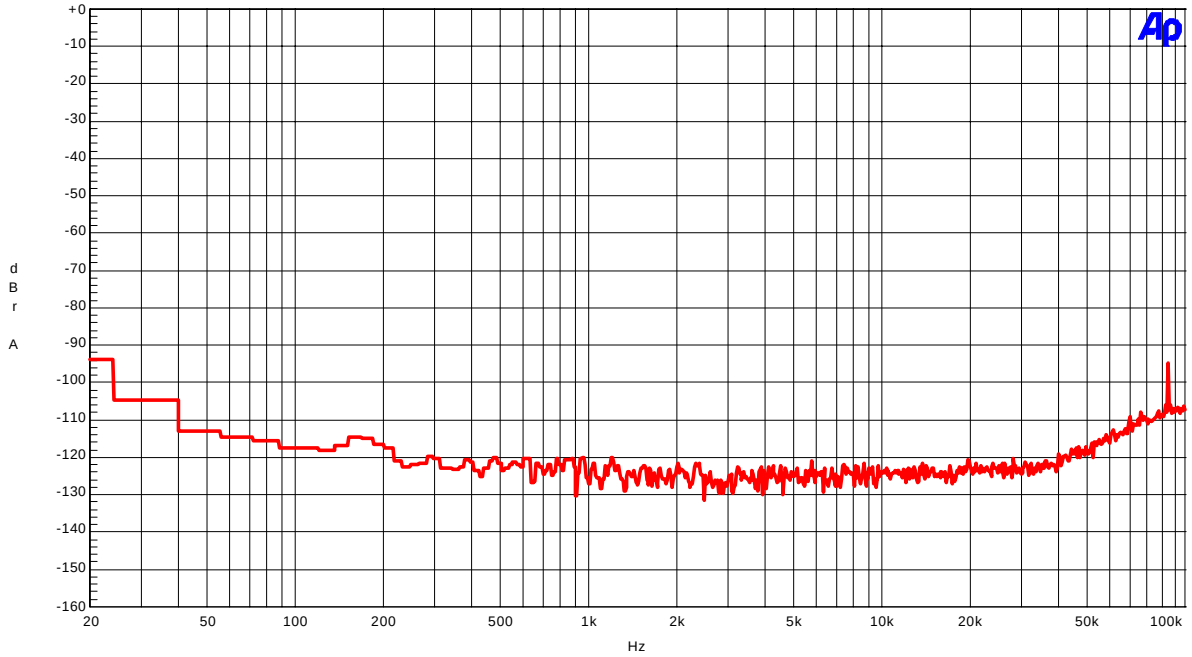


(fs=44.1kHz)

AKM AK4380 Rev.A FFT (Input="0"data, fin=1kHz)

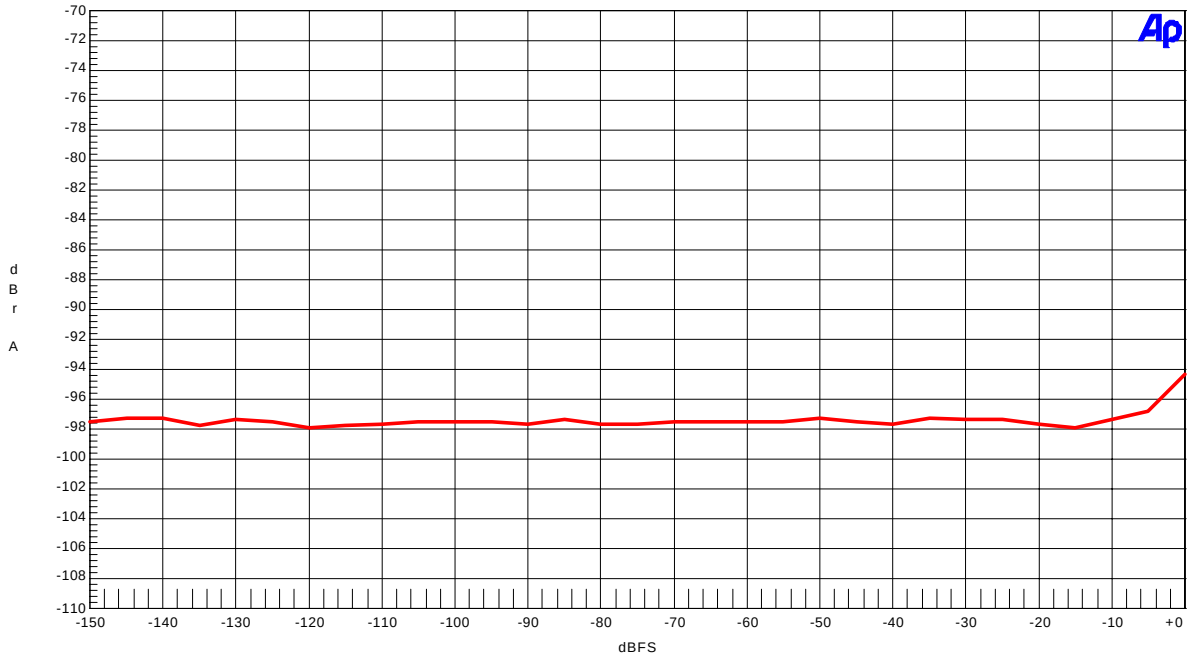


AKM AK4380 Rev.A FFT (Input="0"data, fin=1kHz, HiBW)

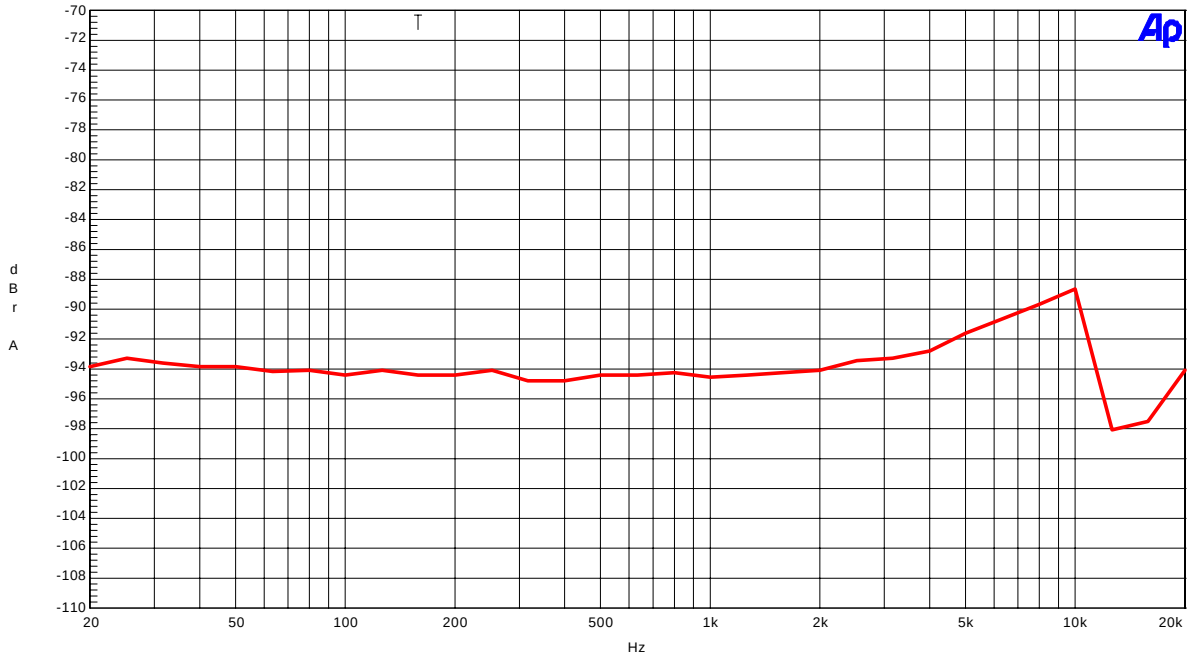


(fs=44.1kHz)

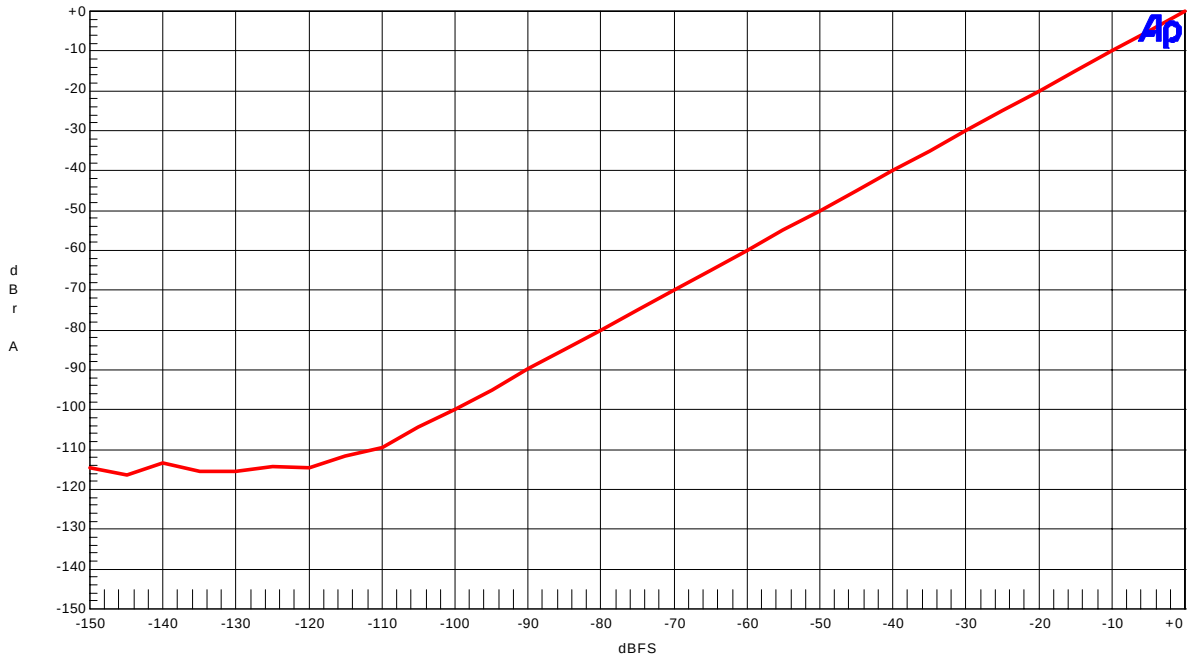
AKM AK4380 Rev.A THD + N vs Amplitude (fin=1kHz)



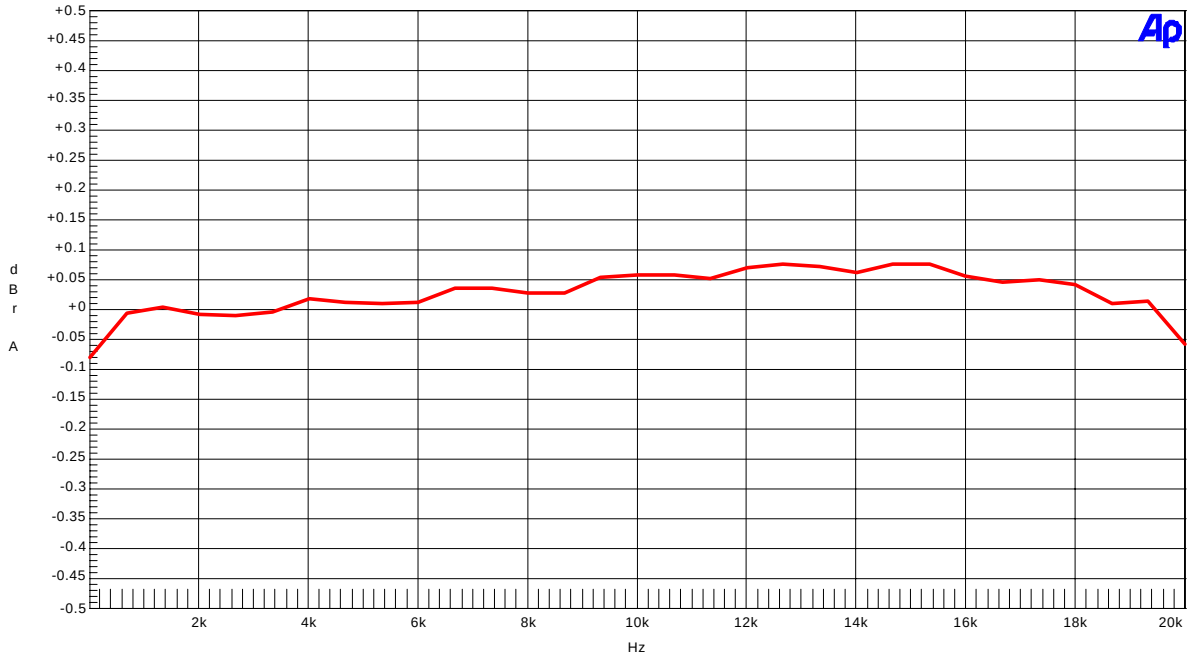
AKM AK4380 Rev.A THD + N vs Input Frequency (fin=1kHz)



AKM AK4380 Rev.A Linearity

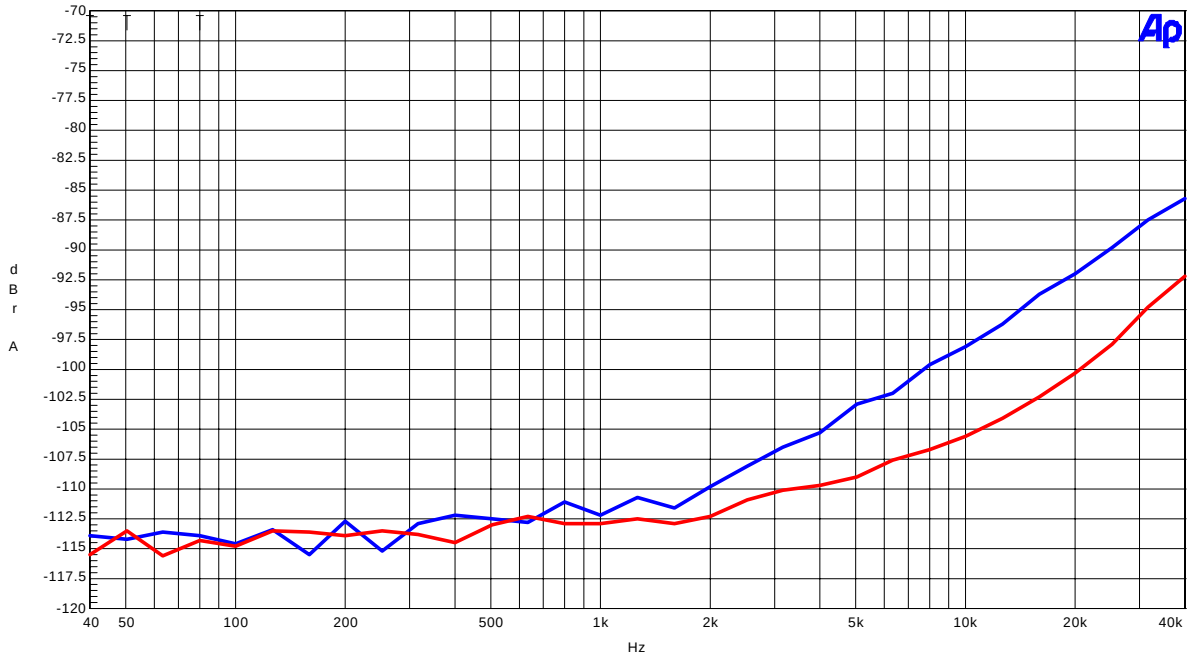


AKM AK4380 Rev.A Frequency Response



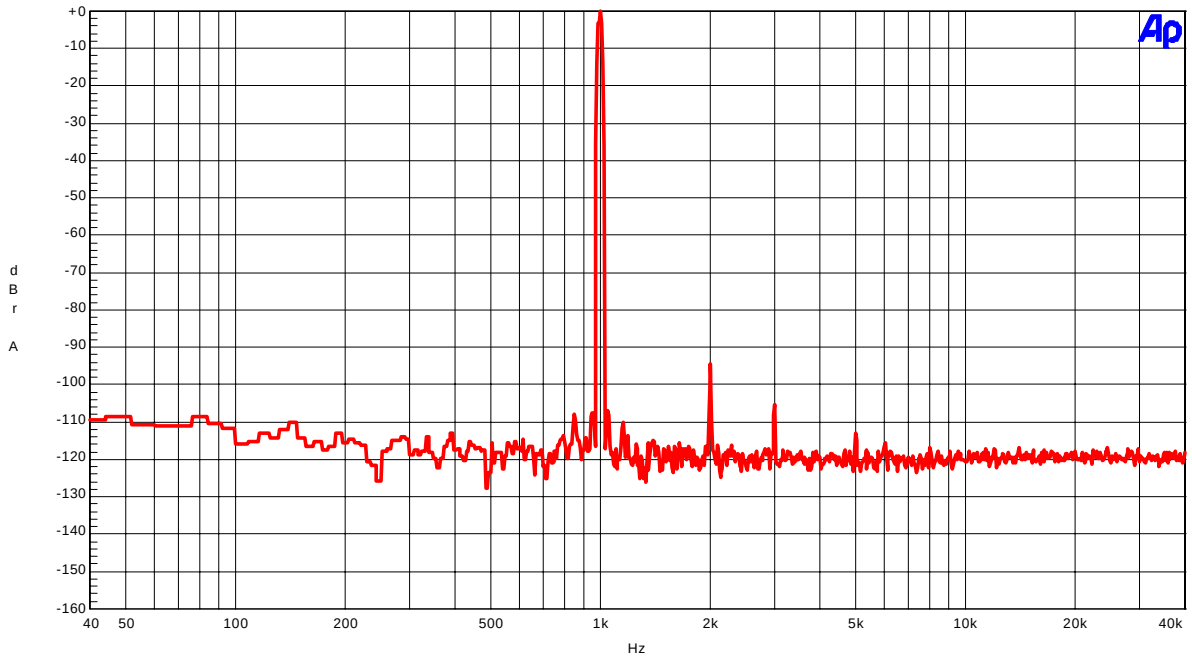
(fs=44.1kHz)

AKM AK4380 Rev.A Crosstalk

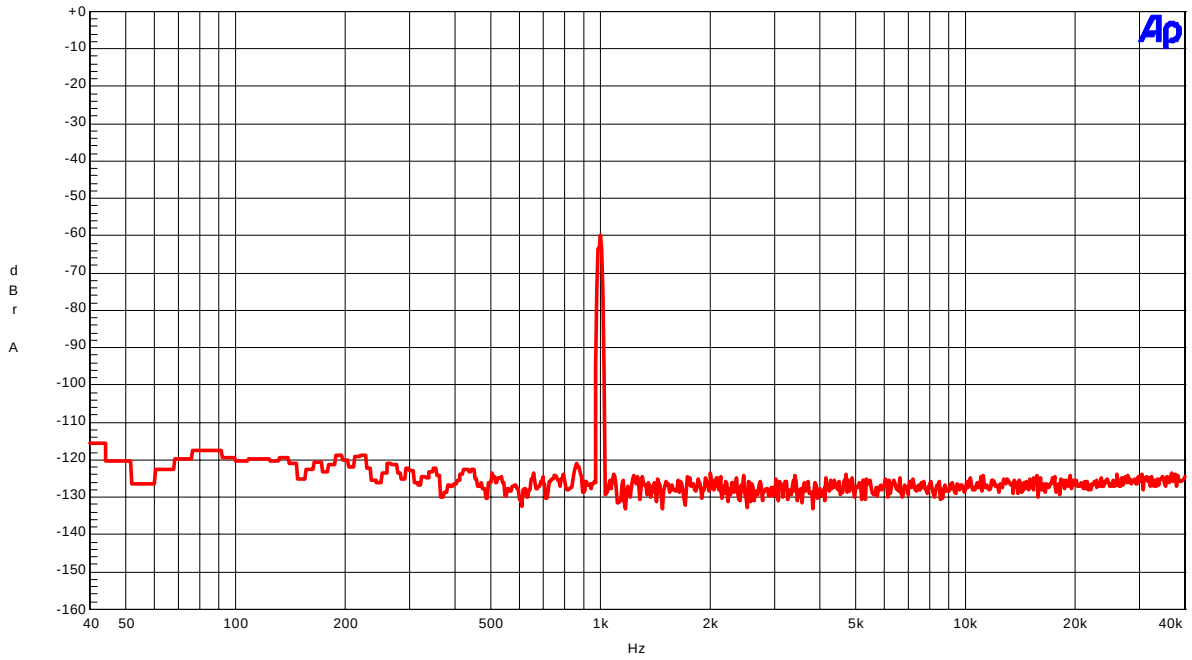


(fs=96kHz)

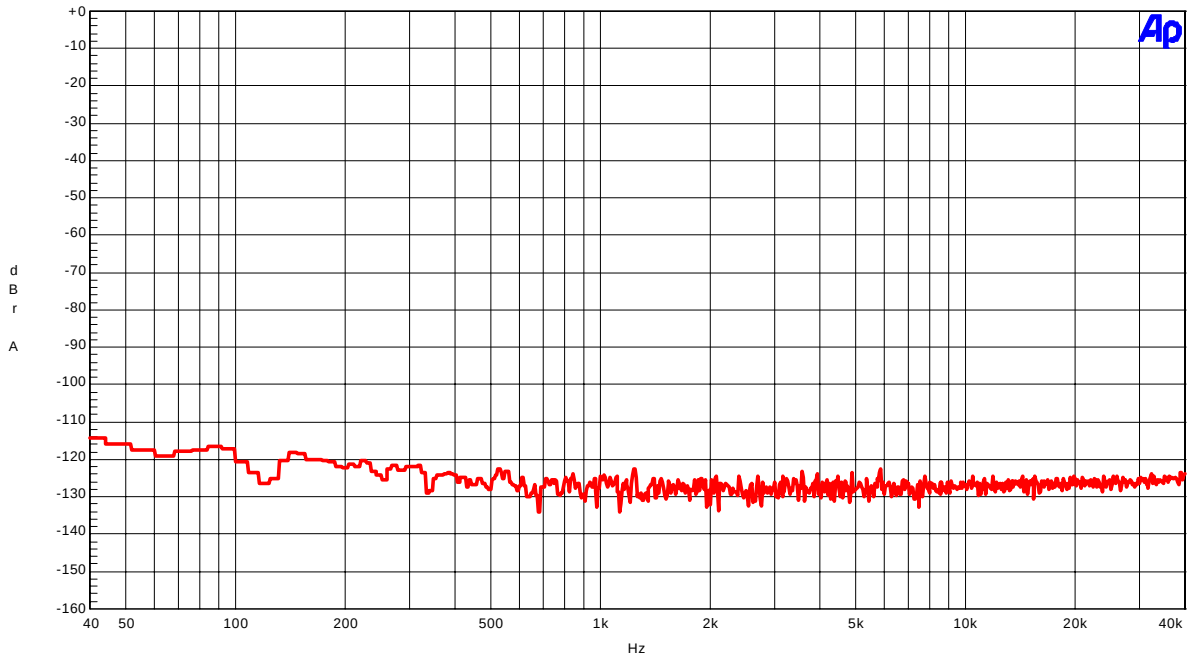
AKM AK4380 Rev.A FFT (Input=0dBFS,fin=1kHz)



AKM AK4380 Rev.A FFT (Input=-60dBFS,fin=1kHz)



(fs=96kHz)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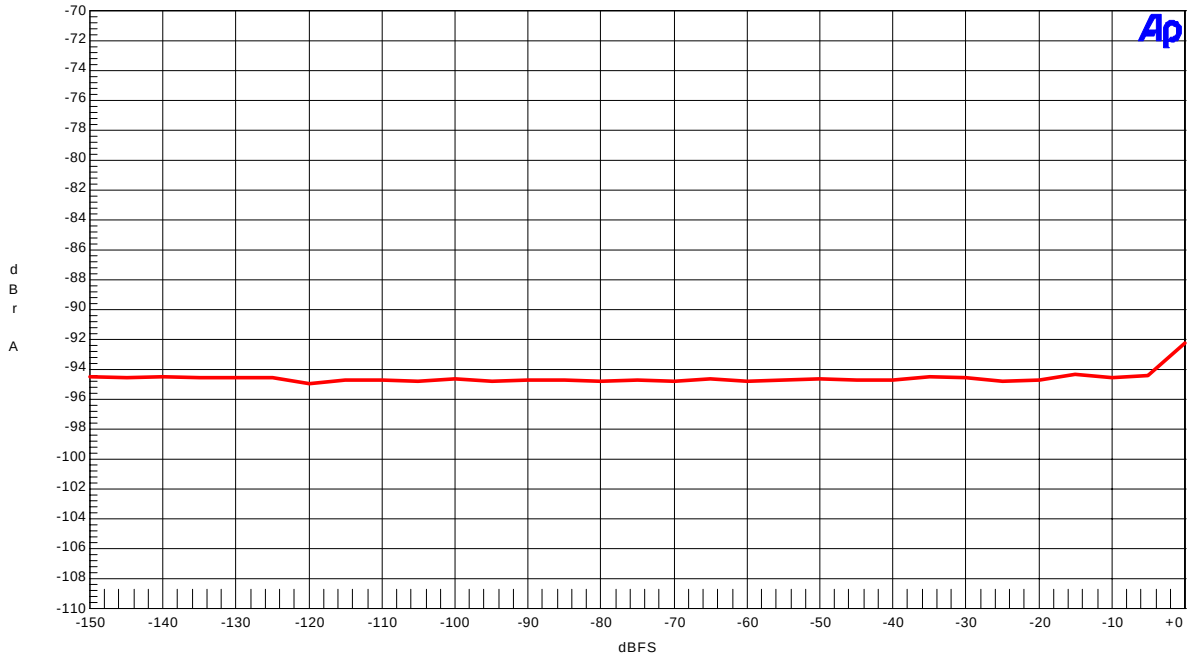
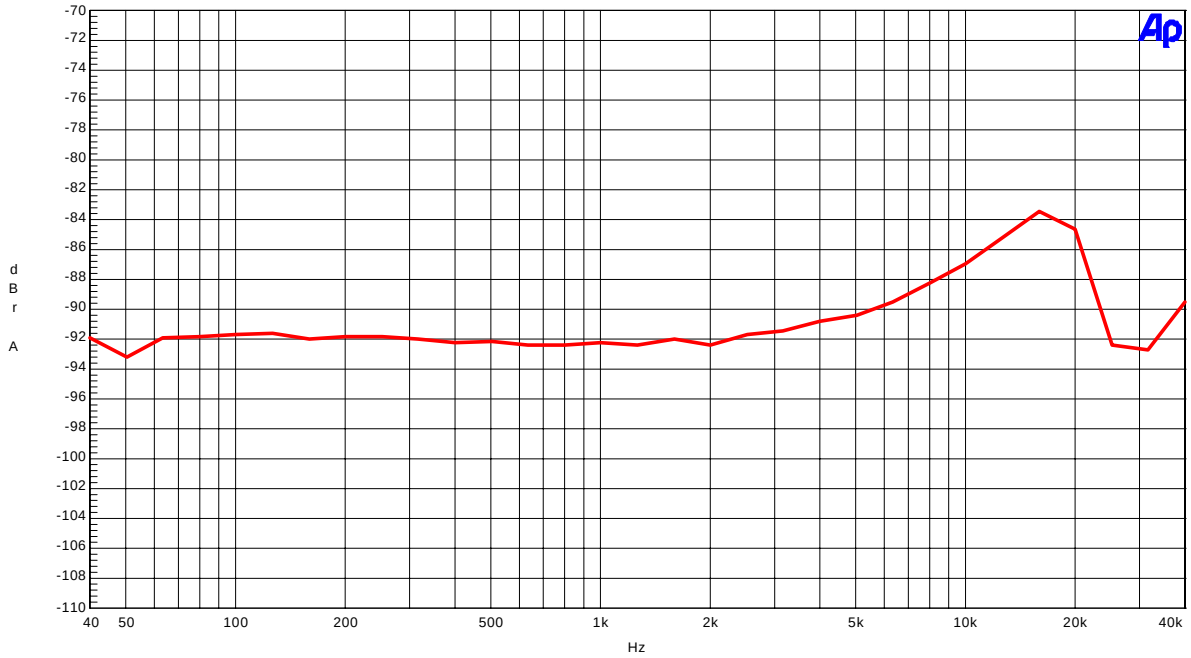
AK4380 Rev.A FFT (Input="0"data,fin=1kHz)
+0
-10
-20
-30
-40
-50
-60
-70
-80
-90
-100
-110
-120
-130
-140
-150
-160
dBrA
40
50
100
200
500
1k
2k
5k
10k
20k
40k
Hz

(fs=96kHz)

AKM AK4380 Rev.A THD + N vs Amplitude(fin=1kHz)

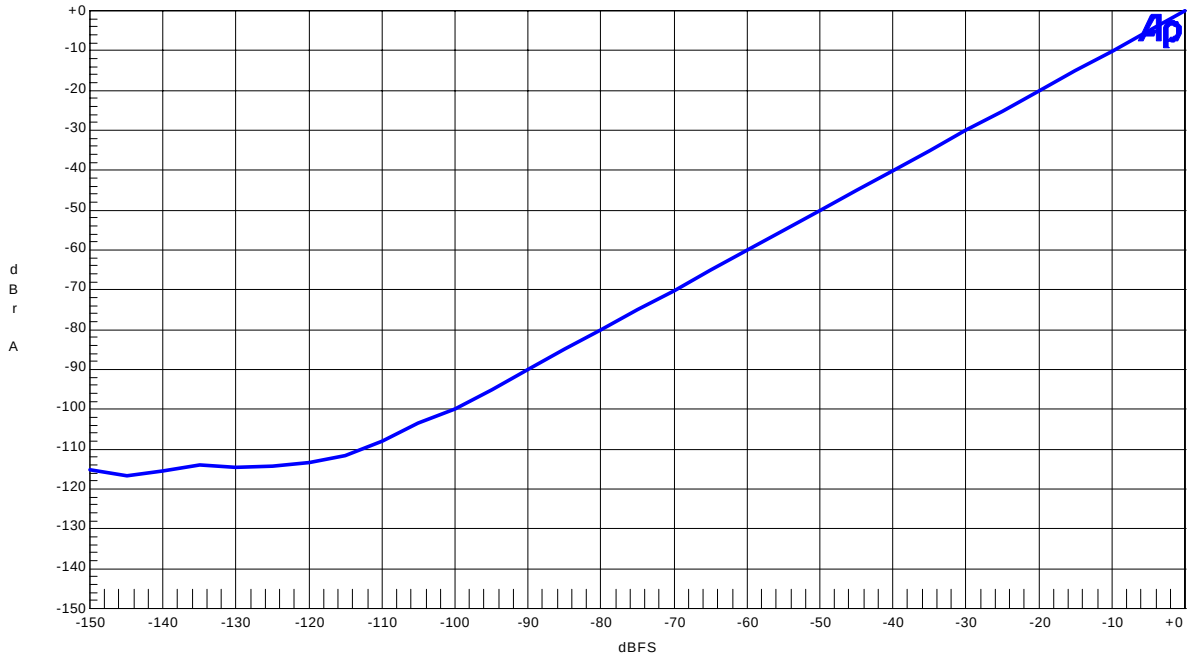


AKM AK4380 Rev.A THD + N vs Input Frequency(Input=0dBFS)

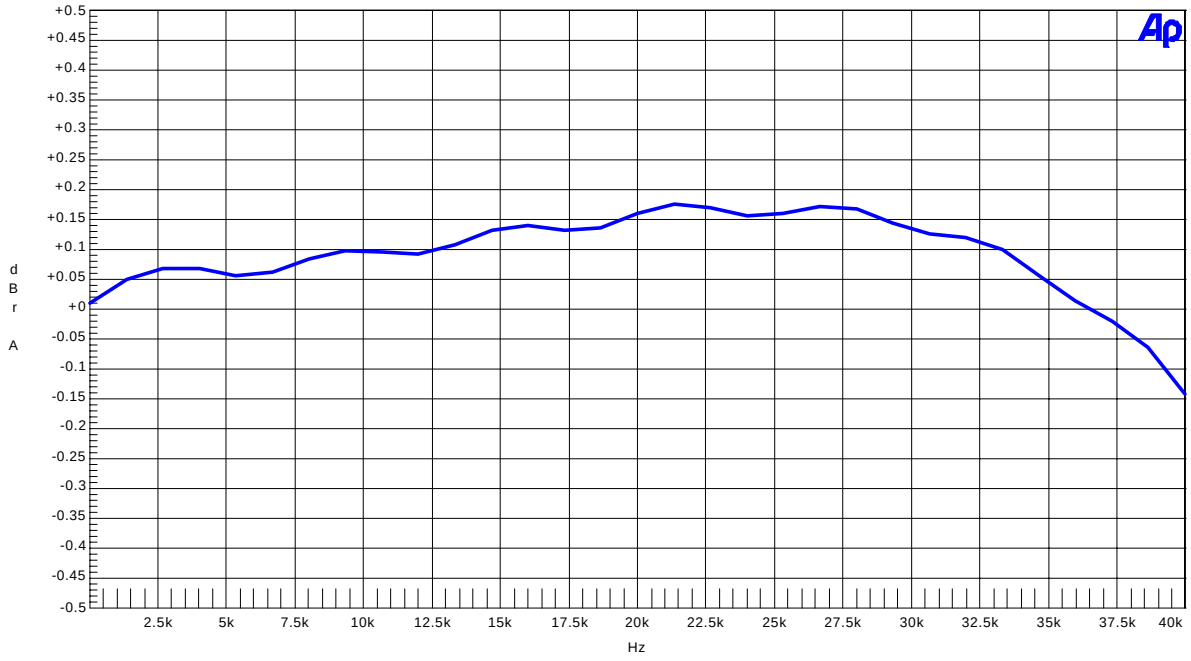


(fs=96kHz)

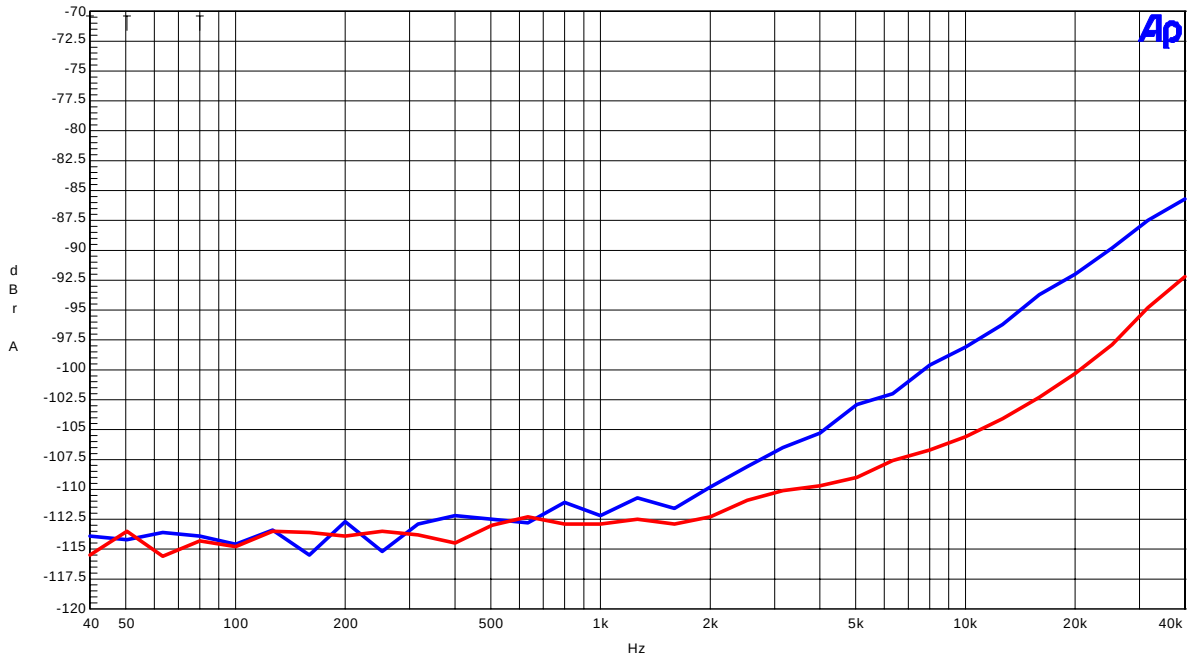
AKM AK4380 Linearity

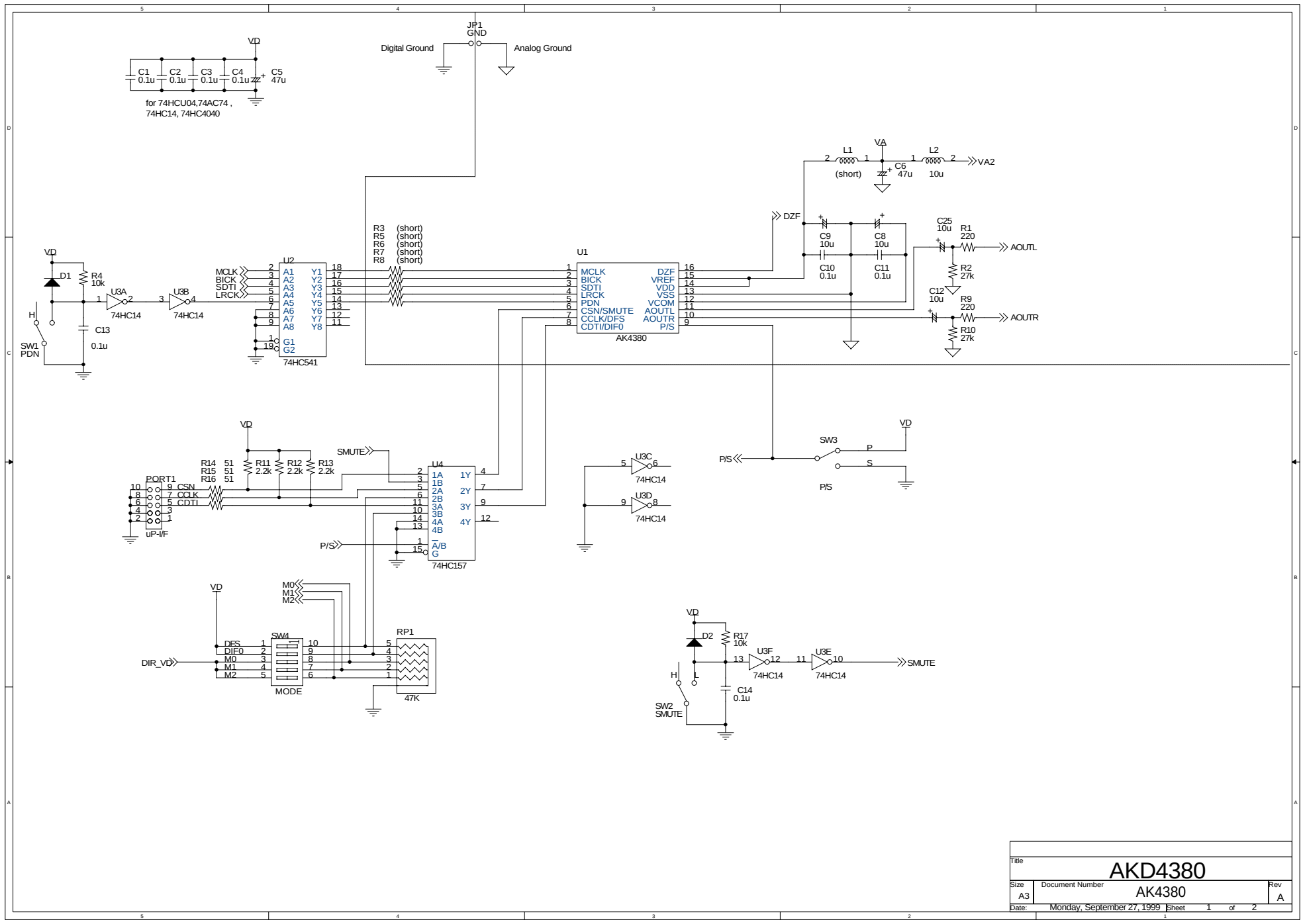


AKM AK4380 Rev.A Frequency Response



AKM AK4380 Rev.A Crosstalk





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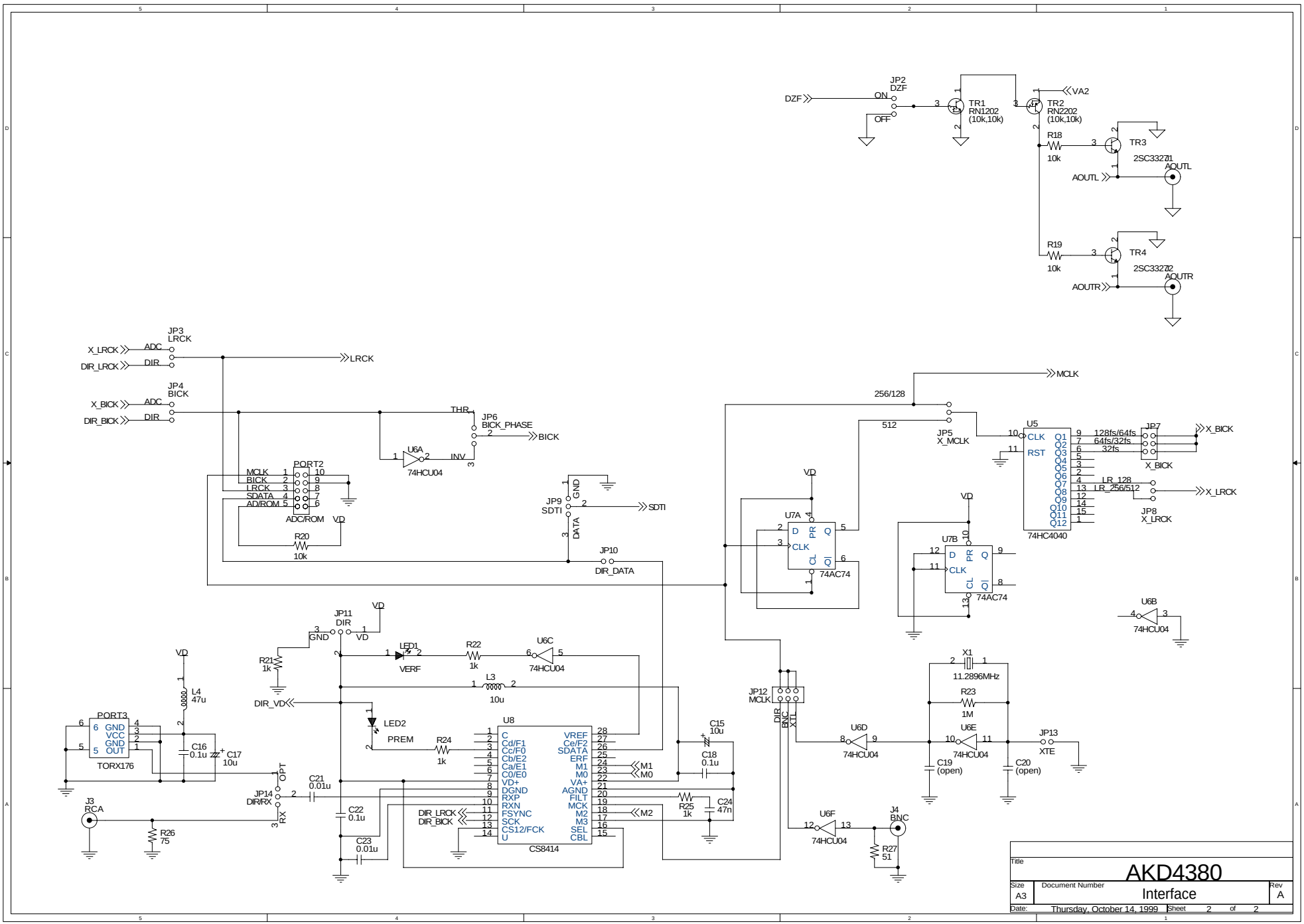

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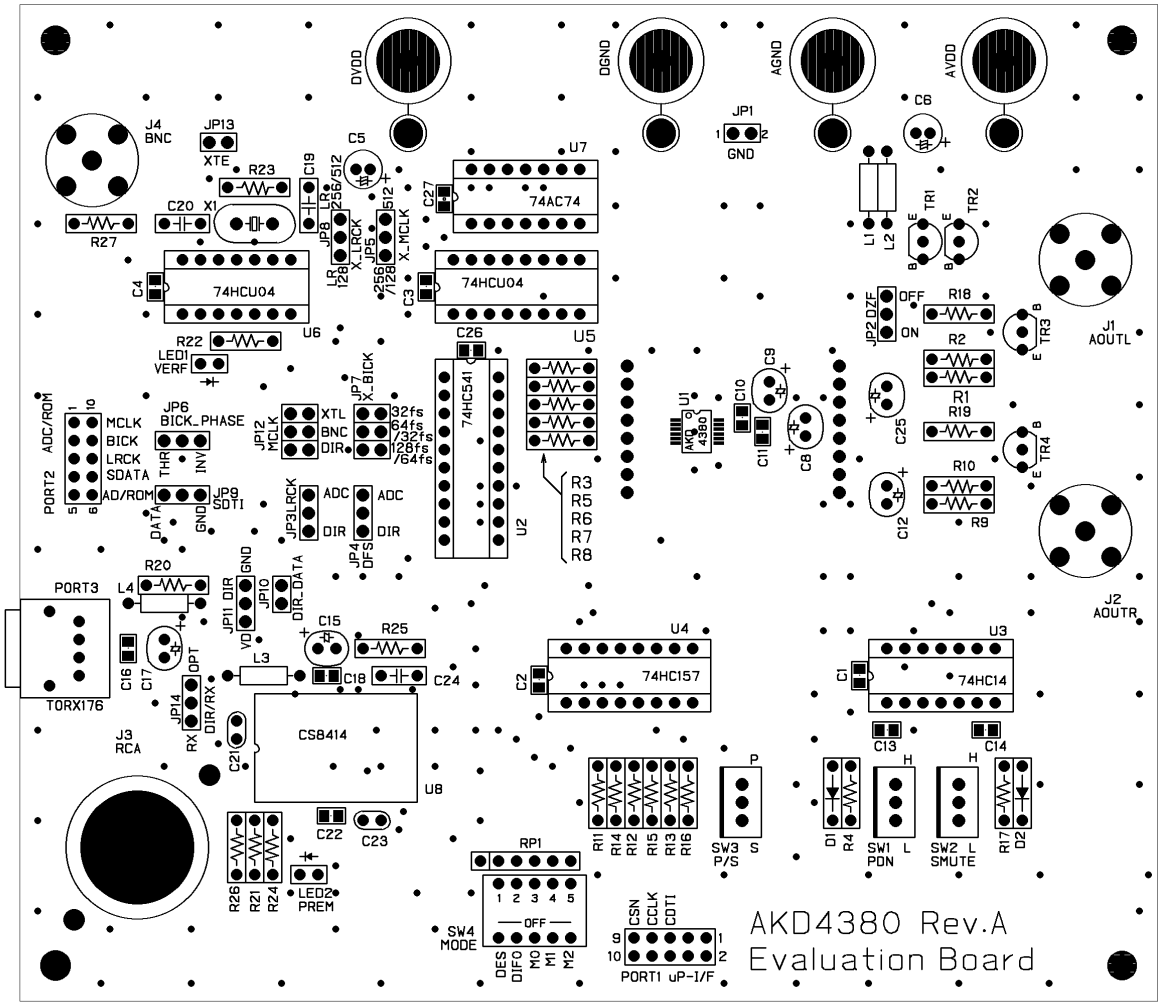

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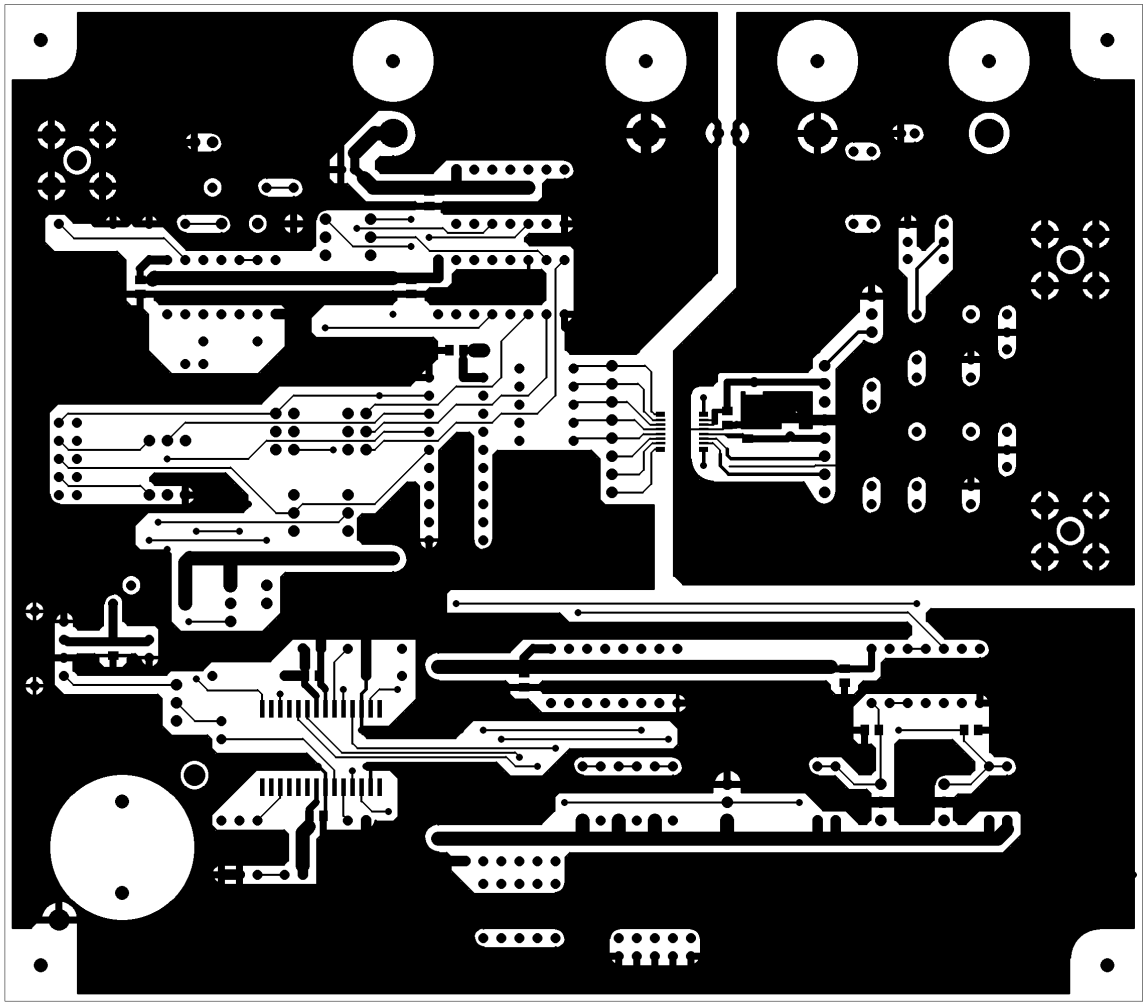

L1 部品面 パターン AKD4380

「S 半田面 パターン AKD4380

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