



AKD4556-B

AK4556 Evaluation board Rev.1

GENERAL DESCRIPTION

The AKD4556-B is an evaluation board for the AK4556, the 24Bit A/D & D/A converter. The AKD4556-B can evaluate A/D converter and D/A converter separately in addition to loopback mode (A/D→D/A). The AKD4556-B also has the digital audio interface and can achieve the interface with digital audio systems via opt-connector.

■ **Ordering guide**

AKD4556-B --- Evaluation board for AK4556

FUNCTION

- **Digital interface**
 - **DIT (AK4114): optical or BNC**
 - **DIR (AK4114): optical or BNC**
- **10pin header for serial control interface**

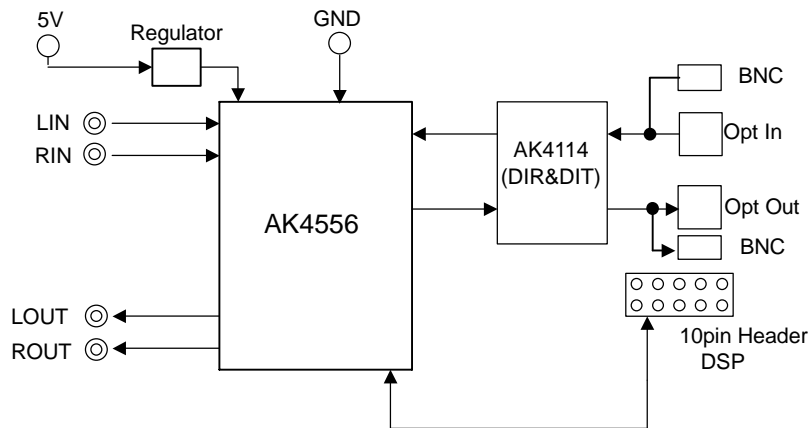


Figure 1. AKD4556-B Block Diagram

* 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
[5V] (red) = +5V (3.3V is supplied to the AK4556 , the AK4114 , and the Digital Logic via the regulator.)
[GND] (black) = 0V
- 2) Set up the evaluation modes, jumper pins and DIP switch. (See the followings.)
- 3) Power on
The AK4556 should be reset once bringing SW1 (PDN) “L” upon power-up.

■ The function of the toggle SW.

[SW1] : Resets the AK4556 & AK4114. Keep “H” during normal operation.

■ Evaluation modes

In case of the AK4556 evaluation using the AK4114, it is necessary to correspond to the audio interface format. RX and TX use BNC connector at evaluation of Quad Speed with the AK4114.

Applicable evaluation modes

- (1) Evaluation of Loopback mode using the AK4114 <default>
- (2) Evaluation of DAC using DIR of the AK4114
- (3) Evaluation of ADC using DIT of the AK4114
- (4) All interface signals including master clock are fed externally.

(1) Evaluation of Loopback mode using the AK4114

X'tal oscillator (X1) 24.576MHz is used.

(1-1) Slave mode <Default>

JP1 : Short
 JP2 : Short
 SW3-1 (XTL1) : H
 SW3-2 (XTL0) : L
 SW3-7 (CM0) : H

For the AK4556's sampling speed and audio interface format, refer to Table 3 on page 8.
 For the AK4114's sampling speed and audio interface format, refer to Table 6 and Table 7 on page 9.

Example . Setting of the AK4556 mode 4 (HPF:ON , Audio Format: I²S)

Speed	SW2 AK4556				SW3 AK4114			
	CKS3 (SW2-3)	CKS2 (SW2-4)	CKS1 (SW2-5)	CKS0 (SW2-6)	DIF1 (SW3-3)	DIF0 (SW3-4)	OCKS1 (SW3-5)	OCKS0 (SW3-6)
Normal	L	H	L	L	L	H	H	L
Double	L	H	L	L	L	H	L	L
Quad	L	H	L	L	L	H	H	H

(1-2) Master mode

JP1 : Short
 JP2 : Short
 SW3-1 (XTL1) : H
 SW3-2 (XTL0) : L
 SW3-3 (DIF1) : H
 SW3-4 (DIF0) : H
 SW3-7 (CM0) : H

For the AK4556's sampling speed and audio interface format, refer to Table 3 on page 8.
 For the AK4114's sampling speed and audio interface format, refer to Table 6 and Table 7 on page 9.

Example . Setting of the AK4556 Master mode (HPF:ON , Audio Format: I²S)

Speed	SW2 AK4556				SW3 AK4114	
	CKS3 (SW2-3)	CKS2 (SW2-4)	CKS1 (SW2-5)	CKS0 (SW2-6)	OCKS1 (SW3-5)	OCKS0 (SW3-6)
Normal	H	H	L	H	H	L
Double	H	H	L	L	L	L
Quad	H	H	H	L	H	H

(2) Evaluation of DAC using DIR of the AK4114

DIR generates MCLK , BCLK , LRCK , and SDATA from received data via optical (PORT1) or BNC connector (J6).

(2-1) Slave mode

JP1 : Short
 JP2 : Short
 JP3 : OPT or BNC
 SW3-1 (XTL1) : H
 SW3-2 (XTL0) : H
 SW3-7 (CM0) : L

For the AK4556's sampling speed and audio interface format, refer to Table 3 on page 8.

For the AK4114's sampling speed and audio interface format, refer to Table 6 and Table 7 on page 9.

Example . Setting of the AK4556 mode 4 (HPF:ON , Audio Format: I²S)

Speed	SW2 AK4556				SW3 AK4114			
	CKS3 (SW2-3)	CKS2 (SW2-4)	CKS1 (SW2-5)	CKS0 (SW2-6)	DIF1 (SW3-3)	DIF0 (SW3-4)	OCKS1 (SW3-5)	OCKS0 (SW3-6)
Nomal	L	H	L	L	L	H	H	L
Double	L	H	L	L	L	H	L	L
Quad	L	H	L	L	L	H	H	H

(2-2) Master mode

JP1 : Short
 JP2 : Short
 JP3 : OPT or BNC
 SW3-1 (XTL1) : H
 SW3-2 (XTL0) : H
 SW3-3 (DIF1) : H
 SW3-4 (DIF0) : H
 SW3-7 (CM0) : L

For the AK4556's sampling speed and audio interface format, refer to Table 3 on page 8.

For the AK4114's sampling speed and audio interface format, refer to Table 6 and Table 7 on page 9.

Example . Setting of the AK4556 Master mode (HPF:ON , Audio Format: I²S)

Speed	SW2 AK4556				SW3 AK4114	
	CKS3 (SW2-3)	CKS2 (SW2-4)	CKS1 (SW2-5)	CKS0 (SW2-6)	OCKS1 (SW3-5)	OCKS0 (SW3-6)
Normal	H	H	L	H	H	L
Double	H	H	L	L	L	L
Quad	H	H	H	L	H	H

(3) Evaluation of ADC using DIT of the AK4114

Optical (PORT2) or BNC (J7) connector is used. DIT generates audio bi-phase signal.

(3-1) Slave mode**(3-1-1) When using the AK4114's PLL**

Optical (PORT1) or BNC (J6) connector provides access to the bi-phase signal generated by the AK4114.

JP1 : Short

JP2 : Short

JP3,JP4 : OPT or BNC

SW3-1 (XTL1) : H

SW3-2 (XTL0) : H

SW3-7 (CM0) : L

(3-1-2) When using X'tal oscillator (X1) 24.576MHz

JP1 : Short

JP2 : Short

JP4 : OPT or BNC

SW3-1 (XTL1) : H

SW3-2 (XTL0) : L

SW3-7 (CM0) : H

For the AK4556's sampling speed and audio interface format, refer to Table 3 on page 8.

For the AK4114's sampling speed and audio interface format, refer to Table 6 and Table 7 on page 9.

Example . Setting of the AK4556 Mode 8 (HPF:ON , Audio Format:LJ)

Speed	SW2 AK4556				SW3 AK4114			
	CKS3 (SW2-3)	CKS2 (SW2-4)	CKS1 (SW2-5)	CKS0 (SW2-6)	DIF1 (SW3-3)	DIF0 (SW3-4)	OCKS1 (SW3-5)	OCKS0 (SW3-6)
Normal	H	L	L	L	L	L	H	L
Double	H	L	L	L	L	L	L	L
Quad	H	L	L	L	L	L	H	H

(3-2) Master mode

(3-2-1) When using the AK4114's PLL

Optical (PORT1) or BNC (J6) connector provides access to the bi-phase signal generated by the AK4114.

- JP1 : Short
- JP2 : Short
- JP3,JP4 : OPT or BNC
- SW3-1 (XTL1) : H
- SW3-2 (XTL0) : H
- SW3-3 (DIF1) : H
- SW3-4 (DIF0) : H
- SW3-7 (CM0) : L

(3-2-2) When using X'tal oscillator (X1) 24.576MHz

- JP1 : Short
- JP2 : Short
- JP4 : OPT or BNC
- SW3-1 (XTL1) : H
- SW3-2 (XTL0) : L
- SW3-3 (DIF1) : H
- SW3-4 (DIF0) : H
- SW3-7 (CM0) : H

For the AK4556's sampling speed and audio interface format, refer to Table 3 on page 8.

For the AK4114's sampling speed and audio interface format, refer to Table 6 and Table 7 on page 9.

Example . Setting of the AK4556 Master Mode (HPF:ON , Audio Format: I²S)

Speed	SW2 AK4556				SW3 AK4114	
	CKS3 (SW2-3)	CKS2 (SW2-4)	CKS1 (SW2-5)	CKS0 (SW2-6)	OCKS1 (SW3-5)	OCKS0 (SW3-6)
Normal	H	H	L	H	H	L
Double	H	H	L	L	L	L
Quad	H	H	H	L	H	H

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

PORT3 is used.

(4-1) Slave mode

JP1 : Open
JP2 : Open
SW3-3 (DIF1) : H
SW3-4 (DIF0) : H

In slave mode , the AK4556's sampling speed and audio interface format is set by SW2. See Table 1 on page 8 for possible mode setting.

(4-2) Master mode

JP1 : Open
JP2 : Open
SW3-3 (DIF1) : H
SW3-4 (DIF0) : H

In master mode , the AK4556's sampling speed and audio interface format is set by SW2. See Table 1 on page 8 for possible mode setting.

■ Setting of DIP SW

1. Evaluation mode setting of SW2 (AK4556)

No.	Name	Default
1	DEM1	L
2	DEM0	H
3	CKS3	L
4	CKS2	H
5	CKS1	L
6	CKS0	L

Table 1 . SW2 AK4556 Mode Setting

DEM1	DEM0	Mode
L	L	44.1kHz
L	H	OFF
H	L	48kHz
H	H	32kHz

Table 2 . De-emphasis filter control

Mode	CKS3	CKS2	CKS1	CKS0	HPF	M/S	MCLK	Audio I/F
0	L	L	L	L	ON	Slave	128/192fs (Quad Speed) 256/384fs (Double Speed) 512/768fs (Normal Speed)	LJ/RJ
1	L	L	L	H	ON	Slave	256/384/512/768fs (Normal Speed)	LJ/RJ
2	L	L	H	L	OFF	Slave	128/192fs (Quad Speed) 256/384fs (Double Speed) 512/768fs (Normal Speed)	LJ/RJ
3	L	L	H	H	OFF	Slave	256/384/512/768fs (Normal Speed)	LJ/RJ
4	L	H	L	L	ON	Slave	128/192fs (Quad Speed) 256/384fs (Double Speed) 512/768fs (Normal Speed)	I ² S
5	L	H	L	H	ON	Slave	256/384/512/768fs (Normal Speed)	I ² S
6	L	H	H	L	OFF	Slave	128/192fs (Quad Speed) 256/384fs (Double Speed) 512/768fs (Normal Speed)	I ² S
7	L	H	H	H	OFF	Slave	256/384/512/768fs (Normal Speed)	I ² S
8	H	L	L	L	ON	Slave	128/192fs (Quad Speed) 256/384fs (Double Speed) 512/768fs (Normal Speed)	LJ
9	H	L	L	H	ON	Slave	256/384/512/768fs (Normal Speed)	LJ
10	H	L	H	L	OFF	Slave	128/192fs (Quad Speed) 256/384fs (Double Speed) 512/768fs (Normal Speed)	LJ
11	H	L	H	H	OFF	Slave	256/384/512/768fs (Normal Speed)	LJ
12	H	H	L	L	ON	Master	256fs (Double Speed)	I ² S
13	H	H	L	H	ON	Master	512fs (Normal Speed)	I ² S
14	H	H	H	L	ON	Master	128fs (Quad Speed)	I ² S
15	H	H	H	H	ON	Master	256fs (Normal Speed)	I ² S

Table 3 . AK4556 Mode Setting

In case of the AK4556 evaluation using the AK4114 , LJ/RJ (Mode 0 ~ Mode 3) in Audio I/F does not support.

2. Evaluation mode setting of SW3 (AK4114)

No.	Name	Default
1	XTL1	H
2	XTL0	L
3	DIF1	L
4	DIF0	H
5	OCKS1	L
6	OCKS0	L
7	CM0	H

Table 4 . SW3 AK4114 Mode Setting

XTL1	XTL0	X'tal Frequency
L	L	11.2896 MHz
L	H	12.288 MHz
H	L	24.576 MHz
H	H	OFF

Table 5 . Reference X'tal Frequency

DIF1	DIF0	DAUX	SDTO	LRCK,BCLK
L	L	24bit LJ	24bit LJ	O
L	H	24bit I ² S	24bit I ² S	O
H	H	24bit I ² S	24bit I ² S	I

Table 6. Audio Data Format

OCKS1	OCKS0	MCKO1	X'tal	fs Max	Speed
L	L	256fs	256fs	96kHz	Double
H	L	512fs	512fs	48kHz	Normal
H	H	128fs	128fs	192kHz	Quad

Table 7. Master Clock Output Frequency

CM0	PLL	Clock Souce	SDTO
L	ON	PLL	RX
H	OFF	X'tal	DAUX

Table 8 . Clock Operation Mode

■ Jumper pins set up

[JP1] : MCLK

Short : MCLK is supplied from the AK4114.

Open : MCLK is supplied from PORT3.

[JP2] : SDTI

Short : SDTI is supplied from the AK4114.

Open : SDTI is supplied from PORT3.

[JP3] : RX (DIR)

OPT : Optical connector (PORT1) is used.

BNC : BNC connector (J5) is used.

[JP4] : TX (DIT)

OPT : Optical connector (PORT2) is used.

BNC : BNC connector (J6) is used.

■ Analog input circuit

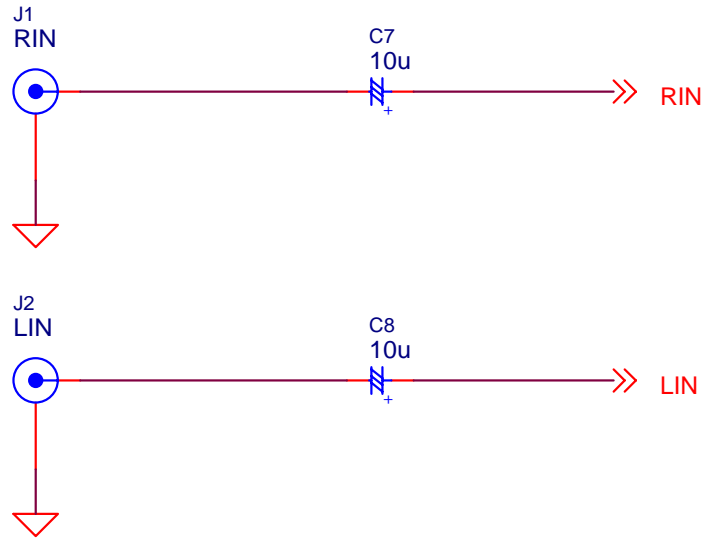


Figure 2. Analog Input Circuit

■ Analog output circuit

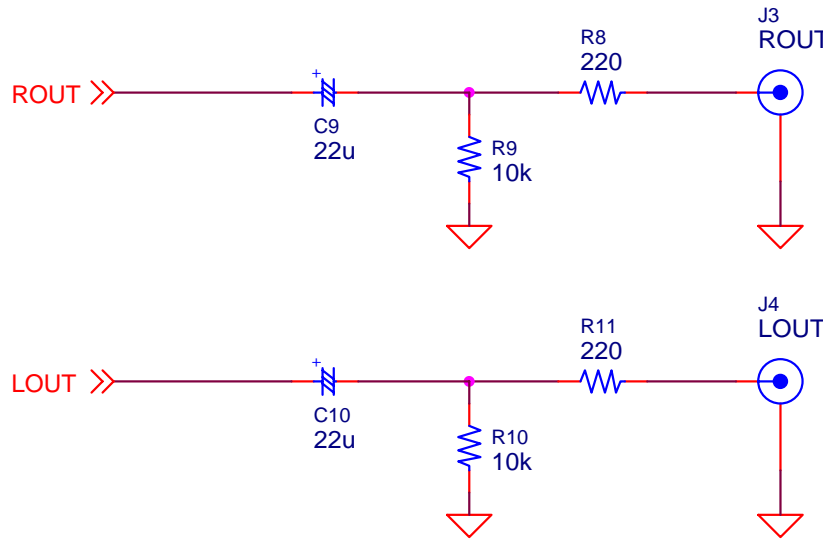


Figure 3. Analog Output Circuit

MEASUREMENT RESULTS

[Measurement condition]

- Measurement unit: Audio Precision, System two Cascade
- Slave Mode
- BCLK: 64fs
- Bit: 24bit
- Measurement Frequency: Nomal Speed : 20Hz ~ 20kHz , Double & Quad Speed : 20Hz ~ 40kHz
- Power Supply: VA=VD=3.3 V
- Temperature: Room
- Input Frequency: 1kHz
- Sampling Frequency: 48kHz , 96kHz , 192kHz

[Measurement Results]

ADC (LIN/RIN) characteristics

Sampling Frequency	Parameter	Condition	Filter	L ch	R ch	Units
48kHz	S / (N+D)	-1dB Input	20kHzLPF	92.2	92.1	dB
	DR	-60dB Input	20kHzLPF	102.4	102.4	dB
	DR	-60dB Input	A-weighted	104.8	104.8	dB
	S/N	No Signal	A-weighted	104.9	104.9	dB
96kHz	S / (N+D)	-1dB Input	40kHzLPF	90.8	90.8	dB
	DR	-60dB Input	40kHzLPF	98.7	98.7	dB
	DR	-60dB Input	A-weighted	104.3	104.3	dB
	S/N	No Signal	A-weighted	104.4	104.4	dB
192kHz	S / (N+D)	-1dB Input	40kHzLPF	90.8	90.8	dB
	DR	-60dB Input	40kHz LPF	98.6	98.6	dB
	DR	-60dB Input	A-weighted	103.8	103.8	dB
	S/N	No Signal	A-weighted	103.9	103.9	dB

DAC (LOUT/ROUT) characteristics

Sampling Frequency	Parameter	Condition	Filter	L [dB]	R [dB]	Units
48kHz	S / (N+D)	0dB Input	20kHzLPF	90.8	90.9	dB
	DR	-60dB Input	20kHzLPF	105.0	105.0	dB
	DR	-60dB Input	A-weighted	107.5	107.5	dB
	S/N	No Signal	A-weighted	107.8	107.8	dB
96kHz	S / (N+D)	0dB Input	40kHzLPF	89.2	89.1	dB
	DR	-60dB Input	40kHzLPF	102.7	102.7	dB
	DR	-60dB Input	A-weighted	107.7	107.7	dB
	S/N	No Signal	A-weighted	107.7	107.7	dB
192kHz	S / (N+D)	0dB Input	40kHzLPF	89.2	89.2	dB
	DR	-60dB Input	40kHz LPF	102.7	102.7	dB
	DR	-60dB Input	A-weighted	107.7	107.7	dB
	S/N	No Signal	A-weighted	107.7	107.7	dB

[Plots]

ADC

fs=48kHz

AKM

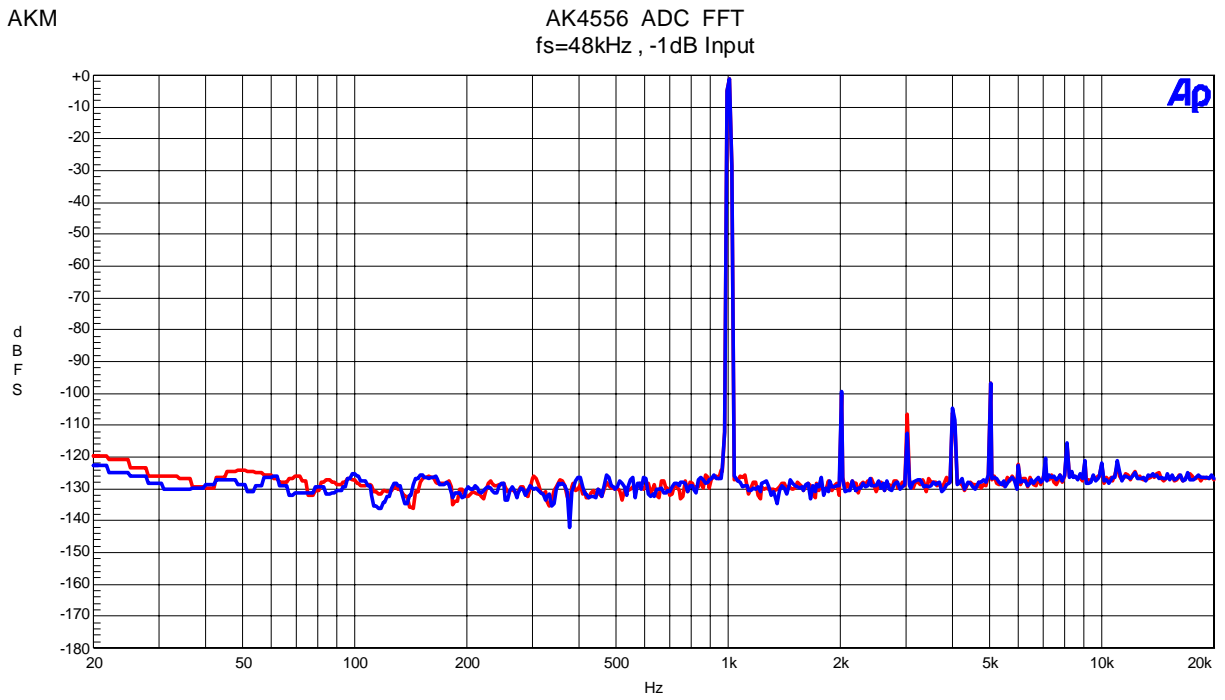


Figure 4. FFT (fin=1kHz , Input Level=-1dBFS)

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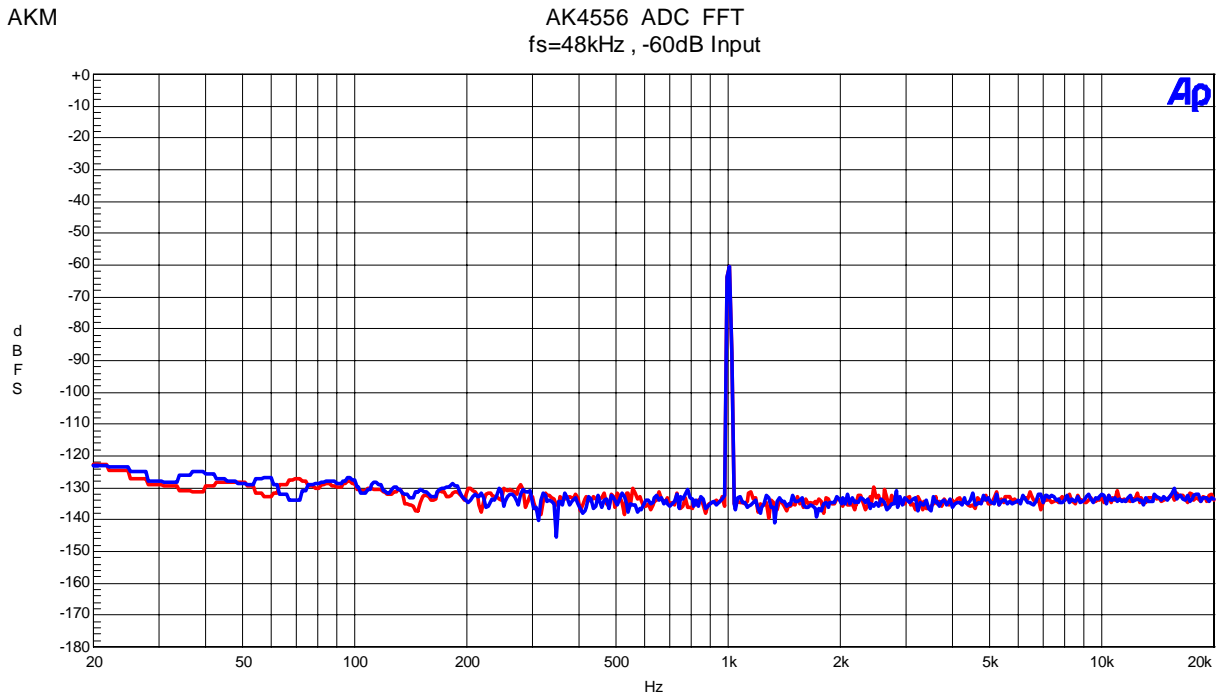


Figure 5. FFT (fin=1kHz , Input Level=-60dBFS)

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AK4556 ADC FFT
fs=48kHz , No Signal

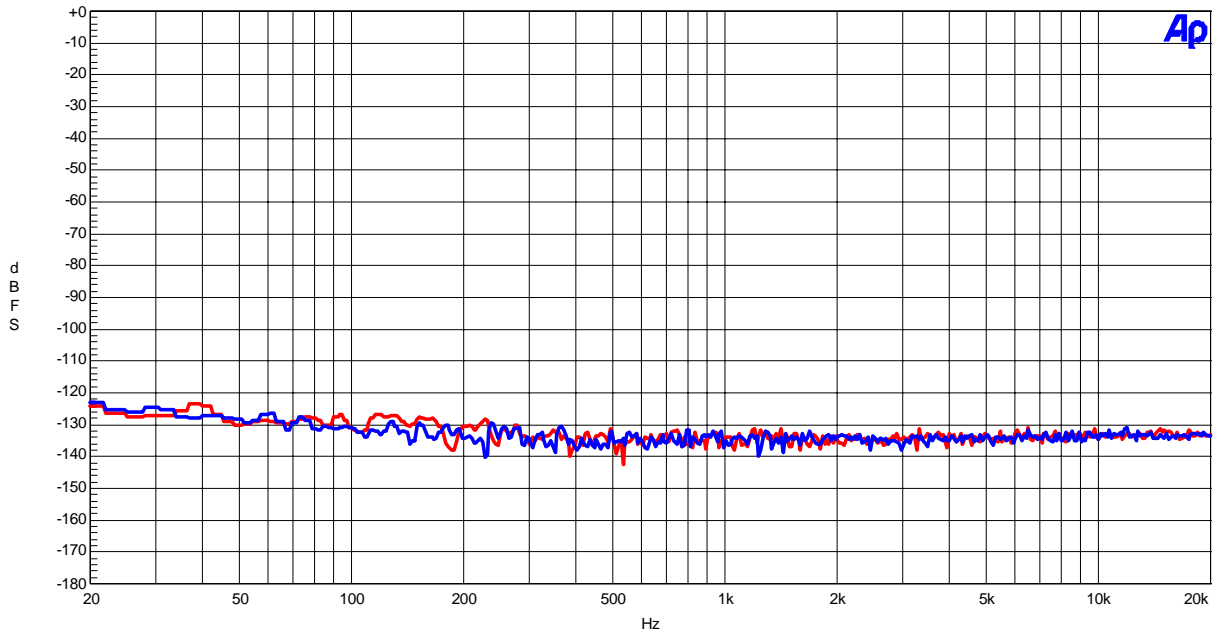


Figure 6. FFT (fin=1kHz , No Signal)

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AK4556 ADC THD + N vs Input Level
fs=48kHz

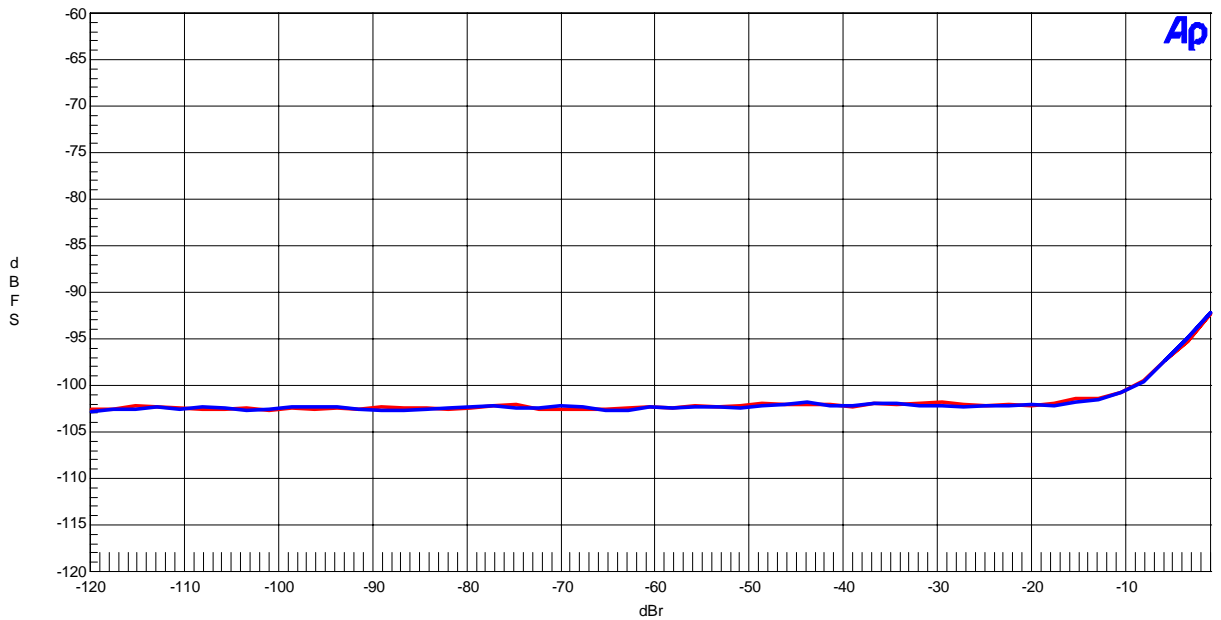


Figure 7. THD+N vs Input Level (fin=1kHz)

AKM

AK4556 ADC THD + N vs Input Frequency
fs=48kHz

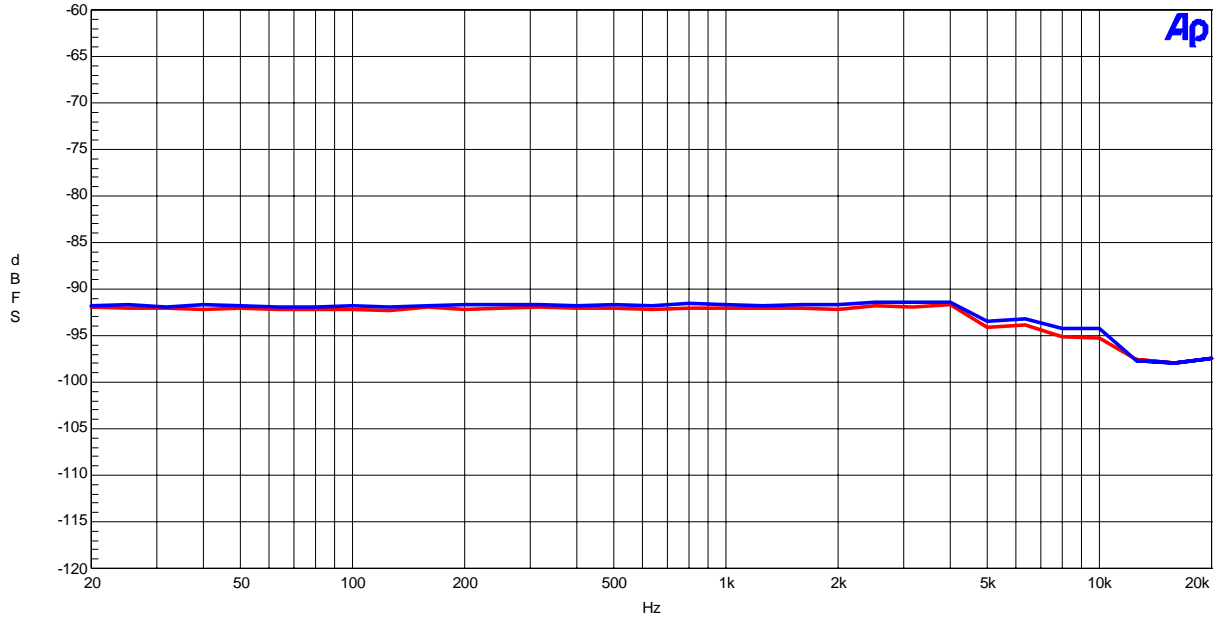


Figure 8. THD+N vs Input Frequency (Input Level =-1dBFS)

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AK4556 ADC Linearity
fs=48kHz

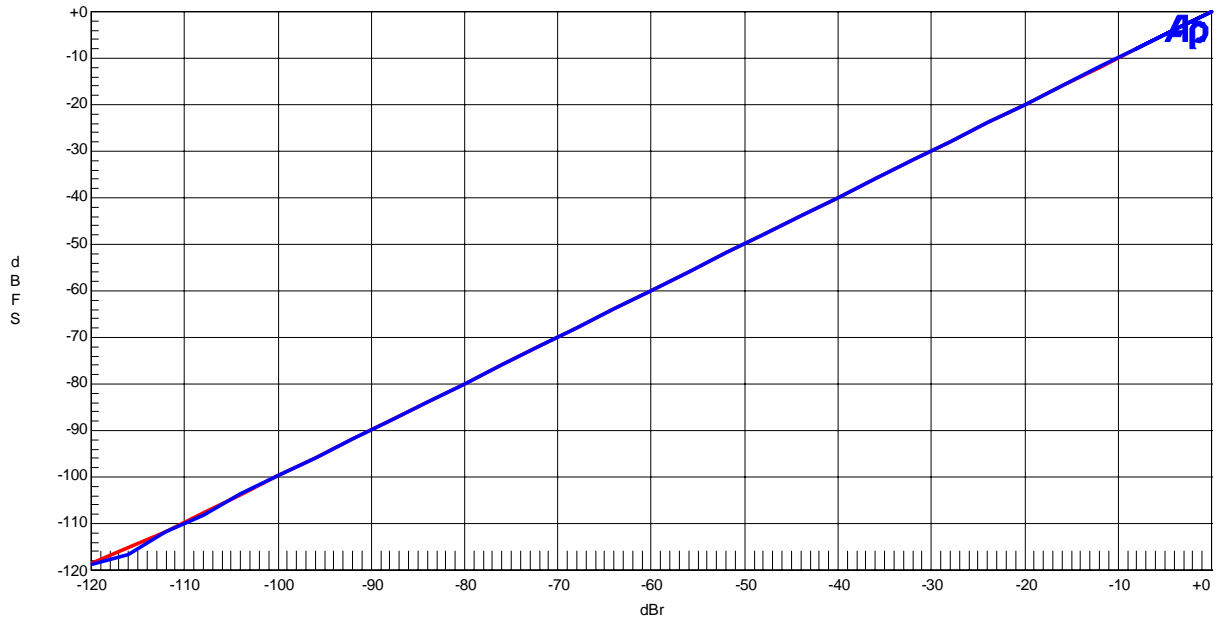


Figure 9. Linearity (fin=1kHz)

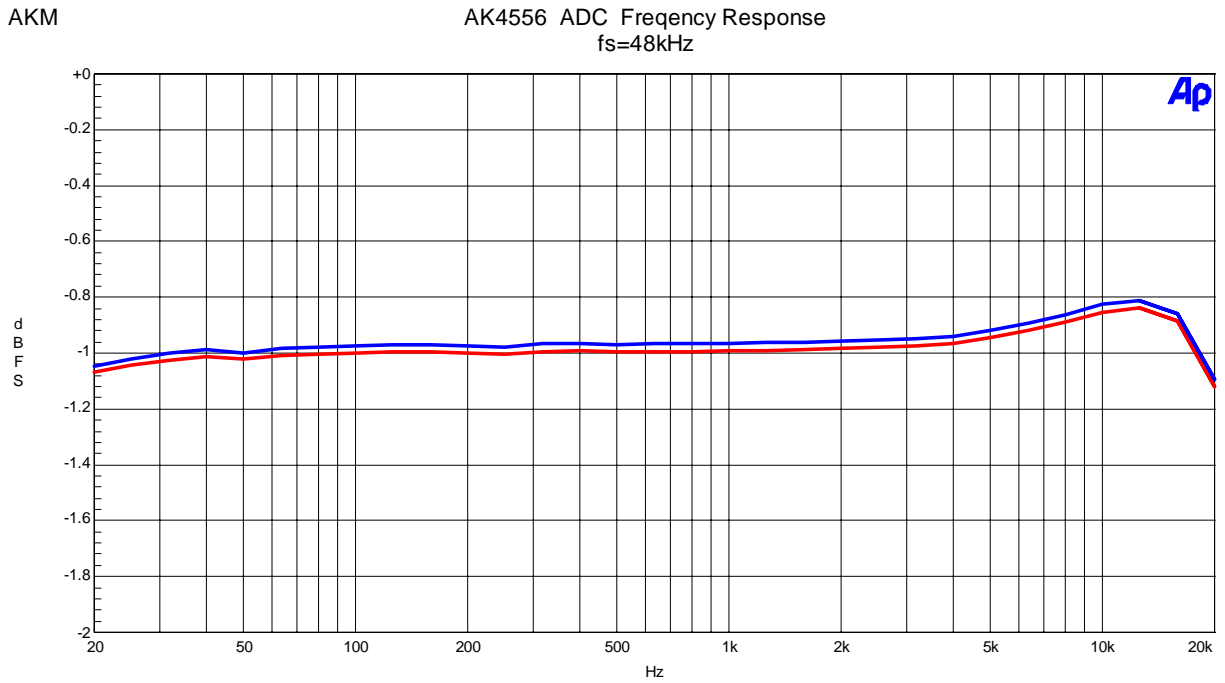


Figure 10. Frequency Response

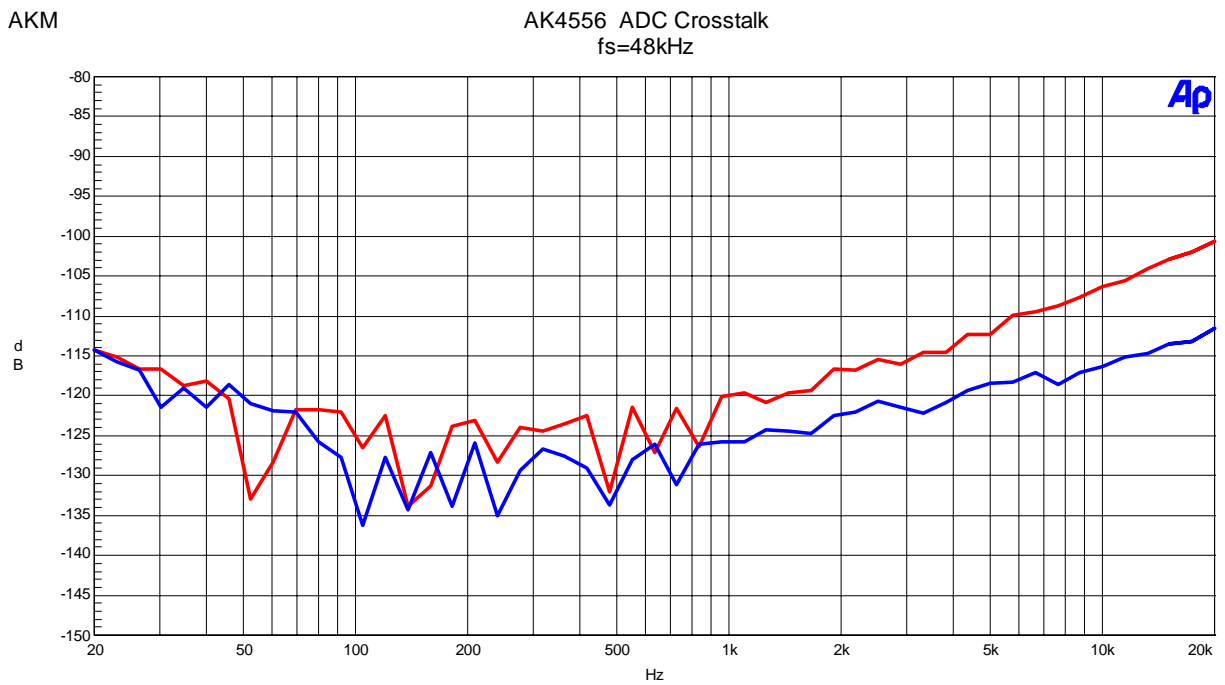


Figure 11. Crosstalk

fs=96kHz

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AK4556 ADC FFT
fs=96kHz , -1dB Input

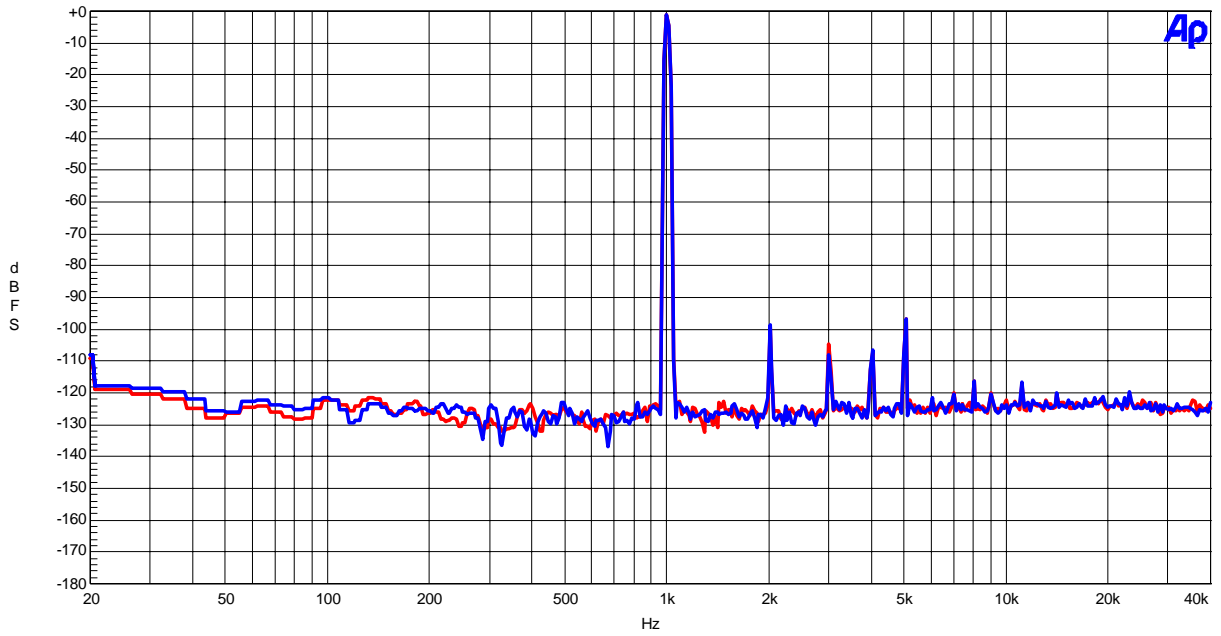


Figure 12. FFT (fin=1kHz , Input Level=-1dBFS)

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AK4556 ADC FFT
fs=96kHz , -60dB Input

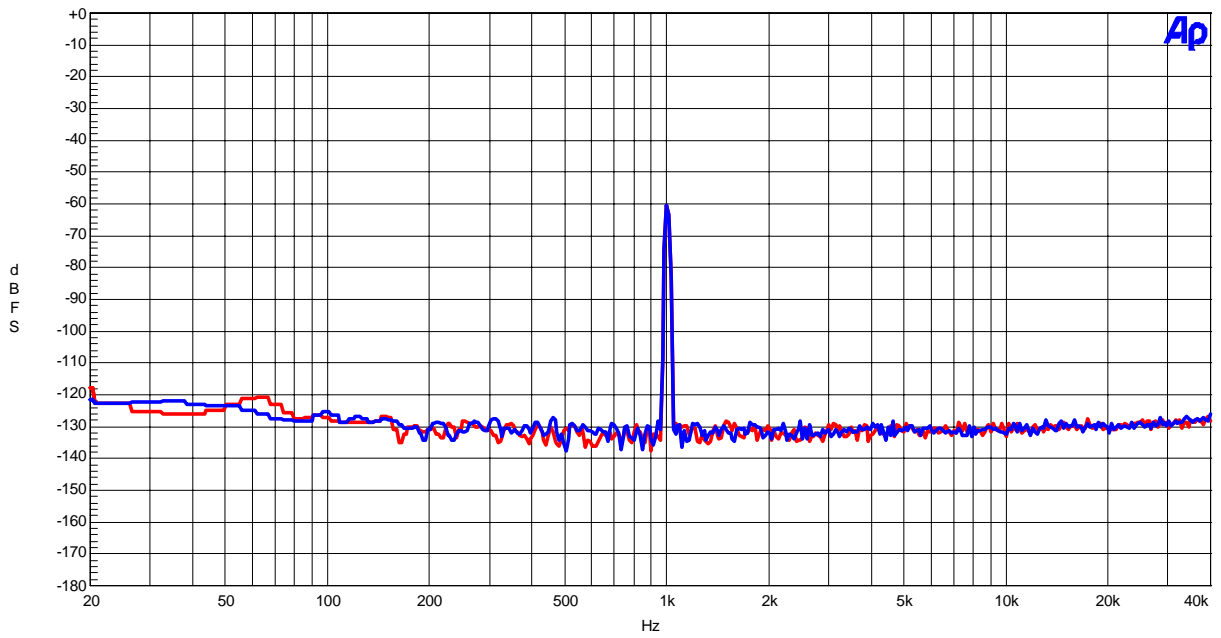


Figure 13. FFT (fin=1kHz , Input Level=-60dBFS)

AKM

AK4556 ADC FFT
fs=96kHz, No Signal

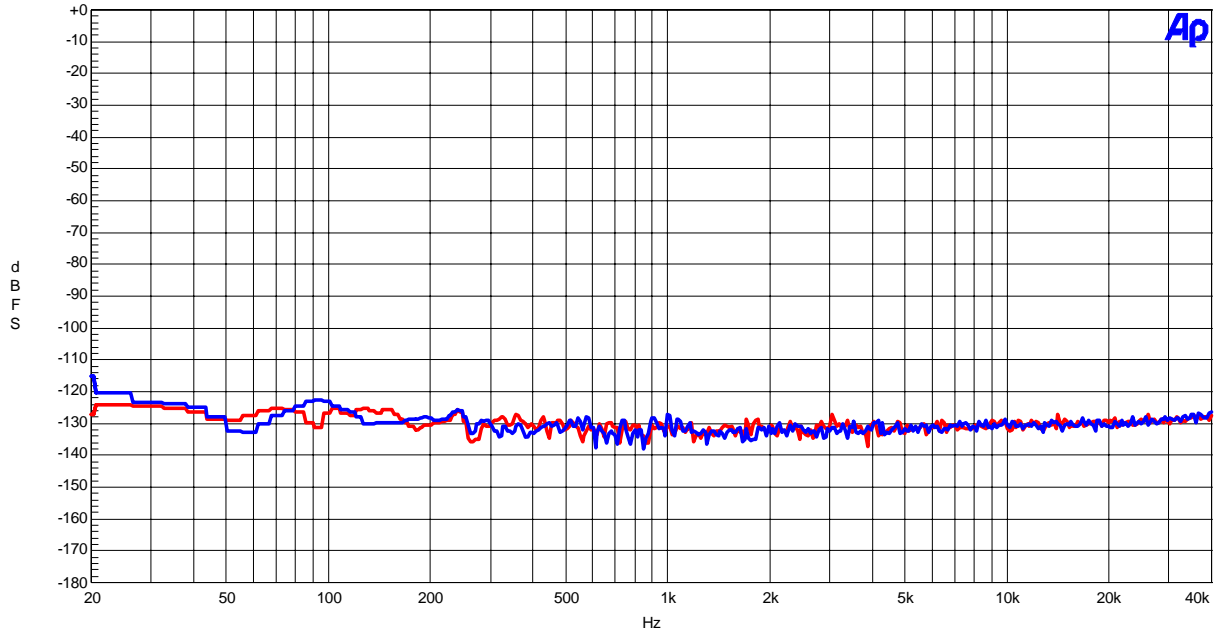


Figure 14. FFT (fin=1kHz, No Signal)

AKM

AK4556 ADC THD + N vs Input Level
fs=96kHz

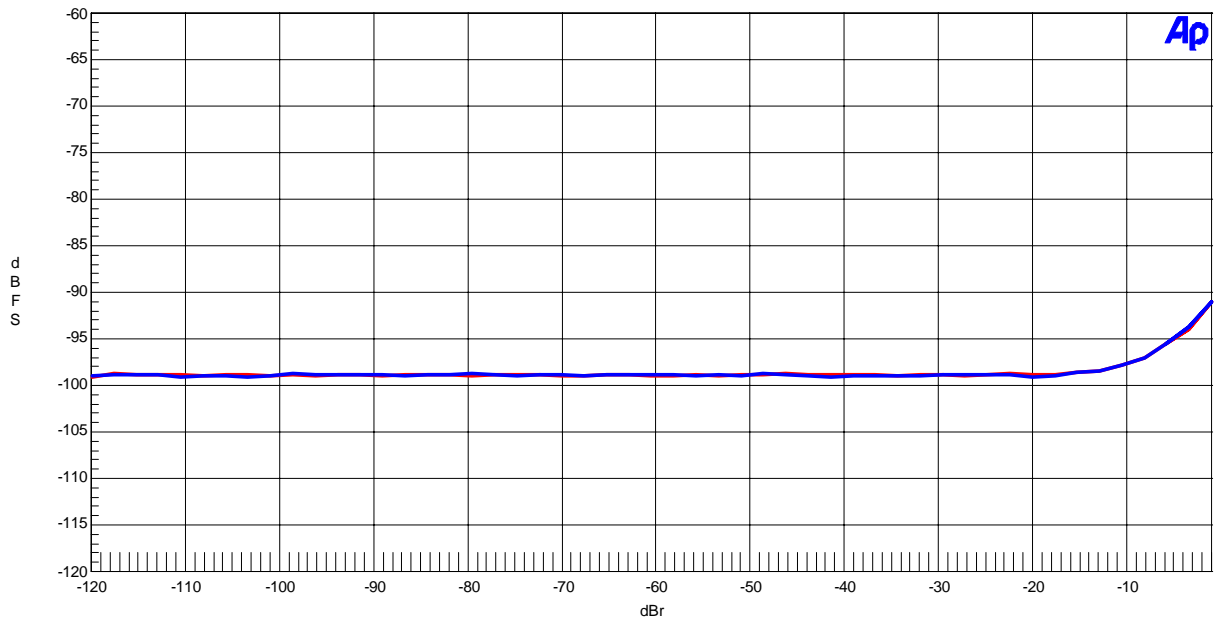


Figure 15. THD+N vs Input Level (fin=1kHz)

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AK4556 ADC THD + N vs Input Frequency
fs=96kHz

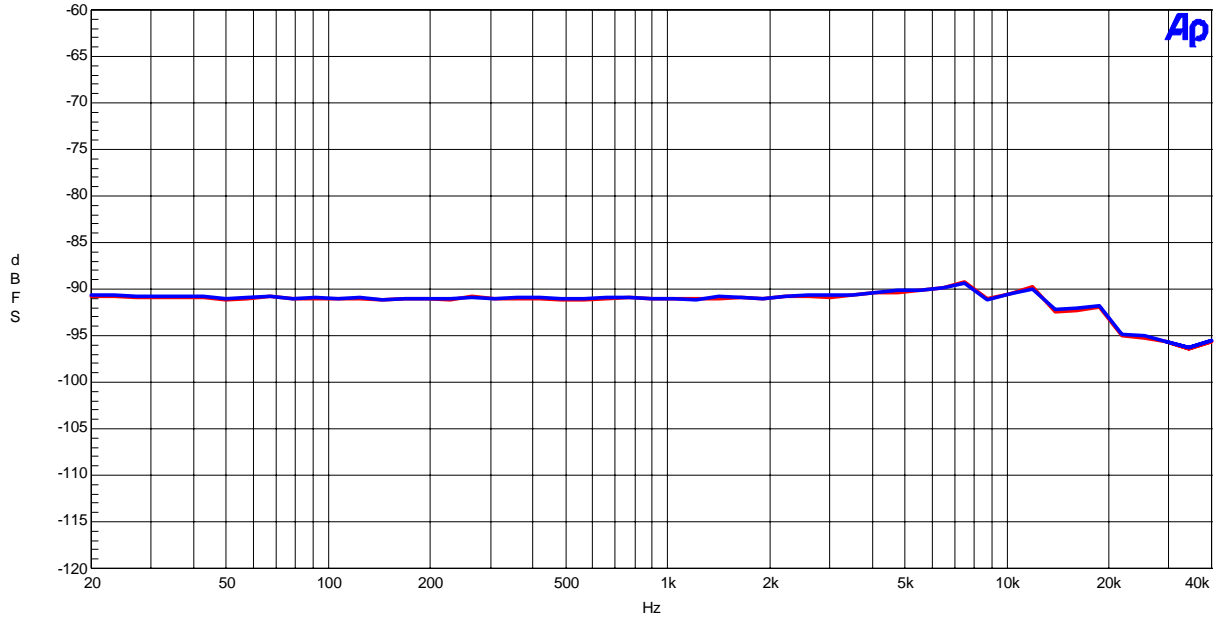


Figure 16. THD+N vs Input Frequency (Input Level =-1dBFS)

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AK4556 ADC Linearity
fs=96kHz

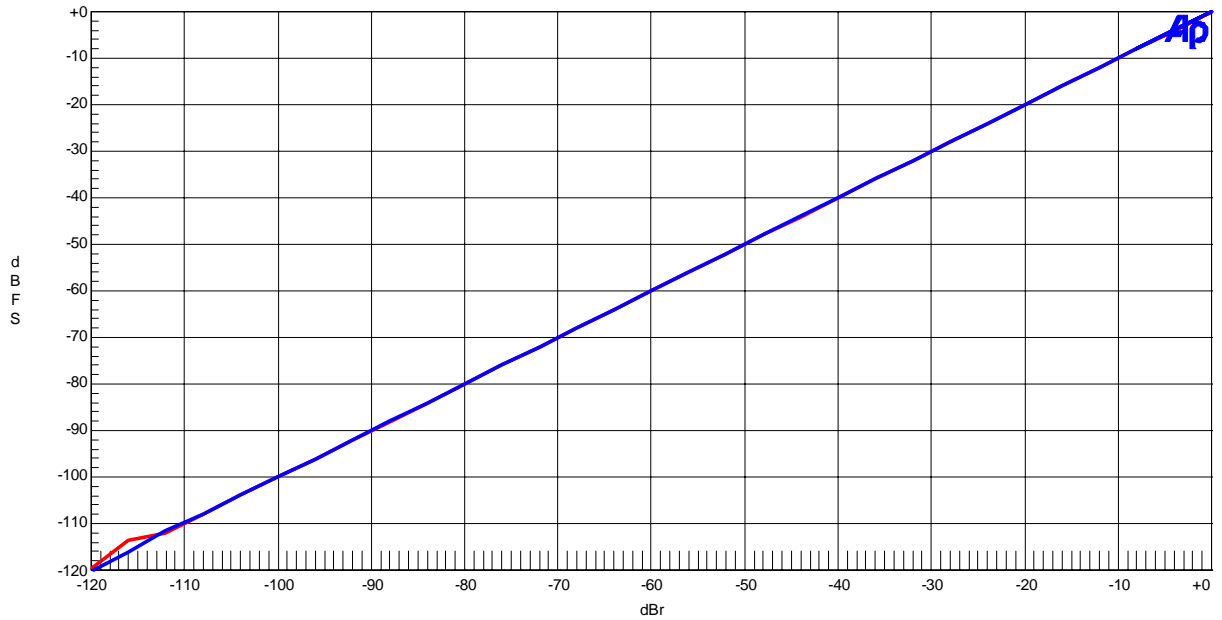


Figure 17. Linearity (fin=1kHz)

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AK4556 ADC Frequency Response
fs=96k

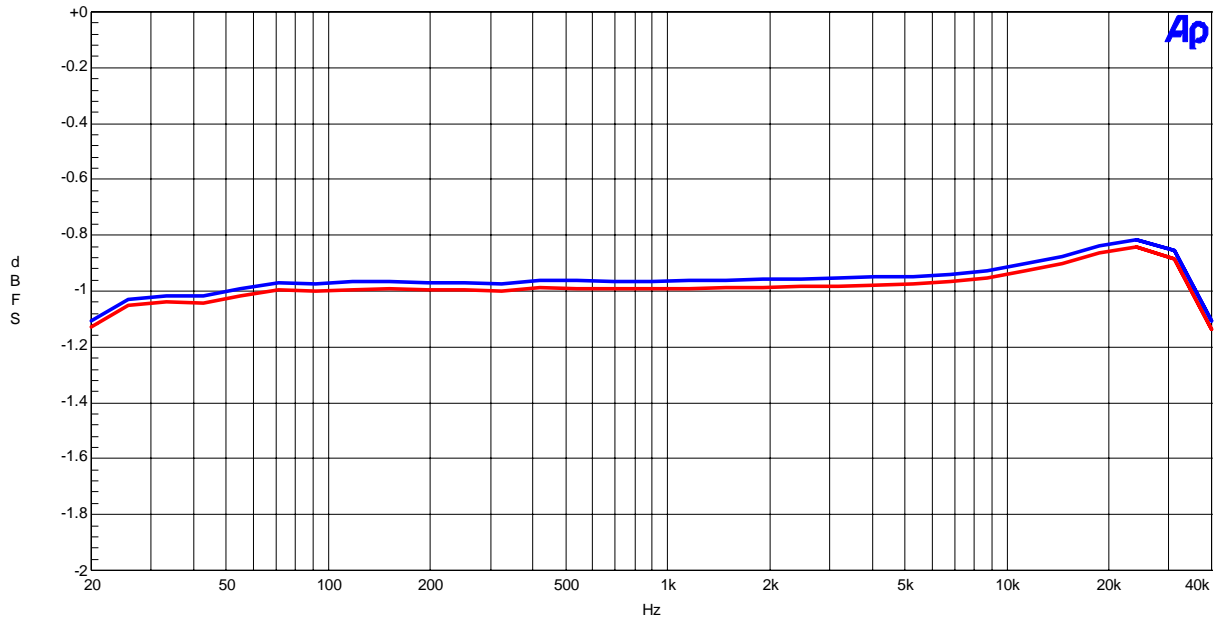


Figure 18. Frequency Response

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AK4556 ADC Crosstalk
fs=96kHz

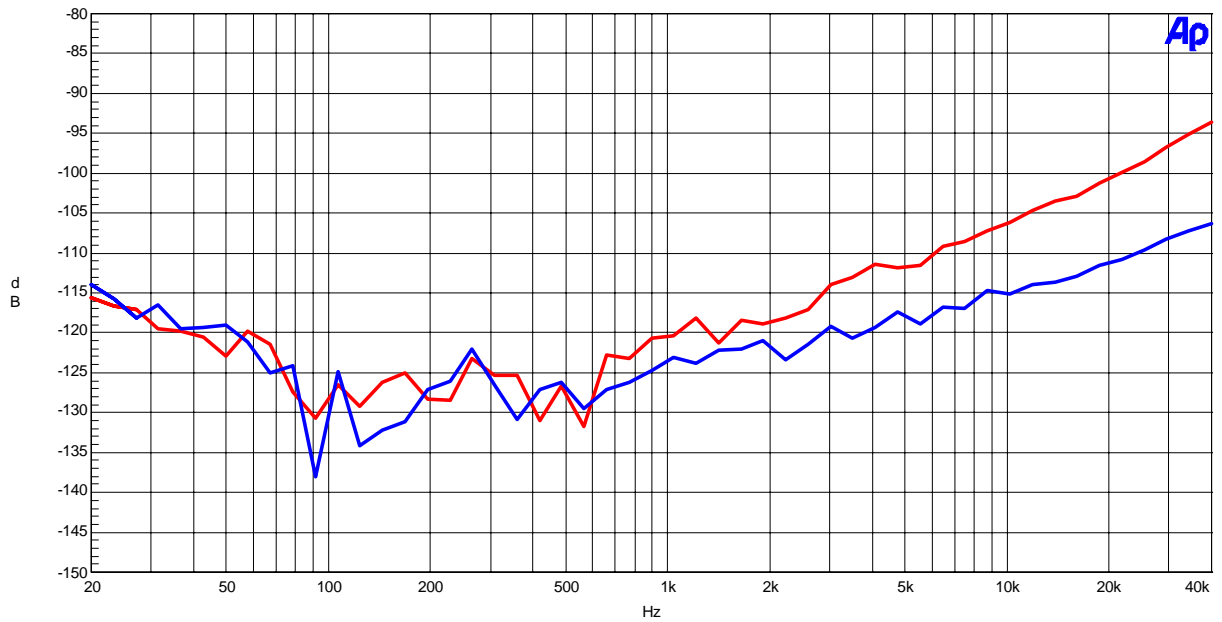


Figure 19. Crosstalk

fs=192kHz

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AK4556 ADC FFT
fs=192kHz , -1dB Input

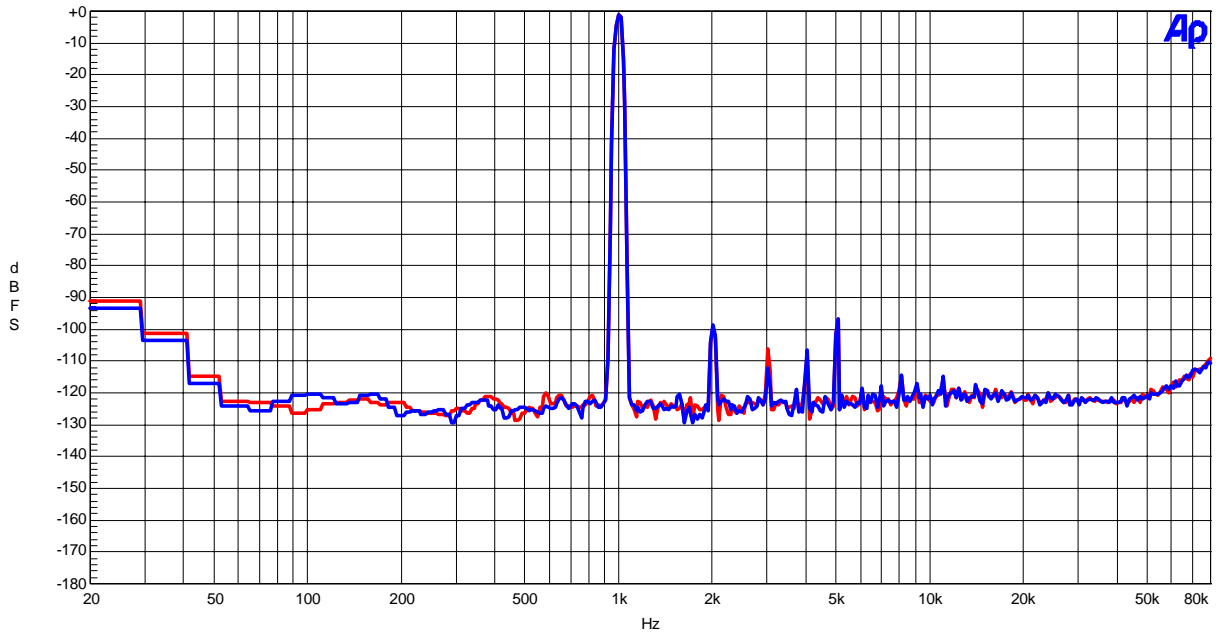


Figure 20. FFT (fin=1kHz , Input Level=-1dBFS)

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AK4556 ADC FFT
fs=192kHz , -60dB Input

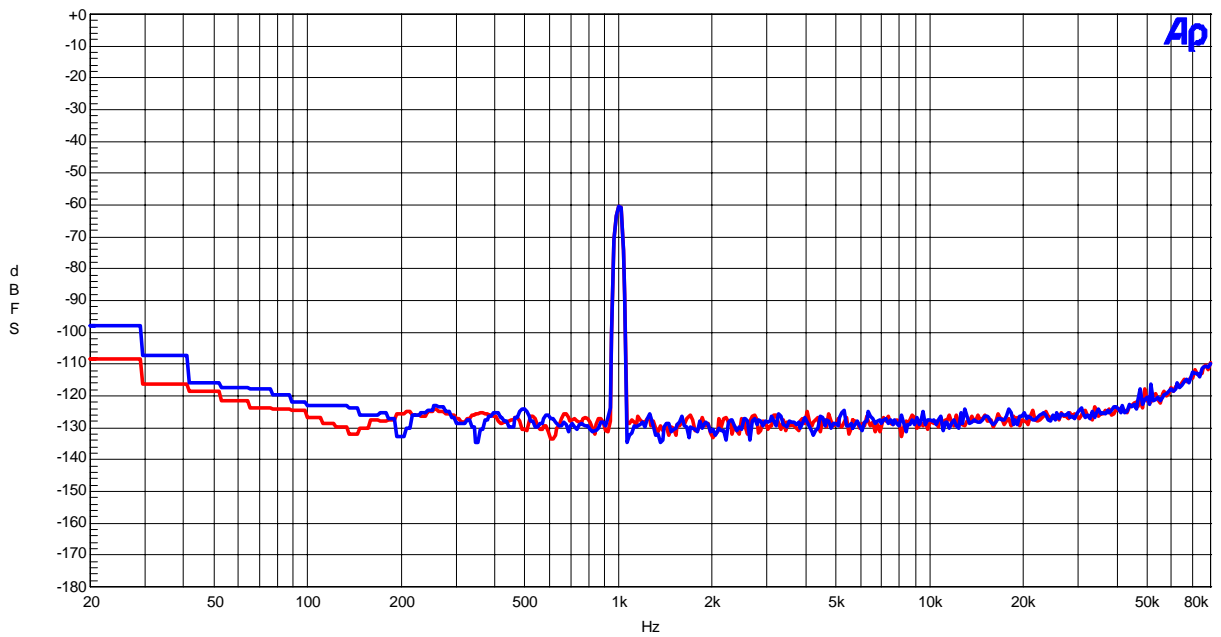


Figure 21. FFT (fin=1kHz , Input Level=-60dBFS)

AKM

AK4556 ADC FFT
fs=192kHz, No Signal

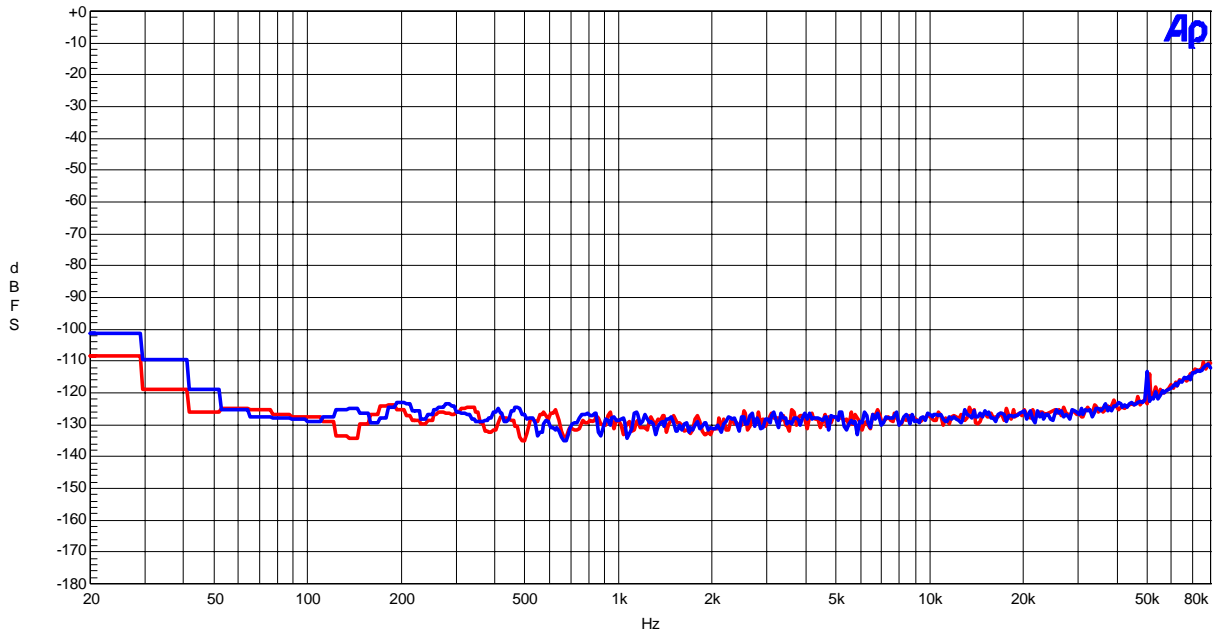


Figure 22. FFT (fin=1kHz, No Signal)

AKM

AK4556 ADC THD + N vs Input Level
fs=192kHz

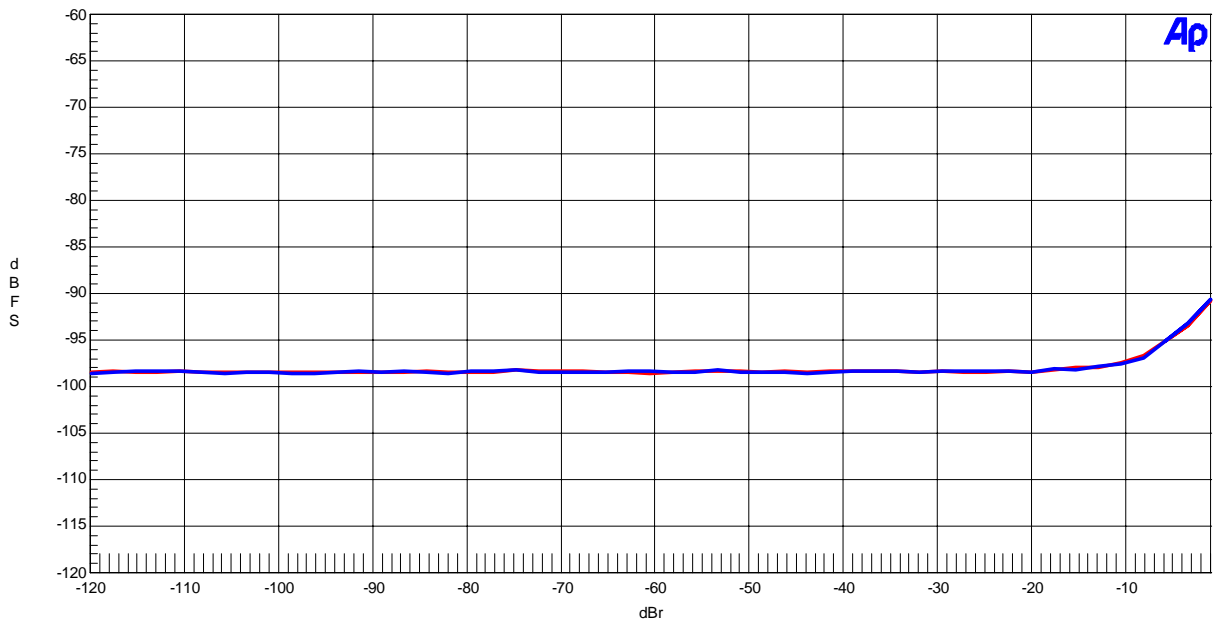


Figure 23. THD+N vs Input Level (fin=1kHz)

AKM

AK4556 ADC THD + N vs Input Frequency
fs=192kHz

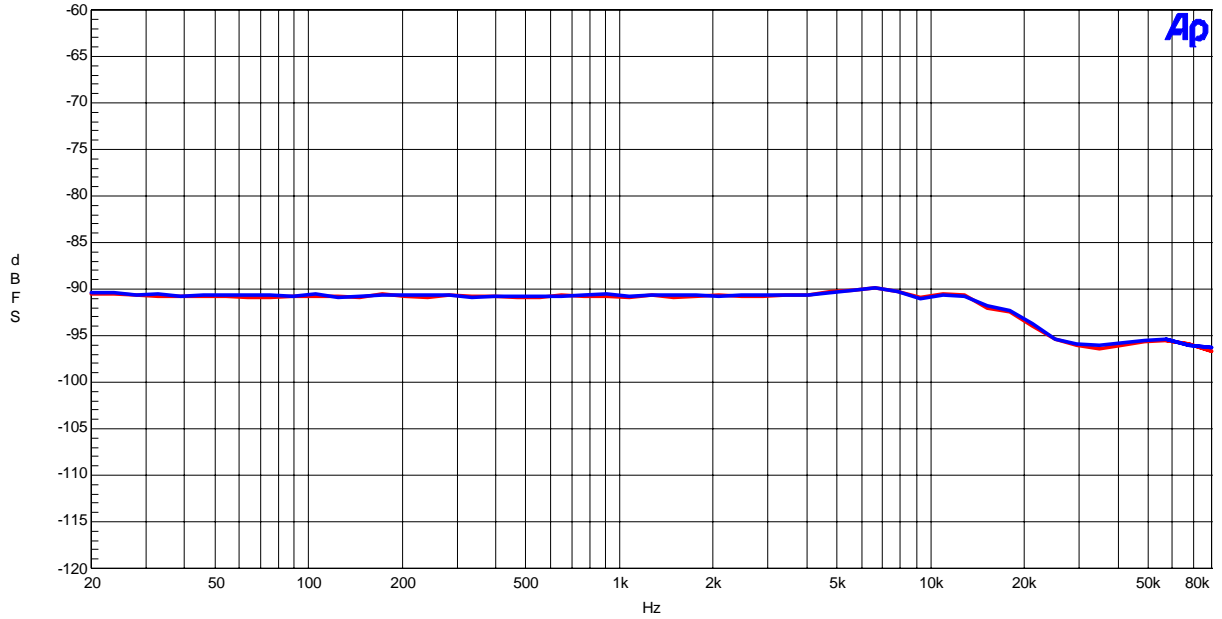


Figure 24. THD+N vs Input Frequency (Input Level =-1dBFS)

AKM

AK4556 ADC Linearity
fs=192kHz

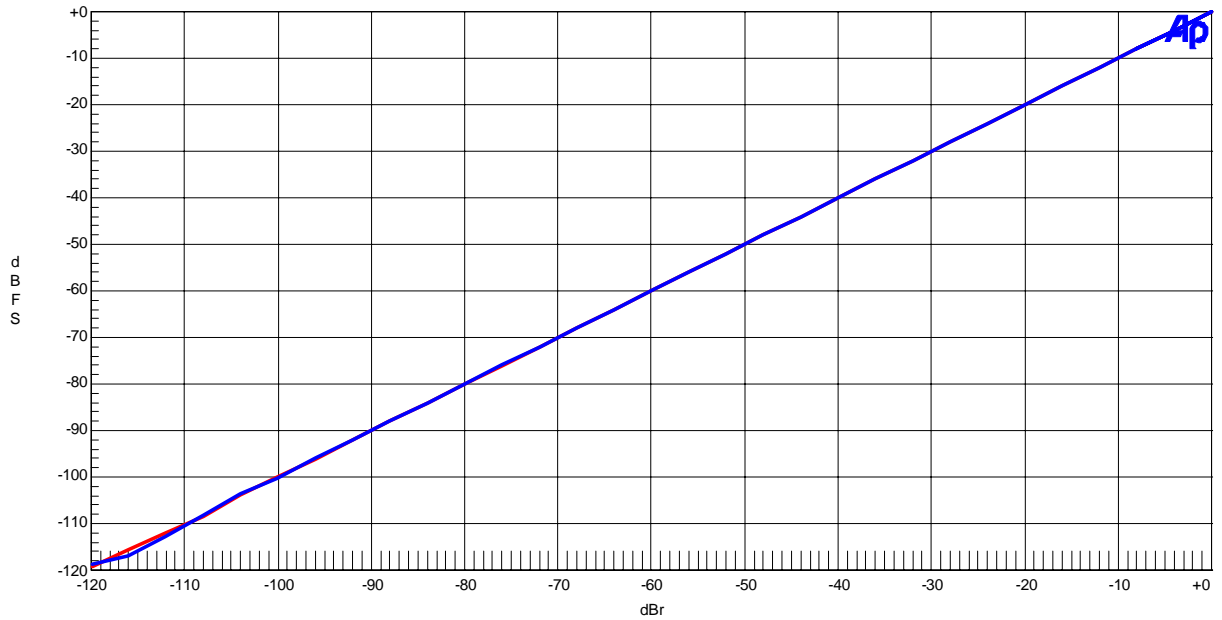


Figure 25. Linearity (fin=1kHz)

AKM

AK4556 ADC Frequency Response
fs=192k

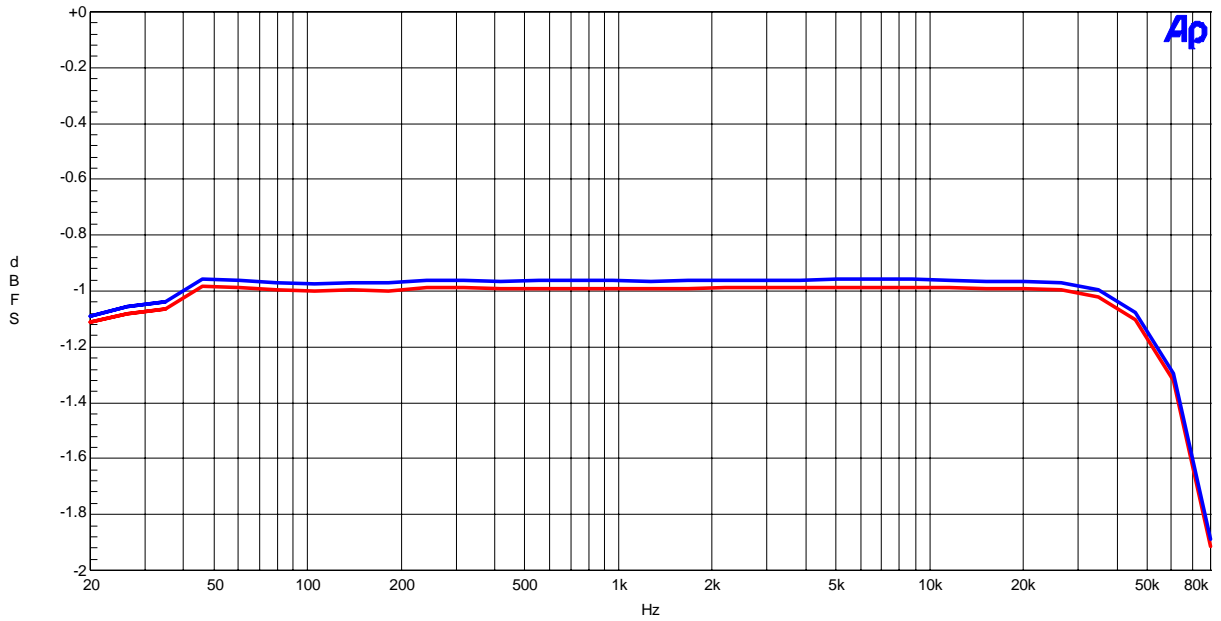


Figure 26. Frequency Response

AKM

AK4556 ADC Crosstalk
fs=192kHz

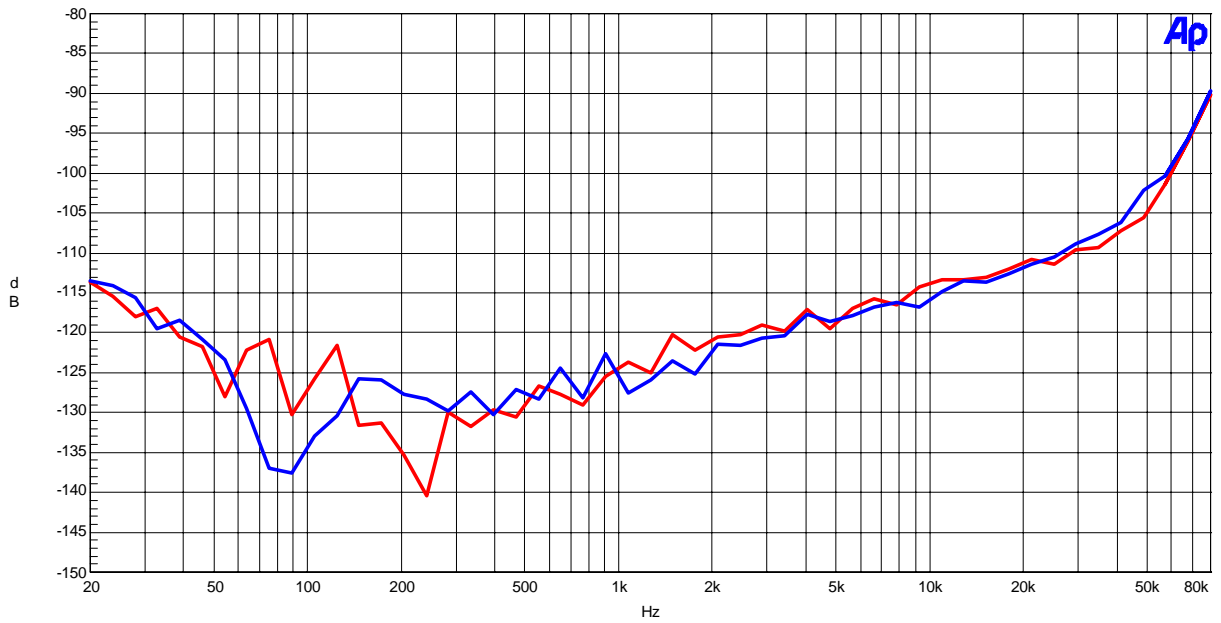


Figure 27. Crosstalk

DAC

fs=48kHz

AKM

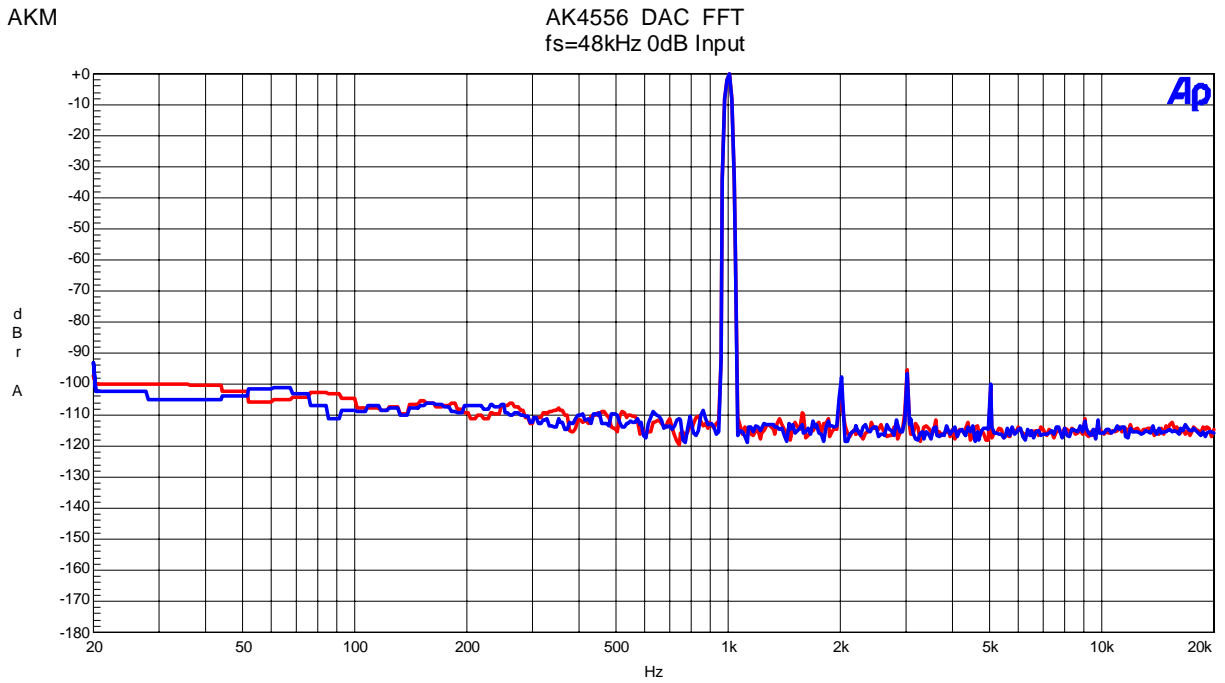


Figure 28. FFT (fin=1kHz , Input Level=0dBFS)

AKM

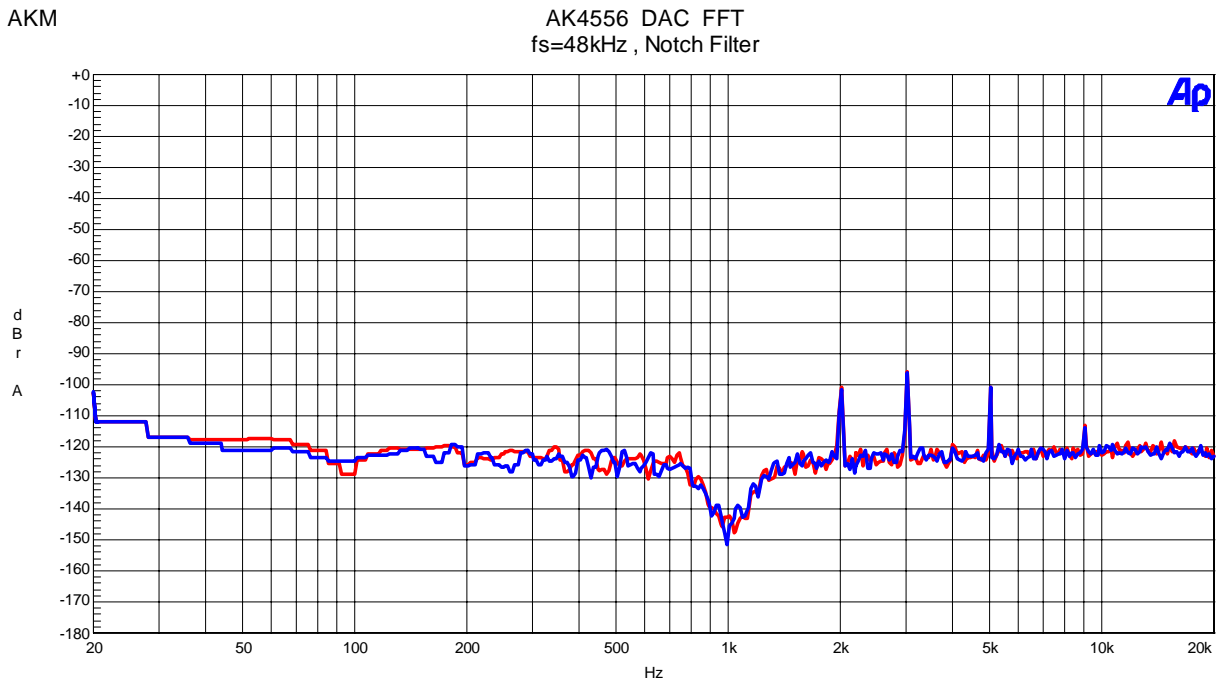


Figure 29. FFT (fin=1kHz , Input Level=0dBFS , Notch Filter)

AKM

AK4556 DAC FFT
fs=48kHz , -60dB Input

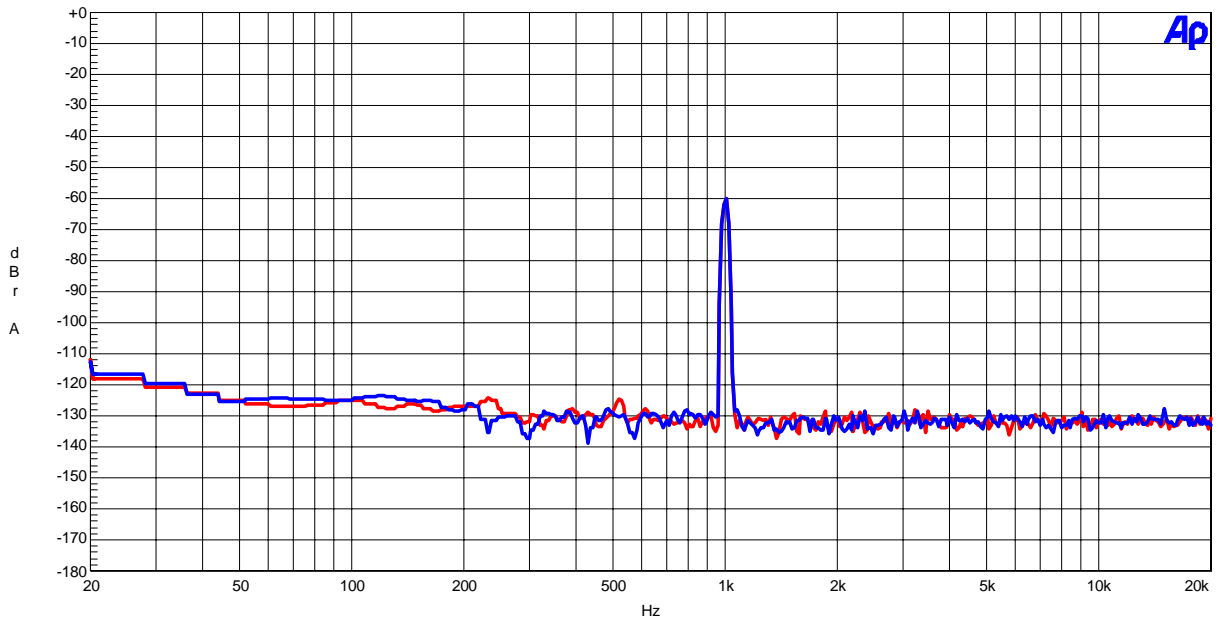


Figure 30. FFT (fin=1kHz , Input Level=-60dBFS)

AKM

AK4556 DAC FFT
fs=48kHz , No Signal

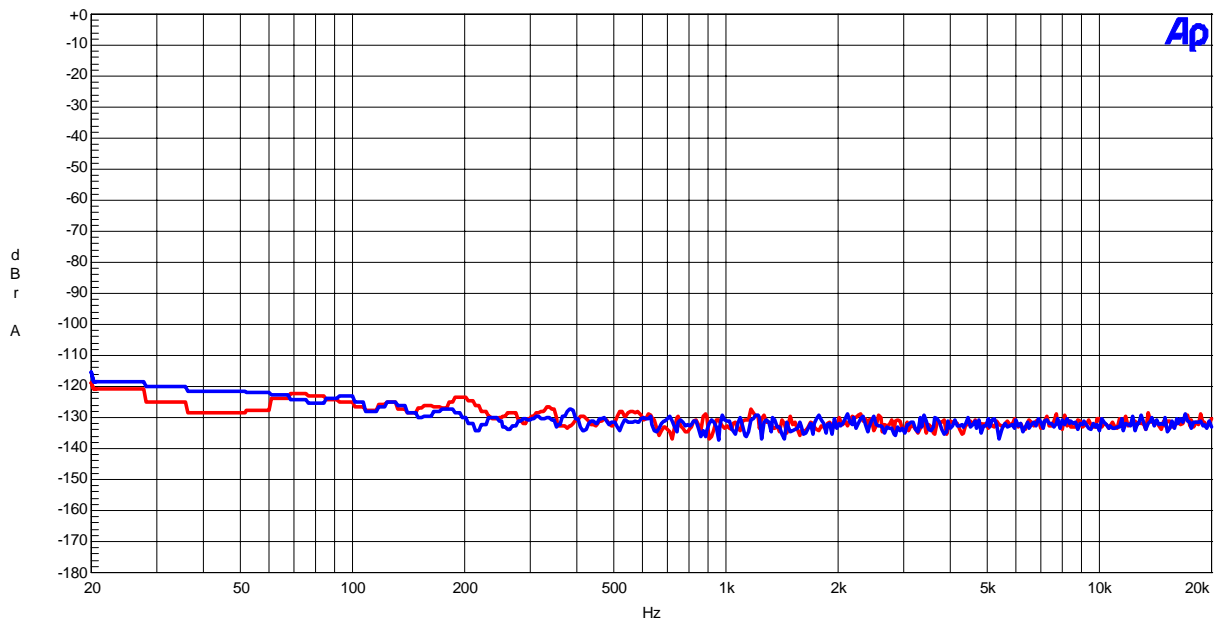


Figure 31. FFT (fin=1kHz , No Signal)

AKM

AK4556 DAC THD + N vs Input Level
fs=48kHz

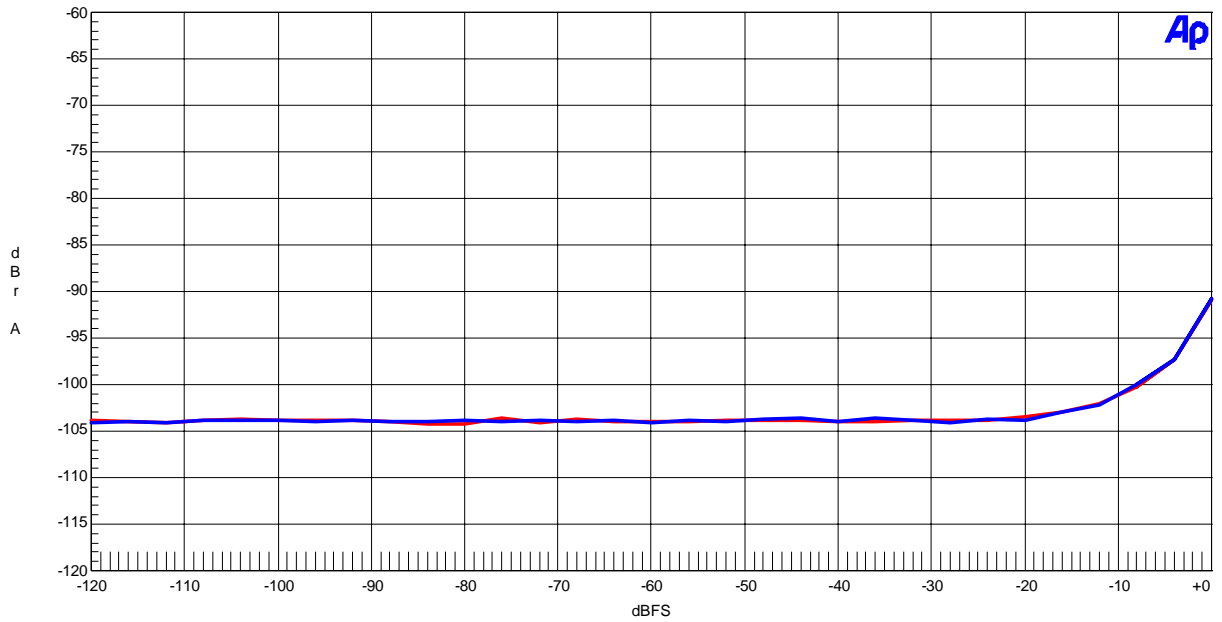


Figure 32. THD+N vs Input Level (fin=1kHz)

AKM

AK4556 DAC THD + N vs Input Frequency
fs=48kHz

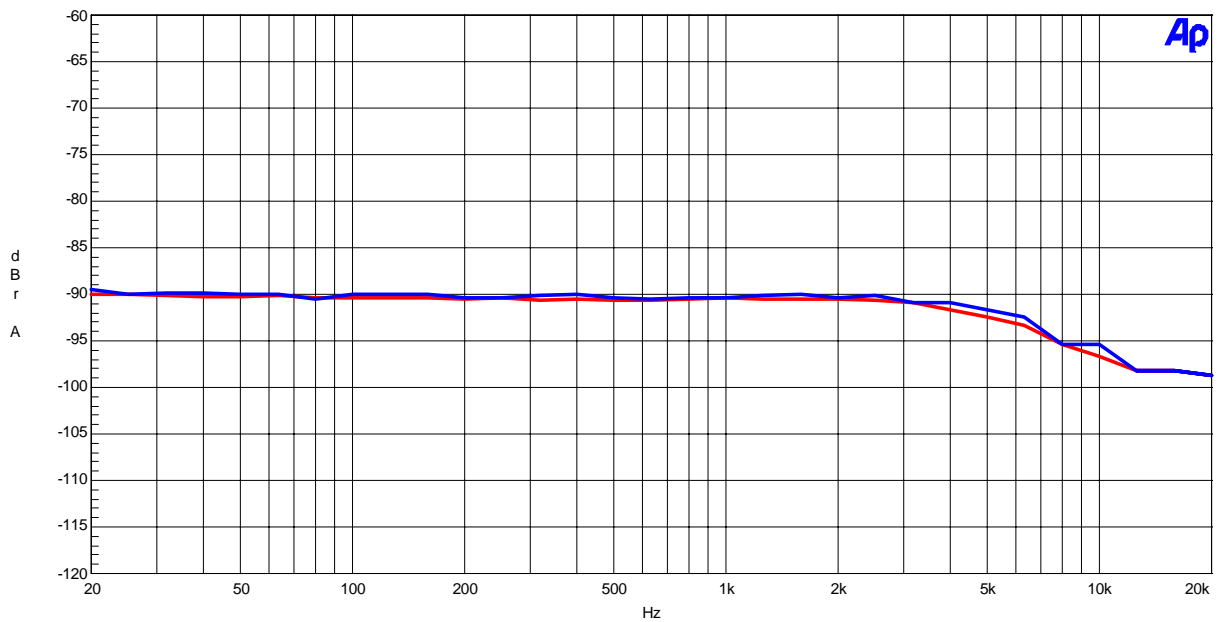


Figure 33. THD+N vs Input Frequency (Input Level =0dBFS)

AKM

AK4556 DAC Linearity
fs=48kHz

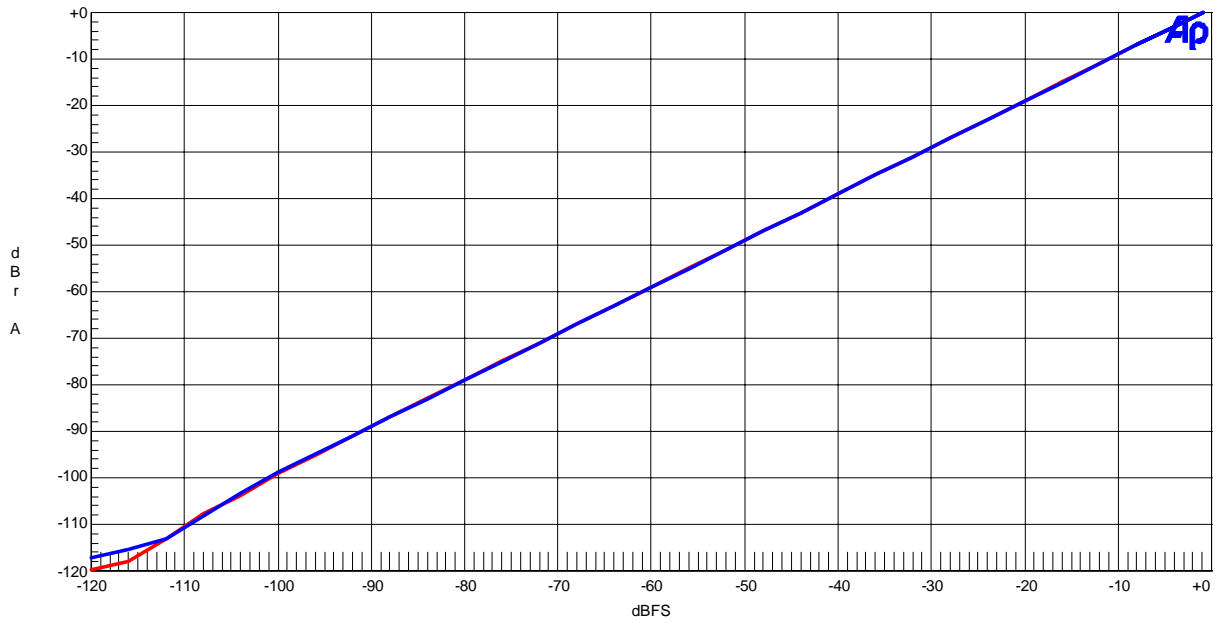


Figure 34. Linearity (fin=1kHz)

AKM

AK4556 DAC Frequency Response
fs=48kHz

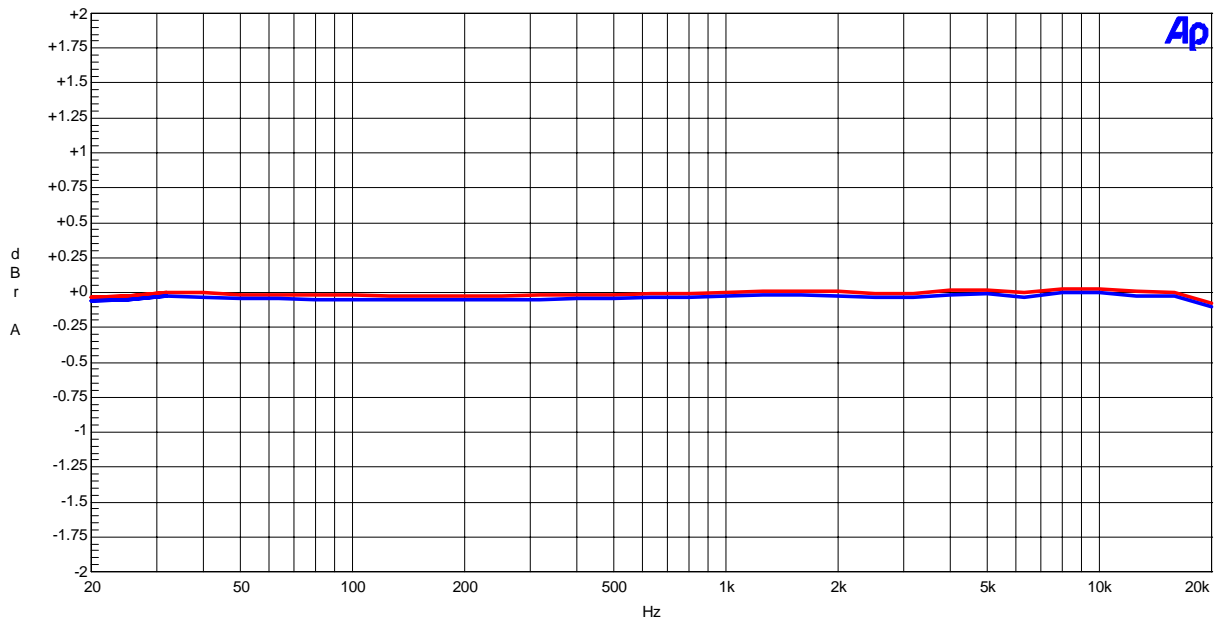


Figure 35. Frequency Response

AKM

AK4556 DAC Crosstalk
fs=48kHz

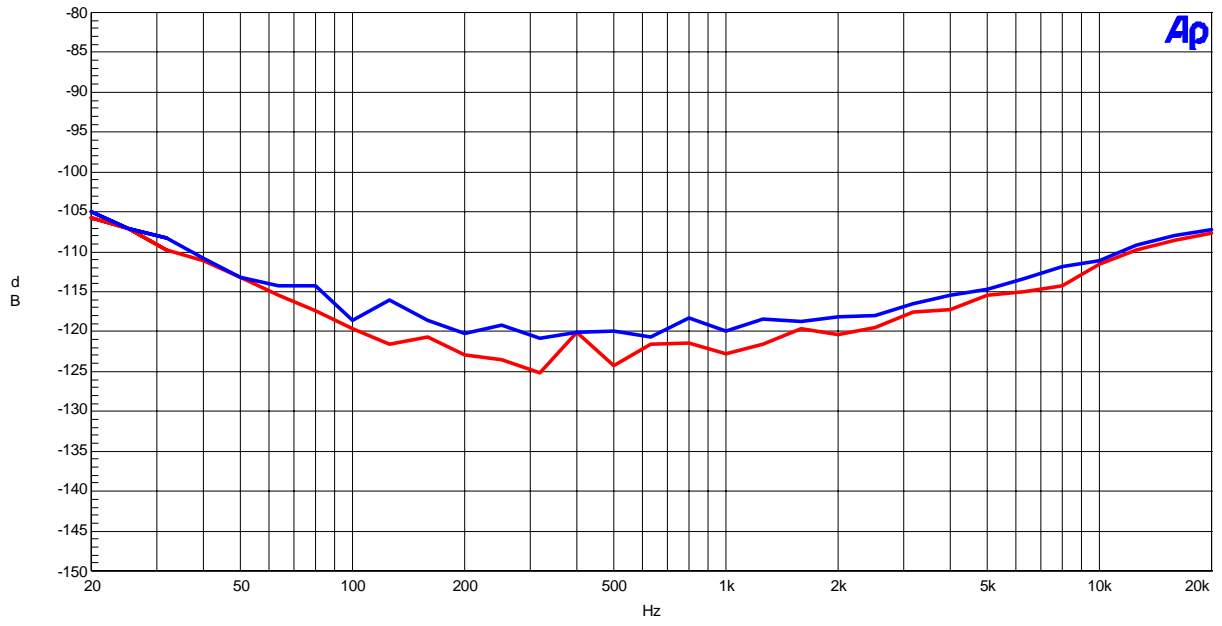


Figure 36. Crosstalk

fs=96kHz

AKM

AK4556 DAC FFT
fs=96kHz, 0dB Input

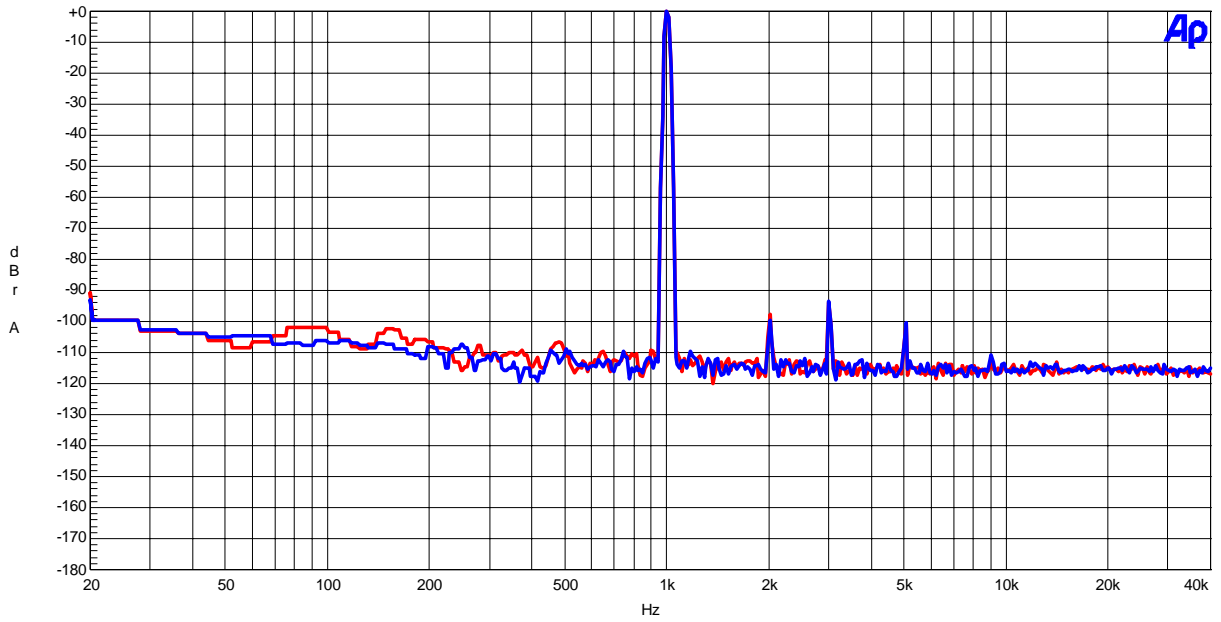


Figure 37. FFT (fin=1kHz, Input Level=0dBFS)

AKM

AK4556 DAC FFT
fs=96kHz, Notch Filter

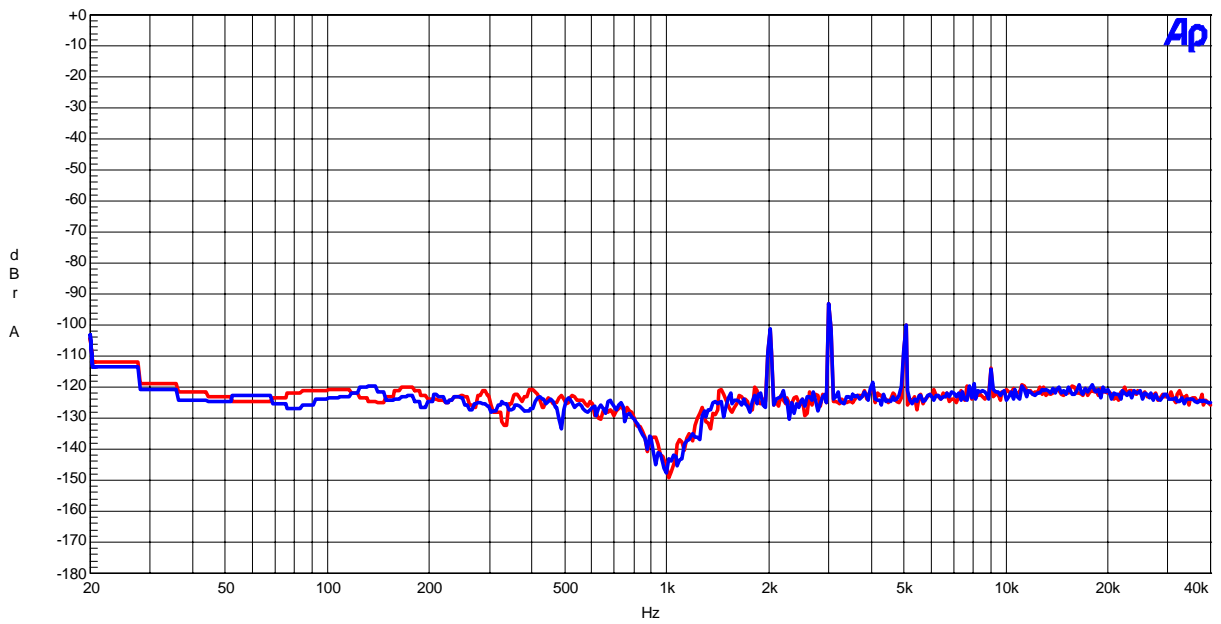


Figure 38. FFT (fin=1kHz, Input Level=0dBFS, Notch Filter)

AKM

AK4556 DAC FFT
fs=96kHz , -60dB Input

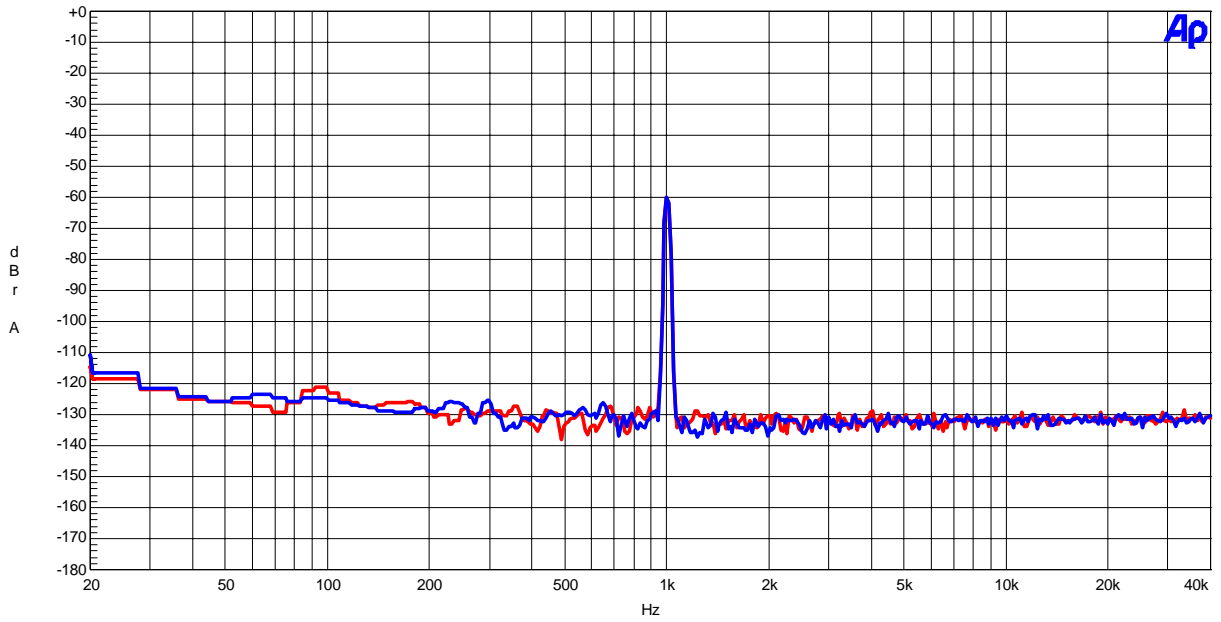


Figure 39. FFT (fin=1kHz , Input Level=-60dBFS)

AKM

AK4556 DAC FFT
fs=96kHz , No Signal

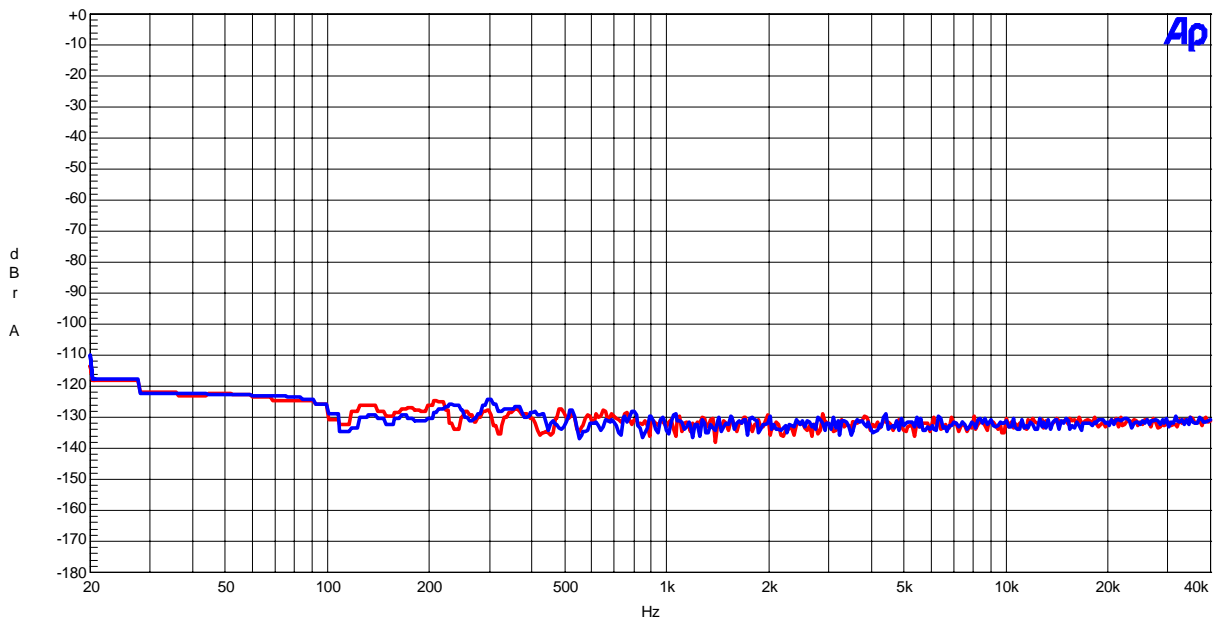


Figure 40. FFT (fin=1kHz , No Signal)

AKM

AK4556 DAC THD + N vs Input Level
fs=96kHz

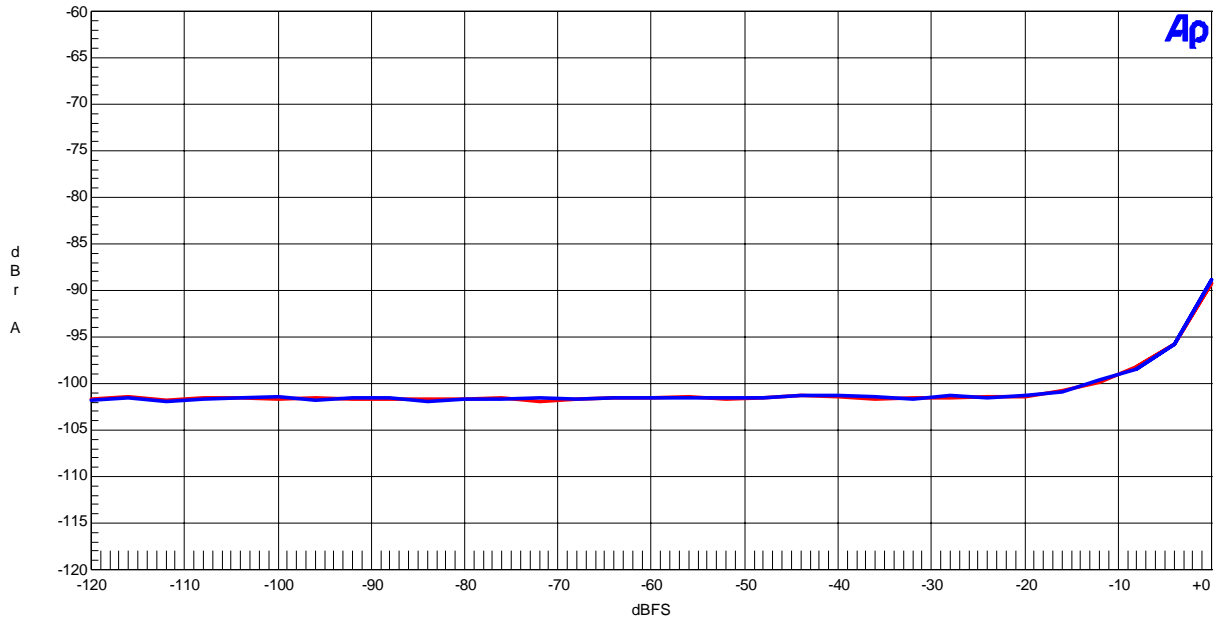


Figure 41. THD+N vs Input Level (fin=1kHz)

AKM

AK4556 DAC THD + N vs Input Frequency
fs=96kHz

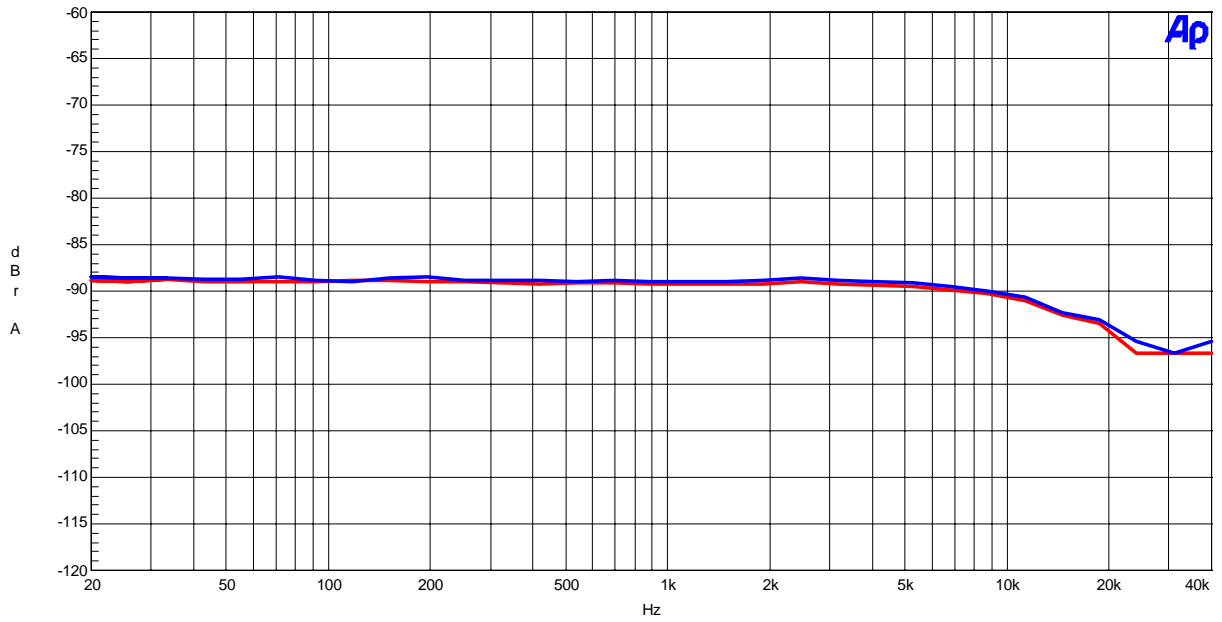


Figure 42. THD+N vs Input Frequency (Input Level =-1dBFS)

AKM

AK4556 DAC Linearity
fs=96kHz

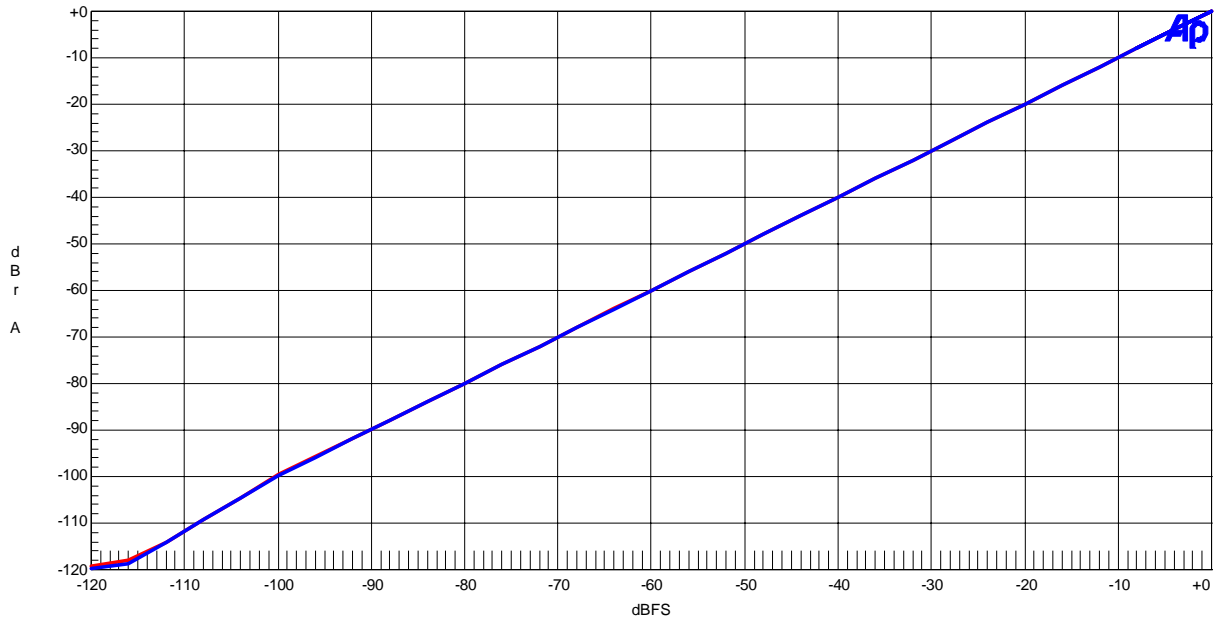


Figure 43. Linearity (fin=1kHz)

AKM

AK4556 DAC Frequency Response
fs=96kHz

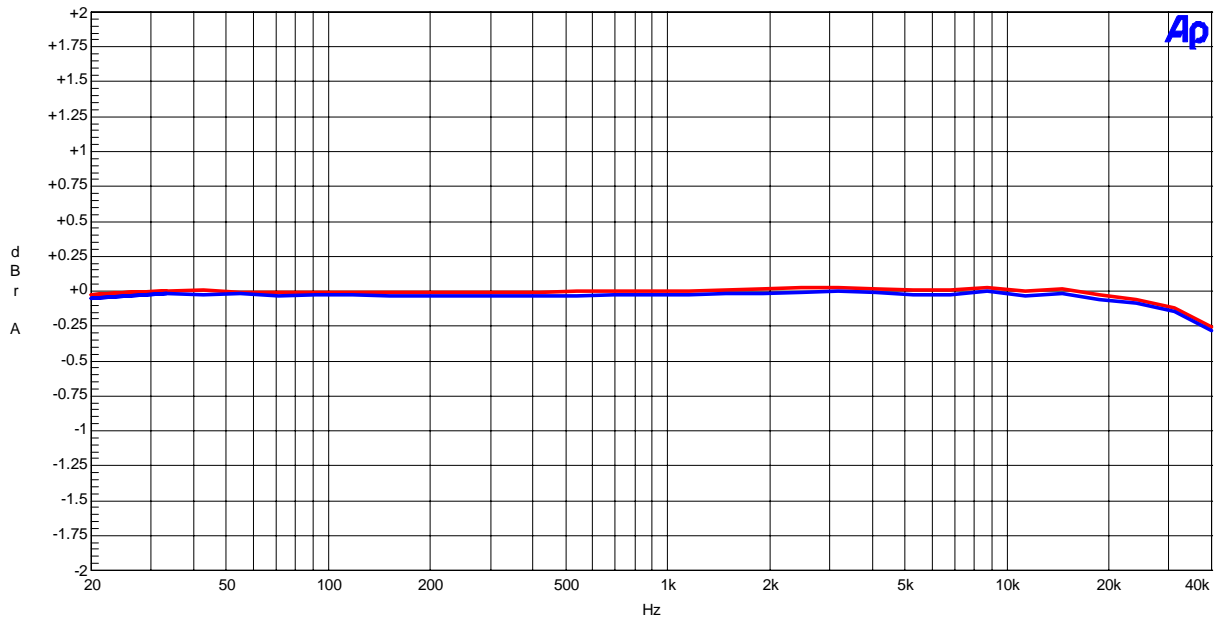


Figure 44. Frequency Response

AKM

AK4556 DAC Crosstalk
fs=96kHz

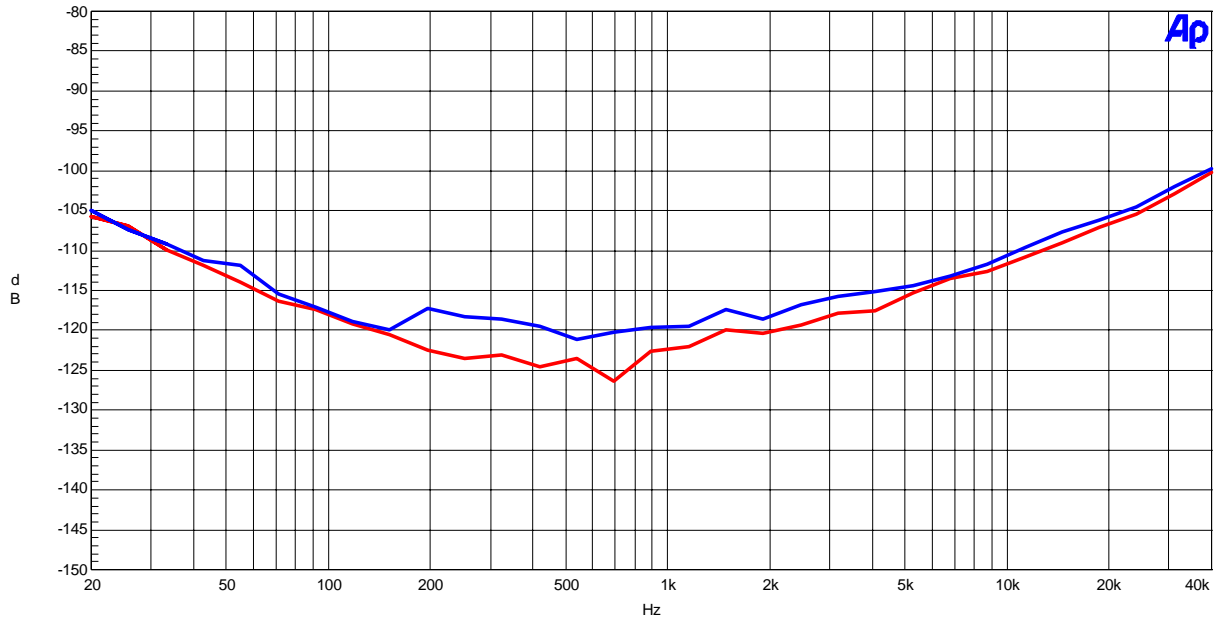


Figure 45. Crosstalk

fs=192kHz

AKM

AK4556 DAC FFT
fs=192kHz , 0dB Input

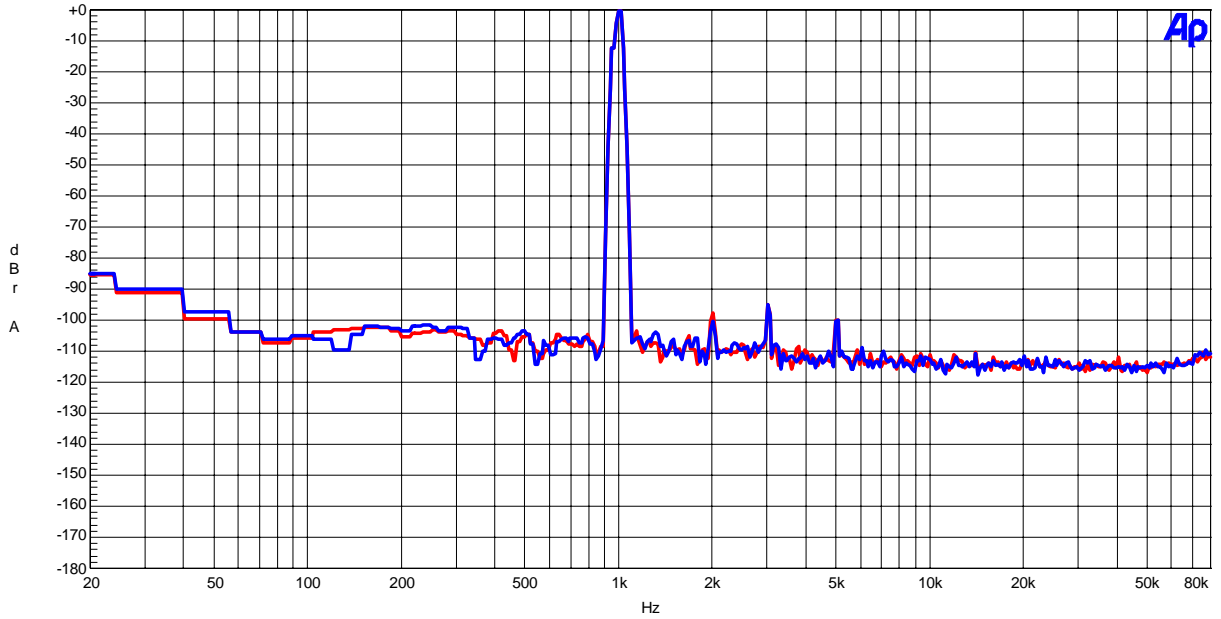


Figure 46. FFT (fin=1kHz , Input Level=0dBFS)

AKM

AK4556 DAC FFT
fs=192kHz , Notch Filter

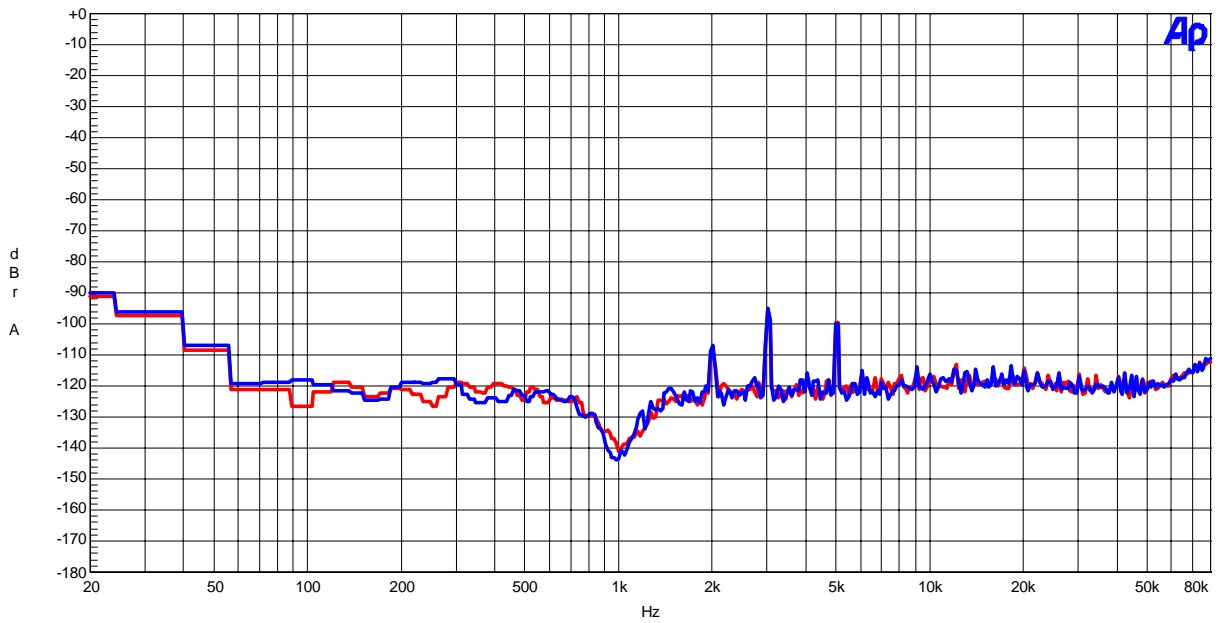


Figure 47. FFT (fin=1kHz , Input Level=0dBFS , Notch Filter)

AKM

AK4556 DAC FFT
fs=192kHz, -60dB Input

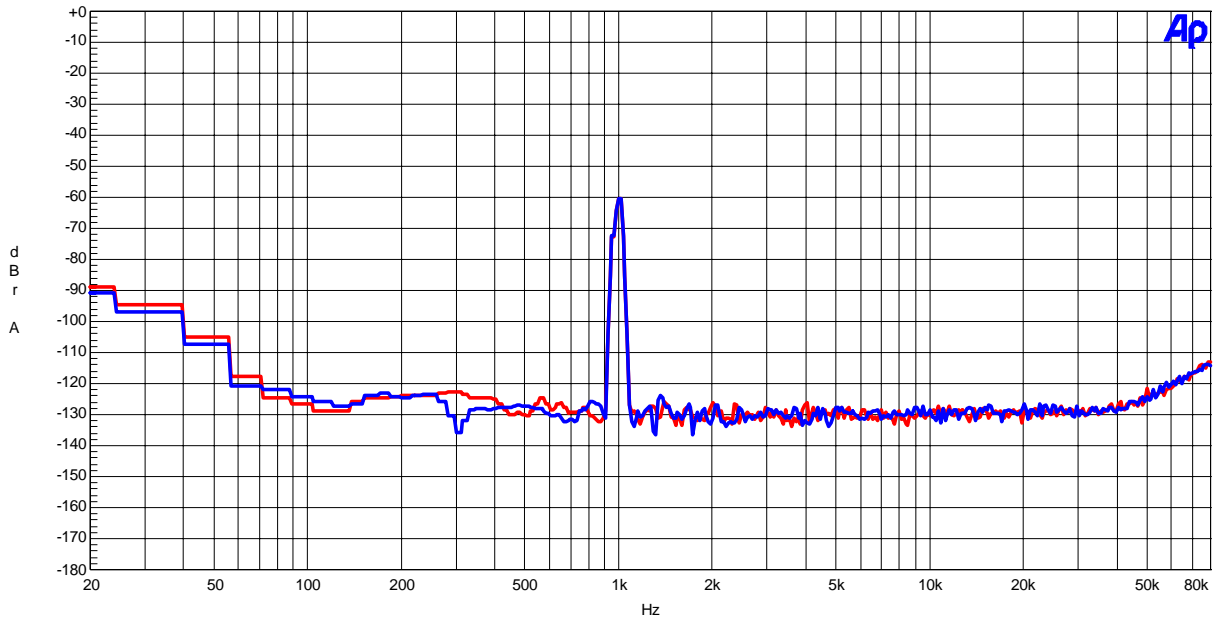


Figure 48. FFT (fin=1kHz, Input Level=-60dBFS)

AKM

AK4556 DAC FFT
fs=192kHz, No Signal

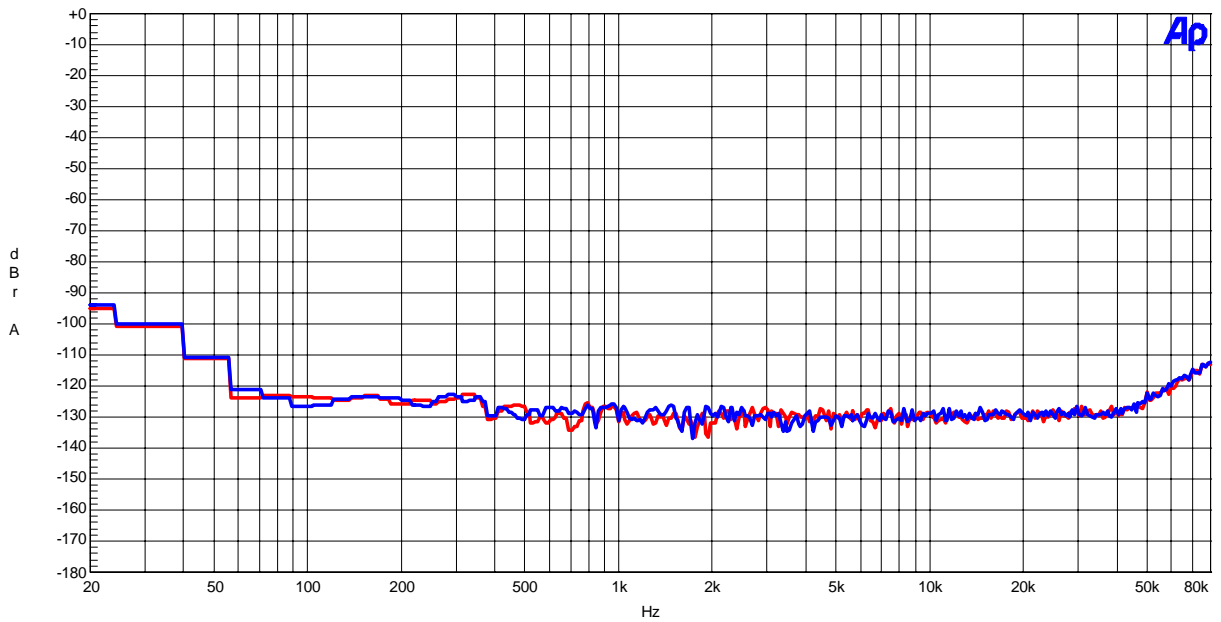


Figure 49. FFT (fin=1kHz, No Signal)

AKM

AK4556 DAC THD + N vs Input Level
fs=192kHz

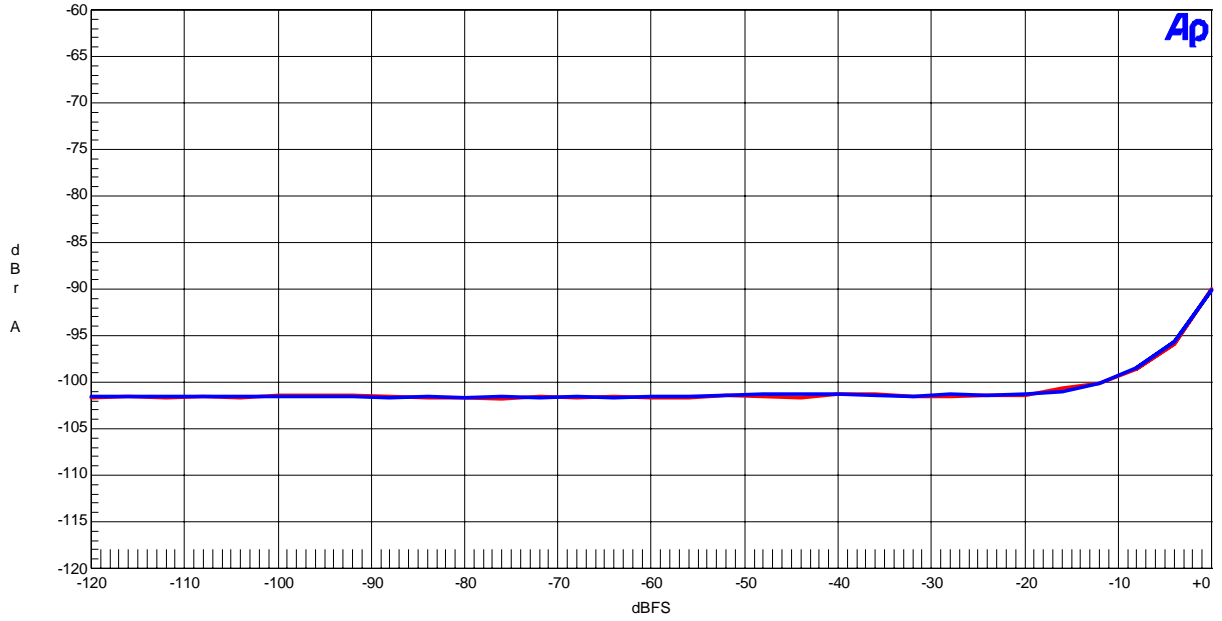


Figure 50. THD+N vs Input Level (fin=1kHz)

AKM

AK4556 DAC THD + N vs Input Frequency
fs=192kHz

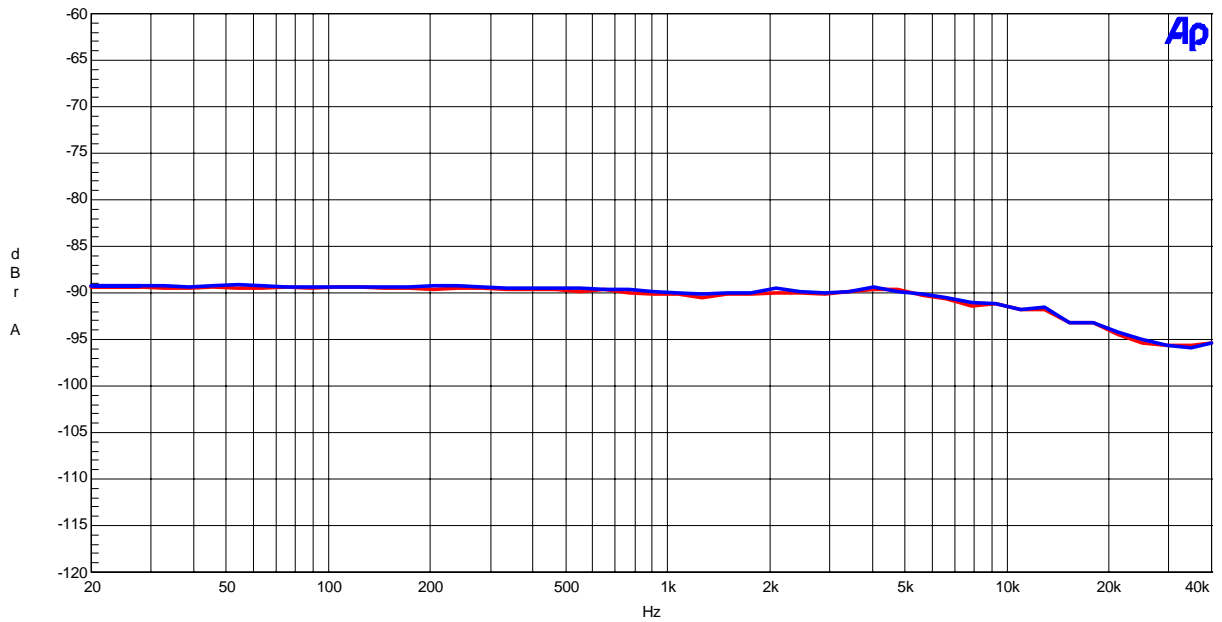


Figure 51. THD+N vs Input Frequency (Input Level =0dBFS)

AKM

AK4556 DAC Linearity
fs=192kHz

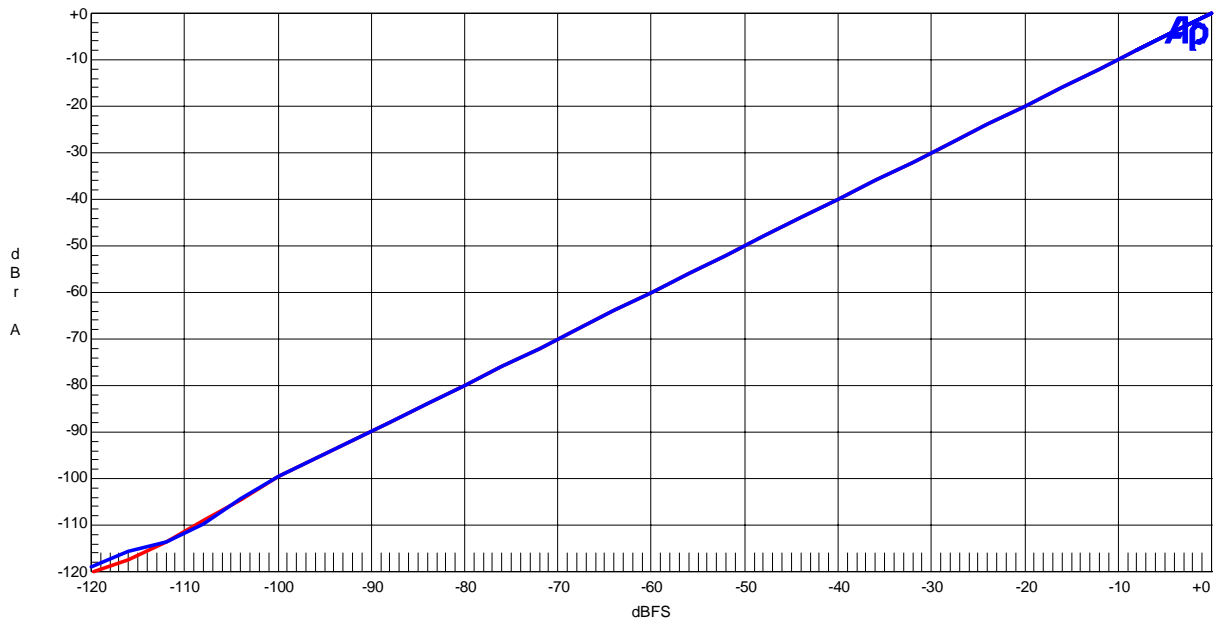


Figure 52. Linearity (fin=1kHz)

AKM

AK4556 DAC Frequency Response
fs=192kHz

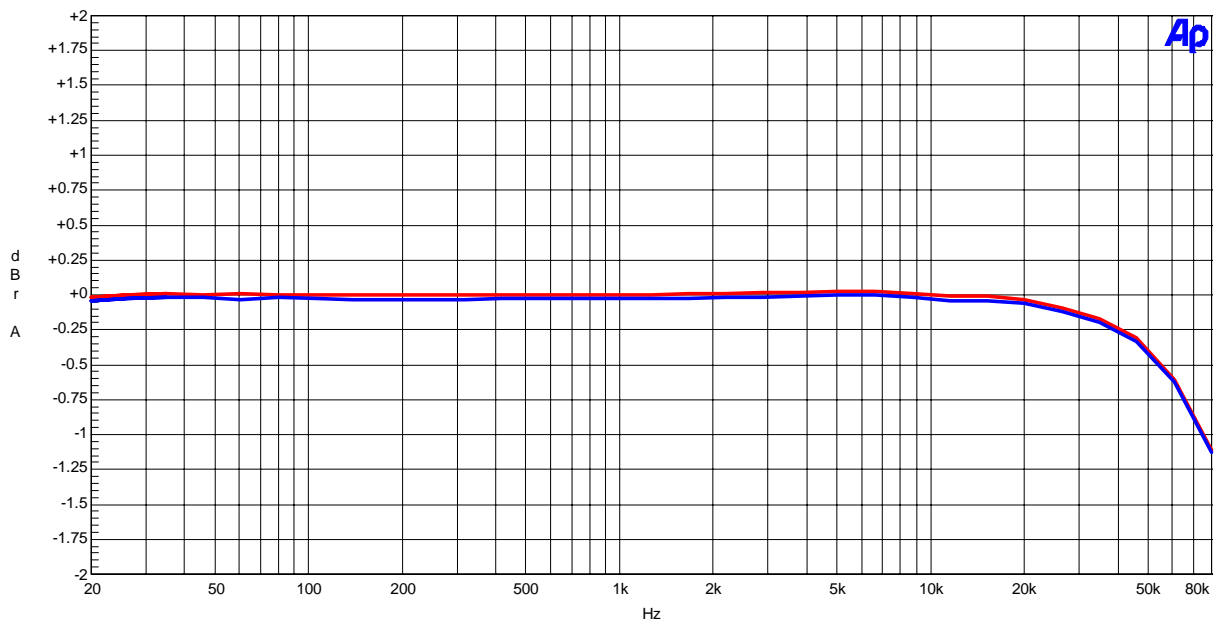


Figure 53. Frequency Response

AKM

AK4556 DAC Crosstalk
fs=192kHz

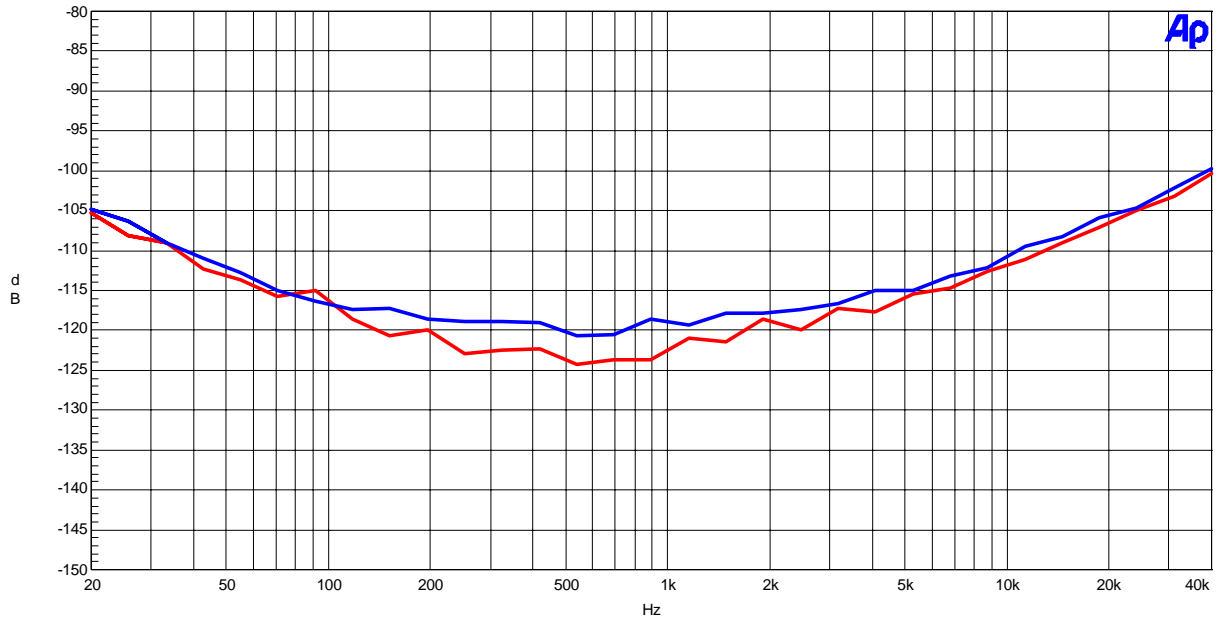


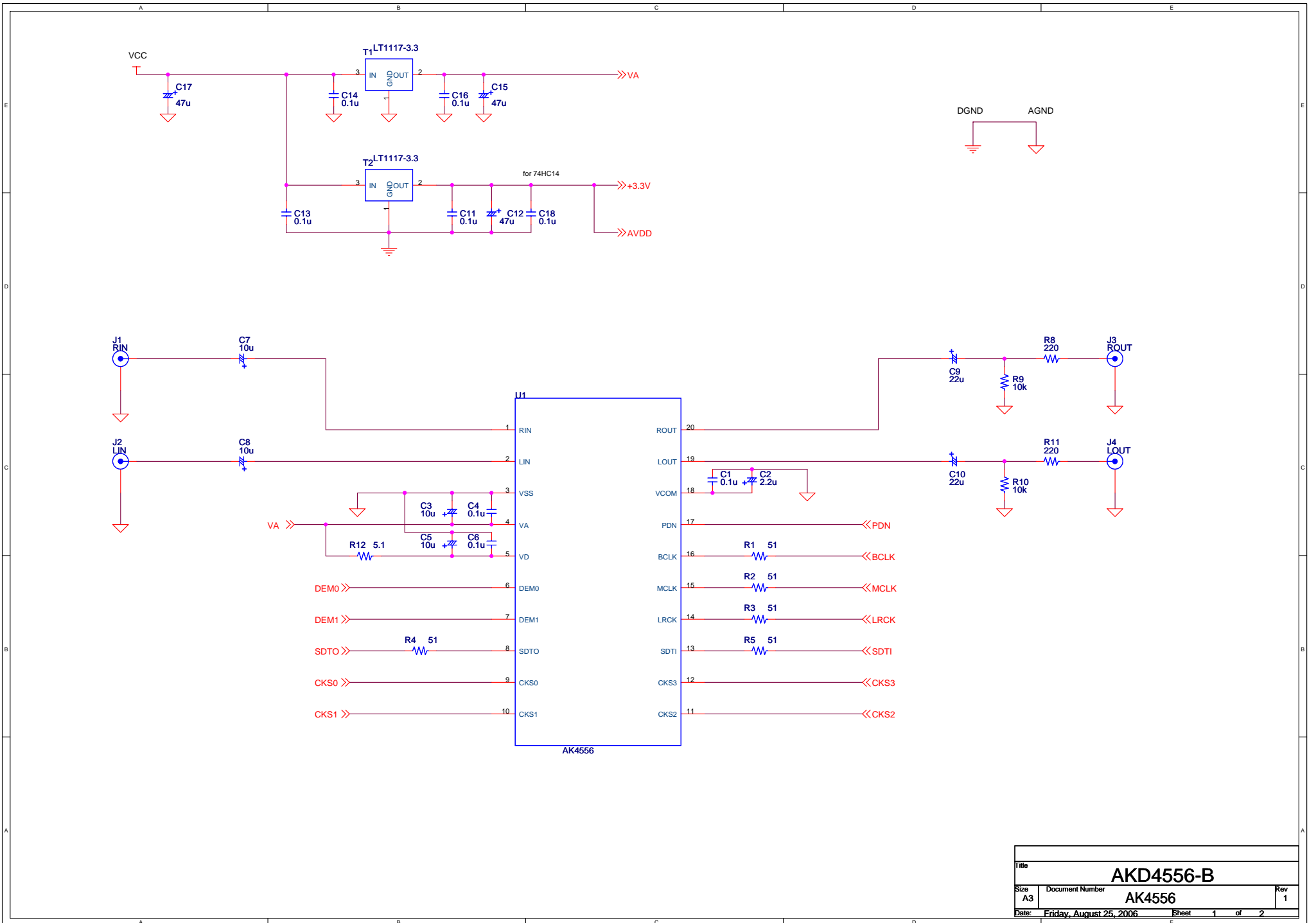
Figure 54. Crosstalk

Revision History

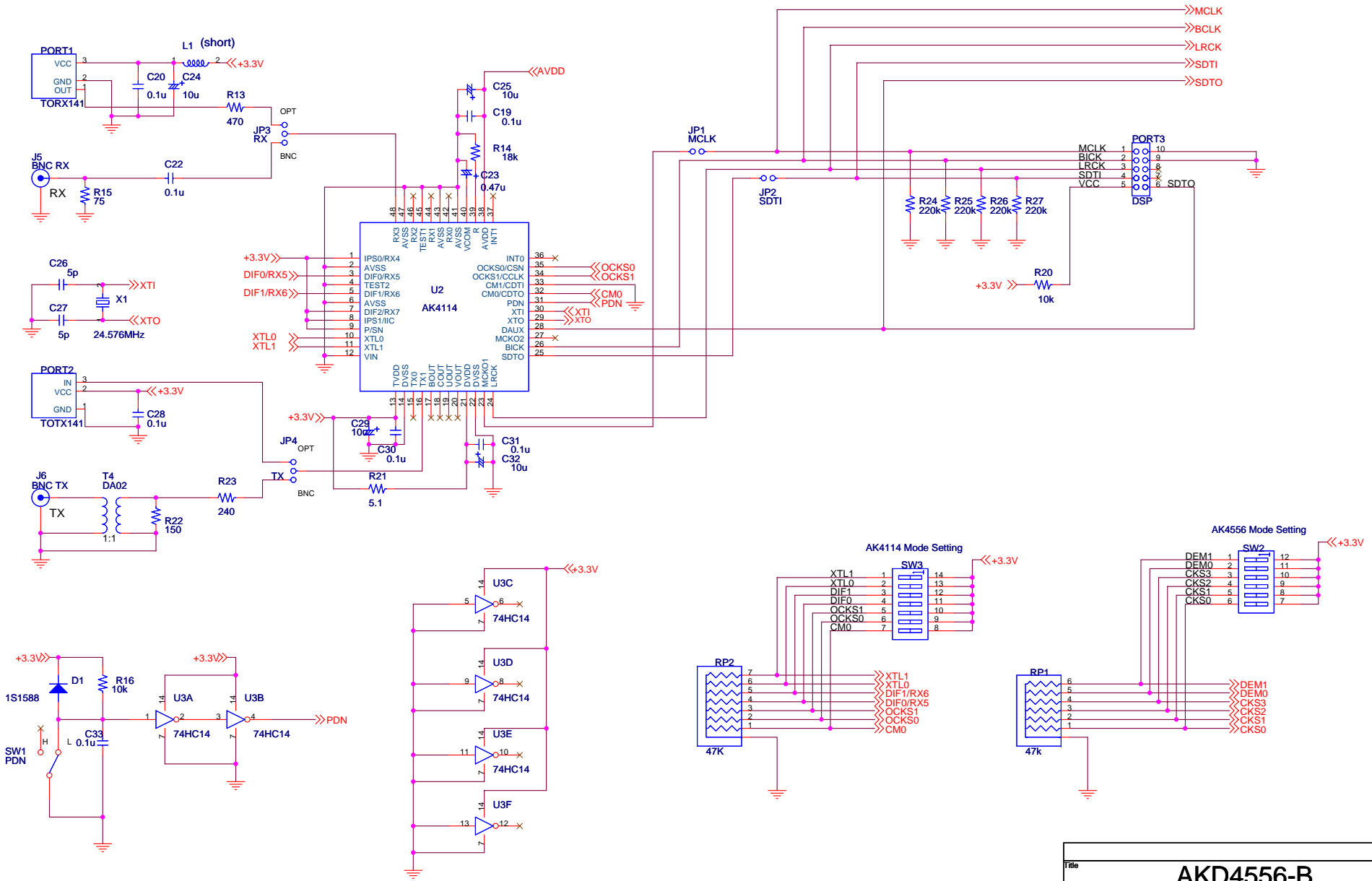
Date (YY/MM/DD)	Manual Revision	Board Revision	Reason	Contents
06/05/18	KM082900	0	First Edition	
06/08/25	KM082901	1	Change device revision	<ul style="list-style-type: none"> • AK4556 Rev.A → Rev.B • Table Data & Plot Data were updated.

IMPORTANT NOTICE

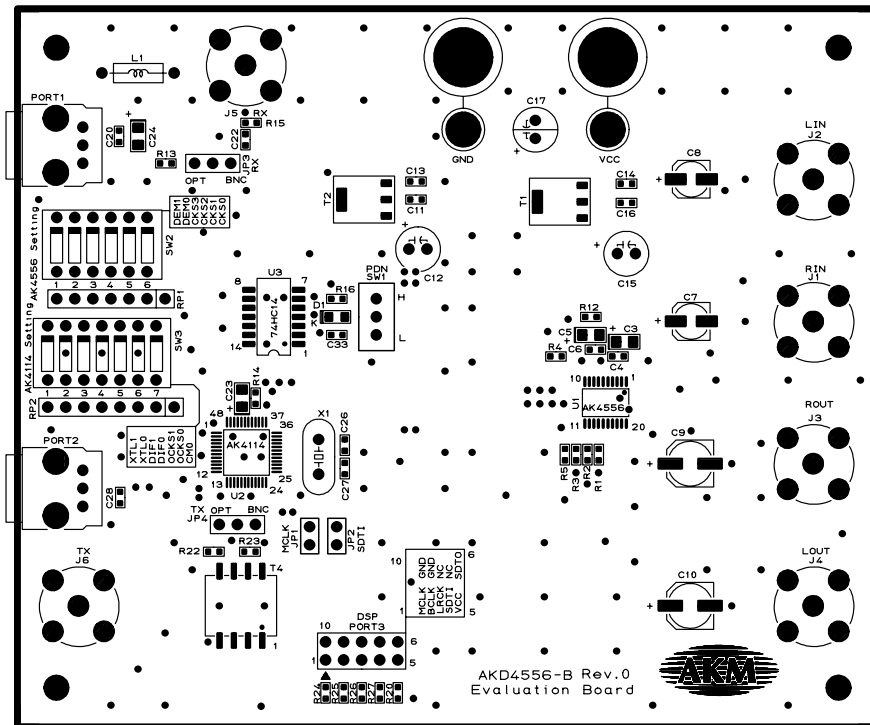
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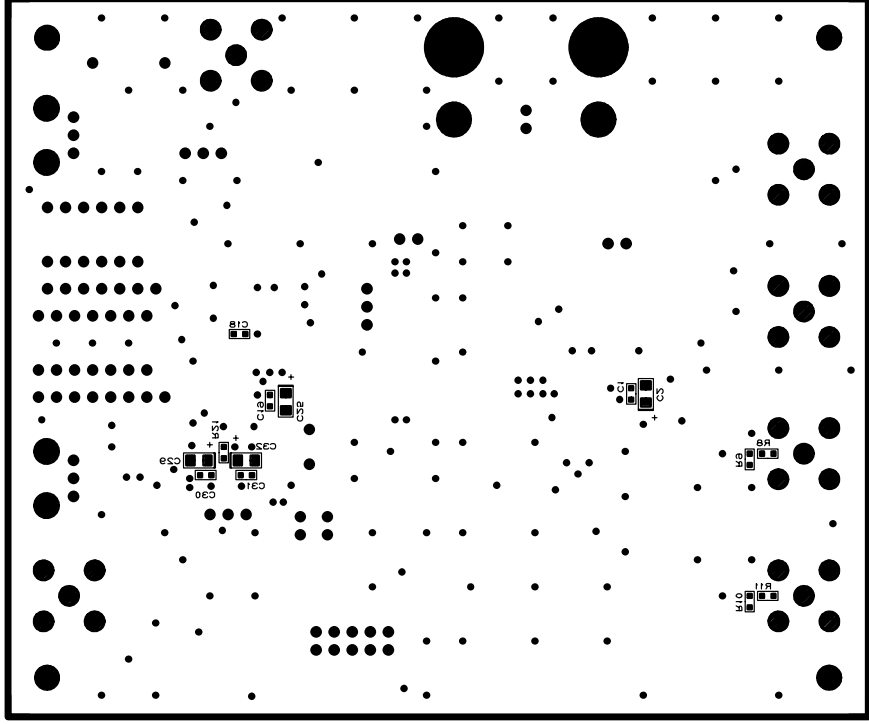
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Size	Document Number			Rev
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Date:	Friday, August 25, 2006	Sheet	1	of 2



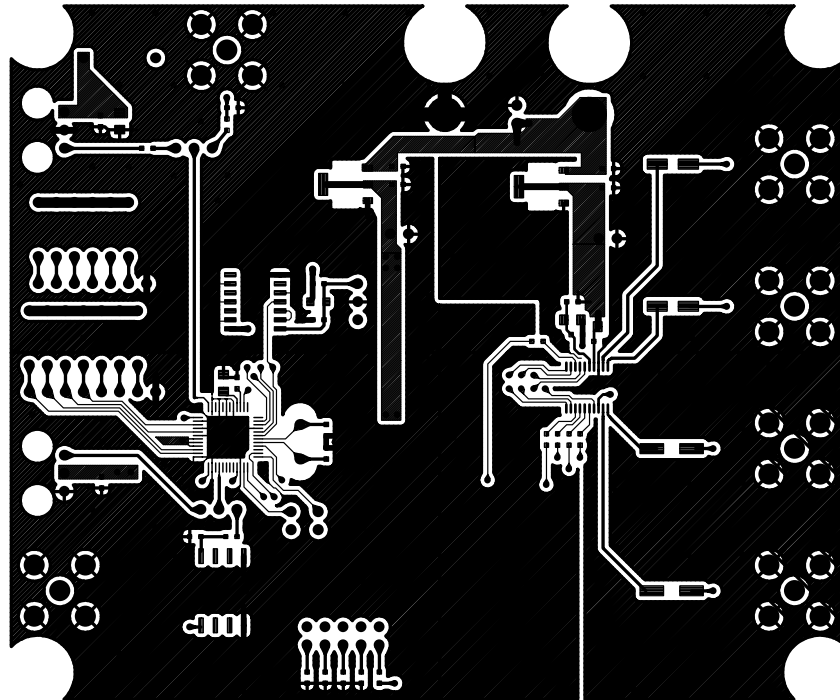
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		Rev	1



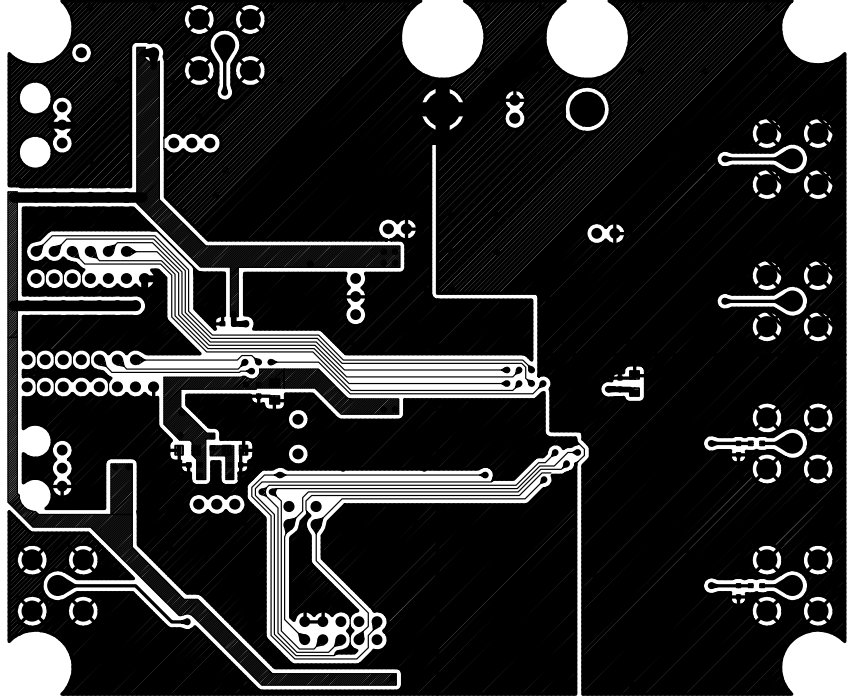
AKD4556-B L1 SILK



AKD422E-B LZ SILK



AKD4556-B L1



AKD422E-B LS