

AKD5385A

Evaluation board Rev.A for AK5385A

GENERAL DESCRIPTION

AKD5385A is an evaluation board for the digital audio 24bit 192kHz A/D converter, AK5385A. The AKD5385A includes the input circuit and also has a digital interface transmitter. Further, the AKD5385A can achieve the interface with digital audio systems via opt-connector.

■ Ordering guide

AKD5385A --- Evaluation board for AK5385A

FUNCTION

- DIT with optical output
- BNC connector for an external clock input

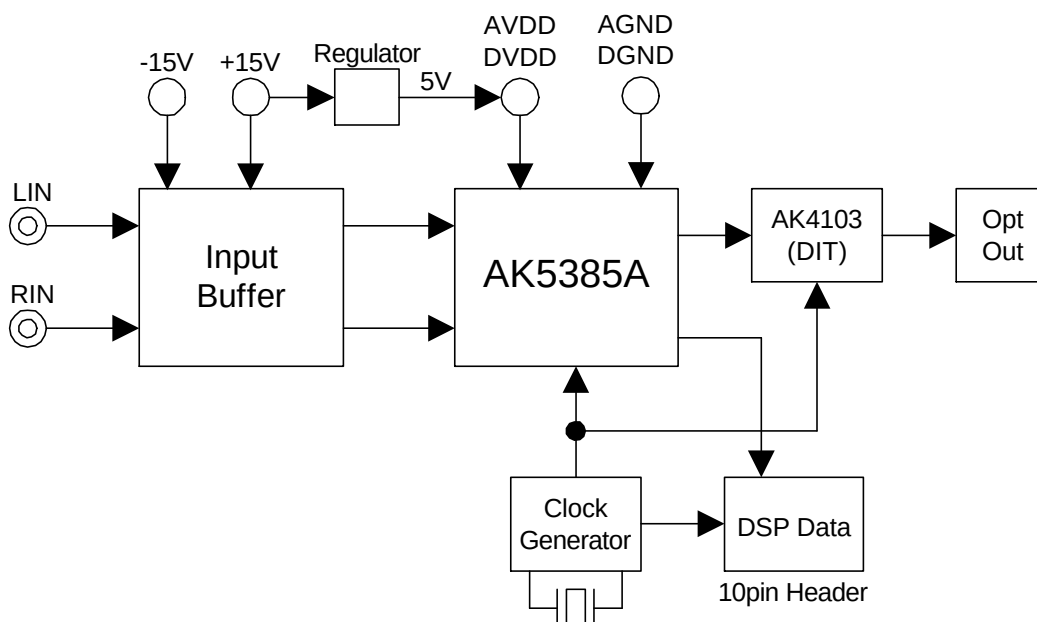


Figure 1. AKD5385A Block Diagram

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

■ Operation sequence

1) Set up the power supplies lines.

[AVDD]	(red)	= 4.75 ~ 5.25V	: for AVDD of AK5385A (typ. 5.0V)
[DVDD]	(red)	= 3.0 ~ 5.25V	: for DVDD of AK5385A (typ. 3.3V)
[+15V]	(green)	= +15V	: for Op-amp
[-15V]	(blue)	= -15V	: for Op-amp
[VCC]	(red)	= 5V	: for logic
[AGND]	(black)	= 0V	: for analog ground
[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.

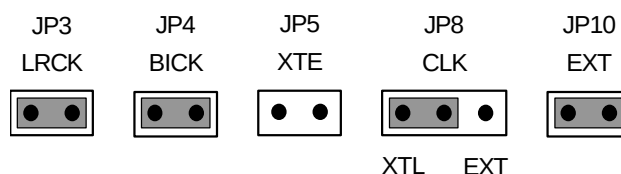
The AK5385A and AK4103 should be reset once bringing SW1 = "L" upon power-up.

■ Evaluation mode

(1) Slave Mode

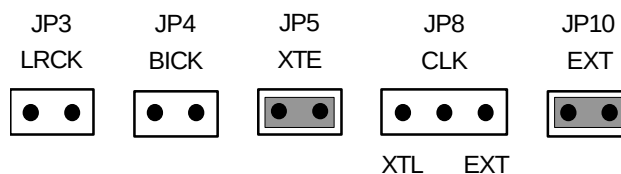
(1-1) A/D evaluation using DIT function of AK4103

PORT1 (DIT) is used. DIT generates audio bi-phase signal from received data and which is output through optical connector (TOTX176). 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 PORT2 (DSP). In case of using external clock through a BNC connector (J3), select EXT on JP8 (CLK) and short JP5 (XTE) and open JP10 (EXT).



(1-2) Feeding all clocks from PORT2 (DSP)

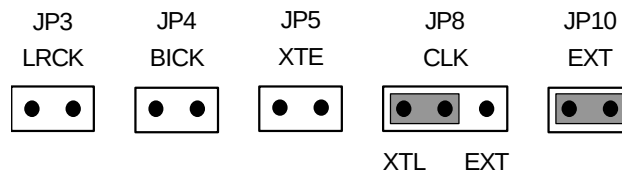
Under the following set-up, all external clocks (MCLK, BICK, LRCK) can be fed through PORT2 (DSP). The A/D converted data is output from SDTO of PORT2 (DSP). Also, the A/D converted data is output through optical connector (TOTX176).



(2) Master Mode

(2-1) A/D evaluation using DIT function of AK4103

PORT1 (DIT) is used. DIT generates audio bi-phase signal from received data and which is output through optical connector (TOTX176). 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 PORT2 (DSP). In case of using external clock through a BNC connector (J3), select EXT on JP8 (CLK) and short JP5 (XTE) and open JP10 (EXT).



■ 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. JP2 (AVDD) : Select AVDD for AK5385A
 AVDD : Supply from AVDD connector <Default>
 REG : Supply from regulator. AVDD connector should be supplied +15V.
3. JP6 (BCFS) : Select BICK frequency
 256 : In case of MCLK=256fs/512fs <Default>
 384 : In case of MCLK=128fs/384fs
4. JP7 (MCLK) : Supply MCLK frequency for 74HC4040
 256 : In case of MCLK=128fs/256fs
 512 : In case of MCLK=512fs <Default>
 384/768 : In case of MCLK=384fs
5. JP9 (LRFS) : Select LRCK frequency
 256 : In case of MCLK=256fs/512fs <Default>
 384 : In case of MCLK=128fs/384fs

■ Clock Setting

Mode	fs	MCLK	JP6(BCFS)	JP7(MCLK)	JP9(LRFS)
Normal Speed	8kHz	256fs = 2.048MHz	256	256	256
		384fs = 3.072MHz	384	384/768	384
		512fs = 4.096MHz	256	512	256
	32kHz	256fs = 8.192MHz	256	256	256
		384fs = 12.288MHz	384	384/768	384
		512fs = 16.384MHz	256	512	256
	44.1kHz	256fs = 11.2896MHz	256	256	256
		384fs = 16.9344MHz	384	384/768	384
		512fs = 22.5792MHz	256	512	256
	48kHz	256fs = 12.288MHz	256	256	256
		384fs = 18.432MHz	384	384/768	384
		512fs = 24.576MHz	256	512	256
Double Speed	88.2kHz	256fs = 22.5792MHz	256	256	256
		384fs = 33.8688MHz	384	384/768	384
	96kHz	256fs = 24.576MHz	256	256	256
		384fs = 36.864MHz	384	384/768	384
Quad Speed	176.4kHz	128fs = 22.5792MHz	384	256	384
	192kHz	128fs = 24.576MHz	384	256	384

Default

Table 1. Clock Setting

■ DIP Switch set up

[SW2] (MODE): Setting the evaluation mode for AK5385A and AK4103
ON is “H”, OFF is “L”.

No.	Name	OFF (“L”)	ON (“H”)	Default
1	CKS0	See Table 3		OFF (“L”)
2	CKS1			ON (“H”)
3	DIF	MSB justified	I ² S Compatible	OFF (“L”)
4	M/S	Slave mode	Master mode	OFF (“L”)
5	DFS0	See Table 4		OFF (“L”)
6	DFS1			OFF (“L”)
7	HPFE	HPF Disable	HPF Enable	ON (“H”)
8	DIT1	See Table 5		ON (“H”)
9	DIT0			OFF (“L”)
10	-	N/A	N/A	OFF (“L”)

Table 2. Mode Setting

CKS1	CKS0	MCLK Frequency	Default
L	L	256fs	
L	H	128fs	
H	L	512fs	
H	H	384fs	

Table 3. MCLK Frequency

DFS1	DFS0	LRCK Frequency	Default
L	L	8kHz ≤ fs ≤ 54kHz	
L	H	54kHz < fs ≤ 108kHz	
H	L	108kHz < fs ≤ 216kHz	
H	H	N/A	

Table 4. Sampling Speed

Mode	DIT1	DIT0	MCLK	fs	Default
0	L	L	256fs	~ 108kHz	
1	L	H	128fs	~ 216kHz	
2	H	L	512fs	~ 54kHz	
3	H	H	384fs	~ 54kHz	

Table 5. MCLK Frequency Setting of AK4103

■ The function of the toggle SW

Upper-side is “H” and lower-side is “L”.

[SW1] (PDN): Resets the AK5385A and AK4103. Keep “H” during normal operation.

■ Input Circuit

Analog signal is input to LIN/RIN pins via J1, J2 connectors.

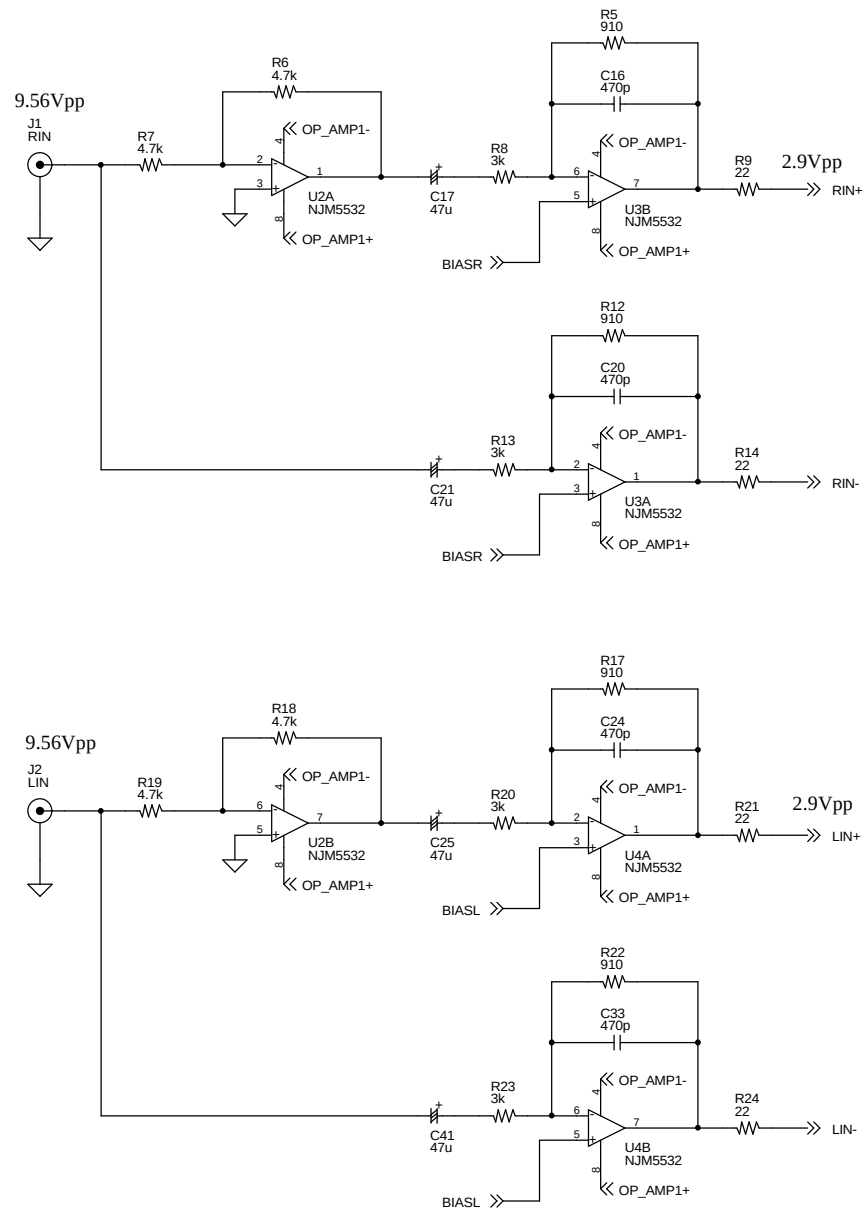


Figure 2. LIN/RIN Input circuits

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

MEASUREMENT RESULTS

[Measurement condition]

- Measurement unit : Audio Precision, System Two Cascade
- MCLK : 256fs@fs=48kHz/96kHz, 128fs@fs=192kHz
- BICK : 64fs
- fs : 48kHz, 96kHz, 192kHz
- Band width : 10Hz ~ 20kHz@fs=48kHz, 10Hz ~ 40kHz@fs=96kHz/192kHz
- Bit : 24bit
- Power Supply : AVDD = 5.0V, DVDD = 3.3V
- Interface : DIT@fs=48kHz/96kHz, Serial port@fs=192kHz
- Temperature : Room

[Measurement Results]

Parameter	Result (Lch/Rch)	Unit
ADC Analog Input Characteristics:		
S/(N+D)		
(fs=48kHz, -1dBFS, BW=20kHz)	101.3 / 101.4	dB
(fs=48kHz, -1dBFS, BW=20kHz, VREF Cap=100μF, Note)	103.5 / 104.1	dB
(fs=96kHz, -1dBFS, BW=40kHz)	99.5 / 100.2	dB
(fs=192kHz, -1dBFS, BW=40kHz)	99.4 / 100.2	dB
D-Range		
(fs=48kHz, -60dBFS, A-weighted)	114.0 / 114.0	dB
(fs=96kHz, -60dBFS, BW=40kHz)	106.1 / 107.2	dB
(fs=192kHz, -60dBFS, BW=40kHz)	105.6 / 107.2	dB
S/N		
(fs=48kHz, A-weighted)	114.0 / 114.0	dB
(fs=96kHz, BW=40kHz)	106.1 / 107.2	dB
(fs=192kHz, BW=40kHz)	105.6 / 107.2	dB
Interchannel Isolation		
(fs=48kHz)	125.1 / 123.3	dB
(fs=96kHz)	121.6 / 123.3	dB
(fs=192kHz)	117.6 / 123.6	dB

Note. 10μF is mounted on the VREFL and VREFR pins on the evaluation board.

[ADC Plot : fs=48kHz]

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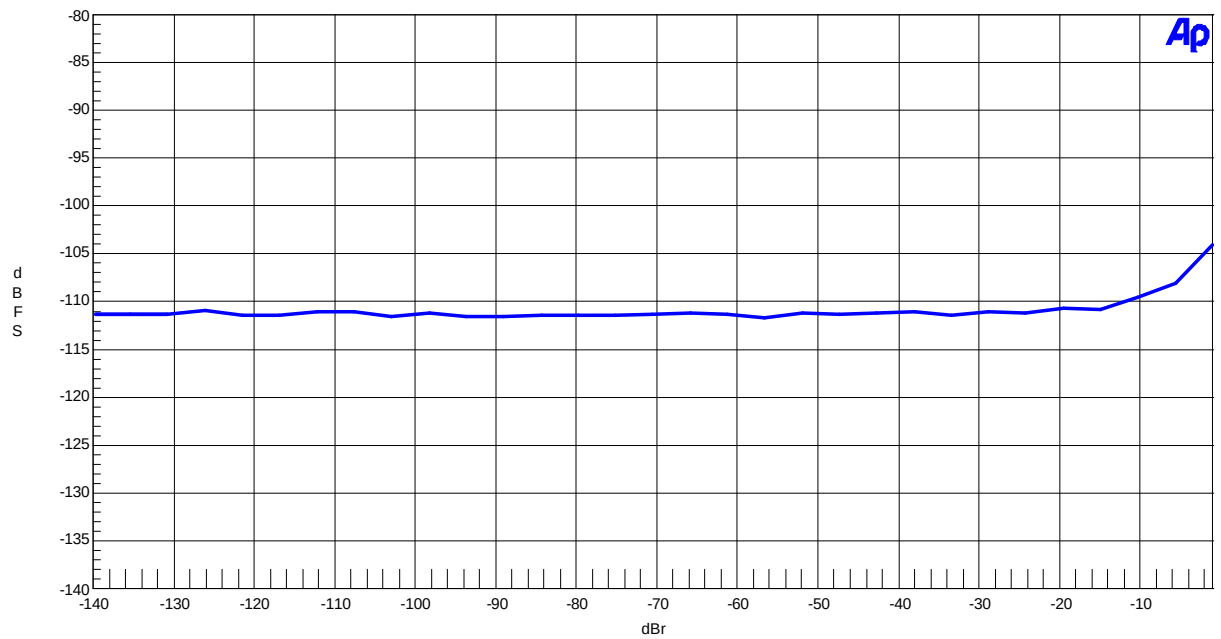
AK5385A THD+N vs. Input Level
AVDD=5.0V, DVDD=3.3V, fs=48kHz, fin=1kHz

Figure 1. THD+N vs. Input Level

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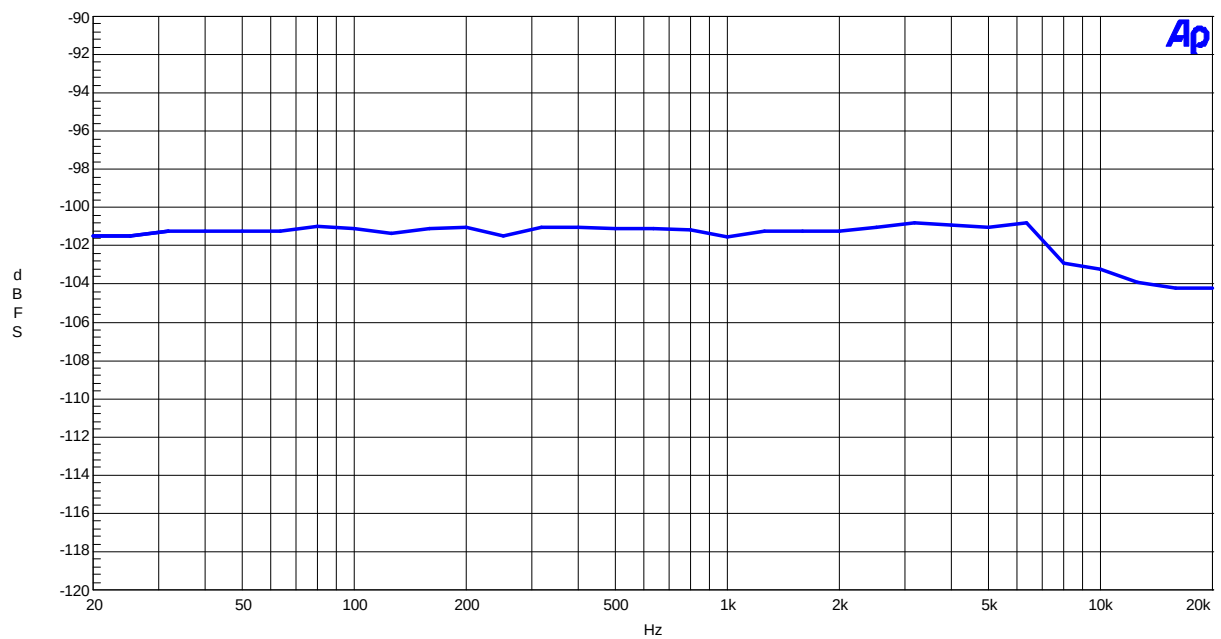
AK5385A THD+N vs. Input Frequency
AVDD=5.0V, DVDD=3.3V, fs=48kHz, Input=-1.0dBr

Figure 2. THD+N vs. Input Frequency

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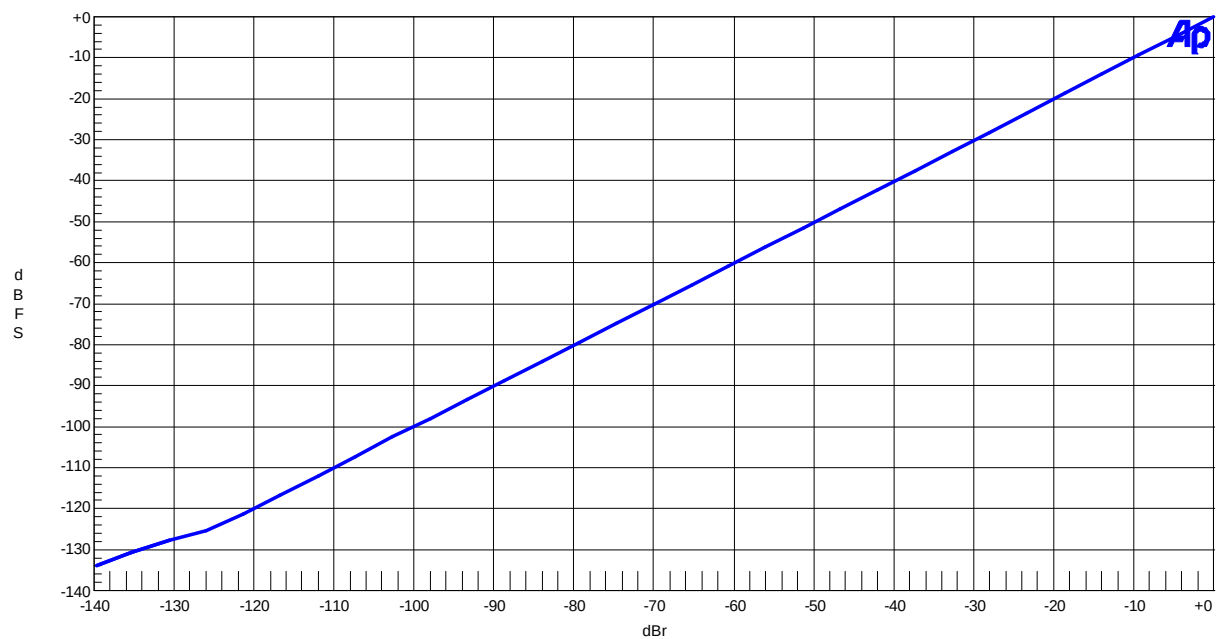
AK5385A Linearity
AVDD=5.0V, DVDD=3.3V, fs=48kHz, fin=1kHz

Figure 3. Linearity

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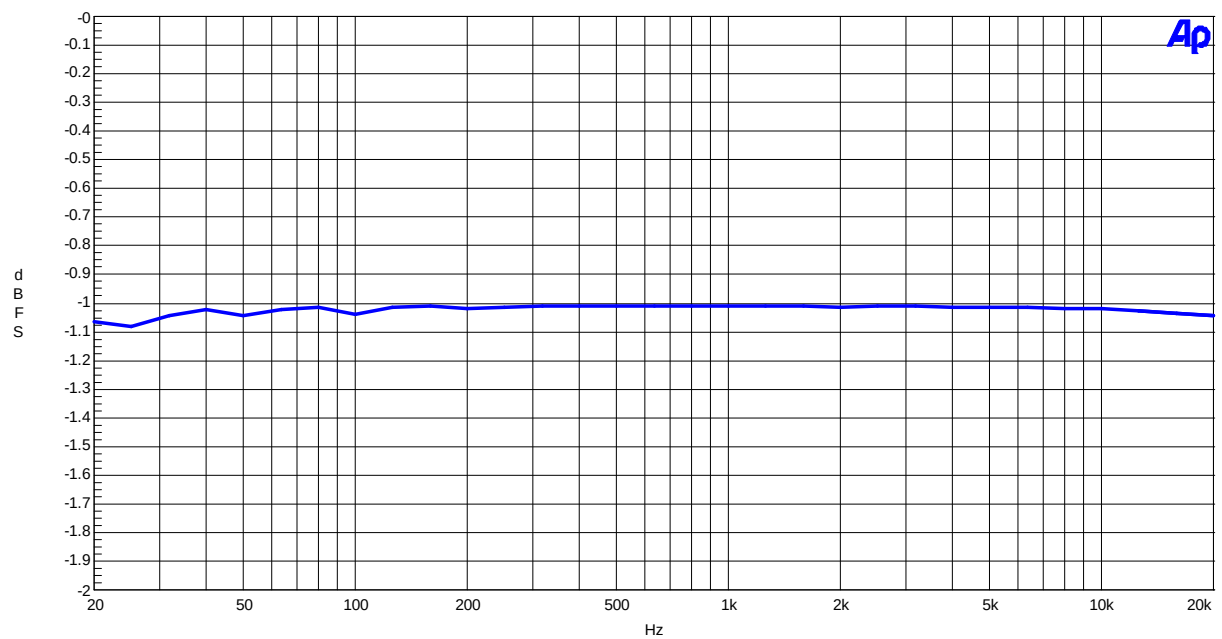
AK5385A Frequency Response
AVDD=5.0V, DVDD=3.3V, fs=48kHz, Input=-1.0dBr

Figure 4. Frequency Response

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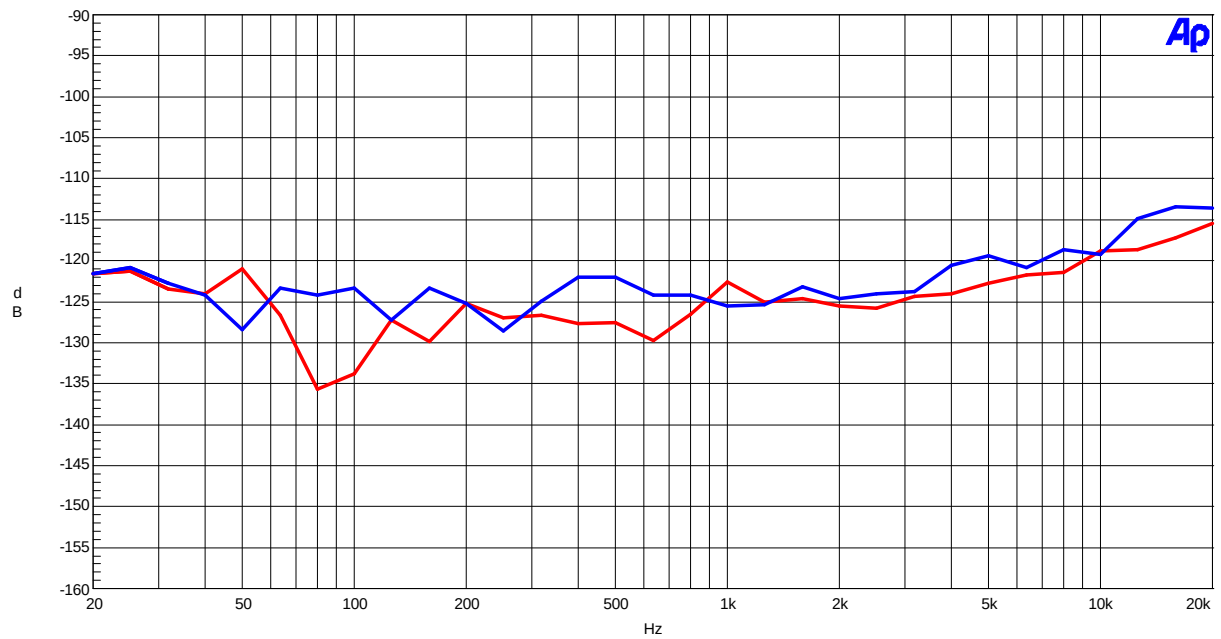
AK5385A Crosstalk
AVDD=5.0V, DVDD=3.3V, fs=48kHz, Input=-1.0dBr

Figure 5. Crosstalk

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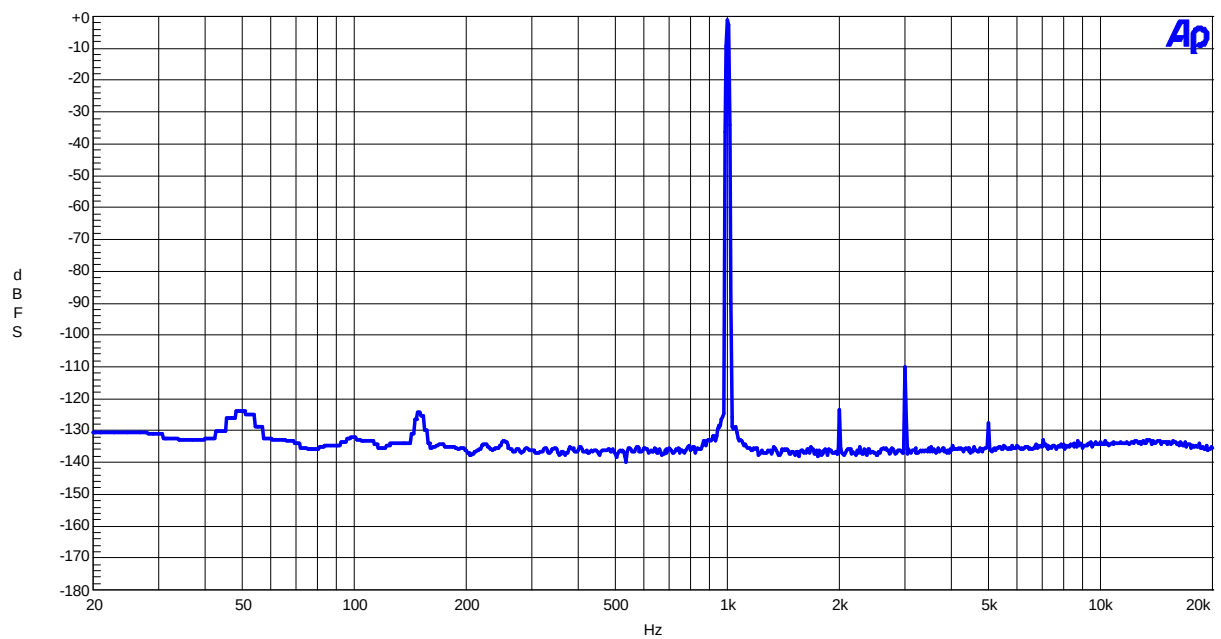
AK5385A FFT Plot
AVDD=5.0V, DVDD=3.3V, fs=48kHz, Input=-1.0dBr, fin=1kHz

Figure 6. FFT Plot

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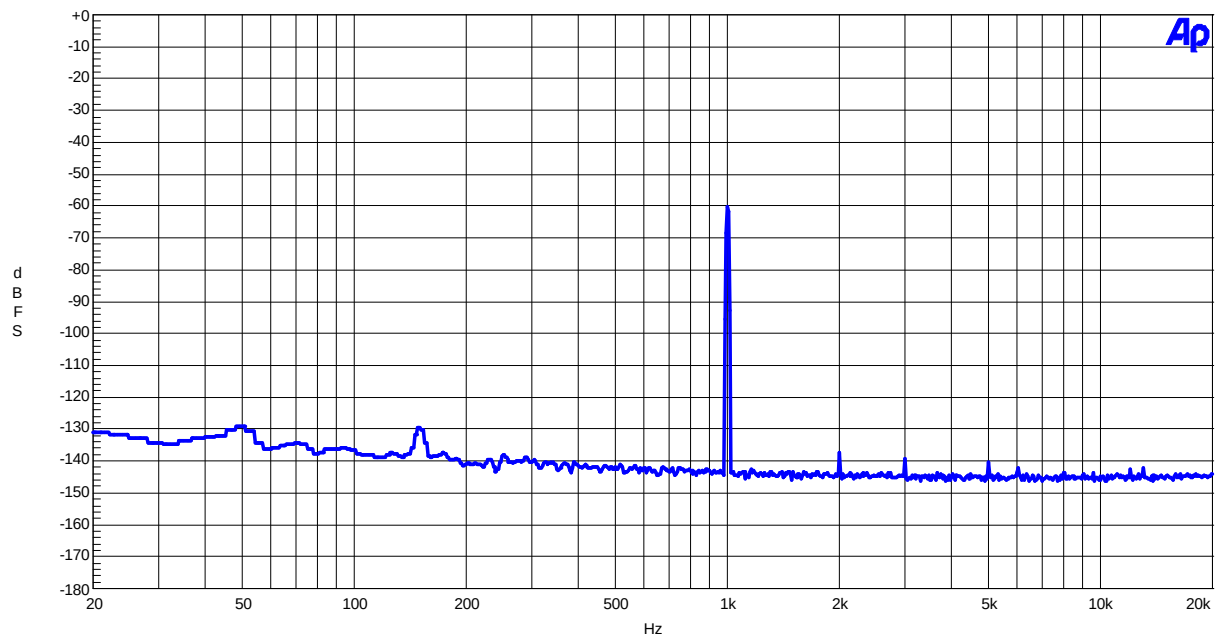
AK5385A FFT Plot
AVDD=5.0V, DVDD=3.3V, fs=48kHz, Input=-60dB, fin=1kHz

Figure 7. FFT Plot

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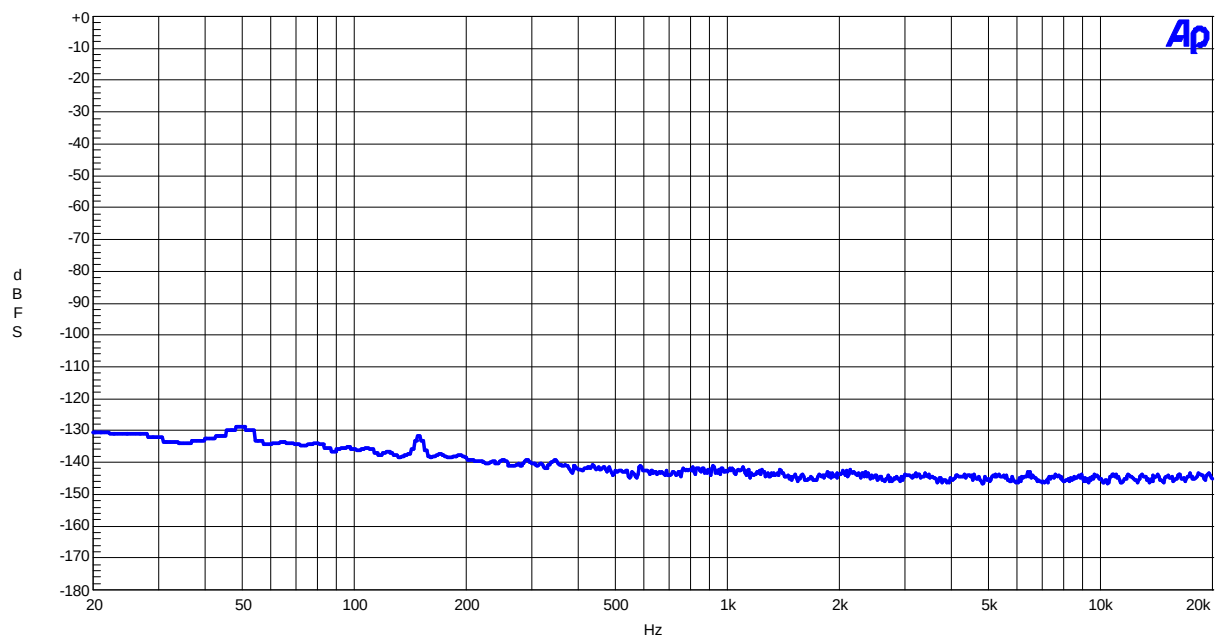
AK5385A FFT Plot
AVDD=5.0V, DVDD=3.3V, fs=48kHz, fin=None

Figure 8. FFT Plot

[ADC Plot : fs=96kHz]

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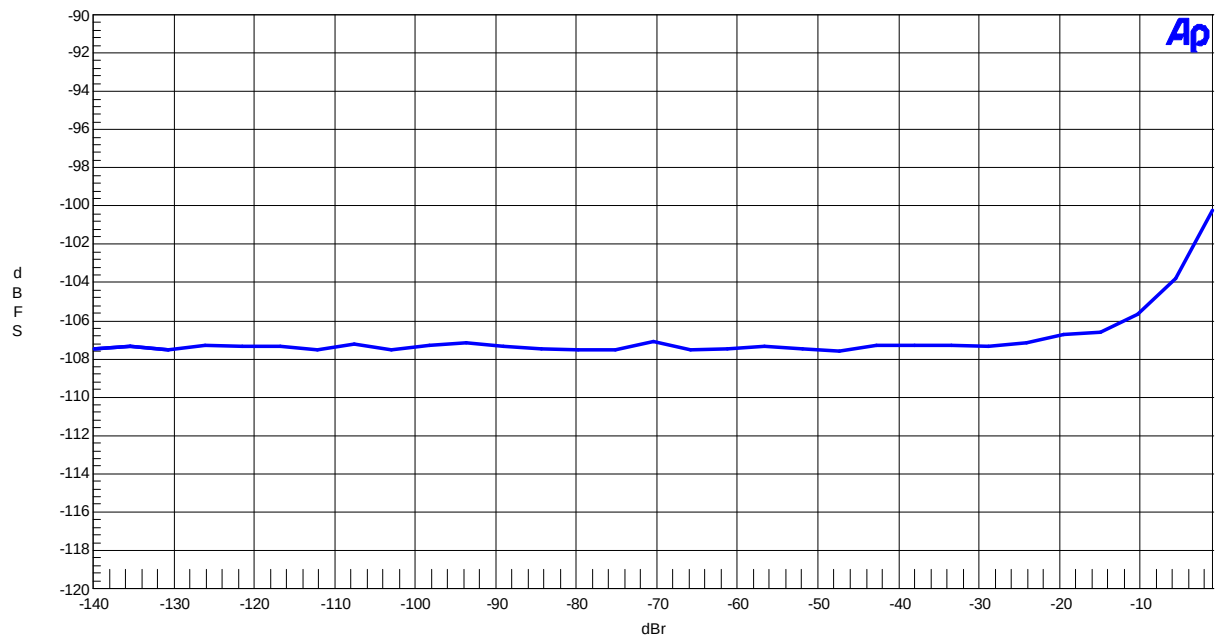
AK5385A THD+N vs. Input Level
AVDD=5.0V, DVDD=3.3V, fs=96kHz, fin=1kHz

Figure 9. THD+N vs. Input Level

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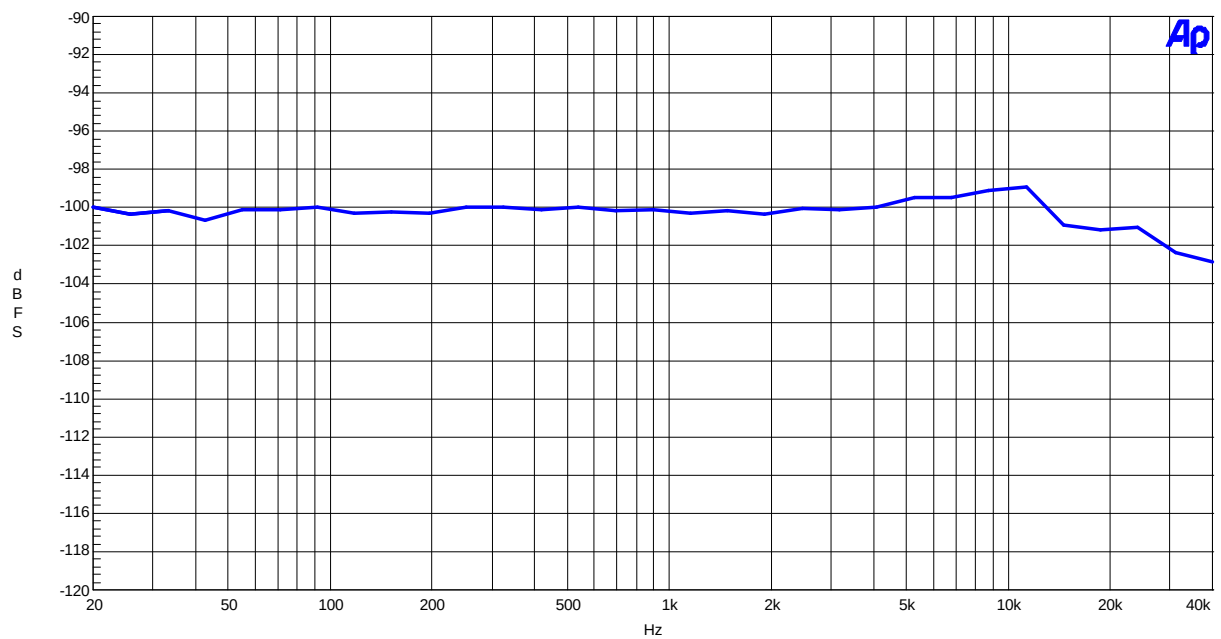
AK5385A THD+N vs. Input Frequency
AVDD=5.0V, DVDD=3.3V, fs=96kHz, Input=-1.0dBr

Figure 10. THD+N vs. Input Frequency

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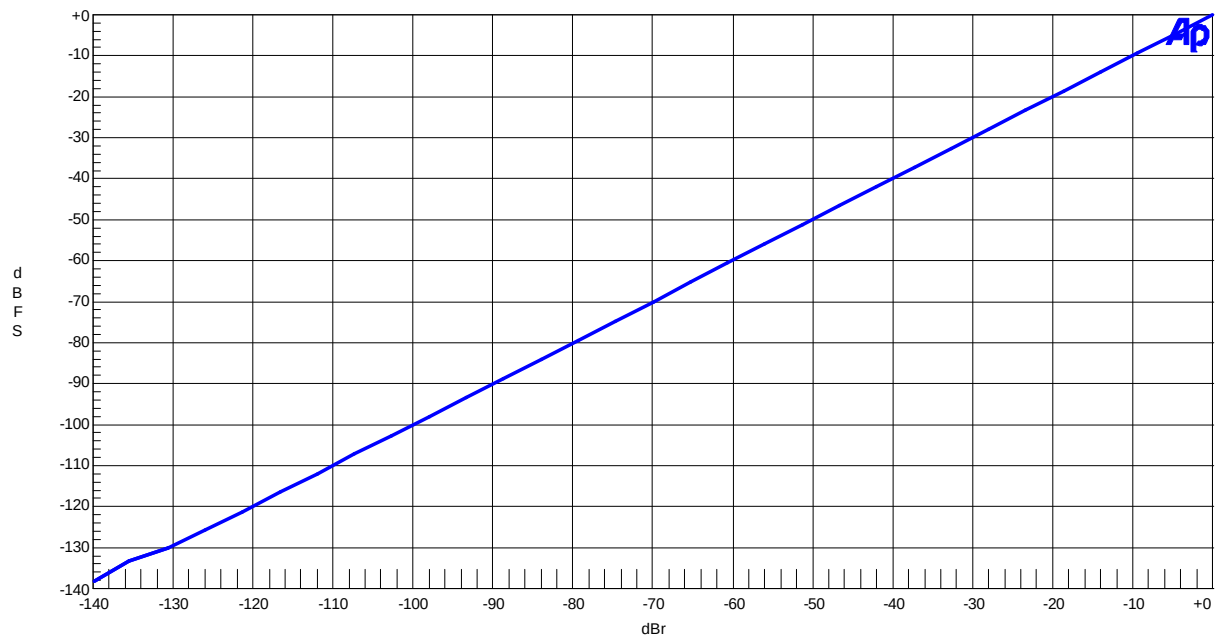
AK5385A Linearity
AVDD=5.0V, DVDD=3.3V, fs=96kHz, fin=1kHz

Figure 11. Linearity

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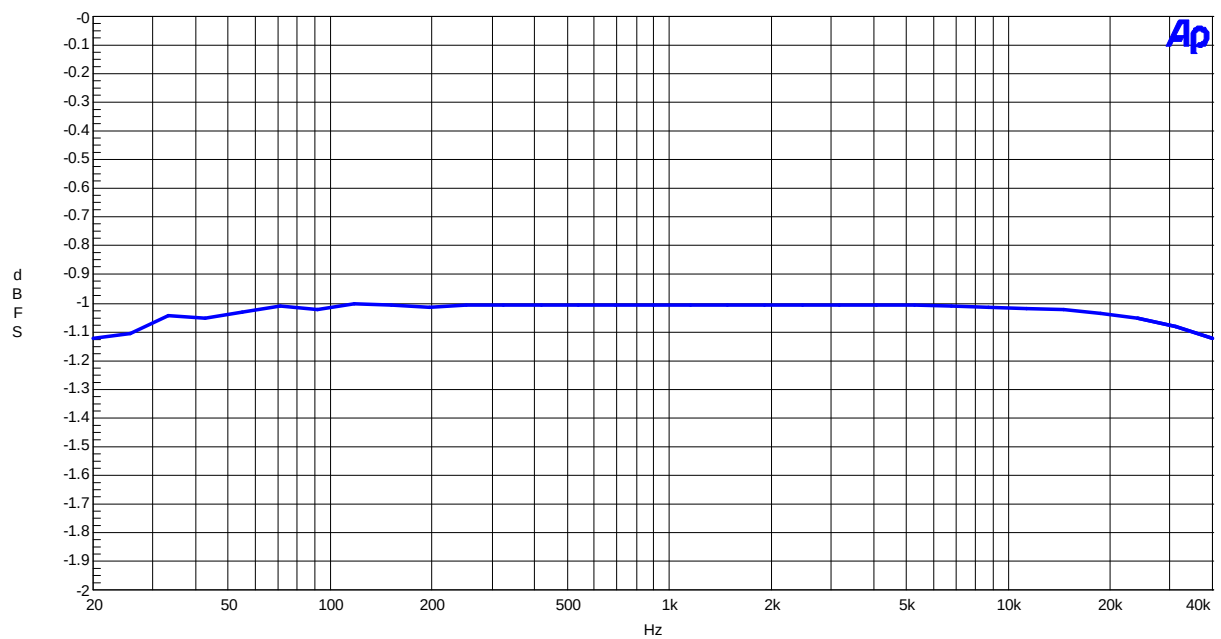
AK5385A Frequency Response
AVDD=5.0V, DVDD=3.3V, fs=96kHz, Input=-1.0dBr

Figure 12. Frequency Response

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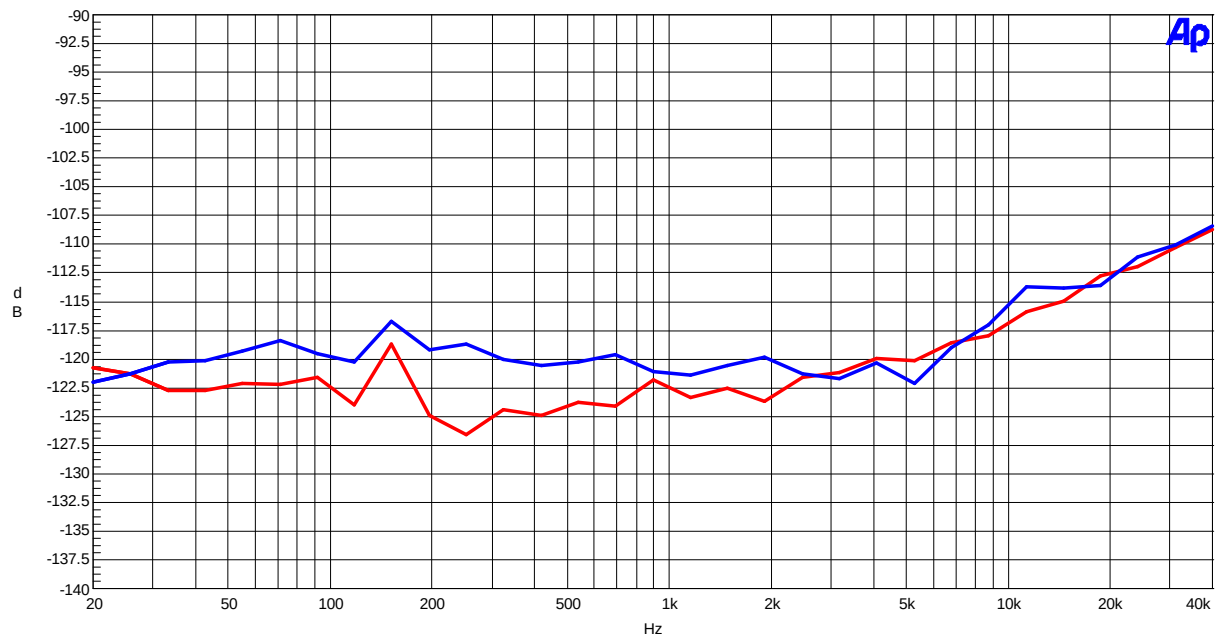
AK5385A Crosstalk
AVDD=5.0V, DVDD=3.3V, fs=96kHz, Input=-1.0dBr

Figure 13. Crosstalk

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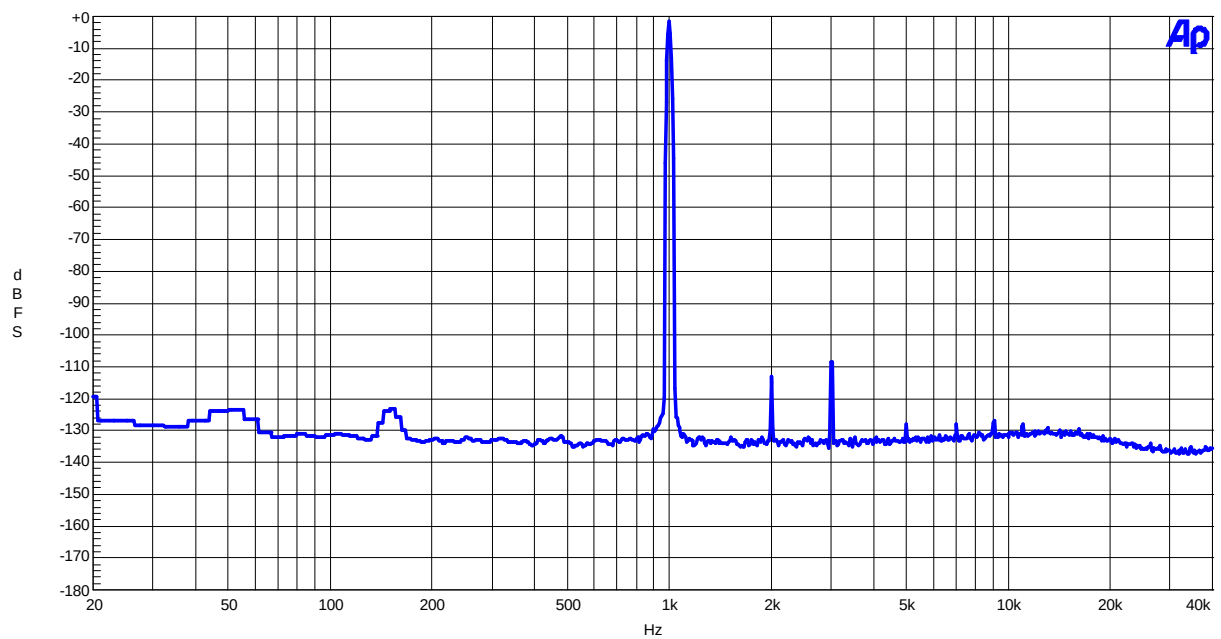
AK5385A FFT Plot
AVDD=5.0V, DVDD=3.3V, fs=96kHz, Input=-1.0dBr, fin=1kHz

Figure 14. FFT Plot

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AK5385A FFT Plot
AVDD=5.0V, DVDD=3.3V, fs=96kHz, Input=-60dB, fin=1kHz

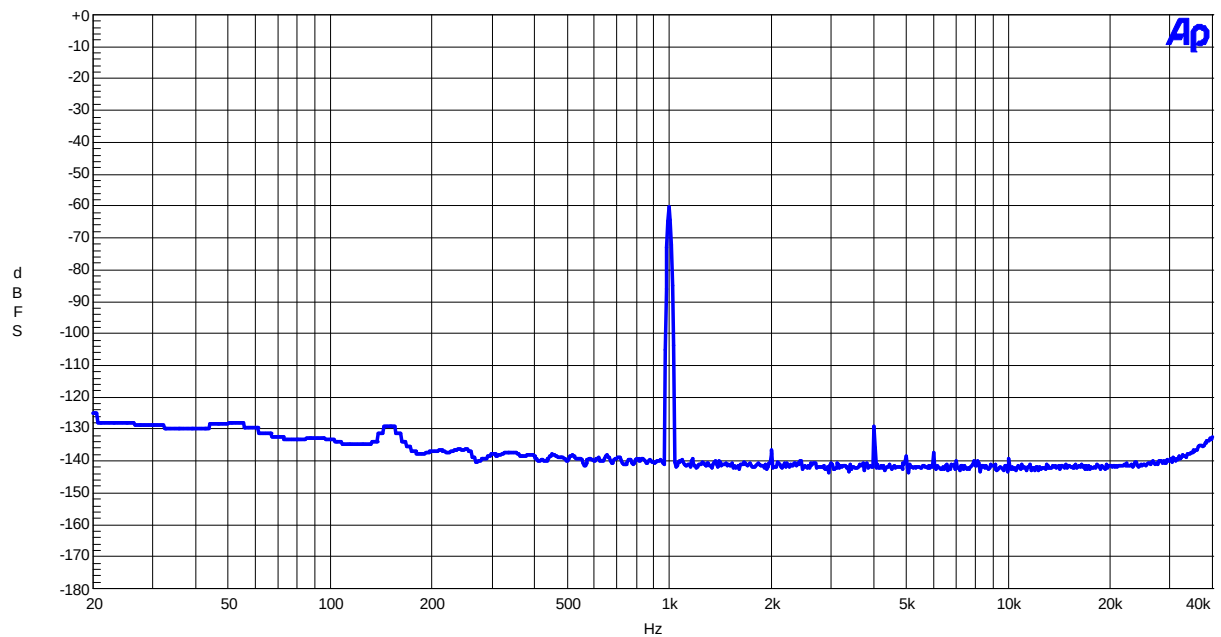


Figure 15. FFT Plot

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AK5385A FFT Plot
AVDD=5.0V, DVDD=3.3V, fs=96kHz, fin=None

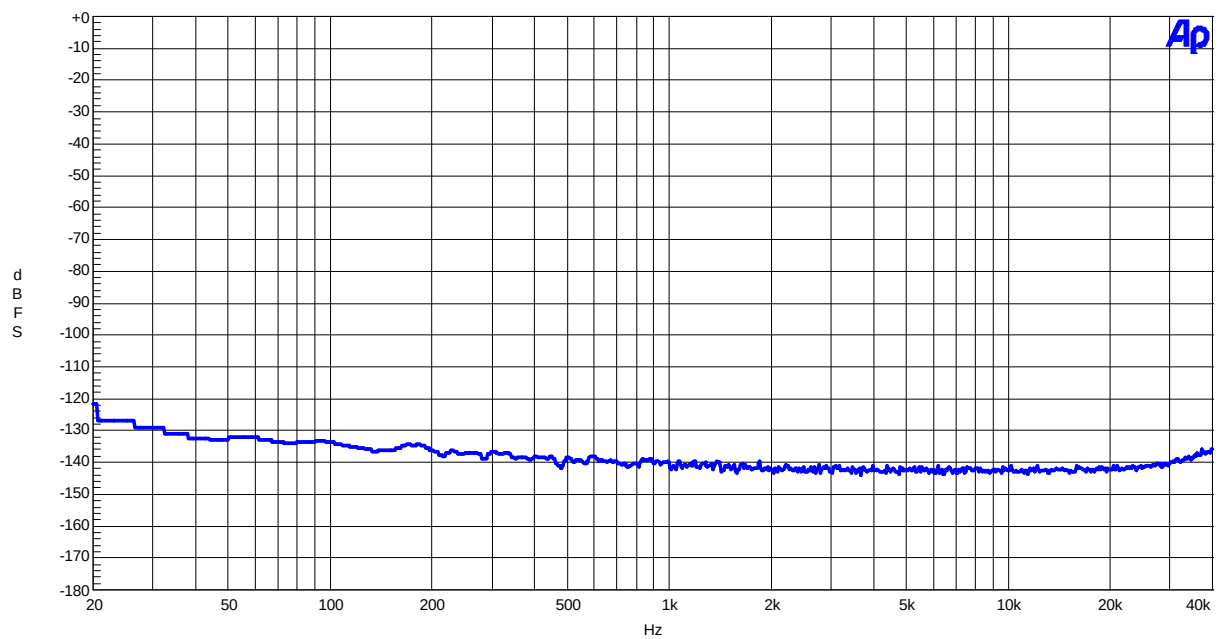


Figure 16. FFT Plot

[ADC Plot : fs=192kHz]

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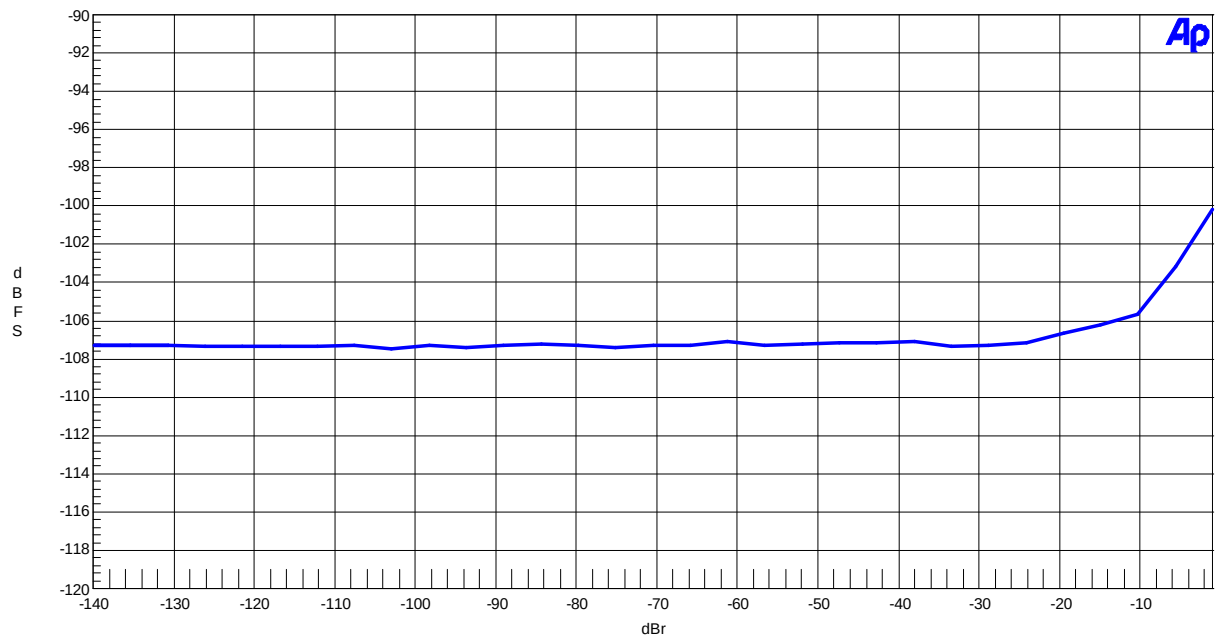
AK5385A THD+N vs. Input Level
AVDD=5.0V, DVDD=3.3V, fs=192kHz, fin=1kHz

Figure 17. THD+N vs. Input Level

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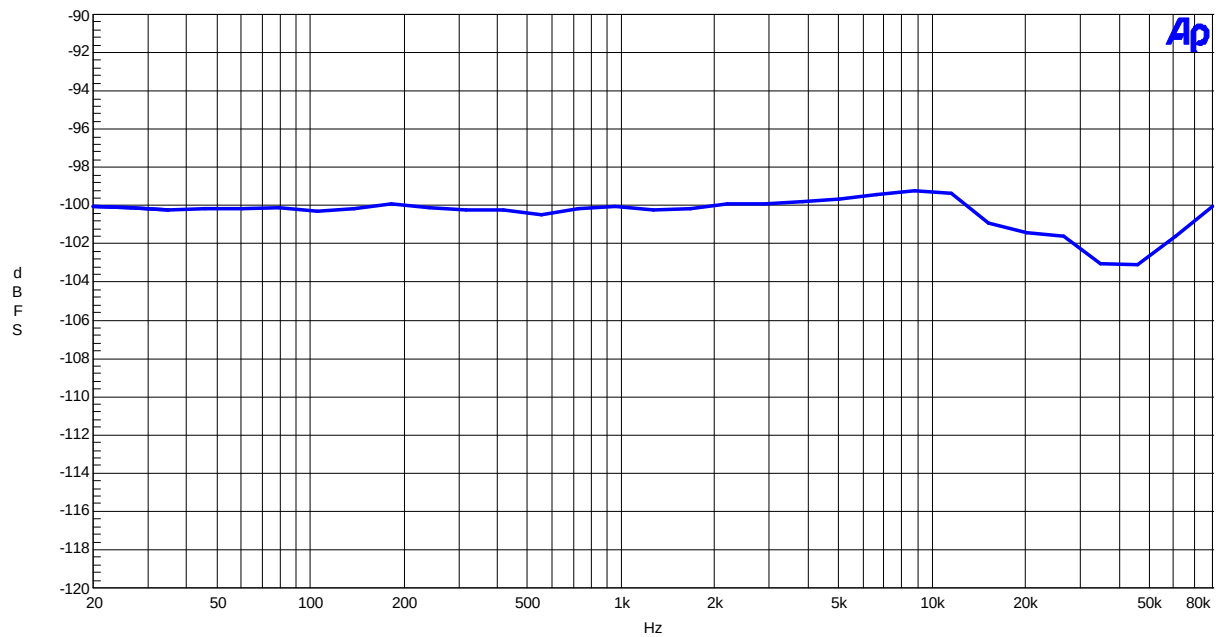
AK5385A THD+N vs. Input Frequency
AVDD=5.0V, DVDD=3.3V, fs=192kHz, Input=-1.0dBr

Figure 18. THD+N vs. Input Frequency (BW=40kHz)

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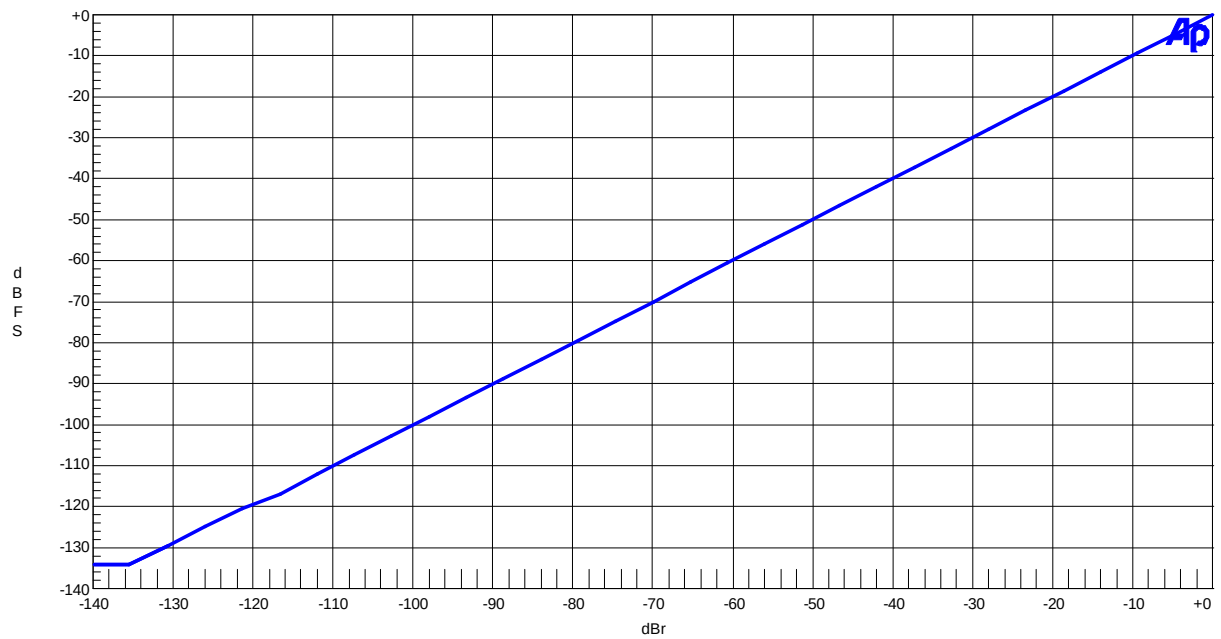
AK5385A Linearity
AVDD=5.0V, DVDD=3.3V, fs=192kHz, fin=1kHz

Figure 19. Linearity

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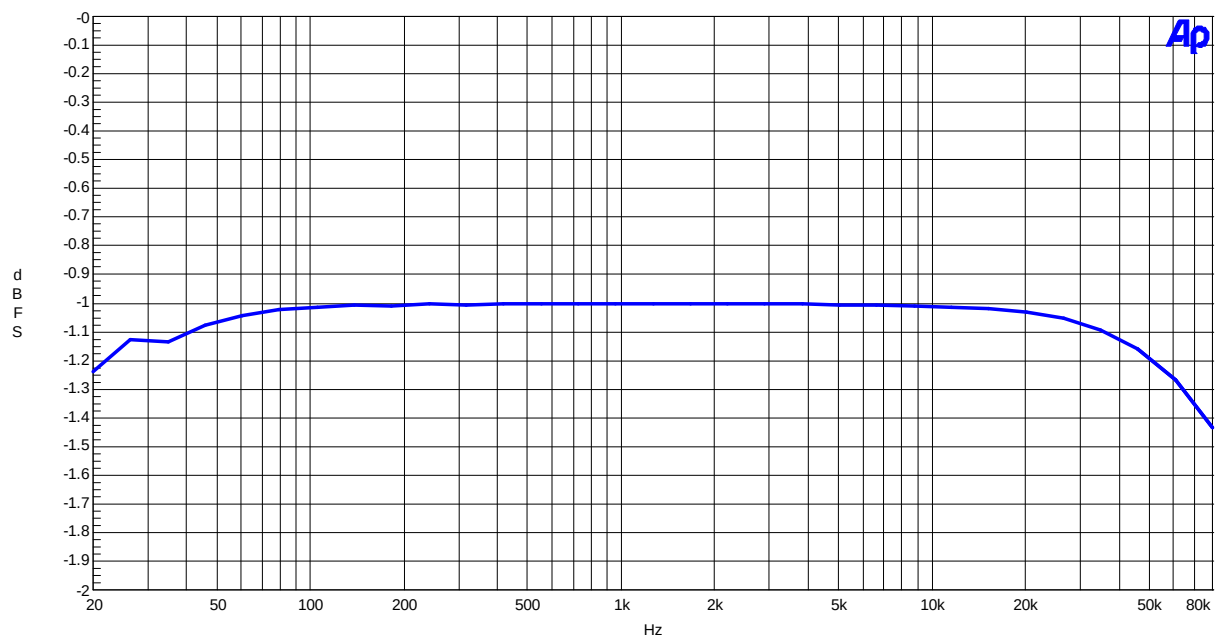
AK5385A Frequency Response
AVDD=5.0V, DVDD=3.3V, fs=192kHz, Input=-1.0dBr

Figure 20. Frequency Response

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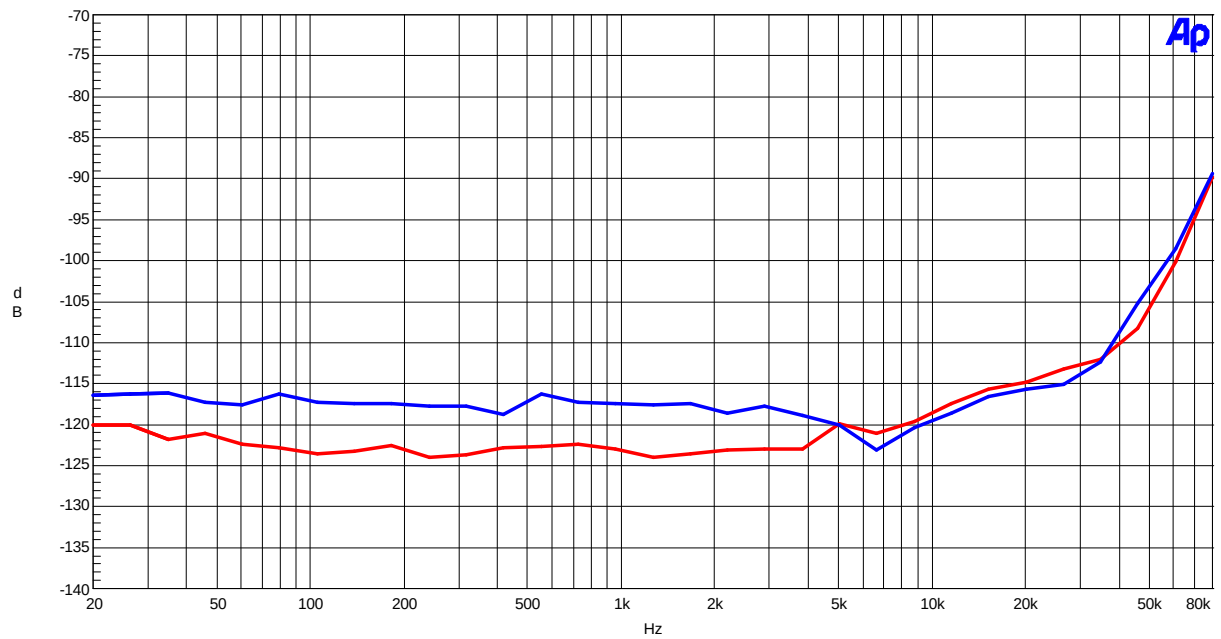
AK5385A Crosstalk
AVDD=5.0V, DVDD=3.3V, fs=192kHz, Input=-1.0dB

Figure 21. Crosstalk

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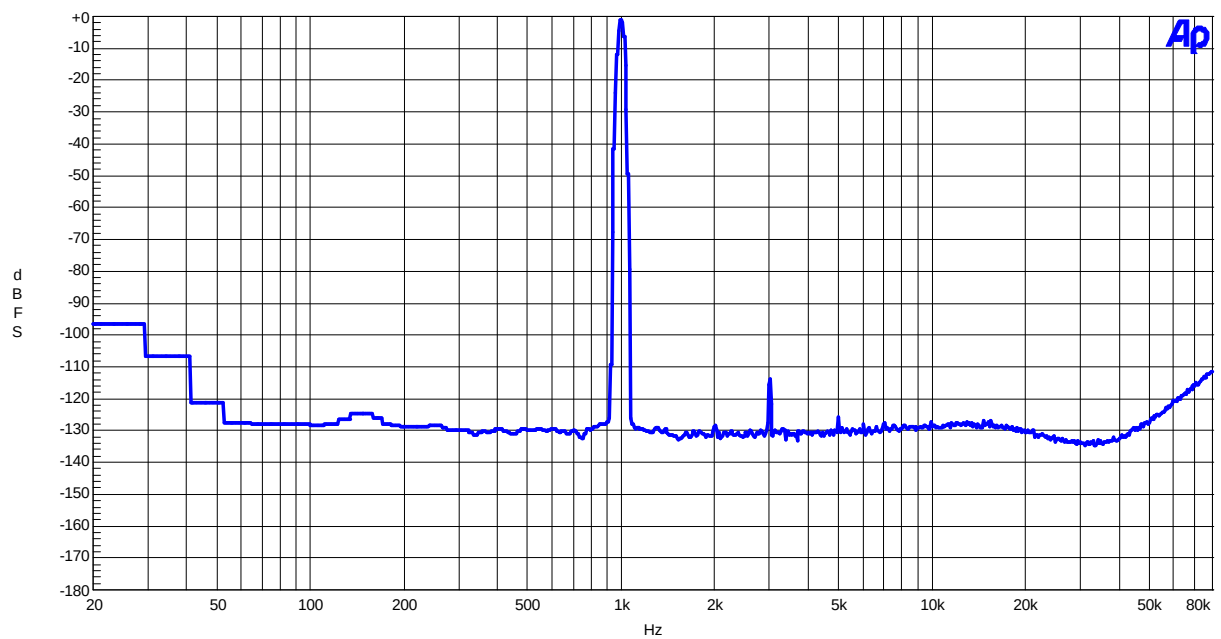
AK5385A FFT Plot
AVDD=5.0V, DVDD=3.3V, fs=192kHz, Input=-1.0dB, fin=1kHz

Figure 22. FFT Plot

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AK5385A FFT Plot
AVDD=5.0V, DVDD=3.3V, fs=192kHz, Input=-60dB, fin=1kHz

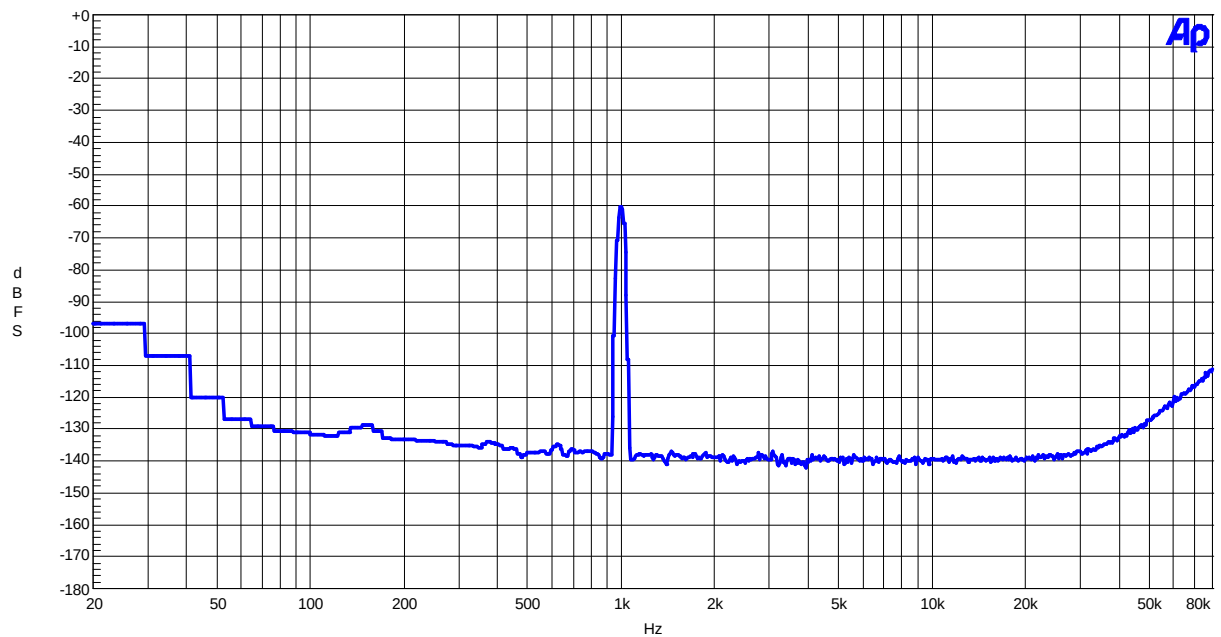


Figure 23. FFT Plot

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AK5385A FFT Plot
AVDD=5.0V, DVDD=3.3V, fs=192kHz, fin=None

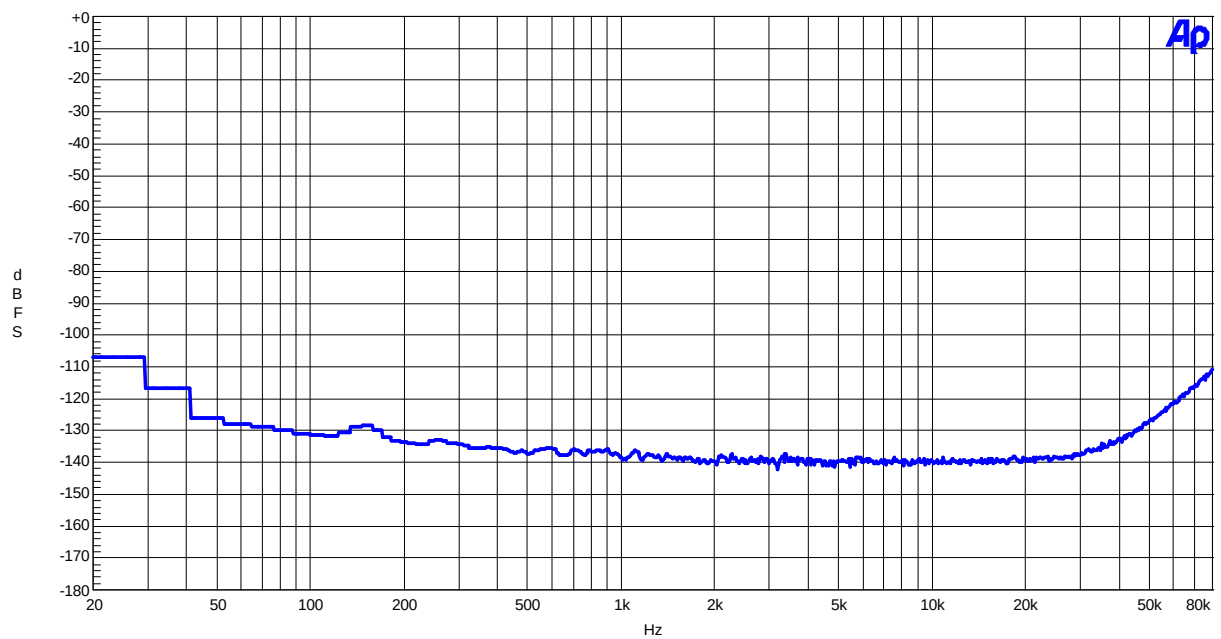
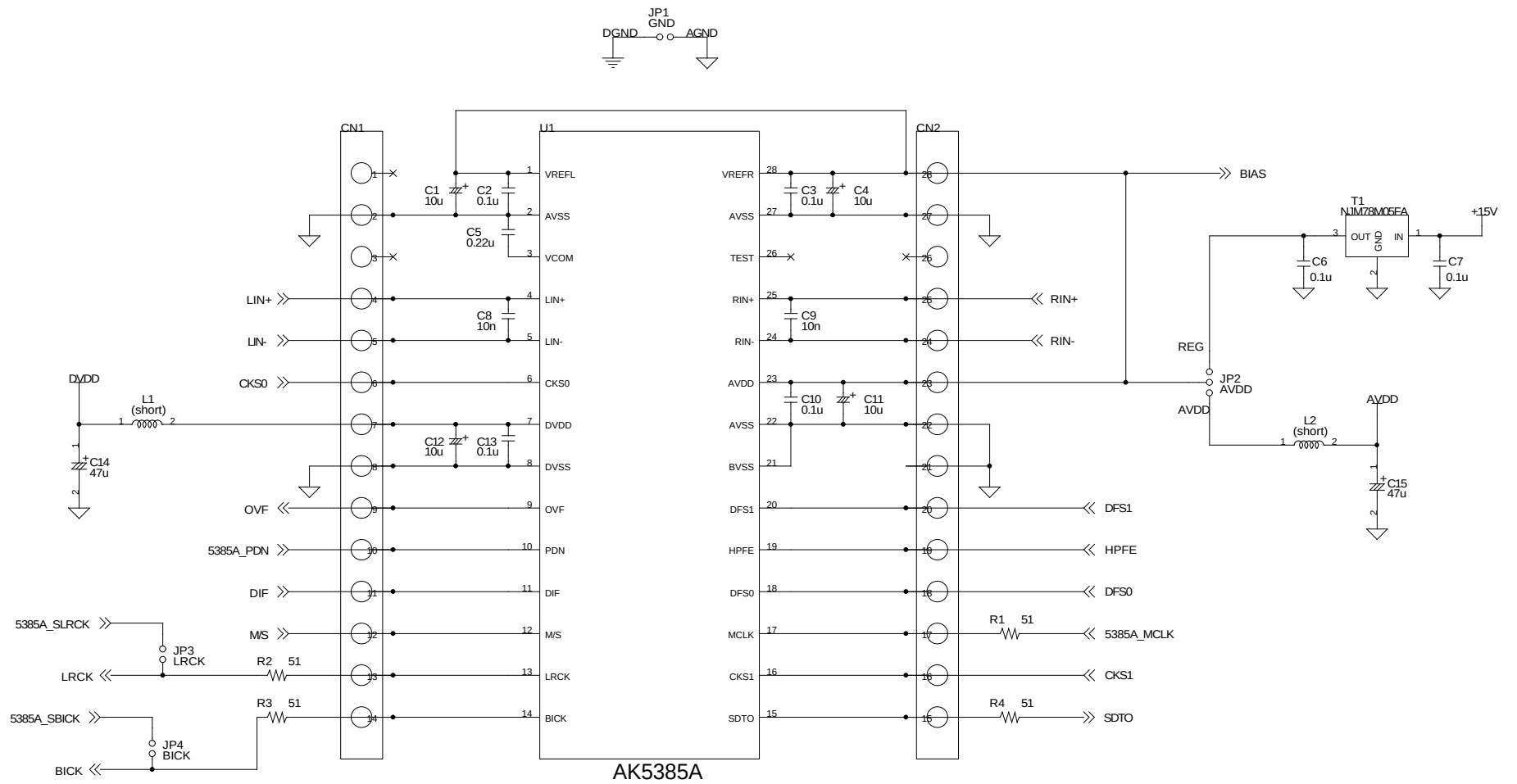


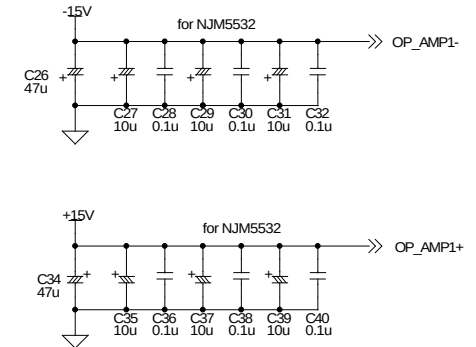
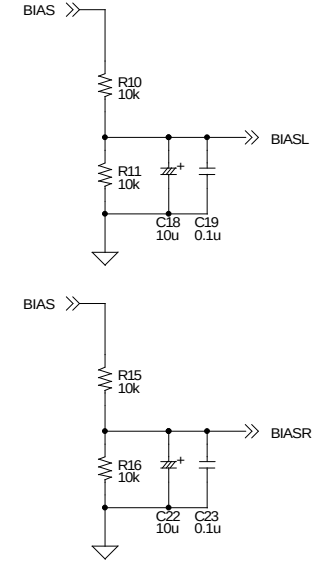
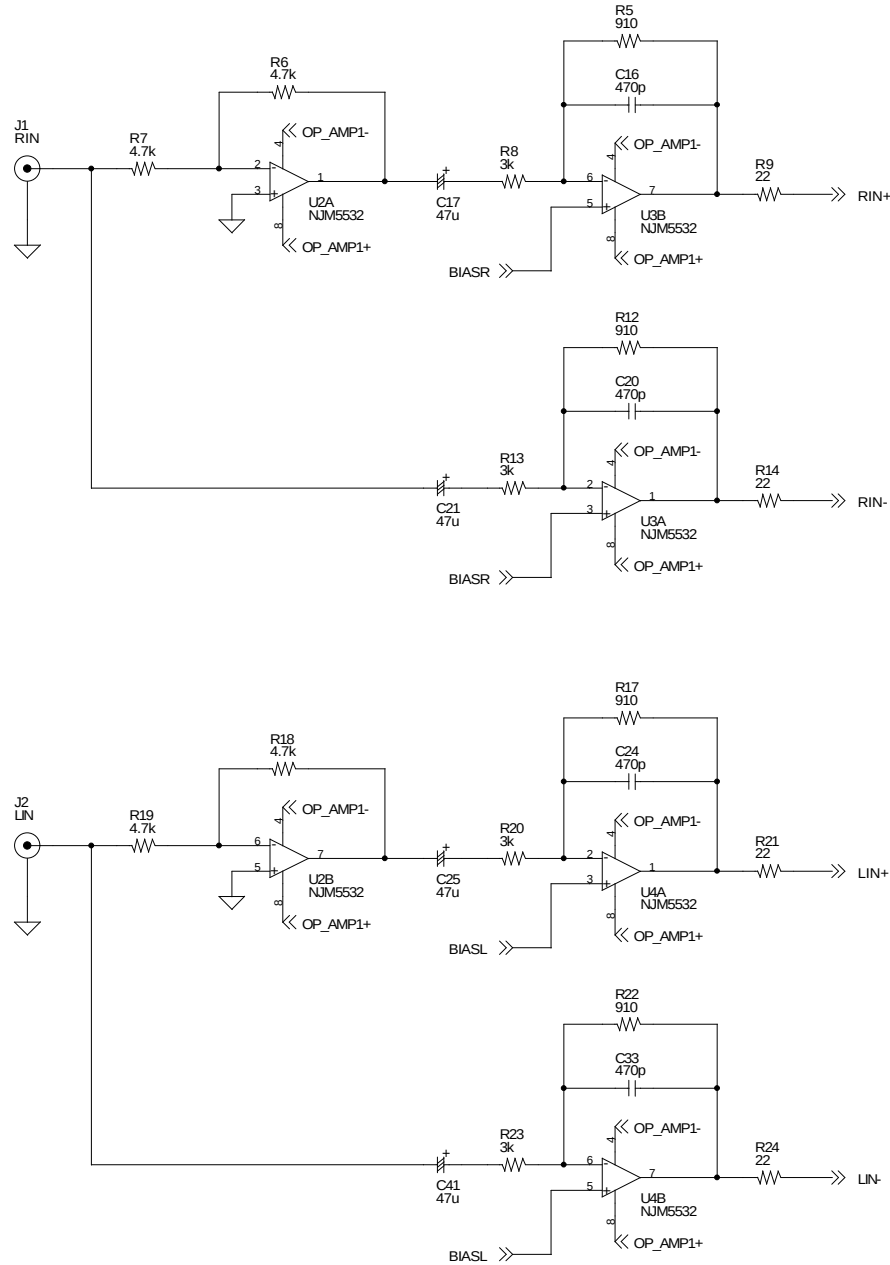
Figure 24. FFT Plot

IMPORTANT NOTICE

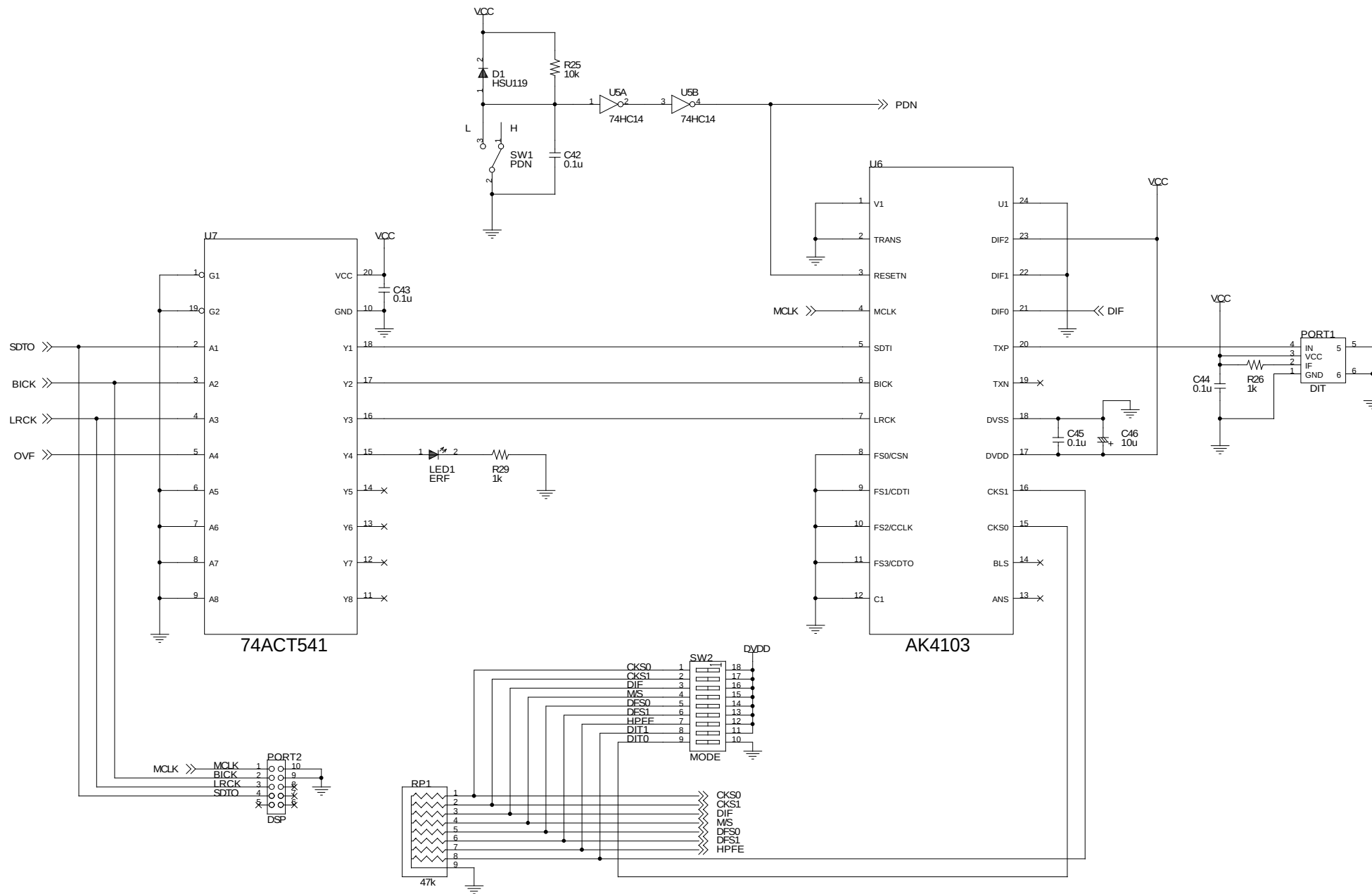
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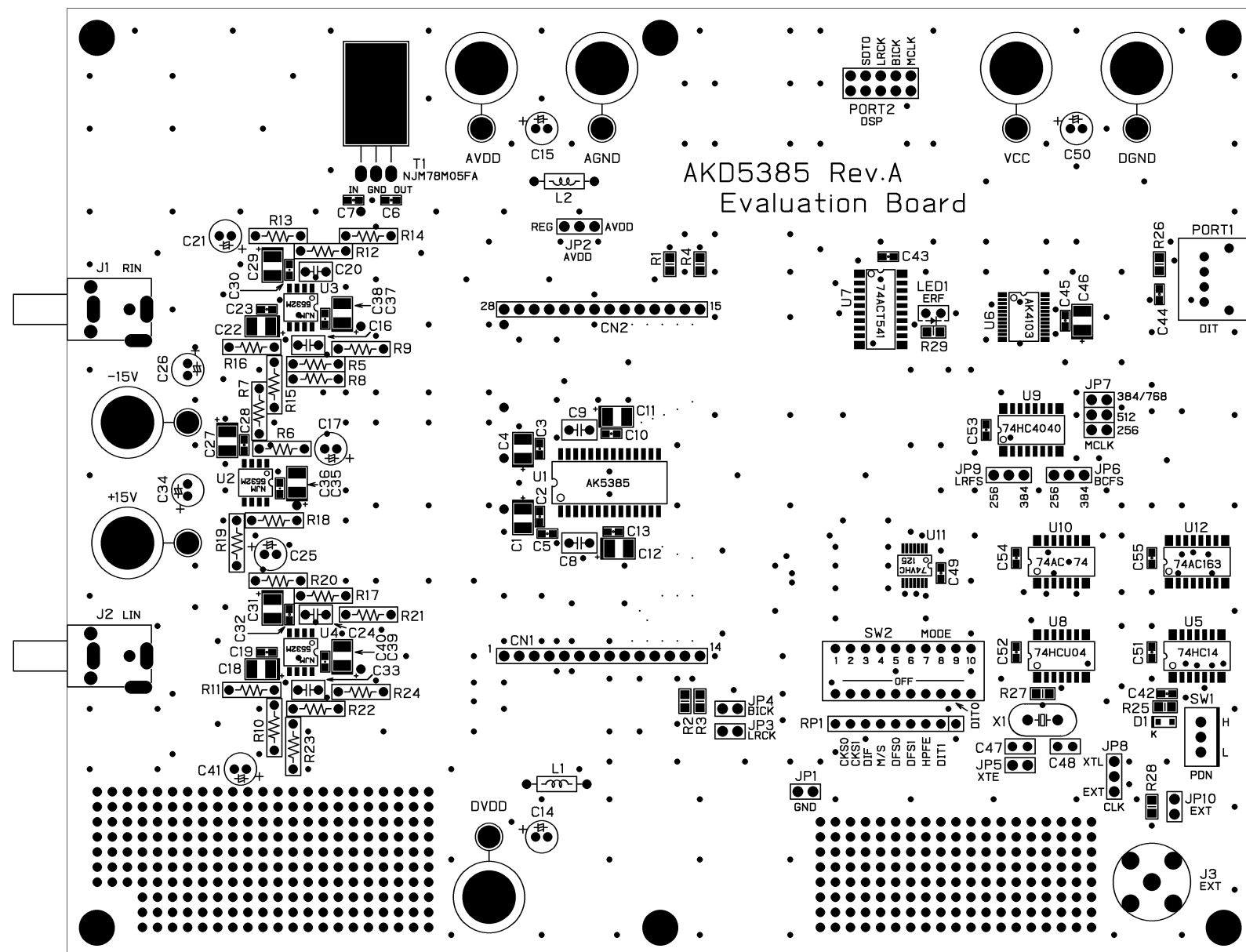


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Size	Document Number	Rev
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Date:	Thursday, July 10, 2003	Sheet 1 of 4

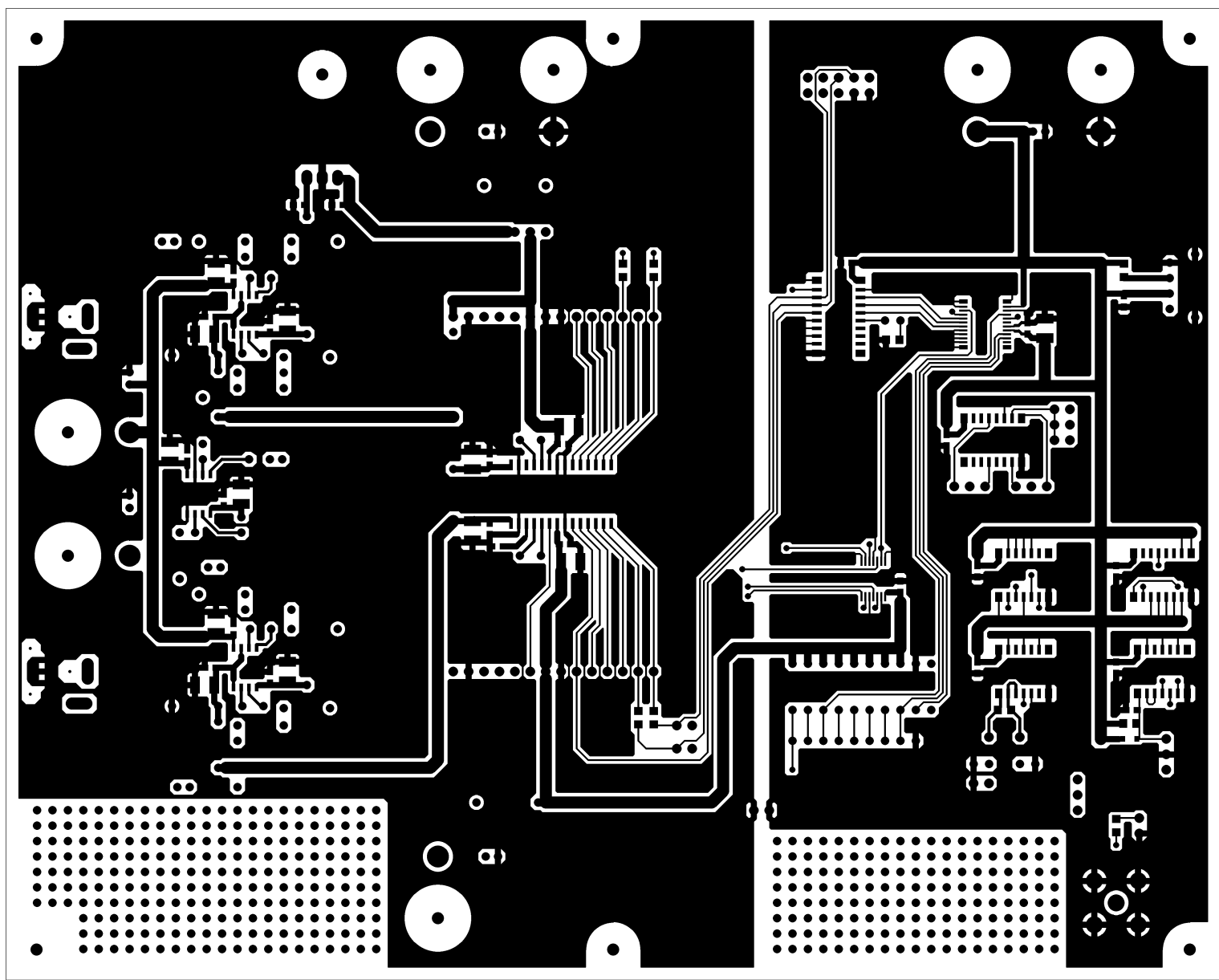


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Size	Document Number	Rev
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Date:	Thursday, July 10, 2003	Sheet 2 of 4

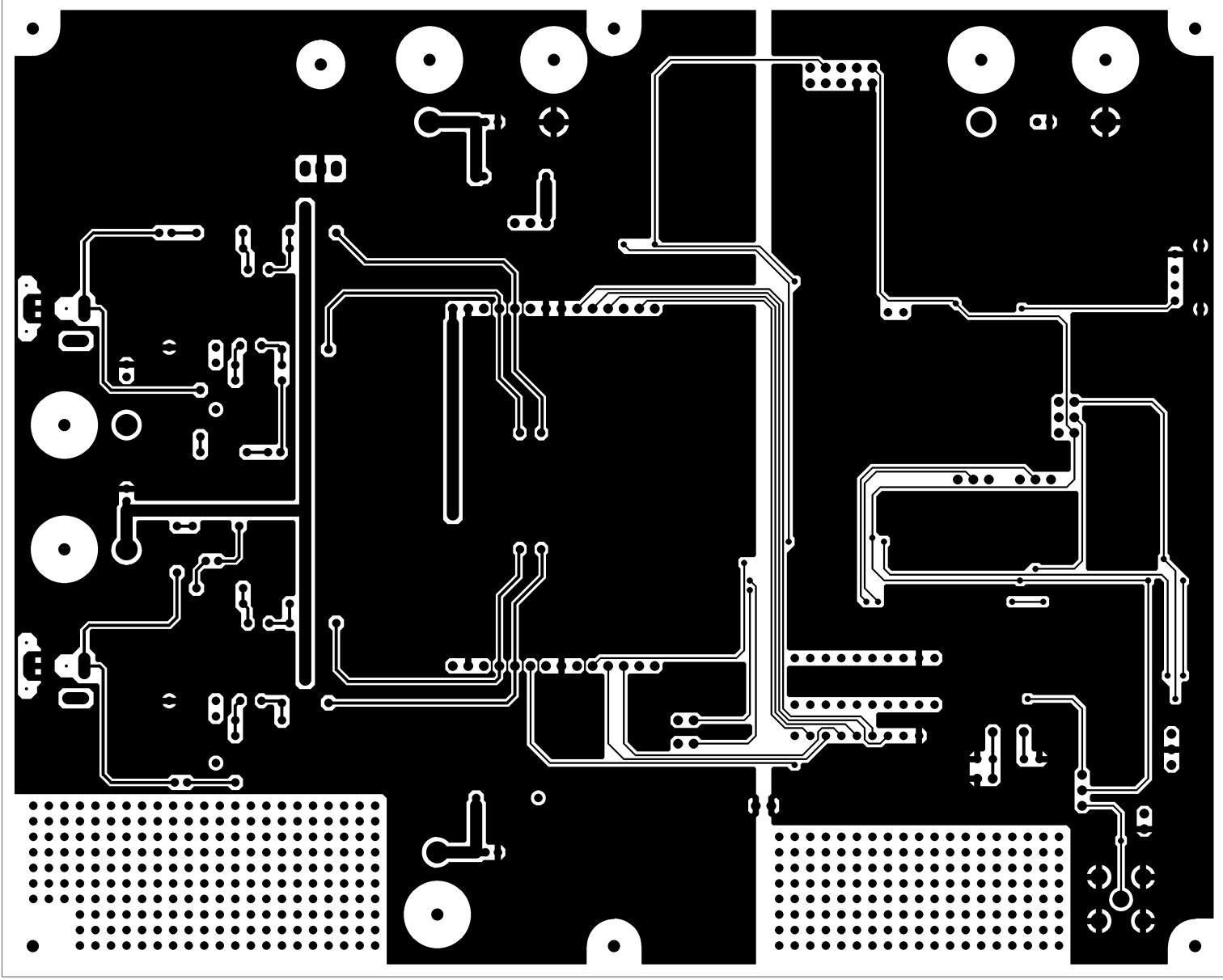




AKD5385 Rev.A L1 SR SILK



AKD5385 Rev.A L1



AKD2382 Rev.A LS