



# AKD5381

## Evaluation board Rev.A for AK5381

**GENERAL DESCRIPTION**

AKD5381 is an evaluation board for the digital audio 24bit 96kHz A/D converter, AK5381. The AKD5381 includes the input circuit and also has a digital interface transmitter. Further, the AKD5381 can achieve the interface with digital audio systems via opt-connector.

■ **Ordering guide**

AKD5381 --- Evaluation board for AK5381

**FUNCTION**

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

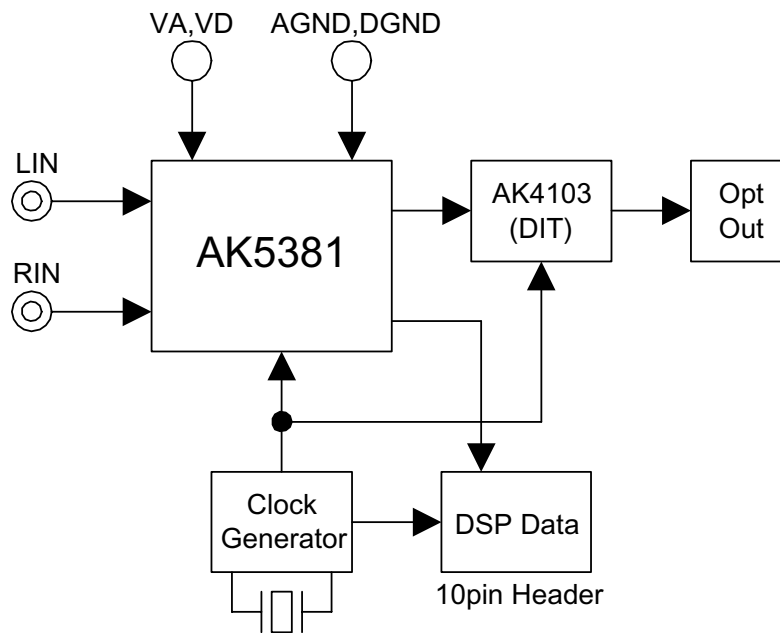


Figure 1. AKD5381 Block Diagram

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

## 1. Evaluation Board Manual

### ■ Operation sequence

1) Set up the power supply lines.

[VA]	(red)	= 4.75 ~ 5.25V	: for VA of AK5381 (typ. 5.0V)
[VD]	(orange)	= 2.7 ~ 5.25V	: for VD of AK5381, 74LVC541 (typ. 5.0V)
[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.

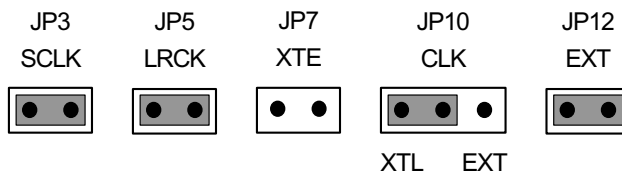
The AK5381 and AK4103 should be reset once bringing SW1 = "L" upon power-up.

### ■ Evaluation mode

(1) Slave Mode

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

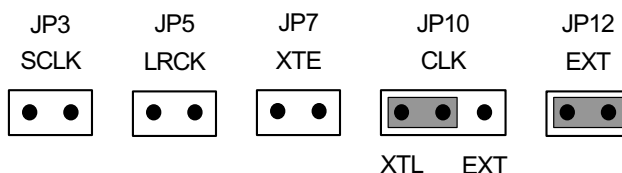
PORT1 (DIT) is used. DIT generates audio bi-phase signal from received data and which is output through optical connector (TOTX176). It is possible to connect AKM's D/A converter evaluation boards on the digital-amplifier which equips DIR input. Nothing should be connected to PORT2 (DSP). In case of using external clock through a BNC connector (J3), select EXT on JP10 (CLK) and short JP7 (XTE) and open JP12 (EXT).



(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 JP10 (CLK) and short JP7 (XTE) and open JP12 (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 (VA) : Select VA for AK5381  
REG : Supply from regulator. VA connector should be supplied +15V.  
VA : Supply from VA connector <Default>
3. JP4 (REG) : Select VA for AK5381  
OPEN : Not use regulator <Default>  
SHORT : Use regulator
4. JP6 (VD) : Select VD for AK5381  
VA : Supply from VA connector  
VD : Supply from VD connector <Default>
5. JP8 (BCFS) : Select SCLK frequency  
256 : In case of MCLK=256fs/512fs/768fs <Default>  
384 : In case of MCLK=384fs
6. JP9 (MCLK) : Supply MCLK frequency for 74HC4040  
256 : In case of MCLK=256fs <Default>  
512 : In case of MCLK=512fs  
768 : In case of MCLK=384fs/768fs
7. JP11 (LRFS) : Select LRCK frequency  
256 : In case of MCLK=256fs/512fs/768fs <Default>  
384 : In case of MCLK=384fs

## ■ DIP Switch set up

[SW2] (MODE1): Setting the evaluation mode for AK5381 and AK4103  
ON is “H”, OFF is “L”.

No.	Name	OFF (“L”)	ON (“H”)
1	DIF	MSB justified	I <sup>2</sup> S Compatible
2	CKS2	See Table 2	
3	CKS1		
4	CKS0		
5	DIT1	See Table 3	
6	DIT0		

Table 1. Mode Setting

CKS2	CKS1	CKS0	Input Level	HPF	Master/Slave	MCLK	SCLK	
L	L	L	CMOS	ON	Slave	256/384/512/768fs	≥ 48fs or 32fs	
L	L	H	CMOS	OFF	Slave	256/384/512/768fs	≥ 48fs or 32fs	
L	H	L	CMOS	ON	Master	256fs (~ 96kHz)	64fs	
L	H	H	CMOS	ON	Master	512fs (~ 48kHz)	64fs	
H	L	L	TTL	ON	Slave	256/384/512/768fs	≥ 48fs or 32fs	
H	L	H	Reserved					
H	H	L	CMOS	ON	Master	384fs (~ 96kHz)	64fs	
H	H	H	CMOS	ON	Master	768fs (~ 48kHz)	64fs	

Table 2. Mode Setting of AK5381

Mode	DIT1	DIT0	MCLK	fs	
0	OFF	OFF	256fs	~ 96kHz	Default
1	OFF	ON	N/A	N/A	
2	ON	OFF	512fs	~ 48kHz	
3	ON	ON	384fs	~ 48kHz	

Table 3. MCLK Frequency Setting of AK4103

Note: AK4103 does not support MCLK=768fs.

## ■ The function of the toggle SW

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

[SW1] (PDN): Resets the AK5381 and AK4103. Keep “H” during normal operation.

■ Input Circuit

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

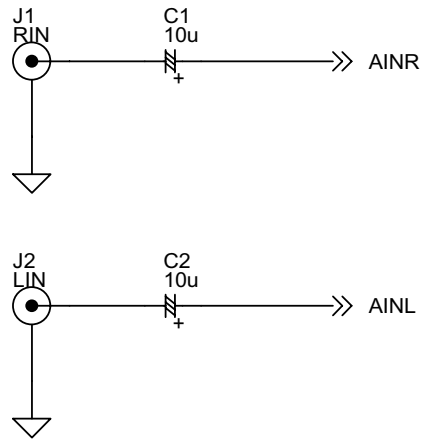


Figure 2. LIN/RIN Input circuits

\* 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
- SCLK : 64fs
- fs : 48kHz, 96kHz
- Bit : 24bit
- Power Supply : VA = VD = 5.0V
- Interface : DIT
- Temperature : Room

Parameter		Result (Lch / Rch)	Unit
ADC Analog Input Characteristics:			
S/(N+D) (-1dB Input)	fs=48kHz	96.7 / 96.9	dB
	fs=96kHz	93.1 / 93.6	dB
D-Range (-60dB Input)	fs=48kHz, A-weighted	106.5 / 106.5	dB
	fs=96kHz	101.7 / 101.7	dB
S/N	fs=48kHz, A-weighted	106.7 / 106.7	dB
	fs=96kHz	101.8 / 101.7	dB
Interchannel Isolation		115.1 / 113.2	dB

[ADC Plot : fs=48kHz]

AKM

AK5381 THD+N vs. Input Level  
VA=VD=5.0V, fs=48kHz, fin=1kHz

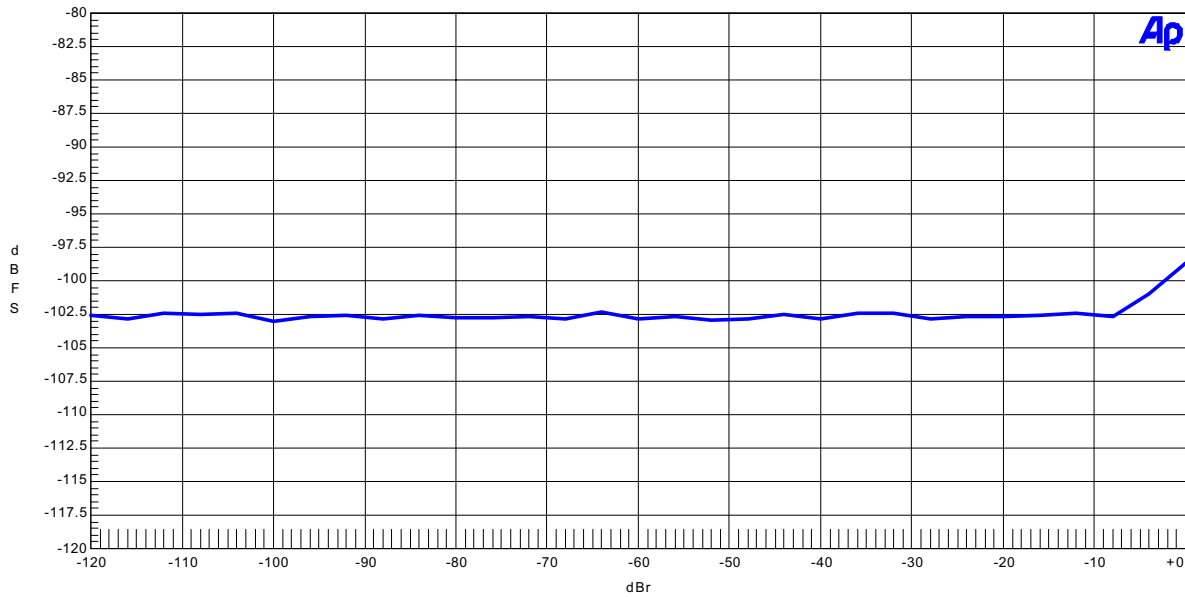


Figure 1. THD+N vs. Input Level

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AK5381 THD+N vs. Input Frequency  
VA=VD=5.0V, fs=48kHz, Input=-1dBr

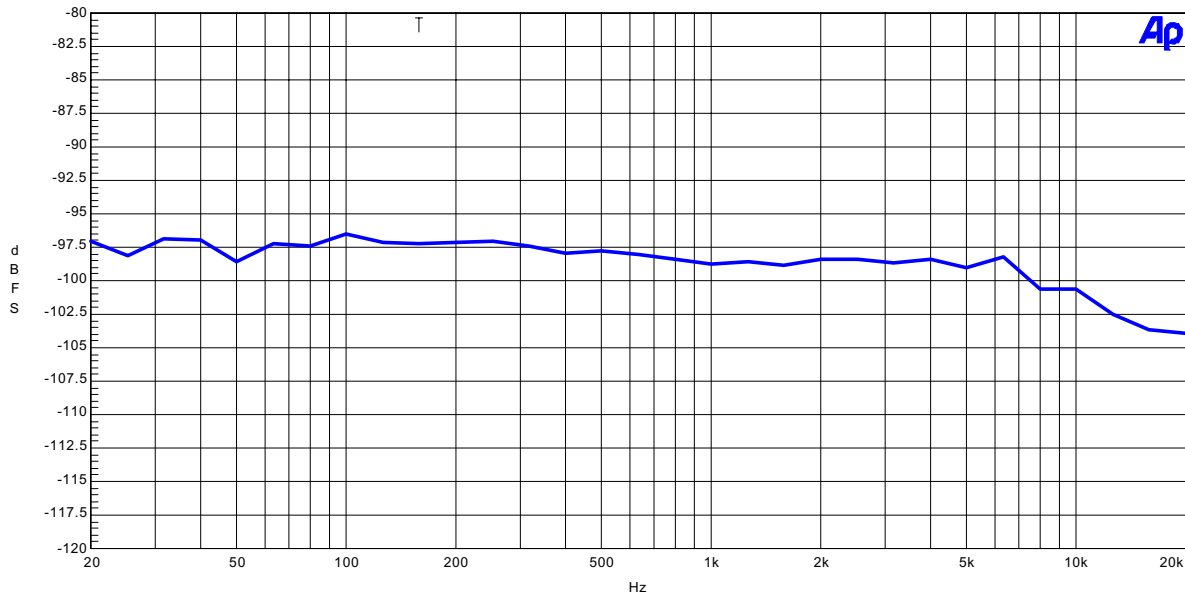


Figure 2. THD+N vs. Input Frequency

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AK5381 Linearity  
VA=VD=5.0V, fs=48kHz, fin=1kHz

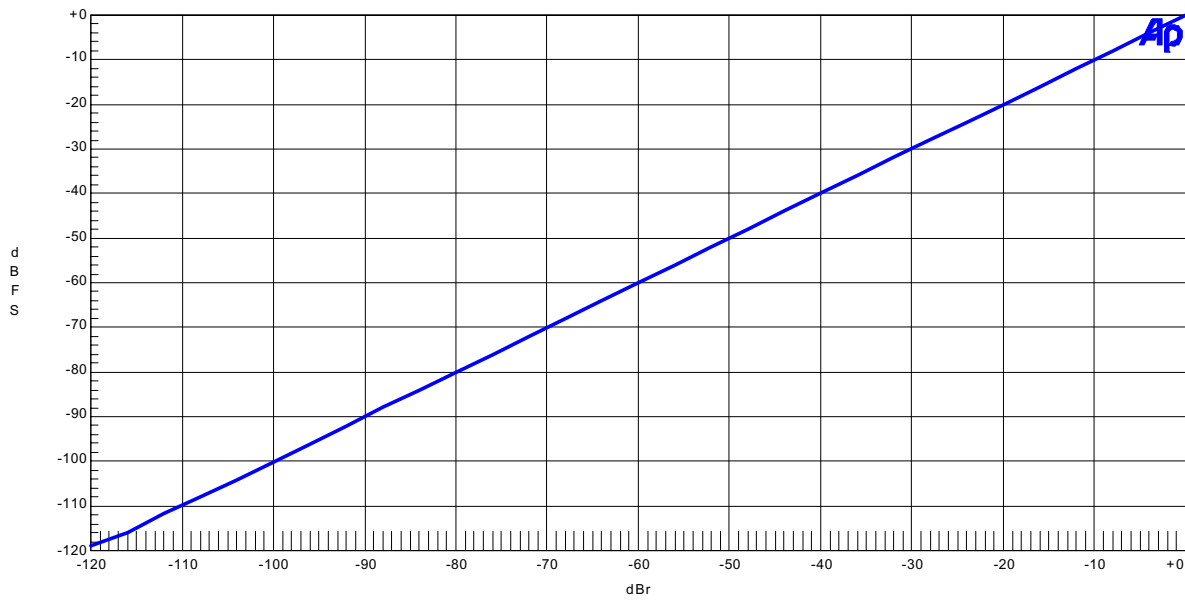


Figure 3. Linearity

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AK5381 Frequency Response  
VA=VD=5.0V, fs=48kHz, Input=-1dBr

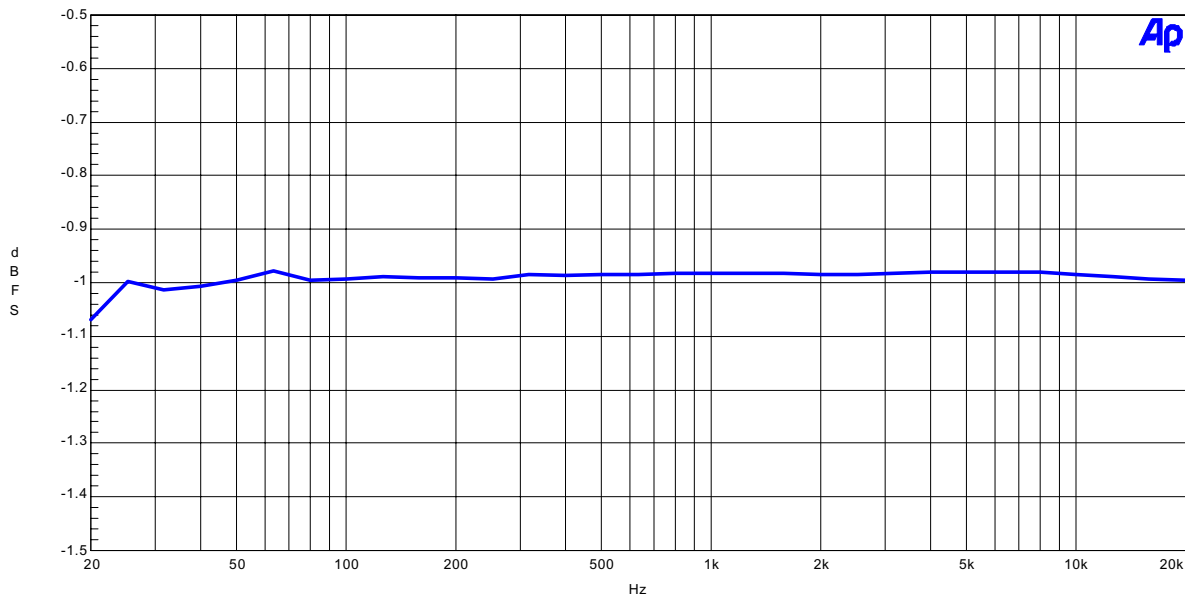


Figure 4. Frequency Response



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AK5381 Crosstalk  
VA=VD=5.0V, fs=48kHz, Input=-1dB

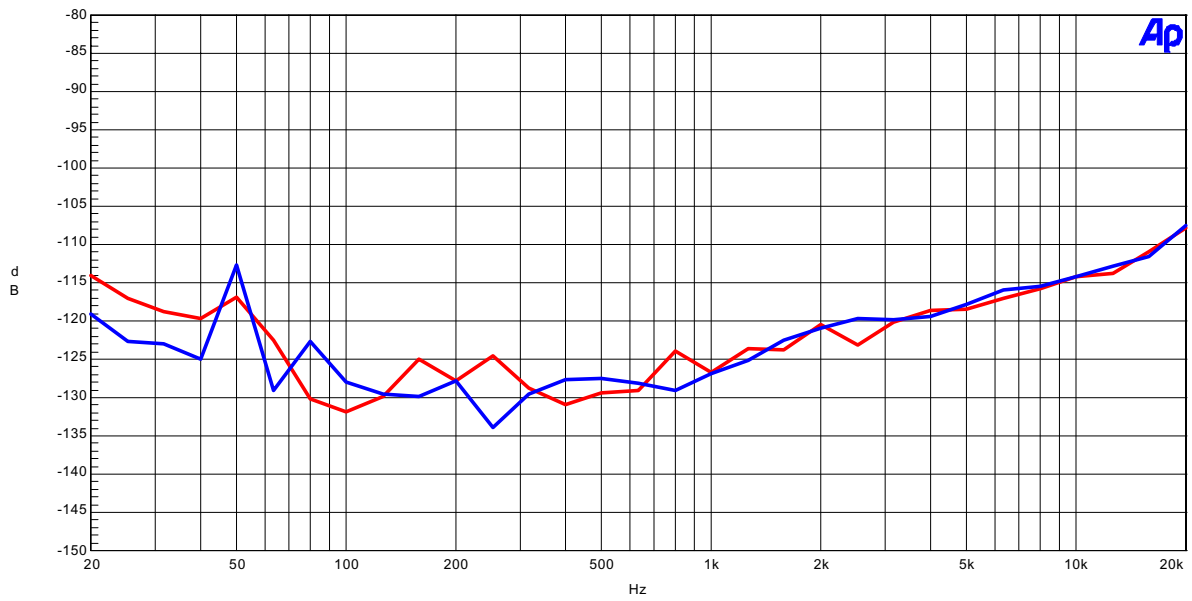


Figure 5. Crosstalk

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AK5381 FFT Plot  
VA=VD=5.0V, fs=48kHz, Input=-1dB, fin=1kHz

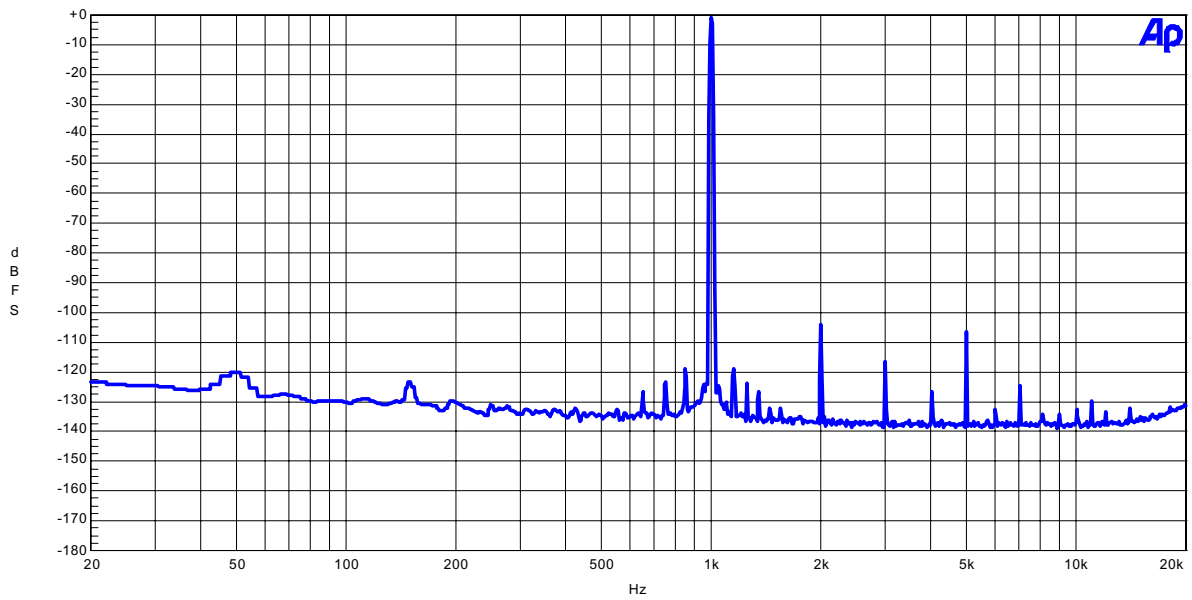


Figure 6. FFT Plot

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AK5381 FFT Plot  
VA=VD=5.0V, fs=48kHz, Input=-60dB, fin=1kHz

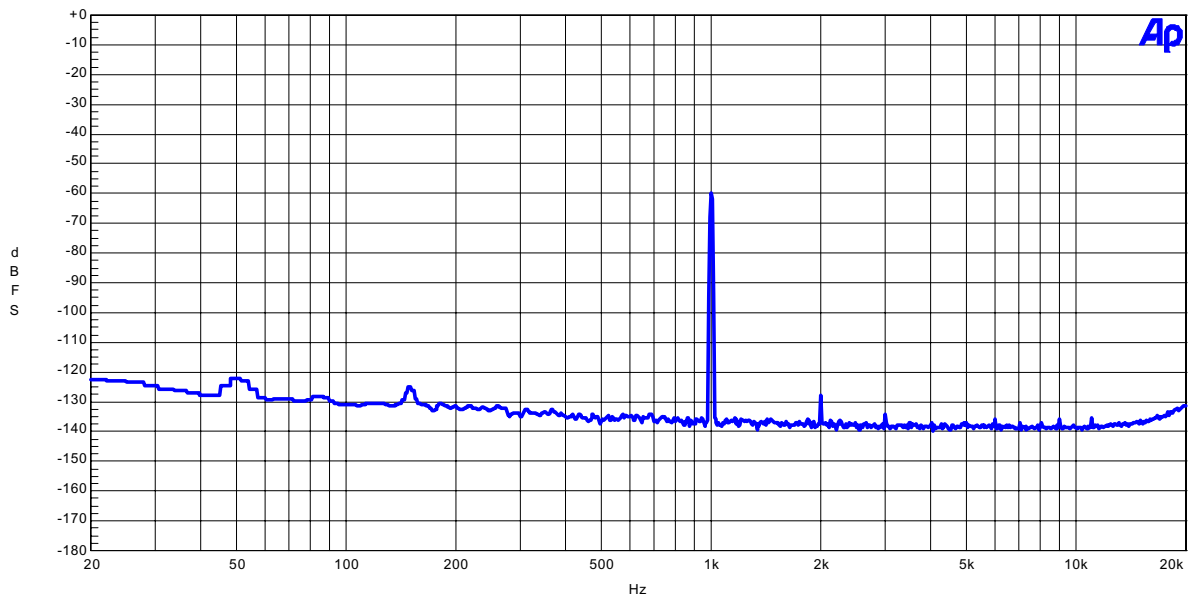


Figure 7. FFT Plot

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AK5381 FFT Plot  
VA=VD=5.0V, fs=48kHz, fin=None

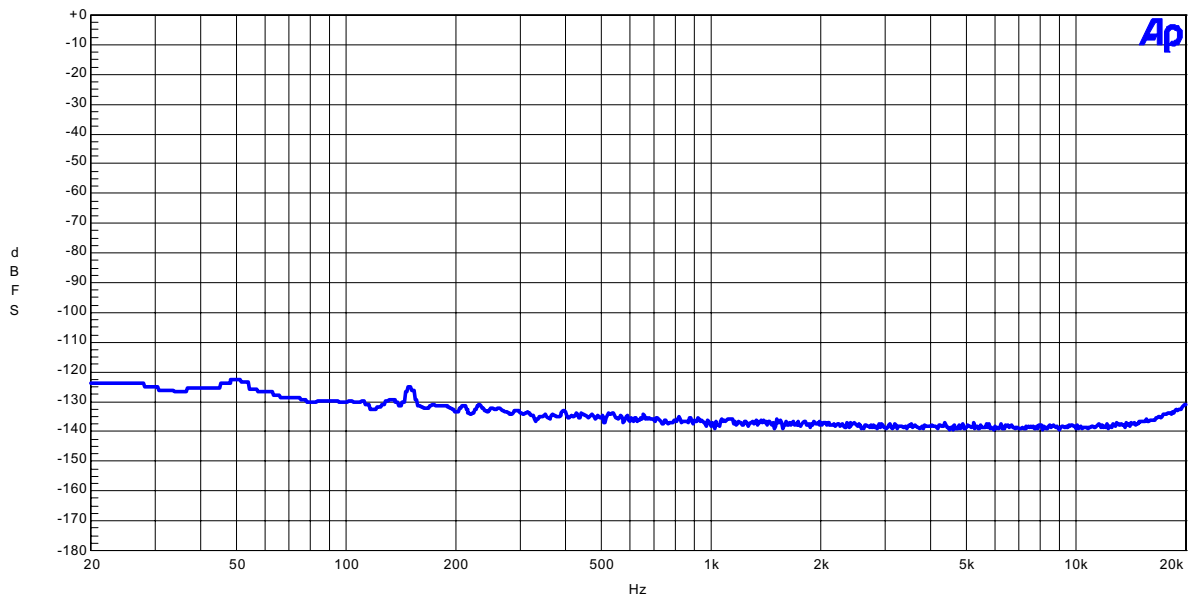


Figure 8. FFT Plot

[ADC Plot : fs=96kHz]

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AK5381 THD+N vs. Input Level  
VA=VD=5.0V, fs=96kHz, fin=1kHz

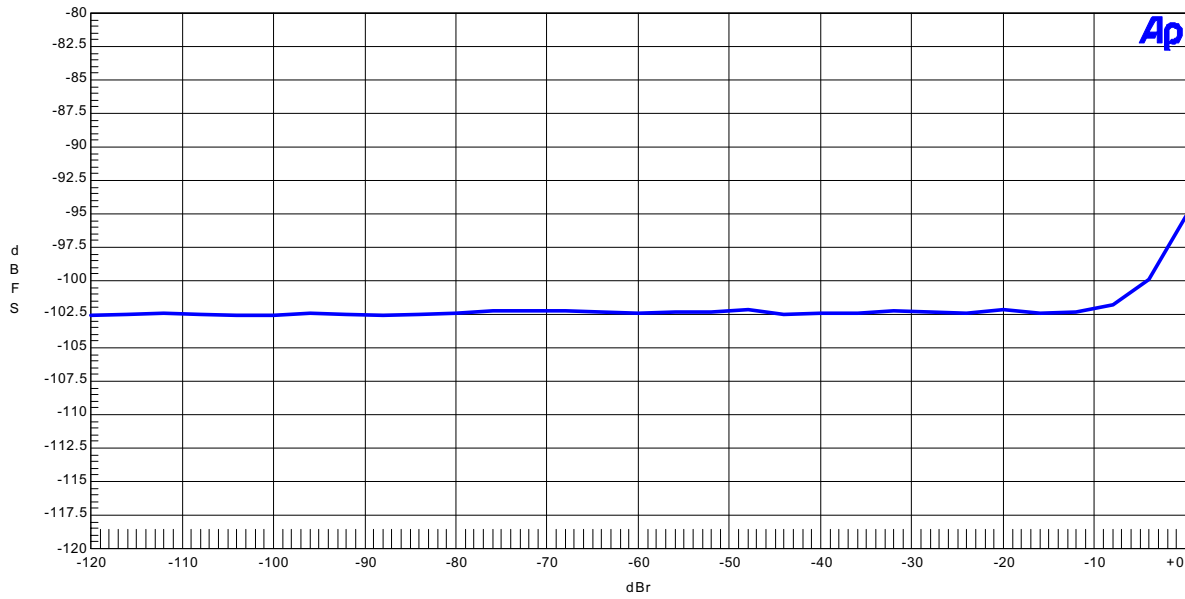


Figure 9. THD+N vs. Input Level

AKM

AK5381 THD+N vs. Input Frequency  
VA=VD=5.0V, fs=96kHz, Input=-1dBr

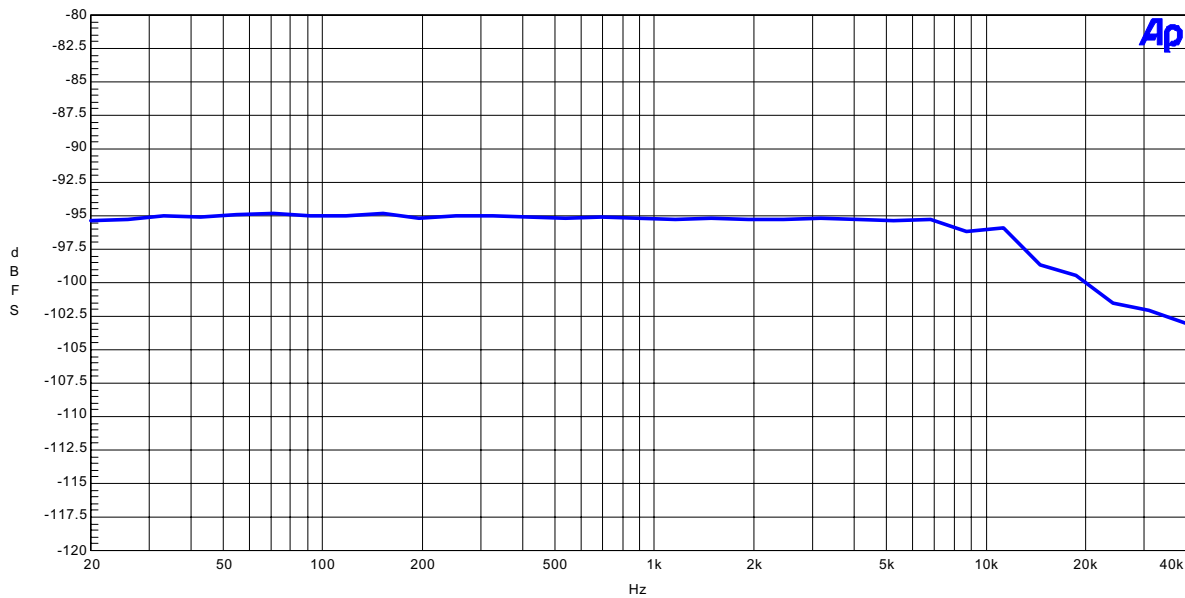


Figure 10. THD+N vs. Input Frequency

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AK5381 Linearity  
VA=VD=5.0V, fs=96kHz, fin=1kHz

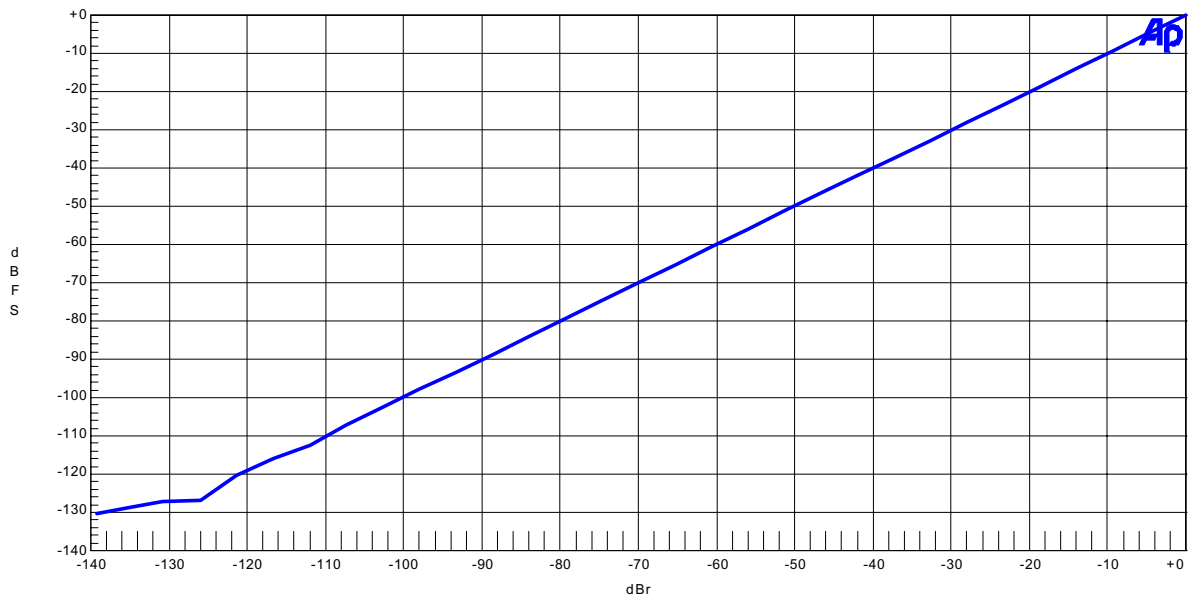


Figure 11. Linearity

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AK5381 Frequency Response  
VA=VD=5.0V, fs=96kHz, Input=-1dBr

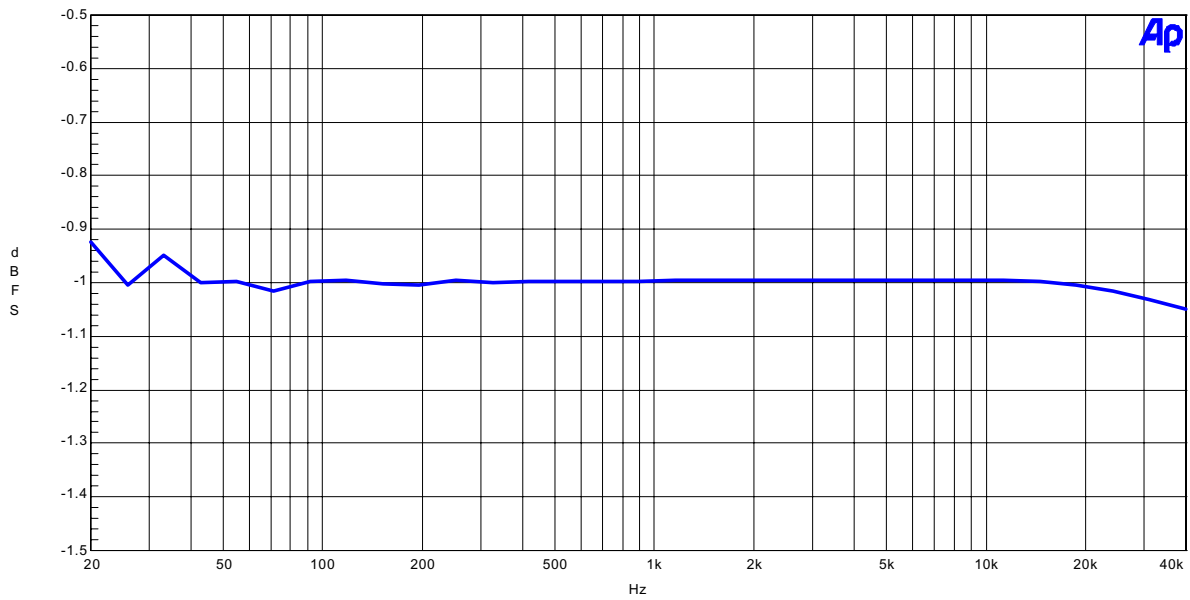


Figure 12. Frequency Response

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AK5381 Crosstalk  
VA=VD=5.0V, fs=96kHz, Input=-1dB

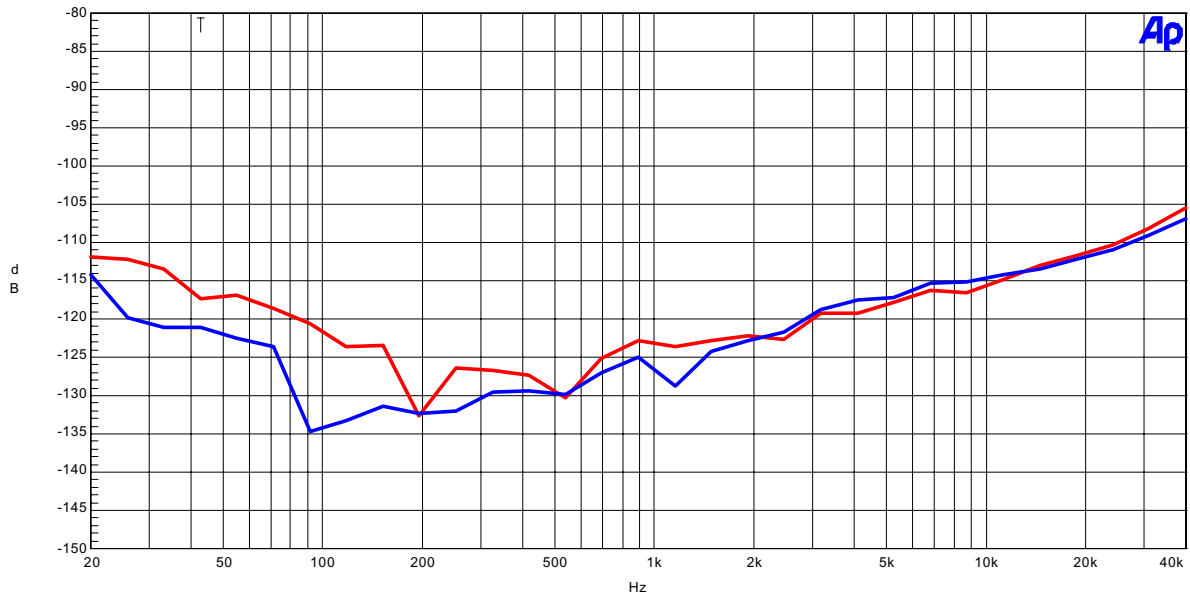


Figure 13. Crosstalk

AKM

AK5381 FFT Plot  
VA=VD=5.0V, fs=96kHz, Input=-1dB, fin=1kHz

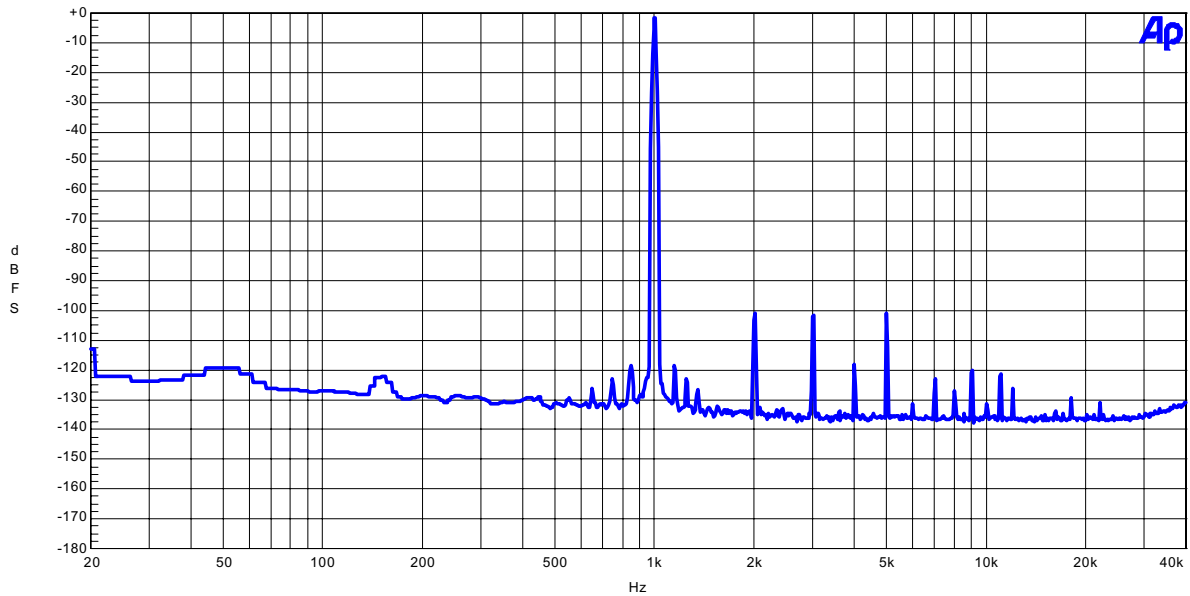


Figure 14. FFT Plot

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AK5381 FFT Plot  
VA=VD=5.0V, fs=96kHz, Input=-60dB, fin=1kHz

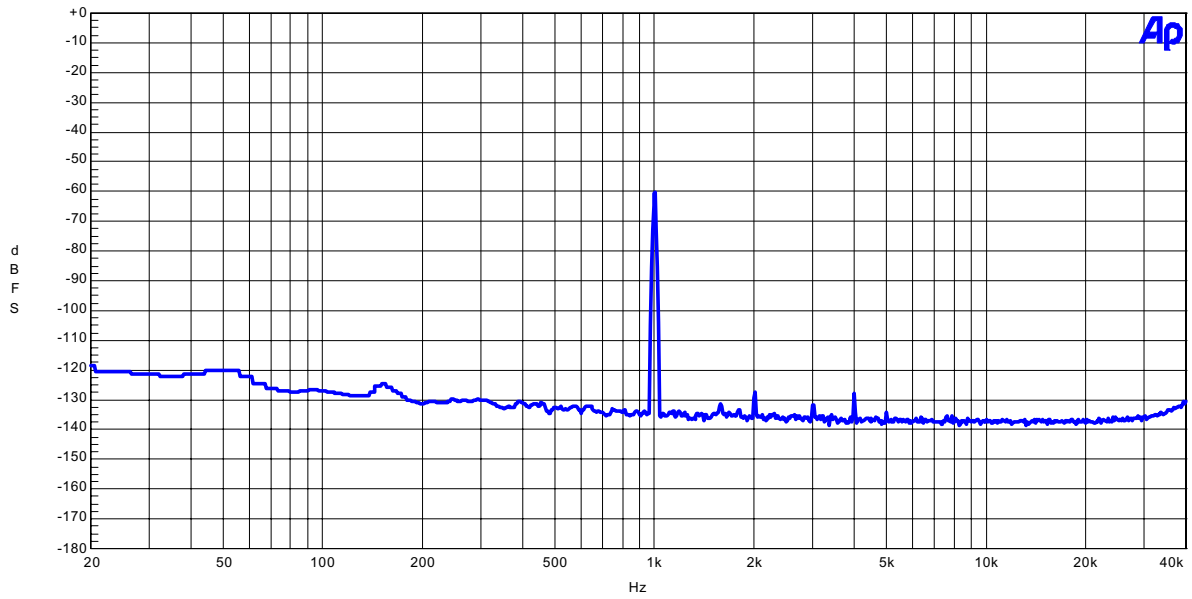


Figure 15. FFT Plot

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AK5381 FFT Plot  
VA=VD=5.0V, fs=96kHz, fin=None

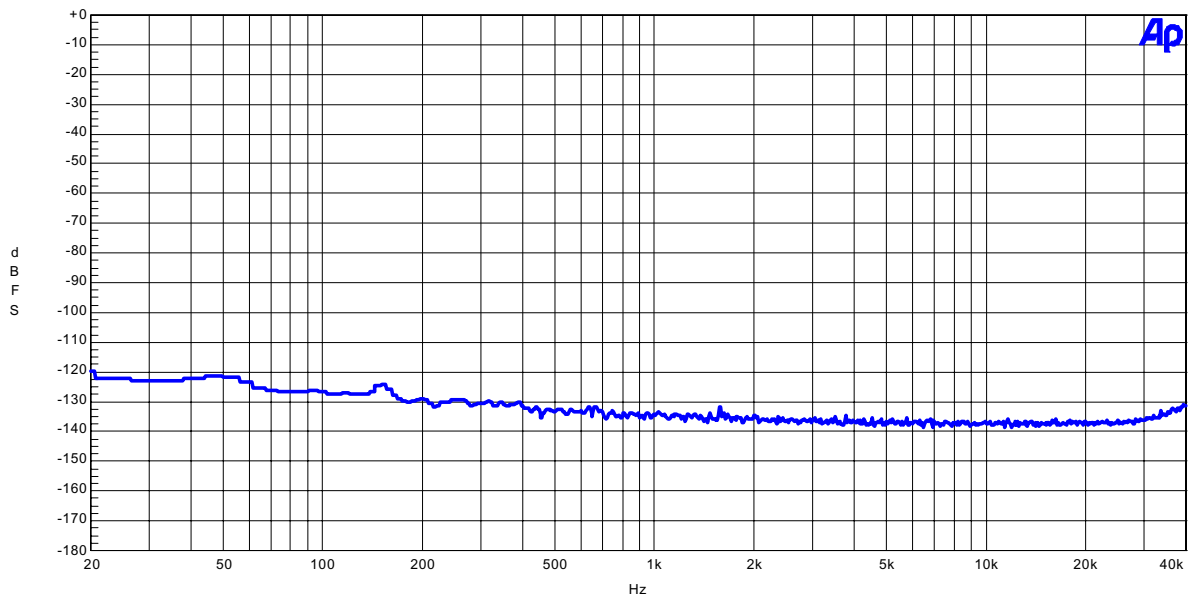
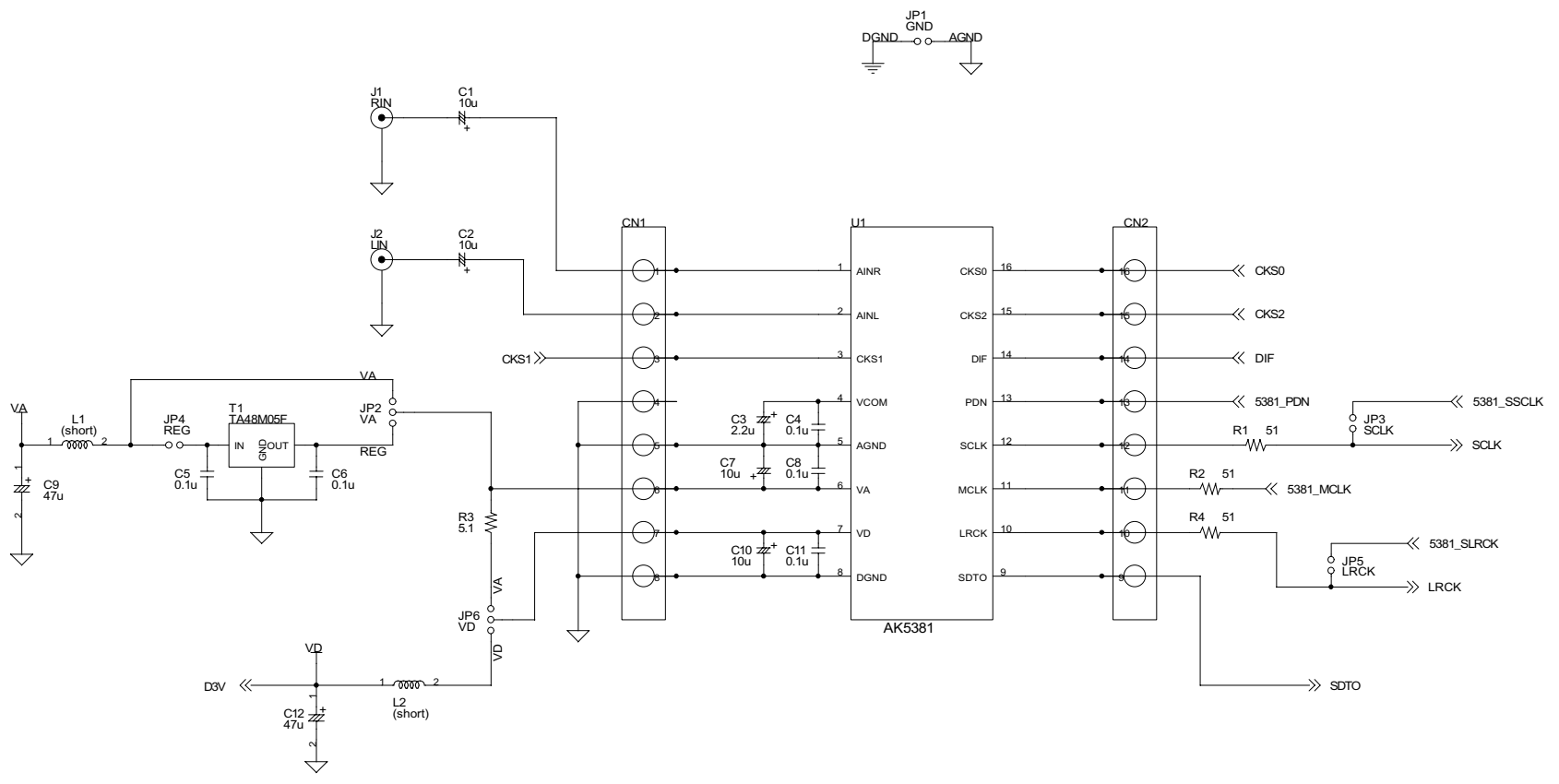


Figure 16. FFT Plot

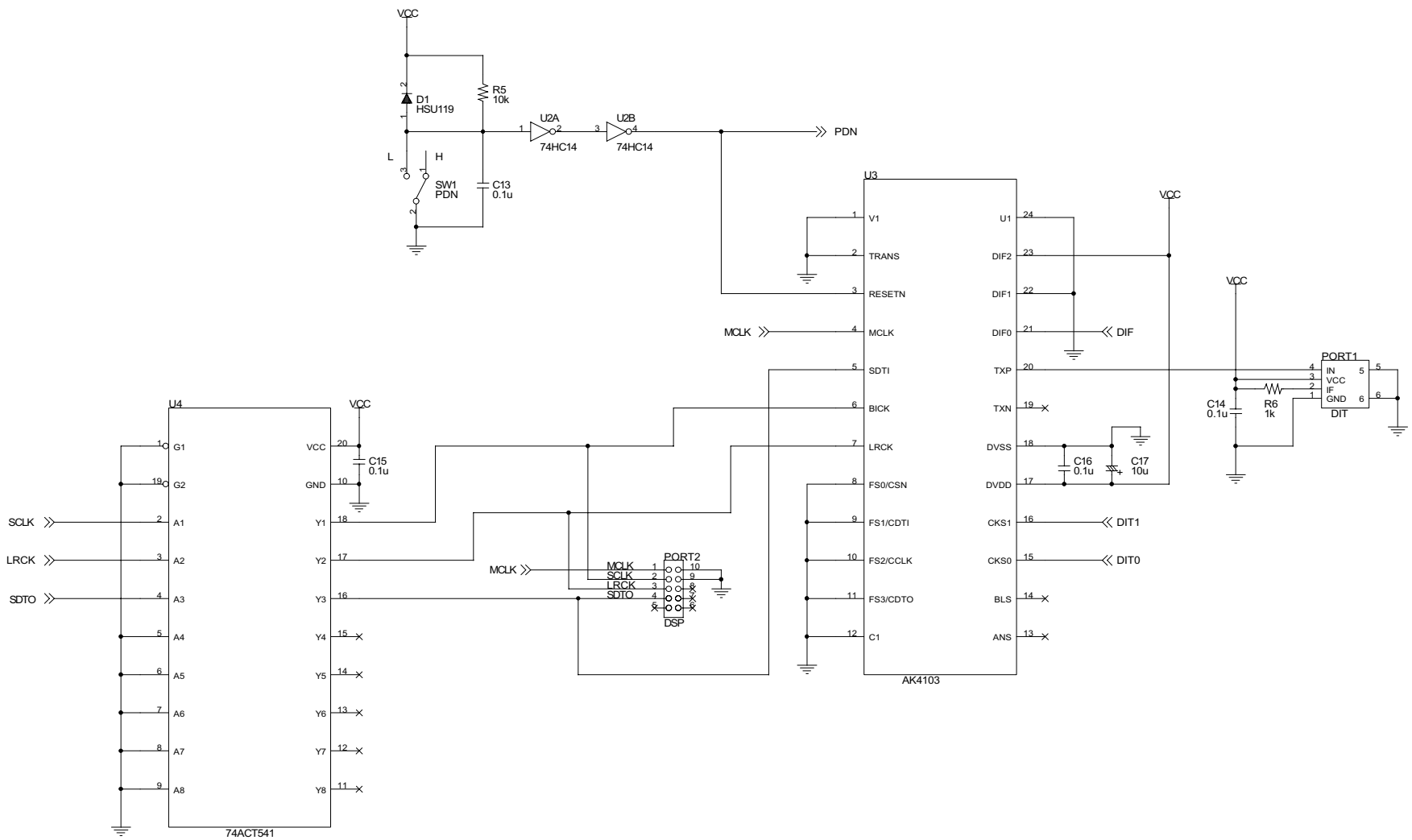
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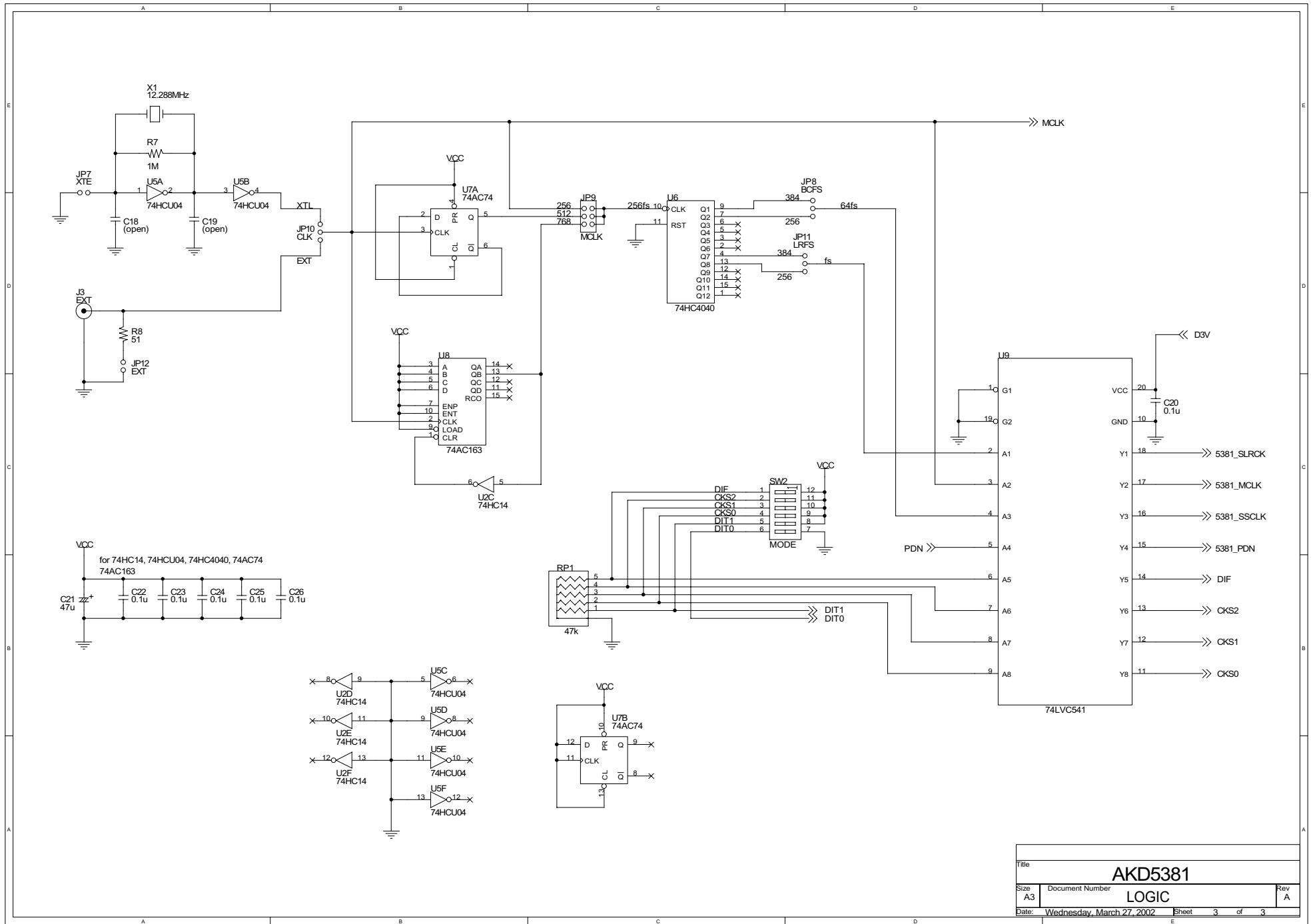


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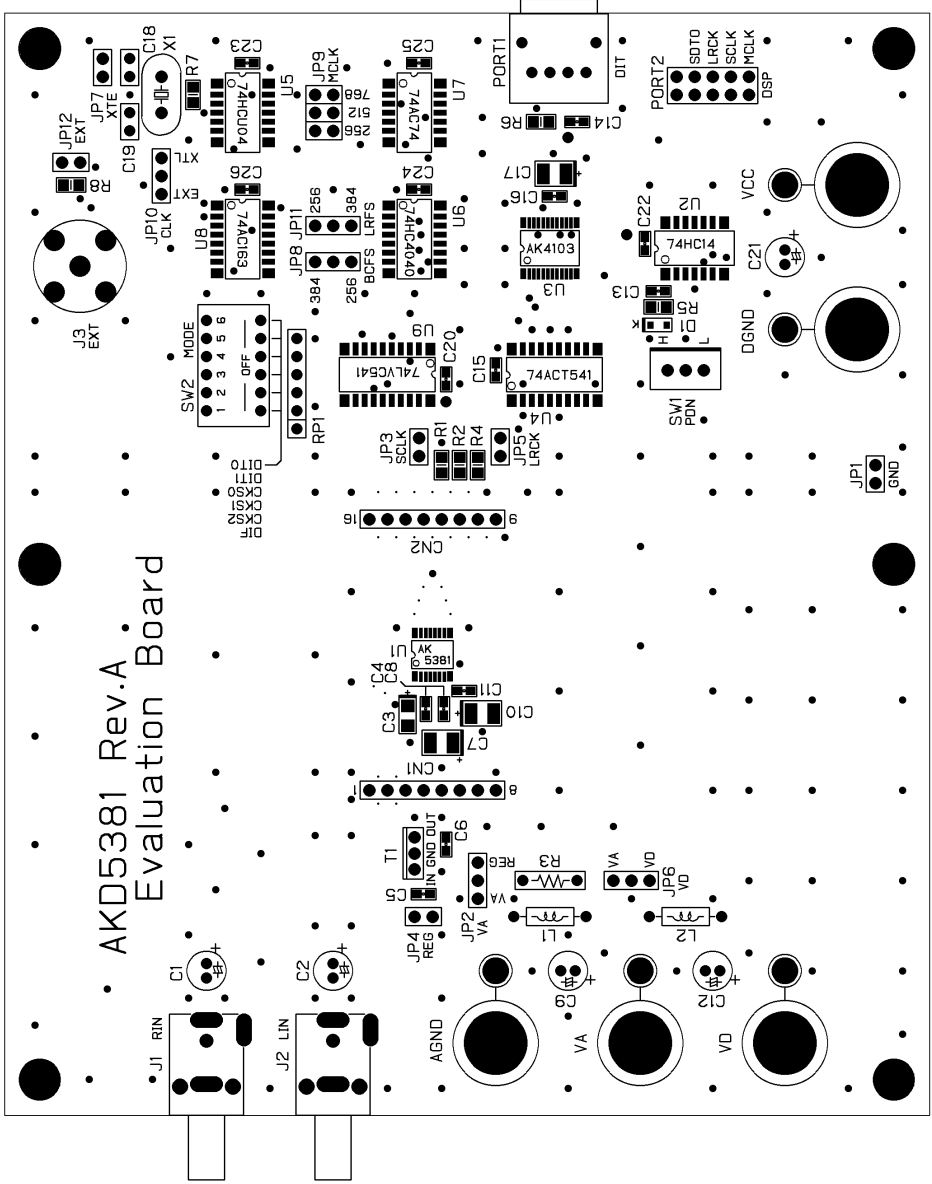


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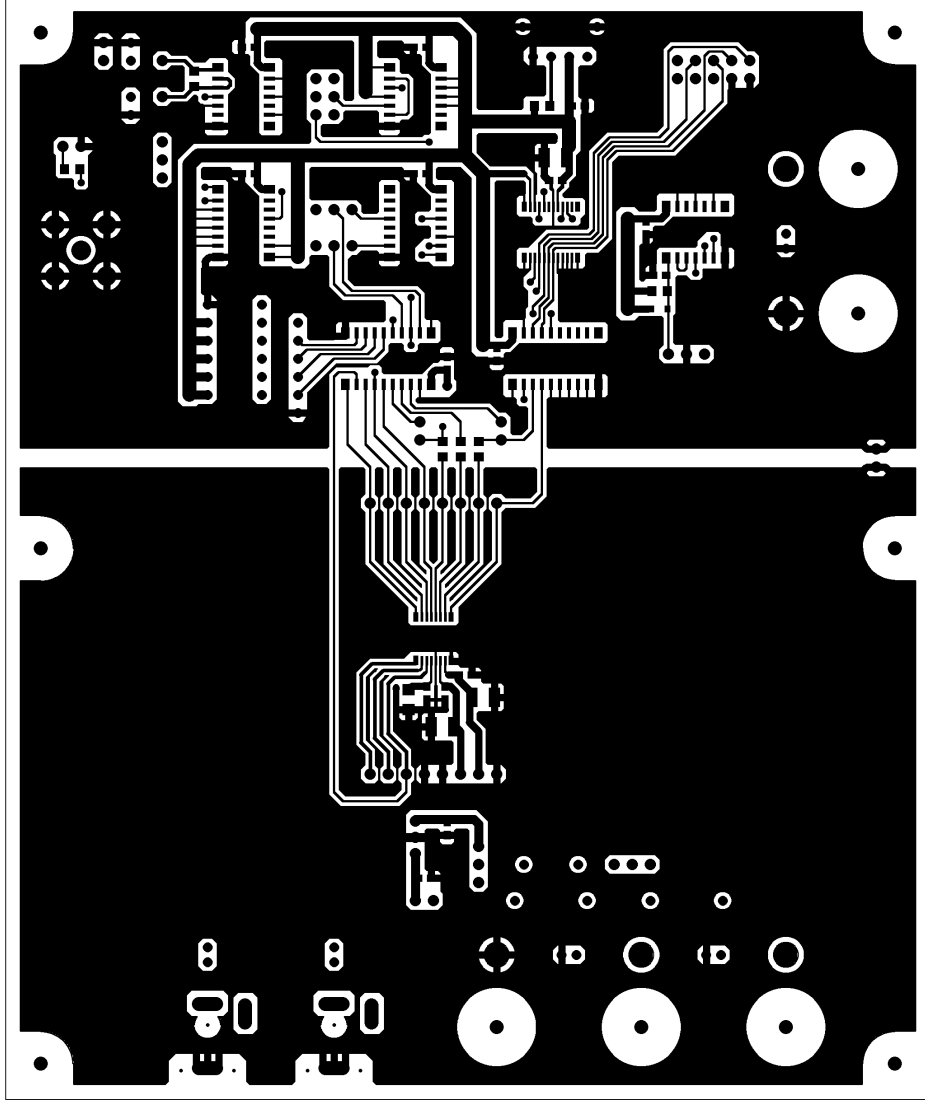


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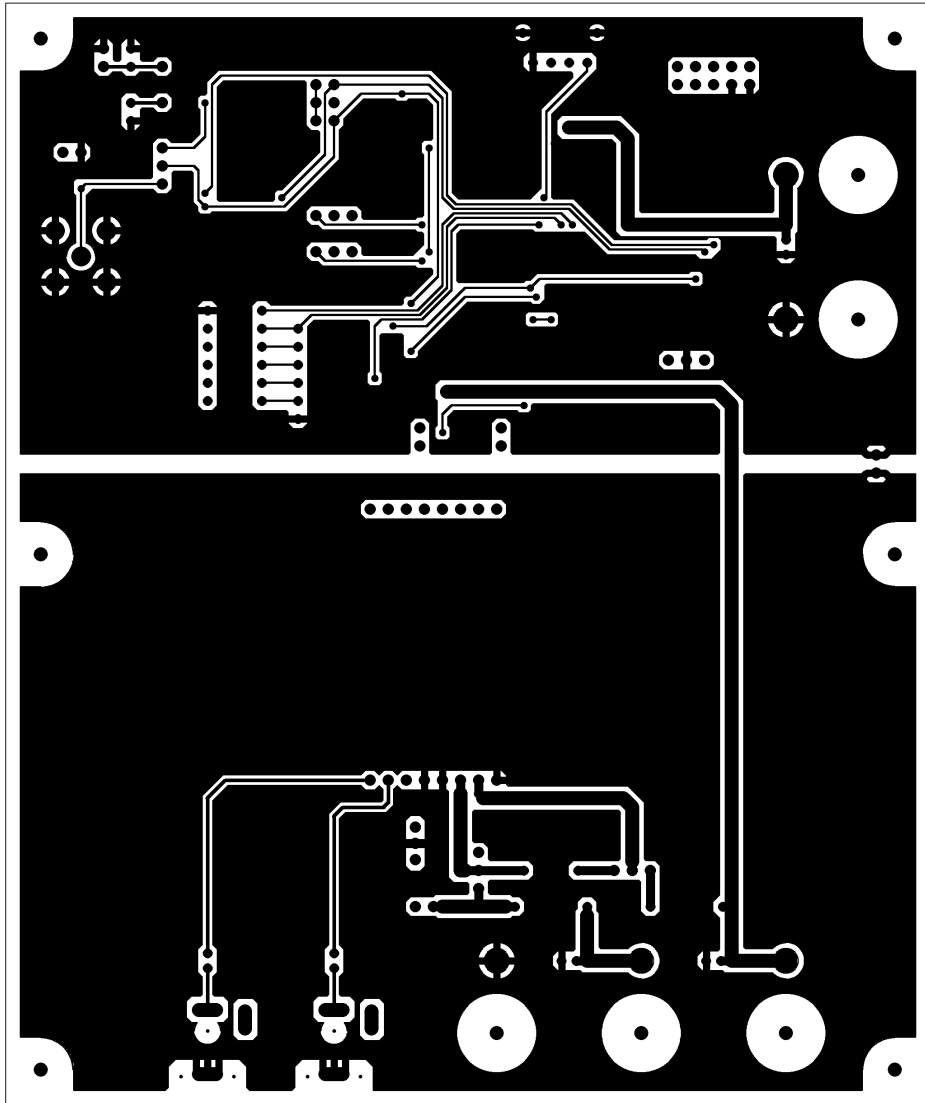
# AKD5381 Rev.A Evaluation Board



AKD5381 Rev.A L1 SR SILK



AKD5381 Rev.A L1



AKD2381 Rev.A TS