

	<h1 style="margin: 0;">AKD5359-B</h1> <h2 style="margin: 0;">AK5359 Evaluation Board Rev.0</h2>
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**GENERAL DESCRIPTION**

AKD5359-B is an evaluation board for the digital audio 24bit 96kHz A/D converter, AK5359. AKD5359-B has analog input circuits and a digital interface transmitter, and can achieve the interface with digital audio systems via opt-connector.

■ **Ordering guide**

AKD5359-B --- AK5359 Evaluation Board

**FUNCTION**

- **DIT (AK4114) with optical output**

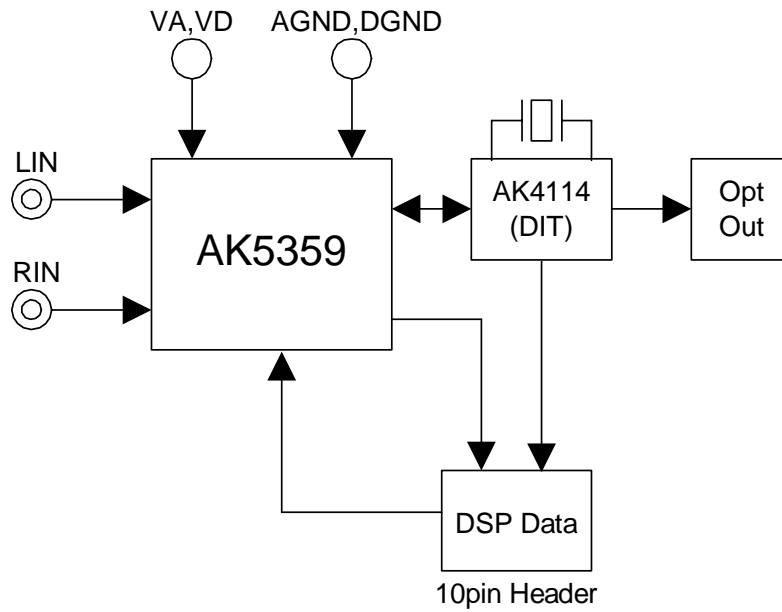


Figure 1 AKD5359-B Block Diagram

\* 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)	= 2.7 ~ 5.5V or +15V	: for VA of AK5359 (typ. 5.0V)
[VD]	(orange)	= 2.7 ~ 5.5V	: for VD of AK5359, 74HC14 (typ. 5.0V)
[VCC]	(red)	= 3.3V	: for AK4114
[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 AK5359 and AK4114 should be reset once bringing SW2 = "L" upon power-up.

### ■ Evaluation mode

(1) Slave Mode

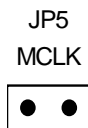
(1-1) A/D evaluation using DIT function of AK4114

PORT2 (DIT) 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. Nothing should be connected to PORT1 (DSP).



(1-2) All interface signals including master clock are fed externally.

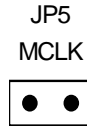
PORT1 (DSP) is used. All interface signals (MCLK, SCLK, LRCK) are provided to the AK5359 through PORT1. JP5 (MCLK) should be open. The DIF1 of SW1 (MODE) should be set to "H".



## (2) Master Mode

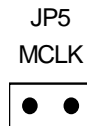
## (2-1) A/D evaluation using DIT function of AK4114

PORT2 (DIT) 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. Nothing should be connected to PORT1 (DSP). The DIF1 of SW1 (MODE) should be set to "H".



## (2-2) Master clock is fed externally.

PORT1 (DSP) is used. MCLK is provided to the AK5359 through PORT1. JP5 (MCLK) should be open. The DIF1 of SW1 (MODE) should be set to "H".



### ■ 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 (CKS1) : Setting of CKS1 pin for AK5359  
 H : Master mode  
 L : Slave mode <Default>
3. JP3 (VA) : Select VA for AK5359  
 VA : Supply from VA connector  
 REG : Supply from regulator. VA connector should be supplied +15V. <Default>
4. JP4 (VD) : Select VD for AK5359  
 VA : Supply from VA connector  
 VD : Supply from VD connector <Default>

## ■ DIP Switch set up

[SW1] (MODE1): Setting the evaluation mode for AK5359 and AK4114  
ON is “H”, OFF is “L”. CKS1 should be set by JP2.

No.	Name	OFF (“L”)	ON (“H”)
1	CKS0	See Table 2	
2	CKS2		
3	DIF	MSB justified	I <sup>2</sup> S Compatible
4	DIF1	AK4114 Master mode	AK4114 Slave mode

Table 1. Mode Setting

CKS2	CKS1	CKS0	HPF	Master/Slave	MCLK	SCLK
L	L	L	ON	Slave	128/192fs (108k<fs≤216k) 256/384fs (8k≤fs≤108k) 512/768fs (8k≤fs≤54k)	≥ 48fs or 32fs
L	L	H	OFF	Slave	128/192fs (108k<fs≤216k) 256/384fs (8k≤fs≤108k) 512/768fs (8k≤fs≤54k)	≥ 48fs or 32fs
L	H	L	ON	Master	256fs (8k≤fs≤108k)	64fs
L	H	H	ON	Master	512fs (8k≤fs≤54k)	64fs
H	L	L	ON	Master	128fs (108k<fs≤216k)	64fs
H	L	H	ON	Master	192fs (108k<fs≤216k)	64fs
H	H	L	ON	Master	384fs (8k≤fs≤108k)	64fs
H	H	H	ON	Master	768fs (8k≤fs≤54k)	64fs

Table 2. Mode Setting of AK5359

Note: AK4114 does not support MCLK=384fs/512fs/768fs.  
PORT1 (DSP) should be used when MCLK=384fs/512fs/768fs.

## ■ The function of the toggle SW

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

[SW2] (PDN): Resets the AK5359 and AK4114. Keep “H” during normal operation.

■ Analog Input Circuits

Analog signal is input via J1(RIN) and J2(LIN) of RCA connectors.

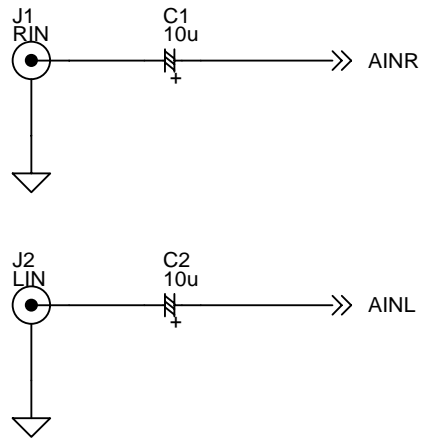


Figure 2 Analog Input circuits

\* 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, 128fs
- SCLK : 64fs
- fs : 48kHz, 96kHz, 192kHz
- Bit : 24bit
- Power Supply : VA = VD = 5.0V (Using regulator)
- Interface : DIT
- Temperature : Room

Parameter		Result (Lch / Rch)	Unit
<b>ADC Analog Input Characteristics:</b>			
S/(N+D) (-1dB Input)	fs=48kHz	94.9 / 94.0	dB
	fs=96kHz	94.5 / 93.5	dB
	fs=192kHz	93.5 / 92.4	dB
D-Range (-60dB Input)	fs=48kHz, A-weighted	102.2 / 102.2	dB
	fs=96kHz	98.6 / 98.6	dB
	fs=192kHz	98.5 / 98.5	dB
S/N	fs=48kHz, A-weighted	102.7 / 102.7	dB
	fs=96kHz	98.7 / 98.7	dB
	fs=192kHz	98.7 / 98.7	dB

fs=48kHz

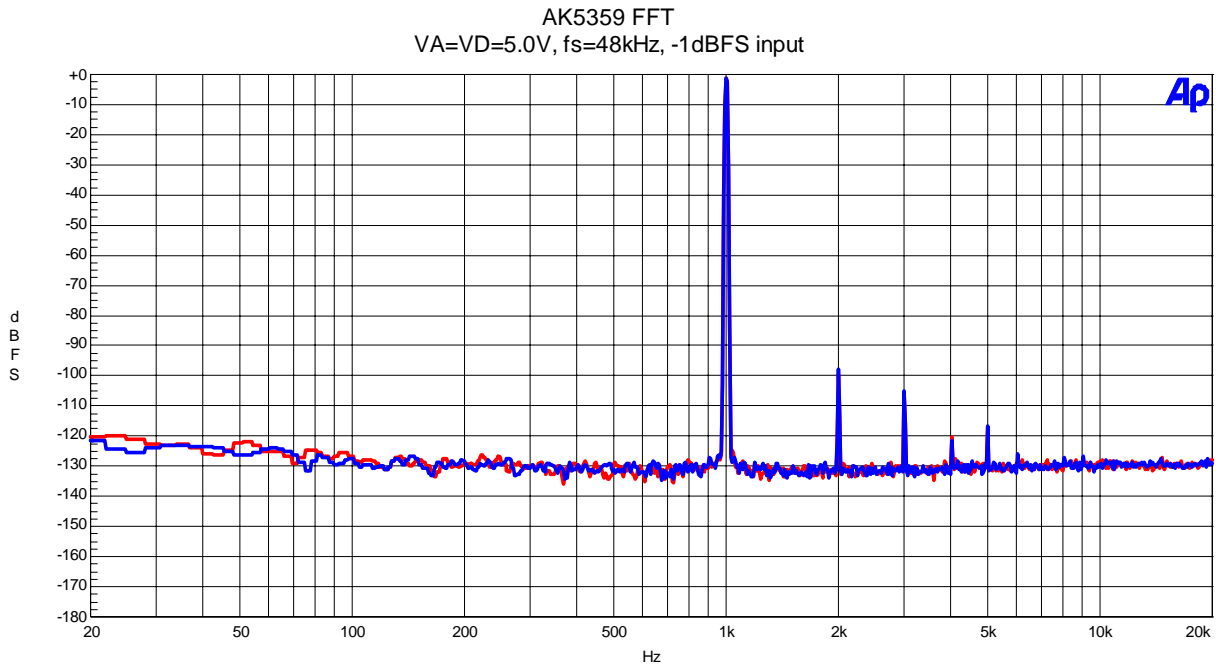


Figure 3 FFT (1kHz, -1dB input)

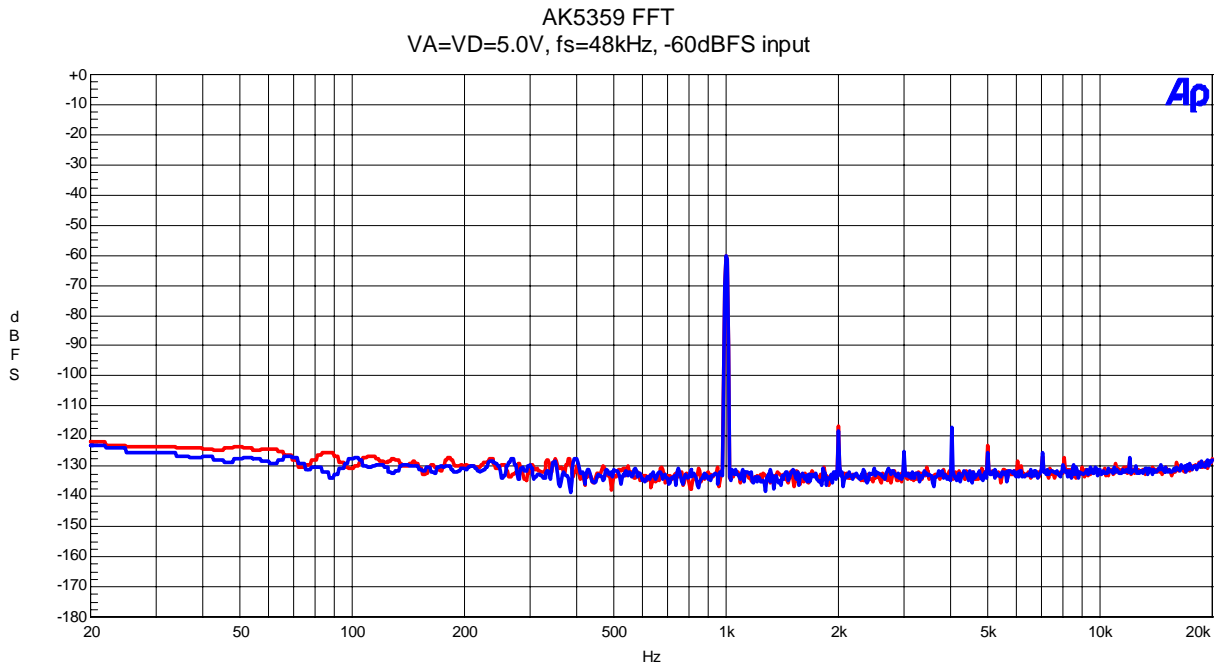


Figure 4 FFT (1kHz, -60dB input)

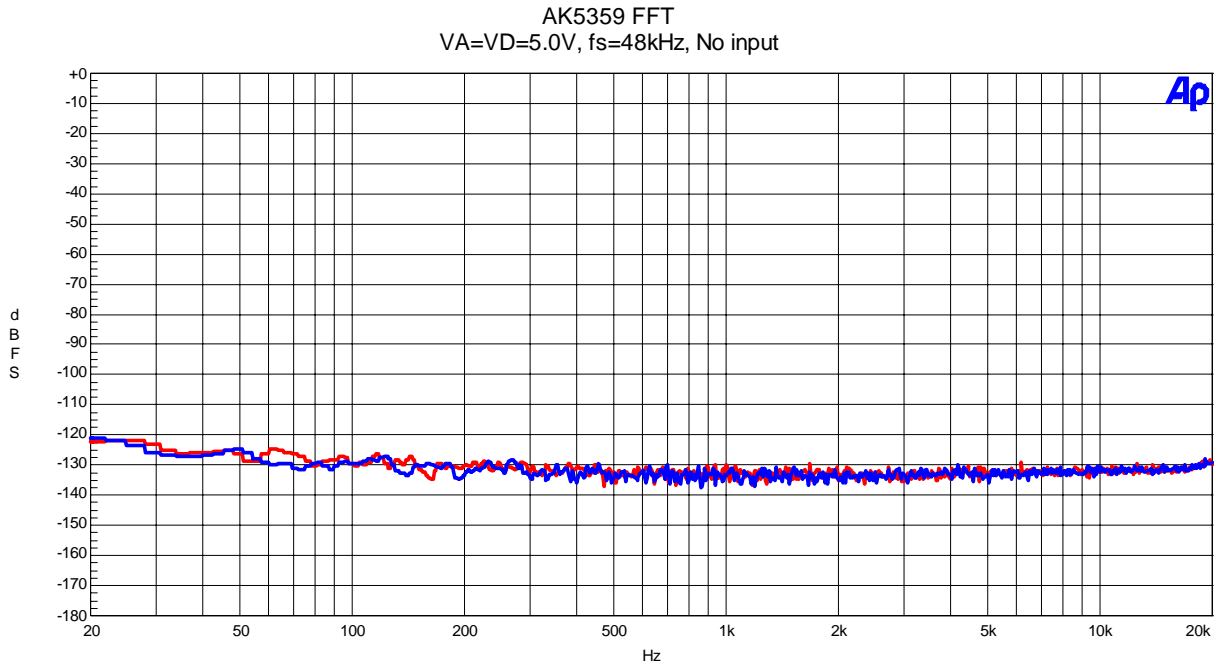


Figure 5 FFT (off the input)

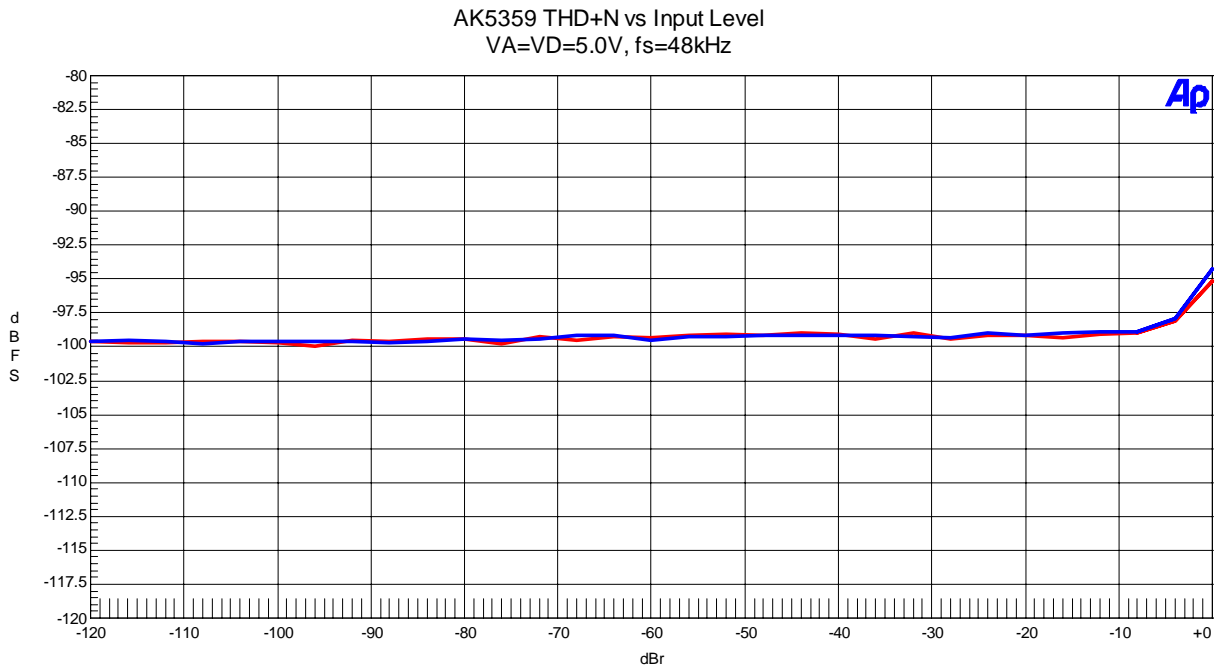


Figure 6 THD+N vs Input Level (1kHz input)



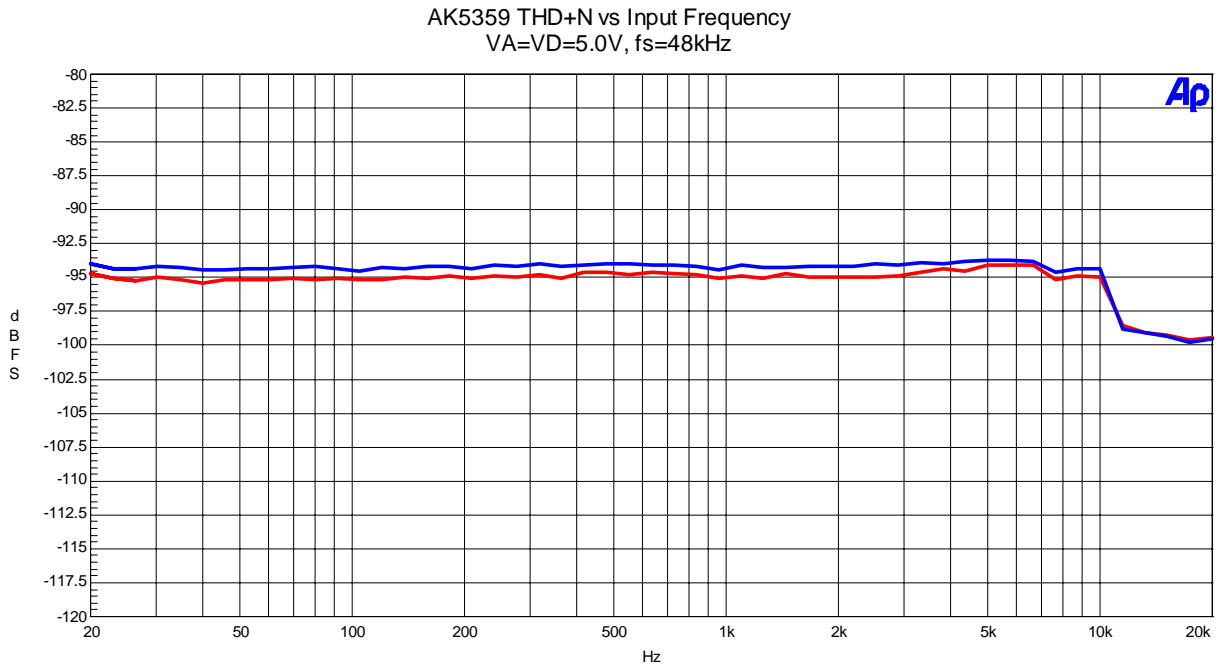


Figure 7 THD+N vs Input Frequency (1kHz input)

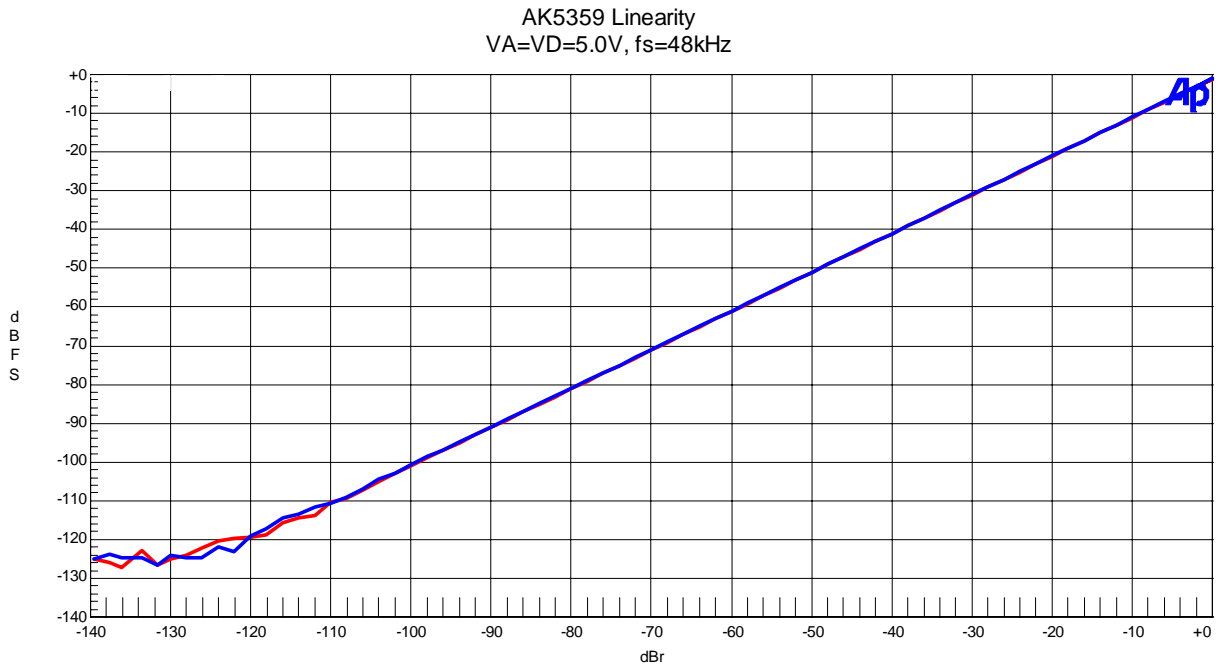


Figure 8 Linearity (fin=1kHz)

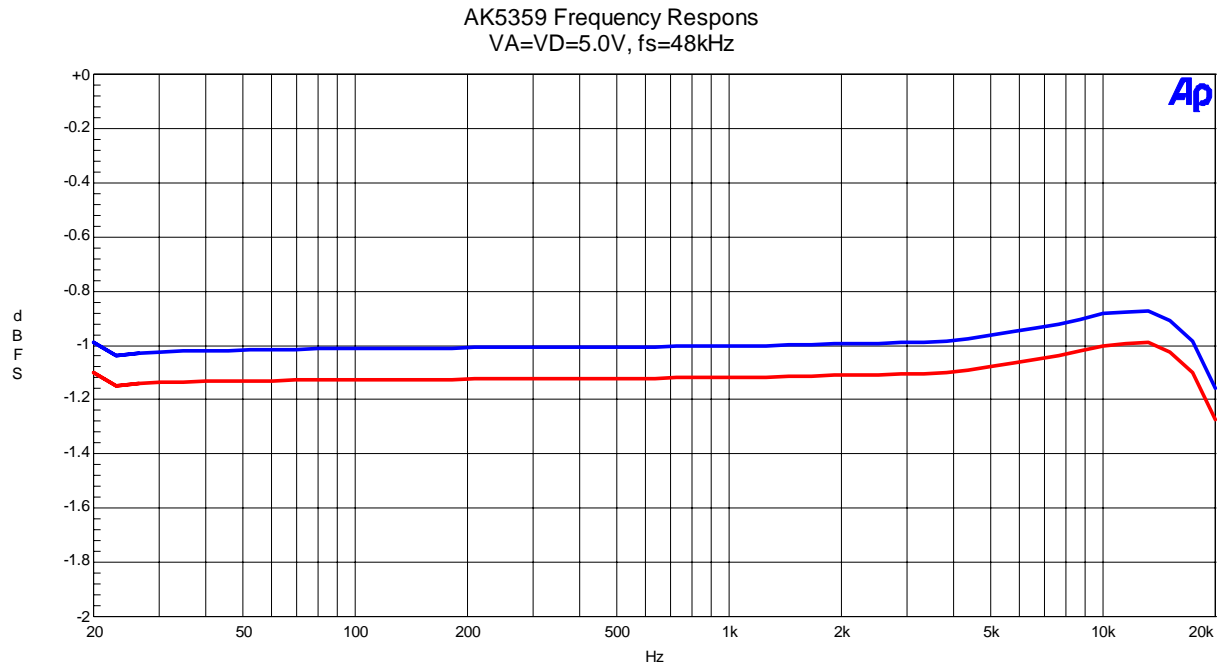


Figure 9 Frequency Response (-1dB input)

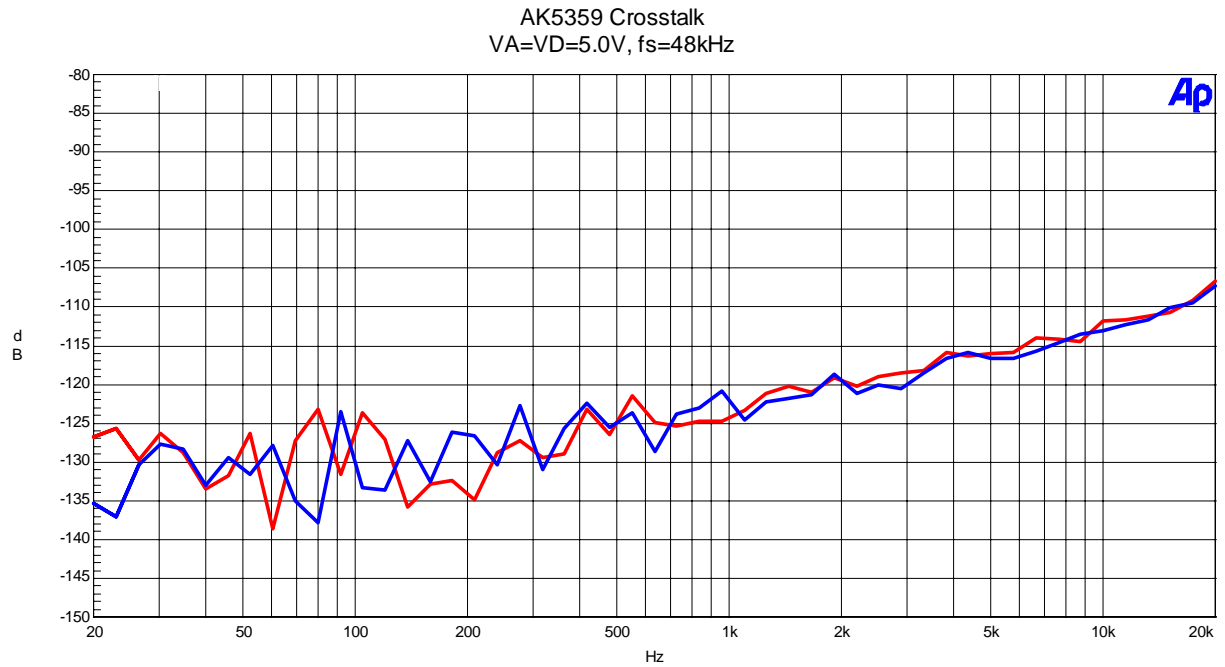


Figure 10 Cross-talk (-1dB input)

fs=96kHz

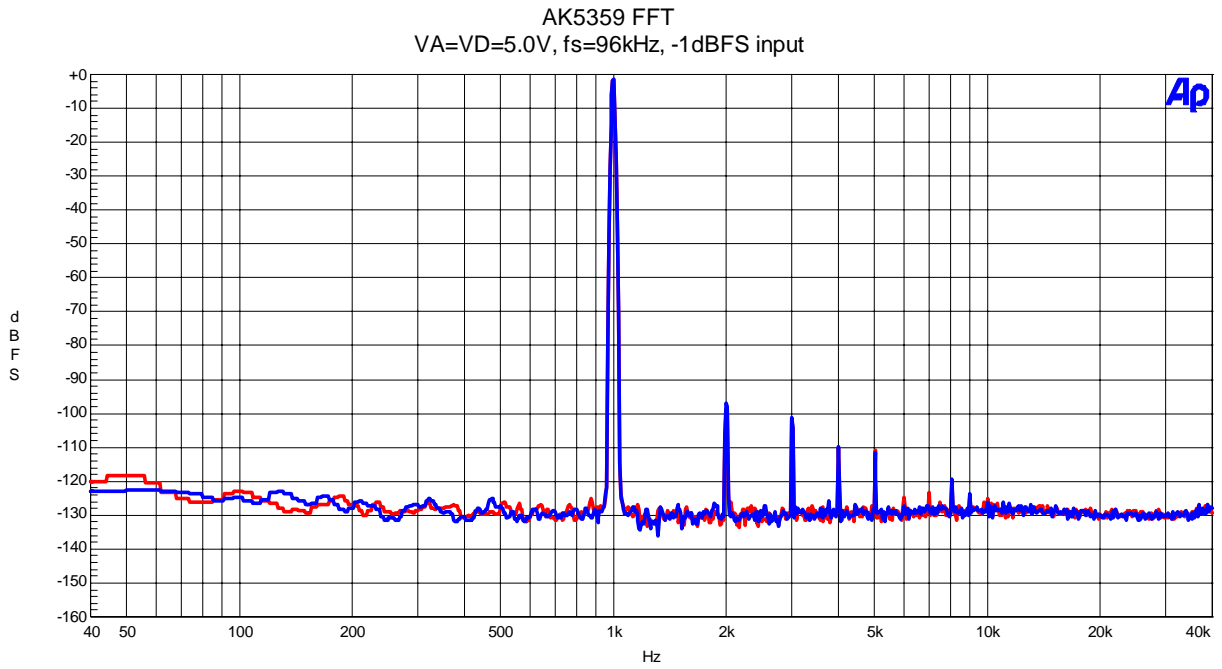


Figure 11 FFT (1kHz, -1dB input)

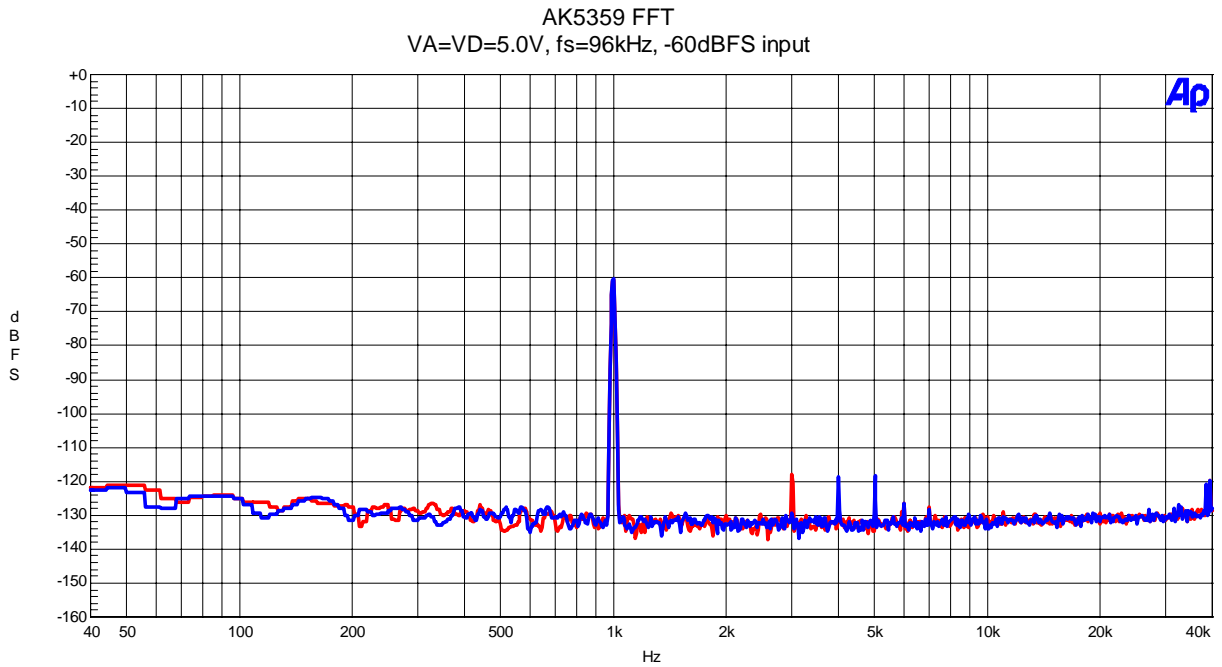


Figure 12 FFT (1kHz, -60dB input)

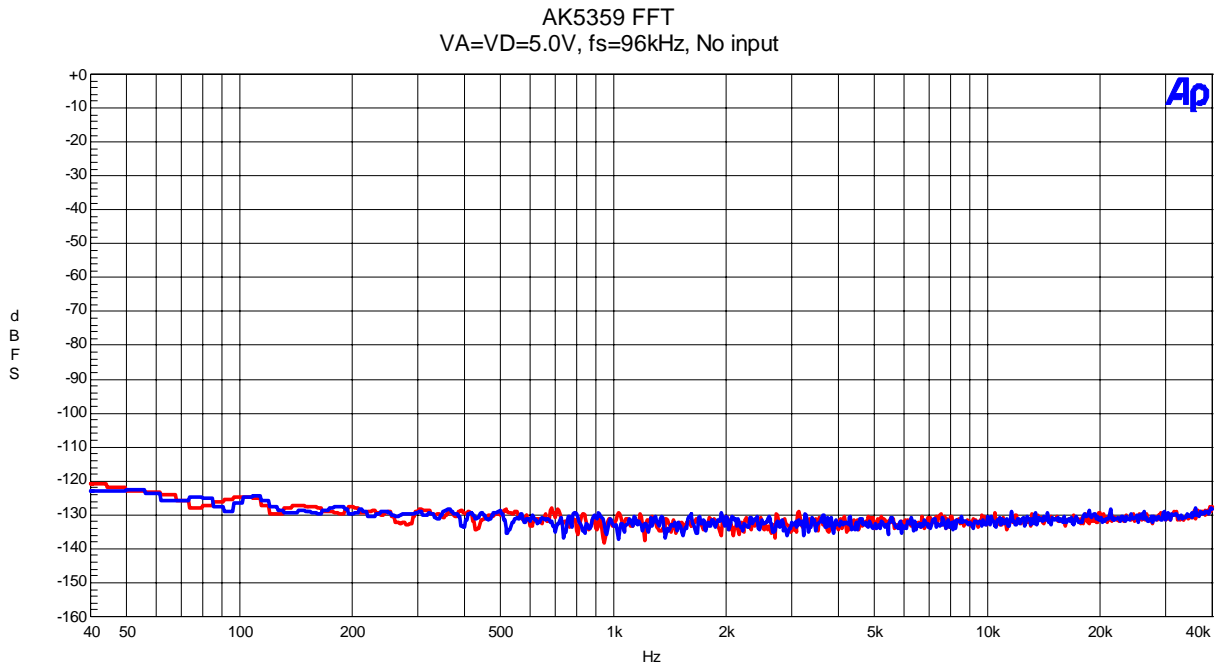


Figure 13 FFT (off the input)

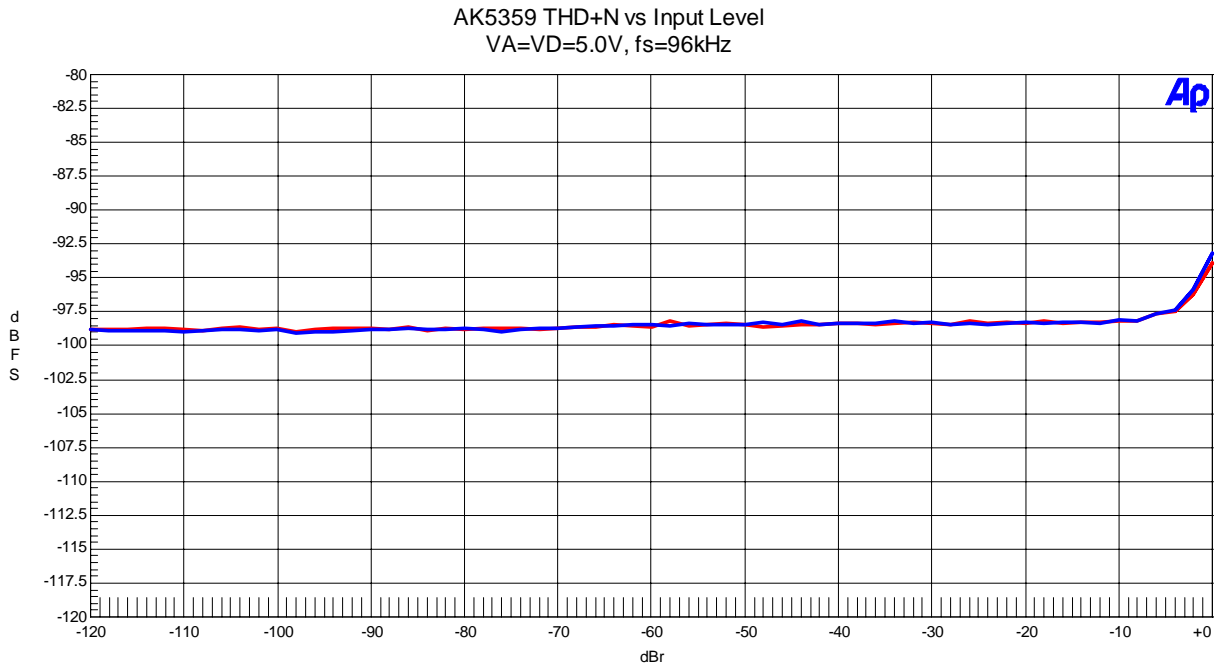


Figure 14 THD+N vs Input Level (1kHz input)

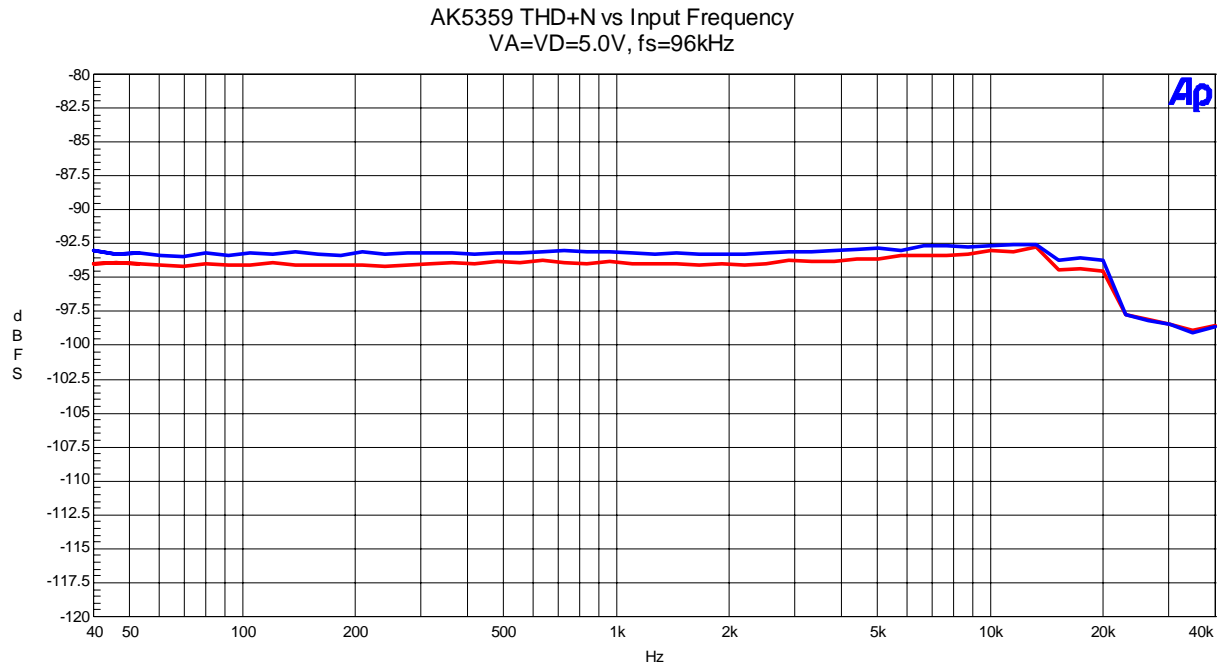


Figure 15 THD+N vs Input Frequency (1kHz input)

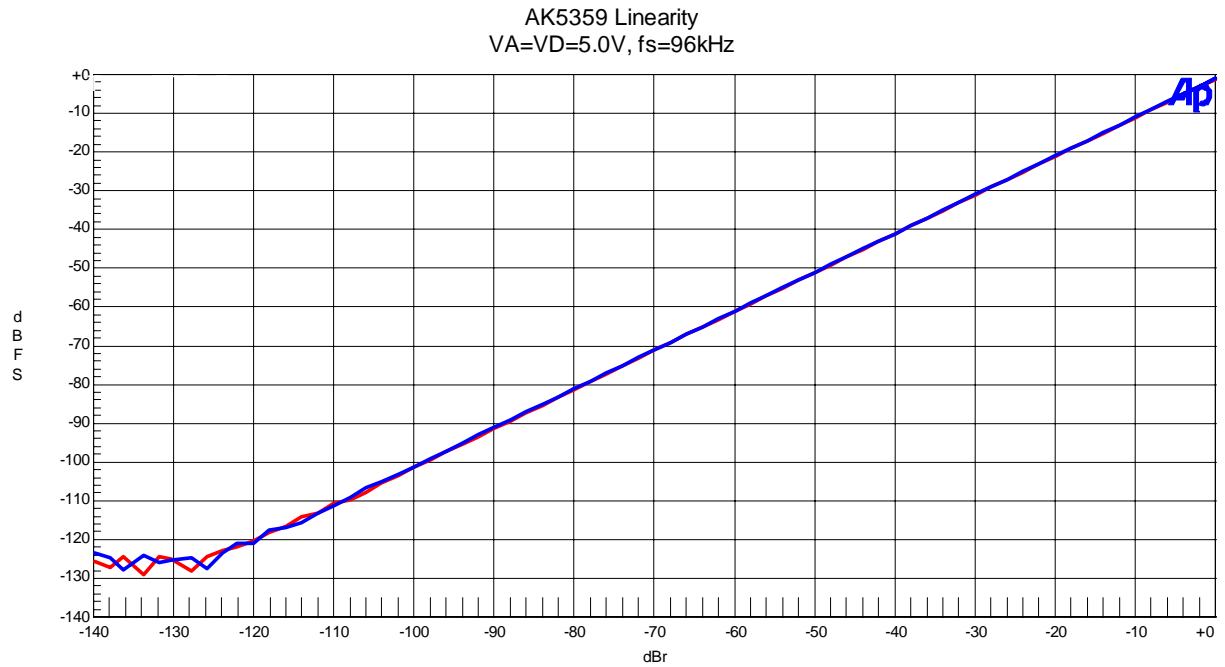


Figure 16 Linearity (fin=1kHz)

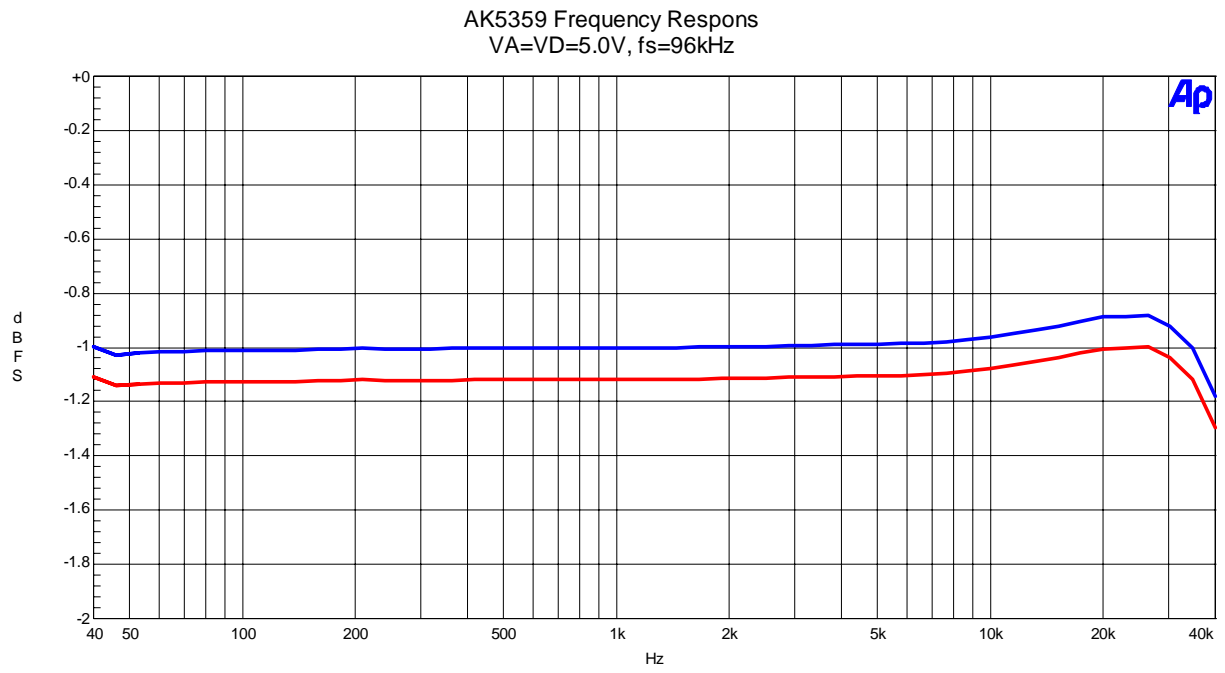


Figure 17 Frequency Response (-1dB input)

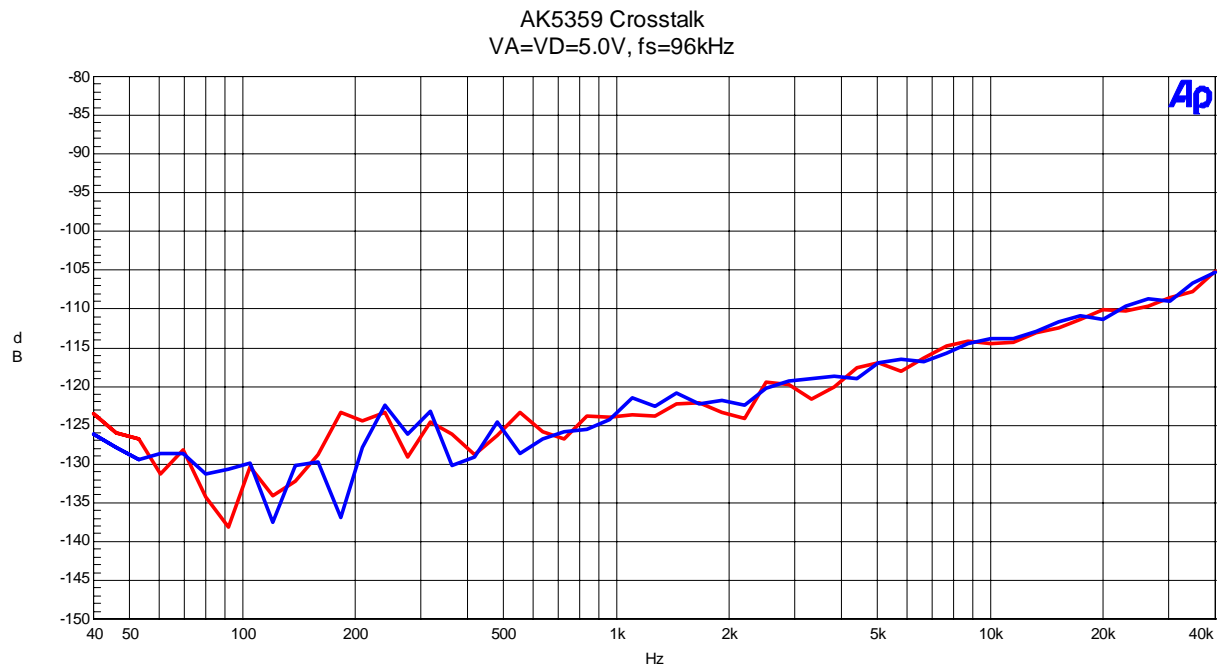


Figure 18 Cross-talk (-1dB input)

fs=192kHz

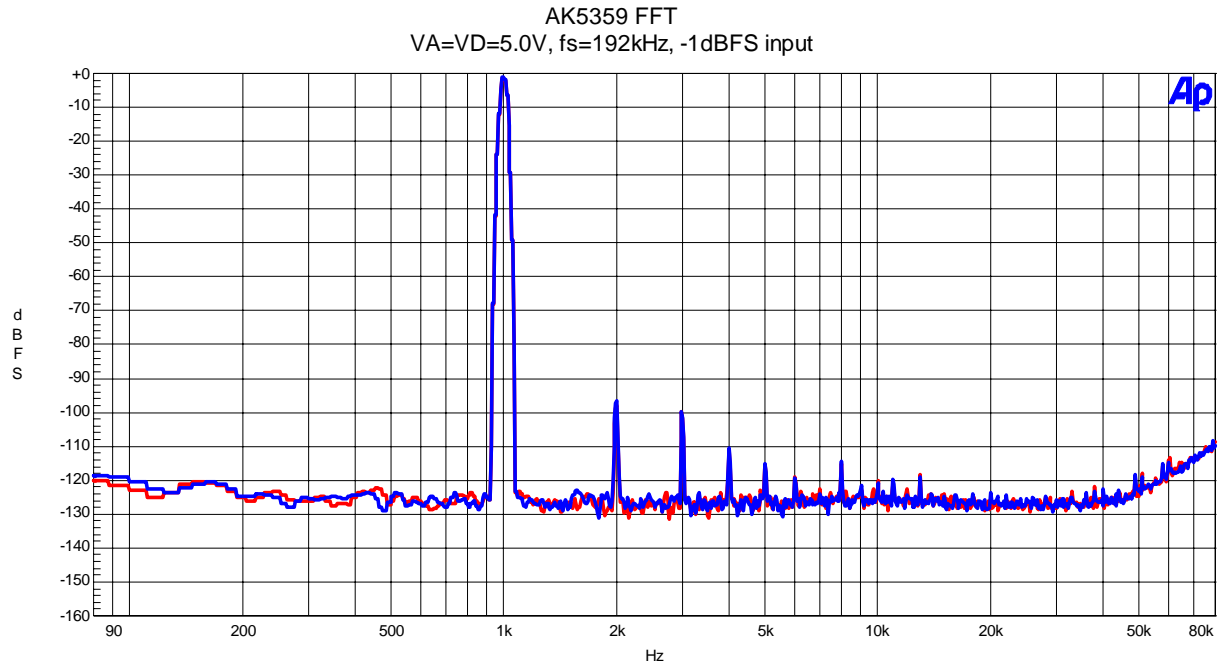


Figure 19 FFT (1kHz, -1dB input)

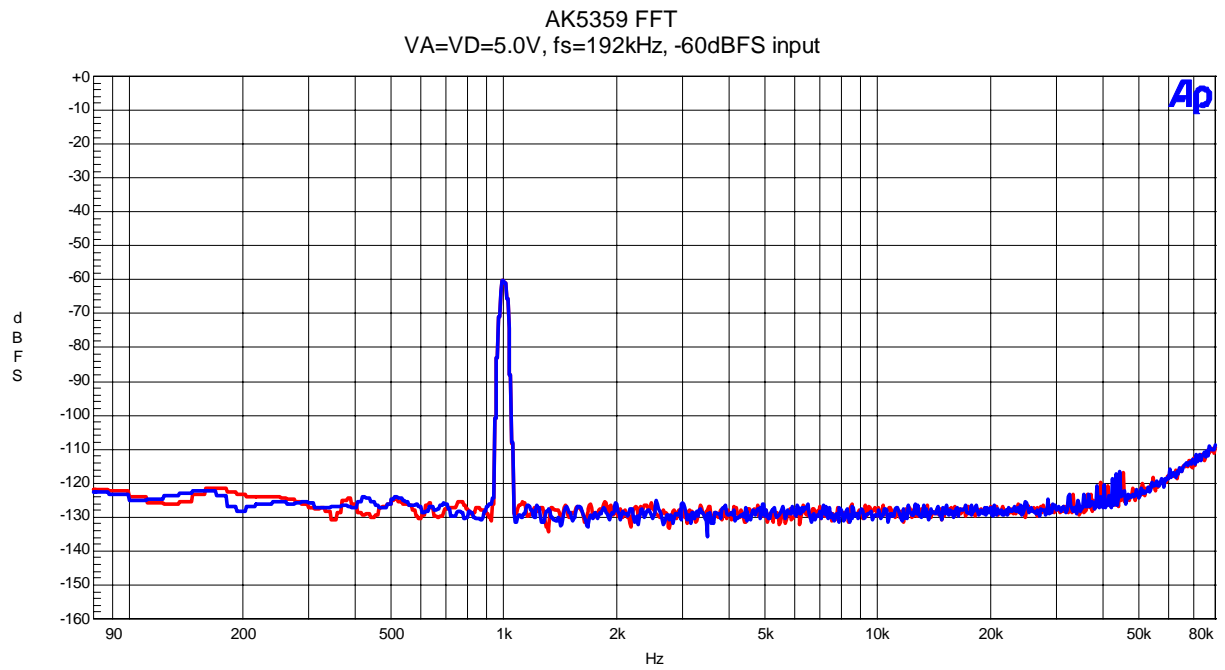


Figure 20 FFT (1kHz, -60dB input)

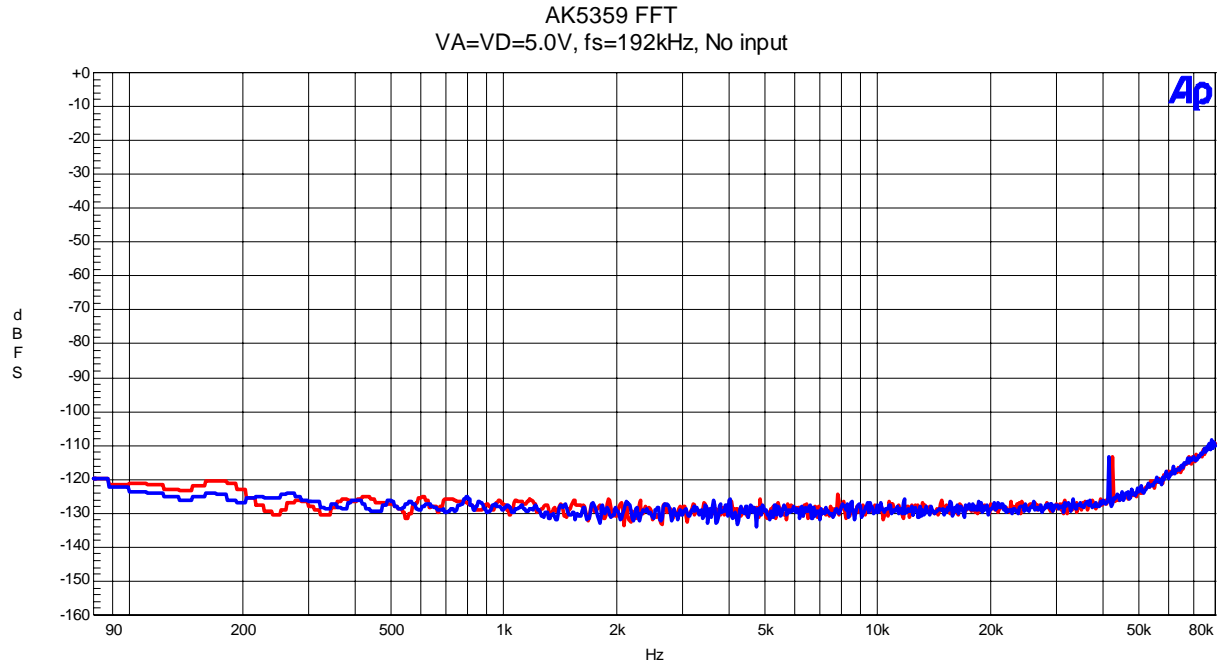


Figure 21 FFT (off the input)

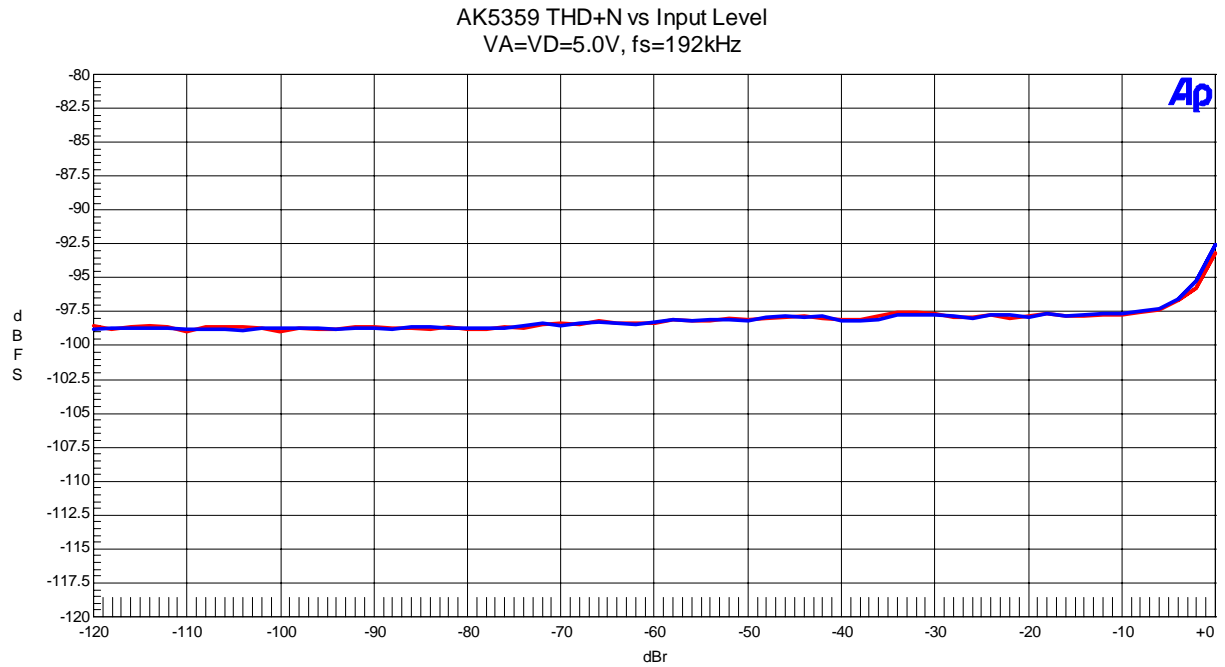


Figure 22 THD+N vs Input Level (-1dB input)



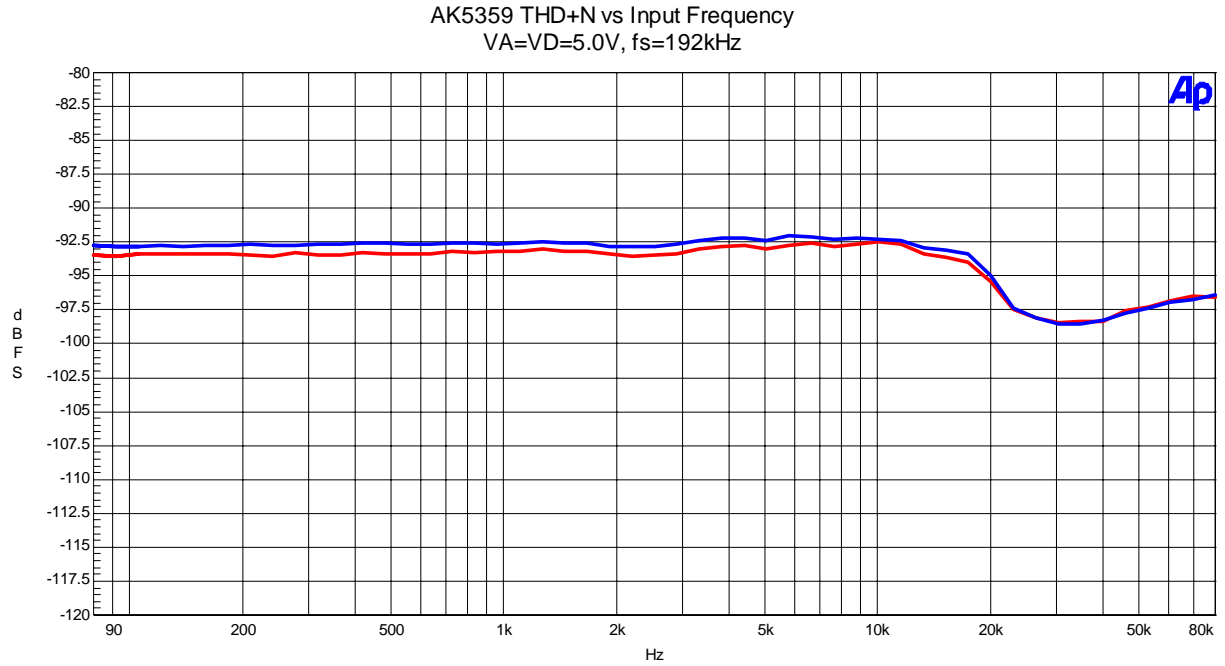


Figure 23 THD+N vs Input Frequency (-1dB input)

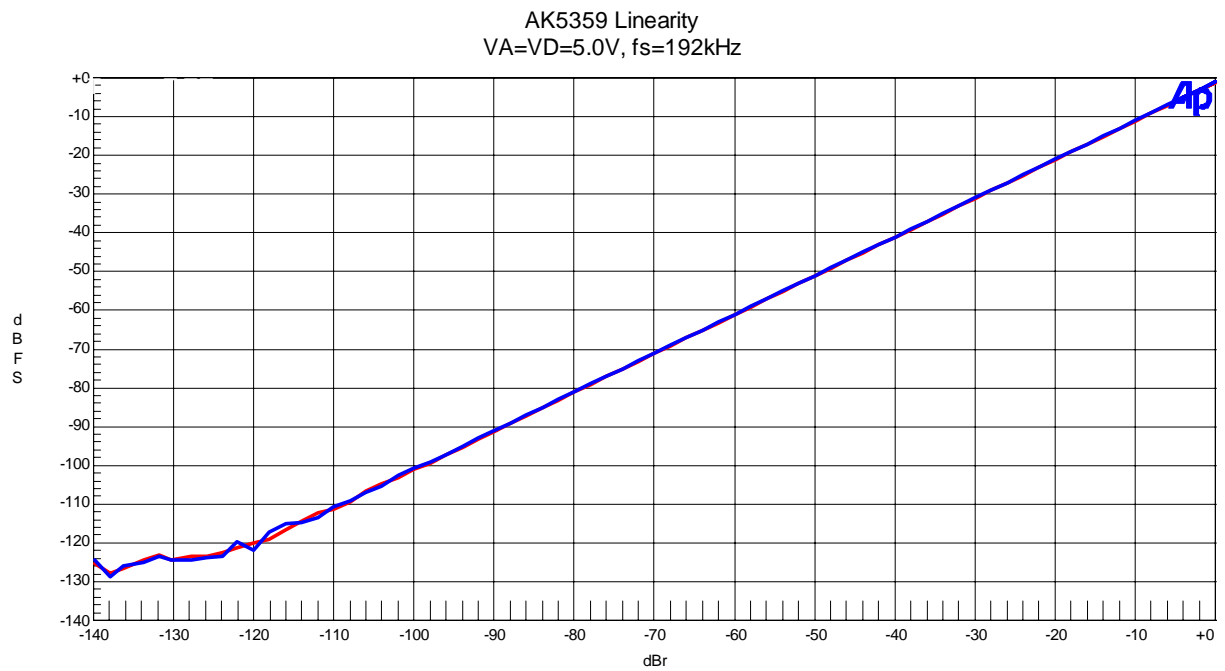


Figure 24 Linearity (fin=1kHz)

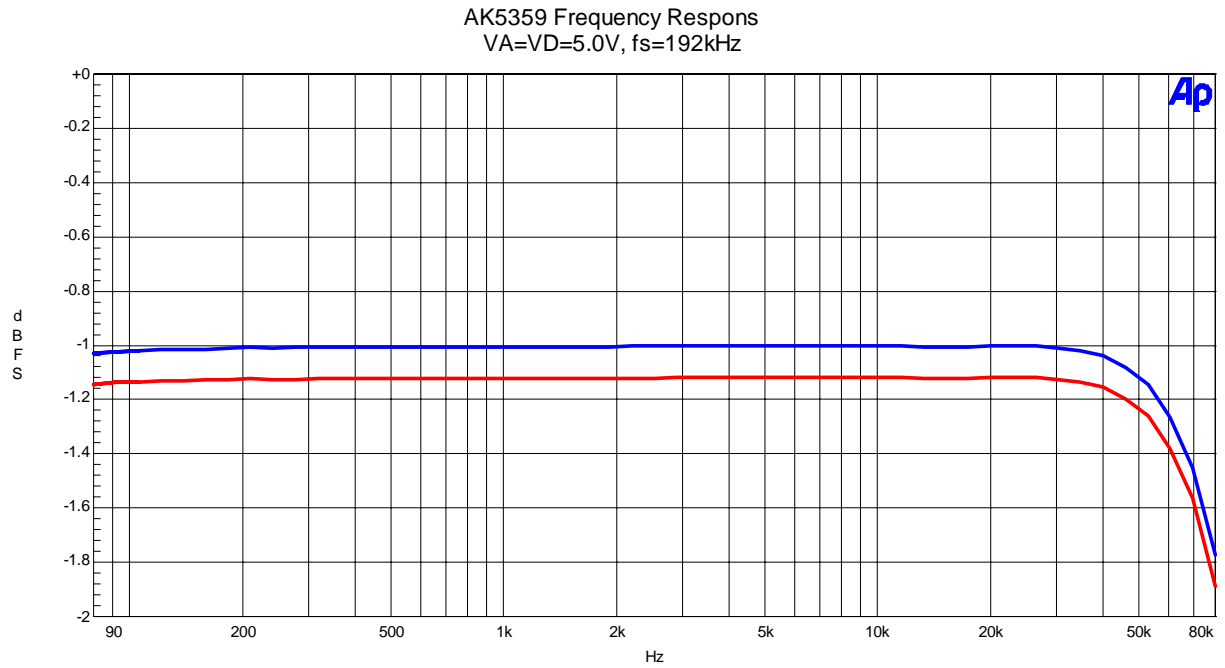


Figure 25 Frequency Response (-1dB input)

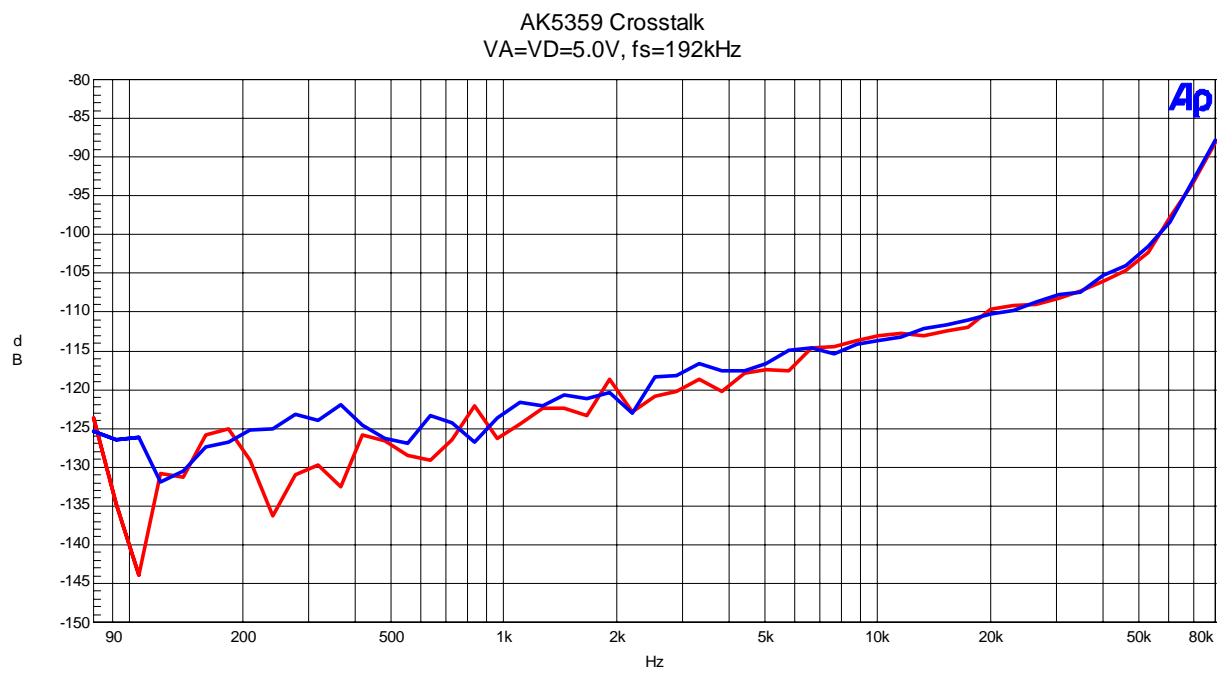


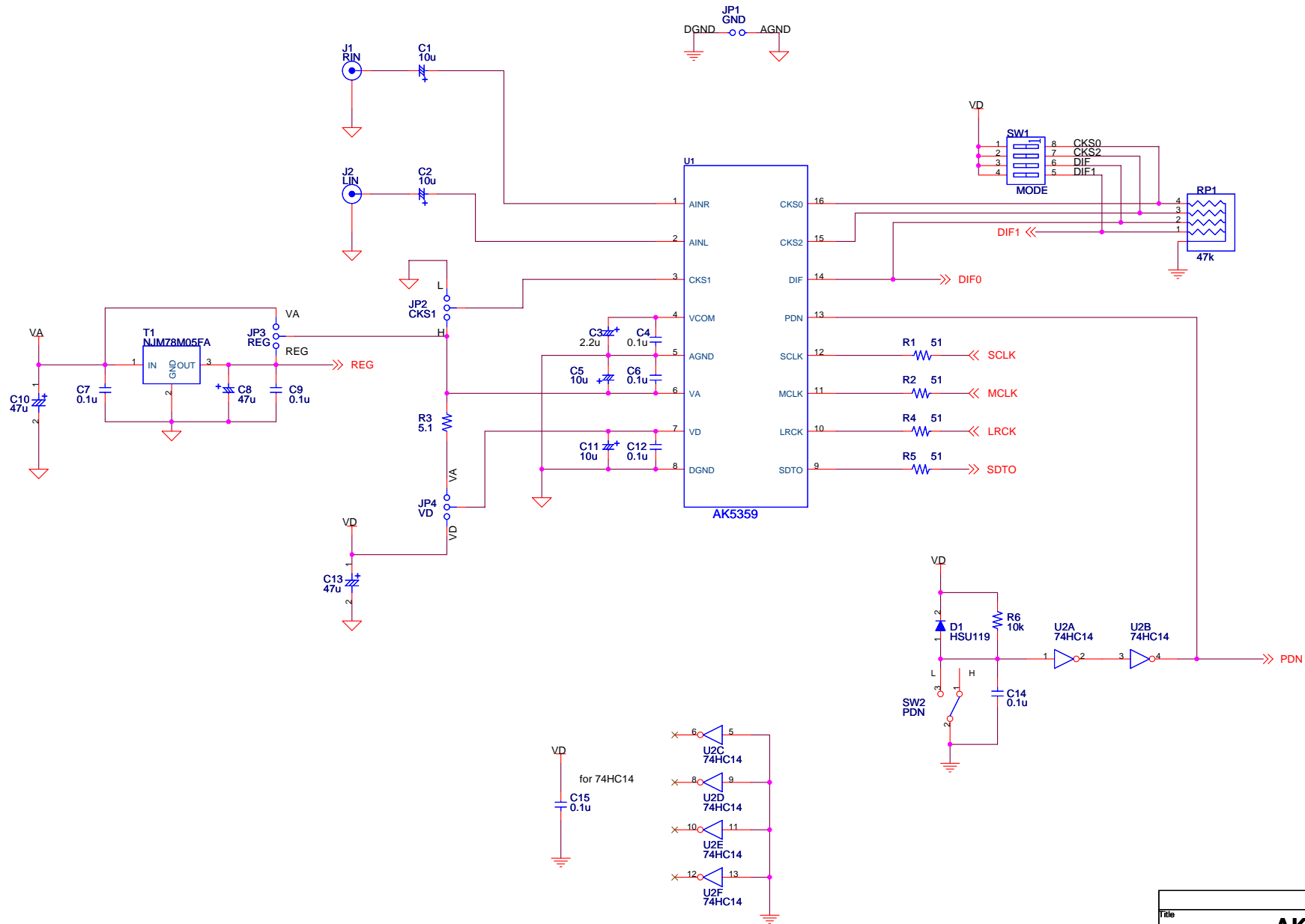
Figure 26 Cross-talk (-1dB input)

<b>Revision History</b>
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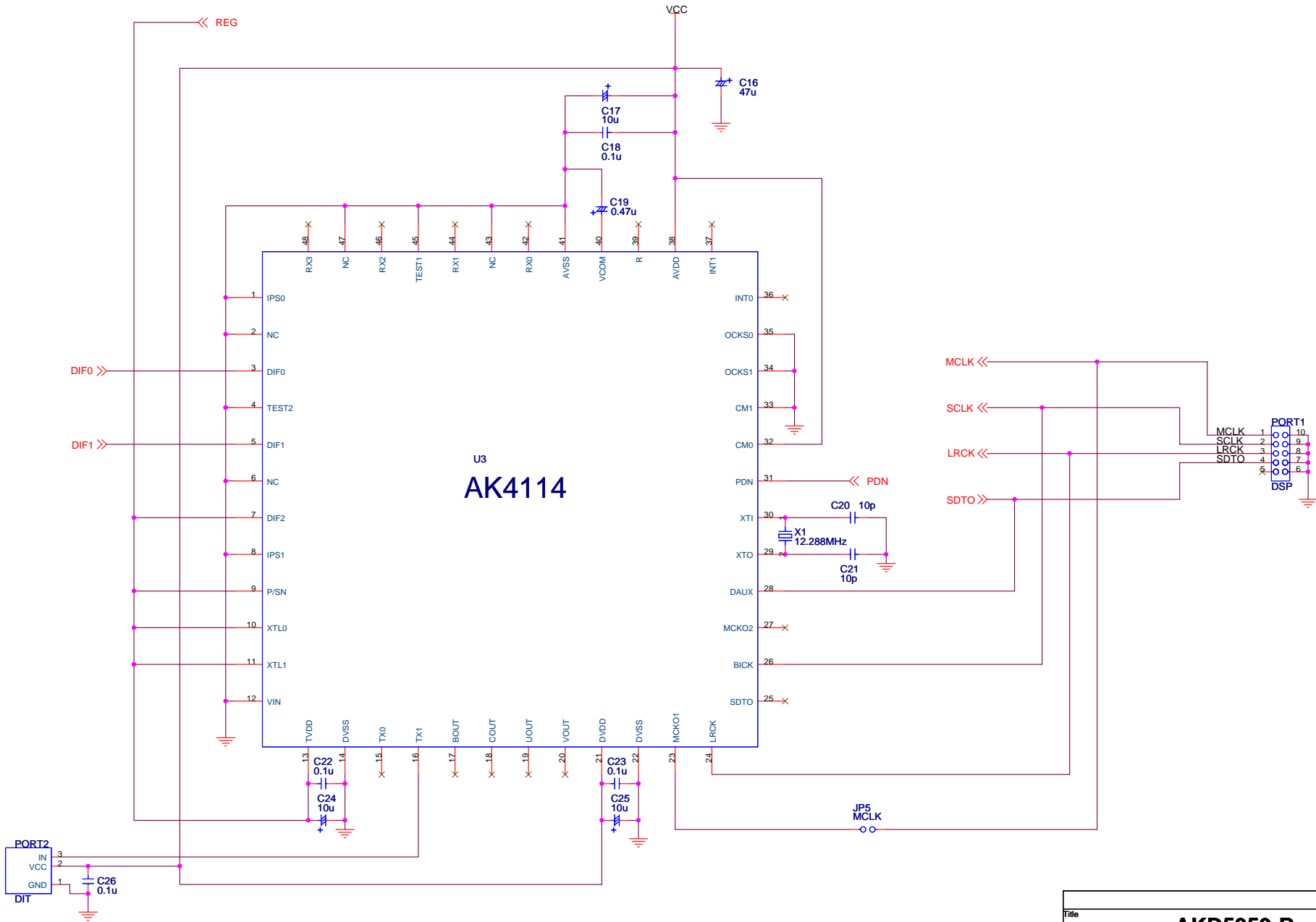
Date (YY/MM/DD)	Manual Revision	Board Revision	Reason	Contents
04/07/04	KM079700		First Edition	

IMPORTANT NOTICE

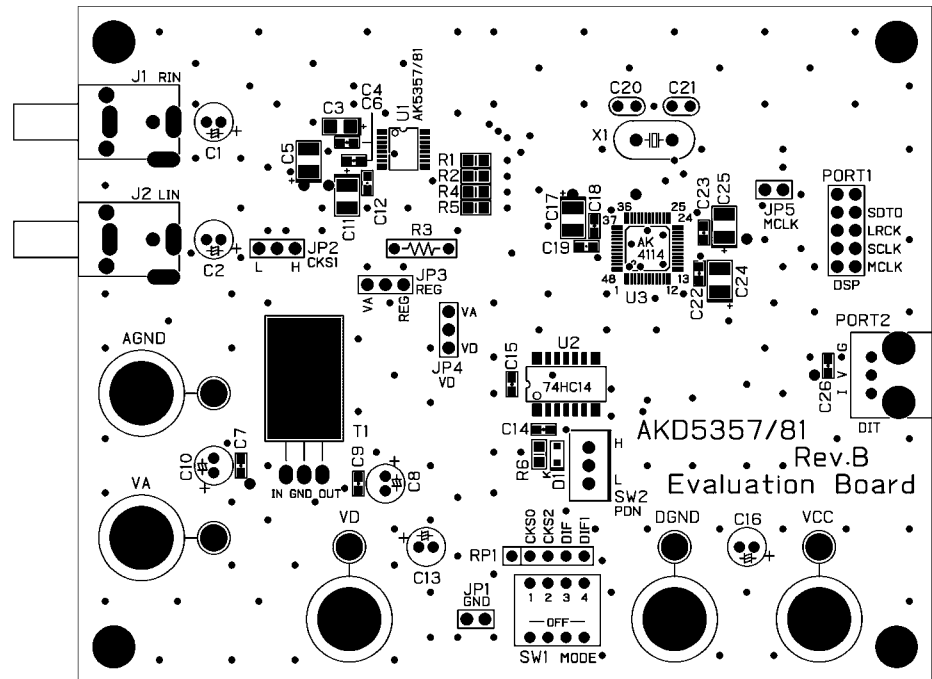
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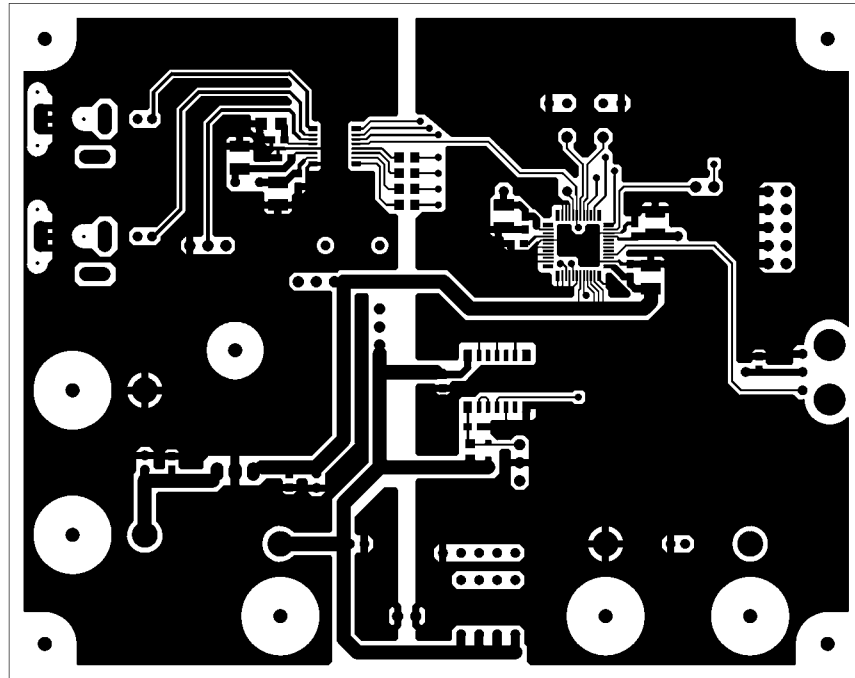
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Size	Document Number	Rev
A3	<b>AK5359</b>	0
Date:	Monday, June 20, 2005	Sheet 1 of 2



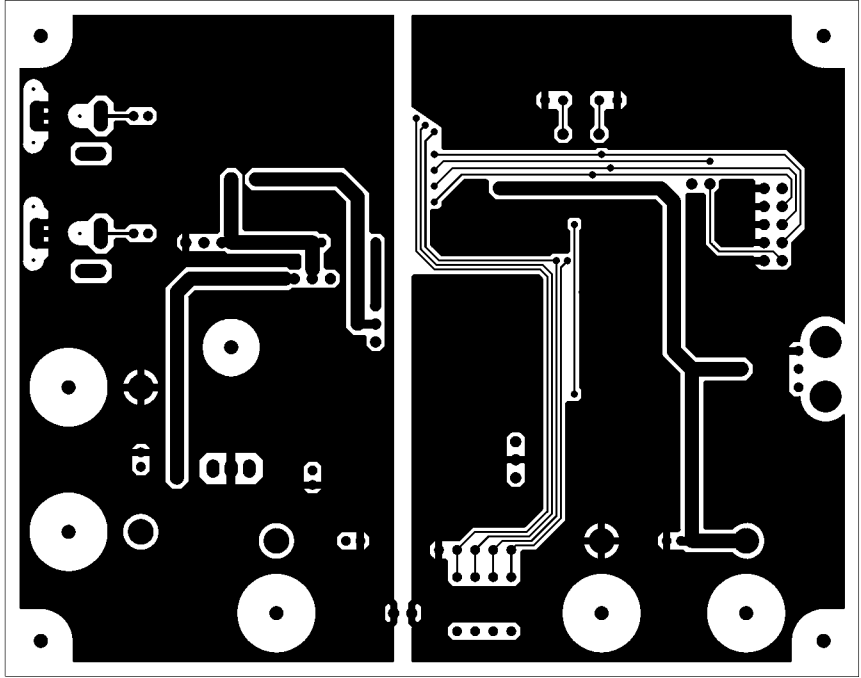
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