AKD4527B
Evaluation board Rev.D for AK4527B

GENERAL DESCRIPTION

The AKD4527B is an evaluation board for the AK4527B, the Multi-channel Audio CODEC. The AKD4527B also has the digital audio interface and can achieve the interface with digital audio systems via opt-connector or BNC connector.

■ Ordering guide

AKD4527B --- Evaluation board for AK4527B
(Cable for connecting with printer port of IBM-AT compatible PC and control software are packed with this.)

FUNCTION

- ☐ **On-board analog input buffer circuit**
- ☐ **Compatible with 2 types of interface**
  - **DIT(AK4353)/DIR(AK4112A) with optical output/input and BNC input**
  - **Direct interface with AC3 decoder by 10pin header**
- ☐ **10pin header for serial control interface**

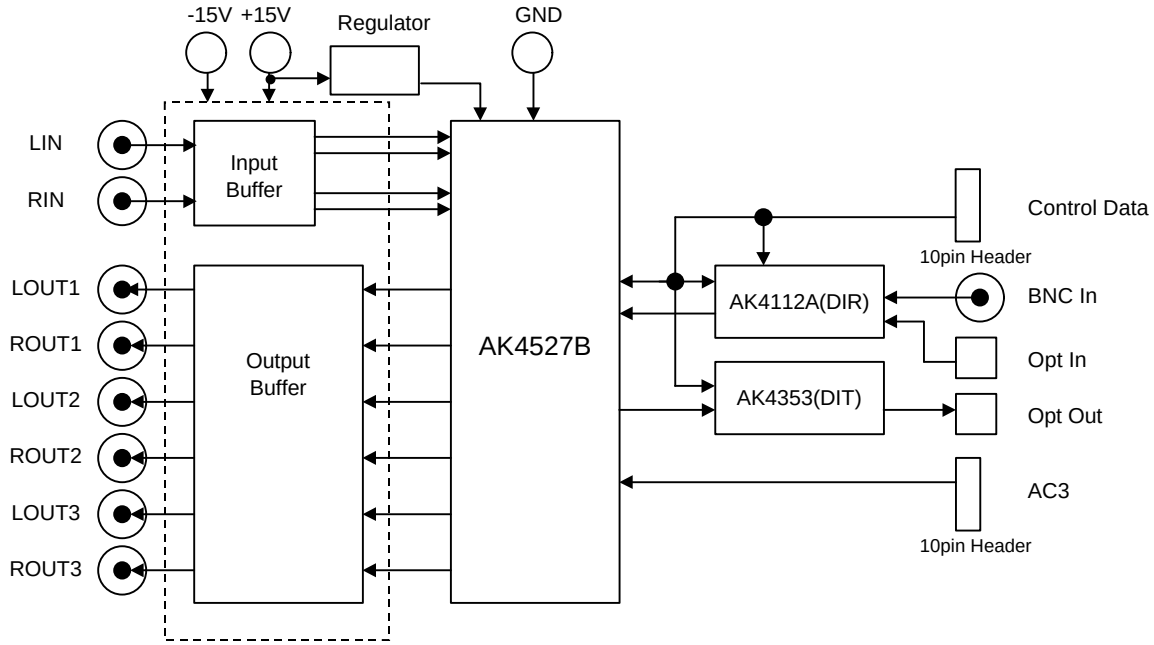
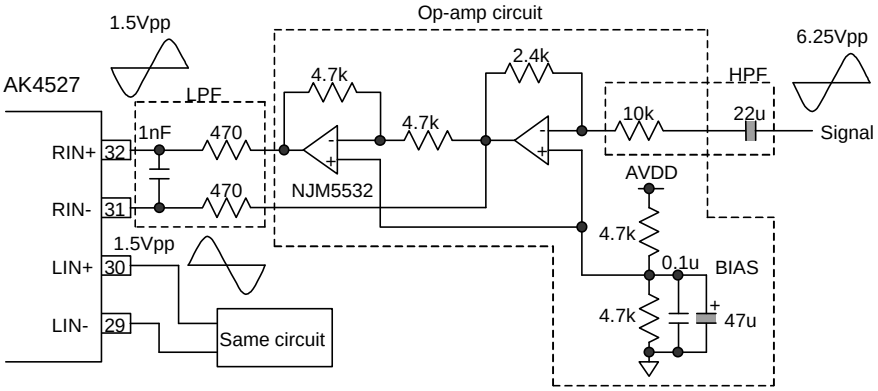


Fig 1. AKD4527B Rev.D Block Diagram

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

■ Consideration for analog input circuit



1) Frequency response of HPF

The HPF is implemented on board to cancel the DC offset of analog output of AK4527B.

Frequency response of 1st-order HPF

$|Amplitued|^2 = 1/\{1+(fc/f)^2\}$; $fc=1/2\pi RC$=**0.7Hz**@R=10k,C=22u

fin	20Hz
Frequency Response	**-0.006dB**

2) Gain and S/N of op-amp circuit

Two stages of inverting op-amp circuit are implemented on board to convert single-ended input to full-differential input for ADC of AK4527B.

a) Gain

The gain of each op-amp circuit is as following table:

	Gain[dB]
First step	-12.40
Second step	0.00

Therefore input level for this board is

-5.51dBV(=1.5Vpp)+12.40dB

= +6.89dBV = 6.25Vpp = 2.21Vrms.

b) S/N (Theory: BW=20k+A)

The output noise level of each op-amp circuit is as following table:

	Noise[dBV]
First step	-120.56
Second step	-115.91

The noise level summing differential output of op-amp circuit is

-113.64dBV = -114.13dB (0dB = +0.49dBV = 3Vpp).

S/N of ADC is

104.5dB (measurement).

Therefore total S/N of op-amp circuit and ADC is

104.05dB (measurement: 103.9dB).

3) Frequency response of LPF

1st-order RC LPF is implemented on board to attenuate the noise around the internal sampling frequency of ADC (64fs=3.072MHz@fs=48kHz)

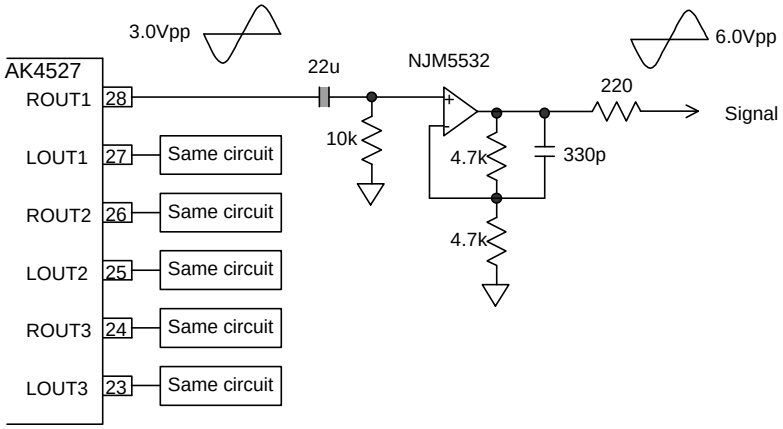
Frequency response of 1st-order LPF

$|\text{Amplitude}|^2 = 1/\{1+(f/fc)^2\}$; $fc=1/2\pi RC=$**169.3kHz**@R=470,C=2000p

(1nF capacitance prior to ADC is doubled because of full-differential input.)

fin	20kHz	40kHz
Frequency Response	**-0.060dB**	**-0.236dB**

■ Consideration for analog output circuit



1) Frequency response of HPF

The HPF is implemented on board to cancel the DC offset of analog output of AK4527B.

Frequency response of 1st-order HPF

$|\text{Amplitude}|^2 = 1/\{1+(fc/f)^2\}$; $fc=1/2\pi RC=$**0.7Hz**@R=10k,C=22u

fin	20Hz
Frequency Response	**-0.006dB**

2) Gain, S/N and frequency response of op-amp circuit

1st-order filter with non-inverting amp is implemented on board to double the analog output level and attenuate out-of-band noise.

a) Gain

The gain is

1+4.7k/4.7k = +6.00dB.

Therefore the output level of this board is

0.51dBV(=3.0Vpp) + 6.00dB

= 6.51dBV = 6.0Vpp = 2.12Vrms.

b) S/N (Theory: BW=20k+A)

The output noise level of non-inverting amp

-110.36dBV = -116.87dB (0dB=6.51dBV)

S/N of DAC is

106.0dB (measurement)

Therefore total S/N of op-amp circuit and DAC is

105.66dB (measurement: 105.5dB).

c) Frequency response of filter

Frequency response of the 1st-order filter

$|\text{Amplitude}|^2 = K*\{1+(f/fc_2)^2\}/\{1+(f/fc_1)^2\}$;

$K = 1+4.7k/4.7k = 2$,

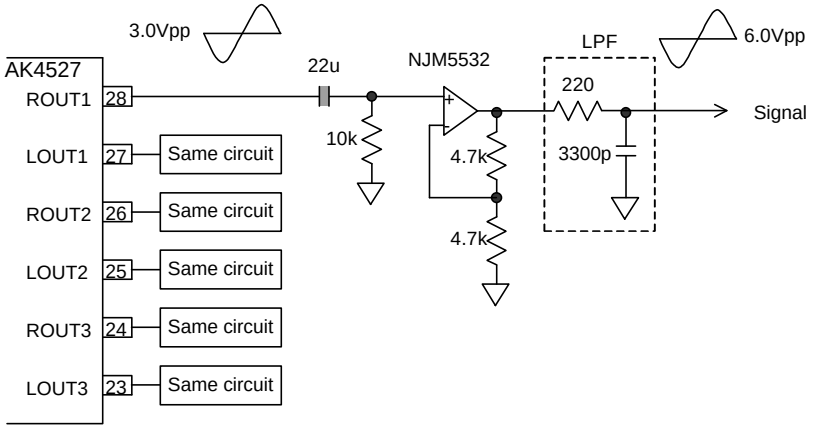
$fc_1 = 1/2\pi RC = 102.7kHz@R=4.7k,C=330p$,

$fc_2 = K*fc_1 = 205.3kHz$

Frequency response referenced to output level of this board is as following table:

fin	DC	20kHz	40kHz	80kHz	145kHz	∞
Frequency Response	0dB	**-0.121dB**	**-0.452dB**	**-1.448dB**	-3dB	-6dB

If the frequency response of filter influences the system, 1st-order LPF is also available as the following figure:



Frequency response of this LPF

$|\text{Amplitude}|^2 = 1/\{1+(f/fc)^2\}$;

$fc = 1/2\pi RC = 219kHz@R=220,C=3300p$

Frequency response referenced to output level of this board is as following table:

fin	DC	20kHz	40kHz	80kHz	219kHz	∞
Frequency Response	0dB	**-0.036dB**	**-0.142dB**	**-0.543dB**	-3dB	-∞dB

The total frequency response of this board is sum of the external filter and internal LPF of AK4527B.

These filters are effective to attenuate the high frequency noise since some measurement units is sensitive for out-of-band noise.

■ Operation sequence

(1) **Set up the power supply lines.**

[+12V] (orange jack) = +12 ~ +15V
[-12V] (blue jack) = -12 ~ -15V
[AGND] (black jack) = 0V
[DGND] (black jack) = 0V
Each supply line should be distributed from the power supply unit.

±12V are supplied to analog interface.
+12V is regulated to +5V and +3.3V by regulators(T1,T2).
+5V is supplied to digital interface, AK4527B and TVDD of AK4112A.
+3.3V is supplied to AVDD and DVDD of AK4112A.

(2) **Set up the evaluation mode and jumper pins.** (See p.3.)

(3) **Connect Optical or BNC connector.**

[PORT2] (OPT_IN) : Optical input to RX1 of AK4112A
[J10] (RX2) : BNC input to RX1 of AK4112A

(4) **Power on.**

The AK4527B, AK4112A and AK4353 should be reset once bringing PDN(SW1) "L" upon power-up.

(5) **Adjust the interface format**

Serial control is needed after the reset by SW1. The default value for interface format of AK4527B, AK4112A, and AK4353 is "Right justified, 20 bit", "Left justified, 24 bit", and "I^2S", respectively. The software "4527.exe" packed with the AKD4527B is used for the set-up of the AK4527B.

Evaluation mode 1 : DIF1-0 bit of the AK4527B should be set to "11" .
Evaluation mode 2, 3: DIF1-0 bit of the AK4527B should be set to "10".
Evaluation mode 4 : AK4112A and AK4527B should be set to adjust the format of DSP.

(6) **Set up software.**

The control mode of AK4527B and AK4112A is fixed to "serial".

The AKD4527B can be controlled via the printer port (parallel port) of IBM-AT compatible PC. Connect PORT3(uP-I/F) with PC by 10-line flat cable packed with the AKD4527B.

Take care of the direction of connector. There is a mark at pin#1.
The pin layout of PORT3 is as Figure 2.

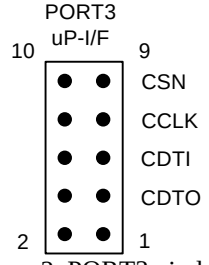


Figure 2. PORT3 pin layout

■ Evaluation mode

1) Evaluation of ADC

TOTX176 is used for digital output. Clock mode of the AK4112A should be set to PLL mode or X'tal mode.

2) Evaluation of DAC

TORX176 or BNC is used for digital input. Clock mode of the AK4112A should be set to PLL mode. "4112" should be selected on JP4,5 and 6.

3) Loopback mode

Clock mode of the AK4112A should be set to PLL mode or X'tal mode. "4112" should be selected on JP4,5 and 6.

4) Evaluation of DAC using DSP

"DSP" should be selected on JP4,5 and 6.

Evaluation mode	AK4112A clock set-up	JP4,5,6	Used I/F
ADC	CM1="0", CM0="0"(PLL mode) or CM1="0", CM0="1"(X'tal mode)	Don't care	TOTX176 optical output
DAC	CM1="0", CM0="0"(PLL mode)	"4112"	
Loopback	CM1="0", CM0="1"(X'tal mode)	"4112"	
Using DSP	CM1="0", CM0="0"(PLL mode)	"DSP"	PORT5(10-pin Header)

Table 2.Evalution mode

■ Jumper pin set up

[JP1] (GND) ---Analog GND and Digital GND

[JP4,5,6] (SDTI1,2,3) --- AK4527B SDTI1,2,3 input source select
<DSP> : Serial Data is input from DSP via PORT5.
<4112> : Serial Data is input from AK4112A SDTO. <default>

[JP2] (V/TX) --- AK4112A V/TX output select.
<V> : Validity. <default>
<TX> : Transmit channel (through data)

■ The function of the toggle SW.

[SW1] : Resets the AK4527B, AK4112A and AK4353. Keep "H" during normal operation.

■ The indication content for LED.

[LE1] (ERF) : AK4112A unlock and parity error output.
[LE2] (FS96) : AK4112A 96kHz sampling detect.
[LE3] (AUTO) : AK4112A AC-3/MPEG detect.
[LE4] (V) : Validity

MEASUREMENT RESULTS

1) ADC part

[Measurement condition]

- Measurement unit: Audio Precision, System two, Cascade
- MCLK : 256fs
- BICK : 64fs
- fs : 44.1kHz
- BW : 10Hz~20kHz(fs=44.1kHz), 10Hz~48kHz(fs=96kHz)
- Bit : 24bit
- Power Supply : AVDD=DVDD=TVDD=5V
- Analog Input : Differential
- Interface : DIT
- Temperature : Room

fs=44.1kHz

Parameter	Input signal	Measurement filter	Results
S/(N+D)	1kHz, -0.5dB	20kLPF	96.2dB
DR	1kHz, -60dB	20kLPF, A-weighted	103.3dB
S/N	no signal	20kLPF, A-weighted	103.9dB

fs=96kHz

Parameter	Input signal	Measurement filter	Results
S/(N+D)	1kHz, -0.5dB	fs/2	86.7dB
DR	1kHz, -60dB	fs/2, A-weighted	102.9dB
S/N	no signal	fs/2, A-weighted	103.4dB

2) DAC part

[Measurement condition]

- Measurement unit: Audio Precision, System two, Cascade
- MCLK : 256fs
- BICK : 64fs
- fs : 44.1kHz, 96kHz
- BW : 10Hz~22kHz (fs=44.1kHz), 10Hz~40kHz (fs=96kHz)
- Bit : 24bit
- Power Supply : AVDD=DVDD=TVDD=5V
- Analog Input : Differential
- Interface : DIR
- Temperature : Room

fs=44.1kHz

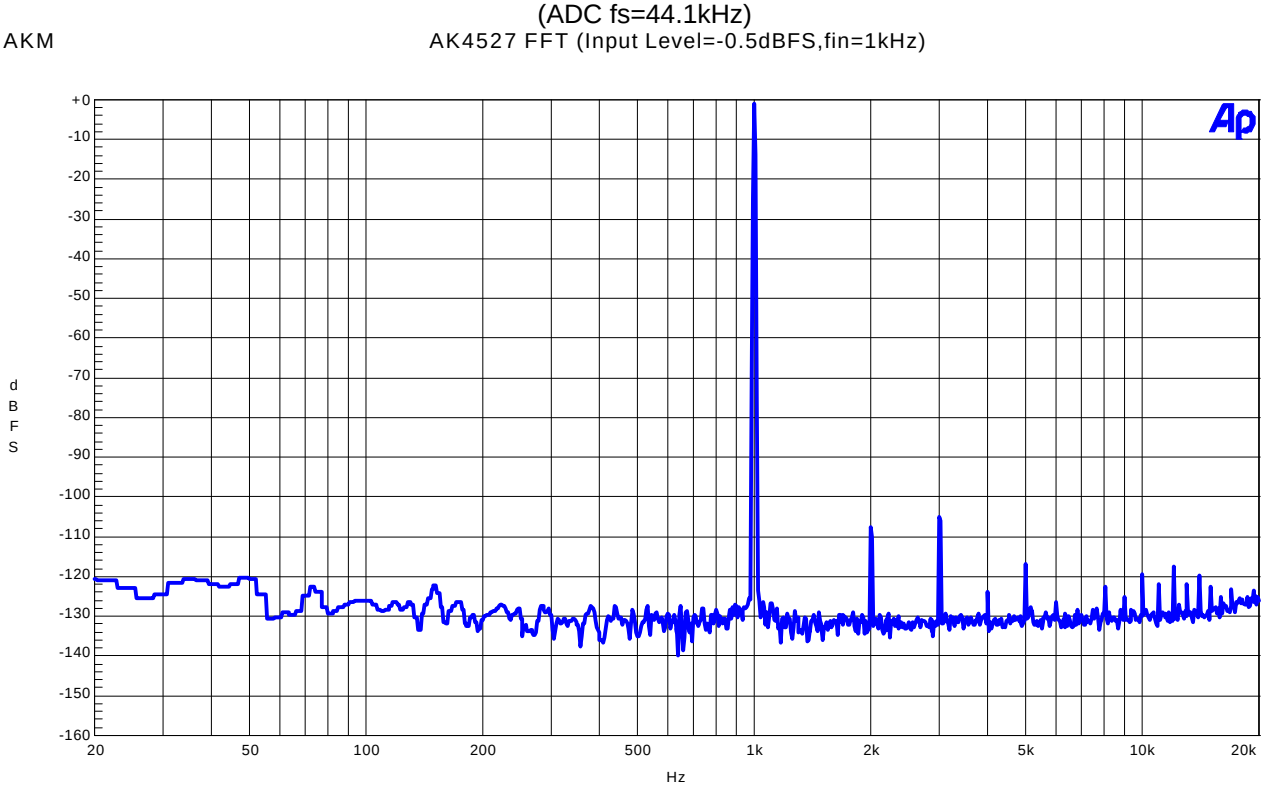
Parameter	Input signal	Measurement filter	Results
S/(N+D)	1kHz, 0dB	20kLPF	97.3dB
DR	1kHz, -60dB	22kLPF, A-weighted	105.1dB
S/N	“0”data	22kLPF, A-weighted	105.5dB

fs=96kHz

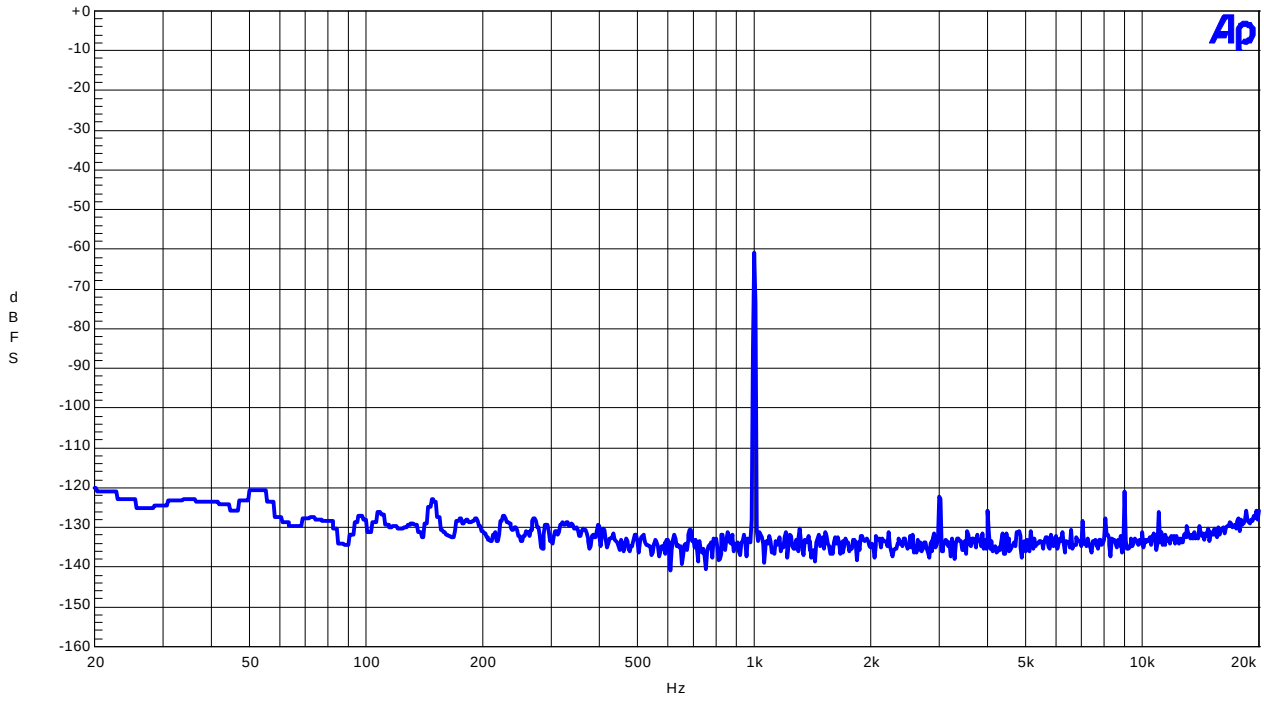
Parameter	Input signal	Measurement filter	Results
S/(N+D)	1kHz, 0dB	40kLPF	96.2dB
DR	1kHz, -60dB	40kLPF	100.5dB
		22kLPF, A-weighted	104.9dB
S/N	“0”data	40kLPF	100.6dB
		22kLPF, A-weighted	104.9dB

1.ADC

(ADC fs=44.1kHz)



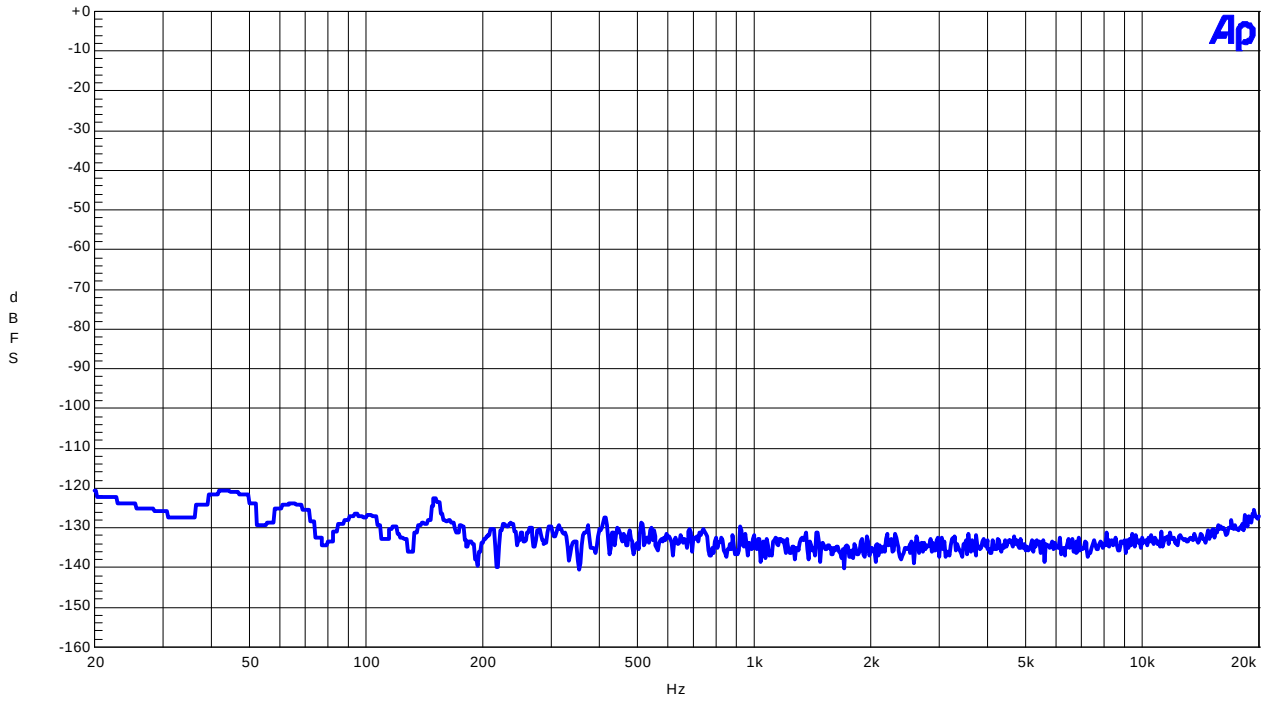
FFT (Input=-0.5dBFS, fin=1kHz)



FFT (Input=-60dBFS, fin=1kHz)

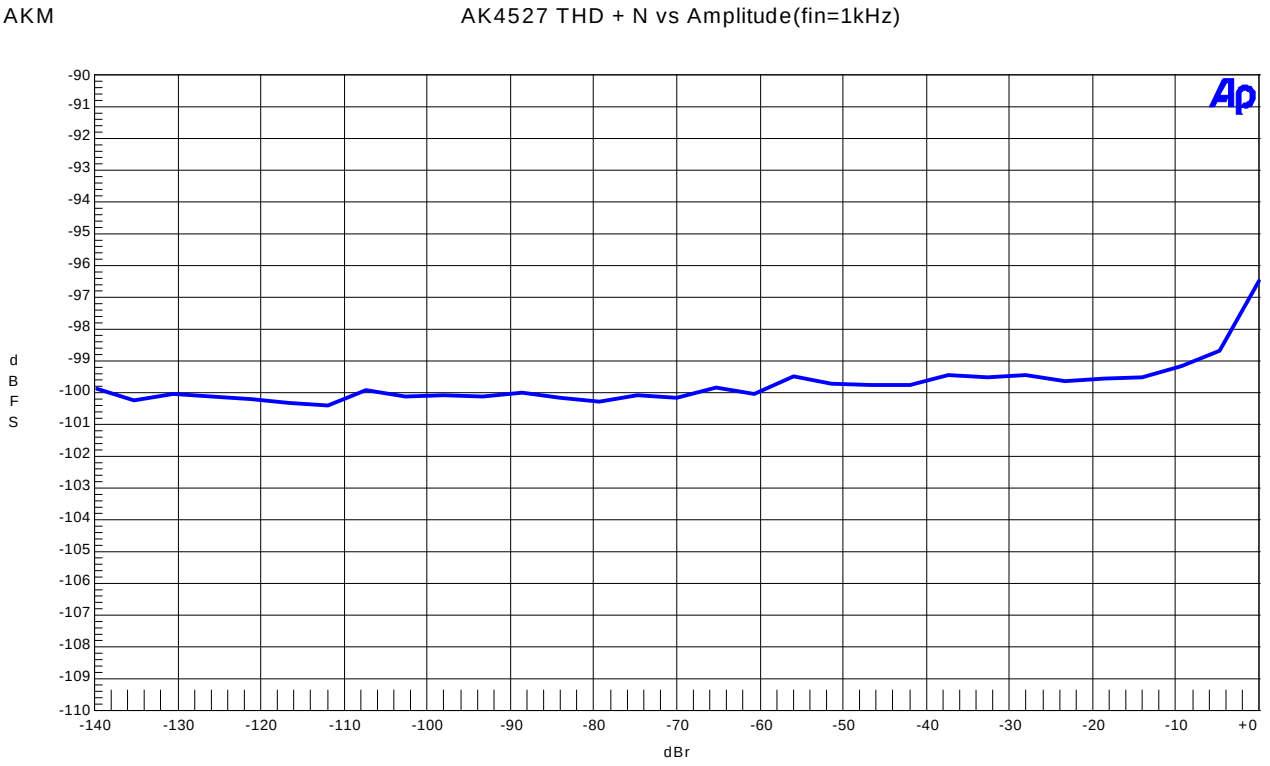
(ADC fs=44.1kHz)

AKM AK4527 FFT(noise floor)

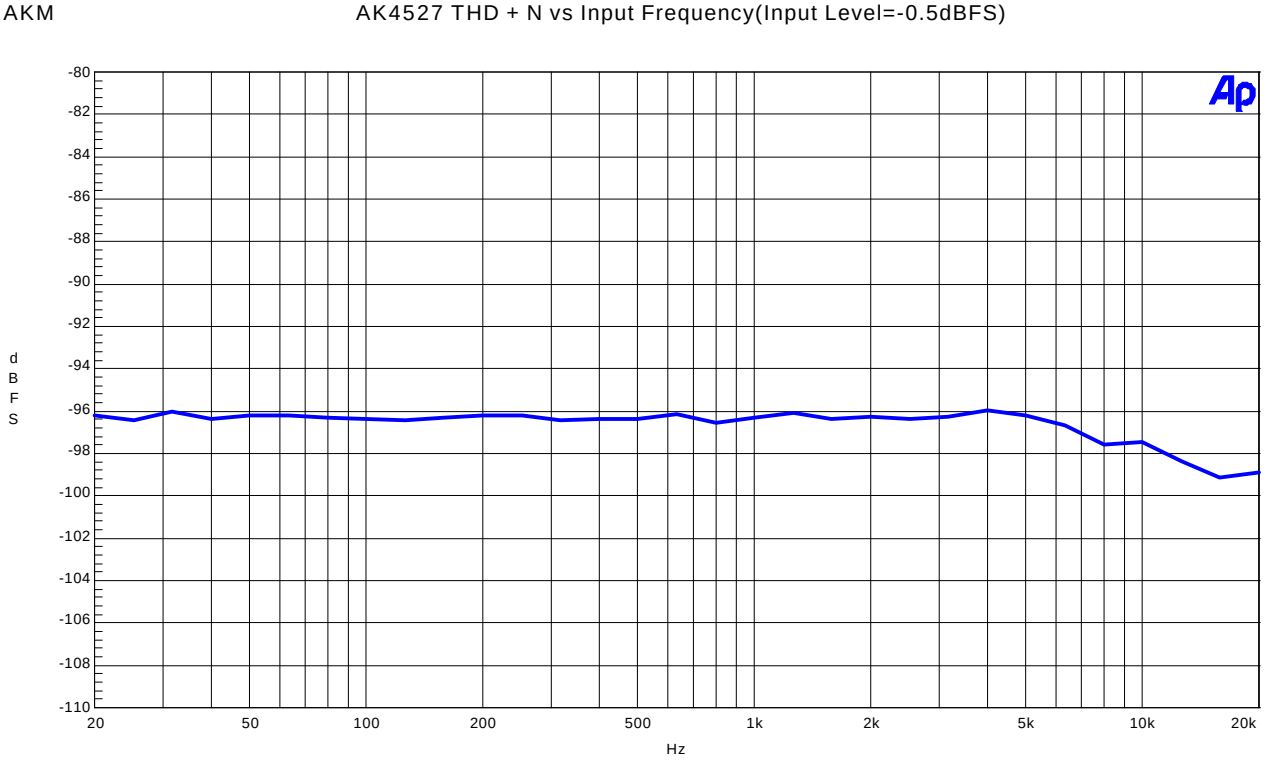


FFT (noise floor)

(ADC fs=44.1kHz)

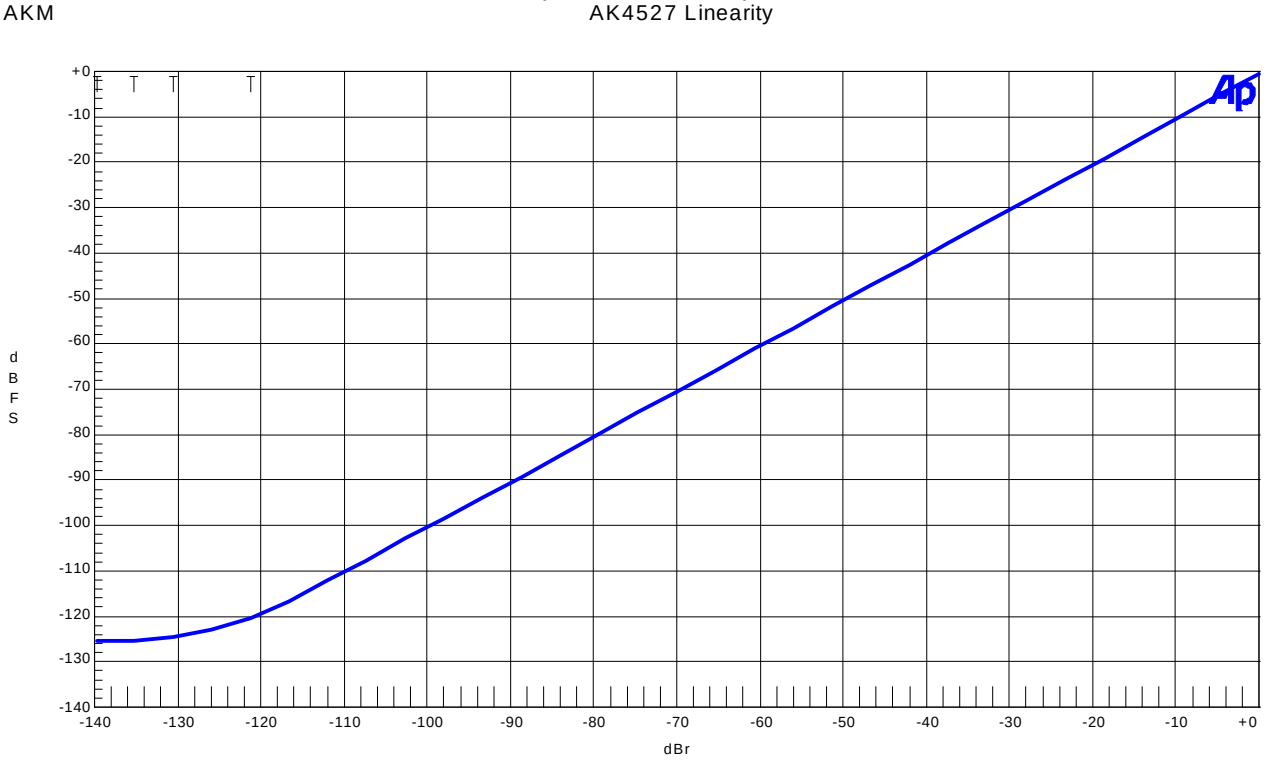


THD + N vs Amplitude (fin=1kHz)

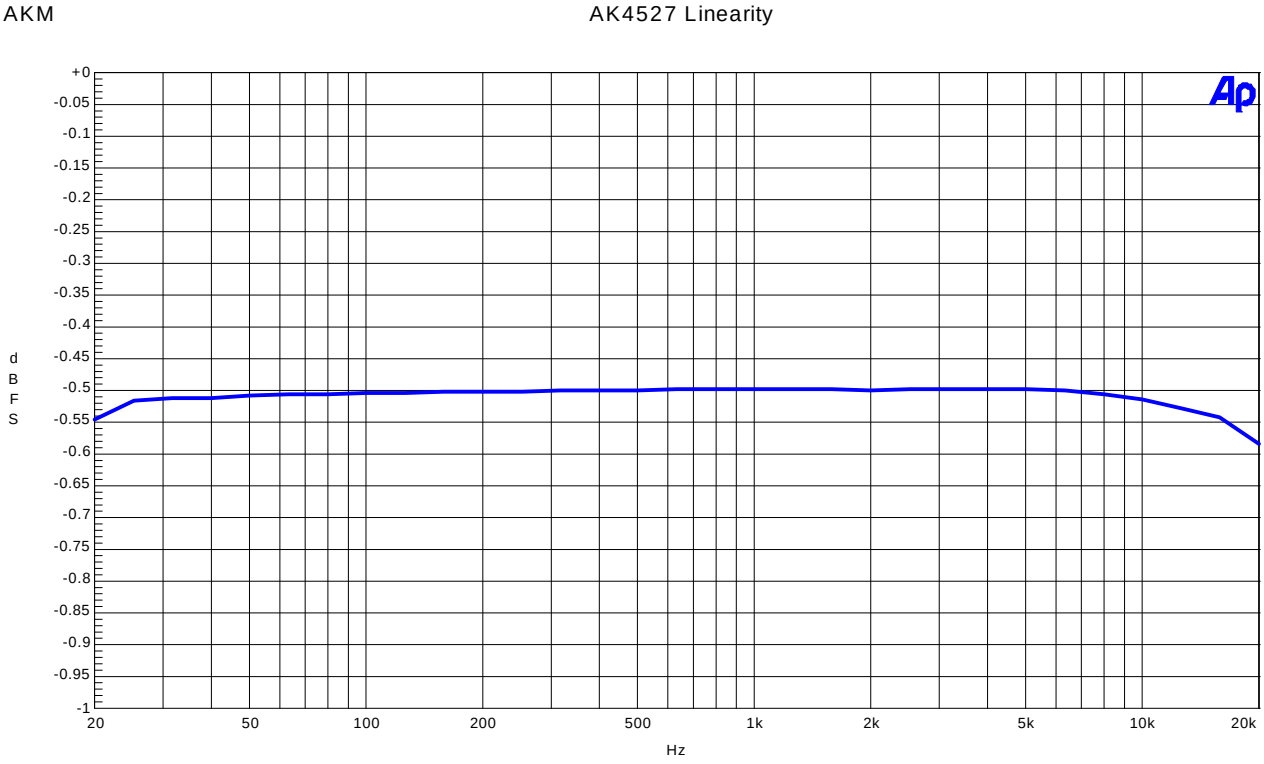


THD + N vs Input Frequency (Input=-0.5dBFS)

(ADC fs=44.1kHz)

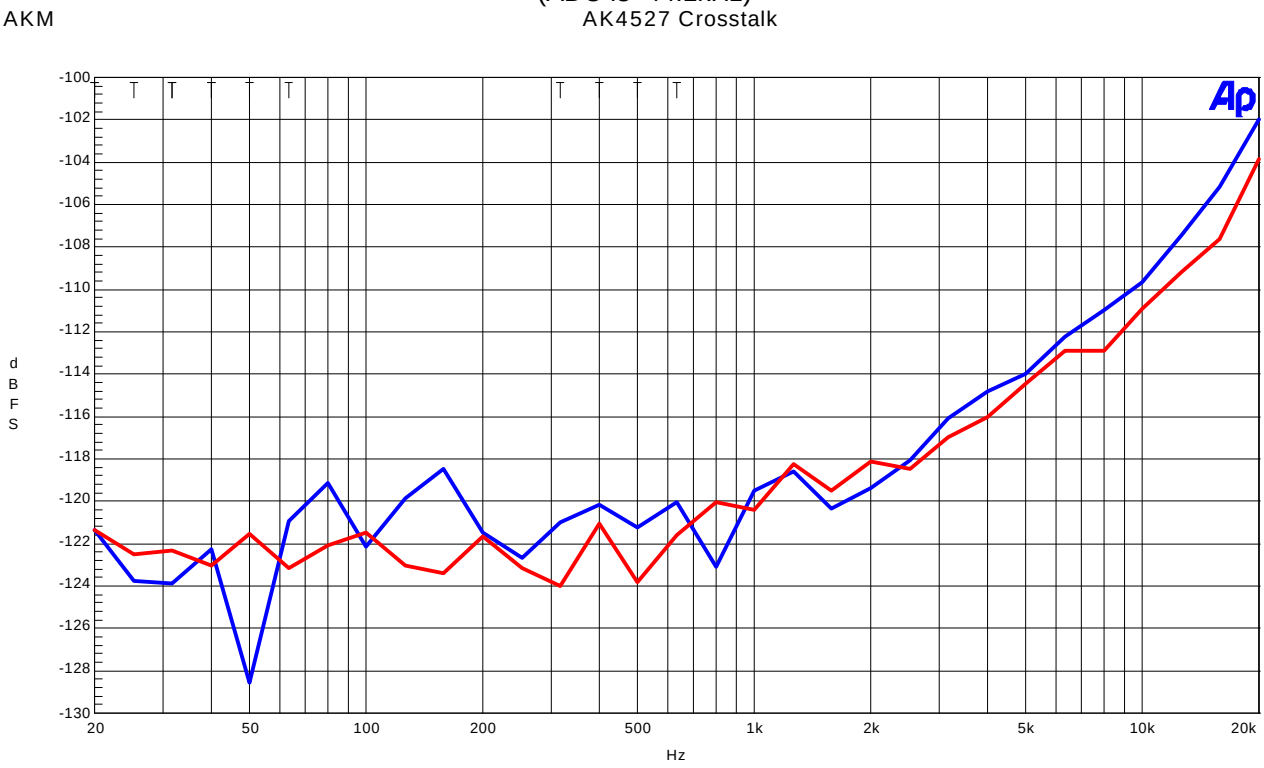


Linearity(fin=1kHz)



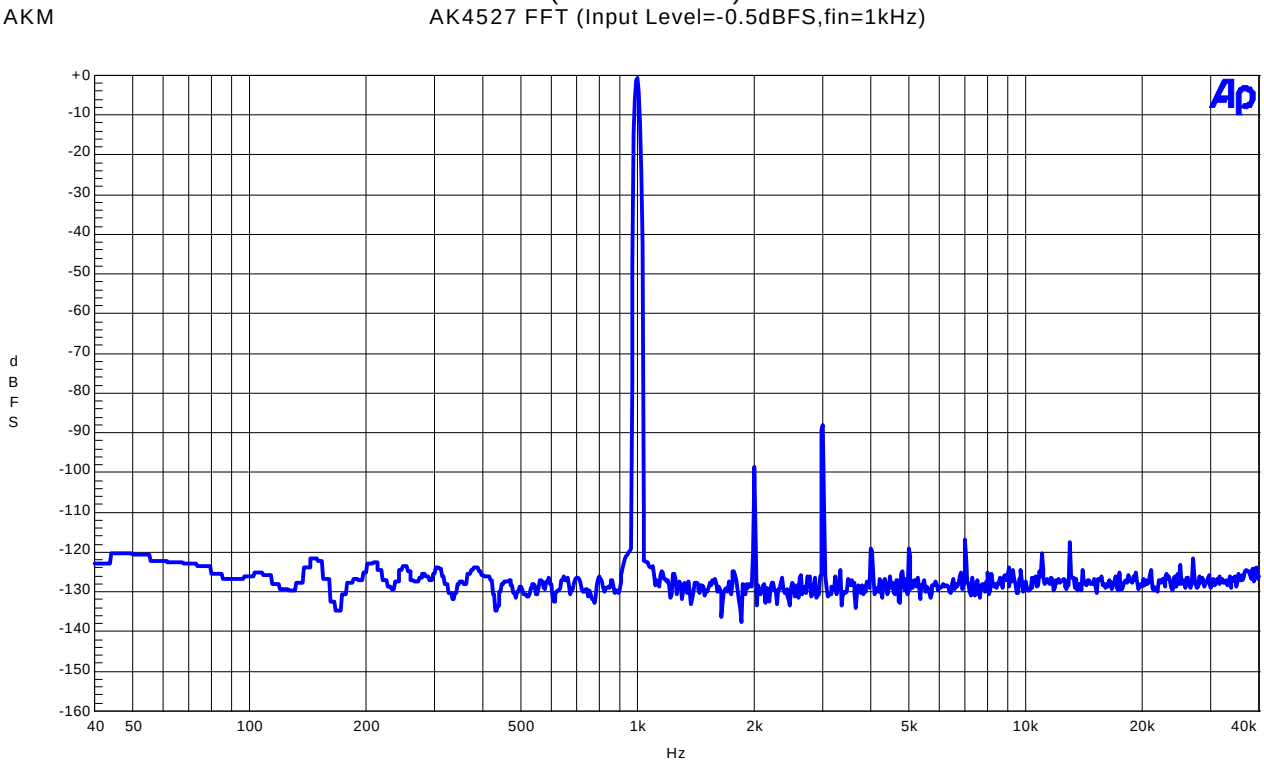
Frequency Response(Input Level=-0.5dBFS)
(including input RC filter)

(ADC fs=44.1kHz)

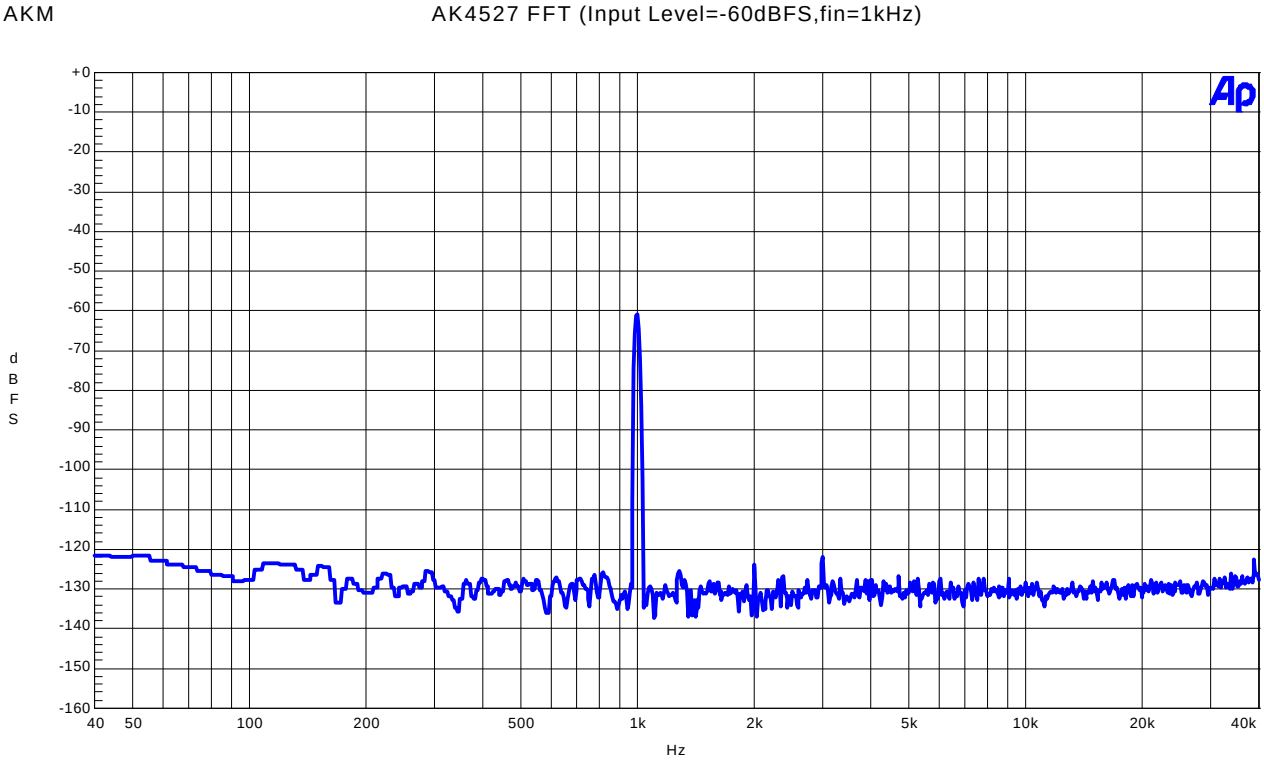


Crosstalk (Upper = Rch, Lower = Lch)

(ADC fs=96kHz)



FFT(Input=-0.5dBFS, fin=1kHz)

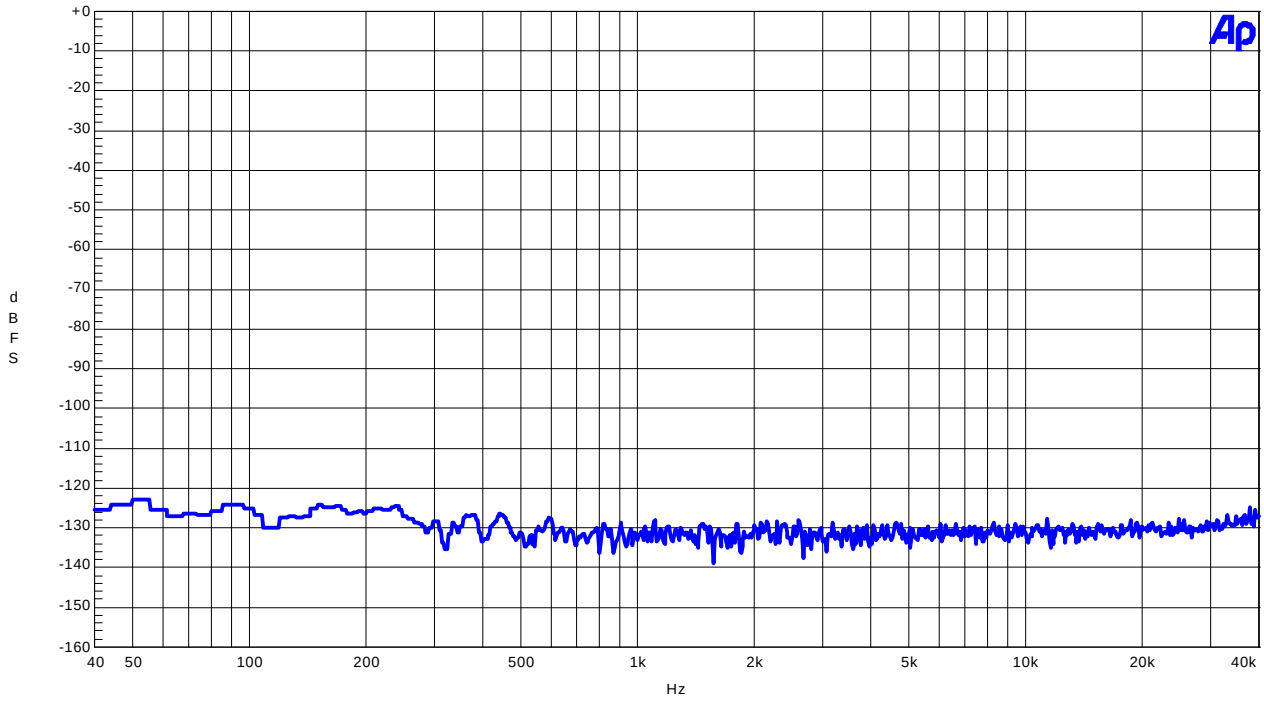


FFT(Input=-60dBFS, fin=1kHz)

(ADC fs=96kHz)

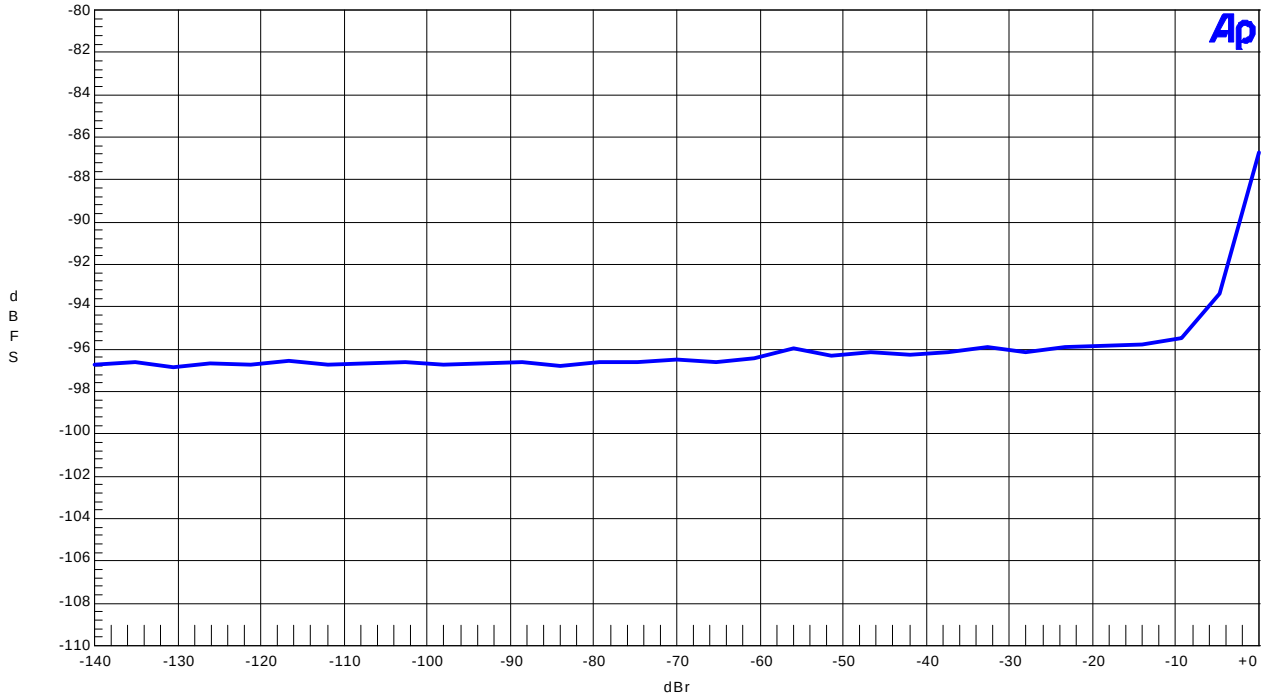
AKM

AK4527 FFT (noise floor)



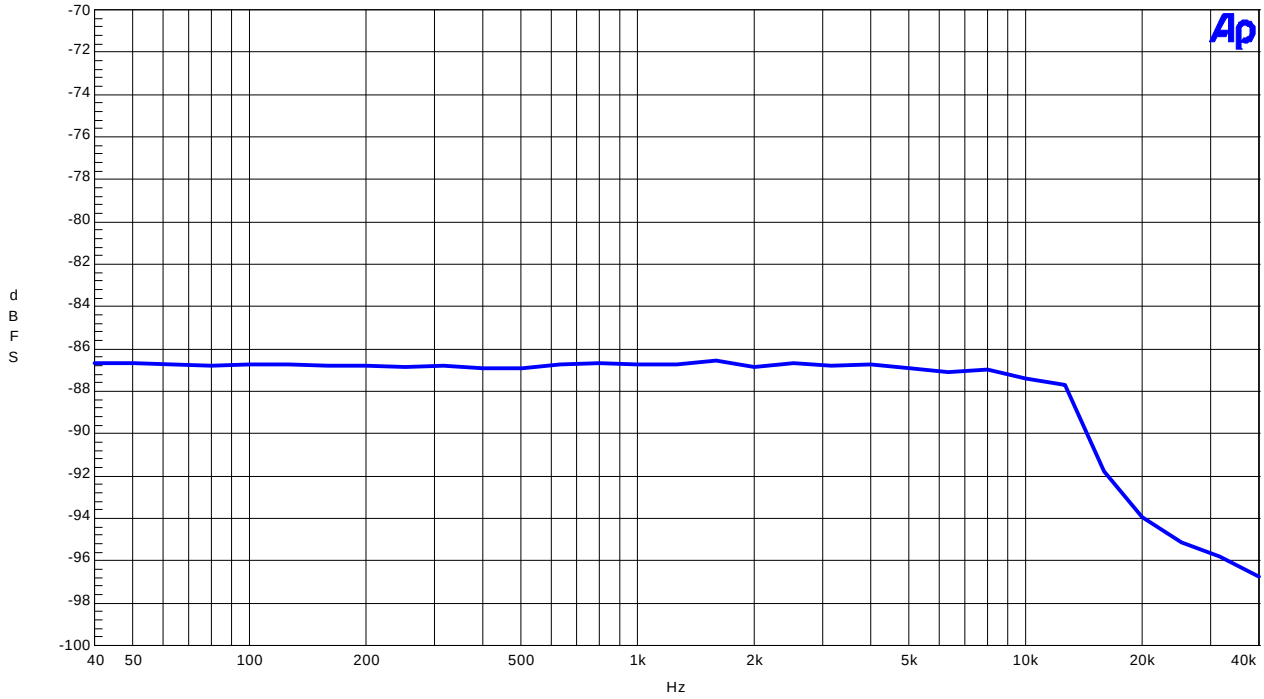
FFT(Input = noise floor)

AKM AK4527 THD + N vs Amplitude(fin=1kHz)



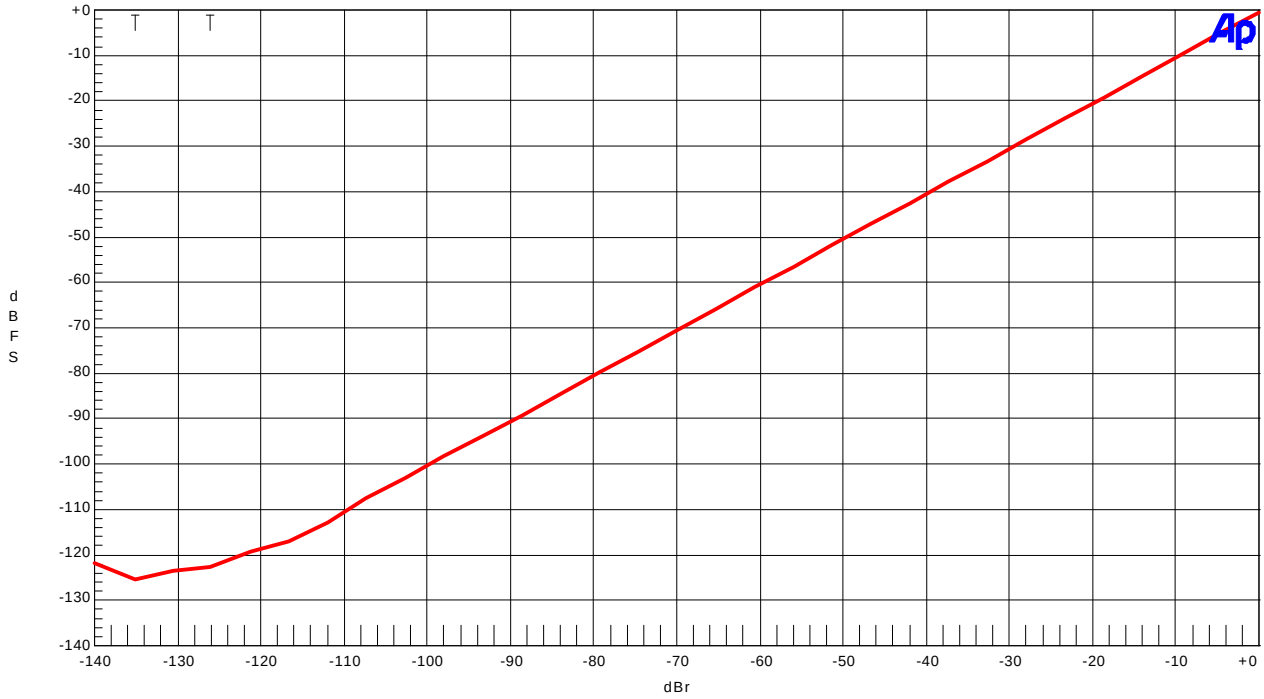
THD + N vs Amplitude(fin=1kHz)

AKM AK4527 THD + N vs Input Frequency(Input Level=-0.5dBFS)



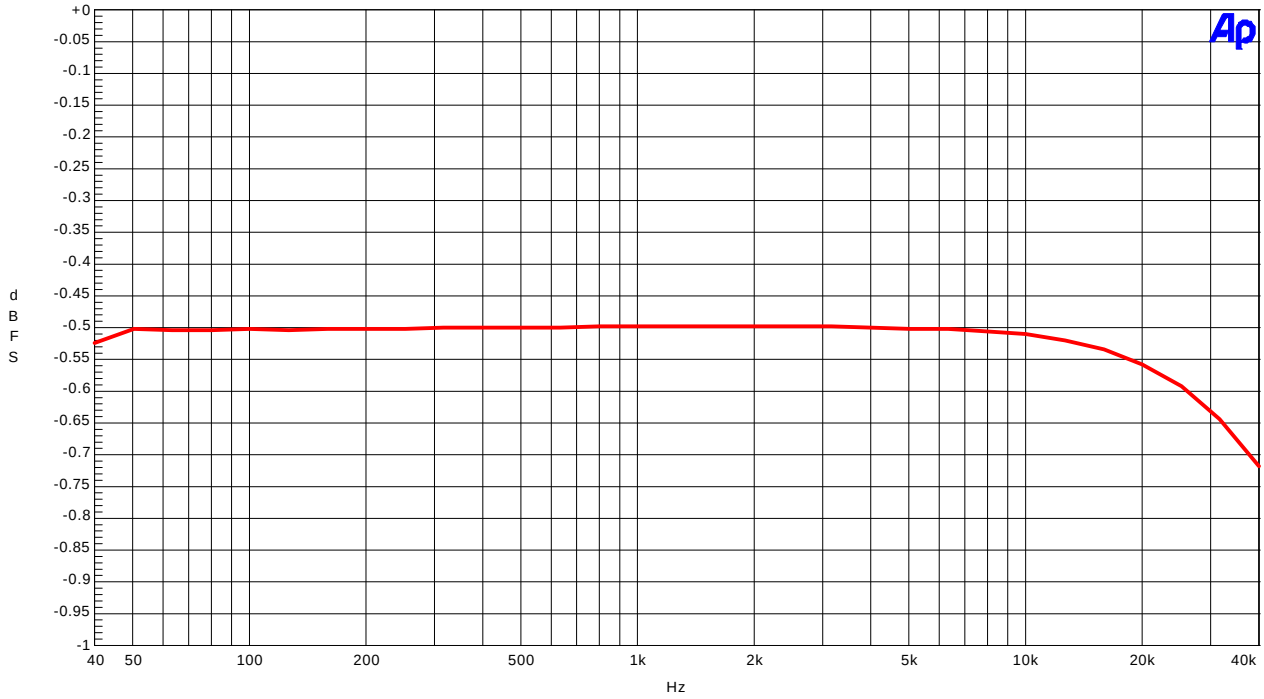
THd + N vs Input Frequency(Input Level=-0.5dBFS)

AKM AK4527 Linearity



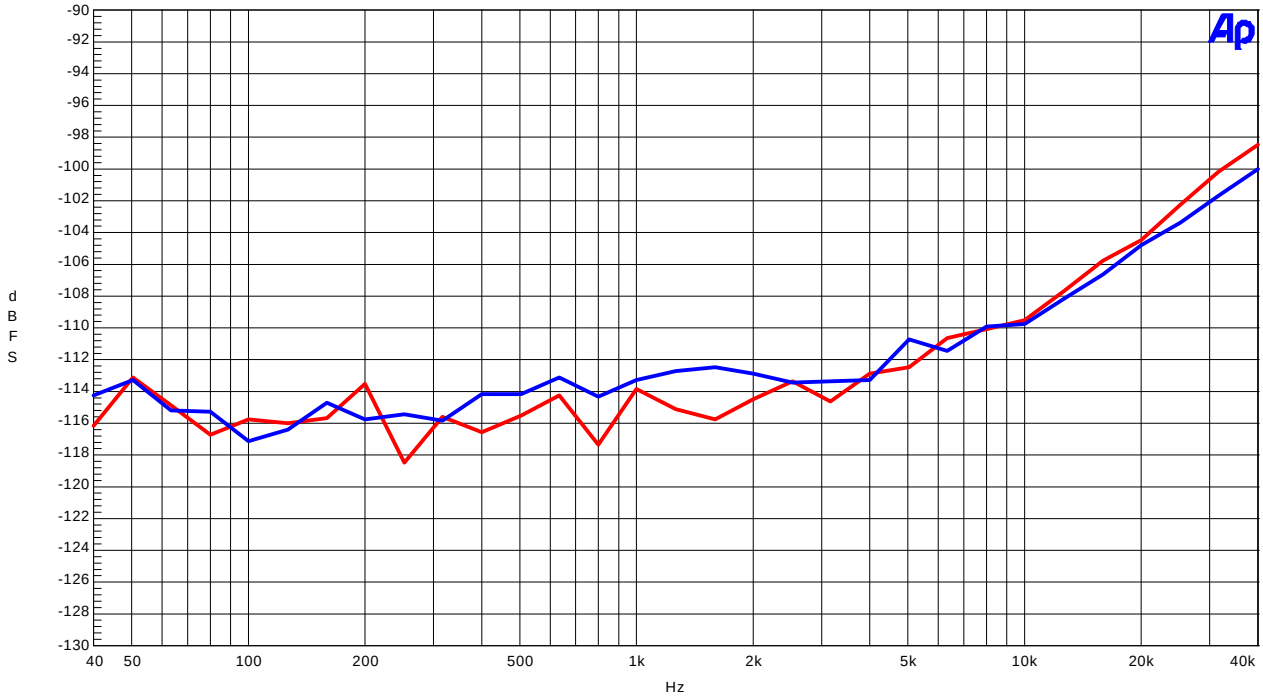
Linearity(fin=1kHz)

AKM AK4527 Crosstalk



Frequency Response(Input Level=-0.5dBFS)
(including input RC filter)

AKM AK4527 Crosstalk

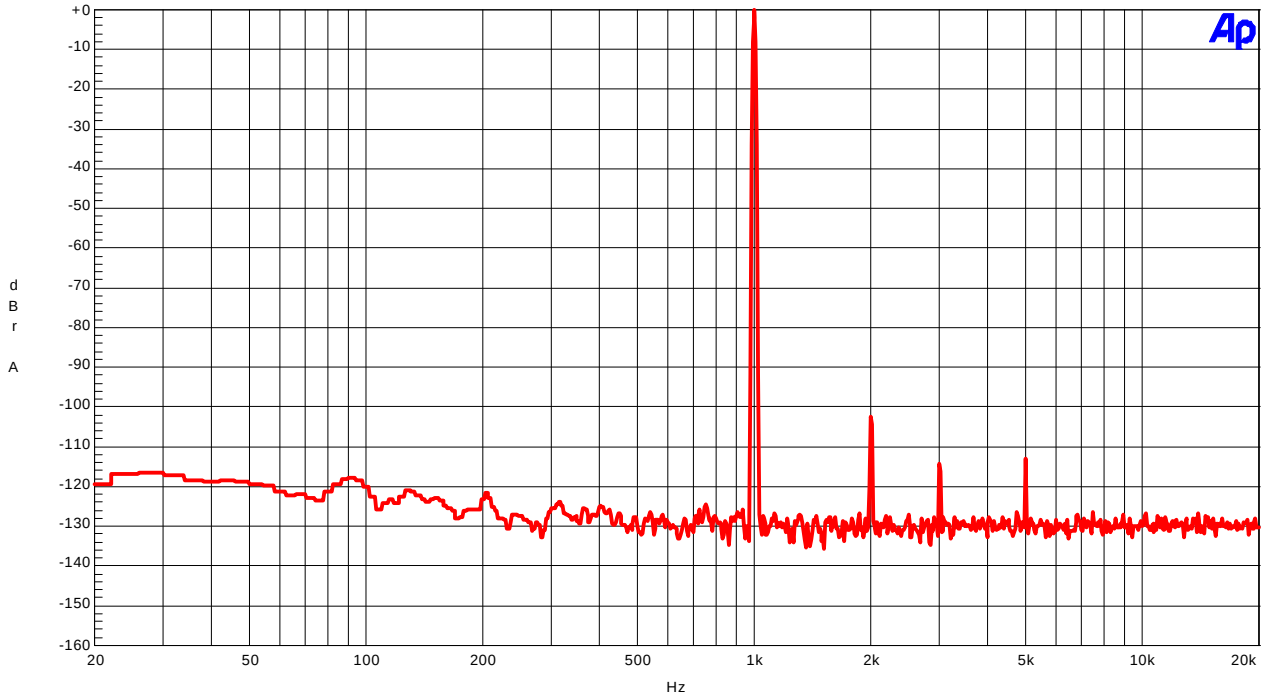


Crosstalk (Upper = Rch, Lower = Lch)

2.DAC

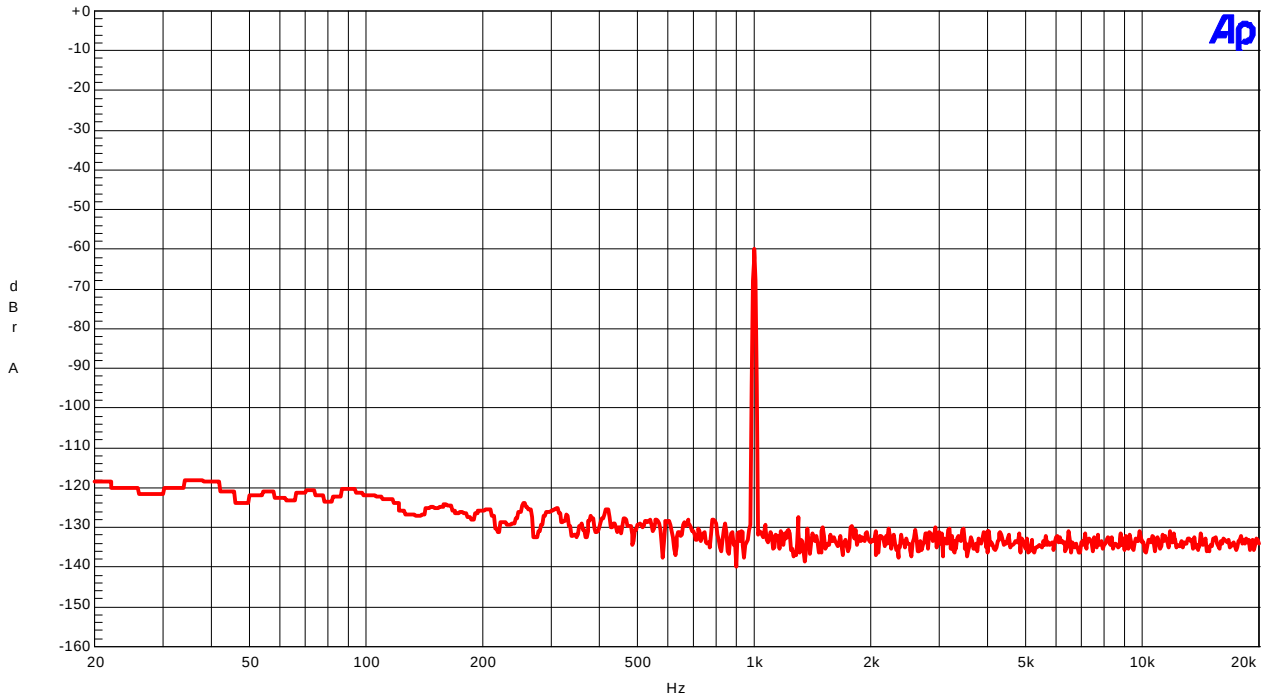
(DAC fs=44.1kHz)

AKM AK4527 DAC FFT (Input Level=0dBFS, fin=1kHz)



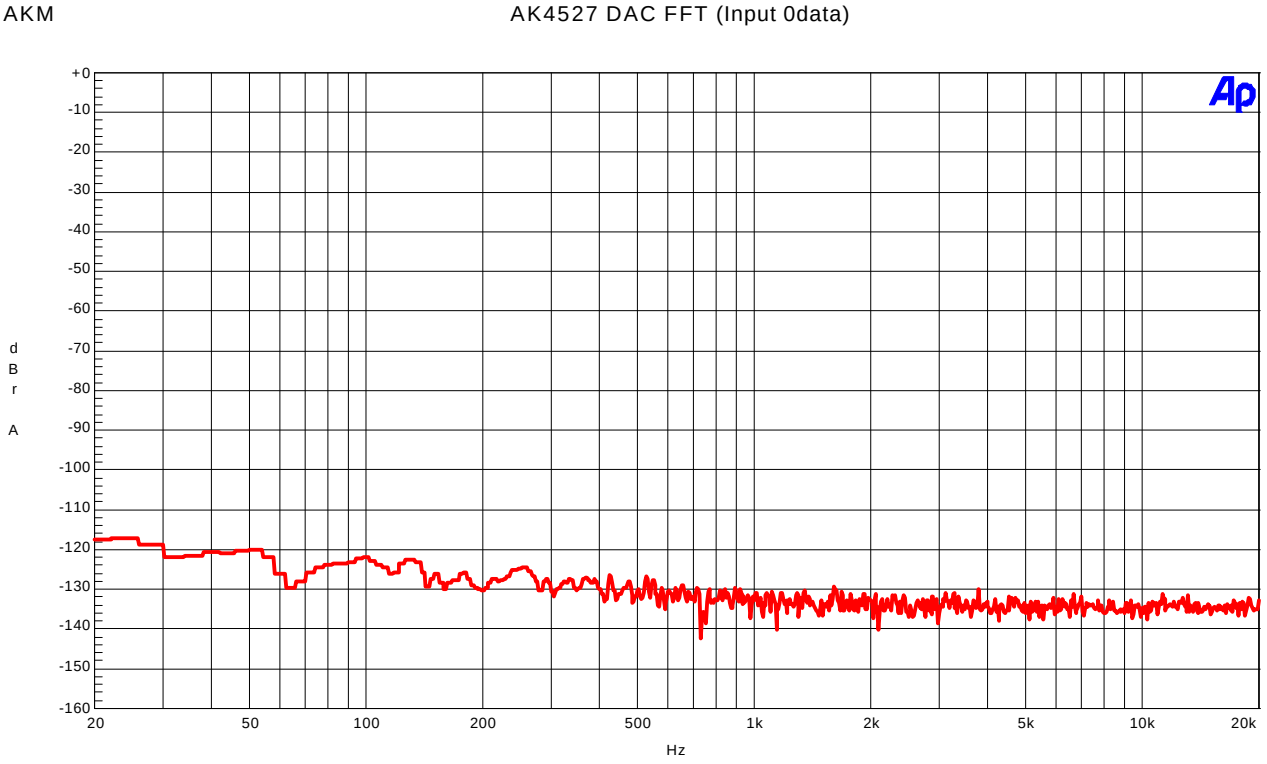
FFT (Input=0dBFS, fin=1kHz)

AKM AK4527 DAC FFT (Input Level=-60dBFS, fin=1kHz)



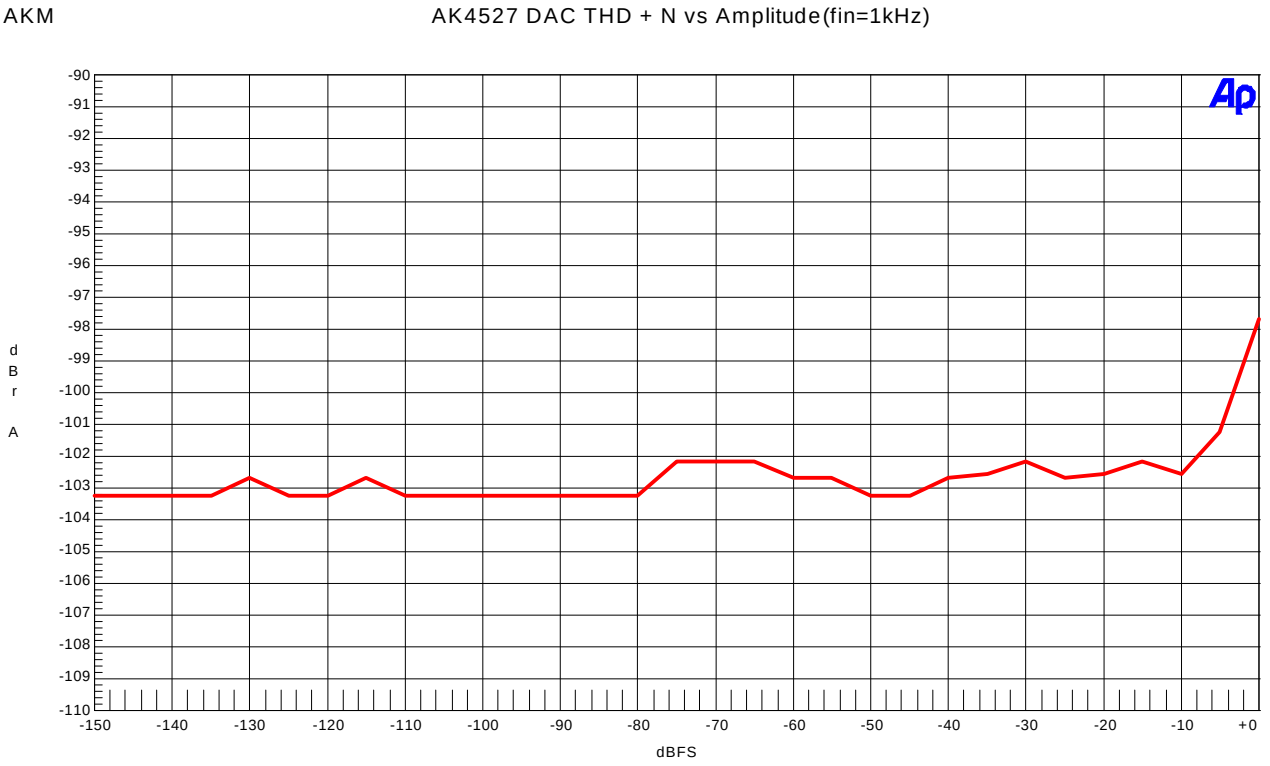
FFT (Input=-60dBFS, fin=1kHz)

(DAC fs=44.1kHz)

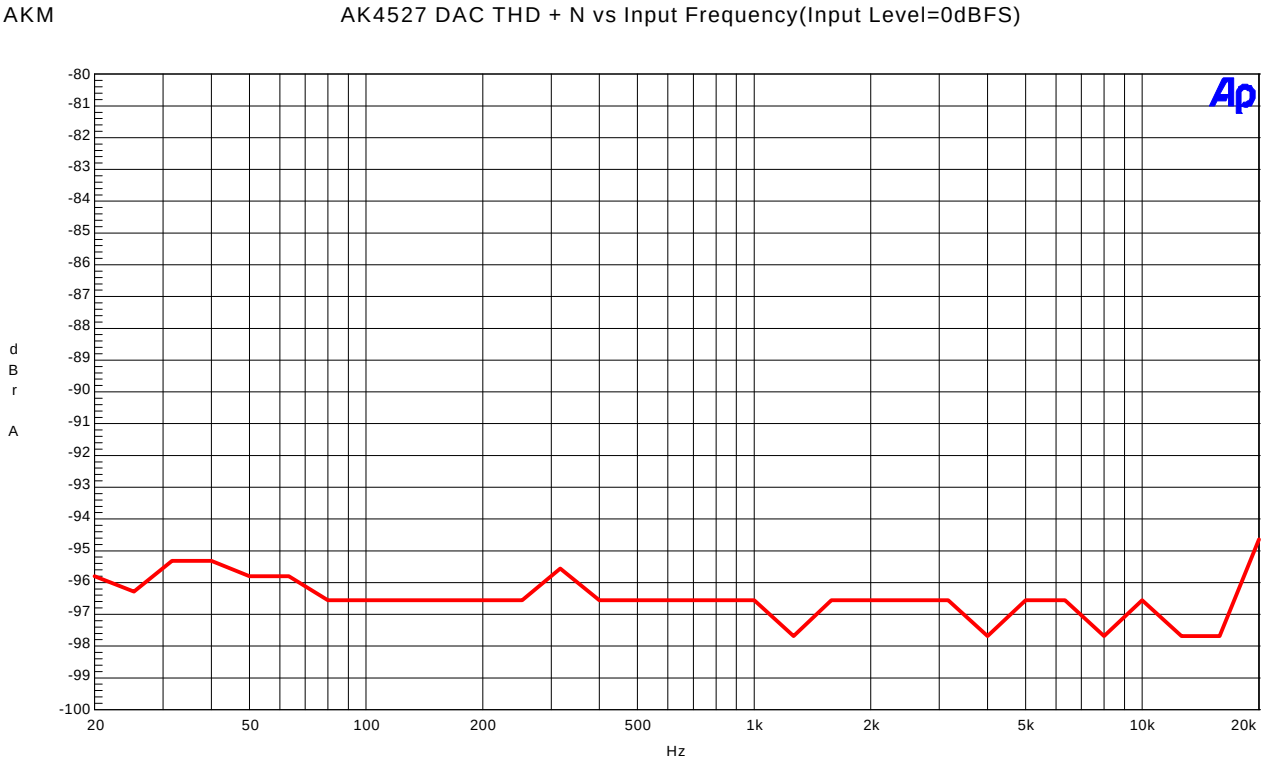


FFT (Input=”0”data)

(DAC fs=44.1kHz)

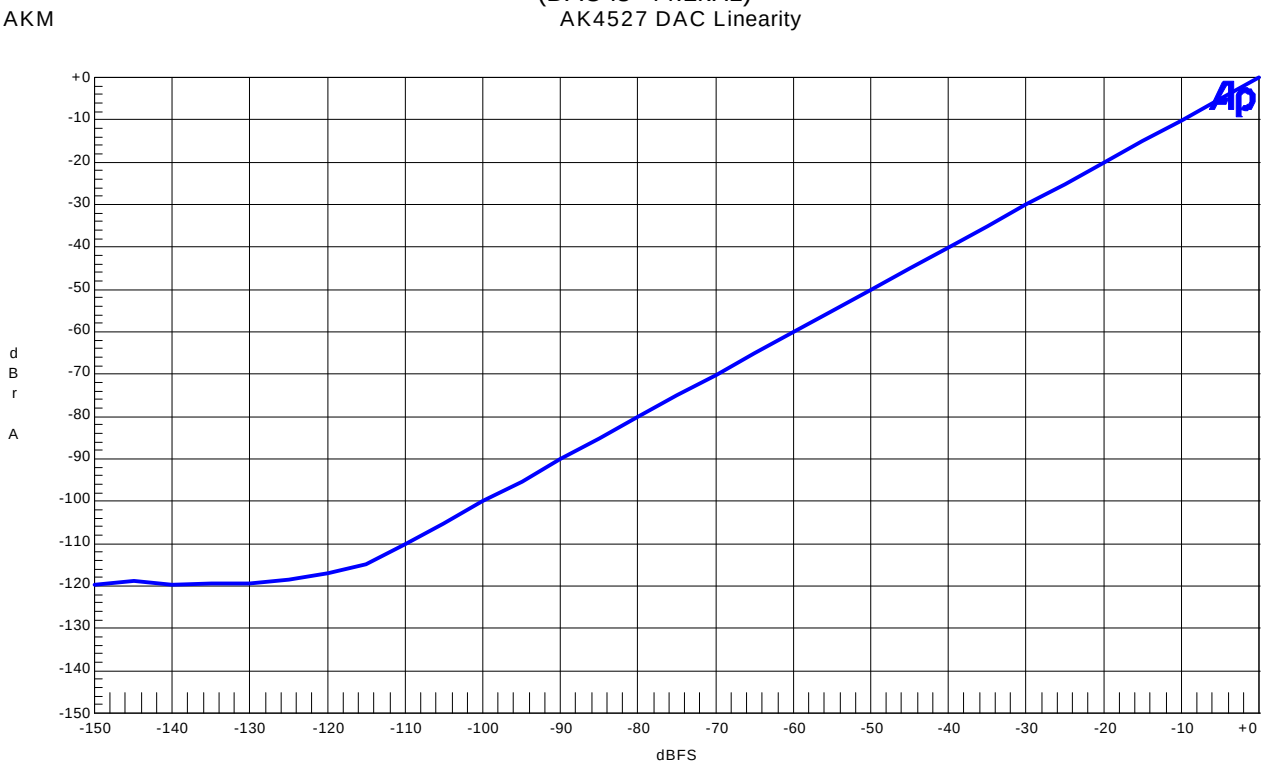


THD + N vs Amplitude(fin=1kHz)

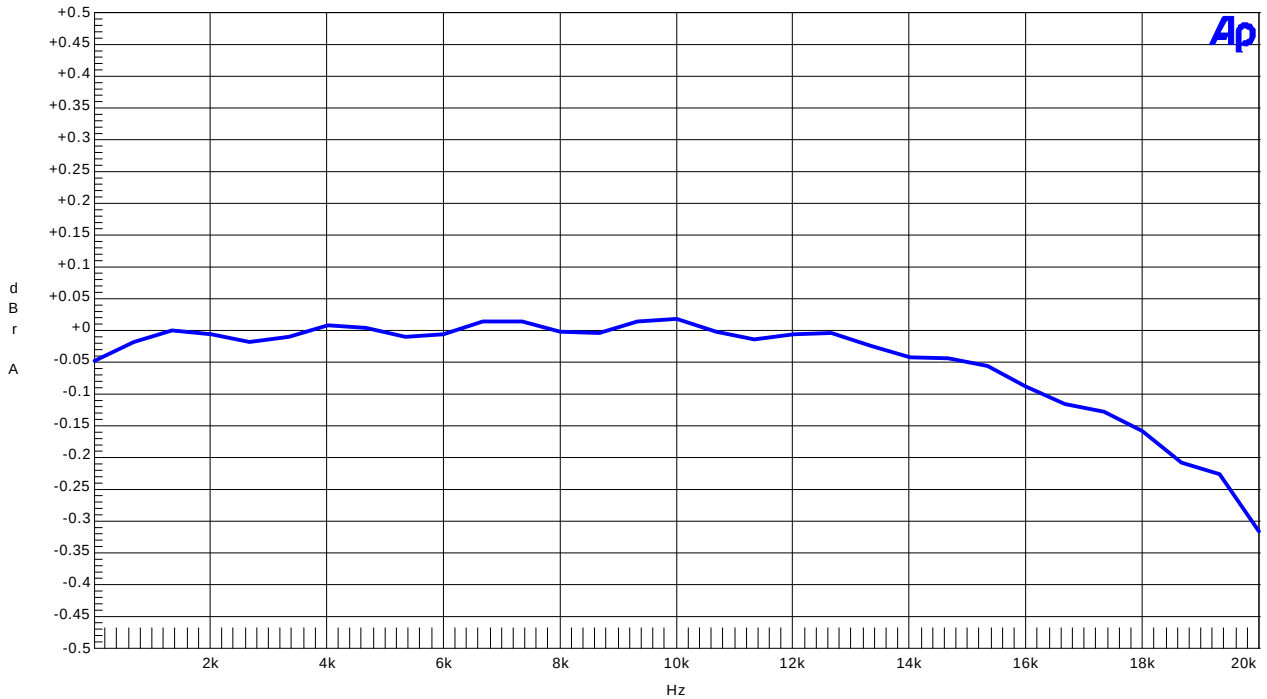


THD + N vs Input Frequency (Input=0dBFS)

(DAC fs=44.1kHz)



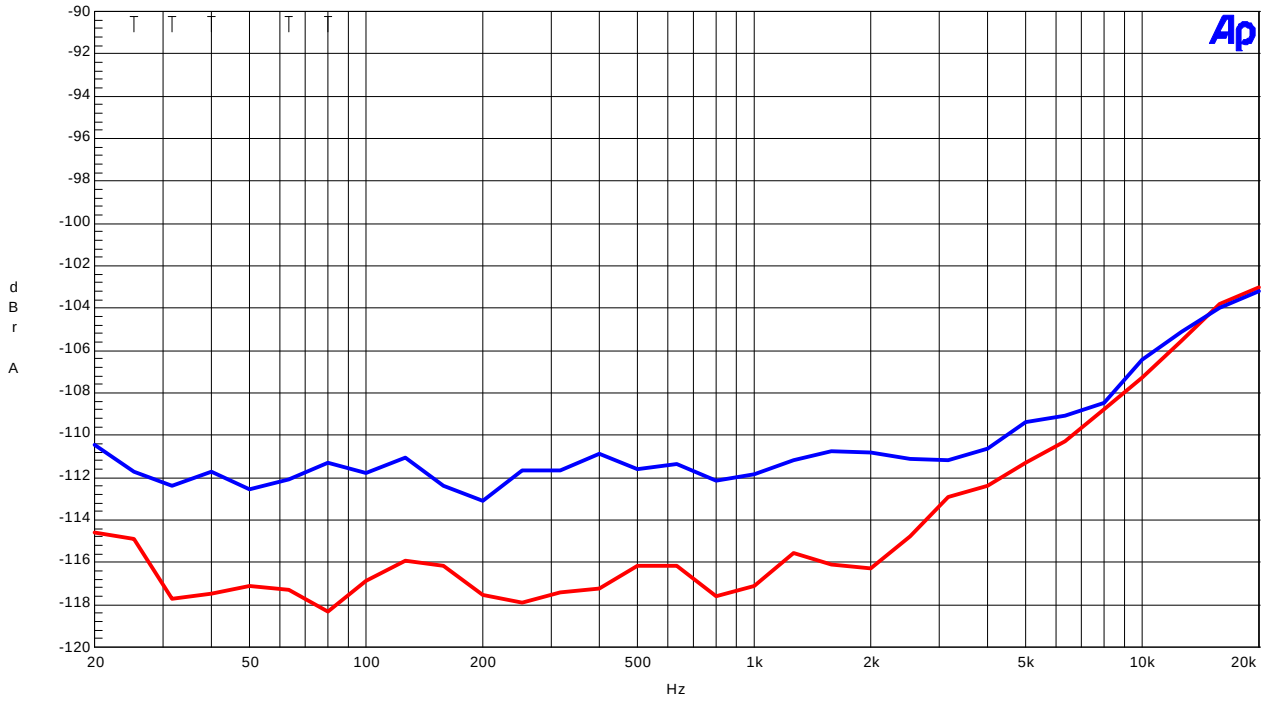
Linearity(fin=1kHz)



Frequency Response(Input Level=0dBFS)
(including external RC filter)

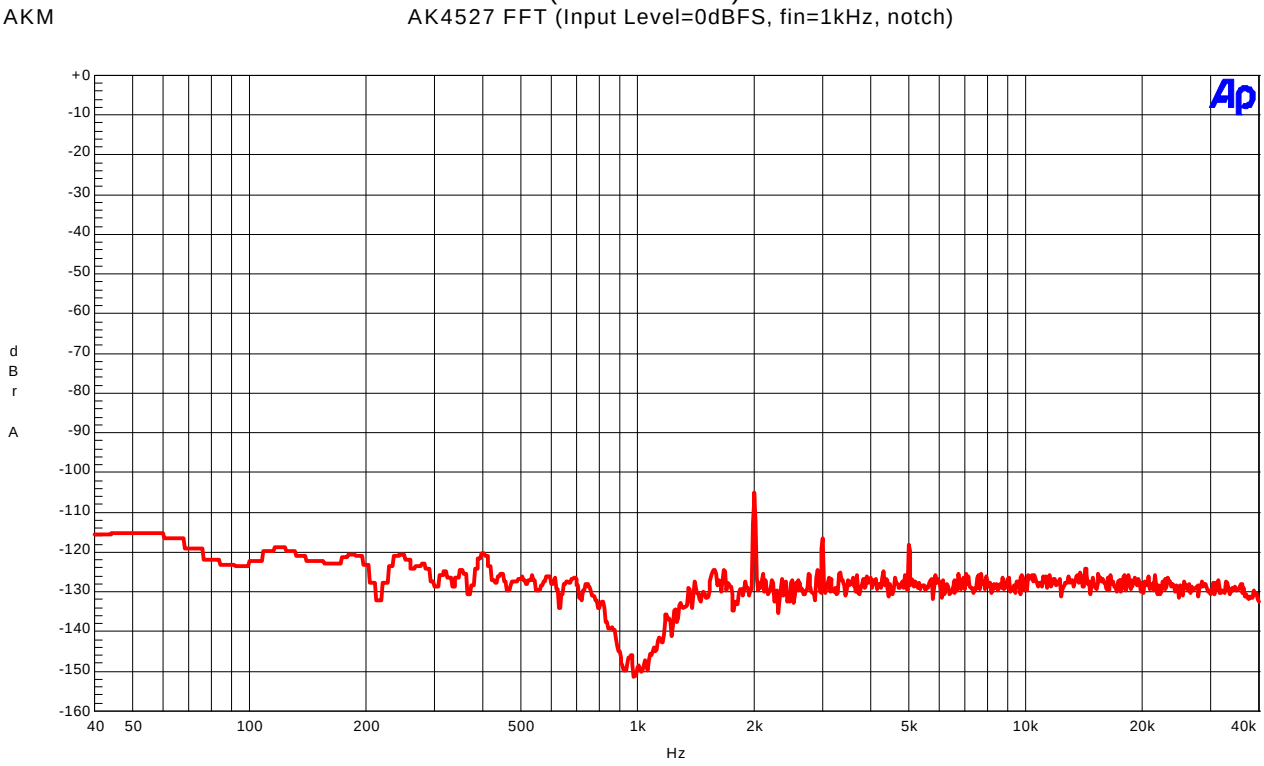
(DAC fs=44.1kHz)

AKM AK4527 DAC Crosstalk

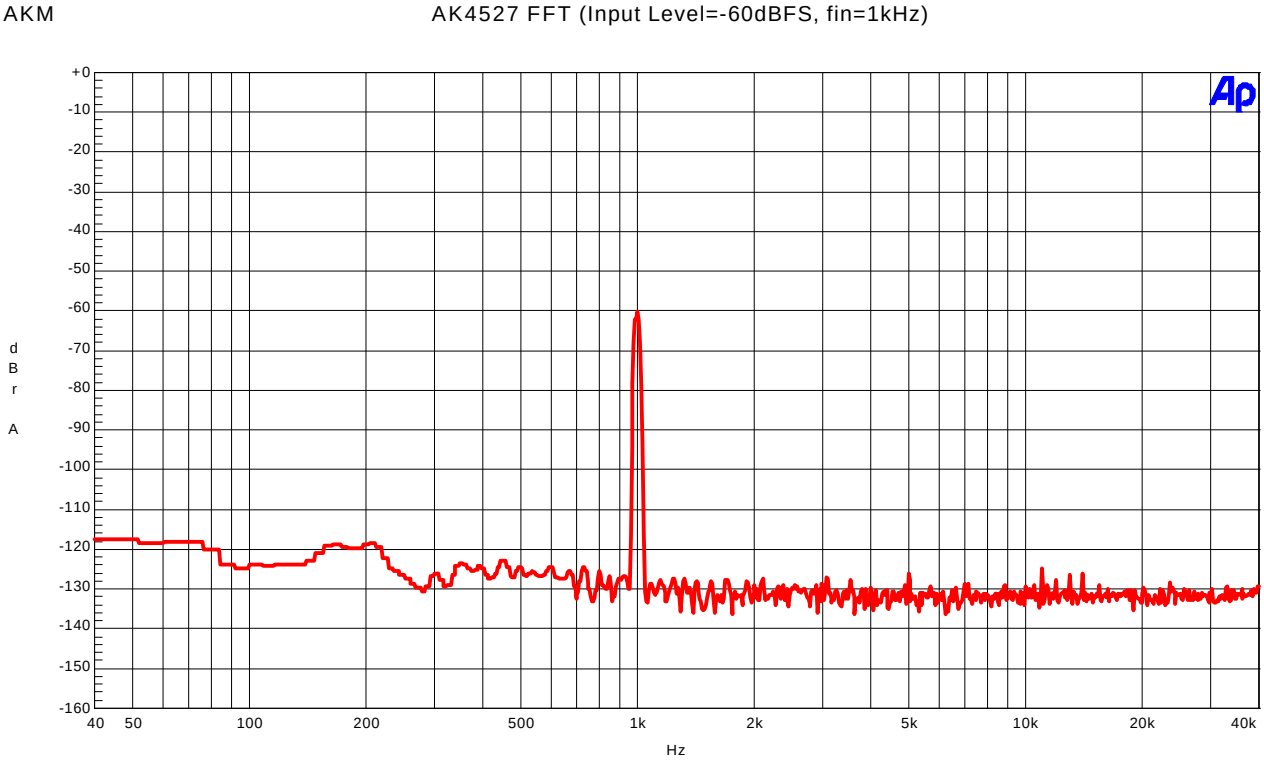


Crosstalk(Upper=Rch, Lower=Lch)

(DAC fs=96kHz)



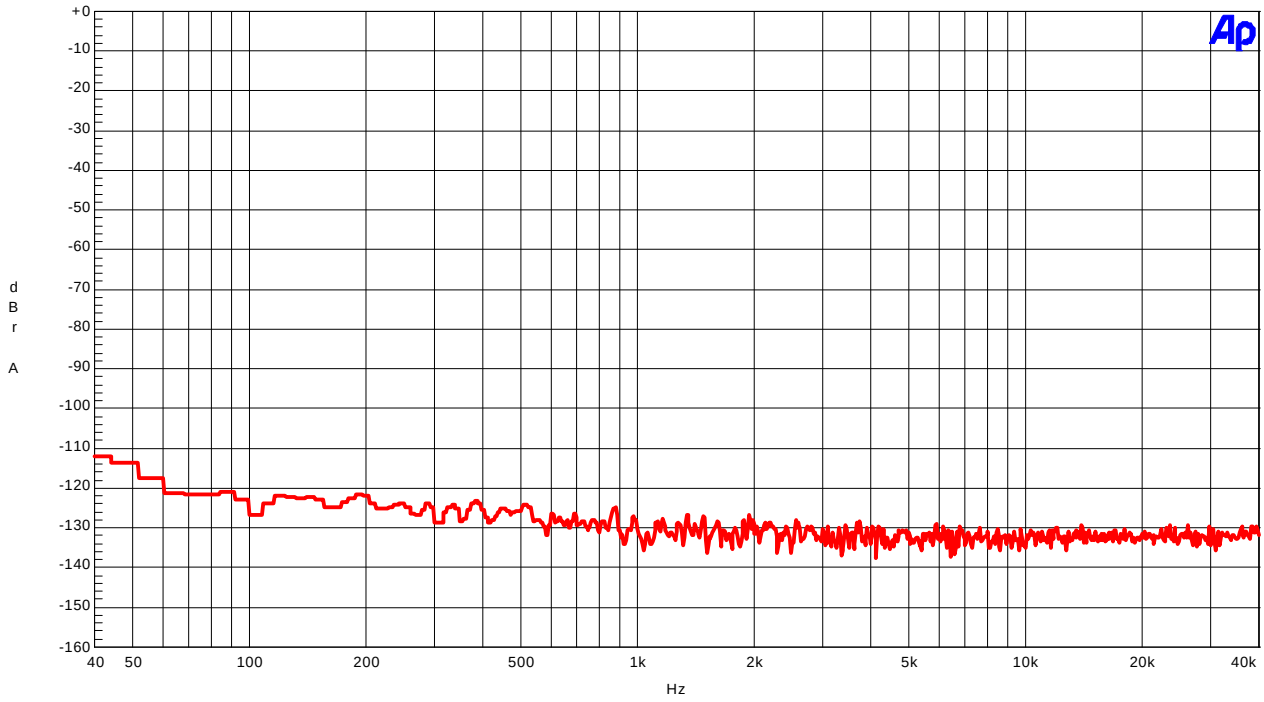
FFT (Input=0dBFS, fin=1kHz, Notch)



FFT (Input=-60dBFS,fin=1kHz)

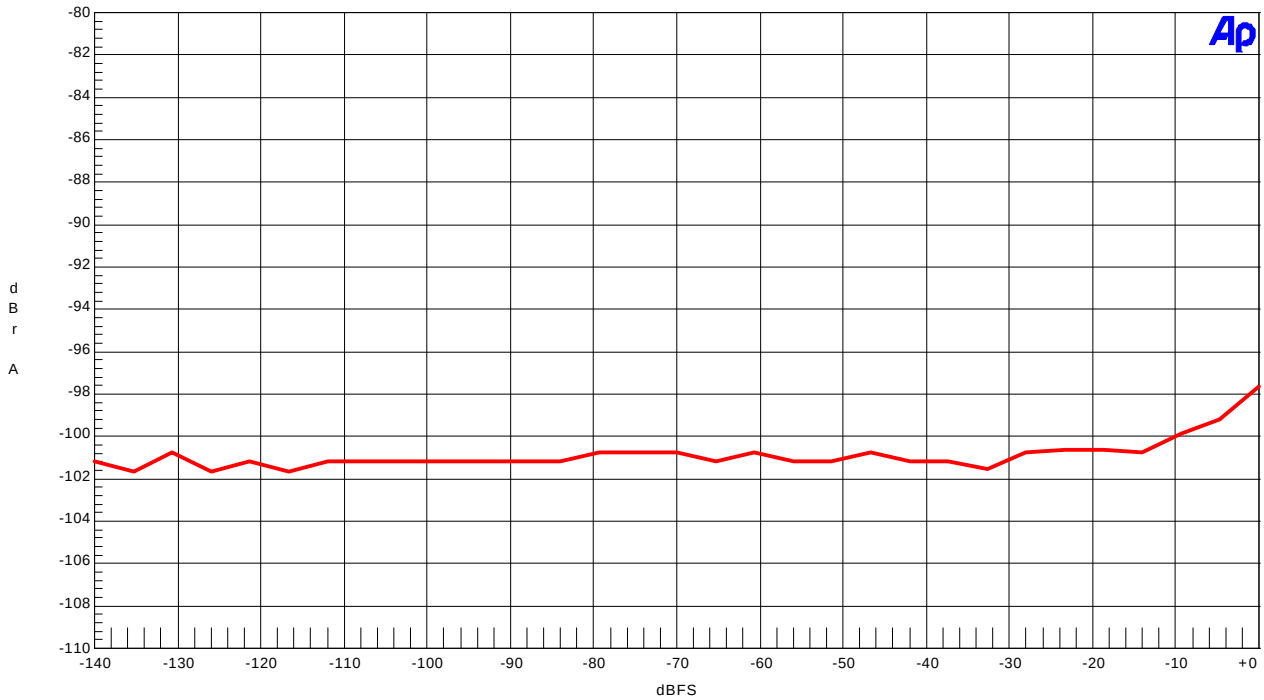
(DAC fs=96kHz)

AKM AK4527 FFT (Input="0" data)



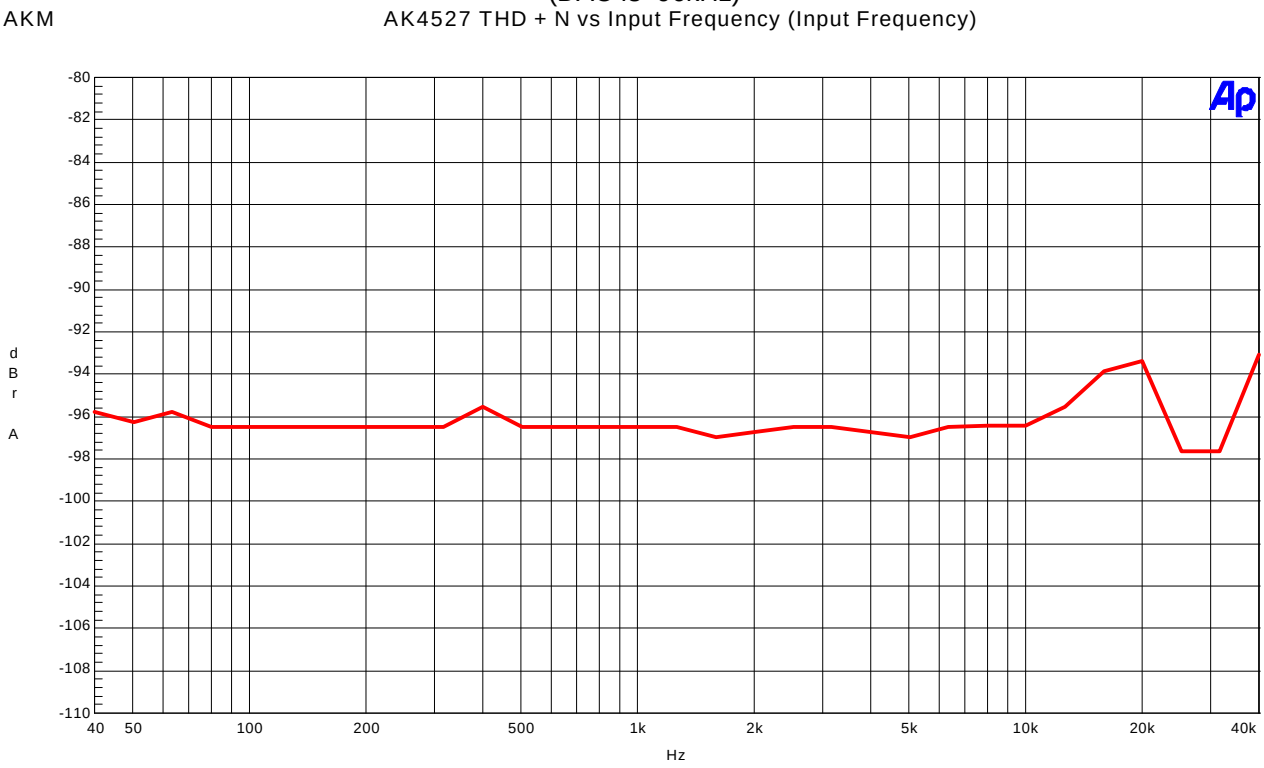
FFT (Input="0"data)

AKM AK4527 THD + N vs Amplitude (fin=1kHz)

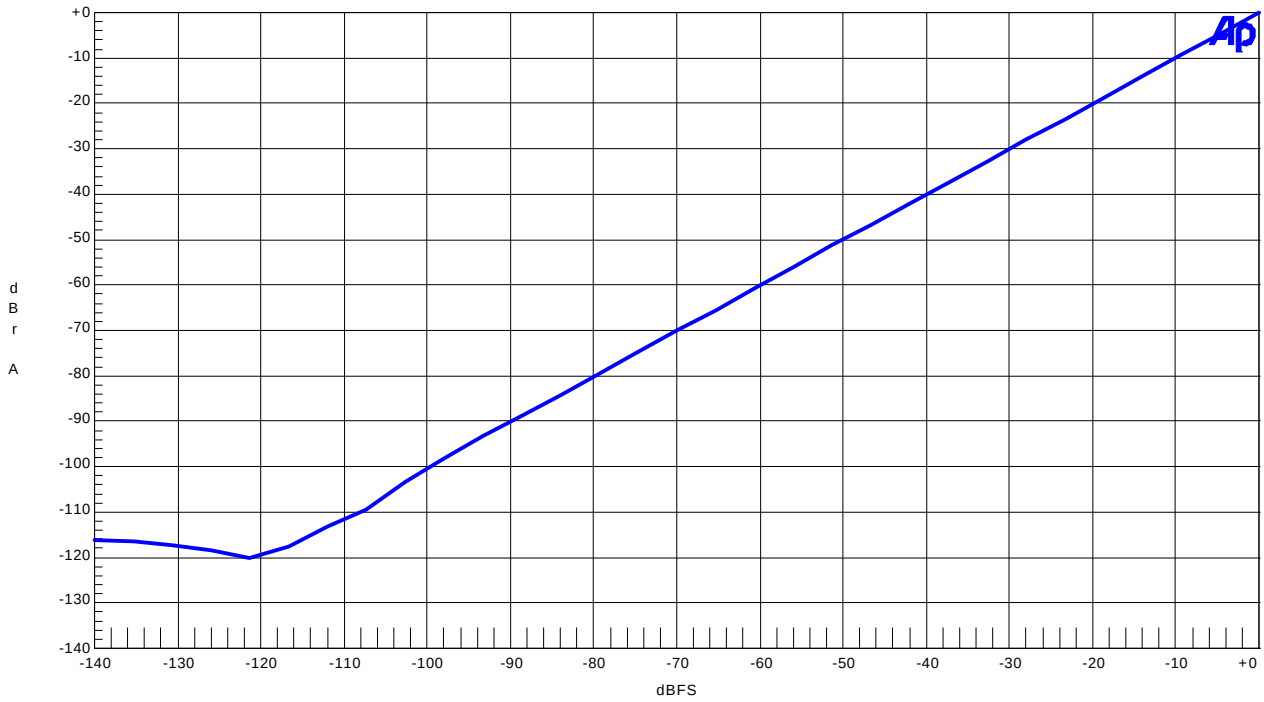


THD + N vs Amplitude (fin=1kHz)

(DAC fs=96kHz)



THD + N vs Input Frequency (Input=0dBFS)

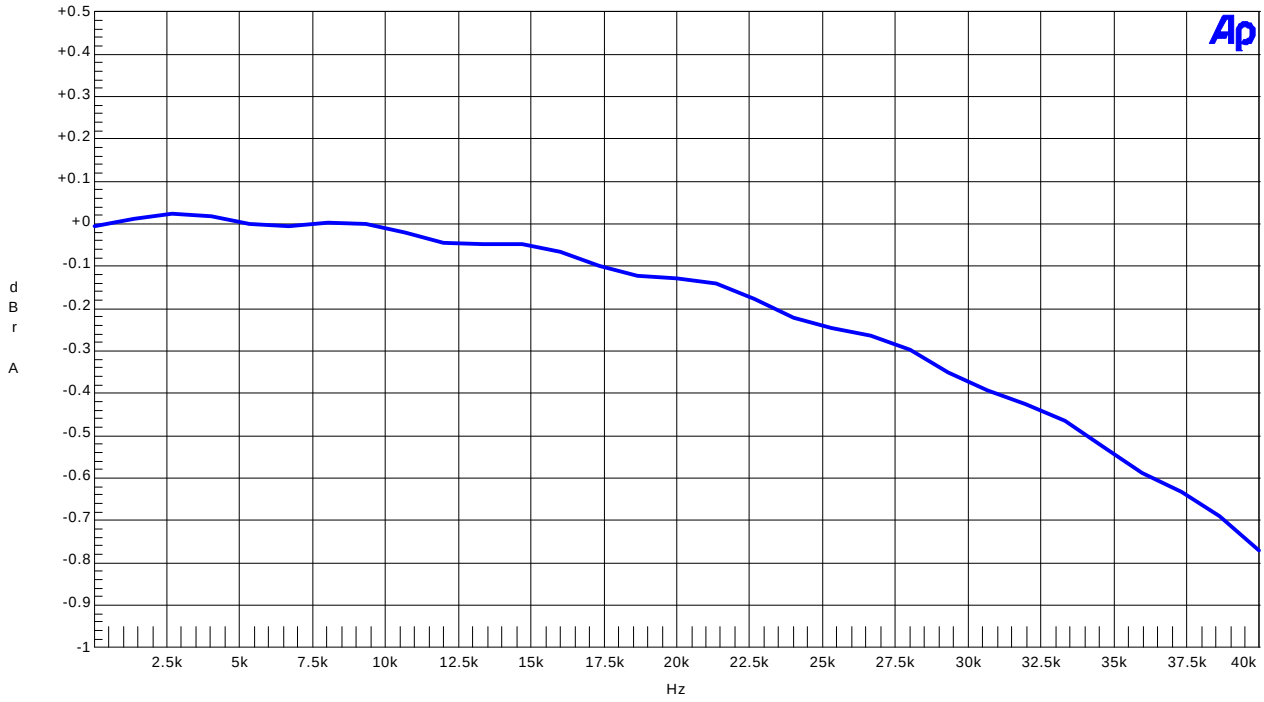


Linearity(fin=1kHz)

(DAC fs=96kHz)

AKM

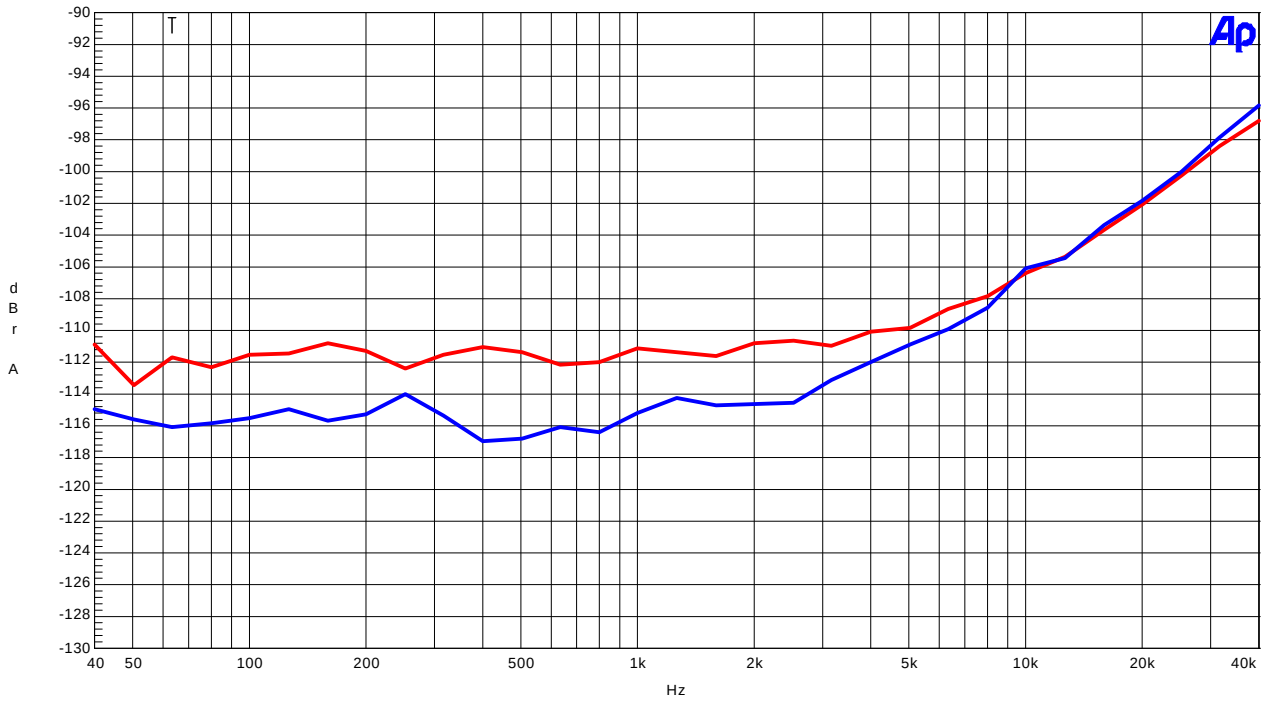
AK4527 Frequency Response



Frequency Response(Input Level=0dBFS)
(including external RC filter)

AKM

AK4527 Crosstalk



Crosstalk (Upper=Rch, Lower=Lch)

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AK4527B Control Program operation manual

1. Connect IBM-AT compatible PC with Eva-board by 10-line type flat cable (packed with Eva-board).
   Take care of the direction of 10pin Header (Refer to manual of Eva-board).
2. Start up “WINDOWS 95” or “WINDOWS 98”.
3. Insert the floppy-disk packed with Eva-board into the floppy-disk drive.
4. Set up “MS-DOS” from start menu.
5. Change directory to the floppy-disk drive(ex.a:) at MS-DOS prompt.
6. Type “4527b”.
7. Then follow the displayed comment (See the following).

========== <<Operating flow>> ==========
Write data/ Display register map/ Reset etc.→ loop
==========

At first the following message is displayed:

```
****** AK4527B Control Program ver 2.0 , '00/9 ******
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```

Then the following default register map is displayed (Loop starts from here):

```
AK4527B : 3-wire Serial control mode    CAD1-0=01  ----------------------------
 ADDR = 00 : 00 <Control 1>  ( 0     0     0     0     DIF1  DIF0   0     SMUTE)
 ADDR = 01 : 00 <Control 2>  ( 0     0     LOOP1 LOOP0 SDOS  DFS    ACKS  0    )
 ADDR = 02 : 00 <L1 ATT>     ( ATT7  ATT6  ATT5   ATT4  ATT3  ATT2   ATT1  ATT0 )
 ADDR = 03 : 00 <R1 ATT>     ( ATT7  ATT6  ATT5   ATT4  ATT3  ATT2   ATT1  ATT0 )
 ADDR = 04 : 00 <L2 ATT>     ( ATT7  ATT6  ATT5   ATT4  ATT3  ATT2   ATT1  ATT0 )
 ADDR = 05 : 00 <R2 ATT>     ( ATT7  ATT6  ATT5   ATT4  ATT3  ATT2   ATT1  ATT0 )
 ADDR = 06 : 00 <L3 ATT>     ( ATT7  ATT6  ATT5   ATT4  ATT3  ATT2   ATT1  ATT0 )
 ADDR = 07 : 00 <R3 ATT>     ( ATT7  ATT6  ATT5   ATT4  ATT3  ATT2   ATT1  ATT0 )
 ADDR = 08 : 00 <DEM>        ( 0     0     DEMA1 DEMA0 DEMB1 DEMB0 DEMC1 DEMC0)
 ADDR = 09 : 01 <CLK Mode>   ( 0     0     0     0     0     0     0     RSTN )
 ADDR = 0A : 3F <DZF>        ( OVFE 0     DZFM2 DZFM1 DZFM0 PWVRN PWADN PWDAN)

Input 1(Write), R(Reset), T(Table), I(Increment) or D(Decrement) :
```

1) If you input “1”, you can write data to AK4527B.

```
    You can write data to AK4527B
Input Register Address (2 figure, hex) (00-0A) =
```

Input register address in 2 figures of hexadecimal.
Then current data of this address is displayed:

```
AK4527B
 ADDR = 00 : 08 <Control 1>  ( 0     0     0     0     DIF1  DIF0  0     SMUTE)
                               0     0     0     0     1     0     0     0
Input Register Data    (2 figure, hex) (00-FF) =
```

You can write control data to this address. Input control data in 2 figures of hexadecimal.
Refer to datasheet of AK4527B.
Then the data written to this address is displayed:

```
AK4527B
 ADDR = 00 : 0C <Control 1>  ( 0     0     0     0     DIF1  DIF0  0     SMUTE)
                               0     0     0     0     1     1     0     0
```

2) If you input “R” or “r”, this program writes default data to all register addresses.

3) If you input “T” or “t”, current register map is displayed.

4) If you input “I” or “i”, this program increment data of current address by 1.

5) If you input “D” or “d”, this program decrement data of current address by 1.

6) If you input “S” or “s”, this program is terminated.

AK4112A Control Program operation manual

1. Connect IBM-AT compatible PC with Eva-board by 10-line type flat cable (packed with Eva-board).
   Take care of the direction of 10pin Header (Refer to manual of Eva-board).
2. Start up “WINDOWS 95” or “WINDOWS 98”.
3. Insert the floppy-disk packed with Eva-board into the floppy-disk drive.
4. Set up “MS-DOS” from start menu.
5. Change directory to the floppy-disk drive(ex.a:) at MS-DOS prompt.
6. Type “4112”.
7. Then follow the displayed comment (See the following).

========== <<Operating flow>> ==========
Write data/ Display register map/ Reset etc.→ loop
==========

At first the following message is displayed:

```
****** AK4112 Control Program ver 2.0 , '00/1 ******
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```

Then the following is displayed:

After chip address is defined, the following default register map is displayed (Loop starts from here):

```
AK4112 Register Map
 ADDR = 00 : 03 <CLK PD ctrl> (0    BCU   CM1   CM0   OCKS1 OCKS0 PWN   RSTN )
 ADDR = 01 : 80 <I/O   ctrl> (MPAR  MTSC  CS12  XTE   IPS1  IPS0  OPS1  OPS0 )
 ADDR = 02 : 4A <FMT DM ctrl> (V/TX  DIF2  DIF1  DIF0  DEAU  DEM1  DEM0  DFS  )
 ADDR = 03 : 00 <RCV STAT 1>  (ERF    0    AUDIO AUTO  PEM   FS1   FS0   RFS96)
 ADDR = 04 : 00 <RCV STAT 2>  (CV    STC   CRC  UNLOCK V     FRERR BIP   PAR  )
 ADDR = 05 : 00 <ChA STAT 0>  (CA7   CA6   CA5   CA4   CA3   CA2   CA1   CA0 )
 ADDR = 06 : 00 <ChA STAT 1>  (CA15  CA14  CA13  CA12  CA11  CA10  CA9   CA8 )
 ADDR = 07 : 00 <ChA STAT 2>  (CA23  CA22  CA21  CA20  CA19  CA18  CA17  CA16)
 ADDR = 08 : 00 <ChA STAT 3>  (CA31  CA30  CA29  CA28  CA27  CA26  CA25  CA24)
 ADDR = 09 : 00 <ChB STAT 0>  (CB7   CB6   CB5   CB4   CB3   CB2   CB1   CB0 )
 ADDR = 0A : 00 <ChB STAT 1>  (CB15  CB14  CB13  CB12  CB11  CB10  CB9   CB8 )
 ADDR = 0B : 00 <ChB STAT 2>  (CB23  CB22  CB21  CB20  CB19  CB18  CB17  CB16)
 ADDR = 0C : 00 <ChB STAT 3>  (CB31  CB30  CB29  CB28  CB27  CB26  CB25  CB24)
 ADDR = 0D : 00 <BstPre Pc 0> (PC7   PC6   PC5   PC4    PC3   PC2   PC1   PC0  )
 ADDR = 0E : 00 <BstPre Pc 1> (PC15  PC14  PC13  PC12  PC11  PC10  PC9   PC8  )
 ADDR = 0F : 00 <BstPre Pd 0> (PD7   PD6   PD5   PD4    PD3   PD2   PD1   PD0  )
 ADDR = 10 : 00 <BstPre Pd 1> (PD15  PD14  PD13  PD12  PD11  PD10  PD9   PD8  )
 ADDR = 11 : 02 <Count ctrl>  (0     0     0     0     0     EFH1  EFH0  XFS96)
Input 0(Read), 1(Write), R(Reset), T(Table) or S(Stop) :
```

1) If you input “0”, you can read data from AK4112A.

```
    You can read data from AK4112
Input Register Address (2 figure, hex) (00H-11H) =
```

Input register address in 2 figures of hexadecimal.
Then current data of this address is displayed:

```
AK4112A
 ADDR = 00 : 03 <CLK PD ctrl> (0    BCU   CM1   CM0   OCKS1 OCKS0 PWN   RSTN)
                               0    0     0     0     0     0     1     1
```

2) If you input “1”, you can write data to AK4112A.

```
    You can write data to AK4112
Input Register Address (2 figure, hex) (00H-02H or 11H) =
```

Input register address in 2 figures of hexadecimal.
Then current data of this address is displayed:

```
AK4112A
 ADDR = 00 : 03 <CLK PD ctrl> (0    BCU   CM1   CM0   OCKS1 OCKS0 PWN   RSTN)
                               0    0     0     0     0     0     1     1
Input Register Data    (2 figure, hex) =
```

You can write control data to this address. Input control data in 2 figures of hexadecimal.
Refer to datasheet of AK4112A.
Then the data written to this address is displayed:

```
AK4112
 ADDR = 00 : 23 <CLK PD ctrl> (0    BCU   CM1   CM0   OCKS1 OCKS0 PWN   RSTN)
                               0    0     1     0     0     0     1     1
```

3) If you input “R” or “r”, this program writes default data to all register addresses.

4) If you input “T” or “t”, current register map is displayed.

5) If you input “S” or “s”, this program is terminated.

‘00/2

AK4353 Control Program operation manual

1. Connect IBM-AT compatible PC with Eva-board by 10-line type flat cable (packed with Eva-board).
   Take care of the direction of 10pin Header (Refer to manual of Eva-board).
2. Start up “WINDOWS 95” or “WINDOWS 98”.
3. Insert the floppy-disk packed with Eva-board into the floppy-disk drive.
4. Set up “MS-DOS” from start menu.
5. Change directory to the floppy-disk drive(ex.a:) at MS-DOS prompt.
6. Type “4353”.
7. Then follow the displayed comment (See the following).

========== <<Operating flow>> ==========
Write data/ Display register map/ Reset etc.→ loop
==========

At first the following message is displayed:

```
****** AK4353 Control Program ver 3.0 , '00/2 ******
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```

Then the following default register map is displayed (Loop starts from here):

```
3-wire Serial control mode    CAD1-0=11  ------------------------------------
 ADDR = 00 : 0B <Control 1>  ( 0     0    0    0     DIF2  DIF1  DIF0  RSTN )
 ADDR = 01 : 01 <Control 2>  ( 0     0    DFS1  DFS0  CKS2  CKS1  CKS0  RSTN )
 ADDR = 02 : 94 <Control 3>  ( PL3   PL2   PL1   PL0   DEM1  DEM0  ATC   SMUTE)
 ADDR = 03 : FF <Lch ATT>    ( ATT7  ATT6  ATT5  ATT4  ATT3  ATT2  ATT1  ATT0 )
 ADDR = 04 : FF <Rch ATT>    ( ATT7  ATT6  ATT5  ATT4  ATT3  ATT2  ATT1  ATT0 )
 ADDR = 05 : 00 <TX>         ( 0     0     0     0     0     0     V     TXE  )
 ADDR = 06 : 00 <Ch Status 1>( 0     CS29  CS28  CS24  CS3   CS2   CS2   CS1  )
 ADDR = 07 : 04 <Ch Status 2>( CS15  CS14  CS13  CS12  CS11  CS10  CS9   CS8  )

Input 1(Write), R(Reset), T(Table), I(Increment), D(Decrement) or S(Stop) :
```

1) If you input “1”, you can write data to AK4353.

```
    You can write data to AK4353
Input Register Address (2 figure, hex) (00-07) =
```

Input register address in 2 figures of hexadecimal.
Then current data of this address is displayed:

```
ADDR = 00 : 0B <Control 1>  ( 0     0    0    0    DIF2  DIF1  DIF0  RSTN )
                              0     0    0    0    1     0     1     1
Input Register Data    (2 figure, hex) (00-FF) =
```

You can write control data to this address. Input control data in 2 figures of hexadecimal.
Refer to datasheet of AK4353.
Then the data written to this address is displayed:

```
ADDR = 00 : 09 <Control 1>  ( 0     0    0    0    DIF2  DIF1  DIF0  RSTN )
                              0     0    0    0    1     0     0     1
```

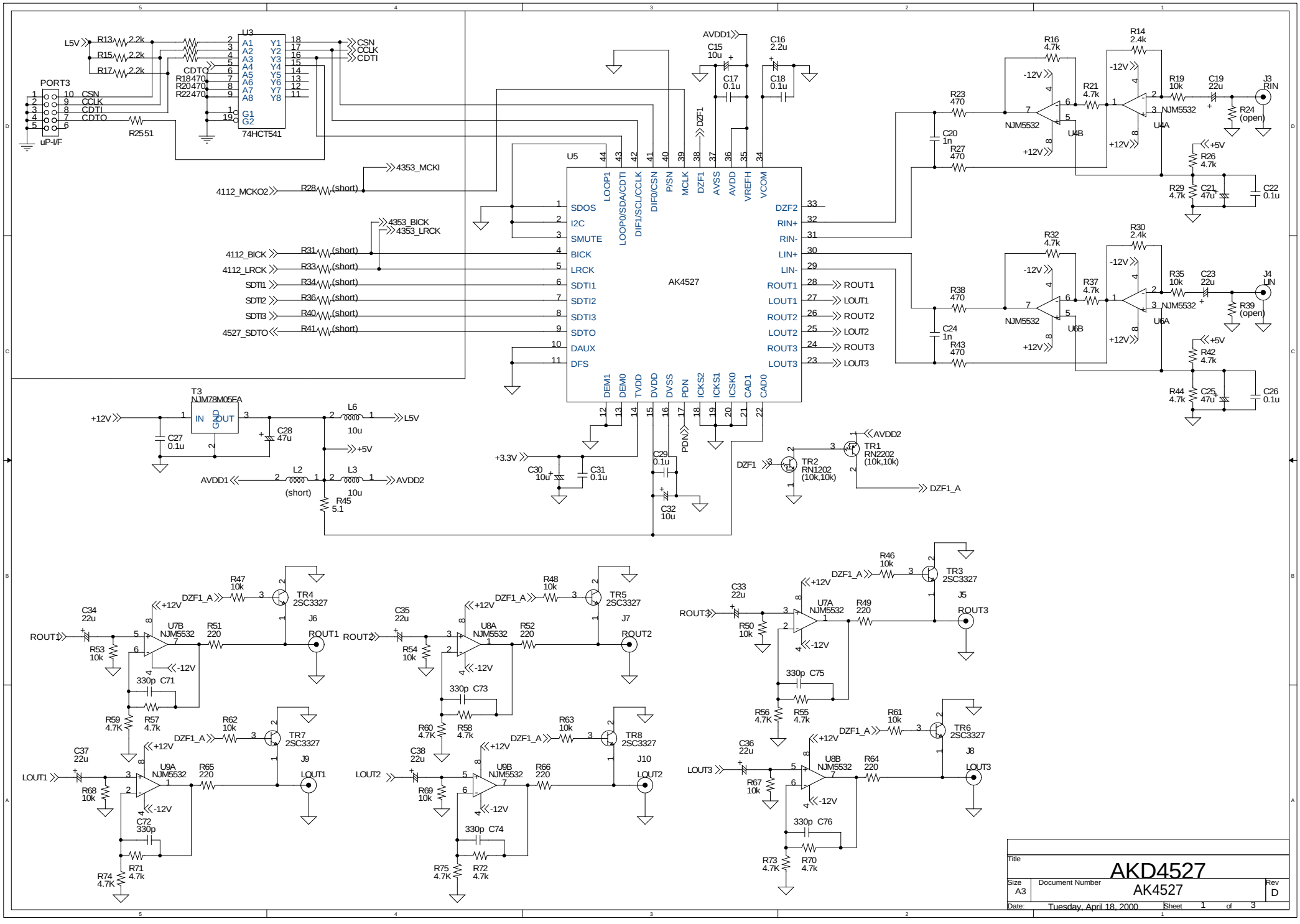
2) If you input “R” or “r”, this program writes default data to all register addresses.

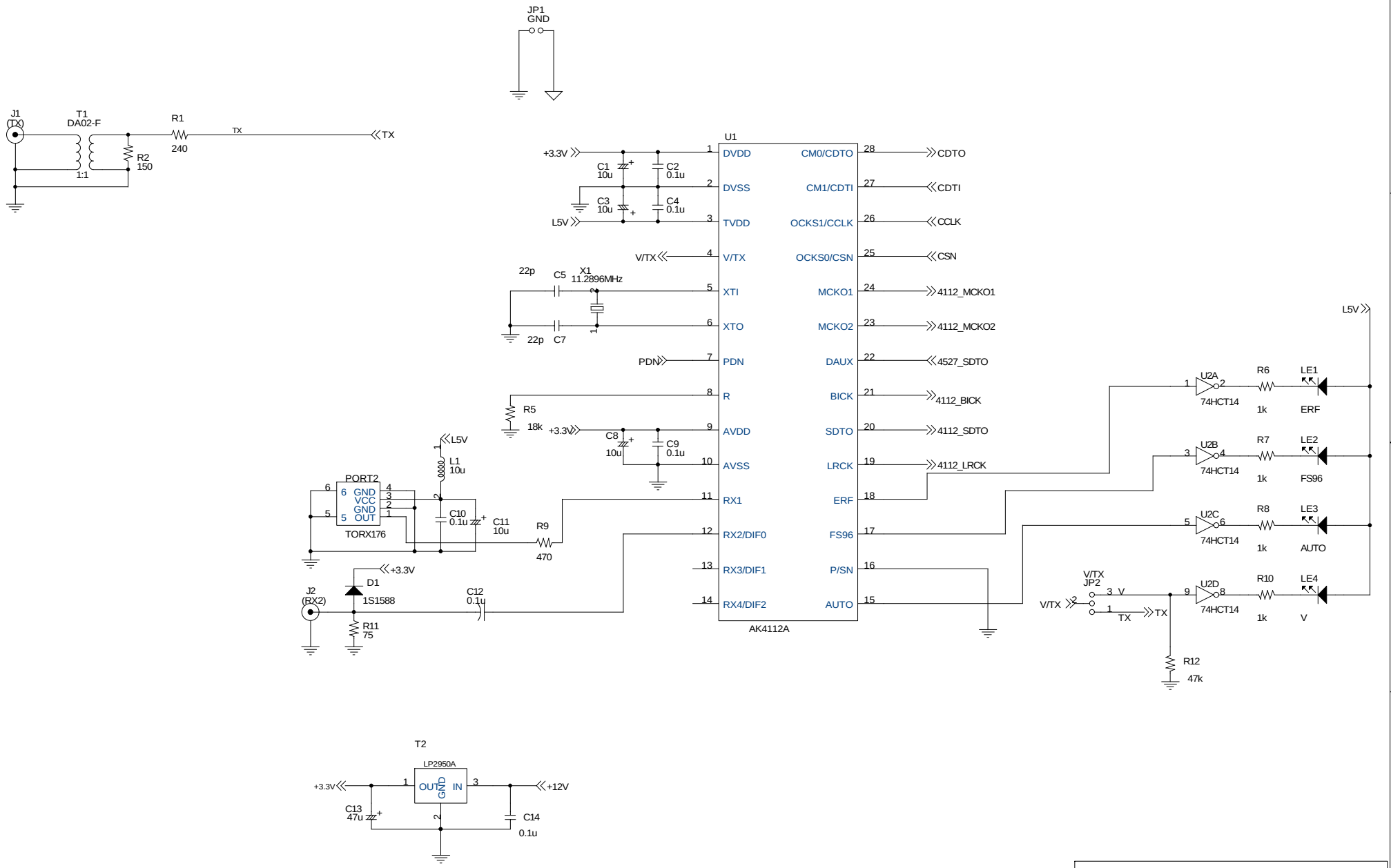
3) If you input “T” or “t”, current register map is displayed.

4) If you input “I” or “i”, this program increment data of current address by 1 (only for addr=03H or 04H). You can increment ATT value by 1step.

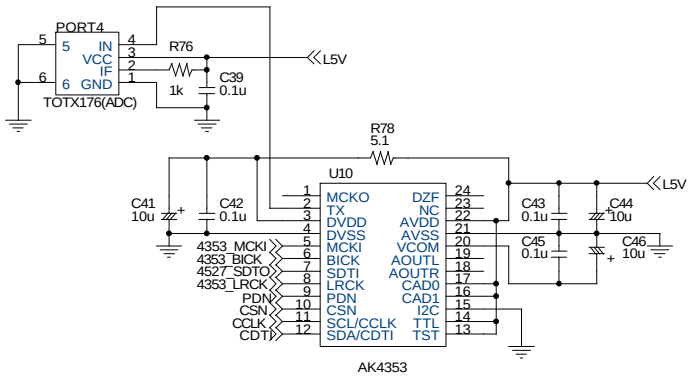
5) If you input “D” or “d”, this program decrement data of current address by 1 (only for addr=03H or 04H). You can decrement ATT value by 1step.

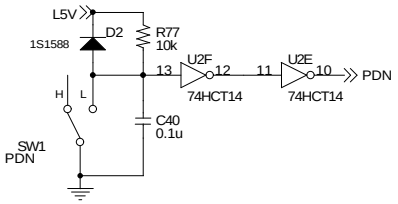
6) If you input “S” or “s”, this program is terminated.

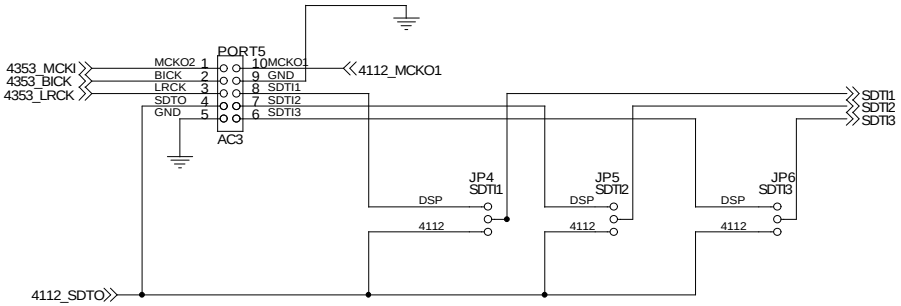

U5
AK4527
SDOS
I2C
SMUTE
BICK
LRCK
SDTI1
SDTI2
SDTI3
SDTO
DAUX
DFS
LOOP1
LOOP0/SDA/CDTI
DIF1/SCL/CCLK
DIF0/CSN
P/SN
MCLK
DZF1
AVSS
AVDD
VREFH
VCOM
DZF2
RIN+
RIN-
LIN+
LIN-
ROUT1
LOUT1
ROUT2
LOUT2
ROUT3
LOUT3
DEM1
DEM0
TVDD
DVDD
DVSS
PDN
ICKS2
ICKS1
ICSK0
CAD1
CAD0
U3
74HCT541
PORT3
uP-I/F
CSN
CCLK
CDTI
CDTO
L5V
R2551
4353_MCKI
4112_MCKO2
R28 (short)
4353_BICK
4353_LRCK
4112_BICK
4112_LRCK
SDTI1
SDTI2
SDTI3
4527_SDTO
R31 (short)
R33 (short)
R34 (short)
R36 (short)
R40 (short)
R41 (short)
AVDD1
C15 10u
C16 2.2u
C17 0.1u
C18 0.1u
DZF1
+3.3V
C30 10u
C31 0.1u
C29 0.1u
C32 10u
PDN
T3
NJM78M05FA
+12V
C27 0.1u
C28 47u
L6 10u
L2 (short)
L3 10u
AVDD2
R45 5.1
TR1
RN2202
(10k,10k)
TR2
RN1202
(10k,10k)
DZF1_A
R13 2.2k
R15 2.2k
R17 2.2k
R18470
R20470
R22470
R16 4.7k
R14 2.4k
R21 4.7k
R19 10k
C19 22u
J3
RIN
R24 (open)
R23 470
C20 1n
R27 470
R26 4.7k
R29 4.7k
C21 47u
C22 0.1u
U4A
U4B
NJM5532
R32 4.7k
R30 2.4k
R37 4.7k
R35 10k
C23 22u
J4
LIN
R39 (open)
R38 470
C24 1n
R43 470
R42 4.7k
R44 4.7k
C25 47u
C26 0.1u
U6A
U6B
R47 10k
TR4
2SC3327
J6
C34 22u
U7B
R51 220
R53 10k
330p C71
R59 4.7K
R57 4.7k
R62 10k
TR7
J9
C37 22u
U9A
R65 220
R68 10k
C72 330p
R74 4.7K
R71 4.7k
R48 10k
TR5
J7
C35 22u
U8A
R52 220
R54 10k
330p C73
R60 4.7K
R58 4.7k
R63 10k
TR8
J10
C38 22u
U9B
R66 220
R69 10k
330p C74
R75 4.7K
R72 4.7k
R46 10k
TR3
J5
C33 22u
U7A
R49 220
R50 10k
330p C75
R56 4.7K
R55 4.7k
R61 10k
TR6
J8
C36 22u
U8B
R64 220
R67 10k
330p C76
R73 4.7K
R70 4.7k
-12V
+5V
Title
AKD4527
Size
A3
Document Number
AK4527
Rev
D
Date:
Tuesday, April 18, 2000
Sheet
1
of
3

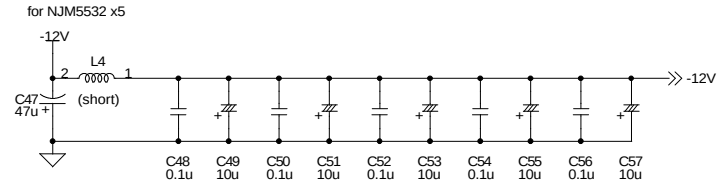


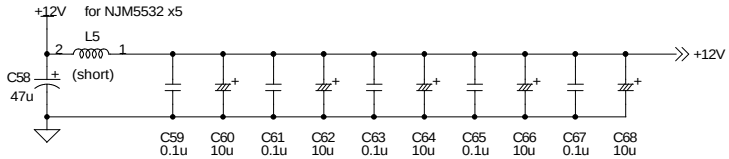
Title	AK4527	
Size: A3	Document Number: AK4112	Rev: D
Date: Tuesday, April 18, 2000	Sheet 2 of 3	

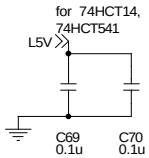




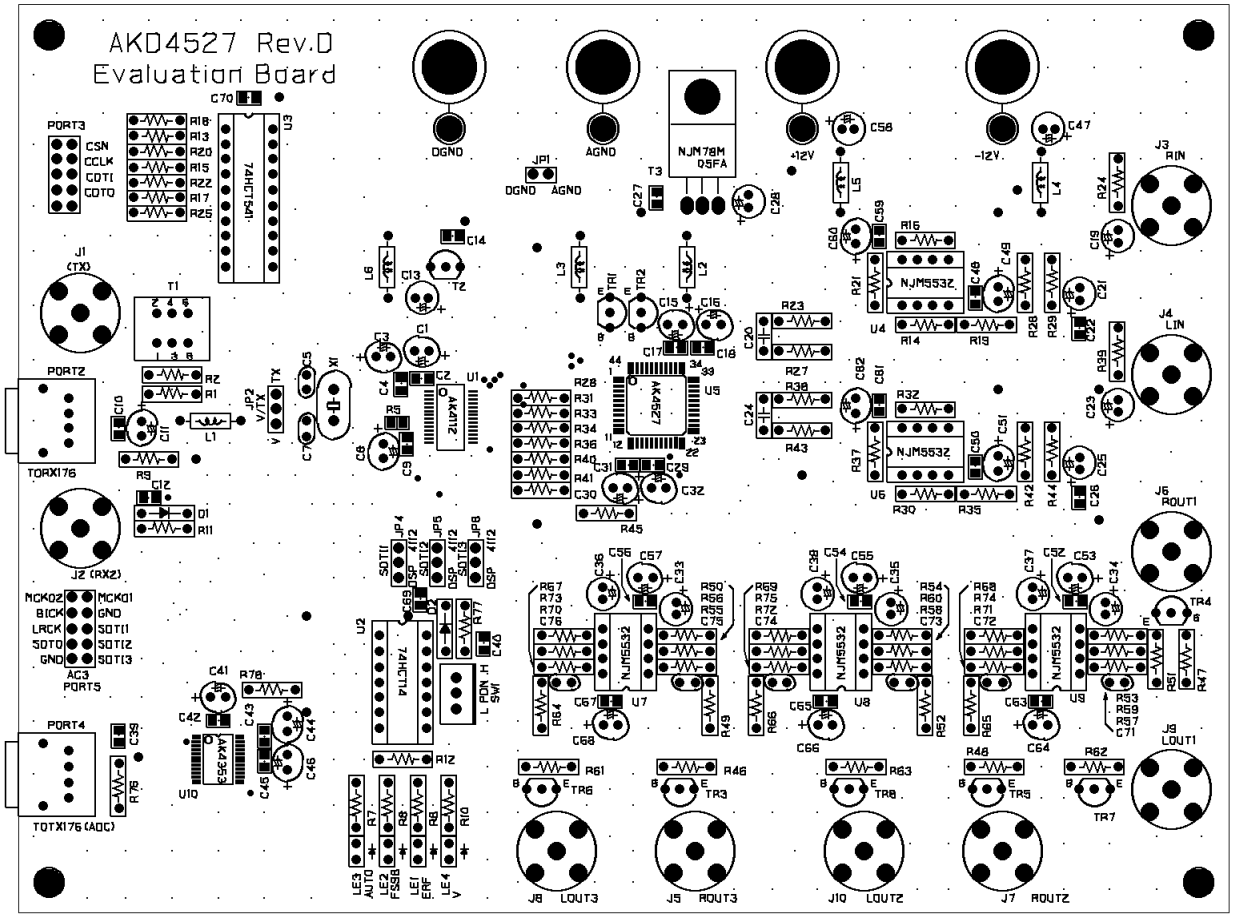




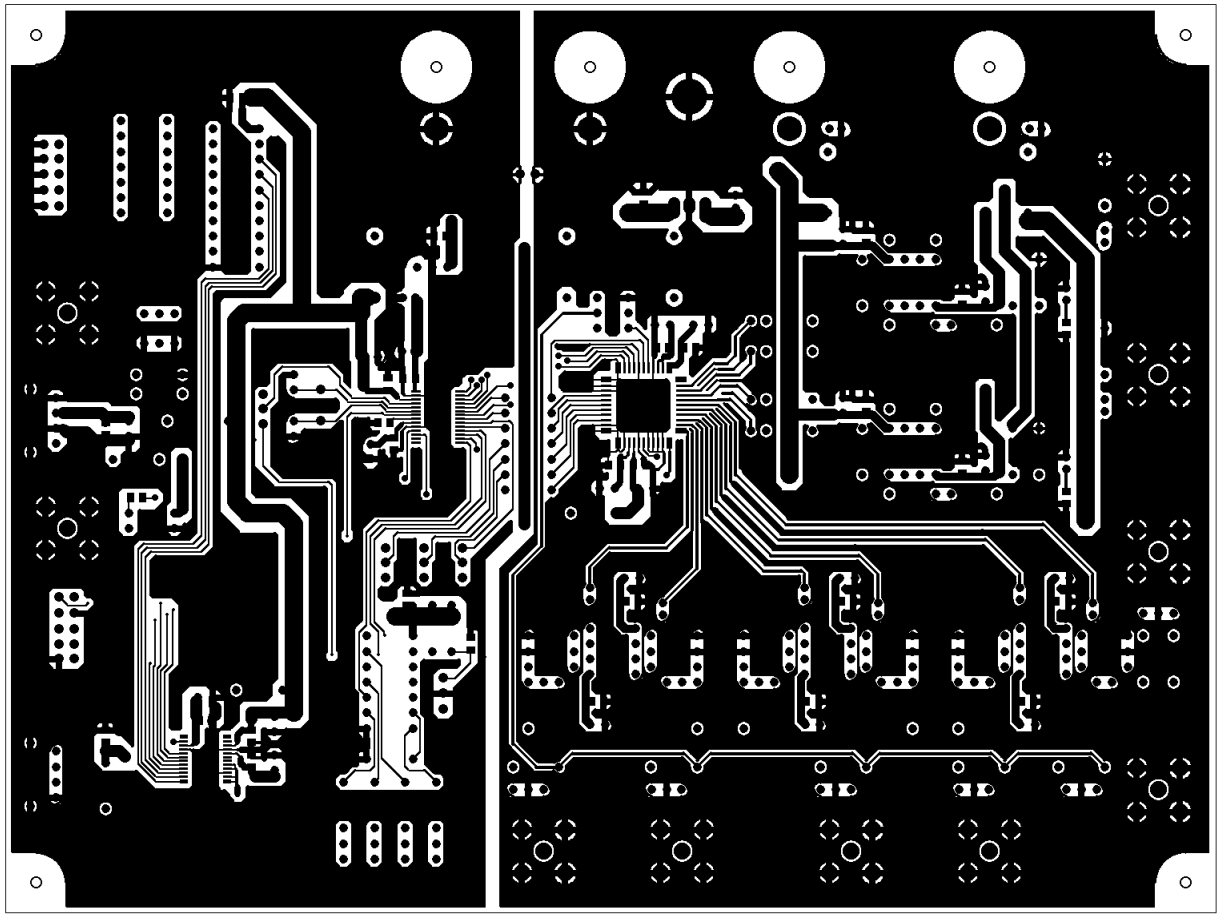




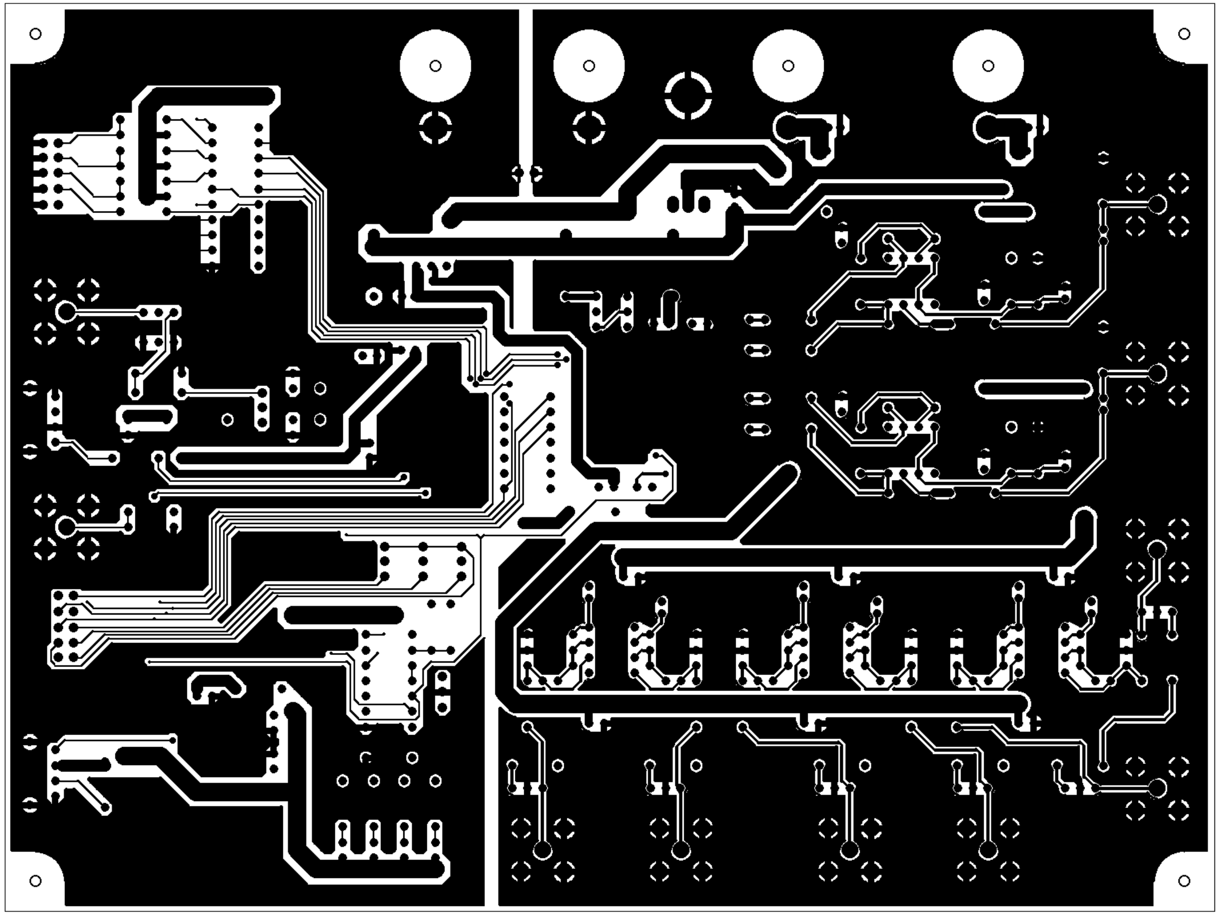
Title	AKD4527	
Size A3	Document Number Interface	Rev D
Date: Wednesday, April 19, 2000	Sheet 3 of 3	



L1 部品面　　レジスト シルク AKD4527 Rev.D



L1 部品面 パターン　　AKD4527 Rev.D



L2 半田面 パターン　　AKD4527 Rev.D