AKM

AKD4356
Evaluation board Rev.B for AK4356

GENERAL DESCRIPTION

The AKD4356 is an evaluation board for AK4356, the 24bit 6ch D/A converter for DVD-audio. The AKD4356 has the interface with AKM's wave generator using ROM data and with AKM's A/D converter evaluation boards. Therefore, it is easy to evaluate the AK4356. The AKD4356 also has the digital audio interface and can achieve the interface with digital audio systems via opt-connector or RCA connector.

■ **Ordering guide**

AKD4356 --- Evaluation board for AK4356
(Cable for connecting with printer port of IBM-AT compatible PC
and control software are packed with this.)

FUNCTION

- **On-board 2nd order LPF**
- **On-board clock generator**
- **Compatible with 3 types of interface**
    - **Direct interface with AKM's A/D converter evaluation boards
      and direct interface with AKM's signal generator(AKD43XX) by 10pin header**
    - **On-board CS8414 as DIR which accepts optical input**
    - **Direct interface with AC3 decoder by 10pin header**
- **BNC connector for an external clock input**
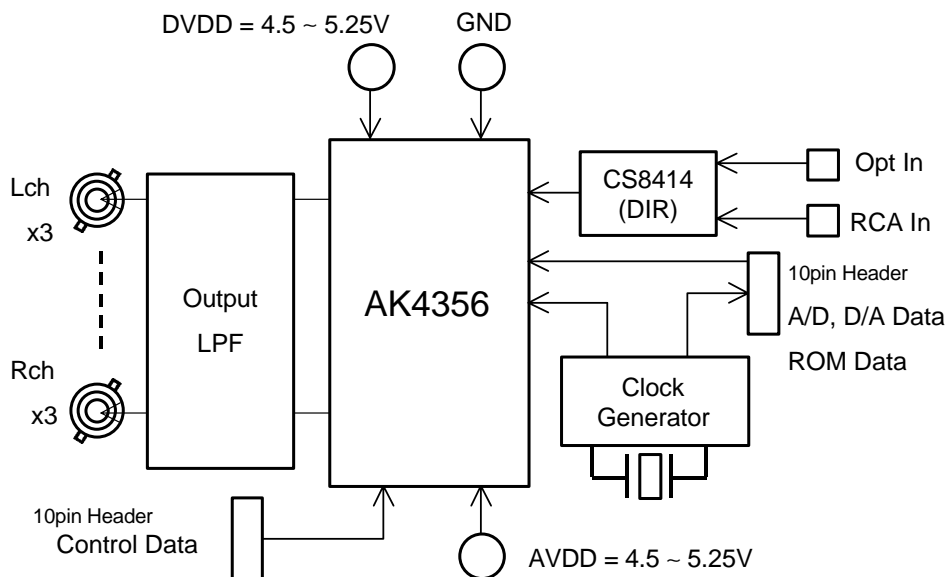- **10pin header for serial control interface**

Figure 1. AKD4356 Block Diagram

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

■ External analog circuit

The 2nd order LPF (fc=93.2kHz, Q=0.712) which adds differential outputs of AK4356 is implemented on the board. When the further attenuation of the out-band noise is needed, some additional LPF is required. Analog signal is output through BNC connectors on the board. And the output level of AK4356 is 5.5Vpp@5V.
The AK4356 detects input signal "zero" conditions and assert high on DZFL/DZFR pins. As shown on Figure 2, analog output is muted externally with this signal.
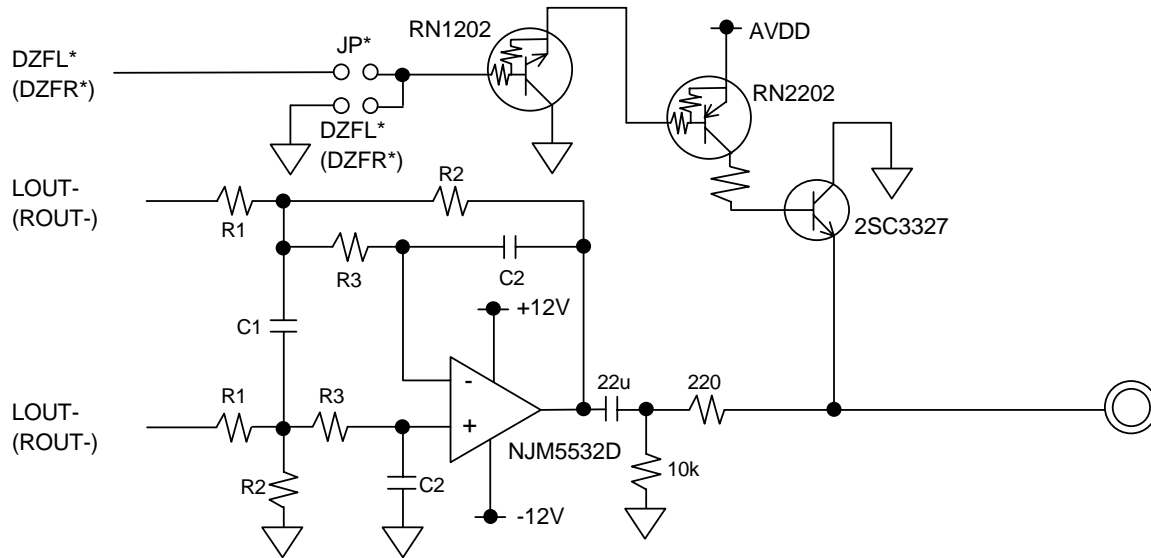

Figure 2. On-board analog filter

R1	R2	R3	C1	C2
4.7k	4.7k	200	3300p	470p

Table 1. The value of R,C on this board

fin	20kHz	40kHz	80kHz
Frequency Response	-0.004dB	-0.123dB	-1.823dB

Table 2. Frequency Response of LPF

<Calculation>

$$f_C = \frac{\omega_0}{2\pi},$$

$$\omega_0 = \frac{1}{\sqrt{2*C1*C2*R2*R3}},$$

$$Q = \frac{2*C1*\omega_0}{\frac{1}{R1}+\frac{1}{R2}+\frac{1}{R3}}.$$

■ **Operation sequence**

1) Set up the power supply lines.

        [AVDD] (orange)   = 4.5~5.25V
        [DVDD] (orange)   = 4.5~5.25V
        [VD]   (red)   = 3.4~5.0V
        [VP+]   (green) = +12V~+15V
        [VP-]   (blue)   = -12V~-12V
        [AGND] (black) = 0V
        [DGND] (black) = 0V

        Each supply line should be distributed from the power supply unit.

2) Set-up the evaluation modes, jumper pins and DIP switches (See the followings.)

3) Power on.
        The AK4356 should be reset once bringing SW1(-PD) "L" upon power-up.

■ **Evaluation mode**

Applicable evaluation modes
        1) DIR (Optical Link and RCA) (default)
        2) Using ROM data (AK43XX)
        3) Using AKM's evaluation board for ADC
        4) Feeding all signals from external

1) DIR (Optical Link and RCA) <default>
PORT4(TORX174) or J1(RCA) is used. All clock are supplied from CS8414(DIR). DIR generates MCLK, BICK, LRCK and SDATA from the received data through optical connector (TORX174) or RCA connector. Used for the evaluation using CD test disk. Nothing should be connected to PORT2,3. In case of using optical connector (TORX174), select "OPT" on JP17(RCA/OPT). In case of using RCA connector, select "RCA".
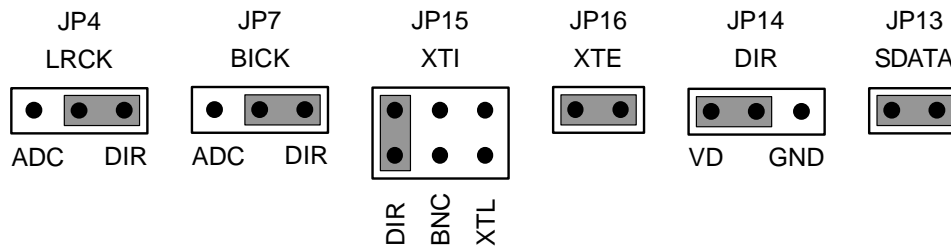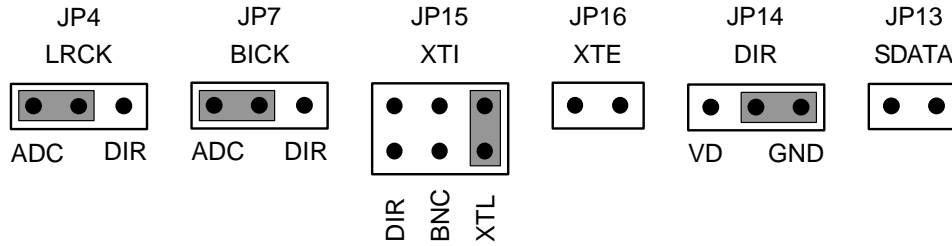

2) Ideal sine wave generated by ROM data
Connect the AKD43XX with PORT3(AD/ROM). AKD4356 sends MCLK to AKD43XX, and receives LRCK, BICK and SDATA. In case of using external master clock through a BNC connector, select "BNC" on JP15(XTI) and short JP16(XTE).
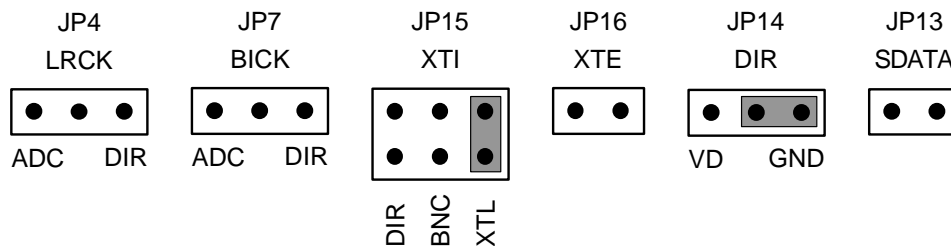
3) Using AKM's evaluation board for ADC
To evaluate AK4356 with analog input, the AKM's evaluation board for ADC can be used. MCLK, BICK and LRCK are supplied from clock generator on the AKD4356, and analog signal is A/D converted and send to AKD4356 through PORT3(AD/ROM). In case of using external master clock through a BNC connector, select "BNC" on JP15(XTI) and short JP16(XTE).

JP4	JP7	JP15	JP16	JP14	JP13
LRCK	BICK	XTI	XTE	DIR	SDATA

ADC   DIR   ADC   DIR   VD   GND

DIR BNC XTL

4) Feeding all signals from external
Under the following set-up, all external signals can be fed through POTR3.

JP4	JP7	JP15	JP16	JP14	JP13
LRCK	BICK	XTI	XTE	DIR	SDATA

ADC   DIR   ADC   DIR   VD   GND

DIR BNC XTL
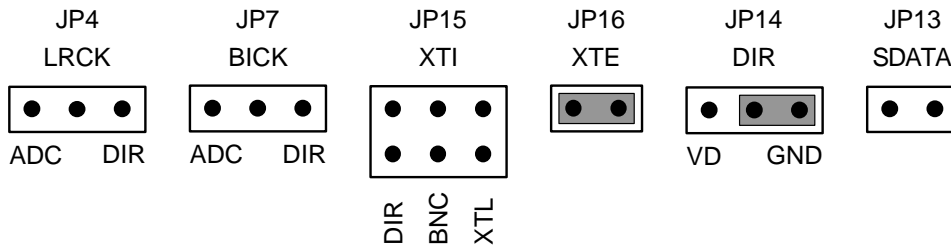
◼ BICK frequency

[JP9]: When BICK is fed from 74HC4040 on board, it's frequency is selected with JP9.
       128fs: BICK = 128fs
       64fs: BICK = 64fs (Figure 3)
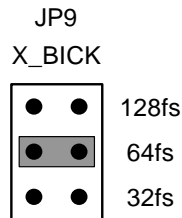   32fs: BICK = 32fs

JP9
X_BICK

128fs
64fs
32fs

Figure 3. BICK frequency

■ **DIP switch set up**

Upper side is "ON"("H"), lower side is "OFF"("L").

[SW3](MODE1): No.1 to 5 set the mode of AK4356 and No.6 to 8 set the mode of CS8412.

No.	Pin	OFF	ON
1	CAD1	Chip address (2bit)	
2	CAD0	<default="00">	
3	DIF0	Digital interface format of AK4356	
4	DIF1	(See table 2.)	
5	DIF2		
6	M2	Digital interface format of CS8414	
7	M1	(See table 2.)	
8	M0	(Note)	

Table 3. SW3 set-up

(Note: M2-0 should be selected at only evaluation mode 1.
In other mode, these should be "OFF".)

		3	4	5	6	7	8	JP6	
Mode	Format	DIF0	DIF1	DIF2	M2	M1	M0	BICK2	
0	16bit, LSB justified	0	0	0	1	0	1	THR	
1	20bit, LSB justified	1	0	0	-	-	-	-	
2	24bit, MSB justified	0	1	0	0	0	0	INV	
3	I2S	1	1	0	0	1	0	THR	default
4	24bit, LSB justified	0	0	1	-	-	-	-	

Table 4. Digital interface format set-up (1=ON, 0=OFF)
(CS8414 does not correspond to 20/24bit LSB justified format.)

[SW4](MODE2): Set the mode of AK4356.

No.	Pin	OFF <default>	ON
1	DFS0	Normal speed	Double speed
2	DZFE	Zero detect disable	Zero detect enable
3	CKS2	Clock select	
4	CKS1	(See the datasheet of AK4356.	
5	CKS0	JP5 and 8 should be selected as table 4.)	

Table 5. SW4 set-up

[JP5, 8]: Set the dividing rate corresponding to CKS2-0. This set up is needed only for the evaluation mode 3.

	JP5	JP8
Mode	FS2	FS1
128fs	x1/2	x1
256fs	x1	x1
512fs	x1	x2

Table 6. JP5 and 8 set up
(For 192fs/384fs/768fs mode, use the external divider.)

■ **Other jumpers set up**

[JP1](GND): Analog ground and digital ground
    Open: Separated <default>
    Short: Common (The connector "DGND" can be open.)

[JP2](DVDD): DVDD of AK4356
    DVDD: Independent of AVDD <default>
    AVDD: Same as AVDD (The connector "DVDD" can be open.)

[JP3](REG): AVDD of AK4356
    Open: Supplied from "AVDD" connector
    Short: Supplied from the regulator (The connector "AVDD" should be open.)

[JP10-12](SDTI1-3): SDTI of AK4356
    DATA: Serial data <default>
    GND: "0" data

■ **The function of the toggle SW**
    Upper-side is "H" and lower-side is "L".

    [SW1](-PD):   Resets the AK4356. Keep "H" during normal operation.
    [SW2](SMUTE): Soft mute of AK4356. Bring "H" when using soft mute.

■ **The indication content for LED**

    [D2] (VERF):   Monitors VERF pin of the CS8414. LED turns on when some error has occurred to CS8414.
    [D3] (PREM): Indicates whether the input data is pre-emphasized or not. LED turns on when the data is pre-emphasized.

■ **Serial control mode**

    The AK4356 can be controlled via the printer port (parallel port) of IBM-AT compatible PC. Connect PORT1(CR-I/F) with PC by 10-line flat cable packed with the AKD4356.

    Chip address can be selected by SW3(MODE1)-No.1(CAD1) and No.2(CAD0).

    Take care of the direction of connector. There is a mark at 1pin.
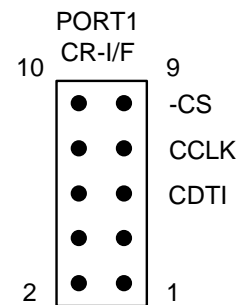   The pin layout of PORT1 is as Figure 4.

PORT1
CR-I/F

Figure 4. PORT1 pin layout

■ **Interface with AC3 decoder**

    PORT2(AC3) is used for interface with AC3 decoder.
    MCLK, BICK, LRCK and 3-line serial data can be input from the decoder via PORT2.
    Pin layout of PORT2 is as Figure5.

    In this case, JP4(LRCK), JP7(BICK), JP15(XTI), JP16(XTE), JP14(DIR) and JP13(SDATA) should be set up as evaluation mode 4.
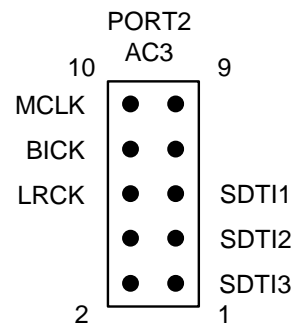
PORT2
AC3

Figure 5. PORT2 pin layout

MEASUREMENT RESULTS

[Measurement condition]
- Measurement unit   : ROHDE & SCHWARZ, UPD04
- MCLK   : 256fs
- BICK   : 64fs
- fs   : 44.1kHz, 96kHz, 192kHz
- BW   : 20Hz~20kHz (fs=44.1kHz), 20Hz~40kHz (fs=96kHz), 20Hz~80kHz (fs=192kHz)
- Bit   : 24bit
- Power Supply   : AVDD=DVDD=5V
- Interface   : DIR (fs=44.1kHz), Serial Multiplex (fs=96kHz, 192kHz)
- Temperature   : Room

Parameter	Input signal	Measurement filter	fs=44.1kHz
S/(N+D)	1kHz, 0dB	20kLPF	97.5dB
DR	1kHz, -60dB	20kLPF	110.0dB
		20kLPF, A-weighted	113.2dB
S/N	no signal	20kLPF	110.1dB
		20kLPF, A-weighted	113.5dB

Parameter	Input signal	Measurement filter	fs=96kHz
S/(N+D)	1kHz, 0dB	40kLPF	94.4dB
DR	1kHz, -60dB	40kLPF	106.2dB
		20kLPF, A-weighted	112.3dB
S/N	no signal	40kLPF	106.4dB
		20kLPF, A-weighted	112.8dB

Parameter	Input signal	Measurement filter	fs=192kHz
S/(N+D)	1kHz, 0dB	80kLPF	90.0dB
DR	1kHz, -60dB	80kLPF	92.6dB
		20kLPF, A-weighted	112.8dB
S/N	no signal	80kLPF	93.3dB
		20kLPF, A-weighted	112.8dB

[Measurement condition]
- Measurement unit   : Audio Precision, System two, Cascade
- MCLK   : 256fs
- BICK   : 64fs
- fs   : 44.1kHz
- BW   : 20Hz~20kHz
- Bit   : 24bit
- Power Supply   : AVDD=DVDD=5V
- Interface   : DIR
- Temperature   : Room

Parameter	Input signal	Measurement filter	Results
S/(N+D)	1kHz, 0dB	20kLPF	98.8dB
DR	1kHz, -60dB	22kLPF, A-weighted	112.2dB
S/N	no signal	22kLPF, A-weighted	112.6dB

■ **Plots**

[Measurement condition]
- Measurement unit   : Audio Precision, System two, Cascade (fs=48kHz),
  ROHDE & SCHWARZ, UPD04 (fs=96kHz)
- MCLK   : 256fs
- BICK   : 64fs
- fs   : 44.1kHz, 96kHz, 192kHz
- BW   : 20Hz~20kHz (fs=44.1kHz), 20Hz~40kHz (fs=96kHz), 20Hz~80kHz (fs=192kHz)
- Bit   : 24bit
- Power Supply   : VA=VD=5V
- Interface   : DIR (fs=48kHz, 96kHz), Serial Multiplex (fs=192kHz)
- Temperature   : Room

fs=44.1kHz
   Figure 6. THD+N vs Input Level (fin=1kHz)
   Figure 7. THD+N vs fin (0dBFS input)
   Figure 8. Linearity (fin=1kHz)
   Figure 9. Frequency Response (0dBFS input)
   Figure 10. Cross-talk (0dBFS input)
   Figure 11. FFT (1kHz, 0dBFS input)
   Figure 12. FFT (1kHz, -60dBFS input)
   Figure 13. FFT (noise floor)
   Figure 14. FFT (outband noise)
fs=96kHz
   Figure 15. THD+N vs Input Level (fin=1kHz)
   Figure 16. THD+N vs fin (0dBFS input)
   Figure 17. Linearity (fin=1kHz)
   Figure 18. Frequency Response (0dBFS input)
fs=192kHz
   Figure 19. THD+N vs Input Level (fin=1kHz)
   Figure 20. THD+N vs fin (0dBFS input)
   Figure 21. Linearity (fin=1kHz)
   Figure 22. Frequency Response (0dBFS input)

AKM   AK4356 THD+N vs Input Level (fs=44.1kHz, fin=1kHz)
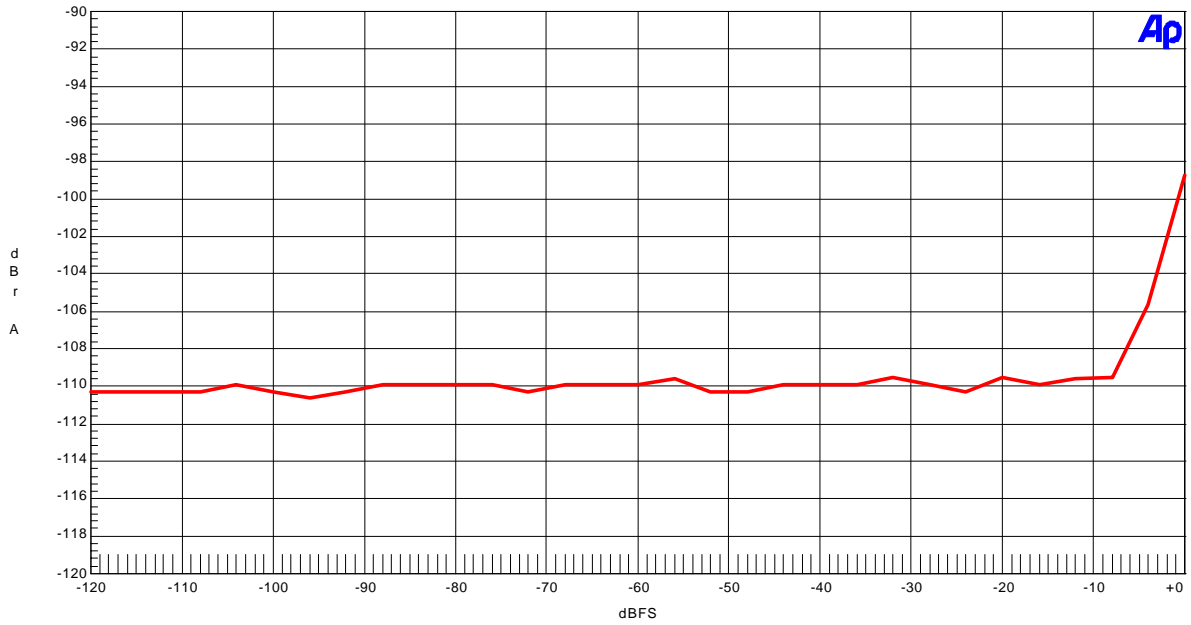
Figure 6. THD+N vs Input Level (fs=44.1kHz; fin=1kHz)

AKM   AK4356 THD+N vs fin (fs=44.1kHz, 0dBFS input)
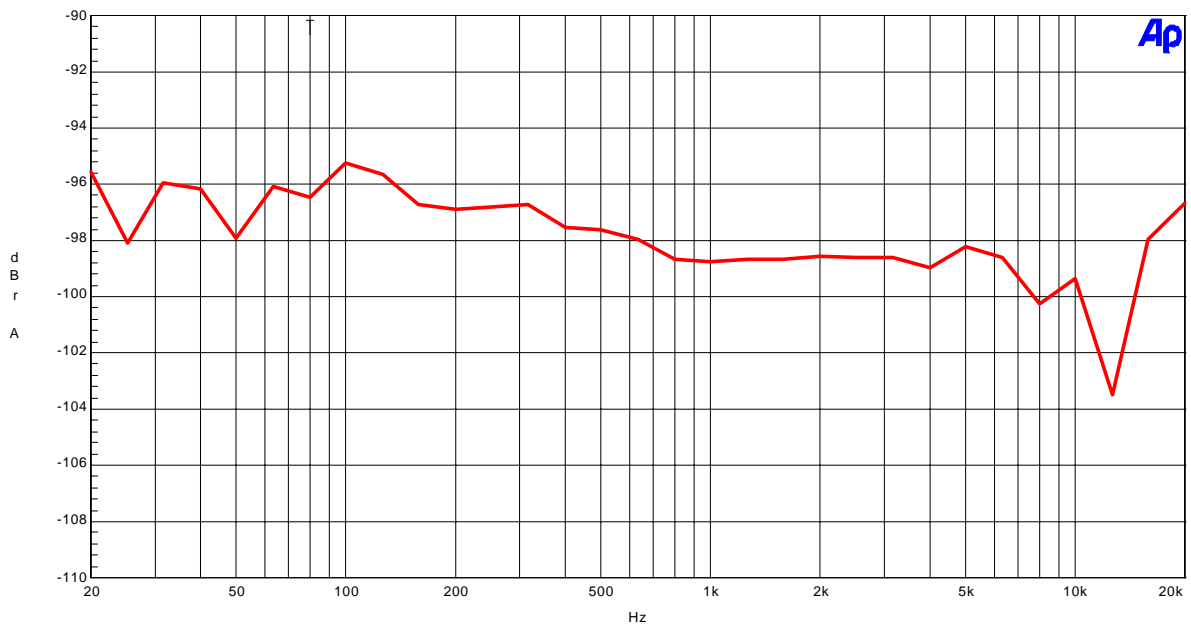
Figure 7. THD+N vs fin (fs=44.1kHz; 0dBFS input)

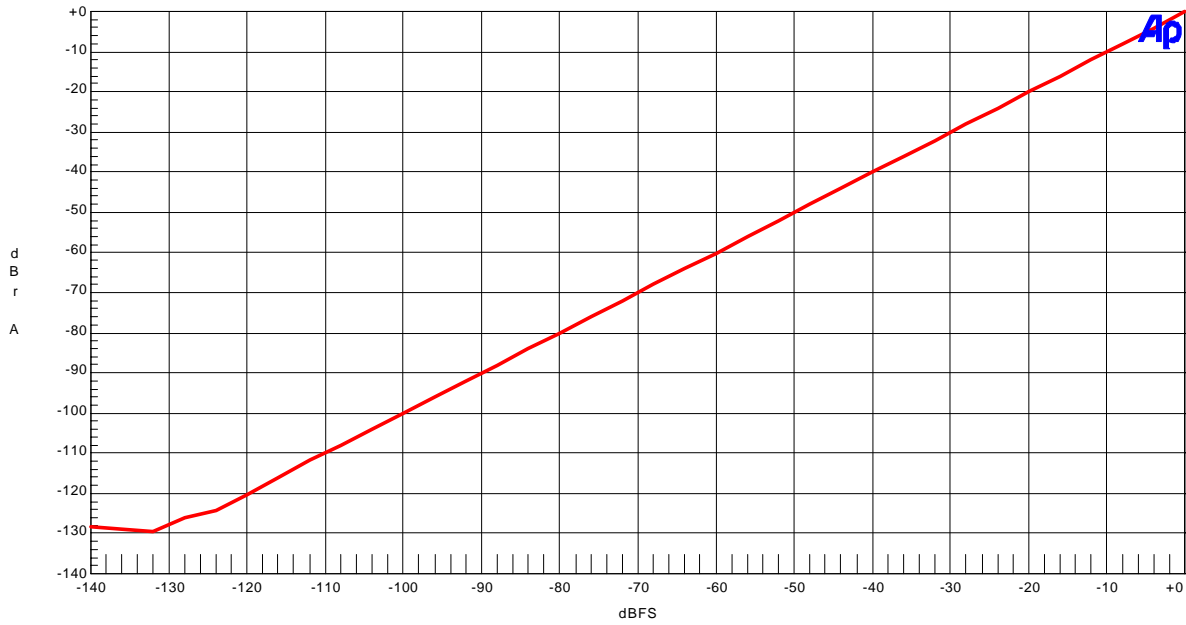AKM   AK4356 Linearity (fs=44.1kHz, fin=1kHz)

Figure 8. Linearity (fs=44.1kHz; fin=1kHz)
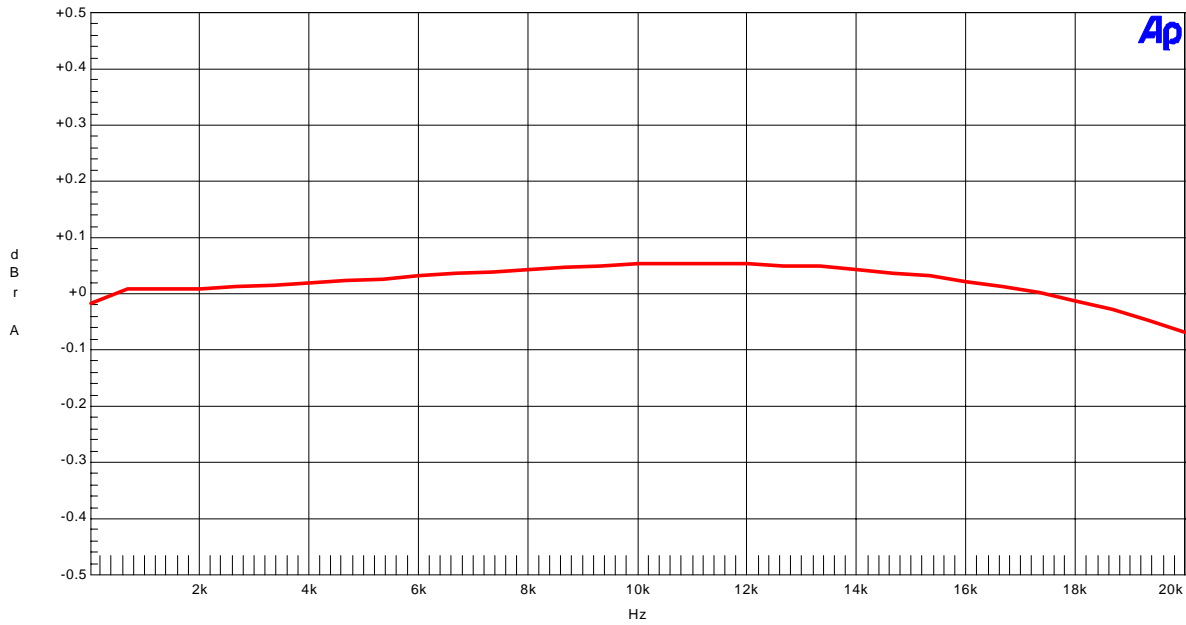
AKM   AK4356 Frequency Response (fs=44.1kHz, 0dBFS input)

Figure 9. Frequency Response (fs=44.1kHz; 0dBFS input)
* including output 2nd order LPF Response

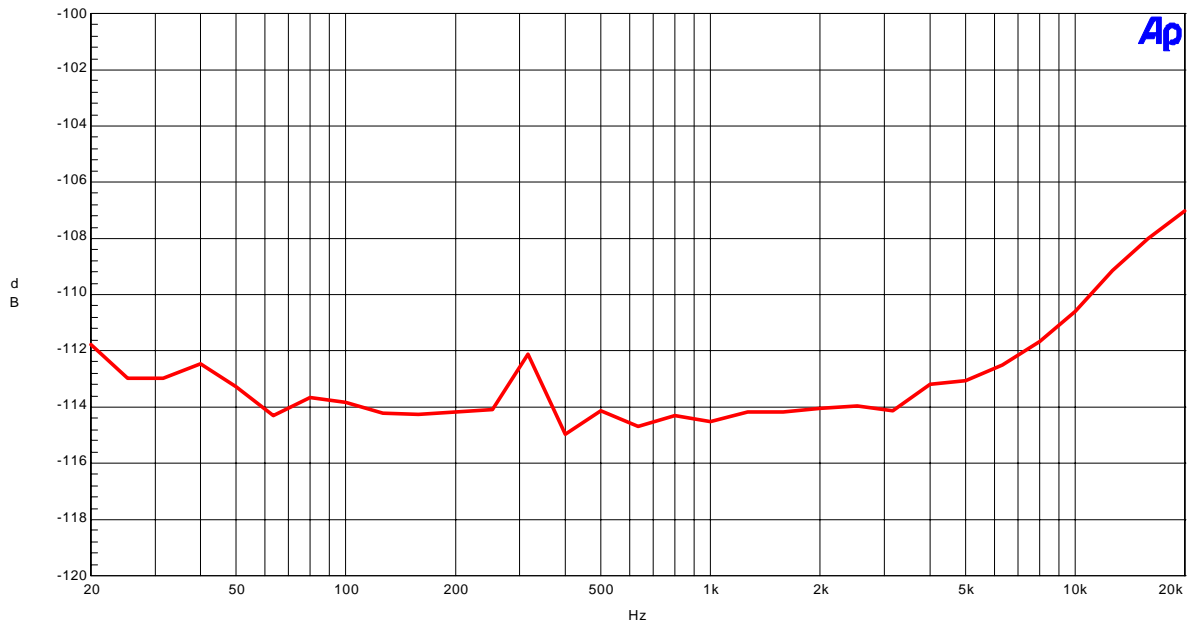AKM   AK4356 Cross-talk (fs=44.1kHz, 0dBFS input)

Figure 10. Cross-talk (fs=44.1kHz; 0dBFS input)

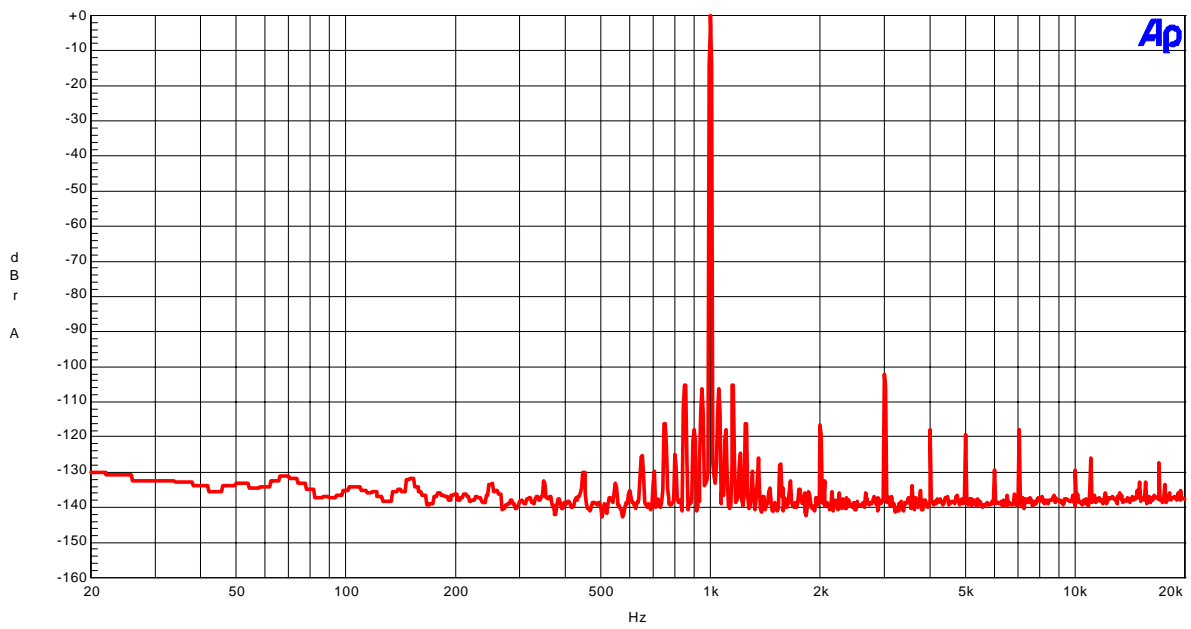AKM   AK4356 FFT (fs=44.1kHz; 1kHz, 0dBFS input)

Figure 11. FFT (fs=44.1kHz; 1kHz, 0dBFS input)
FFT point=16384, Avg=8

ASAHI KASEI   [AKD4356]

AKM   AK4356 FFT (fs=44.1kHz; 1kHz, -60dBFS input)
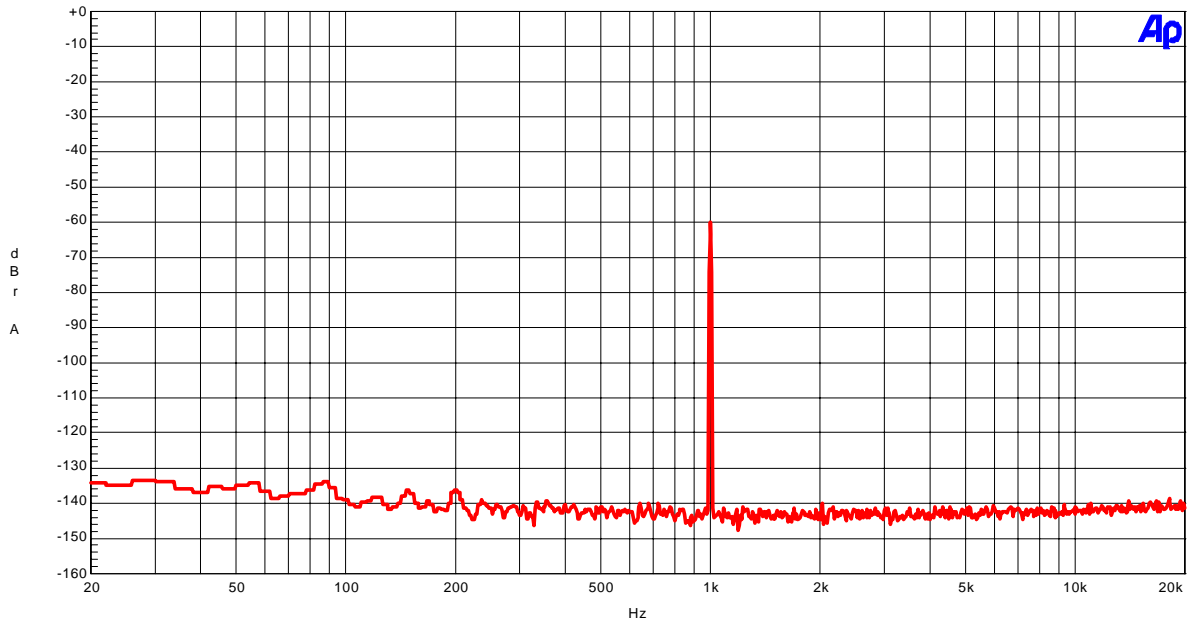

Figure 12. FFT (fs=44.1kHz; 1kHz, -60dBFS input)
FFT point=16384, Avg=8

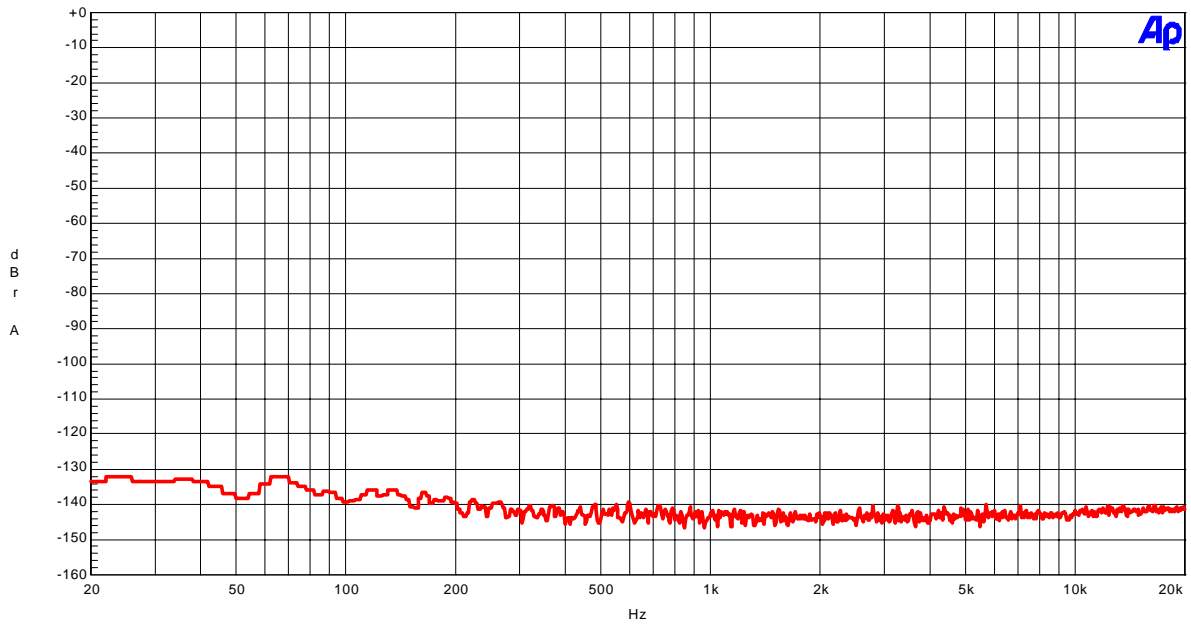AKM   AK4356 FFT (noise floor; fs=44.1kHz, no signal input)

Figure 13. FFT (noise floor: fs=44.1kHz; no signal input)
FFT point=16384, Avg=8
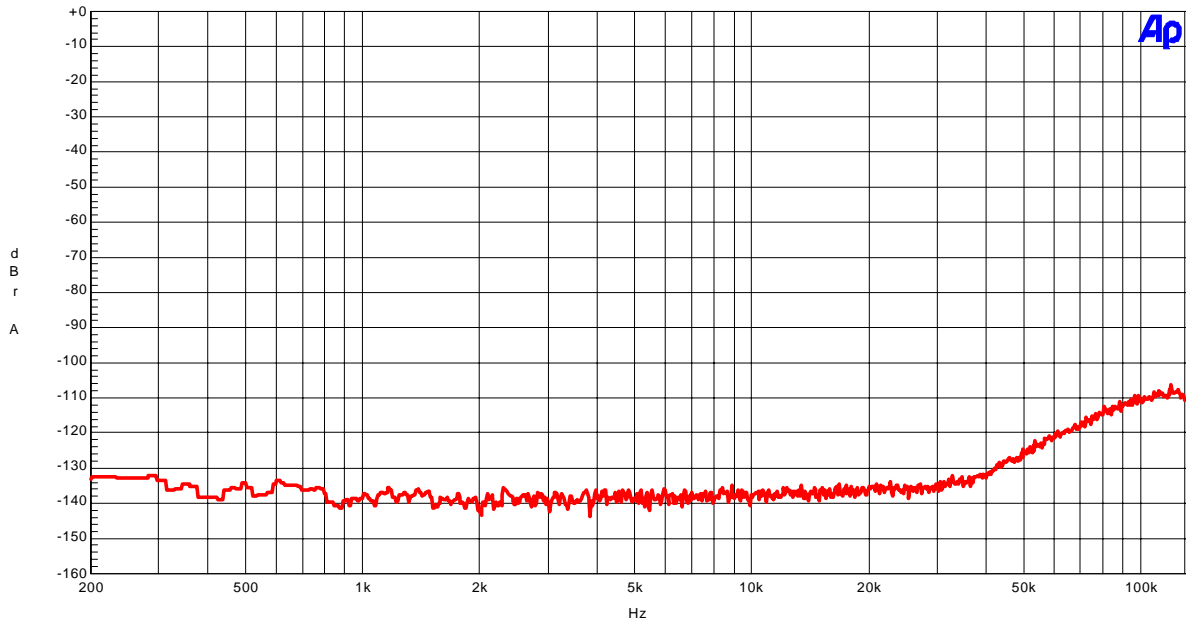
Figure 14. FFT (outband noise: fs=44.1kHz; no signal input)
FFT point=16384, Avg=8

AKM   AK4356 THD+N vs Input Level (fs=96kHz, fin=1kHz)
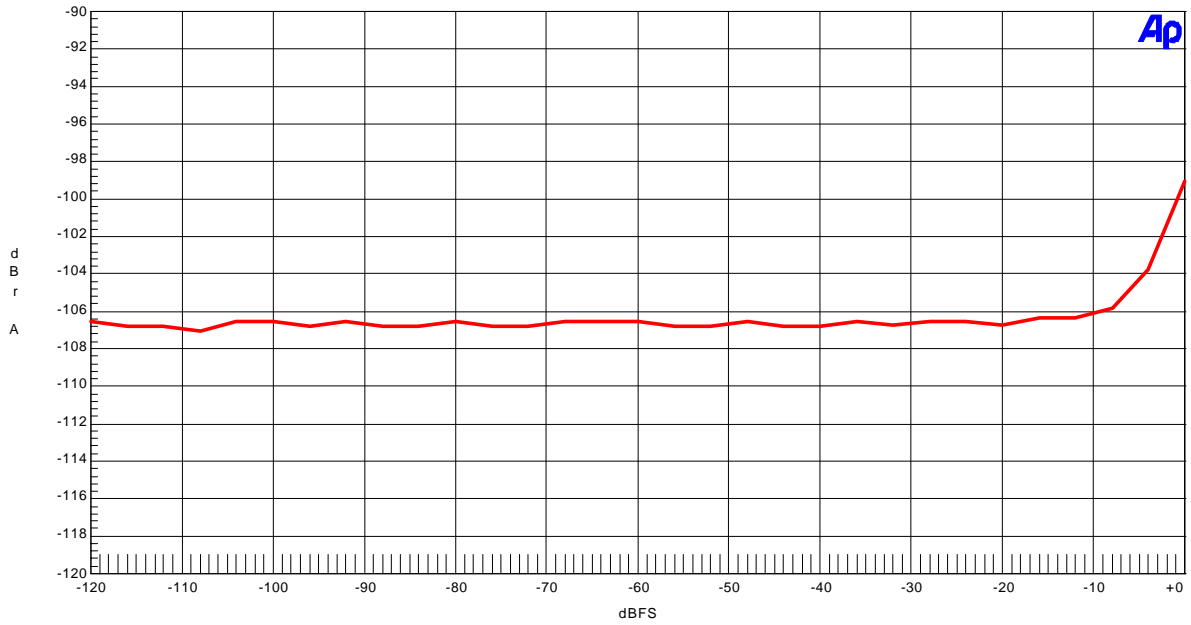
Figure 15. THD+N vs Input Level (fs=96kHz; fin=1kHz)

AKM   AK4356 THD+N vs fin (fs=96kHz, 0dBFS input)

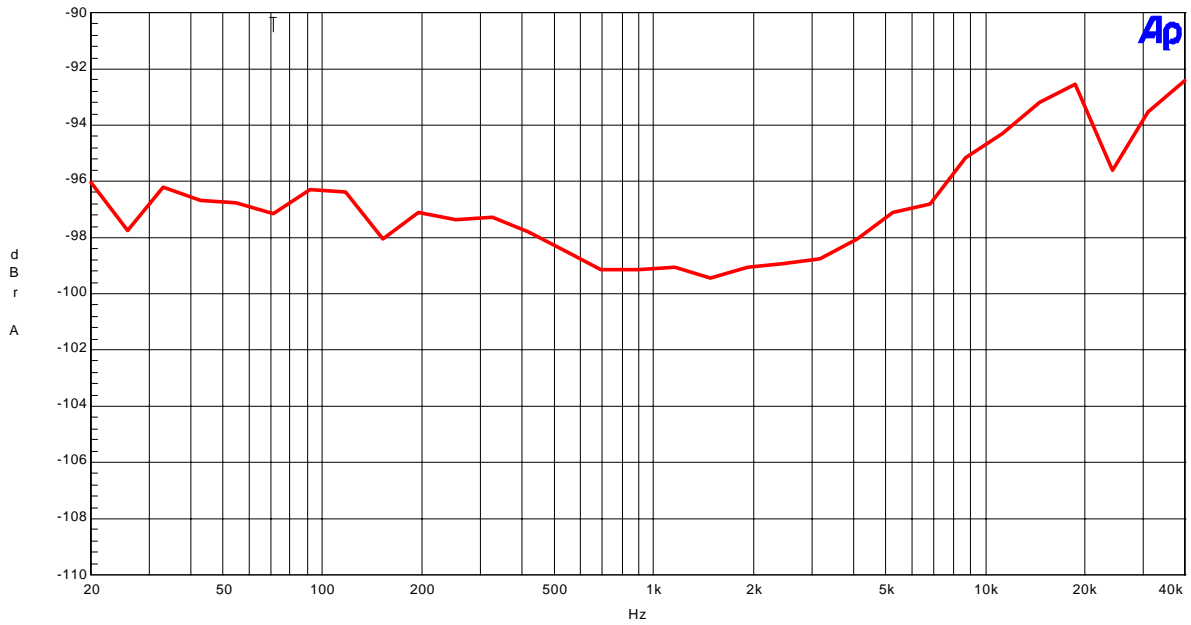Figure 16. THD+N vs fin (fs=96kHz; 0dBFS input)

AKM   AK4356 Linearity (fs=96kHz, fin=1kHz)

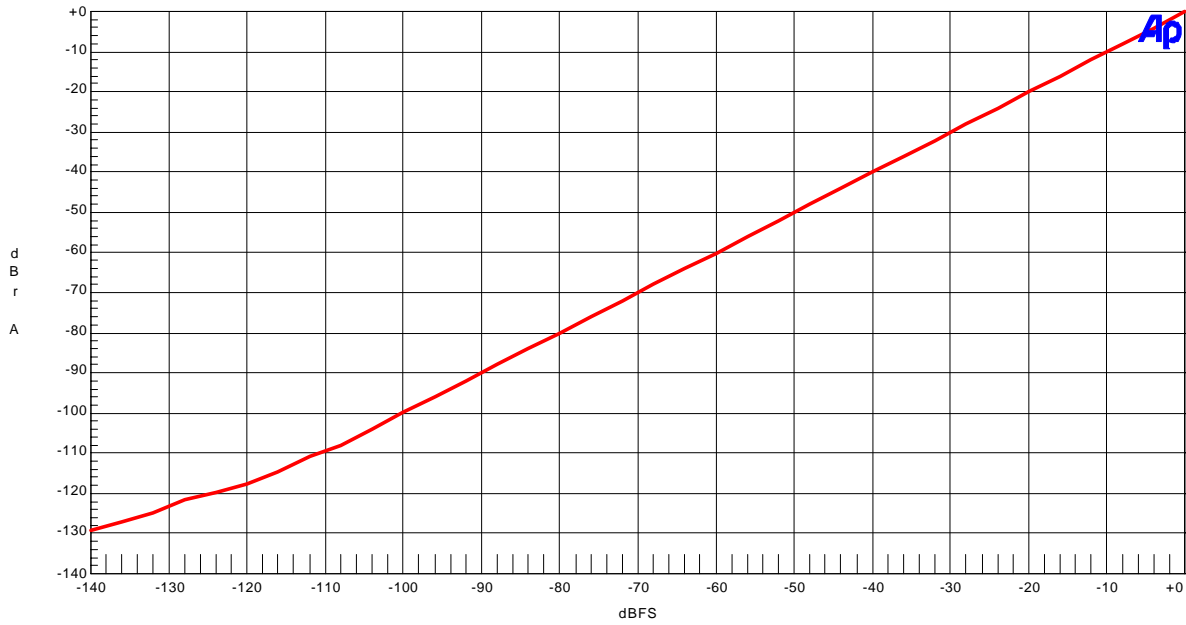

Figure 17. Linearity (fs=96kHz; fin=1kHz)

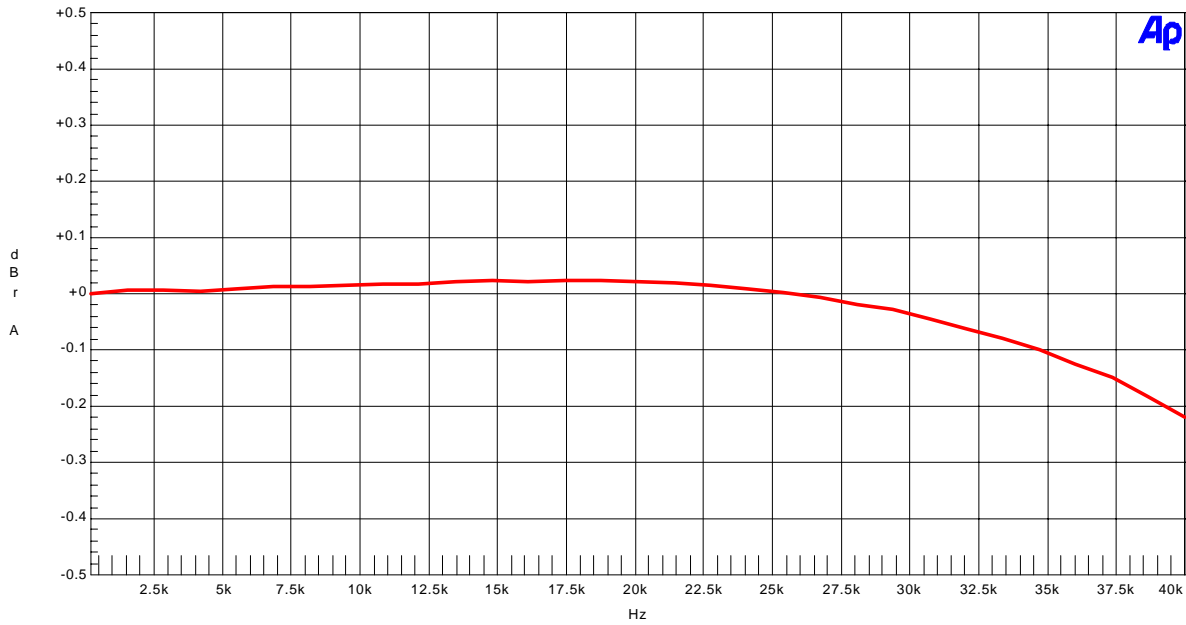AKM   AK4356 Frequency Response (fs=96kHz, 0dBFS input)

Figure 18. Frequency Response (fs=96kHz; 0dBFS input)
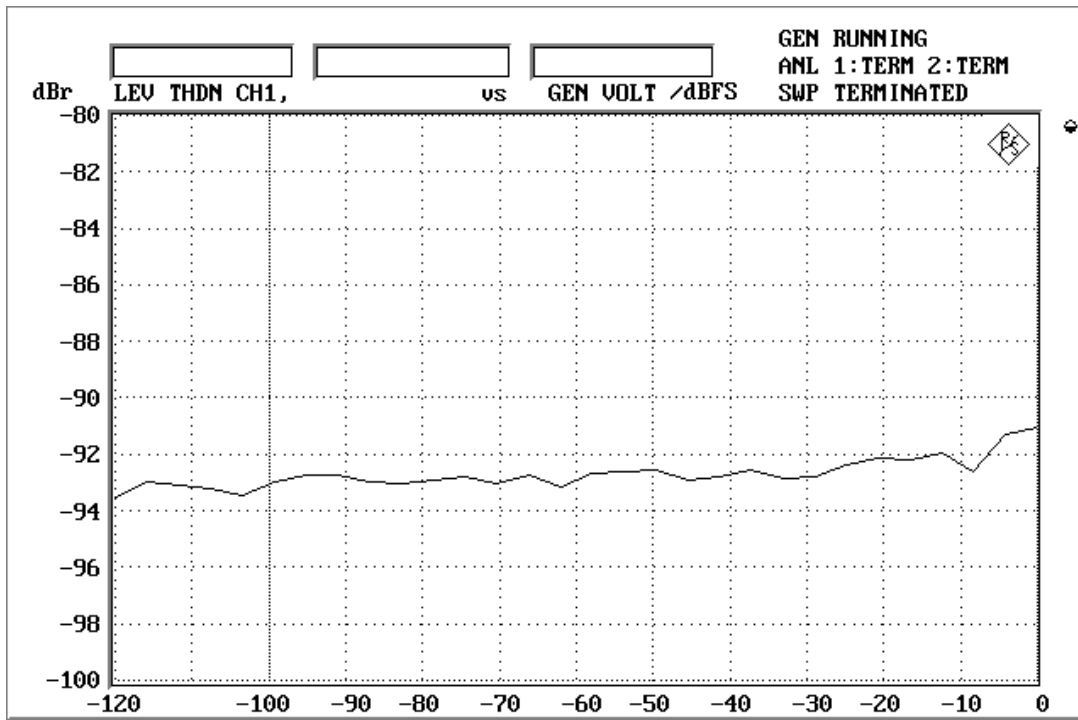including external 2nd order LPF response

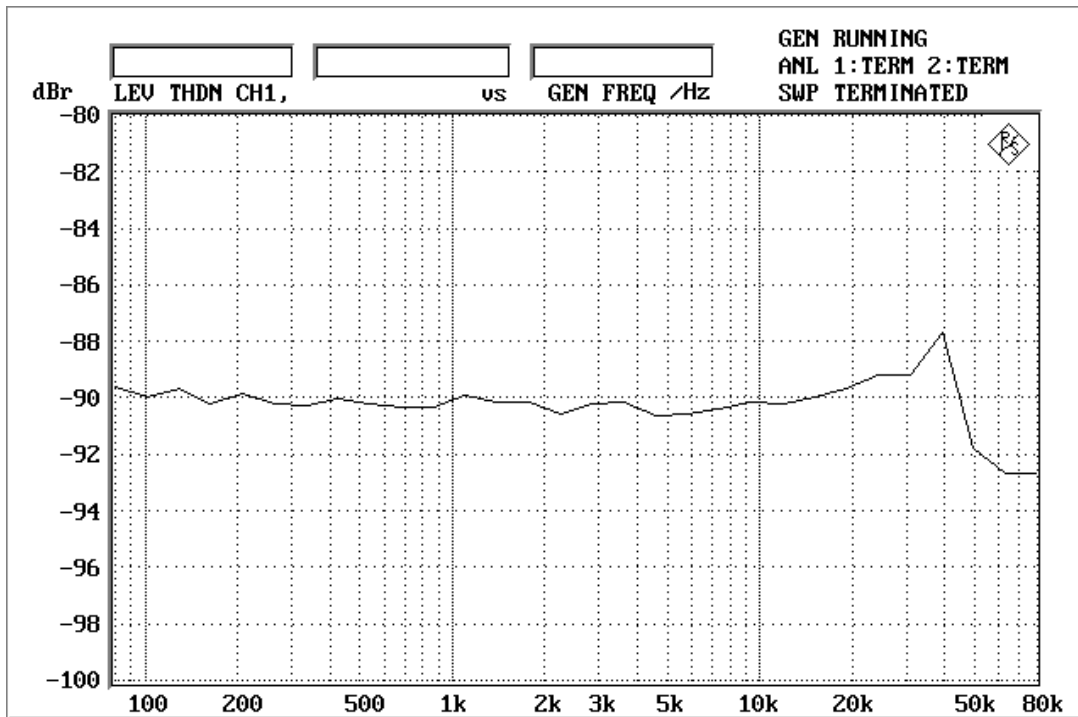Figure 19. THD+N vs Input Level (fs=192kHz; fin=1kHz)

Figure 20. THD+N vs fin (fs=192kHz; 0dBFS input)
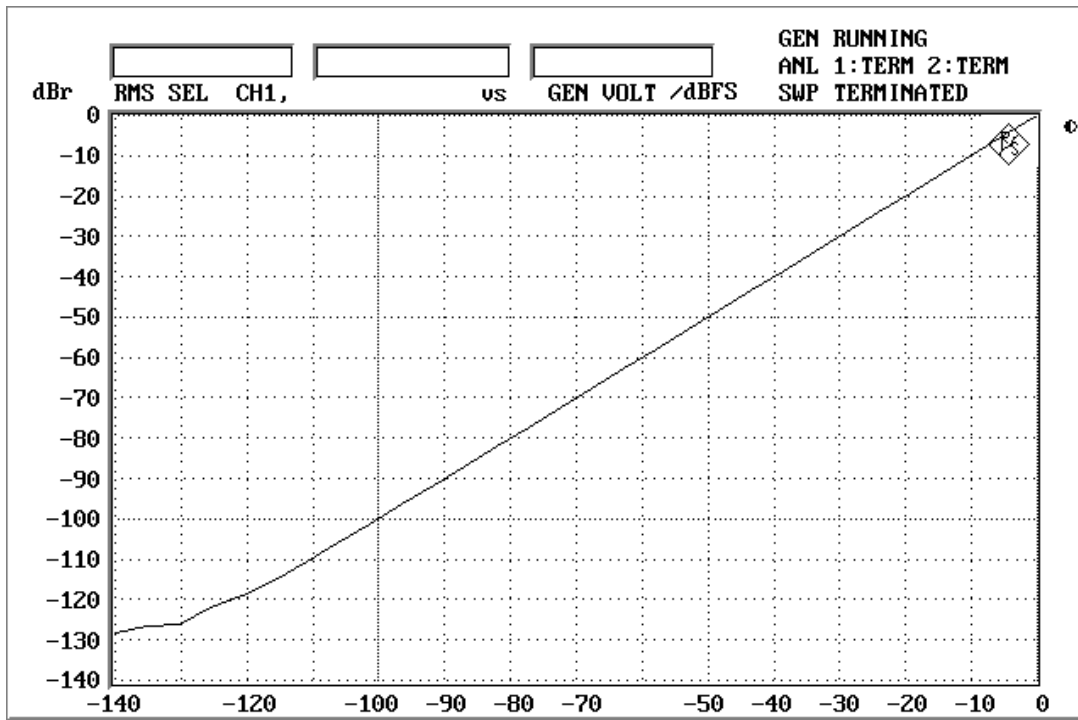
Figure 21. Linearity (fs=192kHz; fin=1kHz)
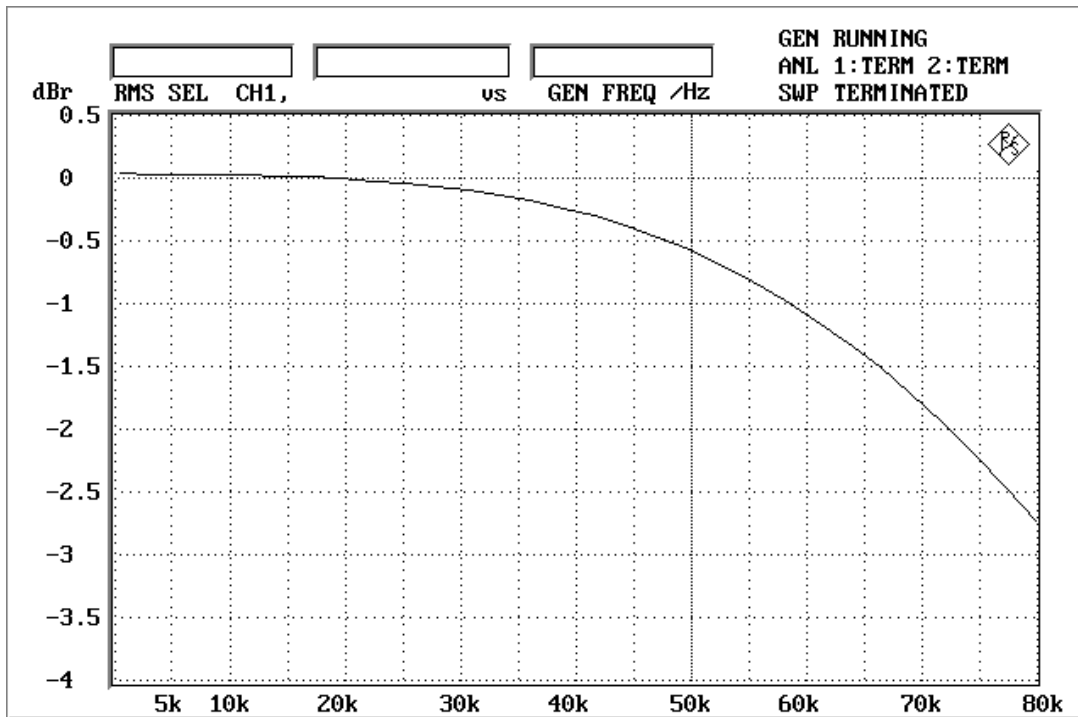
Figure 22. Frequency Response (fs=192kHz; 0dBFS input)
* including external 2nd order LPF response

AKD4356 Control Program ver 1.0 operation manual

1. Connect IBM-AT compatible PC with AKD4356 by 10-line type flat cable (packed with AKD4356).
  Take care of the direction of 10pin Header (Refer to manual of AKD4356).
2. Start up "WINDOWS 95" or "WINDOWS 98".
3. Insert the floppy-disk labeled "AKD4356 Control Program ver 1.0" 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 "ak4356".
7. Then follow the displayed comment (See the following).


```
=================== <<Operating flow>> ===================
 Input Chip Address (2bit)
 Write data/ Display register map/ Reset etc.     loop
=========================================================
```

At first the following message is displayed:

```
****** AK4356 Control Program ver 1.0 , '99/3 ******
 copyright(c) 1999, Asahi Kasei Microsystems co.,ltd.
               All rights reserved.


 Input Chip Address(CAD1,CAD0) (2 figure, binary) =
```

Input chip address in 2 figures of binary.
Set CAD1 and CAD0 before the AKD4356 is powered up.
When hanging CAD1 and CAD0, set SW1(-PD) "L", then "H" after that.

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

```
CAD1-0=00  ------------------------------------------------------------
 ADDR = 00 : 01 <Control 1> ( 0     SLOW  DZFM  DZFE  DIF2  DIF1  DIF0  RSTN )
 ADDR = 01 : 01 <Control 2> ( 0     0     0     CKS2  CKS1  CKS0  SMUTE RSTN )
 ADDR = 02 : 0F <Speed & PD> ( 0    0     DFS1  DFS0  PW3   PW2   PW1   RSTN )
 ADDR = 03 : 15 <DEM control>( 0    0     DEMC1 DEMC0 DEMB1 DEMB0 DEMA1 DEMA0)
 ADDR = 04 : FF <LOUT1 ATT> ( ATT7  ATT6  ATT5  ATT4  ATT3  ATT2  ATT1  ATT0 )
 ADDR = 05 : FF <ROUT1 ATT> ( ATT7  ATT6  ATT5  ATT4  ATT3  ATT2  ATT1  ATT0 )
 ADDR = 06 : FF <LOUT2 ATT> ( ATT7  ATT6  ATT5  ATT4  ATT3  ATT2  ATT1  ATT0 )
 ADDR = 07 : FF <ROUT2 ATT> ( ATT7  ATT6  ATT5  ATT4  ATT3  ATT2  ATT1  ATT0 )
 ADDR = 08 : FF <LOUT3 ATT> ( ATT7  ATT6  ATT5  ATT4  ATT3  ATT2  ATT1  ATT0 )
 ADDR = 09 : FF <ROUT3 ATT> ( ATT7  ATT6  ATT5  ATT4  ATT3  ATT2  ATT1  ATT0 )
 ADDR = 0A : 00 <Test>      ( TEST7 TEST6 TEST5 TEST4 TEST3 TEST2 TEST1 TEST0)


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

1) If you input "1", you can write data to AK4356.

```
     You can write data to AK4356
 Input Register Address (2 figure, hex) (00-0A) =
```

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

```
ADDR = 00 : 01 <Control 1>  ( 0     SLOW  DZFM  DZFE  DIF2  DIF1  DIF0  RSTN )
                              0     0     0     0     0     0     0     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 AK4356.
Then the data written to this address is displayed:

```
ADDR = 00 : 07 <Control 1>  ( 0     SLOW  DZFM  DZFE  DIF2  DIF1  DIF0  RSTN )
                              0     0     0     0     0     1     1     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=04H to 09H).
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=04H to 09H).
You can decrement ATT value by 1step.

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

AKD4356

This is a schematic diagram titled "AKD4356" for an AK4356 device.

Components and connections

Power/Reset section (top left):
- VD, D1, R1 10k, C1 0.1u, SW1 -PD
- U1A 74HC14 (pins 1, 2), U1B 74HC14 (pins 3, 4)
- BICK, MCLK signals

U2 74AC541:
- A1-A8 (pins 2,3,4,5,6,7,8,9), Y1-Y8 (pins 18,17,16,15,14,13,12,11)
- G1 (pin 1), G2 (pin 19)

SMUTE section (middle left):
- VD, R2 10k, R3 1k, U1C 74HC14 (pins 5, 6), C4 1u
- SW2 SMUTE

U4 74AC541:
- SDTI1, SDTI2, SDTI3, LRCK
- A1-A8 (pins 2,3,4,5,6,7,8,9), Y1-Y8 (pins 18,17,16,15,14,13,12,11)
- G1 (pin 1), G2 (pin 19)

PORT1 CR-I/F:
- pins 1-10
- -CS, CCLK, CDTI, VD
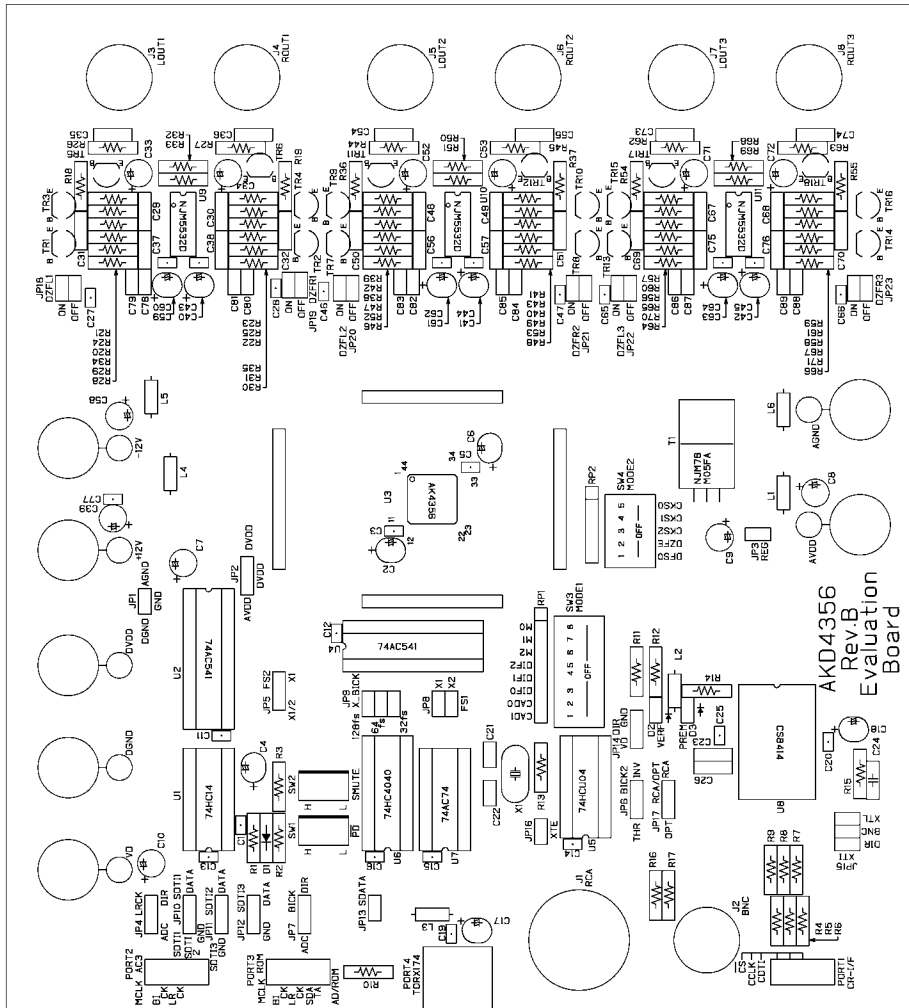- R5 51, R4 51, R6 51, R7 2.2k, R8 2.2k, R9 2.2k

U3 AK4356:
- DVDD (11), MCLK (10), BICK (9), PD (8), CAD1 (7), CAD0 (6), DZFL1 (5), DZFR1 (4), DZFL2 (3), LOUT1+ (2), LOUT1- (1)
- DVSS (12), SDTI1 (13), SDTI2 (14), SDTI3 (15), LRCK (16), SMUTE (17), CCLK (18), CDTI (19), CS (20), DFS0 (21), CKS0 (22)
- CKS1 (23), CKS2 (24), DIF0 (25), DIF1 (26), DIF2 (27), DZFE (28), DZFR3 (29), DZFL3 (30), DZFR2 (31), VREFH (32), AVDD (33)
- ROUT1+ (44), ROUT1- (43), LOUT2+ (42), LOUT2- (41), ROUT2+ (40), ROUT2- (39), LOUT3+ (38), LOUT3- (37), ROUT3+ (36), ROUT3- (35), AVSS (34)

Decoupling:
- DVDD1, C3 0.1u, C2 10u
- C5 0.1u, C6 10u, AVDD1
- C7 47u, DVDD, JP2 DVDD, DVDD1, AVDD1

Regulator section (bottom):
- T1 NJM78M05FA (IN, GND, OUT)
- REG, JP3 REG, C9 47u, L1 (short), AVDD, C8 47u, L6 10u, AVDD2, AVDD1

Outputs (right side):
- DZFL1, DZFR1, DZFL2
- LOUT1+, LOUT1-
- ROUT1+, ROUT1-, LOUT2+, LOUT2-, ROUT2+, ROUT2-, LOUT3+, LOUT3-, ROUT3+, ROUT3-
- DZFR2, DZFL3, DZFR3

Grounds (top):
- JP1 GND, Digital Ground, Analog Ground

AKD4356

Title		
	Interface	
Size A3	Document Number	Rev B
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DZFL1
C27 (open)
ON1 OFF JP18 DZFL1
TR1 RN1202 (10k,10k)
TR3 RN2202 (10k,10k)
AVDD2
R18 10k
TR5 2SC3327

LOUT1-
C78 (short) R20 4.7k R21 4.7k C29 470p
R24 200
C31 3300p
LOUT1+
C79 (short) R28 4.7k R29 200
C37 470p
R34 4.7k
12V_N
U9A NJM5532D
12V_P
C33 22u
R26 220
R32 10k
C35 (open)
J3 LOUT1

DZFR1
C28 (open)
ON1 OFF JP19 DZFR1
TR2 RN1202 (10k,10k)
TR4 RN2202 (10k,10k)
AVDD2
R19 10k
TR6 2SC3327

ROUT1-
C80 (short) R22 4.7k R23 4.7k C30 470p
R25 200
C32 3300p
ROUT1+
C81 (short) R30 4.7k R31 200
C38 470p
R35 4.7k
12V_N
U9B NJM5532D
12V_P
C34 22u
R27 220
R33 10k
C36 (open)
J4 ROUT1

+12V for NJM5532D x3
REG
L4 10u
C77 0.1u C39 47u C40 10u C43 0.1u C41 10u C44 0.1u C42 10u C45 0.1u
12V_P

DZFL2
C46 (open)
ON1 OFF JP20 DZFL2
TR7 RN1202 (10k,10k)
TR9 RN2202 (10k,10k)
AVDD2
R36 10k
TR11 2SC3327

LOUT2-
C82 (short) R38 4.7k R39 4.7k C48 470p
R42 200
C50 3300p
LOUT2+
C83 (short) R46 4.7k R47 200
C56 470p
R52 4.7k
12V_N
U10A NJM5532D
12V_P
C52 22u
R44 220
R50 10k
C54 (open)
J5 LOUT2

DZFR2
C47 (open)
ON1 OFF JP21 DZFR2
TR8 RN1202 (10k,10k)
TR10 RN2202 (10k,10k)
AVDD2
R37 10k
TR12 2SC3327

ROUT2-
C84 (short) R40 4.7k R41 4.7k C49 470p
R43 200
C51 3300p
ROUT2+
C85 (short) R48 4.7k R49 200
C57 470p
R53 4.7k
12V_N
U10B NJM5532D
12V_P
C53 22u
R45 220
R51 10k
C55 (open)
J6 ROUT2

-12V for NJM5532D x3
L5 10u
C58 47u C59 10u C60 0.1u C61 10u C62 0.1u C63 10u C64 0.1u
12V_N

DZFL3
C65 (open)
ON1 OFF JP22 DZFL3
TR13 RN1202 (10k,10k)
TR15 RN2202 (10k,10k)
AVDD2
R54 10k
TR17 2SC3327

LOUT3-
C86 (short) R56 4.7k R57 4.7k C67 470p
R60 200
C69 3300p
LOUT3+
C87 (short) R64 4.7k R65 200
C75 470p
R70 4.7k
12V_N
U11A NJM5532D
12V_P
C71 22u
R62 220
R68 10k
C73 (open)
J7 LOUT3

DZFR3
C66 (open)
ON1 OFF JP23 DZFR3
TR14 RN1202 (10k,10k)
TR16 RN2202 (10k,10k)
AVDD2
R55 10k
TR18 2SC3327

ROUT3-
C88 (short) R58 4.7k R59 4.7k C68 470p
R61 200
C70 3300p
ROUT3+
C89 (short) R66 4.7k R67 200
C76 470p
R71 4.7k
12V_N
U11B NJM5532D
12V_P
C72 22u
R63 220
R69 10k
C74 (open)
J8 ROUT3

L1 部品面　シルク　　AKD4356 Rev.B

AKD4356
Rev.B
Evaluation
Board

LOUT1 ROUT1 LOUT2 ROUT2 LOUT3 ROUT3
J3 J4 J5 J6 J7 J8

AK4356
U3

74AC541
U2

74HC14
U1

74HC4040
74AC74

AKD4184
U8

NJM78
M05FA
T1

SW4 MODE2
SW3 MODE1

L1 部品面 パターン   AKD4356 Rev.B

AKD4358 Rev.B

レイアウト 半田面11