

AKD4351

Evaluation board Rev.B for AK4351

General Description

AKD4351 is an evaluation board for the 18bit audio D/A converter AK4351. The AKD4351 has the interface with AKM's wave generator using ROM data and with AKM's ADC evaluation boards(AKD5392, AKD5391, AKD5352, and AKD5351). Therefore, it is easy to evaluate the AK4351. The AKD4351 also has the digital audio interface and can achieve the interface with digital audio systems via opt-connector.

■ Ordering guide

AKD4351

--- Evaluation board of AK4351

Function

- On-board clock generator
- Compatible with the following 3 types of interface
 - 1) Direct interface with AKM's A/D converter, and direct interface with ROM board.
 - 2) Direct interface with signal generator(AKD43XX)
 - 3) On-board CS8412 as DIR which accepts optical input
- A BNC connector for an external clock input

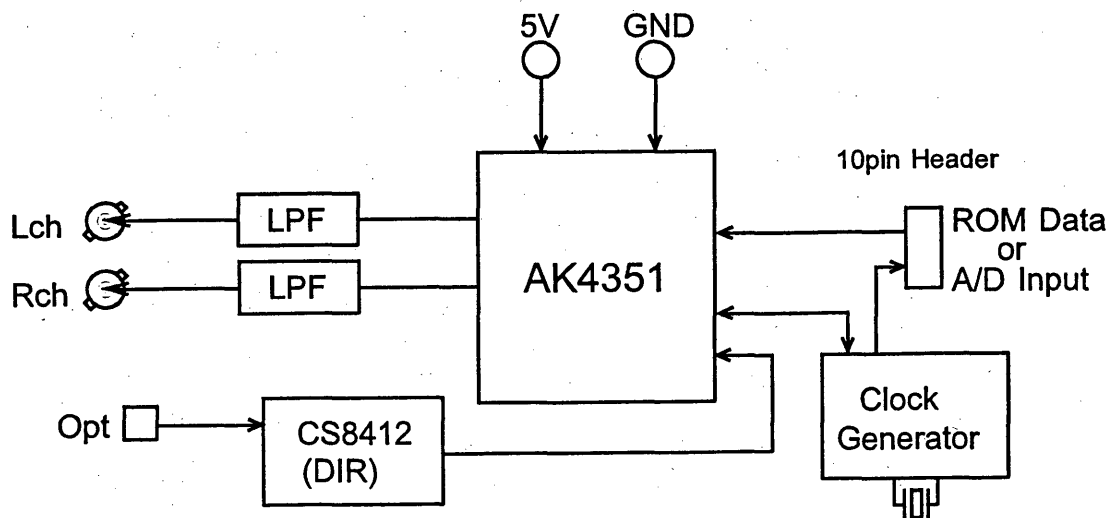
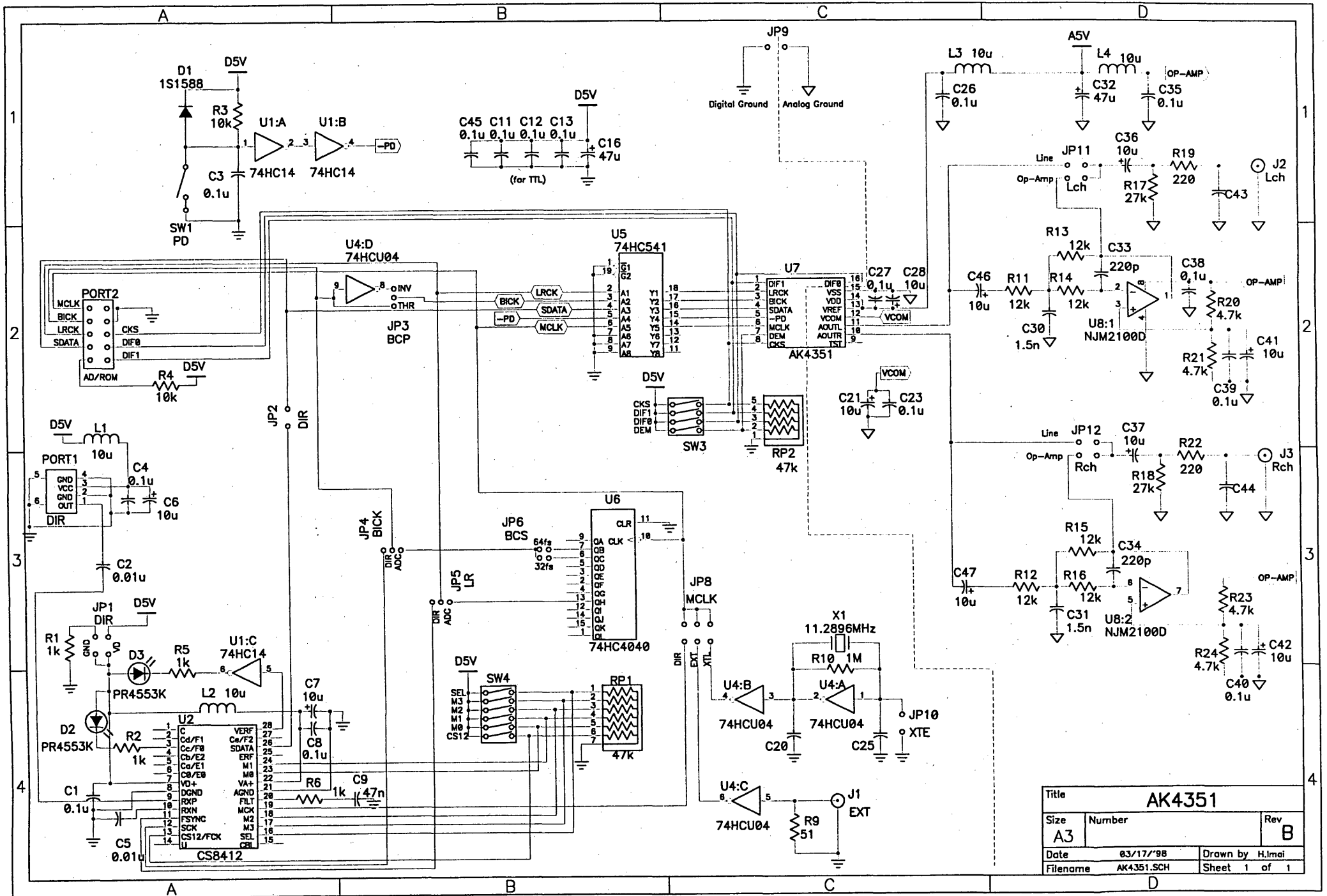


Figure 1. AKD4351 Block Diagram



Title			AK4351		
Size	Number				Rev
A3					B
Date	03/17/98		Drawn by		H.Imai
Filename	AK4351.SCH		Sheet		1 of 1

■ Analog Output

Analog signals are output through BNC connectors on the board and the output level are typically 3.4Vpp (@ VREFH-VREFL=5.0V). Please set JP11/JP12 "Line".

※ C46 and C47 has been removed.

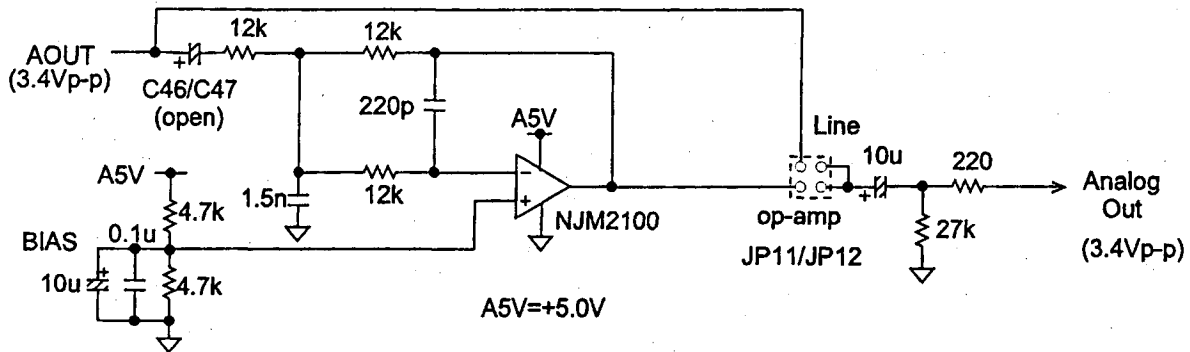


Fig.2 on-board analog filter

■ Grounding and Power Supply Decoupling

To minimize the effect of digital noise, the AKD4351 should be decoupled. VDD is supplied from analog power supply of the system. Decoupling capacitors should be connected to AK4351 as near as possible. Especially the capacitor between VREF and VSS should be connected nearest.

■ Operation Sequence

- ① Set up the power supply lines.

D5V=A5V= 5.0V,
AGND=DGND=0V.

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

- ② Set up the evaluation modes and jumper pins.

(See the next item)

- ③ Set up the DIP-SW.

(See the next item.)

- ④ Power on.

- ⑤ Reset the AK4351 by SW1.

(The AK4351 is reset by SW1: PD = "L" during operation.)

■ Set-up of the evaluation modes and jumper pins

1. Evaluation modes

Applicable evaluation modes

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

① DIR (Optical Link)

PORT1 is used. All clock are supplied from CS8412 (DIR). DIR generates MCLK, BICK, LRCK and SDATA from the received data through optical connector(TORX174). Used for the evaluation using CD test disk. Nothing should be connected to PORT2.

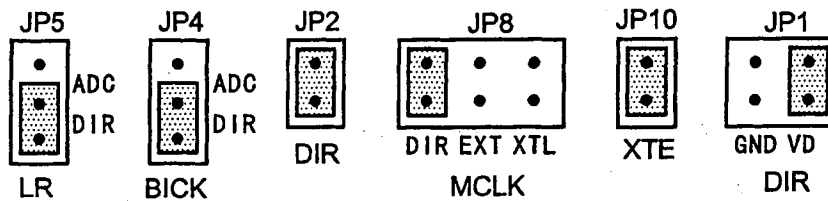


Fig.3 DIR

② Using ROM data(AK43XX).

Connect the AK43XX with PORT2.

AKD4351 sends MCLK to AKD43XX, and receives LRCK,BICK and SDATA.

※ In case of using external master clock through a BNC connector, set JP8(MCLK) EXT and short JP10(XTE).

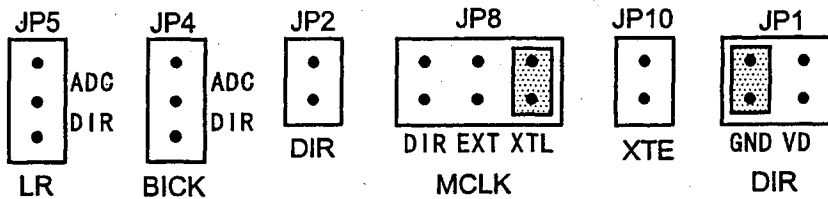


Fig.4 ROM data

③ Using AKM's evaluation board for ADC

To evaluate AK4351 with analog input, The AKM's evaluation board for ADC can be used.

MCLK, BICK and LRCK are supplied from clock generator on the AKD4351, and analog signal is A/D converted and send to AKD4351 through PORT2.

※ In case of using external master clock through a BNC connector, sets JP7(MCLK) EXT and shorts JP10(XTE).

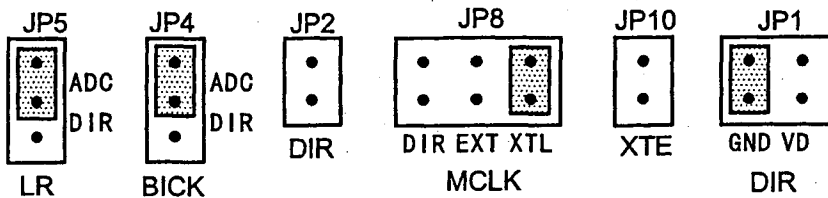


Fig.5 A/D data

④ Feeding all signals from external

Under the following set-up, all external signals could be fed through PORT2.

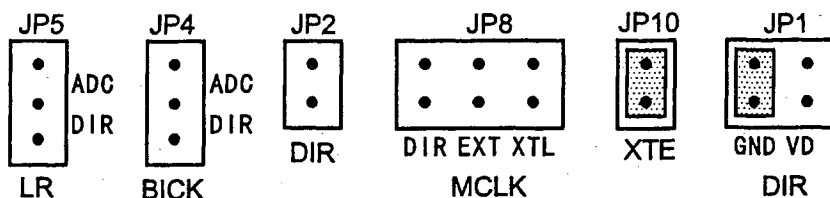


Fig.6 External signal

2. BICK frequency (JP6)

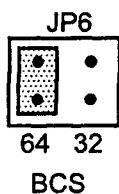


Fig.7

When BICK is fed from 74HC4040 on board, its frequency is selected with JP6.

- 64 : BICK = 64fs (Fig.7) (default)
- 32 : BICK = 32fs

3. MCLK frequency (SW3-1)

Following the MCLK frequency, set up the SW3-1(CKS)

- MCLK = 256fs : CKS = OFF (default)
- MCLK = 384fs : CKS = ON

※ In case of mode ① and ③, set SW3-1 OFF(256fs).

4. De-emphasis filter (SW3-4)

Set the De-emphasis filter of AK4351 with SW3-4(DEM). (default = OFF)

5. Serial data format (SW3-2,3)

Set serial data format of AK4351 with SW3-2,3(DIF0,1).

※ In case of mode ①, adjust the data format between DIR and AK4351 with SW4.

Table 1 Serial data format of AK4351

DIF1	DIF0	Mode	BICK
0	0	16bit LSB justified	≥ 32fs
0	1	18bit LSB justified	≥ 36fs
1	0	18bit MSB justified	≥ 36fs
1	1	I ² S (IIS)	≥ 32fs or ≥ 36fs

. (default)

6. CS8412(DIR) Set-up (SW4, JP3)

Set the data format of CS8412(DIR) with SW4 and JP3. This format must be fitted to AK4351, which is set with DIF0 and DIF1.

(For more detailed configurations, please refer to the CS8412 data-sheet.)

Table 2-1 (SW4)

No.	pin name	ON	OFF
1	SEL	normally ON ※ 1	
2	M 3	see Table 2-2	
3	M 2		
4	M 1		
5	M 0		
6	CS12	Rch	Lch ※ 2

Table 2-2 CS8412 data format

M 3	M 2	M 1	M 0	mode	JP3 ※ 3
0	0	0	0	0: 18bit MSB justified	INV
0	0	1	0	2: I ² S	THR
0	1	0	1	5: 16bit LSB justified	THR
0	1	1	0	6: 18bit LSB justified	THR

..... (default)

1:ON, 0:OFF

- ※ 1 When "ON", LED shows the pre-emphasis status.
(LED turns on when the data is pre-emphasized.)
- ※ 2 Selects the channel whose set up of CS8412.
- ※ 3 JP3 fits the BICK phase of CS8412 to AK4351s.

■ Switch list

- [SW1] Reset switch for AK4351. The reset state is "L".
- [SW2] Soft-mute switch for AK4351. AK4351 is soft-muted while SW2 is pushed.
- [SW3] Set-up switch of CKS,DEM,DIF1,DIF0.
- [SW4] Set-up switch of CS8412.

- [D1] "Pre-emphasis"-monitor. LED turns on when the data is pre-emphasized.
- [D2] "VERF pin"-monitor for the CS8412.
LED turns on when some error has occurred to CS8412.

■ Other functions

- [JP3] THR : The phase of BICK is not changed. (through)
INV : The phase of BICK is inverted.

- [JP9] AGND and DGND are connected together by this jumper.

AK4351 measurement example

Measurement conditions :

DVDD=AVDD=5.0V, fs=44.1kHz, MCLK=256fs, BICK=64fs, DIR,
Resolution = 18bit,

1. Measurement unit = ROHDE&SCHWARZ UPD04

		units	external filters
THD+N(0dB)	-89.0	dBr	20kHzLPF
DR(-60dB)	96.0	dBr	20kHzLPF + A-weight
S/N	96.0	dBr	20kHzLPF + A-weight

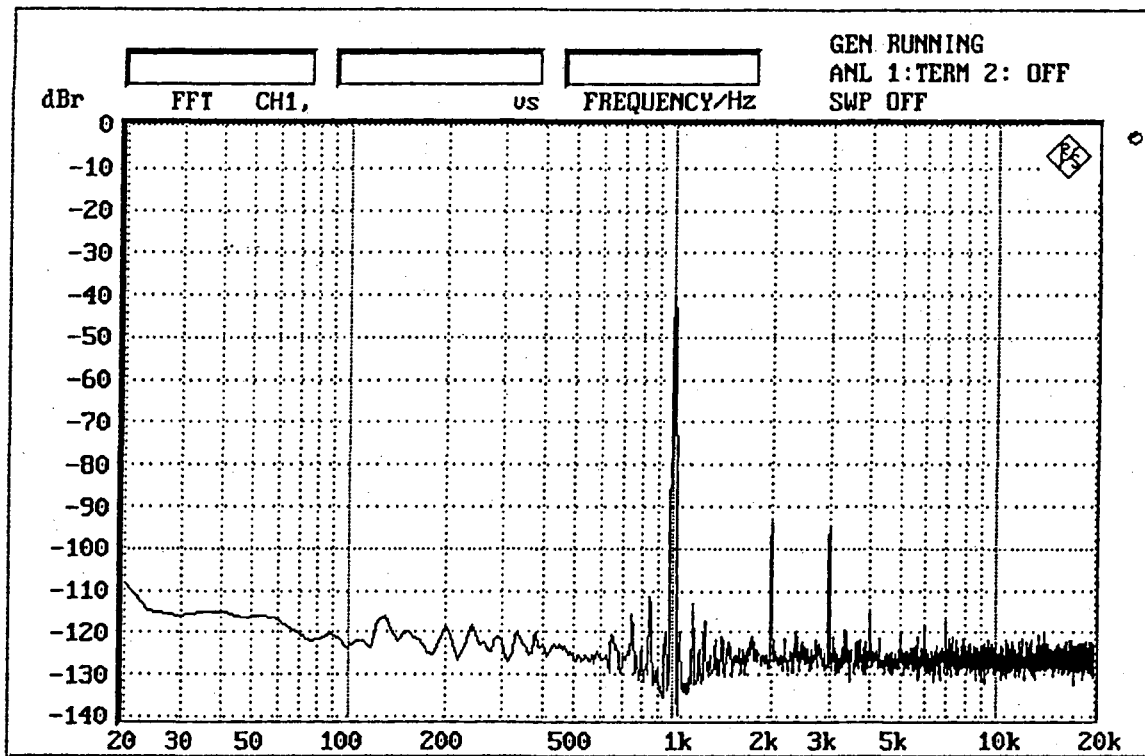


Fig.1 FFT plot (1kHz, 0dB, Notch=30dB)

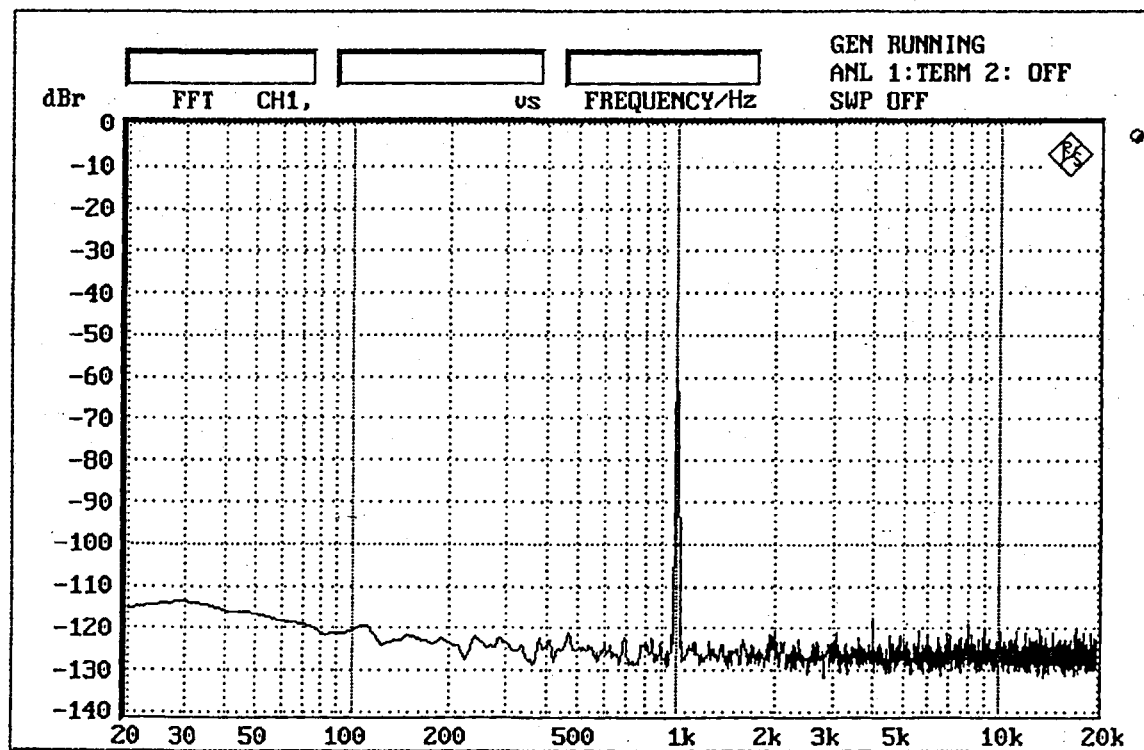


Fig.2 FFT plot (1kHz, -60dB)

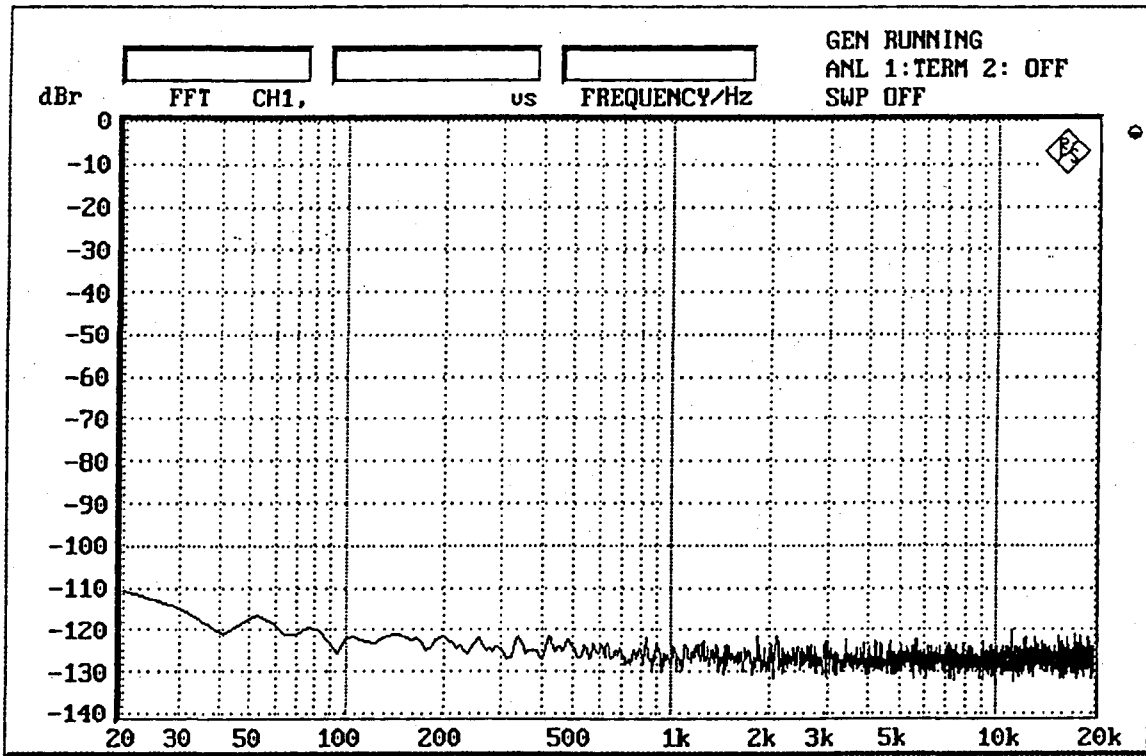


Fig.3 FFT plot (noise floor)

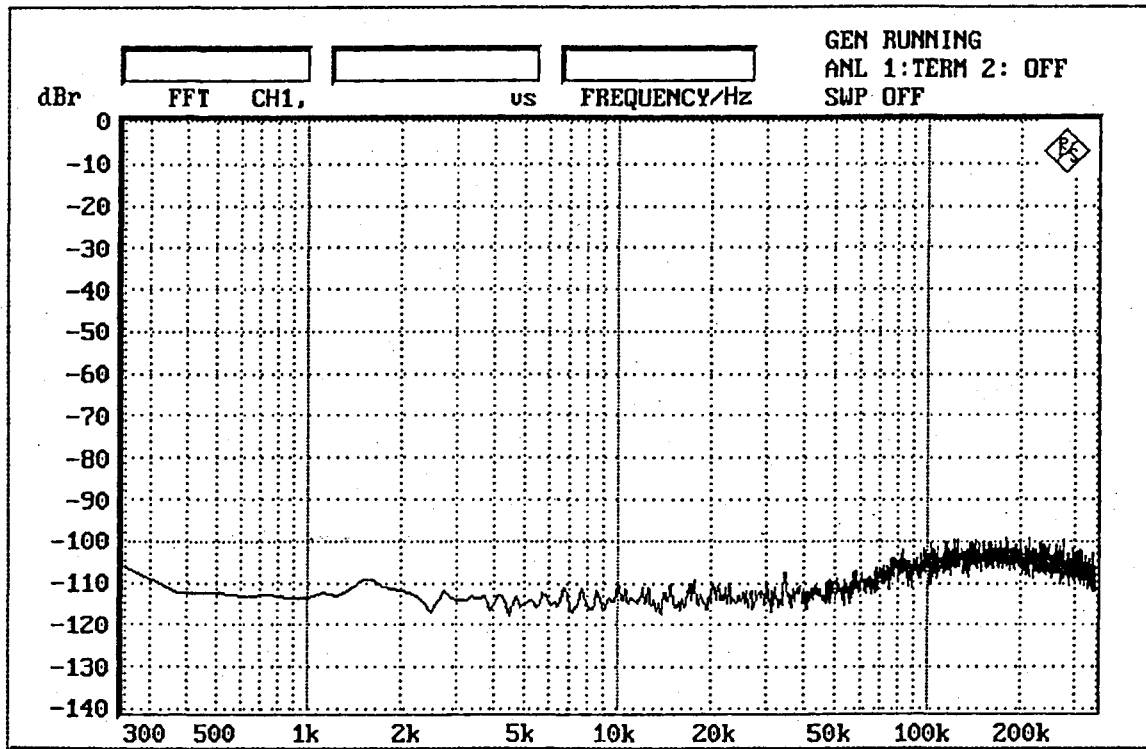


Fig.4 FFT plot (noise floor ~300kHz)

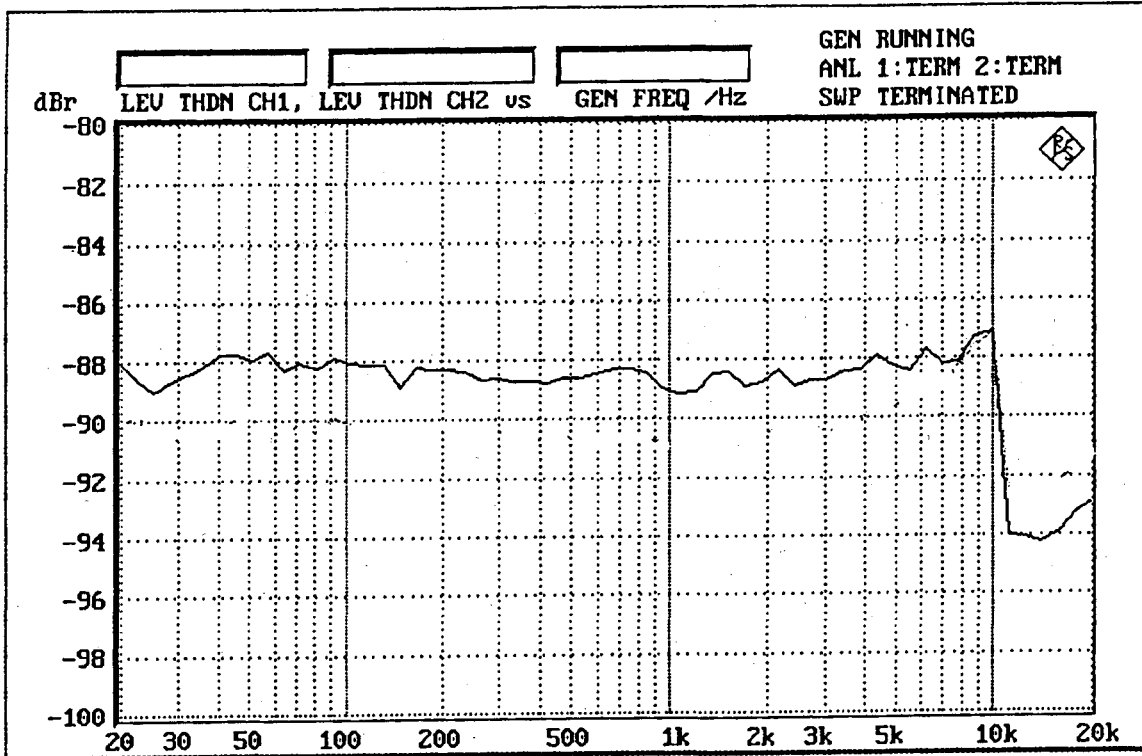


Fig.5 THD+N vs. Input frequency

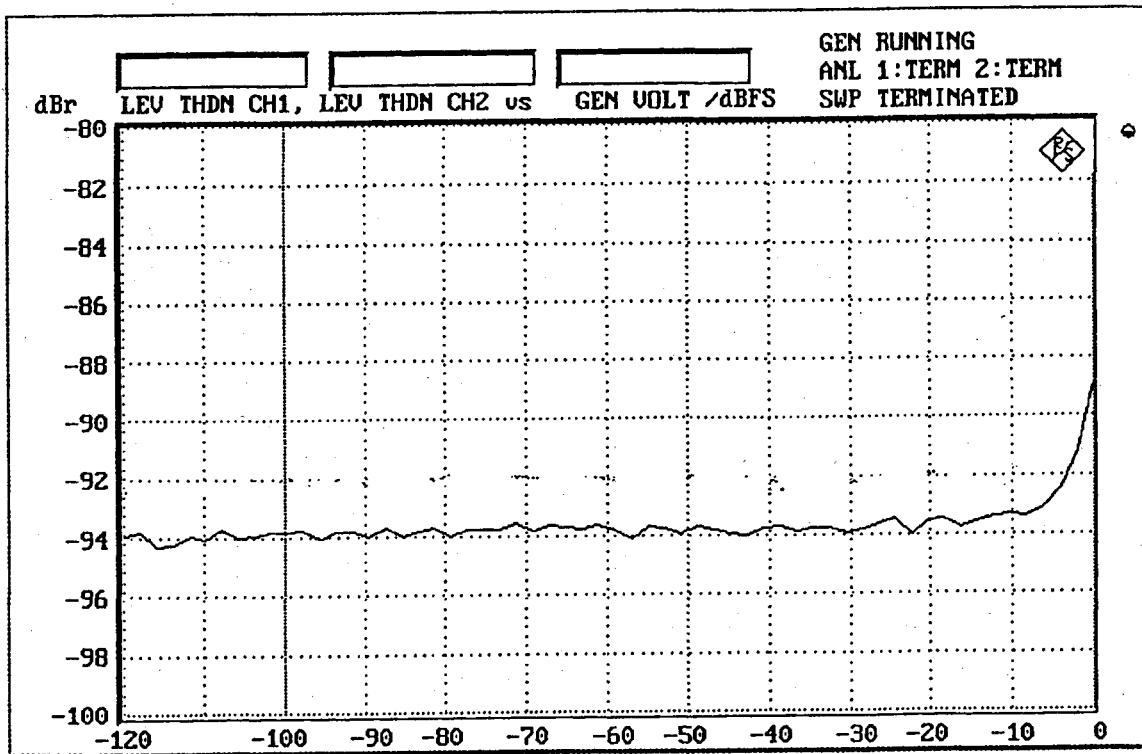


Fig.6 THD+N vs. Input level

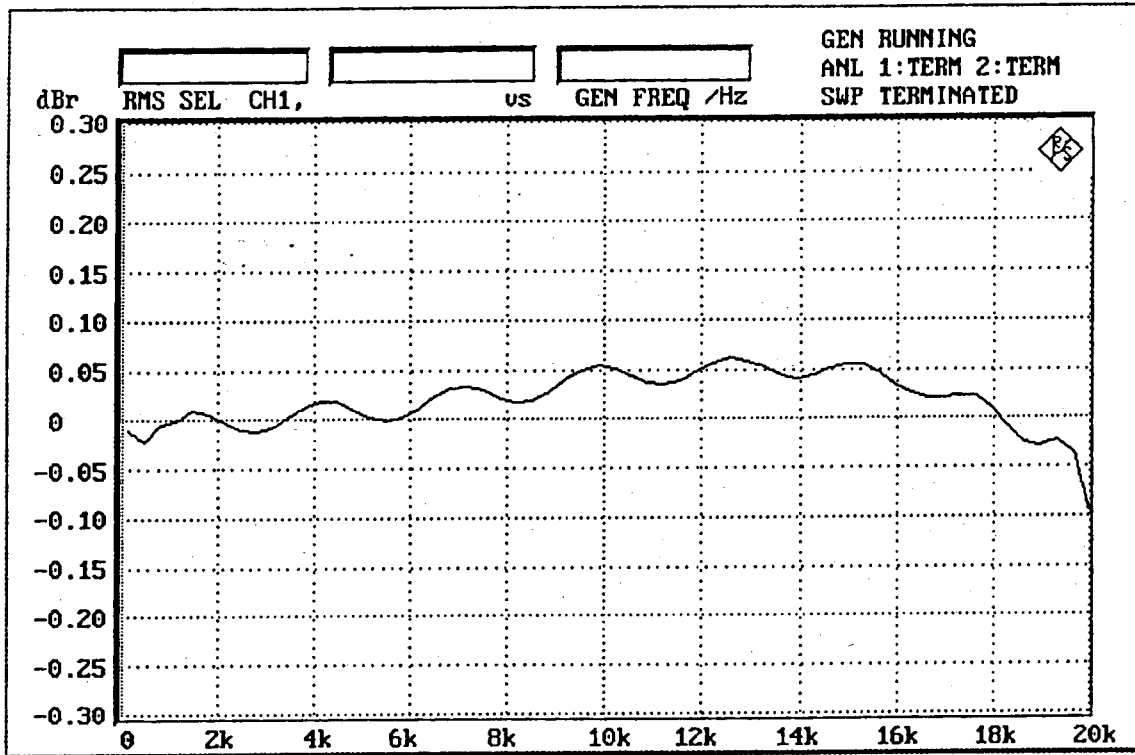


Fig.7 Frequency response

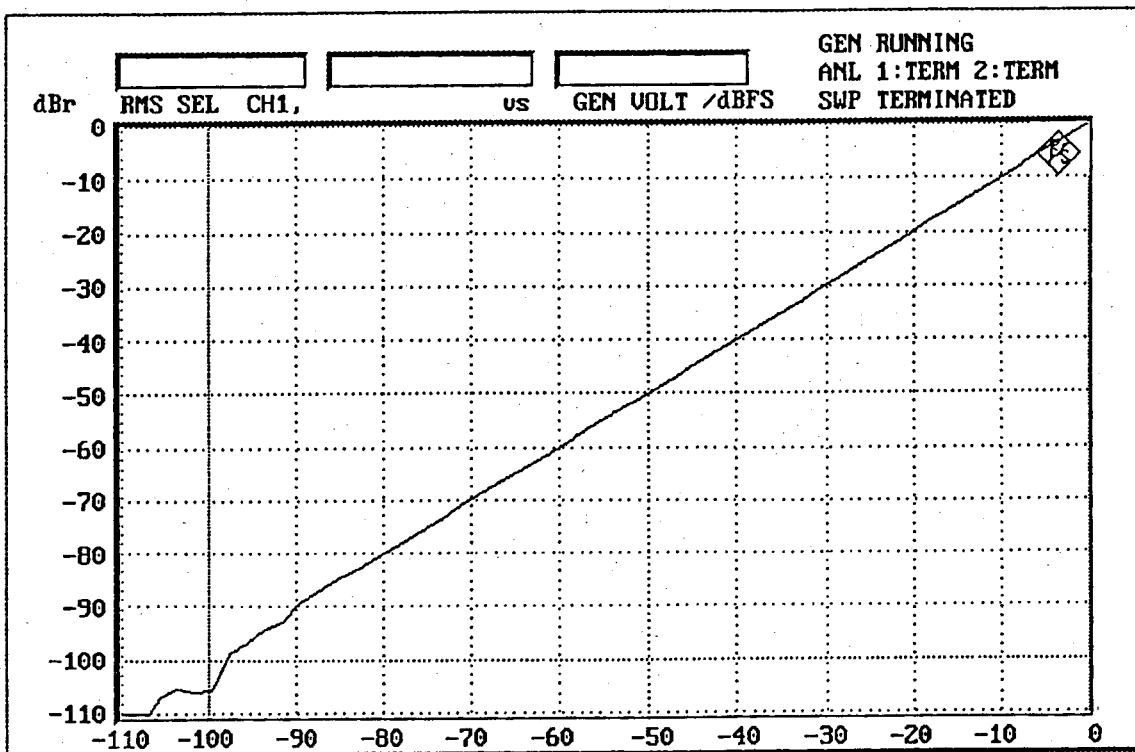


Fig.8 Linearity

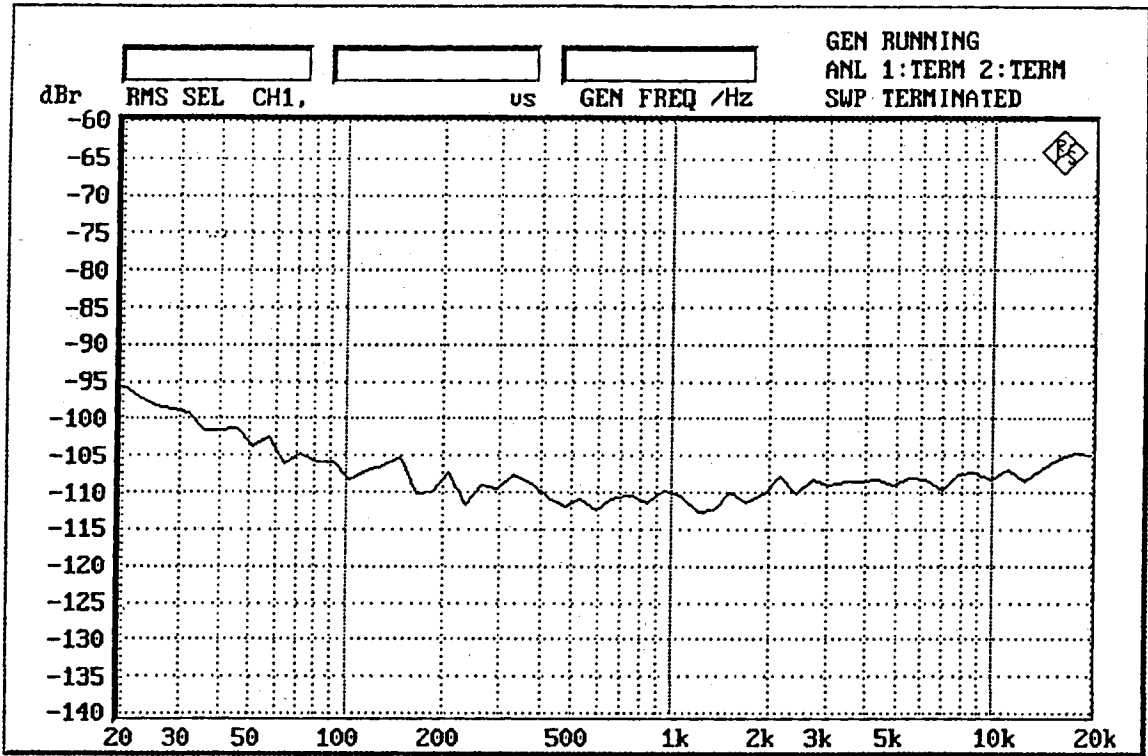
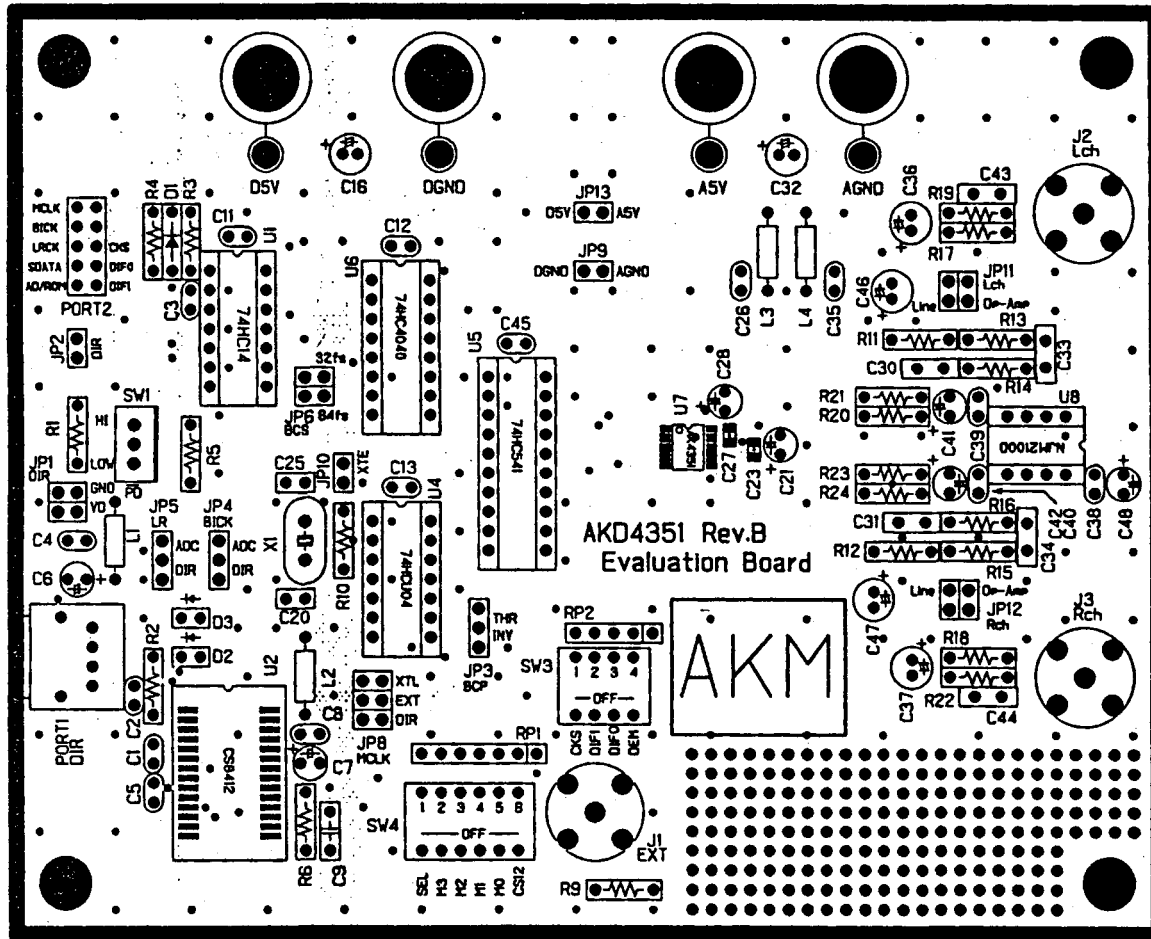
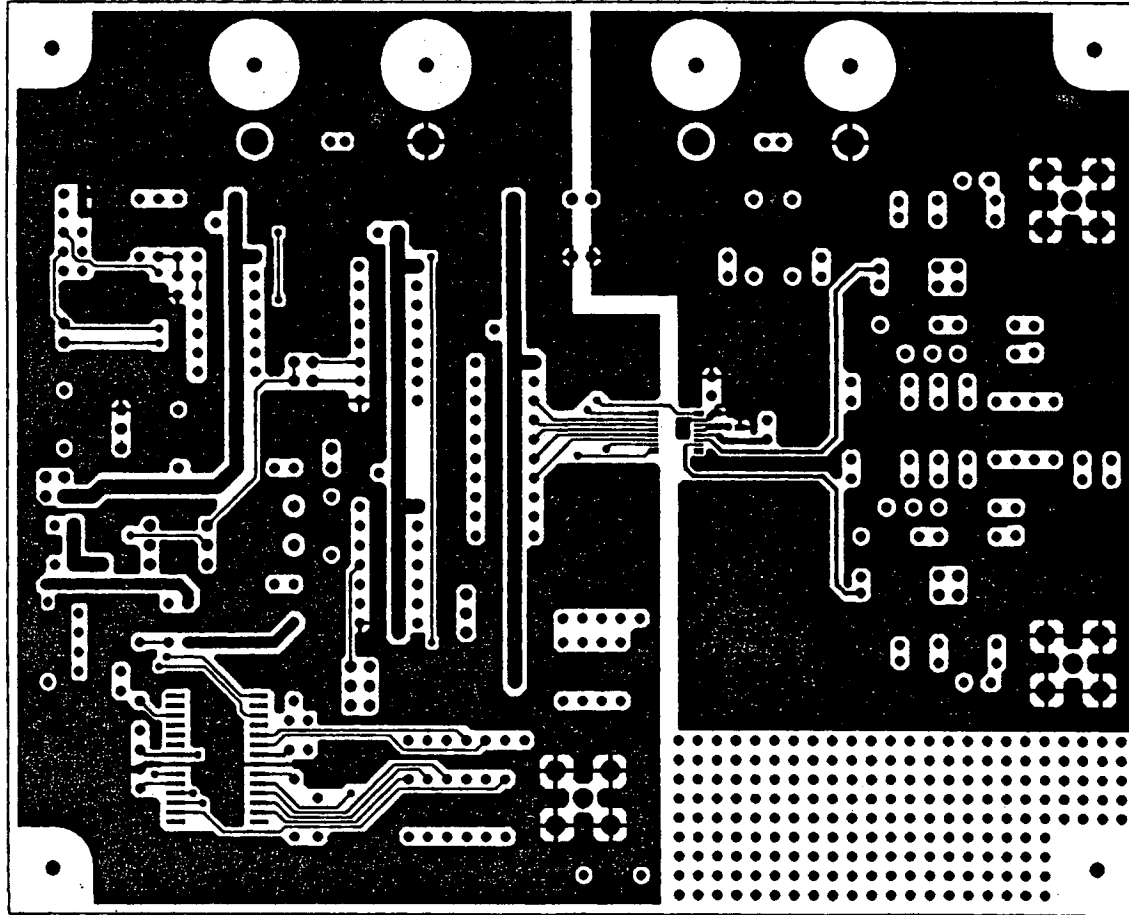


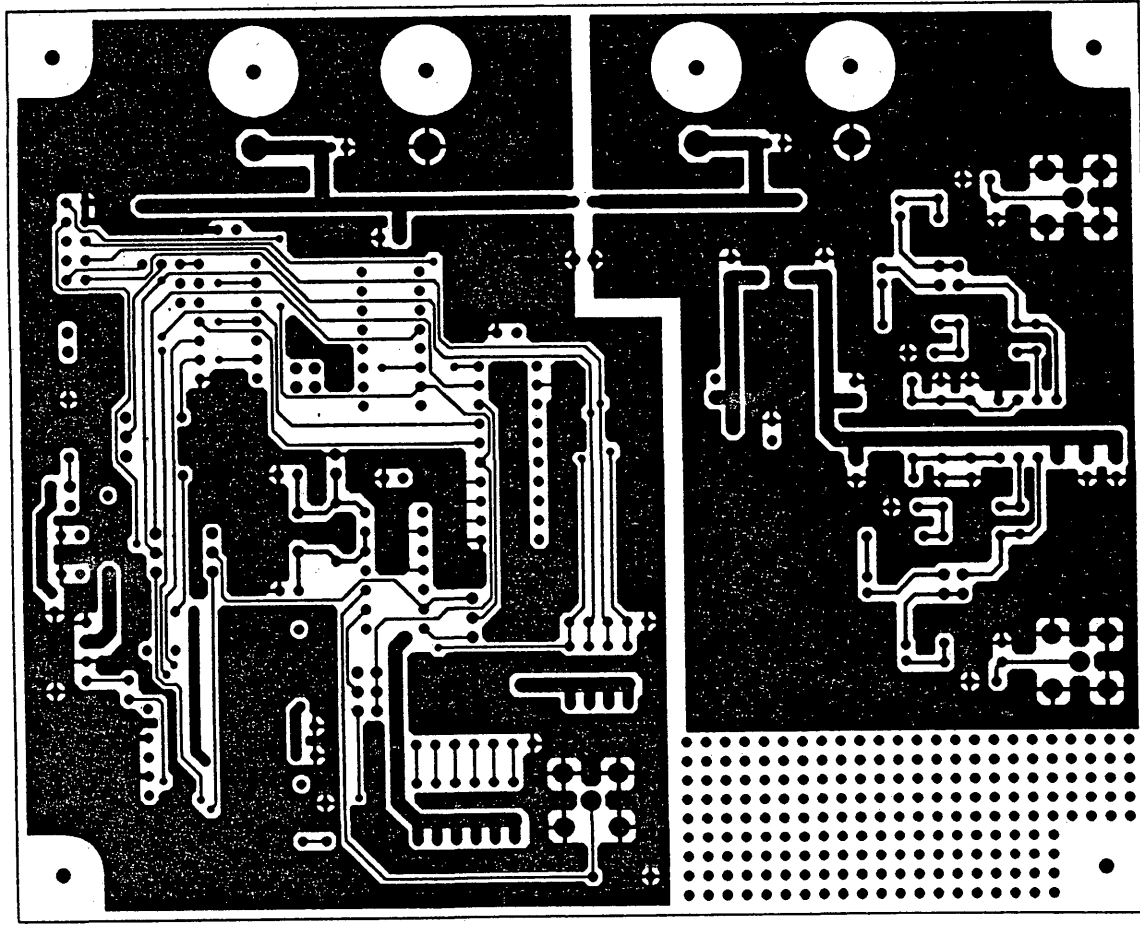
Fig.9 Crosstalk



AKD4351 Rev.B L1 SR SILK



AKD4351 Rev.B L1



KD4321 Rev.B LS

IMPORTANT NOTICE

- These products and their specifications are subject to change without notice. Before considering any use or application, consult the Asahi Kasei Microsystems Co., Ltd. (AKM) sales office or authorized distributor concerning their current status.
- AKM assumes no liability for infringement of any patent, intellectual property, or other right in the application or use of any information contained herein.
- Any export of these products, or devices or systems containing them, may require an export license or other official approval under the law and regulations of the country of export pertaining to customs and tariffs, currency exchange, or strategic materials.
- AKM products are neither intended nor authorized for use as critical components in any safety, life support, or other hazard related device or system, and AKM assumes no responsibility relating to any such use, except with the express written consent of the Representative Director of AKM. As used here:
 - (a) A hazard related device or system is one designed or intended for life support or maintenance of safety or for applications in medicine, aerospace, nuclear energy, or other fields, in which its failure to function or perform may reasonably be expected to result in loss of life or in significant injury or damage to person or property.
 - (b) A critical component is one whose failure to function or perform may reasonably be expected to result, whether directly or indirectly, in the loss of the safety or effectiveness of the device or system containing it, and which must therefore meet very high standards of performance and reliability.
- It is the responsibility of the buyer or distributor of an AKM product who distributes, disposes of, or otherwise places the product with a third party to notify that party in advance of the above content and conditions, and the buyer or distributor agrees to assume any and all responsibility and liability for and hold AKM harmless from any and all claims arising from the use of said product in the absence of such notification.