



AKD4707-A

AK4707 Evaluation Board Rev.1

GENERAL DESCRIPTION

AKD4707 is an evaluation board for quickly evaluating the AK4707, AV SCART switch. Evaluation requires audio/video analog analyzers/generators and a power supply.

■ **Ordering guide**

AKD4707-A --- AK4707 Evaluation Board
 (Cable for connecting with printer port of IBM-AT, compatible PC and control software are packed with this.)

FUNCTION

- **BNC connectors for analog audio input/output**
- **BNC connectors for analog video input/output**
- **10pin header for serial control interface**

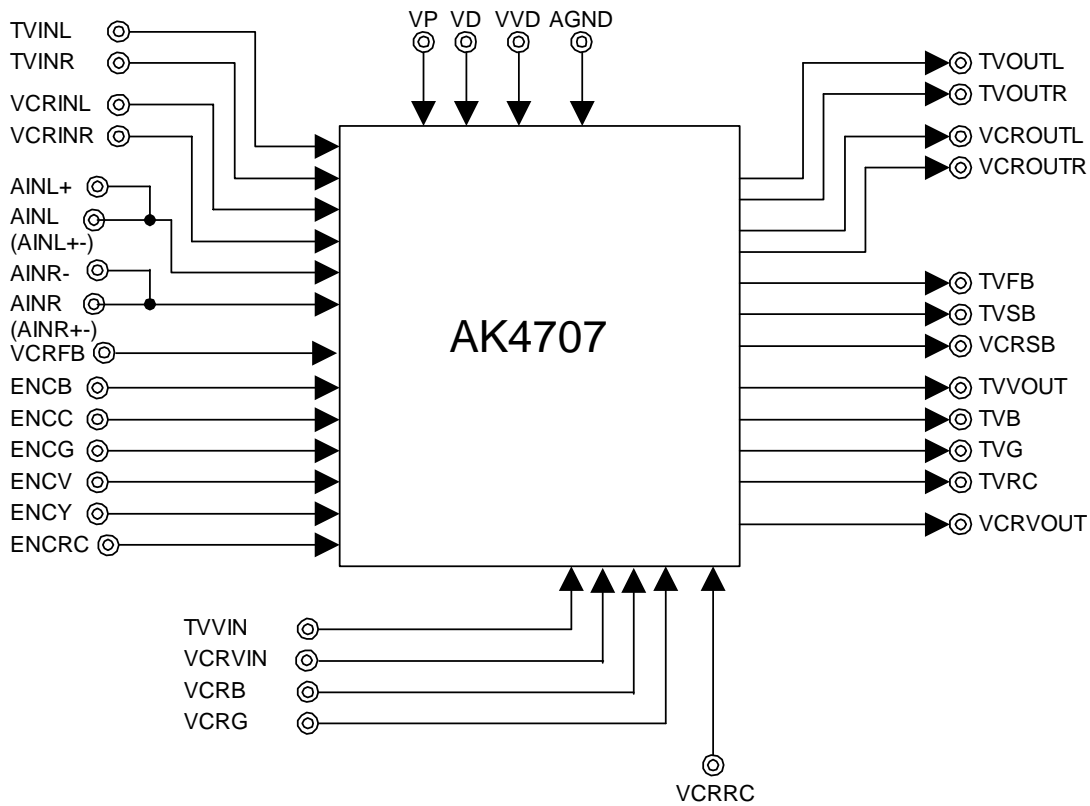


Figure 1. AKD4707 Block Diagram

* 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.

[VP]	(Orange)	= 11.4 ~ 12.6V (typ. 12V, for VP pin)
[VD]	(Red)	= 4.75 ~ 5.25V (typ. 5.0V, for VD pin)
[VVD]	(Red)	= 4.75 ~ 5.25V (typ. 5.0V, for VVD1 pin, VVD2 pin)
[VCC]	(Red)	= 5.0V (for digital logic)
[AGND]	(Black)	= 0V (for analog ground: VSS, VVSS)
[DGND]	(Black)	= 0V (for digital ground)

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

2) Set-up jumper pins. (See the followings.)

3) Power on.

The AK4707 should be reset once bringing SW1 "L" upon power-up.

■ Jumper pins set up

[JP1] (GND): Analog ground and Digital ground

OPEN: Separated

SHORT: Common. (The connector "DGND" can be open.) <Default>

[JP2] (VD): Regulator +5V or VD connector

OPEN: VD pin is supplied from VD connector.

SHORT: VD pin is supplied to regulator +5V. (The connector "VD" can be open.) <Default>

[JP3] (VVD): VD connector or VVD connector

OPEN: VVD1 and VVD2 pins are supplied from VVD connector.

SHORT: VVD1 and VVD2 pins are supplied from VD connector.
(The connector "VVD" can be open.) <Default>

[JP4] (VCC): VVD connector or VCC connector

OPEN: Logic voltage is supplied from VCC connector.

SHORT: Logic voltage is supplied from VVD connector. (The connector "VCC" can be open.) <Default>

The regulator can be supplied 5.0V to all circuits by shorting JP2, JP3 and JP4 and supplying 12V to VP connector.

■ The function of the toggle SW

[SW1] (PDN): Resets the AK4707. Keep “H” during normal operation.

■ The indication content for INT pin

Changes of the 08H status can be monitored via the TEST1 (INT). The INT pin is the open drain output and goes “L” for 2μs (typ.) when the status of 08H is changed.

■ Serial Control

The AK4707 can be controlled via the printer port (parallel port) of IBM-AT compatible PC. Connect PORT1 (CTRL) with PC by 10-line flat cable packed with the AKD4707-A. The control software packed with this evaluation board supports I²C control only.

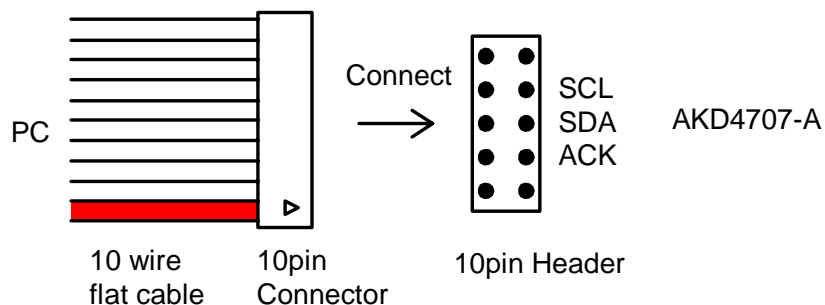


Figure 2. Connect of 10-line flat cable

■ Analog Input/Output List

		Signal Name	Note
Audio	Input	J1 (TVINL), J4 (TVINR), J7 (VCRINL), J11 (VCRINR) J34 (AINL-), J35 (AINR-)	Max. 2Vrms Max. 1Vrms
	Output	J24 (TVOUTL), J27 (TVOUTR) J30 (VCROUTL), J32 (VCROUTR)	Max. 2.15Vrms
Video	Input	J2 (ENCB), J5 (ENCC), J8 (ENCG), J12 (ENCV), J15 (ENCY) J17 (ENCRC), J3 (TVVIN), J6 (VCRVIN), J9 (VCRB) J13 (VCRG), J16 (VCRRC)	Max. 1.5Vpp
	Output	J19 (TVVOUT), J20 (TVB), J23 (TVG), J26 (TVRC) J29 (VCRVOUT)	Max. 3.0Vpp
Slow Blanking	Input	J25 (VCRSB)	Max. VP+0.3V
	Output	J22 (TVSB), J25 (VCRSB)	Max. VP
Fast Blanking	Input	J10 (VCRFB)	Max. VVD1+0.3V
	Output	J28 (TVFB)	Max. VVD2

Table 1. Analog Input/Output List

Control Software Manual

■ Set-up of evaluation board and control software

1. Set up the AKD4707-A according to previous term.
2. Connect IBM-AT compatible PC with AKD4707-A by 10-line type flat cable (packed with AKD4707-A). Take care of the direction of 10pin header. (Please install the driver in the CD-ROM when this control software is used on Windows 2000/XP. Please refer "Installation Manual of Control Software Driver by AKM device control software". In case of Windows95/98/ME, this installation is not needed. This control software does not operate on Windows NT.)
3. Insert the CD-ROM labeled "AK4707 Evaluation Kit" into the CD-ROM drive.
4. Access the CD-ROM drive and double-click the icon of "akd4707-a.exe" to set up the control program.
5. Then please evaluate according to the follows.

■ Operation flow

Keep the following flow.

1. Set up the control program according to explanation above.
2. Click "Port Reset" button.
3. Click "Write default" button

■ Explanation of each buttons

1. [Port Reset] : Set up the USB interface board (AKDUSBIF-A) when using the board.
2. [Write default] : Initialize the register of AK4707.
3. [All Write] : Write all registers that is currently displayed.
4. [Function1] : Dialog to write data by keyboard operation.
5. [Function2] : Dialog to write data by keyboard operation.
6. [Function3] : The sequence of register setting can be set and executed.
7. [Function4] : The sequence that is created on [Function3] can be assigned to buttons and executed.
8. [Function5] : The register setting that is created by [SAVE] function on main window can be assigned to buttons and executed.
9. [SAVE] : Save the current register setting.
10. [OPEN] : Write the saved values to all register.
11. [Write] : Dialog to write data by mouse operation.

■ Indication of data

Input data is indicated on the register map. Red letter indicates "H" or "1" and blue one indicates "L" or "0". Blank is the part that is not defined in the datasheet.

■ Explanation of each dialog

1. [Write Dialog]: Dialog to write data by mouse operation

There are dialogs corresponding to each register.

Click the [Write] button corresponding to each register to set up the dialog. If you check the check box, data becomes "H" or "L". If not, "0" or "1".

If you want to write the input data to the AK4707, click [OK] button. If not, click [Cancel] button.

2. [Function1 Dialog] : Dialog to write data by keyboard operation

Address Box: Input registers address in 2 figures of hexadecimal.

Data Box: Input registers data in 2 figures of hexadecimal.

If you want to write the input data to the AK4707, click [OK] button. If not, click [Cancel] button.

3. [Function2 Dialog] : Dialog to evaluate DATT

There are dialogs corresponding to register of 02h.

Address Box: Input registers address in 2 figures of hexadecimal.

Start Data Box: Input starts data in 2 figures of hexadecimal.

End Data Box: Input end data in 2 figures of hexadecimal.

Interval Box: Data is written to AK4707 by this interval.

Step Box: Data changes by this step.

Mode Select Box:

If you check this check box, data reaches end data, and returns to start data.

[Example] Start Data = 00, End Data = 09

Data flow: 00 01 02 03 04 05 06 07 08 09 09 08 07 06 05 04 03 02 01 00

If you do not check this check box, data reaches end data, but does not return to start data.

[Example] Start Data = 00, End Data = 09

Data flow: 00 01 02 03 04 05 06 07 08 09

If you want to write the input data to the AK4707, click [OK] button. If not, click [Cancel] button.

4. [SAVE] and [OPEN]

4-1. [SAVE]

All of current register setting values displayed on the main window are saved to the file. The extension of file name is "akr".

<Operation flow>

- (1) Click [SAVE] Button.
- (2) Set the file name and click [SAVE] Button. The extension of file name is "akr".

4-2. [OPEN]

The register setting values saved by [SAVE] are written to the AK4707. The file type is the same as [SAVE].

<Operation flow>

- (1) Click [OPEN] Button.
- (2) Select the file (*.akr) and Click [OPEN] Button.

5. [Function3 Dialog]

The sequence of register setting can be set and executed.

(1) Click [F3] Button. The following is displayed.

(2) Set the control sequence.

Set the address, Data and Interval time. Set “-1” to the address of the step where the sequence should be paused.

(3) Click [START] button. Then this sequence is executed.

The sequence is paused at the step of Interval="-1". Click [START] button, the sequence restarts from the paused step.

This sequence can be saved and opened by [SAVE] and [OPEN] button on the Function3 window. The extension of file name is “aks”.

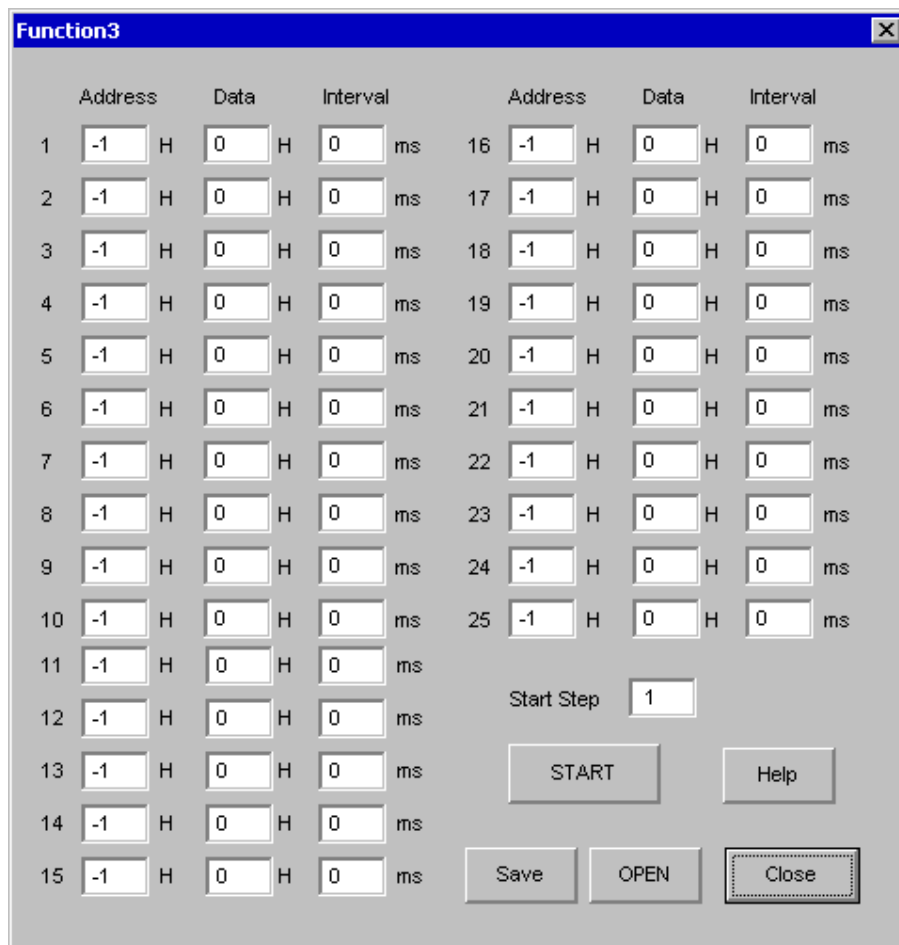


Figure 1. Window of [F3]

6. [Function4 Dialog]

The sequence file (*.aks) saved by [Function3] can be listed up to 10 files, assigned to buttons and then executed. When [F4] button is clicked, the window as shown in Figure 2 opens.

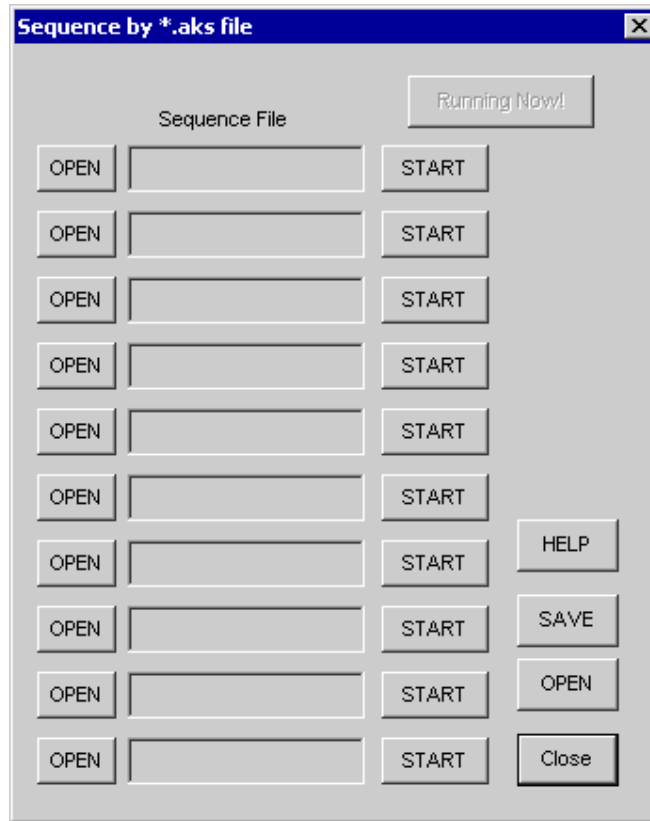


Figure 2. [F4] window

6-1. [OPEN] buttons on left side and [START] buttons

(1) Click [OPEN] button and select the sequence file (*.aks) saved by [Function3].

The sequence file name is displayed as shown in Figure 3. (In case that the selected sequence file name is “DAC_Stereo_ON.aks”)

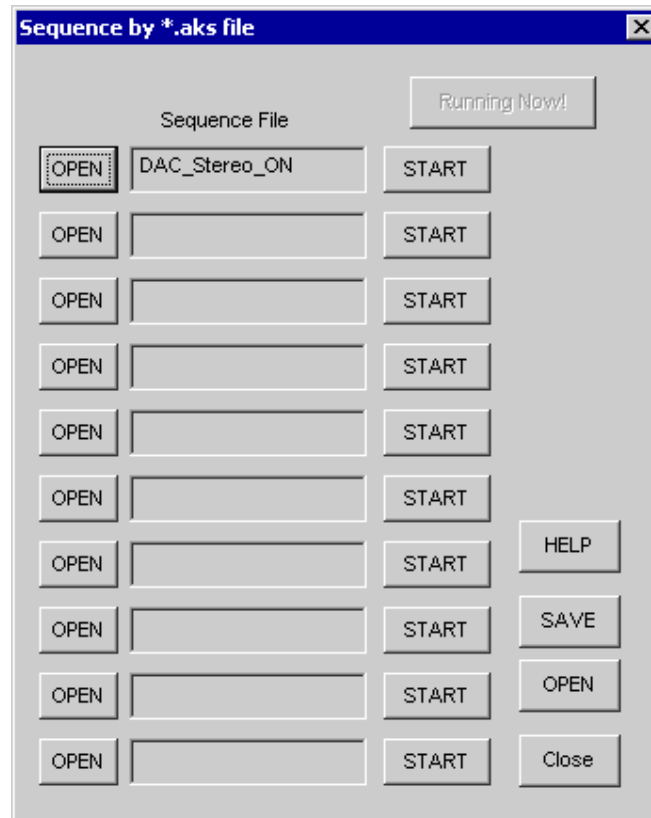


Figure 3. [F4] window(2)

(2) Click [START] button, then the sequence is executed.

6-2. [SAVE] and [OPEN] buttons on right side

[SAVE] : The name assign of sequence file displayed on [Function4] window can be saved to the file. The file name is “*.ak4”.

[OPEN] : The name assign of sequence file(*.ak4) saved by [SAVE] is loaded.

6-3. Note

- (1) This function doesn't support the pause function of sequence function.
- (2) All files used by [SAVE] and [OPEN] function on right side need to be in the same folder.
- (3) When the sequence is changed in [Function3], the sequence file (*.aks) should be loaded again in order to reflect the change.

7. [Function5 Dialog]

The register setting file(*.akr) saved by [SAVE] function on main window can be listed up to 10 files, assigned to buttons and then executed. When [F5] button is clicked, the window as shown in Figure 4 opens.

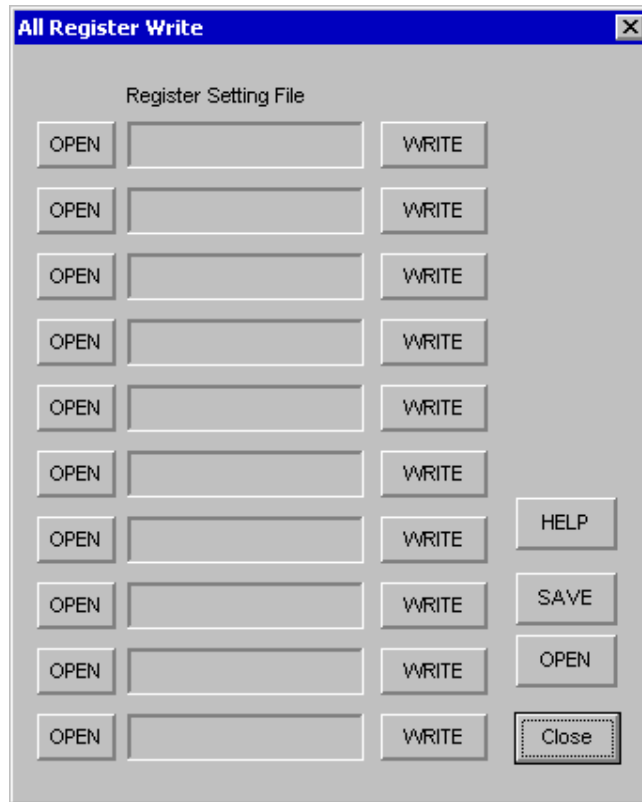


Figure 4. [F5] window

7-1. [OPEN] buttons on left side and [WRITE] button

(1) Click [OPEN] button and select the register setting file (*.akr).

The register setting file name is displayed as shown in Figure 5. (In case that the selected file name is "DAC_Output.akr")

(2) Click [WRITE] button, then the register setting is executed.

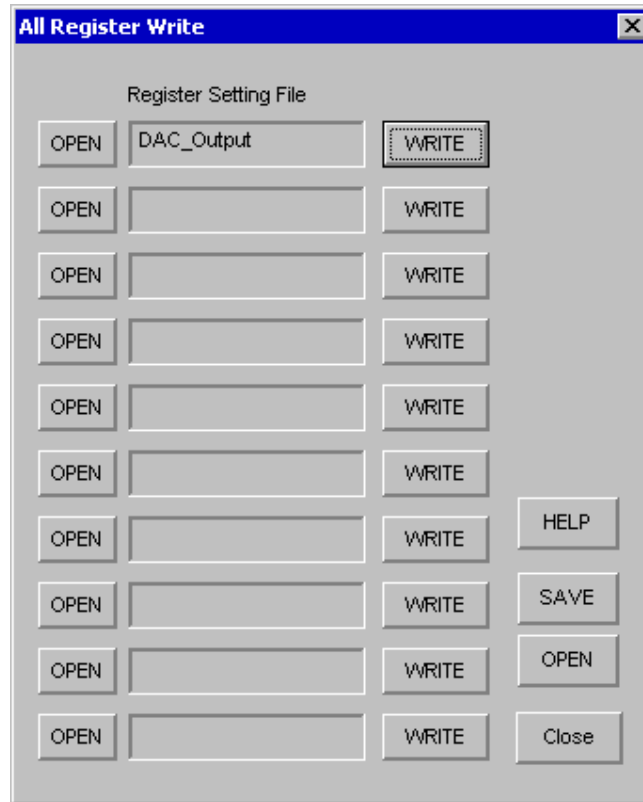


Figure 5. [F5] windows(2)

7-2. [SAVE] and [OPEN] buttons on right side

[SAVE] : The name assign of register setting file displayed on [Function5] window can be saved to the file. The file name is "*.ak5".

[OPEN] : The name assign of register setting file(*.ak5) saved by [SAVE] is loaded.

7-3. Note

(1) All files used by [SAVE] and [OPEN] function on right side need to be in the same folder.

(2) When the register setting is changed by [SAVE] Button on the main window, the register setting file (*.akr) should be loaded again in order to reflect the change.

MEASUREMENT RESULTS

■ Audio

[Measurement condition]

- Measurement unit: Audio Precision SYS-2722
- BW : 20Hz~20kHz
- Power Supply : VP=12V, VD=5V, VDD1=5V, VDD2=5V
- Interface : Input: Cannon, Output: BNC
- Temperature : Room
- Volume#0 Gain : 0dB
- Measurement signal line path: AINL/AINR → Volume#0 → TVOUTL/TVOUTR

Parameter	Input signal	Measurement filter	Results Lch [dB]	Results Rch [dB]
S/(N+D) (At 2Vrms Output)	1kHz, 0dBFS	20kLPF	93.9	94.5
DR	1kHz, -60dBFS	22kLPF, A-weighted	98.5	98.6
S/N	"no-input"	22kLPF, A-weighted	98.5	98.6

Plots

- Figure 1-1. FFT (1kHz, 0dBFS input) at 2Vrms output
- Figure 1-2. FFT (1kHz, -60dBFS input)
- Figure 1-3. FFT (Noise floor)
- Figure 1-4. THD+N vs. Input Level (fin=1kHz)
- Figure 1-5. THD+N vs. fin (Input Level=0dBFS)
- Figure 1-6. Linearity (fin=1kHz)
- Figure 1-7. Frequency Response (Input Level=0dBFS)
- Figure 1-8. Crosstalk (Input Level=0dBFS)

■ Video

[Measurement condition]

- Signal Generator : Sony Tectonics TG2000
- Measurement unit: Sony Tectonics VM700T
- Power Supply : VP=12V, VD=5V, VDD1=5V, VDD2=5V
- Interface : Input: BNC, Output: BNC
- Temperature : Room
- Measurement signal line path: S/N: ENCV → TVVOUT
Y/C Crosstalk: ENCV → TVVOUT, ENCRC → TVRC
DG, DP: ENCV → TVVOUT

Parameter	Input Signal	Measurement Filter	Results	Unit
S/N	0% Flat Field	BW=15kHz to 5MHz Filter=Uni-Weighted	73.1	dB
Y/C Crosstalk (Measured at TVVOUT)	100% Red Field (Y→ENCV, C→ENCRC)	BW=15kHz to Full	-51.9 (Note1)	dB
DG	Modulated Lamp		Min:-0.07 Max:0.06	%
DP	Modulated Lamp		Min:-0.01 Max:0.30	deg.

Plots

Figure 2-1. Noise spectrum (Input=0% Flat Field, BW=15kHz to 5MHz, Filter=Uni-Weighted)

Figure 2-2. Y/C Crosstalk (Measured at TVVOUT, Input= 100% Red, ENCV=Y, ENCRC=C), BW=15kHz to Full)

Figure 2-3. DG, DP (Input= Modulated Lamp)

(Note1) Y/C Crosstalk: Reference Measurement: Results: 1.9dB (p-p)

Composite signal→ENCV, no input→ENCRC, TVRC is terminated by 75Ohm.

Y/C Crosstalk: Measurement: Results: -50.0dB (p-p)

Y→ENCV, C→ENCRC, TVRC is terminated by 75Ohm.

Y/C Crosstalk calculation: -50.0 dB (p-p) -1.9dB (p-p) = -51.9 dB (p-p)

Plots (Audio)

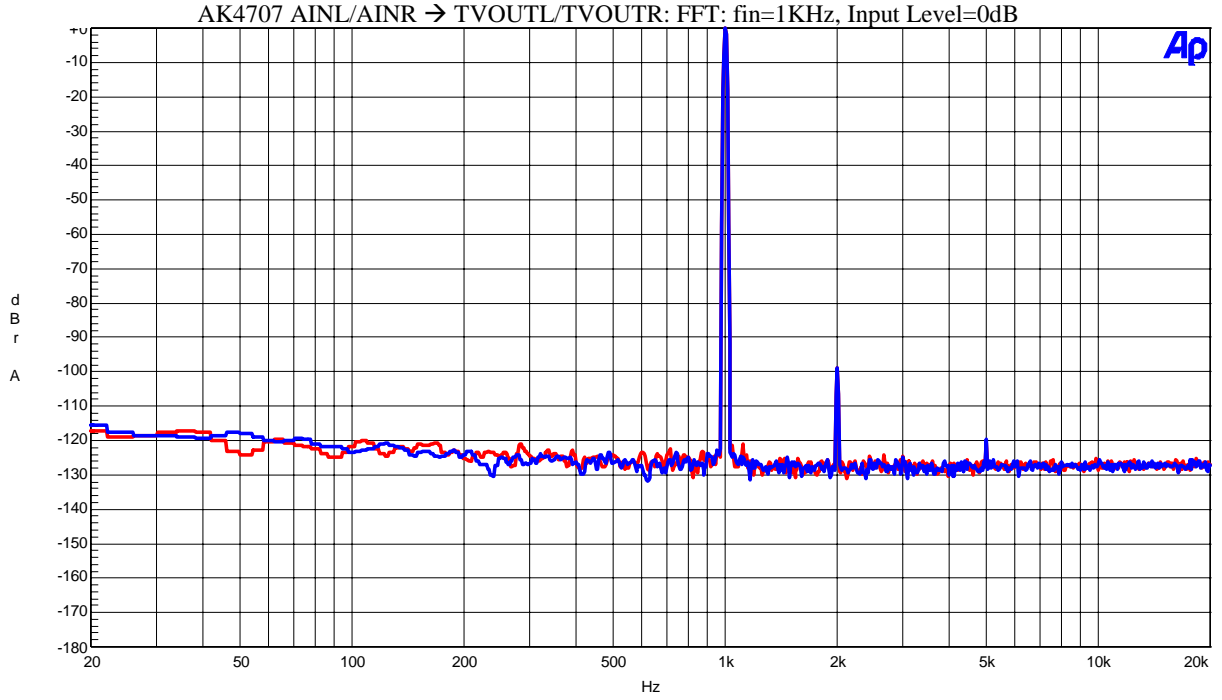


Figure1-1. FFT (fin=1kHz, Input Level=0dBFS)

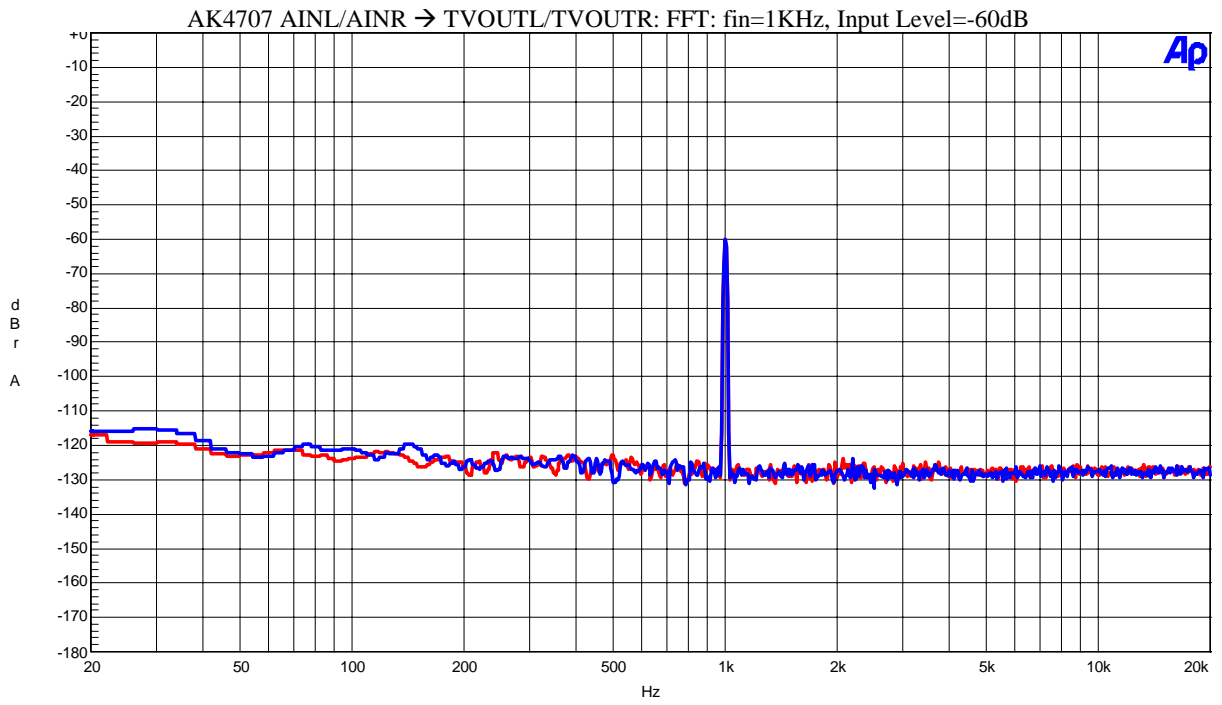


Figure-1-2. FFT (fin=1kHz Input Level=-60dBFS)

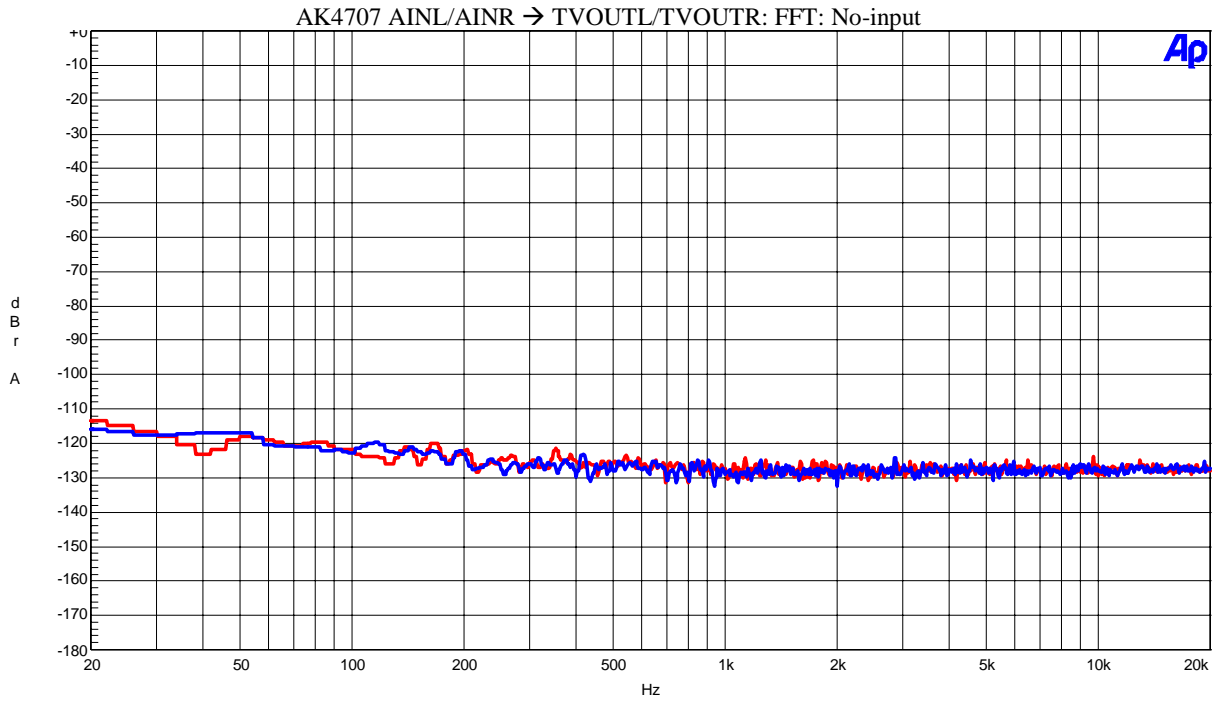


Figure1-3. FFT (Noise Floor)

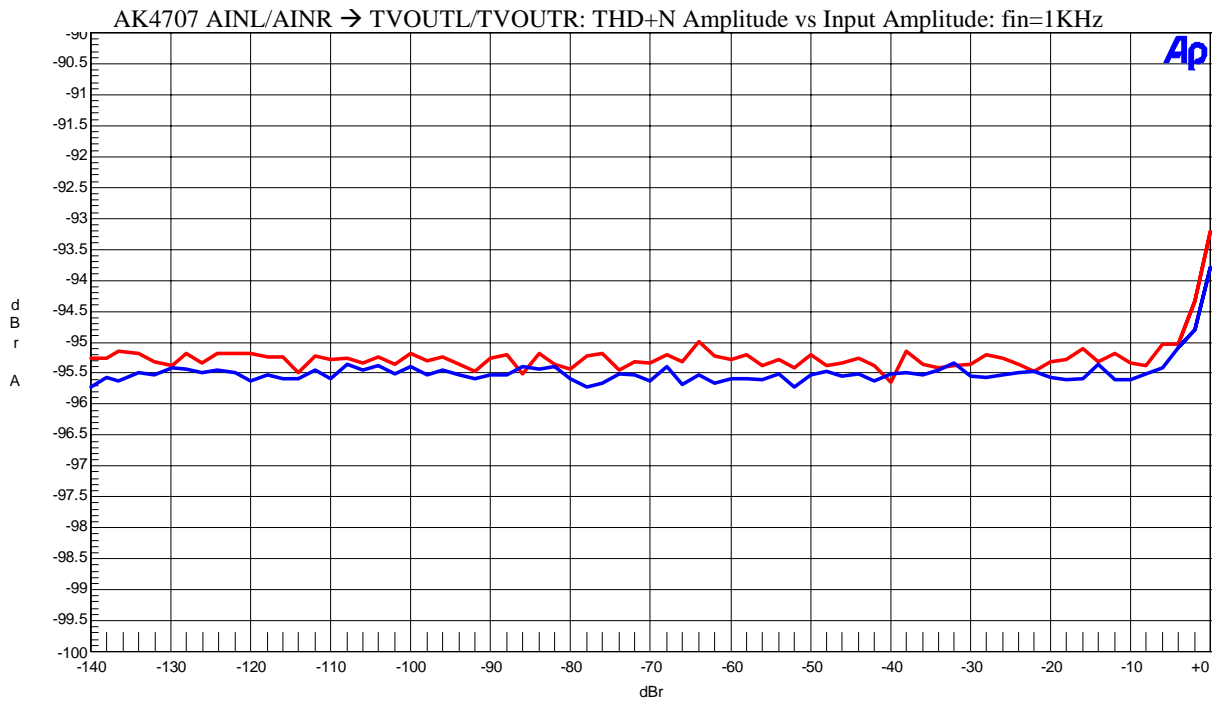


Figure1-4. THD+N vs. Input level (fin=1kHz)

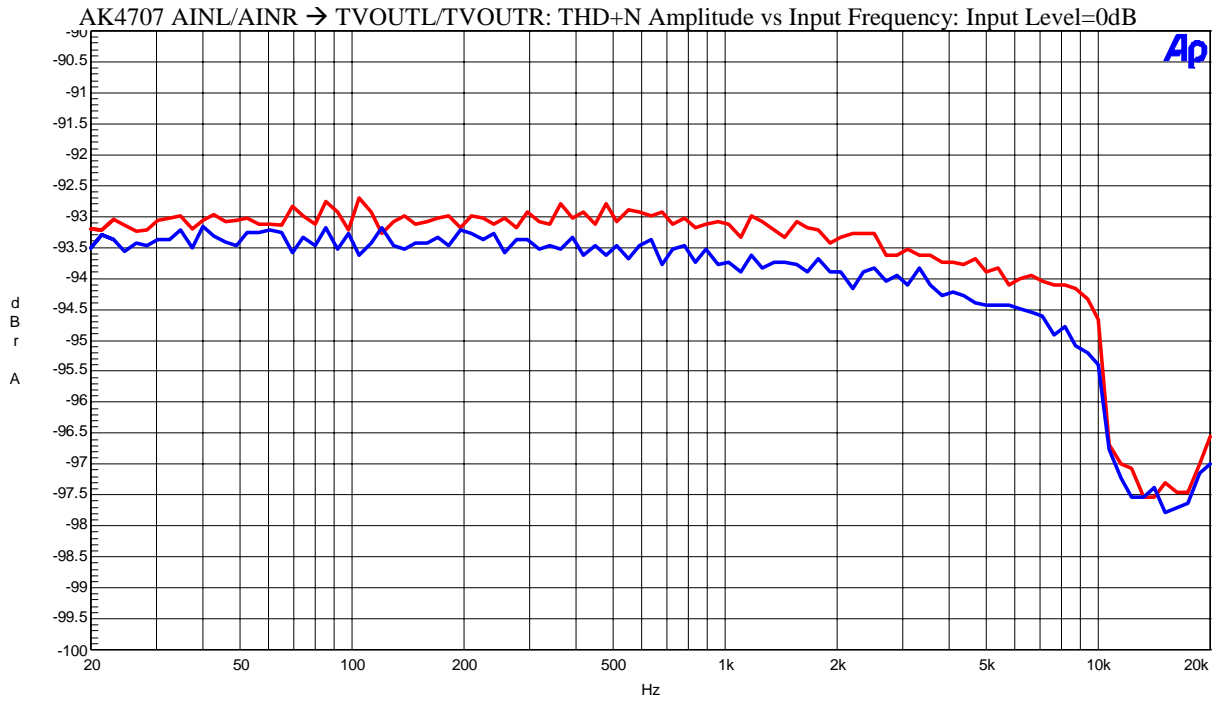


Figure1-5. THD+N vs. Input Frequency (Input level=0dBFS)

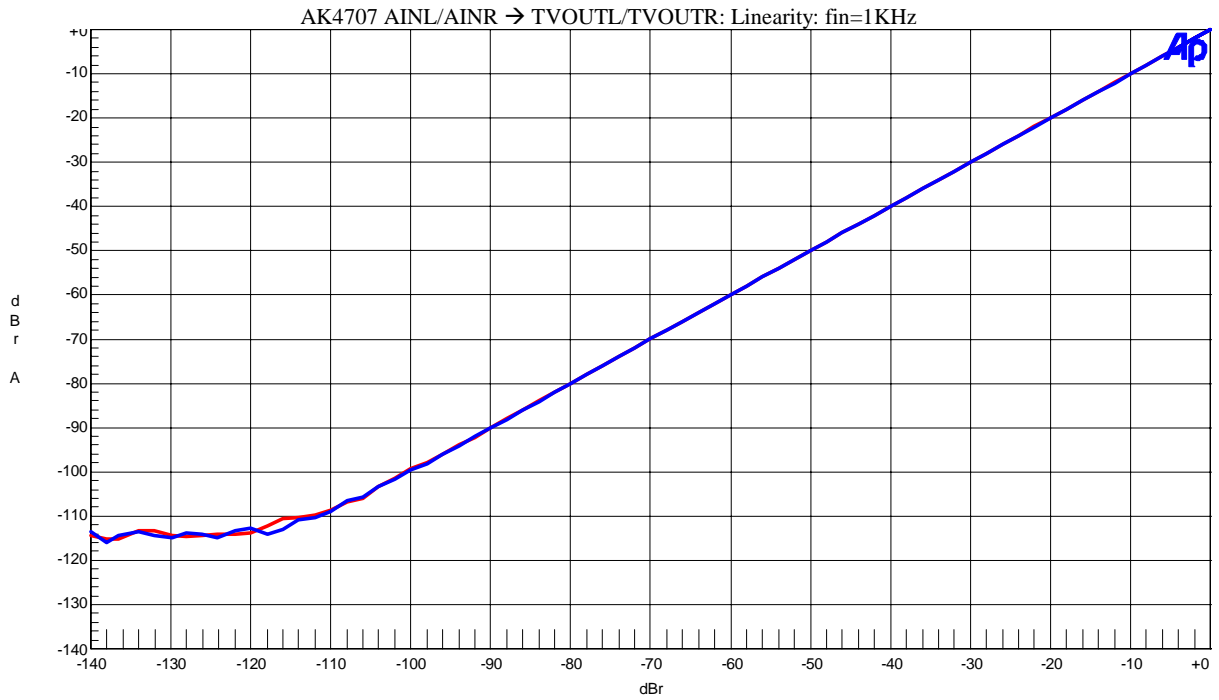


Figure1-6.Linearity (fin=1kHz)

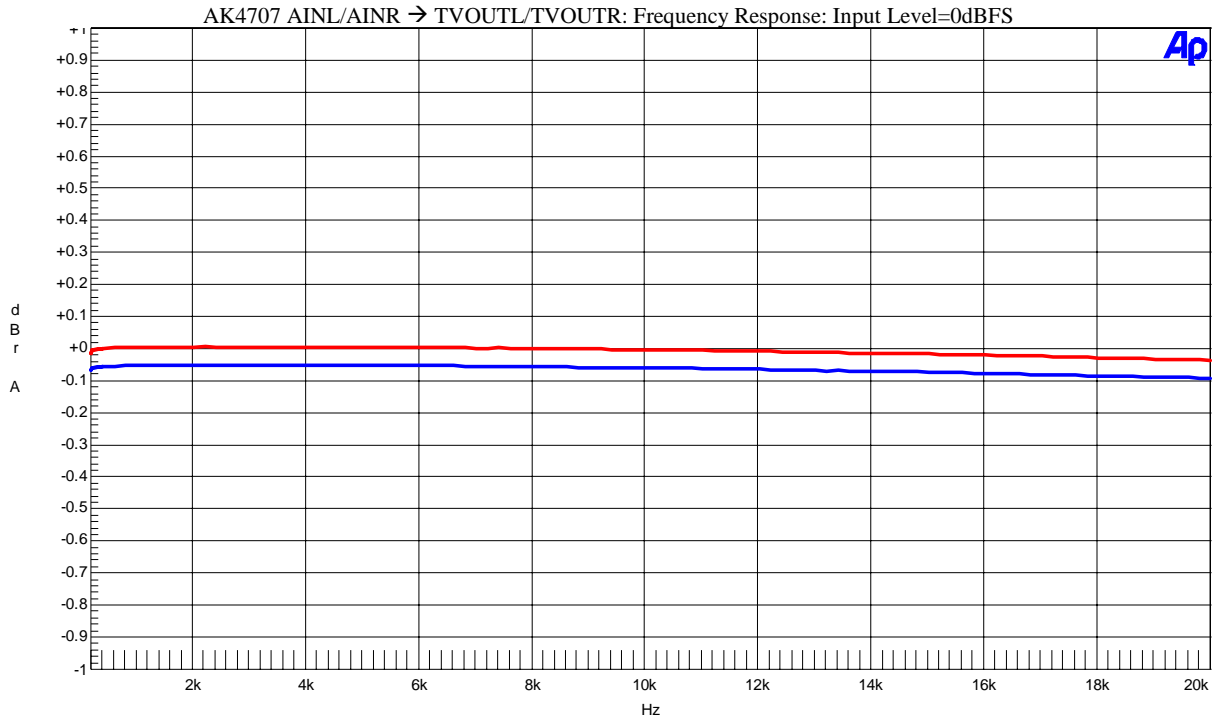


Figure1-7. Frequency Response (Input level=0dBFS)

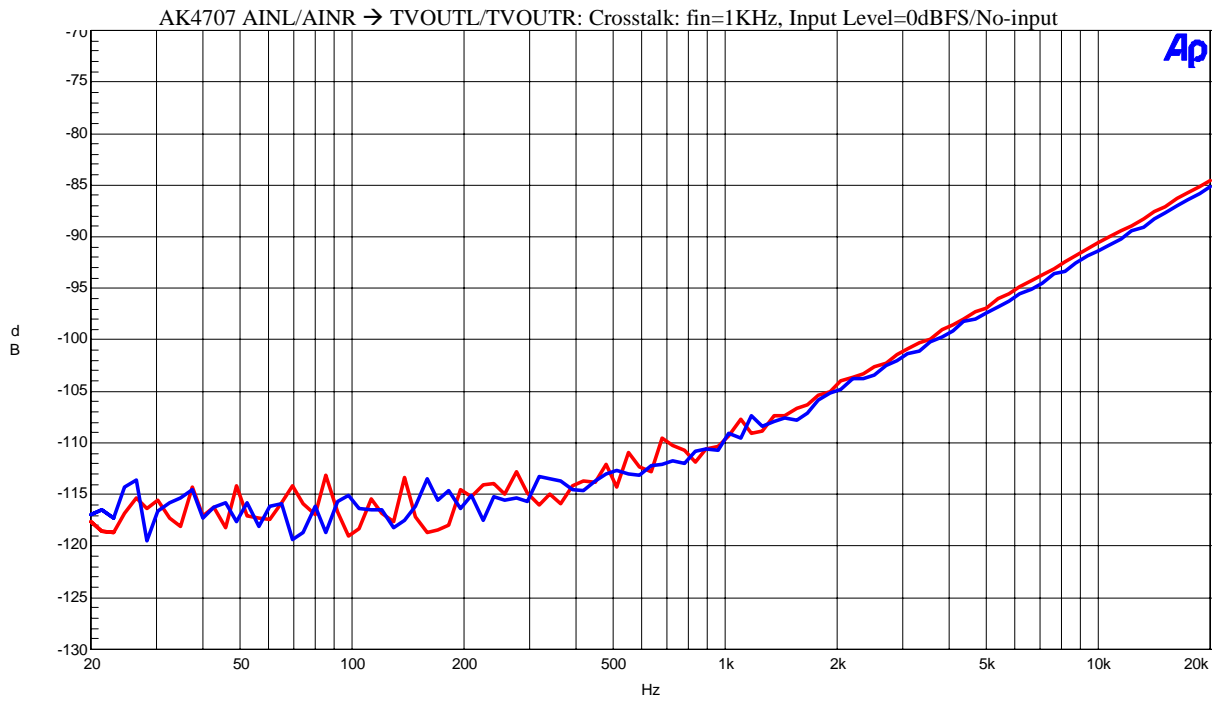


Figure1-8. Crosstalk (Input level=0dBFS)

Plots(Video)

AK4707 ENCV → TVVOUT: S/N: Input Signal=0% Flat Field, BW=15kHz to 5MHz, Filter=Uni-Weighted

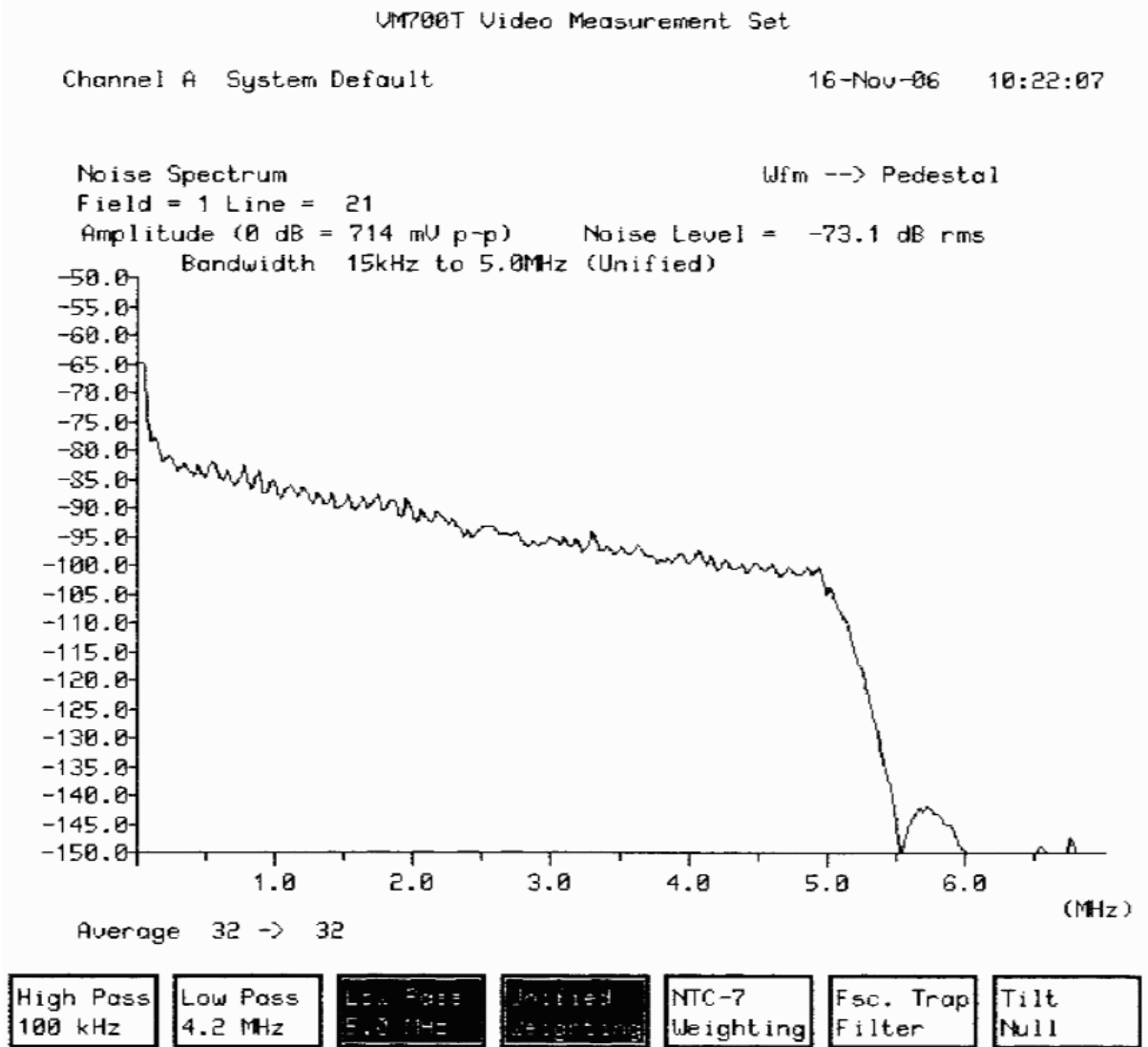


Figure 2-1. Noise spectrum (Input=0% Flat Field, BW=15kHz to 5MHz, Filter=Uni-Weighted)

AK4707 ENCV → TVVOUT/ENCRC → TVRC: Y/C Crosstalk: Input Signal=100% Red Field,
Y → ENCV, C → ENCRC, BW=15kHz to Full

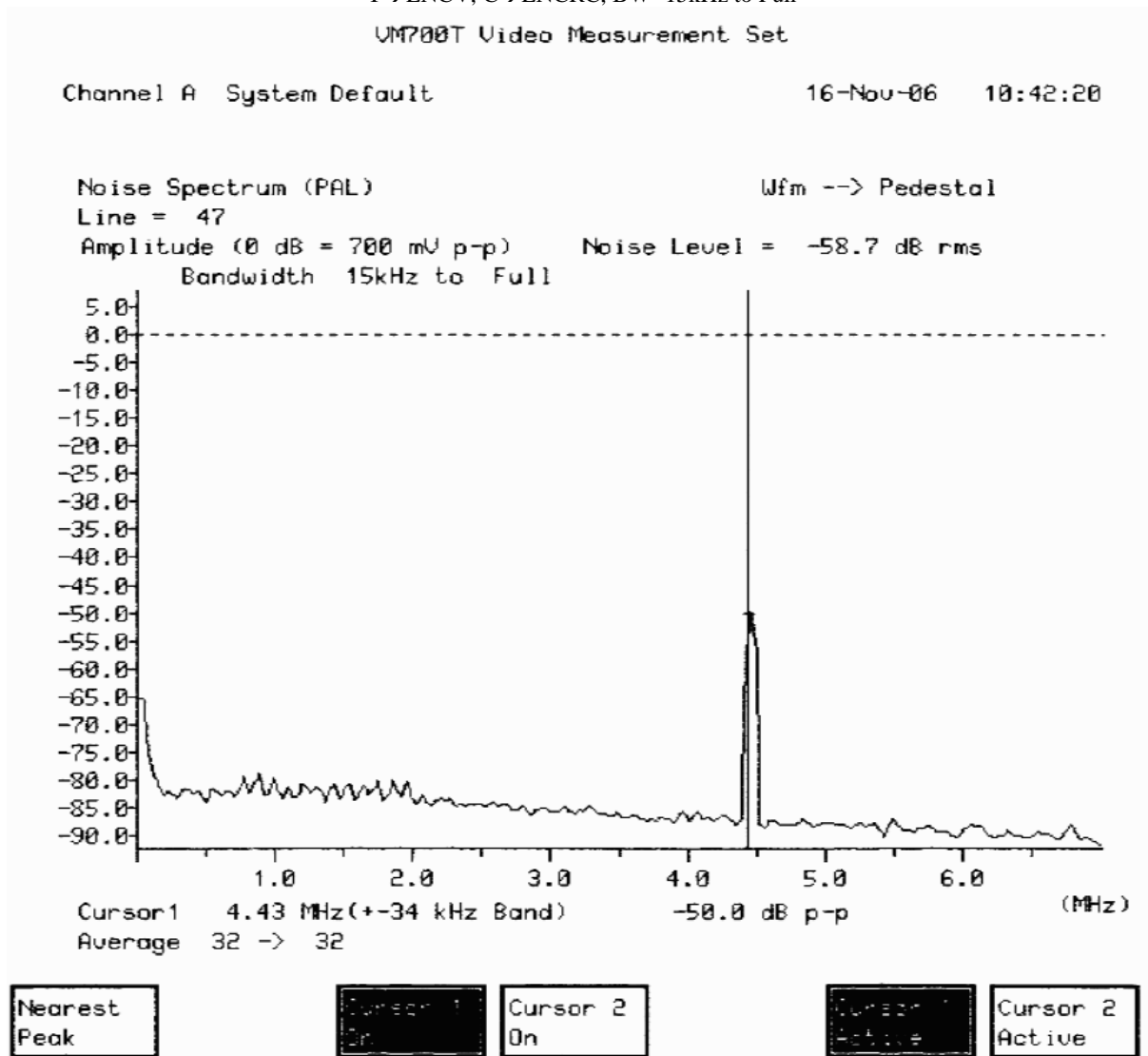


Figure 2-2 Crosstalk (Measured at TVVOUT, Input= 100% Red Field, Y → ENCV, C → ENCRC, BW=15kHz to Full)

AK4707 ENCV → TVVOUT: DG, DP: Input Signal=Modulated Ramp

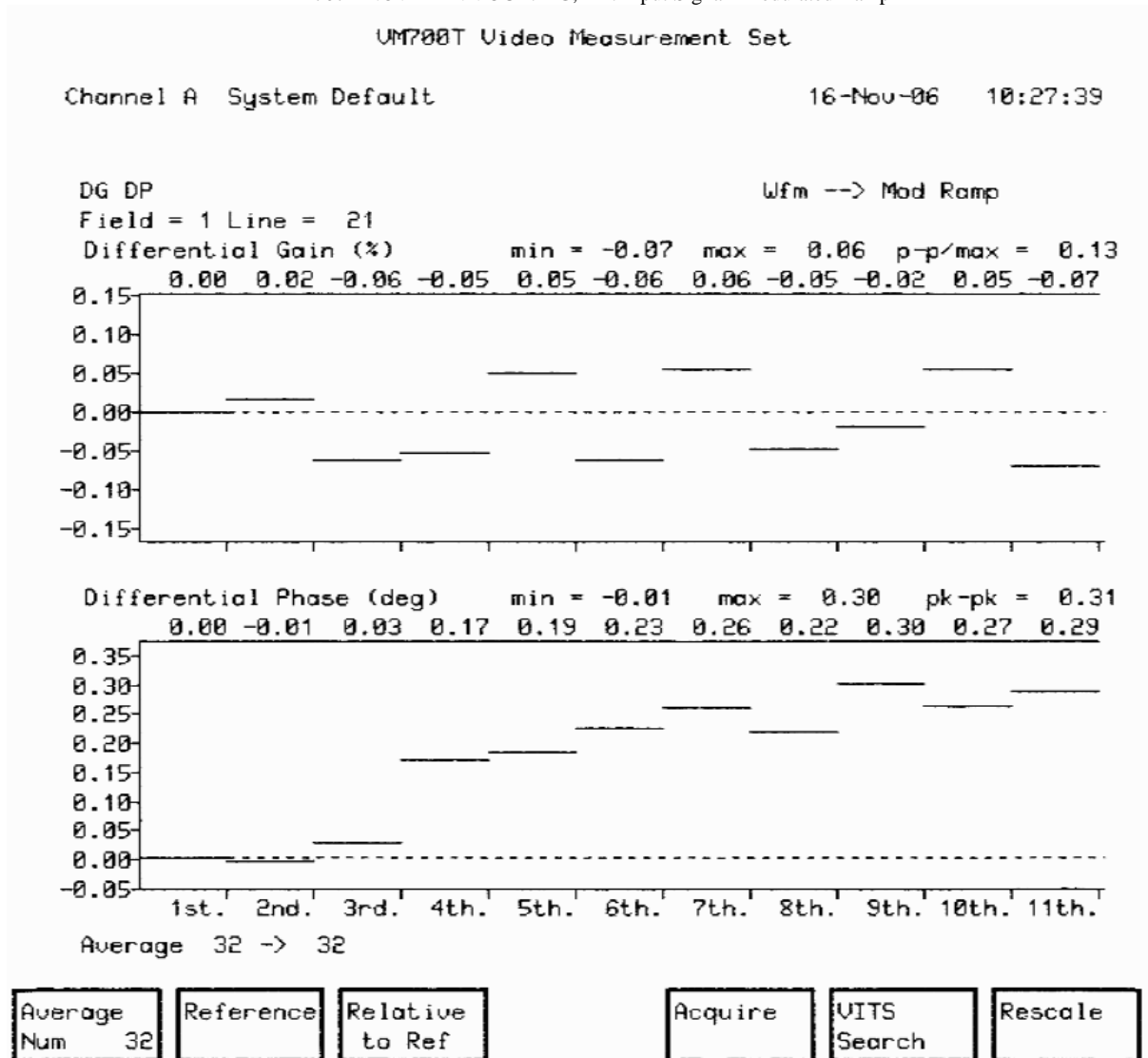


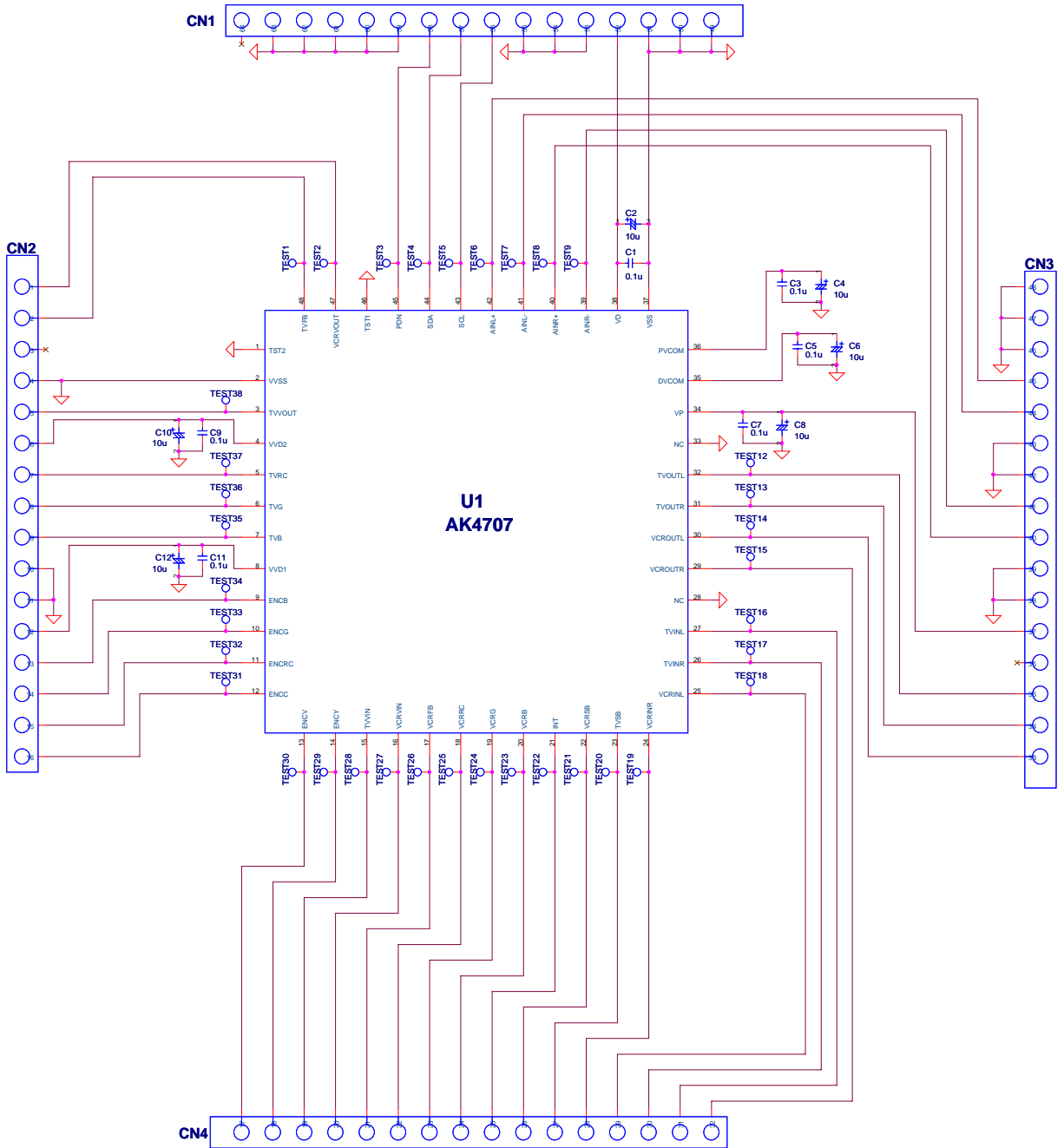
Figure 2-3 DG, DP (Input Signal= Modulated Lamp)

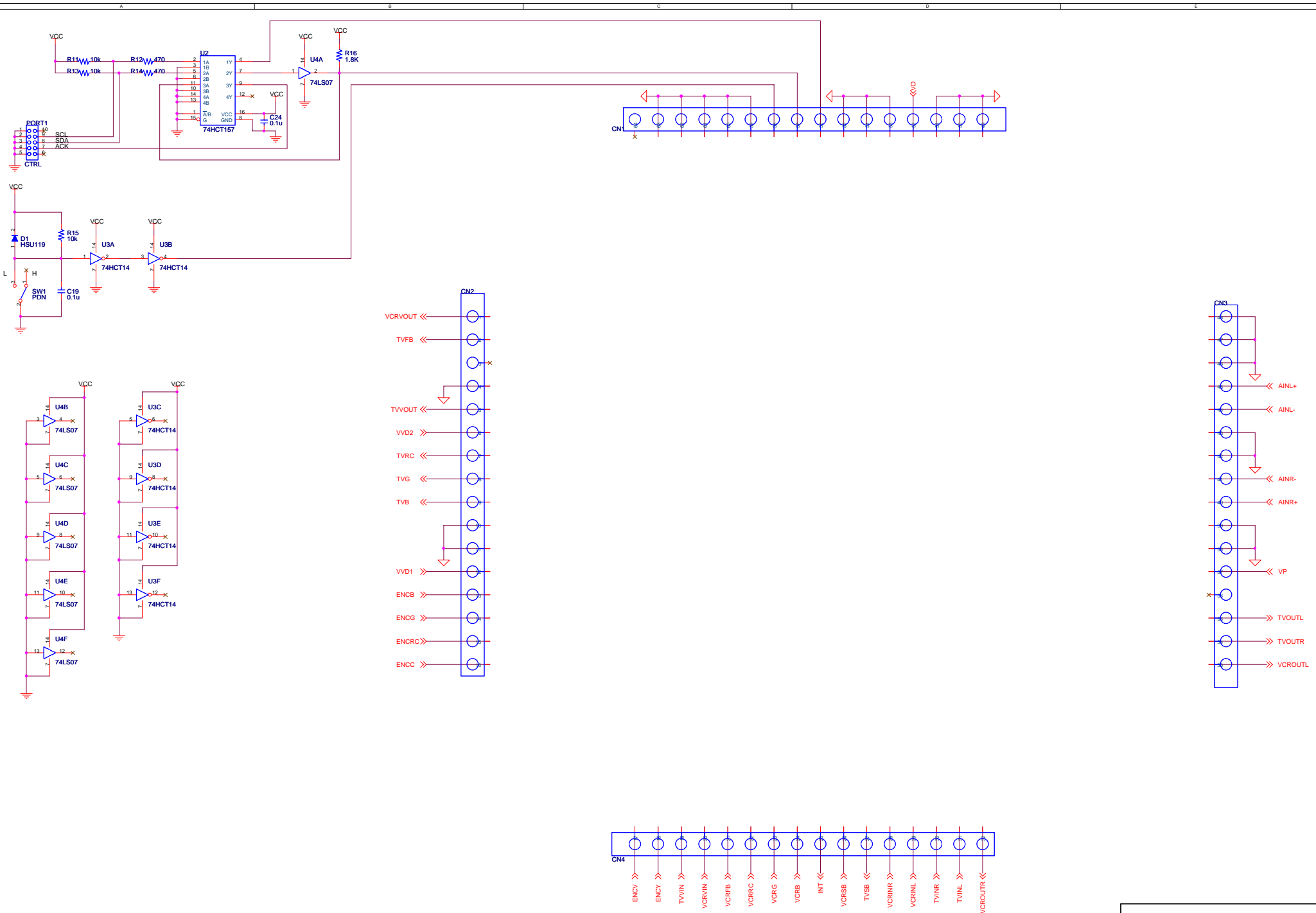
Revision History

Date (YY/MM/DD)	Manual Revision	Board Revision	Reason	Contents
06/04/30	KM083600	0	First Edition	
06/07/31	KM083601	1	Device Rev. Change	IC: AK4707: Rev.A→Rev.B
07/01/09	KM083602	1	Add Measurement Results	Add Table Data, Plot Data

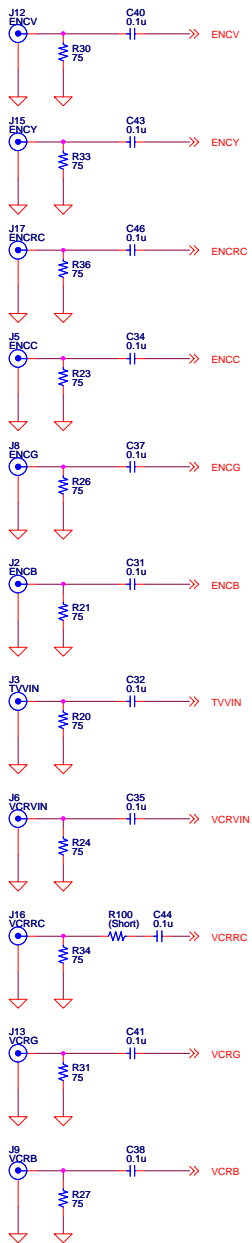
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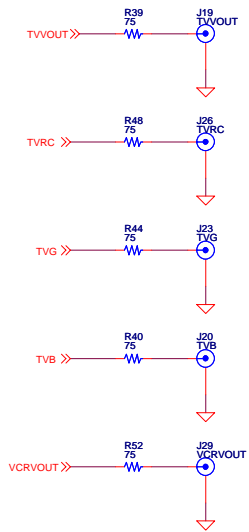




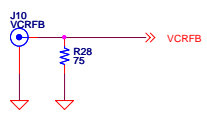
Video Input



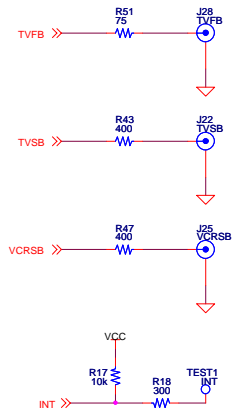
Video Output



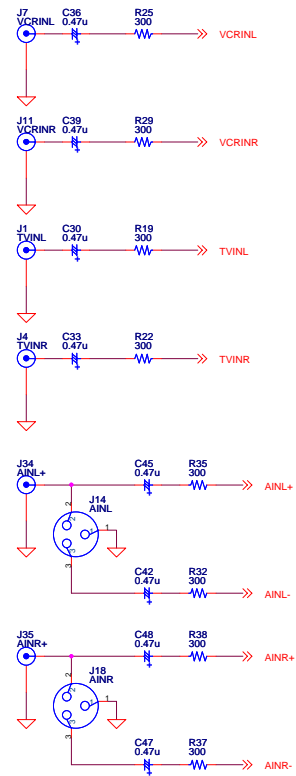
Blanking Input



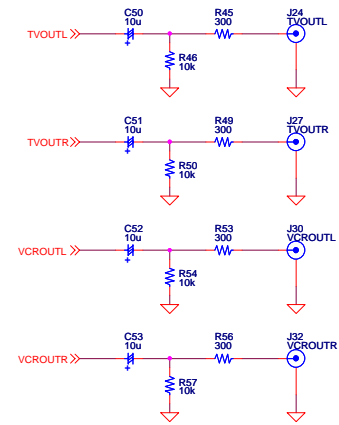
Blanking Output

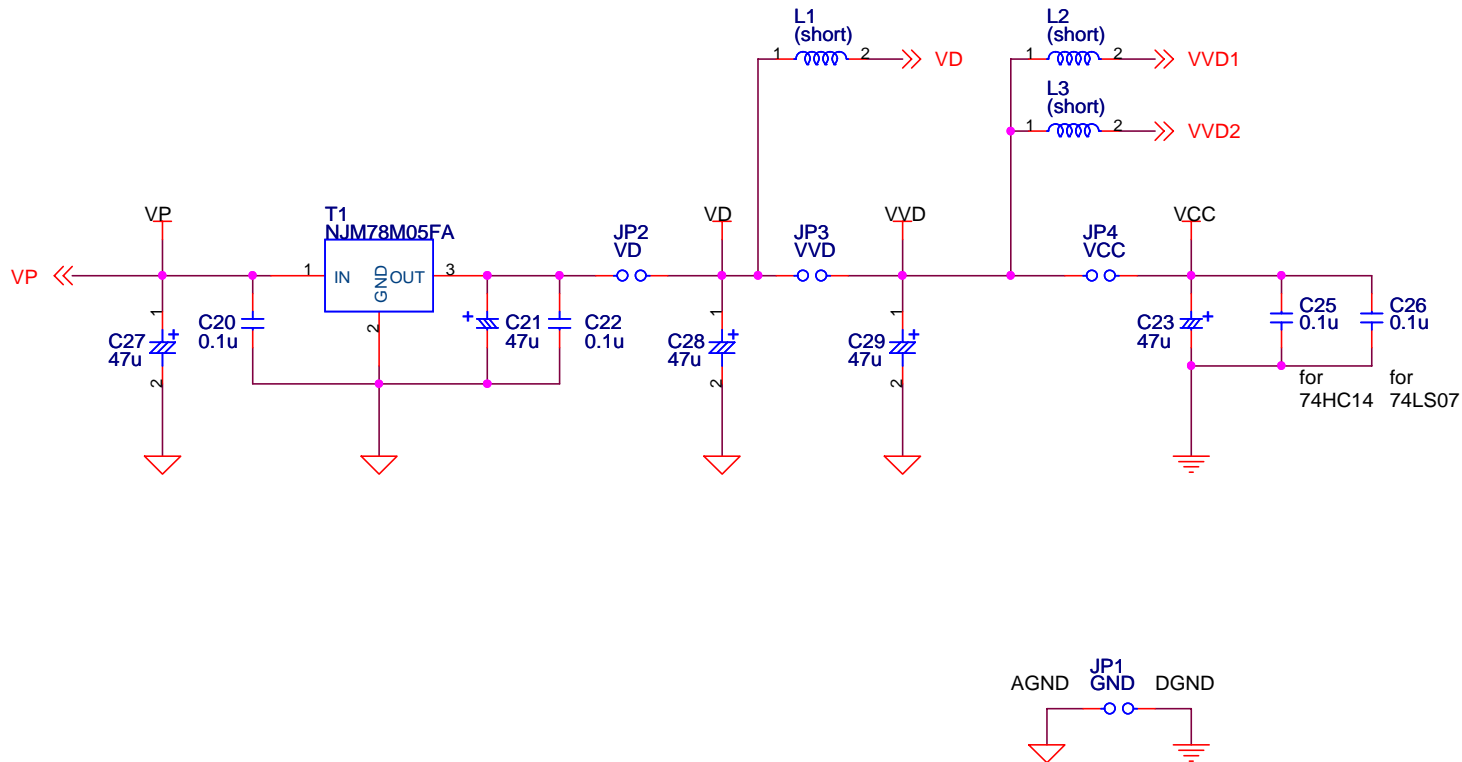


Audio Input

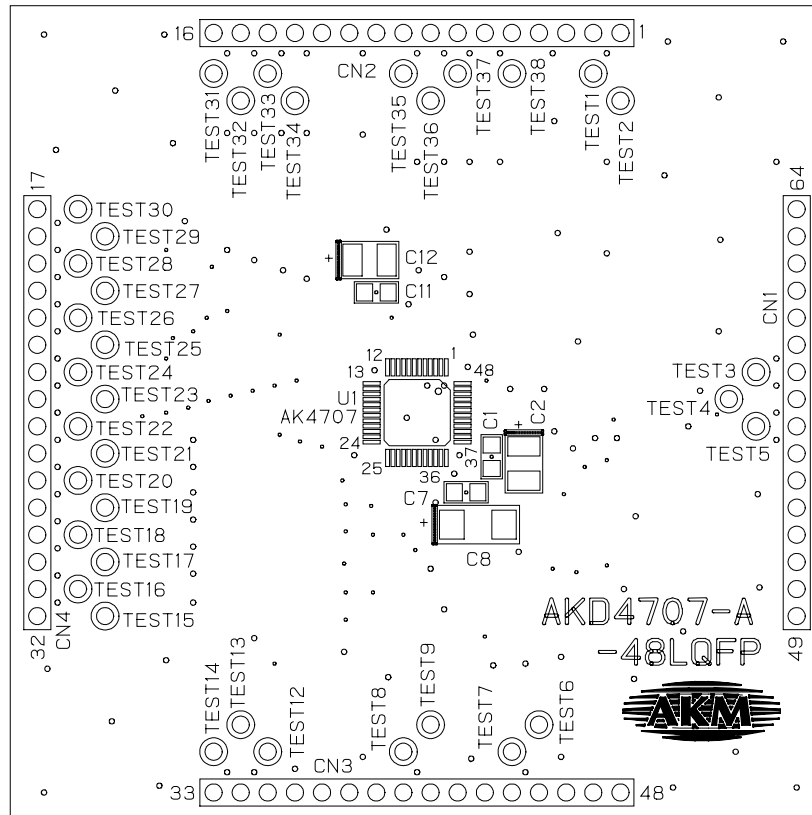


Audio Output

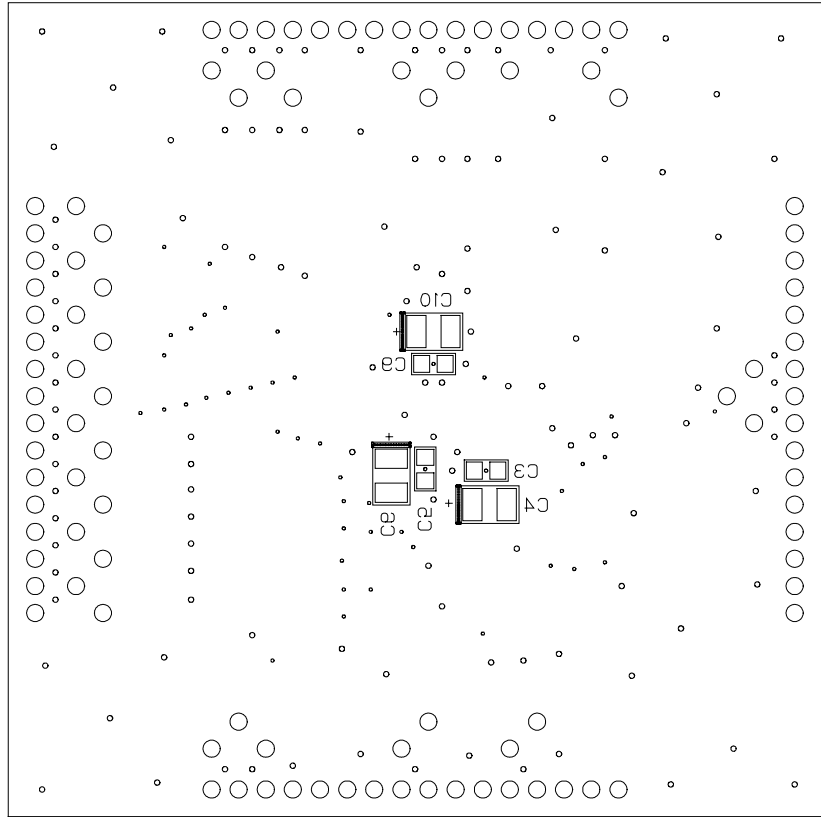




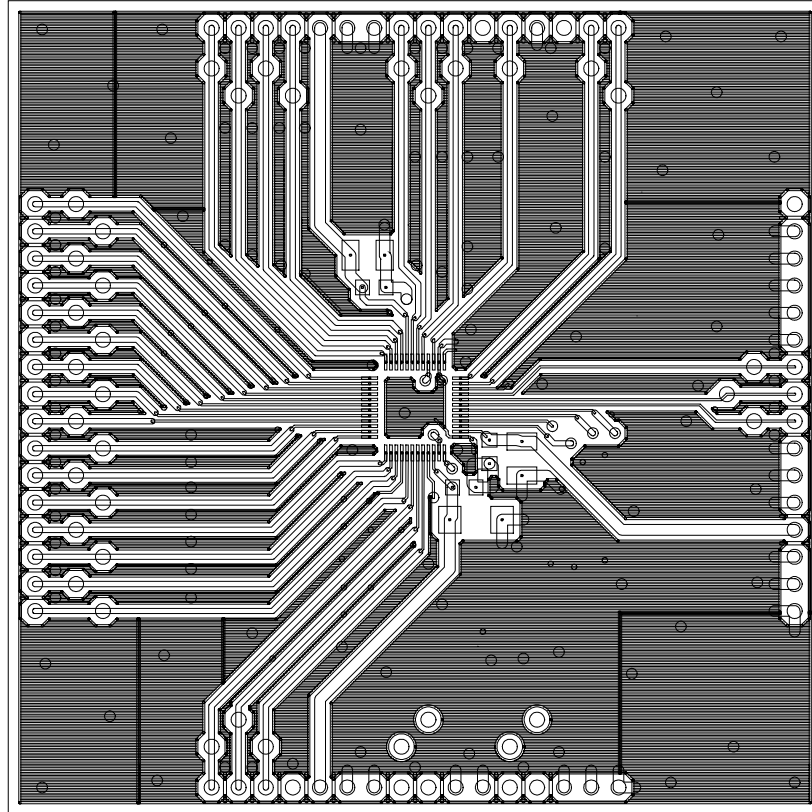
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Size	Document Number	Power Supply		Rev	
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Date:	Monday, July 31, 2006	Sheet	3	of	3



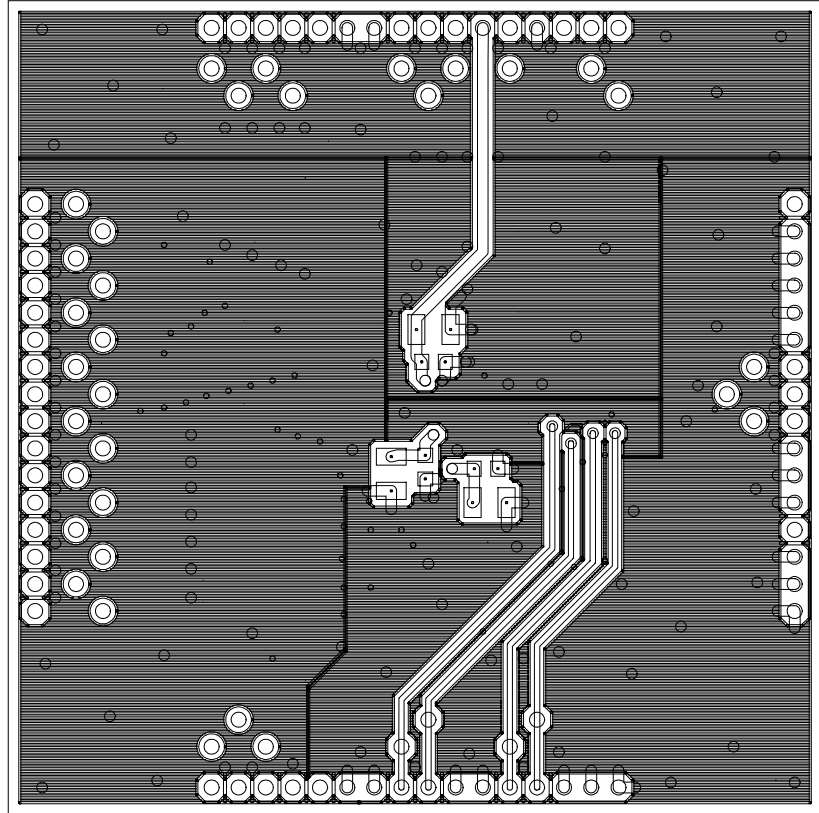
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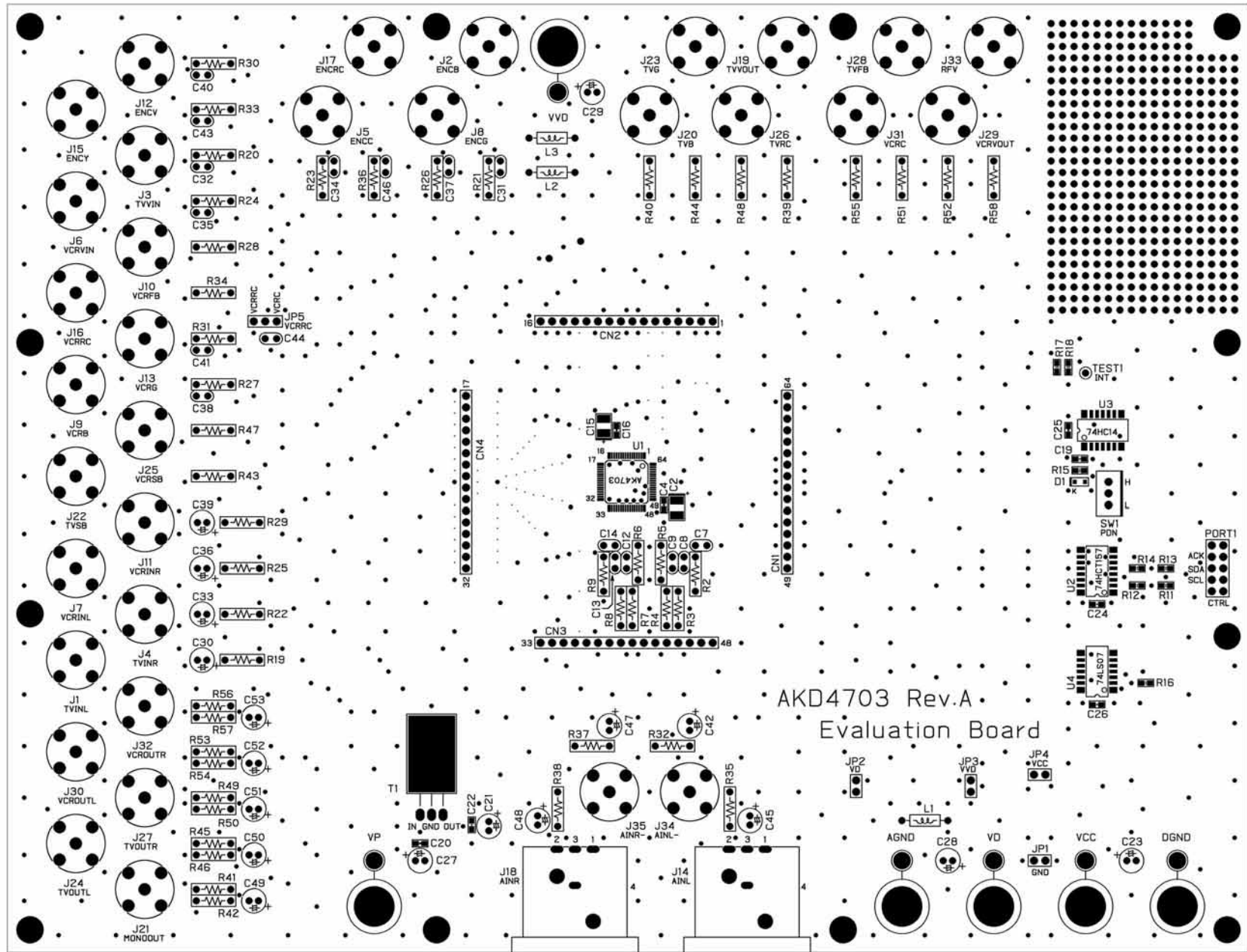
AKD4707-A 48LQFP L2 SR SILK



AKD4707-A 48LQFP L1

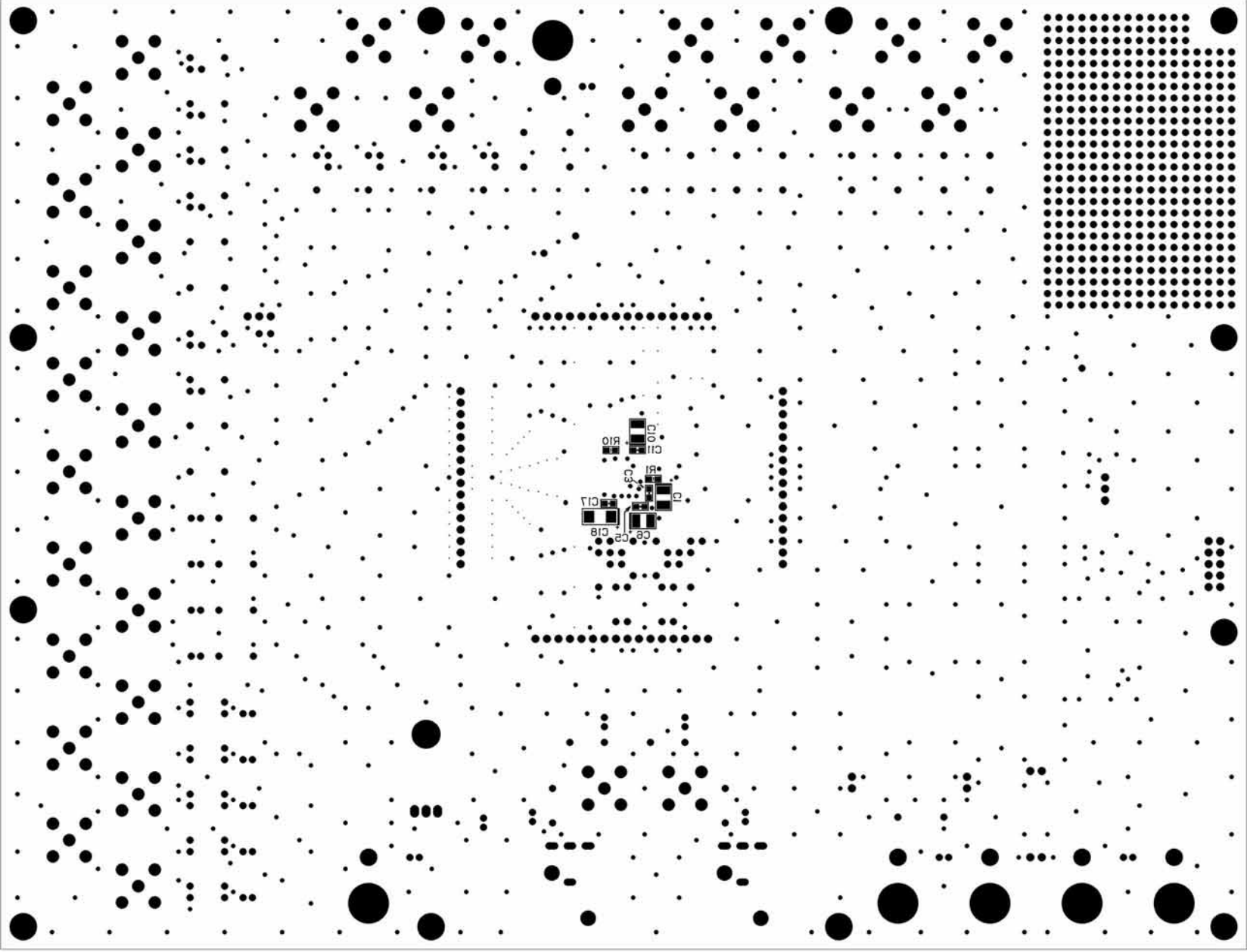


AKD4707-A 48LQFP L2

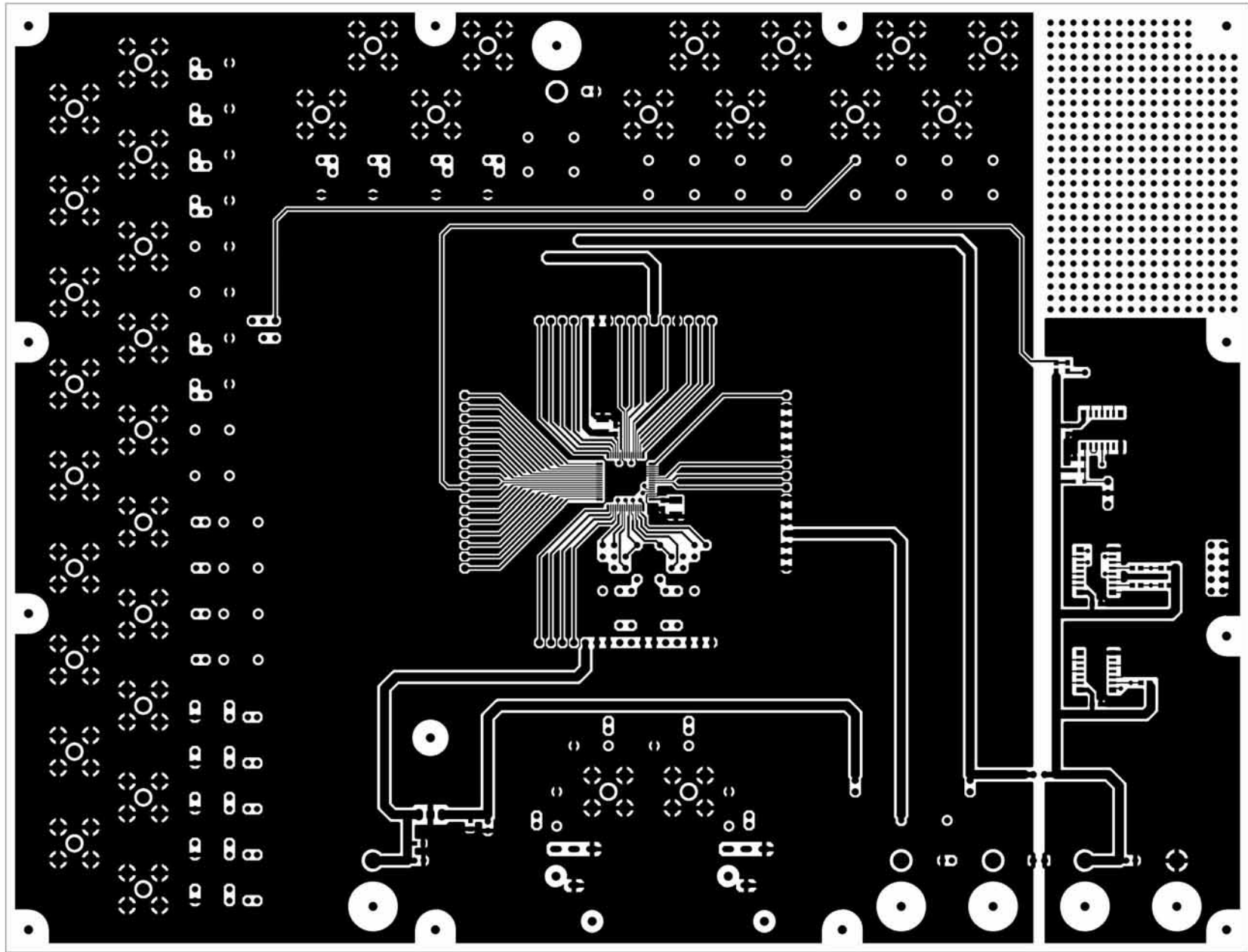


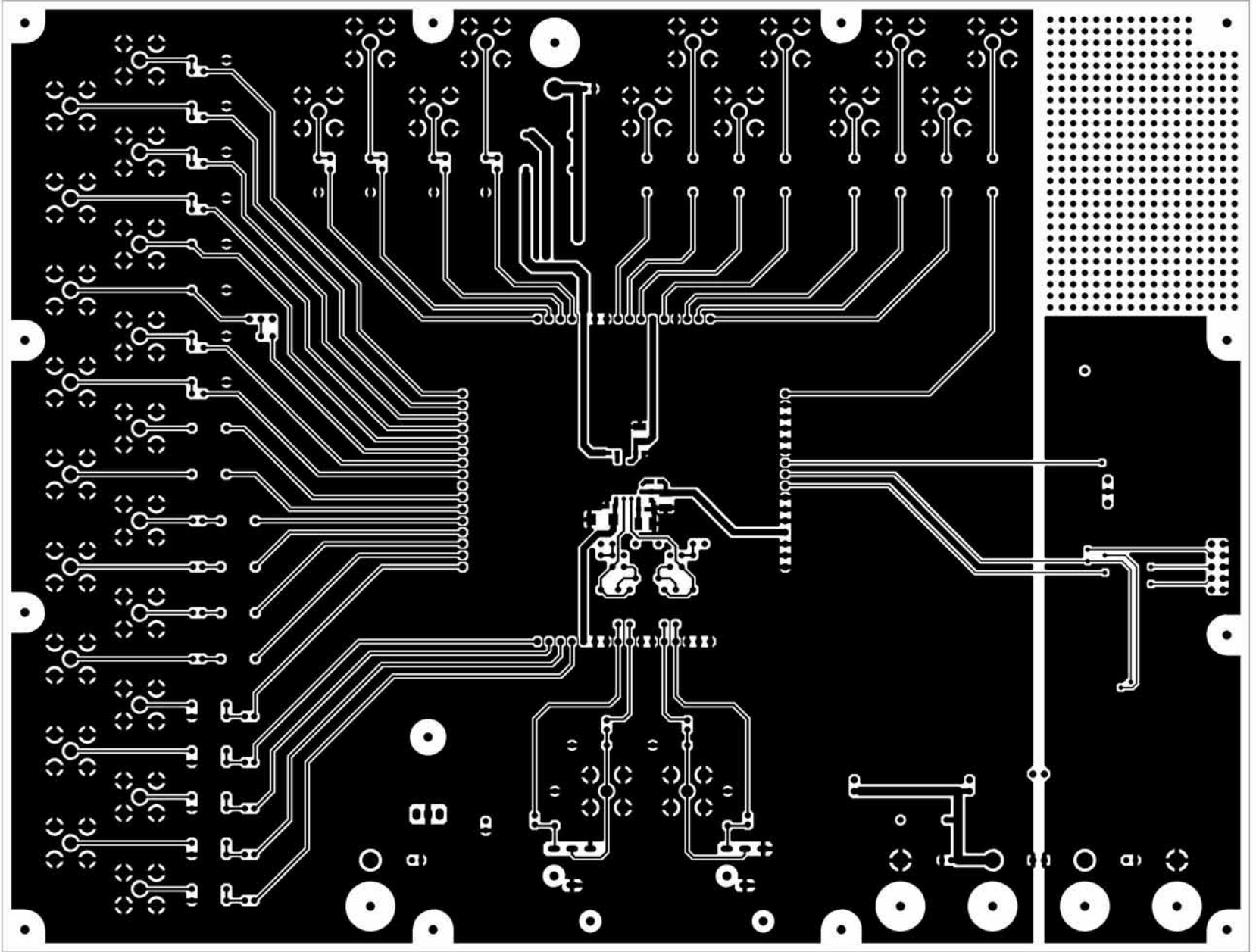
AKD4703 Rev.A
Evaluation Board

AKD4703 Rev.A L1 SR SILK



AKD4703 Rev.A LS SR SILK





AKD4703 Rev.A LS