

**AsahiKASEI**  
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**AKD4186-A**  
Evaluation board Rev.1 for AK4186

### GENERAL DESCRIPTION

AKD4186-A is the board for evaluation of the touch screen controller AK4186, which adopted the CSP small package suitable for the cellular phone, the handheld game machine. Since AKD4186-A has a touch-screen I/F and a digital I/O power supply input terminal, it is easily connectable with a target system of low power/voltage drive. Furthermore, since the analog input terminal is equipped analog voltage can also be measured.

### ■ Ordering guide

AKD4186-A --- Evaluation board for AK4186  
(Cable for connecting with printer port of IBM-AT compatible PC and control software are packed with this. This control software does not operate on Windows NT.)

### FUNCTION

- I<sup>2</sup>C serial I/F
- Touch-screen I/F (4-wire, 5-wire)
- Analog input terminal
- Digital I/O power supply terminal

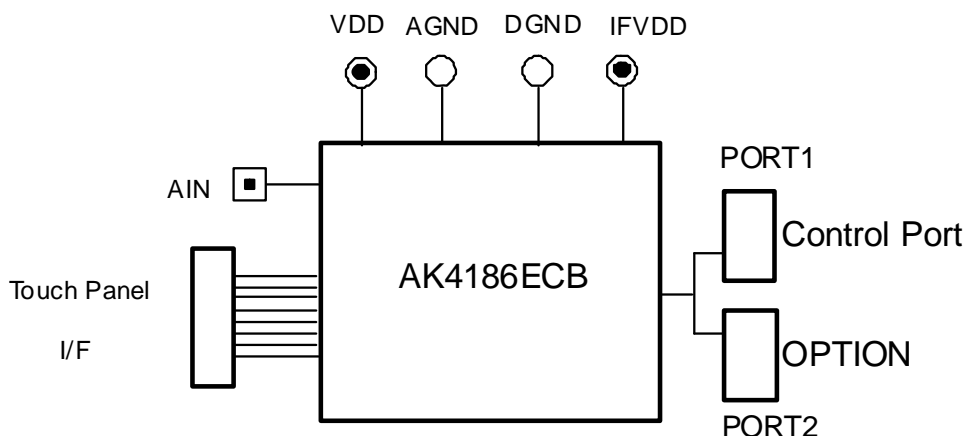


Figure 1. AKD4186 Block Diagram

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

## BOARD OUTLINE CHART

## ■ Outline Chart

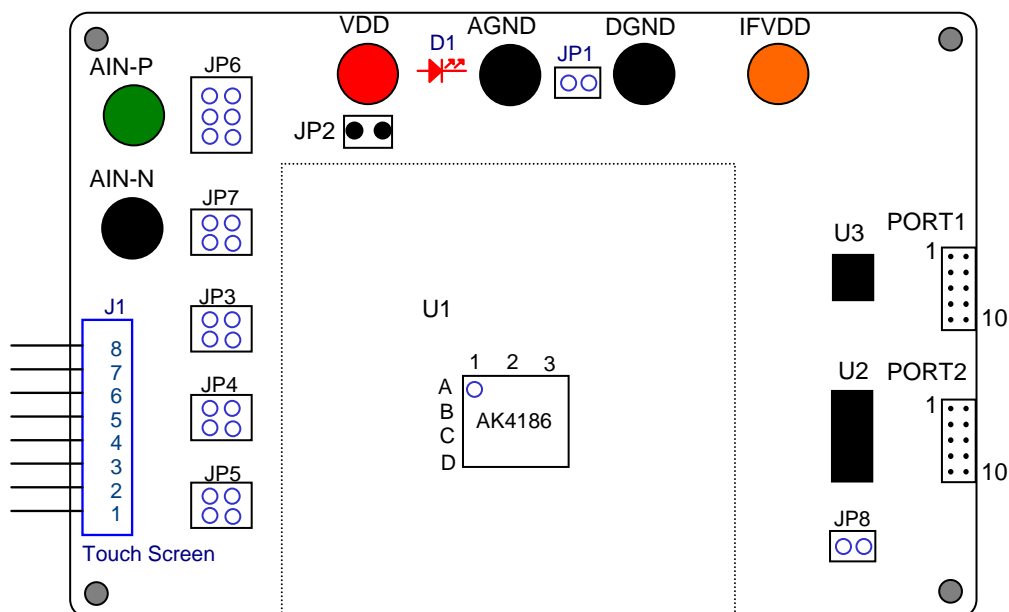


Figure 2. AKD4186-A Outline Chart

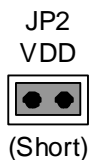
## ■ Comment

- (1) 4/5 WIRE Touch Screen  
Connector for the touch screen connection. Match the pins of the screen with these connectors and connect the touch screen.
- (2) AIN-P, AIN-N  
AIN-P is an analog input pin. The signal of 0V~VDD can be input.  
AIN-N must be left open.
- (3) VDD, AGND, DGND, IFVDD  
Connect power supply with these pins.
- (4) D1  
LED turns on when the AK4186 is powered up.
- (5) PORT1  
Control port. Connect the bundled cable into this port.
- (6) PORT2  
This Port is for test.
- (7) JP1~JP8  
Jumper pins. Please refer to the following sections for explanation.

## ■ Operation sequence

- (1) Set up the power supply lines.

Set up the jumper pin.



Set up the power supply lines.

Name	Color	Voltage	Comments
VDD	Red	+1.6~+3.6V(typ1.8V)	Power supply for VDD of AK4186.
IFVDD	Orange	+1.2~+3.6V(typ3.3V)	Power supply for Digital logic circuits.
AGND	Black	0V	Analog GND.
DGND	Black	0V	Digital GND.

Table 1. Set up of power supply lines

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

- (2) Set up the evaluation mode and jumper pins. (See the followings.)
- (3) Power on.  
Run the control soft of the AK4186, and click the “RESET” button.

## ■ Evaluation mode

In case of evaluating a Touch Screen function of the AK4186, it is necessary to connect the Touch Screen with J1 terminal. Regarding pin assignment of J1, refer to Table 2, Table 3 or circuit diagram in this manual. As for the AK4186's register definitions, refer to datasheet of the AK4186.

### Applicable Evaluation Mode

- (1) 4-Wire Touch Screen position, pressure measurement and evaluation of A/D using the analog input terminal.
- (2) 5-Wire Touch Screen position measurement.

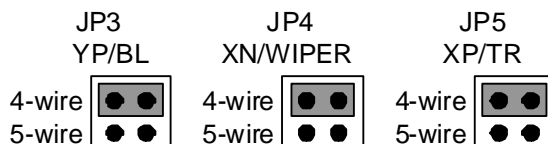
#### (1-1) 4-Wire Touch Screen position and pressure measurement.

4-wire resistive touch screen must be connected to J1.  
The pin assignment of J1 is shown on Table 2.

No.	Name	Description
8	YN	4-Wire Touch Screen Y-
7		
6	YP	4-Wire Touch Screen Y+
5		
4	XN	4-Wire Touch Screen X-
3		
2	XP	4-Wire Touch Screen X+
1		

Table 2. J1 (8P Header) pin assign

Set up the jumper pins.

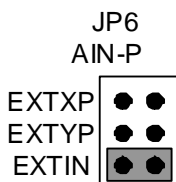


The "PANEL" of the AK4186's Control Soft must be set to "4-Wire".  
The A/D converter converts the voltage measured at the point where the screen is touched.

#### (1-2) Evaluation of A/D using the analog input terminal.

The analog generator must be connected to AIN-P terminal.

Set up the jumper pin.



The "SCREEN" of the AK4186's Control Soft must be set to "4-Wire".  
The A/D converter converts the voltage measured at AIN-P.

## (2) 5-Wire Touch Screen position measurement.

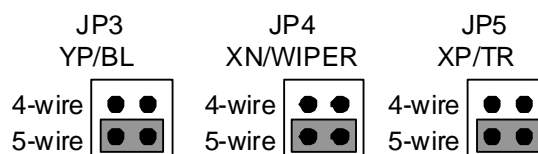
5-wire resistive touch screen should be connected to J1.

The pin assignment of J1 is shown on Table 3.

No.	Name	Description
8	NC	Nothing is connected to this pin
7	NC	Nothing is connected to this pin
6	NC	Nothing is connected to this pin
5	BL	5-Wire Touch Screen Bottom-Left
4	TL	5-Wire Touch Screen Top-Left
3	WIPER	5-Wire Touch Screen WIPER
2	BR	5-Wire Touch Screen Bottom-Right
1	TR	5-Wire Touch Screen Top-Right

Table 3. J1 (8P Header) pin assign

Set up the jumper pins.



The “PANEL” of the AK4186’s Control Soft should be set to “5-Wire”.

The A/D converter converts the voltage measured at the point where the screen is touched.

## ■ Other jumper pins set up

### Main Board

[JP1] Analog ground and Digital ground

OPEN: Separated.

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

[JP6] (AIN-P): Selection of AIN-P

EXTXP: AIN-P signal is input to XP/BR pin.

EXTYP: AIN-P signal is input to YP/TR pin.

EXTIN: AIN-P signal is input to IN/WIPER pin. <Default>

[JP7] (AIN-N): Selection of AIN-N

EXTXN: AIN-N signal is input to XN/TL pin. <Default>

EXTYN: AIN-N signal is input to YN/BL pin.

[JP8] (CAD0): Selection of CAD0

OPEN: Select CAD0 pin to “H” (CAD0 bit = “1”).

SHORT: Select CAD0 pin to “L” (CAD0 bit = “0”). <Default>

■ Indication for LED

[D1]: LED turns on when AK4186 power up.

■ Serial Control

The AKD4186 can be connected via the printer port (parallel port) of IBM-AT compatible PC. Connect PORT1 (Control Port) with PC by 10 wire flat cable packed with the AKD4186.

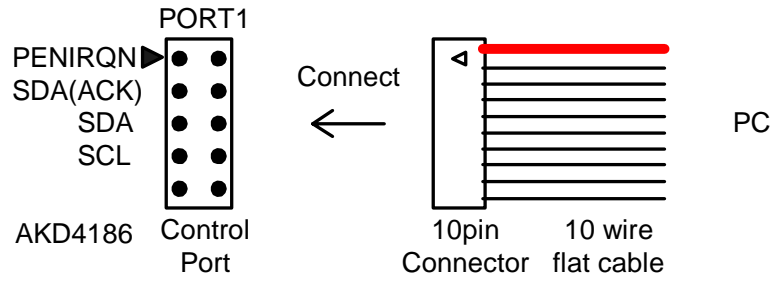


Figure 3. Connect of 10 wire flat cable

■ Touch Screen Input Circuits

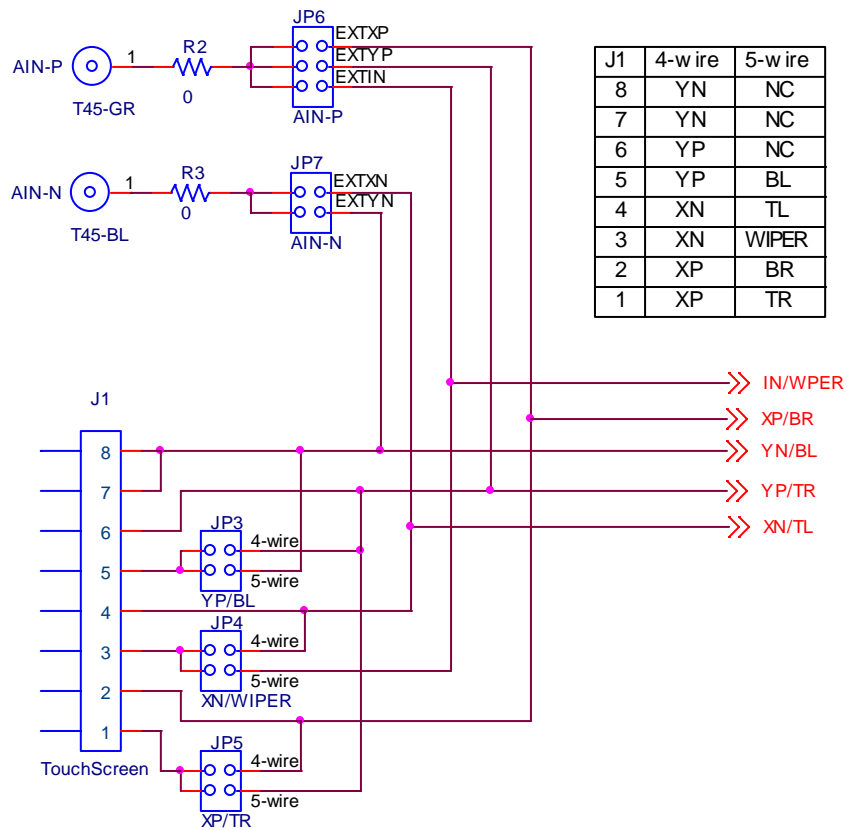


Figure 4. Touch Screen Input Circuits

\* AKEMD assumes no responsibility for the trouble when using the above circuit examples.



## CONTROL SOFTWARE MANUAL

### ■ Set-up of evaluation board and control software

1. Set up the AKD4186 board.
2. Connect IBM-AT compatible PC with AKD4186 by 10-line type flat cable (packed with AKD4186). 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/Vista. Please refer “Installation Manual of Control Software Driver by AKM device control software”. In case of Windows95/98/ME, this installation is not needed. In case of Windows Vista, please open the property of the control soft, and set the compatibility to “Windows XP”. This control software does not operate on Windows NT.)
3. Turn on power supply for the AKD4186 board.
4. Insert the CD-ROM labeled “AK4186 Evaluation Kit” into the CD-ROM drive.
5. Access the CD-ROM drive and double-click the icon of “akd4186.exe” to set up the control program.
6. Click the “RESET” on the top-left of the control soft window to reset the AK4186.
7. Then evaluate according to the follows.

## ■ Explanation of main window

When runs the control program, the window as shown in Figure 5 opens.

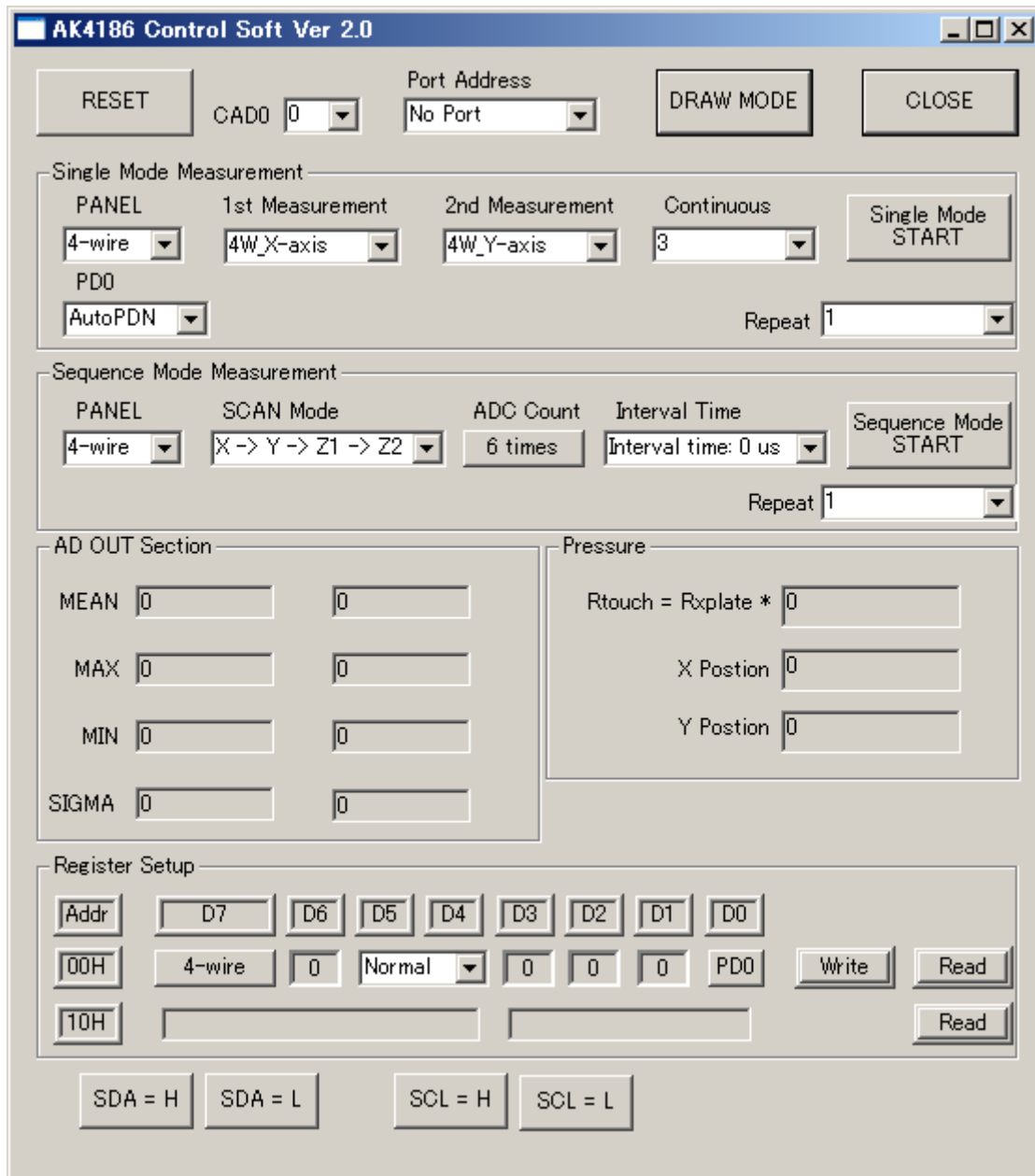


Figure 5. Control Soft window

1. Initial Setting
  - [Reset]: The AK4186 is reset.
  - [CAD0]: Please make it fit to the setting of CAD0 pin.
  - [Port Address]: The setting of Parallel Port. (Normally, this setting is not needed.)
  
2. Single Mode Measurement
  - AK4186 measures the position of 4-wire or 5-wire touch screen and the voltage of analog input.
  - [PANEL]: Select the touch screen interface. (PANEL bit)
  - [1st Measurement]: Select last Measurement Channel for the 1st Measurement.
  - [2nd Measurement]: Select last Measurement Channel for the 2nd Measurement.
  - [Continuous]: Set A/D conversion times and continuously outputs ADC data.
  - [Repeat]: Set measurement times of repeat.
  - [Single Mode Start]: Start the single measurement.
  
3. Sequence Mode Measurement
  - AK4186 measures the position of 4-wire or 5-wire touch screen and the voltage of analog input.
  - [PANEL]: Select the touch screen interface. (PANEL bit)
  - [SCAN Mode]: Select the sequence mode.
  - [ADC Count]: Set the A/D conversion count. (COUNT bit)
  - [Interval Time]: Set the sampling interval time. (INTERVAL 2-0 bits)
  - [Repeat]: Set the measurement times of repeat.
  - [Sequence Mode Start]: Start the sequence measurement.
  
4. Show the Measurement Result (AD OUT Section)
  - [MEAN]: The average value of measurement result is shown.
  - [MAX]: The maximum value of measurement result is shown.
  - [MIN]: The minimum value of measurement result is shown.
  - [SIGMA]: The standard deviation of measurement result is shown.
  
5. Show the Measurement Result of Pen Pressure (For 4-wire Touch Screen)
  - In case of selecting the SCAN Mode to “X→Y→Z1→Z2” at the sequence measurement mode, the measurement results of pen pressure are shown.
  
6. Register Setup
  - [Add 00H]: Setup Command.
  - [Add 01H]: Status of sequence mode.
  - [Write]: Write the register data after setting the register bits.
  - [Read]: Read the register data.

\*Please refer to the AK4186 datasheet about register command functions.

## ■ Explanation of Draw Function

When clicks the “DRAW MODE”, the window as shown in Figure 6 opens.

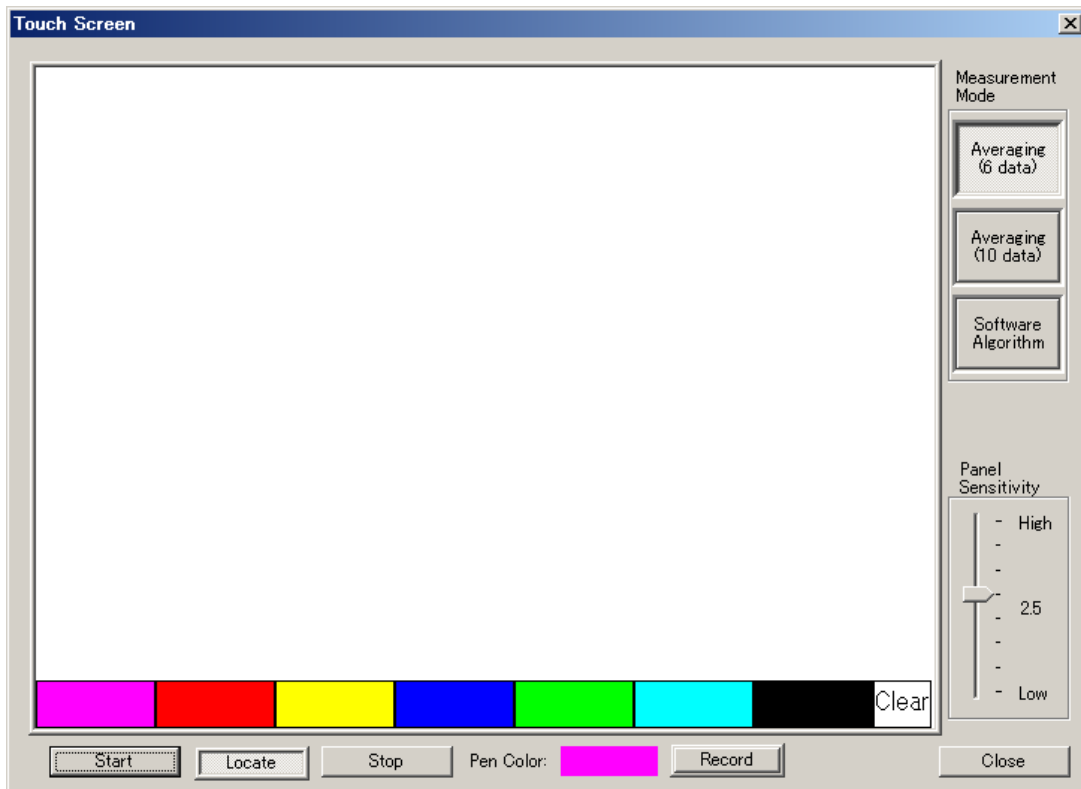


Figure 6. Draw Function Window

1. Measurement Mode
  - [Averaging 6 data]: COUNT bit is set to “0” (6 times).
  - [Averaging 10 data]: COUNT bit is set to “1” (10 times).
  - [Software Algorithm]: Predict the movement before and after the measurement of the data based on Averaging (6 data), and invalidate the data out of range.
2. Panel Sensitivity
  - Please adjust panel sensitivity regarding to the Touch Screen.
3. Operation
  - [START]: Start scanning of the touch screen. The track that you drew on touch screen is shown on the screen. Please adjust screen sensitivity to get smooth tracking. The screen will be cleared when [START] button is clicked again.
  - [Paint/Locate]: When drawing on a touch screen, a track is shown on the screen if Paint is active. When drawing on a touch screen, a mouse cursor moves on the screen if Locate is active. (shortcut key: Ctrl)
  - [STOP]: Stop the draw function.
  - [Pen Color]: Pen color using is shown. Select the color from a color panel on the touch screen to change the pen color.
  - [Close]: Close the Draw Function Window.
4. Record
  - A painting track can be recorded. After clicking the [START] button, pen touch is detected and a recording starts. If Pen Up is detected, the recording finishes. The recorded file is saved as a time stamp name, without overwrite.

## ■ Trouble Shooting

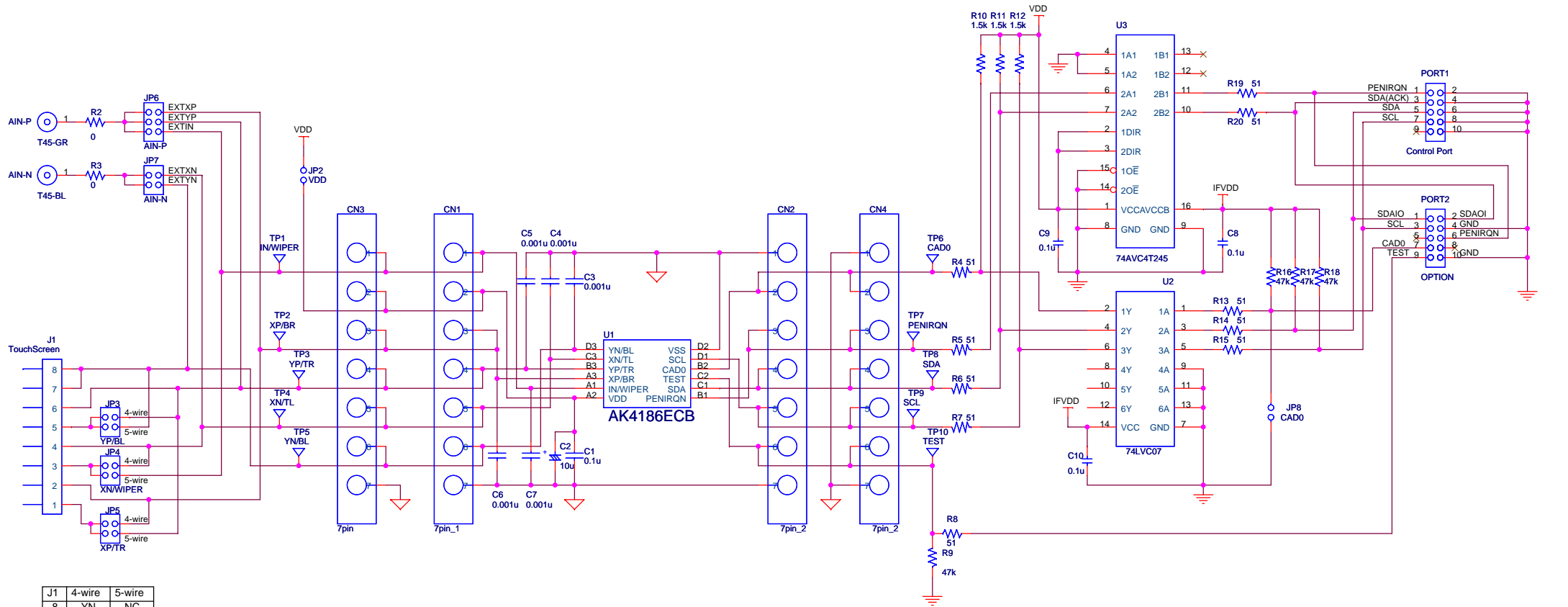
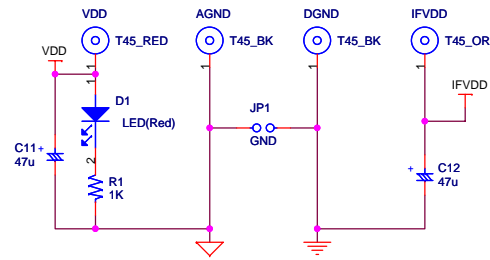
1. Application error is occurred and doesn't start up  
If the operating system is Windows 2000/XP, Please install AKM port driver first.
2. As click [START] button, "DEVICE SEND NAK!" is shown that can not have a measure.  
(Can not write control command to AK4186.)  
Please set the port address to your PC platform environment.  
Check the connections of the evaluation board and ensure power up of the AK4186.
3. The MEAN, MAX, MIN value doesn't change wherever the pen pushes down on the screen.  
There is a possibility of the trouble of the contact of the relay connector that connects the touch screen. Please open JP3, 4, and 5 on the evaluation board, measure screen seat resistance, and check the resistance. Generally, the screen seat resistance is hundreds of  $\Omega$ . There is a possibility that the touch screen is not correctly connected if the value is over thousands of  $K\Omega$ . Please connect the relay connector and check the resistance value again.

<b>REVISION HISTORY</b>
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Date (yy/mm/dd)	Manual Revision	Board Revision	Reason	Page	Contents
08/10/08	KM095900	0	First Edition		
08/02/02	KM095901	1	Device Rev. changed		AK4186: Rev.A → Rev.B

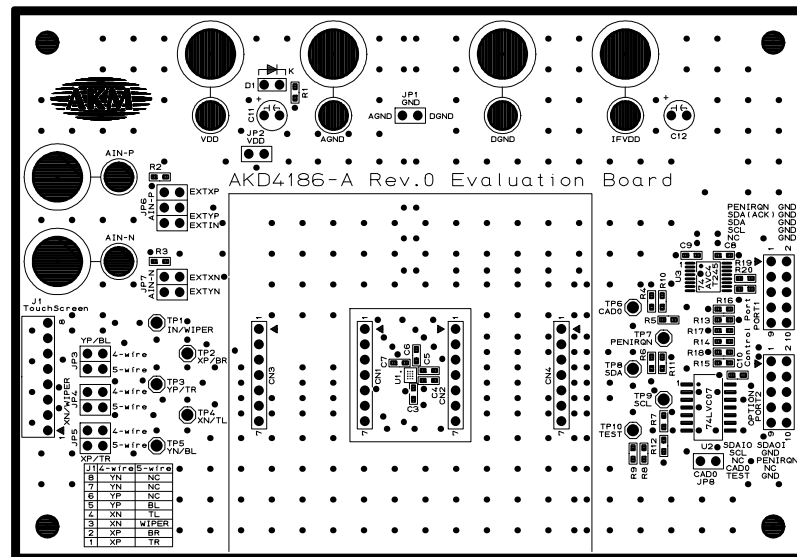
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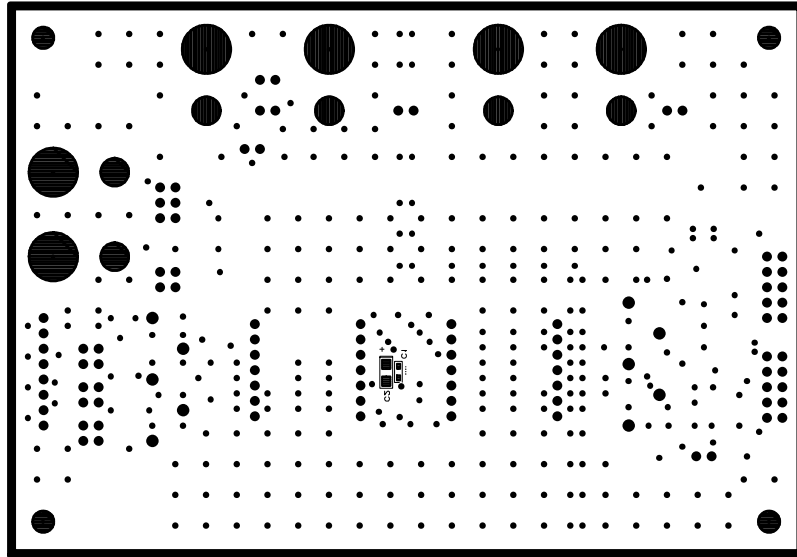
J1	4-wire	5-wire
8	YN	NC
7	YN	NC
6	YP	NC
5	YP	BL
4	XN	TL
3	XN	WIPER
2	XP	BR
1	XP	TR

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Date:	Wednesday, July 30, 2008	Sheet	1 of 1
		Rev	0

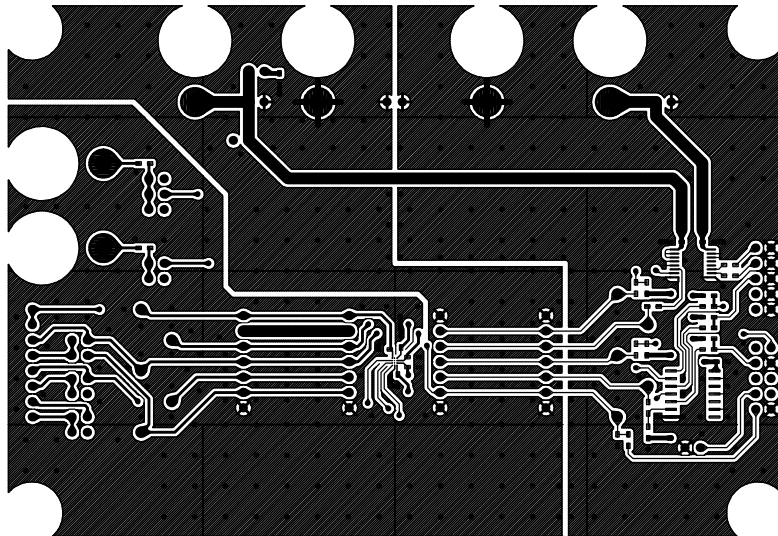


AKD4186-A L1 SILK

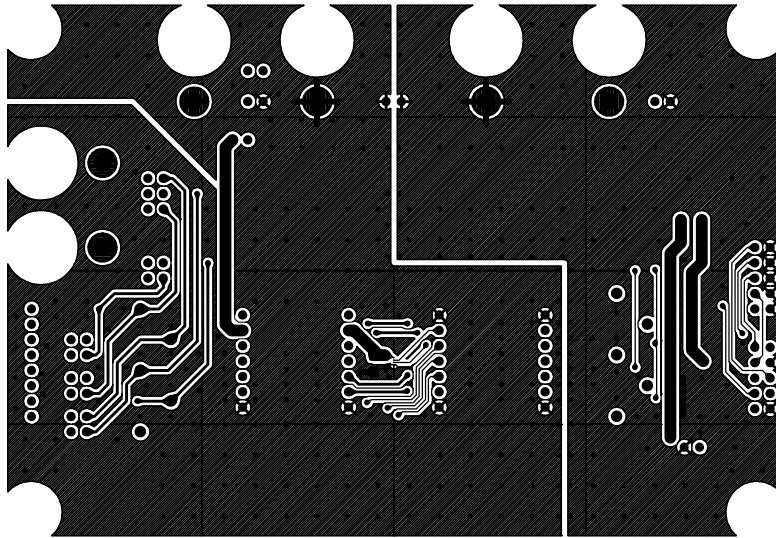




KD4186-A LS 21LK



AKD4.186-A L1



AKD4186-A FS