

	<h1 style="margin: 0;">AKD4117-B</h1>
<h2 style="margin: 0;">AK4117 Evaluation Board Rev.1</h2>	
<h3 style="margin: 0;">GENERAL DESCRIPTION</h3>	

AKD4117-B is the evaluation board for AK4117, 192kHz digital audio receiver. This board has BNC connector to interface with other digital audio equipment.

■ **Ordering guide**

AKD4117-B --- Evaluation board for AK4117
(Control software is included in this package.)

<h3 style="margin: 0;">FUNCTION</h3>

□ **Digital interface**

- S/PDIF :
 1 input (BNC)
- Serial audio data I/F :
 1 output (for DIR data output. 10-pin port)
- U bit :
- Serial control data I/F
 1 input/output port (10-pin port)

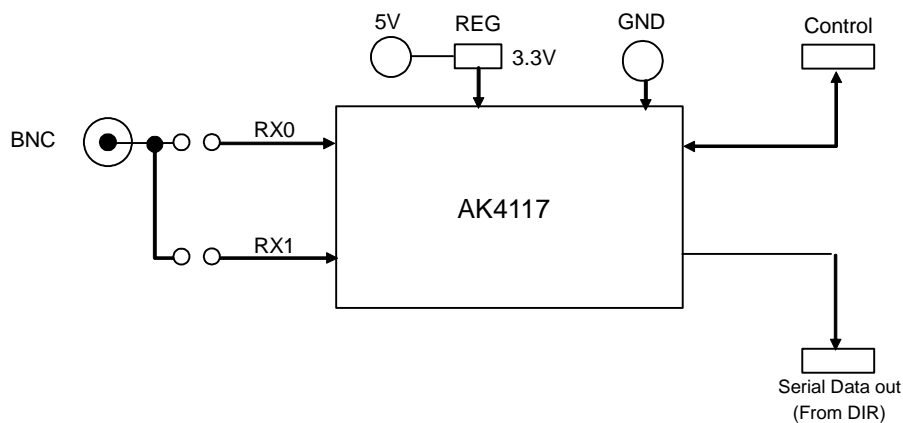


Figure 1. AKD4117-B Block Diagram

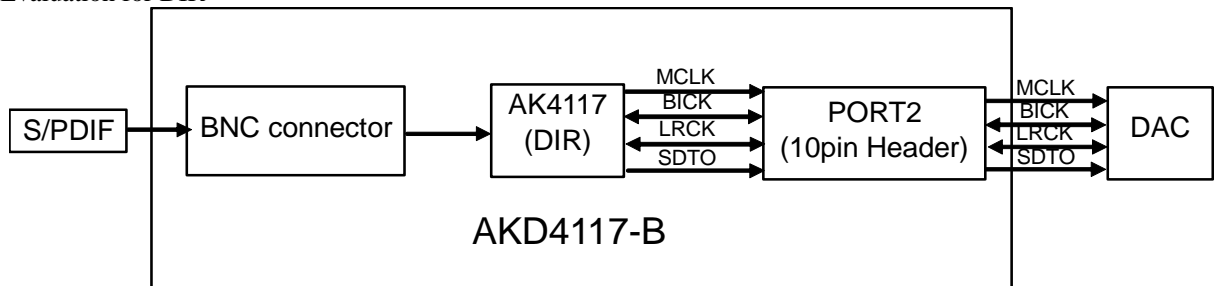
Evaluation Board Manual

■ **Operating sequence**

- (1) **Set up the power supply lines.**
 [+ 5V] (Red) = 5V
 [GND] (Black) = 0V
- (2) **Set up the evaluation mode and jumper pins.** (Refer to the following item.)
- (3) **Connect cables.** (Refer to the following item.)
- (4) **Power on.**
 The AK4117 should be reset once bringing PDN(SW2) “L” upon power-up.

■ **Evaluation modes**

- (1) Evaluation for DIR



The DIR generates MCLK, BICK, LRCK and SDATA from the received data through BNC connector . The AKD4117-B can be connected with the AKM’s DAC evaluation board via 10-line cable.

a. Set-up of Bi-phase Input

RX0 and RX1 should not select BNC at the same time.

a-1. Set-up of evaluation board

Input	RX0	RX1
JP	JP2 (BNC)	JP4
	Short	Short

Table 1. Set-up of RX0 and RX1

a-2. Set-up of AK4117 input path

IPS bit	Input data	
0	RX0	Default
1	RX1	

Table 2. Recovery Data Select

b. Set-up of clock input and output

The signal level outputted/inputted from PORT2 is 3.3V.

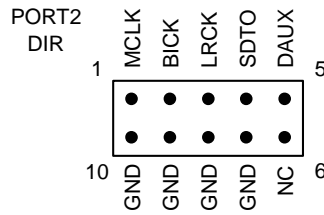


Figure 2. PORT2 pin layout

b-1. MCKO1/MCKO2

The AK4117 has a master clock output pin, MCKO. In PLL mode, PCKS1-0 bits select the MCKO frequency as shown in Table 3. When MCKO=512fs, MCKO goes to “L” when fs=96kHz and 192kHz. When MCKO=256fs, MCKO goes to “L” when fs=192kHz. When LP bit is set to “1”, the AK4117 is in low power mode (default). In low power mode, PLL lock range is up to 48kHz and the MCKO frequency is fixed to 256fs.

In the X’tal mode, XCKS1-0 bits select the ratio of the X’tal frequency to fs (sampling frequency). The DIV bit selects the ratio (x1 or x1/2) of the MCKO frequency to the X’tal frequency (Table 4).

LP	PCKS1	PCKS0	MCKO	fs [kHz]
0	0	0	512fs	32 ~ 48
	0	1	256fs	32 ~ 96
	1	0	128fs	32 ~ 192
	1	1	N/A	N/A
1	x	x	256fs	32 ~ 48

Default

Table 3. Master Clock Frequency Select
(PLL mode: Clock operation mode 0, 2(UNLCK=0))

XCKS1	XCKS0	X’tal or EXT	MCKO		fs [kHz]					
					EXTCLK [MHz]			X’tal [MHz]		
			DIV=0	DIV=1	2.048	4.096	8.192	11.2896	12.288	24.576
0	0	128fs	128fs	64fs	16	32	64	88.2	96	192
0	1	256fs	256fs	128fs	8	16	32	44.1	48	96
1	0	512fs	512fs	256fs	N/A	8	16	N/A	N/A	48
1	1	1024fs	1024fs	512fs	N/A	N/A	8	N/A	N/A	N/A

Default

Table 4. Master Clock Frequency Select
(X’tal mode: Clock operation mode 1, 2(UNLCK=1), 3)

c. Set-up of Audio format

Please set up DIF2-0 bit.

Mode	DIF2 bit	DIF1 bit	DIF0 bit	DAUX	SDTO	LRCK	
							I/O
0	0	0	0	24bit, Left justified	16bit, Right justified	H/L	O
1	0	0	1	24bit, Left justified	18bit, Right justified	H/L	O
2	0	1	0	24bit, Left justified	20bit, Right justified	H/L	O
3	0	1	1	24bit, Left justified	24bit, Right justified	H/L	O
4	1	0	0	24bit, Left justified	24bit, Left justified	H/L	O
5	1	0	1	24bit, I ² S	24bit, I ² S	L/H	O
6	1	1	0	Reserved			
7	1	1	1				

Default

Table 5. Audio format

d. Set-up of CM1 and CM0

The operation mode of PLL is selected by CM1 and CM0. It can be selected by CM1-0 bits.

CM1 bit	CM0 bit	(UNLOCK)	PLL	X'tal	Clock source	SDTO source
0	0	-	ON	ON (Note 1)	PLL(RX)	RX
0	1	-	OFF	ON	X'tal	DAUX
1	0	0	ON	ON	PLL(RX)	RX
		1	ON	ON	X'tal	DAUX
1	1	-	ON	ON	X'tal	DAUX

Default

ON: Oscillation (Power-up), OFF: STOP (Power-Down)

Note 1. When the X'tal is not used as clock comparison for fs detection (XTL0, 1= "1,1"), the X'tal is OFF.

Table 6. Clock Operation Mode Select

■ **U output**

U(user data) can be monitored by TP1: U.

■ **Serial control**

The AK4117 can be controlled via the printer port (parallel port) of IBM-AT compatible PC. Connect PORT6 (uP-I/F) with PC by 10-line flat cable packed with the AKD4117-B. Take care of the direction of connector. There is a mark at pin#1. The pin layout of PORT6 is as Figure 3.

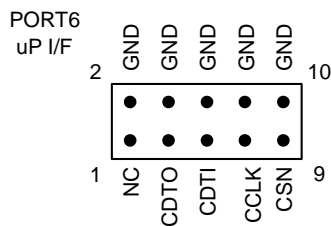


Figure 3. PORT6 pin layout

This evaluation board encloses control software. A software operation procedure is included in an evaluation board manual.

■ Toggle switch set-up

SW2	PDN	Reset switch for AK4117. Set to “H” during normal operation. Bring to “L” once after the power is supplied.
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■ LED indication

LE1	INT0	Bright when INT0 pin goes to “H”.
LE2	INT1	Bright when INT1 pin goes to “H”.

■ Set-up of XTL1 and XTL0

SW3_6	SW3_5	X'tal Frequency	Default
XTL1	XTL0	X'tal #1	
0	0	11.2896MHz	
0	1	12.288MHz	
1	0	24.576MHz	
1	1	(Use channel status)	

Table 7. Reference X'tal frequency

■ Jumper set up.

No.	Jumper Name	Function
2	RX0	Set-up of RX0 input circuit. BNC : BNC (default)
4	RX1	Set-up of RX1 input circuit.

Control Soft Manual

■ Evaluation Board and Control Soft Settings

1. Set an evaluation board properly.
2. Connect the evaluation board to an IBM PC/AT compatible PC by a 10wire flat cable.
Be aware of the direction of the 10pin header.
3. Start up the control program following the process above.
4. The operation screen is shown below.

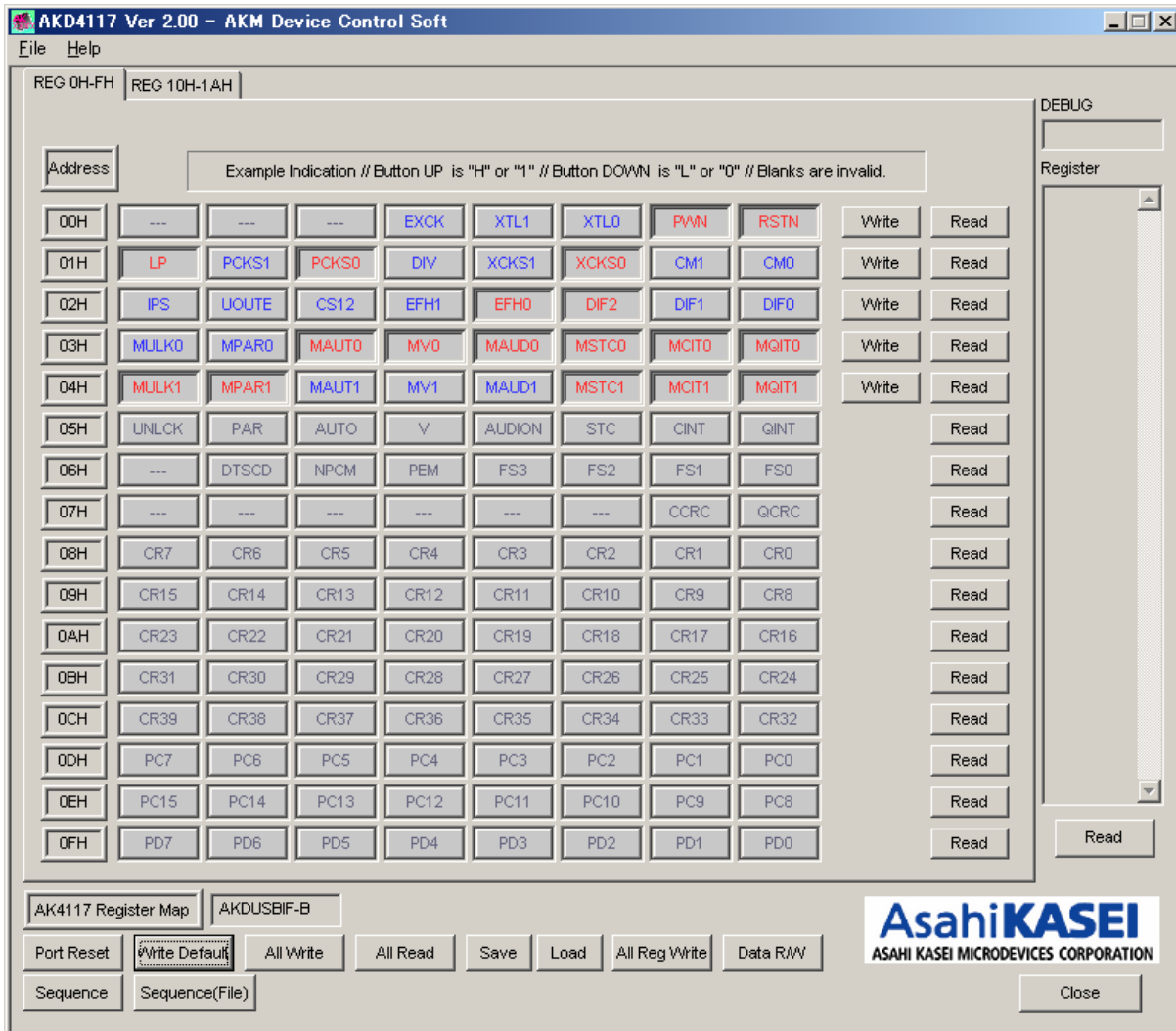


Figure 4. Window of Control Soft

■ Operation Overview

Function, register map and testing tool can be controlled by this control soft. These controls are selected by upper tabs.

Buttons which are frequently used such as register initializing button “Write Default”, are located outside of the switching tab window. Refer to the “■ Dialog Boxes” for details of each dialog box setting.

- 1.[Port Reset] : For when connecting to USB I/F board (AKDUSBIF-B)
Click this button after the control soft starts up when connecting USB I/F board (AKDUSBIF-B).
- 2.[Write Default] : Register Initializing
When the device is reset by a hardware reset, use this button to initialize the registers.
- 3.[All Write] : Executing write commands for all registers displayed.
- 4.[All Read] : Executing read commands for all registers displayed.
- 5.[Save] : Saving current register settings to a file.
- 6.[Load] : Executing data write from a saved file.
- 7.[All Req Write] : “All Req Write” dialog box is popped up.
- 8.[Data R/W] : “Data R/W” dialog box is popped up.
- 9.[Sequence] : “Sequence” dialog box is popped up.
- 10.[Sequence(File)] : “Sequence(File)” dialog box is popped up.
- 11.[Read] : Reading current register settings and display on to the Register area (on the right of the main window).
This is different from [All Read] button, it does not reflect to a register map, only displaying hexadecimal.

■ Tab Functions

1. [REG]: Register Map

This tab is for a register writing and reading.

Each bit on the register map is a push-button switch.

Button Down indicates “H” or “1” and the bit name is in red (when read only it is in deep red).

Button Up indicates “L” or “0” and the bit name is in blue (when read only it is in gray)

Grayout registers are Read Only registers. They can not be controlled.

The registers which is not defined in the datasheet are indicated as “---”.

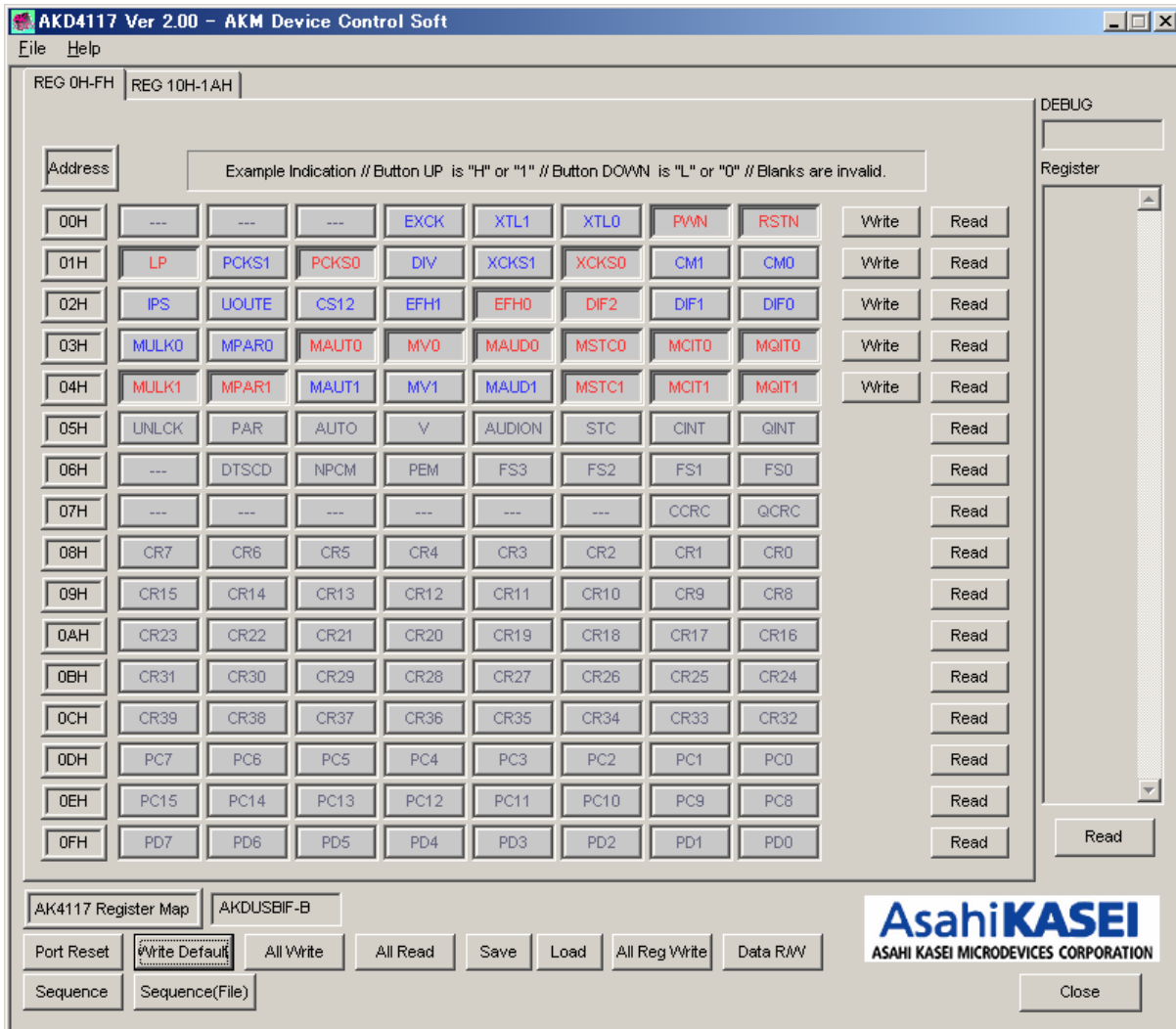


Figure 5. Window of [REG]

[Write]: Data Writing Dialog

It is for when changing two or more bits on the same address at the same time.

Click [Write] button located on the right of the each corresponded address for a pop-up dialog box.

When checking the checkbox, the register will be “H” or “1”, when not checking the register will be “L” or “0”.

Click [OK] to write setting value to the registers, or click [Cancel] to cancel this setting.

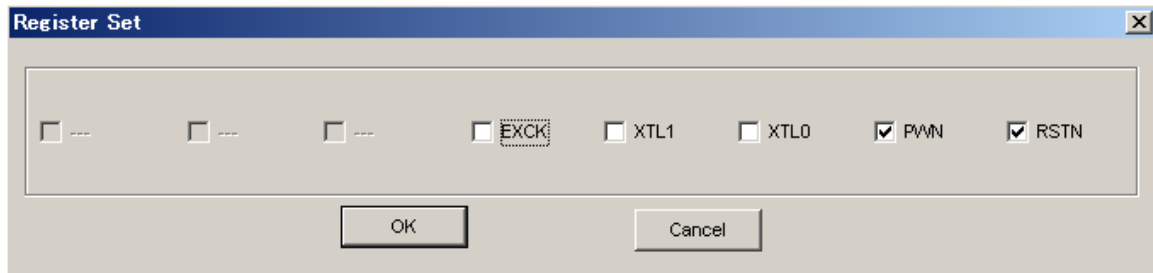


Figure 6. Window of [Register Set]

[Read]: Data Read

Click [Read] button located on the right of the each corresponded address to execute register reading.

After register reading, the display will be updated regarding to the register status.

Button Down indicates “H” or “1” and the bit name is in red (when read only it is in deep red).

Button Up indicates “L” or “0” and the bit name is in blue (when read only it is in gray)

Please be aware that button statuses will be changed by Read command.

■ Dialog Boxes

1. [All Req Write]: All Req Write dialog box

Click [All Reg Write] button in the main window to open register setting files.
Register setting files saved by [SAVE] button can be applied.

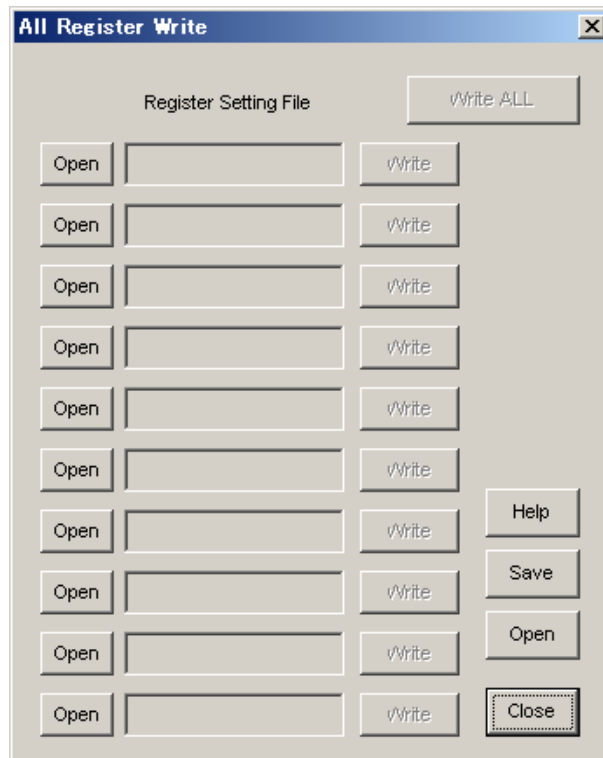


Figure 7. Window of [All Reg Write]

- [Open (left)] : Selecting a register setting file (*.akr).
- [Write] : Executing register writing.
- [Write All] : Executing all register writings.
Writings are executed in descending order.
- [Help] : Help window is popped up.
- [Save] : Saving the register setting file assignment. The file name is “*.mar”.
- [Open (right)] : Opening a saved register setting file assignment “*. mar”.
- [Close] : Closing the dialog box and finish the process.

~ Operating Suggestions ~

- (1) Those files saved by [Save] button and opened by [Open] button on the right of the dialog “*.mar” should be stored in the same folder.
- (2) When register settings are changed by [Save] button in the main window, re-read the file to reflect new register settings.

2. [Data R/W]: Data R/W Dialog Box

Click the [Data R/W] button in the main window for data read/write dialog box.
Data write is available to specified address.

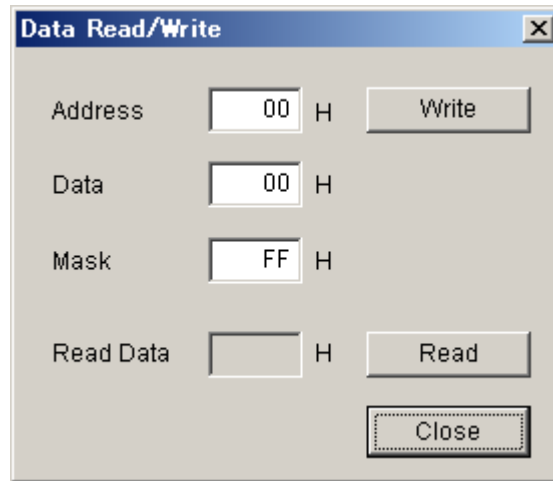


Figure 8. Window of [Data R/W]

- [Address] Box : Input data address in hexadecimal numbers for data writing.
- [Data] Box : Input data in hexadecimal numbers.
- [Mask] Box : Input mask data in hexadecimal numbers.
This is “AND” processed input data.
- [Write] : Writing to the address specified by “Address” box.(Note 2)
- [Read] : Reading from the address specified by “Address” box.(Note 2)
The result will be shown in the Read Data Box in hexadecimal numbers.
- [Close] : Closing the dialog box and finish the process.
Data writing can be cancelled by this button instead of [Write] button.

Note 2. The register map will be updated after executing [Write] or [Read] commands.

3. [Sequence]: Sequence Dialog Box

Click [Sequence] button to open register sequence setting dialog box.
Register sequence can be set in this dialog box.

	Address	Data	Mask	Interval	Select		Address	Data	Mask	Interval	Select
1	00 H	00 H	FF H	0 ms	No_use	16	00 H	00 H	FF H	0 ms	No_use
2	00	00	FF	0	No_use	17	00	00	FF	0	No_use
3	00	00	FF	0	No_use	18	00	00	FF	0	No_use
4	00	00	FF	0	No_use	19	00	00	FF	0	No_use
5	00	00	FF	0	No_use	20	00	00	FF	0	No_use
6	00	00	FF	0	No_use	21	00	00	FF	0	No_use
7	00	00	FF	0	No_use	22	00	00	FF	0	No_use
8	00	00	FF	0	No_use	23	00	00	FF	0	No_use
9	00	00	FF	0	No_use	24	00	00	FF	0	No_use
10	00	00	FF	0	No_use	25	00	00	FF	0	No_use
11	00	00	FF	0	No_use						
12	00	00	FF	0	No_use						
13	00	00	FF	0	No_use						
14	00	00	FF	0	No_use						
15	00	00	FF	0	No_use						

Start Step: 1

Buttons: Start, Help, Save, Open, Close

Figure 9. Window of [Sequence]

~ Sequence Setting ~

Set register sequence by following process bellow.

(1) Select a command

Use [Select] pull-down box to choose commands.
Corresponding boxes will be valid.

< Select Pull-down menu >

- No_use : Not using this address
- Register : Register writing
- Reg(Mask) : Register writing (Masked)
- Interval : Taking an interval
- Stop : Pausing the sequence
- End : Finishing the sequence

(2)Input sequence

[Address] : Data address

[Data] : Writing data

[Mask] : Mask

[Data] box data is ANDed with [Mask] box data. This is the actual writing data.

When Mask = 0x00, current setting is hold.

When Mask = 0xFF, the 8bit data which is set in the [Data] box is written.

When Mask =0x0F, lower 4bit data which is set in the [Data] box is written.

Upper 4bit is hold to current setting.

[Interval] : Interval time

Valid boxes for each process command are shown bellow.

- No_use : None
- Register : [Address], [Data], [Interval]
- Reg(Mask) : [Address], [Data], [Mask], [Interval]
- Interval : [Interval]
- Stop : None
- End : None

Control Buttons

The function of Control Button is shown bellow.

[Start] : Executing the sequence

[Help] : Opening a help window

[Save] : Saving sequence settings as a file. The file name is "*.aks".

[Open] : Opening a sequence setting file "*.aks".

[Close] : Closing the dialog box and finish the process.

Stop of the sequence

When "Stop" is selected in the sequence, processing is paused and it starts again when [Start] button is clicked.

Restarting step number is shown in the "Start Step" box. When finishing the process until the end of sequence, "Start Step" will return to "1".

The sequence can be started from any step by writing the step number to the "Start Step" box.

Write "1" to the "Start Step" box and click [Start] button, when restarting the process from the beginning.

4. [Sequence(File)]: Sequence Setting File Dialog Box

Click [Sequence(File)] button to open sequence setting file dialog box.
Those files saved in the “Sequence setting dialog” can be applied in this dialog.

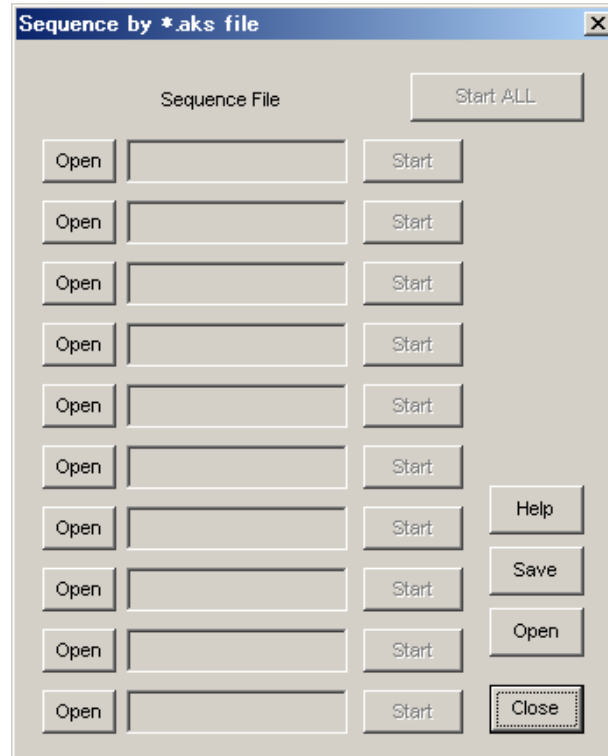


Figure 10. Window of [Sequence(File)]

[Open (left)] : Opening a sequence setting file (*.aks).
 [Start] : Executing the sequence setting.
 [Start All] : Executing all sequence settings.
 Sequences are executed in descending order.

[Help] : Pop up the help window.
 [Save] : Saving sequence setting file assignment. The file name is “*.mas”.
 [Open(right)] : Opening a saved sequence setting file assignment “*. mas”.
 [Close] : Closing the dialog box and finish the process.

~ Operating Suggestions ~

- (1) Those files saved by [Save] button and opened by [Open] button on the right of the dialog “*.mas” should be stored in the same folder.
- (2) When “Stop” is selected in the sequence the process will be paused and a pop-up message will appear. Click “OK” to continue the process.



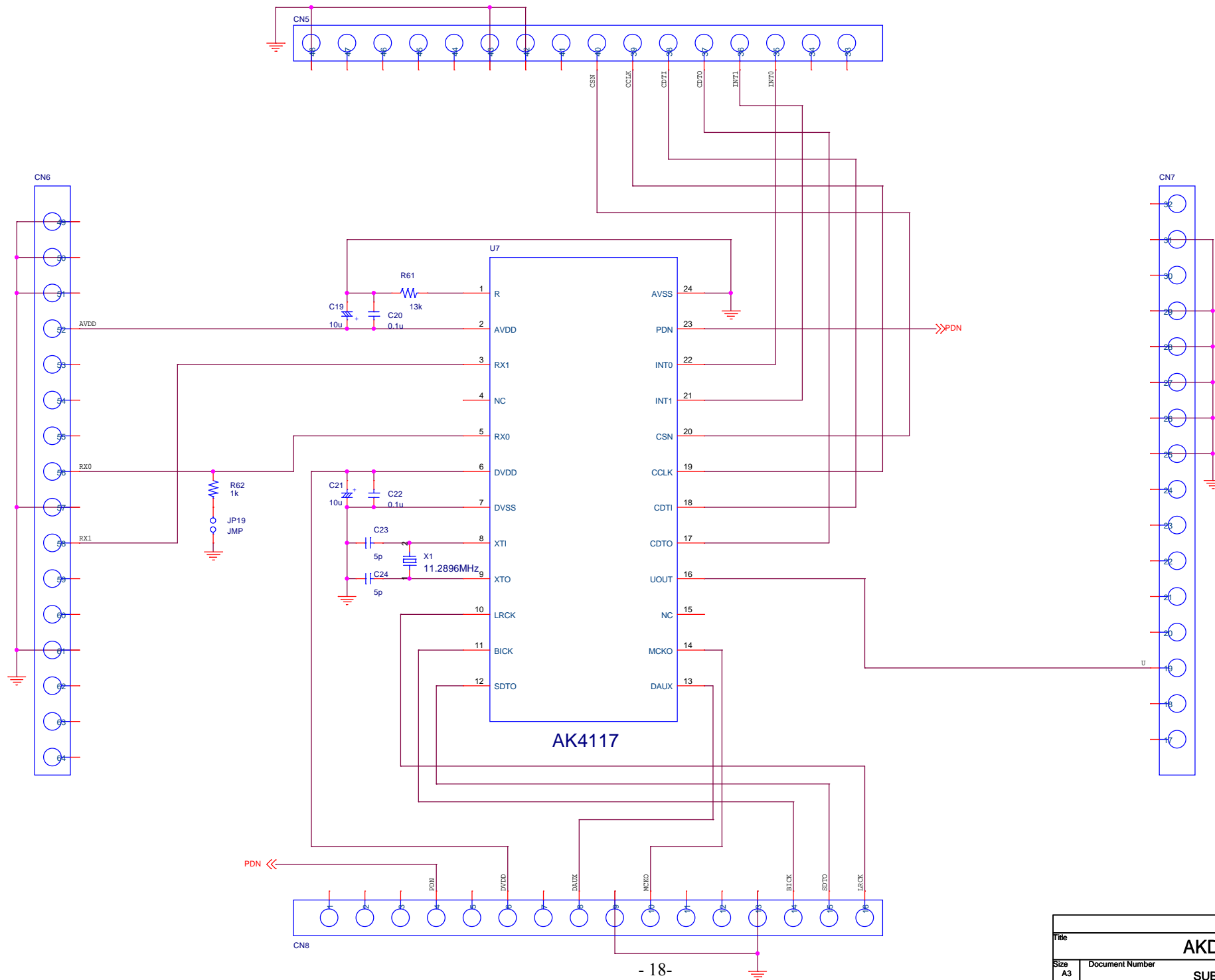
Figure 11. Window of [Sequence Pause]

Revision History

Date (YY/MM/DD)	Manual Revision	Board Revision	Reason	Page	Contents
04/12/21	KM077200	0	First edition	-	
10/12/21	KM077201	0	Change	7-15	“Control Soft Manual” was changed.
15/11/12	KM077202	1	Change	19	Circuit diagram was changed. PORT1: “Mount” -> “No Mount”

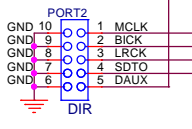
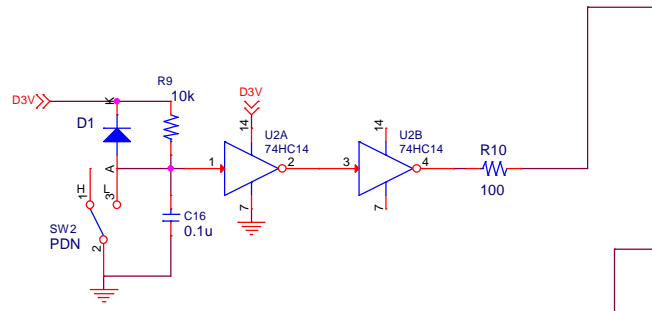
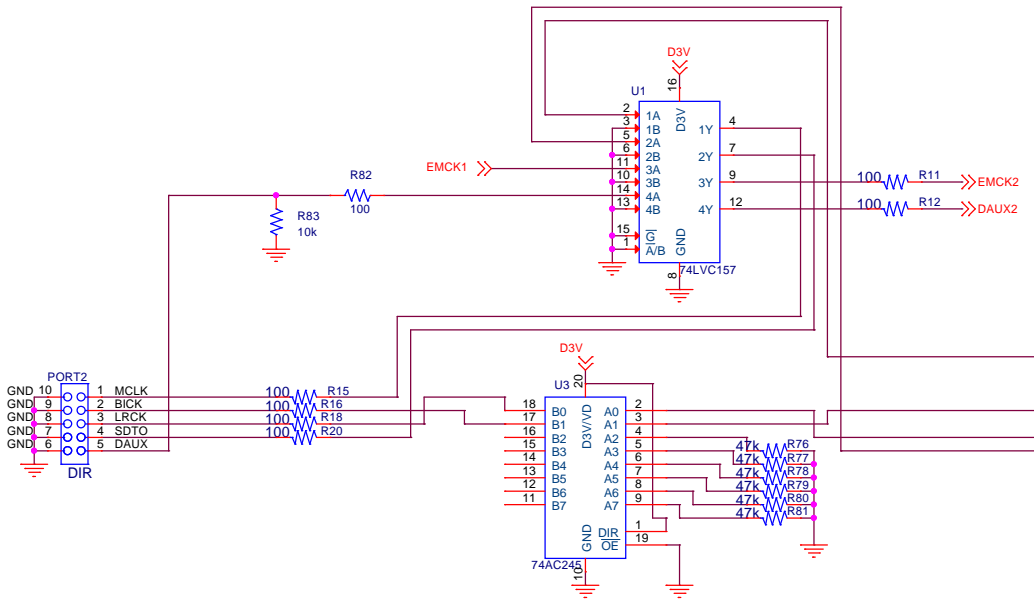
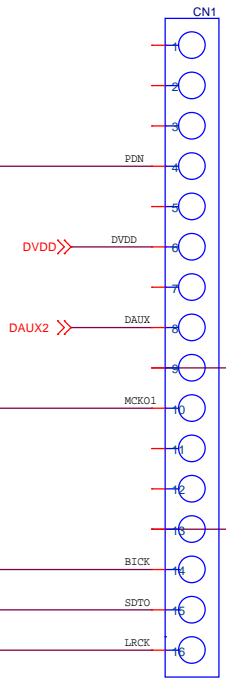
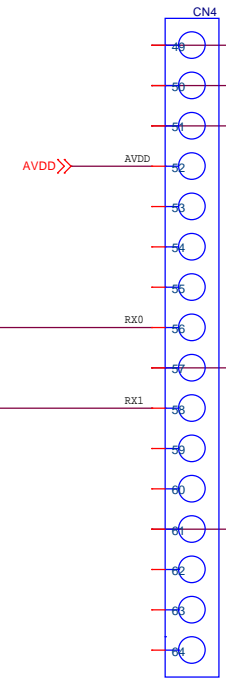
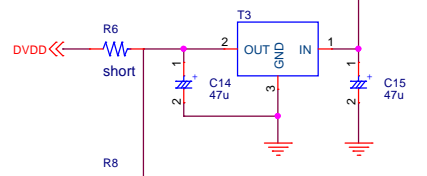
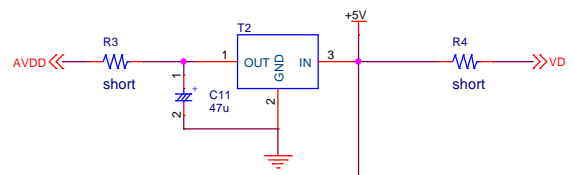
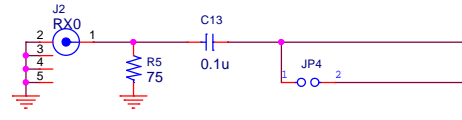
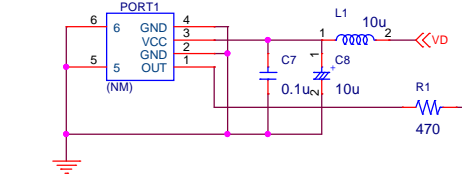
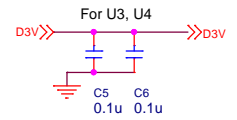
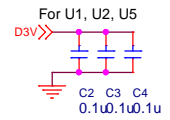
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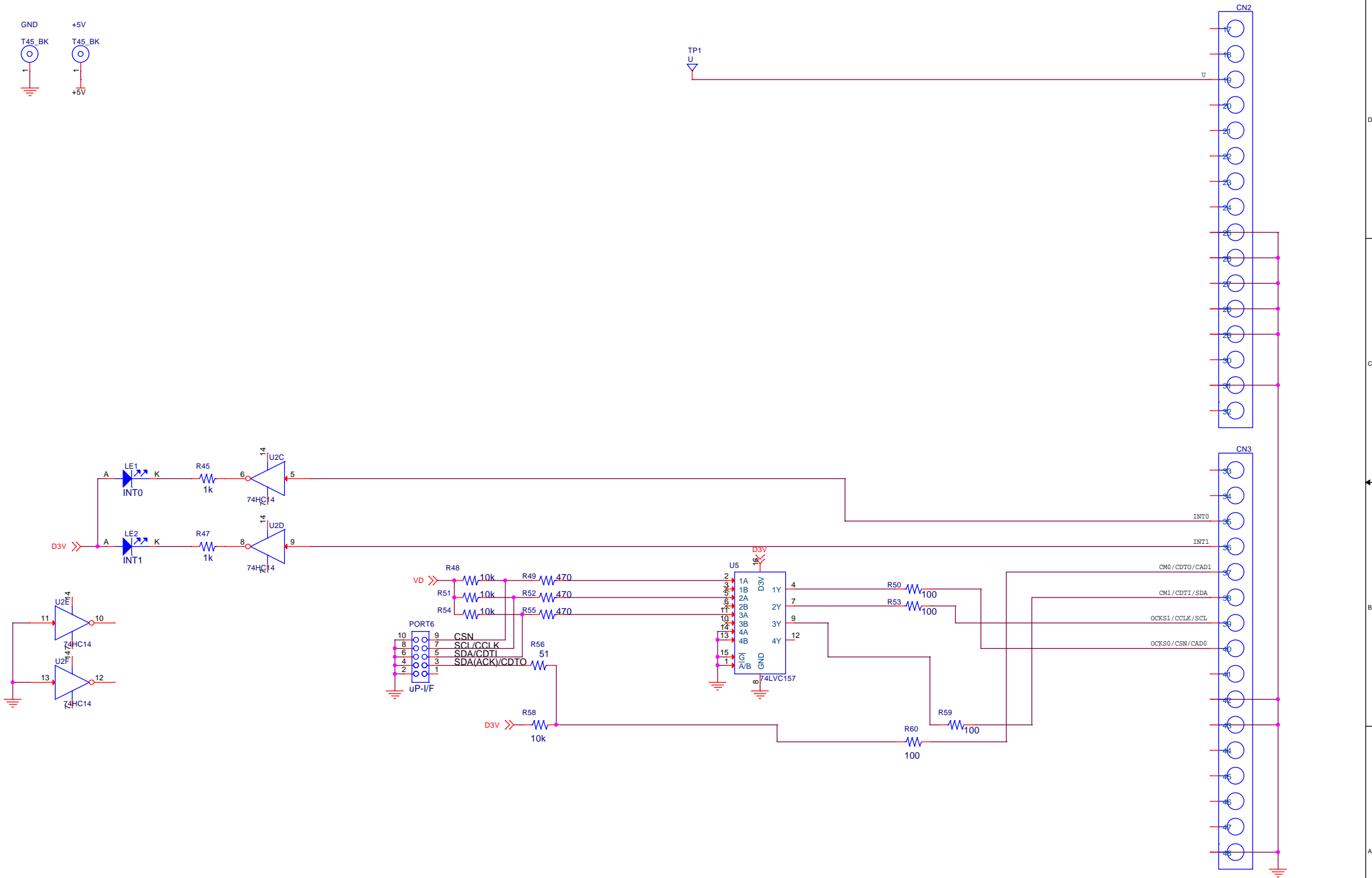
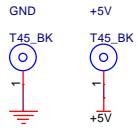


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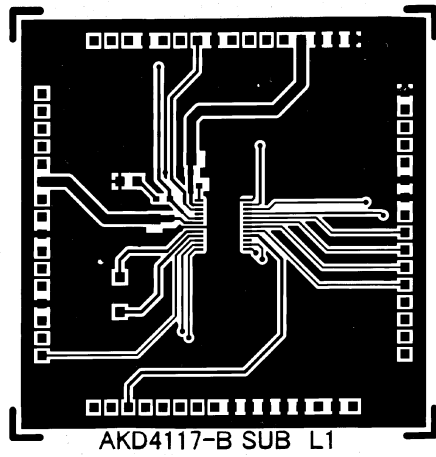
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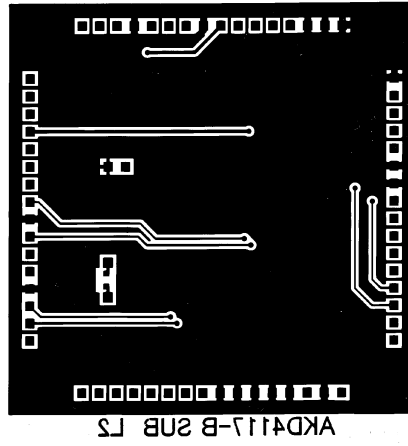


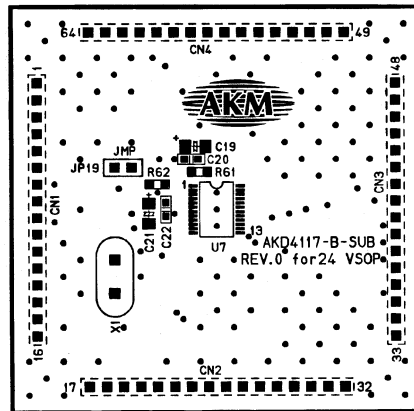
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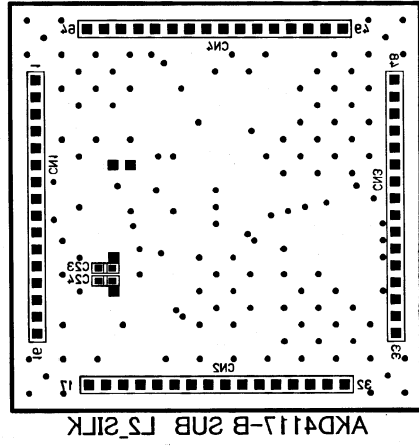
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Date:	Tuesday, September 29, 2015	Sheet	2	of	2

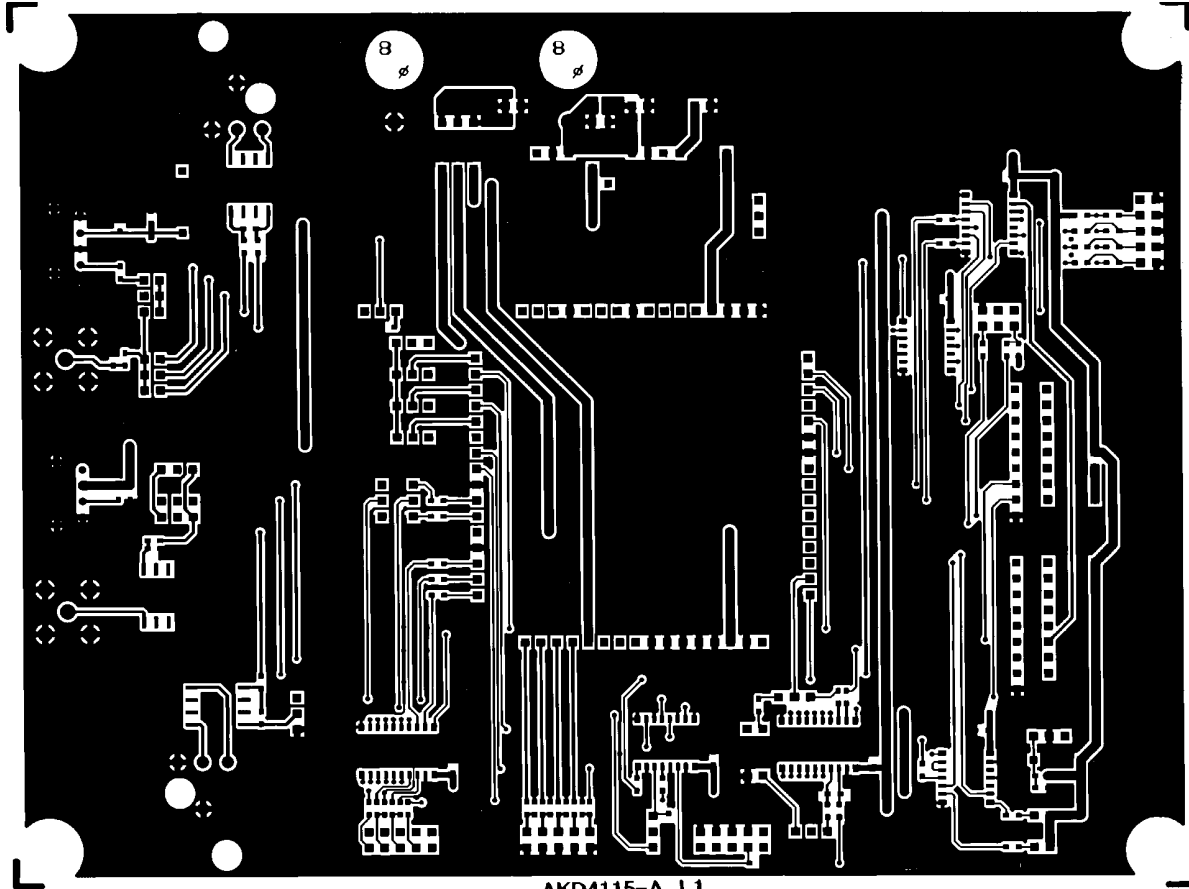




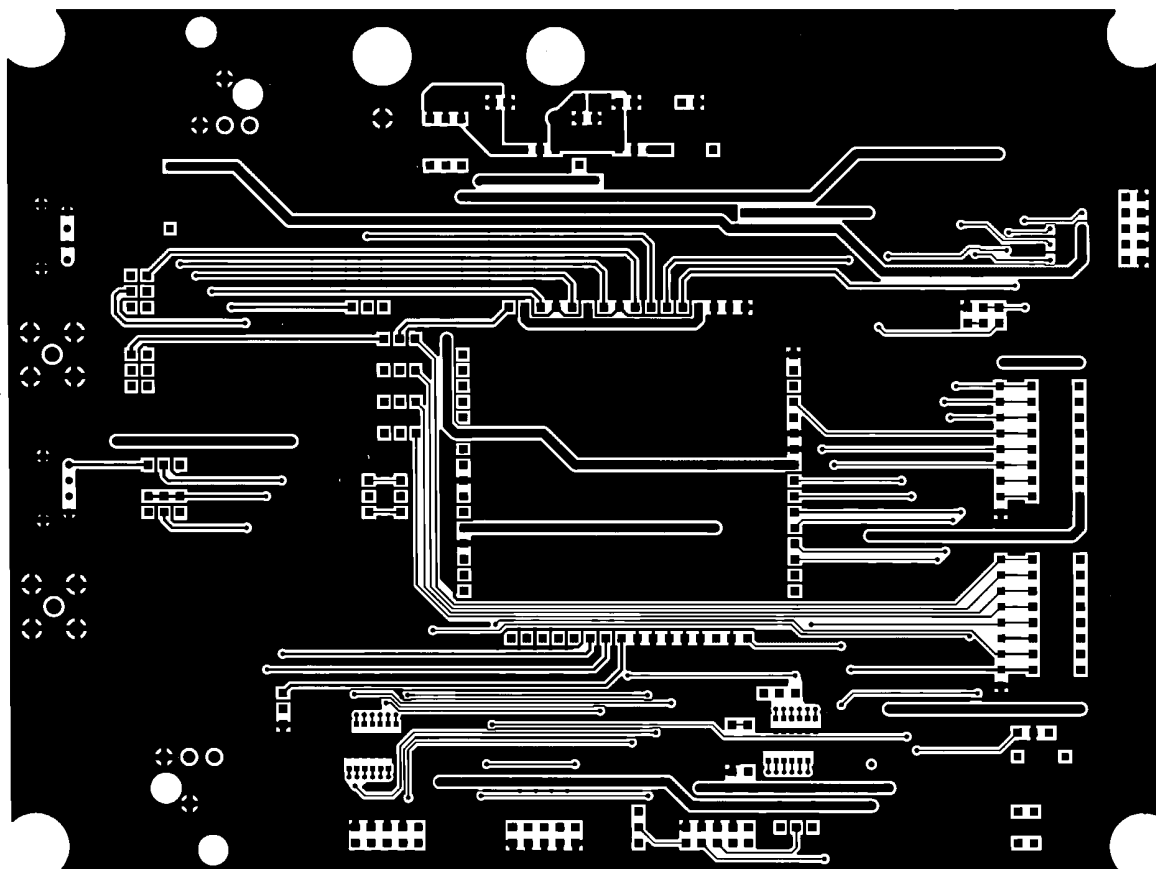


AKD4117-B SUB L1_SILK

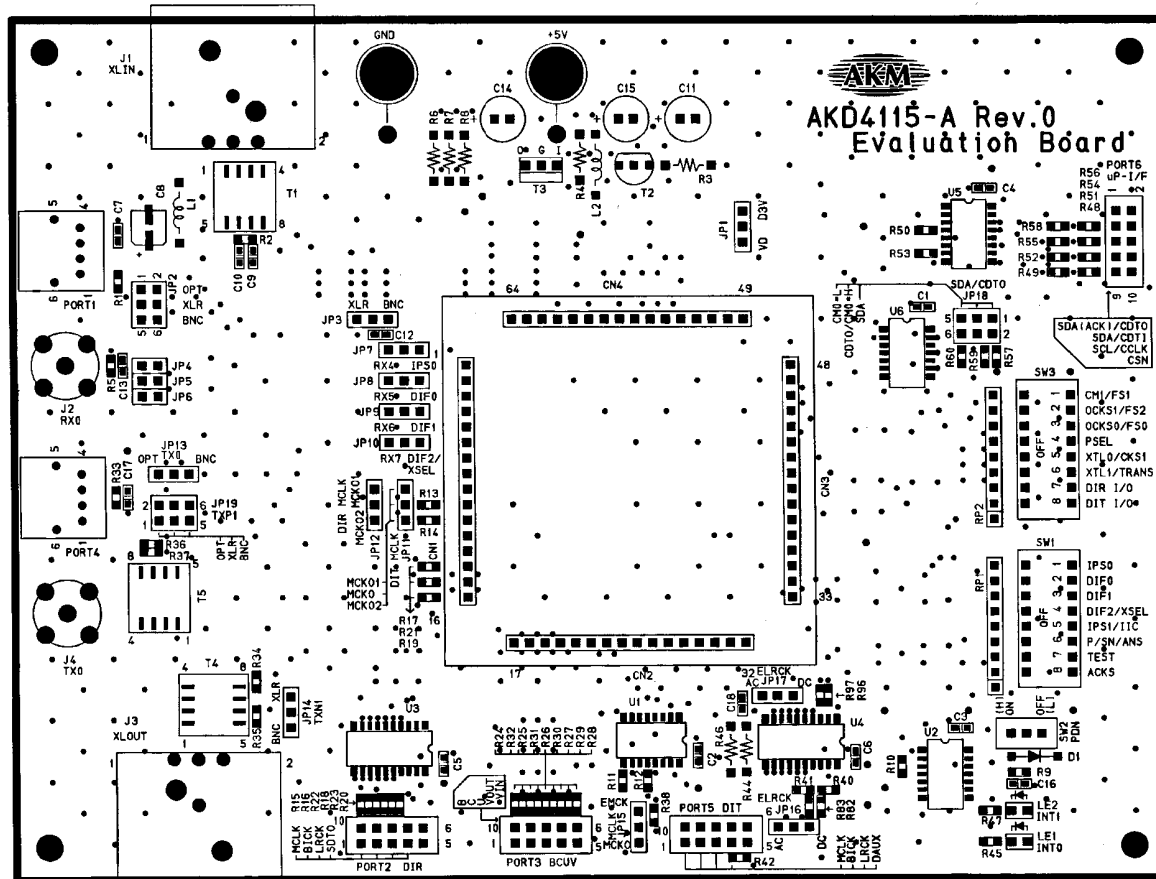




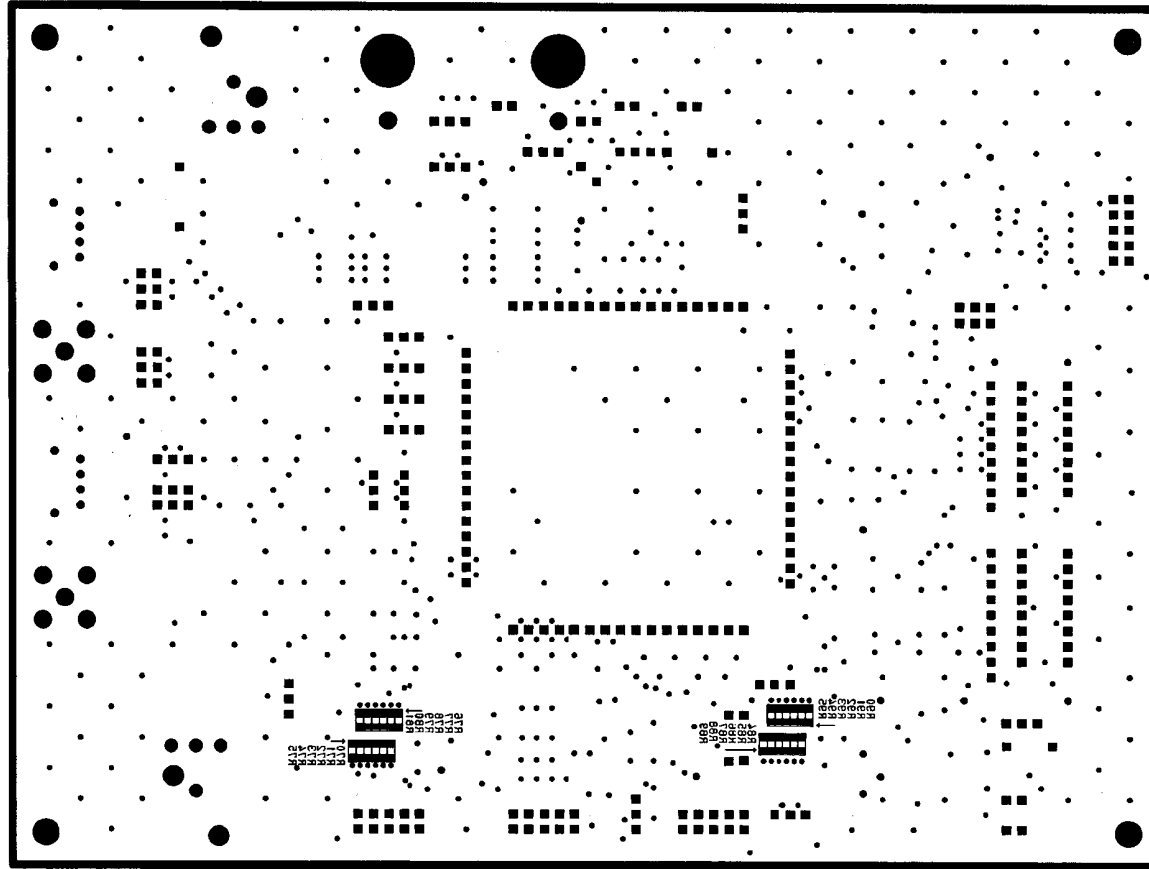
AKD4115-A L1



AKD412-A LS



AKD4115-A L1_SILK



AKD4112-A_L3_SILK