

	<h1 style="margin: 0;">AKD4114-B</h1> <h2 style="margin: 0;">AK4114 Evaluation Board Rev.0</h2>
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GENERAL DESCRIPTION

AKD4114-B is the evaluation board for AK4114, 192kHz digital audio transceiver. This board has optical and BNC connector to interface with other digital audio equipment.

■ **Ordering guide**

AKD4114-B --- Evaluation board for AK4114
 (A cable for connecting with printer port of IBM-AT compatible PC and a control software are packed with this. The control software does not operate on Windows NT.)

FUNCTION

□ **Digital interface**

- S/PDIF :
 - 8 channel input (optical or BNC)
 - 2 channel output (optical or BNC)
- Serial audio data I/F :
 - 1 input/output (for DIR data output/DIT data input. 10-pin port)
- B,C,U,V bit :
 - 1 input/output port (10-pin port)
- Serial control data I/F
 - 1 input/output port (10-pin port)

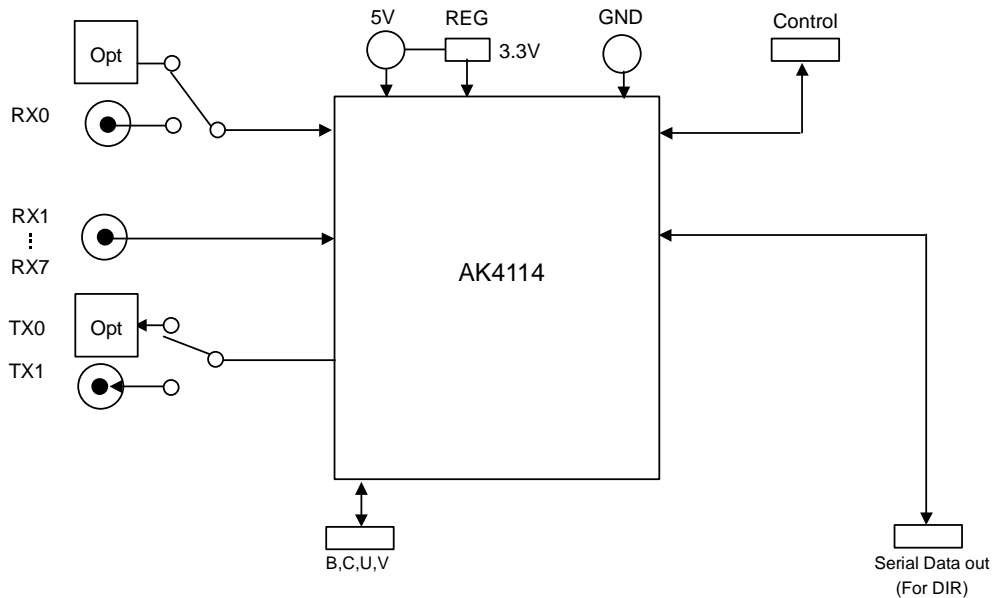


Figure 1. AKD4114-B Block Diagram

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

Evaluation Board Manual

■ Operating sequence

(1) **Set up the power supply lines.**

[+ 5V] (Red) = 5V
 [GND] (Black) = 0V

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

(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 AK4114 should be reset once bringing PDN(SW2) “L” upon power-up.

■ Evaluation modes

(1) Evaluation for DIR (Default)

S/PDIF in (optical or BNC) – AK4114 – Serial Data out (10pin port)

The DIR generates MCLK, BICK, LRCK and SDATA from the received data through optical connector(PORT1: TORX176) or BNC connector. The AKD4114-B can be connected with the AKM's DAC evaluation board via 10-line cable.

a. Set-up of Bi-phase Input

RX0 and RX1-7 should not select BNC at the same time.

a-1. RX0

Connector	JP2(RXP0)	JP3(RXN0)
Optical (PORT1)	OPT	BNC
BNC (J2)	BNC	BNC

Table 1. Set-up of RX0

a-2. RX1, 2, 3, 4, 5, 6, and 7 can be inputted from a BNC (J2) connector only.

Only RX1, RX2 and RX 3 can be used in parallel mode. The jumper which selects the Rx channel should be Short.

Input	RX1	RX2	RX3	RX4	RX5	RX6	RX7
JP	JP4	JP5	JP6	JP7	JP8	JP9	JP10
	Short	Short	Short	RX4	RX5	RX6	RX7

Table 2. Set-up of RX1, 2, 3, 4, 5, 6 and 7

a-3. Set-up of AK4114 input path

It sets up by SW 1_1 and SW 1_5 in parallel mode. Please set up IPS2-0 bits in serial mode.

-	IPS1 pin (SW1_5)	IPS0 pin (SW1_1)	INPUT Data	Default
IPS2 bit	IPS1 bit	IPS0 bit		
0	0	0	RX0	
0	0	1	RX1	
0	1	0	RX2	
0	1	1	RX3	
1	0	0	RX4	
1	0	1	RX5	
1	1	0	RX6	
1	1	1	RX7	

(In parallel mode, IPS2 is fixed to "0")
Table 3. Recovery Data Select

b. Set-up of clock input and output

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

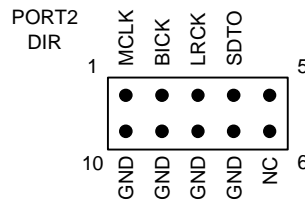


Figure 2. PORT2 pin layout

b-1. MCKO1/MCKO2

The output of MCKO1 pin or MCKO2 pin can be selected by JP12. The output frequency of MCKO1/MCKO2 is selected by OCKS 1-0.

Output signal	JP12	Default
MCKO1	MCKO1	
MCKO2	MCKO2	

Table 4. Set-up of MCKO1/MCKO2

OCKS1 pin (SW3_2)	OCKS0 pin (SW3_3)	(X'tal)	MCKO1	MCKO2	fs (max)	Default
OCKS1 bit	OCKS0 bit					
0	0	256fs	256fs	256fs	96 kHz	
0	1	256fs	256fs	128fs	96 kHz	
1	0	512fs	512fs	256fs	48 kHz	
1	1	128fs	128fs	64fs	192 kHz	

Table 5. Master Clock Frequency Select

b-2. Set-up of input/output of BICK and LRCK

Please select SW 2_7 (DIR_I/O) according to the setup of audio format of AK4114 (Refer to Table 7).

Audio format	SW3_7 (DIR_I/O)
Slave mode	0
Master mode	1

Default

Table 6. Set-up of DIR_I/O

c. Set-up of Audio format

It sets up by SW 1_2, SW 1_3 and SW1_4 in parallel mode. Please set up DIF2-0 bit in serial mode.

Mode	DIF2 pin (SW1_4)	DIF1 pin (SW1_3)	DIF0 pin (SW1_2)	DAUX	SDTO	LRCK		BICK	
	DIF2 bit	DIF1 bit	DIF0 bit				I/O		I/O
0	0	0	0	24bit, Left justified	16bit, Right justified	H/L	O	64fs	O
1	0	0	1	24bit, Left justified	18bit, Right justified	H/L	O	64fs	O
2	0	1	0	24bit, Left justified	20bit, Right justified	H/L	O	64fs	O
3	0	1	1	24bit, Left justified	24bit, Right justified	H/L	O	64fs	O
4	1	0	0	24bit, Left justified	24bit, Left justified	H/L	O	64fs	O
5	1	0	1	24bit, I ² S	24bit, I ² S	L/H	O	64fs	O
6	1	1	0	24bit, Left justified	24bit, Left justified	H/L	I	64-128fs	I
7	1	1	1	24bit, I ² S	24bit, I ² S	L/H	I	64-128fs	I

Default

Table 7. Audio format

d. Set-up of CM1 and CM0

The operation mode of PLL is selected by CM1 and CM0. In parallel mode, it can be selected by SW2_1 and JP18. In serial mode, it can be selected by CM1-0 bits.

CM1 pin (SW3_1)	CM0 pin (JP18)	(UNLOCK)	PLL	X'tal	Clock source	SDTO source
CM1 bit	CM0 bit					
0	0 (CM0)	-	ON	ON(Note)	PLL(RX)	RX
0	1 (CDTO/CM0=H)	-	OFF	ON	X'tal	DAUX
1	0 (CM0)	0	ON	ON	PLL(RX)	RX
		1	ON	ON	X'tal	DAUX
1	1 (CDTO/CM0=H)	-	ON	ON	X'tal	DAUX

Default

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

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

Table 8. Clock Operation Mode Select

(2) Evaluation for DIT

Serial Data in(10pin port) – AK4114 – S/PDIF out(optical or BNC)

MCLK, BICK, LRCK and DAUX are input the via 10pin header (PORT2: DIR). The AKD4114-B can be connected with the AKM's DAC evaluation board via 10-line cable.

a. Set-up of a Bi-phase output signal

TX0 and TX1 should not select an optical connector or a BNC connector at the same time.

a-1. The data outputted from TX1 can be selected by OPS12-10 bit.

Connector	JP19 (TX1)	JP14 (TX1)
Optical (PORT4)	OPT	BNC
BNC (J4)	BNC	BNC

Table 9. Set-up of TX1

a-2. As for TX0, only the loop back mode of RX corresponds. This mode is fixed to RX0 in parallel mode. In serial mode, it can be selected by OPS02-00 bits.

Connector	JP13 (TX0)	JP19 (TXP1)	JP14 (TXN1)
Optical (PORT4)	OPT	Open	BNC
BNC (J4)	BNC	Open	BNC

Table 10. Set-up of TX0

b. Set-up of clock input and output

The used signals are MCKO1, MCKO2, LRCK, BICK, ELRCK and DAUX.
The signal level outputted and inputted from PORT2 and PORT5 is 3.3V.

Clock	PORT
MCLK	PORT2
BICK	PORT2
LRCK	PORT2
DAUX	PORT2

Table 11. Clock input/output

b-1. MCKO1/MCKO2

The output of MCKO1 pin or MCKO2 pin can be selected by JP12. The output frequency of MCKO1/MCKO2 sets up by OCKS 1-0.

Output signal	JP12	JP15	JP11	
MCKO1	MCKO1	MCKO	MCKO1	Default
MCKO2	MCKO2	MCKO	MCKO2	

Table 12. Selection of MCKO1/MCKO2

OCKS1 pin (SW3_2)	OCKS0 pin (SW3_3)	(X'tal)	MCKO1	MCKO2	fs (max)	Default
OCKS1 bit	OCKS0 bit					
0	0	256fs	256fs	256fs	96 kHz	
0	1	256fs	256fs	128fs	96 kHz	
1	0	512fs	512fs	256fs	48 kHz	
1	1	128fs	128fs	64fs	192 kHz	

Table 13. Master Clock Frequency Select

b-2. Set-up of input/output of BICK and LRCK

Please set up SW 2_8 (DIT_I/O) according to the setup of audio format of AK4114 (Refer to Table 20). JP16 and 17 should be fixed to the “DC” side.

Audio format	SW3_8 (DIT_I/O)	Default
Slave mode	0	
Master mode	1	

Table 14. Set-up of DIT_I/O

c. Set-up of audio data format

Please refer to Table 7.

d. Set-up of CM1 and CM0

CM1 pin (SW3_1)	CM0 pin (JP18)	(UNLOCK)	PLL	X'tal	Clock source	SDTO source	Default
CM1 bit	CM0 bit						
0	0	-	ON	ON(Note)	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	

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

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

Table 15. Clock Operation Mode Select

■ B, C, U, V Inputs and output

B(block start), C(channel status), U(user data) and V(validity) are inputted/outputted via 10pin header (PORT3: BCUV). Pin arrangement of PORT3 has become like Figure 3.

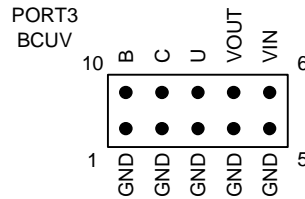


Figure 3. PORT3 pin layout

■ Serial control

The AK4114 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 AKD4114-B. Take care of the direction of connector. There is a mark at pin#1. The pin layout of PORT6 is as Figure 4.

Mode	SW1_6	JP18
4 wire Serial	L	CDTO/CM0="H"
IIC	H	SDA and CM0="L"(Note)

Note: In IIC mode, the chip address is fixed to "01".

Table 16. Set-up of Parallel mode and Serial mode

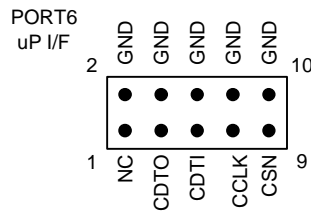


Figure 4. PORT6 pin layout

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 AK4114. 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”.

■ DIP switch (SW1) set-up: -off- means “L”

No.	Switch Name	Function	Default
1	IPS0	Set-up of IPS0 pin. (in parallel mode)	OFF
2	DIF0	Set-up of DIF0 pin. (in parallel mode)	OFF
3	DIF1	Set-up of DIF1 pin. (in parallel mode)	ON
4	DIF2	Set-up of DIF2 pin. (in parallel mode)	ON
5	IPS1/IIC	Set-up of IPS1 pin. (in parallel mode) Set-up of IIC pin. (in serial mode) “L”: 4 wire Serial, “H”: IIC	OFF
6	P/SN	Set-up of P/SN pin. “L”: Serial mode, “H”: Parallel mode	OFF
7	TEST	Don’t care	OFF
8	ACKS	Don’t care	OFF

■ DIP switch (SW3) set-up: -off- means “L”

No.	Switch Name	Function	Default
1	CM1	Set-up of CM1 pin. (in parallel mode)	OFF
2	OCKS1	Set-up of OCKS1 pin. (in parallel mode)	OFF
3	OCKS0	Set-up of OCKS0 pin. (in parallel mode)	OFF
4	PSEL	Don’t care	OFF
5	XTL0	See Table 17	OFF
6	XTL1		OFF
7	DIR_I/O	Set-up of the transmission direction of 74AC245 “L”: When inputting from PORT2, “H”: When outputting from PORT2	ON
8	DIT_I/O	Don’t care	OFF

■ Set-up of XTL1 and XTL0

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

Default

Table 17. Set-up of XTL1 and XTL0

■ Jumper set up.

No.	Jumper Name	Function
1	D3V/VD	Set-up of Power supply source for 74AC245. D3V : D3V (default) VD : VD
2	RXP0	Set-up of RXP0 input circuit. OPT : Optical (default) BNC : BNC
4,5,6	RX1-3	Set-up of RX1-3 input circuit.
7,8,9,10	RX4-7	RX4-7 set-up depending serial/parallel mode RX4-7 : Serial mode (default) DIF2-0,IPS0 : Parallel mode
11,12	DIR MCLK , DIT MCLK	MCKO set-up for PORT5(DIT) and PORT2(DIR) MCKO1 : MCKO1 of AK4114 (default) MCKO2 : MCKO2 of AK4114
13	TX0	Set-up of TX0 output circuit. OPT : Optical BNC : BNC (default)
15	MCLK	MCLK input output selection of PORT5(DIT). MCKO : MCKO (default) EMCK : EMCK
18	SDA/CDTO	Set-up of SDA/CDTO pin. 4 wire Serial : CDTO/CM0="H". (default) IIC : SDA
19	TXP1	Set-up of TXP1 input circuit. OPT : Optical (default) BNC : BNC

Control Software Manual

■ Set-up of evaluation board and control software

1. Set up the AKD4114-B according to previous term.
2. Connect IBM-AT compatible PC with AKD4114-B by 10-line type flat cable (packed with AKD4114-B). 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 "AKD4114-B Evaluation Kit" into the CD-ROM drive.
4. Access the CD-ROM drive and double-click the icon of "akd4114-b0.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 "Write default" button.
3. Then set up the dialog and input data.

■ Explanation of each buttons

- | | |
|----------------------|--|
| 1. [Port Setup] : | Set up the printer port. |
| 2. [Write default] : | Initialize the register of AK4114. |
| 3. [All Write] : | Write all registers that is currently displayed. |
| 4. [Read All] : | All the registers of AK4114 are read. |
| 5. [Function1] : | Dialog to write data by keyboard operation. |
| 6. [F3] : | Dialog of sequential writing. |
| 7. [SAVE] : | Save the current register setting. |
| 8. [OPEN] : | Write the saved values to all register. |
| 9. [Write] : | Dialog to write data by mouse operation. |
| 10. [Read] : | The data corresponding to each register is read. |

■ Explanation of each dialog

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

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

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

If you want to write the input data to AK4114, click "OK" button. If not, click "Cancel" button.

2. [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 "1". If not, "L" or "0".

If you want to write the input data to AK4114, click "OK" button. If not, click "Cancel" button.

■ 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.

■ Attention on the operation

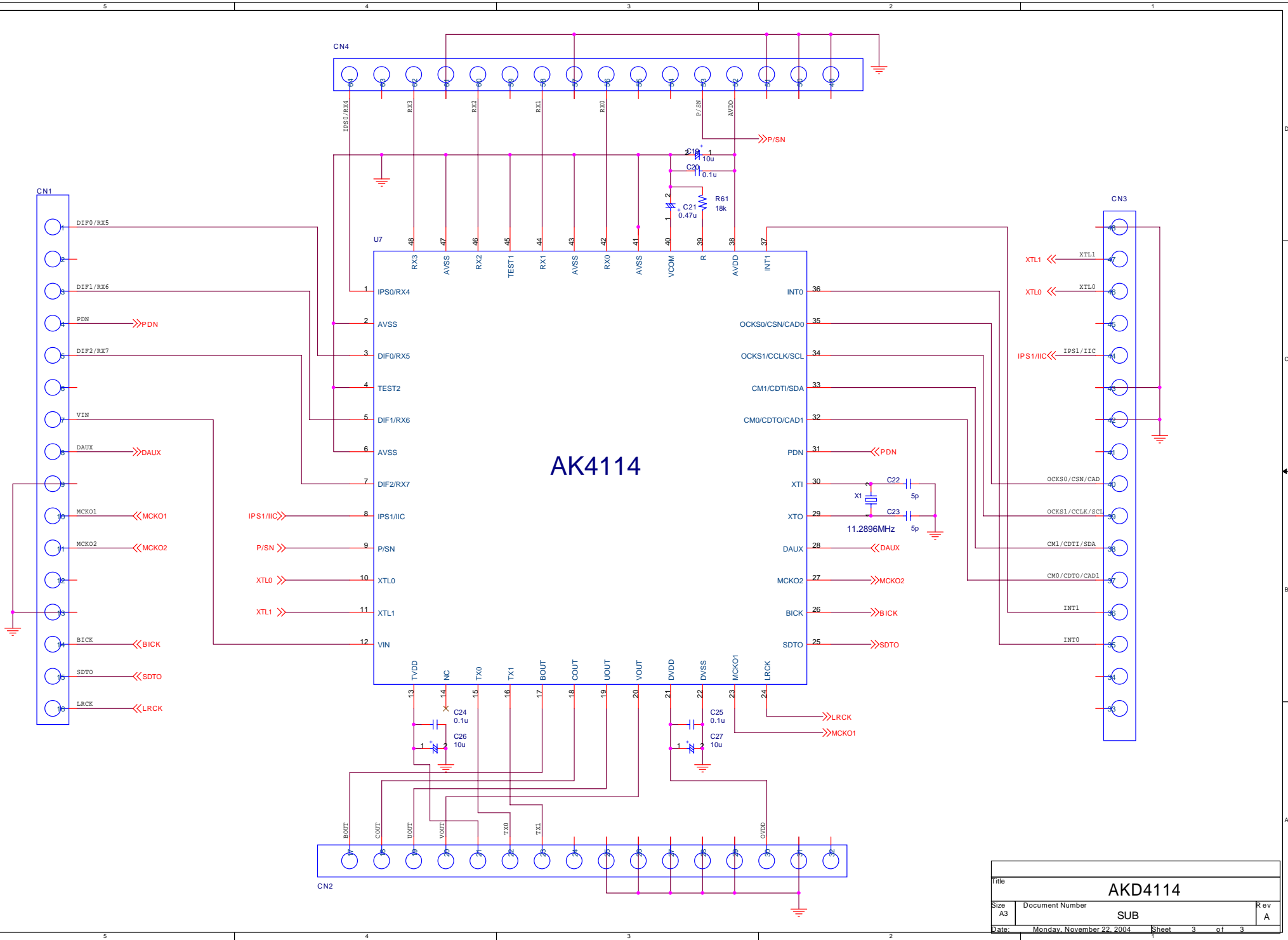
If you set up Function1 dialog, input data to all boxes. Attention dialog is indicated if you input data or address that is not specified in the datasheet or you click "OK" button before you input data. In that case set up the dialog and input data once more again. These operations does not need if you click "Cancel" button or check the check box.

Revision History

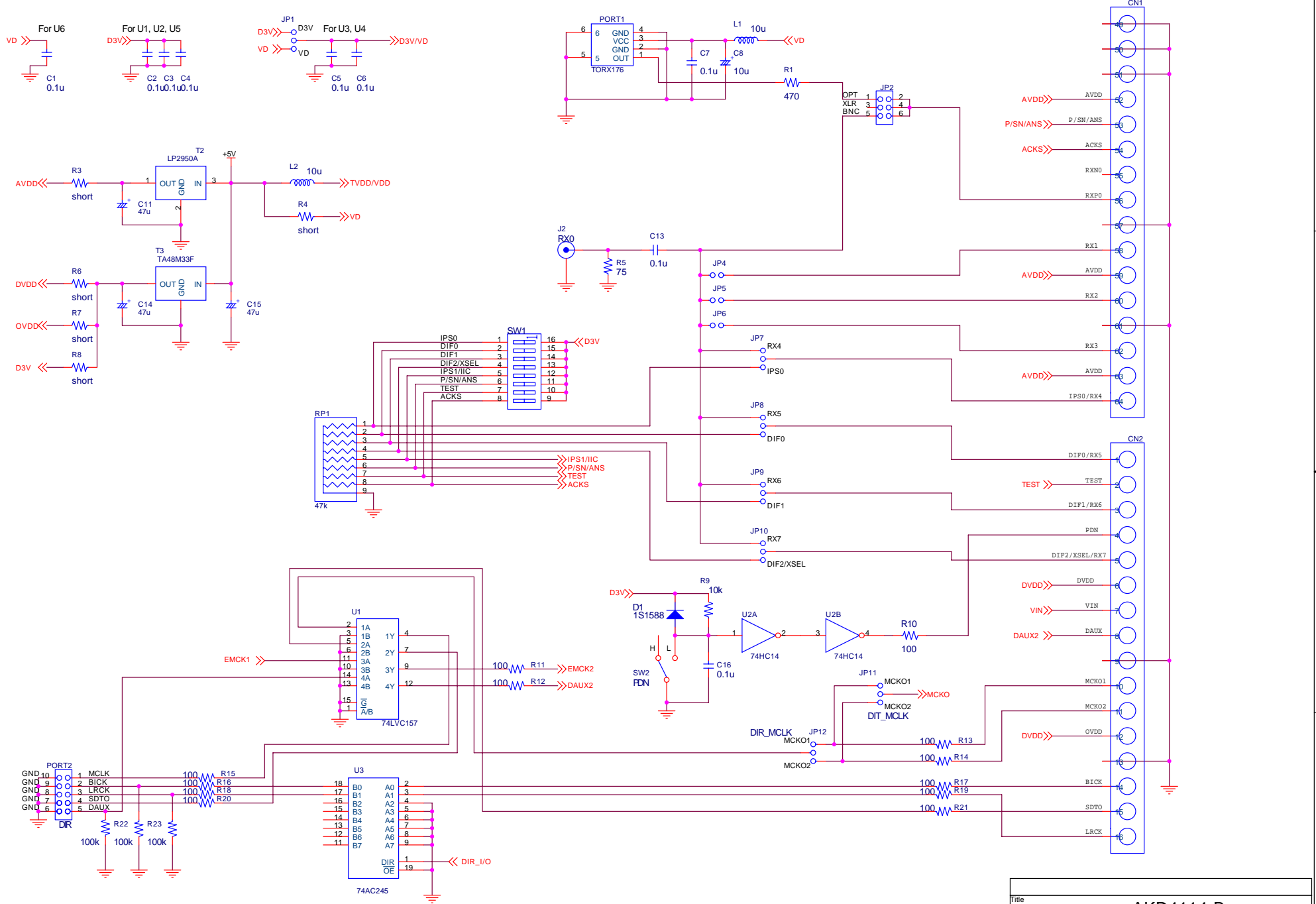
Date (YY/MM/DD)	Manual Revision	Board Revision	Reason	Contents
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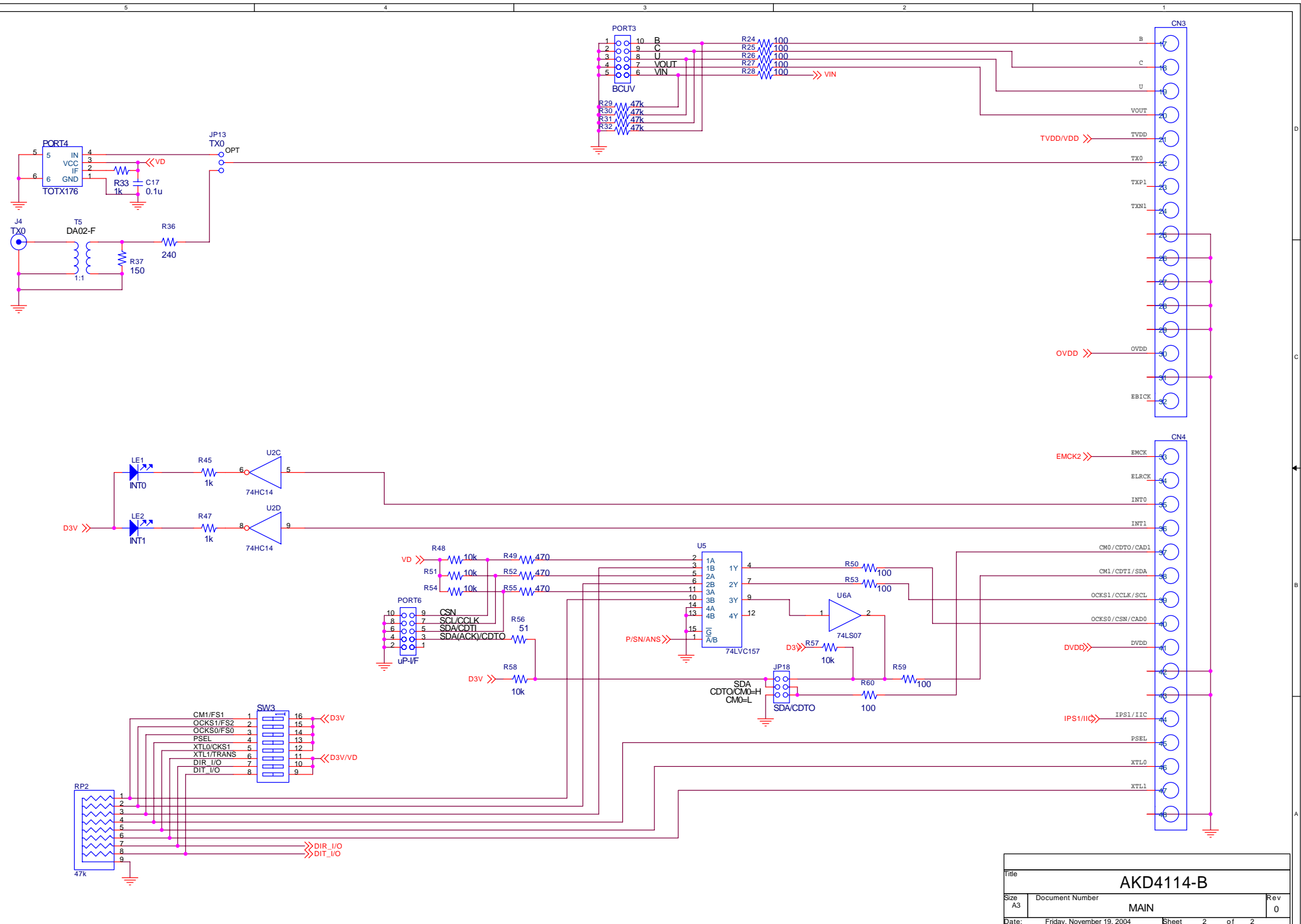
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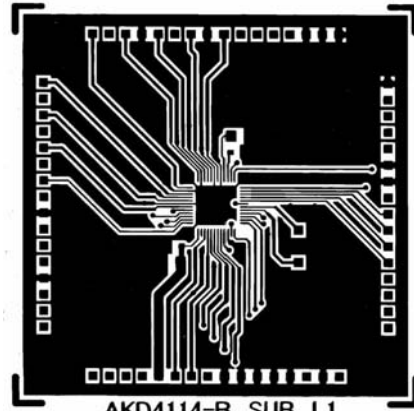
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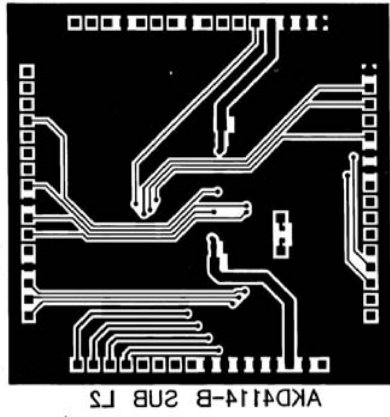
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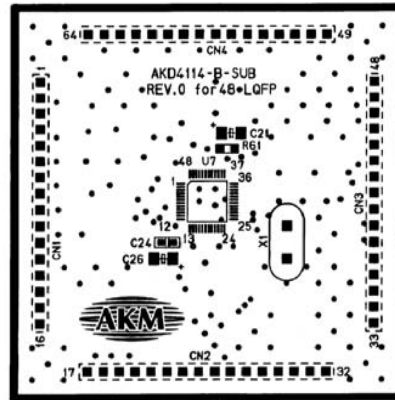


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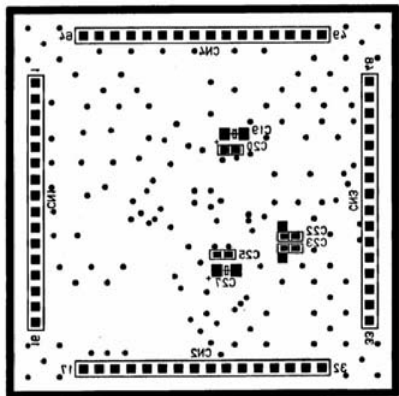
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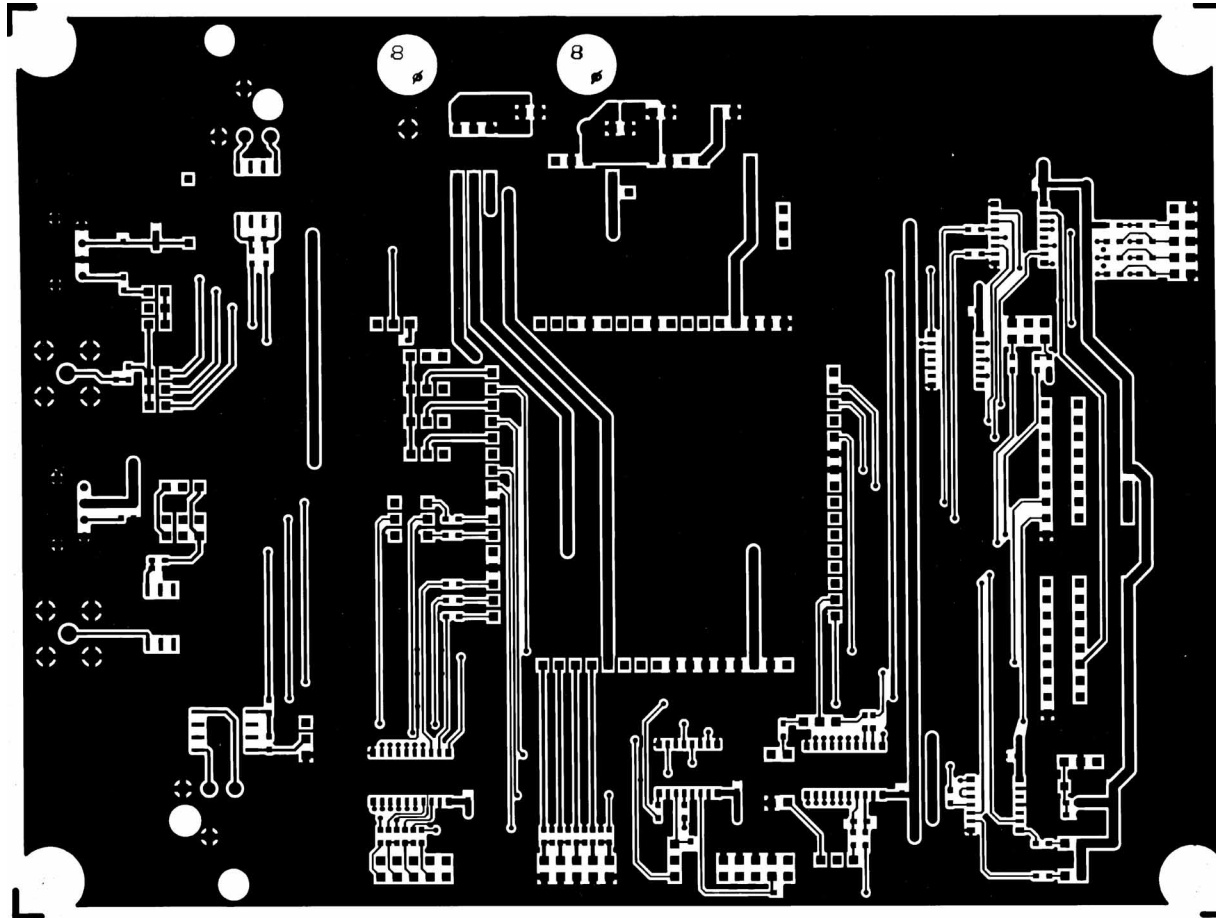




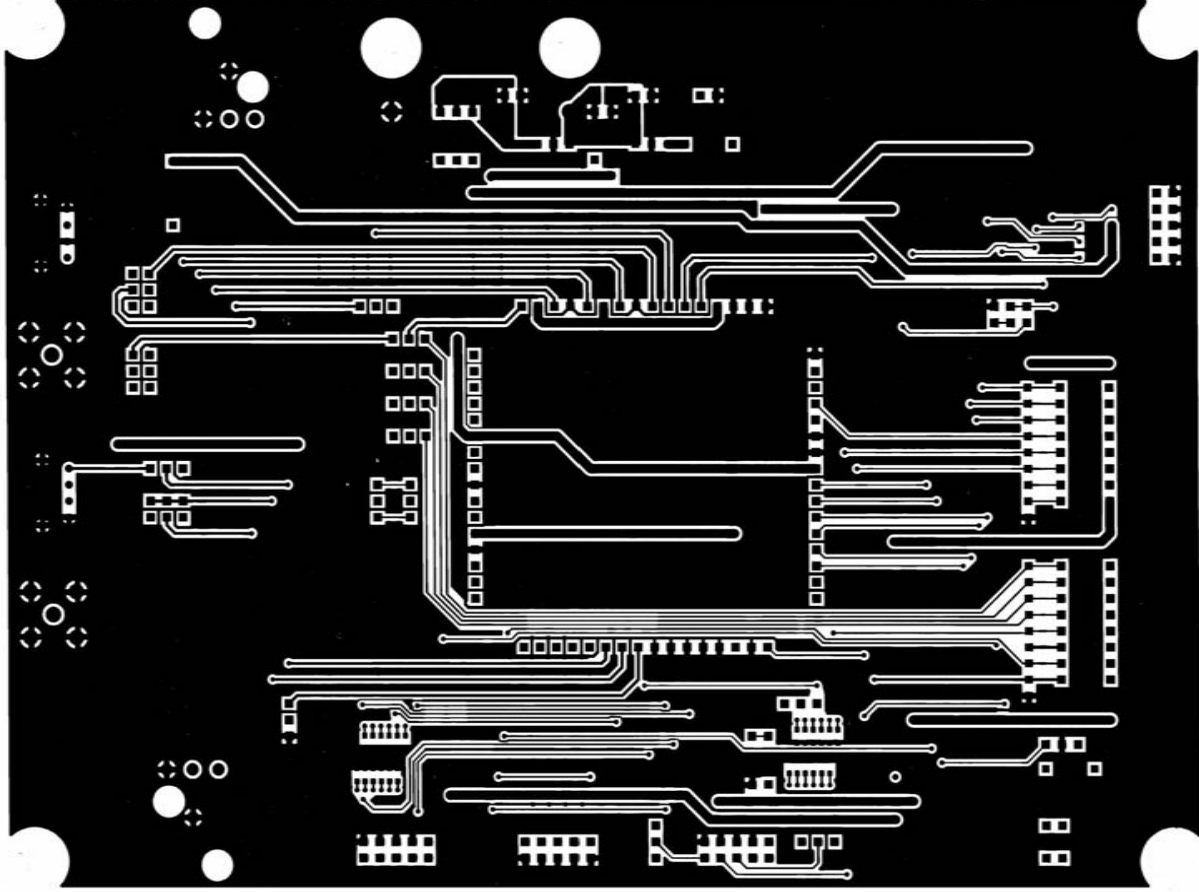
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AKD4114-B SUB L3_SILK

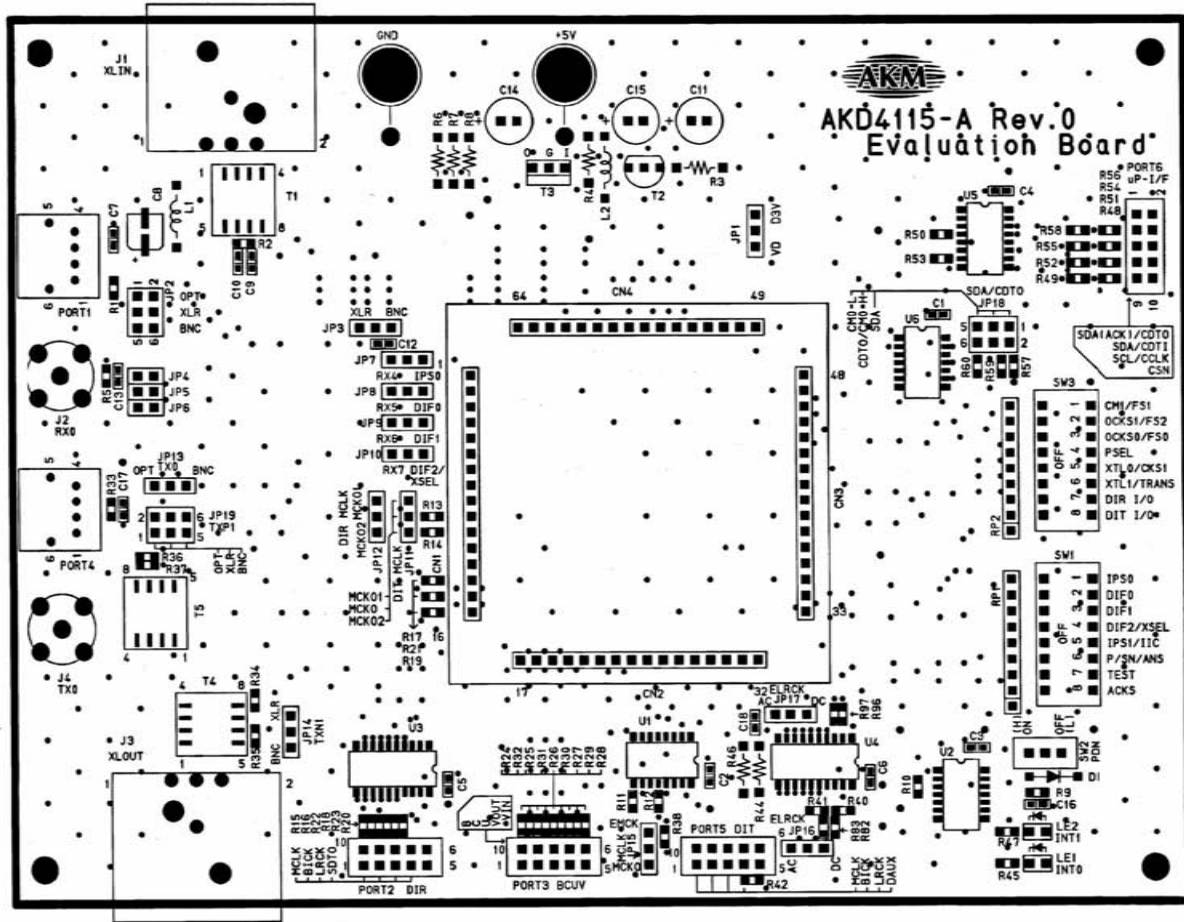




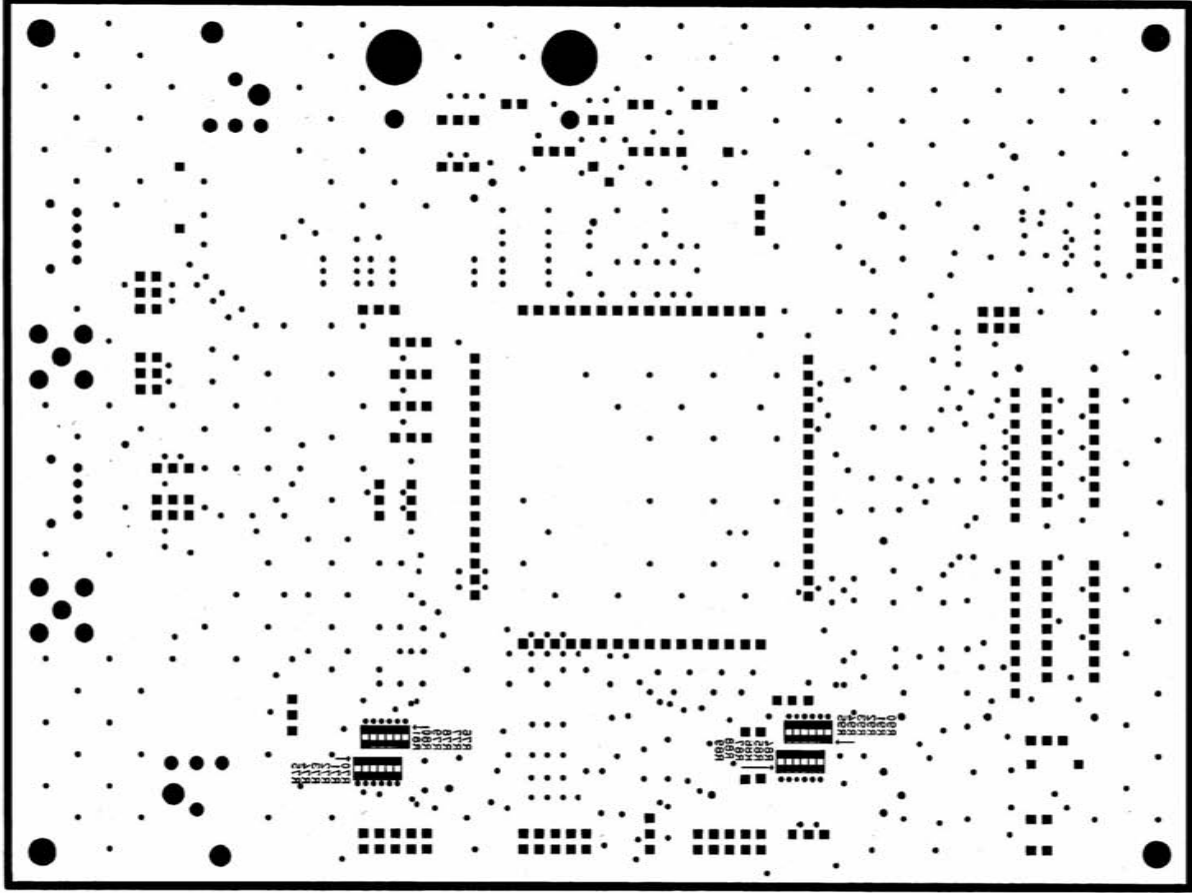
AKD4115-A L1



AKD4112-A L2



AKD4115-A L1_SILK



AKD4112-A-LS_SILK