AKD4117-B
AK4117 Evaluation Board Rev.0

GENERAL DESCRIPTION

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

■ **Ordering guide**

AKD4117-B --- Evaluation board for AK4117
(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)
- 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)

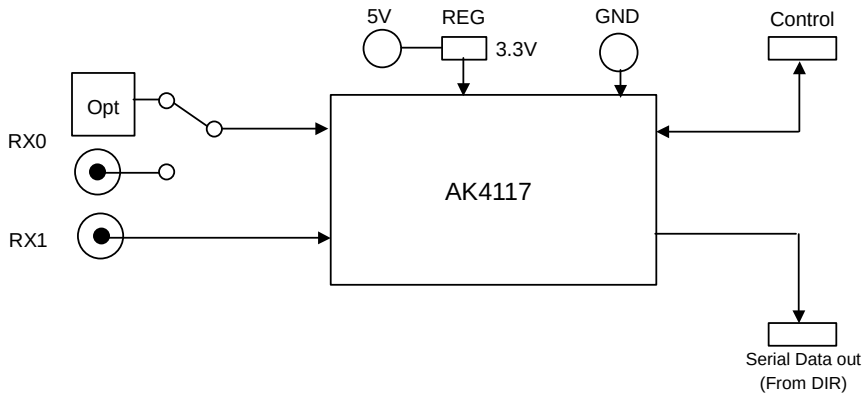


Figure 1. AKD4117-B Block Diagram
*Circuit diagram and PCB layout are attached at the end of this manual.

Evaluation Board Manual

■ Operating sequence

(1) **Set up the power supply lines.**
[+ 5V] (Red) = 5V
[GND] (Black) = 0V

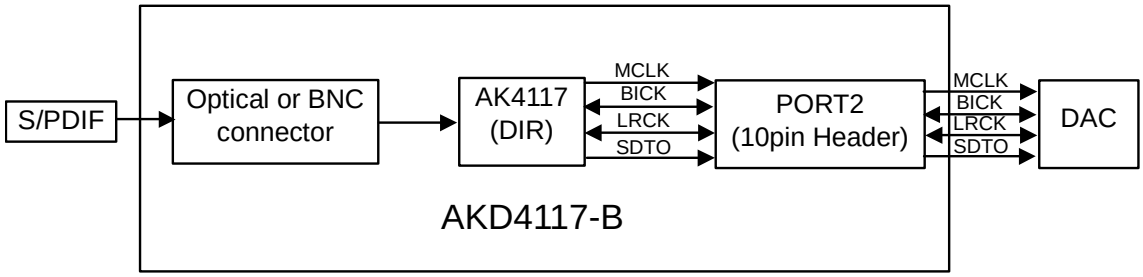
(2) **Set up the evaluation mode and jumper pins.** (Refer to the following item.)

(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 optical connector(PORT1: TORX176) or 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. RX0

Connector	JP2(RX0)
Optical (PORT1)	OPT
BNC (J2)	BNC

Table 1. Set-up of RX0

When S/PDIF signal is inputted from PORT1 (optical), JP19 should be short.

a-2. RX1 can be inputted from a BNC (J2) connector only.

Input	RX1
JP	JP4
	Short

Table 2. Set-up of RX1

a-3. Set-up of AK4117 input path

IPS bit	Input data	
0	RX0	Default
1	RX1	

Table 3. Recovery Data Select

b. Set-up of clock input and output

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

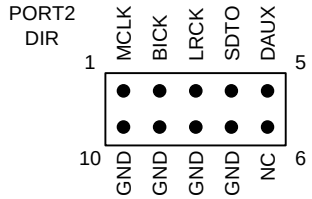


Figure 2. PORT2 pin layout

b-1. MCKO1/MCKO2

The AK4117 has a master clock output pin, MCKO. In PLL mode, PCKS1-0 bits select the MCKO frequency as shown in Table 4. 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 5).

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 4. 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	Default
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	

Table 5. 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	Default
5	1	0	1	24bit, I^2S	24bit, I^2S	L/H	O	
6	1	1	0	Reserved				
7	1	1	1					

Table 6. 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	Default
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 7. 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.

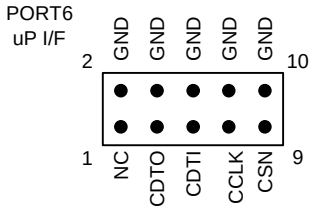


Figure 3. PORT6 pin layout

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.

■ **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	
XTL1	XTL0	X’tal #1	
0	0	11.2896MHz	Default
0	1	12.288MHz	
1	0	24.576MHz	
1	1	(Use channel status)	

Table 8. Reference X’tal frequency

■ **Jumper set up.**

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

Control Software Manual

■ Set-up of evaluation board and control software

1. Set up the AKD4117-B according to previous term.

2. Connect IBM-AT compatible PC with AKD4117-B by 10-line type flat cable (packed with AKD4117-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 “AKD4117-B Evaluation Kit” into the CD-ROM drive.

4. Access the CD-ROM drive and double-click the icon of “akd4117-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 AK4117.
3. [All Write] : Write all registers that is currently displayed.
4. [Read All] : All the registers of AK4117 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 AK4117, 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 AK4117, 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

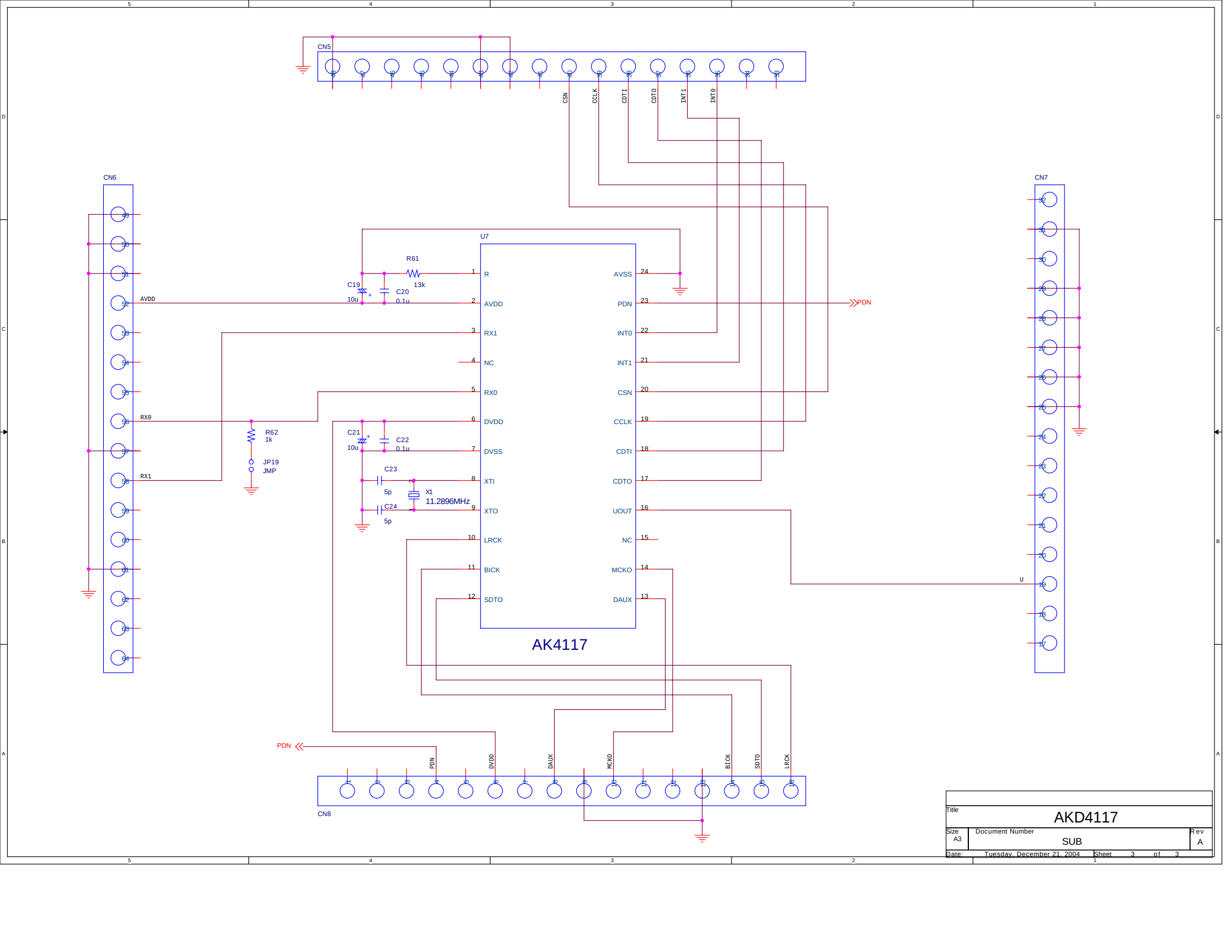
If you set up Function1 dialog, input data to all boxes. Attention dialog is indicated if you input data or address that is not specified in the datasheet or you click “OK” button before you input data. In that case set up the dialog and input data once more again. These operations does not need if you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

Revision History

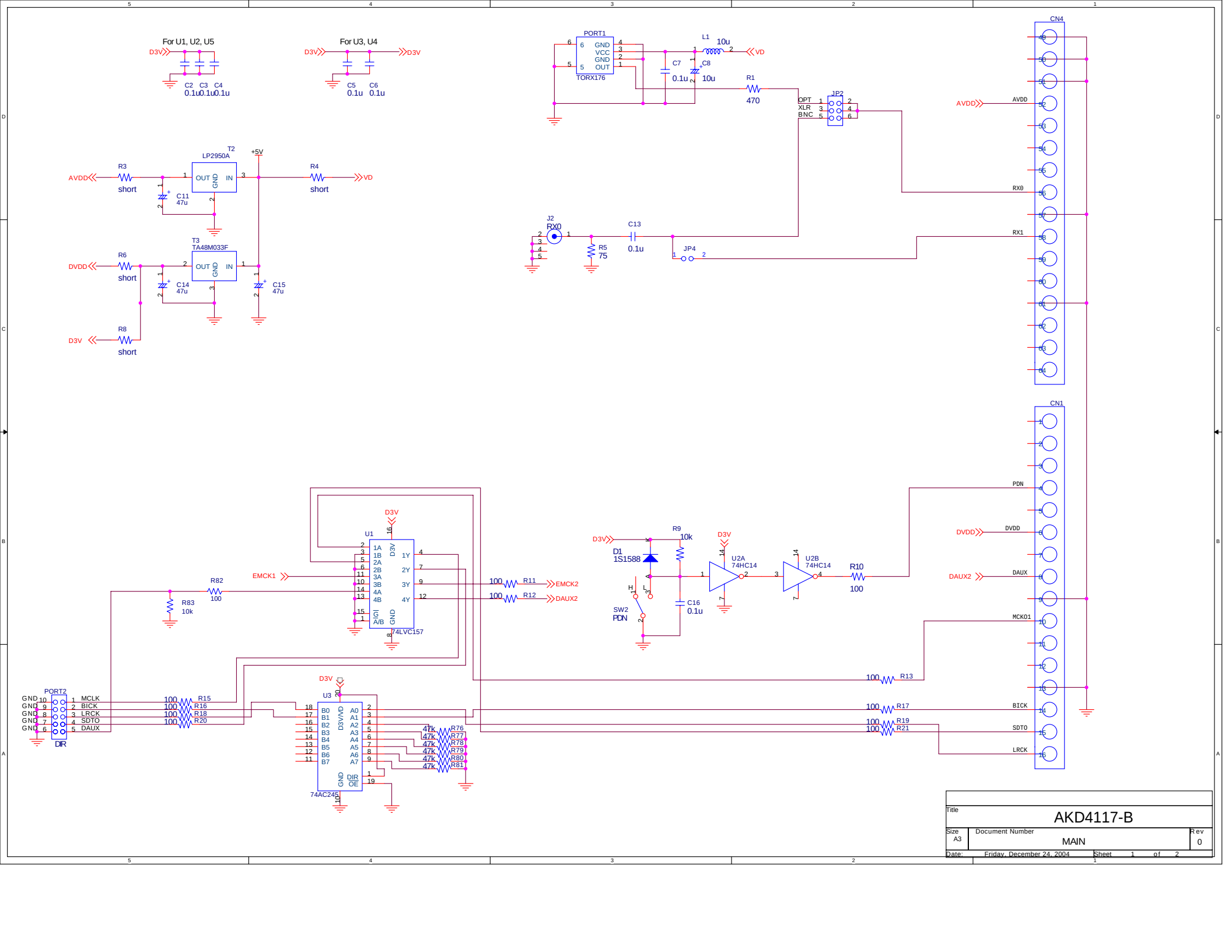
Date (YY/MM/DD)	Manual Revision	Board Revision	Reason	Contents
04/12/21	KM077200	0	First edition	

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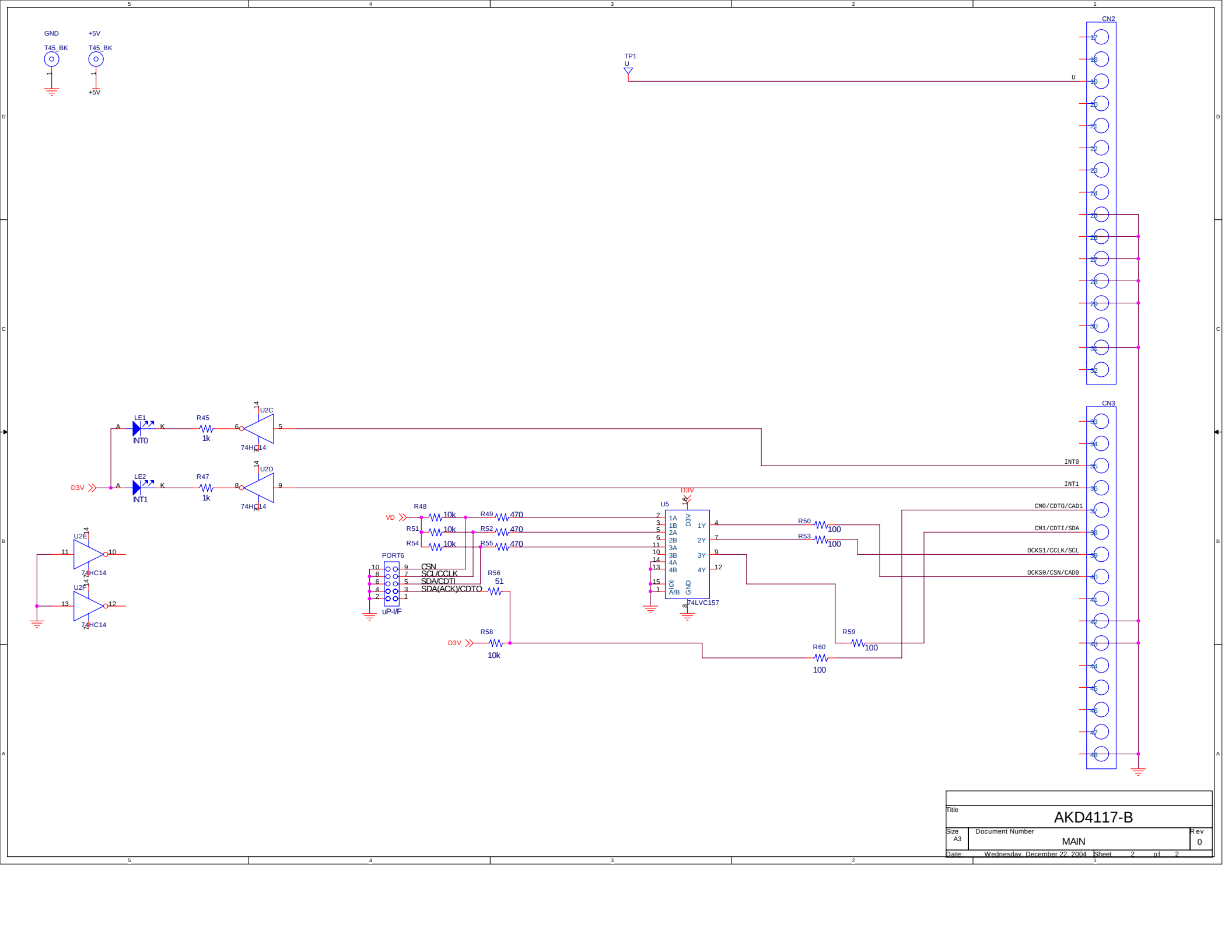
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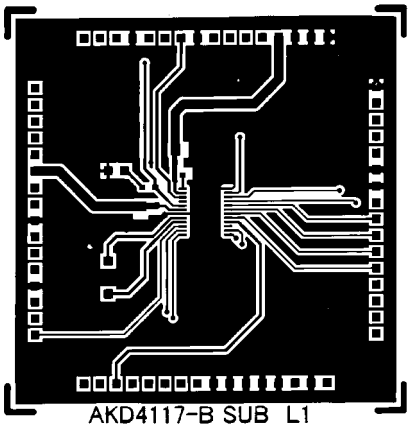


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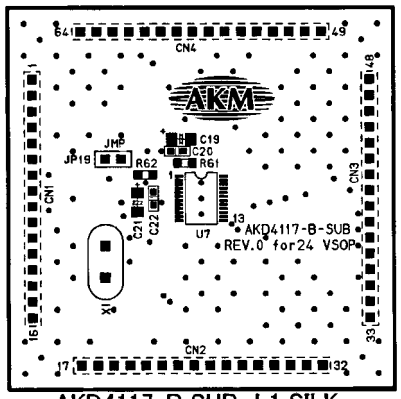
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Date: Friday, December 24, 2004	Sheet 1 of 2	


GND
T45_BK
+5V
T45_BK
+5V
TP1
U
CN2
CN3
LE1
INT0
LE2
INT1
R45
1k
R47
1k
U2C
U2D
74HC14
D3V
R48
10k
R49
470
R51
10k
R52
470
R54
10k
R55
470
VD
PORT6
CSN
SCL/CCLK
SDA/CDTI
SDA(ACK)/CDTO
uP-I/F
R56
51
R58
10k
U5
74LVC157
R50
100
R53
100
R59
100
R60
100
INT0
INT1
CM0/CDTO/CAD1
CM1/CDTI/SDA
OCKS1/CCLK/SCL
OCKS0/CSN/CAD0
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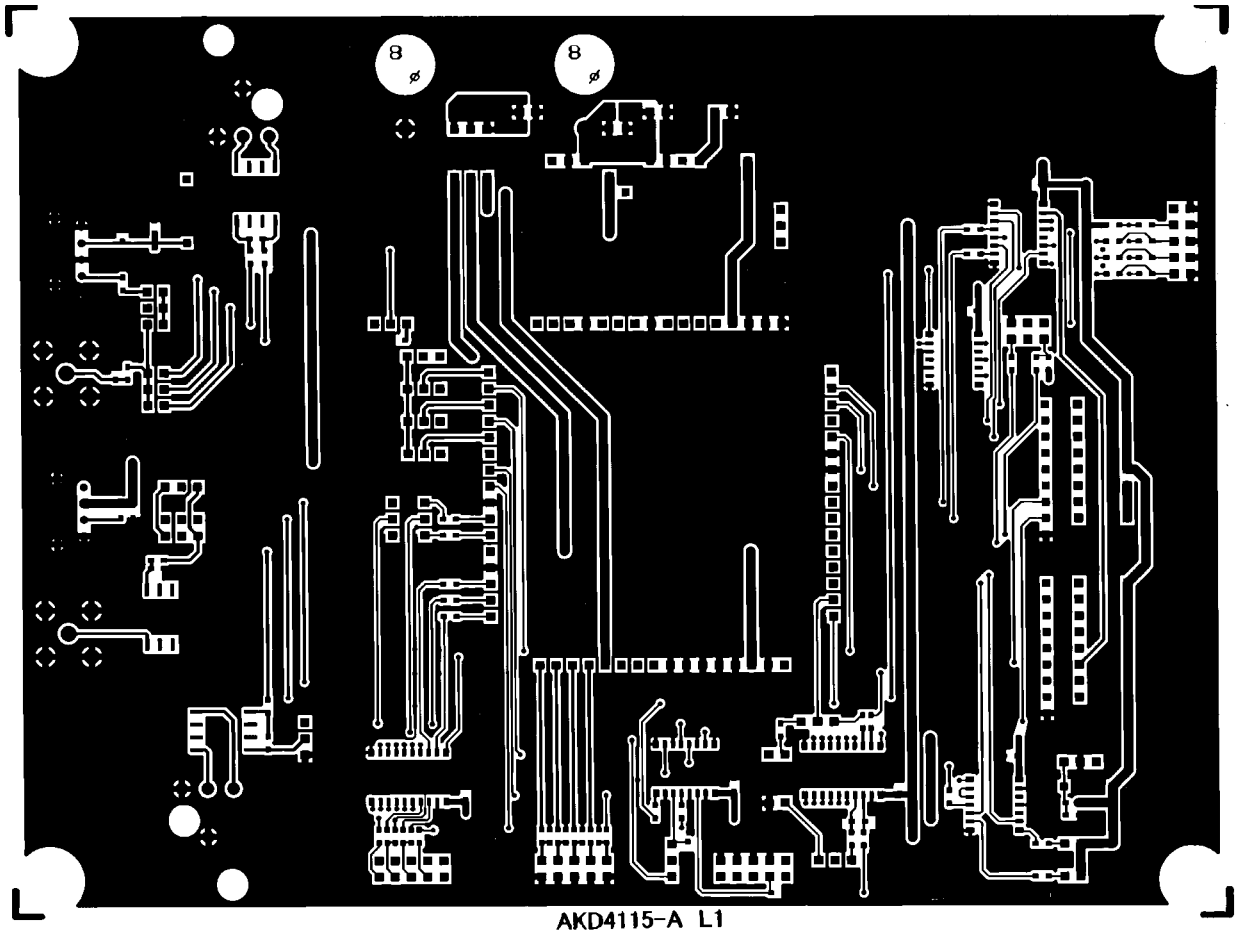
AKD4117-B SUB L1

AKD4117-B SUB L2



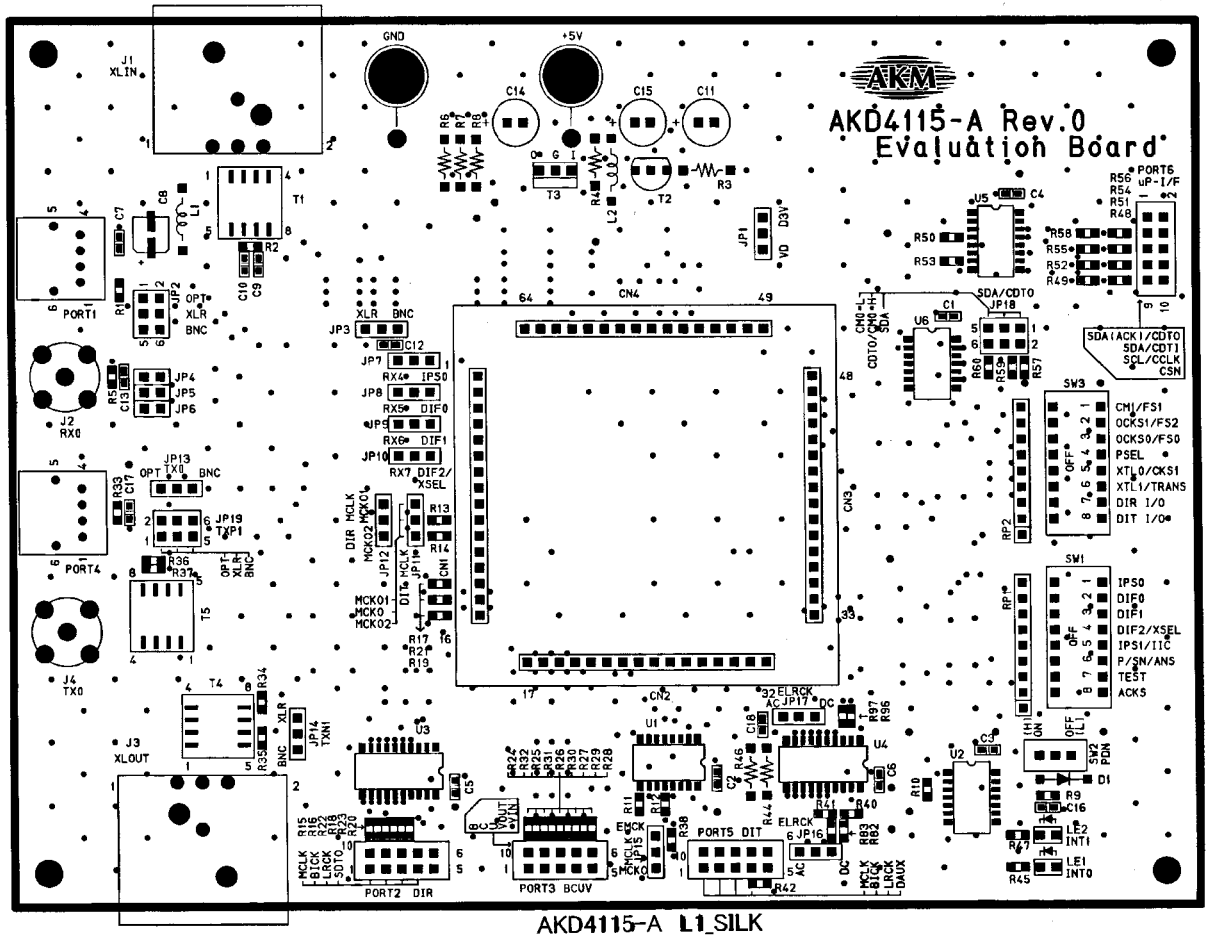
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AKD4117-B SUB L2_SILK

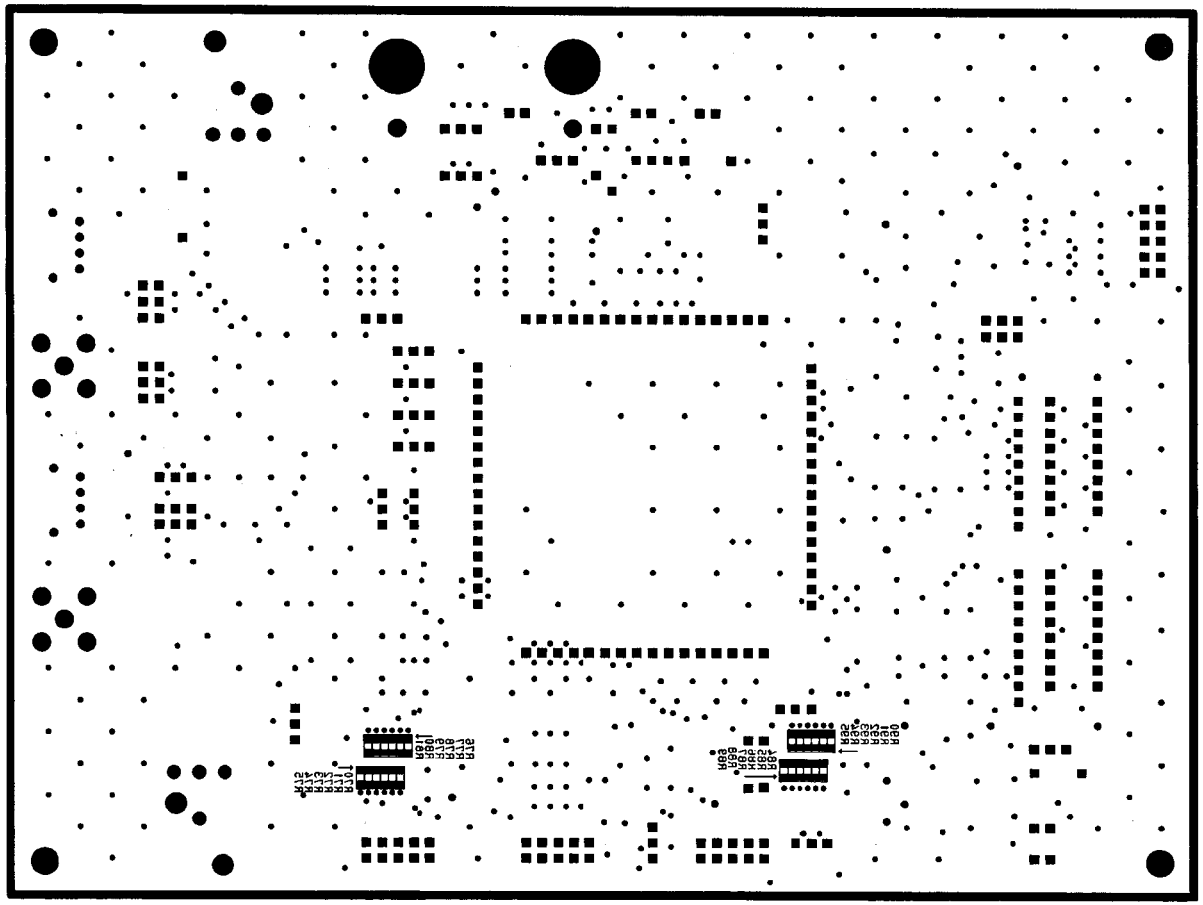


AKD4115-A L1

AKD4115-A L2



AKD4115-A L1_SILK



AKD4115-A L2_SILK