AKD4113-B
AK4113-B Evaluation Board Rev.1

GENERAL DESCRIPTION

AKD4113-B is the evaluation board for AK4113, 192kHz digital audio receiver. This board has optical, cannon connector and BNC connector to interface with other digital audio equipment.

■ Ordering guide

AKD4113-B --- Evaluation board for AK4113
(A cable for connecting with printer port of IBM-AT compatible PC and a control software are packed with this.)

FUNCTION

☐ Digital interface

-S/PDIF :
6 channel input (optical or BNC)
1 channel output (optical or BNC)
- Serial audio data I/F :
1 output (for DIR data output. 10-pin port)
-Serial control data I/F
1 input/output port (10-pin port)

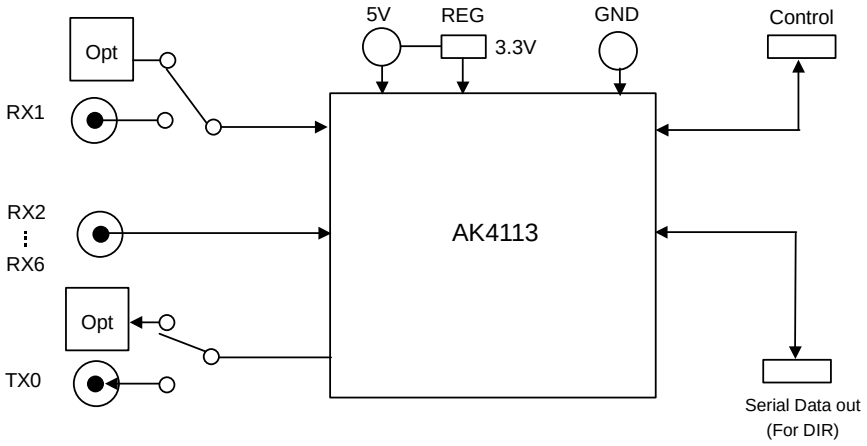

Figure 1. AKD4113-B Block Diagram
*Circuit diagram and PCB layout are attached at the end of this manual.

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 AK4113 should be reset once bringing PDN(SW2) "L" upon power-up.

■ Evaluation modes

(1) Evaluation for DIR
S/PDIF in (optical or BNC) – AK4113 – Serial Data out (10pin port)

The DIR generates MCLK, BICK and LRCK SDATA from the received data through optical connector(PORT1: TORX176) or BNC connector. The AKD4113-B can be connected with the AKM's DAC evaluation board via 10-line cable.

a. Set-up of Bi-phase Input

RX1 and RX2-6 should not select BNC connector at the same time.

a-1. RX1

Connector	JP2(RX1)
Optical (PORT1)	OPT
BNC (J2)	BNC

Table 1. Set-up of RX1

a-2. RX2, 3, 4, 5 and 6 can be inputted from a BNC (J2) connector only.
Only RX1 and RX5 can be used in parallel mode.

a-2-1. Set-up of the jumper on the sub board.

Mode	JP19	JP21	JP22	JP23	JP24	JP25	JP26
Serial mode	RX2	RX3	RX4	RX6	RX4	RX5	RX6
Parallel mode	DIF0	DIF1	DIF2	IPS	IPS	DIF0	DIF1

Table 2. Set-up of the Jumper on the sub board

a-2-2. Set-up of the jumper on the main board.

Input	RX2	RX3	RX4	RX5	RX6
JP	JP5	JP6	JP7	JP8	JP9
	Short	Short	RX4	RX5	RX6

The jumper, which selects the Rx channel, should be Short.
Table 3. Set-up of RX2, 3, 4, 5 and 6

a-3. Set-up of AK4113 input path

It sets up by SW 1_1 (IPS pin) in parallel mode. Please set up IPS2-0 bits in serial mode.

IPS2 bit	IPS1 bit	IPS0 bit	INPUT Data	
0	0	0	RX1	Default
0	0	1	RX2	
0	1	0	RX3	
0	1	1	RX4	
1	0	0	RX5	
1	0	1	RX6	
1	1	0	No use	
1	1	1	No use	

Table 4. Recovery Data Select (Serial)

IPS0 pin	INPUT Data	
L	RX1	Default
H	RX5	

Table 5. Recovery Data Select (parallel mode)

b. Set-up of clock input and output

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

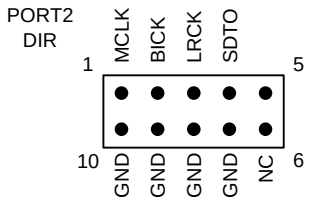

Figure 2. PORT2 pin layout

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	
MCKO1	MCKO1	Default
MCKO2	MCKO2	

Table 6. MCKO1/MCKO2 set-up

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

Table 7. Master Clock Frequency Select

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

Please select SW 2_7 (DIR_I/O) according to the setup of audio format of AK4113 (Refer to Table 7).

Output signal	SW3_7 (DIR_I/O)	
Slave mode	0	Default
Master mode	1	

Table 8. DIR_I/O set-up

c. Set-up of Audio data 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^2S	24bit, I^2S	L/H	O	64fs	O	
6	1	1	0	24bit, Left justified	24bit, Left justified	H/L	I	64-128fs	I	Default
7	1	1	1	24bit, I^2S	24bit, I^2S	L/H	I	64-128fs	I	

Table 9. Audio data 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	Default
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	

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 10. Clock Operation Mode Select

(2) Evaluation for DIT
S/PDIF in (optical or BNC)– AK4113 – S/PDIF out (optical or BNC)

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

As for TX, only the loop back mode of RX corresponds. In serial mode, it can be selected by OPS2-0 bits. This mode is not supported in parallel mode.

Connector	JP13 (TX)
Optical (PORT4)	OPT
BNC (J4)	BNC

Table 11. Set-up of TX

■ Serial control

The AK4113 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 AKD4113-B. Take care of the direction of connector. There is a mark at pin#1. The pin layout of PORT6 is as Figure 3.

Mode	SW1_6	JP18	JP20
4 wire Serial	L	CDTO/CM0="H"	IIC
IIC	H	SDA and CM0="L"(Note)	IIC

Note: In IIC mode, the chip address is fixed to "01".
Table 12. Set-up of parallel mode and serial mode

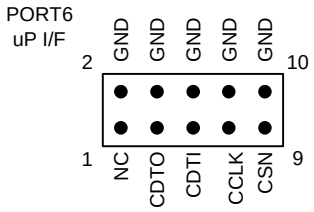

Figure 3. PORT6 pin layout

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 AK4113. 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”.

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

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

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

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

■ **Jumper set up.**

No.	Jumper Name	Function
1	D3V/VD	Set-up of Power supply source for 74AC245. D3V : D3V (default) VD : VD
2	RX1	Set-up of RX1 input circuit. OPT : Optical (default) BNC : BNC
5,6	RX2-3	Set-up of RX2-3 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 AK4113 (default) MCKO2 : MCKO2 of AK4113
13	TX0	Set-up of TX0 output circuit. OPT : Optical (default) BNC : BNC
18	SDA/CDTO	Set-up of SDA/CDTO pin. 4 wire Serial : CDTO/CM0="H". (default) IIC : SDA and CM0="L"
19	RX2/DIF0	Set-up depending serial/parallel mode RX2: Serial mode (default) DIF0: Parallel mode
20	IIC/FS96	Set-up depending serial/parallel mode IIC: Serial mode (default) FS96: Parallel mode
21	RX3/DIF1	Set-up depending serial/parallel mode RX3: Serial mode (default) DIF1: Parallel mode
22	RX4/DIF2	Set-up depending serial/parallel mode RX4: Serial mode (default) DIF2: Parallel mode
23	RX6/IPS	Set-up depending serial/parallel mode RX6: Serial mode (default) IPS: Parallel mode
24	RX4/IPS	Set-up depending serial/parallel mode RX4: Serial mode (default) IPS: Parallel mode
25	RX5/DIF0	Set-up depending serial/parallel mode RX5: Serial mode (default) DIF0: Parallel mode
26	RX6/DIF1	Set-up depending serial/parallel mode RX6: Serial mode (default) DIF1: Parallel mode

Control Software Manual

■ Set-up of evaluation board and control software

1. Set up the AKD4113-B according to previous term.

2. Connect IBM-AT compatible PC with AKD4113-B by 10-line type flat cable (packed with AKD4113-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 “AKD4113-B Evaluation Kit” into the CD-ROM drive.

4. Access the CD-ROM drive and double-click the icon of “akd4113-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 AK4113.
3. [All Write] : Write all registers that is currently displayed.
4. [Read All] : All the registers of AK4113 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 AK4113, 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 AK4113, 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
04/11/11	KM076500	0	First Edtion	
04/11/30	KM076501	1	Modification	Circuit diagram (U1-15 pin and U1-1 pin) is changed

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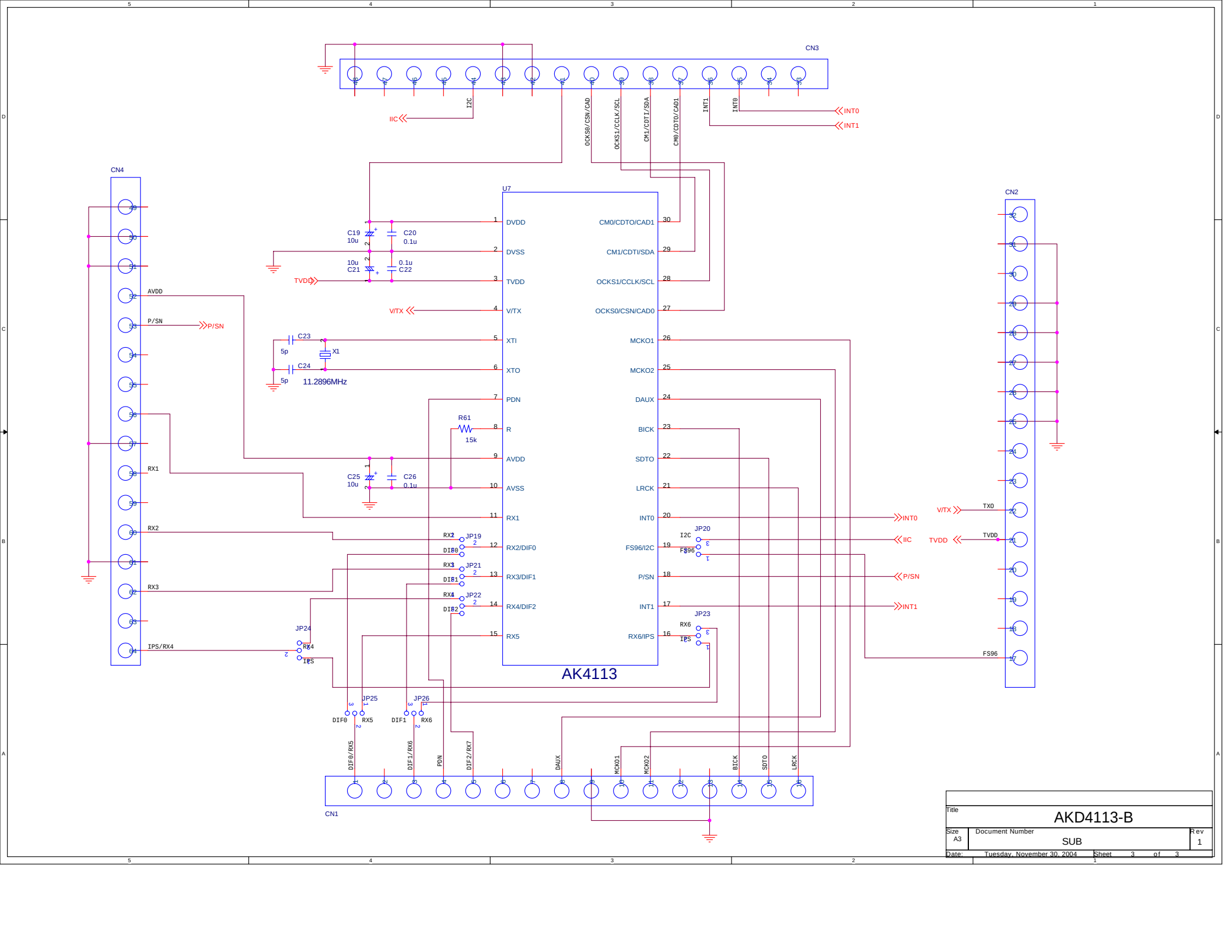

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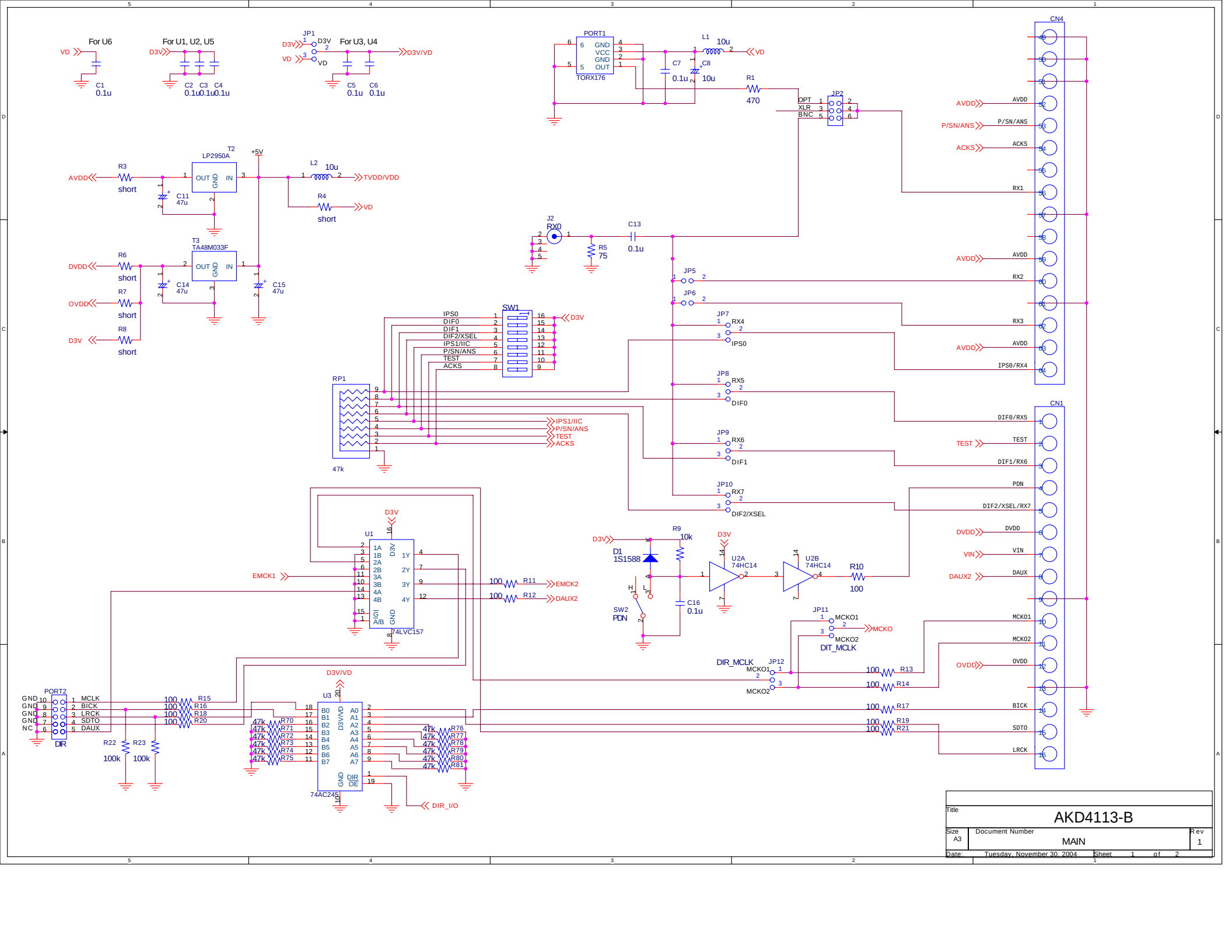

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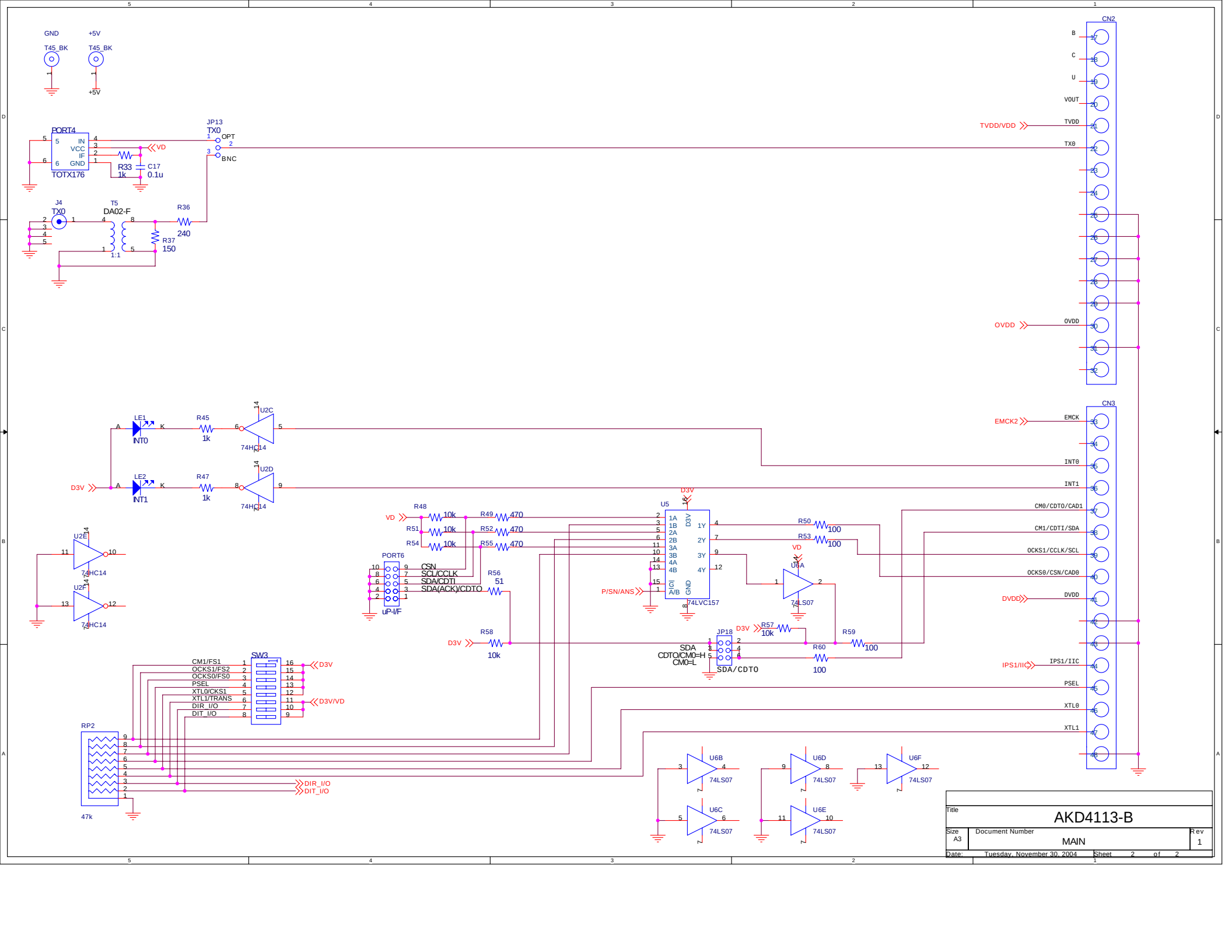
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CN2
B
C
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OVDD
CN3
EMCK
INT0
INT1
CM0/CDTO/CAD1
CM1/CDTI/SDA
OCKS1/CCLK/SCL
OCKS0/CSN/CAD0
DVDD
IPS1/IIC
PSEL
XTL0
XTL1
EMCK2
DVDD
IPS1/IIC
LE1
INT0
LE2
INT1
R45
1k
R47
1k
U2C
U2D
74HC14
D3V
U2A
U2B
74HC14
R48
R49
R51
R52
R54
R55
10k
470
PORT6
CSN
SCL/CCLK
SDA/CDTI
SDA(ACK)/CDTO
uP-I/F
R56
51
R58
10k
U5
74LVC157
P/SN/ANS
R50
R53
100
U6A
74LS07
VD
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JP18
SDA
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SW3
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OCKS1/FS2
OCKS0/FS0
PSEL
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XTL1/TRANS
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DIT_I/O
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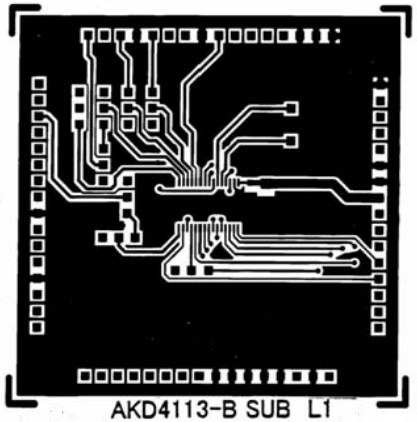

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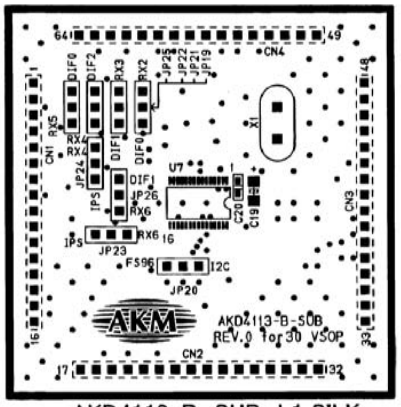
AKD4113-B SUB L2



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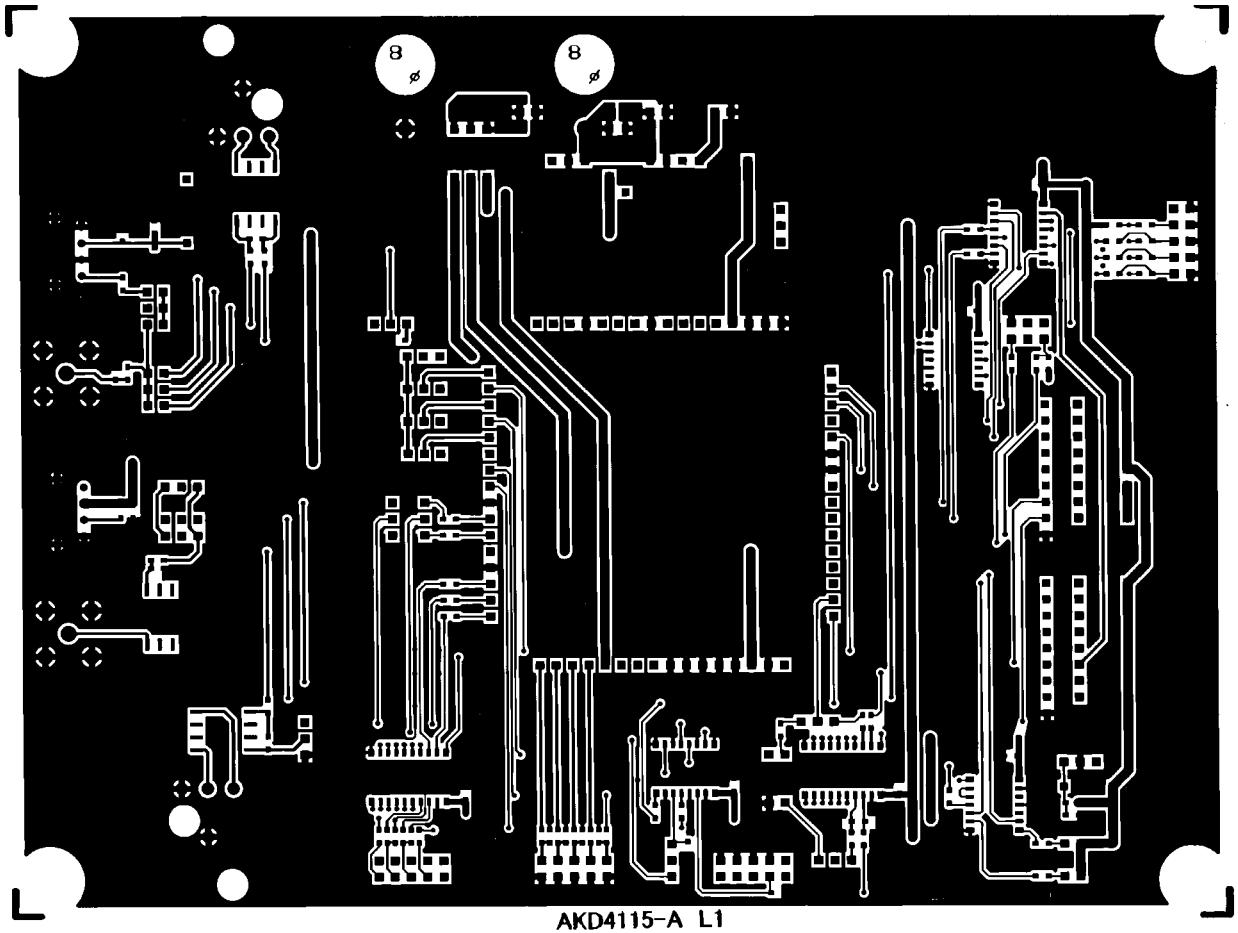
AKD4113-B SUB L2_SILK



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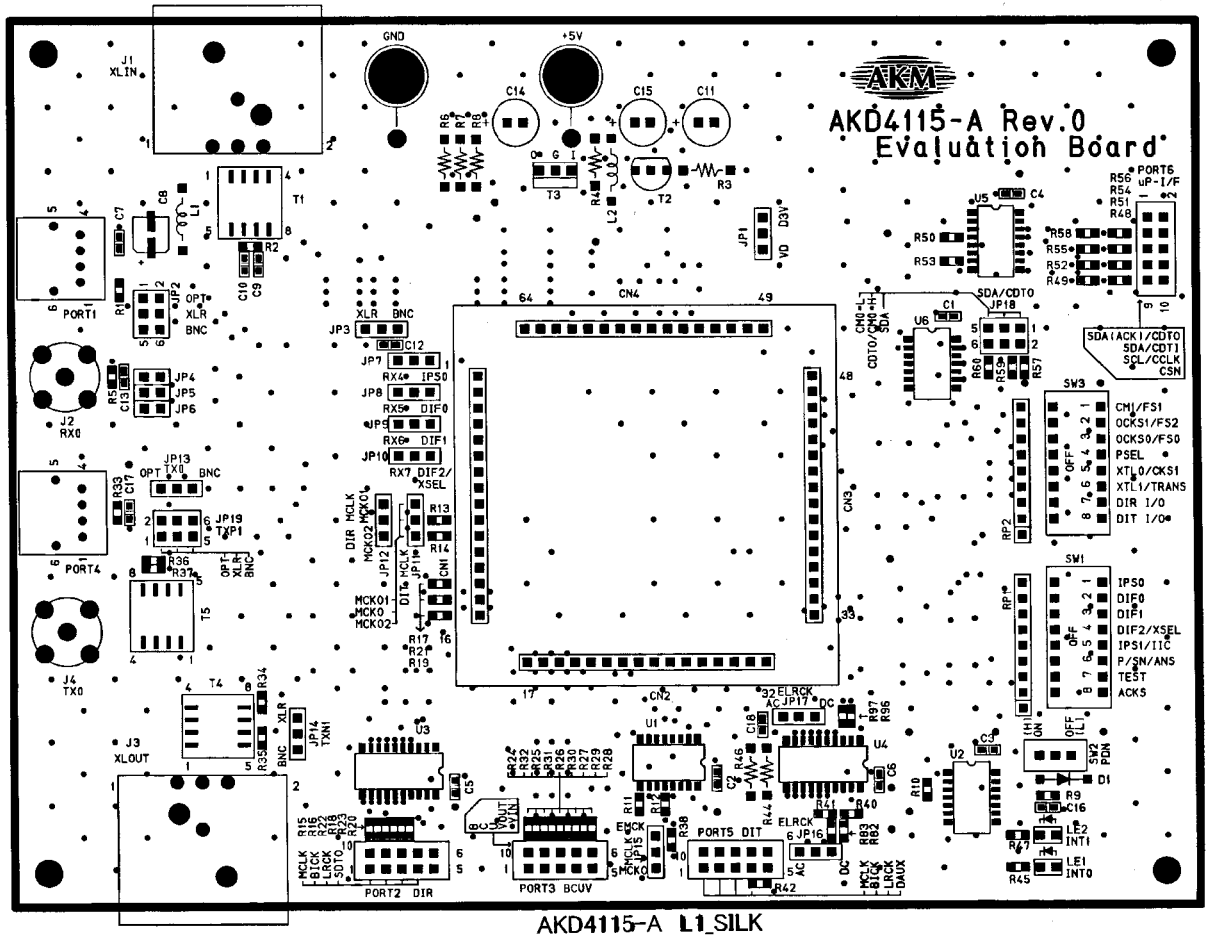

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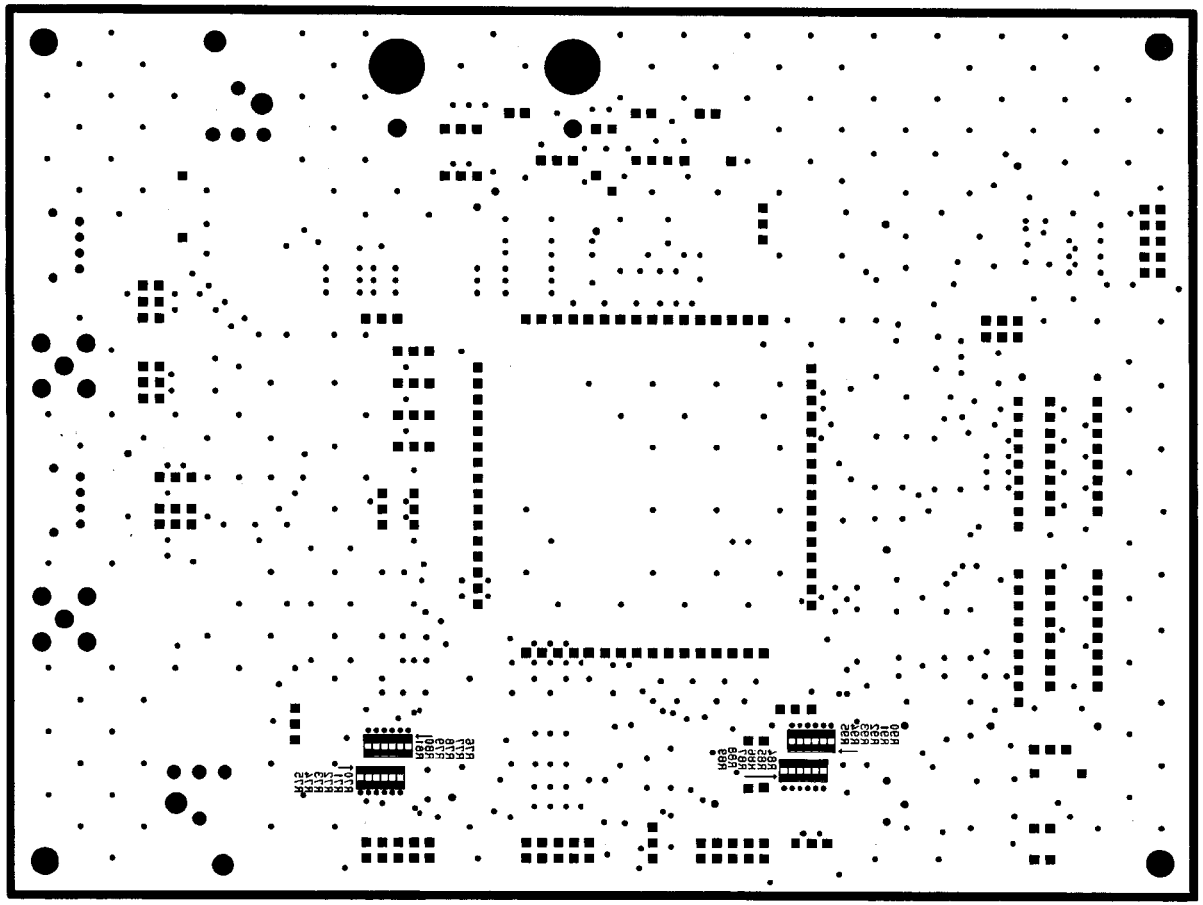

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