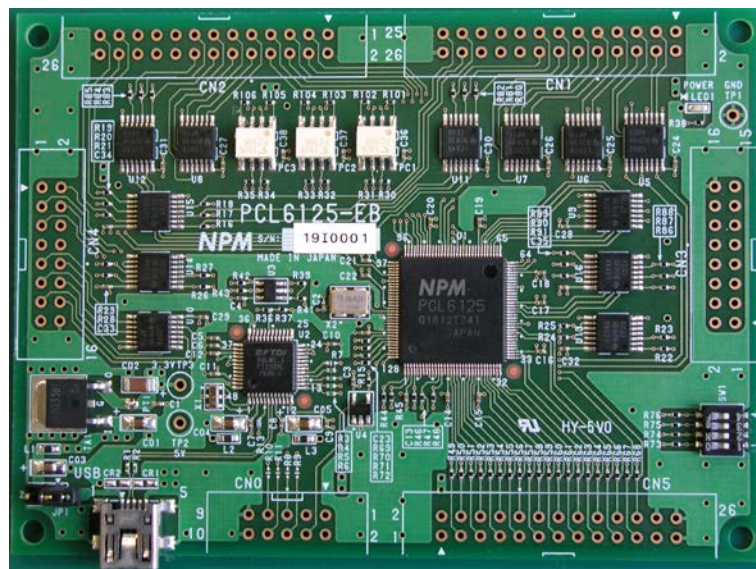


PCL6125 Evaluation Board

PCL6125-EB

User's Manual

Hardware



Index

1. Introduction	1
1.1 How to use this manual	1
1.2 Product warranty	1
1.2.1 Warranty period	1
1.2.2 Warranty scope	1
1.3 Notice	2
1.4 Confirmation	2
2. Information	3
2.1 Outline	4
2.2 Notes	4
3. Specification	5
3.1 Specification summary	5
3.2. Outline specification	6
3.3 Connector pin assignment	7
3.3.1 CN1	7
3.3.2 CN2	8
3.3.3 CN3	9
3.3.4 CN4	9
3.3.5 CN5	10
3.3.6 CN0	11
3.3.7 USB	11
3.3.8 SW1	11
3.3.9 JP1	11
3.4 Circuit diagrams	12
3.4.1 Circuit No.1	12
3.4.2 Circuit No.2	13
3.4.3 Circuit No.3	14
3.4.4 Circuit No.4	15
3.4.5 Circuit No.5	16
3.4.6. Parts List	17
3.5 External dimensions	18

4. Accessories.....	19
4.1 USB cable	19
5. 2-axis board using PCL6125-EB (Application example)	20
5.1 PCL6125-EB_SUBBASE Circuit No.1	21
5.2 PCL6125-EB_SUBBASE Circuit No.2	22
6. PCL6125-EB control with CPU board (SPI) (Application example).....	23

1. Introduction

Thank you for considering our PCL6125 Evaluation Board(PCL6125-EB).

This manual describes the specifications, functions of our PCL6125 Evaluation Board(PCL6125-EB) and how to connect and use it. Be sure to read this manual thoroughly and keep it handy in order to use the product appropriately.

1.1 How to use this manual

1. Reproduction of this manual in whole or in part without permission is prohibited by the Copyright Act.
2. The contents of this manual are subject to change without the prior notice along with the improvement of performance and quality.
3. Although this manual is produced with the utmost care, if there are any questions, errors or omissions, please contact our sales representative.

1.2 Product warranty

1.2.1 Warranty period

The warranty period is one year from the date of the delivery to an assigned place.

1.2.2 Warranty scope

If any defect is found in a product during the warranty period under the normal use following this document, NPM will repair or replace the product without charge.

However, the following cases are not covered by the warranty even during the warranty period.

- 1) Products modified or repaired by anyone other than NPM or a person authorized by NPM.
- 2) Defects that result from dropping after the delivery or mishandling in transit.
- 3) Natural deterioration, wearing, and fatigue of components.
- 4) Defects result from any usage other than the original described in this manual.
- 5) Defects result from natural disaster or force majeure such as fires, earthquakes, lightning strikes, winds, floods, salts or electrical surges.
- 6) Defects or damages result from a cause that is not the fault of NPM.

Products exported outside Japan are not covered by the warranty.

When the product is purchased from a supplier other than NPM, please contact that supplier regarding the product's warranty.

Free repairs will only be conducted at NPM locations; no repairs will be made by business trips.

Warranty period of repaired product is the same as the warranty period before repair.

This warranty covers the product itself. The detriments or damages induced by the product failure etc. will not be covered by the warranty.

1.3 Notice

This document aims to describe the details of functions of the product. It does not warrant fitness for a particular purpose of the customer. The examples of applications and circuit diagrams in this manual are included only for your reference. Please confirm the features and the safeties of devices or equipment before use.

1.4 Confirmation

Please do not use this product in the following conditions. If you need to use in the following conditions, please contact our sales representatives:

1. Any equipment that may require a high reliability or a safety, such as nuclear facilities, electricity or gas supply systems, transportation facilities, vehicles, various safety systems, medical equipment, etc.
2. Any equipment that may directly affect human survivals or properties.
3. Usages under conditions or circumstances that are not specified in the catalog, manual, etc.

For applications that may cause serious damages to a human life or property due to failure of this product, ensure high reliability and safety by redundant design.

2. Information

This is the instruction manual of the hardware of PCL6125 Evaluation Board(PCL6125-EB).
By using this product, you can learn motor control functions using pulse control LSI PCL6125.

Please refer to the following manuals along with this manual.

(x: revision)

	Manual Name [Outline]	Document File name	Software File name	Document No.
Hardware Manual	PCL6125 Evaluation Board (PCL6125-EB) User's Manual (Hardware)	PCL6125-EB _HardwareManual_VerxE.pdf	—	TA600038-ENx/x (This document)
Application Software Manual	PCL6125 Evaluation Board (PCL6125-EB) User's Manual (Application Software) [Setting accel/decel pattern and register display]	PCL6125-EB _ApplicationManual_VerxE.pdf	PCL6125-EB_ Application_VxxxJE.zip	TA600039-ENx/x
Motion Pattern Builder Manual	PCL6125 Evaluation Board (PCL6125-EB) User's Manual (Motion Pattern Builder Application Software) [To describe function to perform axis control visually with a flowchart]	PCL6125-EB _MotionBuilderManual_VerxE.pdf	PCL6125-EB_ MotionBuilder_VxxxJE. zip	TA600040-ENx/x
Reference	PCL6115/6125/6145 User's Manual		-	DA70152-0/xE

Please download the application software and related materials from our NPM website.

2.1 Outline

This product can be connected to your PC using USB2.0, and controls PCL6125 pulse control LSI by PCL6125-EB_APP application software.



2.2 Notes

- When unpacking the PCL6125 Evaluation Board (PCL6125-EB) box, please check that PCL6125-EB board and accessories are included.
- The board can be replaced by a new one only in the initial failure.



3. Specification

A USB-Serial interface IC (FT232HL [FTDI]) and a pulse control LSI (PCL6125 [NPM]) are connected by serial bus interface specification.

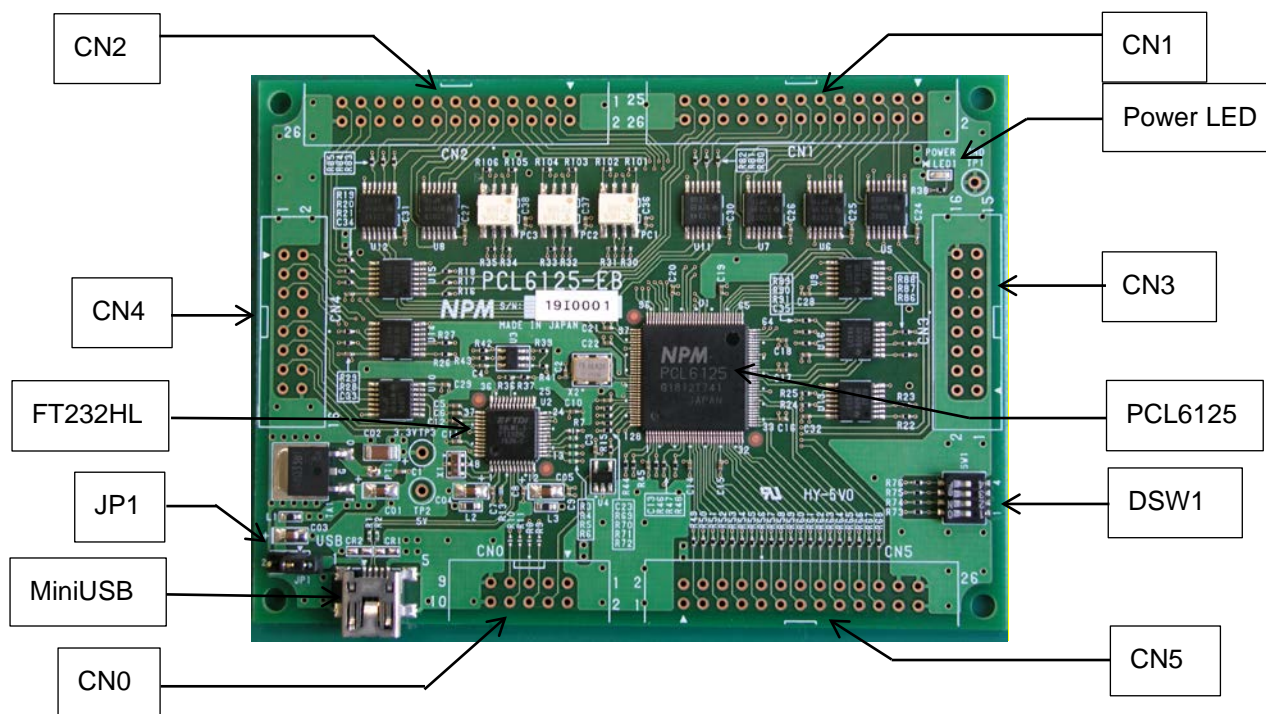
You can check the function of PCL6125 using PCL6125-EB_APP application software from your PC.

In addition, the PCL6125 pin signals are connected to CN0, CN1, CN2, CN3, CN4, and CN5 connectors, so it can be connected to your CPU board and used in your embedded systems.

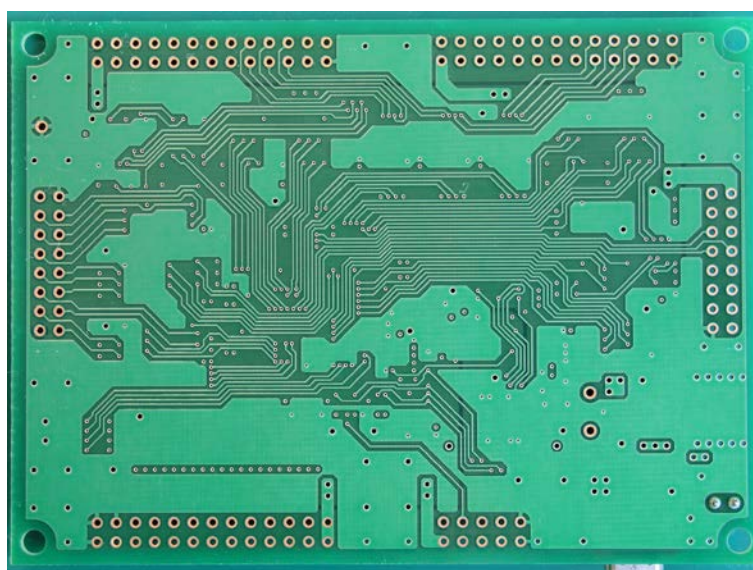
3.1 Specification summary

Item	Specification	Remark
USB-Serial interface	·Convert USB2.0 Hi-speed (480Mb / s) to serial-bus (SPI)	U2: FT232HL
FT232HL clock	·12 MHz	
FT232HL memory	·128 × 16-bit, I2C interface ·Customized FTDI device	U3: 93LC56B
Pulse control LSI	·2-axis motion control	U1: PCL6125
PCL6125 clock	·19.6608 MHz	
Motion control	Speed, positioning control ·Linear acceleration/deceleration, S-curve acceleration/deceleration ·Linear interpolation control ·Positioning control range -2,147,483,648 to +2,147,483,647 ·Pulse output frequency 0.3 to 9,829,800 pps ·Slow-down point auto setting ·Counter x 2 Command position counter (28-bit) / Mechanical position counter (28-bit)	
Motion control output interface	Pulse output (OUT) / Direction output (DIR) / Deviation counter clear (ERC) / General-purpose output (P0, P1, P2, P3) / In operation (BSY) / Acceleration (FUP) / Deceleration (FDW) / Constant speed (MVC) /Comparator 1 (CP1) / Comparator 2 (CP2)	
Motion control input interface	In-position (INP) / Alarm (ALM) / General-purpose input (P4, P5, P6, P7) / Encoder A-phase (EA) / Encoder B-phase (EB) / Encoder Z-phase (EZ) / ± End-limit (+EL, -EL) / Slow-down (SD) / Origin (ORG) / Pulser A-phase (PA) / Pulser B-phase (PB) / Pulser enabled (PE) / Positioning control (PCS) / Counter latch (LTC)	
SPI Input/Output connector	CN0: INT / RESET output signals ·SS / MISO / MOSI / SCK signals 2.54 pitch 10P (Unimplemented)	
Input/Output connector	CN1(X-axis), CN2(Y-axis): OUT / DIR / ERC / P0 / P1 / P2 / INP / ALM / P4 / P5 / P6 / P7/ EA / EB / EZ input signals 2.54 pitch 26P (Unimplemented)	
Input/Output connector	CN3(X-axis),CN4(Y-axis): +EL / -EL / SD / ORG / PA / PB / PE input signals, BSY / FUP / FDW / MVC / CP1 / CP2 output signals 2.54 pitch 16P (Unimplemented)	
General-purpose I/O connector	CN5: ·GP0-GP15 I/O signals ·PCSx/LTCx/PCSy/LTCy input signal 2.54 pitch 16P (Unimplemented)	
USB interface connector	USB: miniB type	
Display	Turns ON when power is supplied: Yellow	
External diameters	W99 × D72 × H12 [mm]	
Power supply	USB bus power 5V (disabled by JP1)	
Current consumption	74 mA max.	
Usage environment	·Storage temperature: 0°C to 50°C ·Storage humidity: 10% to 90% (No condensation)	
Environment specification	Non-RoHS-Directive compliant	

3.2. Outline specification



TOP VIEW



BOTTOM VIEW

3.3 Connector pin assignment

3.3.1 CN1

Input/Output connector (PS-26PE-D4T1-B1E [JAE]) [not mounted]

Pin No.	Pin Symbol	Pin Name	Remark
1	5 V	5 V	Power supply
2	3.3 V	3.3 V	Power supply
3	OUTPx	OUT[+] signal	X-axis OUT signal line driver output [+]
4	OUTMx	OUT[-] signal	X-axis OUT signal line driver output [-]
5	DIRPx	DIR[+] signal	X-axis DIR signal line driver output [+]
6	DIRMx	DIR[-] signal	X-axis DIR signal line driver output [-]
7	OUTOx	OUT signal	X-axis OUT signal open drain output
8	DIROx	DIR signal	X-axis DIR signal open drain output
9	ERCx	ERC signal	X-axis ERC signal open drain output
10	P0Ox	P0 output signal	X-axis P0 signal open drain output
11	P1Ox	P1 output signal	X-axis P1 signal open drain output
12	P2Ox	P2 output signal	X-axis P2 signal open drain output
13	P3Ox	P3 output signal	X-axis P3 signal open drain output
14	P5Ix	P5 input signal	X-axis P5 signal input
15	P6Ix	P6 input signal	X-axis P6 signal input
16	P7Ix	P7 input signal	X-axis P7 signal input
17	EAPx	EA[+] signal	X-axis EA signal line receiver input [+]
18	EAMx	EA[-] signal	X-axis EA signal line receiver input [-]
19	EBPx	EB[+] signal	X-axis EB signal line receiver input [+]
20	EBMx	EB[-] signal	X-axis EB signal line receiver input [-]
21	EZPx	EZ[+] signal	X-axis EZ signal line receiver input [+]
22	EZMx	EZ[-] signal	X-axis EZ signal line receiver input [-]
23	INPx	INP signal	X-axis INP signal input
24	ALMx	ALM signal	X-axis ALM signal input
25	RDYx(P4Ix)	RDY (P4) input signal	X-axis RDY(P4) signal input
26	GND	GND	Ground

3.3.2 CN2

Input/Output connector (PS-26PE-D4T1-B1E [JAE]) [not mounted]

Pin No.	Pin Symbol	Pin Name	Remark
1	5 V	5 V	Power supply
2	3.3 V	3.3 V	Power supply
3	OUTPy	OUT[+] signal	Y-axis OUT signal line driver output [+]
4	OUTMy	OUT[-] signal	Y-axis OUT signal line driver output [-]
5	DIRPy	DIR[+] signal	Y-axis DIR signal line driver output [+]
6	DIRMy	DIR[-] signal	Y-axis DIR signal line driver output [-]
7	OUTOy	OUT signal	Y-axis OUT signal open drain output
8	DIROy	DIR signal	Y-axis DIR signal open drain output
9	ERCy	ERC signal	Y-axis ERC signal open drain output
10	P0Oy	P0 output signal	Y-axis P0 signal open drain output
11	P1Oy	P1 output signal	Y-axis P1 signal open drain output
12	P2Oy	P2 output signal	Y-axis P2 signal open drain output
13	P3Oy	P3 output signal	Y-axis P3 signal open drain output
14	P5ly	P5 input signal	Y-axis P5 signal input
15	P6ly	P6 input signal	Y-axis P6 signal input
16	P7ly	P7 input signal	Y-axis P7 signal input
17	EAPy	EA[+] signal	Y-axis EA signal line receiver input [+]
18	EAMy	EA[-] signal	Y-axis EA signal line receiver input [-]
19	EBPy	EB[+] signal	Y-axis EB signal line receiver input [+]
20	EBMy	EB[-] signal	Y-axis EB signal line receiver input [-]
21	EZPy	EZ[+] signal	Y-axis EZ signal line receiver input [+]
22	EZMy	EZ[-] signal	Y-axis EZ signal line receiver input [-]
23	INPy	INP signal	Y-axis INP input signal input
24	ALMy	ALM signal	Y-axis ALM input signal input
25	RDYx(P4ly)	RDY (P4) input signal	Y-axis RDY(P4) signal input
26	GND	GND	Ground

3.3.3 CN3

Input/Output connector (PS-16PE-D4T1-B1E [JAE]) [not mounted]

Pin No.	Pin Symbol	Pin Name	Remark
1	3.3V	3.3 V Power	Power Supply
2	+ELx	+EL signal	X-axis End-limit (+) direction input signal
3	-ELx	-EL signal	X-axis End-limit (-) direction input signal
4	SDx	SD signal	X-axis Deceleration (Deceleration stop) input signal
5	ORGx	ORG signal	X-axis Origin input signal
6	PAX	PA signal	X-axis PA input signal
7	PBx	PB signal	X-axis PB input signal
8	PEx	PE signal	X-axis PE input signal
9	BSYx	BSY signal	X-axis BUSY(operation status monitor) output signal
10	FUPx	FUP signal	X-axis FUP output signal
11	FDWx	FDW signal	X-axis FDW output signal
12	MVCx	MVC signal	X-axis MVC output signal
13	CP1x	CP1 signal	X-axis CP1 output signal
14	CP2x	CP2 signal	X-axis CP2 output signal
15	-	-	-
16	GND	GND	Ground

3.3.4 CN4

Input/Output connector (PS-16PE-D4T1-B1E [JAE]) [not mounted]

Pin No.	Pin Symbol	Pin Name	Remark
1	3.3V	3.3 V Power	Power Supply
2	+ELy	+EL signal	Y-axis End-limit (+) direction input signal
3	-ELy	-EL signal	Y-axis End-limit (-) direction input signal
4	SDy	SD signal	Y-axis Deceleration (Deceleration stop) input signal
5	ORGy	ORG signal	Y-axis Origin input signal
6	PAY	PA signal	Y-axis PA input signal
7	PBy	PB signal	Y-axis PB input signal
8	PEy	PE signal	Y-axis PE input signal
9	BSYy	BSY signal	Y-axis BUSY (operation status monitor) output signal
10	FUPy	FUP signal	Y-axis FUP output signal
11	FDWy	FDW signal	Y-axis FDW output signal
12	MVCy	MVC signal	Y-axis MVC output signal
13	CP1y	CP1 signal	Y-axis CP1 output signal
14	CP2y	CP2 signal	Y-axis CP2 output signal
15	-	-	-
16	GND	GND	Ground

3.3.5 CN5

Input/Output connector (PS-26PE-D4T1-B1E [JAE]) [not mounted]

Pin No.	Pin Symbol	Pin Name	Remark
1	3.3 V	3.3 V	Power Supply
2	3.3 V	3.3 V	Power Supply
3	GP0	GP0 signal	GP0 shared I/O signal
4	GP1	GP1 signal	GP1 shared I/O signal
5	GP2	GP2 signal	GP2 shared I/O signal
6	GP3	GP3 signal	GP3 shared I/O signal
7	GP4	GP4 signal	GP4 shared I/O signal
8	GP5	GP5 signal	GP5 shared I/O signal
9	GP6	GP6 signal	GP6 shared I/O signal
10	GP7	GP7 signal	GP7 shared I/O signal
11	GP8	GP8 signal	GP8 shared I/O signal
12	GP9	GP9 signal	GP9 shared I/O signal
13	GP10	GP10 signal	GP10 shared I/O signal
14	GP11	GP11 signal	GP11 shared I/O signal
15	GP12	GP12 signal	GP12 shared I/O signal
16	GP13	GP13 signal	GP13 shared I/O signal
17	GP14	GP14 signal	GP14 shared I/O signal
18	GP15	GP15 signal	GP15 shared I/O signal
19	PCSx	PCS signal	X-axis PCS output signal
20	LTCx	LTC signal	X-axis LTC output signal
21	PCSy	PCS signal	Y-axis PCS output signal
22	LTCy	LTC signal	Y-axis LTC output signal
23	GND	GND	Ground
24	GND	GND	Ground
25	GND	GND	Ground
26	GND	GND	Ground

3.3.6 CNO

Input/Output connector (PS-10PE-D4T1-B1E [JAE]) [not mounted]

Pin No.	Pin Symbol	Pin Name	Remark
1	5V	5V Power	Power Supply
2	3.3V	3.3V Power	Power Supply
3	INT	INT signal	INT output signal
4	RESET	RESET signal	RESET output signal
5	SS	SS signal	SS output signal
6	MISO	MISO signal	MISO input signal
7	MOSI	MOSI signal	MOSI output signal
8	SCK	SCK signal	SCK output signal
9	GND	GND	Ground
10	GND	GND	Ground

3.3.7 USB

Mini USB Connector UB-M5BR-G14-4S [JST]

Pin No.	Pin Symbol	Pin Name	Remark
1	VBus	5V Power	Power Supply
2	-Data (D-)	- Data	"-" DATA I/O signal
3	+Data (D+)	+ Data	"+" DATA I/O signal
4	NC	-	-
5	GND	GND	Ground

3.3.8 SW1

CFP-04B2 [Copal]

Pin No.	Pin Symbol	Pin Name	Remark
1	ELLx	X-axis EL logic setting	L level: Positive logic (default setting) H level: Negative logic
2	ELLy	Y-axis EL logic setting	L level: Positive logic (default setting) H level: Negative logic
3	DS0	Device number setting 0	DS1 DS0 Device Number L L 0 (Default setting) L H 1
4	DS1	Device number setting 1	H L 2 H H 3

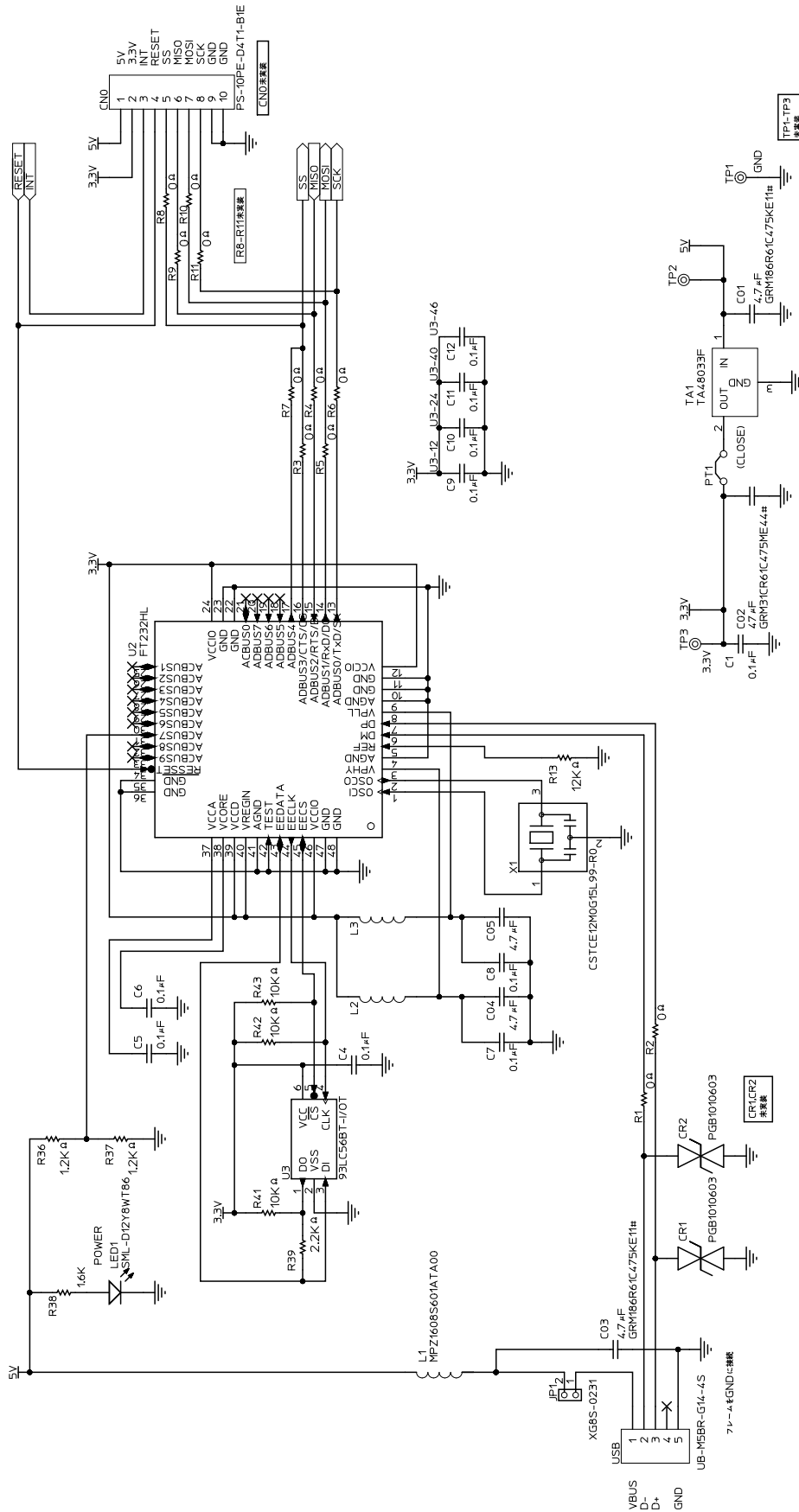
3.3.9 JP1

XG8S-0231 [OMRON], Short-circuit socket XJ8A-0241 [OMRON]

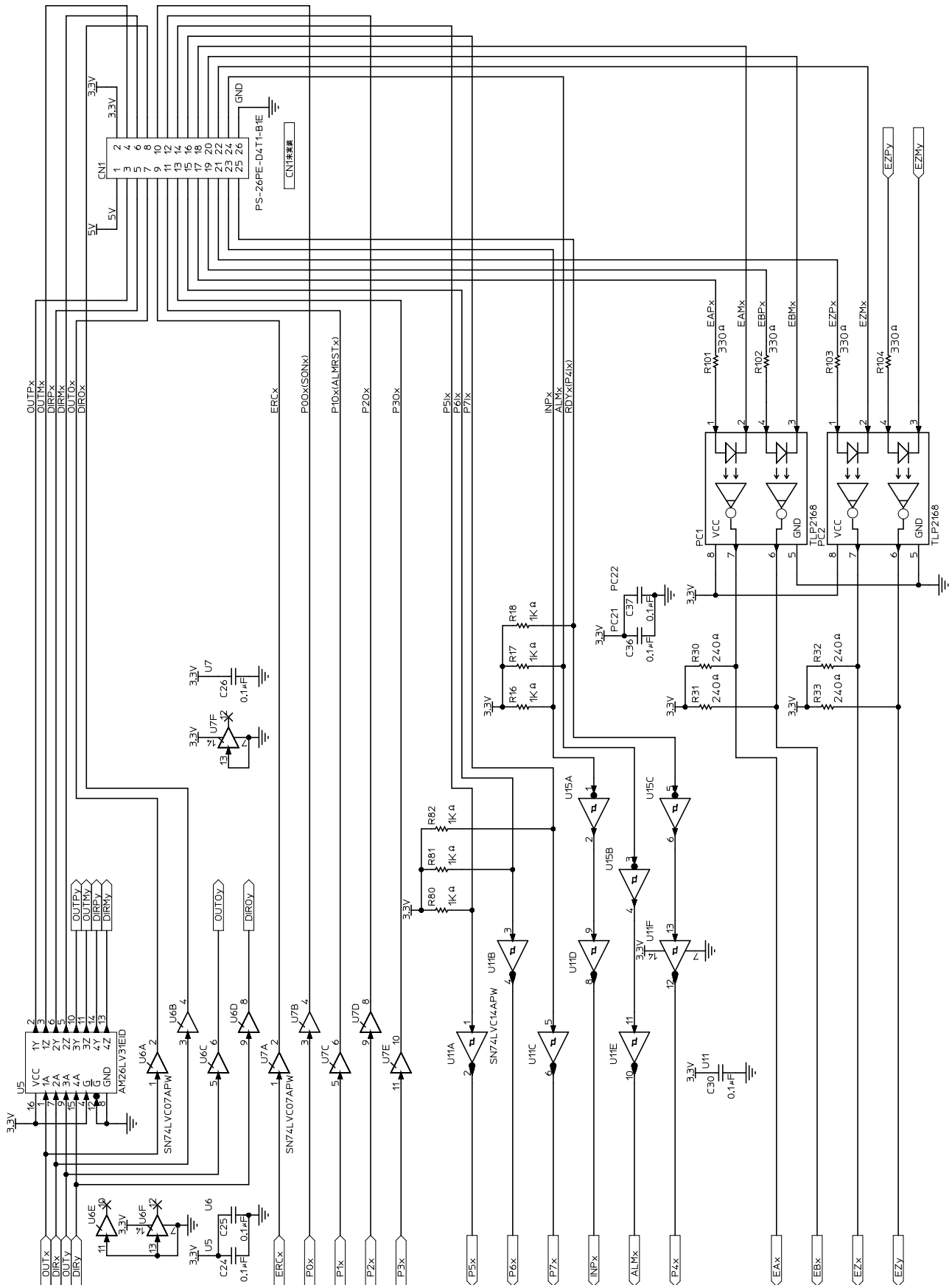
Pin No.	Status	Remark
1-2	CLOSE	USB power supply (5 V) (default setting)
1-2	OPEN	External power supply (5 V) from connector

3.4 Circuit diagrams

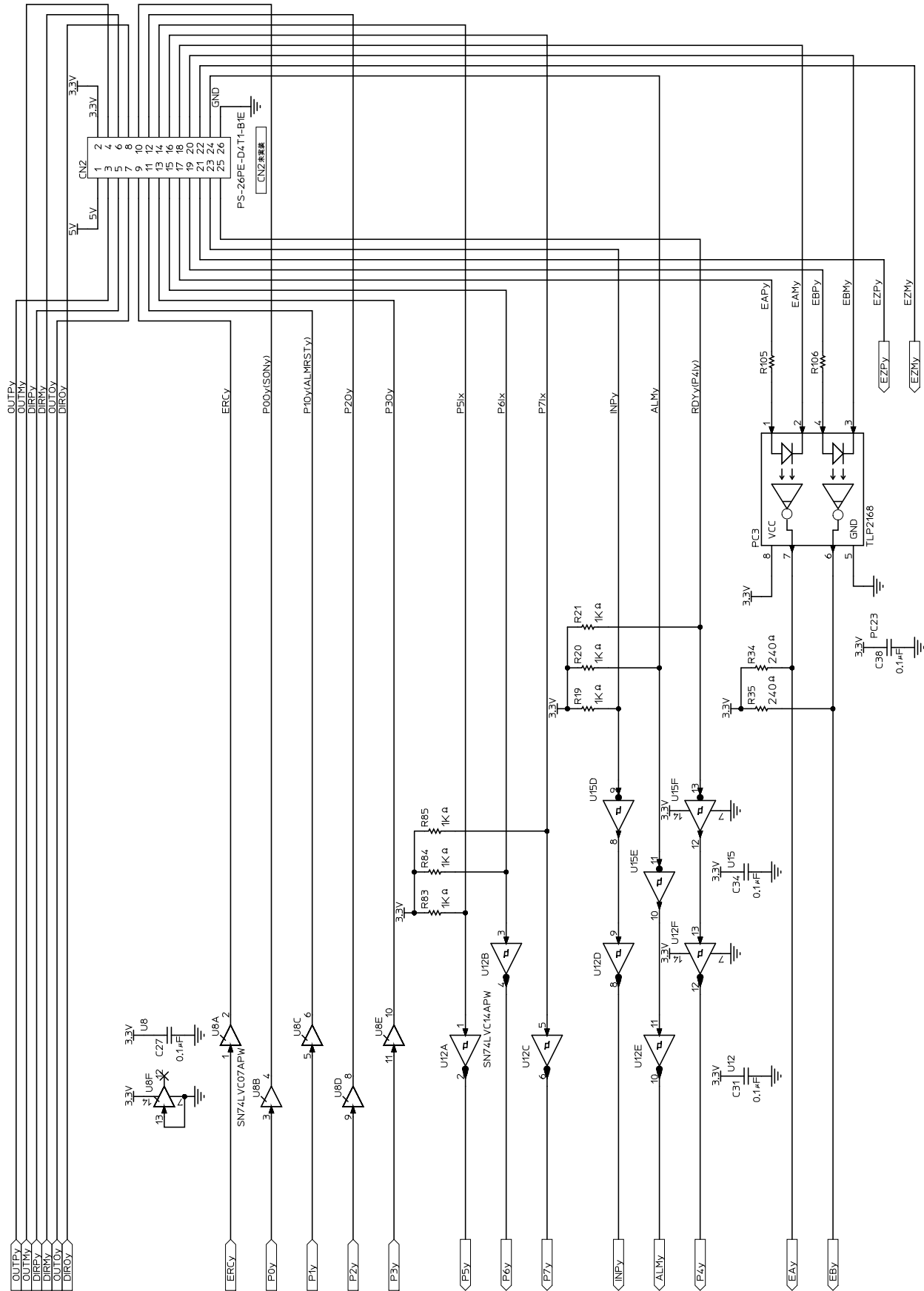
3.4.1 Circuit No.1



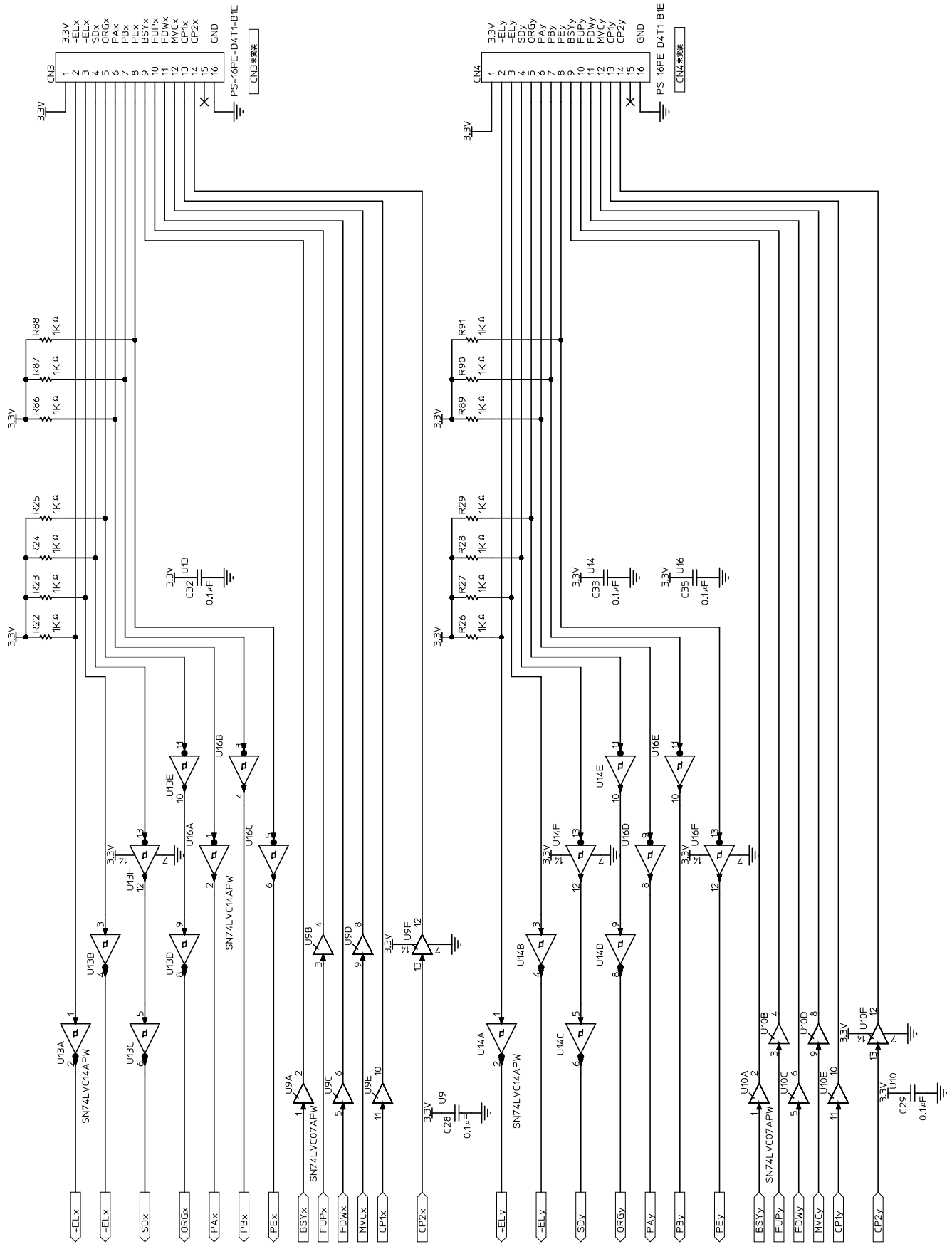
3.4.3 Circuit No.3



3.4.4 Circuit No.4



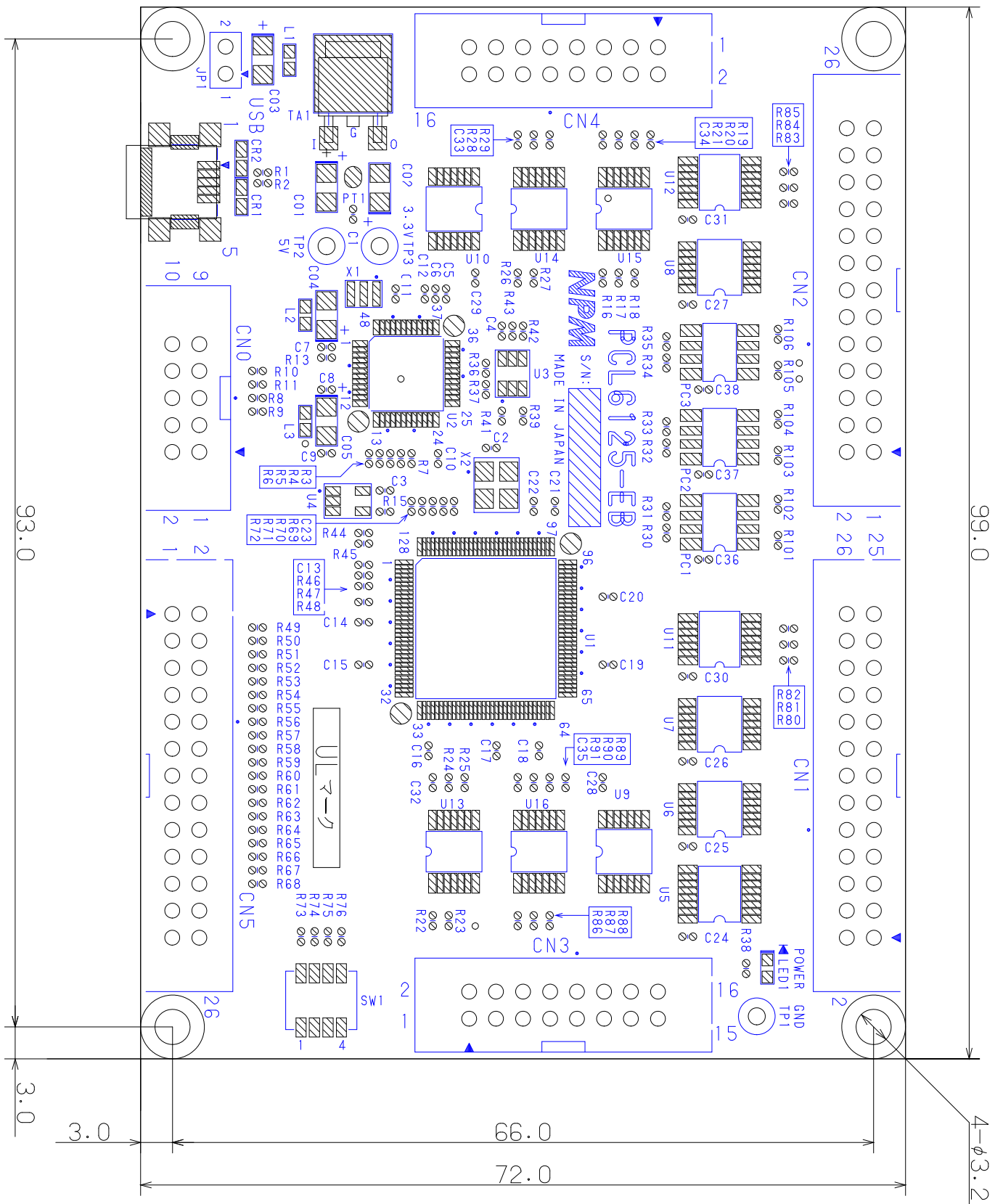
3.4.5 Circuit No.5



3.4.6. Parts List

No.	Part Name	Manufacture	Model	Qty	Part No.	Remark
1	LSI	NPM	PCL6125	1	U1	
2	LSI	FTDI	FT232HL	1	U2	
3	EEPROM	MicroChip	93LC56BT-I/OT	1	U3	
4	Reset IC	MITSUMI	PST883A290NR	1	U4	
5	Line driver	TI	AM26LV31EIPWR	1	U5	
6	IC	TI	SN74LV07APWR	5	U6-U10	
7	IC	TI	SN74LV14APWR	6	U11-U16	
8	Photo coupler	TOSHIBA	TLP2168	3	PC1-PC3	
9	Oscillator	MURATA	CSTCE12M0G15L99-R0	1	X1	
10	Oscillator	KDK	SG-8018CB-19.6608M-TIHPA-ND	1	X2	
11	Regulator	TOSHIBA	TA48033BF	1	TA1	
12	EMC Part	TDK	MPZ1608S601ATA00	3	L1,L2,L3	
13	LED	ROHM	SML-D12Y8WT86	1	LED1	
14	Slide Switch	COPAL	CHS-04TA1	1	-	-
15	Jumper	OMRON	XG8S-0231	1	JP1	
16	Socket	OMRON	XJ8A-0241	1	-	-
17	PULSE-GUARD	Littelfuse	PGB1010603	2	CR1,CR2	Not mounted
18	Check pin	Mac8	LC-2-S White	2	TP2,TP3	Not mounted
19	Check pin	Mac8	LC-2-S Black	1	TP1	Not mounted
20	Resistor	KOA	RK73Z1ETTP	6	R1-R6	(R7-R11 Not mounted)
21	Resistor	KOA	RK73B1ETTP241J	6	R30-R35	
22	Resistor	KOA	RK73B1ETTP331J	6	R101-R106	
23	Resistor	KOA	RK73B1ETTP102J	27	R15-R29	R80-R91
24	Resistor	KOA	RK73B1ETTP122J	2	R36,R37	
25	Resistor	KOA	RK73B1ETTP162J	1	R38	
26	Resistor	KOA	RK73B1ETTP222J	1	R39	
27	Resistor	KOA	RK73B1ETTP103J	36	R41-R76	
28	Resistor	KOA	RK73H1ETTD1202F	1	R13	
29	Capacitor	MURATA	GRM155B31E104KA87D	38	C1-C38	
30	Capacitor	MURATA	GRM185R61C475KE11#	4	C01, C03-C05	
31	Capacitor	MURATA	GRM31CR61C476ME44#	1	C02	
32	Connector	JST	UB-M5BR-G14-4S	1	USB	
33	Connector	JAE	PS-26-PE-D4T1-B1E	3	CN1,CN2, CN5	Not mounted
34	Connector	JAE	PS-16-PE-D4T1-B1E	2	CN3,CN4	Not mounted
35	Connector	JAE	PS-10-PE-D4T1-B1E	1	CN0	Not mounted

3.5 External dimensions



Unit: mm

4. Accessories

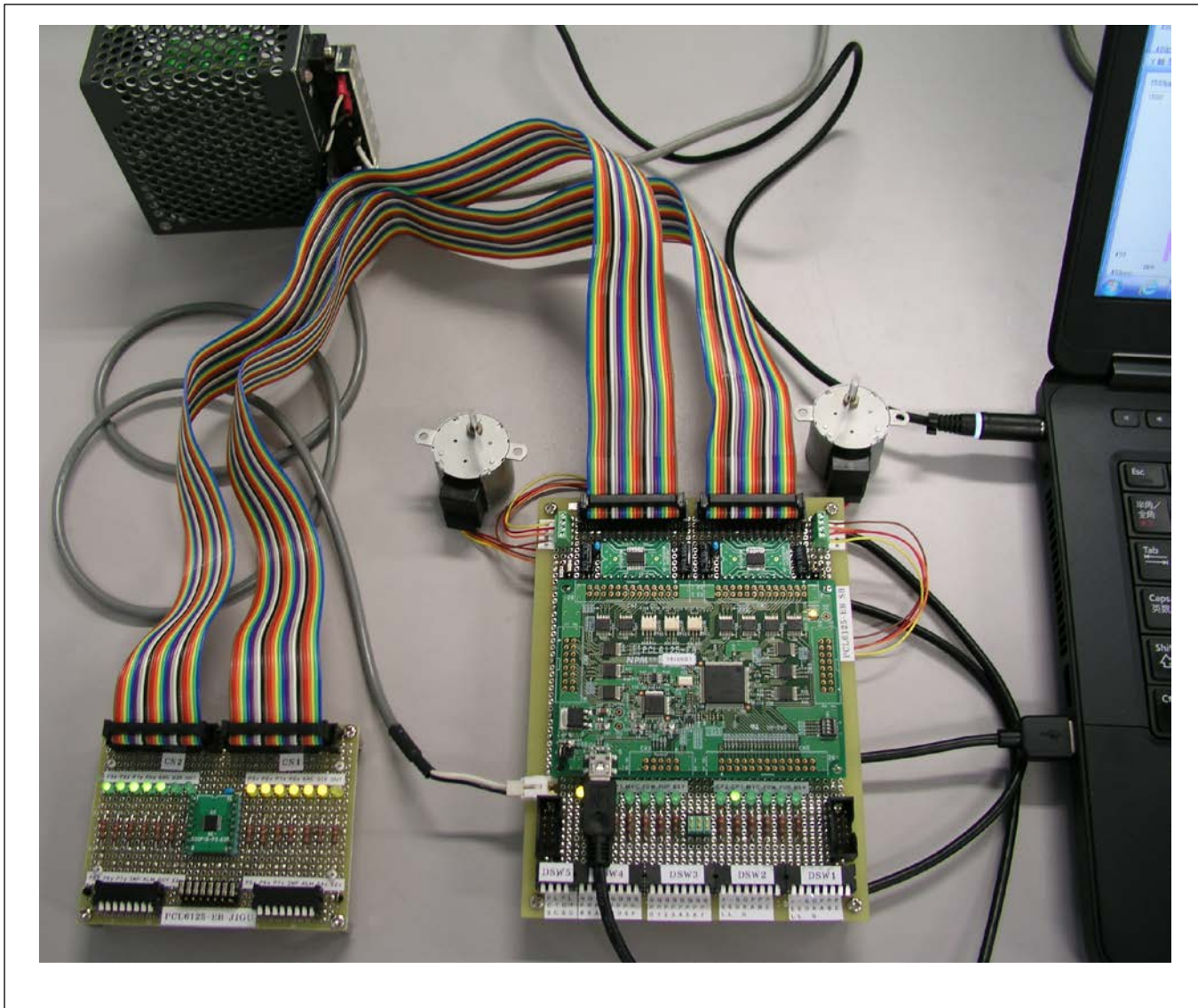
4.1 USB cable

Mini USB cable (AB-10H) A-miniB type 1m (1 piece)



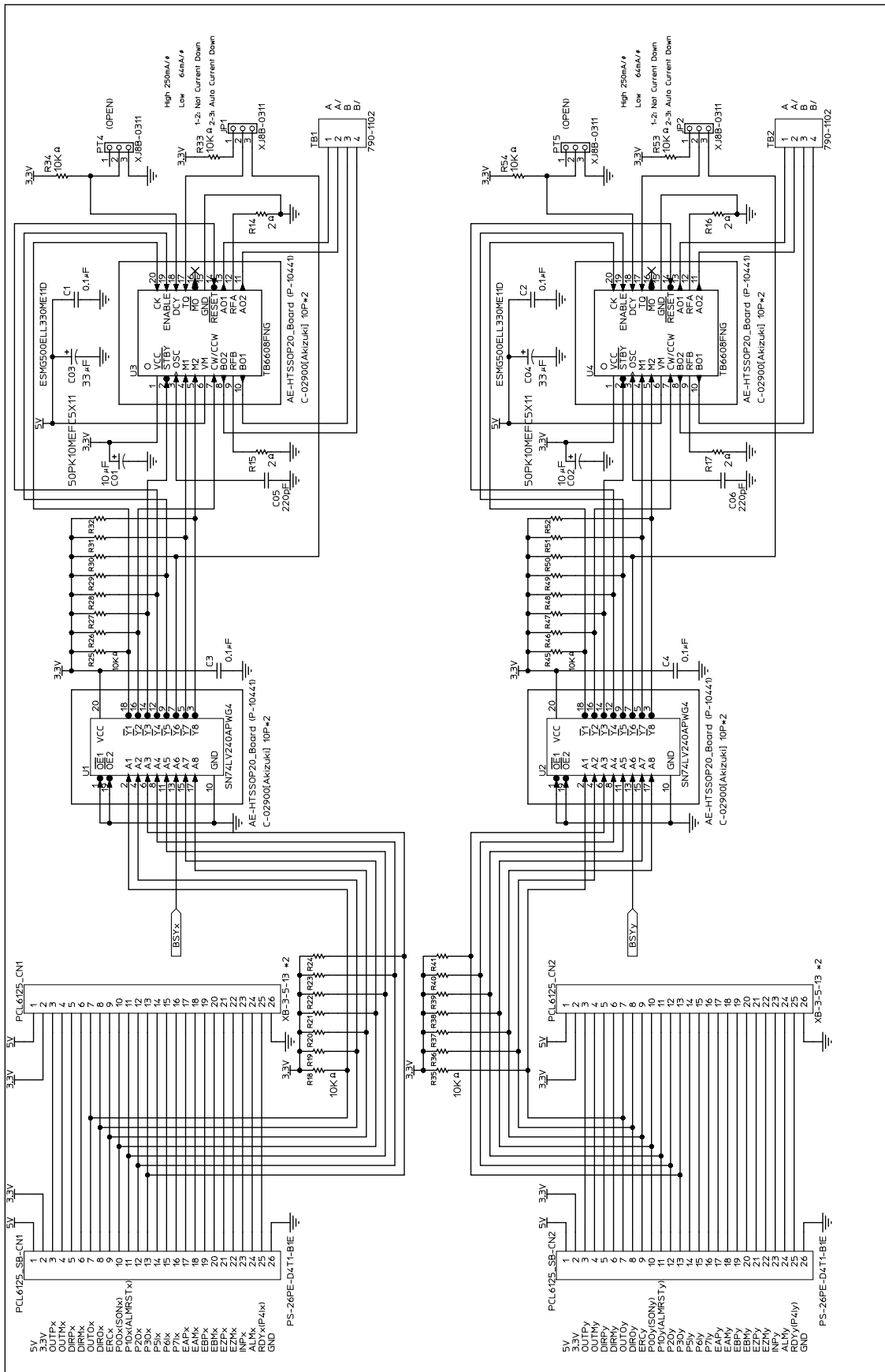
5. 2-axis board using PCL6125-EB (Application example)

Mount the PCL6125-EB on a board (PCL6125-EB_SUBBASE) with two built-in stepping motor driver ICs (TB6608FNG [TOSHIBA]) and operate two stepping motors (PFCU30-24V4GM (1/12)). It performs 2-axis-operation check from your PC (Personal Computer) using the application software PCL6125-EB_APP.

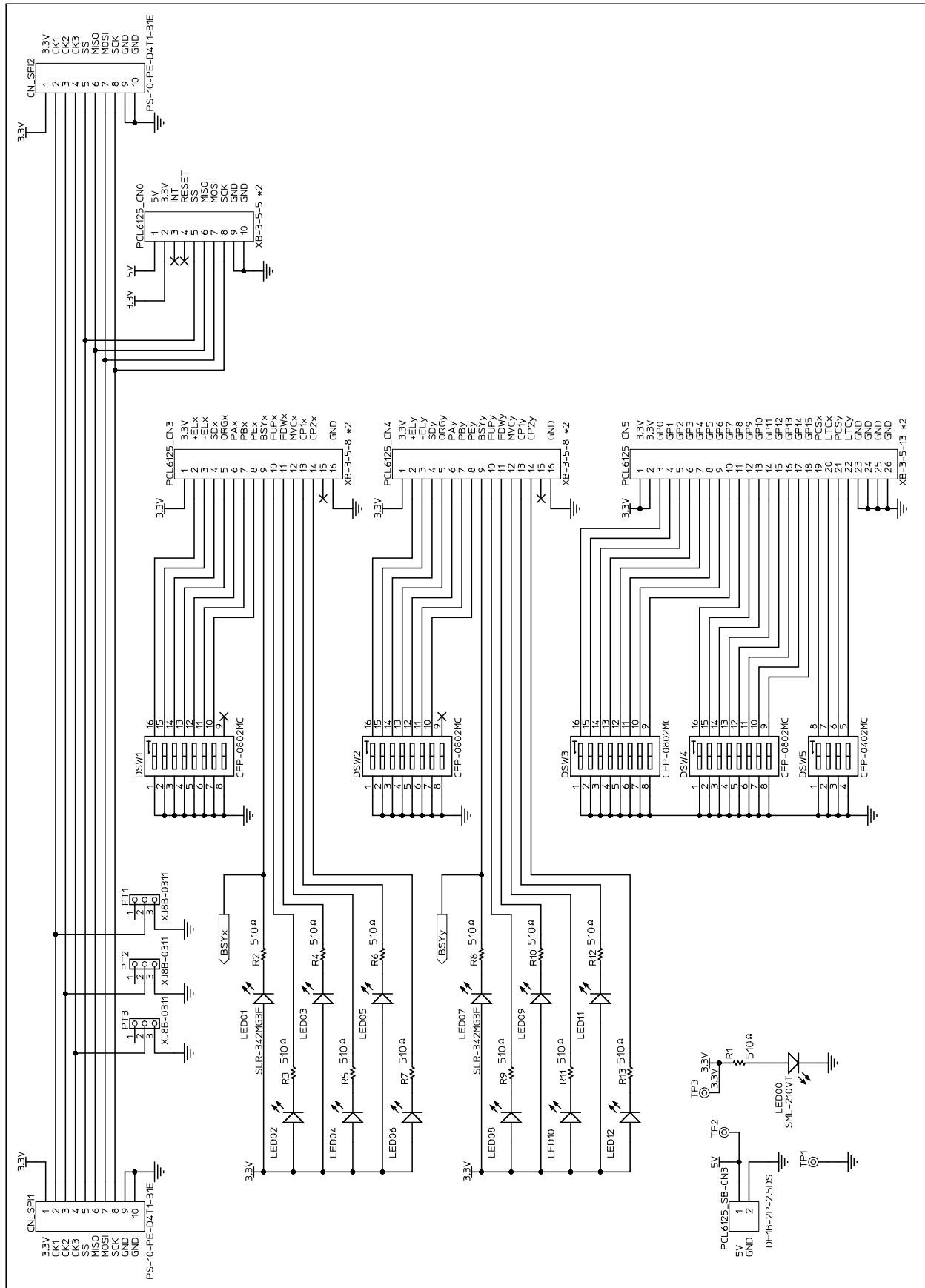


Note: Set the 1-2 of JP1 to OPEN on PCL6125-EB to supply the external power supply (5V).

5.1 PCL6125-EB_SUBBASE Circuit No.1



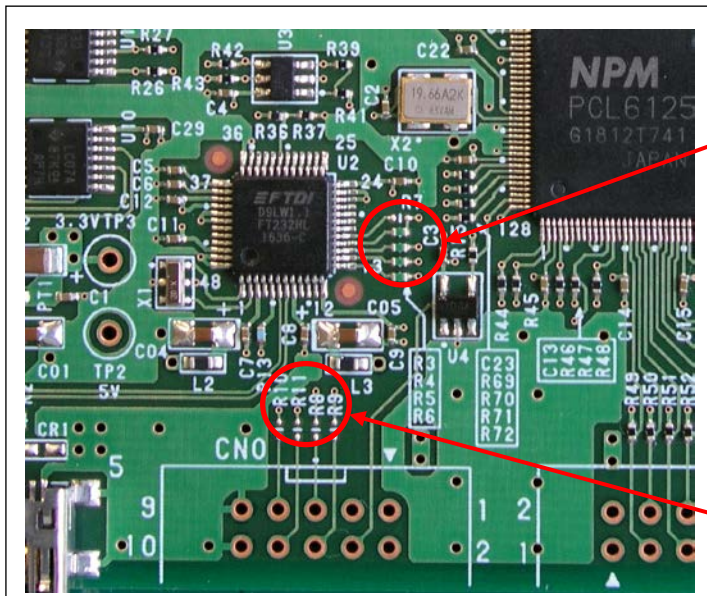
5.2 PCL6125-EB_SUBBASE Circuit No.2



6. PCL6125-EB control with CPU board (SPI) (Application example)

PCL6125-EB can perform and check 2-axis operations using the SPI function of an external CPU board.

Remove resistors R3, R4, R5, and R6 (RK73Z1ETTP) of "3.4.1 Circuit No.1" diagram, and attach them to unmounted resistors R8, R9, R10, and R11, or short-circuit the resistors R8, R9, R10, and R11. So that the SPI (SS, MISO, MOSI, and SCK) signals are connected to connector CN0.



Remove the resistors R3, R4, R5, and R6

Short the resistors R8, R9, R10, and R11

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Revision

Revision	Date	Contents
1st	March 4, 2020	Initial Release

NPM Impress, not just satisfy
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