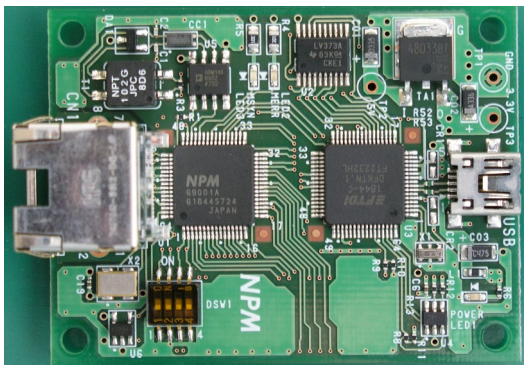
Motionnet Starter Kit

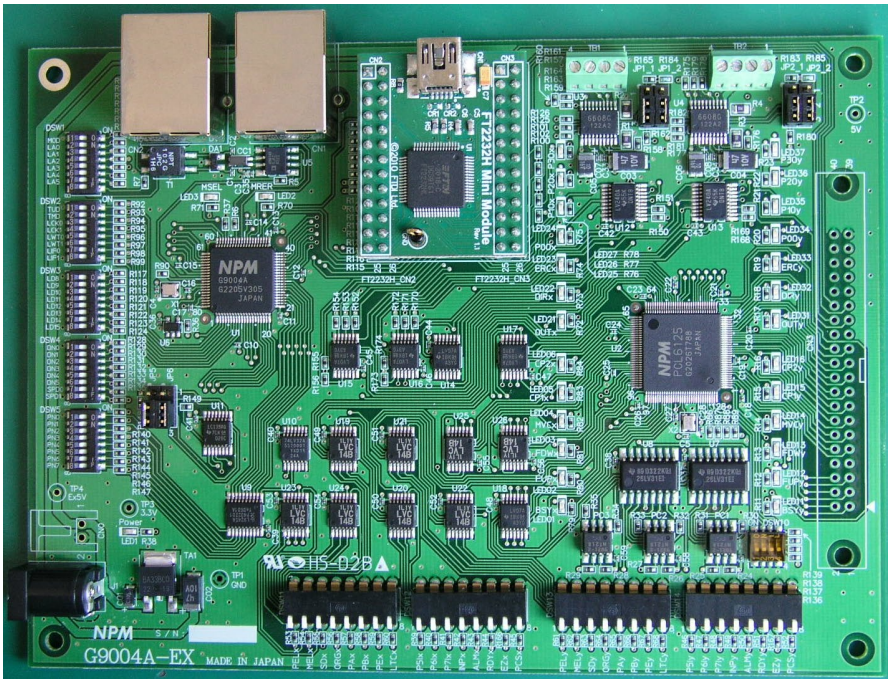
G9004A-EX

User's Manual

Hardware



G9001A-EV Board



G9004A-EX Board

NPM Impress, not just satisfy
Nippon Pulse Motor Co., Ltd.

INDEX

1. Introduction

Thank you for choosing our Motionnet Starter Kit (G9001A-EV Board, G9004A-EX Board).

This manual describes the specifications, functions, connections, and usages of our Motionnet Starter Kit.

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, please contact our sales representative if there are any questions, errors or omissions.

1.1.1 Symbol description

1.1.1.1 Physical damage level

In this manual, the physical damage level is defined as follows.

- Serious injury

Those that might cause aftereffects such as loss of sight, wound, burn, electric shock, fracture, poisoning, or those requiring hospitalization or long-term outpatient treatment.

- Minor injury

Those not requiring hospitalization or long-term outpatient treatment. (Other than "serious injury" above)

1.1.1.2 Hazardous level

The product is designed with the top priority for the safety of operators. However, due to the nature of the product, there are risks that cannot be eliminated. In this manual, the seriousness and level of these risks are divided into three categories: "Danger," "Warning," and "Caution." Be sure to read and understand the symbols descriptions thoroughly before operating or performing maintenance work on the product.
“Danger”, “Warning”, and “Caution" are indicated in the order of severity of hazard: (danger > warning > caution), and the meanings are described underneath.

⚠ D a n g e r

"Danger" indicates that it might cause an imminent risk that could result in the death or serious injury of the operator during operations of this product.

⚠ W a r n i n g

"Warning" indicates that it may result in the death or serious injury of the operator during operations of this product.

⚠ Caution
"Caution" indicates that it may result in minor injury of the operator during operations of this product.

Caution
"Caution" without warning symbol ⚠ indicates that the operator is not likely to be injured, but it can cause damage or result in a malfunction to this product, your equipment, or your instruments.

In addition to the hazardous level classifications described above, the following notations are also used.

Importance
"Importance" indicates the information and contents that must be known particularly in operations and maintenance works of this product.

Remarks
"Remarks" initiates the useful information or contents for operations and maintenance works of this product.

1.1.1.3 Warning symbol

In this manual, the following symbols are added along with the notations "Danger," "Warning," "Caution," and "Importance" to indicate the warning contents in an easy-to-understand manner.

Indicates that a high voltage may be applied.
Failure to confirm safety or mishandling of this product might cause a risk of electric shock, burn, or death.

Indicates that some parts have a high surface temperature, and the mishandling can cause a risk of burns.

Indicates that mishandling may cause a fire.

Indicates "prohibited" actions that must not be performed in the operation and the maintenance work of this product.

Indicates "mandatory" actions that must be performed in the operation and the maintenance work of this product.

1.2 Handling the product

1.2.1 Storing

Store the product in an environment where condensation does not occur at a temperature of −20°C to +70°C.

1.2.2 Unpacking

Check if the following items are included when unpacking.

- Board (G9001A-EV, G9004A-EX) 2 sheets
- Stepping motor, Lead wire for the motor (G9004A-EX) 2 sets
- AC adapter (5V, 1A power supply) (G9004A-EX) 1 piece
- USB cable (G9001A-EV, G9004A-EX) 2 pieces
- LAN cable (G9004A-EX) 1 piece

1.3 Product Warranty

Since this product is provided free of charge, we cannot guarantee any defects or failures that may occur during use.
We will replace only if the product is defective.

1.4 Notice

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

1.5 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 survival or property.
3. Usages under conditions or circumstances that are not specified in the catalog, manual, etc.

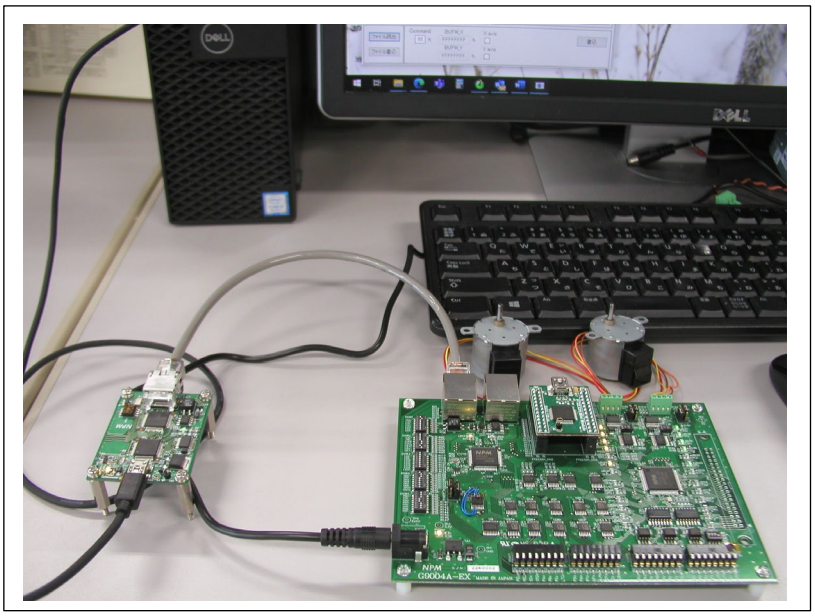
For applications that may cause serious damage to a human life or property due to failure of this product, ensure high reliability and safety by redundant design.

2. Outline

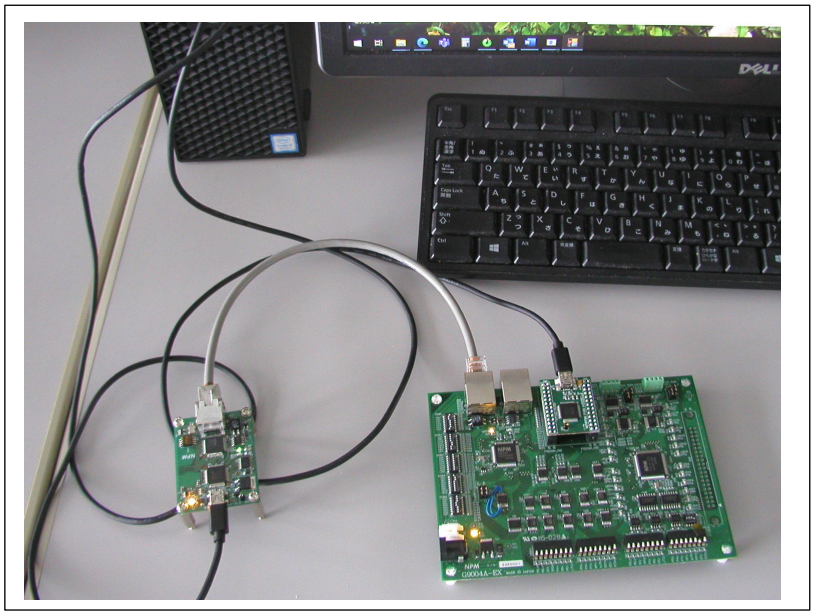
2.1 Outline

This product connects the G9001A-EV Board and G9004A_EX Board to a PC (personal computer) via USB 2.0 in message communication mode. In both CPU emulation mode and message communication mode, connect the G9001A-EV Board and G9004A -EX Board with a Motionnet cable.

By controlling the G9001A-EV Board from the application software (MNET-STK.exe), the CPU emulation mode G9004A -EX Board can operate our axis control LSI (PCL6125) using an 8-bit/16-bit interface. In Message communication mode G9004A_EX Board, you can send and receive by message communication by starting the application software (MNET-STK_Message.exe).



CPU emulation mode G9004A -EX Board requires an external power supply.



The message communication mode G9004A_EX Board can be operated with a USB power supply.

2.2 Information

This manual shows how to use Motionnet Starter Kit (G9001A-EV Board, G9004A-EX Board)) with learning the CPU emulation mode and message communication mode using the center device G9001A and the local device G9004A.
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	Motionnet Starter Kit User's Manual (Hardware)	Motionnet Starter Kit _Hardware Manual _VerxE.pdf	—	TA600036-ENx/x
	Motionnet Starter Kit User's Manual (Simple Manual)	Motionnet Starter Kit _Simple Manual _VerxJE.pdf	—	TA600035-ENx/x
	Motionnet Starter Kit G9004A-EX User's Manual (Hardware)	Motionnet Starter Kit _G9004A-EX_Hardware Manual_VerxE.pdf	—	TA600140-ENx/x (This document)
Application Software Manual	Motionnet Starter Kit User's Manual (Application Software) [Display all registers]	Motionnet Starter Kit _Application Manual _VerxE.pdf	Motionnet Starter Kit _Application _VxxxJE.zip	TA600037-ENx/x
	Motionnet Starter Kit G9004A-EX User's Manual (Application Software)	Motionnet Starter Kit _Message Manual _VerxE.pdf	Motionnet Starter Kit _Message _VxxxJE.zip	TA600141-ENx/x
Reference	G9001A/G9002A User's Manual		—	DA70109-4/xE
	G9004A User's Manual		—	DA70120-1/xE

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

3. Specification

The G9004A-EX Board is connected to the G9001A-EV Board with a Motionnet cable.
The local device LSI (G9004A) controls in the CPU emulation mode or message communication mode by the system communication, I/O communication (cyclic transmission), and data communication of the center device LSI (G9001A).

3.1 Specification summary

3.1.1 Motionnet communication common specifications

Item	Specification	Remarks
Motionnet Communication	Communication speed: 2.5M / 5M / 10M / 20Mbps Communication code: NRZ code Communication protocol: NPM original method Communication method: Half-duplex communication Communication interface: RS-485, Pulse transformer Connection method: Multi-drop connection Number of local devices: 64 devices max. Transmission method: cyclic transmission (I/O), transient transmission (data) Communication Data length: Cyclic transmission (I/O) 4 bytes / local, fixed length Transient transmission (data) 1 to 128 words / column, variable length [G9004A communication data length: 1 to 128 words / column] Communication time: Cyclic transmission (I/O) 15.1µs / local Transient transmission (data) 19.3µs (3 words / column)	

3.1.2 G9001A-EV Board

Item	Specification	Remarks
USB-Parallel interface	Convert USB2.0 Hi-speed (480 Mbps) to parallel bus (8-bit)	U3: FT2232H
Motionnet Communication line	1ch	U1: G9001A
Motionnet communication settings	Communication speed: 2.5M / 5M / 10M / 20Mbps (Set with DSW1)	
Display	Power supply is ON: Yellow During Motionnet communication (MSYN): Green Motionnet communication error (MERR): Red	
Connector	USB: mini-B type CN1: Motionnet communication modular connector 8P	
G9001A clock	80 MHz	
Power supply	USB bus power 5V	
Current consumption	50 mA max.	
External diameters W × D × H [mm]	58 × 44 × 15	
Weight [g]	15	
Storage temperature [℃]	−20 to +70	
Operating temperature [℃]	0 to 50	
Operating humidity [%]	10 to 90 non-condensing	
RoHS compliant	Non-compliant	

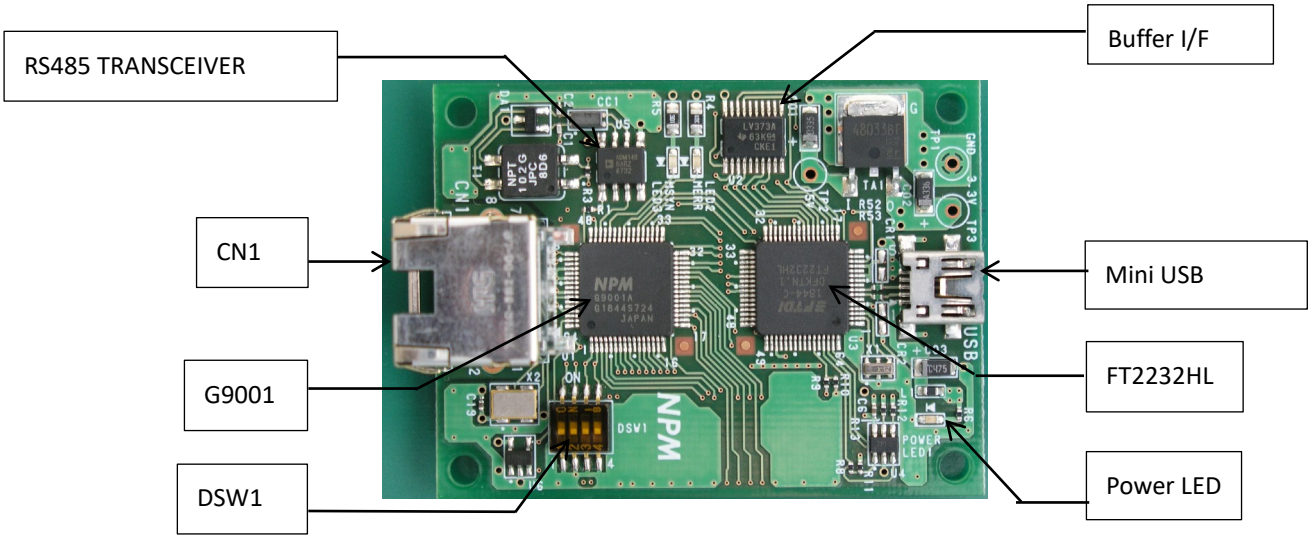
3.1.3 G9004A-EX Board

Item	Specification	Remarks
Motionnet Communication line	1ch	
Motionnet communication settings	Communication speed: 2.5M / 5M / 10M / 20Mbps (Set by DSW3-7, -8) Device number (0-63) (Set by DSW3-1 to -6) Sending Break (Set by DSW1-1) Watchdog timer (Set by DSW1-2) End point resistance setting (Set by DSW0-8)	
Motionnet Local LSI	CPU Emulation Mode (DSW0-1 : OFF) Control address space: 64 bytes (00h to 3Fh) Message Communication Mode (DSW0-1 : ON) Control address space: 4 bytes (00h to 03h)	U1:G9004A
CPU Emulation Mode	Local CPU I/F (Set with DSW1-7,-8) 8-bit I/F-1(Z80) DSW1-7(OFF), DSW1-8(OFF) 8-bit I/F-2(6809) DSW1-7(ON), DSW1-8(OFF) 16-bit I/F-1(8086,H8) DSW1-7(OFF), DSW1-8(ON) 16-bit I/F-2(68000) DSW1-7(ON), DSW1-8(ON) 8-bit setting: DSW0-2(OFF), DSW2(All ON) 16-bit setting: DSW0-2(ON), DSW2(All OFF)	
Connection LSI	Local CPU I/F (Set with DSW5-3,-4) 8-bit I/F-1 (Z80) DSW5-3(OFF), DSW5-4(OFF) 16-bit I/F-3 (8086) DSW5-3(ON), DSW5-4(OFF) 16-bit I/F-2 (H8) DSW5-3(OFF), DSW5-4(ON) 16-bit I/F-1 (68000) DSW1-3(ON), DSW5-4(ON) Connection LSI Identification number setting: DSW4(18h)	U2:PCL6125
Stepping motor driver	Applicable motor: 2-phase bipolar stepping motor ・ Bipolar constant current drive ・ Micro-stepping 1/1, 1/2[1-2 phase], 1/4[W1-2 phase], 1/8[2W1-2 phase] ・ Attached stepping motor PFCU30-24V4GM (1/12) Weigh 75 g Winding resistance 30 Ω, frequency Max 375 pps (1-2 phase), Maximum static torque 100 mN・m	U3:TB6608FNG U4:TB6608FNG
Terminal pin block	TB1(X axis), TB2(Y axis): 790-1102[RS Pro]	
Piano switch for input	PELx / MELx / SDx / ORGx / PAx / PBx / PEx / PCSx Input (DSW10) INPx / ALMx / RDYx / P5Ix / P6Ix / P7Ix / EZx / LTCx Input (DSW11) PELy / MELy / SDy / ORGy / PAy / PBy / PEy / PCSy Input (DSW12) INPy / ALMy / RDYy / P5Iy / P6Iy / P7Iy / EZy / LTCy Input (DSW13)	
LED for output	BSYx / FUPx / FDWx / MVCx / CP1x / CP2x Output (LED01 to LED06) BSYy / FUPy / FDWy / MVCy / CP1y / CP2y Output (LED11 to LED16) OUTx / DIR x/ ERCx / P0Ox / P1Ox / P2Ox / P3Ox Output (LED21 to LED27) OUTy / DIRy / ERCy / P0Oy / P1Oy / P2Oy / P3Oy Output (LED31 to LED37)	
Message Communication Mode	Local bus CPU I/F: 8-bit I/F DSW0-1, -4 to -8(ON), DSW0-2, -3(OFF), DSW2(All ON) Connect FT2232H MINI MODULE to FT2232H_CN2, CN3 (Do not connect the USB cable in CPU emulation mode.)	

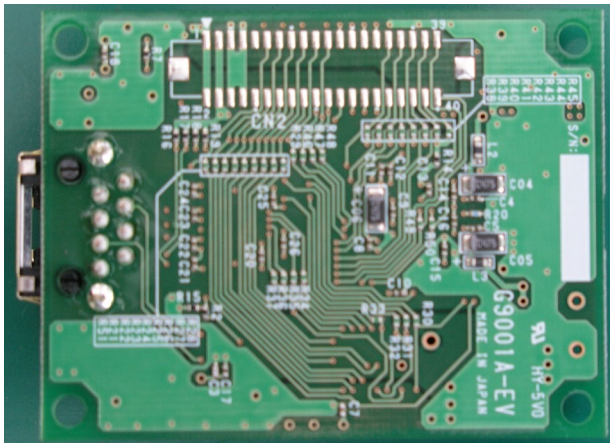
Item	Specification	Remarks
USB-Serial I/F	Convert USB2.0 Hi-Speed (480 Mbps) to parallel bus (8-bit)	(FT2232H)
Display	Power supply is ON: Red During Motionnet communication (MSEL): Green Motionnet communication error (MERR): Red	
Connector	J1: DC5V input, DC jack (for connecting accessory AC adapter) CN0: DC5V input, 2.54 pitch 2P (not mounted) CN1,2: Motionnet communication modular connector 8P CN3: CPU I/F, 2.54 pitch connector 40P (not mounted) For installation of FT2232H_CN2, _CN3: For FT2232H MINI MODULE	
G9004A Clock	80 MHz	X1
PCL6125 Clock	19.6608 MHz	X2
Power supply	5 V supply using the accessory AC adapter MAX: 1A USB bus power 5V(max 500mA)	
Current consumption	420 mA max.	
External diameters W × D × H [mm]	155 × 114 × 20	
Weight [g]	114	
Storage temperature [℃]	−20 to +70	
Operating temperature [℃]	0 to 50	
Operating humidity [%]	10 to 90 non-condensing	
RoHS compliant	Non-compliant	

3.2 Outline specification

3.2.1 G9001A-EV Board

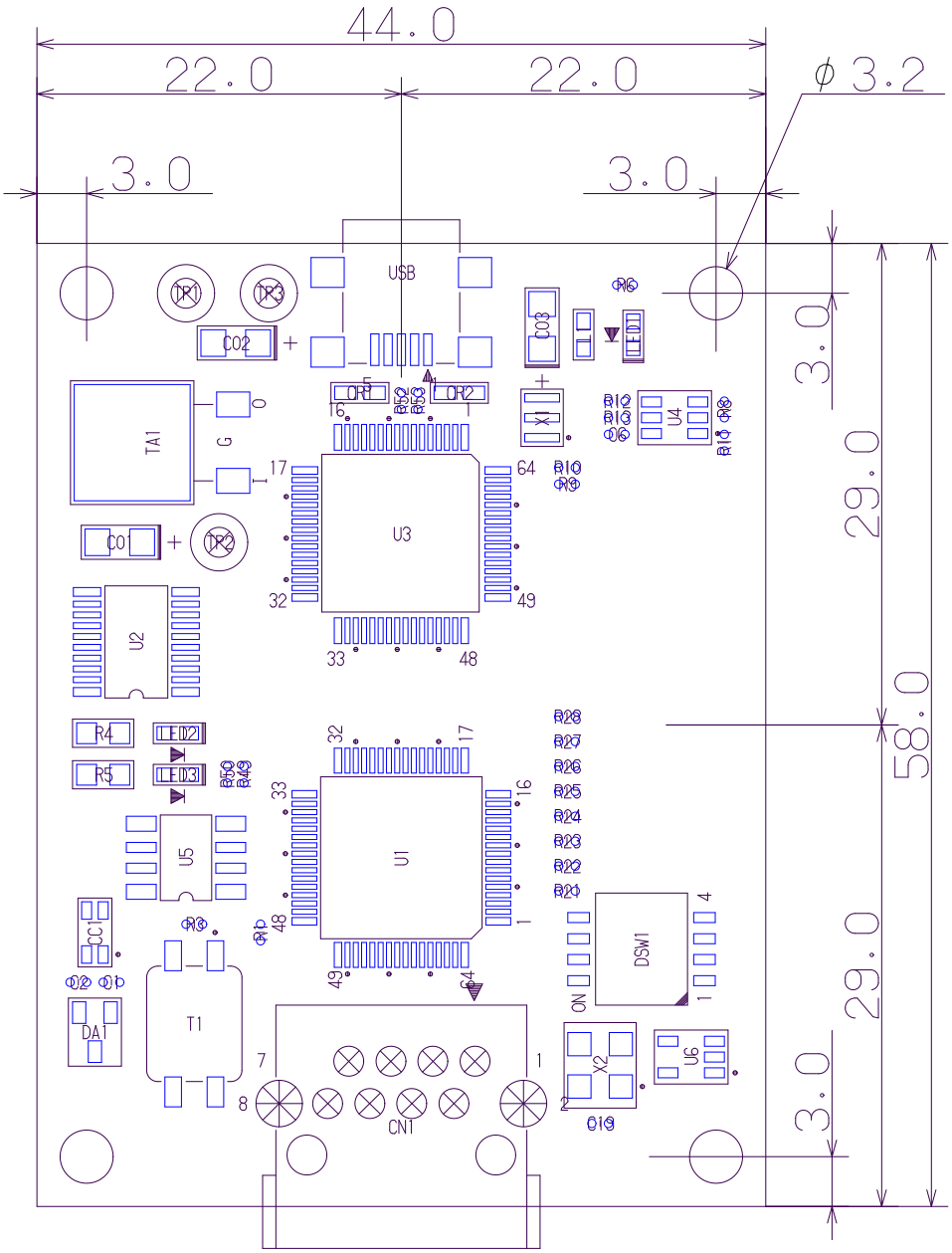


TOP VIEW



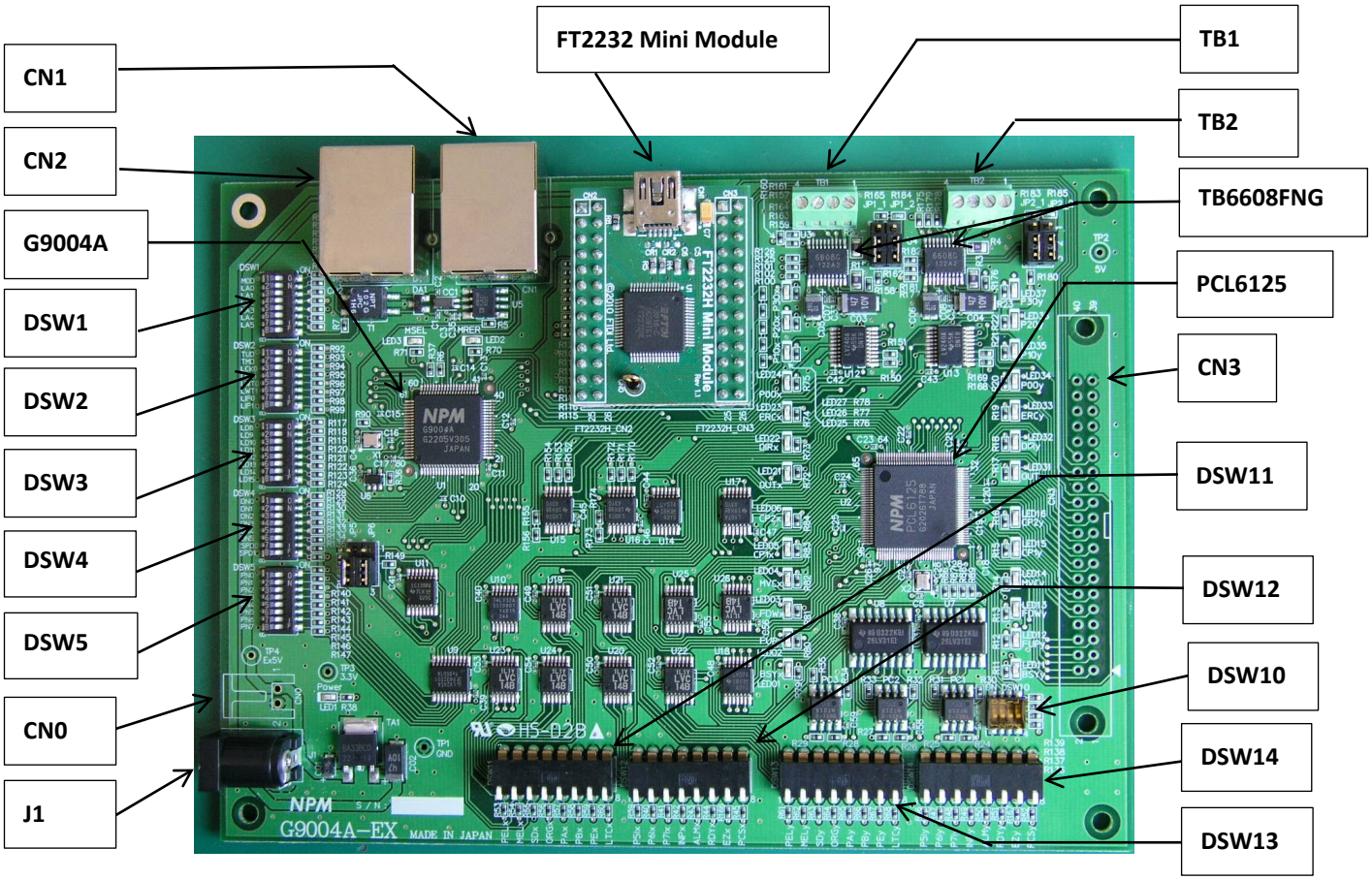
BOTTOM VIEW

3.2.2 G9001A-EV External dimensions

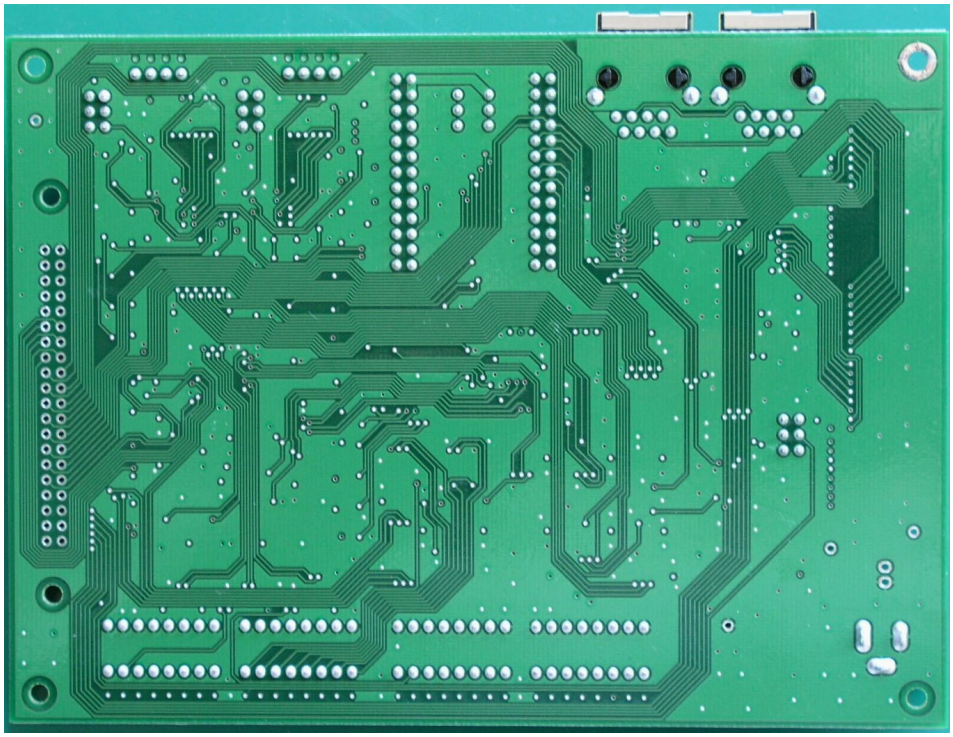


Unit: mm

3.2.3 G9004A-EX Board

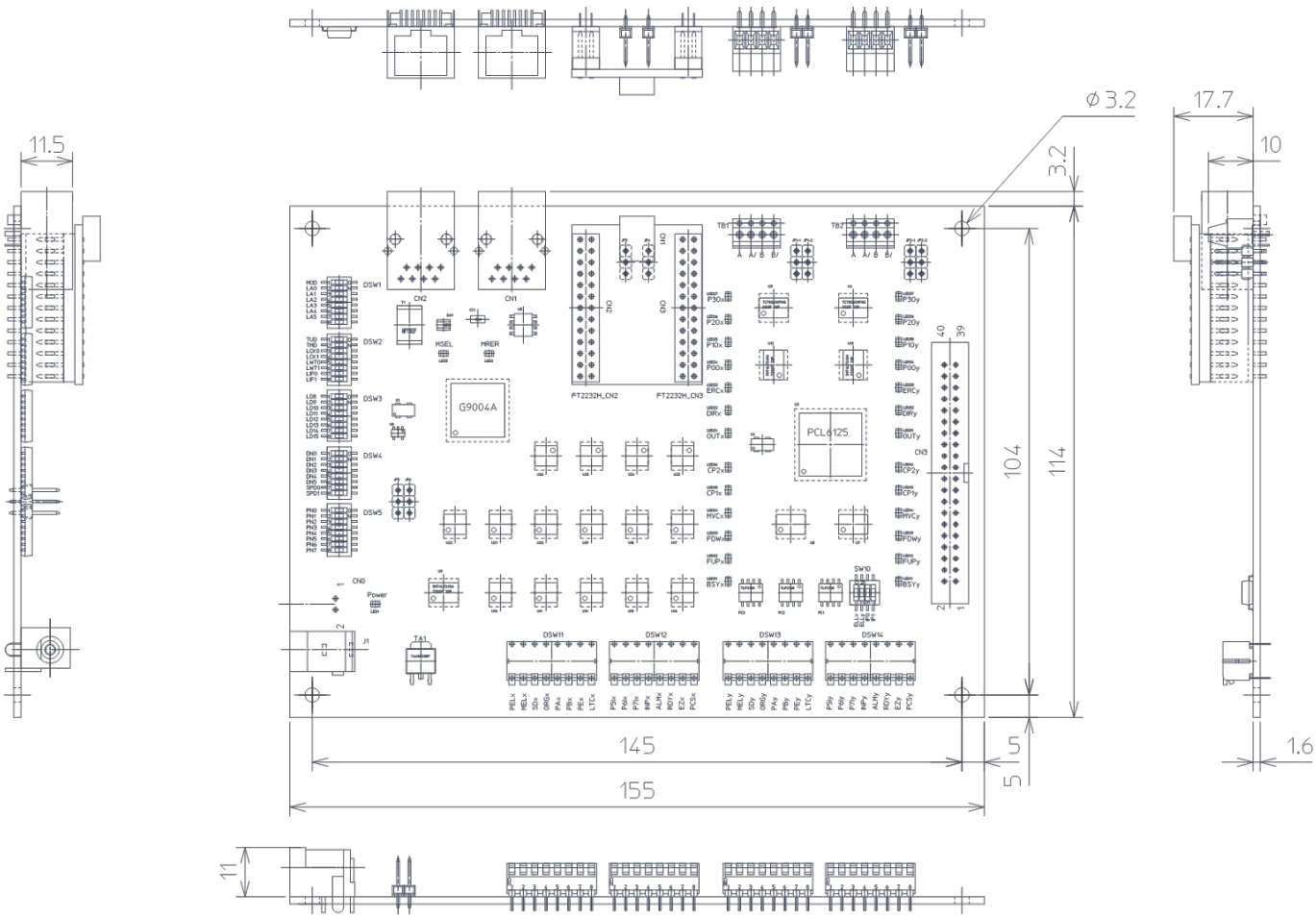


TOP VIEW



BOTTOM VIEW

3.2.4 G9004A-EX External dimensions



Unit: mm

4. Wiring

4.1 G9001A-EV Connectors

4.1.1 Connector type

	Model	Manufacturer	Remarks
USB	UB-M5BR-G14-4S	JST	USB connector
CN1	TM11R-5M2-88-LP	HIROSE	LAN connector

4.1.2 USB Connector pin assignment

Pin No.	Pin Symbol	Pin Name	Note
1	VBus	5 V Power	Power supply
2	−Data(D-)	−Data	Sent/Received data [−]
3	+Data(D+)	+Data	Sent/Received data [+]
4			
5	GND	GND	Power supply ground

4.1.3 CN1 Connector pin assignment

Pin No.	Pin Symbol	Pin Name	Note
1			
2			
3	RS485+	+Data	Sent/Received data [+]
4			
5			
6	RS485−	−Data	Sent/Received data [−]
7			
8			
FG		Frame ground	

4.2 G9004A-EX Connectors

4.2.1 Connector type

	Model	Manufacturer	Remarks
CN1,CN2	J0011D01NL	PULSE	LAN connector
CN3	S-40PE-D4T1-B1E	JAE	CPU I/F connector (Not mounted)
CN0	DF1B-2P-2.5DS	HIROSE	5 V power supply connector (Not mounted)
J1	MJ-179P	Marushin	DC jack connector for 5V power supply
TB1,TB2	790-1102	RS Pro	PCB terminal block for stepper motor

4.2.2 CN1, CN2 connector pin assignment

Pin No.	Pin Symbol	Pin Name	Note
1			
2			
3	RS485+	+Data	Sent/Received data[+]
4			
5			
6	RS485-	-Data	Sent/Received data[-]
7			
8			
FG		Frame ground	

4.2.3 CN3 connector pin assignment

Pin No.	Pin Symbol	Pin Name	Note (Not mounted)
1	LA0		Address for local bus0
2	LA1		Address for local bus1
3	LA2		Address for local bus2
4	LA3		Address for local bus3
5	LA4		Address for local bus4
6	LA5		Address for local bus5
7			
8			
9	LD0		Data for local bus0
10	LD1		Data for local bus1
11	LD2		Data for local bus2
12	LD3		Data for local bus3
13	LD4		Data for local bus4
14	LD5		Data for local bus5
15	LD6		Data for local bus6
16	LD7		Data for local bus7
17	LD8		Data for local bus8
18	LD9		Data for local bus9
19	LD10		Data for local bus10
20	LD11		Data for local bus11
21	LD12		Data for local bus12
22	LD13		Data for local bus13
23	LD14		Data for local bus14
24	LD15		Data for local bus15
25	LRST		Reset for local bus
26	LCS		Chip select for local bus
27	LRD		Read for local bus
28	LWR		Write for local bus

Pin No.	Pin Symbol	Pin Name	Note (Not mounted)
29	LIRQ		Interrupt request for local bus
30	LWRQ		Wait request for local bus
31			
32			
33			
34			
35	3.3 V		Power supply 3.3 V
36	3.3 V		Power supply 3.3 V
37	5 V		Power supply 5 V
38	5 V		Power supply 5 V
39	GND		Power supply ground
40	GND		Power supply ground

4.2.4 CN0 connector pin assignment

Pin No.	Pin Symbol	Pin Name	Note (Not mounted)
1	5 V		Power supply 5 V
2	GND		Power supply ground

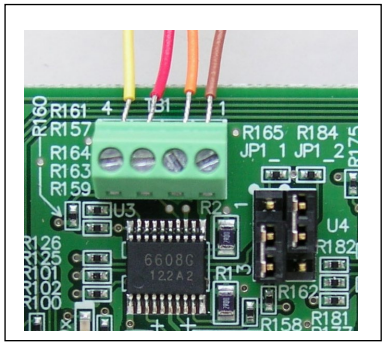
4.2.5 J1 connector pin assignment

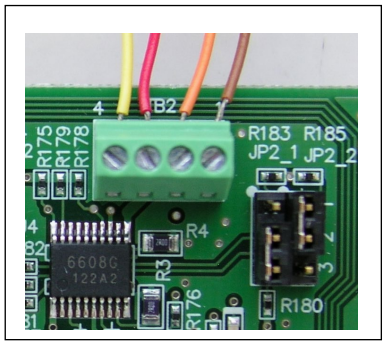
Pin No.	Pin Symbol	Pin Name	Note
1	5 V		Power supply 5 V
2	GND		Power supply ground

4.2.6 TB1(X axis), TB2(Y axis) connector pin assignment

Pin No.	Pin Symbol	Pin Name	Note
1	A	A-phase 1	Motor cable color (Brown)
2	/A	A-phase 2	Motor cable color (Orange)
3	B	B-phase 1	Motor cable color (Red)
4	/B	B-phase 2	Motor cable color (Yellow)

Connect the accessory stepping motor, PFCU30-24V4GM (1/12) to TB1(X axis) and TB2(Y axis).





5. Status display

5.1 LED1-3

SML-D13WWT86A[ROHM]

LED No.	LED Name	Remark (Luminous color: yellow)
1	Power	Power supply (3.3 V)
2	MRER	Signal
3	MSEL	Signal

5.2 LED01-06(X axis)

SML-D13WWT86A[ROHM]

LED No.	LED Name	Remark (Luminous color: yellow)
01	BSYx	X-axis running signal
02	FUPx	X-axis acceleration signal
03	FDWx	X-axis deceleration signal
04	MVCx	X-axis constant speed medium signal
05	CP1x	X-axis comparator1 completion signal
06	CP2x	X-axis comparator2 completion signal

5.3 5LED11-16(Y axis)

SML-D12P8W [ROHM]

LED No.	LED Name	Remark (Luminous color: green)
11	BSYy	Y-axis running signal
12	FUPy	Y-axis acceleration signal
13	FDWy	Y-axis deceleration signal
14	MVCy	Y-axis constant speed medium signal
15	CP1y	Y-axis comparator1 completion signal
16	CP2y	Y-axis comparator2 completion signal

5.4 LED21-27(X axis)

SML-D13WWT86A [ROHM]

LED No.	LED Name	Remark (Luminous color: yellow)
21	OUTx	X-axis command pulse signal
22	DIRx	X-axis direction signal
23	ERCx	X-axis deviation counter clear signal
24	P0Ox	X-axis general-purpose output port0 signal
25	P1Ox	X-axis general-purpose output port1 signal
26	P2Ox	X-axis general-purpose output port2 signal
27	P3Ox	X-axis general-purpose output port3 signal

5.5 LED31-37(Y axis)

SML-D12P8W [ROHM]

LED No.	LED Name	Remark (Luminous color: green)
31	OUTy	Y-axis command pulse signal
32	DIRy	Y-axis direction signal
33	ERCy	Y-axis deviation counter clear signal
34	P0Oy	Y-axis general-purpose output port0 signal
35	P1Oy	Y-axis general-purpose output port1 signal
36	P2Oy	Y-axis general-purpose output port2 signal
37	P3Oy	Y-axis general-purpose output port3 signal

6. Setting

6.1 G9004A-EX Jumper setting

6.1.1 JP1-1, JP2-1

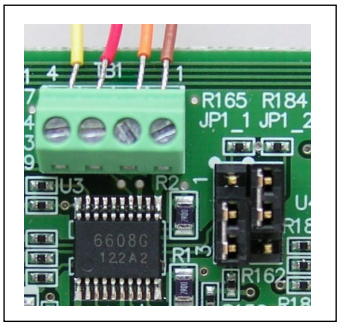
Jumper connector for current setting at motor stopping XJ8B-0311 [OMRON], Short-circuit socket XJ8A-0241 [OMRON]

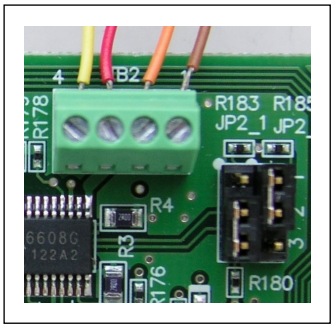
Short-circuit No.	Pin Name	Note
1-2	No current down	When a motor stopped, a current of about 250 mA always flows.
2-3	Automatic current down	When a motor stopped, a current of about 125 mA flows. (Default setting)

6.1.2 JP1-2, JP2-2

Jumper connector for current attenuation mode setting XJ8B-0311 [OMRON], short-circuit socket XJ8A-0241 [OMRON]

Short-circuit No.	Pin Name	Note
1-2	DCY_L	Current decay mode setting "L"
2-3	DCY_H	Current decay mode setting "H" (Default setting)





6.1.3 JP3

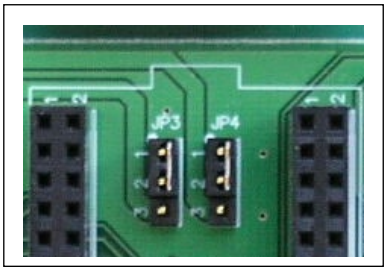
Jumper connector for USB power supply (5V) / External power supply (5V) XJ8B-0311 [OMRON], short-circuit socket XJ8A-0241 [OMRON]

Short-circuit No.	Pin Name	Note
1-2	USB 5 V	USB power supply (5 V) [Set in message communication mode]
2-3	External 5 V	External power supply (5 V) [Set in CPU emulation mode]

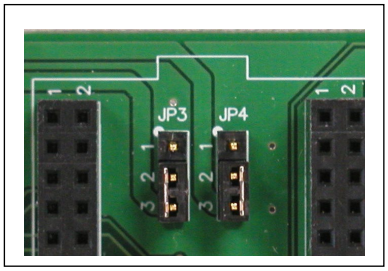
6.1.4 JP4

Jumper connector for USB power supply (3.3 V) / External power supply (3.3 V) XJ8B-0311 [OMRON], short-circuit socket XJ8A-0241 [OMRON]

Short-circuit No.	Pin Name	Note
1-2	USB 3.3 V	USB power supply (3.3 V) [Set in message communication mode]
2-3	External 3.3 V	External power supply (3.3 V) [Set in CPU emulation mode]



USB power supply



External power supply

6.1.5 JP5

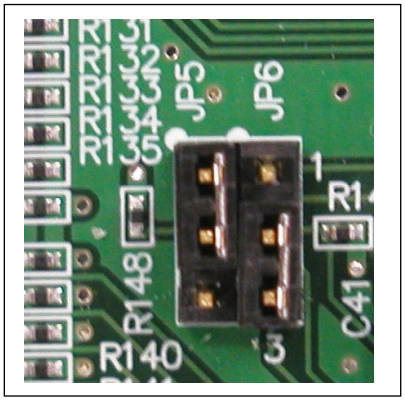
Jumper connector for local chip select PCL XJ8B-0311 [OMRON], short-circuit socket XJ8A-0241 [OMRON]

Short-circuit No.	Pin Name	Note
1-2	LCS00	Local chips select (00h-0Fh) [Set in CPU emulation mode]
2-3	LCS10	Local chips select (10h-1Fh) [Set in message communication mode]

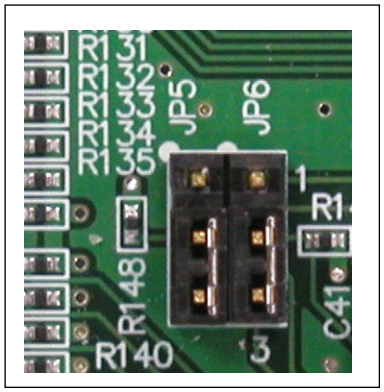
6.1.6 JP6

Jumper connector for local chip select identification number XJ8B-0311 [OMRON], short-circuit socket XJ8A-0241 [OMRON]

Short-circuit No.	Pin Name	Note
1-2	LCS20	Local chips select (20h-2Fh)
2-3	LCS30	Local chips select (30h-3Fh) (Normal setting)



Set in CPU emulation mode



Set in message communication mode

6.2 G9004A-EX Slide switch setting

6.2.1 DSW1

CHS-08TA1 [COPAL]

Pin No.	Pin Symbol	Pin function	Note
1	MOD	Operation mode setting	OFF(H): CPU Emulation Mode ON(L) : Message Communication Mode
2	LA0	Address 0 for local bus	OFF(H): 8-bit I/F ON(L) : 16-bit I/F
3	LA1	Address 1 for local bus	OFF(H) : 8-bit I/F, 16-bit I/F ON(L) : Do not set
4	LA2	Address 2 for local bus	OFF(H): CPU Emulation Mode ON(L) : Message Communication Mode
5	LA3	Address 3 for local bus	OFF(H): CPU Emulation Mode ON(L) : Message Communication Mode
6	LA4	Address 4 for local bus	OFF(H): CPU Emulation Mode ON(L) : Message Communication Mode
7	LA5	Address 5 for local bus	OFF(H): CPU Emulation Mode ON(L) : Message Communication Mode
8	TR	End point resistance setting	OFF(H): No termination resistor ON(L) : With termination resistor

6.2.2 DSW2

CHS-08TA1 [COPAL]

Pin No.	Pin Symbol	Pin function	Note
1	TUD	Watchdog timer operation setting	OFF(H): Keep a current status ON (L) : Reset
2	TMD	Watchdog timer setting	OFF(H): 20ms ON (L) : 5ms (20Mbps)
3	LCK0	Selects the clock frequency (LCLK) for controlling a local bus	4: OFF(H), 3: OFF(H) 20MHz 4: OFF(H), 3: ON(L) 10MHz 4: ON(L), 3: OFF(H) 4MHz 4: ON(L), 3: ON(L) 2MHz
4	LCK1		
5	LWT0	Time interval between writing and reading to a local bus	6: OFF(H), 5: OFF(H) 9*T 6: OFF(H), 5: ON(L) 5*T 6: ON(L), 5: OFF(H) 3*T 6: ON(L), 5: ON(L) 1*T
6	LWT1		
7	LIF0	Select the CPU interface specifications for the local bus	8: OFF(H), 7: OFF(H) 8-bit I/F-1 8: OFF(H), 7: ON(L) 8-bit I/F-2 8: ON(L), 7: OFF(H) 16-bit I/F-1 8: ON(L), 7: ON(L) 16-bit I/F-2
8	LIF1		

6.2.3 DSW3

CHS-08TA1 [COPAL]

Pin No.	Pin Symbol	Pin function	Note
1	LD8	DATA 8 for local bus	OFF(H) : 16-bit I/F ON(L) : 8-bit I/F
2	LD9	DATA 9 for local bus	OFF(H) : 16-bit I/F ON(L) : 8-bit I/F
3	LD10	DATA 10 for local bus	OFF(H) : 16-bit I/F ON(L) : 8-bit I/F
4	LD11	DATA 11 for local bus	OFF(H) : 16-bit I/F ON(L) : 8-bit I/F
5	LD12	DATA 12 for local bus	OFF(H) : 16-bit I/F ON(L) : 8-bit I/F
6	LD13	DATA 13 for local bus	OFF(H) : 16-bit I/F ON(L) : 8-bit I/F
7	LD14	DATA 14 for local bus	OFF(H) : 16-bit I/F ON(L) : 8-bit I/F
8	LD15	DATA 15 for local bus	OFF(H) : 16-bit I/F ON(L) : 8-bit I/F

6.2.4 DSW4

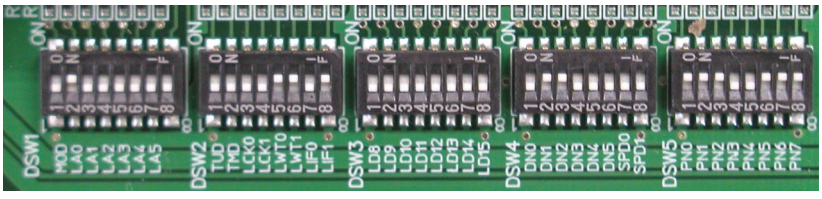
CHS-08TA1 [COPAL]

Pin No.	Pin Symbol	Pin function	Note
1	DN0	Device number setting Bit 0	OFF(H): 0 ON (L): 1 [0x01]
2	DN1	Device number setting Bit 1	OFF(H): 0 ON (L): 2 [0x02]
3	DN2	Device number setting Bit 2	OFF(H): 0 ON (L): 4 [0x04]
4	DN3	Device number setting Bit 3	OFF(H): 0 ON (L): 8 [0x08]
5	DN4	Device number setting Bit 4	OFF(H): 0 ON (L): 16 [0x10]
6	DN5	Device number setting Bit 5	OFF(H): 0 ON (L): 32[0x20]
7	SPD0	Communication Speed Setting 0	8: OFF(H), 7: OFF(H) 20Mbps (default) 8: OFF(H), 7: ON(L) 10Mbps 8: ON(L), 7: OFF(H) 5Mbps 8: ON (L), 7: ON(L) 2.5Mbps
8	SPD1	Communication Speed Setting 1	

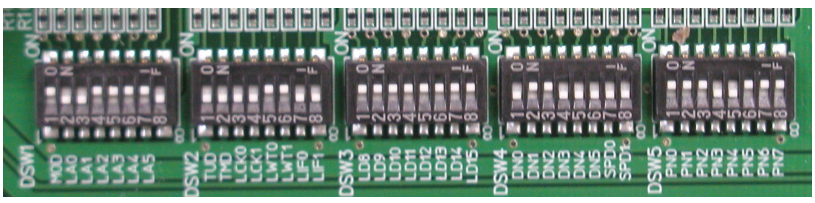
6.2.5 DSW5

CHS-08TA1 [COPAL]

Pin No.	Pin Symbol	Pin function	Note
1	PN0	Product number setting Bit 0	G9004A-EX: 18h (CPU emulation mode) 00h to FFh All OFF = FFh All ON = 00h
2	PN1	Product number setting Bit 1	
3	PN2	Product number setting Bit 2	
4	PN3	Product number setting Bit 3	
5	PN4	Product number setting Bit 4	
6	PN5	Product number setting Bit 5	
7	PN6	Product number setting Bit 6	
8	PN7	Product number setting Bit 7	



Set in CPU emulation mode



Set in message communication mode

6.2.6 DSW10

CHS-04TA1 [COPAL] (for PCL6125)

Pin No.	Pin Symbol	Pin function	Note
1	ELLx	X-axis end limit input logical setting	OFF(H): Negative logic ON (L) : Positive logic (default)
2	ELLy	Y-axis end limit input logical setting	OFF(H): Negative logic ON (L) : Positive logic (default)
3	IF0	CPU bus I/F mode setting bit 0	4:OFF(H), 3:OFF(H) 8-bit I/F 4:OFF(H), 3: ON(L) 16-bit I/F-3 (default)
4	IF1	CPU bus I/F mode setting bit 1	4:ON(L), 3:OFF(H) 16-bit I/F-2 4:ON(L), 3:ON(L) 16-bit I/F-1

6.2.7 DSW11(X axis), DSW13(Y axis)

A6TR-8104 [OMRON] (for PCL6125)

Pin No.	Pin Symbol	Pin function	Note
1	PEL	Plus-side end limit	OFF(H): 0 ON (L): 1
2	MEL	Minus-side end limit	OFF(H): 0 ON (L): 1
3	SD	Slow down	OFF(H): 0 ON (L): 1
4	ORG	Origin	OFF(H): 0 ON (L): 1
5	PA	Phase A of manual pulser	OFF(H): 1 ON (L): 0
6	PB	Phase B of manual pulser	OFF(H): 1 ON (L): 0
7	PE	Manual pulsar enabled	OFF(H): Effectiveness ON (L): Invalid
8	LTC	Counter latch	OFF(H): 0 ON (L): 1

6.2.8 DSW12(X axis), DSW14(Y axis)

A6TR-8104 [OMRON]

Pin No.	Pin Symbol	Pin function	Note
1	P5I	General-purpose input port P5	OFF(H): 0 ON (L): 1
2	P6I	General-purpose input port P6	OFF(H): 0 ON (L): 1
3	P7I	General-purpose input port P7	OFF(H): 0 ON (L): 1
4	INP	Positioning completed	OFF(H): 0 ON (L): 1
5	ALM	Alarm	OFF(H): 0 ON (L): 1
6	RDY	General-purpose input port P4	OFF(H): 1 ON (L): 0
7	EZ	Encoder Z phase	OFF(H): 0 ON (L): 1
8	PCS	Pulse count start	OFF(H): 0 ON (L): 1

6.3 Stepper motor driver IC interface

6.3.1 Output pulse specification

OUT and DIR output signals of G9103C are connected to CK and CW/CCW input signals of the stepping motor driver IC (TB6608FNG).

OUT(CK)	DIR(CW/CCW)	Motor rotation direction
⌐↓⌐	L(H)	CW (Output shaft clockwise direction)
⌐↓⌐	H(L)	CCW (Output shaft counterclockwise direction)

The output pulse specification (PMD2 to 0) of the environment setting 1 register (RENV1) of PCL6125 is 0x02.

6.3.2 Excitation setting method

General-purpose output signals P0 and P1 of PCL6125 are connected to M1 and M2 input signals of stepping motor driver IC (TB6608FNG).

The following shows the maximum speed and movement amount of one rotation when connecting to the stepping motor PFCU30-24V4GM (1/12).

P0(M1)	P1(M2)	Excitation mode	Max speed	Movement amount per rotation
H(L)	H(L)	2-2 phase	188 pps	288
L(H)	H(L)	1-2 phase	375 pps	576
H(L)	L(H)	W1-2 phase	750 pps	1152
L(H)	L(H)	2W1-2 phase	1500 pps	2304

The default setting is 2W1-2 phase excitation mode. The setting contents can be checked with the sub-status (SSTSW) of PCL6125.

6.3.3 Operation mode

P2, and P3 general-purpose output signals of PCL6125 are connected to STBY and RESET input signals of stepping motor driver IC (TB6608FNG).

(ENABLE)	P2(RESET)	P3(STBY)	Operation mode
(H)	L(H)	L(H)	Operable mode
(H)	H(L)	L(H)	Initial mode (MO output [EZ input] Low level)
(H)	x	L(H)	Enable stand-by mode (Output OFF, Hi-impedance)
(H)	x	H(L)	Stand-by mode (Output OFF, Hi-impedance)

x : Both L and H are enabled.

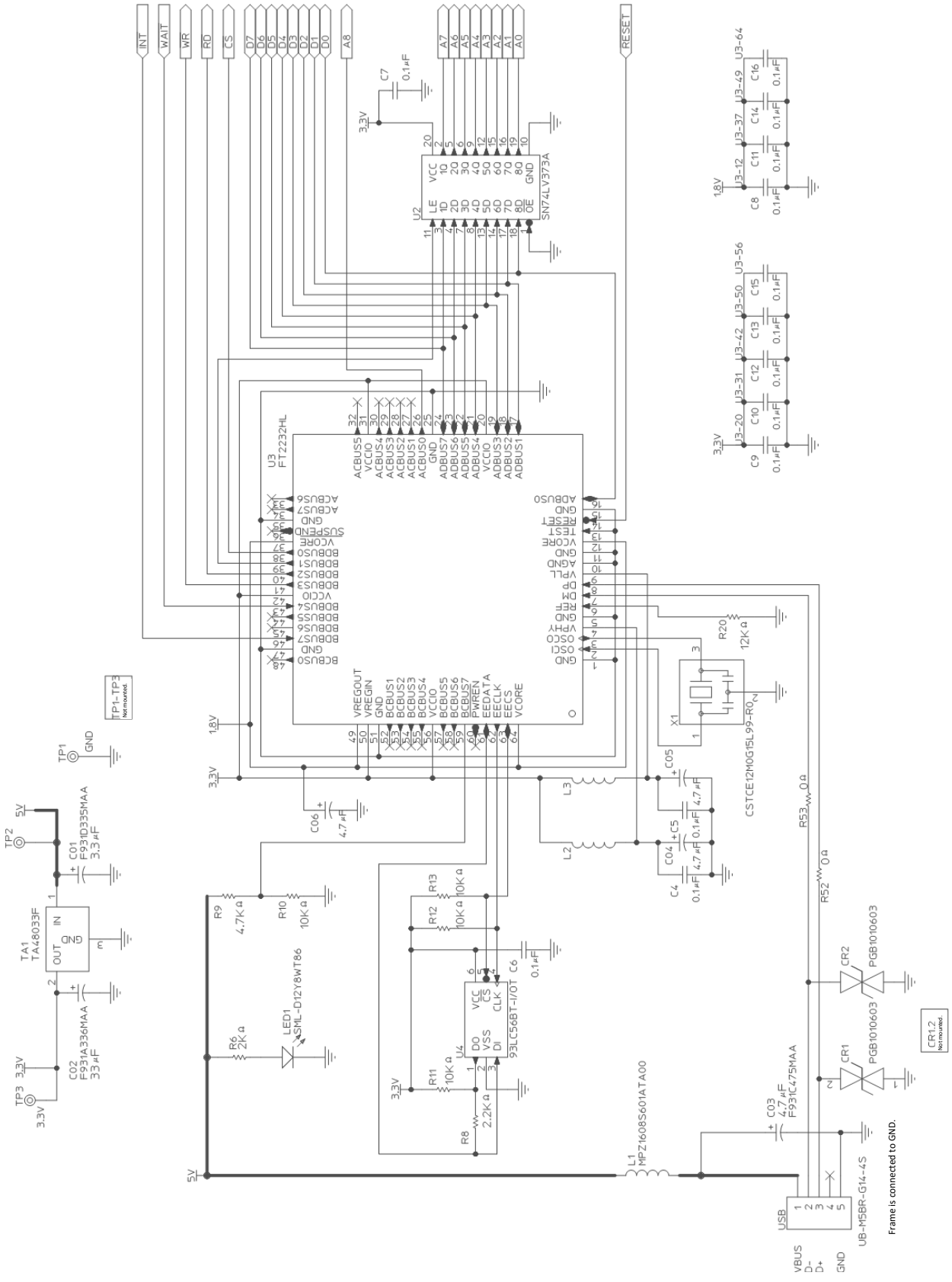
The default is the operable mode.

The setting contents can be checked with the sub-status (SSTSW) of PCL6125.

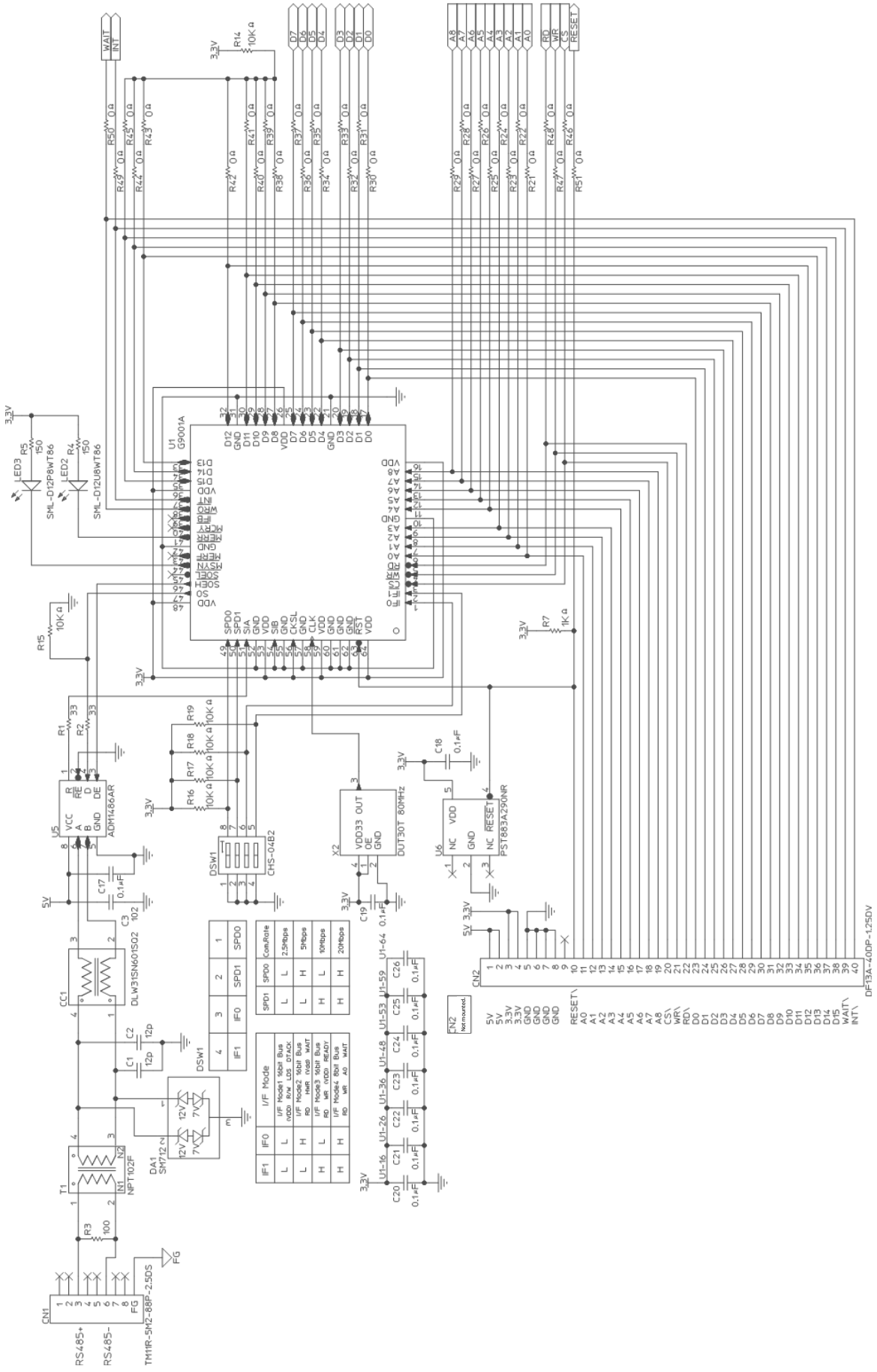
7. Schematic

7.1 G9001A-EV Schematic

7.1.1 Circuit diagram No.1

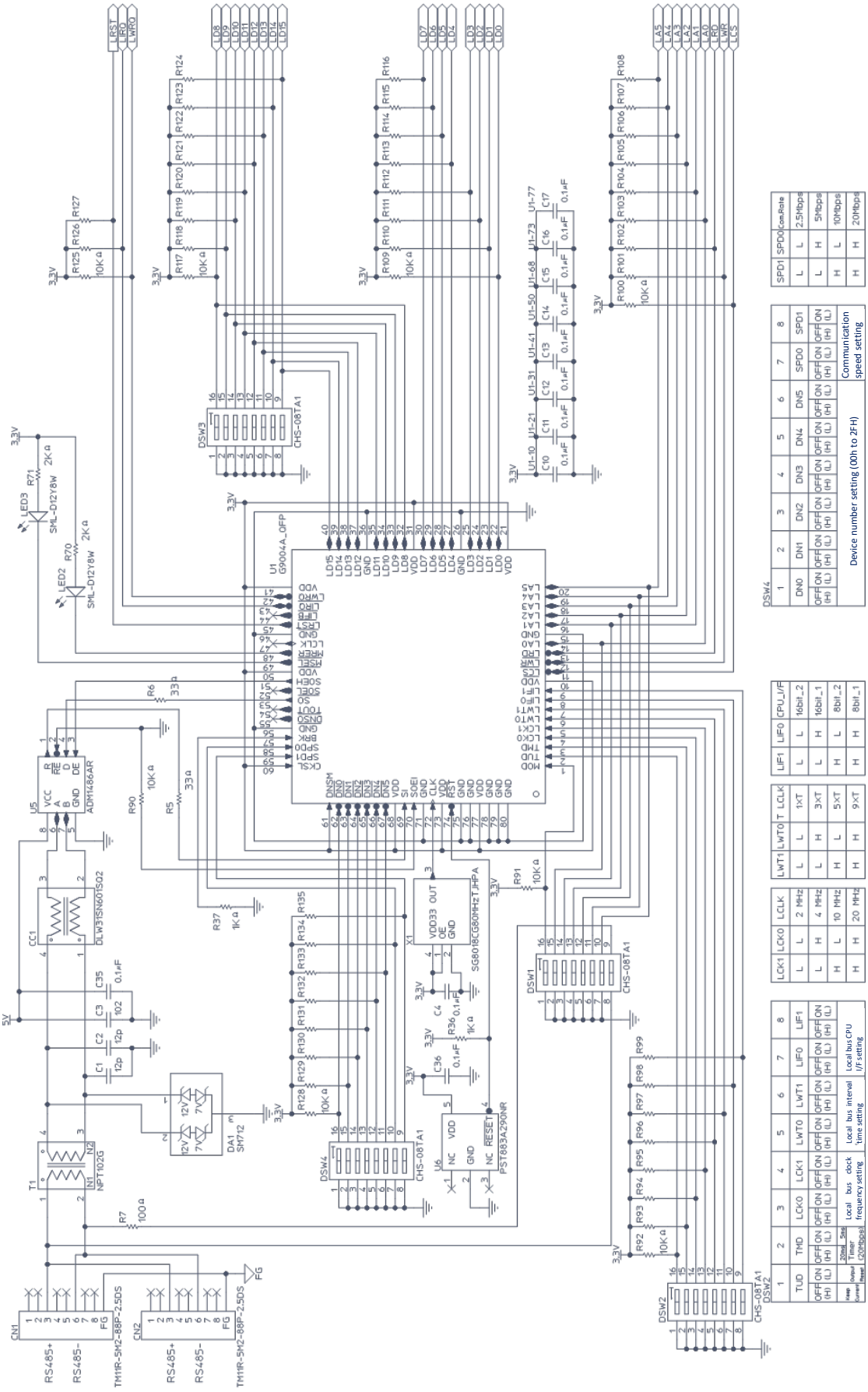


7.1.2 Circuit diagram No.2

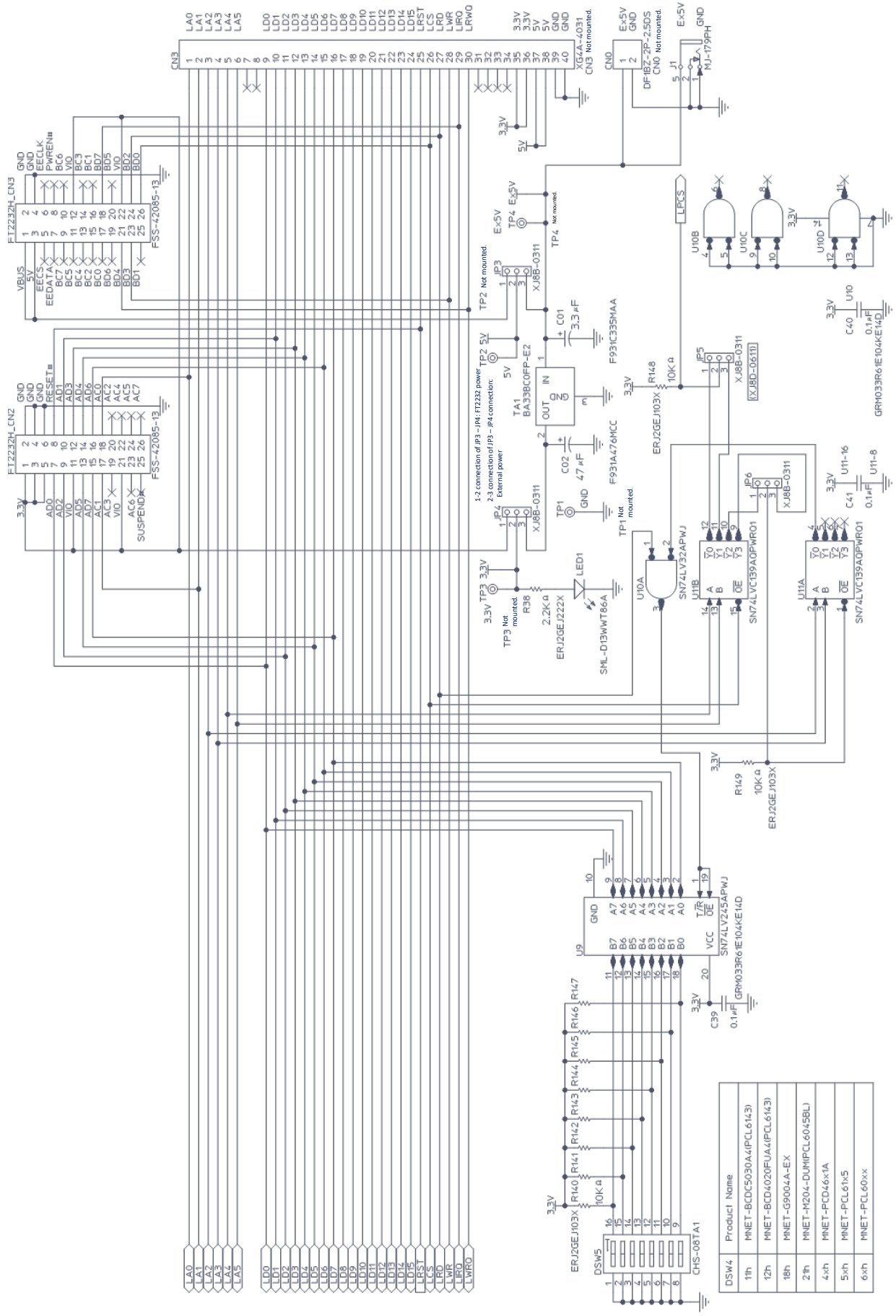


7.2 G9004A-EX Schematic

7.2.1 Circuit diagram No.1

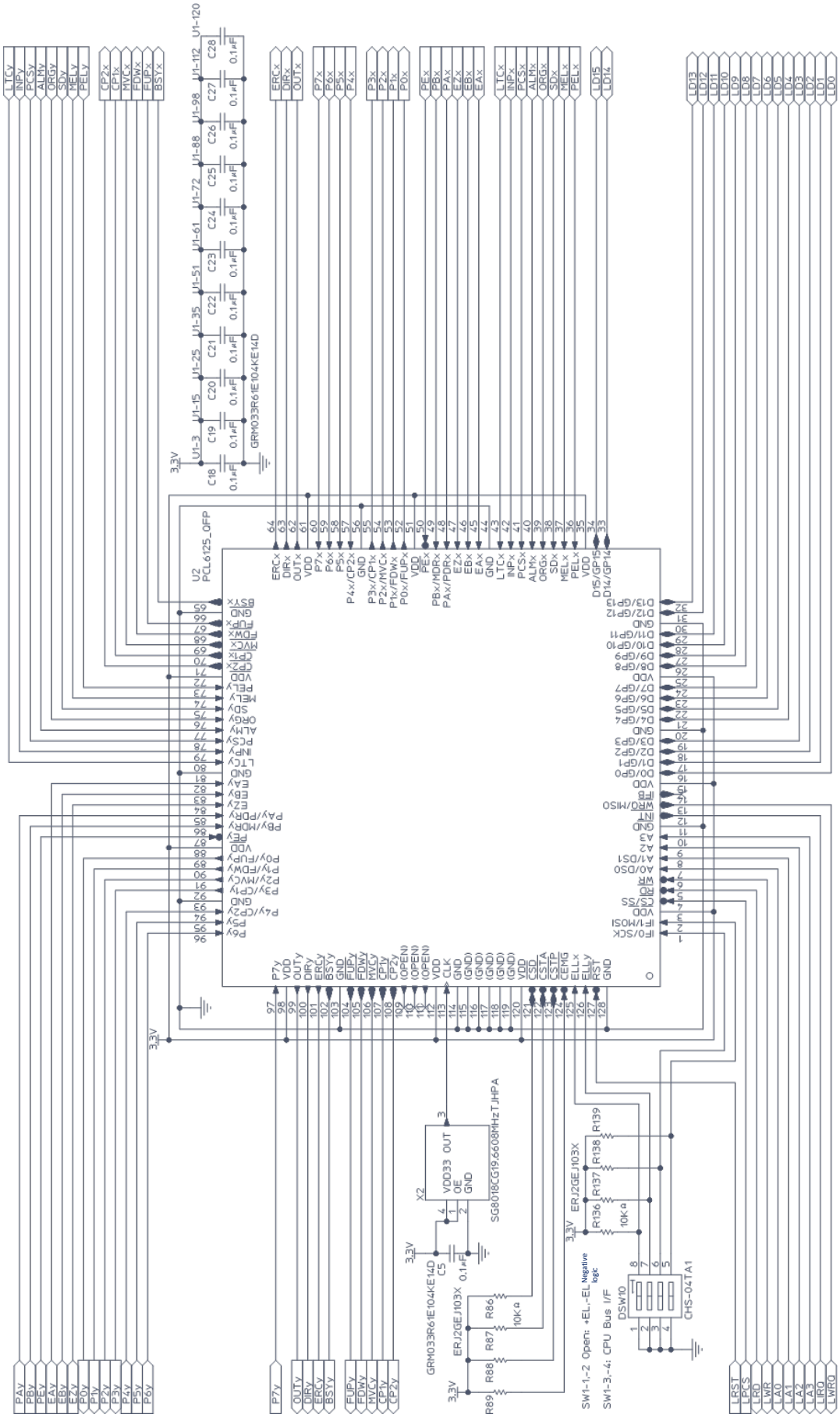


7.2.2 Circuit diagram No.2

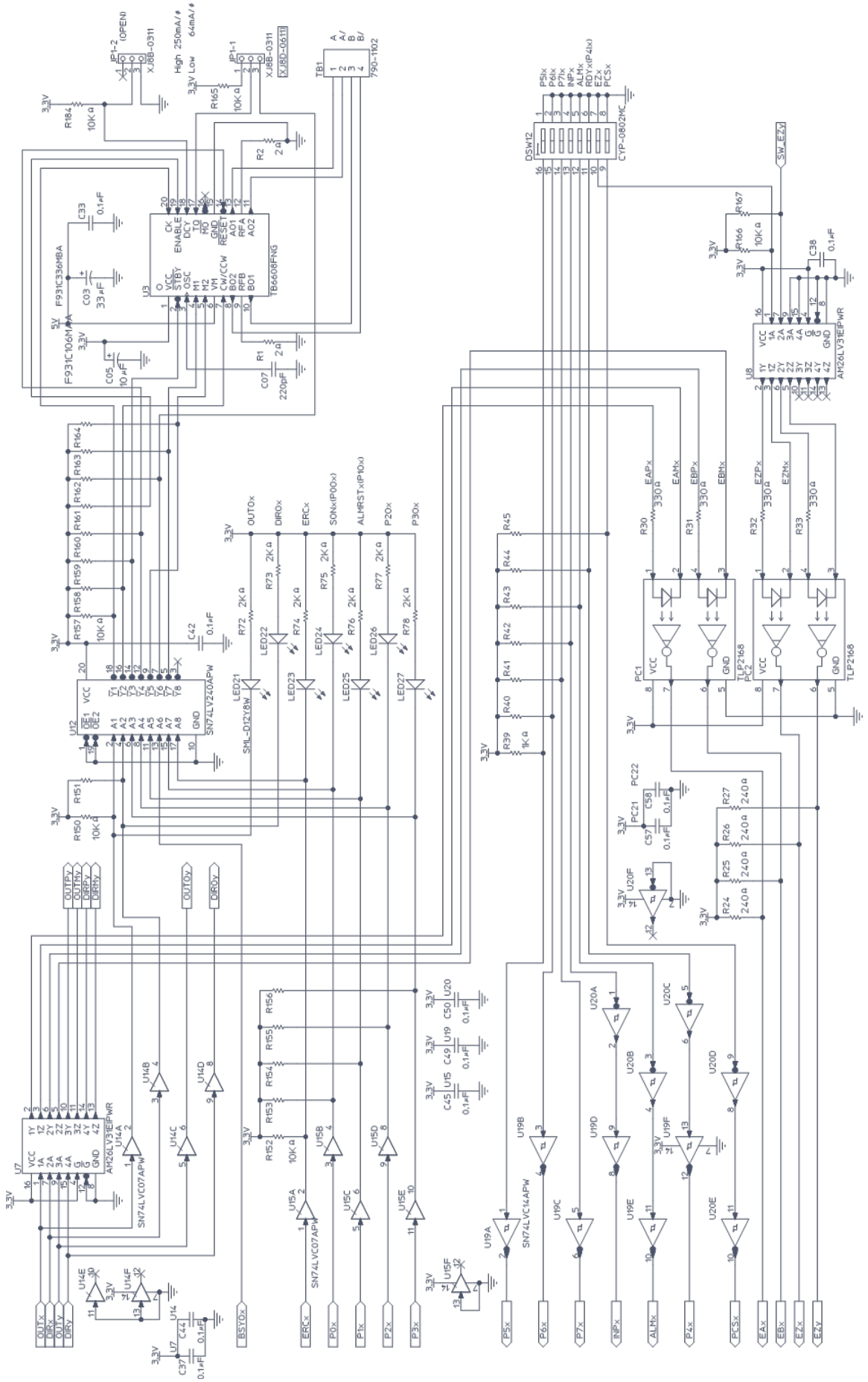


DSW4	Product Name
11h	MNET-BCDC5030A4(PCL6143)
12h	MNET-BCD4020FUA4(PCL6143)
18h	MNET-G9004A-EX
21h	MNET-M204-DUMPCL6045BL)
4xh	MNET-PCD46x1A
5xh	MNET-PCL61x5
6xh	MNET-PCL60xx

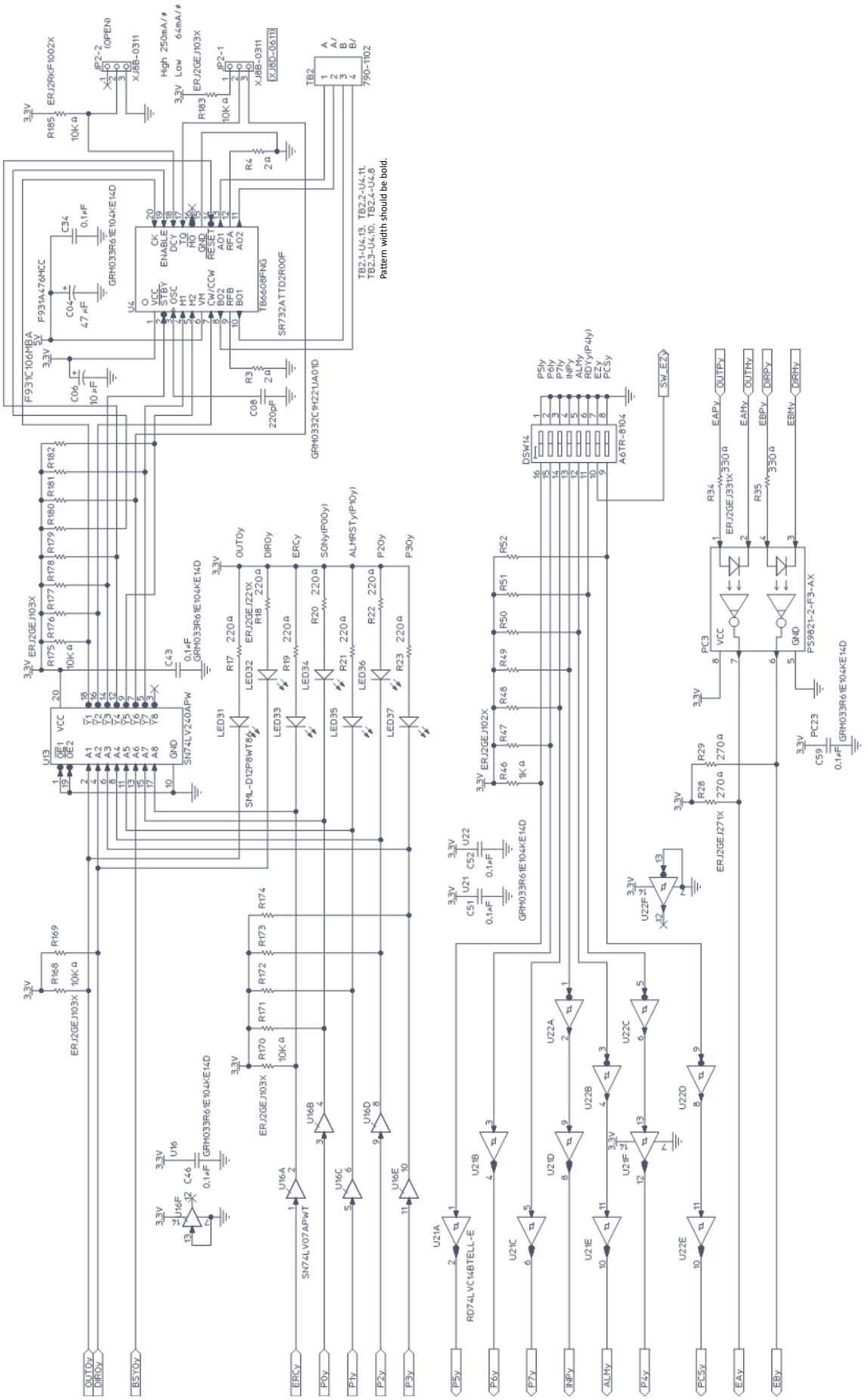
7.2.3 Circuit diagram No.3



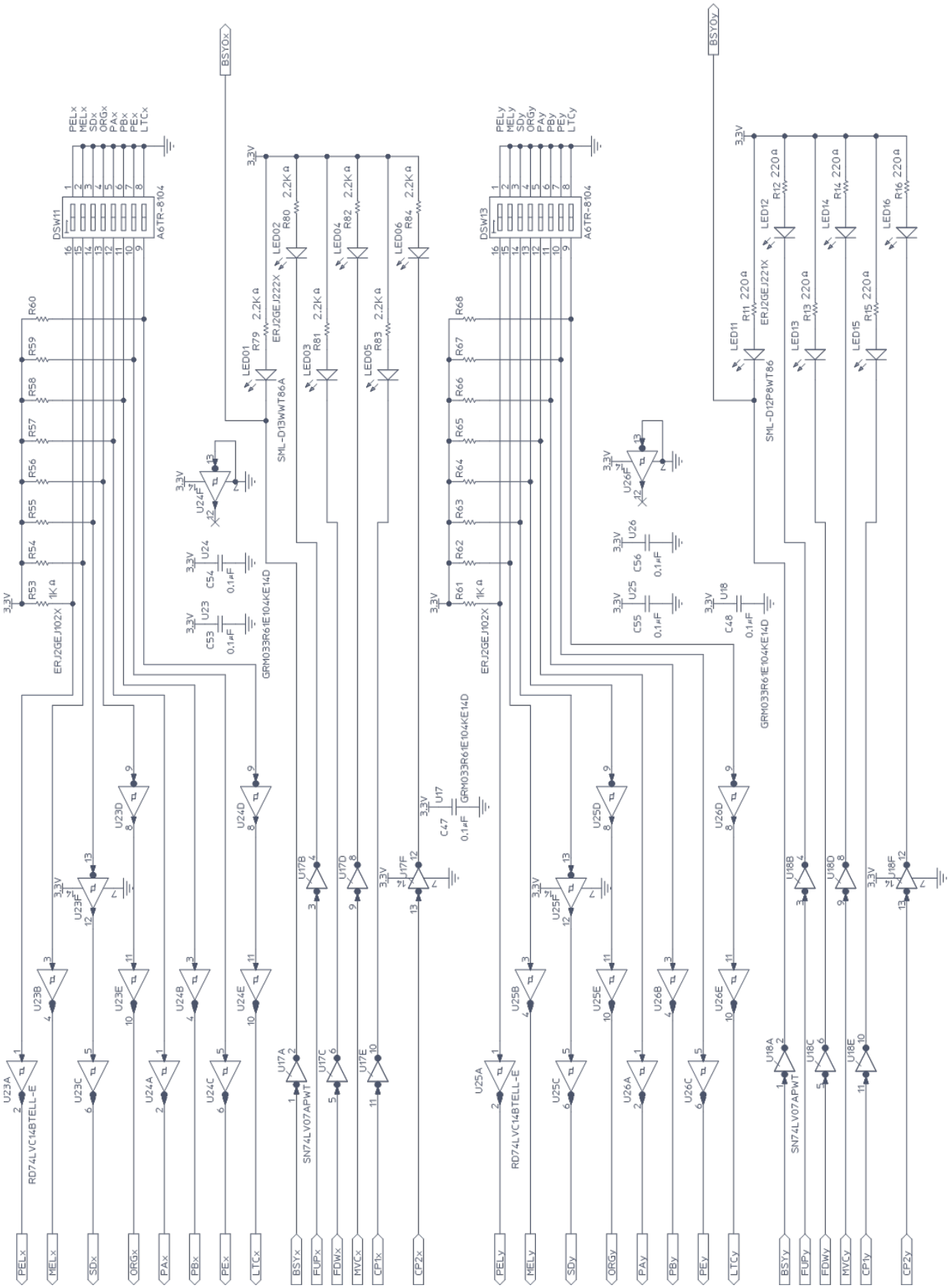
7.2.4 Circuit diagram No.4



7.2.5 Circuit diagram No.5

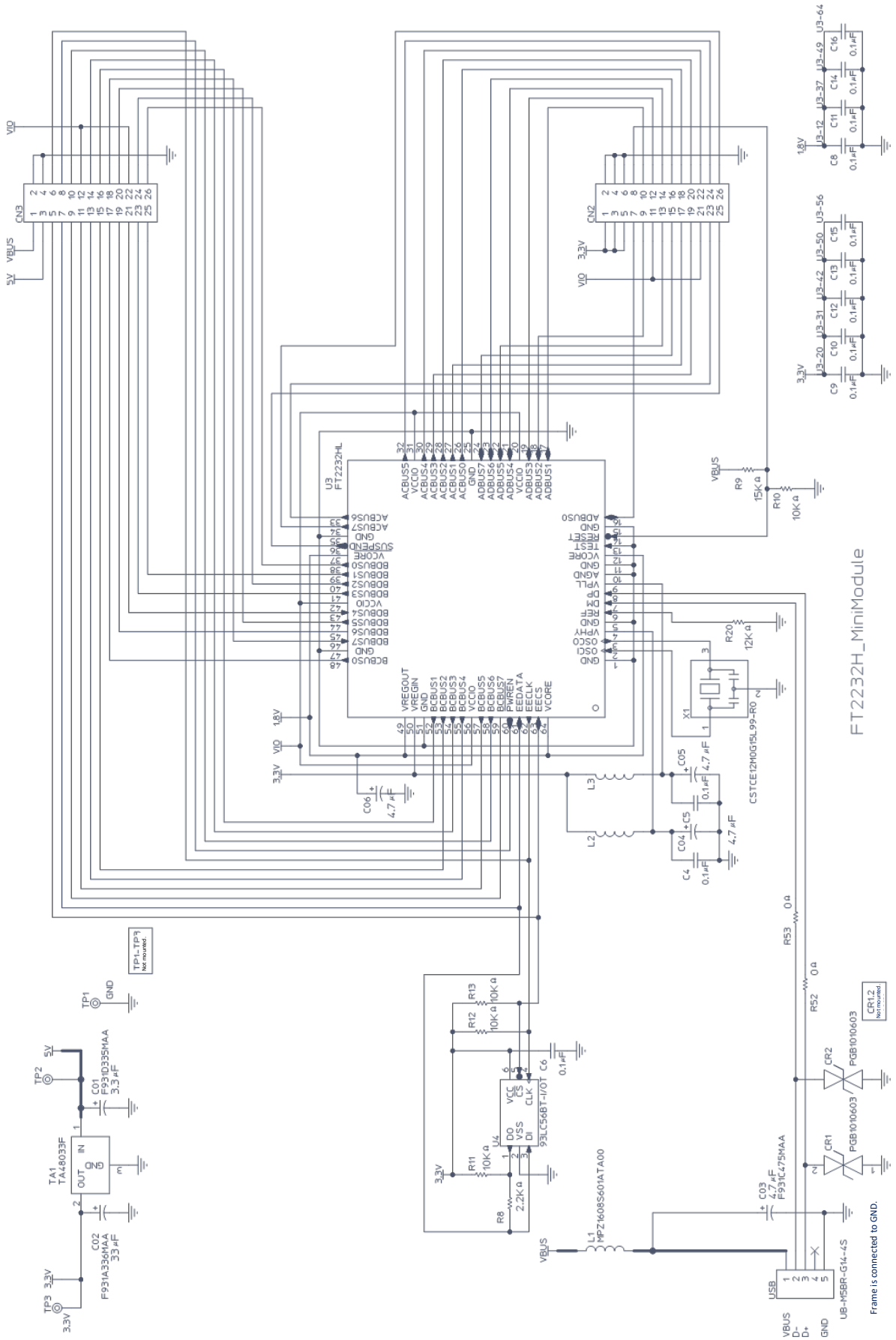


7.2.6 Circuit diagram No.6



NPM

7.2.7 FT2232H Mini Module Circuit diagram



8. Parts list

8.1 G9001A-EV Parts List

No.	Part Name	Manufacture	Model	Quantity	Part No.	Remark
1	LSI	NPM	G9001A	1	U1	
2	IC	TI	SN74LV373APW	1	U2	
3	LSI	FTDI	FT2232HL	1	U3	
4	EEPROM	Micro Chip	93LC56BT-I/OT	1	U4	
5	RS-485 Transceiver	Analog Devices	ADM1486AR	1	U5	
6	Reset IC	MITSUMI	PST883A290NR	1	U6	
7	Oscillator	MURATA	CSTCE12M0G15L99-R0	1	X1	
8	Oscillator	EPSON	SG-8002CB-80MHz-PCB	1	X2	
9	Regulator	TOSHIBA	TA48033BF	1	TA1	
10	EMC Part	TDK	MPZ1608S601ATA00	3	L1,L2,L3	
11	LED	ROHM	SML-D12Y8WT86	1	LED1	
12	LED	ROHM	SML-D12U8WT86	1	LED2	
13	LED	ROHM	SML-D12P8WT86	1	LED3	
14	Choke Coil	MURATA	DLW31SN601SQ2	1	CC1	
15	ESD Suppressors	SETECH	SM712	1	DA1	
16	Pulse Transformer	NPM	NPT102G	1	T1	
17	Slide Switch	COPAL	CHS-04B2	1	DSW1	
18	PULSE-GUARD	Little fuse	PGB1010603	2	CR1,CR2	Not mounted
19	Check Pin	Mac8	LC-2-S White	2	TP2,TP3	Not mounted
20	Check Pin	Mac8	LC-2-S Black	1	TP1	Not mounted
21	Resistor	KOA	RK73Z1ETTP	33	R21-R53	
22	Resistor	KOA	RK73B1ETTP330J	2	R1,R2	
23	Resistor	KOA	RK73B1ETTP101J	1	R3	
24	Resistor	KOA	RK73B2ATTD301J	2	R4,R5	
25	Resistor	KOA	RK73B1ETTP102J	2	R6,R7	
26	Resistor	KOA	RK73B1ETTP222J	1	R8	
27	Resistor	KOA	RK73B1ETTP472J	1	R9	
28	Resistor	KOA	RK73B1ETTP103J	10	R10-R19	
29	Resistor	KOA	RK73H1ETTD1202F	1	R20	
30	Capacitor	Nichicon	F931D335MAA	1	C01	
31	Capacitor	Nichicon	F931A336MAA	1	C02	
32	Capacitor	Nichicon	F931C475MAA	4	C03-C06	
33	Capacitor	MURATA	GRM155C2A120JA01D	2	C1,C2	
34	Capacitor	MURATA	GRM1552C1H221JA01D	1	C3	
35	Capacitor	MURATA	GRM155B31E104KA87D	23	C4-C26	
36	USB Connector	JST	UB-M5BR-G14-4SH	1	USB	
37	LAN Connector	HIROSE	TM11R-5M2-88-LP	1	CN1	

8.2 G9004A-EX Parts List

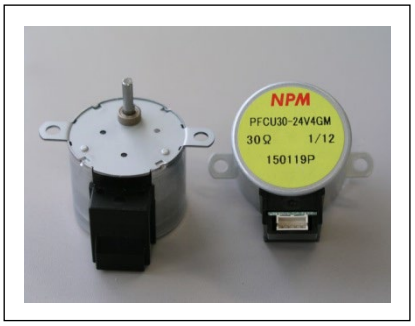
No.	Part Name	Manufacture	Model	Quantity	Part No.	Remark
1	LSI	NPM	G9004A	1	U1	
2	LSI	NPM	PCL6125	1	U2	
3	Driver IC	TOSHIBA	TB6608FNG	2	U3, U4	
4	RS-485 Transceiver	Analog Devices	ADM1486AR	1	U5	
5	Reset IC	MITSUMI	PST883A290NR	1	U6	
6	IC	TI	AM26LV31EINS	2	U7, U8	
7	IC	Nexperia	SN74LV245APWJ	1	U9	
8	IC	Nexperia	SN74LV32APWJ	1	U10	
9	IC	TI	SN74LVC139AQPWRQ1	1	U11	
10	IC	TI	SN74LV240APW	2	U12, U13	
11	IC	TI	SN74LV07APWT	5	U14-U18	
12	IC	RENESAS	RD74LVC14BTELL-E	8	U19-U26	
13	Regulator	RoHM	BA33BC0FP-E2	1	TA1	
14	Choke Coil	MURATA	DLW31SN601SQ2L	1	CC1	
15	ESD Suppressors	SETECH	SM712-02HTG	1	DA1	
16	Pulse Transformer	NPM	NPT102G	1	T1	
17	Photo coupler	RENESAS	PS9821-2-F3-AX	3	PC1-PC3	
18	Oscillator	EPSON	SG-8018CG-80MHz	1	X1	
19	Oscillator	EPSON	SG-8018CG-19.6608MHz	1	X2	
20	LED	ROHM	SML-D13WWT86A	16	LED1-LED3, LED01-LED06, ED21-LED27	
21	LED	ROHM	SML-D12P8WT86	13	LED11-LED16, LED31-LED37	
22	Piano Switch	OMRON	A6TR-8104	4	DSW10-DSW13	
23	Slide Switch	COPAL	CHS-04TA1	1	DSW5	
24	Slide Switch	COPAL	CHS-08TA1	5	DSW0-DSW4	
25	Resistor	KOA	SR732ATTD2R00F	4	R1-4	
26	Resistor	Panasonic	ERJ2RKF1002X	2	R184, R185	
27	Resistor	Panasonic	ERJ2GEJ330X	2	R5, R6	
28	Resistor	Panasonic	ERJ2GEJ101X	1	R7	
29	Resistor	Panasonic	ERJ2GEJ221X	13	R11-R23	
30	Resistor	Panasonic	ERJ2GEJ271X	6	R24-R29	
31	Resistor	Panasonic	ERJ2GEJ331X	6	R30-R35	
32	Resistor	Panasonic	ERJ2GEJ102X	32	R36,R37,R39-R68	
33	Resistor	Panasonic	ERJ2GEJ222X	16	R38,R70-R84	
34	Resistor	Panasonic	ERJ2GEJ103X	98	R86-R183	
35	Capacitor	AVX	F931C105MAA	1	C01	

No.	Part Name	Manufacture	Model	Quantity	Part No.	Remark
36	Capacitor	AVX	F931A476MCC	3	C02-C04	
37	Capacitor	AVX	F931C106MBA	2	C05,C06	
38	Capacitor	MURATA	GRM0332C1H221JA01D	2	C07,C08	
39	Capacitor	MURATA	GRM0335C1H120GA01D	2	C1, C2	
40	Capacitor	MURATA	GRM033R71H102KA12D	1	C3	
41	Capacitor	MURATA	GRM033R61E104KE14D	48	C4, C5, C10-C28, C33-C59	
42	LAN Connector	PULSE	J0011D01NL	2	CN1, CN2	
43	Connector	HIROSUGI	FSS-42085-13	2	FT2232H_CN2, CN3	
44	Terminal Block	RS Pro	790-1102	2	TB1, TB2	
45	Jumper	OMRON	XJ8B-0311	4	JP3, JP4, JP5, JP6	
46	Jumper	OMRON	XJ8D-0611	2	JP1-1/JP1-2, JP2-1/JP2-2	
47	Socket	OMRON	XJ8A-0241	8		
48	DC jack	Marushin	MJ-179PH	1	J1	
49	FTDI Kit	RS	FT2232H MINI MODULE	1		
50	Nylon spacer	HIROSUGI	ASN-310	4		
51	Screw	HIROSUGI	PC-0306	4		
52	AC adapter	AKIZUKI	AD-D50P100	1		
53	Connector	JAE	DF1B-2P-2.5DS	1	CN0	Not mounted
54	Connector	JAE	PS-40PE-D4T1-B1E	1	CN3	Not mounted
55	Check pin	Mac8	LC-2-S White	3	TP2, TP3, TP4	Not mounted
56	Check pin	Mac8	LC-2-S Black	1	TP1	Not mounted

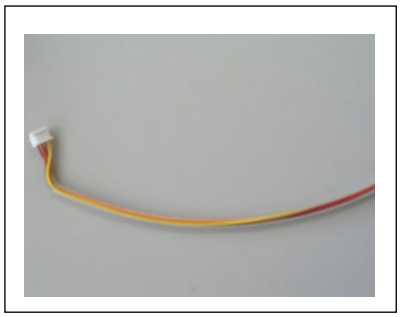
9. Accessories

9.1 Stepping motor, Lead wire for the motor [G9004A-EX]

PFCU30-24V4GM (1/12) [NPM] (2 pieces)



PFCU30 lead wire (E000016-885A) [NPM] 0.2 m (2 pieces)



CAUTION: When inserting the connector into the motor, do not insert it obliquely or do not apply too much load.
After inserting the connector, please do not pull strongly the harness or apply too much load.

9.2 AC adapter (5 V, 1 A power supply) [G9004A-EX]

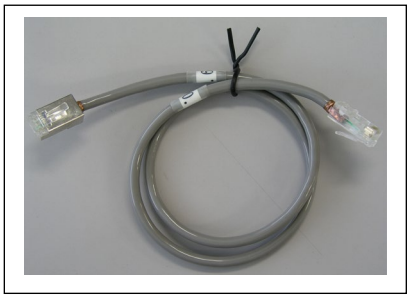
AD-D50P100(1 piece)

9.3 USB cable [G9001A-EV], [G9004A-EX]

Mini USB cable (AB-10H) A–mini-B type 1m (2 pieces)

9.4 LAN cable [G9004A-EX]

Cable RJ-RJ (K-SP-10493-001) 0.6m (1 piece)



NPM reserves all intellectual property rights, including copyrights, for the software. NPM does not transfer any rights regarding the software to customer(s). Customer(s) may use the current software only for the purpose of using our products.

NPM does not provide any warranty with our software, whether expressed or implied, including the completeness, accuracy, applicability, usefulness, or non-infringement of third-party intellectual property. In addition, NPM is not responsible for any damages (including lost revenue or profits) caused by using the software. Customer(s) must comply with the export control laws and regulations of the countries in case the customer(s) use(s) the software outside the country purchased.

Revision

Revision	Date	Contents
1st	June 16, 2023	New document

Impress, not just satisfy
Nippon Pulse Motor Co., Ltd.

www.pulsemotor.com/global

Information
www.pulsemotor.com/global/contact

Issued in June 2023