

FL-850/F1L-176-S

Hardware Manual

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Tessera Technology Inc.

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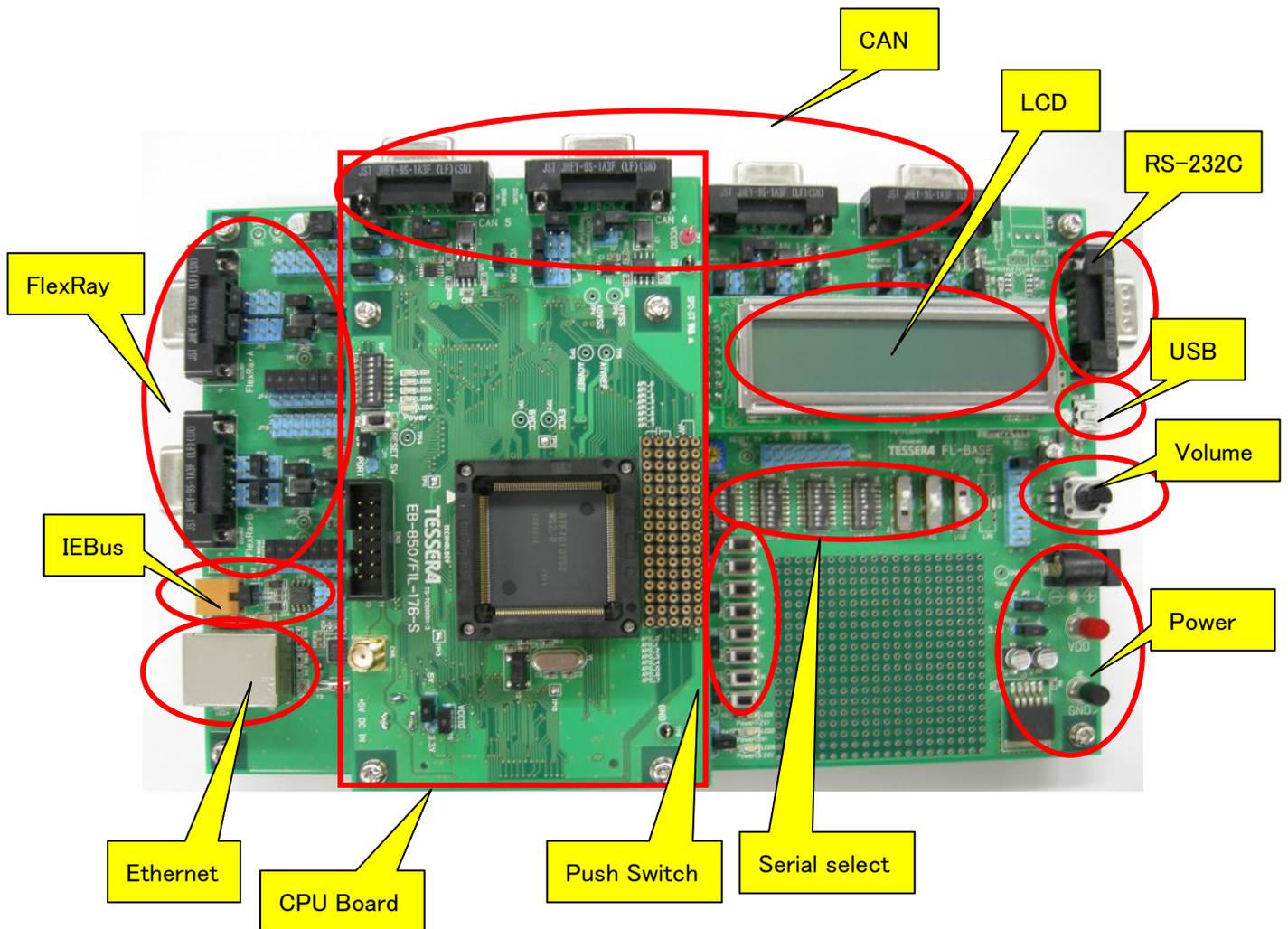
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1 Introduction

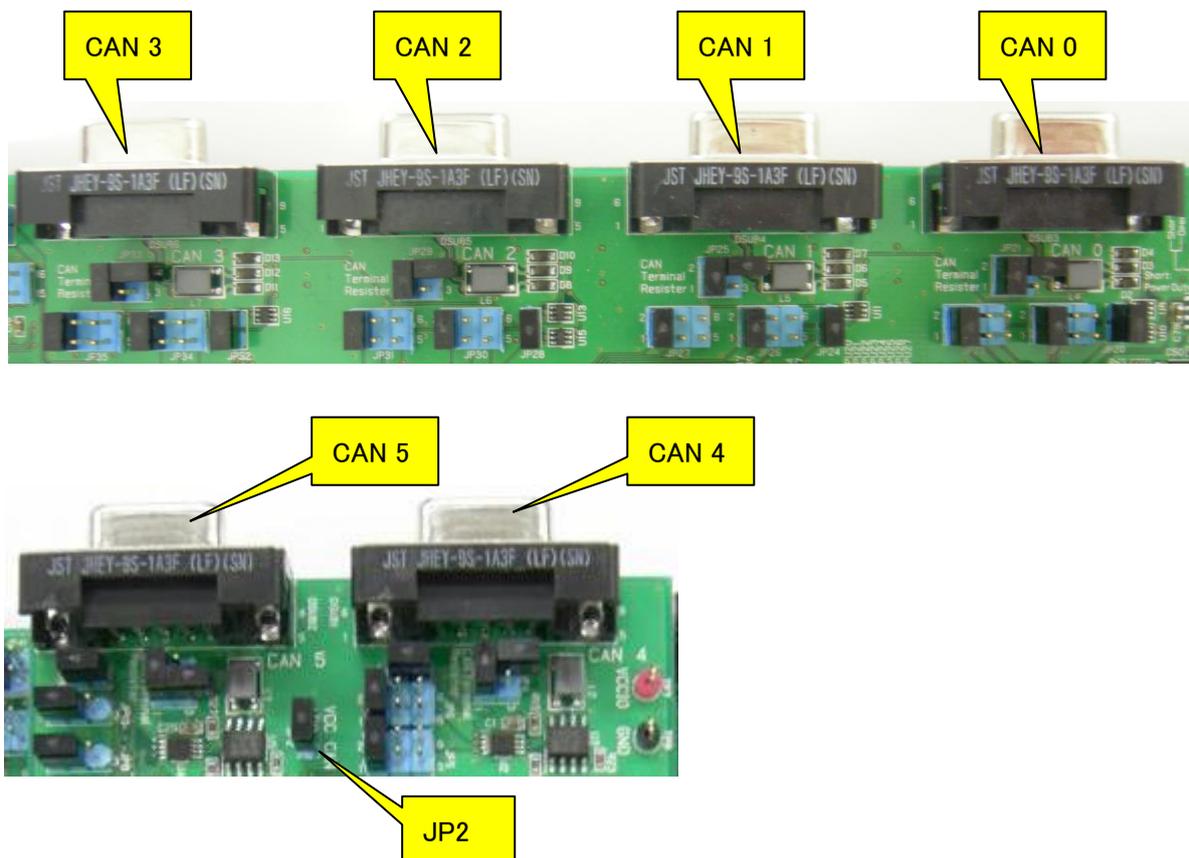
In this document, features and hardware specifications of FL-850/F1L-176-S, which the 32-bit single-chip microcomputer RH850/F1L-176(WS2.0) from Renesas Electronics Corporation is mounted, are described.

2 Features



2.1 CAN

The CAN controller of the microcomputer is connected to the CAN transceiver (TJA1040). It supports CAN physical layer. Also, CAN bus signal is connected to DSUB 9pin female connector.



One terminal can be selected by using jumpers from maximum of three multipurpose terminals, and can be connected to CAN transceiver.

Only one line must be shorted in each jumper.

CAN 4 and CAN 5 is in CPU board. JP2 is a power supply jumper of the CAN transceiver. Be short-circuited usually.

Following table shows the connection of RH850/F1L.

		Jumper		Connector	
P10_1/TAUD013/TAUD003/CAN0TX/PWGA10/TAPA0UN/CSIH1SC/MODE0	TxD	JP22	1-2	CAN0	
P0_0/TAUD012/TAUD002/RLIN20RX/CAN0TX/PWGA100/CSIH0SSI/RESETOUT			3-4		
			5-6		
P10_0/TAUD011/TAUD001/CAN0RX/INTP0/GSCXFOUT/PWGA00/TAPA0UP/CSIH1SI/MEMC0A19	RxD	JP23	1-2		
P0_1/TAUD014/TAUD004/CAN0RX/INTP0/RLIN20TX/INTP0/PWGA110/CSIH0SI/APO			3-4		
			5-6		
P2_0/RLIN27RX	JP20	MODE0	Short		
P0_3/TAUD018/TAUD008/RLIN30RX/INTP10/CAN1TX/PWGA130/CSIH0DCS/CSIH0SO/INTP10	TxD	JP26	1-2		CAN1
P10_7/TAUD015/TAUD0015/CSIG0SC/ENCA0TIN1/PWGA40/CAN1TX/MEMC0AD1			3-4		
			5-6		
P0_2/TAUD016/TAUD006/CAN1RX/INTP1/RLIN30TX/PWGA120/CSIH0SC/INTP1/DPO	RxD	JP27	1-2		
P10_6/TAUD013/TAUD0013/CSIG0DCS/CSIG0SO/ENCA0TIN0/ADCA0SEL2/CAN1RX/INTP1/MEMC0AD0			3-4		
			5-6		
P2_1/RLIN27TX	JP24	MODE1	Short		
P0_4/RLIN31RX/INTP11/CAN2TX/INTP11/PWGA100/CSIH1SI/SELDPO/DPIN8	TxD	JP30	1-2	CAN2	
P12_0/CAN2TX/PWGA560/TAUB1110/TAUB1010/MEMC0A16			3-4		
			5-6		
P0_5/CAN2RX/INTP2/RLIN31TX/DPIN9/SELDP1/CSIH1DCS/CSIH1SO	RxD	JP31	1-2		
P11_15/CAN2RX/INTP2/CSIH2CSS4/PWGA550/TAUB118/TAUB108/MEMC0ASTB			3-4		
			5-6		
P2_2/RLIN28RX	JP28	MODE2	Short		
P1_3/CAN3TX/DPIN23	TxD	JP34	1-2		CAN3
P11_4/CSIH2SI/CAN3TX/PWGA290/TAUB113/TAUB103/MEMC0AD12			3-4		
P0_8/RLIN21TX/DPIN6/CSIH1SSI/TAUB012/TAUB002/CAN3TX			5-6		
P1_2/CAN3RX/INTP3	RxD	JP35	1-2		
P11_3/CSIH2SC/CAN3RX/INTP3/PWGA280/TAUB111/TAUB101/MEMC0AD11			3-4		
P0_7/RLIN21RX/DPIN5/GSCXFOUT/CSIH1RY1/CSIH1RY0/TAUB010/TAUB000/CAN3RX/INTP3			5-6		
P2_3/RLIN28TX	JP32	MODE3	Short		
P1_13/CAN4TX	TxD	JP5	1-2	CAN4	
P20_3/CAN4TX/PWGA670			3-4		
P0_10/INTP3/CSIH1CSS1/DPIN11/RLIN22TX/TAUB016/TAUB006/CAN4TX			5-6		
P1_12/CAN4RX/INTP4	RxD	JP6	1-2		
P20_2/CAN4RX/INTP4/PWGA660			3-4		
P0_9/INTP12/CSIH1CSS0/DPIN7/RLIN22RX/TAUB014/TAUB004/CAN4RX/INTP4			5-6		
P2_4/RLIN29RX	JP3	MODE4	Short		
P0_14/RLIN32TX/PWGA470/TAUB014/TAUB0014/CSIG0SC/CAN5TX	TxD	JP9	1-2		CAN5
P11_6/RLIN33RX/INTP13/CAN5TX/ADCA1TRG1/PWGA310/CSIH3DCS/CSIH3SO/TAUB117/TAUB107/MEMC0AD14			2-3		
P0_13/RLIN32RX/INTP12/PWGA460/TAUB012/TAUB0012/CSIG0DCS/CSIG0SO/CAN5RX/INTP5			1-2		
P11_5/CAN5RX/INTP5/RLIN33TX/PWGA300/CSIH3SI/TAUB115/TAUB105/MEMC0AD13	RxD	JP10	1-2		
P2_5/RLIN29TX			2-3		
	JP11	MODE5	Short		
			Default		

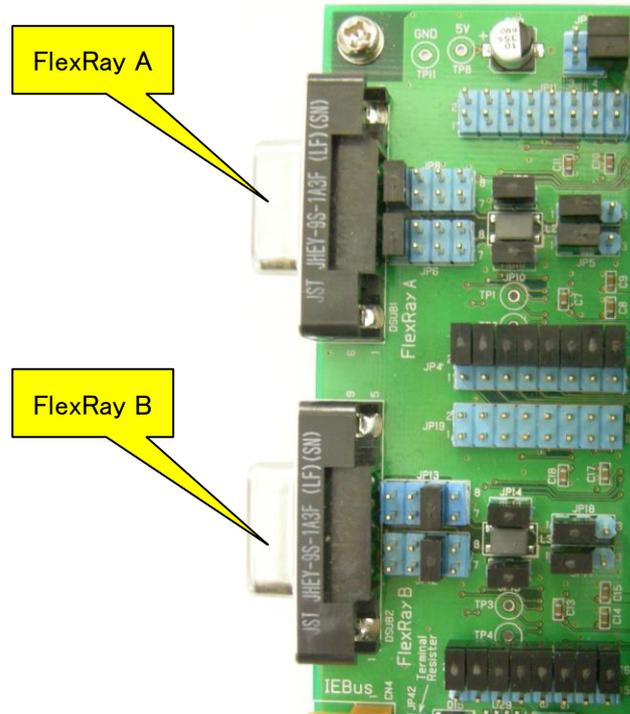
JP21, JP25, JP29, JP33, JP4 and JP12 are termination resistor connect. Open or short these as needed.

		termination resistor
JP21:CAN 0	1-2 Short	60 Ω
JP25:CAN 1	3-4 Short	
JP29:CAN 2	1-2 Short	120 Ω
JP33:CAN 3	3-4 Open	
JP4 : CAN 4	1-2 Open	Non
JP12: CAN 5	3-4 Open	

CAN 0,1,2,3,4,5 DSUB Connector	
Pin Number	Signal Name
1	N.C.
2	CANL
3	GND
4	N.C.
5	0.1uF
6	N.C.
7	CANH
8	N.C.
9	N.C.

2.2 FlexRay

RH850/F1L does not have FlexRay controller, therefore it cannot use FlexRay.



Default Settings

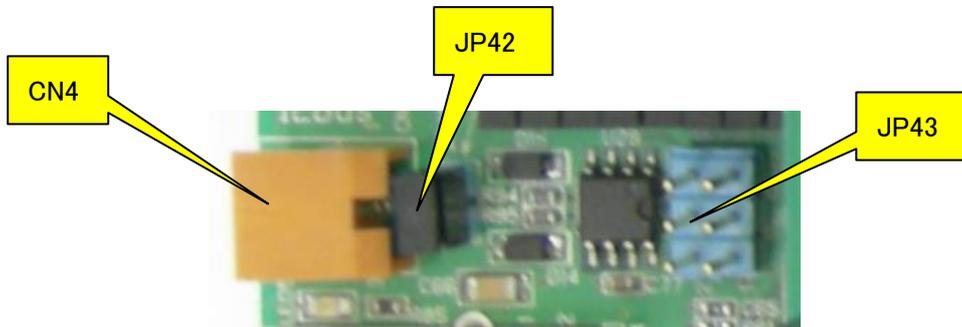
Jumper	Short	Jumper	Short
JP41	2	JP19	All Open
	4	JP13	5-6
JP11	All Open	JP12	5-6
JP8	1-2	JP14	1-2
JP6	1-2	JP15	1-2
JP9	1-2	JP18	1-2
JP10	1-2	JP17	1-2
JP7	1-2	JP16	2
JP5	1-2		4
JP4	2		6
	4		8
	6		10
	8		12
	10		14
	12		16
	14		
	16		

Notes

These parts are not mounted in the product in December 2017 and afterwards.

2.3 IEBus

RH850/F1L does not have IEBus controller, therefore it cannot use IEBus.



Default Settings JP43: Open
JP42: Short

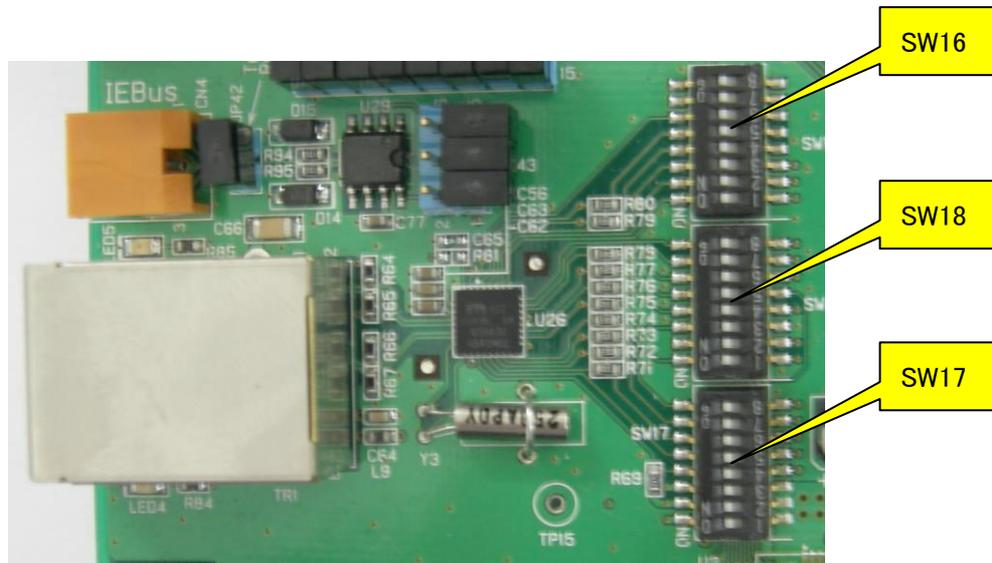
CN4 Pin Number	Function Name
1	(+) Bus Output, (+) Receiver Input
2	GND
3	(-) Bus Output, (-) Receiver Input

Notes

These parts are not mounted in the product in 2014 and afterwards.

2.4 Ethernet

RH850/F1L does not have MAC controller, therefore it cannot use Ethernet.



The function of Ethernet is not used, and make the following dip switches all turning off.

There is a possibility of breaking when turning it on.

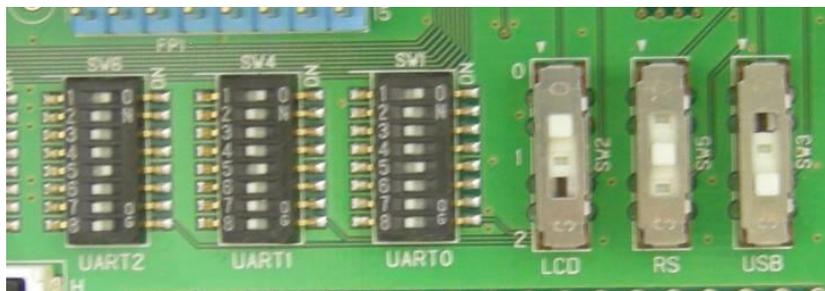
- SW16 (Default OFF)
- SW17 (Default OFF)
- SW18 (Default OFF)

Notes

These parts are not mounted in the product in August, 2014 and afterwards.

2.5 Serial select

It can be connected by selecting the microcomputer's UART terminal to "LCD", "RS-232C", and "USB Serial Conversion".



The terminals for using UART can be selected by DIP switch (SW1, SW4, and SW6).

※ Do not set multiple ON within a group.

		SW1		
P1_1/ RLIN33TX	TxD	1	ON	UART0
P11_5/CAN5RX/INTP5/ RLIN33TX /PWGA300/CSIH3SI/TAUB1I5/TAUB1O5/MEMC0AD13		2	OFF	
P10_10/TAUD0I14/TAUD0O14/ RLIN30TX /ENCA0BIN/PWGA70/CSIH0CSS1/MEMC0AD4		3	OFF	
P1_0/ RLIN33RX /INTP13	N.C.	4	OFF	
P11_6/ RLIN33RX /INTP13/CAN5TX/ADCA1TRG1/PWGA310/CSIH3DCS/CSIH3SO/TAUB1I7/TAUB1O7/MEMC0AD14	RxD	5	ON	
P10_9/TAUD0I12/TAUD0O12/ RLIN30RX /INTP10/ENCA0AIN/PWGA60/CSIH0RY1/CSIH0RYO/MEMC0AD3		6	OFF	
		7	OFF	
	N.C.	8	OFF	
		SW4		
P1_9/ RLIN34TX /DPIN20	TxD	1	ON	UART1
P12_2/ RLIN34TX /PWGA580/TAUB1I14/TAUB1O14/MEMC0A18		2	OFF	
P10_12/PWGA170/ RLIN31TX /CSIH1CSS1/TAUB0I3/TAUB0O3/MEMC0AD6		3	OFF	
P1_8/ RLIN34RX /INTP14	N.C.	4	OFF	
P12_1/ RLIN34RX /INTP14/CSIH2CSS5/PWGA570/TAUB1I12/TAUB1O12/MEMC0A17	RxD	5	ON	
P10_11/PWGA160/ RLIN31RX /INTP11/CSIH1CSS0/TAUB0I1/TAUB0O1/MEMC0AD5		6	OFF	
		7	OFF	
	N.C.	8	OFF	
		SW6		
P1_5/ADCA1TRG0/ RLIN35TX /DPIN17	TxD	1	ON	UART2
P11_8/CSIG1SSI/ RLIN35TX /PWGA480/TAUB1I11/TAUB1O11/MEMC0CS0		2	OFF	
P10_14/ADCA1TRG0/PWGA190/ RLIN32TX /CSIH3SSI/TAUB0I7/TAUB0O7/MEMC0AD8		3	OFF	
P1_4/ RLIN35RX /INTP15	N.C.	4	OFF	
P11_9/CSIG1DCS/CSIG1SO/ RLIN35RX /INTP15/PWGA490/TAUB1I13/TAUB1O13/MEMC0CS1	RxD	5	ON	
P10_13/CSIH0SSI/PWGA180/ RLIN32RX /INTP12/TAUB0I5/TAUB0O5/MEMC0AD7		6	OFF	
		7	OFF	
	N.C.	8	OFF	

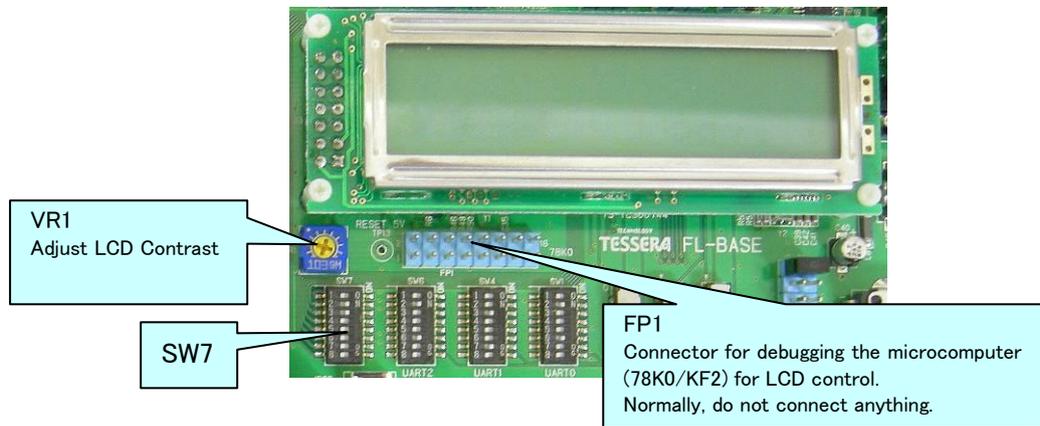
The destination for UART can be selected by the slide switch (SW2, SW3, and SW5).

	Slide Switch	
SW2 LCD	0	UART0
	1	UART1
	2	UART2
SW5 RS-232C	0	UART0
	1	UART1
	2	UART2
SW3 USB Serial Conversion	0	UART0
	1	UART1
	2	UART2

2.5.1 LCD

Words can be displayed on LCD panel by sending data to UART that is connected to LCD. "Binary mode" to display hexadecimal and "ASCII mode" to display ASCII characters can be selected by the DIP switch (SW7).

Initial screen displays when you press the reset switch on CPU board.



UART Communication Specifications

- Baud Rate 115.2Kbps (Fixed)
- Data Length 8bit (LSB First)
- Parity None
- Stop Bit 1bit
- Flow Control None (continuous transmission enabled)

Binary Mode 1 (SW7_1:ON, SW7_2:ON, SW7_3:Any)

It displays the hexadecimal data as sent with entering space between 1Byte data.

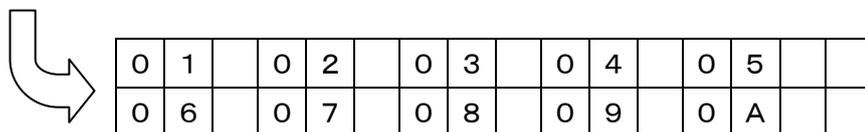
It can display 10Byte in 1 screen. It scrolls 1 line when it received 11Byte of data.

(example) `URTH?TX = 0x01; TXWait();`

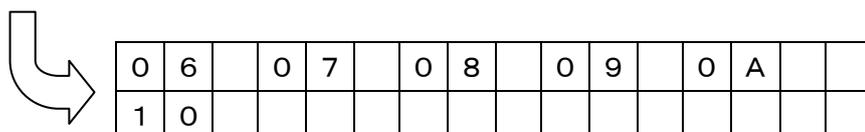
`URTH?TX = 0x02; TXWait();`

.....

`URTH?TX = 0x0A; TXWait();`



`URTH?TX = 0x10; TXWait();`



(use case) By developing a program to send 10Byte once in 1 second, it will display the first 1Byte at the top-left of the screen.

Binary Mode 2 (SW7_1:ON, SW7_2:OFF, SW7_3:ON)

It displays the hexadecimal data as sent without entering space between 1Byte data.

It can display 16Byte in 1 screen. It scrolls 1 line when it received 17Byte of data.

(example) U_RTH?TX = 0x01; TXWait();

U_RTH?TX = 0x02; TXWait();

.....

U_RTH?TX = 0x10; TXWait();



0	1	0	2	0	3	0	4	0	5	0	6	0	7	0	8
0	9	0	A	0	B	0	C	0	D	0	E	0	F	1	0

U_RTH?TX = 0x11; TXWait();



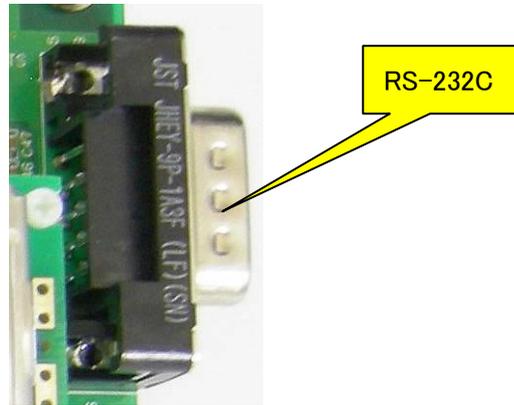
0	9	0	A	0	B	0	C	0	D	0	E	0	F	1	0
1	1														

(use case) By developing a program to send 16Byte once in 1 second, it will display the first 1Byte at the top-left of the screen.

2. 5. 2 RS-232C

UART that is connected to "RS-232C" can send and receive signals with the RS-232C level of D-SUB9 pin connector.

Use a cross cable when you connect to PC.

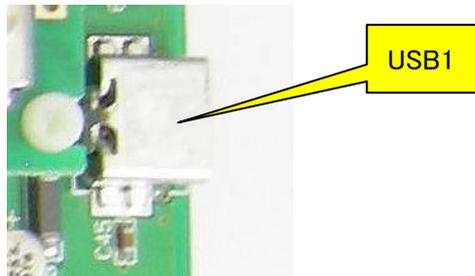


RS-232C D-SUB Connector	
Pin Number	Signal
1	N.C.
2	RxD
3	TxD
4	N.C.
5	GND
6	N.C.
7	RTS(N.C.)
8	CTS(N.C.)
9	N.C.

2.5.3 USB Serial Conversion

UART that is connected to “USB serial conversion” can communicate with the COM port of PC through USB microcomputer (uPD78F0730).

USB driver is stored in the same media as this manual. When you encountered a warning “Windows Logo Test” while installing the USB driver, please select “Continue”.



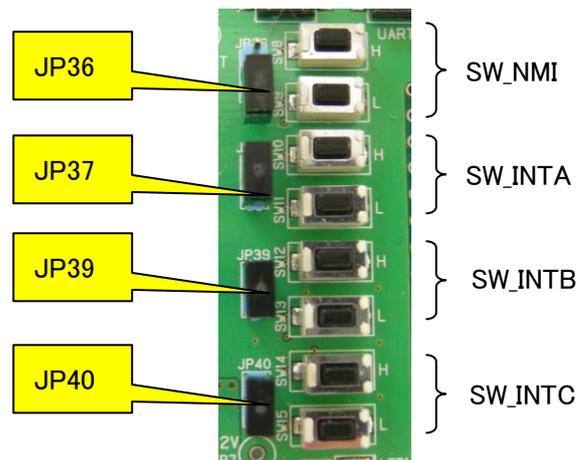
Recommended UART communication specification

- Baud rate 115.2Kbps
- Data length 8bit (LSB First)
- Parity None
- Stop Bit 1bit
- Flow Control None

2.6 Push Switch

4 interrupt signals can be connected to microcomputer's interrupt terminals. The signal can be set to High by pressing H button, and to Low by pressing L button. It becomes High by reset signal of the CPU.

Also, it has chattering prevention circuit.

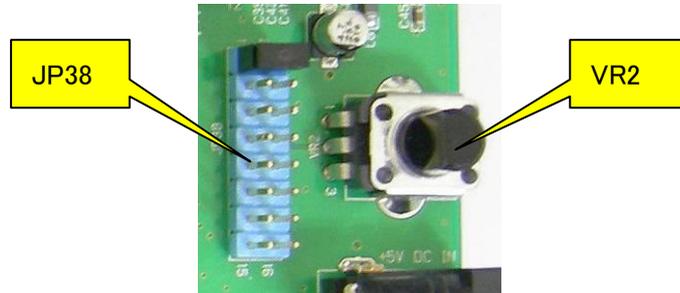


The interrupt signals are disconnected by taking each jumper pin out.

	Jumper	Switch	Signal
P9_0/NMI/PWGA80/TAUD010/TAUD000/ADCA0TRG0/CSIH2CSS0/KR014/ADCA0I2S	JP36: Open	SW8/9	SW_NMI
P0_6/INTP2/DPIN10/SELDP2/CSIH1SC	JP37: Short	SW10/11	SW_INTA
P11_7/INTP5/PWGA320/CSIH3SC/TAUB119/TAUB109/MEMC0AD15	JP39: Short	SW12/13	SW_INTB
P8_0/TAUJ010/TAUJ000/PWGA140/INTP4/CSIH0CSS0/ADCA0I0S	JP40: Short	SW14/15	SW_INTC

2.7 Volume

It can output variable voltage (0V-I/O voltage) to A/D terminal of CPU by variable resistor of 10KΩ.

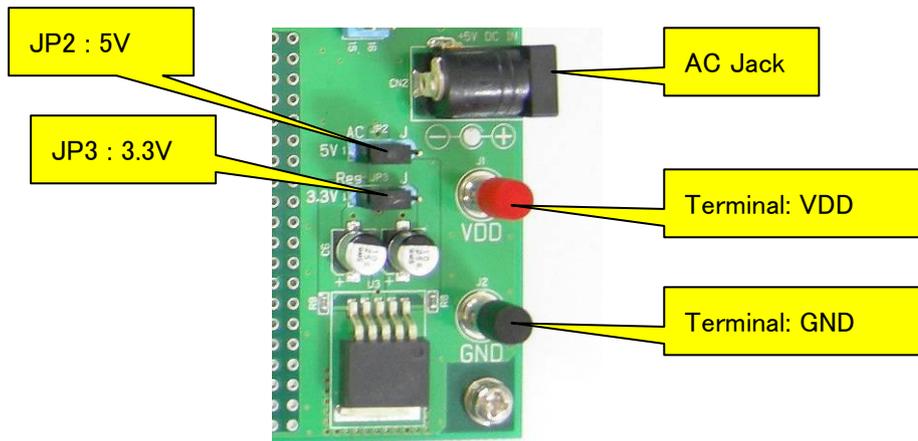


	JP38
AP0_0/ADCA0I0	1-2
AP0_1/ADCA0I1	3-4
AP0_2/ADCA0I2	5-6
AP0_3/ADCA0I3	7-8
AP0_4/ADCA0I4	9-10
AP0_5/ADCA0I5	11-12
AP0_6/ADCA0I6	13-14
AP0_7/ADCA0I7	15-16

2.8 Power

Connect bundled AC adapter (+5V) to AC Jack. You do not need to connect to the AC Jack on the CPU board.

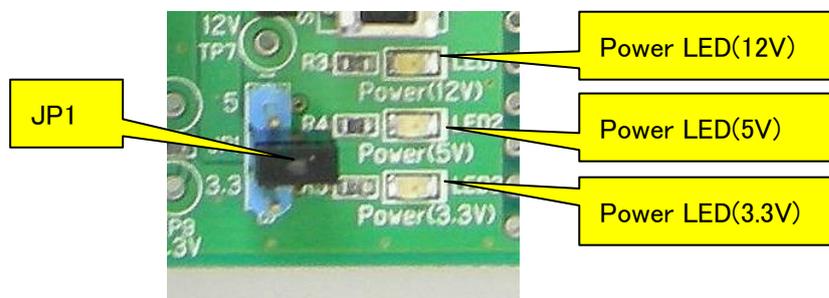
It generates the power of +12V for FlexRay driver and +3.3V for Ethernet PHY chip power from this power supply with using regulator.



Power supply source can be changed by JP2 and JP3.

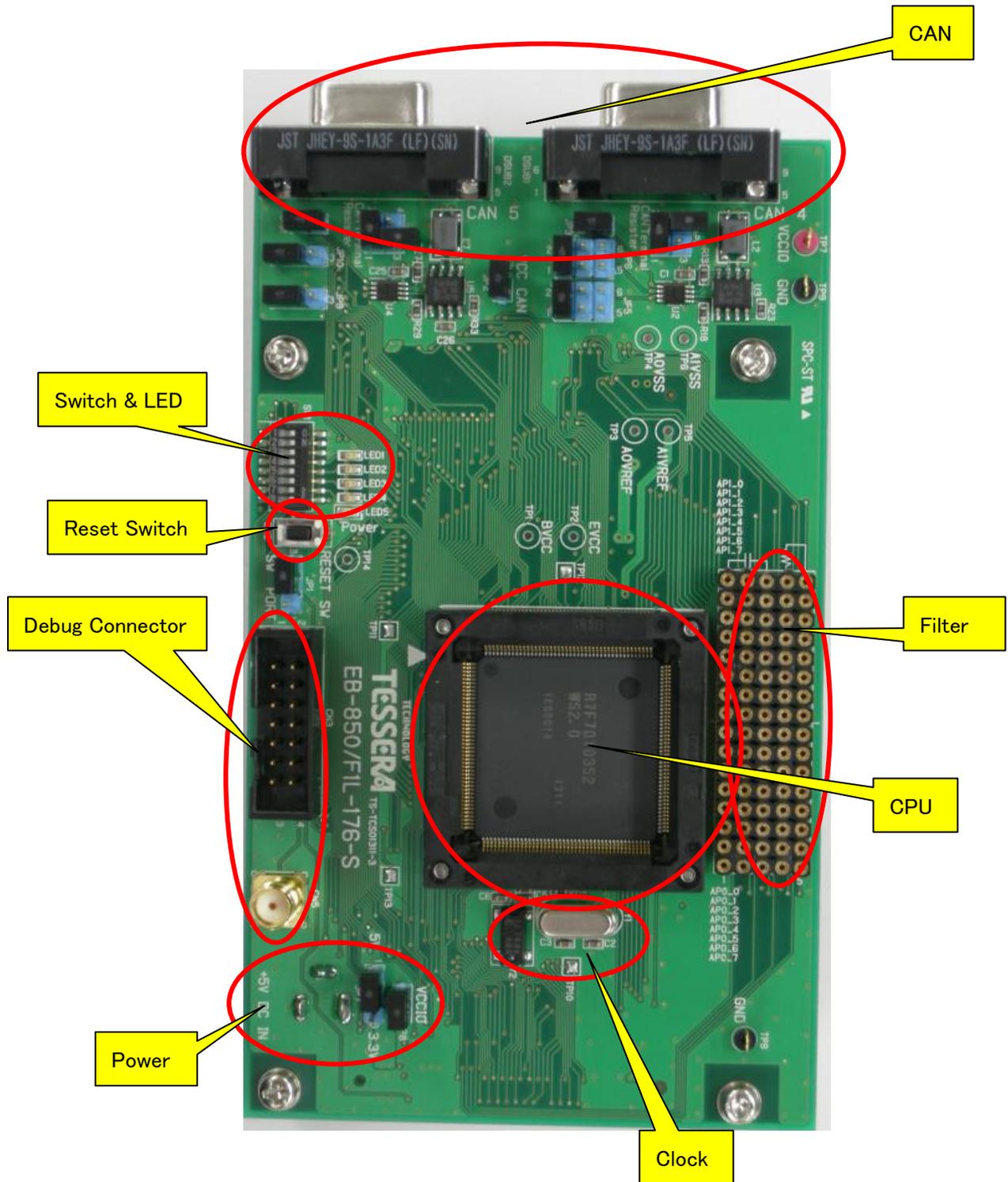
JP2	1-2	AC adapter
	2-3	Terminal
JP3	1-2	Regulator
	2-3	Terminal

JP1 is the jumper to fix the IO voltage when it does not connect CPU board. Normally, do not short this.



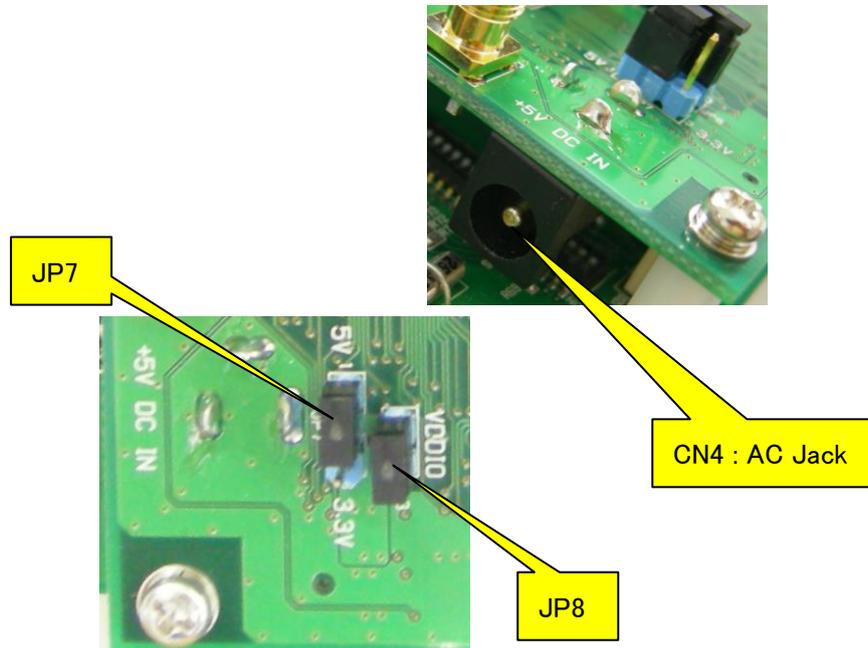
2.9 CPU Board

"EB-850/F1L-176-S" is mounted on the CPU board



2.9.1 Power

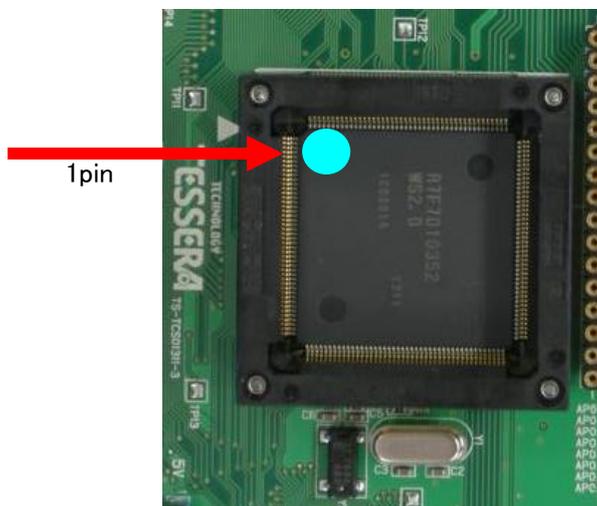
There is a jumper pin for measuring the current when you use only CPU board itself.



No.	Select	Note
JP8	Short	Connect ammeter to check the current
JP7	1-2	Operation voltage is 5V.
	2-3	Operation voltage is 3.3V. (Only when FL-BASE board is connected)

2.9.2 CPU

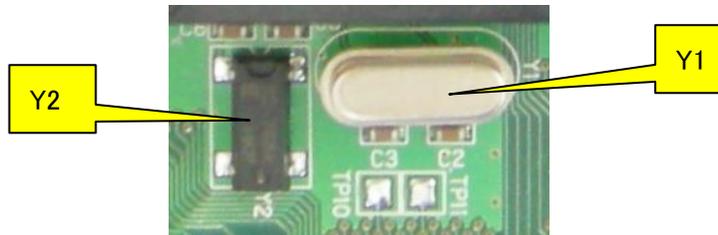
For "EB-850/F1L-176-S", only socket is mounted. Make sure the position of 1pin when you mount CPU.



2.9.3 Clock

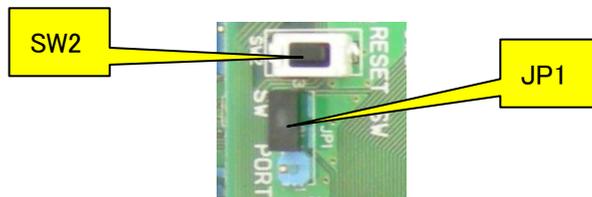
For the X1 and X2 of the CPU, 8MHz crystal oscillator (Y1) is mounted on the socket.

For the XT1 and XT2 of the CPU, 32.768KHz crystal oscillator (Y2) is connected.



2.9.4 Reset

CPU can be reset by pressing the Reset switch (SW2).



The method of outputting reset on the FL-BASE board can be set with the jumper.

No.	Select	Note
JP1	1-2	CPU Port(P0_0)
	2-3	Reset Switch(SW2)

2.9.6 Debug Connector

“PG-FP5” of “E1 emulator” corresponding to Low Pin Debug Interface (4-pin) or a flash programmer is connectable with CN3.

CN5 can connect the emulator corresponding to Low Pin Debug Interface (1-pin).

(Unevaluated)



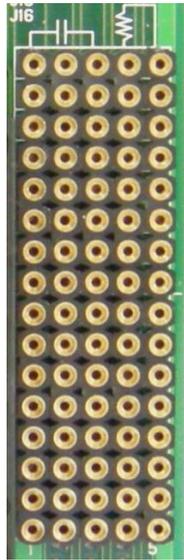
CN3

Pin Number	Signal	
	Debugger	Writer
1	DCUTCK	JP0_2
2	GND	←
3	DCUTRST	
4	FLMD0	←
5	DCUTDO	JP0_1
6	N.C.	
7	DCUTDI	JP0_0
8	VDD	←
9	DCUTMS	
10	N.C.	
11	DCUTRDY	
12	GND	←
13	RESET	←
14	GND	←

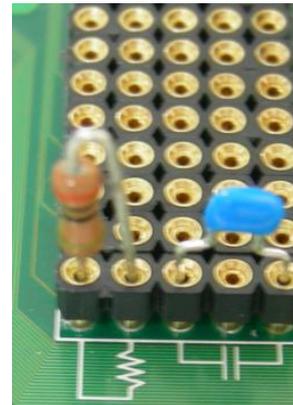
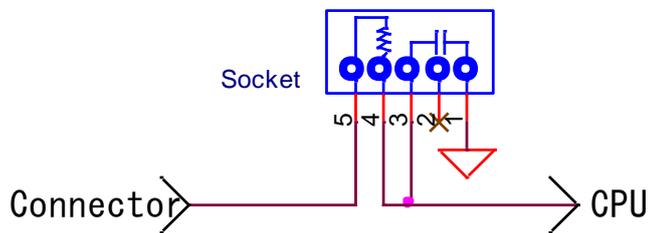
* FLMD1 is pulldown on the board.

2.9.7 Filter socket

Filters can be implemented to A/D input terminals.



Connects (CN1, CN2) are connected through the sockets as illustrated below. Therefore, please make sure you connect resistor between the socket 4pin and 5pin when you use A/D terminal.



	Socket
AP0_0/ADCA0I0	AP0_0
AP0_1/ADCA0I1	AP0_1
AP0_2/ADCA0I2	AP0_2
AP0_3/ADCA0I3	AP0_3
AP0_4/ADCA0I4	AP0_4
AP0_5/ADCA0I5	AP0_5
AP0_6/ADCA0I6	AP0_6
AP0_7/ADCA0I7	AP0_7

	Socket
AP1_0/ADCA1I0	AP1_0
AP1_1/ADCA1I1	AP1_1
AP1_2/ADCA1I2	AP1_2
AP1_3/ADCA1I3	AP1_3
AP1_4/ADCA1I4	AP1_4
AP1_5/ADCA1I5	AP1_5
AP1_6/ADCA1I6	AP1_6
AP1_7/ADCA1I7	AP1_7

2.9.8 CAN

Please refer to 2.1 [CAN](#).

3 CPU Terminal Connection List

Please download the Excel file from the web described in the document attached to the product.