

CMOS 32-BIT SINGLE CHIP MICROCONTROLLER
S5U1C31D50T1 Manual
(S1C31D50 Evaluation Board)

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1. Overview

S5U1C31D50T1(S1C31D50 Evaluation Board) is an evaluation board for the Seiko Epson single-chip microcontroller S1C31D50. The board comes with a speaker connection cable.

Figure 1.1 shows the external view of S5U1C31D50T1.

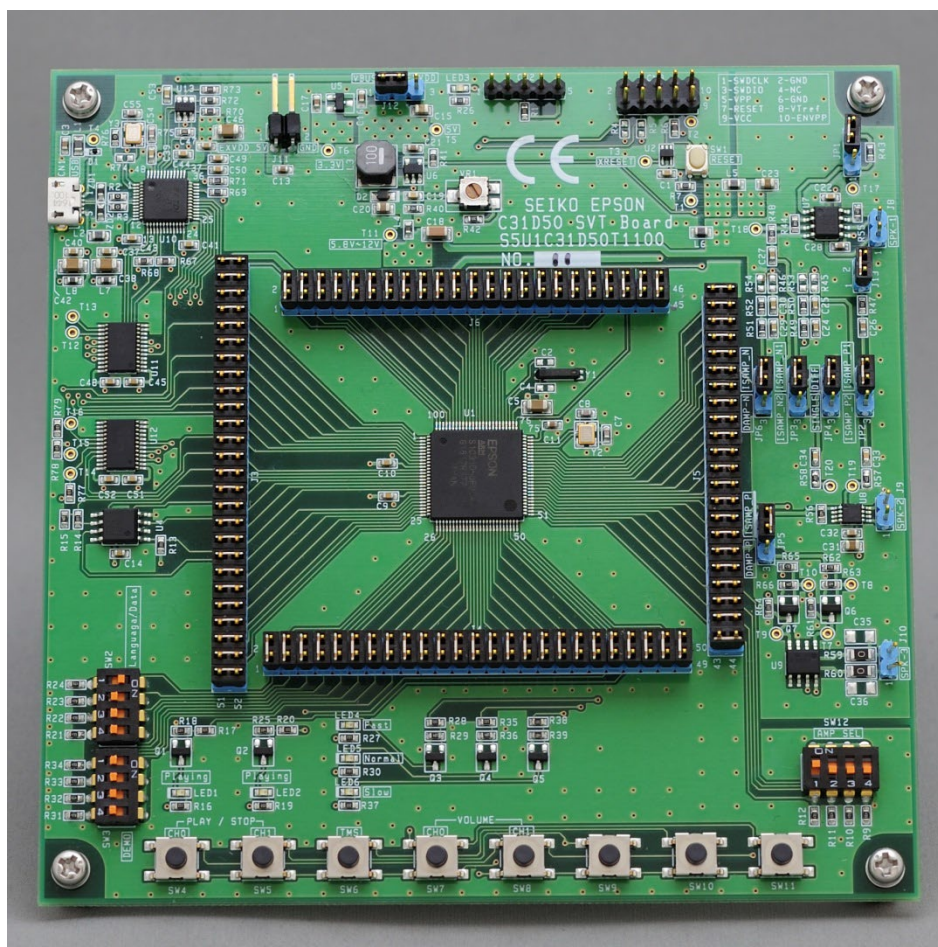


Figure 1.1 S5U1C31D50T1 External View

2. Name and Function of Each Part

2. Name and Function of Each Part

The S5U1C31D50T1 board has the various parts. Table 2.1 lists the main parts on the board. Also Figure 2.1 shows the layout of the parts on the board.

Table 2.1 List of Main Parts

Name	Part Number	Description	Remarks
S1C31D50	U1	Microcontroller(Cortex-M0+)	
Class-AB audio amplifier	U7	For sound output	
Class-D audio amplifier	U8	For sound output	
USB to Serial Converter	U10	Interface with PC (for demo software)	
64Mbit/8Mbyte QSPI flash memory	U4	For storing a sound ROM data	
Power Supply Regulator	U5	For power supply	
Micro-USB connector	CN1	For power supply from USB-VBUS and For connecting PC	
External power connector	J11	For connecting with an external power such as stabilized power supply.	
Sound output connector for class-AB amplifier	J8	For connecting with speaker when selecting class-AB amplifier	
Sound output connector for class-D amplifier	J9	For connecting with speaker when selecting class-D amplifier	
Reset Switch	SW1	For hardware reset	
DIP Switches	SW2/SW3/SW12	For demo software control	
Push Switches	SW4/SW5/SW6/SW7/ SW8/SW9/SW10/SW11	For demo software control	

2. Name and Function of Each Part

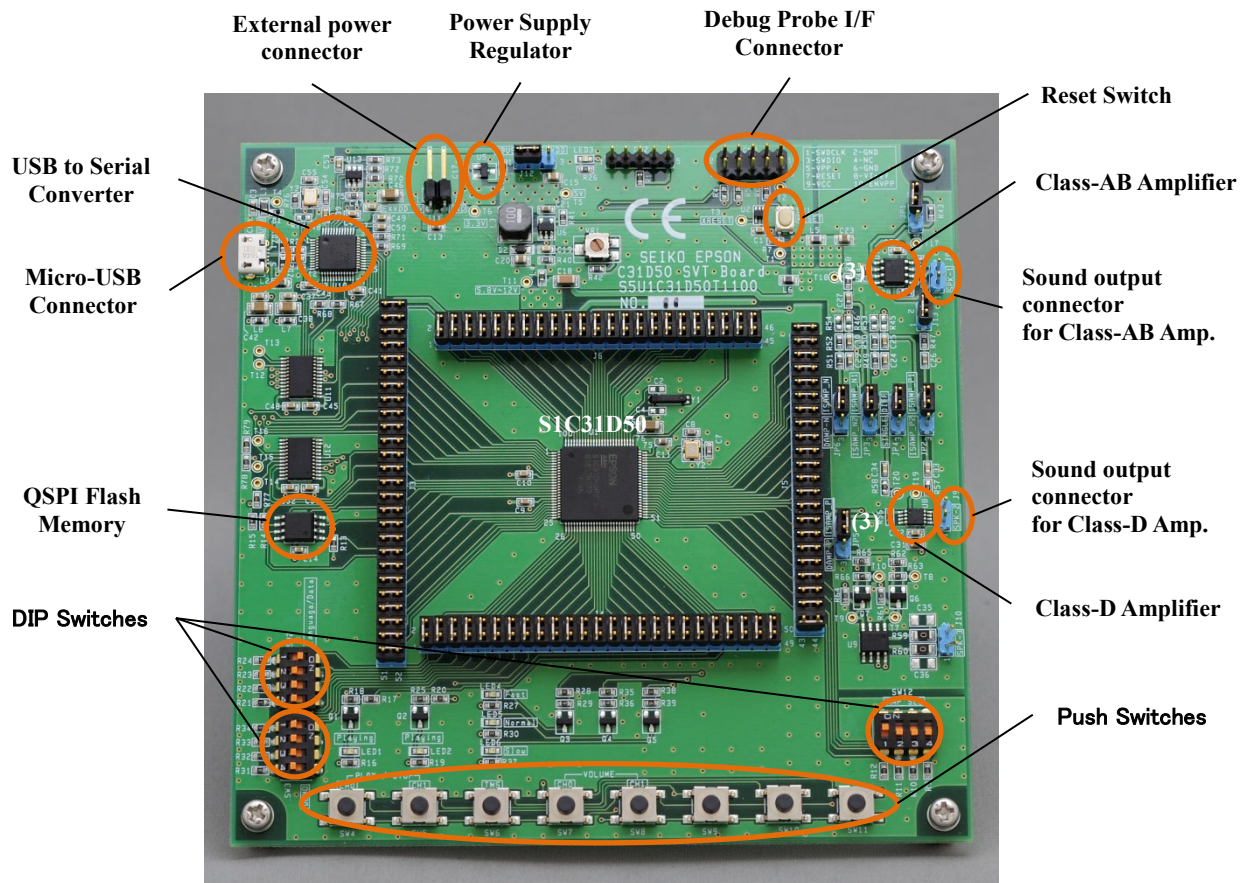


Figure 2.1 Layout of Main Parts

3. Settings

3. Settings

3.1 Jumpers

Although the S5U1C31D50T1 board is shipped with the jumpers set to an operable state, please check to see if they have been set correctly as shown below.

Table 3.1.1 JP5 Jumper Setting

Connector: JP5		
Pin No.	Open/Short	Remarks
1-2	Short	

Table 3.1.2 JP6 Jumper Setting

Connector: JP6		
Pin No.	Open/Short	Remarks
1-2	Short	

Table 3.1.3 J3 Jumper Settings

Connector: J3					
Pin No.	Open/Short	Remarks	Pin No.	Open/Short	Remarks
1-2	Short		27-28	Short	
3-4	Short		29-30	Short	
5-6	Short		31-32	Short	
7-8	Short		33-34	Short	
9-10	Short		35-36	Short	
11-12	Short		37-38	Short	
13-14	Short		39-40	Short	
15-16	Short		41-42	Short	
17-18	Short		43-44	Short	
19-20	Short		45-46	Short	
21-22	Short		47-48	Short	
23-24	Short		49-50	Short	
25-26	Short		51-52	Short	

Table 3.1.4 J4 Jumper Settings

Connector: J4					
Pin No.	Open/Short	Remarks	Pin No.	Open/Short	Remarks
1-2	Short		27-28	Short	
3-4	Short		29-30	Short	
5-6	Short		31-32	Short	
7-8	Short		33-34	Short	
9-10	Short		35-36	Short	
11-12	Short		37-38	Short	
13-14	Short		39-40	Short	
15-16	Short		41-42	Short	
17-18	Short		43-44	Short	
19-20	Short		45-46	Short	
21-22	Short		47-48	Short	
23-24	Short		49-50	Short	
25-26	Short		-	-	

Table 3.1.5 J5 Jumper Settings

Connector: J5					
Pin No.	Open/Short	Remarks	Pin No.	Open/Short	Remarks
1-2	Short		23-24	Short	
3-4	Short		25-26	Short	
5-6	Short		27-28	Short	
7-8	Short		29-30	Short	
9-10	Short		31-32	Short	
11-12	Short		33-34	Short	
13-14	Short		35-36	Short	
15-16	Short		37-38	Short	
17-18	Short		39-40	Short	
19-20	Short		41-42	Short	
21-22	Short		43-44	Short	

3. Settings

Table 3.1.6 J6 Jumper Settings

Connector: J6					
Pin No.	Open/Short	Remarks	Pin No.	Open/Short	Remarks
1–2	Short		25–26	Short	
3–4	Short		27–28	Short	
5–6	Short		29–30	Short	
7–8	Short		31–32	Short	
9–10	Short		33–34	Short	
11–12	Short		35–36	Short	
13–14	Short		37–38	Short	
15–16	Short		39–40	Short	
17–18	Short		41–42	Short	
19–20	Short		43–44	Short	
21–22	Short		45–46	Short	
23–24	Short		-	-	

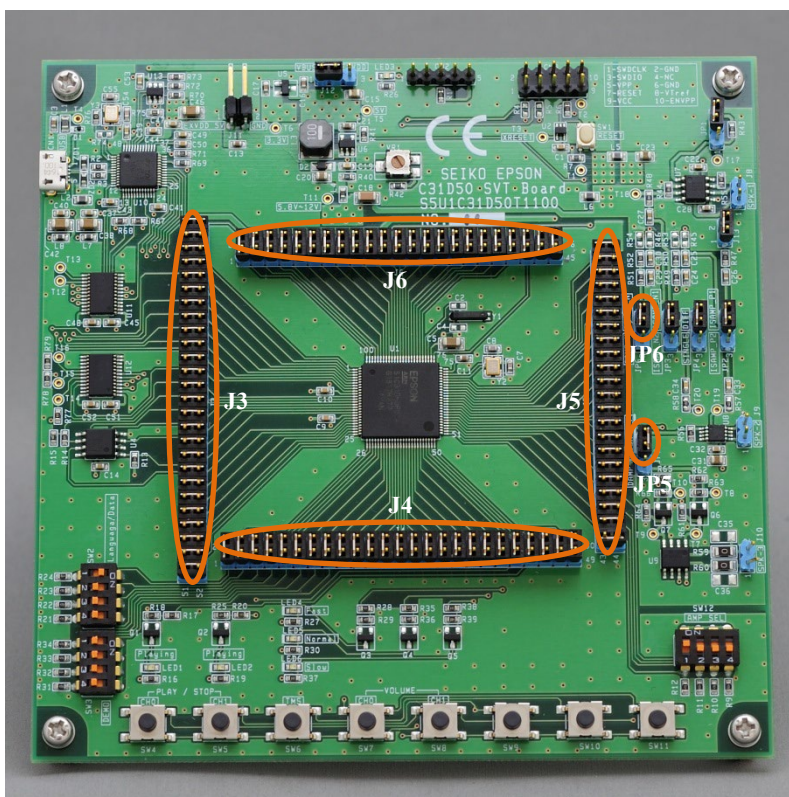


Figure 3.1.1 Layout of Jumpers

3.2 Power Supply

The power supply can be selected from among three sources shown below by setting the J12 jumper, T2 and T5 pins. Make sure of the jumper and the pins settings before using the S5U1C31D50T1 board.

- External: Power is supplied to J11 from an external power such as the stabilized power supply.
- VBUS: Power is supplied to CN1 from USB-VBUS.
- Debug: Power is supplied to CN3 from the debug probe (hardware debugging tool).

Table 3.2.1 Power Supply Switching

Connector:J12, Pins:T2/T5			
Power Source Selection	J12 Setting	T2/T5 Setting	Remarks
External(J11)	Short between pins 2 and 3	Open	DC +5 V
VBUS(CN1)	Short between pins 1 and 2	Open	DC +5 V
Debug(CN3)	Open all pins	Connect pin T2 to pin T5 via a cable	DC +5 V

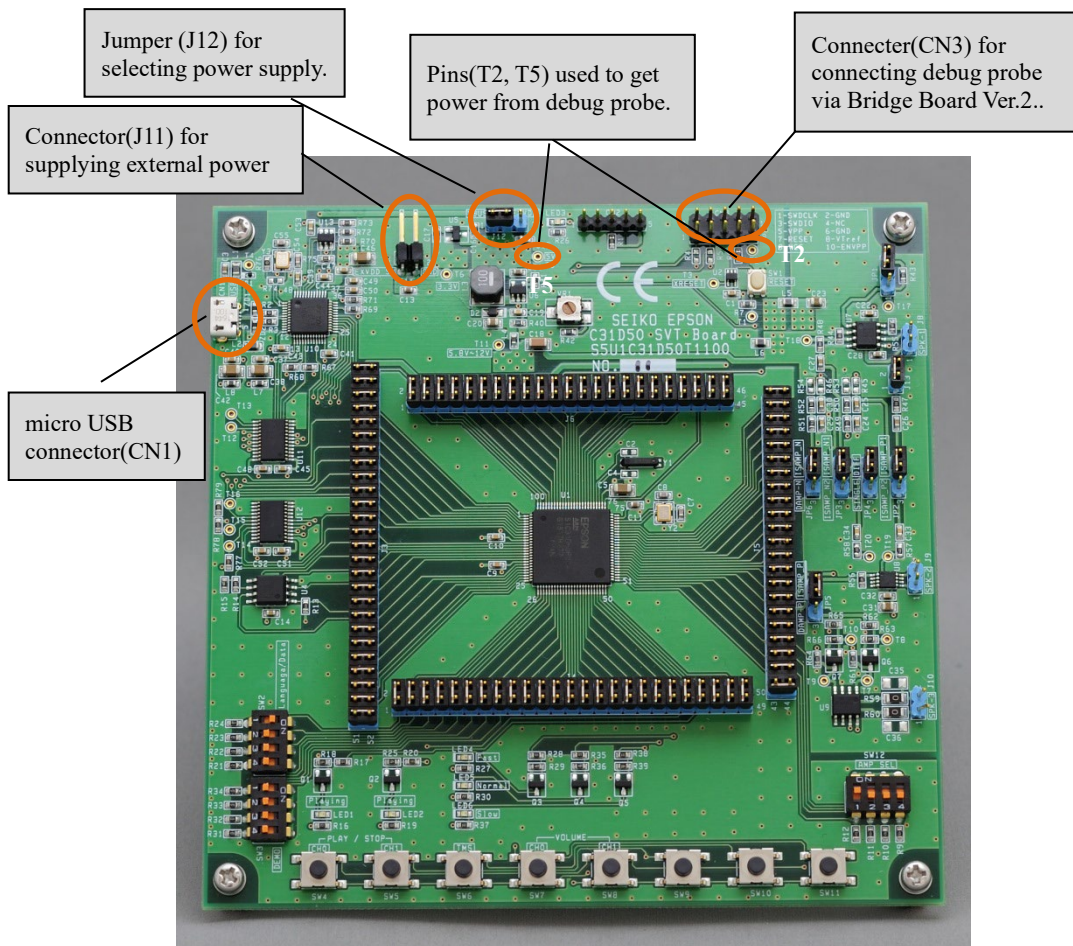


Figure 3.2.1 Layout of Jumpers for Power Supply Selecting

3. Settings

3.3 Audio Amplifier

The S5U1C31D50T1 board has two types of audio amplifiers shown below.

- Class-AB audio amplifier
- Class-D audio amplifier

The audio amplifier can be selected by setting the JP1, JP2, JP3, J13, JP4 and J5 jumpers. Also, for each amplifier, the signal to input to the amplifier can be selected from either single-ended input or differential input.

Note: Amplifier settings should not be done during power supply. Parts mounted on the board such as amplifier may be damaged. Please switch the amplifier with the power off.

Table 3.3.1 Amplifier Settings (Differential Input)

Connectors: JP1/JP2/JP3/J13/JP4/ J5						
Amplifier Type	JP1	JP2	JP3	J13	JP4	J5
Class-AB	Short 2 to 3	Short 1 to 2	Short 1 to 2	Short 1 to 2	Don't care	Short 9 to 10 Short 11 to 12
Class-D	Don't care	Short 2 to 3	Short 2 to 3	Don't care	Short 1 to 2	Short 9 to 10 Short 11 to 12

Table 3.3.2 Amplifier Settings (Single-ended Input)

Connectors: JP1/JP2/JP3/J13/JP4/ J5						
Amplifier Type	JP1	JP2	JP3	J13	JP4	J5
Class-AB	Short 1 to 2	Short 1 to 2	Short 1 to 2	Open	Don't care	Short 10 to 11 Open 9 and 12
Class-D	Don't care	Short 2 to 3	Short 2 to 3	Don't care	Short 2 to 3	Short 10 to 11 Open 9 and 12

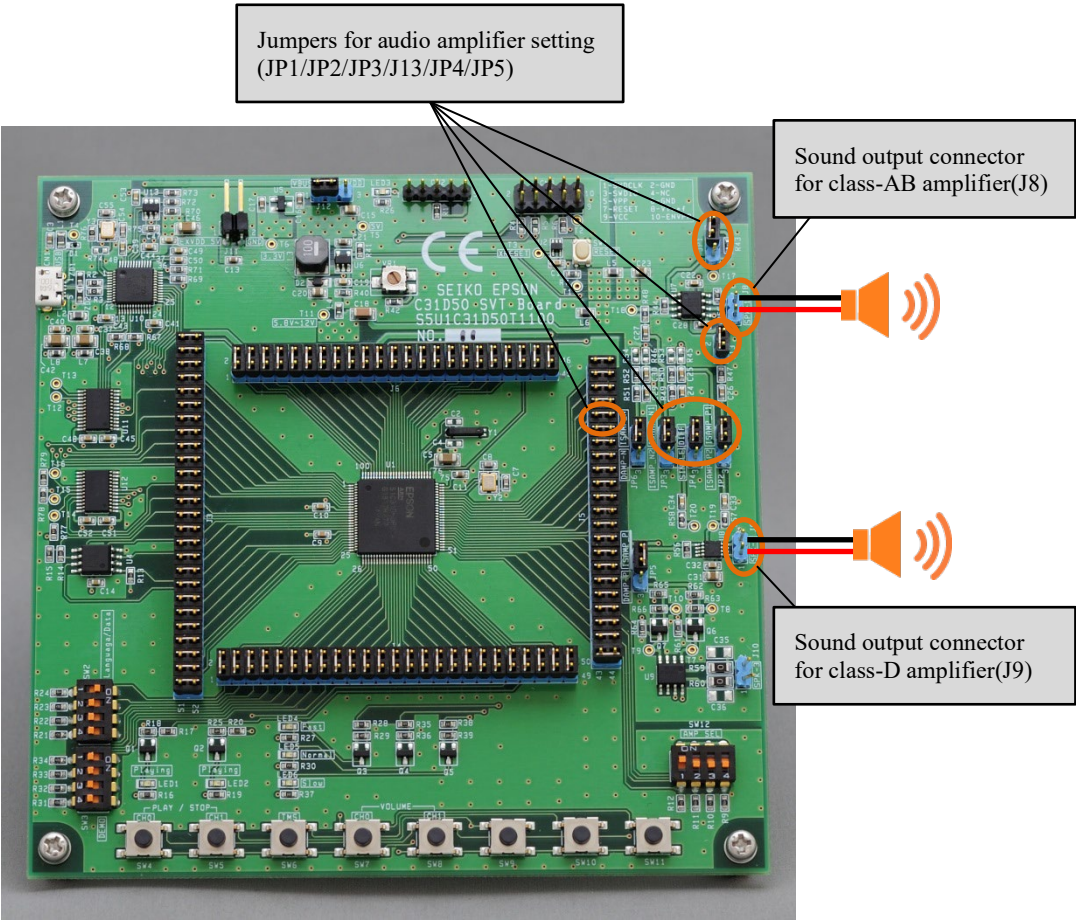


Figure 3.3.1 Layout of Jumpers and Connectors for Audio Amplifier Selecting

4. Usage

4. Usage

4.1 Running Demo Software

The S5U1C31D50T1 board is shipped with the demo software programmed into S1C31D50 mounted on this board. In the demo software, you can operate the push switches(SW4, SW5, ..., SW10) on the board to run the sound playback with 2 channel mixing and speed conversion.

The procedure for running the demo software is as follows.

- 1) Check that the Jumpers are default setting. (Refer to Section 3.1)
- 2) Connect J8 to the speaker via the speaker cable included with the S5U1C31D50T1.
- 3) Set the power supply to "VBUS". (Refer to Section 3.2)
- 4) Select the class-AB amplifier with differential input. (Refer to Section 3.3)
- 5) Set the DIP-switches. (Refer to Figure 4.1.1)
- 6) Connect CN1(USB) to PC or mobile battery via the micro USB cable to supply the 5V power.
- 7) Press SW1(RESET) to reset the S5U1C31D50T1.
- 8) Press SW4(PLAY/STOP-CH0) and/or SW5(PLAY/STOP-CH1) to start the sound play.

For details of the demo mode, refer to "4. Demo Software" in "S1C31D50 Peripheral Circuit Sample Software Manual"

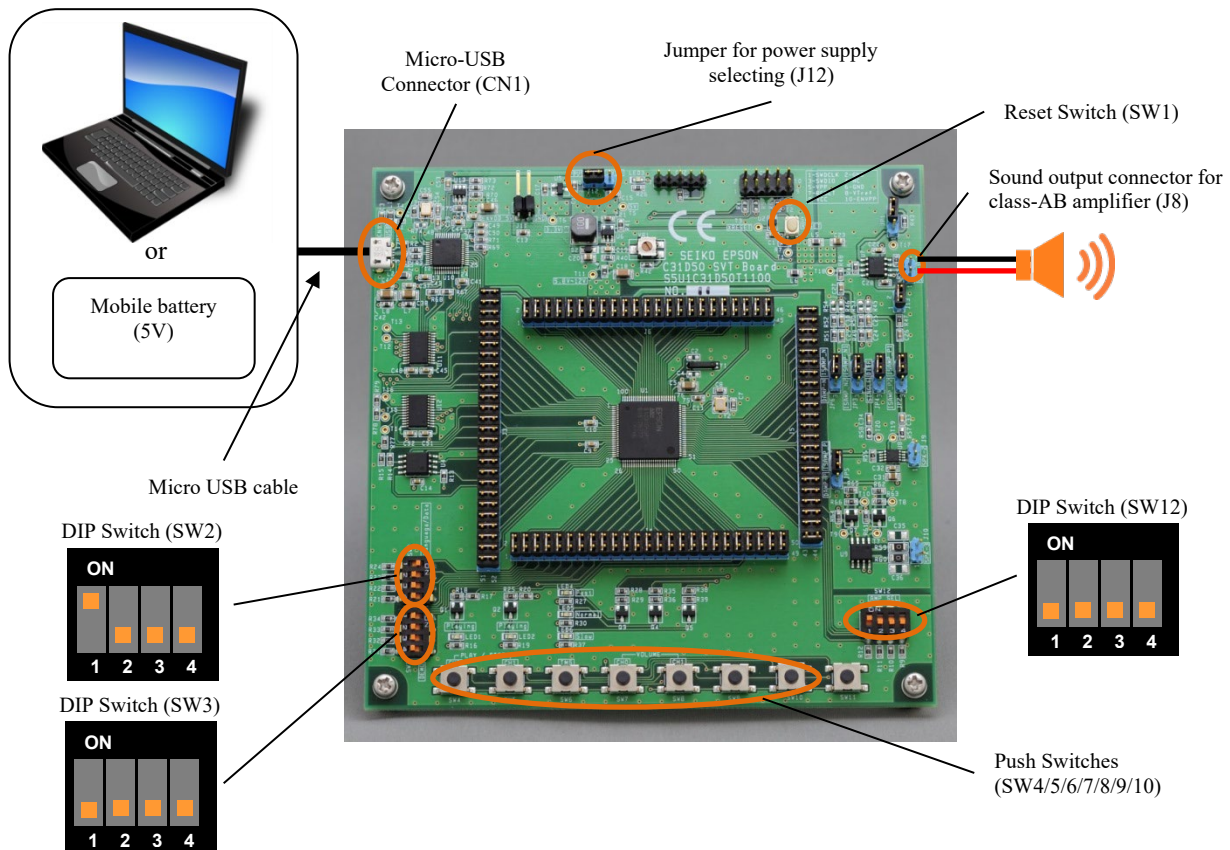


Figure 4.1.1 Layout of Main Parts for Demo Mode

4.2 Debugging Software

Connect the S5U1C31D50T1 board with PC via a debug probe either IAR Systems I-jet or SEGGER J-Link (See Figure 4.2.1 or 4.2.2). The included conversion connector is required for connection.

The terminal layout table of included conversion connector is shown in Table 4.2.1 and 4.2.2 and the terminal layout table of debug i/f on the board is shown in Table 4.2.3. Refer to Appendix.A for the circuit diagram of included conversion connector.

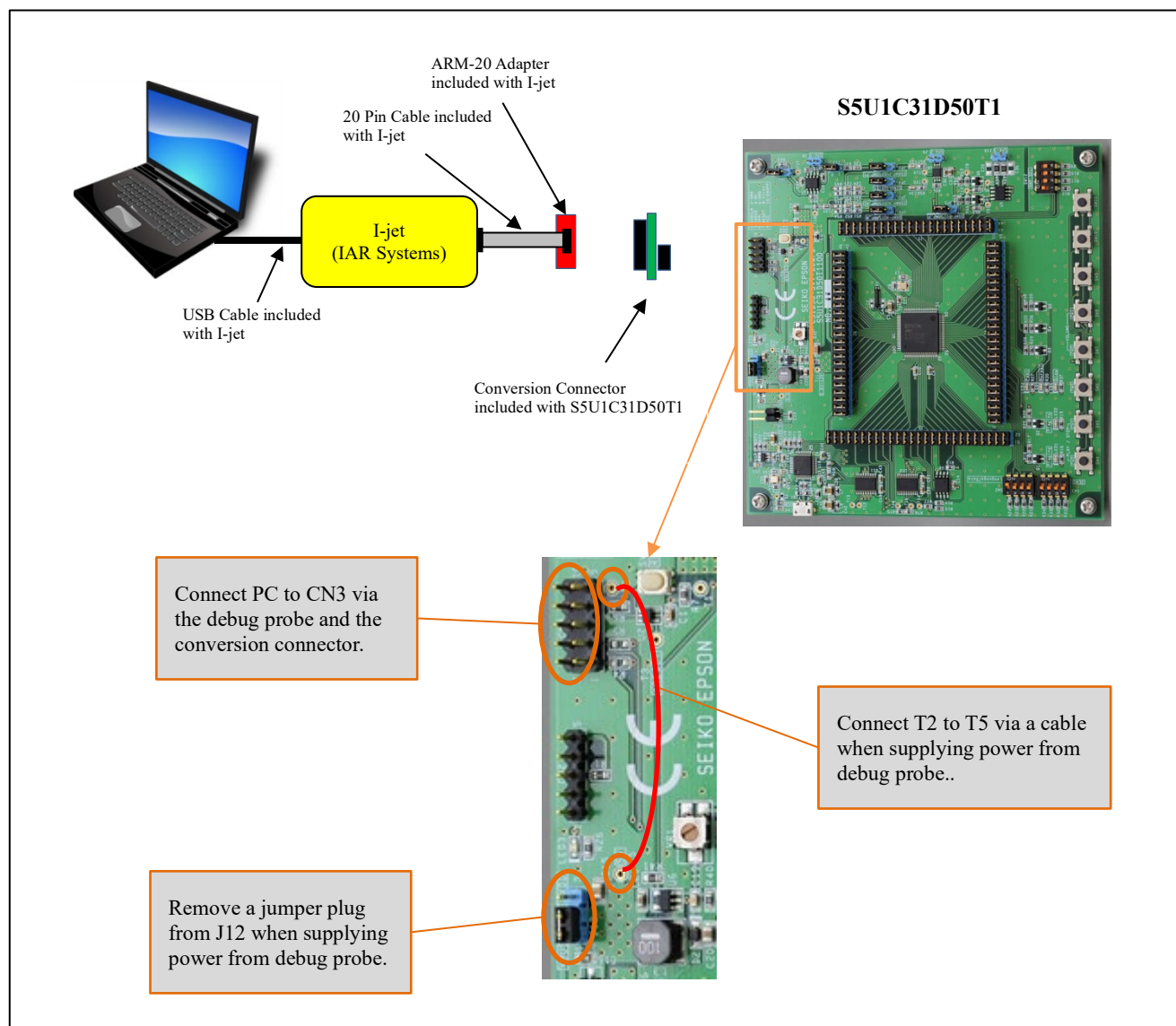


Figure 4.2.1 Connection Diagram of S5U1C31D50T1 and I-jet

4. Usage

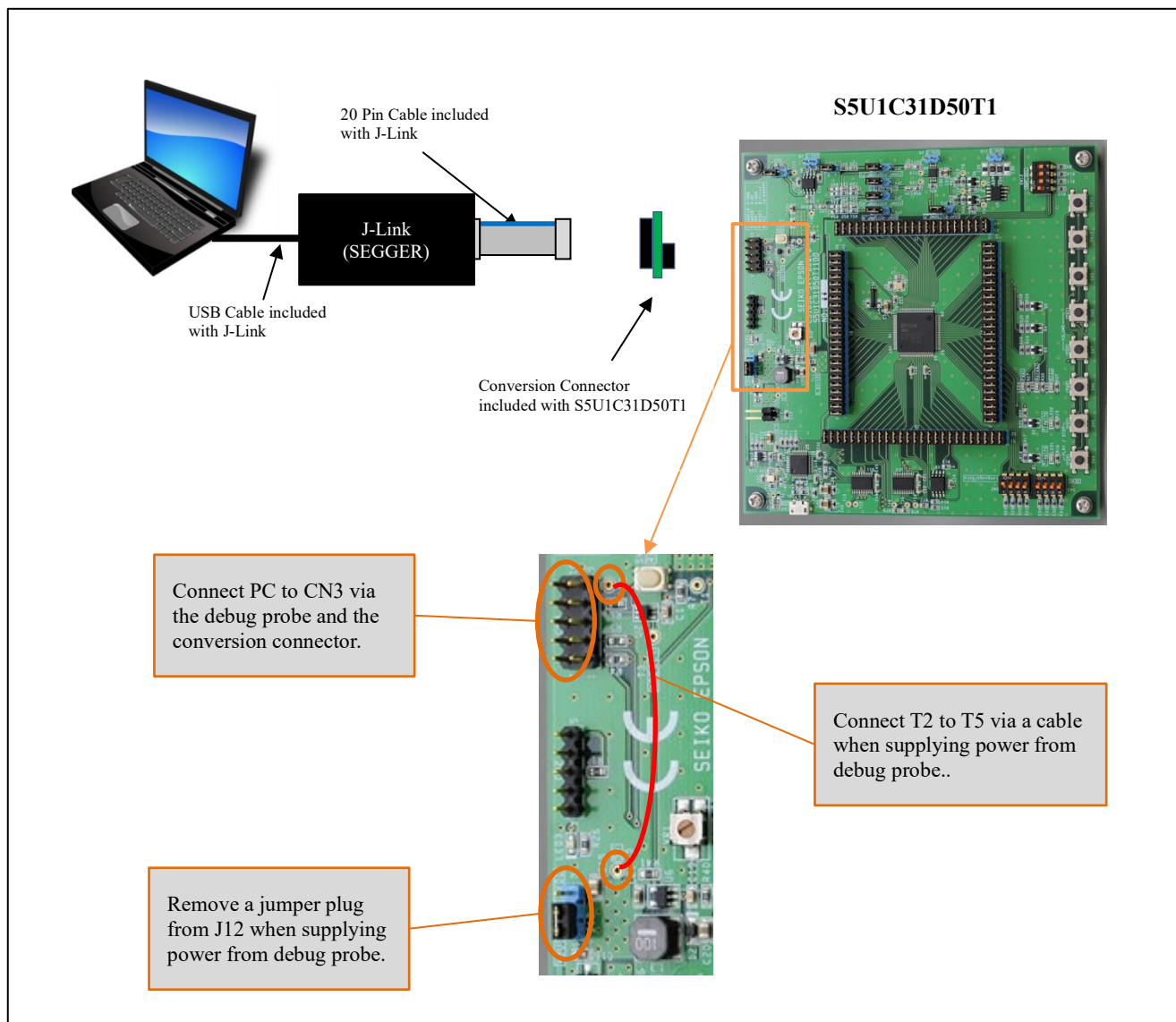


Figure 4.2.2 Connection Diagram of S5U1C31D50T1 and J-Link

Table 4.2.1 Terminal Layout Table for included conversion connector CN1(20pin connectors)

No	Name	IO	Function	No	Name	IO	Function
1	VTref	O	MCU reference voltage	11	RTCK	-	N.C
2	VCC	-	N.C	12	GND	P	GND
3	TRST	-	N.C	13	SWO	-	N.C
4	GND	P	GND	14	GND	P	GND
5	NC	-	N.C	15	nRESET	I	MCU Reset
6	GND	P	GND	16	GND	P	GND
7	SWDIO	IO	Serial wire data input/output	17	NC	-	N.C
8	GND	P	GND	18	GND	P	GND
9	SWDCLK	I	Serial wire clock input	19	NC	-	N.C
10	GND	P	GND	20	GND	P	GND

Table 4.2.2 Terminal Layout Table for included conversion connector CN2(10pin connectors)

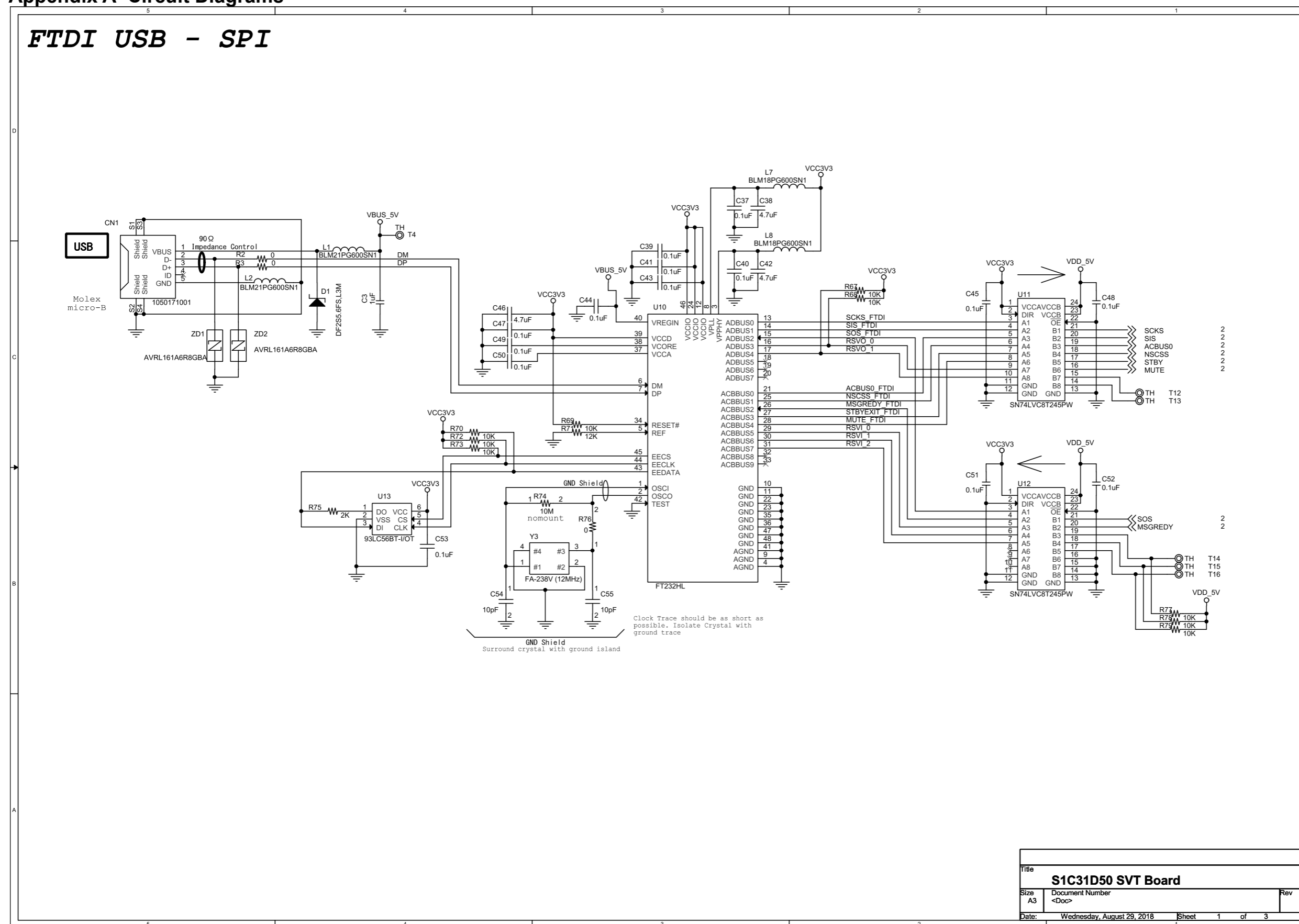
No	Name	IO	Function	No	Name	IO	Function
1	SWDCLK	O	Serial wire clock output	6	GND2	P	GND
2	GND1	P	GND	7	nRESET	O	MCU Reset
3	SWDIO	IO	Serial wire data input/output	8	VTref	I	MCU reference voltage
4	NC1	-	-	9	VCC	-	-
5	NC2	-	-	10	NC3	-	-

Table 4.2.3 Terminal Layout Table for Debug i/f(CN3) on S5U1C31D50T1 board

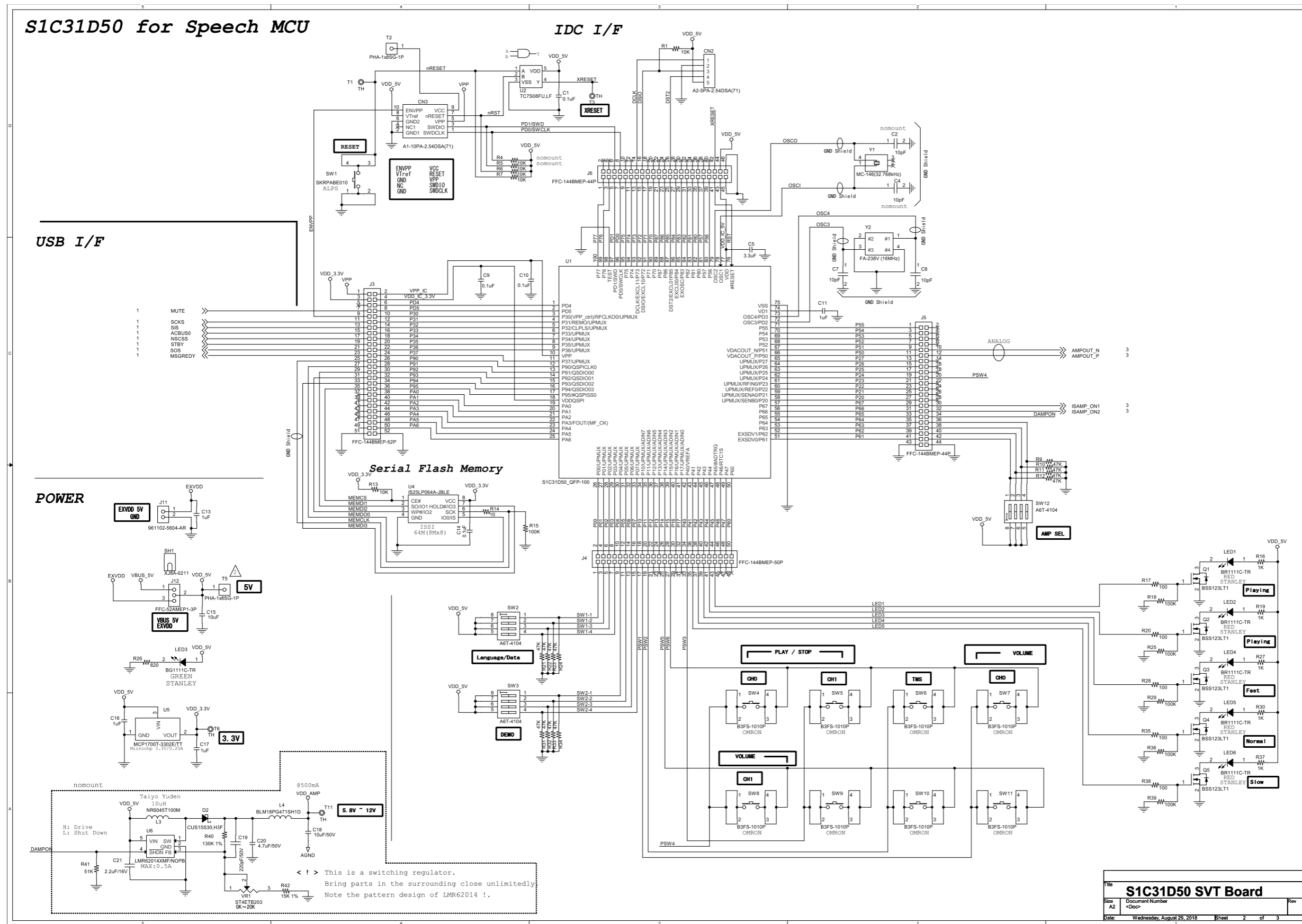
No	Name	IO	機能	No	Name	IO	機能
1	SWDCLK	I	Serial wire clock input	6	GND2	P	GND
2	GND1	P	GND	7	nRESET	I	MCU Reset
3	SWDIO	IO	Serial wire data input/output	8	VTref	O	MCU reference voltage
4	NC1	-	-	9	VCC	-	(T2)
5	VPP	-	-	10	ENVPP	-	-

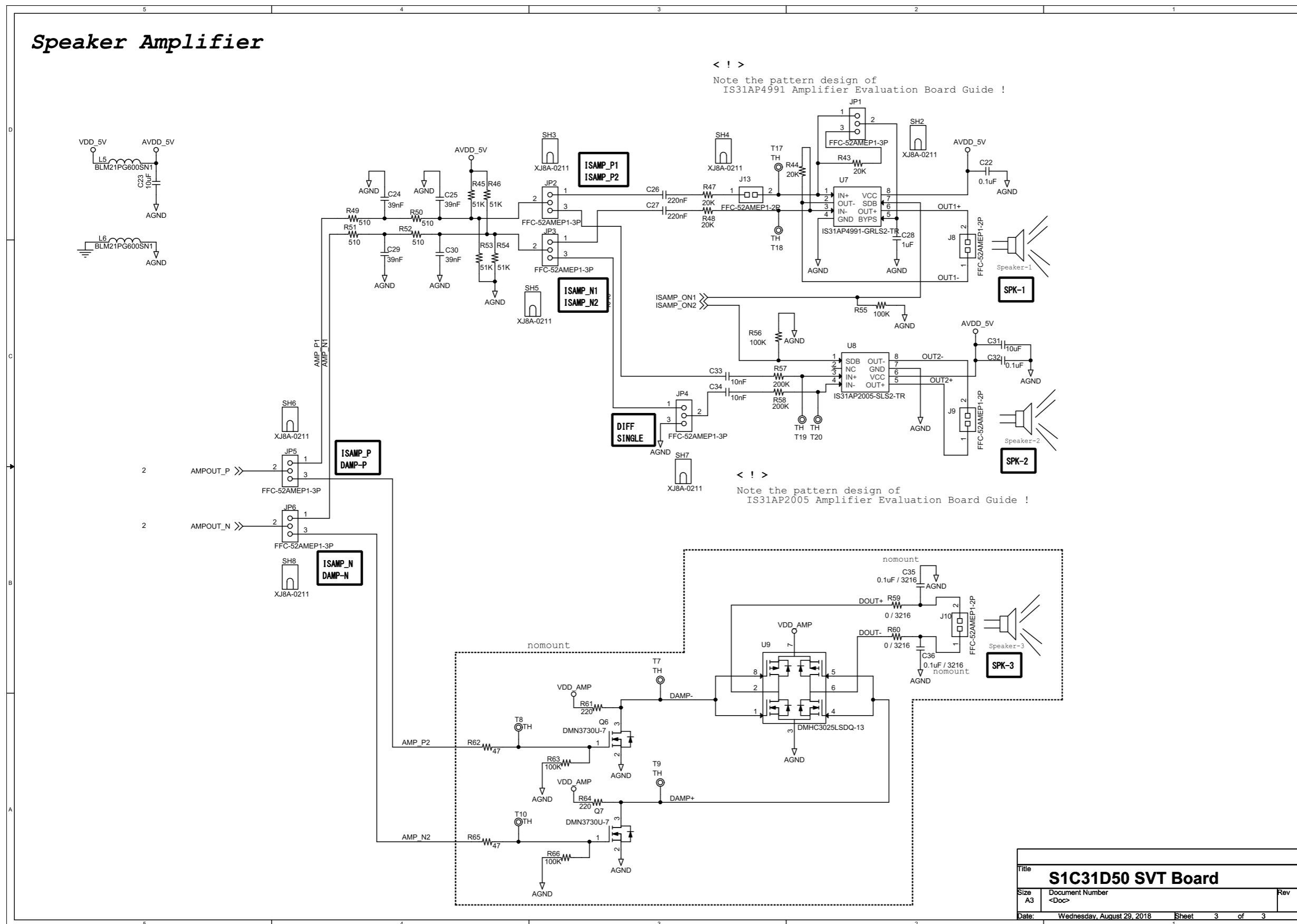
Appendix A Circuit Diagrams

FTDI USB - SPI

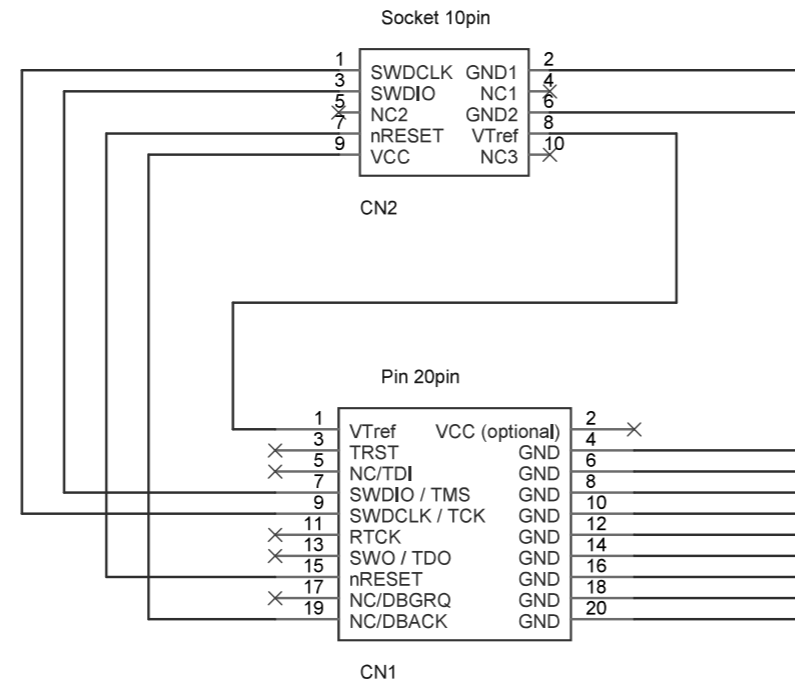


Title		
S1C31D50 SVT Board		
Size	Document Number	Rev
A3	<Doc>	
Date:	Wednesday, August 29, 2018	Sheet 1 of 3





Conversion Connector



Title		
C31 Conv		
Size	Document Number	Rev
A4	<Doc>	<RevC>
Date:	Wednesday, January 30, 2019	Sheet 1 of 1

Appendix B Parts List

Note ! Parts are subject to change without notice.

Item	Quantity	Reference	Part	Manufacture	mount	Other Comment
1	1	CN1	1050171001	Molex		
2	1	CN2	A2-5PA-2.54DSA(71)	HIROSE		
3	1	CN3	A1-10PA-2.54DSA(71)	HIROSE		
4	20	C1,C9,C10,C14,C22,C32,C37,C39,C40,C41,C43,C44,C45,C47,C48,C49,C50,C51,C52,C53	0.1uF			
5	2	C2,C4	10pF		nomount	
6	6	C3,C11,C13,C16,C17,C28	1uF			
7	1	C5	3.3uF			
8	4	C7,C8,C54,C55	10pF			
9	3	C15,C23,C31	10uF			
10	1	C18	10uF/50V		nomount	
11	1	C19	220pF/50V		nomount	
12	1	C20	4.7uF/50V		nomount	
13	1	C21	2.2uF/16V		nomount	
14	4	C24,C25,C29,C30	39nF			
15	2	C26,C27	220nF			
16	2	C33,C34	10nF			
17	2	C35,C36	0.1uF / 3216		nomount	
18	3	C38,C42,C46	4.7uF			
19	1	D1	DF2S5.6FS.L3M	TOSHIBA		
20	1	D2	CUS15S30.H3F	TOSHIBA	nomount	
21	7	JP1,JP2,JP3,JP4,JP5,JP6,JP12	FFC-52AMEP1-3P	HONDA TSUSHIN		
22	1	J3	FFC-144BMEP-52P	HONDA TSUSHIN		
23	1	J4	FFC-144BMEP-50P	HONDA TSUSHIN		
24	2	J5,J6	FFC-144BMEP-44P	HONDA TSUSHIN		
25	3	J8,J9,J13	FFC-52AMEP1-2P	HONDA TSUSHIN		
26	1	J10	FFC-52AMEP1-2P	HONDA TSUSHIN	nomount	
27	1	J11	961102-5604-AR	3M		
28	5	LED1,LED2,LED4,LED5,LED6	BR1111C-TR	STANLEY		
29	1	LED3	BC1111C-TR	STANLEY		
30	4	L1,L2,L5,L6	BLM21PG600SN1	MURATA		
31	1	L3	NR6045T100M	Taiyo Yuden	nomount	
32	1	L4	BLM18PG471SH1D	MURATA	nomount	
33	2	L7,L8	BLM18PG600SN1	MURATA		
34	5	Q1,Q2,Q3,Q4,Q5	BSS123LT1	ON Semi.		
35	2	Q6,Q7	DMN3730U-7	DIODES	nomount	
36	13	R1,R6,R7,R13,R67,R68,R69,R70,R72,R73,R77,R78,R79	10K			
37	3	R2,R3,R76	0			
38	2	R4,R5	10K		nomount	
39	12	R9,R10,R11,R12,R21,R22,R23,R24,R31,R32,R33,R34	47K			
40	1	R14	10			
41	8	R15,R18,R25,R29,R36,R39,R55,R56	100K			
42	5	R16,R19,R27,R30,R37	1K			
43	5	R17,R20,R28,R35,R38	100			
44	1	R26	820			
45	1	R40	130K 1%		nomount	
46	1	R41	51K		nomount	
47	1	R42	15K 1%		nomount	
48	4	R43,R44,R47,R48	20K			
49	4	R45,R46,R53,R54	51K			
50	4	R49,R50,R51,R52	510			
51	2	R57,R58	200K			
52	2	R59,R60	0 / 3216		nomount	
53	2	R61,R64	220			
54	2	R62,R65	47		nomount	
55	2	R63,R66	100K		nomount	
56	1	R71	12K			
57	1	R74	10M		nomount	
58	1	R75	2K			
59	8	SH1,SH2,SH3,SH4,SH5,SH6,SH7,SH8	XJ8A-0211	OMRON		
60	1	SW1	SKRPABE010	ALPS		
61	3	SW2,SW3,SW12	A6T-4104	OMRON		
62	8	SW4,SW5,SW6,SW7,SW8,SW9,SW10,SW11	B3FS-1010P	OMRON		
63	18	T1,T3,T4,T6,T7,T8,T9,T10,T11,T12,T13,T14,T15,T16,T17,T18,T19,T20	TH			
64	2	T2,T5	PHA-1x8SG-1P	AKIZUKI		
65	1	U1	S1C31D50 QFP-100			
66	1	U2	TC7S08FULLF	TOSHIBA		
67	1	U4	IS25LP084A-JBLE	ISSI		
68	1	U5	MCP1700T-3302E/TT	MICROCHIP		
69	1	U6	LMR62014XMF/NOPB	TI	nomount	
70	1	U7	IS31AP4991-GRLS2-TR	ISSI		
71	1	U8	IS31AP2005-SLS2-TR	ISSI		
72	1	U9	DMHC3025LSDQ-13	DIODES	nomount	
73	1	U10	FT232HL	FTDI		
74	2	U11,U12	SN74LVC8T245PW	TI		
75	1	U13	93LC56BT-1/OT	MICROCHIP		
76	1	VR1	ST4ETB203	COPAL	nomount	
77	1	Y1	MC-146(32.768kHz)	EPSON		
78	1	Y2	FA-238V (16MHz)	EPSON		
79	1	Y3	FA-238V (12MHz)	EPSON TOYOCOM		
80	2	ZD1,ZD2	AVRL161A6R8GBA	TDK		

Revision History

Revision History

Attachment-1

Rev. No.	Date	Page	Category	Contents
Rev.1.0	2018/10/11	All	New	New establishment
Rev.2.0	2019/03/18	4,5,6,11, 12	Change	Changed Table 3.1.3 to 3.1.6, Figure 3.1.1, 4.2.1 and 4.2.2.
Rev.2.1	2022/03/04	13, 17	Change	Added Table 4.2.1 to 4.2.3. Added circuit diagram of conversion connector to Appendix.A

America

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