

CMOS 32-BIT SINGLE CHIP MICROCONTROLLER
S5U1C31D51T1 Manual
(S1C31D51 Evaluation Board)

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1. Overview

S5U1C31D51T1(S1C31D51 Evaluation Board) is an evaluation board for the Seiko Epson single-chip microcontroller S1C31D51.

Figure 1.1 shows the external view of S5U1C31D51T1.

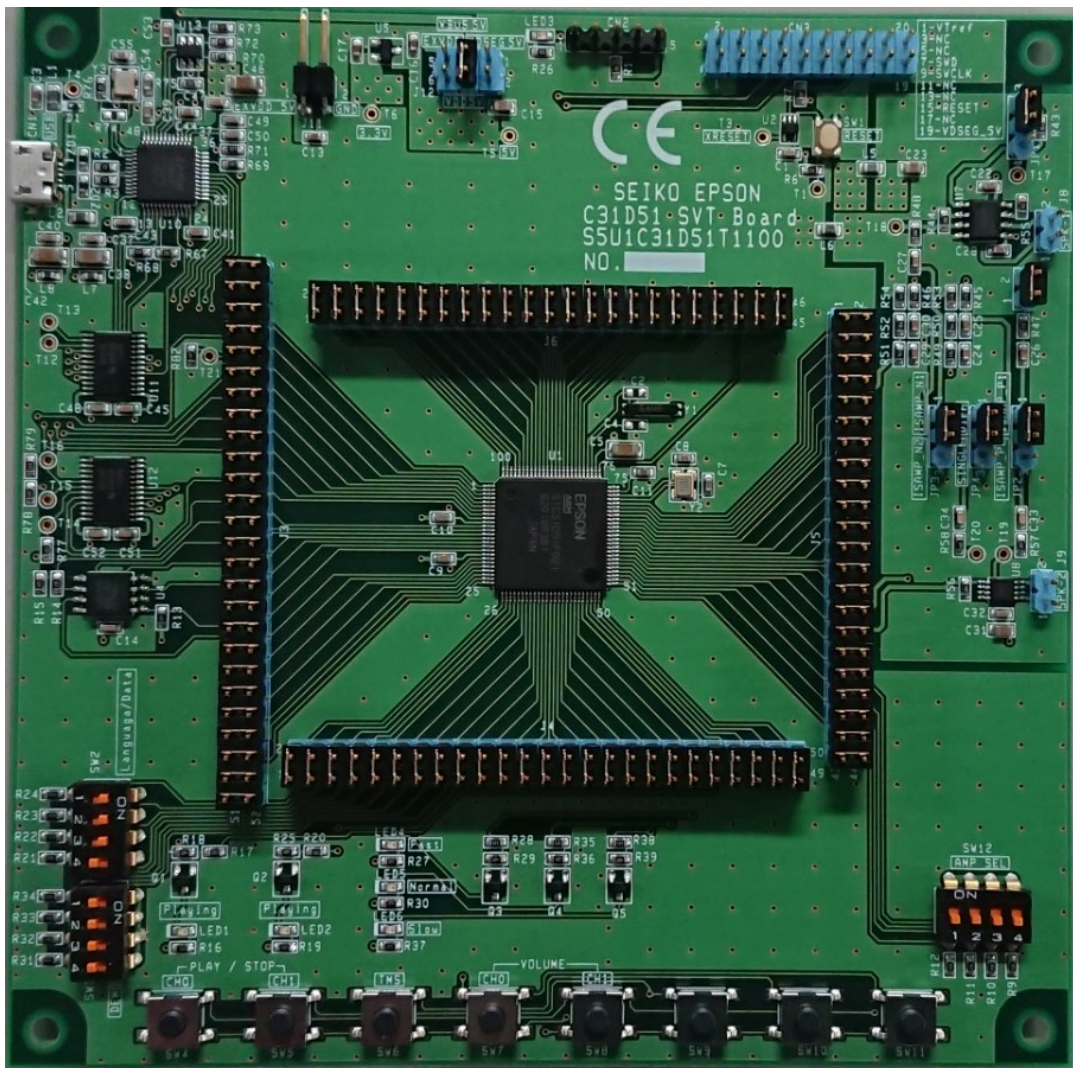


Figure 1.1 S5U1C31D51T1 External View

2. Name and Function of Each Part

2. Name and Function of Each Part

Table 2.1 lists the main parts on S5U1C31D51T1. 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
S1C31D51	U1	MCU(Cortex-M0+)	
Class-AB audio amplifier	U7	For sound output	
Class-D audio amplifier	U8	For sound output	
USB to Serial Converter	U10	For communication with PC (for demo software)	
64Mbit/8Mbyte QSPI flash memory	U4	For storing a sound ROM data	
Power Supply Regulator	U5	For 3.3V 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

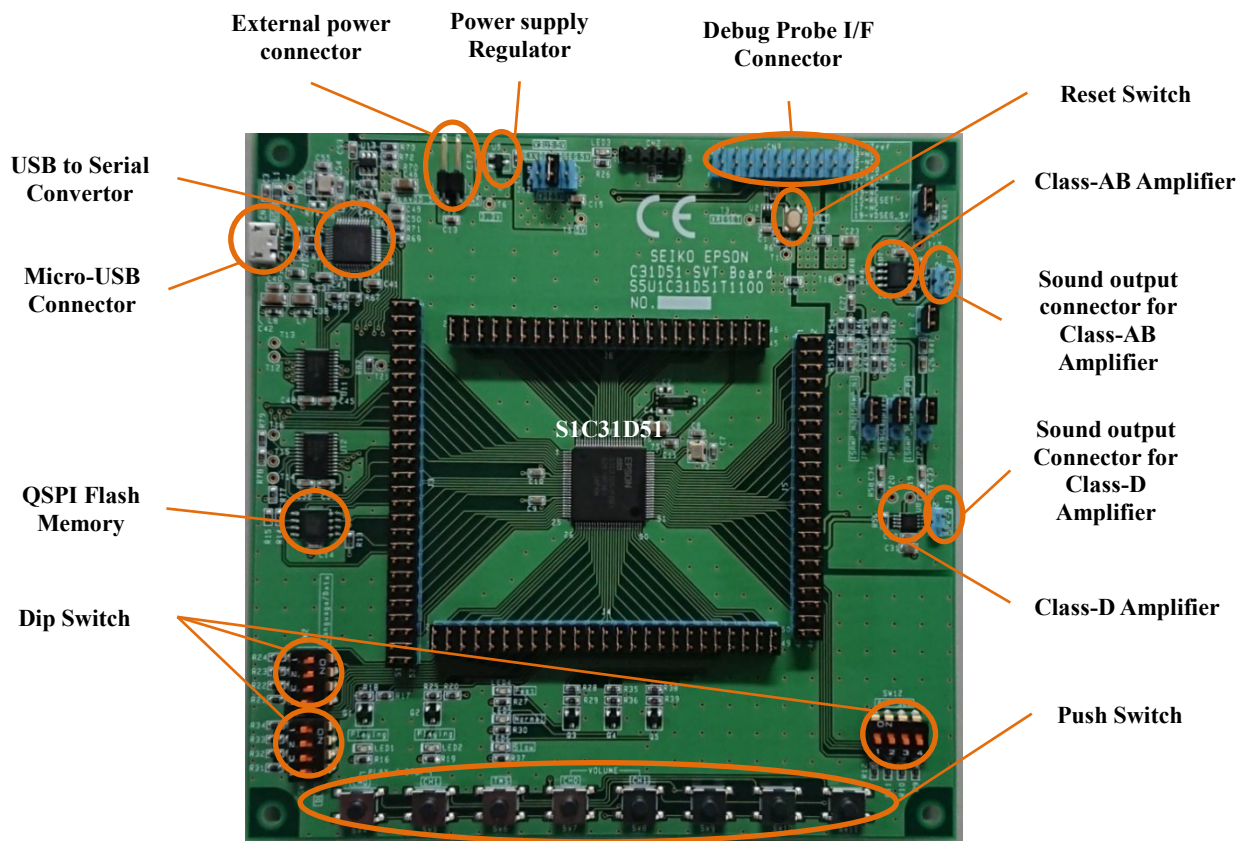


Figure 2.1 Layout of Main Parts

3. Settings

3. Settings

3.1 Jumpers

Check the jumper settings. Although the S5U1C31D51T1 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 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 3.1.2 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 3.1.3 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 3.1.4 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		-	-	

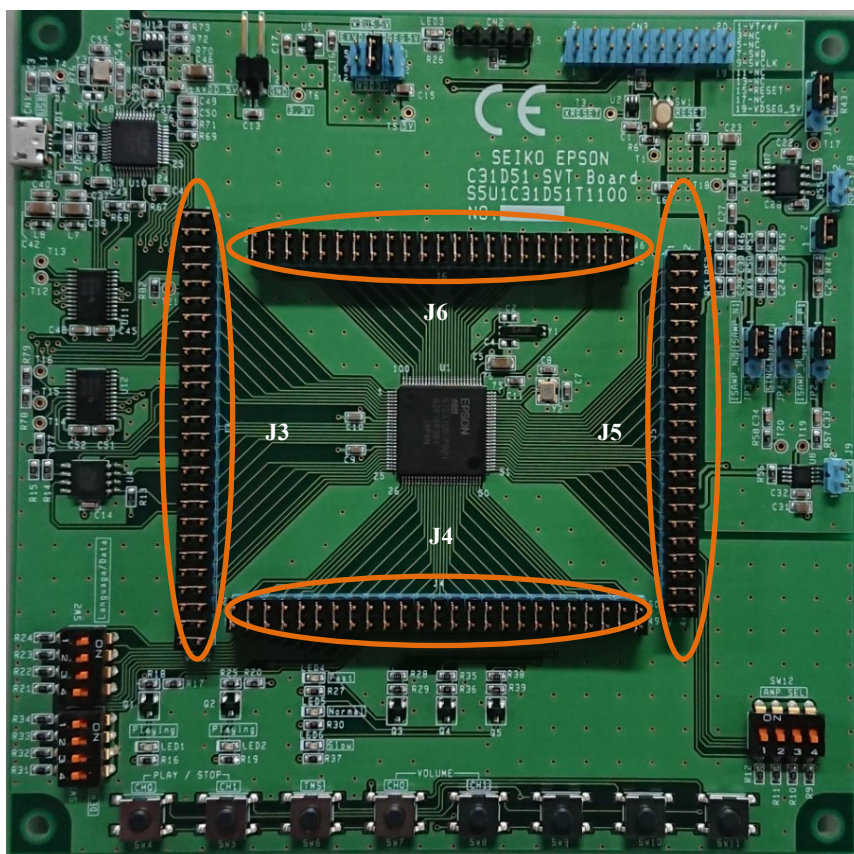


Figure 3.1.1 Layout of Jumpers

3.2 Power Supply

The power supply can be selected from among three sources shown below by setting the J12 jumper.

- External: Power is supplied to J11 from an external power.
- VBUS: Power is supplied to CN1 from USB-VBUS.
- Debug: Power is supplied to CN3 from the debug probe.

Table 3.2.1 Power Supply Switching

Connector: J12		
Power Supply	J12 settings	Remarks
External(J11)	1-2 Open 3-4 Open 5-6 Short	DC +5 V
VBUS(CN1)	1-2 Open (Factory Setting) 3-4 Short (Factory Setting) 5-6 Open (Factory Setting)	DC +5 V
Debug(CN3)	1-2 Short 3-4 Open 5-6 Open	DC +5 V

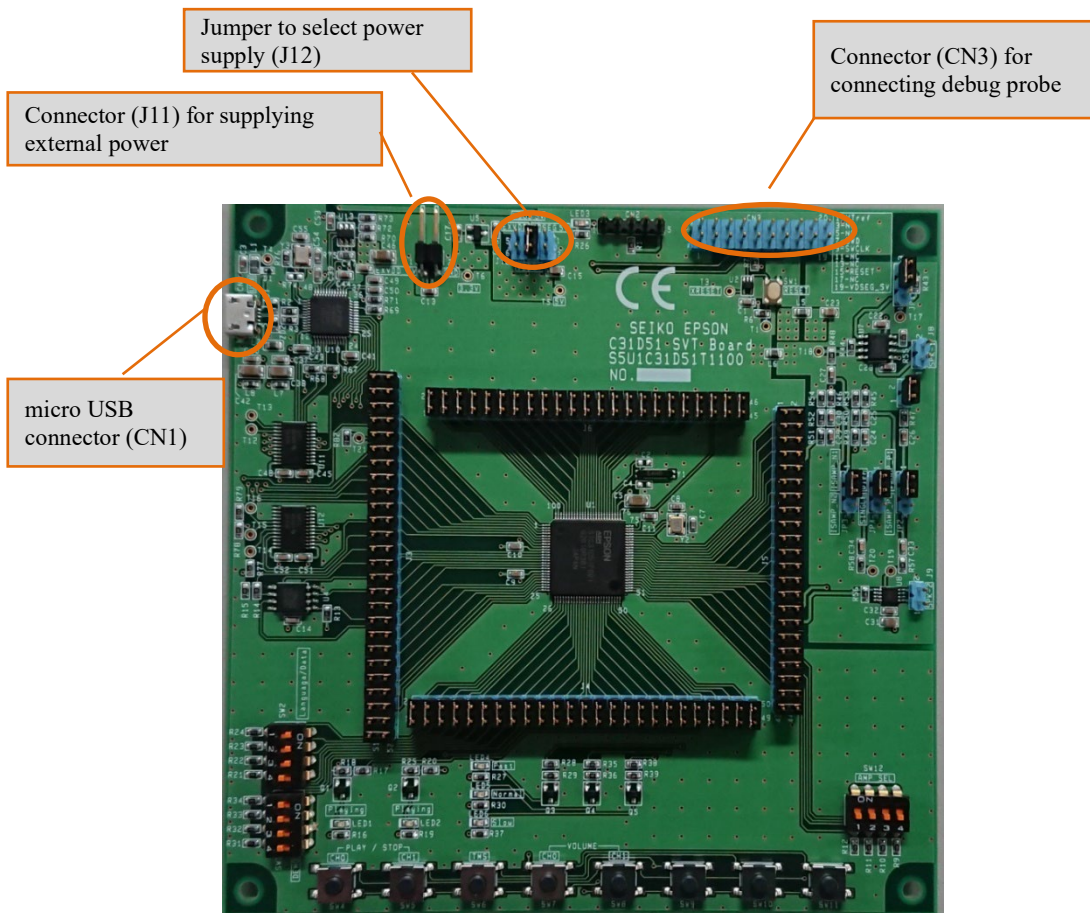


Figure 3.2.1 Layout of Jumpers for Power Supply Selecting

3. Settings

3.3 Audio Amplifier

The S5U1C31D51T1 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, 12
Class-D	Don't care	Short 2 to 3	Short 2 to 3	Don't care	Short 2 to 3	Short 9 to 10 Short 11 to 12

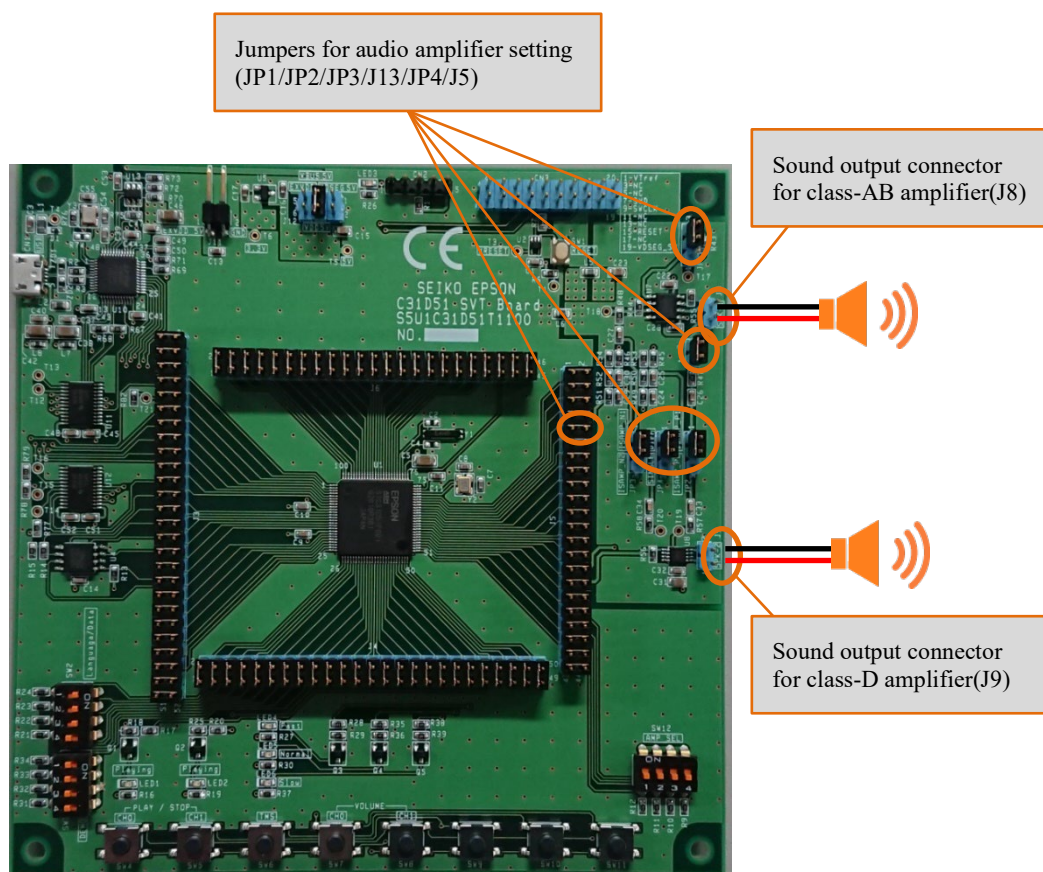


Figure 3.3.1 Layout of Jumpers and Connectors for Audio Amplifier Selecting

3.4 Buzzer Speech

S1C31D51 is implemented with a buzzer speech playback function. The buzzer speech playback can be evaluated on S5U1C31D51T1 connected with S5U1C31D51T2 (sold separately) which has the recommended circuit for buzzer speech playback. Refer to “S5U1C31D51T2 Manual” for details.

4. Usage

4. Usage

4.1 Running Demo Software

The S5U1C31D51T1 board is shipped with the demo software programmed into S1C31D51 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 S5U1C31D51T1.
- 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 S5U1C31D51T1.
- 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 "S1C31D5x Peripheral Circuit Sample Software Manual"

For details of Buzzer Speech playback, refer to "S5U1C31D51T2 Manual".

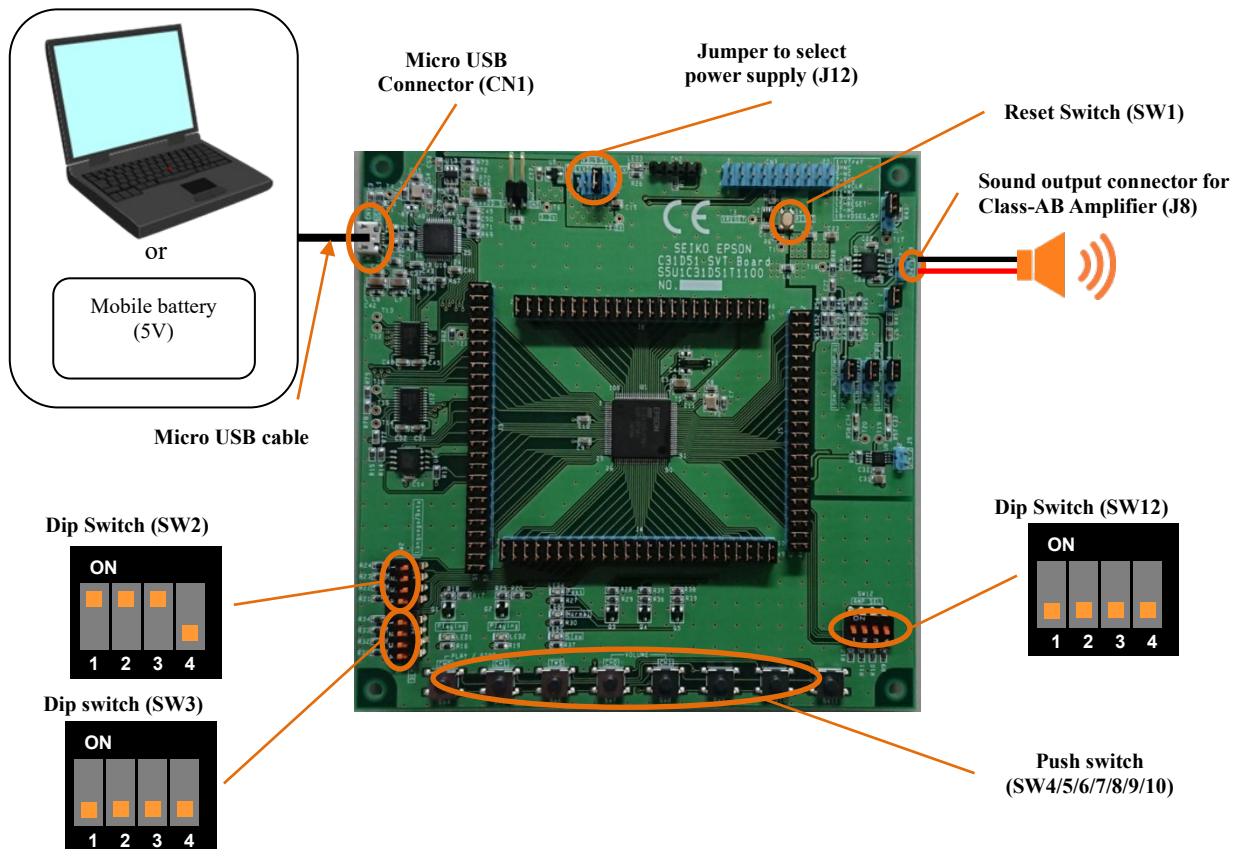


Figure 4.1.1 Layout of Main Parts for Demo Mode

4.2 Debugging Software

Connect the S5U1C31D51T1 board with PC via a debug probe either IAR Systems I-jet or SEGGER J-Link. Refer to Figure 4.2.1 for connection of S5U1C31D51T1 to I-jet, and refer to Figure 4.2.2 for connection of S5U1C31D51T1 to J-Link.

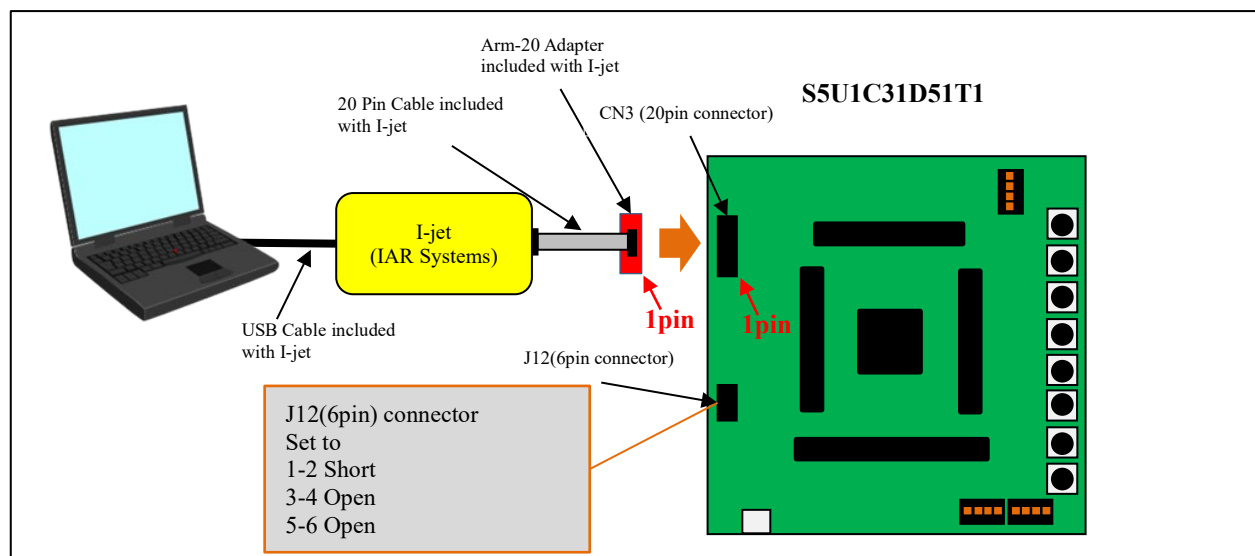


Figure 4.2.1 Connection Diagram of S5U1C31D51T1 and I-jet

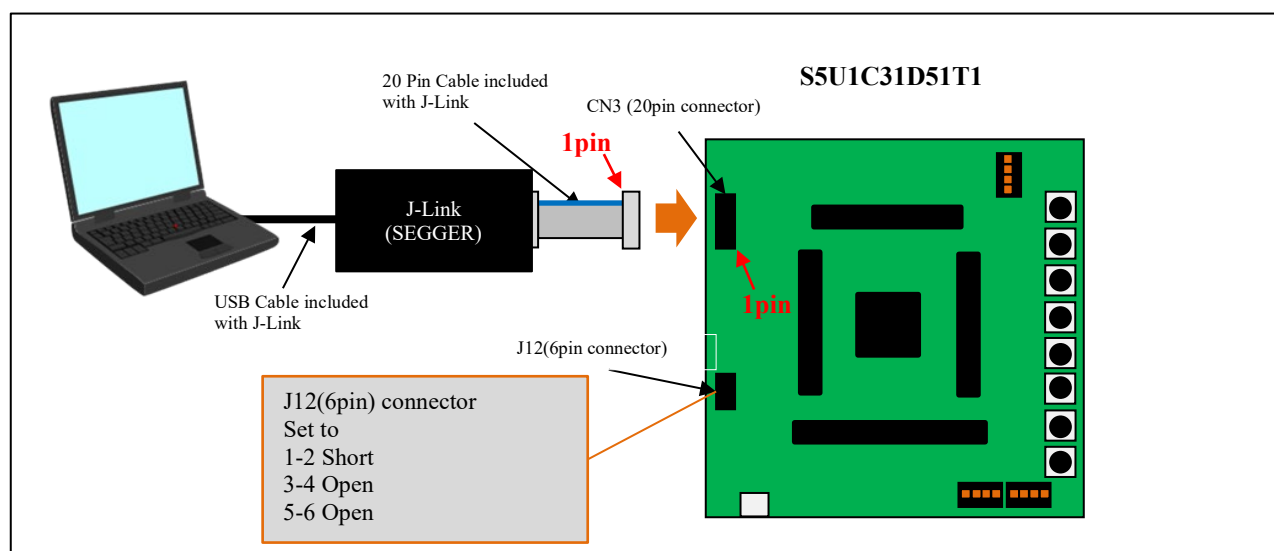


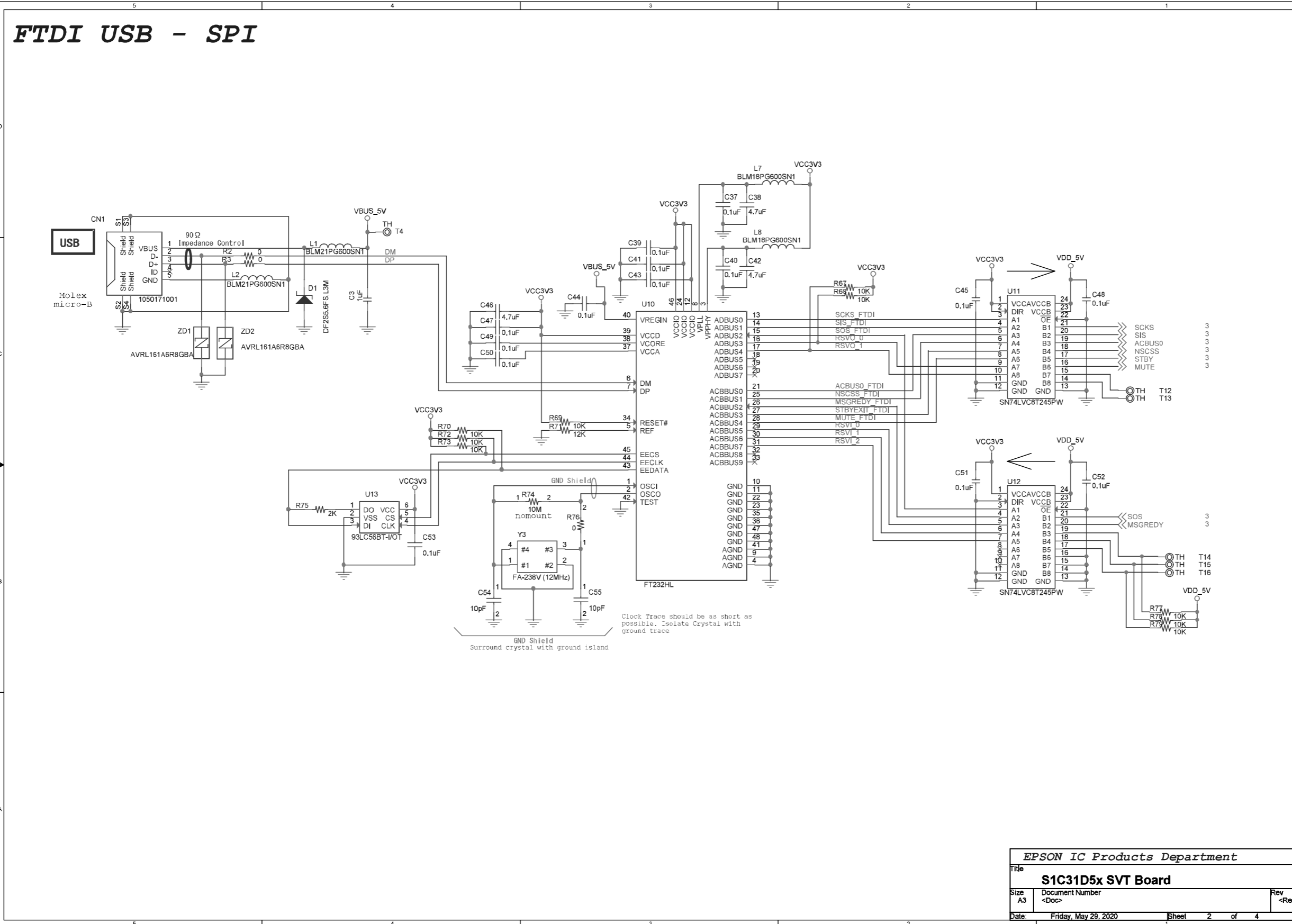
Figure 4.2.2 Connection Diagram of S5U1C31D51T1 and J-Link

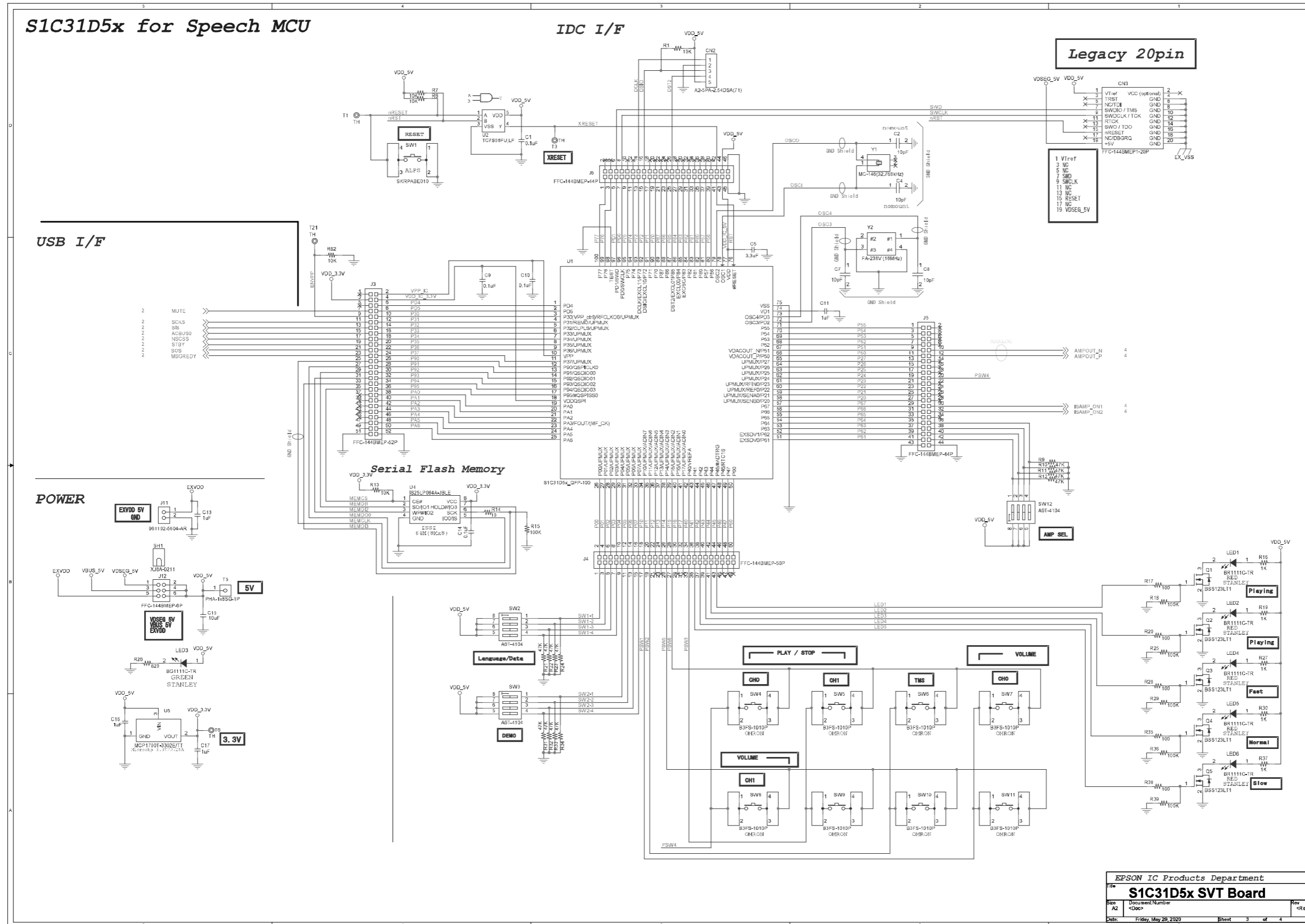
4. Usage

Table 4.2 Terminal Layout Table for Debug i/f(CN3)

No	Name	IO	Function	No	Name	IO	Function
1	Vref	O	MCU reference voltage	11	RTCK	-	N.C
2	VCC	-	(optional) N.C	12	GND	P	GND
3	TRST	IO	N.C	13	SWO	-	N.C
4	VCC	-	(optional) N.C	14	GND	P	GND
5	VPP	-	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/DBGQRQ	-	N.C
8	GND	P	GND	18	GND	P	GND
9	SWDCLK	I	Serial wire clock input	19	+5V	I	DC +5V Power Input
10	GND	P	GND	20	GND	P	GND

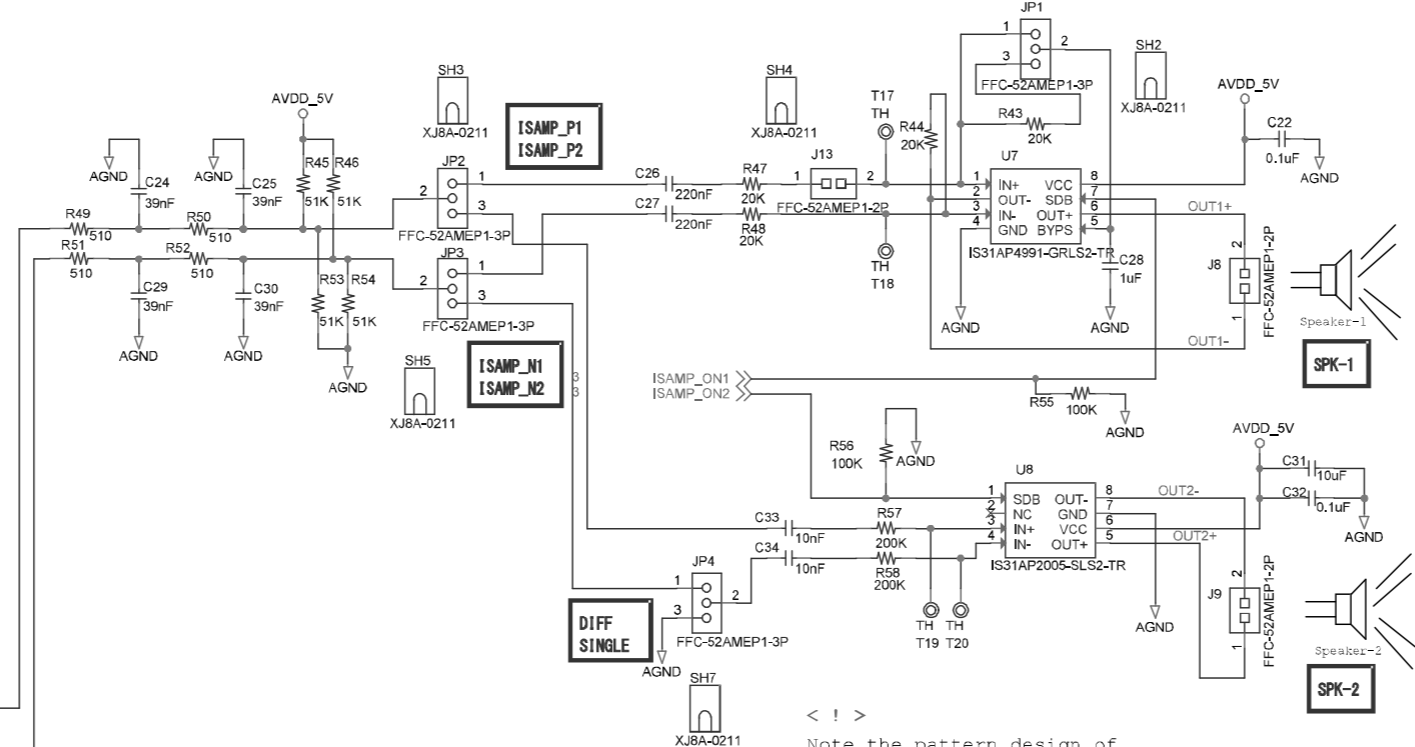
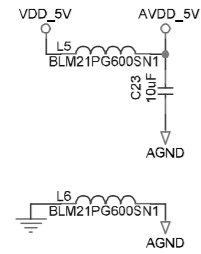
Appendix A Circuit Diagrams





Speaker Amplifier

< ! >
 Note the pattern design of
 IS31AP4991 Amplifier Evaluation Board !



< ! >
 Note the pattern design of
 IS31AP2005 Amplifier Evaluation Board !

3 AMPOUT_P >>
 3 AMPOUT_N >>

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Title S1C31D5x SVT Board			
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Appendix B Parts List

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	FFC-144BMEP1-20P	HONDA TSUSHIN		
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	4	C24,C25,C29,C30	39nF			
11	2	C26,C27	220nF			
12	2	C33,C34	10nF			
13	3	C38,C42,C46	4.7uF			
14	1	D1	DF2S5.6FS.L3M	TOSHIBA		
15	4	JP1,JP2,JP3,JP4	FFC-52AMEP1-3P	HONDA TSUSHIN		
16	1	J3	FFC-144BMEP-52P	HONDA TSUSHIN		
17	1	J4	FFC-144BMEP-50P	HONDA TSUSHIN		
18	1	J5,J6	FFC-144BMEP-44P	HONDA TSUSHIN		
19	1	J6	FFC-144BMEP1-46P	HONDA TSUSHIN		
20	3	J8,J9,J13	FFC-52AMEP1-2P	HONDA TSUSHIN		
21	1	J11	A2-2PA-2.54DS(71)	HIROSE		
22	1	J12	FFC-144BMEP1-6P	HONDA TSUSHIN		
23	5	LED1,LED2,LED4,LED5,LED6	BR1111C-TR	STANLEY		
24	1	LED3	BG1111C-TR	STANLEY		
25	4	L1,L2,L5,L6	BLM21PG600SN1D	MURATA		
26	2	L7,L8	BLM18PG600SN1D	MURATA		
27	5	Q1,Q2,Q3,Q4,Q5	BSS123LT1G	ON Semi.		
28	14	R1,R6,R7,R13,R67,R68,R69,R70,R72,R73,R77,R78,R79,R82	10K			
29	3	R2,R3,R76	0			
30	12	R9,R10,R11,R12,R21,R22,R23,R24,R31,R32,R33,R34	47K			
31	1	R14	10			
32	8	R15,R18,R25,R29,R36,R39,R55,R56	100K			
33	5	R16,R19,R27,R30,R37	1K			
34	5	R17,R20,R28,R35,R38	100			
35	1	R26	820			
36	4	R43,R44,R47,R48	20K			
37	4	R45,R46,R53,R54	51K			
38	4	R49,R50,R51,R52	510			
39	2	R57,R58	200K			
40	1	R71	12K			
41	1	R74	10M		nomount	
42	1	R75	2K			
43	6	SH1,SH2,SH3,SH4,SH5,SH7	XJ8A-0211	OMRON		
44	1	SW1	SKRPABE010	ALPS		
45	3	SW2,SW3,SW12	A6T-4104	OMRON		
46	8	SW4,SW5,SW6,SW7,SW8,SW9,SW10,SW11	B3FS-1010P	OMRON		
47	15	T1,T3,T4,T5,T6,T12,T13,T14,T15,T16,T17,T18,T19,T20,T21	TH			
48	1	U1	51C31D51 QFP-100	EPSON		
49	1	U2	TC7S08FULF	TOSHIBA		
50	1	U4	IS25LP064A-JBLE	ISSI		
51	1	U5	MCP1700T-3302E/TT	MICROCHIP		
52	1	U7	IS31AP4991-GRLS2-TR	ISSI		
53	1	U8	IS31AP2005-SLS2-TR	ISSI		
54	1	U10	FT232HL	FTDI		
55	2	U11,U12	SN74LVC8T245PW	TI		
56	1	U13	93LC56BT-I/OT	MICROCHIP		
57	1	Y1	MC-146(32.768kHz)	EPSON		
58	1	Y2	FA-238V (16MHz)	EPSON		
59	1	Y3	FA-238V (12MHz)	EPSON TOYOCOM		
60	2	ZD1,ZD2	AVRL161A6R8GBA	TDK		

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