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CMOS 16-BIT SINGLE CHIP MICROCONTROLLER

S5U1C31D01T1 Manual

(Software Evaluation Tool for S1C31D01)

SEIKO EPSON CORPORATION

Rev.1.2

Evaluation board/kit and Development tool important notice

1. This evaluation board/kit or development tool is designed for use for engineering evaluation, demonstration, or development purposes only. Do not use it for other purposes. It is not intended to meet the requirements of design for finished products.
2. This evaluation board/kit or development tool is intended for use by an electronics engineer and is not a consumer product. The user should use it properly and in a safe manner. Seiko Epson dose not assume any responsibility or liability of any kind of damage and/or fire coursed by the use of it. The user should cease to use it when any abnormal issue occurs even during proper and safe use.
3. The part used for this evaluation board/kit or development tool may be changed without any notice.

NOTICE

Table of Contents

1. Outline

S5U1C31D01T1 (SVT31D01: Software Evaluation Tool for S1C31D01) is an evaluation board for the Seiko Epson single-chip microcontroller S1C31D01. The parts shown below are mounted on this board.

1) S1C31D01 (MCU)
2) Memory LCD module with 240 (H) × 240 (V) resolution
3) Sensors (gyro sensor, acceleration sensor, and geomagnetic sensor)
4) Piezoelectric buzzer
5) General-purpose switches (one 6-bit DIP switch and two push switches)
6) 128MB serial flash memory (32MB × 4)
7) Pulse wave detector (photoreflector + operational amplifier)
8) Power supply regulator (5 V-to-3 V linear regulator, 6.6 V DC/DC boost converter)
9) Connector for debugging

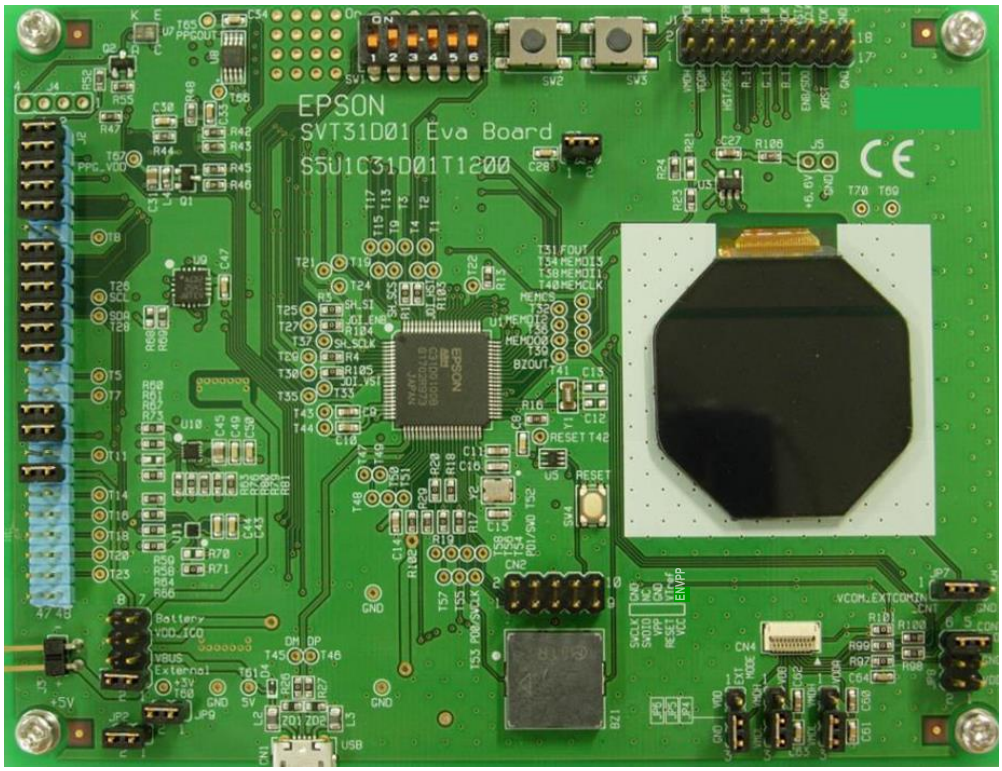


Figure 1.1 SVT31D01 External View

1. Outline

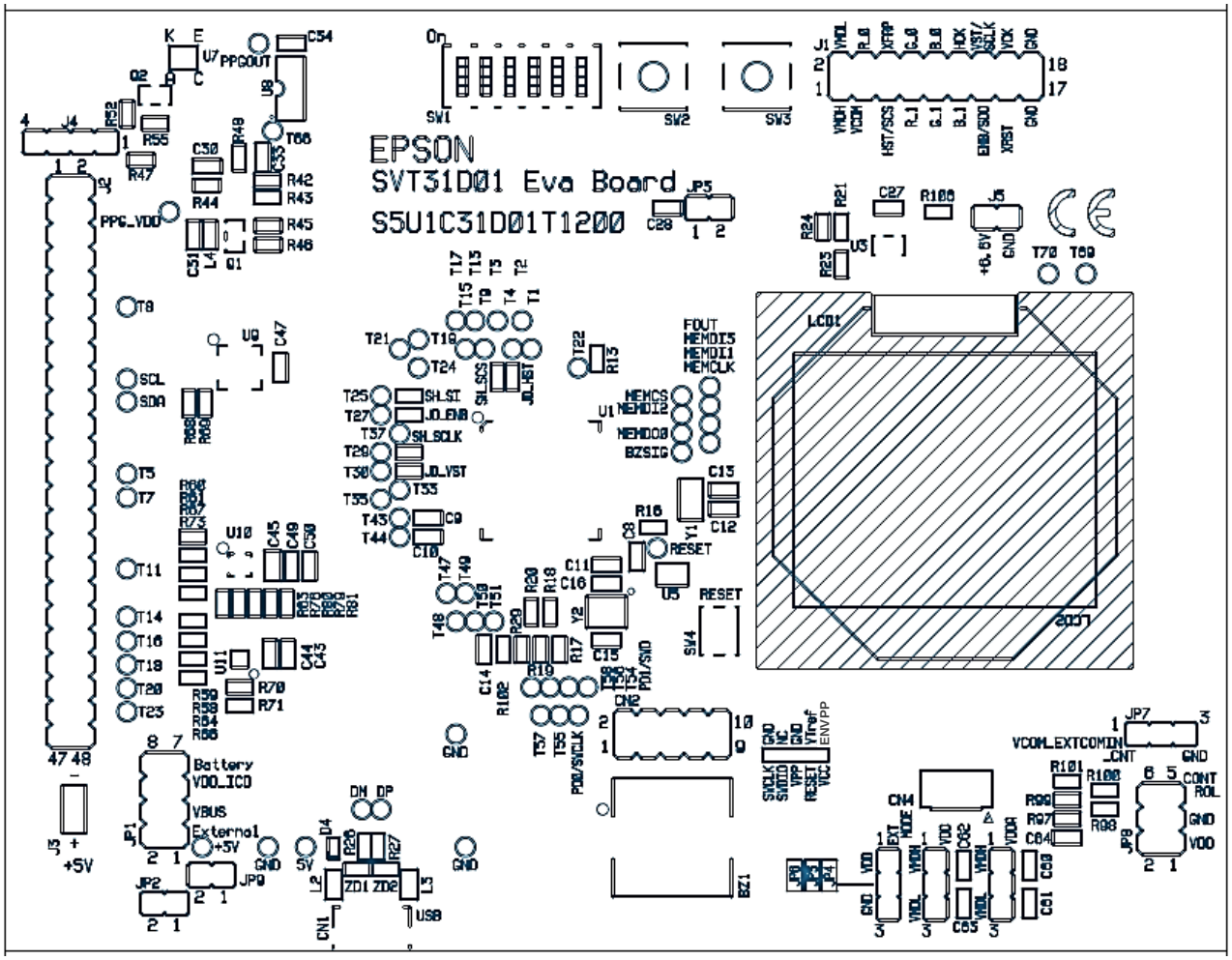


Figure 1.2 SVT31D01 Parts Layout Diagram

2. How to Use SVT31D01

2.1 Setting Jumpers

Although the SVT31D01 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 2.1 J2 Jumper Settings

Connector: J2					
Pin No.	**Open/Short**	**Remarks**	**Pin No.**	**Open/Short**	**Remarks**
1–2	Short		25–26	Open	
3–4	Short		27–28	Open	
5–6	Short		29–30	Short	
7–8	Short		31–32	Short	
9–10	Short		33–34	Open	
11–12	Open		35–36	Short	
13–14	Short		37–38	Open	
15–16	Short		39–40	Open	
17–18	Short		41–42	Open	
19–20	Short		43–44	Open	
21–22	Short		45–46	Open	
23–24	Short		47–48	Open	

Table 2.2 JP2 Jumper Setting

Connector: JP2		
Pin No.	**Open/Short**	**Remarks**
1–2	Short	

Table 2.3 JP3 Jumper Setting

Connector: JP3		
Pin No.	**Open/Short**	**Remarks**
1–2	Short	

Table 2.4 JP4 Jumper Setting

Connector: JP4		
Pin No.	**Open/Short**	**Remarks**
2–3	Short	Don't care.

Table 2.5 JP5 Jumper Setting

Connector: JP5		
Pin No.	**Open/Short**	**Remarks**
2–3	Short	Don't care.

Table 2.6 JP6 Jumper Setting

Connector: JP6		
Pin No.	**Open/Short**	**Remarks**
2–3	Short	Don't care.

Table 2.7 JP7 Jumper Setting

Connector: JP7		
Pin No.	**Open/Short**	**Remarks**
1–2	Short	

Table 2.8 JP8 Jumper Setting

Connector: JP8		
Pin No.	**Open/Short**	**Remarks**
5–6	Short	Don't care.

2.2 Selecting Power Source

The power source can be selected from among four sources shown below by setting the JP1 and JP9 jumpers. Make sure of the jumper settings before using the SVT31D01 board.

- External: Power is supplied to J3 from an external power supply.
- VBUS: Power is supplied from VBUS of USB.
- VDD_ICD: Power is supplied to CN2 from the hardware debugging tool.
- Battery: Power is supplied from the CR2032 coin cell battery set in the BT1 battery holder.

Table 2.9 JP1 and JP9 Jumper Settings

Connectors: JP1/JP9			
Power Source Selection	**JP1 Setting Open/Short**	**JP9 Setting Open/Short**	**Remarks**
External	Short between pins 1 and 2	Short	DC +5 V
VBUS	Short between pins 3 and 4	Short	DC +5 V
VDD_ICD	Short between pins 5 and 6	Short	DC +5 V
Battery *1	Short between pins 7 and 8	Open	DC +3 V, CR2032 is used.

*1 Do not select Battery when driving the pulse wave detector and memory LCD panel simultaneously.

2.3 Connection for Debugging Software

Connect the SVT31D01 board with a debug probe either IAR Systems I-jet or SEGGER J-Link via the Bridge Board Ver. 2 (S5U1C31001L1200) (*1) that comes with the SVT31D01 board.

The SVT31D01 board and the Bridge Board Ver. 2 should be connected using the 10-pin flat cable supplied with the Bridge Board Ver. 2 as shown below. The cable connector pin at the triangle mark must be connected to pin 1 of the CN2 pin-connector on the SVT31D01 board.

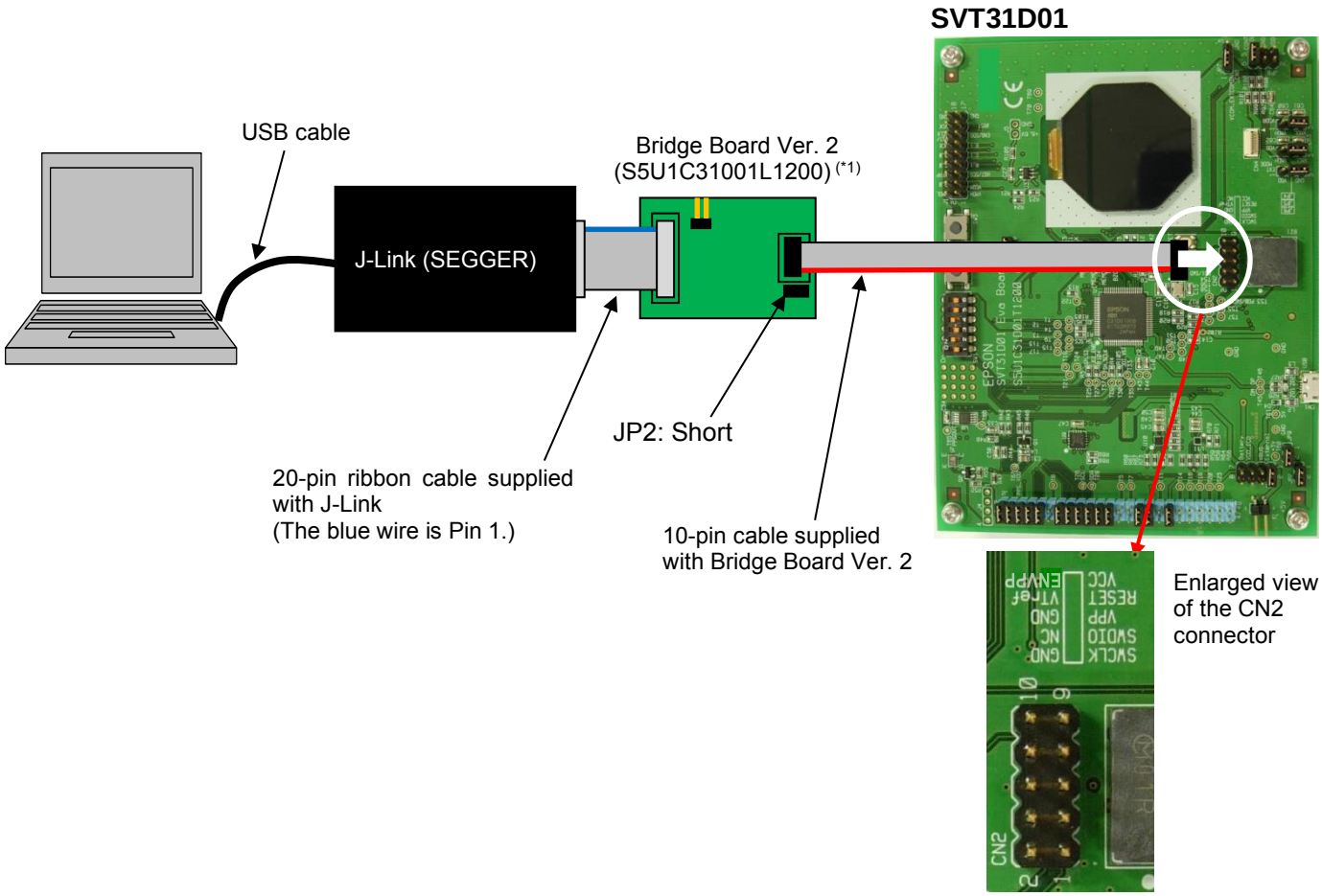


Figure 2.1 Connection Example of SVT31D01, Bridge Board, and Debug Probe (J-Link)

(*1) The SVT31D01 boards with the following serial numbers do not support Bridge Board Ver. 2 (S5U1C3100L1200). If your SVT31D01 board has one of these serial numbers, use Bridge Board (S5U1C31001L1100) instead of Ver. 2.

<Serial No.> 0R02T73001 to 0R02T73020 and 0R02T75001 to 0R02T75007

2.4 Setting Free-Run (Demo) Mode

1) Set the DIP switch SW1-6 on the SVT31D01 board to OFF.

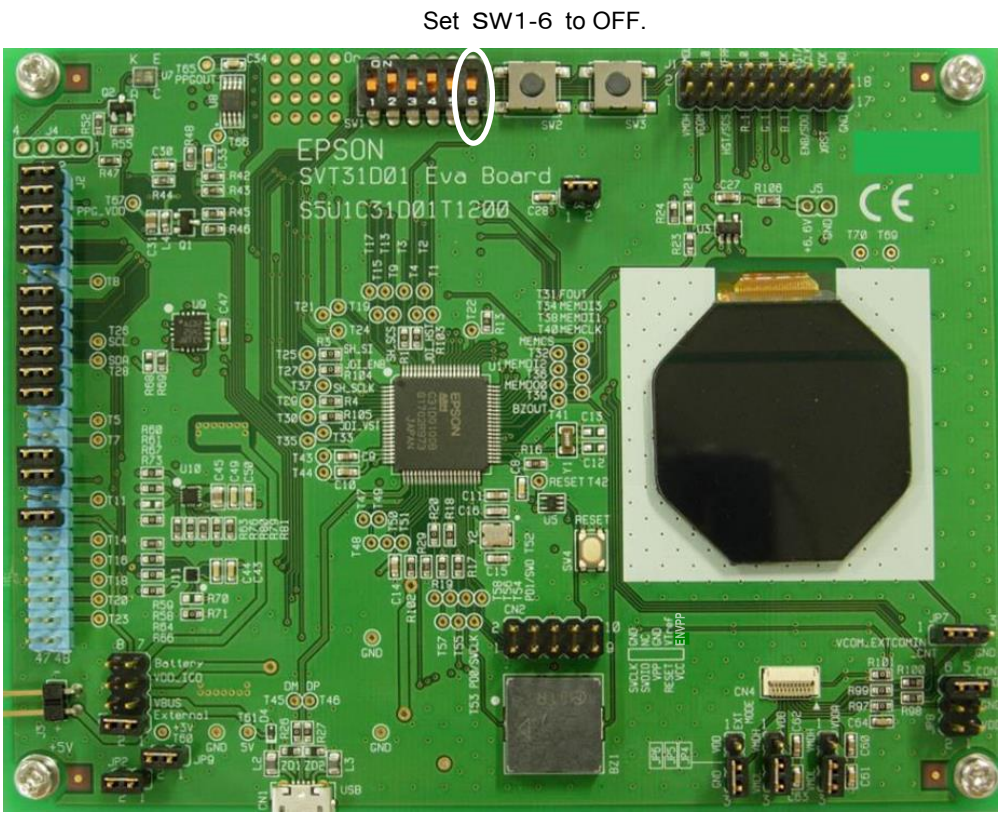
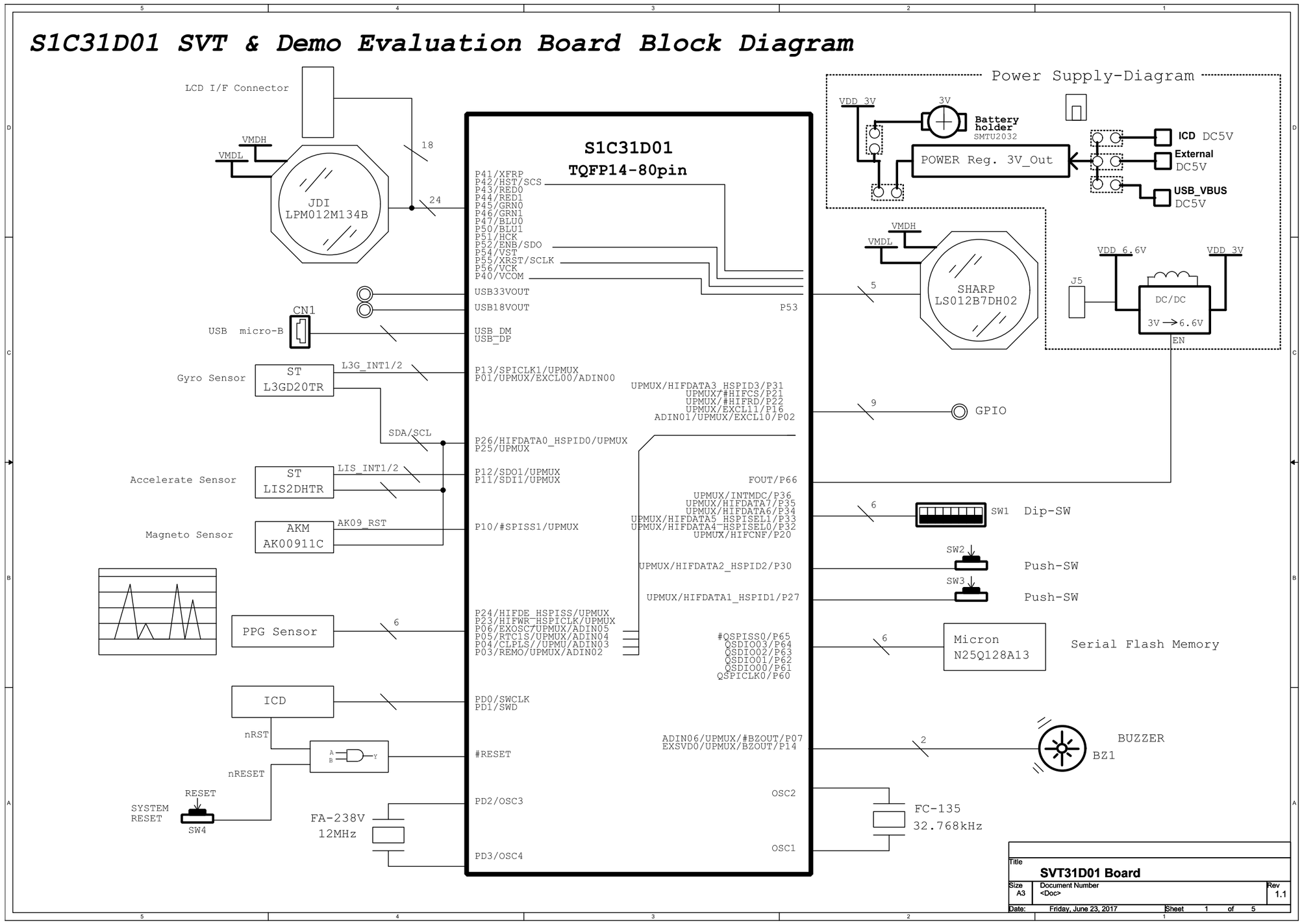
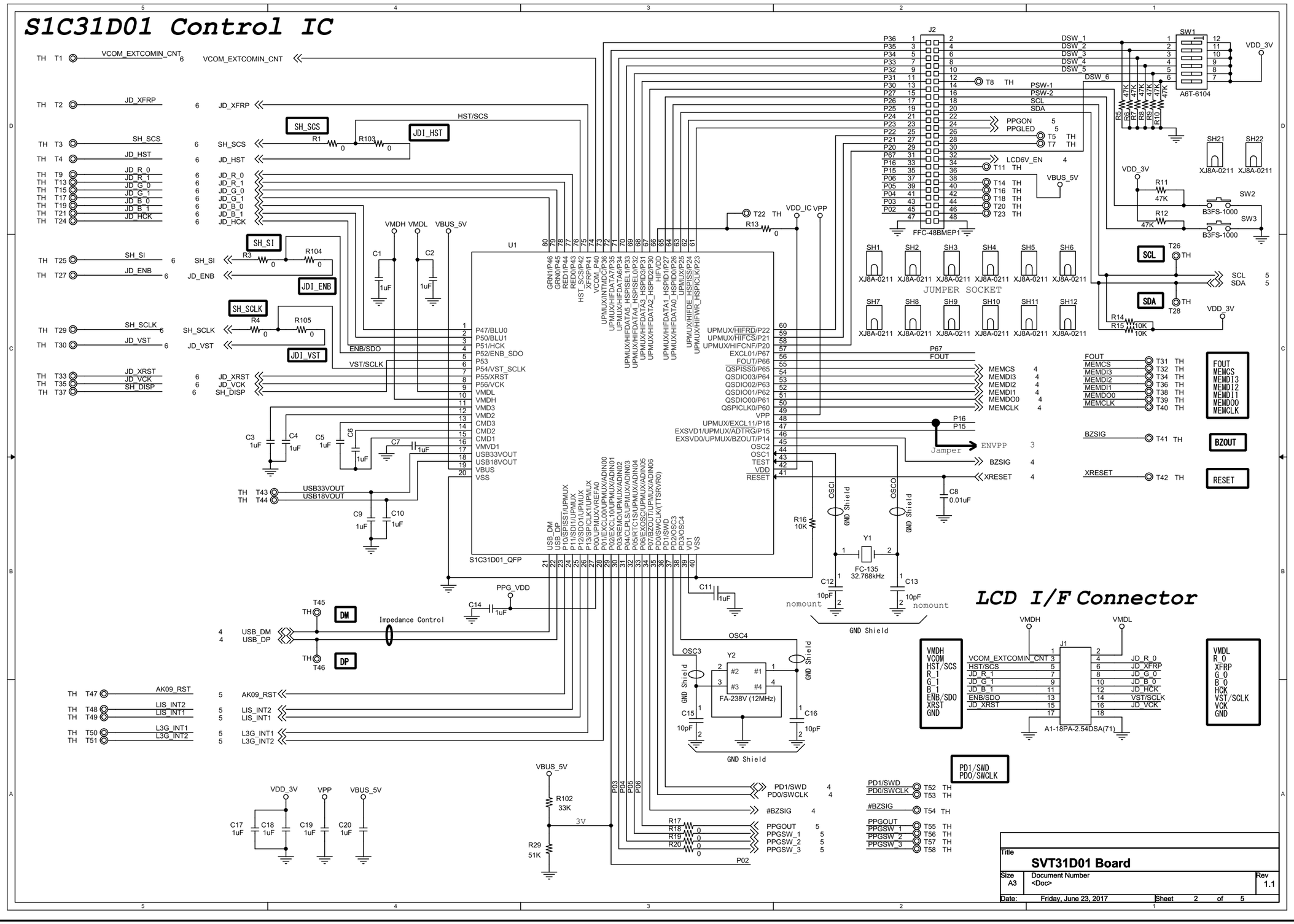


Figure 2.2 Setting SVT31D01 DIP Switch SW1-6

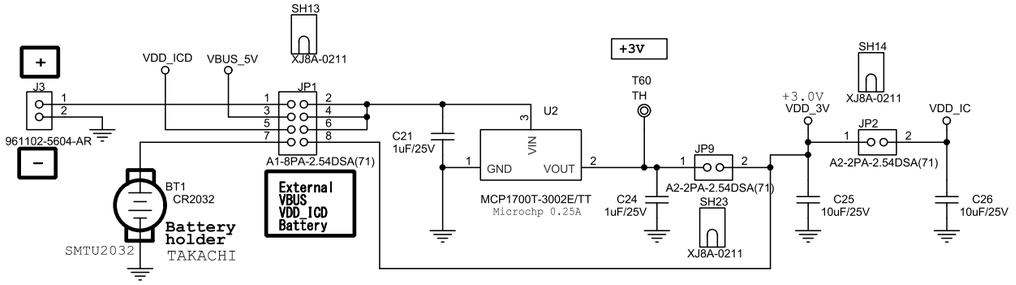
2) Supply power as shown in Section 2.2, "Selecting Power Source." The MCU on the SVT31D01 board starts operating and a demo screen is displayed on the memory LCD. When a cable is required to supply power, please prepare it.

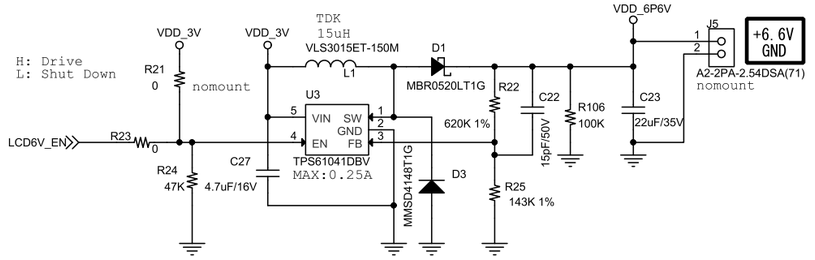
Appendix A Circuit Diagrams



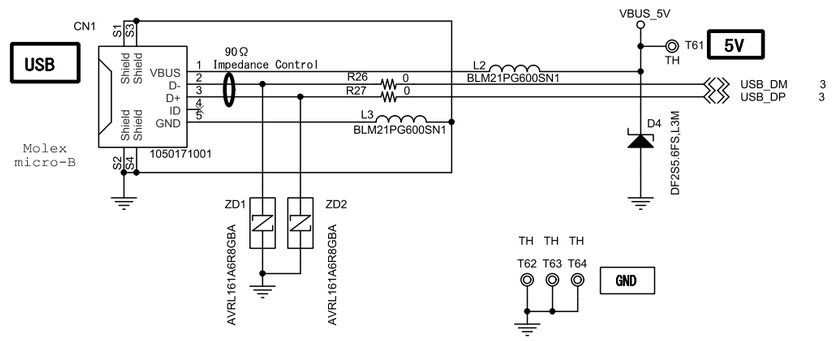

S1C31D01 Control IC
S1C31D01_QFP
LCD I/F Connector
JUMPER SOCKET
FFC-48BMEP1
A6T-6104
A1-18PA-2.54DSA(71)
FC-135 32.768kHz
FA-238V (12MHz)
Impedance Control
Jamper
GND Shield
Title
SVT31D01 Board
Size A3
Document Number <Doc>
Rev 1.1
Date: Friday, June 23, 2017
Sheet 2 of 5

POWER

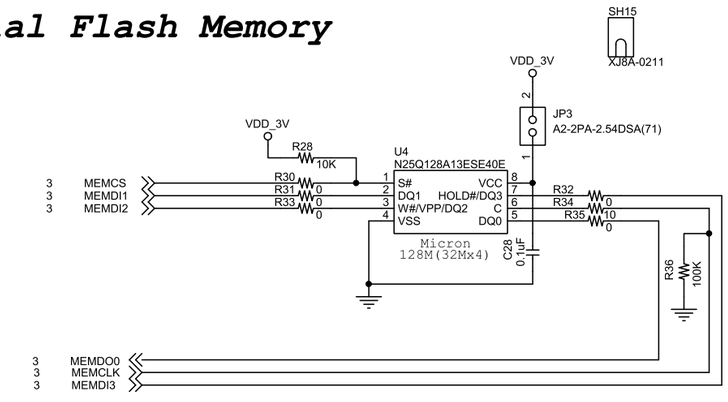




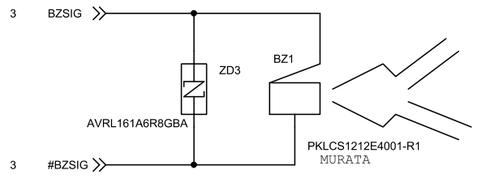
USB I/F



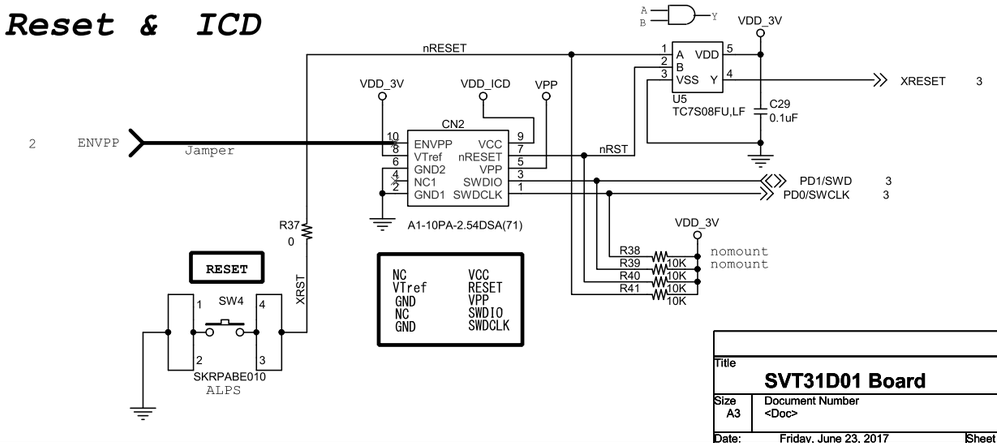
Serial Flash Memory



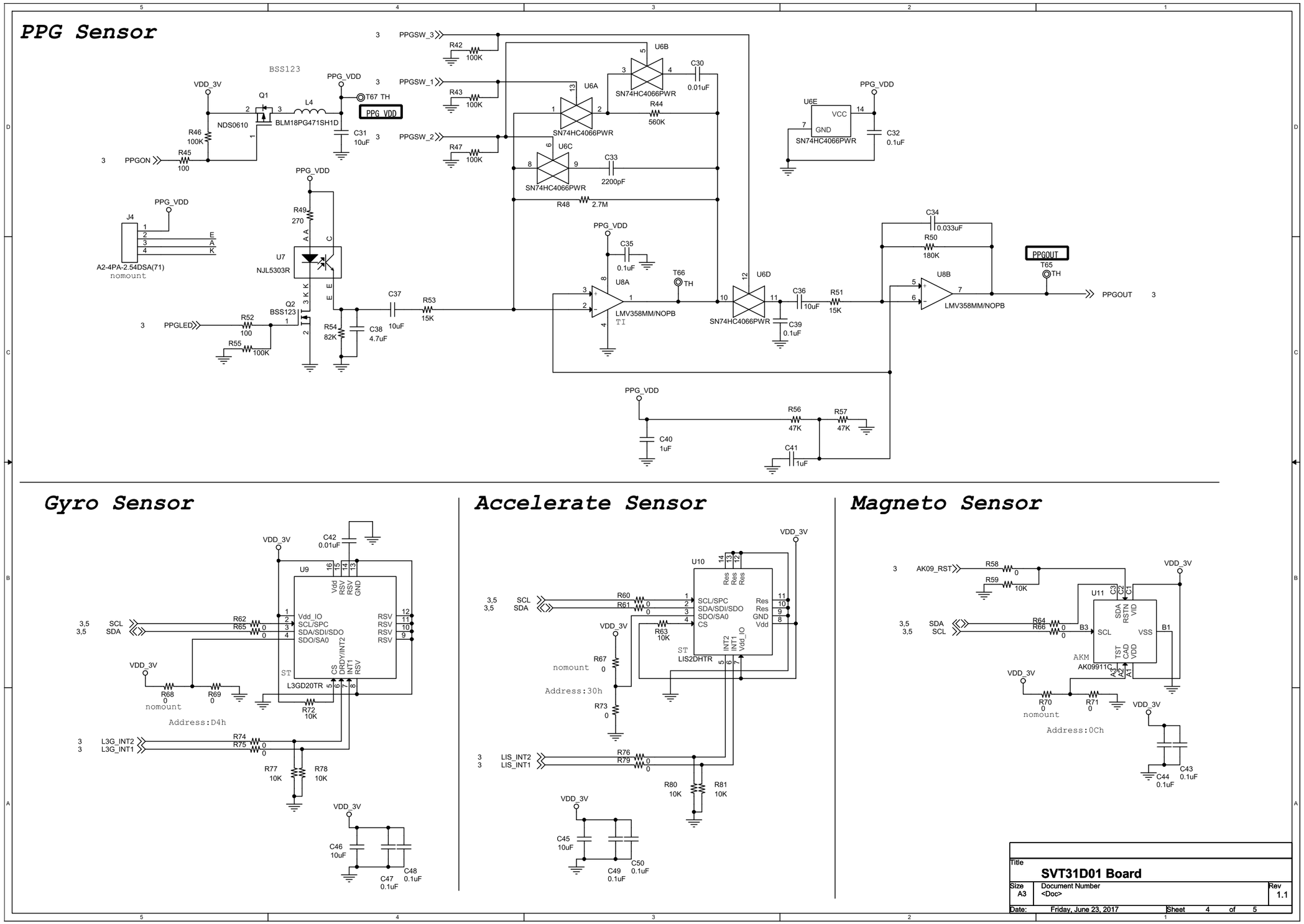
BUZZER



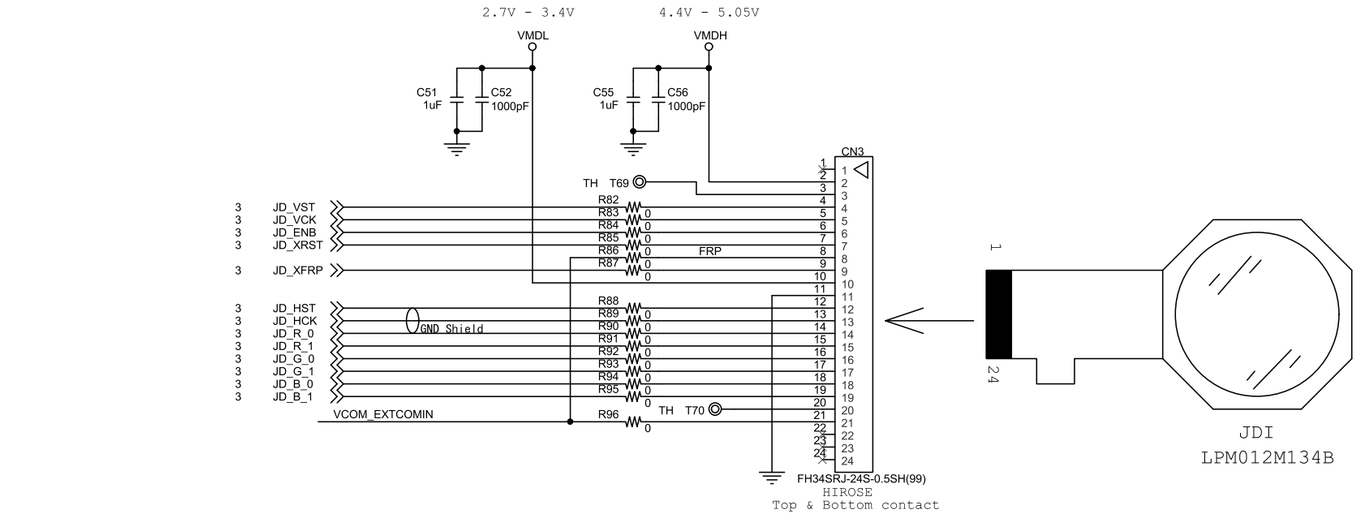
Reset & ICD

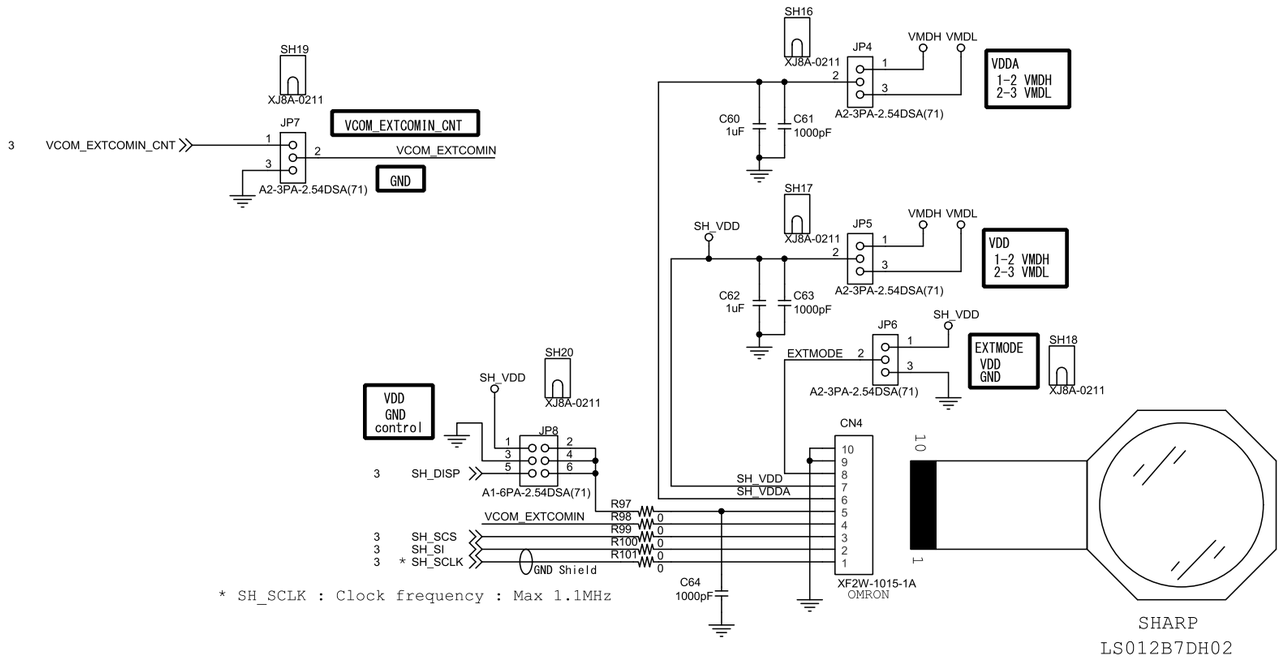


Title	SVT31D01 Board	
Size A3	Document Number <Doc>	Rev 1.1
Date: Friday, June 23, 2017	Sheet 3 of 5	


PPG Sensor
BSS123
VDD_3V
PPG_VDD
Q1
NDS0610
L4
BLM18PG471SH1D
T67 TH
PPG_VDD
R46 100K
R45 100
C31 10uF
PPGON
PPGSW_3
PPGSW_1
PPGSW_2
R42 100K
R43 100K
R47 100K
U6B
U6A
U6C
U6E
SN74HC4066PWR
C30 0.01uF
R44 560K
C33 2200pF
R48 2.7M
VCC
GND
C32 0.1uF
J4
A2-4PA-2.54DSA(71)
nomount
R49 270
U7
NJL5303R
Q2
BSS123
R52 100
R55 100K
R54 82K
C38 4.7uF
C37
R53 15K
PPGLED
C35 0.1uF
U8A
LMV358MM/NOPB
TI
T66 TH
U6D
C36 10uF
C39 0.1uF
R51 15K
C34 0.033uF
R50 180K
U8B
PPGOUT
T65 TH
R56 47K
R57 47K
C40 1uF
C41 1uF
Gyro Sensor
U9
L3GD20TR
Vdd_IO
SCL/SPC
SDA/SDI/SDO
SDO/SA0
CS
DRDY/INT2
INT1
RSV
GND
C42 0.01uF
R62
R65
R68 0 nomount
R69 0
R72 10K
Address:D4h
L3G_INT2
L3G_INT1
R74
R75
R77 10K
R78 10K
C46 10uF
C47 0.1uF
C48 0.1uF
Accelerate Sensor
U10
LIS2DHTR
SCL/SPC
SDA/SDI/SDO
SDO/SA0
CS
Vdd_IO
INT1
INT2
Res
GND
Vdd
R60
R61
R63 10K
R67 0 nomount
R73 0
Address:30h
LIS_INT2
LIS_INT1
R76
R79
R80 10K
R81 10K
C45 10uF
C49 0.1uF
C50 0.1uF
Magneto Sensor
AK09_RST
R58 0
R59 10K
U11
AK09911C
SCL
SDA
RSTN
VID
TST
CAD
VDD
VSS
R64
R66
R70 0 nomount
R71 0
Address:0Ch
C44 0.1uF
C43 0.1uF
Title
SVT31D01 Board
Size A3
Document Number <Doc>
Rev 1.1
Date: Friday, June 23, 2017
Sheet 4 of 5

LCD I/F





Title	SVT31D01 Board	
Size A3	Document Number <Doc>	Rev 1.1
Date: Friday, June 23, 2017	Sheet 5 of 5	

Appendix B Parts List

Note ! Parts are subject to change without notice.

Item	Qty	Reference	Part (Product number)	Manufacture	Specification	Remarks
1	1	BT1	SMTU2032-LF.TR	TAKACHI	CR2032 coin cell battery holder	
2	1	BZ1	PKLCS1212E4001-R1	MURATA	Piezoelectric sounder, external drive type	
3	1	CN1	1050171001	Molex	USB Micro-B connector	
4	1	CN2	A1-10PA-2.54DSA(71)	HIROSE	Dual-row 10-pin	
5	1	CN3	FH34SRJ-24S-0.5SH(99)	HIROSE	FPC connector, top and bottom contact orientation	
6	1	CN4	XF2W-1015-1A	OMRON	FPC connector	
7	21	C1, C2, C3, C4, C5, C6, C7, C9, C10, C11, C14, C17, C18, C19, C20, C40, C41, C51, C55, C60, C62	CL10A105KL8NNNC	Samsung	1 µF	
8	3	C8, C30, C42	CL10B103KA8NNNC	Samsung	0.01 µF	
9	2	C12, C13	CL10C100CB8NNNC	Samsung	10 pF	Not mounted
10	2	C15, C16	CL10C100CB8NNNC	Samsung	10 pF	
11	2	C21, C24	CL10A105KL8NNNC	Samsung	1 µF/25 V	
12	1	C22	CL10C150JB8NNNC	Samsung	15 pF/50 V	
13	1	C23	C3216X5R1V226M160AC	TDK	22 µF/35 V	
14	2	C25, C26	CL21A106KAFN3NE	Samsung	10 µF/25 V	
15	1	C27	CL10A475KO8NNNC	Samsung	4.7 µF/16 V	
16	11	C28, C29, C32, C35, C39, C43, C44, C47, C48, C49, C50	CL10B104KA8NNNC	Samsung	0.1 µF	
17	1	C38	CL10A475KO8NNNC	Samsung	4.7 µF	
18	1	C33	CL10B222KB8NNNC	Samsung	2200 pF	
19	1	C34	CL10B333KB8NNNC	Samsung	0.033 µF	
20	5	C31, C36, C37, C45, C46	CL21A106KAFN3NE	Samsung	10 µF	
21	5	C52, C56, C61, C63, C64	CL10B102KB8NNNC	Samsung	1000 pF	
22	1	D1	MBR0520LT1G	ON Semiconductor		
23	1	D3	MMSD4148T1G	ON Semiconductor		
24	1	D4	DF2S5.6FS,L3M	TOSHIBA	ESD protection diode	
25	1	JP1	A1-8PA-2.54DSA(71)	HIROSE	Dual-row 8-pin	
26	1	JP8	A1-6PA-2.54DSA(71)	HIROSE	Dual-row 6-pin	
27	3	JP2, JP3, JP9	A2-2PA-2.54DSA(71)	HIROSE	Single row 2-pin	
28	1	J5	A2-2PA-2.54DSA(71)	HIROSE		Not mounted
29	4	JP4, JP5, JP6, JP7	A2-3PA-2.54DSA(71)	HIROSE	Single row 3-pin	
30	1	J1	A1-18PA-2.54DSA(71)	HIROSE	Dual-row 18-pin	
31	1	J2	FFC-144BMEP1-48P	HONDA TSUSHIN	Dual-row 48-pin	
32	1	J3	961102-5604-AR	3M	2-pin pin header angle	
33	1	L1	VLS3015ET-150M	TDK		
34	2	L2, L3	BLM21PG600SN1D	MURATA		
35	1	L4	BLM18PG471SH1D	MURATA		
36	1	Q2	BSS123	FAIRCHILD		
37	1	Q1	NDS0610	FAIRCHILD	P-MOS	
38	54	R1, R3, R4, R13, R17, R18, R19, R20, R23, R26, R27, R30, R31, R32, R33, R35, R37, R58, R60, R61, R62, R64, R65, R66, R69, R71, R73, R74, R75, R76, R79, R82, R83, R84, R85, R86, R87, R88, R89, R90, R91, R92, R93, R94, R95, R96, R97, R98, R99, R100, R101, R103, R104, R105	RMCF0603ZT0R00	Stackpole	0	
39	11	R5, R6, R7, R8, R9, R10, R11, R12, R24, R56, R57	RMCF0603JT47K0	Stackpole	47 kΩ	
40	13	R14, R15, R16, R28, R40, R41, R59, R63, R72, R77, R78, R80, R81	RMCF0603JT10K0	Stackpole	10 kΩ	
41	4	R21, R67, R68, R70	RMCF0603ZT0R00	Stackpole	0	Not mounted
42	1	R22	RMCF0603FT620K	Stackpole	620 kΩ 1%	
43	1	R25	RMCF0603FT143K	Stackpole	143 kΩ 1%	
44	1	R29	RMCF0603JT51K0	Stackpole	51 kΩ	
45	1	R34	RMCF0603JT10R0	Stackpole	10 Ω	
46	6	R36, R42, R43, R46, R47, R55	RMCF0603JT100K	Stackpole	100 kΩ	
47	2	R38, R39	RMCF0603JT10K0	Stackpole	10 kΩ	Not mounted
48	1	R44	RMCF0603JT560K	Stackpole	560 kΩ	
49	2	R45, R52	RMCF0603JT100R	Stackpole	100 Ω	

Item	Qty	Reference	Part (Product number)	Manufacture	Specification	Remarks
50	1	R48	RMCF0603JT2M70	Stackpole	2.7 MΩ	
51	1	R49	RMCF0603JT270R	Stackpole	270 Ω	
52	1	R50	RMCF0603JT180K	Stackpole	180 kΩ	
53	2	R51, R53	RMCF0603JT15K0	Stackpole	15 kΩ	
54	1	R54	RMCF0603JT82K0	Stackpole	82 kΩ	
55	1	R102	RMCF0603JT33K0	Stackpole	33 kΩ	
56	23	SH1, SH2, SH3, SH4, SH5, SH6, SH7, SH8, SH9, SH10, SH11, SH12, SH13, SH14, SH15, SH16, SH17, SH18, SH19, SH20, SH21, SH22 SH23	XJ8A-0211	OMRON		
57	1	SW1	A6T-6104	OMRON	6-bit DIP switch	
58	2	SW2, SW3	B3FS-1000	OMRON	Push switch	
59	1	SW4	SKRPABE010	ALPS	Push switch for reset	
60	1	U1	S1C31D01_QFP	EPSON	MCU IC chip, TQFP14-80pin	
61	1	U2	MCP1700T-3002E/TT	MICROCHIP	Linear regulator	
62	1	U3	TPS61041DBVR	TI	3 V-to-6.6 V DC/DC converter	
63	1	U4	N25Q128A13ESE40E	Micron	Quad SPI flash	
64	1	U5	TC7S08FU, LF	TOSHIBA	1-gate AND	
65	1	U6	SN74HC4066PWR	TI	Bidirectional analog switch	
66	1	U7	NJL5303R-TE1	JRC	Photoreflector	
67	1	U8	LMV358MM/NOPB	TI	Operational amplifier	
68	1	U9	L3GD20TR	ST	Gyro sensor	
69	1	U10	LIS2DHTR	ST	Acceleration sensor	
70	1	U11	AK09911C	AKM	Geomagnetic sensor	
71	1	Y1	FC-135 32.7680KA-AC3	EPSON	32.768 kHz, CL = 9 pF	
72	1	Y2	FA-238V 12.0000MB-K3	EPSON	12 MHz, f_tol = 50 ppm, CL = aprox. 10 pF	
73	3	ZD1, ZD2, ZD3	AVRL161A6R8GTA	TDK		
74	1	LCD panel	LPM012M134B	JDI	Memory LCD module	
75	4	M3 spacer	ASP-310	Hirosugi	10 mm	
76	4		M3 screw	Maruei sangyou		
77	1	J4	A2-4PA-2.54DSA(71)	HIROSE		Not mounted
78	1	R106	RMCF0603JT100K		100 kΩ	

Revision History

Attachment-1

Rev. No.	Date	Page	Category	Contents
Rev 1.0	2017/03/10	All	New	New establishment
Rev 1.1	2017/06/23	Last page	Revision	Changed Japan section name
Rev. 1.2	2017/07/06	1, 2, 5, 6–11	Revision	Modified to support ENVPP signal and Bridge Board Ver. 2

EPSON

International Sales Operations

AMERICA

EPSON ELECTRONICS AMERICA, INC.
214 Devcon Drive,
San Jose, CA 95112, USA
Phone: +1-800-228-3964 FAX: +1-408-922-0238

EUROPE

EPSON EUROPE ELECTRONICS GmbH
Riesstrasse 15, 80992 Munich,
GERMANY
Phone: +49-89-14005-0 FAX: +49-89-14005-110

ASIA

EPSON (CHINA) CO., LTD.
4th Floor, Tower 1 of China Central Place, 81 Jianguo Road, Chaoyang District, Beijing 100025 China
Phone: +86-10-8522-1199 FAX: +86-10-8522-1120

SHANGHAI BRANCH
Room 1701 & 1704, 17 Floor, Greenland Center II,
562 Dong An Road, Xu Hui District, Shanghai, CHINA
Phone: +86-21-5330-4888 FAX: +86-21-5423-4677

SHENZHEN BRANCH
Room 804-805, 8 Floor, Tower 2, Ali Center,No.3331
Keyuan South RD(Shenzhen bay), Nanshan District, Shenzhen
518054, CHINA
Phone: +86-10-3299-0588 FAX: +86-10-3299-0560

EPSON TAIWAN TECHNOLOGY & TRADING LTD.
14F, No. 7, Song Ren Road,
Taipei 110, TAIWAN
Phone: +886-2-8786-6688 FAX: +886-2-8786-6660

EPSON SINGAPORE PTE., LTD.
1 HarbourFront Place,
#03-02 HarbourFront Tower One, Singapore 098633
Phone: +65-6586-5500 FAX: +65-6271-3182

SEIKO EPSON CORP.
KOREA OFFICE
19F, KLI 63 Bldg., 60 Yoido-dong,
Youngdeungpo-Ku, Seoul 150-763, KOREA
Phone: +82-2-784-6027 FAX: +82-2-767-3677

SEIKO EPSON CORP.
SALES & MARKETING DIVISION

Device Sales & Marketing Department
421-8, Hino, Hino-shi, Tokyo 191-8501, JAPAN
Phone: +81-42-587-5816 FAX: +81-42-587-5116

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