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CMOS 4-BIT SINGLE CHIP MICROCOMPUTER

S5U1C6F632T1/T2 (SVT6F632)

Hardware Manual

(Software eValuation Tool for S1C6F632)

SEIKO EPSON CORPORATION

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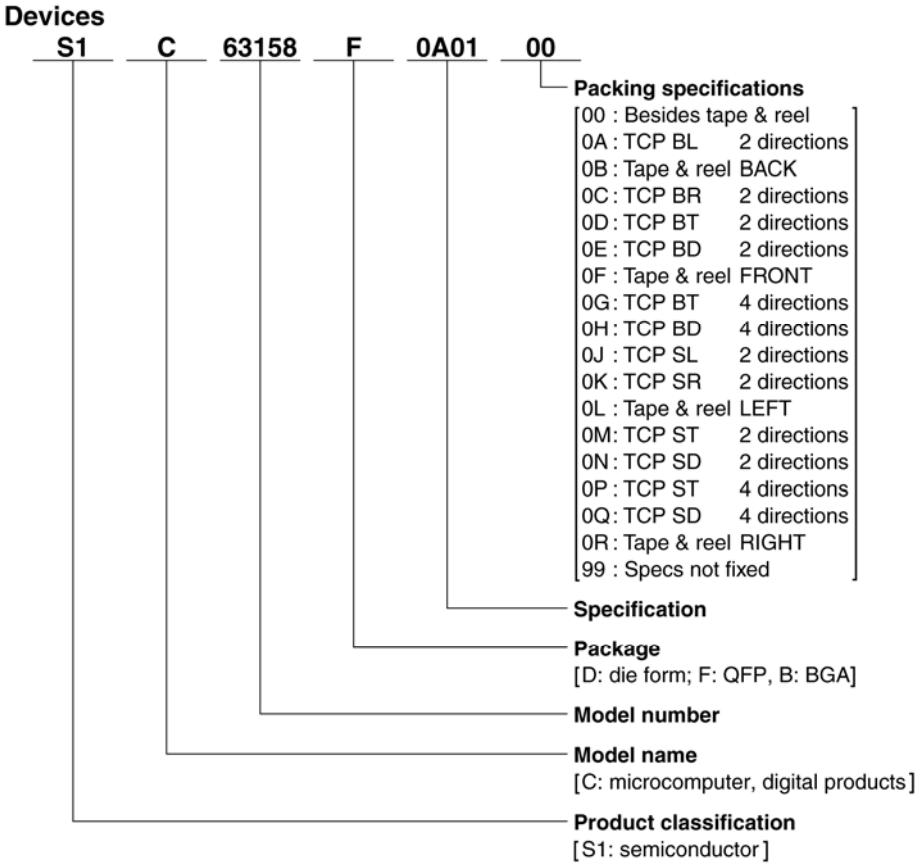
Configuration of product number



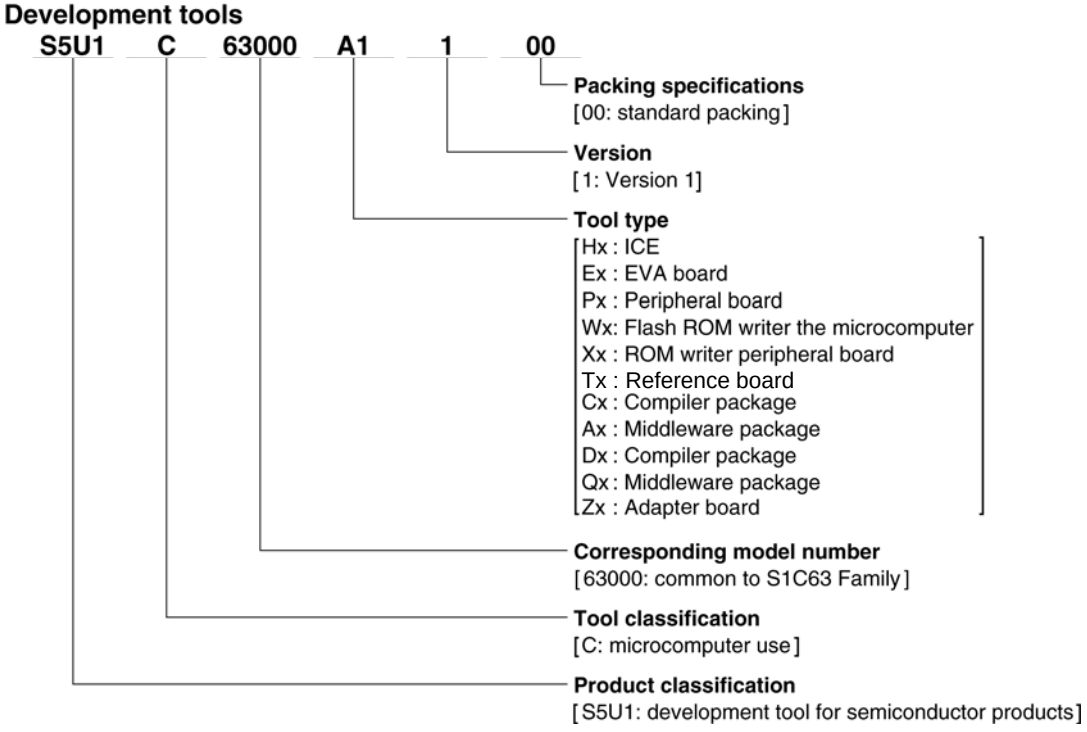


Table of Contents

1. Overview

The S5U1C6F632T1/T2 (SVT6F632: Software eValuation Tool for S1C6F632) are evaluation boards for the S1C6F632 single-chip microcomputer made by Seiko Epson. These boards feature a circuit structure designed for the Weather Center, which is an example of one of S1C6F632's applications. The S1C6F632's internal circuit functions can drive a 48 seg. x 32 com LCD, measure temperature and humidity, and produce a buzzer output. Equipped with an external pressure sensor and an illumination sensor, the S5U1C6F632T1/T2 boards provide power-saving control based on weather forecasts and illumination intensity.

The SVT6F632 comes with two types of boards: S5U1C6F632T1 and S5U1C6F632T2. The S5U1C6F632T1 is capable of standalone operations, while the S5U1C6F632T2 can connect to the In-Circuit Emulator (ICE63: S5U1C63000H) for software debugging. Each board is provided with an expansion connector to allow clients to connect custom boards.

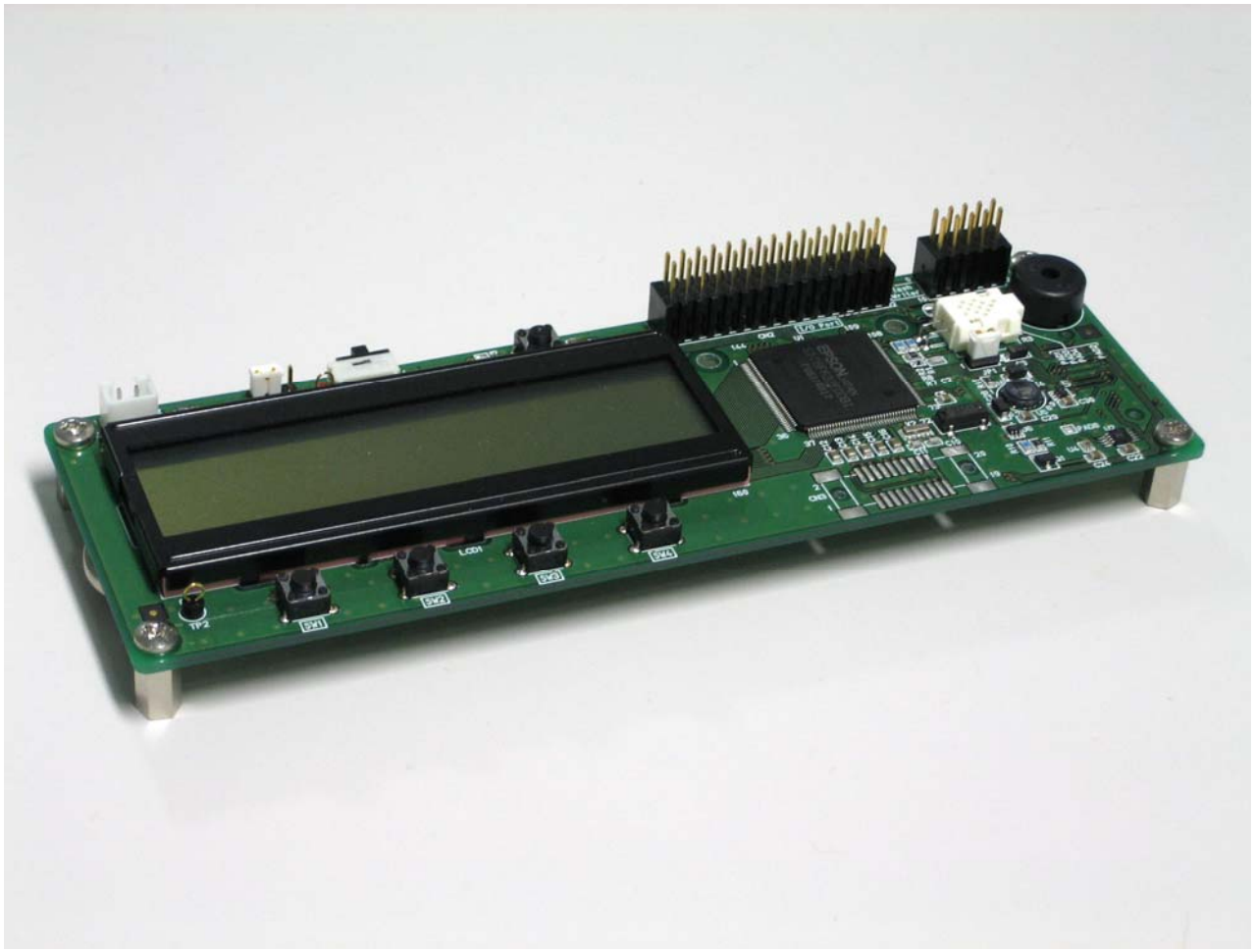


Figure 1.1 External view of S5U1C6F632T1

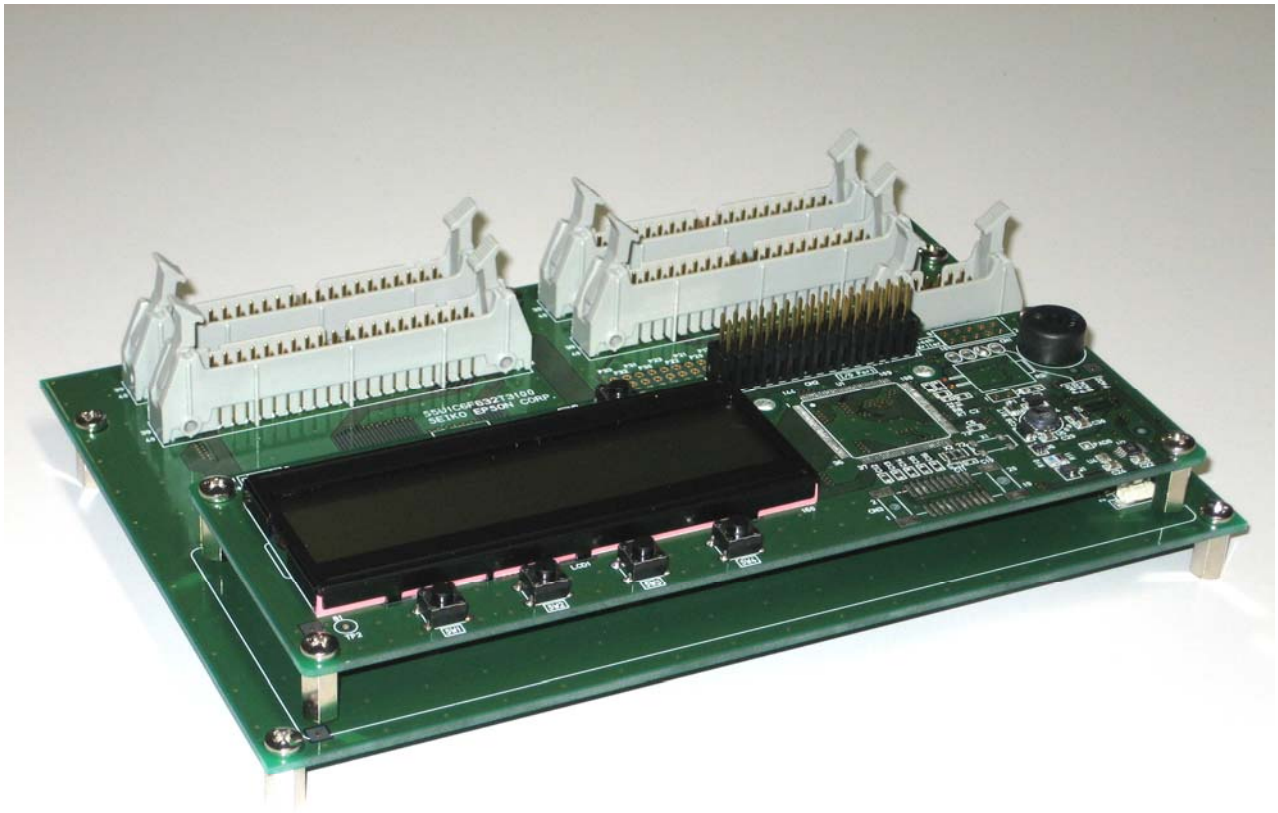


Figure 1.2 External view of S5U1C6F632T2

1.1 Features

■ S5U1C6F632T1

1)	CPU	S1C6F632 (mask option specification: Standard Type B)
2)	Input power supply voltage	+3.0 V(DC), supplied by coin cell (CR2032) or external power source (+5.0 V)
3)	CPU clock	OSC1: 32.768 Hz (crystal oscillator), OSC3: 4 MHz (ceramic oscillator)
4)	Functions/devices	• Reset switch • USB-Serial on Board Writer connector (CN1) • Expansion connector and board pattern (CN2, CN3) • Switch input (4 keys) • Temperature and humidity sensors • Pressure sensor • Illumination sensor • Piezo buzzer • STN LCD panel (128 seg. x 32 com, black and white) * Effective display area: 48 seg. x 32 com

■ S5U1C6F632T2

1)	CPU	S1C6F632 (operated by ICE63)
2)	Input power supply voltage	+3.3 V(DC), supplied from ICE63 through I/O cable
3)	CPU clock	OSC1: 32.768 Hz, OSC3: 4 MHz (based on oscillation frequency adjustment on ICE63's internal peripheral circuit board)
4)	Functions/devices	• Reset switch • Expansion connector and board pattern (CN2, CN3) • Switch input (4 keys) • Pressure sensor • Illumination sensor • Piezo buzzer • STN LCD panel (128 seg. x 32 com, black and white) * Effective display area: 48 seg. x 32 com

1.2 Package contents

The S5U1C6F632T1/T2 package contains the following items.

■ S5U1C6F632T1

(1) Board (main unit) 1
(2) Coin cell (CR2032/3.0 V) 1
(3) External power cable 1
(4) Warranty card ..... 1 in English & 1 in Japanese
(5) Precautions ..... 1 in English & 1 in Japanese
(6) Manual download instructions ..... 1 in English & 1 in Japanese

■ S5U1C6F632T2

(1) Board (main unit, double-board configuration) 1
(2) Warranty card ..... 1 in English & 1 in Japanese
(3) Precautions ..... 1 in English & 1 in Japanese
(4) Manual download instructions ..... 1 in English & 1 in Japanese

2. Component Names and Functions

2.1 Component names

The component names and functions are given below.

■ S5U1C6F632T1

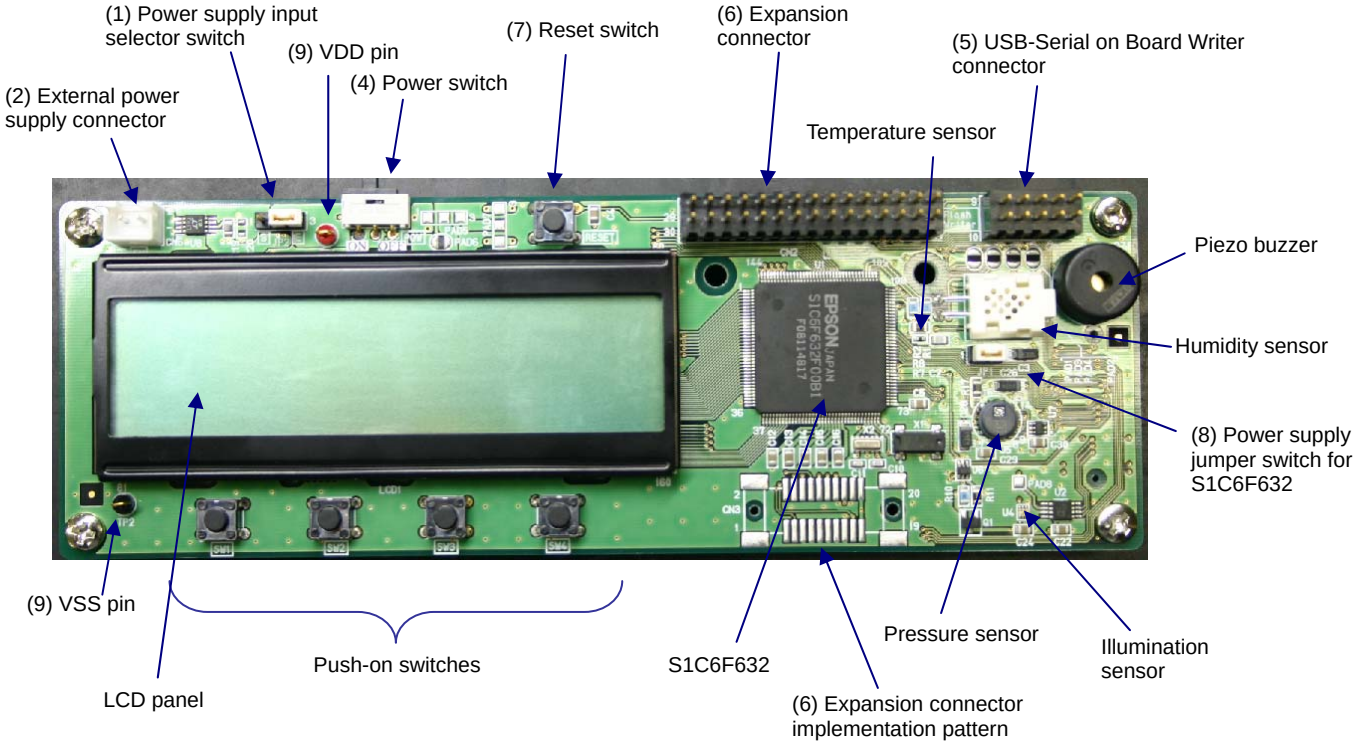


Figure 2.1.1 Names of components mounted on the upper side of S5U1C6F632T1

Figure 2.1.2 Names of components mounted on the underside of the S5U1C6F632T1

■ S5U1C6F632T2

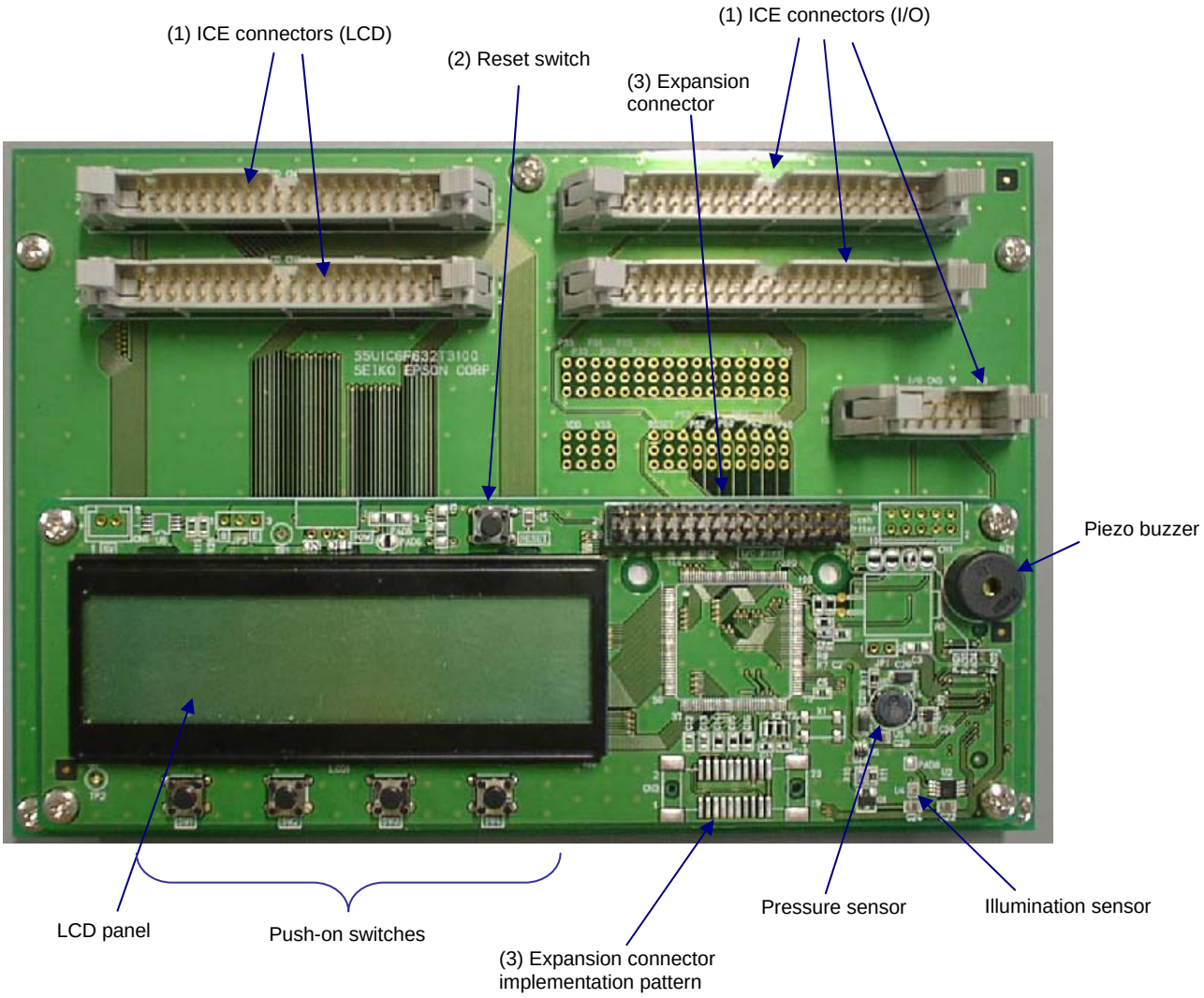


Figure 2.1.3 Names of components mounted on the upper side of S5U1C6F632T2

2.2 Component functions

■ S5U1C6F632T1

(1) Power supply input selector switch

This jumper switch (JP2) is used to select the method of power supply. The S5U1C6F632T1 board can operate on a coin cell or external power supply. When a coin cell is used, set this switch to "B." To use an external power source, set the switch to "E."

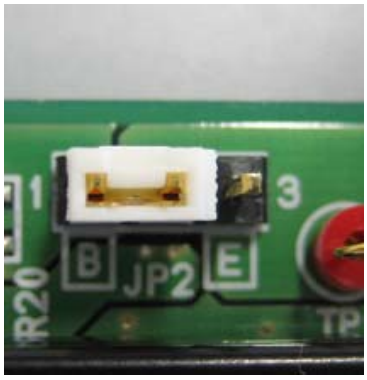


Figure 2.2.1 (a) Switch setting for use of coin cell

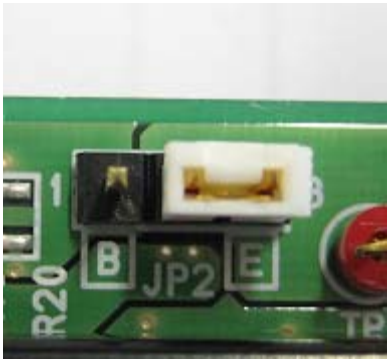


Figure 2.2.1 (b) Switch setting for use of external power supply

(2) External power supply connector

This connector is used to provide a stabilized power supply from an external source. Use the provided power cable to supply power (5.0 V±10%).

(3) Coin cell holder

The coin cell (CR2032) holder is located on the underside of the board. See the instructions below for installing/removing the coin cell.

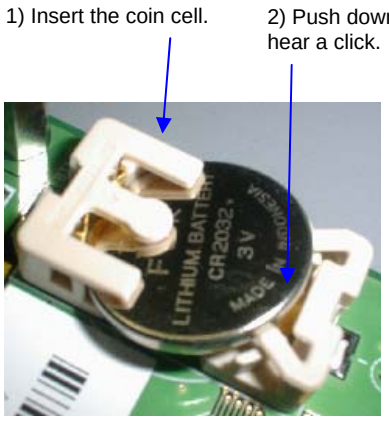


Figure 2.2.2 Installing the coin cell

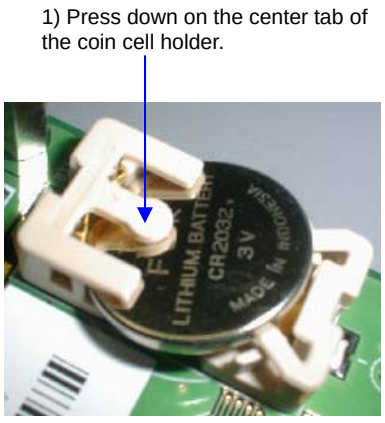


Figure 2.2.3 Removing the coin cell

Caution!
Make sure that the positive side of the coin cell faces up when installing it into the coin cell holder located on the underside of the board.

(4) Power switch

Slide this switch to supply power to the board. When the power supply input selector switch is set to external power supply, the board receives power from the external power supply connector. When the selector is set to coin cell, the board receives power from the coin cell.

(5) USB-Serial on Board Writer connector

This connector is used to write programs/data to the internal flash memory of the S1C6F632. Connect the USB-Serial on Board Writer (S5U1C88000W4) to this connector and transfer programs/data from a PC.

Caution!
When writing programs/data to the flash memory, provide an external stabilized power supply, if at all possible. While it is possible to write programs/data to flash memory using the coin cell as the power source, this may result in write errors if the voltage of the coin cell drops below required levels.

(6) Expansion connector, expansion connector implementation pattern

These are used to connect custom client boards for expanded functionality. For more information, refer to "12. External Interface."

(7) Reset switch

Press this switch to initialize the S1C6F632 and peripheral devices for the board.

Caution!
If a PC is connected via the USB-Serial on Board Writer, the writer software in the PC is used for S1C6F632 reset control. Do not press this Reset switch in such cases.

(8) Power supply jumper switch for S1C6F632

Remove this jumper switch (JP1) and connect an ammeter to the pins to measure the current consumed by the S1C6F632. For normal use, keep the jumper switch mounted on the board. See Appendix A for more information.

(9) VDD pin, VSS pin

These pins supply VDD and VSS power to the S1C6F632.

■ S5U1C6F632T2

(1) ICE connectors (I/O, LCD)

These connectors are used to connect the ICE63. Power (+3.3 V) from the ICE63 is supplied through these connectors (I/O).

(2) Reset switch

Press this switch to initialize the peripheral devices for the board and to provide an initialization signal to the connected ICE63.

(3) Expansion connector, expansion connector implementation pattern

These are used to connect custom client boards for expanded functionality. For more information, refer to "12. External Interface."

2.3 Board dimensional diagram

2.3.1 Board dimensions

The dimensions of the boards are given below.

■ S5U1C6F632T1/T2

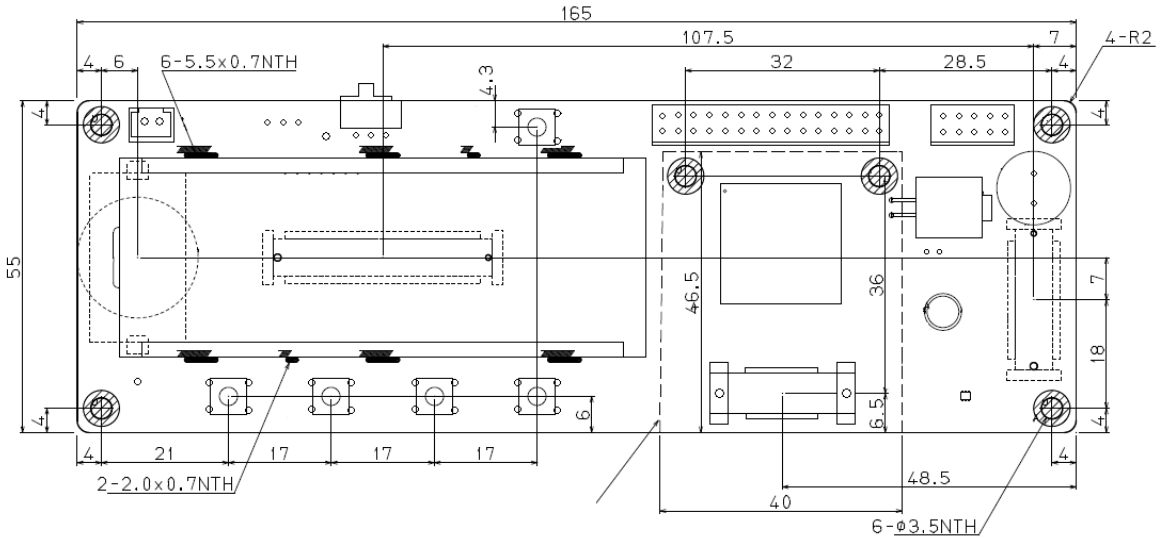


Figure 2.3.1 S5U1C6F632T1 board dimensions

■ S5U1C6F632T2 (interface board)

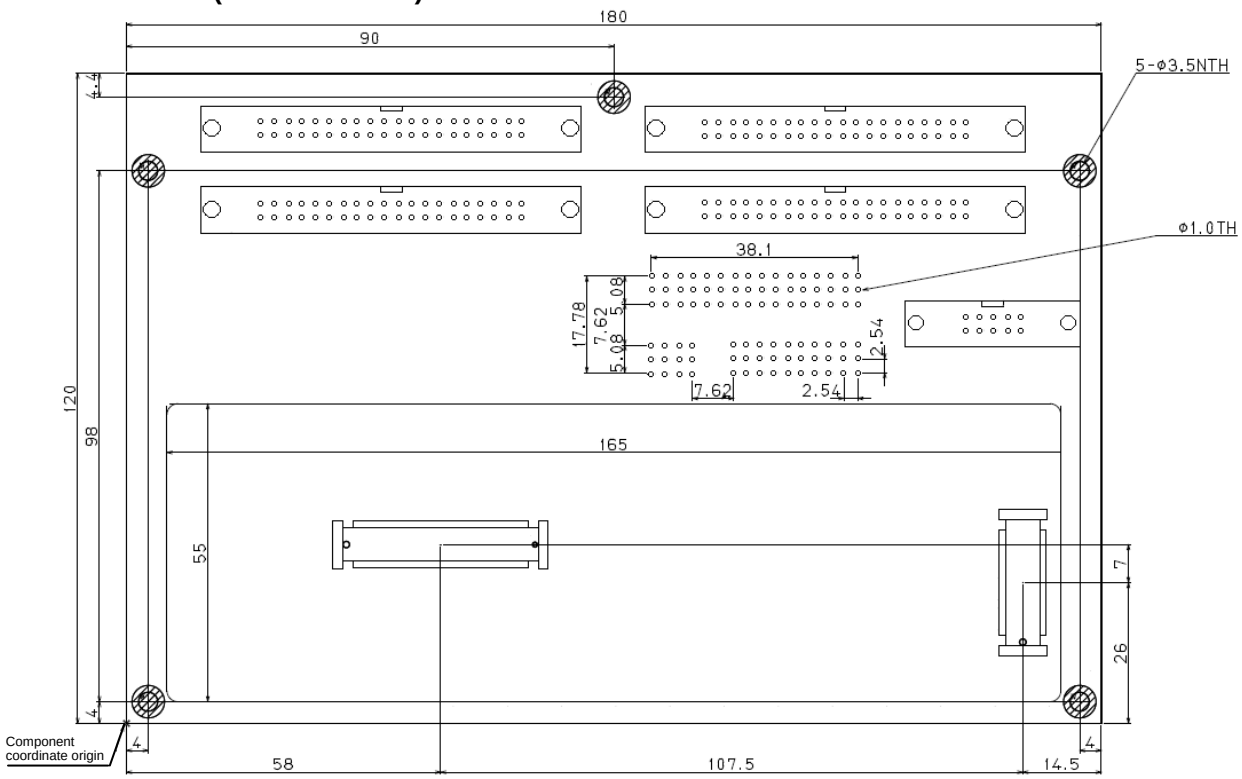


Figure 2.3.2 S5U1C6F632T2 interface board dimensions

* Note

- The unit of measurement is millimeters (mm).

2.3.2 LCD panel dimensions

The dimensions of the LCD panel mounted on the board are given below.

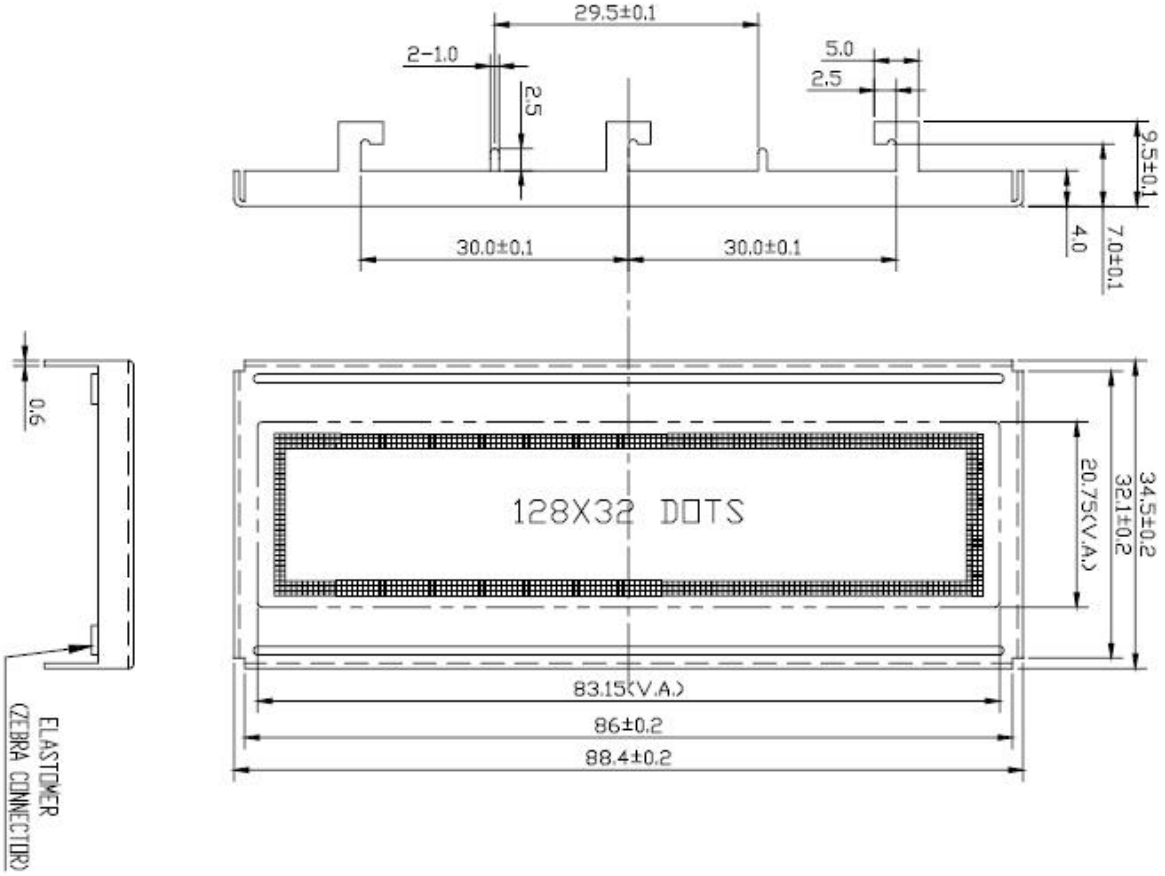


Figure 2.3.3 (a) LCD panel/bezel dimensions

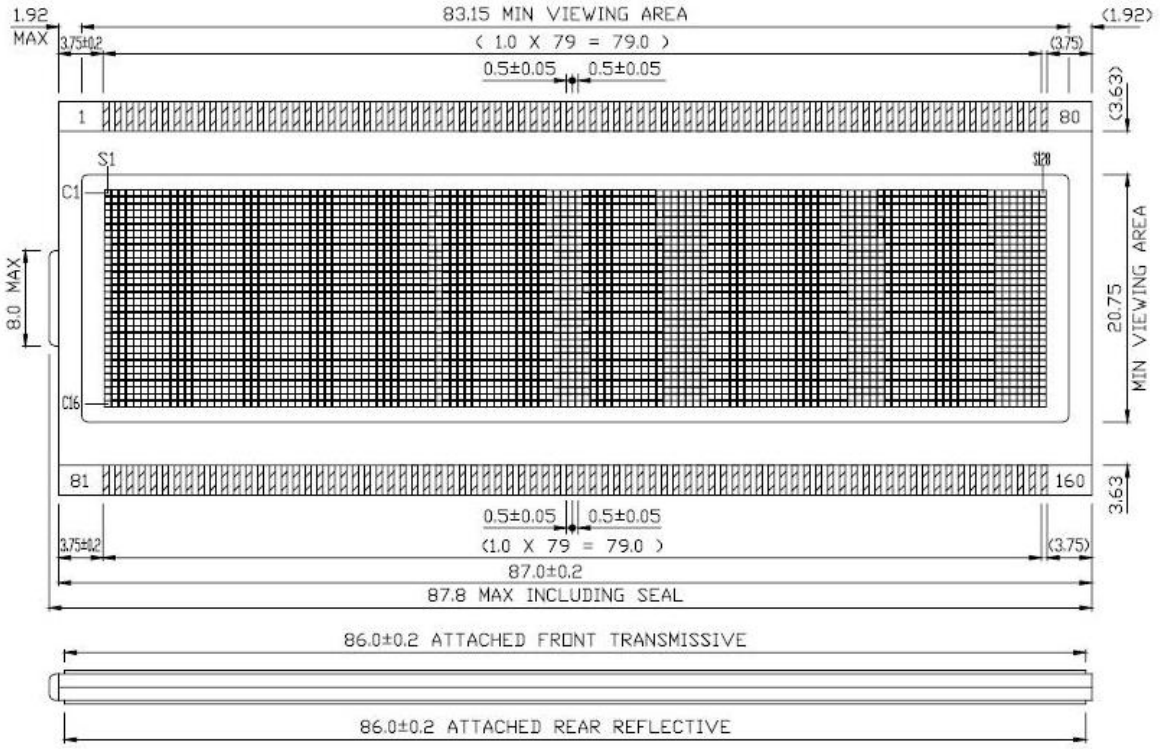


Figure 2.3.3 (b) LCD panel dimensions

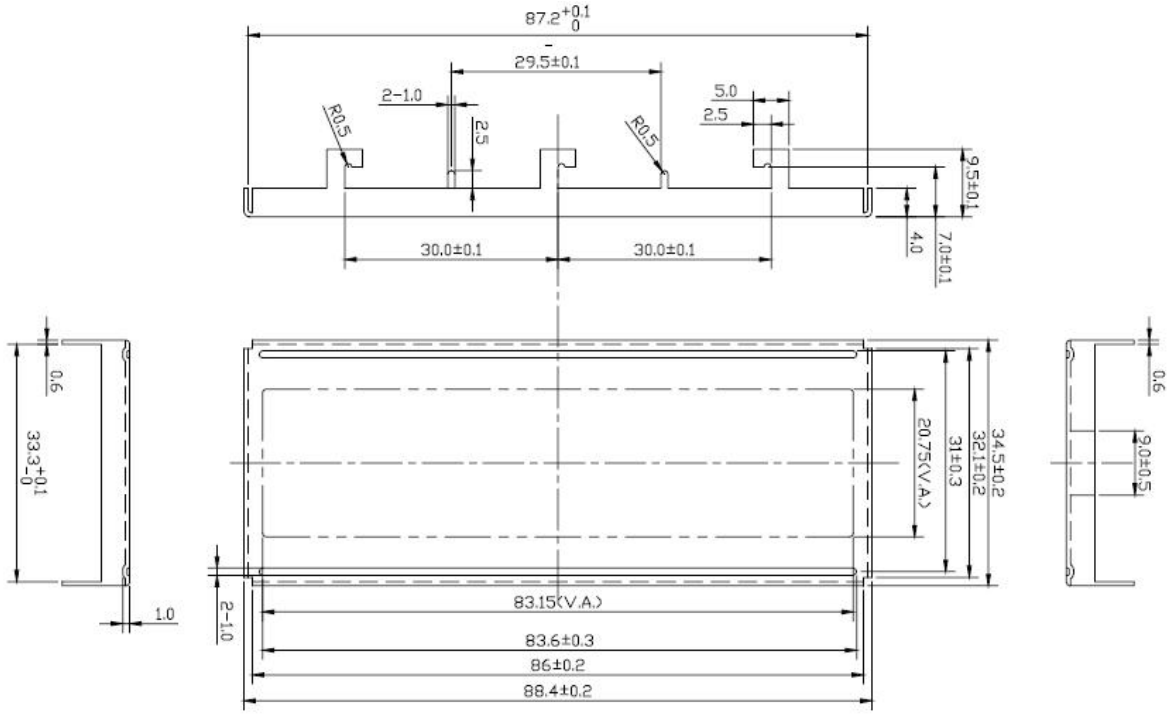


Figure 2.3.3 (c) Bezel dimensions

2.4 Main components

■ S5U1C6F632T1

CPU (U1) ..... S1C6F632 (Seiko Epson)
Crystal oscillator 32.768 kHz (x 1) ..... MC-306 (Epson Toyocom)
Ceramic oscillator (x 2) ..... EFOSS4004E5 (Matsushita)
LCD (LCD1) ..... Custom-made component
Thermistor (R7) ..... 103KT1005 (Ishizuka)
Humidity sensor (R3) ..... C10M53R (Shinyei Technology)
Pressure sensor (U5) ..... SCP1000-D01 (VTI)
Illumination sensor (U4) ..... TPS856 (Toshiba)
A/D converter (U2) ..... AD7466BRM (Analog Devices)
Regulator (U8) ..... LT1962EMS8-3 (Linear Technology)
Piezo buzzer (BZ1) ..... PS1240P02AT (TDK)
Coin cell holder (BT1) ..... BA2032SM (Takachi Electric)
Connector (CN1) ..... HIF3E-10PA-2.54DSA (71) (Hirose Electric)
Connector (CN2) ..... HIF3E-30PA-2.54DSA (71) (Hirose Electric)
Connector (CN6) ..... B2B-XH-A (J.S.T Mfg.)
Switch (SW1, SW2, SW3, SW4, RESET) ..... SKHHDHA010 (Alps Electric)
Switch (POW) ..... 09 10290 01 (SECME)
Coin cell CR2032

<Accessories>
Power cable and connectors ..... XHP-2 (J.S.T Mfg.)

■ S5U1C6F632T2

<Main board: Upper board>
LCD (LCD1) ..... Custom-made component
Pressure sensor (U5) ..... SCP1000-D01 (VTI)
Illumination sensor (U4) ..... TPS856 (Toshiba)
A/D converter (U2) ..... AD7466BRM (Analog Devices)
Piezo buzzer (BZ1) ..... PS1240P02AT (TDK)
Connector (CN1) ..... HIF3E-10PA-2.54DSA (71) (Hirose Electric)
Connector (CN2) ..... HIF3E-30PA-2.54DSA (71) (Hirose Electric)
Switch (SW1, SW2, SW3, SW4, RESET) ..... SKHHDHA010 (Alps Electric)

<Interface board: Lower board>
Connector (P1, P2, P5, P6) 3432-6002LCPL (3M)
Connector (P3) 3662-6002LCPL (3M)

3. Block Diagram

The block diagrams for the SVT6F632 are shown below.

■ S5U1C6F632T1

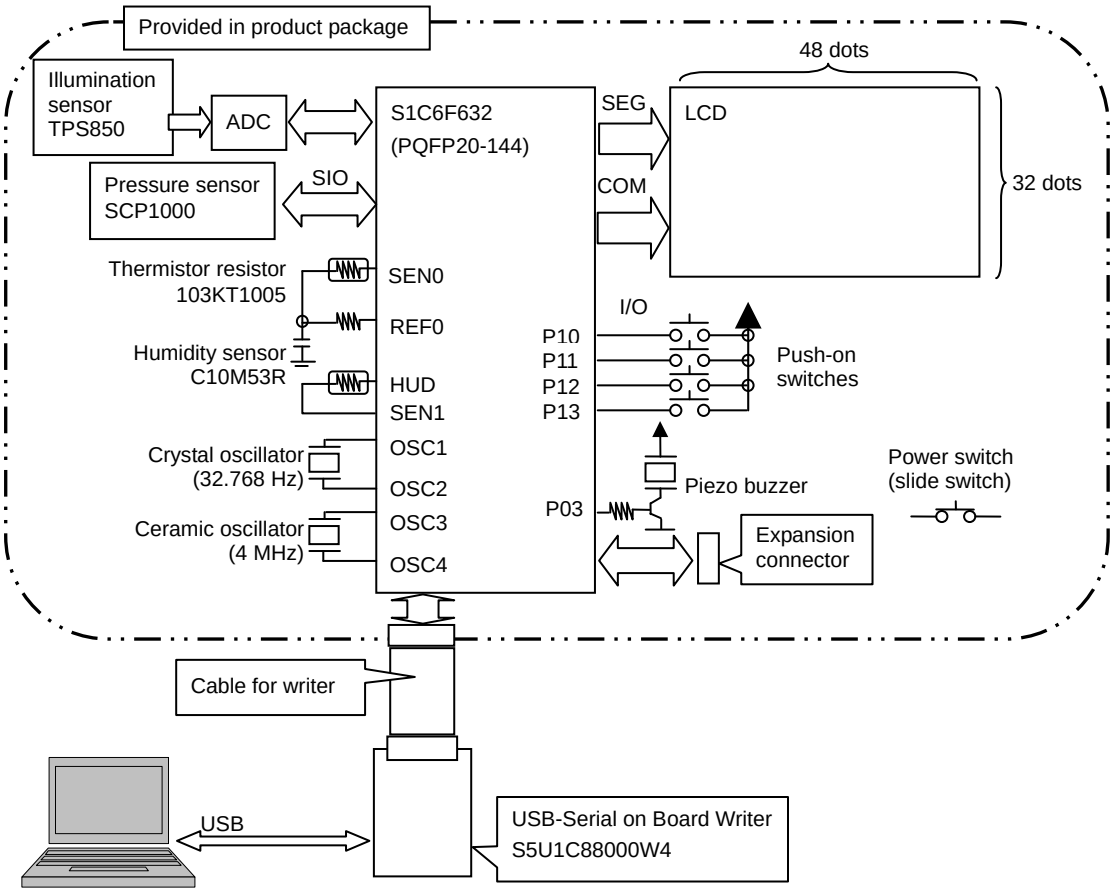


Figure 3.1 S5U1C6F632T1 block diagram

■ S5U1C6F632T2

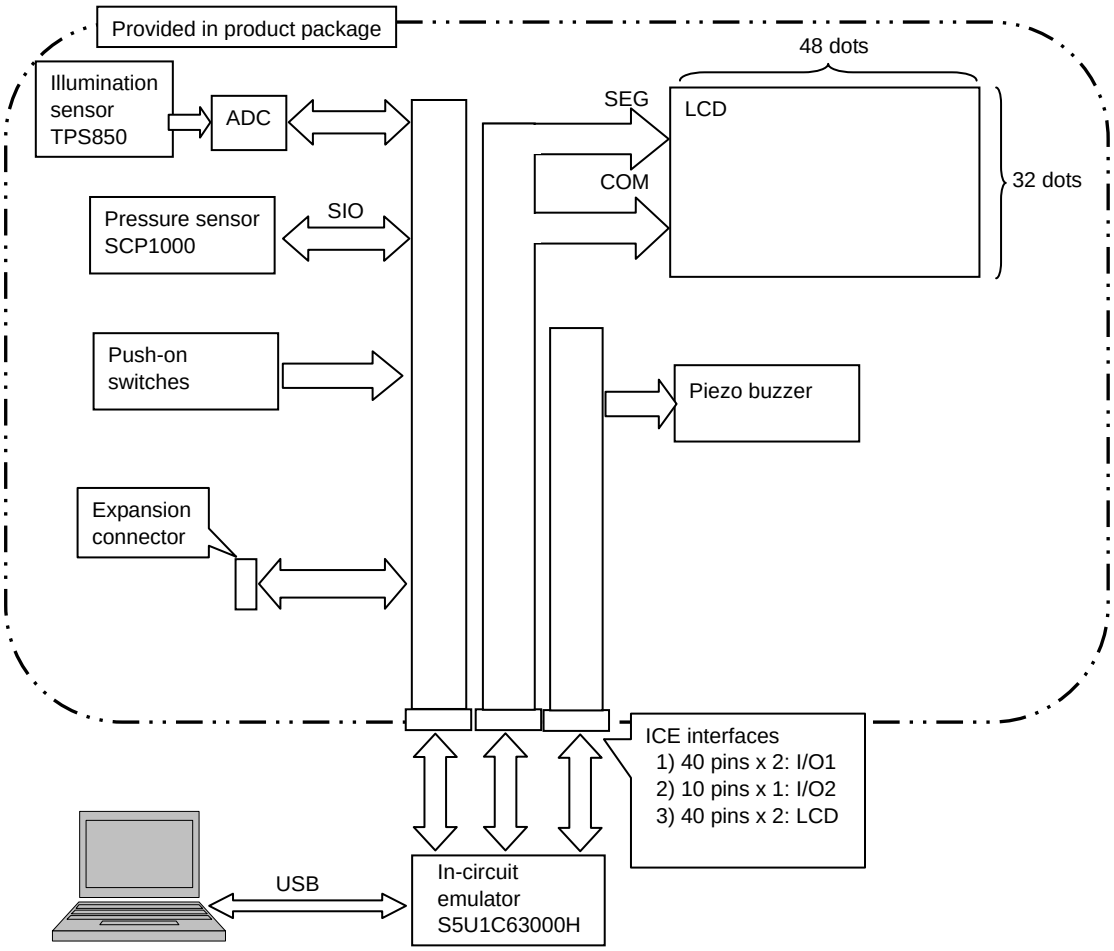


Figure 3.2 S5U1C6F632T2 block diagram

4. Operating Configuration and Startup Procedure

4.1 Standalone operation (S5U1C6F632T1)

With the USB-Serial on Board Writer (S5U1C88000W4) connected, the S5U1C6F632T1 can write programs/data to the internal flash EEPROM of the S1C6F632 mounted on the S5U1C6F632T1 board. Once a program/data is written, the board can run from a coin cell for standalone operations. The corresponding connection configurations and startup procedures are described below.

1) Connecting the USB-Serial on Board Writer

   Connect the USB-Serial on Board Writer (S5U1C88000W4) to the CN1 connector on the S5U1C6F632T1 board.

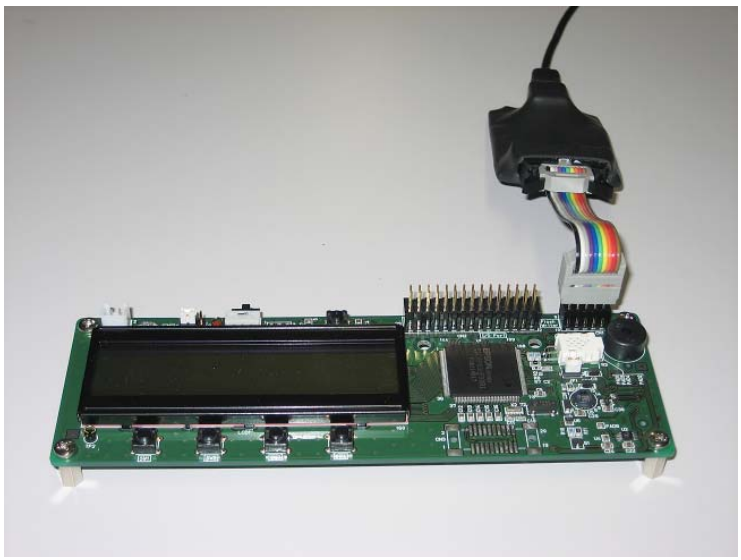


Figure 4.1.1 Connecting the USB-Serial on Board Writer

   Caution!
   Carefully check the position of Pin 1 in the CN1 connector when connecting. The connector lacks a safeguard to prevent reversed connections.

2) Selecting the power supply

   Set the power supply input selector switch correctly. When using a coin cell, set the jumper switch to "B." When using an external power supply, set the switch to "E." For more information, refer to "2. Component Names and Functions."

   Caution!
   When writing programs/data to the flash memory, use an external stabilized power supply, if at all possible. While it is possible to write programs/data to the flash memory by using the coin cell as the power source, this may result in write errors if the voltage of the coin cell drops below required levels.

3) Writing programs/data using the USB-Serial on Board Writer

   Write programs/data to the flash EEPROM by referring to Appendix B "PROM Programming" in the *S1C6F632 Technical Manual*.

4) Operation

   After writing programs/data, turn off the power to the board, disconnect the USB-Serial on Board Writer, then turn on power once again. When an external power supply is used to write programs/data and the coin cell is used for board operations, switch the power supply input selector from "E" to "B."

4.2 In-circuit emulator debugging operations (S5U1C6F632T2)

Connecting the in-circuit emulator (ICE63: S5U1C63000H) to a PC allows use of the S5U1C6F632T2 as part of an advanced debugging environment. The corresponding connection configurations and startup procedures are described below.

1) Connecting the in-circuit emulator

Connect the P1, P2, P5, P6, and P3 connectors, respectively, on the S5U1C6F632T2 board to the CN1-2, CN1-1, CN4-2, CN4-1, and CN3 on the in-circuit emulator (ICE63: S5U1C63000H). The names of the ICE63 connectors (CN1-1, CN1-2, CN4-1, CN4-2, CN3) are also indicated on the S5U1C6F632T2 board. Confirm these connector indications when connecting. Use the I/O cables supplied for the standard peripheral board (S5U1C63000P6) and add-on board (S5U1C6F632P2), which are designed to be used in combination with the ICE63.

Note that circuit data for S1C6F632 must be written to the standard peripheral board (S5U1C63000P6) built into the in-circuit emulator in advance. For a detailed discussion of the procedure for writing data, refer to Appendix A in the *S1C6F632 Technical Manual*.

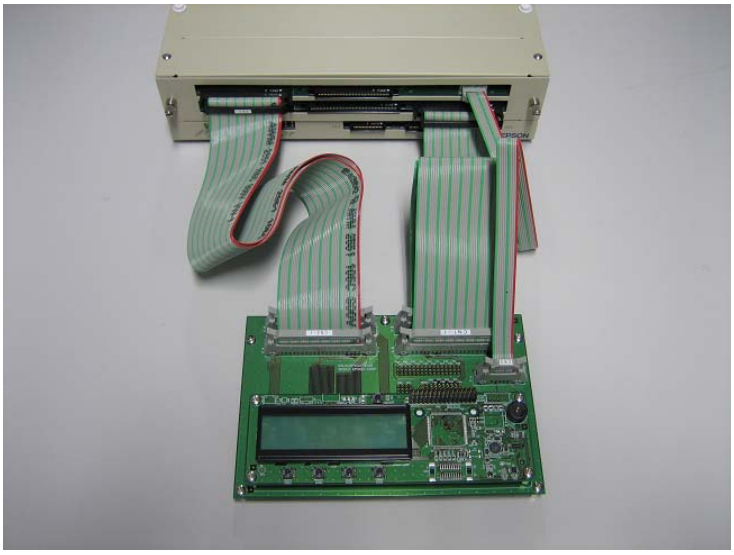


Figure 4.2.1 Connecting the in-circuit emulator

2) Starting the in-circuit emulator

Turn on power for the in-circuit emulator. For operating method of the in-circuit emulator, refer to the *S1C63000H6 Hardware Manual*. Do not supply power to the S5U1C6F632T2 board. The power needed will be provided from the in-circuit emulator through the I/O cables.

Caution!
The sensors (temperature sensor, humidity sensor) for R/F converter use variable resistors in pseudo mode. Mount variable resistors and other components to the in-circuit emulator's internal add-on board (S5U1C6F632P2) for S1C6F632 for software evaluations.

5. Connecting the Ports to Peripheral Circuits

Table 5.1 shows the ports on the S1C6F632 of the SVT6F632 and the peripheral circuits to which ports are connected. For information on the expansion connector, refer to "12. External Interface."

Table 5. 1 List of ports and connection destinations

Port	Direction	Multiplex	Signal name	Connection destination
P00	-	R/F converter (ch0)	P00/RFIN0	Temperature sensor Expansion connector (CN2)*1 ICE connector (CN5 → P4 → P3)*2
P01	-	R/F converter (ch0)	P01/REF0	Temperature sensor Expansion connector (CN2)*1 ICE connector (CN5 → P4 → P3)*2
P02	-	R/F converter (ch0)	P02/SEN0	Temperature sensor Expansion connector (CN2)*1 ICE connector (CN5 → P4 → P3)*2
P03	O	R/F converter (ch0), buzzer	P03/RFOUT/BZ	Piezo buzzer Expansion connector (CN2)*1 ICE connector (CN5 → P4 → P3)*2
P10	I	Stopwatch	P10/RUN/LAP	Push-on switch (SW1) Expansion connector (CN2) ICE connector (CN5 → P4 → P2)*2
P11	I	Stopwatch	P11/RUN/LAP	Push-on switch (SW2) Expansion connector (CN2) ICE connector (CN5 → P4 → P2)*2
P12	I	Event counter	P12/EVIN_A	Push-on switch (SW3) Expansion connector (CN2) ICE connector (CN5 → P4 → P2)*2
P13	I	Programmable timer	P13/TOUT_A	Push-on switch (SW4) Expansion connector (CN2) ICE connector (CN5 → P4 → P2)*2
P20	O	Serial interface	P20/SCLK	SCK pin for pressure sensor (SCP1000) Expansion connector (CN2) Expansion connector (CN3)*3 ICE connector (CN5 → P4 → P2)*2
P21	O	Serial interface	P21/SOUT	MOSI pin for pressure sensor (SCP1000) Expansion connector (CN2) Expansion connector (CN3)*3 ICE connector (CN5 → P4 → P2)*2
P22	I	Serial interface	P22/SIN	MISO pin for pressure sensor (SCP1000) Expansion connector (CN2) Expansion connector (CN3)*3 ICE connector (CN5 → P4 → P2)*2
P23	O	Serial interface, FOUT	P23/SRDY/$\overline{SS}$/FOUT	CSB pin for pressure sensor (SCP1000) (after logic inversion) Expansion connector (CN2) ICE connector (CN5 → P4 → P2)*2
P30	O		P30	PD pin for pressure sensor (SCP1000) (after logic inversion) Expansion connector (CN2) ICE connector (CN5 → P2)*2
P31	I	Programmable timer	P31/TOUT_B	DRDY pin for pressure sensor (SCP1000) Expansion connector (CN2) ICE connector (CN5 → P4 → P2)*2

5. Connecting the Ports to Peripheral Circuits

Port	Direction	Multiplex	Signal name	Connection destination
P32	I/O	Programmable timer	P32/TOUT_C	Expansion connector (CN2) Expansion connector (CN3)*3 ICE connector (CN5 → P4 → P2)*2
P33	O	Programmable timer	P33/TOUT_D	Illumination sensor power supply control (after logic inversion) Expansion connector (CN2) ICE connector (CN5 → P4 → P2)*2
P40	O		P40	SCLK pin for AD converter Expansion connector (CN2) ICE connector (CN5 → P4 → P2)*2
P41	I	Programmable timer	P41/EVIN_B	SDAT pin for AD converter Expansion connector (CN2) ICE connector (CN5 → P4 → P2)*2
P42	O	Programmable timer	P42/EVIN_C	XCS pin for AD converter Expansion connector (CN2) ICE connector (CN5 → P4 → P2)*2
P43	I/O	Programmable timer	P43/EVIN_D	Expansion connector (CN2) ICE connector (CN5 → P4 → P2)*2
P50	I/O		P50	Expansion connector (CN2) Expansion connector (CN3)*3 ICE connector (CN5 → P4 → P2)*2
P51	I/O		P51	Expansion connector (CN2) Expansion connector (CN3)*3 ICE connector (CN5 → P4 → P2)*2
P52	I/O		P52	Expansion connector (CN2) Expansion connector (CN3)*3 ICE connector (CN5 → P4 → P2)*2
P53	I/O		P53	Expansion connector (CN2) Expansion connector (CN3)*3 ICE connector (CN5 → P4 → P2)*2

Caution!

*1 Connect by shorting out the solder bridge.

*2 In the case of S5U1C6F632T2

*3 Connector not provided. Board pattern only.

6. Switch Input (Shared Input/Output Ports)

Switches SW1 through SW4 provided on the SVT6F632 are connected to ports P10, P11, P12, and P13 on the S1C6F632, as shown in Figure 6.1.

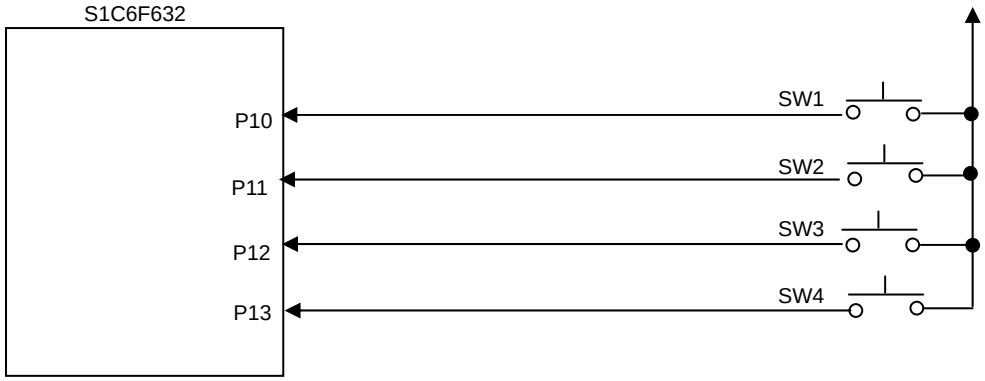


Figure 6.1 Key input connection circuit of CPU board

Input ports P10, P11, P12, and P13 on the S1C6F632 are internally added with pull-down resistors and remain at Low (input = 0) under normal conditions. It changes to High (input = 1) when the push-on switch is pressed.

Caution!
The mask option specification for the S1C6F632 of the board is Standard Type B. For more information, refer to the *S1C6F632 Technical Manual*.

7. Temperature/Humidity Measurement (R/F Converter)

The S5U1C6F632T1 is equipped with a temperature sensor (thermistor resistor) and a humidity sensor. Using the S1C6F632's internal R/F converter, the S5U1C6F632T1 can measure temperature and humidity. The S5U1C6F632T2 lacks the resistor or capacitor necessary for such measurements. For software evaluations, variable resistors and other functions are connected in pseudo mode to the platform on the add-on board (S5U1C6F632P2), which is designed to be used in combination with the ICE63. For more information, refer to Appendix A in the *S1C6F632 Technical Manual*.

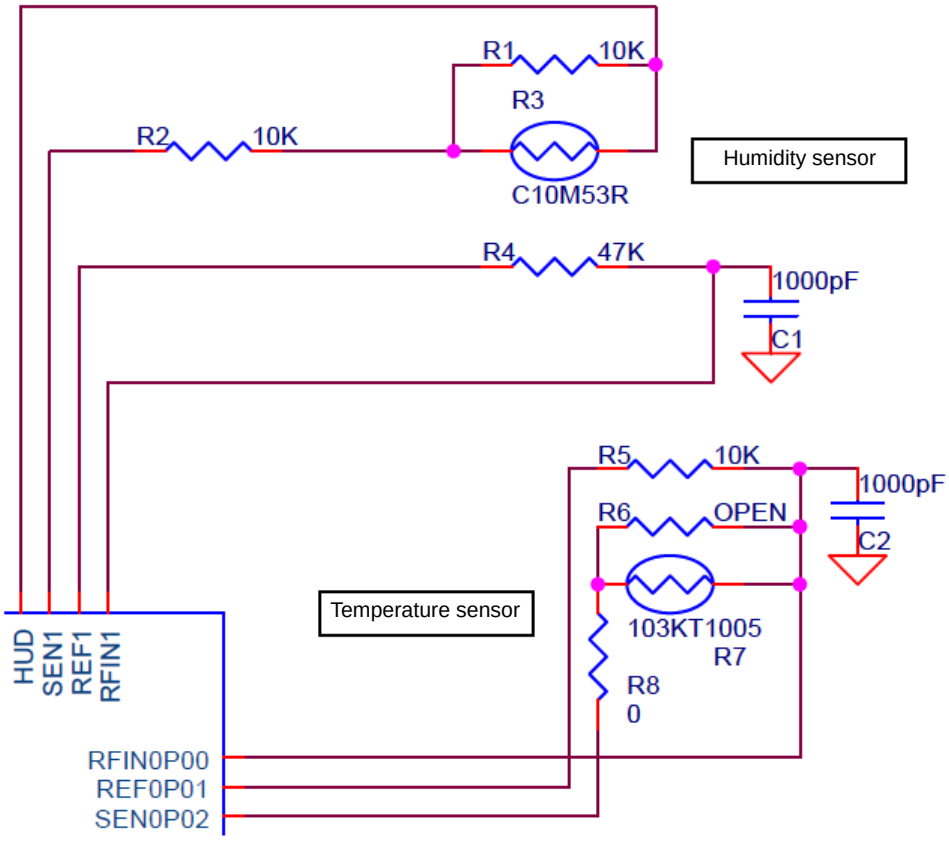


Figure 7.1 Connection for temperature and humidity measurements

Caution!

The P00 to P02 ports on the S1C6F632 are shared with the R/F converter. These ports are used as R/F converter pins by the board and serve as dedicated R/F converter connection pins. However, when the S5U1C6F632T2 is used, the temperature and humidity sensors are connected to the add-on board inside the ICE63. This means the P00 to P02 ports can also be used as general-purpose I/O ports by switching pin functions through software. The P00 to P02 pins can be used through the expansion board connector (CN2). For more information, refer to "12. External Interface."

8. LCD Display (LCD Driver)

The S1C6F632 is equipped with a dot matrix LCD driver capable of driving a black-and-white LCD panel of up to 48 segments (SEG) x 32 commons (COM). The board comes with an LCD panel of 128 segments (SEG) x 32 commons (COM), which is connected to the SEG/COM pins of the S1C6F632, as shown below.

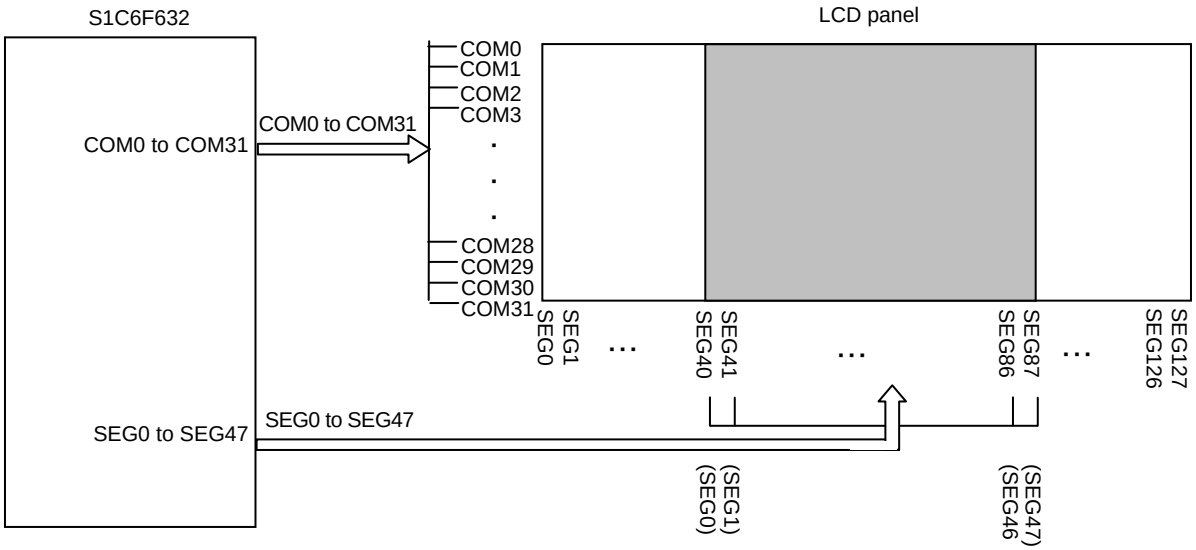


Figure 8.1 LCD panel connection

Although the LCD panel mounted on the SVT6F632 has 128 segments (SEG) x 32 commons (COM), the S1C6F632 is capable of displaying up to 48 segments (SEG) x 32 commons (COM). On the SVT6F632, the display area is centered in the LCD panel, as shown below.

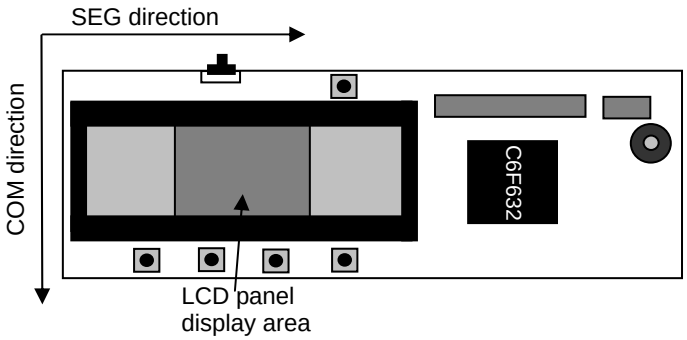


Figure 8.2 SEG/COM direction of LCD panel

9. Pressure Sensor (Serial Interface)

The SVT6F632 uses the S1C6F632's built-in serial interface (clock synchronization type x 1 ch) to communicate with the pressure sensor (SCP1000). Since the general-purpose input/output ports on the S1C6F632 also serve as serial ports, the functions of these ports must be switched by software if they are to be used as serial ports. Input/output signals from the serial ports are also connected to the expansion connector. Furthermore, the shared input/output ports (P30, P31) are used for pressure sensor communication-ready control and power supply control.

Table 9.1 Serial port connection destinations

Interface	Signal name (port pin)	I/O	Connection destination
Clock synchronization type	SCLK (P20)	O	SCK pin for pressure sensor (SCP1000) Expansion connector (CN2) Expansion connector (CN3)*1 ICE connector (CN5 → P4 → P2)*2
	SOUT (P21)	O	MOSI pin for pressure sensor (SCP1000) Expansion connector (CN2) Expansion connector (CN3)*1 ICE connector (CN5 → P4 → P2)*2
	SIN (P22)	I	MISO pin for pressure sensor (SCP1000) Expansion connector (CN2) Expansion connector (CN3)*1 ICE connector (CN5 → P4 → P2)*2
	SS (P23)	O	CSB pin for pressure sensor (SCP1000) (after logic inversion) Expansion connector (CN2) ICE connector (CN5 → P4 → P2)*2

*1 Connector not provided. Board pattern only.

*2 In the case of S5U1C6F632T2

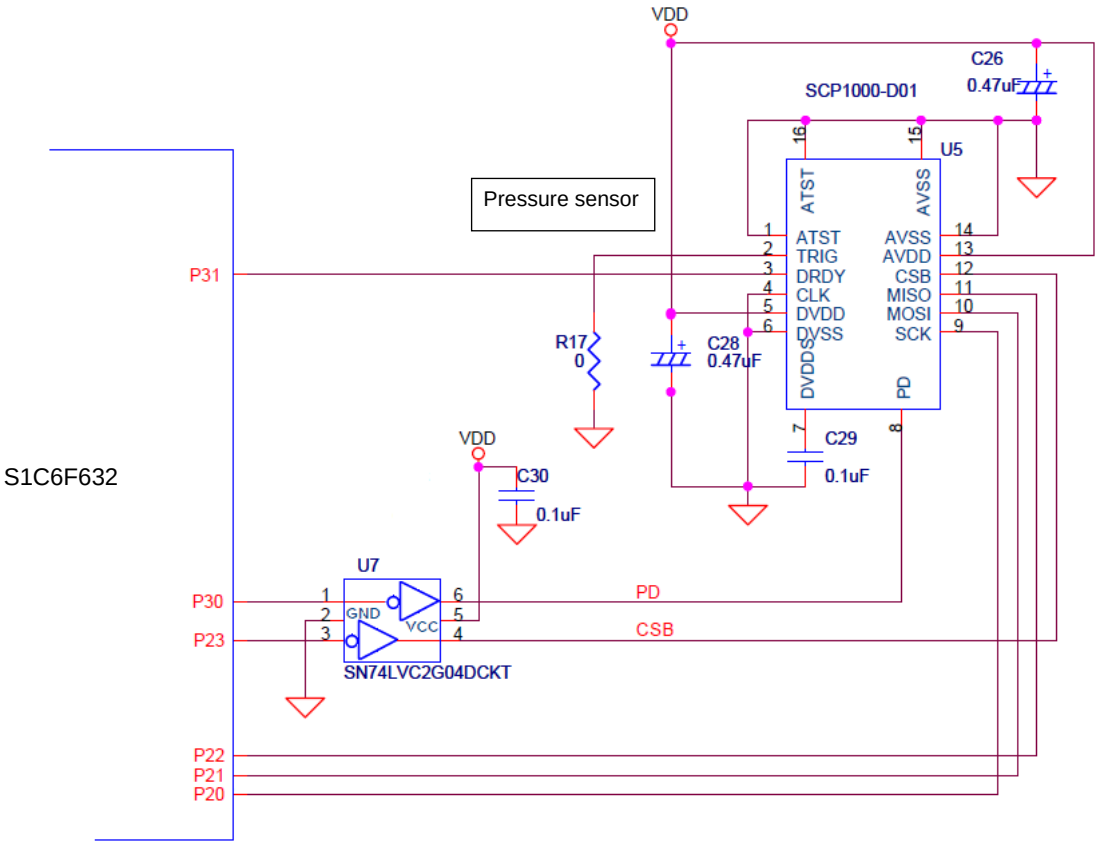


Figure 9.1 Pressure sensor connection diagram

10. Buzzer (Sound Generator)

The SVT6F632 can drive a piezo buzzer using the S1C6F632's built-in sound generator. This capability is enhanced by the externally connected transistor.

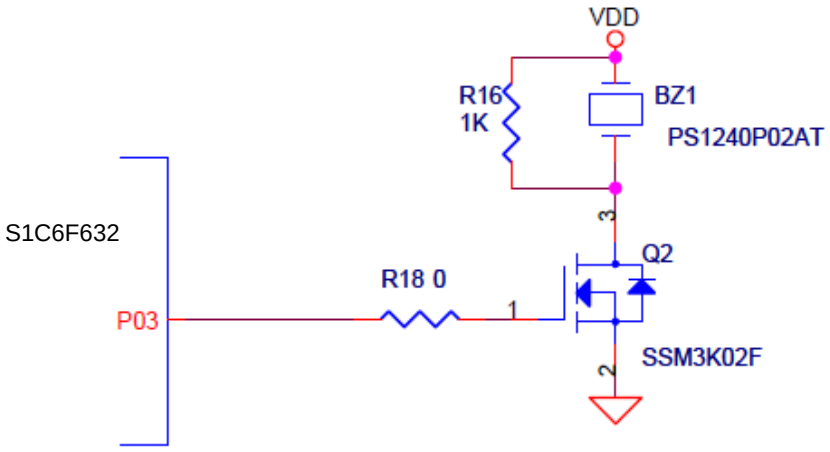


Figure 10.1 Piezo buzzer drive circuit diagram

11. Illumination Sensor

The SVT6F632 is equipped with an illumination sensor and an AD converter. The AD converter processes the voltage output from the illumination sensor for illumination detection. The S1C6F632 uses the shared input/output ports (P40 to P42) to control the AD converter. It also uses the shared input/output port (P33) to control the illumination sensor power supply.

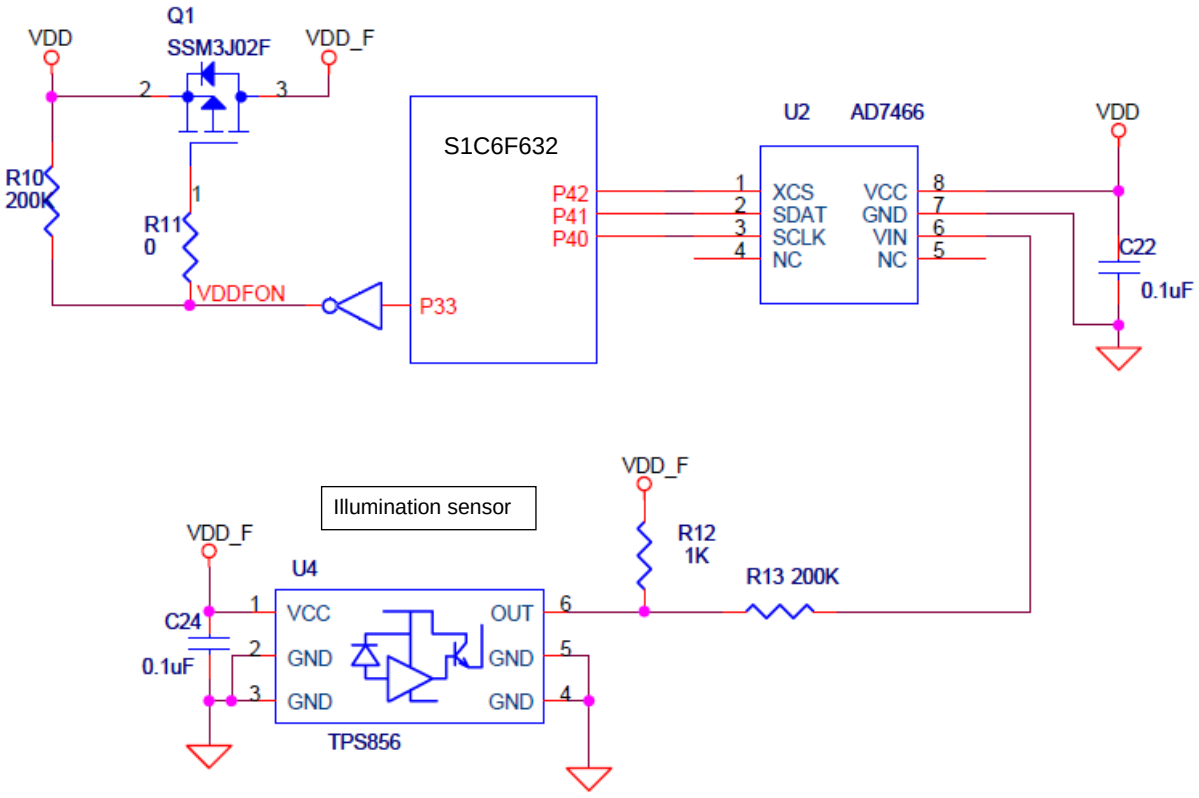


Figure 11.1 Illumination sensor circuit diagram

12. External Interface

The board is provided with an expansion connector (CN2) and an expansion connector implementation pattern (CN3) to allow clients to connect custom boards. The S5U1C6F632T2 is also provided with ICE connectors to allow users to configure an advanced debugging environment by connecting it to the ICE63.

■ S5U1C6F632T1 external interface

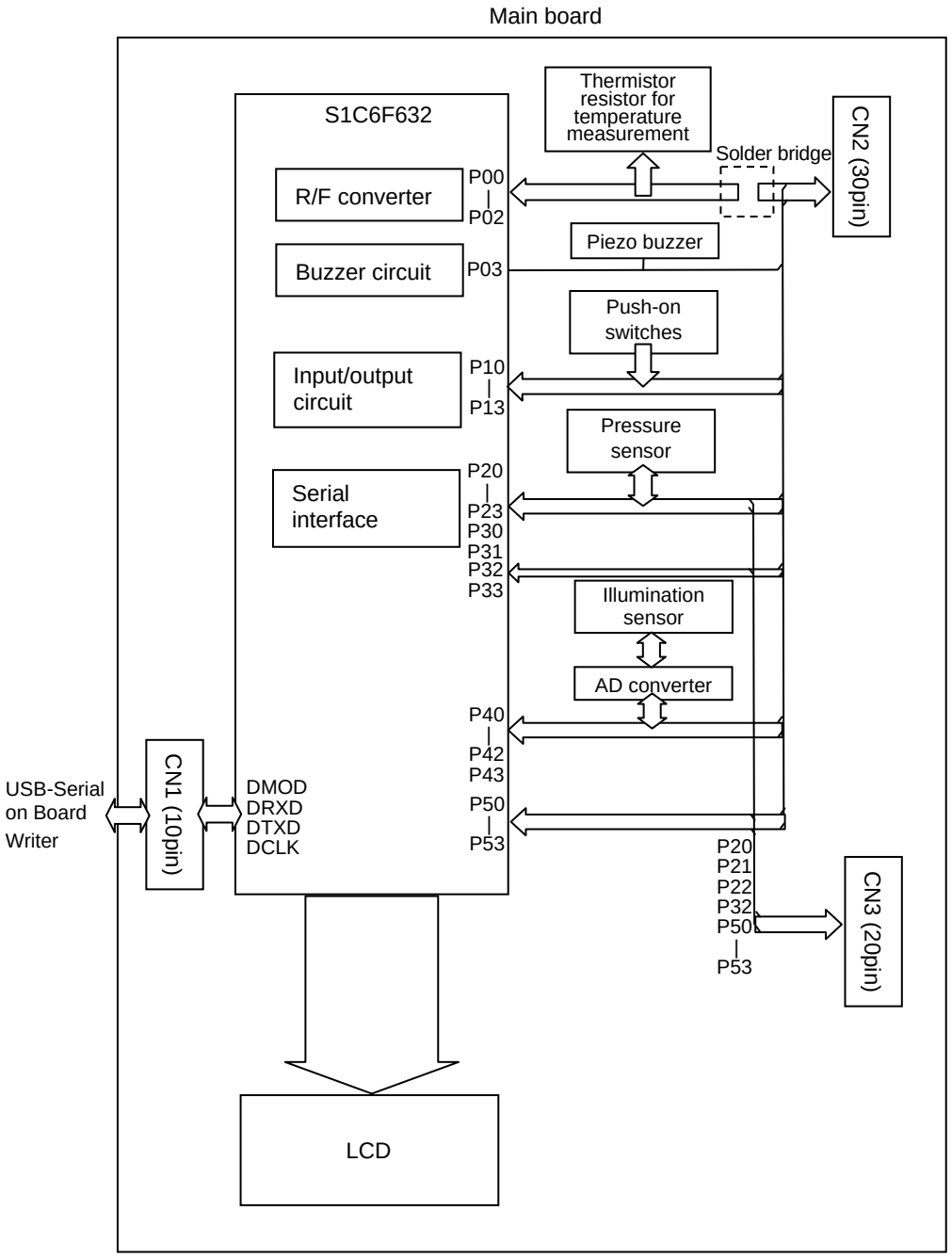


Figure 12.1 External interface connector (S5U1C6F632T1)

■ S5U1C6F632T2 external interface connector

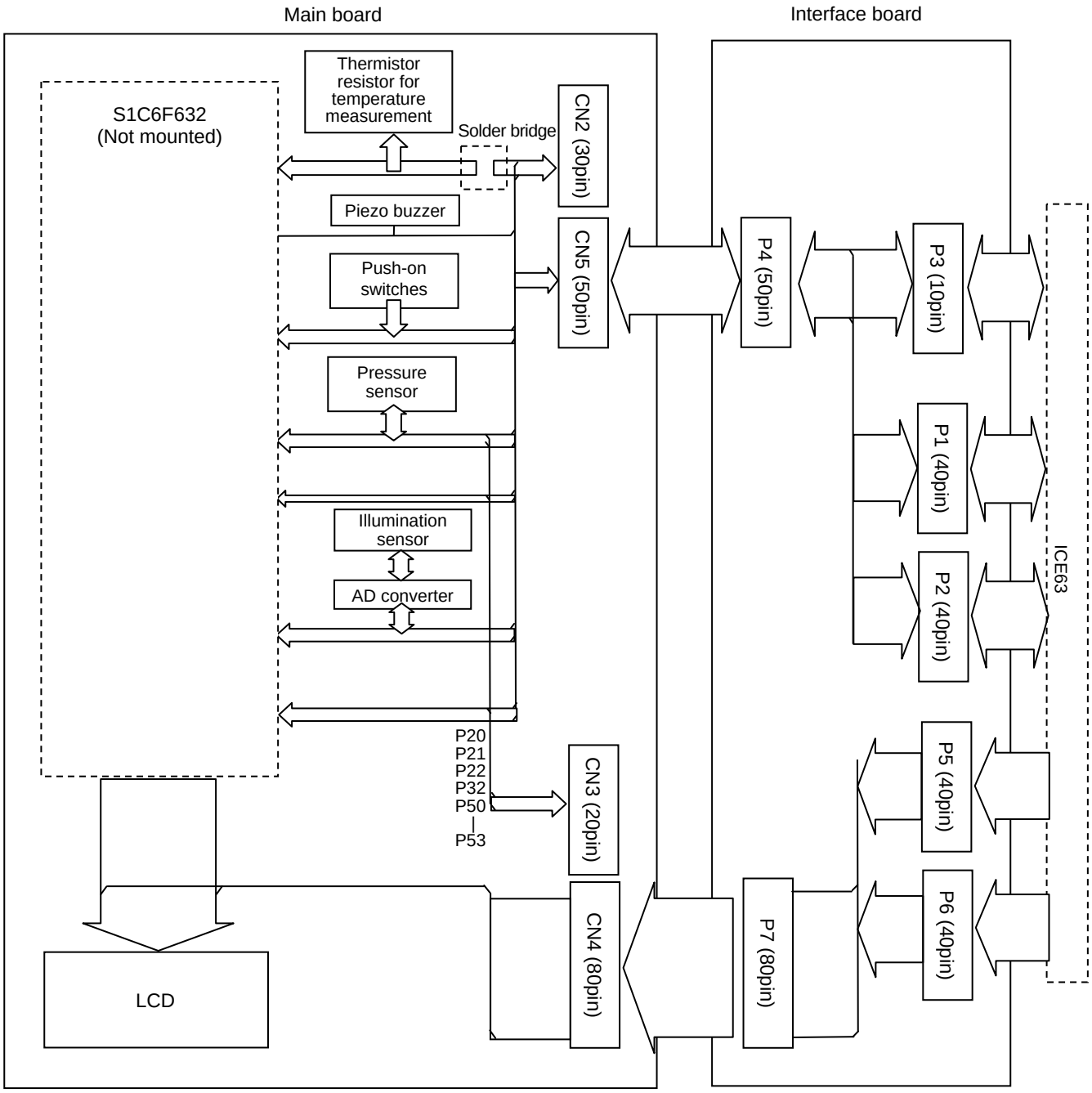


Figure 12.2 External interface connector (S5U1C6F632T2)

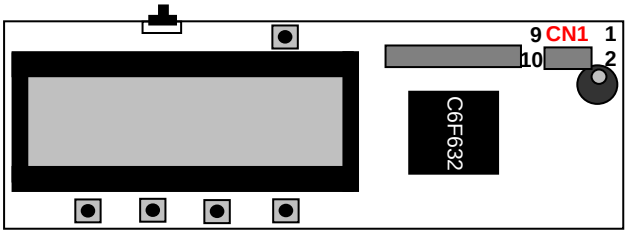
12.1 USB-Serial on Board Writer (S5U1C88000W4) connector (CN1)

The CN1 connector specifications and pin layout are as shown below.

Table 12.1 CN1 connector pin layout and connector diagram (CN1)

CN1 connector

Manufacturer: Hirose Electric
Model: HIF3E-10PA-2.54DSA (71)



(Upper side)

No.	Name	I/O	Function
1	VDD	-	Power supply pin (positive)
2	VDD	-	Power supply pin (positive)
3	DCLK	I	System clock input
4	VSS	-	Power supply pin (negative)
5	DTXD	O	Serial interface data output
6	DRXD	I	Serial interface data input
7	RESET	I	Reset input
8	NC	-	Not connected
9	VSS	-	Power supply pin (negative)
10	DMOD	I	Programming mode setting input

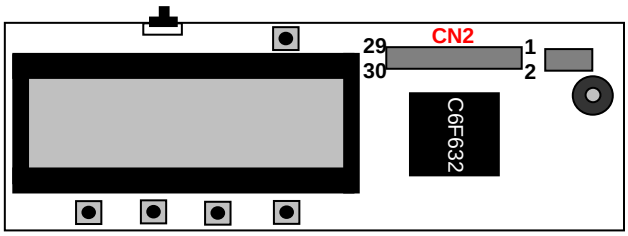
12.2 Expansion connector (CN2)

The CN2 connector specifications and pin layout are as shown below.

Table 12.2 CN2 connector pin layout and connector diagram

CN2 connector

Manufacturer: Hirose Electric
Model: HIF3E-30PA-2.54DSA (71)



(Upper side)

No.	Name	I/O	Function
1	P00	I/O	General-purpose port*1
2	P01	I/O	General-purpose port*1
3	P02	I/O	General-purpose port*1
4	P03	-	Used (buzzer)
5	P10	-	Used (push-on switch (SW1))
6	P11	-	Used (push-on switch (SW2))
7	P12	-	Used (push-on switch (SW3))
8	P13	-	Used (push-on switch (SW4))
9	P20	-	Used (pressure sensor interface (SCK))
10	P21	-	Used (pressure sensor interface (MOSI))
11	P22	-	Used (pressure sensor interface (MISO))
12	P23	-	Used (pressure sensor interface (CSB))
13	P30	-	Used (pressure sensor interface (PD))
14	P31	-	Used (pressure sensor interface (DRDY))
15	P32	I/O	General-purpose port
16	P33	-	Used (illumination sensor power supply control)
17	P40	-	Used (AD converter interface (SCLK))
18	P41	-	Used (AD converter interface (SDAT))
19	P42	-	Used (AD converter interface (XCS))
20	P43	I/O	General-purpose port
21	P50	I/O	General-purpose port
22	P51	I/O	General-purpose port
23	P52	I/O	General-purpose port
24	P53	I/O	General-purpose port
25	VDD	-	Power supply pin (positive)
26	VDD	-	Power supply pin (positive)
27	RESET	O	Reset output (positive logic)
28	VSS	-	Power supply pin (negative)
29	VSS	-	Power supply pin (negative)
30	VSS	-	Power supply pin (negative)

*1 May be used only with the S5U1C6F632T2. (Cannot be used with R/F converter ch0.)
Not connected with S5U1C6F632T1.

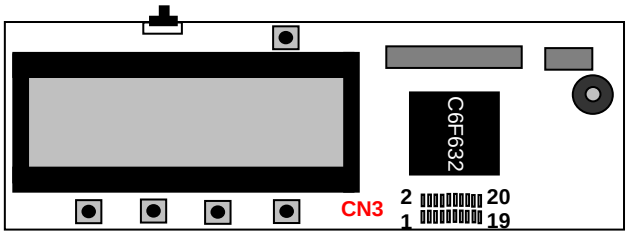
12.3 Expansion connector implementation pattern (CN3)

The pin layout of the CN3 connector implementation pattern is shown below.

Table 12.3 CN3 connector implementation pattern layout

CN3 connector implementation pattern

Manufacturer: KEL
Model: 8913-020-178MS-A (Not mounted)



(Upper side)

No.	Name	I/O	Function
1	NC	-	Not connected
2	NC	-	Not connected
3	P22	-	Used (pressure sensor interface (MISO))
4	P21	-	Used (pressure sensor interface (MOSI))
5	VSS	-	Power supply pin (negative)
6	P32	I/O	General-purpose port
7	VSS	-	Power supply pin (negative)
8	P20	-	Used (pressure sensor interface (SCK))
9	VSS	-	Power supply pin (negative)
10	P50	I/O	General-purpose port
11	VSS	-	Power supply pin (negative)
12	P51	I/O	General-purpose port
13	VSS	-	Power supply pin (negative)
14	P52	I/O	General-purpose port
15	VSS	-	Power supply pin (negative)
16	XRESET	O	Reset output (negative logic)
17	P53	I/O	General-purpose port
18	NC	-	Not connected
19	VDD	-	Power supply pin (positive)
20	VDD	-	Power supply pin (positive)

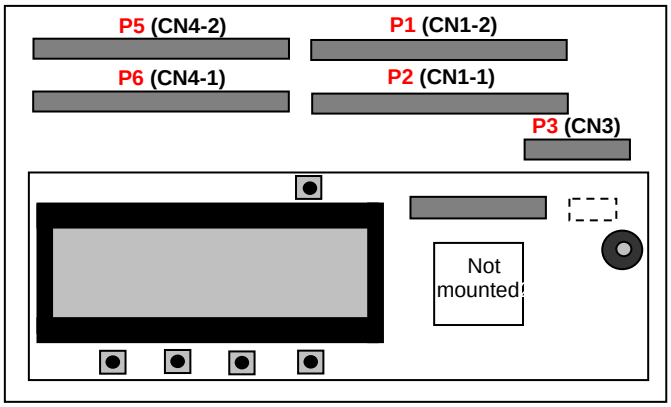
12.4 ICE connector (S5U1C6F632T2)

The ICE connector specifications and pin layouts are shown below.

Table 12.4.1 ICE connector pin layout and connector diagram (P1, P2, P3, P5, P6)

P1, P2, P3, P5, and P6 connectors

Manufacturer: 3M
Models: 3432-6002LCPL (P1, P2, P5, P6)
3662-6002LCPL (P3)



(Upper side)

Table 12.4.2 ICE connector pin layout and connector diagram (P1)

P1 (CN1-2)			
No.	Name	I/O	Function
1	VDD	-	Power supply pin (positive)
2	VDD	-	Power supply pin (positive)
3	NC	-	Not connected
4	NC	-	Not connected
5	NC	-	Not connected
6	NC	-	Not connected
7	NC	-	Not connected
8	NC	-	Not connected
9	NC	-	Not connected
10	NC	-	Not connected
11	VSS	-	Power supply pin (negative)
12	VSS	-	Power supply pin (negative)
13	NC	-	Not connected
14	NC	-	Not connected
15	NC	-	Not connected
16	NC	-	Not connected
17	NC	-	Not connected
18	NC	-	Not connected
19	NC	-	Not connected
20	NC	-	Not connected
21	VDD	-	Power supply pin (positive)
22	VDD	-	Power supply pin (positive)
23	NC	-	Not connected
24	NC	-	Not connected
25	NC	-	Not connected
26	NC	-	Not connected
27	NC	-	Not connected
28	NC	-	Not connected
29	NC	-	Not connected
30	NC	-	Not connected
31	VSS	-	Power supply pin (negative)
32	VSS	-	Power supply pin (negative)
33	NC	-	Not connected
34	NC	-	Not connected
35	NC	-	Not connected
36	NC	-	Not connected
37	NC	-	Not connected
38	RESET	O	Reset output to ICE (positive logic)
39	VSS	-	Power supply pin (negative)
40	VSS	-	Power supply pin (negative)

Table 12.4.3 ICE connector pin layout and connector diagram (P2)

P2 (CN1-1)			
No.	Name	I/O	Function
1	VDD	-	Power supply pin (positive)
2	VDD	-	Power supply pin (positive)
3	NC	-	Not connected
4	NC	-	Not connected
5	NC	-	Not connected
6	NC	-	Not connected
7	NC	-	Not connected
8	NC	-	Not connected
9	NC	-	Not connected
10	NC	-	Not connected
11	VSS	-	Power supply pin (negative)
12	VSS	-	Power supply pin (negative)
13	P10	O	Switch output (SW1)
14	P11	O	Switch output (SW2)
15	P12	O	Switch output (SW3)
16	P13	O	Switch output (SW4)
17	P20	I	Pressure sensor interface (SCK)
18	P21	I	Pressure sensor interface (MOSI)
19	P22	O	Pressure sensor interface (MISO)
20	P23	I	Pressure sensor interface (CSB)
21	VDD	-	Power supply pin (positive)
22	VDD	-	Power supply pin (positive)
23	P30	I	Pressure sensor interface (PD)
24	P31	O	Pressure sensor interface (DRDY)
25	P32	I/O	General-purpose port*1
26	P33	I	Illumination sensor power supply control
27	P40	I	AD converter interface (SCLK)
28	P41	O	AD converter interface (SDAT)
29	P42	I	AD converter interface (XCS)
30	P43	I/O	General-purpose port*1
31	VSS	-	Power supply pin (negative)
32	VSS	-	Power supply pin (negative)
33	P50	I/O	General-purpose port*1
34	P51	I/O	General-purpose port*1
35	P52	I/O	General-purpose port*1
36	P53	I/O	General-purpose port*1
37	NC	-	Not connected
38	NC	-	Not connected
39	VSS	-	Power supply pin (negative)
40	VSS	-	Power supply pin (negative)

*1 May be used by pulling out from the CN2 connector on the main board.

Table 12.4.4 ICE connector pin layout and connector diagram (P3)

P3 (CN3)			
No.	Name	I/O	Function
1	VDD	-	Power supply pin (positive)
2	VDD	-	Power supply pin (positive)
3	P00	I/O	General-purpose port*1
4	P01	I/O	General-purpose port*1
5	P02	I/O	General-purpose port*1
6	P03	I	Buzzer
7	NC	-	-
8	NC	-	-
9	VSS	-	Power supply pin (negative)
10	VSS	-	Power supply pin (negative)

*1 May be used by pulling out from the CN2 connector on the main board.

Table 12.4.5 ICE connector pin layout and connector diagram (P5)

P5 (CN2-2)			
No.	Name	I/O	Function
1	SEG24	I	LCD drive waveform input (SEG)
2	SEG25	I	LCD drive waveform input (SEG)
3	SEG26	I	LCD drive waveform input (SEG)
4	SEG27	I	LCD drive waveform input (SEG)
5	SEG28	I	LCD drive waveform input (SEG)
6	SEG29	I	LCD drive waveform input (SEG)
7	SEG30	I	LCD drive waveform input (SEG)
8	SEG31	I	LCD drive waveform input (SEG)
9	SEG32	I	LCD drive waveform input (SEG)
10	SEG33	I	LCD drive waveform input (SEG)
11	SEG34	I	LCD drive waveform input (SEG)
12	SEG35	I	LCD drive waveform input (SEG)
13	SEG36	I	LCD drive waveform input (SEG)
14	SEG37	I	LCD drive waveform input (SEG)
15	SEG38	I	LCD drive waveform input (SEG)
16	SEG39	I	LCD drive waveform input (SEG)
17	SEG40	I	LCD drive waveform input (SEG)
18	SEG41	I	LCD drive waveform input (SEG)
19	SEG42	I	LCD drive waveform input (SEG)
20	SEG43	I	LCD drive waveform input (SEG)
21	SEG44	I	LCD drive waveform input (SEG)
22	SEG45	I	LCD drive waveform input (SEG)
23	SEG46	I	LCD drive waveform input (SEG)
24	SEG47	I	LCD drive waveform input (SEG)
25	COM31	I	LCD drive waveform input (COM)
26	COM30	I	LCD drive waveform input (COM)
27	COM29	I	LCD drive waveform input (COM)
28	COM28	I	LCD drive waveform input (COM)
29	COM27	I	LCD drive waveform input (COM)
30	COM26	I	LCD drive waveform input (COM)
31	COM25	I	LCD drive waveform input (COM)
32	COM24	I	LCD drive waveform input (COM)
33	COM23	I	LCD drive waveform input (COM)
34	COM22	I	LCD drive waveform input (COM)
35	COM21	I	LCD drive waveform input (COM)
36	COM20	I	LCD drive waveform input (COM)
37	COM19	I	LCD drive waveform input (COM)
38	COM18	I	LCD drive waveform input (COM)
39	COM17	I	LCD drive waveform input (COM)
40	COM16	I	LCD drive waveform input (COM)

Table 12.4.6 ICE connector pin layout and connector diagram (P6)

P6 (CN2-1)			
No.	Name	I/O	Function
1	COM0	I	LCD drive waveform input (COM)
2	COM1	I	LCD drive waveform input (COM)
3	COM2	I	LCD drive waveform input (COM)
4	COM3	I	LCD drive waveform input (COM)
5	COM4	I	LCD drive waveform input (COM)
6	COM5	I	LCD drive waveform input (COM)
7	COM6	I	LCD drive waveform input (COM)
8	COM7	I	LCD drive waveform input (COM)
9	COM8	I	LCD drive waveform input (COM)
10	COM9	I	LCD drive waveform input (COM)
11	COM10	I	LCD drive waveform input (COM)
12	COM11	I	LCD drive waveform input (COM)
13	COM12	I	LCD drive waveform input (COM)
14	COM13	I	LCD drive waveform input (COM)
15	COM14	I	LCD drive waveform input (COM)
16	COM15	I	LCD drive waveform input (COM)
17	SEG0	I	LCD drive waveform input (SEG)
18	SEG1	I	LCD drive waveform input (SEG)
19	SEG2	I	LCD drive waveform input (SEG)
20	SEG3	I	LCD drive waveform input (SEG)
21	SEG4	I	LCD drive waveform input (SEG)
22	SEG5	I	LCD drive waveform input (SEG)
23	SEG6	I	LCD drive waveform input (SEG)
24	SEG7	I	LCD drive waveform input (SEG)
25	SEG8	I	LCD drive waveform input (SEG)
26	SEG9	I	LCD drive waveform input (SEG)
27	SEG10	I	LCD drive waveform input (SEG)
28	SEG11	I	LCD drive waveform input (SEG)
29	SEG12	I	LCD drive waveform input (SEG)
30	SEG13	I	LCD drive waveform input (SEG)
31	SEG14	I	LCD drive waveform input (SEG)
32	SEG15	I	LCD drive waveform input (SEG)
33	SEG16	I	LCD drive waveform input (SEG)
34	SEG17	I	LCD drive waveform input (SEG)
35	SEG18	I	LCD drive waveform input (SEG)
36	SEG19	I	LCD drive waveform input (SEG)
37	SEG20	I	LCD drive waveform input (SEG)
38	SEG21	I	LCD drive waveform input (SEG)
39	SEG22	I	LCD drive waveform input (SEG)
40	SEG23	I	LCD drive waveform input (SEG)

Appendix A Consumption Current Measurement Method

The S5U1C6F632T1 board can measure the current consumed solely by the S1C6F632. Figure A.1 shows the circuit structure of the S5U1C6F632T1 board power supply connection. To measure the amount of current consumed just by the S1C6F632, remove the jumper switch (JP1) and connect an ammeter to the two pins in series. Note that the ports on the S1C6F632 must be set appropriately according to the peripheral circuits.

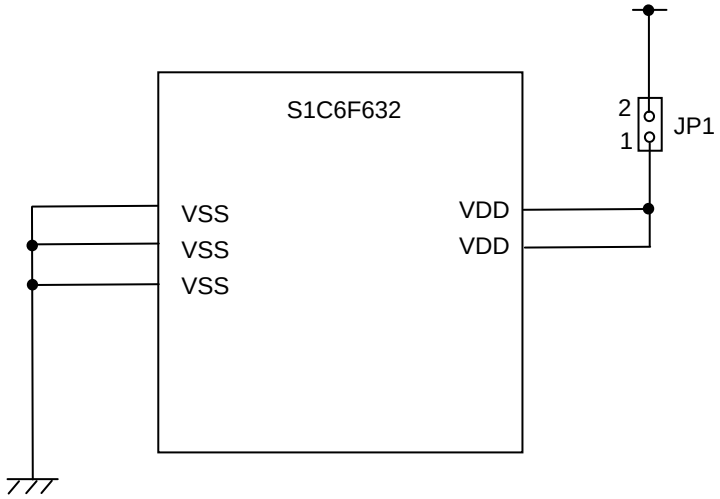
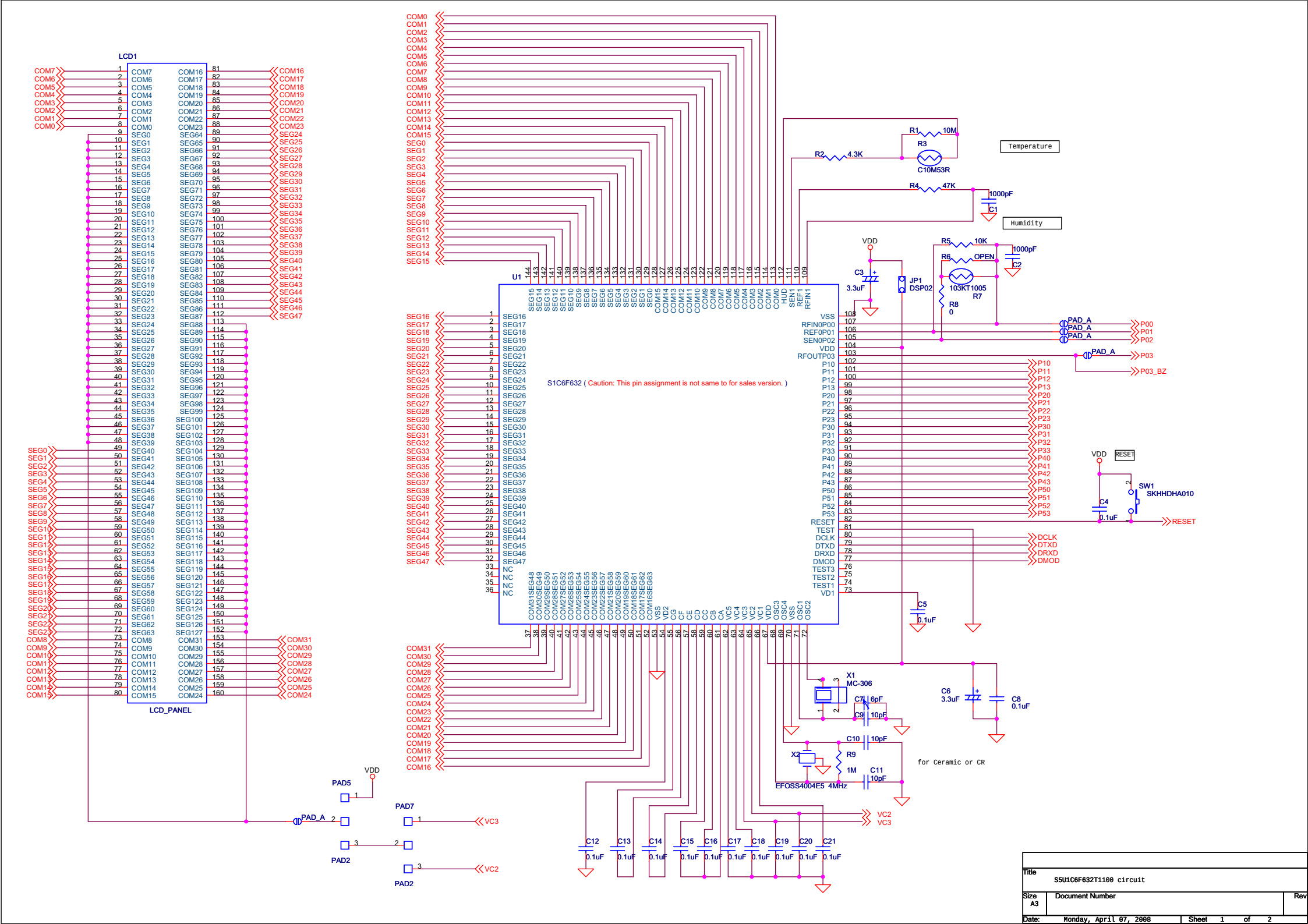


Figure A.1 S1C6F632 consumption current measurement circuit



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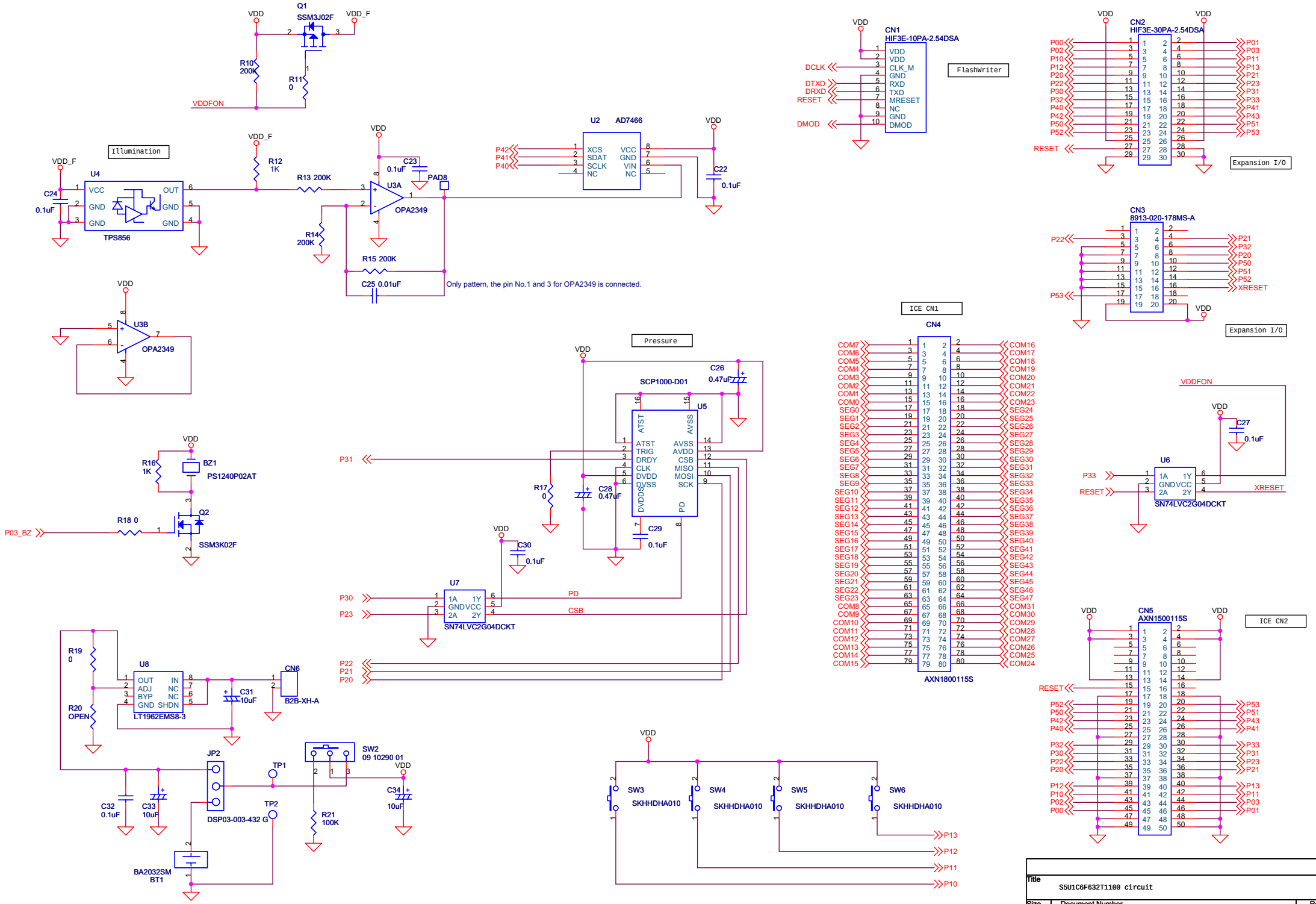
Size A3	Document Number	Rev
Date: Monday, April 07, 2008	Sheet 1 of 2	


Q1
SSM3J02F
VDD
VDD_F
R10
200K
R11
0
VDDFON
Illumination
VDD_F
U4
TPS856
C24
0.1uF
R12
1K
R13 200K
R14
200K
R15 200K
C25 0.01uF
C23
0.1uF
PAD8
U3A
OPA2349
U3B
OPA2349
Only pattern, the pin No.1 and 3 for OPA2349 is connected.
U2
AD7466
P42
P41
P40
C22
0.1uF
CN1
HIF3E-10PA-2.54DSA
FlashWriter
DCLK
DTXD
DRXD
RESET
DMOD
CN2
HIF3E-30PA-2.54DSA
Expansion I/O
CN3
8913-020-178MS-A
Expansion I/O
Pressure
SCP1000-D01
U5
C26
0.47uF
C28
0.47uF
C29
0.1uF
C30
0.1uF
R17
0
U7
SN74LVC2G04DCKT
PD
CSB
ICE CN1
CN4
AXN1800115S
VDDFON
C27
0.1uF
U6
SN74LVC2G04DCKT
XRESET
ICE CN2
CN5
AXN1500115S
R16
1K
BZ1
PS1240P02AT
Q2
SSM3K02F
R18 0
P03_BZ
R19
0
R20
OPEN
U8
LT1962EMS8-3
C31
10uF
CN6
B2B-XH-A
JP2
DSP03-003-432 G
TP1
TP2
SW2
09 10290 01
C32
0.1uF
C33
10uF
C34
10uF
R21
100K
BA2032SM
BT1
SW3
SW4
SW5
SW6
SKHHDHA010
P13
P12
P11
P10
Title
S5U1C6F632T1100 circuit
Size
A3
Document Number
Date:
Tuesday, April 08, 2008
Sheet
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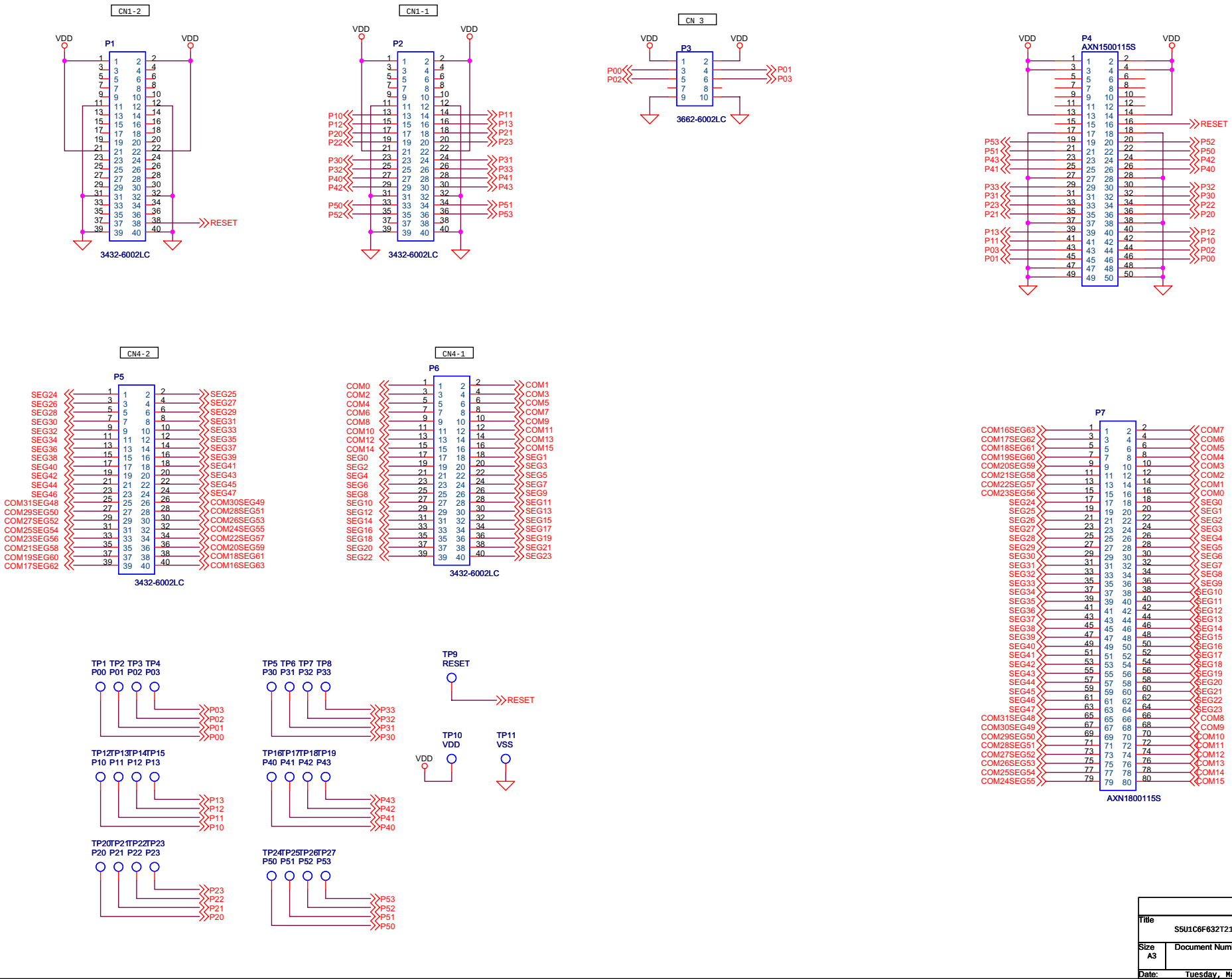
of
2



Title	S5U1C6F632T2100 circuit	
Size A3	Document Number	Rev
Date: Tuesday, March 11, 2008	Sheet 1 of 1	

S5U1C6F632T1100 parts list REV1.0

REVISION/QUANTITY						REV. MARK	PARTS NAME	MATERIAL LOCATION	STANDARD	MODEL No.	MAKER
F	E	D	C	B	A						
					1		Board			SA-0804	Custom
					1		Battery holder	BT1	Surface mount	BA2032SM	TAKACHI
					1		Piezo buzzer	BZ1		PS1240P02AT	TDK
					1		Connector (pin header)	CN1		HIF3E-10PA-2.54DSA(71)	HIROSE
					1		Connector (pin header)	CN2		HIF3E-30PA-2.54DSA(71)	HIROSE
					1		Battery			CR2032	Toshiba
					1		Connector	CN6		B2B-XH-A	J.S.T
					2		Monolithic ceramic capacitor	C1,C2	1000pF 2.0*1.25	GRM2195C2A102JA01D	Murata
					2		Tantalum capacitor	C3,C6	3.3uF/16V 3.2*1.6	F931C335MAA	nichicon
					19		Monolithic ceramic capacitor	C4,C5,C8,C12,C13,C14,C15,C16,C17,C18,C19,C20,C21,C22, C24,C27,C29,C30,C32	0.1uF 2*1.25	GRM219F11H104ZA01D	Murata
					1		Trimmer capacitor	C7	3.0 - 10pF 2.5mm * 3.2mm	TZY2Z100A001R00	Murata
					3		Monolithic ceramic capacitor	C9,C10,C11	10pF 1.6*0.8	GRM1882C1H100JA01D	Murata
					2		Tantalum capacitor	C26,C28	0.47uF/35V 3.2*1.6	F931V474MAA	nichicon
					3		Tantalum capacitor	C31,C33,C34	10uF/16V 3.2*1.6	TEESVA1C106M	NEC TOKIN
					1		Ceramic resonator	X2	4MHz	EFOSS4004E5	Panasonic
					1		Dip short plug	JP1		DSP02-002-431G	KEL
					1		Dip short plug	JP2		DSP03-003-432G	KEL
					1		LCD	LCD1		LCD_PANEL	Custom
					1		Transistor	Q1	SC-59	SSM3J02F	Toshiba
					1		Transistor	Q2	SC-59	SSM3K02F	Toshiba
					1		Resistor	R5	10K	RK73H2ATTD1002F	KOA
					1		Humidity sensor	R3		C10M53R	SHINYEI
					1		Resistor	R4	47K	RK73H2ATTD4702F	KOA
								R6,R20,R14,R15,C23,C25	OPEN		
					1		Thermistor	R7		103KT1005	ISHIZUKA
					5		Resistor	R8,R11,R17,R18,R19	0 Ohm	RK73Z2AT	KOA
					1		Resistor	R9	1M	RK73H2ATTD1004F	KOA
					2		Resistor	R10,R13	200K	RK73H2ATTD2003F	KOA
					2		Resistor	R16,R12	1K	RK73H2ATTD1001F	KOA
					1		Resistor	R21	100K	RK73H2ATTD1003F	KOA
					5		Switch	SW1,SW3,SW4,SW5,SW6		SKHHAKA010	ALPS
					1		Switch	SW2		09 10290 01	SECME
					1		Check pin	TP1		LC-22-G red	MAC8
					1		Check pin	TP2		LC-22-G black	MAC8
					1		IC	U1	22 * 22	S1C6F632	EPSON
					1		A/D converter	U2	RM-8	AD7466BRM	Analog devices
					1		Illumination sensor	U4		TPS856	Toshiba
					1		Pressure sensor	U5		SCP1000-D01	VTI
					2		Inverter	U6,U7		SN74LVC2G04DCKT	T.I.
					1		Regulator	U8		LT1962EMS8-3	LINEAR
					1		Resonator	X1	32.768KHz	MC-306	EPSON TOYOCOM
					1		Resistor	R1	10M	RK73H2ATTD1005F	KOA
					1		Resistor	R2	4.3K	RK73H2ATTD4301F	KOA
					4		Screw			FB-0305N	Wilco
					4		Stud		10mm	ASB-310E	HIROSUGI
					2		Dip short plug socket			DSP01-002-430G-9	KEL
					1		Connector			XHP-2	J.S.T
					2		Contact			SXH-001T-P0.6N	J.S.T
					1		Wire			AWM116-24(7)-SA RED	Junkosha
					1		Wire			AWM116-24(8)-SA BLACK	Junkosha

S5U1C6F632T2100 parts list REV1.0

REVISION/QUANTITY						REV. MARK	PARTS NAME	MATERIAL LOCATION	STANDARD	MODEL No.	MAKER
F	E	D	C	B	A						
					1		Board			SA-0804	Custom
					1		Piezo buzzer	BZ1		PS1240P02AT	TDK
					1		Connector (pin header)	CN2		HIF3E-30PA-2.54DSA(71)	HIROSE
					1		Connector	CN4		AXN1800115S	Panasonic
					1		Connector	CN5		AXN1500115S	Panasonic
					7		Monolithic ceramic capacitor	C4,C22,C24,C27,C29,C30	0.1uF 2*1.25	GRM219F11H104ZA01D	Murata
					2		Tantalum capacitor	C26,C28	0.47uF/35V 3.2*1.6	F931V474MAA	nichicon
					1		Tantalum capacitor	C31,C33,C34	10uF/16V 3.2*1.6	TEESVA1C106M	NEC TOKIN
					1		LCD	LCD1		LCD PANEL	Custom
					1		Transistor	Q1	SC-59	SSM3J02F	Toshiba
					1		Transistor	Q2	SC-59	SSM3K02F	Toshiba
					3		Resistor	R8,R11,R17,R18,R19	0 Ohm	RK73Z2AT	KOA
					4		Resistor	R10,R13	200K	RK73H2ATTD2003F	KOA
					1		Resistor	R16,R12	1K	RK73H2ATTD1001F	KOA
								R6,R20,R14,R15,C23,C25	OPEN		
					5		Switch	SW1,SW3,SW4,SW5,SW6		SKHHAKA010	APLS
					1		A/D converter	U2	RM-8	AD7466BRM	Analog devices
					1		Illumination sensor	U4		TPS856	Toshiba
					1		Pressure sensor	U5		SCP1000-D01	VTI
					2		Inverter	U6,U7		SN74LVC2G04DCKT	T.I.
					1		Board			SA-0805	Custom
					4		Connector	P1,P2,P5,P6		3432-6002LCPL	3M
					1		Connector	P3		3662-6002LCPL	3M
					1		Socket	P4	50pin	AXN1500115S	Panasonic
					1		Socket	P7	80pin	AXN1800115S	Panasonic
					5		Stud		10mm	ASB-310E	HIROSUGI
					5		Screw			FB-0305N	Wilco

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