

S2S65A00

Evaluation Board

Technical Manual

ulTRON Version: S5U2S65A00H0100
Linux Version : S5U2S65A00H0200

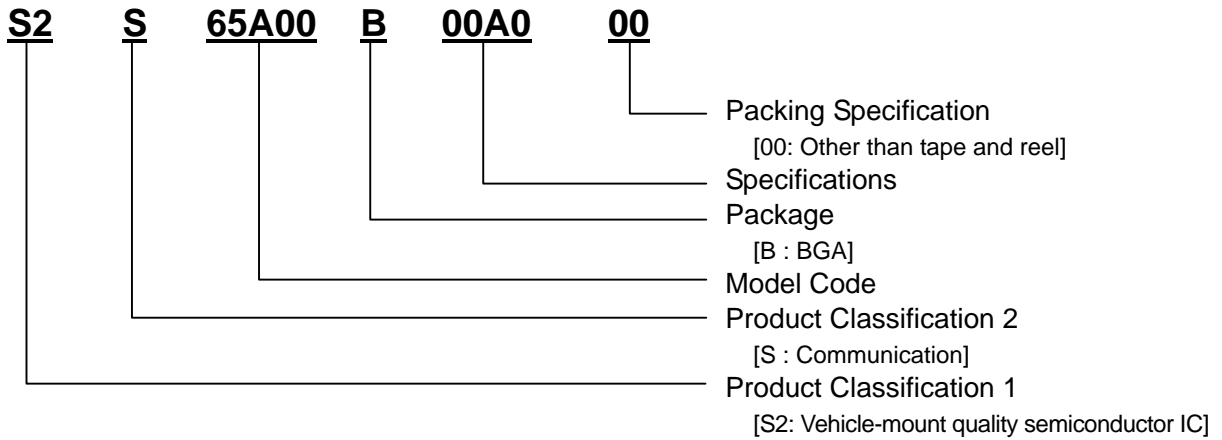
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Configuration of product number

● Device



● Development tool

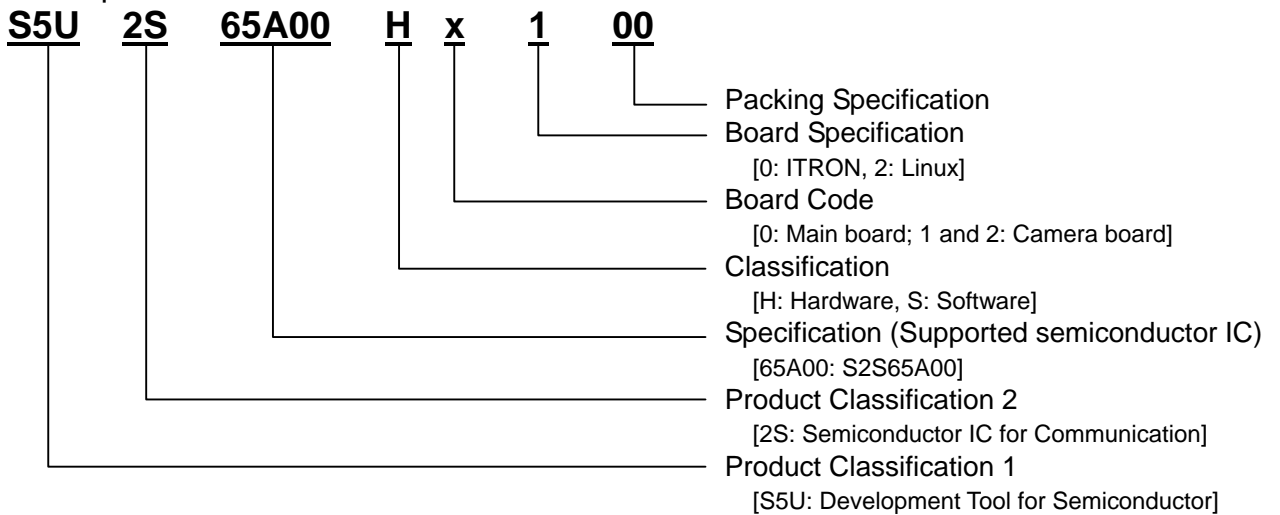


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1. DESCRIPTIONS

This product, the S2S65A00 Evaluation Board, is an optimum evaluation board for building a drive recorder easily with Seiko Epson's Drive Recorder Chip: S2S65A00.

When connected with a camera board (Model No.: S5U1S65K01H3100, separately available), this product can be used for checking sample code operations and developing firmware.

At the time of shipment, the S5U2S65A00H0100 contains a sample code for uITRON in its Flash ROM. The S5U2S65A00H0200 contains a sample code for Linux in its Flash ROM.

2. CONFIGURATION

2.1 Components

Drive recorder IC	: S2S65A00
Flash ROM	: 16 Mbytes (TC58FVM7B5TG65 manufactured by TOSHIBA)
SDRAM	: 64 Mbytes (MT48LC32M16AP-75 manufactured by MICRON) × 2 Two 16-bit SDRAMs are used to compose a 32-bit bus.
JTAG DEBUG interface	: Provides a 20-pin connector for ICE/DEBBUG.
Camera board interface	: Provides two channels of 16/40-pin connectors for connecting to a camera board.
I ² C	: An interface for camera control is assigned to the above connector.
I ² S	: An interface for monaural CODEC_IC connection is assigned to the camera board. * The camera board I/F supports channel 1 only.
GPIO	: Assigned to the above camera board I/F connector for GPIO evaluation.
Serial interface	: Provides two channels of D-sub connectors for RS232C.
USB interface	: Provides a mini B connector.
CF card interface	: Provides a CF card connector.
SD card interface	: Provides an SD card connector.
Supply voltage	: 5V±10%

2.2 Memory IC Mapping

0x0000_0000 to 0x00FF_FFFF	Flash ROM 16MByte
0x4000_0000 to 0x47FF_FFFF	SDRAM 128 Mbytes (when SW1 is in the ① position)
0x5000_0000 to 0x57FF_FFFF	SDRAM 128 Mbytes (when SW1 is in the ② position)

* The sample firmware uses a memory mapping where SW1 is in the ① position.

2. CONFIGURATION

2.3 Block Diagram

Fig.2.1 shows a block diagram of this evaluation board.

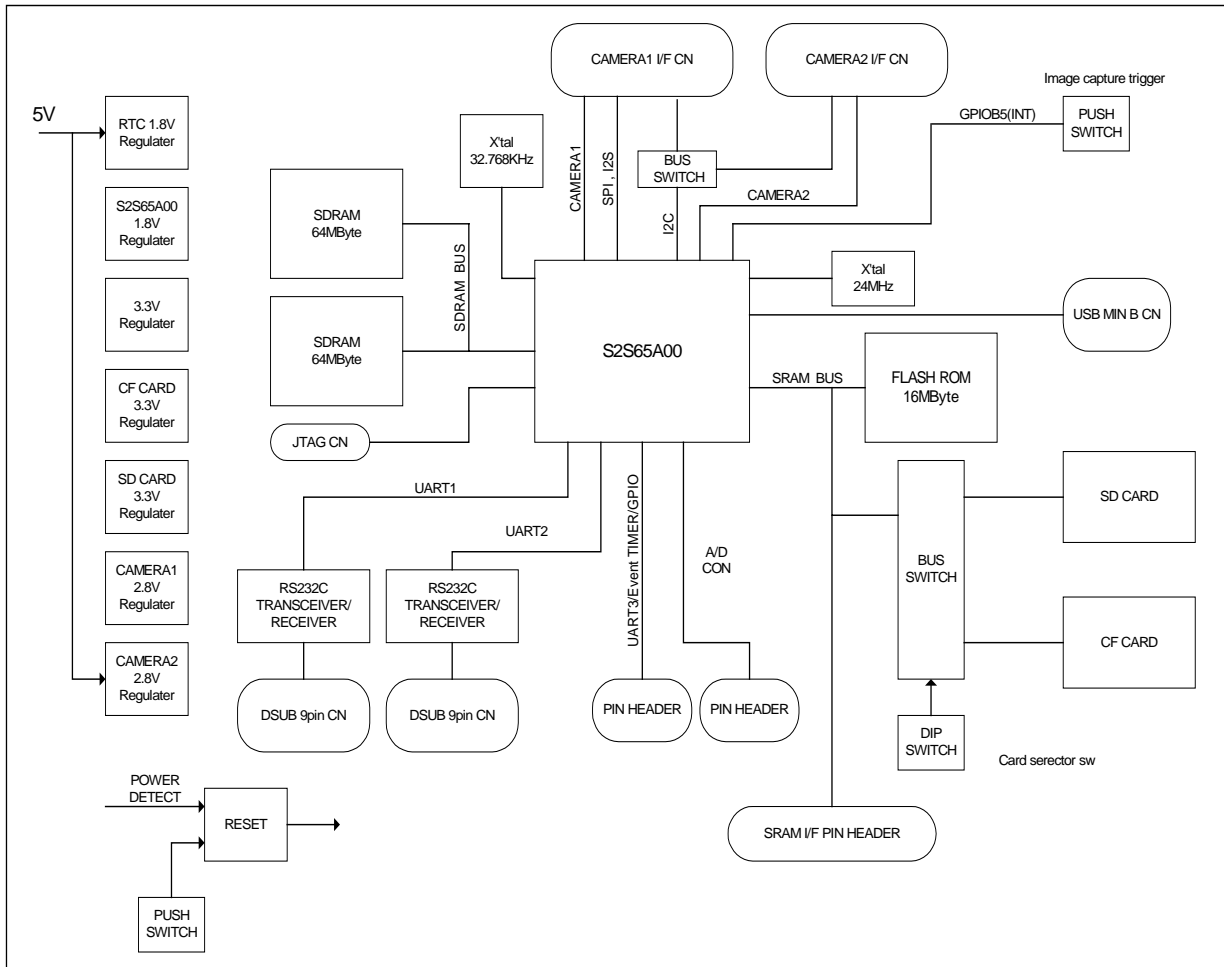


Fig.2.1 Block Diagram

3. MECHANICAL SPECIFICATIONS

Fig.3.1 in 3.1 shows a dimensional outline drawing of the board.

3.1 Dimensions

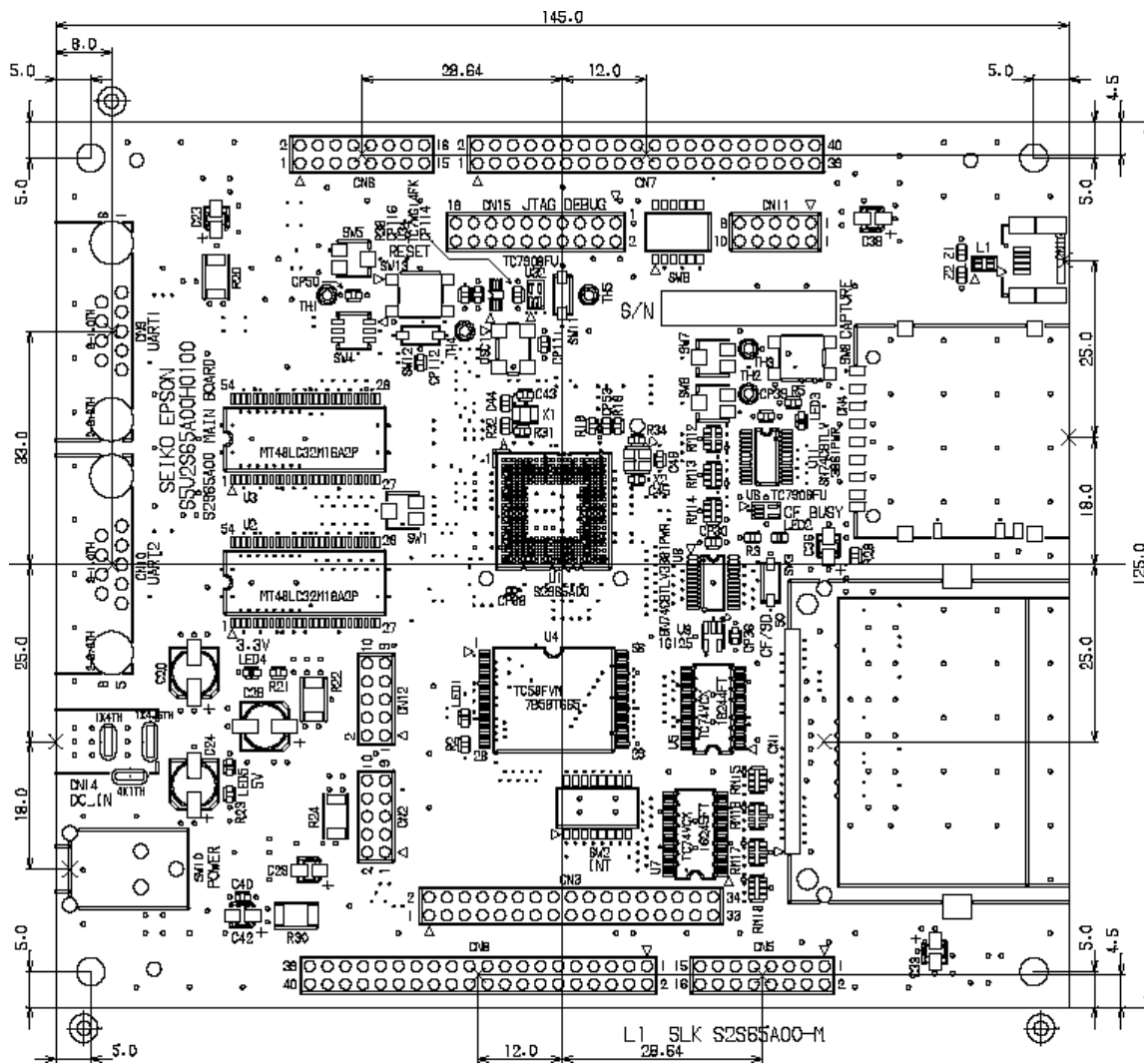


Fig.3.1 Board Dimensional Outline Drawing

4. EXTERNAL PINS

4. EXTERNAL PINS

4.1 Interface Connector Layout

Fig.4.1 shows the locations of the external interfaces on the board. The correspondences between pin numbers and signal names are shown in Sections 4.1.1 to 4.1.10.

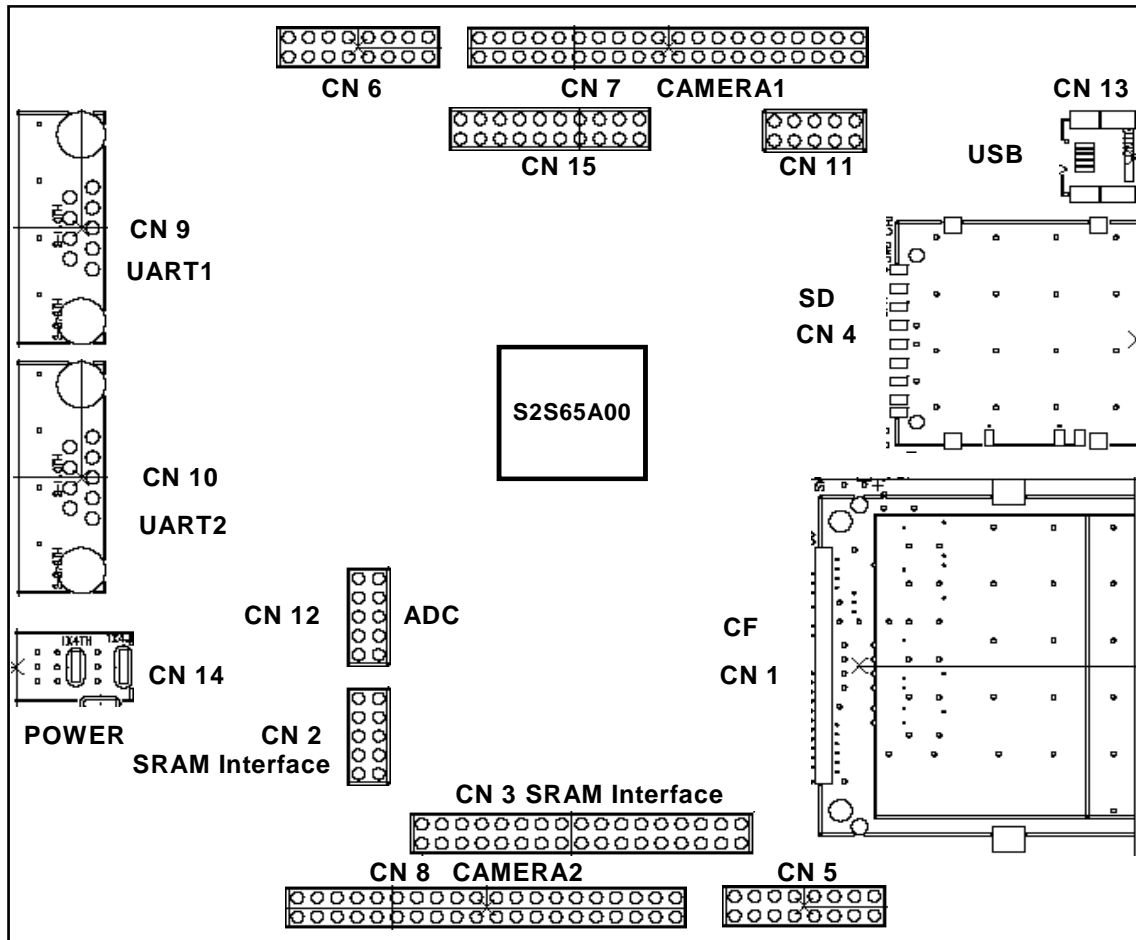


Fig.4.1 Interface Connector Layout

4.1.1 Camera Interface Connectors

1) RESET, 5 V power supply (CN5 and CN6: XG8W-1631)

Pin No.	Signal name	Pin No.	Signal name
1	VDD (5V)	2	VDD (5V)
3	NC	4	NC
5	NC	6	NC
7	NC	8	NC
9	NC	10	NC
11	NC	12	NC
13	RESET#	14	GND
15	GND	16	GND

* RESET# is used on the camera board.

2) Camera interface connector ch1 (CN7: XG8W-4031)

Pin No.	Signal name	Pin No.	Signal name
1	GND	2	GND
3	CAMDATA0	4	CAMDATA1
5	CAMDATA2	6	CAMDATA3
7	CAMDATA4	8	CAMDATA5
9	CAMDATA6	10	CAMDATA7
11	CMCLKOUT	12	CMCLKIN
13	CMVREF	14	CMHREF
15	CAMVDD	16	CAMVDD
17	I ² C_SDA	18	I ² C_SCL
19	3.3V	20	3.3V
21	NC	22	NC
23	GPIOC4 (TXD3/SPI_SS)	24	GPIOC5 (RXD3/SPI_SCLK)
25	NC	26	GPIOC7 (SPI_MOSI)
27	NC	28	NC
29	GPIOB0 (I ² S_WS)	30	GPIOB1 (I ² S_SCK)
31	GPIOB2 (I ² S_SD)	32	GPIOB3 (I ² SI_SD)
33	GPIOB4 (TimerA0out)	34	NC
35	NC	36	NC
37	NC	38	NC
39	GND	40	GND

* In the sample firmware, TimerA0out on this board is used for the clock for the Audio Codec IC installed on the camera board.

4. EXTERNAL PINS

3) Camera interface connector ch2 (CN8: XG8W-4031)

Pin No.	Signal name	Pin No.	Signal name
1	GND	2	GND
3	CAMDATA0	4	CAMDATA1
5	CAMDATA2	6	CAMDATA3
7	CAMDATA4	8	CAMDATA5
9	CAMDATA6	10	CAMDATA7
11	CMCLKOUT	12	CMCLKIN
13	CMVREF	14	CMHREF
15	CAMVDD	16	CAMVDD
17	I ² C_SDA	18	I ² C_SCL
19	3.3V	20	3.3V
21	NC	22	NC
23	NC	24	NC
25	NC	26	NC
27	NC	28	NC
29	NC	30	NC
31	NC	32	NC
33	NC	34	NC
35	NC	36	NC
37	NC	38	NC
39	GND	40	GND

* It is not possible to control the Audio Codec IC on the camera board from the camera 2ch connector.

4.1.2 SRAM Interface

1) Control pins (CN2: XG8W-1031)

Pin No.	Signal name	Pin No.	Signal name
1	GND	2	GND
3	MCS1#	4	MWE#
5	MCS2#	6	MOE#
7	MCS3#	8	MBEH#
9	GND	10	MBEL#

2) Address and data signals (CN3: XG8W-3431)

Pin No.	Signal name	Pin No.	Signal name
1	MA0	2	MA1
3	MA2	4	MA3
5	MA4	6	MA5
7	MA6	8	MA7
9	MA8	10	MA9
11	MA10	12	MA11
13	MA12	14	MA13
15	MA14	16	MA15
17	GND	18	GND
19	MD0	20	MD1
21	MD2	22	MD3
23	MD4	24	MD5
25	MD6	26	MD7
27	MD8	28	MD9
29	MD10	30	MD11
31	MD12	32	MD13
33	MD14	34	MD15

4.1.3 JTAG-ICE Interface (CN15: XG8W-2031)

Pin No.	Signal name	Pin No.	Signal name
1	3.3V	2	3.3V
3	nTRST	4	GND
5	TDI	6	GND
7	TMS	8	GND
9	TCK	10	GND
11	GND	12	GND
13	TDO	14	GND
15	nSRST	16	GND
17	NC	18	GND
19	NC	20	GND

4.1.4 Serial Port (RS232C) Pins (CN9 and CN10: XM2C-0912)

Pin No.	Signal name	Pin No.	Signal name
1	NC	2	RXD
3	TXD	4	NC
5	GND	6	NC
7	RTS	8	CTS
9	NC	10	NC

* Conforms to the layouts on PC motherboards manufactured by ASUS and GIGABYTE.

4.1.5 Power Supply Connector (CN14: MJ-179P)

Use the AC adapter that comes with the product.

4. EXTERNAL PINS

4.1.6 CF-CARD Interface (CN1: M21A-50PD-SF)

Pin No.	Signal name	Pin No.	Signal name
1	GND	2	D3 (CF_D3)
3	D4 (CF_D4)	4	D5 (CF_D5)
5	D6 (CF_D6)	6	D7 (CF_D7)
7	CE1# (CFCE1#)	8	A10 (MA10)
9	OE# (CFOE#)	10	A9 (MA9)
11	A8 (MA8)	12	A7 (MA7)
13	Vcc1 (3.3V)	14	A6 (MA6)
15	A5 (MA5)	16	A4 (MA4)
17	A3 (MA3)	18	A2 (MA2)
19	A1 (MA1)	20	A0 (MA0)
21	D0 (CF_D0)	22	D1 (CF_D1)
23	D2 (CF_D2)	24	WP (NC)
25	CD2#	26	CD1#
27	D11 (CF_D11)	28	D12 (CF_D12)
29	D13 (CF_D13)	30	D14 (CF_D14)
31	D15 (CF_D15)	32	CE2# (CFCE2#)
33	VS1# (NC)	34	IORD# (CFIORD#)
35	IOWR# (CFIOWR#)	36	WE# (MWE0#)
37	RDY/BSY (CFIREQ)	38	Vcc1 (3.3V)
39	CSEL# (CSEL#)	40	VS2# (NC)
41	RESET (CFRST_CN)	42	WAIT# (CFWAIT#)
43	INPACK# (NC)	44	REG# (REG#)
45	BVD2 (BVD2/DASP)	46	BVD1 (CFSTSCHG#)
47	D8 (CF_D8)	48	D9 (CF_D9)
49	D10 (CD_D10)	50	GND

* Pins VS1#, VS2#, WP, INPACK#, and BVD2 are not supported on the S2S65A00, so they are not also used on this evaluation board.
Pins CD1# and CD2# are not also supported on the S2S65A00.
However, a logic-based circuit that detects insertion and removal of a card is installed. The sample firmware does not support the detection of card insertion/removal.

4.1.7 SD-CARD Interface (CN4: M21A-50PD-SF)

Pin No.	Signal name	Pin No.	Signal name
1	SDMDAT3	2	SDCMD
3	GND	4	V _{DD} (SD3.3V)
5	SDMCLK	6	GND
7	SDMDAT0	8	SDMDAT1
9	SDMDAT2		

* The sample firmware does not support the detection of card insertion/removal.

4.1.8 USB Interface (CN13: MINI B)

Pin No.	Signal name	Pin No.	Signal name
1	V _{BUS}	2	D-
3	D+	4	NC
5	GND		

4.1.9 ADC Interface (CN12: XG8W-1031)

Pin No.	Signal name	Pin No.	Signal name
1	AV _{DD}	2	ADIN0
3	ADIN2	4	ADIN1
5	ADIN4	6	ADIN3
7	ADIN6	8	ADIN5
9	ADIN7	10	AV _{SS}

4.1.10 GPIOC Interface (CN11: XG8W-1031)

Pin No.	Signal name	Pin No.	Signal name
1	GPIOC0 (TimerB0IO)	2	GPIOC1 (TimerB1IO)
3	GPIOC2 (TimerB2IO)	4	GPIOC3 (TimerB3IO)
5	GPIOC4 (SPI_SS/TXD3)	6	GPIOC5 (SPI_SCLK/RXD3)
7	GPIOC6 (SPI_MISO/RTS3)	8	GPIOC7 (SPI_MOSI/CTS3)
9	GND	10	GND

5. FUNCTIONAL DESCRIPTION

5. FUNCTIONAL DESCRIPTION

Fig.5.1 shows the locations of the switches on the board surface. For details about each function, see Sections 5.1 to 5.13.

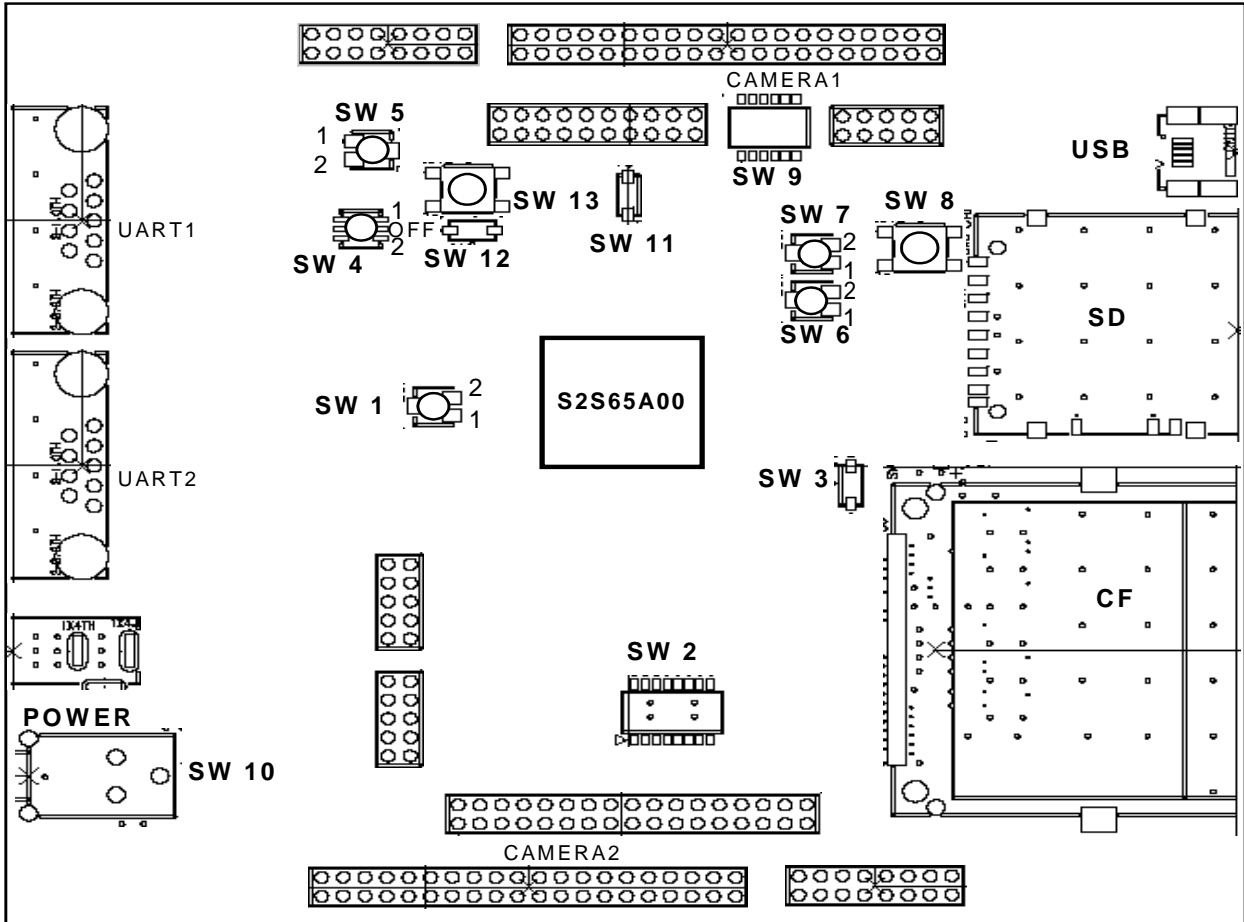


Fig.5.1 Switch Functions (Top View)

5.1 Mode Select DIP-SW (SW2)

Table 5.1 Mode Selection

No.	Abbreviation	Function		Sample firmware	Remarks
		0 (OFF)	1 (ON)		
1	MD0 (MODESEL0)	Reserved		OFF	Set this OFF.
2	MD1 (MODESEL1)				
3	MD2 (MODESEL2)				
4	MD3 (MODESEL3)	For user setting Stored at 0xFFFF_D004 in the Chip Configuration Register at a rise of RESET#.		OFF	
5	MD4 (MODESEL4)				
6	MD5 (MODESEL5)				

5.2 GPIOC4, 5, and 7 DIP-SW (SW9)

This switch selects where GPIOC4, 5, and 7 are connected to. The correspondence between pins is shown in the table below. When using the Audio Codec IC on camera board ch1, set pins 1, 3, and 5 of SW9 to ON. The sample firmware uses an Audio Codec IC.

Table 5.2 GPIOC Setting SW

No.	Abbreviation	Function		Sample firmware	Remarks
		0 (OFF)	1 (ON)		
1	GPIOC4 (SPI_SS/TXD3)	Open	Connects to pin 23 of CN7	ON	CAMERA1
2		Open	Connects to pin 5 of CN11	OFF	
3	GPIOC5 (SPI_SCLK/RXD3)	Open	Connects to pin 24 of CN7	ON	CAMERA1
4		Open	Connects to pin 6 of CN11	OFF	
5	GPIOC7 (SPI_MOSI/CTS3)	Open	Connects to pin 26 of CN7	ON	CAMERA1
6		Open	Connects to pin 8 of CN11	OFF	

5.3 Hardware Reset Switch (SW13)

This switch resets the hardware. Use this switch if necessary.

5.4 SDRAM Chip Select Switch (SW1)

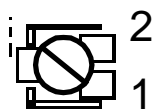
This switch selects the chip select signals of the SDRAM. The correspondence between pins is shown in the table below.

In the sample firmware, this switch is set to ① to use SDCS0#.

Table 5.3 Chip Select Switch

Location	C SDCSx#(SDRAM \emptyset CS#)	Remarks
①	SDCS0# (S2S65A00 output)	0x4000_0000 to
②	SDCS1# (S2S65A00 output)	0x5000_0000 to

The following figure shows a schematic diagram of the switch used above. It shows the switch direction as seen when CN6 and CN7 are at the top. Each connection can be switched by setting the switch to the ① and ② positions shown below.



5. FUNCTIONAL DESCRIPTION

5.5 TimerBin/GPIOB7 Switch (SW5)

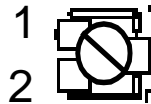
This switch selects where the TimerBin/GPIOB7 signal is connected to. The correspondence between pins is shown in the table below.

In the sample firmware, this switch is set to ① to use GPIOB7 for switching I²C BUS of CAMERA1 and CAMERA2.

Table 5.4 TimerBin/GPIOB7 Setting Switch

Location	C TimerBin/GPIOB7	Remarks
①	Used for OE# control of U19 and U20.	GPIOB7(Low): I ² C of CAMERA1 is enabled. GPIOB7(High): I ² C of CAMERA2 is enabled.
②	Connected to TH1.	TH (Through Hole)

The following figure shows a schematic diagram of the switch used above. It shows the switch direction as seen when CN6 and CN7 are at the top. Each connection can be switched by setting the switch to the ① and ② positions shown below.



5.6 TimerA2Out/GPIOB6 Switch (SW6)

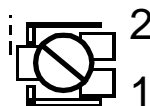
This switch selects where the TimerA2Out/GPIOB6 signal is connected to. The correspondence between pins is shown in the table below.

In the sample firmware, this switch is set to ①.

Table 5.5 TimerBin/GPIOB7 Setting Switch

Location	C TimerA2Out/GPIOB6	Remarks
①	Used for CF card detection.	GPIOB6(Low): CF card inserted GPIOB6(High): CF card not inserted
②	Connected to TH2.	TH (Through Hole)

The following figure shows a schematic diagram of the switch used above. It shows the switch direction as seen when CN6 and CN7 are at the top. Each connection can be switched by setting the switch to the ① and ② positions shown below.



5.7 TimerA1Out/GPIOB5 Switch (SW7)

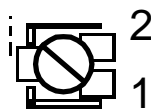
This switch selects where the TimerA1Out/GPIOB5 signal is connected to. The correspondence between pins is shown in the table below.

In the sample firmware, this switch is set to ① to connect to Push SW (SW8), in order to use the GPIOB5 function as an image capture trigger.

Table 5.6 TimerA1Out/GPIOB5 Setting Switch

Location	C TimerA1Out/GPIOB5	Remarks
①	Used as an image capture trigger.	
②	Connected to TH3.	TH(Through Hole)

The following figure shows a schematic diagram of the switch used above. It shows the switch direction as seen when CN6 and CN7 are at the top. Each connection can be switched by setting the switch to the ① and ② positions shown below.



5.8 Push Switch (SW8)

This switch is connected to the TimerA1Out/GPIOB5 signal. In the sample firmware, this switch is used as an image capture trigger. When pressed, it connects to the GND.

5.9 CTS2/I²C_SDA/GPIOA7 and RTS2/I²C_SCL/GPIOA6 Switch (SW4)

This switch is used to select whether to use the CTS2/I²C_SDA/GPIOA7 and CTS2/I²C_SCL/GPIOA6CF signals as the I²C function for controlling the camera or as control pins (RTS and CTS) of UART2. In the sample firmware, this switch is set to ① to use them as the I²C function.

Table 5.7 Setting Switch for I²C and UART2 Control Pins

Location	C CTS2/I ² C_SDA/GPIOA7	C RTS2/I ² C_SCL/GPIOA6	Remarks
①	I ² C_SDA	I ² C_SCL	Camera control
OFF	NC	NC	
②	CTS2	RTS2	UART2

The following figure shows a schematic diagram of the switch used above. It shows the switch direction as seen when CN6 and CN7 are at the top. Each connection can be switched by setting the switch to the ① and ② positions shown below.



5. FUNCTIONAL DESCRIPTION

5.10 CF/SD Select DIP-SW (SW3)

This function switches the connection settings for the CF and SD cards. The CF and SD cards cannot be used at the same time. Set this switch before turning on the power. The sample firmware uses the CF card.

Table 5.8 CF/SD Select Switch

No.	Function		Remarks
	0 (OFF)	1 (ON)	
1	SD Card	CF Card	

* For sample firmware supporting SD cards, contact our sales representative.

5.11 Clock Select DIP-SW (SW11)

Either a crystal oscillator element or a crystal oscillator device can be used as a 32,768-KHz clock input for the S2S65A00. This evaluation board has a crystal oscillator element only. Set this switch to the OFF position.

Table 5.9 Clock Select Switch

No.	Function		Remarks
	0 (OFF)	1 (ON)	
1	Element	Device	

* You can install and use a crystal oscillator device.

5.12 RTC (Real-Time Clock) Select DIP-SW (SW12)

On the S2S65A00, the main power can be turned off to supply power to the RTC only so that the RTC (real-time clock function) operates with low power consumption.

Table 5.10 Backup Select Switch

No.	Function		Remarks
	0 (OFF)	1 (ON)	
1	Operate the RTC only	Normal operation	

5.13 Power SW (SW10)

This switch is used to turn ON or OFF the power to the evaluation board. When this switch is ON, power is supplied to all components. When this switch is OFF, power is supplied only to the RTC on the S2S65A00. Note that not all the power is turned OFF.

The following describes how to use the Power SW (SW10) and RTC SW (SW12) on the evaluation board.

- 1) How to turn the main power OFF to operate the RTC (clock) only
Step 1 - Turn SW12 OFF: This step turns the BUP# pin on the S2S65A00 Low and inhibits access to the register and memory in the RTC from the internal CPU of the S2S65A00. This protects the RTC register and memory from instability that can occur when the main power is turned OFF.
Step 2 - Turn SW10 OFF: This step turns OFF the power to all components except the S2S65A00 RTC on the board. This establishes the mode where only the RTC operates.
- 2) How to turn the main power on to operate the entire system from the mode where only the RTC operates
Step 1 - Turn SW10 ON: This step turns ON the power to all components on the board. This establishes the mode where the entire system operates.
Step 2 - Turn SW12 ON: This step turns the BUP# pin on the S2S65A00 High and permits access to the register and memory in the RTC from the internal CPU of the S2S65A00. It becomes possible to refer to and acquire the time.

6. SPECIFICATIONS

6.1 Power Supply

This board generates seven types of power from the $5\text{ V} \pm 10\%$ power input from CN14. Table 6.1 shows the purposes for using the power supply.

Table 6.1 Use of Power Supply (Main Board)

	Location	Parts	Use	Remarks
3.3 V generator	U25	PQ033EZ1HZ	Power to the I/O and chips on the S2S65A00	
CF 3.3 V generator	U27	PQ033EZ1HZ	Power to the CF card	Power is supplied when a CF card is inserted.
SD 3.3 V generator	U28	PQ033EZ1HZ	Power to the SD card	Power is supplied when an SD card is inserted.
CAM1 2.8 V generator	U29/U35	MM1592J/LP2985IM5-2.8	Power to CAMERA1	U29 and U35 are installed exclusively with each other.
CAM2 2.8 V generator	U30/U36	MM1592J/LP2985IM5-2.8	Power to CAMERA2	U29 and U35 are installed exclusively with each other.
1.8 V generator	U26	UPC3018TJ-AZ	Core and analog PLL power to the S2S65A10	
RTC 1.8 V generator	U24	UPC3018TJ-AZ	RTC Power to the S2S65A00	

* When two cameras operating on the same voltage are used, it is not necessary to use separate power supplies. However, for evaluation purposes, separate power supplies are used on this board.

6.2 Current Consumption

TBD

7. NOTE ON USING THIS BOARD

This board is not ready for live-wire insertion and removal operations on the CF and SD cards. Insert or remove the CF card only when the power is OFF.

Turning the Power SW (SW10) OFF does not turn OFF all components. The RTC is always supplied with 1.8 V power. When not using the board, remove the AC/DC adapter from the outlet.

8. PARTS LIST

8. PARTS LIST

Table 8.1 lists the major parts installed on the board. (Chip resistors and capacitors are not listed.)

Circuit diagrams and detailed parts list are (will be) available at our website. Download them as necessary or contact our sales representative.

Table 8.1 Parts List

Parts No.	Parts Name	Standard		Qty
U1	MPU	S2S65A00 (280pinBGA)	EPSON	1
U2,U3	SDRAM	MT48LC32M16A2P-75 (64MB)	Micron	2
U4	FROM	TC58FVM7B5BTG65 (16MB)	Toshiba	1
U5	Logic IC	TC74VCX16244FT	Toshiba	1
U32,U6	Logic IC	TC7S08FU	Toshiba	2
U7	Logic IC	TC74VCX16245FT (SPL.F)	Toshiba	1
U10,U14,U15,U16	Logic IC	TC7S32FU	Toshiba	4
U12,U13,U17,U21	Logic IC	TC7S04FU	Toshiba	4
U23,U31,U34	Logic IC	TC7WZ14FK	Toshiba	3
U8,U11,U19,U20	Logic IC	SN74CBTLV3861PWR	Ti	4
U9	Logic IC	SN74CBTLV1G125DBVR	Ti	1
U18,U22	RS232C Driver	ADM3222ARUZ	AnalogDevices	2
U26,U24	Regulator	uPC3018TJ-AZ (1.8V1A)	NEC	2
U25,U27,U28	Regulator	PQ033EZ1HZ (3.3V1A)	Sharp	3
U35,U36	Regulator	LP2985IM5-2.8NOPB (2.8V 150mA)	NS	2
U33	Reset IC	PST600KMT-RPbF (2.5V MMP3A)	Mitsumi	1
CN1	CF connector	MI21A-50PD-SF (71)	Hirose Electric	1
CN4	SD connector	DM1AA-SF-PEJ (72)	Hirose Electric	1
CN2,CN11,CN12	Pin header	XG8W-1031	Omron	3
CN6,CN5	Pin header	XG8W-1631	Omron	2
CN15	Pin header	XG8W-2031	Omron	1
CN3	Pin header	XG8W-3431	Omron	1
CN7,CN8	Pin header	XG8W-4031	Omron	2
CN9,CN10	D-SUB connector	XM2C-0912	Omron	2
(CN9,CN10)	Grounding terminal	XM2Z-0031 (installed on the D-SUB connector)	Omron	4
(CN9,CN10)	Fixture	XM2Z-0013 (installed on the D-SUB connector)	Omron	4
CN13	MINI USB connector	54819-0572	Molex	1
CN14	DC jack	MJ-179P	Marushin Electric Mfg.	1
X1	XTAL	FC-135 (32.768KHz)	EPSON TOYOCOM	1
X2	XTAL	FA-238 (24MHz)	EPSON TOYOCOM	1
SW1,SW5,SW6,SW7	Switch	CS-4-12XA	Copal Electronics	4
SW4	Switch	CS-4-22YA	Copal Electronics	1
SW2	Switch	CHS-08B	Copal Electronics	1
SW9	Switch	CHS-06B	Copal Electronics	1
SW3,SW11,SW12	Switch	CHS-01A1	Copal Electronics	3
SW13,SW8	Switch	B3FS-1000	Omron	2
SW10	Switch	21136NA	APEM	1
FL1,FL2,FL3,FL4,FL5	Chip filter	BLM21BB201SN1D	Murata	5
LED1	LED	BR1111C (Red)	Stanley	1
LED2,LED3,LED4,LED5	LED	PG1111C (Green)	Stanley	4
L1	Choke coil	DLW21SN900SQ2	Murata	1
Z1,Z2	Varistor	AVRL161A3R3FTA	TDK	2

<Revision History>

Rev	Date	Description	Person
0.2	2007/03/29	First Edition	T.Suzuki
1.0	2007/04/24	Alter the wording	T.Suzuki

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