

S1D13C00

S5U13C00P01C100 Customer Development Board User Manual

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1. Introduction

The S5U13C00P01C100 is the **S1D13C00 EPD Evaluation Board**. It is a BoosterPack board with a connector for the E Ink ET011TT2 EPD panel intended to be directly connected to the TI Tiva C Series EK-TM4C1294XL Launchpad evaluation board for evaluating and developing embedded EPD applications using the Epson S1D13C00 Memory Display Controller IC. It is possible to be controlled by the ST Nucleo-F746ZG or Nucleo-F767ZI board through the S5U13C00M00C100 (STM32 Nucleo-144 development board) board.

Figure 1 shows the S5U13C00P01C100 EPD Evaluation Board.

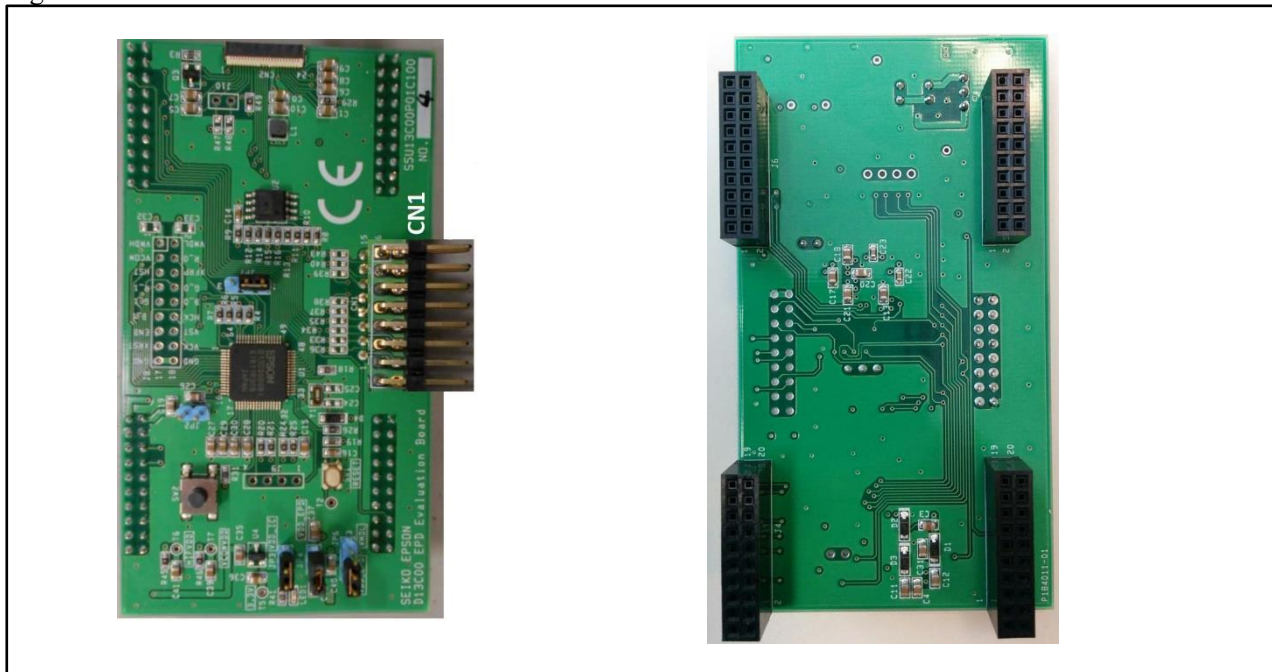


Figure 1 – S5U13C00P01C100 EPD Evaluation Board

The S5U13C00P01C100 EPD Evaluation Board consists of:

- A S1D13C00 Memory Display Controller (U1)
- Four 2x10 connectors for Host Interface connection (J4, J5, J6 and J7) and +5V/+3.3V power
- A 16Mbytes QSPI Serial Flash (U2)
- A flexible printed circuit (FPC) connector (CN2) for connecting to a ET011TT2 EPD panel
- An 18-pin right-angle header connector for connecting to other panels

Figure 1.1 shows the block diagram of S5U13C00P01C100, focused on interfaces. It has a host MCU interface and three interfaces for displays. CN1 is an interface for E Ink's HULK power board, CN2 is an interface for the ET011TT2 panel module, and there are through holes for interface to a memory display panel. You can select one of these interfaces to connect a panel module. CN2 interface is also possible to connect other E Ink panel modules. The booster components on the S5U13C00P01C100 are similar circuits to HULK power board suitable for the ET011TT2 panel module.

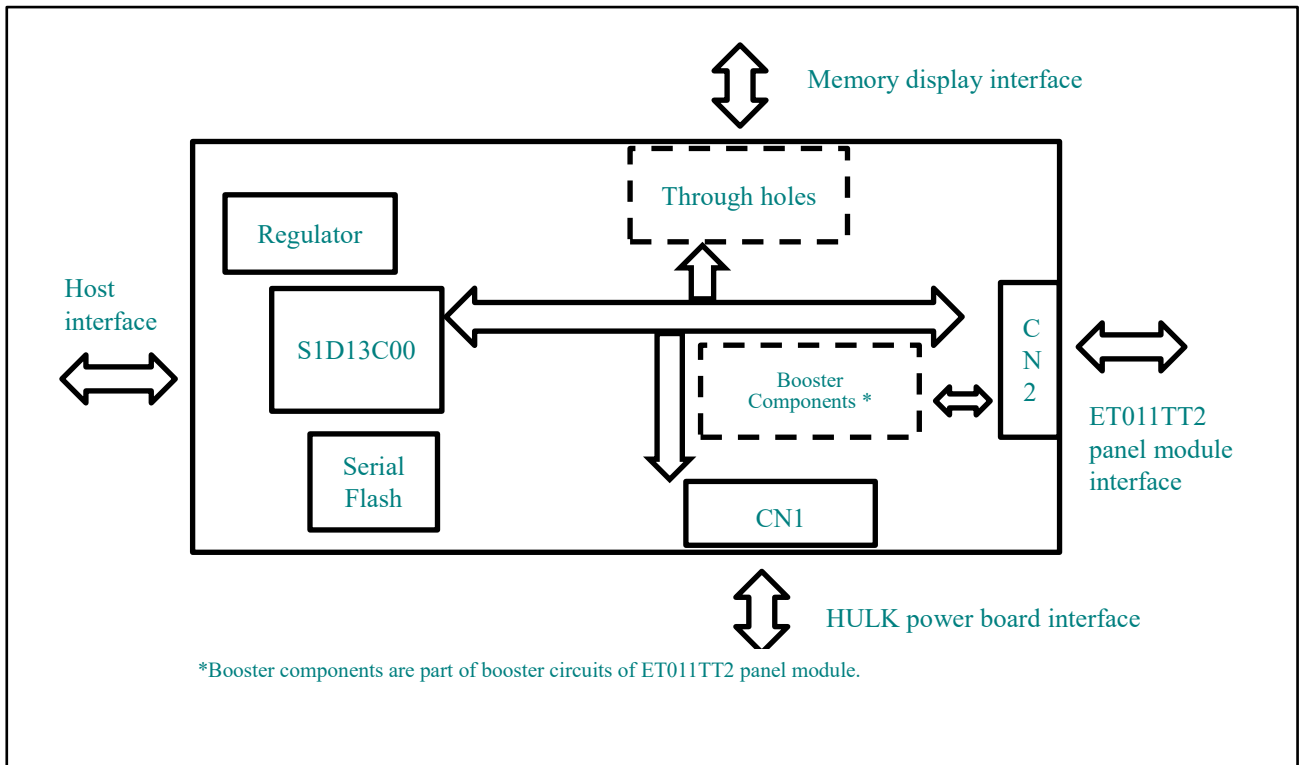


Figure 1.1 – S5U13C00P01C100 Block Diagram for Interface

2. Connecting the ET011TT2 EPD Panel

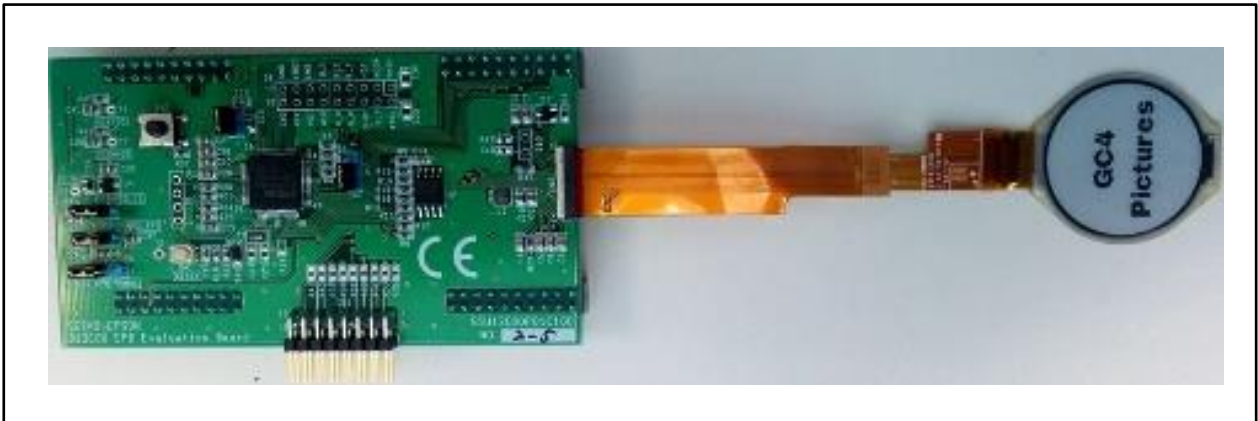


Figure 2 – Connecting the ET011TT2 EPD Panel

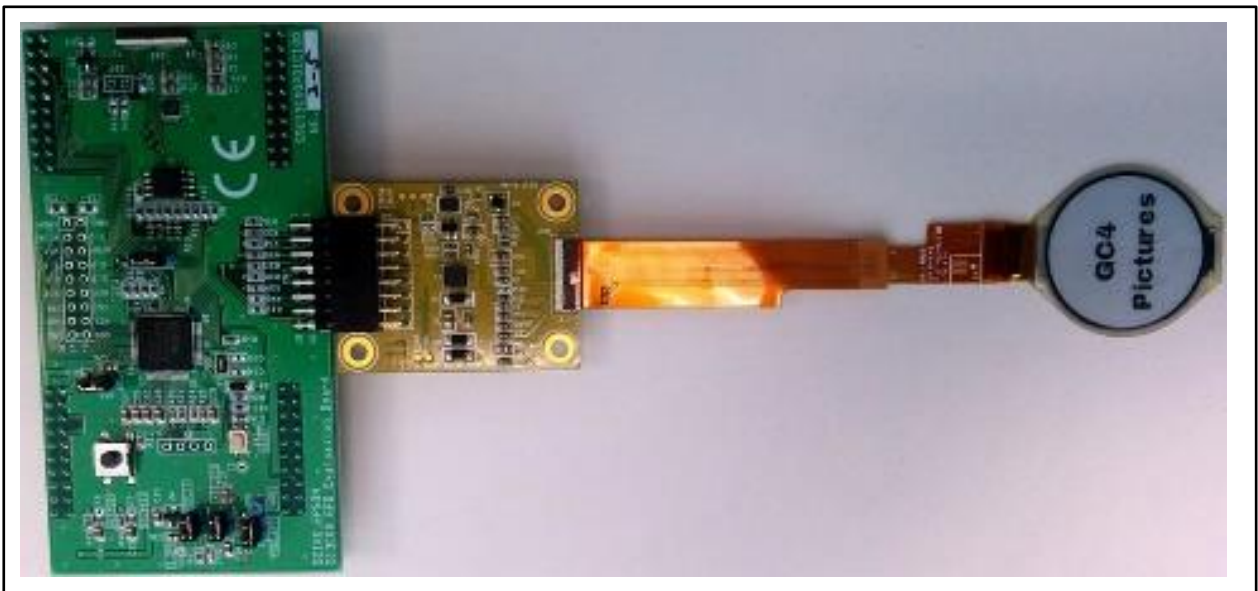


Figure 2.1 – Connecting the HULK Power Board with ET011TT2 EPD Panel

3. Connecting to the Host MCU Board

3.1 EK-TM4C1294XL Board

Position the S5U13C00P01C100 EPD Evaluation Board on TOP of the EK-TM4C1294XL Launchpad Board, press the two boards together with J4 connecting to X8, J5 connecting to X9, J6 connecting to X6, and J7 connecting to X7 respectively.

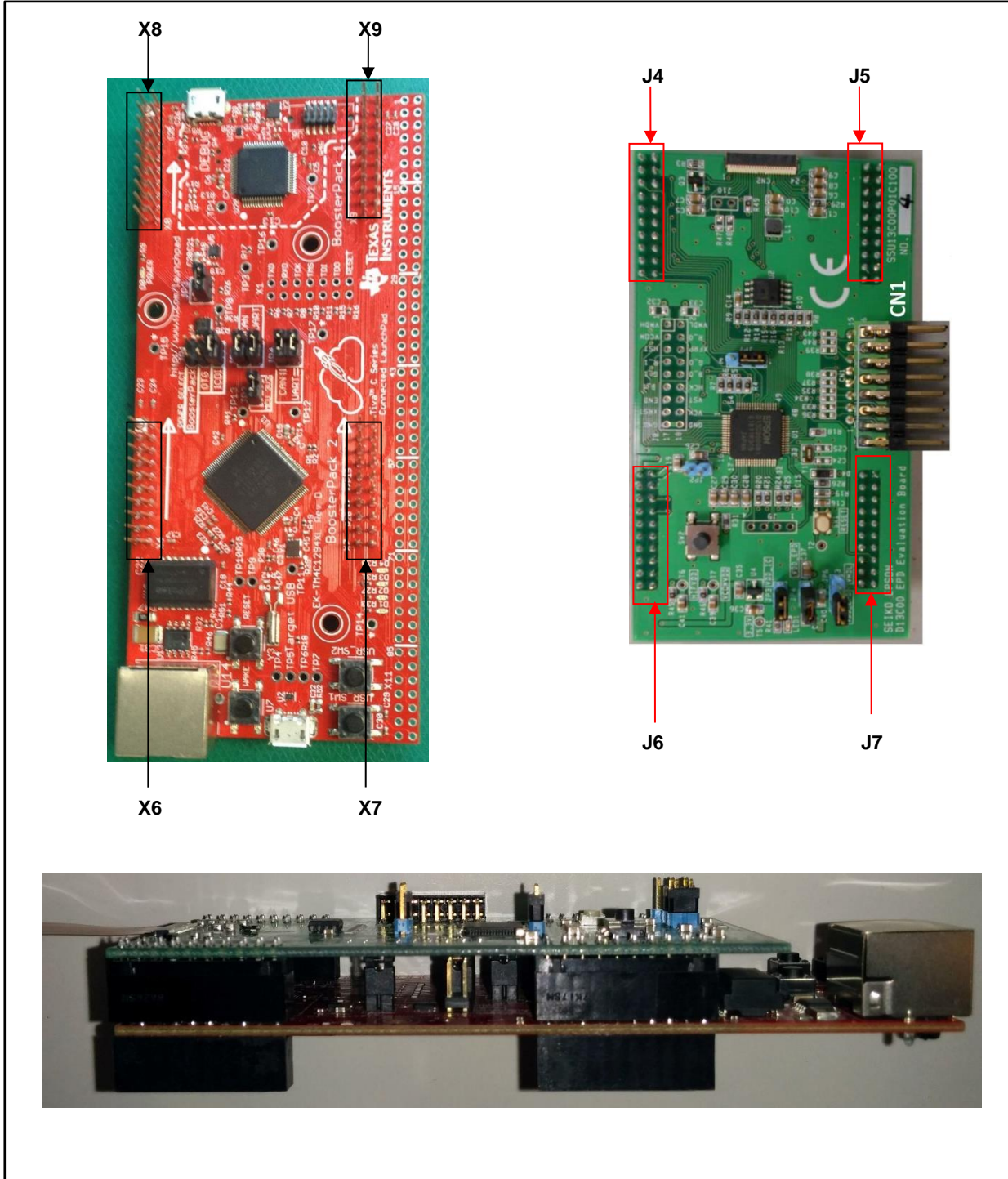


Figure 3 – Connecting the S5U13C00P01C100 to the EK-TM4C1294XL

3.2 Nucleo-F746ZG or Nucleo-F767ZI Board

First, connect the S5U13C00M00C100 adapter board to the Nucleo board. Second, connect the S5U13C00P01C100 board to the S5U13C00M00C100 adapter board.

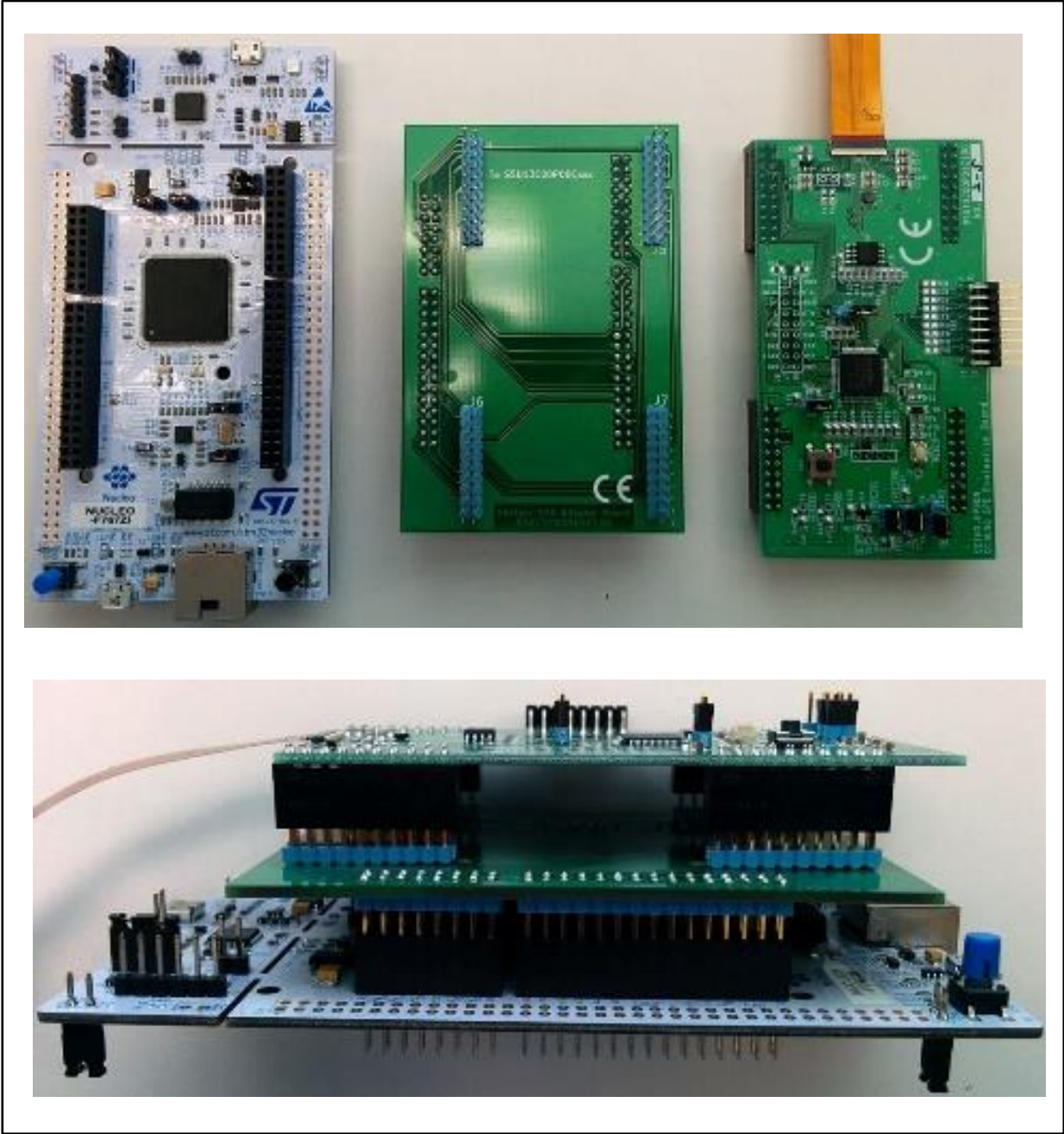


Figure 3.1 – Connecting the S5U13C00P01C100 to the Nucleo-F746ZG or Nucleo-F767ZI

4. Jumpers Settings

The following tables show the jumpers settings for the S5U13C00P01C100 EPD Evaluation Board.

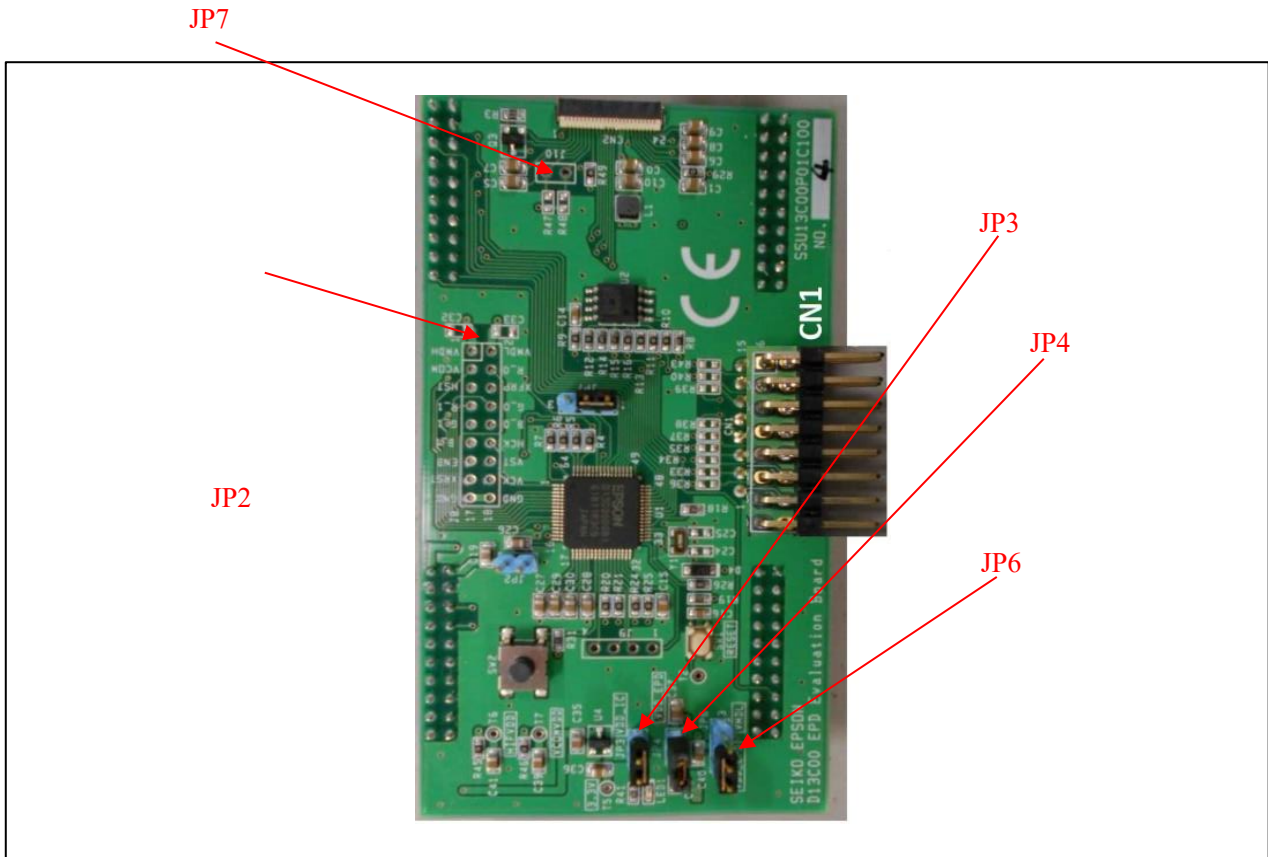


Figure 4 – S5U13C00P01C100 Jumpers Locations

Jumpers	Descriptions	Type	Default Position
JP2	External VC3 Connection	2-pin	Not installed
JP3	VDD_IC supply series jumper	2-pin	Installed
JP4	VDD_EPD supply series jumper	2-pin	Installed
JP6	DISPVDD source supply 1-2 = VDD_EPD 2-3 = VMDL	3-pin	1-2 (VDD_EPD)
JP7	HIFCNF (host interface configuration) 1-2 = SPI/QSPI 2-3 = INDIRECT 8-BIT (not used)	3-pin	1-2 (SPI/QSPI)

5. Push-Buttons and EPD Panel Connectors

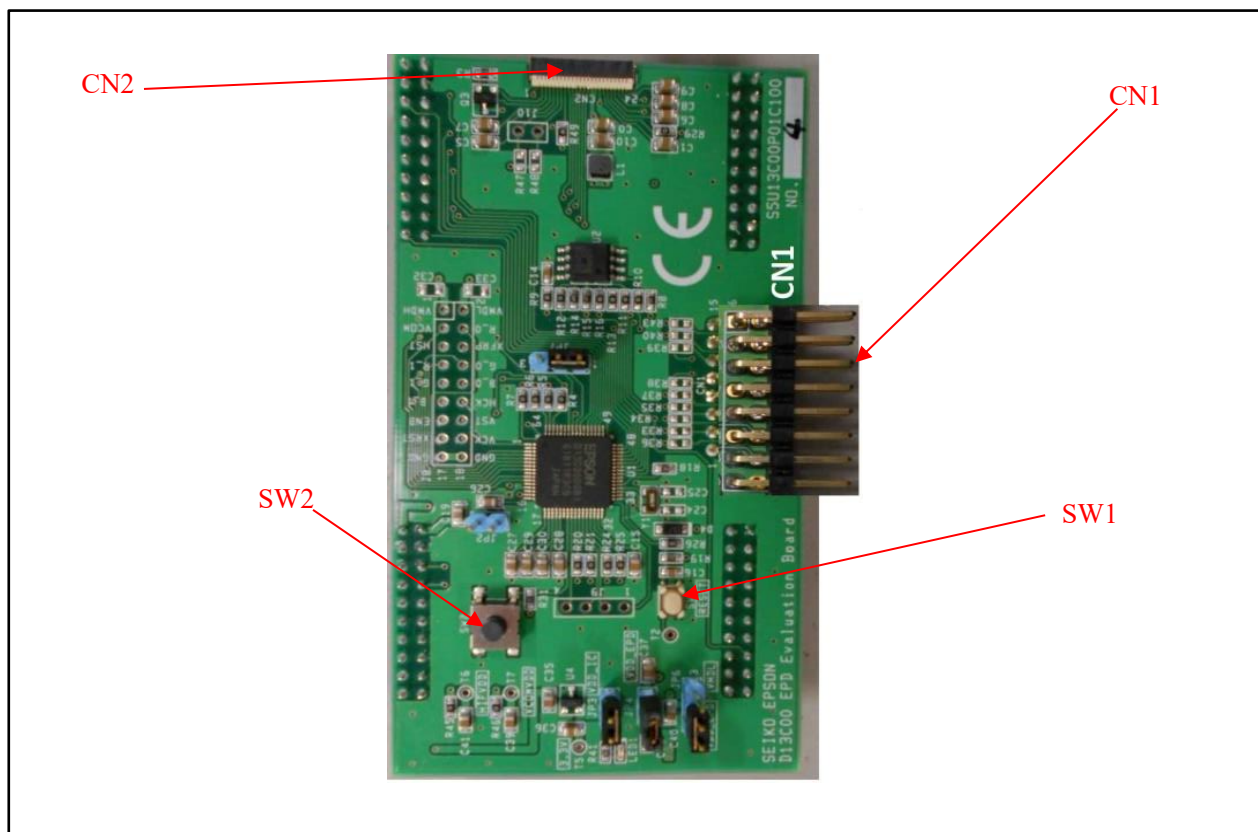


Figure 5 – S5U13C00P01C100 Push-Buttons and EPD Panel Connector Locations

5.1 Push-Buttons

Push-Button	Description
SW1	Reset button
SW2	User button connected to P01 port pin

5.2 Header for Hulk Power Board Connection (CN1)

The table below shows the pin assignments of CN1.

CN1 Pin	Pin name	Description
1	VDD_EPDP	Power supply for EPD panel.
2	EPD_BS	Tied to VDD_EPDP through resistor R49. EPD bus select. 3-wire serial interface is selected.
3	EPD_RST	Connected to port P03 of S1D13C00. EPD reset output from S1D13C00.
4	EPD_BUSY	Connected to port P02 of S1D13C00. EPD busy input status to S1D13C00.
5	HST/EPD_CSB	Chip-select for EPD panel. Connected to HST output of S1D13C00.
6	VCK/EPD_DC	Data/command select for EPD panel. Connected to VCK output of S1D13C00.
7	EPD_P51	Connected to P06 port of S1D13C00.
8	-	-
9	-	-
10	-	-
11	P07	Connected to P07 port of S1D13C00.
12	VST/EPD_SCL	Serial clock for EPD panel. Connected to VST output of S1D13C00.
13	-	-
14	ENB/EPD_SDA	Serial data for EPD panel. Connected to ENB output of S1D13C00.
15	-	-
16	GND	Ground.

5.3 FPC Connector for ET011TT2 Connection (CN2)

The following table shows the pinout and signal connections of the 24-pin FPC (CN2):

CN2 Pin	Pin Connection	Description
1	EPD_P51	Connected to P06 port of S1D13C00.
2	FETG	GDR signal of EPD panel.
3	FETS	RESE signal of EPD panel.
4	VGL	VGL supply from EPD panel.
5	VGH	VGH supply from EPD panel.
6	EPD_TSCL	I2C clock for external temperature sensor on EPD panel.
7	EPD_TSDA	I2C data for external temperature sensor on EPD panel.
8	EPD_BS	Tied to VDD_EPД through resistor R49. EPD bus select. 3-wire serial interface is selected.
9	EPD_BUSY	Connected to port P02 of S1D13C00. EPD busy input status to S1D13C00.
10	EPD_RST	Connected to port P03 of S1D13C00. EPD reset output from S1D13C00.
11	VCK/EPD_DC	Data/command select for EPD panel. Connected to VCK output of S1D13C00.
12	HST/EPD_CSB	Chip-select for EPD panel. Connected to HST output of S1D13C00.
13	VST/EPD_SCL	Serial clock for EPD panel. Connected to VST output of S1D13C00.
14	ENB/EPD_SDA	Serial data for EPD panel. Connected to ENB output of S1D13C00.
15	VDD_EPД	VC1 supply to EPD panel. (No-connect on panel side.)
16	VDD_EPД	VC1 supply to EPD panel.
17	GND	Ground.
18	VDD	VDD supply from EPD panel.
19	P07	Connected to P07 port of S1D13C00.
20	VSH	VSH supply from EPD panel.
21	PREVGH	PREVGH supply to EPD panel.
22	VSL	VSL supply from EPD panel.
23	PREVGL	PREVGL feedback from EPD panel.
24	VCOM_EPД	VCOM supply from EPD panel.

6. Pre-installed On-board Components

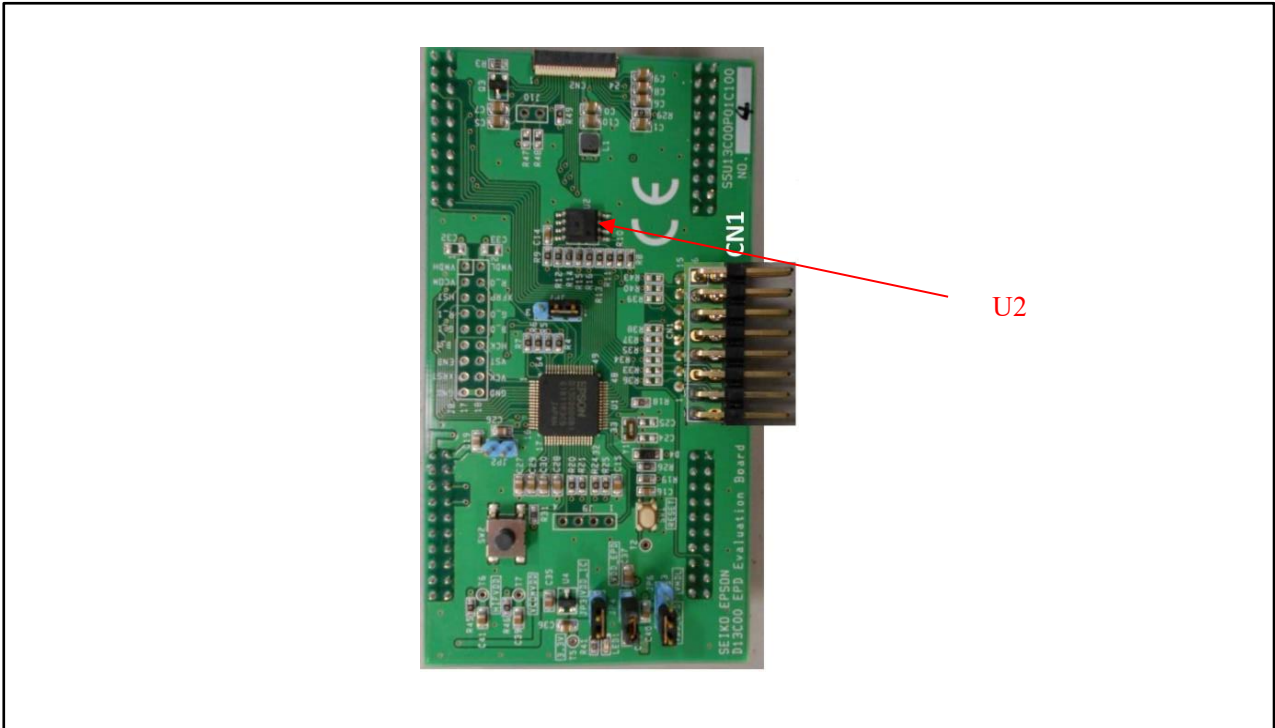


Figure 6 – S5U13C00P01C100 pre-installed on-board components locations

6.1 16Mbytes QSPI Serial Flash (U2)

This serial flash is directly connected to the QSPI interface of the S1D13C00. The flash can be optionally accessed (read-only) through the Memory-Mapped Access area on the memory map of the S1D13C00.

7. Host MCU Board Connections

7.1 Tiva C Series EK-TM4C1294XL Launchpad

The following tables show the signals of the Tiva C Series EK-TM4C1294XL Launchpad connectors which are used by the S5U13C00P01C100 Customer Development Board:

J4	EK-TM4C1294XL Connector X8 Signals	S5U13C00P01C100 Signal
1	3V3	-
2	5V	HOST_5V
3	PE4	HIFD0
4	GND	GND
5	PC4	HIFD7
6	PE0	-
7	PC5	HIFD6
8	PE1	-
9	PC6	HIFD5
10	PE2	-
11	PE5	HIFD1
12	PE3	-
13	PD3	-
14	PD7	-
15	PC7	HIFD4
16	PA6	-
17	PB2	-
18	PM4	P11
19	PB3	HIFRD
20	PM5	HIFIRQ

J5	EK-TM4C1294XL Connector X9 Signals	S5U13C00P01C100 Signal
1	PF1	-
2	GND	GND
3	PF2	-
4	PM3	-
5	PF3	-
6	PH2	-
7	PG0	-
8	PH3	-
9	PL4	-
10	TARGET_RST#	nRST
11	PL5	-
12	PD1	-
13	PL0	-
14	PD0	-
15	PL1	-
16	PN2	-
17	PL2	-
18	PN3	-
19	PL3	-
20	PP2	-

Host MCU Board Connections

J6	EK-TM4C1294XL Connector X6 Signals	S5U13C00P01C100 Signal
1	3V3	HOST_3.3V
2	5V	HOST_5V
3	PD2	-
4	GND	GND
5	PP0	-
6	PB4	HIFDE
7	PP1	-
8	PB5	HIFWR
9	PD4	HIFD2
10	PK0	-
11	PD5	HIFD3
12	PK1	-
13	PQ0	-
14	PK2	-
15	PP4	-
16	PK3	-
17	PN5	-
18	PA4	-
19	PN4	-
20	PA5	-

J7	EK-TM4C1294XL Connector X7 Signals	S5U13C00P01C100 Signal
1	PG1	-
2	GND	GND
3	PK4	-
4	PM7	-
5	PK5	-
6	PP5	-
7	PM0	-
8	PA7	-
9	PM1	-
10	TARGET_RST#	-
11	PM2	-
12	PA3/PQ2	-
13	PH0	-
14	PA2/PQ3	-
15	PH1	-
16	PP3	HIFCS
17	PK6	-
18	PQ1	-
19	PK7	-
20	PM6	-

7.2 STM32 Nucleo-144 development board

The following tables show the signal connections map between the S5U13C00P01C100 board and the STM32 Nucleo-144 development board:

S5U13C00P01C100 Board		STM32 Nucleo-144 development board		Description
	Signal	Signal		
J4-1	-	-	-	
J4-2	HOST_5V	+5V	CN8-9	5V supply
J4-3	HIFD0	PD11	CN10-23	Host SPI/QSPI D0
J4-4	GND	GND	CN7-8	Ground
J4-5	HIFD7	PE10	CN10-24	Host INDIRECT8 D7
J4-6	-	-	-	
J4-7	HIFD6	PE9	CN10-4	Host INDIRECT8 D6
J4-8	-	-	-	
J4-9	HIFD5	PE8	CN10-18	Host INDIRECT8 D5
J4-10	-	-	-	
J4-11	HIFD1	PD12	CN10-21	Host SPI/QSPI D1
J4-12	-	-	-	
J4-13	-	-	-	
J4-14	-	-	-	
J4-15	HIFD4	PE7	CN10-20	Host INDIRECT8 D4
J4-16	-	-	-	
J4-17	-	-	-	
J4-18	-	-	-	
J4-19	HIFRD	PD4	CN9-8	Host INDIRECT8 read signal
J4-20	HIFIRQ	PB1	CN10-7	Interrupt request to host

S5U13C00P01C100 Board		STM32 Nucleo-144 development board		Description
	Signal	Signal		
J5-1	-	-	-	
J5-2	GND	GND	CN10-22	Ground
J5-3	-	-	-	
J5-4	-	-	-	
J5-5	-	-	-	
J5-6	-	-	-	
J5-7	-	-	-	
J5-8	-	-	-	
J5-9	-	-	-	
J5-10	nRST	NRST	CN8-5	Reset
J5-11	-	-	-	
J5-12	-	-	-	
J5-13	-	-	-	
J5-14	-	-	-	
J5-15	-	-	-	
J5-16	-	-	-	
J5-17	-	-	-	
J5-18	-	-	-	
J5-19	-	-	-	
J5-20	-	-	-	

Host MCU Board Connections

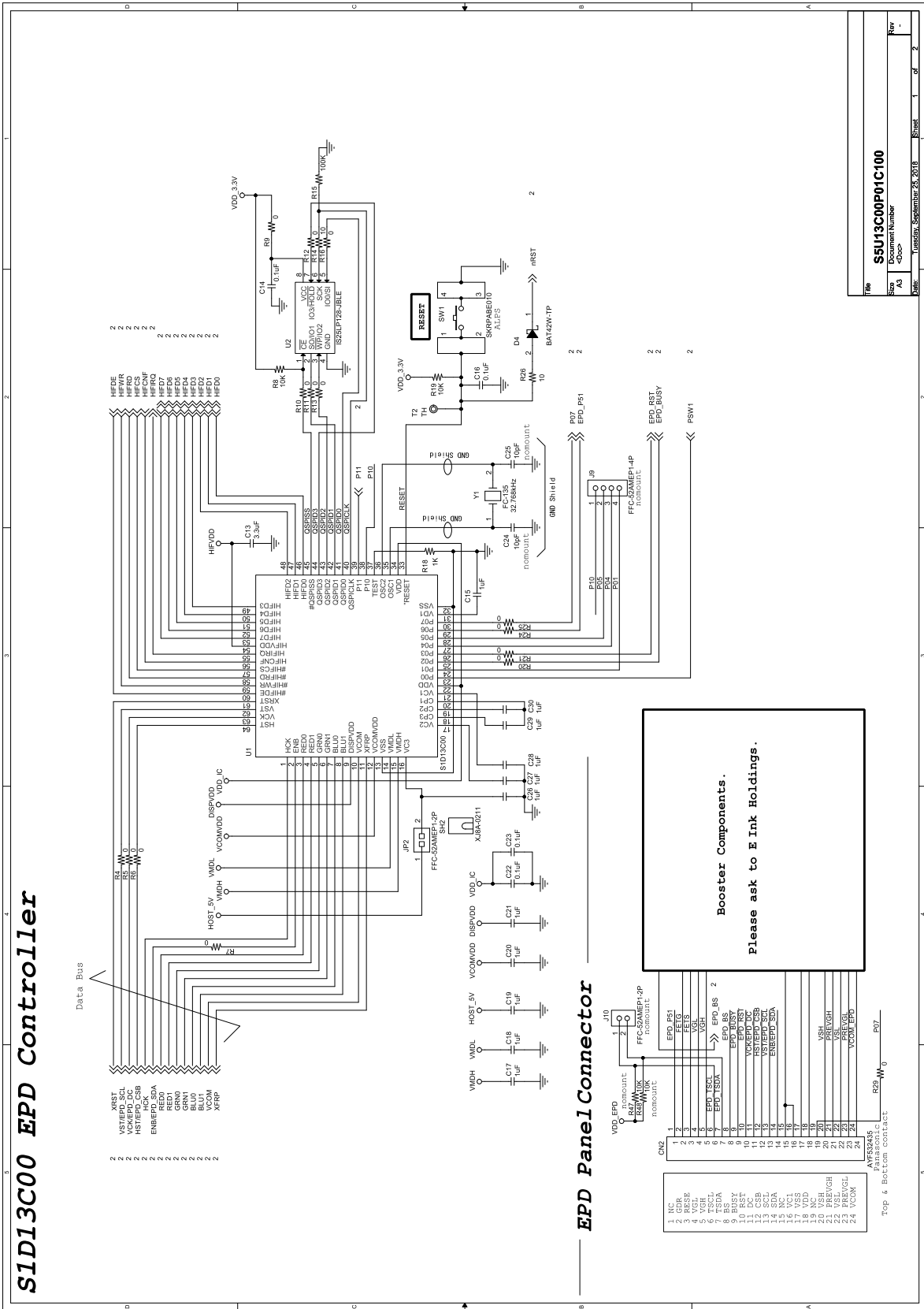
S5U13C00P01C100 Board		STM32 Nucleo-144 development board		Description
	Signal	Signal		
J6-1	HOST_3.3V	+3V3	CN8-7	3.3V supply
J6-2	HOST_5V	+5V	CN8-9	5V supply
J6-3	-	-	-	
J6-4	GND	GND	CN10-3	Ground
J6-5	-	-	-	
J6-6	HIFDE	PB6	CN10-13	Host device enable signal
J6-7	-	-	-	
J6-8	HIFWR	PB2	CN10-15	Host SPI/QSPI clock
J6-9	HIFD2	PE2	CN10-25	Host SPI/QSPI D2
J6-10	-	-	-	
J6-11	HIFD3	PD13	CN10-19	Host SPI/QSPI D3
J6-12	-	-	-	
J6-13	-	-	-	
J6-14	-	-	-	
J6-15	-	-	-	
J6-16	-	-	-	
J6-17	-	-	-	
J6-18	-	-	-	
J6-19	-	-	-	
J6-20	-	-	-	

S5U13C00P00Cx00 Board		STM32 Nucleo-144 development board		Description
	Signal	Signal		
J7-1	-	-	-	
J7-2	GND	GND	CN10-5	Ground
J7-3	-	-	-	
J7-4	-	-	-	
J7-5	-	-	-	
J7-6	-	-	-	
J7-7	-	-	-	
J7-8	-	-	-	
J7-9	-	-	-	
J7-10	-	-	-	
J7-11	-	-	-	
J7-12	-	-	-	
J7-13	-	-	-	
J7-14	-	-	-	
J7-15	-	-	-	
J7-16	HIFCS	PD7	CN9-2	Host INDIRECT8 chip-select
J7-17	-	-	-	
J7-18	-	-	-	
J7-19	-	-	-	
J7-20	-	-	-	

8. Parts List

Item	Qty	Reference	Part	Description	Manufacturer Part No. / Comments
1	1	CN1	HEADER 2X8	CONN HEADER 16POS (2x8) 0.1" right-angle	Amphenol FCI 68021-216HLF
2	1	CN2	CONN_FLEX_24	CONN FPC/FFC 24POS 0.50MM pitch	Panasonic AYF532435
3	10	C0,C1,C4,C5,C6,C7,C8,C9, C12,C31	1uF	1.0uF Ceramic -20%/+80% 25V Y5V C0805	Samsung CL21F105ZAFNNNE
4	2	C3,C11	4.7uF	4.7uF Ceramic 10% 25V X7S C0805	Samsung CL21Y475KAFNNNE
5	1	C10	10uF	10uF Ceramic 10% 25V X5R C0805	Samsung CL21A106KAYNNNE
6	1	C13	3.3uF	3.3uF Ceramic 10% 10V X5R C0805	Samsung CL21A335KPFNNNE
7	4	C14,C16,C22,C23	0.1uF	0.1uF Ceramic 10% 50V X7R C0603	Samsung CL10B104KB8NNNC
8	20	C15,C17,C18,C19,C20,C21, C26,C27,C28,C29,C30,C32, C33, C35,C36,C37,C38,C39 C40,C41	1uF	1uF Ceramic -20%/+80% 25V Y5V C0805	Samsung CL21F105ZAFNNNE
9	2	C24,C25	Not mounted	10pF Ceramic 0.25pF 50V C0G/NP0 C0603	Samsung CL10C100CB8NNNC
10	3	D1,D2,D3	DIODE_SCHOTTKY	Diode Schottky 30V 500mA SOD123	ON Semi MBR0530
11	1	D4	DIODE	Diode Schottky 30V 200mA SOD123	Micro Commercial BAT42W-TP
12	3	JP2,JP3,JP4	HEADER 1X2	CONN HEADER 2POS 0.1"	Honda Tsushin FFC-52AMEP1-2P
13	2	JP6,JP7	HEADER_1X3	CONN HEADER 3POS 0.1"	Honda Tsushin FFC-52AMEP1-3P
14	4	J4,J5,J6,J7	HEADER_10X2	CONN HOUSING 20POS 2.54MM DUAL	Hirose HIF3H-20DA-2.54DSA(71)
15	1	J8	Not mounted	CONN HEADER 18POS (2x9) 0.1"	Hirose A1-18PA-2.54DSA(71)
16	1	J9	Not mounted	CONN HEADER 4POS 0.1"	Honda Tsushin FFC-52AMEP1-4P
17	1	J10	Not mounted	CONN HEADER 2POS 0.1"	Honda Tsushin FFC-52AMEP1-2P
18	1	LED1	LED +3.3V Green	LED GREEN DIFFUSED 1608 SMD	Stanley Electric BG1111C-TR
19	1	L1	10uH	10uH 510mA 540mOhm wirewound inductor	Taiyo Yuden NR3010T100M
20	1	Q3	N-CH FET	MOSFET N-CH 30V 3.2A SOT23	ON Semi NTR4170NT1G
21	1	R3	0.47	0.47 OHM 5% 1/10W R0603	Stackpole RMCF0603JTR470
22	27	R4,R5,R6,R7,R9,R10,R11, R12,R13,R16,R20,R21,R24, R25,R29,R33,R34,R35,R36, R37,R38,R39,R40,R43,R45, R46,R49	0	0 OHM 1/10W R0603	Stackpole RMCF0603ZTOR00
23	3	R8,R19,R31	10K	10K OHM 1% 1/10W R0603	Stackpole RMCF0603FT10K0
24	2	R14,R26	10	10 OHM 1% 1/10W R0603	Stackpole RMCF0603FT10R0
25	1	R15	100K	100K OHM 5% 1/10W R0603	Stackpole RMCF0603JT100K
26	1	R18	1K	1K OHM 5% 1/10W R0603	Stackpole RMCF0603JT1K00
27	1	R41	560	560 OHM 5% 1/10W R0603	Stackpole RMCF0603JT560R
28	2	R47,R48	Not mounted	10K OHM 5% 1/10W R0603	Stackpole RMCF0603JT10K0
29	5	SH2,SH3,SH4,SH6,SH7	JUMPER	SHUNT BLACK 1x2 0.1"	Omron XJ8A-0211
30	1	SW1	SW TACT	SWITCH TACTILE SPST-NO 0.05A 16V	Alps SKRPABE010
31	1	SW2	SW TACT	SWITCH TACTILE SPST-NO 0.05A 24V	Omron B3FS-1010P
32	1	U1	S1D13C00	Epson S1D13C00 TQFP13-64	Epson S1D13C00L00C000
33	1	U2	IS25LP-128	16Mbytes SPI Flash Memory	ISSI IS25LP128-JBLE
34	1	U4	MCP1700	3.3V LDO	Microchip MCP1700T-3302E/TT
35	1	Y1	FC-135	32.768KHz Crystal	Epson FC-135 32.7680KA-K

9. S5U13C00P01C100 Schematics



S5U13C00P01C100 Schematics (1 of 2)

10. Revision History

Rev. No.	Date	Page	Category	Contents
1.0	23/01/2019			<ul style="list-style-type: none">• Released as Rev 1.0•

For more information on the S1C13C00 and other Epson Display Controllers, visit the Epson Global website.

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