



S1D13513 Display Controller

S5U13513P00C100 Evaluation Board User Manual

Document Number: X78A-G-003-01

Status: Revision 1.1

Issue Date: 2010/09/06

© SEIKO EPSON CORPORATION 2006-2010. All Rights Reserved.

Information in this document is subject to change without notice. You may download and use this document, but only for your own use in evaluating Seiko Epson/EPSON products. You may not modify the document. Epson Research and Development, Inc. disclaims any representation that the contents of this document are accurate or current. The Programs/Technologies described in this document may contain material protected under U.S. and/or International Patent laws.

EPSON is a registered trademark of Seiko Epson Corporation. All other trademarks are the property of their respective owners.

Table of Contents

| | | |
|----------|---|-----------|
| 1 | Introduction | 5 |
| 2 | Features | 6 |
| 3 | Installation and Configuration | 7 |
| 3.1 | Configuration DIP Switch | 7 |
| 3.2 | Configuration Jumpers | 10 |
| 4 | Technical Description | 13 |
| 4.1 | Power | 13 |
| 4.1.1 | Power Requirements | 13 |
| 4.1.2 | Voltage Regulators | 13 |
| 4.1.3 | S1D13513 Power | 13 |
| 4.2 | Clocks | 14 |
| 4.3 | Reset | 14 |
| 4.4 | Host Interface | 15 |
| 4.4.1 | Connecting to the Epson S5U13U00P00C100 USB Adapter Board | 15 |
| 4.4.2 | Connecting to the Epson PC Card Extender Board | 15 |
| 4.4.3 | Direct Host Bus Interface Support | 16 |
| 4.5 | LCD Panel Interface | 17 |
| 4.6 | Camera Interface | 18 |
| 4.7 | YUV Output for TV Display | 19 |
| 4.8 | Keypad Interface | 19 |
| 4.9 | PWM Outputs | 19 |
| 4.10 | GPIO Connections | 19 |
| 4.11 | JTAG Connector | 20 |
| 5 | Parts List | 21 |
| 6 | Schematic Diagrams | 24 |
| 7 | S5U13513P00C100 Board Layout | 28 |
| 8 | References | 30 |
| 8.1 | Documents | 30 |
| 8.2 | Document Sources | 30 |
| 9 | Technical Support | 31 |
| 9.1 | EPSON Display Controllers (S1D13513) | 31 |
| 9.2 | Ordering Information | 31 |

1 Introduction

This manual describes the setup and operation of the S5U13513P00C100 Evaluation Board. The evaluation board is designed as an evaluation platform for the S1D13513 Display Controller.

The S5U13513P00C100 evaluation board can connect to the S5U13U00P00C100 USB Adapter board so that it can be used with a laptop or desktop computer, via USB 2.0. With some minor modifications, it is possible to connect the S5U13513P00C100 evaluation board to a Epson PC Card Extender board instead of a USB Adapter board. The S5U13513P00C100 evaluation board can also be used with many other native platforms via the host connectors which provide the appropriate signals to support a variety of CPUs.

This user manual is updated as appropriate. Please check the Epson Research and Development Website at www.erd.epson.com for the latest revision of this document before beginning any development.

We appreciate your comments on our documentation. Please contact us via email at documentation@erd.epson.com.

2 Features

The S5U13513P00C100 Evaluation Board includes the following features:

- 256-pin PBGA S1D13513 Display Controller
- On-board SDRAM, selectable as 8MB x 32-bit or 8MB x 16-bit
- Headers for connection to the S5U13U00P00C100 USB Adapter board or to the PC Card Extender board
- Headers for connecting to various Host Bus Interfaces
- Headers for connecting to LCD panels
- Headers for connecting to cameras
- On-board 10MHz crystal (used for OSC1 clock input)
- On-board 27MHz crystal (used for OSC2 clock input)
- 14-pin DIP socket (used to install an oscillator for CLKI3 clock input)
- 3.3V input power
- On-board voltage regulator with 1.8V output

3 Installation and Configuration

The S5U13513P00C100 evaluation board incorporates a DIP switch, jumpers, and 0 ohm resistors which allow it to be used with a variety of different configurations.

3.1 Configuration DIP Switch

The S1D13513 has configuration inputs (CNF[8:0]) which are read on the rising edge of RESET#. A 10-position DIP switch (SW1) is used to configure the S1D13513 for multiple Host Bus Interfaces. The following figure shows the location of DIP switch SW1 on the S5U13513P00C100.

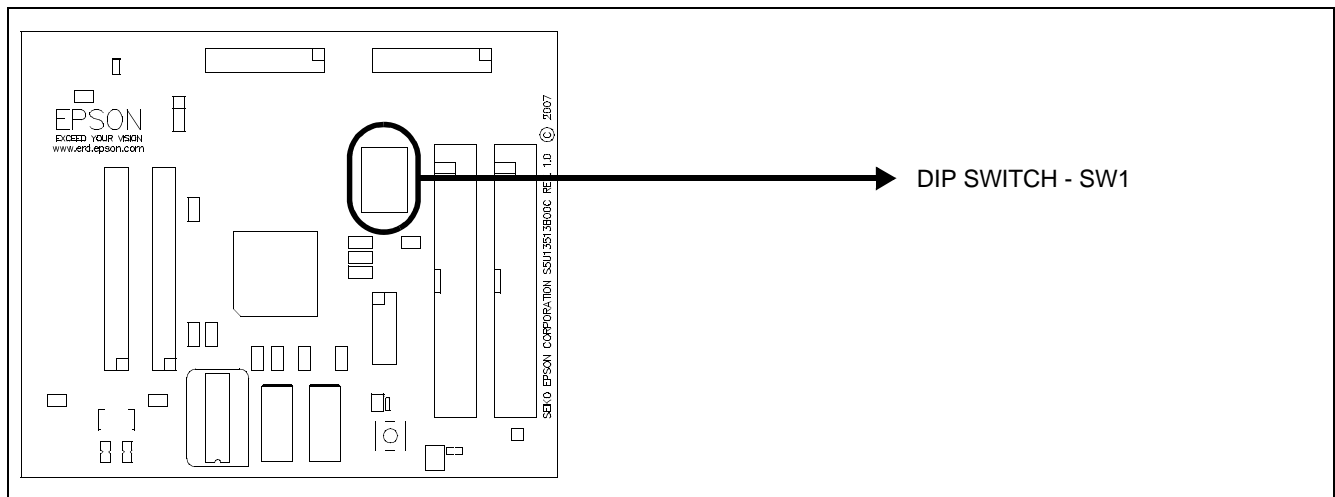


Figure 3-1: Configuration DIP Switch (SW1) Location

All S1D13513 configuration inputs (CNF[8:0]) are fully configurable using DIP switch SW1 as described below.

Table 3-1: Summary of Power-On/Reset Options

| SDU13513B00C SW1-[10:1] Config | S1D13513 CNF[8:0] Config | Power-On/Reset State | |
|-----------------------------------|-----------------------------|--|---|
| | | 1 (ON) | 0 (OFF) |
| SW1-[10] | - | Not used | |
| SW1-[9:8] | CNF[8:7] | 00b | CLKI3 is the PLL1 clock source |
| | | 01b | BUSCLK is the PLL1 clock source |
| | | 10b | OSC1 is the PLL1 clock source |
| | | 11b | OSC2 is the PLL1 clock source |
| SW1-[6] | CNF5 | Indirect access | Direct access |
| SW1-[7] | CNF6 | See Table 3-2: "CNF[4:0] Setting for CNF[6] = 1b" | See Table 3-3: "CNF[4:0] Setting for CNF[6] = 0b" |
| SW1-[5:1] | CNF[4:0] | 00000b Parallel Direct 80 Type 2: 1CS# (see Table 3-2: "CNF[4:0] Setting for CNF[6] = 1b") | |

= Required settings when using S5U13U00P00C100 USB Adapter board (SW1-[9:1] = 101000000b)

Table 3-2: CNF[4:0] Setting for CNF[6] = 1b

| CNF[4:0] | Host Bus |
|-----------------|---|
| 00000b | Parallel Direct 80 Type 2: 1 CS# |
| 00001b | Reserved |
| 00010b | Parallel Indirect 80 Type 2 |
| 00011b | Reserved |
| 00100b | Parallel Direct 80 Type 1: 1 CS# |
| 00101b | Parallel Direct 68: 1 CS# |
| 00110b | Parallel Indirect 80 Type 1 |
| 00111b | Parallel Indirect 68 |
| 01000b | Parallel Direct 80 Type 2: 2 CS# |
| 01001b | Reserved |
| 01010b | Reserved |
| 01011b | Reserved |
| 01100b | Parallel Direct 80 Type 1: 2 CS# |
| 01101b | Parallel Direct 68: 2 CS# |
| 01110b | Reserved |
| 01111b | Reserved |
| 10000b | Serial on HVDD1: Data valid on falling edge |
| 10001b | Serial on HVDD2: Data valid on falling edge |
| 10010b | Reserved |
| 10011b | Reserved |
| 10100b | Reserved |
| 10101b | Reserved |
| 10110b | Reserved |
| 10111b | Reserved |
| 11000b | Serial on HVDD1: Data valid on rising edge |
| 11001b | Serial on HVDD2: Data valid on rising edge |
| 11010b | Reserved |
| 11011b | Reserved |
| 11100b | Reserved |
| 11101b | Reserved |
| 11110b | Reserved |
| 11111b | Reserved |
| | = Required settings when using S5U13U00P00C100 USB Adapter board (SW1-[9:1] = 101000000b) |

Table 3-3: CNF[4:0] Setting for CNF[6] = 0b

| CNF[4:0] | Host Bus |
|-----------------|--|
| 00000b | Generic Little Endian: Active Low WAIT# with tri-state |
| 00001b | Generic Little Endian: Active Low WAIT# always driven |
| 00010b | Generic Little Endian: Active High WAIT# with tri-state |
| 00011b | Reserved |
| 00100b | Generic Big Endian: Active Low WAIT# with tri-state |
| 00101b | Generic Big Endian: Active Low WAIT# always driven |
| 00110b | Generic Big Endian: Active High WAIT# with tri-state |
| 00111b | Reserved |
| 01000b | MIPS/ISA Little Endian: Active Low WAIT# with tri-state |
| 01001b | MIPS/ISA Little Endian: Active Low WAIT# always driven |
| 01010b | MIPS/ISA Little Endian: Active High WAIT# with tri-state |
| 01011b | Reserved |
| 01100b | MC68000 Big Endian: Active High WAIT# with tri-state |
| 01101b | Reserved |
| 01110b | MC68030 Big Endian: Active High WAIT# with tri-state |
| 01111b | Reserved |
| 10000b | PR31500/31700/TX3912 Little Endian: Active Low WAIT# with tri-state (16-bit memory accesses only) |
| 10001b | PR31500/31700/TX3912 Little Endian: Active Low WAIT# always driven (16-bit memory accesses only) |
| 10010b | Reserved |
| 10011b | Reserved |
| 10100b | Reserved |
| 10101b | Reserved |
| 10110b | MPC821/555/556 Big Endian: Active High WAIT# with tri-state |
| 10111b | Reserved |
| 11000b | SH3 Little Endian: Active Low WAIT# with tri-state |
| 11001b | SH3 Little Endian: Active Low WAIT# always driven |
| 11010b | SH4 Little Endian: Active High WAIT# with tri-state |
| 11011b | Reserved |
| 11100b | SH3 Big Endian: Active Low WAIT# with tri-state |
| 11101b | SH3 Big Endian: Active Low WAIT# always driven |
| 11110b | SH4 Big Endian: Active High WAIT# with tri-state |
| 11111b | Reserved |

3.2 Configuration Jumpers

The S5U13513P00C100 has 11 jumper blocks which configure various board settings. The jumper positions for each function are shown below.

Table 3-4: Configuration Jumper Summary

| Jumper | Function | Position 1-2 | Position 2-3 | No Jumper |
|--------|--------------------|-------------------|-------------------|-----------------------------|
| JP1 | COREVDD | Normal | — | COREVDD current measurement |
| JP2 | PLLVDD1 | Normal | — | PLLVDD1 current measurement |
| JP3 | PLLVDD2 | Normal | — | PLLVDD2 current measurement |
| JP4 | OSCVDD1 | Normal | — | OSCVDD1 current measurement |
| JP5 | OSCVDD2 | Normal | — | OSCVDD2 current measurement |
| JP6 | HVDD1 | Normal | — | HVDD1 current measurement |
| JP7 | HVDD2 | Normal | — | HVDD2 current measurement |
| JP8 | HVDD3 | Normal | — | HVDD3 current measurement |
| JP9 | HVDD4 | Normal | — | HVDD4 current measurement |
| JP10 | HVDD5 | Normal | — | HVDD5 current measurement |
| JP11 | SDRAM Width Select | 32-bit wide SDRAM | 16-bit wide SDRAM | — |

JP1-JP10 - Power Supplies for the S1D13513

JP1-JP10 can be used to measure current consumption of each S1D13513 power supply. When the jumper is at position 1-2, normal operation is selected. When no jumper is installed, the current consumption for each power supply can be measured by connecting an ammeter to pin 1 and 2 of the jumper.

The jumper associated to each power supply is as follows:

- JP1 for COREVDD
- JP2 for PLLVDD1
- JP3 for PLLVDD2
- JP4 for OSCVDD1
- JP5 for OSCVDD2
- JP6 for HVDD1 (Host interface)
- JP7 for HVDD2 (LCD Panel interface)
- JP8 for HVDD3 (Camera2 interface)
- JP9 for HVDD4 (Camera1 interface)
- JP10 for HVDD5 (SDRAM interface)

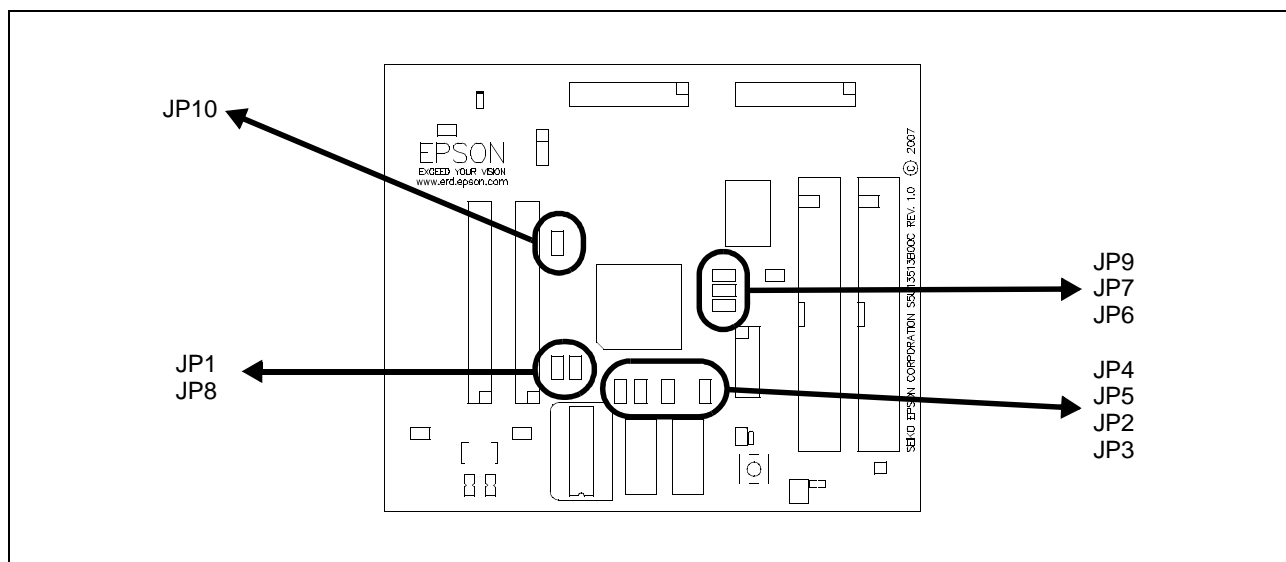


Figure 3-2: Configuration Jumper Locations (JP1-JP10)

JP11 - SDRAM Width Select

JP11 is used to select the bus width of the external SDRAM.

When the jumper is at position 1-2, the external SDRAM is 32-bit wide and memory size is 32MB. The memory consists of 2 chips in parallel, each 16MB and 16-bit wide.

When the jumper is at position 2-3, the external SDRAM is 16-bit wide and memory size is 16MB. In this position one memory chip is disabled and only one chip is active (16MB and 16-bit wide).

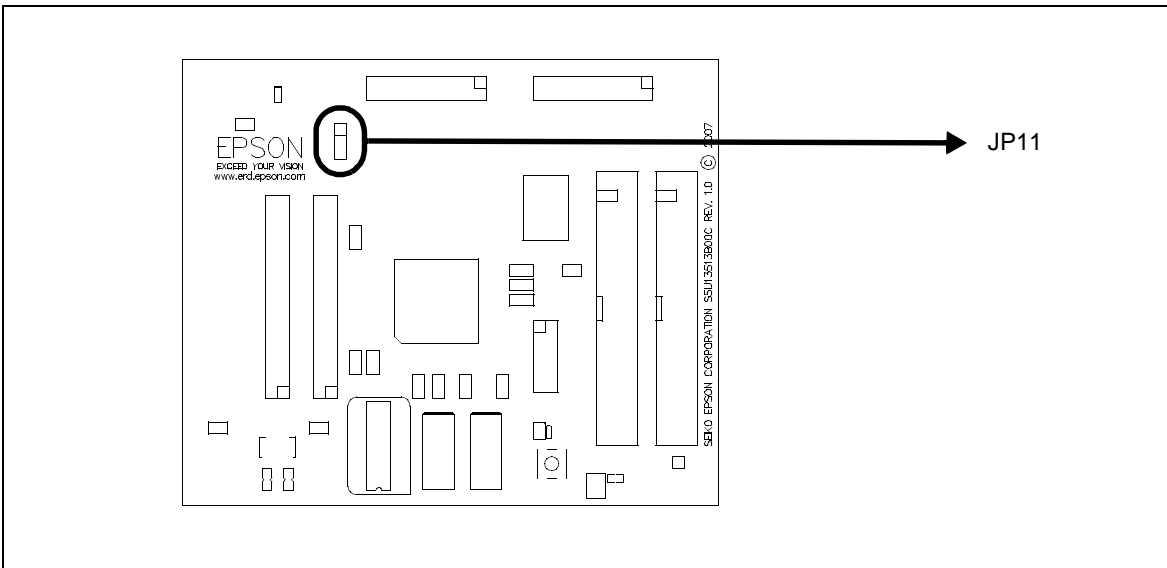


Figure 3-3: Configuration Jumper Location (JP11)

4 Technical Description

4.1 Power

4.1.1 Power Requirements

The S5U13513P00C100 evaluation board requires an external regulated power supply (3.3V at 1A). The power is supplied to the evaluation board through pin 5 of the P2 header, or pin 29 of the H2 header.

The green LED '3.3V Power' is turned on when 3.3V power is applied to the board.

4.1.2 Voltage Regulators

The S5U13513P00C100 evaluation board has an on-board linear regulator to provide the 1.8V power required by the S1D13513 Display Controller.

Additionally, there is a step-up switching voltage regulator to generate 6~24V. This output is adjustable and can be used to power the LED backlight on some LCD panels.

4.1.3 S1D13513 Power

The S1D13513 Display Controller requires 1.8V and 3.3V power supplies.

1.8V power is provided by the on-board linear voltage regulator. It is used for CoreVDD, PLLVDD1, PLLVDD2, OSCVDD1, OSCVDD2.

3.3V power must be provided by the external power supply. It is used for HVDD1 (host interface - HIOVDD), HVDD2 (LCD panel interface - PIOVDD), HVDD3 (camera 2 interface - CIOVDD2), HVDD4 (camera 1 interface - CIOVDD1), and HVDD5 (SDRAM interface).

HIOVDD is connected to 3.3V through a 0 ohm resistor, R31. If it is desired to have a different voltage for HIOVDD, R31 must be removed and the desired supply connected to pin 11 of connector P1.

PIOVDD is connected to 3.3V through a 0 ohm resistor, R33. If it is desired to have a different voltage for PIOVDD, R33 must be removed and the desired supply connected to pin 32 of connector H4.

CIOVDD2 is connected to 3.3V through a 0 ohm resistor, R34. If it is desired to have a different voltage for CIOVDD2, R34 must be removed and the desired supply connected to pin 15 of connector H7.

CIOVDD1 is connected to 3.3V through a 0 ohm resistor, R70. If it is desired to have a different voltage for CIOVDD1, R70 must be removed and the desired supply connected to pin 15 of connector H6.

HVDD5 is always connected to 3.3V.

Note

The recommended range for HVDD1 (HIOVDD), HVDD2 (PIOVDD), HVDD3 (CIOVDD2), and HVDD4 (CIOVDD1) is 3.0V~3.6V.

4.2 Clocks

S1D13513 has four clock inputs: BUSCLK, OSC1, OSC2 and CLKI3. BUSCLK and CLKI3 require a clock provided by an external oscillator. OSC1 and OSC2 have an internal oscillator and can work with a crystal or with an external oscillator.

For the S5U13513P00C100 evaluation board, OSC1 and OSC2 use crystals (10MHz for OSC1 and 27MHz for OSC2).

For the S5U13513P00C100 evaluation board, CLKI3 is not used and is pulled to ground by a 10kΩ resistor. However, if CLKI3 is required, connect a 14-pin, DIP package oscillator in the Y1 footprint.

For the S5U13513P00C100 evaluation board, BUSCLK is not used and is pulled to ground by a 10kΩ resistor. However, if BUSCLK is required, the BUSCLK pin is connected to the H2 connector and to the P1 connector where it may be provided by the host development platform.

4.3 Reset

The S5U13513P00C100 evaluation board can be reset using a push-button, or via an active low reset signal from the host development platform (see H2 connector or P1 connector).

The reset signal will reset the S1D13513 Display Controller and is available on the H6 and H7 connectors. It is possible to remove the reset signal from the H6 and H7 connectors by removing the 0 Ohm resistor R80 from the board.

4.4 Host Interface

4.4.1 Connecting to the Epson S5U13U00P00C100 USB Adapter Board

The S5U13513P00C100 evaluation board is designed to connect to a S5U13U00P00C100 USB Adapter Board. The USB adapter board provides a simple connection to any computer via a USB 2.0 connection. The S5U13513P00C100 directly connects to the adapter board through connectors P1 and P2. The USB adapter board also supplies the 3.3V power required by the S5U13513P00C100.

4.4.2 Connecting to the Epson PC Card Extender Board

The S5U13513P00C100 evaluation board may be connected to an Epson PC Card Extender Board, but it will require an external 3.3V power supply and some modifications to the S5U13513P00C100 board.

The modifications required for the S5U13513P00C100 board are:

1. Remove R107 and R108 (0 ohm resistors, size 0603)
2. Remove R109 and R112 (0 ohm resistors, size 0402)
3. Populate R110 and R111 with 0 ohm resistors, size 0402 (or short the pads on the board)
4. Set DIP switch SW1-[5:1] to 00100b (CNF[4:0]=00100b) to select Parallel Direct 80 Type 1: 1CS# host interface

To use a modified S5U13513P00C100 with an Epson PC Card Extender board:

1. Connect the 2 boards using connectors P1 and P2.
2. Connect 3.3V power supply to the S5U13513P00C100. Connect the positive of the power supply to test point TP3.3VDD1, and the negative to test point TPGND2
3. Plug the PC Card Extender (with S5U13513P00C100 connected to it) into a PC Card slot on a PC.
4. Turn on the 3.3V power supply and the S5U13513P00C100 is ready to use. Note that a windows driver is required to be installed on the PC (the S1D13xxx PCI/PC Card Bus driver is available from www.erd.epson.com).

4.4.3 Direct Host Bus Interface Support

The S1D13513 Display Controller directly supports many host bus interfaces. For detailed S1D13513 pin mapping, refer to the *S1D13513 Hardware Functional Specification*, document number X78B-A-001-xx.

All S1D13513 host interface pins are available on connectors H2 and H3 which allow the S5U13513P00C100 to be connected to a variety of development platforms. However, connectors H2 and H3 are not populated on the S5U13513P00C100 evaluation board.

If connectors H2 and H3 are added, all host interface signals must match HVDD1 of the S1D13513. For the maximum/minimum values of the voltages, refer to the *S1D13513 Hardware Functional Specification*, document number X78B-A-001-xx.

The following diagram shows the location of the host bus connectors, H2 and H3. They are 0.1x0.1" 34-pin headers (17x2).

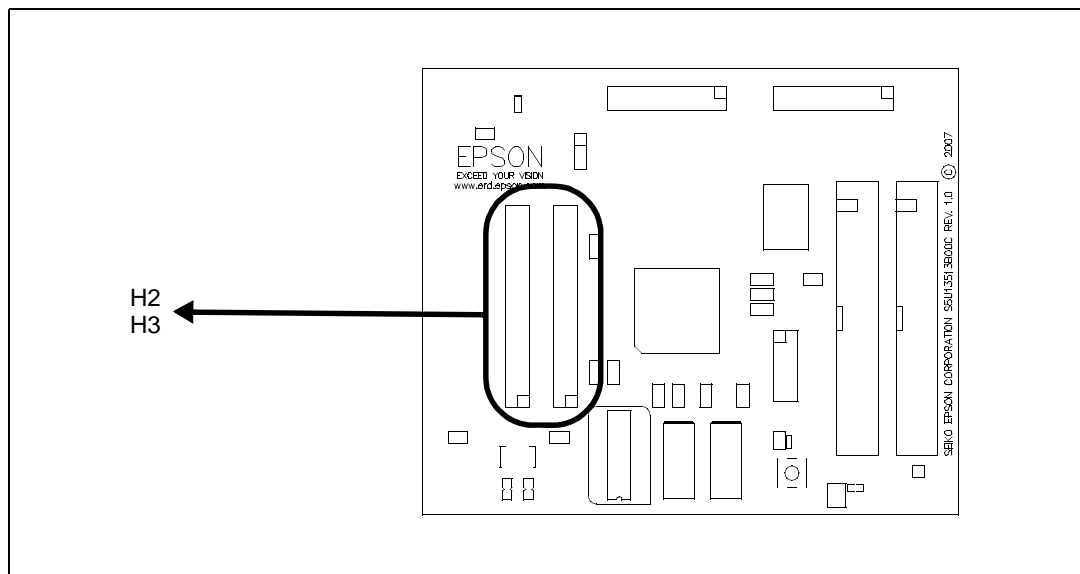


Figure 4-1: Host Bus Connector Locations (H2 and H3)

For the pinout of connectors H2 and H3, see “Schematic Diagrams” on page 24.

4.5 LCD Panel Interface

The LCD interface signals are available on connectors H4 and H5. Connector H5 includes GPIOG[4:0] which may be used as additional signals for extended TFT interfaces. For S1D13513 LCD interface pin mapping, refer to the *S1D13513 Hardware Functional Specification*, document number X78B-A-001-xx.

Connectors H4 and H5 are both 0.1x0.1" 40-pin headers (20x2). For the pinout of connectors H4 and H5, see "Schematic Diagrams" on page 24.

On the evaluation board there is an adjustable 6~24V, 40mA max. power supply. This voltage is provided only on connector H4 (it is not used elsewhere on the board). It is intended for use to power the LED backlight on some LCD panels. The voltage is adjusted by the R106 pot.

Note

For LCD panels that use CCFL backlight, an external power supply must be used to provide power to the inverter for CCFL backlight. Usually, the inverter current consumption is higher than the maximum 40mA current available from the on-board voltage regulator.

The following diagram shows the location of the LCD panel connectors H4 and H5.

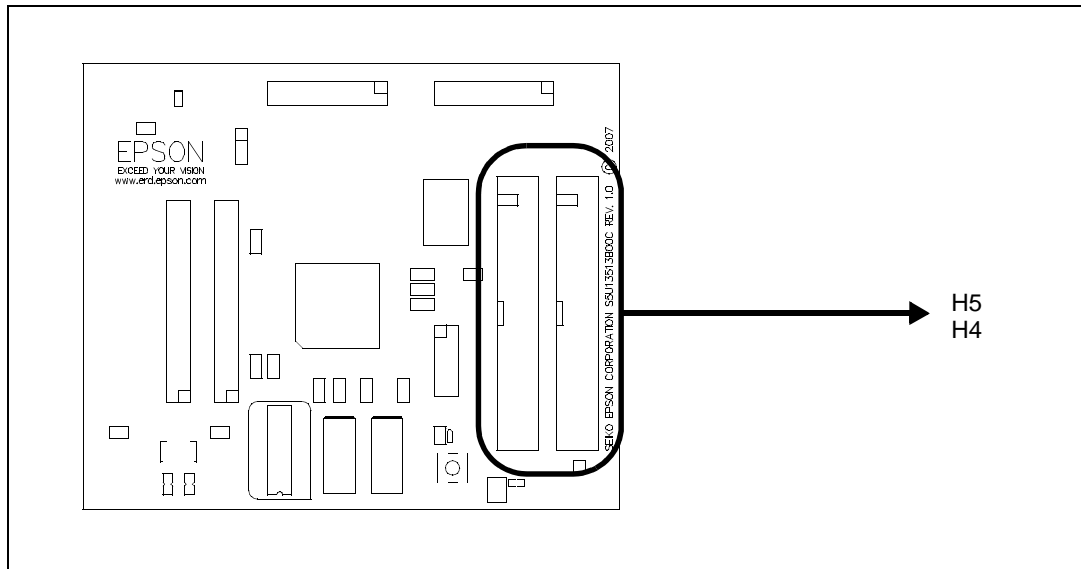


Figure 4-2: LCD Panel Connectors Locations (H4, H5)

4.6 Camera Interface

All the signals for the Camera1 interface are available on connector H6. All the signals for the Camera2 interface are available on connector H7. H6 and H7 are 0.1x0.1" 20-pin headers (10x2). For the pinout of connectors H6 and H7, see "Schematic Diagrams" on page 24.

The S1D13513 Camera1 interface signals use the GPIOC[7:0] and GPIOD[3:0] pins. The Camera2 interface signals use the GPIOA[7:0] and GPIOB[7:0] pins. These GPIO pins may be configured for a variety of S1D13513 supported functions. GPIOC[7:0] and GPIOD[3:0] may be configured as GPIO pins, Camera1 interface pins, or as YUV output pins. GPIOA[7:0] and GPIOB[7:0] may be configured as GPIO pins, Camera2 interface pins, Keypad interface pins, or PWM output pins. For detailed S1D13513 GPIO pin mapping, refer to the *S1D13513 Hardware Functional Specification*, document number X78B-A-001-xx.

Connector H6 and H7 may be used to evaluate any function for which the GPIOA[7:0], GPIOB[7:0], GPIOC[7:0], GPIOD[3:0] can be configured.

The S1D13513 has an I2C interface which uses two signals that are connected to both the H6 and H7 connectors. The default configuration of the evaluation board has the I2C signals, I2C_SCL and I2C_SDA, pulled high to CIOVDD1. If the I2C signals must be pulled high to CIOVDD2, R162 and R175 must be removed and 4.7kΩ resistors must be mounted for R164 and R177.

The reset signal provided on H6 and H7 is active low and is pulled to HIOVDD when inactive.

The following diagram shows the location of the camera connectors H6 and H7.

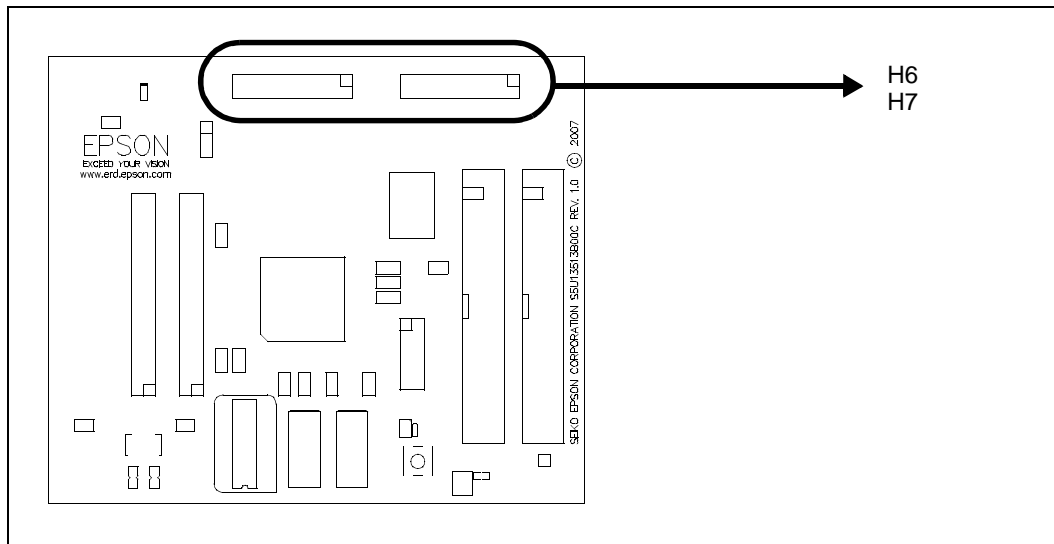


Figure 4-3: Camera Expansion Connector Locations (H6, H7)

4.7 YUV Output for TV Display

The S1D13513 can output YUV data which can be used to display an image on a TV screen via an external video encoder. The YUV output is multiplexed with other functions on the GPIOC[7:0] and GPIOD[2:0] pins. These pins are routed to connector H6.

4.8 Keypad Interface

The S1D13513 has a 5x5 keypad interface which is multiplexed with other functions on the GPIOA[4:0] and GPIOB[4:0] pins. These pins are routed to connectors H6 and H7. It is possible to use a Keypad device with the S5U13513P00C100 evaluation board by connecting it to the H6 and H7 connectors.

4.9 PWM Outputs

The S1D13513 has 4 PWM outputs which may be used to control the brightness of 4 LEDs. It also has an input, AUDIN, which is used to control the overall operation of the PWM outputs. The PWM output function is multiplexed on the GPIOA[7:5] and GPIOB[7] pins. AUDIN is multiplexed on the GPIOD[3] pin. These pins are routed to connector H6 and H7.

4.10 GPIO Connections

The S1D13513 Display Controller GPIO pins have multiple functions. All the GPIO pins are routed to the connectors on the S5U13513P00C100 evaluation board. If any pin is configured as a GPIO, it will be available on the connectors as listed below:

GPIOA[7:0] pins are routed to connector H7.

GPIOB[7:5] and GPIOB[3:0] pins are routed to connector H7. GPIOB[6:5] are also routed to connector H6.

GPIOB[4] pin is routed to connector H6.

GPIOC[7:0] pins are routed to connector H6.

GPIOD[3:0] pins are routed to connector H6.

GPIOG[4:0] pins are routed to connector H5.

FPDAT[23:18] which may be used as GPIOH[5:0] are routed to connector H5.

4.11 JTAG Connector

The S1D13513 design includes a JTAG interface. All the JTAG signals are available on connector H1, however, connector H1 is not populated on the board. For the pinout of connector H1, see “Schematic Diagrams” on page 24.

The following diagram shows the location of the JTAG connector (H1).

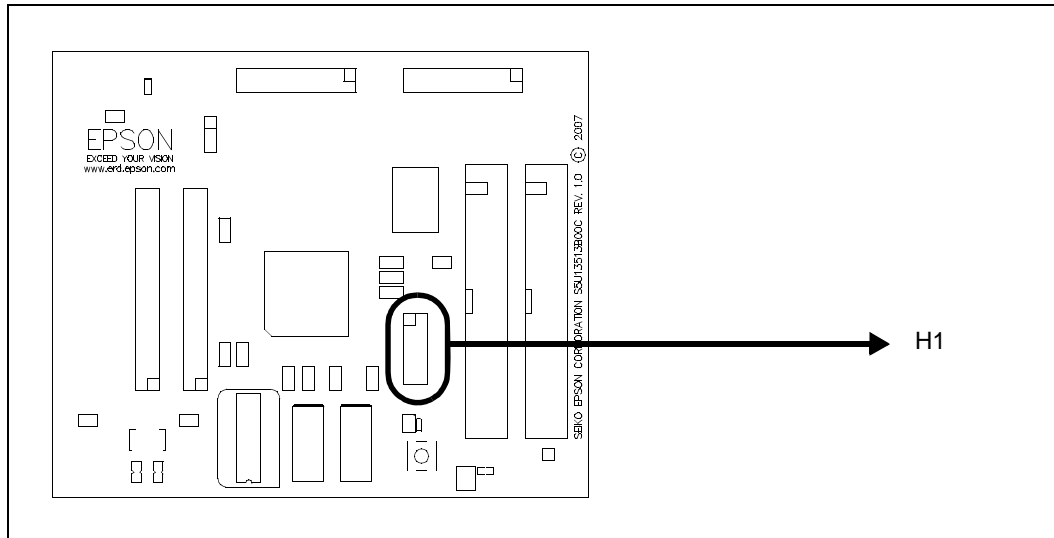


Figure 4-4: JTAG Connector Location

5 Parts List

Table 5-1: Parts List

| Item | Qty | Reference | Part | Description | Manufacturer / Part No. / Assembly Instructions |
|------|-----|---|------------------------|----------------------------------|---|
| 1 | 49 | C1, C2, C3, C4, C5, C6, C7, C8, C9, C19, C22, C26, C28, C29, C30, C31, C32, C33, C34, C35, C43, C44, C45, C46, C47, C48, C49, C50, C51, C65, C66, C69, C70, C71, C72, C73, C74, C75, C76, C77, C78, C79, C80, C81, C82, C98, C100, C104, C105 | 0.1uF | | Yageo America 04022F104Z7B20D |
| 2 | 41 | C10, C11, C12, C13, C14, C15, C16, C17, C18, C25, C27, C36, C37, C38, C39, C40, C41, C42, C52, C53, C54, C55, C56, C57, C58, C59, C60, C83, C84, C85, C86, C87, C88, C89, C90, C91, C92, C93, C94, C95, C96 | 0.01uF | | Yageo America 0402ZRY5V7BB103 |
| 3 | 2 | C20, C23 | 1nF | | Yageo America 04022R102K9B20D |
| 4 | 2 | C21, C24 | 10uF | | Panasonic - ECG ECJ-CV50J106M |
| 5 | 4 | C61, C62, C63, C64 | 18pF | | Panasonic - ECG ECJ-0EC1H180J |
| 6 | 2 | C67, C68 | 10uF | | Panasonic - ECG ECJ-2FB1A106K |
| 7 | 2 | C97, C99 | 1uF | | Panasonic - ECG ECJ-0EBOJ105M |
| 8 | 1 | C101 | 4.7uF 10V T | | Kemet T491B475K010AS |
| 9 | 1 | C102 | 10pF | | Panasonic - ECG ECJ-0EC1H100D |
| 10 | 1 | C103 | 1uF 50V | | TDK C3216X7R1H105K |
| 11 | 1 | D1 | DIODE | DIODE SCHOTTKY 20V100MA SSSMINI2 | Panasonic - SSG MA27D2700L |
| 12 | 1 | D2 | 3.3V Power | LED GREEN SS TYPE LOW CUR SMD | Panasonic - SSG LNJ308G8LRA |
| 13 | 1 | D3 | MBR0530 | | Micro Commercial Co. MBR0530-TP |
| 14 | 2 | F1, F2 | ACF451832-222 | FILTER 3-TERM 60MHZ 300MA SMD | TDK ACF451832-222 |
| 15 | 0 | H1 | HEADER 6X2 | | Samtec TSW-106-05-G-D |
| 16 | 0 | H2, H3 | HEADER_17X2 | | AMP 1-87215-7 |
| 17 | 1 | H4 | LCD Connector | | Samtec TST-120-01-G-D |
| 18 | 1 | H5 | Extended LCD Connector | | Samtec TST-120-01-G-D |

Table 5-1: Parts List

| Item | Qty | Reference | Part | Description | Manufacturer / Part No. / Assembly Instructions |
|------|-----|---|-----------------------|---|---|
| 19 | 2 | H6, H7 | HEADER_10X2 | | Samtec TSW-110-05-G-D |
| 20 | 10 | JP1, JP2, JP3, JP4, JP5, JP6, JP7, JP8, JP9, JP10 | | CONN HEADER VERT 2POS .100 TIN or GENERIC | |
| 21 | 1 | JP11 | HEADER 3 | CONN HEADER VERT 3POS .100 TIN or GENERIC | |
| 22 | 9 | L1, L2, L3, L4, L5, L6, L7, L8, L9 | Ferrite | FERRITE 200MA 938 OHMS 0603 SMD | Steward HZ0603B751R-10 |
| 23 | 1 | L10 | 10uH | COIL 10UH 1300MA CHOKE SMD | Panasonic - ECG ELL-6SH100M |
| 24 | 2 | P1, P2 | HEADER_20X2 | | 3M 151240-8422-RB |
| 25 | 58 | R1, R2, R3, R4, R5, R6, R7, R8, R9, R10, R11, R12, R13, R14, R15, R16, R17, R18, R19, R20, R21, R22, R23, R24, R25, R26, R27, R28, R29, R30, R32, R35, R36, R37, R38, R39, R40, R41, R42, R43, R44, R45, R46, R47, R48, R49, R50, R51, R52, R53, R54, R55, R56, R57, R58, R68, R69, R77 | 33 1% | | |
| 26 | 7 | R31, R33, R34, R70, R96, R107, R108 | 0 | | |
| 27 | 12 | R59, R60, R61, R62, R63, R64, R65, R66, R67, R78, R79, R81 | 10k | | |
| 28 | 6 | R71, R76, R80, R102, R109, R112 | 0 | | |
| 29 | 2 | R72, R73 | 1M | | |
| 30 | 2 | R74, R75 | 220 | | |
| 31 | 1 | R82 | 270 1% | | |
| 32 | 15 | R83, R85, R87, R88, R89, R90, R91, R92, R93, R94, R95, R97, R99, R101, R105 | 47k | | |
| 33 | 2 | R84, R98 | 4.7k | | |
| 34 | 0 | R86, R100, R110, R111 | NP | | |
| 35 | 1 | R103 | 887k 1% | | |
| 36 | 1 | R104 | 22k | | |
| 37 | 1 | R106 | 200k | | Panasonic - ECG EVN-5ESX50B25 |
| 38 | 11 | SH1, SH2, SH3, SH4, SH5, SH6, SH7, SH8, SH9, SH10, SH11 | .100 in. Jumper Shunt | JUMPER SHORTING TIN | Sullins Electronics Corp. STC02SYAN |

Table 5-1: Parts List

| Item | Qty | Reference | Part | Description | Manufacturer / Part No. / Assembly Instructions |
|------|-----|--------------------------------------|------------------|--------------------------------------|--|
| 39 | 1 | SW1 | SW DIP-10 | | CTS 218-10LPST |
| 40 | 1 | SW2 | SW TACT-SPST | SWITCH TACT SILVER PLT GULLWING | ITT Industries KSC241GLFS |
| 41 | 4 | TPGND1, TPGND2, TPGND3, TP3.3VDD1 | TP_SMT | PC TEST POINT MINIATURE SMT | Keystone 5015 |
| 42 | 0 | T1 | TP SIP | | |
| 43 | 1 | U1 | S1D13513 PBGA256 | | |
| 44 | 2 | U2, U3 | IS42S16800D-7TL | alternate Micron MT48LC8M16A2P-7E | ISSI IS42S16800D-7TL |
| 45 | 1 | U4 | TPS3801L30DCKR | IC 2.64V SUPPLY MON SOT-323-5 | Texas Instruments TPS3801L30DCKR |
| 46 | 1 | U5 | MIC37100-1.8WS | Alternate MIC39100- 1.8WS | Micrel MIC37100-1.8WS |
| 47 | 1 | U6 | TPS61040 | IC CONV DC/DC BOOST LP SOT-23-5 | TI TPS61040DVBR |
| 48 | 1 | X1 | MA-506 10.0000M | | |
| 49 | 1 | X2 | MA-506 27.0000M | | |
| 50 | 0 | Y1 | 14-Pin DIP | | AMP 2-641609-1 |

6 Schematic Diagrams

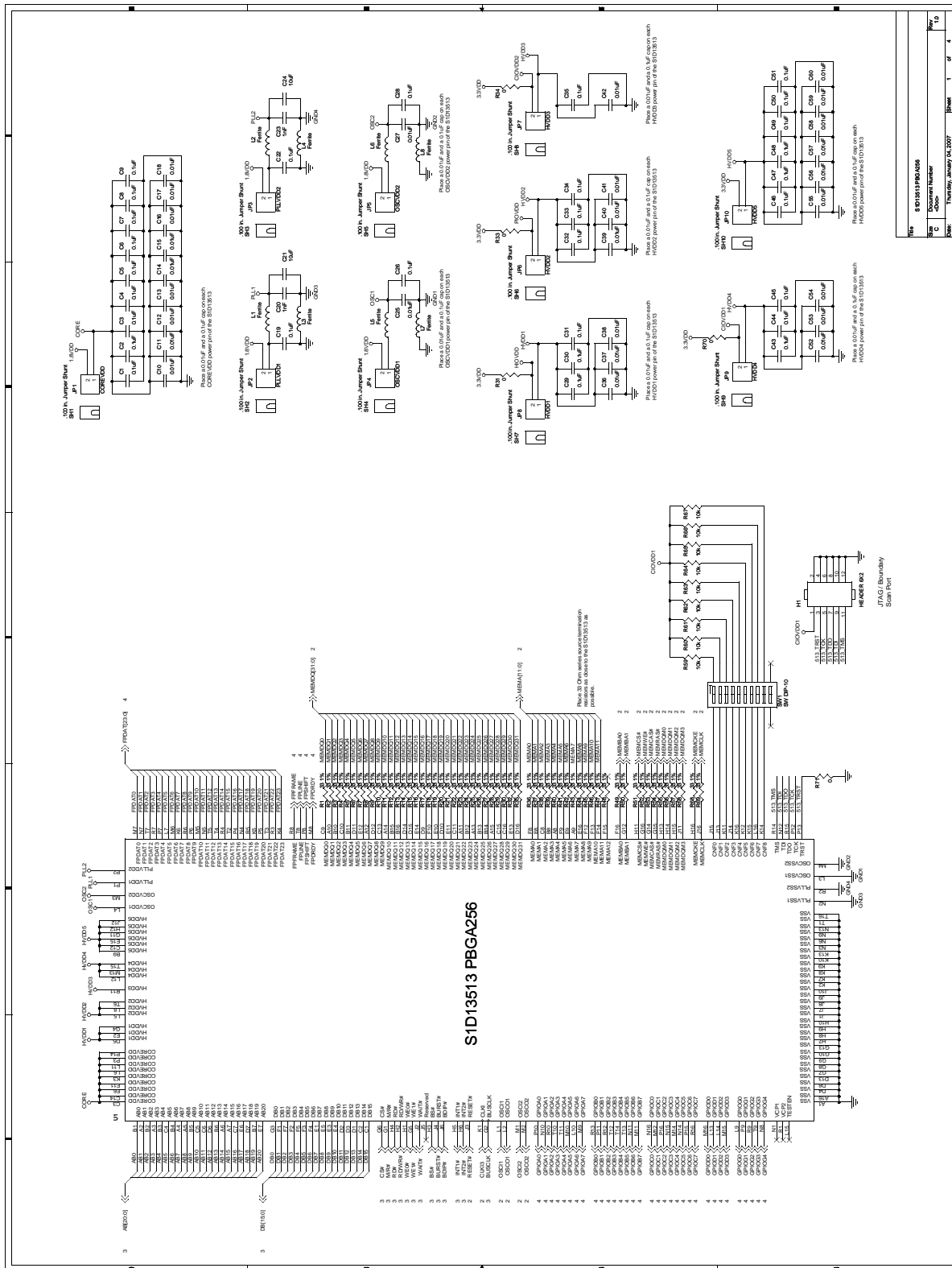


Figure 6-1: S5U13513P00C100 Schematics (1 of 4)

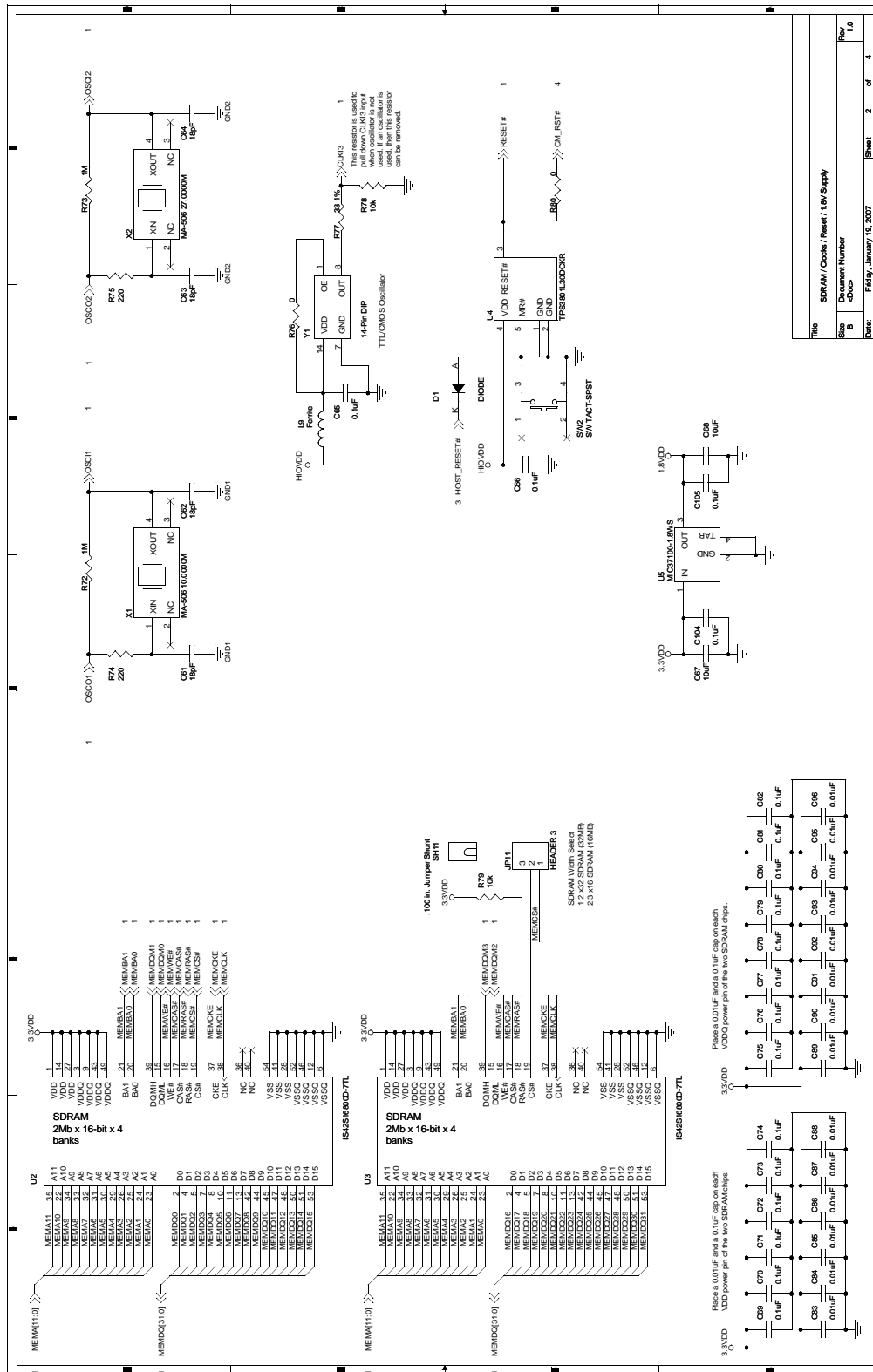


Figure 6-2: S5U13513P00C100 Schematics (2 of 4)

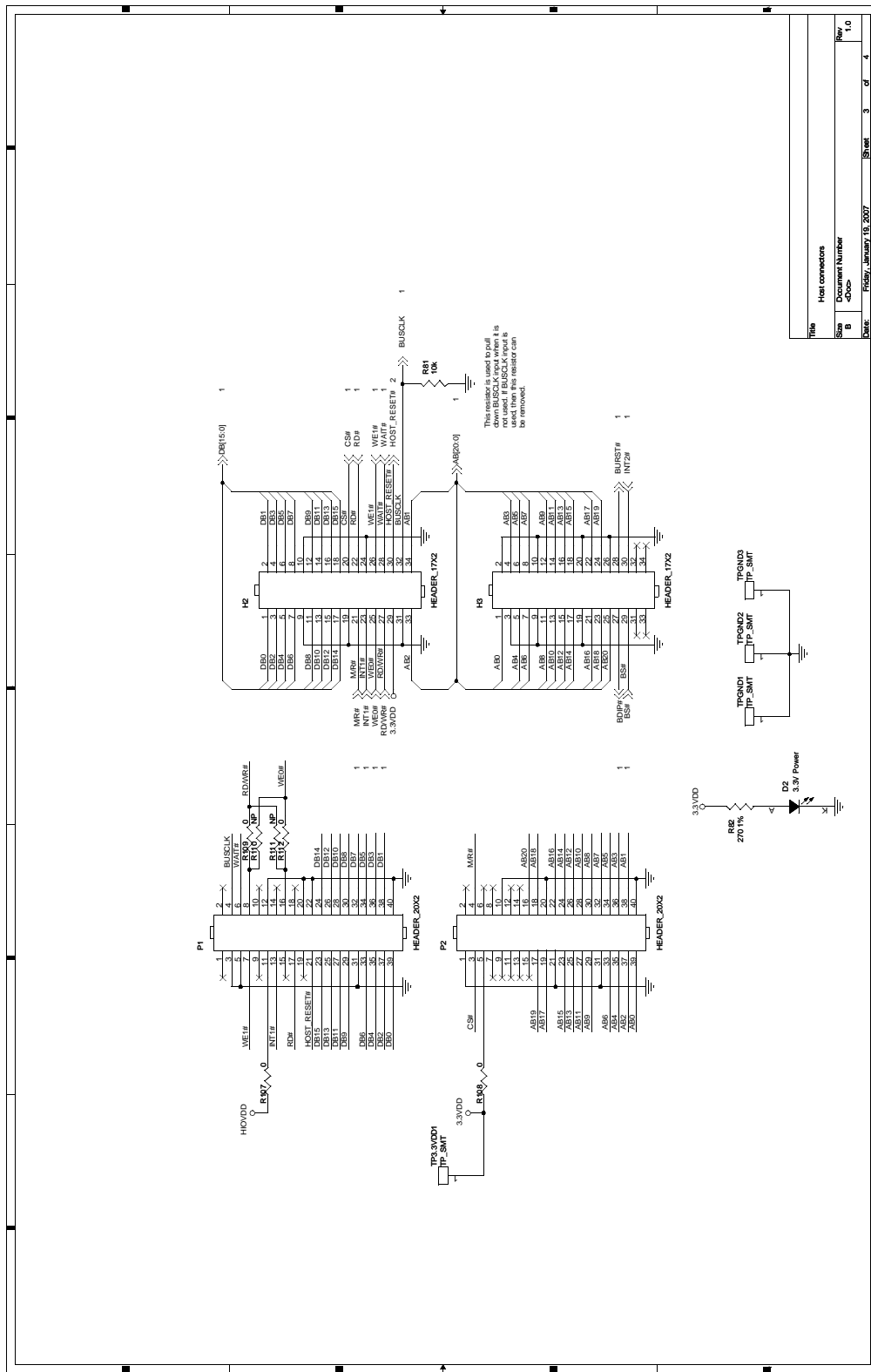


Figure 6-3: S5U13513P00C100 Schematics (3 of 4)

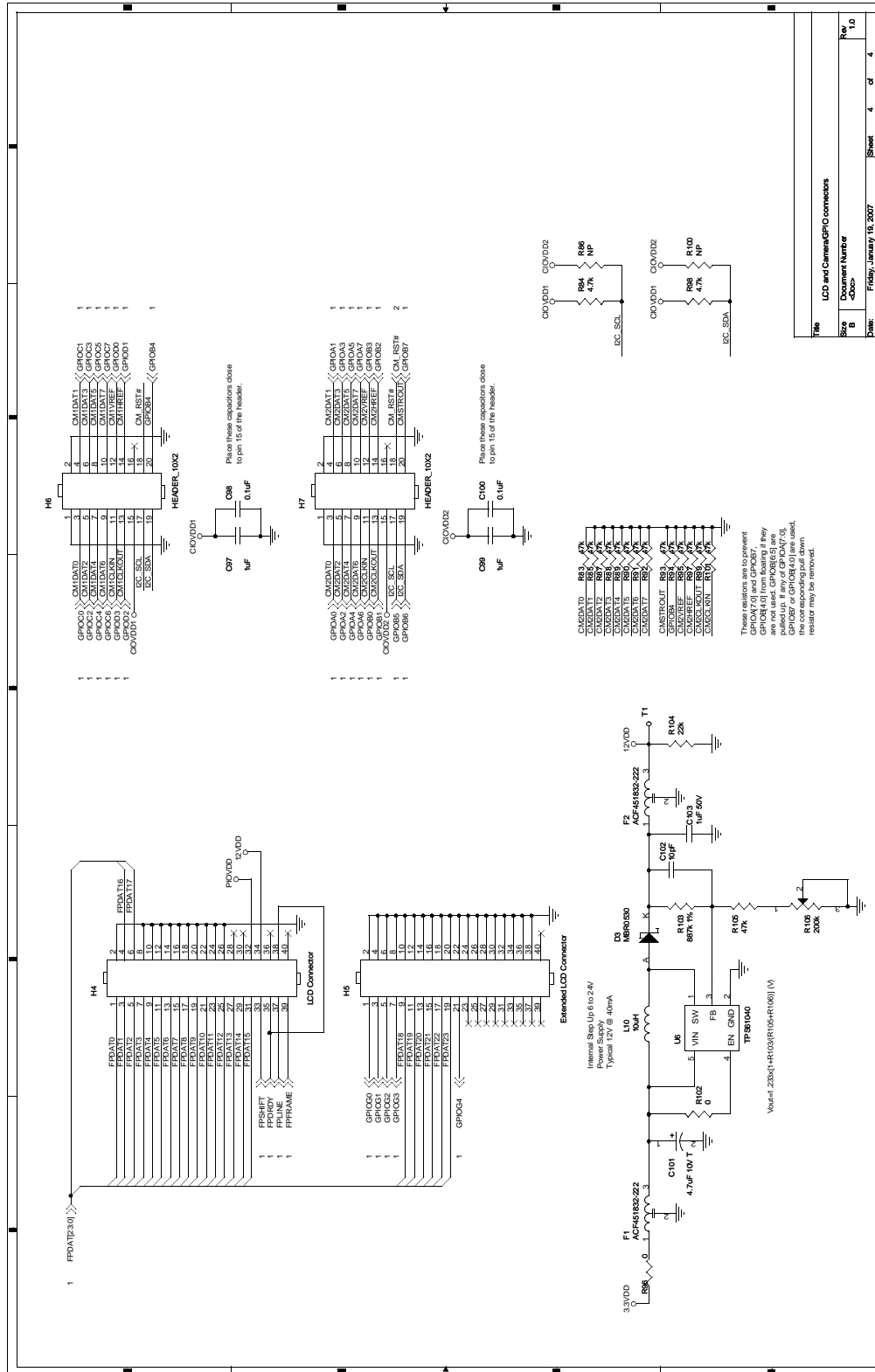


Figure 6-4: S5U13513P00C100 Schematics (4 of 4)

7 S5U13513P00C100 Board Layout

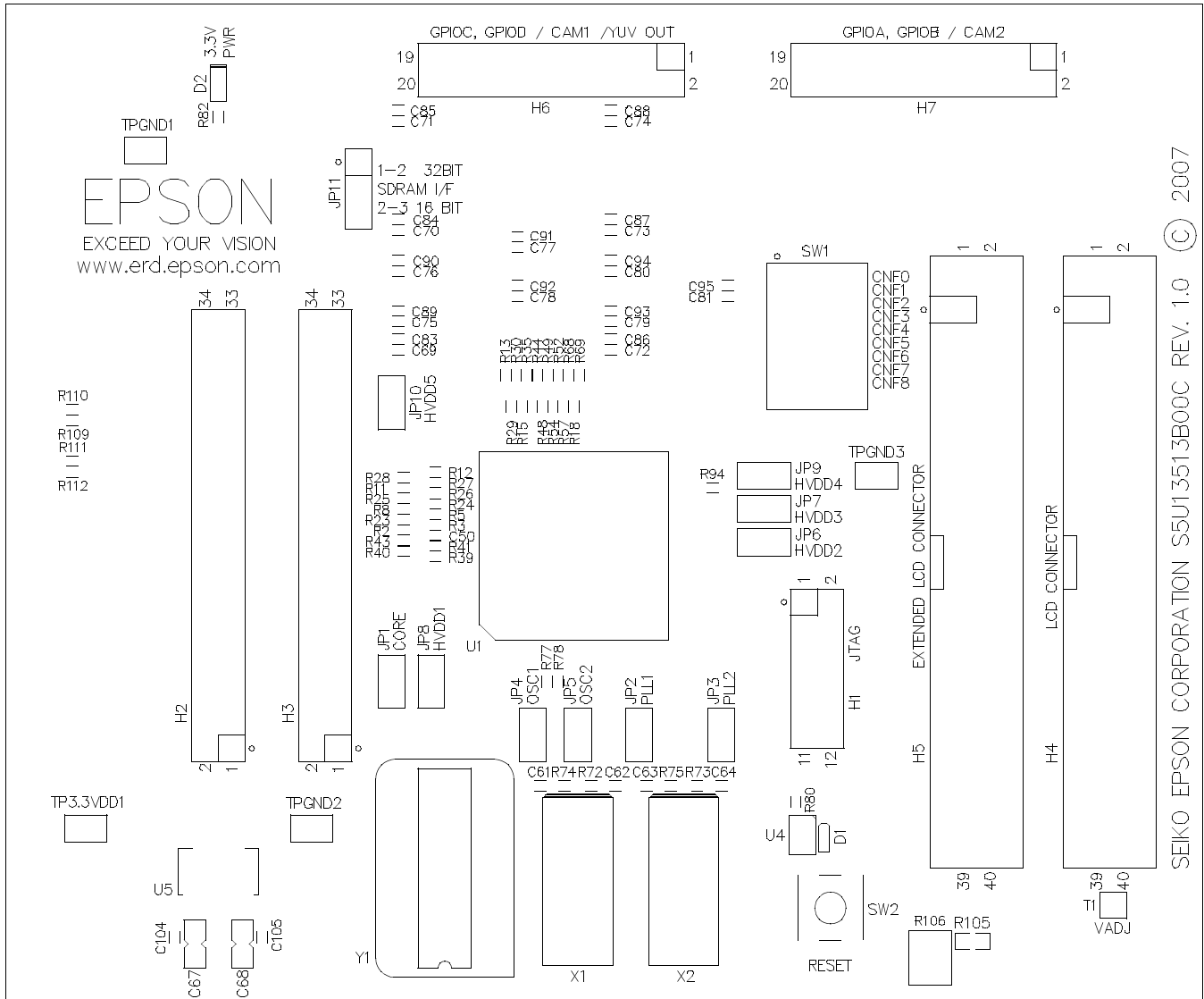


Figure 7-1: S5U13513P00C100 Board Layout - Top View

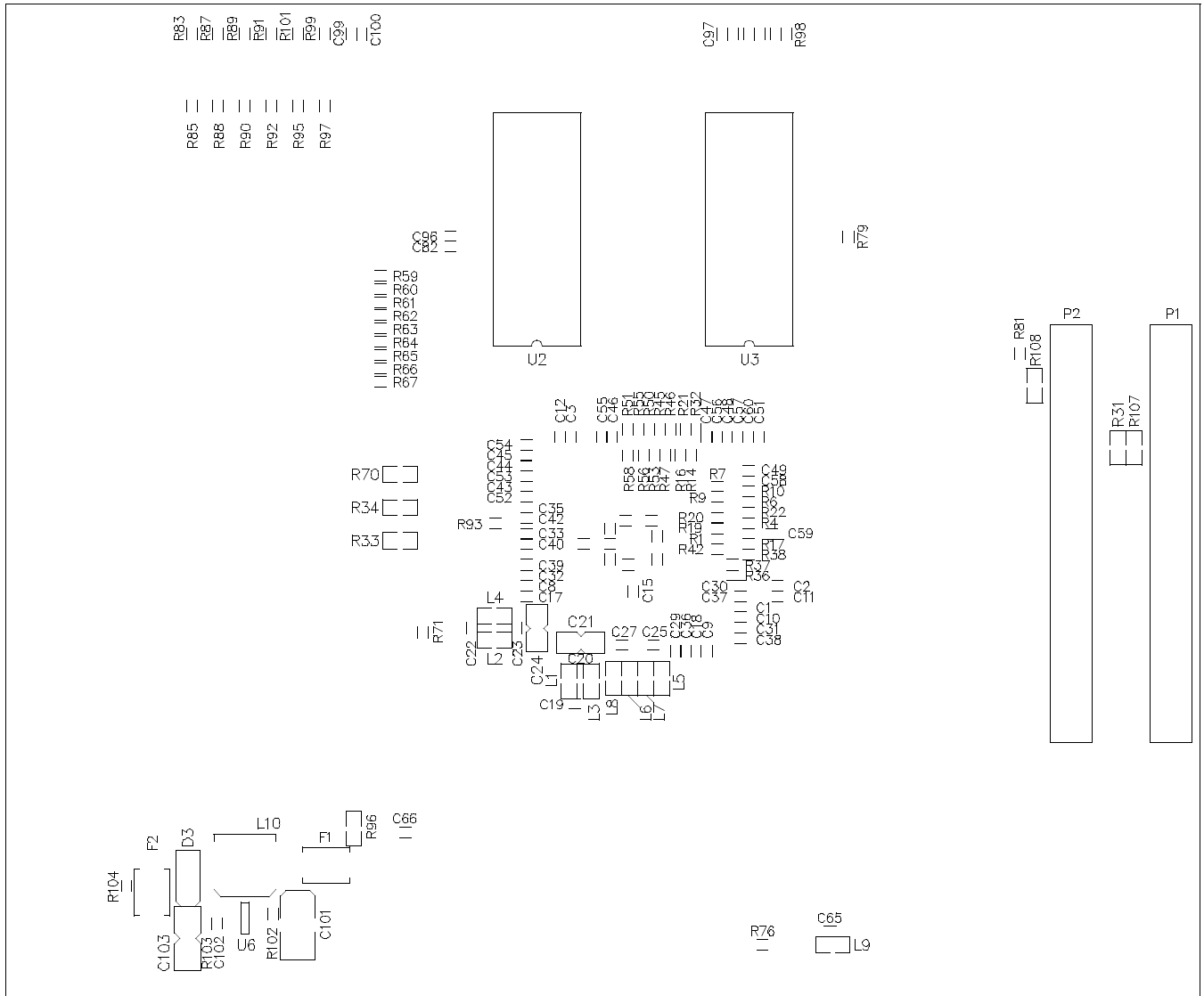


Figure 7-2: S5U13513P00C100 Board Layout - Bottom View

8 References

8.1 Documents

- Epson Research and Development, Inc., *S1D13513 Hardware Functional Specification*, document number X78B-A-001-xx.

8.2 Document Sources

- Epson Research and Development Website: <http://www.erd.epson.com>.

9 Technical Support

9.1 EPSON Display Controllers (S1D13513)

AMERICA

EPSON ELECTRONICS AMERICA, INC.

2580 Orchard Parkway
San Jose, CA 95131, 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.

7F, Jinbao Bldg., No.89 Jinbao St.,
Dongcheng District,
Beijing 100005, CHINA
Phone: +86-10-8522-1199 FAX: +86-10-8522-1125

SHANGHAI BRANCH

7F, Block B, High-Tech Bldg., 900, Yishan Road,
Shanghai 200233, CHINA
Phone: +86-21-5423-5577 FAX: +86-21-5423-4677

SHENZHEN BRANCH

12F, Dawning Mansion, Keji South 12th Road,
Hi-Tech Park, Shenzhen 518057, CHINA
Phone: +86-755-2699-3828 FAX: +86-755-2699-3838

EPSON HONG KONG LTD.

20/F, Harbour Centre, 25 Harbour Road
Wanchai, Hong Kong
Phone: +852-2585-4600 FAX: +852-2827-4346
Telex: 65542 EPSCO HX

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**

5F, 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.**SEMICONDUCTOR OPERATIONS DIVISION****IC Sales Dept.****IC International Sales Group**

421-8, Hino, Hino-shi, Tokyo 191-8501, JAPAN
Phone: +81-42-587-5814 FAX: +81-42-587-5117

9.2 Ordering Information

To order the S5U13513P00C100 Evaluation Board, contact the Epson sales representative in your area and order part number **S5U13513P00C100**.

Change Record

- | | |
|---------------|--|
| X78A-G-003-01 | Revision 1.1 - Issued: September 6, 2010 |
| | <ul style="list-style-type: none">• remove references to type 3 interface |
| X78A-G-003-01 | Revision 1.0 - Issued: March 30, 2007 |
| | <ul style="list-style-type: none">• minor edits• updated schematics• updated parts list• added board layout |
| X78A-G-003-00 | Revision 0.02 |
| | <ul style="list-style-type: none">• revised manual due to design changes• added new schematics• added new parts list |
| X78A-G-003-00 | Revision 0.01 |
| | <ul style="list-style-type: none">• Initial draft of manual |

X-ON Electronics

Largest Supplier of Electrical and Electronic Components

Click to view similar products for [Display Development Tools](#) category:

Click to view products by [Epson](#) manufacturer:

Other Similar products are found below :

[KIT 60121-3](#) [S5U13U11P00C100](#) [KIT 60145-3](#) [S5U13748P00C100](#) [DFR0413](#) [KIT95000-3](#) [LCD-16396](#) [PIM370](#) [1109](#) [MIKROE-2449](#)
[MIKROE-2453](#) [131](#) [DEV-13628](#) [1590](#) [MIKROE-2269](#) [1601](#) [1770](#) [1947](#) [1983](#) [1987](#) [2050](#) [2218](#) [2260](#) [2345](#) [2418](#) [2423](#) [2454](#) [2455](#) [2478](#)
[2674](#) [SK-220RD-PI](#) [FIT0477](#) [333](#) [334](#) [TE-M321-SDK](#) [DFR0428](#) [cs-epapersk-03](#) [338](#) [DEV-14442](#) [FIT0478](#) [cs-paperino-01](#) [OM-E-OLE](#)
[ALTHSMCMIPILCD](#) [ASD2421-R](#) [TDP0500T800480PCAP](#) [LCD-14048](#) [cs-epapersk-02](#) [2719](#) [LCD-01](#) [PIM113](#)