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S3 Family of Microcontrollers

S3F8S5A Development Kit

User Manual

UM027202-0816

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Revision History

Each instance in this document's revision history reflects a change from its previous edition. To learn more, refer to the corresponding page(s) or appropriate links furnished in the table below.

Date	Revision Level	Description	Page
Aug 2016	02	Updated for ZDS-S3 version 5.3.0. Removed ISP I support	All
Jul 2015	01	Original issue.	n/a

Overview

Zilog's S3F8S5A Development Kit, part number S3F8S5A0100ZCOG, allows you to evaluate your S3F8S5A-based designs and applications. The Kit features a Development Board consisting of the following components:

- Four LEDs
- Two pushbuttons
- Buzzer/Speaker
- LCD module
- UART
- 256 byte Serial EEPROM
- Header pins

This user manual provides instructions for setting up and configuring the S3F8S5A Development Board. It includes schematic diagrams and a discussion of the Board features and ZDS II.

The S3F8S5A Development Board features an S3F8S5A MCU in a 44-pin QFP package, plus an S3 PGM connector to connect the Board to a host development PC using the S3 Flash In-System Programmer II (ISP). To learn more about the S3F8S5A MCU, refer to the S3F8S5A Product Specification (PS0323) and/or the S3 Flash In-System Programmer User Manual (UM0266).

This document guides you through the following tasks:

- Downloading and installing ZDSII software and documentation
- Connecting the S3 Flash ISP II and S3F8S5A Development Board to your PC
- Starting the S3F8S5A Ledblink sample program

Kit Contents

The S3F8S5A Development Kit contains the following items:

- S3F8S5A Development Board
- S3 Flash ISP II
- 10-circuit ribbon cable
- USB A (male) to Mini-B USB cable (2)
- S3F8S5A Development Kit hardcopy insert

Figure 1 shows the contents of the S3F8S5A Development Kit.

Figure 1. The S3F8S5A Development Kit

Features

The S3F8S5A Development Kit includes the following key items.

- S3F8S5A Development Board, which contains the following features:
  - S3F8S5A 44-pin QFP MCU operating at 12 MHz, with 48KB of internal Flash memory and 1 KB of internal RAM memory
  - USB interface to supply power to the board
  - LCD module
  - Buzzer/Speaker
  - UART header at J8
  - 256 byte Serial EEPROM
  - Test Points headers for all pins of MCU
  - MCU current measurement Test Points J4 and J5
  - Pin P03/AD3 level adjustable with potentiometer R4

- S3 Flash In-System Programmer II
- ZDSII software, samples, and documentation available free for download
  - Sample programs

Supported Host Environments

The S3F8S5A Development Board supports the following operating systems:

- Microsoft Windows 7 (32-bit/64-bit)
- Microsoft Windows 8 (32-bit/64-bit)

Install the ZDSII Software and Documentation

Observe the following steps to download and install your ZDSII software and documentation.

Note: If you have already installed ZDSII – S3 <version> and have downloaded the software and documentation by following the procedure on the paper insert in your kit (FL0170), skip ahead to the next section.

1. Prior to connecting the S3F8S5A Development Board to your development PC, download ZDS II for S3 v5.3.0 (or later) from the Downloadable Software category in the Zilog Store.
2. When the download is complete, unzip the file to your hard drive, then double-click the installation file named `ZDS2_S3_<Version>.exe` and follow the on-screen instructions.
3. When the ZDS II installation is complete, double-click the installation file named `DOCS_S3<version>.exe` and follow the on-screen instructions.
4. When these installations are complete, view the S3F8S5A Development Kit User Manual (UM0272); this document will be located in the following path, by default:
   `C:\Zilog\ZDSII_ S3 _<version>\Documentation\Tools_Documentation`

Establish a Connection with the PC

Observe the following procedure to connect the S3 Flash ISP II and S3F8S5A Development Board to your PC.

Caution: Disconnect or turn off the power to the S3F8S5A Development Board before connecting or disconnecting the S3 Flash ISP II.

1. Connect the Mini-B side of the USB A (male)-to-Mini-B cable to the S3 Flash ISP II. Connect the other end of this cable to the PC, as shown in Figure 2.

Figure 2. Connecting the S3 Flash ISP II to the Development PC

2. Connect the 10p 5x2 ribbon cable to the S3 Flash ISP II, as shown in Figure 3.

Figure 3. Connecting the 10-pin Ribbon Cable to the S3 Flash ISP II

3. Connect the other end of the ribbon cable to Debug Connector J1 on the Development Board, shown in Figure 4.

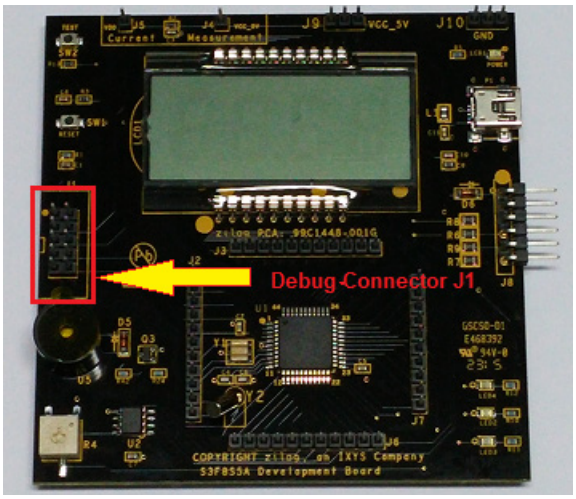


Figure 4. Debug Connector J1

4. After completing the procedure to connect the S3F8S5A Development Board to the PC, the complete setup appears as shown in Figure 5.

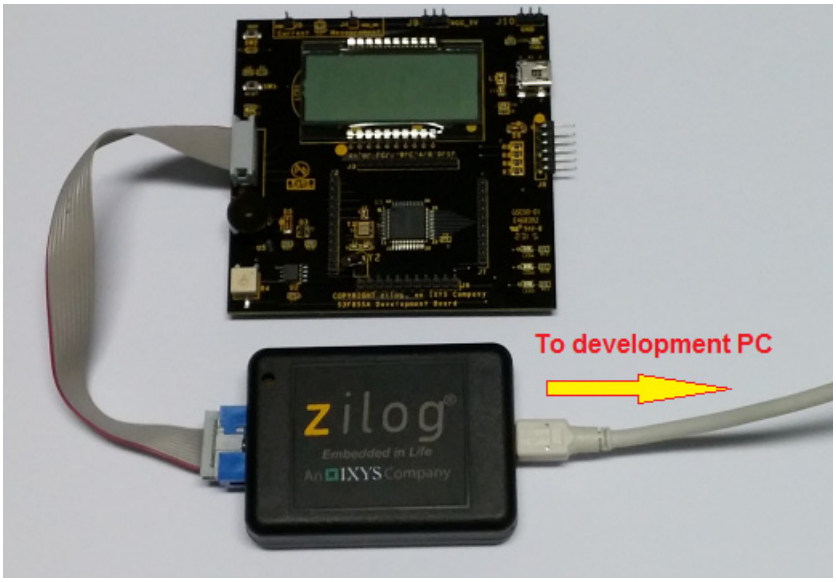


Figure 5. The Completed ISP II and Development Board Assembly

Start the S3F8S5A Ledblink Sample Program

The S3F8S5A Development Kit includes a sample program that demonstrates an LED blinking application. To start the S3F8S5A Ledblink sample program, observe the following procedure.

1. Launch ZDSII by navigating from the Windows Start menu to **Programs** → **Zilog ZDSII – S3 <Version>** → **ZDSII – S3 <Version>**.
2. From the **File** menu in ZDSII, select **Open Project** as indicated in Figure 6, and navigate to the following filepath:

   `<ZDS Install>\samples\S3F8S5A\ledblink_asm`

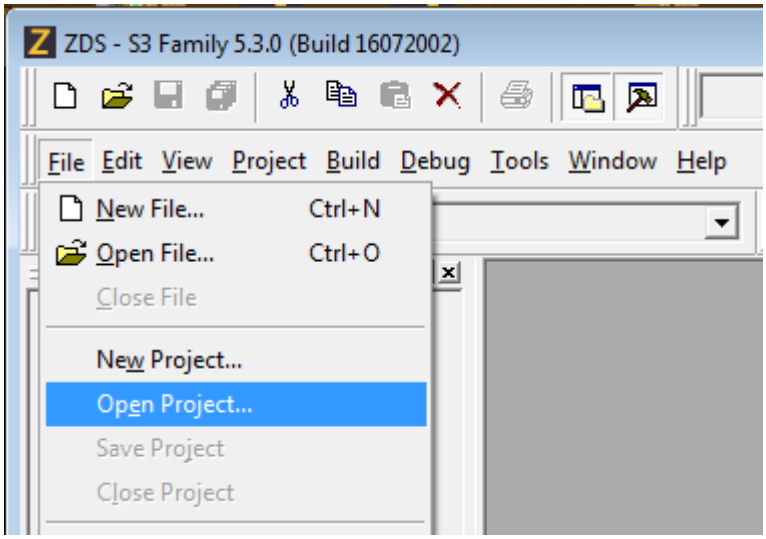


Figure 6. The Open Project Selection in the File Menu

3. Select the `ledblink.zdsproj` project from within the `ledblink_asm` folder as indicated in Figure 7 and click **Open**. A list of source files will appear in the Workspace panel.

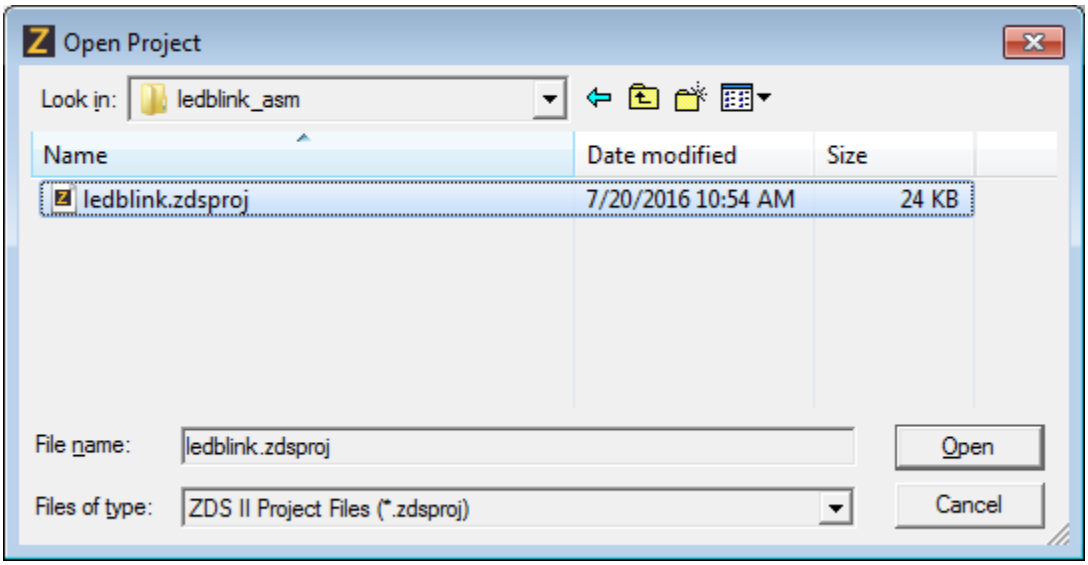


Figure 7. Select the ledblink.zdsproj Project

4. From the **Build** menu, select **Set Active Configuration** to open the Select Configuration dialog box.
5. Select **Debug**, then click **OK** to close the Select Configuration dialog box.
6. From the **Project** menu in ZDSII, select **Settings** to open the Project Settings dialog box. In the Project Settings dialog box, click the **Debugger** tab.

7. On the Debugger page, select **S3F8S5X_FlashIspII** from the Target list, then select **S3FlashIspII** from the **Debug Tool** drop-down menu, as indicated in Figure 8.

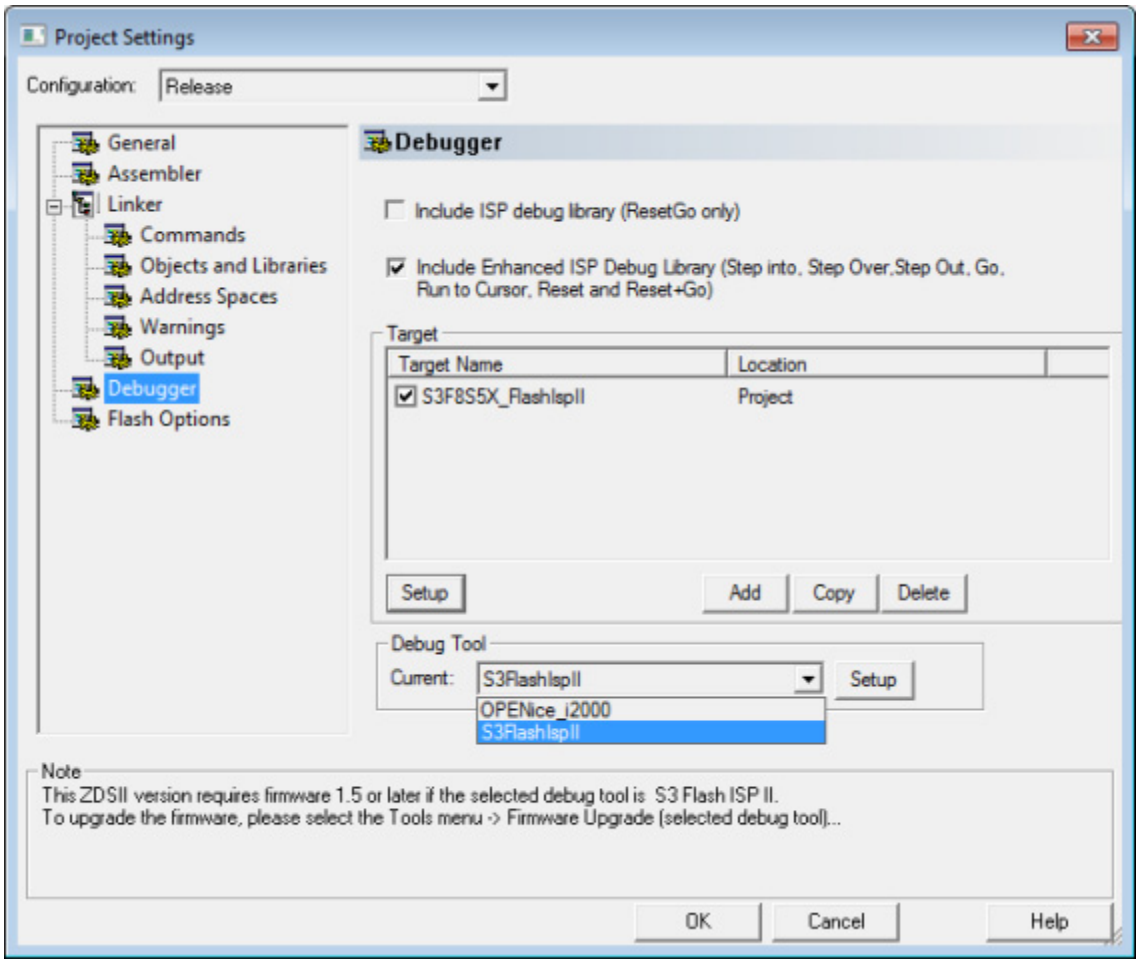


Figure 8. Select the Target and Debug Tool

8. After selecting **S3FlashIspII** from the Debug Tool drop-down menu, click **Setup** to select the serial number of the S3 Flash ISP II you are using, as indicated in Figure 9. Click **OK** to close the Setup USB Communication dialog box.

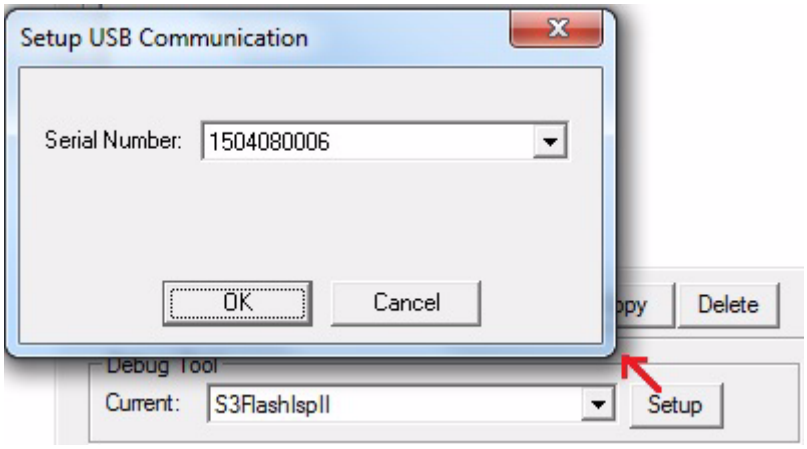


Figure 9. The Setup USB Communication Dialog

Note: The serial number you see on your screen will be different from the serial number shown in Figure 9.

9. After selecting the serial number of the S3 Flash ISP II that you are using, select **Setup** from the Target field to select the Target Voltage.
10. From the target Configuration dialog, enter "**0"** on I**SP_DBRG_IDX** and select the **3.3V by ISP** button and Click **OK**. See Figure 10.

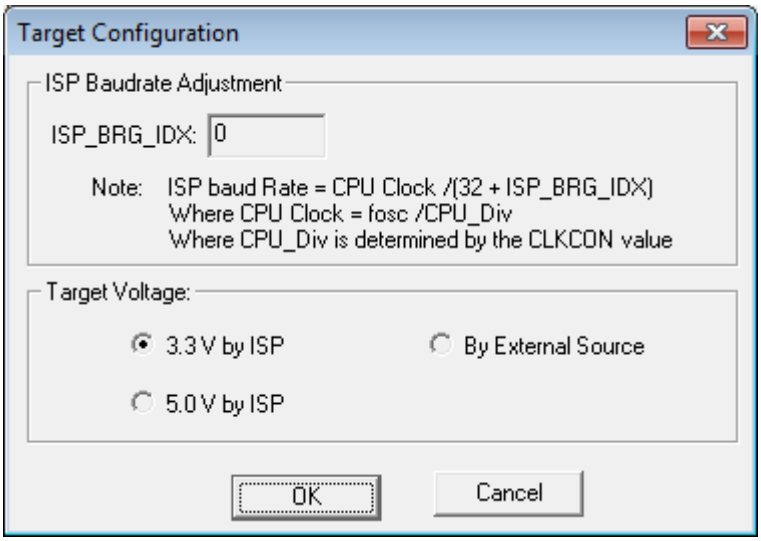


Figure 10. The Target Configuration Dialog

11. Make sure that the **Enhanced ISP Debug Library** is selected on the debugger window..
12. Click **OK** to close the Project Settings dialog box.
13. If you are prompted to rebuild any affected files, click **Yes**. Otherwise, choose **Build** from the menu bar, then click **Rebuild All**. The following example message is displayed:

Space	Base	Top	Size	Used	Unused
Page0	P:00	P:05	COH	6H	BAH
			(192	6	186)
ROM	C:0000	C:1BB7	C000H	1AB8H	A548H
			(49152	6840	42312)

```
OUTPUT CHECKSUM

ledblink.hex   F834
ledblink.lod   F834

0 warning(s
0 error(s)
Build succeeded.
```

Note: This Output Checksum message is an example and may not match the actual checksum of the project for a particular release of the ZDS installation software.

14. To run the application, select **Reset+Go** from the **Debug** menu, as indicated in Figure 11. As a result, LEDs D2, D3, and D4 will blink in sequence.

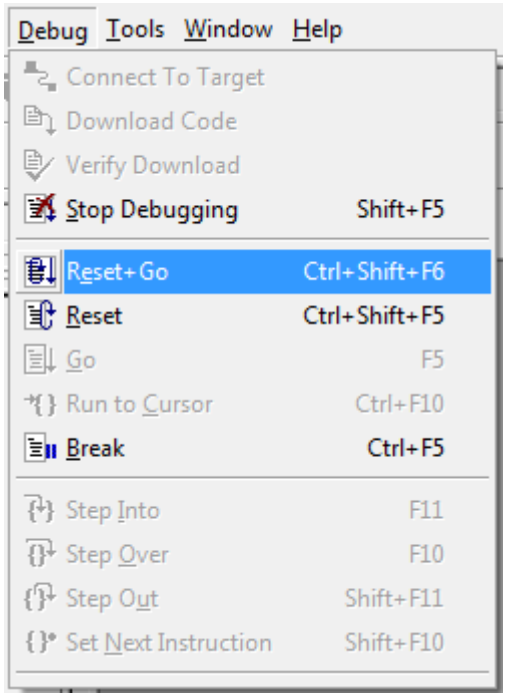


Figure 11. Select Reset+ Go from the Debug Menu

Troubleshooting Tips

The following troubleshooting tips are useful when starting the S3F8S5A Ledblink sample program.

- Ensure that the LED1 PWR indicator on the S3 Flash ISP II lights up upon connecting to the USB port of your PC.
- Navigate to **Project → Settings → Debugger → Debug Tool → Setup**. Upon clicking **Setup** on the Setup USB Communication dialog box, verify that the S3FlashIspII serial number is displayed.

- Remove and reconnect the ISP II on the USB port of your PC.
- Refer to Figure 14 on page 13 to learn more about the operations and power options of the S3F8S5A Development Board.

S3F8S5A Development Board

The purpose of the S3F8S5A Development Kit is to provide a set of hardware and software tools for the development of hardware and firmware for applications based on the S3F8S5A microcontroller. An image of the S3F8S5A Development Board is shown in Figure 12; a block diagram is shown in Figure 13.

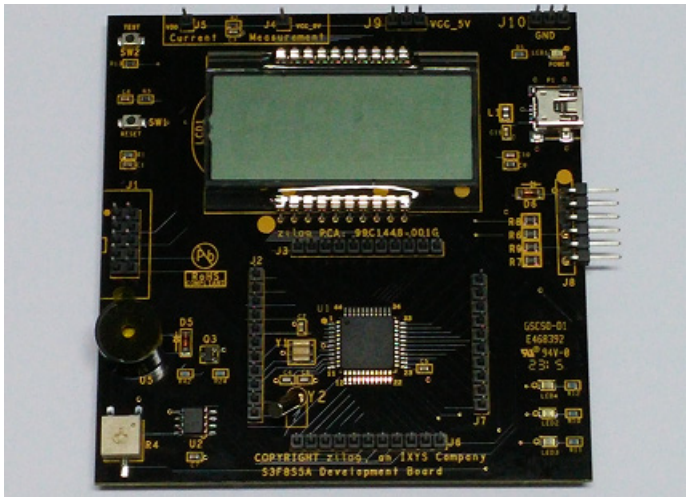


Figure 12. The S3F8S5A Development Board

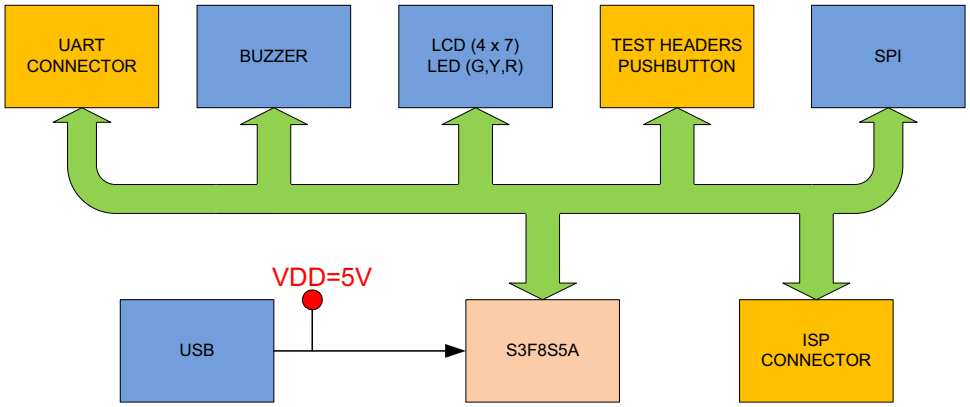


Figure 13. S3F8S5A Development Board Block Diagram

Operations and Power Options

The operations and power options of the S3F8S5A Development Board are listed in Figure 14.

Operations and Power Options

Option	Operations	ISP II cable on J1	USB Cable on P1	Target Voltage	Power	Notes
1	Programming/ Debugging	ON	OFF	3.3V by ISP	VDD = 3.3V VCC_5V = 3.3V	MCU power from S3 ISP II cable
2	Programming/ Debugging	ON	OFF	5.0V by ISP	VDD = 5.0V VCC_5V = 5.0V	MCU power from S3 ISP II cable
3	Programming/ Debugging	ON	See Notes	By External Source	VDD = VCC_5V = Vin	MCU power from External Source via P1 or J9
4	Standalone	OFF	ON	Vin at P1	VDD = VCC_5V = Vin	MCU power from External Source via P1
5	Standalone	OFF	OFF	Vin at J9	VDD = VCC_5V = Vin	MCU power from External Source via J9

Figure 14. Operations and Power Options of the S3F8S5A Development Board

S3F8S5A MCU

Key features of the S3F8S5A MCU include:

- SAM88RC CPU core
- 48K x 8 bits program memory
- 1024 × 8 bits data memory
- Endurance: 10,000 Erase/Program cycles
- 78 instructions
- 36 normal I/O pins in the 44-pin QFP package
- Eight bit-programmable pins for external interrupts
- One 8-bit basic timer for oscillation stabilization and watchdog functions (system reset)
- Three 8-bit timer/counters and two 16-bit timer/counters with selectable operating modes
- Watch timer for real time
- LCD controller/driver
- A/D converter with 8 selectable input pins
- Synchronous SIO modules
- Two asynchronous UART modules
- Pattern generation module

To learn more about the S3F8S5A MCU, refer to the S3F8S5A Product Specification (PS0323).

Magnetic Buzzer

The CEM1206S magnetic buzzer (U5) manufactured by CUI Inc. is rated at a frequency of 2400Hz and an operating voltage of 3.0–8.0V zero-to-peak (V_{0-P}). An image of the CEM1206S device is shown in Figure 15.

Figure 15. Magnetic Buzzer

To learn more about the CEM1206S device, visit http://www.cui.com/product/resource/cem-1206s.pdf.

Reset Circuit

The reset circuit features a 100KΩ pull-up resistor R3 and SW1. This circuit resets the S3F8S5A MCU when SW1 is pressed. See Figure 16 for a representation of the reset circuit.

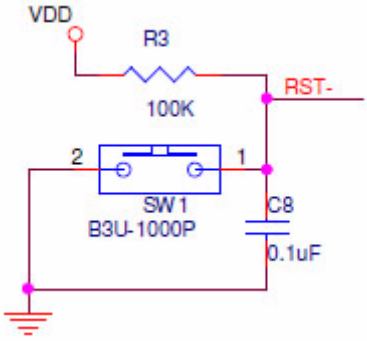


Figure 16. The Reset Circuit

ISP II Connector

The ISP II connector (J1) provides an interface between the S3 Flash ISP II tool and the S3F8S5A device. See Figure 17 for an illustration of the ISP II connector.

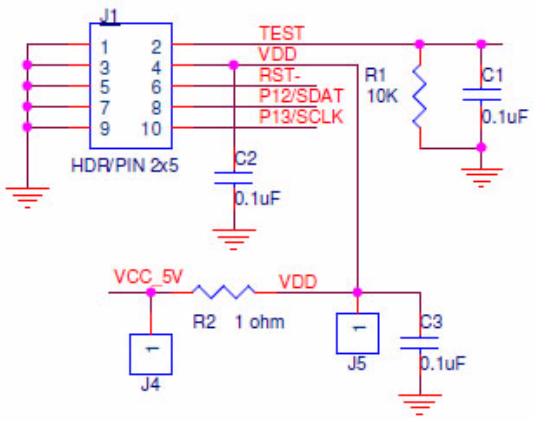


Figure 17. The ISP II Connector

LCD

The VIM-404-DP-RC-S-HV LCD manufactured by Varitronix Ltd. is a 20-pin module. Figure 18 shows an image of this LCD.

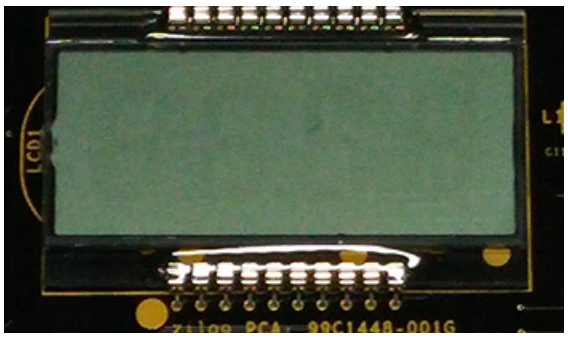
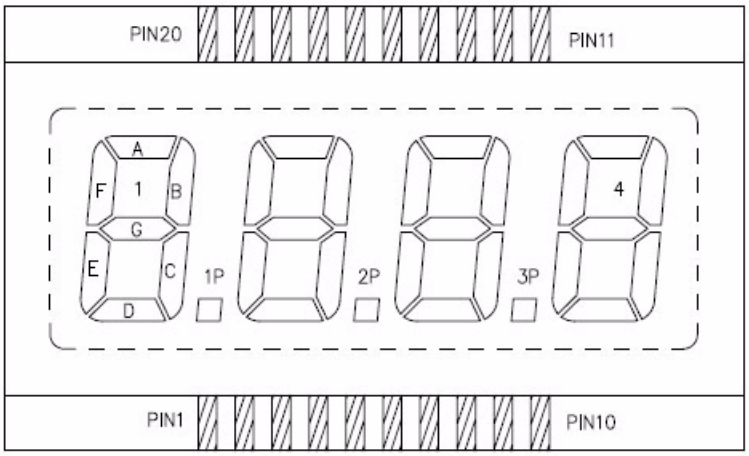


Figure 18. LCD

This four-digit LCD is activated by selecting the segment of each digit that must light up. Figure 19 shows the LCD pin configuration and assignments.



PIN	1–3	4	5	6	7	8	9–10	11	12	13	14	15	16	17	18	19	20
COM1	N.C.	1B	2B	3B	4B	---	N.C.	COM1	4A	4F	3A	3F	2A	2F	1A	1F	---
COM2	N.C.	1C	2C	3C	4C	---	N.C.	---	4G	4E	3G	3E	2G	2E	1G	1E	COM2
COM3	N.C.	1P	2P	3P	---	COM3	N.C.	---	4D	---	3D	---	2D	---	1D	---	---

REMARKS: N.C. = NO CONNECTION

Figure 19. LCD Pin Configuration and Assignments

Serial EEPROM

The 93C56B is enabled through the Chip Select pin (CS) and accessed via a 3-wire serial interface consisting of Data Input (DI), Data Output (DO), and Shift Clock (SK). Upon receiving a Read instruction at DI, the address is decoded, and the data is clocked out serially on the DO pin. Figure 20 shows the Serial EEPROM schematics.

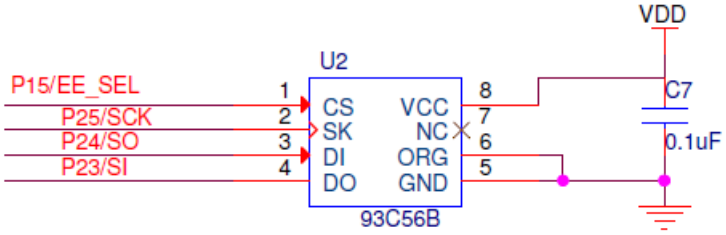


Figure 20. Serial EEPROM

ZDS Flash Loader Utility

A Flash Loader utility is included in Zilog Developer Studio II via the Tools menu. Figure 21 shows an image of the Flash Programming screen.

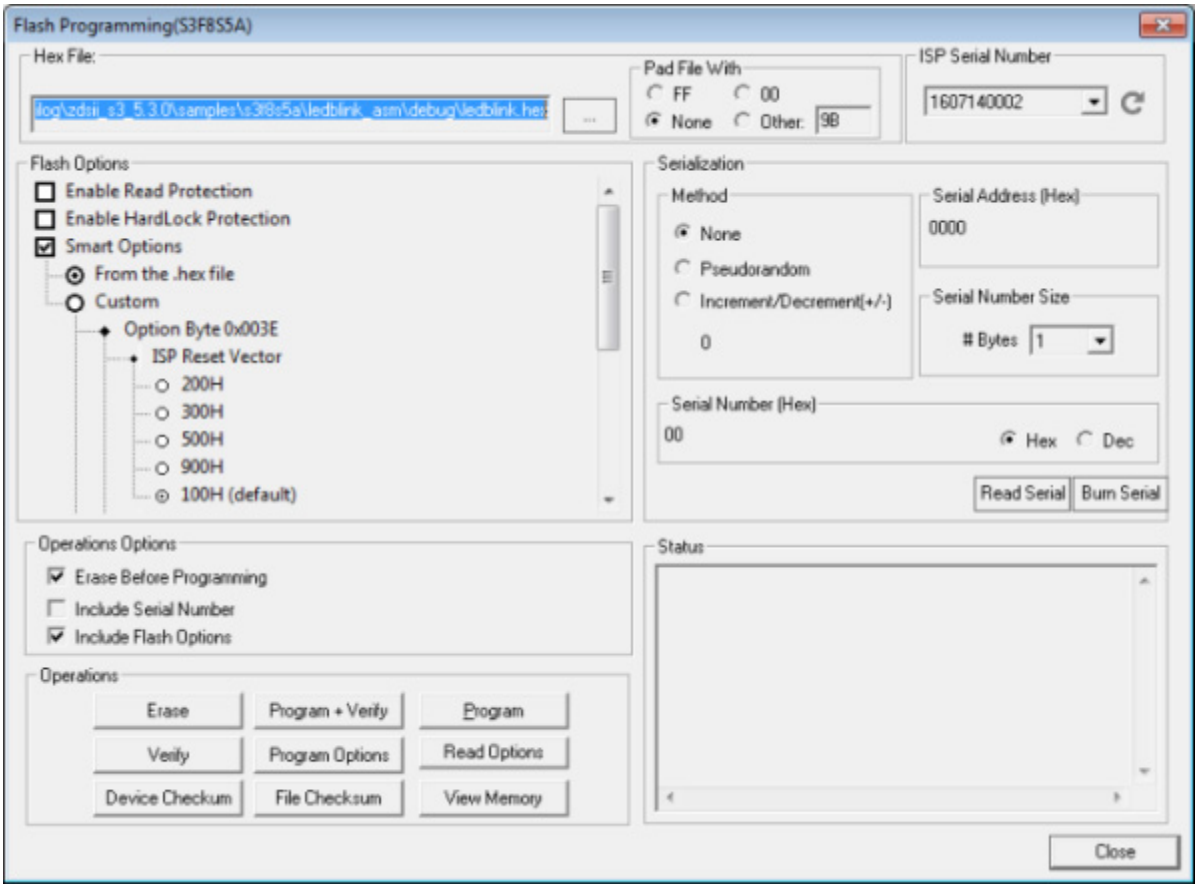


Figure 21. The Flash Programming Screen

You can program the S3F8S5A MCU directly using the hex code generated from the ZDS IDE tools.

S3F8S5A Development Kit Documentation

The documents associated with the S3F8S5A Development Kit are listed in Table 1. Each of these documents can be obtained from the Zilog website by clicking the link associated with its Document Number. Alternatively, navigate to the directory listed in the Location column in your installed application.

Table 1. S3F8S5A Development Kit Documentation

Document	Description	Location
UM0272	S3F8S5A Development Kit User Manual	Documentation\Tools_Documentation
PS0323	S3F8S5A Product Specification	Documentation\Chip_Documentation
UM0266	S3 Flash In-System Programmer User Manual	Documentation\Tools_Documentation
FL0170	S3F8S5A0100ZCOG Development Kit Insert	Documentation\Tools_Documentation
FL0165	S3 Flash In-System Programmer Insert	Documentation\Tools_Documentation
Online Help	ZDS II-S3 IDE, Assembler and C Compiler On-Line Help	ZDS II-S3 >Help >Help Topics

S3F8S5A Sample Projects

Table 2 lists the sample projects developed for this application. Follow the filepath stated in the Location column to access the associated project.

Table 2. S3F8S5A Sample Projects

Project	Location
timerD	samples\S3F8S5A\ISP_BL_Demo
lcd	samples\S3F8S5A\LCD_asm
lcd	samples\S3F8S5A\LCD_c
ledblink	samples\S3F8S5A\ledblink_asm
ledblink	samples\S3F8S5A\ledblink_c
eeprom	samples\S3F8S5A\EEPROM_c

Appendix A. Schematic Diagrams

Figure 22 presents schematic diagrams of the S3F8S5A Development Board.

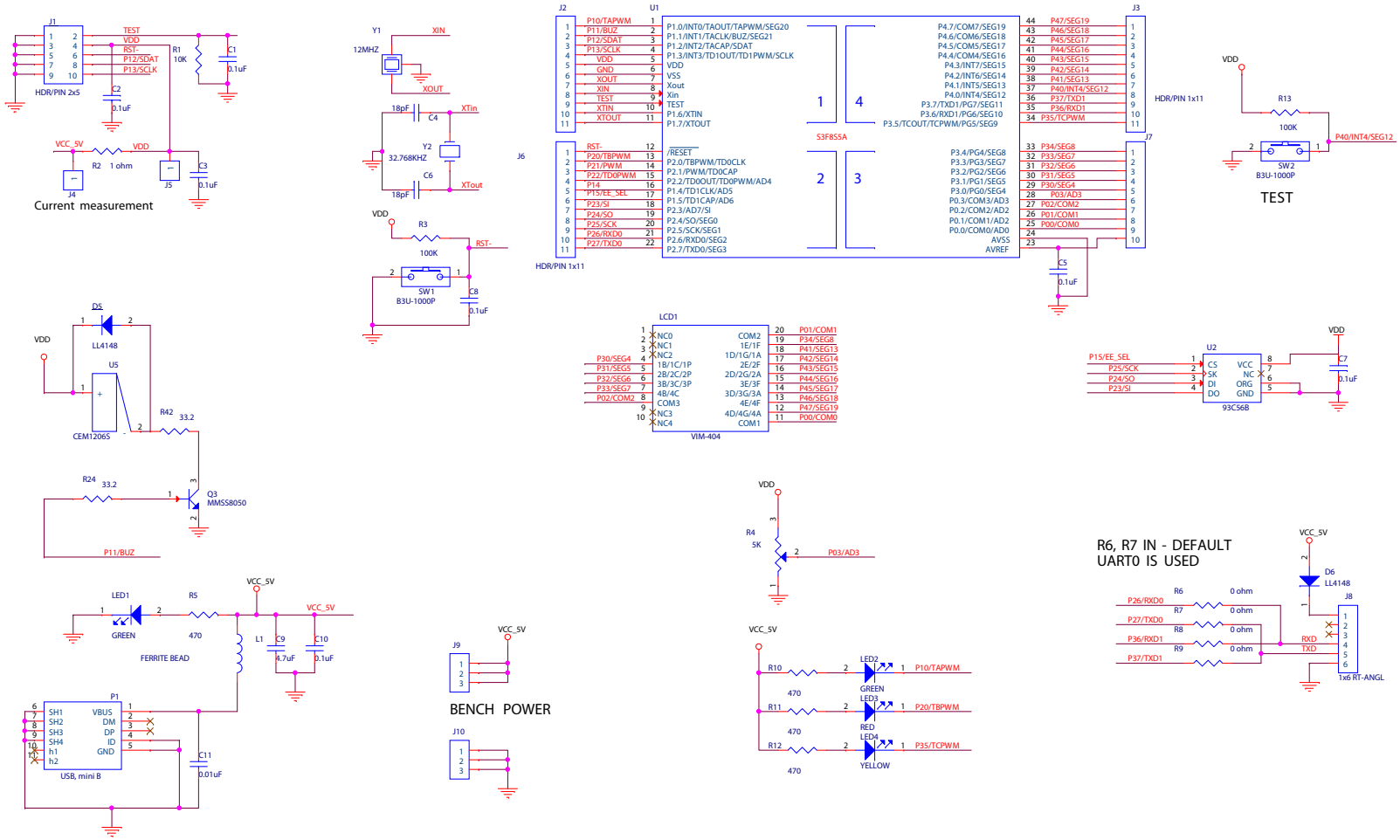


Figure 22. S3F8S5A Development Board Schematic Diagram

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To learn more about this product, find additional documentation, or to discover other facets about Zilog product offerings, please visit the Zilog Knowledge Base or consider participating in the Zilog Forum.

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