S3 Family of Microcontrollers

S3F8S19 Development Kit

User Manual

S³Microcontrollers

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As used herein

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Document Disclaimer

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	03	Updated for ZDS-S3 version 5.3.0. Removed ISP I support	All
Jun 2015	02	Deleted Step 6 of Establish a Connection with the PC; Deleted Appendices C, D, and E and changed references to online help topics.	3
Sep 2014	01	Original issue.	n/a

Overview

Zilog's S3F8S19 Development Kit, part number S3F8S190100ZCOG, allows you to evaluate your S3F8S19-based designs and applications. The Kit features a Development Board consisting of the following components:

- Four LEDs
- Five pushbuttons
- Buzzer/speaker
- LCD module
- UART

This user manual provides instructions for setting up and configuring the S3F8S19 Development Board. It includes schematic diagrams and a discussion of the Board features and ZDS II.

The S3F8S19 Development Board features an S3F8S19 MCU in a 48-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 S3F8S19 MCU, refer to the S3F8S19 Product Specification (PS0312) and/or the S3 Flash In-System Programmer User Manual (UM0266).

This document guides you through the following tasks:

- Downloading and installing ZDS II software and documentation
- Connecting the S3 Flash ISP II and S3F8S19 Development Board to your PC
- Starting the S3F8S19 Ledblink sample program

Kit Contents

The S3F8S19 Development Kit contains the following items:

- S3F8S19 Development Board
- S3 Flash ISP II
- 10-circuit ribbon cable
- USB A (male) to Mini-B USB cable (2)
- S3F8S19 Development Kit hardcopy insert

Figure 1 shows the contents of the S3F8S19 Development Kit.

Figure 1. The S3F8S19 Development Kit

Features

The S3F8S19 Development Kit includes the following key items.

- S3F8S19 Development Board, which contains the following features:
    - S3F8S19 48-pin QFP MCU operating at 12 MHz, with 32 KB of internal Flash memory and 2 KB of internal RAM memory
    - USB interface to supply power to the board and used as a PC virtual COM port with the S3 Monitor and Boot Loader libraries
    - LCD module
    - Buzzer/Speaker
    - UART Connector footprint
    - Test Points footprint for all pins of MCU
    - MCU current measurement Test Points J7 and J8
    - Power Supply level adjustable with potentiometer R16

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

Supported Host Environments

The S3F8S19 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 (FL0167), skip ahead to the next section.

1. Prior to connecting the S3F8S19 Development Board to your development PC, download ZDSII for S3 Family devices version 5.3.0 (or later) from the **Downloadable Software** category in the Zilog Store.

2. When the download is complete, unzip the file to your hard drive. Double-click the installation file named ZDSII – S3_<version>.exe, and follow the on-screen instructions.

Establish a Connection with the PC

Observe the following procedure to connect the S3 Flash ISP II and S3F8S19 Development Board to your PC.

> ⚠ **Caution:** Disconnect or turn off the power to the S3F8S19 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 Jumper J6 on the Development Board. Ensure that Pin 1 on the ribbon cable is aligned with Pin 1 on the target connector, as indicated in Figure 4.
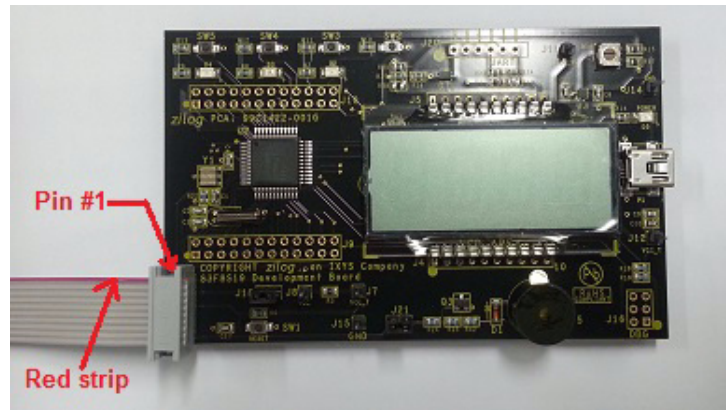
Figure 4. Debug Connector J6

⚠ **Caution:** Ensure that you connect the 10 pin ribbon cable using the correct orientation to prevent damage to the S3 Flash ISP II.

4. With the USB A (male) to Mini-B cable, connect Port P1 on the S3F8S19 Development Board to a USB port on the Development PC to apply power to the Development Board, as indicated in Figure 5.
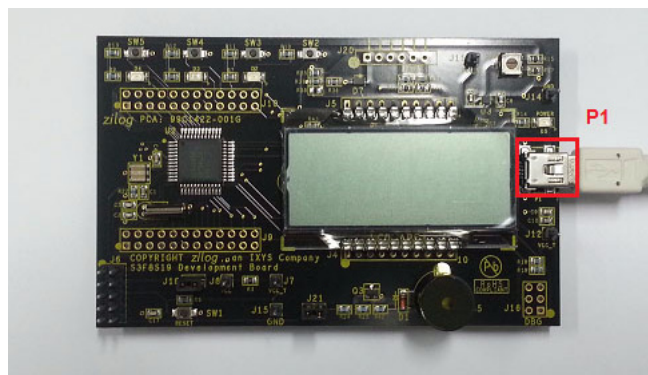

Figure 5. Power Supply Port P1 Connector

After completing the procedure to connect the S3F8S19 Development Board to the PC, the complete setup appears as shown in Figure 6.
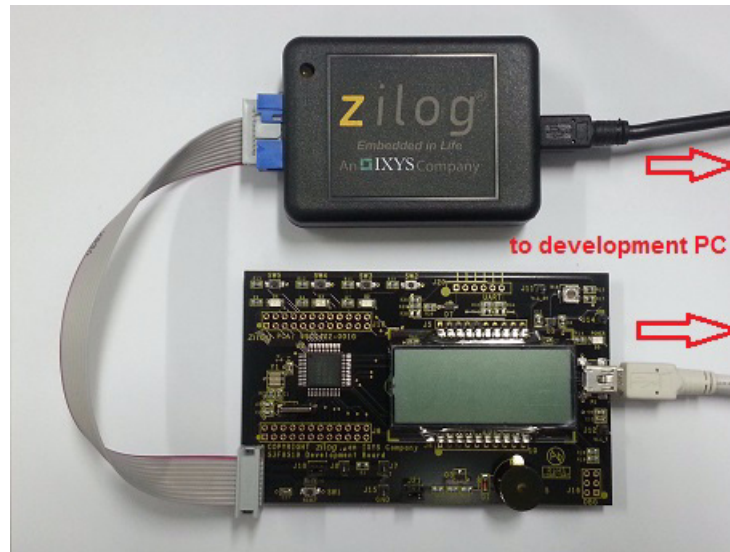
Figure 6. The Completed ISP II and Development Board Assembly

Start the S3F8S19 Ledblink Sample Program

The S3F8S19 Development Kit includes a sample program that demonstrates an LED blinking application. To start the S3F8S19 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 7, and navigate to the following filepath:

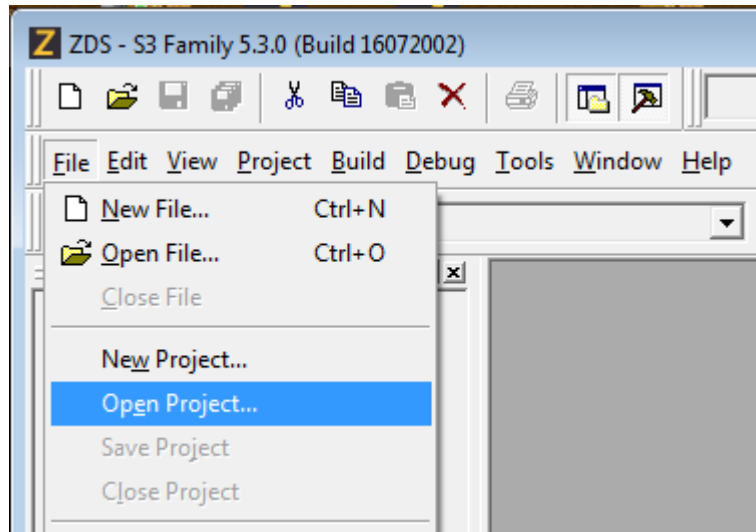   `<ZDS Install>\samples\S3F8S19\ledblink_asm`

Figure 7. The Open Project Selection in the File Menu

3. Select the `ledblink.zdsproj` project from within the `ledblink_asm` folder as indicated in Figure 8 and click **Open**. A list of source files will appear in the Workspace panel.
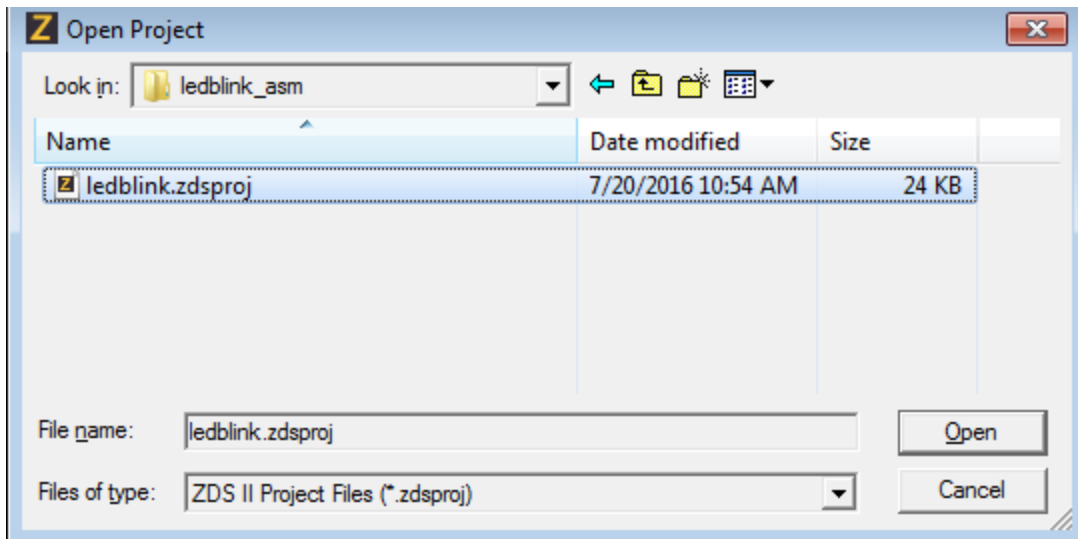

Figure 8. Select the ledblink.zdsproj Project

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 **S3F8S1X_FlashIspII** from the Target list, then select **S3FlashIspII** from the **Debug Tool** drop-down menu, as indicated in Figure 9.
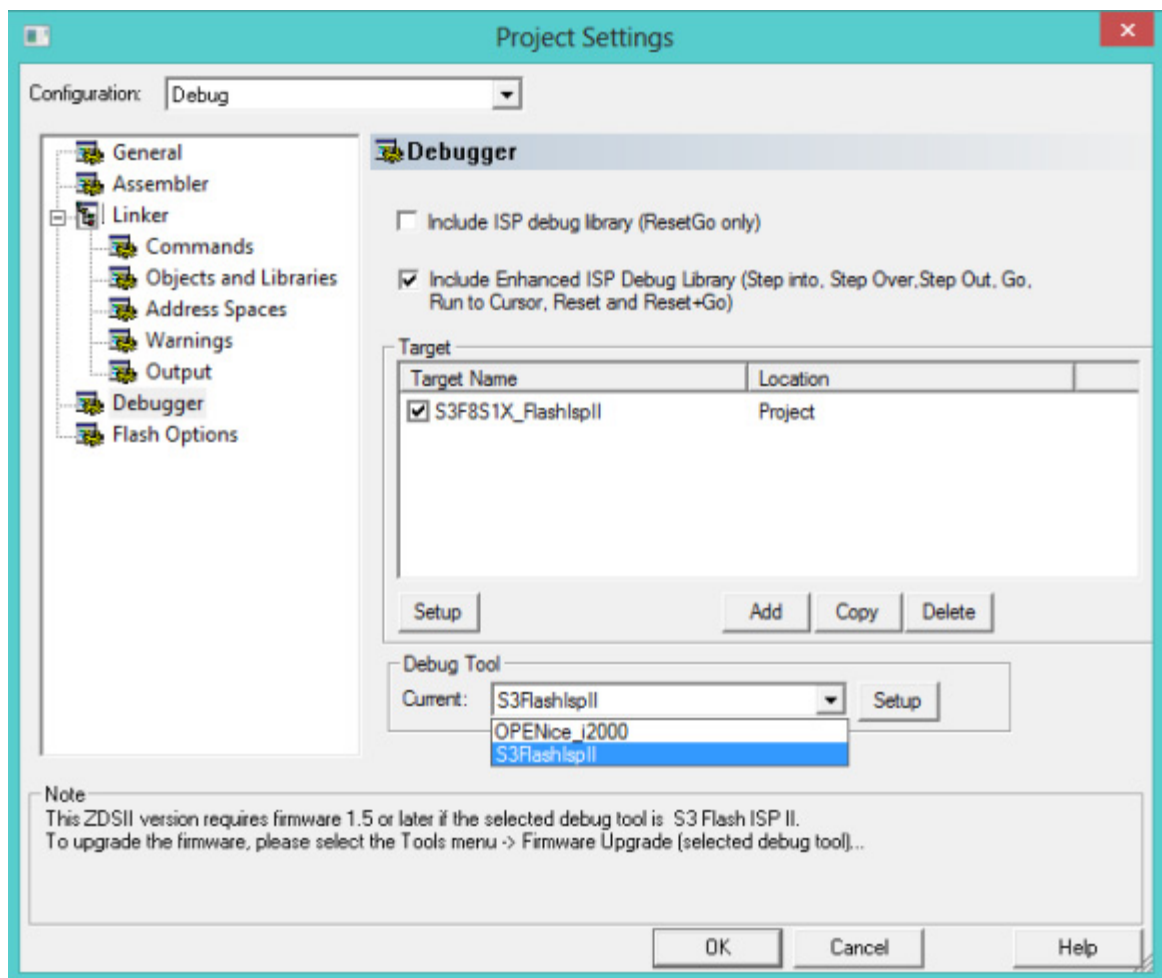

Figure 9. Select the Target and Debug Tool

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 10.
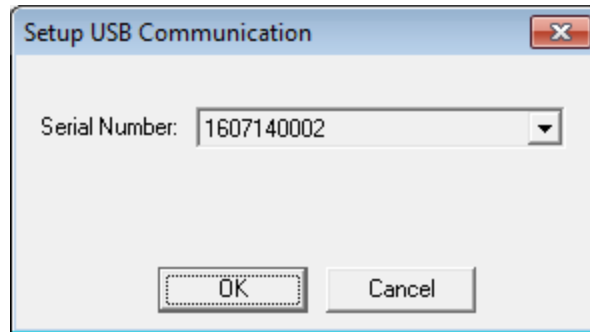

Figure 10. The Setup USB Communication Dialog

➤ **Note:** The serial number you see on your screen will be different from the serial number shown in Figure 10.

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9. Click **OK** to close the Setup USB Communication dialog box.

10. Make sure that the Enhanced ISP Debug Library is selected.

11. Click **OK** to close the Project Settings dialog box.

12. If you are prompted to rebuild any affected files, click **Yes**. Otherwise, choose **Build** from the menu bar, then click **Rebuild All**. The following message is displayed.

```
OUTPUT CHECKSUM
===============
ledblink.hex        9AC2
ledblink.lod        9AC2

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.

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13. 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.
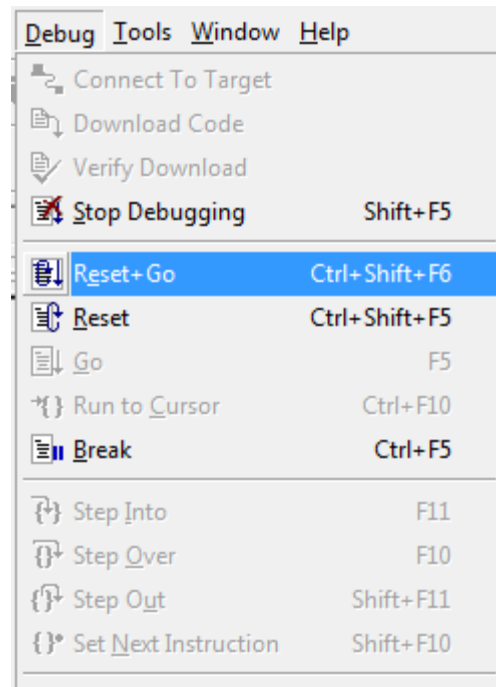

Figure 11. Select Reset+ Go from the Debug Menu

Trouble Shooting Tips

The following trouble-shooting tips are useful when starting the S3F8S19 Ledblink sample program.

• Ensure that the LED 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 S3FlashIspII is displayed.

• Remove and reconnect the ISP II on the USB port of your PC.

• Refer to to learn more about the operations and power options of the S3F8S19 Development Board.

S3F8S19 Development Board

The purpose of the S3F8S19 Development Kit is to provide a set of hardware and software tools for the development of hardware and firmware for applications based on the S3F8S19 microcontroller. An image of the S3F8S19 Development Board is shown in Figure 12; a block diagram is shown in Figure 13.
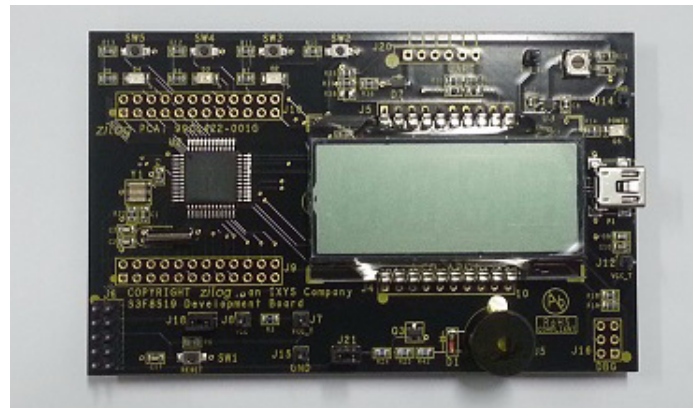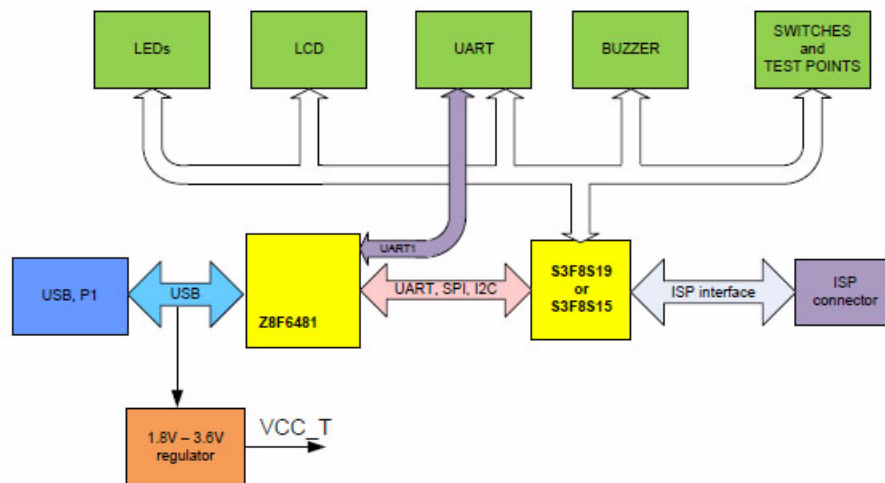

Figure 12. The S3F8S19 Development Board

Figure 13. S3F8S19 Development Board Block Diagram

Operations and Power Options

The operations and power options of the S3F8S19 Development Board are listed in Table 1.

Table 1. Operations and Power Options of the S3F8S19 Development Board

Option	Operations	Jumper		Status	Power	Notes
1	Programming /Debugging	J18	1-2	ON	V_{DD} = 3.00V V_{CC}_T = 2.95V	USB cable not connected on P1
		J21	1-2	OFF		J21 should be OFF when programming
2	Programming /Debugging	J18	1-2	OFF	V_{DD} = 3.12V V_{CC}_T = 3.30V	USB cable connected on P1
		J21	1-2	OFF		J21 should be OFF when programming
3	Programming /Debugging	J18	1-2	ON	V_{DD} = 3.30V V_{CC}_T = 3.30V	USB cable connected on P1
		J21	1-2	OFF		J21 should be OFF when programming
4	Stand-Alone	J18	1-2	ON	V_{DD} = V_{CC}_T = 3.30V	USB cable connected on P1
		J21	1-2	Not relevant		

S3F8S19 MCU

Key features of the S3F8S19 MCU include:

- SAM88RC CPU core

- 32K x 8 bits program memory

- 2,086 × 8 bits data memory

- Endurance: 10,000 Erase/Program cycles

- 78 instructions

- 40 normal I/O pins in the 48-pin QFP package

- 8 interrupt levels and 26 interrupt sources

- One programmable 8-bit basic timer (BT) for oscillation stabilization control or watch-dog timer function

- One 16-bit timer/counter (Timer 0) with Interval mode and PWM mode

- 10-channel analog input

- 10-bit conversion resolution

- Two-channel Universal Asynchronous Receiver/Transmitter (UART)

- Serial peripheral interface

- Serial, 8-bit data transfer

- Programmable clock prescaler

- LCD Controller/Driver

- Low-voltage check to reset system

- ISP-related option selectable (ROM address 3EH) via Smart Option

- Oscillator selection, LVR selection (ROM address 3FH) via Smart Option

To learn more about the S3F8S19 MCU, refer to the S3F8S19/S3F8S15 Product Specification ([PS0312](PS0312)).

Magnetic Buzzer

The CEM1206S magnetic buzzer (U2) manufactured by CUI Inc. is rated at a frequency of 2400 Hz and an operating voltage of 3.0–8.0 V zero-to-peak (V_{0-P}). An image of the CEM1206S device is shown in Figure 14.
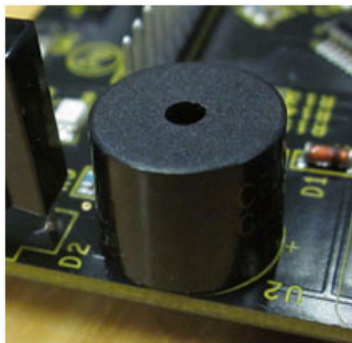

Figure 14. Magnetic Buzzer

This buzzer is activated by setting the jumper J9 to the 1-2 position that connects the buzzer to the P3.0 pin of the S3F8S19 MCU in the Development Kit.

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

Reset Circuit

The reset circuit features a $100 K\Omega$ pull-up resistor R6 and SW1. This circuit resets the S3F8S19 MCU when SW1 is pressed. See Figure 15 for a representation of the reset circuit.
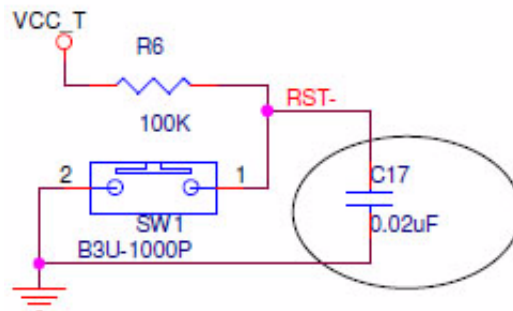

Figure 15. The Reset Circuit

ISP II Connector

The ISP II connector (J6) provides an interface between the S3 Flash ISP II tool and the S3F8S19 device. See Figure 16 for an illustration of the ISP II connector.
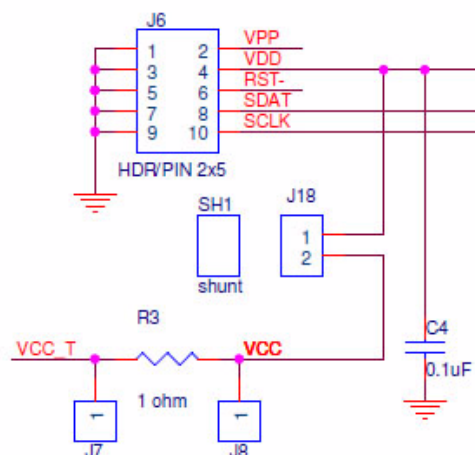

Figure 16. The ISP II Connector

LCD

The VIM-404-DP-RC-S-HV LCD manufactured by Varitronix Ltd. is a 20-pin module seated on both J4 and J5. Figure 17 shows an image of this LCD.
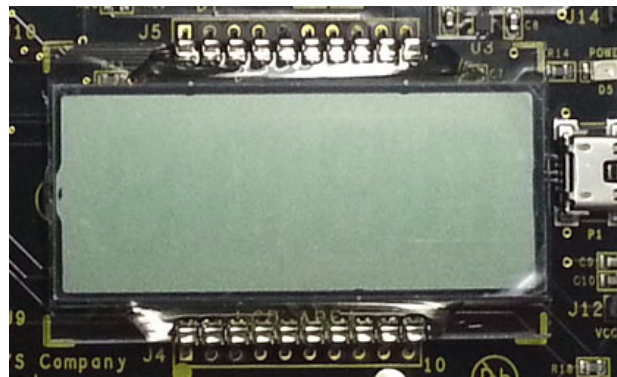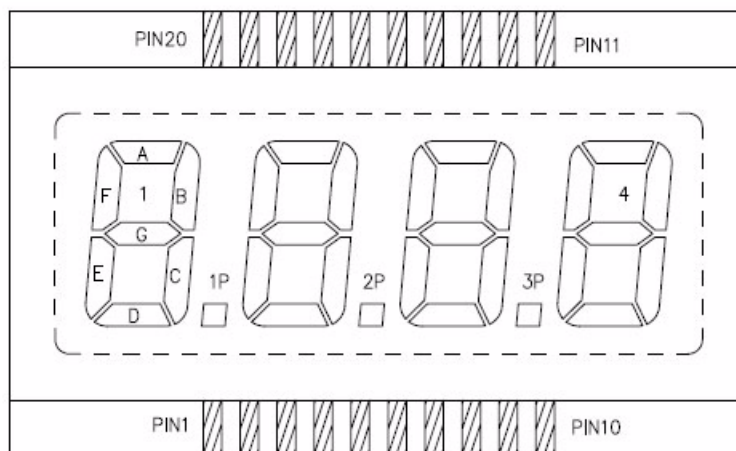

Figure 17. LCD

This four-digit LCD is activated by selecting the segment of each digit that must light up. Figure 18 shows the LCD pin configuration and assignments.

REMARKS: N.C. = NO CONNECTION

Figure 18. LCD Pin Configuration and Assignments

ZDS Flash Loader Utility

A Flash Loader utility is included in Zilog Developer Studio II via the Tools menu. Figure 19 shows an image of the Flash Programming screen.
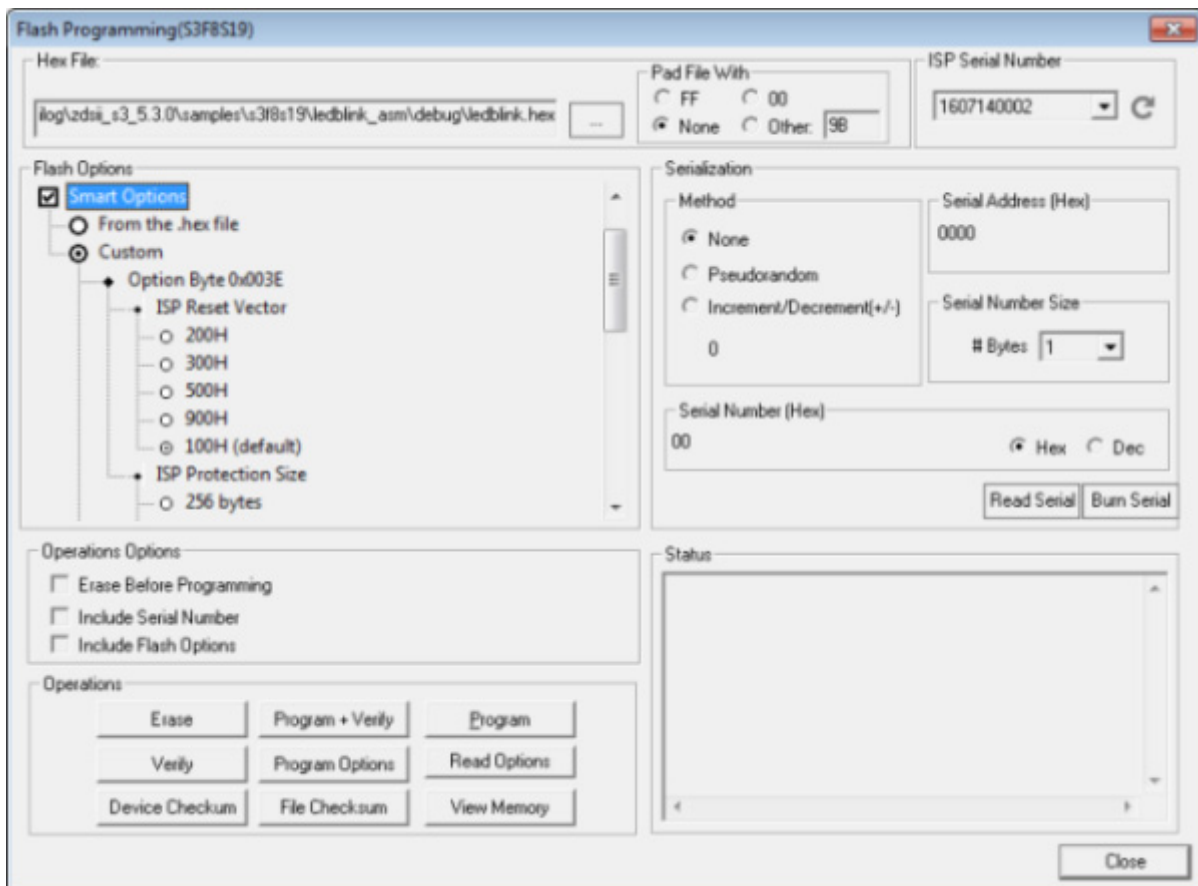

Figure 19. The Flash Loader Programming Screen

You can program the S3F8S19 MCU directly using the hex code generated from the ZDS IDE tools.

S3F8S19 Development Kit Documentation

The documents associated with the S3F8S19 Development Kit are listed in Table 2. 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 2. S3F8S19 Development Kit Documentation

Document	Description	Location
UM0268	S3F8S19 Development Kit User Manual	Documentation\Tools_Documentation
PS0312	S3F8S19 Product Specification	Documentation\Chip_Documentation
UM0266	S3 Flash In-System Programmer User Manual	Documentation\Tools_Documentation
FL0167	S3F8S190100ZCOG 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

S3F8S19 Sample Projects

Table 3 lists the sample projects developed for this application. Follow the filepath stated in the Location column to access the associated project.

Table 3. S3F8S19 Sample Projects

Project	Location
S3F8S19_BL_Demo	samples\BL_Demo
buzzer	samples\buzzer_asm
buzzer	samples\buzzer_c
lcd	samples\lcd_asm
lcd	samples\lcd_c
ledblink	samples\ledblink_asm
ledblink	samples\ledblink_c
S3F8S19_ISP_Demo	samples\ ISP_Demo

Appendix A. Schematic Diagrams

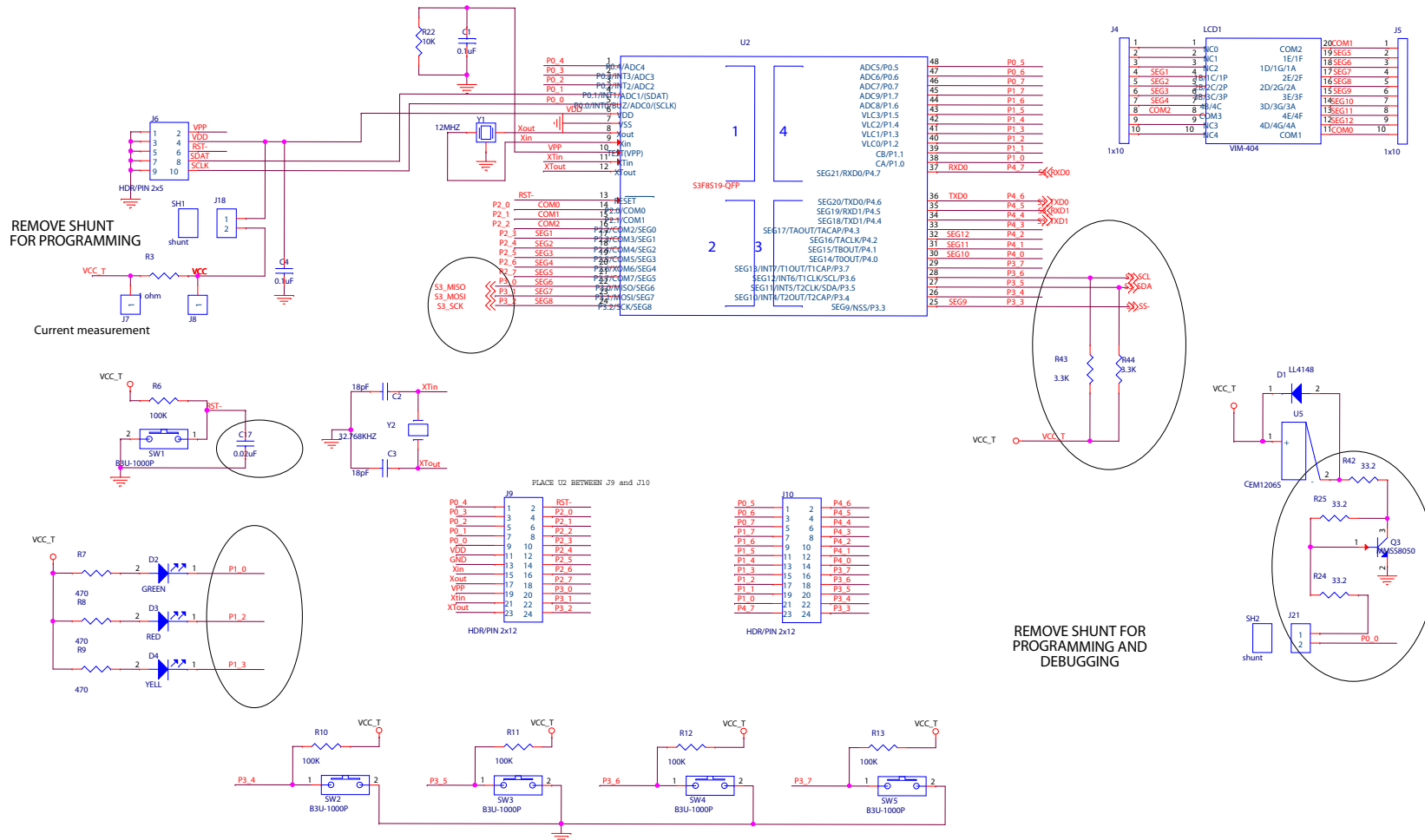Figures 20 and 21 present schematic diagrams of the S3F8S19 Development Board.

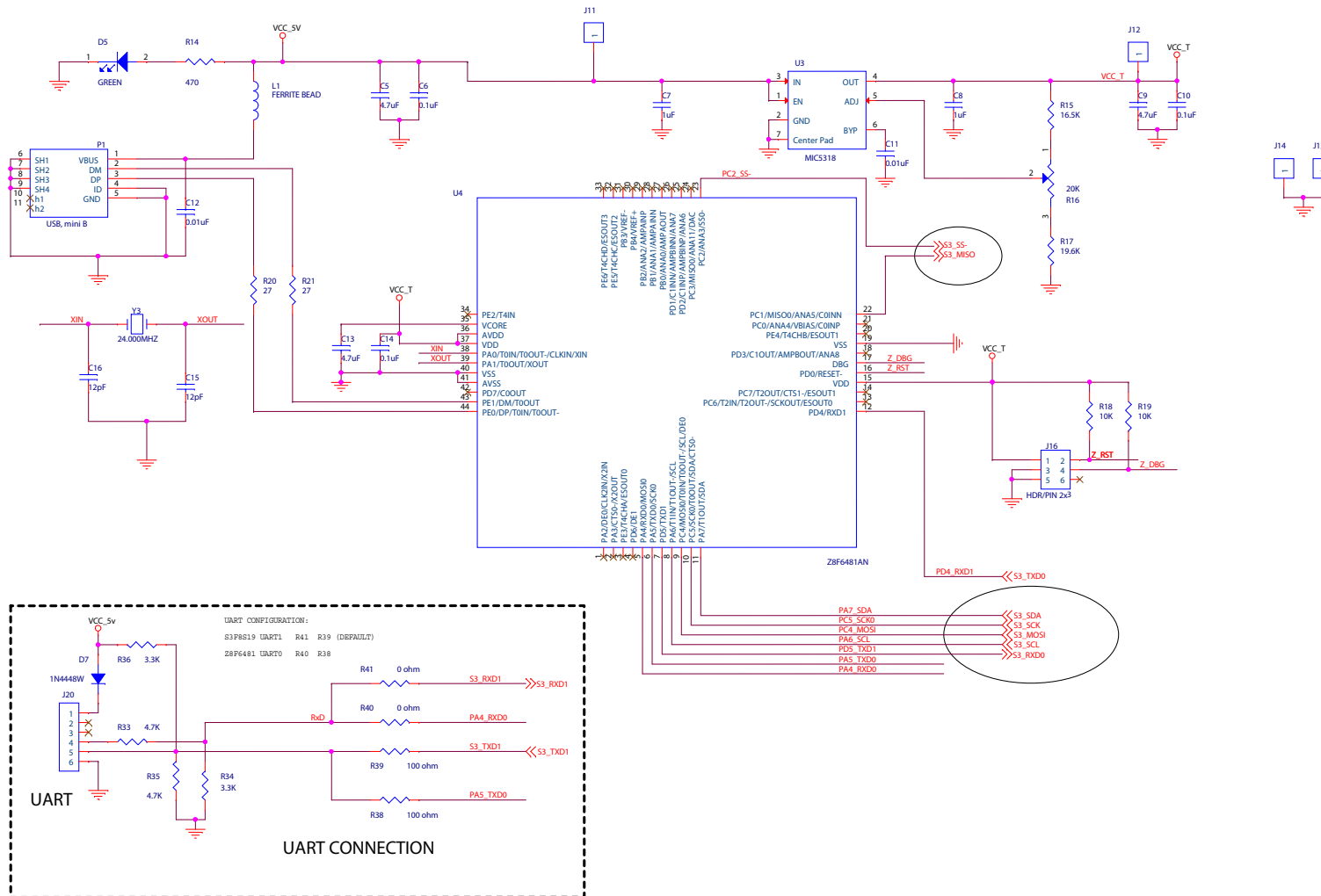**Figure 20. S3F8S19 Development Board Schematic Diagram, #1 of 2**

Figure 21. S3F8S19 Development Board Schematic Diagram, #2 of 2

Customer Support

To share comments, get your technical questions answered, or report issues you may be experiencing with our products, please visit Zilog's Technical Support page at http:/ support.zilog.com.

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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