S3 Family of Microcontrollers

S3 Flash In-System Programmer

User Manual

UM026605-0117

PRELIMINARY

Warning: DO NOT USE THIS PRODUCT IN LIFE SUPPORT SYSTEMS.

LIFE SUPPORT POLICY

ZILOG'S PRODUCTS ARE NOT AUTHORIZED FOR USE AS CRITICAL COMPONENTS IN LIFE SUPPORT DEVICES OR SYSTEMS WITHOUT THE EXPRESS PRIOR WRITTEN APPROVAL OF THE PRESIDENT AND GENERAL COUNSEL OF ZILOG CORPORATION.

As used herein

Life support devices or systems are devices which (a) are intended for surgical implant into the body, or (b) support or sustain life and whose failure to perform when properly used in accordance with instructions for use provided in the labeling can be reasonably expected to result in a significant injury to the user. A critical component is any component in a life support device or system whose failure to perform can be reasonably expected to cause the failure of the life support device or system or to affect its safety or effectiveness.

Document Disclaimer

 Information in this publication concerning the devices, applications, or technology described is intended to suggest possible uses and may be superseded. ZILOG, INC. DOES NOT ASSUME LIABILITY FOR OR PROVIDE A REPRESENTATION OF ACCURACY OF THE INFORMATION, DEVICES, OR TECHNOLOGY DESCRIBED IN THIS DOCUMENT. ZILOG ALSO DOES NOT ASSUME LIABILITY FOR INTELLECTUAL PROPERTY INFRINGEMENT RELATED IN ANY MANNER TO USE OF INFORMATION, DEVICES, OR TECHNOLOGY DESCRIBED HEREIN OR OTHERWISE. The information contained within this document has been verified according to the general principles of electrical and mechanical engineering.

S3 and Z8 are trademarks or registered trademarks of Zilog, Inc. All other product or service names are the property of their respective owners.

Revision History

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

Date	Revision Level	Description	Page
Jan 2017	05	Updated Figure 3 and added Figure 4. Renumbered figures.	4, 5
Aug 2016	04	Remove support for S3 Flash ISP I and updated for ZDS-S3 5.3.0 release	All
Jun 2015	03	Added support for both S3 Flash ISP I and II	7, 10
May 2015	02	Applicable to S3USBISP000ZACG Rev C or later. Added Windows 8 (32/64-bit) to Supported Host Environment Updated Figure 3, Figure 9, and Figure 10 Edited Wording in ISP Interface Section Edited Wording in Target Power Section Edited Steps 4, 6, and 8 in Appendix A Added Step 10 in Apendix A	 2 4, 11, 12 4 4 7 12
Jun 2014	01	Original issue.	n/a

Overview

Zilog's The S3 Flash In-System Programmer II (S3USBISP000ZACG) is used with the Zilog Developer Studio (ZDS) S3 Integrated Development Environment (IDE) to program Flash memory on a target board through a high-speed USB port on a Windows PC. S3 applications that include the Zilog S3 Debug Library can also be debugged through the S3 Flash ISP II using the IDE's graphical user interface (GUI).

The In-System Programmer II (ISP II), shown in Figure1, and the ZDS II S3 IDE provide the following features:

- Download code to Flash and begin program execution.
- Insert multiple Breakpoints in a program at compile/assembly time; onlyone break-point is triggered during program execution.
- Break into a program running from within the IDE to monitor the state of the system without recompiling the application (requires interrupts to be enabled).
- Resume program execution after Breakpoint.
- View or Modify SFR, RAM or Flash memory
- Single Step, Step Over and Run to Cursor

Figure 1. The S3 Flash In-System Programmer II

This document describes how to install the S3 Flash In-System Programmer II device and its associated drivers. After the device is connected and the drivers are installed, you can proceed with the developing and debugging of your code and hardware as described in the documentation that is applicable to your development board.

Kit Contents

The S3 Flash In-System Programmer II Kit contains the following items:

- S3 Flash In-System Programmer II
- USB cable with Type-A and Type Mini-B connectors
- 10-wire ribbon cable
- S3 Flash In-System Programmer Kit hardcopy insert (FL0165)

Supported Host Environments

The S3 Flash In-System Programmer II operates in the following environments:

- A host PC running ZDSII – S3 version 5.3.0 or later
- Windows 7 (32/64-bit) or Windows 8 (32/64-bit).
- One USB full-speed port on the host computer or a USB hub connected to the host computer

Supported Target Environments

The S3 Flash In-System Programmer II supports the following targets:

- Any Zilog S3 Family development board
- Any other development or application board with any Zilog S3 Family device and a 10-pin ISP connector

See Figure 2 for the supported S3 Flash ISP II.

Programmer/ Debugger	Type or A.K.A.	FW Version	Use ZDS - S3 Version	Notes
S3USBISP000ZACG Rev C or later	S3 Flash ISP II	1.3 or 1.4	5.2.3 or earlier	Includes Target Connected detection, VDD selection, and SW UART (SWIO) support. Compatible with ZDS II - S3 version 5.2.3 and earlier. Does not include S3 Enhanced ISP Interface Debug library support. Recommended to upgrade to FW 1.5
S3USBISP000ZACG Rev C or later	S3 Flash ISP II	1.5 or later	5.3.0 or later	Includes Target Connected detection, VDD selection, and SW UART (SWIO) support. Compatible with ZDS II - S3 version 5.3.0 and later. Includes S3 Enhanced ISP Interface Debug library support.

Figure 2. Supported S3 Flash ISP II

Installing the S3 Flash ISP Driver II

To install drivers for the S3 Flash In-System Programmer II, see Appendix A. Installing the S3 Flash ISP II Driver on page 8.

10-Pin Connector

The S3 Flash In-System Programmer II connects to the S3 Family Development Board (or other target board with an S3 device) using a 10-pin ribbon cable and 2x5 female connectors. Pin 1 of this cable is marked by a red wire. An S3 Flash ISP II male connector is required on the target system; it is a 2x5 header with standard 0.025-inch square posts on 0.100 inch centers, the same as headers commonly used for jumper blocks. The connector used on all S3 development boards is FCI part number 67997-210HLF.

Figure 3 shows the connections between the ISP II connector and the S3 Flash MCU. When connecting the ribbon cable to your target board, ensure that you align Pin 1 of the cable with Pin 1 of the connector on the board.

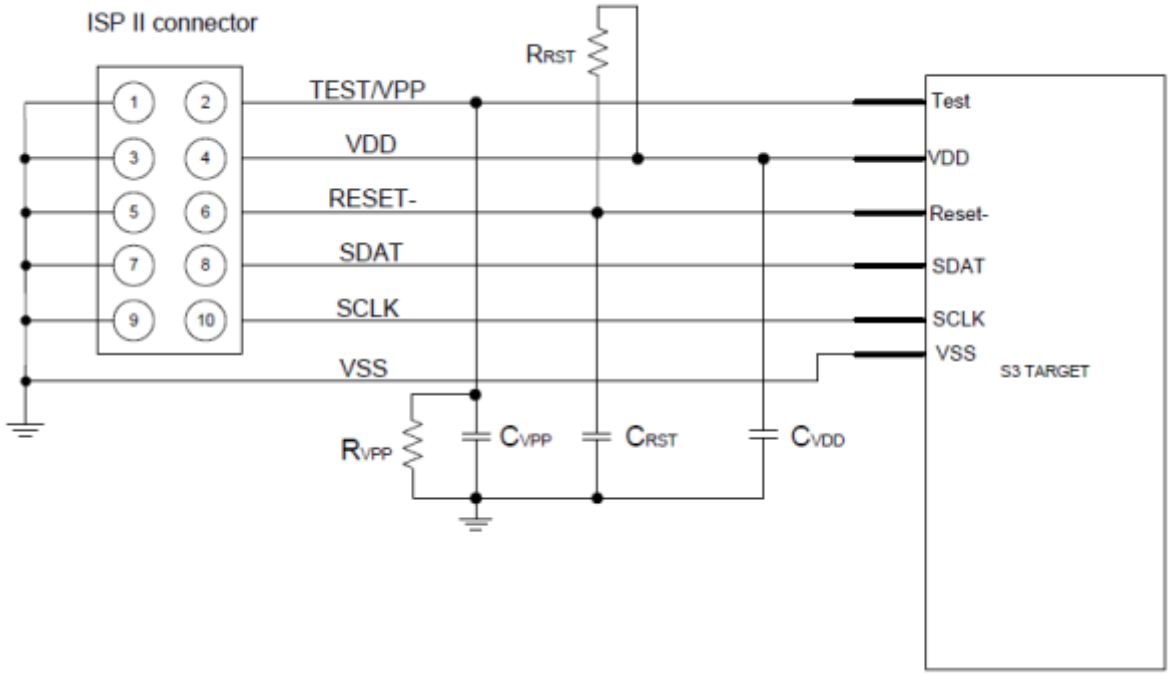

Figure 3. Target ISP II Connector Interface

ISP II Interface

The S3 Flash ISP II interface consists of the following signals:

TEST/V_{PP}. Test Mode signal; when driven High, this signal places the S3 Flash MCU into Test Mode to make on-chip Flash memory available for access by the S3 Flash ISP II. Ensure that you place a 0.1µF capacitor and 10KOhm resistor between this pin and Ground, as shown in Figure 3.

RESET. Input; an active Low signal that resets the S3 Flash MCU.

SDAT. Serial data; bidirectional signal.

SCLK. Serial clock; input for the S3 Flash MCU.

V_{DD}, V_{SS}. Power.

Zilog recommends keeping the traces connecting SCLK and SDAT to the ISP II connector as short as possible.

Figure 4 shows the recommended values for the passive components in the ISP II circuit of Figure 3.

ISP Signal (Pin Number)	Passive Component	Notes
VPP/ Test (2)	C_{VPP} = 0.1 uF R_{VPP} = 10K	If the S3 MCU has a shared VPP/Reset pin, connect the ISP II VPP/ Test pin to the MCU VPP/Test pin.
VDD (4)	C_{VDD} = 0.1 uF	
Reset (6)	C_{RST} = 0.1 uF R_{RST} = 40K	
SDAT (8) SCLK (10)		The ZDS IDE and S3 Flash ISP II cannot be used to debug applications that use the GPIO pins associated with the SCLK & SDAT signals. In this instance, it is only possible to access Flash Memory in the target S3 MCU.
GND (1,3,5,7,9)		Connect all odd number pins of the ISP connector to GND on the target board and S3 MCU

Figure 4. ISP II Circuit Recommended Values

Target Power

During programming and debugging, power to the S3 target can be provided by the development board through the USB connector or an external power source. Alternatively, the S3 Flash ISP II can be configured to supply power to the S3 target. Please note however, that the S3 Flash ISP II is only capable of providing up to 100mA of current at 3.3V. If the target board requires more current, be sure to connect the USB cable and/ or use an external power source.

It is safe to apply additional power when the S3 Flash ISP II is connected to a target board because the S3 Flash ISP II device features a built-in diode on the V_{DD} line.

Ground

Ensure a good ground connection between the S3 Flash MCU and the connector to avoid injection of noise into the SDAT, the SCLK, and especially the TEST/V_{PP} traces during code download and debugging.

Connecting to the Target Board

Observe the following procedure to safely connect the S3 Flash In-System Programmer II (ISP II) to the target board. See Appendix A. Installing the S3 Flash ISP II Driver on page 8 for information on how to install the S3 Flash ISP II drivers.

1. Connect the Mini-B connector of the USB cable to the S3 Flash ISP II.
2. Connect the Type A connector of the same USB cable to the host PC. The yellow LED of the S3 Flash ISP II will illuminate.
3. If you are following this procedure for the first time, ensure that the USB driver has been properly installed.
4. Connect the 10-pin ribbon cable to the S3 Flash ISP II as shown in Figure 5.

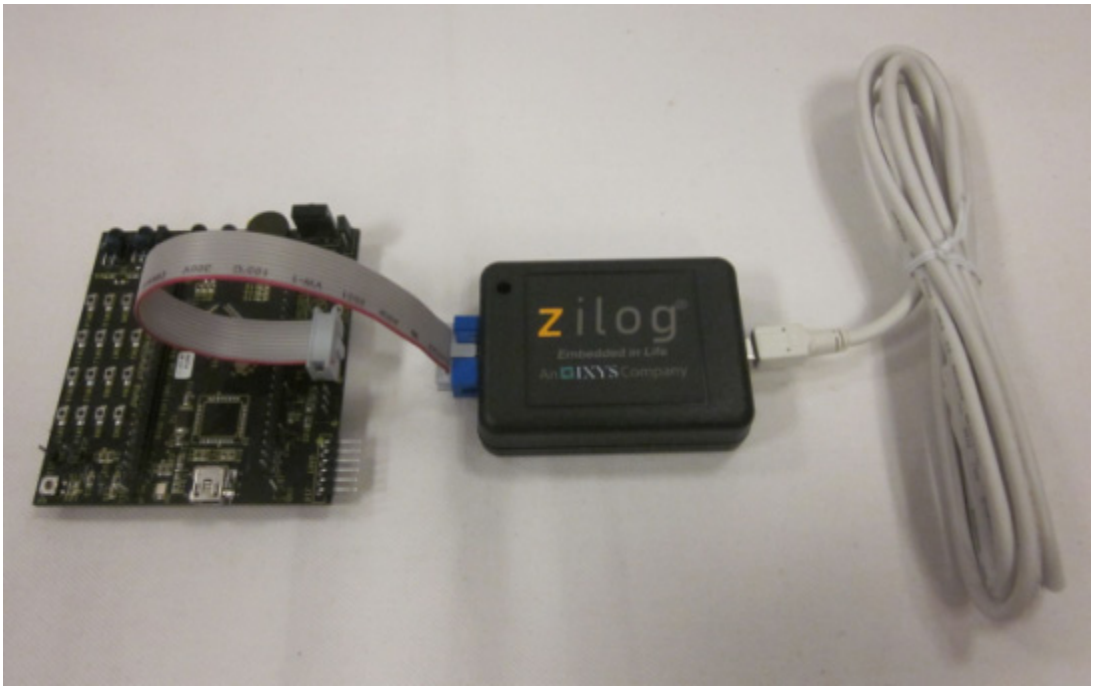

Figure 5. Target Board and S3 Flash ISP II Assembly

5. Connect the other end of the ribbon cable to the target board. Observe that Pin 1 of the target board connector is connected to Pin 1 of the ribbon cable. Pin 1 of the ribbon cable is marked by a red wire on the cable.
6. Apply power to the target board.

Programming of the S3 Family Devices

The S3 Family devices are utilizing two-wires serial interface for programming of the internal flash. Since the interface is synchronous, the requirements for hardware are very restricted. Two most important requirement are:

1. The configuration and components values of programming circuit must match those in the current document.
2. There should be no loose wires connection used while programming is in progress.

Figure 4 shows an example on how to connect the S3 Flash ISP II to the system that contains an S3 Family device. Figure 5 shows an example that is connected to a programming board with a Zero Insertion Force socket.

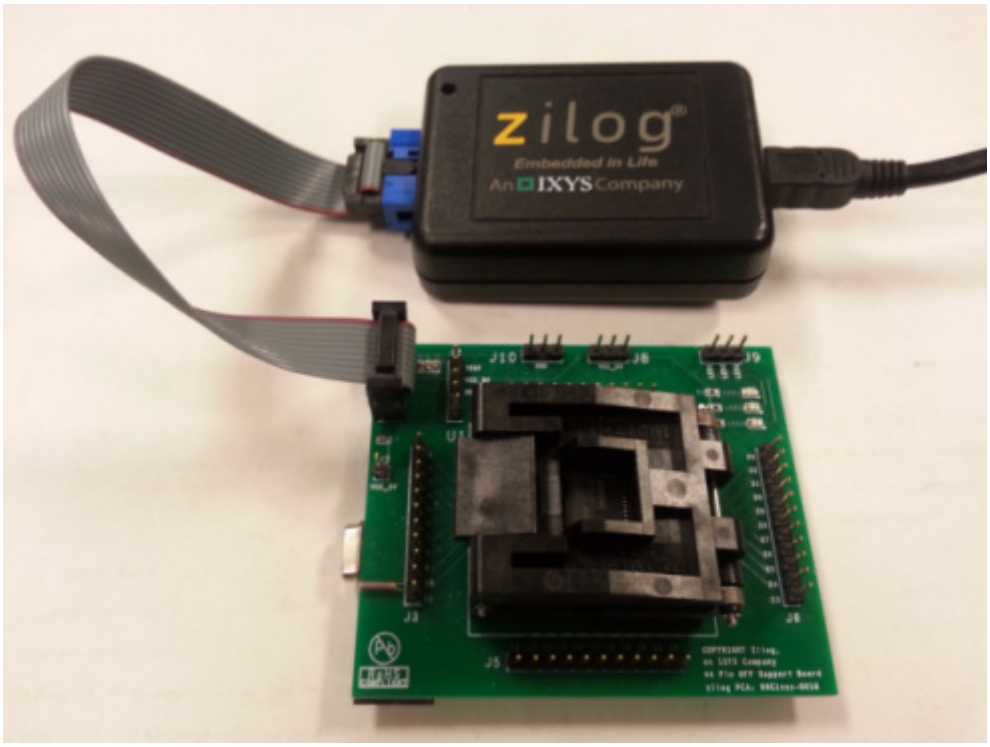

Figure 6. Programming Board with socket and S3 Flash ISP II Assembly

Appendix A. Installing the S3 Flash ISP II Driver

Observe the following procedure to install the S3 Flash ISP II driver on a Windows 7 system. This procedure requires that ZDS II-S3 5.3.0 or later has been installed on the host computer.

1. Click the Windows Start button, select the All Programs menu option and then left-click the Zilog ZDS II - S3 5.3.0 (or later) option. In the list of menu options that appears, right-click on the Install S3 Flash ISP II Drivers and select the Run as administrator option.
2. Windows may display a message asking if you want to allow the progam to make changes to the computer. Click Yes to continue.
3. The Zilog S3 Flash ISP II Driver installation dialog box appears.

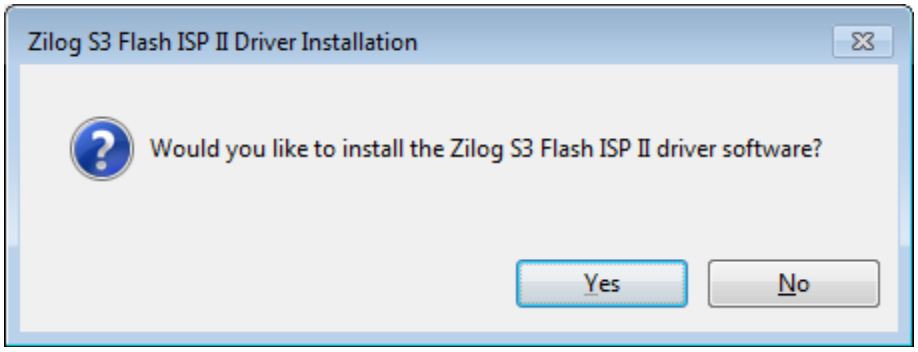

Figure 7. Zilog S3 Flash ISP II Driver Installation Dialog Box

4. Click Yes to continue. The Device Driver installation Wizard will be displayed.

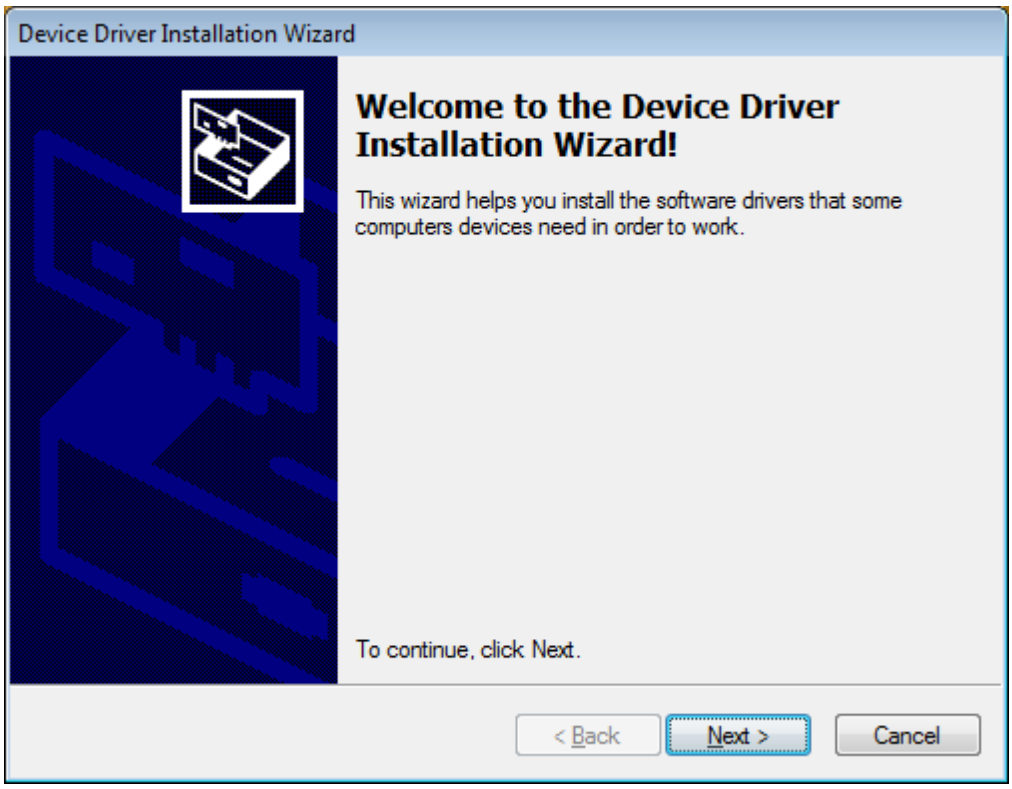

Figure 8. The Device Driver Installation Wizard Dialog Box