CY3207-ISSP

In-System Serial Programming (ISSP) Guide

Doc. # 001-15301 Rev. *E

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1. Introduction

The in-system serial programming (ISSP) programmer programs PSoC® ICs with hex files created with Cypress's PSoC Designer™ software.

1.1 Functionality

The programmer programs a PSoC chip mounted on your PCB, one at a time. It connects to your PCB with a 5-wire cable and to your PC with a USB cable. PDIP devices can be programmed using the ZIF socket provided on the CY3207-ISSP programmer.

To automate programming operation, incorporate the programmer into a PC-based test system. The tester software communicates with the programmer-control software through a command line interface. The ISSP programmer can also be operated manually using the supplied Windows GUI software.

The ISSP functions are as follows:

- **Program** – Programs a hex file into a PSoC device.
- **Verify** – Verifies that data in the PSoC device's flash memory matches data in the selected hex file.
- **Read** – Displays data from a PSoC device's flash memory.
- **Flexible Connections to Target PSoC Device** – Devices can be inserted directly into ISSP, connected via a test fixture, or programmed in-system on a product circuit board.

For more information on ISSP, see application notes AN2014 Design for In-System Serial Programming (ISSP) and AN2026a In-System Serial Programming (ISSP) Protocol.

1.2 Kit Contents

- ISSP programmer
- ISSP software CD-ROM
- 6-foot USB A to B cable
- 2-foot programming cable
- 9-Volt power supply

1.3 ISSP Hardware

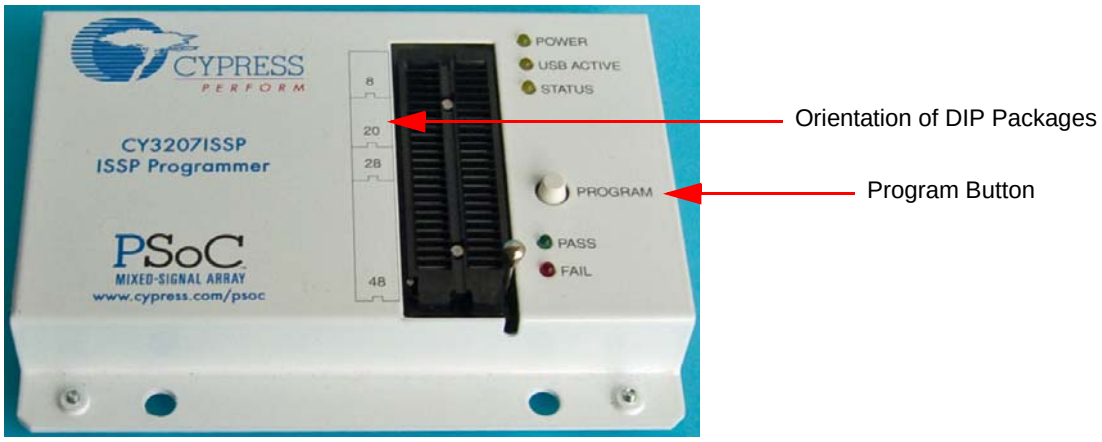
Down the center of the programmer (Figure 1-1) is a graphic showing the orientation of the various DIP packages; pin 1 down and the package justified to the top of the socket.

The ZIF socket accepts DIP packages directly and surface mount packages via adapter boards. Following is a description of the ISSP buttons and LEDs.

1.3.1 Top View of ISSP

- The POWER LED indicates that a valid power source is connected
- The USB ACTIVE LED lights when the USB connection is made
- The STATUS LED lights after the initialization sequence completes
- The PROGRAM button starts a programming sequence
- The PASS and FAIL LEDs report the results of programming and verification sequences

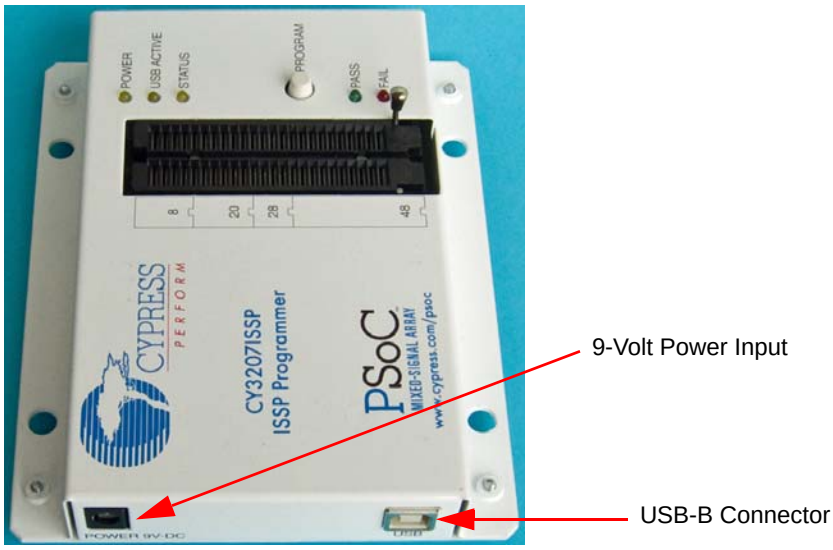
Figure 1-1. Top View of ISSP



1.3.2 Left Side of ISSP

- 9-Volt power connection
- USB connection

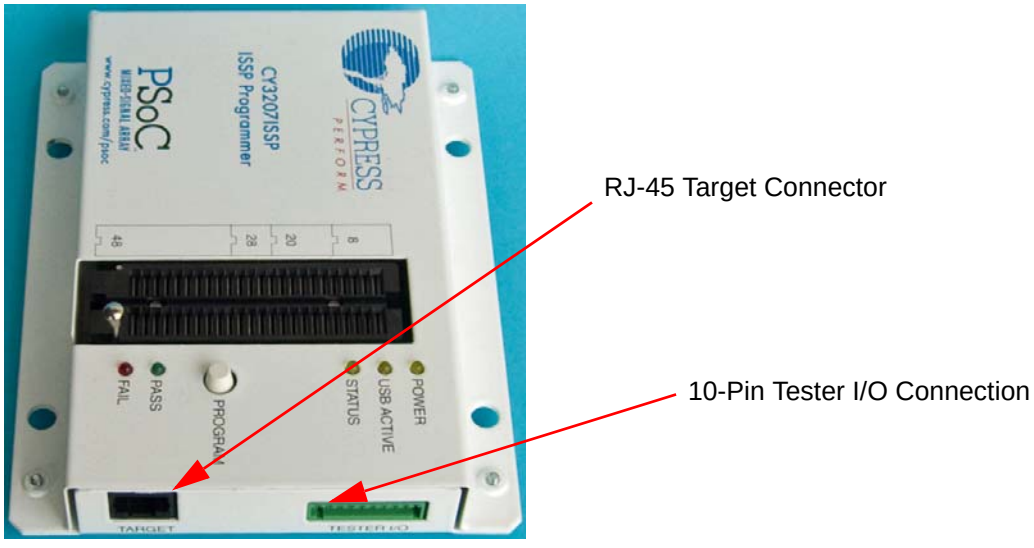
Figure 1-2. Left Side of ISSP



1.3.3 Right Side of ISSP

- RJ-45 target connector
- 10-pin tester I/O connection

Figure 1-3. Right Side of ISSP



1.4 Document Revision History

Table 1-1. Revision History

Revision	PDF Creation Date	Origin of Change	Description of Change
**	June 14, 2007	YMJ	Added supported OS, Vista installation instructions, a caution note for socket programming, a new Standalone Programming section in chapter 3, and a new Tester IO Mating Connector graphic.
*A	February 13, 2008	YMJ	Added the In-System Socket section in Chapter 1. Updated all the pictures to higher resolution photographs. Updated the pinout diagram in Chapter 3.
*B	September 11, 2008	QVR/PYRS	Made changes in Page 15 under the section Standalone Programming.
*C	January 28, 2011	RKPM	Updated CD installation steps (Section 2.2). Added Programming Time section
*D	May 30, 2011	RKPM	Added programming time for CY8C22x45 family in Table 3-2.
*E	February 01, 2012	WBZ	Sunset review. No technical updates.

1.5 Document Conventions

These conventions are used throughout this guide.

Table 1-2. Documentation Conventions

Convention	Usage
`Courier New Size 12`	Displays file locations and source code: `C:\ …cd\icc\`, user entered text.
Italics	Displays file names and reference documentation: *sourcefile.hex*
[**bracketed, bold**]	Displays keyboard commands in procedures: [**Enter**] or [**Ctrl**] [**C**]
Bold → With → Arrows	Represents menu paths: **File → New Project → Clone**
Bold	Displays commands and selections, and icon names in procedures: Click the **Debugger** icon, and then click **Next**.
NOTE:	Displays functionality unique to PSoC Designer or the PSoC device.
CAUTION:	Displays cautions that are important to the subject.

2. Software Installation

The software can be installed from the CD-ROM included in the box or from the Cypress web site at http://www.cypress.com.

Refer to the ISSP Programmer 1.999 Release Notes for system requirements. The release notes can be downloaded from http://www.cypress.com.

2.1 Supported Operating Systems

- Windows 2000
- Windows XP
- Windows Vista (32-bit)
- Windows 7 (32-bit)

2.2 CD Installation

2.2.1 Windows 2000/XP CD Installation

If the ISSP software has been installed previously, you must run the install program twice. The first time uninstalls the previous version. The second run installs the new version. To install the ISSP software, perform the following procedure.

1. Place the CD-ROM in the CD drive. The software installer should start automatically.

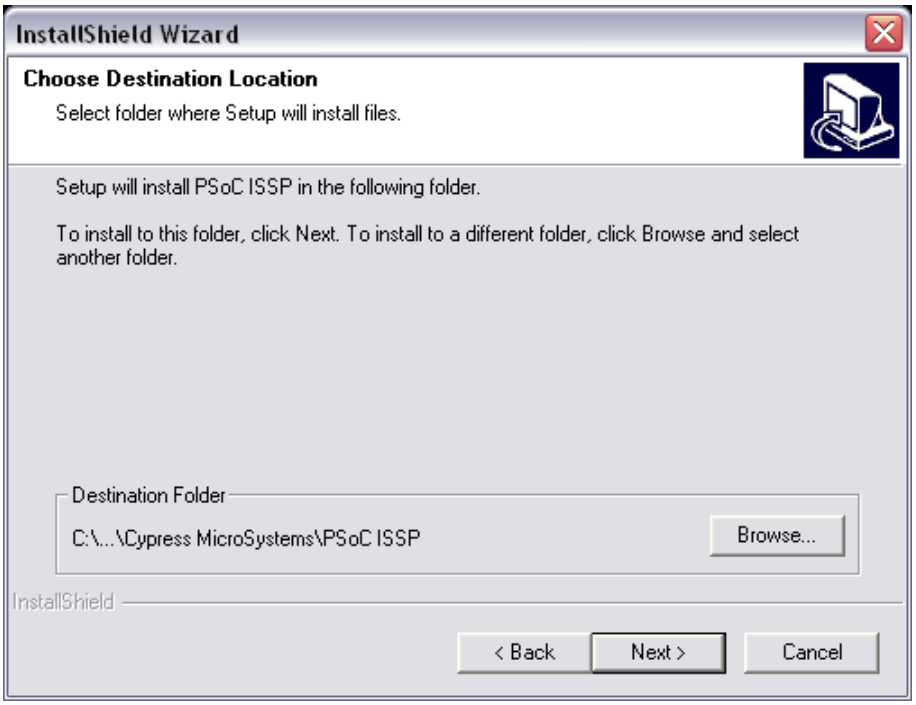
   If the CD-ROM does not run or to run it a second time, browse to **My Computer** and double-click the CD-ROM icon labeled **CY3207ISSP v1.999** or **setup.exe** in the root directory of the CD.
2. Select **Next** to continue with installation.
3. Click **Yes** to accept the license agreement and proceed with installation.

Figure 2-1. License Agreement



4. In the next screen, click **Next** to install necessary program and drivers.
5. The next screen allows you to chose a location where the files will be installed. Click **Next** to select the default location. To select a different location, click the **Browse** button and browse to the required location; click **OK**. Click **Next** to proceed with installation.

Figure 2-2. Select Destination



6. The next screen allows you to select where program icons are added. Select the required folder and click **Next**.
7. A pop-up window displays the message that the driver is unsigned (Figure 2-3). Select **Continue Anyway**.
8. Click **Finish** on the next screen to complete installation.

Figure 2-3. Warning Message for Driver



2.2.2 Windows Vista/Windows 7 (32-bit) CD Installation

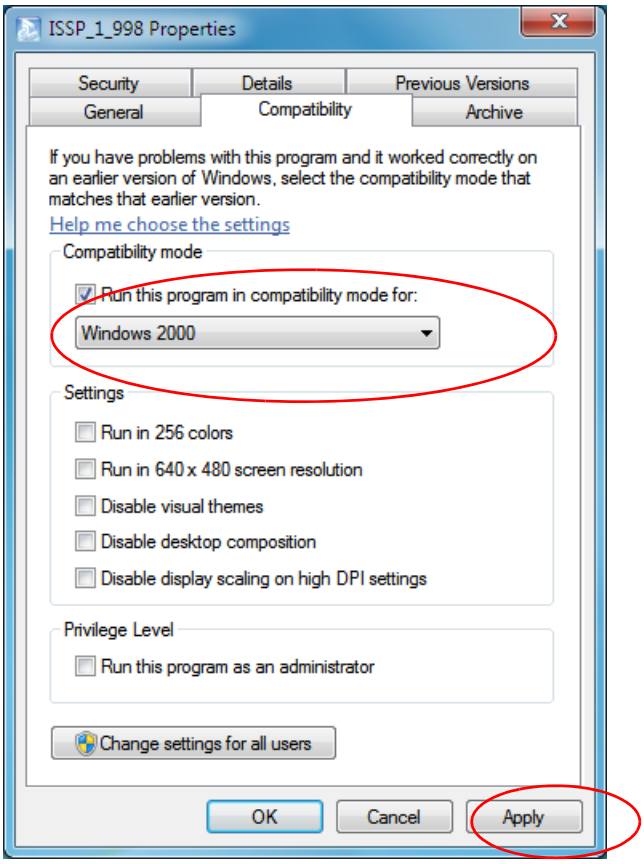
Follow these instructions to install the ISSP software on computers running Windows Vista or Windows 7.

Note ISSP software must be installed and run in Windows 2000 compatibility mode to run in Windows Vista/7.

Do not install from autorun installer; when installer starts automatically upon CD insertion, cancel the installation.

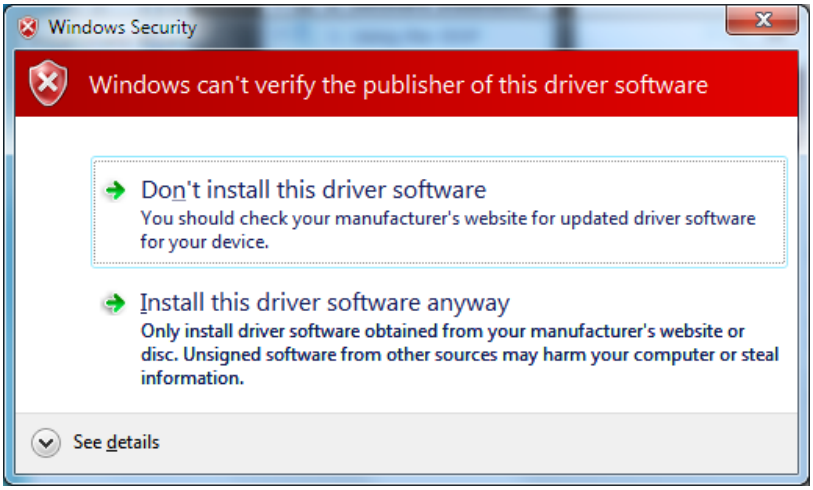
1. Browse to **My Computer** and double-click the CD-ROM icon labeled **CY3207ISSP v1.999**.
2. Right-click **Setup.exe** and select **Properties**.
3. Click the **Compatibility** tab.
4. Check **Run this program in compatibility mode for**.
5. Select **Windows 2000** from the drop-down menu.
6. Click **Apply**.
7. Click **OK**.

Figure 2-4. Properties Window



8. Double-click **Setup.exe** and follow the screen prompts (similar to steps 2 to 6 in Windows 2000/ XP CD Installation on page 9).
9. A pop-up appears with the message that the driver is unsigned. Select **Install this driver software anyway**.

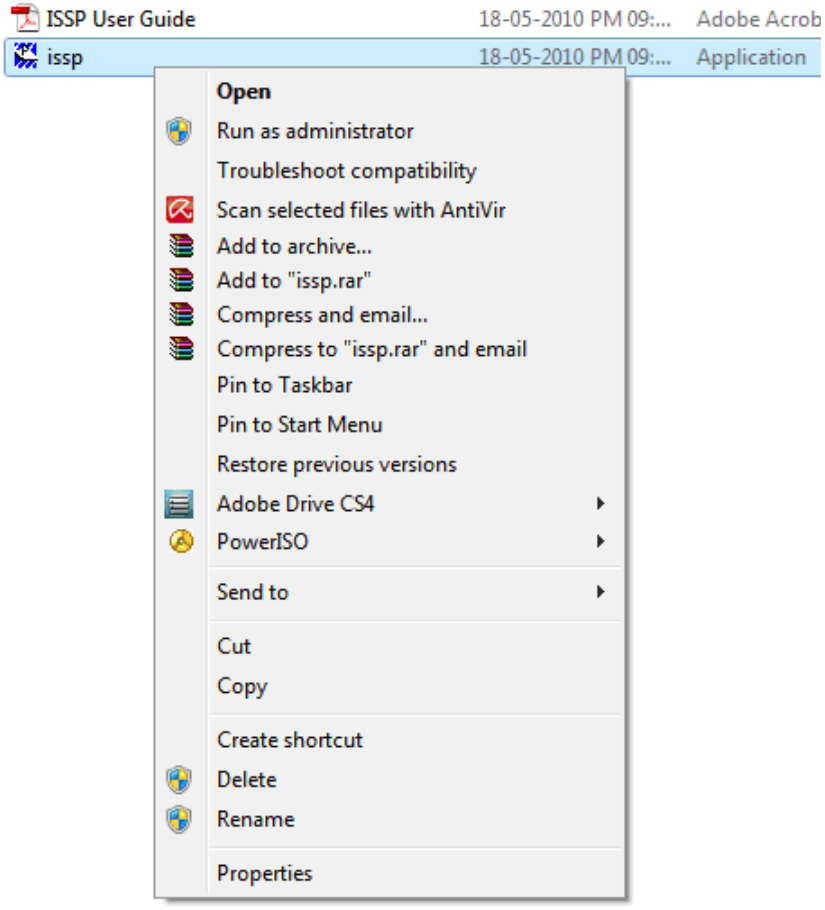
Figure 2-5. Warning Message on Driver



10. Click **Finish** on the next screen to complete installation.

11. After installation, browse to `C:\Programs Files\Cypress MicroSystems\ISSP\`.
12. Right-click **issp.exe** and select **Properties**.

Figure 2-6. Right-click issp.exe



13. Click the **Compatibility** tab. Check **Run this program in compatibility mode for**.
14. Select **Windows 2000** from the drop-down menu.
15. Click **Apply**.
16. Click **OK**.

2.3 Download Installation

To download CY3207-ISSP v1.999, follow this procedure:

1. Go to http://www.cypress.com.
2. Search for 'In-System Serial Programming'
3. Scroll to 'In-System Serial Programming (ISSP) CY3207ISSP Software v1.999 or the latest version and select it.
4. Click on the download icon and unzip package.

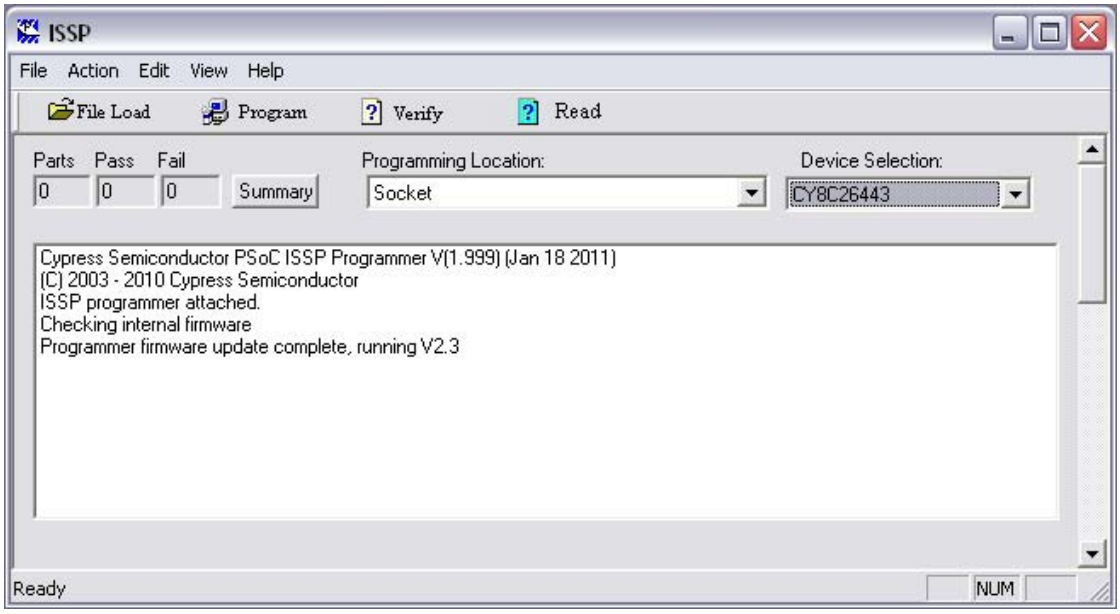
To install the software in Windows 2000/XP, double-click on **setup.exe**; follow instructions in Windows 2000/XP CD Installation on page 9.

To install the software in Windows Vista/Windows7, follow instructions in Windows Vista/Windows 7 (32-bit) CD Installation on page 11.

2.4 Main Screen Operation

After you have installed the ISSP software, the main ISSP window is displayed.

Figure 2-7. Main Window after Startup and Connection of ISSP



The system programs the part and reports the result to the appropriate pass or fail LED. The following is a typical usage sequence.

1. Place a part, CY8C26443-24PI, in the ZIF socket.
2. Select the **File Load** button; browse to the desired hex file and load it.
3. Select **Socket** in the Programming Location drop-down box.
4. Select a **CY8C26443-24PI** in the Device Selection drop-down box.
5. Select the **Program** button.

3. Using the ISSP

Programming PSoC ICs with ISSP is versatile using the available options.

3.1 Socket Programming

All packages are supported by the socket programming method. Surface-mount parts require an adapter. Insert the part to be programmed into the socket on the ISSP programmer. The ISSP supplies power. Execute the following:

1. Select **Socket** in the Programming Location drop-down box.
2. Select the appropriate part number in the Device Selection drop-down box.
3. Load a hex file.
4. Place a part in the socket and click one of the function buttons; **Program**, **Verify**, or **Read**.

CAUTION: Disconnect the programming cable before socket programming; otherwise, programming the device in the socket may fail.

3.2 In-System Programming

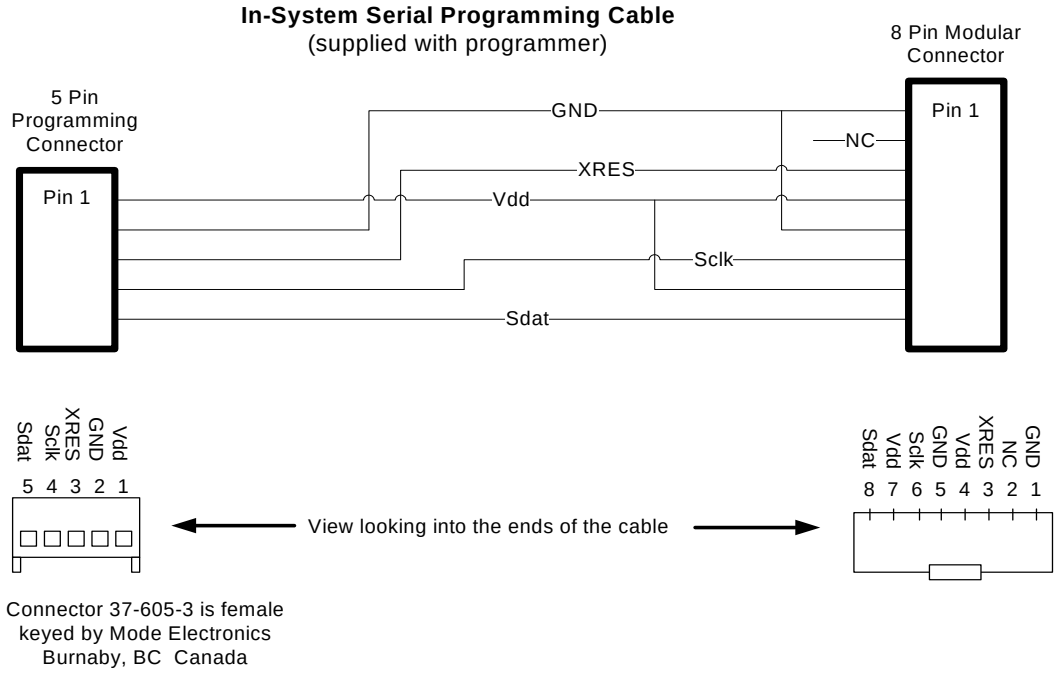
The device to be programmed is installed on a circuit board or held in an external fixture. Vdd power is supplied by the circuit board or external fixture.

3.2.1 ISSP Cable

Connections to target systems are as follows:

- Vdd (Vdd sense line)
- GND (Ground)
- XRES (external reset)
- SCLK (serial clock)
- SDAT (serial data)

Figure 3-1. Cable Schematic



The connector part shown here is 37-605-3 female keyed by Mode Electronics Ltd. Burnaby, BC, Canada: http://www.mode-elec.com/.

3.2.2 Methods

There are two ISSP methods. To control programming, one uses the XRES signal and the other uses the Vdd power-on ramp.

3.2.2.1 In-System – Vdd Stable On

This method is recommended to control the target part. The programmer cycles the XRES high and begins programming. This method does not work on 8-pin parts because they lack the XRES pin.

3.2.2.2 In-System – Vdd Rising Edge

This method works for all packages. The ISSP takes control of the target part when the Vdd is turned on. Each function sequence requires a rising edge on the Vdd. The rising edge triggers the start of the function. When the ISSP is commanded to perform a function, it waits until it senses a rising edge on Vdd.

The sequence and delay between command and power application are important. The graphical interface prompts you to apply power when needed and turn it off when complete. The delay for ISSP software 1.89 and higher is 4.3 seconds.

3.2.2.3 In-System – Socket

In-system programming with current is supplied by the ISSP. This method works for all packages. The ISSP takes control of the target part when programming is initiated and supplies current to the device and the target board. In low current mode, the ISSP supplies 5.0 V at about 30 mA. In high current mode, the ISSP supplies 5.0 V at about 150 mA.

The programmer supplies power and cycles XRES high, and then begins programming. This method does not work on devices with an XRES pin. See the product datasheet to verify that the device does not have an XRES pin.

Current selection is accessed through **Action → Change Current**. Select **30 mA** or **150 mA** current.

CAUTION: Measure the current requirement of the target board before programming. If the current exceeds 150 mA, an external power source is required and ISSP modes Vcc Stable On or Vcc Rising Edge are used.

CAUTION: High currents can damage the ISSP, the device, or both when programming. ISSP units that are damaged from use in high current mode are not eligible for replacement. Make sure the 9-V DC power supply is connected and operational before continuing. Failure to use the 9-V DC power supply can damage the host computer.

3.2.3 Access

The software .exe file runs as a GUI if launched from Windows. If the software is started from a command-line window or directly from another program, it operates in command-line mode.

3.3 Standalone Programming

ISSP software can be used to program supported devices independent (disconnected) of a PC.

Set up the ISSP for Socket or In-Systems Programming mode, as described in Socket Programming on page 15 and In-System Programming on page 15. Independent read and verify functions are not available in the standalone mode. However, the program function in the standalone mode includes verification.

When all parameters are set, programming mode is set, the device is selected, and the hex file is loaded, disconnect the ISSP from the PC. All the settings are saved into the internal flash memory of the ISSP.

Power the ISSP by the 9-V power supply. A device can then be placed into the socket, or the ISSP can be connected via the programming cable to a PCB or fixture.

For socket programming, place a device in the socket and press the white button on top of the ISSP. The green LED signals a passing programming sequence and the red LED signals a failed programming sequence.

3.4 DOS Command Line Controls

A DOS batch file called *issp.bat* included on the CD-ROM is a multifunctional file that can be used to view the return code from an ISSP call (among other things). Commands can also be typed directly on the command line.

The following is an ISSP command, followed by a description of each field:

```
issp [cy8cxxxxx] [example.hex] [-p|-v] [-s|-n]
```

- ISSP is the call to the PSoC programmer executable. Precede it with a file path if *issp.exe* is not in the current directory.
- cy8cxxxxx is the device part number you wish to program (upper or lower case).
- *example.hex* is the hex file to program into the part or to verify the programmed part against.

Note Ensure that the hex file is available in the directory where *issp.exe* is located; or add the location of the hex file in the command.

Function options:

- -p invokes the Program function (one function equals Erase, Program, Verify, and Protect).
- -v invokes the Verify function.

Location options:

- -s invokes Socket Programming.
- -n invokes In-System Vdd Stable On Programming.

Specific command examples:

```
issp cy8c26443 example.hex -p -s
```

Programs *example.hex* into the device in the socket.

```
issp cy8c26443 example.hex -v -s
issp cy8c26443 example.hex -p -n
```

Programs *example.hex* into the device in the system connected by the programming cable. The Vdd is stable during the whole programming sequence.

These DOS commands return ‘0’ if the function is successful and a negative number if the function fails.

3.5 Tester I/O Connector

This connector is used to control the ISSP with logic level signals. The hex file and programming settings are loaded while the USB is connected to the PC. After the USB is disconnected, the ISSP can be powered by the 9-V supply and controlled through the Tester I/O connector. See Figure 3-2 for a description of the pins in the Tester I/O connector.

The mating connector for connecting to the ISSP Tester I/O is manufactured by Phoenix Contact. The part number is 1881406 FK-MC 0.5/10-ST-2.5 and is available from Digi-Key.

Figure 3-2. Tester I/O Connector

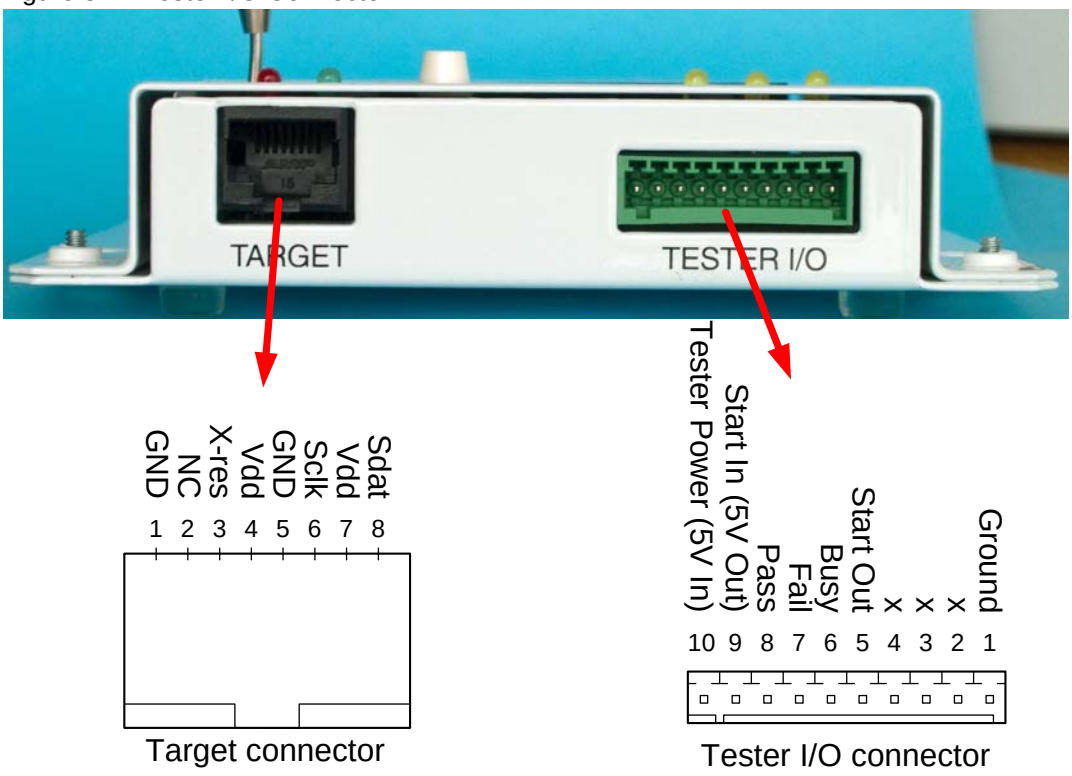


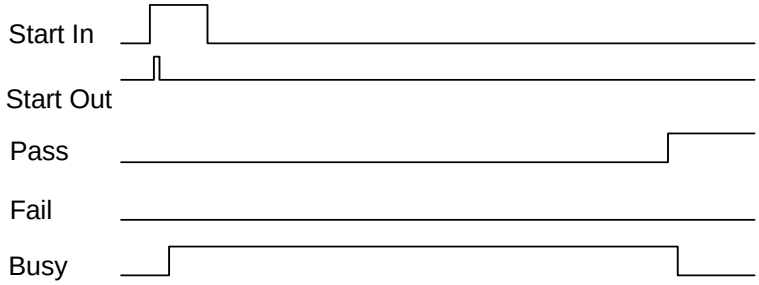
Table 3-1. I/O Connector Pinouts

Pin	Name	Type	Description
1	Ground	Input	User connects to system ground
2	X	N/A	
3	X	N/A	
4	X	N/A	
5	Start Out	Output	Output from ISSP
6	Busy	Output	Output from ISSP
7	Fail	Output	Output from ISSP
8	Pass	Output	Output from ISSP
9	Start In	Input	User supplies 5 V input signal, see Figure 3-3
10	Tester Power	Input	User supplies high logic voltage (5 V)

3.6 Tester I/O Signaling

Connect Pin 1 to the test systems ground. Connect Pin 10 to a DC level equal to the testers logic high-level output. Pin 10 controls a level shifter between the ISSP and the tester. Figure 3-3 shows the Tester I/O signals during a programming sequence. The tester drives the “Start in” signal. The ISSP drives the Pass, Fail, and Busy lines.

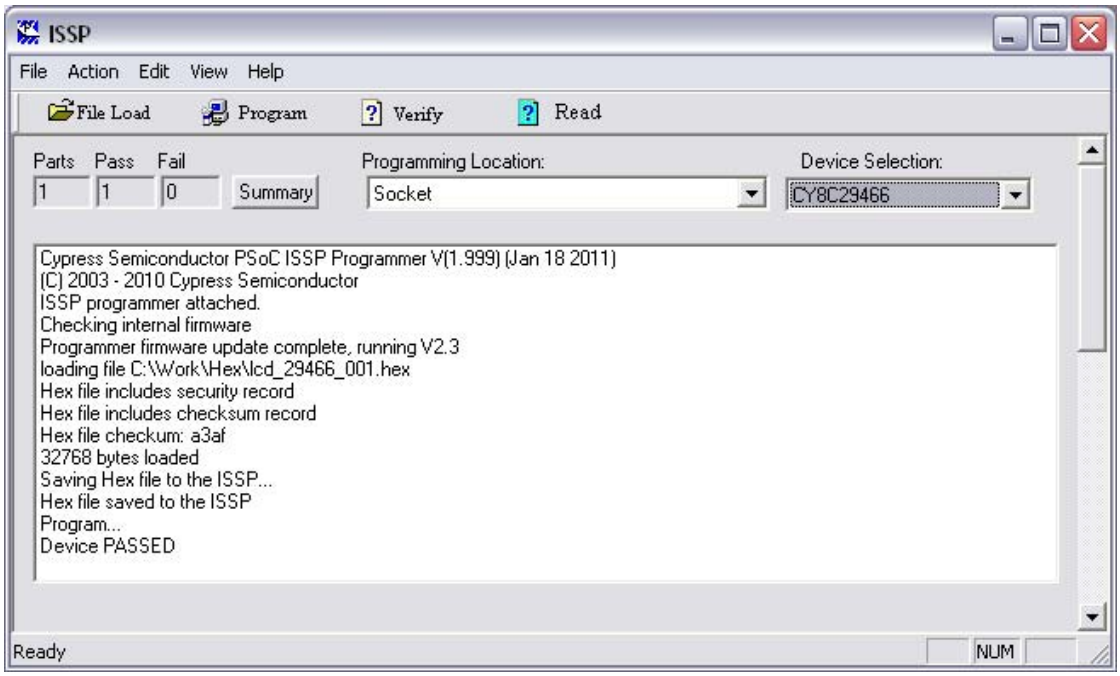
Figure 3-3. Tester I/O Signals



3.7 Test Counters

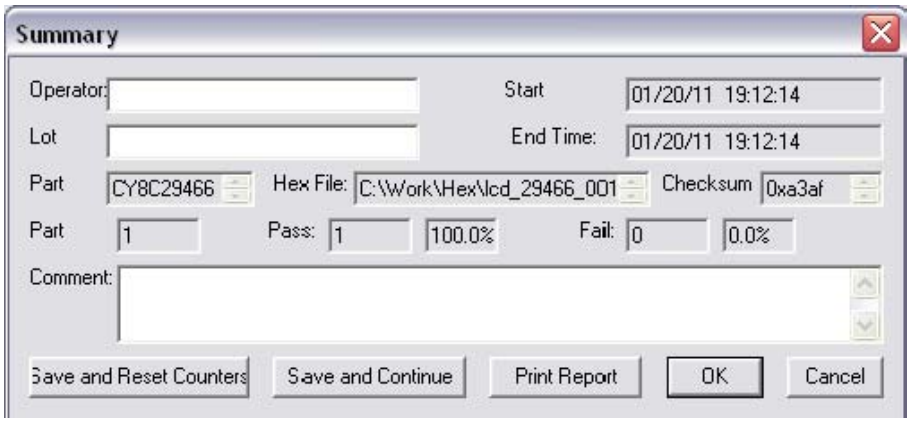
A new feature in ISSP 1.80 and later versions is the ability to automatically keep track of the parts that are programmed. This feature is only available while the ISSP is connected to the PC via the USB interface. The total number of parts programmed and the number of parts that passed or failed is displayed in the window.

Figure 3-4. Text Counters Window



For additional information, click the **Summary** button to bring up the following dialog.

Figure 3-5. Summary Dialog Box



This displays the time that the first and last parts were programmed, the part number, hex file, checksum, and pass/fail counts with percentages.

Note that if more than one part number is programmed or if more than one hex file is used, the number of passed and failed parts for each configuration is recorded, but not displayed in this dialog box. To obtain this detailed data, print the report or save it to a log file. Any information entered in the Operator, Lot#, or Comment field is included in the printout and the log file.

To reset the counters, click the **Save and Reset Counters** button from the Summary dialog. The counters are not reset until the data is saved successfully. To save an intermediate copy of the data without resetting the counters, select **Save and Continue**. Clicking **OK** saves what is entered in the Operator, Lot#, and Comment fields. This ensures that they are filled the next time the Summary dialog is opened, but the data is not written to the disk or printed. **Cancel** exits the dialog and discards any changes made to the Operator, Lot#, or Comment fields.

3.8 Programming Time

Table 3-2 illustrates the timing characteristics of the CY3207-ISSP Programmer for 4-k, 8-k, 16-k, and 32-k flash sizes. The devices are tested using Reset acquire mode with external power. A program time includes Acquire, Erase, Write, and Verify operations.

Table 3-2. Program Time

Family	Flash Size (k)	Program Time (s)	
		Standalone	GUI
CY8C24x23A	4	7.7	8.5
CY8C21x45	8	10.3	12.3
CY8C21x23	4	7.7	8.8
CY8C21x34	8	9.9	10.4
CY8C22x45	16	23.6	20.1
CY8C24x94	16	19.3	23.4
CY8C27x43	16	12.0	13.5
CY8C29x66	32	39.3	46.0
CY8CTMA3xxE	16	6.4	12.6
CY8CTMA3xxE	32	12.5	23.0
CY8C20xx6	8	9.0	7.1
CY8C20xx6	16	13.4	15.2
CY8C20xx6	32	25.6	28.0