



CY3207ISSP

## In-System Serial Programming (ISSP) Guide

Spec. # 001-15301 Rev. \*\*

Cypress Semiconductor  
198 Champion Court  
San Jose, CA 95134-1709  
Phone (USA): 800.858.1810  
Phone (Intl): 408.943.2600  
<http://www.cypress.com>

© Cypress Semiconductor Corporation, 2007. The information contained herein is subject to change without notice. Cypress Semiconductor Corporation assumes no responsibility for the use of any circuitry other than circuitry embodied in a Cypress product. Nor does it convey or imply any license under patent or other rights. Cypress products are not warranted nor intended to be used for medical, life support, life saving, critical control or safety applications, unless pursuant to an express written agreement with Cypress. Furthermore, Cypress does not authorize its products for use as critical components in life-support systems where a malfunction or failure may reasonably be expected to result in significant injury to the user. The inclusion of Cypress products in life-support systems application implies that the manufacturer assumes all risk of such use and in doing so indemnifies Cypress against all charges.

PSoC Designer™, Programmable System-on-Chip™, and PSoC Express™ are trademarks and PSoC® is a registered trademark of Cypress Semiconductor Corp. All other trademarks or registered trademarks referenced herein are property of the respective corporations.

Any Source Code (software and/or firmware) is owned by Cypress Semiconductor Corporation (Cypress) and is protected by and subject to worldwide patent protection (United States and foreign), United States copyright laws and international treaty provisions. Cypress hereby grants to licensee a personal, non-exclusive, non-transferable license to copy, use, modify, create derivative works of, and compile the Cypress Source Code and derivative works for the sole purpose of creating custom software and or firmware in support of licensee product to be used only in conjunction with a Cypress integrated circuit as specified in the applicable agreement. Any reproduction, modification, translation, compilation, or representation of this Source Code except as specified above is prohibited without the express written permission of Cypress.

Disclaimer: CYPRESS MAKES NO WARRANTY OF ANY KIND, EXPRESS OR IMPLIED, WITH REGARD TO THIS MATERIAL, INCLUDING, BUT NOT LIMITED TO, THE IMPLIED WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE. Cypress reserves the right to make changes without further notice to the materials described herein. Cypress does not assume any liability arising out of the application or use of any product or circuit described herein. Cypress does not authorize its products for use as critical components in life-support systems where a malfunction or failure may reasonably be expected to result in significant injury to the user. The inclusion of Cypress' product in a life-support systems application implies that the manufacturer assumes all risk of such use and in doing so indemnifies Cypress against all charges.

Use may be limited by and subject to the applicable Cypress software license agreement.

# Contents



|                                                          |           |
|----------------------------------------------------------|-----------|
| <b>1. Introduction</b>                                   | <b>5</b>  |
| 1.1 Functionality .....                                  | 5         |
| 1.2 Kit Contents .....                                   | 5         |
| 1.3 ISSP Hardware .....                                  | 6         |
| 1.4 Conventions .....                                    | 7         |
| 1.5 Document Revision History .....                      | 8         |
| <b>2. Software Installation</b>                          | <b>9</b>  |
| 2.1 Supported Operating Systems .....                    | 9         |
| 2.2 CD Installation .....                                | 9         |
| 2.2.1 Windows 2000/XP CD Installation .....              | 9         |
| 2.2.2 Windows Vista (32 Bit) CD Installation .....       | 9         |
| 2.3 Download Installation .....                          | 10        |
| 2.3.1 Windows 2000/XP Download Installation .....        | 10        |
| 2.3.2 Windows Vista (32 Bit) Download Installation ..... | 10        |
| 2.4 Main Screen Operation .....                          | 11        |
| <b>3. Using the ISSP</b>                                 | <b>13</b> |
| 3.1 Socket Programming .....                             | 13        |
| 3.2 In-System Programming .....                          | 13        |
| 3.2.1 ISSP Cable .....                                   | 13        |
| 3.2.2 Methods .....                                      | 14        |
| 3.2.2.1 In-System – Vdd Stable On .....                  | 14        |
| 3.2.2.2 In-System – Vdd Rising Edge .....                | 14        |
| 3.2.3 Access .....                                       | 14        |
| 3.3 Standalone Programming .....                         | 15        |
| 3.4 DOS Command Line Controls .....                      | 15        |
| 3.5 Tester I/O Connector .....                           | 16        |
| 3.6 Tester I/O Signaling .....                           | 17        |
| 3.7 Test Counters .....                                  | 17        |



# 1. Introduction



The In-System Serial Programming (ISSP) programmer programs PSoC ICs with HEX files created with Cypress' 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.

Programming operation can be automated by incorporating 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 the data in a PSoC device's Flash memory matches the data in the selected HEX file.
- **Read** – Displays the 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 In-System Serial Programming, refer to Application Note AN2014 “Design for In-System Serial Programming (ISSP)” and AN2026 “In-System Serial Programming (ISSP) Protocol.” Both are available at <http://www.cypress.com/>.

## 1.2 Kit Contents

- The ISSP Programmer
- ISSP Software CD-ROM
- 6-Foot USB Cable
- 2-Foot Programming Cable
- 9-Volt Power Supply

## 1.3 ISSP Hardware

Figure 1-1. Top View of the ISSP



Down the center of the programmer 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 the DIP packages directly and surface mount packages via adapter boards. Following is a description of the ISSP buttons and LEDs:

- Along the right side of the programmer, the POWER LED indicates a valid power source is connected.
- The USB ACTIVE LED lights when the USB connection is made.
- The STATUS LED is lit 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 1-2. Left Side View of the ISSP



- 9-Volt Power Connection
- USB Connection

Figure 1-3. Right Side View of the ISSP



- RJ-45 Target Connector
- 10-Pin Tester I/O Connection

## 1.4 Conventions

These conventions are used throughout this guide.

Table 1-1. Documentation Conventions

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

## 1.5 Document Revision History

Table 1-2. Revision History

| Document Title: User ISSP User Guide |         |              |                  |                                                                                                                                                                                                                                          |
|--------------------------------------|---------|--------------|------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Document Number: 001-15301           |         |              |                  |                                                                                                                                                                                                                                          |
| Revision                             | ECN#    | Issue Date   | Origin of Change | Description of Change                                                                                                                                                                                                                    |
| **                                   | 1120745 | June 1, 2007 | SFVTMP3          | Added supported OS, Vista installation instructions, a caution note for socket programming, a new Standalone Programming section in chapter 3, and a new Tester I/O Mating Connector graphic The revision number for this release is **. |
|                                      |         |              |                  |                                                                                                                                                                                                                                          |
| <b>Distribution:</b> External/Public |         |              |                  |                                                                                                                                                                                                                                          |
| <b>Posting:</b> None                 |         |              |                  |                                                                                                                                                                                                                                          |

## 2. Software Installation



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

### 2.1 Supported Operating Systems

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

### 2.2 CD Installation

#### 2.2.1 Windows 2000/XP CD Installation

If the ISSP software has previously been installed, 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 ISSP 1.80.
2. Follow the on-screen instructions to complete the installation.

#### 2.2.2 Windows Vista (32 Bit) CD Installation

Follow these instructions for installing ISSP Software on computers running Windows Vista.

**Note:** ISSP Software must be installed in Windows 2000 compatibility mode, and run in Windows 2000 compatibility mode.

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

- a. Browse to My Computer and double-click the CD-ROM icon labeled ISSP 1.89.
- b. Right-click on **Setup**, and select **Properties**.
- c. Click the **Compatibility** tab.
- d. Check **Run this program in compatibility mode for**.
- e. Select **Windows 2000** from the drop down menu.
- f. Click **Apply**
- g. Click **OK**.
- h. Double-click on **Setup** and follow on screen prompts.
- i. Vista will warn that drivers are unsigned; click **OK**.
- j. Once installed browse to `c:\Programs Files\Cypress Microsystems\ISSP\`

- k. Right-click on **issp.exe** and select **Properties**.
- l. Click the **Compatibilty** tab.
- m. Check **Run this program in compatibility mode for**.
- n. Select **Windows 2000** from the drop down menu.
- o. Click **Apply**.
- p. Click **OK**.

## 2.3 Download Installation

### 2.3.1 Windows 2000/XP Download Installation

If the ISSP software has previously been installed 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. Browse to [www.cypress.com](http://www.cypress.com).
- 2. Click on the Software and Drivers entry under the Design Resources heading.
- 3. Select the PSoC Mixed-Signal Controllers in the Product Group drop down box and click Apply Filters.
- 4. Scroll down to In-System Serial Programming (ISSP) CY3207ISSP software and select it.
- 5. Click on the download icon, and unzip and run the install package.

### 2.3.2 Windows Vista (32 Bit) Download Installation

**Note:** ISSP Software must be installed in Windows 2000 compatibility mode, and run in Windows 2000 compatibility mode. Do not install from autorun installer. Cancel the installation when CD-ROM is inserted and the installer starts automatically.

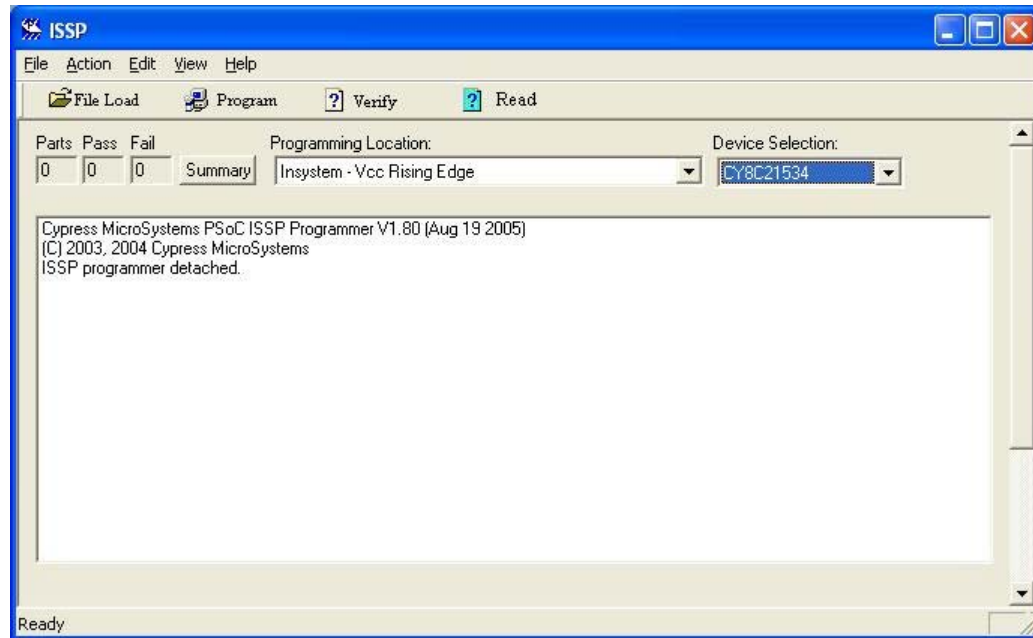
To install ISSP on a Windows Vista system, browse to location where you saved the download, and then:

- a. Right-click on **Download**, and select **Properties**.
- b. Click the **Compatibilty** tab.
- c. Check **Run this program in compatibility mode for**.
- d. Select **Windows 2000** from the drop down menu.
- e. Click **Apply**.
- f. Click **OK**.
- g. Double-click **Setup** and follow on screen prompts.
- h. Vista will warn that drivers are unsigned; click **OK**.
- i. Once installed, browse to `c:\Programs Files\Cypress Microsystems\ISSP\`
- j. Right-click on **issp.exe**, and select **Properties**.
- k. Click the **Compatibilty** tab.
- l. Check **Run in compatibility mode**.
- m. Select **Windows 2000** from the drop down menu.
- n. Click **Apply**.
- o. Click **OK**.

## 2.4 Main Screen Operation

Once you have installed the ISSP software, the Main ISSP window is available for viewing.

Figure 2-1. 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 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. The part to be programmed is inserted into the Socket on the ISSP programmer. Power is supplied by the ISSP. 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 on one of the function buttons; Program, Verify or Read.

**CAUTION:** Disconnect the programming cable before socket programming or programming the device in the socket may fail.

### 3.2 In-System Programming

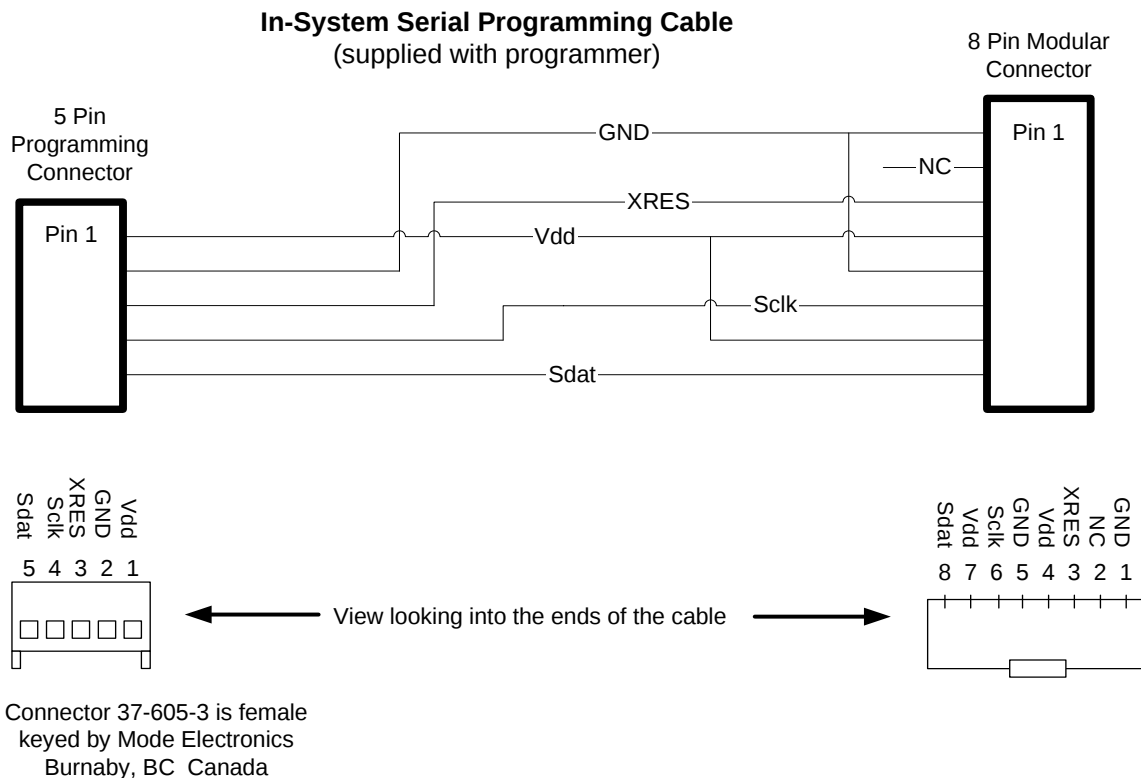
The device to be programmed is installed on a circuit board or held in an external fixture. Vdd power is supplied by the circuit board or external fixture.

#### 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. One uses the XRES signal to control programming and the other uses the Vdd power-on ramp to control programming.

#### 3.2.2.1 *In-System – Vdd Stable On*

This is the recommended method of controlling the target part. The programmer cycles 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 will prompt the user to apply power when needed and to turn it off when done. The delay for ISSP Software 1.89 and higher is 4.3 seconds.

### 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.

Setup the ISSP for programming mode Socket or In-Systems as described in [Socket Programming on page 13](#) and [In-System Programming on page 13](#). The read and verify functions are not available in standalone mode.

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

The ISSP must then be powered by the supplied 9V 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 will signal a passing programming sequence, and a red LED will signal a failed programming sequence.

### 3.4 DOS Command Line Controls

A DOS batch file called `issp.bat` included on the CD-ROM is a multi-functional 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.

An ISSP command, followed by a description of each field, is presented below.

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

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
- `-i` invokes In-System Vdd Rising Edge 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
```

Verifies the device in the socket against `example.hex`.

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

Programs *example.hex* into the device in the system connected by the programming cable. The Vdd must rise after 4 seconds, but no later than 20 seconds after the command is executed.

```
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.

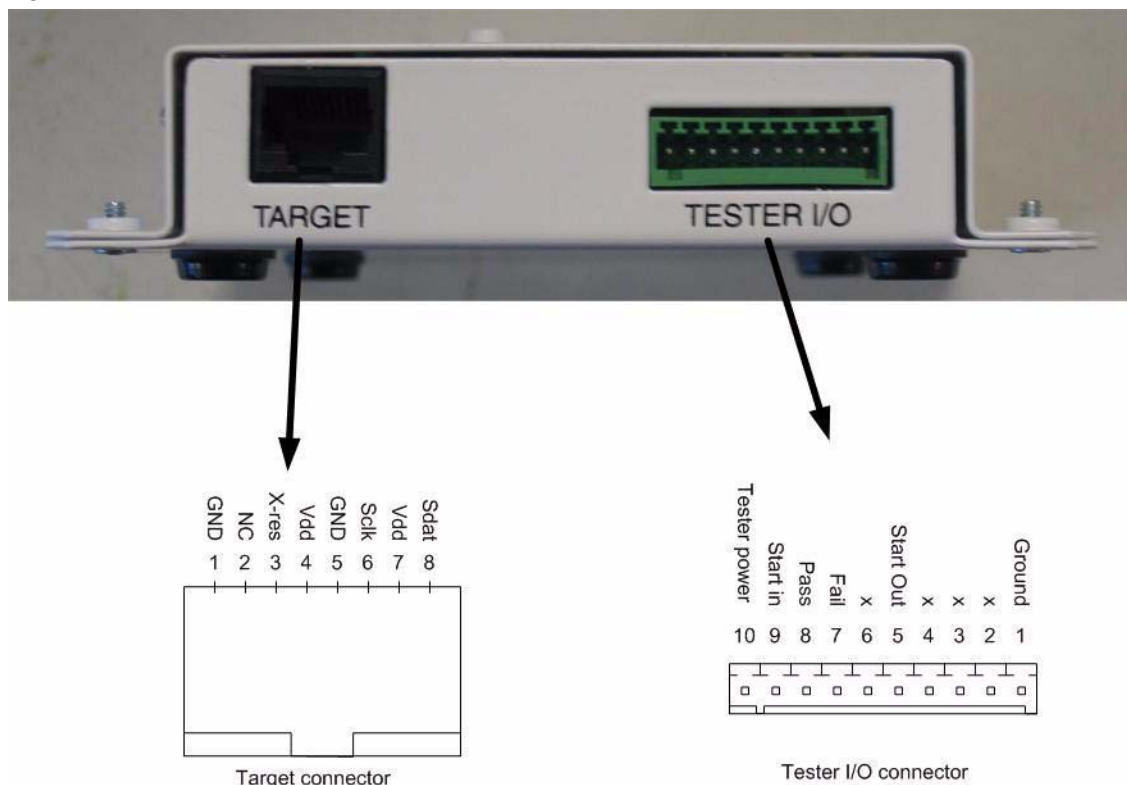
These DOS commands return '0' if the function is successful and a negative number if the function fails.

### 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 volt 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 Contactor. The part number is [1881406 FK-MC 0,5/10-ST-2,5](#)

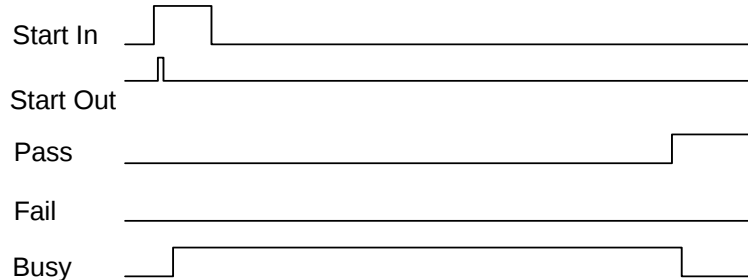
Figure 3-2. Tester IO Connector



## 3.6 Tester I/O Signaling

Pin 1 must be connected to the test systems ground. Pin 10 must be connected 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.

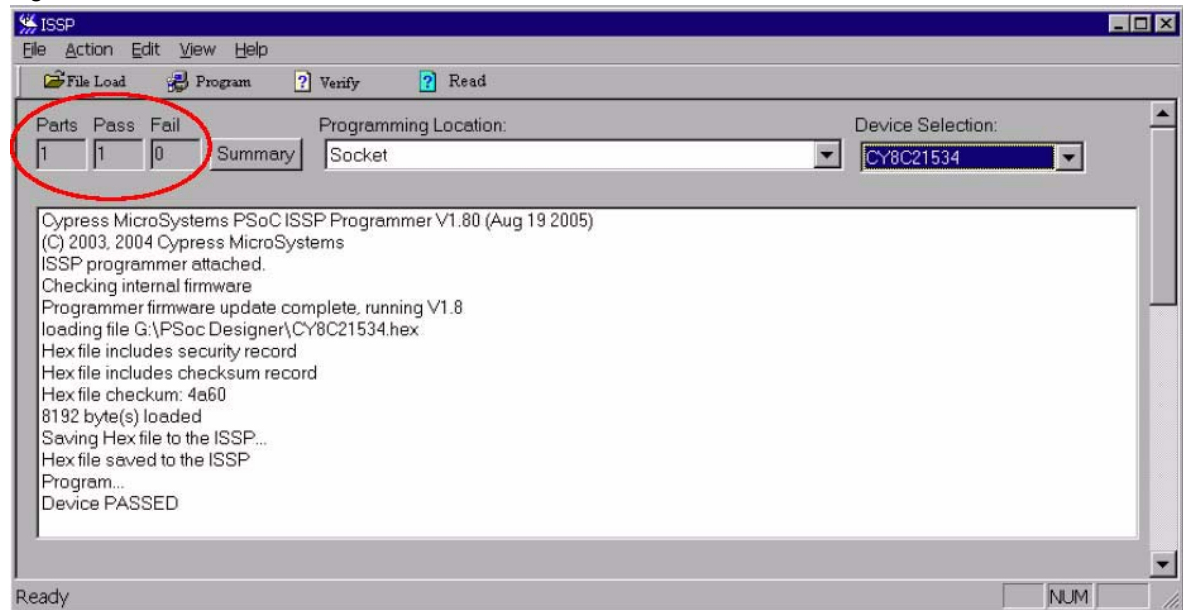
Figure 3-3. Tester I/O Signals



## 3.7 Test Counters

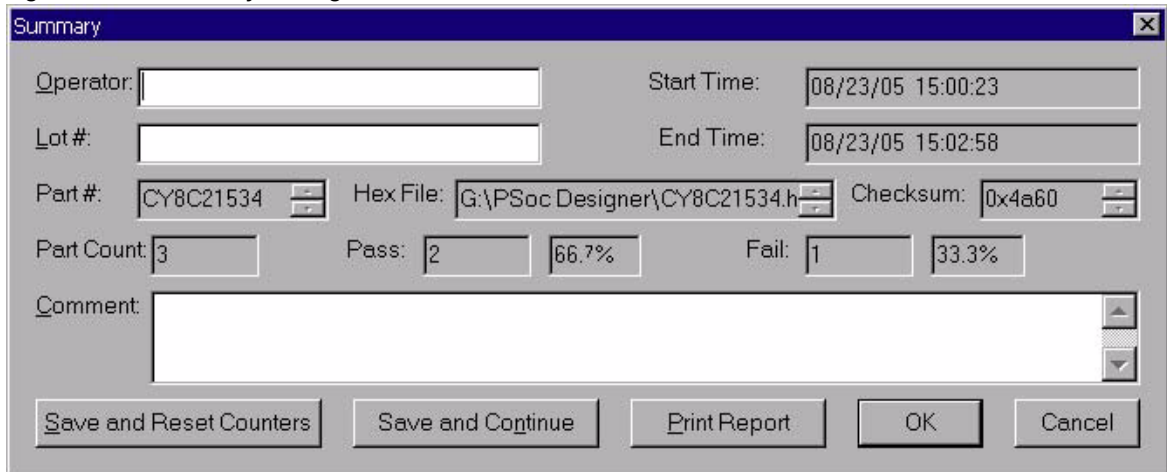
A new feature in ISSP version 1.80 and later is the ability to automatically keep track of the parts that are programmed. This feature is only available while the ISSP is connected to the PC via the USB interface. The total number of parts programmed, as well as the number of parts that passed or failed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

Figure 3-4. Text Counters Window



To obtain additional information, click the Summary button to bring up the following dialog:

Figure 3-5. Summary Dialog Box



The Summary Dialog Box is a window with a title bar labeled 'Summary'. It contains the following fields and controls:

- Operator:** A text input field.
- Start Time:** A text input field showing '08/23/05 15:00:23'.
- Lot#:** A text input field.
- End Time:** A text input field showing '08/23/05 15:02:58'.
- Part #:** A text input field showing 'CY8C21534'.
- Hex File:** A text input field showing 'G:\PSoc Designer\CY8C21534.h'.
- Checksum:** A text input field showing '0x4a60'.
- Part Count:** A text input field showing '3'.
- Pass:** A text input field showing '2'.
- Fail:** A text input field showing '1'.
- Percentages:** Two text input fields showing '66.7%' and '33.3%'.
- Comment:** A large text area with a vertical scrollbar.
- Buttons:** Five buttons at the bottom: 'Save and Reset Counters', 'Save and Continue', 'Print Report', 'OK', and 'Cancel'.

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 was programmed, or if more than one hex file was 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 will be 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 will not be reset until the data has been saved successfully. To save an intermediate copy of the data without resetting the counters, select Save and Continue. Clicking OK will save what has been entered in the Operator, Lot# and Comment fields so that they will be filled in the next time the Summary dialog is opened, but the data will not be written to disk or printed. Cancel exits the dialog and discards any changes made to the Operator, Lot# or Comment fields.