
Actel® FlashPro v3.1

User's Guide



Windows®

Actel Corporation, Sunnyvale, CA 94086

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Introduction

Thank you for selecting the FlashPro Programming System. This *User's Guide* is designed to help you take full advantage of FlashPro's capabilities.

Document Organization

This guide provides detailed information about FlashPro. Step-by-step instructions for using FlashPro on Windows are included in this guide. This guide is based on FlashPro version 3.1.

The FlashPro User's Guide is divided into the following chapters:

Chapter 1 - "Getting Started" explains how to install the hardware and software for FlashPro and FlashPro Lite. Details about the graphical user interface are also included.

Chapter 2 - "Using FlashPro" describes how to use the FlashPro software to program ProASIC and ProASIC ^{PLUS} devices.

Chapter 3- "Using FlashPro Lite" describes how to use FlashPro Lite to program ProASIC ^{PLUS} devices.

Appendix A - "Error Messages & Trouble Shooting Tips" contains workarounds for error messages and warnings.

Appendix B - "Software Freeze" describes the steps to take if the FlashPro software crashes.

Appendix C - "Product Support" describes our support services.

Document Assumptions

The information in this manual is based on the following assumptions:

1. You are familiar with the Actel Designer software.
2. You are familiar with FPGA architecture and FPGA design software.

Platform Support

Supported platforms for the PC include:

- Win98
- Win2000
- WinXP
- WinNT 4.0 SP6

Actel Application Notes

Application Notes are available at our web site, <http://www.actel.com/products/tools/prog.asp>.

Several Application Notes are specifically helpful to programming ProASIC and ProASIC^{PLUS} devices.

- *Programming Actel Devices*
- *Implementation of Security in Actel's ProASIC and ProASIC^{PLUS} Flash Based FPGAs.*
- *In-System Programming ProASIC^{PLUS} Devices.*

Actel User Manuals

Other Actel user manuals are available at our web site, under Technical Documentation, <http://www.actel.com/techdocs/manuals/index.html>.

These manuals provide additional information on designing Actel FPGAs. They include:

Getting Started User's Guide. This manual contains information for using the Designer Series Development System software to create designs for, and program, Actel devices.

Libero IDE User's Guide. This manual contains information about using Libero IDE, Actel's Integrated Design Environment. Details about using ViewDraw for Actel, WaveFormer Lite, Synplicity, and ModelSim are provided.

Designer User's Guide. This manual provides an introduction to the Designer series software as well as an explanation of its tools and features.

PinEdit User's Guide. This guide provides a detailed description of the PinEdit tool in Designer. It includes cross-platform explanations of all the PinEdit features.

ChipEdit User's Guide. This guide provides a detailed description of the ChipEdit tool in Designer. It includes a detailed explanation of the ChipEdit functionality.

Timer User's Guide. This guide provides a detailed description of the Timer tool in Designer. It includes a detailed explanation of the Timer functionality.

Netlist Viewer User's Guide. This guide provides a detailed description of how to use the Actel Netlist Viewer tool to view your netlist and how to use it with other Actel tools to analyze your netlist.

SmartPower User's Guide. This guide contains information on how to use the the Actel SmartPower tool to perform power analysis.

Actel HDL Coding Style Guide. This guide provides preferred coding styles for the Actel architecture and information about optimizing your HDL code for Actel devices.

FlashPro User's Guide. This guide contains information to assist designer in the use of Actel's FlashPro programmer.

Mentor Graphics® Interface Guide. This guide contains information to assist designers in the design of Actel devices using Mentor Graphics CAE software and the Designer Series software.

Synopsys® Synthesis Methodology Guide. This guide contains preferred HDL coding styles and information to assist designers in the design of

Actel devices using Synopsys CAE software and the Designer Series software.

Innoveda® eProduct Designer Interface Guide (Windows). This guide contains information to assist designers in the design of Actel devices using eProduct Designer CAE software and the Designer Series software.

Innoveda® eProduct Designer Interface Guide (UNIX). This guide contains information to assist designers in the design of Actel devices using eProduct Designer CAE software and the Designer Series software.

VHDL Vital Simulation Guide. This guide contains information to assist designers in simulating Actel designs using a Vital compliant VHDL simulator.

Verilog Simulation Guide. This guide contains information to assist designers in simulating Actel designs using a Verilog simulator.

Silicon Sculptor User's Guide. This guide contains information about how to program Actel devices using the Silicon Sculptor software and device programmer.

Silicon Explorer Quick Start. This guide contains information about connecting the Silicon Explorer diagnostic tool and using it to perform system verification.

Actel FPGA Data Book. This guide contains detailed specifications on Actel device families. Information such as propagation delays, device package pinout, derating factors, and power calculations are found in this guide.

Macro Library Guide. This guide provides descriptions of Actel library elements for Actel device families. Symbols, truth tables, and module count are included for all macros.

A Guide to ACTgen Macros. This Guide provides descriptions of macros that can be generated using the Actel ACTgen Macro Builder software.

Getting Started

This chapter describes what should be included in the FlashPro and FlashPro Lite kits and how to install the FlashPro software and hardware. It also contains an overview of the graphical user interface and commands.

For specific details about the board layout, please refer to the Actel Application Note, *In-System Programming Pro.ASIC^{PLUS} Devices*.

FlashPro Kit

The FlashPro kit contains:

- FlashPro CD
- FlashPro Actel Programmer
- IEEE-1284 25 pin cable, Type A-C, 10 ft.
- Loop Back Test board
- Power supply brick and cable

FlashPro Lite Kit

The FlashPro Lite kit contains:

- FlashPro Lite CD
- FlashPro Lite Programmer
- IEEE-1284 25 pin extension cable, Type A-A, 10 ft.
- 18 inch programmer target cable, 26 pin

Software Installation

After installing the FlashPro software, you must install the most recent service packs available from our website at

<http://www.actel.com/custsup/updates/flashpro/index.html>.

To install the FlashPro software:

1. **Insert the FlashPro CD into your drive.** The installation wizard starts, as shown in Figure 1-1.

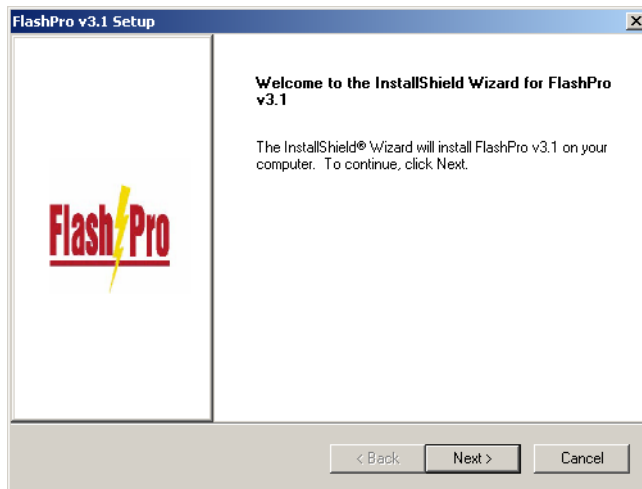


Figure 1-1. FlashPro Installation Wizard

2. **Click *Next* to see the license agreement.**

3. Click **Yes**, then **Next** to accept the license agreement, as shown in Figure 1-2.

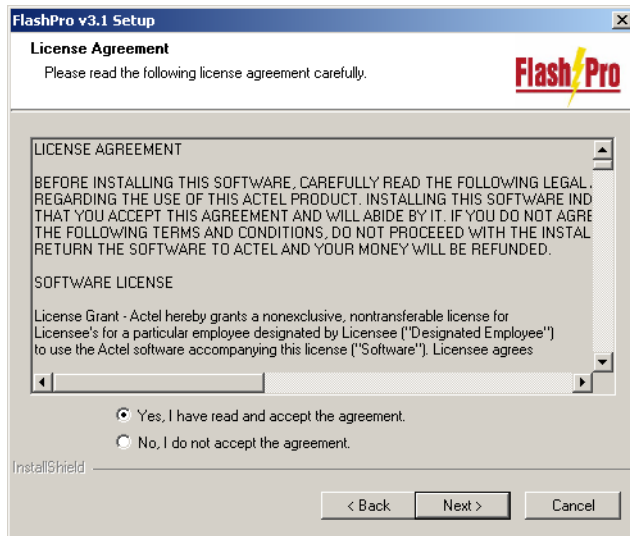


Figure 1-2. License Agreement

4. Click **Next** to install FlashPro to the destination folder, as shown in Figure 1-3. To install to a different folder, click *Browse* and

select another folder. FlashPro installs the software to the directory you select.

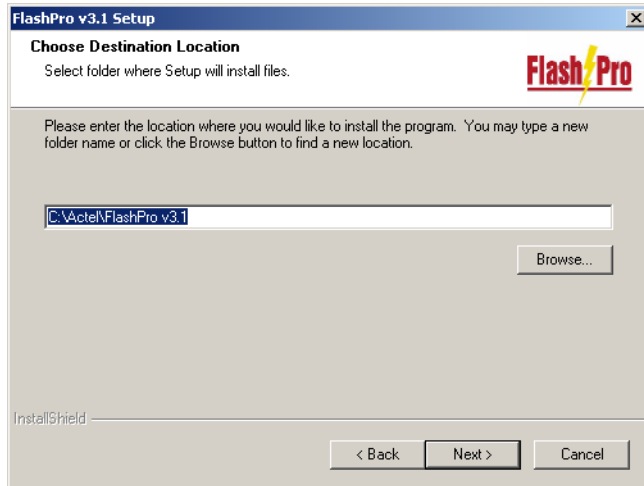


Figure 1-3. FlashPro Destination Location

5. **Click *Next* to install.** The FlashPro software installs.
6. **Click *Finish* to restart your computer as shown in Figure 1-4.** Actel recommends that you restart your computer before starting FlashPro.

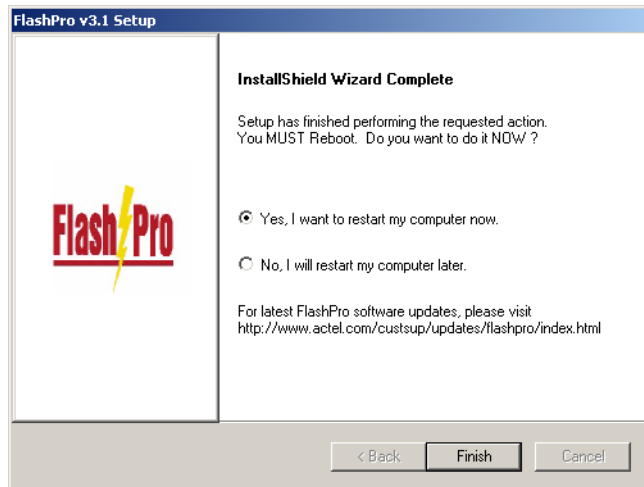


Figure 1-4. Installation Complete

Software Update

For the latest software update available, visit the Actel website at [http:// www.actel.com/custsup/updates/flashpro/index.html](http://www.actel.com/custsup/updates/flashpro/index.html) or by selecting *Software Update* from the Help drop down menu in the FlashPro software. See Figure 1-5.

Note: Select Software Update from the Help menu to visit the Actel website.

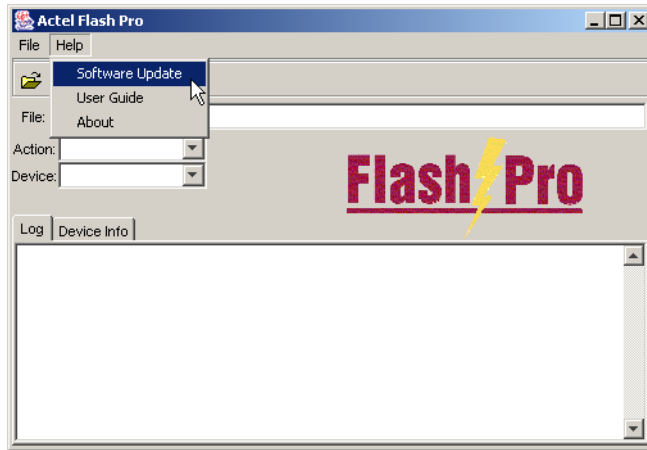


Figure 1-5. Software Update Help Drop Down Menu

Hardware Installation

For FlashPro Lite hardware installation procedures, please refer to “Hardware Installation”.

To connect the FlashPro to your PC:

- 1. Connect the programmer to a parallel printer port on your PC.** Connect one end of the IEEE-1284 cable to the programmer’s connector. Plug the other end of the cable into your parallel printer port and tighten the screws. You should not have any licensing dongles connected between the parallel port and cable.

Your port settings should be EPP or bidirectional. Actel also supports the ECP mode with the FlashPro version 2.1 software and newer versions.

- 2. Verify that you are connected to the correct parallel port on your computer.** Actel recommends that you dedicate a port to the programmer. Connecting to a serial port or a third party card may damage the programmer. This type of damage is not covered by the warranty.
- 3. Verify that the FlashPro power switch is in the 0 position.**

- 4. Power up the programmer.** Plug the DC adapter into a power socket. Plug the other end of the AC power supply to the DC-IN input at the back of the FlashPro.
- 5. Turn on the programmer.** Turn the FlashPro power switch to the 1 position. The POWER LED on the front of the programmer lights up. If it does not, contact Actel technical support at (888) 99-ACTEL.

Powering Down the Programmer

Before you power down the programmer, make sure of the following:

- The programmer is not active
- The programming sequence is complete
- You are not programming a device
- Turn the FlashPro power switch to the 0 position
- Disconnect the programmer from the parallel port

Hardware Update

After you install or update the FlashPro software, a Version Mismatch dialog box may appear, as shown in Figure 1-6, so you can download an update to your FlashPro hardware.

To update your hardware:

- 1. Click OK as shown in Figure 1-6.**

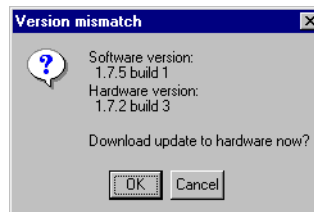


Figure 1-6. Version Mismatch Dialog Box

2. After reading the message in the Hardware Update dialog box, click OK as shown in Figure 1-7.

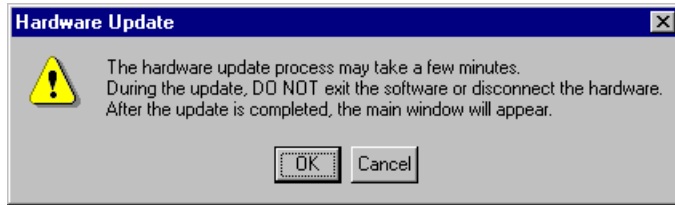


Figure 1-7. Hardware Update Dialog Box

The Updating Hardware status window displays while your hardware updates.

Self-Test

Before you program any devices, please run the self-diagnostic test.

To run the self-diagnostic test:

1. **Connect the loopback test board to the FlashPro programmer.** (The loopback test board is included in the FlashPro kit.)
2. **Connect the FlashPro programmer to your PC's parallel port.**
3. **Turn on the FlashPro programmer.**
4. **Start the FlashPro Diagnostic software.** From the *Start* menu, point to *Programs, FlashPro V3.1*, and click *Diagnostic*.
5. **Connect to the FlashPro programmer by entering**
`openport lpt<port number>`

The port number represents the parallel port you used to connect to the FlashPro programmer. If the FlashPro is connected to port 1, you would enter:

`openport lpt1`

If this fails, check your licensing dongles and make sure the FlashPro's power is turned on.

6. Enter

test

The unit enters the self-test mode, which lasts less than one minute. Do not interrupt the unit until the self-test mode is completed. If the self-test fails, you may see the following error messages:

- Failed self-test. V_{DDP} setting: Expected 2300...27000. Actual 750 (see [page 57](#)).
- Loopback failure TDI->TDO. Expected 1, Actual 0 (see [page 57](#)).
- Parallel port device does not support IEEE-1284 negotiation protocol (see [page 57](#)).

Please refer to “[Error Messages & Trouble Shooting Tips](#)” for help with error messages. If you are not successful, please contact technical support at tech@actel.com for assistance.

Starting FlashPro

From the *Start* menu, select *Programs, FlashPro V3.1*, and click *FlashPro V3.1*, to start FlashPro.

Note: If you installed the program in another folder other than FlashPro, choose that folder from the Programs menu.

FlashPro Software Graphical User Interface

The FlashPro software, as shown in Figure 1-8, consists of a menu bar, toolbar, log window, and areas to specify your STAPL file, device, and action.

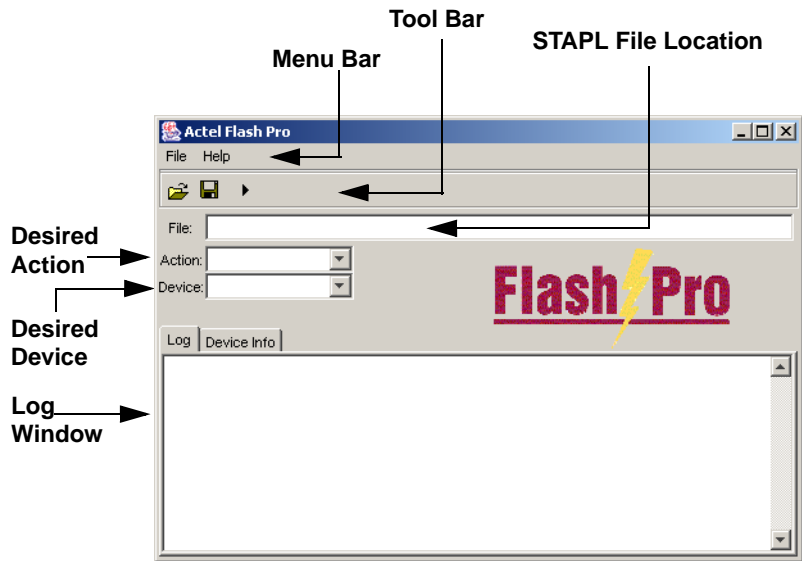


Figure 1-8. FlashPro Software Graphical User Interface

Menu Bar

Use the menu bar to set up your programmer connection, specify the device, and to save your log file. From the File menu, you can set up the programmer connection, specify the device, and save or clear the programming log file, which appears in the log window.

Toolbar

The toolbar buttons in the toolbar, as shown in Figure 1-9, allow you to open a programming file (*.stp) and execute the action you selected from the Action window.

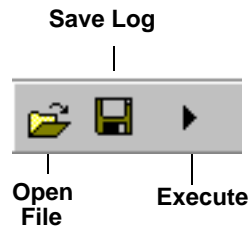


Figure 1-9. FlashPro Toolbar

Action

Use the Action list menu to specify the action you want performed on the device. Options are available when a STAPL file is loaded. Options appear in Table 1-1.

Table 1-1. Action Options

Option	Action
QUERY_SECURITY	Checks the security status of the device. If the device is programmed with the security key, then this command returns with Read inhibit:1 Write inhibit:1. If the security key is not present, the values are Read inhibit:0 Write inhibit 0.
ERASE	Erases the device.
READ_IDCODE	Reads the device ID code.
VERIFY	Verifies whether the device was programmed with the loaded STAPL file. If the wrong STAPL file is loaded, Exit 11 appears in the log window. A successful operation results in Exit 0.
PROGRAM	Programs the device.
DEVICE_INFO	Displays the serial number of the device, the Design Name that is programmed into the device, and the checksum that is programmed into the device.

Device

Options in the Device list specify the device within a chain. The selected action in the Action list is applied to this device. The Device list only appears after selecting *Analyze Chain* from the File menu.

Log Window

The Log window displays results of the action and any error messages.

Using FlashPro

This chapter describes how to use the FlashPro programmer to program Actel ProASIC and ProASIC^{PLUS} devices. All screen shots shown refer to ProASIC^{PLUS} devices only and the options may vary for ProASIC devices.

Initial Setup

Before any action can be performed with the FlashPro programmer, it must be properly setup. Please properly connect the FlashPro ribbon cable with the programming header and turn on the switch.

Actel recommends running the self test before programming any devices, see “Self-Test” on page 20.

To setup FlashPro:

1. **From the File menu, click Connect.** The FlashPro Connect to Programmer dialog box displays, as shown in Figure 2-1.

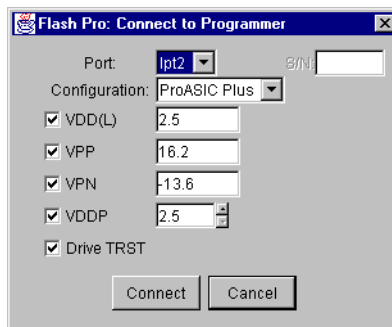


Figure 2-1. FlashPro: Connect to Programmer Dialog Box

2. **In the Port list, select the port the FlashPro programmer is connected to.**
3. **In the Configuration list, select the device family (ProASIC or ProASIC^{PLUS}).**
4. **(Optional) Disable voltages from the programmer if they are available on the board.** When you select the ProASIC configuration,

the Drive TRST voltage turns grey and becomes unavailable. See Figure 2-2.

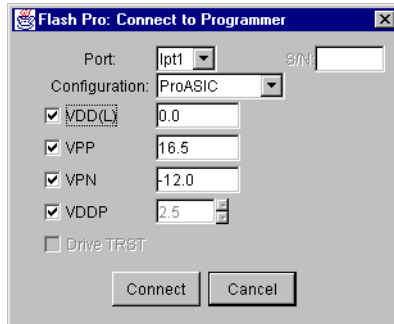


Figure 2-2. Connect to Programmer Dialog Box for ProASIC Devices

Note: If you want to power-up the device from the board power supply, please deselect Vddl and Vddp. Vpp and Vpn are required during programming only and are supplied by the FlashPro programmer. Programming of ProASIC devices requires that Vddl be at 0 volts during programming. The board power supply design must allow for this if it is used to power-up the device during programming. ProASIC^{PLUS} devices do not have this requirement.

5. **Click Connect.** A successful connect or any errors appears in the Log window, as shown in Figure 2-3. If you encounter failures, please refer to “Error Messages & Trouble Shooting Tips” for more information.

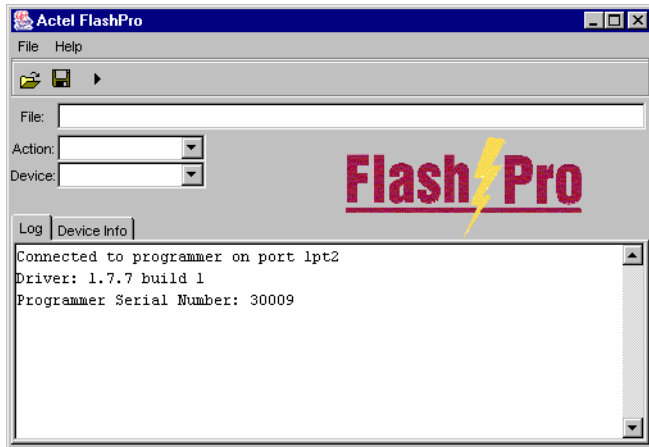


Figure 2-3. FlashPro: Successful Connection

Analyze Chain and Device Selection

To analyze the chain and select the device:

1. **From the File menu, click Analyze Chain.** Chain details appear in the Log window, as shown in Figure 2-4. If you encounter any failures,

please refer to “Error Messages & Trouble Shooting Tips” for more information.

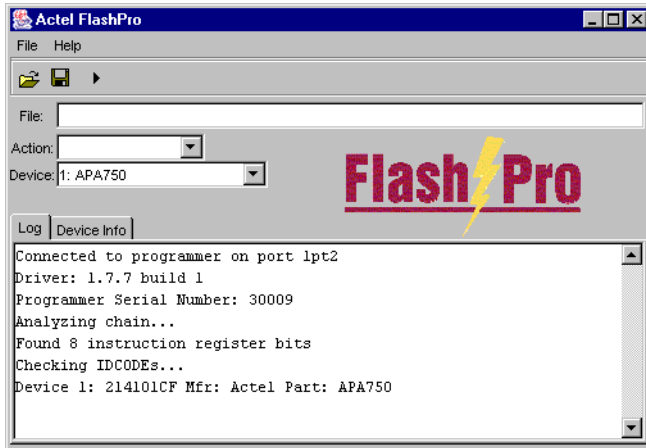


Figure 2-4. FlashPro: Analyzing Chain

- 2. Select your devices.** In the Device list, select your device before you perform any action. If you have only one device in the chain, performing Analyze Chain selects that device automatically from the Device list. If you

have multiple devices in the chain, you must select a device as shown in Figure 2-5.

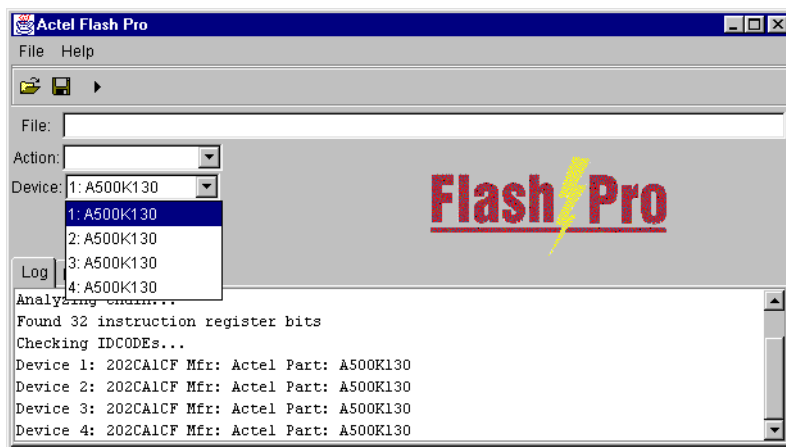


Figure 2-5. FlashPro: Device Selection

Note: The first device, selected in Figure 2-5, is the device that is nearest to TDO of the programming header.

Loading the STAPL File

The FlashPro programmer uses a STAPL (*.stp) file to program the device. Export the STAPL file from Designer. For more information, please refer to the [Designer Online Help](#).

Note: The STAPL file must be generated from Designer R1-2003SP1 or later. Actel strongly recommends using the latest version of Designer software or Libero IDE with the most recent service pack installed. Software service packs can be found at <http://www.actel.com/custsup/updates/index.html>.

To load the STAPL file:

1. Click the **Open File** button in the toolbar, as shown in Figure 2-6.



Figure 2-6. Open File Toolbar Button

The Open dialog box appears, as shown in Figure 2-7.

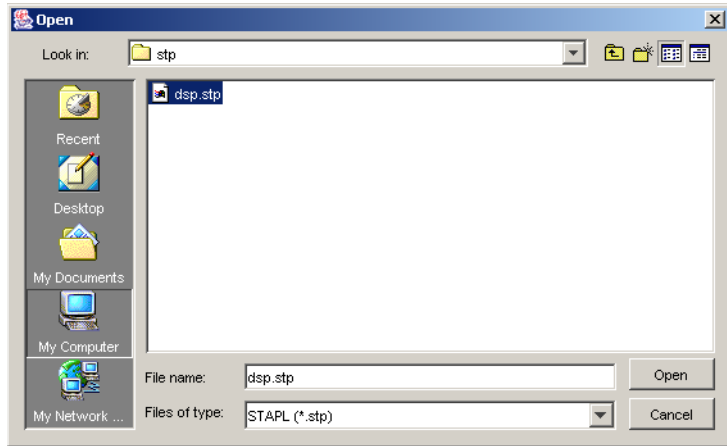


Figure 2-7. Open Dialog Box

2. Select your **STAPL file and click *Open***. The FlashPro software loads the file.

Selecting an Action

After loading the STAPL file, select an action from the Action list. See Table 2-1 for a definition of each action.

Table 2-1. Action Options

Option	Action
QUERY_SECURITY	Checks the security status of the device. If the device is programmed with the security key, then this command returns with Read inhibit:1 Write inhibit:1. If the security key is not present, the values are Read inhibit:0 Write inhibit 0.
ERASE	Erases the device.
READ_IDCODE	Reads the device ID code.
VERIFY	Verifies whether the device was programmed with the loaded STPL file. If the wrong STPL file is loaded, Exit 11 appears in the log window. A successful operation results in Exit 0.
PROGRAM	Programs the device.
DEVICE_INFO	Displays the serial number of the device, the Design Name that is programmed into the device, and the checksum that is programmed into the device.

Programming a Device

To program a device:

- 1. In the Action list, select *PROGRAM*.**
- 2. In the Device list, select the device.**

3. Click the *Execute* button in the toolbar, as shown in Figure 2-8.



Figure 2-8. Execute Toolbar Button

The Execute Action dialog box appears, as shown in Figure 2-9.

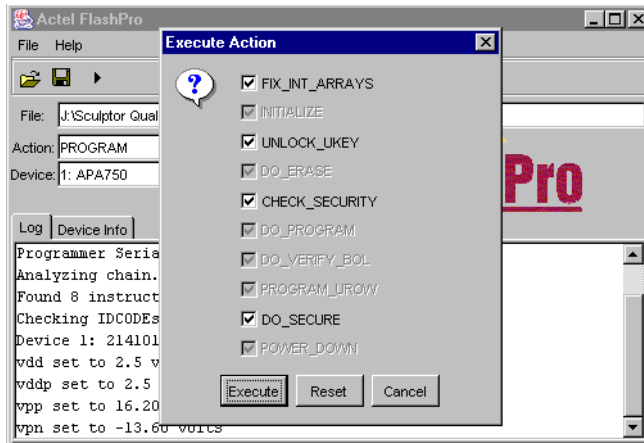


Figure 2-9. Execute Action Dialog Box

All the steps of the programming sequence are listed. Optional steps appear in bold. Grayed out options are required for programming and cannot be changed.

4. **Make your selections and click *Execute* to start programming.** The progress of the programming action displays in the Log window.

The message 'Exit 0' indicates that the device has been successfully programmed, as shown in Figure 2-10.

Note: Do not interrupt the programming sequence, it may damage the device or programmer.

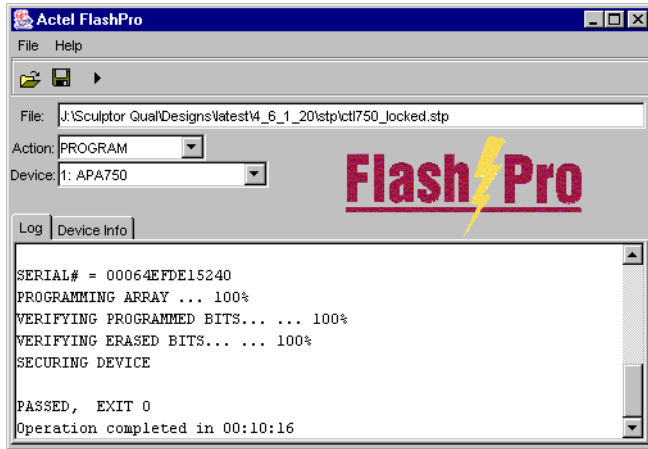


Figure 2-10. Successfully Programmed Device

If you encounter any failures, please refer to “[Error Messages & Trouble Shooting Tips](#)” for more information.

Verifying the Correct Programming

To verify the device is programmed with the correct STAPL file:

1. **Load the STAPL file.**
2. **In the Action list, click *VERIFY*.**
3. **Click the *Execute* button in the toolbar, as shown in Figure 2-11.**



Figure 2-11. Execute Toolbar Button

The Execute Action dialog box appears, as shown in Figure 2-12.

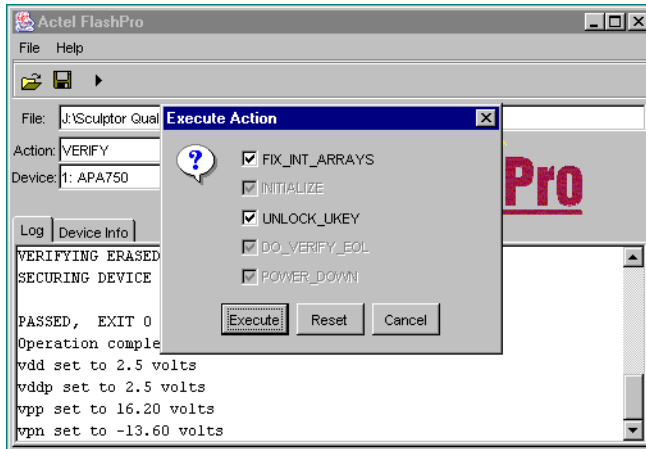


Figure 2-12. Execute Action Dialog Box

The default settings appear in the Execute Action dialog box.

4. **Click *Execute* to start the verification process.** A successful verification will result in Exit 0, as shown in Figure 2-13. If the STPL file is different from the file used for programming, Exit 11 appears in the Log window (see “[Error Messages & Trouble Shooting Tips](#)”, “Exit 11” for more details).

Note: Do not interrupt the verifying sequence, it may damage the device.

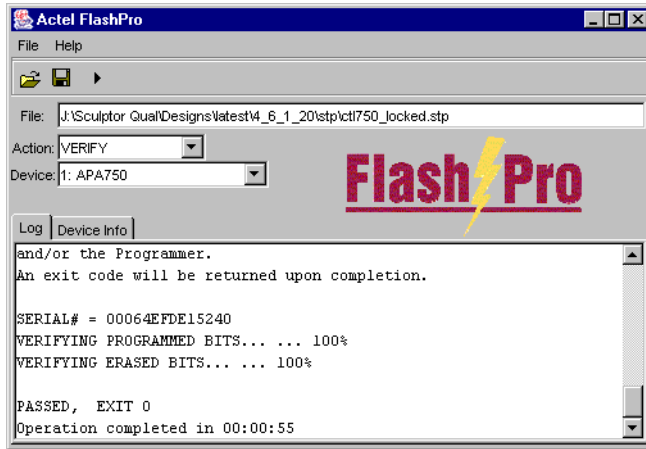


Figure 2-13. Successful Verification

Permanently Lock the Device

The FlashPro software includes a new feature which enables you to permanently lock your device. The permanent lock feature permanently locks your device and prevents you from reprogramming. This provides the highest level of security to the ProASIC^{PLUS} device family.

Loading the Permanent Lock STAPL File:

Export the permanent lock STAPL file from Designer. See the note from “Loading the STAPL File” in this chapter.

To load the permanent lock STAPL file:

1. **Click the *Open File* button in the toolbar.** The Open dialog box appears.
2. **Select your permanent STAPL file and click *Open*.** The Permanent Lock About dialog box displays, as shown in Figure 2-14.



Figure 2-14. Permanent Lock About Dialog Box

3. **Read the message and click *OK* to load the permanent STAPL file.** The FlashPro software loads the file.

Programming a Device Using Permanent Lock

To program a device using Permanent Lock:

1. **In the Action list, select *PROGRAM*.**
2. **In the Device list, select the device.**
3. **Click the *Execute* button in the toolbar, as shown in Figure 2-15.**



Figure 2-15. Execute Toolbar Button

The Execute Action dialog box appears, as shown in Figure 2-16.

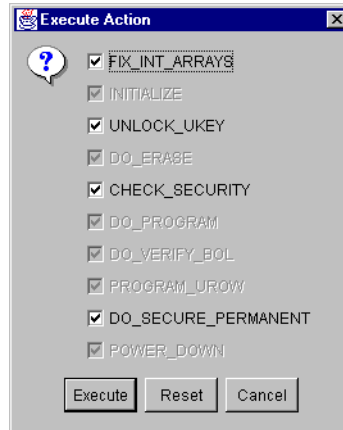


Figure 2-16. Execute Action Dialog Box

Note: The Do_Secure_Permanent checkbox is checked automatically. You have the option of unchecking this box. However, if you do, you will not permanently lock your device.

All the steps in the programming sequence are listed. Optional steps appear in bold. Grayed out options are required for programming and cannot be changed.

- 4. Make your selections and click *Execute* to start programming.** The progress of the programming action is displayed in the Log window. The message 'Exit 0' indicates that the device has successfully been programmed as shown in Figure 2-17.

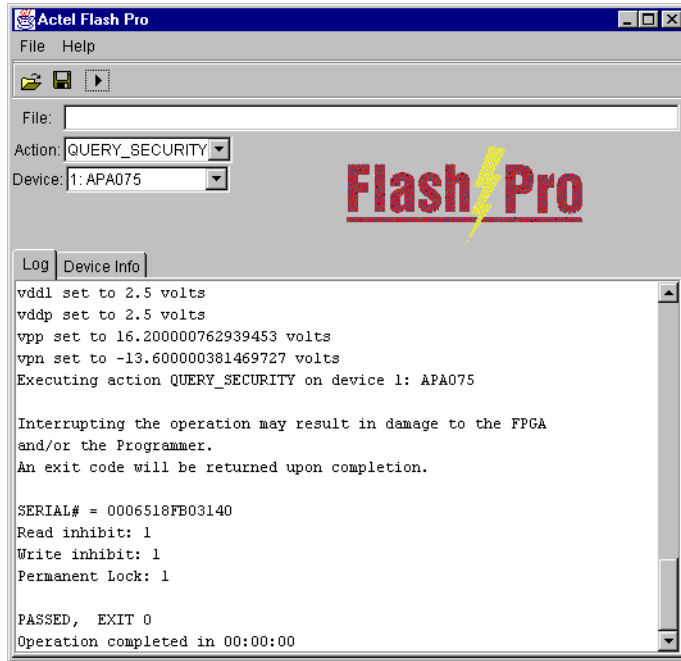


Figure 2-17. Query Results for the Permanently Locked Device

Note: Do not interrupt the programming sequence, it may damage the device or programmer.

If you encounter any failures, please refer to “[Error Messages & Trouble Shooting Tips](#)” for more information.

Saving Your Log File

All FlashPro results are displayed in the Log window. You can save these results into a file.

To save your log file:

1. **From the *File* menu, click *Save Log*.** The Save dialog box appears, as shown in Figure 2-18.

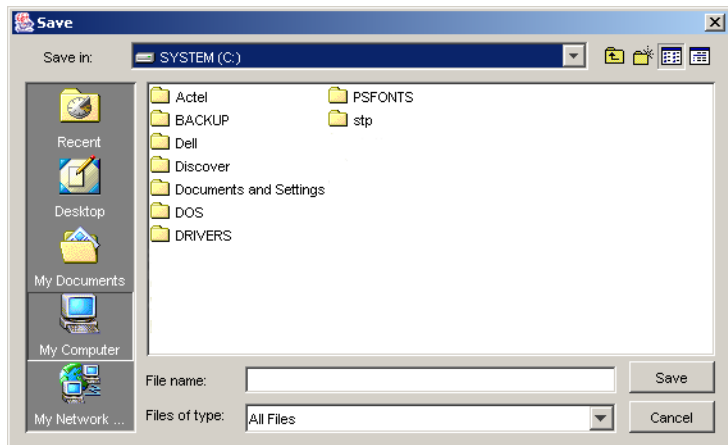


Figure 2-18. Save Dialog Box

2. **Select a directory, type in the file name, and click *Save*.** The FlashPro software saves the file.

Using FlashPro Lite

This chapter describes how to set up and use the FlashPro Lite to program Actel ProASIC^{PLUS} devices. FlashPro Lite does not support ProASIC (A500K) devices. All screen shots shown refer to ProASIC^{PLUS} devices only.

Hardware Installation

To connect the FlashPro Lite to your PC:

- 1. Connect the programmer to a parallel printer port on your PC.** Connect one end of the IEEE-1284 cable to the programmer's connector. Plug the other end of the cable into your parallel printer port and tighten the screws. You should not have any licensing dongles connected between the parallel port and cable.

Your port settings should be EPP or bidirectional. Actel also supports the ECP mode with the FlashPro v2.1 software and newer.

- 2. Verify that you are connected to the correct parallel port on your computer.** Actel recommends that you dedicate a port to the programmer. Connecting to a serial port or a third party card may damage the programmer. This type of damage is not covered by the warranty.
- 3. Connect the FlashPro ribbon cable with the programming header and turn the target board on.**

Initial Setup

Before any action can be performed with the FlashPro Lite programmer, it must be properly setup. See "Hardware Installation".

The FlashPro Lite's Live and Status LEDs should be on. This indicates that the FlashPro Lite is getting power from the target board and is ready to use.

To setup FlashPro Lite:

1. From the **File** menu, click **Connect**. The FlashPro Connect to Programmer dialog box displays, as shown in Figure 3-1.

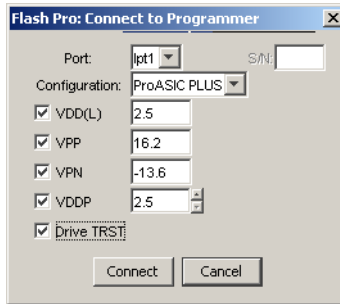


Figure 3-1. FlashPro: Connect to Programmer Dialog Box

2. In the Port list, select the Line Printer (lpt) port the FlashPro programmer is connected to.
3. In the Configuration list, select the ProASIC **PLUS** device. FlashPro Lite only supports ProASIC^{PLUS} devices. Use FlashPro to program ProASIC devices.

4. **Click Connect.** A successful connect or any errors appears in the Log window, as shown in Figure 3-2. If you encounter failures, please refer to “Error Messages & Trouble Shooting Tips” for more information.

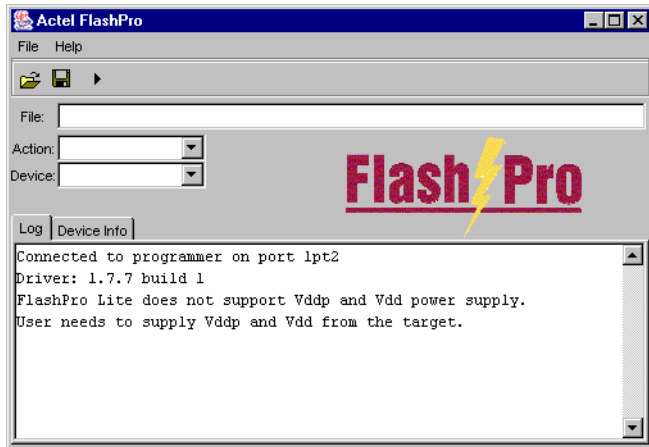


Figure 3-2. FlashPro: Successful Connection

Analyze Chain and Device Selection

To analyze the chain and select the device:

1. **From the File menu, click Analyze Chain.** Chain details appear in the Log window, as shown in Figure 3-3. If you encounter any failures,

please refer to “Error Messages & Trouble Shooting Tips” for more information.

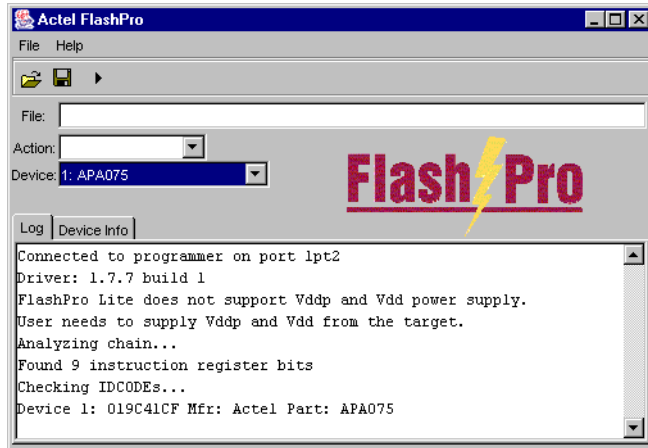


Figure 3-3. FlashPro: Analyzing Chain

- 2. Select your devices.** In the Device list, select your device before you perform any action. If you have only one device in the chain, performing Analyze Chain selects that device automatically from the Device list. However, if you have multiple devices in the chain, click the down arrow next to the Device text box, and select your device from the Device list menu.

Note: The first device, shown in the Device text box is the device nearest to TDO of the programming header.

Loading the STAPL File

The FlashPro Lite programmer uses a STAPL (*.stp) file to program the device. Export the STAPL file from Designer. For more information, please refer to the [Designer Online Help](#).

Note: The STAPL file must be generated from Designer R1-03SP1 or later. Actel strongly recommends using the latest version of Designer software or Libero IDE with the most recent service pack installed. Software

service packs can be found at <http://www.actel.com/custsup/updates/index.html>.

To load the STAPL file:

1. You can click the **Open File** button in the toolbar, as shown in Figure 3-4 or from the File menu, you can click **Open**.



Figure 3-4. Open File Toolbar Button

The Open dialog box appears, as shown in Figure 3-5.

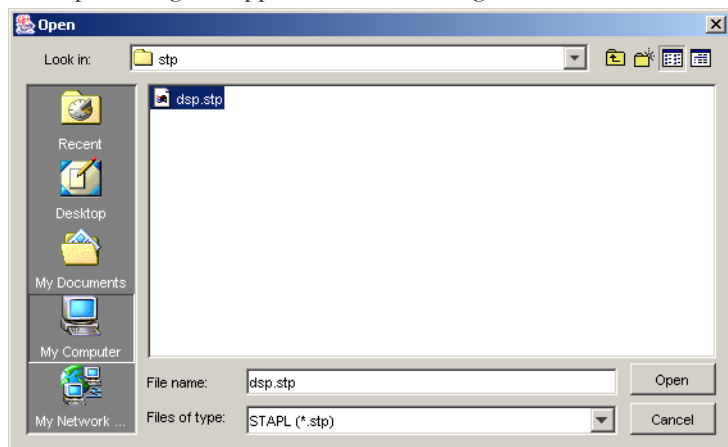


Figure 3-5. Open Dialog Box

2. **Select your STAPL file and click Open.** The FlashPro software loads the file. The FlashPro Log window displays a message indicating that the software has successfully loaded the software. See Figure 3-6.

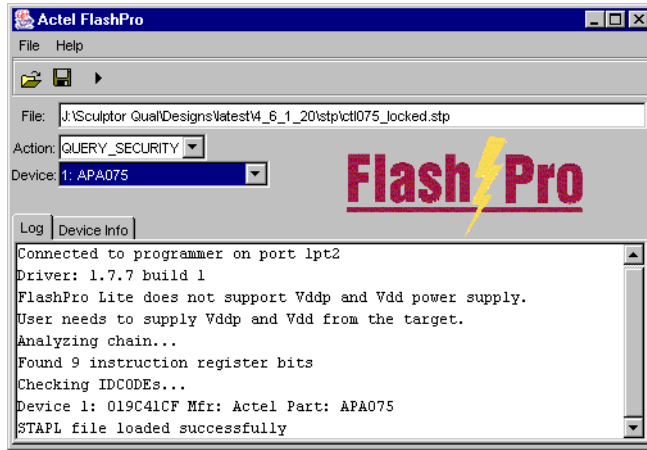


Figure 3-6. STAPL File Loaded Successfully

Selecting an Action

After loading the STAPL file, select an action from the Action list. See Table 3-1 for a definition of each action.

Table 3-1. Action Options

Option	Action
QUERY_SECURITY	Checks the security status of the device. If the device is programmed with the security key, then this command returns with Read inhibit:1 Write inhibit:1. If the security key is not present, the values are Read inhibit:0 Write inhibit 0.
ERASE	Erases the device.
READ_IDCODE	Reads the device ID code.

Table 3-1. Action Options

Option	Action
VERIFY	Verifies whether the device was programmed with the loaded STPL file. If the wrong STPL file is loaded, Exit 11 appears in the log window. A successful operation results in Exit 0.
PROGRAM	Programs the device.
DEVICE_INFO	Displays the serial number of the device, the Design Name that is programmed into the device, and the checksum that is programmed into the device.

Programming a Device

To program a device:

1. In the Action list, select **PROGRAM**.
2. In the Device list, select the device.
3. Click the **Execute** button in the toolbar, as shown in Figure 3-7.



Figure 3-7. Execute Toolbar Button

The Execute Action dialog box appears, as shown in Figure 3-8.

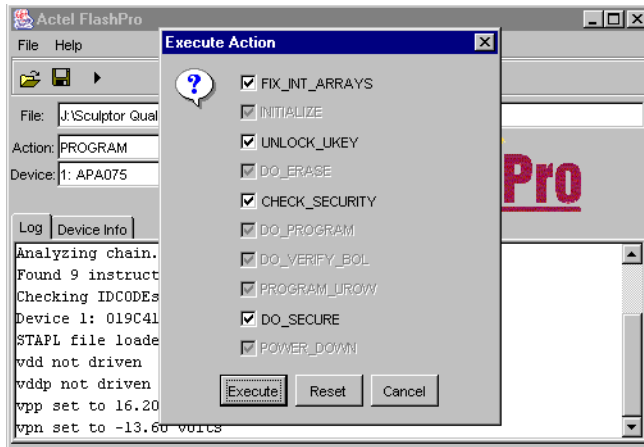


Figure 3-8. Execute Action Dialog Box

All the steps of the programming sequence are listed. Optional steps appear in bold. Grayed out options are required for programming and cannot be changed.

- 4. Make your selections and click *Execute* to start programming.** The progress of the programming action appears in the Log window.

Note: Do not interrupt the programming sequence, it may damage the device or programmer.

The message 'Exit 0' indicates that the device has been successfully programmed, as shown in Figure 3-9.

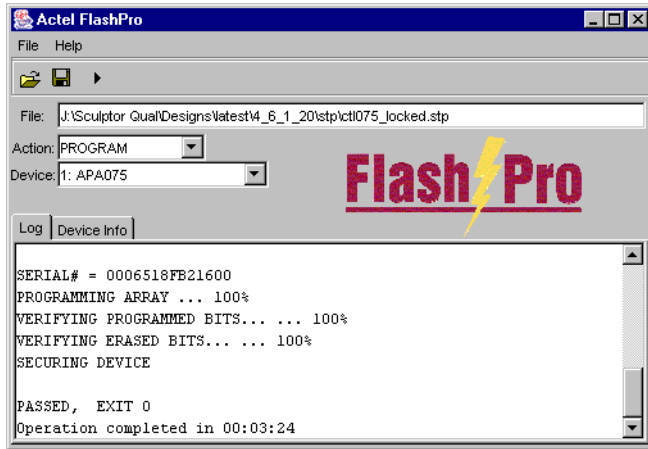


Figure 3-9. Successfully Programmed Device

If you encounter any failures, please refer to “[Error Messages & Trouble Shooting Tips](#)” for more information.

Verifying the Correct Programming

To verify the device is programmed with the correct STAPL file:

1. **Load the STAPL file.**
2. **In the Action list, click *VERIFY*.**
3. **Click the *Execute* button in the toolbar, as shown in Figure 3-10.**



Figure 3-10. Execute Toolbar Button

The Execute Action dialog box appears, as shown in Figure 3-11.

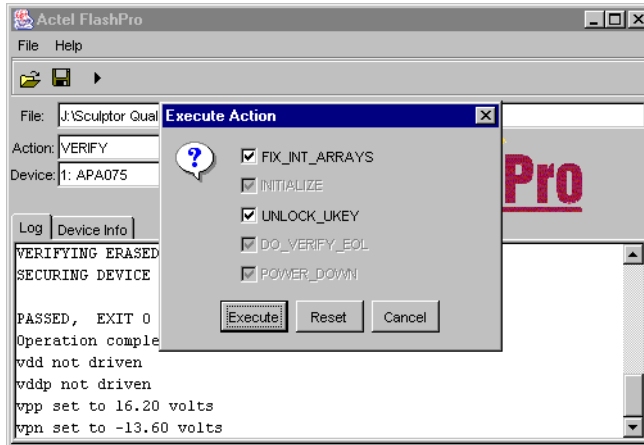


Figure 3-11. Execute Action Dialog Box

The default settings appear in the Execute Action dialog box.

4. **Click *Execute* to start the verification process.** A successful verification will result in Exit 0, as shown in Figure 3-12. If the STPL file is different from the file used for programming, Exit 11 appears in the Log window (see “[Error Messages & Trouble Shooting Tips](#)”, “Exit 11” for more details).

Note: Do not interrupt the verifying sequence, it may damage the device.

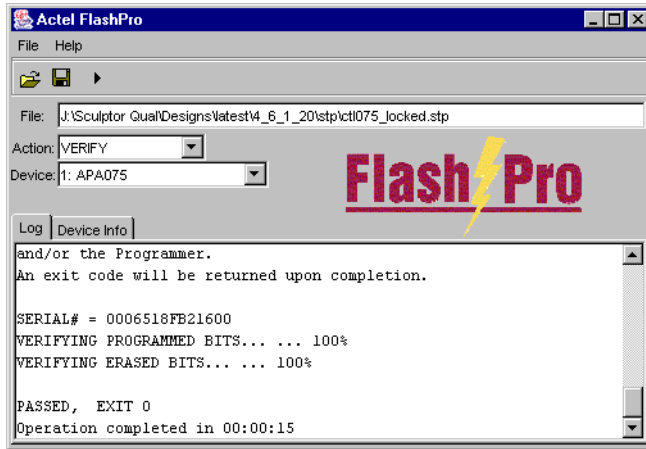


Figure 3-12. Successful Verification

Permanently Lock the Device

ProASIC^{PLUS} devices have a new feature which enables you to permanently lock your device. The permanent lock feature permanently locks your device and prevents you from reprogramming. This provides the highest level of security to the ProASIC^{PLUS} device family.

Loading the Permanent Lock STAPL File:

Export the permanent lock STAPL file from Designer. See the note from “Loading the STAPL File” in this chapter.

To load the permanent lock STAPL file:

1. **Click the *Open File* button in the toolbar.** The Open dialog box appears.
2. **Select your permanent STAPL file and click *Open*.** The Permanent Lock About dialog box displays, as shown in Figure 3-13.



Figure 3-13. Permanent Lock About Dialog Box

3. **Read the message and click *OK* to load the permanent STAPL file.** The FlashPro software loads the file.

Programming a Device Using Permanent Lock

To program a device using Permanent Lock:

1. **In the Action list, select *PROGRAM*.**
2. **In the Device list, select the device.**
3. **Click the *Execute* button in the toolbar, as shown in Figure 3-14.**



Figure 3-14. Execute Toolbar Button

The Execute Action dialog box appears, as shown in Figure 3-15.

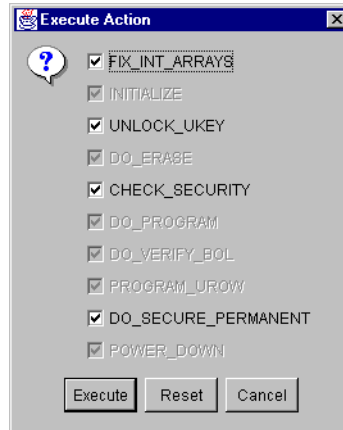


Figure 3-15. Execute Action Dialog Box

Note: The Do_Secure_Permanent checkbox is checked automatically. You have the option of unchecking this box. However, if you do, you will not permanently lock your device.

All the steps in the programming sequence are listed. Optional steps appear in bold. Grayed out options are required for programming and cannot be changed.

- 4. Make your selections and click *Execute* to start programming.** The progress of the programming action is displayed in the Log window. The message 'Exit 0' indicates that the device has successfully been programmed as shown in Figure 3-16.

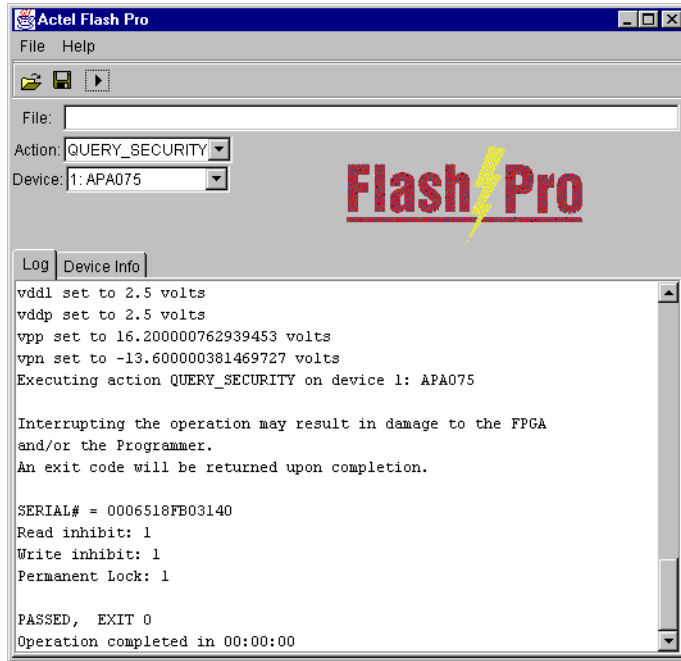


Figure 3-16. Query Results for the Permanently Locked Device

Note: Do not interrupt the programming sequence, it may damage the device or programmer.

If you encounter any failures, please refer to “[Error Messages & Trouble Shooting Tips](#)” for more information.

Saving Your Log File

All FlashPro results are displayed in the Log window. You can save these results into a file.

To save your log file:

1. **From the File menu, click *Save Log*.** The Save dialog box appears, as shown in Figure 3-17.

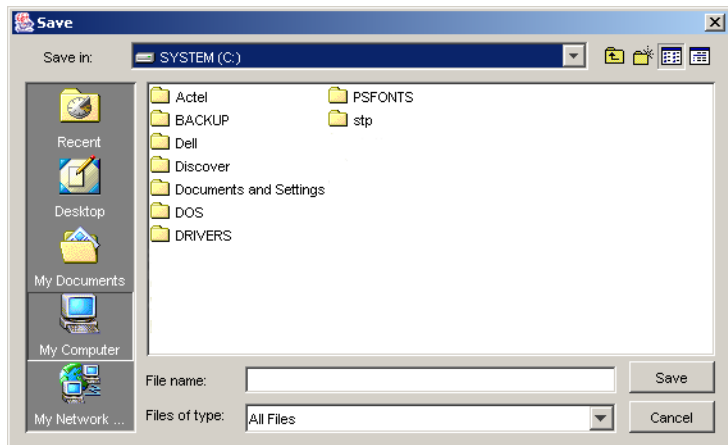


Figure 3-17. Save Dialog Box

2. **Select a directory, type in the file name, and click *Save*.** The FlashPro software saves the file.

Error Messages & Trouble Shooting Tips

The information in this chapter may help you solve or identify a problem with the FlashPro programmer. If you have a problem that you can not solve, please contact Actel Customer Technical Support at tech@actel.com or call our hotline 1-800-262-1060. We are dedicated to making FlashPro as trouble-free as possible. This chapter contains information on the following error messages:

- “Exit 0” on page 58
- “Exit 3” on page 58
- “Exit 5” on page 58
- “Exit 6” on page 58
- “Exit 7” on page 59
- “Exit 8” on page 60
- “Exit 11” on page 60
- “Exit 12” on page 60
- “Exit 15” on page 61
- “Exit 17” on page 61
- “Exit 80” on page 61
- “Exit 90” on page 62
- “Exit 91” on page 62
- Exit Null
- “Cable to target is not connected properly” on page 63
- “Chain Integrity Test Failed: XX” on page 63
- “Could not connect to programmer on port lpt1 or Parallel port device does not support IEEE-1284 negotiation protocol” on page 64
- “External Voltage Detected on <Supply>” on page 65
- “Failed self-test. VDDP setting: Expected 2300...27000. Actual 750” on page 65
- “Loopback Failure TDI -> TDO. Expected 1, Actual 0” on page 66

- “More than one unidentified device cannot continue” on page 66
- “Self-test” on page 66
- “VDDP Disconnected” on page 67

Exit 0

This message means success. This does not indicate an error.

Exit 3

This occurs when using ProASIC^{PLUS} devices.

Possible Cause: Connect was set up for a ProASIC device and the device is actually a ProASIC^{PLUS}.

Solution: Set up for a ProASIC^{PLUS} device.

Exit 5

Indicates a problem in programming setup, also known as “Entering ISP Failure.”

Possible Cause: The A500K device senses the V_{DDL} power supply as being on.

Solutions:

- Power the V_{DDL} down during programming.
- Check that the device has the correct voltages on V_{DDP} , V_{DDL} , V_{PB} and V_{PN} .

Exit 6

JEDEC standard message. The IDCODE of the target device does not match the expected value in the STAPL file.

Possible Causes:

- User loaded an APA150 STAPL file to program an APA300.
- User selected wrong device.
- Device TRST pin is grounded.
- Noise or reflections on one or more of the JTAG pins caused by the IR Bits reading it back incorrectly.

Solutions:

- Choose the correct STAPL file and select the correct device.
- Measure JTAG pins and noise or reflection. TRST should be floating or tied high.
- Cut down the extra length of ground connection.

Exit 7

Unknown algorithm: alg=x, prev=x

Invaield data read from device

Possible Causes:

- In the factory row, the factory writes the algorithm revision the part is calibrated with. This error occurs with current STAPL files when the revision written into the factory row is not rev 2 for ProASIC devices. The STAPL files from last year may "exit 7" with newer devices or the older revision may cause this failure if the STAPL file used is from latest version. This can occur if you are using Engineering Sample parts that are no longer supported, such as ProASIC Engineering Sample parts.
- Programming -F ProASICPlus device with old STAPL file.
- Connect V_{PP} and V_{PN} the wrong way around.
- No bypass Caps on V_{PP} V_{PN} , which damaged the device.

Solutions:

- Re-generate STAPL file from Libero v2.3 SP3 or Designer R1-2003SP3.
- Replace A500K ES parts with commerical parts.

- Double check V_{PP} and V_{PN} connections.
- Make sure V_{PP} and V_{PN} have correct bypass caps.

Exit 8

This message occurs when the FPGA failed during the Erase operation.

Possible Causes: The device is secured, and the corresponding STAPL file is not loaded. The device has been permanently secured and cannot be unlocked.

Solution: Load the correct STAPL file.

Exit 11

The message occurs when the FPGA failed verify.

Possible Causes

- The device is secured, and the corresponding STAPL file is not loaded.
- You used the Libero software v. 2.3 or earlier or the Designer R1-2003 software or earlier to generate the STAPL file.
- V_{PN} caps were soldered in the wrong polarity.

Solutions:

- Please load the correct STAPL file.
- Please use later software versions-- at least Libero v2.3 SP1 and Designer R1-2003 SP1.
- Double check the V_{PN} bypass caps polarity.

Exit 12

Occurs when security is enabled.

Possible Causes:

- The device is secured and the wrong key/STAPL file was entered.

- The device is damaged.
- The verification was interrupted and therefore fails, causing it to think the device is secure.

Exit 15

This message is a factory Calibration Data CRC Error. During program, erase, or verify, the programmer must read back Calibration Data from the FPGA. The Data contains a CRC and the programmer uses the CRC to ensure the data is not corrupted/wrong.

Possible Causes:

- The device is damaged.
- Noise on the JTAG signals causes the programmer to read back wrong data.

Exit 17

This message means that the device has been secured, write-security enabled.

Possible Causes:

- The device is secured and the wrong key/STAPL file was entered.
- The device is damaged.

Solution: Please load the correct STAPL file.

Exit 80

Error code results from STAPL files for A500K devices.

Possible Cause:

- An internal calibration (based on V_{DDP} and V_{PP}) failed.

Solutions:

- Check voltages on the device pins.

- Check voltages on the V_{DDP} and V_{PP} pins.

Exit 90

This message means that an unexpected RCK is detected. The ProASIC devices use either TCK or RCK to shape the programming pulse. The FlashPro uses TCK, it does not sense RCK directly. Rather, the device senses RCK and FlashPro reads it from the device.

Possible Causes:

- Noise on the RCK signal.
- You connected a CLK source to the RCK signal.
- The polarized bypass capacitors on VPP or VPN are reversed biased and are affecting the programmer's VPP or VPN output voltage. This is causing programming to fail.
- Several FlashPros are programming at the same time and are too close to each other.

Solutions:

- Disconnect the RCK and make sure TCK has a clean signal.
- Separate FlashPros away from each other while they are programming Internal ISP.

Exit 91

This message occurred because of a calibration data parity error. Before the FPGA is programmed, calibration data (stored in the device) are read back for programming purposes. The programmer performs a parity check on the data to ensure the proper data is read back.

Possible Cause: The device is damaged.

Solution: Please replace the device.

Exit Null

Possible Causes:

- Several FlashPros are programming at the same time and are too close to each other.
- FlashPro connects to PC parallel port through a dongle key.
- Data length mismatch when performing DRSCAN on STAPL file.

Possible Solutions:

- Separate FlashPros away from each other while they are programming.
- Connect FlashPro to PC parallel port directly.
- Regenerate STAPL file in case you mistakenly modified the file.

Cable to target is not connected properly

When the Analyze command is executed, the FlashPro will look for target devices. If the cable connection is wrong, FlashPro senses assumes that nothing is connected at all.

Possible Cause: The cable connector is not connected to the header properly or the connection from header to the device is missing something. Header pin 10 is the GND sensing pin. It senses if FlashPro is connected to the target's GND. Also, all other GND pins should be connected to the GND plane.

Solution: Please confirm the connection between header to the device. If the board supplies the power to the device, please make sure the voltage level is correct.

Chain Integrity Test Failed: XX

When the analyze chain operation is performed, the FlashPro programmer expects the first two bits of the data from the device chain to be a "01." When the programmer does not see the 01 pattern, it will return an error and report the bit values that it read. For example, if the bits it read were 11, then it would return "Chain Integrity Test Failed: 3"

Possible Causes:

- The connection between the FlashPro programmer and the Device is broken.
- The programmer cable might not be securely inserted into the header.
- The header is not connected to the JTAG pins of the FPGA correctly.
- The configuration setting (ProASIC/ProASIC^{PLUS}) does not match the target device.
- Noise or reflections on the JTAG pins has caused communication between the programmer and the device to fail.
- A dongle is plugged in between the PC parallel port and the FlashPro parallel port cable.

Solutions:

- Please secure the connections.
- Check the JTAG pins for signal activity.
- Check for broken TDO, TMS, and TCK pins.
- After checking all type of connections if the failure exists, you may need to replace the first device (the devices closest to the TDO of the programming header) in the chain.
- Remove the dongle.

Could not connect to programmer on port lpt1 or Parallel port device does not support IEEE-1284 negotiation protocol

Possible Causes: These errors can occur because the remote device does not respond to the negotiation protocol, for a variety of reasons.

Solutions:

- Make sure the port is connected
- Make sure the connected device is a FlashPro/Lite programmer

- Turn the programmer on
- Check parallel port setting in BIOS
- Make sure that there are no dongles in between the parallel port and the FlashPro connection
- Try another parallel cable, the parallel cable might be defective
- Check to see if the programmer is damaged (see step 4 in “[Software Freeze](#)” on page 69)
- Make sure the FlashPro Lite has power. The FlashPro Lite is powered from the target board through the Vdd pin of the programming header. Please make sure the Vdd pin is connected and the target board is powered up.

External Voltage Detected on <Supply>

From the CONNECT menu, the FlashPro programmer has been told to power a supply (one of Vdd, Vddp, Vpp, Vpn) of the FPGA, but it is already driven from another source. The FlashPro has sense-amps on all the power supplies to make sure that it does not drive a power supply that is already driven by the board.

Possible Cause: The voltage supply for the FPGA is driven by the another source (board, external power-supply), but the user forgot to turn off the supply in the CONNECT menu.

Solution: Set appropriate options in the CONNECT menu.

Failed self-test. V_{DDP} setting: Expected 2300...27000. Actual 750

This failure happens due to low V_{DDP} . A loose cable connector usually causes a low voltage or no voltage.

Possible Cause: The cable may have become loose if the cable was disconnected from the target by pulling up on the cable instead of lifting the connector directly.

Solution: Secure the connection between the cable connector and the programming header.

Loopback Failure TDI -> TDO. Expected 1, Actual 0

Possible Causes: An error message indicating a mismatch between expected signal values of 1 or 0 indicates a hard failure. The signals will be TCK, OUT0, or TDI.

Solution: Send the programmer back for repair.

More than one unidentified device cannot continue

In order to perform an operation to the ProASIC device, the rest of the devices in the chain must be in bypass mode. To put the devices into bypass mode, the programmer must need to know the IDCODE (hence the instruction register length) of these devices. If there is more than one device in the chain which does not support IDCODE command, then the programmer cannot put them into bypass mode, therefore cannot reach the desired ProASIC device.

Possible Causes:

- The user has chained the ProASIC device with non-Actel devices. Currently that is not supported in our software.
- One or more of the devices in the chain is damaged, and the IDCODE cannot be read back.

Solution:

Please remove all non-Actel devices from the chain. If you still experience the failure, it is likely that the device's ID CODE can not be read and you need to replace the device.

Self-test

Before you program any devices, you should run the self-diagnostic test (see “Self-Test” on page 20). The diagnostic software can be found on the Actel

web site. If the test fails, please contact Actel Customer Technical Support at tech@actel.com for credit and replacement.

Note: The Self-test is only available for FlashPro, not FlashPro Lite.

V_{DDP} Disconnected

This message occurred because there is no Vddp voltage supply to the FPGA.

Possible Causes:

- You accidentally turned off the Vddp supply in the CONNECT menu.
- The Vddp supply on the board is not functioning.

Solution: Please check the Vddp supply on the board for appropriate voltages and correct the CONEECT menu.

Software Freeze

During programming, the device may be damaged due to a voltage/current spike. When the device is damaged (usually in the form of a power-supply shorted to ground), it causes the FlashPro programmer to lose communication with the PC. This in turn causes the software to hang.

To restart the software after a crash:

1. Power-down everything.

- If V_{pp} and V_{pn} are provided on the board, power them down first, then power down V_{dd} and V_{ddp} . Finally, power down the FlashPro and disconnect it from the board.
- If the FlashPro is providing all the voltages, power down the FlashPro and disconnect it from the board.

2. Close the FlashPro software.

3. On the FPGA, measure resistance between all power supplies to GND. If any power supply is shorted to GND, then the device is damaged. Don't power up the board.

4. Power up the FlashPro, invoke the FlashPro software, and run self-test (“Self-Test” on page 20).

5. Assuming that the FPGA does not have any supply to GND short, reconnect the FlashPro and run an Analyze Chain (“Analyze Chain and Device Selection” on page 27).



Product Support

Actel backs its products with various support services including Customer Service, a Customer Applications Center, a web site, an FTP site, electronic mail, and worldwide sales offices. This appendix contains information about contacting Actel and using these support services.

Actel U.S. Toll-Free Line

Use the Actel toll-free line to contact Actel for sales information, technical support, requests for literature about Actel and Actel products, Customer Service, investor information, and using the Action Facts service.

The Actel toll-free line is (888) 99-ACTEL.

Customer Service

Contact Customer Service for nontechnical product support, such as product pricing, product upgrades, update information, order status, and authorization.

From Northeast and North Central U.S.A., call (408) 522-4480.

From Southeast and Southwest U.S.A., call (408) 522-4480.

From South Central U.S.A., call (408) 522-4434.

From Northwest U.S.A., call (408) 522-4434.

From Canada, call (408) 522-4480.

From Europe, call (408) 522-4252 or +44 (0) 1256 305600.

From Japan, call (408) 522-4743.

From the rest of the world, call (408) 522-4743.

Fax, from anywhere in the world (408) 522-8044.

Customer Applications Center

Actel staffs its Customer Applications Center with highly skilled engineers who can help answer your hardware, software, and design questions. The Applications Center spends a great deal of time creating application notes and answers to FAQs. So, before you contact us, please visit our online resources. It is very likely we have already answered your question(s).

Guru Automated Technical Support

Guru is a web-based automated technical support system accessible through the Actel home page (**<http://www.actel.com/custsup/search.html>**). Guru provides answers to technical questions about Actel products. Many answers include diagrams, illustrations, and links to other resources on the Actel web site. Guru is available 24 hours a day, seven days a week.

Web Site

Actel has a World Wide Web home page where you can browse a variety of technical and nontechnical information. Use a Net browser (Netscape recommended) to access Actel's home page.

The URL is **<http://www.actel.com>**. You are welcome to share the resources provided on the Internet.

Be sure to visit the Technical Documentation area on our web site, which contains information regarding products, technical services, current manuals, and release notes.

FTP Site

Actel has an anonymous FTP site located at **<ftp://ftp.actel.com>**. Here you can obtain library updates, software patches, design files, and data sheets.

Contacting the Customer Applications Center

Highly skilled engineers staff the Customer Applications Center from 7:30 A.M. to 5:00 P.M., Pacific Time, Monday through Friday. Several ways of contacting the Center follow:

Electronic Mail

You can communicate your technical questions to our e-mail address and receive answers back by e-mail, fax, or phone. Also, if you have design problems, you can e-mail your design files to receive assistance. We constantly monitor the e-mail account throughout the day. When sending your request to us, please be sure to include your full name, company name, and your contact information for efficient processing of your request.

The technical support e-mail address is **tech@actel.com**.

Telephone

Our Technical Message Center answers all calls. The center retrieves information, such as your name, company name, phone number and your question, and then issues a case number. The Center then forwards the information to a queue where the first available application engineer receives the data and returns your call. The phone hours are from 7:30 A.M. to 5:00 A.M., Pacific Time, Monday through Friday.

The Customer Applications Center number is (800) 262-1060.

European customers can call +44 (0) 1256 305600.

Worldwide Sales Offices

Headquarters

Actel Corporation
955 East Arques Avenue
Sunnyvale, California 94086
Toll Free: 888.99.ACTEL
Tel: 408.739.1010
Fax: 408.739.1540

US Sales Offices

California

Bay Area
Tel: 408.328.2200
Fax: 408.328.2358

Irvine
Tel: 949.727.0470
Fax: 949.727.0476

San Diego
Tel: 619.938.9860
Fax: 619.938.9887

Thousand Oaks
Tel: 805.375.5769
Fax: 805.375.5749

Colorado

Tel: 303.420.4335
Fax: 303.420.4336

Florida

Tel: 407.677.6661
Fax: 407.677.1030

Georgia

Tel: 770.831.9090
Fax: 770.831.0055

Illinois

Tel: 847.259.1501
Fax: 847.259.1572

Maryland

Tel: 410.381.3289
Fax: 410.290.3291

Massachusetts

Tel: 978.244.3800
Fax: 978.244.3820

Minnesota

Tel: 612.854.8162
Fax: 612.854.8120

North Carolina

Tel: 919.376.5419
Fax: 919.376.5421

Pennsylvania

Tel: 215.830.1458
Fax: 215.706.0680

Texas

Tel: 972.235.8944
Fax: 972.235.965

International Sales Offices

Canada

Suite 203
135 Michael Cowpland Dr,
Kanata, Ontario K2M 2E9
Tel: 613.591.2074
Fax: 613.591.0348

France

361 Avenue General de Gaulle
92147 Clamart Cedex
Tel: +33 (0)1.40.83.11.00
Fax: +33 (0)1.40.94.11.04

Germany

Actel GmbH
Lohweg 27,
D-85375 Neufahrn, Germany
Phone: +49.(0)81.659.584.0
Fax: +49.(0)81.659.584.10

Hong Kong

39th Floor,
One Pacific Place,
88 Queensway
Admiralty, Hong Kong
Tel: +011.852.2273.5712
Fax: +011.852.2918.9693

Italy

Via Giovanni da Udine No. 34
20156 Milano
Tel: +39 (0)2.3809.3259
Fax: +39 (0)2.3809.3260

Japan

EXOS Ebisu Building 4F
1-24-14 Ebisu Shibuya-ku
Tokyo 150
Tel: +81 (0)3.3445.7671
Fax: +81 (0)3.3445.7668

Korea

135-090, 18th Floor,
Kyoung Am Building
157-27 Samsung-dong
Kangnam-ku, Seoul
Tel: +82 (0)2.555.7425
Fax: +82 (0)2.555.5779

Taiwan

4F-3, No. 75, Sec. 1,
Hsin-Tai-Wu Road,
Hsi-chih, Taipei, 221
Tel: +886 (0)2.698.2525
Fax: +886 (0)2.698.2548

United Kingdom

Dunlop House,
Riverside Way
Camberley,
Surrey GU15 3YL
Tel: +44 (0)1276.401452
Fax: +44 (0)1276.401490

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***For more information about Actel's products, call 888-99-ACTEL
or visit our Web site at <http://www.actel.com>***

Actel Corporation • 955 East Arques Avenue • Sunnyvale, CA USA 94086

U.S. Toll Free Line: 888-99-ACTEL • Customer Service: 408-739-1010 • Customer Service FAX: 408-522-8044

Customer Applications Center: 800-262-1060 • Customer Applications FAX: 408-739-1540

Actel Europe Ltd. • Dunlop House, Riverside Way • Camberley, Surrey GU15 3YL • Tel: +44 (0)1276.401452 •

Fax: +44 (0)1276.401490

Actel Japan • EXOS Ebisu Bldg. 4F • 1-24-14 Ebisu Shibuya-ku • Toyko 150 • Japan

Tel: +81 (0)334-457-671 Fax: +81 (0)334-457-668

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