

UG0809 FlashPro User Guide

SmartFusion, IGLOO, ProASIC3, Fusion, SmartFusion2, IGLOO2, RTG4, and PolarFire

NOTE: PDF files are intended to be viewed on the printed page; links and cross-references in this PDF file may point to external files and generate an error when clicked. **View the online help included with software to enable all linked content.**



**Microsemi Corporate Headquarters**

One Enterprise, Aliso Viejo,
CA 92656 USA
Within the USA: +1 (800) 713-4113
Outside the USA: +1 (949) 380-6100
Fax: +1 (949) 215-4996
Email:
sales.support@microsemi.com
www.microsemi.com

Microsemi makes no warranty, representation, or guarantee regarding the information contained herein or the suitability of its products and services for any particular purpose, nor does Microsemi assume any liability whatsoever arising out of the application or use of any product or circuit. The products sold hereunder and any other products sold by Microsemi have been subject to limited testing and should not be used in conjunction with mission-critical equipment or applications. Any performance specifications are believed to be reliable but are not verified, and Buyer must conduct and complete all performance and other testing of the products, alone and together with, or installed in, any end-products. Buyer shall not rely on any data and performance specifications or parameters provided by Microsemi. It is the Buyer's responsibility to independently determine suitability of any products and to test and verify the same. The information provided by Microsemi hereunder is provided "as is, where is" and with all faults, and the entire risk associated with such information is entirely with the Buyer. Microsemi does not grant, explicitly or implicitly, to any party any patent rights, licenses, or any other IP rights, whether with regard to such information itself or anything described by such information. Information provided in this document is proprietary to Microsemi, and Microsemi reserves the right to make any changes to the information in this document or to any products and services at any time without notice.

About Microsemi

Microsemi Corporation (Nasdaq: MSCC) offers a comprehensive portfolio of semiconductor and system solutions for aerospace & defense, communications, data center and industrial markets. Products include high-performance and radiation-hardened analog mixed-signal integrated circuits, FPGAs, SoCs and ASICs; power management products; timing and synchronization devices and precise time solutions, setting the world's standard for time; voice processing devices; RF solutions; discrete components; enterprise storage and communication solutions; security technologies and scalable anti-tamper products; Ethernet solutions; Power-over-Ethernet ICs and midspans; as well as custom design capabilities and services. Microsemi is headquartered in Aliso Viejo, California, and has approximately 4,800 employees globally. Learn more at www.microsemi.com.

©2018 Microsemi Corporation. All rights reserved. Microsemi and the Microsemi logo are registered trademarks of Microsemi Corporation. All other trademarks and service marks are the property of their respective owners.

Table of Contents

About FlashPro	9
Programming Tool Model Overview.....	10
Programming Tool User Model Overview - SmartFusion Only.....	12
SmartFusion2 Programming	13
Supported Families.....	14
Installing FlashPro Software and Hardware	15
Starting FlashPro	15
FlashPro Interface	16
Creating a New Project	17
Opening a Project	18
Saving a Project	18
Parallel Programming with FlashPro5/4/3/3X	18
Serialization with FlashPro.....	19
FlashPro and SVF.....	20
FlashPro and the 1532 File Format	21
Introductory Programming Tutorials	23
Single STAPL/PDB File Basic Tutorial.....	23
Single Microsemi Device with Serialization Tutorial	26
Chain Programming Tutorial	31
SmartFusion Programming Tutorial	35
Modifying Memory Contents and Programming a Device Tutorial	36
Modifying FlashROM Contents and Programming a Device Tutorial	37
Programming Only Security Settings Tutorial	39
Automatic Chain Construction Tutorial	41
eNVM/EFMB Client JTAG Protection Use Flow	44
eNVM Client JTAG Protection Tutorial - SmartFusion.....	45
EFMB Client JTAG Protection Tutorial - Fusion	50
Fusion Calibration Backup and Recovery Tutorial.....	53
Specify I/O States During Programming Tutorial.....	54
Advanced Tutorials.....	57
Multiple Device Chain Programming.....	57
Multiple Device Serialization Chain Programming.....	59
Multiple Programmer Multiple Device Chain Programming.....	62
Multiple Programmer and Multiple Device Serialization Chain Programming	66
Setting Disabled Microsemi SoC Devices to HIGH-Z.....	69

Programming Settings and Operations	71
Programmer Settings	71
Ping Programmers	73
Performing a Self-Test	73
Scanning a Chain	74
Enabling and Disabling Programmers	74
Renaming a Programmer	74
Removing a Programmer	74
Selecting Programmers	75
Single Device Configuration	76
Single Device Programming	76
Loading a Programming File	76
Select Target Device	77
Chain Settings	78
Serial Settings	78
Chain Programming.....	80
Chain Order.....	80
Multiple Device Chain Programming.....	80
Chain Configuration Window	82
Editing the Chain Configuration Grid	83
Chain Editing.....	85
Using the Organize Buttons in the Chain Programming Grid	85
Cutting, Copying and Pasting Devices from the Chain.....	86
Removing Devices from the Chain	86
Moving Devices within the Chain	86
Skip Serial Data	86
Reuse Serial Data	86
Serialization with Parallel Programming	87
Chain Editing.....	88
Adding a Microsemi Device	88
Adding a Microsemi Device from Files.....	88
Adding a Non-Microsemi Device.....	88
Configuring a Programmer	91
Selecting an Action	91
Using Serialization	91
Modifying Programming Settings in FlashPro with a PDB File	92
Configuring Security	94
Configuring Security, FlashROM and Embedded Flash Memory Settings in FlashPro	94
Configuring Security Settings in FlashPro	95
Custom Security Settings.....	97
Changing or Disabling Security Keys.....	102
Configuring FlashROM Settings in FlashPro	102

Express Configuration.....	103
IGLOO and ProASIC3 Programming	104
Programming File Actions for IGLOO and ProASIC3 Devices	104
SmartFusion and Fusion (AFS) Programming	107
Programming File Actions - SmartFusion and Fusion	107
ProASIC ^{PLUS} and ProASIC Families Programming Introduction	111
Generating Programming Files	112
Generate a Programming File in FlashPoint.....	112
Programming File Types	113
Generate a Programming File for SmartFusion	114
Generate a Programming File for CoreMP7/Cortex-M1 Device Support	115
Generate a Programming File for AFS Device Support - Designer Only	115
Generate a Programming File for Serialization Support in In House Programming (IHP)	116
Creating a Programming Database (PDB) File in Designer	119
Programming Embedded Flash Memory Block	119
Programming the FPGA Array	120
Programming the FlashROM	120
Silicon Signature	122
Programming Security Settings	122
Custom Security Levels	123
Reprogramming a Secured Device.....	128
Custom Serialization Data for FlashROM Region	130
Custom Serialization Data File Format	131
Specifying I/O States During Programming	133
Custom I/O Settings and Boundary Scan Registers.....	135
Specifying I/O States During Programming - I/O States and BSR Details	135
Specify I/O States During Programming Dialog Box	137
Generate a DAT file	138
Parallel Port Cable Information	139
Importing and Exporting Files	140
Importing Configuration Files	140
Exporting Configuration Files	140
Export Programming Files (SmartFusion Only)	140
Exporting a Chain STAPL File	141
Exporting a Chain SVF File.....	141
Exporting Single Device STAPL Files.....	142
Exporting Single Device SVF Files	142
Exporting Single Device 1532 Files	142
Opening an Existing FlashPro Project on a Different Machine.....	143
Using Hot Keys	144
General Hot Keys.....	144
Single Device Programming Hot Keys.....	144

Chain Programming Hot Keys	145
Batch Mode	145
About TCL Commands - FlashPro Tcl Command Reference.....	146
Running Tcl Scripts from within FlashPro	149
Running Tcl Scripts from the Command Line	149
Exporting Tcl Scripts from within FlashPro	150
Troubleshooting	198
Loopback Test.....	198
Exit Codes (PolarFire).....	198
Exit Codes (SmartFusion2 and IGLOO2)	203
Exit Codes for Software v8.6 and Above (SmartFusion, IGLOO, ProASIC3 and Fusion).....	209
Exit Codes for pre-v8.6 Software (SmartFusion, IGLOO, ProASIC3 and Fusion)	224
ProASIC ^{PLUS} and ProASIC Exit Codes	230
Electrical Parameters	237
DC Characteristics for FlashPro5/4/3/3X	237
DC Characteristics for FlashPro Lite.....	238
DC Characteristics for FlashPro	239
Electrical Specifications.....	241
FlashPro5.....	241
FlashPro4.....	242
FlashPro3.....	243
FlashPro Lite	244
FlashPro	245
FlashPro 5/4/3/3X Characteristics	247
FlashPro and FlashPro Lite Characteristics	248
Illustration of the JTAG Switching Characteristics	248
Reference Topics.....	249
Customizing the Toolbar	249
Customizing the Programming Window.....	250
FlashPro Preferences	251
FlashPro File Menu.....	254
FlashPro Edit Menu.....	255
FlashPro View Menu	255
FlashPro Tools Menu	256
FlashPro Programmers Menu	257
FlashPro Configuration Menu	257
FlashPro Customize Menu.....	258
FlashPro Help Menu	258
FlashPro Flow Window	259
FlashPro Log Window.....	259
FlashPro Status Bar	260
FlashPro Programmer List Window	260
Programmer Details Window	261



FlashPro Single Device Configuration Window262

Chain Configuration Window265

Microsemi SoC Products Group Headquarters267

Contact Information.....267

Regulatory and Compliance Information.....268

About FlashPro

FlashPro is Microsemi's programming software tool for PolarFire, SmartFusion2, IGLOO2, RTG4, SmartFusion, IGLOO, ProASIC3, and Fusion devices. You will be able to navigate easily through the FlashPro software because of its similarities with other Microsemi software tools.

The FlashPro software includes the following features:

- Supports modification of I/O states during programming
- Supports automatic construction of chain from scan chain operation
- Supports importing non-Microsemi BSDL files for automatic chain construction
- Supports direct multiple Microsemi device chain programming and serialization
- Supports single device STAPL files generation
- Supports single device SVF files generation
- Supports single device IEEE 1532 files generation
- Supports Chain SVF file generation
- Supports a single GUI to drive multiple FlashPro5/4/3/3X programmers for parallel programming
- Supports 1.2V programming for IGLOO devices
- Supports device serialization for parallel programming
- A redesigned GUI, which features a project manager to manage the programming files and data
- Enhanced In-System Programming (ISP) Support

An optional In-House Programming (IHP) service is available if you are purchasing Microsemi devices in volume. Contact [Microsemi](#) for more information.

For step-by-step instructions on how to use these features, see the [FlashPro Tutorial](#).

If you arrived here by pressing the F1 key in FlashPro, use the **Search** tool in help for more information on specific content, or click the **Help** button embedded in any dialog box or GUI for context-specific help.

Support Notes

- FlashPro3 is not supported on Windows 8.1.
- PC support: Libero supports programming of all families. For SmartFusion, Fusion, IGLOO, and ProASIC3 projects, use FlashPro. For PolarFire, SmartFusion2, IGLOO2, and RTG4 projects, use FlashPro Express.
- Linux support: Libero supports programming for PolarFire, SmartFusion2, IGLOO2, and RTG4 projects only using FlashPro Express.
- The JTAG chain supports programming of all Microsemi device families.
- Parallel programming via FlashPro (USB/LPT1) or FlashPro Lite programmers is not supported.

See [the Microsemi Website](#) for more information about FlashPro.

Programming Tool Model Overview

The FlashPro software is designed for use in the operation, user design, and production programming flows.

Design Debug

The figure below illustrates the programming design flow when an engineer is in debug mode. In the programming design flow, the new Programming files (STAPL/ PDB) are generated for a design change and are sent to the FlashPro software for testing and debugging the design.

Note: FlashPoint is integrated into Designer; therefore, the STAPL file is generated from Designer. FlashPro v6.2 and greater can be used to export STAPL files from PDB files created by FlashPoint (Designer).

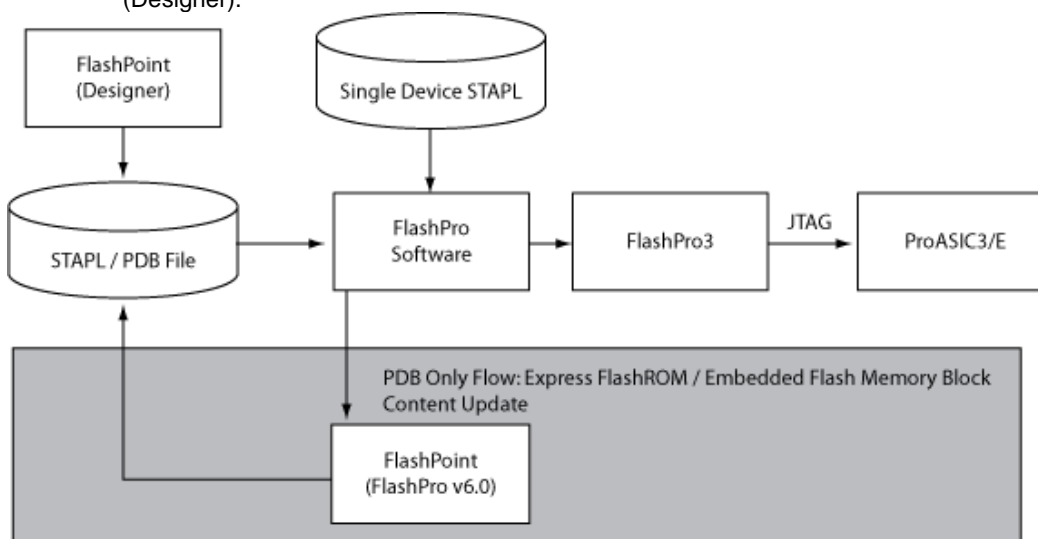


Figure 1 · Programming Design Flow

Operation/Production Planning

The figure below shows an illustration of the operation flow. In this illustration, the production coordinator generates the programming files (STAPL/PDB) with or without serialization and/or security settings (see Programming application note for further information). The production coordinator loads the programming file in the FlashPro software to set up the configurations for production programming, such as Serialization options, Action selections, and Procedure selections, etc.

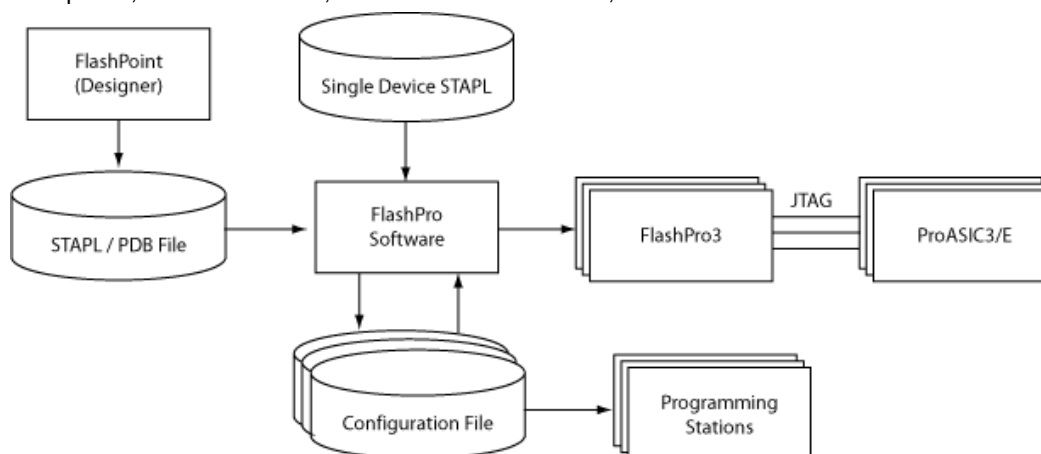


Figure 2 · Operation Flow

The production coordinator may want to generate different configuration files for each programming station (depending on the logistics and serialization options). For example, if the Programming file contains 10,000 serial data and the production coordinator decides to split the serial data designation to one thousand for each programming station, then ten configuration files will be generated (one for each of the ten programming stations). However, if you are not using serialization, you only need one configuration file.

The production coordinator can test the configuration files with one or more FlashPro5/4/3/3X programmers before sending it to the production programming floor. If PDB files are used in the production flow, warning icons may appear on the FlashPro/FlashPoint GUI because the automatic audit cannot find the source file on the production environment; the PDB file contains the valid programming data. If STAPL files are used, loaded STAPL files will be audited on execution of an action to determine if the original STAPL file has been modified. If it has not been modified, the action will continue to run. If it has been modified you will be prompted to reload the modified STAPL file, or to continue running the current action. If you select to reload the modified STAPL file, all previous programming settings will be refreshed and will need to be performed again.

Operation/Production Programming

The figure below shows an illustration of the production programming flow. The operator imports the configuration file and begins programming the devices by clicking the **Run** button. The operator's interaction with FlashPro should be limited.

At the end of a programming session, the serialization log file (if applicable) and the programming log file are sent back to the production coordinator for record keeping.

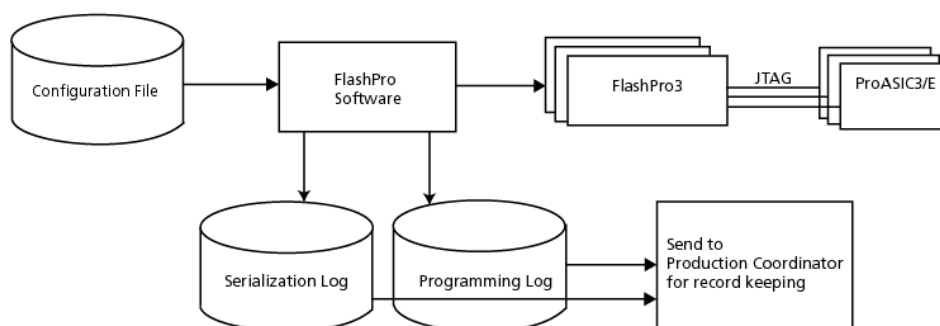


Figure 3 · Production Programming Flow

Express Configuration Programming (IGLOO, ProASIC3 and Fusion devices only)

The figure below illustrates the Express Configuration Programming Flow. In this flow, you can program the security setting into the IGLOO, ProASIC3 and Fusion family device directly from the FlashPro software.

Note: FlashPoint is integrated into the FlashPro v6.0 and later software.

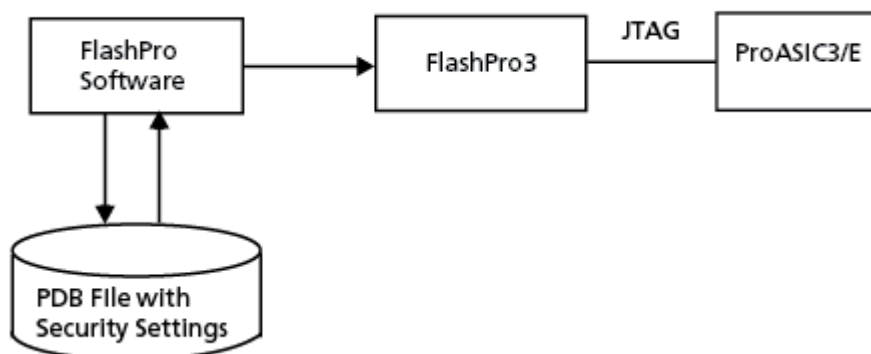


Figure 4 · Express Configuration Programming Flow

Programming Tool User Model Overview - SmartFusion Only

The FlashPro software is designed for use in the operation, user design, and production programming flows.

Design Debug

The figure below illustrates the programming design flow when an engineer is in debug mode. In the programming design flow, the new files (FDB, UFC, EFC) are generated for a design change and are sent to the FlashPro software for testing and debugging the design.

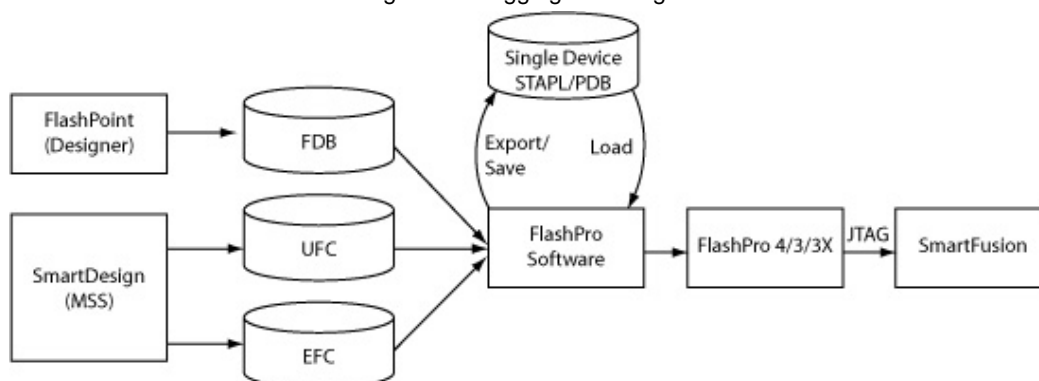


Figure 5 · SmartFusion Programming Design Debug Flow

Operation/Production Planning

The figure below shows an illustration of the operation flow. In this illustration, the production coordinator generates the programming files (STAPL/PDB) with or without serialization and/or security settings (see Programming application note for further information). The production coordinator loads the programming file in the FlashPro software to set up the configurations for production programming, such as Serialization options, Action selections, and Procedure selections, etc.

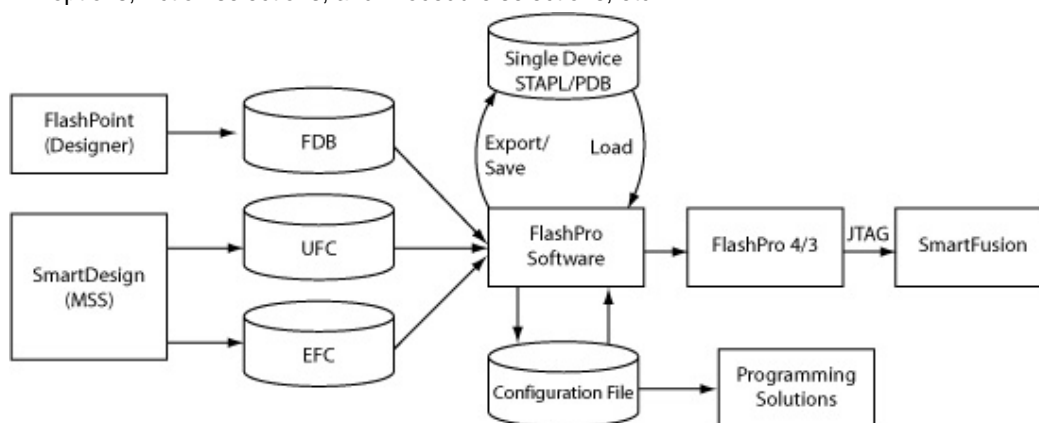


Figure 6 · SmartFusion Operation Flow

The production coordinator may want to generate different configuration files for each programming station (depending on the logistics and serialization options). For example, if the Programming file contains 10,000 serial data and the production coordinator decides to split the serial data designation to one thousand for each programming station, then ten configuration files will be generated (one for each of the ten programming stations). However, if you are not using serialization, you only need one configuration file.

The production coordinator can test the configuration files with one or more FlashPro5/4/3/3X programmers before sending it to the production programming floor. If PDB files are used in the production flow, warning icons may appear on the FlashPro/FlashPoint GUI because the automatic audit cannot find the source file on the production environment; the PDB file contains the valid programming data. If STAPL files are used, loaded STAPL files will be audited on execution of an action to determine if the original STAPL file has been modified. If it has not been modified, the action will continue to run. If it has been modified you will be

prompted to reload the modified STAPL file, or to continue running the current action. If you select to reload the modified STAPL file, all previous programming settings will be refreshed and will need to be performed again.

Operation/Production Programming

The figure below shows an illustration of the production programming flow. The operator imports the configuration file and begins programming the devices by clicking the **Run** button. The operator's interaction with FlashPro should be limited.

At the end of a programming session, the serialization log file (if applicable) and the programming log file are sent back to the production coordinator for record keeping.

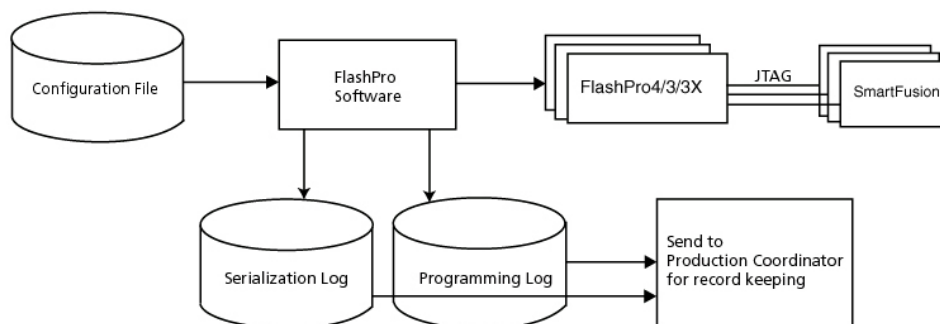


Figure 7 · SmartFusion Production Programming Flow

Creating a New PDB for SmartFusion

The figure below illustrates the new [SmartFusion programming flow](#). In this flow you can program the security, FPGA Array, FlashROM and Embedded Flash Memory (NVM) for SmartFusion.

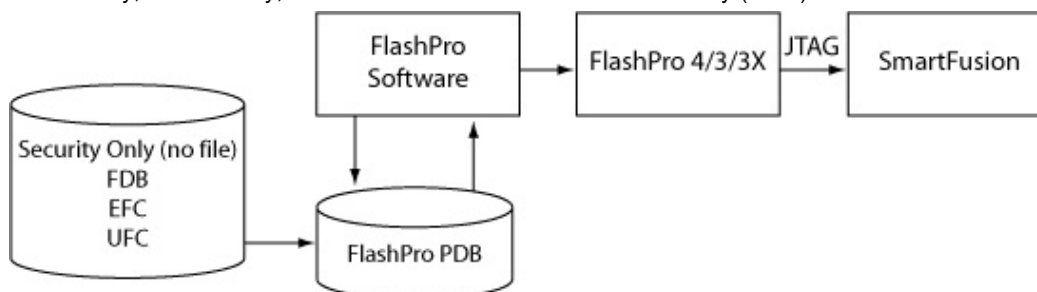


Figure 8 · Creating a New PDB for SmartFusion

SmartFusion2 Programming

SmartFusion2 programming is executed from within Libero SoC.

See the Libero SoC help for information on SmartFusion2 programming, including programming authentication error codes and programming error codes.

Supported Families

Microsemi's Libero SoC software supports the following device families and their derivatives.

Table 1 • Product Families and Derivatives

Device Family	Family Derivatives	Description
PolarFire	N/A	Lowest power, cost optimized, mid-range solution
SmartFusion2	N/A	Address fundamental requirements for advanced security, high reliability and low power in critical industrial, military, aviation, communications and medical applications.
IGLOO2	N/A	Low-power mixed-signal programmable solution
RTG4	N/A	Radiation-tolerant programmable solution
SmartFusion	SmartFusion	SmartFusion intelligent mixed-signal FPGAs are the only devices that integrate an FPGA, ARM Cortex-M3, and programmable analog, offering full customization and IP protection.
Fusion	N/A	Mixed-signal FPGA integrating ProASIC3 FPGA fabric, programmable analog block, support for ARM® Cortex™-M1 soft processors, and flash memory into a monolithic device.
IGLOO	IGLOO	The ultra-low-power, programmable solution
	IGLOOe	Higher density IGLOO FPGAs with six PLLs and additional I/O standards
	IGLOO nano	The industry's lowest power, smallest size solution
	IGLOO PLUS	The low-power FPGA with enhanced I/O capabilities
ProASIC3	ProASIC3	The low-power, low-cost, FPGA solution
	ProASIC3E	Higher density ProASIC3 FPGAs with six PLLs and additional I/O standards
	ProASIC3 nano	Lowest cost solution with enhanced I/O capabilities
	ProASIC3L	The FPGA that balances low power, performance, and low cost
	Automotive ProASIC3	ProASIC3 FPGAs qualified for automotive applications
	Military ProASIC3/EL	Military temperature A3PE600L, A3P1000, and A3PE3000L
	RT ProASIC3	Radiation-tolerant RT3PE600L and RT3PE3000L

Installing FlashPro Software and Hardware

See [the Microsemi Website](#) for more information about FlashPro.

Starting FlashPro

You can start the FlashPro software from **Programs > Microsemi FlashPro vx.x > FlashPro**. If you installed the program in a folder other than FlashPro, choose that folder from the **Programs** menu.

The figure below shows the FlashPro GUI. From this GUI, you can create a new project by clicking the **New Project** button or open an existing project by clicking the **Open Project** button.

You can also access the above features from the menu bar. You can access all the other features after you [open](#) or [create](#) a new project.

FlashPro Interface

The main FlashPro interface consists of two views, one for Single Device Programming and the other for Chain Programming (see figure below). The GUI consists of a [Flow window](#), Device Configuration Window (for [single](#) or [chain programming](#)), [Log](#) window and a [Status](#) bar. The Log window displays programming information, error messages, and warning messages. The Status bar displays your programming mode (chain programming or single device programming) and file status.

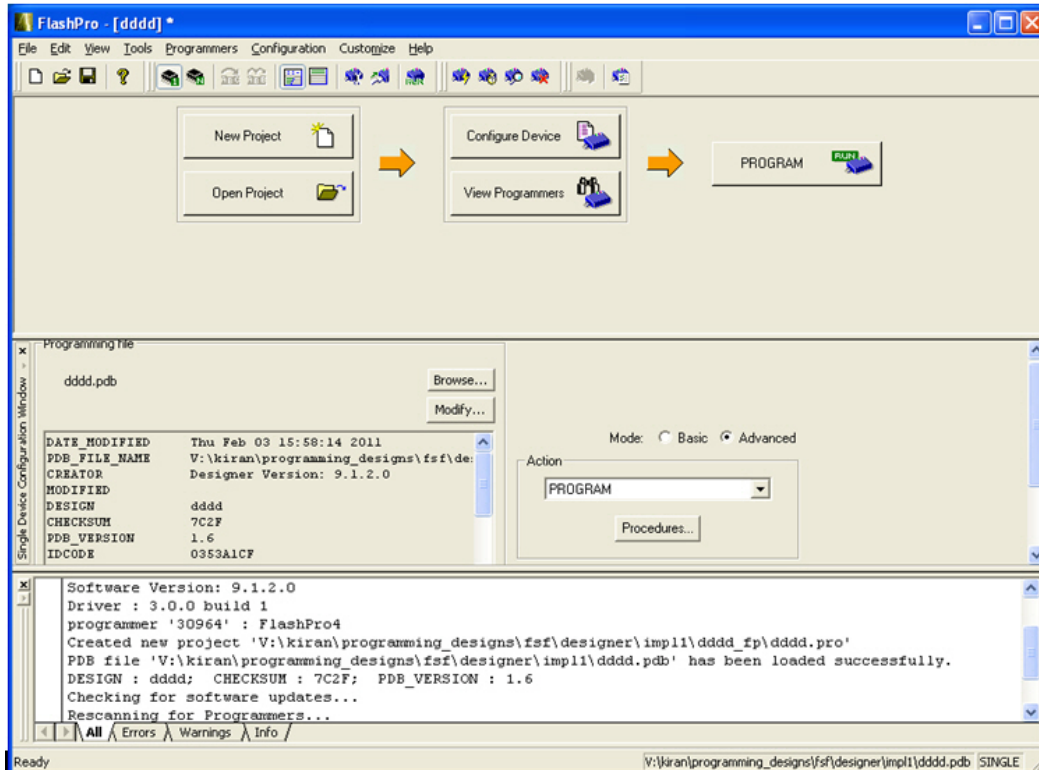


Figure 9 · FlashPro for Single Device File Programming

Note the different options in the Flow window for the Chain Programming GUI and the Single Device Programming GUI. In addition to the different Flow window options, the Chain Programming GUI view consists of the Chain Configuration window which displays the devices in your chain.

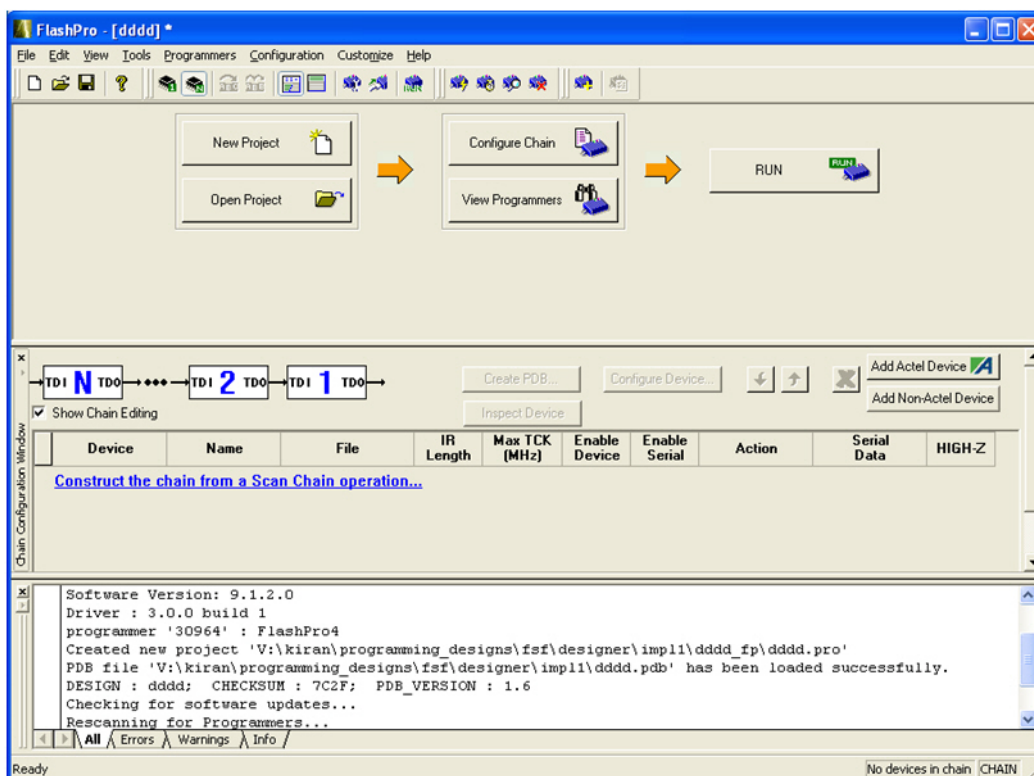


Figure 10 · FlashPro for Chain Programming

Creating a New Project

With the FlashPro software, you have the option of choosing either the **Single STAPL file** or **Chain programming** mode. You make this choice through the **New Project** dialog box (see figure below). By choosing the **Chain Programming** mode, you are enabling chain programming. The **Single STAPL file Programming** mode functions with the same programming capabilities as the FlashPro software v4.2.

To create a new project:

1. Click the **New Project** button or from the **File** menu choose **New Project**.
2. From the **New Project** dialog box, type in the name of your project in the **Project Name** field.

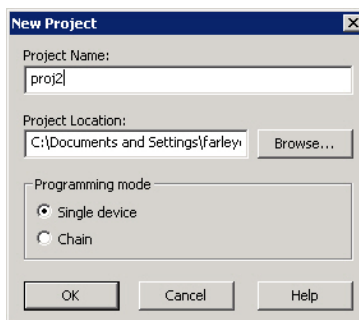


Figure 11 · New Project Dialog Box

3. If necessary, change the default location of your project in the **Project Location** field.
4. Choose your **Programming** mode (Single device or Chain).
5. Click **OK**. The FlashPro GUI displays (see figure below).

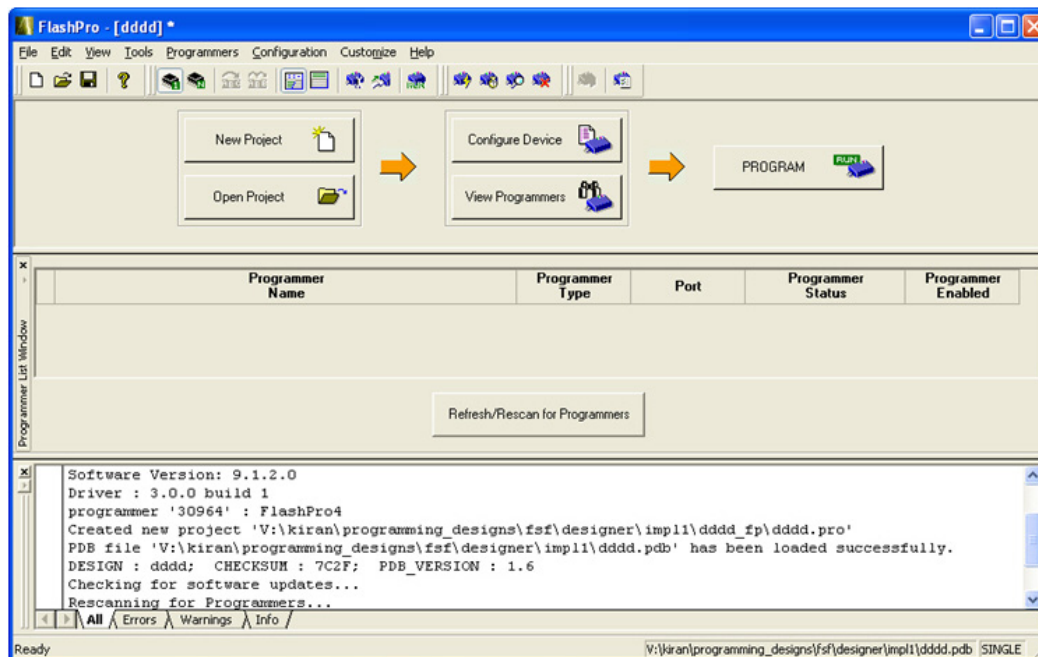


Figure 12 · FlashPro GUI

Note: You can switch between the two programming modes from Tools > Mode. From there, you can choose either Single Device Programming or Chain Programming.

Opening a Project

You can open a project from the **File** menu or by clicking on the **Open Project** button in the [flow window](#).

To open a project:

1. From the **File** menu, choose **Open Project**. The **Open Project** dialog box appears.
2. Find your project file or type in your project file name in the **File name** field.
3. Click **Open**.

Saving a Project

Click the **Save** button on the toolbar, or from the **File** menu choose **Save Project** to save your project.

If you want to save your project under a different name/path, from the **File** menu choose **Save Project As** and save your project with the new name.

Parallel Programming with FlashPro5/4/3/3X

Parallel programming enables you to program multiple Microsemi devices in parallel with multiple programmers. In parallel programming, all targeted devices are programmed with the same programming file (STAPL). The targeted device or chain configuration that is connected to each programmer must be identical.

The FlashPro software together with the FlashPro5/4/3/3X programmers supports parallel programming via a USB port. You can connect up to sixteen FlashPro5/4/3/3X's to a PC via a USB v1.1 or a USB v2.0 port. FlashPro5/4/3/3X requires a self-powered hub.

Connecting FlashPro5/4/3/3X (a USB v2.0 enabled programmer) to USB v1.1 port increases device programming time due to a slow data transfer rate on the USB v1.1 port in comparison to a USB v2.0 port.

Note: FlashPro (USB/LPT1) or FlashPro Lite programmers do not support parallel programming.

The following figure illustrates how you can connect a FlashPro5/4/3/3X programmer for parallel programming.

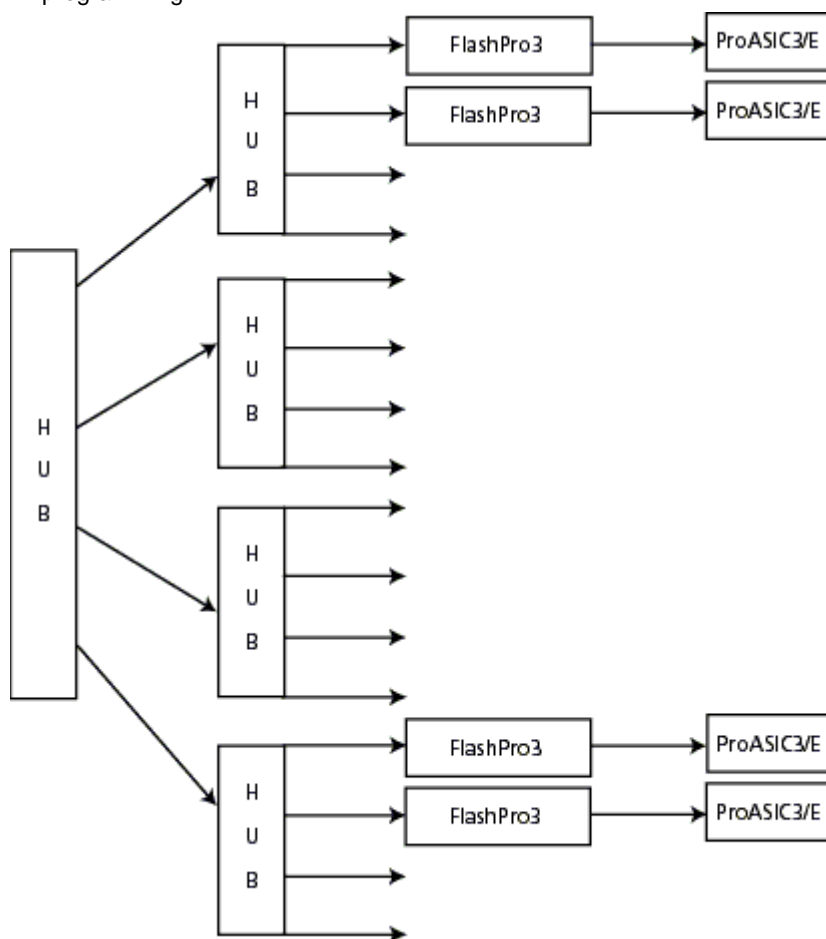


Figure 13 · Connecting a FlashPro5/4/3/3X Programmer

An independent thread processes the STAPL file during parallel programming. In an Microsemi test, parallel programming is approximately five times faster than programming 16 devices sequentially.

Note: Microsemi has tested Belkin PCI-USB cards and hubs. We have found that parallel programming works best with the vendor's latest driver installed and with the matching hubs.

Serialization with FlashPro

You can use the FlashROM in the ProASIC3 device for serialization. For each target ProASIC3 device, different FlashROM contents are generated.

Serial Programming enables you to program a sequence of ProASIC3 devices in serial with an identical FPGA program and with different serialization data. Serialization data can consist of different FlashROM content and/or AES key values. To learn how to activate the serialization feature, see [Skip Serial Data](#) or [Reuse Serial Data](#).

There are two different STAPL formats that support serial programming, multiple actions to multiple serial data and single action to multiple FlashROM.

Multiple Actions to Multiple FlashROM Serial Data

This format supports a generic STAPL player because the STAPL player does not provide a mechanism for Serial Programming. One programming action is created to target different serial data. See examples below:

- PROGRAM_1 programs the FPGA Array and the first serial data.

- PROGRAM_2 programs the FPGA Array and the second serial data.

Single Action to Multiple FlashROM Serial Data

This format is created when the target programmer is FlashPro, Sculptor II, or BP auto programmer, where the newly innovated Microsemi Serial Programming mechanism is supported. One programming action will program multiple serial data in serial.

FlashPro and SVF

SVF (Serial Vector Format) is an industry standard file format that is used to describe JTAG operations. Like STAPL files, SVF files are used for describing the in-system programming algorithm for SmartFusion, IGLOO, ProASIC3 and Fusion family devices. Unlike STAPL files, SVF files support only one ACTION or programming flow per file, due to language limitations. In addition, the SVF specification does not support message display and flow control, such as conditional statements or loops.

As a result, Microsemi tools (Designer and FlashPro software) generate a set of SVF files corresponding to the equivalent STAPL ACTIONS that are applicable to the silicon features selected.

For example, for a typical STAPL file that has the following ACTIONS: ERASE, ERASE_ALL, PROGRAM, PROGRAM_ARRAY, VERIFY, VERIFY_ARRAY, DEVICE_INFO, READ_IDCODE, and VERIFY_DEVICE_INFO, a set of corresponding SVF files are generated and named: ERASE.svf, ERASE_ALL.svf, PROGRAM.svf, PROGRAM_ARRAY.svf, etc. These files are generated in a folder, <Programming File Name>_svf, created during generation. The diagram below demonstrates the differences between the STAPL and SVF files that are created.

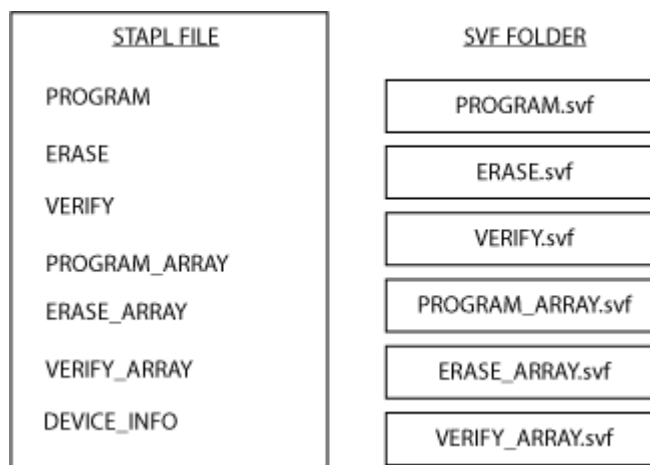


Figure 14 · STAPL vs SVF files

Note: DEVICE_INFO.svf file is not generated because SVF files do not support message display or flow control.

Table 2 · SVF Outline

SVF File	Array	FROM	NVM (Flash Memory System Builder)	Security Settings	Previously Programmed Device?
ERASE	X	X			YES or NO
ERASE_ALL	X	X		X	YES or NO
ERASE_ARRAY	X				YES or NO
ERASE_FROM		X			YES or NO

SVF File	Array	FROM	NVM (Flash Memory System Builder)	Security Settings	Previously Programmed Device?
ERASE_SECURITY				X	YES or NO
PROGRAM	X	X			YES or NO
PROGRAM_ARRAY	X				YES or NO
PROGRAM_FROM		X			YES or NO
PROGRAM_NVM			X		YES or NO
PROGRAM_SECURITY				X	YES or NO
VERIFY	X	X	X		YES or NO
VERIFY_ARRAY	X				YES or NO
VERIFY_FROM		X			YES or NO
VERIFY_NVM			X		NO
ENC_DATA_AUTHENTICATION	X				YES

STAPL Actions not Available with SVF

The following STAPL actions are not available with SVF: DEVICE_INFO, VERIFY_DEVICE_INFO, READ_IDCODE

FlashPro and the 1532 File Format

1532 is an IEEE industry standard file format that is used to describe JTAG operations. Like STAPL files, 1532 files are used for describing the in-system programming algorithm for SmartFusion, IGLOO, ProASIC3 and Fusion family devices. 1532 programming file generation will generate two files (*.isc, *.bsd) within a folder.

The folder will be created with the following name <Programming File Name>_1532. The *.bsd file contains the IEEE 1532 programming algorithm. The *.isc file contains the programming data to be programmed into the device.

IEEE 1532 programming files will only be exported in FlashPro for SmartFusion devices when an FDB has been properly imported.

STAPL to 1532 Action Mapping

The IEEE 1532 standard requires using default ACTION names in order to function with 1532 compliant players. The table below describes the STAPL to 1532 ACTION name mappings.

Note: 1532 ACTIONS can have a data member parameter to allow reuse of the same ACTION name for different features.

Table 3 · STAPL to 1532 Action Name Mapping

STAPL Action	1532 Action
ERASE_FROM	ERASE(FROM)
PROGRAM_FROM	PROGRAM(FROM)
VERIFY_FROM	VERIFY(FROM)
PROGRAM	PROGRAM
PROGRAM_ARRAY	PROGRAM(ARRAY)
ERASE_ARRAY	ERASE(ARRAY)
ERASE	ERASE
ERASE_ALL	ERASE(ALLDATA)
VERIFY	VERIFY
VERIFY_ARRAY	VERIFY(ARRAY)
READ_IDCODE	READ(IDCODE)
ENC_DATA_AUTHENTICATION	VERIFY(ENCDATA)
PROGRAM_SECURITY	PROGRAM(SEcurity)
DEVICE_INFO	READ
VERIFY_NVM	VERIFY_NVM
VERIFY_SECURITY	VERIFY(SEcurity)
PROGRAM_NVM	PROGRAM_NVM

STAPL Actions not Available with 1532

The following STAPL action is not available with 1532: VERIFY_DEVICE_INFO.

Introductory Programming Tutorials

Single STAPL/PDB File Basic Tutorial

This section provides step-by-step instructions to familiarize you with the basic features of the FlashPro software, specifically how to program a device. For more detailed step-by-step instructions and help with advanced features of the software, please see specific topics in the online help.

Note: This tutorial assumes that you have already installed the latest version of FlashPro software and have started the program.

First, create a new project and name it Tutorial. If FlashPro is launched through the Libero SoC, a new project will be created automatically and a PDB or FDB file loaded, if available.

To Create a Project:

1. Click the **New Project** button in FlashPro.
2. In the **New Project** dialog box, type Tutorial in the **Project Name** field.

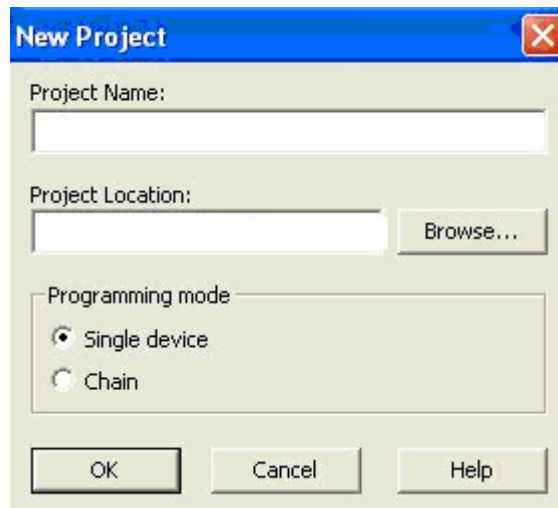


Figure 15 · New Project Dialog Box

3. If necessary, change the default location of your project in the **Project Location** field.
4. Select the Single device **Programming** mode
5. Click **OK**. The FlashPro GUI displays (see figure below). The Programmer List Window updates with your programmer information.

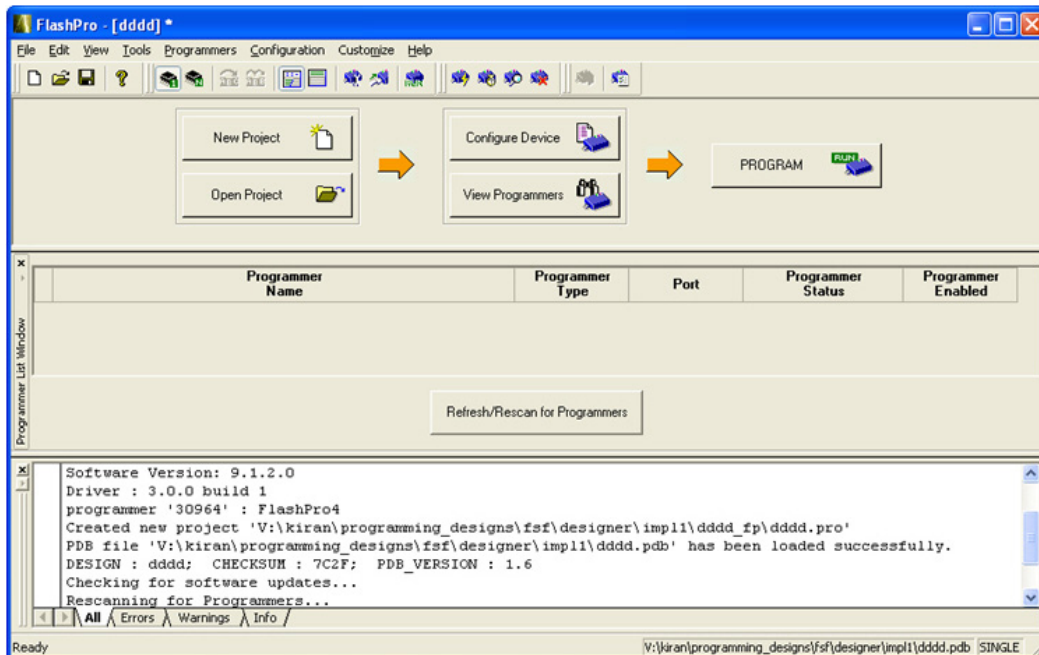


Figure 16 · FlashPro Main Window

Loading and Configuring a Programming File

Once you have created your project and connected your programmer, you are ready to load your PDB or STAPL file.

To load a Programming file:

1. Click the **Configure device** button. The **Single Device Configuration** window displays in FlashPro .
2. Click the **Browse** button to find your Programming file.
3. From the **Load Programming File** dialog box, select your Programming file and click **Open**.

The Single Device Configuration Window updates to list your Programming file information and the actions available with your Programming file in the Action list box (see figure below). Program is the default action displayed in the Action list box.

Note: Microsemi recommends using the default settings.

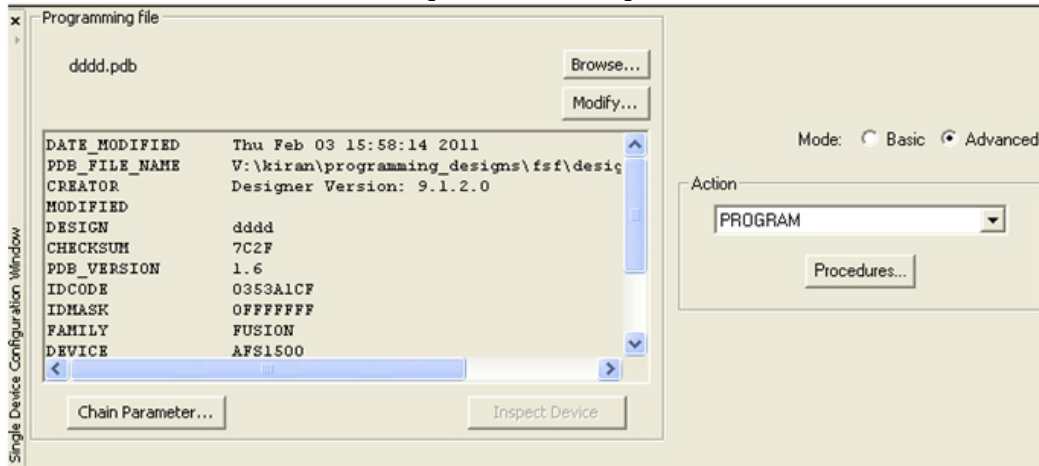


Figure 17 · Single Device Configuration Window

This tutorial gives instructions on how to program a device. For an explanation on the other actions available, see [Programming File Actions](#).

Programming a Device

Now that you have loaded your PDB file, programming a device is the next step.

To program a device:

1. From the **Action** list, select **Program** (see figure below).

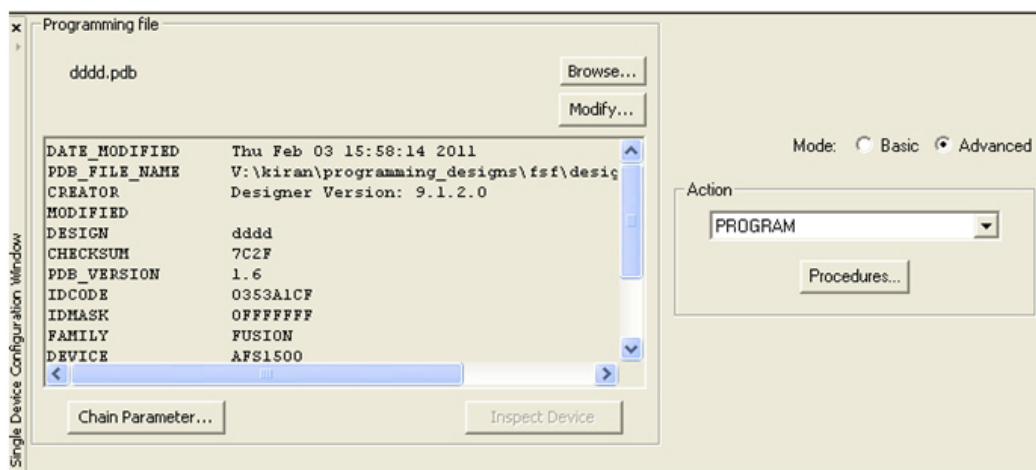


Figure 18 · Selecting Program from the Action List box

2. Click the **Procedures** button (see figure below).

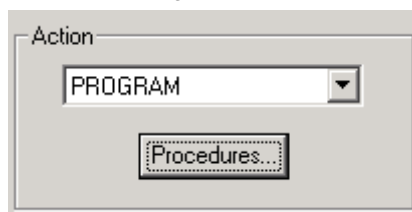


Figure 19 · Procedures Button

The **Select Action And Procedures** dialog box appears, showing the procedures for the Programming action (see figure below). Microsemi recommends using the default settings.

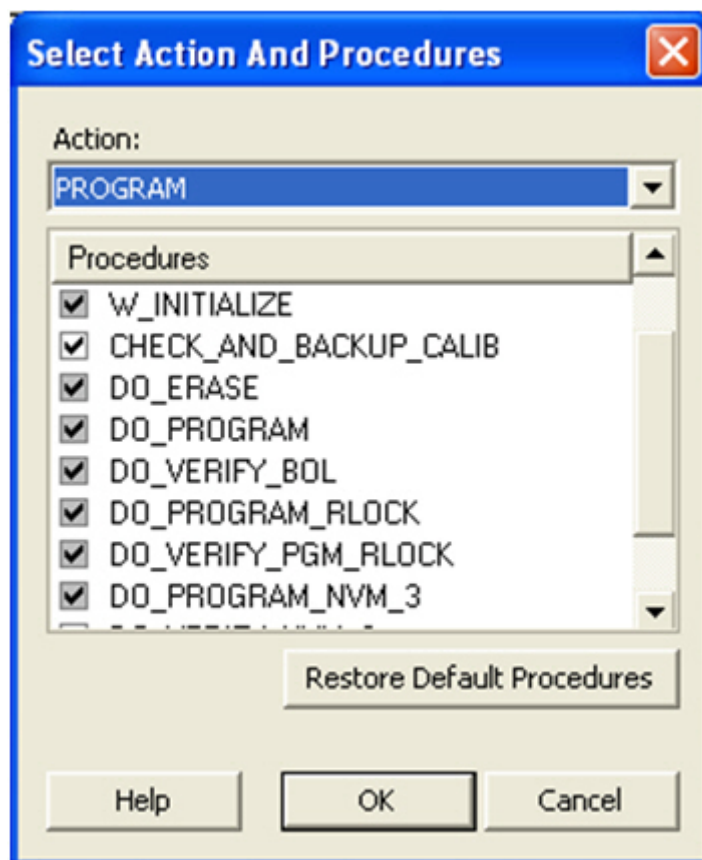


Figure 20 · Select Action and Procedures Dialog Box

3. Click the **Restore Default Procedures** button.
4. In FlashPro click the **Program** button to program your device.

The **Programmer List Window** updates the **Programmer Status** column with Run Passed indicating that you have successfully programmed the device (see figure below).

Note: The status indicator updates during programming to show the programming progress, then it will change to a pass or fail result when the operation is complete.

	Programmer Name	Programmer Type	Port	Programmer Status	Programmer Enabled
1	03375	FlashPro3	usb03375 (USB 1.1)	RUN PASSED	<input checked="" type="checkbox"/>

Figure 21 · Successfully Programmed Device

5. View the **Log** window and take note of the details about your programmed device.

Single Microsemi Device with Serialization Tutorial

This tutorial provides step-by-step instructions on how to program a single Microsemi Device with Serialization. Before you begin this tutorial, make sure you have already installed the FlashPro software and that you are familiar with the basic features of using the FlashPro software.

First, create the file generator using FlashROM for device serialization.

To Configure the FlashROM data for serialization:

1. In Libero SoC, generate FlashROM from the Catalog.
2. Drag the mouse across a page to create a region between Word 0 and Word 15. The region can range between 1 to 16 words.
3. Click **Create**.

4. From the Properties section in the FlashROM Create Core dialog box, select **Auto Inc** or **Read From File** region from the Content drop-down. For the Auto Inc region, specify the Step value (you cannot change this value later in FlashPro). Start Value and Max Value can be configured later in FlashPro. For Read from File, enter the File name, and File Type (BIN/HEX/DEC/TEXT).
5. Click **Generate**.
6. Click **OK** in the Generate Core pop-up that appears.
7. Complete the normal design flow and finish Place and Route.

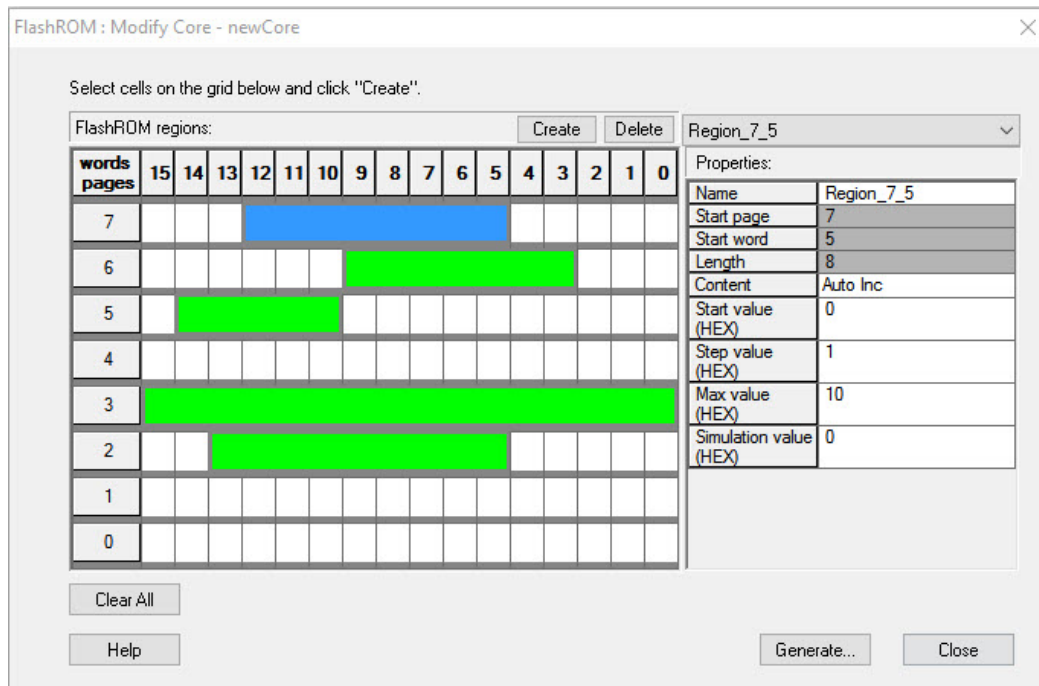


Figure 22 • FlashROM Settings

8. Inside the Design Flow window, right-click **Export Programming File** and select **Open Interactively**. This opens FlashPro and automatically loads the PDB from Libero SoC.
9. Click **Configure Device**.
10. Click **Modify**, which opens FlashPoint.

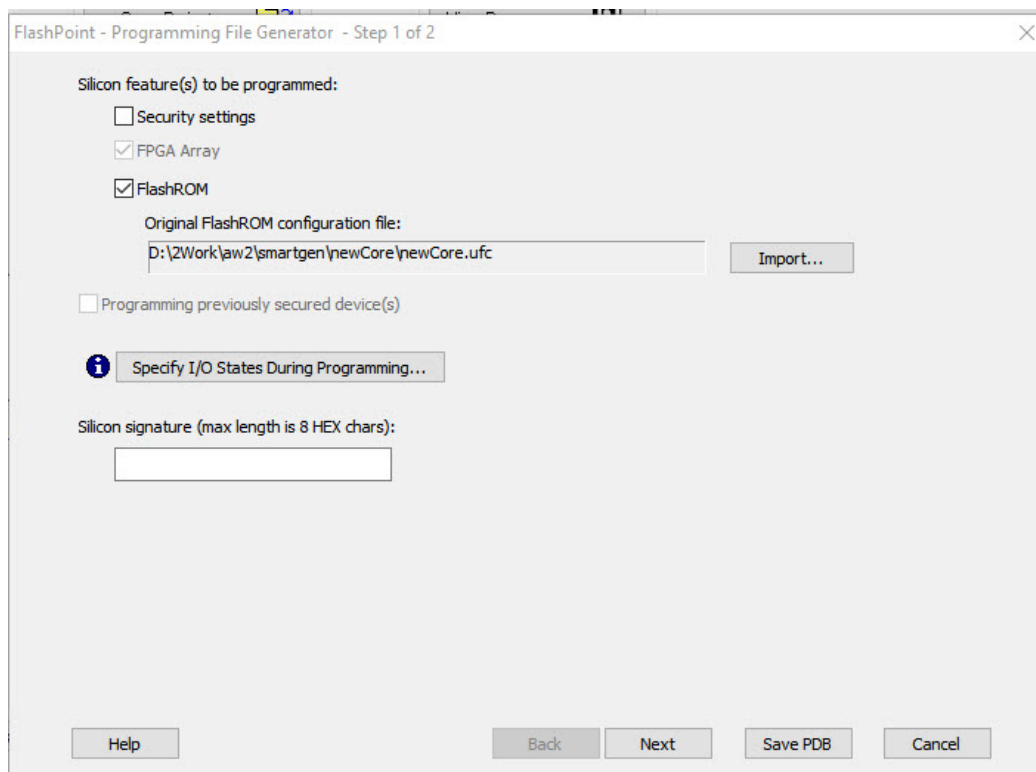


Figure 23 · FlashPoint

FlashROM is selected for programming by default.

The FlashROM Configuration File (*.ufc) file is imported from Libero SoC by default.

11. Click **Next**. The FlashROM Settings window appears (as shown in the figure below).

FlashROM Settings - Step 2 of 2

Program page	words	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
<input checked="" type="checkbox"/>	7																
<input checked="" type="checkbox"/>	6																
<input checked="" type="checkbox"/>	5																
<input type="checkbox"/>	4																
<input checked="" type="checkbox"/>	3																
<input checked="" type="checkbox"/>	2																
<input type="checkbox"/>	1																
<input type="checkbox"/>	0																

FlashROM regions: Region_7_5

Properties:

Name	Region_7_5
Start page	7
Start word	5
Length	8
Content	Auto Inc
Start value (HEX)	0
Step value (HEX)	1
Max value (HEX)	10

Number of devices to program: 10

Help Back Save PDB Cancel

12. All pages are selected by default for programming. You can deselect/uncheck the FROM page you want to program. Note: The generated PDB file contains only the data that targets the selected FROM page.
13. Modify properties for the serialization by specifying the Start and Max values. For the Auto Inc region, specify the Start and Max values. For the Read From File region, select the file name of the custom serialization file.
14. Enter the number of devices you want to program and generate the required programming file. Entering a value greater than 1 enables serialization.
15. Select **Save PDB** to save settings and serialization will be enabled by default

You have completed the steps to enable device serialization. Now you are ready to program a device using Device Serialization in FlashPro.

To program a device using device serialization:

1. From FlashPro, click **Select Serialization Indexes**.

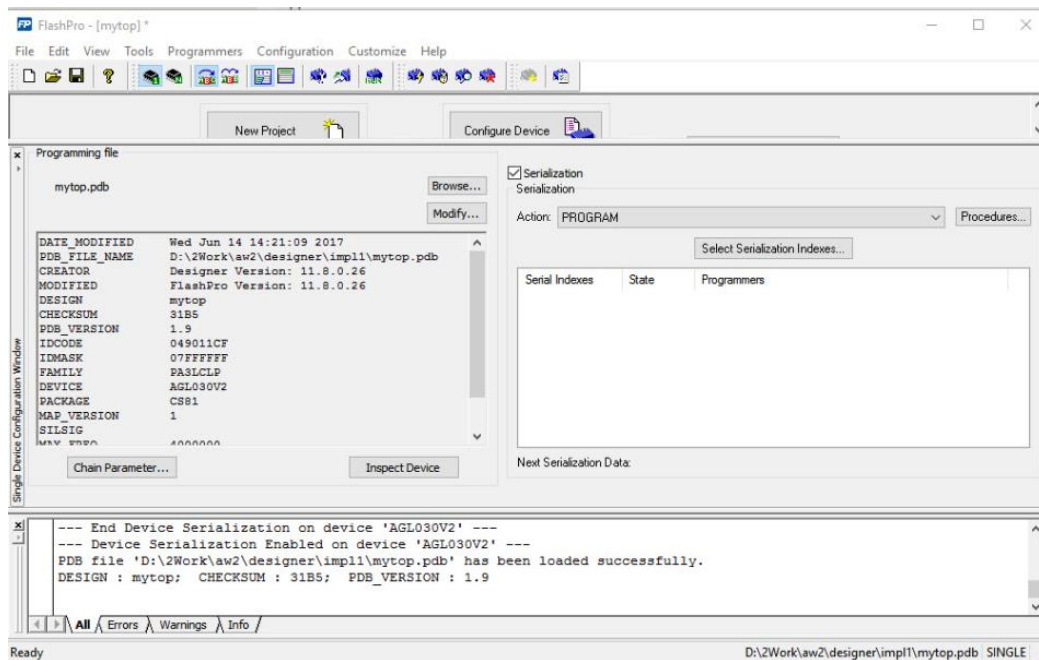


Figure 24 · FlashPro

2. The Serial Settings dialog box appears. See the figure below.

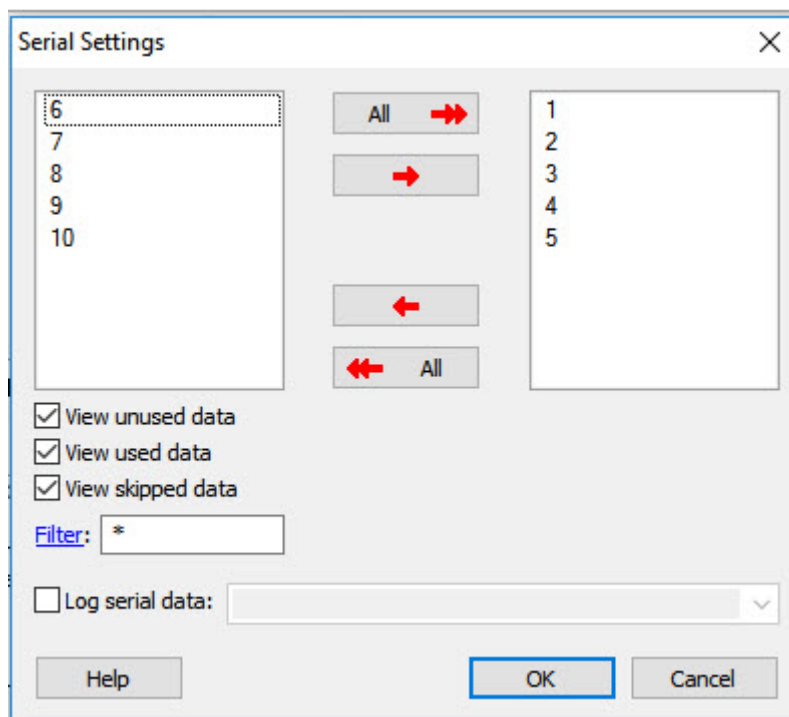


Figure 25 · Serial Settings Dialog Box

3. From the Serial Settings dialog box, click **All** to select all the serial data or use the left or right arrows to select what you need.
4. Click **OK**. The Serialization Indexes text box updates (see the figure below).

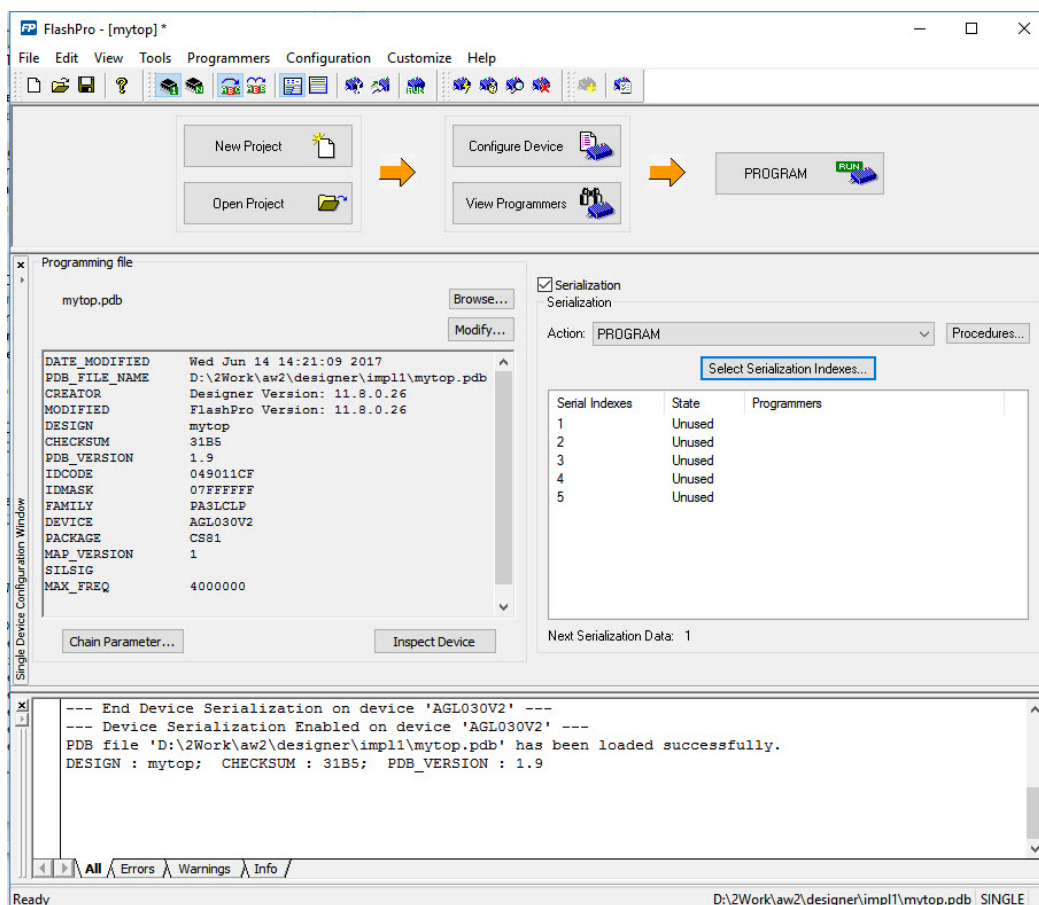


Figure 26 · Single STAPL File Configuration Window- Serialization Indexes Update

- Click the **Program** button inside FlashPro to program your device using serialization.

Chain Programming Tutorial

This tutorial demonstrates how to directly program an APA300 device that is part of a heterogeneous JTAG chain. The example in this tutorial uses one APA300 device and three non-Microsemi devices configured as shown in the figure below.

Note: This tutorial is performed in Advanced Mode. You can change your display mode to Advanced Mode from the [Preferences](#) dialog box.

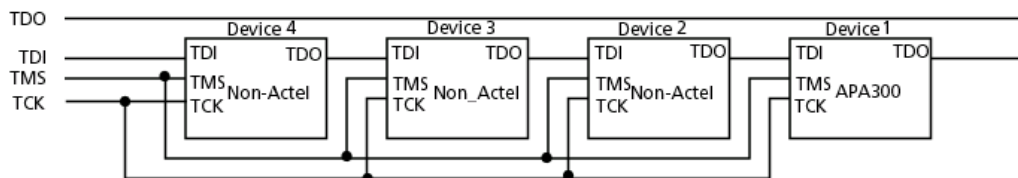


Figure 27 · APA Device Tutorial Example

First, create a new project.

To create a new project:

- Click the **New Project** button in FlashPro.
- In the **New Project** dialog box, type Tutorial in the Project Name field.
- Select the **Chain** option in the **Programming Mode**.

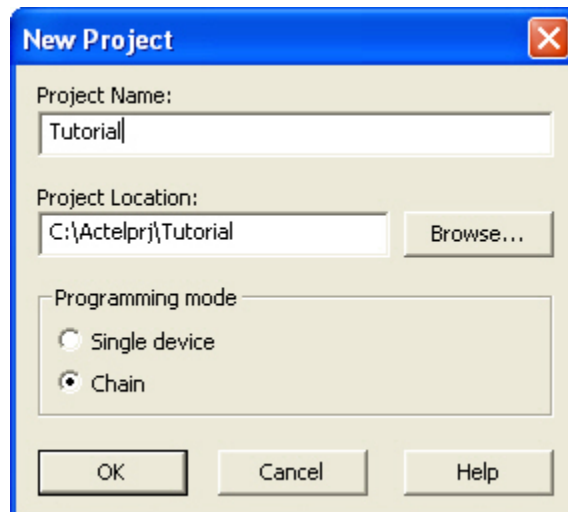


Figure 28 · New Project Dialog Box

4. If necessary, change the default location of your project in the **Project Location** field.
5. Click **OK**. The FlashPro GUI appears (see figure below).

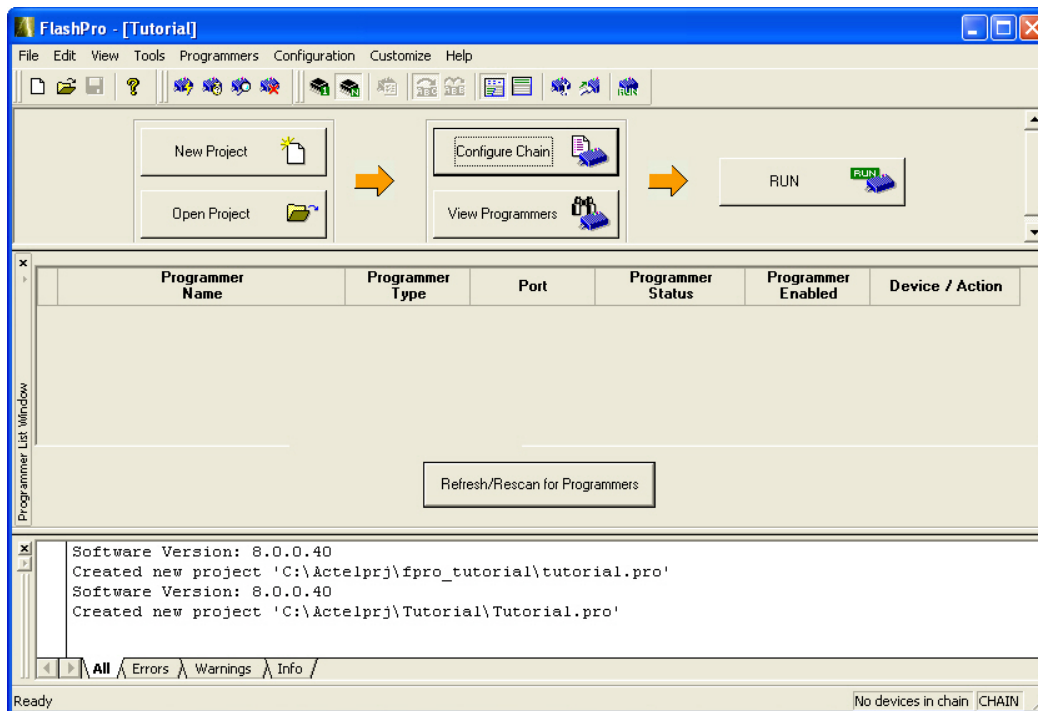


Figure 29 · FlashPro Main GUI

Note: The Programmer List Window updates with your programmer information.

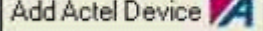
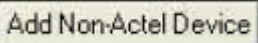
6. From the **Menu** bar, click **Programmers > Scan Chain** (or select the programmer in the **Programmer List Window**, right-click and choose **Scan Chain**).

Scan Chain shows how the devices are ordered in the chain in the **Log** window (see figure below). In this example, APA300 is the first device and will be programmed first in the chain since it is connected directly to TDO.

```

programmer '30175' : Scan Chain...
programmer '30175' : Found 32 instruction register bits.
programmer '30175' : Checking IDCODEs...
programmer '30175' : Device 1: 11A081CF Mfr: Actel Part: APA300
programmer '30175' : Device 2: Unknown
programmer '30175' : Device 3: Unknown
programmer '30175' : Device 4: Unknown
programmer '30175' : Scan Chain PASSED.
  
```

Figure 30 · Log Window Scan Chain Order

7. From the **Chain Configuration** window, click either ;  or  buttons to add devices to the chain. In this example, click the **Add Microsemi Device** button because the APA300 is the first device in the chain. The **Add Microsemi Device** dialog box displays (see figure below).

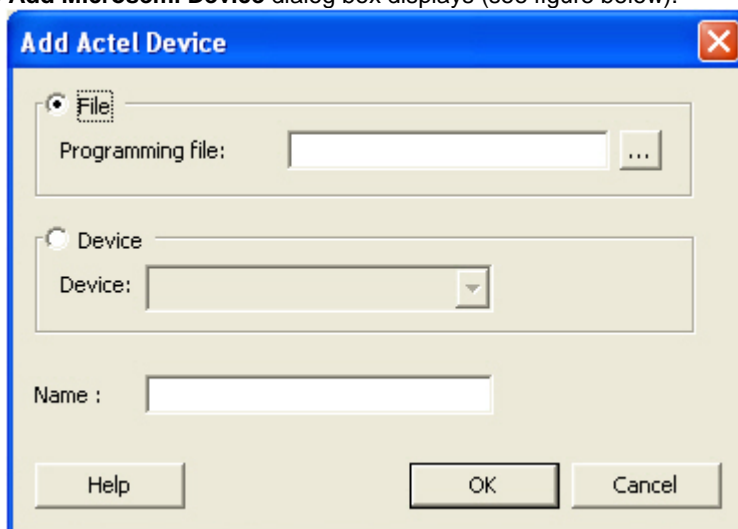



Figure 31 · Add Microsemi Device Dialog Box

8. Select the **File** radio button and click the **Browse** button to find your programming file.
9. Select the **Device** radio button, then choose the APA300 device from the **Device** drop-down.
10. In the **STAPL File** field, load the APA300.stp file by using the **Browse** button  to locate the file.
11. In the **Name** field, keep APA300 as the default name.
12. The APA300 device is added to the **Chain Configuration** Window (see figure below).

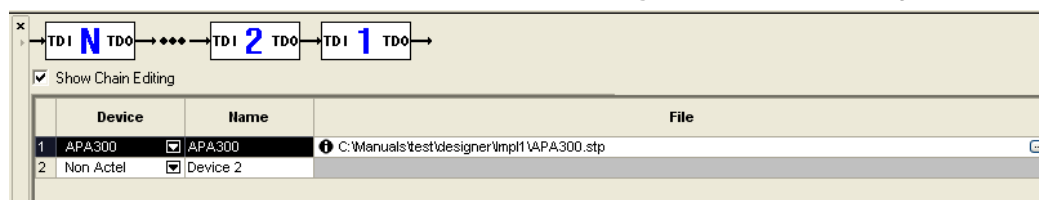


Figure 32 · Chain Configuration Window: Device One

12. Click the **Add Non-Microsemi Device** button to add the non-Microsemi device. The **Add Non-Microsemi Device** dialog box appears (see figure below). You can load the BSDL file or enter the IR length and Max TCK Frequency of the device. In this tutorial, you will enter the IR length and Max TCK frequency for this device.

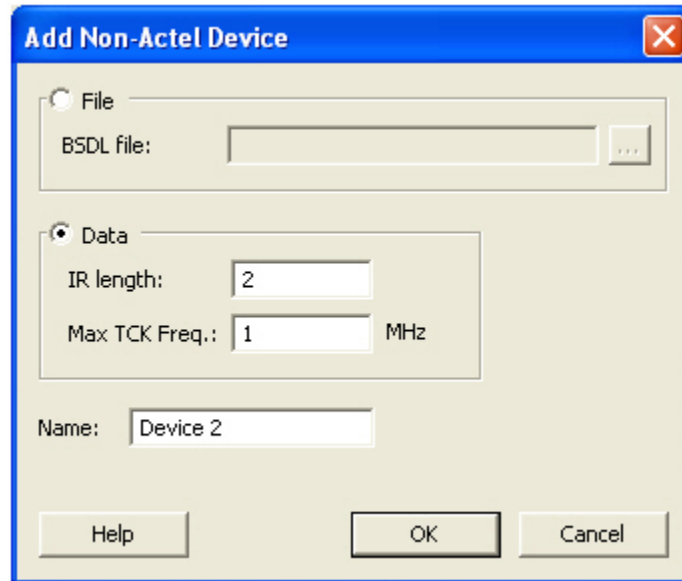


Figure 33 · Add Non-Microsemi Device Window

14. For this device, enter 8 in the **IR length** field and keep the **Max TCK freq** default to 1MHz.
15. Name the device, "Device 2" and click **OK**. The second device now appears in the Chain Configuration Window (as shown in the figure below).

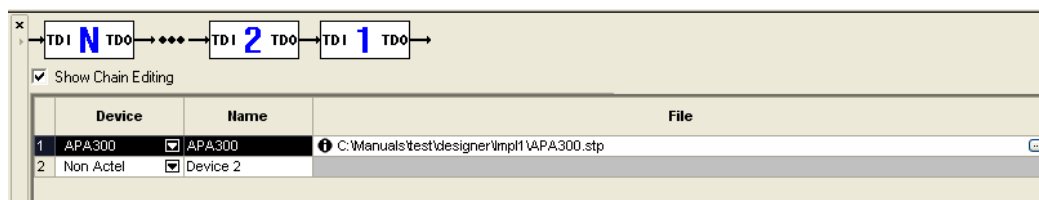


Figure 34 · Chain Configuration Window: Device Two

16. Repeat step 15 for Device 3 and Device 4.
17. Check the **Enable Device** box for the APA300 device. After you add all the devices in the chain, the **Chain Configuration Window** should look like the figure below.

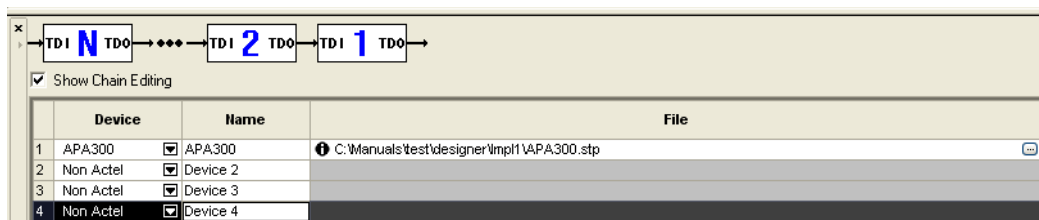


Figure 35 · Chain Configuration Window: All Devices in the Chain

18. After you have added all of the devices to the chain in the correct order, click the **Run** button to program the chain.
19. When programming is complete, the results are listed in the Log window (see figure below).

```

programmer '30175' : Scan Chain...
programmer '30175' : Scan Chain PASSED.
programmer '30175' : device 'APA300' : Executing action PROGRAM
programmer '30175' : device 'APA300' : SERIAL# = OC1DFA7BB06080
programmer '30175' : device 'APA300' : PROGRAMMING ARRAY
programmer '30175' : device 'APA300' : VERIFYING PROGRAMMED BITS...
programmer '30175' : device 'APA300' : VERIFYING NON-PROGRAMMED BITS...
programmer '30175' : device 'APA300' : Finished: Tue Jul 18 18:09:59 2006 (Elapsed time 00:03:00)
programmer '30175' : device 'APA300' : Executing action PROGRAM PASSED.
programmer '30175' : Chain programming PASSED.
  
```

Figure 36 · Programmer List Window: Programming Complete

SmartFusion Programming Tutorial

You can program your SmartFusion device without using the Libero SoC by using an EFC or UFC file from standalone SmartDesign, or using an FDB file from standalone Designer.

To program a SmartFusion device without using the Libero SoC:

1. Start FlashPro and click **New Project** to create a new project. Specify your **Project Name**, **Project Location** and **Programming Mode**.
2. Click **Configure Device**.
3. **Single Mode:** Click the **Create** button to create your new PDB programming file. The create PDB dialog box appears (as shown in the figure below).

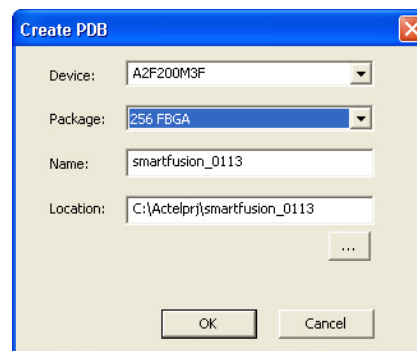


Figure 37 · Create PDB Dialog Box

Chain Mode: Click **Add Microsemi Device** and choose a SmartFusion device from the drop-down menu. Click the **Create PDB** button in the Chain Configuration Window. The Create PDB dialog box appears.

4. Specify your PDB parameters. Click **OK** to continue. The [FlashPoint SmartFusion Programming File](#) dialog box appears.
5. Specify your [security settings](#) and select which silicon features you want to program. Click the **Import** button for your [FPGA Array](#), [FlashROM](#) and [Embedded Flash Memory files](#) to add them to your PDB file.

You must have a FDB file to program your FPGA Array, a UFC file to program your FlashROM, and a EFC file to program your Embedded Flash Memory.

Click the **Modify** buttons if you wish to modify your FlashROM or Embedded Flash Memory files before you save your PDB file.

6. (Optional) [Specify your I/O States During Programming](#).
7. Click **Save PDB** to save your new PDB file.

If you make changes to your Security, I/O States During Programming, EFC, UFC or FDB file, click **Modify** in FlashPro to open and re-save your PDB with the updated files and settings.

See [Reprogramming a Secured Device](#) for information on programming a secured SmartFusion device.

Modifying Memory Contents and Programming a Device Tutorial

This tutorial provides step-by-step instructions on how to load a Program Database (PDB) file, modify the memory contents, and program the device.

Before you begin this tutorial, you should have a design with an EFMB client in it with a generated programming file for this design. You will first create a new project and title it "tutorial." If FlashPro is launched through Libero SoC, a new project will automatically be created and a PDB file will be loaded, if available.

Creating a new project

If you are familiar with this feature, follow the basic procedures for [creating a new project](#). However, if you would like step-by-step instructions, see the creating a new project section in the [Single STAPL/PDB File Basic Tutorial](#).

Loading and Configuring a PDB File

Once you have created your project and connected your programmer, you are ready to load your PDB file.

To load a PDB file:

- 1. Click the **Configure Device** button. The **Single PDB Configuration** window appears in FlashPro.
- 2. Click the **Browse** button to find your PDB file.
- 3. From the **Load PDB File** dialog box, find your PDB file and click **Open**.

Modify Embedded Flash Memory Block Content

Now, you are ready to modify the Embedded Flash Memory Block content.

To modify Embedded Flash Memory Block content:

- 1. Click the PDB Configuration button to open FlashPoint.

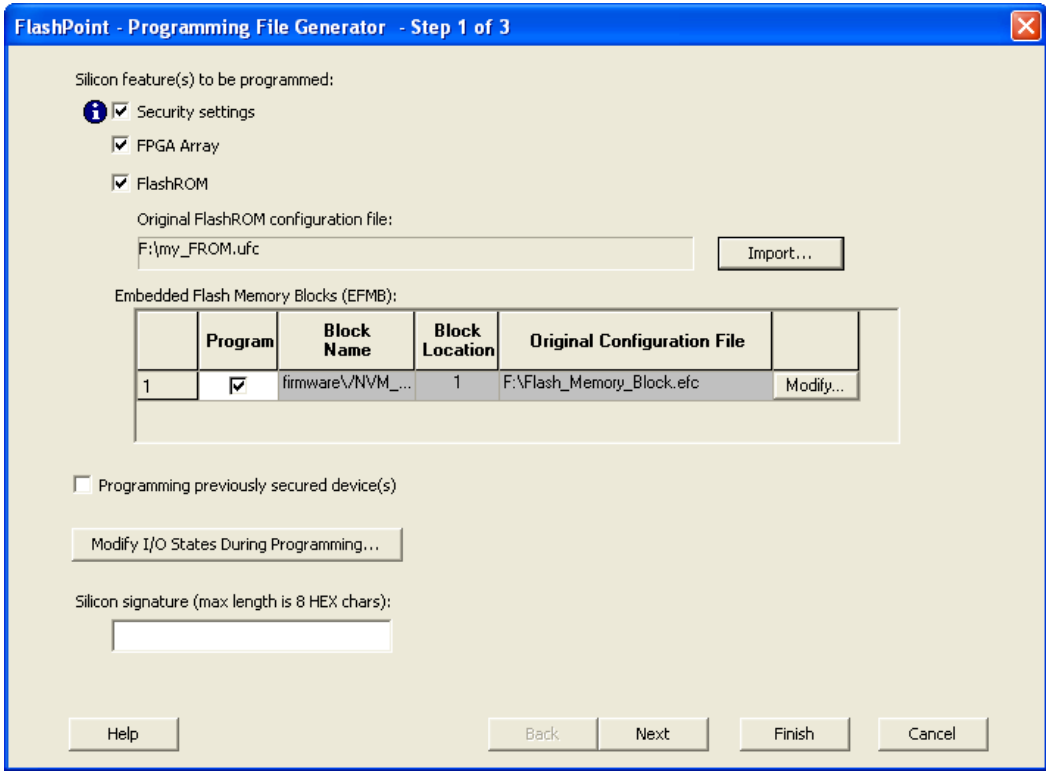


Figure 38 · Program File Generator

2. Check the **Program** box.
3. Click the **Modify** button to import Embedded Flash Memory Block configuration and memory content file. The **Modify Embedded Flash Memory Block** dialog box appears

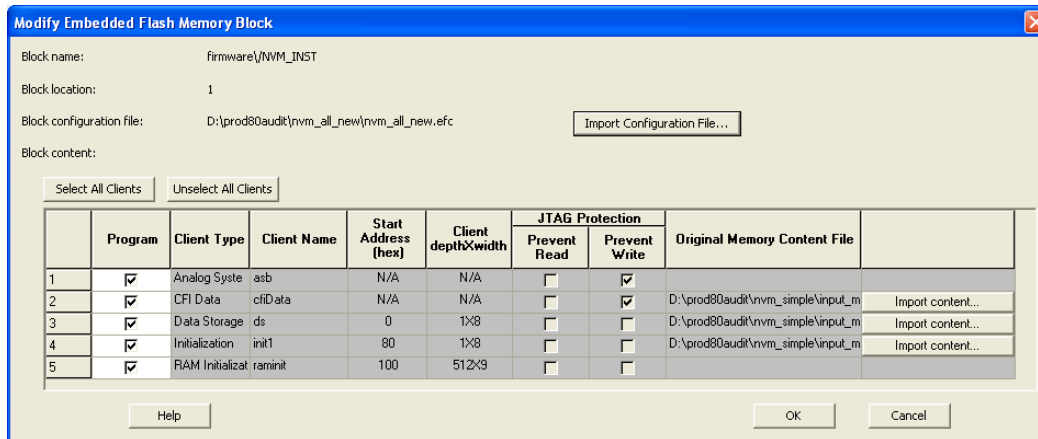


Figure 39 · Modify Embedded Flash Memory Block Content Dialog Box

4. Click the **Import Configuration File** button to import the Embedded Flash Memory Block configuration and memory content from the EFC file. This will populate the client table below. All clients that belong to this block will be selected by default.
5. Click the **Import content** button if you want to change the client memory content.
6. Click **OK**.
7. Click **Finish**.

Note: FlashPoint audits original configuration and memory content files and warns you if the files cannot be located or if they have been updated. These files are not required as the last updated configuration and memory content is stored in the PDB.

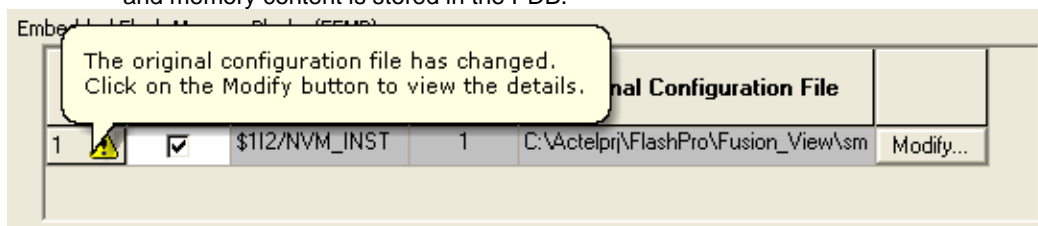


Figure 40 · Audit Warning

Proceed to program the device. For steps on how to program a device, see the [Programming a device](#) section of the [Single STAPL/PDB file basic tutorial](#).

Modifying FlashROM Contents and Programming a Device Tutorial

This tutorial provides step-by-step instructions on how to load a Program Database (PDB) file, modify the memory contents, and program the device.

Before you begin this tutorial, you should have a design with an EFMB client in it with a generated programming file for this design. You will first create a new project and title it "tutorial." If FlashPro is launched through the Libero SoC Project Manager, a new project will automatically be created and a PDB file will be loaded, if available.

Creating a new project

If you are familiar with this feature, follow the basic procedures for [creating a new project](#). However, if you would like step-by-step instructions, see the creating a new project section in the [Single STAPL/PDB File Basic Tutorial](#).

Loading and Configuring a PDB File

Once you have created your project and connected your programmer, you are ready to load your PDB file.

To load a PDB file:

1. Click the **Configure Device** button. The **Single Device Configuration** Window displays in FlashPro (see figure below).

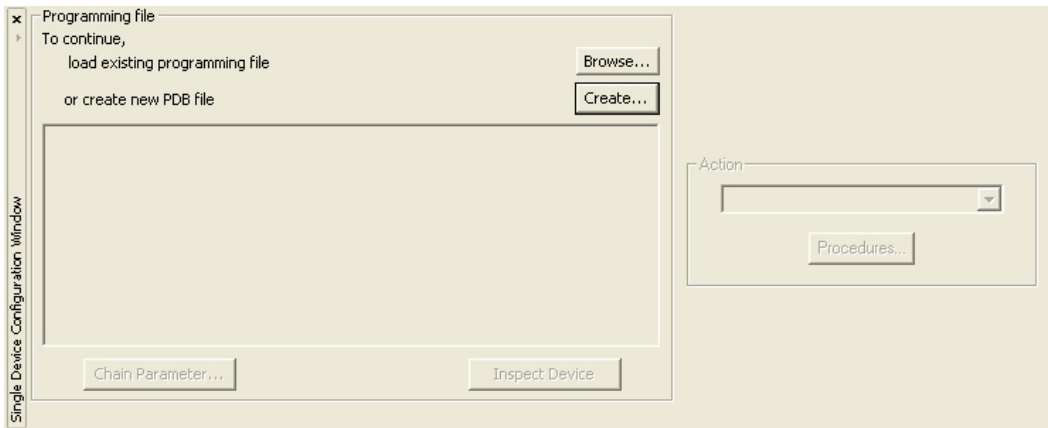


Figure 41 · Single Device Configuration Window

2. Click the **Browse** button to find your PDB file. From the **Load Programming File** dialog box, find your PDB file and click **Open**.

Modify FlashROM Content

Now you are ready to modify the FlashROM content.

1. Click the **PDB Configuration** button. This opens FlashPoint.
2. Select **FlashROM** under Silicon feature(s) to be programmed (see figure below).

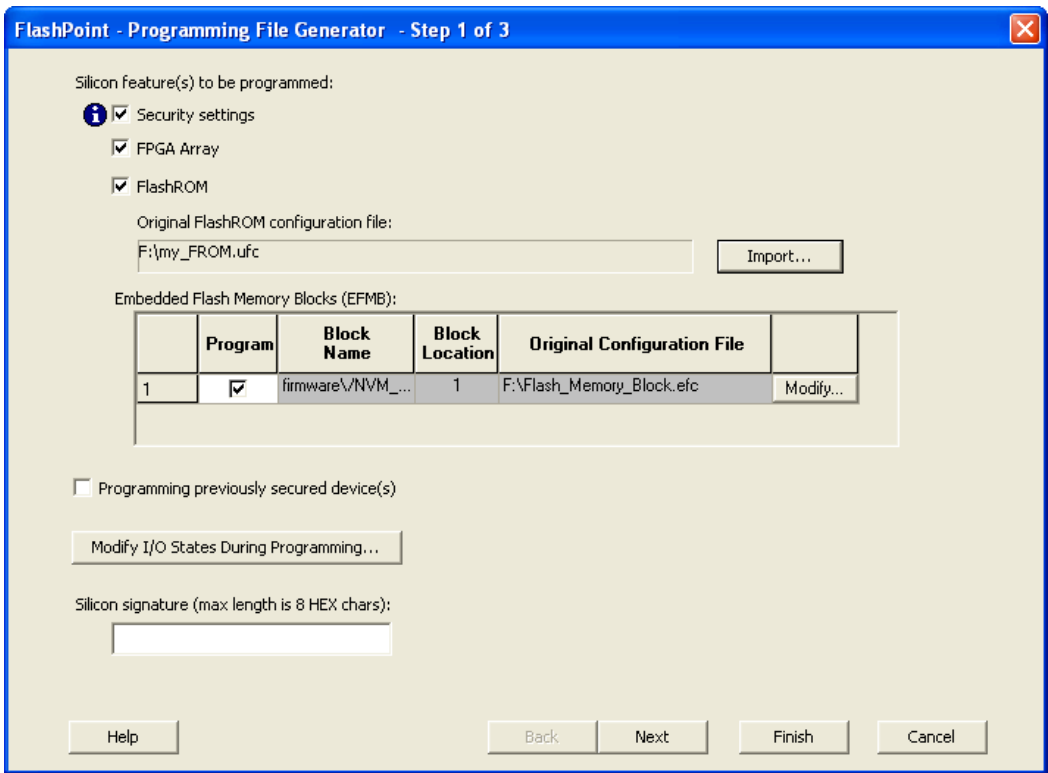


Figure 42 · FlashPoint Programming File Generator

3. Click the **Browse** button to select the *.ufc FlashROM configuration file by navigating to the configuration file. This file is normally present in the SmartGen subfolder of the Libero SoC project, in a folder with the FlashROM IP block's name.
4. Click **Next**.
5. Select the FlashROM pages you want to program (see figure below).

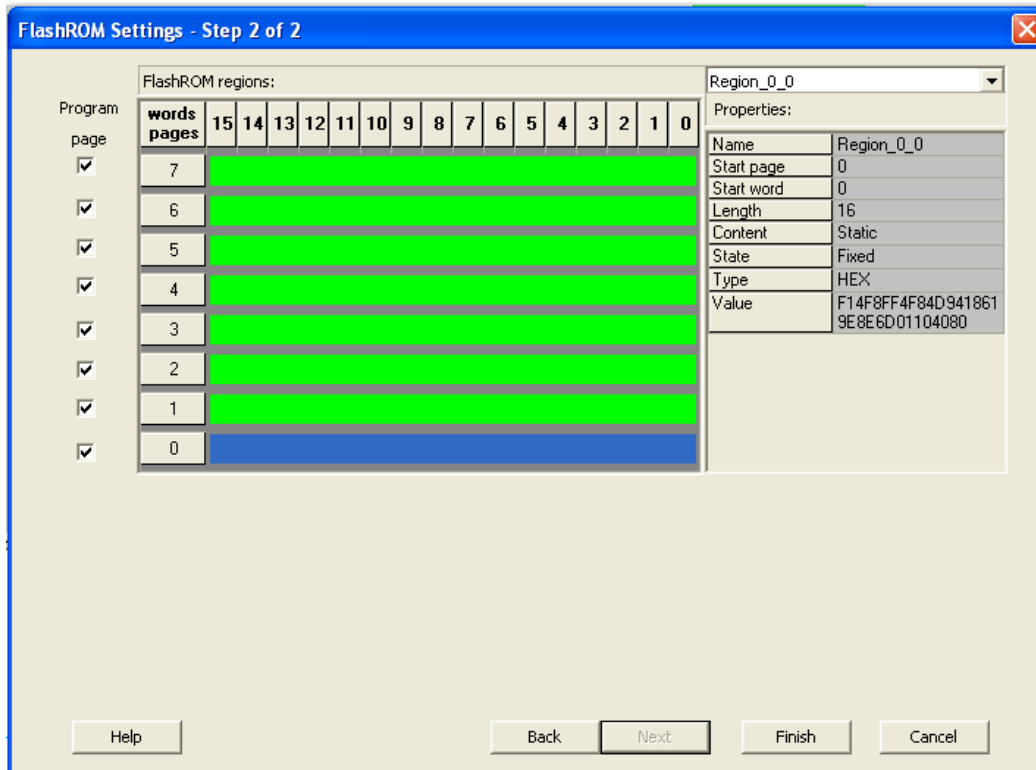


Figure 43 · FlashROM Settings Dialog Box

6. Click **Finish**.

Proceed to program the device. For steps on how to program a device, see the [Programming a device](#) section of the [Single STAPL/PDB file basic tutorial](#).

Programming Only Security Settings Tutorial

This tutorial provides step-by-step instructions on how to program only the security settings into a device. No design or PDB file is needed to follow this tutorial.

First create a new project and name it tutorial. If FlashPro is launched from the Project Manager, a new project will automatically be created and a PDB file will be loaded, if available. For this tutorial you always need to create a new project.

Creating a New Project

If you are familiar with this feature, follow the basic procedures for [creating a new project](#). However, if you would like step-by-step instructions, see the creating a new project section in the [Single STAPL/PDB file basic tutorial](#).

Configuring the Security Settings

Once you have created your project and connected your programmer, you are ready to load your PDB file.

To configure the security settings:

1. Click the **Configure Device** button. The **Single Device Configuration window** appears in FlashPro (see figure below).

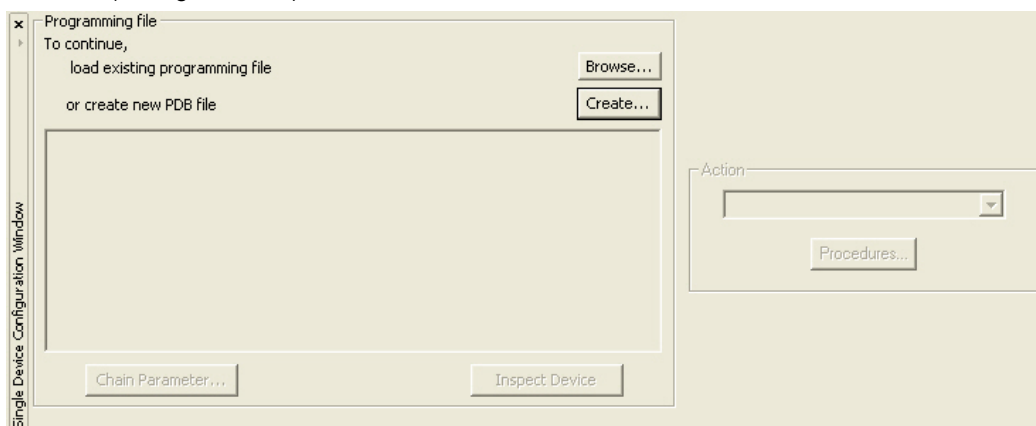


Figure 44 · Single Device Configuration Window

2. Click **Create**. This opens the Create PDB dialog box, as shown in the figure below.

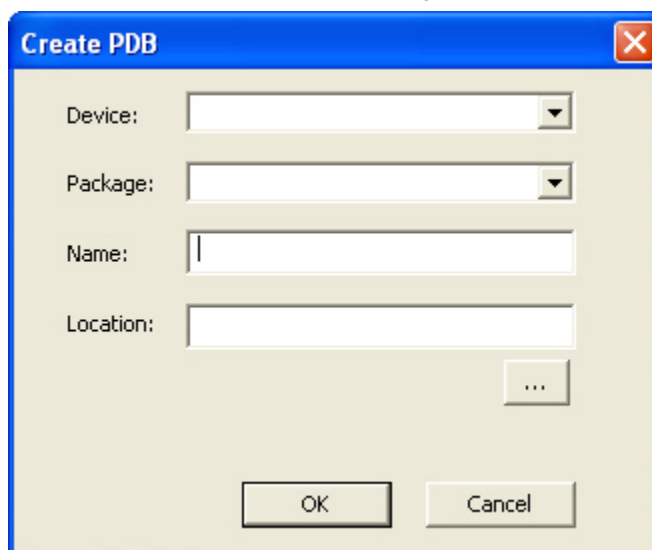


Figure 45 · Create PDB Dialog Box

3. Select the desired device and package (if available) from the drop down list, and specify the filename and location. Click **OK**. FlashPoint opens. SmartFusion, IGLOO, ProASIC3 and Fusion family devices support securing the device with a pass key as well as encrypting programming files using an AES key. Flash devices can also be permanently locked, preventing reprogramming.
4. Check the **Security Settings** checkbox to secure the unsecured device.

Warning: Make a note of the security keys that you are using. Once a device is secured, it cannot be reprogrammed without those keys.

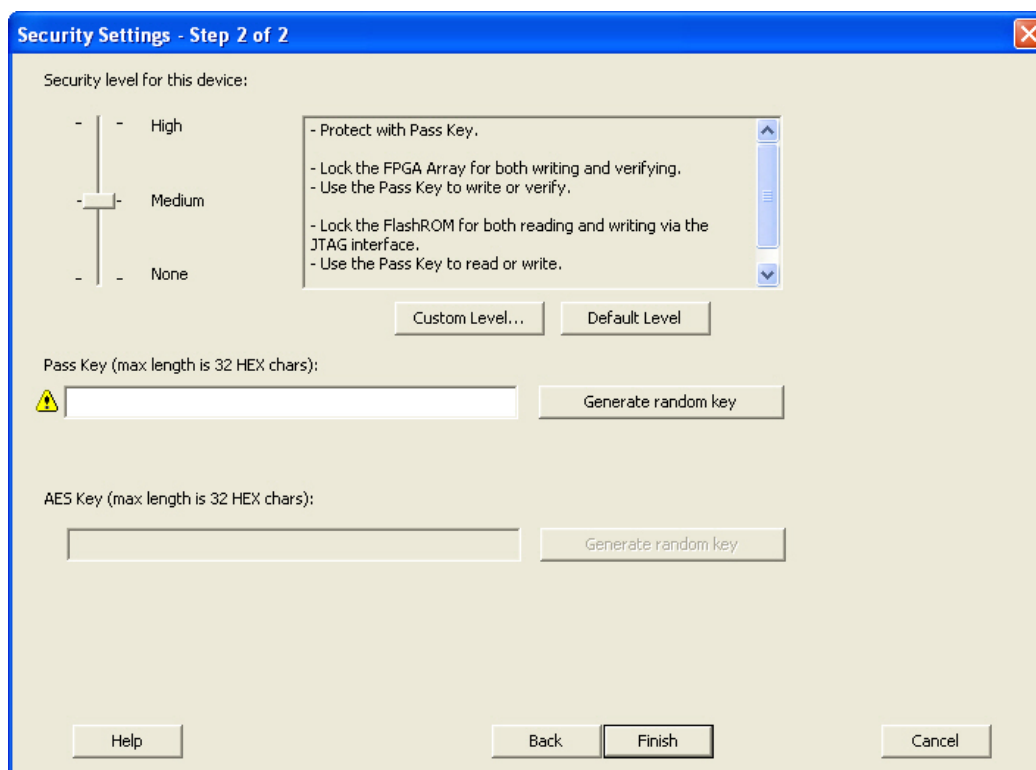


Figure 46 · Security Settings Dialog Box

5. Click **Finish**.

Proceed to program the device. For steps on how to program a device, see the [Programming a device](#) section of the [Single STAPL/PDB file basic tutorial](#).

Automatic Chain Construction Tutorial

This tutorial demonstrates how to automatically scan a chain of devices and construct the chain within FlashPro. Automatic chain construction saves the effort of manually adding each device to your chain.

The software also scans the chain before constructing it, which reduces the possibilities of having errors in the chain. This feature is fully automated if your chain is composed of only Microsemi devices. If you have non-Microsemi devices in your chain, you can still use the Auto Chain Construction feature. However, you will be required to either manually add the BSDL file or enter the IR length and max TCK for each non-Microsemi device. This tutorial goes through the flow for an Microsemi-only chain first, followed by instructions on adding Non-Microsemi devices to the database.

Note: This tutorial requires that your chain is connected to the computer you are using, via an Microsemi programmer, and that you have suitable programming files to program the devices in your chain.

To automatically scan a chain of devices and construct the chain:

1. Start a new project in FlashPro. Select **Chain** as the Programming Mode.
2. Click the **Configure Chain** button in FlashPro.
3. From the **Configuration** menu, choose **Construct Chain Automatically**; or click the **Construct the chain from a Scan Chain operation** link in the Chain Configuration Window, see below.

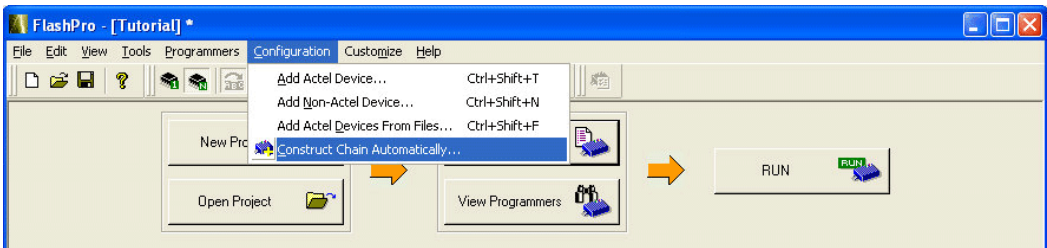


Figure 47 · Construct Chain Automatically

4. A popup appears asking you to select the programmer you would like to use from the ones attached to your computer. Choose the appropriate programmer (as shown in the figure below) and click **OK**.

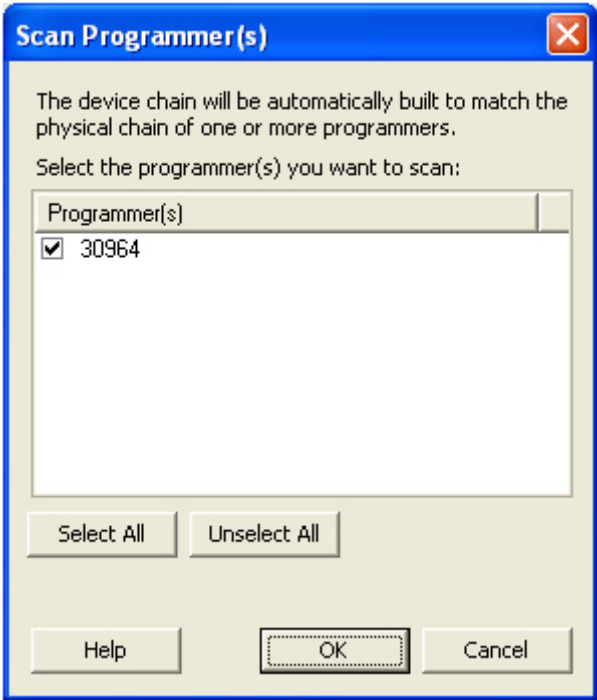


Figure 48 · Select Programmer Popup

Automatic chain construction starts. The Log window documents the detection and verification of all devices in your chain. The devices are added to the chain in the Chain Configuration Window; see figure below for an example.

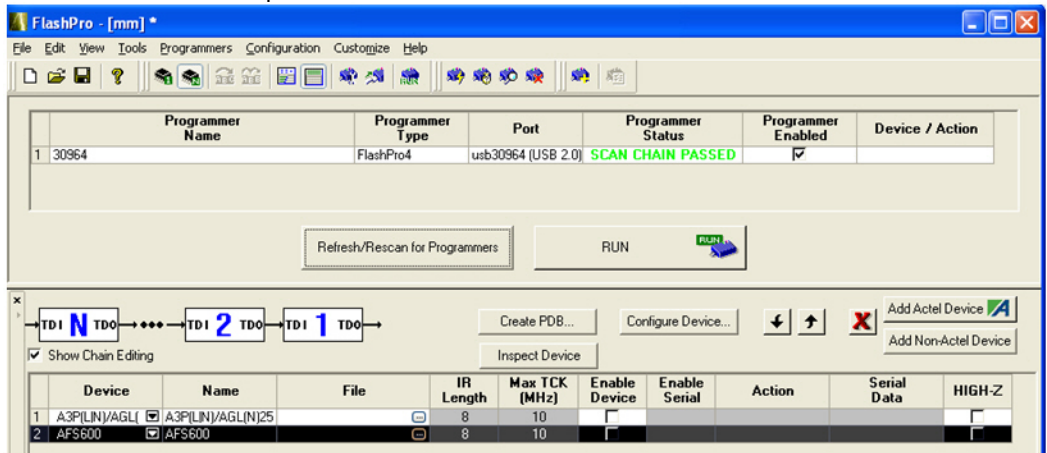
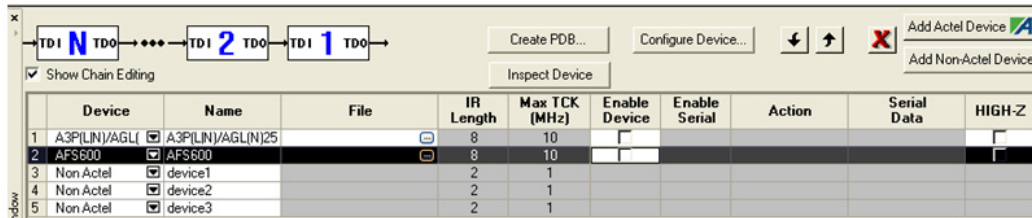


Figure 49 · Scan Chain Configuration Passed

In some cases, FlashPro is not able to uniquely identify the device due to shared IDCODEs, and lists all possible devices (ex: AGL030V2/AGL030V5). Once a programming file is loaded for that device, the device field only shows one device, since the programming file will only be targeted to one device.

Adding Non-Microsemi Devices to the Chain

FlashPro recognizes non-Microsemi devices in the chain, but it does not contain any device information, such as IR length or Max TCK. The figure below lists Microsemi devices and non-Microsemi devices in the chain.



	Device	Name	File	IR Length	Max TCK (MHz)	Enable Device	Enable Serial	Action	Serial Data	HIGH-Z
1	A3PILIN/AGLI	A3PILIN/AGLIN25		8	10	<input type="checkbox"/>				<input type="checkbox"/>
2	AFS600	AFS600		8	10	<input type="checkbox"/>				<input type="checkbox"/>
3	Non Actel	device1		2	1	<input type="checkbox"/>				
4	Non Actel	device2		2	1	<input type="checkbox"/>				
5	Non Actel	device3		2	1	<input type="checkbox"/>				

Figure 50 · Non-Microsemi Devices in a Chain

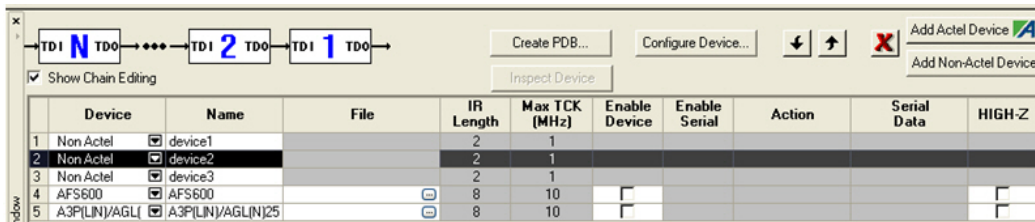
You must import the BSDL file into Microsemi's non-Microsemi device database for FlashPro to recognize your non-Microsemi device.

To import the device BSDL into the FlashPro non-Microsemi device database and run the scan chain:

1. From the **Tools** menu, choose **Import Settings for Non-Microsemi Devices**. This opens the [Import Settings for Non-Microsemi Devices](#) dialog box. This dialog box enables you to import and remove BSDL files from the database and lists all the device information contained in the BSDL file.
2. Click the **Import BSDL Files** button and navigate to the folder that contains your BSDL files. Select the file and click **OK**. Once the BSDL is imported into the database, the original BSDL file is no longer audited by FlashPro. If changes are made to the original source BSDL file, it will not affect the BSDL file that has been imported into the non-Microsemi device database.

Remove BSDL files from the database by selecting the file and clicking the **Remove** button.

3. Once you have the appropriate BSDL files loaded to the database, you can construct the chain. To do so, from the **Configuration** menu, choose **Construct Chain Automatically** and select the appropriate programmer from the dialog box. FlashPro runs a scan chain, detects the devices in the chain, and associates them with the BSDL files in the database, as shown in the figure below.



	Device	Name	File	IR Length	Max TCK (MHz)	Enable Device	Enable Serial	Action	Serial Data	HIGH-Z
1	Non Actel	device1		2	1	<input type="checkbox"/>				
2	Non Actel	device2		2	1	<input type="checkbox"/>				
3	Non Actel	device3		2	1	<input type="checkbox"/>				
4	AFS600	AFS600		8	10	<input type="checkbox"/>				<input type="checkbox"/>
5	A3PILIN/AGLI	A3PILIN/AGLIN25		8	10	<input type="checkbox"/>				<input type="checkbox"/>

Figure 51 · Non-Microsemi Devices in the Chain with Associated BSDL Files

It is possible to add multiple BSDL files to your Non-Microsemi device database that have the same IDCODE. If the BSDL files list the same IR length but different TCK values, FlashPro automatically chooses the file with the lowest TCK value by default and no action is required. If the IR lengths are different you receive an error message asking you to resolve the conflict.

To resolve the issue, click the drop-down arrow adjacent to the device name. This opens the Non-Microsemi Device Configuration dialog box (as shown in the figure below). From here you can choose the BSDL file that you wish to use. Browse to the BSDL file or use the Data to input the IR length and Max TCK Frequency. Once you select your data you can enter a new name or use the default.

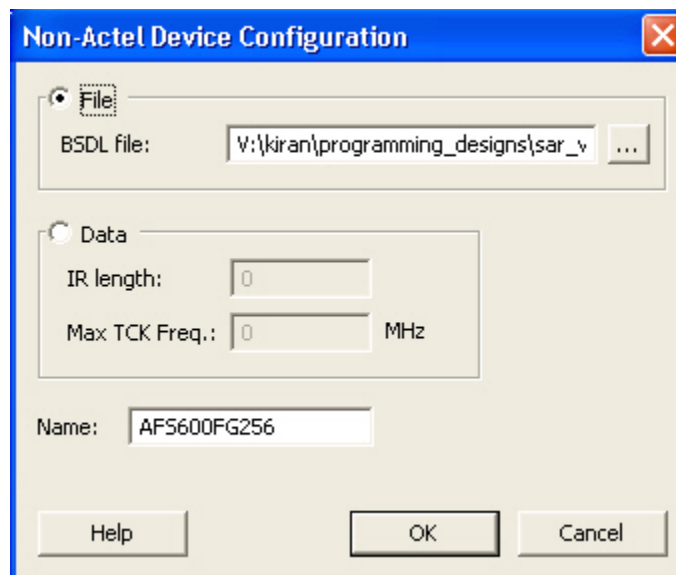


Figure 52 · Non-Microsemi Device Configuration Dialog Box

For a tutorial on manually adding both Microsemi and non-Microsemi devices to your chain as well as programming the chain, refer to the [Chain Programming Tutorial](#).

See Also

[Understanding the Chain Configuration Window](#)

[Import Settings for Non-Microsemi Devices](#)

eNVM/EFMB Client JTAG Protection Use Flow

eNVM/EFMB client JTAG protection enables you to protect specific clients with a User Pass Key while leaving others unprotected.

See the [eNVM Client JTAG Protection Tutorial](#) or [EFMB Client JTAG Protection Tutorial](#) for step by step instructions.

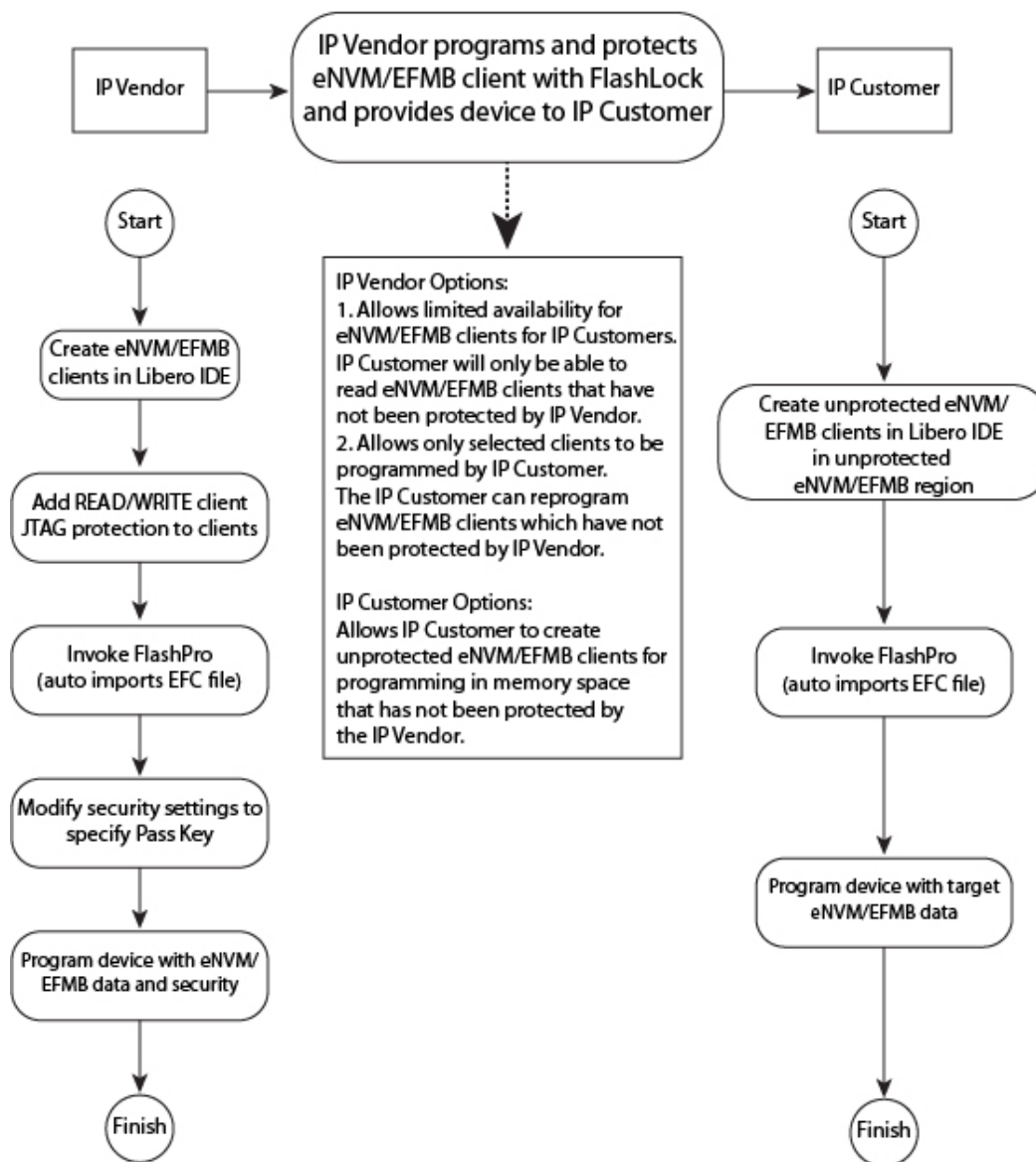


Figure 53 · eNVM/EFMB Client JTAG Protection Tutorial Use Flow

eNVM Client JTAG Protection Tutorial - SmartFusion

This tutorial provides step-by-step instructions on how to enable JTAG protection for eNVM clients. The protection can be read, write or both and it is protected with a User Pass Key (FlashLock).

The JTAG protection of eNVM clients enables you to protect specific clients with a User Pass Key while leaving others unprotected.

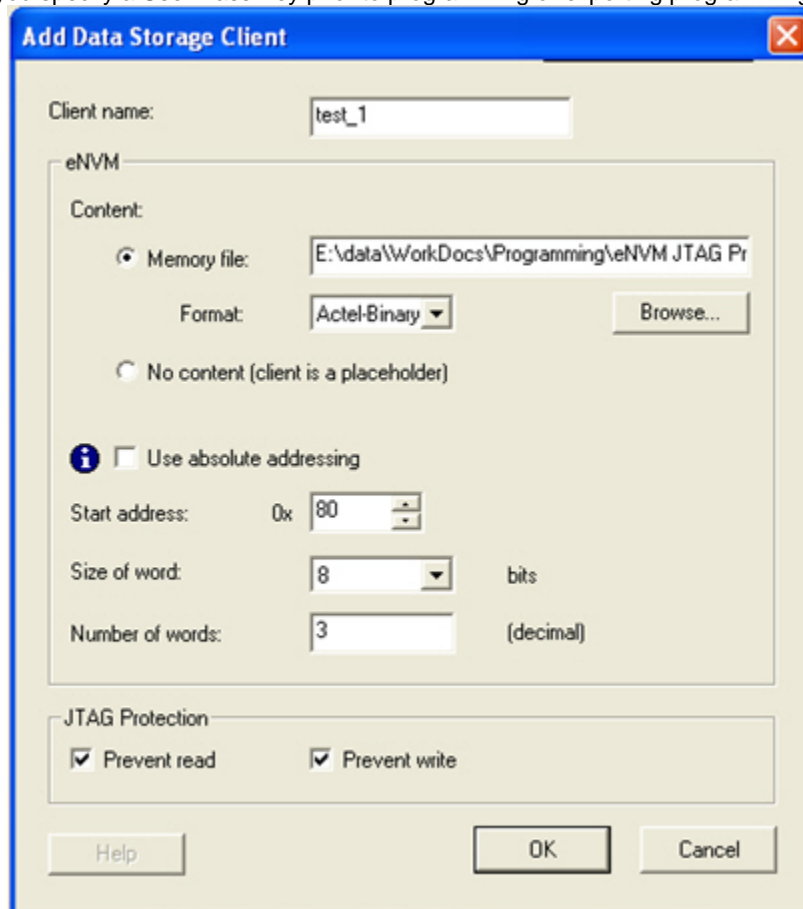
One example use is IP customization. This enables an IP vendor to allow limited visibility to eNVM clients for IP customers. The IP vendor can protect specific clients and leave other clients unprotected for modification by IP customers. See the [eNVM/EFMB Client JTAG Protection use flow diagram](#) for a detailed example of a typical use case.

Before you begin this tutorial, make sure you have already installed the FlashPro software and that you are familiar with its basic features.

JTAG READ/WRITE protection is set when you create your original eNVM in Libero SoC. You cannot change this setting in FlashPro/FlashPoint.

Importing an EFC (Embedded Flash Configuration) File with Client JTAG protection in a Previously Unsecured PDB

1. Create a client in eNVM configurator with JTAG read and write protect (as shown in the figure below). If the MSS block is generated with an eNVM client with JTAG protection then FlashPro requires that you specify a User Pass Key prior to programming or exporting programming files.



Add Data Storage Client

Client name:

eNVM

Content:

☒ Memory file:

Format:

☐ No content (client is a placeholder)

☐ Use absolute addressing

Start address: 0x

Size of word: bits

Number of words: (decimal)

JTAG Protection

☒ Prevent read ☒ Prevent write

Figure 54 · Generating the EFC File with JTAG Protection

2. Import the EFC file with JTAG protection in FlashPoint. When the EFC file is imported the Security Settings box is checked automatically, implying that you must set the User Pass Key (as shown in the figure below).
The PDB file cannot be saved without specifying the pass key.

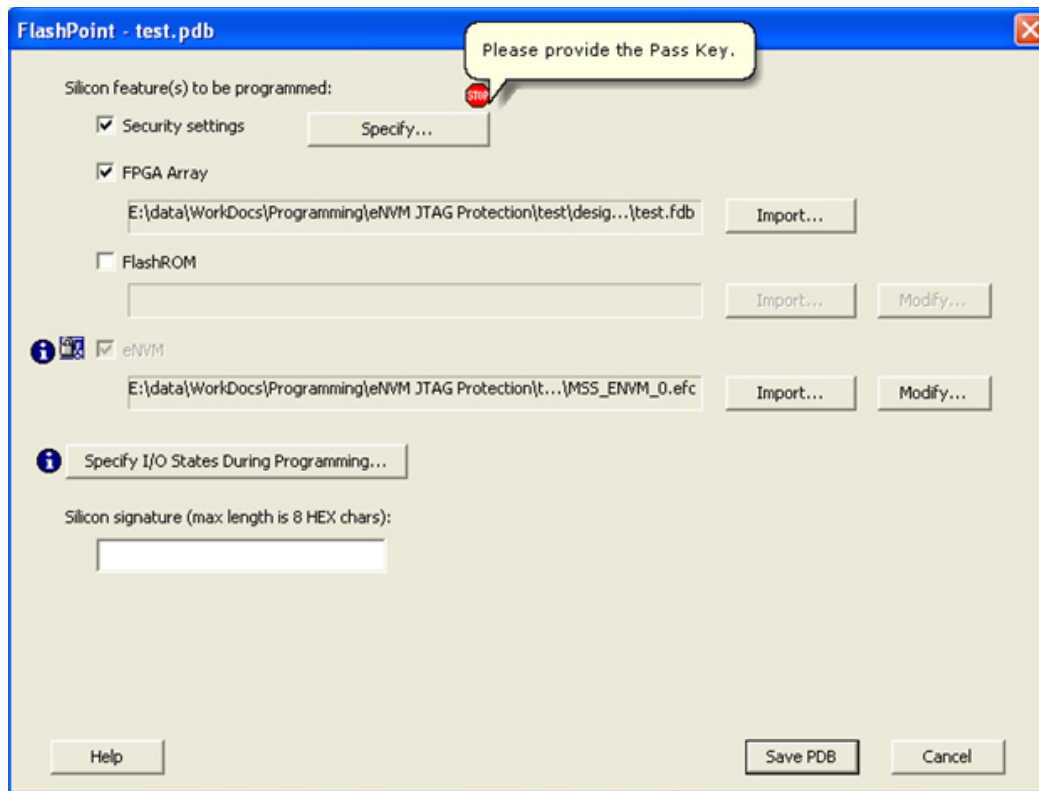


Figure 55 · Importing the EFC File with JTAG Protection

3. Click **Specify** to open the Security Settings dialog box. Notice that Enable eNVM client JTAG protection box is checked. This indicates that reading, writing, and verifying of other eNVM pages are allowed but the reading and writing of specific eNVM clients are protected.
4. To enforce the eNVM client JTAG protection in the PDB file, enter a **Pass Key** or click **Generate random key** (as shown in the figure below).

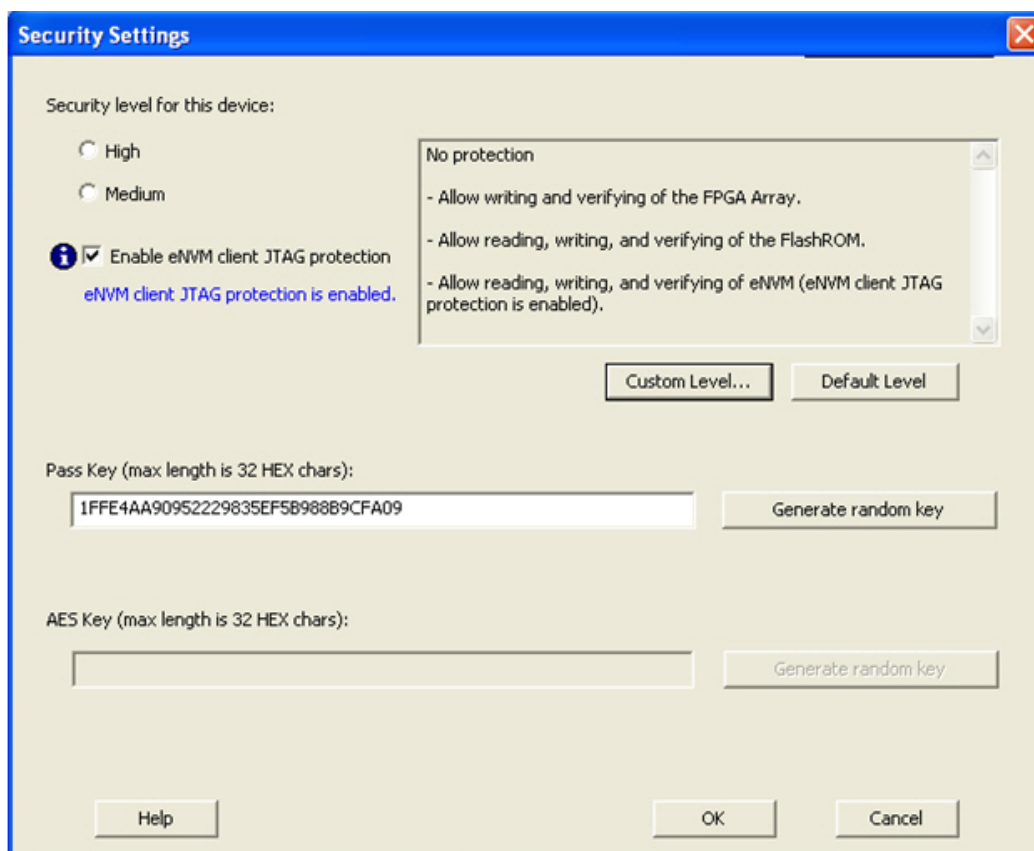


Figure 56 · Setting Security

Custom Level Security Settings

If you select Custom Level security and decide to protect writing of the entire eNVM block, then the eNVM client JTAG protection Write, if enabled, will be overridden by full block protection.

If the Read protection of the eNVM block is left open, then the eNVM client JTAG protection Read will be enabled if a client has a read protection enabled.

If you choose to encrypt the entire eNVM block, then the eNVM client JTAG protection Write will be disabled if enabled, due to enforced encryption. The eNVM client JTAG protection Write, if enabled, will be overridden by full block protection.

To set Custom Level Security:

1. Click **Custom Level** to open the Custom Security Level dialog box (as shown in the figure below)

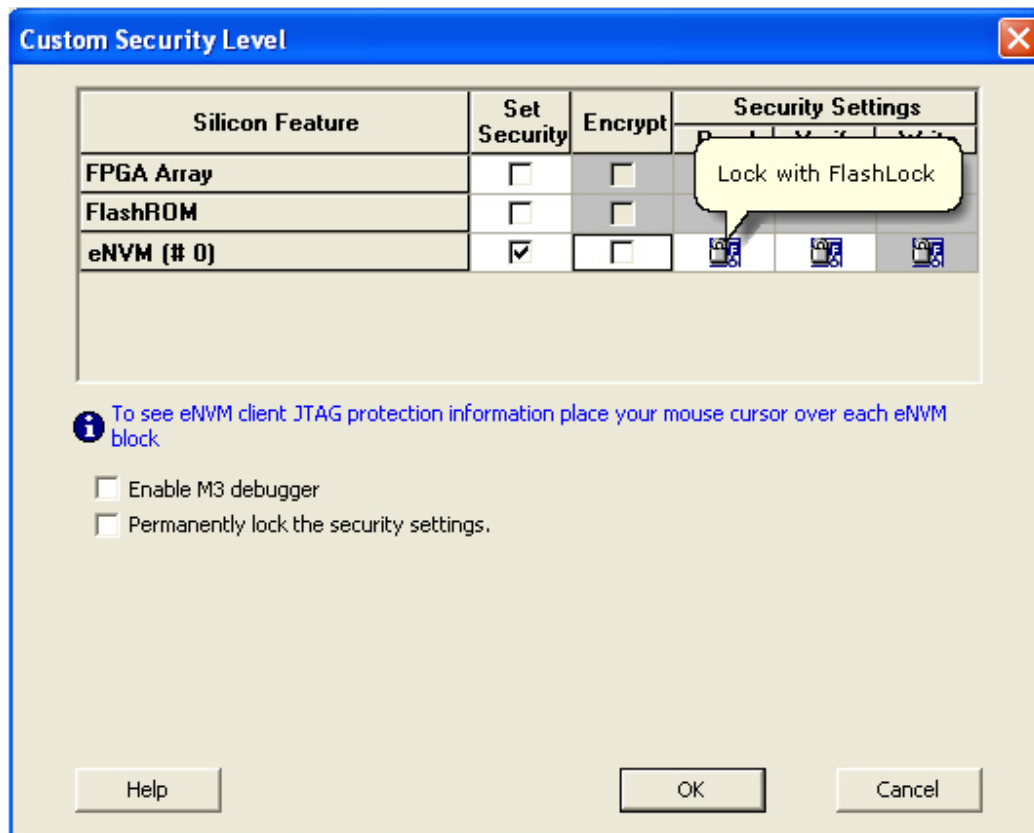


Figure 57 · Setting Security for Unprotected eNVM Clients

2. Click the **Set Security** checkbox to secure Read, Write and Verify using Flash Lock. In this mode you can unlock Read and Verify and only protect Write by FlashLock. The eNVM client JTAG read protection will be enabled.
3. Click the **Encrypt** checkbox to secure Write using the AES Key. Read, Verify will be secured by FlashLock in this mode. You must enter the **AES key** in addition to the **Pass Key** before saving the PDB file.

Setting Standard Security Levels

There are two types of standard level security: High and Medium. If either of the two is selected the eNVM client JTAG protection is overridden or disabled. You can enforce Read, Write and Verify protection of the entire eNVM block with the Pass Key and/or AES key. JTAG protection of specific pages will not be available.

Importing EFC (Embedded Flash Configuration) File with Client JTAG Protection in Previously Secured PDB

The secure PDB file exported from FlashPro is called a secured PDB.

If you import an EFC file that has JTAG protection into a secured PDB file but does not have eNVM clients with JTAG protection enabled then the FlashPro returns an **EFC file has eNVM client JTAG protection and cannot be loaded** error, as shown in the figure below.



Figure 58 · EFC File with JTAG Protection Cannot be Imported into a Secured PDB Error Message

You can import any EFC file that does not have JTAG protection.

You cannot import a new EFC with JTAG protection into a secured PDB that already has an EFC file imported with eNVM client JTAG protection. You can update the memory content by importing MEM files for the specific clients (as shown in the figure below).

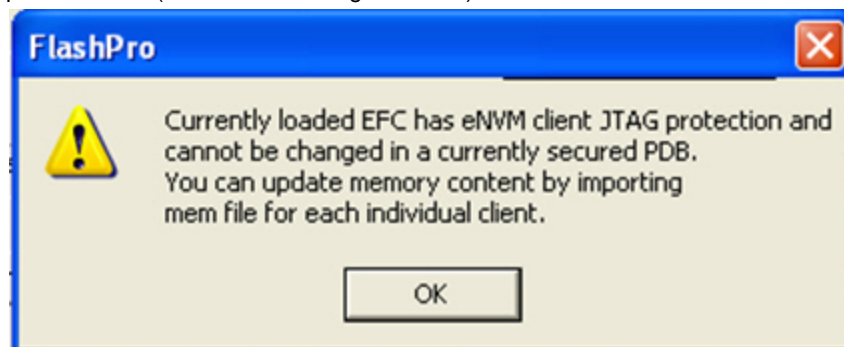


Figure 59 · New EFC File Cannot Overwrite Existing eNVM Client JTAG Protection Error Message

EFMB Client JTAG Protection Tutorial - Fusion

This tutorial provides step-by-step instructions on how to enable JTAG protection for eNVM clients. The protection can be read, write or both and it is protected with a User Pass Key (FlashLock).

The JTAG protection of EFMB clients enables you to protect specific clients with a User Pass Key while leaving others unprotected.

One example use is IP customization. This enables an IP vendor to allow limited visibility to EFMB clients for IP customers. The IP vendor can protect specific clients and leave other clients unprotected for modification by IP customers. See the [eNVM/EFMB Client JTAG Protection use flow diagram](#) for a detailed example of a typical use case.

Before you begin this tutorial, make sure you have already installed the FlashPro and/or Designer software and that you are familiar with its basic features.

JTAG READ/WRITE protection is set when you create your original EFMB in Libero SoC. You cannot change this setting in Designer/FlashPoint or FlashPro/FlashPoint.

EFMB Client JTAG Protection in Designer/FlashPoint

If the ADB file has an EFM (Embedded Flash Memory) block with page/client JTAG protection enabled, the EFC file appears in the FlashPoint window when you click the Programming File button in Designer.

A message indicating JTAG protection is enabled appears in the Embedded Flash Memory Block (EFMB) tooltip, as shown in the figure below.

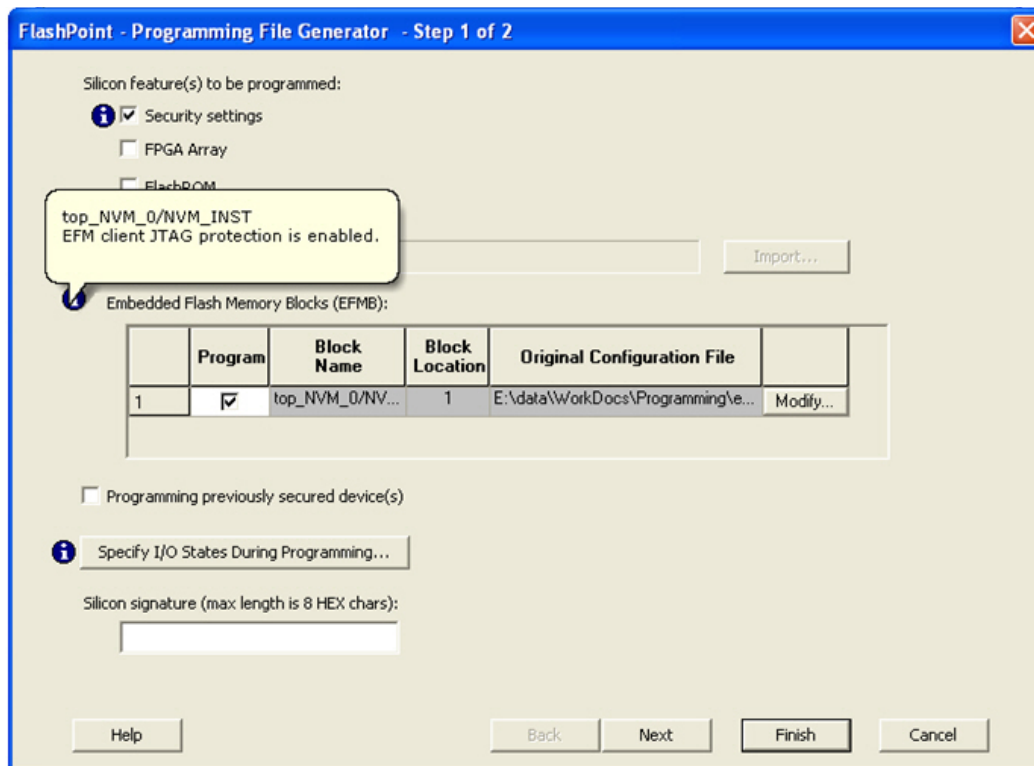


Figure 60 · EFMB Client JTAG Protection

To set EFMB Client JTAG Protection:

1. Check the **Security Settings** or **Programming previously secured devices** checkbox and click Next. The Security Settings dialog box opens.
2. Specify the appropriate security settings.
If the EFM block is generated with an EFMB client with JTAG protection then FlashPro requires that you specify a User Pass Key prior to programming or exporting programming files.
3. Import the EFC file with JTAG protection in the FlashPoint dialog box. When the EFC file is imported the Security Settings box is checked automatically, implying that you must set the **User Pass Key** (as shown in the figure below).
The PDB file cannot be saved without specifying the pass key.

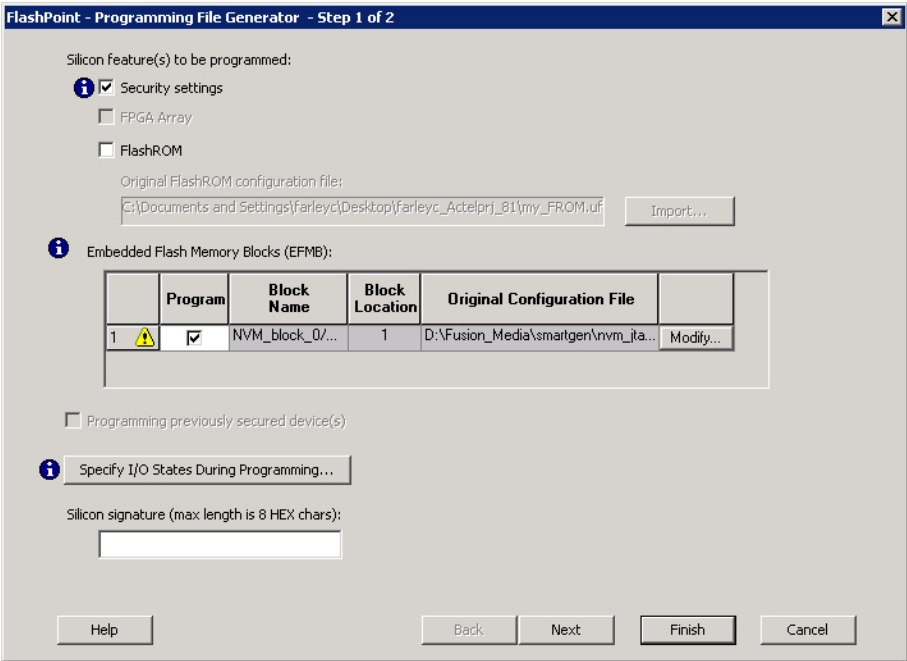


Figure 61 · Importing the EFC File with JTAG Protection

- Click **Next** to open the Security Settings dialog box. Notice that the **Enable EFMB client JTAG protection** box is checked. This indicates that reading, writing, and verifying of other EFMB pages are allowed but the reading and writing of specific EFMB clients are protected.
- To enforce the EFMB client JTAG protection in the PDB file, enter a **Pass Key** or click **Generate random key** (as shown in the figure below).

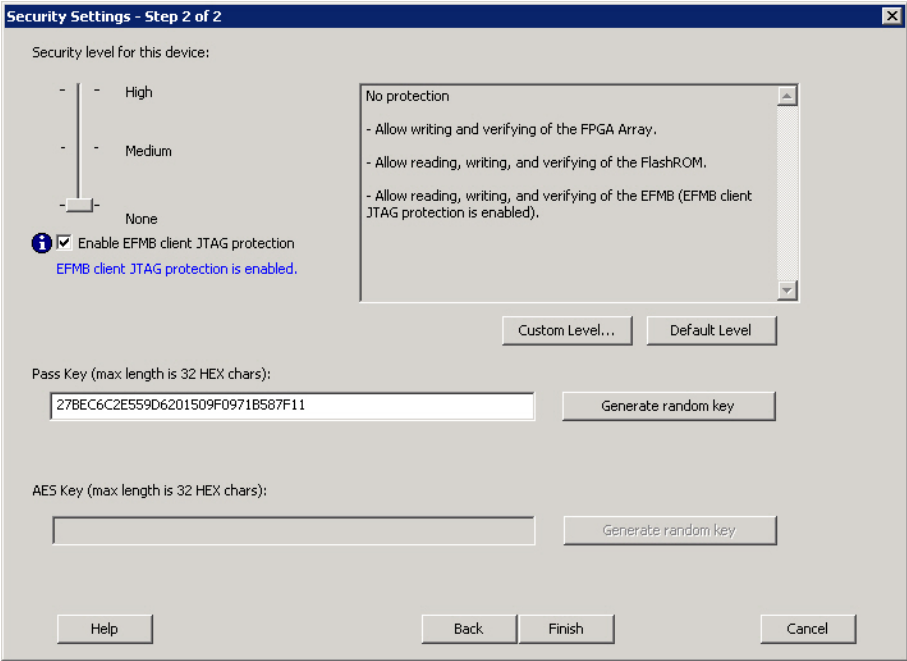


Figure 62 · Setting Security

Custom Level Security Settings

If you select Custom Level security and decide to protect writing of the entire EFMB, then the EFMB client JTAG protection Write, if enabled, will be overridden by full block protection.

If the Read protection of the EFMB is left open, then the EFMB client JTAG protection Read will be enabled if a client has Read protection enabled.

If you choose to encrypt the entire EFMB, then the EFMB client JTAG protection Write will be disabled due to enforced encryption. The EFMB client JTAG protection Write, if enabled, will be overridden by full block protection.

To set Custom Level Security:

1. Click **Custom Level** to open the Custom Security Level dialog box (as shown in the figure below)

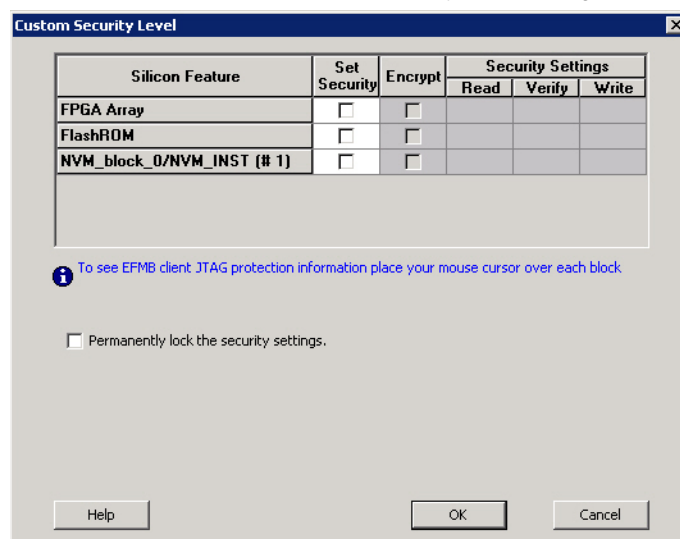


Figure 63 · Setting Security for Unprotected eNVM Clients

2. Click the **Set Security** checkbox to secure Read, Write and Verify using Flash Lock. In this mode you can unlock Read and Verify and only protect Write by FlashLock. The EFMB client JTAG read protection will be enabled.
3. Click the **Encrypt** checkbox to secure Write using the AES Key. Read, Verify will be secured by FlashLock in this mode. You must enter the **AES Key** in addition to the **Pass Key** before saving the PDB file.

Setting Standard Security Levels

There are two types of standard level security: High and Medium. If either of the two is selected the EFMB client JTAG protection is overridden or disabled. You can enforce Read, Write and Verify protection of the entire EFMB with the Pass Key and/or AES key. JTAG protection of specific pages will not be available.

EFMB client JTAG Protection via FlashPro/FlashPoint

If the PDB file was created with the EFMB client and JTAG protection is enabled you can click Modify in FlashPro to change the settings.

Fusion Calibration Backup and Recovery Tutorial

This tutorial provides step-by-step instructions on how to backup and recover default calibration data on a Fusion device. It assumes that you have created a new project, connected your programmer, and loaded a Fusion PDB/STAPL file created in Designer v8.4 or above.

If you would like step-by-step instructions on how to create a new project, see the Creating a New Project section in the [FlashPro Single STAPL Basic Tutorial](#).

If you would like step-by-step instructions on loading a programming file, see the Loading and Configuring a Programming File section in the [FlashPro Single STAPL Basic Tutorial](#).

Note: This feature is only supported in STAPL and PDB programming files.

Backing Up Default Fusion Calibration Data

A backup copy of the Fusion calibration data is created once after ANY programming ACTION, except READ_IDCODE, is executed. The copy will be stored in the spare pages of eNVM. The FlashPro Log window shows that a backup copy of the calibration data has been created (as shown in the figure below).

```

programmer '07898' : Scan Chain...
programmer '07898' : Scan Chain PASSED.
programmer '07898' : Executing action PROGRAM
programmer '07898' : Checking for Backup Calibration Data...
programmer '07898' : Reading Master Calibration Data...
programmer '07898' : Writing Calibration Backup Copy
programmer '07898' : Erase ...
programmer '07898' : Completed erase
programmer '07898' : Programming FPGA Array
  
```

Figure 64 · FlashPro Log Window

Recovering Default Fusion Calibration Data

1. Load the PDB/STAPL file created in Designer v8.4 or above.
2. In the FlashPro Configuration window, click **Advanced** and select **RECOVER_CALIB** (as shown in the figure below).

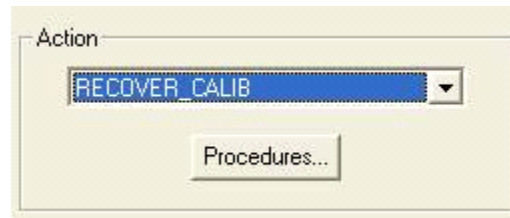


Figure 65 · RECOVER_CALIB

3. Click **Run** to restore the original Fusion calibration data. The Log window shows the data is restored (as shown in the figure below).

```

programmer '07898' : Scan Chain...
programmer '07898' : Scan Chain PASSED.
programmer '07898' : Executing action RECOVER_CALIB
programmer '07898' : Checking for Backup Calibration Data...
programmer '07898' : Reading Master Calibration Data...
programmer '07898' : Writing Calibration Backup Copy
programmer '07898' : Checking for Backup Calibration Data...
programmer '07898' : Restoring Master Calibration Data.
  
```

Figure 66 · Restoring Original Calibration Data

Note: The Calibration data can only be restored after a backup has been made.

Specify I/O States During Programming Tutorial

This tutorial explains how to modify the I/O states during programming within FlashPro for used and unused I/Os. It also explains how to modify the Boundary Scan Registers (BSRs) for each I/O to allow for more detailed customization of the I/O states during programming. Finally, it shows how to save and load these settings with a file.

Note: This tutorial requires a design with a valid *.pdb file associated with it. If you launch FlashPro from a Libero SoC project, a FlashPro project is created automatically and the PDB file loaded. Otherwise, you can start a new FlashPro project and load a PDB file; refer to [Single STAPL/PDB file basic tutorial](#) for more information.

You can also modify the individual Boundary Scan Registers; see the [Modify Boundary Scan Registers section](#) for more information.

To modify the state of an I/O during programming:

1. Once your PDB is successfully loaded, from the **Configuration** menu, choose **PDB Configuration**. This brings up FlashPoint . FlashPoint is the tool that allows you to modify the PDB programming file from within FlashPro.
2. In FlashPoint, click the **Specify I/O States During Programming** button. The Specify I/O States During Programming dialog box appears (as shown below). This dialog box enables you to modify the I/O states during programming for all used and unused I/Os.

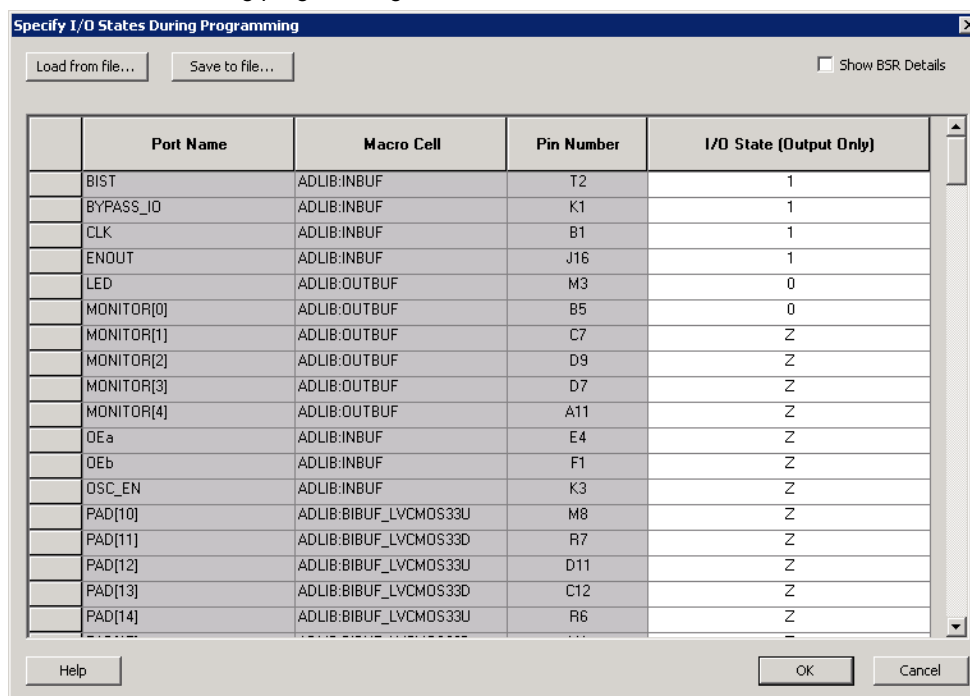


Figure 67 · I/O States During Programming Window

The default view displays a grid with 4 columns: Port Name, Macro Cell, Pin Number, and I/O State (Output Only). Port Name lists the port associated with each of these pins, if the pin is not used in the design, the Port Name for this pin reads Unused. The Pin Number column contains a list of all the pins for the package associated with the design open in FlashPro. The Macro Cell column contains the Microsemi macro associated with each pin, as with Port Names, if the pin is not used, the Macro Cell for this pin reads Unused. The I/O State column is the only column editable in FlashPro.

3. Select an I/O State from the drop-down menu for each I/O you want to modify.
Please refer to [Specifying I/O States During Programming](#) for information on sorting and selecting multiple entries in the grid.
4. Click **Save** in the Specify I/O States During Programming window, then **Finish** in FlashPoint to return to FlashPro. The PDB is updated with your new settings.

Congratulations, you have successfully modified the I/O states that will be held during programming.

Modifying Boundary Scan Registers

Each I/O in your device is comprised of an Input, Output and Output Enable Boundary Scan Register (BSR) cell.

The BSR cells enable you to define I/O states during programming and control the individual states for each Input, Output, and Output Enable register.

To modify the individual Boundary Scan Registers of an I/O in your device:

1. Select the **Show BSR Details** checkbox in the **Specify I/O States During Programming** window. This replaces the I/O State (Output Only) column with a Boundary Scan Registers column that is split into Input, Output Enable and Output.
2. Modify each of the registers for any I/O to set your custom options. See the [Specifying I/O States During Programming - I/O States and BSR Details help topic](#) for an explanation of the individual BSR settings.
3. (Optional) Uncheck the Show BSR Details checkbox to return to the default view.

Note: Updated I/Os with non-default settings are displayed as *User-Defined BSR* in the default view. Click OK and complete programming to save your updated settings to the ADB and programming files.

Saving and Loading I/O State Settings

Click Save to File to save your changes. This enables you to save your custom I/O settings in an IOS file. Click Load from File to load a previously saved *.ios file.

Note: You must click OK and complete programming to save your updated settings to the ADB and programming files.

See Also

[Specifying I/O States During Programming](#)

[Specifying I/O States During Programming - I/O States and BSR Details](#)

Advanced Tutorials

Multiple Device Chain Programming

This tutorial provides step-by-step instructions on how to program multiple Microsemi devices in a chain. You should already be familiar with the basic features of the FlashPro software.

Note: This tutorial does not provide software installation instructions. Please have FlashPro already installed before you begin.

In the figure below, there are three devices in a chain (two A3P250 and one A3PE600). In this section, we will program these three devices in the chain.

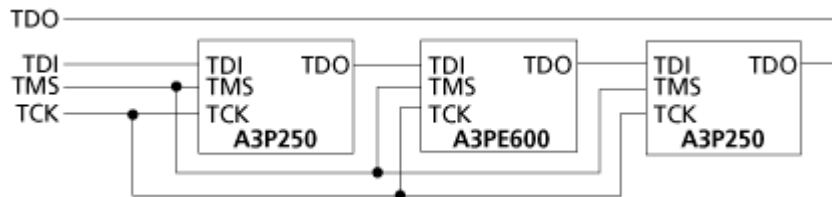


Figure 68 · APA Device Tutorial Example

First you need to create a project.

To create a new project:

1. Click the **New Project** button in FlashPro.
2. From the **New Project** dialog box, type "Tutorial" in the Project Name field.
3. Check the **Chain** box (see figure below).

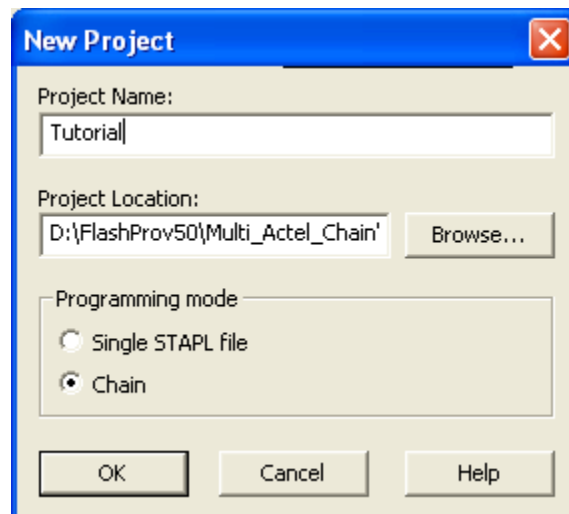


Figure 69 · New Project Dialog Box

4. If necessary, change the default location of your project in the **Project Location** field.
5. Click **OK**. The FlashPro main window appears.

Note: The Programmer List window updates with your programmers information.

6. From the **Programmers** menu, choose **Scan Chain** (or select the programmer in the **Programmer List** window, right-click, then choose **Scan Chain**) (see figure below).

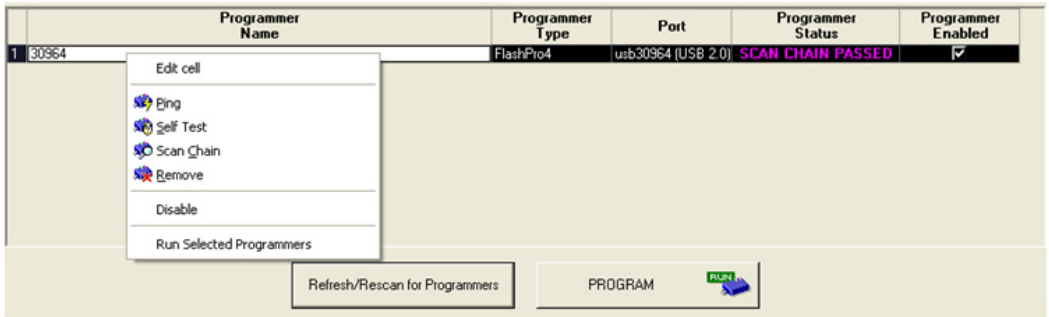


Figure 70 · Select Programmer Window

Scan Chain shows how the devices are ordered in the chain in the log window (see figure below). In this case, A3P250 is the first device that will be programmed in the chain since it is connected directly to TDO.

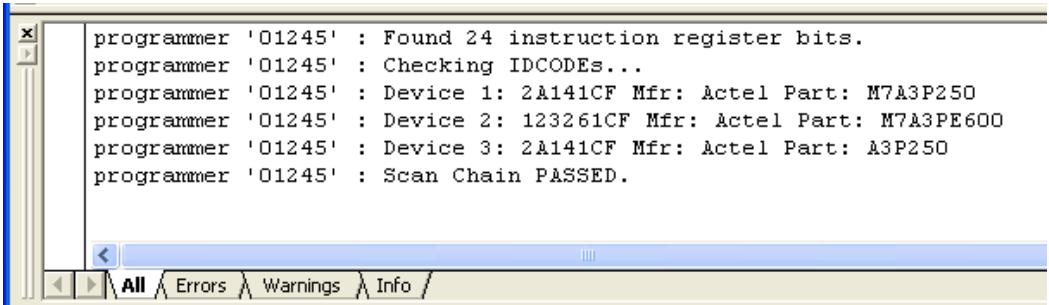


Figure 71 · Scan Chain Order in the Log Window

7. Click the **Configure Chain** button. The **Chain Configuration** window displays (see figure below).

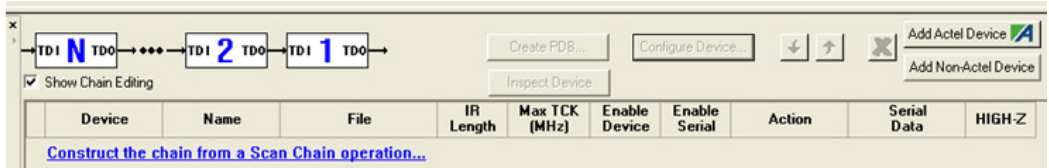


Figure 72 · Chain Configuration Window

8. In the **Chain Configuration** window, click the **Add Device** button to add devices to the chain. The **Add Microsemi Device** dialog box appears (as shown in the figure below).

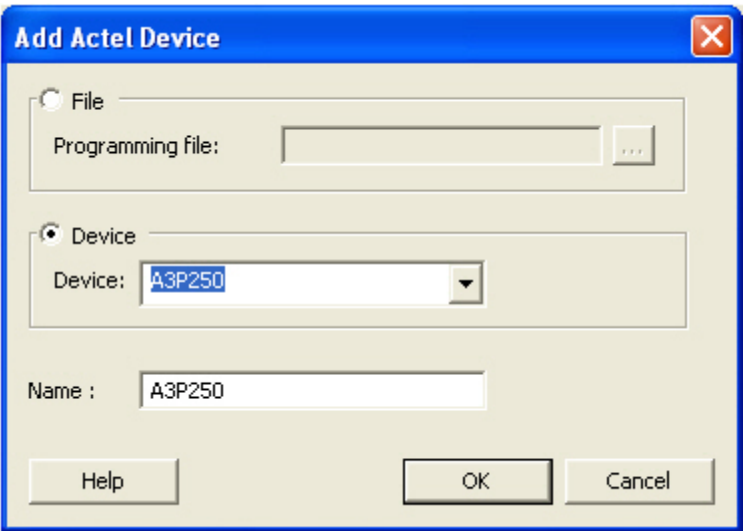


Figure 73 · Add Microsemi Device Dialog Box

9. Choose the "A3P250" device from the **Device** drop-down.

10. In the **STAPL file** field, use the **Browse** button to locate the **A3P250.stp** file.
11. In the **Name** field, leave A3P250 as default. The A3P250 device is added into the **Chain Configuration** window (see figure below).

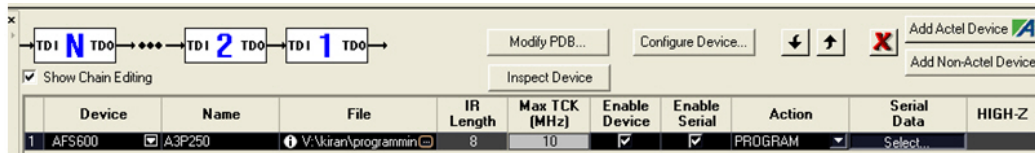


Figure 74 · Device One Chain Configuration Window

12. Repeat the same process for A3PE600 and the other A3P250 respectively.
13. After you have finished adding all of the devices in the chain, the **Chain Configuration** window updates.

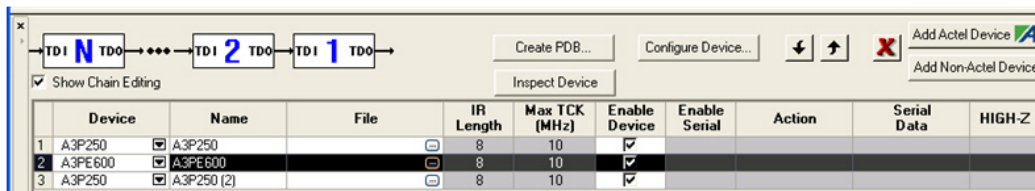


Figure 75 · Chain Configuration Window: All Devices in the Chain

14. Once all the devices have been added to the chain in the correct order, click the **Run** button to program the chain.
15. When Programming is complete, the **Programmer List** window displays. See figure below.

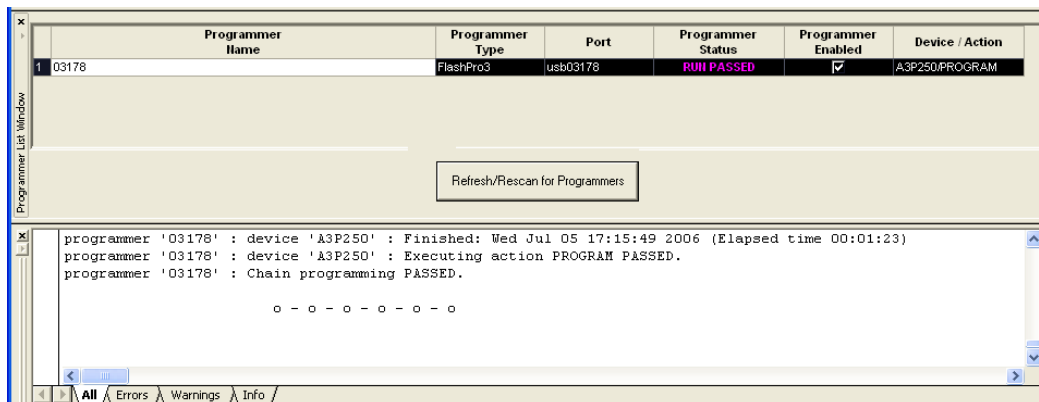


Figure 76 · Programmer List Window Done

Congratulations! You have just completed the FlashPro Multiple Microsemi Device Chain Programming tutorial.

Multiple Device Serialization Chain Programming

This tutorial provides step-by-step instructions on how to program multiple Microsemi devices with serialization. Before you begin this tutorial, you should already be familiar with the basic features of the FlashPro software.

Note: This tutorial does not provide software installation instructions. Please have FlashPro already installed before you begin.

In this tutorial you will program two devices in a chain (one device is A3P250 and the other is A3PE600). The STAPL file for the first A3P250 device contains 10 serialization data. See figure below.

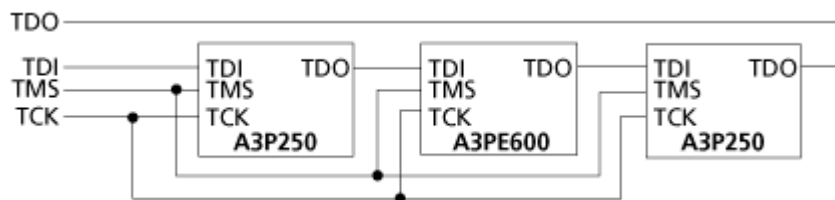


Figure 77 · APA Device Tutorial Example

First you need to create a project.

To create a new project:

1. Click the **New Project** button in FlashPro.
2. From the **New Project** dialog box, type "Tutorial" in the Project Name field.
3. Check the **Chain** box (as shown in the figure below).

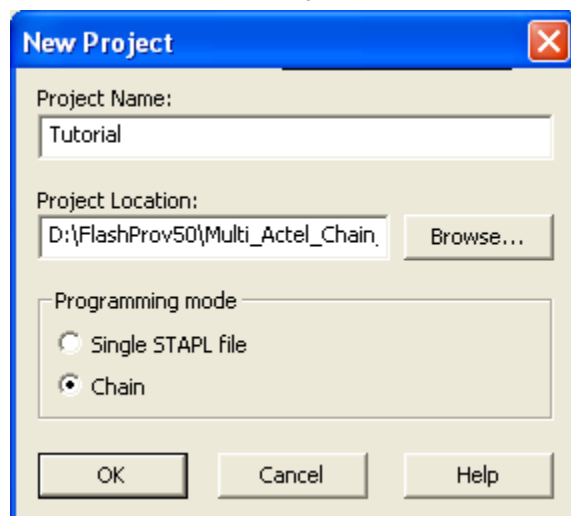


Figure 78 · New Project Dialog Box

4. If necessary, change the default location of your project in the **Project Location** field.
5. Click **OK**. The FlashPro main window appears and updates the Programmer List info with your programmer information.
6. From the **Programmers** menu, choose **Scan Chain** (or select the programmer in the Programmer List window, right-click, then choose **Scan Chain**) (as shown in the figure below).

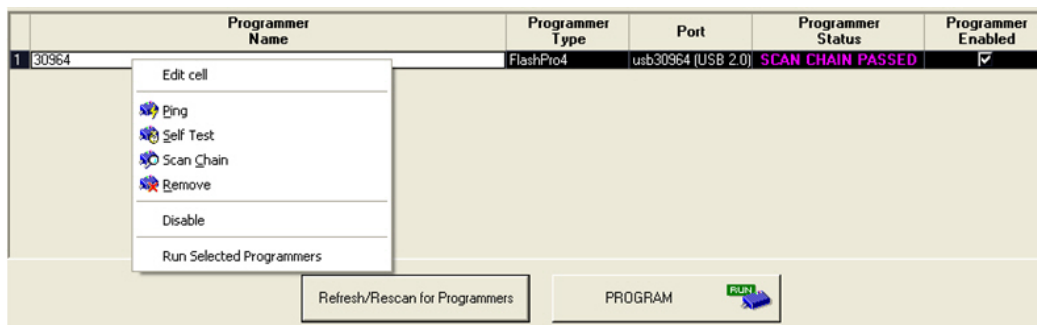


Figure 79 · Scan Chain Selection

Scan Chain shows how the devices are ordered in the chain in the log window (see figure below). In this case, A3P250 is the first device will be programmed in the chain since it is connected directly to TDO.

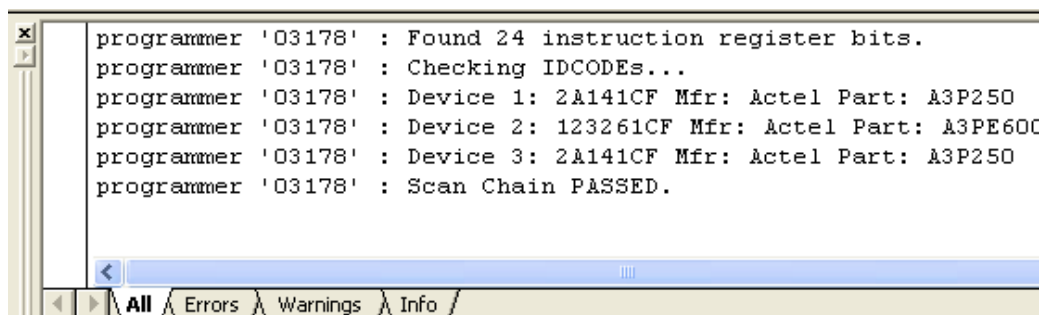


Figure 80 · Scan Chain Order in the Log Window

7. Click the **Configure Chain** button. The **Chain Configuration** window appears (see figure below).

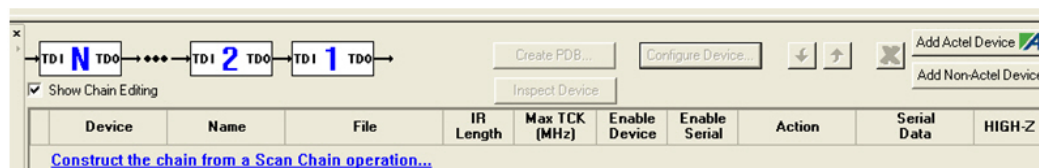


Figure 81 · Chain Configuration Window

8. In the **Chain Configuration** window, click the **Add Device** button to add devices to the chain. The **Add Microsemi Device** dialog box appears.
9. Choose **A3P250** device from the **Device** drop-down menu (as shown in the figure below).

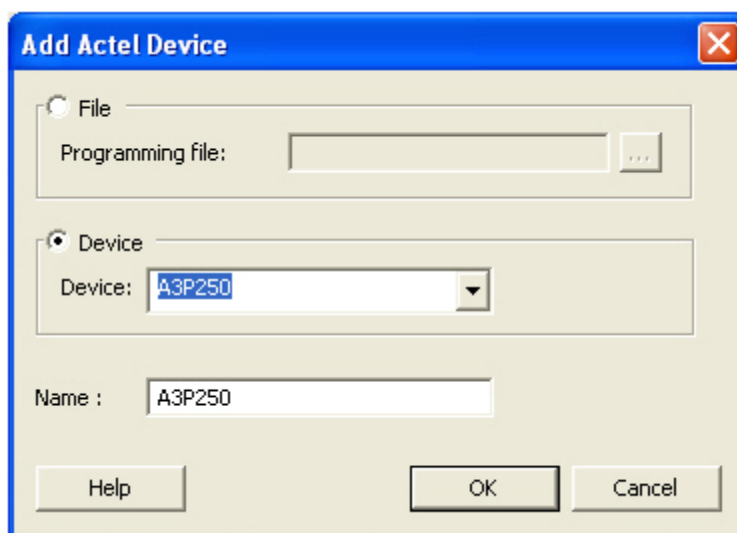


Figure 82 · Add Microsemi Device Dialog Box

10. In the **STAPL file** field, use the **Browse** button to locate the A3P250.stp file.
11. In the **Name** field, leave A3P250 as default.
12. Click **OK**. The A3P250 device is added into the **Chain Configuration** window.
13. Repeat steps 8 to 11 for A3PE600 and A3P250 respectively. After you are finished adding all devices in the chain, the **Chain Configuration** window updates (as shown in the figure below).

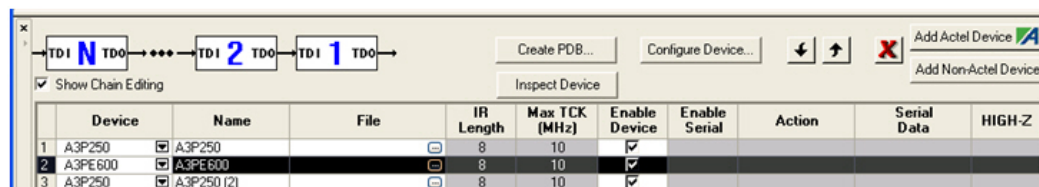


Figure 83 · Chain Configuration Window for all Devices

- 14. From the **Chain Configuration** Window, check the **Enable Serial** box. This enables the Serial Data option in the Chain Configuration window.
- 15. Click **Select** in the **Serial Data** column, the **Serial Settings** dialog box displays as shown in the figure below.

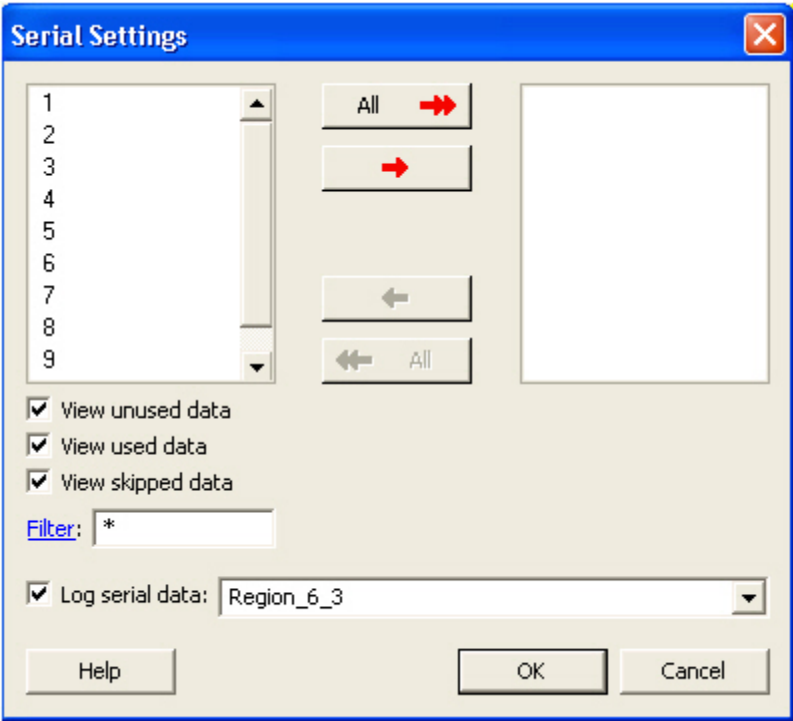


Figure 84 · Serial Settings Dialog Box

- 16. From the **Serial Settings** dialog box, click the **All** button to select all the serial data.
- 17. Click **OK**.
- 18. Once all the devices have been added to the chain in the correct order and serialization has been selected, click the **Run** button to program the chain.
- 19. When programming is complete, the **Programmer List** window appears and indicates that the devices are ready for programming (as shown in the figure below).

	Programmer Name	Programmer Type	Port	Programmer Status	Programmer Enabled	Device / Action
1	03178	FlashPro3	usb03178	RUN PASSED	<input checked="" type="checkbox"/>	A3P250/PROGRAM

Figure 85 · Programmer List Window Done

Congratulations! You have just completed the FlashPro Multiple Device Serialization Chain Programming tutorial.

Multiple Programmer Multiple Device Chain Programming

This tutorial demonstrates step-by-step instructions on how to parallel program two chains using two programmers, each with two Microsemi SoC Devices (A3P250 and A3PE600). See the figure below for an illustration.

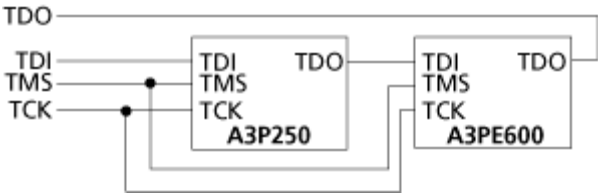


Figure 86 · APA Device Tutorial Example

You should already be familiar with the basic features of the FlashPro software before you begin this tutorial.

Note: This tutorial does not provide software installation instructions. Please have FlashPro already installed before you begin.

First you need to create a project.

- 1. Click the **New Project** button in FlashPro.
- 2. From the **New Project** dialog box, type “Tutorial” in the **Project Name** field.
- 3. Check the **Chain** box (see figure below).

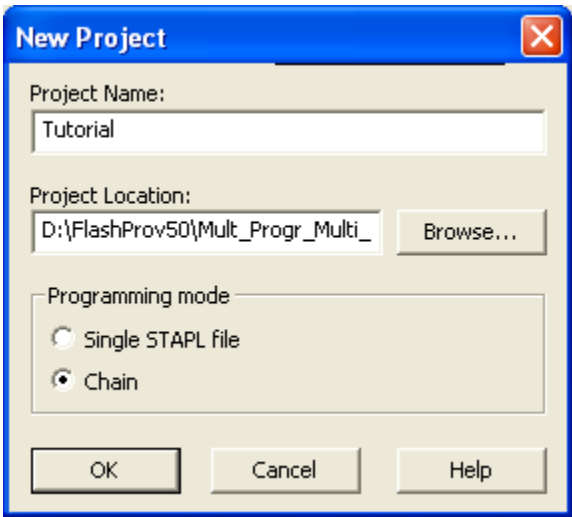


Figure 87 · New Project Dialog Box

- 4. If necessary, change the default location of your project in the **Project Location** field.
- 5. Click **OK**. The FlashPro main window appears and displays your updated programmer information (as shown in the figure below).

	Programmer Name	Programmer Type	Port	Programmer Status	Programmer Enabled	Device / Action
1	03178	FlashPro3	usb03178		<input checked="" type="checkbox"/>	
2	01245	FlashPro3	usb01245		<input checked="" type="checkbox"/>	

Figure 88 · FlashPro User Interface

- 6. From the **Programmers** menu, choose **Scan Chain** (or select the programmer in the **Programmer List** window, right-click, then choose **Scan Chain**). The **Select Programmer(s)** dialog box displays (see figure below).

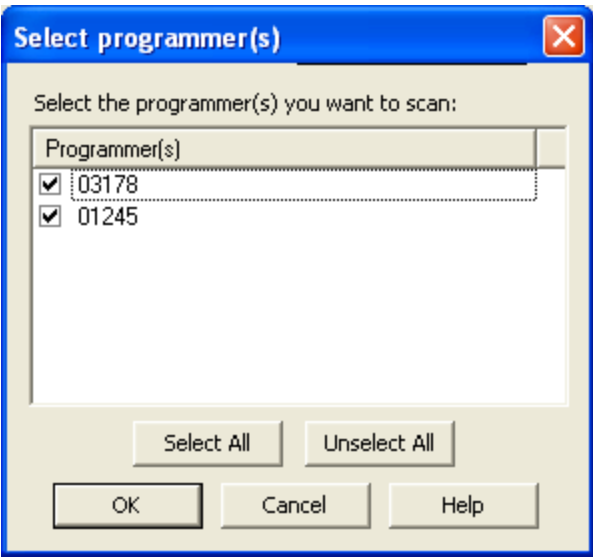


Figure 89 - Select Programmer Window

The **Programmer List** window shows the Scan Chain Test was passed and how the devices are ordered in the chain (see figure below).

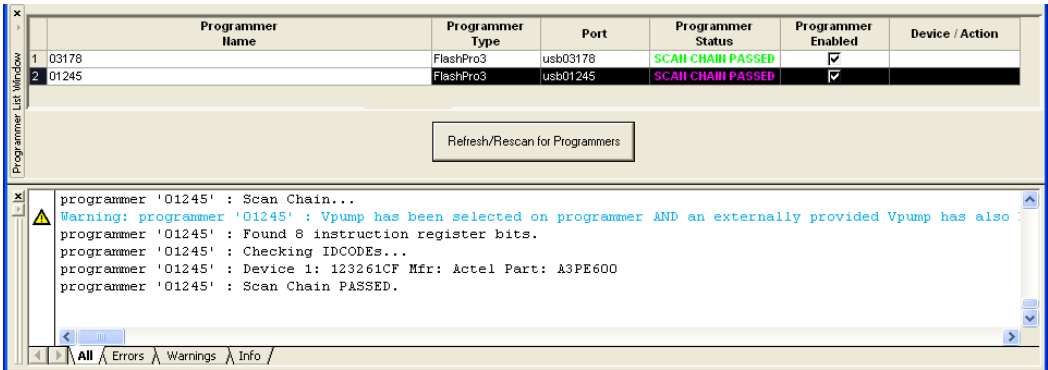


Figure 90 - Scan Chain Order in the Log Window

7. Click the **Configure Chain** button . The **Chain Configuration** window appears (as shown in the figure below).

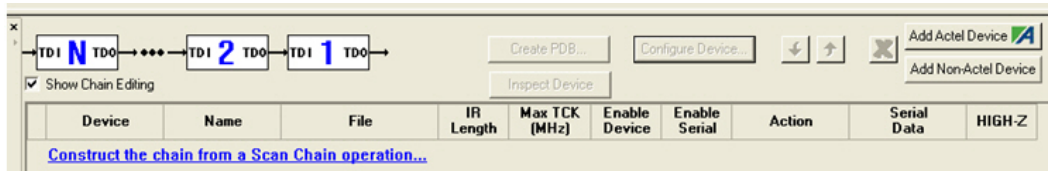


Figure 91 - Chain Configuration Window

8. In the **Chain Configuration** window, click the **Add Device** button to add devices to the chain. The **Add Microsemi Device** dialog box appears.
9. Choose **A3PE600** device from the **Device** drop-down menu (as shown in the figure below).

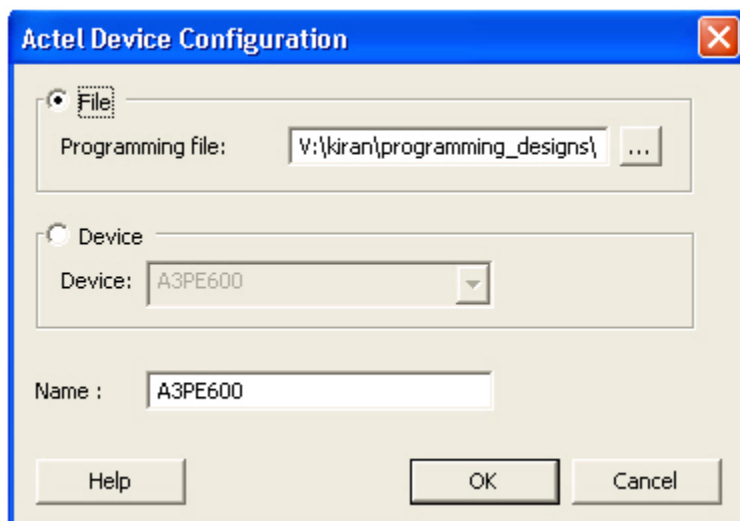


Figure 92 · Add Microsemi Device Dialog Box

10. In the **STAPL file** field, use the **Browse** button to locate the A3PE600.stp file.
11. In the **Name** field, leave A3PE600 as default.
12. The A3PE600 device is added into the **Chain Configuration** window (as shown in the figure below).

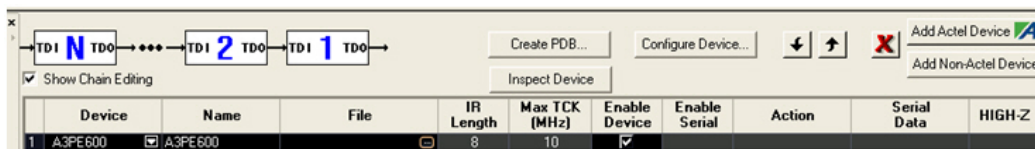


Figure 93 · Device One Chain Configuration Window

13. Repeat steps 8 to 11 for A3P250. After you are finished adding all devices in the chain, the **Chain Configuration** window updates (as shown in the figure below).

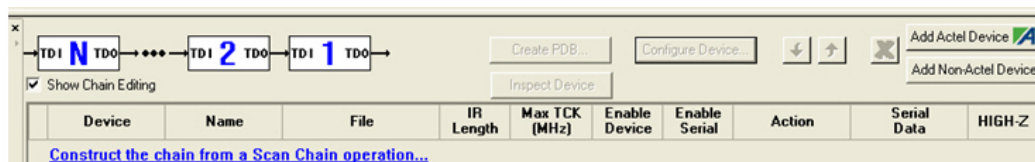


Figure 94 · Chain Configuration Window for all Devices

14. Once all the devices have been added to the chain in the correct order and serialization has been selected, click the **Run** button to program the chain.
15. When programming is complete, the **Programmer List** Window appears (as shown in the figure below).

	Programmer Name	Programmer Type	Port	Programmer Status	Programmer Enabled	Device / Action
1	03178	FlashPro3	usb03178	RUN PASSED	<input checked="" type="checkbox"/>	A3P250/PROGRAM
2	01245	FlashPro3	usb01245	RUN PASSED	<input checked="" type="checkbox"/>	A3P250/PROGRAM

Figure 95 · Programmer List Window Done

Congratulations! You have just completed the FlashPro Multiple Device Serialization Chain Programming tutorial.

Multiple Programmer and Multiple Device Serialization Chain Programming

This tutorial demonstrates step-by-step instructions on how to parallel program two chains using two programmers, each with two Microsemi SoC Devices (A3P250 with Serialization and A3PE600). See the figure below for an illustration.

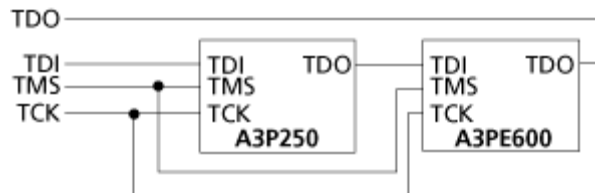


Figure 96 · APA Device Tutorial Example

You should already be familiar with the basic features of the FlashPro software before you begin this tutorial. The STAPL file for the A3P250 device contains 10 serialization data.

Note: This tutorial does not provide software installation instructions. Please have FlashPro already installed before you begin.

First you need to create a project.

1. Click the **New Project** button in FlashPro.
2. From the **New Project** dialog box, type "Tutorial" in the **Project Name** field.
3. Check the **Chain** box (see figure below).

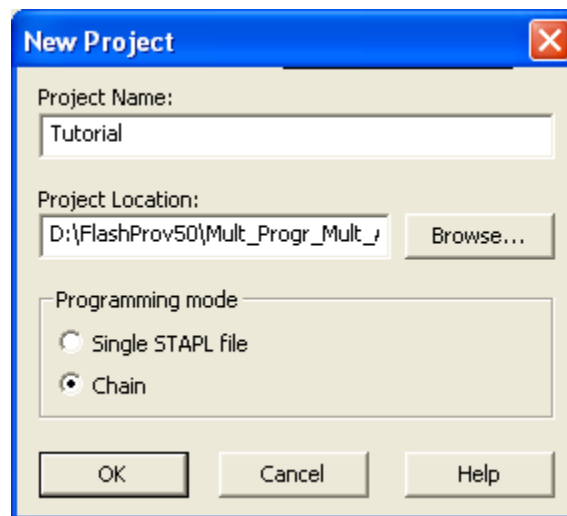


Figure 97 · New Project Dialog Box

4. If necessary, change the default location of your project in the **Project Location** field.
5. Click **OK**. The FlashPro main window and the Programmer List window displays your updated programmer information.
6. From the **Programmers** menu, choose **Scan Chain** (or select the programmer in the **Programmer List** window, right-click, then choose **Scan Chain**). The **Select Programmer(s)** dialog box appears (as shown in the figure below).

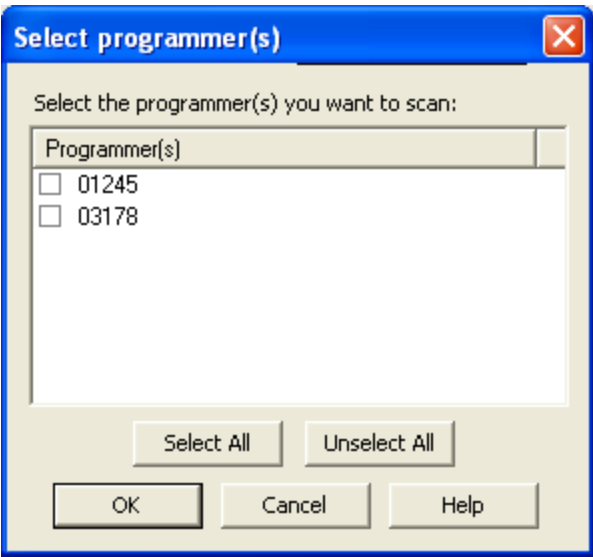


Figure 98 · Select Programmer Window

The **Programmer List** window shows the Scan Chain Test was passed and how the devices are ordered in the chain (see figure below). In this example, A3PE600 will be programmed first in the chain since it is connected directly to TDO.

	Programmer Name	Programmer Type	Port	Programmer Status	Programmer Enabled	Device / Action
1	03178	FlashPro3	usb03178	SCAN CHAIN PASSED	<input checked="" type="checkbox"/>	
2	01245	FlashPro3	usb01245	SCAN CHAIN PASSED	<input checked="" type="checkbox"/>	

Figure 99 · Scan Chain Order in the Log Window

7. Click the **Configure Chain** button . The **Chain Configuration** window appears (as shown in the figure below).

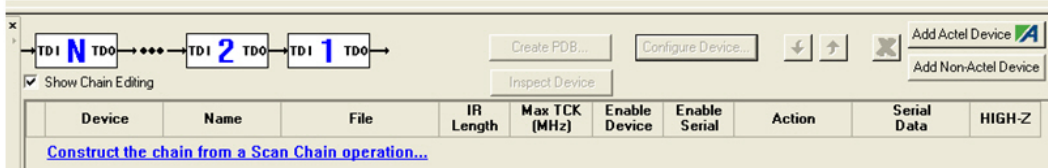


Figure 100 · Chain Configuration Window

8. In the **Chain Configuration** window, click the **Add Microsemi Device** button to add devices to the chain. The **Add Microsemi Device** dialog box appears.
9. Choose **A3PE600** device from the **Device** drop-down menu (as shown in the figure below).

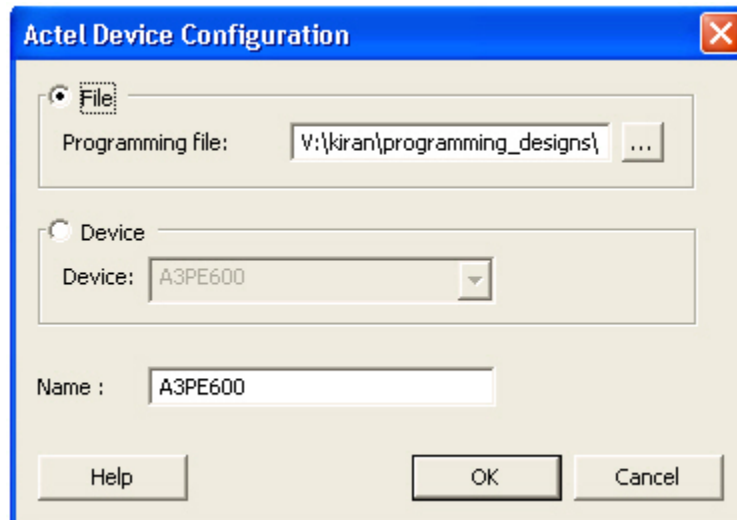


Figure 101 · Add Microsemi Device Dialog Box

10. In the **STAPL file** field, use the **Browse** button to locate the A3PE600.stp file.
11. In the **Name** field, leave A3PE600 as default. The A3PE600 device is added into the **Chain Configuration** window.
12. Repeat the steps above to add the A3P250. After finished adding all devices in the chain, the **Chain Configuration** window updates (see figure below).

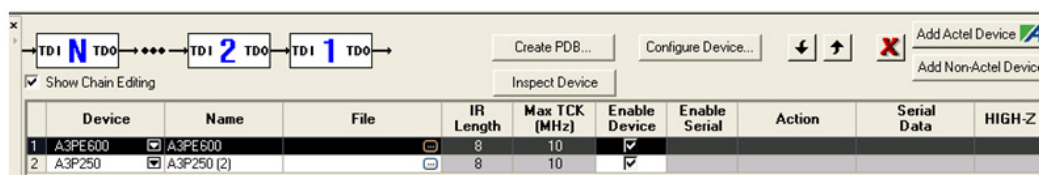


Figure 102 · Chain Configuration Window for all Devices

14. In the **Chain Configuration** Window, check the **Enable Serial** box.
15. Click **Select** in the **Serial Data** column. The **Serial Settings** dialog box appears (as shown in the figure below).

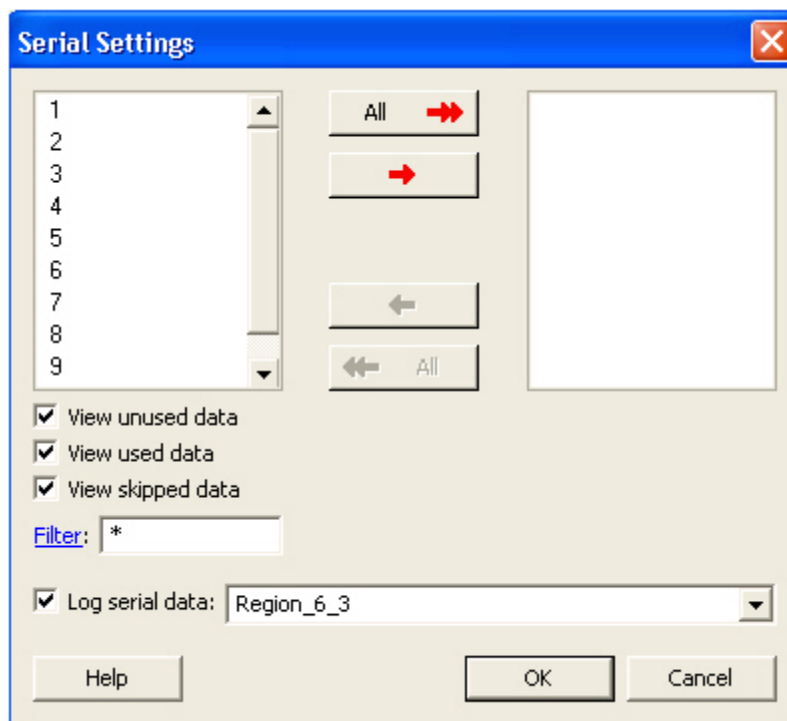


Figure 103 · Serial Settings Dialog Box

16. From the **Serial Settings** dialog box, click the **All** button to select all the serial data.
17. Click **OK**.
18. Once all the devices have been added to the chain in the correct order and serialization has been selected, click the **Run** button to program the chain.
19. When programming is complete, the **Programmer List** window updates (as shown in the figure below).

	Programmer Name	Programmer Type	Port	Programmer Status	Programmer Enabled	Device / Action
1	03178	FlashPro3	usb03178	RUN PASSED	<input checked="" type="checkbox"/>	A3P250/PROGRAM
2	01245	FlashPro3	usb01245	RUN PASSED	<input checked="" type="checkbox"/>	A3P250/PROGRAM

Figure 104 · Programmer List Window Done

Congratulations! You have just completed the FlashPro Multiple Programmer and Multiple Device Serialization Chain Programming tutorial.

Setting Disabled Microsemi SoC Devices to HIGH-Z

This tutorial explains how to set disabled Microsemi SoC SmartFusion, IGLOO, ProASIC3, Fusion devices in a chain to HIGH-Z during chain programming.

Note: This tutorial requires a design with valid *.pdb/*.stp files for a chain of devices. If you launch FlashPro from a Libero SoC project, a FlashPro project is created automatically and the PDB/STP file loaded. Otherwise, you can start a new FlashPro project and load a PDB/STP file; refer to the [Chain Programming Tutorial](#) for more information.

1. Once all your devices have been added to the chain, from the Chain Configuration window, choose which devices you would like disabled during programming by de-selecting the appropriate checkbox from the Enable Device column.
 Now that you have disabled devices a checkbox appears in the HIGH-Z column of the Chain Configuration window. If the HIGH-Z column is not shown in the Chain Configuration Grid, right-click any column header and choose **HIGH-Z**.
2. Select the HIGH-Z checkbox to ensure your disabled devices enter HIGH-Z mode and remains in that mode until chain programming is complete.

HIGHZ is not supported if enabled Microsemi devices are executing one of the following ACTIONS:

- PROGRAM_NVM_ACTIVE_ARRAY
- VERIFY_NVM_ACTIVE_ARRAY
- READ_IDCODE

Disabled devices I/Os will not go to HIGHZ and they will not tri-state. Any other ACTION will work as expected

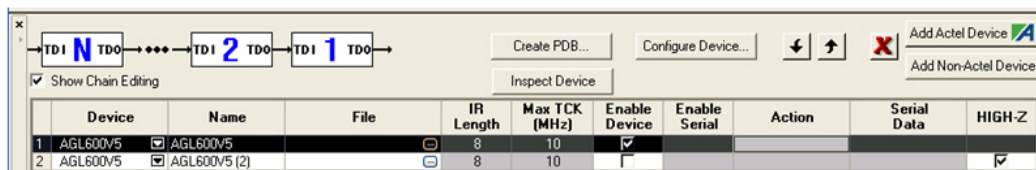


Figure 105 · HIGH-Z Option in FlashPro

Programming Settings and Operations

Introduction

The FlashPro software enables you to connect multiple programmers to your computer. With each programmer you select, you can connect the programmer, perform a self-test, customize, add, and remove and analyze the JTAG chain.

Programmer Settings

The Programmer Settings dialog box includes setting options for FlashPro5/4/3/3X, FlashPro Lite and FlashPro.

Note: You can set the TCK setting in the PDB/STAPL file by selecting the TCK frequency in the Programmer Settings dialog box.

Limitation of the TCK frequency for the selected programmer:

- FlashPro supports 1-4 MHz
- FlashPro Lite is limited to 1, 2, or 4 MHz only.
- FlashPro5: 1, 2, 3, 4, 5, 6, 10, 15, 30 MHz
- FlashPro4: 1, 2, 3, 4, 5, 6 MHz
- FlashPro3/3X: 1, 2, 3, 4, 6 MHz

Limitation of the TCK frequency for the target device:

- IGLOO, ProASIC3, and Fusion – 10MHz to 20MHz
- ProASICPLUS and ProASIC – 10 MHz
- SmartFusion2, IGLOO2, and RTG4 - 30MHz
- PolarFire - 25MHz

During execution, the frequency set by the FREQUENCY statement in the PDB/STAPL file will override the TCK frequency setting selected by you in the Programmer Settings dialog box unless the **Force TCK Frequency** checkbox is selected.

To set your programmer settings:

1. From the **Tools** menu, choose **Programmer Settings**. The **Programmer Settings** dialog box appears (as shown in the figure below).

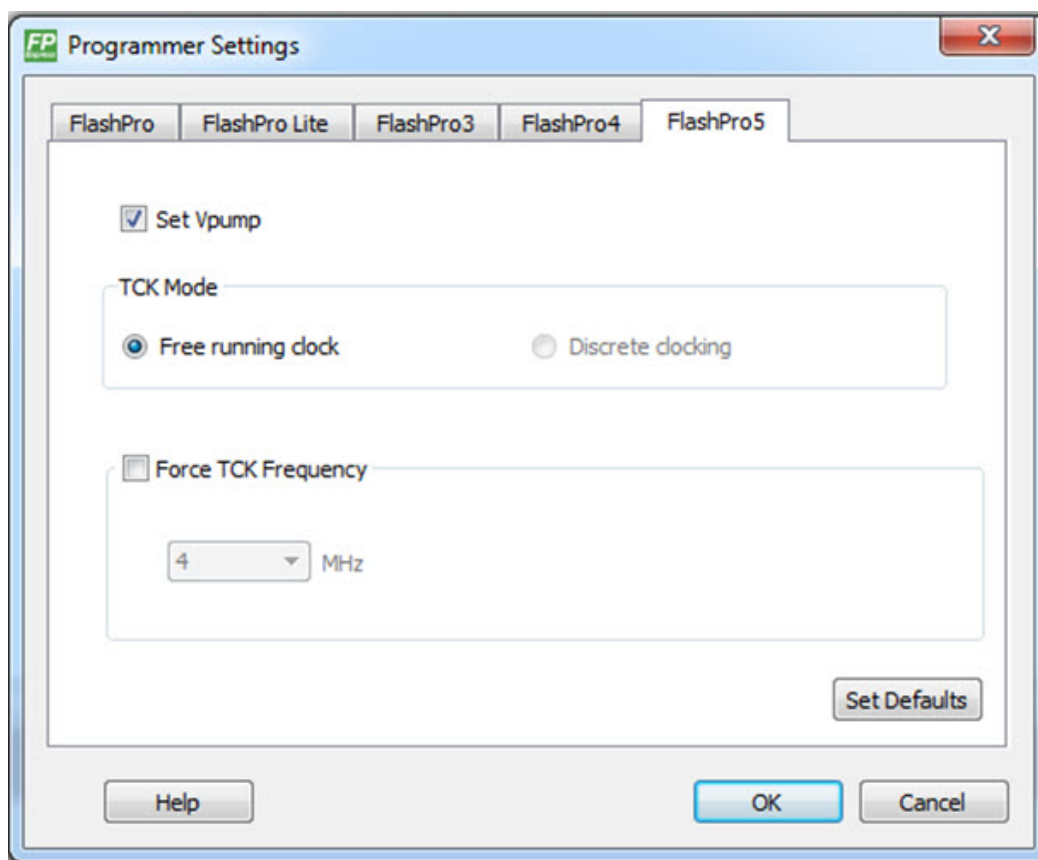


Figure 106 · Programmer Settings Dialog Box for FlashPro

2. Click a programmer tab and check the appropriate settings for your programmer.
3. Click **OK**.

FlashPro Programmer Settings

Choose your programmer settings for FlashPro (see above figure). If you choose to add the Force TCK Frequency, select the appropriate MHz frequency. After you have made your selection(s), click **OK**.

Default Settings

- The Vpp, Vpn, Vdd(I), and Vddp options are checked (Vddp is set to 2.5V) to instruct the FlashPro programmer(s) to supply Vpp, Vpn, Vdd(I) and Vddp.
- The Drive TRST option is unchecked to instruct the FlashPro programmer(s) NOT to drive the TRST pin.
- The Force TCK Frequency option is unchecked to instruct FlashPro to use the TCK frequency specified by the Frequency statement in the STAPL file(s).

FlashPro Lite Programmer Settings

If you choose to add the Force TCK Frequency, select the appropriate MHz frequency. After you have made your selection(s), click **OK**.

Default Settings

- The Vpp and Vpn options are checked to instruct the FlashPro Lite programmer(s) to supply Vpp and Vpn.
- The Drive TRST option is unchecked to instruct the FlashPro Lite programmer(s) NOT to drive the TRST pin.

- The Force TCK Frequency option is unchecked to instruct the FlashPro Lite to use the TCK frequency specified by the Frequency statement in the STAPL file(s).

FlashPro5/4/3/3X Programmer Settings

For FlashPro5/4/3/3X, you have the option of choosing the Set Vpump setting or the Force TCK Frequency. If you choose the Force TCK Frequency, select the appropriate MHz frequency. For FlashPro4/3X settings, you have the option of switching the TCK mode between Free running clock and Discrete clocking. After you have made your selections(s), click **OK**.

Default Settings

- The Vpump option is checked to instruct the FlashPro5/4/3/3X programmer(s) to supply Vpump to the device.
NOTE: VPUMP voltage will not be checked for the SmartFusion2/IGLOO2 and newer families of devices. VPUMP does not need to be connected to the programmer for these devices.
- The Force TCK Frequency option is unchecked to instruct the FlashPro5/4/3/3X to use the TCK frequency specified by the Frequency statement in the PDB/STAPL file(s).
- FlashPro5/4/3/3X default TCK mode setting is Free running clock

TCK Setting (ForceTCK Frequency)

If **Force TCK Frequency** is checked (in the **Programmer Setting**) then the selected TCK value is set for the programmer and the Frequency statement in the PDB/STAPL file is ignored.

Note: FlashPro Lite RevA supports only 4MHz on TCK.

Default TCK frequency

When the PDB/STAPL file or Chain does not exist, the default TCK frequency is set to 4MHz. In the **Single Device File Programming** mode, FlashPro will parse through the file and search for the "freq" keyword and the "MAX_FREQ" Note field, which are expected in all Microsemi flash device files. The FlashPro software uses the lesser value of the two as the default TCK frequency.

In **Chain Programming** mode, when more than one Microsemi flash device is targeted in the chain, the FlashPro software passes through all of the files and searches for the "freq" keyword and the "MAX_FREQ" Note field. The FlashPro software uses the lesser value of all the TCK frequency settings and the "MAX_FREQ" Note field values.

Ping Programmers

To ping a programmer(s):

1. From the **Programmers** menu, choose **Ping**.
2. Select the programmers you want to connect from the **Select Programmer(s)** dialog box.
3. Click **OK**.

Note: You can click the Refresh/Rescan for Programmers button to quickly ping new programmers.

Performing a Self-Test

To perform a self-test:

1. From the **Programmers** menu, choose **Self Test**.
2. Select the programmer(s) you want to self-test from the **Select Programmer(s)** dialog box.
3. Click **OK**.

Note: You must connect the programmer to the self-test board that comes with your programmer before performing a self-test.

You can also perform self-test by right-clicking on a specific programmer from the **Programmer List Window** and selecting **Self-Test**.

Note: Self-test is not supported with FlashPro4 or FlashPro Lite programmers. These programmers are rigorously tested at the factory during production.

Scanning a Chain

The scan chain operation scans and analyzes the JTAG chain connected to programmer(s) you have selected.

To scan a chain:

1. From the **Programmers** menu, choose **Scan Chain**.
2. Select the programmers you want to scan from the **Select Programmer(s)** dialog box.
3. Click **OK**.

You can also perform Scan Chain by right-clicking on a specific programmer from the **Programmer List Window** and selecting **Scan Chain**.

To scan and check a chain:

1. From the **Tools** menu, choose **Modes > Chain Programming**.
2. From the Chain Configuration window, select **auto construct or add devices**.
3. From the **Programmers** menu, choose **Scan and Check Chain**.
4. Select the programmers that you want to scan and check chain from the **Select Programmer(s)** dialog box.
5. Click **OK**.

You can also perform Scan Chain and Scan and Check Chain by right-clicking a specific programmer from the **Programmer List Window** and selecting **Scan Chain** or **Scan and Check Chain**.

Enabling and Disabling Programmers

Once your programmer is enabled you can connect the programmer, perform a self-test, scan the chain, or remove it.

To enable a programmer:

1. From the **View** menu, choose **Programmer Details Window**.
2. Check the **Enable programmer** checkbox in the **Programmer Details** Window.

The **Programmer Details** window displays all the information about your programmer.

Note: You can also enable your programmer from the Programmer List window by checking the checkbox in the Programmer Enabled column.

Disable your programmer by unchecking the **Enable programmer** checkbox from the **Programmer Details** Window or by unchecking the checkbox in the **Programmer Enabled** column in the **Programmer** window.

Renaming a Programmer

Enter the new programmer name in the **Programmer Details** window to rename the programmer. By default, the programmer name is the same as the programmer ID.

Removing a Programmer

To remove a programmer:

1. From the **Programmers** menu, choose **Remove**.
2. Select the programmers you want to remove from the **Select Programmer(s)** dialog box.

3. Click **OK**.

Selecting Programmers

The **Select Programmer(s)** dialog box gives you the option of selecting all and unselecting all of the programmers that you want to ping. See figure below.



Figure 107 · Selecting Programmer(s) Dialog Box

Single Device Configuration

Single Device Programming

When devices are joined together in a JTAG chain, all of their Instruction Registers (IR) and Data Registers (DR) are put in a long shift register from TDI to TDO. The IR length defers from device to device and the DR length depends on the instruction that shifts into the instruction register.

When targeting Device 2 (see figure below), you need to know the IR length for Device 1 and Device 3. Given this information, you can bypass both devices by shifting an all one pattern into their instruction registers before and after the instruction targeted at Device 2. The number of bits you shift before Device 2's instruction is the pre IR length, and the number of bits you need to add after Device 2's instruction is the post IR length. In this case, the pre IR bits are shifted into Device 1 and post IR bits are shifted into Device 3.

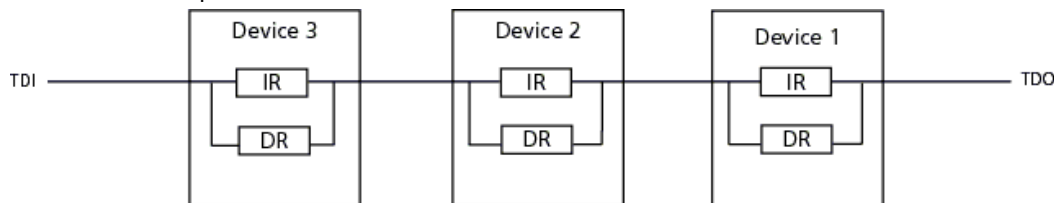


Figure 108 · Targeting Device 2

When the bypass instruction is shifted into Device 1 and Device 3, the TDI and TDO of the two devices are connected to the 1-bit bypass register at the Shift-DR state. To correctly shift the data in and data out of Device 2's register, you need to shift one bit of data before and after Device 2's data.

The number of bits you need to shift into the data register for Device 1 is the pre-DR length and the number of bits we need to shift into the data register for Device 3 is the post-DR length. With the IR and DR length information, you can shift instructions and data into Device 2 with the correct registration.

To create the JTAG chain (shown in the above figure):

1. Connect the TCK and TMS from the programmer to all of the devices.
2. Connect the programmer's TDI pin to the TDI pin of device 3.
3. For all devices in the chain, connect the TDO output of one device to the TDI input of the next device.
4. Connect the TDO output of the last device to the programmer's TDO input.

The order of devices in the chain is set by the connections of TDI to TDO.

The ChainBuilder software takes the order of the devices in a chain and their IR lengths and adds the pre-IR, post-IR, pre-DR, and post-DR padding bits in the device you want to program, which properly aligns the instructions and data within the IR and DR of the devices.

If you do not use the ChainBuilder software, the FlashPro software tries to find the pre-IR, post IR, pre-DR, and post-DR values during the Analyze Chain operation.

For more information, see ProASIC programming and [ProASICPLUS and ProASIC programming introduction](#).

To find out how to set the IR length, see [Chain Settings](#).

Loading a Programming File

You can either load a programming file from the **Configuration** menu or from the **Single Device Programming** Window. The section below describes how to load a programming file from the **Single Device Programming** Window.

To Load a programming file from the Single Device Programming window:

1. From the **View** menu, choose **Single Device Configuration** to activate the **Single Device Configuration** Window.
2. Click the **Browse** button in the **Single Device Configuration** Window (see figure below).

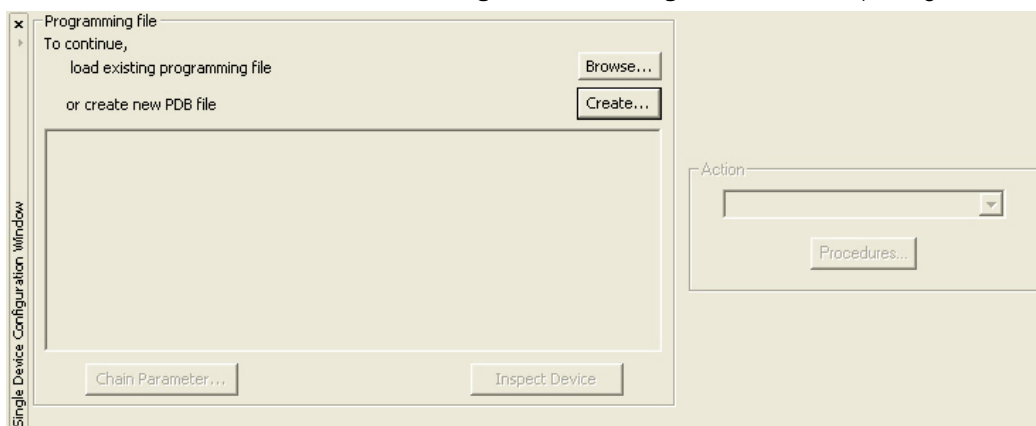


Figure 109 · Signal Device Configuration Window

The **Load Programming File** dialog box appears.

3. Navigate to your programming file, select it, and click **Open**. The programming file is loaded and the **Single Device Configuration** Window updates.

Select Target Device

The **Select Target Device** dialog box is located in the **Configuration** menu.

The **Select Target Device** dialog box enables you to select the target device you want to program. If you are only programming one device in a chain, there is no need for you to make a selection. The **Select Target Device** dialog box automatically displays your device (see figure below).

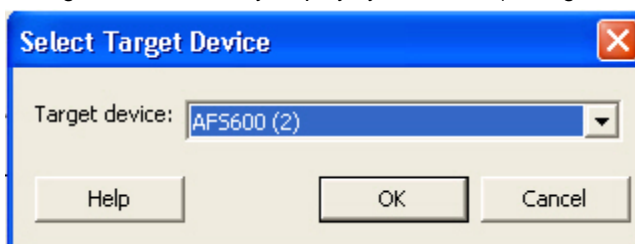


Figure 110 · Select Target Device (One Device in a Chain)

If you are programming more than one Flash device in a chain, you need to select the target device you want to program. If you attempt to program your device without selecting a target device, a warning message appears.

If the warning message appears, click **OK** and the **Select Target Device** dialog box appears. From the **Select Target Device** dialog box, select the device you want to program (see figure below).

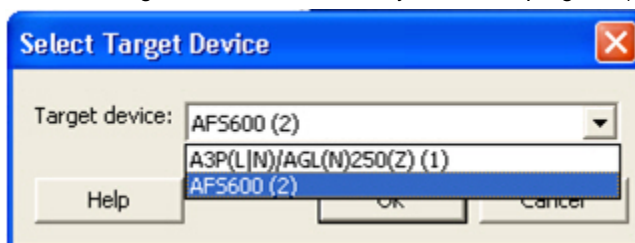


Figure 111 · Select Target Device (Multiple Devices in a Chain)

Click the down arrow to display the list of devices in your chain. Then, make your selection and click **OK**.

Note: When the FlashPro software does not detect your chain configuration, you must specify the Pre/Post IR fields by entering these values in the Set Pre/Post IR Values dialog box (see figure below).

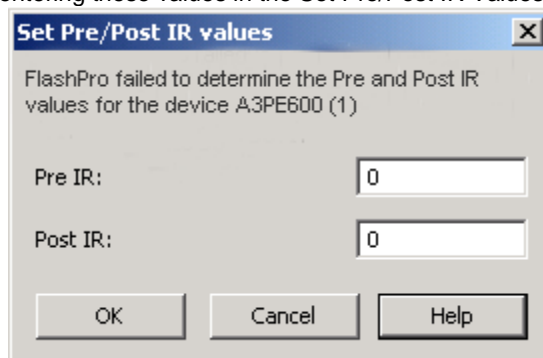


Figure 112 · Pre IR and Post IR Values for the Target Device

For more information, see [Single STAPL file programming information](#).

Chain Settings

Click the **Chain Parameter** button in the **Single Device Configuration** window to set the chain settings (see the **Chain Settings** dialog box below). See [Single Device Programming Information](#) for more information about these STAPL settings.



Figure 113 · Chain Settings Dialog Box

Serial Settings

Click the **Select Serialization Indexes/Select Serialization Actions** button from the **Single Device Configuration** Window. The Serial Settings dialog box appears (as shown in the figure below).

Note: Depending on the STAPL file format (Microsemi format or generic format) used, you will either see Indexes columns or Actions columns in the Serial Settings dialog box.

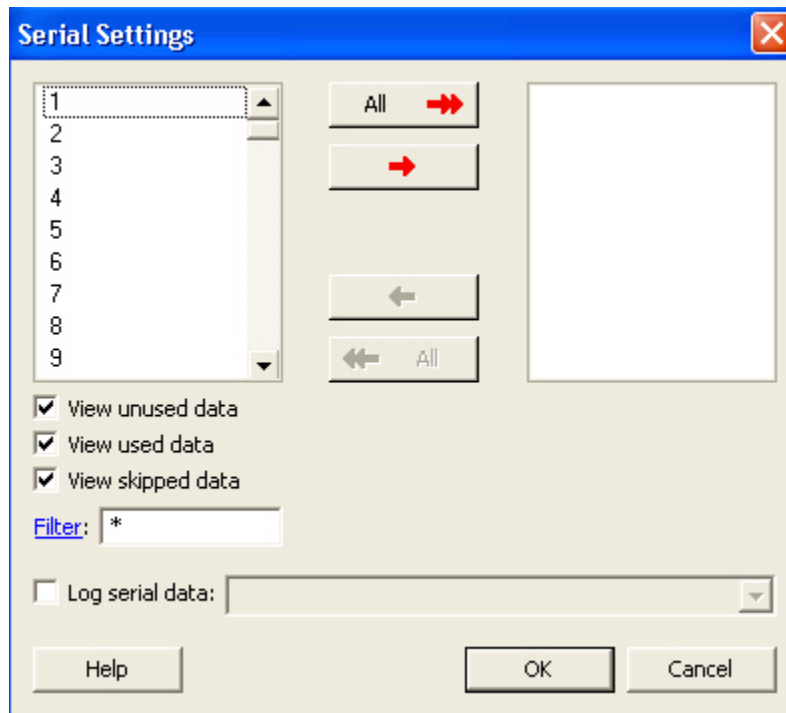


Figure 114 · Serial Settings Dialog Box

Click the red arrow buttons in the center of the dialog box to move from the **Actions** column to the **Selected Actions** column. The indexes/actions available for selection are located on the left and the indexes/actions you choose to select are located on the right column. Viewing options are available in the checkboxes under the **Actions** column. If you check Log serial data, you can select the FlashROM region name where the serial data will be stored.

Chain Programming

Chain Order

The chain order is located in the [Chain Configuration Window](#). The devices you add to the chain must be in the correct order and must match the physical chain to be programmed. The TDO for the first device connects to the programmer, and the last device's TDI connects to the programmer. The devices in the chain go in order from a device's TDI into the next device's TDO, as shown in the figure below.

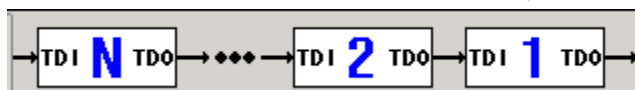


Figure 115 · Chain Order

Multiple Device Chain Programming

The FlashPro software enables direct chain programming without generating a chain STAPL file. Each device will be programmed in sequential order starting from device 1 to device N. See example below. For more information about chain order, see the [Chain Order](#) help topic.

TDI > Device N > Device N-1 >... > Device 2 > Device 1 > TDO

You have the advantage of using the Chain Builder GUI interface to construct the target physical chain. Therefore, you do not need to calculate the PRE/POST IR/DR value of the target device. Instead, you must provide either a valid BSDL file or the IR length and TCK Fmax values when you add a non-Microsemi device to the chain.

You also have the advantage of automatically generating the chain from a scan chain operation. If you connect the target chain to your Microsemi programmer, then you can automatically construct the chain. Refer to the [Automatic Chain Construction Tutorial](#) for more information.

Note: Even though the FlashPro software enables direct chain programming without generating a Chain STAPL file, this functionality is still available. For more information, see [Export Chain STAPL file](#).

Device Programming Compatibility

The following is a list of flash devices that can be programmed together in a chain.

- SmartFusion, IGLOO, ProASIC3 and Fusion, excluding ProASIC3L, families can be programmed in the same chain.
- ProASIC^{PLUS} can only be programmed with other ProASIC^{PLUS} devices.
- ProASIC can only be programmed with other ProASIC devices.

Programmer Support

FlashPro5/4/3/3X supports only SmartFusion, IGLOO, ProASIC3 and Fusion family devices. The Vpump on FlashPro5/4/3/3X is designed to support the programming of only one device. Please make sure that Vpump, Vcc and Vjtag are provided on board for chain programming. Connect the Vpump to the header as the FlashPro software will attempt to check for all external supplies, including Vpump, to ensure successful programming. There is no limitation to the chain length; however, ensure that the JTAG signal integrity and the timing are preserved.

FlashPro and FlashPro Lite support both ProASIC^{PLUS} and ProASIC devices. However you cannot program both devices in the same chain.

Unless all supplies are provided on board, there is a limitation of programming eight ProASIC^{PLUS} or ProASIC devices in a chain.

Multiple Device Serialization in a Chain

When you program multiple SmartFusion, IGLOO, ProASIC3 and Fusion family parts, you can use the serialization functionality for more than one device. You must generate STAPL files with the correct serialization data in them to use this functionality.

Each serialization enabled STAPL file may contain a different number of serialization data, but you may only select the same number of serialization data to program in a single Serialization/Programming session.

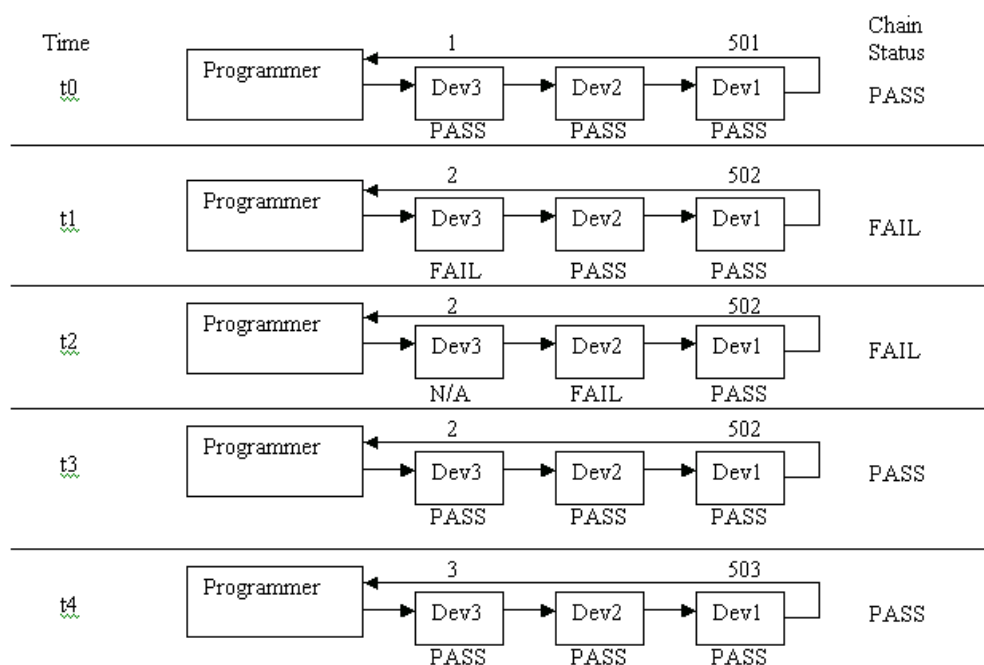
See the example below for further explanation:

In this example, you have a chain of two devices (one device is an A3P250 and the other device is an A3PE600). The STAPL file for the A3P250 contains 10,000 serialization data and the STAPL file for the A3PE600 has 5,000 serialization data. In a single Serialization/Programming session, you are allowed to select serialization data indexed from 1 to 1,000 for the A3PE600 device and serialization data indexed from 5,001 to 6000 for the A3P250 device. However, FlashPro errors out (at the beginning of a programming operation) when the amount of the Serialization data you select is different from the devices.

Reuse Serial Data That Failed Programming

If any of the devices in the chain fail programming, the entire chain fails. All of the devices with serialization enabled will fail as well. The serialization data will be reused or skipped based on your settings. See the example below for more information:

You have a chain with three devices. Device 1 and Device 3 are serialization enabled. You have selected Serialization Data 1 to 100 for Device 1 and 501 to 600 for Device 3, and you have set to reuse any unused Serialization Data. Device 2 is targeted for programming without serialization. See the figure below for an illustration.

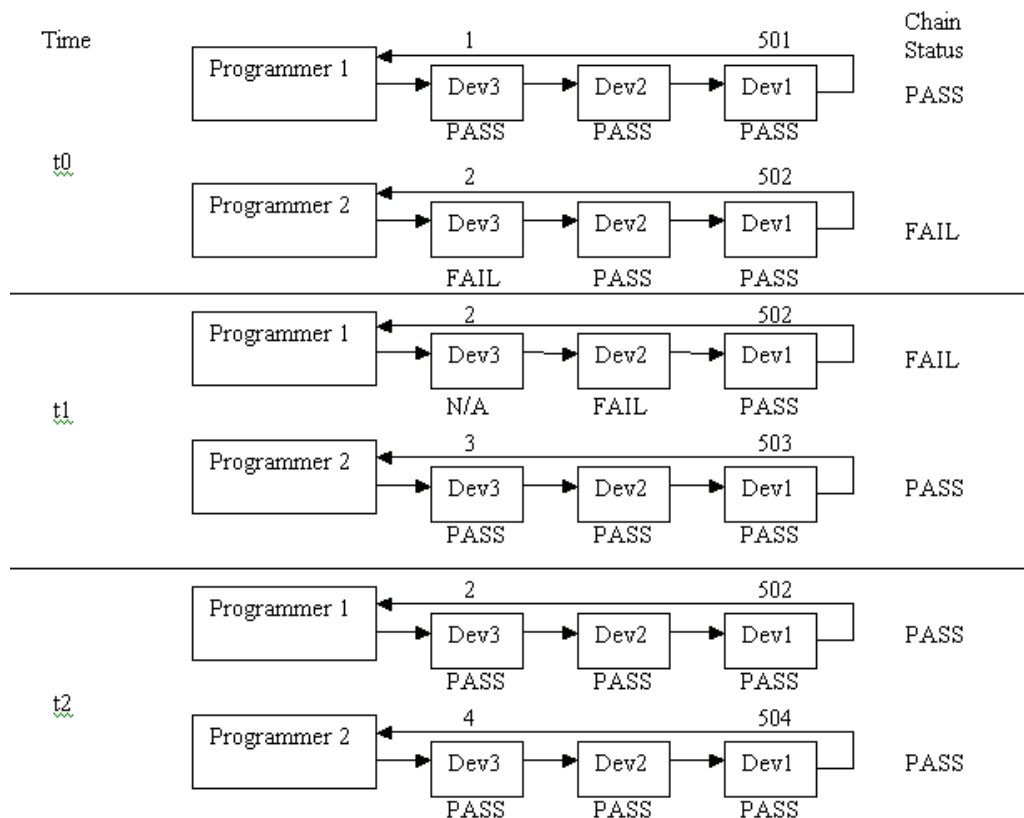


At time t₀, all devices in the chain passed programming so the Serialization Data indexes are advance to 2 and 502 for Device 3 and Device 1 respectively. At time t₁ and t₂, one of the devices failed programming so the device indexes are reused for time t₃.

Note that at time t₂, when Device 2 failed to program; Device 3 will not be programmed.

Multiple Device Serialization and Parallel Programming

The FlashPro software enables parallel programming for ProASIC3, excluding ProASIC3L, family devices using multiple FlashPro5/4/3/3X programmers. The following figure illustrates how the indexes are reused in a parallel programming environment.



At time t0, the chain failed to program so index 2 and 502 are reassigned to Device 3 and Device 1 respectively at time t1. The failed indexes are not assigned to the programmer that previously failed. It will always be assigned to the devices in the first programmer in the Programmer List.

Chain Configuration Window

The Chain Configuration Window displays the chain order, the chain editing options, and the chain configuration grid (see figure below). The Chain Configuration Grid enables you to view and set options for each of your devices. Right-click a column heading in the grid and choose a menu option to show or hide a specific column.

The Chain Configuration Grid enables you to view, sort and/or set the following options:

- Device - Device name
- Name - Editable field for a user-specified device name. If you have two or more identical devices in your chain you can use this column to give them unique names.
- File - Path to programming file
- IR Length - Device instruction length.
- Max TCK (MHz) - Maximum clock frequency to program a specific device. FlashPro uses this information to ensure that the programmer operates at a frequency lower than the slowest device in the chain.
- Enable Device - Select to enable the device for programming
- Enable Serial- Select to enable serialization when you have loaded a serialization programming file
- Action - List of programming actions for your device.
- Procedures - Advanced option; enables you to customize the list of recommended and optional procedures for the selected Action.
- Serial Data - Opens the Serial Settings dialog box; enables you to set your serialization data.

- **Serial Status** - Displays serialization status; lists serialization index(es)/action(s) that have been used and shows the next serialization data that will be programmed.
- **HIGH-Z** - Sets disabled Microsemi SoC SmartFusion, IGLOO, ProASIC3, Fusion devices in the chain to HIGH-Z (tri-states all the I/Os) during chain programming of enabled Microsemi devices in the daisy chain.

The **Show Chain Editing** checkbox, when checked displays your chain editing options (Configure device, Add Microsemi Device, Add Non-Microsemi Device, and organization buttons to move your device within the grid).

Note: For information on how to Add Microsemi and Non-Microsemi devices, see [Chain Editing](#).

Note: For information on how to use the Organize buttons (located next to the Add Microsemi and Add Non-Microsemi buttons) in the Chain Configuration grid, see [Using the Organize buttons in the Chain Programming grid](#).

You can enable programming and serialization by checking the **Enable Device** checkbox and the **Enable Serial** checkbox in the **Chain Configuration** grid.

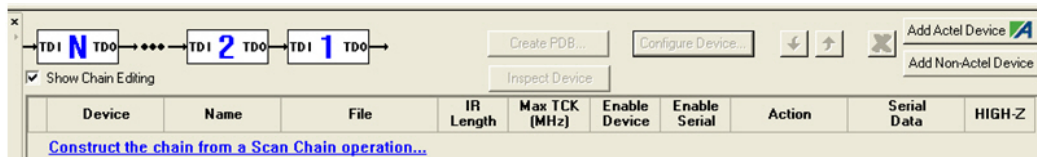


Figure 116 - Chain Configuration Window

Chain Editing Options

The FlashPro software enables you to automatically construct the chain by clicking the **Construct the chain from a Scan Chain operation** link, or by selecting **Construct Chain Automatically** from the **Configuration** menu.

FlashPro also enables you to manually edit your chain by adding Microsemi and Non-Microsemi devices. You can add devices by clicking the **Add Microsemi Device** button and the **Add Non-Microsemi Device** button, or you can select these options from the **Configuration** menu.

For more information about how to edit the chain, see [Chain Editing](#).

Editing the Chain Configuration Grid

The Chain Configuration Grid enables you to select an Action for your device, Enable Serialization, and edit the grid using the right-click menu.

To select an Action from the Configuration Grid:

1. Choose the device you would like to program and check the **Enable Device** checkbox.
2. In the Action column, click the down arrow to expose the drop down menu (see figure below).
3. Select your desired action.

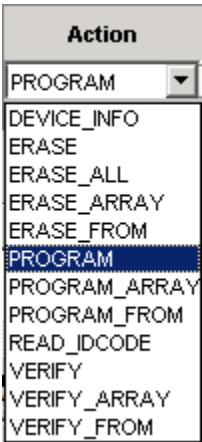


Figure 117 · Drop Down Menu for Select Action

Before you can enable serialization, you must check the **Enable Device** checkbox.

To enable Serialization:

1. Check the **Enable Serial** checkbox. By enabling serialization, the action options change.
2. In the **Action** column, click the down arrow to expose the drop down menu (see figure below).

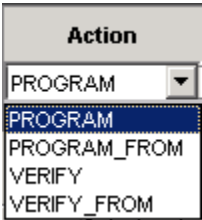


Figure 118 · Drop Down Menu for Select Action

3. Select your desired action.



Figure 119 · Serial Data Column

4. Click the **Select** button from the **Serial Data** column, which is next to the **Action** column (see above figure). The **Serial Settings** dialog box displays.
5. Choose your serial settings from the **Serial Settings** dialog box.

See [Serial Settings](#) for more information about this topic.

Note: Uncheck the Enable Serial checkbox to disable serialization.

To edit the Chain Configuration Grid:

1. Select the device you would like to edit and right click anywhere in the row of the selected device.
2. Select and click an option from the right-click menu.

Note: The Device Configuration menu (see figure below) includes options for configuring your device.

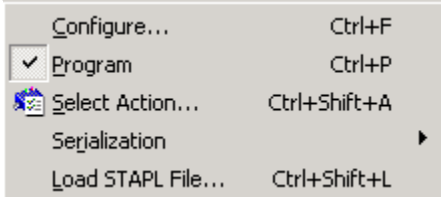


Figure 120 · Device Configuration Menu

Chain Editing

The chain order is located in the [Chain Configuration Window](#) (see figure below). The devices you add to the chain must be in the correct order and must match the physical chain to be programmed.

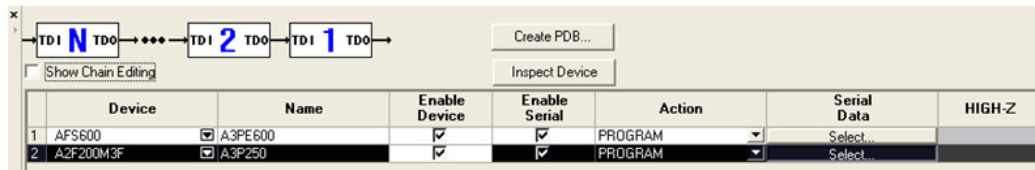


Figure 121 · Chain Configuration Window

Check the **Show Chain Editing** checkbox to display chain editing options (**Add Microsemi Device**, **Add Non-Microsemi Device**). See figure below.

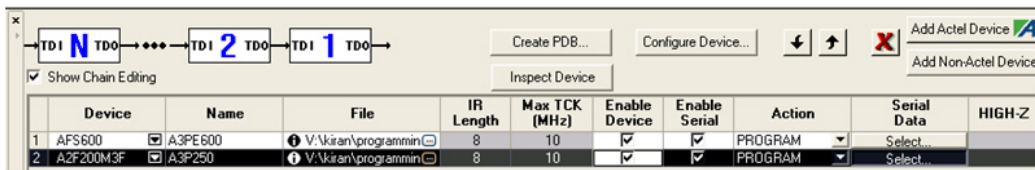


Figure 122 · Chain Configuration Window

You can edit the chain by adding Microsemi and Non-Microsemi Devices, for information refer to:

- [Adding Microsemi Devices](#)
- [Adding Non-Microsemi Devices](#)
- [Adding Microsemi Devices from a STAPL File](#)
- [Automatic Chain Construction Tutorial](#)
- [Chain Programming Tutorial](#)

Using the Organize Buttons in the Chain Programming Grid

The organize buttons enable you to select the order of the devices in your **Chain Programming** grid (see figure below).

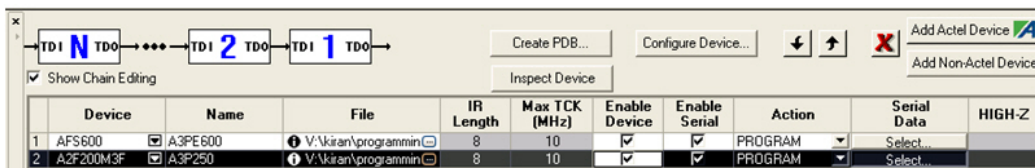





Figure 123 · Chain Configuration Window (Displaying Organize Buttons)

You can move devices up and down or delete devices within the grid. See the table below for a description of each button.

Table 4 · Organize Buttons

Button	Description
	Moves your device up in the Chain Programming grid.
	Moves your device down in the Chain Programming grid.
	Deletes your device from the Chain Programming grid.

Cutting, Copying and Pasting Devices from the Chain

If you want to make changes to your chain, you must make these changes from the spreadsheet in the Chain Programming grid.

To copy or cut a device from the chain programming grid:

1. Select the device you would like to edit and right click anywhere in the row of the selected device. The right-click menu appears.
2. Select **Copy** or **Cut** from the right-click menu to copy your device.

To paste a device from the chain programming grid:

1. Right-click the location where you would like to **Paste** the device.
2. Select **Paste** from the right-click menu .

Removing Devices from the Chain

If you want to make changes to your chain, you must make these changes from the spreadsheet in the Chain Programming grid.

To remove a device from the chain programming grid:

1. Select the device you would like to remove and right click anywhere in the row of the selected device. The right-click menu appears.
2. Choose **Remove** from the right-click menu to delete your device.

Moving Devices within the Chain

You can move devices within the chain by using the Organize buttons (located next to the Add Microsemi and Add Non-Microsemi Device buttons) in the Chain Programming grid (as shown in the figure below).

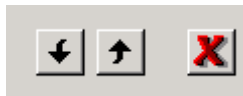


Figure 124 · Organize Buttons

To move or delete a device within the chain:

1. Click a device to select it.
2. Click one of the **Organize** button arrows to move your device up or down the spreadsheet. Click the delete button (red X) to remove a device.

For more information about the Organize buttons, see [Using the Organize buttons in the Chain Programming grid](#).

Skip Serial Data

If you are unable to perform the programming action on your device, if your device fails to program, and you have selected the **Skip Serial Data** serialization setting, the software automatically uses the next serial data when you program the next device. By default, the software is set to **Skip Serial Data**.

You can change the serialization setting by selecting **Tools > Serialization** or you can click the **Skip serial data** icon or the **Reuse serial data** icon from the toolbar.

Reuse Serial Data

If your device fails to program, and you have selected the **Reuse Serial Data** serialization setting, the software automatically reuses the current serial data when you program the next device.

Note: The FlashPro default setting is [Skip Serial Data](#).

You can change the serialization setting by selecting **Tools > Serialization** or you can click the **Skip serial data** icon or the **Reuse serial data** icon from the toolbar.

Serialization with Parallel Programming

When programming the multiple ProASIC3 devices in parallel, while performing serialization at the same time, each target device is assigned a Serial Index/Action for each programming run. Upon each successful completion of each programming run, a new index is assigned to the each target device for the next programming run. This process continues until the selected **Serial Indices/Actions** are exhausted.

Note: If programming failure is encountered, depending on the user setting, the failed serial data may be reused or skipped in the next programming run.

Note: If, in the last programming run, the remaining number selected Serial Indices/Actions is less than the number of targeted ProASIC3 devices, the targeted devices without an assigned Serial Index/Action are skipped in the final serial programming run.

Chain Editing

Adding a Microsemi Device

To add an Microsemi device:

1. Click the **Add Microsemi Device** button from the **Chain Programming** grid. The **Add Microsemi Device** dialog box appears (see figure below).

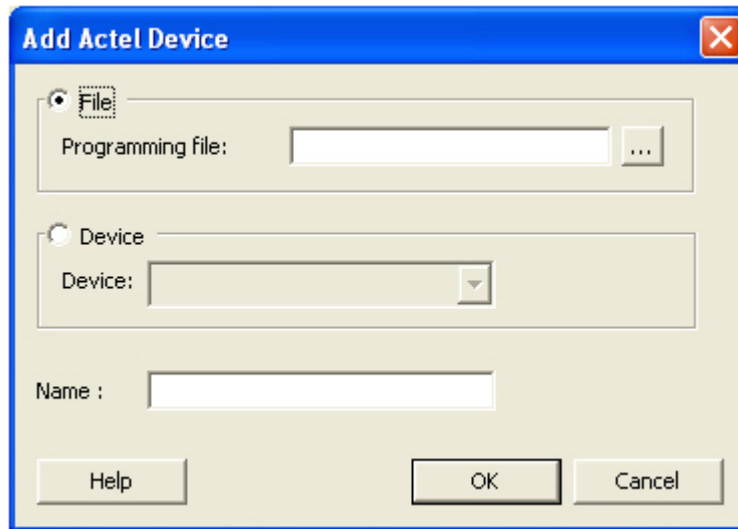


Figure 125 · Add Microsemi Device

2. Click the **Device** radio button and choose your device from the **Device** list drop-down menu.
3. Click the **File** radio button, then click the **Browse** button in the **Programming file** text box to find your PDB/STAPL file. The **Use File** dialog box appears.
4. Find your PDB/STAPL file and click **Open**. Your PDB/STAPL file name appears in the **Name** text box. You can change the name by clicking in the text box.
5. Click **OK**. Your device displays in the **Chain Programming** grid.

You can also add a Microsemi device from **Configuration > Add Microsemi Device**.

Adding a Microsemi Device from Files

To add a Microsemi device from a file:

1. From the **Configuration** menu, choose **Add Microsemi Devices From Files**. The **Add Microsemi Devices From Files** dialog box appears.
2. Locate your file and click **Open**. Your device displays in the **Chain Programming** grid.

Adding a Non-Microsemi Device

When adding a non-Microsemi device, you must choose either a BSDL file or customize the Instruction Register (IR) length and the Max TCK frequency of the device.

IR Length

The IR length specifies the number of IR bits in a specific device.

Max TCK Frequency

Maximum clock frequency to program a specific device. FlashPro uses this information to ensure that the programmer operates at a frequency lower than the slowest device in the chain.

BSDL File

Boundary Scan Description Language (BSDL) files describe the characteristics of a specific device. When using a BSDL file, FlashPro extracts the IR length and TCK frequency for the specific device and uses the information to build the FlashPro STAPL file. If you do not have a BSDL file for your specific device, you must manually enter the IR length and Max TCK for your device. This information should be found in the datasheet for the device.

To add a non Microsemi device using a BSDL file:

1. Click the **Add Non-Microsemi Device** button in the **Chain Programming** window. The **Add Non-Microsemi Device** dialog box appears (see figure below).

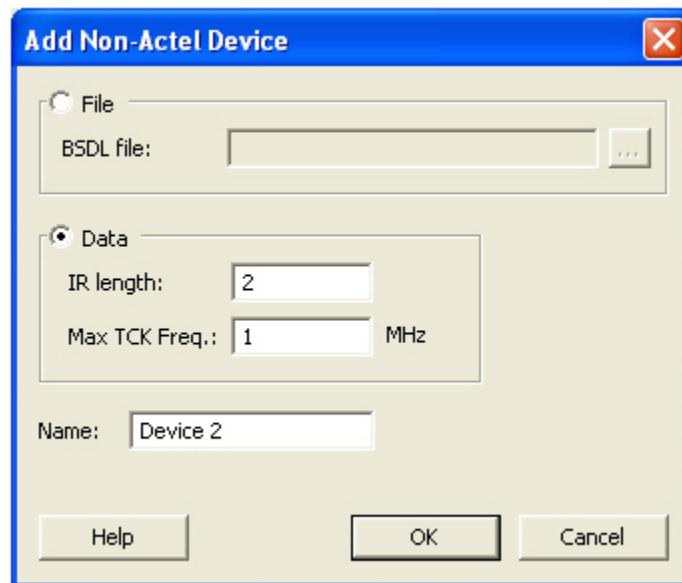


Figure 126 · Add Non-Microsemi Device Dialog Box

2. Type in the BSDL file or locate it by clicking the **Browse** button. If you click the **Browse** button to find your BSDL file, the **Use File** dialog box displays.
3. Select your BSDL file from the **Use File** dialog box, and click **Open**.
4. Click **OK**, and your device appears in the **Chain Programming** grid.

When closing the **Add Non-Microsemi Device** window, if you specified a BSDL file, it is parsed and its IR length and Max TCK frequency are retrieved.

Note: If you select a BSDL file, you cannot specify an IR length and Max TCK frequency.

To add a Non-Microsemi device using an IR length and a Max TCK frequency:

1. Click the **Add Non-Microsemi Device** button from the **Chain Programming** window.
2. Click the **Data** option from the **Add Non-Microsemi Device** dialog box.
3. Enter the IR length **AND** the Max TCK frequency in MHz.
4. Click **OK**.

If you decide to use custom data, you must specify both an IR length and Max TCK frequency.

Note: The IR length must be an integer greater than or equal to 2, and the Max TCK frequency must be a float greater than or equal to 1.

Non-Microsemi Device Configuration Dialog Box

It is possible to add multiple BSDL files to your Non-Microsemi device database that have the same IDCODE. If the BSDL files list the same IR length but different TCK values, FlashPro automatically chooses the file with the lowest TCK value by default and no action is required. If the IR lengths are different you receive an error message asking you to resolve the conflict.

To resolve the issue, click the drop-down arrow adjacent to the device name. This opens the Non-Microsemi Device Configuration dialog box (as shown in the figure below). From here you can choose the device that you wish to use. Select the device from the dropdown menu and enter a new name or use the default.

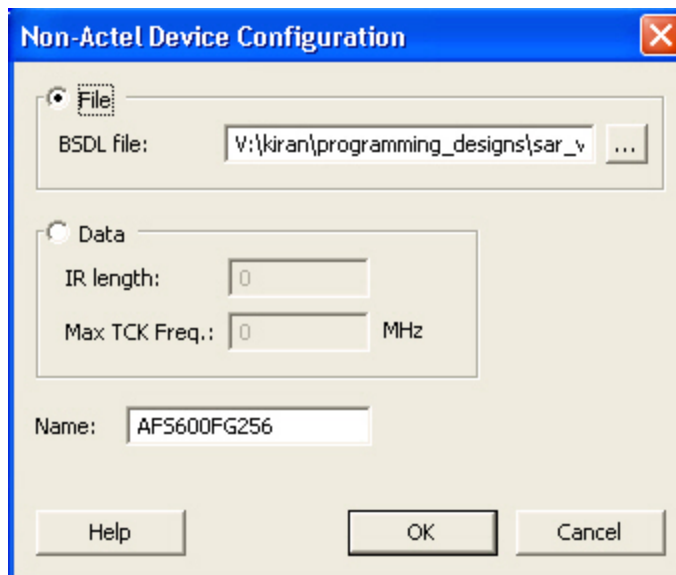


Figure 127 · Non-Microsemi Device Configuration Dialog Box

Configuring a Programmer

Selecting an Action

The available actions are dependent on what type of STAPL file you have loaded into the software.

To configure a programmer:

1. From the **Configuration** menu, choose **Select Action**. The **Select Action and Procedures** dialog box appears (see figure below). You can change the procedures for each action; the procedures that appear will vary depending on both your device and the action you have selected.

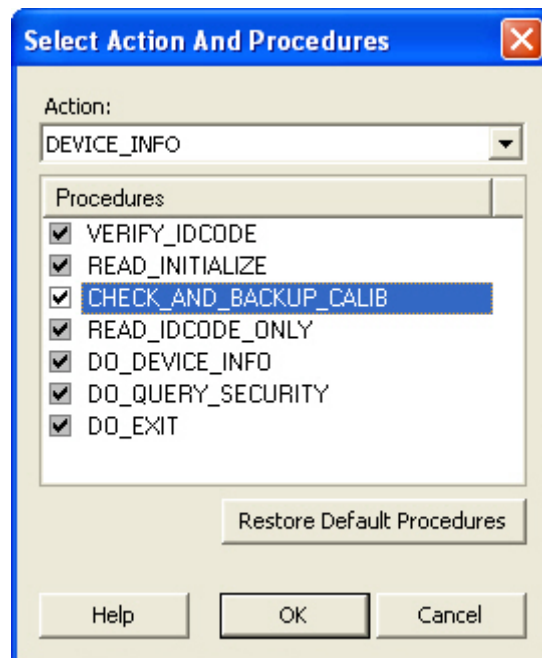


Figure 128 • Select Action and Procedures Dialog Box

2. Click the checkboxes of the available procedures or click the **Restore Default Procedures** button in the **Select Action and Procedures** dialog box.
3. Click **OK**.

Click the **Restore Default Procedures** to return to default settings.

For example, if you wish to disable the gathering of Check and Backup calibration data:

1. In the **Action** drop-down menu, choose **DEVICE_INFO**.
2. Click **Procedures** to open the **Select Action and Procedures** dialog box (as shown in the figure above).
3. Click **CHECK_AND_BACKUP_CALIB** to clear the checkbox and disable it.
4. Click **OK** to continue.

Using Serialization

To use serialization:

1. Enable serialization by checking the **Serialization** checkbox.
2. Select an action in the **Action** text box.

- Click the **Select Serialization Indexes** button. The **Serial Settings** dialog box displays (see figure below).

Note: Depending on the STAPL file format (Microsemi format or generic format) used, you will either see Indexes columns or Actions columns in the Serial Settings dialog box.

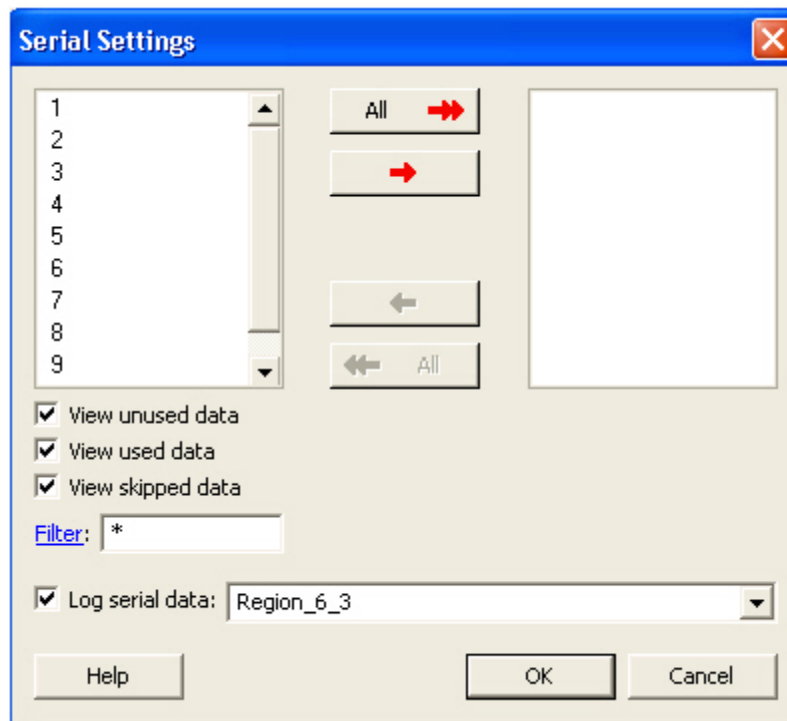


Figure 129 · Serial Settings Dialog Box

Note: Depending on your STAPL file, you would click the Select Serialization Action button (see figure below).

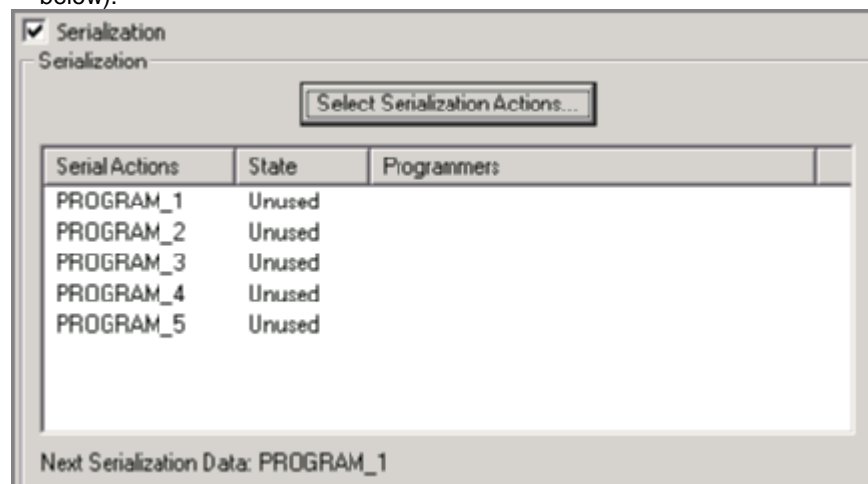


Figure 130 · Select Serialization Actions Button

Modifying Programming Settings in FlashPro with a PDB File

FlashPro enables you to modify programming settings within the software by using a PDB file. This feature is available only for PDB files generated from Designer v8.1 or greater. This feature allows modification of features being programmed, security settings, and memory content update for FlashROM and Embedded

Flash Memory Blocks (Fusion only). Please refer to [Modifying Memory Contents and Programming a Device Tutorial \(EFMB\)](#) and [Modifying FlashROM Contents and Programming a Device Tutorial](#) for an example.

Note: You cannot add or remove the FPGA feature from your PDB. If you would like to add or remove this feature from your PDB, regenerate the PDB from Designer.

See Also

[Configuring security, FlashROM and Embedded Flash Memory Block settings in FlashPro](#)

Configuring Security

Configuring Security, FlashROM and Embedded Flash Memory Settings in FlashPro

1. From the **Configuration** menu, choose **Load Programming File (PDB)**.
2. Select the PDB file and click **Open**, this loads the programming file.
3. From the **Configuration** menu, choose **PDB Configuration**. The **Programming File Generator** appears (see figure below).

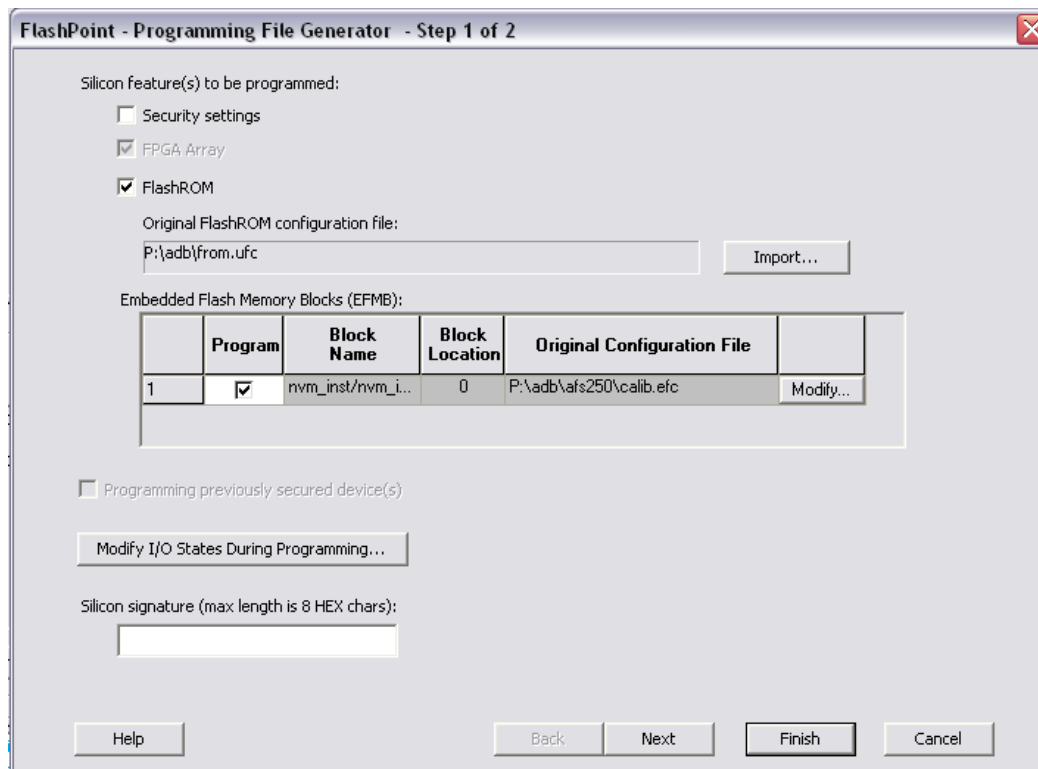


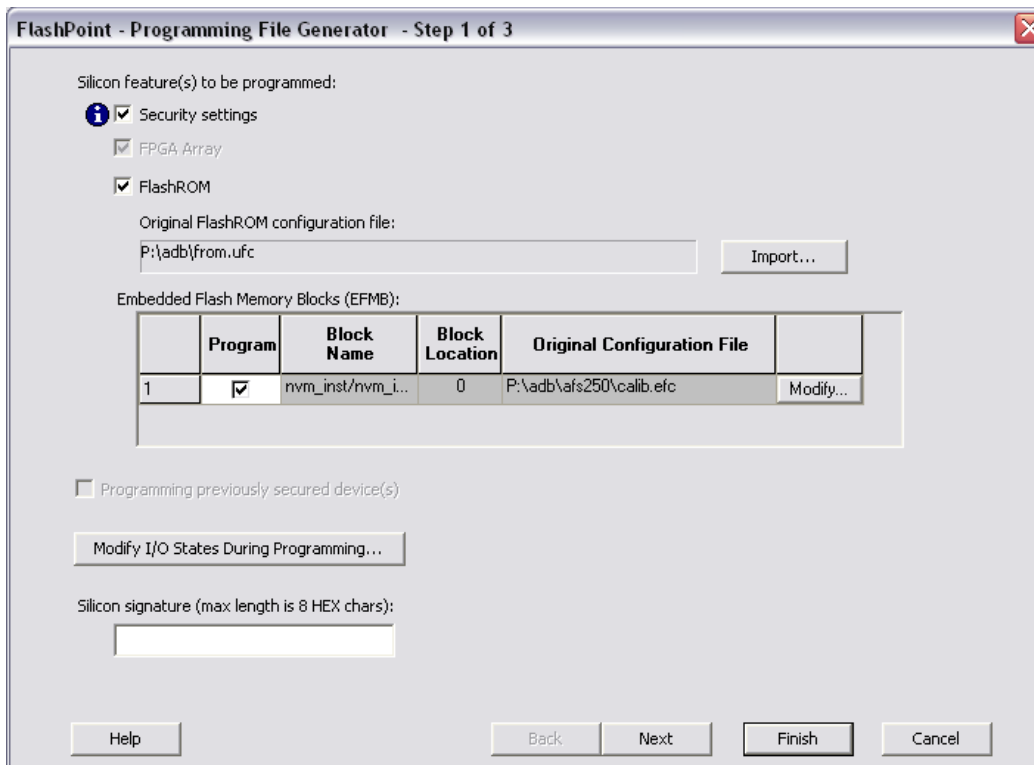
Figure 131 - Programming File Generator

4. Select the Silicon feature(s) you want to program:
 - [Security settings](#)
 - [FlashROM](#)
 - [Embedded Flash Memory Block](#)
5. Check the **Programming previously secured device(s)** box if you are reprogramming a device that has been secured.
 Because the SmartFusion, IGLOO, ProASIC3 and Fusion families enable you to program the Security Settings separately from the FPGA Array and/or FlashROM, you must indicate if the Security Settings were previously programmed into the target device. This requirement also applies when you generate programming files for reprogramming.
6. Enter the **Silicon signature** (0-8 HEX characters).
7. Click **Next**.

Configuring Security Settings in FlashPro

To configure the security settings:

1. From the **Configuration** menu, choose **Load Programming File (PDB)**.
2. Select the PDB file and click **Open**, this loads the programming file.
3. From the **Configuration** menu, choose **PDB Configuration**. The **Programming File Generator** appears (as shown in the figure below).



FlashPoint - Programming File Generator - Step 1 of 3

Silicon feature(s) to be programmed:

- ☒ Security settings
 - ☒ FPGA Array
 - ☒ FlashROM

Original FlashROM configuration file:

P:\adb\from.ufc Import...

Embedded Flash Memory Blocks (EFMB):

	Program	Block Name	Block Location	Original Configuration File	
1	<input checked="" type="checkbox"/>	nvm_inst/nvm_i...	0	P:\adb\afs250\calib.efc	Modify...

☐ Programming previously secured device(s)

Modify I/O States During Programming...

Silicon signature (max length is 8 HEX chars):

Help Back Next Finish Cancel

Figure 132 · Programming File Generator

4. Check the **Security Settings** checkbox and click **Next**. This brings up the **Security Settings** dialog box (shown below).

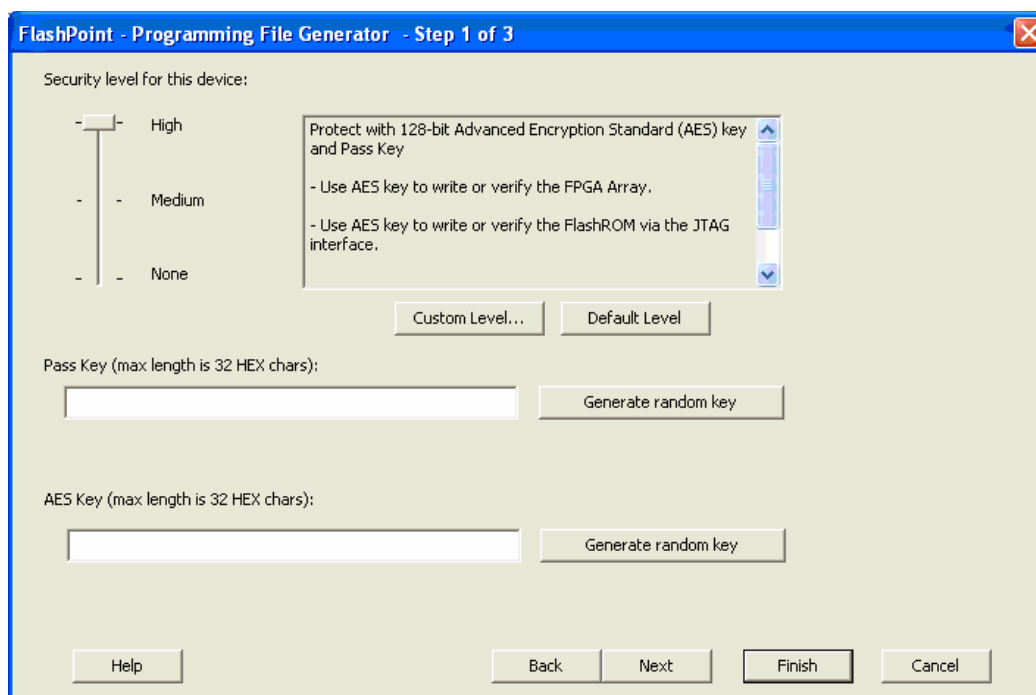


Figure 133 · Security Settings Dialog Box

5. Move the sliding bar to select the security level for FPGA, FlashROM, and EFMB (see table for a description of the security levels).

Table 5 · Security Level Descriptions

Security Level	Security Option	Description
High	Protect with a 128-bit Advanced Encryption Standard (AES) key and a Pass Key	Access to the device is protected by an AES Key and the Pass Key. The Write and Verify operations of the FPGA Array use a 128-bit AES encrypted bitstream. From the JTAG interface, the Write operation of the FlashROM uses a 128-bit AES encrypted bitstream. Read back of the FlashROM content via the JTAG interface is protected by the Pass Key. Read back of the FlashROM content is allowed from the FPGA Array.
Medium	Protect with Pass Key	The Write and Verify operations of the FPGA Array require a Pass Key. From the JTAG interface, the Read and Write operations on the FlashROM content require a Pass Key. You can Verify the FlashROM content via the JTAG interface without a Pass Key. Read back of the FlashROM content is allowed from the FPGA Array.
None	No Security	The Write and Verify operations of the FPGA Array do not require keys. The Read, Write, and Verify operations of the FlashROM content also do not require keys.

Note: When a device is programmed with a Pass key and AES key, only the Pass key is required for reprogramming since re-entering the correct Pass key unlocks the bits that restrict programming to require AES encryption and also unlocks the bits that prohibit reprogramming altogether (if locked); thus both plaintext and encrypted programming are [re-] enabled.

6. Enter the **Pass Key** and/ or the **AES Key** as appropriate. You can generate a random key by clicking the Generate random key button.

The **Pass Key** protects all the Security Settings for the FPGA Array and/or FlashROM.
The **AES Key** decrypts FPGA Array and/or FlashROM programming file content. Use the AES Key if you intend to program the device at an unsecured site or if you plan to update the design at a remote site in the future.

7. Click **Finish**.

You can also customize the security levels by clicking the [Custom Level](#) button.

To [change or disable your security keys](#) you must run the ERASE_SECURITY action code. This erases your security settings and enables you to generate the programming file with new keys and reprogram, or to generate a programming file that has no security key.

Custom Security Settings

For advanced use, you can customize your security levels.

To set custom security levels:

1. Click the **Custom Level** button in the **Setup Security** page. The **Custom Security** dialog box appears (see figure below).

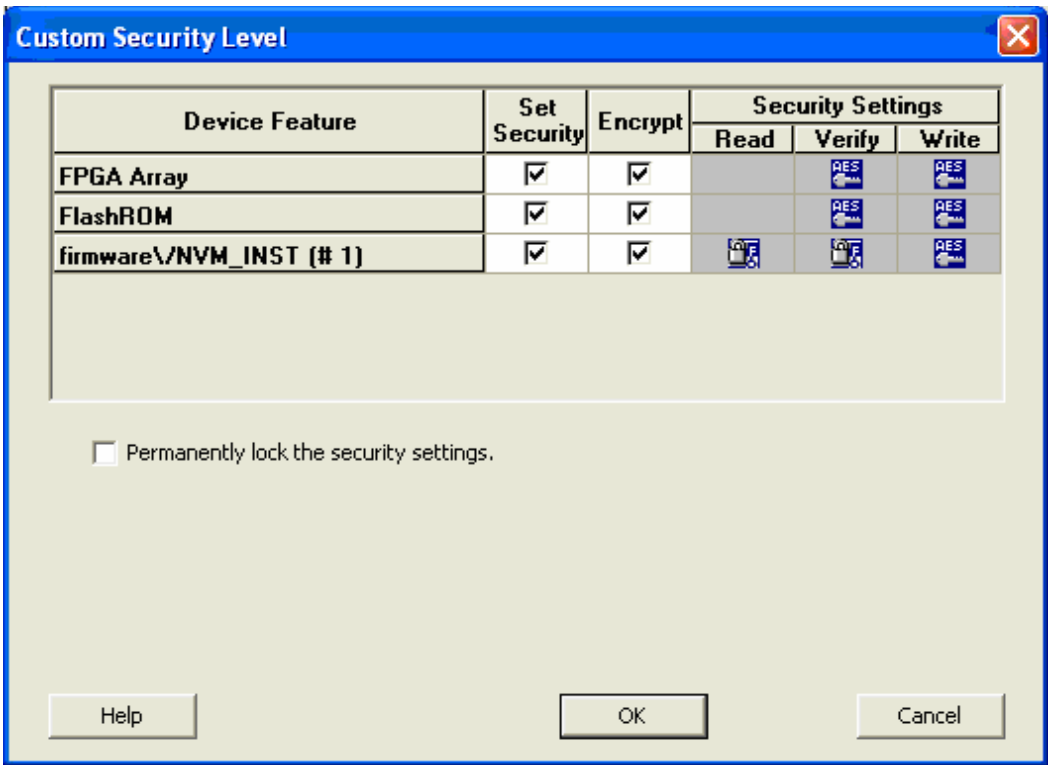


Figure 134 · Custom Security Level

2. Select the **FPGA Array Security**, the **FlashROM Security**, and Embedded Flash Memory block levels.

The silicon features can have different Security Settings. See the tables below for a description of the custom security option levels for FPGA Array, FlashROM, and Embedded Flash Memory block.








Table 6 · FPGA Array

Security Option						Description
Lock for both writing and verifying						Allows writing/erasing and verification of the FPGA Array via the JTAG interface only with a valid Pass Key.
Device Feature		Set Security	Encrypt	Security Settings		
FPGA Array		<input checked="" type="checkbox"/>	<input type="checkbox"/>	Read	Verify	
					Write	
Lock for writing						Allows the writing/erasing of the FPGA Array only with a valid Pass Key. Verification is allowed without a valid Pass Key.
Device Feature		Set Security	Encrypt	Security Settings		
FPGA Array		<input checked="" type="checkbox"/>	<input type="checkbox"/>	Read	Verify	
					Write	
Use the AES Key for both writing and verifying						Allows the writing/erasing and verification of the FPGA Array only with a valid AES Key via the JTAG interface. This configures the device to accept an encrypted bitstream for reprogramming and verification of the FPGA Array. Use this option if you intend to complete final programming at an unsecured site or if you plan to update the design at a remote site in the future. Accessing the device security settings requires a valid Pass Key.
Device Feature		Set Security	Encrypt	Security Settings		
FPGA Array		<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	Read	Verify	
					Write	

Security Option						Description
Allow write and verify						Allows writing/erasing and verification of the FPGA Array with plain text bitstream and without requiring a Pass Key or an AES Key. Use this option when you develop your product in-house.
Device Feature	Set Security	Encrypt	Security Settings			
			Read	Verify	Write	
FPGA Array	<input type="checkbox"/>	<input type="checkbox"/>				

Note: The ProASIC3 family FPGA Array is always read protected regardless of the Pass Key or the AES Key protection.










Table 7 · FlashROM

Security Option						Description
Lock for both reading and writing						Allows the writing/erasing and reading of the FlashROM via the JTAG interface only with a valid Pass Key. Verification is allowed without a valid Pass Key.
Device Feature	Set Security	Encrypt	Security Settings			
			Read	Verify	Write	
FlashROM	<input checked="" type="checkbox"/>	<input type="checkbox"/>				
Lock for writing						Allows the writing/erasing of the FlashROM via the JTAG interface only with a valid Pass Key. Reading and verification is allowed without a valid Pass Key.
Device Feature	Set Security	Encrypt	Security Settings			
			Read	Verify	Write	
FlashROM	<input checked="" type="checkbox"/>	<input type="checkbox"/>				
Use the AES Key for writing						Allows the writing/erasing of the FlashROM via the JTAG interface only with a valid AES Key. This configures the device to accept an encrypted bitstream for reprogramming of the FlashROM. Use this option if you complete final programming at an unsecured site or if you plan to update the
Device Feature	Set Security	Encrypt	Security Settings			
			Read	Verify	Write	
FlashROM	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>				

Security Option						Description	
						design at a remote site in the future. Note: The bitstream that is read back from the FlashROM is always unencrypted (plain text).	
Allow reading, writing, and verifying						Allows writing/erasing, reading and verification of the FlashROM content with a plain text bitstream and without requiring a valid Pass Key or an AES Key.	
Device Feature		Set Security	Encrypt	Security Settings			
				Read	Verify		Write
FlashROM		<input type="checkbox"/>	<input type="checkbox"/>				

Note: The FPGA Array can always read the FlashROM content regardless of these Security Settings.

Table 8 · Embedded Flash Memory Block

Security Option						Description
Lock for reading, verifying, and writing						Allows the writing and reading of the Embedded Flash Memory Block via the JTAG interface only with a valid Pass Key. Verification accomplished by reading back and compare.
Device Feature	Set Security	Encrypt	Security Settings			
			Read	Verify	Write	
firmware\NVM_INST (# 1)	<input checked="" type="checkbox"/>	<input type="checkbox"/>				
Lock for writing						Allows the writing of the Embedded Flash Memory Block via the JTAG interface only with a valid Pass Key. Reading and verification is allowed without a valid Pass Key.
Device Feature	Set Security	Encrypt	Security Settings			
			Read	Verify	Write	
firmware\NVM_INST (# 1)	<input checked="" type="checkbox"/>	<input type="checkbox"/>				
Use AES Key for writing						Allows the writing of the Embedded Flash Memory Block via the JTAG interface only with a valid AES Key. This configures the device to accept an encrypted bitstream for reprogramming of
Device Feature	Set Security	Encrypt	Security Settings			
			Read	Verify	Write	
firmware\NVM_INST (# 1)	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>				

Security Option					Description		
					the Embedded Flash Memory Block. Use this option if you complete final programming at an unsecured site or if you plan to update the design at a remote site in the future. The bitstream that is read back from the Embedded Flash Memory Block is always unencrypted (plain text), when a valid pass key is provided.		
Allow reading, writing, and verifying					Allows writing, reading and verification of the Embedded Flash Memory Block content with a plain text bitstream and without requiring a valid Pass Key or an AES Key.		
Device Feature		Set Security	Encrypt	Security Settings			
firmware\NVM_INST (# 1)		<input type="checkbox"/>	<input type="checkbox"/>	Read	Verify	Write	

- To make the Security Settings permanent, select the **Permanently lock the security settings** check box. This option prevents any future modifications of the Security Setting of the device. A Pass Key is not required if you use this option.

Note: When you make the Security Settings permanent, you can never reprogram the Silicon Signature. If you lock the write operation for the FPGA Array or the FlashROM, you can never reprogram the FPGA Array or the FlashROM, respectively. If you use an AES key, this key cannot be changed once you permanently lock the device.

- To use the Permanent FlashLock™ feature (One-time programmable or OTP), select **Lock for both writing and verifying** for FPGA Array, **Lock for both reading and writing** for FlashROM, **Lock for reading, writing, and verifying** for each Embedded Flash Memory Block (for Fusion and SmartFusion), if present, and select the **Permanently lock the security settings** checkbox as shown in the figure below. This will make your device one-time programmable.

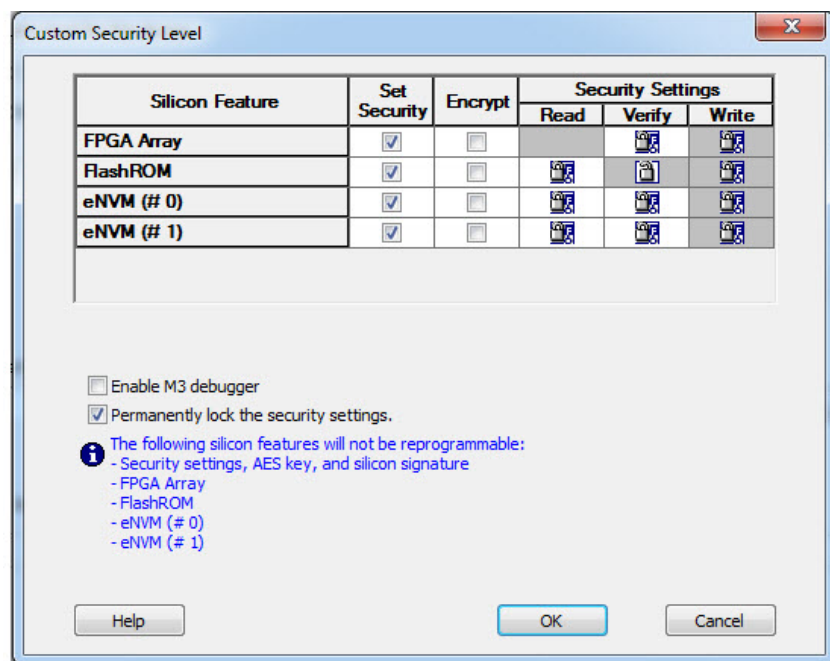


Figure 135 · Custom Security Level- Permanent Lock

- Click the **OK** button. The **Security Settings** page appears with the **Custom security setting** information.

Changing or Disabling Security Keys

To change or disable your security keys you must run the ERASE_SECURITY action code. ERASE_SECURITY erases your security settings and enables you to generate the programming file with new keys and reprogram, or to generate a programming file that has no security key.

Your action codes vary according to device family:

- [Programming File Actions - SmartFusion and Fusion Devices](#)
- [Programming Actions - IGLOO and ProASIC3 Devices](#)

Configuring FlashROM Settings in FlashPro

To configure the FlashROM settings:

- From the **Configuration** menu, choose **Load Programming File (PDB)**.
- Select the PDB file and click **Open**, this loads the programming file.
- From the **Configuration** menu, choose **PDB Configuration**. The **Programming File Generator** appears.
- Check the **FlashROM** checkbox and click **Browse** to load a FlashROM configuration file. Click **Next**. This brings up the **FlashROM Settings** dialog box (see figure below).

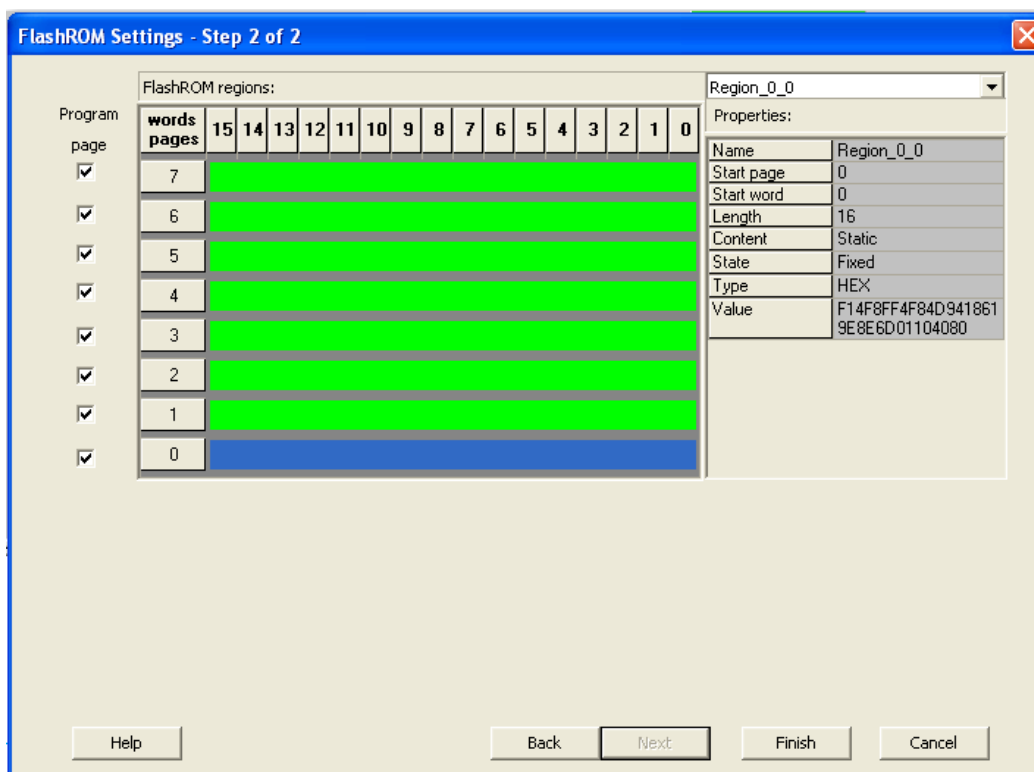


Figure 136 · FlashROM Settings Dialog Box

5. Select the FlashROM memory page that you want to program.
6. Enter the data value for the configured regions.
7. If you selected the region with a **Read From File**, specify the file location.
8. If you selected the **Auto Increment** region, specify the **Start** and **Max** values.
9. Enter the number of devices you want to program.
10. Click the **Target Programmer** button. The **Select Programmer Type** dialog box appears.
11. Click **Finish**. FlashPoint generates your programming file.

Note: You cannot change the FlashROM region configuration from FlashPoint. You can only change the configuration from the FlashROM core generator.

Express Configuration

The express configuration feature in FlashPro allows you to set the security settings as well as FlashROM content without a design. This allows the production flow to be executed in parallel to the design effort if needed.

For example, you can pre-program the security settings with the **High Security** setting and serialize the device using FlashROM without the FPGA design in a secured programming environment. The FPGA Array and EFMB design can be programmed in unsecured programming environment using encrypted programming file. Refer to [Programming Only Security Settings Tutorial](#) for more information.

Note: This feature is only available for SmartFusion, IGLOO, ProASIC3 and Fusion devices.

IGLOO and ProASIC3 Programming

Programming File Actions for IGLOO and ProASIC3 Devices

IGLOO and ProASIC3 devices support the following features:

- FPGA Array
- FlashROM
- Security settings

You can program these features separately or together using different programming files or by using one programming file.

Note: When a family name is specified, it refers to the device family and all its derivatives, unless otherwise noted. See the [Supported Families topic](#) for a complete list of families and their derivatives.

The STAPL files for IGLOO and ProASIC3, excluding ProASIC3L, devices include actions targeted at one, two, or all three of the IGLOO and ProASIC3 features (FPGA Array, FlashROM, and Security Settings). The combinations of the features you selected to target results in different actions that are available in the STAPL file. See the following table.

The table indicates that if you choose the feature FPGA Array, it will be affected by the PROGRAM file action.

If you choose the feature Security, it will be unaffected by the PROGRAM action.

Table 9 · IGLOO and ProASIC3 Device Programming Actions

	Features Selected					
	FPGA Array	FlashROM	Security	FPGA Array and FlashROM	FPGA Array and Security	FlashROM and Security
	STAPL Actions Available (correspond with Features Selected above)					
PROGRAM	X	X		X	X	X
VERIFY	X	X		X	X	X
ERASE	X	X		X	X	X
ERASE_ALL	X	X	X	X	X	X
DEVICE_INFO	X	X	X	X	X	X
READ_IDCODE	X	X	X	X	X	X
ERASE_FROM		X		X		X
PROGRAM_FROM						
ERASE_ARRAY	X			X	X	
VERIFY_ARRAY	X			X	X	

	Features Selected					
ENC_DATA_AUTHENTICATION	X			X	X	
PROGRAM_SECURITY			X		X	X
ERASE_SECURITY			X		X	X

Note: The ENC_DATA_AUTHENTICATION Action is only available when you choose encrypted programming.

Programming Actions

See the table below for a list of all the actions for the programming file.

Table 10 • Programming File Actions

Action	Description
PROGRAM	Programs all selected family features: FPGA Array, targeted FlashROM pages, security setting and silicon signature (if provided). Note: If the FPGA Array is selected, the FPGA Array core is enabled after successful programming.
VERIFY	Verifies all selected features: FPGA Array, targeted FlashROM pages, security setting and silicon signature (if provided).
ERASE	Erases all selected family features: FPGA Array, targeted FlashROM pages, security setting and silicon signature (if provided).
ERASE_ALL	Erases all features in the targeted device regardless of the features selected to generate the STAPL file.
DEVICE_INFO	Displays the IDCODE, Silicon Signature, the design name, the checksum, and device security settings and programming environment information programmed into the device.
VERIFY_DEVICE_INFO	Verifies the IDCODE, silicone signature, design name, checksum, device security settings and programming information programmed into the device.
READ_IDCODE	Reads the device ID code from the device.
ERASE_FROM	Erases only the targeted FlashROM pages, not the entire FlashROM.
PROGRAM_FROM	Programs only the targeted FlashROM pages.
VERIFY_FROM	Verifies the targeted FlashROM pages.
PROGRAM_ARRAY	Programs the FPGA Array and Silicon Signature (if applicable) into the device. The FPGA Array core is enabled after successful programming of the FPGA.
VERIFY_ARRAY	Verifies the FPGA Array and Silicon Signature (if applicable) into the device.
ERASE_ARRAY	Erases the FPGA Array and Silicon Signature (if provided).

Action	Description
DISABLE_FPGA_ARRAY	Disables the FPGA Array core. Note: The FPGA Array core is enabled after successful programming of the FPGA.
DISABLE_FPGA_ARRAY_PROGRAM	Disables the FPGA Array core, then programs all selected family features: FPGA Array, targeted FlashROM pages, security setting, and silicon signature (if provided). Note: The FPGA Array core is enabled after successful programming of the FPGA.
PROGRAM_SECURITY	Programs only the Security Settings.
ERASE_SECURITY	Erases only the Security Settings.

Note: FIX_INT_ARRAYS - This function only applies to STAPL files. Depending on the STAPL player implementation, the indexing of an integer array may start from a different direction. The STAPL standard did not clearly specify how it should be implemented. The FIX_INT_ARRAYS function detects the indexing implemented by the STAPL player and flips the content of the integer array if needed.

Note: UNLOCK_UKEY: This function unlocks a secured device if it is locked by FlashLock.

Options available in Programming Actions

The table below shows the available actions in the programming file.

Table 11 · Programming File Actions

Action	Description
PROGRAM	When you target the Security Setting, you have the option of not erasing and programming the Security Setting by deselecting the following 2 procedures before executing the action. - SET_ERASE_SEC, - DO_PROGRAM_SECURITY. When you perform encrypted programming, you have the option of skipping the data authentication before programming by deselecting the DO_ENC_AUTHENTICATION procedure before executing the action.
ERASE	When you target the Security Setting, you have the option of not erasing the Security Setting by deselecting the SET_ERASE_SEC procedures before executing the action.
PROGRAM_ARRAY	When you perform encrypted programming, you have the option of skipping the data authentication before programming by deselecting the DO_ENC_AUTHENTICATION procedure before executing the action.

Note: The DO_ENC_AUTHENTICATION procedure prevents you from proceeding with encrypted programming with incorrect data due to corruption or an operator error. If incorrect data is detected during encrypted programming, the device will not be functional after programming.

SmartFusion and Fusion (AFS) Programming

Programming File Actions - SmartFusion and Fusion

FlashPro enables you to program security settings, FPGA Array, eNVM and embedded flash memory blocks (EFMB), and FlashROM features for AFS device support. You can program these features separately using different programming files or you can combine them into one programming file.

Note: If you are programming SmartFusion devices you are using eNVM. If you are programming Fusion devices you are using the Embedded Flash Memory Block (EFMB). When referring to these elements together we refer to them as eNVM/EFMB.

The STAPL files for SmartFusion and Fusion devices include actions targeted at one, two, or all four of the programming features: FPGA Array and FlashROM, Security Settings, and eNVM/EFMB. The combinations of the features you selected to target, results in different actions that are available in the STAPL file. See the following table for an illustration.

The table indicates that if you select ERASE_ALL that it will affect any Programming Feature (or combination of features) marked with an X. According to the table, the only Programming Feature unaffected by ERASE_ALL is the eNVM/EFMB.

Compare that to the ERASE command: ERASE does not have any effect on the following Programming Features: Security; Embedded Flash Memory Block; Security AND eNVM/EFMB.

Table 12 · SmartFusion and Fusion Programming File Actions

	Programming Features Selected												
	FPGA Array	FlashROM	Security	eNVM/Embedded Flash Memory Block (EFMB)	FPGA Array and eNVM/EFMB	FlashROM and eNVM/EFMB	Security and eNVM/EFMB	FPGA Array and FlashROM	FPGA Array and Security	FlashROM and Security	FPGA Array, FlashROM and eNVM/EFMB	FPGA Array, Security and eNVM/EFMB	FlashROM, Security and eNVM/EFMB
	STAPL Actions Available (correspond with Features Selected above)												
PROGRAM	X	X			X	X		X	X	X	X	X	X
VERIFY	X	X			X	X		X	X	X	X	X	X
ERASE	X	X			X	X		X	X	X	X	X	X
ERASE_ALL	X	X	X		X	X	X	X	X	X	X	X	X
DEVICE_INFO	X	X	X	X	X	X	X	X	X	X	X	X	X
READ_IDCODE	X	X	X	X	X	X	X	X	X	X	X	X	X
ERASE_FROM		X				X		X		X	X		X

	Programming Features Selected												
PROGR AM_ARRA Y	X				X			X	X		X	X	
VERIFY _ARRA Y	X				X			X	X		X	X	
ENC_D ATA_A UTHEN TIFICA TION	X				X			X	X		X	X	
PROGR AM_SE CURIT Y			X				X		X	X		X	X
ERASE _SECU RITY			X				X		X	X		X	X
VERIFY _SECU RITY			X				X		X	X		X	X
PROGR AM_FP				X	X	X	X				X	X	X
VERIFY _FP				X	X	X	X				X	X	X
PROGR AM_NV M				X	X	X	X				X	X	X
VERIFY _NVM				X	X	X	X				X	X	X
PROGR AM_NV M_ACTI VE_ARRA Y				X	X	X					X		
VERIFY _NVM_ ACTIVE _ARRA Y				X	X	X					X		
PROGR AM_NV M_ACTI				X	X	X					X		

	Programming Features Selected												
VE_RS TM3													
RESET _CORT EXM3 (SmartF usion only)				X	X	X	X				X	X	X

Note: The ENC_DATA_AUTHENTICATION Action is only available when you choose encrypted programming.

Note: PROGRAM_NVM_ACTIVE_ARRAY and VERIFY_NVM_ACTIVE_ARRAY actions are not available when the EFMB read/write/verify is locked with FlashLock.

STAPL Actions

See the table below for a list of all the actions for the STAPL file.

Table 13 · STAPL File Actions

Action	Description
PROGRAM	Programs all selected family features: FPGA Array, targeted FlashROM pages, security setting and silicon signature (if provided). SmartFusion only: Resets the CORTEX M3.
VERIFY	Verifies all selected family features: FPGA Array, targeted FlashROM pages, security setting and silicon signature (if provided).
ERASE	Erases the selected family features.
ERASE_ALL	Erases all features in the targeted family device except Embedded Flash Memory Blocks, regardless of the features selected to generate the STAPL file.
DEVICE_INFO	Displays the IDCODE, Silicon Signature, the design name, the checksum, and device security settings and programming environment information programmed into the device.
READ_IDCODE	Reads the device ID code from the device.
ERASE_FROM	Erases only the targeted FlashROM pages, not the entire FlashROM.
PROGRAM_FROM	Programs only the targeted FlashROM pages.
PROGRAM_ARRAY	Programs the FPGA Array and Silicon Signature (if applicable) into the device. SmartFusion only: Resets the CORTEX M3.
VERIFY_ARRAY	Verifies the FPGA Array and Silicon Signature (if applicable) into the device.
ERASE_ARRAY	Erases the FPGA Array and Silicon Signature (if provided).
PROGRAM_SECURITY	Programs only the Security Settings.

Action	Description
ERASE_SECURITY	Erases only the Security Settings.
PROGRAM_NVM	Programs the targeted EFMBs. SmartFusion only: Resets the CORTEX M3.
VERIFY_NVM	Verifies the targeted EFMBs.
PROGRAM_NVM_ACTIVE_ARRAY	Programs the targeted EFMBs while the FPGA Array remains active.
VERIFY_NVM_ACTIVE_ARRAY	Verifies the targeted EFMBs while the FPGA Array remains active.
PROGRAM_NVM_ACTIVE_RSTM3	SmartFusion only; programs the eNVM while the core is active and then resets the CORTEX M3.
RESET_CORTEX_M3	SmartFusion only; resets the CORTEX M3.

Options available in STAPL Actions

The table below shows the available actions in the STAPL file.

Table 14 · STAPL File Actions

Action	Description
PROGRAM	When you target the Security Setting, you have the option of not erasing and programming the Security Setting by deselecting the following two procedures before executing the action. - SET_ERASE_SEC, - DO_PROGRAM_SECURITY. When you perform encrypted programming, you have the option of skipping the data authentication before programming by deselecting the DO_ENC_AUTHENTICATION procedure before executing the action.
ERASE	When you target the Security Setting, you have the option of not erasing the Security Setting by deselecting the SET_ERASE_SEC procedures before executing the action.
PROGRAM_ARRAY	When you perform encrypted programming, you have the option of skipping the data authentication before programming by deselecting the DO_ENC_AUTHENTICATION procedure before executing the action.

Note: The DO_ENC_AUTHENTICATION procedure prevents you from proceeding with encrypted programming with incorrect data due to corruption or an operator error. If incorrect data is detected during encrypted programming, the device will not be functional after programming.

ProASIC^{PLUS} and ProASIC Families Programming Introduction

ProASIC^{PLUS} and ProASIC family devices support security settings and FPGA Array. You can program these features together using one programming file. The table below shows the STAPL actions for the FPGA Array only.

Table 15 · FPGA Array Only STAPL File

Action	Description
PROGRAM	Checks the security status of the device. If you are programming the security key, you may select to program only the FPGA Array by unselecting the PROGRAM_SECURITY procedure. 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_ARRAY	Erases the device.
READ_IDCODE	Reads the device ID code.
VERIFY	Verifies whether the device was programmed with the loaded STAPL file. Can be used to ensure that the bitstream programmed in the device is the same as the original STAPL file. If you load the wrong STAPL file, 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.

Generating Programming Files

Generate a Programming File in FlashPoint

FlashPoint enables you to program security settings, FPGA Array, and FlashROM features for SmartFusion, IGLOO, ProASIC3, Fusion family devices. You can program these features separately using different programming files or you can combine them into one programming file. Each feature is listed as a silicon feature in the GUI.

Note: You can generate a programming file with one, two, or all of the silicon features from the Programming File Generator first page.

To generate a programming file:

1. Select the **Silicon feature(s)** you want to program.
 - [Security settings](#)
 - [FPGA Array](#)
 - [FlashROM](#)

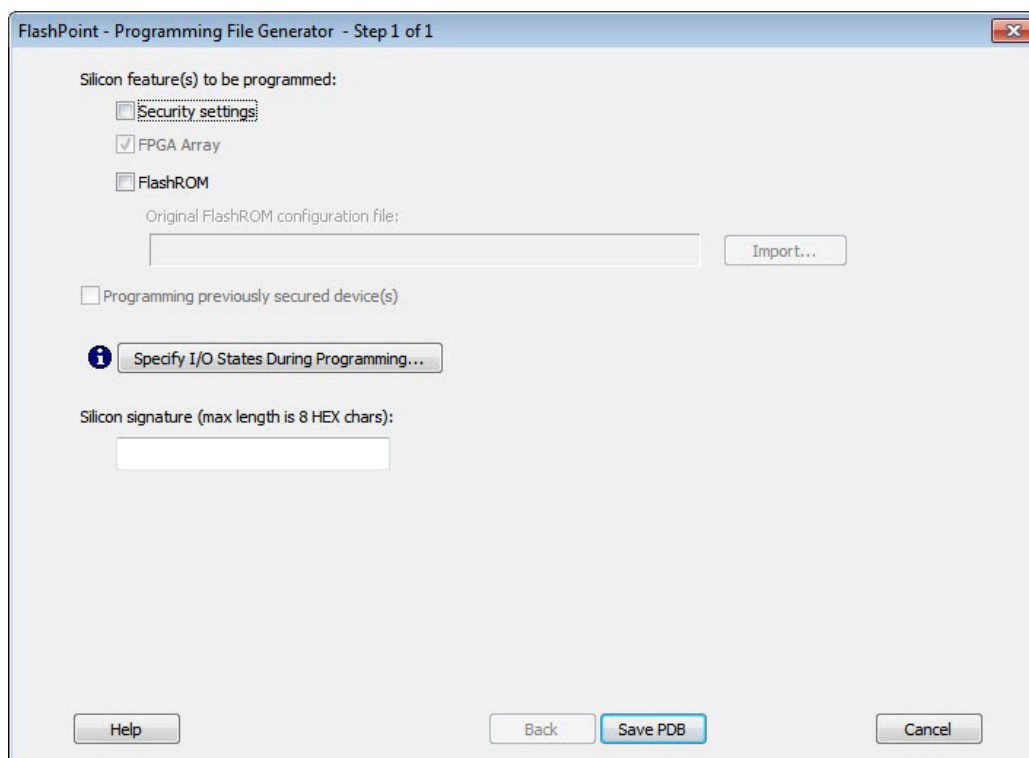


Figure 137 · Programming File Generator – Step 1 of 1

Note: When FlashPoint is invoked for the first time, after netlist files are imported and the design is in post-layout state, the software retrieves the FlashROM and EFM blocks configuration files from the imported netlists and imports the configuration files. Otherwise, you need to import configuration files.

2. Click the **Programming previously secured device(s)** check box if you are reprogramming a device that has been secured.

Because the SmartFusion, IGLOO, ProASIC3, Fusion families enable you to program the Security Settings separately from the FPGA Array and/or FlashROM, you must indicate if the Security Settings

were previously programmed into the target device. This requirement also applies when you generate programming files for reprogramming.

3. Enter the silicon signature (0-8 HEX characters). See [Silicon Signature](#) for more information.
4. Click **Save PDB**.

Programming File Types

The table below summarizes the Microsemi SoC programming file types and programmers.

Unless otherwise noted, listing an individual device indicates the device family and all its derivatives. For example, IGLOO indicates IGLOO, IGLOOe, IGLOO nano and IGLOO plus. See the [Supported Families](#) topic for more information. See the list of programming file type descriptions below for more details.

Programming File Type	Device Support	Programmer
PDB (*.pdb)	See device specifications	FlashPro 4/3/3x
STAPL (*.stp)		FlashPro 4/3/3x, FlashPro Lite, FlashPro, Silicon Sculptor III/II
SVF (*.svf)		Third party programmer
IEEE 1532 (*.isc or *.bsd)		Third party programmer

The following programming-related files are required if you use the related functional block elements in your enabled devices. See the appropriate sections of the FlashPro help for more information on creating these files.

File Type	Device Support	Function
FDB (*.fdb)	See device specifications	Contains your FPGA array data
UFC (*.ufc)		Contains your FlashROM data
EFC (*.efc)		Contains your Embedded Flash Memory file

PDB Files

A proprietary Microsemi programming data file.

STAPL Files

The Standard Test And Programming Language (STAPL) is designed to support the programming of programmable devices and testing of electronic systems, using the IEEE Standard 1149.1: "Standard Test Access Port and Boundary Scan Architecture" (commonly referred to as JTAG) interface. As a STAPL file is executed, signals are produced on the IEEE 1149.1 interface, as described in the STAPL file. STAPL operates on a single IEEE 1149.1 chain. STAPL supports the programming of any IEEE 1149.1-compliant programmable device.

STAPL has support for programming and test systems with user interface features. A single STAPL file may perform several different functions, such as programming, verifying, and erasing a programmable device.

Bitstream Files

Proprietary Microsemi programming data file.

SVF Files

Courtesy Serial Vector Format Specification from ASSET InterTech, 1999:

Serial Vector Format (SVF) is the media for exchanging descriptions of high-level IEEE 1149.1 bus operations. In general, IEEE 1149.1 bus operations consist of scan operations and movements between different stable states on the IEEE 1149.1 state diagram. SVF does not explicitly describe the state of the IEEE 1149.1 bus at every Test Clock.

The SFV file is defined as an ASCII file that consists of a set of SVF statements. The maximum number of characters on a line is 256, although one SVF statement can span more than one line. Each statement consists of a command and associated parameters. Each SVF statement is terminated by a semicolon. SVF is not case sensitive.

IEEE 1532 Files

Courtesy ieee.org:

The IEEE 1532 files implement programming capabilities within programmable integrated circuit devices, utilizing (and compatible with) the 1149.1 communication protocol. This standard allows the programming of one or more compliant devices concurrently, while mounted on a board or embedded in a system, known as In-System Configuration.

Generate a Programming File for SmartFusion

You can configure and generate a new PDB file from FlashPoint.

If you are using Single Mode, click **Create** to add a new PDB, or click **Modify** to make changes to a loaded PDB.

In Chain Mode, if you have not already done so, [construct a chain](#) and click **Create PDB** to create a new PDB for programming, or click **Modify PDB** to make changes to a loaded PDB.

FlashPoint enables you to specify your [security settings](#) and silicon features when you generate your programming file in SmartFusion. You can specify your [FPGA Array](#), [FlashROM](#), and [Embedded Flash Memory](#) by importing FDB, UFC and EFC files, respectively (as shown in the figure below). If you have imported a FlashROM and Embedded Flash Memory file you can click **Modify** to configure these feature before saving your PDB file.

Click [Specify I/O States During Programming](#) to set custom I/O states.

Note: You must import an FDB to populate Port Name and Macro Cell columns.

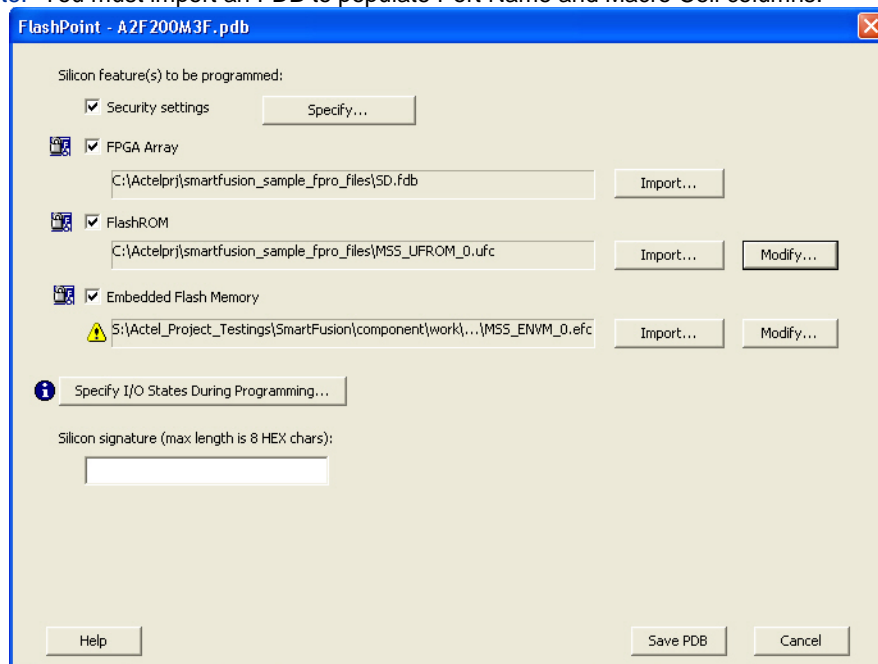


Figure 138 · FlashPoint Programming Settings for SmartFusion

Generate a Programming File for CoreMP7/Cortex-M1 Device Support

FlashPoint enables you to program FPGA Array and FlashROM features for CoreMP7/Cortex-M1 devices. You can program these features separately using different programming files or you can combine them into one programming file. Each feature is listed as a silicon feature in the GUI. You can generate a programming file with one, two, or all of the silicon features from the **Programming File Generator** first page. For CoreMP7/Cortex-M1 device support, you cannot select your own security settings. The generated programming file always has the encrypted FPGA Array content. The programming file generation is the same as the ProASIC3 family devices.

To generate a programming file:

1. Select the Silicon feature(s) you want to program.

[FPGA Array](#)

[FlashROM](#)

2. Click **Next** or **Finished** depending on the silicon features you selected.

If you click **Next**, follow the instructions in the appropriate dialog box. If you click **Finish**, the **Generate Programming Files** dialog box appears. Use this dialog box to specify the programming file name, location, and output format ([STAPL file](#), [SVF file](#), [PDB file](#), [DirectC DAT file](#), [1532 file](#)).

For more information on DAT files, refer to the Data File Generator (DatGen) section of the *DirectC User's Guide*.

CoreMP7/Cortex-M1 Device Security

CoreMP7/Cortex-M1 devices are shipped with the following security enabled:

- FPGA Array enabled for AES encrypted programming and verification.
- FlashROM enabled for plain text read and write.

You cannot select your own security settings. The generated programming file includes the encrypted FPGA Array content.

Programming FlashROM and FPGA Array

For CoreMP7/Cortex-M1 device support, the programming generation for [FlashROM](#) and [FPGA Array](#) is the same as the programming generation for ProASIC3 and ProASIC family devices.

Generate a Programming File for AFS Device Support - Designer Only

FlashPoint enables you to program Security Settings, FPGA Array, Embedded Flash Memory Blocks, and FlashROM features for AFS device support. You can program these features separately using different programming files or you can combine them into one programming file. Each feature is listed as a silicon feature in the GUI. You can generate a programming file with one, two, or all of the silicon features from the **Programming File Generator** first page.

AFS Programming

In addition to FPGA Array, FlashROM and security setting, the Fusion devices provide Embedded Flash Memory

Blocks (FB) for both Analog configuration initialization and regular memory storage. Depending on the targeted AFS device, you may have one, two, or four FBs available to you. FlashPoint enables you to initialize the FB Instance(s), as described in the Embedded Flash Memory help.

To generate a programming file:

1. Select the **Silicon feature(s)** you want to program.

[Security Settings](#)

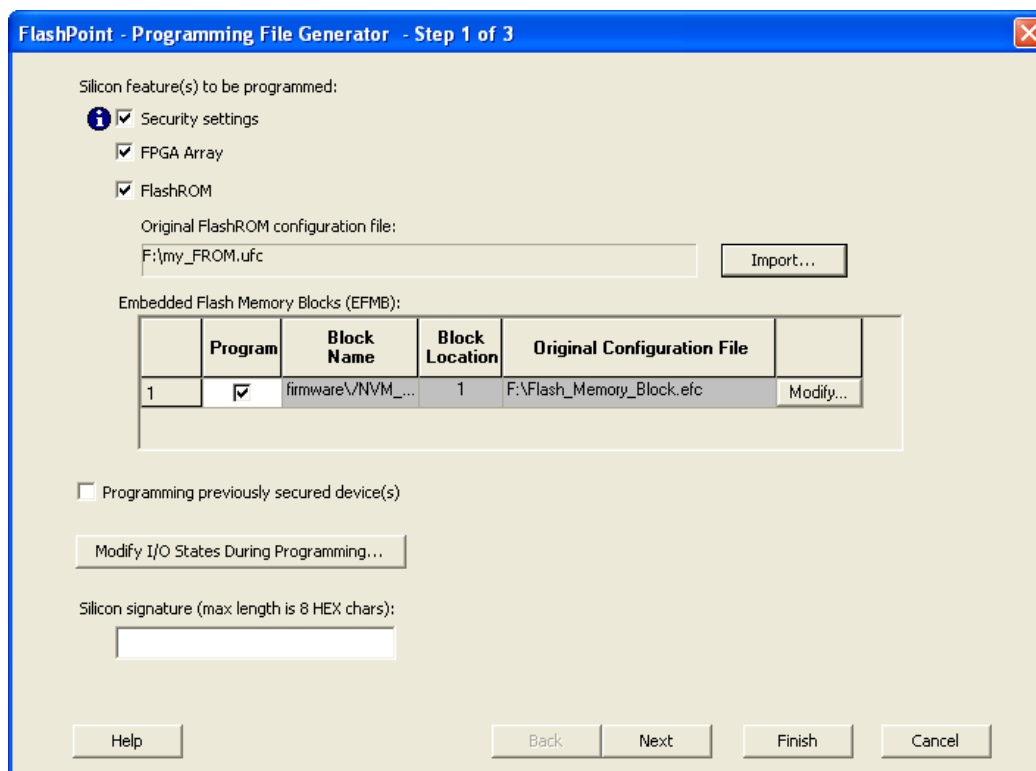
[FPGA Array](#)
[FlashROM](#)
[Embedded Flash Memory Block](#)


Figure 139 · FlashPoint- Programming File Generator for AFS

Note: Check the check box in the Program column to enable block modification.

2. Check the **Programming previously secured devices(s)** box if you want to program previously secured devices.
3. Enter the **Silicon signature**.
4. Depending upon the Silicon features you selected, click **Finish** or **Next**.

If you click **Next**, follow the instructions in the appropriate dialog box. If you click **Finish**, the **Generate Programming Files** dialog box appears. Use this dialog box to specify the programming file name, location, and output format ([STAPL file](#), [SVF file](#), [PDB file](#), [DirectC DAT file](#), [1532 file](#)).

For more information on DAT files, refer to the Data File Generator (DatGen) section of the *DirectC User's Guide*.

Programming Security Settings, FlashROM, and FPGA Array

For AFS device support, the programming generation for [Security Settings](#), [FlashROM](#) and [FPGA Array](#) is the same as the programming generation for ProASIC3 family devices.

Generate a Programming File for Serialization Support in In House Programming (IHP)

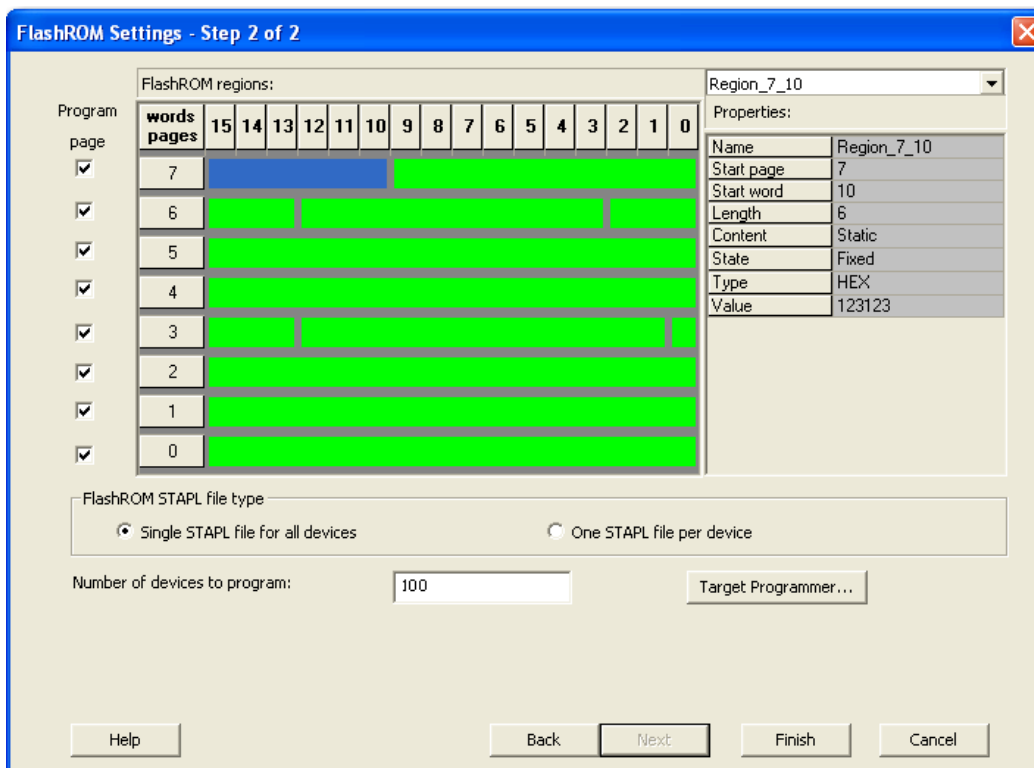
FlashPoint allows you to program security settings, FPGA Array, and FlashROM features for SmartFusion, IGLOO, ProASIC3, Fusion family devices. You can program these features separately using different programming files or you can combine them into one programming file. Each feature is listed as a silicon feature in the GUI.

SVF Serialization Support in IHP

In addition to FPGA Array, FlashROM, and security setting, FlashPoint supports generating SVF files with serialization support in IHP.

To generate SVF with serialization support:

1. Select the **Silicon feature(s)** you want to program.
 - [Security settings](#)
 - [FPGA Array](#)
 - [FlashROM](#)
 - [Programming Embedded Flash Memory Block](#)
2. Import the UFC file which contains serialization data to FlashROM. Click **Next**.
3. Type in the number of devices to program (as shown in the figure below).



The dialog box is titled "FlashROM Settings - Step 2 of 2". It contains a table for "FlashROM regions:" with columns for "words" and "pages" (15, 14, 13, 12, 11, 10, 9, 8, 7, 6, 5, 4, 3, 2, 1, 0). The "words" column has a dropdown menu. The "pages" column has checkboxes. The "words" column is currently set to "7". The "pages" column has checkboxes for 7, 6, 5, 4, 3, 2, 1, and 0, all of which are checked. The "words" column is currently set to "7". The "pages" column has checkboxes for 7, 6, 5, 4, 3, 2, 1, and 0, all of which are checked. The "words" column is currently set to "7". The "pages" column has checkboxes for 7, 6, 5, 4, 3, 2, 1, and 0, all of which are checked.

FlashROM STAPL file type

☒ Single STAPL file for all devices ☐ One STAPL file per device

Number of devices to program:

Figure 140 · Type Number of Devices

4. Click **Target Programmer** and select **Microsemi IHP**.

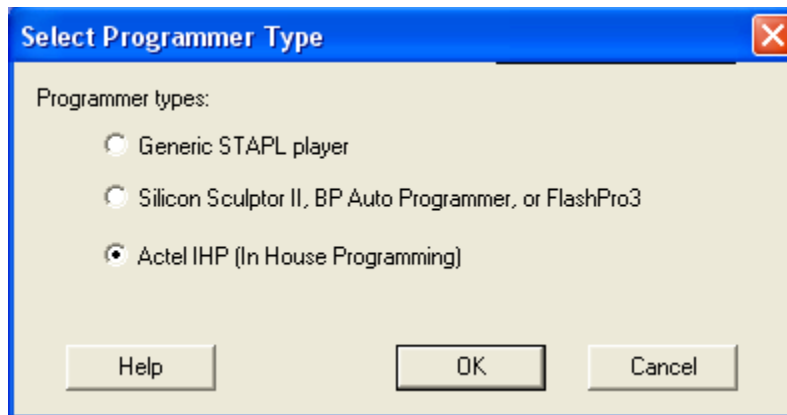


Figure 141 · Select Microsemi IHP

- Click **OK**. The Generate Programming Files window appears (as shown in the figure below). Select **Serial Vector Files (*.svf)**.

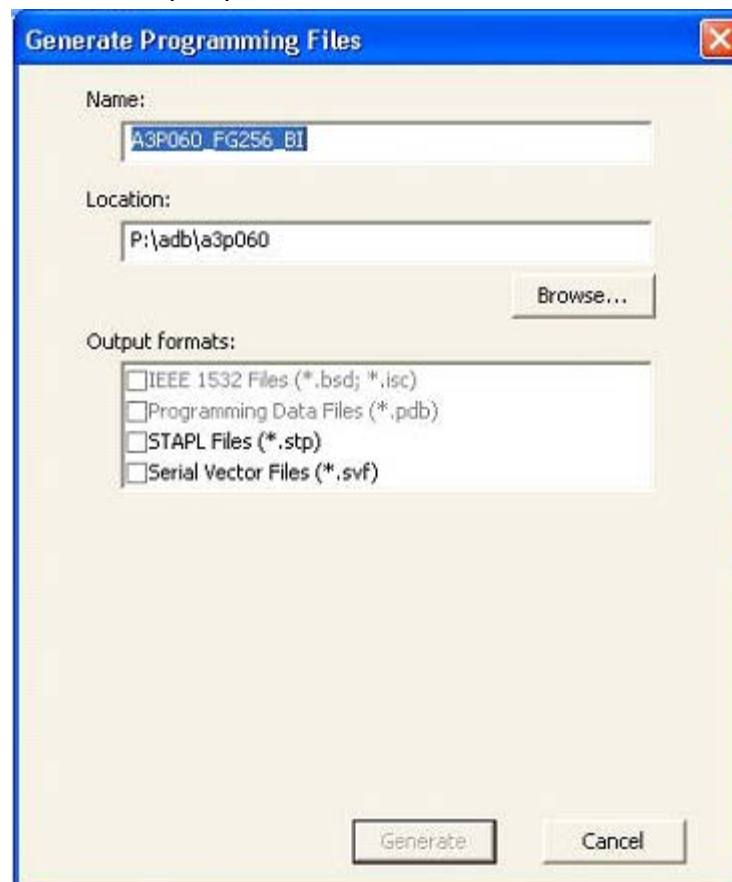


Figure 142 · Select Serial Vector Files

- Click **Generate**. An Microsemi-specific SVF file will be generated with a corresponding serialization data file.

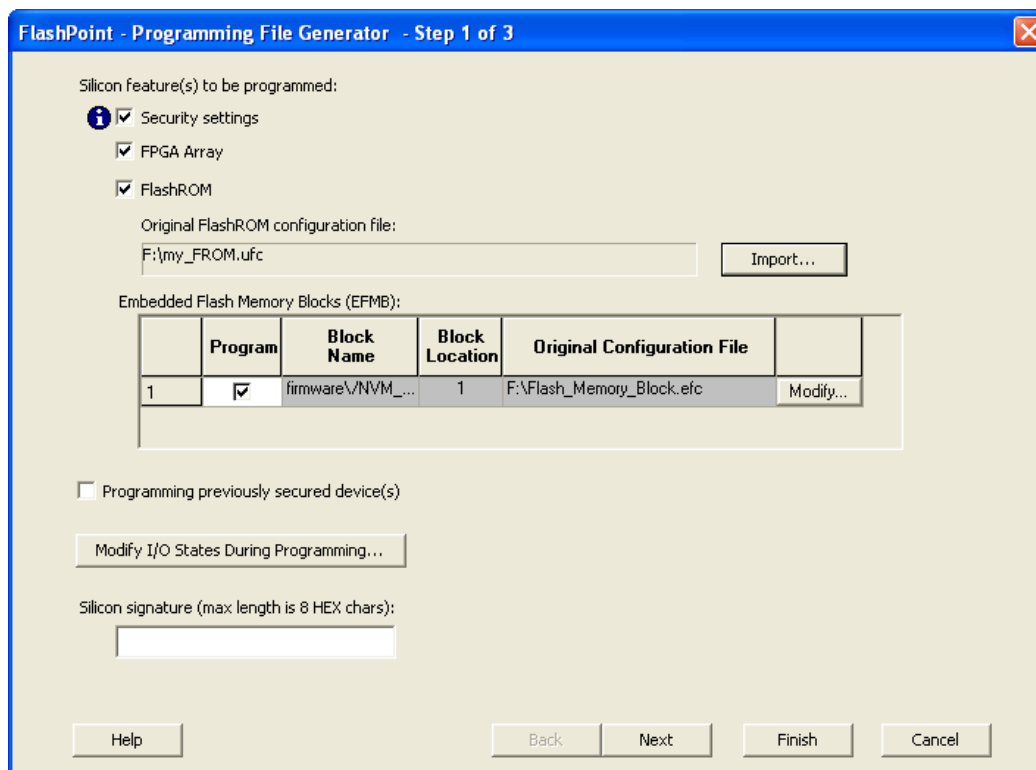
Note: Generated SVF files will only work with IHP.

Creating a Programming Database (PDB) File in Designer

The programming database (PDB) file supports SmartFusion, IGLOO, ProASIC3 and Fusion devices only. This allows reconfiguration of the security settings, FlashROM, FPGA Array, and Embedded Flash Memory Blocks. You create the file in Designer using FlashPoint and you modify the file in FlashPro.

You must create programming files for SmartFusion in FlashPro; see the [Generate a Programming File for SmartFusion](#) topic for more information.

1. From the Designer main window, click the **Programming File** button. This brings up FlashPoint (see figure below).



FlashPoint - Programming File Generator - Step 1 of 3

Silicon feature(s) to be programmed:

- ☒ Security settings
- ☒ FPGA Array
- ☒ FlashROM

Original FlashROM configuration file:

F:\my_FLASH.ufc Import...

Embedded Flash Memory Blocks (EFMB):

	Program	Block Name	Block Location	Original Configuration File	
1	<input checked="" type="checkbox"/>	firmware\NVM_...	1	F:\Flash_Memory_Block.ufc	Modify...

☐ Programming previously secured device(s)

Modify I/O States During Programming...

Silicon signature (max length is 8 HEX chars):

Help Back Next Finish Cancel

Figure 143 · FlashPoint Programming File Generator - PDB File

2. Select the **silicon feature(s) to be programmed**: [Security Settings](#), [FPGA array](#), [FlashROM](#), and [Embedded Flash Memory Block](#). If you are programming a previously secured device, check the **Programming previously secured device(s)** and enter the silicon signature.
3. Click **Finish** to create the PDB file.

See Also

[Configuring security and FlashROM settings in FlashPro](#)
[Configuring security settings in FlashPro](#)
[Configuring FPGA array settings](#)
[Configuring FlashROM settings in FlashPro](#)
[Configuring Embedded Flash Memory Block settings in FlashPro](#)

Programming Embedded Flash Memory Block

For more information about the Embedded Flash Memory Block, see the [Flash Memory System Builder](#) online help.

To program the Embedded Flash Memory Block:

1. Check the **Program** box to enable Embedded Flash Memory Block modification.

- Click the **Modify** button to import Embedded Flash Memory Block configuration and memory content.
The **Modify Embedded Flash Memory Block** dialog box appears.

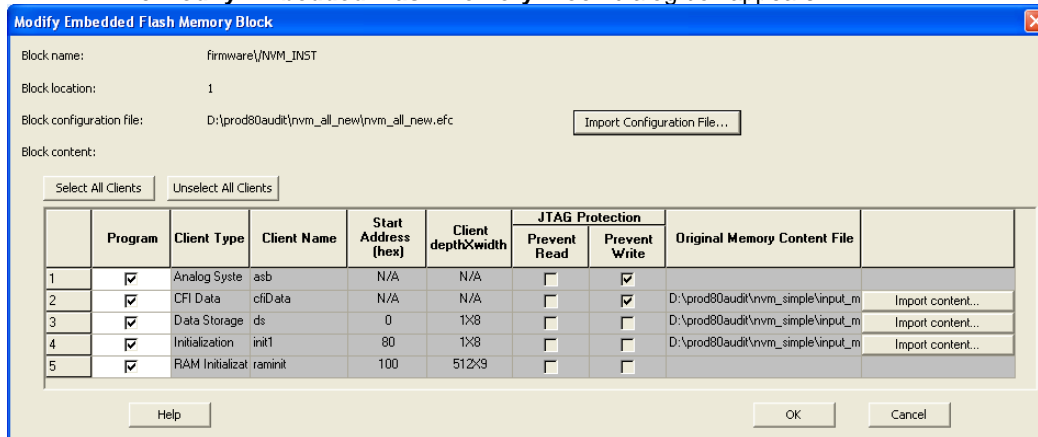


Figure 144 · Modify Embedded Flash Memory Block Content Dialog Box

- Click the **Import Configuration File** button (if available) to import the Embedded Flash Memory Block configuration and memory content from the EFC file. This will populate the client table below. All clients that belong to this block will be selected by default.
- Click the **Import content** button if you want to change the client memory content.
- Click **OK**.

Note: FlashPoint audits original configuration and memory content files and warns you if the files cannot be located or if they have been updated.

Programming the FPGA Array

The FPGA Array contains your design; in FlashPro for SmartFusion you must have an FDB file to program your FPGA Array.

You can program the FPGA Array by selecting the silicon feature **FPGA Array** in the Generate Programming File page and clicking **OK**.

In FlashPro, if you are using a PDB with an FPGA Array you cannot de-select it for programming unless you are using SmartFusion.

See [Generate a programming file](#) for more information.

Programming the FlashROM

You can program selected memory pages and specify the region values of the FlashROM.

- Single STAPL file for all devices:** generates one programming file with all the generated increment values or with values in the custom serialization file.
- One STAPL file per device:** generates one programming file for each generated increment value or for each value in the custom serialization file.

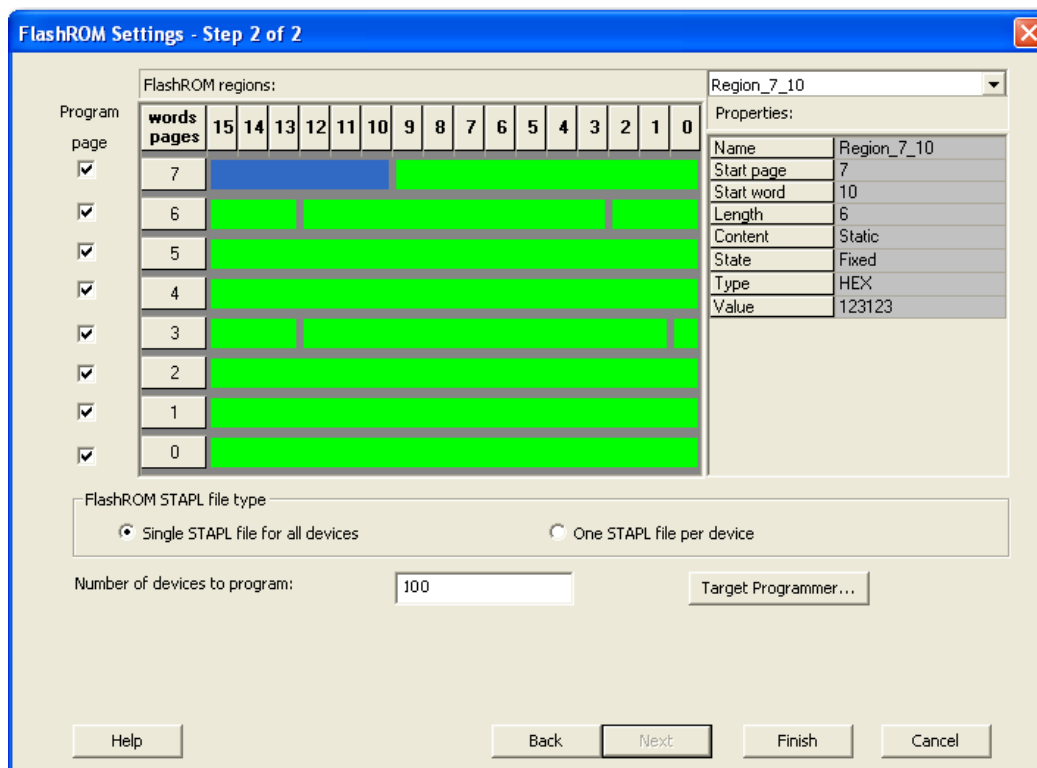
- Select your target **Programmer type**.
 - Select Generic STAPL Player when generating STAPL files for generic STAPL players.
 - Select Silicon Sculptor II, BP Auto Programmer, or FlashPro5/4/3x/3 when generating programming files for those programmers.
 - Select Microsemi IHP (In House Programming) when generating STAPL or SVF files for Microsemi SoC (formerly Actel) IHP.
- Click **OK**.
FlashPoint generates your programming file.

Note: You cannot change the FlashROM region configuration from FlashPoint. You can only change the configuration from the FlashROM core generator.

For more information, click the Help button in FlashROM.

To program FlashROM:

1. Select **FlashROM** from the **Generate Programming File** page.
2. Enter the location of the FlashROM configuration file. The **FlashROM Settings** page appears (see figure below).



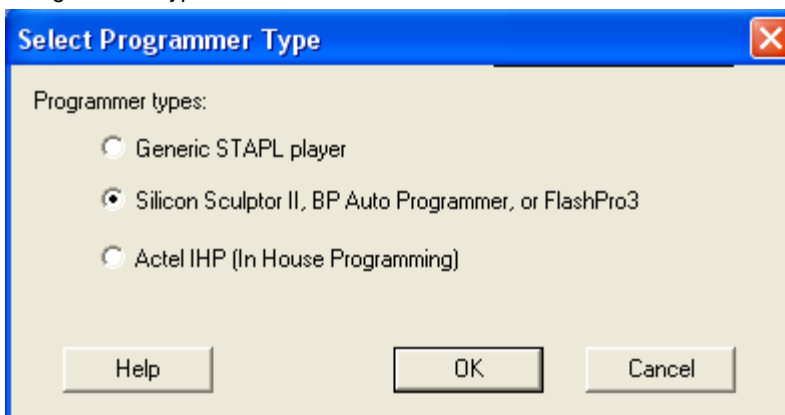
The dialog box is titled "FlashROM Settings - Step 2 of 2". It contains a table for "FlashROM regions:" with columns for "words" and "pages" (0-15). The "pages" column is highlighted in green. To the right is a "Properties:" table for "Region_7_10" with fields: Name, Start page, Start word, Length, Content, State, Type, and Value. Below the regions table is a section for "FlashROM STAPL file type" with two radio buttons: "Single STAPL file for all devices" (selected) and "One STAPL file per device". At the bottom, there is a "Number of devices to program:" field set to "100" and a "Target Programmer..." button. Navigation buttons at the bottom include "Help", "Back", "Next", "Finish", and "Cancel".

words	pages	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
7																	
6																	
5																	
4																	
3																	
2																	
1																	
0																	

Properties:	
Name	Region_7_10
Start page	7
Start word	10
Length	6
Content	Static
State	Fixed
Type	HEX
Value	123123

Figure 145 · FlashROM Settings

3. Select the FlashROM memory page that you want to program.
 4. Enter the data value for the configured regions.
 5. If you selected the region with a **Read From File**, specify the file location.
 6. If you selected the **Auto Increment** region, specify the **Start** and **Max** values.
- Enter the number of devices you want to program.
Select your target Programmer Type.



The dialog box is titled "Select Programmer Type". It contains a section for "Programmer types:" with three radio buttons: "Generic STAPL player", "Silicon Sculptor II, BP Auto Programmer, or FlashPro3" (selected), and "Actel IHP (In House Programming)". At the bottom are "Help", "OK", and "Cancel" buttons.

Select Programmer

- Click **Finish**.
FlashPoint generates your programming file.

Note: You cannot change the FlashROM region configuration from FlashPoint. You can only change the configuration from the FlashROM core generator.

Silicon Signature

With Libero SoC tools, you can use the silicon signature to identify and track Microsemi designs and devices. When you generate a programming file, you can specify a unique silicon signature to program into the device. This signature is stored in the design database and in the programming file, and programmed into the device during programming.

The silicon signature is accessible through the USERCODE JTAG instruction.

Note: If you set the security level to high, medium, or custom, you must program the silicon signature along with the Security Setting. If you have already programmed the Security Setting into the target device, you cannot reprogram the silicon signature without reprogramming the Security Setting.

Note: The previously programmed silicon signature will be erased if:

- You have already programmed the silicon signature and
- You are programming the security settings, but you do not have an entry in the silicon signature field

Programming Security Settings

FlashPoint allows you to set a security level of high, medium, or none (SmartFusion uses radio buttons and the option Clear Security instead of None).

To program Security Settings on the device:

- If you choose to program Security Settings on the device from the **Generate Programming File** page, the wizard takes you to the **Security Settings** page.

Your Security Settings page depends on your family.

- Set the security level for FPGA, FlashROM, and EFMB (see the table below for a description of the security levels).

Table 16 · FPGA, FlashROM, and EFMB Security Settings

Security Level	Security Option	Description
High	Protect with a 128-bit Advanced Encryption Standard (AES) key and a Pass Key	Access to the device is protected by an AES Key and the Pass Key. The Write and Verify operations of the FPGA Array use a 128-bit AES encrypted bitstream. From the JTAG interface, the Write and Verify operations of the FlashROM use a 128-bit AES encrypted bitstream. Read back of the FlashROM content via the JTAG interface is protected by the Pass Key. Read back of the FlashROM content is allowed from the FPGA Array. The Read and Verify operations of the EFMB module are protected by Pass Key from the JTAG interface. The Write operations of the EFMB module use a 128-bit AES encrypted bitstream.

Security Level	Security Option	Description
Medium	Protect with Pass Key	The Write and Verify operations of the FPGA Array require a Pass Key. From the JTAG interface, the Read and Write operations on the FlashROM content require a Pass Key. You can Verify the FlashROM content via the JTAG interface without a Pass Key. Read back of the FlashROM content is allowed from the FPGA Array. The Read, Write, and Verify operations of the EFMB module are protected by Pass Key from the JTAG interface.
None	No security	<p>The Write and Verify operations of the FPGA Array do not require keys. The Read, Write, and Verify operations of the FlashROM content also do not require keys. The Read, Write, and Verify operations of the EFMB module content do not require keys.</p> <p>This option is available for SmartFusion; to choose it, de-select the Security Settings checkbox.</p>

Note: When a Device is programmed with a Pass key and AES key, only the Pass key is required for reprogramming since re-entering the correct Pass key unlocks the bits that restrict programming to require AES encryption and also unlocks the bits that prohibit reprogramming altogether (if locked); thus both plaintext and encrypted programming are [re-] enabled.

3. **Enable eNVM client JTAG protection** - Enables eNVM client JTAG protection in the event you have not set Medium or High security. Enables you to protect specific clients with a user pass key and then leave others unprotected. This can be advantageous if you want to protect your IP, but give another user access to the rest of the eNVM for storage. You can also set [custom security levels](#) for your eNVM.
NOTE: EFMB (Fusion) is called eNVM for SmartFusion devices.
4. Enter the **Pass Key** and/ or the **AES Key** as appropriate. You can generate a random key by clicking the **Generate random key** button.

The **Pass Key** protects all the Security Settings for the FPGA Array, FlashROM, and/or EFMB.

The **AES Key** decrypts the FPGA Array, FlashROM, and/or EFMB programming file content. Use the AES Key if you intend to program the device at an unsecured site or if you plan to update the design at a remote site in the future.

You can also customize the security levels by clicking the **Custom Level** button. For more information, see the [Custom Security Levels](#) section.

To change or disable your security keys you must run the ERASE_SECURITY action code. This erases your security settings and enables you to generate the programming file with new keys and reprogram, or to generate a programming file that has no security key.







Custom Security Levels

For advanced use, you can customize your security levels.

To set custom security levels:









1. Click the **Custom Level** button in the **Security Settings** page. The **Custom Security Level** dialog box appears.
2. Select the **FPGA Array Security** and the **FlashROM Security** levels. For SmartFusion and Fusion devices, you can also choose the Embedded Flash Memory Block level of security. The FPGA Array and the FlashROM can have different Security Settings. See the tables below for a description of the custom security option levels for FPGA Array and FlashROM.

Table 17 · FPGA Array

Security Option						Description
Lock for both writing and verifying						Allows writing/erasing and verification of the FPGA Array via the JTAG interface only with a valid Pass Key.
Device Feature	Set Security	Encrypt	Security Settings			
			Read	Verify	Write	
FPGA Array	<input checked="" type="checkbox"/>	<input type="checkbox"/>				
Lock for writing						Allows the writing/erasing of the FPGA Array only with a valid Pass Key. Verification is allowed without a valid Pass Key.
Device Feature	Set Security	Encrypt	Security Settings			
			Read	Verify	Write	
FPGA Array	<input checked="" type="checkbox"/>	<input type="checkbox"/>				
Use the AES Key for both writing and verifying						Allows the writing/erasing and verification of the FPGA Array only with a valid AES Key via the JTAG interface. This configures the device to accept an encrypted bitstream for reprogramming and verification of the FPGA Array. Use this option if you intend to complete final programming at an unsecured site or if you plan to update the design at a remote site in the future. Accessing the device security settings requires a valid Pass Key.
Device Feature	Set Security	Encrypt	Security Settings			
			Read	Verify	Write	
FPGA Array	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>				
Allow write and verify						Allows writing/erasing and verification of the FPGA Array with plain text bitstream and without requiring a Pass Key or an AES Key. Use this option when you develop your product in-house.
Device Feature	Set Security	Encrypt	Security Settings			
			Read	Verify	Write	
FPGA Array	<input type="checkbox"/>	<input type="checkbox"/>				










Note: The ProASIC3 family FPGA Array is always read protected regardless of the Pass Key or the AES Key protection.

Table 18 · FlashROM

Security Option						Description
Lock for both reading and writing						Allows the writing/erasing and reading of the FlashROM via the JTAG interface only with a valid Pass Key. Verification is allowed without a valid Pass Key.
Device Feature	Set Security	Encrypt	Security Settings			
			Read	Verify	Write	
FlashROM	<input checked="" type="checkbox"/>	<input type="checkbox"/>				
Lock for writing						Allows the writing/erasing of the FlashROM via the JTAG interface only with a valid Pass Key. Reading and verification is allowed without a valid Pass Key.
Device Feature	Set Security	Encrypt	Security Settings			
			Read	Verify	Write	
FlashROM	<input checked="" type="checkbox"/>	<input type="checkbox"/>				
Use the AES Key for both writing and verifying						Allows the writing/erasing and verification of the FlashROM via the JTAG interface only with a valid AES Key. This configures the device to accept an encrypted bitstream for reprogramming and verification of the FlashROM. Use this option if you complete final programming at an unsecured site or if you plan to update the design at a remote site in the future. Note: The bitstream that is read back from the FlashROM is always unencrypted (plain text).
Device Feature	Set Security	Encrypt	Security Settings			
			Read	Verify	Write	
FlashROM	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>				
Allow reading, writing, and verifying						Allows writing/erasing, reading and verification of the FlashROM content with a plain text bitstream and without requiring a valid Pass Key or an AES Key.
Device Feature	Set Security	Encrypt	Security Settings			
			Read	Verify	Write	
FlashROM	<input type="checkbox"/>	<input type="checkbox"/>				

Note: The FPGA Array can always read the FlashROM content regardless of these Security Settings.

Table 19 · Embedded Flash Memory Block

Security Option						Description
Lock for reading, verifying, and writing						Allows the writing and reading of the Embedded Flash Memory Block via the JTAG interface only with a valid Pass Key. Verification accomplished by reading back and compare.
Device Feature	Set Security	Encrypt	Security Settings			
			Read	Verify	Write	
firmware\NVM_INST (# 1)	<input checked="" type="checkbox"/>	<input type="checkbox"/>				
Lock for writing						Allows the writing of the Embedded Flash Memory Block via the JTAG interface only with a valid Pass Key. Reading and verification is allowed without a valid Pass Key.
Device Feature	Set Security	Encrypt	Security Settings			
			Read	Verify	Write	
firmware\NVM_INST (# 1)	<input checked="" type="checkbox"/>	<input type="checkbox"/>				
Use AES Key for writing						Allows the writing of the Embedded Flash Memory Block via the JTAG interface only with a valid AES Key. This configures the device to accept an encrypted bitstream for reprogramming of the Embedded Flash Block. Use this option if you complete final programming at an unsecured site or if you plan to update the design at a remote site in the future. The bitstream that is read back from the Embedded Flash Memory Block is always unencrypted (plain text), when a valid pass key is provided.
Device Feature	Set Security	Encrypt	Security Settings			
			Read	Verify	Write	
firmware\NVM_INST (# 1)	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>				
Allow reading, writing, and verifying						Allows writing, reading and verification of the Embedded Flash Memory Block content with a plain text
Device Feature	Set Security	Encrypt	Security Settings			
			Read	Verify	Write	
firmware\NVM_INST (# 1)	<input type="checkbox"/>	<input type="checkbox"/>				

Security Option	Description
	bitstream and without requiring a valid Pass Key or an AES Key.

- To make the Security Settings permanent, select **Permanently lock the security settings** check box. This option prevents any future modifications of the Security Setting of the device. A Pass Key is not required if you use this option.

Note: When you make the Security Settings permanent, you can never reprogram the [Silicon Signature](#). If you Lock the write operation for the FPGA Array or the FlashROM, you can never reprogram the FPGA Array or the FlashROM, respectively. If you use an AES key, this key cannot be changed once you permanently lock the device.

- (SmartFusion Only) Enable M3 Debugger option enables access to the M3 debugger even if security is enforced. Select the **Enable M3 debugger** checkbox if you want to access the M3 debugger after programming.
- To use the Permanent FlashLock™ feature (One-time programmable or OTP), select **Lock for both writing and verifying** for FPGA Array, **Lock for both reading and writing** for FlashROM, **Lock for reading, writing, and verifying** each Embedded Flash Memory Block (for Fusion and SmartFusion), if present, and select the **Permanently lock the security settings** checkbox as shown in the figure below. This will make your device one-time programmable.

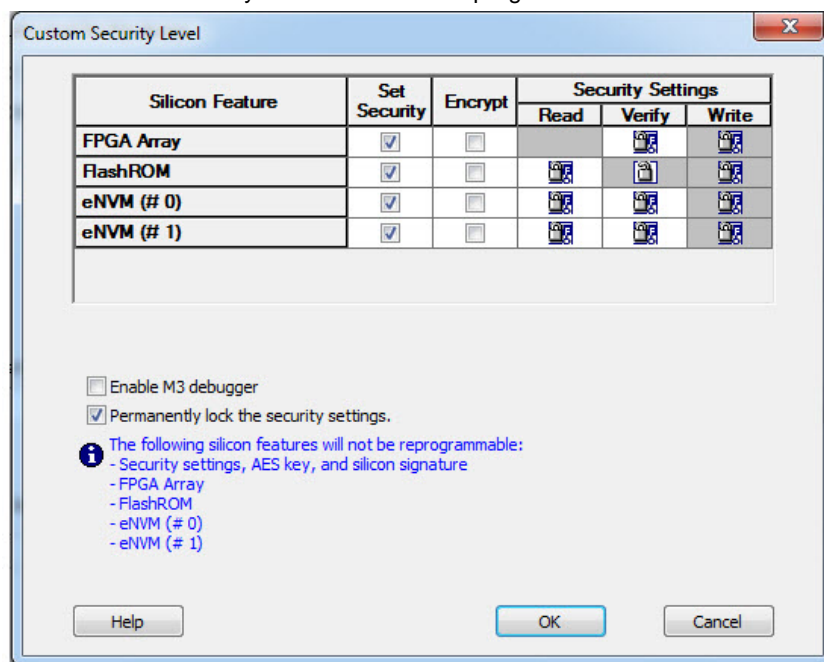


Figure 146 · Custom Security Level

- Click the **OK** button. The **Security Settings** page appears with the **Custom security settings** information as shown in the figure below.

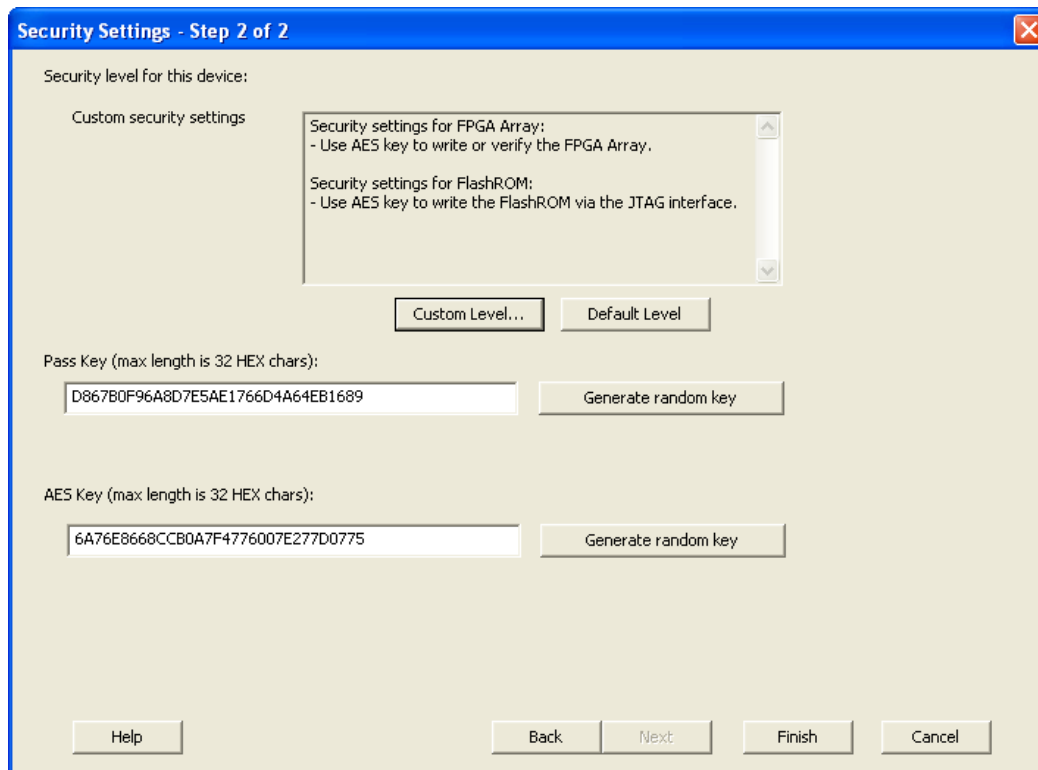


Figure 147 · Security Settings

Reprogramming a Secured Device

You must know the previous Security Settings of the device before you can reprogram a device with Security Settings.

To program a secured device:

1. In the Generate Programming File window, click the **Programming previously secured devices(s)** check box (see figure below).

FlashPoint - Programming File Generator - Step 1 of 2

Silicon feature(s) to be programmed:

☐ Security settings

☒ FPGA Array

☐ FlashROM

FlashROM configuration file:


D:\MyDesign\from.ufc Browse...

Embedded Flash Memory Blocks (EFMB):

	Program	Block Name	Block Location	Original Configuration File	
1	<input checked="" type="checkbox"/>	FM1_0/NVM_IN...	1	D:\fus_80ws\nvm_all\nvm_all.efc	Modify...

☒ Programming previously secured device(s)

Modify I/O States During Programming...

Silicon signature (max length is 8 HEX chars):  Select Security settings above to program silicon signature.

Help Back Next Finish Cancel

Figure 148 · Generate Programming File

- Specify the previously programmed security setting for the FlashROM and/or the FPGA Array. To generate a programming file for encrypted programming please ensure that the Security settings checkbox is unchecked.
- If you programmed the device with a custom security level, click the **Custom Level** button to open the Custom security dialog box, and select the **Security Settings for the FPGA Array** or the FlashROM that you programmed (see figure below).

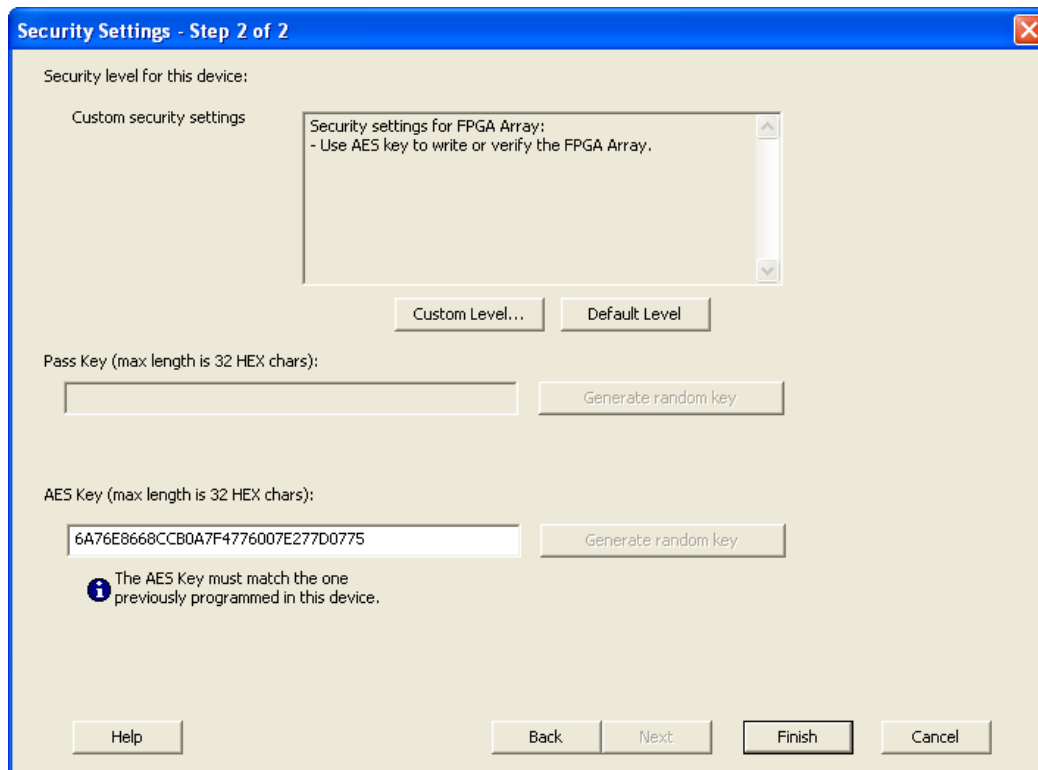


Figure 149 · Security Settings

4. Enter the previously programmed Pass Key and/or the AES Key.
5. Click **Finish**.

Note: Enter the AES Key only if you want to perform encrypted programming.

Programming a Secured SmartFusion Device

After you create a PDB you may wish to export a programming file for a secured device. To do so:

1. Create a PDB file (as explained above) with security set to **High** or **Medium**. Save the PDB file.
2. From the **File** menu, choose **Export Single Programming File**. The [Export Programming Files](#) dialog box appears.
3. Click the **Export programming file(s) for currently secured device** checkbox. This exports programming files for devices that already have security settings programmed.
4. Choose your outputs and enter your output file **Name** and **Location**.
5. Click **Export** to create the file(s). Your updated secured programming files are in the directory you specified.

Custom Serialization Data for FlashROM Region

FlashPoint enables you to specify a custom serialization file as a source to provide content for programming into a Read from file FlashROM region. You can use this feature for serializing the target device with a custom serialization scheme.

To specify a FlashROM region:

1. From the Properties section in the FlashROM Settings page, select the file name of the custom serialization file (see figure below). For more information on custom serialization files, see [Custom Serialization Data File Format](#).

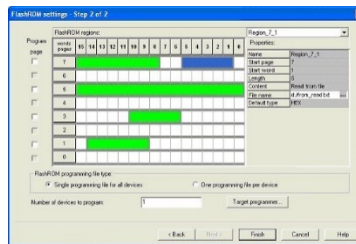


Figure 150 · FlashROM Settings

2. Select the FlashROM programming file type you want to generate from the two options below:
 - Single programming file for all devices option: generates one programming file with all the values in the custom serialization file.
 - One programming file per device: generates one programming file for each value in the custom serialization file.
3. Enter the number of devices you want to program.
4. Click the **Target Programmer** button.
5. Select your target Programmer type.
6. Click **OK**.

Custom Serialization Data File Format

FlashPoint supports custom serialization data files that specify the data in binary, HEX, decimal, or ASCII text. The custom serialization data files may contain multiple data with the Line Feed (LF) character as the delimiter. You can create a file by entering serialization data into any type of text editor. Depending on the serialization data format (hex, ASCII, binary, decimal), input the serialization data according to the size of the region you specified in the FlashROM settings page.

Semantics

Each custom serialization file has only one type of data format (binary, decimal, Hex or ASCII text). For example, if a file contains two different data formats (i.e. binary and decimal) it is considered an invalid file.

The length of each data file must be shorter or equal to the selected region length. If the data is shorter than the selected region length, the most significant bits shall be padded with 0's. If the specified region length is longer than the selected region length, it is considered an invalid file.

The digit / character length is as follows:

- Binary digit: 1 bit
- Decimal digit: 4 bits
- Hex digit: 4 bits
- ASCII Character: 8 bits

Note: Note the standard example below:

If you wanted to use, for example, device serialization for three devices with serialization data 123, 321, and 456, you would create file name from_read.txt. Each line in from_read.txt corresponds to the serialization data that will be programmed on each device. For example, the first line corresponds to the first device to be programmed, the second line corresponds to the second device to be programmed, and so on.

Hex serialization data file example

The following example is a Hex serialization data file for a 40-bit region. Enter the serialization data below into file created by any text editor:

```
123AEEd210
AeB1
0001242E
```

Note: If you enter an invalid Hex digit such as 235SedF1, an error occurs. An error will also occur if you enter data that is out of range, i.e. 4300124EFE.

The following is an example of programming "AeB1" into Region_7_1 located on page 7, from Word 5 to Word 1 in the FlashROM settings page. See [Custom serialization data for FlashROM region](#) for more information.

	Table 15	...		Word 5	Word 4	Word 3	Word 2	Word 1	Word 0
Page 7	00	00	00	AE	B1	...

Binary serialization data file example

The following example is a binary serialization data file for a 16-bit region:

```
1100110011010001
100110011010011
11001100110101111 (This is an error: data out of range)
1001100110110111
1001100110110112 (This is an error: invalid binary digit)
```

Decimal serialization data file example

The following example is a decimal serialization data file for a 16-bit region:

```
65534
65535
65536 (This is an error: data out of range)
6553A (This is an error: invalid decimal digit)
```

Text serialization data file example

The following example is a text serialization data file for a 32-bit region:

```
AESB
A )e
ASE3 23 (This is an error: data out of range)
65A~
1234
AEbF
```

Syntax

Indentations in the syntax below indicate a wrapped line. If a line wraps and is not indented, then it should appear on one line; you may need to expand your help window to view the syntax correctly.

```
Custom serialization data file =
    <hex region data list> | <decimal region data list> |
    <binary region data list> | <ascii text data list>
Hex region data list = <hex data> <new line> { < hex data> <new line> }
Decimal region data list = <decimal data> <new line> {<decimal data><new line> }
Binary region data list = <binary data> <new line> { <binary data> <new line> }
ASCII text region data list = < ascii text data> <new line> { < ascii text data> <new line> }
hex data = <hex digit> {<hex digit>}
decimal data = < decimal digit> {< decimal digit>}
binary data = < binary digit> {< binary digit>}
ASCII text data = <ascii character> {< ascii character >}
```

```

new line = LF
binary digit = '0'|'1'
decimal digit = '0'|'1'|'2'|'3'|'4'|'5'|'6'|'7'|'8'|'9'
hex digit = '0'|'1'|'2'|'3'|'4'|'5'|'6'|'7'|'8'|'9'|'A'|'B'|'C'|'D'|'E'|'F'|
            'a'|'b'|'c'|'d'|'e'|'f'
ascii character = characters from SP(0x20) to '~'(0x7E).

```

File Format Limitations

The read from file data size cannot exceed the size of the region. The maximum size supported for each format is described below:

HEX - limited to the size of the FlashROM page. Maximum size of 128-bits

DEC - 32-bit unsigned numbers. Maximum decimal value is: 4294967295

BIN - limited to the size of the FlashROM page. Maximum size of 128-bits

TEXT - limited to the size of the FlashROM page. Maximum size of 128-bits

Specifying I/O States During Programming

You can modify the I/O states during programming in FlashPro. In FlashPro, this feature is supported for PDB files generated from Designer v8.5 or greater.

Note: PDB files generated from Designer v8.1 to Designer v8.4 (including all service packs) have limited display of Pin Numbers only.

1. Load a PDB from the FlashPro GUI. You must have a PDB loaded to modify the I/O states during programming.
2. From the FlashPro GUI, click **PDB Configuration**. The FlashPoint – Programming File Generator window appears.
3. Click **Specify I/O States During Programming** to display the Specify I/O States During Programming dialog box.
4. Sort the pins as desired by clicking any of the column headers to sort the entries by that header. Select the I/Os you wish to modify (as shown in the figure below).
5. Set the I/O Output State. You can set Basic I/O settings if you want to use the default I/O settings for your pins, or use Custom I/O settings to customize the settings for each pin. See [Specifying I/O States During Programming - I/O States and BSR Details](#) for more information about setting your I/O state and the corresponding pin values. Basic I/O state settings are:
 - 1 – I/O is set to drive out logic High
 - 0 – I/O is set to drive out logic Low
 - Last Known State: I/O is set to the last value that was driven out prior to entering the programming mode, and then held at that value during programming
 - Z - Tri-State: I/O is tristated

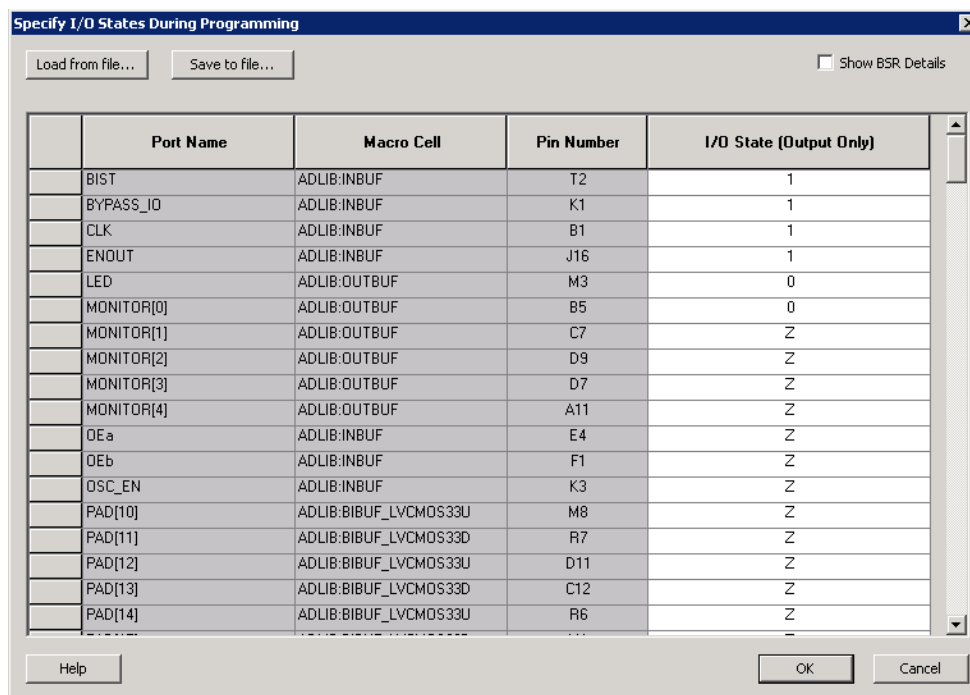


Figure 151 · I/O States During Programming Window

- Click **OK** to return to the FlashPoint – Programming File Generator window.

Note: I/O States During Programming are saved to the ADB and resulting programming files after completing programming file generation.

In Libero SoC, the I/O states can be set prior to programming, and held at the set values during programming. This feature is only available after layout is completed.

- From the Designer GUI, click **Modify I/O States During Programming**. The Programming File Generator window appears.
- Click **Specify I/O States During Programming** to display the Specify I/O States During Programming dialog box.
- Sort the pins as desired by clicking any of the column headers to sort the entries by that header. Select the I/Os you wish to modify (as shown in the figure below).
- Set the I/O Output state. You can set Basic I/O settings if you want to use the default I/O settings for your pins, or use Custom I/O settings to customize the settings for each pin. See [Specifying I/O States During Programming - I/O States and BSR Details](#) for more information about setting your I/O state and the corresponding pin values. Basic I/O state settings are:
 - 1 – I/O is set to drive out logic High
 - 0 – I/O is set to drive out logic Low
 - Last Known State: I/O is set to the last value that was driven out prior to entering the programming mode, and then held at that value during programming
 - Z - Tri-State: I/O is tristated

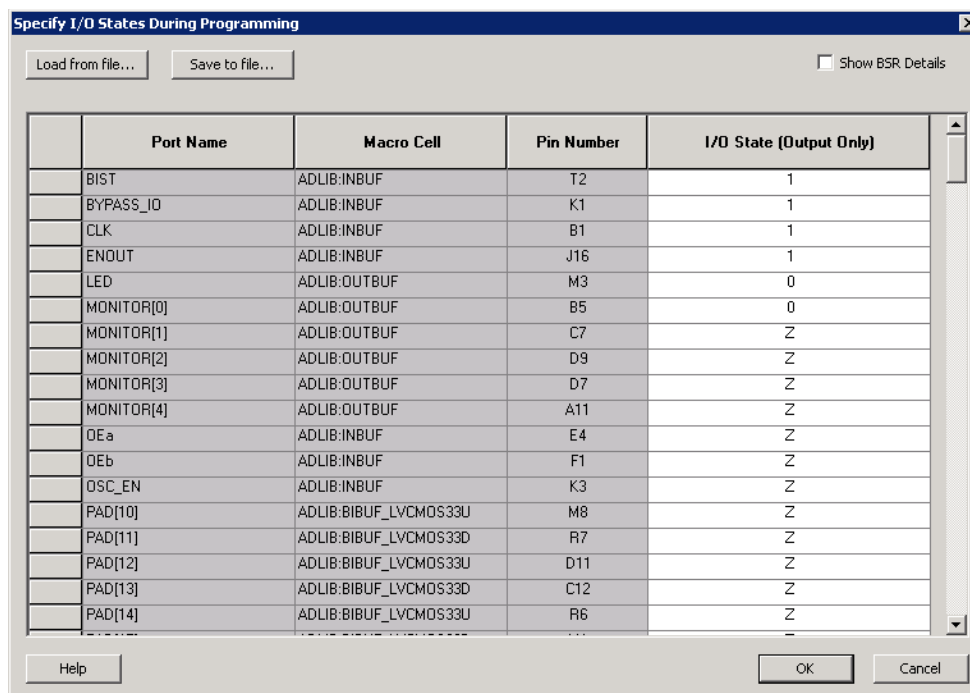


Figure 152 · I/O States During Programming Window

6. Click **OK** to return to the FlashPoint – Programming File Generator window.

Note: I/O States During Programming are saved to the ADB and resulting programming files after completing programming file generation.

Custom I/O Settings and Boundary Scan Registers

Each I/O in your device is comprised of an Input, Output and Output Enable Boundary Scan Register (BSR) cell..

The BSR cells enable you to define I/O states during programming and control the individual states for each Input, Output, and Output Enable register.

The [Specify I/O States During Programming dialog box](#) enables access to each of these BSR cells for control over the individual states. You can use the I/O State (Output Only) settings to set a specific output state and ignore the other values for the individual BSR elements, or you can click the [Show BSR Details checkbox](#) for control over the settings for each Input, Output Enable, and Output as you exit programming.

Specifying I/O States During Programming - I/O States and BSR Details

The I/O States During Programming dialog box enables you to set custom I/O states prior to programming.

I/O State (Output Only)

Sets your I/O states during programming to one of the values shown in the list below.

- 1 – I/Os are set to drive out logic High
- 0 – I/Os are set to drive out logic Low
- Last Known State: I/Os are set to the last value that was driven out prior to entering the programming mode, and then held at that value during programming
- Z - Tri-State: I/Os are tristated

When you set your I/O state, the Boundary Scan Register cells are set according to the table below. Use the Show BSR Details option to set custom states for each cell.

Table 20 · Default I/O Output Settings

Output State	Settings		
	Input	Control (Output Enable)	Output
Z (Tri-State)	1	0	0
0 (Low)	1	1	0
1 (High)	0	1	1
Last_Known_State	Last_Known_State	Last_Known_State	Last_Known_State

Table Key:

- 1 – High: I/Os are set to drive out logic High
- 0 – Low: I/Os are set to drive out logic Low
- Last_Known_State - I/Os are set to the last value that was driven out prior to entering the programming mode, and then held at that value during programming

Boundary Scan Registers - Enabled with Show BSR Details

Sets your I/O state to a specific output value during programming AND enables you to customize the values for the Boundary Scan Register (Input, Output Enable, and Output). You can change any Don't Care value in Boundary Scan Register States without changing the Output State of the pin (as shown in the table below).

For example, if you want to Tri-State a pin during programming, set Output Enable to 0; the Don't Care indicates that the other two values are immaterial.

If you want a pin to drive a logic High and have a logic 1 stored in the Input Boundary scan cell during programming, you may set all the values to 1.

Table 21 · BSR Details I/O Output Settings

Output State	Settings		
	Input	Output Enable	Output
Z (Tri-State)	Don't Care	0	Don't Care
0 (Low)	Don't Care	1	0
1 (High)	Don't Care	1	1
Last Known State	Last State	Last State	Last State

Table Key:

- 1 – High: I/Os are set to drive out logic High
- 0 – Low: I/Os are set to drive out logic Low
- Don't Care – Don't Care values have no impact on the other settings.
- Last_Known_State – Sampled value: I/Os are set to the last value that was driven out prior to entering the programming mode, and then held at that value during programming

The figure below shows an example of Boundary Scan Register settings.

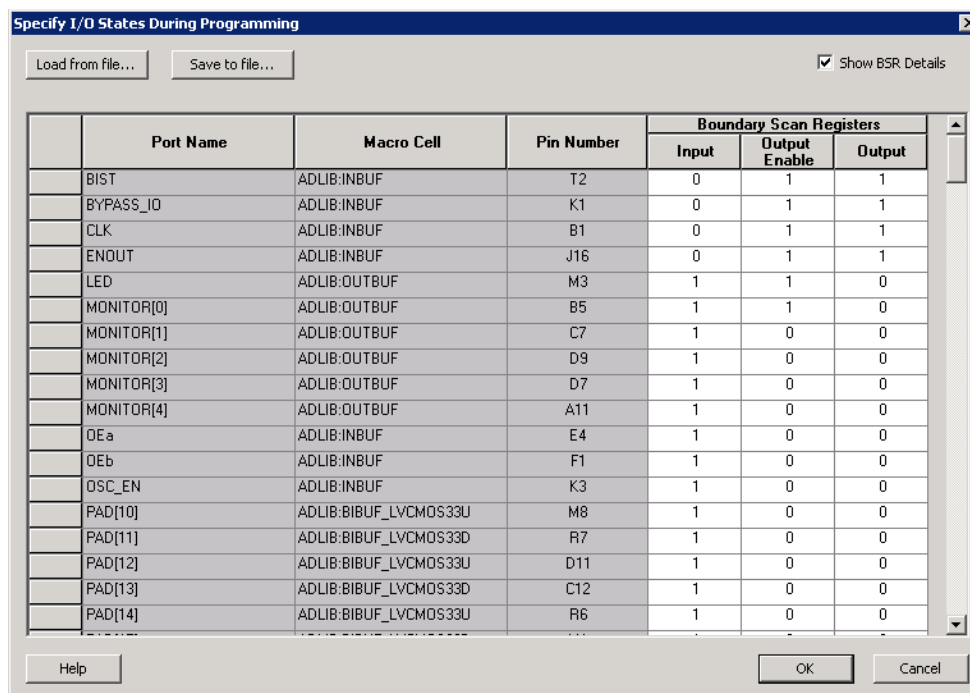


Figure 153 · Boundary Scan Registers

Specify I/O States During Programming Dialog Box

The I/O States During Programming dialog box enables you to specify [custom settings](#) for I/Os in your programming file. This is useful if you want to set an I/O to drive out specific logic, or if you want to use a custom I/O state to manage settings for each Input, Output Enable, and Output associated with an I/O.

Load from file

Load from file enables you to load an I/O Settings (*.ios) file. You can use the IOS file to import saved custom settings for all your I/Os. The exported IOS file have the following format:

- Used I/Os have an entry in the IOS file with the following format:

```
set_prog_io_state -portName {<design_port_name>} -input <value> -outputEnable <value> -output <value>
```

- Unused I/Os have an entry in the IOS file with the following format:

```
set_prog_io_state -pinNumber {<device_pinNumber>} -input <value> -outputEnable <value> -output <value>
```

Where <value> is:

- 1 – I/O is set to drive out logic High
- 0 – I/O is set to drive out logic Low
- Last_Known_State: I/O is set to the last value that was driven out prior to entering the programming mode, and then held at that value during programming
- Z - Tri-State: I/O is tristated

Save to file

Saves your I/O Settings File (*.ios) for future use. This is useful if you set custom states for your I/Os and want to use them again later in conjunction with a PDC file.

Port Name

Lists the names of all the ports in your design.

Macro Cell

Lists the I/O type, such as INBUF, OUTBUF, PLLs, etc.

Pin Number

The package pin associate with the I/O.

I/O State (Output Only)

Your custom I/O State set during programming. This heading changes to Boundary Scan Register if you select the BSR Details checkbox; see the [Specifying I/O States During Programming - I/O States and BSR Details](#) help topic for more information on the BSR Details option.

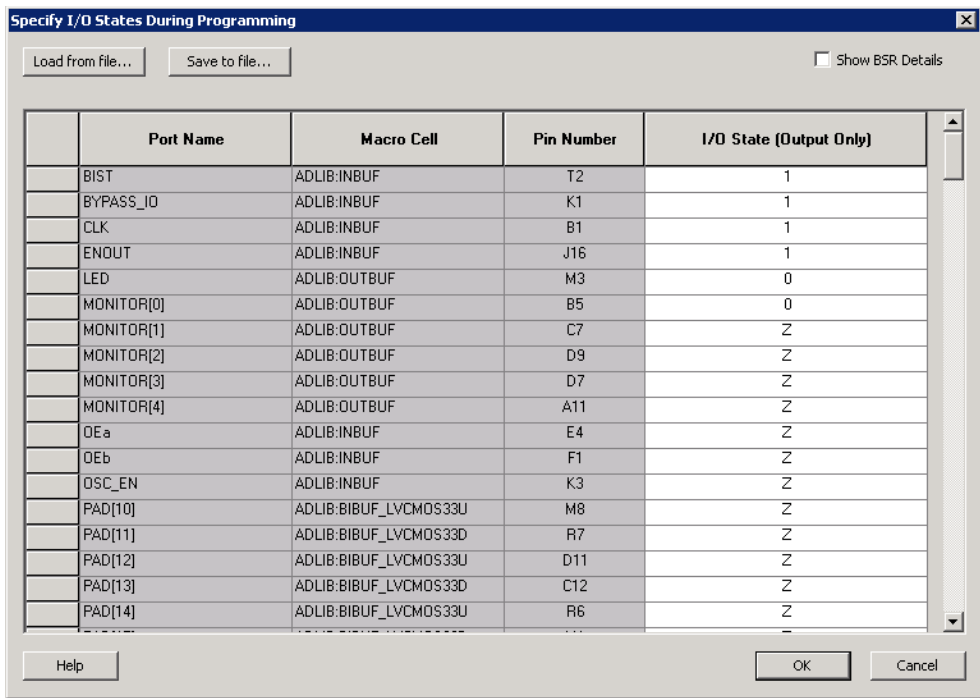


Figure 154 · I/O States During Programming Dialog Box

Generate a DAT file

DAT files are generated via the Generate Programming Files dialog box.

To access the Generate Programming Files dialog box from Libero SoC and generate a DAT file:

1. In the Design Flow window, expand **Implement Design**, right-click **Generate Programming Data** and choose **Open Interactively**. This opens Designer.
2. Click **Programming File** to start FlashPoint.
3. Set your feature and I/O options if necessary. Click **Finish**. This opens the Generate Programming File dialog box, as shown in the figure below.

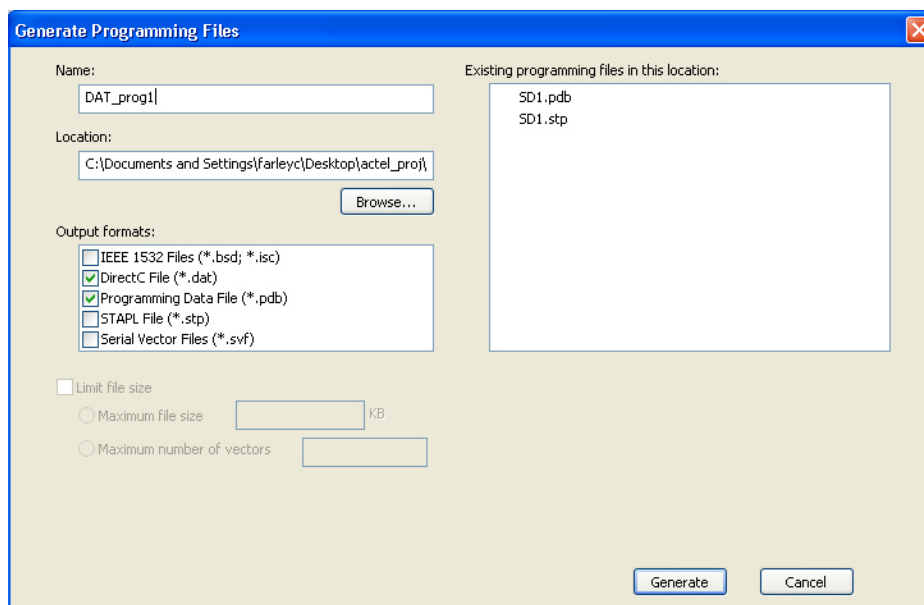


Figure 155 · Generate Programming Files Dialog Box - DirectC File (*.dat)

4. Set your output file **Name** and **Location**.
5. Set your Output Formats to **DirectC file (*.dat)** and **Programming Data File (*.pdb)**.
6. Click **Generate** to create your file.

Parallel Port Cable Information

The FlashPro software supports the generic Parallel Port Cable.

To connect to the Parallel Port Cable:

1. From the **Parallel Port Cable** text box, select the Parallel Port Buffer Cable (as shown in the figure below).
2. Select the parallel port that is connected to the cable from the **Parallel Port** text box.

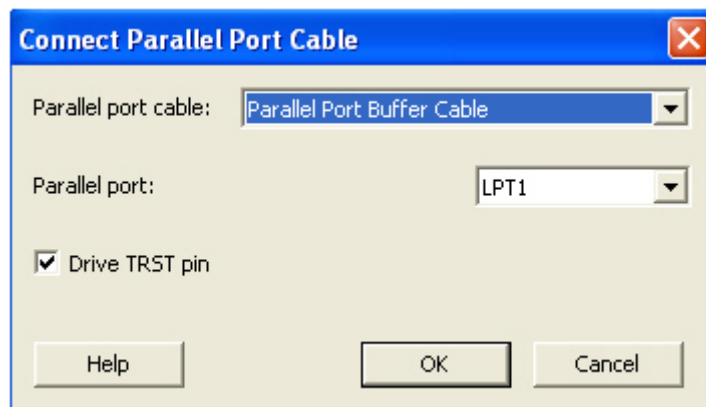


Figure 156 · Connect Parallel Port Cable

3. Click **OK**.

The **Para2Buff** programmer is added to the programmer list.

Importing and Exporting Files

Importing Configuration Files

To import a configuration file:

1. From the **File** menu, choose **Import Configuration File**. The **Import Configuration File** dialog box appears.
2. Navigate to your file and click **Open**.

Exporting Configuration Files

To export a configuration file:

1. From the **File** menu, choose **Export** and then choose **Export Configuration File**. The **Export Configuration File** dialog box appears.
2. Navigate to your file and click **Save**.

Export Programming Files (SmartFusion Only)

Export Programming Files enables you to export DirectC DAT, PDB and STP programming files. Exporting programming files is supported in both Chain and Single mode; to export programming files in Chain mode you must select one SmartFusion device in your chain.

To export a programming file:

1. From the FlashPro **File** menu choose **Export > Single Programming File**. The Export Programming Files dialog box appears.
2. Specify the **Output format**, **Name** and **Location** and click **Export** to create the files.

Export programming files for currently secured device enables you to generate PDB files for devices that have already been programmed with security settings. It generates encrypted data for encrypted features.

Target Programming Solution and STAPL file type options are available only if you have serialization.

Target Programming Solution

- Select Microsemi IHP (In House Programming) when generating STAPL or SVF files for Microsemi IHP.
- Select Silicon Sculptor II, BP Auto Programmer, or FlashPro5/4/3 when generating programming files for those programmers.
- Select Generic STAPL Player when generating STAPL files for generic STAPL players.

STAPL File Type Options

- **Single STAPL file for all devices:** Generates one programming file with all the generated increment values or with values in the custom serialization file.
- **One STAPL file per device:** Generates one programming file for each generated increment value or for each value in the custom serialization file.

Limit file size

Some testers may have memory size restrictions for a single SVF file. The SVF limit file option enables you to limit the size of each SVF file by either file size or vectors.

The generated SVF files append an index to the file name indicating the sequence of files. The format is:

<SVF_filename>_XXXXX.svf

where XXXXX is the index of the SVF file. The first SVF file begins with <SVF_filename>_00000.svf and increments by 1 until file generation is complete.

Maximum file size: Max file size limit for the SVF file; use this option to limit your SVF file size based on number of kB.

Maximum number of vectors: Max vector limit for the SVF file; use this option to limit the size of your SVF based on number of vectors.

When serialization is available, choose the appropriate Target Programming Solution and STAPL File Type (if necessary) for your programming chain.

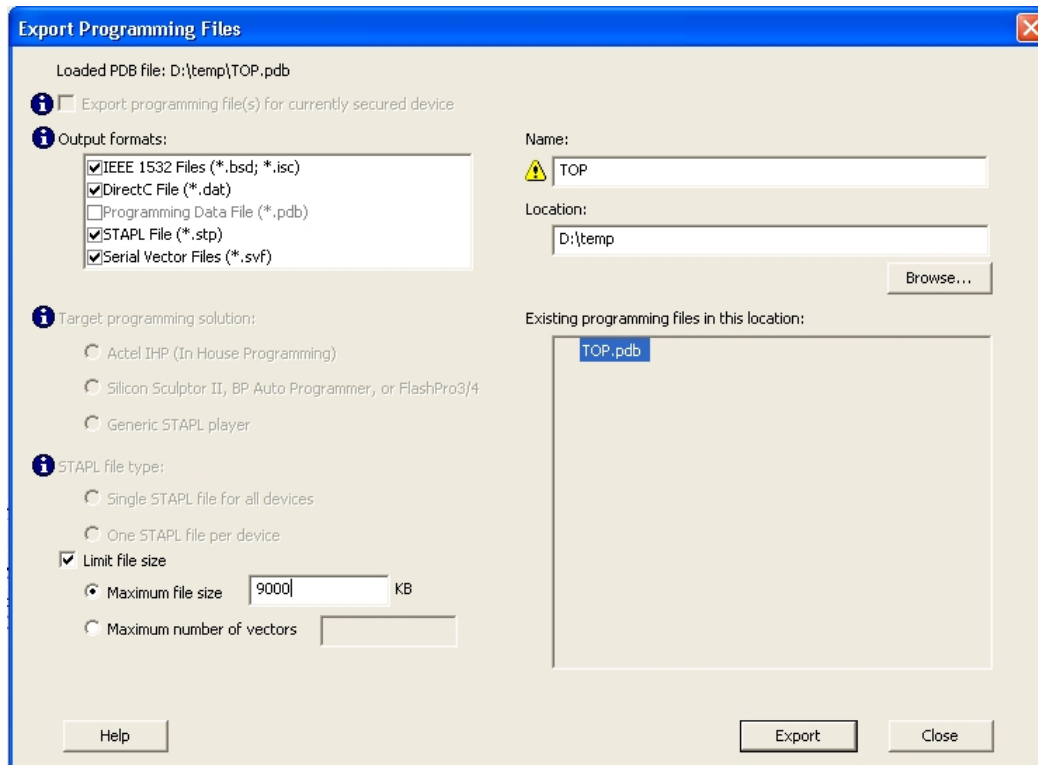


Figure 157 · Export Programming Files Dialog Box

Exporting a Chain STAPL File

To export a chain STAPL file:

1. From the **File** menu, select **Export** and then choose **Export Chain STAPL File**. The **Export Chain STAPL File** dialog box appears.
2. Name your file and click **Save**.

Note: Chain STAPL file export is supported if all selected SmartFusion, IGLOO, ProASIC3 and Fusion devices have STAPL or PDB files loaded.

Exporting a Chain SVF File

To export a chain SVF file:

1. From the **File** menu, choose **Export** and then choose **Export Chain SVF File**. The **Export Chain SVF File** dialog box appears.
2. Name your file and click **Save**.

Note: Chain SVF file export is supported if all selected devices have STAPL or PDB files loaded.

Exporting Single Device STAPL Files

To export a single STAPL file in single mode:

This option is available only for single programming mode projects with a PDB file loaded (refer to [Single STAPL file basic tutorial](#) for more information).

1. From the **File** menu, choose **Export > Export Single Device STAPL File**. The **Export Single Device STAPL File** dialog box appears.
2. Name your file and click **Save**.

To export a single device STAPL file in chain mode:

This option is available only for chain programming mode projects with a PDB file loaded (refer to [Chain programming tutorial](#) for more information). Exporting a single device STAPL file is only supported for one device in the chain.

1. Select only one device from the chain, and from the **File** menu, select **Export** and then choose **Export Single Device STAPL File**. The **Export Single Device STAPL File** dialog box appears.
2. Name your file and click **Save**.

Or

1. Right-click a device in the Chain Configuration Window, and then choose **Export Single Device STAPL File**. The **Export Single Device STAPL File** dialog box appears.
2. Name your file and click **Save**.

Exporting Single Device SVF Files

The following steps describe how to export SVF files.

To export single device SVF files in single mode:

This option is available only for single programming mode projects with a PDB file loaded (refer to [Single STAPL file basic tutorial](#) for more information).

1. From the **File** menu, select **Export** and then choose **Export Single Device SVF File**. The **Export Single Device SVF File** dialog box appears.
2. Name your file and click **Save**.

Note: Multiple SVF files will be generated from a single PDB. Each file corresponds to a PDB action, and will be saved in the <SVF_filename> folder as <SVF_filename>_<action name>.SVF.

To export single device SVF files in chain mode:

This option is available only for chain programming mode projects with a PDB file loaded (refer to [Chain programming tutorial](#) for more information).

1. Select only one device from the chain, and from the **File** menu, choose **Export** and then choose **Export Single Device SVF File**. The **Export Single Device SVF File** dialog box appears.
2. Name your file and click **Save**.

Or

1. Right-click a device in the Chain Configuration Window, and then choose **Export Single Device SVF File**. The **Export Single Device SVF File** dialog box appears.
2. Name your file and click **Save**.

Note: Multiple SVF files will be generated from a single PDB. Each file corresponds to a PDB action, and will be saved in the <SVF_filename> folder as <SVF_filename>_<action name>.SVF.

Exporting Single Device 1532 Files

IEEE 1532 programming files will only be exported in FlashPro for SmartFusion devices when an FDB has been properly imported.

To export single device 1532 files in single mode:

This option is available only for single programming mode projects with a PDB file loaded (refer to [Single STAPL file basic tutorial](#) for more information).

1. From the **File** menu, choose **Export Single Device 1532 File**. The **Export Single Device 1532 File** dialog box appears.
2. Name your file and click **Save**.

Note: Two files will be generated from a single PDB and will be saved in the <1532_filename>_1532 folder as

Note: IEEE 1532 BSDL file - <1532_filename>.bsd

Note: IEEE 1532 Data file - <1532_filename>.isc

To export single device 1532 files in chain mode:

This option is available only for chain programming mode projects with a PDB file loaded (refer to [Chain programming tutorial](#) for more information). Exporting a single device STAPL file is only supported for one device in the chain.

1. Select only one device from the chain, and from the **File** menu, choose **Export** and then choose **Export Single Device 1532 File**. The **Export Single Device 1532 File** dialog box appears.
2. Name your file and click **Save**.

Or

1. Right-click a device in the Chain Configuration Window, and then choose **Export Single Device 1532 File**. The **Export Single Device 1532 File** dialog box appears.
2. Name your file and click **Save**.

Note: Two files will be generated from a single PDB and will be saved in the <1532_filename>_1532 folder as

Note: IEEE 1532 BSDL file - <1532_filename>.bsd

Note: IEEE 1532 Data file - <1532_filename>.isc

Opening an Existing FlashPro Project on a Different Machine

Opening a FlashPro project created on a different PC than it was created on causes tool problems. The project cannot be opened and the PDB file cannot be imported. You must export the configuration file from the original machine and import it on the new machine in order to preserve your project.

To move a FlashPro project and open it on a different machine:

1. [Export configuration files](#) on the machine where you created the original project. The configuration files contain all FlashPro settings, including loaded programming files.
2. Send the configuration files to the new desktop
3. Open FlashPro on the new desktop and [create a new FlashPro project](#).
4. [Import the configuration file](#).

Using Hot Keys

General Hot Keys

You can use hot keys for a lot of the features of the FlashPro software. See the table below for a list of general hot keys.

Table 22 · FlashPro Software General Hot Keys

Feature	Hot Key
New Project	Ctrl+N
Open Project	Ctrl+O
Save Project	Ctrl+S
Import Configuration File	Ctrl+I
Refresh Views	F5
Refresh/Rescan for Programmers	Ctrl+F5

See Also

[Single STAPL programming hot keys](#)

[Chain programming hot keys](#)

Single Device Programming Hot Keys

See the table below for the hot keys for single device programming.

Table 23 · Single Device Programming Hot Keys

Feature	Hot Key
Load a STAPL file	Ctrl + Shift + L
Select Action and Procedures	Ctrl + Shift + A
Enable Serialization	Ctrl + Shift + S
Select Serialization Data	Ctrl + Shift + R
View Serialization Status	Ctrl + Shift + U
View Chain Parameter (Pre/Post IR/DR)	Ctrl + Shift + H
Configure Target Device	Ctrl + Shift + D
Run	Ctrl + Return

Chain Programming Hot Keys

See the table below for the hot keys for chain programming.

Table 24 · Chain Programming Hot Keys

Feature	Hot Key
Add Microsemi Device	Ctrl + Shift + T
Add non Microsemi Device	Ctrl + Shift + N
Remove Device	Ctrl + R
Configure Device	Ctrl + F
Load STAPL File	Ctrl + Shift + L
Load BSDL File	Ctrl + Shift + B
Enable Device	Ctrl + E
Select Action and Procedures	Ctrl + Shift + A
Enable Serialization	Ctrl + Shift + S
Select Serialization Data	Ctrl + Shift + R
View Serialization Data	Ctrl + Shift + u
Copy Device	Ctrl + Shift + C
Cut Device	Ctrl + Shift + X
Paste Device	Ctrl + Shift + V
Move Device Down	Ctrl + D
Move Device Up	Ctrl + U
Run	Ctrl + Return

Batch Mode

Batch mode programming can be achieved by executing FlashPro [TCL scripts from the command line](#).

The example below executes The FlashPro TCL script *batch.tcl* from the command line:

```
<location of Microsemi software>/bin/flashpro.exe script:batch.tcl
```

Batch.tcl contains the following script:

```
new_project -name {newproject} -location {./newproject} -mode {single}
  set_programming_file -file {./design.stp}
set_programming_action -action {PROGRAM}
run_selected_actions
close_project
```


About TCL Commands - FlashPro Tcl Command Reference

A Tcl (Tool Command Language) file contains scripts for simple or complex tasks. You can run scripts from the Windows command line or store and run a series of Tcl commands in a *.tcl batch file. The Tcl commands supported by FlashPro are listed in the table below.

Note: Tcl commands are case sensitive. However, their arguments are not.

Command	Action
add_actel_device	Adds an Actel device to the chain
add_non_actel_device	Adds a non-Actel device in the chain
add_non_actel_device_to_database	Imports settings via a BSDL file that adds non-Actel or non-Microsemi devices to the device database
check_flash_memory	Performs diagnostics of the page status and data information
close_project	Closes the FlashPro project
compare_analog_config	Compares the content of the analog block configurations in your design against the actual values in the device
compare_flashrom_client	Compares the content of the FlashROM configurations in your design against the actual values in the selected device
compare_memory_client	Compares the memory client in a specific device and block
configure_flashpro_prg	Changes FlashPro programmer settings
configure_flashpro3_prg	Changes FlashPro 3 programmer settings
configure_flashpro4_prg	Changes FlashPro 4 programmer settings
configure_flashpro5_prg	Changes FlashPro 5 programmer settings
configure_flashproLite_prg	Changes FlashPro Lite programmer settings
connect_cable	Connects a parallel cable to a port
construct_chain_automatically	Automatically starts chain construction for the specified programmer
copy_device	Copies a device in the chain to the clipboard
cut_device	Removes one or more devices from the chain
dump_tcl_support	Unloads the list of supported FlashPro Tcl commands
enable_device	Enables or disables a device in the chain
enable_prg	Enables or disables one or more programmers
enable_prg_type	Enables or disables all programmers of a specified programmer type
enable_procedure	Enables/disables an optional procedure for an action
enable_serialization	Enables/disables serialization for a device

Command	Action
export_config	Exports a configuration file
export_script	Exports the history in a Tcl script
export_secured_pdb	Exports a single device secured PDB from the loaded PDB
export_single_1532	Exports a single device 1532 file
export_single_dat	Exports a single device DirectC data file
export_single_stapl	Exports a single device STAPL file
export_single_svf	Exports a single device SVF file
export_stapl	Exports the ChainBuilder STAPL file in chain programming mode
import_config	Imports a configuration file
new_project	Creates a new FlashPro project or convert an old ChainBuilder project into a new FlashPro project
open_project	Opens a FlashPro project
paste_device	Pastes the devices that are on the clipboard in the chain
ping_prg	Pings one or more programmers
read_analog_block_config	Reads analog block configuration information
read_device_status	Compares the memory client in a specific device and block
read_flash_memory	Reads information from the eNVM modules
read_flashrom	Reads the content of the FlashROM
read_id_code	Reads IDCode from the device without masking any IDCode fields
recover_flash_memory	Removes ECC2 errors due to memory corruption by reprogramming specified flash memory (NVM) pages
refresh_prg_list	Refreshes the programmer list
remove_device	Removes the device from the chain
remove_non_actel_device_to_database	Removes settings for non-Microsemi or non-Actel device from the device database
remove_prg	Removes the programmer from the programmer list
run_selected_actions	Runs the selected action on the specified programmer and returns the exit code from the action
sample_analog_channel	Samples the configured analog channel with the ADC parameters you provided

Command	Action
save_log	Saves the log file
save_project	Saves the FlashPro project
save_project_as	Saves the FlashPro project under a new project name
scan_chain_prq	Runs scan chain on a programmer
select_from_region_name	Enables you to select the serialization region you want to add to the log file
select_libero_design_device	Selects the Libero design device to resolve when there are two or more identical Libero design devices in the configured JTAG chain. This TCL command is for Libero usage only.
select_serial_range	Selects the serialization data
select_target_device	Sets the target device for programming in Single Device Programming mode
self_test_prq	Runs Self-Test on a programmer
set_bsdfile	Sets a BSDL file to a non-Actel device in the chain
set_chain_param	Sets the chain parameters in single programming mode
set_debug_device	Identifies the device you intend to debug
set_debug_programmer	Identifies the programmer you want to use for debugging (if you have more than one)
set_device_to_highz	Sets a disabled Microsemi or Actel device in Chain programming mode to HIGH-Z
set_device_ir	Sets the IR length of a non-Actel device in the chain
set_device_name	Changes the user name of a device in the chain
set_device_order	Sets the order of the devices in the chain to the order specified
set_device_tck	Sets the maximum TCK frequency of a non-Actel device in the chain
set_device_type	Changes the family of an Actel device in the chain
set_main_log_file	Sets the FlashPro log file
set_prq_name	Changes the user name of a programmer
set_programming_action	Selects the action for a device
set_programming_file	Sets the programming file for a device
set_programming_mode	Sets the programming mode
set_serialization_log_file	Sets the log file to be used for serialization

Command	Action
set_serialization_mode	Sets the serialization mode
update_programming_file	Updates the programming file with the selected parameters

Running Tcl Scripts from within FlashPro

Instead of running scripts from the command line, you can use FlashPro's Run Script dialog box to run a script.

To execute a Tcl script file within FlashPro:

1. From the **File** menu, choose **Run Script** to display the **Execute Script** dialog box.

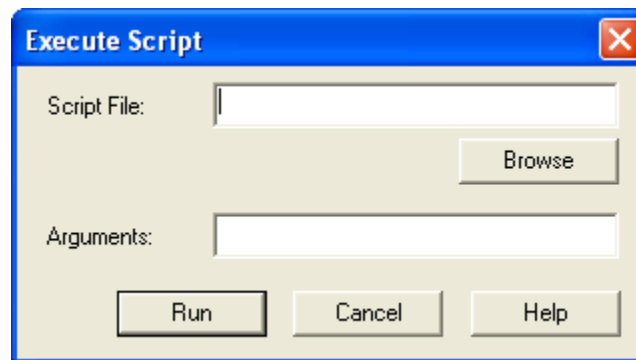


Figure 158 · Execute Script Dialog Box

2. Click **Browse** to display the **Open** dialog box, in which you can navigate to the folder containing the script file to open. When you click **Open**, FlashPro enters the full path and script filename into the Execute Script dialog box for you.
3. In the Arguments box, enter the arguments to pass to your Tcl script. Separate each argument by a space character. For information about accessing arguments passed to a Tcl script, see
4. Click **Run**.

Running Tcl Scripts from the Command Line

You can run Tcl scripts from your Windows command line.

To execute a Tcl script file in the FlashPro software from a shell command line:

1. At the prompt, type the path to the Microsemi software followed by the word "SCRIPT" and a colon, and then the name of the script file as follows:

```
<location of Microsemi software>/bin/flashpro.exe SCRIPT:<filename>
```

The example below executes in batch mode the script *foo.tcl*:

```
<location of Microsemi software>/bin/flashpro.exe script:foo.tcl
```

The example below executes in batch mode the script *foo.tcl* and exports the log in the file *foo.txt*:

```
<location of Microsemi software>/bin/flashpro.exe script:foo.tcl logfile:foo.txt
```

The example below executes in batch mode the script *foo.tcl*, creates a console where the log is displayed briefly, and exports the log in the file *foo.txt*:

```
<location of Microsemi software>/bin/flashpro.exe script:foo.tcl console_mode:brief logfile:foo.txt
```

If you leave `console_mode` unspecified or set it to 'hide' FlashPro executes without a console window. If you want to leave the console window open you can run the script with the `console_mode` parameter set to 'show', as in the following example:

```
<location of Microsemi software>/bin/flashpro.exe script:foo.tcl console_mode:show
logfile:foo.txt
```

2. If you want to pass arguments to the Tcl script from the command line, then use the "SCRIPT_ARGS" variable as follows:

```
<location of Microsemi software>/bin/flashpro.exe SCRIPT:<filename> SCRIPT_ARGS:"param1
param2 param3"
```

Arguments passed to a Tcl script can be accessed through the Tcl variables *argc* and *argv*. The example below demonstrates how a Tcl script accesses these arguments:

```
puts "Script name: $argv0"
puts "Number of arguments: $argc"
set i 0
foreach arg $argv {
    puts "Arg $i : $arg"
    incr i
}
```

Note: Script names can contain spaces if the script name is protected with double quotes:

```
flashpro.exe script:"flashpro tcl/foo 1.tcl"
```

Exporting Tcl Scripts from within FlashPro

To export a set of Tcl commands from the FlashPro history:

1. From the **File** menu, choose **Export > Export Script**.
2. Enter the filename and click **Save**. The Script Export Options dialog is appears (see image below).

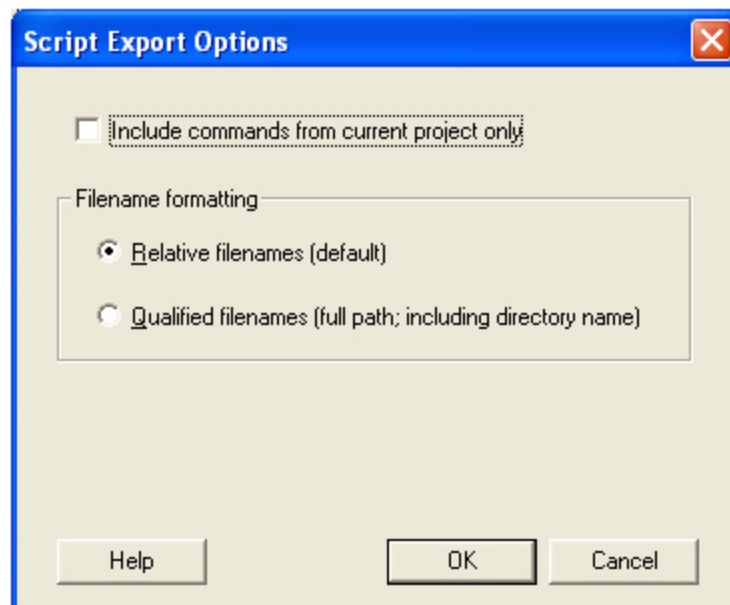


Figure 159 · Script Export Options Dialog Box

Check the **Include commands from current project only** to export commands of the current project only. You can specify the filename formatting by selecting **Relative filenames** (relative to the current directory) or **Qualified filenames** (absolute path, including the directory name).

4. Click **OK**.

add_actel_device

Adds an Actel device to the chain. Either the *file* or *device* parameter must be specified. Chain programming mode must have been set.

```
add_actel_device [-file {filename}] [-device {device}] -name {name} [-ukey {ukey_value}]
```

Arguments

Where:

-file{*filename*}

Specifies a programming filename.

-device{*device*}

Specifies the Actel device family(such as AFS600).

-name{*name*}

Specifies the device user name.

-ukey{*ukey_value*}

Optional (SmartFusion only) - Specifies the ukey value.

Supported Families

All

Exceptions

None

Example

```
add_actel_device -file {e:/design/stp/TOP.stp} -name {MyDevice1}
add_actel_device -device {A3P250} -name {MyDevice2}
```

add_non_actel_device

Adds a non-Actel device in the chain. Either the file, or (-tck And -ir) parameters must be specified. The Chain programming mode must have been set.

```
add_non_actel_device [-file {file}] [-ir {ir}] [-tck {tck}] [-name {name}]
```

Arguments

-file {*filename*}

Specifies a BSDL file.

-ir {*ir*}

Specifies the IR length.

-tck {*tck*}

Specifies the maximum TCK frequency (in MHz).

-name {*name*}

Specifies the device user name.

Supported Families

All

Exceptions

None

Examples

```
add_non_actel_device -file {e:/design/bsdl/DeviceX.bsd } -name {MyDevice3}
add_non_actel_device -ir 8 - tck 5 -name {MyDevice4}
```

add_non_actel_device_to_database

Imports settings via a BSDL file that adds non-Actel or non-Microsemi devices to the device database so that they are recognized during scan chain and auto-construction operations.

```
add_non_actel_device_to_database [-file {bsdl_filename}]
```

Arguments

-file {bsdl_filename}

Specifies the path to the BSDL file and the BSDL filename add to the database.

Supported Families

All non-Microsemi and non-Actel families

Exceptions

N/A

Examples

The following example uses a BSDL file to add a non-Microsemi (1502AS J44) device to the device database:

```
add_non_actel_device_to_database -file {c:/bsdl/atmel/1502AS_J44.bsd}
```

The following example uses a BSDL file to add a non-Microsemi (80200) device to the device database:

```
add_non_actel_device_to_database -file {c:/bsdl/intel/80200_v1.0.bsd}
```

check_flash_memory

The command performs diagnostics of the page status and data information as follows:

- Page Status – includes ECC2 check of the page status information, write count
- Page Data - ECC2 check

```
check_flash_memory
[-name {device_name}]
[-block {integer_value}]
[-client {client_name}]
[-startpage {integer_value}]
[-endpage {integer_value}]
[-access {all / status / data}]
[-show {summary / pages}]
[-file {filename}]
```

At a minimum you must specify -client <name> OR

-startpage <page_number> -endpage <page_number> -block <number>

Arguments

-name {device_name}

Optional user-defined device name. The device name is not required if there is only one device in the current configuration, or a device has already been selected using the [set_debug_device](#) command.

`-block {integer_value}`

(Optional argument; you must set `-client` or `-startpage`, `-endpage` and `-block` before use.) Specifies location of block for memory check.

`-client {client_name}`

Name of client for memory check.

`-startpage {integer_value}`

Startpage for page range; value must be an integer. You must specify a `-endpage` and `-block` along with this argument.

`-endpage {integer_value}`

Endpage for page range; value must be an integer. You must specify a `-startpage` and `-block` along with this argument.

`-access {all / status / data}`

(Optional argument; you must set `-client` or `-startpage`, `-endpage` and `-block` before use.) Specifies what NVM information to check: page status, data or both.

Value	Description
all	Shows the number of pages with corruption status, data corruption and out-of-range write count (default)
status	Shows the number of pages with corruption status and the number of pages with out-of-range write count
data	Shows only the number of pages with data corruption

`-show {summary / pages}`

(Optional argument; you must set `-client` or `-startpage`, `-endpage` and `-block` before use.) Specifies output level, as explained in the table below.

Value	Description
summary	Displays the summary for all checked pages (default)
pages	Displays the check results for each checked page

`-file {filename}`

(Optional argument; you must set `-client` or `-startpage`, `-endpage` and `-block` before use.) Name of output file for memory check.

Supported Families

SmartFusion, Fusion

Exceptions

None

Example

The following command checks the page status for block 0 from startpage 0 to endpage 2:

```
check_flash_memory -startpage 0 -endpage 2 -block 0
```

The following command checks the memory status for the client 'DS8bit' and saves it to the file 'checkFlashMemory.log':


```
check_flash_memory -client {DS8bit} -file {checkFlashMemory.log}
```

close_project

Closes the FlashPro or FlashPro Express project.

```
close_project
```

Arguments

None

Supported Families

All

Exceptions

None

Example

```
close_project
```

compare_analog_config

Compares the content of the analog block configurations in your design against the actual values in the device. In a typical SoC project, this directory is located at <project_root>/smartgen/<analog_block_core_name>.

```
compare_analog_config
[-name "device_name"] -mem_file_dir "mem_file_directory"
[-file "filename"]
```

Arguments

-name {*device_name*}

Optional user-defined device name. The device name is not required if there is only one device in the current configuration, or a device has already been selected using the [set_debug_device](#) command.

-mem_file_dir {*mem_file_directory*}

Location of memory file.

-file {*filename*}

Output filename.

Supported Families

Fusion

Exceptions

None

Example

The following command reads the analog block configuration in the directory F:/tmp/Analog_Block and saves the data in the logfile compare_analogReport.log:

```
compare_analog_config -mem_file_dir {F:/tmp/Analog_Block} -file
{compare_analogReport.log}
```

The following command reads the analog block configuration information in the device 'AFS600' in the directory F:/tmp/Analog_Block and saves the data in the log file compare_analogReport.log:

```
compare_analog_config -name {AFS600} -mem_file_dir {F:/tmp/Analog_Block} -file {compare_analogReport.log}
```

compare_flashrom_client

Compares the content of the FlashROM configurations in your design against the actual values in the selected device.

```
compare_flashrom_client [-name {device_name}] [-file {filename}]
```

Arguments

-name {*device_name*}

Optional user-defined device name. The device name is not required if there is only one device in the current configuration, or a device has already been selected using the [set_debug_device](#) command.

-file {*filename*}

Optional file name for FlashROM compare log.

Supported Families

SmartFusion, IGLOO, ProASIC3 and Fusion

Exceptions

None

Example

The following command saves the FlashROM data to the file 'FlashRomCompReport.log':

```
compare_flashrom_client -file {FlashRomCompReport.log}
```

The following command compares the data in the device 'A3P250' and saves the data in the logfile 'FlashRomCompReport.log':

```
compare_flashrom_client -name {A3P250} -file {FlashRomCompReport.log}
```

compare_memory_client

Compares the memory client in a specific device and block.

```
compare_memory_client [-name {device_name}] [-block integer_value] -client {client_name} [-file {filename}]
```

Arguments

-name { *device_name* }

Optional user-defined device name. The device name is not required if there is only one device in the current configuration, or a device has already been selected using the [set_debug_device](#) command.

-block {*integer_value*}

(Optional argument; you must set -client.) Specifies location of block for memory compare.

-client {*client_name*}

Name of client for memory compare.

-file {*filename*}

Optional file name.

Supported Families

SmartFusion and Fusion

Exceptions

None

Example

The following command compares the memory in the client 'DS32' on the device 'AFS600'.

```
compare_memory_client -client DS32 -name AFS600
```

The following command compares the data at block '0' to the client 'DS8bit':

```
compare_memory_client -block 0 -client {DS8bit}
```

The following command compares the memory in the device 'AFS600' at block '0' to the memory client 'DS8bit':

```
compare_memory_client -name {AFS600} -block 0 -client {DS8bit}
```

The following command compares the memory at block '1' to the memory client 'DS8bit' and saves the information in a log file to F:/tmp/NVMCompReport.log:

```
compare_memory_client -block 1 -client {DS8bit} -file {F:/tmp/NVMCompReport.log}
```

configure_flashpro_prg

Changes FlashPro programmer settings.

```
configure_flashpro_prg [-vpp {ON|OFF}] [-vpn {ON|OFF}] [-vddl {ON|OFF}] [-force_vddp {ON|OFF}] [-vddp {2.5|3.3}] [-drive_trst {ON|OFF}] [-force_freq {ON|OFF}] [-freq {freq}]
```

Arguments

-vpp {ON|OFF}

Enables FlashPro programmer to drive VPP. Set to ON to drive VPP.

-vpn {ON|OFF}

Enables FlashPro programmer to drive VPN; set to ON to drive VPN.

-vddl {ON|OFF}

Enables FlashPro programmer to drive VDDL; set to ON to drive VDDL.

-force_vddp {ON|OFF}

Enables FlashPro programmer to drive VDDP; set to ON to drive VDDP.

-vddp {2.5|3.3}

Sets VDDP to 2.5 or 3.3 volts.

-drive_trst {ON|OFF}

Enables FlashPro programmer to drive TRST; set to ON to drive TRST.

-force_freq {ON|OFF}

Forces the FlashPro software to use the TCK frequency specified by the software rather than the TCK frequency specified in the programmer file.

-freq {freq}

Specifies the TCK frequency in MHz.

Supported Families

ProASIC^{PLUS}, ProASIC

Exceptions

None

Example

The following example enables the FlashPro programmer to drive the VPP, VPN, VDDL, VDDP, sets the drive voltage to 3.3v, disables the driver for TRST, and does not force the programmer to use the TCK frequency specified in the software.

```
configure_flashpro_prg -vpp {ON} -vpn {ON} -vddl {ON} -force_vddp {ON} -vddp {3.3} -
drive_trst {OFF} -force_freq {OFF}
```

configure_flashpro3_prg

Changes FlashPro3 programmer settings.

```
configure_flashpro3_prg [-vpump {ON|OFF}] [-clk_mode {discrete_clk|free_running_clk}] [-
force_freq {ON|OFF}] [-freq {freq}]
```

Arguments

-vpump {ON|OFF}

Enables FlashPro programmer to drive VPUMP. Set to ON to drive VPUMP.

-clk_mode {discrete_clk|free_running_clk}

Specifies free running or discrete TCK.

-force_freq {ON|OFF}

Forces the FlashPro software to use the TCK frequency specified by the software rather than the TCK frequency specified in the programmer file.

-freq {freq}

Specifies the TCK frequency in MHz.

Supported Families

SmartFusion, IGLOO, ProASIC3 and Fusion

Exceptions

None

Example

The following example sets the VPUMP option to ON, TCK to free running, and uses the TCK frequency specified in the programmer file (force_freq is set to OFF):

```
configure_flashpro3_prg -vpump {ON} -clk_mode {free_running_clk} -force_freq {OFF} -freq
{4}
```

The following example sets VPUMP to ON, TCK to discrete, forces the FlashPro software to use the TCK frequency specified in the software (-force_freq is set to ON) at a frequency of 2 MHz.

```
configure_flashpro3_prg -vpump {ON} -clk_mode {discrete_clk} -force_freq {ON} -freq {2}
```

configure_flashpro4_prg

Changes FlashPro4 programmer settings.

```
configure_flashpro4_prg [-vpump {ON|OFF}] [-clk_mode {discrete_clk|free_running_clk}] [-
force_freq {ON|OFF}] [-freq {freq}]
```

Arguments

-vpump {ON|OFF}

Enables FlashPro4 programmer to drive VPUMP. Set to ON to drive VPUMP.

-clk_mode {discrete_clk|free_running_clk}

Specifies free running or discrete TCK.

`-force_freq {ON|OFF}`

Forces the FlashPro software to use the TCK frequency specified by the software rather than the TCK frequency specified in the programmer file.

`-freq {freq}`

Specifies the TCK frequency in MHz.

Supported Families

SmartFusion, IGLOO, ProASIC3 and Fusion

Exceptions

None

Example

The following example sets the VPUMP option to ON and uses a free running TCK at a frequency of 4 MHz (force_freq is set to OFF).

```
configure_flashpro4_prg -vpump {ON} -clk_mode {free_running_clk} -force_freq {OFF} -freq {4}
```

The following example sets the VPUMP option to ON, uses a discrete TCK and sets force_freq to ON at 2 MHz.

```
configure_flashpro4_prg -vpump {ON} -clk_mode {discrete_clk} -force_freq {ON} -freq {2}
```

configure_flashpro5_prg

Tcl command; changes FlashPro5 programmer settings.

```
configure_flashpro5_prg [-vpump {ON/OFF}] [-clk_mode {free_running_clk}]
[-force_freq {ON/OFF}] [-freq {freq}]
```

Arguments

`-vpump {ON|OFF}`

Enables FlashPro5 programmer to drive VPUMP. Set to ON to drive VPUMP. Default is ON.

`-clk_mode {free_running_clk}`

Specifies free running TCK. Default is free_running_clk.

`-force_freq {ON|OFF}`

Forces the FlashPro software to use the TCK frequency specified by the software rather than the TCK frequency specified in the programmer file. Default is OFF.

`-freq {freq}`

Specifies the TCK frequency in MHz. Default is 4.

Supported Families

RT ProASIC3, SmartFusion, IGLOO, ProASIC3, Fusion, SmartFusion2, IGLOO2, RTG4, PolarFire

Exceptions

None

Example

The following example sets the VPUMP option to ON and uses a free running TCK at a frequency of 4 MHz (force_freq is set to OFF).

```
configure_flashpro5_prg -vpump {ON} -clk_mode {free_running_clk} -force_freq {OFF} -freq {4}
```

The following example sets the VPUMP option to ON, uses a free running TCK and sets force_freq to ON at 2 MHz.

```
configure_flashpro5_prg -vpump {ON} -clk_mode {free_running_clk} -force_freq {ON} -freq {2}
```

configure_flashproLite_prg

Changes FlashPro Lite programmer settings.

```
configure_flashproLite_prg [-vpp {ON|OFF}] [-vpn {ON|OFF}] [-drive_trst {ON|OFF}] [-force_freq {ON|OFF}] [-freq {freq}]
```

Arguments

-vpp {ON|OFF}

Enables FlashPro programmer to drive VPP. Set to ON to drive VPP.

-vpn {ON|OFF}

Enables FlashPro programmer to drive VPN; set to ON to drive VPN.

-drive_trst {ON|OFF}

Enables FlashPro programmer to drive TRST; set to ON to drive TRST.

-force_freq {ON|OFF}

Forces the FlashPro software to use the TCK frequency specified by the software rather than the TCK frequency specified in the programmer file.

-freq {freq}

Specifies the TCK frequency in MHz.

Supported Families

ProASIC^{PLUS}

Exceptions

None

Example

The following example sets the programmer to drive the VPP, drive VPN, drive the TRST and uses the frequency set by the programmer file (sets force_freq to OFF):

```
configure_flashprolite_prg -vpp {ON} -vpn {ON} -drive_trst {ON} -force_freq {OFF}
```

connect_cable

Connects a parallel cable to a port.

```
connect_cable -cable_name {cable_name} -port_name {port_name} [-drive_trst {ON|OFF}]
```

Arguments

-cable_name {cable_name}

Identifies the name of the parallel port cable you wish to connect.

-port_name {port_name}

Specifies the parallel port where the parallel programmer is connected.

`-drive_trst {ON|OFF}`

Enables the parallel port cable to drive TRST.

Supported Families

All

Exceptions

None

Example

The following example connects the cable named `Parallel_Port_Buffer_Cable` to the port `LPT1` and enables drive TRST:

```
connect_cable -cable_name {Parallel_Port_Buffer_Cable} -port_name {Lpt1} -drive_trst {ON}
```

construct_chain_automatically

Automatically starts chain construction for the specified programmer.

```
construct_chain_automatically[(-name {name})+]
```

Arguments

`-name {name}`

Specifies the programmer(s) name(s).

Supported Families

All

Exceptions

N/A

Example

Example for one programmer:

```
construct_chain_automatically -name {21428}
```

Example for two programmers:

```
construct_chain_automatically -name {21428} -name {00579}
```

copy_device

Copies a device in the chain to the clipboard. Chain programming mode must be set. See the [paste_device command](#) for more information.

```
copy_device (-name {name})*
```

Arguments

`-name {name}`

Specifies the device name. Repeat this argument to copy multiple devices.

Supported Families

All

Exceptions

None

Example

The example copies the device 'mydevice1' to the same location with a new name 'mydevice2'.

```
copy_device -name {MyDevice1} -name {MyDevice2}
```

cut_device

Removes one or more devices from the chain. It places the removed device in the clipboard. Chain programming mode must be set to use this command. See the [paste_device](#) command for more information.

```
cut_device (-name {name}) *
```

Arguments

-name {*name*}

Specifies the device name. You can repeat this argument for multiple devices.

Supported Families

All

Exceptions

None

Example

The following example removes the devices 'mydevice1' and 'mydevice2' from the chain.

```
cut_device -name {MyDevice1} -name {MyDevice2}
```

dump_tcl_support

Unloads the list of supported FlashPro or FlashPro Express Tcl commands.

```
dump_tcl_support -file {file}
```

Arguments

-file {*file*}

Supported Families

All

Exceptions

None

Example

The following example dumps your Tcl commands into the file 'tcldump.tcl'

```
dump_tcl_support -file {tcldump.tcl}
```

enable_device

Enables or disables a device in the chain (if the device is disabled, it is bypassed). Chain programming mode must be set. The device must be a Microsemi device.

```
enable_device -name {name} -enable {TRUE|FALSE}
```

Arguments

-name {*name*}

Specifies your device name

-enable {TRUE|FALSE}

Specifies whether the device is to be enabled or disabled. If you specify multiple devices, this argument applies to all specified devices. (TRUE = enable. FALSE = disable)

Supported Families

All

Exceptions

None

Example

The following example disables the device 'mydevice1' in the chain.

```
enable_device -name {MyDevice1} -enable {FALSE}
```

enable_prg

Enables or disables one or more programmers.

```
enable_prg (-name {name})* -enable {TRUE|FALSE}
```

Arguments

-name {*name*}*

Specifies the programmer name. You can repeat this argument for multiple programmers.

-enable {TRUE|FALSE}

Specifies whether the programmer is to be enabled or disabled. If you specify multiple programmers, this argument applies to all of them (TRUE = enable. FALSE = disable).

Supported Families

All

Exceptions

None

Example

The following example enables the programmers 'FP300085' and 'FP300086'.

```
enable_prg -name {FP300085} -name {FP300086} -enable {TRUE}
```

enable_prg_type

Enables or disables all programmers of a specified programmer type.

```
enable_prg_type -prg_type {prg_type} -enable { TRUE | FALSE }
```

Arguments

```
-prgType { FP | FPLite | FP3 | PP }
```

Specifies the programmer type to be enabled/disabled (FP–FlashPro type programmers, FPLite–FlashPro Lite type programmers, FP3–FlashPro3 type programmers, PP–Parallel port cable type programmers).

```
-enable {TRUE|FALSE}
```

Specifies whether the programmers are to be enabled or disabled (TRUE–enable, FALSE–disable).

Supported Families

All

Exceptions

None

Example

The following example enables the FlashPro3 programmer.

```
enable_prog_type -prg_type{FP3} -enable{TRUE}
```

enable_procedure

To enable/disable an optional procedure of an action. The device name parameter must be specified only in chain programming mode. A programming file must have been loaded.

```
enable_procedure [-name {name}] -action {action} -procedure {procedure} -enable  
{TRUE|FALSE}
```

Arguments

```
-name {name}
```

```
-action {action}
```

```
-procedure {procedure}
```

```
-enable {TRUE|FALSE}
```

Supported Families

All

Exceptions

None

Example

In single programming mode:

```
enable_procedure -action {PROGRAM} -procedure {DO_ERASE} -enable {TRUE}
```

In chain programming mode:

```
enable_serialization -name {MyDevice2} -action {PROGRAM} -procedure {DO_ERASE} -enable  
{FALSE}
```

enable_serialization

This Tcl command enables or disables serialization programming.

```
enable_serialization -name {device_name} -enable {true/false}
```

Arguments

-name

Specifies the device name.

-enable

Enables (true) or disables (false) serialization programming.

Exceptions

Must be a Microsemi Device

Supported Families

Fusion, ProASIC3, IGLOO, SmartFusion, SmartFusion2, IGLOO2

Note: Serialization Commands are not supported for PolarFire

Example

```
enable_serialization -name M2S/M2GL050{T|S|TS} -enable true
```

export_chain_stapl

Exports the ChainBuilder STAPL file in chain programming mode.

```
export_chain_stapl -file {file}
```

Arguments

-file {*file*}

Specifies the file to be exported.

Supported Families

All

Exceptions

None

Example

The following example exports the STAPL file 'tcl_testing_chain.stp':

```
-export_chain_stapl -file {./tcl_testing_chain.stp}
```

export_chain_svdf

Tcl command; FlashPro only.

```
export_chain_svdf -file [path to svf folder] [-tck {double-value}]
```

Arguments

-file

Required. SVF folder name will be name_svf.

Example: If the SVF file name is top.svf, folder top_svf will be created, which will contain the individual SVF files per PROGRAMMING action.

-tck

Optional. This is the TCK used in the exported SVF files. This value needs to be specified in MHz. The default is 4.00 MHz.

Supported Families

SmartFusion, IGLOO, ProASIC3, and Fusion

Example

```
export_chain_svf -file {d:\66316\top.svf} -tck {6.25}
```

export_config

Exports a configuration file.

```
export_config -file {file}
```

Arguments

-file {file}

Specifies the file to export.

Supported Families

All

Exceptions

None

Example

The following example exports the configuration file 'myconfig1'

```
export_config -file {myconfig1}
```

export_secured_pdb

Exports a single device secured PDB from the loaded PDB.

```
export_secured_pdb -file {file} [-name {name}]
```

Arguments

-file {file}

Specifies the file to export.

-name {name}

Specifies the name of the device in chain mode to export a single device currently secured PDB.

Supported Families

SmartFusion, Fusion

Exceptions

'-secured' is only supported for SmartFusion devices.

Example

In single mode, the following command exports the secured PDB 'my_design.pdb':

```
export_secured_pdb -file {D:/TOP/my_design.pdb}
```

In chain mode, the following example exports the secured PDB 'my_design.pdb' from the A2F200M3F device in the chain:

```
export_secured_pdb -name {A2F200M3F} -file {./my_design.pdb}
```

export_script

Exports the history in a Tcl script.

```
export_script -file {file} -relative_path {TRUE|FALSE}
```

Arguments

-file {file}

Specifies the file to export.

-relative_path {TRUE|FALSE}

Specifies whether the file path must be exported as a relative path or an absolute path.

Supported Families

All

Exceptions

None

Example

The following example exports your Tcl history to the file 'history.tcl' with absolute pathnames.

```
export_script -file {./history.tcl} -relative_path {FALSE}
```

export_single_1532

Exports a single device IEEE 1532 file.

```
export_single_1532 -file {file} [-name {name}] [-pdb {pdb_file}] [-secured]
```

Arguments

-file {file}

Specifies the file to export.

-name {name}

Specifies the name of the device in chain mode to export single device IEEE 1532 programming file.

-pdb {pdb_file}

Specifies the PDB to use for exporting a IEEE 1532 programming file. By default, the loaded PDB is used for exporting a IEEE 1532 programming file.

-secured

Exports a IEEE 1532 programming file for a secured device.

Supported Families

SmartFusion, IGLOO, ProASIC3 and Fusion

Exceptions

'-secured' is only supported for SmartFusion devices.

Example

Single Mode, exports the secured IEEE 1532 files 'my_design.isc' and 'my_design.bsd' into folder 'D:/TOP/my_design_1532' using the PDB 'my_design.pdb':

```
export_single_1532 -file {D:/TOP/my_design_1532} -pdb {D:/TOP/my_design.pdb} -secured
```

Chain Mode example exports secured IEEE 1532 files 'my_design.isc' and 'my_design.bsd' into folder 'D:/TOP/my_design_1532' from a device in the chain named 'A2F200M3F' using the PDB 'my_design.pdb':

```
export_single_1532 -name {A2F200M3F} -file {./my_design_1532} -pdb {./my_design.pdb} -secured
```

export_single_dat

Exports a single device DirectC data file.

```
export_single_dat -file {file} [-name {name}] [-pdb {pdb_file}] [-secured]
```

Arguments

-file {file}

Specifies the name of the file you are exporting.

-name {name}

Specifies the name of the device in chain mode to export a single device DirectC data file.

-pdb {pdb_file}

Specifies the PDB to use for exporting a DirectC data file. By default, the loaded PDB will be used for exporting a DirectC data file.

-secured

Use this argument to export a secured DirectC data file.

Supported Families

SmartFusion, IGLOO, ProASIC3 and Fusion

Exceptions

'-secured' is only supported for SmartFusion devices.

Example

Single Mode, exports a secured DirectC DAT file 'my_design.dat' using the PDB file 'my_design.pdb':

```
export_single_dat -file {D:/TOP/my_design.dat} -pdb {D:/TOP/my_design.pdb} -secured
```

Chain Mode, exports a secured DirectC DAT file 'my_design.dat' from a device in the chain named 'A2F200M3F', using the PDB 'my_design.pdb':

```
export_single_dat -name {A2F200M3F} -file {./my_design.dat} -pdb {./my_design.pdb} -secured
```

export_single_stapl

Exports a single device STAPL file or single device chain STAPL file.

```
export_single_stapl -file {file} [-name {name}] [-pdb {pdb_file}] [-secured] [-chain]
```

Arguments

-file {file}

Specifies the file to export.

-name {name}

Specifies the name of the device in chain mode to export a single device STAPL or single device chain STAPL file.

-pdb {pdb_file}

Specifies the PDB to use for exporting a STAPL file. By default, the loaded PDB is used for exporting a STAPL file.

-secured

Exports a secured STAPL file.

-chain

Indicates that you want to export a single device chain STAPL file.

Note: This parameter is only supported for SmartFusion2, IGLOO2, and RTG4 families.

Supported Families

SmartFusion2, IGLOO2, RTG4, SmartFusion, IGLOO, ProASIC3 and Fusion

Exceptions

None

Example

Single Mode example exports the secured file 'my_design.stp' using the PDB 'my_design.pdb':

```
export_single_stapl -file {D:/TOP/my_design.stp} -pdb {D:/TOP/my_design.pdb} -secured
```

Chain Mode example exports secured STAPL file 'my_design.stp' from device 'A2F200M3F' using the PDB 'my_design.pdb':

```
export_single_stapl -name {A2F200M3F} -file {./my_design.stp} -pdb {./my_design.pdb} -secured
```

export_single_svf

Exports a single device SVF programming file.

```
export_single_svf -file {file} [-name {name}] [-pdb {pdb_file}] [-secured]
```

Arguments

-file {file}

Specifies the file to export.

-name {name}

Specifies the name of the device in chain mode to export a single device SVF programming file.

-pdb {pdb_file}

Specifies the PDB to use for exporting a SVF programming file. By default, the loaded PDB is used for exporting a SVF programming file.

-secured

Exports a SVF programming file for a secured device.

Supported Families

SmartFusion, IGLOO, ProASIC3 and Fusion

Exceptions

'-secured' is only supported for SmartFusion devices.

Example

Single Mode, exports the secured SVF files for each programming ACTION with the following format 'my_design_ACTION.svf' into folder 'D:/TOP/my_design_SVF' using the PDB 'my_design.pdb':

```
export_single_SVF -file {D:/TOP/my_design_SVF} -pdb {D:/TOP/my_design.pdb} -secured
```

Chain Mode example exports secured SVF files for each programming ACTION with the following format 'my_design_ACTION.svf' into folder 'D:/TOP/my_design_SVF' from a device in the chain named 'A2F200M3F' using the PDB 'my_design.pdb':

```
export_single_SVF -name {A2F200M3F} -file {./my_design_SVF} -pdb {./my_design.pdb} -secured
```

export_spi_directory

Tcl command; exports the SPI directory that contains address and design version information for the Golden and Update SPI images.

```
export_spi_directory [-golden_ver {decimal}] [-golden_addr {hex}] [-update_ver {decimal}] [-update_addr {hex}] -file {file}
```

Arguments

-golden_ver {decimal}

Specifies Golden SPI Image design version where *decimal* is a decimal value and less than 65536 (exclusive).

-golden_addr {hex}

Specifies Golden SPI Image address where *hex* is 32-bit hexadecimal value with prefix 0x/0X.

-update_ver {decimal}

Specifies Update SPI Image design version where *decimal* is a decimal value and less than 65536 (exclusive).

-update_addr {hex}

Specifies Update SPI Image address where *hex* is a 32-bit hexadecimal value with prefix 0x/0X.

-file {file}

Mandatory argument; specifies the file export location.

Supported Families

SmartFusion2, IGLOO2

Examples

Both golden* options go together. The same is true for both update* options.; the file argument is required:

```
export_spi_directory -golden_ver {23} -golden_addr {0x40001234} -file {D:\flashpro_files\m2s090t_spi_1\designer\m2s090t_spi_1_MSS\export\m2s090t_spi_1_MSS1.spi Dir}
```

```
export_spi_directory -update_ver {8} -update_addr {0x2000abcd} -file {D:\flashpro_files\m2s090t_spi_1\designer\m2s090t_spi_1_MSS\export\m2s090t_spi_1_MSS2.spi Dir}
```

```
export_spi_directory -golden_ver {23} -golden_addr {0x40001234} -update_ver {8} -update_addr {0x2000abcd} -file
```



```
{D:\flashpro_files\m2s090t_spi_1\designer\m2s090t_spi_1_MSS\export\m2s090t_spi_1_MSS3.spi  
Dir}
```

import_config

Imports a configuration file.

```
import_config -file {file}
```

Arguments

-file {*file*}

Specifies the file to import.

Supported Families

All

Exceptions

None

Example

The following example imports the configuration file 'my_config1.ufc':

```
import_config -file {my_config1.ufc'}
```

new_project

Creates a new FlashPro project or convert an old ChainBuilder project into a new FlashPro project (the mode parameter must be 'chain' in this case).

```
new_project -name {name} -location {location} -mode {single|chain} [-convert_chb  
{convert_chb}]
```

Arguments

-name {*name*}

Specifies the project name.

-location {*location*}

Specifies the project location.

-mode {single|chain}

Specifies programming mode; either single or chain.

-convert_chb {*convert_chb*}

An optional argument that specifies the ChainBuilder project to be converted.

Supported Families

All

Exceptions

None

Example

Create a new FlashPro single device project named 'FPPrj1' in a directory with the name 'FPProject1':

```
new_project -name {FPPrj1} -location {./FPProject1} -mode {single}
```

Create a new FlashPro project named 'FPPrjChb' in the directory 'ChbProject1'; converts the ChainBuilder project 'prj1.chb' project to FlashPro.

```
new_project -name {FPPrjChb} -location {./ChbProject1} -mode {chain} -convert_chb  
{./chb_prj/prj1.chb}
```

open_project

Opens a FlashPro or FlashPro Express project.

```
open_project -project {project}
```

Arguments

-project {*project*}

Specifies the location and name of the project you wish to open.

Supported Families

All

Exceptions

None

Example

Opens the 'FPPrj1.pro' project from the FPProject1 directory

```
open_project -project {./FPProject1/FPPrj1.pro}
```

paste_device

Pastes the devices that are on the clipboard in the chain, immediately above the *position_name* device, if this parameter is specified. Otherwise it places the devices at the end of the chain. The chain programming mode must be enabled.

```
paste_device [-position_name {position_name}]
```

Arguments

-position_name {*position_name*}

Optional argument that specifies the name of a device in the chain.

Supported Families

All

Exceptions

None

Examples

The following example pastes the devices on the clipboard immediately above the device 'mydevice3' in the chain.

```
paste_device -position_name {MyDevice3}
```

ping_prg

Pings one or more programmers.

```
ping_prg (-name {name})*
```

Arguments

-name {*name*}

Specifies the programmer to be pinged. Repeat this argument for multiple programmers.

Supported Families

All

Exceptions

None

Example

The following example pings the programmers 'FP300085' and 'FP30086'.

```
ping_prg -name {FP300085} -name {FP300086}
```

read_analog_block_config

Reads each channel configuration on your analog system, enabling you to identify if/how each channel is configured.

```
read_analog_block_config [-name {device_name}] [-file {filename}]
```

Arguments

-name {*device_name*}

Optional user-defined device name. The device name is not required if there is only one device in the current configuration, or a device has already been selected using the [set_debug_device](#) command.

-file {*filename*}

(Optional) Identifies the name of the file to which read results will be saved.

Supported Families

Fusion

Exceptions

None

Example

The following command reads the analog block configuration information in the device 'AFS600':

```
read_analog_block_config -name {AFS600}
```

read_device_status

Displays the Device Information report; the Device Information report is a complete summary of your device state, analog block test values, user information, factory serial number and security information..

```
read_device_status [-name {device_name}] [-file {filename}]
```

Arguments

-name *device_name*

Optional user-defined device name. The device name is not required if there is only one device in the current configuration, or a device has already been selected using the [set_debug_device](#) command.

-file {*filename*}

(Optional) Identifies the name of the file to which read results will be saved.

Supported Families

SmartFusion, IGLOO, ProASIC3 and Fusion

Exceptions

None

Example

The following reads device info from the 'AFS600' device.

```
read_device_status -name AFS600
```

read_flash_memory

The command reads information from the NVM modules. There are two types of information that can be read:

- Page Status – includes ECC2 status, write count, access protection
- Page Data

```
read_flash_memory
[-name {device_name}]
[-block {integer_value}]
[-client {client_name}]
[-startpage {integer_value}]
[-endpage {integer_value}]
[-access {all / status / data}]
[-file {filename}]
```

At a minimum you must specify -client *<name>* OR

-startpage *<page_number>* -endpage *<page_number>* -block *<number>*

Arguments

-name {*device_name*}

Optional user-defined device name. The device name is not required if there is only one device in the current configuration, or a device has already been selected using the [set_debug_device](#) command.

-block {*integer_value*}

(Optional argument; you must set -client or -startpage and -endpage before use.) Specifies location of block for memory read.

-client {*client_name*}

Name of client for memory read.

`-startpage {integer_value}`

Startpage for page range; value must be an integer. You must specify a `-endpage` and `-block` along with this argument.

`-endpage {integer_value}`

Endpage for page range; value must be an integer. You must specify a `-startpage` and `-block` along with this argument.

`-access {all / status / data}`

(Optional argument; you must set `-client` or `-startpage`, `-endpage` and `-block` before use.) Specifies what eNVM information to check: page status, data or both.

Value	Description
all	Shows the number of pages with corruption status, data corruption and out-of-range write count (default)
status	Shows the number of pages with corruption status and the number of pages with out-of-range write count
data	Shows only the number of pages with data corruption

`-file {filename}`

(Optional argument; you must set `-client` or `-startpage`, `-endpage` and `-block` before use.) Name of output file for memory read.

Supported Families

SmartFusion, Fusion

Exceptions

None

Example

The following command reads the flash memory for the client 'DS8bit' and reports the data in a logfile 'readFlashMemoryReport.log':

```
read_flash_memory -client {DS8bit} -file {readFlashMemoryReport.log}
read_flash_memory -startpage 0 -endpage 2 -block 0 -access {data}
```

read_flashrom

Reads the content of the FlashROM from the selected device.

```
read_flashrom [-name {device_name}] [-mapping {logical / physical}] [-file {filename}]
```

Arguments

`-name device_name`

Optional user-defined device name. The device name is not required if there is only one device in the current configuration, or a device has already been selected using the [set_debug_device](#) command.

`-mapping {logical / physical}`

(Optional) Specifies how the data read from the UFROM is mapped. Values are explained in the table below.

Value	Description
logical	Logical mapping (default)
physical	Physical mapping

-file {*filename*}

(Optional) Identifies the name of the file to which read results will be saved.

Supported Families

SmartFusion, IGLOO, ProASIC3 and Fusion

Exceptions

None

Example

The following reads the FROM content on the device 'AFS600' and sets to physical mapping:

```
read_flashrom -name {AFS600} -mapping {physical}
```

read_id_code

The command reads IDCode from the device without masking any IDCode fields. This is the raw IDcode from the silicon.

Note: Being able to read the IDCode is an indication that the JTAG interface is working correctly.

```
read_id_code [-name {device_name}]
```

Arguments

-name *device_name*

Optional user-defined device name. The device name is not required if there is only one device in the current configuration, or a device has already been selected using the [set_debug_device](#) command.

Supported Families

SmartFusion, IGLOO, ProASIC3 and Fusion

Exceptions

None

Example

The following command reads the IDCODE from the device 'AFS600':

```
read_id_code -name {AFS600}
```

recover_flash_memory

The command removes ECC2 errors due to memory corruption by reprogramming specified flash memory (NVM) pages and initializing all pages to zeros. The recovery affects data blocks and auxiliary blocks.

The write counters of the corrupted pages might not be accurate due to corruption. The recovery operation will not change state of the page write counters.

Use the `check_flash_memory` command to detect flash memory errors.

```
recover_flash_memory
[-name {device_name}]
[-block {integer_value}]
[-client {client_name}]
[-startpage {integer_value}]
[-endpage {integer_value}]
```

At a minimum you must specify `-client <name>` OR

`-startpage <page_number> -endpage <page_number> -block <number>`

Arguments

`-name {device_name}`

Optional user-defined device name. The device name is not required if there is only one device in the current configuration, or a device has already been selected using the [set_debug_device](#) command.

`-block {integer_value}`

(Optional argument; you must set `-client` or `-startpage` and `-endpage` before use.) Specifies location of block for memory recovery.

`-client {client_name}`

Name of client for memory recovery.

`-startpage {integer_value}`

Startpage for page range; value must be an integer. You must specify a `-endpage` and `-block` along with this argument.

`-endpage {integer_value}`

Endpage for page range; value must be an integer. You must specify a `-startpage` and `-block` along with this argument.

Supported Families

SmartFusion, Fusion

Exceptions

None

Example

The following command recovers flash memory data in the client 'DS8bit':

```
recover_flash_memory -client {DS8bit}
```

The following command recovers flash memory from block 0, startpage 0, and endpage 3:

```
recover_flash_memory -block 0 -startpage 0 -endpage 3
```

refresh_prg_list

Refreshes the programmer list. This is most often used to have FlashPro or FlashPro Express detect a programmer that you have just connected.

```
refresh_prg_list
```

Arguments

None

Supported Families

All

Exceptions

None

Example

```
refresh_prg_list
```

remove_device

Removes the device from the chain. Chain programming mode must be set.

```
remove_device (-name {name})*
```

Arguments

-name {*name*}

Specifies the device name. You can repeat this argument for multiple devices.

Supported Families

All

Exceptions

None

Example

Remove a device 'A3P250' from the chain:

```
remove_device (-name {A3P250})*
```

remove_non_actel_device_from_database

Removes settings for non-Microsemi or non-Actel device from the device database.

```
remove_non_actel_device_from_database [-name {device_name}]
```

Arguments

-name {*device_name*}

Specifies the non-Actel or non-Microsemi device name to be removed from the database. You can repeat this argument for multiple devices.

Supported Families

Non-Microsemi and non-Actel devices

Exceptions

None

Example

The following example removes the F1502AS_J44 device from the database:

```
remove_non_actel_device_from_database -name {F1502AS_J44}
```


The following example removes the SA2_PROCESSOR device from the database:

```
remove_non_actel_device_from_database -name {SA2_PROCESSOR}
```

remove_prg

Removes the programmer from the programmer list.

```
remove_prg (-name {name})*
```

Arguments

-name {*name*}*

Specifies the programmer to be removed. You can repeat this argument for multiple programmers.

Supported Families

All

Exceptions

None

Example

The following example removes the programmer '03178' from the programmer list:

```
remove_prg (name {03178})*
```

run_selected_actions

Runs the selected action on the specified programmer and returns the exit code from the action. If no programmer name is specified, the action is run on all connected programmers. Only one exit code is returned, so return code cannot be used when action is run on more than one programmer. A programming file must be loaded.

```
run_selected_actions [(-name {name})*]
```

Arguments

-name {*name*}

Optional argument that specifies the programmer name. You can repeat this argument for multiple programmers.

Supported Families

All

Exceptions

None

Example

The following example runs the selected actionS on the programmers 'FP30085' and 'FP30086'.

```
run_selected_actions -name {FP300085} -name {FP300086}
```

Example using return code:

```
if {[catch {run_selected_actions} return_val]} {puts "Error running Action"} else {puts "exit code $return_val"}
```

Example returning exit code to the command line (returns exit 99 on script failure, otherwise returns exit code from selected action):

```
if {[catch {run_selected_actions} return_val]}{exit 99} else {exit $return_val}
```

sample_analog_channel

Performs analog-to-digital conversion of a selected analog channel. This command is used when debugging the Analog Subsystem and is performed on the pre-configured analog channel with user-supplied ADC conversion parameters. The command also performs digital filtering using a single-pole low-pass filter if you opt to use it.

```
sample_analog_channel [(-name {name})*]  
[-resolution {8 | 10 | 12}]  
[-clock_periods {int_value}]  
[-clock_divider {int_value}]  
[-num_samples { int_value}]  
[-filtering_factor {real_value}]  
[-initial_value {int_value}]  
[-show_details {yes | no}]  
[-file {filename}]
```

Arguments

-name { *name* }

Specifies the analog channel to be sampled. Channel name is a combination of the channel type followed by the channel index. Valid channel names are listed in the table below.

Family	Valid Channel Name
Fusion	AV<n>, AT<n>, AC<n>
SmartFusion	AV<n>, AT<n>, AC<n>, ADC<n>

The maximum number of channels depends on particular device type; refer to the Analog Block specification in the device handbook.

-resolution {*8* | *10* | *12*}

ADC conversion resolution. Specifies bit size of the conversion results. Selection of certain resolutions may affect timing parameter valid ranges. See your device handbook for details.

-clock_periods {*int_value* }

Parameter specifying sampling time: $\text{Sampling_time} = \text{clock_periods} * \text{adc_clock_period}$.

-clock_divider {*int_value* }

Specifies clock prescaling factor.

-num_samples { *int_value* }

Optional argument that specifies the number of samples to be performed by the ADC. Default number of samples is 1. Selecting multiple vs single sample will change appearance of the generated report. For the single sample a single result is shown and if "show_details" is set to "yes" then detailed status of the ADC register is also shown.

If multiple samples are requested then the results are printed in a table. If the digital filtering is enabled the table also includes filtered results.

-filtering_factor {*real_value*}

Optional argument that specifies the filtering factor if multiple samples requested. The default value of 1.0 disables digital filtering.

-initial_value {*int_value*}

Optional argument that specifies the initial value for the digital averaging filter. The value is specified in ADC register counts. Default value is set to 0. Specifying this parameter improves filtering process during initial samples.

`-show_details {yes | no}`

Optional argument that specifies the level of the report output. Detailed output includes initial user-supplied conversion parameters. For the single-sampling case final output also includes detailed content of ADC register after sampling.

`-file {filename}`

Optional argument. Specifies name of output file for conversion results.

Supported Families

SmartFusion and Fusion

Exceptions

None

Example

The following example performs single sample analog-to-digital conversion for channel AV0:

```
sample_analog_channel -channel AV0 -resolution 8 -clock_periods 4 -clock_divider 4
```

Example with multiple sampling and digital signal filtering for AV0:

```
sample_analog_channel -channel AV0 -resolution 10 -clock_periods 4 -clock_divider 4 -
num_samples 10 -filtering_factor 2.5
```

save_log

Saves the log file.

```
save_log -file {file}
```

Arguments

`-file {file}`

Specifies the log filename.

Supported Families

All

Exceptions

None

Example

The following example saves the log file with the name 'my_logfile1.log':

```
save_log -file {my_logfile1.log}
```

save_project

Saves the FlashPro or FlashPro Express project.

```
save_project
```

Arguments

None

Supported Families

All

Exceptions

None

Example

```
save_project
```

save_project_as

Saves the FlashPro project under a new project name.

```
save_project_as -name {name} -location {location}
```

Arguments

-name {*name*}

Specifies the project name.

-location {*location*}

Specifies the project location.

Supported Families

All

Exceptions

None

Example

The following example saves the FlashPro project 'FPPrj2' to the directory 'FPProject2':

```
save_project_as -name {FPPrj2} -location {./FPProject2}
```

scan_chain_prg

In single mode, this command runs scan chain on a programmer.

In chain mode, this command runs scan and check chain on a programmer if devices have been added in the grid.

```
scan_chain_prg [(-name {name})+]
```

Arguments

-name {*name*}

Specifies the programmer name.

Supported Families

All

Exceptions

None

Example

The following example runs scan chain on a single programmer (single mode) named '21428':

```
scan_chain_prg -name {21428}
```

select_from_region_name

Enables you to select the serialization region you want to add to the log file.

```
select_from_region_name -enable {1|0} -region_name {name}
```

Arguments

-enable {1|0}

Enable serialization region logging. '1' enables serialization region logging; '0' disables it.

-region_name {*name*}

The name of the target serialization/client within FlashRom you wish to log.

Supported Families

SmartFusion, IGLOO, ProASIC3 and Fusion

Exceptions

None

Example

The following example enables select_from_region_name and adds the serialization region 'afs090_b' to the log file:

```
select_from_region_name -enable {1} -region_name {afs090_b}
```

select_libero_design_device (SmartFusion2, IGLOO2, RTG4, PolarFire)

FlashPro-specific Tcl command. This command selects the Libero design device for the Programming Connectivity and Interface tool within Libero. This command is needed when the tool cannot automatically resolve the Libero design device when there are two or more identical devices that match the Libero design device in the configured JTAG chain.

Syntax

```
select_libero_design_device -name {device_name}
```

Arguments

-name {*device_name*}

Specifies a user-assigned unique device name in the JTAG chain.

Supported Families

SmartFusion2, IGLOO2, RTG4, PolarFire

Exceptions

None

Example

```
select_libero_design_device -name {M2S050TS (2)}
select_libero_design_device -name {my_design_device}
```

Note

This Tcl command is typically used in a Flashpro Tcl command script file that is passed to the Libero run_tool command.

```
run_tool -name {CONFIGURE_CHAIN} -script {<flashPro_cmd>.tcl}
```

select_serial_range

This Tcl command selects the range of indexes to program.

```
select_serial_range -name device_name -from_data start_index_to_program -to_data
end_index_to_program
```

Arguments

-name
Specifies the device name.

-from_data
Specifies the start index to program.

-to_data
Specifies the end index.

Supported Families

Fusion, ProASIC3, IGLOO, SmartFusion, SmartFusion2, IGLOO2

Note: Serialization Commands are not supported for PolarFire

Exceptions

Must be a Microsemi Device

Example

```
select_serial_range -name M2S/M2GL050{T|S|TS} -from_data 3 -to_data 5
```

select_target_device

Enables you to set a target device for programming in Single Device Programming mode. The command is identical to the [Select Target Device dialog box](#) in FlashPro.

```
Select_target_device -name {device_name}
```

Arguments

-name {*device_name*}
Specifies the name of the target device.

Supported Families

SmartFusion, IGLOO, ProASIC3 and Fusion

Exceptions

None

Examples

The following example targets the A3P(L) / AGL1000 device for programming:

```
select_target_device -name {A3P(L)/AGL1000 (1)}
```

self_test_prg

Runs Self-Test on a programmer.

```
self_test_prg (-name {name})*
```

Arguments

-name {*name*}

Specifies the programmer name. You can repeat this argument for multiple programmers.

Supported Families

All

Exceptions

None

Example

The following examples runs the self test on the programmer '30175':

```
self_test_prg (-name {30175})*
```

set_bsdfile

Sets a BSDL file to a non-Microsemi device in the chain. Chain programming mode must have been set. The device must be a non-Microsemi device.

```
set_bsdfile -name {name} -file {file}
```

Arguments

name {*name*}

Specifies the device name.

-file {*file*}

Specifies the BSDL file.

Supported Families

Any non-Microsemi device supported by FlashPro.

Exceptions

None

Example

The following example sets the BSDL file /design/bsdl/NewBSL2.bsl to the device 'MyDevice3':

```
set_bsl_file -name {MyDevice3} -file {e:/design/bsdl/NewBSL2.bsl}
```

set_chain_param

Sets the chain parameters in single programming mode. Single programming mode must be set .

```
set_chain_param [-pre_ir {pre_ir}] [-pre_dr {pre_dr}] [-post_ir {post_ir}] [-post_dr {post_dr}]
```

Arguments

-pre_ir {pre_ir}

Specifies the pre IR length.

-pre_dr {pre_dr}

Specifies the pre DR length.

-post_ir {post_ir}

Specifies the post IR length.

-post_dr {post_dr}

Specifies post DR length.

Supported Families

All

Exceptions

None

Example

The following example sets the chain parameters for pre IR length to 2, pre DR length to 3, post IR length to 4, and post DR length to 5:

```
set_chain_param -pre_ir {2} -pre_dr {3} -post_ir {4} -post_dr {5}
```

set_debug_device

Identifies the device you intend to debug.

```
set_debug_device -name {device_name}
```

Arguments

name {*device_name*}

Device name. The device name is not required if there is only one device in the current configuration.

Supported Families

SmartFusion2, IGLOO2, SmartFusion, IGLOO, ProASIC3 and Fusion

Exceptions

None

Example

The following example identifies the device 'A3P250' for debugging:

```
set_debug_device -name {A3P250}
```

set_debug_programmer

Identifies the programmer you want to use for debugging (if you have more than one). The name of the programmer is the serial number on the bar code label on the FlashPro programmer.

```
set_debug_programmer -name {programmer_name}
```

Arguments

-name {*programmer_name*}

Programmer name is the serial number on the bar code label of the FlashPro programmer.

Supported Families

SmartFusion, IGLOO, ProASIC3 and Fusion

Exceptions

None

Example

The following example selects the programmer 10841

```
set_debug_programmer -name {10841}
```

set_device_ir

Sets the IR length of a non-Microsemi device in the chain. Chain programming mode must be set. The device must be a non-Microsemi device.

```
set_device_ir -name {name} -ir {ir}
```

Arguments

-name {*name*}

Specifies the device name.

-ir {*ir*}

Specifies the IR length.

Supported Families

Any non-Microsemi device supported by FlashPro.

Exceptions

None

Example

The following example sets the IR length to '2' for the non-Microsemi device 'MyDevice4':

```
set_device_ir -name {MyDevice4} -ir {2}
```

set_device_name

Changes the user name of a device in the chain. Chain programming mode must be set .

```
set_device_name -name {name} -new_name {new_name}
```

Arguments

-name {*name*}

Identifies the old device name.

-new_name {*new_name*}

Specifies the new device name.

Supported Families

All

Exceptions

None

Example

The following example changes the user name of the device from 'MyDevice4' to 'MyDevice5':

```
set_device_name -name {MyDevice4} -new_name {MyDevice5}
```

set_device_order

Sets the order of the devices in the chain to the order specified. Chain programming mode must have been set. Unspecified devices will be at the end of the chain.

```
set_device_order (-name {name}) *
```

Arguments

-name {*name*}

Specifies the device name. To specify a new order you must repeat this argument and specify each device name in the order desired.

Supported Families

All

Exceptions

None

Example

The following example sets the device order for 'MyDevice1', 'MyDevice2', 'MyDevice3', and 'MyDevice4'. 'MyDevice2' is unspecified so it moves to the end of the chain.

```
set_device_order -name {MyDevice3} -name {MyDevice1} -name {MyDevice4}
```

the new order is:

```
MyDevice3 MyDevice1 MyDevice4 MyDevice2
```

set_device_tck

Sets the maximum TCK frequency of a non-Microsemi device in the chain. Chain programming mode must be set. The device must be a non-Microsemi device.

```
set_device_tck -name {name} -tck {tck}
```

Arguments

-name {*name*}

Specifies the device name.

-tck {*tck*}

Specifies the maximum TCK frequency (in MHz).

Supported Families

Any non-Microsemi device supported by FlashPro.

Exceptions

None

Example

The following example sets the maximum TCK frequency of the non-Microsemi device 'MyDevice4':

```
set_device_tck -name {MyDevice4} -tck {2.25}
```

set_device_to_highz

Sets a disabled Microsemi or Microsemi device in Chain programming mode to HIGH-Z. This Tcl command is related to the [Set Device to HIGH-Z GUI command](#).

```
set_device_to_highz -name {device_name} -highz {1|0}
```

Arguments

-name {*device_name*}

Target device name in chain mode.

-highz {1|0}

Sets disabled device to HIGH-Z. '1' sets the device to HIGH-Z, '0' removes the setting.

Supported Families

SmartFusion, IGLOO, ProASIC3 and Fusion

Exceptions

None

Example

The following example sets the AFS090 device to HIGH-Z:

```
set_device_to_highz -name {AFS090} -highz 1
```

The following example removes the HIGH-Z setting from the AFS1500 device:

```
set_device_to_highz -name {AFS1500} -highz 0
```

set_device_type

Changes the family of a Microsemi device in the chain. The device must be a Microsemi device. The device parameter below is now optional.

```
set_device_type -name {name} -type {type}
```

Arguments

-name {*name*}

Identifies the name of the device you want to change.

-type {*type*}

Specifies the device family.

Supported Families

Any Microsemi device supported by FlashPro.

Exceptions

None

Example

The following example sets the device 'MyDevice2' to the type A3PE600.

```
set_device_type -name {MyDevice2} -type {A3PE600}
```

set_main_log_file

Sets the FlashPro log file.

```
set_main_log_file -file {file}
```

Arguments

-file {*file*}

Specifies the log file.

Supported Families

All

Exceptions

None

Example

The following example sets the FlashPro log file to 'log1000.txt'.

```
set_main_log_file -file {e:/log/log1000.txt}
```

set_prg_name

Changes the user name of a programmer.

```
set_prg_name -name {name} -new_name {new_name}
```

Arguments

-name {*name*}
 Identifies the old programmer name.

-new_name {*new_name*}
 Specifies the new programmer name.

Supported Families

All devices supported by FlashPro.

Exceptions

None

Example

The following example changes the name of the programmer 'FP300086' to 'FP3Prg2':

```
set_prgr_name -name {FP300086} -new_name {FP3Prg2}
```

set_programming_action

Selects the action for a device. The device name parameter must be specified only in chain programming mode. A programming file must be loaded. The device must be a Microsemi device.

```
set_programming_action [-name {name}] -action {action}
```

Arguments

-name {*name*}
 Specifies the device name.

-action {*action*}
 Specifies the action.

Supported Families

SmartFusion, IGLOO, ProASIC3, Fusion, SmartFusion2, IGLOO2, RTG4, PolarFire

Exceptions

Must be a Microsemi device

Example

The following example sets the programming action in single programming mode:

```
set_programming_action -action {PROGRAM}
```

And in chain programming mode:

```
set_programming_action -name {MyDevice1} -action {ERASE}
```

set_programming_file

Sets the programming file for a device. Either the *file* or the *no_file* flag must be specified. A programming file must be loaded. The device must be a Microsemi device .

```
set_programming_file [-name {name}] [-file {file}] [-no_file { }]
```

Arguments

-name {*name*}

Specifies the device name. This argument must be specified only in chain programming mode.

-file {*file*}

Specifies the programming file.

-no_file

Specifies to unload the current programming file.

Supported Families

SmartFusion, IGLOO, ProASIC3, Fusion, SmartFusion2, IGLOO2, RTG4, PolarFire

Exceptions

Must be a Microsemi device.

Examples

In single programming mode:

```
set_programming_file -file {e:/design/pdb/TopA3P250.pdb}
```

In chain programming mode:

```
set_programming_file -name {MyDevice2} -file {e:/design/pdb/TopA3P250.pdb}
```

```
set_programming_file -name {MyDevice1} -no_file
```

set_programming_mode

Sets the programming mode.

```
set_programming_mode -mode {single|chain}
```

Arguments

-mode {single|chain}

Specifies the mode, either single programming or chain programming.

Supported Families

All devices supported by FlashPro.

Exceptions

None

Example

The following example sets the programming mode to 'single':

```
set_programming_mode -mode {single}
```

set_serialization_log_file

This Tcl command sets the path and name of the serialization log file.

```
set_serialization_log_file -file {log_file_path}
```

Arguments

-file

Specifies the serialization log file path and name

Supported Families

Fusion, ProASIC3, IGLOO, SmartFusion, SmartFusion2, IGLOO2

Note: Serialization Commands are not supported for PolarFire

Exceptions

Must be a Microsemi Device

Example

```
set_serialization_log_file -file {C:/local_z_folder/work/my_serial_log}
```

set_serialization_mode

Sets the serialization mode.

```
set_serialization_mode -mode {skip|reuse}
```

Arguments

-mode {skip|reuse}

Supported Families

All devices supported by FlashPro.

Exceptions

None

Example

The following example sets the serialization mode to 'skip':

```
set_serialization_mode -mode {skip}
```

update_programming_file

Updates the programming file with the selected parameters.

```
update_programming_file
[(-name {name}) *]
-feature {value}
-signature {value}
-from_content {name}
-from_config_file {name}
-number_of_devices {value}
-from_program_pages {value}
-custom_security {value}
-security_permanent {value}
-fpa_security_level {value}
-from_security_level {value}
-efm_block_security{location:X;security_level: value}
-pass_key {value} -aes_key {value}
-efm_content {location:X;source: value}
```

```
-efm_block {location:X;config_file: value}
-efm_client {location:X;client:value; mem_file: value}
-tie_off_arch {value}
-set_io_state {value}
-pdb_file {name}
-enable_m3debugger {value}
```

Arguments

-name {*name*}

Specifies the device name. This argument must be specified only in chain programming mode.

-feature {*value*}

Select the silicon feature(s) you want to program. Possible values for this option are listed in the table below, or the instance-specific program options available only for specific families (as shown in the table below). Microsemi recommends that you specify your program parameters for each Embedded Flash Memory Block (EFMB) instance, from 0-3. The instance specific program options replace [-feature {*value*}].

value	Family
{setup_security:on/off}	SmartFusion
{prog_fpga:on/off}	SmartFusion
{prog_from:on/off}	SmartFusion
{prog_nvm:on/off}	SmartFusion
{setup_security}	Fusion
{prog_from}	Fusion
{all}	IGLOO; ProASIC3

To program the Embedded Flash Memory Block, use the following EFM arguments: [-efm_block](#), [-efm_client](#), and [-efm_block_security](#).

-signature {*value*}

Optional argument that identifies and tracks Microsemi designs and devices.

-from_content {*name*}

Optional argument that identifies the source file for the FlashROM content. The file type is UFC or PDB (default). This argument only applies when programming the FlashROM (prog_from option).

-from_config_file {*name*}

Optional argument that specifies the location of the FlashROM configuration file. This argument only applies when programming the FlashROM (prog_from option) and the from_content is set to UFC.

-number_of_devices {*value*}

Optional argument that specifies the number of devices to be programmed. This argument only applies when FlashROM has serialization regions. This argument only applies when programming the FlashROM (prog_from option).

-from_program_pages {*value*}

Optional argument that identifies the program pages in FlashPoint. This argument only applies when programming the FlashROM (prog_from option).

-custom_security {*value*}

Optional argument that specifies the security level. This argument only applies when programming the security settings (setup_security) or programming previously secured devices. The following table shows the acceptable values for this argument:

Value	Description
Yes	Custom security level
No	Standard security level

`-security_permanent {value}`

Optional argument that specifies whether the security settings for this file are permanent or not. This argument only applies when programming the security settings (setup_security) or programming previously secured devices. The following table shows the acceptable values for this argument:

Value	Description
Yes	Permanently disables future modification of security settings
No	Enables future modifications of security settings

`-fpga_security_level {value}`

Optional argument that specifies the security level for the FPGA Array. This argument only applies when programming the security settings (setup_security) or programming previously secured devices. Possible values:

Value	Description
write_verify_protect	The security level is medium (standard) and the FPGA Array cannot be written or verified without a Pass Key
write_protect	The security level is write protected. The FPGA Array cannot be written without a Pass Key, but it is open for verification (custom FPGA)
encrypted	The security level is high (standard) and uses a 128-bit AES encryption
none	The FPGA Array can be written and verified without a Pass Key

`-from_security_level {value}`

Optional argument that specifies the security level for the FlashROM. This argument only applies when programming the security settings (setup_security) or programming previously secured devices. Possible values:

Value	Description
write_verify_protect	The security level is medium (standard) and the FlashROM cannot be read, written or verified without a Pass Key
write_protect	The security level is write protected. The FlashROM cannot be written without a Pass Key, but it is open for reading and verification (custom FlashROM)
encrypted	The security level is high (standard) and uses a 128-bit AES encryption
none	The FlashROM can be written and verified without a Pass Key

```
-efm_block_security{location:X;security_level: value }
```

This option is available only for SmartFusion and Fusion; this argument only applies when programming the security settings (setup_security) or programming previously secured devices.

'X' identifies an Embedded Flash Memory Block instance from 0-3.

Possible values for security_level:

Value	Description
clients_jtag_protect	Enables eNVM client JTAG protection; a pass key is required for this option.
write_verify_protect	The security level is medium (standard) and the Embedded Flash Memory Block cannot be read, written or verified without a Pass Key
write_protect	The security level is write protected. The Embedded Flash Memory Block cannot be written without a Pass Key, but it is open for reading (custom FB)
encrypted	The security level is high (standard) and uses a 128-bit AES encryption
none	The Embedded Flash Memory Block can be written and read without a Pass Key

```
-pass_key {value}
```

Protects all the security settings for FPGA Array, FlashROM, and Embedded Flash Memory Block. The maximum length of this value is 32 characters. You must use hexadecimal characters for the pass key value.

```
-aes_key {value}
```

Decrypts FPGA Array and/or FlashROM and Embedded Flash Memory Block programming file content. Max length is 32 HEX characters.

```
-efm_content {location:X;source: value }
```

This option is available only for SmartFusion and Fusion; X identifies an Embedded Flash Memory Block from 0-3. Option identifies the source file for the Embedded Flash Memory Block configuration content, either an EFC or PDB file. If you specify EFC as your source, you need to specify the -efm_block parameter. Possible values:

Value	Description
PDB	Embedded Flash Memory Block configuration and content is taken from your PDB
EFC	FlashPoint uses the Embedded Flash Memory Block configuration and content from the EFC file specified in -efm_block parameter

```
-efm_block {location:X;config_file: value }
```

This option is available only for SmartFusion and Fusion; X identifies an Embedded Flash Memory Block (EFMB) from 0-3.

Config_file specifies the location of the EFMB configuration file (must be an EFC file with full pathname).

```
-efm_client {location:X;client:value; mem_file: value }
```

This option is available only for SmartFusion and Fusion; X identifies an EFMB from 0-3.

You must specify the client name and its memory content file for each client of EFMB you wish to program.

Mem_file specifies the file with the memory content for the client. If you want to program a client with a PDB or EFC file memory content (as defined by the -efm_content argument), the mem_file path should be

empty (see [example 3](#)); but if a mem_file path is specified, the memory content from this file will overwrite the client content in PDB or EFC (as defined by the -efm_content argument).

-tie_off_arch {*value*}

This optional argument is used only for IT6X6M2 and M7IT6X6M2 devices. Possible values:

Value	Description
pull-down	Pull-down resistor: reduced quiescent power consumption
pull-up	Pull-up resistor: compatible behavior for migrated ProASIC <i>PLUS</i> designs

-set_io_state {*value*}

Sets the I/O state during programming by port name or pin number.

To set the I/O by port name, use -set_io_state {portName:<port name>; state:<state>}.

To set the I/O by pin number, use -set_io_state {pinNumber:<pin number>; state:<state>}.

To set all I/Os to the specified state, use -set_io_state {all; state:<state>}.

Possible state values:

Value	Description
Tri-State	Sets the I/O state to tristate
Last Known State	Sets the I/O state to last known state
High	Sets the I/O state to high
Low	Sets the I/O state to low

-pdb_file {*name*}

Optional PDB filename; if not specified the default is 'expresspdbX'.

-enable_m3debugger {*yes* / *no*}

SmartFusion only; .enables the [M3 debugger](#).

Supported Families

All devices supported by FlashPro.

Exceptions

None

Example

Fusion example 1:

```
update_programming_file \
-feature {setup_security} \
-feature {prog_from} \
-from_content {ufc} \
-from_config_file {D:/from_ah.ufc} \
-number_of_devices {1} \
-from_program_pages {1 2 3 4 5 6 7} \
-custom_security {no} \
-security_permanent {no} \
-fpga_security_level {write_verify_protect} \
```

```

-from_security_level {write_verify_protect} \
-efm_block_security {location:1;security_level:write_verify_protect} \
-efm_content {location:1;source:efc} \
-efm_block {location:1;config_file:{D:\ nvm_all_new.efc}} \
-efm_client {location:1;client:asb;mem_file:{}} \
-efm_client {location:1;client:cfiData;mem_file:{D:\cfid.mem}} \
-efm_client {location:1;client:ds;mem_file:{D:\ds.hex}} \
-efm_client {location:1;client:init1;mem_file:{D:\init1.hex}} \
-efm_client {location:1;client:raminit;mem_file:{}}

```

Update loaded PDB file: use ufc file for FlashROM configuration and content; use efc file for block 1 configuration; efc memory content will be overwritten by memory content from specified mem files for each client.

Fusion example 2:

```

update_programming_file \
-feature {prog_from} \
-from_content {pdb} \
-from_program_pages {1} \
-efm_content {location:1;source:pdb} \
-efm_client {location:1;client:cfiData;mem_file:{D:\cfid.mem}}

```

Update loaded PDB file: use pdb data for FlashROM; program only page 1; use pdb data for block 1; program only client cfiData; overwrite memory content for this client with memory content from the specified file.

Fusion example 3:

```

update_programming_file \
-efm_content {location:1;source:pdb} \
-efm_client {location:1;client:cfiData;mem_file:{D:\cfid.mem}} \
-efm_client {location:1;client:init1;mem_file:{}}

```

Update loaded PDB file: use pdb data for block 1; program client cfiData using memory content from the specified file; program client init1 using memory content from pdb (no mem_file path is specified) .

SmartFusion example:

```

update_programming_file \
update_programming_file \
-feature {setup_security:on} \
-feature {prog_fpga:off} \
-feature {prog_from:off} \
-feature {prog_nvm:on} \
-custom_security {no} \
-security_permanent {no} \
-fpga_security_level {none} \
-from_security_level {none} \
-efm_block_security {location:0;security_level:clients_jtag_protect} \
-efm_block_security {location:1;security_level:clients_jtag_protect} \
-pass_key {73F09973E792EC9F462AE5A446FB6C77} \
-efm_content {location:0;source:pdb} \
-efm_block
{location:0;config_file:{./eNVM_client_JTAG_protection_A2F500/allClients_Read_ON_Write_O
N.efc}}
\
-pdb_file {./fpro_jtag/fpro_jtag_30.pdb} \
-enable_m3debugger {no}

```

Troubleshooting

Loopback Test

The console software supports all JTAG functions and a diagnostic loopback test. Note that loopback is not supported on all boards.

To perform the diagnostic test

1. Connect the loopback test board to the FlashPro.
2. Connect the FlashPro to the parallel/USB port of the PC.
3. Power-on the FlashPro.
4. From the **Start** menu, choose **Programs > Microsemi FlashPro > Diagnostics**. This opens the diagnostics console program.
5. Connect to the FlashPro by entering *openport lpt1* or *openport usb*. The parallel port number depends on the port used to connect the FlashPro.
6. Enter *test*. The unit runs into self-test mode. Do not interrupt the unit during self-test mode.

Note: To see a complete list of all functions, enter *help*. To get a more detail description of each function, enter *help <command>*.

Exit Codes (PolarFire)

Error Code	Exit Message	Exit Code	Possible Cause	Possible Solution
	Passed (no error)	0	-	-
0x8002	Failed to disable programming mode Failed to set programming mode	5	Unstable voltage level Signal integrity issues on JTAG pins	Monitor related power supplies that cause the issue during programming; check for transients outside of Microsemi specifications. See your device datasheet for more information on transient specifications. Monitor JTAG supply pins during programming; measure JTAG signals for noise or reflection.
0x8032	Device is busy	5	Unstable VDDIx voltage level	Monitor related power supplies that cause the issue during programming; check for transients outside of Microsemi specifications. See your device datasheet for more information on transient specifications.
0x8003	Failed to enter programming mode	5	Unstable voltage level Signal integrity issues on JTAG pins DEV_RST_N is tied to LOW	Monitor related power supplies that cause the issue during programming; check for transients outside of Microsemi specifications. See your device datasheet for more information on transient specifications. Monitor JTAG supply pins during programming; measure JTAG signals for noise or reflection.

Error Code	Exit Message	Exit Code	Possible Cause	Possible Solution
				Tie DEVRST_N to HIGH prior to programming the device.
0x8004	Failed to verify IDCODE	6	Incorrect programming file Incorrect device in chain Signal integrity issues on JTAG pins	Choose the correct programming file and select the correct device in the chain. Measure JTAG pins and noise for reflection. If TRST is left floating then add pull-up to pin. Reduce the length of Ground connection.
0x8005 0x8006 0x8007 0x8008	Failed to verify FPGA Array Failed to verify Fabric Configuration Failed to verify Security Failed to verify sNVM	11	Device is programmed with a different design or the component is blank. Unstable voltage level. Signal integrity issues on JTAG pins.	Verify the device is programmed with the correct data/design. Monitor related power supplies that cause the issue during programming; check for transients outside of Microsemi specifications. See your device datasheet for more information on transient specifications. Monitor JTAG supply pins during programming; measure JTAG signals for noise or reflection.
0x8013	External digest check via JTAG/SPI Slave is disabled.	-18	External Digest check via JTAG/SPI Slave is disabled.	Need to use a bitstream file which has a valid FlashLock/UPK1 to enable external digest check via JTAG/SPI Slave.
0x8015	FPGA Fabric digest verification: FAIL Deselect procedure 'DO_ENABLE_FABRIC' to remove this digest check.	-20	FPGA Fabric is either erased or the data has been corrupted or tampered with	If the Fabric is erased, deselect procedure "DO_ENABLE_FABRIC" from action "VERIFY_DIGEST"
0x8016	sNVM digest verification: FAIL Deselect procedure 'DO_ENABLE_SNVM' to remove this digest check.	-20	sNVM is either erased or the data has been corrupted or tampered with	If the sNVM is erased, deselect procedure "DO_ENABLE_SNVM" from action "VERIFY_DIGEST"
0x8018	User security policices segment digest verification: FAIL Deselect procedure 'DO_ENABLE_SECURITY' to remove this digest check.	-20	Security segment is either erased or the data has been corrupted or tampered with	If the security is erased, deselect procedure "DO_ENABLE_SECURITY" from action "VERIFY_DIGEST"

Error Code	Exit Message	Exit Code	Possible Cause	Possible Solution
0x8019	UPK1 segment digest verification: FAIL Deselect procedure 'DO_ENABLE_SECURITY' to remove this digest check.	-20	UPK1 segment is either erased or the data has been corrupted or tampered with	If the UPK1 is erased, deselect procedure "DO_ENABLE_SECURITY" from action "VERIFY_DIGEST"
0x801A	UPK2 segment digest verification: FAIL Deselect procedure 'DO_ENABLE_UKS2' to remove this digest check.	-20	UPK2 segment is either erased or the data has been corrupted or tampered with	If the UPK2 is erased, deselect procedure "DO_ENABLE_UKS2" from action "VERIFY_DIGEST"
0x801B	Factory row and factory key segment digest verification: FAIL	-20	Factory row and factory key segment have been erased through zeroization or the data has been corrupted or tampered with	
0x801C	Fabric configuration segment digest verification: FAIL Deselect procedure 'DO_ENABLE_FABRIC' to remove this digest check.	-20	Fabric configuration segment is either erased or has been corrupted or tampered with	If the Fabric configuration is erased, deselect procedure "DO_ENABLE_FABRIC" from action "VERIFY_DIGEST"
0x8052	UEK1 segment digest verification: FAIL Deselect procedure 'DO_ENABLE_UEK1' to remove this digest check.	-20	UEK1 segment is either erased or the data has been corrupted or tampered with	If the UEK1 is erased, deselect procedure "DO_ENABLE_UEK1" from action "VERIFY_DIGEST"
0x8053	UEK2 segment digest verification: FAIL Deselect procedure 'DO_ENABLE_UEK2' to remove this digest check.	-20	UEK2 segment is either erased or the data has been corrupted or tampered with	If the UEK2 is erased, deselect procedure "DO_ENABLE_UEK2" from action "VERIFY_DIGEST"
0x8054	DPK segment digest verification: FAIL	-20	DPK segment is either erased or the data has been corrupted or tampered with	If the DPK is erased, deselect procedure "DO_ENABLE_DPK" from action "VERIFY_DIGEST"

Error Code	Exit Message	Exit Code	Possible Cause	Possible Solution
	Deselect procedure 'DO_ENABLE_DPK' to remove this digest check.			
0x8057	SMK segment digest verification: FAIL	-20	SMK segment is either erased or the data has been corrupted or tampered with	If the SMK is erased, deselect procedure "DO_ENABLE_SMK" from action "VERIFY_DIGEST"
0x8058	User Public Key segment digest verification: FAIL	-20	User Public Key segment is either erased or the data has been corrupted or tampered with	If the User Public Key is erased, deselect procedure "DO_ENABLE_USER_PUBLIC_KEY" from action "VERIFY_DIGEST"
0x801D	Device security prevented operation	-21	<p>The device is protected with user pass key 1 and the bitstream file does not contain user pass key 1.</p> <p>User pass key 1 in the bitstream file does not match the device.</p>	<p>Run DEVICE_INFO to view security features that are protected.</p> <p>Provide a bitstream file with a user pass key 1 that matches the user pass key 1 programmed into the device.</p>
0x801F	<p>Programming Error.</p> <p>Bitstream or data is corrupted or noisy</p>	-22	<p>Bitstream file has been corrupted or was incorrectly generated.</p> <p>Unstable voltage level.</p> <p>Signal integrity issues on JTAG pins.</p>	<p>Regenerate bitstream file</p> <p>Monitor related power supplies that cause the issue during programming; check for transients outside of Microsemi specifications. See your device datasheet for more information on transient specifications.</p> <p>Monitor JTAG supply pins during programming; measure JTAG signals for noise or reflection.</p>
0x8021	<p>Programming Error.</p> <p>Invalid/Corrupted encryption key</p>	-23	<p>File contains an encrypted key that does not match the device</p> <p>File contains user encryption key, but device has not been programmed with the user encryption key</p>	<p>Provide a programming file with an encryption key that matches that on the device</p> <p>First program security with master programming file, then program with user encryption 1/2 field update programming files</p>
0x8023	<p>Programming Error.</p> <p>Back level not satisfied</p>	-24	Design version is not higher than the back-level programmed device	Generate a programming file with a design version higher than the back level version
0x8001	Failure to read DSN	-24	<p>Device is in System Controller Suspend Mode</p> <p>Check board connections</p>	TRSTB should be driven High or disable "System Controller Suspend Mode".

Error Code	Exit Message	Exit Code	Possible Cause	Possible Solution
0x8027	Programming Error. Insufficient device capabilities	-26	Device does not support the capabilities specified in programming file	Generate a programming file with the correct capabilities for the target device
0x8029	Programming Error. Incorrect DEVICEID	-27	Incorrect programming file Incorrect device in chain Signal integrity issues on JTAG pins	Choose the correct programming file and select the correct device in chain Measure JTAG pins and noise or reflection. If TRST is left floating, then add pull-up to pin Reduce the length of ground connection
0x802B	Programming Error. Programming file is out of date, please regenerate.	-28	Programming file version is out of date	Generate programming file with latest version of Libero SoC
0x8030	Programming Error Invalid or inaccessible Device Certificate	-31	FAB_RESET_N is tied to ground	FAB_RESET_N should be tied to HIGH
0x8032 0x8034 0x8036 0x8038	Instruction timed out	-32	Unstable voltage level Signal integrity issues on JTAG pins	Monitor related power supplies that cause the issue during programming; check for transients outside of Microsemi specifications. See your device datasheet for more information on transient specifications. Monitor JTAG supply pins during programming; measure JTAG signals for noise or reflection.
0x8010	Failed to unlock user pass key 1	-35	Pass key in file does not match device	Provide a programming file with a pass key that matches pass key programmed into the device.
0x8011	Failed to unlock user pass key 2	-35	Pass key in file does not match device	Provide a programming file with a pass key that matches pass key programmed into the device.
0x804F	Bitstream programming action is disabled	-38	Unstable voltage level Bitstream programming action has been disabled in Security Policy Manager	Monitor related power supplies that cause the issue during programming; check for transients outside of Microsemi specifications. See your device datasheet for more information on transient specifications. Need to use a bitstream file which has a valid FlashLock/UPK1 to enable the bitstream programming action.

Exit Codes (SmartFusion2 and IGLOO2)

Error Code	Exit Code	Exit Message	Possible Cause	Possible Solution
	0	Passed (no error)	-	-
0x8002	5	Failure to configure device programming at 1.2/1.0 VCC voltage	Unstable voltage level Signal integrity issues on JTAG pins	Monitor related power supplies that cause the issue during programming; check for transients outside of Microsemi specifications. See your device datasheet for more information on transient specifications. Monitor JTAG supply pins during programming; measure JTAG signals for noise or reflection.
0x8032	5	Device is busy	Unstable VDDI _x voltage level	Monitor related power supplies that cause the issue during programming; check for transients outside of Microsemi specifications. See your device datasheet for more information on transient specifications.
0x8003	5	Failed to enter programming mode	Unstable voltage level Signal integrity issues on JTAG pins DEVRST_N is tied to LOW	Monitor related power supplies that cause the issue during programming; check for transients outside of Microsemi specifications. See your device datasheet for more information on transient specifications. Monitor JTAG supply pins during programming; measure JTAG signals for noise or reflection. Tie DEVRST_N to HIGH prior to programming the device.
0x8004	6	Failed to verify IDCODE	Incorrect programming file Incorrect device in chain Signal integrity issues on JTAG pins	Choose the correct programming file and select the correct device in the chain. Measure JTAG pins and noise for reflection. If TRST is left floating then add pull-up to pin. Reduce the length of Ground connection.
0x8005 0x8006 8x804A	10	Failed to program eNVM	Unstable voltage level. Signal integrity issues on JTAG pins.	Monitor related power supplies that cause the issue during programming; check for transients outside of Microsemi specifications. See your device datasheet for more information on transient specifications. Monitor JTAG supply pins during

Error Code	Exit Code	Exit Message	Possible Cause	Possible Solution
				programming; measure JTAG signals for noise or reflection.
0x8027 0x8028	10	Authentication Error Bitstream and device mismatch	Libero device selection does not match the target device.	Generate a programming file with the correct device selection for the target device.
0x8007 0x804C	11	Failed to verify FPGA Array Failed to verify Fabric Configuration Failed to verify Security	Device is programmed with a different design or the component is blank. Unstable voltage level. Signal integrity issues on JTAG pins.	Verify the device is programmed with the correct data/design. Monitor related power supplies that cause the issue during programming; check for transients outside of Microsemi specifications. See your device datasheet for more information on transient specifications. Monitor JTAG supply pins during programming; measure JTAG signals for noise or reflection.
0x8008 0x8009 0x8049	11	Failed to verify eNVM	Device is programmed with a different design. Unstable voltage level. Signal integrity issues on JTAG pins.	Verify the device is programmed with the correct data/design. Monitor related power supplies that cause the issue during programming; check for transients outside of Microsemi specifications. See your device datasheet for more information on transient specifications. Monitor JTAG supply pins during programming; measure JTAG signals for noise or reflection.
0x8013	-18	Digest request from SPI/JTAG is protected by User Pass Key 1	Digest request from SPI/JTAG is protected by user pass key 1. Lock bit has been configured in the Debug Policy within SPM (Security Policy Manager)	Provide a programming file with a pass key that matches pass key programmed into the device.
0x8014	-19	Failed to verify digest	>Unstable voltage level Signal integrity issues on JTAG pins	Monitor related power supplies that cause the issue during programming; check for transients outside of Microsemi specifications. See your device datasheet for more information on transient specifications. Monitor JTAG supply pins during programming; measure JTAG signals for noise or reflection.
0x8015	-20	FPGA Fabric digest verification: FAIL	Programming bitstream components do not match	Use the same programming file that was used to program the device.

Error Code	Exit Code	Exit Message	Possible Cause	Possible Solution
			components programmed FPGA Fabric is either erased or the data has been corrupted or tampered with	
0x8016	-20	eNVM_0 digest verification: FAIL	Programming bitstream components do not match components programmed eNVM_0 data has been corrupted or tampered with	Use the same programming file that was used to program the device.
0x8017	-20	eNVM_1 digest verification: FAIL	Programming bitstream components do not match components programmed eNVM_1 data has been corrupted or tampered with	Use the same programming file that was used to program the device.
0x8018	-20	User security policies segment digest verification: FAIL	Programming bitstream components do not match components programmed User security policy segment data has been corrupted or tampered with	Use the same programming file that was used to program the device.
0x8019	-20	User key set 1 segment digest verification: FAIL	Programming bitstream components do not match components programmed User key set 1 segment data has been corrupted or tampered with	Use the same programming file that was used to program the device.
0x801A	-20	User key set 2 segment digest verification: FAIL	Programming bitstream components do not match components programmed User key set 2 segment data has been corrupted or tampered with	Use the same programming file that was used to program the device.
0x801B	-20	Factory row and factory key segment digest verification: FAIL	Programming bitstream components do not match components programmed Factory row and factory key segment data has been corrupted or tampered with	Use the same programming file that was used to program the device.
0x801C	-20	Fabric configuration segment digest verification: FAIL	Programming bitstream components do not match components programmed.	Use the same programming file that was used to program the device.

Error Code	Exit Code	Exit Message	Possible Cause	Possible Solution
			Fabric configuration segment data has been corrupted or tampered with	
0x801D 0x801E 0x804B	-21	Device security prevented operation	<p>The device is protected with user pass key 1 and the bitstream file does not contain user pass key 1.</p> <p>User pass key 1 in the bitstream file does not match the device.</p>	<p>Run DEVICE_INFO to view security features that are protected.</p> <p>Provide a bitstream file with a user pass key 1 that matches the user pass key 1 programmed into the device.</p>
0x801F 0x8020 0x8040	-22	Authentication Error Bitstream or data is corrupted or noisy	<p>eNVM has been locked by a master in your design</p> <p>Running VERIFY action on a blank device.</p> <p>Bitstream file has been corrupted</p> <p>Bitstream was incorrectly generated</p>	<p>Release the lock on the eNVM after your master has completed its access operations. Write 0x00 to "REQACCESS" register in eNVM Control Registers (address 0x600801FC) to release the access.</p> <p>Program the device prior to running VERIFY action</p> <p>Regenerate bitstream file.</p>
0x8021 0x8022	-23	Authentication Error Invalid/Corrupted encryption key	<p>File contains an encrypted key that does not match the device</p> <p>Attempting to erase a device with no security using master security file</p> <p>File contains user encryption key, but device has not been programmed with the user encryption key</p> <p>Device has user encryption key 1/2 enforced and you are attempting to reprogram security settings</p>	<p>Provide a programming file with an encryption key that matches that on the device.</p> <p>Run DEVICE_INFO action to verify that the device has no security. If the device does not have security, you cannot erase it.</p> <p>First program security with master programming file, then program with user encryption 1/2 field update programming files.</p> <p>You must first ERASE security with the master security file, then you can reprogram new security settings.</p>
0x8041	-23	Authentication Error Invalid/Corrupted encryption key	<p>File contains an encrypted key that does not match the device</p> <p>File contains user encryption key, but device has not been programmed with the user encryption key</p> <p>Attempting to erase a device with no security using master security file</p>	<p>Provide a programming file with an encryption key that matches that on the device.</p> <p>Run DEVICE_INFO action to verify that the device has no security. If the device does not have security, you cannot erase it.</p> <p>First program security with master programming file, then program with user encryption 1/2 field update programming files.</p>

Error Code	Exit Code	Exit Message	Possible Cause	Possible Solution
			Device has user encryption key 1/2 enforced and you are attempting to reprogram security settings	You must first ERASE security with the master security file, then you can reprogram new security settings.
0x8023 0x8024 0x8042	-24	Authentication Error Back level not satisfied	Design version is not higher than the back-level programmed device	Generate a programming file with a design version higher than the back level version.
0x8001	-24	Failure to read DSN	Device is in System Controller Suspend Mode Check board connections	TRSTB should be driven High or disable "System Controller Suspend Mode".
0x8025 0x8026 0x8043	-25	Authentication Error DSN binding mismatch	DSN specified in programming file does not match the device being programmed	Use the correct programming file with a DSN that matches the DSN of the target device being programmed.
0x8044	-26	Authentication Error Insufficient device capabilities	Device does not support the capabilities specified in programming file	Generate a programming file with the correct capabilities for the target device.
0x8027 0x8028	-26	Authentication Error Bitstream and device mismatch	Libero device selection does not match the target device	Generate a programming file with the correct device selection for the target device.
0x8029 0x802A 0x8045	-27	Authentication Error Incorrect DEVICEID	Incorrect programming file Incorrect device in chain Signal integrity issues on JTAG pins	Choose the correct programming file and select the correct device in chain. Measure JTAG pins and noise or reflection. If TRST is left floating, then add pull-up to pin. Reduce the length of ground connection.
0x802B 0x802C	-28	Authentication Error Programming file is out of date, please regenerate	Programming file version is out of date	Generate programming file with latest version of Libero SoC.
0x8046	-28	>Authentication Error Unsupported bitstream protocol version	Old programming file	Generate programming file with latest version of Libero SoC.
0x802F	-30	JTAG interface is protected by UPK1	Invalid or no UPK1 is provided	User needs to provide correct UPK1 to unlock device.
0x8030 0x8031 0x8048	-31	Authentication Error Invalid or inaccessible Device Certificate	M2S090 Rev. A or M2S150 Rev. A: Either certificate is corrupted or	User can program a valid application code. This can be done with SoftConsole. FAB_RESET_N should be tied to HIGH.

Error Code	Exit Code	Exit Message	Possible Cause	Possible Solution
			<p>the user hasn't provided the application code in the eNVM or provided invalid application code</p> <p>FAB_RESET_N is tied to ground</p>	
0x8032 0x8033 0x8034 0x8035 0x8036 0x8037 0x8038 0x8039	-32	Instruction timed out	<p>Unstable voltage level</p> <p>Signal integrity issues on JTAG pins</p>	<p>Monitor related power supplies that cause the issue during programming; check for transients outside of Microsemi specifications. See your device datasheet for more information on transient specifications.</p> <p>Monitor JTAG supply pins during programming; measure JTAG signals for noise or reflection.</p>
0x8010	-35	Failed to unlock User Pass Key 1	<p>Pass key in file does not match device.</p> <p>Plaintext pass key match is disabled. This occurs if HSM was used to program the device.</p>	<p>Provide a programming file with a pass key that matches pass key programmed into the device.</p> <p>Match pass key using HSM.</p>
0x8011	-35	Failed to unlock User Pass Key 2	<p>Pass key in file does not match device.</p> <p>Plaintext pass key match is disabled. This occurs if HSM was used to program the device.</p>	<p>Provide a programming file with a pass key that matches pass key programmed into the device.</p> <p>Match pass key using HSM.</p>
0x8012	-35	Failed to unlock debug pass key	<p>Pass key in file does not match device.</p> <p>Plaintext pass key match is disabled. This occurs if HSM was used to program the device.</p>	<p>Provide a programming file with a pass key that matches pass key programmed into the device.</p> <p>Match pass key using HSM.</p>
0x804D	-36	<HSM related error message based on scenario>	HSM communication error. HSM call returns error.	Check if HSM the communication path to HSM is up. Make sure project is loaded properly and that HSM tickets have not been cleaned.
0x804E	-37	Device already has Security programmed. Please erase the device using master file before reprogramming Security Settings.	HSM flow does not support reprogramming device directly if Security has already been programmed.	Erase security and try programming the device.

Exit Codes for Software v8.6 and Above (SmartFusion, IGLOO, ProASIC3 and Fusion)

The table below lists exit codes for SmartFusion, IGLOO, ProASIC3 and Fusion devices in software v8.6 and ABOVE only. See the [Device Exit Codes for pre-v8.6 Software](#) help topic for exit codes for older versions.

Note: Exit codes with positive integers are reserved for current and future standard EXIT codes of the STAPL standard. Exit codes with negative integers are reserved for vendor-specific EXIT codes.

Table 25 · Exit Codes for SmartFusion, IGLOO, ProASIC3 and Fusion Family Devices in Software v8.6 and Above

Error Code	Exit Code	Exit Message	Possible Cause	Possible Solution
	0	Passed (no error)		
	1	A physical chain does not match the expected set up from the STAPL file. Also known as Checking Chain Error.	Physical chain configuration has been altered. Something has become disconnected in the chain. The specific IR length of non-Microsemi devices may be incorrect. The order of the specified chain may be incorrect.	
0x8052	5	Failed to enter programming mode.	Unstable VPUMP voltage level. Unstable VCC Signal integrity issues on JTAG pins. Device is in FlashFreeze mode (ProASIC3 or IGLOO devices) Older software or programming file used.	Monitor related power supplies that cause the issue during programming; check for transients outside of Microsemi specifications. See your device datasheet for more information on transient specifications. Monitor VJTAG during programming; measure JTAG signals for noise or reflection. Disable the FlashFreeze pin (ProASIC3 or IGLOO devices) Generate STAPL file with the latest version of Designer/FlashPro. Use latest version of FlashPro software.
0x801D 0x8053	6	Failed to verify IDCODE	Incorrect programming file Incorrect device in chain Signal integrity issues on JTAG pins	Choose the correct programming file and select the correct device in chain. Measure JTAG pins and noise or reflection. If TRST is left floating then add pull-up to pin. Reduce the length of ground connection.

Error Code	Exit Code	Exit Message	Possible Cause	Possible Solution
0x8005 0x8009 0x800B	6	Failed to verify AES Sec.	Programming file generated with an older version of software	Generate STAPL file with the latest version of Designer/FlashPro. Use latest version of FlashPro software. Try again at a slower TCK. Contact Microsemi Technical Support.
0x8008	6	Failed to verify IDCODE. Target is an M7 device	File is not for M7, but target device is M7 Signal integrity issues on JTAG pins.	Check that the target device is M7 enabled. Make sure that the programming file you generated is for an M7-enabled device. Measure JTAG pins, noise and reflection.
0x800A	6	Failed to verify IDCODE Target is an M1 device	Files not for M1, but target device is M1. Signal integrity issues on JTAG pins	Check that the target device is M1 enabled. Make sure the programming file generated is for an M1-enabled device. Monitor VJTAG during programming; measure JTAG signals for noise or reflection.
0x800C	6	Failed to verify IDCODE. Core enabled device detected	File is not for target device. Signal integrity issues on JTAG pins	Check the target device; make sure the programming file generated is matches the target device. Monitor VJTAG during programming; measure JTAG signals for noise or reflection.
0x800D	6	Failed to verify IDCODE. The target is not M7 device	File is for M7 but target device is not M7. Signal integrity issues on JTAG pins.	Check that the target device is not M7 enabled. Make sure that the programming file generated is for non-M7 enabled device. Monitor VJTAG during programming; measure JTAG signals for noise or reflection.
0x800E	6	Failed to verify IDCODE. Target is not an M1 device	File is for M1, but target device is not M1. Signal integrity issues on JTAG pins	Check that the target device is not M1 enabled. Make sure that the generated programming file is for non-M1 enabled device. Monitor VJTAG during programming; measure JTAG signals for noise or reflection.
0x8006	6	Failed to verify IDCODE. Target is not a P1 device	File is not for P1, but target device is a P1 device. Signal integrity issues on JTAG pins	Check that the target device is P1 enabled. Make sure programming file generated is for M1 enabled device. Monitor VJTAG during programming; measure JTAG signals for noise or reflection.

Error Code	Exit Code	Exit Message	Possible Cause	Possible Solution
0x801E	6	A3PE600 Engineering Sample Device Detected. This device is supported with pre-v8.3 SP1 STAPL files only		Contact Microsemi Technical Support
0x8057	8	Failed Erase Operation.	Unstable VPUMP voltage level. Unstable VCC Unstable VCC_OSC (Fusion only) Unstable VCC_ROSC voltage level (SmartFusion only) Signal integrity issues on JTAG pins.	Monitor related power supplies that cause the issue during programming; check for transients outside of Microsemi specifications. See your device datasheet for more information on transient specifications. Monitor VJTAG during programming; measure JTAG signals for noise or reflection.
0x8058	10	Failed to program FPGA array at row <row number>.	Unstable VPUMP voltage level. Unstable VCC Unstable VCC_OSC (Fusion only) Unstable VCC_ROSC voltage level (SmartFusion only) Signal integrity issues on JTAG pins.	Monitor related power supplies that cause the issue during programming; check for transients outside of Microsemi specifications. See your device datasheet for more information on transient specifications. Monitor VJTAG during programming; measure JTAG signals for noise or reflection.
0x805D 0x805E 0x807B	10	Failed to enable FPGA Array.	Unstable VPUMP voltage level. Unstable VCC Unstable VCC_OSC (Fusion only) Unstable VCC_ROSC voltage level (SmartFusion only) Signal integrity issues on JTAG pins.	Monitor related power supplies that cause the issue during programming; check for transients outside of Microsemi specifications. See your device datasheet for more information on transient specifications. Monitor VJTAG during programming; measure JTAG signals for noise or reflection.

Error Code	Exit Code	Exit Message	Possible Cause	Possible Solution
0x8095 0x8096 0x8097	10	Failed to disable FPGA Array.	Unstable VPUMP voltage level. Unstable VCC Unstable VCC_OSC (Fusion only) Unstable VCC_ROSC voltage level (SmartFusion only) Signal integrity issues on JTAG pins.	Monitor related power supplies that cause the issue during programming; check for transients outside of Microsemi specifications. See your device datasheet for more information on transient specifications. Monitor VJTAG during programming; measure JTAG signals for noise or reflection.
0x8061 0x8062	10	Failed to program FlashROM.	Unstable VPUMP voltage level. Unstable VCC Unstable VCC_OSC (Fusion only) Unstable VCC_ROSC voltage level (SmartFusion only) Signal integrity issues on JTAG pins.	Monitor related power supplies that cause the issue during programming; check for transients outside of Microsemi specifications. See your device datasheet for more information on transient specifications. Monitor VJTAG during programming; measure JTAG signals for noise or reflection.
0x801B 0x801C 0x806C 0x806D 0x806E	10	Error programming Embedded Flash Memory Block (EFMB)	Unstable VCC_NVM/VCC_OSC voltage level (Fusion only) Unstable VCC_ENVM/VCC_RC OSC voltage level (SmartFusion only) Signal integrity issues on JTAG pins NVM corruption is possible when writing from your design; check the NVM status for confirmation.	Monitor related power supplies that cause the issue during programming; check for transients outside of Microsemi specifications. See your device datasheet for more information on transient specifications. Monitor VJTAG during programming; measure JTAG signals for noise or reflection. Reset signal is not properly tied off in your design. Inspect device using Device Debug . Inspect device using Device Debug.
0x807D 0x807E	10	Error programming system init and boot clients	Unstable VCC Unstable VCC_OSC (Fusion only)	Monitor related power supplies that cause the issue during programming; check for transients outside of Microsemi specifications. See your device datasheet for more information on transient specifications.

Error Code	Exit Code	Exit Message	Possible Cause	Possible Solution
			Unstable VCC_ROSC voltage level (SmartFusion only) Signal integrity issues on JTAG pins	Monitor VJTAG during programming; measure JTAG signals for noise or reflection. Inspect device using Device Debug . Inspect device using Device Debug.
0x8069 0x806A 0x806B	10	Error programming Embedded Flash Memory Block (EMFB)	Programming file generated with an older version of software	Generate STAPL file with the latest version of Designer/FlashPro; use the latest version of FlashPro software Try again at a slower TCK Inspect device using Device Debug . Inspect device using Device Debug. Contact Microsemi Technical Support
0x808E 0x808F 0x8090 0x8091	10	Error programming Embedded Flash Memory Block (EFMB)		Try reprogramming Contact Microsemi Technical Support
0x807F 0x8080	10	Error programming system init and boot clients	Programming file generated with an older version of software	Generate STAPL file with the latest version of Designer/FlashPro; use the latest version of FlashPro software Try again at a slower TCK Inspect device using Device Debug . Inspect device using Device Debug. Contact Microsemi Technical Support
0x8059 0x805B	11	Verify 0 failed at row <row number> Verify 1 failed at row <row number>.	Unstable VPUMP voltage level. Unstable VCC Unstable VCC_OSC (Fusion only) Unstable VCC_ROSC voltage level (SmartFusion only) Signal integrity issues on JTAG pins.	Monitor related power supplies that cause the issue during programming; check for transients outside of Microsemi specifications. See your device datasheet for more information on transient specifications. Monitor VJTAG during programming; measure JTAG signals for noise or reflection.
0x8060	11	Failed to verify FlashROM at row	Device is programmed with a different design.	Run VERIFY_DEVICE_INFO to verify the device is programmed with the correct data/design.

Error Code	Exit Code	Exit Message	Possible Cause	Possible Solution
		<FlashROM row number>.	Unstable VPUMP voltage level. Unstable VCC Unstable VCC_OSC (Fusion only) Unstable VCC_ROSC voltage level (SmartFusion only) Signal integrity issues on JTAG pins.	Monitor related power supplies that cause the issue during programming; check for transients outside of Microsemi specifications. See your device datasheet for more information on transient specifications. Monitor VJTAG during programming; measure JTAG signals for noise or reflection.
0x8075 0x8076 0x8077	11	Failed to verify Embedded Flash Memory Block (EFMB)	Device is programmed with a different design. Unstable VCC Unstable VCC_NVM/VCC_OSC (Fusion only) Unstable VCC_ENVM/VCC_ROSC voltage level (SmartFusion only) Signal integrity issues on JTAG pins. The EFMB data was modified in your FPGA design after programming. This could have occurred during standalone verify. The target EFMB is locked with FlashLock when running ACTION PROGRAM_NVM_ACTIVE_ARRAY or VERIFY_NVM_ACTIVE_ARRAY.	Verify the device is programmed with the correct data/design. Monitor related power supplies that cause the issue during programming; check for transients outside of Microsemi specifications. See your device datasheet for more information on transient specifications. Measure JTAG pins, and noise or reflection. Run DEVICE_INFO to confirm if the target EFMB block is locked with FlashLock (pass key). If the target EFMB block is locked, then you must unlock it by erasing the security and then reprogramming with the desired security settings. After unlocking the target EFMB block attempt to rerun the target ACTION. Inspect device using Device Debug . Inspect device using Device Debug.
0x8085 0x8086	11	Failed to verify system init and boot clients	Device is programmed with a different design. Unstable VCC Unstable	Verify the device is programmed with the correct data/design. Monitor related power supplies that cause the issue during programming; check for transients outside of Microsemi specifications. See your

Error Code	Exit Code	Exit Message	Possible Cause	Possible Solution
			<p>VCC_NVM/VCC_OSC (Fusion only)</p> <p>Unstable VCC_ENVM/VCC_RO SC voltage level (SmartFusion only)</p> <p>Signal integrity issues on JTAG pins.</p> <p>The EFMB data was modified in your FPGA design after programming. This could have occurred during standalone verify.</p> <p>The target EFMB is locked with FlashLock when running ACTION PROGRAM_NVM_ACTIVE_ARRAY or VERIFY_NVM_ACTIVE_ARRAY.</p>	<p>device datasheet for more information on transient specifications.</p> <p>Measure JTAG pins, and noise or reflection.</p> <p>Run DEVICE_INFO to confirm if the target EFMB block is locked with FlashLock (pass key). If the target EFMB block is locked, then you must unlock it by erasing the security and then reprogramming with the desired security settings. After unlocking the target EFMB block attempt to rerun the target ACTION.</p> <p>Inspect device using Device Debug. Inspect device using Device Debug.</p>
0x8072 0x8073 0x8074	11	Failed to verify Embedded Flash Memory Block (EFMB)	Programming file generated with an older version of software	<p>Generate STAPL file with the latest version of Designer/FlashPro; use the latest version of FlashPro software</p> <p>Try again at a slower TCK</p> <p>Inspect device using Device Debug. Inspect device using Device Debug.</p> <p>Contact Microsemi Technical Support</p>
0x8083 0x8084	11	Failed to verify system init and boot clients	Programming file generated with an older version of software	<p>Generate STAPL file with the latest version of Designer/FlashPro; use the latest version of FlashPro software</p> <p>Try again at a slower TCK</p> <p>Inspect device using Device Debug.</p> <p>Contact Microsemi Technical Support</p>
0x8014 0x8015	11	Failed to verify calibration data	<p>Unstable VCC</p> <p>Unstable VCC_NVM/VCC_OSC (Fusion only)</p>	<p>Monitor related power supplies that cause the issue during programming; check for transients outside of Microsemi specifications. See your device datasheet for more information on transient specifications.</p>

Error Code	Exit Code	Exit Message	Possible Cause	Possible Solution
			Unstable VCC_ENVM/VCC_ROSC voltage level (SmartFusion only) Signal integrity issues on JTAG pins	Monitor VJTAG during programming; measure JTAG signals for noise or reflection. Try reprogramming. Workaround: Disable optional procedure CHECK_AND_BACKUP_CALIB
0x805A 0x805C	11	Verify 0 failed at row <row number> . Verify 1 failed at row <row number>	Device is programmed with a different design Unstable VPUMP voltage level. Unstable VCC Unstable VCC_OSC (Fusion only) Unstable VCC_ROSC voltage level (SmartFusion only) Signal integrity issues on JTAG pins	Run VERIFY_DEVICE_INFO to verify the device is programmed with the correct data/design. Monitor related power supplies that cause the issue during programming; check for transients outside of Microsemi specifications. See your device datasheet for more information on transient specifications. Monitor VJTAG during programming; measure JTAG signals for noise or reflection.
0x8063	14	Failed to program Silicon Signature. Failed to program security lock settings.	Signal integrity issues on JTAG pins.	Monitor related power supplies that cause the issue during programming; check for transients outside of Microsemi specifications. See your device datasheet for more information on transient specifications. Monitor VJTAG during programming; measure JTAG signals for noise or reflection.
0x8068	-18	Failed to authenticate the encrypted data.	Incorrect AES key. Signal integrity issues on JTAG pins.	Generate a programming file with the correct AES key. Monitor VJTAG during programming; measure JTAG signals for noise or reflection.
0x805F	-20	Failed to verify FlashROM at row <FlashROM row number>.	Programming file generated with an older version of software Device is programmed with a different design. Unstable VPUMP voltage level. Unstable VCC	Generate STAPL file with the latest version of Designer/FlashPro; use the latest version of FlashPro software. Program with the correct data/design. Monitor related power supplies that cause the issue during programming; check for transients outside of Microsemi specifications. See your device datasheet for more information on transient specifications. Measure JTAG pins and noise or reflection.

Error Code	Exit Code	Exit Message	Possible Cause	Possible Solution
			Unstable VCC_OSC (Fusion only) Unstable VCC_ROSC voltage level (SmartFusion only) Signal integrity issues on JTAG pins.	
0x8065	-22	Failed to program pass key.	Unstable VPUMP voltage level. Unstable VCC Unstable VCC_OSC (Fusion only) Unstable VCC_ROSC voltage level (SmartFusion only) Signal integrity issues on JTAG pins.	Monitor related power supplies that cause the issue during programming; check for transients outside of Microsemi specifications. See your device datasheet for more information on transient specifications. Monitor VJTAG during programming; measure JTAG signals for noise or reflection.
0x8066	-23	Failed to program AES key.	Unstable VPUMP voltage level. Unstable VCC Unstable VCC_OSC (Fusion only) Unstable VCC_ROSC voltage level (SmartFusion only) Signal integrity issues on JTAG pins.	Monitor related power supplies that cause the issue during programming; check for transients outside of Microsemi specifications. See your device datasheet for more information on transient specifications. Measure JTAG pins and noise or reflection.
0x8055 0x8056	-24	Failed to program UROW.	Unstable VPUMP voltage level. Unstable VCC Unstable VCC_OSC (Fusion only) Unstable VCC_ROSC voltage level (SmartFusion only) Signal integrity issues on JTAG pins.	Monitor related power supplies that cause the issue during programming; check for transients outside of Microsemi specifications. See your device datasheet for more information on transient specifications. Monitor VJTAG during programming; measure JTAG signals for noise or reflection. Make sure you mounted 0.01μF and 0.33μF caps on Vpump (close to the pin).

Error Code	Exit Code	Exit Message	Possible Cause	Possible Solution
0x802A	-27	FlashROM Write/Erase is protected by the passkey. A valid passkey needs to be provided.	File contains no passkey and device is secured with a passkey. Passkey in the file does not match device.	Provide a programming file with a passkey that matches the passkey programmed into the device.
0x8025	-28	FPGA Array Write/Erase is protected by the passkey. A valid pass key needs to be provided.	File contains no passkey and device is secured with a passkey. Passkey in the file does not match device.	Provide a programming file with a passkey that matches the passkey programmed into the device.
0x802B 0x802D	-29	FlashROM Read is protected by passkey. A valid passkey needs to be provided.	File contains no passkey and device is secured with a passkey. Passkey in the file does not match device.	Provide a programming file with a pass key that matches the passkey programmed into the device
0x8024 0x8026	-30	FPGA Array verification is protected by a passkey. A valid passkey needs to be provided.	File contains no passkey and device is secured with a passkey. Passkey in the file does not match device.	Provide a programming file with a passkey that matches the passkey programmed into the device.
0x804B 0x8001 0x8007	-31	Failed to verify AES key.	<p>AES key in the file does not match the device.</p> <p>Unstable VCC</p> <p>Unstable VCC_OSC (Fusion only)</p> <p>Unstable VCC_ROSC voltage level (SmartFusion only)</p> <p>Unstable JTAG/VPUMP voltage level.</p>	<p>Provide a programming file with an AES key that matches the AES key programmed into the device.</p> <p>Monitor related power supplies that cause the issue during programming; check for transients outside of Microsemi specifications. See your device datasheet for more information on transient specifications.</p> <p>Monitor VJTAG during programming; measure JTAG signals for noise or reflection.</p>
0x8000	-31	Failed to verify AES key.	Programming file generated with an older version of software	Generate STAPL file with the latest version of Designer/FlashPro; use the latest version of FlashPro software.

Error Code	Exit Code	Exit Message	Possible Cause	Possible Solution
				Try again at a slower TCK Contact Microsemi Technical Support
0x8020 0x8022 0x8028	-33	FPGA Array encryption is enforced. A programming file with encrypted FPGA array data needs to be provided.	File contains unencrypted array data, but device contains AES key.	Provide a programming file with an encrypted FPGA Array data.
0x802C 0x802F	-34	FlashROM encryption is enforced. A programming file with encrypted FlashROM data needs to be provided.	File contains unencrypted FlashROM data, but the device contains an AES key.	Provide a programming file with an encrypted FlashROM data.
0x801F 0x804A	-35	Failed to match pass key.	Pass key in file does not match pass key in device.	Provide a programming file with a pass key that matches the pass key programmed into the device.
0x802E 0x8030	-36	FlashROM Encryption is not enforced. Cannot guarantee valid AES key present in target device. Unable to proceed with Encrypted FlashROM programming.	File contains encrypted FlashROM, but device encryption is not enforced for FlashROM	Regenerate security programming file with proper AES key. Program device security. Retry programming FlashROM with encrypted programming file.
0x8021 0x8023 0x8027 0x8029	-37	FPGA Array Encryption is not enforced. Cannot guarantee valid AES key present in target device. Unable to proceed with Encrypted FPGA Array verification.	File contains encrypted FPGA Array, but the device encryption is not enforced for FPGA Array.	Regenerate security programming file with proper AES key. Program device security. Retry programming FPGA Array with encrypted programming file.
0x8067	-38	Failed to program pass key.	Unstable VPUMP voltage level.	Monitor related power supplies that cause the issue during programming; check for transients

Error Code	Exit Code	Exit Message	Possible Cause	Possible Solution
			Unstable VCC Unstable VCC_OSC (Fusion only) Unstable VCC_ROSC voltage level (SmartFusion only) Signal integrity issues on JTAG pins. Bad device.	outside of Microsemi specifications. See your device datasheet for more information on transient specifications. Measure JTAG pins and noise or reflection.
0x806F 0x8070 0x8071 0x8081 0x8082 0x8089	-39	ERROR: 2 or more errors found on this page	Unstable VCC_NVM/VCC_OSC voltage (Fusion only) Unstable VCC_ENVM/VCC_ROSC (SmartFusion only) NVM reset signal is floating in user design 2 or more ECC errors found when reading the eNVM	Monitor related power supplies that cause the issue during programming; check for transients outside of Microsemi specifications. See your device datasheet for more information on transient specifications. Bias NVM reset to a logic state in user design. Try reprogramming.
0x8010	-39	ERROR: 2 or more errors found on this page.	2 or more ECC errors found when reading the master calibration data	The master calibration data has been corrupted. Try restoring master calibration from backup, if it exists, by running RECOVER_CALIB. Workaround: Disable optional procedure CHECK_AND_BACKUP_CALIB
0x8013	-39	ERROR: 2 or more errors found on this page.	2 or more ECC errors found when verifying the backup calibration	Rerun action to attempt to write backup calibration again. Workaround: Disable optional procedure CHECK_AND_BACKUP_CALIB
0x8078 0x8079 0x807A 0x8087 0x8088	-40	Embedded Flash Memory Block MAC Failure.	Data in the file is encrypted with a different AES key than the device.	Verify the programming file is generated from the latest version of Designer/FlashPro.
0x8002 0x8003	-42	Failed to verify security settings.	File security settings do not match device.	Provide a programming file with security setting that match the security settings programmed into the device.
0x8093	-42	Failed to verify eNVM/EFMB client	Device eNVM/EFMB client JTAG protection	Verify the device is programmed with the correct eNVM/EFMB client JTAG protection settings

Error Code	Exit Code	Exit Message	Possible Cause	Possible Solution
		JTAG protection settings	settings are not programmed or are programmed with different settings	
0x8004	-43	Failed to verify design information.	File checksum and design name do not match the device.	Verify the device is programmed with the correct data and design.
0x8049	-44	Failed to verify AES key.	The AES key in the file does not match the AES key in the device. File does not contain an AES key and the device is secured with an AES key.	Provide a programming file with an AES key that matches the AES key programmed into the device.
0x8054	-45	Device package does not match the programming file.	Programming file was generated with an older version of software	Generate STAPL file with the latest version of Designer/FlashPro; use the latest version of FlashPro software.
0x8033 0x8038 0x803D 0x8042 0x8045 0x8046 0x8047 0x8048	-46	Embedded Flash Memory Block X Read is protected by pass key. A valid pass key needs to be provided.	File contains no pass key or incorrect pass key but EFMB read is secured with a pass key.	Provide a programming file with the correct pass key.
0x8034 0x8039 0x803E 0x8043	-46	Embedded Flash Memory Block (EFMB) block X Read is not protected by pass key. EFMB content is not secure after encrypted programming. Unable to proceed with encrypted NVM programming.	File contains encrypted EFMB for block X but the device encryption is not enforced for EFMB block X.	Regenerate security programming file with the proper AES key. Program device security. Retry programming with EFMB block X with encrypted programming file.
0x8032 0x8037 0x803C 0x8041	-47	Embedded Flash Memory Block (EFMB) block X encryption is enforced. A programming file with encrypted	The programming EFMB data is not encrypted, but the device contains an AES key with encryption enforced.	Provide a programming file with encrypted EFMB data.

Error Code	Exit Code	Exit Message	Possible Cause	Possible Solution
		EFMB data needs to be provided.		
0x8031 0x8036 0x803B 0x8040	-48	Embedded Flash Memory Block (EFMB) block X Write is protected by pass key. A valid pass key needs to be provided.	File contains no pass key or incorrect pass key, but device is secured with a pass key.	Provide a programming file with a passkey that matches the passkey programmed into the device.
0x8035 0x803A 0x803F 0x8044	-49	Embedded Flash Memory Block (EFMB) block X Encryption is not enforced. Cannot guarantee valid AES key present in target device. Unable to proceed with Encrypted EFMB programming.	File contains encrypted EFMB for block X, but the device encryption is not enforced for EFMB block X.	Regenerate security programming file with proper AES key. Program device security. Retry programming EFMB block X with encrypted programming file.
0x801A	-50	No backup calibration data found or backup calibration data has been corrupted	No backup calibration copy has been made or the backup copy has been corrupted	If master copy is still intact, rerun Action to create backup calibration copy. Workaround: Disable optional procedure CHECK_AND_BACKUP_CALIB
8x804E	-51	Failed to access Embedded Flash Memory. (AFS600 only)	This version of the silicon does not support programming of the Embedded Flash Memory Block while the FPGA Array is active.	If programming the EFMB while the FPGA is active is not required, then use actions PROGRAM_NVM or VERIFY_NVM. Otherwise, use latest revision of silicon.
0x804F	-52	Failed to access Embedded Flash Memory. (AFS1500 only)	This version of the silicon does not support programming of the Embedded Flash Memory Block while the FPGA Array is active.	If programming the EFMB while the FPGA is active is not required, then use actions PROGRAM_NVM or VERIFY_NVM. Otherwise, use latest revision of silicon.
0x8050	-53	Failed to access Embedded Flash Memory. (AFS1500 only)	This version of the silicon does not support programming block 3 of the EFMBs	If programming the EFMB while the FPGA is active is not required, then use actions PROGRAM_NVM or VERIFY_NVM. Otherwise, use EFMB blocks 0, 1, or 2, but do not use block 3.

Error Code	Exit Code	Exit Message	Possible Cause	Possible Solution
			while the FPGA Array is active.	
0x8051	-54	Failed to access Embedded Flash Memory.	<p>FPGA Array is accessing the target EFMB block while attempting programming.</p> <p>NVM reset signal is stuck in design.</p> <p>Unstable VCC</p> <p>MSS Clock is disabled during programming.</p> <p>MSS Clock is not properly routed to the correct pin.</p>	<p>If programming the EFMB while the FPGA is active is not required, then use actions PROGRAM_NVM or VERIFY_NVM. Otherwise, check the FPGA design or use a different EFMB block that is not being accessed. Check if target EFMB block logic is tied to reset.</p> <p>Monitor related power supplies that cause the issue during programming; check for transients outside of Microsemi specifications. See your device datasheet for more information on transient specifications.</p> <p>Verify that the NVM reset signal in the design is not stuck.</p> <p>Verify the MSS clock is enabled during programming.</p> <p>If the MSS clock is defined as an external I/O, then verify that it is properly routed to the correct pin.</p>
0x808A 0x8094	-55	Failed to read Embedded Flash Memory Block (EFMB)	Programming file generated with an older version of software	<p>Generate STAPL file with the latest version of Designer/FlashPro; use the latest version of FlashPro software</p> <p>Try again at a slower TCK</p> <p>Inspect device using Device Debug</p> <p>Contact Microsemi Technical Support</p>
0x808B	-55	Failed to read Embedded Flash Memory Block (EFMB)	<p>Unstable VPUMP voltage level.</p> <p>Unstable VCC</p> <p>Unstable VCC_OSC (Fusion only)</p> <p>Unstable VCC_ROSC voltage level (SmartFusion only)</p> <p>Signal integrity issues on JTAG pins</p>	<p>Monitor related power supplies that cause the issue during programming; check for transients outside of Microsemi specifications. See your device datasheet for more information on transient specifications.</p> <p>Monitor VJTAG during programming; measure JTAG signals for noise or reflection.</p>
0x808C	-55	Failed to read Embedded Flash Memory Block (EFMB)	Internal error	Contact Microsemi Technical Support

Error Code	Exit Code	Exit Message	Possible Cause	Possible Solution
0x8011	-56	Failed to read calibration data		Try reprogramming. Workaround: Disable optional procedure CHECK_AND_BACKUP_CALIB
0x8012	-56	Failed to read calibration data	Unstable VCC Unstable VCC_NVM/VCC_OSC (Fusion only) Unstable VCC_ENVM/VCC_ROSC voltage level (SmartFusion only) Signal integrity issues on JTAG pins	Monitor related power supplies that cause the issue during programming; check for transients outside of Microsemi specifications. See your device datasheet for more information on transient specifications. Measure JTAG voltages, noise, and reflection. Try reprogramming. Workaround: Disable optional backup procedure CHECK_BACKUP_CALIB
0x808D 0x8092	-57	eNVM/EFMB is protected by a Pass Key; you must provide a valid Pass Key	File contains no Pass Key and device is secured with a Pass Key Pass Key in the file does not match device	Provide a programming file with a Pass Key that matches the Pass Key programmed into the device

Exit Codes for pre-v8.6 Software (SmartFusion, IGLOO, ProASIC3 and Fusion)

The table below lists exit codes for SmartFusion, IGLOO, ProASIC3 and Fusion devices in pre-v8.6 software only. This includes v8.5 SP2, v8.5 SP1, v8.5, etc. See the [Device Exit Codes for Software v8.6 and Above](#) help topic for exit codes for older versions.

Note: Exit codes with positive integers are reserved for current and future standard EXIT codes of the STAPL standard. Exit codes with negative integers are reserved for vendor-specific EXIT codes.

Table 26 · Exit Codes for SmartFusion, IGLOO, ProASIC3 and Fusion Family Devices in pre-v8.6 Software

Exit Code	Exit Message	Possible Cause	Possible Solution
0	Passed (no error).		
1	A physical chain does not match the expected set up from the STAPL file. Also known as Checking Chain Error.	Physical chain configuration has been altered. Something has become disconnected in the chain. The specific IR length of non-Microsemi devices may be incorrect. The order of the specified chain may be incorrect.	

Exit Code	Exit Message	Possible Cause	Possible Solution
5	Failed to enter programming mode.	Unstable VPUMP voltage level. Signal integrity issues on JTAG pins. Older software or programming file used.	Monitor VPUMP voltage during programming Measure JTAG voltages, noise, and reflection. Generate STAPL file with the latest version of Designer/FlashPro. Use latest version of FlashPro software.
6	Failed to verify IDCODE.	Signal integrity issues on JTAG pins.	Measure JTAG pins, noise and reflection.
8	Failed Erase Operation.	Signal integrity issues on JTAG pins.	Monitor VPUMP voltage during programming. Measure JTAG voltages, noise, and reflection.
10	Failed to program FPGA array at row ", rowNumber, "."	Signal integrity issues on JTAG pins.	Monitor VPUMP voltage during programming. Measure JTAG voltages, noise, or reflection.
10	Failed to enable FPGA Array.	Signal integrity issues on JTAG pins.	Monitor VPUMP voltage during programming. Measure JTAG voltages, noise, or reflection.
10	Failed to program FlashROM.	Signal integrity issues on JTAG pins.	Monitor VPUMP voltage during programming. Measure JTAG voltages, noise, and reflection.
11	Verify 0 failed at row",rowNumber, "." Verify 1 failed at row",rowNumber, "." Failed to verify FlashROM at row",from rowNumber-1.	Device is programmed with a different design. Signal integrity issues on JTAG pins.	Run VERIFY_DEVICE_INFO to verify the device is programmed with the correct data/design. Monitor VPUMP voltage during programming. Measure JTAG voltages, noise and reflection .
14	Failed to program Silicon Signature. Failed to program security lock settings.	Signal integrity issues on JTAG pins.	Monitor VPUMP voltage during programming. Measure JTAG voltages, noise, and reflection.
-18	Failed to authenticate the encrypted data.	Incorrect AES key. Signal integrity issues on JTAG pins.	Generate a programming file with the correct AES key. Measure JTAG voltages, noise and reflection
-20	Failed to verify FlashROM at row ", FRowRowNumber-1.	Device is programmed with a different design. Signal integrity issues on JTAG pins.	Program with the correct data/design. Monitor VPUMP level during programming. Measure JTAG pins and noise or reflection.
-22	Failed to program pass key.	Unstable VPUMP voltage level.	Monitor VPUMP voltage during programming. Measure JTAG voltages, noise, and reflection.

Exit Code	Exit Message	Possible Cause	Possible Solution
		Signal integrity issues on JTAG pins.	
-23	Failed to program AES key.	Unstable VPUMP voltage level. Signal integrity issues on JTAG pins.	Monitor VPUMP voltage during programming. Measure JTAG pins and noise or reflection.
-24	Failed to program UROW.	Unstable VPUMP voltage level. Signal integrity issues on JTAG pins.	Monitor VPUMP voltage during programming. Measure JTAG voltages, noise, and reflection. Make sure you mounted 0.01iF and 0.33iF caps on Vpump (close to the pin).
-25	Failed to enter programming mode	Signal integrity issues on JTAG pins.	Measure JTAG voltages, noise, and reflection.
-26	Failed to enter programming mode	Signal integrity issues on JTAG pins.	Measure JTAG voltages, noise, and reflection.
-27	FlashROM Write/Erase is protected by the passkey. A valid passkey needs to be provided.	File contains no passkey and device is secured with a passkey. Passkey in the file does not match device.	Provide a programming file with a passkey that matches the passkey programmed into the device.
-28	FPGA Array Write/Erase is protected by the passkey. A valid pass key needs to be provided.	File contains no passkey and device is secured with a passkey. Passkey in the file does not match device.	Provide a programming file with a passkey that matches the passkey programmed into the device.
-29	FlashROM Read is protected by passkey. A valid passkey needs to be provided.	File contains no passkey and device is secured with a passkey. Passkey in the file does not match device.	Provide a programming file with a pass key that matches the passkey programmed into the device
-30	FPGA Array verification is protected by a passkey. A valid passkey needs to be provided.	File contains no passkey and device is secured with a passkey. Passkey in the file does not match device.	Provide a programming file with a passkey that matches the passkey programmed into the device.
-31	Failed to verify AES key.	AES key in the file does not match the device. Unstable JTAG/VPUMP voltage level.	Provide a programming file with an AES key that matches the AES key programmed into the device. Monitor VPUMP/VJTAG voltage during programming. Measure JTAG voltages, noise, and reflection.
-32	Failed to verify IDC CODE. Target is an M7 device	File is not for M7, but target device is an M7.	Check that the target device is M7 enabled. Make sure programming file generated is for M7 enabled device.

Exit Code	Exit Message	Possible Cause	Possible Solution
		Signal integrity issues on JTAG pins.	Measure JTAG pins , noise, and reflection.
-32	Failed to verify IDCODE. Target is an M1 device	File is not for M1, but target device is an M1 device. Signal integrity issues on JTAG pins.	Check that the target device is M1 enabled. Make sure programming file generated is for M1 enabled device. Measure JTAG pins, noise, and reflection.
-32	Failed to verify IDCODE. Core enabled device detected	File is not for target device. Signal integrity issues on JTAG pins	Check the target device. Make sure programming file generated for target device. Measure JTAG voltages, noise, and reflection.
-32	Failed to verify IDCODE. The target is not an M7 device	File is for M7, but target device is not M7. Signal integrity issues on JTAG pins.	Check that the target device is not M7 enabled. Make sure programming file generated is for non M7 enabled device. Measure JTAG voltages, noise, and reflection.
-32	Failed to verify IDCODE. The target is not an M1 device	File is for M1, but target device is not an M1 device. Signal integrity issues on JTAG pins.	Check that the target device is not M1 enabled. Make sure programming file generated is for non M1 enabled device. Measure JTAG voltages, noise and reflection.
-33	FPGA Array encryption is enforced. A programming file with encrypted FPGA array data needs to be provided.	File contains unencrypted array data, but device contains AES key.	Provide a programming file with an encrypted FPGA Array data.
-34	FlashROM encryption is enforced. A programming file with encrypted FlashROM data needs to be provided.	File contains unencrypted FlashROM data, but the device contains an AES key.	Provide a programming file with an encrypted FlashROM data.
-35	Failed to match pass key.	Pass key in file does not match pass key in device.	Provide a programming file with a pass key that matches the pass key programmed into the device.
-36	FlashROM Encryption is not enforced. Cannot guarantee valid AES key present in target device. Unable to proceed with Encrypted FlashROM programming.	File contains encrypted FlashROM, but device encryption is not enforced for FlashROM	Regenerate security programming file with proper AES key. Program device security. Retry programming FlashROM with encrypted programming file.

Exit Code	Exit Message	Possible Cause	Possible Solution
-37	<p>FPGA Array Encryption is not enforced.</p> <p>Cannot guarantee valid AES key present in target device.</p> <p>Unable to proceed with Encrypted FPGA Array verification.</p>	<p>File contains encrypted FPGA Array, but the device encryption is not enforced for FPGA Array.</p>	<p>Regenerate security programming file with proper AES key.</p> <p>Program device security.</p> <p>Retry programming FPGA Array with encrypted programming file.</p>
-38	Failed to program pass key.	<p>Unstable VPUMP voltage level.</p> <p>Signal integrity issues on JTAG pins.</p> <p>Bad device.</p>	<p>Monitor VPUMP voltage during programming.</p> <p>Measure JTAG pins and noise or reflection.</p>
-39	Failed to verify Embedded Flash Memory Block (EFMB).	<p>Device is programmed with a different design.</p> <p>Signal integrity issues on JTAG pins.</p> <p>The EFMB data was modified through user FPGA design after programming; this could occur during standalone verify.</p> <p>The target EFMB block is locked with FlashLock when running ACTION PROGRAM_NVM_ACTIVE_ARRAY or VERIFY_NVM_ACTIVE_ARRAY.</p>	<p>Verify the device is programmed with the correct data/design.</p> <p>Monitor VPUMP voltage during programming.</p> <p>Measure JTAG pins and noise or reflection.</p> <p>Run DEVICE_INFO to confirm if the target EFMB block is locked with FlashLock (pass key). If the target EFMB block is locked, then you must unlock it by erasing the security and then reprogramming with the desired security settings. After unlocking the target EFMB block attempt to rerun the target ACTION.</p>
-40	Embedded Flash Memory Block MAC Failure.	Data in the file is encrypted with a different AES key than the device.	Verify the programming file is generated from the latest version of Designer/FlashPro.
-41	Error programming Embedded Flash Memory Block. (EFMB)	Signal integrity issues on JTAG pins.	Measure JTAG pins and noise or reflection.
-42	Failed to verify security settings.	File security settings do not match device.	Provide a programming file with security setting that match the security settings programmed into the device.
-43	Failed to verify design information.	File checksum and design name do not match the device.	Verify the device is programmed with the correct data and design.
-44	Failed to verify AES key.	The AES key in the file does not match the AES key in	Provide a programming file with an AES key that matches the AES key programmed into the device.

Exit Code	Exit Message	Possible Cause	Possible Solution
		the device. File does not contain an AES key and the device is secured with an AES key.	
-45	Device package does not match the programming file.		
-46	Embedded Flash Memory Block X Read is protected by pass key. A valid pass key needs to be provided.	File contains no pass key or incorrect pass key but EFMB read is secured with a pass key.	Provide a programming file with the correct pass key.
-47	Embedded Flash Memory Block, block X encryption is enforced. A programming file with encrypted EFMB data needs to be provided.	The programming EFMB data is not encrypted, but the device contains an AES key with encryption enforced.	Provide a programming file with encrypted EFMB data.
-48	Embedded Flash Memory Block (EFMB) block X Write is protected by pass key. A valid pass key needs to be provided.	File contains no pass key or incorrect pass key, but device is secured with a pass key.	Provide a programming file with a passkey that matches the passkey programmed into the device.
-49	Embedded Flash Memory Block (EFMB) block X Encryption is not enforced. Cannot guarantee valid AES key present in target device. Unable to proceed with Encrypted EFMB programming.	File contains encrypted EFMB for block X, but the device encryption is not enforced for EFMB block X.	Regenerate security programming file with proper AES key. Program device security. Retry programming EFMB block X with encrypted programming file.
-51	Failed to access Embedded Flash Memory. (AFS600 only)	This version of the silicon does not support programming of the Embedded Flash Memory Block while the FPGA Array is active.	If programming the EFMB while the FPGA is active is not required, then use actions PROGRAM_NVM or VERIFY_NVM. Otherwise, use latest revision of silicon.
-52	Failed to access Embedded Flash Memory. (AFS1500 only)	This version of the silicon does not support programming of the Embedded Flash Memory	If programming the EFMB while the FPGA is active is not required, then use actions PROGRAM_NVM or VERIFY_NVM. Otherwise, use latest revision of silicon.

Exit Code	Exit Message	Possible Cause	Possible Solution
		Block while the FPGA Array is active.	
-53	Failed to access Embedded Flash Memory. (AFS1500 only)	This version of the silicon does not support programming block 3 of the EFMBs while the FPGA Array is active.	If programming the EFMB while the FPGA is active is not required, then use actions PROGRAM_NVM or VERIFY_NVM. Otherwise, use EFMB blocks 0, 1, or 2, but do not use block 3.
-54	Failed to access Embedded Flash Memory.	FPGA Array is accessing the target EFMB block while attempting programming. NVM reset signal is stuck in design.	If programming the EFMB while the FPGA is active is not required, then use actions PROGRAM_NVM or VERIFY_NVM. Otherwise, check the FPGA design or use a different EFMB block that is not being accessed. Check if target EFMB block logic is tied to reset. Verify that the NVM reset signal in the design is not stuck.

ProASIC^{PLUS} and ProASIC Exit Codes

The table below lists the exit codes for ProASIC^{PLUS} and ProASIC family devices.

Table 27 · ProASIC^{PLUS} and ProASIC Family Devices Exit Codes

Exit Code	Exit Message	Possible Cause	Possible Solution
0	This message means passed. This does not indicate an error.		
1	A physical chain does not match the expected set up from the STAPL file. Also known as Checking Chain Error.	Physical chain configuration has been altered. Something has become disconnected in the chain. The specific IR length of non-Microsemi devices may be incorrect. The order of the specified chain may be incorrect.	
2	There is a reading device ID failure.	The device either does not have a valid device ID or the data cannot be read correctly.	Check the device ID.
3	This occurs when using ProASIC ^{PLUS} devices.	Connect was set up for a ProASIC device and the device is actually ProASIC ^{PLUS} .	Set up for a ProASIC ^{PLUS} device.
5	Programming set up problem. Also known as Entering ISP Failure.	The A500K device senses the VDDL power supply as being on.	Power the VDDL down during programming. Check the device has the correct voltages on VDDP, VDDL, VPP, and VPN.
6	The IDCODE of the target device does not match the expected	The device targeted in the STAPL file does not match the device being programmed. User selected wrong device.	Choose the correct STAPL file and select the correct device. Measure JTAG pins and noise

Exit Code	Exit Message	Possible Cause	Possible Solution
	value in the STAPL file. This is a JEDEC standard message.	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.	or reflection. TRST should be floating or tied high. Cut down the extra length of ground connection.
7	Unknown algorithm: alg=x, prev=x Invalid data read from device	<p>This occurs with current STAPL files when the revision written into the factory row is not rev 1 for ProASICPLUS or 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.</p> <p>It can occur if you are using Engineering Sample parts that are no longer supported, such as ProASIC Engineering Sample parts.</p> <p>This error can also occur if the programmer has trouble reading the factory row due to signal noise, crosstalk, or reflections on the JTAG signal and clock lines.</p> <p>It can occur if you program an -F ProASICPLUS device with an old STAPL file.</p> <p>This error occurs if you connected VPP and VPN the wrong way.</p> <p>It occurs if there are no bypass Caps on VPP VPN, which damaged the device.</p> <p>This error may occur if your power supply cannot source the correct current for programming.</p>	<p>Re-generate STAPL file from Designer 6.1 SP1.</p> <p>Replace A500K ES parts with commercial parts.</p> <p>Double check VPP and VPN connections.</p> <p>Make sure VPP and VPN have correct bypass caps.</p> <p>Make sure that your power supply can deliver the correct current during programming.</p>
8	FPGA failed during the erase operation.	The device is secured, and the corresponding STAPL file is not loaded. The device has been permanently secured and cannot be unlocked.	Load the correct STAPL file.
11	FPGA failed verify	The device is secured and the corresponding STAPL file is not loaded. You used the Libero IDE software v2.3 or earlier or the Designer R1-2003 software or earlier to generate the STAPL file. VPN caps were soldered in the wrong polarity.	Load the correct STAPL file. Use later software versions — at least Libero v2.3 SP1 and Designer R1-2003 SP1. Double-check the VPN bypass caps polarity.
12	Security is enabled.	The device is secured and the wrong key/STAPL file was entered. The device is damaged. The verification was interrupted and therefore fails, causing the software to think the device is secure.	
14	Program security failure.		

Exit Code	Exit Message	Possible Cause	Possible Solution
15	This is a factory Calibration Data CRC error.	During program, erase, or verify, you must read back Calibration Data from the FPGA. The data contains a CRC. You use the CRC to ensure the data is not corrupted/wrong. Device is damaged. Noise on the FTAL signals causes the programmer to read back wrong data.	
17	The device has been secured. Write-security is enabled.	The device is secured and the wrong key or STAPL file was entered. The device is damaged.	Load the correct STAPL file.
-54	Failed to access Embedded Flash Memory	Analog power supplies (Vcc15A, Vcc33A, GNDAQ and GNDA) are not connected.	Connect the analog power supplies (Vcc15A, Vcc33A, GNDAQ and GNDA)
-80	Error code results from STAPL files for A500K devices.	An internal calibration (based on DDP and VPP) failed.	Check voltages on the device pins. Check voltages on the VDDP and VPP pins.
-90	Unexpected RCK detected.	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 causes programming to fail. Several FlashPros are programming at the same time and are too close to each other. Programmer not properly installed by Admin.	Disconnect the RCK and make sure TCK has a clean signal. Separate FlashPros away from each other while they are programming Internal ISP. Connect programmer as an Admin in FlashPro.
-91	Calibration data parity error.	Device is damaged.	Replace the device.
	Null	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.	
	Cable to target is not connected properly.	When the Analyze command is executed, the FlashPro looks for target devices. If the cable connection is wrong, FlashPro assumes that nothing is connected at all.	Confirm the connection between the header to the device. If the board supplies the power to the device, make sure the voltage level is correct.

Exit Code	Exit Message	Possible Cause	Possible Solution
	Chain integrity test failed: xx	<p>The connection between the FlashPro programmer and the device is broken.</p> <p>The programmer cable might not be securely inserted into the header.</p> <p>The header is not connected to the JTAG pins of the FPGA correctly.</p> <p>The configuration setting (ProASIC/ProASICPLUS) does not match the target device.</p> <p>Noise or reflections on the JTAG pins has caused communication between the programmer and the device to fail.</p> <p>A dongle is plugged in between the PC parallel port and the FlashPro parallel port cable.</p>	<p>Secure the connections.</p> <p>Check the JTAG pins for signal activity.</p> <p>Check for broken TDO, TMS, and TCK pins.</p> <p>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.</p> <p>Remove the dongle.</p>
	Could not connect to programmer on port lp1 or parallel port device does not support IEEE-1284 negotiation protocol	The remote device does not respond to the negotiation protocol, for a variety of reasons.	<p>Make sure the port is connected.</p> <p>Make sure the connected device is a FlashPro/Lite programmer.</p> <p>Turn the programmer on.</p> <p>Check parallel port setting in BIOS.</p> <p>Make sure that there are no dongles in between the parallel port and the FlashPro connection.</p> <p>Try another parallel cable, the parallel cable might be defective.</p> <p>Check to see if the programmer is damaged.</p> <p>Make sure the FlashPro Lite has power. The FlashPro Lite is powered from the target board through the Vdd pin of the programming header.</p> <p>Make sure the Vdd pin is connected and the target board is powered up.</p> <p>Secure the connection between the cable connector and the programming header.</p> <p>Before you program any devices, you should run the self-diagnostic test. The diagnostic software can be found on the Microsemi web site. If the test fails, please contact Microsemi Customer Technical Support at tech@Microsemi.com for credit and replacement.</p> <p>Note: The Self-test is only</p>

Exit Code	Exit Message	Possible Cause	Possible Solution
			available for FlashPro, not FlashPro Lite.
	External voltage detected on <Supply>	The voltage supply for the FPGA is driven by another source (board, external power-supply), but the user forgot to turn off the supply in the Connect menu.	Set appropriate options in the Connect menu.
	VDPP Disconnected.	There is no Vddp voltage supply to the FPGA. You accidentally turned off the Vddp supply in the Connect menu. The Vddp supply on the board is not functioning.	Check the Vddp supply on the board for appropriate voltages and correct the Connect menu.
	More than one unidentified device.		
	If you want to perform an operation on the ProASIC device, the rest of the devices in the chain must be in bypass mode. To put devices in bypass mode, select Configuration > Chain Parameter (or click the Chain Parameter button in the Single STAPL Configuration window), then set the Pre IR, Pre DR, Post IR or Post DR.	STAPL settings of Pre IR, Pre DR, Post IR, and Post DR do not match the chain configuration. One or more of the devices in the chain is damaged and the ID CODE cannot be read back.	Make sure you have set Pre IR, Pre DR, Post IR, and Post DR to match the chain configuration. If you are still experiencing the failure, it is likely that the device's ID CODE cannot be read and you need to replace the device.
	Cannot find the programmer with ID xxx	The programmer is removed from the PC.	Delete programmer (or reconnect programmer) and select the Refresh Programmer button. See Connecting Programmers for more information.
	Fatal Error: Please check programmer set up.	Software cannot resolve the error encountered in the programmer.	Save the project file, restart the software, and power cycle the programmer.
	External voltage xxx mV is detected on xxx.	You have specified the programmer to drive the xxx but external xxx is detected.	Deselect the xxx in the programmer setting.
	Executing action xxx failed.	The STAPL runtime failed.	
	Executing action xxx with serial index/action xx failed.	The STAPL runtime failed.	

Exit Code	Exit Message	Possible Cause	Possible Solution
	No Vpump voltage source is detected.		Select the Vpump in the Programmer setting. Make sure the external Vpump is properly turned on.
	Vpump short detected.		Use a different programmer. If the problem persists, check the board layout.
	xxx Mhz TCK frequency in this STAPL file is not supported by the FlashPro Lite detected. It supports only 4 MHz TCK frequency.		Check FlashPro Lite version being used. Use FlashPro Lite Rev C or modify the STAPL file to 4 MHz.
	xxx Mhz TCK frequency in this STAPL file is not supported by the FlashPro Lite RevC detected. It supports only 1, 2 or 4 Mhz TCK frequency.		Modify STAPL file to 1, 2, or 4 MHz.
	Cannot find the serial Index/Action xxx in STAPL file.	Mismatch between STAPL file and the Index/Action selection.	Make sure the STAPL file was not overwritten. Save the project with updated serial/action selection.
	Duplicated serial Index/Action xxx was removed.	Mismatch between STAPL file and the Index/Action selection.	Make sure the STAPL file was not overwritten. Save the project with updated serial/action selection.
	Using local backup copy xxx	Cannot find original copy.	Check for available space on the disk. Check that write permissions are enabled.
	FlashPro cannot rename the programmer/device with an existing name.	Name is already in use.	Create a new name.
	FlashPro cannot rename the programmer/device with an invalid character.	Invalid character used in programmer/device name.	Do not use invalid characters.
	Automatic check for updates.		FlashPro can check the Microsemi website to find if an updated version of the software is available. If you

Exit Code	Exit Message	Possible Cause	Possible Solution
			would like to have FlashPro automatically check for software updates, choose Preferences from the File menu. From the Updates tab, you can choose your automatic software update settings. You can also select Software Updates from the Help menu for updates to the FlashPro software.
	FlashPro parse error.	FlashPro software failed to parse the file.	
	FlashPro does not support STAPL files for xxx.	STAPL file not allowed.	Use a STAPL file for your device that is supported by FlashPro.

Electrical Parameters

DC Characteristics for FlashPro5/4/3/3X

Note: The target board must provide the VCC, VCCI, VPUMP, and VJTAG during programming. However, if there is only one ProASIC3 device on the target board, the FlashPro5/4/3/3X can provide the VPUMP power supply via the USB port.

Note: The VJTAG signal is driven from the target/DUT board. The VJTAG pin is sensed by the FP4 to configure the internal input and output buffers to the same IO Voltage levels. The VJTAG pin is only an input pin to the programmer.

Table 28 · DC Characteristic for FlashPro5/4/3/3X

Description	Symbol	Min	Max	Unit
Input low voltage, TDO	VIL	-0.5	0.35*VJTAG	V
Input high voltage, TDO	VIH	0.65*VJTAG	3.6	V
Input current, TDO	IIL, IIH	-20	+20	mA
Input capacitance, TDO			40	pF
Output voltage, VPUMP, operating	VPP	+3.0	+3.6	V
Output current, VPUMP	IPP		250	mA
VJTAG = 1.5V				
Output low voltage, TCK, TMS, TDI, 100μA load	VOL	0.0	0.2	V
Output low voltage, TCK, TMS, TDI, 4mA load	VOL	0.0	0.30*VJTAG	V
Output high voltage, TCK, TMS, TDI, 100μA load	V	VJTAG-0.2	VJTAG	V
Output high voltage, TCK, TMS, TDI, 4mA load	VOH	0.70*VJTAG	VJTAG	V
Output current, TCK, TMS, TDI	IOL, IOH	-4	+4	mA
VJTAG = 1.8V				
Output low voltage, TCK, TMS, TDI, 100μA load	VOL	0.0	0.2	V
Output low voltage, TCK, TMS, TDI, 6mA load	VOL	0.0	0.3	V
Output high voltage, TCK, TMS, TDI, 100μA load	VOH	VJTAG-0.2	VJTAG	V

Description	Symbol	Min	Max	Unit
Output high voltage, TCK, TMS, TDI, 6mA load	VOH	1.25	VJTAG	V
Output current, TCK, TMS, TDI	IOL, IOH	-6	+6	mA
VJTAG = 2.5V				
Output low voltage, TCK, TMS, TDI, 100µA load	VOL	0.0	0.2	V
Output low voltage, TCK, TMS, TDI, 8mA load	VOL	0.0	0.6	V
Output high voltage, TCK, TMS, TDI, 100µA load	VOH	VJTAG-0.2	VJTAG	V
Output high voltage, TCK, TMS, TDI, 8mA load	VOH	1.8	VJTAG	V
Output current, TCK, TMS, TDI	IOL, IOH	-8	+8	mA
VJTAG = 3.3V				
Output low voltage, TCK, TMS, TDI, 100µA load	VOL	0.0	0.2	V
Output low voltage, TCK, TMS, TDI, 8mA load	VOL	0.0	0.4	V
Output high voltage, TCK, TMS, TDI, 100µA load	VOH	VJTAG-0.2	VJTAG	V
Output high voltage, TCK, TMS, TDI, 8mA load	VOH	2.4	VJTAG	V
Output current, TCK, TMS, TDI	IOL, IOH	-8	+8	mA

DC Characteristics for FlashPro Lite

Table 29 - DC Characteristic for FlashPro Lite

Description	Symbol	Min	Max	Unit
Input low voltage, TDO	VIL	-0.5	0.7	V
Input high voltage, TDO	VIH	1.7	5.0	V
Input current, TDO	IIL, IIH	-10	+10	µA
Input capacitance, TDO			40	pF

Description	Symbol	Min	Max	Unit
Input voltage, VDD, operating (see note)		+2.3	+3.5	V
Input voltage, VDD, power off		-1.0	+1.0	V
Input current, VDD	IVDD		500	mA
Output voltage, VPP, operating	VPP	+15.9	+16.5	V
Output voltage, VPN, operating	VPN	-13.8	-13.4	V
Output current, IPP	IPP	0	35	mA
Output current, IPN	IPN	0	-15	mA
Output low voltage, TCK, TMS, TDI, 100uA load	VOL	0.0	0.2	V
Output low voltage, TCK, TMS, TDI, 1mA load	VOL	0.0	0.5	V
Output low voltage, TCK, TMS, TDI, 2mA load	VOL	0.0	0.8	V
Output high voltage, TCK, TMS, TDI, 100uA load	VOH	2.1	2.5	V
Output high voltage, TCK, TMS, TDI, 1mA load	VOH	1.9	2.5	V
Output high voltage, TCK, TMS, TDI, 2mA load	VOH	1.6	2.5	V
Output current, TCK, TMS, TDI, nTRST	IOL, IOH	-2	+2	mA

Note: Up to 3.5 V can be supplied to the FlashPro Lite on the VDD pin. However, if the VDD supply for the FlashPro is also connected to the APA VDD supply, the voltage for the VDD pin cannot exceed 2.7 V.

DC Characteristics for FlashPro

Table 30 - DC Characteristic for FlashPro

Description	Symbol	Min	Max	Unit
Input low voltage, TDO	VIL	-0.5	0.30 * VDDP	V
Input high voltage, TDO	VIH	0.70 * VDDP	5.5	V
Input current, TDO	IIL, IIH	-10	+10	uA
Input voltage, VDDP, VDDL		0	5.25	V
Input voltage, VPP		0	21.0	V

Description	Symbol	Min	Max	Unit
Input voltage, VPN		-21.0		V
Input current, VDDP, VDDL, VPN, VP	IVCC		5.0	mA
Output voltage range, VDDP	VDDP	1.5	3.3	V
Output voltage range, VPP	VPP	15.0	18.0	V
Output voltage range, VPN	VPN	-16.0	-12.0	V
Output voltage resolution / Accuracy			100 / ± 50	mV
Output current, IDDP	IDDP	-135 ¹	+135	mA
Output current, IDDL	IDDL	-135 ¹	+135	mA
Output current, IPP	IPP	-270 ¹	+270	mA
Output current, IPN	IPN	-270	+270 ¹	mA
Output low voltage, TCK, TMS, TDI, OUT0, nTRST	VOL	0.0	0.4	V
Output high voltage, TCK, TMS, TDI, OUT0, nTRST	VOH	0.85 * VDDP	+ 0.3 VDDP	V
Output current, TCK, TMS, TDI, OUT0, nTRST	IOL, IOH	-12	+12	mA

Note: (1): When power supply mode is set to ABI_GROUND.

Note: * - If you want to power-up the device from the board power supply, clear the checkboxes for VDDL and VDDP. VPP and VPN are required during programming only and are supplied by the FlashPro programmer.

Note: (2) Microsemi does not have operating temperature information for the FlashPro programmer. FlashPro is intended to be used as lab or production equipment and not tested at extreme temperatures. All devices in the unit are commercial temp. FlashPro4 went through a burn-in cycle operating at 100C for 250 hours during quality testing. This involved repeatedly powering the programmers and then programming after the burn in; they are not actively programming during the burn in.

Electrical Specifications

FlashPro5

The FlashPro5 is a JTAG and a SPI based programmer for flash based Microsemi devices.

The FlashPro5 output is supplied via a connector to which a detachable 10-pin cable is fitted. The connector on the FlashPro5 unit is a 2x5, RA male Header connector, which is manufactured by AMP and has a manufacturer's part number of 103310-1. This is a standard 2x5, 0.1 pitch connector which is keyed. Use the 10 pin right-angle header, AMP P/N 103310-1 (DigiKey P/N A26285-ND) for FlashPro4 and use the 10 pin straight header, AMP P/N 103308-1 (DigiKey P/N A26267-ND) for the straight version.

The signals on the pins of the FlashPro5 10-pin connector are shown in the figure below.

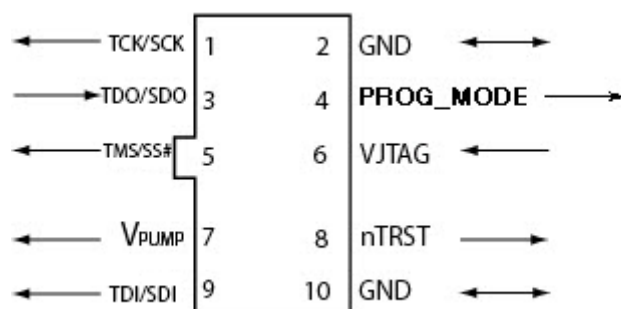


Figure 160 · FlashPro5 10-Pin Connector

Note: All ground pins must be connected. The rectangular shape shows connections on the programmer itself. Arrows show current flow towards or from the rectangular programmer.

The table below shows a description of the signals.

Table 31 · FlashPro5 Signal Description

Signal	Description
VPUMP	3.3V Programming voltage
GND	Signal reference
TCK/SCK	JTAG clock; SPI clock
TDI/SDI	JTAG data input to device; SPI MOSI
TDO/SDO	JTAG data output from device; SPI MISO
TMS/SS#	JTAG mode select; SPI Chip Select
nTRST	Programmable output pin may be set to off, toggle, low, or high level
VJTAG	Reference voltage from the target board
PROG_MODE	IGLOO v2 family - Used for switching from VCC 1.2V to 1.5V during programming

Some designers of high-integrity boards (military and avionic) may arrange their boards so that TRST is tied to ground via a weak pull-down resistor. The purpose of this is to hold the JTAG state-machine in a reset state by default, so that even with TCK oscillating, some sudden ion bombardment or other electrical even will not suddenly throw the JTAG state-machine into an unknown state. If your design also uses a weak pull-down resistor on TRST on your board, then enabling the “Drive TRST” flag will be required to force the JTAG state-machine out of reset to permit programming to take place. With most boards, there is no need to select this flag.

FlashPro4

The FlashPro4 output is supplied via a connector to which a detachable 10-pin cable is fitted. The connector on the FlashPro4 unit is a 2x5, RA male Header connector, which is manufactured by AMP and has a manufacturer's part number of 103310-1. This is a standard 2x5, 0.1 pitch connector which is keyed. Use the 10 pin right-angle header, AMP P/N 103310-1 (DigiKey P/N A26285-ND) for FlashPro4 and use the 10 pin straight header, AMP P/N 103308-1 (DigiKey P/N A26267-ND) for the straight version..

The signals on the pins of the FlashPro4 10-pin connector are shown in the figure below (extracted from FlashPro4 product specification):

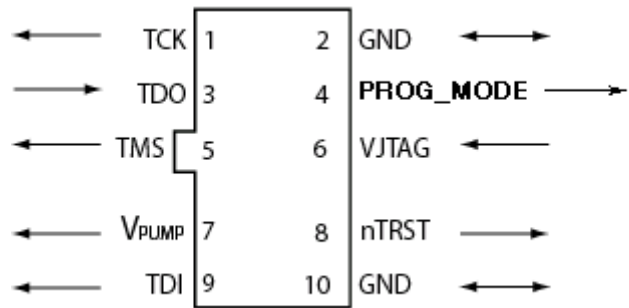


Figure 161 · FlashPro4 10-Pin Connector

Note: All ground pins must be connected. The rectangular shape shows connections on the programmer itself. Arrows show current flow towards or from the rectangular programmer.

The table below shows a description of the signals.

Table 32 · FlashPro4 Signal Description

Signal	Description
VPUMP	3.3V Programming voltage
GND	Signal reference
TCK	JTAG clock
TDI	JTAG data input to device
TDO	JTAG data output from device
TMS	JTAG mode select
nTRST	Programmable output pin may be set to off, toggle, low, or high level
VJTAG	Reference voltage from the target board

Signal	Description
PROG_MODE	IGLOO v2 family - Used for switching from VCC 1.2V to 1.5V during programming

Some designers of high-integrity boards (military and avionic) may arrange their boards so that TRST is tied to ground via a weak pull-down resistor. The purpose of this is to hold the JTAG state-machine in a reset state by default, so that even with TCK oscillating, some sudden ion bombardment or other electrical even will not suddenly throw the JTAG state-machine into an unknown state. If your design also uses a weak pull-down resistor on TRST on your board, then enabling the "Drive TRST" flag will be required to force the JTAG state-machine out of reset to permit programming to take place. With most boards, there is no need to select this flag.

FlashPro3

Note: FlashPro3 is not supported on Windows 8.1.

The FlashPro3 output is supplied via a connector to which a detachable 10-pin cable is fitted. The connector on the FlashPro3 unit is a 2x5, RA male Header connector, which is manufactured by AMP and has a manufacturer's part number of 103310-1. This is a standard 2x5, 0.1 pitch connector which is keyed. Use the 10 pin right-angle header, AMP P/N 103310-1 (DigiKey P/N A26285-ND) for FlashPro5/4/3/3X and use the 10 pin straight header, AMP P/N 103308-1 (DigiKey P/N A26267-ND) for the straight version.

The signals on the pins of the FlashPro3 10-pin connector are shown in the figure below (extracted from FlashPro3 product specification):

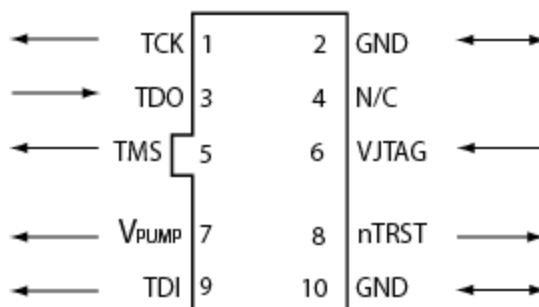


Figure 162 · FlashPro3 10-Pin Connector

Note: All ground pins must be connected. The rectangular shape shows connections on the programmer itself. Arrows show current flow towards or from the rectangular programmer.

The table below shows a description of the signals.

Table 33 · FlashPro3 Signal Description

Signal	Description
VPUMP	3.3V Programming voltage
GND	Signal reference
TCK	JTAG clock
TDI	JTAG data input to device
TDO	JTAG data output from device
TMS	JTAG mode select

Signal	Description
nTRST	Programmable output pin may be set to off, toggle, low, or high level
VJTAG	Reference voltage from the target board
N/C	Programmer does not connect to this pin

Some designers of high-integrity boards (military and avionic) may arrange their boards so that TRST is tied to ground via a weak pull-down resistor. The purpose of this is to hold the JTAG state-machine in a reset state by default, so that even with TCK oscillating, some sudden ion bombardment or other electrical even will not suddenly throw the JTAG state-machine into an unknown state. If your design also uses a weak pull-down resistor on TRST on your board, then enabling the “Drive TRST” flag will be required to force the JTAG state-machine out of reset to permit programming to take place. With most boards, there is no need to select this flag.

FlashPro Lite

For FlashPro Lite, the existing 26-pin connector is shown in the figure below.

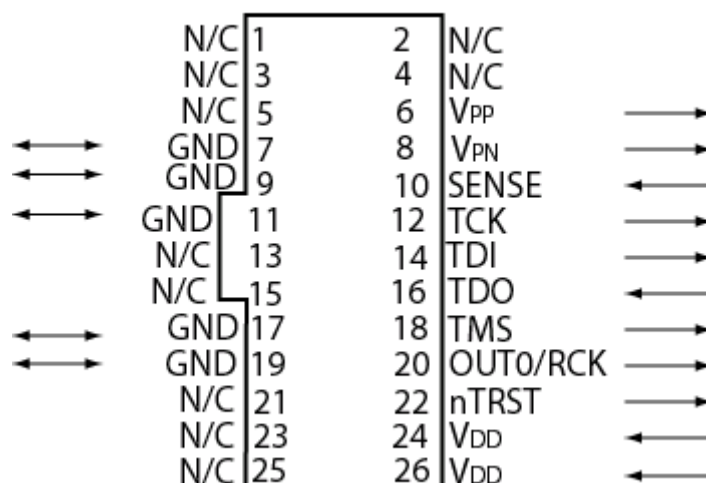


Figure 163 · 26-pin Connector for FlashPro Lite

Note: All ground pins must be connected. The rectangular shape shows connections on the programmer itself. Arrows show current flow towards or from the rectangular programmer.

The appropriate SAMTEC micro connector target cable for this is:

Samtec FFSD-13-D-12.00-01-N.

The 12 inch cable is specified. This is likely to be more than enough to connect to the board and reducing the inductance will help compared with 18 inches, which is supplied by the default with FlashPro Lite.

See the table below for a description of the signals.

Table 34 · FlashPro Lite Signal Description

Signal	Description
VDDP	VDD supply for logic I/O pads
VDDL	VDD supply for core

Signal	Description
VPP	Positive programming supply (+16.5V)
VPN	Negative programming supply(-13.8V)
GND	Signal reference
SENSE	Input from target board to programmer to indicate connection to ground
TCK	JTAG clock
TDI	JTAG data input to device
TDO	JTAG data output from device
TMS	JTAG mode select
nTRST	Programmable output pin may be set to off, toggle, low, or high level
RCK/OUT0	Programmable output pin may be set to off, toggle, low, or high level
N/C	Programmer does not connect to this pin

Some designers of high-integrity boards (military and avionic) may arrange their boards so that TRST is tied to ground via a weak pull-down resistor. The purpose of this is to hold the JTAG state-machine in a reset state by default, so that even with TCK oscillating, some sudden ion bombardment or other electrical even will not suddenly throw the JTAG state-machine into an unknown state. If your design also uses a weak pull-down resistor on TRST on your board, then enabling the "Drive TRST" flag will be required to force the JTAG state-machine out of reset to permit programming to take place. With most boards, there is no need to select this flag.

FlashPro

For FlashPro, you can use the same 26-pin target cable you used for FlashPro Lite, but the connections are shown in the figure below.

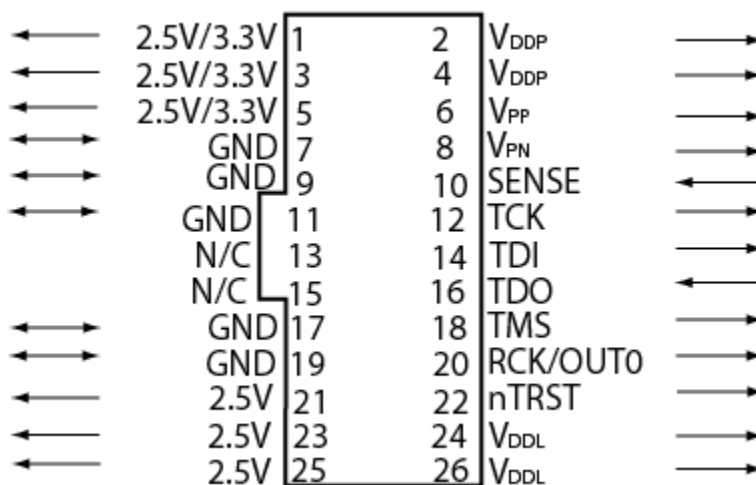


Figure 164 · 26-pin connections for FlashPro

Note: All ground pins must be connected. The rectangular shape shows connections on the programmer itself. Arrows show current flow towards or from the rectangular programmer.

The table below shows the signal pin descriptions for FlashPro.

Table 35 · FlashPro Signal Description

Signal	Description
VDDP	VDD supply for logic I/O pads
VDDL	VDD supply for core
VPP	Positive programming supply (+16.5 V)
VPN	Negative programming supply (-13.8 V)
GND	Signal reference
SENSE	Input from target board to programmer to indicate connection to ground
TCK	JTAG clock
TDI	JTAG data input to device
TDO	JTAG data output from device
TMS	JTAG mode select
nTRST	Programmable output pin may be set to off, toggle, low, or high level
RCK/OUT0	Programmable output pin may be set to off, toggle, low, or high level
2.5V, 2.5V/3.3V, N/C	Programmer does not connect to these pins

Some designers of high-integrity boards (military and avionic) may arrange their boards so that TRST is tied to ground via a weak pull-down resistor. The purpose of this is to hold the JTAG state-machine in a reset state by default, so that even with TCK oscillating, some sudden ion bombardment or other electrical event will not suddenly throw the JTAG state-machine into an unknown state. If your design also uses a weak pull-down resistor on TRST on your board, then enabling the "Drive TRST" flag will be required to force the JTAG state-machine out of reset to permit programming to take place. With most boards, there is no need to select this flag.

FlashPro 5/4/3/3X Characteristics

Table 36 · JTAG Switching Characteristics for FlashPro5/4/3/3X

Description	Symbol	Min	Max	Unit
Output delay from TCK to TDI, TMS	TTCKTDI	-2	2	ns
TDO setup time before TCK rising, VJTAG=3.3	TTDOTCK	12		ns
TDO setup time before TCK rising, VJTAG=1.5	TTDOTCK	14.5		ns
TDO hold time after TCK rising	TTCKTDO	0		ns

Description	Symbol	Min	Max	Unit
TCK period	TTCK	41.7	10667	ns

FlashPro and FlashPro Lite Characteristics

The table below shows the JTAG switching characteristics for FlashPro and FlashPro Lite measured at the programmer end of the JTAG cable.

Table 37 · JTAG Switching Characteristics for FlashPro and FlashPro Lite

Description	Symbol	Min	Max	Unit
Output delay from TCK falling to TDI, TMS	TTCKTDI	-2	2	ns
TDO setup time before TCK rising	TTDOTCK	5.0		ns
TDO hold time after TCK rising	TTCKTDO	0		ns
TCK period	TTCK	40	10240	ns

Illustration of the JTAG Switching Characteristics

The figure below is an illustration of the JTAG switching characteristics.

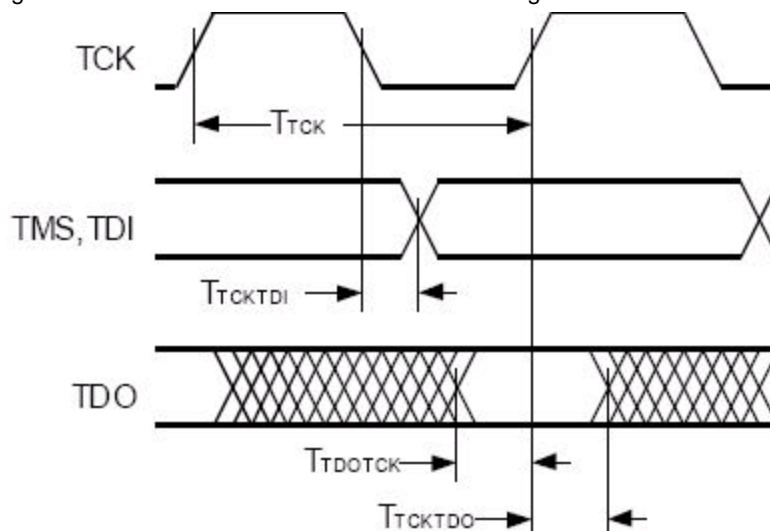


Figure 165 · JTAG Switching Characteristics

Reference Topics

Customizing the Toolbar

Display the tools and commands you frequently use in the toolbar by customizing it.

To customize the toolbar:

1. From the **Customize** menu, choose **Toolbars**. The **Customize** dialog appears.
2. Click the **Toolbar** tab and check the tools you want to display by checking their respective boxes, (see figure below).

Note: You can remove tools from your toolbar by deselecting tools from the Toolbar field.

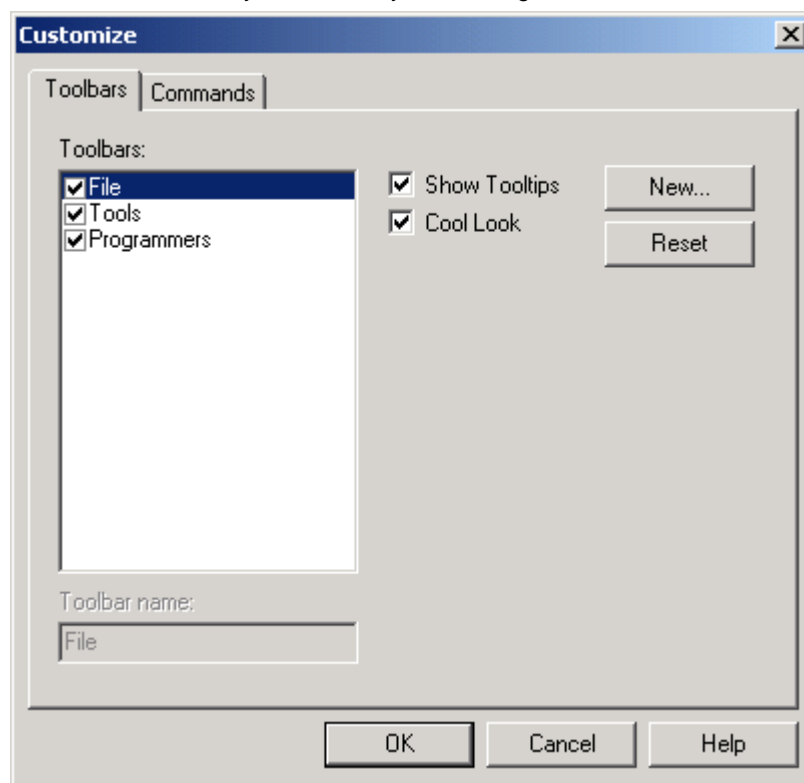


Figure 166 · Customize Dialog Box

3. Click inside the **Show Tooltips** checkbox for assistance in identifying icons on your toolbar when you scroll across them with your mouse.
4. Click inside the **Cool Look** checkbox to change the look of your toolbar.
5. Click **OK**.

You can create multiple toolbars and assign names to them. Click the **New** button and type in a name in the **New toolbar** dialog box to create a new toolbar. The name of your toolbar will display in the **Toolbar** field. Reset your toolbar to the default settings by clicking the **Reset** button.

To customize commands:

1. From the **Customize** menu, choose **Toolbars**. The **Customize** dialog appears.
2. Click the **Commands** tab.

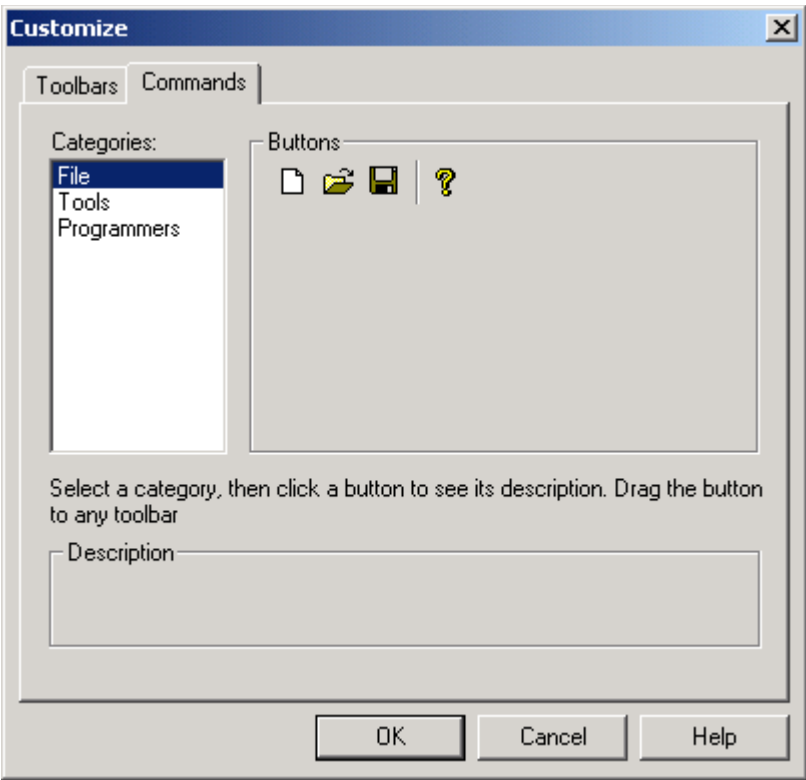


Figure 167 · Customize Dialog Box

- 3. Select a category by clicking one of three options (**File**, **Tools**, or **Programmers**). As you click an option, the buttons to the right of the category area change accordingly.
- 4. Click and drag a button to your toolbar.
- 5. Click **OK** after you have customized your toolbar.

You can also remove commands from your toolbar by reversing the click and drag method described in the steps above. Click and drag tools from your toolbar to the **Buttons** field in the **Customize** dialog box.

Customizing the Programming Window

The FlashPro software also enables you to customize the programmer window by right-clicking on the programmer window's header (see figure below).

Programmer ID	Programmer Name	Programmer Type	Port	Programmer Status	Programmer Enabled
---------------	-----------------	-----------------	------	-------------------	--------------------

Figure 168 · Programming Window Header

The following right-click menu displays (see figure below).

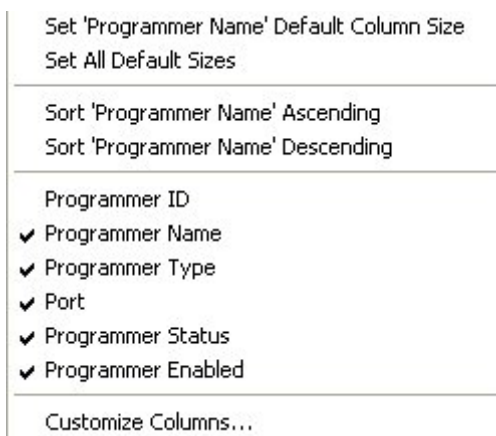


Figure 169 · Right-click Menu

The Customize right-click menu (as shown above) is divided into three sections. Click an item in the first section to set default sizes. Click an item in the second/middle section to add that item to the programmer window, and click the **Advanced** or last section to customize the columns in the **Programmer** window from the **Customize Columns** dialog box (see figure below).

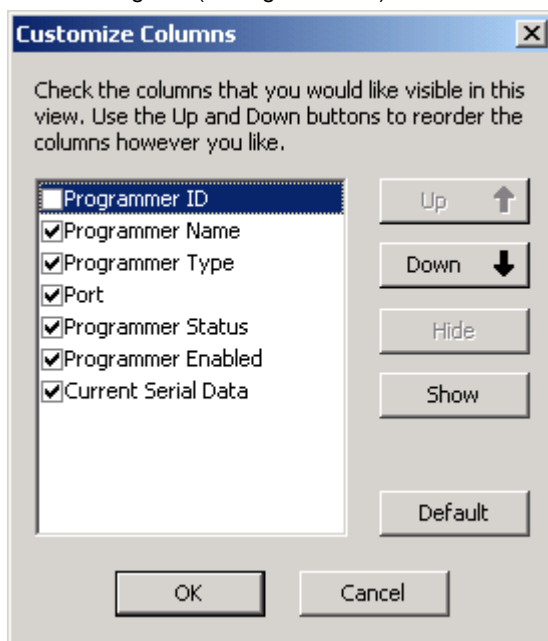


Figure 170 · Customize Columns Dialog Box

Note: Follow the instructions in the Customize Columns dialog box to customize the programming window. Use the Up and Down buttons to move through the list. Use the Show and Hide buttons to hide or show columns in the programmer window.

FlashPro Preferences

The Preferences dialog box includes three tabs: Log Window, Display Mode, and Updates (see figure below). You can access the Preferences dialog box by choosing **File > Preferences**.

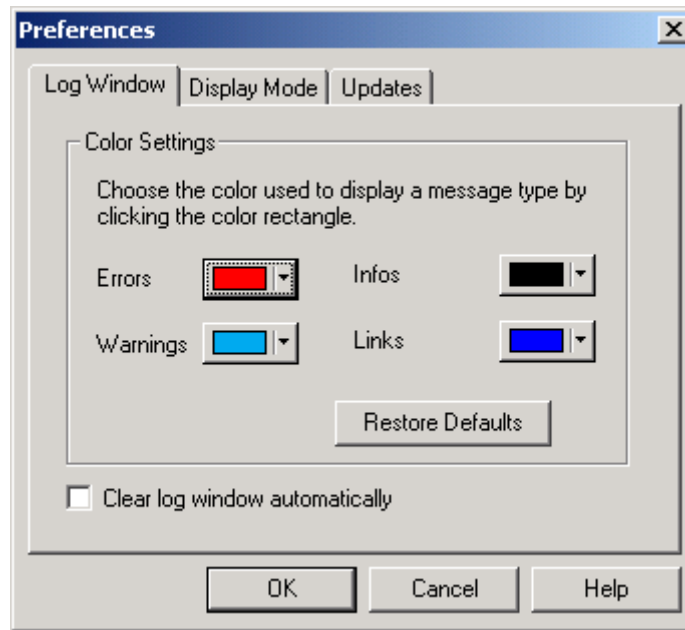


Figure 171 · Preferences Dialog Box

Log Window

The Log Window tab includes options for you to choose color settings for the various messages (Errors, Warnings, Information, Links) displayed in the Log window (see figure above).

Display Mode

The Display Mode tab describes the two display modes available in the FlashPro software (as shown in the figure below). Read each option carefully and choose the mode that will meet your programming needs. As the Preferences dialog box indicates, the Classic Mode is designed for multiple programming runs when it is not necessary for you to change your device settings. The Advanced Mode differs from the Classic Mode because displays both windows (Programmer List and Device Configuration) in the same GUI. Use this mode when you need to change device settings frequently.

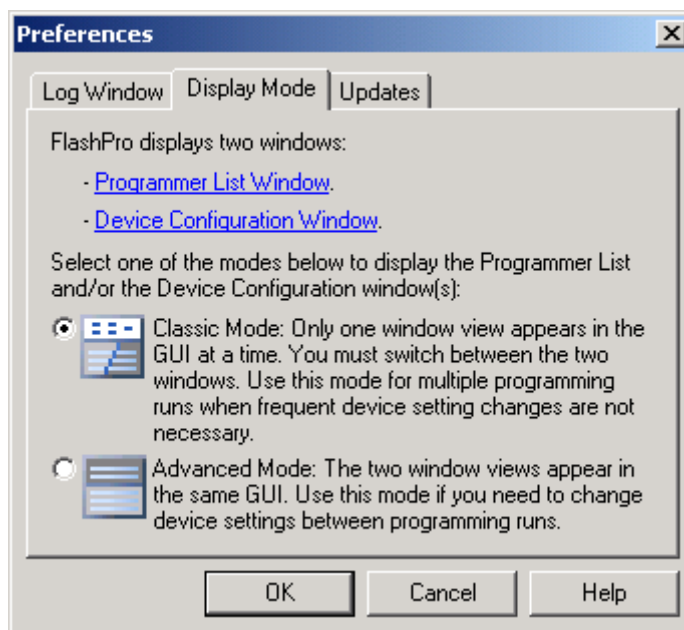


Figure 172 · Preferences Dialog Box- Display Mode

Software Updates

The Updates tab lists the FlashPro software setting options. You can choose to have the FlashPro software automatically check for updates at startup (from the Microsemi website) or remind you to check for updates at startup (requires you to go to the Microsemi SoC website). If you want to decline both options, choose the last option: Do not check for updates or remind me at startup.

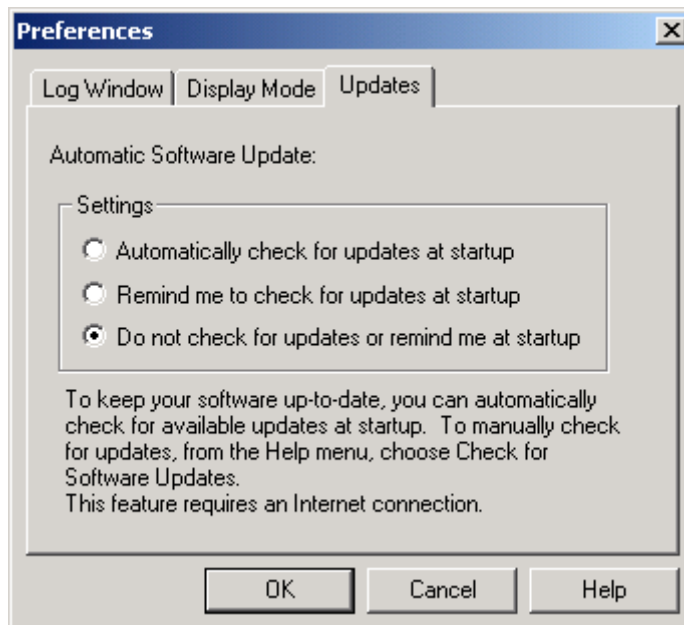





Figure 173 · Preferences Dialog Box- Updates

Software version is up to date

This informational message notifies you that there are no software updates available from Microsemi at this time. You can set your update preferences to automatically check for [software updates](#).

FlashPro File Menu

In the **Chain Programming** mode, the **Edit** menu and the **Configuration** menu changes. The table notes these changes.

Command	Icon	Shortcut	Sub-menu	Function
New Project		Ctrl + N		Create a new project
Open Project		Ctrl + O		Opens the FlashPro Open Project dialog box
Restore Chainbuilder Project				Restores a ChainBuilder project in FlashPro
Close Project				Closes the current project
Save Project		Ctrl + S		Saves the current project
Save Project As				Opens the Save As dialog box; enables you to save your project in a different directory or with a different name
Import Configuration File		Ctrl + I		Opens the Import Configuration File dialog box; enables you to import configuration files for your device(s)
Set Project Log File >			Main Log File	Opens the Set Log File dialog box; sets the location of your main log file
			Serialization Log File	Opens the Set Serialization Log File dialog box; sets the location of your serialization log file
Run Script				Opens the Execute Script dialog box; enables you to run Tcl Scripts with arguments
Export >			Configuration File	Opens the Export Configuration File dialog box; enables you to export configuration file(s)
			Script	Opens the Save As dialog box; enables you to export your actions as a Tcl script
			Chain STAPL File	Opens the Export Chain STAPL File dialog box; enables you to export and save your Chain STAPL file
			Chain SVF File	Opens the Export Chain SVF File dialog box; enables you to

Command	Icon	Shortcut	Sub-menu	Function
				export and save your Chain SVF file
			Single Device STAPL File	Opens the Export Single Device STAPL File dialog box; enables you to export and save your single device STAPL file
			Single Device SVF File	Opens the Export Single Device SVF File dialog box; enables you to export and save your single device SVF file
			Single 1532 File	Opens the Export Single 1532 File dialog box; enables you to export and save your single 1532 file
Preferences				Opens the Preferences dialog box; enables you to set your Log window, Display Mode and Update preferences for FlashPro
Exit				Exits FlashPro

FlashPro Edit Menu

Command	Shortcut	Function
Cut Devices	Ctrl + Shift + X	Removes (cuts) devices from the project
Copy Devices	Ctrl + Shift + C	Copies the selected device(s) to your Clipboard
Paste Devices	Ctrl + Shift + V	Pastes the devices from your Clipboard into the project
Clear Log Window		Clears the Log window (deletes all Log window content)







FlashPro View Menu


The View menu shows or hides the FlashPro GUI elements.

Command	Sub-menu	Function
Status Bar		Shows/hides the FlashPro Status Bar





Command	Sub-menu	Function
Programmer List Window		Shows/hides the Programmer List Window
Programmer Details Window		Shows/hides the Programmer Details Window
Single Device Configuration Window		Shows/hides the Single Device Configuration Window
Log Window		Shows/hides the Log window
Single Device Configuration >	Basic View	Enables the Basic view for the Single Device Configuration window
	Advanced View	Enables the Advanced view for the Single Device Configuration window

FlashPro Tools Menu


Command	Icon	Shortcut	Sub-menu	Function
Mode >			Single-Device Programming	Sets FlashPro to Single-Device Programming mode
			Chain Programming	Sets FlashPro to Chain Programming mode
Serialization >			Skip Serial Data	Sets FlashPro to skip serial data during programming
			Reuse Serial Data	Sets FlashPro to reuse serial data during programming
Programmer Settings				Opens the Programmer Settings dialog box; enables you to set options for all FlashPro programmer types
Import Settings for Non-Microsemi Devices				Opens the Import Settings for Non-Microsemi Devices dialog box; enables you to import your settings for non-Microsemi devices you wish to program with FlashPro
Connect Parallel Port Cable				Opens the Connect Parallel Port Cable dialog box; enables you to connect your parallel port buffer cable

Command	Icon	Shortcut	Sub-menu	Function
Run		Ctrl + Enter		Programs your device

FlashPro Programmers Menu

Command	Icon	Shortcut	Function
Ping			Pings a selected programmer(s)
Self Test			Runs a self-test on the selected programmer(s)
Scan Chain			Runs scan chain on the selected programmer(s)
Remove			Removes the selected programmer(s) from FlashPro
Refresh/Rescan		Ctrl + F5	Refreshes FlashPro and rescans for programmers

FlashPro Configuration Menu

Command	Icon	Shortcut	Sub-menu	Function
Select Action		Ctrl + Shift + A		
Serialization >		Ctrl + Shift + S	Use Serialization	Enables you to use Serialization in FlashPro
		Ctrl + Shift + R	Select Range	Enables you to set your Serialization range
		Ctrl + Shift + U	View Status	Enables you to view your Serialization status
Load Programming File		Ctrl + Shift + L		Opens the Load Programming File dialog box
Unload Programming File				Removes (unloads) your programming file from FlashPro

Command	Icon	Shortcut	Sub-menu	Function
PDB Configuration		Ctrl + Shift + P		Opens the PDB Configuration dialog box; enables you to set your PDF configuration options
Select Target Device		Ctrl Shift + D		Opens the Select Target Device dialog box; enables you to set your target device for programming
Chain Parameter		Ctrl + Shift + H		Opens the Chain Parameter dialog box; enables you to set parameters for your programming chain

FlashPro Customize Menu

Command	Function
Toolbars	Opens the Customize dialog box to the Toolbars tab; enables you to show/hide toolbars and tooltips
Commands	Opens the Customize dialog box to the Commands tab; enables you to add/remove individual commands to your toolbars

FlashPro Help Menu

Command	Icon	Sub-menu	Function
Help >		Help Topics	Opens the help
		Programmer View	Opens the help to the FlashPro Programmer List Window topic
		Details on Programmer View	Opens the help to the Programmer Details Window topic
		Single Device Programming	Opens the Single Device Programming help topic
		Chain Programming	Opens the Chain Configuration Window help topic
Microsemi Web Site			Opens the Microsemi website in your default browser

Command	Icon	Sub-menu	Function
Check for Software Updates			Checks for software updates (works only if you are connected to the internet)
About FlashPro			Lists the FlashPro release information

FlashPro Flow Window

The **Flow** window (located between the toolbar and **Log** window in the FlashPro GUI) consists of the following buttons: [New Project](#), [Open Project](#), **Configure Device**, **View Programmers**, and **Run**. See the table below for a description of these features.

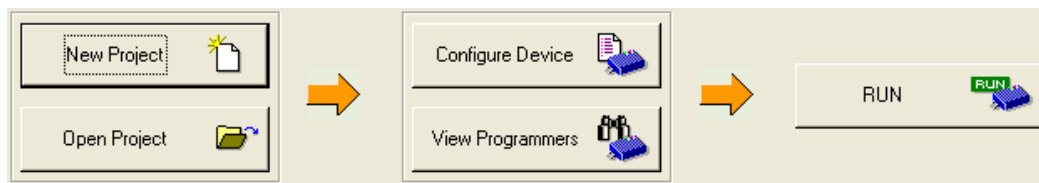


Figure 174 · Flow Window

Table 38 · Flow Window Button Description

Button	Description
New Project	Creates a new project. Opens the New Project dialog box.
Open Project	Opens a new project. Opens the Open Project dialog box.
Configure Device	Opens the Single Device Configuration window to configure your file.
View Programmers	Opens the Programmer List Window for you to view your programmers.
Refresh/Rescan for Programmers	Rescans for programmers.
Run	Executes programming.

FlashPro Log Window

The Log window displays errors, warnings, and basic information about your device. Click the tabs at bottom of the Log window to toggle between messages or click the **All** tab to display all of the messages.

You can access the Log window from the View menu.

Setting Log window preferences

From the **Preferences** dialog box, you can change the text color of the messages that appear in the **Log** window.

To set Log window preferences:

1. From the **File** menu, choose **Preferences**.

- Follow the directions in the **Color Settings** area or click the **Restore Defaults** button.

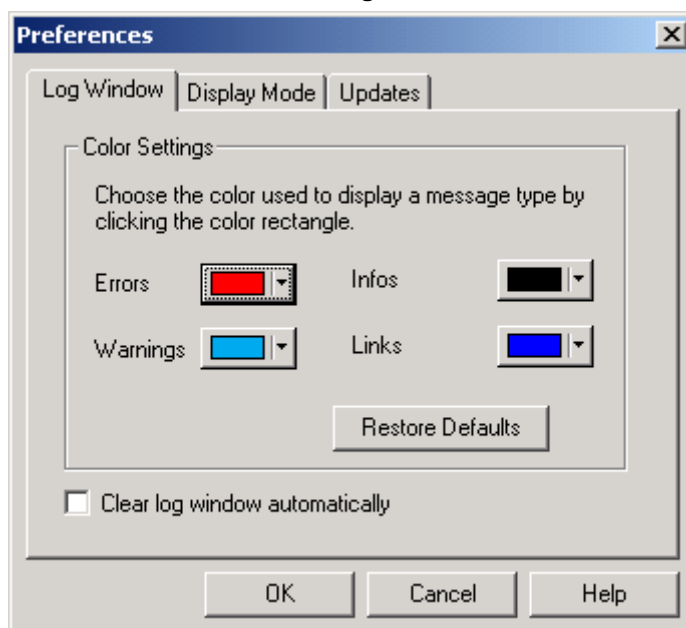


Figure 175 · Preferences

- Click **OK** to apply settings.

Note: You can clear the Log window by choosing Clear Log window from the Edit menu or you can automatically erase the information by checking the Clear Log Window Automatically checkbox.

FlashPro Status Bar

The **Status** bar displays the program status, the programmer information (the file name for single device programming and number of devices for chain programming), and the programming mode (single or chain).

FlashPro Programmer List Window

To activate the **Programmer List** Window, select **View > Programmer List Window**. The FlashPro **Programmer List** Window consists of a spreadsheet with the programmer name, programmer type, port number, programmer status, programmer enable check box, and a **Refresh/Rescan for New Programmers** button as shown in the figure below.

Note: Double-clicking any of the spreadsheet columns opens the [Programmer Details window](#).



Figure 176 · Programmer List Window

Changing the Name of your Programmer

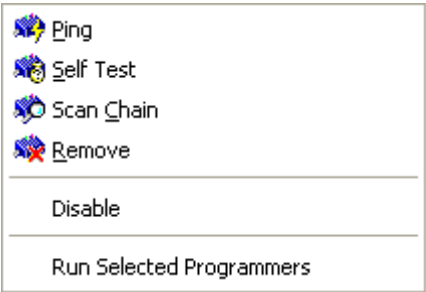
You can change the name of your programmer by double-clicking in the spreadsheet cell or you can choose **Edit Cell** from the right-click menu.

Connecting New Programmers

You can connect new programmers by clicking the **Refresh/Rescan for Programmers** button.

Accessing Right-Click Menus

If you have checked the **Programmer Enabled** checkbox, you can right-click on any of the spreadsheet fields to access the menu in the figure below.



Right-Click Menu

If you have not checked the **Programmer Enabled** checkbox, you can right-click in the on any of the spreadsheet fields, to access a menu to remove or enable the programmer (see figure below).

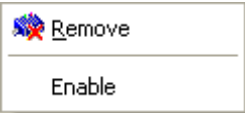


Figure 177 · Right-Click Menu

Programmer Details Window

The Programmer Details Window displays your programmer ID, port, type, name, and programming status (see figure below). Use this window to check the status and access common commands (ping, self-test, scan chain) and to enable/disable or remove the programmer from the chain.

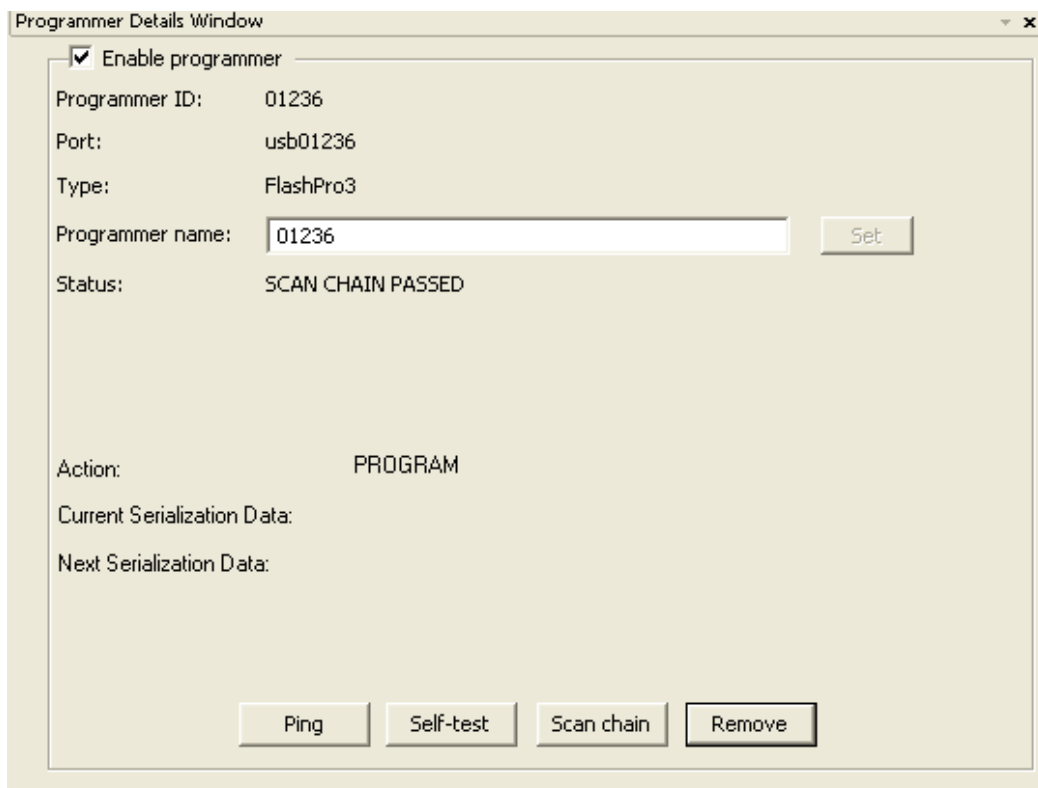


Figure 178 · Programmer Details Window

You can access this window from the **View** menu or you can double click any of the fields in the **Programmer List** Window (Programmer Name, Programmer Type, Port, Programmer Status, and Programmer Enabled).

Click the **Enable Programmer** checkbox to enable your programmer and activate the **Programmer Details** Window.

From the Programmer Details Window, you can [ping a programmer](#), [perform a self-test](#), [scan a programmer](#), or [remove a programmer](#).

FlashPro Single Device Configuration Window

To access the Single Device Configuration Window click the **Configure Device** button in the **Flow** window. The Single Device Configuration window displays PDB/STAPL file and serialization information (see figure below). You can also deactivate serialization by clicking the **Serialization** checkbox.

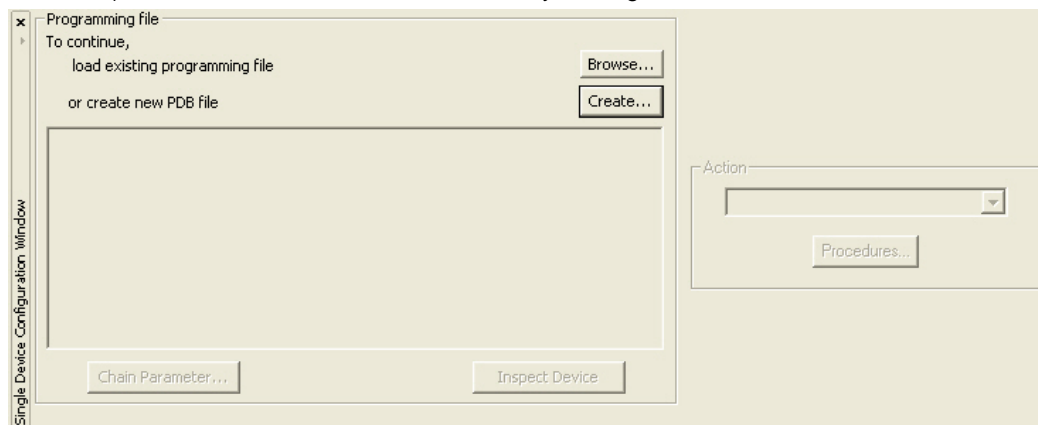


Figure 179 · Single Device Configuration Window

Loading the PDB/STAPL File

You can load your PDB/STAPL file from the **Configuration** menu by choosing **Load Programming File** or by clicking the **Browse** button in the **Single Device Configuration Window**.

You can set chain parameter settings by clicking the **Chain Parameter** button.

Selecting Serialization Indexes

To select the serialization indexes:

1. Check the **Serialization** checkbox to activate serialization.
2. Click the **Select Serialization Indexes** button. The **Serial Settings** dialog box appears (as shown in the figure below).

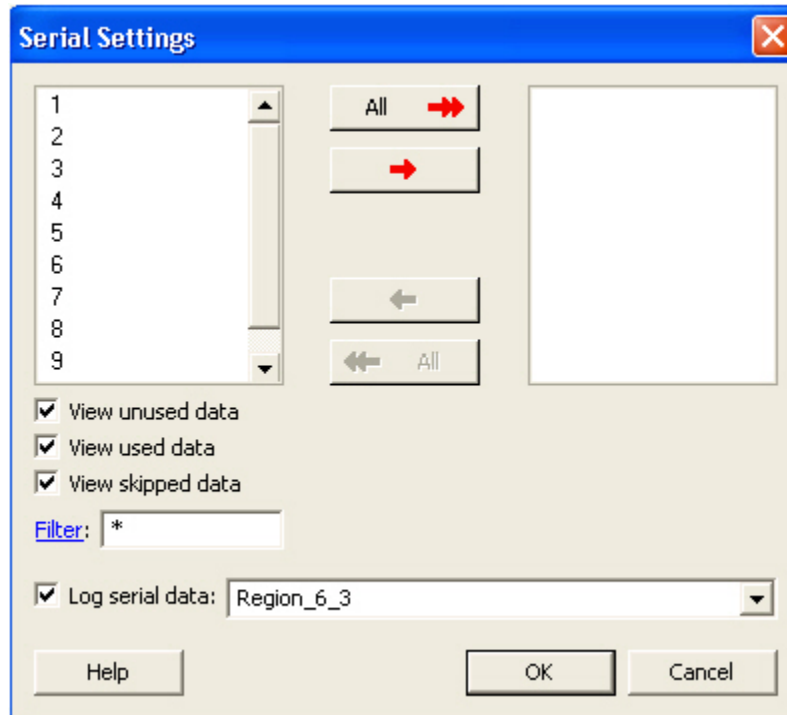


Figure 180 · Serial Settings Dialog Box

3. Click to select an index in the **Indexes** column.
4. Click the red arrow button that is pointing toward the **Selected Indexes** column to move an index to the **Selected Indexes** column.
5. If you want to move all the Indexes to the **Selected Indexes** column, click the **All** button.
6. Click **OK**. Information about your serial indexes displays.

You can move indexes from the **Selected Indexes** column to the **Indexes** column by clicking the red arrow buttons pointing toward the **Indexes** column.

You can set your indexes by choosing the following check boxes: View unused data, View used data, and View skipped data.

Selecting Action and Procedures

You can select actions from the Basic mode and the Advanced mode. The Basic mode is provided for users that only require the Program, Verify and Erase actions. In Basic mode, other actions are not visible, and the Procedures run by an Action cannot be modified.

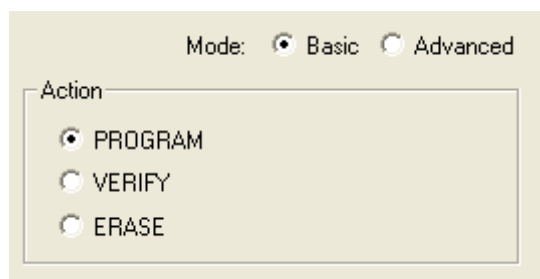


Figure 181 • Basic Mode

The Advanced mode enables you to select an action and modify the procedures for the selected action. In Advanced mode, actions are determined by the stapl standard used.

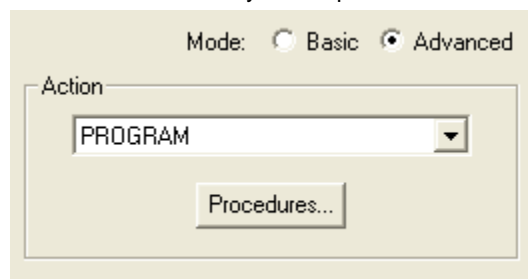


Figure 182 • Advanced Mode

To select an action (Advanced Mode):

1. Click the down arrow in the **Action** menu and select an action (see figure below).

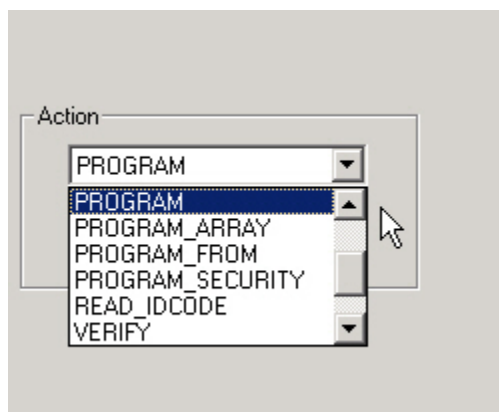


Figure 183 • Action Menu

2. Click the **Procedures** button. The **Select Action and Procedures** dialog box appears.

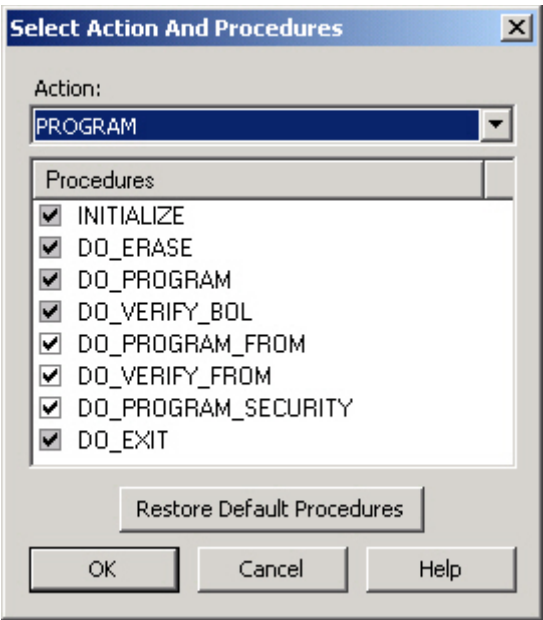


Figure 184 · Select Action And Procedures Dialog Box

3. Select a procedure or click the **Restore Default Procedures** button. Gray checkboxes indicate that the procedure is mandatory.

Note: The procedures in the Select Action And Procedures dialog box are determined by the STAPL standard. The Recommended procedures are selected by default and the Optional procedures are unselected by default.

4. Click **OK**.

Note: You can also click the Select Action and Procedures dialog box from the toolbar.

Chain Configuration Window

The Chain Configuration Window displays the chain order, the chain editing options, and the chain configuration grid (see figure below).

The **Show Chain Editing** checkbox, when checked, displays your chain editing options (Configure device, Add Microsemi Device, Add Non-Microsemi Device, and organization buttons to move your device within the grid).

For information on how to add Microsemi and Non-Microsemi devices, see the [Chain Editing help topic](#).

For information on how to use the Organize buttons, see Using the [Organize Buttons in the Chain Programming Grid](#).

You can enable programming and serialization by checking the **Enable Device** checkbox and the **Enable Serial** checkbox in the **Chain Configuration** grid.

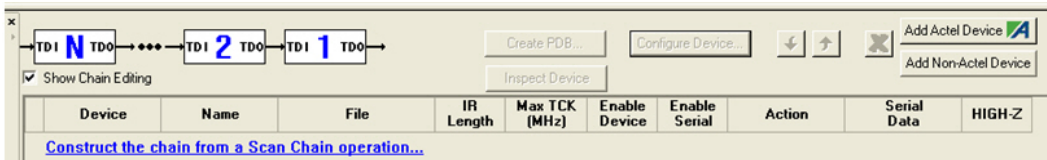


Figure 185 · Chain Configuration Window

Auto-Construction of Chain from Scan Chain

When in chain programming mode, the FlashPro software enables you to automatically construct the chain by clicking the **Construct the chain from a Scan Chain operation** link, or by selecting **Construct Chain Automatically** from the **Configuration** menu.

This enables you to scan a chain of devices and automatically construct the chain within FlashPro. If you are using non-Microsemi devices, you will need to import the device settings into the database by using the [Import Settings for Non-Microsemi Devices](#) dialog box. The software also scans the chain before constructing it, which reduces the possibilities of having errors in the chain. For more information on how to automatically construct a chain from scan chain, refer to the [Automatic Chain Construction Tutorial](#).

Chain Editing Options

The FlashPro software enables you to edit your chain by adding Microsemi and Non-Microsemi devices. You can add devices by clicking the **Add Microsemi Device** button and the **Add Non-Microsemi Device** button or you can select these options from the **Configuration** menu.

Note: For more information about how to edit the chain, see [Chain Editing](#).

Editing the Chain Configuration Grid

The **Chain Configuration Grid** enables you to select an **Action** for your device, **Enable Serialization**, and edit the grid using the right-click menu.

To select an Action from the Configuration Grid:

1. Choose the device you would like to program and check the **Enable Device** checkbox.
2. In the **Action** column, click the down arrow to expose the drop-down menu (see figure below).
3. Select your desired action.

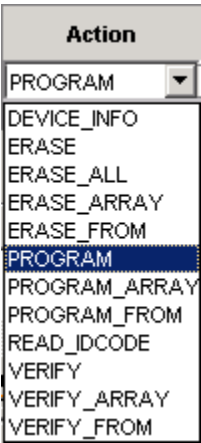


Figure 186 · Drop-Down Menu for Select Action

To enable Serialization:

1. Check the **Enable Serial** checkbox. By enabling serialization, the action options change.
2. In the **Action** column, click the down arrow to expose the drop-down menu (see figure below).

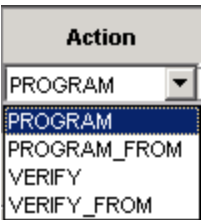


Figure 187 · Drop-Down Menu for Select Action

3. Select your desired action.
4. Choose **Select** button from the **Serial Data** column, which is next to the **Action** column (see figure below).



Figure 188 · Serial Data Column

The **Serial Settings** dialog box appears.

5. Choose your serial settings from the **Serial Settings** dialog box.

See [Serial Settings](#) for more information about this topic.

Note: Uncheck the Enable Serial checkbox to disable serialization.

To edit the Chain Configuration Grid:

1. Select the device you would like to edit and right click anywhere in the row of the selected device. The right-click menu below displays.
2. Select and click an option from the right-click menu.

Note: The Device Configuration menu includes options for configuring your device.

Microsemi SoC Products Group Headquarters

Microsemi Corporation is a supplier of innovative programmable logic solutions, including field-programmable gate arrays (FPGAs) based on antifuse and flash technologies, high-performance intellectual property (IP) cores, software development tools, and design services targeted for the high-speed communications, application-specific integrated circuit (ASIC) replacement, and radiation-tolerant markets.

Address:	Microsemi SoC Products Group 3870 North First Street San Jose, CA 95134
Phone:	408-643-6000

Contact Information

For the most up-to-date contact information, check the [Microsemi Home Page](#).

Contact information for FPGAs & SoCs can be found at the [FPGAs and SoCs Support Page](#)

If you do not have internet access, the following information was accurate at the time of publication:

- Technical Support
 - Web: <https://soc.microsemi.com/mycases>
 - Phone (NA): 800.262.1060
 - Phone (Int'l): +1 650.313.4460
 - Email: soc_tech@microsemi.com
- Customer (non-technical) Support
 - Phone: +1 650.318.2470
 - Email: customer.service@microsemi.com
- Sales Support
 - For pricing, order status and lead time information for all Microsemi SoC products, contact your [Microsemi Sales Representative](#)

- Technical Support for RH and RT FPGAs that are regulated by International Traffic in Arms Regulations (ITAR)
 - Phone (NA): 888.988.ITAR
 - Phone (Int'l): +1 650.318.4900
 - Email: soc_tech_itar@microsemi.com

Regulatory and Compliance Information

EU Declaration of Conformity:

This product complies with Directive 2011/65/EU of the European Parliament and of the Council of 8 June 2011 on the restriction of the use of certain hazardous substances in electrical and electronic equipment.

To view the Declaration of Conformity in English:

http://www.microsemi.com/index.php?option=com_docman&task=doc_download&gid=131772

Non-English:

http://www.microsemi.com/index.php?option=com_docman&task=doc_download&gid=131748

Markings:



This product complies with 2004/108/EC, Electromagnetic Compatibility (EMC) Directive

See [Serial Settings](#) for more information about this topic.

Note: Uncheck the Enable Serial checkbox to disable serialization.