FlashPro Express Tutorial: Installing and Running

Created by: David Rubio G.

Blog post: https://soceame.wordpress.com/2025/03/09/flashpro-express-tutorial-installing-and-running/

Blog: https://soceame.wordpress.com/

GitHub: https://github.com/DRubioG

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In this mini-tutorial I'm going to explain how to install and run FlashPro Express.

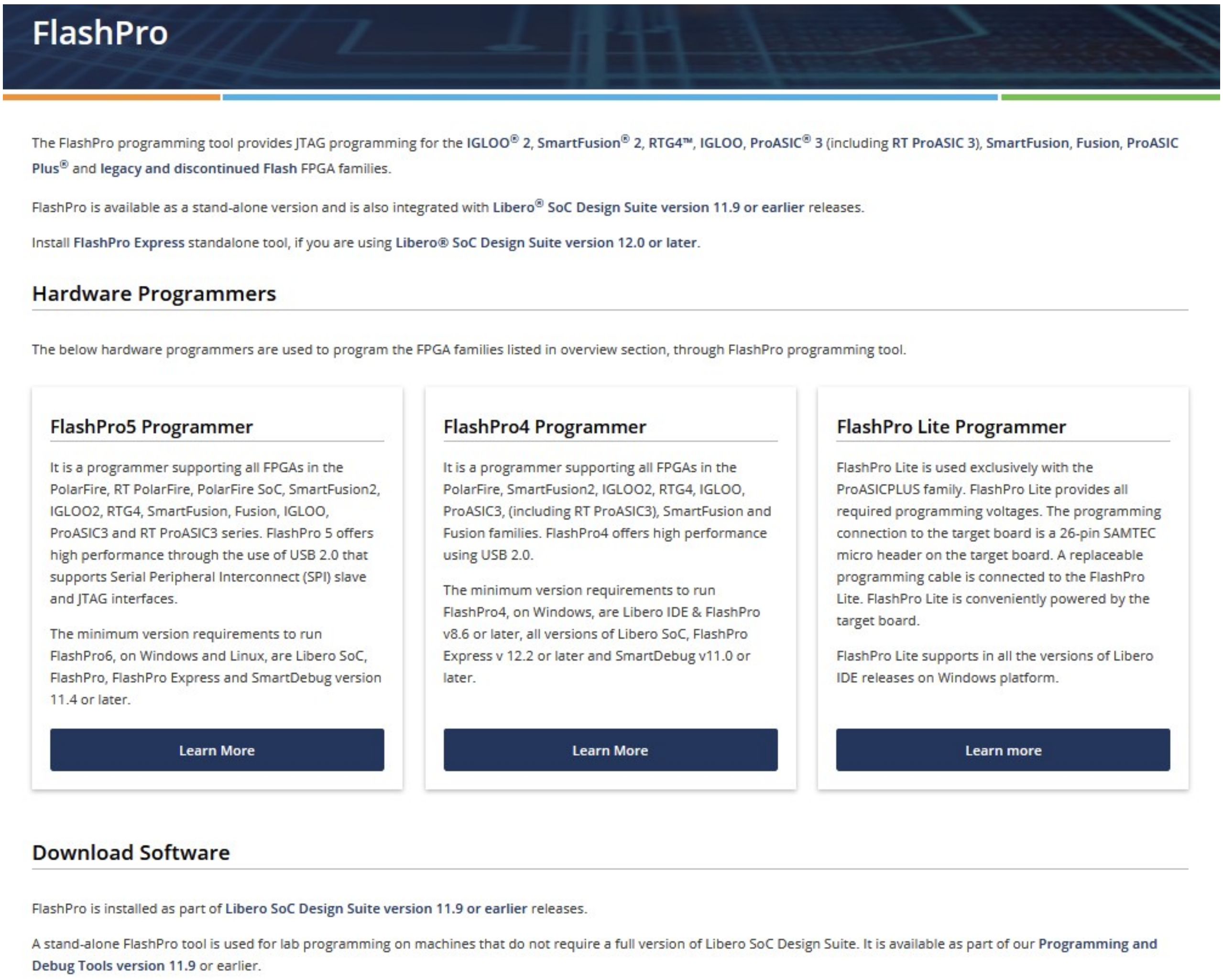
First of all, **FlashPro Express** is the software provided by Microchip to program their FPGAs/SoCs without the need to use Libero (which internally has an option to program the FPGAs).

Note: do not confuse FlashPro, which is the official Microchip debugging cable, with FlashPro Express, which is the software that allows you to program FPGAs/SoCs. Some boards do not need a FlashPro cable to program FPGAs with FlashPro Express, because it is already integrated.

Installation

The installation of FlashPro Express is supposed to come installed with the Full version of the Libero installer, so it is possible that you already have it installed. In case you do not have it installed, either because you have not installed Libero, you do not want to install Libero (because you are in a production environment) or it has not been installed with Libero, I will now explain how to do it.

First, we go to the FlashPro page and go to the Download Software section, and click on the link to install the *stand-alone* option.



FlashPro

The FlashPro programming tool provides JTAG programming for the **IGLOO® 2**, **SmartFusion® 2**, **RTG4™**, **IGLOO**, **ProASIC® 3** (including **RT ProASIC 3**), **SmartFusion**, **Fusion**, **ProASIC Plus®** and **legacy and discontinued Flash** FPGA families.

FlashPro is available as a stand-alone version and is also integrated with **Libero® SoC Design Suite version 11.9 or earlier** releases.

Install **FlashPro Express** standalone tool, if you are using **Libero® SoC Design Suite version 12.0 or later**.

Hardware Programmers

The below hardware programmers are used to program the FPGA families listed in overview section, through FlashPro programming tool.

FlashPro5 Programmer

It is a programmer supporting all FPGAs in the PolarFire, RT PolarFire, PolarFire SoC, SmartFusion2, IGLOO2, RTG4, SmartFusion, Fusion, IGLOO, ProASIC3 and RT ProASIC3 series. FlashPro 5 offers high performance through the use of USB 2.0 that supports Serial Peripheral Interconnect (SPI) slave and JTAG interfaces.

The minimum version requirements to run FlashPro6, on Windows and Linux, are Libero SoC, FlashPro, FlashPro Express and SmartDebug version 11.4 or later.

Learn More

FlashPro4 Programmer

It is a programmer supporting all FPGAs in the PolarFire, SmartFusion2, IGLOO2, RTG4, IGLOO, ProASIC3, (including RT ProASIC3), SmartFusion and Fusion families. FlashPro4 offers high performance using USB 2.0.

The minimum version requirements to run FlashPro4, on Windows, are Libero IDE & FlashPro v8.6 or later, all versions of Libero SoC, FlashPro Express v 12.2 or later and SmartDebug v11.0 or later.

Learn More

FlashPro Lite Programmer

FlashPro Lite is used exclusively with the ProASICPLUS family. FlashPro Lite provides all required programming voltages. The programming connection to the target board is a 26-pin SAMTEC micro header on the target board. A replaceable programming cable is connected to the FlashPro Lite. FlashPro Lite is conveniently powered by the target board.

FlashPro Lite supports in all the versions of Libero IDE releases on Windows platform.

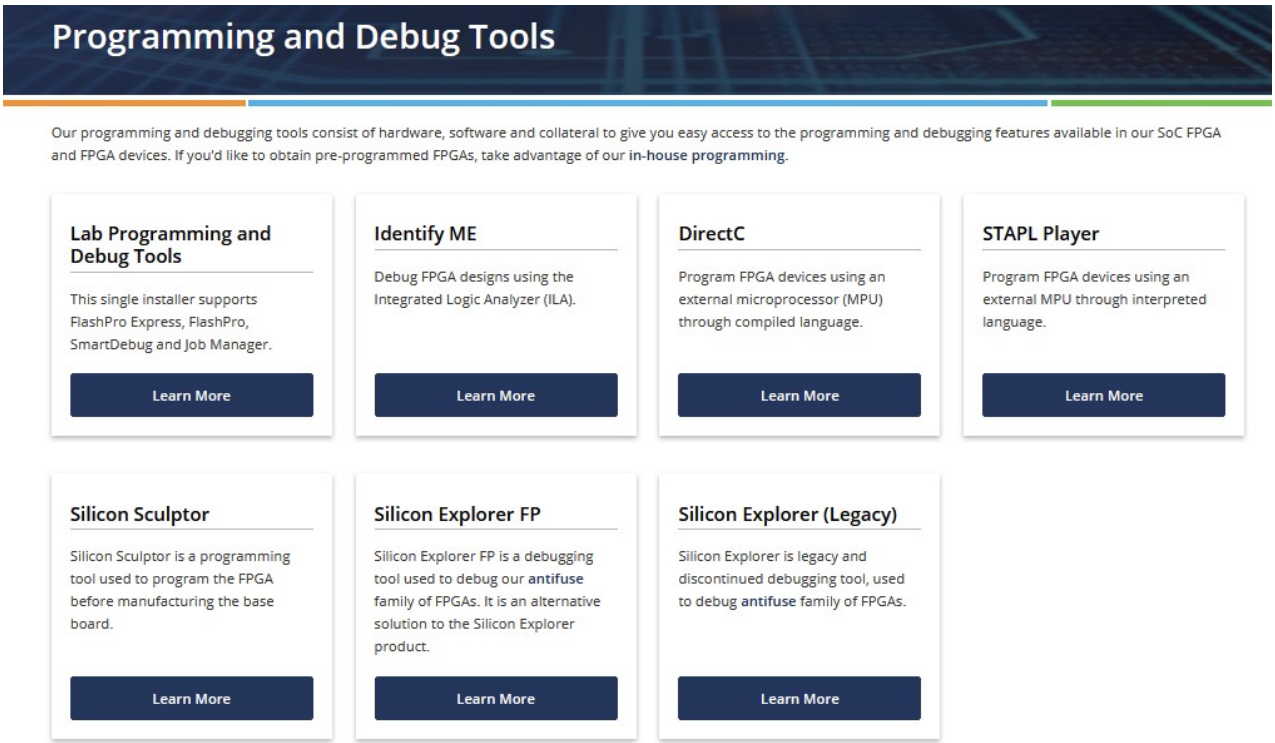
Learn more

Download Software

FlashPro is installed as part of **Libero SoC Design Suite version 11.9 or earlier** releases.

A stand-alone FlashPro tool is used for lab programming on machines that do not require a full version of Libero SoC Design Suite. It is available as part of our **Programming and Debug Tools version 11.9** or earlier.

This takes us to the next tab, so now we click on the *Lab Programming and Debug Tools* option.



Programming and Debug Tools

Our programming and debugging tools consist of hardware, software and collateral to give you easy access to the programming and debugging features available in our SoC FPGA and FPGA devices. If you'd like to obtain pre-programmed FPGAs, take advantage of our in-house programming.

Lab Programming and Debug Tools

This single installer supports FlashPro Express, FlashPro, SmartDebug and Job Manager.

Identify ME

Debug FPGA designs using the Integrated Logic Analyzer (ILA).

DirectC

Program FPGA devices using an external microprocessor (MPU) through compiled language.

STAPL Player

Program FPGA devices using an external MPU through interpreted language.

Silicon Sculptor

Silicon Sculptor is a programming tool used to program the FPGA before manufacturing the base board.

Silicon Explorer FP

Silicon Explorer FP is a debugging tool used to debug our antifuse family of FPGAs. It is an alternative solution to the Silicon Explorer product.

Silicon Explorer (Legacy)

Silicon Explorer is legacy and discontinued debugging tool, used to debug antifuse family of FPGAs.

Now we are on the page where FlashPro Express is installed. It lets us choose the operating system on which we are going to install it.

When we click on it, the installer is automatically downloaded, without the need to have a Microchip account or an associated computer.

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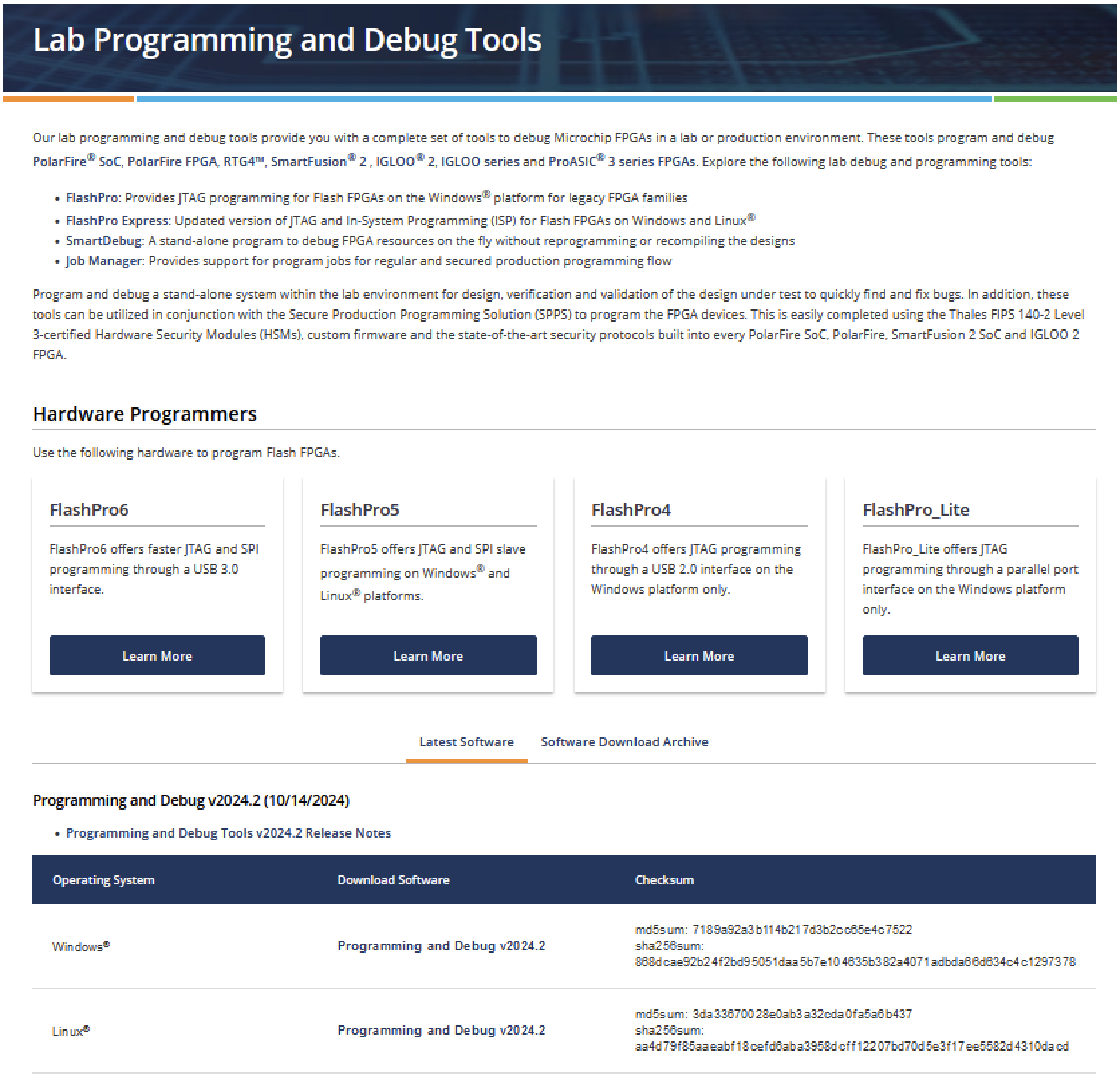


Lab Programming and Debug Tools

Our lab programming and debug tools provide you with a complete set of tools to debug Microchip FPGAs in a lab or production environment. These tools program and debug PolarFire® SoC, PolarFire FPGA, RTG4™, SmartFusion® 2 , IGLOO® 2, IGLOO series and ProASIC® 3 series FPGAs. Explore the following lab debug and programming tools:

- FlashPro: Provides JTAG programming for Flash FPGAs on the Windows® platform for legacy FPGA families
- FlashPro Express: Updated version of JTAG and In-System Programming (ISP) for Flash FPGAs on Windows and Linux®
- SmartDebug: A stand-alone program to debug FPGA resources on the fly without reprogramming or recompiling the designs
- Job Manager: Provides support for program jobs for regular and secured production programming flow

Program and debug a stand-alone system within the lab environment for design, verification and validation of the design under test to quickly find and fix bugs. In addition, these tools can be utilized in conjunction with the Secure Production Programming Solution (SPPS) to program the FPGA devices. This is easily completed using the Thales FIPS 140-2 Level 3-certified Hardware Security Modules (HSMs), custom firmware and the state-of-the-art security protocols built into every PolarFire SoC, PolarFire, SmartFusion 2 SoC and IGLOO 2 FPGA.

Hardware Programmers

Use the following hardware to program Flash FPGAs.

FlashPro6

FlashPro6 offers faster JTAG and SPI programming through a USB 3.0 interface.

Learn More

FlashPro5

FlashPro5 offers JTAG and SPI slave programming on Windows® and Linux® platforms.

Learn More

FlashPro4

FlashPro4 offers JTAG programming through a USB 2.0 interface on the Windows platform only.

Learn More

FlashPro_Lite

FlashPro_Lite offers JTAG programming through a parallel port interface on the Windows platform only.

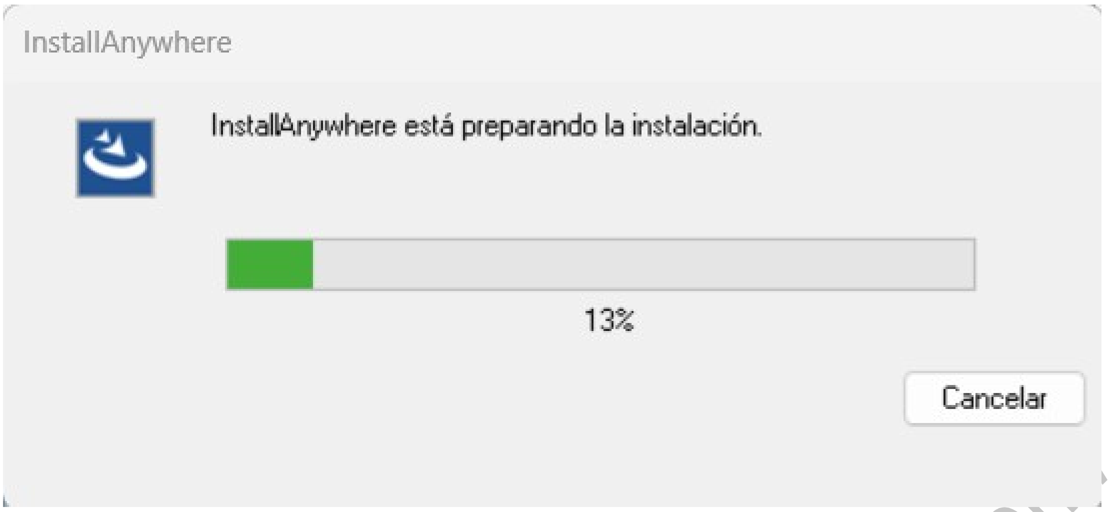
Learn More

Programming and Debug v2024.2 (10/14/2024)

- Programming and Debug Tools v2024.2 Release Notes

Operating System	Download Software	Checksum
Windows®	Programming and Debug v2024.2	md5sum: 7189a92a3b114b217d3b2cc65e4c7522 sha256sum: 868dcae92b24f2bd95051daa5b7e104635b382a4071adbda66d634c4c1297378
Linux®	Programming and Debug v2024.2	md5sum: 3da33670028e0ab3a32cda0fa5a6b437 sha256sum: aa4d79f85aaeabf18cefd6aba3958dcff12207bd70d5e3f17ee5582d4310dacd

When we launch the installer, a download tab opens.



InstallAnywhere

InstallAnywhere está preparando la instalación.

13%

When it finishes, the installer appears with a warning that informs us that we have not launched it with administrator privileges, we decide to continue.

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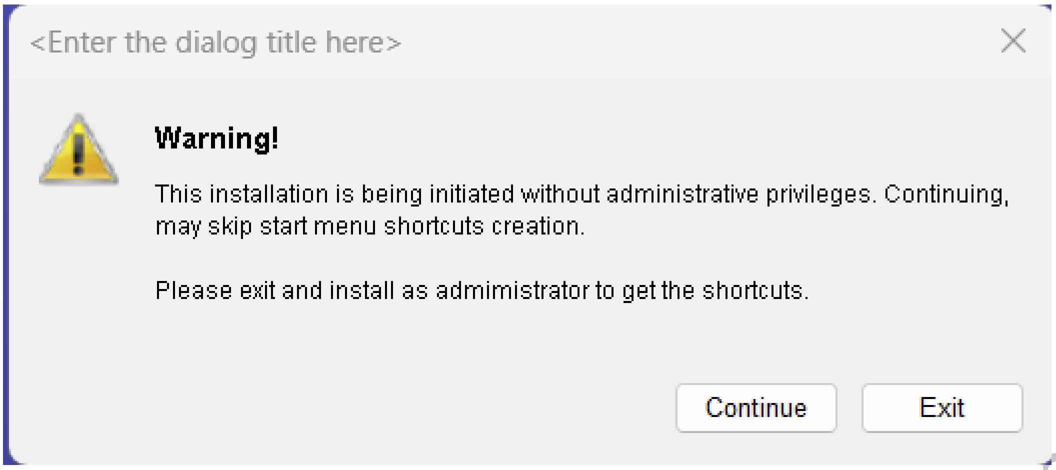
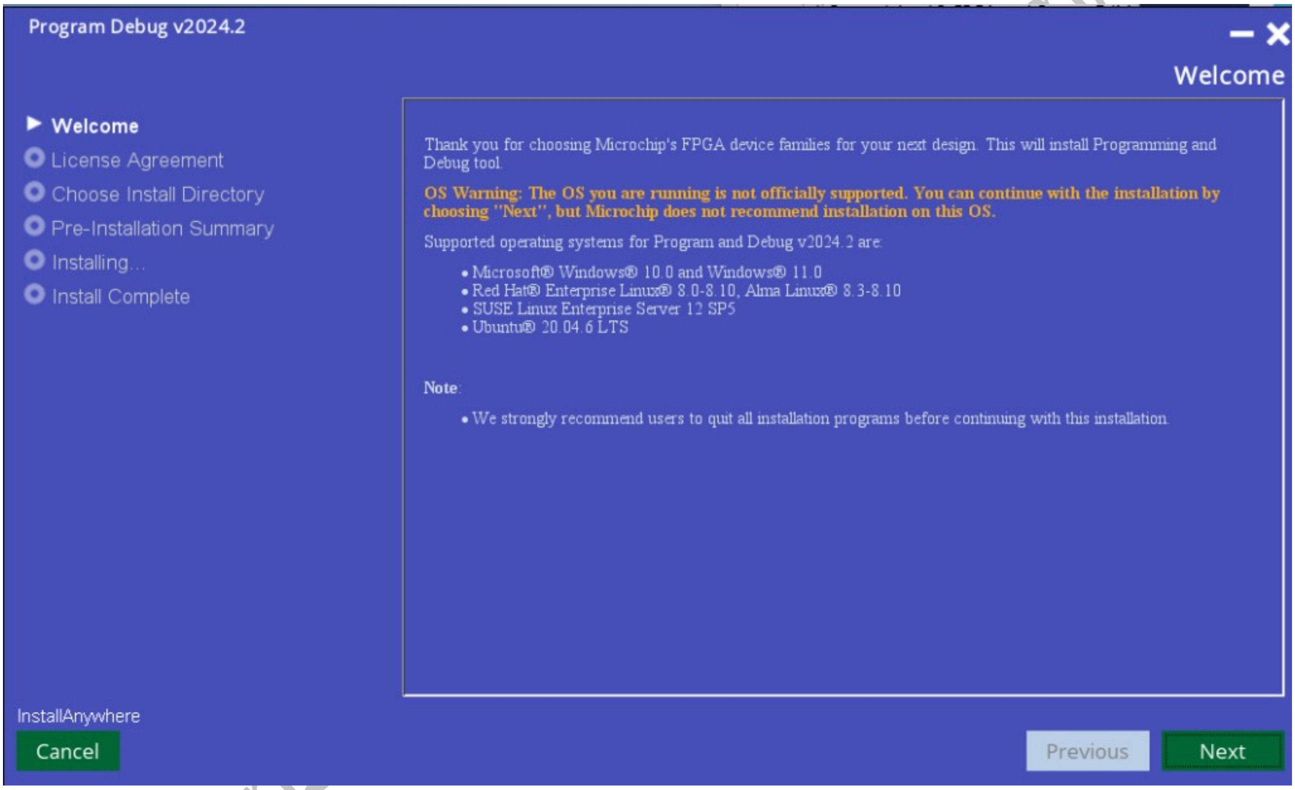


Warning!

This installation is being initiated without administrative privileges. Continuing, may skip start menu shortcuts creation.

Please exit and install as admimistrator to get the shortcuts.



Thank you for choosing Microchip's FPGA device families for your next design. This will install Programming and Debug tool.

OS Warning: The OS you are running is not officially supported. You can continue with the installation by choosing "Next", but Microchip does not recommend installation on this OS.

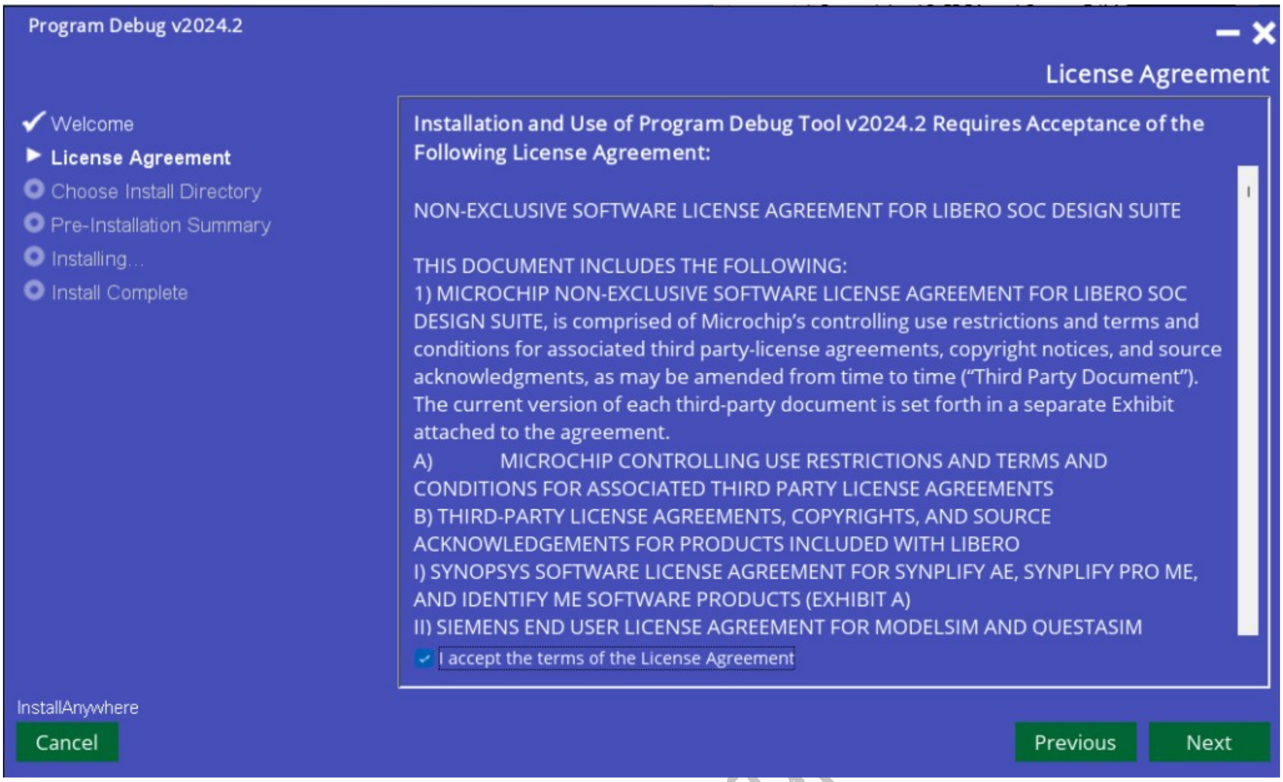
Supported operating systems for Program and Debug v2024.2 are:

- Microsoft® Windows® 10.0 and Windows® 11.0
- Red Hat® Enterprise Linux® 8.0-8.10, Alma Linux® 8.3-8.10
- SUSE Linux Enterprise Server 12 SP5
- Ubuntu® 20.04.6 LTS

Note:

- We strongly recommend users to quit all installation programs before continuing with this installation.

The next tab is the license, accept and Next.



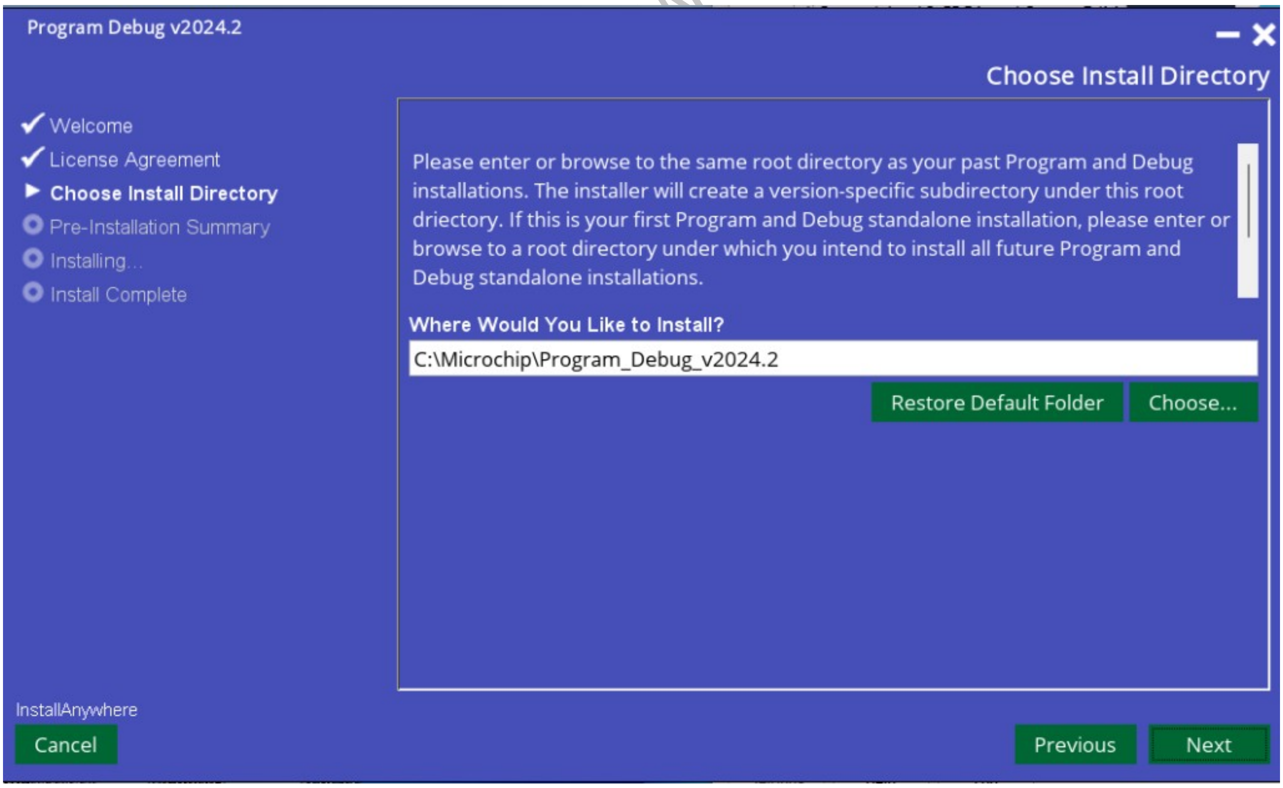
Installation and Use of Program Debug Tool v2024.2 Requires Acceptance of the Following License Agreement:

NON-EXCLUSIVE SOFTWARE LICENSE AGREEMENT FOR LIBERO SOC DESIGN SUITE

THIS DOCUMENT INCLUDES THE FOLLOWING:
1) MICROCHIP NON-EXCLUSIVE SOFTWARE LICENSE AGREEMENT FOR LIBERO SOC DESIGN SUITE, is comprised of Microchip's controlling use restrictions and terms and conditions for associated third party-license agreements, copyright notices, and source acknowledgments, as may be amended from time to time ("Third Party Document"). The current version of each third-party document is set forth in a separate Exhibit attached to the agreement.
A) MICROCHIP CONTROLLING USE RESTRICTIONS AND TERMS AND CONDITIONS FOR ASSOCIATED THIRD PARTY LICENSE AGREEMENTS
B) THIRD-PARTY LICENSE AGREEMENTS, COPYRIGHTS, AND SOURCE ACKNOWLEDGEMENTS FOR PRODUCTS INCLUDED WITH LIBERO
I) SYNOPSYS SOFTWARE LICENSE AGREEMENT FOR SYNPLIFY AE, SYNPLIFY PRO ME, AND IDENTIFY ME SOFTWARE PRODUCTS (EXHIBIT A)
II) SIEMENS END USER LICENSE AGREEMENT FOR MODELSIM AND QUESTASIM

☑ I accept the terms of the License Agreement

Then the place where it is going to be installed, Next.



Please enter or browse to the same root directory as your past Program and Debug installations. The installer will create a version-specific subdirectory under this root directory. If this is your first Program and Debug standalone installation, please enter or browse to a root directory under which you intend to install all future Program and Debug standalone installations.

Where Would You Like to Install?
C:\Microchip\Program_Debug_v2024.2

Then the information on how much it is going to occupy, Install.

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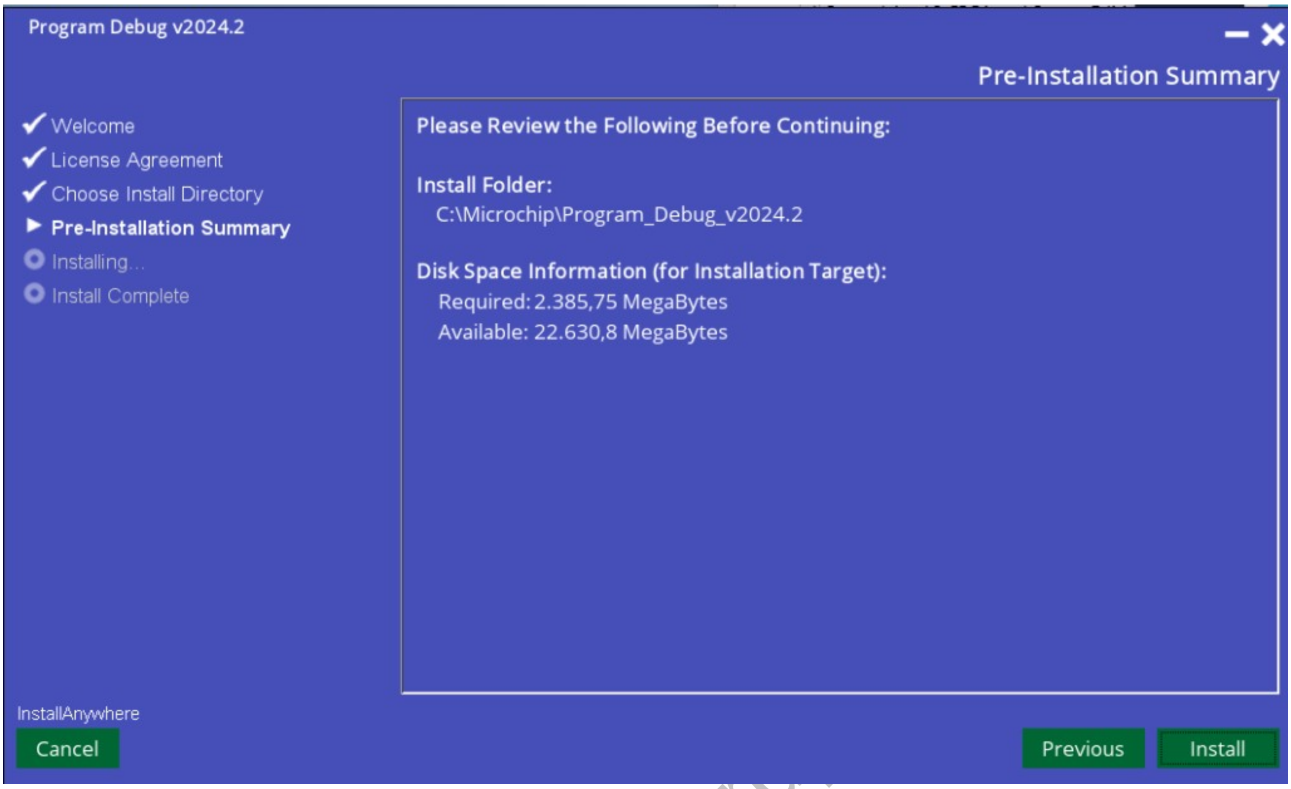

Program Debug v2024.2

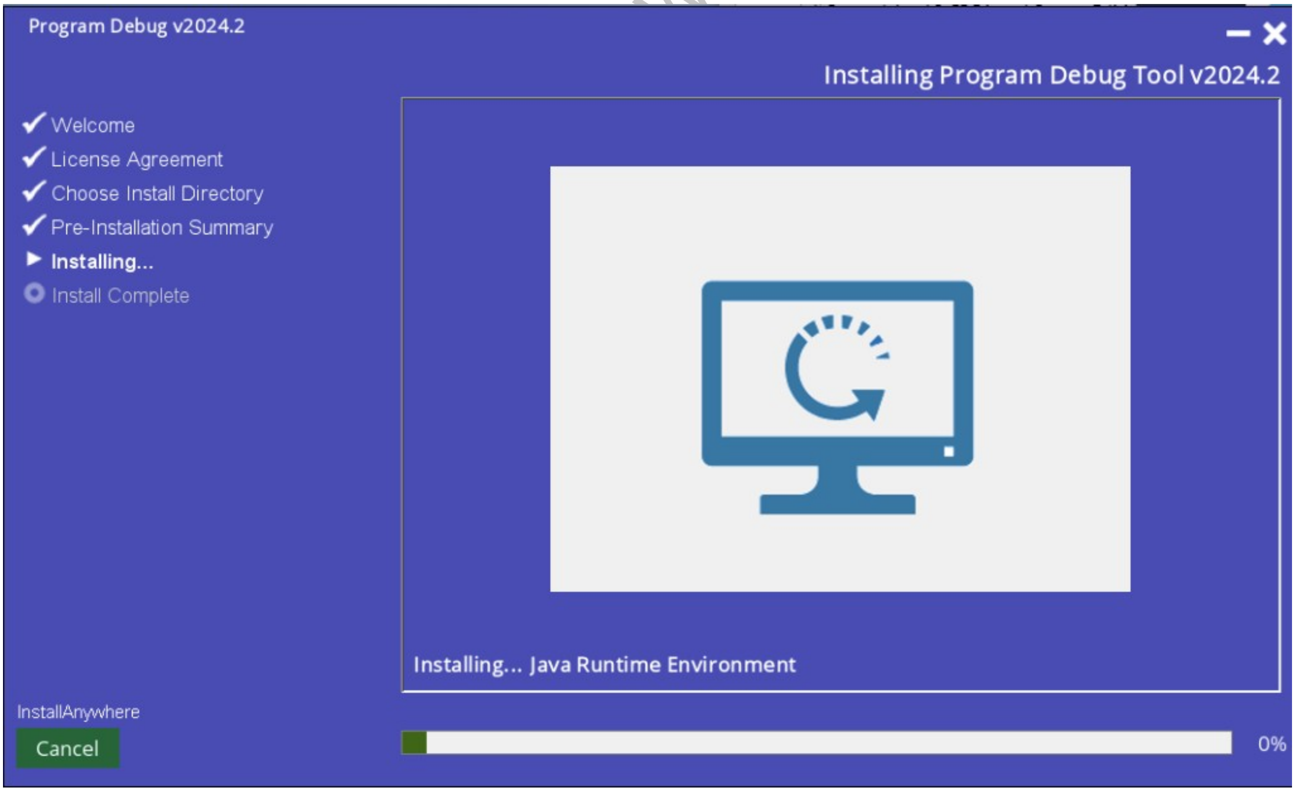
Pre-Installation Summary

Please Review the Following Before Continuing:

Install Folder:
C:\Microchip\Program_Debug_v2024.2

Disk Space Information (for Installation Target):
Required: 2.385,75 MegaBytes
Available: 22.630,8 MegaBytes

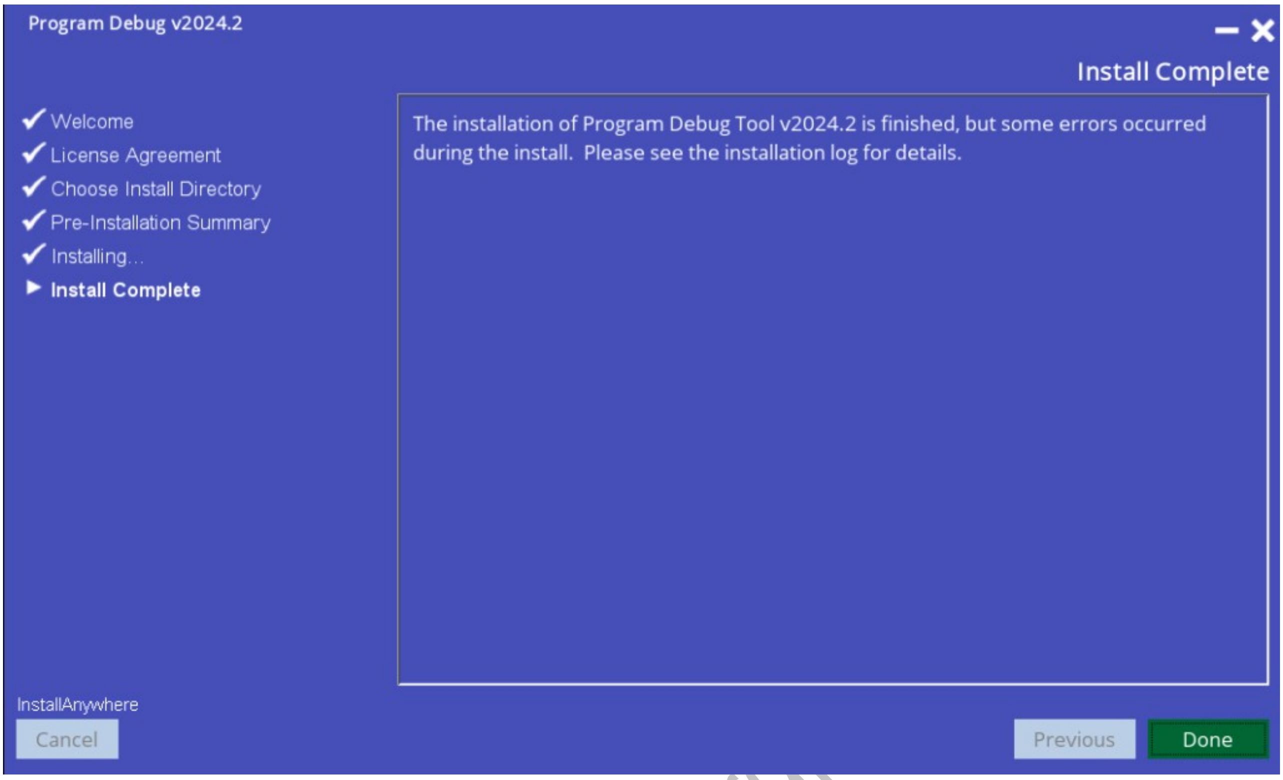
Then it begins to install, it is possible that it asks for administrator permissions.


Program Debug v2024.2

Installing Program Debug Tool v2024.2

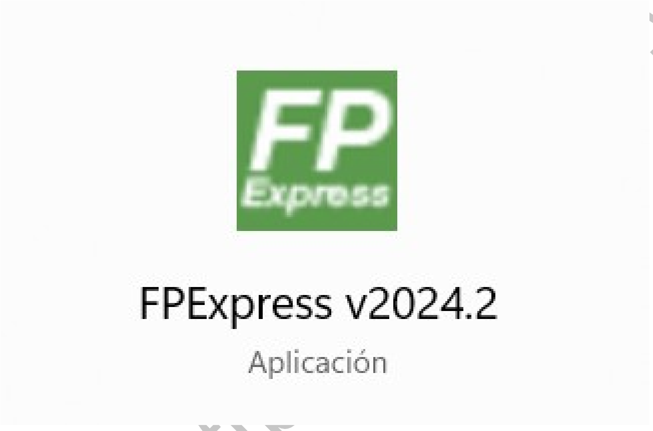
Installing... Java Runtime Environment

Once finished, we click Done.



The installation of Program Debug Tool v2024.2 is finished, but some errors occurred during the install. Please see the installation log for details.

Now to search for it in the system it is called FPExpress (it is not called "FlashPro").



In case it does not appear it is in the bin folder within the installation path, in my case *C:\Microchip\Program_Debug_v2024.2\Program_Debug_Tool\bin*.

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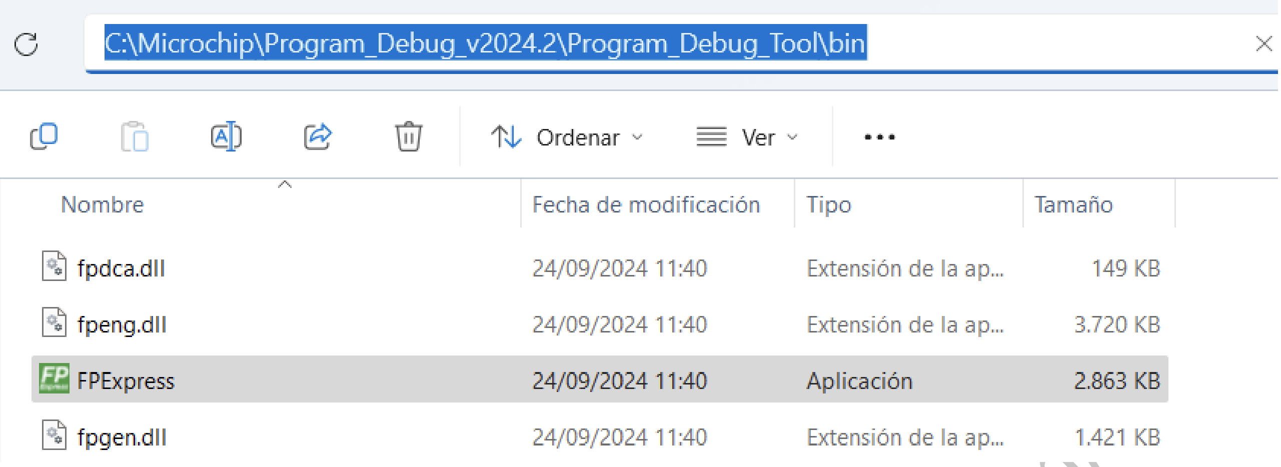
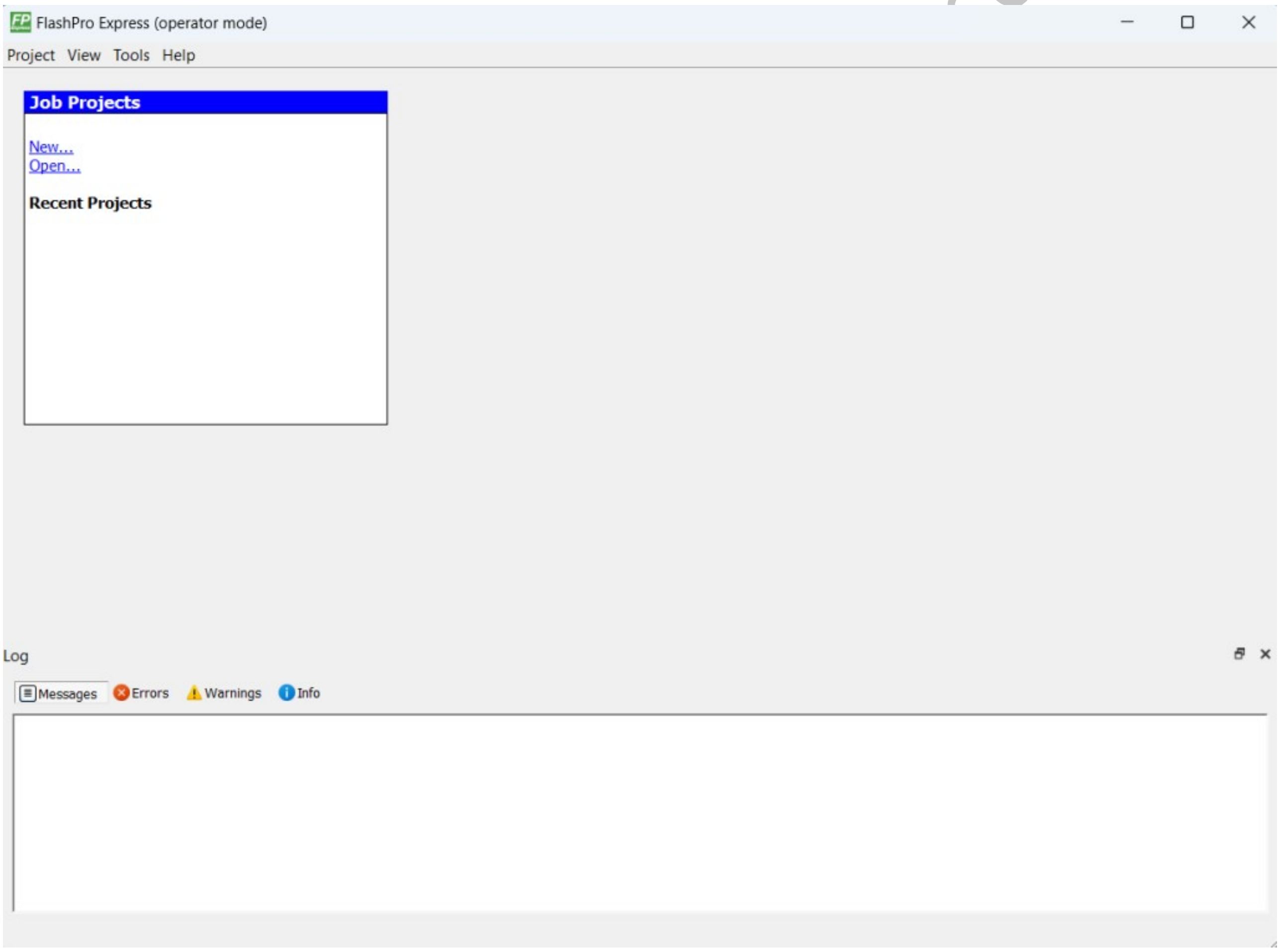


C:\Microchip\Program_Debug_v2024.2\Program_Debug_Tool\bin

Nombre	Fecha de modificación	Tipo	Tamaño
fpdca.dll	24/09/2024 11:40	Extensión de la ap...	149 KB
fpeng.dll	24/09/2024 11:40	Extensión de la ap...	3.720 KB
FPExpress	24/09/2024 11:40	Aplicación	2.863 KB
fpgen.dll	24/09/2024 11:40	Extensión de la ap...	1.421 KB

And if we launch it, FlashPro opens.



Running FlashPro Express

There are two options to use FlashPro Express: you can send us a **FlashPro Express project from Libero** (which is not really a project, but the information to create one), or you can send us **just the bitstream**. Microchip bitstreams have several formats, the most commonly used are *.ppd* and *.stp*.

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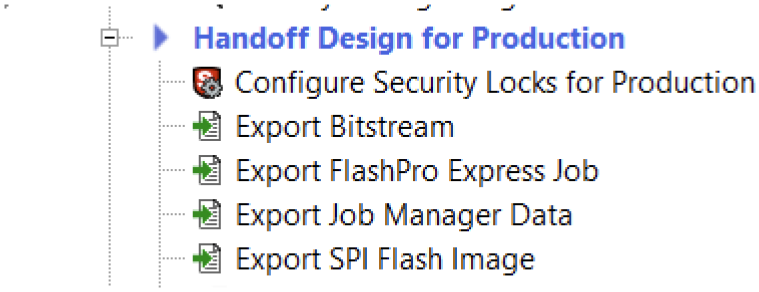
All the export options are in *Libero's Handoff Design for Production*.



Handoff Design for Production

- Configure Security Locks for Production
- Export Bitstream
- Export FlashPro Express Job
- Export Job Manager Data
- Export SPI Flash Image

FlashPro Express Project

This way of working is the most recommended for production systems, because one project is created per bitstream. This option is not recommended for development because it generates a project for each bitstream.

To export a FlashPro Express project, you have to select the *Export FlashPro Express Job* option from Libero.

When you click on the option, a tab will appear asking you what you are going to call the project that is being exported and where you are going to save it. In addition, it will ask you what type of bitstream you are going to export.

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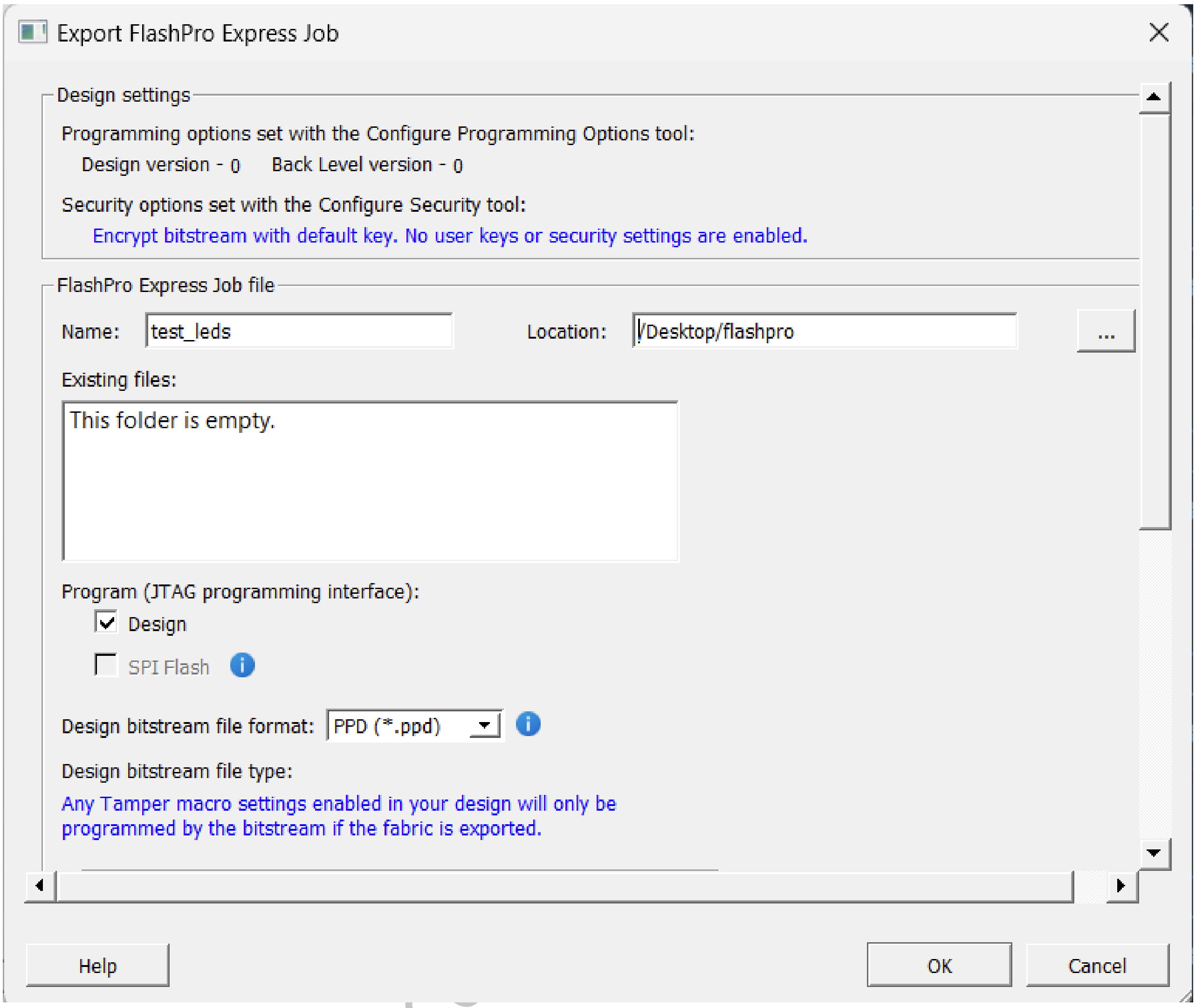


Export FlashPro Express Job

Design settings

Programming options set with the Configure Programming Options tool:

Design version - 0   Back Level version - 0

Security options set with the Configure Security tool:

Encrypt bitstream with default key. No user keys or security settings are enabled.

FlashPro Express Job file

Name: test_leds   Location: \/Desktop/flashpro

Existing files:

This folder is empty.

Program (JTAG programming interface):

☑ Design

□ SPI Flash

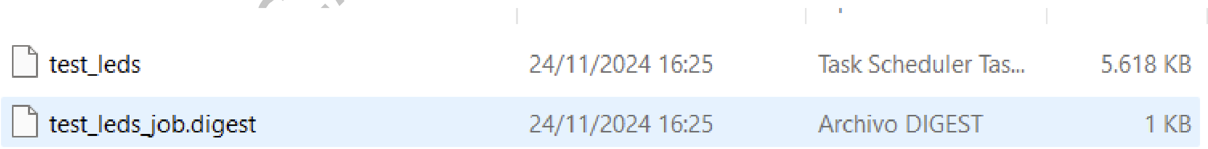
Design bitstream file format: PPD (*.ppd)

Design bitstream file type:

Any Tamper macro settings enabled in your design will only be programmed by the bitstream if the fabric is exported.

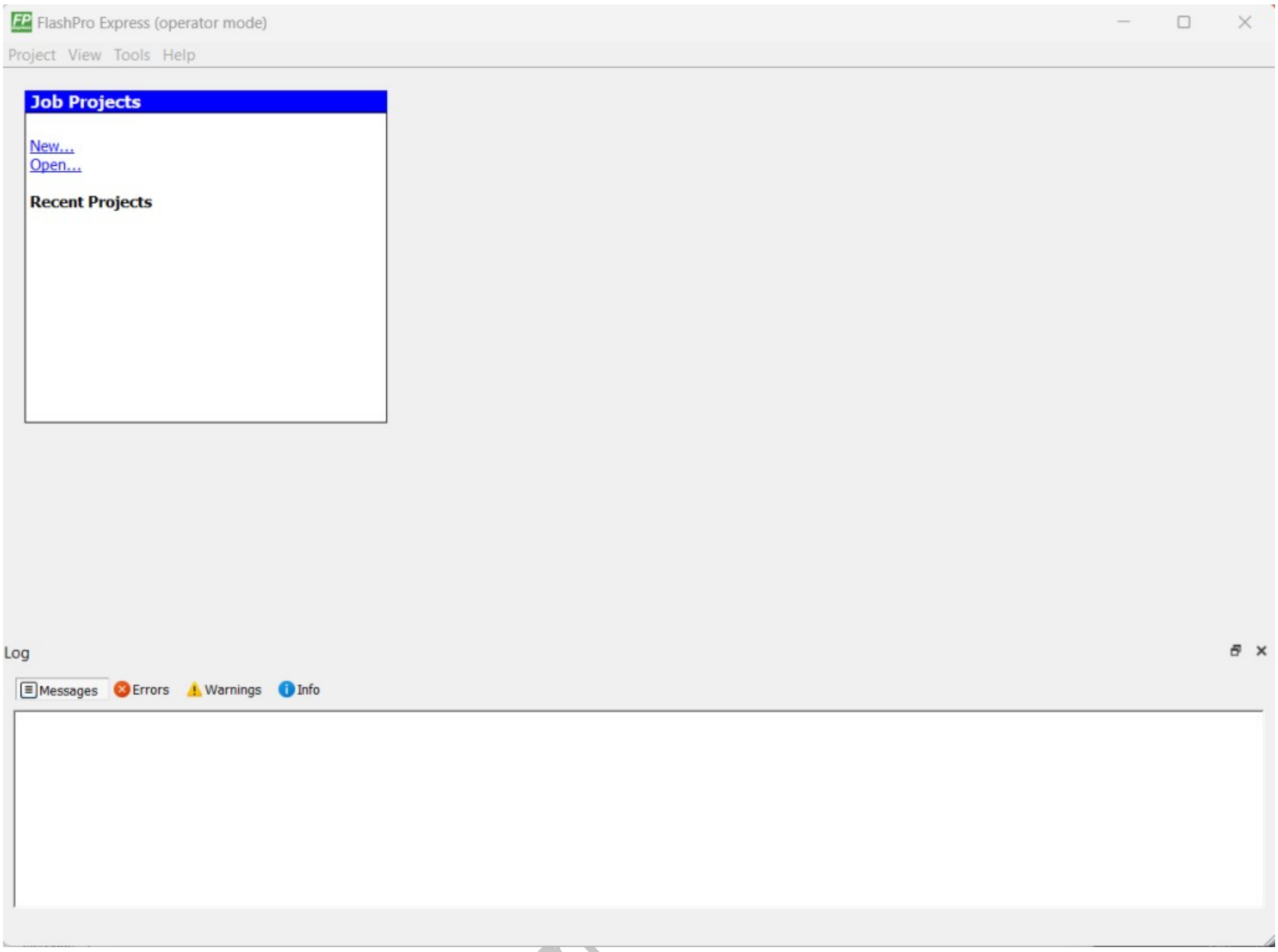
Once we click OK, we wait for it to export.

Once exported, it generates these two files.

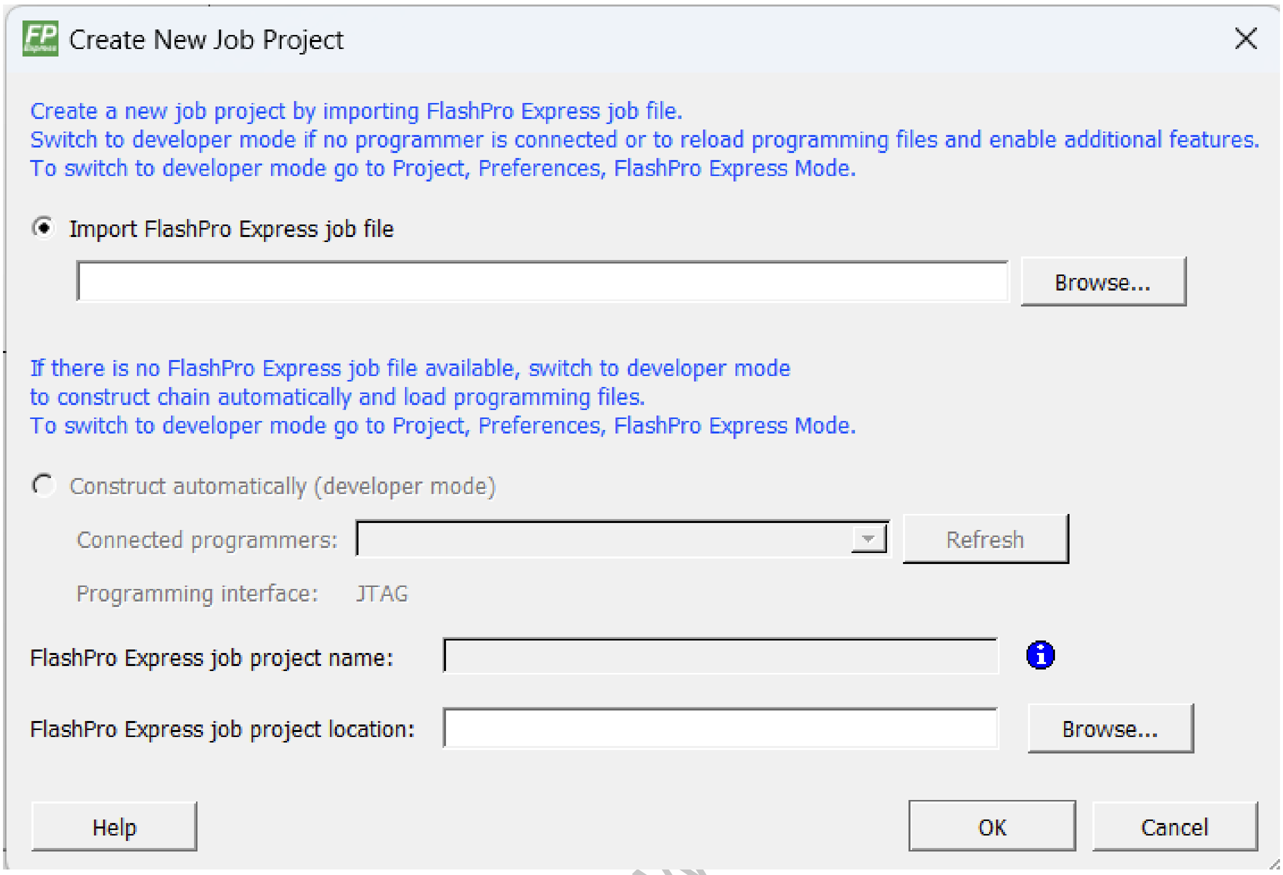


test_leds	24/11/2024 16:25	Task Scheduler Tas...	5.618 KB
test_leds_job.digest	24/11/2024 16:25	Archivo DIGEST	1 KB

The next step is to open FlashPro Express.



Now we tell it to create a project (*New…*) in FlashPro Express.



Create a new job project by importing FlashPro Express job file.
Switch to developer mode if no programmer is connected or to reload programming files and enable additional features.
To switch to developer mode go to Project, Preferences, FlashPro Express Mode.

● Import FlashPro Express job file

If there is no FlashPro Express job file available, switch to developer mode
to construct chain automatically and load programming files.
To switch to developer mode go to Project, Preferences, FlashPro Express Mode.

○ Construct automatically (developer mode)

Connected programmers:

Programming interface: JTAG

FlashPro Express job project name:

FlashPro Express job project location:

Now it will ask us to give it the project that we have exported from Libero, and also where it will create the FlashPro Express project.

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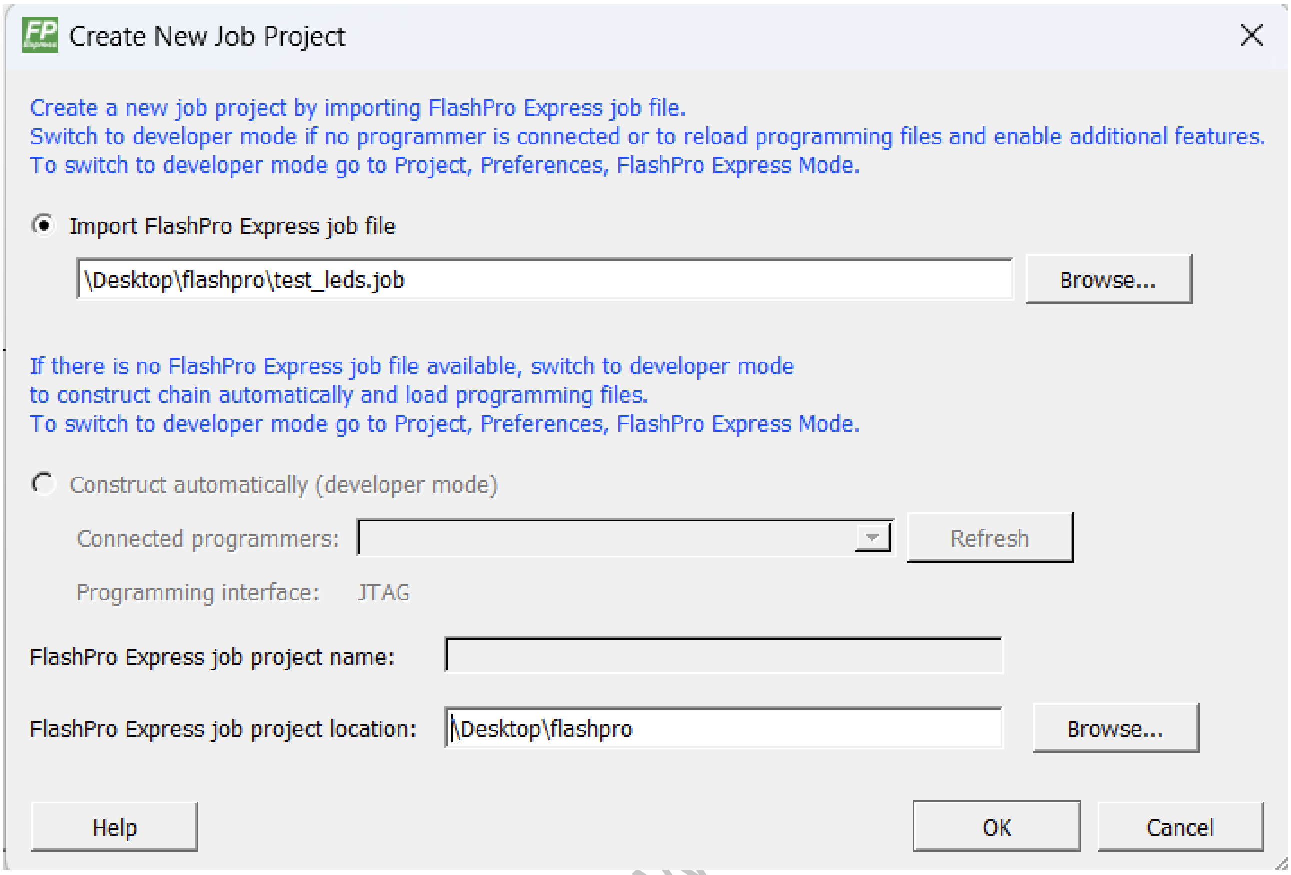

Create New Job Project

Create a new job project by importing FlashPro Express job file.
Switch to developer mode if no programmer is connected or to reload programming files and enable additional features.
To switch to developer mode go to Project, Preferences, FlashPro Express Mode.

● Import FlashPro Express job file

\Desktop\flashpro\test_leds.job

If there is no FlashPro Express job file available, switch to developer mode
to construct chain automatically and load programming files.
To switch to developer mode go to Project, Preferences, FlashPro Express Mode.

○ Construct automatically (developer mode)

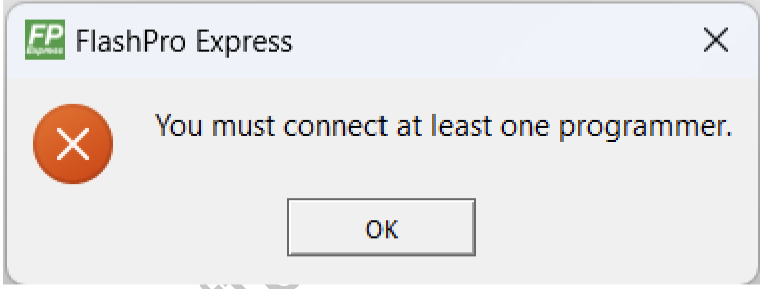
Connected programmers:

Programming interface: JTAG

FlashPro Express job project name:

FlashPro Express job project location: \Desktop\flashpro

To launch FlashPro Express, it will ask us to connect the debugger cable or the board that has the debugger inside.


FlashPro Express

You must connect at least one programmer.

If we connect the debugger and open the project that has been created, FlashPro Express opens. Then, the serial number of the debugger appears.

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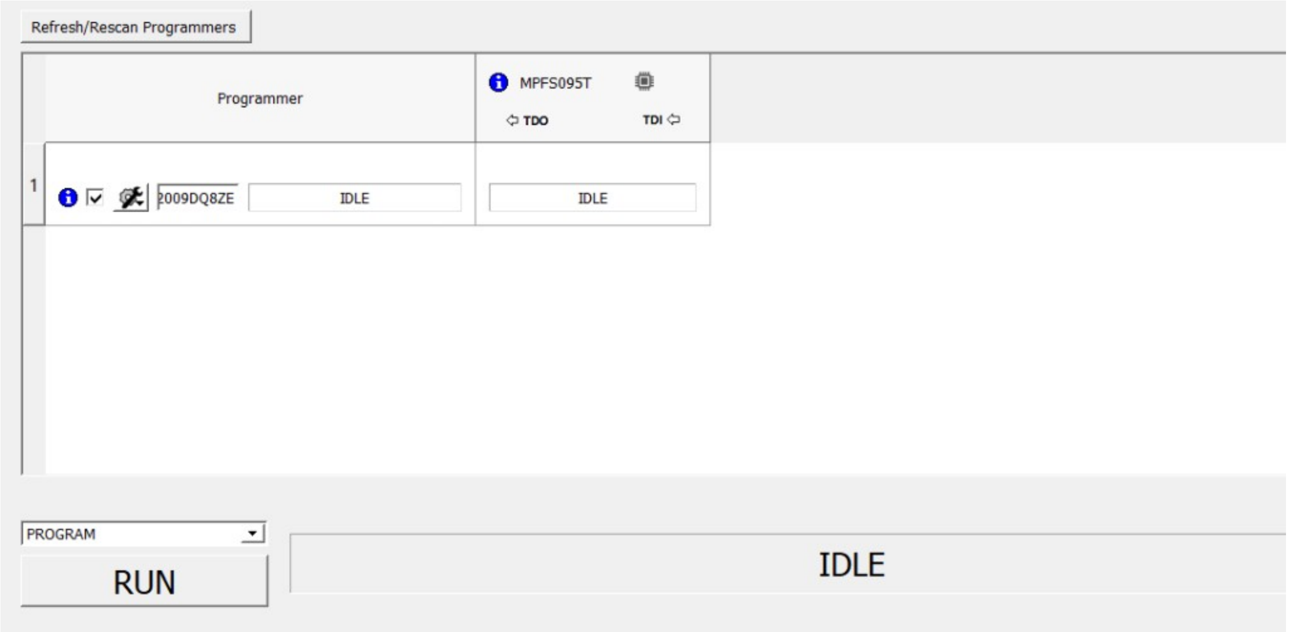
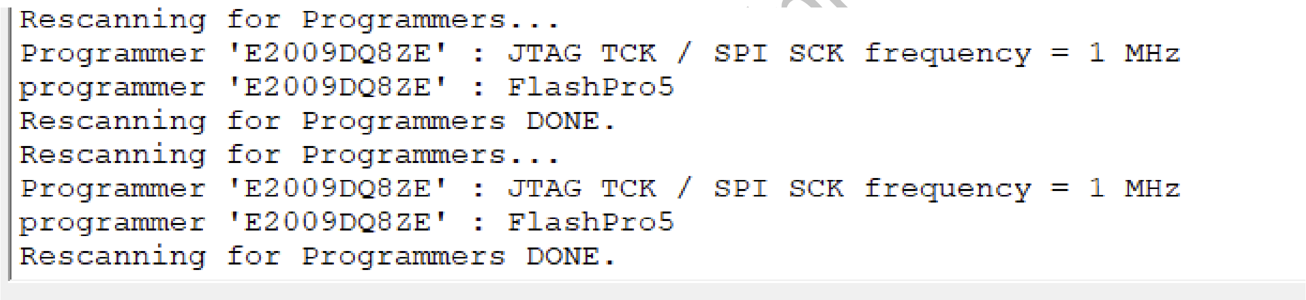
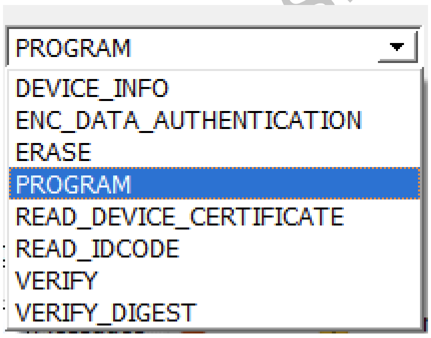


And in the tab below, the type of debugger that we are using appears.



```
Rescanning for Programmers...
Programmer 'E2009DQ8ZE' : JTAG TCK / SPI SCK frequency = 1 MHz
programmer 'E2009DQ8ZE' : FlashPro5
Rescanning for Programmers DONE.
Rescanning for Programmers...
Programmer 'E2009DQ8ZE' : JTAG TCK / SPI SCK frequency = 1 MHz
programmer 'E2009DQ8ZE' : FlashPro5
Rescanning for Programmers DONE.
```

Also, there is a tab that gives us the different options that can be executed in FlashPro Express (Libero also allows us to use these same options). The ERASE and PROGRAM options are those that act directly on the operation of the FPGA, the rest are for obtaining information from the FPGA.



The option that interests us is the PROGRAM option, to program the FPGA (or the SoC, because the SoC can also be recorded, but the binary of the embedded SW part has to be within a bitstream, I will talk about this in another post). When you click on it, the recording operation begins.

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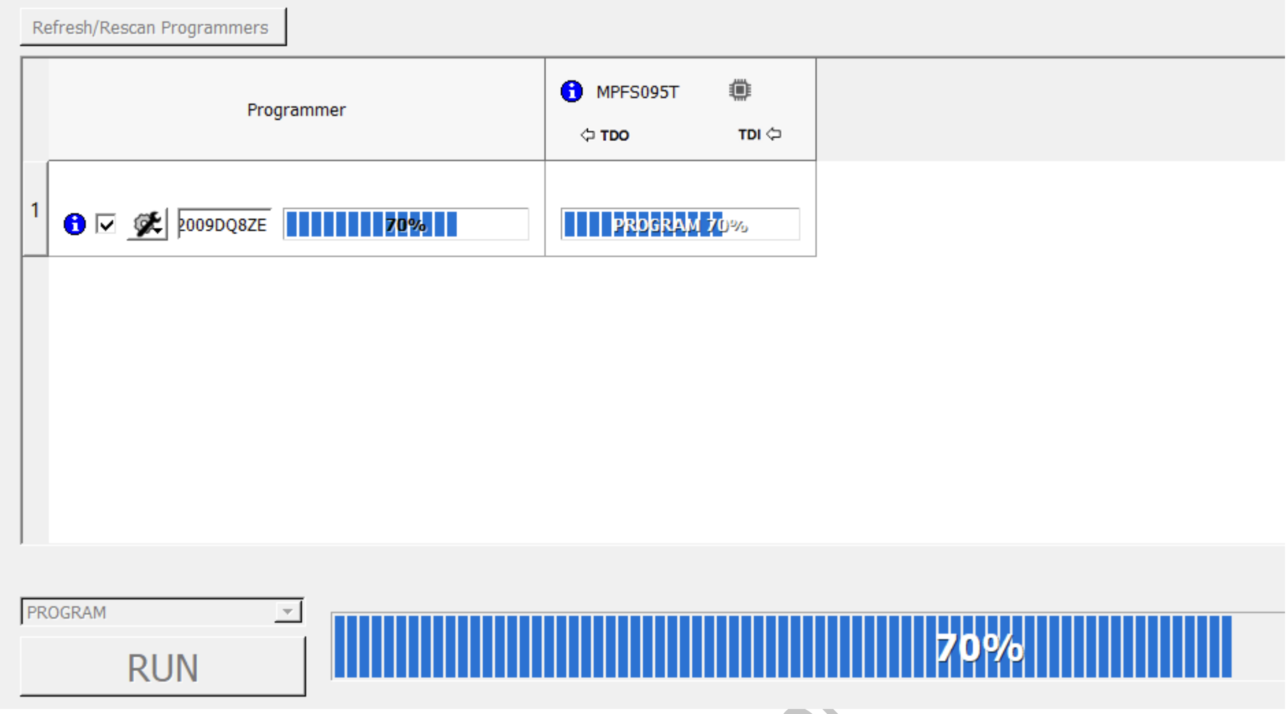
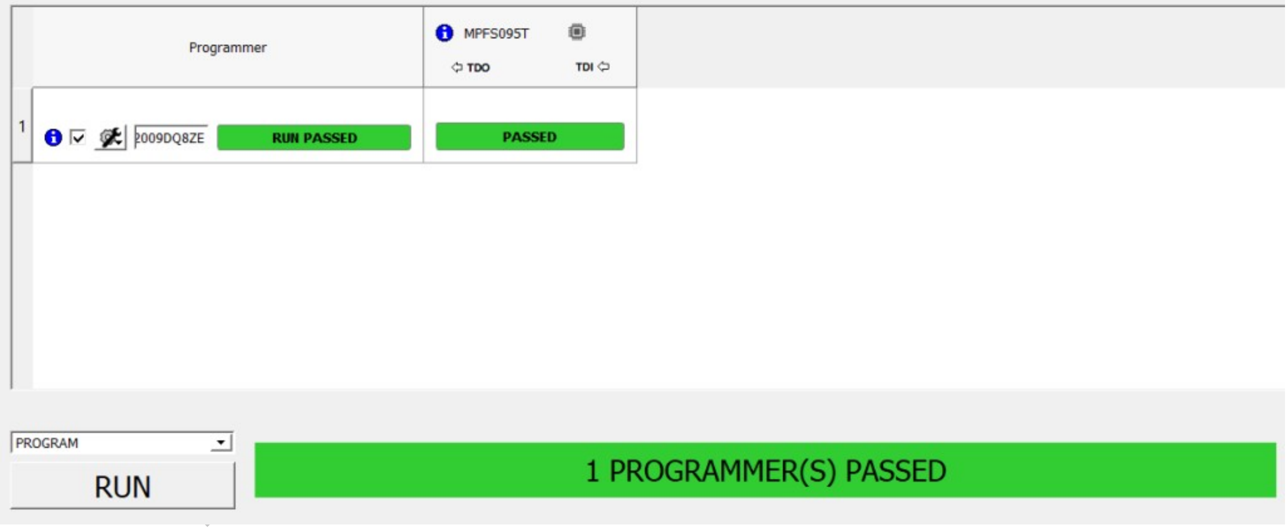


And when it finishes, it tells us if it has been recorded correctly, and with this the FPGA/SoC is programmed.



And with this the FPGA is programmed with a FlashPro Express Job.

Single bitstream

Now we go to the case in which you are given a loose bitstream. This option is the most recommended if you want to reprogram the FPGA continuously, because with a single project of this type you can record as many times as you want.

To do this, the first thing is to export the bitstream from Libero, in the *Export Bitstream* option. You only need to choose a bitstream format.

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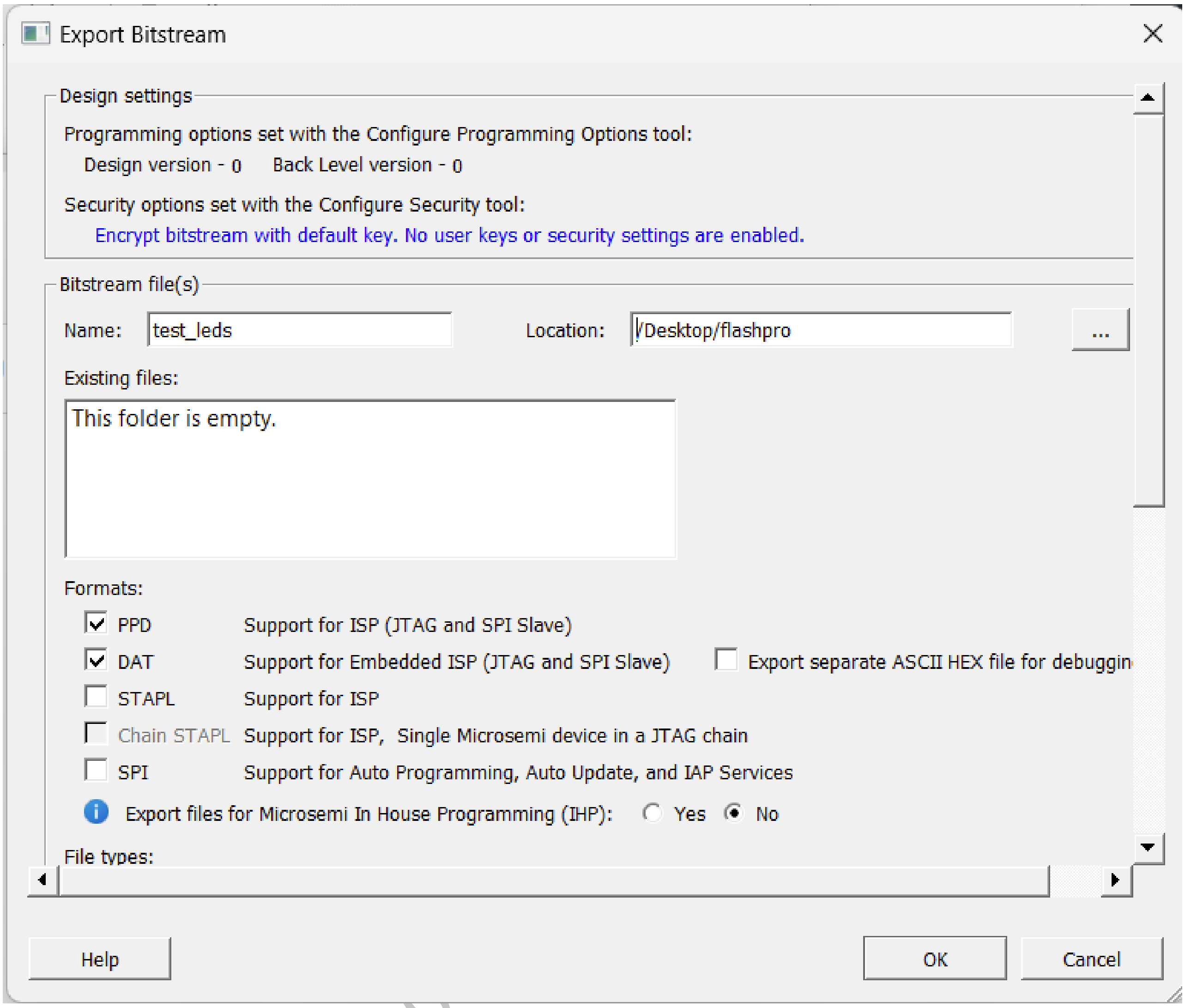

Export Bitstream

Design settings

Programming options set with the Configure Programming Options tool:
Design version - 0 Back Level version - 0

Security options set with the Configure Security tool:
Encrypt bitstream with default key. No user keys or security settings are enabled.

Bitstream file(s)

Name: test_leds Location: \Desktop/flashpro ...

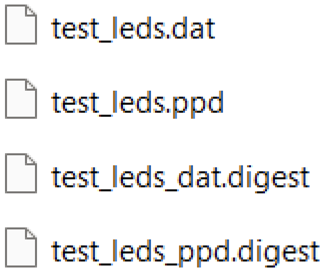
Existing files:
This folder is empty.

Formats:
☑ PPD Support for ISP (JTAG and SPI Slave)
☑ DAT Support for Embedded ISP (JTAG and SPI Slave) □ Export separate ASCII HEX file for debuggin
□ STAPL Support for ISP
□ Chain STAPL Support for ISP, Single Microsemi device in a JTAG chain
□ SPI Support for Auto Programming, Auto Update, and IAP Services

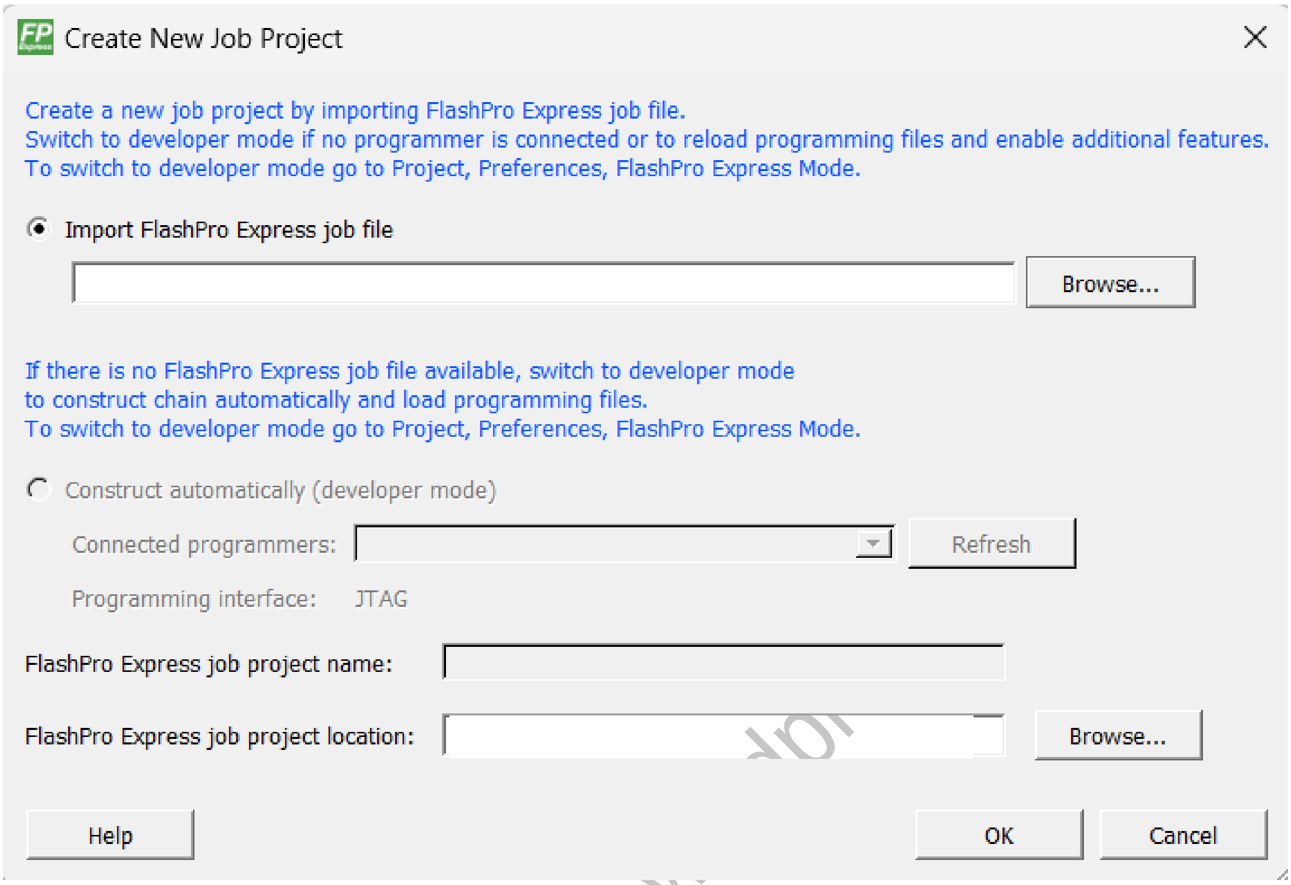
Export files for Microsemi In House Programming (IHP): ○ Yes ● No

File types:

When exporting it, it generates two files per type of bitstream.


test_leds.dat
test_leds.ppd
test_leds_dat.digest
test_leds_ppd.digest

Now we go to *FlashPro Express*, and we see that the *Construct automatically* option is disabled. Well, what we have to do is enable it.



Create New Job Project

Create a new job project by importing FlashPro Express job file.
Switch to developer mode if no programmer is connected or to reload programming files and enable additional features.
To switch to developer mode go to Project, Preferences, FlashPro Express Mode.

● Import FlashPro Express job file

If there is no FlashPro Express job file available, switch to developer mode
to construct chain automatically and load programming files.
To switch to developer mode go to Project, Preferences, FlashPro Express Mode.

○ Construct automatically (developer mode)

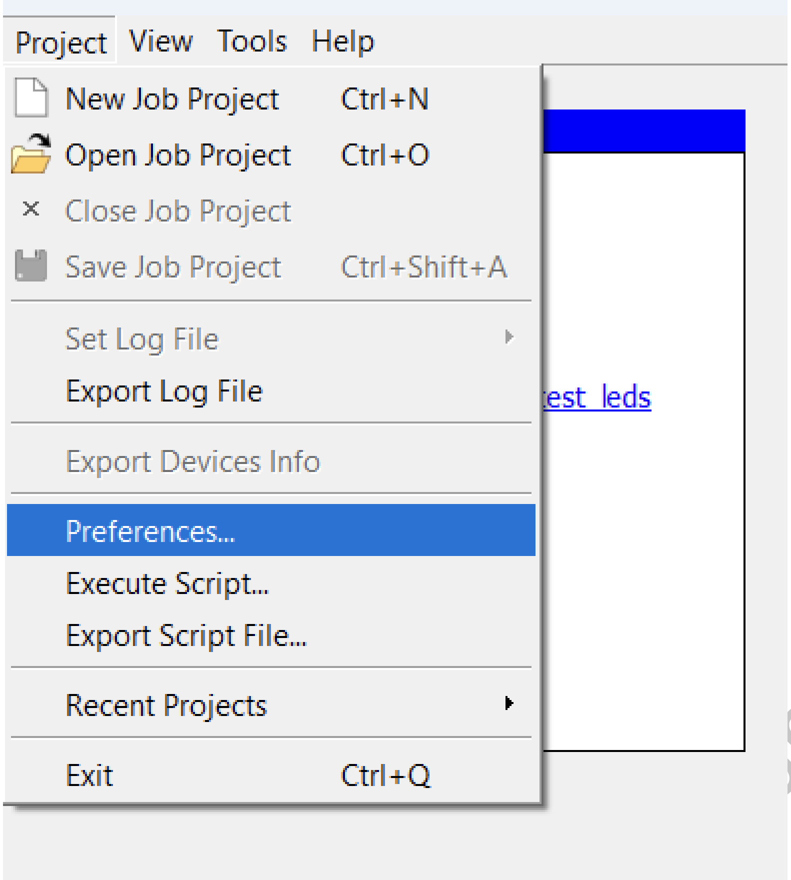
Connected programmers:

Programming interface: JTAG

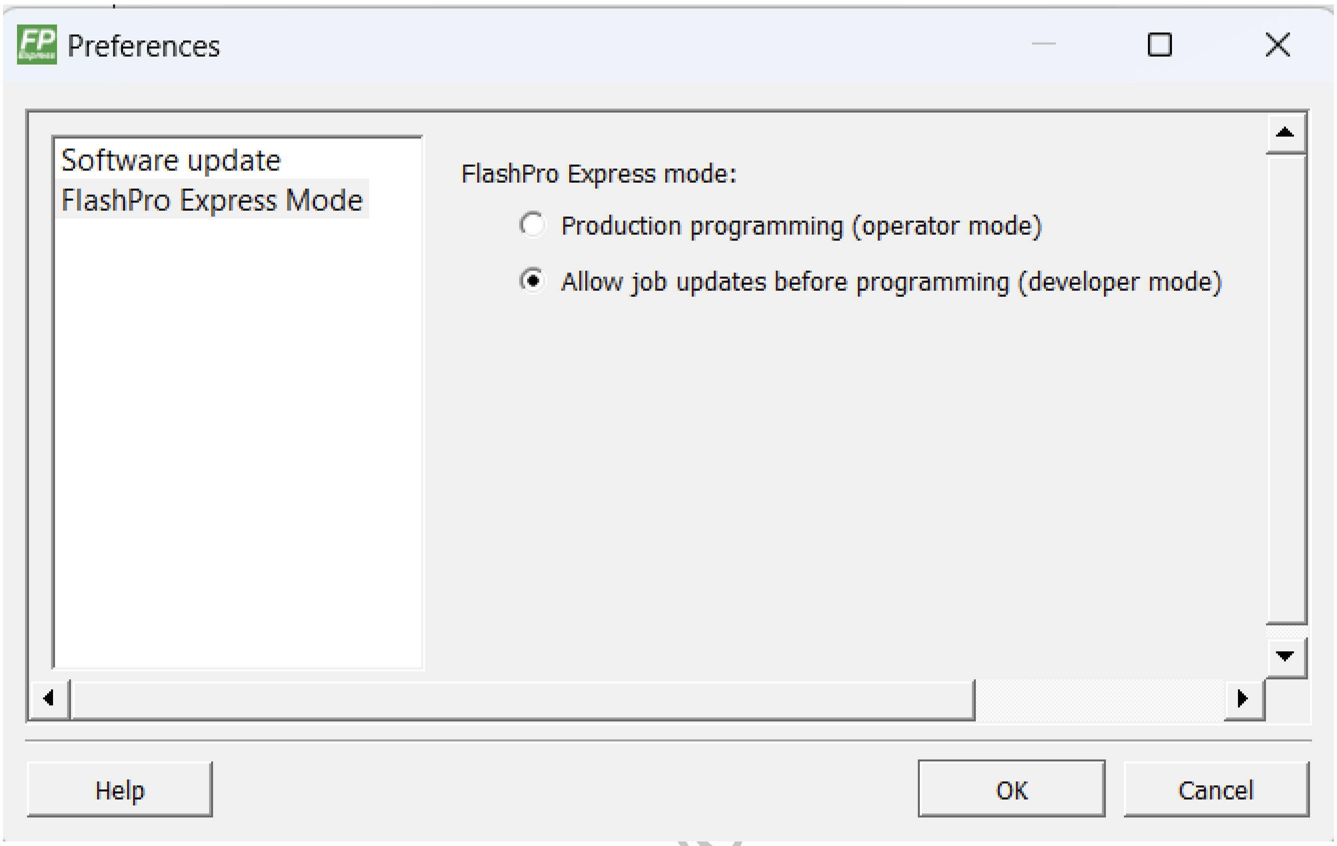
FlashPro Express job project name:

FlashPro Express job project location:

To activate it, we have to go to the *Project* tab and to *Preferences*.



Now a tab opens, in the *FlashPro Express Mode* option we have to check the *Allow job updates before programming (developer mode)* option.



FlashPro Express mode:

○ Production programming (operator mode)

● Allow job updates before programming (developer mode)

Once checked we can create a project in developer mode, we just have to pass the name of the *FlashPro Express* project and the location of the project.

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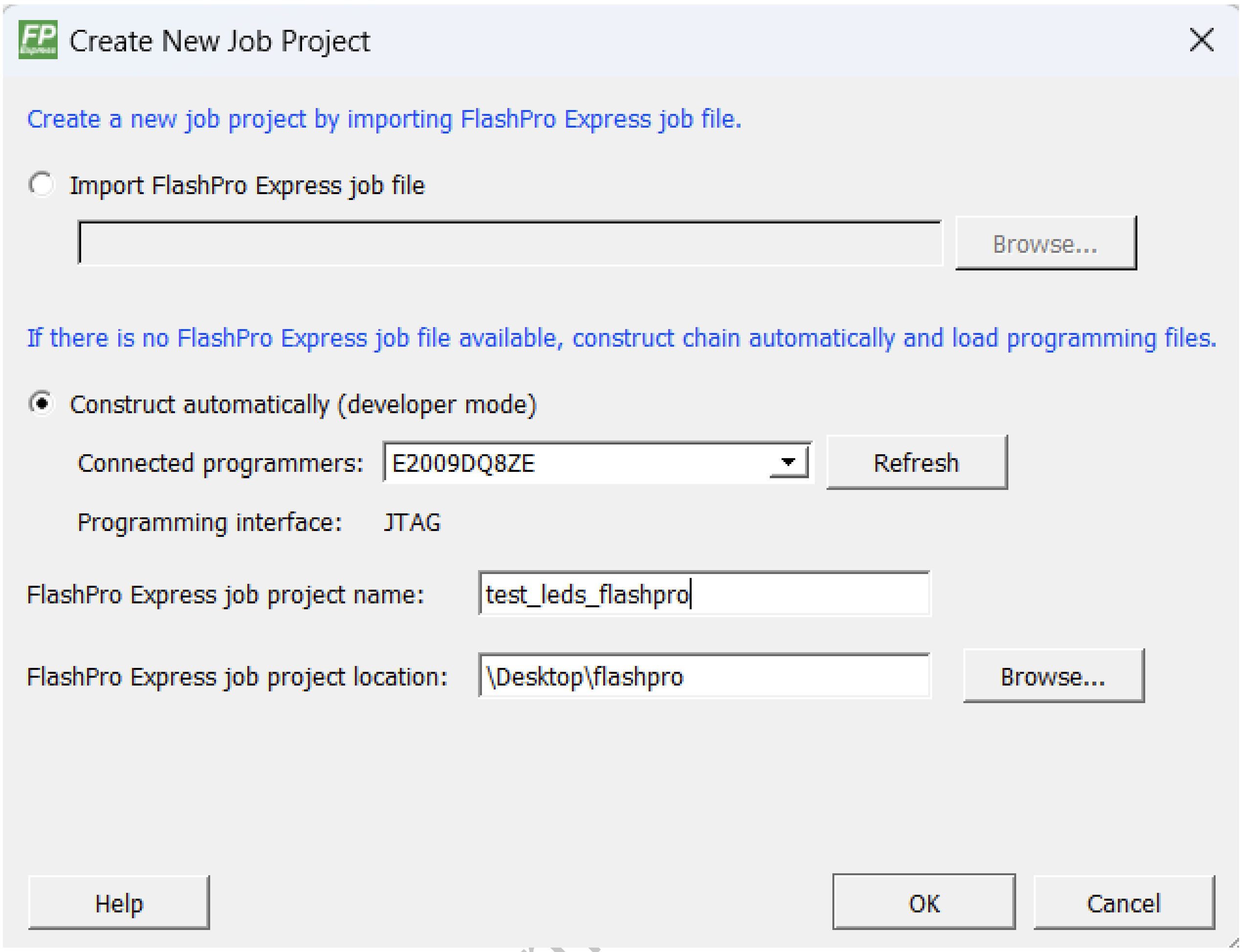

Create New Job Project

Create a new job project by importing FlashPro Express job file.

○ Import FlashPro Express job file

If there is no FlashPro Express job file available, construct chain automatically and load programming files.

● Construct automatically (developer mode)

Connected programmers: E2009DQ8ZE

Programming interface: JTAG

FlashPro Express job project name: test_leds_flashpro

FlashPro Express job project location: \Desktop\flashpro

Now FlashPro Express opens but there is no bitstream selected to record. The type of device is recognized by the debugger.

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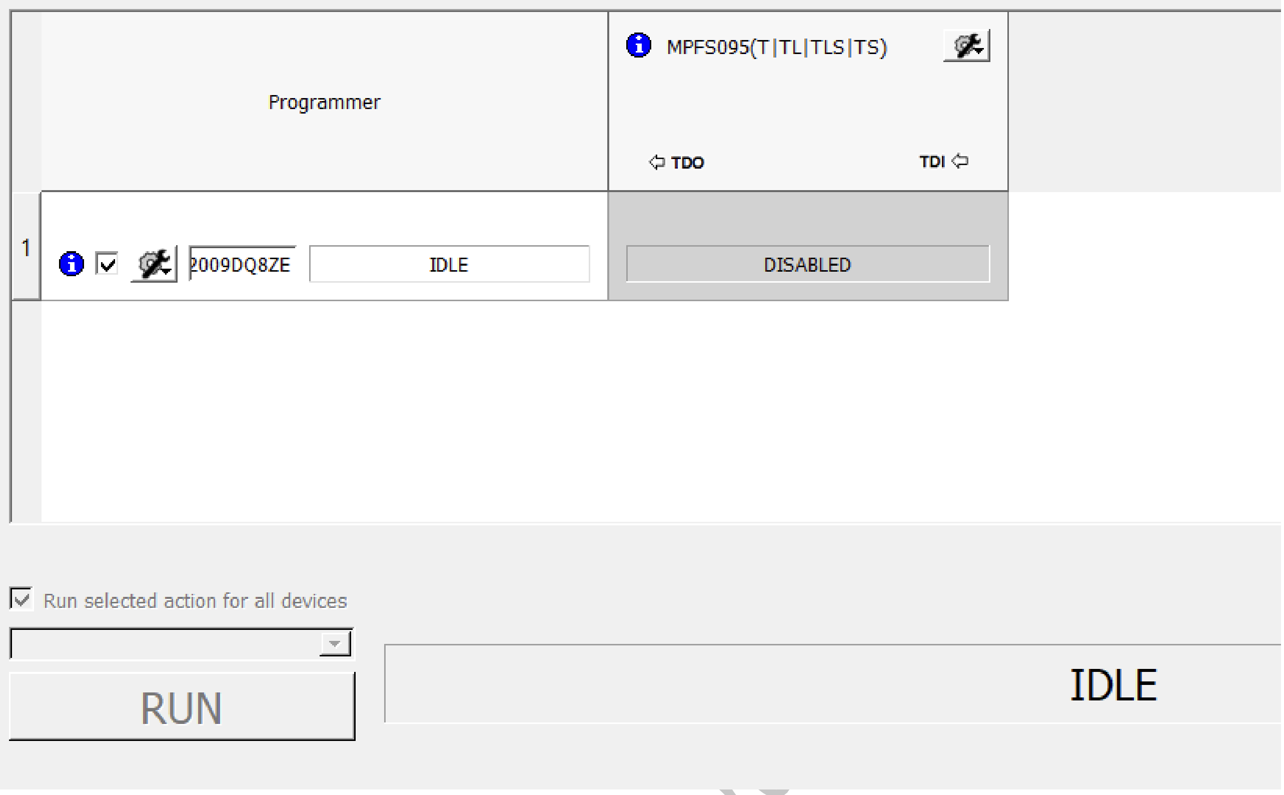
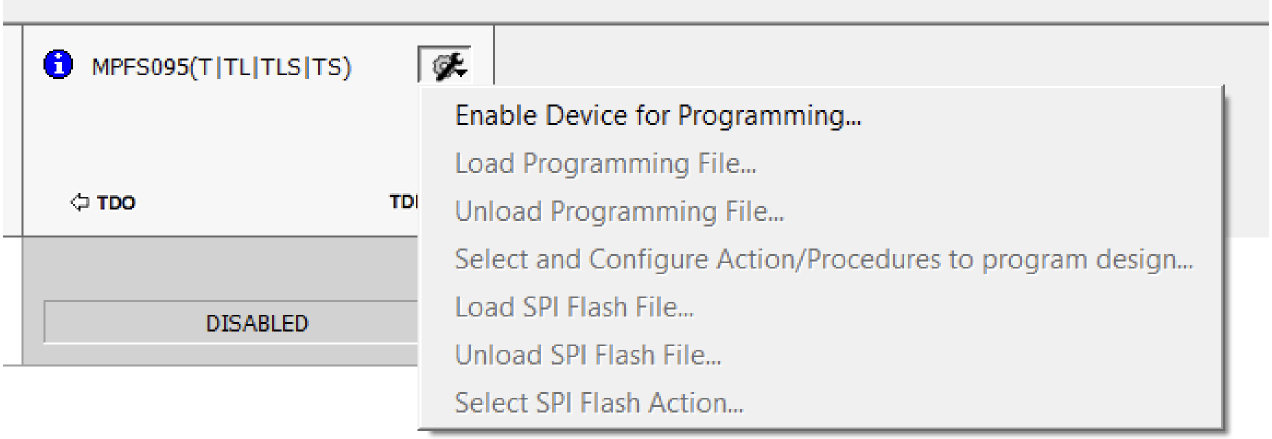


To indicate the bitstream to be recorded there are two options.

- **In the name gear.** First we mark the option *Enable Device for Programming*, and it will ask us to tell it which bitstream we want to record.


MPFS095(T|TL|TLS|TS)
TDO
TDI
DISABLED
Enable Device for Programming...
Load Programming File...
Unload Programming File...
Select and Configure Action/Procedures to program design...
Load SPI Flash File...
Unload SPI Flash File...
Select SPI Flash Action...

Once we tell it which bitstream we are going to record, it then tells us if we want the bitstream we are going to use to be recorded in the FlashPro Express project folder. This is a good way to keep version control, because with this way of programming we can change the bitstream as many times as we want to record it, while with the *FlashPro Express Job* we cannot change the bitstream every time we want to record it, but we will have to create a FlashPro Express project for each recording.

Now we can record the FPGA.

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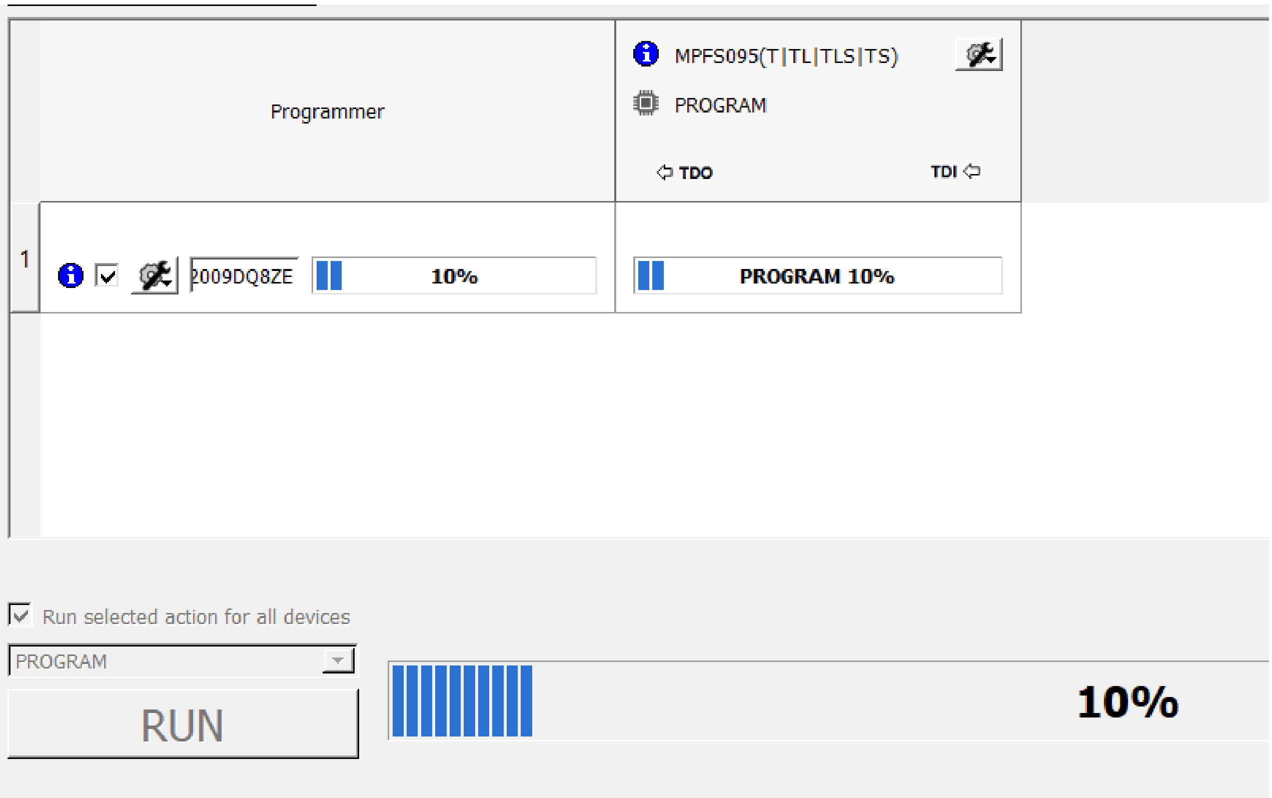
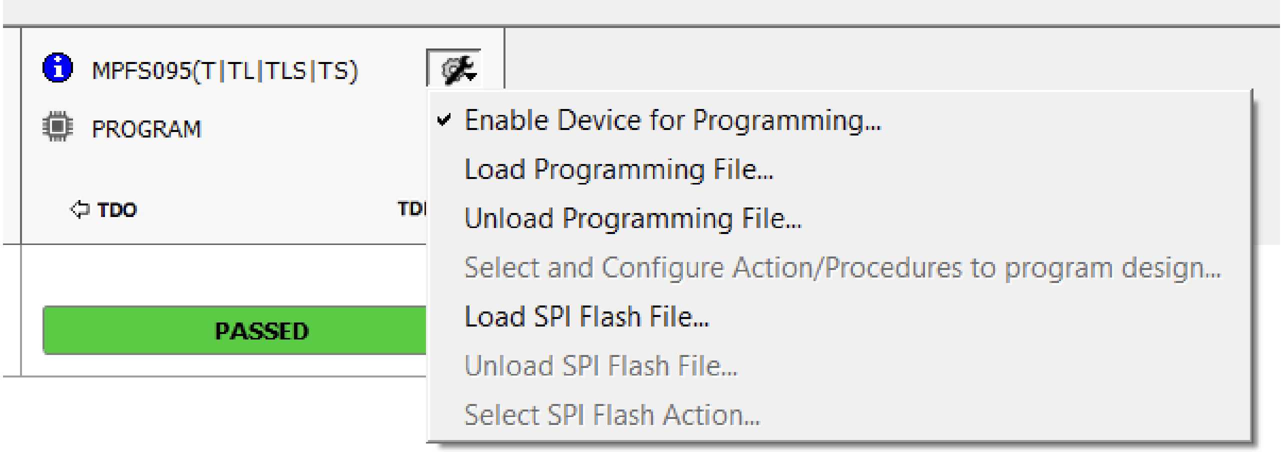
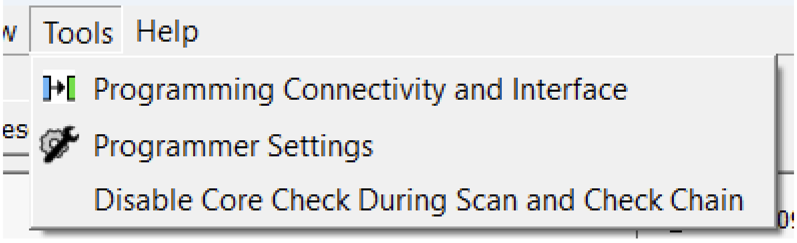


If we want to change the bitstream, all we have to do is go back to the gear and click on *Load Programming File*, and it will ask us for the new bitstream, and tell us if we want to copy it to the project folder.


MPFS095(T|TL|TLS|TS)
PROGRAM
TDO
TDI
PASSED
✓ Enable Device for Programming...
Load Programming File...
Unload Programming File...
Select and Configure Action/Procedures to program design...
Load SPI Flash File...
Unload SPI Flash File...
Select SPI Flash Action...

- **In Tools**. The *Programming Connectivity* and Interface option opens a tab.


Tools
Help
Programming Connectivity and Interface
Programmer Settings
Disable Core Check During Scan and Check Chain

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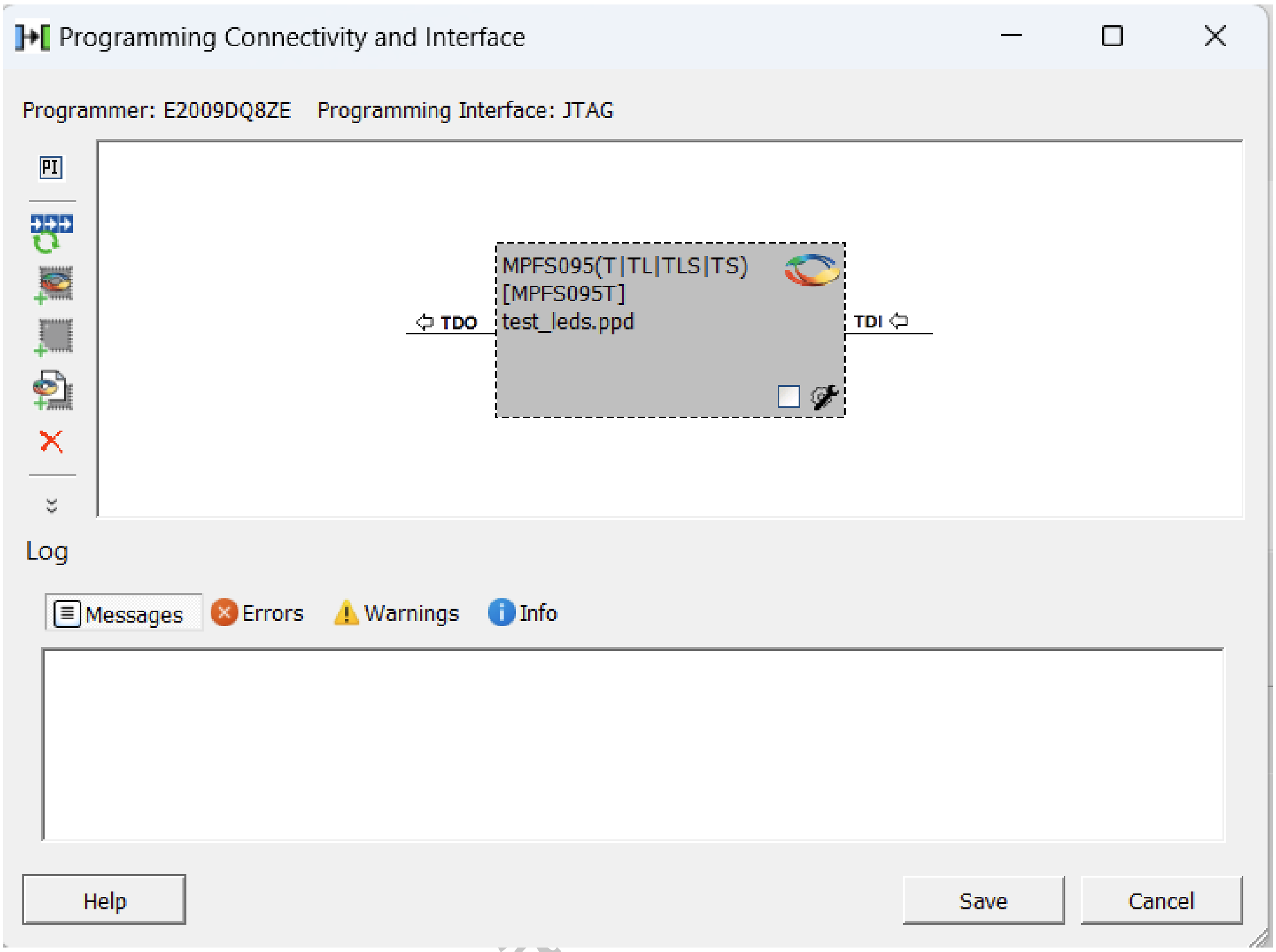
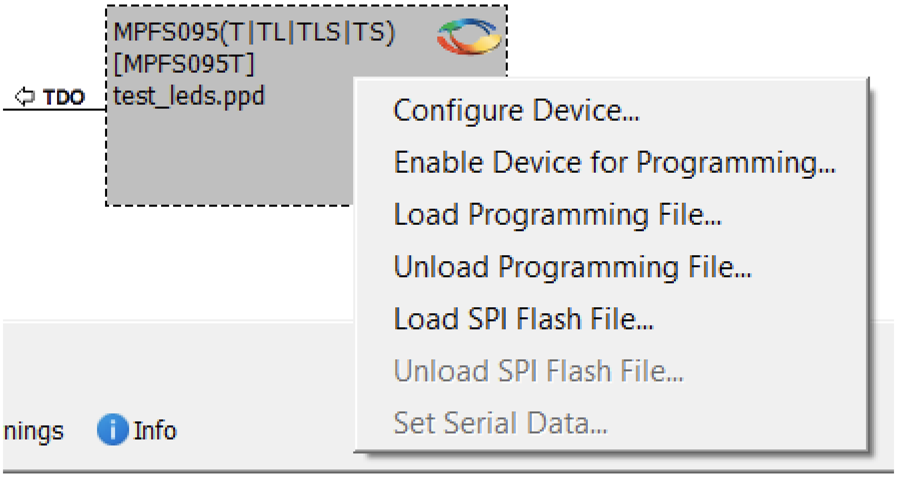
It opens a tab, which is the one that allows us to program chained devices.


Programming Connectivity and Interface

Programmer: E2009DQ8ZE Programming Interface: JTAG

If we right-click on it, it allows us to enable the device to record or load a bitstream.



In order to record, the *Enable Device for Programming* option must be checked, either by this method or by the gear. It can also be enabled in the box that has the block.

And to choose the bitstream, just check the *Load Programming File…* option and select it.

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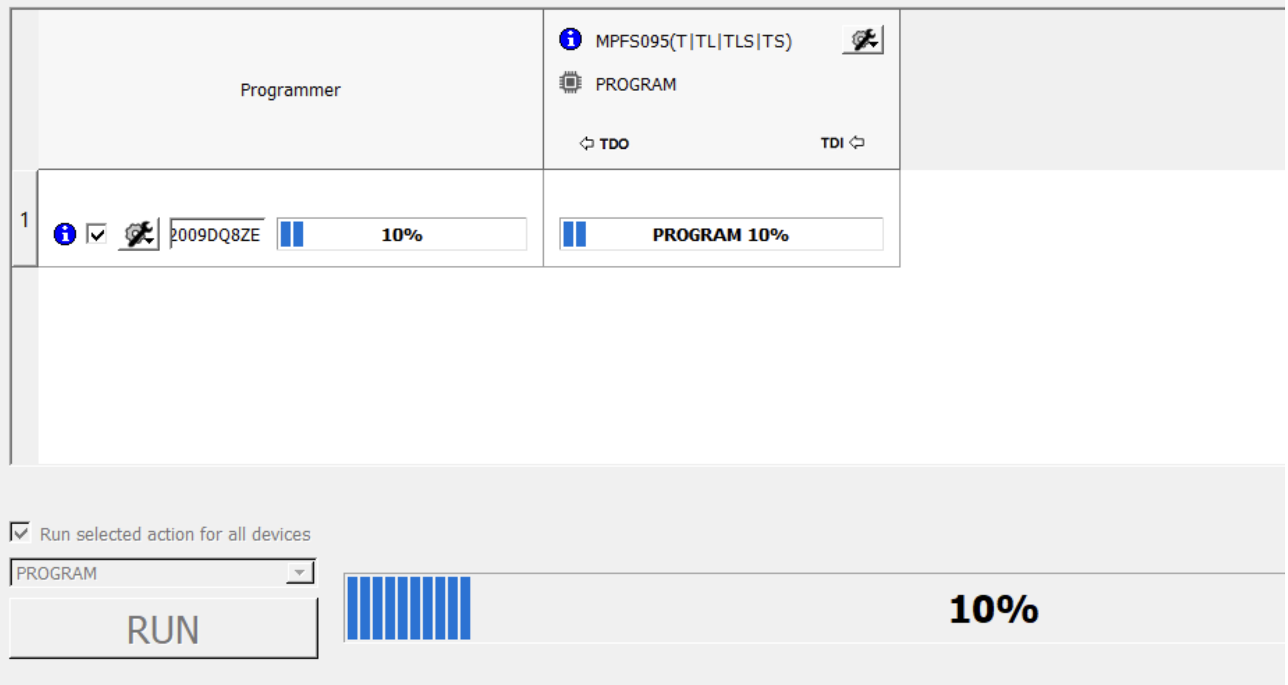
When everything is done, the FPGA can be programmed.



Final note

FlashPro Express can also be run by **TCL** commands through the terminal, which can be more useful for production, and it is programmed faster by commands, it just inv