Programming and Debug Tools Release Notes v12.6

Introduction

Microchip's Programming and Debug Tools installer is intended for laboratory and production environments where Libero® is not installed. The installler allows you to install the following tools:

- FlashPro Express
- SmartDebug
- Job Manager

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1. Device Support

Programming and Debug Tools v12.6 supports IGLOO®2, SmartFusion®2, RTG4™, and PolarFire® families, as well as preliminary support of PolarFireSoC.

2. What's New in Programming and Debug Tools v12.6

Programming and Debugging Tools v12.6 includes the following new features and enhancements.

2.1 FlashPro Express: Developer Mode

Starting from version 12.6, users can select between Developer mode and Production (Operator) mode based on the objective for which FlashPro Express is being used:

- Production (Operator) mode is the "classic" mode that FlashPro Express has always supported. This mode was designed primarily for production programming. Where FlashPro Express loads the job file created by Libero or JobManager and execute based on the configurations specified by Libero or JobManager with limited ability to modify.
- Developer mode: is a new mode for developers and engineers to use in the lab. It allows them to create new projects, configure chains, and so on.

By default, after installation, Production (Operator) mode is selected. User can change or toggle between the two modes in the Preference menu. The preference selected is remembered the next time FlashPro Express is launched.

In Developer mode, users can create a new job project by automatically constructing chain. This is done by scanning the physical devices connected to the selected programmer. Users can also construct a chain manually by using Programmer Connectivity and Interface feature to add, edit, and delete devices in a chain. Similar to LiberoSoC, the Programming Connectivity and Interface feature is used to load/unload programming files, and load/unload SPI flash files.

2.2 Expanded SPI Flash Memory Device Support

FlashPro Express v12.6 now supports programming of the following additional SPI Flash memories:

- Microchip SST26VF064B, SST25PF040CT
- Macronix MX25V4035, MX66U1G45GMI00, MX25L8006EM2I-12G, MX66L51235SF
- Winbond W25Q80DVSSIG, W25Q256FV
- Micron MT25QL01GBBB8ES, MT25QPL128AB
- Spansion/Cypress S25FL128S, S25FL256S, S25FL512S, CYRS16B256

2.3 PolarFire SoC Zeroization Support

Libero SoC v12.6 enables Zeroization support in "Export Bitstream". The generated file will have ZEROIZE_LIKE_NEW and ZEROIZE_UNRECOVERABLE programming actions.

For more information, see the *PolarFire Design Flow User Guide*.

2.4 PolarFire SoC Security Policy Manager Option to Disable eNVM Field Updates

Using this option, eNVM can be pass key protected for field updates. By default, field updates are allowed for eNVM without requiring FlashLock Passcode (UPK1). To protect eNVM, select the option to disable erase/write operations, which requires FlashLock Passcode (UPK1) to be able to update eNVM.

2.5 Bitstream Option to Sanitize All sNVM/eNVM Pages in Erase Action

Libero v12.6 supports **sanitize sNVM** and **sanitize eNVM** options for the ERASE action. This option programs all 0's into all eNVM/sNVM pages.

- The sNVM sanitize option is supported for PolarFire, RT PolarFire, and PolarFire SoC.
- The eNVM sanitize option is supported for SmartFusion2, IGLOO2, and PolarFire SoC.

The tools that have these options are:

- Generate bitstream.
- Export bitstream.
- Export job.

The tools have the new Tcl parameters **sanitize_snvm** (PolarFire, RT PolarFire, and PolarFire SoC) and **sanitize_envm** (SmartFusion2, IGLOO2, and PolarFire SoC).

The sNVM sanitization option is enabled in the Generate Bitstream and Export Job tools if Fabric/sNVM component is selected. In the Export Bitstream, the option is enabled if Fabric/sNVM component is selected for at least one programming file type (master or update).

The eNVM sanitization option is enabled in the Generate Bitstream and Export Job tools if eNVM is configured and eNVM component is selected. In the Export Bitstream tool, the option is available if eNVM is configured and selected for at least one file type (master or update).

Default for both options when they are enabled is "off".

Note: The sanitization options do not depend on the OTP security setting. ERASE actions fail if there is OTP security.

2.6 SmartDebug: I/O Margining Analysis for PolarFireSoC Fabric DDR Memory Controllers

With Programming and Debug Tools v12.6, SmartDebug introduces the Debug DDR Memory tool for DDR3/DDR4/LPDDR3. This tool retrieves the status and result from the PolarFire DDR Training IP, and allows users to visualize the margin on the DDR I/Os.

2.7 SmartDebug: Transceiver Debug Register Access

With Programming and Debug Tools v12.6, SmartDebug introduces the capability to perform transceiver register read, write, and export operations. The user can perform register access operations using Smart Debug UI and also export the read register information to a file.

2.8 SmartDebug: PolarFire and RTG4 ECC Block View Support

With Programming and Debug Tools v12.6, SmartDebug introduces the capability to observe and inject errors in ECC-enabled RAM blocks.

3. Resolved Issues

Table 3-1. Customer-reported Defects and Enhancement Requests with Case Numbers

Case Number	Description	Resolution
493642-2174852554	Enable eNVM/sNVM Sanitization Action/command - ERASE action.	eNVM/sNVM sanitization has been added to this release.
493642-2752765844	FP6 - Support for Spansion / Cypress S25FL512S SPI Flash memory.	Support for SPI flash devices has been expanded.
493642-2748414757	FP6 - Support for Macronix MX25V4035F SPI Flash memory.	Support for SPI flash devices has been expanded.
493642-2684754568, 493642-2490103952, 493642-2568791212, 493642-2606807822, 493642-2635375032, 493642-2661732256	FP6: PolarFire: SPI-Flash Programming devices supported.	Support for SPI flash devices has been expanded.
493642-2707013487	FP6 - Support for Cypress S70FS01GSAGMFI010 SPI Flash memory.	Support for SPI flash devices has been expanded.
493642-2706626995	FP6 - Support for Macronix MX66U1G45G SPI Flash memory.	Support for SPI flash devices has been expanded.
493642-2761396209	Provide SPI Flash memory custom size less than 1 MB.	Support for SPI flash devices has been expanded.
493642-2706626995	FP6 - Support for Macronix MX66U1G45G SPI Flash memory.	Support for SPI flash devices has been expanded.
493642-2761396209	Provide SPI Flash memory custom size less than 1 MB.	Support for SPI flash devices has been expanded.
493642-2772574227	Issue programming PolarFire device through SmartDebug via Tcl script.	The exported Tcl file has been corrected in this release and programming through the Tcl script passes.
493642-2507765827, 493642-2638828358	RTG4: Use SmartDebug to Inject Errors on ECC RAM blocks.	Libero SmartDebug has been enhanced to inject errors in RAM blocks.

Table 3-2. Customer-reported Defects and Enhancement Requests (No Case Numbers)

Description	Resolution
Incorrect FPGA state printed relative to the selected run Action.	The issue with Flash Pro has been fixed and the correct state of device is now displayed.
Support for ISSI SPI Flash memory.	Support for SPI flash devices has been expanded.

4. Known Issues and Limitations

This chapter lists known issues for SmartDebug and programming.

4.1 SmartDebug

Table 4-1. SmartDebug Known Issues and Limitations

Family	Description
PolarFire family	PCIe and EXTPLL's registers are not yet supported from "Transceiver Debug Register Access" feature. They will be added in a future release.
RTG4 family	ECC representation in physical view for RAM configurations of 512x36 mode is not yet supported. It will be added in a future release.

4.2 Programming

Table 4-2. Programming Known Issues and Limitations

Family	Description
PolarFireSoC	For PolarFireSoC Libero designs that contain eNVM, running VERIFY_DIGEST after programming device will fail with "eNVM digest verification: FAIL". Workaround: Deselect procedure 'DO_ENABLE_ENVM' in VERIFY_DIGEST action.
PolarFireSoC	For PolarFireSoC Libero designs that generate/export eNVM only bitstream, the generated bitstream file/job will include ERASE action which is not applicable and does nothing. Affected releases are v12.4 and later. **Note:** For v12.6, this issue applies for the eNVM only case + no eNVM sanitization option.
PolarFireSoC	For Libero designs with sNVM clients configured, no custom user security options selected, and have the program designed on device, modifying sNVM client content and sNVM client Fabric/MSS read/write permissions and run VERIFY action fails with the message "Failed to verify Security" instead of "Failed to verify SNVM".
PolarFireSoC	This release supports only the following Micron SPI Flash memory devices: • Using FlashPro5: MT25QL01G only • Using FlashPro6: all members of N25Q and MT25Q device families **Note:** Contact Microchip Technical Support about support for Flash memory devices from other vendors and device families using FlashPro6.
PolarFire, PolarFireSoC	Although sNVM / eNVM are being sanitized when enabled since the action is part of the bitstream, FP6 does not report a "Sanitizing sNVM..." or "Sanitizing eNVM..." message during erase operations in the ppd flow.
SmartFusion2, IGLOO2	Device Info log displays wrong CheckSum and Design name during SPI Slave programming.

5. System Requirements

The Programming and Debug Tools v12.6 release has the following system requirements:

- 64-bit OS
  - Windows 7 or Windows 10 OS
  - RHEL 6.6-6.11, RHEL 7.2-7.6
  - CentOS 6.6-6.11 and CentOS 7.2-7.6
  - Ubuntu 18.04
    Note: FlashPro5 is not supported with Ubuntu.
  - OpenSUSE Leap 42.3 (SLES 12.3 equivalent)
- A minimum of 16 GB RAM

Note: Setup instructions for using Programming and Debug Tools v12.3 on Red Hat Enterprise Linux OS or CentOS are available in Libero SoC Linux Environment Setup User Guide.

6. Download Libero SoC v12.6 Programming and Debug Tools

Click the following links to download Programming and Debug Tools v12.6 on Windows and Linux operating systems:

- Windows Download
- Linux Download

Note: Installation requires administrator privileges to the system.

7. Appendix: Sample Programming and SmartDebug Times Using FlashPro5/FlashPro6

The tables in this appendix show sample programming times and SmartDebug runtimes using FlashPro5 and FlashPro6 programmers.

7.1 Microsemi FPGA Array Programming

The following table shows sample PPD programming times of the FPGA Array.

Table 7-1. Sample PPD Programming Times of the FPGA Array

Devices[1]	PPD Programming Time[2] (mm:ss)		
	FlashPro5	FlashPro6	
	TCK=4 MHz USB 2.0	TCK=4 MHz	TCK=20 MHz[3]
		USB 2.0/3.0	USB 2.0/3.0
M2S/M2GL	2 min 9 sec	2 min 10 sec	2 min 2 sec
M2S/A2GL 150	4 min 21 sec	4 min 19 sec	3 min 54 sec
RTG4	2 min 10 sec	1 min 56 sec[4]	1 min 33 sec[4]
MPF100	39 sec	28 sec	23 sec
MPF200	1 min 3 sec	43 sec	28 sec
MPF300	1 min 33 sec	1 min 4 sec	43 sec
MPF500	1 min 57 sec	1 min 34 sec	1 min

[1] FlashPro6 supports JTAG programming for all SmartFusion2, IGLOO2, RTG4, PolarFire, RT PolarFire, and PolarFire SoC devices.

[2] To benefit from the improved programming time using FlashPro6, use the PPD file format for SmartFusion2, IGLOO2, and PolarFire devices.

[3] To ensure successful programming at 20 MHz TCK, take appropriate steps to ensure signal integrity of JTAG signals.

[4] New and improved programming time for RTG4 starting with Libero SoC/FlashPro Express v12.3 and later.

7.2 SPI Flash Programming

The following table shows sample SPI Flash Programming time using the PolarFire Splash Kit.

Table 7-2. Sample SPI Flash Programming Time

(N25Q00AA13GSF40G / MT25QL01GBBB8ESF-0SIT TR)[1] 10 MByte Data	SPI Flash Programming Time				
	FlashPro5		FlashPro6[2]		
	TCK = 4 MHz	TCK = 15 MHz[3]	TCK = 4 MHZ	TCK = 15 MHz[3]	TCK = 20 MHz[3]
	USB 2.0	USB 2.0	USB 2.0/3.0	USB 2.0/3.0	USB 2.0/3.0
Erase and Program SPI Flash[4]	8 min 15 sec	4 min 58 sec	14 min 53 sec	5 min 45 sec	4 min 54 sec
Verify SPI Flash	1 hr 57 min 38 sec	1 hr 50 min 45 sec	16 min 33 sec	7 min 53 sec	7 min 04 sec
Read SPI Flash	2 hrs 02 min 43 sec	1 hr 55 min 30 sec	16 min 12 sec	7 min 36 sec	6 min 47 sec
Erase SPI Flash	18 sec	18 sec	1 min 52 sec	1 min 50 sec	1 min 50 sec

[1] SPI Flash programming has been tested on N25Q00AA and MT25QL01G/MT25QU01G devices only. Contact technical support for other SPI-Flash device support needs.

[2] FlashPro6 has longer erase and programming times for SPI Flash devices compared to FlashPro5. However, readback and verification times are significantly shorter. As a result, the total combined Erase, Program, and Verify time is significantly lower compared to FlashPro5. Programming time for FlashPro6 will be improved in future releases.

[3] To program the device successfully at a high TCK frequency, take appropriate to ensure signal integrity of JTAG signals.

[4] SPI Flash programming time may vary from device to device even though the part number is the same. This is due to die to die variation.

7.3 SmartDebug Runtime Samples

The following table shows sample runtimes of some SmartDebug key functions.

Table 7-3. Sample Runtimes of SmartDebug Key Functions

SmartDebug Operations	FlashPro5	FlashPro6[1]
	TCK = 4 MHZ	TCK = 4 MHZ
	USB 2.0	USB 2.0/3.0
Active Probe Read (13,000 probe points)	28 sec	1 sec
Active Probe Write (13,000 probe points)	35 sec	6 sec
Logical View Read of LSRAM (340 LSRAM Blocks)	20 min	<5 min
Logical View Read to USRAM (32 USRAM Blocks)	1 sec	1 sec
FHB - Waveform dump to VCD file (160 probe points; 1,000 cycles)	7 min	25 sec

[1] FlashPro6 SmartDebug runtime is applicable for SmartDebug v12.3 and later only.

8. Revision History

Revision	Date	Description
A	12/2020	Initial Revision

9. Microchip FPGA Technical Support

Microchip FPGA Products Group backs its products with various support services, including Customer Service, Customer Technical Support Center, a website, and worldwide sales offices. This section provides information about contacting Microchip FPGA Products Group and using these support services.

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- Fax, from anywhere in the world, **650.318.8044**

9.2 Customer Technical Support

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Technical support can be reached at soc.microsemi.com/Portal/Default.aspx.

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9.3 Website

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 PIS_TABLE - Variable missingPIS_EXAMPLE - Variable missingPIS_NOTES - Variable missing

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