



Application Notes

AN_377

Altera FPGA FIFO master Programming Guide

Version 1.0

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This document provides a guide on how to use Altera's program tool - Quartus II Programmer to program an Altera FPGA (Sample FPGA BD: Cyclone V GX Starter Kit) as a FIFO master for interfacing with UMFT600A/UMFT601A modules.

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1 Introduction

This document explains how to use the Altera Quartus II Programmer to program an Altera FPGA as a FIFO master with a sample image compatible with interfacing to either a UMFT600A or UMFT601A module.

1.1 Overview

The UMFT600A/UMFT601A modules are evaluation modules with HSMC high speed connectors, providing USB3.0 to 16Bit/32Bit wide parallel FIFO interfaces, which are used to evaluate the functionality of FT600/FT601 device.

As a FIFO slave board, the UMFT600A/UMFT601A operates with a FIFO master board which has a standard HSMC connector. This document explains how to program an Altera FPGA Board (Cyclone V GX Starter Kit) as a FIFO master with the sample image, so that the user can run the ['FT600DataLoopbackApp'](#) to verify module's functions.

1.2 Prerequisite

- A PC with Altera Quartus II Programmer (Assume Altera drivers have been installed.)
- Altera Cyclone V GX Starter Kit

1.3 Notes

FTDI provides 4 different FPGA loopback application images and 2 PCB evaluation boards with an HSMC connector that is compatible with Altera FPGA development kits. Ensure the FPGA image used, matches with the PCB evaluation board i.e. UMFT600 or UMFT601 and either 600 mode or 245 mode of operation. Data transfer will not work properly if the FPGA image is incompatible with the PCB evaluation board.

FPGA loopback application images

- Altera FPGA-Cyclone V starter kit C5G, FT601, 600 mode
- Altera FPGA-Cyclone V starter kit C5G, FT601, 245 mode
- Altera FPGA-Cyclone V starter kit C5G, FT600, 600 mode
- Altera FPGA-Cyclone V starter kit C5G, FT600, 245 mode

PCB evaluation boards

- UMFT601A (HW_432) – For Altera FPGA with FT601 image
- UMFT600A (HW_430) – For Altera FPGA with FT600 image

2 Step-by-step instruction

1. Connect the Cyclone V GX Starter board J10 (USB BLASTER) to a PC with a USB cable.
2. Push SW11 to the 'PROG' position for Flash programming and the 'RUN' position for FPGA programming and loopback test.
3. Plug in a 12V DC supply to J9, then turn on the POWER (press SW10.)
4. All other SW and Jumpers on board should be default factory settings.

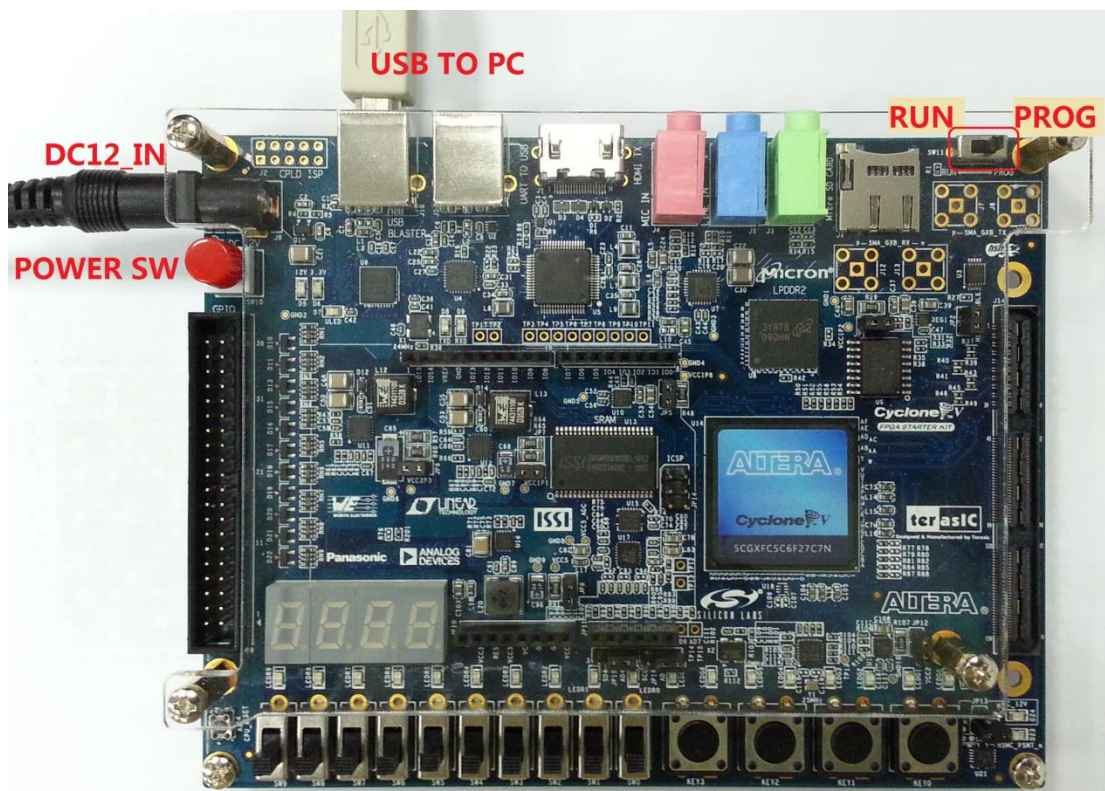
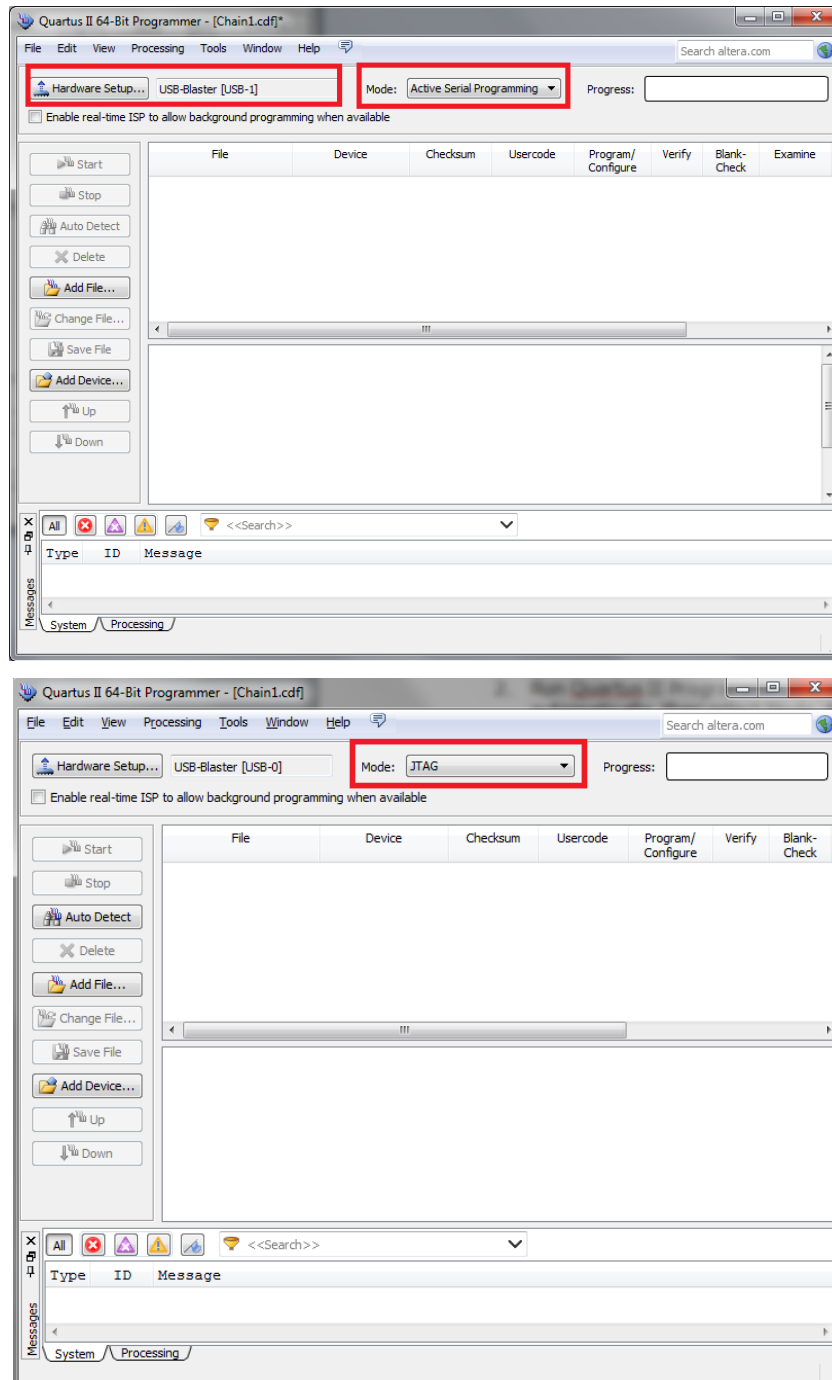


Figure 2.1 Cyclone V GX Starter board Hardware Setup

5. Run the Quartus II Programmer, the hardware (USB-Blaster [USB-1]) should be found automatically, and then select Mode '**Active Serial Programming**' for programming flash or '**JTAG**' for programming FPGA.

**Figure 2.2 Select Program Mode**

6. Click the 'Add File...' icon to specify the file for Flash(*.pof) or FPGA(*.sof), and the device will be added automatically.
7. Click 'Start' to program the selected device.

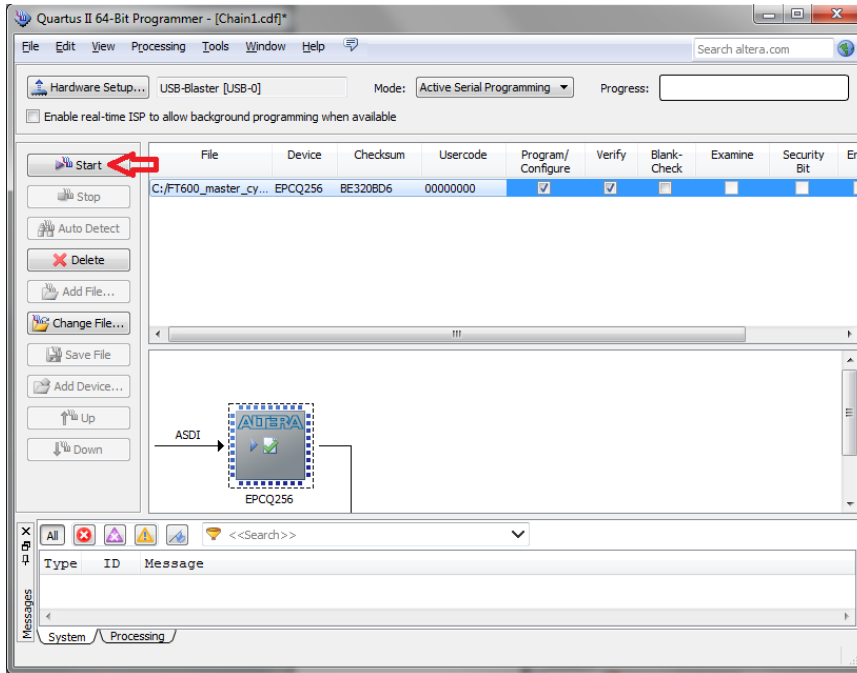


Figure 2.3 Flash Programming

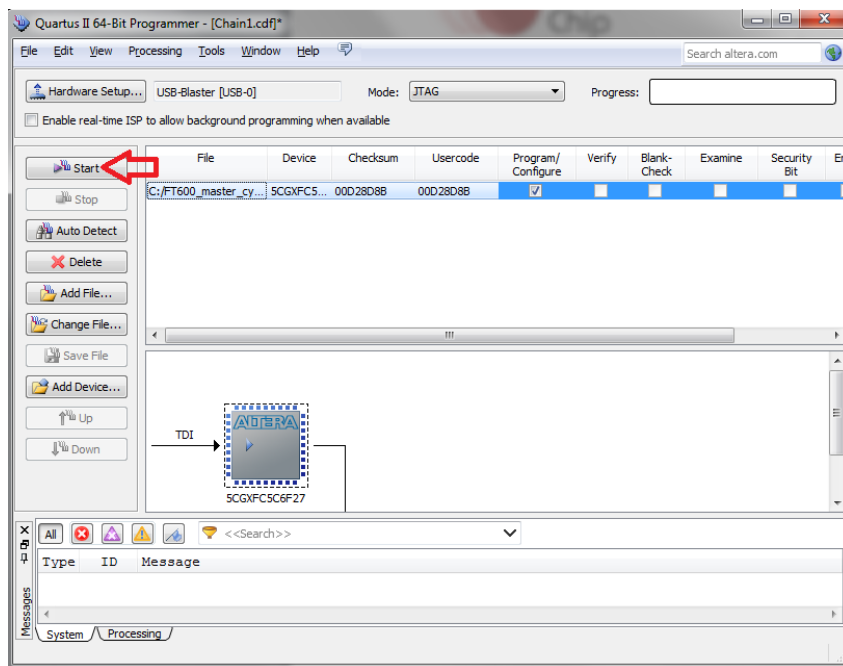


Figure 2.4 FPGA Programming

8. Program successfully.

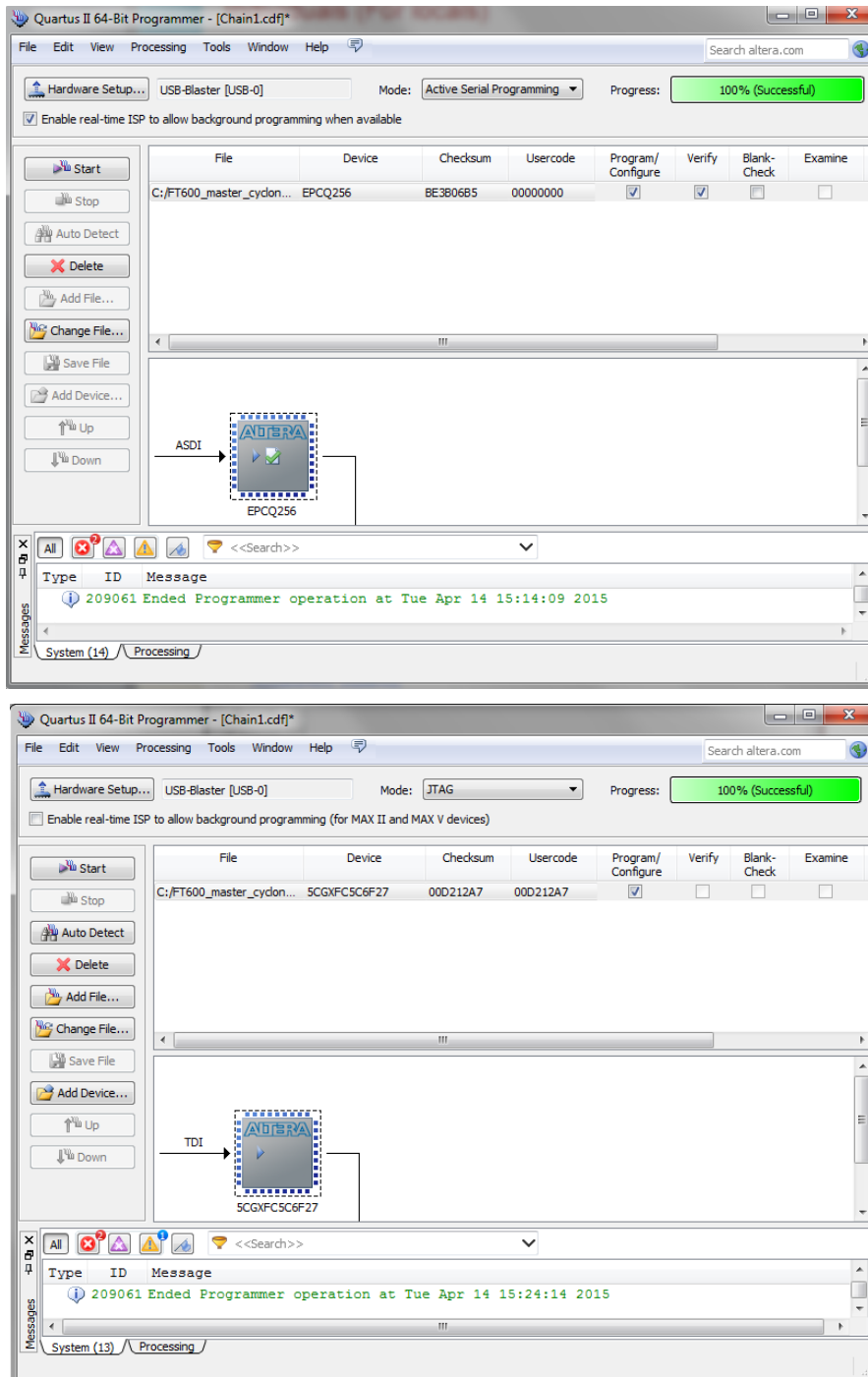


Figure 2.5 Program Successfully

3 UMFT600A/UMFT601A Data Loopback Demo

1. Hardware setup: Connect the UMFT600A or UMFT601A module to the Altera Cyclone V GX Starter Board; connect the UMFT601A or UMFT601A CN1 to the PC with a micro-USB3.0 cable. Plug in a 12V DC supply to J9 on the Altera Cyclone V GX Starter Board, and then turn on the POWER.



Figure 3.1 UMFT600A/UMFT601A data loopback demo hardware setup

2. Run '[FT600DataLoopbackApp](#)', the application will find the device automatically; click the 'Start All' button to do all channels data loopback test. Please refer to '[AN_375_FT600_Data_Loopback_Application_User_Guide](#)' for more details of this application.

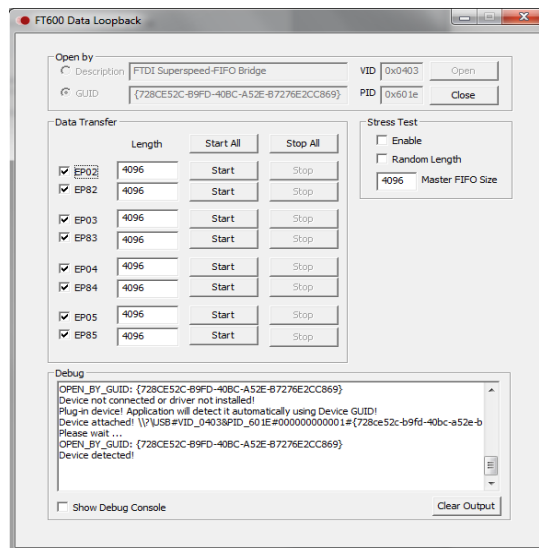


Figure 3.2 FT600 Data loopback application

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Appendix A

Document References

[FT600Q-FT601Q SuperSpeed USB3.0 IC Datasheet](#)

[AN_375 FT600 Data Loopback Application User Guide](#)

[DS_UMFT60xx module datasheet](#)

[D3XX Programmer's Guide](#)

[AN_385 D3xx Installation Guide](#)

[ALTERA Firmware Download](#)

[Loopback utility](#)

[C5G User Manual](#)

Acronyms and Abbreviations

Terms	Description
FIFO	First In First Out
FPGA	Field Programmable Gate Array
HSMC	High Speed Mezzanine Card
JTAG	Joint Test Action Group
USB	Universal Serial Bus

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Appendix C – Revision History

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