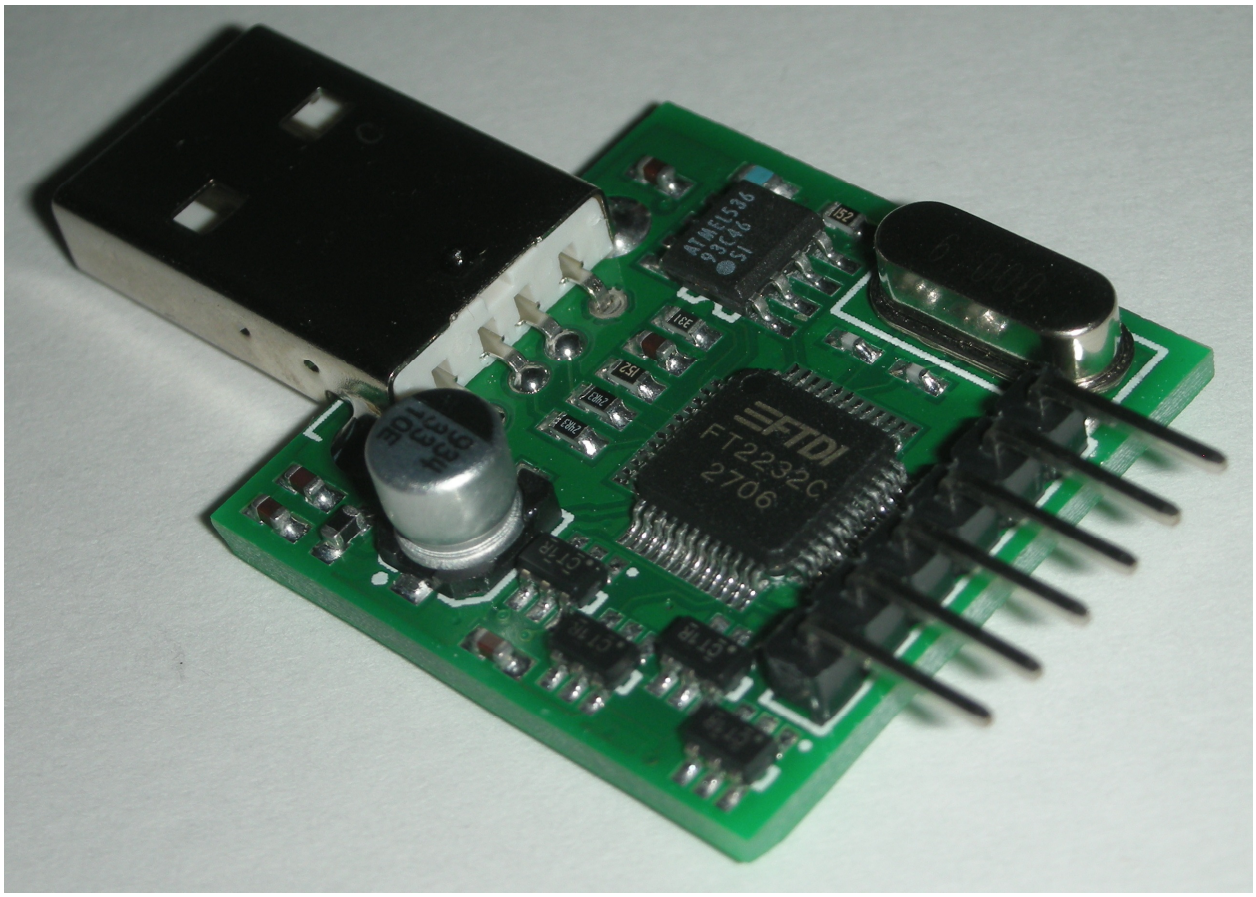
# FTDI USB JTAG PROGRAMMER USER's GUIDE

***MODEL: FPU1  Revision B***



# Introduction

**FPU1 FTDI USB JTAG programmer is designed for programming XILINX FPGA/CPLD/FLASH ICs. It is also can be used for programming other JTAG devices. It is easy to use, has small sizes, and supports wide range of Vref JTAG chain voltages. Guide for this programmer includes step by step instructions for programming XILINX devices.**

# Features

- FTDI FT2232 USB controller
- Buffered port for programming JTAG devices. Vref 1.65V -5.5V
- Programmer is powered by 5V from USB
- 2.54mm pitch 6 pin JTAG header
- Small 25 x 25(mm) PCB outline
- With included cable and adapter, it can be connected to any 2.54mm pitch connector and to 2mm pitch 14pin XILINX standard connector

# Instructions

FPU1 FTDI USB JTAG programmer has FTDI FT2232 USB controller onboard. PORT A of FT2232 is configured as JTAG interface. It is connected to buffer IC's. They are needed to amplify driving current and to widen the supported voltage levels. Buffer IC's are connected to 6 pin JTAG header J2, with 2.54mm pitch. Programmer is powered by 5v from USB, but still, external Vref JTAG voltage must be connected. Vref voltage must match JTAG signals voltage. Programmer can work with Vref from 1.65v to 5.5v. This includes 1.8v, 2.5v, 3.3v and 5v standard signal levels. As long as you can find right software, you can program any JTAG device with this programmer.

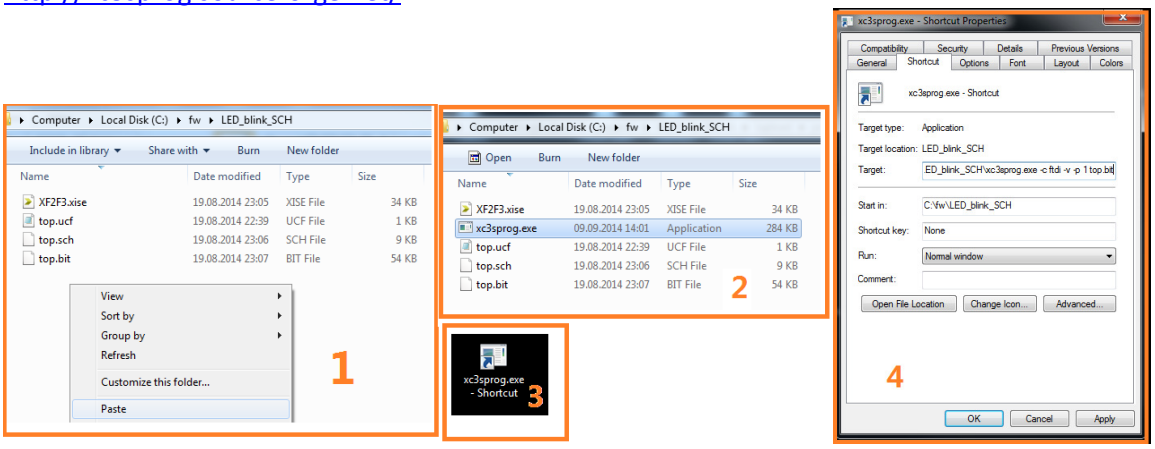
Package includes programmer, cable, and adapter for 14 pin connector. Programmer has USB connector on one side, and 6-pin male header on the other side. Cable has 6-pin, 2.54mm pitch, female connector on one side, and separate 1-pin, 2.54mm pitch, female connectors, for every wire, on the other side. Adapter has 6-pin, 2.54mm pitch, male header on one side, and 14-pin, 2mm pitch, female connector on the other side. JTAG signal locations are marked on the PCB.

Plug your FPU1 programmer into USB port. Windows should find and install driver automatically, without any problems. If this did not happen, or you are not using windows, then, download drivers for FT2232 chip, from FTDI website:
http://www.ftdichip.com/Drivers/D2XX.htm

How to program XILINX device with “XC3SPROG” program and FPU1 programmer:

1. Download latest version of xc3sprog from http://sourceforge.net/projects/xc3sprog/
2. Place xc3sprog.exe to the folder of your ISE project, where .bit file is located.
3. Create shortcut on your desktop "C:\...\xc3sprog.exe -c ftdi -v -p 0 FILE_NAME.bit". Change "0" to "1", if you want to program second device in JTAG chain. If something went wrong, or you want to explore more options, start "xc3sprog" from CMD.
4. If you are working with XILINX CPLD IC, xc3sprog may require .map file. You can find .map files in ISE installation folders.

- More info about XC3SPROG: http://xc3sprog.sourceforge.net/




In some cases, “.bit” file what was created by XILINX PLATFORM STUDIO, may not work correctly, on hardware, if programmed with “xc3sprog” to XILINX platform flash.
Follow these steps, to “fix” your “.bit” file, what is created in XPS, and not working on HW:
Start program “XILINX iMPACT” -> Press “launch wizard” -> “prepare a PROM file” -> “OK” -> “XILINX FLASH/PROM” -> platform flash xcfXX -> add storage device -> ok -> add your XPS .bit file -> close all pop up information windows -> go to folder, what you specified as output file location ->
find there file “… _cclktemp.bit” -> use it with xc3sprog, instead of your original “.bit” file.
Don't change original names of any "bit" files.

How to program XILINX device with “UrJTAG” program and FPU1 programmer:

1. Download UrJTAG from http://sourceforge.net/projects/urjtag/files/
2. Install UrJTAG to your computer
3. Plug FPU1 into USB. Connect your XILINX device to FPU1
4. Start jtag.exe from C:\Program Files (x86)\UrJTAG
5. Type “cable ft2232”, to connect the cable
6. Type “detect”, to detect JTAG chain.
7. If your part is detected correctly, proceed to step 11. If UrJTAG reports that part is unknown, then download BSDL model for your part from here: http://www.xilinx.com/support/download/index.html/content/xilinx/en/downloadNav/device-models.html
8. Place all .bsd files to folder “C:\bsdl”
9. Set BSDL path by issuing command in UrJTAG: “bsdl path c:/bsdl”
10. Now try command “detect” again. If everything done correctly, UrJTAG should find correct BSDL model.

11. Prepare .svf file for XILINX part. Start XILINXs “iMPACT” program. Launch wizard -> prepare a Boundary-Scan File -> SVF -> OK -> navigate to disk C:/ and save it as “1.svf” -> when information window pops up, press “ok” -> when “assign new configuration file” window pops up, select configuration file, what you want to program into your XILINX part -> when window is closed, right click on the IC picture -> program -> close iMPACT, no need to save project.
12. In UrJTAG, program/play the SVF file by issuing command: "svf c:/1.svf progress stop" (this will show the progress, and stop on errors)

- More info about UrJTAG:
  http://urjtag.org/

Configuration for FT2232 USB controller is stored in 93c46 EEPROM. If something went terribly wrong, and programmer is not working anymore, use FTDI’s program “FT_Prog”, to restore EEPROM configuration. You can find “FPU1.xml” file, in zip archive for this programmer, it is FPU1 EEPROM content.

- FTDI's program "FT prog":
  http://www.ftdichip.com/Support/Utilities/FT_Prog_v2.8.2.0.zip

Board size is small (25 x 25 mm) and handy. It is designed to be plugged directly into your computers USB port. If you are using desktop pc, and your USB port is far from your desk, you can use USB extender cable, or external USB hub.