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Abstract

This tutorial guides users through programming a Cyclone V FPGA with Quartus using a .pof file. It covers board preparation, hardware setup, file loading, and final configuration, ensuring a reliable workflow for flashing and testing the FPGA.

FPGA ProGramMing Tutorial

English – v1.0

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# Introduction

This step-by-step tutorial explains how to program the Cyclone V FPGA board using the provided VHDL design file. It assumes you already have Quartus installed, the board powered and connected, and the .pof file ready.

# Step 1 – Prepare the FPGA board

* Plug in the FPGA power supply.
* Turn on the board using the red ON/OFF switch.
* Flip the small switch to the 'programming' position (left).
* Connect the USB-Blaster cable to the rectangular port on the top left and link it to your computer.

# Step 2 – Launch Quartus

* Open Quartus (Quartus Prime Lite used here – version 21.1).
* In the top menu, go to 'Tools' > 'Programmer'.

Example interface:

A computer screen with a blue background

AI-generated content may be incorrect.

Note: If you have issues with installing Quartus Prime Lite, please, do not hesitate to contact us.

# Step 3 – Set up the hardware interface

* In the Programmer window, click on 'Hardware Setup...'.
* In the 'Currently selected hardware' field, choose 'USB-Blaster'.
* Close the window once selected.

Example interface:

A screenshot of a computer

AI-generated content may be incorrect.

# Step 4 – Load the .pof file

* Click on 'Add File...' in the Programmer window.
* Browse to the .pof file location (e.g., `output\_files.pof`). .pof is the bitstream file and it is the one we need to upload to the FPGA.
* Make sure the “mode” is set to 'Active Serial Programming' (not JTAG).
* Check the 'Program/Configure' and optionally 'Verify' boxes.

Example interface:

A screenshot of a computer

AI-generated content may be incorrect.

# Step 5 – Start the programming

* Click 'Start'. The programming process begins.
* Do not disconnect the board during this phase – it may take 20–30 minutes.
* Once the progress bar is fully green, programming is complete.

Example interface:

A screenshot of a computer

AI-generated content may be incorrect.

# Step 6 – Finalize setup

* Flip the switch back to 'Run'.
* You can now test the FPGA to verify the new configuration.

# Additional Notes

* The .pof file will be available in the open-source repository (GitHub or Zenodo). Make sure to use the correct version matching your hardware.
* If Quartus shows an error regarding the USB-Blaster, ensure drivers are installed and Quartus has administrator rights.
* You can repeat the process to flash multiple boards, starting again from Step 4.

# Versioning

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| --- | --- | --- | --- |
| Authors | Version | Date | Comment |
| L. Durieux | V1.0 | 23.09.25 | Document first release |
| A. Barbelivien  M. MAJCHRzAK |  | 01.11.25 | Proofreading |
|  |  |  |  |