QUICK START GUIDE: ARRIA 10 GX FPGA DEVELOPMENT KIT

A Complete Development Environment

Introduction

Altera's Arria® 10 GX FPGA Development Kit, which comes with a one-year license for the Quartus® Prime software, provides all that you need to begin developing high-performance designs.

You can use this development kit to:

- Develop and test PCI Express® (PCIe®) 3.0 designs using the PCI-SIG®-compliant development board.
- Develop and test memory subsystems consisting of DDR4, DDR3, QDR IV*, and RLDRAM III memories.
- Develop modular and scalable designs by using the FPGA mezzanine card (FMC) connectors to interface to a FMC mezzanine card provided by Altera partners and supporting protocols, such as JESD204B, Hybrid Memory Cube, Bandwidth Engine 2, Serial RapidIO®, 10-Gbps Ethernet (10GbE), SONET, Common Public Radio Interface (CPRI), OBSAI, and many others.

What's in the Box

- **Hardware**
  The development kit includes the following hardware:
  - Arria 10 GX FPGA
  - DDR4 SDRAM, DDR3 SDRAM, and RLDRAM III daughtercards
  - Two FMC loopback cards supporting transceiver, LVDS, and single-ended I/Os
  - One quad small-form-factor pluggable (QSFP) and one SFP+ port
  - Two FMC low-pin count (LPC + 15 transceivers) connector
  - PCIe x8 edge connector
  - Serial digital interface (SDI) channel
  - Character LCD
  - AC adapter power cables
  - Ethernet and USB cables

- **Software**
  Download and install Arria 10 GX FPGA Development Kit installer to obtain the following items:
  - Design examples
    - Board Update Portal design
    - Board Test System (BTS) design
  - Documentation
    - Arria 10 GX FPGA Development Kit User Guide
    - Board design files
  - Design software*
    - Quartus Prime software (required)
    - Nios® II processor (optional)
    - MegaCore® intellectual property (IP) library (optional)
    - Mentor Graphics® ModelSim®-Altera software (optional)

* QDR IV daughtercard is not included with this development kit. Contact Altera to order a QDR IV daughtercard for use with this development kit.

You can download the kit installer directly from **www.altera.com/products/boards_and_kits/dev-kits/altera/kit-a10-gx-fpga.html.**

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Keep Your Board Current with the Board Update Portal

The Board Update Portal design example included in this development kit facilitates easy development of software and board flash memory updates, allowing you to:

- Access useful information on **www.altera.com**, including the page that contains updated software and design examples.
- Load designs into the flash memory on your board.

The following steps ensure that you have the latest software available on both your computer and your board. The Board Update Portal design example, which includes a Nios II embedded processor, an Ethernet media access control (MAC), and a web page, is stored in the "factory" portion of your board's flash memory. The source for this design is installed with the development kit software. When your board is connected to a DHCP-enabled network, the Nios II processor obtains an Internet Protocol (IP) address and allows you to interface with your board over the network through a web page.

Before you proceed, ensure that you have the following:

- A computer with a connection to a working Ethernet port on a DHCP-enabled network.
- A separate working Ethernet port connected to the same network for your board.
- The Ethernet, power cables, and development board included in your kit.

Step 1. Connect to the Board Update Portal

1. With the board powered down, set the DIP switch SW6.4 to the ON position (factory default), which loads the factory design into flash on power-up.
2. Attach the Ethernet cable from the board to your network hub.
3. Power up the board. The LCD will first display "Connecting". The board then connects to your network server and obtains an Internet Protocol address, which will be displayed on the board's Character LCD when it has been assigned.
4. Launch a web browser on a computer that is connected to the same network, and type the Internet protocol address displayed on the LCD in the address bar. The Board Update Portal web page appears on your PC.
5. Click on the "Arria 10 GX FPGA Development Kit" link and download the latest version of the development kit software. The version number noted in the "Downloads" section of the website corresponds to the version of Quartus Prime software used to create the design examples.
6. Browse through the additional designs that are available. Check this website often for new designs and for updates to existing designs and documentation. Note that some designs may require specific versions of the Altera Complete Design Suite to function properly.
7. If necessary, click on the link to the Software Download Center to install the latest Altera software tools, including Quartus Prime software, Nios II processor, and IP functions.
8. This development kit comes with a one-year, nonrenewable development kit license for the Quartus Prime Standard Edition software. To get your nonrenewable one-year license, visit **www.altera.com/download/licensing/lic-index.html**.

If you cannot connect to the Board Update Portal, go to **www.altera.com/products/boards_and_kits/dev-kits/altera/kit-a10-gx-fpga.html** to ensure that you have the latest development kit software.

Step 2. Install the development kit software

Install the latest development kit software tools from **www.altera.com** and follow the on-screen instructions to complete the installation.

Step 3. If necessary, use the Board Update Portal to update your board and load the latest BTS

The Board Update Portal allows you to download new FPGA configurations to the "user" portion of the board's flash memory. If your board is up to date, you can skip this step and proceed to *Using the BTS* section of this quick start guide.

If you cannot connect to the Board Update Portal, refer to the kit's user guide for other options to update the flash memory.

To update the user portion of flash memory on your board, follow these steps:

1. Perform the steps in Step 1 to display the Board Update Portal web page.
2. In the **Hardware File Name** field, specify the .flash file (<*package root directory*>**factory_recovery\build_factory_source\<silicon type>\bts_config.flash**) that you downloaded from the Altera website. Because the design does not have a software component, leave the **Software File Name** field blank.
3. Click **Upload**.
4. Reconfigure the FPGA with the new files:
   a. Press the PGM_SEL (S5 push button until LED D13, labeled PGM1 illuminates.
   b. Press the PGM_CONFIG (S6) push button, to configure the FPGA from the "user_hardware1" portion of the flash memory.

The BTS design now runs in the FPGA.

The Board Update Portal can also be used to upload your custom designs. The kit's user guide describes in detail how to prepare your designs for use with the Board Update Portal.

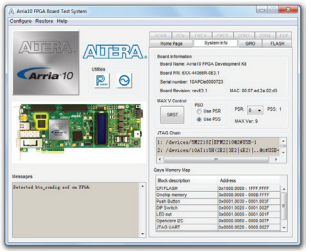
Using the BTS

The BTS interface allows you to verify most of the components on your board. All design files for the BTS are included in the <*package root directory*>**examples\ board_test_system** directory.

BTS Interface

When you launch the **BoardTestSystem.exe** file in that directory, the screen shown in Figure 1 appears. To view each tab, select the design from the Configure menu. Each tab has options for interfacing to one or more of the board components. The Help menu provides further information about each test design.

Figure 1. BTS Interface



Power Measurement Tool

The power measurement tool, available via the buttons in the upper left of the BTS interface, can be used to see how any design—including your custom design—affects the FPGA's power consumption.

Related Links

Kit-specific Resources

- Arria 10 GX FPGA Development Kit
  www.altera.com/products/boards_and_kits/dev-kits/altera/kit-a10-gx-fpga.html
- Arria 10 GX devices
  www.altera.com/products/fpga/arria-series/arria-10/overview.html

General Design Resources

- Board Design Resource Center
  www.altera.com/technology/signal/board-design-guidelines/sgl-bdg-index.html
- Licensing
  www.altera.com/download/licensing/lic-index.html
- Software Download Center
  www.altera.com/download/dnl-index.jsp
- Technical Support Center
  www.altera.com/support/spt-index.html
- Development kits
  www.altera.com/products/devkits/kit-index.html
- Embedded processing
  www.altera.com/products/processors/overview.html
- Altera Forum:
  www.alteraforum.com

Electromagnetic interference caused by any modification made to the kit contents is the sole responsibility of the user. This equipment is designated for use only in an industrial research environment.

Without proper anti-static handling, the board can be damaged. Therefore, use anti-static handling precautions when touching the board.

FCC NOTICE: This kit is designed to allow:

(1) Product developers to evaluate electronic components, circuitry, or software associated with the kit to determine whether to incorporate such items in a finished product and

(2) Software developers to write software applications for use with the end product. This kit is not a finished product and when assembled may not be resold or otherwise marketed unless all required FCC equipment authorizations are first obtained. Operation is subject to the condition that this product not cause harmful interference to licensed radio stations and that this product accept harmful interference. Unless the assembled kit is designed to operate under part 15, part 18 or part 95 of this chapter, the operator of the kit must operate under the authority of an FCC license holder or must secure an experimental authorization under FCC Part 5 of CFR Title 47.

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