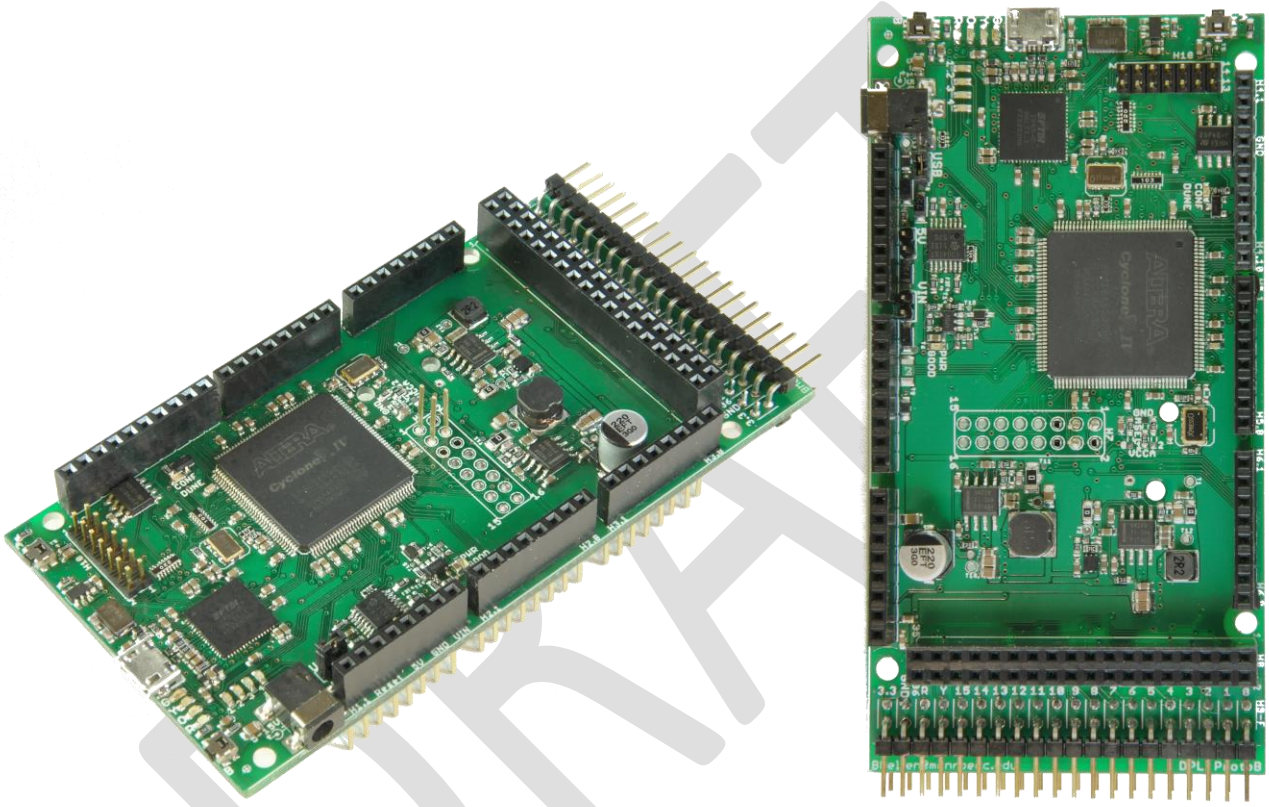
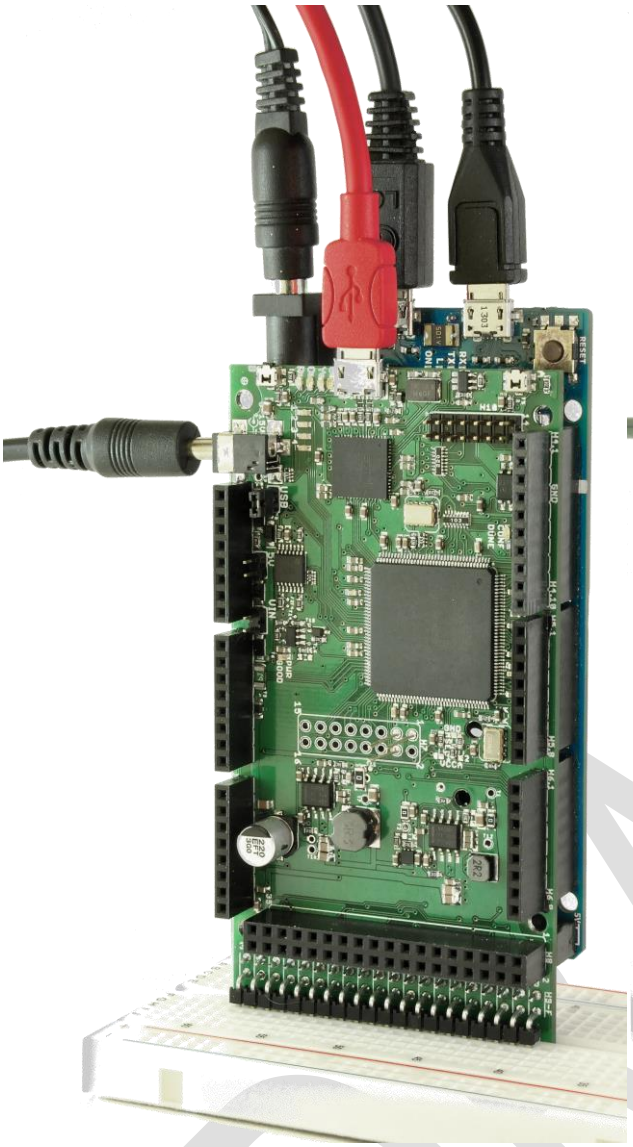
DueProLogic from

EARTHPEOPLE TECHNOLOGY



This is the FPGA (Field-Programmable Gate Array)/Programmable Logic Device (PLD) development board you have been waiting for or need to consider bringing into your repertoire of electronics project tools.

The DueProLogic (DPL) and its integrated development environment has been specifically designed for Electrical Engineering students, hobbyists, and entrepreneurs prototyping/developing projects involving logic, with the added opportunity, should it be needed for your project, of readily mating with a widely used microprocessor board, the Arduino Due, and other ARM Cortex compatibles. The combination of FPGA programmable logic and microcontroller is unbeatable in an educational student learning setting and in many other projects where each can bring its strength.



The DPL gives learners the opportunity to have an appropriate hands-on approach when learning logic, exploring different iterations of schematic/code designs with simple uploads of the design, and the operation of those circuits with relatively easy feedback and an abundance of headers that can interface to external components, without having to spend inordinate amounts of time reading datasheets, designing the right combinations of gates on multi-gate chips, and building/revising/debugging/revising repeatedly… spaghetti bowls of wires and chips on multiple breadboards to connect to those same external components. With the DPL's FPGA, projects can also more easily be attempted which rely on asynchronous, exceedingly fast, and even multiple separate concurrent logic structures operating in parallel which would have traditionally required a plethora of chip gates or multiple high speed microprocessors to implement parallel processes. Logic circuits are implemented within the FPGA at few-nanosecond gate speeds and highly parallel in operation, effectively a few hundred MHz; Microprocessors often rely on inherently slower single threaded program loops with interrupt servicing, which is typically much slower. Programmable logic is today's technology for logic learners and implementers, replacing discrete logic chips. The DPL allows the learner to be more productive and better focus on the underlying logic and integration with the non-logic aspects of non-trivial projects.

Projects and solving real-world applications might involve:

- Basic labs exploring digital design and logic devices, possibly interfacing to non-logic electrical components

- Embedded system controls (or simulations of common devices like a microwave oven)
- Robotics, especially those that involve significant or blazingly fast processing and responsive DC motor control requiring precise timing of multiple motors concurrently
- The mating between FPGA and microprocessor
- 3.3V compatible Arduino shields that bring project-related functionality
- Add-on modules from EarthPeopleTechnology (EPT) and others (or your own) that bring specific project-related functionality
- Home environmental controls
- Video/Audio stream processing
- Xxx-coin mining
- And other projects with a wide variety of levels of logic and electrical design complexity.

The included integrated development environment (IDE) software includes not only the Quartus programming interface for Windows, but an interactive library accessible on the PC and corresponding distributable Intellectual Property (IP) code for the DPL, to facilitate communication between the PC and DPL while the DPL is running the developed project.

- Quartus is a Programmable Logic Device (PLD) development environment allowing for the development and simulation of runnable code by drawing logic schematics or by using Verilog or VHDL (and other coding methods/languages), open code modules, and more specific IP from EPT and others. It is a very rich development environment.
- The EPT interactive library ActiveHost .dll for the PC is readily useable from MS Visual Express and others on the PC. A comprehensive user setup and use manual and sample projects with code are available on the EPT website.

The board comes preloaded with Blinky, the test that each board goes through before being shipped with conductive foam in an static-control bag. Also included with the product is a CD with the needed PC/Quartus/DPL drivers, library, and sample projects, which are also available on the EPT web site.

When you order the DPL, it is offered in the Arduino Due or the Maple/Olimexino configuration with options for a 2nd 100MHz oscillator and/or Micro-USB card holder mounted.

EPT offers add-ons if you need a micro-USB-B cable, standoffs/nuts for stand-alone use, AC-DC converter, converter adapter, 5500mAh LiPO battery pack & charger (a LiPo charger module that the DPL can run/control is under development), and custom JTAG/AS cable.

To save on costs, the DPL typically ships, with options and most accessories, in a small Priority Mail box that works well to also store the DPL in.

Specifications:

- Designed to be stand-alone and/or be mated with an Arduino Due, LeafLabs Maple, or Olimexino-STM32
- Designed to be inserted directly into a standard breadboard, for easier prototyping
- Designed with the Arduino Due/Mega shield header layout, to accommodate 3.3v-compatible Arduino-type shields, plug-in modules EPT offers, or modules you might develop using standard 0.1" pitch single or double row pin headers.
- Designed and assembled in the USA, made to operate at the Industrial temperature classification of 85°C, and made to be RoHS (no Lead) compliant around the world.

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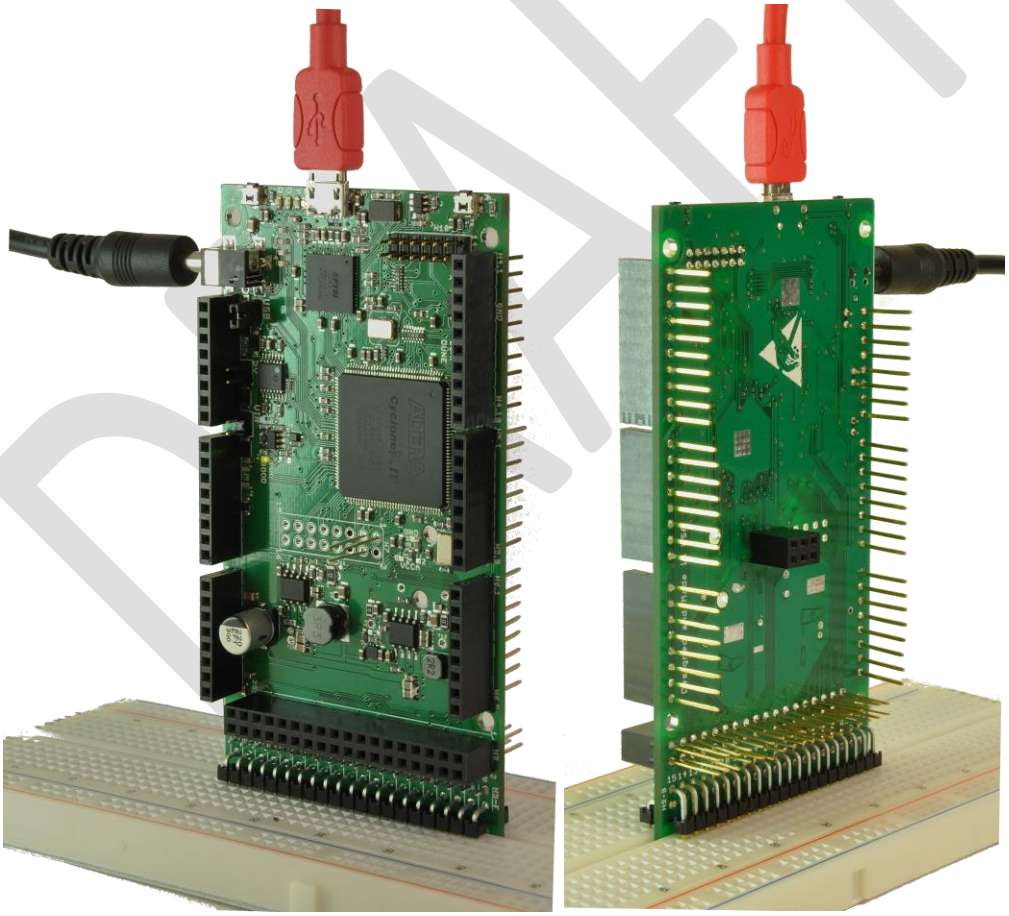
- Not mincing words, the DPL is made to accept standard USB cable connection and power input of 5-15VDC, but the header logic pins are only 3.3V compatible, like most other high-speed products using today's chips. Applying 5V to a pin connected to the FPGA chip can cause permanent damage to the FPGA chip.

Processor:

Board Layout:

- The first connection you use for the PDL is the single micro-USB-B from your PC. It uses a USB 2.0 (480Mb/s) connection through the on-board dual-engine FTDI FT2232H chip for both programming the Cyclone and communication with the running Cyclone application.
- Stackable Headers surround the DPL:
    - Standard Arduino shield (3.3v tolerant only) layout with 15 pins on the headers connected to the Cyclone.
    - Headers match those of the Arduino Due, including its 2x36 pin header and three center SPI header pins, having connection to 71(check the number) pins on the Cyclone.
    - An additional 2x40 right angle header allowing the DPL to be plugged directly into a standard 0.1" pitch breadboard, both supporting the DPL on your project board(s) and simplifying the wiring to external 3.3V project-related components.



    - The headers are also designed to mate with the ARM-Cortex 'duino-like LeafLabs Maple board and Olimexino-STM32 board, allowing access to the Maple "BUT" button.
- Comes with a 66MHz oscillator and has a pad setup for a 2nd user-installed oscillator (EPT can install as an option)
- Includes a 14pin dedicated header to support, if you want to take a different path, JTAG or alternative programming methods supported by the Cyclone IV E Chip. The DPL is setup to use Active Serial programming but the method of programming the Cyclone can be changed.

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Features:

Power:

- The DPL draws its power from the highest voltage source you provide (limited to 5-15VDC) and enable. To assure the integrity of concurrent sources, each is substantially isolated from the other and each can be fully isolated by pulling the corresponding jumper. To assure the integrity of all of your power sources, the DPL incorporates a PTC and will not attempt to draw more than 750mA from your USB and 5V sources, and 9 watts from a 12V source.
    - For low power needs, power can be drawn from a connected USB cable, if enabled (w/USB jumper).
    - A mated Arduino due will supply the DPL, if enabled (w/5V jumper).
    - To maintain compatibility with Arduino Shields, if the Vin header pin is supplied power, the DPL can use it, if enabled (w/Vin jumper)
    - The DPL also has a low profile 3.5x1.35mm barrel jack to accommodate wall AC to DC converters, and 3-cell LiPo batteries for portable requirements. The low jack profile keeps the DPL from interfering with any shields you may want to stack.
- With DC power supplied to the board, there are 3 on-board DC-DC converters
    - 3.3V high efficiency buck converter that, by design and in our tests, delivers over 1900mA before going outside 3.3V±10% or temporarily shutting itself down. It has been designed and has been proven to repeatedly accommodate the inevitable shorting to ground that takes place during [student] project development. The Cyclone and other board circuitry uses much less than 1900mA, so there are multiple pins on the DPL header from which you can draw 3.3V for your external project components.
    - 1.2V high efficiency buck converter similar to the 2.2V above, for the Cyclone's needs.
    - 2.5V LDO regulator (very little current draw thus no need for high-efficiency) for the Cyclone.
- Together and for example, the Blinky demonstration project draws ___mW when running at any speed. ___mW of that is just for the LEDs being lit.
- The DPL does not create 5V, but passes it through from an Arduino Due to stacked shields.

Future:

When the initial run of DPLs ship, we will be turning our attention to the development of requested add-on modules. There are already quite a number of modules available if you look, including many that users have developed for the Arduino platform and some PMod devices from Digilent. We have already recognized that a significant number of projects need the one or more of the following:

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