



This document describes how to program and update Duagon UE2G products. It is also a guide on how to set up a computer to perform these actions.



User's Guide

Programming

Duagon Data Sheet Preamble

On having purchased products described in this data sheet, the customer acquires the right to use the products according to its specified purpose and in accordance with all operation, service and maintenance instructions. All other rights to the product, Duagon's intangible assets rights in particular, belong solely to Duagon and may not be deemed to have been assigned along with the sale of the products.

All product properties are fully described in the data sheet under express exclusion of any warranty for other properties. Of decisive relevance is the data sheet valid at the time of the order being placed. Duagon provides a warranty that the product properties are retained during the period of warranty. Evidence that the properties of the product have been retained will be brought, always and exclusively, on Duagon premises by means of a test construction pursuant to the type test.

The customer is obliged to inspect whether the products themselves are suitable for the application intended. In particular, that inspection must include the integration of the products into the intended system configuration and a check on whether the properties as per data sheet can be fulfilled once integrated into the system configuration as planned by the customer. Since the products are not certificated for operation with security applications, the customer must take appropriate measures to ensure that any malfunctions that may occur in a system configuration with other products will be absorbed by supplementary security measures.

The period of warranty for the products is 24 months and it begins on the date the products are shipped from the factory.

The warranty that Duagon assumes for the products will, at Duagon's discretion, be limited either to the repair of or the replacement of the products at the Duagon factory. The warranty solely covers the products or parts thereof which, despite professional handling, have become defective or unusable and which arrive at the Duagon factories for repair or replacement during the period of warranty. The extent of Duagon's warranty is fully set out in this data sheet. Duagon cannot be held liable for consequential damage caused by a defect or for indirect damage or for consequential damage of any kind. Therefore the customer bears all and any costs that occur due to production downtime, for example, or due to the installation or dismantling of products or due to their transportation to Duagon and back.

Duagon's liability and warranty do not obtain if evidence cannot be brought that the products were being operated according to its specified purpose and in accordance with all operation, service and maintenance instructions as issued by Duagon.

These provisions form an integrated part of the product properties. Duagon products cannot be acquired with other or more extensive degrees of warranty and liability on the part of Duagon.

This data sheet is to be evaluated in accordance with **Swiss** law. The court of jurisdiction is the **seat of the vendor**. The applicability of the UN agreement as to international sales of goods (also known as "Viennese Purchasing Convention") is herewith expressly excluded.

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Document history

Rev	Date	Author	Comments	Ident-Number
1	June, 10 th 2007	Ludwig	See Revision history	d-002247-005717
2	October, 9 th 2008	Zimmermann		d-002247-006151
3	August, 7 th 2009	Ludwig		d-002247-007423
4	July 26 th , 2010	Klauser		d-002247-009067
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Introduction

There are several different ways to program the Flash of a Duagon Product:

	JTAG ¹⁾	Web Server ²⁾	CLI
Virgin Download / Panic Recovery ³⁾	X	-	-
Reprogram Flash	X	X	X

Remarks

- 1) An Altera USB Blaster is needed to perform a virgin download or to program a new firmware via JTAG. Follow the instructions in chapter "Firmware Programming via JTAG" on page 5f.
- 2) The web server is only available on products with an Ethernet interface.
- 3) A device with no or a defective firmware can only be programmed via the JTAG interface.

The Web server and CLI provide an interface via a web browser respectively a serial console to download and install a new firmware. Follow the instructions in chapter "Firmware Update via Web Server" on page 8f or alternatively "Firmware Update via CLI" on page 11 and consult the "Duagon HTTP Web Server – Data Sheet", d-001787-nnnnnn or the "Command Line Interface – Data Sheet", d-002357-nnnnnn.

The Web server can further be used to (re)configure an already programmed interface (see chapter Board-Configuration on page 12).

List of OP Files

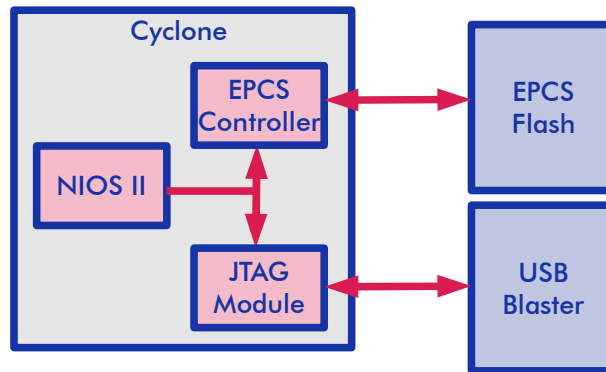
An OP contains the following files:

File	Remarks
d-xxxxx-yyyyy.flash	Flash Image
d-xxxxx-yyyyy.bat	Batch Script
dNNNe.sof*	simple PLD configuration
dNNNe.cdf*	chain description file for programming of simple PLD configuration (e.g. "dNNNe.sof") ¹⁾

¹⁾ dNNNe stands for the product name (e.g. D015e, D134m,...)

Firmware Programming via JTAG

The programming via JTAG is not straight ahead, because the flash device is not directly accessible. It is located behind the Cyclone device and needs a configured PLD to be accessed.



If the flash already contains a PLD image, the initial step of downloading the simple PLD configuration may be omitted.

Environment Setup

Computer

The computer where the programming is done from has to meet the following conditions:

- Quartus II Programmer installed.
Download from "<http://www.altera.com/>" (search for "quartus programmer").
Select feature "Stand-Alone Programmer" during installation.
- USB-Blaster connected and driver installed.
When asked: drivers are found in the folder: "...\qprogrammer\drivers\usb-blaster" of the Quartus Programmer installation.

Programmer Software

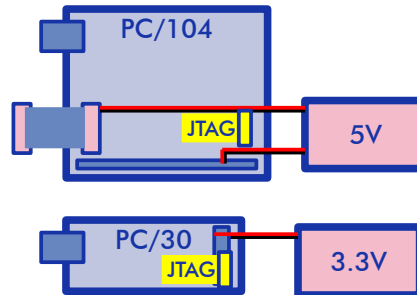
Copy the following files into the "bin" directory of the Quartus Programmer.

- nios2-flash-programmer.exe
- cygwin1.dll

Performing the Download

Hardware Setup

Connect the 10-pin header of the USB-Blaster Programming Cable to the JTAG connector of the Duagon Product.



Power the device according to its data sheet.

Note: For PC/104 interfaces, connect 5V to the PC/104 or SER connector. For PC/30 interfaces use 3.3V and the power pins on the PC/30 connector. Check the data sheets of the products.

Download – Step-by-Step

The programming is done by the following steps, which are part of the OP Batch script (e.g. d-xxxxxx-yyyyyy.bat):

- 1) Add the bin folder of the Quartus Programmer installation to the PATH environment variable:

```
PATH=%PATH%;C:\altera\80\qprogrammer\bin
```

- 2) Download the simple PLD configuration:

```
quartus_pgm.exe d113e.cdf
```

Note: After the simple PLD configuration has been loaded, all diagnostic LEDs are lit (PC/104) or the system led is blinking (PC/30).

Note: This step may be omitted if the PLD is already configured (no virgin download).

- 3) Program the flash memory:

```
nios2-flash-programmer.exe -e --base=0x802800 -program  
d-xxxxxx-yyyyyy.flash
```

- 4) Verify the flash memory:

```
nios2-flash-programmer.exe -e --base=0x802800 -verify  
d-xxxxxx-yyyyyy.flash
```

The following terminal screen shot shows a successful flash download using the OP Batch Script:

```
C:\WINNT\system32\cmd.exe
C:\duagon\D113E\OP\d-002180-005700>rem Program flash memory.
C:\duagon\D113E\OP\d-002180-005700>PATH=C:\WINNT\system32;C:\WINNT;C:\WINNT\System32\Wbem;C:\Programme\Simba\bin;C:\Programme\Simba\bin\projects\NewPendolino;C:\altera\80\qprogrammer\bin
C:\duagon\D113E\OP\d-002180-005700>quartus_pgm.exe d113e.cdf
Info: *****
Info: Running Quartus II Programmer
Info: Version 8.0 Build 215 05/29/2008 SJ Full Version
Info: Copyright (C) 1991-2008 Altera Corporation. All rights reserved.
Info: Your use of Altera Corporation's design tools, logic functions
Info: and other software and tools, and its ANPP partner logic
Info: functions, and any output files from any of the foregoing
Info: (including device programming or simulation files), and any
Info: associated documentation or information are expressly subject
Info: to the terms and conditions of the Altera Program License
Info: Subscription Agreement, Altera MegaCore Function License
Info: Agreement, or other applicable license agreement, including,
Info: without limitation, that your use is for the sole purpose of
Info: programming logic devices manufactured by Altera and sold by
Info: Altera or its authorized distributors. Please refer to the
Info: applicable agreement for further details.
Info: Processing started: Wed Jun 11 11:16:43 2008
Info: Command: quartus_pgm d113e.cdf
Info: Using programming cable "USB-Blaster [USB-01]"
Info: Started Programmer operation at Wed Jun 11 11:16:44 2008
Info: Configuring device index 1
Info: Device 1 contains JTAG ID code 0x020B30DD
Info: Configuration succeeded -- 1 device(s) configured
Info: Successfully performed operation(s)
Info: Ended Programmer operation at Wed Jun 11 11:16:46 2008
Info: Quartus II Programmer was successful. 0 errors, 0 warnings
Info: Peak virtual memory: 45 megabytes
Info: Processing ended: Wed Jun 11 11:16:46 2008
Info: Elapsed time: 00:00:03
Info: Total CPU time (on all processors): 00:00:01
C:\duagon\D113E\OP\d-002180-005700>nios2-flash-programmer.exe -e --base=0x002000
--program d-002180-005700.flash
Using cable "USB-Blaster [USB-01]", device 1, instance 0x00
Resetting and pausing target processor: OK
Checksummed/read 53kB in 1.7s
Erased 1216kB in 12.5s (97.2kB/s)
Programmed 1164KB +52KB in 32.2s (37.7KB/s)
Did not attempt to verify device contents
Leaving target processor paused
C:\duagon\D113E\OP\d-002180-005700>nios2 flash programmer.exe -e --base=0x002000
--verify d-002180-005700.flash
Using cable "USB-Blaster [USB-01]", device 1, instance 0x00
Resetting and pausing target processor: OK
Verified 1164KB in 37.2s (31.2KB/s)
Leaving target processor paused
C:\duagon\D113E\OP\d-002180-005700>pause
Drücken Sie eine beliebige Taste . . .
```

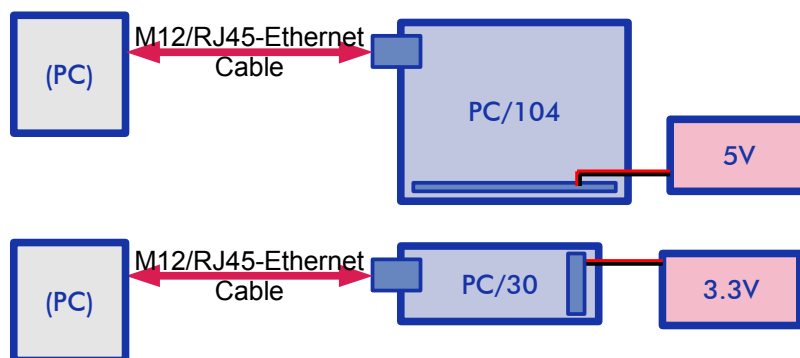
Firmware Update via Web Server

This Firmware Update Method does not work with devices where the web server is not accessible (non-existent or not working Ethernet interface). For such cases perform a virgin download via the JTAG interface (see chapter "Firmware Programming via JTAG" on page 5f) or use the CLI (see chapter "Firmware Update via CLI" on page 11).

Environment Setup

- Connect the Duagon Product with an Ethernet cable to a computer with an Internet Browser installed.

Note: You may use a Duagon D294 M12-RJ45 cable to connect the Duagon Product to your PC.



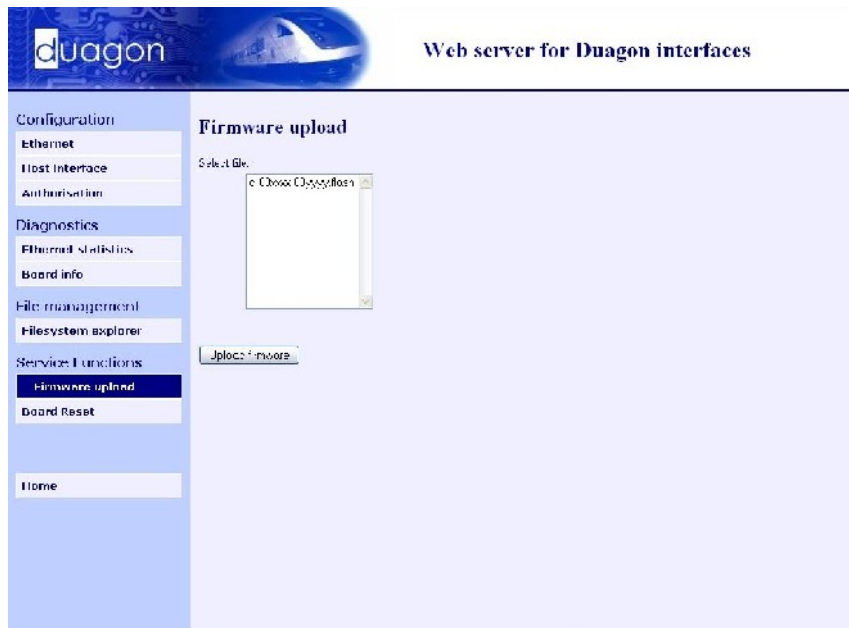
- Power the device according to its data sheet.
Note: For PC/104 interfaces, connect 5V to the PC/104 connector. For PC/30 interfaces use 3.3V and the power pins on the PC/30 connector. Check data sheet of the product.
- Make sure the Duagon Product starts in normal mode. Check the MODE pins on PC/30 interfaces and don't power PC/104 interfaces via the SER connector. If the SER connector is used for powering a jumper has to be mounted on the PC/104 connector Row B (Pin 2-3).
- Use the CLI output to get the IP address. If needed, provide a DHCP server on the PC.
- Open the web page (<http://<IP address>/>) of the Duagon Product in a browser application (e.g. Firefox or MS Internet Explorer).

Performing the Download

1. Upload the flash-file into the "/FIRMWARE/" directory – this may take several minutes depending on the file size.



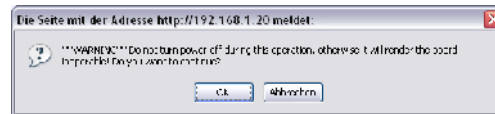
2. Open the Firmware Upload Page. Select the "*.flash" file. Then click "Upload firmware".



3. Click "OK" to confirm the installation.



4. Click again "OK"



5. Wait until flash programming is performed.

6. Restart the Duagon Product by disconnecting the power supply, using the BoardReset Button in the web server or typing the command "boardreset" on the interfaces command line.

Important Note



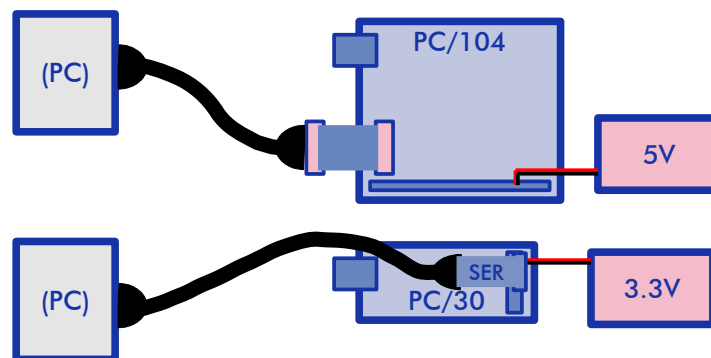
- If power is cut off during flash programming, the interface may get inaccessible. In this case a virgin download (panic recovery) has to be performed (see page 5f).

Firmware Update via CLI

The Duagon Products provide a command line interface (CLI) that can be used to upload and install a new firmware. More information about the CLI is collected in the "Command Line Interface – Data Sheet", d-002357-nnnnnn.

Environment Setup

- Connect a serial cable to the SER connector of the device. Be aware, that PC/30 cannot handle RS232 voltages but rather need LVTTTL signals.



- Open a serial terminal on the PC with following settings:
Baud Rate: 115.2k
Data Bits: 8
Parity: None
Stop Bits: 1
No flow control
- Power the device according to its data sheet.
Note: For PC/104 interfaces, connect 5V to the PC/104 connector. For PC/30 interfaces use 3.3V and the power pins on the PC/30 connector. Check data sheets of the products.
- Check boot messages on the console and wait for output "CLI>".
The board is now ready for CLI commands.

Performing the Firmware Update

Follow these steps to update a Firmware via the CLI:

1. Create the directory FIRMWARE and change current directory to it

```
mkdir /FIRMWARE  
cd /FIRMWARE
```

2. Upload the firmware file to the created folder

```
xmodem -dkF d-xxxxxx-yyyyyy.flash
```

3. Install the new firmware with

```
fw_load d-xxxxxx-yyyyyy.flash
```

Important Note



- If power is cut off during firmware installation, the interface may get inaccessible. In this case a virgin download (panic recovery) has to be performed (see page 5f).

Board-Configuration

The following files are needed for the proper configuration of a Duagon Product. More information may be collected in the "Configuration – User's Guide", d-001785-nnnnnn:

- device.cfg
- ipt_config.xml (only when IPTCom protocol is available)
- tdchost (only when IPTCom protocol is available)

These files may already be contained in the flash image and will be copied to the device during firmware update. However, flash images with the suffix "nocfg" in its name will come without these files (i.e. d-xxxxxx-yyyyyy_nocfg.-flash). In this case to change the device configuration these files have to be manually downloaded into the /etc directory of the Duagon Product.

Manually Download Configuration Files

Downloading the configuration files via the web server is done in the same way as downloading the firmware (*.flash file). Additionally, the files can be configured over the web server later on.

Downloading via the CLI is done by using the "xmodem" command. Make sure you changed the current directory to /etc.

For more information about configuration options and the web server, refer to the "Configuration – User's Guide", d-001785-nnnnnn and the "Duagon HTTP Web Server – Data Sheet", d-001787-nnnnnn.

Links to other Duagon Documents

Configuration – User's Guide, d-001785-nnnnnn

This document describes the configuration of UE2G interfaces. The configuration mainly includes fieldbus and host-interface related parameters.

Duagon HTTP Web Server – Data Sheet, d-001787-nnnnnn

The HTTP web server running on Duagon products provides a wide range of functionality including firmware upload, configuration and diagnostics.

Command Line Interface – Data Sheet, d-002357-nnnnnn

This document describes the Command Line Interface on the service serial line of Duagon products.

Document History

d-002247-009067

Various editorial changes

d-002247-007423

Generalized programming guide for all Duagon UE2G Products
Added CLI programming capability

d-002247-006151

New screen shots

d-002247-005717

First Release. SPI programming not yet defined.
Configuration files still in the YAFFS flash. (Upload only by web browser).

Appendix A: Document Numbering System

All Duagon documents have a unique identification number. The identification number has a certain internal structure in order to ease the tracking of different documents. In general, there are two parts:

Prefix	Document number	Filing number
d	-000310	-001952
Always constant	<p>Specifies a certain purpose of a document with the intention to link several documents with different filing number.</p> <p>Please note, that the purpose of the document number is not stored for each document number, but can be derived from the document title, which is stored for each Filing number.</p> <p>The format is either 6 digits or not available.</p>	<p>Unique number, that identifies a particular document. Released in sequential manner as the documents are filed in the archive. A duagon internal data base contains exactly one document title text for each filing number.</p> <p>Always 6 digits.</p>

Examples for identification numbers

Identification number	Document Title / Remarks
d-000310-001606	"DXIO data sheet Rev 2.2"
d-000310-001952	<p>"DXIO data sheet Rev 2.3"</p> <p>A document, that is updated from time to time: the document number has the purpose to link several versions of the "DXIO data sheet" together. The filing number distinguishes between different versions.</p> <p>Please note, that the document number part is kept the same, as long as the basic intention of the early versions is still kept, for example during revisions due to debugging or manufacturing updates.</p> <p>In case a significant change happens, another document number would be applied.</p>
d-000719	<p>"Notes from prototype meeting ..."</p> <p>A document, that is obviously not updated after release. The "document number" part is missing and the filing number remains the only used part for identification.</p>

Recommendation:

In your order, you may specify for example "d-000584-nnnnnn" in order to get the "newest" version of a specific product. When you do not want to follow the sequence of newer versions, i.e. you want to stick to a specific version, then specify the full identification number like "d-000584-002043".