

AN11002

Pegoda Toolchain Information

Rev. 2.0 — 9 July 2012
198020

Application note
COMPANY PUBLIC

Document information

Info	Content
Keywords	Pegoda, Toolchain, Eclipse, LPCXpresso, OpenSource, Debugger
Abstract	The intention of this document is to provide information on the recommended toolchain solutions for embedded programming on Pegoda.



Revision history

Rev	Date	Description
2.0	20120709	General update for new firmware (v2.2.7)
1.2	20110804	Cross references updated, no content change
1.1	20110726	Cross references updated, no content change
1.0	20110420	Initial Release
	20101103	Draft version

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1. Introduction

This document provides information on several toolchain solutions for Pegoda. The idea of a toolchain is to provide a closed workspace solution for programming and debugging applications on the LPC of the Pegoda reader. The complete Pegoda firmware/project file is zipped in the <pegoda2_fw_src.zip> file.

The only remaining steps for starting embedded programming is to install the toolchain and import the project as <archive file>.

A kind of advanced “Hello World” example is already included in the source code. This is the demo mode of the reader, which works autonomously and gives an acoustic signal when a card is present. The entry point can be found under <p3fw.c> in the project.

Two types of toolchain solutions are presented:

- LPCXpresso
- Open source toolchain based on Eclipse and required compilers, debuggers

LPCXpresso's IDE (powered by Code Red) is a highly-integrated software development environment for NXP's LPC microcontrollers, which includes all the tools necessary to develop high-quality software solutions in a timely and cost effective manner.

LPCXpresso is based on Eclipse with many LPC-specific enhancements. It also features the latest version of the industry standard GNU tool chain with a proprietary optimized C library providing professional quality tools at low cost. The LPCXpresso IDE can build an executable of any size with full code optimization, and it supports a download limit of 128KB after registration. A full license has to be obtained to get full download capabilities.

The open source tool chain is an alternative recommendation to LPCXpresso without the 128kb download limitation. Additional tools have to be installed to run the solution. An ARM Tiny USB hardware debugger needs to be bought to connect to the Pegoda board.

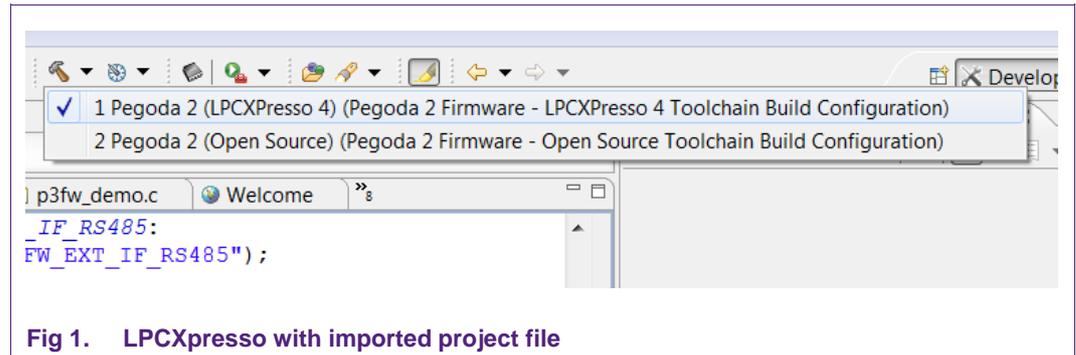
For information on availability of samples as well as documentation, please refer to the application note ‘Pegoda EV710 Documentation and Sampling guide’.

2. LPCXpresso

Detailed information on the LPCXpresso toolchain can be found in the “LPCXpresso Getting Started” document.

Installation and debugging board details are cover inside the document.

For building the binary with LPCXpresso you have to select “Pegoda 2 (LPCXpresso 4)” as the build configuration. See Fig 1 for more information.



A bin file called “pegoda2x.bin” will be generated in the target directory (can be found under the project folder \Pegoda 2 (LPCXpresso 4))

3. Open Source Toolchain

3.1 Required Software

- OpenOCD 0.4.0 compiled to use libftdi + libusb-win32 libraries from www.nxp.com/redirect/freddiechopin.info/en/download/category/4-openocd
- Sourcery G++ Lite ARM EABI from : www.nxp.com/redirect/codesourcery.com/sgpp/lite/arm/portal/release1294
- JRE from www.nxp.com/redirect/java.com/en/download/manual.jsp
- Eclipse IDE for C/C++ Developers from www.nxp.com/redirect/eclipse.org/downloads/
- MSYS from www.nxp.com/redirect/sourceforge.net/projects/mingw/files/Automated%20MinGW%20Installer/mingw-get-inst/

3.2 Required Hardware

- Pegoda
- *ARM-USB-Tiny from Olimex¹*

1. ¹ Only required if debugging on board is used

3.3 Install toolchain from Sourcery G++ Lite ARM EABI



Fig 2. Installing G++ Lite ARM EABI

3.4 Install MSYS

Windows doesn't come with a build-in compiler. Therefore, we need to install MSYS which is part of the MinGW suite providing free development tools for Windows.

The referenced link in chapter 3.1. requires an internet connection. For offline installation refer to the website of mingw.

3.5 Install Eclipse and JRE for Windows

Download and install Eclipse.

In Eclipse it is required to start a new C project and import the zip-File as <Archive file> or <Existing Workspace>. For the existing workspace option, you have to unzip the archive file.

An "Pegoda 2 (Open Source)" configuration can be seen under the Build options of Eclipse. If you are using the open source tools, get sure that the paths are correctly set in the project properties.

Set the "Pegoda 2 (Open Source)" configuration as default target first.

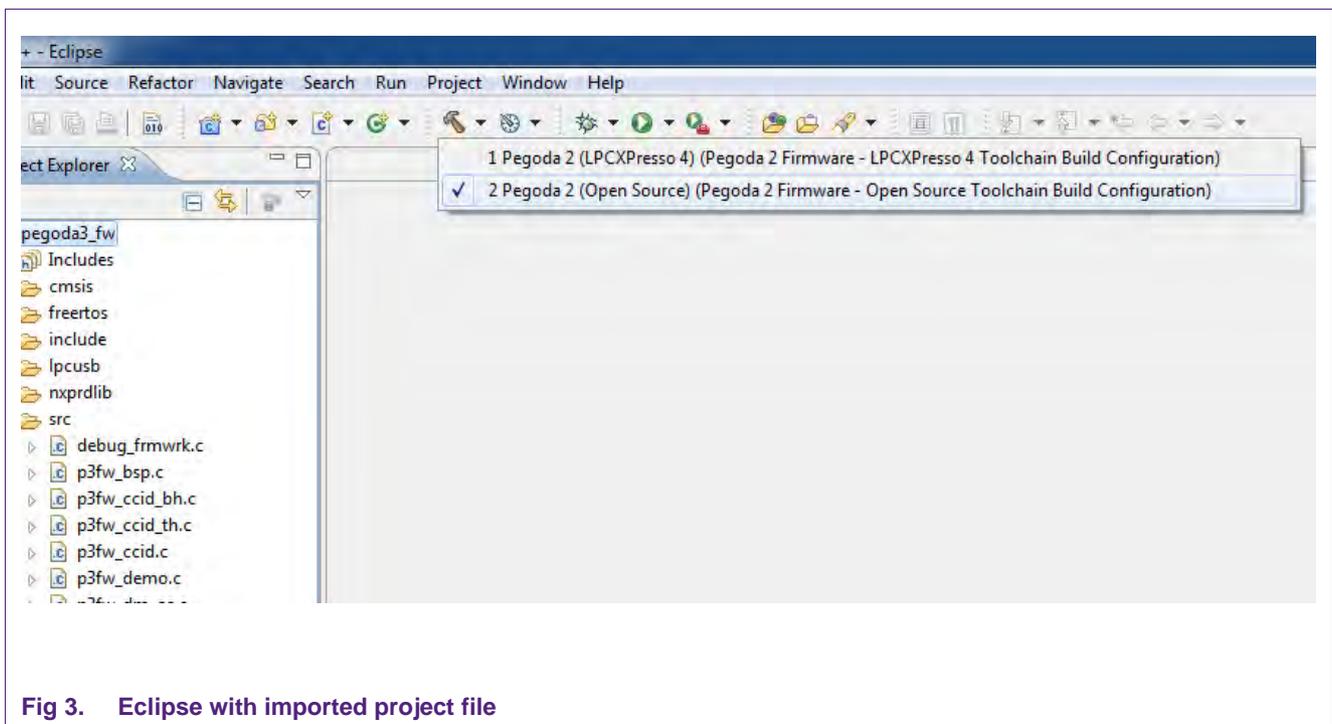


Fig 3. Eclipse with imported project file

Right click on the project and select the properties from window.

Select then the "Environment" section and add the following environment variables:

- System path
- MinGW/msys/1.0/bin folder

See [Fig 4](#) for more information.

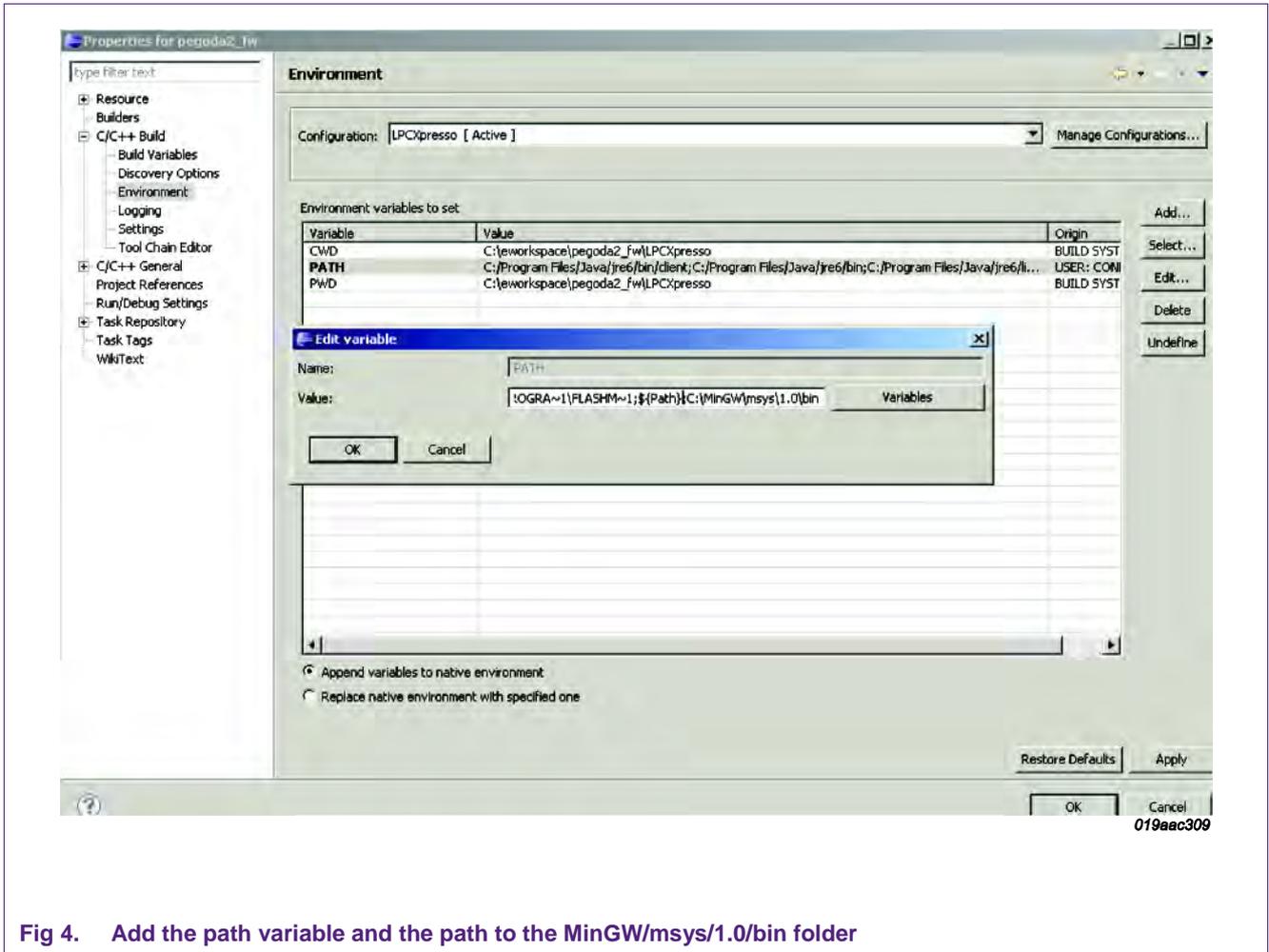
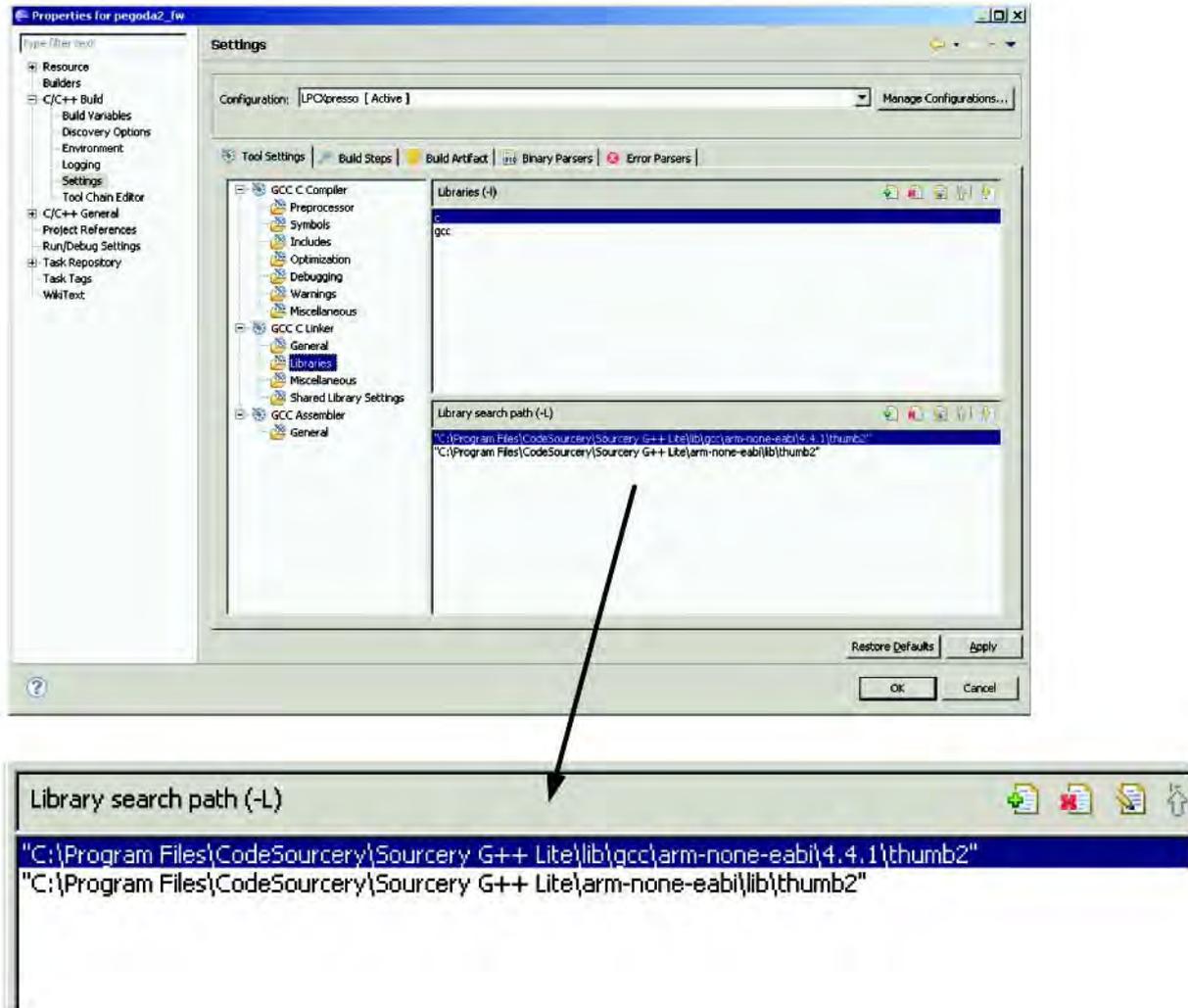


Fig 4. Add the path variable and the path to the MinGW/msys/1.0/bin folder

Now the project can be compiled by pressing the Build button.

If you receive a build error you might have to check if the is set properly. Therefore go again to the project properties. Go to "C/C++ Build", select "Settings", select GCC C Linker, then go to Libraries and add the correct GCC paths to the library search path. See [Fig 5](#) for more information.



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Fig 5. Set the path correctly for open source tool chains

After a successful build a bin file called “pegoda2x.bin” will be generated in the target directory (can be found under the project folder \Pegoda 2 (Open Source)).

Take care that the bin file is still named correctly to “pegoda2x.bin” before flashing. Therefore proceed as described in “AN10992 Quick Startup Guide for RD710”

3.6 Differences if using firmware source v1.3

It is not recommended to use the old firmware source in folder \firmware_v1_3 any more for new designs but if you have any reason to do so you have to be aware of some differences.

After project is compiled by pressing the Build button a bin file called "p2_fw_dbg_rom.bin" will be generated in the target directory (can be found under the project folder/windows or LPCXpresso). This file is in ELF format and must be striped in order to flash it to the Pegoda reader.

Therefore add the following lines to the make_hex.sh file:

```
if [ $1 = "LPCXpresso" ]; then
    if [ -e ../LPCXpresso/p2_fw_dbg_rom ]; then
        arm-none-eabi-strip -s ../LPCXpresso/p2_fw_dbg_rom -o
        ../LPCXpresso/p2_fw_dbg_rom.striped
        arm-none-eabi-objcopy -O ihex ../LPCXpresso/p2_fw_dbg_rom.striped
        ../LPCXpresso/p2_fw_dbg_rom.hex
        arm-none-eabi-objcopy -O binary ../LPCXpresso/p2_fw_dbg_rom.striped
        ../LPCXpresso/p2_fw_dbg_rom.bin
        cp ../LPCXpresso/p2_fw_dbg_rom.bin ../LPCXpresso/pegoda2.bin
        ls -lh ../LPCXpresso/p2_fw_dbg_rom
        ls -lh ../LPCXpresso/p2_fw_dbg_rom.bin
        ls -lh ../LPCXpresso/p2_fw_dbg_rom.hex
        ls -lh ../LPCXpresso/p2_fw_dbg_rom.striped
        rm -rf ../p2_fw_dbg_rom.hex
        cp ../LPCXpresso/p2_fw_dbg_rom.hex ../p2_fw_dbg_rom.hex
        echo "Done: p2_fw_dbg_rom.hex"
    fi
fi
```

Otherwise, the command can be directly executed in the target directory:

```
arm-none-eabi-strip -s p2_fw_dbg_rom -o p2_fw_dbg_rom.striped
arm-none-eabi-objcopy -O binary p2_fw_dbg_rom.striped pegoda2.bin
```

Take care that the bin file is named correctly to "pegoda2x.bin" before flashing.

3.7 Installation openOCD and driver for Jtag

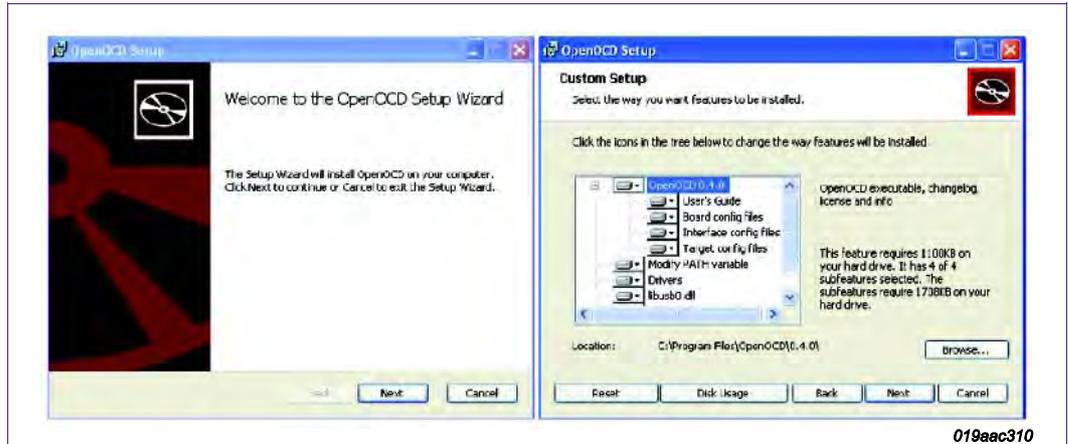


Fig 6. Installing openOCD

After installing OpenOCD unzip libusb-win32 driver, installed during openOCD installation located in "c:\Program Files\OpenOCD\0.4.0\drivers\libusbwin32_ft2232-100223.zip" by default.

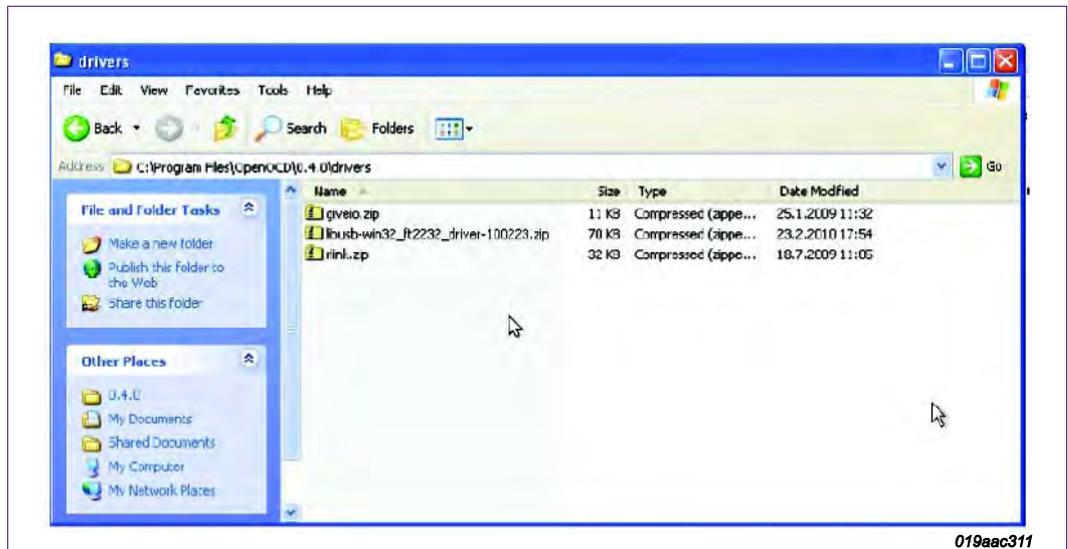


Fig 7. openOCD drivers

Plug in the Olimex ARM-USB-TINY Jtag adapter



Fig 8. Driver installation

Specify the location where you unzipped the driver



Fig 9. Locate the drivers

Repeat the process of driver installation for “Channel b”.

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Date of release: 9 July 2012
198020

Document identifier: AN11002