BlueBoard-LPC11U24/37

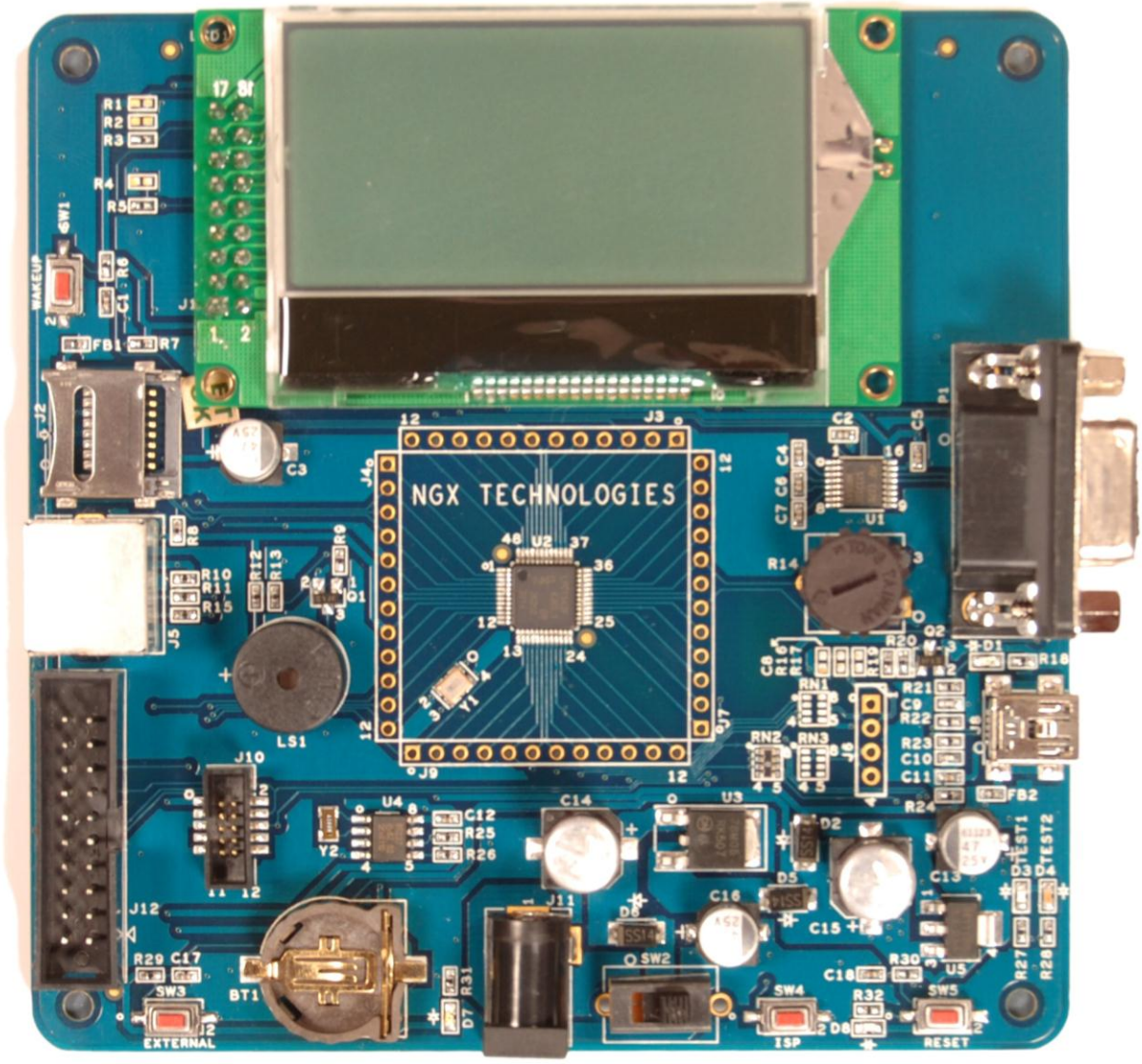

Fig. 1

About NGX Technologies

NGX Technologies is a premier supplier of development tools for the ARM7, ARM Cortex M0, M3 and M4 series of microcontrollers. NGX provides innovative and cost effective design solutions for embedded systems. We specialize in ARM MCU portfolio, which includes ARM7, Cortex-M3, M0 & M4 microcontrollers. Our experience with developing evaluation platforms for NXP controller enables us to provide solutions with shortened development time thereby ensuring reduced time to market and lower development costs for our customers. Our cost effective and feature rich development tool offering, serves as a testimony for our expertise, cost effectiveness and quality.

Contact Information:

NGX Technologies Pvt. Ltd.
No.216, 5th main Road, R.P.C. Layout,
Vijayanagar 2nd Stage,
Bangalore – 560 104
Phone : +91-80-40925507
email:sales@ngxtechnologies.com

CE certification

NGX Technologies BLUEBOARD-LPC11U24/37 board have been tested for radiated emission as per EN55022 class A standard. The device is under the limits of the standard EN55022 class A and hence CE marked. No other test have been conducted other than the radiated emission (EN55022 class A standard). The device was tested with the ports like USB, Serial, and Power excluding the GPIO ports. Any external connection made to the GPIO ports may alter the EMC behaviour. Usage of this device under domestic environment may cause unwanted interference with other electronic equipment's. User is expected to take adequate measures. The device is not intended to be used in and end product or any subsystem unless the user re-evaluates applicable directive/conformance.

Table of Contents

1.0 INTRODUCTION

This document is the User Manual for the BLUEBOARD-LPC11U24/37, a low cost ARM Cortex-M0 based board by NGX Technologies. This document reflects its contents which include system setup, debugging, and software components. This document provides detailed information on the overall design and usage of the board from a systems perspective.

Before proceeding further please refer the quick start guide for BLUEBOARD-LPC11U24/37 features and BLUEBOARD-LPC11U24/37 verification.

For BLUEBOARD-LPC11U24/37 Quick Start Guide: Click here.

For the most updated information on the BLUEBOARD-LPC11U24 board please refer to NGX'website.

For the most updated information on the BLUEBOARD-LPC11U37 board please refer to NGX'website.

2.0 BLUEBOARD-LPC11U24/37 Development Tool Setup

2.1 IDE and debugger

As mentioned in the earlier section, NGX's MCU evaluation platforms are not coupled tightly with any one particular combination of IDE and debugger. The following sections will explain the setup for KEIL and ULINK as the IDE and debugger respectively.

2.2 Installation & Configuration of KEIL software

The Installation of KEIL software is explained below:

*Note: We have used **Keil uvision version 4.23** while creating the User manual for this evaluation kit. Please ensure that you are using uvision version 4.23 or above.*

Step 1: Open the keil setup

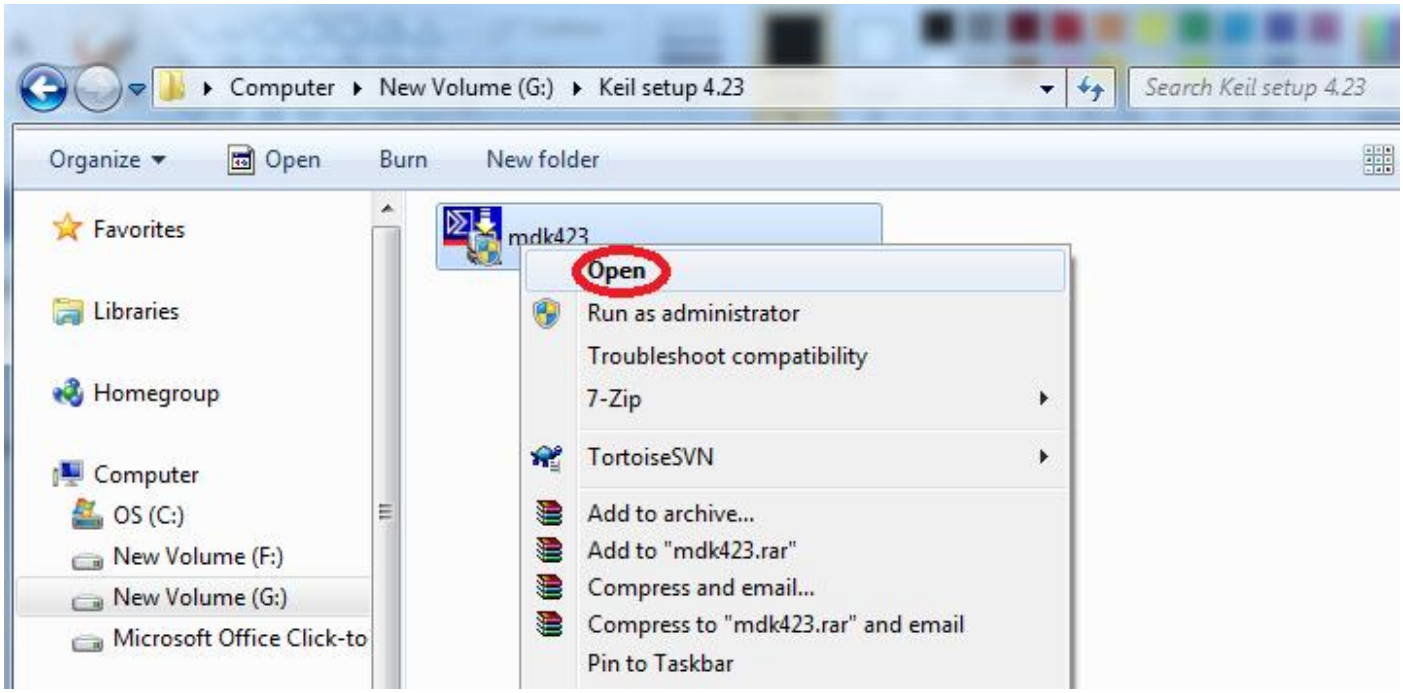

Fig. 2

Step 2: Keil µvision4.23 information Click on Next

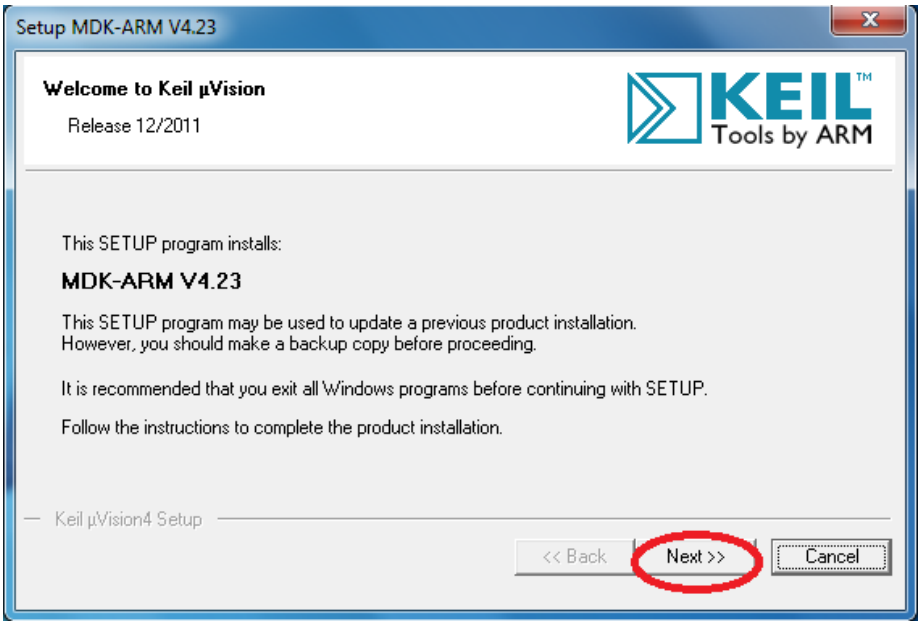

Fig. 3

Step 3: Terms & conditions

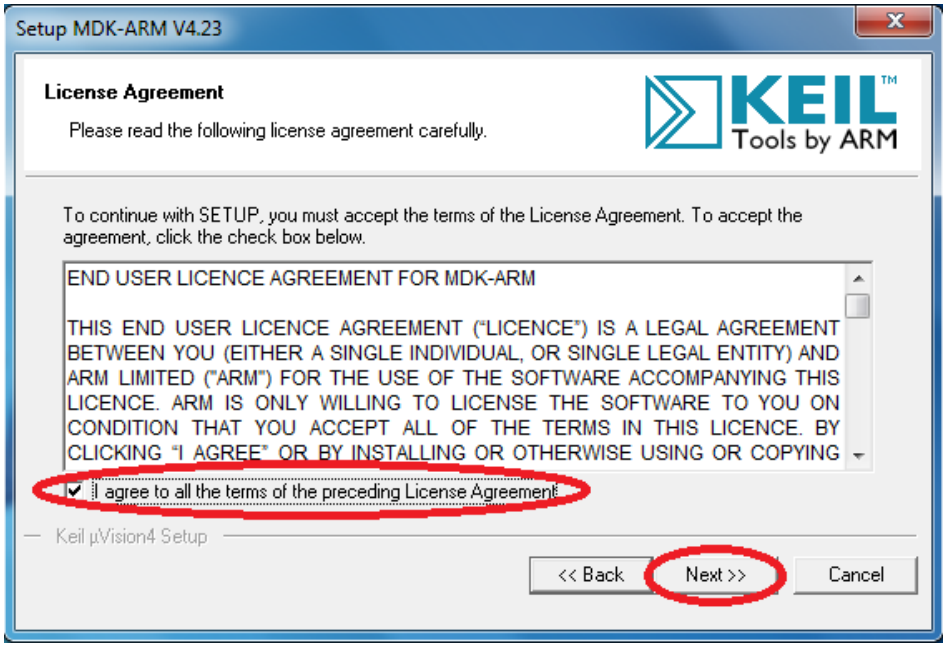

Fig. 4

Step 4: Provide the destination path and Click on Next

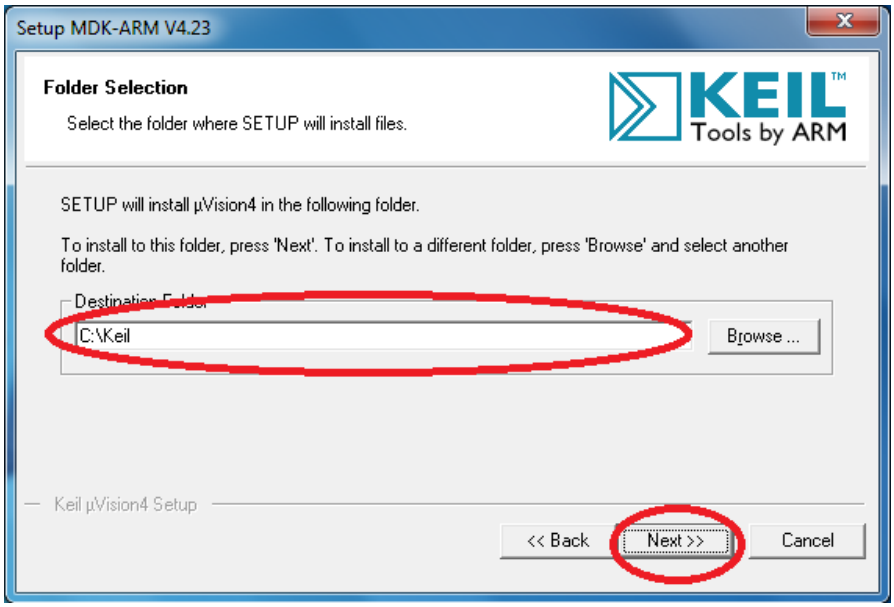

Fig. 5

Step 5: Fill your Personal information and Click on Next

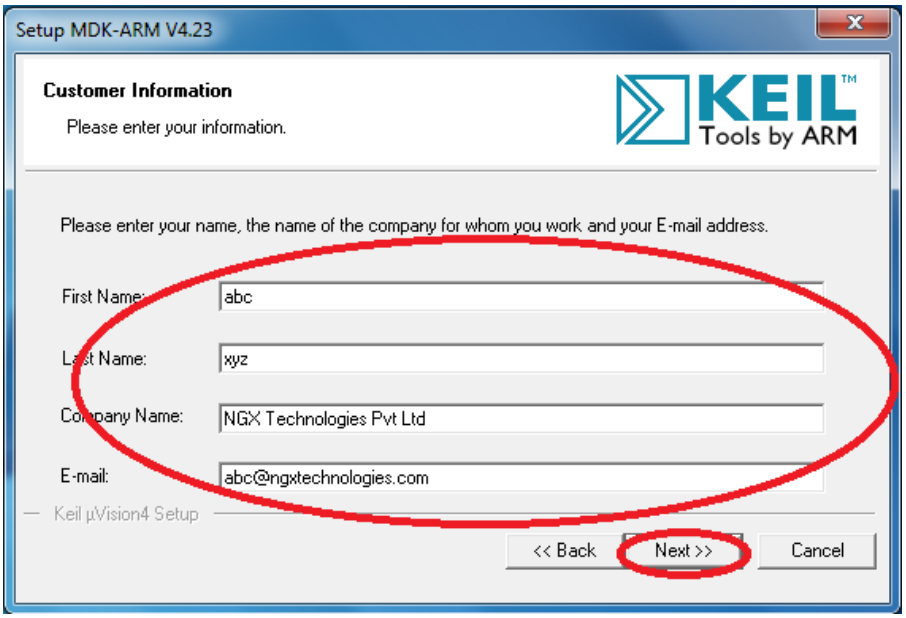

Fig. 6

Step 5: Click on Next

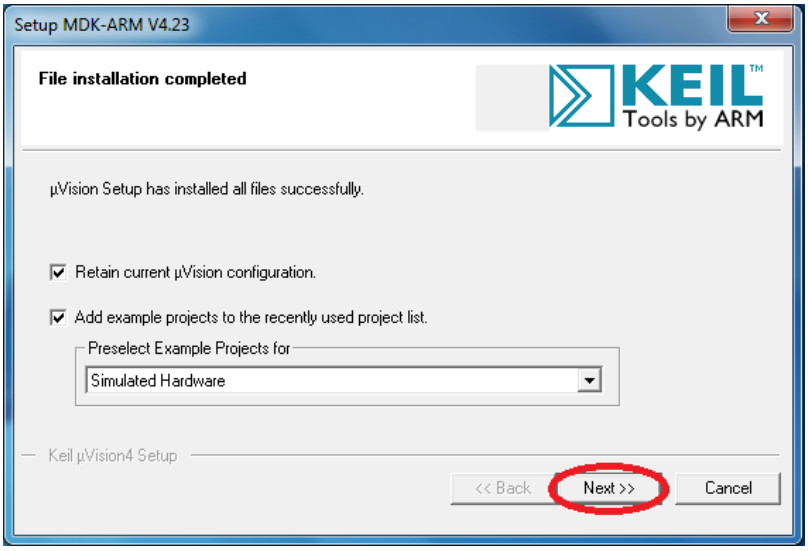

Fig. 7

Step 6: Keil µVision4.23 setup is completed. Click on Finish

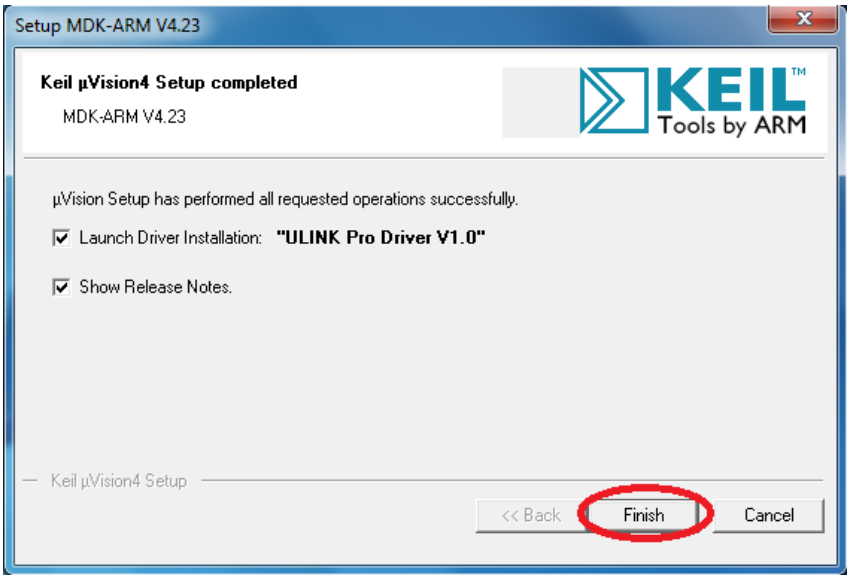

Fig.8

2.3 Setup for ULINK2 and BLUEBOARD-LPC11U24/37 Board

The BlueBoard-LPC11U24/37 board has on board 20 pin SWD box, the ULINK2 is not a part of the BlueBoard-LPC11U24/37 package, user need to buy separately.

To run the BlueBoard-LPC11U24/37 examples you need the following components and the image shows the each components:

- ULINK2
- BlueBoard-LPC11U24/37 Board
- USB type-B cable

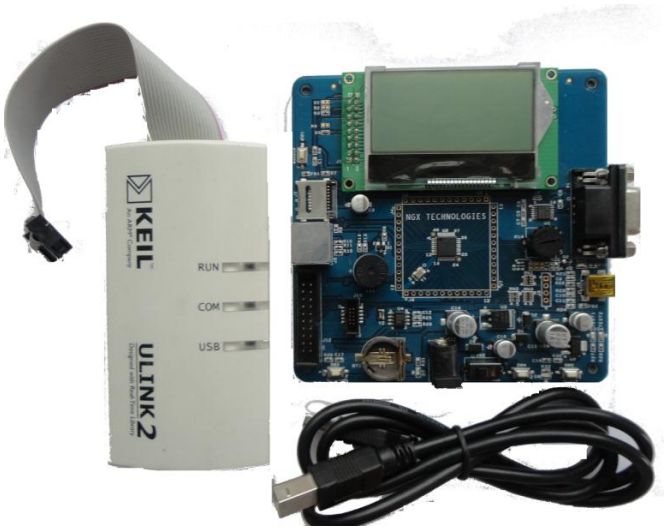

Fig. 9

Connections of components are as shows in the following image.

Fig. 10

The above setup is ready to use for development in Keil IDE

2.4 Configuration of ULINK2 Debugger

The configuration flow of ULINK2 Debugger is explained below:

Step 1: Open the Keil Workspace then by clicking on the **target** option, the window opens as shown below. Next click on Debug option and select the ULINK2 debugger as shown in the image.

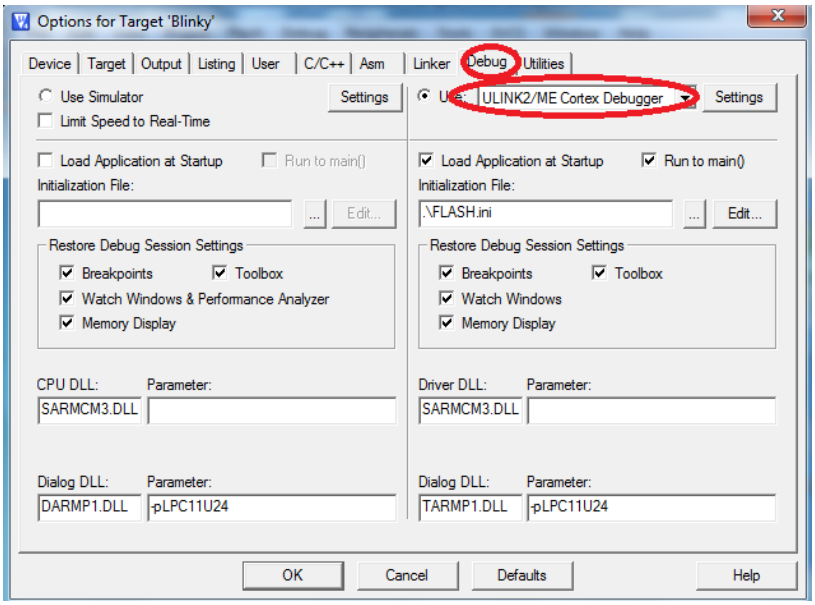

Fig.11

Step 2: Click on the settings option, the Cortex-M Target Driver Setup window opens then select SW port. After selection of the SW port the ULINK2 detected is as shown in the image below

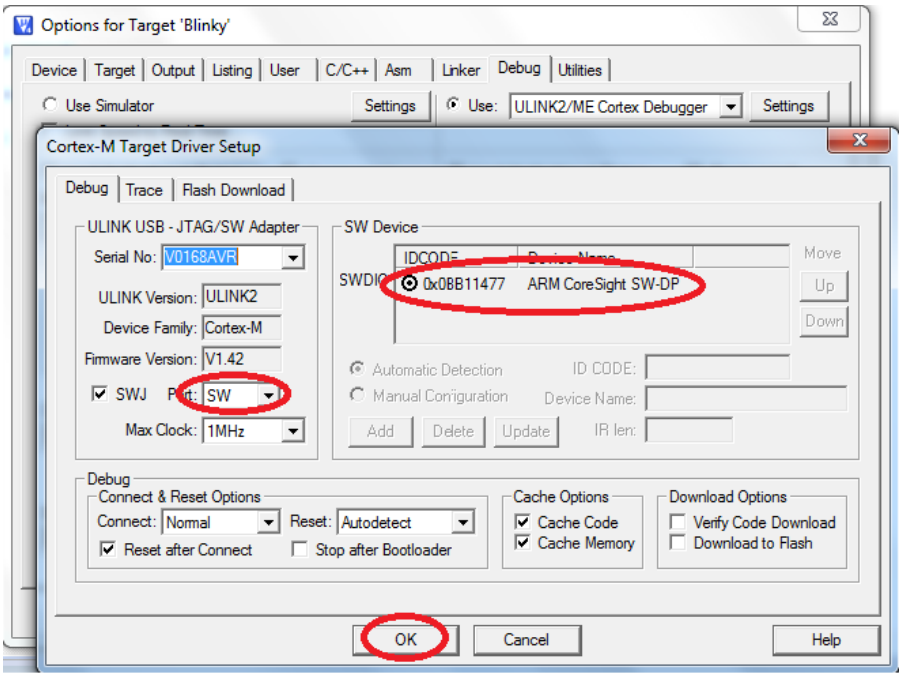

Fig.12

Step 3: Click on Utilities and select ULINK2 Cortex Debugger as shown below

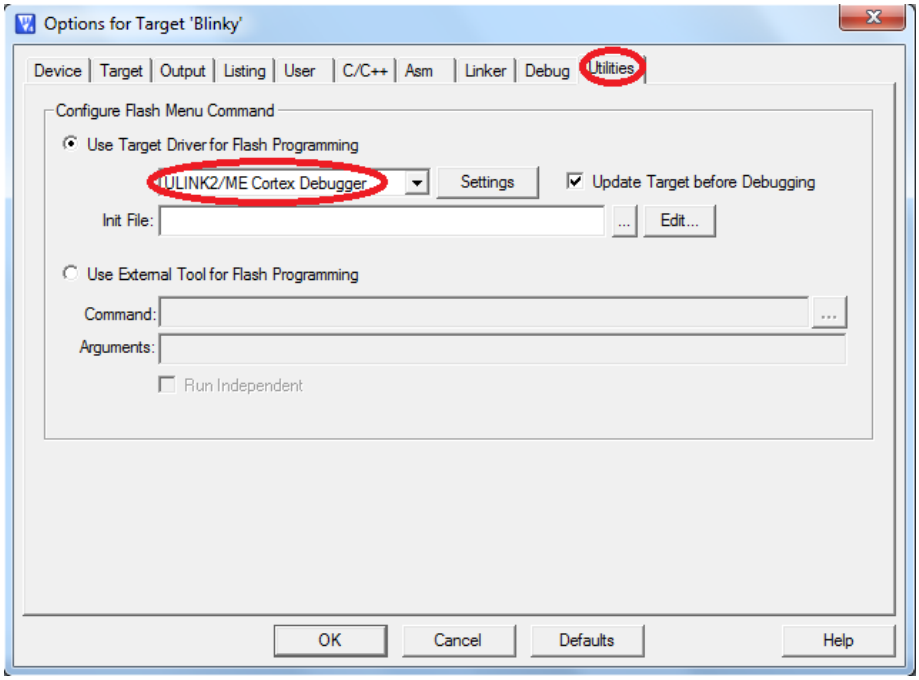

Fig.13

Step 4: By Clicking on Settings the Cortex-M Target Driver Setup window opens, Click on Add to select the flash as shown below

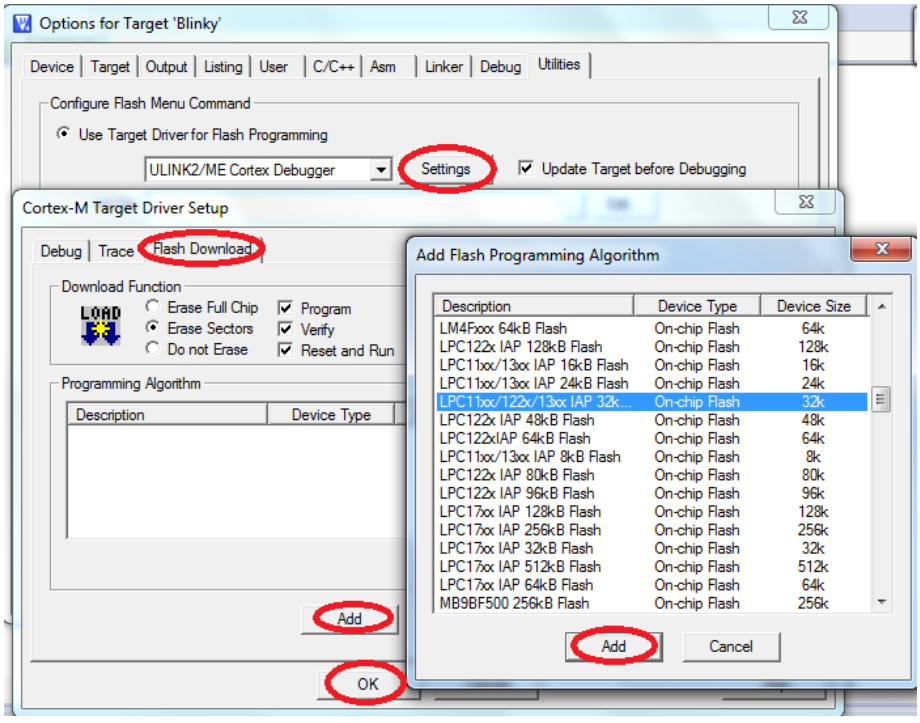

Fig.14

Click OK to complete the ULINK2 Debugger configuration

3.0 BLUEBOARD-LPC11U24/37 Software Development

3.1 Executing the sample projects

The sample projects are provided with the available kit.

Steps to execute the sample projects:

Step 1: Open the project folder.
Step 2: Then open the file **project_**name.uvproj eg blinky.uvproj.

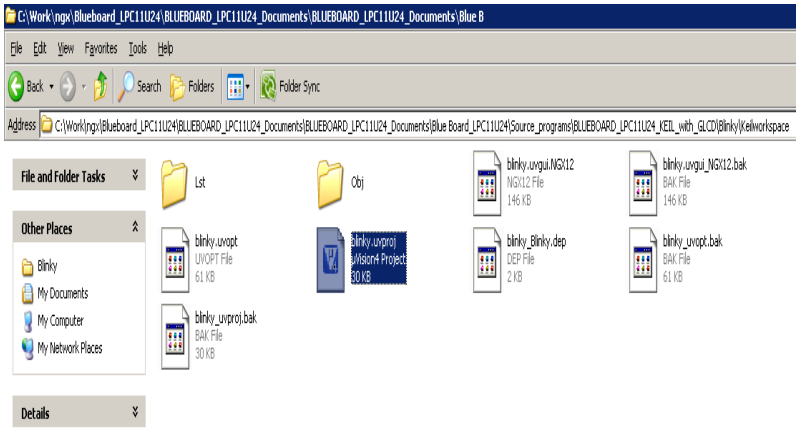

Fig.15

Step 3: This launches the IDE

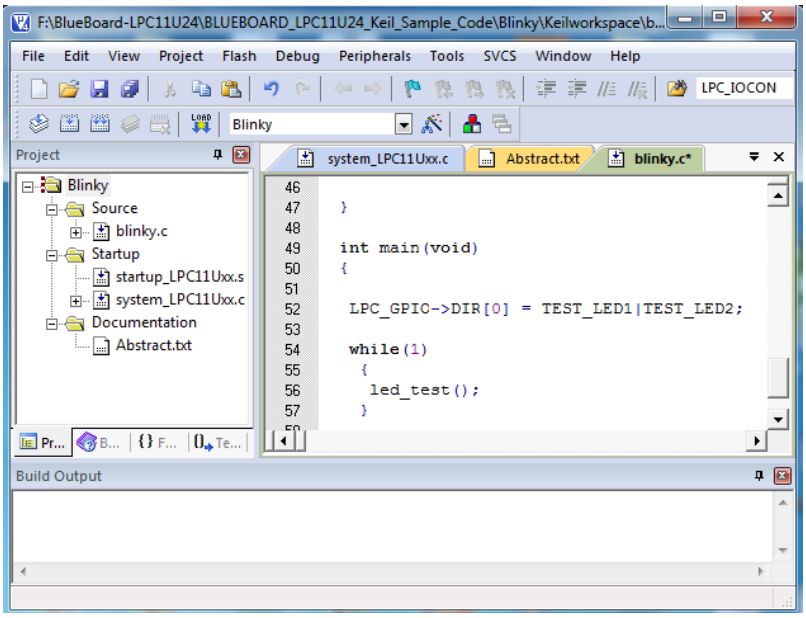

Fig.16

Step 4: Click on Build to build the project as shown in the below image

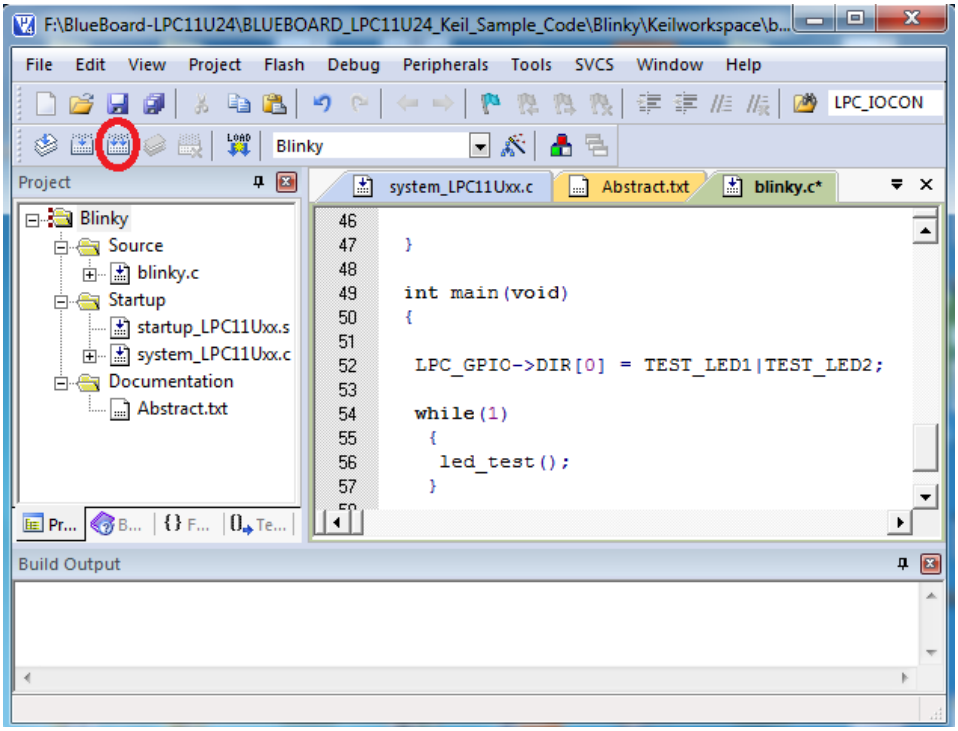

Fig. 17

Step 5: Click on Load to download as shown in the below image

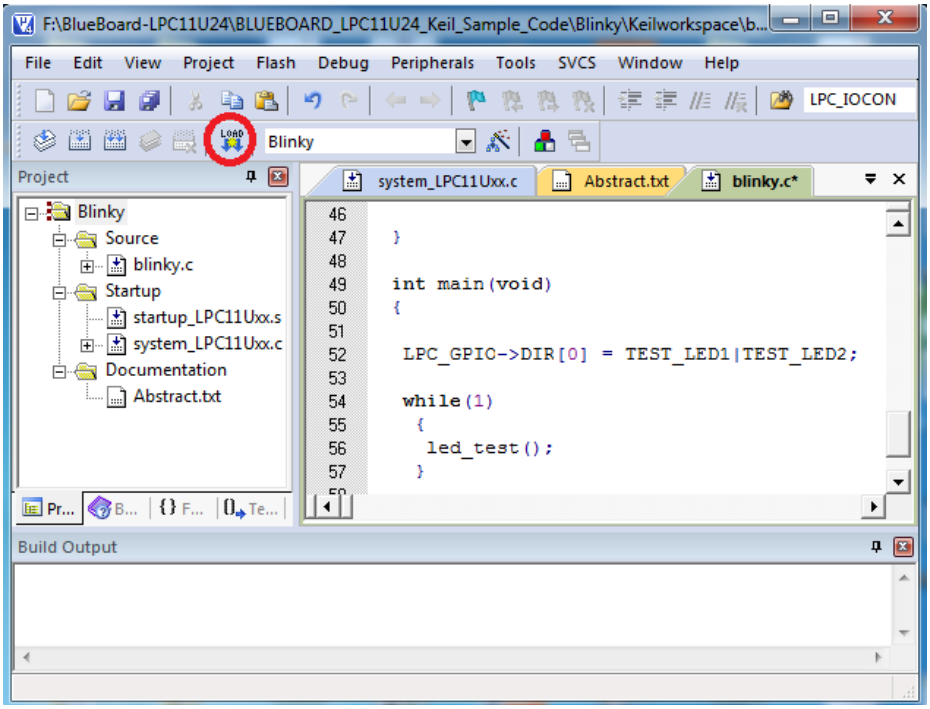

Fig. 18

Step 6: To debug the code click on Debug option then click on Start/Stop Debug session as shown in the below image. Press F5 to free run or press F10 to line by line debug.

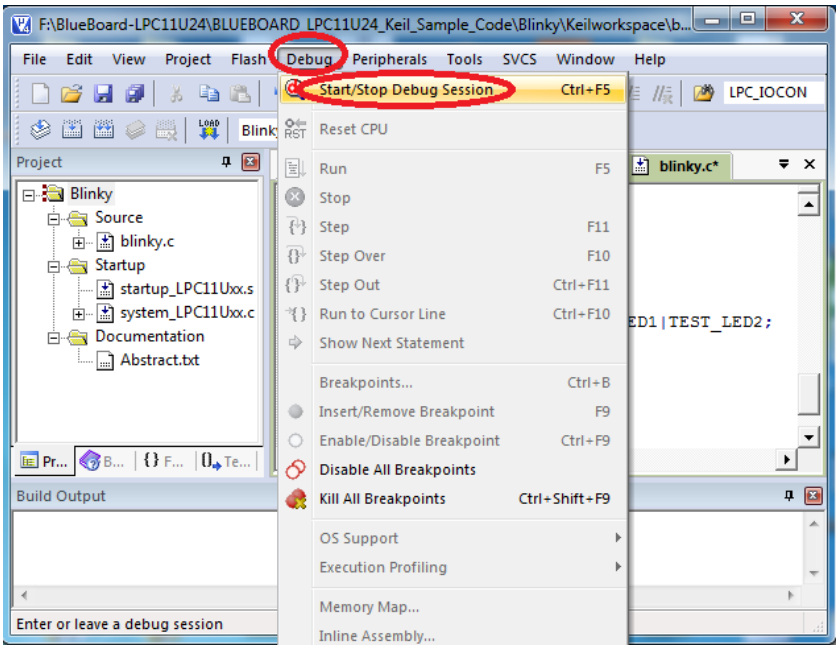

Fig. 19

3.2 Creating New project

Follow the below steps, for creating new project:

Step 1: Open the keil IDE.

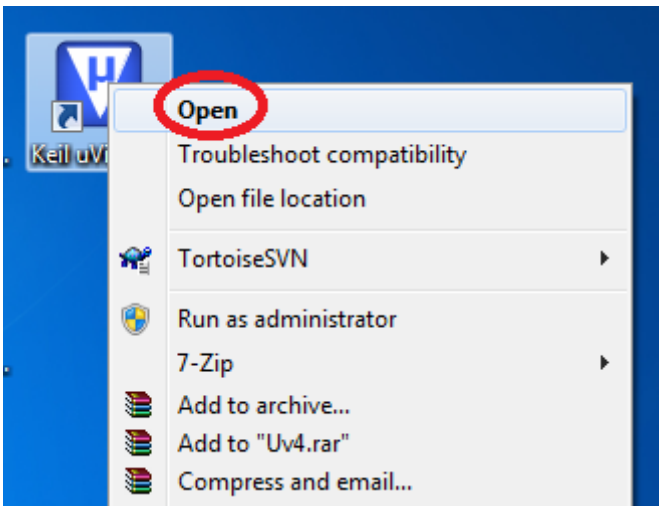

Fig. 20

Step 2: Click on to the Project tab – new uvision project.

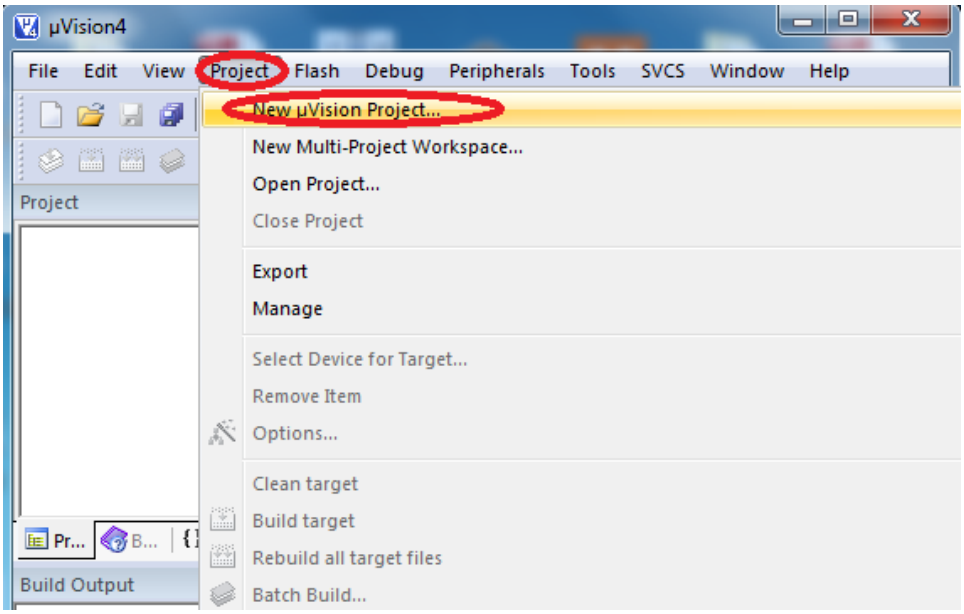

Fig. 21

Step 3: Give project name then click Save.

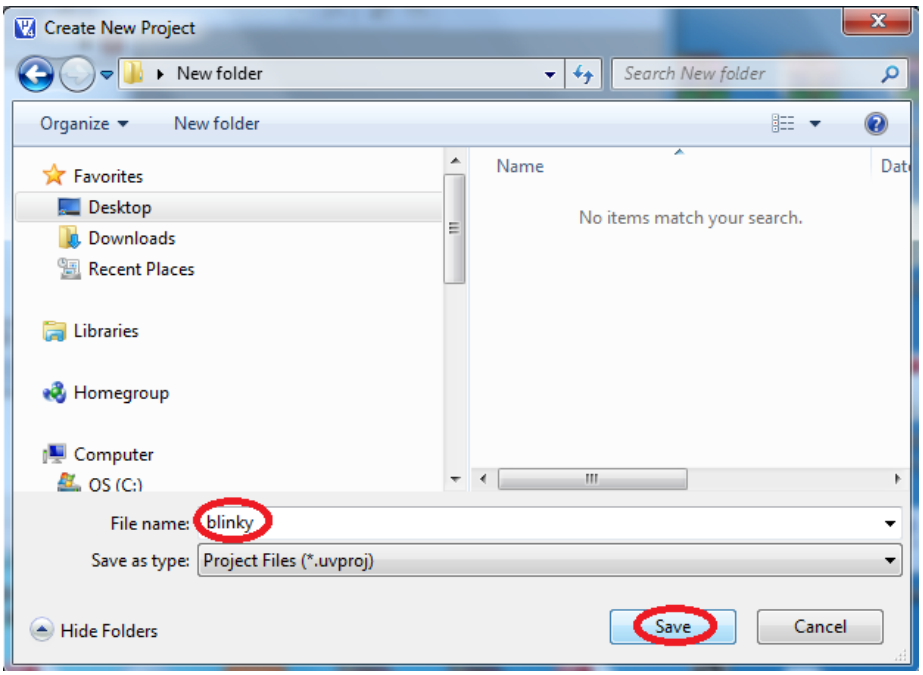

Fig. 22

Step 4: Select the controller.

Note: Both LPC11U24 and LPC11U37 are pin and binary compatible; we can select LPC11U24 device for BB-LPC11U37.

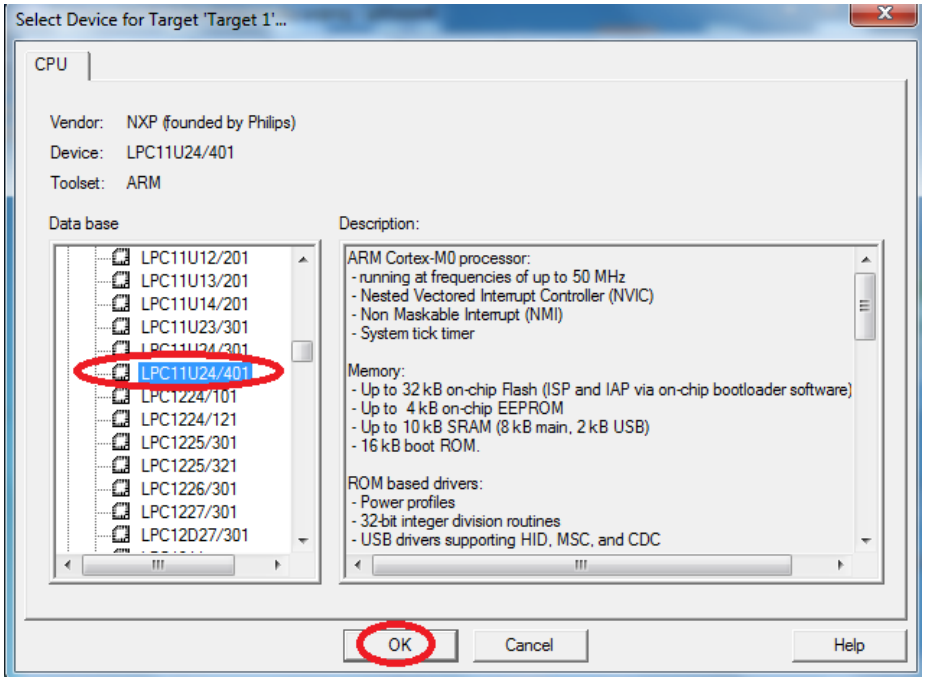

Fig. 23

Step 5: Go to file – new, & start writing the code.

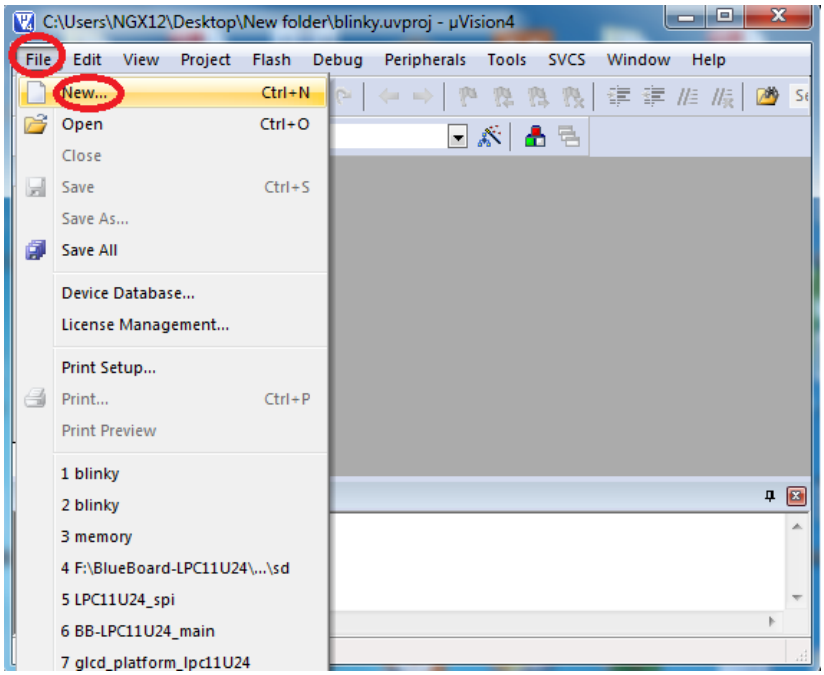

Fig. 24

Step 6: Save the file with some name.

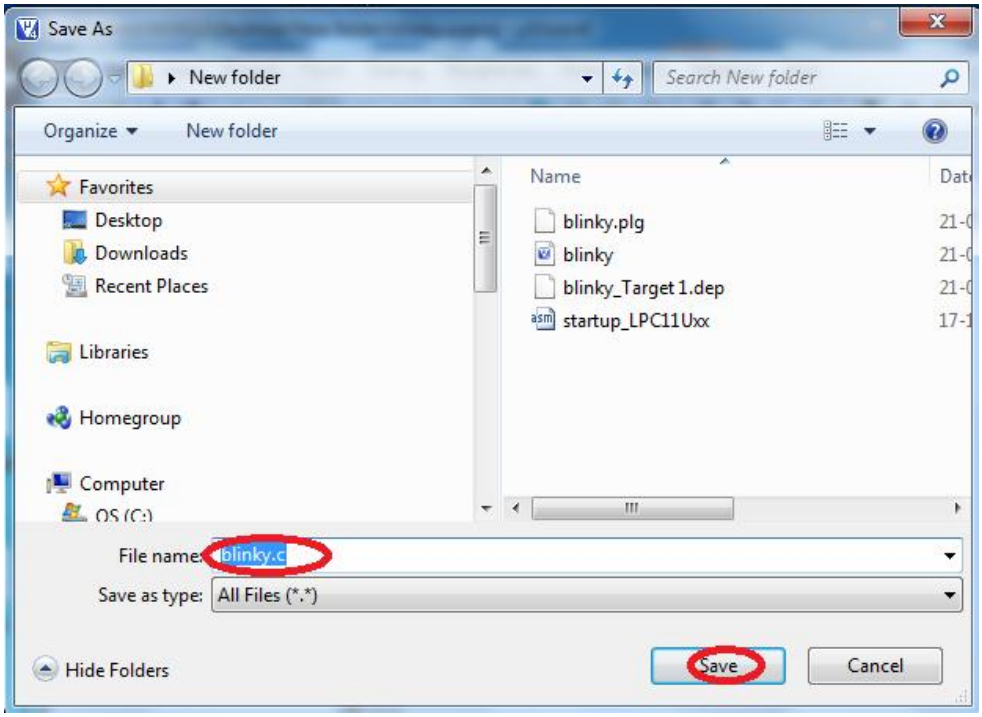

Fig. 25

Step 7: Add the file to the source group as shown in the below image.

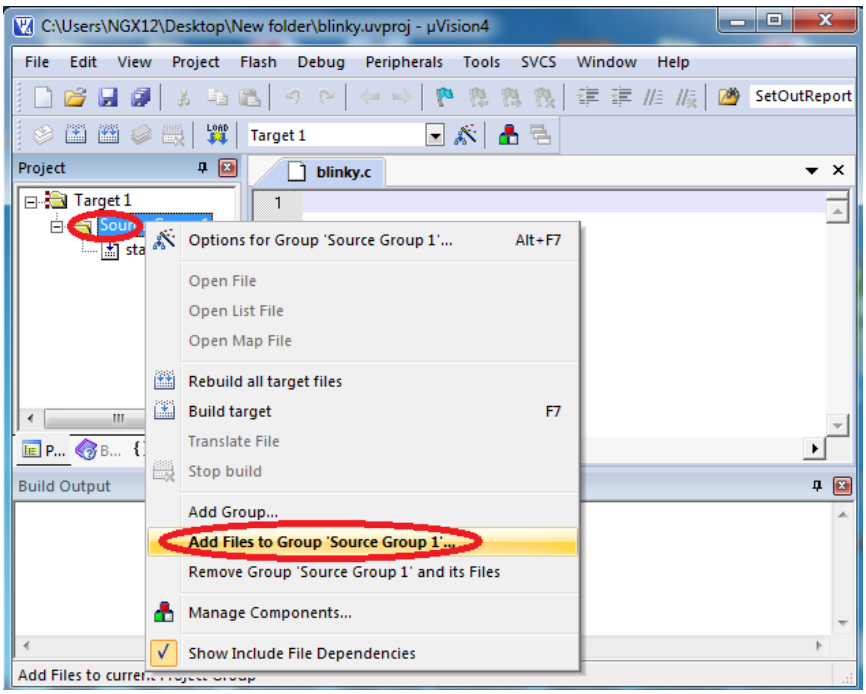

Fig. 26

Step 8: Select the file and click on Add as shown in the below image.

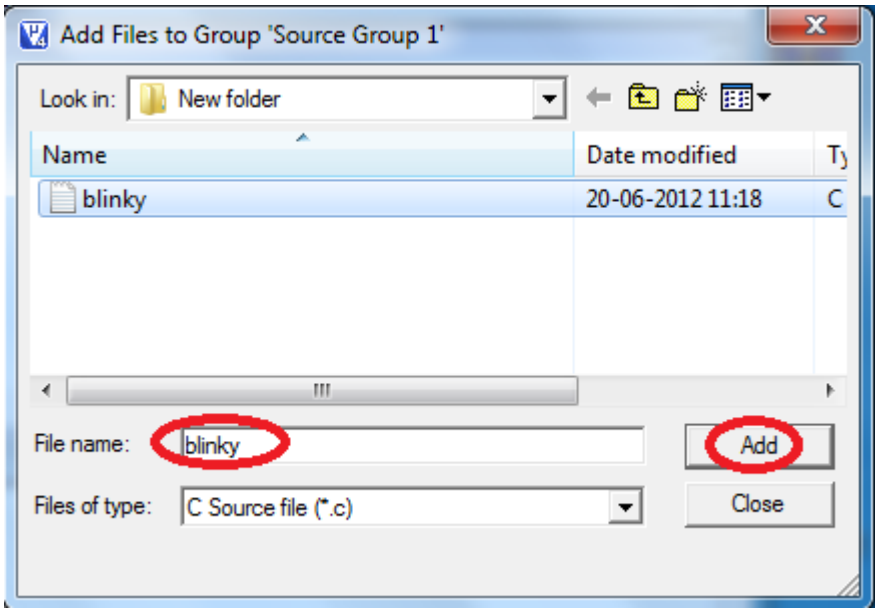

Fig. 27

Step 9: To build, download and debug follow the steps 4, 5 and 6 in section 3.1.

3.3 Creating Bin File

For creating bin file follow the below steps:

Step 1: Open the project & click **'Target Options'** and a window will appear.

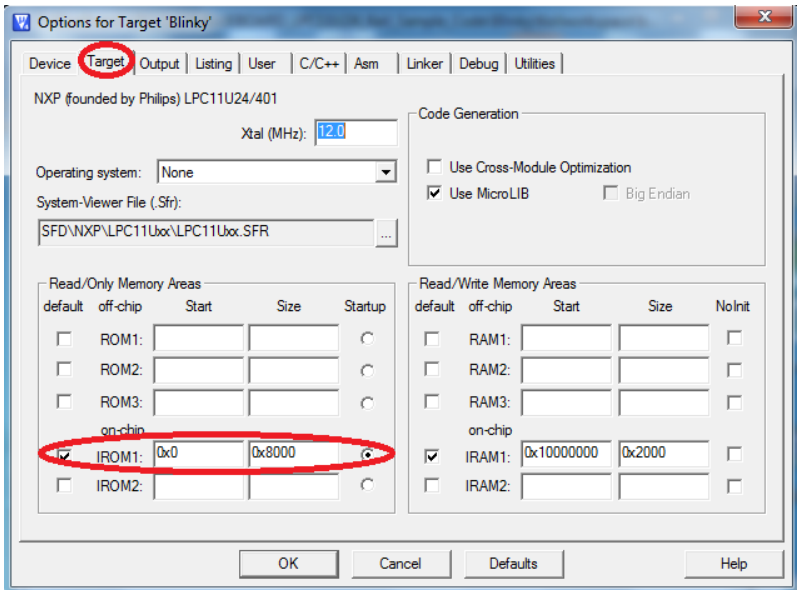

Fig. 28

Step 2: Check the device & the start address of IROM1 should be 0x0.

Step 3: Then go to the User tab & insert the below line in the Run #1:

fromelf --bin "./Obj/file.axf" –output "./Obj/file.bin"

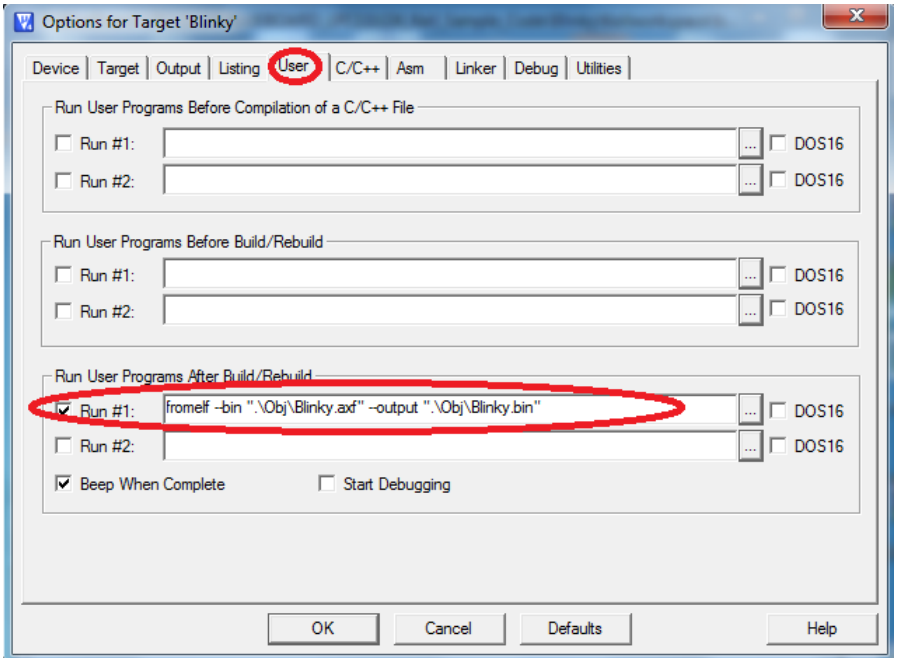

Fig. 29

Step 4: Click on the Linker tab & select the 'Use Memory Layout from Target Dialog', then click ok and build the project, finally .bin file will be created.

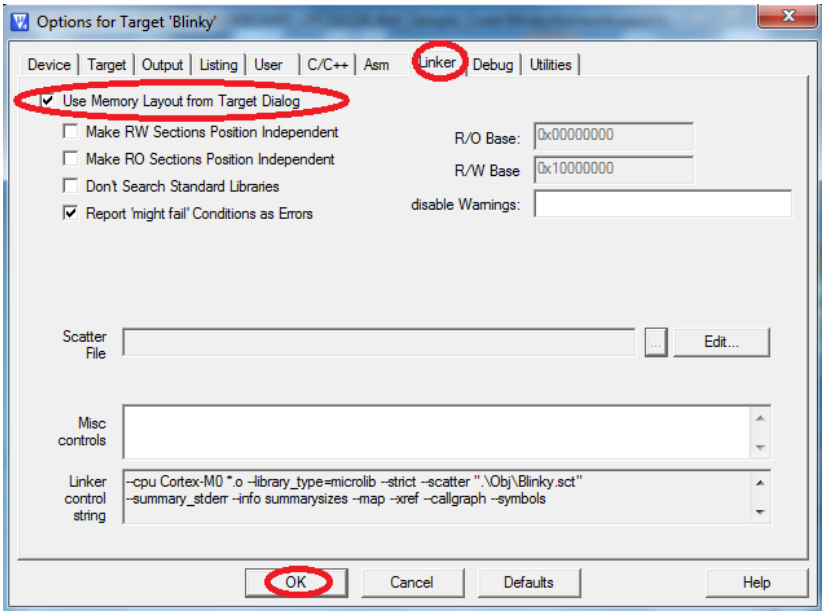

Fig. 30

Note: For newly built bin file you should update crc. Refer **6.0 Trouble Shooting** *for more details.*

4.0 BLUEBOARD-LPC11U24/37 Programming

4.1 Programming options

BLUEBOARD-LPC11U24/37 can be programmed using the

- On-chip bootloader (USB or UART)
- Debugger (ULINK2)

4.1.1 On-Chip bootloader (USB or UART)

In order to program the board either through USB or UART we need to get the board under programming mode.

Getting the board in programming mode:

Theory: The On-chip bootloader looks for a logic LOW to be present on a pre-defined PIN (ISP pin) during reset. If the ISP pin is held LOW and reset signal is provided to the MCU, the MCU enters into programming mode.

Practical:
On the BLUEBOARD-LPC11U24/37 the RESET and ISP signals are connected to buttons provided on the board. Look for the RESET and ISP marking on the board. Therefore to enter into programming mode:

- **Press and hold** the ISP button
- Press the RESET button and release it
- Now release the ISP button
- The board is in the programming mode

We know that the on-chip bootloader can be used with USB or UART. Please note that if you have connected a USB cable to the board the USB bootloader is activated else the UART bootloader is activated. Meaning, if you have connected the USB cable as your power source then you cannot use UART bootloader, you need to use an alternate external power source (DC jack) to enable UART bootloader. If a particular MCU supports USB bootloading it is highly recommended to use the same for programming.

Programming through USB is the most convenient way to program the BlueBoard-LPC11U24. The LPC11U24 has an on-chip USB bootloader support which makes programming the board very simple. You don't require any PC application to program using USB bootloader. Once the board enters the programming mode it appears as a drive on your Windows machine and all you need to do is just drag-n-drop your binary to this drive.

Note: Not all NXP USB MCUs support USB boot loading. For example the LPC11U14 does not support USB bootloader although it has support for USB on the chip.

4.1.2 Flashing the board using USB

The pre-build binaries can be used to flashing onto to the board for each peripheral by using the USB bootloader as a Mass storage device. Press SW4, then SW5; release SW5, then SW4, the mass storage device will appear on your screen. On the board LED D1 glows. Remove firmware.bin file and then place your bin file and then press reset switch to execute the specific code written on to the flash.

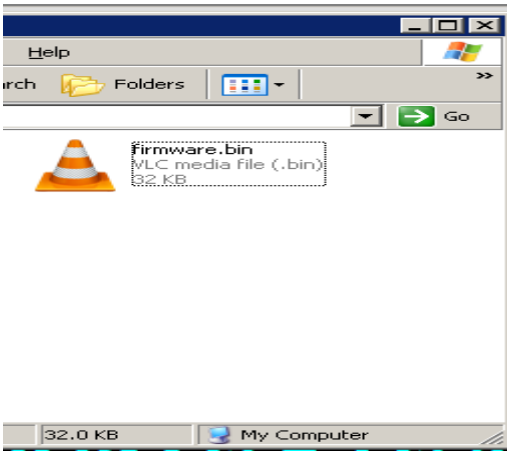

Fig. 31

Flashing the bin file (Drag & drop).

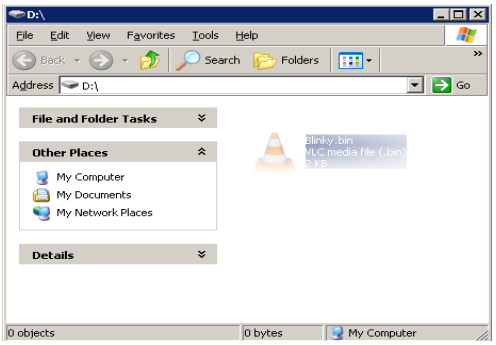

Fig. 32

Note: For newly built bin file you should update crc. Refer **6.0 Trouble Shooting** *for more details.*

4.2 Flashing the Hex file through UART

Step 1: Connect the serial cable to the PC as well as to the board UART0 and open the flash magic tool.

Step 2: Input all the parameters as shown in below Fig.

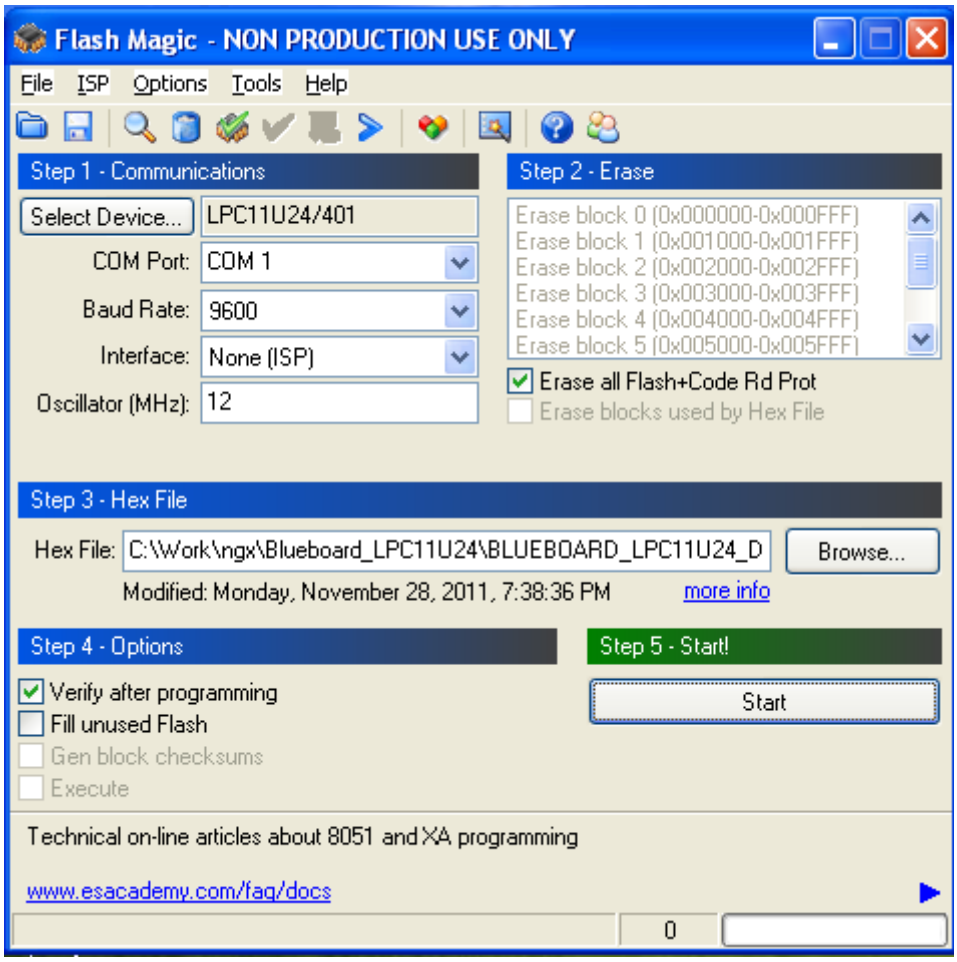

Fig. 33

Step 3: Click **Star**t to flash the hex file. Press Reset to run.

NOTE: Make sure that the Board is not powered through USB.

5.0 Schematic & Board Layout

5.1 Schematic

This manual will be periodically updated, but for the latest documentations please check our website for the latest documents. The Board schematic and sample code are available after the product has been registered on our website.

5.2 Board layout

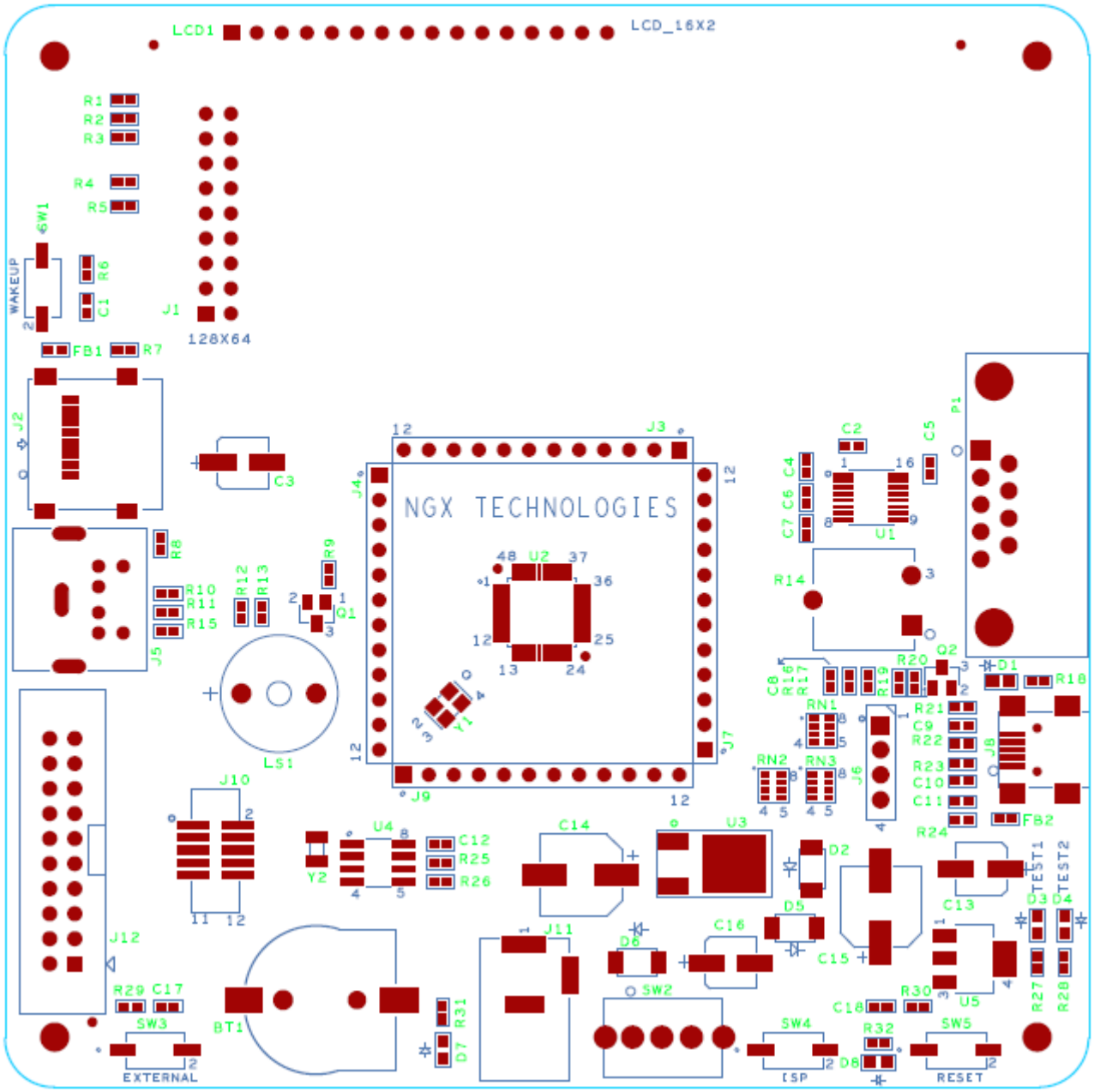

Fig. 34

6.0 Trouble Shooting

For newly created bin file you should update crc.

Unfortunately, the checksum generated is not correct and unless the checksum of the .bin file is modified, the firmware will be rejected by the USB bootloader. Thankfully, this is relatively easy to fix. There is free utility to fix the checksum. A pre-compiled version for Windows (named lpcrc.exe) is also located in the root folder. To fix the checksum, simply go into the command-line and go to the root folder where both the lpcrc.exe tool and your .bin file are located (the file will be named 'firmware.bin' unless you have modified the Makefile), and enter the following command:

Fixing the firmware.bin Checksum

lpcrc firmware.bin

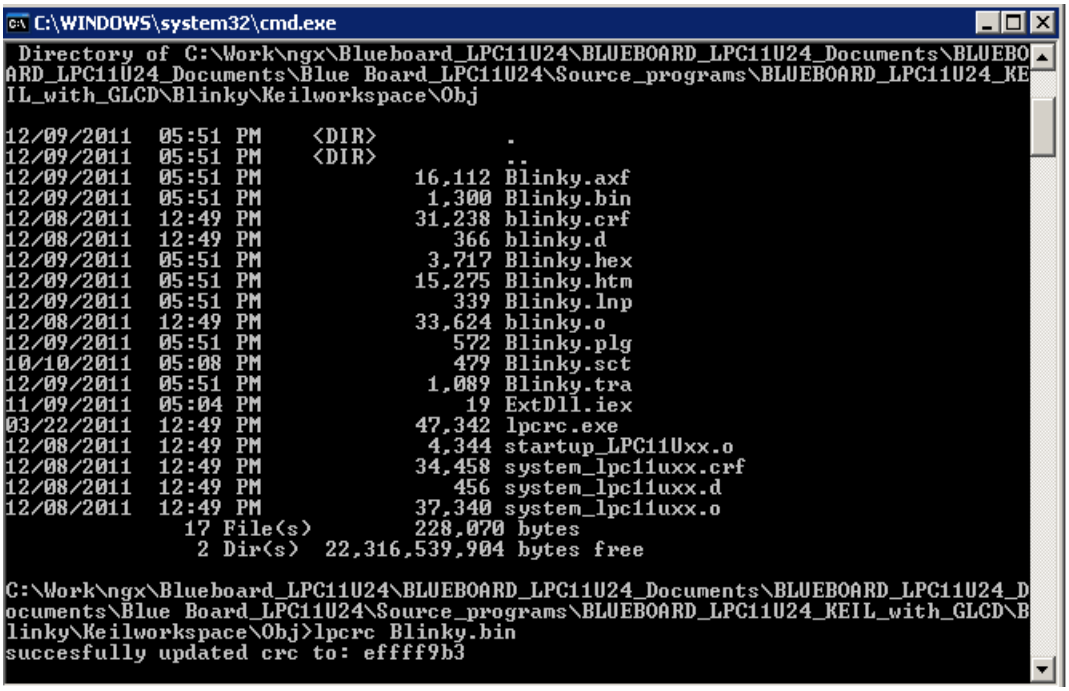

Fig. 35

7.0 CHANGE HISTORY

7.1 Change History

Rev	Changes	Date (dd/mm/yy)	By
1.0	Initial release of the manual	18/06/2012	Veeresh Tumbaragi

8.0 REFERENCES

In addition to this document, the following references are included on the NGX BLUEBOARD-LPC11U24/37 product and can also be downloaded from www.ngxtechnologies.com:

- NGX BLUEBOARD-LPC11U24/37 schematic for the Development board.

Additional references include:

- Information on development tool being used:
  - Keil uvision 4.23, http://www.keil.com/download/product/
  - Flash magic, http://www.flashmagictool.com/

About this document:

Revision History

Version: V1.0 author: Veeresh Tumbaragi

Company Terms & Conditions

Legal

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