



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-M0, M3 & 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.

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## **CE certification**

NGX Technologies BLUEBOARD-LPC1114 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	4
2.0 BLUEBOARD-LPC1114 OVERVIEW	4
2.1 INTRODUCTION	4
2.2 Board Features	4
2.3 Block Diagram	5
2.4 MCU Features	5
3.0 BLUEBOARD-LPC1114 Hardware Description	7
3.1 Introduction	
3.2 Board Image with pointer to each peripheral & connectors	7
4.1 Board connections	
4.2 Powering the Board	9
4.3 Verifying all the peripherals on Blueboard	9
4.3.1 LEDs.	
4.3.2 Buzzer	10
4.3.3 Graphics LCD (GLCD)	10
4.3.4 RTC	10
4.3.5 Micro SD Card	10
4.3.6 ADC	11
4.3.7 PS/2 Keyboard	11
4.3.8 USB	11
4.3.9 UART	11
4.3.9 External Interrupt Switch & Wakeup Switch	13
4.3.10 Serial Wire Debug	
5.0 BLUEBOARD-LPC1114 Development Tool Setup	
5.1 IDE and debugger	
5.2 Installation & Configuration of KEIL software	
5.3 Configuration of ULINK Debugger	
The configuration flow of ULINK Debugger is explained below:	
6.0 BLUEBOARD-LPC1114 Programming	
6.1 Programming options	
BlueBoard-LPC1114 can be programmed using the	
▲ On-chip bootloader UART)	
▲ Debugger (ULINK)	21
6.1.1 On-Chip bootloader (UART)	
6.2 Flashing the Hex file through UART	
7.0 BLUEBOARD-LPC1114 Software Development	
7.1 Executing the sample projects	23
7.2 Creating New project	
8.0 Schematic & Board Layout	
8.1 Schematic	
8.2 Board layout	
9.0 CHANGE HISTORY	
9.1 Change History	29
10.0 REFERENCES	29



# **1.0 INTRODUCTION**

This document is the System Reference Manual for the BLUEBOARD-LPC1114, 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.

# 2.0 BLUEBOARD-LPC1114 OVERVIEW

## **2.1 INTRODUCTION**

The NGX BLUEBOARD-LPC1114 is a compact and versatile evaluation platform for the NXP's Cortex-M0-based MCU. NGX's evaluation platforms are generally not tied up to any particular debugger or compiler/IDE. However it is not practical to test and ensure that the solution would work out of box with all the available debuggers and compilers/IDE. As long as the compiler supports the particular MCU and the debugger supports the standard debug interfaces like the SWD you can use this platform with any tool. For our development we use ULINK and KEIL as the debugger and compiler/IDE respectively. The board is supported by extensive sample examples allowing you to focus on the application development.

### **2.2 Board Features**

Following are the salient features of the board

- ▲ Dimensions: 110mm X 110mm
- ▲ Two layer PCB (FR-4 material)
- Power: DC 6.5V with power LED On-board linear regulators generate +3.3V/500mA and +5V/500mA from power supply USB connector (as alternate power source)
- ▲ 10 pin, 20 pin CORTEX debug connector for SWD (Serial Wire Debug)
- ▲ ISP, Wakeup, External Interrupt and reset switch
- ▲ 12.0000 MHz crystal for MCU, 32Khz crystal for RTC
- ▲ Extension headers for all MCU pins
- ▲ RS232 connector, PS2 connector, Micro SD/MMC card connector, USB type-B mini connector with link-LED
- ▲ 64x128 parallel graphical LCD with Backlight control
- ▲ High accuracy external RTC connected on I2C bus
- ▲ RTC battery holder
- ▲ 10K pot for ADC

Note: The BlueBoard-LPC1114 has support for both 20 pin and 10 pin debug header. You don't need to buy a 20pin to 10pin converter (board which costs 10-15 USD).



### 2.3 Block Diagram



Fig. 2

## 2.4 MCU Features

- ARM Cortex-M0 processor, running at frequencies of up to 50 MHz
- ARM Cortex-M0 built-in Nested Vectored Interrupt Controller (NVIC)
- Non-Maskable Interrupt (NMI) input selectable from several input sources
- System tick timer
- Up to 32 kB on-chip flash program memory
- Up to 8 kB SRAM data memory
- 16 kB boot ROM
- In-System Programming (ISP) and In-Application Programming (IAP)



- Serial Wire Debug
- Up to 42 General-Purpose I/O (GPIO) pins
- GPIO pins can be used as edge and level sensitive interrupt sources.
- Two GPIO grouped interrupt modules
- High-current source output driver (20 mA) on one pin
- High-current sink driver (20 mA) on true open-drain pins
- Four general-purpose counter/timers
- Programmable Windowed WatchDog Timer (WWDT)
- 10-bit ADC with input multiplexing among eight pins
- USART (Universal Synchronous Asynchronous Receiver/Transmitter)
- Two SPI controllers with SSP features and with FIFO and multi-protocol capabilities
- I2C-bus interface supporting the full I2C-bus specification and Fast-mode Plus
- Crystal Oscillator with an operating range of 1 MHz to 25 MHz
- 12 MHz high-frequency Internal RC oscillator (IRC)
- Internal low-power, low-frequency WatchDog Oscillator (WDO)
- PLL allows CPU operation up to the maximum CPU rate
- A second, dedicated PLL is provided for USB
- Clock output function with divider
- Integrated PMU (Power Management Unit)
- Power profiles residing in boot ROM
- Four reduced power modes
- Processor wake-up
- Power-On Reset (POR)
- Brownout detect with four separate thresholds for interrupt and forced reset
- Unique device serial number for identification
- Single 3.3 V power supply (1.8 V to 3.6 V)
- Temperature range -40  $^{\circ}$ C to +85  $^{\circ}$ C

For the most updated information on the MCU please refer to NXP's website.



# 3.0 BLUEBOARD-LPC1114 Hardware Description

## **3.1 Introduction**

The NGX BLUEBOARD-LPC1114 is based on ARM Cortex-M0 microcontroller from NXP. LPC1114 offers 32-KB Flash memory, 50-MHz operation, I2C controller with data rate of up to 1 Mbit/s and wide range of peripherals. Refer to the LPC1114 data sheet for complete device details.

BLUEBOARD-LPC1114 microcontroller is factory-programmed with a quick start demo program. The quick start program resides in the BB-LPC1114 on-chip Flash memory and runs each time power is applied, unless the quick start has been replaced with a user program.

## 3.2 Board Image with pointer to each peripheral & connectors



Fig 3



# 4.0 BLUEBOARD-LPC1114 hardware verification

NGX's Blueboard evaluation platforms ship with a factory-programmed test firmware that verifies the Blueboard peripherals. It is highly recommended that you verify the board, before you start programming. Also this exercise helps you get acclimatized with the board quickly.

To run the tests you will need the following:

- ▲ NGX BLUEBOARD-LPC1114
- ▲ Power: DC 6.5V Supply & +5V/500mA from power supply USB cable
- ▲ PC
- ▲ Mini USB type-B cable
- ▲ Serial RS232 cable
- ▲ PS/2 Keyboard
- ▲ Micro SD card

#### **4.1 Board connections**

BlueBoard Peripheral	Schematic labels	MCU pins
Test LEDs	T_LED1	42
	T_LED2	30
-		
Buzzer	BUZZER	45
128X64 Graphical LCD	LCD_D0	2
1	LCD_D1	13
	LCD_D2	26
	LCD_D3	38
	LCD_D4	11
	LCD_D5	12
	LCD_D6	24
	LCD_D7	25
	LCD_EN	33
	LCD_R/W	34
	LCD_RS	35
	LCD_CS	36
	NRST	3
	LCD_BL	37
MicroSD card	SCK	31
	MOSI	28
	SSEL	10
	MISO	27
ADC POT	ADC3	32
External RTC	SDA	16
	SCL	15
Keyboard (PS/2)	PS2_DATA	43
	PS2_CLK	48
USB	USB_DM	19
	USB_DP	20
	VBUS	14

### User Manual: BlueBoard-LPC1114



UART	RXD	46
	TXD	47
External Interrupt Switch	EXT_SW	23
Wakeup Switch	WAKEUP	40
SWD (Serial Wire Debug)	NRST	3
	SWDIO	39
	SWO	28
	SWDCLK	29
In system Programming	ISP	4
switch		
Power supply	Connecting this will provide	44
	3.3V supply to board	

Table. 2

#### **4.2** Powering the Board

The Blueboard requires DC supply of 6.5V or 7.5 V, 1A rating to power it up. Alternatively the board could be powered through USB connector.

Note: The USB power can source only up to 500 mA of current. For applications having higher current requirements we recommend to use an external power supply. Please note that the external adaptor is not a part of standard delivery.

#### **4.3** Verifying all the peripherals on Blueboard

The following section focusses on the verification of all the peripherals supported on the Blueboard. The order of the tests is mentioned in the same manners as the flow of the test firmware. We highly recommend that you follow the order of the test. The test firmware is designed in a manner that the user needs to spend as minimum time as possible to verify all the peripherals.

Note: It is highly recommended that the user tests all the peripherals as soon as the board is received.

Power up the board and we are all set to verify the Blueboard peripherals. The order of the peripherals that are verified by the firmware are as follows:

#### 4.3.1 LEDs

#### Test setup and verification:

As soon as the BlueBoard is turned ON or reset; the test LEDs go ON & OFF for a couple of times, this simple test validates the LEDs.



#### 4.3.2 Buzzer

#### Test setup and verification:

When the board is turned ON or reset you will hear a beep after few seconds. This confirms the status of the Buzzer.

## 4.3.3 Graphics LCD (GLCD)

#### Test setup and verification:

After the LEDs blink and buzzer test the next interface that the firmware validates is the GLCD. A message "NGX TECHNOLOGIES" should be displayed on the GLCD.



#### 4.3.4 RTC

#### Test setup and verification:

Next, the firmware validates the external RTC connected over I2C bus. The RTC value is read and displayed on the LCD.

Note: You may place the battery (not part of standard deliverables) for the RTC to retain the time even after power off.

#### 4.3.5 Micro SD Card

#### Test setup and verification:

Insert the Micro SD card in the SD card holder (J2), the status of the SD card will be displayed on GLCD. If the SD card is inserted properly "SD card detected" is displayed on GLCD else it displays "SD card missing".

*NOTE:* Please note that we have verified with the Transcend micro SD card. This test basically reads/writes few bytes to the SD-card.



## 4.3.6 ADC

#### Test setup and verification:

The ADC pin is connected to a potentiometer. To test the ADC rotate the wheel of the potentiometer, as the position varies the ADC value sensed is displayed on the GLCD.

Note: Since the LPC1114 has a 10-bit ADC, the values of the ADC reading will range from 0x0000 to 0x1023.

### 4.3.7 PS/2 Keyboard

#### Test setup and verification:

Connect a PS/2 keyboard to PS2 connector. Press any key on the keyboard. The corresponding key gets displayed on the GLCD

#### 4.3.8 USB

#### Test setup and verification:

Connect the USB cable to USB connector. The power LED (D7) turns ON. The USB interface can be used only as source for power supply.

#### 4.3.9 UART

#### Test setup and verification:

Open the hyper terminal as shown in the below image. To test the UART open the hyper terminal with settings 115200 bps 8N1, i.e.

#### Baud Rate: 115200 bps Bits: 8 Parity: None Stop bits: 1 Flow Control: None

### User Manual: BlueBoard-LPC1114





Fig. 4

A 'Connect To' window opens where you have to select the COM port. In this example it is COM13. Click OK. A 'COM13 Properties' window appears. Set the values as shown below. Click OK.

Note: Please check for your machines COM port number. The COM port number can be different.

Connect To	ard
×	the phone number that you want to dial:
Country/region:	India (91) 👻
Area code:	080
Phone number:	
Connect using:	COM13 -
	OK Cancel

Fig. 5

COM13 Properties	? X
Port Settings	
Bits per second: 115200	•
Data bits: 8	•
Parity: None	•
Stop bits: 1	•
Flow control: None	•
Restore	Defaults
OK Cancel	Apply

Fig. 6

Next a 'Hyper Terminal' window opens as shown.



SLUEBOARD - HyperT	erminal				x
File Edit View Call	Transfer He	elp			
1 🖻 🖉 📾 🕻	<mark>6</mark> 8				
NGX Technolo	gies, Ba	angalore ,	India		E
<					
Connected 00:01:16	Auto detect	115200 8-N-1	SCROLL	CAPS	NUI

Fig. 7

Make sure the board is powered and the serial port is connected to the board. The key that are typed on the keyboard are echoed back to the hyper terminal.

#### 4.3.9 External Interrupt Switch & Wakeup Switch

#### Test setup and verification:

When you press the External Interrupt Switch (External SW3) the controller enters into the deep power down mode, once you press the wake up switch (SW1) the controller wakes up from the deep power down mode.

#### 4.3.10 Serial Wire Debug

#### Test setup and verification:

Connect the Ulink2 debugger to the debug port (10 pin or 20 pin), Open the keil project, build the project and click on load/debug option to program or debug the BlueBoard as shown in the below images.



G:\BLUE BOARD_LPC1000_Set	ries\BLUE BOARD_LPC1114\BLU	EBOARD_LPC1114_wi	ith_GLCD\BL	_ 0 <b>_ X</b>
File Edit View Project Fl	ash Debug Peripherals Too	ols SVCS Window	Help	
📄 😂 🖬 🗿 🕹 <u>Þ</u> 🛍	ע מיז (⇔ ⇒ ( איי ע	株 秋   徳 徳	//#//#	SetOutReport
🛛 🕸 🕮 🥔 🔣 🕎 I	PC1114_blinky 💽 🌋	📥 🕾		
Project 4	Download	📰 Abstract.txt		<b>▼</b> ×
🖃 🗎 LPC1114_blinky	Download code to flash memory			T I
🗄 🧰 StartUp	63 Note	1		_
🚊 🤤 Source Files	64 **********	*****	******	*******
🗄 🖈 🔝 blinky.c	65 */ 66 int main(void)			
	67 {			
	<pre>68 led_test();</pre>			
	69			
	70 while(1) 71 {			
				<b>_</b>
<b>■ P ③</b> B   {} F   0, T	1			
Build Output				<b>д </b> 🛛
				*
				~
				4
Download code to flash memory		_		1 .H

Fig 8

😨 G:\BLUE BOARD_LPC1000_Series\BLUE BOARD_LPC1114\BLUEBOARD_LPC1114_with_GLCD\BL				
File Edit View Project Flash	n Deb	ug Peripherals Tools	SVCS Window	Help
📄 😂 🛃 🥔 👗 🛍 🛍	-	Start/Stop Debug Session	Ctrl+F5	🗐 //👷 🖄 SetOutReport
🕸 🍱 🕮 🧼 🔜   🙀   📭	11 RST	Reset CPU		
Project 🛛 📮 💌	E.	Run	F5	<b>▼</b> ×
E- 🔁 LPC1114_blinky	62	Stop		
⊡ ि StartUp	63 64 <sup>{</sup> }	Step	F11	*****
	65 (0 <sup>1</sup> )	Step Over	F10	
⊕ 💼 Documentation	66 (}} 67	Step Out	Ctrl+F11	
	68 713	Run to Cursor Line	Ctrl+F10	
	65 🔶 70	Show Next Statement		
	71	Breakpoints	Ctrl+B	•
	<u>(</u> )	Insert/Remove Breakpoint	F9	•
Build Output	$\circ$	Enable/Disable Breakpoint	Ctrl+F9	д 🖂
	~	Disable All Breakpoints	<b></b>	A
		Kill All Breakpoints	Ctrl+Shift+F9	
		OS Support	Þ	
		Execution Profiling	+	
•		Memory Map		- F
Enter or leave a debug session		Inline Assembly		1

Fig 9



# 5.0 BLUEBOARD-LPC1114 Development Tool Setup

#### 5.1 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.

Other tool options that could be considered are:

- ▲ J-link and IAR
- ▲ Co-link and CooCox

#### 5.2 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 and above.

Step 1: Open the keil setup



Fig. 10



Step 2: Keil µvision4.23 information Click on Next

Setup MDK-ARM V4.23	×
Welcome to Keil μVision Release 12/2011	
This SETUP program installs: <b>MDK-ARM V4.23</b> This SETUP program may be used to update a previous p However, you should make a backup copy before procee	
It is recommended that you exit all Windows programs before	ore continuing with SETUP.
Follow the instructions to complete the product installation	
— Keil μVision4 Setup ————————————————————————————————————	<pre>&lt;&lt; Back Next &gt;&gt; [Cancel]</pre>

Fig. 11

Step 3: Terms & conditions

Setup MDK-ARM V4.23
License Agreement Please read the following license agreement carefully.
To continue with SETUP, you must accept the terms of the License Agreement. To accept the agreement, click the check box below.
END USER LICENCE AGREEMENT FOR MDK-ARM THIS END USER LICENCE AGREEMENT ("LICENCE") IS A LEGAL AGREEMENT BETWEEN YOU (EITHER A SINGLE INDIVIDUAL, OR SINGLE LEGAL ENTITY) AND ARM LIMITED ("ARM") FOR THE USE OF THE SOFTWARE ACCOMPANYING THIS LICENCE. ARM IS ONLY WILLING TO LICENSE THE SOFTWARE TO YOU ON CONDITION THAT YOU ACCEPT ALL OF THE TERMS IN THIS LICENCE. BY CLICKING "I AGREE" OR BY INSTALLING OR OTHERWISE USING OR COPYING +
<ul> <li>✓ I agree to all the terms of the preceding License Agreement</li> <li>— Keil µVision4 Setup</li> <li>— Keil µVision4 Setup</li> <li>— Keil µVision4 Setup</li> </ul>

Fig. 12



Step 4: Provide the destination path and Click on Next

Setup MDK-ARM V4.23	
Folder Selection Select the folder where SETUP will install files.	
SETUP will install μVision4 in the following folder. To install to this folder, press 'Next'. To install to a different fold folder. Destination Foldor	ler, press 'Browse' and select another
C:\Keil	B <u>r</u> owse
— Keil μVision4 Setup —	<< Back Next >> Cancel

Fig. 13

Step 5: Fill your Personal information and Click on Next

Setup MDK-ARM V4.2	3	×
Customer Informa Please enter your		
Please enter your r First Name:	name, the name of the company for whom you work	and your E-mail address.
Last Name: Company Name:	xyz NGX Technologies Pvt Ltd	
E-mail: — Keil µVision4 Setup	abc@ngxtechnologies.com	k Next >> Cancel

Fig. 14





#### Step 5: Click on Next

Setup MDK-ARM V4.23	
File installation completed	
μVision Setup has installed all files successfully.	
✓ Retain current µVision configuration.	
Add example projects to the recently used project list.	
Preselect Example Projects for	
Simulated Hardware	•
— Keil μVision4 Setup	<< Back Next >> Cancel



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

Setup MDK-ARM V4.23	
Keil µVision4 Setup completed MDK-ARM V4.23	
μVision Setup has performed all requested operations successfully.	
✓ Launch Driver Installation: "ULINK Pro Driver V1.0"	
✓ Show Release Notes.	
— Keil μVision4 Setup	
<< Back	Finish Cancel

Fig. 16

#### **5.3 Configuration of ULINK Debugger**

The configuration flow of ULINK 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.



	Dutput Listing User C/C++ Asm					
<ul> <li>Use Simulator</li> <li>Limit Speed to</li> </ul>		Us ULINK2/ME Cortex Debugger Settings				
Load Applicati	on at Startup	✓     Load Application at Startup     ✓     Run to main()       Initialization File:				
	Edit	Edit				
Restore Debug	Session Settings	Restore Debug Session Settings				
Breakpoint	is 🔽 Toolbox	Freakpoints Toolbox				
Watch Wir	ndows & Performance Analyzer	Watch Windows				
Memory Di		Memory Display				
Memory Di						
Memory Di	splay	Memory Display				
CPU DLL:	splay	Memory Display       Driver DLL:     Parameter:				
CPU DLL:	splay	Memory Display       Driver DLL:     Parameter:				
Memory Di CPU DLL: SARMCM3.DLL Dialog DLL:	splay Parameter:	Memory Display       Driver DLL:     Parameter:       SARMCM3.DLL				

Fig.17

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

Use Simulator	Settings 🖉 Use: ULINK2/ME Cortex Debugger 💌 Settings
Cortex-M Target Driver Setup	
Debug Trace Flash Download	
ULINK USB - JTAG/SW Adapter-	SW Device
Serial No: V0168AVR	IDCODE Durin Neno Move
ULINK Version: ULINK2	SWDIC O 0x0BB11477 ARM Core Sight SW-DP
Device Family: Cortex-M	Dow
Firmware Version: V1.42	Automatic Detection     ID CODE:
🔽 SWJ Pit: SW 🚽	O Manual Configuration Device Name:
Max Clock: 1MHz 💌	Add Delete Update IR len:
Debug Connect & Reset Options	Cache Options Download Options
	et: Autodetect 💌 🔽 Cache Code 🗌 🗆 Verify Code Download
Reset after Connect	Stop after Bootloader 🔽 Cache Memory 🔽 Download to Flash

Fig.18



Step 3:	Click on Utilities a	nd select ULINK2	Cortex Debugger as	shown below
---------	----------------------	------------------	--------------------	-------------

🛛 Options for Ta	rget 'Blinky'	x
Device Target	Output   Listing   User   C/C++   Asm   Linker   Debug Utilities	
Configure Flash	n Menu Command	1
Use Targe	t Driver for Flash Programming	
	ULINK2/ME Cortex Debugger	
Init File:	Edit	
	nal Tool for Flash Programming	
Command:		
Arguments:	1	
	🗖 Run Independent	
	OK Cancel Defaults Help	

Fig.19

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

Options for Target 'Blinky'  Device   Target   Output   Listing   User   C/C++   Asm  Configure Flash Menu Command    Configure Flash Menu Command     ULINK2/ME Cortex Debugger    Cortex-M Target Driver Setup	Linker   Debug Utilities   Settings IV Update Target t	pefore Debugging		
Debug   Trace (Flash Download)	Add Flash Programming Algorit	hm		X
Download Function       Image: Class Full Chip       Image: Program         Image: Class Full Chip       Image: Program       Image: Venfy         Image: Class Full Chip       Image: Venfy       Image: Venfy	Description LM4Fxxx 64kB Flash LPC122x IAP 128kB Flash LPC11xx/13xx IAP 16kB Flash LPC11xx/13xx IAP 24kB Flash LPC11xx/122x/13xx IAP 24kB Flash LPC122x IAP 48kB Flash LPC122x IAP 80kB Flash LPC122x IAP 80kB Flash LPC12xx IAP 80kB Flash LPC12xx IAP 96kB Flash LPC17xx IAP 256kB Flash LPC17xx IAP 256kB Flash LPC17xx IAP 256kB Flash LPC17xx IAP 256kB Flash LPC17xx IAP 512kB Flash LPC17xx IAP 512kB Flash	Device Type On-chip Flash On-chip Flash	Device Size 64k 128k 16k 24k 24k 48k 64k 8k 80k 96k 96k 96k 256k 32k 512k 64k	*
	MB9BF500 256kB Flash	On-chip Flash Cancel	256k	T



Click OK to complete the ULINK2 Debugger configuration



# 6.0 BLUEBOARD-LPC1114 Programming

#### **6.1 Programming options**

BlueBoard-LPC1114 can be programmed using the

▲ On-chip bootloader UART)

▲ Debugger (ULINK)

## 6.1.1 On-Chip bootloader (UART)

In order to program the board either through 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-LPC1114 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:

- A **Press and hold** the ISP button
- ▲ Press the RESET button and release it
- $\checkmark$  Now release the ISP button
- $\checkmark$  The board is in the programming mode



# 6.2 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.

🌧 Flash Magic -	NON PRODUCTION USE ON	ILY			x
File ISP Opti	ons Tools Help				
🗀 🗔   🔍 🍘	) 🐗 🖌 🌉 ≽   💖   🗵	l   🕜 😂			
Sten 1 - Communi	cations	Step 2 - Er	ase		
Select Device.	LPC1114/302			000-0x000FFF) 000-0x001FFF)	
COM Port:	COM 13 -	Erase block	k 2 (0x002)	000-0x002FFF)	=
Baud Rate:	9600 🗸	Erase block	k 4 (0x004)	000-0x003FFF) 000-0x004FFF)	
Interface:	None (ISP)	_		000-0x005FFF)	-
Oscillator (MHz):	12	Erase all		de Ra Prot by Hex File	
	JE BOARD_LPC1000_Series\BL d: Thursday, April 12, 2012, 12:5:			\BLL Brow	se)
Step 4 - Options	. marady, April 12, 2012, 12.0		ep 5 - Star		
Verify after prog Fill unused Flas Gen block chec Execute	h			Start	
On-Line training cl Internetworking www.esacademy.	asses for microcontrollers and er com/fag/classes	nbedded net		nd	►
			0		

Fig. 21

Step 3: Get the board in programming mode by following the step 6.1.1 then click **star**t to flash the hex file.

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



# 7.0 BLUEBOARD-LPC1114 Software Development

### 7.1 Executing the sample projects

The sample projects are provided with the available kit.

Steps to execute the sample projects:

- 1. Open the project folder.
- 2. Then open the file project\_name.uvproj eg blinky.uvproj.



Fig. 22



3. This launches the IDE

	ries\BLUE BOARD_LPC1114\BLUEBOARD_LPC1114_with_GLCD\BL	_ 🗆 🗙
-	ash Debug Peripherals Tools SVCS Window Help 1   ッ @   @ ⇒   🏴 隐 隐 限   譯 譯 //: //::  🖄 !	SetOutReport
	LPC1114_blinky	•
Project 📮 🖾	blinky.c blinky.h Abstract.txt	<b>▼</b> ×
□- LPC1114_blinky ⊕- StartUp ⊕- Source Files ⊕- blinky.c	62 63 Note : 64 ************************************	*******
⊡ onny.c     ⊡ Documentation	<pre>66 int main(void) 67 { 68 led_test(); </pre>	
	69 70 while(1) 71 { 	
E P		<u> </u>
Build Output		<b>₽ </b>
4		₹ 1
		1.11



4. If you have the ulink programmer just click the Debug button on the IDE and the project is loaded onto the controller and ready for debugging. If you wish to just flash/program the generated binaries onto the board, follow the steps in 6.2 Flashing the Hex file through UART

## 7.2 Creating New project

Follow the below steps, for creating new project:

Step 1: Open the keil IDE.



Fig. 24

## User Manual: BlueBoard-LPC1114



Step 2: Click on to the Project tab – new uvision project & then click save.

Create New Proje	ect				? ×
Savejn:	C New Folder		•	🗢 🗈 💣 🎟•	
My Recent Documents Desktop					
My Documents					
My Computer					
My Network	File <u>n</u> ame:	new			Save
Places	Save as <u>t</u> ype:	Project Files (*.uvproj)		•	Cancel

Fig. 25

Step 3: Select the controller.

V Options for Target 'LPC1114_blinky'
Device Target Output Listing User C/C++ Asm Linker Debug Utilities
Database: Generic CPU Data Base
Vendor: NXP (founded by Philips)
Device: LPC1114/302
Toolset: ARM
Image: Control of the control of th
OK Cancel Defaults Help

Fig. 26

Step 4: Go to file – new, & start writing the code



Step 5: Save the file with some name & add the files to the source group.

Add Files to G	roup 'Source Group 1'						? ×
Look in: 🗀	New Folder	-	+	£	<del>d</del> i:	-	
inc.c							
, File <u>n</u> ame: Files of <u>t</u> ype:	jhc.c  C Source file (*.c)			-		Add Close	_

Fig. 27

For creating hex file follow the below steps:

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

Options for Target 'LPC1114_blinky'								
Device Target Output   Listing   User   C/C++   Asm   Linker   Debug   Utilities								
NXP (founded by Philips) LPC1114/302								
Xtal (MHz): 12.0								
Operating system: None Use Cross-Module Optimization								
System-Viewer File (.Sfr):								
Read/Only Memory Areas								
default off-chip Start	Size Startup	default	off-chip	Start	Size	Nolnit		
ROM1:	0		RAM1:					
ROM2:	0		RAM2:					
ROM3:	0		RAM3:					
on-chip			on-chip	1000000	0.0000			
INOMI:	x8000			<10000000	0x2000			
IROM2:	0		IRAM2:					
OK Cancel Defaults Help								

Fig. 28

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



Step 3: Then go to the Output tab and select options as shown in below image:



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 .hex file will be created.

Device   Targ	et Output Listing User C/C++ A	sm Linker Debug	Utilities	
☐ Make ☐ Make ☐ Don1	ory Layout from Target Dialog RW Sections Position Independent RO Sections Position Independent Search Standard Libraries rt 'might fail' Conditions as Errors	R/O Base: R/W Base disable Warnings:	0x0000000 0x10000000	 
Scatter File	[			 Edit
				 Edit
File Misc	-cpu Cortex-M0 *.o -library_type=microlit -summary_stderr -info summarysizes -ma			Edit

Fig. 30



# 8.0 Schematic & Board Layout

## 8.1 Schematic

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

### 8.2 Board layout



Fig. 31



# 9.0 CHANGE HISTORY

### 9.1 Change History

Rev	Changes	Date (dd/mm/yy)	By
1.0	Initial release of the manual	08/03/2012	Veeresh Tumbaragi

## **10.0 REFERENCES**

In addition to this document, the following references are included on the NGX BLUEBOARD-LPC1114 product and can also be downloaded from <u>www.ngxtechnologies.com</u>:

• NGX BLUEBOARD-LPC1114 schematic for the Development board.

Additional references include:

- NGX BLUEBOARD-LPC1114 DATASHEET.
- Information on development tool being used:
  - Keil uvision 4.23, <u>http://www.keil.com/download/product/</u>
  - Flash magic, http://www.flashmagictool.com/

#### About this document:

#### **Revision History**

Version: V1.0 author: Veeresh Tumbaragi

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