USB-Dongle and Derivative Board

User's Manual











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1.0 Introduction

The USB-Dongle and Derivative Boards allow quick and easy ICP or ISP programming of many popular NXP Semiconductors microcontroller families such as the LPC9xx, ARM7 LPC2xxx and 89V52X2. The unit also provides a low cost platform for testing or prototyping of simple microcontroller based designs. The USB-Dongle provides a Virtual COM Port interface to the PC and allows hex files to be downloaded and programmed using Flash Magic or other common utilities. The USB-Dongle provides all power needed by the various Derivative Boards so no external power supply is required. Low cost Derivative Boards are available for many different microcontrollers from NXP, please consult our website for details.

The USB-Dongle is an interface module providing easy USB control of multiple test boards called Derivative Boards. Features include:

- Virtual COM Port connection to the PC
- ICP/ISP interface to program and control Derivative Boards
- Interface connector (J3) to Derivative Board for ICP/ISP, expansion

2.0 Guide to Kit

2.1 Kit Contents

The following items are included in the USB-Dongle Kit.

- USB-Dongle
- Derivative Boards are sold separately (see **www.teamfdi.com/USBDongle** for a complete list of available boards)
- Download all documentation and software examples at

www.teamfdi.com/USBDongle

2.2 **Power Requirements**

The USB-Dongle and Derivative Boards are powered by the USB port from the connected PC. No outside power should be needed.

2.3 Jumpers

No jumpers for hardware configuration are used.





3.0 Hardware Setup

To setup the hardware, follow these two steps.

- 1. Plug in the USB-Dongle. If this is the first time you have plugged in the device, you will need to follow the Software Installation procedure in the next section.
- 2. Plug the selected Derivative Board into J3 as shown below. The connector is keyed so the Derivative Board can only be plugged in correctly.







4.0 Software Installation

4.1 Windows XP

These instructions assume a Windows XP operating system. Different OS's may have different dialogs.

NOTE: Your specific version of Windows MAY already include drivers. If drivers are not found, please download and unzip the latest drivers from:

http://www.teamfdi.com/USBDongle/

When the USB-Dongle is plugged into the device, Windows XP will identify a device named "USBSerial" and bring up the following dialog box:

Found New Hardware Wizard				
	Welcome to the Found New Hardware Wizard Windows will search for current and updated software by looking on your computer, on the hardware installation CD, or on the Windows Update Web site (with your permission).			
	Can Windows connect to Windows Update to search for software?			
	 <u>Les</u>, and and every time I connect a device No, not this time 			
	Click Next to continue.			
	< <u>B</u> ack <u>N</u> ext > Cancel			





Select "No, not this time" and click Next. The following dialog will appear:



Click on "Install from a list or specific location (Advanced)" and click **Next**. The following dialog will appear:

Found New Har	dware Wizard
Please cho	lose your search and installation options.
⊙ <u>S</u> ean	ch for the best driver in these locations.
Use th	he check boxes below to limit or expand the default search, which includes local
paths	and removable media. The best driver found will be installed.
۲	Search removable media (floppy, CD-ROM) Include this location in the search: D:\drivers Browse Browse
C <u>D</u> on1	: search. I will choose the driver to install.
Choo:	se this option to select the device driver from a list. Windows does not guarantee that
the dr	iver you choose will be the best match for your hardware.
	< <u>B</u> ack <u>N</u> ext > Cancel

Select "Search for the best driver in these locations." and select only "Include this location in the search:". Click Browse and find the previously downloaded and unzipped directory "USB Serial Driver".





Two dialogs will appear. The one on top is this one:



Click Continue Anyway.

The following dialog will appear during the install process:

Found New Hardware Wizard	
Please wait while the wizard installs the software)
USB-Dongle	
Setting a system restore point and backing up old files in case your system needs to be restored in the future.	
< <u>B</u> ack <u>N</u> ext > Cancel	





Finally, the following dialog should appear:



The device has been installed and attached to a serial port. Follow the instructions in section 5.0 to determine the serial port.





4.2 Windows Vista

These instructions assume a Windows Vista operating system. Different OS's may have different dialogs.

NOTE: Your specific version of Windows MAY already include drivers. If drivers are not found, please download and unzip the latest drivers from:

http://www.teamfdi.com/USBDongle/

When the USB-Dongle is plugged into the device, Windows Vista will identify a device named "USB-Dongle" and bring up the following dialog box:



Select "Don't show this message again for this device", and a dialog box asking for user permission may appear, please press Continue.





Go to the start menu and select "Computer" located on the right side of the start menu to bring up "My Computer". If you are using the classic start menu, just double-click the "My Computer" on the desktop.



Select System Properties, located near the top of the window to bring up the following window.







Select "Device Manager" from the left pane under "Tasks" to pull up the device manager. A dialog box asking for user permission may appear, please press **Continue**.

🛃 Device Manager	A manhager	
<u>File Action View H</u> elp		
The Disk drives		
🖥 📲 Display adapters		
DVD/CD-ROM drives		
🖶 🚛 Human Interface Devices		
DE ATA/ATAPI controllers		
🗄 🛲 Keyboards		
Mice and other pointing devices		
Network adapters		
Porte (COM & LPT)		
Sound, video and game controllers		
E Storage controllers		
🕀 🚛 System devices		
🗄 🟺 Universal Serial Bus controllers		





Under "Other devices", right-click on "USB-Dongle" and select **Update Driver** Software.

Hov	v do you want to search for driver software?	
•	Search automatically for updated driver software Windows will search your computer and the Internet for the latest driver software for your device.	
+	B <u>r</u> owse my computer for driver software Locate and install driver software manually.	

Select "Browse my computer for driver software".

🚱 🗕 Update Driver Software - USB-Dongle		
Browse for driver software on your o	computer	
Search for driver software in this location:		
D:\drivers	+	B <u>r</u> owse
Let me pick from a list of device This list will show installed driver software software in the same category as the devi	e drivers on my comp e compatible with the devic ce.	puter ce, and all driver
		Next Cancel





Specify the location in which you downloaded and unzipped the drivers and click **Next**. Installation of the driver will begin and a warning dialog box will appear.



Select "Install this driver software anyway" and the installation will complete.

Update Driver Software - USB-Dongle (COM4)	×
Windows has successfully updated your driver software	
Windows has finished installing the driver software for this device:	
USB-Dongle	
	Close

The device has been installed and attached to a serial port. Follow the instructions in section 5.0 to determine the serial port.





5.0 Determining USB-Dongle Serial Port

NOTE: This step is VERY IMPORTANT for proper operation of the USB-Dongle with FlashMagic Software.

To determine the correct port for the USB-Dongle, go to the Windows Control Panel and open **System**. Click on tab **Hardware** and then click on **Device Manager**. You should see a similar list:



Open up "Ports (COM & LPT)" and look for a device called "USB-Dongle". Next to it is the COM port address. In the above picture, this is COM4.





5.1 Changing the COM port address

If the COM port is at an unacceptable location, right click on the device and select **Properties**. Then click on tab **Port Settings**. Finally click on **Advanced...** and the following dialog will appear:

Advanced Settings for COM4							<u>? ×</u>
Select lower settings to Select higher settings fo	ires 16550 c correct con or faster perf	ompatible UART nection problems ormance.)				OK Cancel
Receive Buffer: Low (1)	1			—Ţ	High (14)	(14)	<u>D</u> efaults
<u>T</u> ransmit Buffer: Low (1)		•		—Į	High (16)	(16)	
COM Port Number: COM4	•						J

The last field is "COM Port Number" and can be used to change the COM port to another address. NOTE: Entries marked "in use" may still be usable. Just make sure nothing else is currently listed on that COM port in the Device Manager dialog.

When a new COM Port address is selected, click **OK** and then **OK** again. Then unplug the USB-Dongle and wait until the device disappears from the Device Manager list. Now plug the USB-Dongle back in. The COM address will change to the new address.





6.0 Programming a Derivative Board with Flash Magic

Using Derivative Boards with the USB-Dongle requires the Flash Magic software from Embedded Systems Academy (**www.esacademy.com**). Make sure you are using version 3.51 or later.

If you have not already done so, plug the Derivative Board into the connector (J3) on the back of the USB-DONGLE. In this example, we'll use a DB-HVSON-LPC9103 Derivative Board to load LED blinking code into.

Open Flash Magic and put in the following settings:

🏀 Flash Magic	_ 🗆 🗙
<u>File ISP Options Tools Help</u>	
🖻 🗟 🔍 🕄 🐗 🗸 😹 🔈 🔗 🔯 🥝 😂	
Step 1 - Communications Step 2 - Erase	
COM Port: COM 4 Erase block 0 (0x0000-0x00FF)	
Baud Rate: 19200	
Device: 89LPC9103	
Interface: EDI USB-ICP	
Erase all Flash	
Step 3 - Hex File	
Hex File: USBDongle_v1.00\USBDongle_EXE\Examples\Blink\BLINK.HEX Brow	wse
Modified: Friday, March 30, 2007, 9:21:00 AM more info	
Step 4 - Options Step 5 - Start	
Verify after programming Block 0 Sec Bit 0 Start Fill unused Flash Block 0 Sec Bit 1 Start Gen block checksums Block 0 Sec Bit 2	
Execute	
Rotating, fully customizable, remotely updated Internet links. Embed them in your application! www.embeddedhints.com	

The settings should be:

Field	Setting
COM Port	COM port that USB-Dongle is in. For this example, COM4 is used.
Baud Rate	Flash Magic will forces this to be 19200
Device	89LPC9103
Interface	FDI USB-ICP
Erase	Select "Erase blocks used by Hex File"
Checkboxes	Leave all other checkboxes unchecked





Before programming the device, select ISP -> Read Device Signature and make sure the following appears:

Device Signature	×
Manufacturer ID: 0x 15	
Device ID 1: 0x DD	
Device ID 2: 0x 23	
Device ID: 0x	
Bootloader Ver:	_
Close	

If the above is correct, click **Start** to program the device. The text "Finished" should appear at the bottom.

Additionally, for the LED Blink example, use option ISP -> Device Configuration to setup these settings:

89LPC910x UCFG1	<			
Enable Watchdog Enable Reset Pin Enable Watchdog Safety Enable Brownout Detection Double Speed of Internal RC Oscillator (14.7456MHz)				
Clock: Watchdog Oscillator (400kHz +- 10%)				
Clear Config Protection Cancel Reprogram				

Click **Reprogram** to save the settings.

The device is now ready to run. Continue with the next section.





7.0 Running code on the Derivative Board

After programming, the Derivative Board will still be held in programming mode by the USB-DONGLE. To start executing the code on the Derivative Board, the character '\$' must be sent to the COM port. Do this by selecting Tools -> Terminal and the following dialog will appear:

Terminal Settings				
Port and Speed				
COM Port: COM 4 Saud Rate: 19200				
Options				
Modify default COM Port behavior:				
While connected: Deassert DTR, Deassert RTS				
🔲 Use a delay character				
Character: # generates a delay of 1000 ms				
Newlines: CR + LF				
Cancel (OK)				

Make sure the COM port is correct and click **OK**. Under "Input >>" type the single character '\$'. Looking at the Derivative Board that is attached to the USB-Dongle, the small green LED (D1) should be flashing.

When done, close Flash Magic's terminal window. Using another terminal program, open the same COM port to 110 baud and then close (FlashMagic does not support less than 2400 baud) or unplug the USB-Dongle and plug back in to reset. Reprogramming of the Derivative Board can now occur.

Once out of run mode, select the correct hex file, and click **Start**. The microcontroller on the Derivative Board will be reset and programmed as expected.





8.0 Blink Example

Used in the above example was the BLINK.HEX file. The source code to the Blink example has been included in Examples\Blink. Any appropriate 80C51 compiler should be able to compile and recreate the .hex file.

The Blink example toggles pins on P0.1 and P3.5. Delays are performed with simple loops; therefore, changing the timing of the target device will change the speed of the LED blink rate.

9.0 Communicating between Derivative Board and PC

Once the microcontroller on a Derivative Board has been programmed, communications between the PC and the Derivative Board can be established using the same COM port that the USB-Dongle is on.

To change the USB-Dongle from program mode to communications mode, send the single character '\$' to the USB-Dongle. The USB-Dongle will then act as a serial pass through between the Derivative Board and PC.

All data to and from the Derivative Board will be passed at the baud rate specified by the PC. Note that Derivative Boards may not be able to run all baud rates and may depend on target processor speed. In addition, because handshake lines are not available, buffer overflow may occur and may require software handshaking.

To take the USB-Dongle out of communications mode, change to 110 baud and then back to 19200 baud.

In the Examples folder (see website for latest), there is an Uppercase example for several of the Derivative Boards. Assuming you are using a DB-TSSOP-LPC938 with a LPC938, program the file UPPERCASE.HEX into the device. Then click on Tools -> Terminal in FlashMagic. Select the same COM port as the USB-Dongle and a baud rate of 19200. Leave all other options unchecked. Click **OK**.

Terminal Settings	×
Port and Speed	
COM Port: COM 4 Saud F	Rate: 19200 💌
Coptions	
Modify default COM Port behavior:	
While connected: Deassert DTR, Deassert	RTS 🔽
🔲 Use a delay character	
Character: # generates a delay of 1000	ms
Newlines: CR + LF	
	Cancel OK





Notice that as you type lower case characters in the input box, uppercase characters appear in the output window. Close the dialog when done.



Using another terminal program, open the COM port to 110 baud and then close (FlashMagic does not support less than 2400 baud) or unplug the USB-Dongle and plug back in to reset. Reprogramming of the Derivative Board can now occur.





10.0 Technical Support

NXP Semiconductors provides technical support for the NXP devices utilized on these boards. Please contact your local NXP sales office or Field Applications Engineer.

Technical support for the USB-Dongle and Derivative Boards is provided by Future Designs, Inc. For fastest response;

- e-mail: support@teamfdi.com
- fax: (256) 883-1241
- phone: (256) 883-1240

FDI also provides a Web site at: http://www.teamfdi.com. This web site provides the latest product information and updates for all FDI products.

FlashMagic support is provided at: **http://www.flashmagictool.com/** Check this website for the latest software version and forums for discussing problems.

11.0 General Sales and Contact Information

11.1 General Sales

Authorized sales representatives for the USB-Dongle family of products include:

Digi-Key Corporation	http://www.digikey.com	(800) 344-4539
Mouser Electronics	http://www.mouser.com	(800) 346-6873

11.2 Contact Information

The following is a list of company contact information related to the USB-Dongle Kit.

NXP Semiconductors web site: http://www.NXP.com

Future Designs, Inc web site: http://www.teamfdi.com

Embedded Systems Academy web site for FlashMagic: http://www.flashmagictool.com/

Digi-Key web site:http://www.digikey.comMouser website:http://www.mouser.com