AN10811

Programming SPI flash on EA3131 boards

Rev. 01 — 1 May 2009 **Application note**

NXP founded by Philips

Revision history

Rev	Date	Description
01	20090501	Initial version.

Contact information

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1. Introduction

The SPI programmer example provided with the Common Driver Library (CDL) can be used to program the Atmel SPI flash with bootable images. The current version of the programmer operates only in 512 byte page mode. The AT45DB321D chip used on an EA board comes from the factory in 528 byte page mode. The SPI programmer will blow the OTP fuse which controls the page mode on AT45DB321D the very first time. If your application requires 528 byte page flash devices then don't use this programmer, or modify it accordingly.
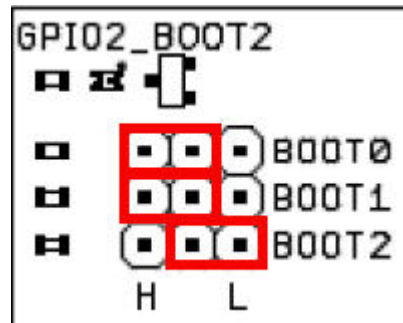
2. Configuring the EA3131 board

Fig 1 shows the EA3131 board, with the relevant settings:

1 – Boot mode jumpers

2 – USB-to-UART bridge / UART selection jumper

3 – UART / XBee selection jumper

| (1) Boot mode jumpers | (2) USB-to-UART bridge / UART selection jumpers | (3) UART / XBee selection jumpers |

Fig 1. EA3131 board jumpers
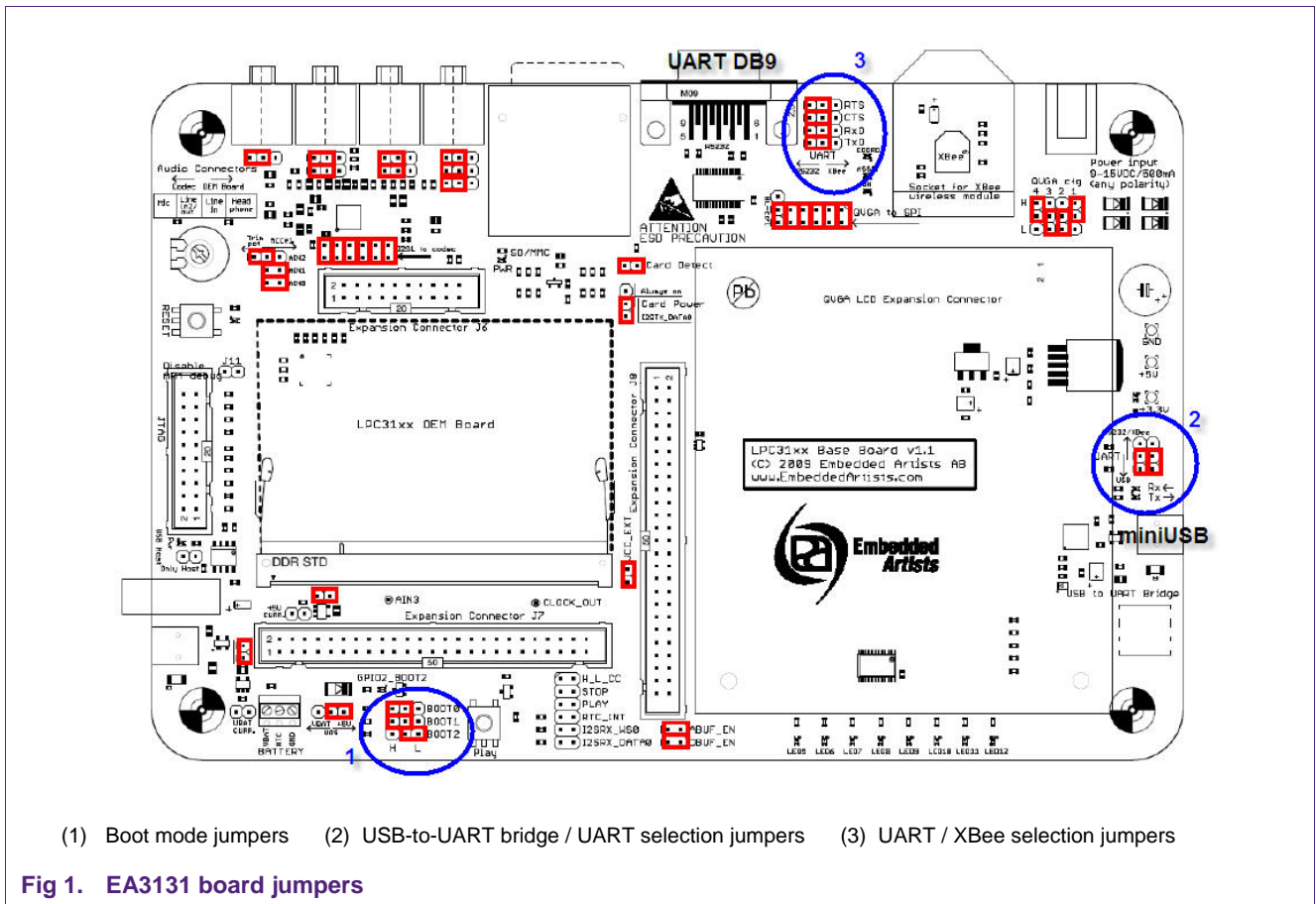
2.1 Setting the EA3131 board in UART boot mode

Set the EA board in UART boot mode (see 1 in Fig 1):

UART boot mode: Boot0 = High, Boot1 = High, Boot2 = Low

Fig 2.   Boot mode jumpers setting for UART boot mode

2.2   Configuring the serial port in EA3131 board

Two different modes can be used for the serial port:

a)   UART (DB9 connector):

In this case, J27/J29 (see 2 in Fig 1) must be set to the Upper position (RS232 position), while J28/J30/J31/J32 (see 3 in Fig 1) must be set to the Left position (RS232 position). A serial cable must be connected between the EA3131 board (DB9 connector) and the PC (serial connector).

b)   USB-to-UART bridge (mini-USB connector):

In this case, J27/J29 (see 2 in Fig 1) must be set to the Lower position (USB position). A USB cable must be connected between the EA3131 board (mini-USB connector) and the PC (USB connector). A Virtual COM driver must be installed in this case, so please refer to the EA3131 board's User Manual for specific instructions.

Note: independent of the above configuration chosen, the EA3131 board can be powered via the mini-USB or the External Power Supply connectors (or even from both connectors at the same time).

3.   Preparing the binary file

The SPI flash programmer performs a CRC check on the downloaded binary image, so it's necessary to append a CRC Header to the binary image. NXP provides the LPC313xImgCreator.exe utility for this purpose.

3.1   Using the LPC313XImgCreator

The LPC313xImgCreator utility (attached to this Application Note and also found in the tool directory if the CDL) can be used to append a CRC Header to a binary image. Fig 3 shows the options available from the utility:

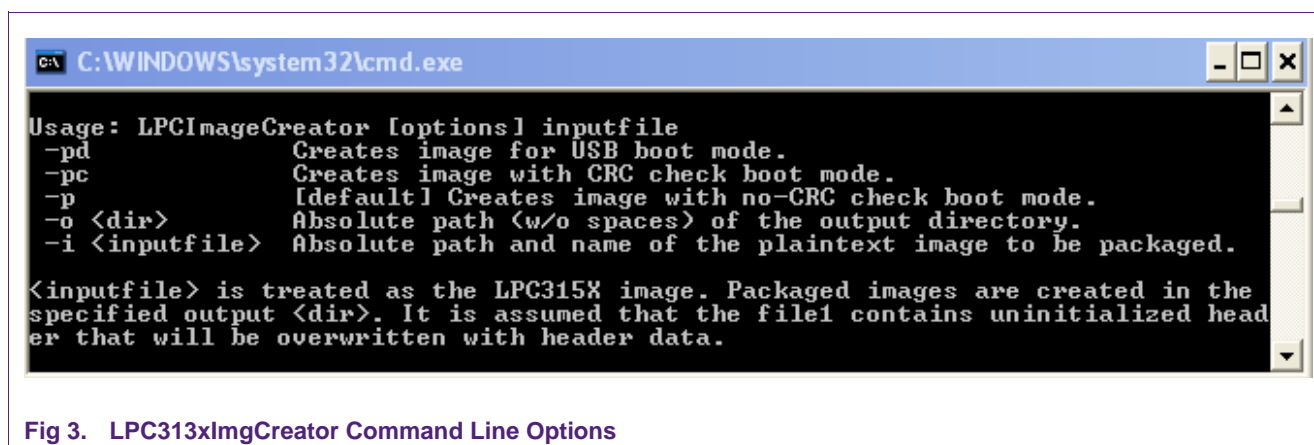**Fig 3. LPC313xImgCreator Command Line Options**

According to Fig 3, the following command will append the CRC header to the *demo.bin* image:

lpc313xImgCreator –o *path* **-pc –i** *path/filename.***bin**

and it will create a *filename.***rom** file in the specified output directory.

Notes:

1) This utility allows binary images up to 128 kB in size.

2) The current version of this utility does not overwrite the output file, so in case a previous version of the .rom file already exists, it should be manually deleted before running the utility.

4. Programming the SPI flash

4.1 Connect the EA313x board to the PC

Use a serial cable or USB cable (see section 2.2) in order to connect EA313x board to a PC.

4.2 Start a PC Terminal application program

Configure a terminal application (which should be able to transfer files in binary mode, such as TeraTerm Pro) with 115200-8-n settings. If using USB-to-serial bridge port on EA board, the appropriate Virtual COM port has to be selected. By the time USB-to-serial enumerates, the bootROM of LPC313x would have transmitted the initial string. Hence reset the board using the "reset" button after opening the terminal application.

Notes:

1) The default installation of TeraTerm Pro allows only up to COM4 ports. To increase the number of COM ports accessible by TeraTerm Pro, change the following line in TERATERM.INI (C:\Program Files\TTERMPRO):

MaxComPort=4 to MaxComPort=10

2) Don't use Hyperterminal program, because it does not provide a way to send a file as binary.

4.3 Load the programmer code

Once the EA313x board is powered and connected to the PC, reset the board. The following message should appear in the terminal window:
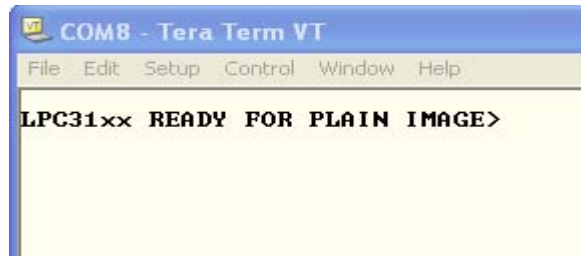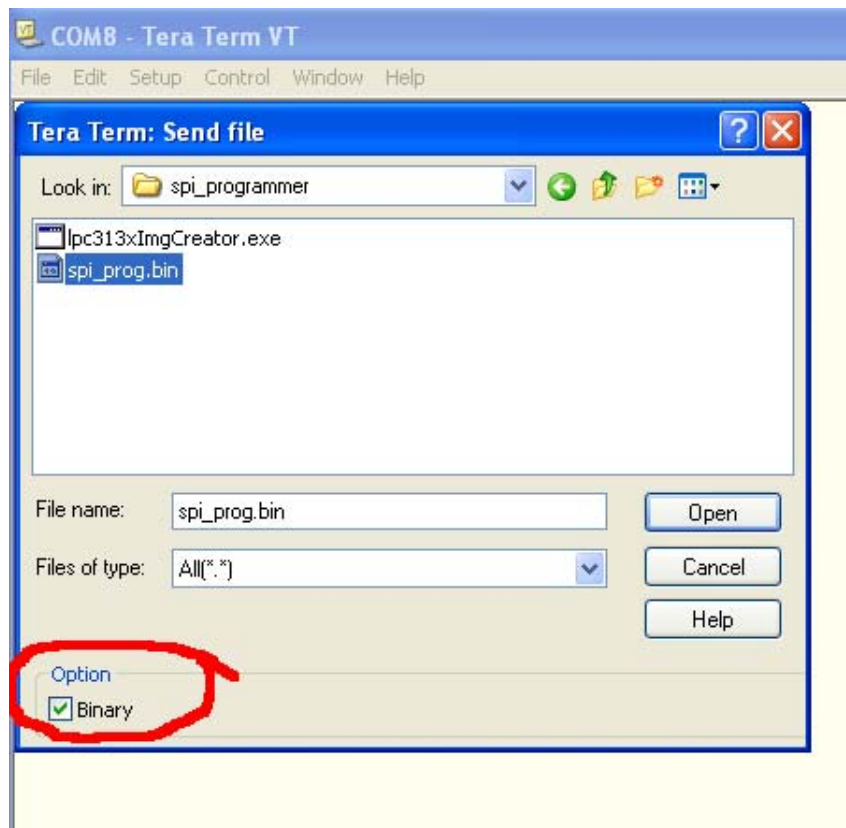

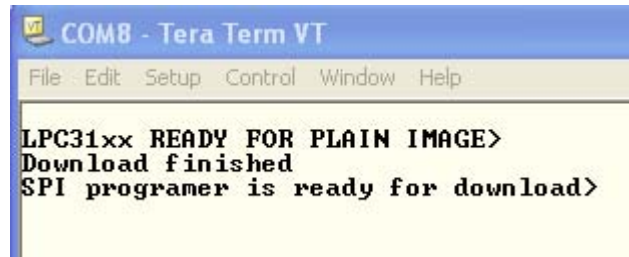**Fig 4. Initial prompt after resetting the board**

Select *File -> Send* file option from the terminal application's menu and the next screen will appear:

!!!Don't forget to check the Binary option, as the file to send is a binary image.

Fig 5. Send file selection: spi_prog.bin

Choose the "spi_prog.bin" file, check the Binary option, and press Open to start the file transfer. After download, the following message will appear:
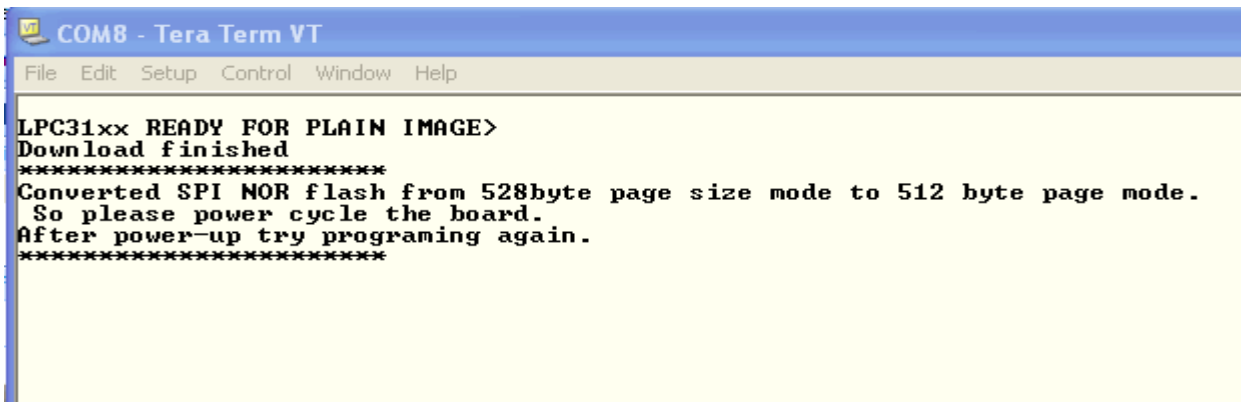
Fig 6. The spi_prog.bin file is downloaded and executing

Note: as it is stated in the introduction, the AT45DB321D chip used on EA board comes from the factory in 528 byte page mode. The SPI programmer will blow the OTP fuse which controls the page mode on AT45DB321D the very first time. Then, the first time you run the spi_prog.bin code, the following message will appear:

Fig 7. Message informing the NOR flash was converted from 528-byte page size to 512-byte page size.

Then, power cycle the board and repeat the previous procedure.

4.4 Download the user's image file

The last step is to download the actual user's image file (*.rom* file generated with lpc313xImgCreator utility). For this, select *File -> Send* file from the menu, choose the user's image file, check the Binary option (if it's not already checked) and press the Open button in order to start the download process. An example binary (timer_example_crc.rom) is attached to the application note to test this procedure. When finished, the following message should appear:
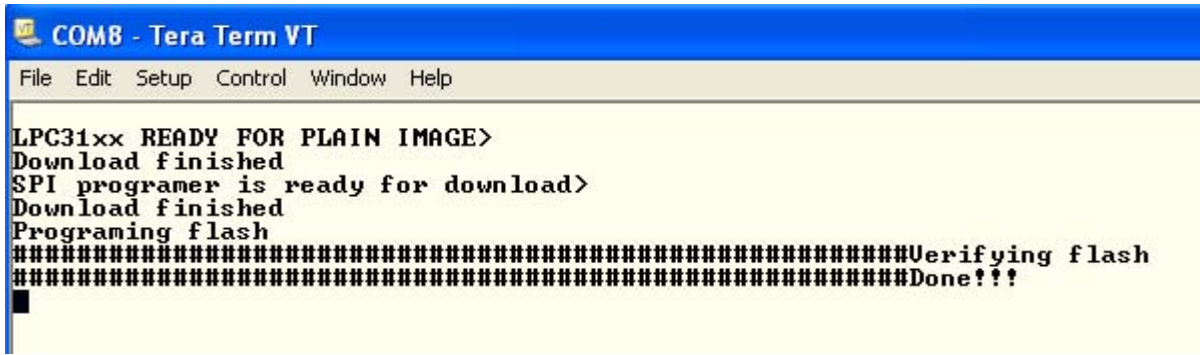
Fig 8. Message once the user's image was programmed into the SPI flash

At this point, the SPI flash is programmed with the user's image.
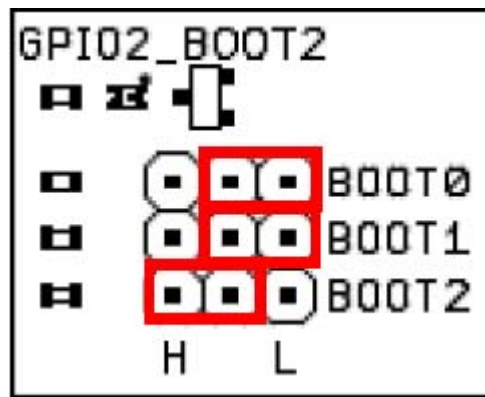
Note: The spi_prog.bin file is attached to this Application Code, and its source code can be found in the Common Driver Library, at the following directory:

C:\nxpmcu\Software\csps\lpc313x\bsps\ea3131\examples\spi_prog

5. Booting from the SPI flash

The last step is to configure the Boot mode jumpers for SPI flash boot mode and reset the board.

5.1 Setting the EA313x board for SPI flash boot mode

SPI flash boot mode: Boot0 = Low, Boot1 = Low, Boot2 = High

Fig 9. Boot mode jumpers setting for SPI NOR Flash boot mode

Once the SPI flash boot mode is set, and after resetting the board, the lpc313x will boot from the SPI flash.

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