

## ***Using the TI TUSBxxxx EEPROM Programmer***

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### **ABSTRACT**

This document provides details on using the TI TUSBxxxx EEPROM Programmer software used with TUSB3210, TUSB3410, TUSB5052 and TUSB6250 based devices. The software is a Windows-based tool allowing in-circuit programming of I<sup>2</sup>C EEPROMs via the Universal Serial Bus (USB).

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## **1 Overview**

The TI TUSBxxxx EEPROM Programmer is a windows based application allowing EEPROMs to be programmed, in-circuit, via the Universal Serial Bus (USB) with TUSB3210, TUSB3410, TUSB5052 and TUSB6250 based boards.

In addition to the EEPROM programmer software, a header generator utility must also be executed in order to create the proper file to load to the EEPROM.

The term 'EEPROM burner' is equivalent to 'TI TUSBxxxx EEPROM programmer.'

Windows 2000, Windows are trademarks of Microsoft Corporation in the United States and/or countries.  
Windows XP is a trademark of Microsoft Corporation in the United States and/or other countries.

## 2 Required Equipment

The following is required in order to use the EEPROM programmer software:

1. TUSB3210, TUSB3410, TUSB5052 or TUSB6250 based board, with the ability to disable a programmed EEPROM if multiple erasures/re-programs are required. Disabling a programmed EEPROM is required to allow the board to use the default USB descriptor information stored in the device's boot ROM (which is required by the EEPROM programmer software) rather than using the USB descriptor information currently stored in a programmed EEPROM.  
Disabling the EEPROM can be accomplished with a removable jumper on the SCL terminal of the I<sup>2</sup>C EEPROM. The TUSB3410UART EVM has a jumper (JP2) which allows the EEPROM to be enabled/disabled.
2. 400-kHz I<sup>2</sup>C EEPROM (see Appendix A for acceptable devices)
3. USB interface Cable (Type A connector to Type B connector)
4. PC running Windows XP™ or Windows 2000™. This software will not run on Windows™ 9x machines.

## 3 Header Generator Utility

The header generator utility is a DOS program that generates a vendor specific EEPROM image. TUSB3410 header generator utilities exist for both virtual communication port (VCP) applications and general purpose applications. The appropriate header generator utility should be used. Both header generator utilities can be downloaded, as \*.zip files, from <http://focus.ti.com/docs/prod/folders/print/tusb3410.html>.

The header generator utility for the TUSB6250 can be downloaded from <http://focus.ti.com/docs/prod/folders/print/tusb6250.html>, Texas Instruments USB I<sup>2</sup>C Header Generator Utility for the TUSB6250 (sllc250.zip).

The header generator utility for the other devices can be downloaded from <http://focus.ti.com/docs/prod/folders/print/tusb3210.html>, USB I<sup>2</sup>C Header Generator Utility for General Purpose Applications (Rev. D) (sllc152D.zip).

The header generator utility expects a configuration file (\*.cfg) as input. This configuration file defines the EEPROM image contents and contains vendor specific details, such as the vendor ID / product ID reported by the USB device to the host.

The header generator for the TUSB6250 requires, as input, a compiler output hex file in addition to the configuration file. A compiler output binary or hex file is optional when using the TUSB3410 header generator utility.

The output of the header generator utility is an EEPROM image file (either \*.bin or \*.hex) with the same name as the configuration file.

A batch file is used to operate the header generator application. See the read-me file that is part of the header generator utility. Sample configuration files (\*.cfg) are also included to be used as a template.

## 4 Installing the EEPROM Programmer Software

### 4.1 Extract EEPROM Programmer Files

The first step in installing the EEPROM programmer software is to extract the files from the zip file. Make sure that the directory structure is left intact when extracting.

## 4.2 Preparing the PC for the EEPROM Programmer Software Installation

The PC where the EEPROM programmer software is to be installed must have all other application using the TUSB3210, TUSB3410, TUSB5052, or TUSB6250 devices removed prior to running the installation/setup program for the TI TUSBxxxx EEPROM Programmer.

Removing all TUSB6250 or TUSB3410 applications is accomplished by using the Control Panel and selecting *Add/Remove Programs*. Scroll down to the applicable TUSBxxxx application and select *Change/Remove*.

## 4.3 Running the Setup Program

Once the files are extracted, run the setup.exe file located within the DISK1 directory. Installshield will guide you through the pre-installer installation process. The pre-installer copies files to the correct places for the 'Found New Hardware Installer' process that occurs once the TUSBxxxx based USB device is connected.

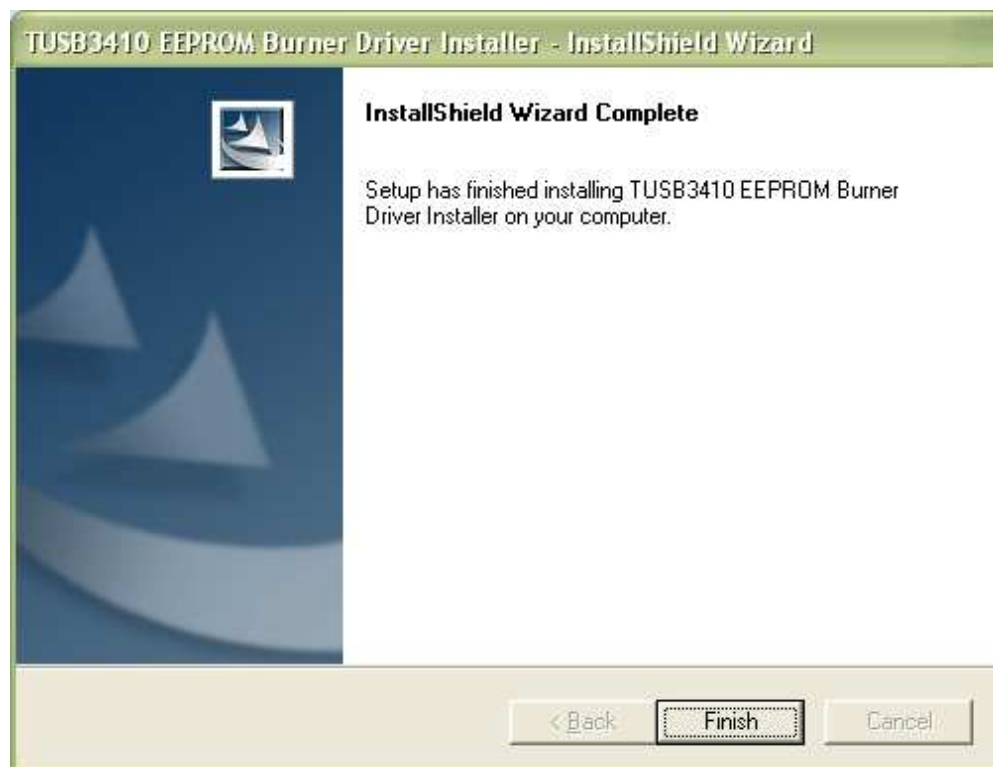
For this example, the TUSB3410 EEPROM programmer software is installed and the target machine is a Window XP system. The installation on a Windows 2000 system is very similar.

When prompted, press *Continue Anyway* when the dialog boxes indicating the software has not passed Windows Logo Testing appear. This will occur twice. TI has not submitted this software for Windows certification. The software has been proven robust after extensive use within TI and in the field. See [Figure 1](#).



**Figure 1. Windows Logo Testing Dialog Box**

Press *Finish* when the install shield indicates the EEPROM Burner driver installer is complete. See [Figure 2](#).



**Figure 2. TUSB3410 EEPROM Burner Driver Installer Complete**

#### **4.4 Connecting the TUSBxxxx Based Hardware**

The process of installing the EEPROM programmer actually installs two drivers. The first driver installed is the firmware loader. The second driver is the EEPROM Programmer driver. Therefore, the Found New Hardware wizard will occur twice.

With no EEPROM installed, a blank EEPROM installed, or with the EEPROM disabled, attach the USB cable between the TUSB3210, TUSB3410, TUSB5052 or TUSB6250 based hardware and the PC.

The PC will indicate it found new hardware and display the Found New Hardware Wizard. In this case the TUSB3410-based hardware was connected and the PC reported the TI TUSB3410 EEPROM Burner Firmware Loader. Select *Install the software automatically (Recommended)* and press *Next>*. See [Figure 3](#).



Figure 3. Found New Hardware – Firmware Loader

Press *Continue Anyway* in the dialog box indicating that the software for the TI TUSB3410 EEPROM Burner Firmware Loader has not passed Windows logo testing. TI has not submitted this software for Windows certification. The software has been proven robust after extensive use within TI and in the field. See [Figure 4](#).



Figure 4. Windows Logo Testing Dialog Box

Press *Finish* in the dialog box indicating the EEPROM Burner Firmware Loader installation has completed. See [Figure 5](#).



**Figure 5. EEPROM Burner Firmware Loader Complete**

The Found New Hardware Wizard will occur a second time. This time it will install the driver for the EEPROM burner. Select *Install the software automatically (Recommended)* and press *Next>*. See [Figure 6](#).





Figure 6. Found New Hardware – EEPROM Burner

Press *Continue Anyway* in the dialog box indicating that the software for the TI TUSB3410 EEPROM Burner has not passed Windows logo testing. TI has not submitted this software for Windows certification. The software has been proven robust after extensive use within TI and in the field See [Figure 7](#).



Figure 7. Windows Logo Testing Dialog Box

Press *Finish* when the EEPROM Burner installation has completed. See [Figure 8](#).



**Figure 8. EEPROM Burner Software Installation Complete**

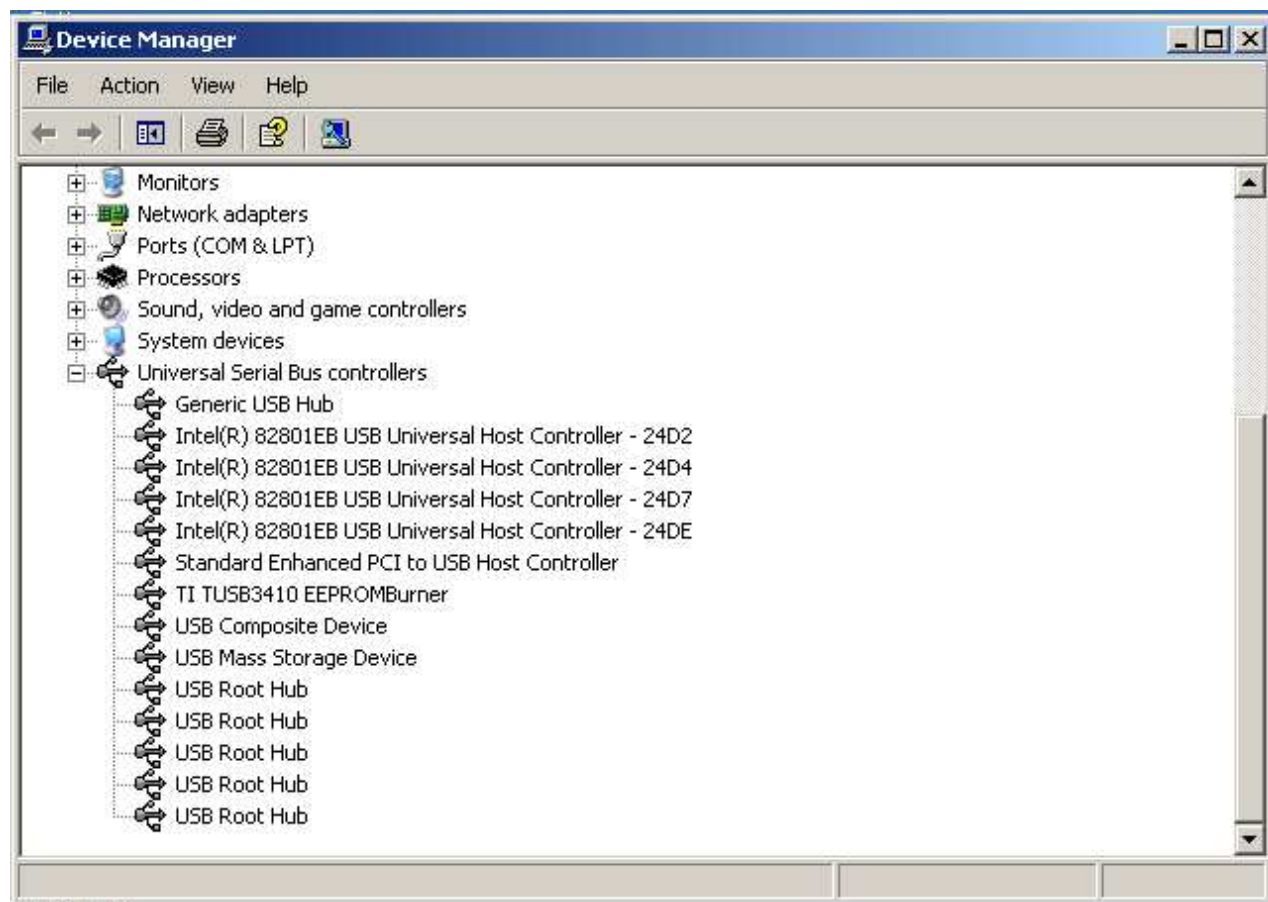
The new hardware is installed and ready for use. A shortcut for the EEPROM programmer application should be present on the desktop.

## **5 Using the EEPROM Programmer**

### **5.1 Connecting the Hardware and Verifying EEPROM Burner is Recognized**

1. Disconnect the USB interface cable.
2. If no EEPROM is present, install a blank EEPROM and go to step 4. If a blank EEPROM is installed, proceed to step 4.
3. If a programmed EEPROM is present and TUSB3410-based hardware is used, disable the EEPROM so that it does not use the descriptor information stored in the EEPROM. The EEPROM programmer software only associates with the hardware if the default USB descriptors stored in the TUSB3410 boot ROM are reported. When using the TUSB3410UART EVM, this is accomplished by removing the jumper at JP2, disconnecting the serial clock to the I<sup>2</sup>C EEPROM device.
4. Re-connect the USB interface cable.
5. *Optional step:* Verify the PC recognizes the TUSB3410 or TUSB6250 based hardware (audible sounds). Using device manager, verify that the EEPROM programmer is present:  
Start → settings → Control Panel → System → Hardware tab → Device Manager
6. *Optional step:* Scroll down to the Universal Serial Bus Controllers and press + to show the TI TUSB3410 EEPROM Burner when TUSB3410 based hardware is connected. See [Figure 9](#).





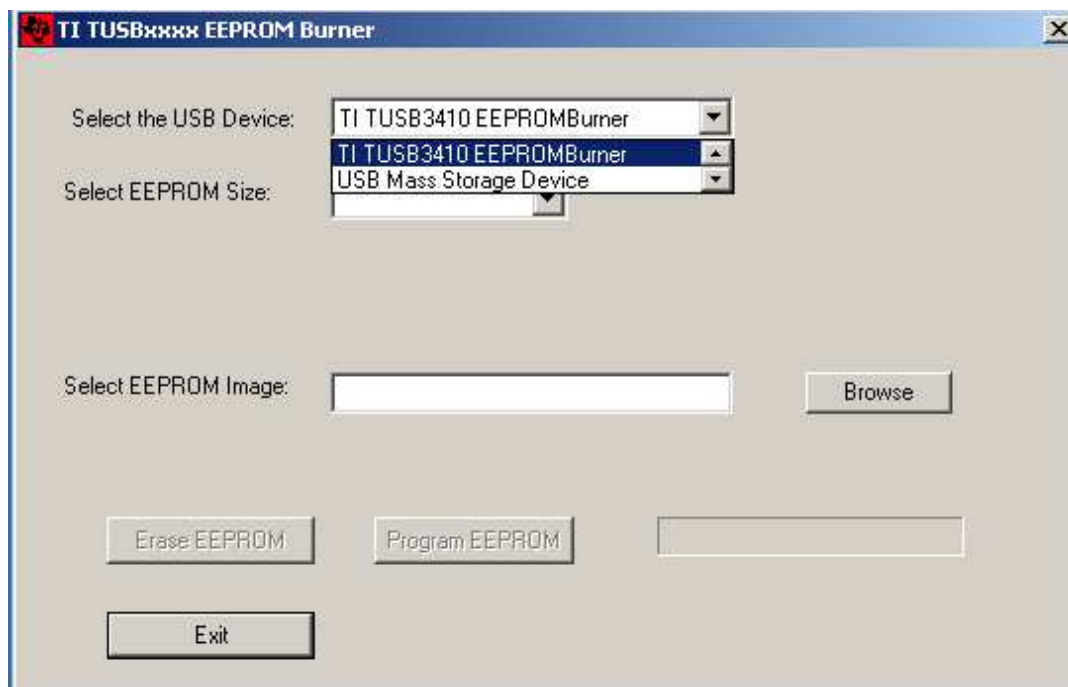
**Figure 9. Device Manager Showing EEPROM Burner**

## 5.2 Running the EEPROM Programmer Application

The EEPROM programmer application can be executed by double clicking on the EEPROM Burner Icon on the desktop or from the START menu:

Start → Programs → Texas Instruments → TUSB3410 EEPROM Burner Driver Installer → TUSB3410 EEPROM Burner Application

For this example, the TUSB3410-based hardware is present and the TUSB3410 EEPROM programmer is used. For the USB device, select the TUSB3410 EEPROMBurner. See [Figure 10](#).



**Figure 10. EEPROM Programmer Application**

In order to program or erase the EEPROM

- The EEPROM must be installed on the board
- The EEPROM must be enabled after the USB interface cable is connected and the USB hardware is recognized. This is accomplished by installing the shunt on JP2 when using the TUSB3410UART EVM.
- The EEPROM must not be hardware write protected. The WP terminal on the device should be pulled low, enabling reading/writing to the entire memory. Some EEPROM devices contain an internal pull-down resistor on the WP terminal allowing the terminal to be left floating.

### 5.2.1 Erasing the EEPROM

The steps to erase an EEPROM are:

1. Verify an EEPROM is installed, enabled and not write protected. The WP terminal on the device should be pulled low, enabling reading/writing to the entire memory. Some EEPROM devices contain an internal pull-down resistor on the WP terminal allowing the terminal to be left floating.
2. Select the EEPROM size.
3. Press the *Erase EEPROM* button.
4. The erasure is successful if the dialog box in [Figure 11](#) is displayed. Press *OK*.



**Figure 11. EEPROM Successfully Erased**

If the EEPROM is not installed or the EEPROM is not enabled, the application reports the message shown in [Figure 12](#). Press *OK*.



**Figure 12. EEPROM Erase Failure**

To resolve the error, perform the following steps:

1. Remove the USB cable from the hardware. Exiting the EEPROM programmer application is not necessary.
2. Install an EEPROM, re-install the USB cable
3. Enable the EEPROM after the USB device is detected (for the TUSB3410UART EVM JP2 would be installed after the USB hardware is recognized)
4. Verify the device is not hardware write protected.
5. Re-select the USB device and press the *Erase EEPROM* button.

### 5.2.2 Programming the EEPROM

Prior to programming an EEPROM, it is not necessary to erase it. The EEPROM programmer software **does not** verify the memory contents after programming.

The steps to programming an EEPROM are:

1. Using the appropriate header generator utility, generate a valid EEPROM image.
2. Verify that the EEPROM is installed, enabled and not write protected. The WP terminal on the device should be pulled low, enabling reading/writing to the entire memory. Some EEPROM devices contain an internal pull-down resistor on the WP terminal allowing the terminal to be left floating.
3. Select the EEPROM size
4. Select the EEPROM image by navigating to the directory where the file exists using the browse button and selecting the correct file format (either \*.bin or \*.hex).
5. Press the *Program EEPROM* button.
6. The programming is successful if the message shown in [Figure 13](#) is displayed. Press *OK*.



**Figure 13. EEPROM Program Success**

If the EEPROM is not installed, is disabled or is write protected, the application reports the message shown in [Figure 14](#). Press *OK*.



**Figure 14. EEPROM Program Failure**

To resolve the error, perform the following steps:

1. Remove the USB cable from the hardware. Exiting the EEPROM programmer application is not necessary.
2. Install an EEPROM and re-install the USB cable.
3. Verify the EEPROM is not hardware write protected.
4. Re-install the USB cable and then enable the EEPROM after the USB device is detected (for the TUSB3410UART EVM JP2 would be installed after the USB hardware is recognized).
5. Re-select the USB device in the EEPROM burner application and press the *Program EEPROM* button.

## 6 References

1. *Texas Instruments USB I2C Header Generator Utility for VCP Applications* ([SLLC251](#))
2. *USB I2C Header Generator Utility for General Purpose Applications* ([SLLC152](#))
3. *TUSB3410UART EVM User's Guide* ([SLLU043](#))
4. *USB-to-Serial Port Controller Data Sheet* ([SLLS519](#))
5. *VIDs, PIDs and Firmware: Design Decisions When Using TI USB Device Controllers* ([SLLA154](#))
6. *USB 2.0 to ATA/ATAPI Bridge Controller Data Sheet* ([SLLS535](#))
7. *Texas Instruments USB I2C Header Generator Utility for the TUSB6250* ([SLLC250](#))

## Appendix A Suggested I<sup>2</sup>C EEPROMs

Recommended I<sup>2</sup>C EEPROMs are shown in [Table A-1](#). EEPROMs that are capable of operating at 400 kHz and 3.3 V should be used. The TUSB6250 requires a device of at least 256K bits.

**Table A-1. Recommended I<sup>2</sup>C EEPROMs<sup>(1)(2)</sup>**

# Bits	Microchip	Atmel	Catalyst	ST Micro
2K	24LC02B	See <sup>(3)</sup>	See <sup>(3)</sup>	See <sup>(3)</sup>
4K	24LC04B	See <sup>(3)</sup>	See <sup>(3)</sup>	See <sup>(3)</sup>
8K	24LC08B	See <sup>(3)</sup>	See <sup>(3)</sup>	See <sup>(3)</sup>
32K	24LC32A	AT24C32A	CATFC32	M24C32
64K	24LC64	AT24C64A	CAT24FC64	M24C64
128K	24LC128	AT24C128	CAT24AC128	M24128
256K	24LC256	AT24C256	CAT24FC256	M24256
512K	24LC512	AT24C512	—	—

<sup>(1)</sup> 16K bit EEPROMs will not work with the TUSB3410.

<sup>(2)</sup> Special attention should be paid to the manufacturer's recommendations for configuring the write protect terminal.

<sup>(3)</sup> Due to a bug in the TUSB3410 boot code, these devices should not be used.