TUSB926x Flash Burner

User's Guide

Literature Number: SLLU125D
August 2010–Revised October 2013

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Introduction

This document provides details on using the Flash Burner software with TUSB926x based devices. The software is a Windows-based tool allowing in-circuit programming of the SPI Flash via the universal serial bus (USB). A valid firmware file is necessary to properly use the TUSB926x device as a USB 3.0 to SATA bridge.

The term Flash Burner is equivalent to TUSB926x Flash Burner or Re-Programmer.

1.1 Reference Material

All materials referenced by this user's guide are on the TUSB926x Program Management and Design SharePoint sites, if not available from any external public source.

1.2 Definitions

The following are useful definitions for reference:

- BOT – Bulk-only transfer
- FW – Firmware
- GUI – Graphical user interface
- HID – Human interface device
- SCSI – Small computer system interface
- SPI – Serial peripheral interface
- UAS – USB-attached SCSI
- VID – Vendor ID
- PID – Product ID

1.3 Required Equipment

The following equipment is required to use the Flash Burner software:

- TUSB926x EVM board
- SPI Flash device (see Figure 5-1 to verify supported Op-codes)
- USB interface Cable (Type A connector to Type B connector)
- PC that runs Windows XP™, or higher (32-bit or 64-bit) operating system (OS)
- TUSB926x firmware version 0.95 or greater

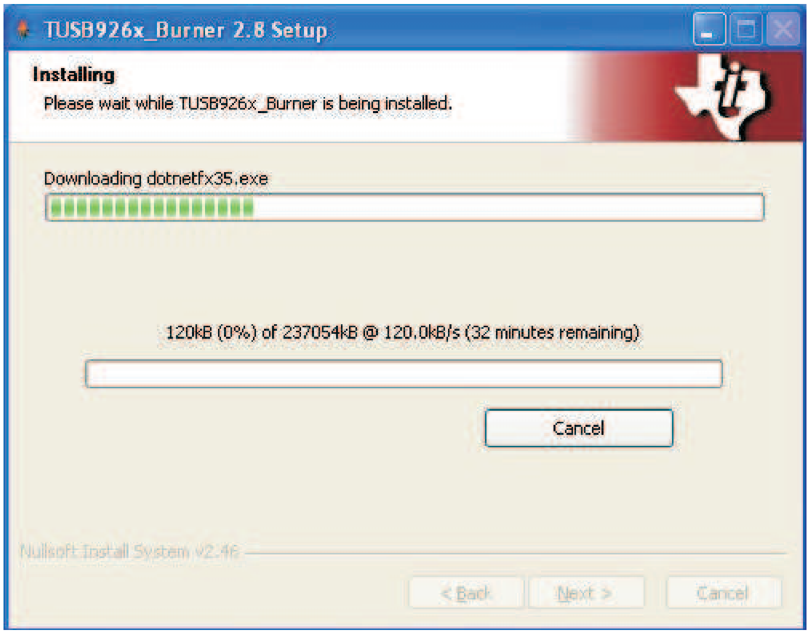
Windows is a trademark of Microsoft.
Windows XP, Microsoft .NET Framework 3.5, Microsoft, Windows are trademarks of Microsoft Corporation.

Installing the Flash Burner Software

2.1 Running the Setup Program

Extract the setup program on the preferred directory. Run the setup.exe file. The InstallShield Wizard guides the user through the installation process.

The Flash Burner program requires Microsoft .NET Framework 3.5™. The installer downloads and installs this framework version, if it is not present on the system. Ensure a proper internet connection because the installation is performed by a web download directly from the Microsoft™ website (see Figure 2-1).



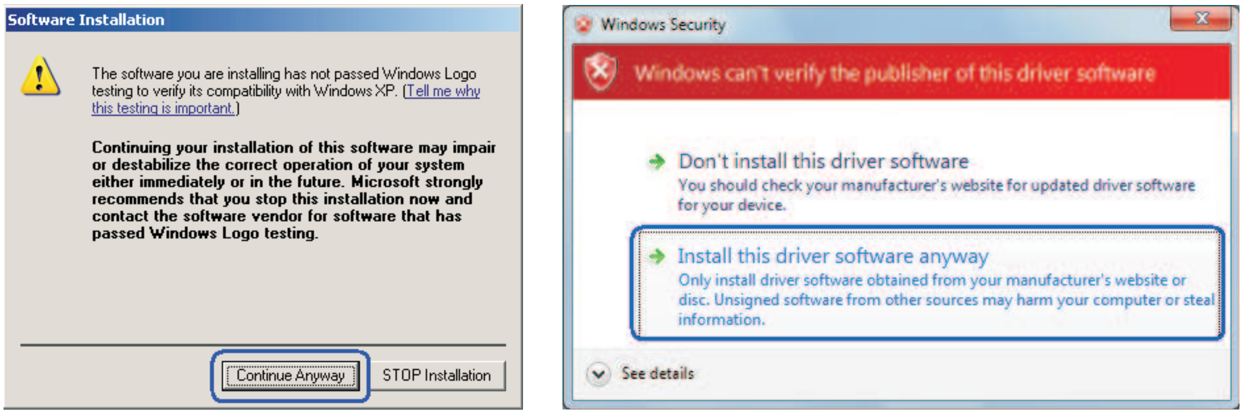
Please wait while TUSB926x_Burner is being installed.

Downloading dotnetfx35.exe

120kB (0%) of 237054kB @ 120.0kB/s (32 minutes remaining)

Figure 2-1. .NET Framework 3.5 Installation

After the .NET validation finishes, the installer copies the necessary files to the local disk and executes a driver co-installer, which installs the “FlashBurner” driver in the system. Depending on the system settings, a caution message or security window may appear during the driver installation process. When prompted, accept the driver installation as shown in Figure 2-2 and Figure 2-3.



Software Installation

The software you are installing has not passed Windows Logo testing to verify its compatibility with Windows XP. (Tell me why this testing is important.)

Continuing your installation of this software may impair or destabilize the correct operation of your system either immediately or in the future. Microsoft strongly recommends that you stop this installation now and contact the software vendor for software that has passed Windows Logo testing.

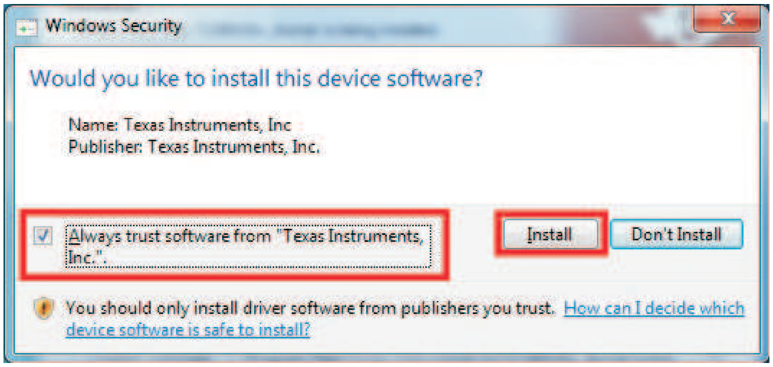
Windows Security

Windows can't verify the publisher of this driver software

Don't install this driver software
You should check your manufacturer's website for updated driver software for your device.

Install this driver software anyway
Only install driver software obtained from your manufacturer's website or disc. Unsigned software from other sources may harm your computer or steal information.

Figure 2-2. Driver Installation Caution Examples



Windows Security

Would you like to install this device software?

Name: Texas Instruments, Inc
Publisher: Texas Instruments, Inc.

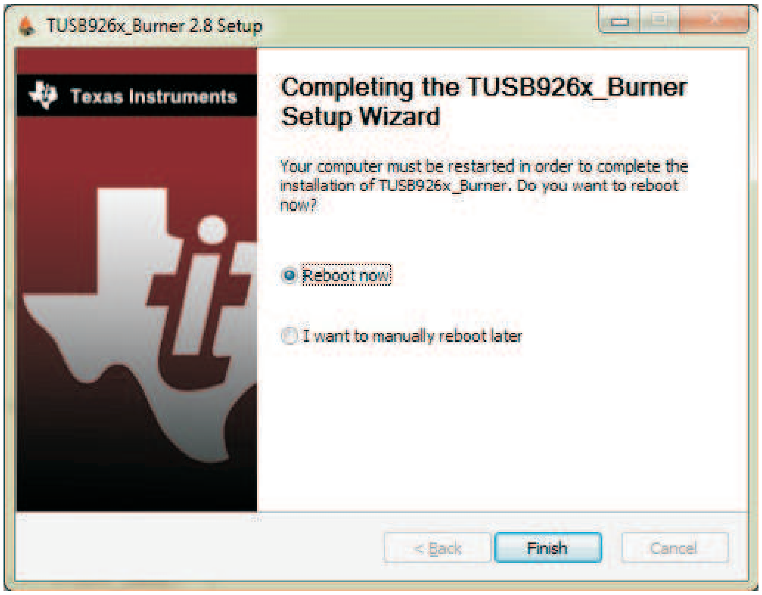
☑ Always trust software from "Texas Instruments, Inc.".

You should only install driver software from publishers you trust. How can I decide which device software is safe to install?

Figure 2-3. Security Example for Windows™

After all the necessary files have been copied into the system, the installer gives the option to restart the system to properly update the files.

TI recommends to choose “Reboot now” and click Finish when the installer wizard indicates the Flash Burner software installation is complete (see Figure 2-4).



TUSB926x_Burner 2.8 Setup

Completing the TUSB926x_Burner Setup Wizard

Your computer must be restarted in order to complete the installation of TUSB926x_Burner. Do you want to reboot now?

● Reboot now

○ I want to manually reboot later

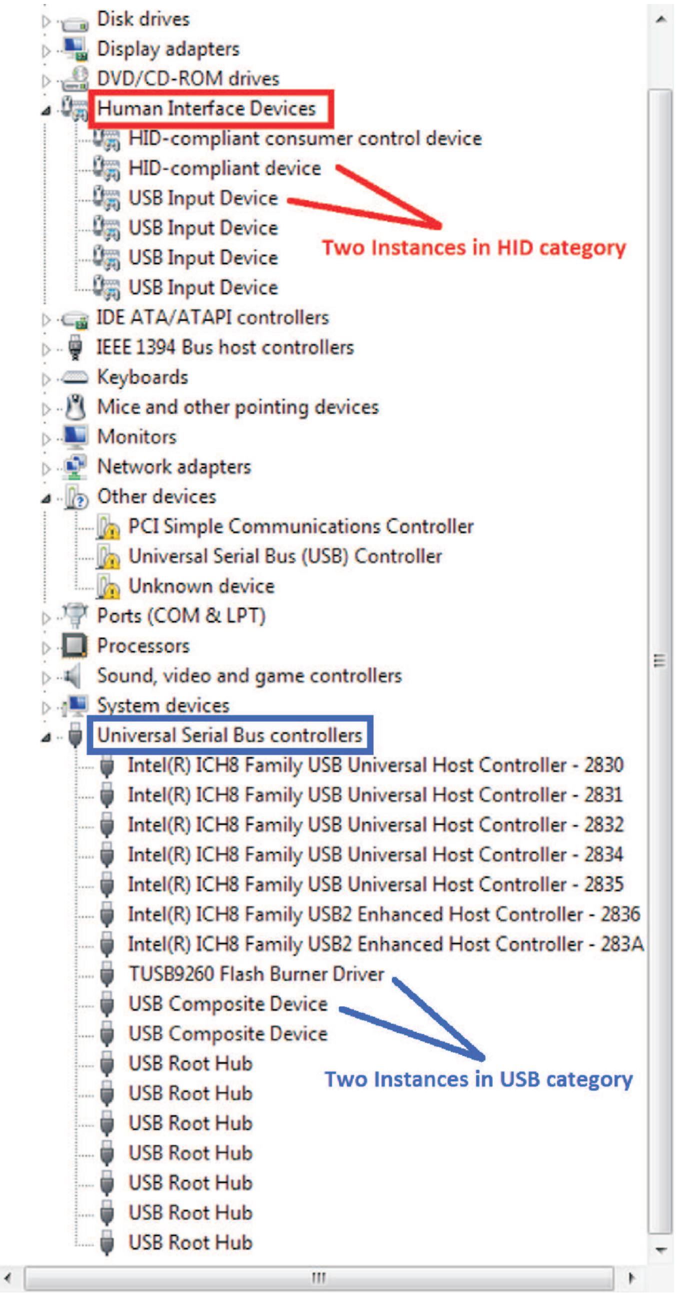
Figure 2-4. Software Installation Completed

2.2 Connecting the TUSB926x Based Hardware

Connect the TUSB926x EVM board to any USB port available on the PC.

The OS enumerates the TUSB926x EVM board in different ways, which depend on the content of the SPI Flash of the device:

1. Blank or SPI Flash not connected (see Figure 2-5)
2. HID-enabled firmware (see Figure 2-6)
3. Mass-storage-only (no HID) (see Figure 2-7)

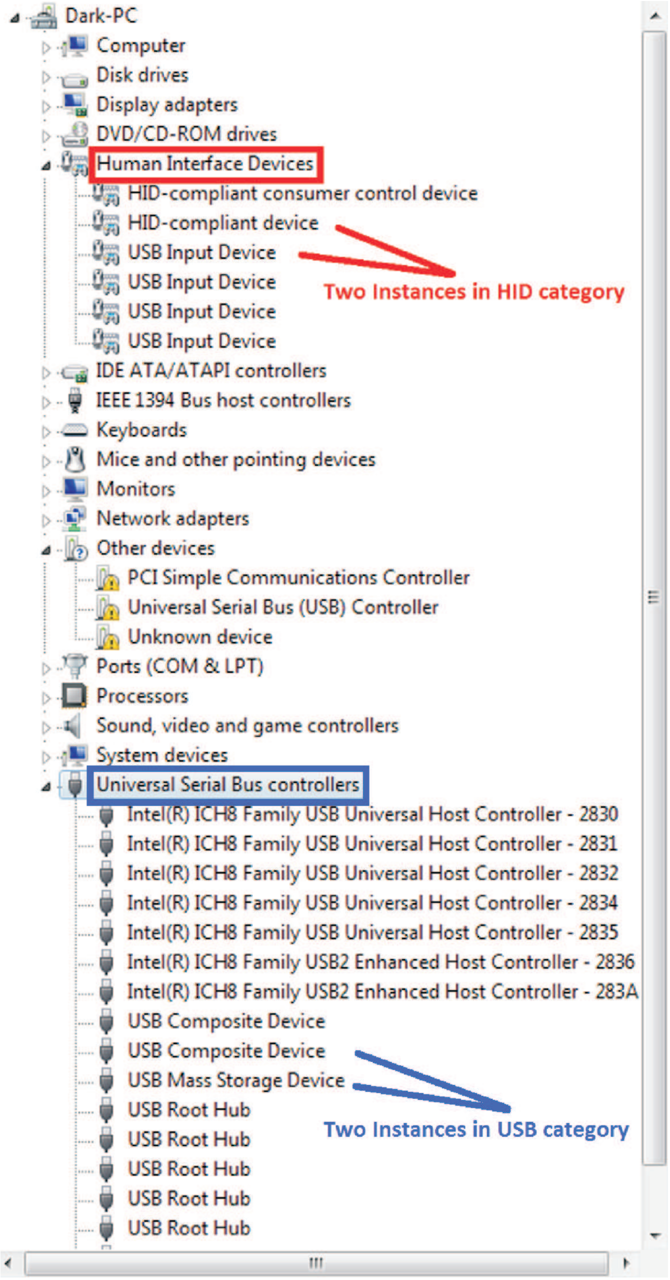


```
Disk drives
Display adapters
DVD/CD-ROM drives
Human Interface Devices
    HID-compliant consumer control device
    HID-compliant device
    USB Input Device
    USB Input Device
    USB Input Device
    USB Input Device
IDE ATA/ATAPI controllers
IEEE 1394 Bus host controllers
Keyboards
Mice and other pointing devices
Monitors
Network adapters
Other devices
    PCI Simple Communications Controller
    Universal Serial Bus (USB) Controller
    Unknown device
Ports (COM & LPT)
Processors
Sound, video and game controllers
System devices
Universal Serial Bus controllers
    Intel(R) ICH8 Family USB Universal Host Controller - 2830
    Intel(R) ICH8 Family USB Universal Host Controller - 2831
    Intel(R) ICH8 Family USB Universal Host Controller - 2832
    Intel(R) ICH8 Family USB Universal Host Controller - 2834
    Intel(R) ICH8 Family USB Universal Host Controller - 2835
    Intel(R) ICH8 Family USB2 Enhanced Host Controller - 2836
    Intel(R) ICH8 Family USB2 Enhanced Host Controller - 283A
    TUSB9260 Flash Burner Driver
    USB Composite Device
    USB Composite Device
    USB Root Hub
    USB Root Hub
    USB Root Hub
    USB Root Hub
    USB Root Hub
    USB Root Hub
    USB Root Hub
```

Two Instances in HID category

Two Instances in USB category

Figure 2-5. TUSB926x Device Instances With Blank or SPI Flash Not Connected

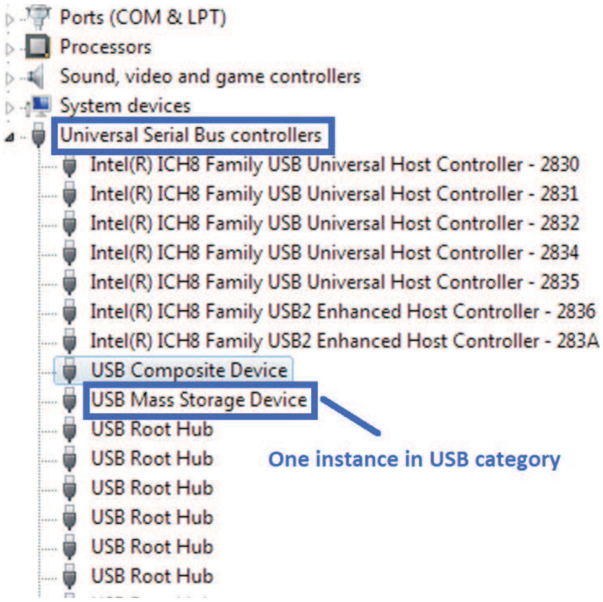


- Dark-PC
  - Computer
  - Disk drives
  - Display adapters
  - DVD/CD-ROM drives
  - Human Interface Devices
    - HID-compliant consumer control device
    - HID-compliant device
    - USB Input Device
    - USB Input Device
    - USB Input Device
    - USB Input Device
  - IDE ATA/ATAPI controllers
  - IEEE 1394 Bus host controllers
  - Keyboards
  - Mice and other pointing devices
  - Monitors
  - Network adapters
  - Other devices
    - PCI Simple Communications Controller
    - Universal Serial Bus (USB) Controller
    - Unknown device
  - Ports (COM & LPT)
  - Processors
  - Sound, video and game controllers
  - System devices
  - Universal Serial Bus controllers
    - Intel(R) ICH8 Family USB Universal Host Controller - 2830
    - Intel(R) ICH8 Family USB Universal Host Controller - 2831
    - Intel(R) ICH8 Family USB Universal Host Controller - 2832
    - Intel(R) ICH8 Family USB Universal Host Controller - 2834
    - Intel(R) ICH8 Family USB Universal Host Controller - 2835
    - Intel(R) ICH8 Family USB2 Enhanced Host Controller - 2836
    - Intel(R) ICH8 Family USB2 Enhanced Host Controller - 283A
    - USB Composite Device
    - USB Composite Device
    - USB Mass Storage Device
    - USB Root Hub
    - USB Root Hub
    - USB Root Hub
    - USB Root Hub
    - USB Root Hub

Two Instances in HID category

Two Instances in USB category

Figure 2-6. TUSB926x Device Instances on HID-Enabled Firmware



Ports (COM & LPT)
Processors
Sound, video and game controllers
System devices
Universal Serial Bus controllers
Intel(R) ICH8 Family USB Universal Host Controller - 2830
Intel(R) ICH8 Family USB Universal Host Controller - 2831
Intel(R) ICH8 Family USB Universal Host Controller - 2832
Intel(R) ICH8 Family USB Universal Host Controller - 2834
Intel(R) ICH8 Family USB Universal Host Controller - 2835
Intel(R) ICH8 Family USB2 Enhanced Host Controller - 2836
Intel(R) ICH8 Family USB2 Enhanced Host Controller - 283A
USB Composite Device
USB Mass Storage Device
USB Root Hub
USB Root Hub
USB Root Hub
USB Root Hub
USB Root Hub
USB Root Hub

One instance in USB category

Figure 2-7. TUSB926x Device Instances on Mass-Storage-Only (No HID) Firmware

Flash Burner GUI description

3.1 HID Interface

The Flash Burner GUI can interact directly with the TUSB926x device using a set of HID reports. Each HID report instructs the boot loader or firmware in the device to perform a specific task.

- **USB_HID_SETUP_DOWNLOAD_DATA**

  This report prepares the device for a data download. After issuing this HID call, the data sends to the device through a bulk transfer to the USB endpoint 2 of the device. The Flash Burner GUI achieves this transfer through an IOCTL call using the TUSB926x Flash Burner driver, which is installed along with the Flash Burner utility. The data contains the device descriptors and firmware formatted as represented in Figure 3-1.

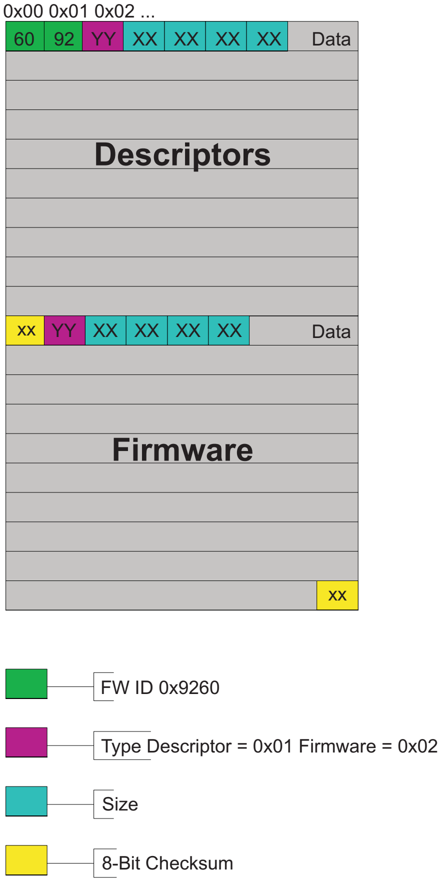


Figure 3-1. Descriptors and Firmware Location

Only the boot loader device supports this HID report.

- **USB_HID_RESET_FLASH_BURNER_DEVICE**

  This report instructs the device to perform a soft reset. Both the Boot Loader and the firmware support this HID report.
- **USB_HID_POISON_FLASH**

  This report instructs the boot loader to erase the content of the SPI Flash. Only the firmware supports this HID report.
- **USB_HID_ENABLE_REPROGRAM**

  This report prepares a device that already has firmware to be re-programmed. Only the firmware supports this HID report.
- **USB_HID_IS_FLASH_PRESENT**

  This report helps the user determine whether the device has an SPI Flash or not. Only the boot loader supports this HID call.
- **USB_HID_GET_FIRMWARE_VERSION**

  Through this report, the user can determine the current firmware version operating in our device. Only the firmware supports this HID report.

Table 3-1 describes the data contained on these reports.

Table 3-1. HID Reports

HID REPORT	BYTE 0	BYTE 1	BYTE 2	BYTE 3	BYTE 4	BYTE 5	BYTE 6	BYTE 7	BYTE 8
USB_HID_SETUP_ DOWNLOAD_DATA	Opcode = 0x01	Should be set to 0x00	Not used; value should be set to 0x00	Not used; value should be set to 0x00	Not used; value should be set to 0x00	Not used; value should be set to 0x00	Not used; value should be set to 0x00	Not used; value should be set to 0x00	Not used; value should be set to 0x00
USB_HID_RESET_ FLASH_BURNER_DEVICE	Opcode = 0x02	Should be set to 0x00	Not used; value should be set to 0x00	Not used; value should be set to 0x00	Not used; value should be set to 0x00	Not used; value should be set to 0x00	Not used; value should be set to 0x00	Not used; value should be set to 0x00	Not used; value should be set to 0x00
USB_HID_POISON_FLASH	Opcode = 0x03	Not used Value should be set to 0x00	Not used; value should be set to 0x00	Not used; value should be set to 0x00	Not used; value should be set to 0x00	Not used; value should be set to 0x00	Not used; value should be set to 0x00	Not used; value should be set to 0x00	Not used; value should be set to 0x00
USB_HID_ENABLE_REPROGRAM	Opcode = 0x07	Valid values: 0x00 or 0x01. 0x00 = Re-programming disabled 0x01 = Re-programming enabled	Not used; value should be set to 0x00	Not used; value should be set to 0x00	Not used; value should be set to 0x00	Not used; value should be set to 0x00	Not used; value should be set to 0x00	Not used; value should be set to 0x00	Not used; value should be set to 0x00
USB_HID_IS_FLASH_PRESENT	Opcode = 0x08	Valid values: 0x00 or 0x01. 0x00 = Flash 0x01 = No flash	Not used; value should be set to 0x00	Not used; value should be set to 0x00	Not used; value should be set to 0x00	Not used; value should be set to 0x00	Not used; value should be set to 0x00	Not used; value should be set to 0x00	Not used; value should be set to 0x00
USB_HID_GET_FIRMWARE_ VERSION	Opcode = 0x09	Not used; value should be set to 0x00	Not used; value should be set to 0x00	Not used; value should be set to 0x00	Not used; value should be set to 0x00	Not used; value should be set to 0x00	Not used; value should be set to 0x00	Firmware minor version	Firmware major version

To recognize an HID device as TUSB926x compatible, the device must respond with a 0x9260 to an HID Feature report request. Figure 3-2 describes this process in detail.

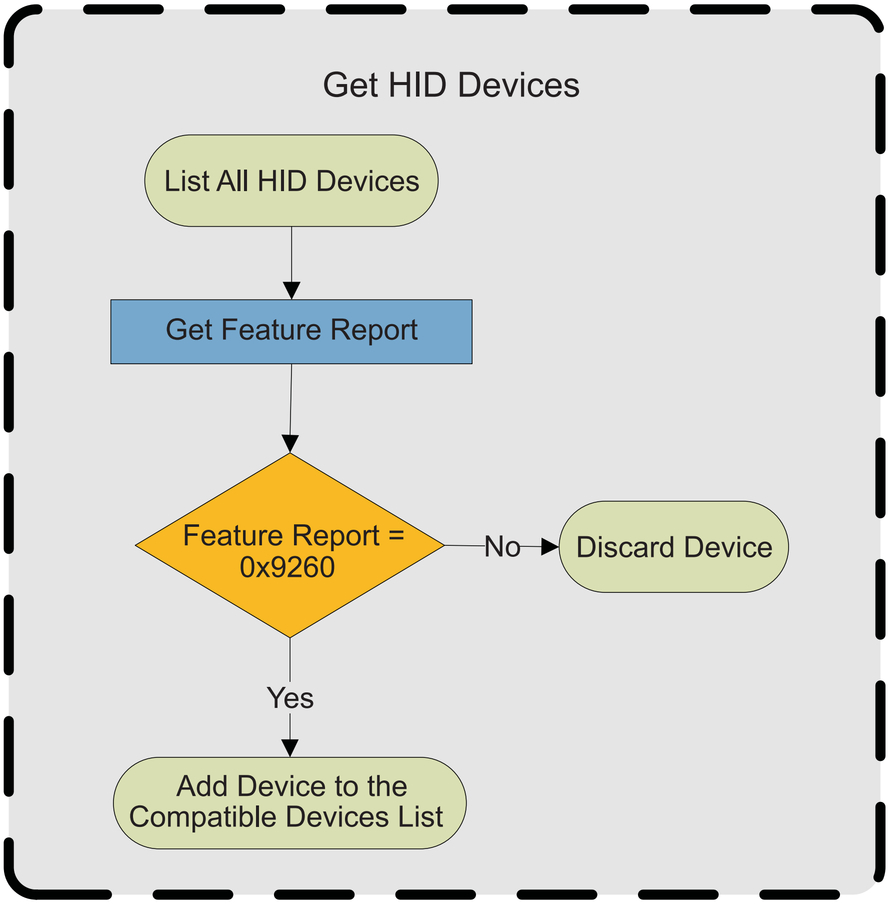


Figure 3-2. Get HID Devices Flow Diagram

After the GUI has successfully detected at least one TUSB926x HID compatible device, the user needs to determine whether the device has already been programmed or not. The user can achieve this by getting the VID and PID of the device.

If a device has VID = 0x0451 and PID = 0x926B, the user can assume the device is not programmed and is ready to be programmed. Otherwise, the user needs to take the device to its original configuration (by erasing or poisoning the SPI Flash of the device) before sending the new data to be programmed.

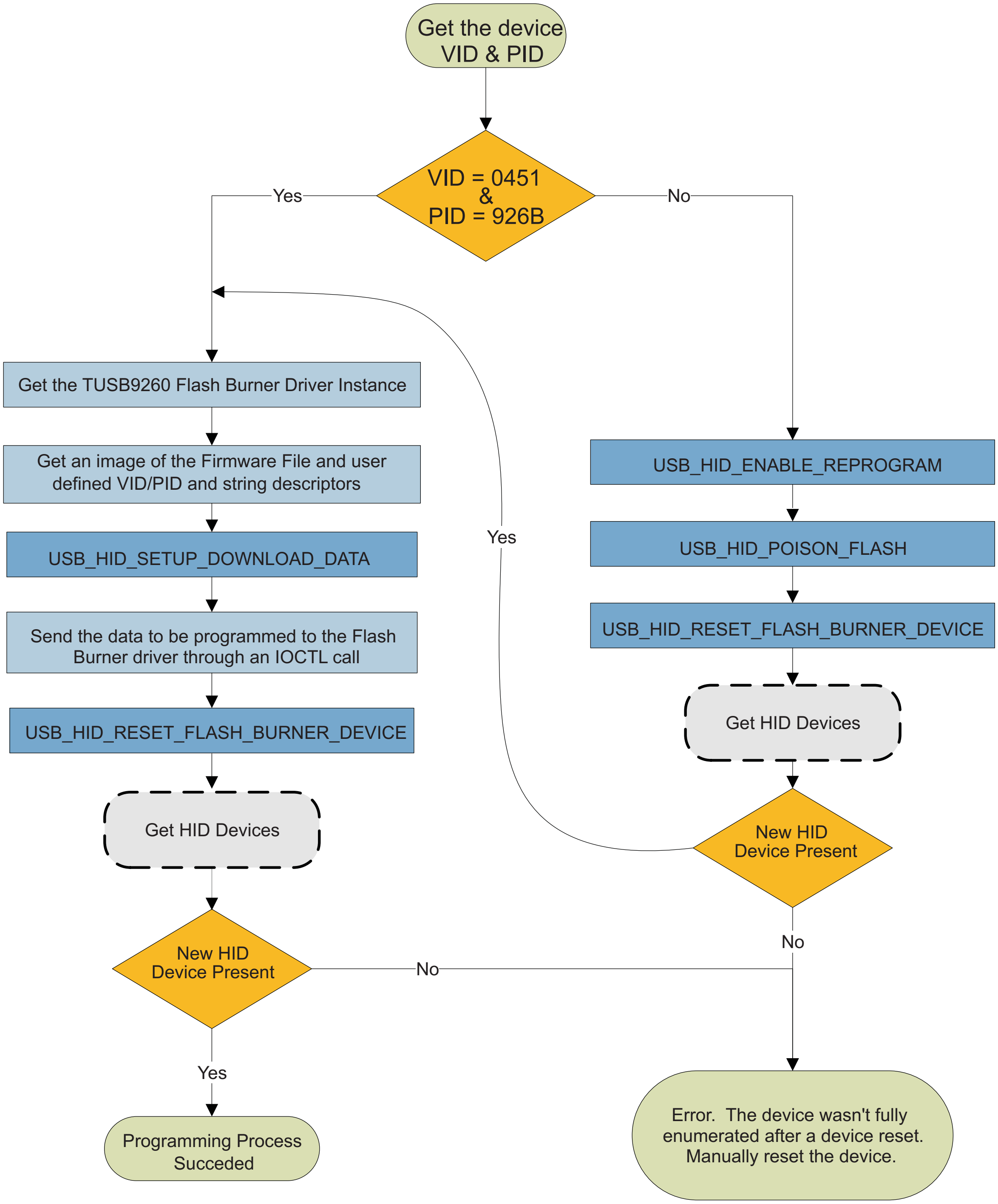

Get the device VID & PID
VID = 0451 & PID = 926B
Yes
No
Get the TUSB9260 Flash Burner Driver Instance
Get an image of the Firmware File and user defined VID/PID and string descriptors
USB_HID_SETUP_DOWNLOAD_DATA
Send the data to be programmed to the Flash Burner driver through an IOCTL call
USB_HID_RESET_FLASH_BURNER_DEVICE
Get HID Devices
New HID Device Present
Yes
Programming Process Succeded
No
USB_HID_ENABLE_REPROGRAM
USB_HID_POISON_FLASH
USB_HID_RESET_FLASH_BURNER_DEVICE
Get HID Devices
New HID Device Present
Yes
No
Error. The device wasn't fully enumerated after a device reset. Manually reset the device.

Figure 3-3. GUI Burner or Re-Programmer Flow Diagram

3.2 SCSI Interface

When a previously-burned firmware in the SPI Flash of the device contains a mass-storage-only interface, it must have additional means to erase the flash of the device when updating the firmware content. Beginning on Firmware version 0.95, a set of TI vendor-specific SCSI commands were implemented to provide the necessary means to communicate specific commands to the device whenever the HID interface is missing. The currently implanted SCSI commands are:

- **SCSI_TI_FLASH_UNLOCK**

  Similar to the USB_HID_ENABLE_REPROGRAM, this command prepares the device to be re-programmed. This command serves as a lock to ensure no accidental flash erasing is performed.
- **SCSI_TI_FLASH_ERASE**

  As with the USB_HID_POISON_FLASH report, this command instructs the device to erase the content of the SPI Flash.
- **SCSI_TI_GET_PID**

  This SCSI command returns a constant data (0x9260) that helps to identify the device among other storage devices in the system, similar to the HID Feature report implementation
- **SCSI_TI_GET_FIRMWARE_VERSION**

  Through this command, the user can determine the current firmware version operating in the device.
- **SCSI_TI_GET_USB_SPEED**

  Through this command, the user receives an indicator representing the current USB connection speed.
- **SCSI_TI_DEVICE_RESET**

  Similar to the USB_HID_RESET_FLASH_BURNER_DEVICE report, this command instructs the device to perform a soft reset. This command is specially required after erasing the flash of the device, so the BootLoader instance can re-initialize.
- **SCSI_TI_READ_FLASH**

  This command reads a block of data from the SPI Flash. This command dumps the content of the SPI Flash into a file.

Table 3-2 describes the data contained on the above detailed commands.

Table 3-2. SCSI Commands

SCSI COMMAND	COMMAND DATA	RETURN DATA
SCSI_TI_FLASH_UNLOCK	0xE1	No data returned
SCSI_TI_FLASH_ERASE	0xE2	No data returned
SCSI_TI_GET_PID	0xE3	2 bytes – 0x9260
SCSI_TI_GET_FIRMWARE_VERSION	0xE4	2 bytes
		Byte 0 – Firmware minor version
		Byte 1 – Firmware major version
SCSI_TI_GET_USB_SPEED	0xE5	1 byte
		USB_LOW_SPEED = 0
		USB_FULL_SPEED = 1
		USB_HIGH_SPEED = 2
		USB_SUPER_SPEED = 3
		USB_SPEED_UNKNOWN = 4
SCSI_TI_DEVICE_RESET	0xE6	No data returned
SCSI_TI_READ_FLASH	0xE7	Up to 255 bytes of data read from the SPI Flash

Figure 3-4 describes the TI vendor-specific SCSI commands usage while listing compatible TUSB926x based disks over the Flash Burner GUI.

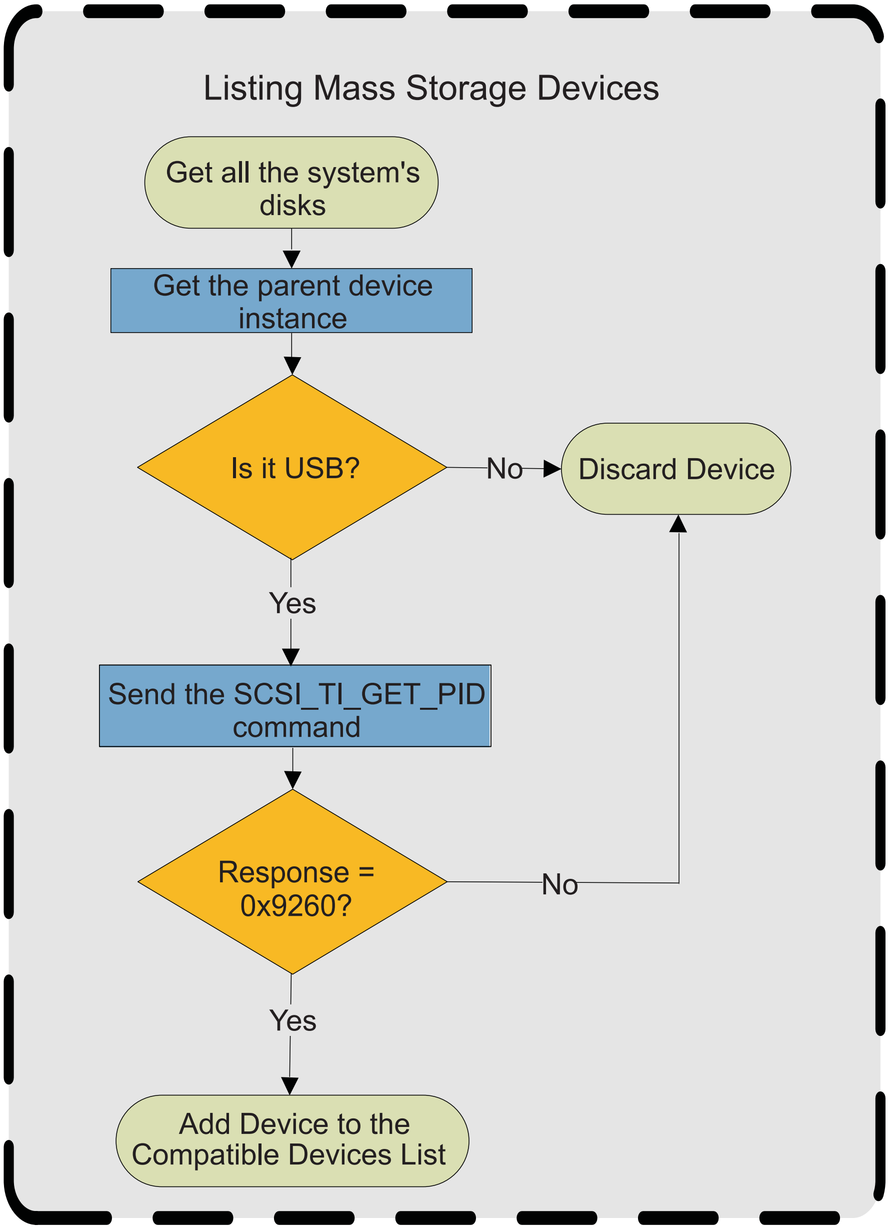

Listing Mass Storage Devices
Get all the system's disks
Get the parent device instance
Is it USB?
No
Discard Device
Yes
Send the SCSI_TI_GET_PID command
Response = 0x9260?
No
Yes
Add Device to the Compatible Devices List

Figure 3-4. Listing Compatible Mass Storage Devices

During the flash erasing process, TI vendor-specific SCSI commands are issued in the sequence described in Figure 3-5.

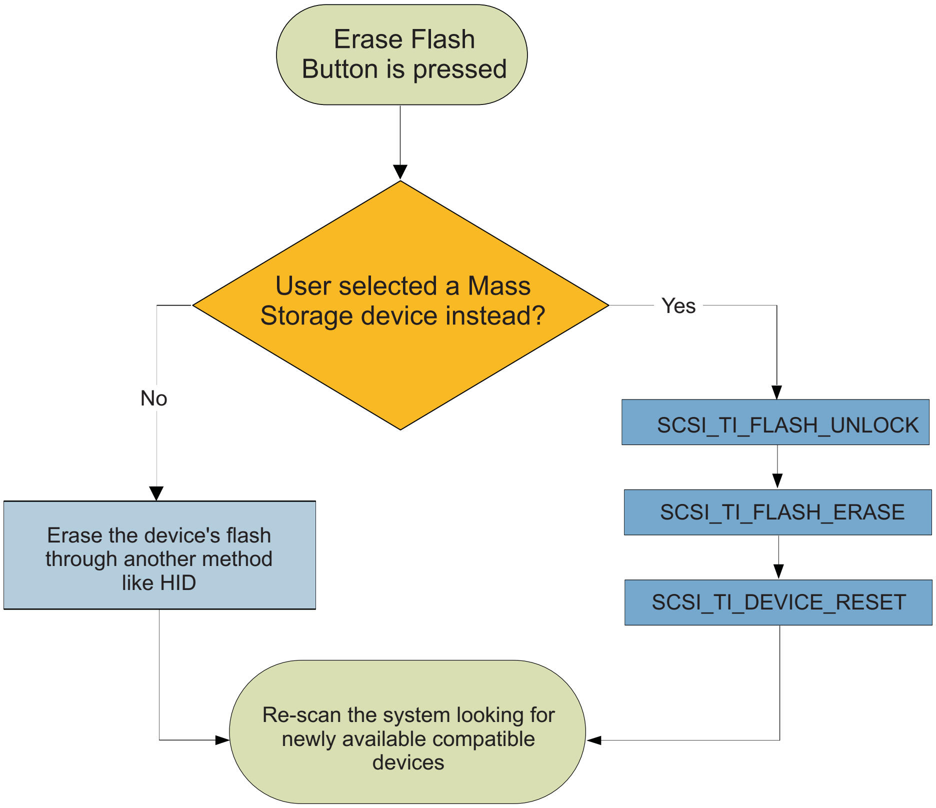

Erase Flash Button is pressed
User selected a Mass Storage device instead?
Yes
No
SCSI_TI_FLASH_UNLOCK
SCSI_TI_FLASH_ERASE
SCSI_TI_DEVICE_RESET
Erase the device's flash through another method like HID
Re-scan the system looking for newly available compatible devices

Figure 3-5. Erasing the Device’s Flash Through SCSI Commands

Chapter 4

Using the Flash Burner Software

4.1 Opening the Flash Burner Software

After checking that no missing instances of the TUSB926x EVM are present at the Device Manager, the user can access the Flash Burner utility by clicking on the “TUSB926x Flash Burner” shortcut added to desktop, or by going to “Start → Texas Instruments Inc → TUSB926_FlashBurner → TUSB926x Flash Burner” (see Figure 4-1).

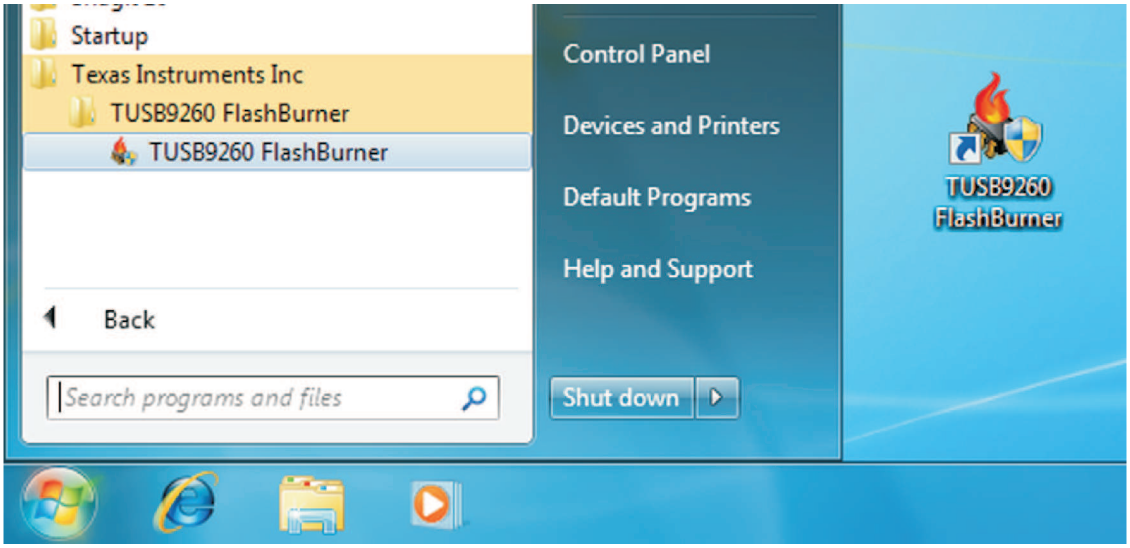
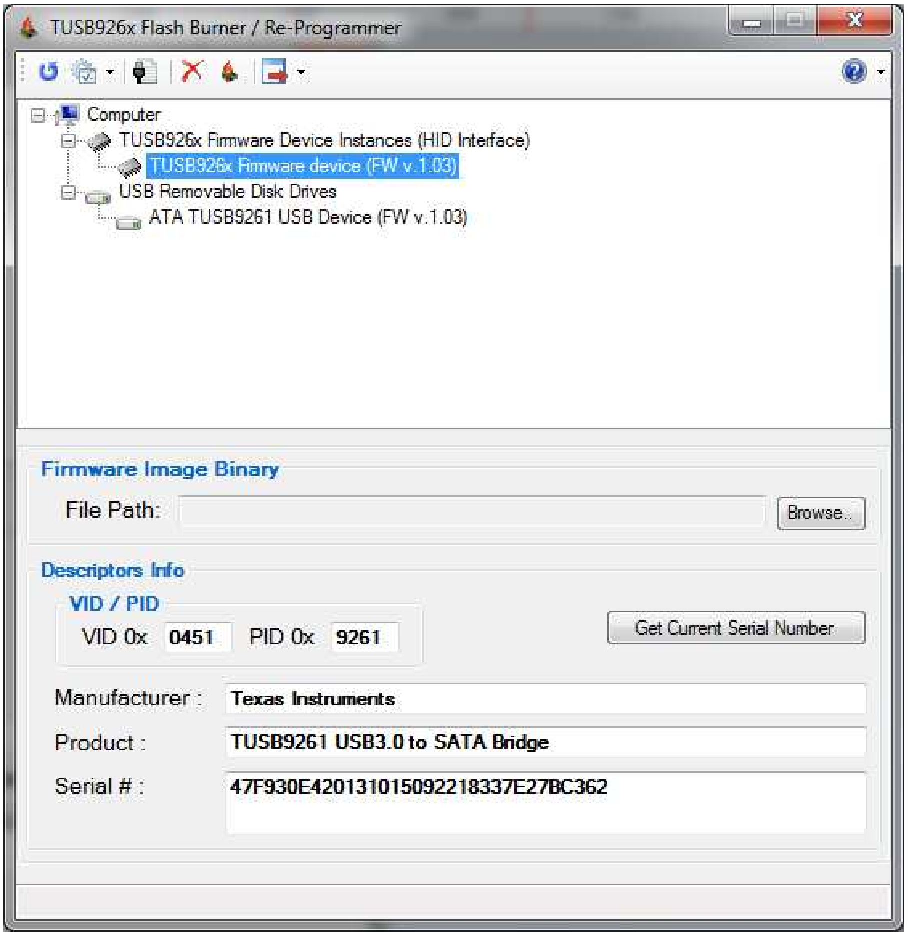


Figure 4-1. Flash Burner Software Locations

NOTE: Administrator rights are required under Windows Vista and higher operating systems to execute this application.

After executing the TUSB926x Flash Burner application, the following user interface appears:


TUSB926x Flash Burner / Re-Programmer
Computer
TUSB926x Firmware Device Instances (HID Interface)
TUSB926x Firmware device (FW v.1.03)
USB Removable Disk Drives
ATA TUSB9261 USB Device (FW v.1.03)
Firmware Image Binary
Browse..
Descriptors Info
VID / PID
Get Current Serial Number

File Path:

VID 0x 0451 PID 0x 9261

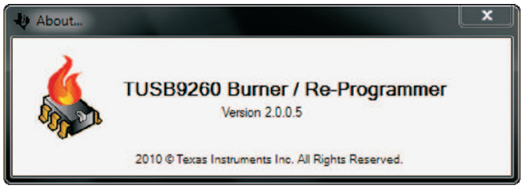
Manufacturer : Texas Instruments

Product : TUSB9261 USB3.0 to SATA Bridge

Serial # : 47F930E420131015092218337E27BC362

Figure 4-2. Flash Burner GUI

To check for the GUI version in use, click on the Help drop-down menu and choose “About” to display the application information (see Figure 4-3).



TUSB9260 Burner / Re-Programmer

Version 2.0.0.5

2010 © Texas Instruments Inc. All Rights Reserved.

Figure 4-3. Flash Burner Software Version

4.2 Flash Burner GUI options

The Options menu enables the user to change different aspects of the Flash Burner GUI configuration.

To access the options menu items, simply click the Options button (see Figure 4-4).

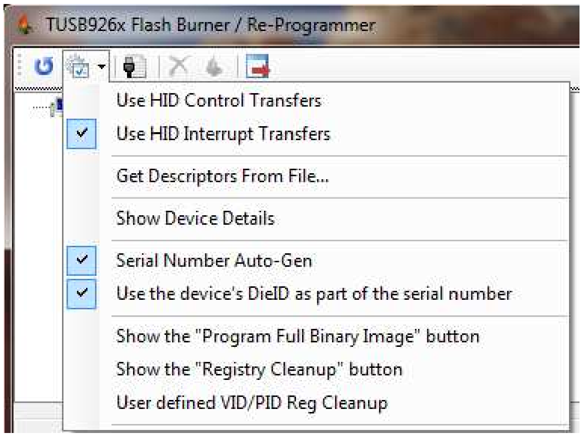

TUSB926x Flash Burner / Re-Programmer
Use HID Control Transfers
✓ Use HID Interrupt Transfers
Get Descriptors From File...
Show Device Details
✓ Serial Number Auto-Gen
✓ Use the device's DieID as part of the serial number
Show the "Program Full Binary Image" button
Show the "Registry Cleanup" button
User defined VID/PID Reg Cleanup

Figure 4-4. Selecting Options on the Flash Burner GUI

The following configuration aspects can be changed from the Options menu:

(a) **HID transfer type**: Users can select between using either “Control Transfers” or “Interrupt Transfers” (default).

> **NOTE:** If “HID Control Transfers” is used, make sure the device is PG2.5 and firmware v0.83, or better; otherwise, an error message displays and the device might become unresponsive, until the device is reset.

(b) **Get Descriptors from File**: By setting this option, the user can get a set of descriptor settings from a descriptors file (*.desc), previously generated with the “Advance Descriptors Editor” (refer to Section 4.3 for more details).

> **NOTE:** By un-checking this option, the application uses the default descriptor settings.

(c) **Show Device Details**: By setting this option, the application shows a panel displaying additional information about the selected device.

(d) **Serial Number Auto-Generator**: By setting this option, the Flash Burner GUI automatically generates a unique serial number for every programmed device.
The auto-generated serial number is made of:

- Random number (8 chars)
- Date and time (Year – 4 chars, Month – 2 chars, Day – 2 chars, Hour – 2 chars, Minutes – 2 chars, Seconds – 2 chars, and Milliseconds – 3 chars)
- Serial number of the HDD running Windows™ (8 chars)

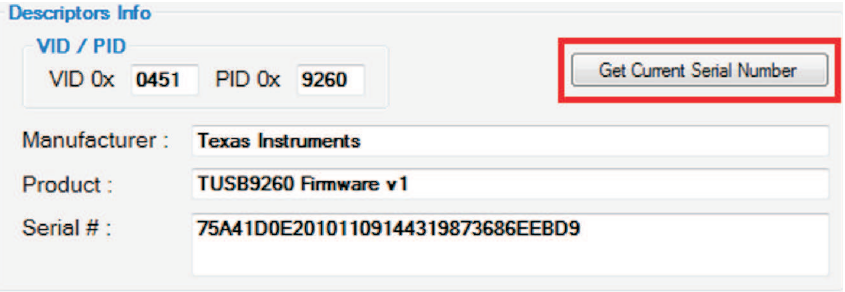
(e) **Use DieID for serial number**: When this option is set, part of the serial number reported by the TUSB926x string descriptors is overwritten with the device Die ID (a unique ID number which is generated during the device manufacturing process). This option is set by default.

(f) **Show the Program Full Binary Image button**: When setting this option, a new button is shown on the toolbar at the top of the utility; that button allows the user to program the selected binary image without adding the formatting and descriptors data. This can be used to program a firmware file previously generated using the “Export” button. (Please refer to section 4.8 for additional details)

(g) **Show the Registry Cleanup button and User-defined VID/PID Registry Cleanup**: Allows the user to clean up the Windows™ registry from possible conflicts originated when programming multiple devices on the same system with different configurations (observed only on development environments). Please refer to Section 5.5 for additional details on how to use these options.

Additionally to the serial number auto-generation feature, users can also get the serial number from its current device just in case they need to keep it for upcoming firmware updates.

To achieve this, after selecting a compatible device from the Flash Burner GUI device list, the Get Current Serial Number button is displayed within the Descriptors Info group-box. By clicking this button (see Figure 4-5) the Flash Burner GUI gets the current serial number on the device and automatically disables the serial number auto-generation feature if it is enabled.



VID 0x 0451 PID 0x 9260

Manufacturer : Texas Instruments

Product : TUSB9260 Firmware v1

Serial # : 75A41D0E20101109144319873686EEBD9

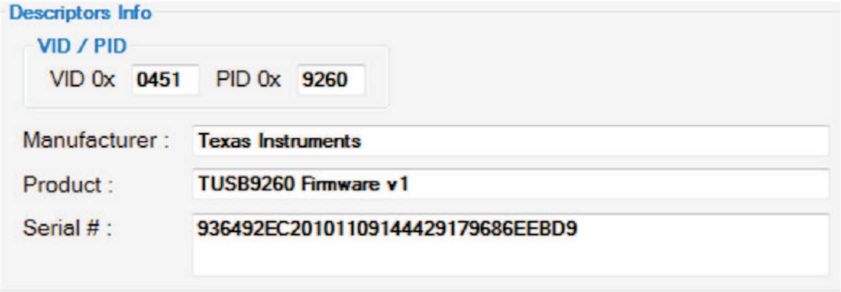
Figure 4-5. Getting Current Serial Number

4.3 Editing USB Descriptors

USB descriptors provide the host with all the necessary information to describe the USB device, so any change to these values must be done carefully.

Basic descriptor information can be changed from the TUSB926x Flash Burner GUI main form. Within the Descriptors Info group-box there is a series of text box controls (see Figure 4-6) that lets the user enter customized information about the device such as:

- **VID** – 4 characters long (assigned by USB-IF)
- **PID** – 4 characters long (assigned by the manufacturer)
- **Manufacturer String Descriptor** – Maximum 30 characters long
- **Product String Descriptor** – Maximum 30 characters long
- **Serial Number String Descriptor** – Must be unique for each device, maximum 64 characters long



VID 0x 0451 PID 0x 9260

Manufacturer : Texas Instruments

Product : TUSB9260 Firmware v1

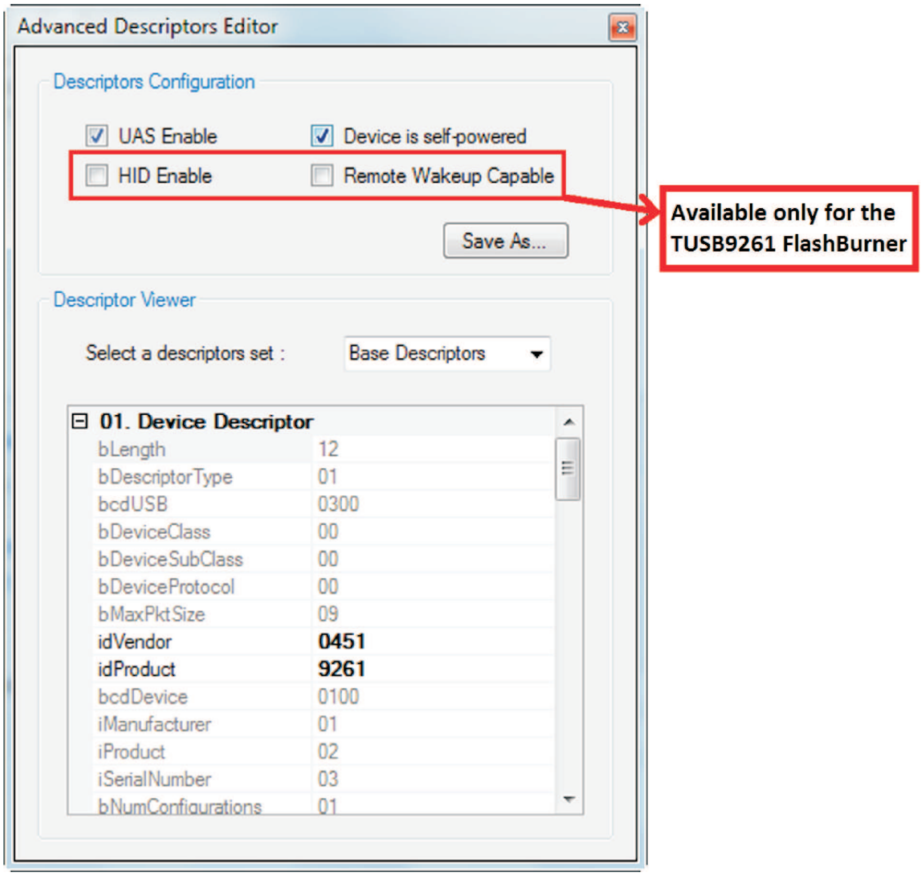
Serial # : 936492EC20101109144429179686EEBD9

Figure 4-6. Descriptors Info Group-Box

The Flash Burner GUI also provides the means to edit additional descriptors information through the Advanced Descriptors Editor tool.

To open the “Advanced Descriptors editor” tool interface, click on the editor button located on the tool bar menu at the top of the Flash Burner GUI.

Once the descriptors editor is open (see Figure 4-7), the user can check the value of each individual descriptor to be used, edit additional descriptors data, and enable or disable some of the interfaces used by the device.



☑ UAS Enable ☑ Device is self-powered
□ HID Enable □ Remote Wakeup Capable

Available only for the TUSB9261 FlashBurner

Select a descriptors set : Base Descriptors

⊟ 01. Device Descriptor

bLength	12
bDescriptorType	01
bcdUSB	0300
bDeviceClass	00
bDeviceSubClass	00
bDeviceProtocol	00
bMaxPktSize	09
idVendor	**0451**
idProduct	**9261**
bcdDevice	0100
iManufacturer	01
iProduct	02
iSerialNumber	03
bNumConfigurations	01

Figure 4-7. Editing USB Descriptors

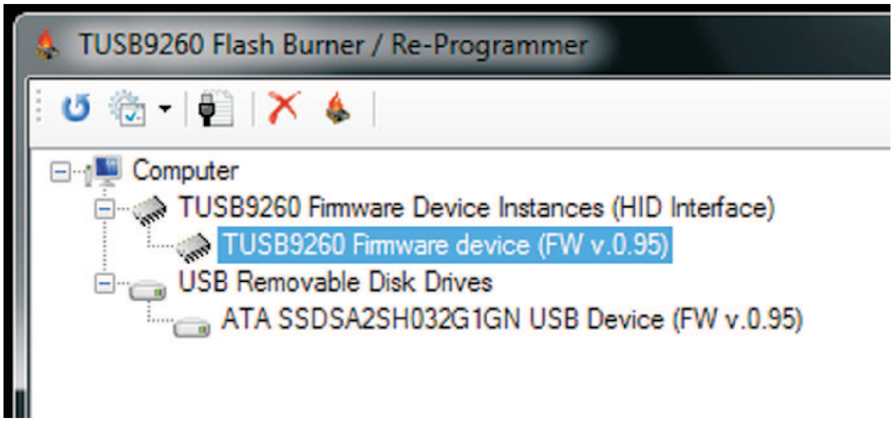
Through this tool, users can also save the configuration for the descriptors to a descriptors (*.desc) file for future use. That file can later be loaded from the Options menu (refer to Section 4.2).

To save the current descriptors to a file, simply click on the Save As button, select a file name, and location from the resulting dialog and click OK.

NOTE: Make sure that all the enabled interfaces are supported by the firmware that is to be burned in the SPI Flash.

4.4 Selecting a Compatible Device

The Flash Burner GUI automatically identifies all the compatible devices already connected on the system. These compatible devices are listed on the top of the Flash Burner application instance. Through this list, the user can choose among all the TUSB926x based devices detected (see Figure 4-8). For this example, a TUSB926x EVM board was connected with a valid firmware image. Depending on the device selected, the toolbar buttons are enabled, so the user can perform any of the available tasks.

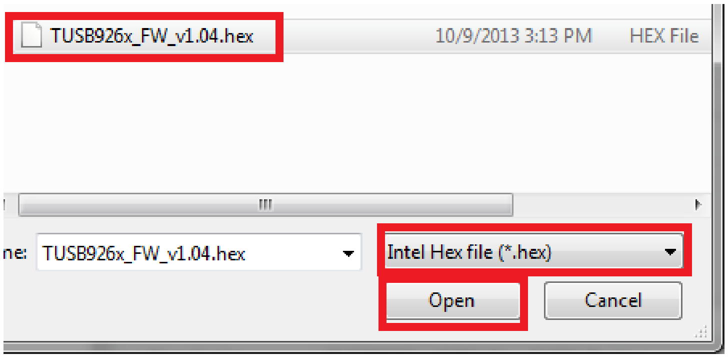


Computer
TUSB9260 Firmware Device Instances (HID Interface)
TUSB9260 Firmware device (FW v.0.95)
USB Removable Disk Drives
ATA SSDSA2SH032G1GN USB Device (FW v.0.95)

Figure 4-8. List for Selecting a Compatible TUSB926x Device

4.5 Selecting a Compatible Firmware Binary File

In the middle of the Flash Burner GUI, there is a group-box identified as Firmware Image Binary, which has a browse button that lets the user choose the *.BIN or *.HEX file to be burned into the SPI Flash. Click on this Browse button and select the appropriate firmware file located in the system. Click on Open after (see Figure 4-9).



TUSB926x_FW_v1.04.hex 10/9/2013 3:13 PM HEX File

ne: TUSB926x_FW_v1.04.hex

Intel Hex file (*.hex)

Figure 4-9. Selecting a Valid Firmware File

4.6 Burning a Firmware Binary File Into the SPI Flash

After selecting a valid firmware file, the user can now click on the Program button (see Figure 4-10).

The status bar indicates that the programming process has started by displaying a message stating that “Programming is in progress…”.

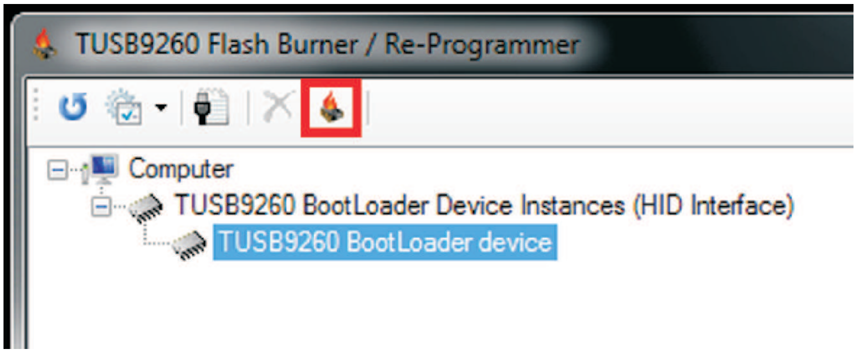
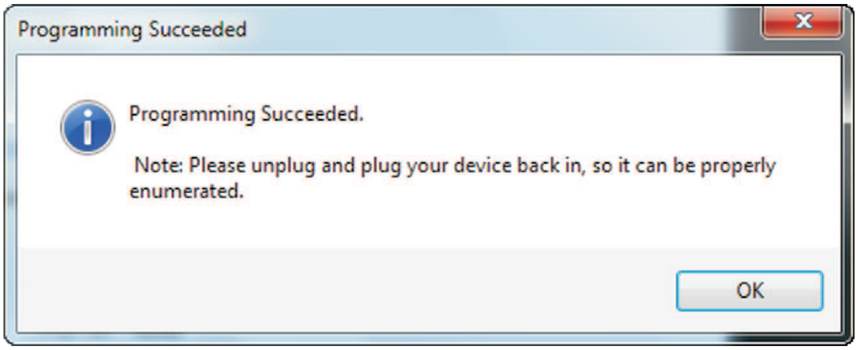

TUSB9260 Flash Burner / Re-Programmer
Computer
TUSB9260 BootLoader Device Instances (HID Interface)
TUSB9260 BootLoader device

Figure 4-10. Burning a Valid Firmware File into the SPI Flash

When the firmware file has been properly burned into the SPI Flash, a message box showing “Flash Programming Succeeded” appears. Click OK to continue (see Figure 4-11).


Programming Succeeded

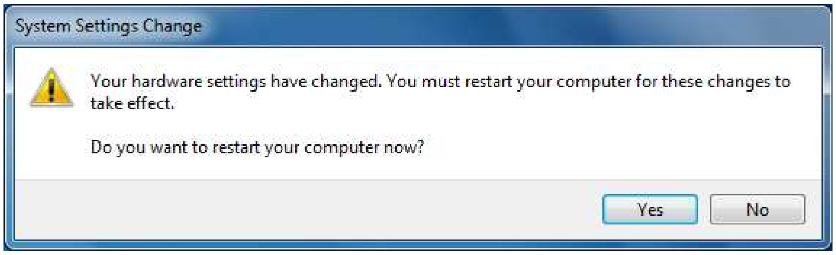
Programming Succeeded.

Note: Please unplug and plug your device back in, so it can be properly enumerated.

Figure 4-11. SPI Flash Programming Succeeded

TI recommends a reboot after successfully programming a firmware file into the SPI Flash device. Although not mandatory, the OS sometimes asks the user to perform this action.

When prompted by the system, click Yes to restart the computer (see Figure 4-12).


System Settings Change

Your hardware settings have changed. You must restart your computer for these changes to take effect.

Do you want to restart your computer now?

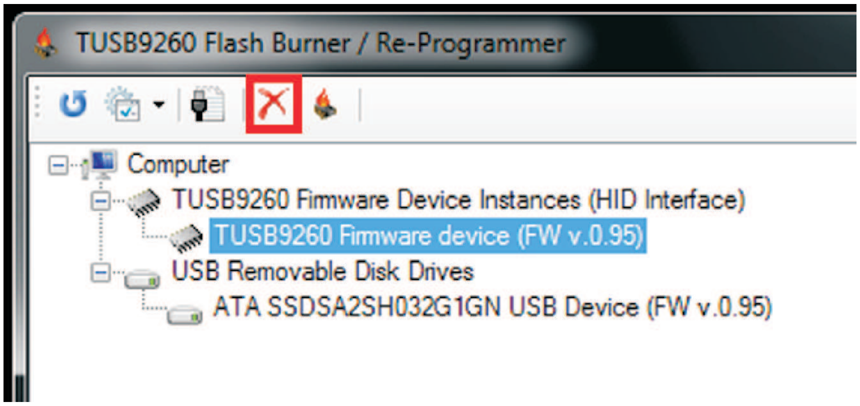
Figure 4-12. Operating System Asking for a Reboot

4.7 Erasing Firmware in the SPI Flash

To erase the content of the SPI Flash, click the Erase Flash button to issue the erase flash command on the device.

There are two different ways to erase the SPI Flash, depending on the firmware already present:

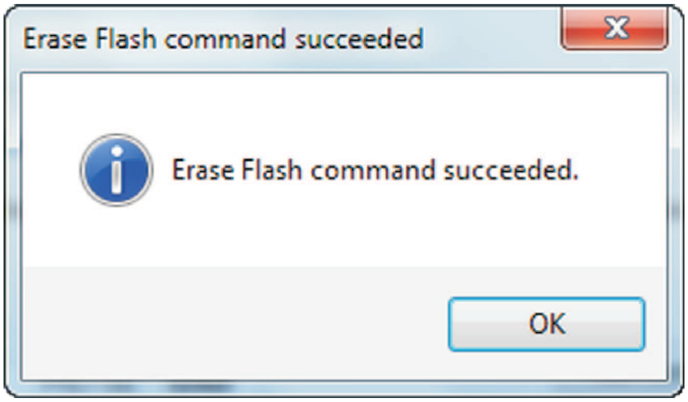
1. HID-enabled firmware:
   - In this case, select the preferred HID interface instance that is shown in the compatible device list, and then click the Erase Flash button (see Figure 4-13).



TUSB9260 Flash Burner / Re-Programmer
Computer
TUSB9260 Firmware Device Instances (HID Interface)
TUSB9260 Firmware device (FW v.0.95)
USB Removable Disk Drives
ATA SSDSA2SH032G1GN USB Device (FW v.0.95)

Figure 4-13. Erasing SPI Flash With HID-Enabled Firmware

   - Click OK after the erase flash command succeeds (see Figure 4-14).



Erase Flash command succeeded

Erase Flash command succeeded.

Figure 4-14. Erase Flash Command Succeeded

   - After the SPI Flash is erased, the TUSB926x board re-enumerates with its Boot Loader instance (see Figure 2-7).

2. Mass-storage-only firmware (no HID)

   When having a firmware without an HID instance, the Erase Flash button can also be accessed when selecting the “USB Mass Storage” instance of our device under the “USB Removable Disk Drives” category.

   - From a user perspective, this method is exactly the same as with the HID instance of the device, that is simply select the Mass Storage device instance and click the Erase Flash Button (see Figure 4-15). This time the GUI sends the erase flash command through TI vendor-specific SCSI commands.

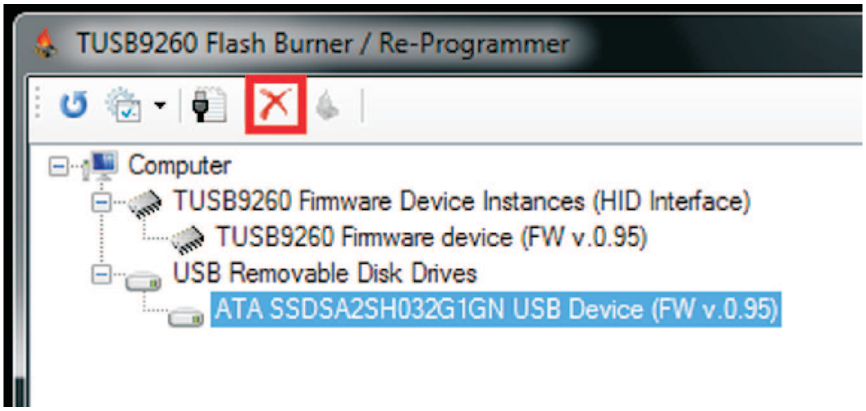

TUSB9260 Flash Burner / Re-Programmer
Computer
TUSB9260 Firmware Device Instances (HID Interface)
TUSB9260 Firmware device (FW v.0.95)
USB Removable Disk Drives
ATA SSDSA2SH032G1GN USB Device (FW v.0.95)

Figure 4-15. Erasing the Device's Flash from USB Mass Storage Instance

- Click OK after the erase flash command succeeds (see Figure 4-14).
- After the SPI Flash is erased, the TUSB926x board re-enumerates with its Boot Loader instance.

NOTE: Only firmware version 0.95 and above support the TI (vendor) specific SCSI commands required by this function. Please make sure to use the appropriate firmware version.

4.8 Exporting the Firmware Data to a File

The TUSB926x Flash Burner GUI is also helpful when a user wants to burn the SPI Flash data using a method other than the FlashBurner GUI, as it can export all the required data such as the USB descriptors, checksums, and firmware in the appropriate format (as shown in Figure 3-1).

To generate and export the formatted binary image to a file, follow the steps described in Section 4.3 and Section 4.5 and click the Export Formatted Binary button within the Export Menu button as shown in Figure 4-16.

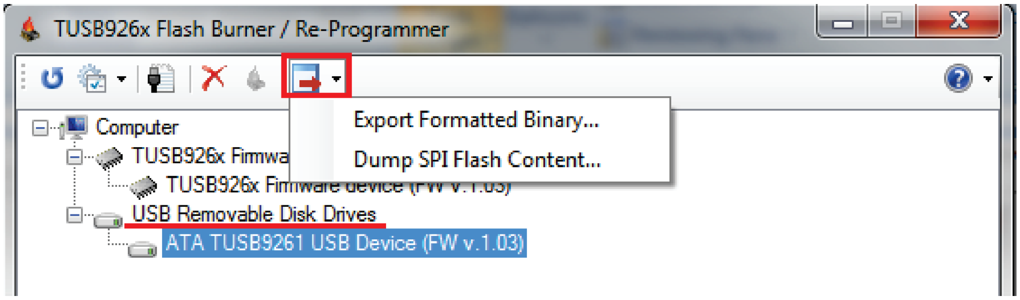
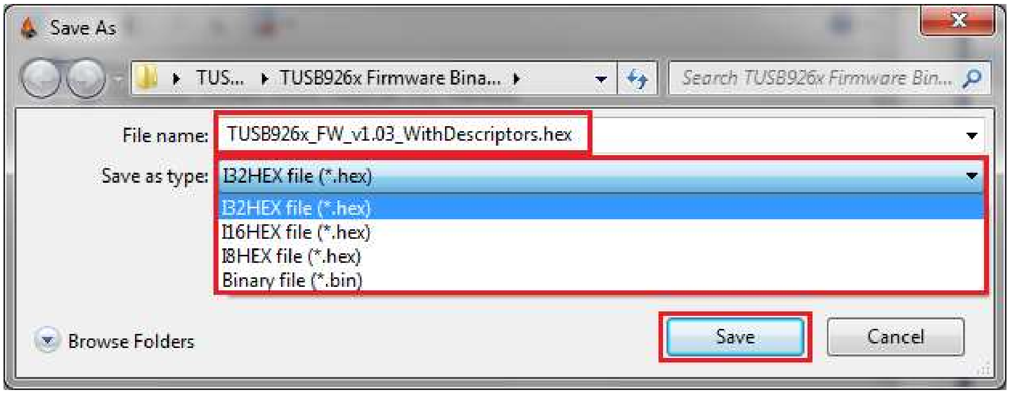

TUSB926x Flash Burner / Re-Programmer
Export Formatted Binary...
Dump SPI Flash Content...
Computer
TUSB926x Firmwa
TUSB926x Firmware device (FW v.1.03)
USB Removable Disk Drives
ATA TUSB9261 USB Device (FW v.1.03)

Figure 4-16. Export Button

When prompted, select a folder to store the EEPROM image, and input the desired name and format. Finally, click the Save button as shown in Figure 4-17.



Save As
TUS... ▸ TUSB926x Firmware Bina... ▸
Search TUSB926x Firmware Bin...

File name: TUSB926x_FW_v1.03_WithDescriptors.hex

Save as type: I32HEX file (*.hex)

Figure 4-17. Saving the EEPROM Image

Additionally, by using the “Dump SPI Flash Content…” users can extract the data currently stored on the SPI flash and save it into a file. Please note that this function is only supported through vendor-specific SCSI commands, so the button to use is only enabled when selecting a device instance under the “USB Removable Disk Drives” category.

Troubleshooting

During the TUSB926x EVM enumeration process, there might be problems that do not allow the user to run the Flash Burner software in an adequate way. All instances should be present in order to burn or reprogram the SPI Flash.

The following are the most common cases that may arise when using the Flash Burner software:

5.1 Re-Installing Flash Burner Driver Instance Manually

This section details how to manually install the Flash Burner driver in the system, although it is not necessary because the Flash Burner GUI automatically installs the driver when required.

In case the TUSB926x EVM board initializes with a “TUSB926x Boot Loader” yellow alert instance (see Figure 5-1), implement the following steps to perform a manual driver installation:

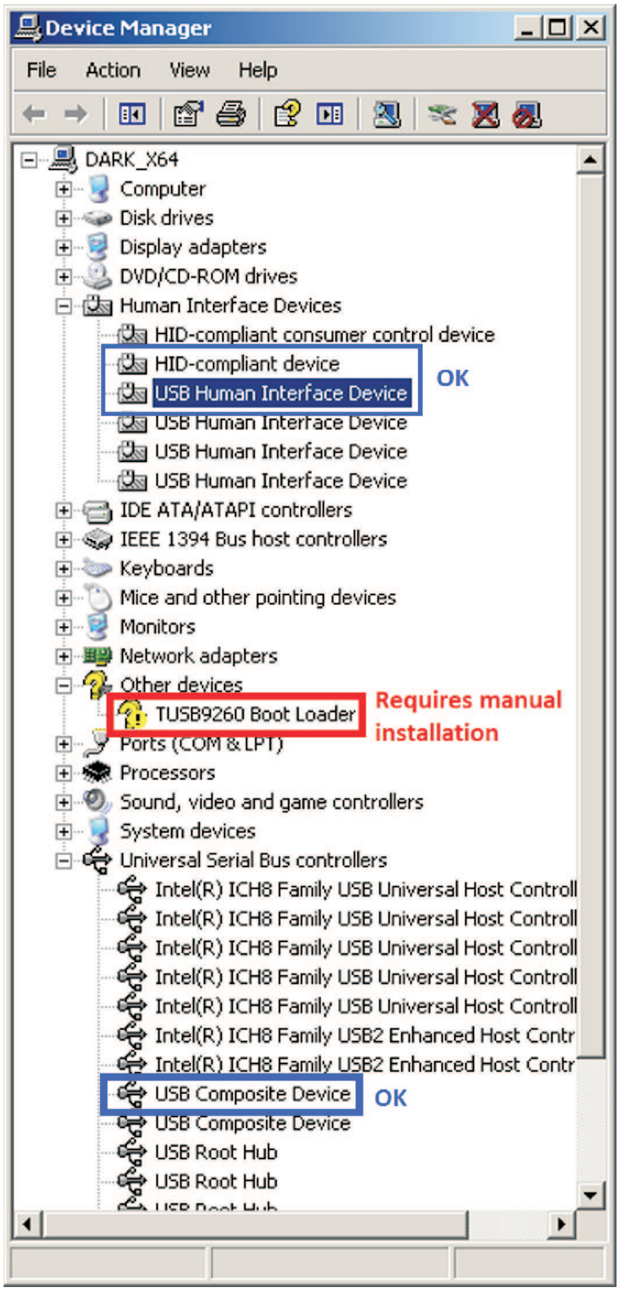

Device Manager
File
Action
View
Help
DARK_X64
Computer
Disk drives
Display adapters
DVD/CD-ROM drives
Human Interface Devices
HID-compliant consumer control device
HID-compliant device
USB Human Interface Device
USB Human Interface Device
USB Human Interface Device
USB Human Interface Device
OK
IDE ATA/ATAPI controllers
IEEE 1394 Bus host controllers
Keyboards
Mice and other pointing devices
Monitors
Network adapters
Other devices
TUSB9260 Boot Loader
Requires manual installation
Ports (COM & LPT)
Processors
Sound, video and game controllers
System devices
Universal Serial Bus controllers
Intel(R) ICH8 Family USB Universal Host Controll
Intel(R) ICH8 Family USB Universal Host Controll
Intel(R) ICH8 Family USB Universal Host Controll
Intel(R) ICH8 Family USB Universal Host Controll
Intel(R) ICH8 Family USB Universal Host Controll
Intel(R) ICH8 Family USB2 Enhanced Host Contr
Intel(R) ICH8 Family USB2 Enhanced Host Contr
USB Composite Device
OK
USB Composite Device
USB Root Hub
USB Root Hub
USB Root Hub

Figure 5-1. TUSB926x Boot Loader Instance Not Properly Recognized

Right-click on the “TUSB926x Boot Loader” instance and select the “Update Driver…” option (see Figure 5-2).

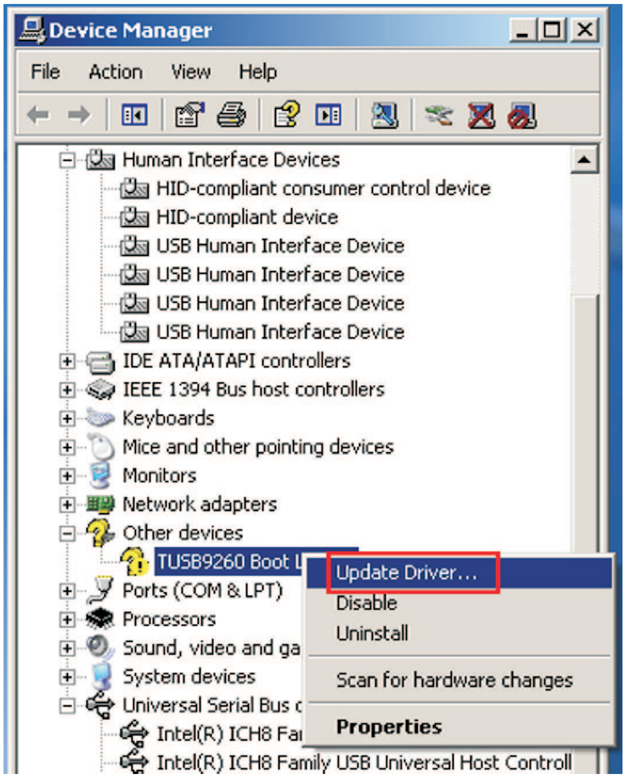
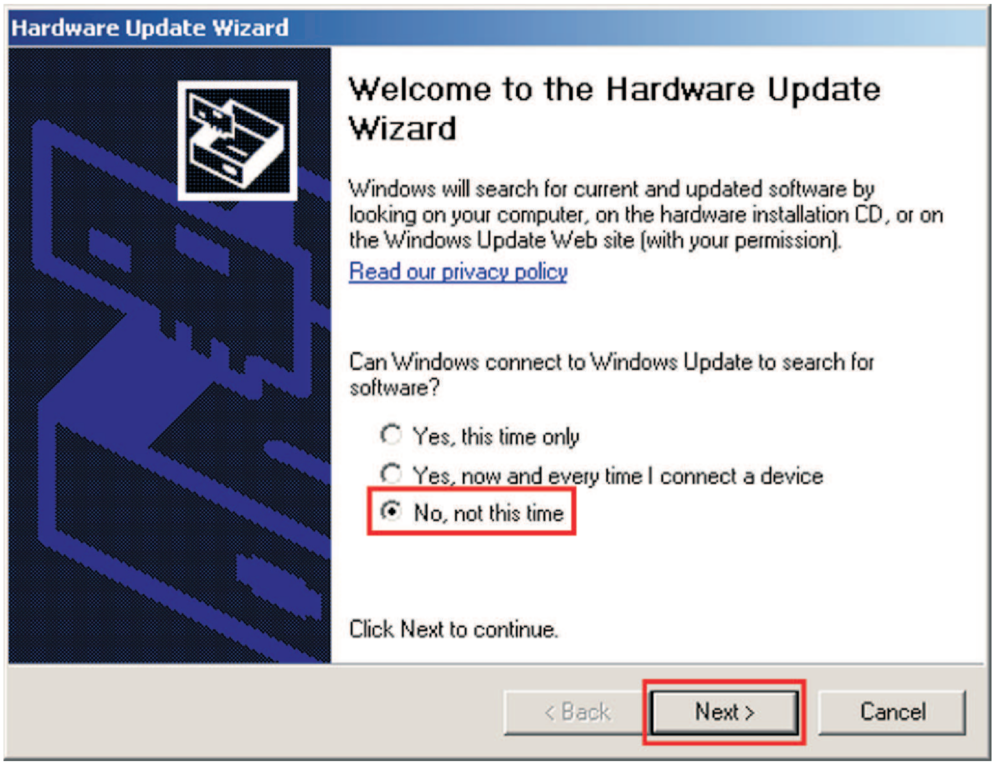

Device Manager
File
Action
View
Help
Human Interface Devices
HID-compliant consumer control device
HID-compliant device
USB Human Interface Device
USB Human Interface Device
USB Human Interface Device
USB Human Interface Device
IDE ATA/ATAPI controllers
IEEE 1394 Bus host controllers
Keyboards
Mice and other pointing devices
Monitors
Network adapters
Other devices
TUSB9260 Boot L
Ports (COM & LPT)
Processors
Sound, video and ga
System devices
Universal Serial Bus c
Intel(R) ICH8 Fai
Intel(R) ICH8 Family USB Universal Host Controll
Update Driver...
Disable
Uninstall
Scan for hardware changes
Properties

Figure 5-2. Manual Flash Burner Driver Installation

After some seconds, a Hardware Update Wizard window appears. Select “No, not this time” and click Next (see Figure 5-3).



Welcome to the Hardware Update 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).

Read our privacy policy

Can Windows connect to Windows Update to search for software?

○ Yes, this time only

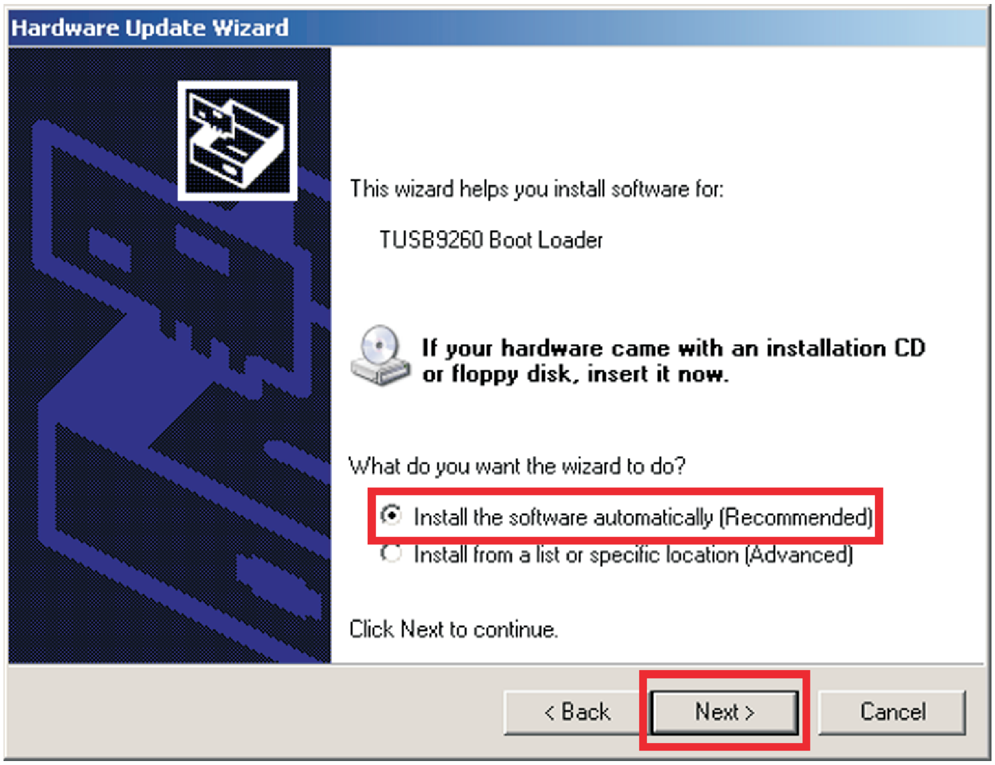
○ Yes, now and every time I connect a device

● No, not this time

Click Next to continue.

Figure 5-3. Skipping Windows™ Update for Driver Installation

Since the Flash Burner installer has already copied the proper drivers to the system, the user can now select “Install the software automatically…” and click Next to start searching for the proper drivers for such hardware instance. Wait until the yellow alert disappears and the instance is properly enumerated under the “USB controllers” category (see Figure 5-4).



Hardware Update Wizard

This wizard helps you install software for:

TUSB9260 Boot Loader

If your hardware came with an installation CD or floppy disk, insert it now.

What do you want the wizard to do?

● Install the software automatically (Recommended)
○ Install from a list or specific location (Advanced)

Click Next to continue.

Figure 5-4. Automatic Driver Search

5.2 TUSB926x Not Detected Due to Corrupted Firmware

In case the TUSB926x EVM is not detected by the Flash burner GUI app, it is possible that the SPI Flash device was not properly programmed, or its firmware image is corrupted. To get the TUSB926x EVM detected, let it enumerate using the boot loader embedded in the TUSB926x device. To do so, please perform the following steps:

1. Close the Flash Burner GUI application.
2. Unplug the TUSB926x EVM.
3. Remove the SPI Enable jumper.
4. Plug the TUSB926x EVM and wait until it is properly enumerated and detected.

After the TUSB926x boot loader is enumerated, follow these additional steps to properly re-program the SPI Flash:

1. Open the Flash Burner GUI application.
2. Put the SPI Enable jumper back in its original position.
3. Follow Section 4.2 through Section 4.4. The user can now select the proper device and burn the desired USB descriptors and firmware in the SPI flash.

5.3 TUSB926x Unrecognized by the Flash Burner GUI and Device Manager

In some cases, after burning a new firmware on the device, or after installing either the Flash Burner, or the Erase Flash driver in one of the instances of the device, Windows™ can take a considerably long time to properly enumerate the device. While this happens, the device might be listed as “Unknown Device” in the Device Manager and the Flash Burner GUI does not show any of the device instances.

If that is the case, simply unplug and plug the device back in, and it should be properly enumerated in both the Flash Burner GUI and Device Manager.

5.4 GUI Succeeded, But Device is Not Properly Programmed

When the Flash Burner GUI displays the “Programming Succeeded” message, it indicates that the TUSB926x device acknowledged the reception of the firmware data; however, there is no implemented procedure to verify that the firmware data was indeed programmed into the SPI flash.

If the device was not properly programmed after the GUI “Programming Succeeded” message is displayed:

1. Unplug and plug the device back in, and wait for the device to be fully enumerated by the Device Manager.
2. Verify the SPI memory supports the following Op-codes:

Table 5-1. OP-Codes

OP-CODE DESCRIPTION	OP-CODE DATA
Write Enable	0x06
Write Disable	0x04
Read Data	0x03
Page Program	0x02
Chip Erase	0xC7

3. Verify the connections between the TUSB926x and the SPI Flash and make sure there is activity on those lines when attempting to program the SPI Flash.

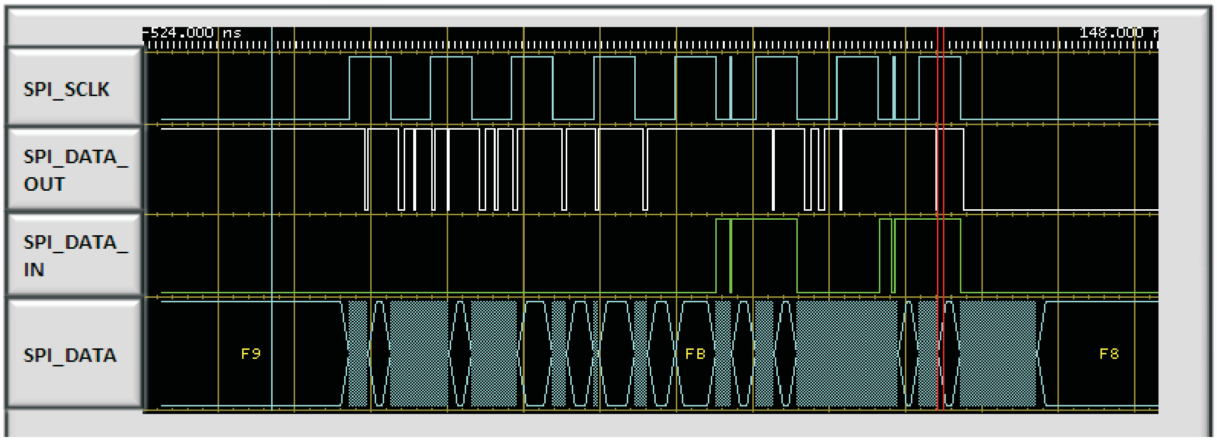
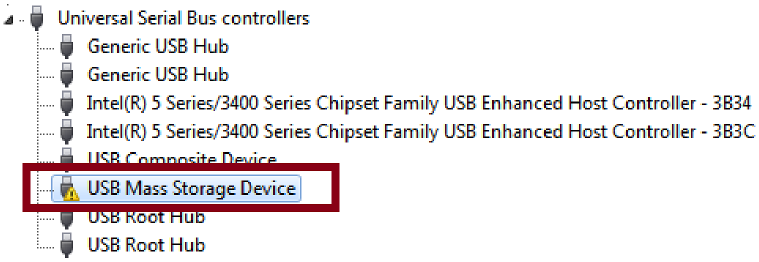


Figure 5-5. Data Transmission During Flash Programming

5.5 TUSB926x is Properly Programmed But has Yellow Alert in Device Manager

Programming multiple devices on the same system with different device descriptors, can occasionally produce Windows™ registry conflicts. When this happens, the Device Manager displays the yellow alert that the TUSB926x devices are in conflict, thus preventing the device from proper enumeration.



Universal Serial Bus controllers
Generic USB Hub
Generic USB Hub
Intel(R) 5 Series/3400 Series Chipset Family USB Enhanced Host Controller - 3B34
Intel(R) 5 Series/3400 Series Chipset Family USB Enhanced Host Controller - 3B3C
USB Composite Device
USB Mass Storage Device
USB Root Hub
USB Root Hub

Figure 5-6. TUSB926x Based Device in Conflict

The TUSB926x FlashBurner GUI implements the required functionality to perform a Windows™ Registry cleanup to resolve the above mentioned conflicts. If the conflicted device is using TI's VID (0x0451) and PID (0x9260 or 0x9261), simply press the Registry Cleanup button (see Figure 5-7).

NOTE: Please unplug any TUSB926x based devices before cleaning up the registry.

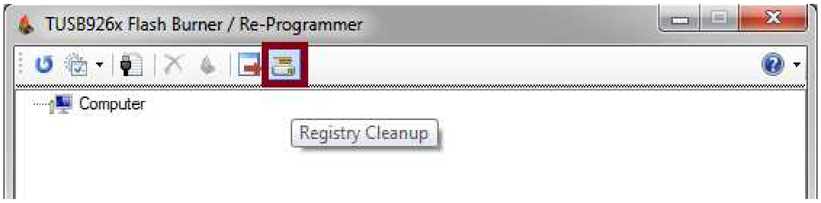
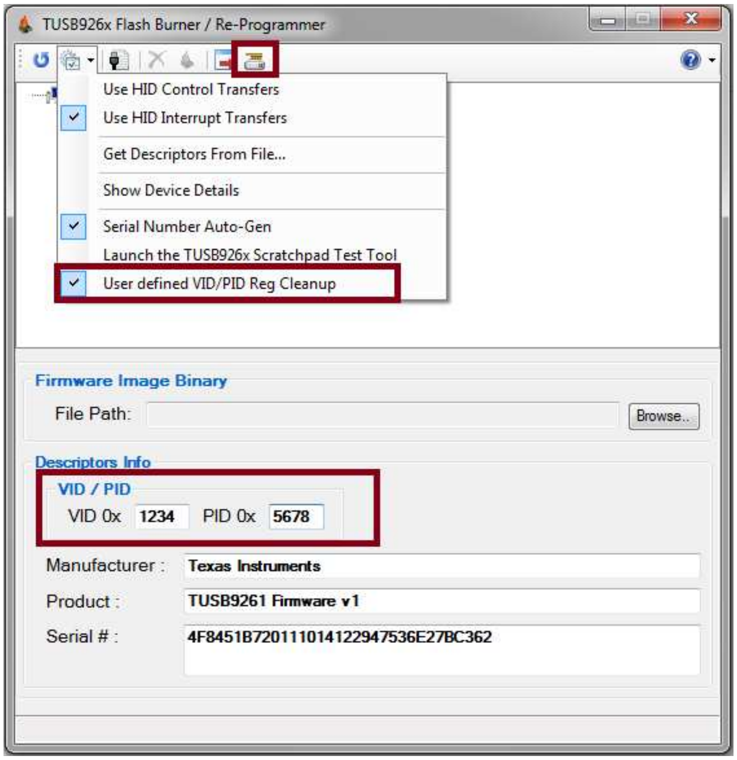


Figure 5-7. Registry Cleanup Button

If programming the device with a customized VID and PID, check the Options → User Defined VID/PID Reg Cleanup menu, enter the customized VID and PID within the “Descriptors Info” group-box, and finally click the Registry Cleanup button.


TUSB926x Flash Burner / Re-Programmer
Use HID Control Transfers
Use HID Interrupt Transfers
Get Descriptors From File...
Show Device Details
Serial Number Auto-Gen
Launch the TUSB926x Scratchpad Test Tool
User defined VID/PID Reg Cleanup
Firmware Image Binary
File Path:
Browse..
Descriptors Info
VID / PID

☐ Use HID Control Transfers
☑ Use HID Interrupt Transfers
☑ Serial Number Auto-Gen
☑ User defined VID/PID Reg Cleanup

VID 0x 1234 PID 0x 5678

Manufacturer : Texas Instruments

Product : TUSB9261 Firmware v1

Serial # : 4F8451B720111014122947536E27BC362

Figure 5-8. User-Defined VID/PID Cleanup

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DSP	dsp.ti.com	Energy and Lighting	www.ti.com/energy
Clocks and Timers	www.ti.com/clocks	Industrial	www.ti.com/industrial
Interface	interface.ti.com	Medical	www.ti.com/medical
Logic	logic.ti.com	Security	www.ti.com/security
Power Mgmt	power.ti.com	Space, Avionics and Defense	www.ti.com/space-avionics-defense
Microcontrollers	microcontroller.ti.com	Video and Imaging	www.ti.com/video
RFID	www.ti-rfid.com		
OMAP Applications Processors	www.ti.com/omap	**TI E2E Community**	e2e.ti.com
Wireless Connectivity	www.ti.com/wirelessconnectivity		

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