# UM0412
# User manual

## Getting started with DfuSe USB device firmware upgrade STMicroelectronics extension

## Introduction

This document describes the demonstration user interface that was developed to illustrate use of the STMicroelectronics Device Firmware Upgrade Library. A description of this Library, including its application programming interface, is contained in the “DfuSe Application Programming Interface” document and installed with the DfuSe software.

# Contents

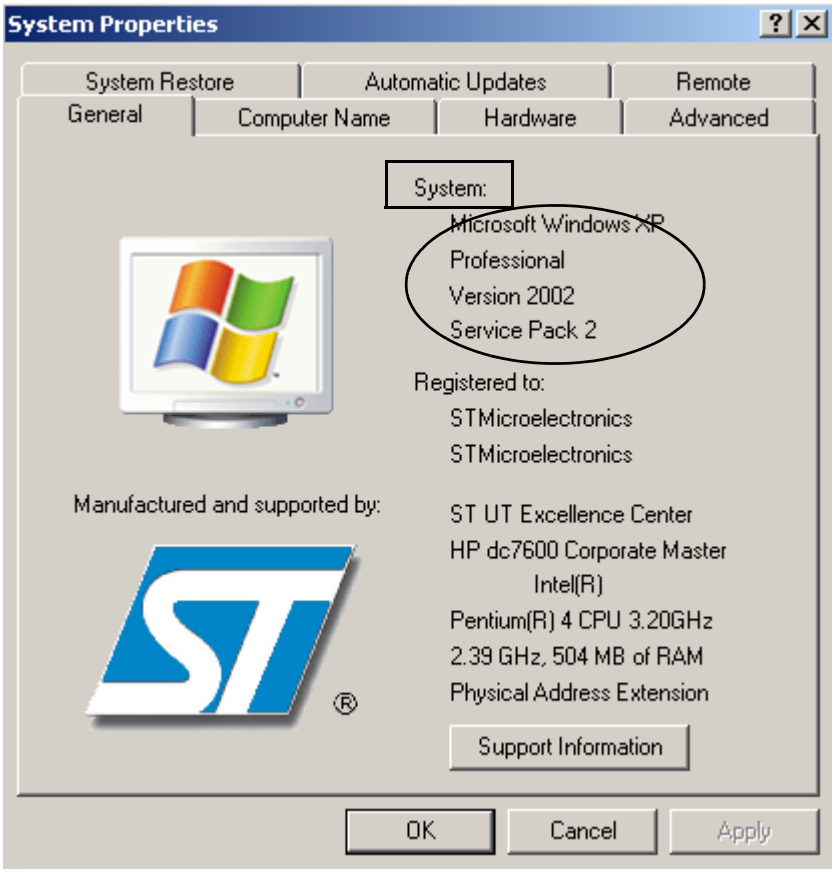
# 1 Getting started

## 1.1 System requirements

In order to use the DfuSe demonstration with the Windows operating system, a recent version of Windows, such as Windows 98SE, Millennium, 2000, XP or VISTA, must be installed on the PC.

The version of the Windows OS installed on your PC may be determined by right-clicking on the “My Computer” icon in the desktop, then clicking on the “Properties” item in the displayed PopUpMenu. The OS type is displayed in the “System properties” dialog box under the “System” label in the “General” tabsheet (see *Figure 1*).

**Figure 1. System properties dialog box**



## 1.2 Package contents

The following items are supplied in this package:

**Software contents**

1. STTube driver consisting of the two following files:
   – STTub203.sys: Driver to be loaded for demoboard.
   – STDFU.inf: Configuration file for driver.
2. DfuSe_Demo_V2.2.1_Setup.exe: Installation file which installs the DfuSe applications and source code on your computer.

**Hardware contents**

This tool is designed to work with all STMicroelectronics devices which supports the Device Firmware Upgrade via an USB interface. For more details, please contact your ST representative or visit the ST web site (http://www.st.com).

## 1.3 DfuSe demonstration installation

### 1.3.1 Software installation

Run DfuSe_Demo_V2.2.1_Setup.exe file: the InstallShield Wizard will guide you to install DfuSe applications and source code on your computer. When the software is successfully installed, click the “Finish” button. You can then explore the driver directory.

The driver files are located in the “Driver” folder in your install path (C:\Program files\STMicroelectronics\DfuSe).

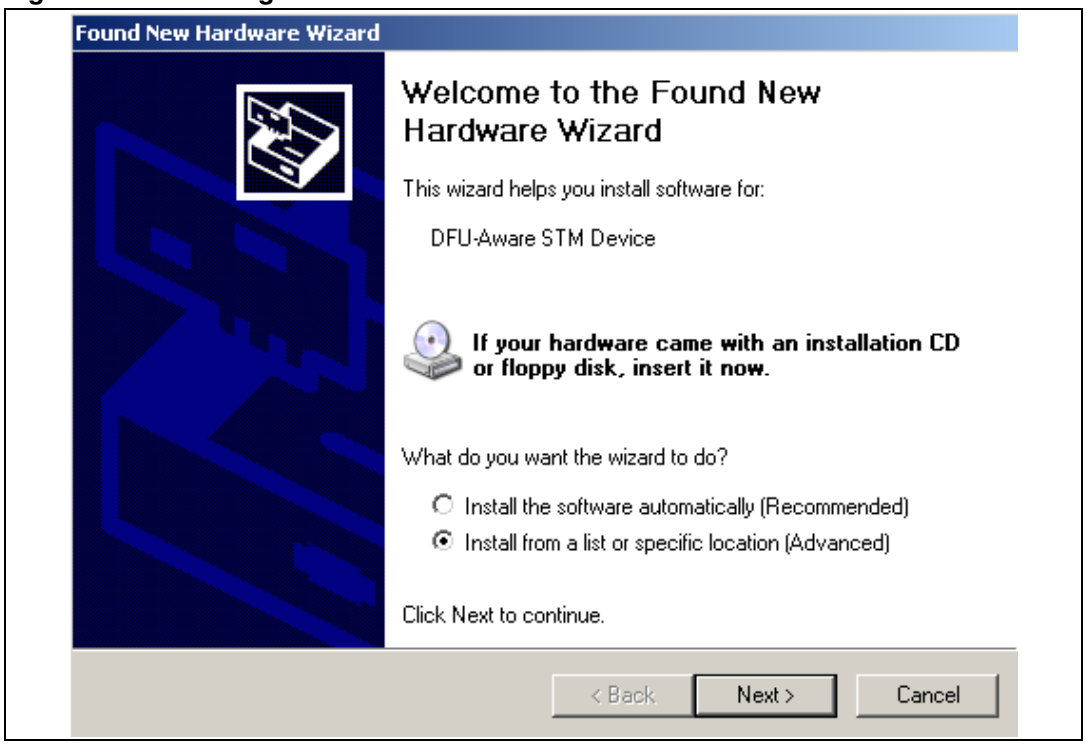
The source code for the Demo application and DfuSe library is located in the “C:\Program Files\STMicroelectronics\DfuSe\Sources” folder.

Documentation is located in the “C:\Program Files\STMicroelectronics\DfuSe\Sources\Doc” folder.

### 1.3.2 Hardware installation

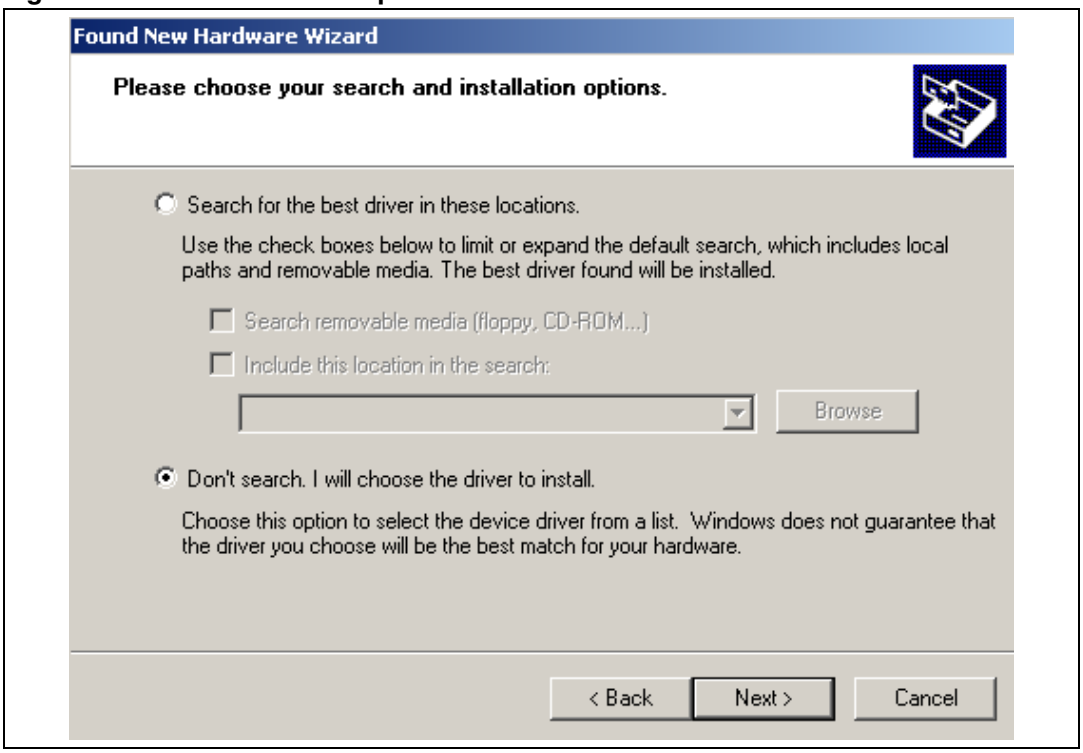
- Connect the device to a spare USB port on your PC.
- The “Found New Hardware Wizard” then starts. Select the “Install from a list or specific location” as shown below and then click "Next".

**Figure 2. Selecting the installation location**



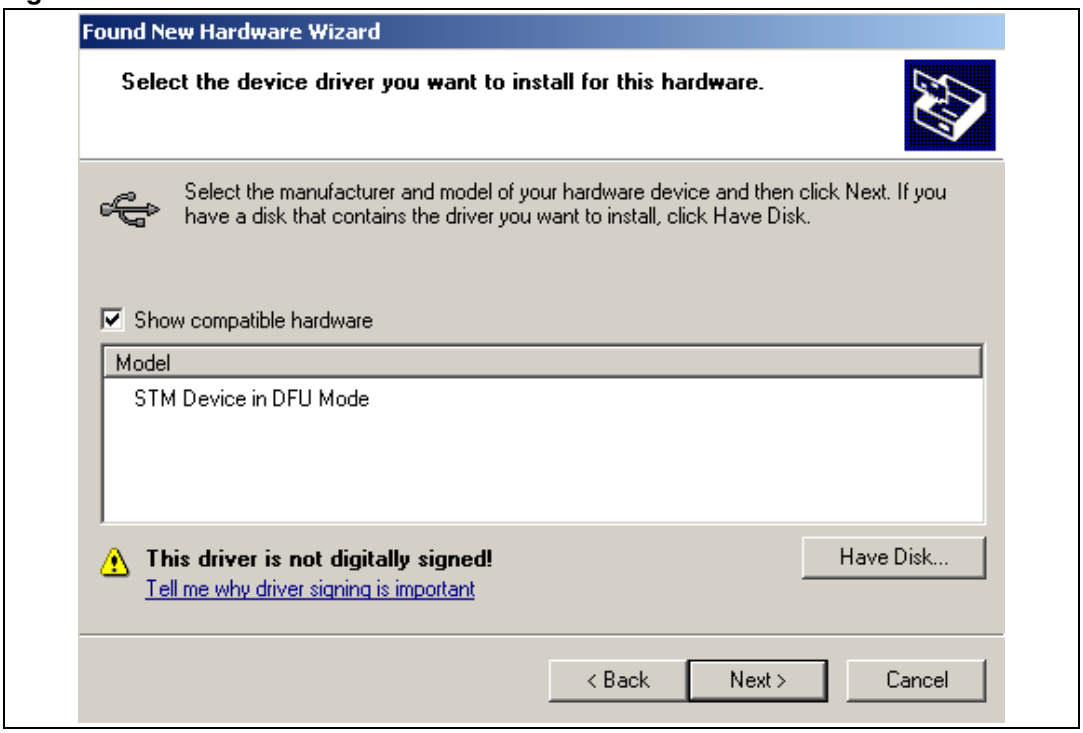

- Select “Don’t search. I will choose the driver to install” as shown below and then click "Next".

**Figure 3. Driver selection option**



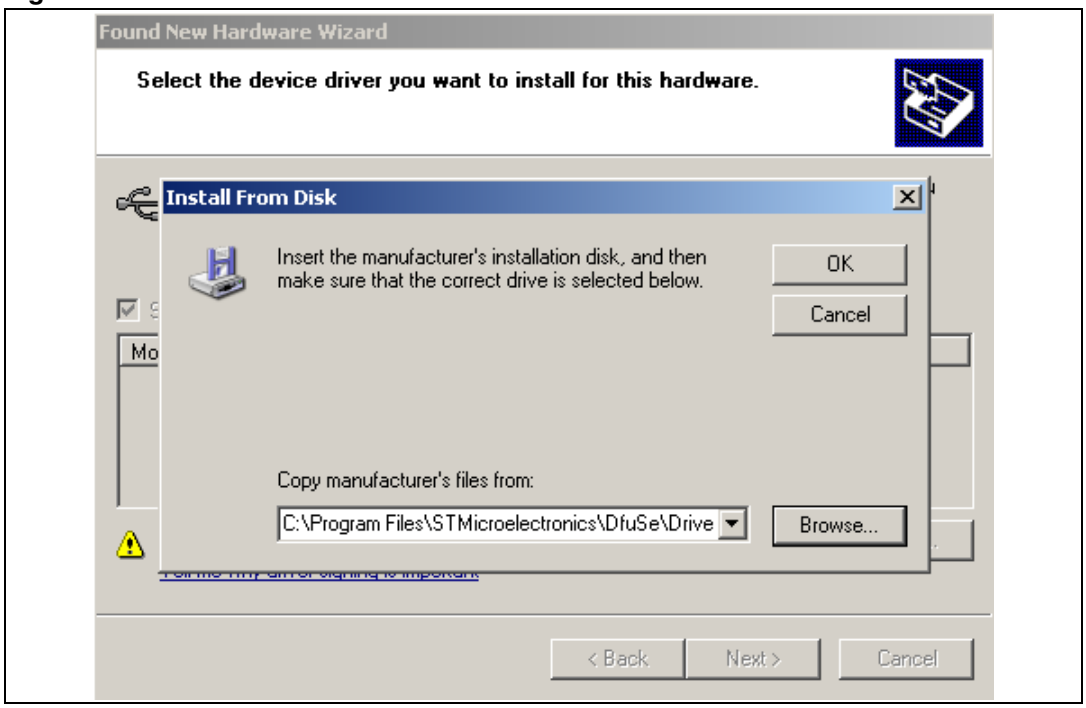

- If a driver is already installed, the model list will show the compatible hardware models, else click “Have Disk...” to locate the driver files.

**Figure 4. Driver selection**




- In the “Install From Disk” dialog box, click “Browse...” to specify the driver files location, the driver directory is located in your install path (C:\Program files\STMicroelectronics\DfuSe\Driver), then click "OK".
  The PC autoselects the correct INF file, in this case STDFU.INF. Once Windows has found the required driver .INF file, the compatible hardware model will be displayed in the model list. Click "Next" to proceed.

**Figure 5. Installation from disk**




- When Windows is performing the driver installation, a warning dialog will be displayed indicating that the driver has not passed Windows logo testing, click “continue Anyway” to continue.

**Figure 6. Progress message**

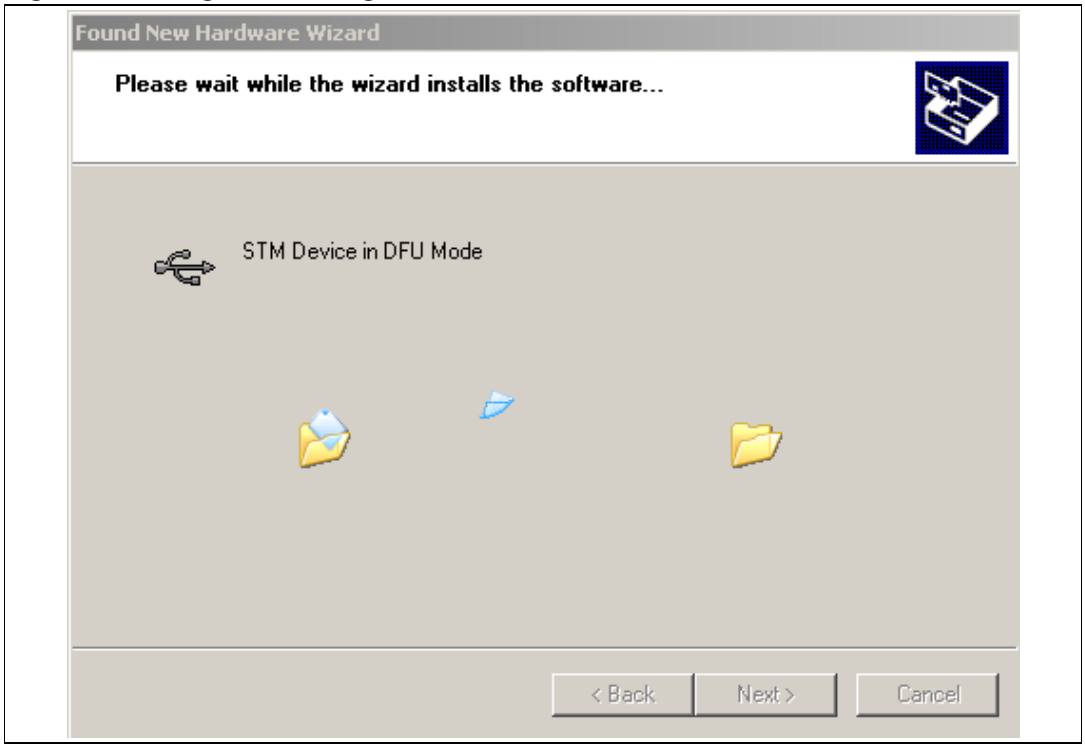
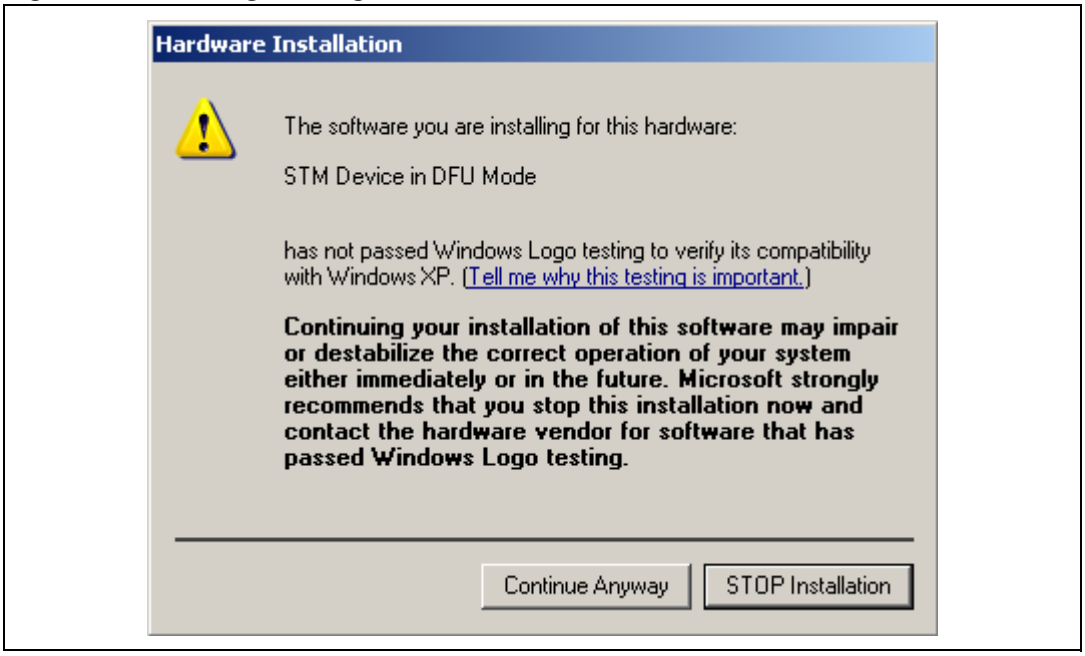
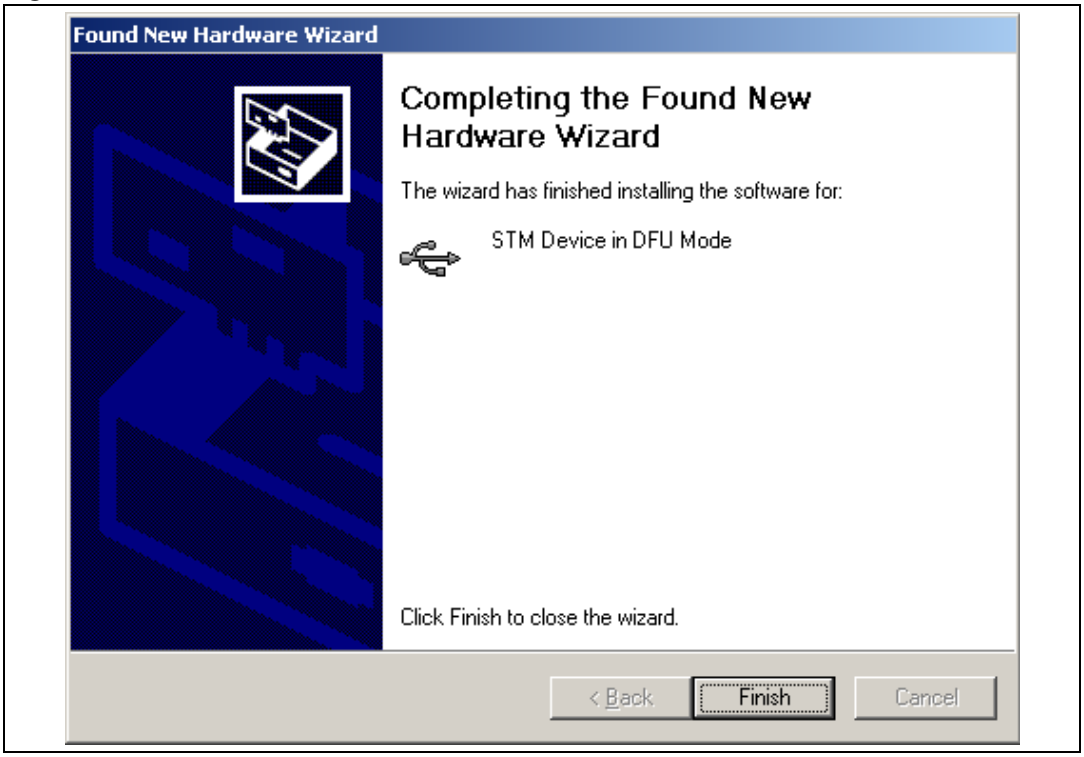


**Figure 7. Warning message**




- Windows should then display a message indicating that the installation was successful. Click "Finish" to complete the installation.

**Figure 8. Installation finish**



# 2 DFU file

Users that have purchased DFU devices require the ability to upgrade the firmware of these devices. Traditionally, firmware is stored in Hex, S19 or Binary files, but these formats do not contain the necessary information to perform the upgrade operation, they contain only the actual data of the program to be downloaded. However, the DFU operation requires more information, such as the product identifier, vendor identifier, Firmware version and the Alternate setting number(Target ID) of the target to be used, this information makes the upgrade targeted and more secure. To add this information, a new file format should be used, to be called DFU file format. For more details refer to the “DfuSe File Format Specification” document (UM0391).

# 3 User interface description

This section describes the different user interfaces available in the DfuSe package, and explains how to use them to perform DFU operations such as Upload, Download and firmware file management.

## 3.1 DfuSe demonstration

Firmware upgrades need to be able to be performed without any special training, even by novice users. Hence, the user interface was designed to be as robust and simple to use as possible (see *Figure 9*). The numbers in *Figure 9* refer to the description in *Table 1* listing the available controls in the DfuSe Demonstration interface.

**Figure 9. DfuSe demo dialog box**

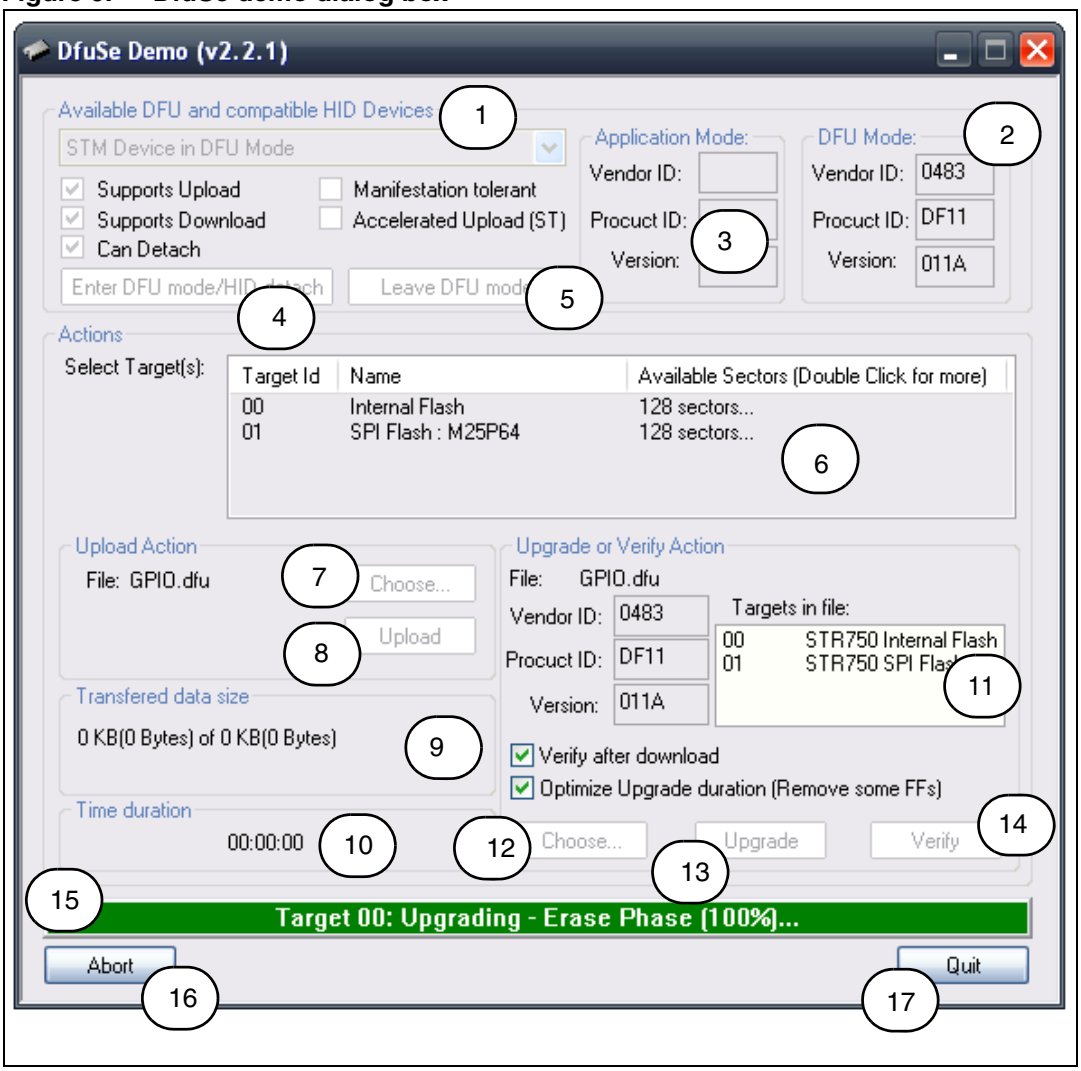


**Table 1. DfuSe demo dialog box description**

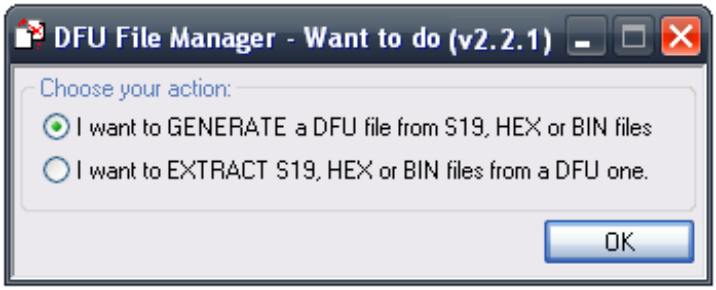
| Control | Description |
|---|---|
| 1 | Lists the available DFU and compatible HID devices, the selected one is the one currently used.<br>Compatible HID device is a HID class device providing the HID detach feature (USAGE_PAGE 0xFF00 and USAGE_DETACH 0x0055) in its report descriptor.<br>Example:<br>`0xa1, 0x00, // Collection(Physical)`<br>`0x06, 0x00, 0xFF, // Vendor defined usage page - 0xFF00`<br>`0x85, 0x80, // REPORT_ID (128)`<br>`0x09, 0x55, // USAGE (HID Detach)`<br>`0x15, 0x00, // LOGICAL_MINIMUM (0)`<br>`0x26, 0xFF, 0x00, // LOGICAL_MAXIMUM (255)`<br>`0x75, 0x08, // REPORT_SIZE (8 bits)`<br>`0x95, 0x01, // REPORT_COUNT (1)`<br>`0xB1, 0x82, // FEATURE (Data,Var,Abs,Vol)`<br>`0xC0, // END_COLLECTION (Vendor defined)` |
| 2 | Device identifiers for DFU mode; PID, VID and Version. |
| 3 | Device identifiers for Application mode; PID, VID and Version. |
| 4 | Send Enter DFU mode command. Target will switch from Application to DFU mode or send a HID Detach if the device is a compatible HID device. |
| 5 | Send Leave DFU mode command. Target will switch from DFU to Application mode. |
| 6 | Memory mapping, Double click each item to view more details about the memory part. |
| 7 | Choose destination DFU file, the uploaded data will be copied into this file. |
| 8 | Start Upload operation. |
| 9 | Size of the transferred data during the current operation (Upload/Upgrade). |
| 10 | Duration time of the current operation (Upload/Upgrade). |
| 11 | Available targets in the loaded DFU file. |
| 12 | Choose source DFU file, the downloaded data will be loaded from this file. |
| 13 | Start upgrade operation(Erase then download). |
| 14 | Verify if data was successfully uploaded. |
| 15 | Show the progress of the operation. |
| 16 | Abort current operation. |
| 17 | Exit application. |

## 3.2 DFU file manager

### 3.2.1 “Want to do” dialog box

When DFU file manager application is executed, the “Want to do” dialog box appears, the user has to choose the file operation he wants to do. Select the first Radio button to generate a DFU file from an S19, Hex or Bin file, or the second to extract an S19, Hex or Bin file from a DFU file (see *Figure 10*).

**Figure 10. "Want to do" dialog box**




Select "I want to GENERATE a DFU file from S19, HEX or BIN files" radio button if you want to generate a DFU file from S19, Hex or Binary files.

Select "I want to EXTRACT S19, HEX or BIN files from a DFU one" radio button if you want to extract an S19, Hex or Binary file from a DFU file.

### 3.2.2 File generation dialog box

If the first choice was selected, click the OK button to display the "File Generation dialog box". This interface allows the user to generate a DFU file from an S19, Hex or Bin file.

**Figure 11. "Generation" dialog box**

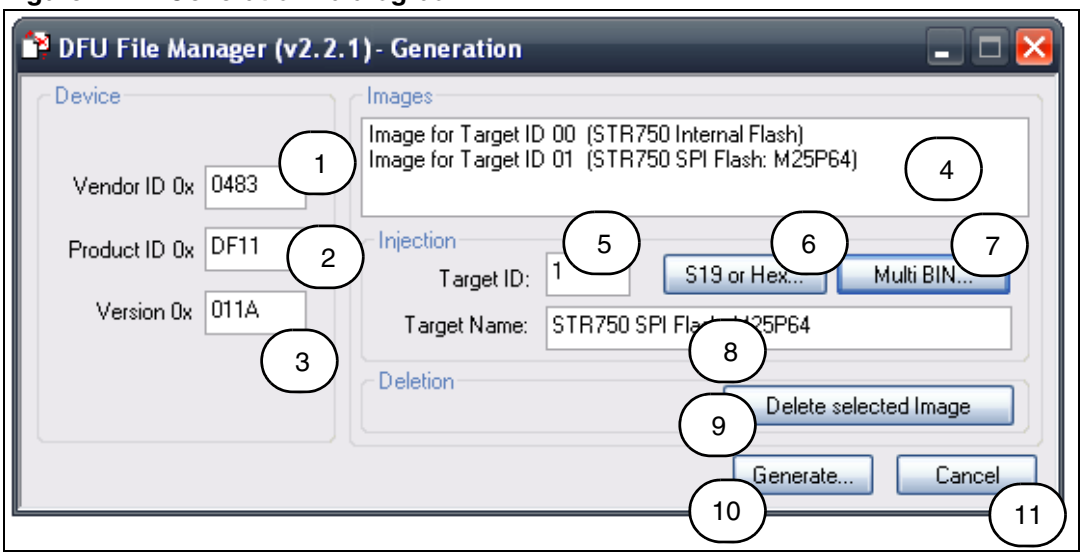



**Table 2. File generation dialog box description**

| Control | Description |
|---|---|
| 1 | Vendor identifier. |
| 2 | Product identifier. |
| 3 | Firmware version. |
| 4 | Available images to be inserted in the DFU file. |
| 5 | Target identifier number. |
| 6 | Open S19 or Hex file. |

Table 2. File generation dialog box description (continued)

| Control | Description |
|---|---|
| 7 | Open Binary files. |
| 8 | Target name. |
| 9 | Delete selected image from the images list. |
| 10 | Generate DFU file. |
| 11 | Cancel and exit application. |

Because S19, Hex and Bin files do not contain the target specification, the user must enter the Device properties (Vid, Pid and version), the Target ID and the target name before generating the DFU file.

Figure 12. "Multi bin injection" dialog box

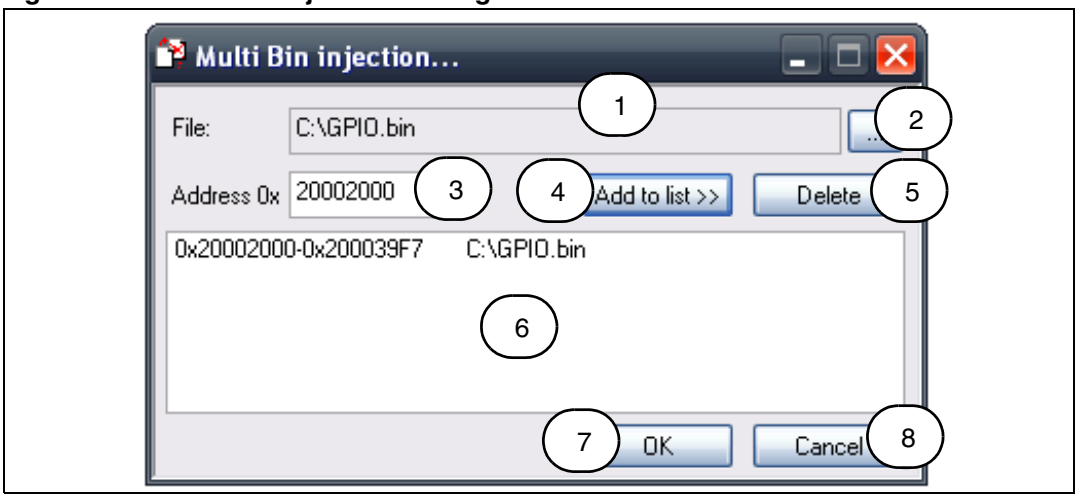



Table 3. Multi bin injection dialog box description

| Control | Description |
|---|---|
| 1 | Path of the last opened binary file. |
| 2 | Open binary files. A binary file could be a file of any format (Wave, video, Text, ...). |
| 3 | Start address of the loaded file. |
| 4 | Add file to the file list. |
| 5 | Delete file from file list. |
| 6 | File list. |
| 7 | Confirm file selection. |
| 8 | Cancel and exit operation. |

### 3.2.3 File extraction dialog box

If the second choice in the “Want to do” dialog box was selected, Click the OK button to display the “File extraction” dialog box. This interface allows you to generate an S19, Hex or Bin file from a DFU file.

**Figure 13. “Extract” dialog box**

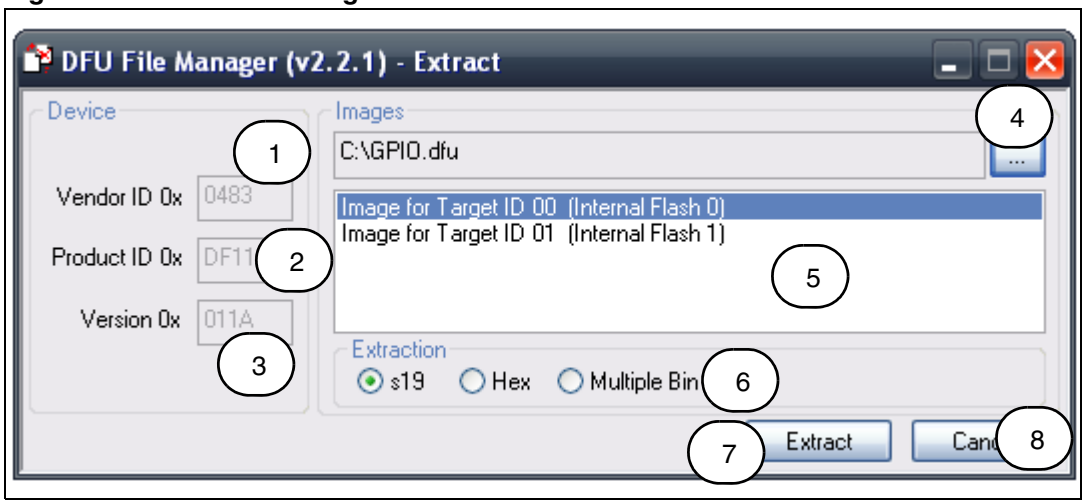



**Table 4. File extraction dialog box description**

| Control | Description |
|---|---|
| 1 | Device vendor identifier. |
| 2 | Device product identifier. |
| 3 | Firmware version. |
| 4 | Open DFU file. |
| 5 | Image list in the loaded DFU file. |
| 6 | Type of the file to be generated. |
| 7 | Extract image to S19, Hex or Bin file. |
| 8 | Cancel and exit application. |

# 4 Step-by-step procedures

## 4.1 DfuSe demonstration procedures

### 4.1.1 How to upload a DFU file

1. Run the “DfuSe demonstration” application (Start -> All Programs -> STMicroelectronics -> DfuSe -> DfuSe Demonstration).
2. Click “Choose” button (Item 7 in *Table 1*/*Figure 9*) to select a DFU file.
3. Select the memory target(s) in the memory mapping list (Item 6 in *Table 1*/*Figure 9*).
4. Click “Upload” button (Item 8 in *Table 1*/*Figure 9*) to start uploading memory content to the selected DFU file.

### 4.1.2 How to download a DFU file

1. Run the “DfuSe demonstration” application (Start -> All Programs -> STMicroelectronics -> DfuSe -> DfuSe Demonstration).
2. Click the “Choose” button (Item 12 in *Table 1*/*Figure 9*) to select a DFU file. the displayed Information such as VID, PID, Version and target number is read from the DFU file.
3. Check the “Optimize upgrade duration” checkbox to ignore FF blocks during the upload.
4. Check the “Verify after download” checkbox if you want to launch the verification process after downloading data.
5. Click the “Upgrade” button (Item 13 in *Table 1*/*Figure 9*) to start upgrading file content to the memory.
6. Click the “Verify” button (Item 14 in *Table 1*/*Figure 9*) to verify if the data was successfully downloaded.

## 4.2 DFU file manager procedures

### 4.2.1 How to generate DFU files from S19/Hex/Bin files

1. Run the “DFU File Manager” application(Start -> All Programs -> STMicroelectronics -> DfuSe-> DFU File Manager).
2. Select “I want to GENERATE a DFU file from S19, HEX or BIN files” item in the “Want to do” dialog box(*Table 10*) then click “OK”.
3. Create a DFU image from an S19/Hex or binary file.
   a) Set a non used Target ID number (Item 5 in *Table 2*/*Figure 11*).
   b) Fill the VID, PID, Version and the target name
   c) To create the image from an S19 or Hex file, click the “S19 or Hex” button (Item 6 in *Table 2*/*Figure 4*) and select your file, a DFU image will be created for each added file.
   d) To create the image from one or more binary files, click the “Multi Bin” button (Item 7 in *Table 2*/*Figure 11*) to show the “Multi Bin Injection” dialog box (*Figure 12.*).

      Click the Browse button (Item 2 in *Table 3*/*Figure 12*) to select a binary file(*.bin) or other format of file (Wave, Video, Text, ...).

      Set the start address in the address field (Item 3 in *Table 3*/*Figure 12*).

      Click the “Add to list” button (Item 4 in *Table 3*/*Figure 12*) to add the selected binary file with the given address.

      To delete an existing file, select it, then click the “Delete” button (Item 5 in *Table 3*/*Figure 12*).

      Redo the same sequence to add other binary files,

      Click “OK” to validate.
4. Repeat step (3.) to create other DFU images.
5. To create the DFU file, click “Generate”.

### 4.2.2 How to extract S19/Hex/Bin files from DFU files

1. Run “DFU File Manager” application(Start -> All Programs -> STMicroelectronics -> DfuSe -> DFU File Manage).
2. Select “I want to EXTRACT S19, HEX or BIN files from a DFU one” radio button in the “Want to do” dialog box (*Figure 10*) then click “OK”.
3. Extract an S19/Hex or binary file from a DFU file.
   a) Click the Browse button (Item 4 in *Table 4*/*Figure 13*) to select a DFU file. The contained images will be listed in the images list (Item 4 in *Table 4*/*Figure 13*).
   b) Select an image from the images list.
   c) Select Hex, S19 or Multiple Bin radio button (Item 6 in *Table 4*/*Figure 13*).
   d) Click the “Extract” button (Item 7 in *Table 4*/*Figure 13*) to extract the selected image.
4. Repeat step (3.) to extract other DFU images.

# 5 Revision history

Table 5. Document revision history

| Date | Revision | Changes |
|---|---|---|
| 06-Jun-2007 | 1 | Initial release. |
| 02-Jan-2008 | 2 | Added *Section 4*. |
| 24-Sep-2008 | 3 | Updated *Figure 9* to *Figure 13*. |

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