

DfuSe Quick Start Guide

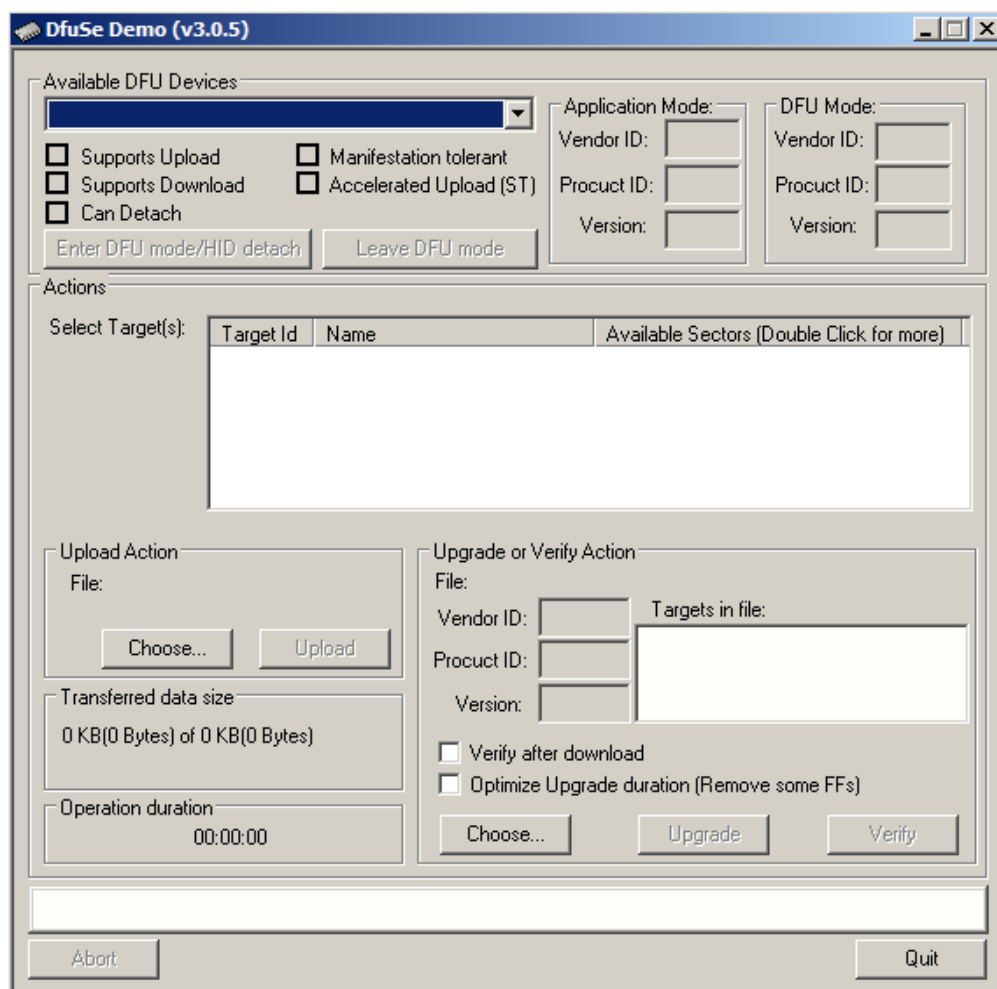
Introduction

DFU 는 Device Firmware Upgrade 의 줄임말로 MCU 초기 or 일반 상태에서 System or User Bootloader 를 이용해서 Flash memory 에 Firmware 를 Writing 하는 것을 의미합니다. 이 문서에서는 MCU 에 내장 된 System Bootloader 를 이용해서 MUC 에 USB 를 통해 F/W Download 할 수 있는 ST 에서 제공되는 DfuSe Tool 사용법에 대해 간략히 설명 합니다.

Table 1. Applicable products

Type	Part number or Series
Microcontrollers	STM32F0 Series: – STM32F04xxx, STM32F07xxx
	STM32F1 Series: – STM32F105xx, STM32F107xx
	STM32F2 Series
	STM32F3 Series: – STM32F301xx, STM32F302xx, STM32F303xB, STM32F303xC, STM32F303xD, STM32F303xE, STM32F373xx
	STM32F4 Series: – STM32F401xx, STM32F405xx, STM32F407xx, STM32F411xx, STM32F412xx, STM32F415xx, STM32F417xx, STM32F427xx, STM32F429xx, STM32F437xx, STM32F439xx, STM32F446xx, STM32F469xx, STM32F479xx
	STM32F7 Series: – STM32F722xx, STM32F723xx, STM32F732xx, STM32F733xx, STM32F745xx, STM32F746xx, STM32F756xx, STM32F765xx, STM32F767xx, STM32F769xx, STM32F777xx, STM32F779xx
	STM32L0 Series: – STM32L07xxx, STM32L08xxx
	STM32L1 Series: – STM32L1xxx, STM32L1xxxD, STM32L1xxxE
	STM32L4 Series: – STM32L431xx, STM32L432xx, STM32L433xx, STM32L442xx, STM32L443xx, STM32L471xx, STM32L475xx, STM32L476xx, STM32L486xx, STM32L496xx, STM32L4A6

Target Device는 위 List 참고 하시기 바랍니다.



(M

*** DfuSE Tool 사용 방법은 크게 두 가지 형태**

1. 생선 된 F/W bin or hex file 을 xxx.dfu file 형식으로 변환
2. DfuSE Tool 을 이용 Download

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1 준비사항

1.1 STM32 microcontroller DfuSE 를 위한 회로 구성

- USB 를 이용한 System Boot mode

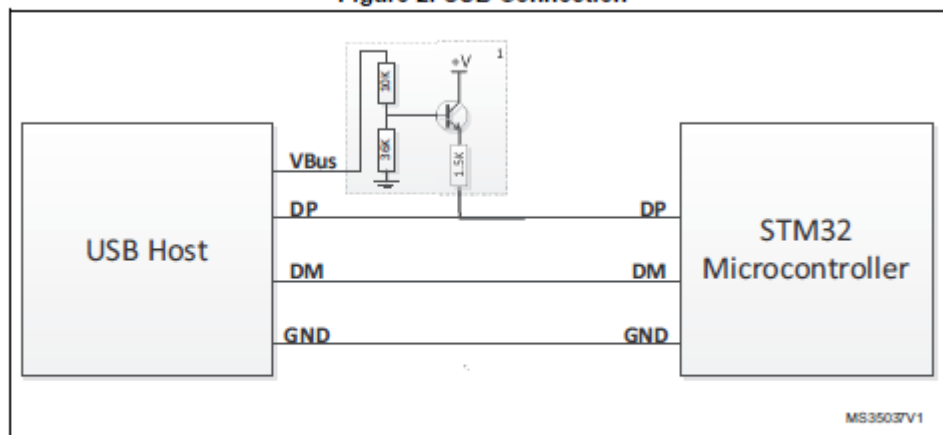
System Boot mode (BOOT0 : 1, BOOT1 : 0) -> MCU 내부에 Program 되어져 있는 Boot 를 이용하는 방법

사용하시는 MCU(STM32F411)는 전원 공급 또는 reset 상황에서 BOOTn 핀에 따라 아래와 같이 instruction fetch 를 시작합니다. “Main Flash memory”는 internal flash memory 영역을 의미하며, “System memory”는 MCU 제조 공정에서 user application 다운로드를 위한 system bootloader 가 위치한 internal ROM 영역을 의미합니다. 보통 internal flash memory 를 업데이트 하기 위해 외부에서 BOOT0 핀을 제어(to HIGH)하여 system bootloader 를 동작시키며, 그 외의 경우(BOOT0: LOW)에서는 internal flash memory 의 user application 을 동작시키게 됩니다. 현재 BOOT0 핀이 GND 연결되어 있으므로, BOOT1 핀도 GND 연결 처리하시면 reset 또는 전원 공급 상황에서 internal flash memory 의 user application 이 수행되게 됩니다.

Table 2. Boot modes

Boot mode selection pins		Boot mode	Aliasing
BOOT1	BOOT0		
x	0	Main Flash memory	Main Flash memory is selected as the boot space
0	1	System memory	System memory is selected as the boot space
1	1	Embedded SRAM	Embedded SRAM is selected as the boot space

Figure 2. USB Connection



1. This additional circuit permit to connect a Pull-Up resistor to (DP) pin using VBus when needed. Refer to product section (Table which describe STM32 Configuration in system memory boot mode) to know if an external pull-up resistor must be connected to (DP) pin.

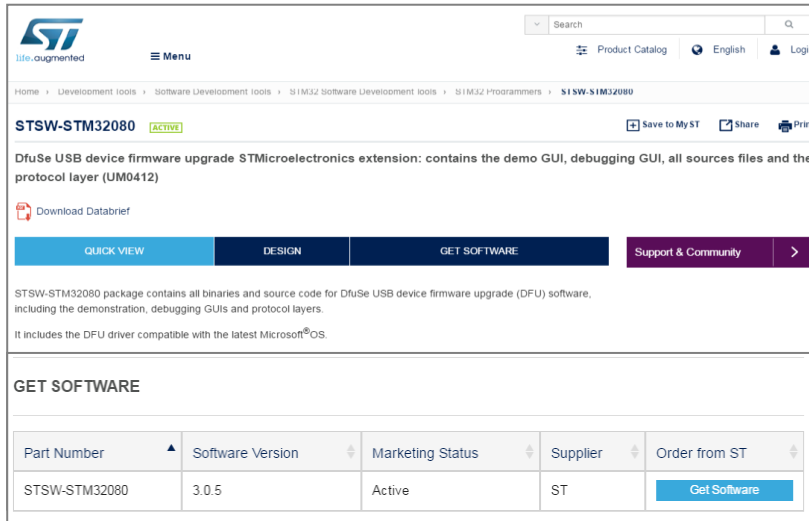
Note: +V typically 3.3 V. This value depend on the application and the used hardware.

1.2 DfuSE 설치

Download URL:

http://www.st.com/content/st_com/en/products/development-tools/software-development-tools/stm32-software-development-tools/stm32-programmers/stsw-stm32080.html

프로그램 설치



STSW-STM32080 ACTIVE Save to My ST Share Print

DfuSe USB device firmware upgrade STMicroelectronics extension: contains the demo GUI, debugging GUI, all sources files and the protocol layer (UM0412)

Download Databrief

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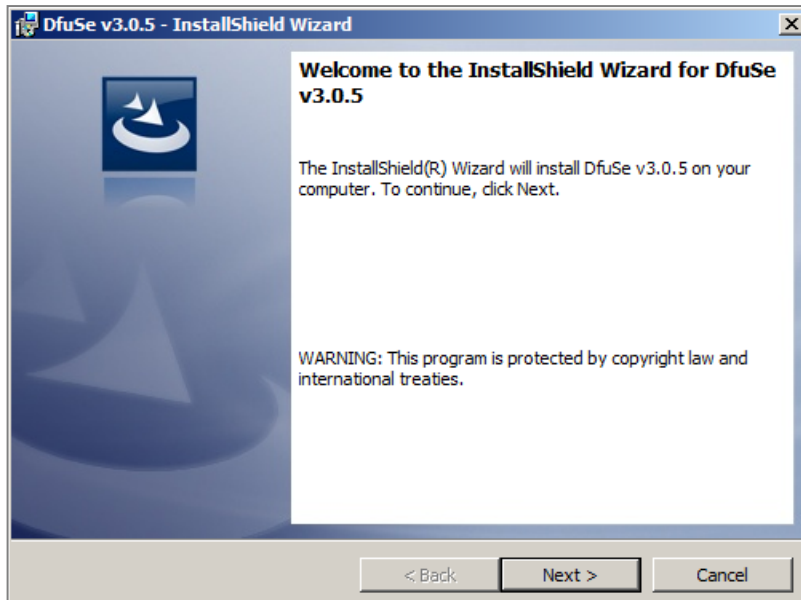
STSW-STM32080 package contains all binaries and source code for DfuSe USB device firmware upgrade (DFU) software, including the demonstration, debugging GUIs and protocol layers.

It includes the DFU driver compatible with the latest Microsoft®OS.

GET SOFTWARE

Part Number	Software Version	Marketing Status	Supplier	Order from ST
STSW-STM32080	3.0.5	Active	ST	Get Software

Download 에서 Setup file 로 설치 (DfuSe_Demo_V3.0.5_Setup.exe)

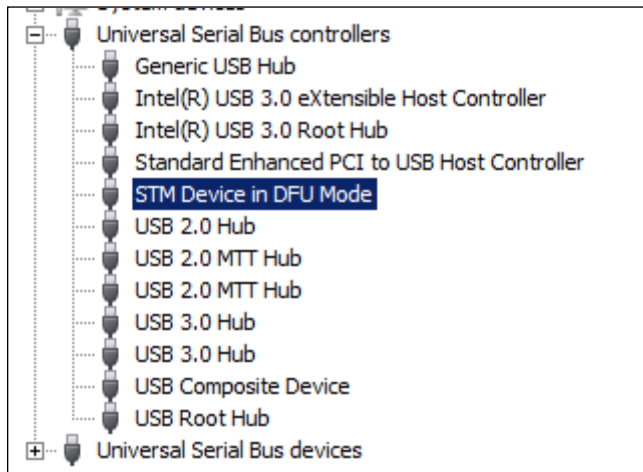


2 DfuSE 사용 방법

2.1 Target Board 설정 : System Boot mode (BOOT0 : 1, BOOT0 : 0)

2.2 DfuSE tool 실행

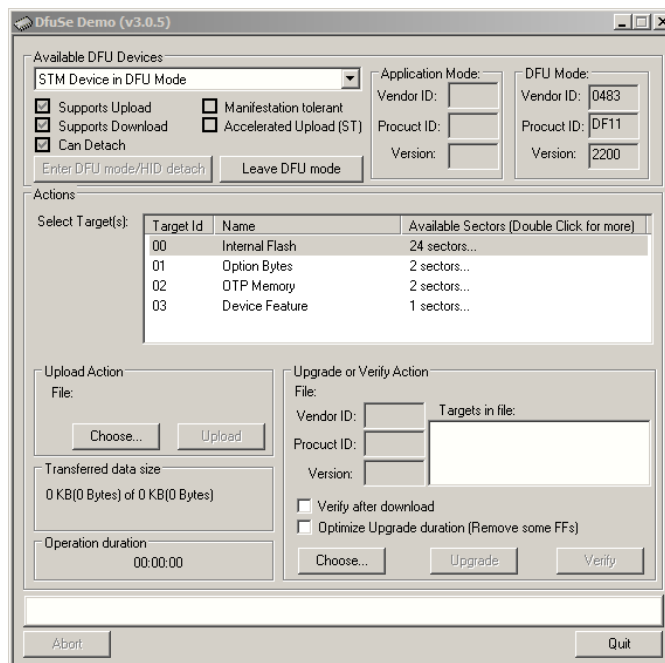
2.3 DfuSE USB Driver 설치



USB driver 수동 설치 필요할 경우

Driver 위치 : C:\Program Files
(x86)\STMicroelectronics\Software\DfuSe\Driver

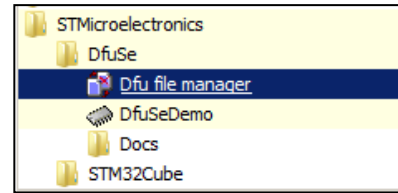
2.4 DfuSE Demo Tool Board 인식 화면



2.5 DfuSE File 생성

Download dfu file 변환

1. Dfu file manager 프로그램 실행



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 12. "Generation" dialog box

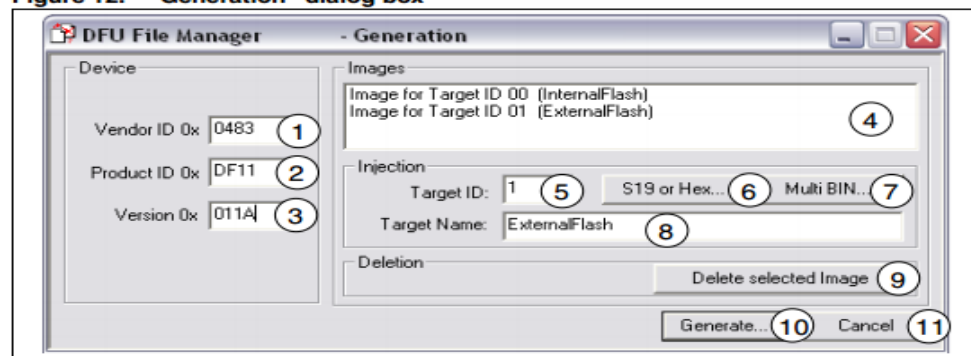


Table 2. File generation dialog box description

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

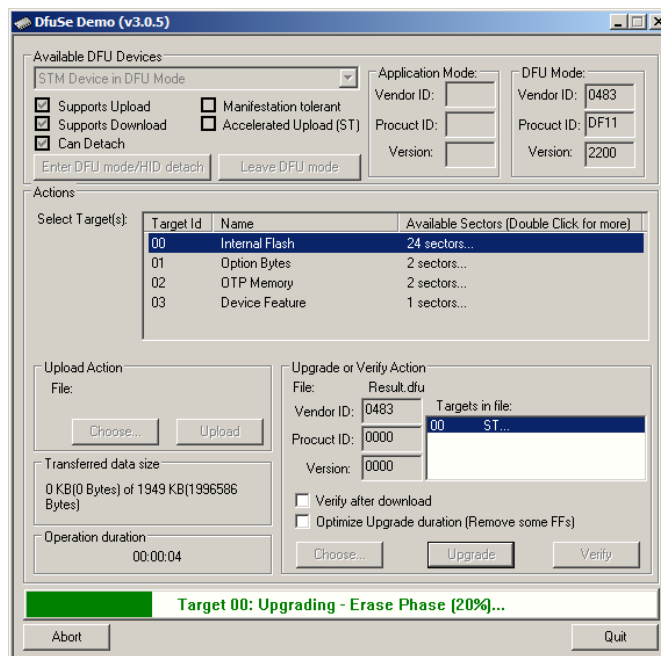
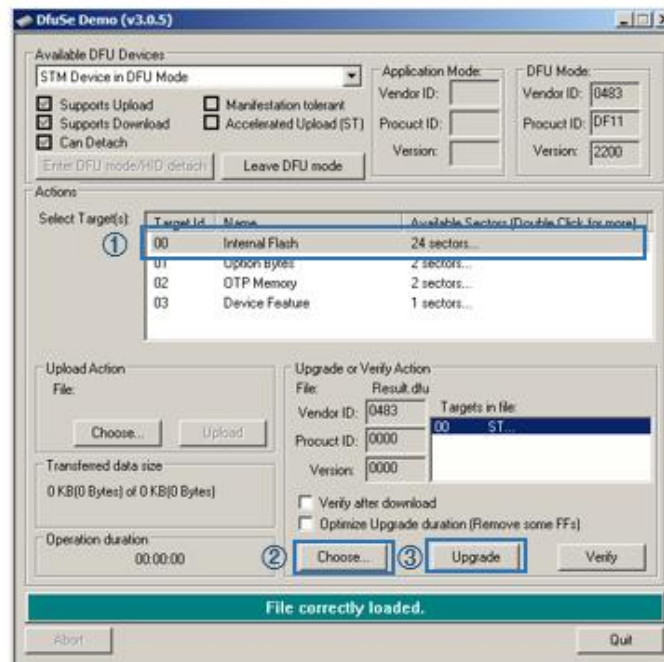
Because S19, Hex and Bin files do not contain the target specification, the user must enter the Device properties (VID, PID and version), the Target ID and the target name before generating the DFU file.

- ④, ⑧ 현재 Target 이 되고 있는 Flash 정보
- ⑤ 0 : Internal Flash, 1 : External Flash
- ⑥ 변환을 원하는 Target S19 or Hex or Binary 선택
- ⑦ Internal & External Flash 를 한개의 dfu file 형식으로 변환

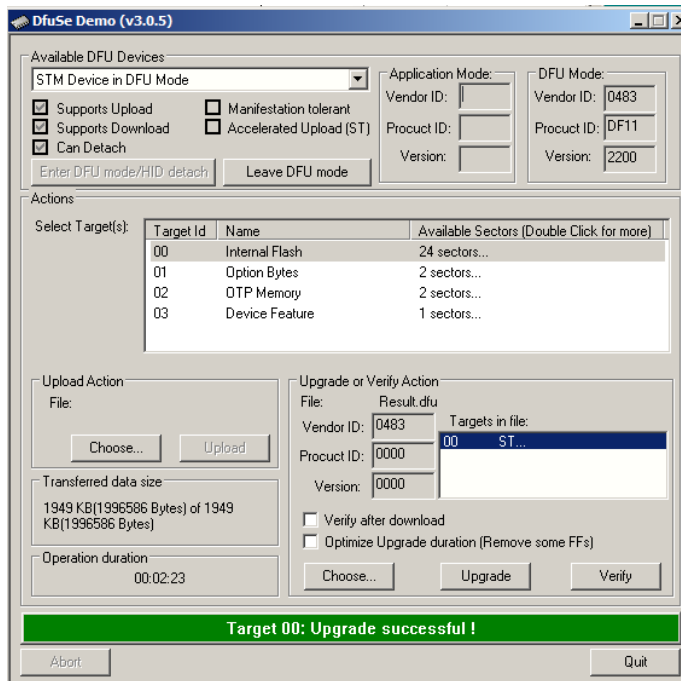
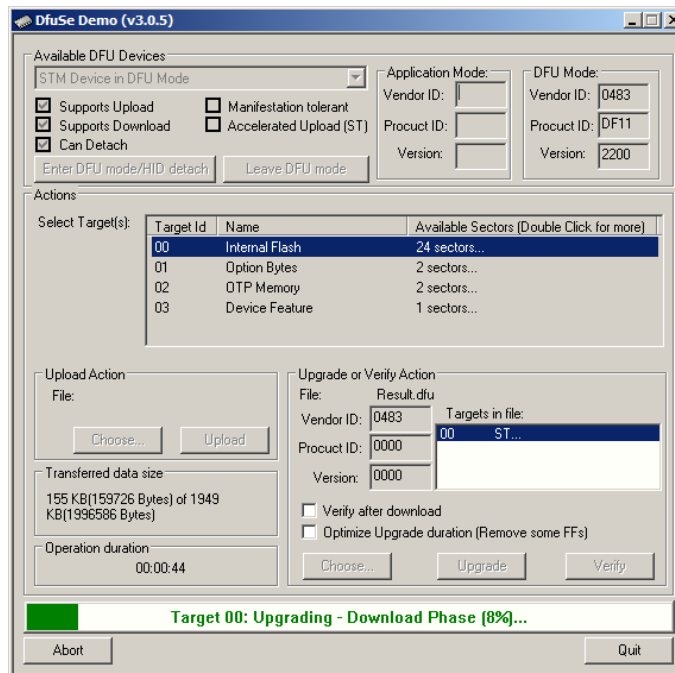
2. Gerate Button 이후 결과물은 xxxx.dfu file 생성 됨을 확인 할 수 있습니다.

2.6 Target Programming

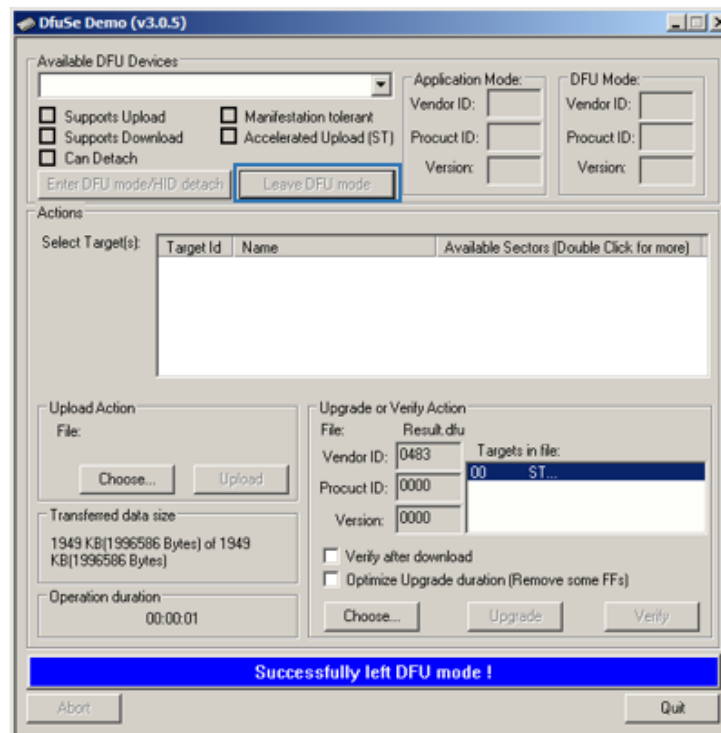
1. DfuSe Demo 프로그램 실행
2. Internal Flash 선택 -> Choose button -> 생성 된 xxxx.dfu file 선택



3. Upgrade button 실행



4. Leave DFU Mode Button



2.7 Download F/W 동작 확인 (주의 Target Board 설정: User F/W mode BOOT0 : 0, BOOT0 : X)

추가적으로 Tool 사용에 대한 자세한 사항은 [참고자료 2. DfuSE User Manual](#) 참고 하시기 바랍니다.


3 참고 자료

3.1 STM32 microcontroller system memory boot mode

STM32 system bootloader 사용법에 대한 문서입니다.

Download URL :

http://www.st.com/st-web-i/static/active/en/resource/technical/document/application_note/C00167594.pdf



AN2606
Application note

STM32 microcontroller system memory boot mode

Introduction

The bootloader is stored in the internal boot ROM memory (system memory) of STM32 devices. It is programmed by ST during production. Its main task is to download the application program to the internal Flash memory through one of the available serial peripherals (USART, CAN, USB, I²C, SPI, etc.). A communication protocol is defined for each serial interface, with a compatible command set and sequences. This document applies to the products listed in [Table 1](#). They are referred as STM32 throughout the document.

Table 1. Applicable products

Type	Part number or product series
Microcontrollers	STM32L0 series: STM32L031xx, STM32L041xx, STM32L051xx, STM32L052xx, STM32L053xx, STM32L062xx, STM32L063xx, STM32L07xxx, STM32L08xxx
	STM32L1 series.
	STM32L4 series: STM32L476xx, STM32L486xx
	STM32F0 series: STM32F03xxx, STM32F04xxx, STM32F05xxx, STM32F07xxx, STM32F098xx
	STM32F1 series.
	STM32F2 series.
	STM32F3 series: STM32F301xx, STM32F302xx, STM32F303xx, STM32F318xx, STM32F328xx, STM32F334xx, STM32F358xx, STM32F373xx, STM32F378xx, STM32F398xx
	STM32F4 series: STM32F401xx, STM32F405xx, STM32F407xx, STM32F410xx, STM32F411xx, STM32F412xx, STM32F415xx, STM32F417xx, STM32F427xx, STM32F429xx, STM32F437xx, STM32F439xx, STM32F446xx, STM32F469xx, STM32F479xx
	STM32F7 series: STM32F74xxx, STM32F75xxx

Table 60. STM32F411xx configuration in system memory boot mode

Bootloader	Feature/Peripheral	State	Comment
Common to all bootloaders	RCC	HSI enabled	The system clock frequency is 60 MHz using the PLL. The HSI clock source is used at startup (interface detection phase) and when USART or SPI or I2C interfaces are selected (once DFU bootloader is selected, the clock source will be derived from the external crystal).
		HSE enabled	The system clock frequency is 60 MHz. The HSE clock source is used only when the DFU (USB FS Device) interfaces are selected. The external clock must provide a frequency multiple of 1 MHz and ranging from 4 MHz to 26 MHz.
		-	The Clock Security System (CSS) interrupt is enabled for the CAN and DFU bootloaders. Any failure (or removal) of the external clock generates system reset.
	RAM	-	12 Kbyte starting from address 0x20000000 are used by the bootloader firmware
	System memory	-	30424 byte starting from address 0x1FFF0000, contain the bootloader firmware

Table 60. STM32F411xx configuration in system memory boot mode (continued)

Bootloader	Feature/Peripheral	State	Comment
DFU bootloader	USB	Enabled	USB OTG FS configured in Forced Device mode
	USB_DM pin	Input/Output	PA11: USB DM line.
	USB_DP pin		PA12: USB DP line No external Pull-up resistor is required
	TIM11	Enabled	This timer is used to determine the value of the HSE. Once the HSE frequency is determined, the system clock is configured to 60 MHz using PLL and HSE.

The system clock is derived from the embedded internal high-speed RC for USARTx, I2Cx and SPIx bootloaders. This internal clock is also used for CAN and DFU (USB FS Device) but only for the selection phase. An external clock multiple of 1 MHz (between 4 and 26 MHz) is required for CAN and DFU bootloader execution after the selection phase.

3.2 DfuSE User Manual

DfuSE Tool 에 대한 사용 방법에 대한 문서 입니다.

Download URL : http://www.st.com/st-web-ui/static/active/en/resource/technical/document/user_manual/CD00155676.pdf



UM0412 User manual

Getting started with DfuSe USB device firmware upgrade STMicroelectronics extension

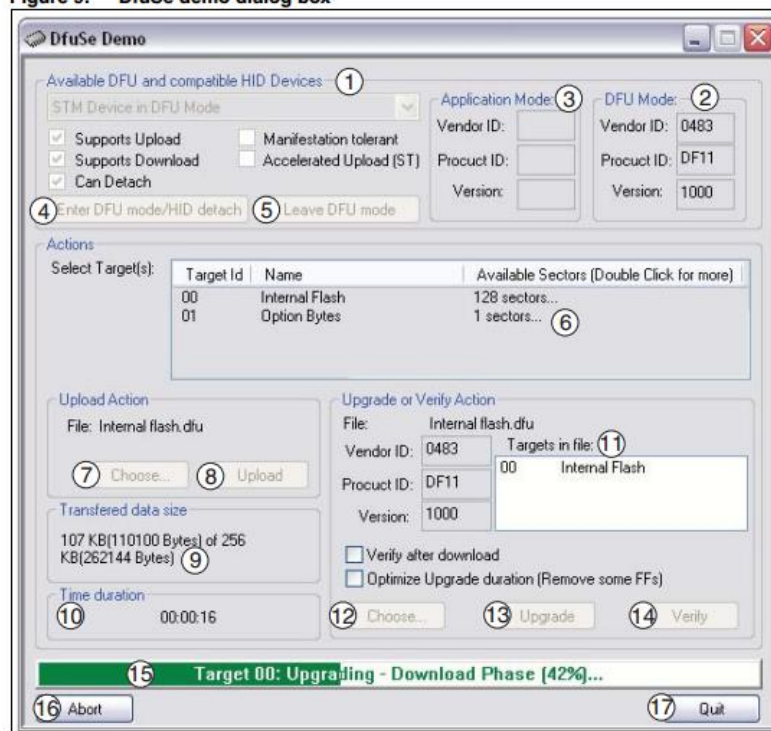
Introduction

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.

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



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