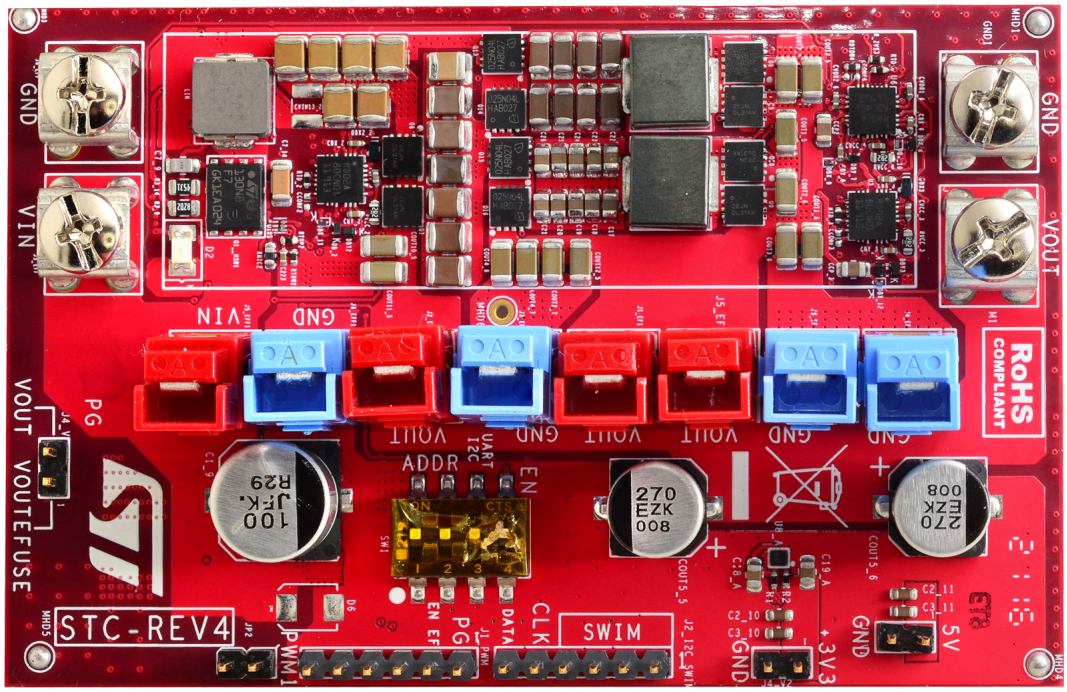
STNRG328S EEPROM programming procedure

Introduction

This document describes the procedure to reprogram the EEPROM memory of the STNRG328S device mounted on boards with STC/HSTC topologies. The procedure involves downloading the binary file stsw-stc in hex format using the USB/TTL-RS232 cable adapter.

The example below shows a board with STC topology and STNRG328S mounted. The design is based on X7R components (switch capacitors and resonant inductors) for rate conversion 4:1 (from 48 V input bus to 12 V Vout), able to deliver 1 kW power in server applications.

Figure 1. X7R-1kW board in STC topology with STNRG328S



The binary code stsw-stc can be downloaded from the link https://www.st.com/en/product/stnrg328s. The stsw-stc supports the PMBUS communication. You can find the command list and more information about the device at the same location.

Important: Contact the local sales office when programming the chip for the first time.

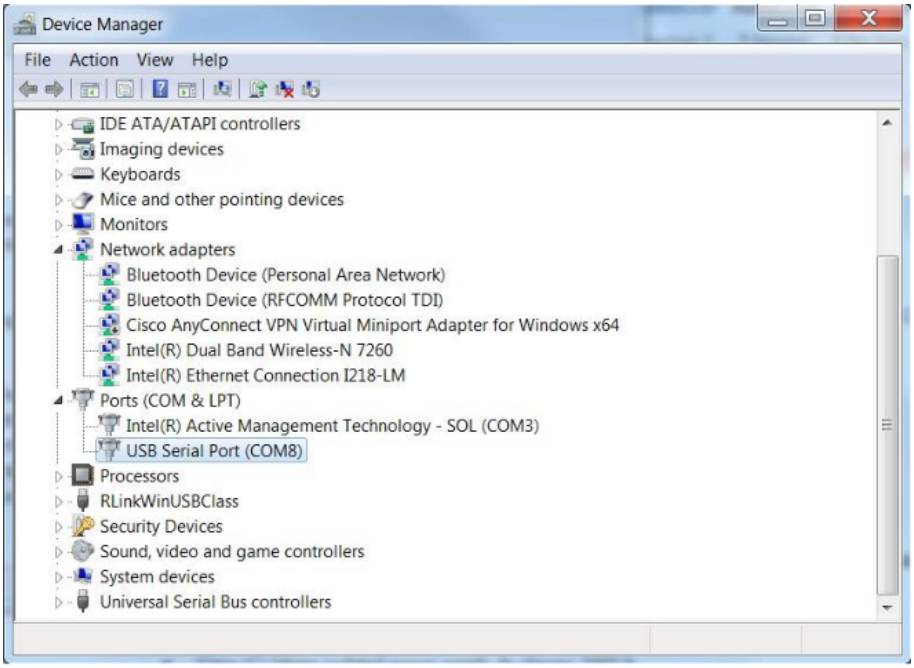
1 Tools and instruments

The tools and the instruments needed to execute upgrade procedure are described below.

1. Personal computer with the following requirements:
   - Windows XP, Windows 7 operating systems
   - at least 2 GB of RAM memory
   - 1 USB port
2. Installation file *CDM v2.12.00 WHQL Certified.exe* for FTDI driver for USB 2.0 to serial UART converter. The file can be downloaded from ST.com at the STEVAL-ILL077V1 evaluation tool firmware page in the STSW-ILL077FW_SerialLoader subdirectory.
   - Connect the USB /UART cable of into the PC and motherboard. The first time the cable is connected to the PC, the FTDI USB serial converter driver should be found and installed automatically.

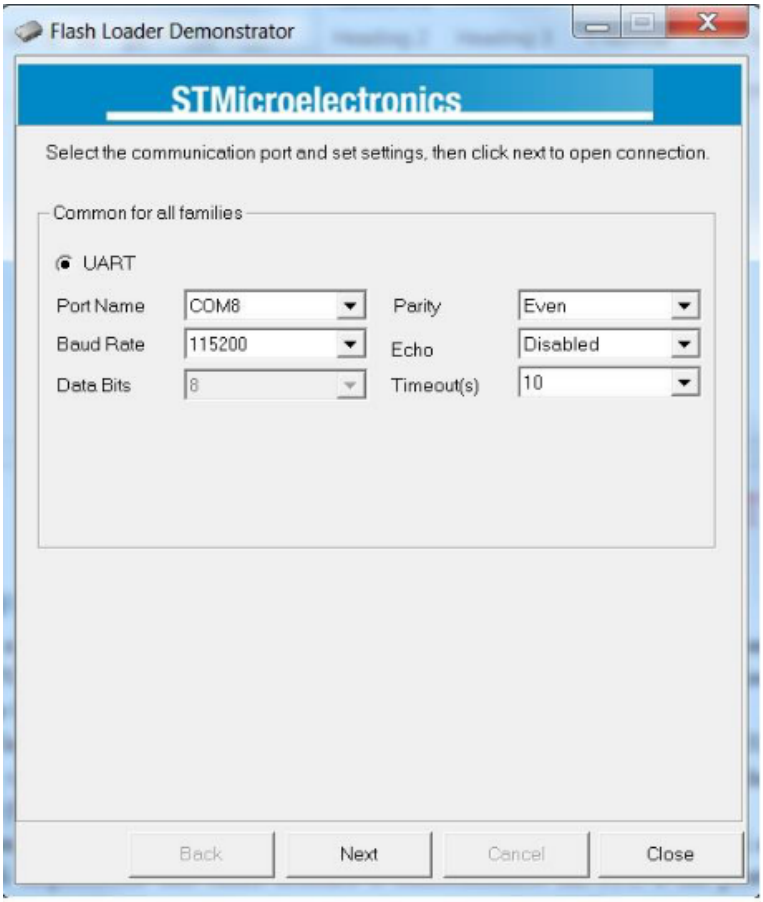
     If the driver is not installed, launch the installation file *CDM v2.12.00 WHQL Certified.exe*.
   - Once the driver is installed, the communication through the USB port is mapped to an internal PC COM. The mapping can be verified in Windows Device manager: [**Control Panel**]>[**System**]>[**Device Manager**]>[**Ports**].

Figure 2. Windows Device Manager showing COM port mapping



3. *Archive file Flash Loader Demonstrator.7z*, required to install the ST serial flash loader on the PC.
   The file can be downloaded from ST.com at the STEVAL-ILL077V1 evaluation tool firmware page in the STSW-ILL077FW_SerialLoader subdirectory.
   – After having installed the toolset, run the executable file *STFlashLoader.exe*. The screen shown in the figure below will appear.

Figure 3. ST Flash Loader Demonstrator tool

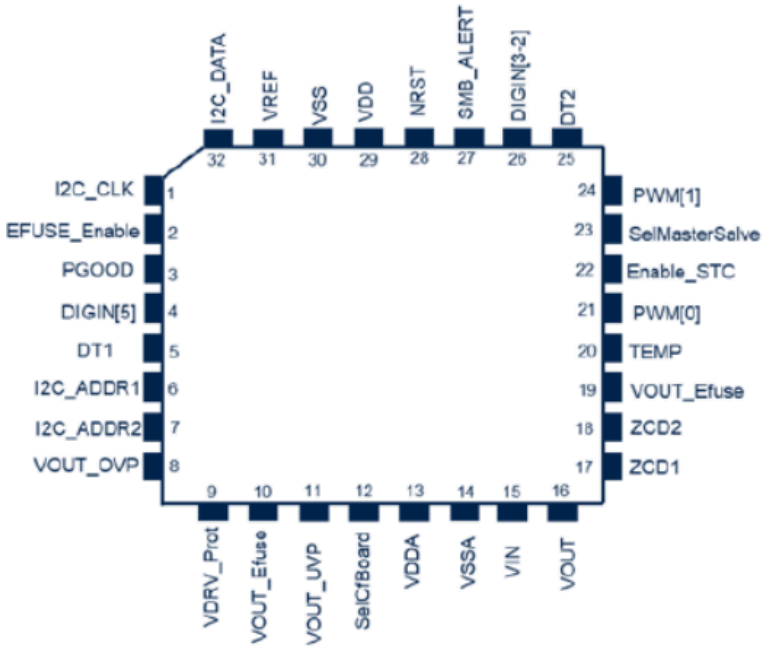


4. The *.hex* binary file compiled with IAR Embedded Workbench. The device on board must already be flashed with firmware having PMBUS communication support. For firmware, we refer to *STUniversalCode*.
5. Micro USB cable.
6. DC power supply with to power the board.

2 Hardware setup

This section describes the connection between UART cable and device's pins.
The pinout of the device is shown below:

Figure 4. STNRG328S pinout



1. Set the pins as specified in the following table:

Table 1. STNRG328S pin settings

Jumper reference	Set position
Pin 13 (VDDA)	+3.3V / +5V on board supplied
PIN 29 VDD	+3.3V / +5V on board supplied
Pin 1 (UART_RX)	Set to UART TX of cable
Pin 32 (UART_TX)	Set to UART RX of cable
Pin 30 (VSS)	GND
Pin 7 (UART2_RX)	Connect to ground to disable bootloader on second UART

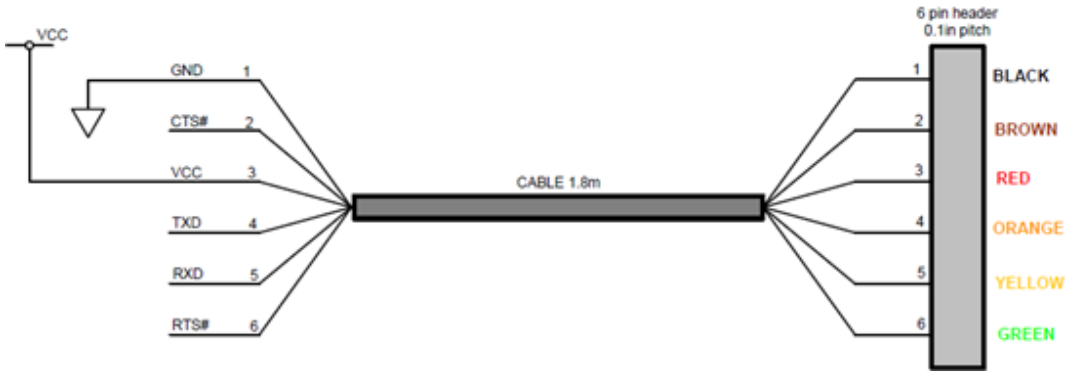
2. Connect the USB end of the adapter cable to USB port of PC; then connect the serial end with pin connectors of the socket.

   Verify the following connections:

   – RX_cable = TX_devive (Pin 32)
   – TX_cable = RX_device (Pin 1)
   – GND_cable = GND_device (Pin 30)

   The other UART RX Pin 7of the STNRG328S must be connected to ground.

Figure 5. STNRG328S pin connections



3 Downloading firmware

For the reprogramming of the EEPROM memory of the STNRG328S device, we will refer to the X7R-1kW board shown in Figure 1. The *stsw-stc* firmware is considered already installed.

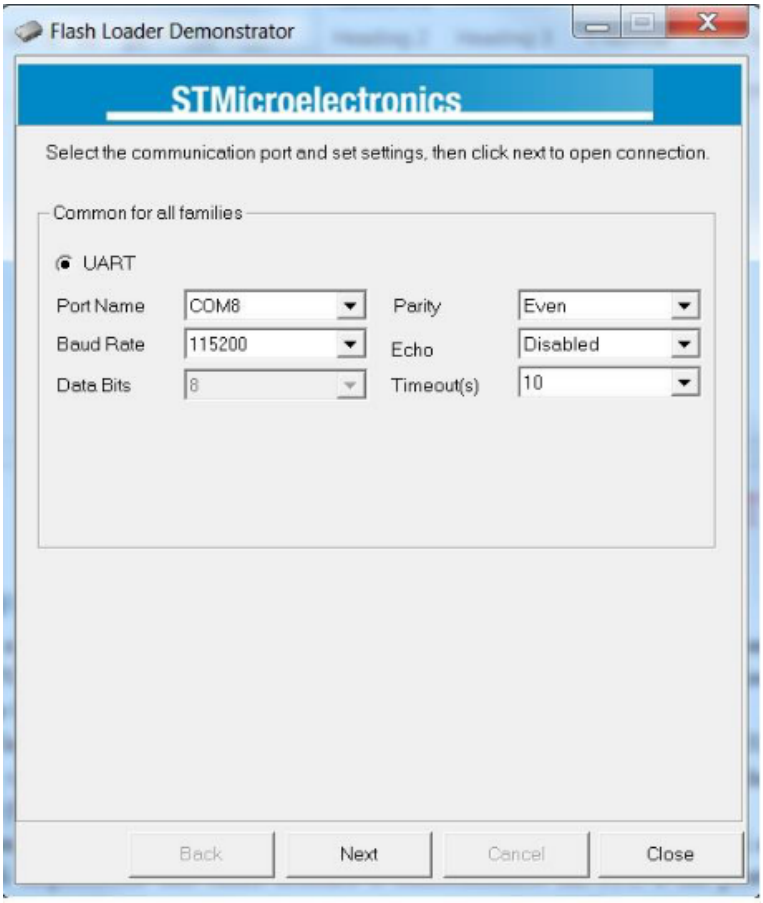
The board uses Pin 1 and Pin 32 as UART. The firmware configures these shared I2C pins as UART because it needs to enable the bootloader through UART. This feature can be activated by executing the PMBUS write command to set the 0xDE value to 0x0001.

To send the PMBUS commands, user needs a GUI and an interface hardware USB/UART (see 1.).

After running this command, connect the UART cable on Pin 1 and Pin 32 as described above and follows the steps below:

1. Run the *STFlashLoader.exe*, the window below is shown.

Figure 6. ST Flash Loader Demonstrator tool



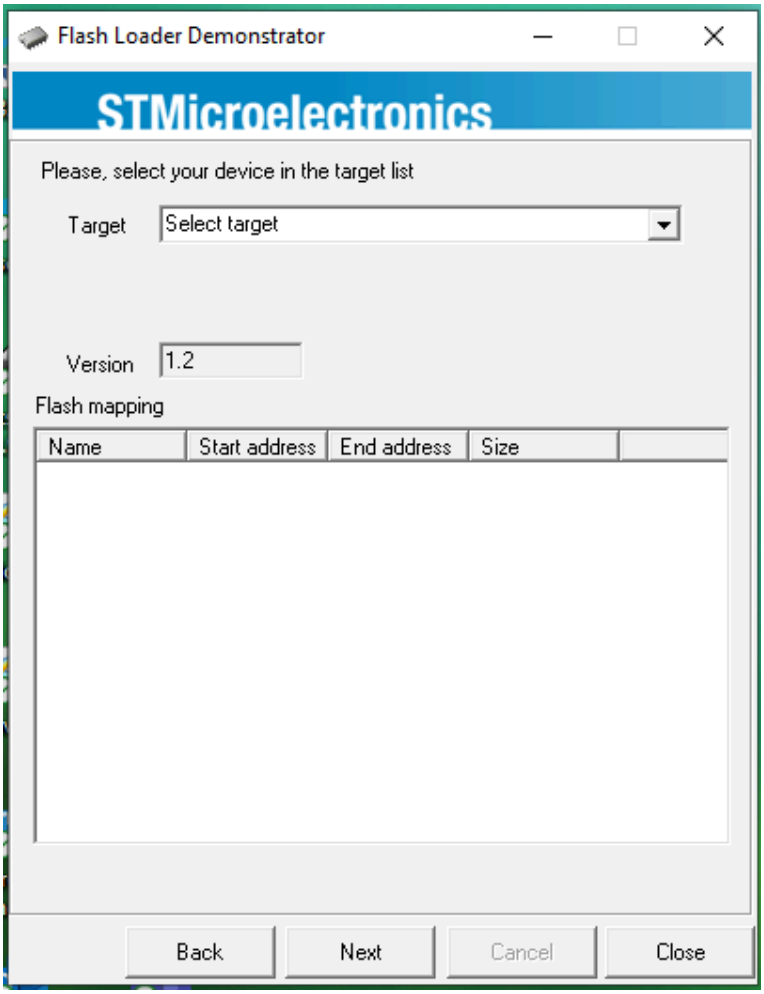
– Apply the settings shown in the figure above.

Important:
*Do not click the **[Next]** button immediately as it might close the time window. A further reset pin cycling is required before continuing.*

– For the [**Port Name**], select the COM port associated with USB/Serial converter. Windows Device Manager on the user PC shows the mapping of the COM port (see Tools and instruments).

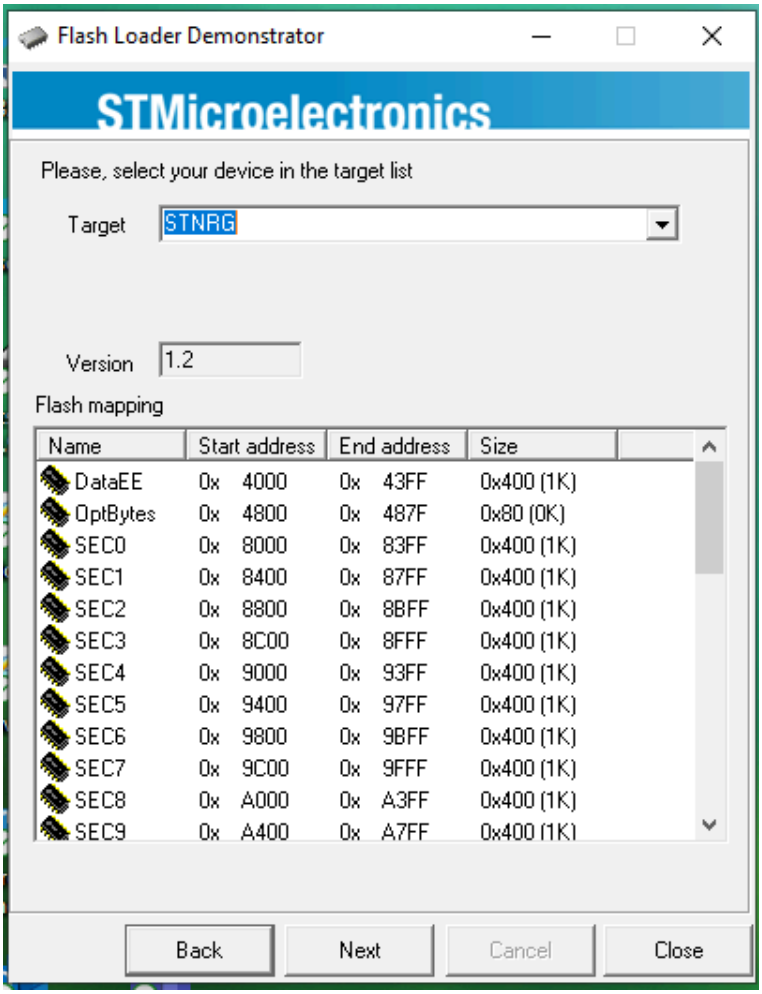
2. Power the board OFF and ON and immediately (less than 1 s) press the [**Next**] button in the figure above. The following screen will appear if successful connection between the PC and the board has been established.

Figure 7. ST Flash Loader – successful connection



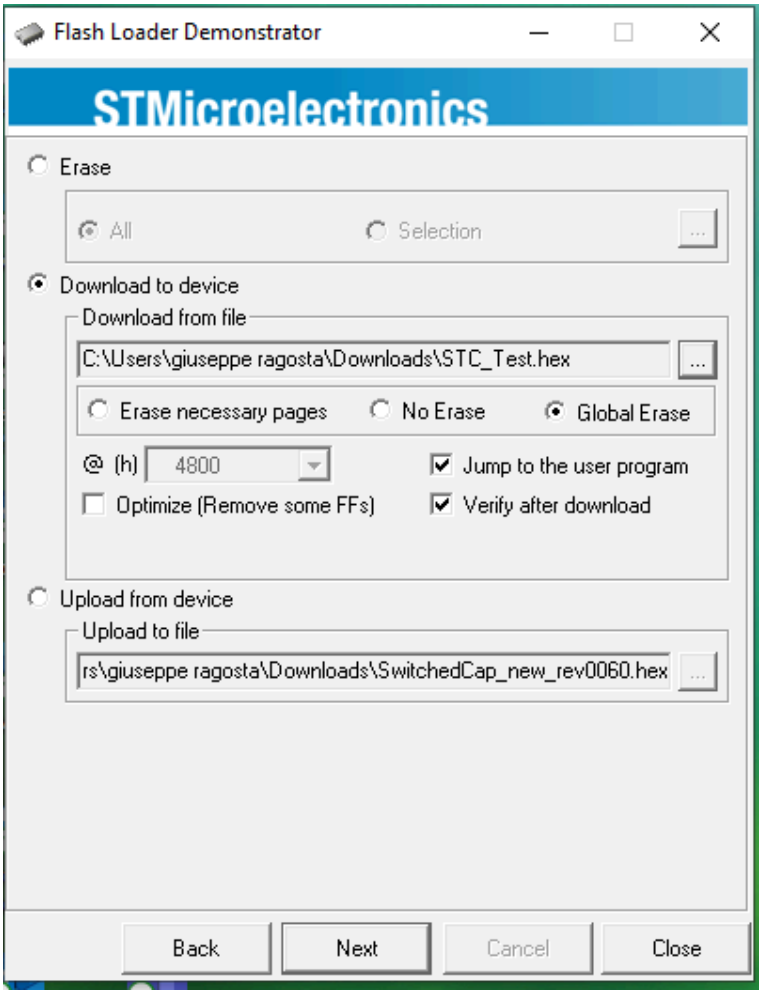
3. From dialog-box in the above figure, select STNRG from the [**Target**] list. A new window will appear with the memory map of the non-volatile memory.

Figure 8. ST Flash Loader – STNRG NVM map



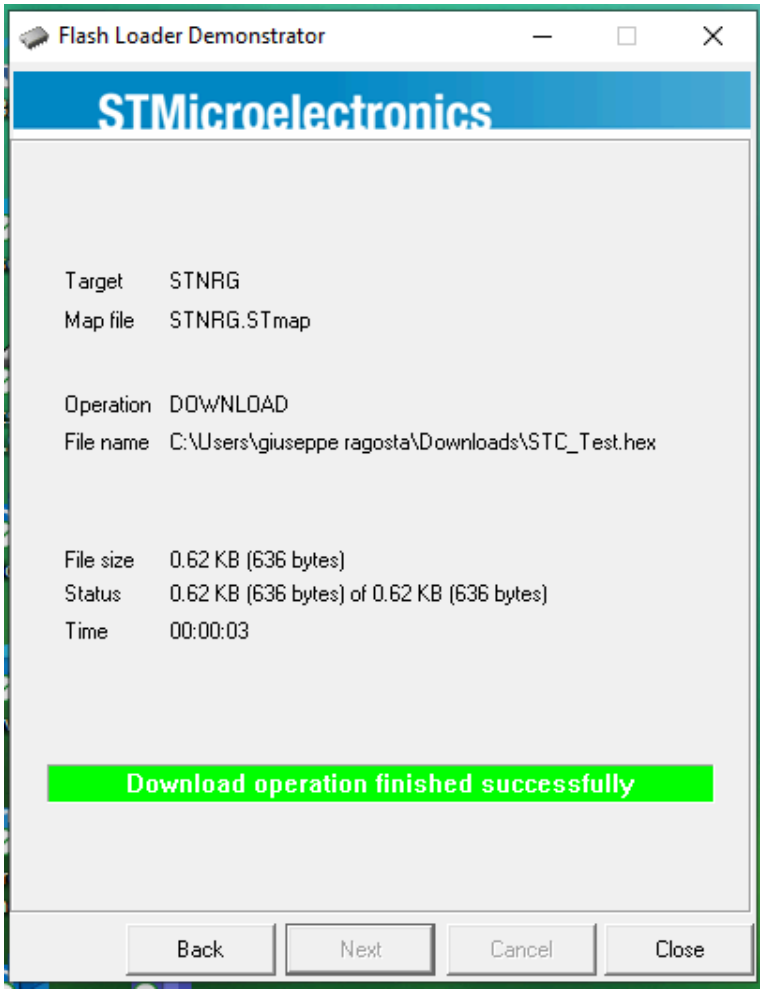
4. Click on the [**Next**] button, and the figure below will appear.
   To program the EEPROM:
   – select [**Download to Device**]
   – in [**Download from file**], browse to the file to download into the SNRG328S memory.
   – select the [**Global Erase**] option.

Figure 9. ST Flash Loader – STNRG programming settings



5. Click [**Next**] to start the downloading procedure.
   Wait for the programming procedure to complete and verify that the success message in green appears, as shown in the figure below.

Figure 10. ST Flash Loader – STNRG programming complete



6. You can verify the correct binary has been downloaded by checking that the *data&code* checksum of the firmware matches the release.
   This procedure is explained in *STC Checksum Implemetation.docx* available on ST.com.

4 References

1. Application note: AN4656: Bootloading procedure for STLUX™ and STNRG™ digital controllers

Revision history

Table 2. **Document revision history**

Date	Version	Changes
02-Mar-2022	1	Initial release.

Contents

List of figures

List of tables