

# WAVE2: How to Upgrade Firmware

Applicable models: 15801K, 15802K, 15801

## 1. Introduction

The micro-controller (STM32F103CBT6) used in WAVE2 contains a built-in bootloader. This is a small piece of firmware that can communicate with PC via serial port to write firmware into the flash ROM inside the chip. This article describes how to setup the connection and how to perform firmware upgrade step by step.

## 2. Tools You Need

In order to complete the upgrade the following tools and file are required.

### 1) Serial converter that connects WAVE2 to PC

The serial port of WAVE2 uses 3.3V LVTTTL level. The PC port that we need to connect to is usually a USB port. These two ports are quite different electronically and can not be connected directly. To connect WAVE2 to PC a Uart-USB (or TTL-USB) is required. There are many such converters available on market. JYE119 (sku# 11901) is one of such products that JYE Tech offers (see Fig. 1). For details about the converter please visit [www.jyetechnology.com](http://www.jyetechnology.com).



Fig. 1

### 2) PC software that can work with the bootloader

In order to work with the bootloader in the micro-controller supporting software that runs on PC is required. This software is called Flash Bootloader Demonstrator which is provided by ST. It is free software and can be downloaded at <http://www.st.com/web/en/catalog/tools/PF257525#>. After downloading install it to your PC.

### 3) The firmware file (HEX file) to be written to WAVE2

This is the file that contains codes to be written to your WAVE2. It can be downloaded at

<https://www.jyetechnology.com/wave2-firmware/>

Save the file to a known place on your PC for later use.

## 3. Connection

Fig. 2 shows the connection scheme between oscilloscope and PC.



Fig. 2

The serial port of WAVE2 is accessible via the Auxiliary Port at the bottom of enclosure. Fig. 3 shows the connection using 119 board as Uart-USB converter.

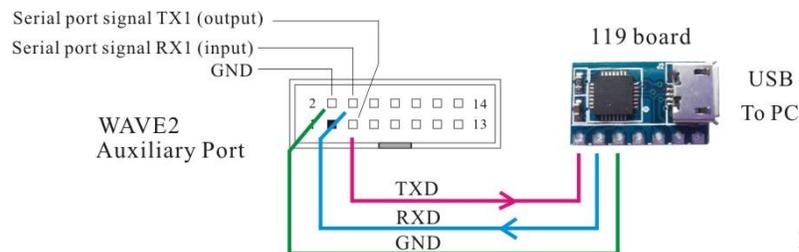


Fig. 3

Three signals, TXD, RXD, and GND at WAVE2 serial port will be used. TXD is an output pin (out of WAVE2) and RXD is an input pin (into WAVE2). GND is the common reference. Please make sure they are connected correctly if you use a different Uart-USB converter.

**Note:** A ribbon cable with matching header is provided with the product for convenience of connection to WAVE2 auxiliary port.

#### 4. Upgrading Steps

- 1) Short BOOT0 (pin13 and pin14 on the Auxiliary Port) and BOOT1 (pin 11 and pin12 on the Auxiliary Port) respectively (see Fig. 4. **Note: use the provided ribbon cable to do the shorts. Do not do them directly on the auxiliary port pins since that could easily damage the connector**). This will make the MCU enter bootloader at next power up (you will see a blank screen after power is applied again and this is normal).

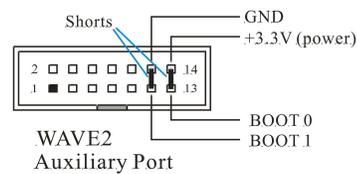


Fig. 4

- 2) Connect WAVE2 to a USB port on PC as described in section 3 above. Power up the oscilloscope.
- 3) Launch Flash Bootloader Demonstrator and proceed to the state as shown in Fig. 5. Here you need to setup some parameters for the serial connection. Please set the parameters to what illustrated in Fig. 5. For Port Name you need to choose the one corresponding to WAVE2. Find it out by plugging and unplugging the USB cable.

**Please note that many Uart-USB converters require drivers be installed on PC before they can function properly. For JYE119 converter you need install the driver for CP2102 (the converter chip). Please use the following link to download and install the driver.**

<http://www.silabs.com/products/mcu/pages/usbtouartbridgevcpdrivers.aspx>

After all parameters are set properly click Next button to continue.



Fig. 5

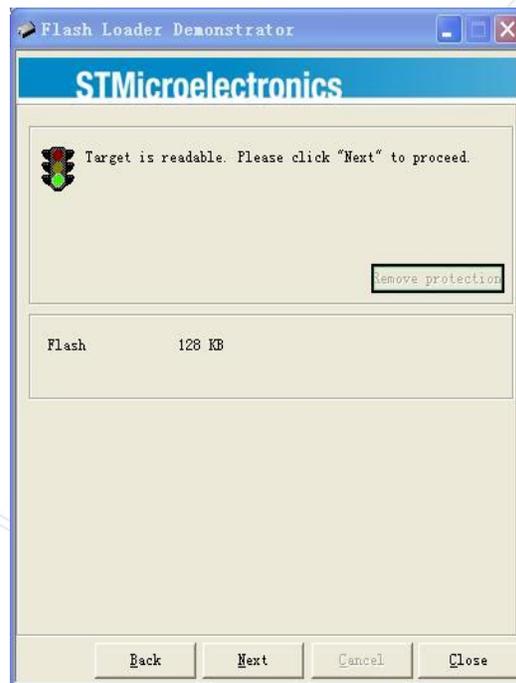


Fig. 6

- 4) If there is no error you should see Fig. 6. This is a temporary state showing that the PC has successfully detected bootloader and whether the chip flash memory is readable. If you have problem to reach this state you can try resetting the MCU by switching off the DSO and switching on again. If that still doesn't work check connections and BOOT0/BOOT1. [**Hint: It is a good try to swap TXD and RXD since these denotation are often confusing.**] Otherwise, click on Next to proceed to the next step as shown in Fig. 7.
- 5) Fig. 7 shows information about the MCU type and its flash memory. You just need to make sure the selection at Target dropdown is the same as shown in Fig. 7. Then click on Next to proceed to next step.
- 6) In Fig. 8 select "Download to device" and open the firmware file (HEX file) which you have saved earlier by clicking on the "... " button. Make all the rest settings the same as shown in Fig. 8. Then click on Next to start writing.
- 7) You should see progress bar like that in Fig. 9. When writing is done you should see Fig. 10.
- 8) Power off WAVE2 and disconnect the connection. **Remove the shorts on BOOT0 and BOOT1.**

Then apply power to the oscilloscope again. Check if the oscilloscope boots up properly. Verify if the firmware versions are correct. If everything is good the upgrading is done.

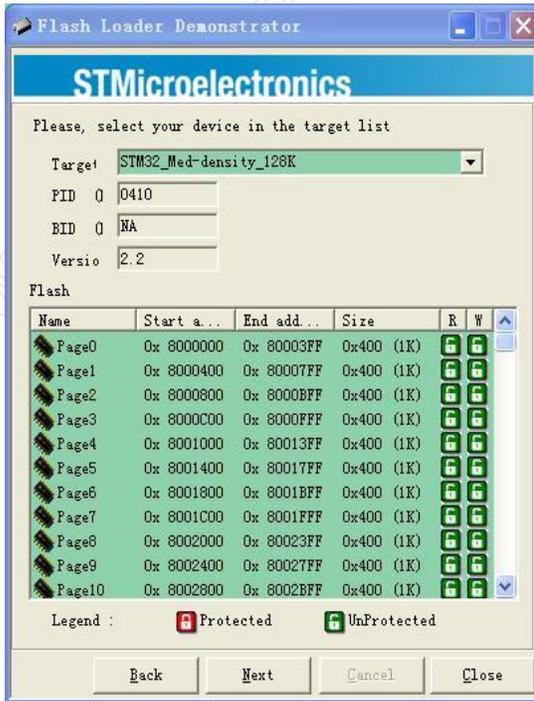


Fig. 7



Fig. 8

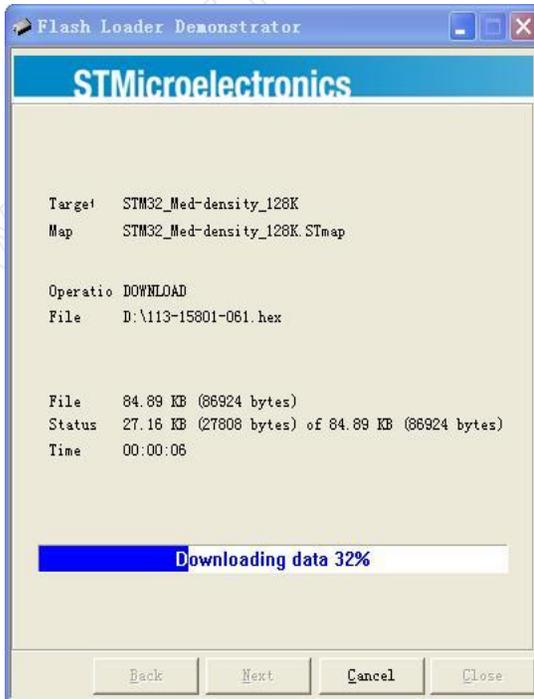


Fig. 9



Fig. 10

**Revision History**

<b>Version</b>	<b>Date</b>	<b>Summary</b>
v01	2020.04.29	Draft