EVALUATION BOARD

Firmware Recording and Running Tests

This tutorial aims to present how to write the firmware previously developed to the SiP HTLRBL32L. As an example, we will use the "**PushButton_LoRaWAN**" code available in the HT Micron GitHub repository. The **SiP HTLRBL32L** is ready for multi-region LoRaWAN® applications and firmware upgrades.

To perform this tutorial, you will need:

Hardware - Components

- ❏ SiP HTLRBL32L;
- ❏ FTDI module for connecting the board to the computer;
- ❏ Protoboard;
- ❏ Jumpers.

SOFTWARE:

- ❏ **Wise Studio** IDE to compile the code;
- ❏ **Termite** to visualize the board's serial number;
- ❏ **RF-flasher** software to write the firmware to the board;
- ❏ Git installed on your computer.

1. Circuit.

The first step is to prepare the hardware environment by looking at the schematic for connecting the HTLRBL32L microcontroller to the FTDi. Observe in image 1, that the **GPIO PA10** connector of the microcontroller should be at high level, that is, connected to 3.3v on the board itself. First, the reset (NRST) should be connected to “GND”.

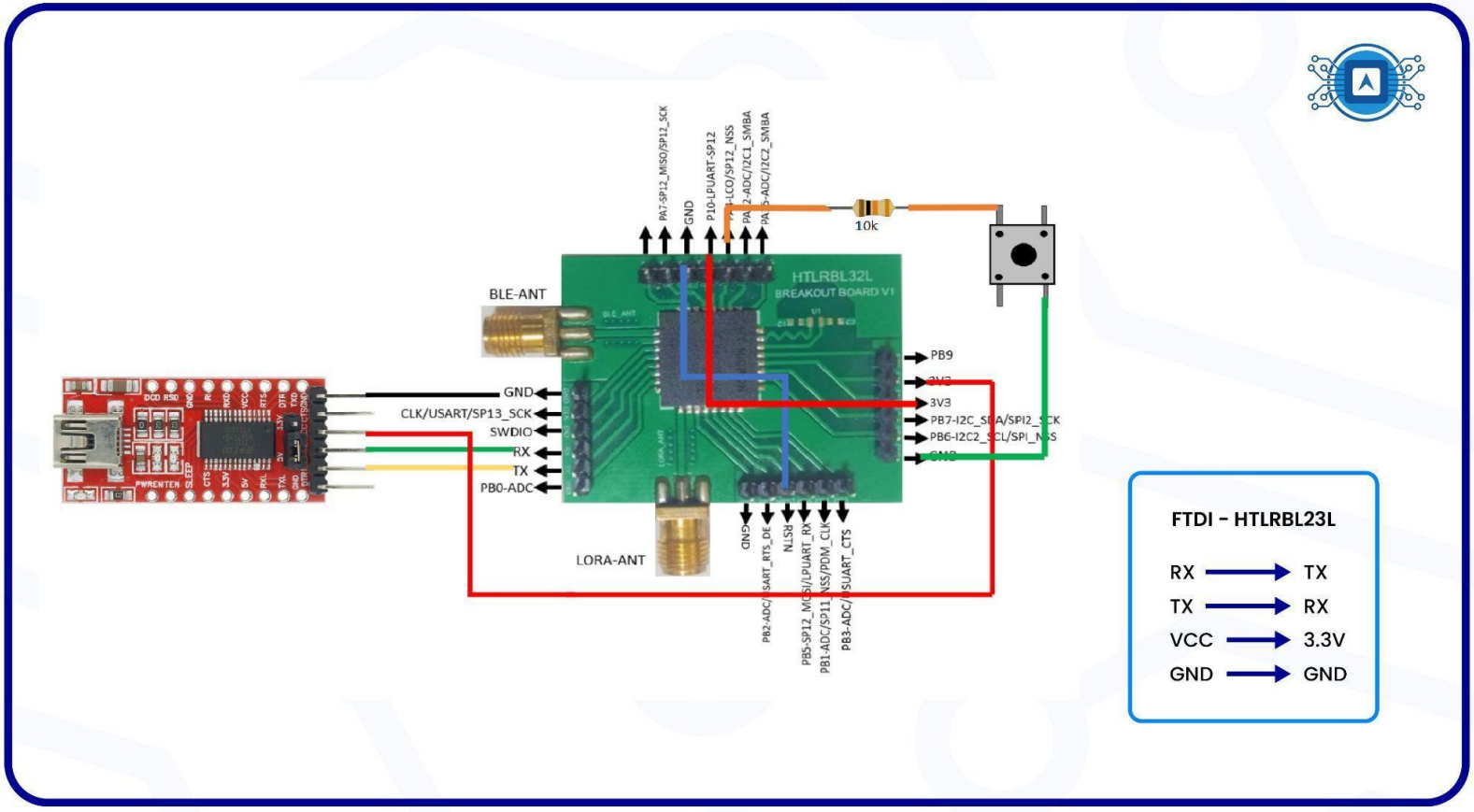

Image 1: Electronic schematic of the board. Source: *The author*.

1.1 Board physically connected.

Physically assembled board according to the electronic schematic . As seen in image 2.

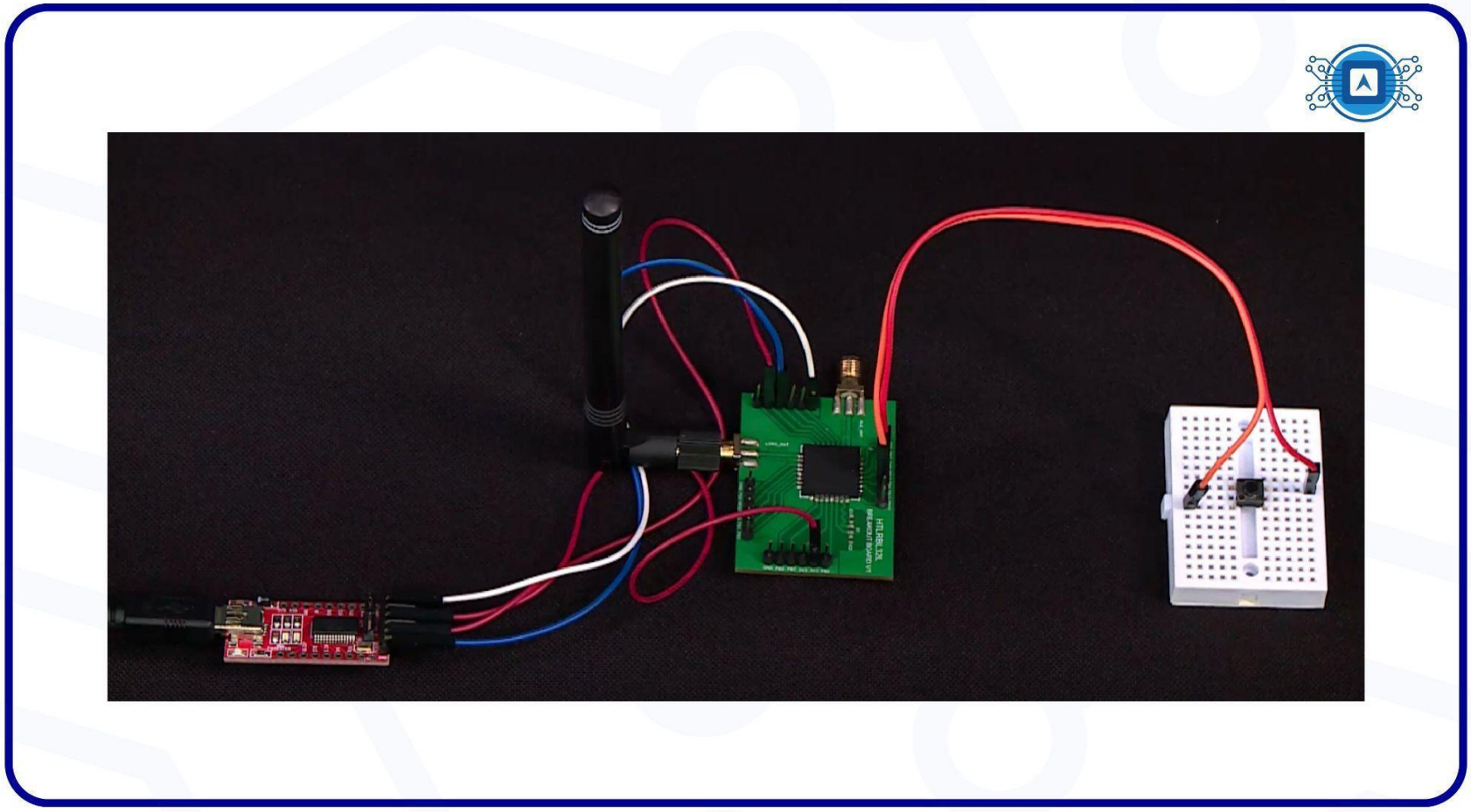

Image 2: Plate physically assembled according to the electronic schematic. Source: *The author*.

2. Writing the Firmware to the SiP HTLRBL32L

Open the **RF-Flasher Utility** and connect the board to the computer through the FTDi's UART, observing the information in the "**Comport Settings**" output and also the "baud rate". In this case, the baud rate is set to **115200**, as shown in image 3.

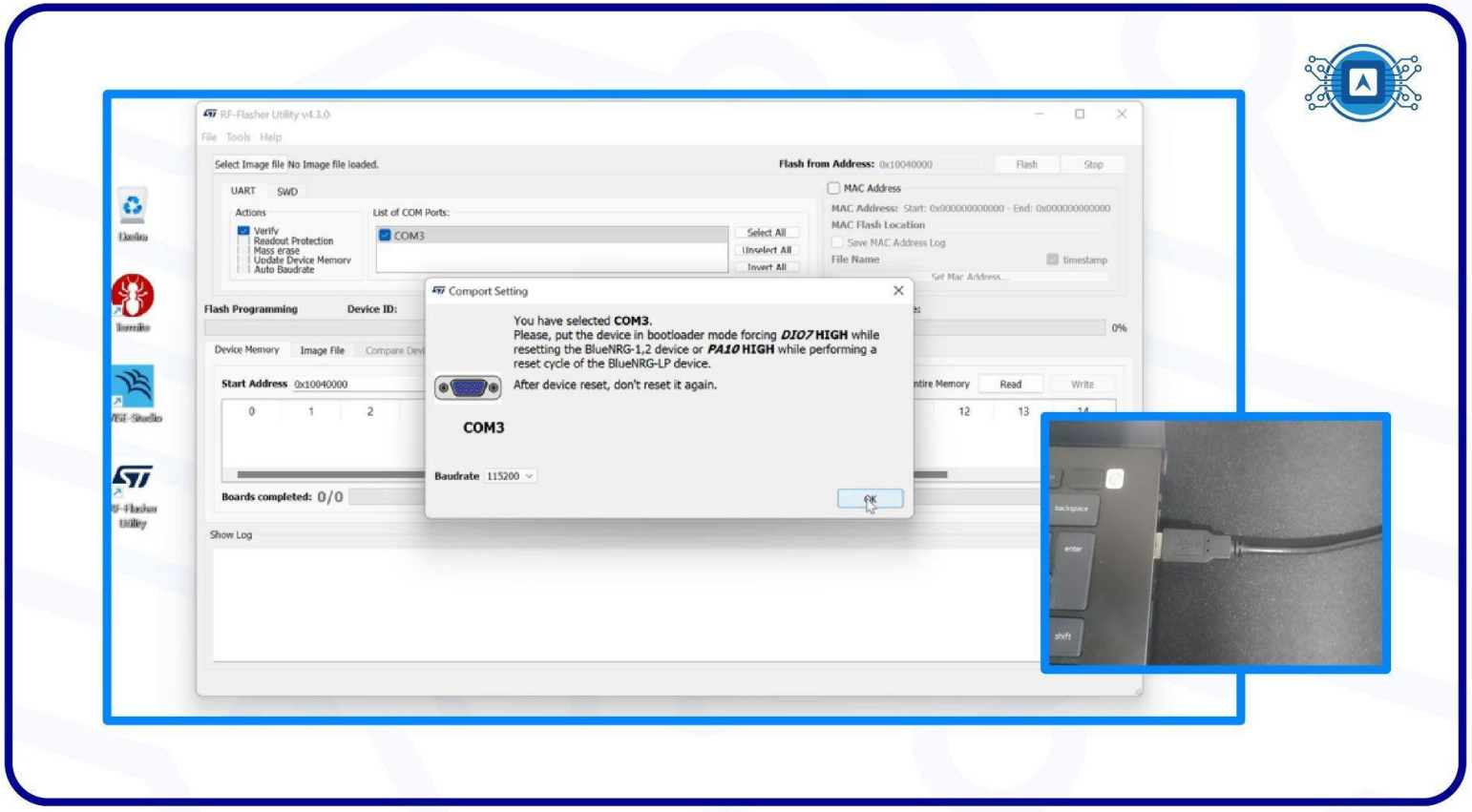

Image 3: Connecting the board to the computer through UART(FTDI). Source: *The author*.

Next, remove the **reset (NRST)** connected to **GND** and click on **Read**. With this procedure, the software will recognize the microcontroller in its environment, as shown in image 4.

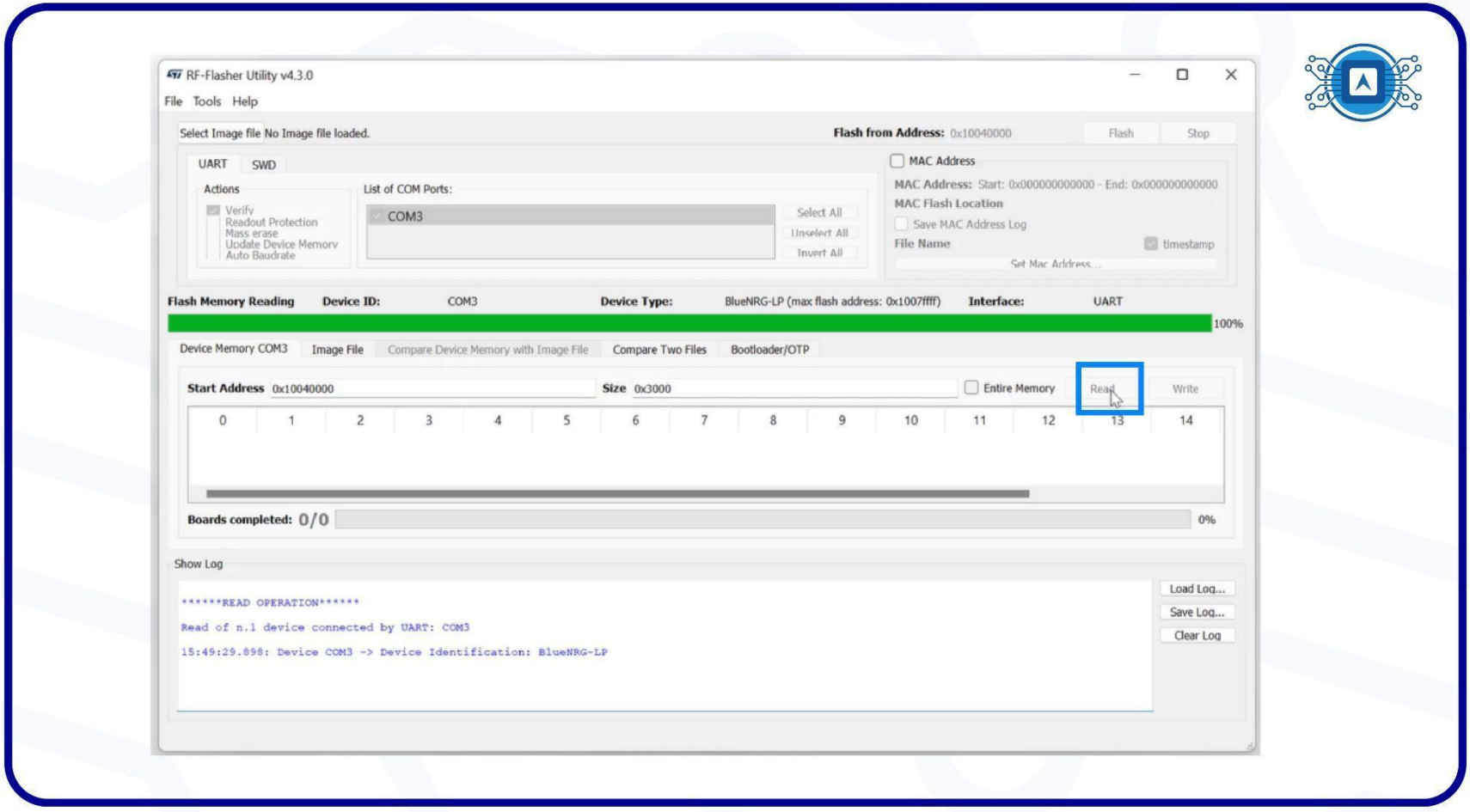

Image 4: Writing Firmware to the SiP HTL RBL microcontroller. Source: *The author*.

After recognizing the UART in the **RF-Flasher** environment, click the "**Select Image**" button and select the binary from the code generated by **WISE Studio**, as shown in image 5.

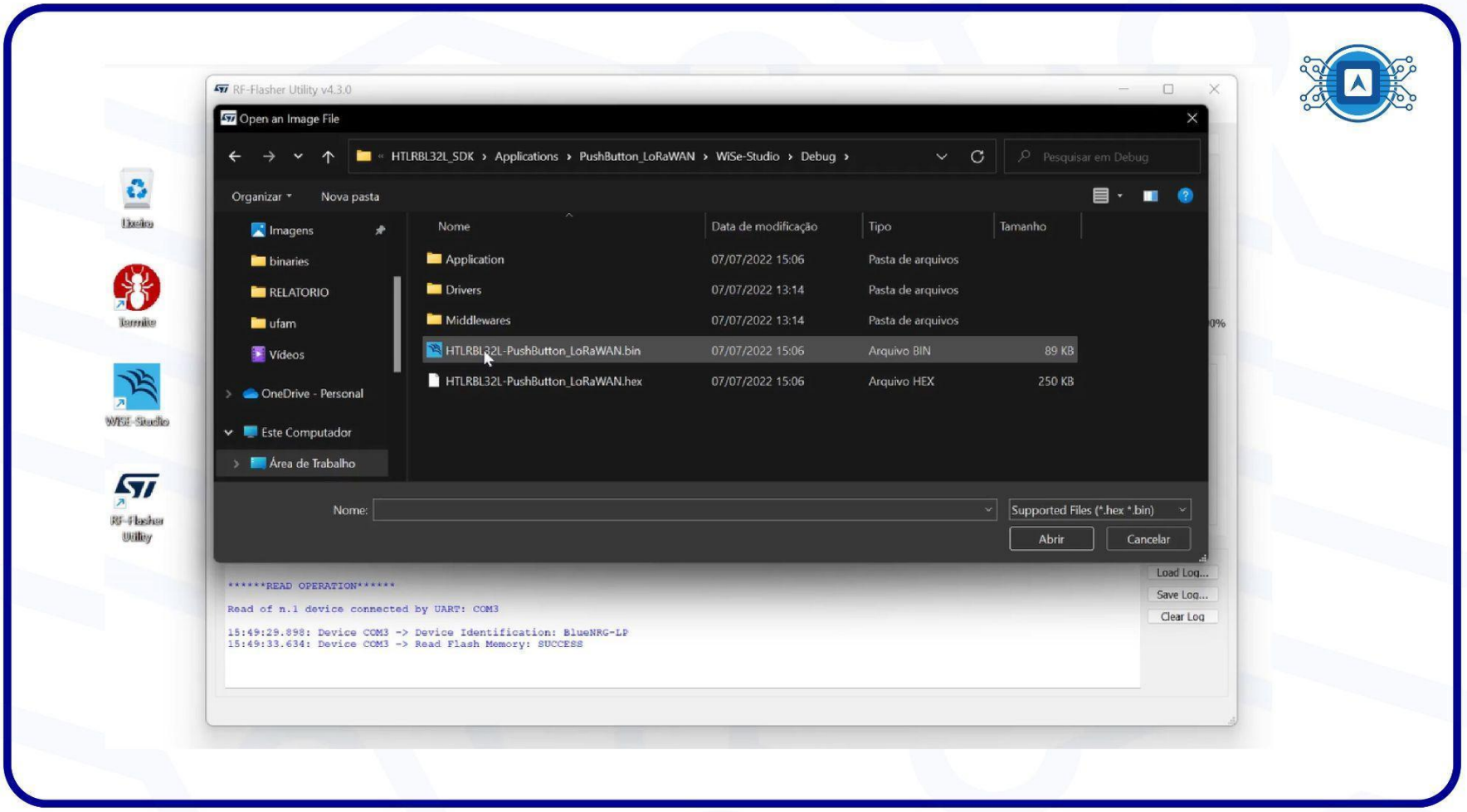

Image 5: Finding the Binary. Source: The author.

With the binary selected click “**FLASH**”. At the end of the recording the “**SUCCESS**” message will appear

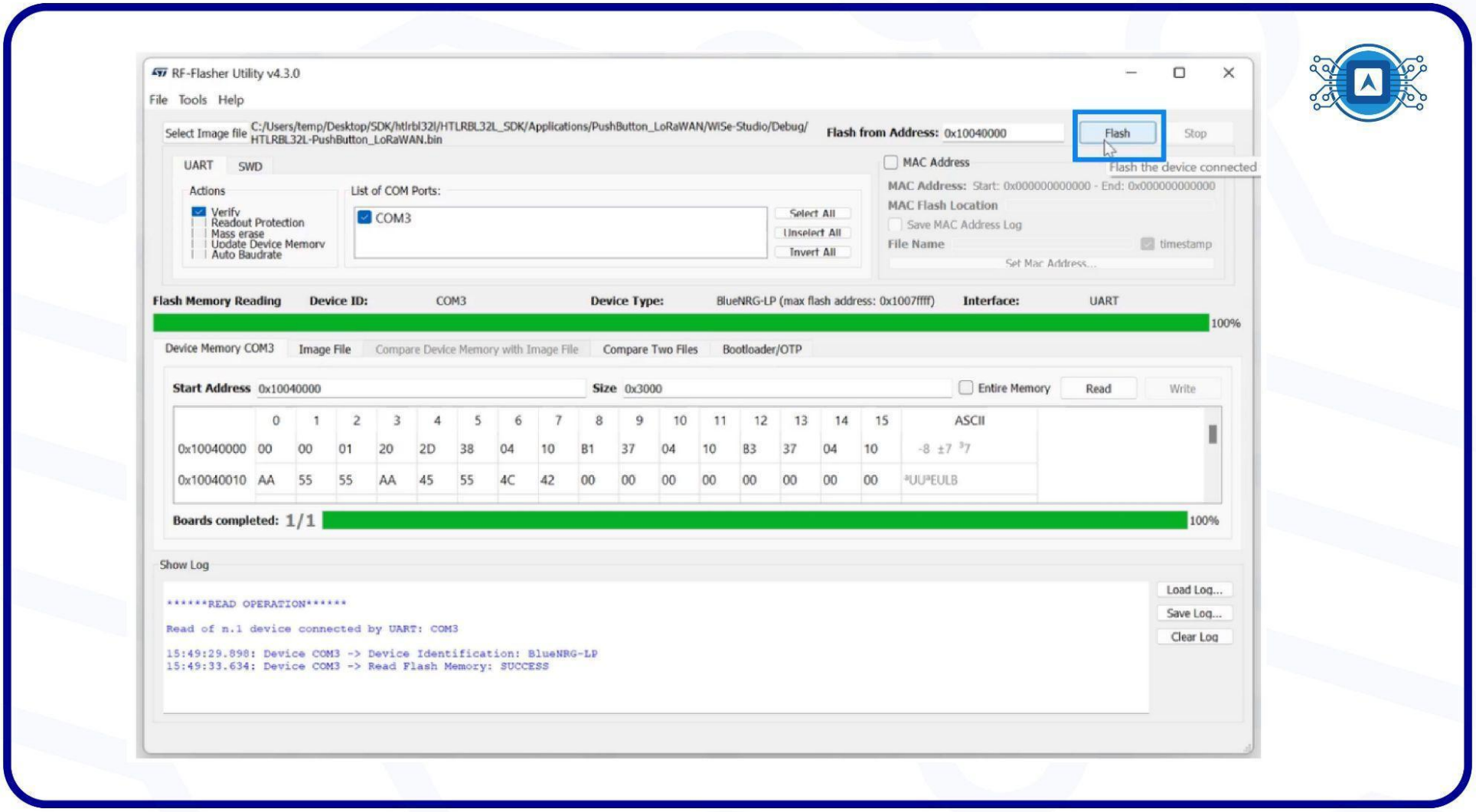

Image 6: Finishing the firmware writing process. Source: *The author*.

3. Visualizing recorded data.

It will be necessary to see what has been written to the microcontroller. To perform this procedure, open the **Termite** software, remembering that it is necessary to take the board out of bootloader mode, disconnecting the **GPIO P10** from the 3.3v. To reset the device, remove the **reset (NRST)** jumper connected to GND and after the procedure, the following logs will be shown, as shown in image 7. Note that the device is waiting for the interrupt, which in this case is the click on the **PushButton**.

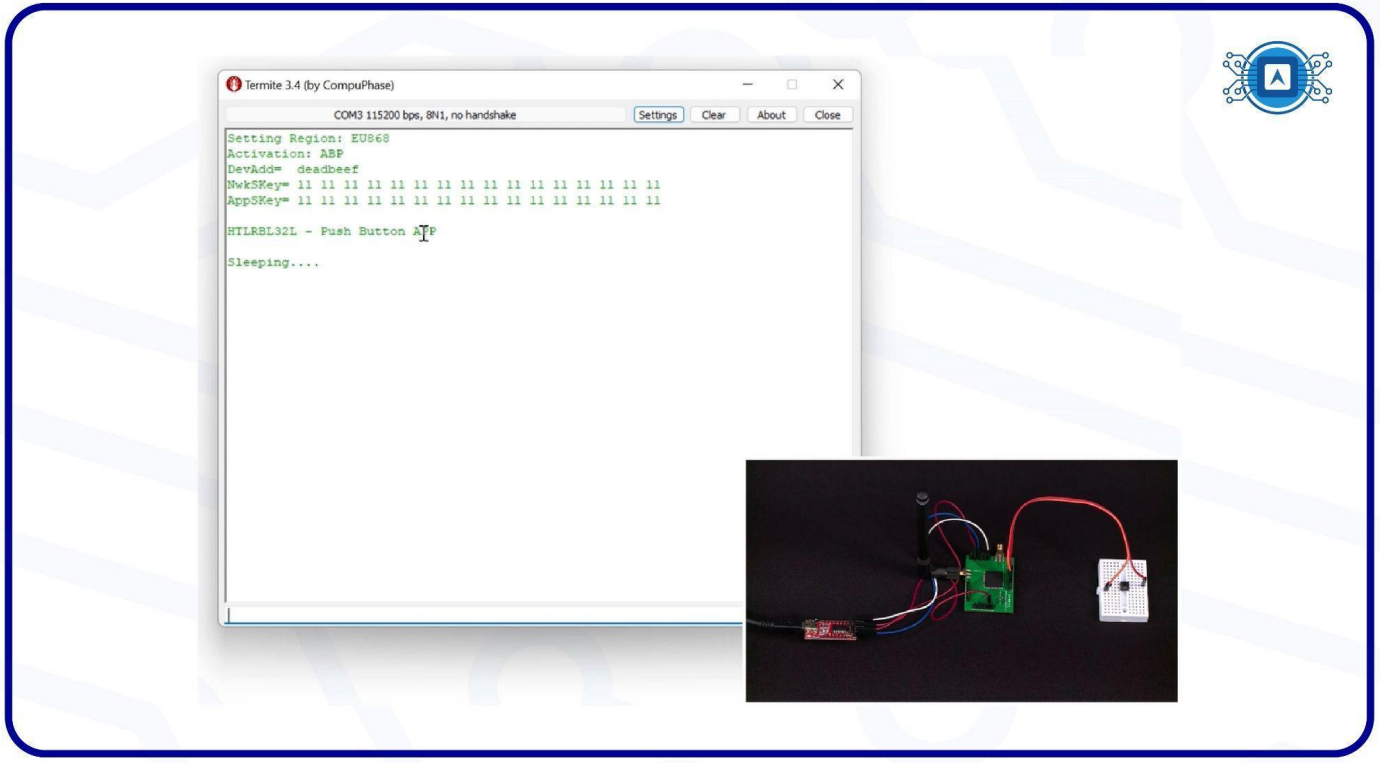

Image 7: Visualizing the data in the Termite. Source: *The author*.

When the push button is pressed, an interrupt “wakes up” the device and sends a load in data frequency, as seen in image 8. You can see that the frequency displays 86830000 and a bandwidth of 125hz.

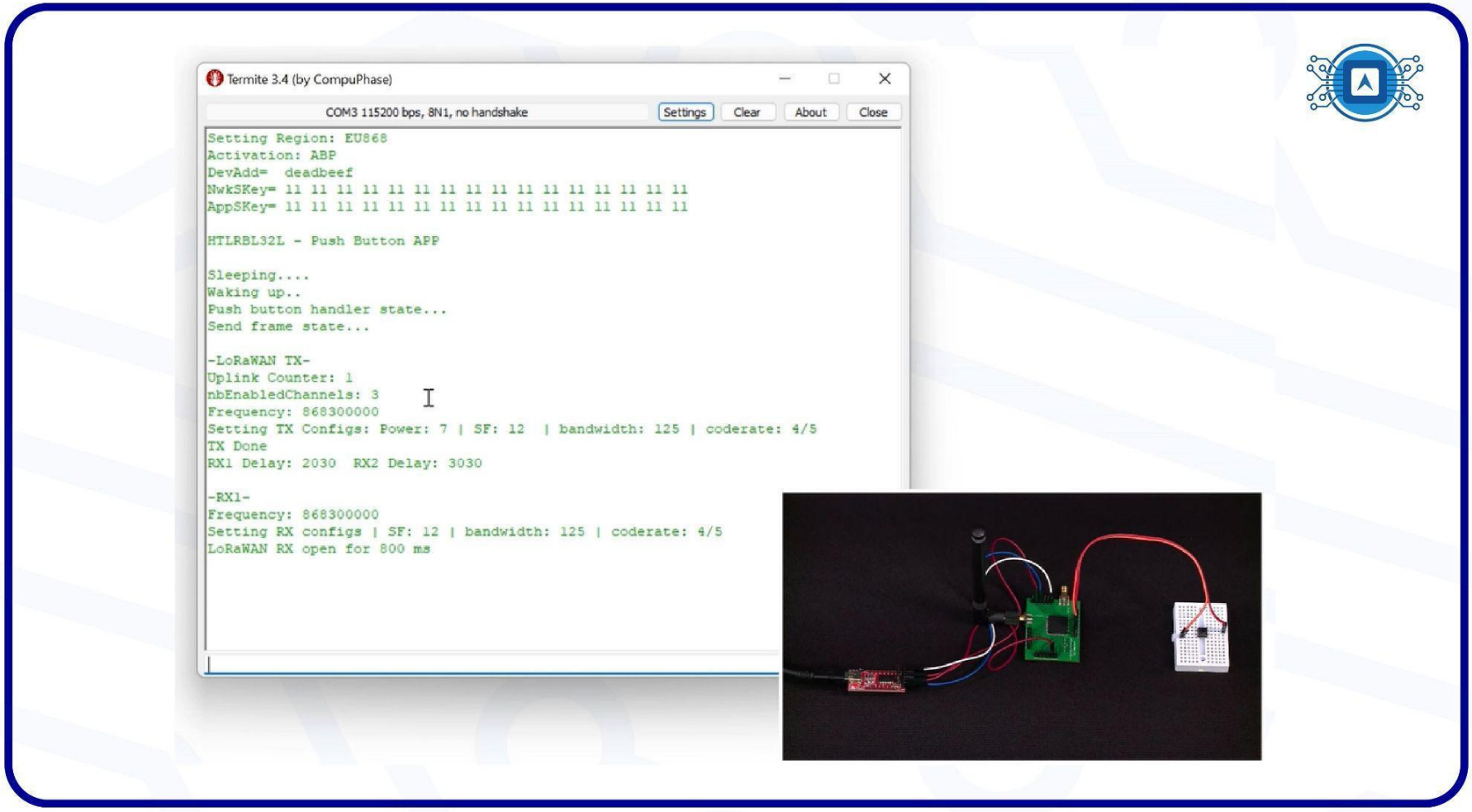

Image 8: Interrupt test. Source: *The author.*

References

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