

# SYSTEM-IN-PACKAGE



# Using already learned knowledge for firmware writing

After the entire process of design, fabrication, assembly, and verification, it will be necessary to perform a write with the test board. This follows the process described in the Evaluation Board: Test Board Recording and Firmware Execution track.

### - Use firmware writing features purchased from EVB on the assembled board

To perform firmware writing, you must follow these steps:

- 1. Use the ST RF Flasher as a recording software;
- 2. Set Jumpers P1 and P2 to start a new recording;
- 3. Make the firmware recording;
- 4. Check the connection of the PCB with the other Boards such as FTDI and the breakout board;
- 5. Connect the USB cable to the FTDI board.



Image 01: Connecting USB to the Test Board. Source: Source: The author.

6. Open the Device Manager on your computer and check which port the card has been connected to. A COM port will be shown under Ports (COM) and (LPT).



Image 02: Device Manager Screen. Source: Screenshot by the author.

#### 7. Open the RF Flasher utility application.

|                       | loaded.            |              | Flash from Address: 0x100400   | 00 Flash Stop  |  |
|-----------------------|--------------------|--------------|--|--|--|
| Actions               | List of COM Ports: |              | MAC Address<br>MAC Address<br>MAC Flash I noath<br>Save MAC Addre<br>File Name | Start: 0x0000000000 - End: 0x00000000000<br>m<br>ss Lod<br>Ser there normale |  |
| Flash Programming     | Device ID:         | Device Type: | Interface:   | 0%   |  |
| Boards completed: 0/0 |                    |              |  | 0%   |  |
| Show Log              |                    |              |  | Load Log   |  |
|                       |                    |              |  | Save Log   |  |
|                       |                    |              |  | Clear Log  |  |

Image 03: RF Flasher Utility screen. Source: Screenshot by the author.

8. Open the .bin file that will be written to the Test Board.



Image 04: Bin file. Source: Screenshot by the author.

- 9. In the RF Flasher application, follow the on-screen instructions by placing the jumpers in the required position.
- 10. Set **JP1(DI07)** to **High** and **JP2** to **Low**, thus resetting the chip, and after the reset we will set **Jumper P2** to the **HIGH** position.



Image 05: Positioning Jumpers. Source: The author.

#### 11. Check with the **READ** button to read data from memory.

| File Tools Help  |                                  |                                  |  |   |                            |
|--|----------------------------------|----------------------------------|--|---|----------------------------|
| Select Image file No Image file lo   | aded.                            |                                  | Flash fr                                 | rom Address: 0x10040000   | Flash Stop                 |
| UART SWD   |                                  |                                  |  | MAC Address   |                            |
| Actions<br>Verify<br>Readout Protection<br>Mass erase<br>Update Device Memory<br>Auto Baudrate | List of COM Ports:               |                                  | Select All<br>Unselect All<br>Invert All | MAC Address: Start: 0x00000000<br>MAC Flash Location<br>Save MAC Address Log<br>File Name | 0000 - End: 0x000000000000 |
| Flash Memory Reading Dev   | ice ID: COM3                     | Device Type: Blu                 | eNRG-LP (max flash address               | s: 0x1007ffff) Interface:   | UART                       |
| Device Memory COM3 Image   | File Compare Device Memory with  | Image File Compare Two Files R   | ootloader/OTP                            |   | 100%                       |
| Timage   | The Compare Device Plenting with | anage rine compare rino rines of | Jududel/OTP                              |   |                            |
| Start Address 0x10040000   |                                  | Size 0x3000                      |  | Entire Memory   | Read Write                 |
| Boards completed: 0/0  |                                  |                                  |  |   | 0%                         |
| Show Log   |                                  |                                  |  |   |                            |
|  |                                  |                                  |  |   | Load Log                   |
| Read of n.1 device conne   | cted by UART: COM3               |                                  |  |   | Save Log                   |
| 15:49:29.898: Device COM   | 13 -> Device Identification:     | BlueNRG-LP                       |  |   | Clear Log                  |
|  |                                  |                                  |  |   |                            |

Image 06: Read button in the RF Flasher Utility. Source: Screenshot by the author.

| 12. Still in the RF Flasher Utility application, click the <b>FLASH</b> butto |
|---|
|---|

| List of COM Ports: |   | MAC Address<br>MAC Address: Start: 0x0000000000 - End: 0x00 - End: 0 |
|--------------------|---|--|
| Device ID:         | Device Type:  | Interface:<br>0%   |
| 2 3                | Size         0x3000           4         5         6         7 | Entire Memory Read Write 8 9 10 11 12  |
|                    |   | 0%   |
|                    |   | Load Log<br>Save Log   |

Image 07 - RF Flasher Utility FLASH button. Source: Screenshot by the author.

- 13. Then the firmware update will start.
- 14. When the process is finished, the **SUCCESS** screen will appear.

| UART SWD  |  |              | _Applications/bindries/Fusilbutton_torka | WAN.DIN Flash Th | om Address: 0x10040000  | Hash Stop                         |
|---|--|--------------|--|------------------|---|-----------------------------------|
| AND DOWN  |  |              |  |                  | MAC Address   |                                   |
| Actions<br>Elite Ventry<br>1 Magnati Vintertion<br>1 Magnatics<br>1 Magnatics<br>1 Autor Kaudrata   | List of COM Ports:   |              |  |                  | MAC Address: Start: 0x0000000000<br>MAC Flach Location<br>Save MAC Address Loo<br>File Name | 0 - End: 0x00000000000            |
| Flash Memory Verifing   | Device ID: COM4  | Device Type: | BlueNRG-LP (max flash addre:             | ss: 0x1007ffff)  | Interface: UART   |                                   |
|   |  |              | ОК                                       |                  |   |                                   |
| Boards completed: 1/1   |  |              | OK                                       |                  |   | 100%                              |
| Boards completed: 1/1<br>Show Log   | ATION*****   |              | ОК                                       |                  |   | 100%                              |
| Boards completed: 1/1<br>Show Log<br>******START FLASH OPER<br>Flash Boards: COM4   | ATION*****   |              | ОК                                       |                  |   | Load Log<br>Save Log              |
| Boards completed: 1/1<br>Show Log<br>******START FLASH OPER<br>Flash Boards: COM4<br>10:07:49.978: Device C<br>10:07:50.177: Device C<br>10:08:12.729: Device C | ATION*****<br>ON4 -> Device Identification<br>ON4 -> Flash Programming<br>ON4 -> Flash Programming: SUCCESS. |              | OK                                       |                  |   | Load Log<br>Save Log<br>Clear Log |

Image 08: Completed Memory Recording Screen. Source: Screenshot by the author.

- 15. Return jumper P1 to the **LOW** position.
- 16. Run a test with **Termite Software** and check the serial port information.
- 17. Let's open the Termite software, check that the COM port is correct.



Image 09: SW Termite screen. Source: Screenshot by the author.

18. Then press the SW1 button and check the information that appears on the screen.

| COM4 115700 box 2011 po bandebaka  | Class Class About Class        |
|------------------------------------|--------------------------------|
| COM4 115200 bps, 8N1, no handshake | Setungs Clear About Close      |
| RX1 Delay: 2030 RX2 Delay          | : 3030                         |
| -RX1-                              |                                |
| Frequency: 868100000               |                                |
| Setting RX configs   SF: 1         | 2   bandwidth: 125   coderate: |
| LoRaWAN RX open for 800 ms         |                                |
| RX limeout                         |                                |
| -RX2-                              |                                |
| Frequency: 869525000               |                                |
| Setting RX configs   SF: 1         | 2   bandwidth: 125   coderate: |
| LORAWAN KX open for 800 ms         |                                |
| Sleeping                           |                                |
|                                    |                                |
|                                    |                                |
|                                    |                                |

Image 10: Serial Port Information. Source: Screenshot by the author.

### References

**IMCP HTLRBL32L - New System-in-Package LoRa® & Bluetooth Low Energy®.** In: Github HTMicron HTLRBL32L. [S. I.], 2022. Available at: < <u>https://github.com/htmicron/htlrbl32l</u> > . Accessed on aug 05th 2022.