MAX32664

Software and Firmware Update Instructions

The purpose of this document is to instruct the user how to update the software and firmware for the MAXM86161EVSYS# to evaluate the updated GUI v2.0.0 and algorithm 39.2.23 versions. The GUI, nrf52832 .hex, and the MAX32664C .msbl must be updated to one of the two rows in the compatibility matrix below:

Compatibility Matrix

MAX32664C for MAXM86161 .msbl Version	MAXM86161 GUI Version	NRF52832 Firmware Version
30.2.3 (KX122 Accel) (MAXM86161EVSYS is factory programmed to 30.2.3)	v1.0.0	0.1 (MAXM86161EVSYS is factory programmed to 0.1)
32.9.23 (KX122 Accel)	**v2.0.0-rc2**	**2.2**

The necessary steps for a user to update to the latest firmware and software for MAXM86161 EVSYS are the following:

▶ Install the latest MAXM86161 GUI v2.0.0-rc2.

- The user must uninstall the previous GUI v1.0.0 to prevent incompatibility between installations.

▶ Flash the NRF52832 microcontroller on the MAXSENSORBLE_EVKIT board to version 2.2.

▶ Flash the MAX32664C on the MAXSENSORBLE_EVKIT board with version 32.9.23 of the Algorithm .msbl file.

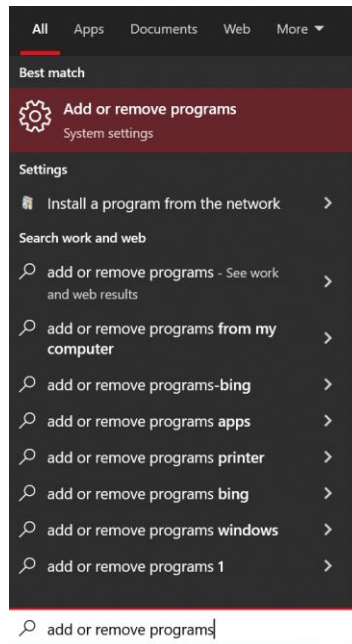- See the firmware release notes for details on the two .msbl files.

This document will outline the steps in order.
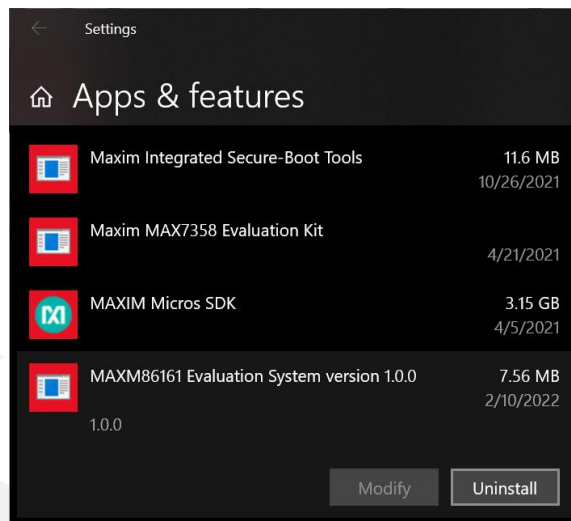
Updating the MAXM86161EVSYS# Software GUI

Below are the steps required to update the MAXM86161EVSYS# GUI to version v2.0.0-rc2.

1. If a user has the previous GUI installed, they must uninstall v1.0.0 of the GUI.

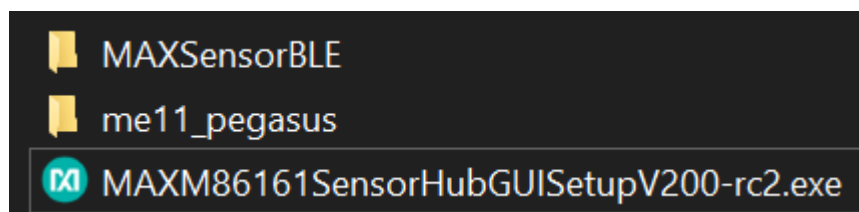   a. In the Windows search bar, type « **Add or remove programs** »

    b. Press Enter, and scroll down to the program titled « **MAXM86161 Evaluation System version 1.0.0** ». Click « **Uninstall** ».
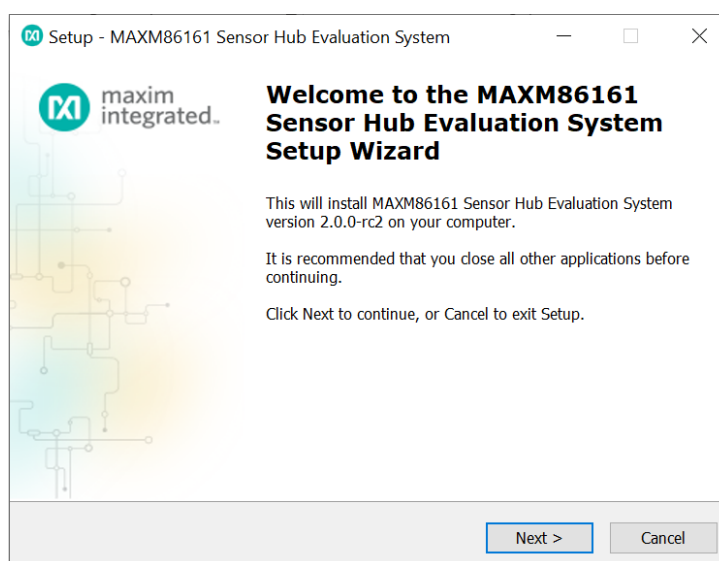

    c. Follow the prompts within the Uninstall Wizard to complete the uninstallation process.

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2. Next, locate the installer file called « **MAXM86161SensorHubGUISetupV200-rc2.exe** » within the updated MAXM86161EVSYS GUI package.

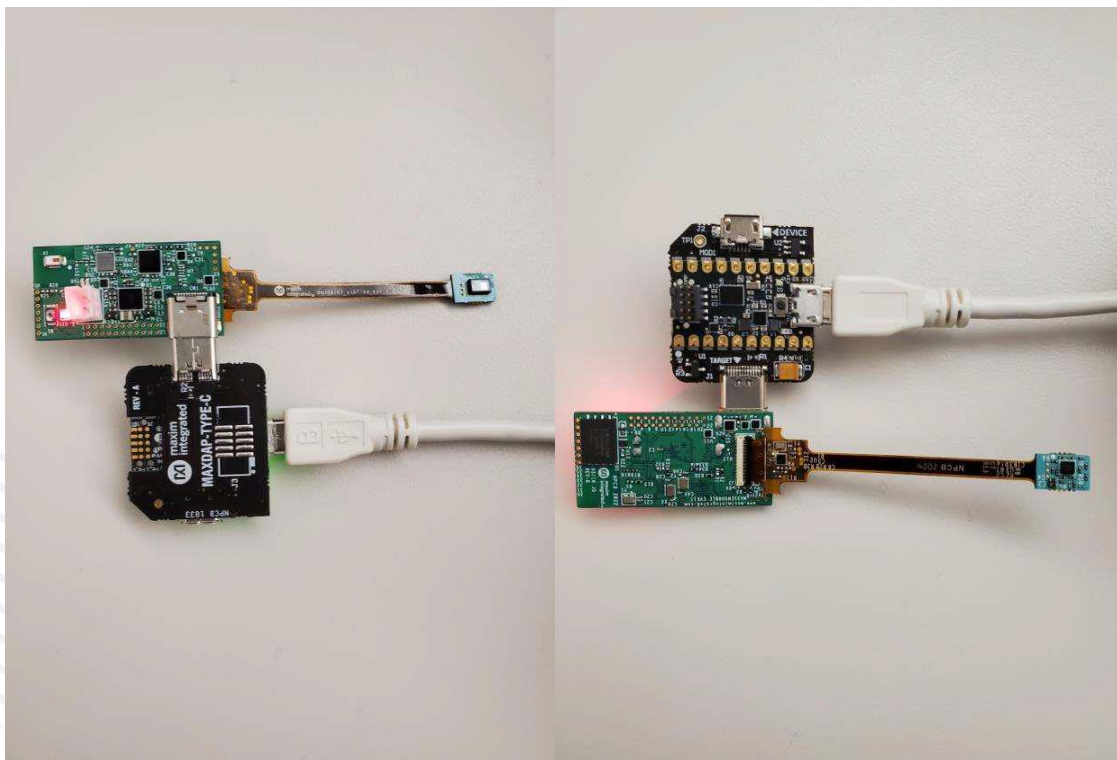3. Double-click the installer file to open the installation wizard for the v2.0.0-rc2 GUI.

4. Follow the installer prompts to complete installation of the MAXM86161EVSYS# GUI.
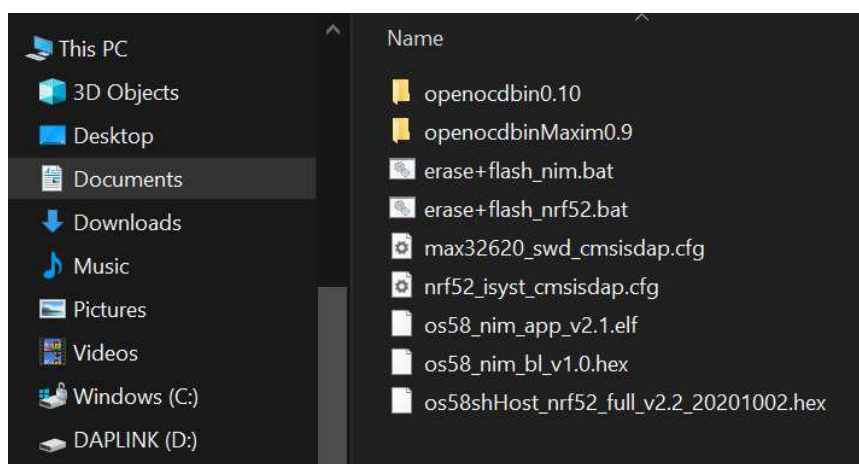
Flashing the nRF52 Firmware

Next, the user must flash the firmware for the NRF52832 microcontroller on the MAXM86161EVSYS# board. This microcontroller manages the BLE connection between the PC and the EVSYS board. Without the compatible firmware, the GUI may not detect the EVSYS through the Bluetooth connection. Programming the NRF52 may be done using either the MAX-DAP-TYPE-C or the MAXREFDES 100HDK# adapter that is shipped with some older EVSYS boards.

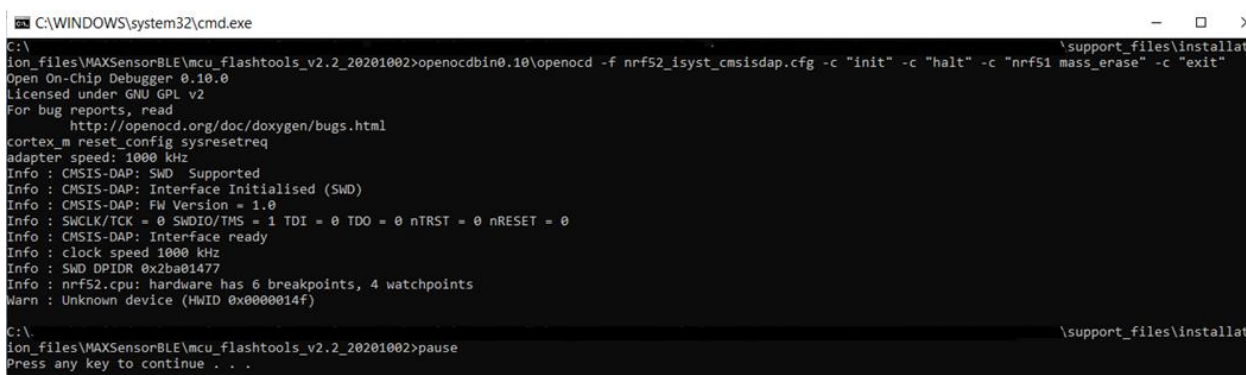## Programming the NRF52 using the MAX-DAP-TYPE-C

1. Connect the MAX-DAP-TYPE-C# programmer board to the USB-C port of the MAXM86161EVSYS#. Ensure the side with the IC and programming hardware on the MAX-DAP TYPE-C is on the same side as the bottom of the EVSYS board.

2. Connect a micro-USB cable to the programming bottom micro-USB input on the MAX-DAP TYPE-C board. The programming input should be 90-° from the USB-C connection to the EVSYS board. Be sure not to use the « **DEVICE** » input of the MAX-DAP-TYPE-C board for this programming portion, as this may cause errors.

   a. The onboard LED will blink yellow and red while the EVSYS is plugged into the PC's USB port.

3. Ensure that the setup appears as below :

4. A drive called « **DAPLINK** » will appear in your Devices, as below :

5. In the MAXM86161 EVSYS software package, go to the folder called « **support_files\installation_files_2.0\MAXSensorBLE\mcu_flashtools_v2.2_20201002** » and locate the file « **erase+flash_nrf52.bat** ».

6. Open a Command Prompt by typing the shortcut « **Win+R** », typing « cmd », then hitting Enter.

   a. Open the directory that has this batch script by running the following command:

      cd "[Path to mcu_flashtools folder]\mcu_flashtools_v2.2_20201002"

   b. Type and enter « **"erase+flash_nrf52.bat"** » including the quotation marks to run this batch script from the command line. Press the Enter key when prompted.

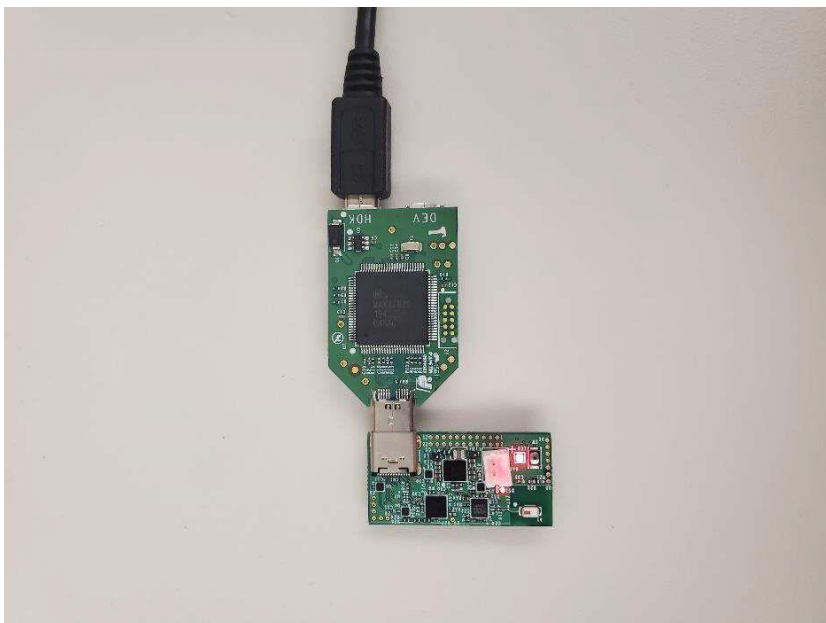   c. Ensure you see « **Verified OK** » to be sure the flashing process has completed successfully. Then you may close the command prompt window.

```
C:\                                                                                   \support_files\installat
ion_files\MAXSensorBLE\mcu_flashtools_v2.2_20201002>openocdbin0.10\openocd -f nrf52_isyst_cmsisdap.cfg -c "program os58shHost_nrf52_full_v2.2_20201002.hex ve
rify exit"
Open On-Chip Debugger 0.10.0
Licensed under GNU GPL v2
For bug reports, read
        http://openocd.org/doc/doxygen/bugs.html
cortex_m reset_config sysresetreq
adapter speed: 1000 kHz
Info : CMSIS-DAP: SWD  Supported
Info : CMSIS-DAP: Interface Initialised (SWD)
Info : CMSIS-DAP: FW Version = 1.0
Info : SWCLK/TCK = 0 SWDIO/TMS = 1 TDI = 0 TDO = 0 nTRST = 0 nRESET = 0
Info : CMSIS-DAP: Interface ready
Info : clock speed 1000 kHz
Info : SWD DPIDR 0x2ba01477
Info : nrf52.cpu: hardware has 6 breakpoints, 4 watchpoints
target halted due to debug-request, current mode: Thread
xPSR: 0x01000000 pc: 0xfffffffe msp: 0xfffffffc
** Programming Started **
auto erase enabled
Warn : Unknown device (HWID 0x0000014f)
Info : Padding image section 0 with 1692 bytes
Info : Padding image section 1 with 2380 bytes
Info : Padding image section 2 with 329316 bytes
Info : Padding image section 3 with 16096 bytes
Warn : using fast async flash loader. This is currently supported
Warn : only with ST-Link and CMSIS-DAP. If you have issues, add
Warn : "set WORKAREASIZE 0" before sourcing nrf51.cfg to disable it
Warn : Adding extra erase range, 00000000 to 0x00000013
Warn : using fast async flash loader. This is currently supported
Warn : only with ST-Link and CMSIS-DAP. If you have issues, add
Warn : "set WORKAREASIZE 0" before sourcing nrf51.cfg to disable it
wrote 524524 bytes from file os58shHost_nrf52_full_v2.2_20201002.hex in 48.471169s (10.568 KiB/s)
** Programming Finished **
** Verify Started **
verified 170732 bytes in 1.843615s (90.437 KiB/s)
** Verified OK **
shutdown command invoked
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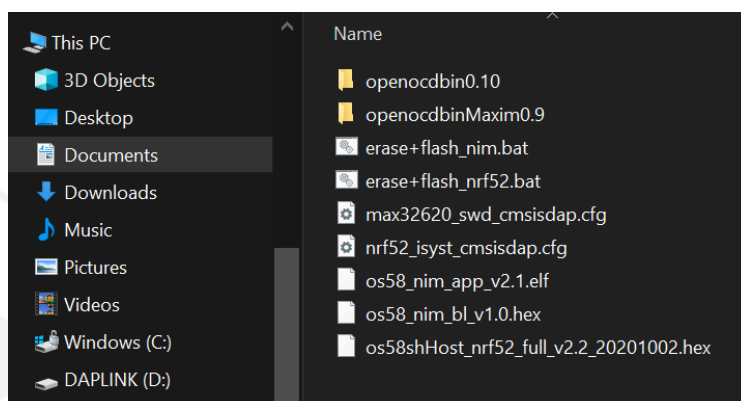
7. Remove the micro-USB cable. Then press down on the « **SW** » button for approximately 10 seconds (or until the LED stops blinking) to power-cycle the EVSYS board.

8. Re-power the device by doing one of the following:

   a. Re-connect to the << **DEVICE** » input of the MAX-DAP-TYPE-C board to verify operation by checking that the LED blinks red and yellow while plugged in, and green when unplugged.

   b. Or simply unplug the MAX-DAP-TYPE-C board and plug in the EVSYS board through USB-C. Similar to the above, check that the LED blinks red and yellow while plugged in, and green when unplugged.

9. If errors should arise during the programming procedure, please ensure that the MAX-DAP TYPE-C adapter has the correct firmware by doing the following:

   a. Check the following GitHub page: GitHub - MaximIntegrated/max32625pico-firmware images

   b. Download the firmware targeting the "MAX32625PICO".

   c. Hold down the reset button when first applying power to the programming input micro USB connector on the MAX-DAP-TYPE-C.

   d. A removable drive titled "MAINTENANCE" will appear under Devices, similar to the "DAPLINK" drive in Step 4 above.

   e. Drag and drop the downloaded firmware file into the "MAINTENANCE" drive. Once the firmware has been downloaded to the device, unplug and re-plug in the micro-USB connection and repeat the above procedure again from Steps 4-8.

Programming the NRF52 using the MAXREFDES 100HDK#

1. Connect the MAXREFDES100HDK# programmer board to the USB-C port of the MAXM86161EVSYS#. Ensure the side with the IC on the MAXREFDES100HDK# is the same side as the top of the EVSYS board.

2. Connect a micro-USB cable to the « **HDK** » input on the MAXREFDES100HDK# board. Be sure not to use the « **DEVICE** » input of the MAXREFDES100HDK# board for this programming portion, as this may cause errors.

3. Ensure that the setup appears as below :

4. In the MAXM86161 EVSYS software package, go to the folder called « **support_files\installation_files_2.0\MAXSensorBLE\mcu_flashtools_v2.2_20201002** » and locate the file « **erase+flash_nrf52.bat** ».

5. A drive called « **DAPLINK** » will appear in your Devices, as below :

6. Double-click « **erase+flash_nrf52.bat** » to flash the NRF52832 microcontroller and make sure the flashing script shows « **Verified OK** » when it is finished. Example below :

7. [Alternative to Step 6] Open a Command Prompt by typing the shortcut « **Win+R** », typing « **cmd** », then hitting Enter.

   a. Open the directory that has this batch script by running the following command :

   cd "[Path to MAXM86161 software]\support_files\installation_files_2.0\MAXSensorBLE\mcu_flashtools_v2.2_20 201002"

   b. Type « **"erase+flash_nrf52.bat"** » including the quotation marks to run this batch script from the command line.

   c. Ensure you see « **Verified OK** » to be sure the flashing process has completed successfully. Then you may close the command prompt window.

8. Remove the micro-USB cable to power-cycle the EVSYS board. Re-connect to the « **DEV** » input to verify operation.

Flashing the Algorithm ".msbl" File

Finally, flashing the updated .msbl file ensures that the GUI can operate the Sensor Hub with the expected commands, so the user may evaluate the MAXM86161 with no errors.
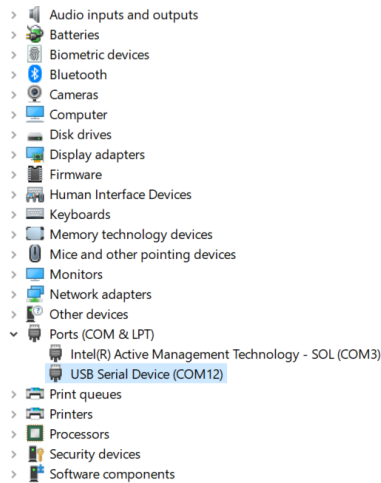
1. Make sure the host board MAX32630FTHR is not connected to a power source.

2. Connect the « **MAXM86161_ADPTR_EVKIT_B** » adapter board to the MAX32630FTHR host board.

   a. Note: For other EVKits without an adapter board, the standard MAX32630FTHR .msbl flasher may be used. Connections must be made between the MAX32630FTHR and the MAX32664 for this application, but customers may also use this as example software to build their own custom .msbl flasher.

3. *Carefully* insert the MAXM86161 MAXSENSORBLE_EVKIT flex connector into the « **J2** » flex connector on the « **MAXM86161_ADPTR_EVKIT_B** » adapter board.

   a. **Note : Please ensure the MAXSENSORBLE_EVKIT board is copper side up going into the J2 connector. Applying power with the copper side down may short out the sensor board and irreparably damage it. Ensure the setup looks exactly as below <u>before</u> appling power through the micro-USB cable.**

4. Apply power to the assembly through the MAX32630FTHR micro-USB port and ensure the LED on the MAX32630FTHR blinks green, verifying connection to the MAXM86161 sensor.
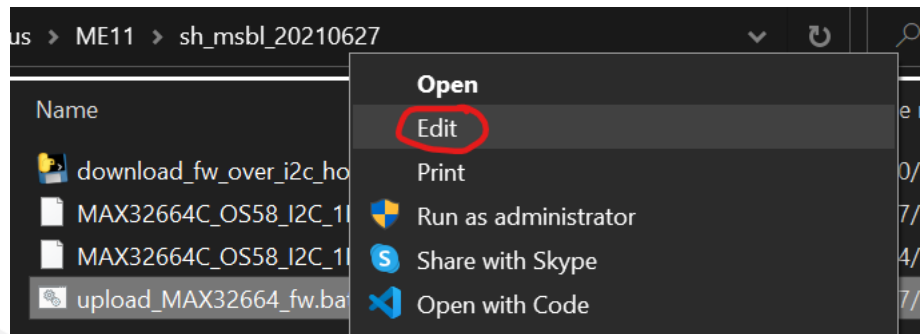
5. Find the COM port of the MAX32630FTHR by doing the following :

    a. Open Device Manager by using the Windows Search Bar.

    b. Under « **Ports (COM & LPT)** », look for the COM port number that shows up when you plug in the MAX32630FTHR board.
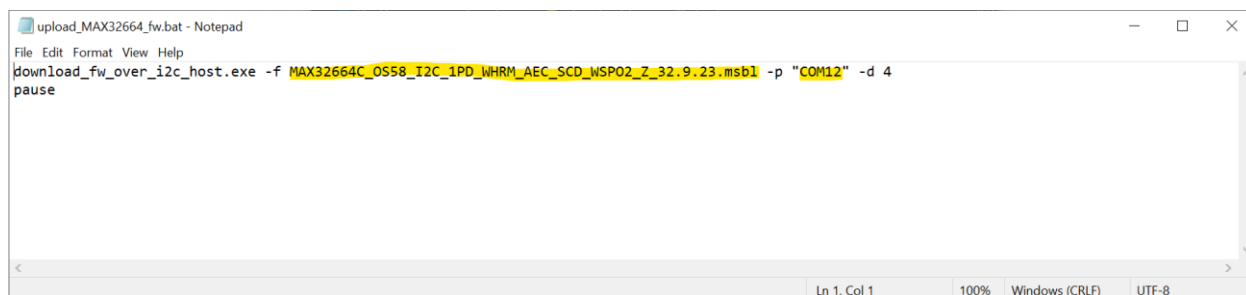

    c. In this instance it was « **COM12** », but this number may be different for each individual MAX32630FTHR board.

6. In the MAXM86161 software package, open the folder called « **support_files\installation_files_2.0\me11_pegasus\ME11\sh_msbl_20210627** ». Next, open the file « **upload_MAX32664_fw.bat** » in a text Editor such as Notepad. You can do this by right-clicking the file and selecting « **Edit** ».
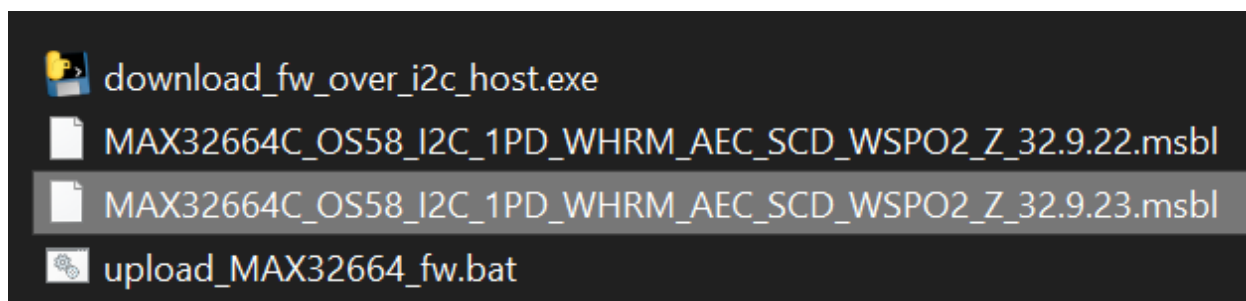
7. Ensure the COM port number and the .msbl file name match your FTHR board's COM port and your desired Sensor Hub algorithm file. Example below :
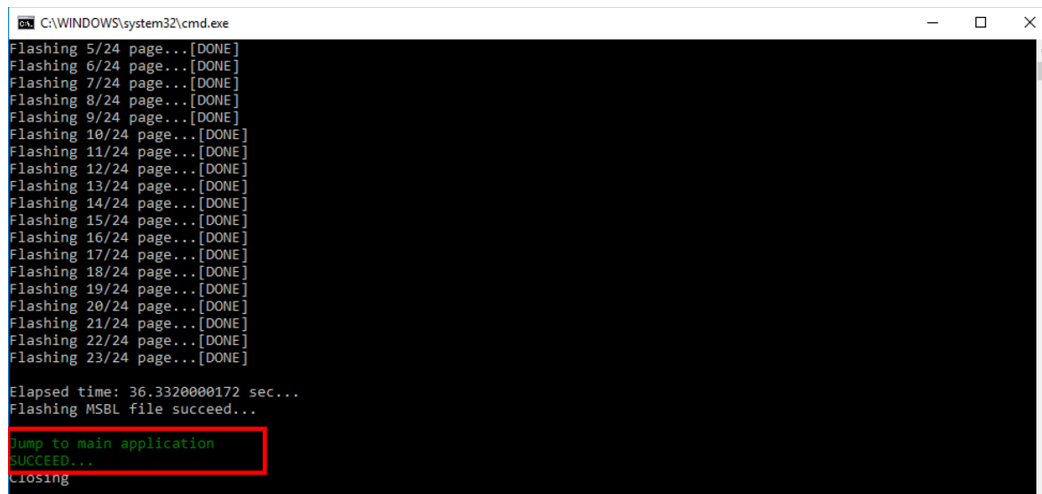

   a. Note : *Only* change the COM port and the .msbl file name in this script, or undefined errors may occur.

   b. Please ensure the correct .msbl file is inside the « **sh_msbl_20210627** » folder and that the file name inside the .bat script matches it *exactly.*

8. When you have finished the last step, save and close the « **upload_MAX32664_fw.bat** » file. Double-click this file to run the .bat script to begin flashing the .msbl file.

    a. Please do not disrupt any of the hardware connections during this phase of the setup.

    b. Ensure you see « **SUCCEED** » once the flashing completes to verify you have successfully flash the .msbl file.

9. Disconnect the micro-USB cable to power cycle the Sensor Hub.

Evaluating with the new MAXM86161EVSYS# Software
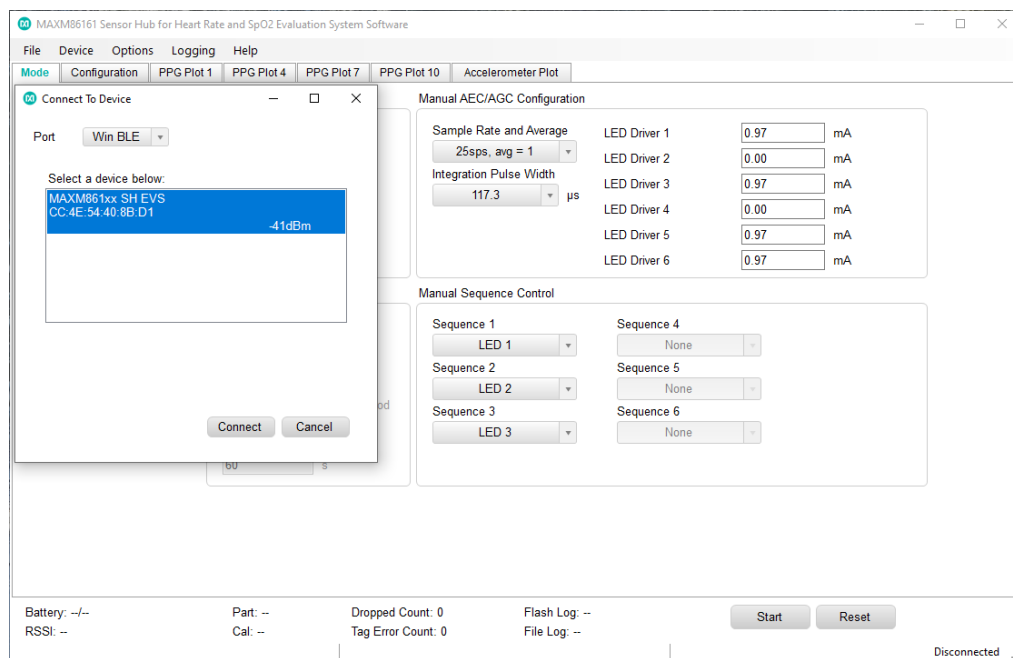
Now the user is ready to evaluate the MAXM86161EVSYS with all the latest software and firmware.

1. Connect the MAXSENSORBLE_EVKIT board via the flex cable to the MAXM86161EVSYS# with the **copper side down** on the EVSYS flex connector.
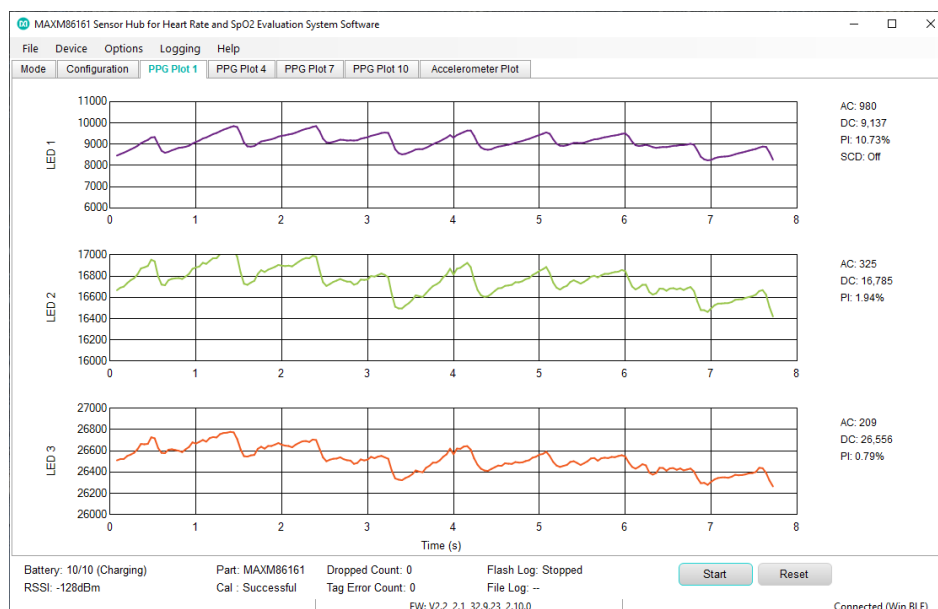
2. Power the EVSYS board via the USB-C cable provided with the EVSYS.

   a. Note : the EVSYS may be powered either from USB-C or a battery provided with the EVSYS. If the user desires battery power, they may plug in the battery provided with the EVSYS and press and hold the button labeled « **SW** » on the EVSYS board.

3. Open the MAXM86161 EVSYS GUI v2.0.0-rc2 installed in the first section of this document.

4. Using either the Cypress BLE dongle or your PC's native BLE connection (WinBLE), connect to the « **MAXM861xx SH EVSYS** » device as in the figure below (the will show up in the BLE device after the MAXM86161EVSYS has been powered on for at least five seconds):

5. Go to the PPG_Plot1 tab and click the « **Start** » button at the bottom of the GUI window.

6. Place a finger on the MAXSENSORBLE_EVKIT module and observe PPG plots with the default settings as below :

Status LED Indicators

The status LED indicates the current functional behavior of the device using both the color and blink frequency. Below are the definitions for this indicator:

- **LED Green**

    - Toggling (1Hz 50% duty cycle) = BLE advertising

    - Toggling (1Hz 10% duty cycle) = BLE connected

- **LED Red**

    - USB-C cable connected to charger

        - On = charging

        - Off = charge complete

- **Flash Logging**

    - On = busy preparing the flash memory or flash memory is full

    - Toggling (synchronously with the green LED) = logging

    - Off = not logging

Note: Flash logging indication takes precedence over the charging indication. I.e., if the device is plugged into a charger, the red LED indicates charge status. If flash logging is enabled while plugged into the charger, the red LED indicates flash log status.