AN-013 OPS24x Code Update

From time to time, OmniPreSense provides code updates with new features and/or fixes for its radar sensors. The embedded code in the OPS241/OPS242/OPS243 short range radar sensor can be easily updated to take advantage of these enhancements. This application note describes how to update the code on OPS241/OPS242/OPS243 radar sensors.

Update Process

There are two methods for updating the code on the radar sensors. The primary method is using a JTAG programmer such as a Segger and Infineon XMCFlasher software tool. The alternate method is updating via the UART interface using Memtool.

XMCFlasher and Segger Programmer Update Method

The first method of update utilizes JTAG programmer and a PC based code flashing tool. An example of a low-cost JTAG programmer is shown Figure 1. This programmer is relatively inexpensive and available from Adafruit here or other distributors. Other models are available from Segger.

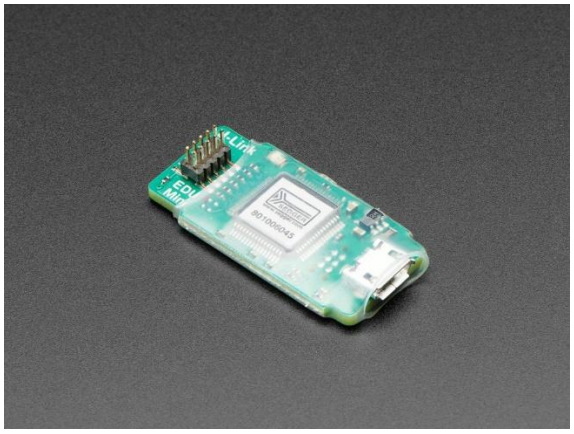


Figure 1. JTAG Programmer

The code flashing tool is XMCFlasher™ provided by Infineon. This free tool is available here.

Updating Code

To update the code in OPS241/OPS242/OPS243, follow the step-by-step instructions below. You will need to have a JTAG programming tool like the Segger noted above. You may also need to install the J-Link Software and Documentation Pack which can be found here.

Step 1. Download and install the XMCFlasher programming tool from the Infineon website. Follow the installation instructions that come with the download.

Step 2. Connect the JTAG programmer's connector to the JTAG connector on the OPS241/OPS242 (J6) located near the middle of the board (Figure 2). On OPS243, the JTAG connector is J2 and located at the lower left on the version D2 and later boards. The connector is keyed, so it can only connect in one direction.

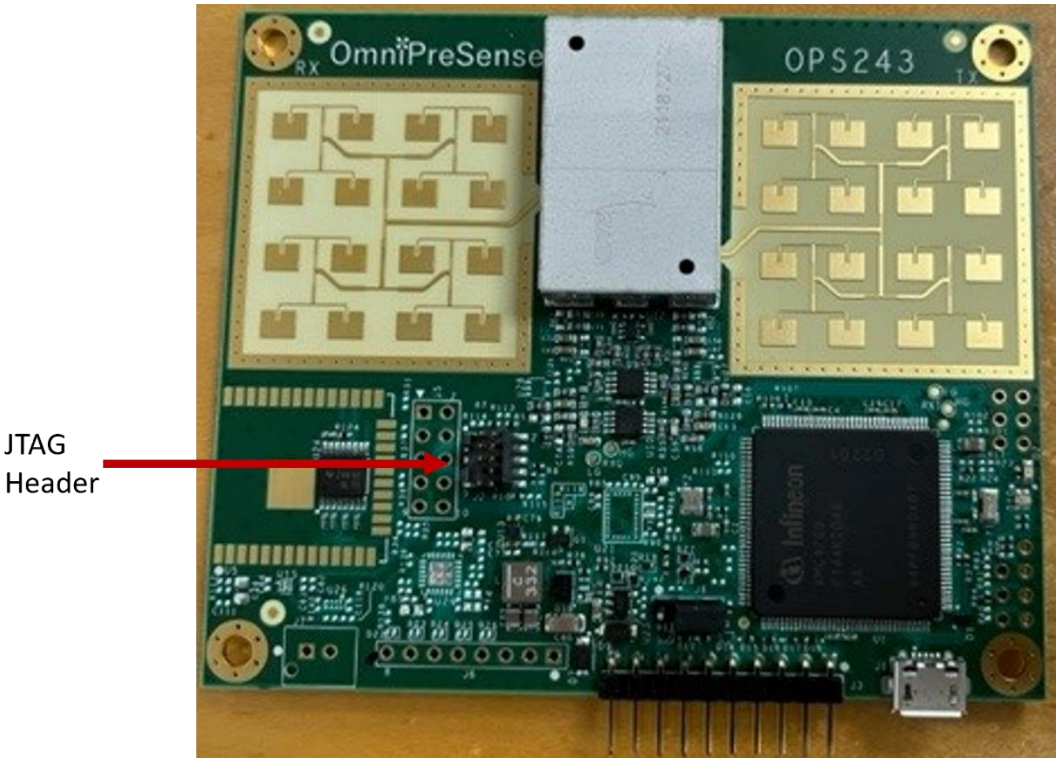


Figure 2. JTAG Connector (J2 on OPS243)

Step 3. Plug in the USB connector of the JTAG programmer into a USB port on the PC. If the ribbon cable that came with the Segger programmer was not plugged in, connect it. The connector on the programmer is not keyed. On some Seggers, the connector on the cable should be mounted so that the cable goes away from the programmer board as show in (*Figure 3*). On other boards, the cable may need to point in the other direction. When the sensor is connected to the XMCFlasher tool, if the Unique Chip ID does not populate (Step 7), rotate the connector on the Segger by 180° and hit the Connect button again. Plug in a USB micro cable into the OPS241/OPS242/OPS243 and the other end into another USB port on the PC. This provides power to the OPS241/OPS242/OPS243 during the program update.

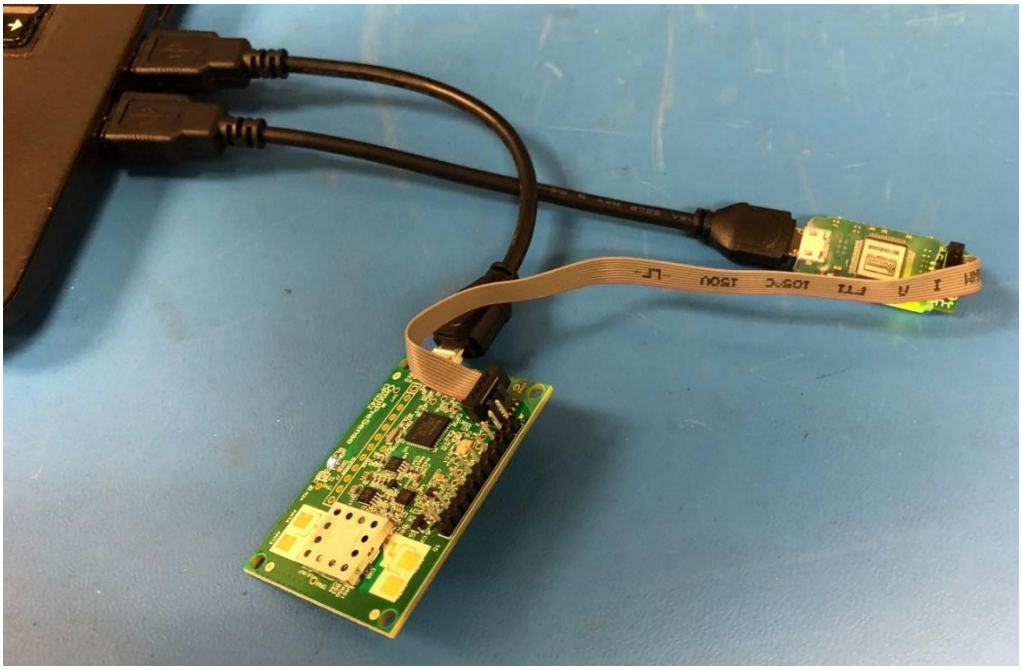


Figure 3. USB and JTAG Connections to PC

Step 4. Start XMCFlasher on the PC to get a window like that shown in *Figure 4*.

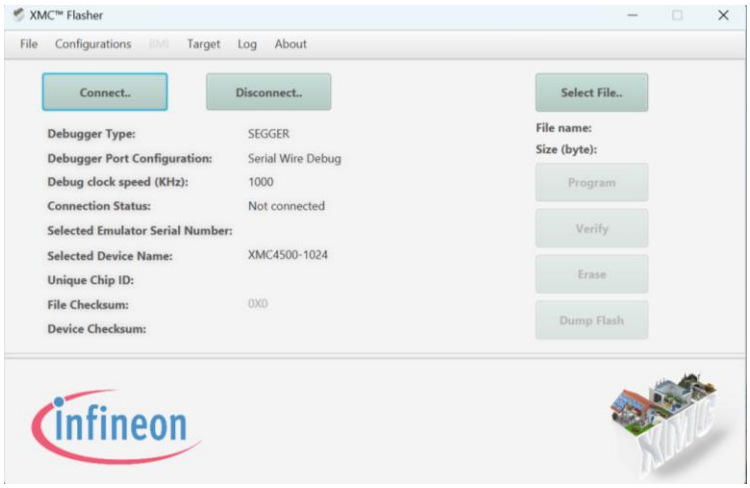


Figure 4. XMCFlasher Programming Tool

Step 5. Make sure the XMCFlasher configuration is set for Serial Wire Debug and not JTAG (*Figure 5*). Some of the OPS243 version D2 boards require setting to JTAG. If you find XMCFlasher does not connect to your OPS243 version D2 or later board, select JTAG as the Debugger Type. The Interface Setup is found under Configuration – Setup… Make sure the "Reset and verify content after programming" box is also checked off.

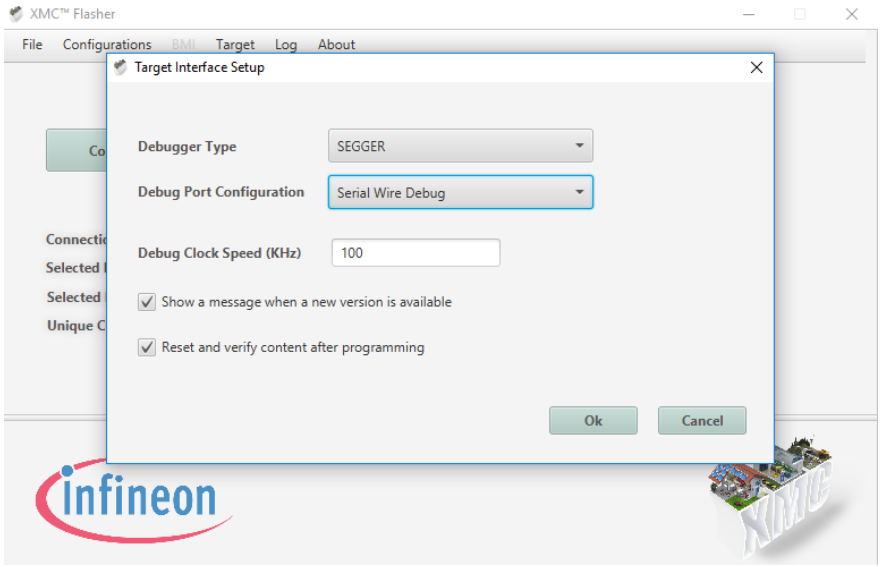


Figure 5. Serial Interface Setting

Step 6. With the OPS241/OPS242/OPS243 connected to the PC, press the Connect button on XMCFlasher. A pop-up window like that in Figure 6 will appear. For the OPS241/OPS242, scroll down and select the XMC4200-256 and press Ok. For OPS243, there are two options to choose depending on your board version. Some version D2 and later sensors use the XMC4700 while most others use the XMC4500. Check which processor is used by issuing a ?P API command or by looking at the marking on the large IC on the board. Once the processor is known, scroll down and select the appropriate processor as shown in Figure 7 and press Ok.

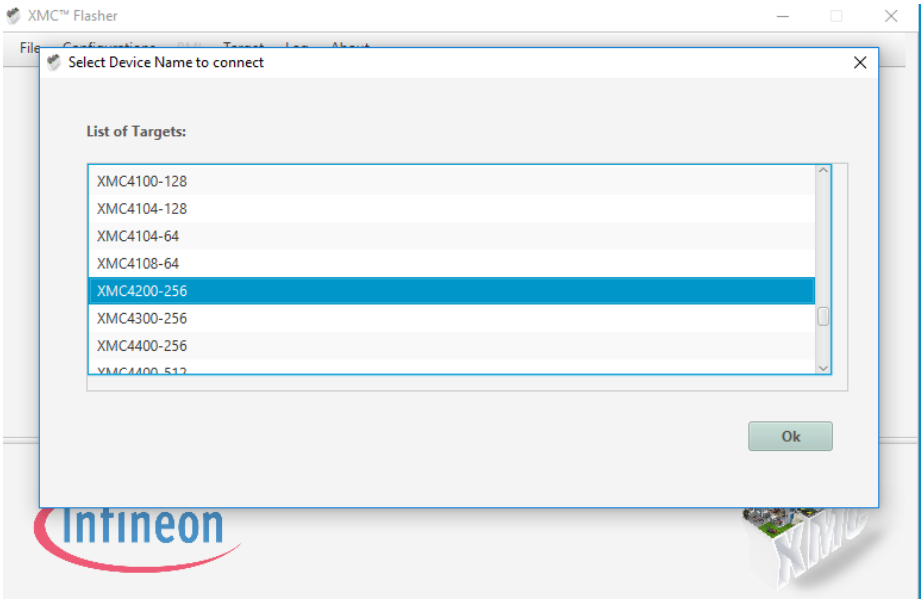


Figure 6. XMCFlasher Device Selection Window – OPS241/OPS242

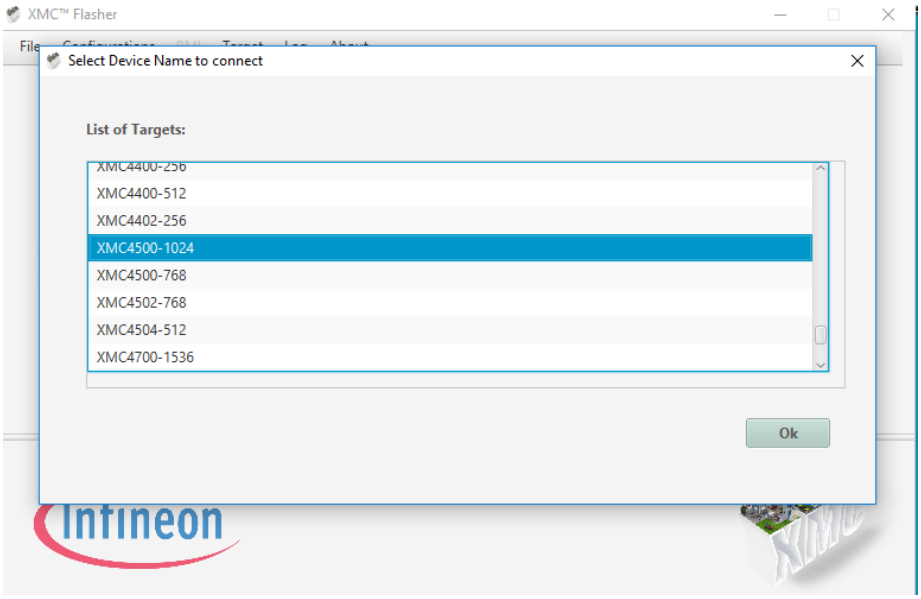


Figure 7. XMCFlasher Device Selection - OPS243

Step 7. The window will change and show the Connected Status as Connected (Figure 8). Additional information about the device will be shown including the Unique Chip ID. The Unique Chip ID will be a long line of random numbers and letters. If the Unique Chip ID shows 00, the XMCFlasher is not connected to the sensor and will not program correctly. Check that the Segger is plugged in or reverse the connector cable on the Segger side which is not keyed.

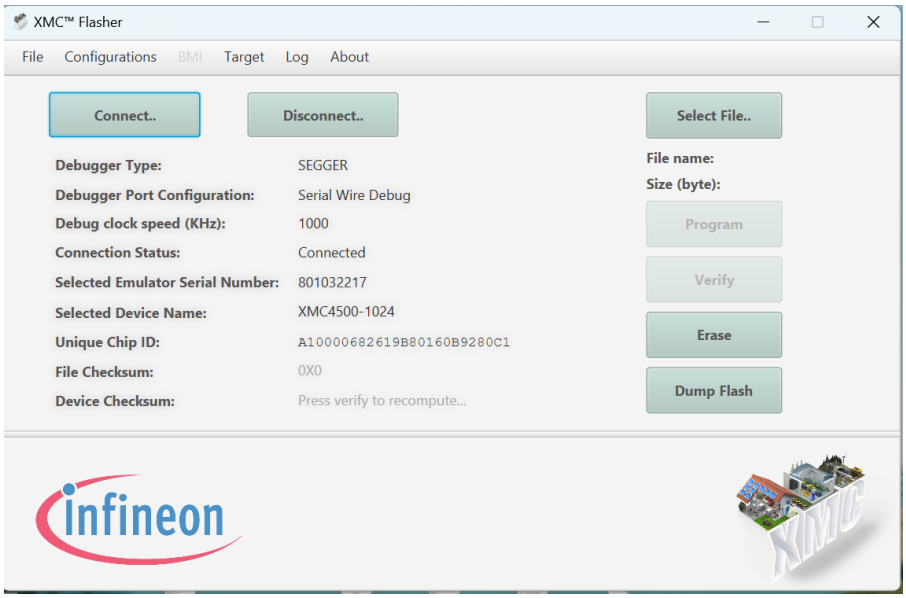


Figure 8. XMCFlasher Connected State Window

Step 8. Next, click on Select File and browse to the location of the hex file with the code to be updated on the OPS241/OPS242/OPS243. The name of the file will show up under the Select File button (Figure 9). Contact OmniPreSense customer service to obtain the latest code version.

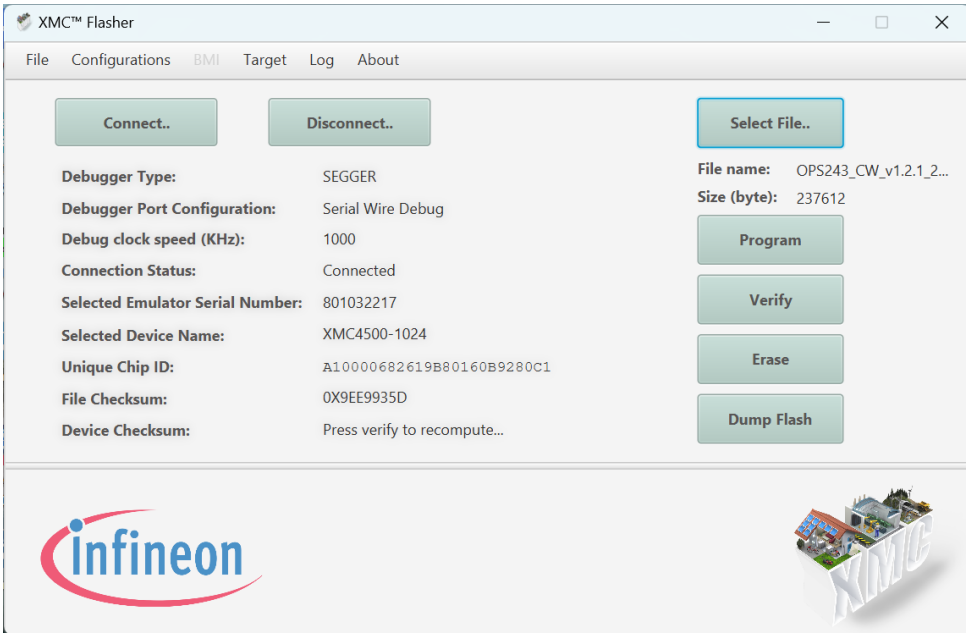


Figure 9. Hex File Selection

Step 9. Press Program to start the flashing process. A pop-up of rolling balls along with a status box will appear while the flashing in process (Figure 10). Typically, it only takes a few seconds to complete the flashing process. Do not press the Erase button. OmniPreSense saves factory settings in the sensors and pressing the Erase button will clear those out as well as any persistent memory settings which have been saved.



Figure 10. Sensor Flashing in Process

Step 10. Upon a successful re-flashing, a pop-up window will appear indicating a success (Figure 11). Click Ok and followed by the Disconnect button. The sensor can now be unplugged from the JTAG programmer and PC.

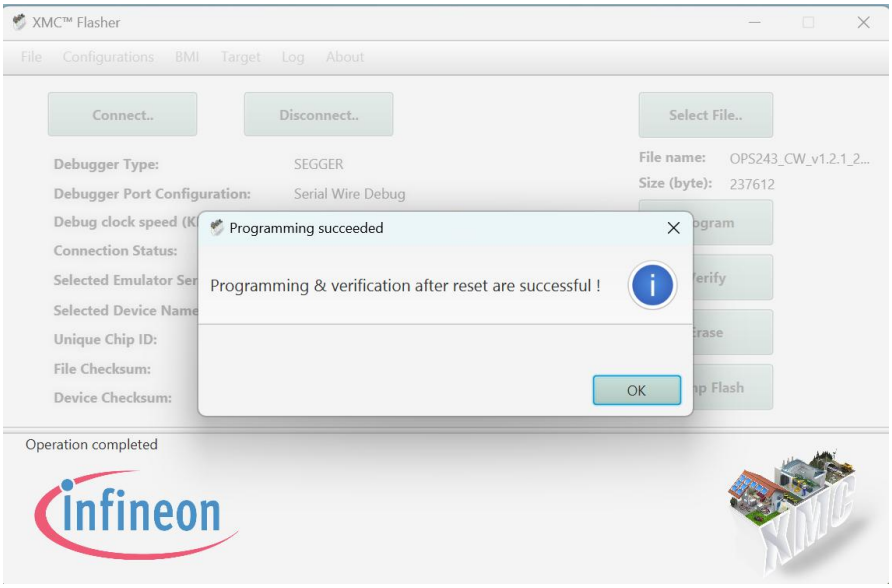


Figure 11. Successful Flashing of Sensor

You can check the programming was successful by plugging the board back into the USB port on the PC and using Tera Term to validate the new code is programmed and runs. Start Tera Term and it will automatically detect which port the board is connected to. Select the Serial button with the proper port selection. You should see speed data (m/s) start to stream from the board while waving your hand above the board. Press ?? to report the board information and note the Version number is correct for the expected code which has been programmed (Figure 12).

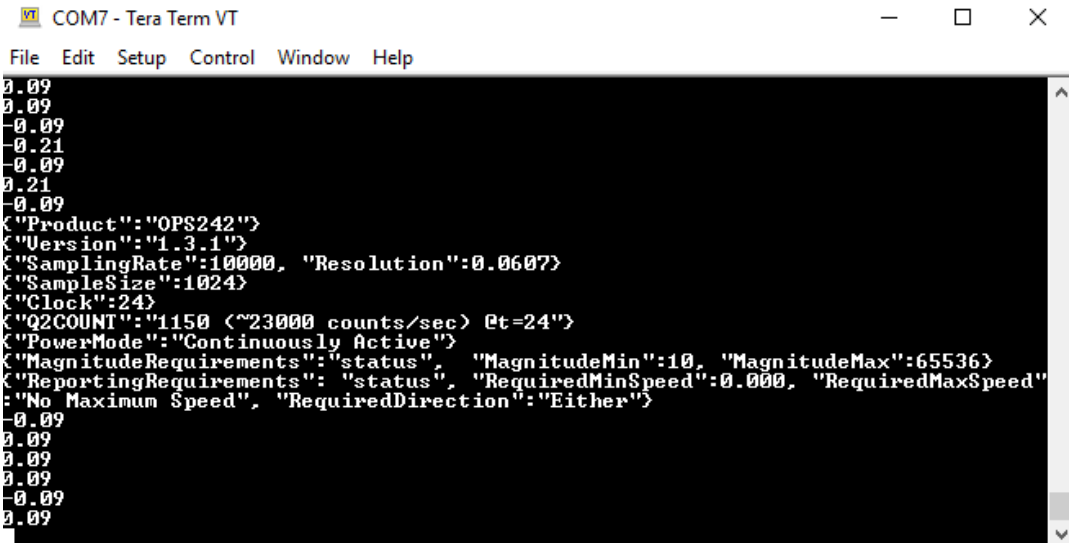


Figure 12. Programmed Board Validation

UART and Memtool Update Method

Starting with OPS243 code version 1.3.3, an alternate method using Memtool and the UART interface is available. Memtool is a free programming tool from Infineon and is available for download here. The UART interface is available on the 10-pin J3 header, and you will need a USB to UART cable assembly like the one shown in Figure 13. The cable is available from Adafruit and other sources.



Figure 13. USB to UART Cable Assembly to OPS243 Header J3

Step 1. Connect your OPS243 to your PC via the USB to UART cable as shown in Figure 13. The connections on header J3 include power (red, pin 9), ground (black, pin 10), UART-TxD (green, pin 7), and UART-RxD (white, pin 6).

Step 2. Open a terminal program like Teraterm or Putty, selecting Serial Port and the COM port if necessary. Make sure the baud rate is set to 19200. Set the sensor in Boot mode with the B1 API command followed by the reset command, P!. After B1, you'll see the message:

{"BootMode" : "ASC_BSL"}

Close the terminal program after issuing the P! reset command.

Step 3. After installing Memtool, start the program and a window as shown in Figure 14 will appear.

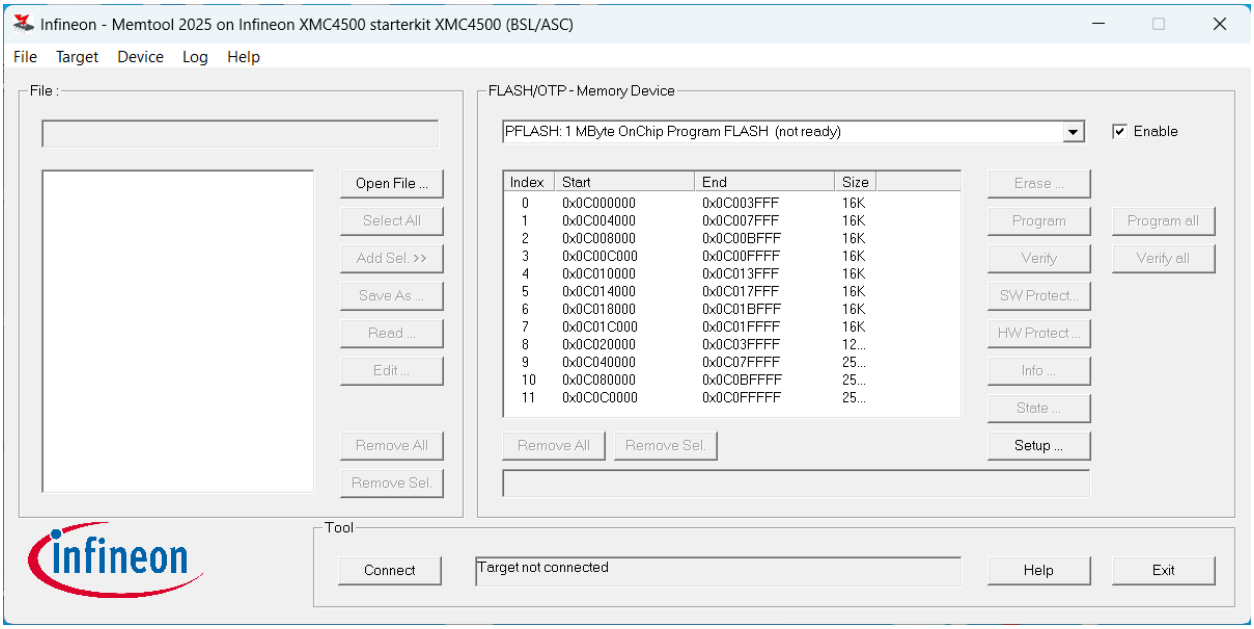


Figure 14. Memtool Main Window

Step 4. Select the Open File button on the left side and select the new code file to flash to the sensor. The details of the memory location will appear on the left side of the window (Figure 15).

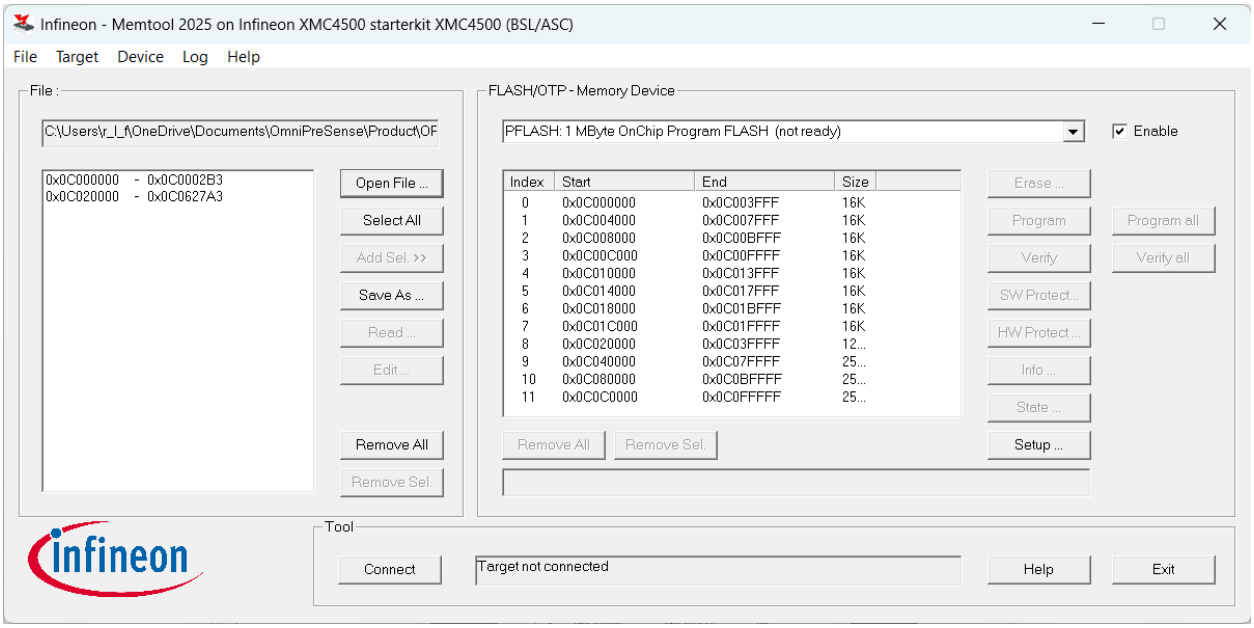


Figure 15. Memtool with Loaded Code File (not connected)

Step 5. Select the Connect button at the bottom of the Memtool window. The message to the right of the Connect button will change from **Target not connected** to **Ready for Memtool Command** (Figure 16).

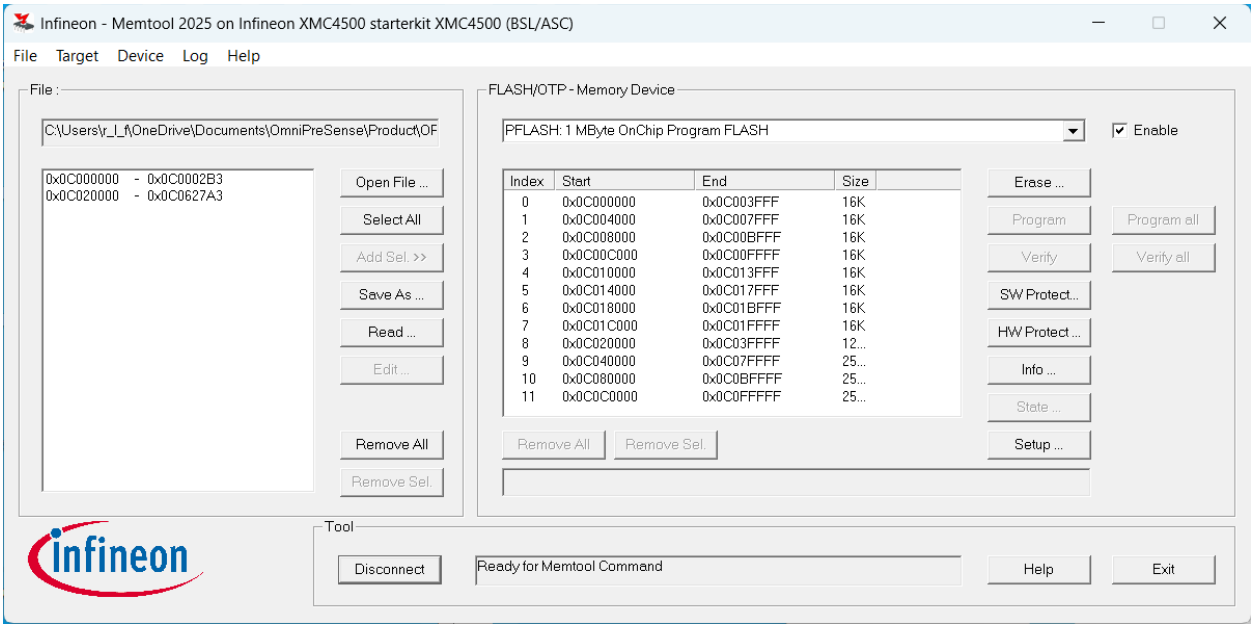


Figure 16. Memtool with Loaded Code File (connected)

Step 6. Press the Select All button next to the code files which will highlight the files (Figure 17). Then press the Add Sel.>> button which will add the code files to the memory listing on the right side (Figure 18). The code is now ready to update to the sensor memory.

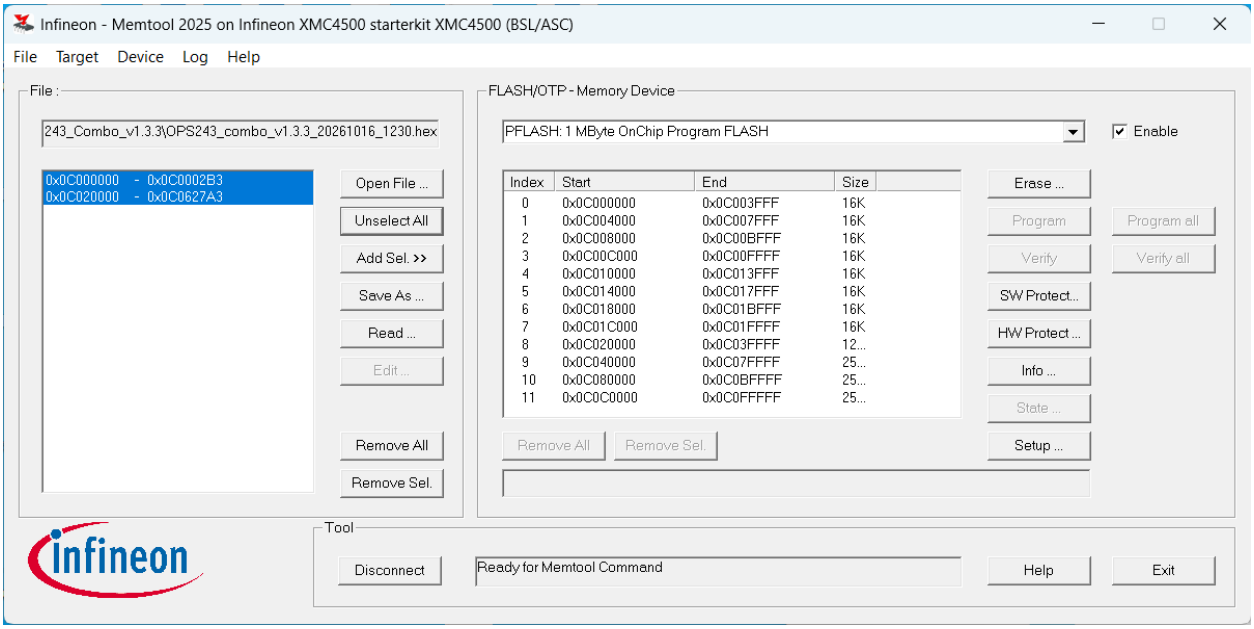


Figure 17. Code File Selected

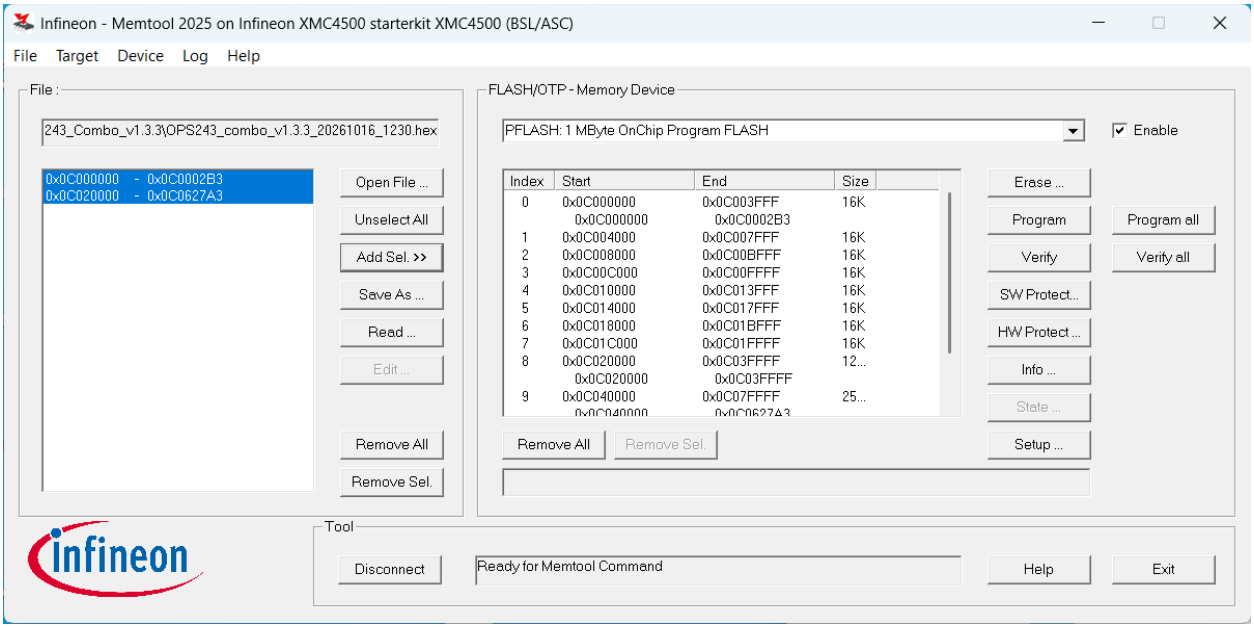


Figure 18. Code File Added to Target Data

Step 7. Press the Program button on the right side and a new pop window (Figure 19) will appear, showing the programming status. It may take a little time but eventually it will be completed with a success message in the Result section as shown in Figure 20.

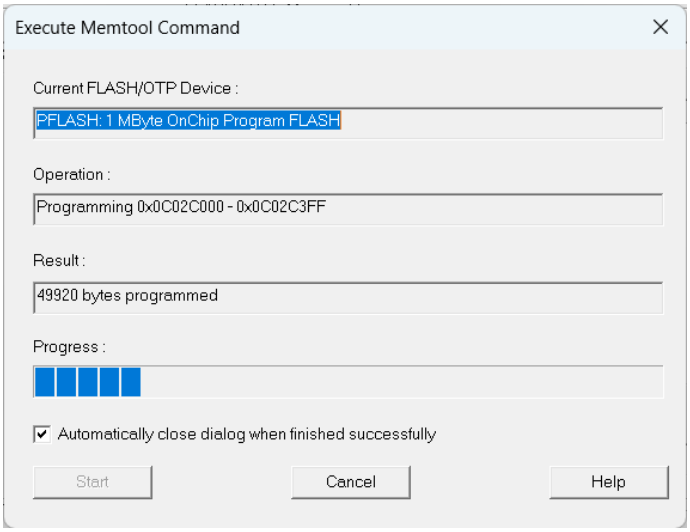


Figure 19. Progress Bar During Programming

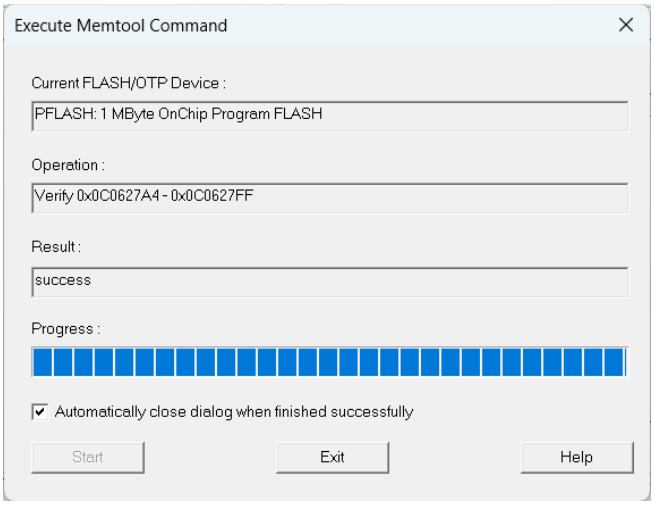


Figure 20. Successful Programming

Step 7. Press theMemtool Disconnect button at the bottom and power cycle the sensor. The new code will now run on your sensor and you can validate the code version with the V? API command.

Revision History

Version	Date	Description
A	November 13, 2017	Initial release.
B	November 26, 2018	Updated with newer re-flashing tools.
C	February 26, 2019	Added new step 5 to check for serial setting as opposed to JTAG.
D	June 19, 2019	Updated with support for OPS243. Added clarification not to use Erase button.
E	July 29, 2022	Updated information about rev D2 boards and removed comments about 1st generation OPS241 board.
F	February 18, 2025	Corrected Segger connection position Added comments about installing J-Link software Updated screenshots
G	November 6, 2026	Added OPS243 update using Memtool and UART interface (v1.3.3 code)