UHF Transceiver Type II

Updating the Firmware with Debugger

UHF TRANSCEIVER TYPE II UPDATING THE FIRMWARE WITH DEBUGGER

These instructions describe the full procedure for a firmware update of EnduroSat's UHF Transceiver Type II module when using a debugger.

Please read these instructions carefully before starting the firmware upgrade.

Figure 1: UHF Transceiver Type II Module

1 CHANGE LOG

Date	Version	Note
26/06/2019	Rev 1.0	Initial
16/01/2020	Rev 1.1	Update using MSP430Flasher

2 ACRONYMS LIST

COM	Communication Port
GUI	Graphic User Interface
PC	Personal Computer
PCB	Printed Circuit Board
UART	Universal asynchronous receiver/transmitter
USB	Universal Serial Bus

3 FIRMWARE UPGRADE INSTRUCTIONS

Updating EnduroSat's UHF Transceiver TYPE II using a debugger is a straightforward procedure requiring only a few steps. Before beginning with the update process make sure that all the below listed components are present:

- **MSP-FET: MSP430 Flash Emulation Tool** (http://www.ti.com/tool/MSP-FET)
- **Uniflash Standalone Flash Tool for TI Microcontrollers** (http://www.ti.com/tool/UNIFLASH) **or MSP430Flasher** (http://www.ti.com/tool/MSP430-FLASHER)
- **UHF_BA.vX.XX.bin** file or **UHF_Boot_vX.XX.exe** file provided by EnduroSat
- **Screwdriver with T6 Hexagon bit**
- **Board-to-Board connector, 2 rows, 7 Contacts each, 2.54mm spacing, Through hole, Male Header (Figure 7)**
- **Mini-USB cable**

3.1 Install and Configure

3.1.1 Using **UniFlash**

Uniflash is a free tool distributed by Texas Instruments. Open the link given above and download Uniflash from the option *UniFlash for most TI Microcontrollers (MCUs) and mmWave sensors.*

Once Uniflash is installed and started the main windows will appear (Figure 2). Choose **MSP430FR5989** under the device list and **TI MSP430 USB1** for USB connection.

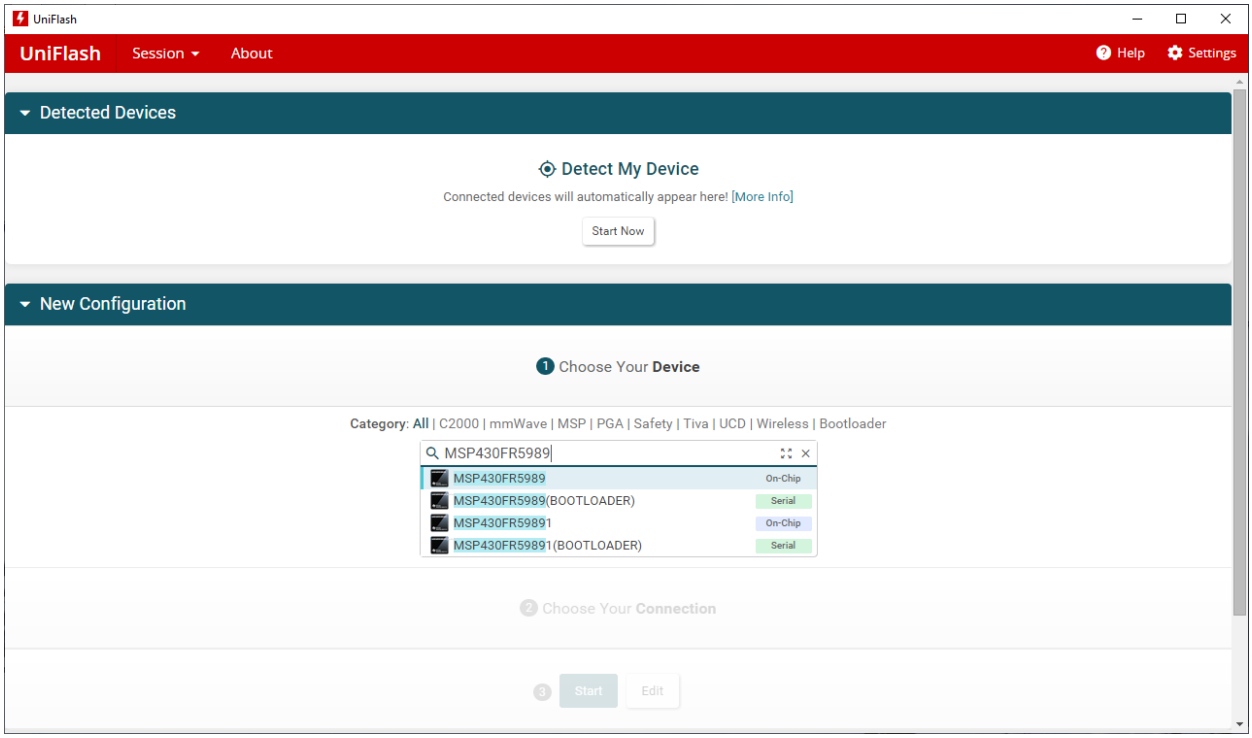

Figure 2: Select Device in Uniflash

Pressing the *"Start"* button opens the main window of the program. By default, the *"Program"* window selection is loaded (Figure 3).

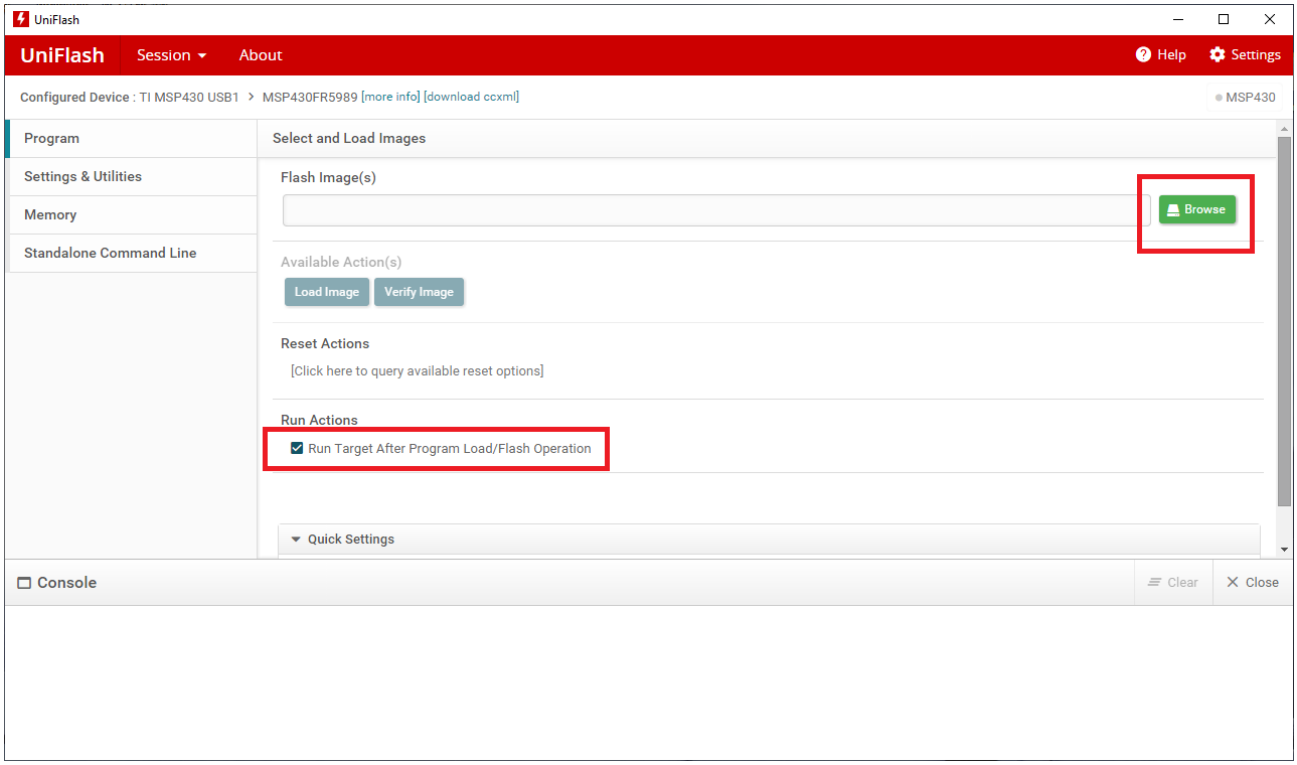

Figure 3: Uniflash's Main Window
(with the *"Browse"* button and *"Run Action"* checkbox highlighted)

Navigate to the *"Browse"* button located near the right edge of the window and use it to choose the UHF_BA.vX.XX.bin file provided by EnduroSat. The file will be listed in the *"Flash Image(s)"* field. Notice that once the file is loaded several new options appear (Figure 4). Leave the checkbox checked for *"Binary"* and under *"Load Addr."* enter: 0x4400.

Finally untick the checkbox under *"Run Actions"* – this will prevent the UHF from starting after the firmware update and will allow for firmware verification.

With this the Uniflash configuration is complete. All that is left to do is attach the debugger to the device and execute the firmware update and verification process.

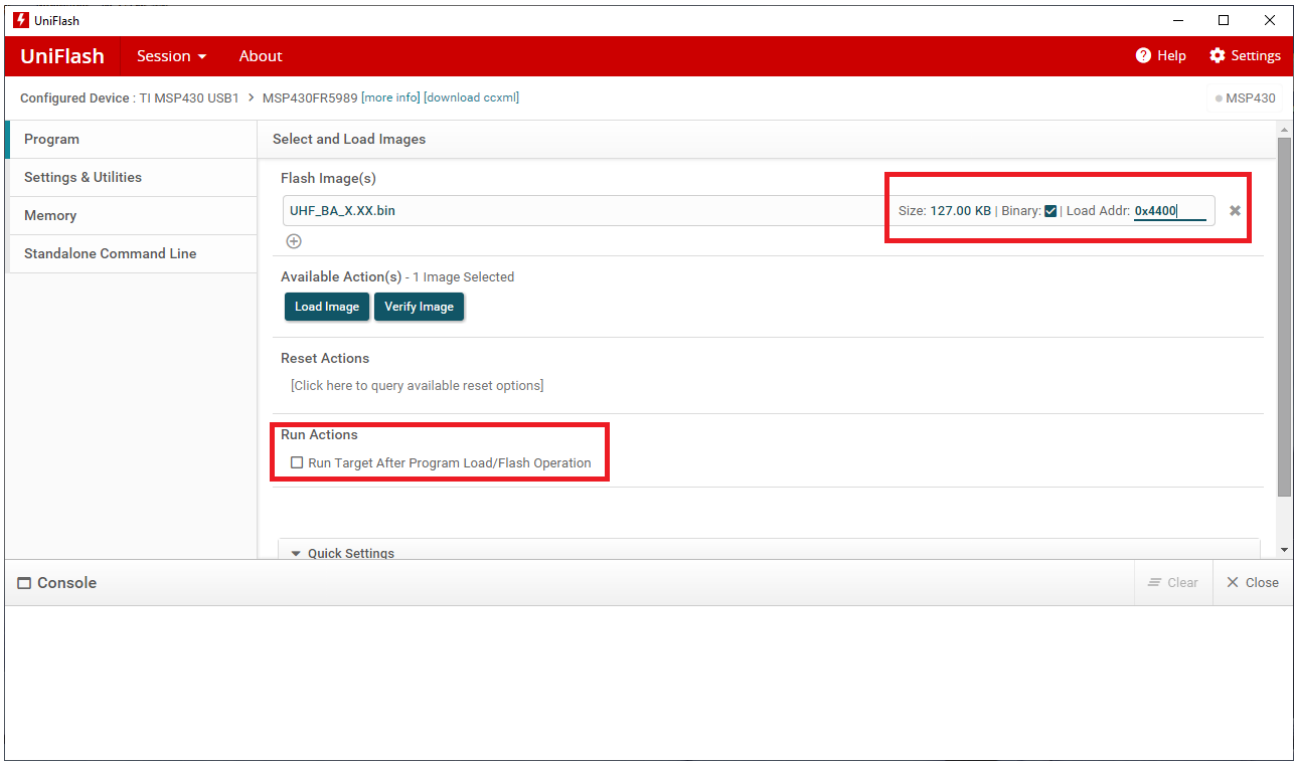

Figure 4: Uniflash's *"Program"* Window
(after choosing the provided .bin file. Notice the new options appearing in the *"Flash Images(s)"* field and the unchecked *"Run Actions"* checkbox)

3.1.2 Using MSP430Flasher

MSP430Flasher is a free command line tool distributed by Texas Instruments. Open the link given above and download MSP430Flasher.

Extract the zip and locate MSP430Flasher.exe, if you double click on the application, you will see the command line window (console) open as depicted in Figure 5.

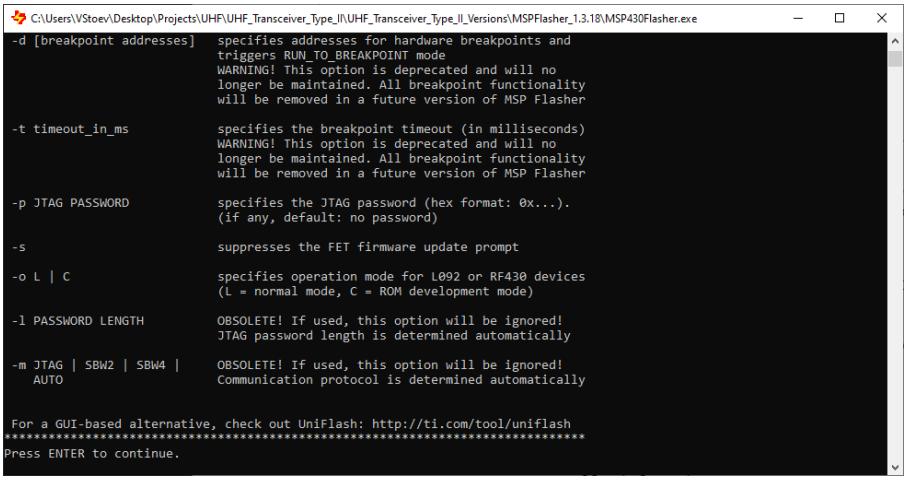

Figure 5: MSP430Flasher's main view

If you press ENTER the screen will close. To open in and send the FW update command you will have to open **Command Prompt** or another command line interface and navigate to the folder where **MSP40Flasher.exe** resides as depicted in Figure 6. Next you will need to attach the debugger.

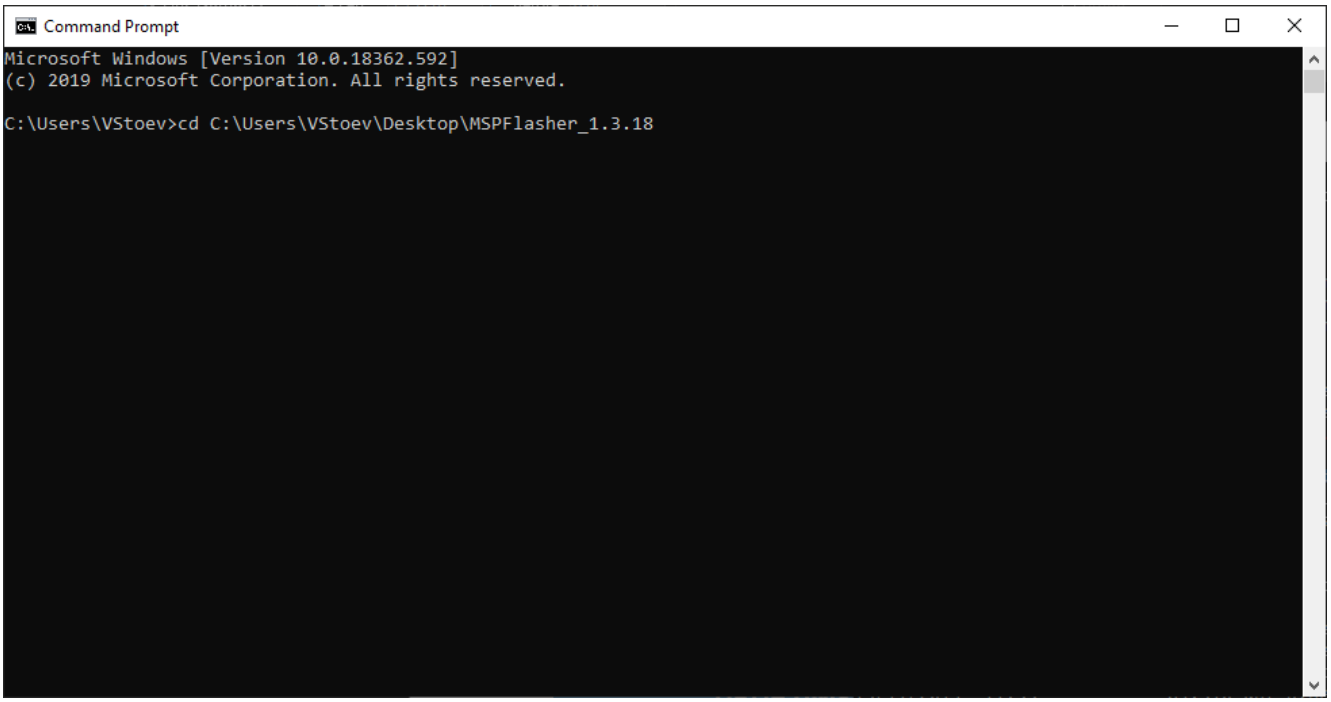

Figure 6: Navigating to MSPFlasher's location using Command Prompt

3.2 Attaching the debugger

To attach the debugger, first open the UHF aluminum box by unscrewing the 11 **M2X6** screws located on the bottom side of the module. This will expose the PCB and the 14-pin JTAG through-hole footprint to be used with the MSP-FET debugger (Figure 8).

Notice that **Pin 1** is located at the left end, bottom row and has a square through-hole footprint as opposed to all other pins.

Since the MSP-FET debugger cable is female, use the male header (Figure 7) to connect the debugger with the UHF PCB.

Figure 7: 14-pin male header with 2.54mm step

Pin 1 of the debugger flat cable is indicated first by a white coloring and second by a small arrow pointing downwards and located on the black plastic ending of the cable. This arrow should point to the square footprinted depicted in Figure 8.

Figure 8: JTAG Connector

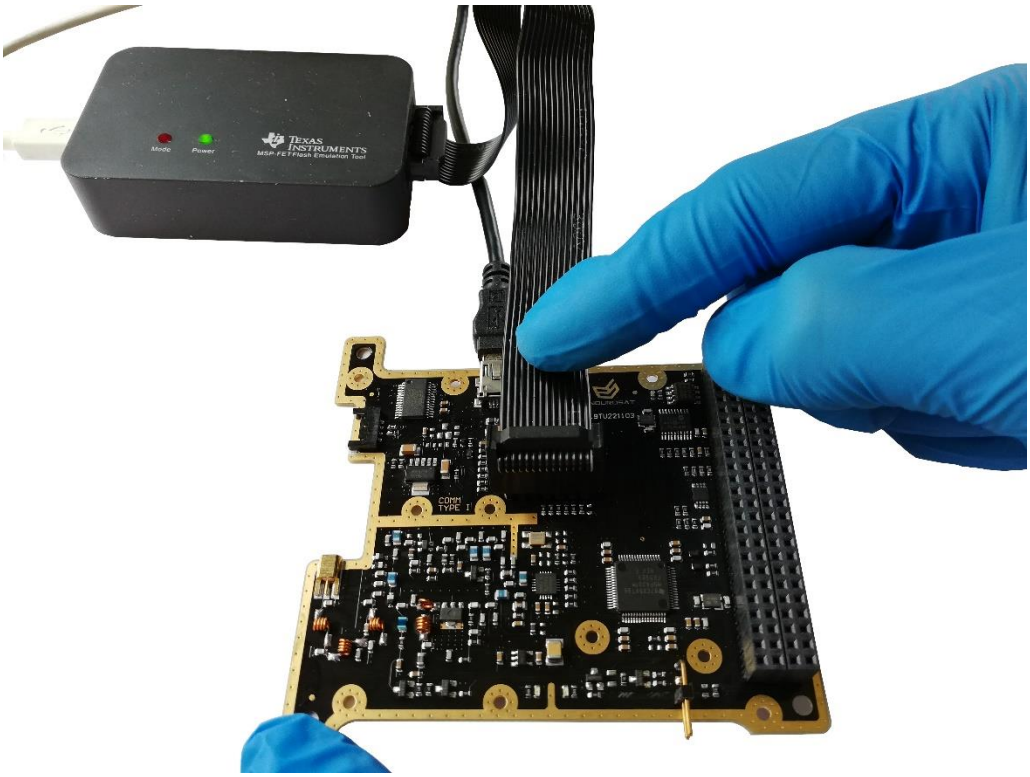

Figure 9: Connect the Debugger
(hold it steady during the update process)

3.3 Performing the Firmware Update

3.3.1 Using Uniflash

Connect your device to the PC via the mini-USB cable to power-up the device.

To execute the firmware update, the debugger will have to be firmly connected to the PCB. To this end attach the male header and press slightly the debugger to one side so that all pins are well in contact with the PCB (Figure 9.) and keep it this way while the firmware update and verification process is completed.

Important: The debugger should have good contact with the PCB during the entire firmware update. Any loss of physical contact can result in the lockdown of the micro-controller!

- Press the *"Load Image"* button on Uniflash's main screen and wait until the update procedure is completed. Notice that you may be asked to update the firmware of the debugger.

- Once successful, press the *"Verify Image"* and wait until the verification process is completed.

Important: If the verification process is unsuccessful the downloaded firmware is not guaranteed to work properly! Make sure that the verification is complete before using the device or contacting EnduroSat for support.

If both procedures finished successfully, remove the debugger and re-connect the mini-USB cable to hard reset the device. The firmware update is successfully completed.

3.3.2 Using MSP430Flasher

Connect your device to the PC via the mini-USB cable to power-up the device.

To execute the firmware update, the debugger will have to be firmly connected to the PCB. To this end attach the male header and press slightly the debugger to one side so that all pins are well in contact with the PCB (Figure 9.) and keep it this way while the firmware update and verification process is completed.

Important: The debugger should have good contact with the PCB during the entire firmware update. Any loss of physical contact can result in the lockdown of the micro-controller!

- Open the location of the MSP430Flasher.exe file as depicted in Figure 6.

- Copy the provided bootloader file (UHF_Boot_vX.XX.txt) in the folder where MSP430Flasher.exe resides

- Enter the following line in the Command Prompt (Figure 10):
  MSP430Flasher -w UHF_Boot_vX.XX.hex -v

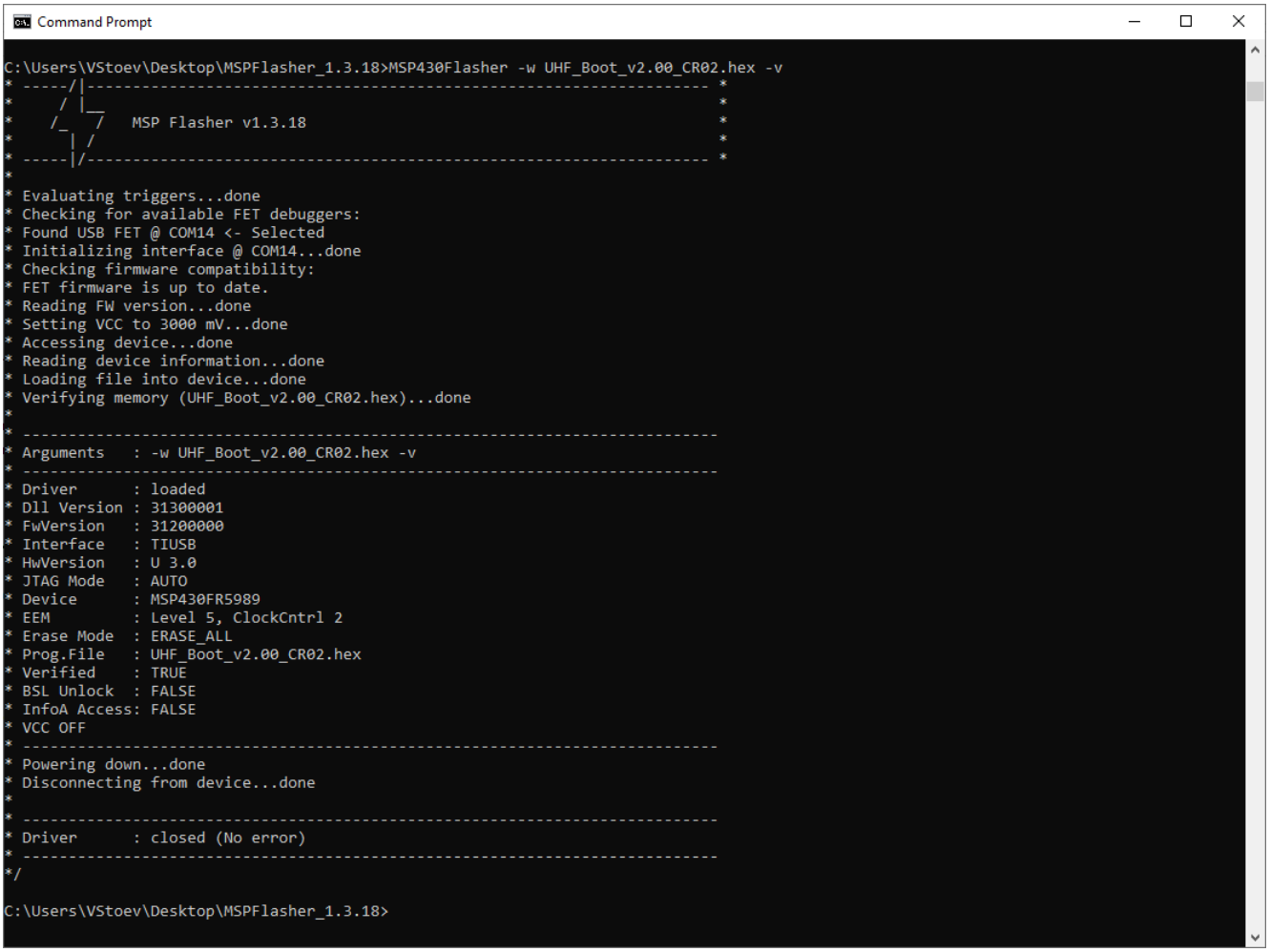

Figure 10: Command and output of update.

Bear in mind the name of the file may be different from the one depicted here. Inspect the output of the update process. The **Verified field** should return **TRUE**.

Important: If the verification process is unsuccessful the downloaded firmware is not guaranteed to work properly! Make sure that the verification is complete before using the device or contacting EnduroSat for support.

Remove the debugger and re-connect the mini-USB cable to hard reset the device. The firmware update is successfully completed.