

MCU Flasher

V2.0.0
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COM Port Select Combo Box

Labeled “Select COM Port:” and initially displaying the text “Unselected”

This is where you select the port that your board, programmed with Secure Bootloader Plus, is connected to on your PC. Once the port is selected and a connection is made the select box disappears and is replaced with a **Disconnect** Button.

The Disconnect Button

This button appears only if connection to a board is successfully made on the port selected from the COM Port Select Combo Box. Upon clicking this button, MCU Flasher commands the connected board to reset and then closes the COM Port. The disconnect button disappears and the Port Select box re-appears. Alternately you may click the “Exit” button which closes the port without resetting the board and also closes MCU Flasher.

The Commission Unit Button

Use this button to commission a board with its permanent serial number. A serial number must first have been entered in the serial number entry box. This number is burned into the bootloader area of FLASH memory and becomes permanent to the board. ReFLASHing the bootloader will erase the serial number also.

The Update Unit With Selected File Button

This button is initially disabled and non-functional until an .ffg update file has been opened and the board has been commissioned with a serial number. Both commissioning the board and pening an .ffg file is required to enable this button. Clicking this button causes MCU Flasher to update the connected board with the currently opened file.

The Boot The Application Button

This button is initially disabled and non-functional until MCU Flasher determines that a connected board has an authenticated application in its FLASH memory. Once it is determined that an authenticated application is present on the board this button becomes enabled. Clicking this button causes MCU Flasher to command the bootloader to reboot with the application. The bootloader will no longer be executing and MCU Flasher disconnects.

The Open / Close Update Log Button

This button is a toggle. Clicking this button when the log is not open will cause the update log to be opened in notepad. Clicking this button while the log is open will cause it and notepad to be closed.

The Open / Close Activity Log Button

This button is a toggle. Clicking this button when the log is not open will cause the activity log to be opened in notepad. Clicking this button while the log is open will cause it and notepad to be closed.

The Tool Strip **Open File** Button (Folder Icon left most in the tool strip)

Click this button to open a secured application update file (.ffg file) See the User manual **SBL+ & FFG ST Micro edition UM.pdf** for creating the secure update file.

The MCU Flasher GUI interface.



Figure 1

MCU Flasher is designed to simplify updating your product firmware in the field and to also program and prepare your boards for sale from the production line by automatically setting the MCU's onboard Real Time Clock (RTC) saving the time to enter it manually.

1. COM Port Select combo box and the COM Status window

UART ports are always recognized and inventoried regardless of a device connection. USB ports on the other hand are only inventoried and displayed in the combo box when connected to the PC.

In the port select box which should be displaying “Unselected” initially, select the port your device is connected to. Again, in the case of a USB port you may need to go look in the Windows Device Manager to see which COMx the USB port was assigned. This will show up in the device manager only after the board is connected. MCU Flasher will also inventory this port at connection time.

Once the connection port is identified select it from the dropdown box under the label “Select COM Port:”

As soon as the port is selected and if a properly functioning board programmed with Secure Bootloader Plus has been connected the **COM Status** window to the right with a red background and displaying “Not Connected” will change its background to yellow and display “Connecting”. MCU Flasher then sends out a poll request and checks for a reply. If the connected board replies correctly to the poll, the com select box is replaced with a “Disconnect” button, the background of the **COM Status** window changes to green and “COMx Connected” is displayed with the x in COMx being the actual port number.

Note that the Buttons “Update Unit With Selected File” and “Boot The Application” are disabled and non-functional at this time. Also note that you may click on either the “Open / Close Update Log” button or the “Open / Close Activity Log” button at any time. The selected log file will be opened in notepad for you. Clicking the button again will close the log or you may close the log from inside notepad, your choice. If you now open the activity log you will see the same text that appears in the activity window. If you open the update log file you will see a newly created file with no update entries. No board updates have been performed yet.

Upon every execution, MCU Flasher checks for the existence of these files and if not found they are created new and empty.

If your board is new board and has not yet been commissioned or received an application, MCU Flasher should appear as below (*Figure 2*).



Figure 2

As soon as a connection is established MCU Flasher will query the board for its serial number. Finding no serial number it displays the result in the activity window as seen above. MCU Flasher will then retrieve the current time and date from the Windows OS and command the board to set its onboard RTC by sending the command to do so with the date and time retrieved from Windows. The board will respond to MCU Flasher with the results either positively, negatively (failure), or “Operation Not Supported” (no onboard RTC).

The board must now be commissioned with a serial number prior to uploading an application. In the serial number window under the label “Enter Unit’s Serial Number” enter a serial number using your company’s prescribed serial number format. The serial number may be from 1 to a maximum

of 32 characters in length using any printable character. Your company should define the characters and format used.

As an example, during testing we used “D2D-5891326-000001.” “D2D” being our companies initials. “5891326” being a fictitious part number and “000001” being a manufacturing sequence number. You may use anything you like from 1 to 32 characters in length.

Note here too, the label under the serial number text box is displayed as “Status: Not Commissioned” and the box labeled **Commission Date:** is blank.

Also note that when a unit is commissioned that the serial number is programmed into FLASH memory within the bootloader’s code space and is permanent. Updating a board with a new application will not erase the serial number and the number may not be changed with an update.

The only way to change a board’s serial number after it has been commissioned is to reFLASH the board with the Secure Bootloader. The reFLASH erases the current bootloader and the serial number and reprograms the bootloader into the MCU. When this is done the board is again without a serial number and is considered UNCOMMISSIONED.

Enter a prescribed serial number in the serial number entry box and then click the button labeled “Commission Unit” When this button is clicked MCU Flasher will display a warning (*Figure 3*) to verify that you are really wanting to commission the board with its permanent serial number.

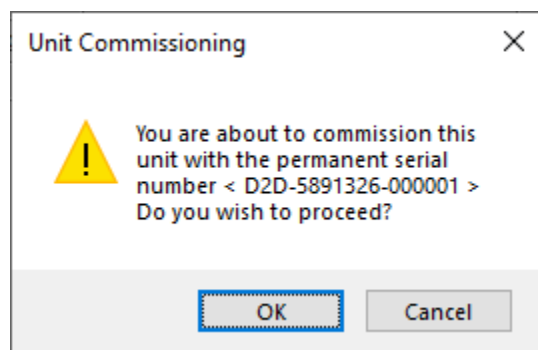


Figure 3

Clicking Cancel does just that, commissioning is canceled. If OK is clicked MCU Flasher issues the command with the serial number data to the board and the board burns the serial number into FLASH memory. The serial number is now a permanent part of the board unless the bootloader is reFLASHED. Below is how the GUI should now appear. After a positive response is received to the commission command. MCU Flasher queries the board for its serial number. The serial number is received in the command response and displayed in the activity window.

Note the area around the serial number entry box. The box label is changed to display “Unit’s Serial Number”. The status label below now displays “Status: Commissioned” and the Commissioning Date box displays the current date as the commissioning date and the button “Commission Unit” is now disabled and non-functional.



Figure 4

Your board is now ready to receive its first application code update. Use the Open File Icon in the upper left of the GUI (Folder Icon) to open your secure update file (.ffg file)

Up until now the text under the label **Opened File:** read “No File Opened”. After you open your update file “No File Opened” is replaced with the full file spec (full path/filename) of the opened file. Also note that the **Update Unit With Selected File** is now enabled and functional. The activity window is also updated to show that the file was updated. The activity log file has also been updated with this information.

If you have opened an update file the GUI should now appear something like below (Figure 5).



Figure 5

Your update file is now open and ready to be uploaded to your board. Click button **Update Unit With Selected File** and watch the activity window. If all proceeds well you will see the update progress as capital letter 'B's displayed for each 1KB block sent to the board. When the update has completed status of the update will be displayed in the activity window and appended to the activity log file. The MCU Flasher GUI should now appear as below (Figure 6).



Your board now has its first application program burned into FLASH memory just above Secure Bootloader.

Secure Bootloader Plus occupies the default reset vector and will always have control of the board coming out of reset. This prevents your product from being “bricked” in the field and requiring return. If for any reason units in the field are updated with applications that crash, SBLp is still there to boot the board and receive a new update. Resetting the board will bring the bootloader back into control of the board.

If you open the Update log you will see the update just performed recorded in this file. If you open the activity log you will see a copy of all of the activity recorded in this file. The only exception is that the upload progress 'B's are excluded.

At this point the button **Boot The Application** is enabled and functional. Clicking this button will command the bootloader to Boot the newly installed application. After clicking this button the GUI should appear as here (*Figure 7*):



No further communication with the board is possible from here. The bootloader is dormant and your application is now running in the MCU. Use the Exit button to close MCU Flasher.

To bring the Bootloader back press the reset button on your board. When first coming up, the bootloader reads a register in the MCU to determine the cause for the reset. It also authenticates the application region of FLASH memory to determine if an application is present or not.

If the reset was a POWER ON reset and it has been determined that an application is present the bootloader will immediately boot the application.

If the reset was caused by any other means (reset button press, watchdog reset etc...) the bootloader will wait for 15 seconds. If the bootloader receives communication from MCU Flasher in that 15 seconds it will remain in control until commanded to boot the application or until power is cycled. If in 15 seconds it receives no communication it boots the application if present.

If you now press the reset button on your board and then immediately open MCU Flasher and select the com port, MCU Flasher will catch the board in that 15 seconds and a connection will be established. The GUI will appear as below (*Figure 8*). As you can see at a glance, MCU Flasher has established a connection with a board that has been commissioned and has an application present.

If you now open an update file and again click on **Update Unit With Selected File**, the board will again be updated as before with the added steps of first erasing the existing application and then blank checking the application region of FLASH memory (*Figure 9*).

For a complete history of activity open the activity log.



Figure 8

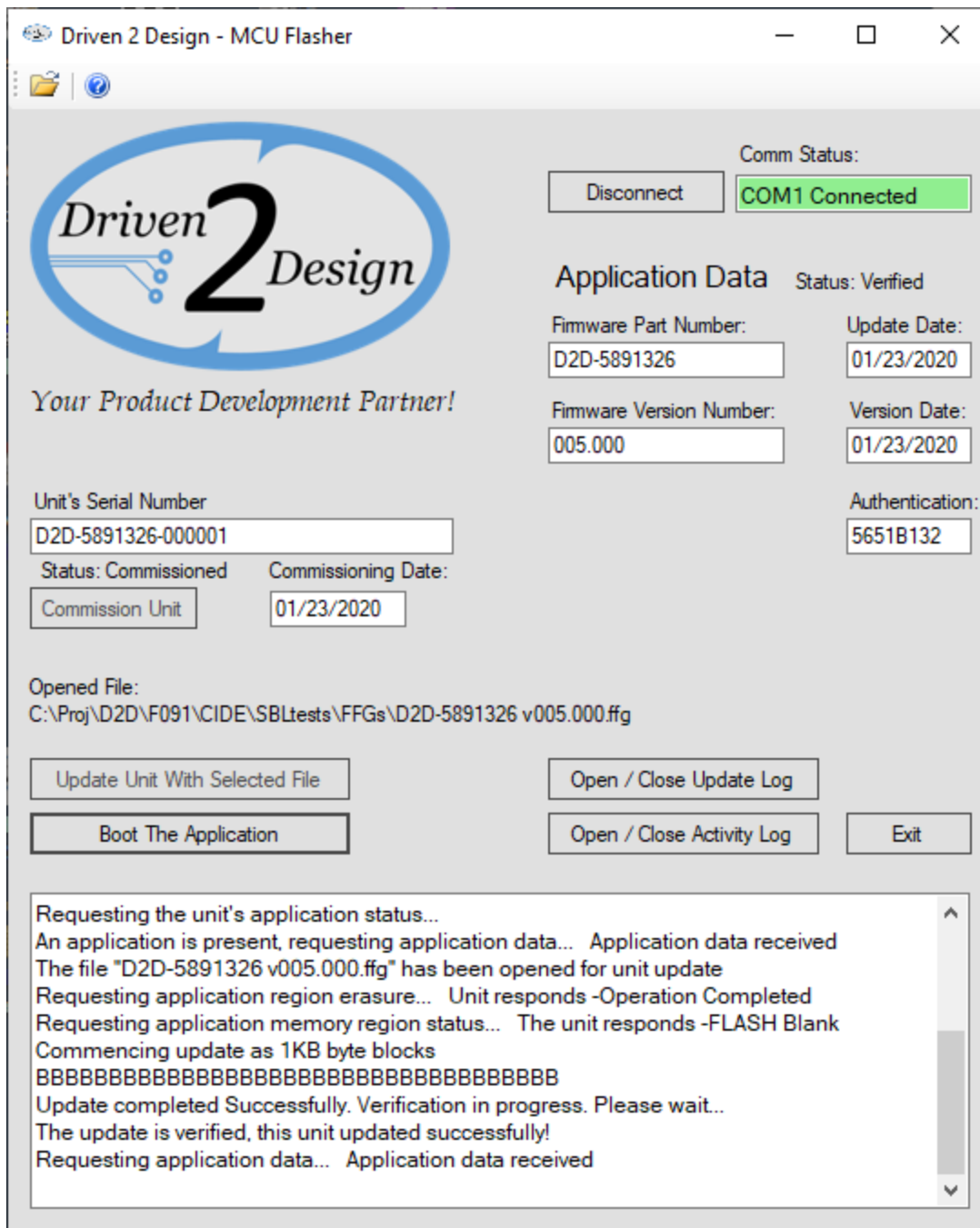


Figure 9