

User's Guide
for
Bootloader for MSP430 Flash (BLMSPF)

18 June, 2002

From

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This device complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) this device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

1. Features

The Bootloader for MSP430 Flash (BLMSPF) allows access to MSP430F devices via the bootloader port. Refer to documentation from Texas Instruments for detailed information for the variant used in your project.

The key features of this product are:

- Write/Read/Verify access to flash programming
- 32-byte password entry and verification
- Mass erase
- Sector erase
- Load PC execution capability
- Supports the v1.10 flash ROM patch
- Win32 host application
- Intel hex or TI text object files
- Access to target via standard 10-pin header

2. Power Supply

The BLMSPF requires an external DC power supply, capable of a minimum of 50mA at 3.6v. Should the target board require power from the BLMSPF, the target's current requirements should be factored into the external supply. The target can be provided a maximum of 200mA from the BLMSPF.

The power connector is a 2.1 mm barrel connector:



Figure 2-1 DC Power Connector

The board has a 10v, 1W zener diode (D1) to protect the on-board voltage regulators against power fluctuations. Please note that most wall-mount power supplies have voltage ratings based on maximum load. It is important to obtain a power supply with an open circuit voltage no greater than 12 volts.

3. Target Adapter

The target board is to be connected to the BLMSPF using the header J4. This header mates with a 10-pin 0.100" box header (Oupiin 3012-10GSB, or equivalent) on the target board. The definition of J4 is given below:

Table 3-1 - Target Adapter Signals

Pin	Name	Purpose
1	BLTX	Bootloader Tx from the target. (Note 1)
2	BLTCK	Bootloader TCK pin. (Note 3)
3	BLRX	Bootloader Rx from the target.
4	BLRST	Bootloader RST pin.
5	GND	Ground.
6	BLVCC	Bootloader VCC supplied to the target. (Note 3)
7	BLTST	Bootloader TEST pin. (Note 2)
8	BLPWOFF	Bootloader power-off signal available to the target. (Note 4)
9	NC	Not connected
10	NC	Not connected

Refer to the pin marking on the header to orient pin 1.

Note 1: The BLTX pin will be held high by the BLMSPF during normal operation of the target to isolate the host from any non-serial operation of the target's firmware. Should the target require use of this pin on their processor, a 1k resistor must be placed in series between the target connector and the BLTX pin on the target, and all target circuitry connected on the target side of the series resistor.

Note 2: For target processors without the TEST pin, the TCK signal is used to access the bootloader port. These processors require a 10k pullup on the TMS signal to prevent entry of JTAG mode.

Note 3: The BLMSPF can supply up to 200mA to the target board. This supply is cycled during bootloader access and target resets to ensure a complete reset of the target. This power cycling ensures that firmware using the RST/NMI pin in NMI can still be reset. User's of the FET140, leave R11 installed and R10 removed for proper operation.

Note 4: When BLPWOFF is high, the target supply is to be turned off. This signal must be used if a) RST/NMI is used in NMI mode, and b) the target does not or cannot use BLVCC.

Header J2 is used only for manufacture of the BLMSPF. It is not accessible to the user.

4. BootWrite Software

The BootWrite.exe host software utility is provided to easily program targets with your code. A screen capture of the BootWrite.exe host software is provided below:

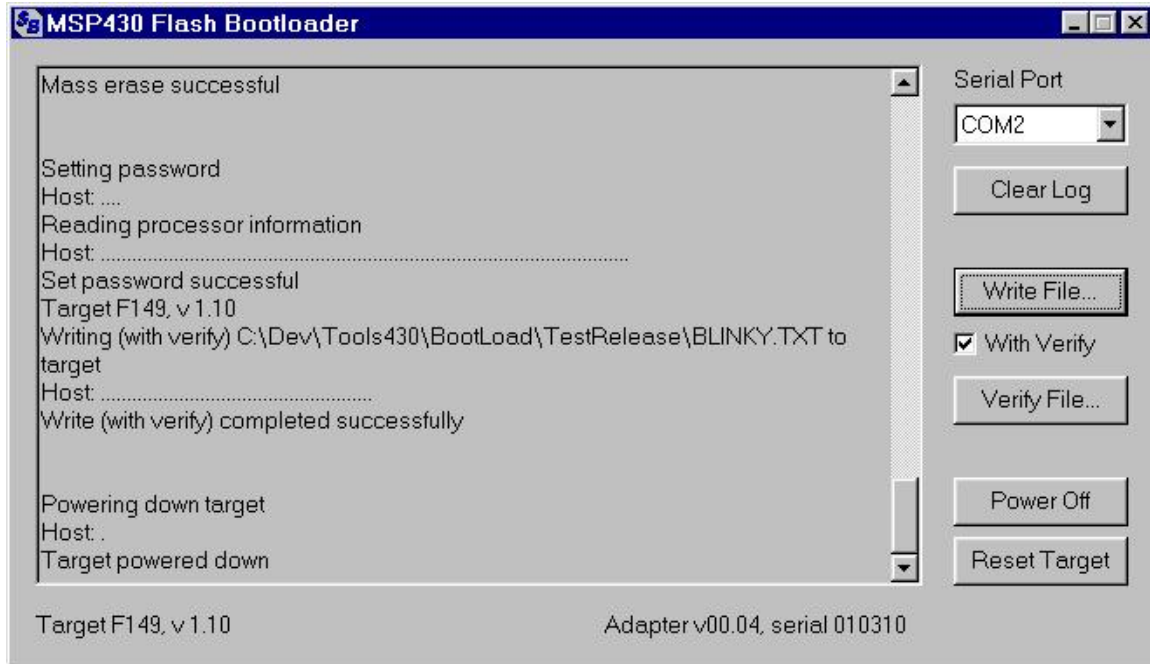


Figure 4-1 BootWrite Software Operation

The host software is used to control the operation of the BLMSPF adapter board. The components of the host software GUI are discussed in detail in the following sections.

4.1 Event Log

The *Event Log* provides a listing of all operations performed by the software. A permanent record of this log is provided on disk as EventLog.txt.

4.2 Serial Port Dropdown

The *Serial Port Dropdown* allows selection of serial port on the host PC.

4.3 Clear Log Button

The *Clear Log Button* will erase the event log and start a fresh logging session.

4.4 Write File ... Button

The *Write File ... Button* prompts for an object file, and then writes the file to the target. Note: This function does NOT verify that the bytes were written successfully unless the

With Verify Check Box is selected. Or, use the *Verify File* feature to verify a previous *Write File* operation.

4.5 With Verify Check Box

The *With Verify Check Box* determines whether the *Write File* command performs an internal verify.

4.6 Verify File ... Button

The *Verify File ... Button* prompts for an object file, and then checks the target addresses against the data contained in the file.

4.7 Power Off Button

The *Power Off Button* turns off power to the target board. Use this feature while connecting/disconnecting the target board to ensure the power at the target is in a known state.

4.8 Reset Target Button

The *Reset Target Button* performs a normal power-off and RST/NMI reset, allowing the target board to execute its firmware.

4.9 Target Version Display

The *Target Version Display* provides an indication of the target processor sub-family, and the bootloader ROM version of the target processor, as read from the target. Note: Many devices will show the major sub-family device rather than the target itself. In the example, the F149 shown may actually represent the F133. This is a property of the bootloader ROM versions, and not the BLMSPF or the host software. This display is updated after each target operation.

4.10 Adapter Version Display

The *Adapter Version Display* provides an indication of the BLMSPF adapter firmware version and serial number. In the example, the BLMSPF is running firmware version 00.04, and the serial number of the BLMSPF adapter is 010310. This display is updated after each target operation.

5. BootFlash Software

WARNING: The BootFlash.exe host software is only provided as a low-level lab tool for user's intimately familiar with the required sequence of operations to control the bootloader ROM. Refer to Texas Instruments documentation provided at www.ti.com/sc/msp430 for the latest information regarding low-level bootloader port operations. We highly recommend the use of BootWrite.exe for normal use.

A screen capture of the BootFlash.exe host software is provided below:

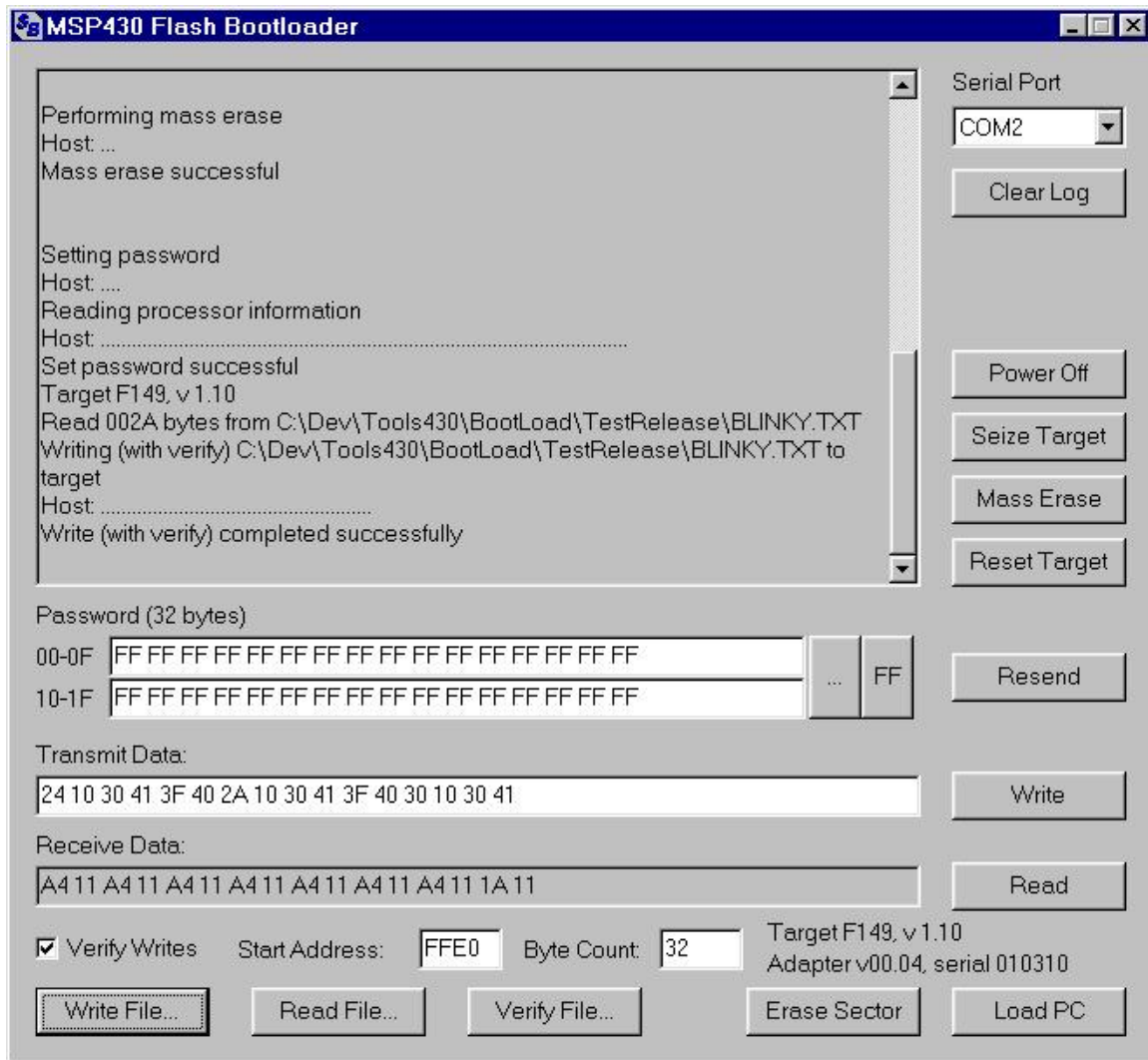


Figure 5-1 BootFlash Software Operation

The host software is used to control the operation of the BLMSPF adapter board. The components of the host software GUI are discussed in detail in the following sections.

5.1 Event Log

The *Event Log* provides a listing of all operations performed by the software. A permanent record of this log is provided on disk as EventLog.txt.

5.2 Serial Port Dropdown

The *Serial Port Dropdown* allows selection of serial port on the host PC.

5.3 Clear Log Button

The *Clear Log Button* will erase the event log and start a fresh logging session.

5.4 Power Off Button

The *Power Off Button* turns off power to the target board. Use this feature while connecting/disconnecting the target board to ensure the power at the target is in a known state. This feature can also be used to ensure a proper bootloader sequence when the target application reconfigures the RST pin as NMI.

5.5 Seize Target Button

The *Seize Target Button* will send a bootload reset sequence to the target, without a power cycle, capturing the target bootloader port for subsequent operations. Use the Power Off feature to ensure a proper target initialization if the user application reconfigures RST as NMI.

5.6 Mass Erase Button

After target seizure, the *Mass Erase Button* can be used to perform a mass erase operation.

5.7 Reset Target Button

The *Reset Target Button* performs a normal power-off and RST/NMI reset, allowing the target board to execute its firmware.

5.8 Password Entry Boxes

The *Password Entry Boxes* allow manual entry of the 32-byte password, 16-bytes per box.

5.9 Password Browse Button (...)

The *Password Browse Button* allows selection of an object file to be scanned for a password in the interrupt vector section, and sends the extracted password to the target.

5.10 FF Button

The *FF Button* restores the password to 32 FFs and sends the password to the target.

5.11 Resend Button

The *Resend Button* sends the contents of the password entry boxes to the target to enable protected operations.

5.12 Transmit Data Box

The *Transmit Data Box* allows manual entry of bytes to be sent to the target for subsequent *Write* commands.

5.13 Write Button

The *Write Button* commands the BLMSPF to write the contents of the transmit data box to the target at the address provided in the starting address box. The byte count box contains the number of bytes to be written to the target. Up to 32 bytes may be written at a time in this manner. The target must be seized and in receipt of a correct password for this operation to work.

5.14 Receive Data Box

The *Receive Data Box* displays bytes read from the target with the *Read* command.

5.15 Read Button

The *Read Button* commands the BLMSPF to read bytes from the target starting from the address provided in the starting address box. The byte count box contains the number of bytes to be read from the target. The bytes read are displayed in the receive data box. Up to 32 bytes may be read at a time in this manner. The target must be seized and in receipt of a correct password for this operation to work.

5.16 Verify Writes Check Box

The *Verify Writes Check Box* determines whether the *Write File* command performs an internal verify.

5.17 Start Address Box

The *Start Address Box* contains the hexadecimal address to begin a write or read operation, or the address of the sector to be erased for a sector erase operation, or the address to be loaded into the PC for a load PC operation.

5.18 Byte Count Box

The *Byte Count Box* contains the decimal number of bytes to be read or written during write or read operations (maximum of 32 bytes).

5.19 Target Version Display

The *Target Version Display* provides an indication of the target processor sub-family, and the bootloader ROM version of the target processor, as read from the target. Note: Many devices will show the major sub-family device rather than the target itself. In the example, the F149 shown may actually represent the F133. This is a property of the bootloader ROM versions, and not the BLMSPF or the host software.

This display is updated after each password operation.

5.20 Adapter Version Display

The *Adapter Version Display* provides an indication of the BLMSPF adapter firmware version and serial number. In the example, the BLMSPF is running firmware version 00.04, and the serial number of the BLMSPF adapter is 010310.

This display is updated after each seize target operation.

5.21 Write File ... Button

The *Write File ... Button* prompts for an object file, and then writes the file to the target. Note: This function does NOT verify that the bytes were written successfully unless the *Verify Writes Check Box* is selected. Or, use the *Verify File* feature to verify a previous Write File operation. The target must be seized and in receipt of a correct password for this operation to work.

5.22 Read File ... Button

The *Read File ... Button* prompts for an object file, and then reads the target into the file. Target locations to be read are identified by the starting address and byte count boxes. The target must be seized and in receipt of a correct password for this operation to work.

5.23 Verify File ... Button

The *Verify File ... Button* prompts for an object file, and then checks the target addresses against the data contained in the file. The target must be seized and in receipt of a correct password for this operation to work.

5.24 Erase Sector Button

The *Erase Sector Button* erases the flash sector containing the address shown in the starting address box. The target must be seized and in receipt of a correct password for this operation to work.

5.25 Load PC Button

The *Load PC Button* is used to load the target PC with the address contained in the starting address box. The target must be seized and in receipt of a correct password for this operation to work.

6. Typical Detailed Operations

In this section, typical operations to be performed with the BLMSPF using the BootFlash are discussed. Again, for simple operations, the use of the BootWrite utility is highly recommended.

6.1 Mass Erase

The mass-erase operation prepares the target for access via an FF password.

- a. Seize the target
- b. Mass erase with the Mass Erase button

The target will be erased.

6.2 Write File (with verify)

- a. Seize the target
- b. Mass erase the target
- c. Check the *Verify Writes* box
- d. Use the *Write File* button to select a file to be written to the target.

6.3 Execute Target Program

There are two ways to execute a target program after seizing the target, *Load PC* and *Reset Target*. Use *Reset Target* when the target firmware is to be run in its entirety. Use *Load PC* if a particular known function is to be executed. *Reset Target* will cause a power cycle, erasing RAM contents.

Note: Using *Load PC* with target firmware that manipulates the BLTX may cause unpredictable results with some PC comm port drivers, requiring that the host application be closed and restarted if comm failure occurs. Use of *Reset Target* is highly recommended over *Load PC*.

In addition, executing a target program with either technique will require reseizure of the target, and subsequent reloading of the target ROM patch if the target processor is ROM version 1.10 or older.

6.4 Read Target

- a. Seize the target
- b. Use the ... password button to find the file which contains the target's password.
- c. Set the block read start address and byte count (max: 32 bytes) to be read from the target.
- d. Use the *Read File* button to select a file receive the target data.