DLP® LightCrafter™ 4500 Flash Programming Guide

This flash programming guide provides instructions on how to create a JTAG cable and use the flash programming tool to install the DLPR350 firmware on the DLP LightCrafter 4500.

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Trademarks

1 Overview

The DLP LightCrafter 4500 contains firmware, stored in flash memory, to initialize the onboard DLPC350 controller. If the firmware is compromised, or a blank flash memory module is installed, the memory must be programmed with the DLPR350 firmware. Without the firmware loaded, the DLPC350 cannot boot up or initialize the onboard USB port. The user must have access to the USB port to control the device using the DLP LightCrafter 4500 GUI.

1.1 System Requirements

The following list shows the minimum recommended system requirements for the DLP LightCrafter 4500 flash programming tool:

- PC with 1.4-GHz Pentium IV CPU or higher
- Windows® XP SP3 or higher
- Microsoft Visual C++® 2005 Redistributable
- Microsoft Visual C++ 2008 Redistributable
- 512 MB of RAM
- 20 MB of free hard-disk space
- USB port

1.2 Hardware Requirements

The user must create a JTAG boundary scan cable as described in Section 3. The cable requires a UM232H USB-to-serial adapter board that can be found on the FTDI Chip® development modules page.

The cable also requires a Molex® 51021-0600 connector that can be found on the Molex connector website.

A single 2-mm jumper is required during the flashing process. The jumper is not consumed.

2 Software Installation

2.1 DLP LightCrafter 4500 Flash Programmer And GUI Installation

Download the flash programming tool from the tool page. Extract the executable file from the downloaded JTAGFlashProgrammer_v***.zip file and run it. Follow the on-screen prompts and select a convenient installation path for the program. The installer creates a shortcut to the tool in the start menu and on the desktop.

Download the LightCrafter 4500 GUI from the same tool page as above. Extract the executable file from the downloaded DLPLCR45000GUI-*.*.*-windows-installer.zip file and run it. Follow the on-screen prompts and select a convenient installation path for the program. The installer creates a shortcut to the tool in the start menu and on the desktop.

2.2 DLP LightCrafter 4500 Firmware Installation

Download the latest DLPR350 firmware version from the tool page. Extract the executable file from the downloaded DLPLCR4500GUI-***-********.zip file and run it. Follow the on-screen prompts and select a convenient installation path for the files. TI recommends using the default installation path.

2.3 Communication Interface Driver Installation

When using the DLP LightCrafter 4500 flash programming tool, the user must have a communication link established between the DLP LightCrafter 4500 and the computer running the tool. This allows the user to read and write to the flash memory from the computer. This connection is established through the JTAG cable created following this guide. The user needs to install device drivers for the USB-to-serial adapters from the FTDI Chip website. Choose and install the driver specific to the operating system on the computer.

3 JTAG Boundary Scan Cable

The UM232H USB-to-serial adapter must be connected to the JTAG port on the DLP LightCrafter 4500. Connecting the two devices requires the use of a Molex 51021-0600 connector. The user can either directly connect the header pins on the UM232H to the cable or create a board to host the UM232H. The required pin connections are shown in Table 1 and Figure 1.

NOTE: Two separate pairs of pins must be connected together to supply power to the UM232H from the computer's USB port.

Table 1. Required Pin Connections

UM232H-J2	Molex 51021-0600
6	6
7	5
8	2
9	4
10	3
11	1

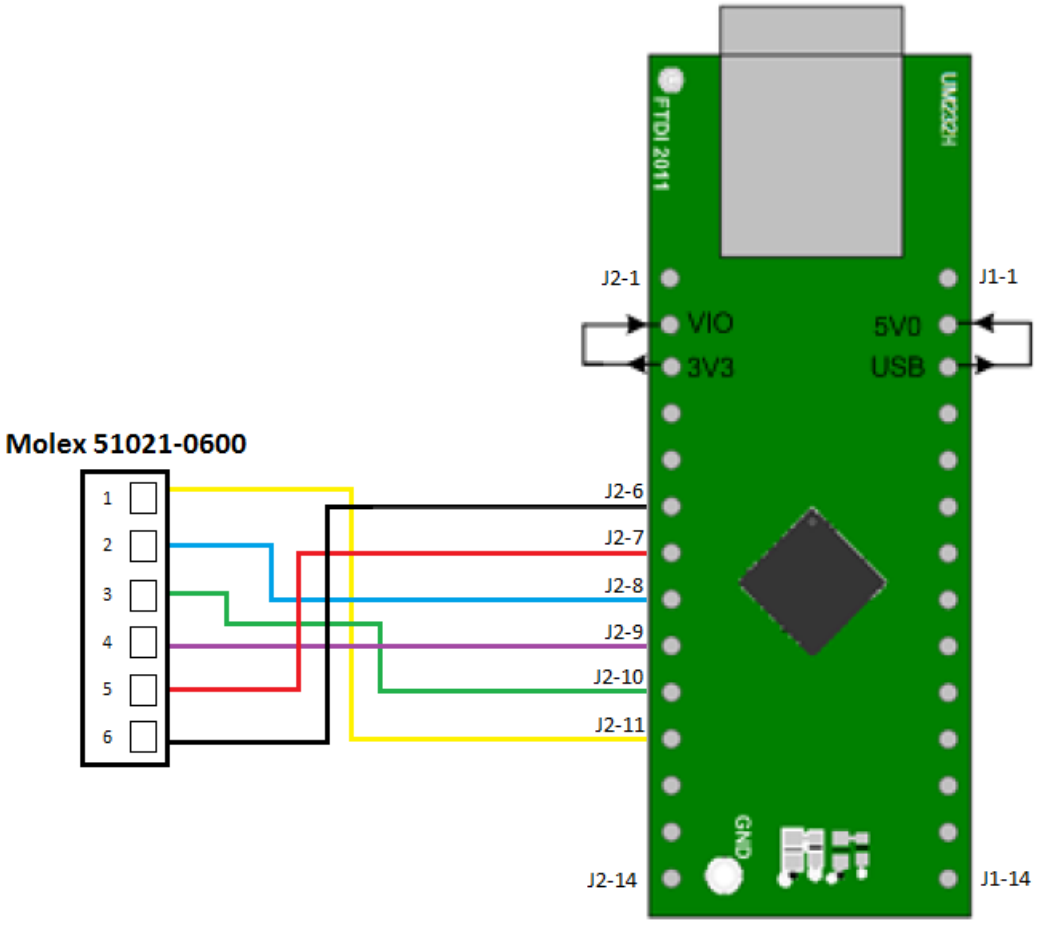

Figure 1. UM232H to Molex 51021-0600 Connections

4 Flash Programming Procedure

Populate J30 with a 2-mm jumper on the DLP LightCrafter 4500, as shown in Figure 2 and Figure 3.

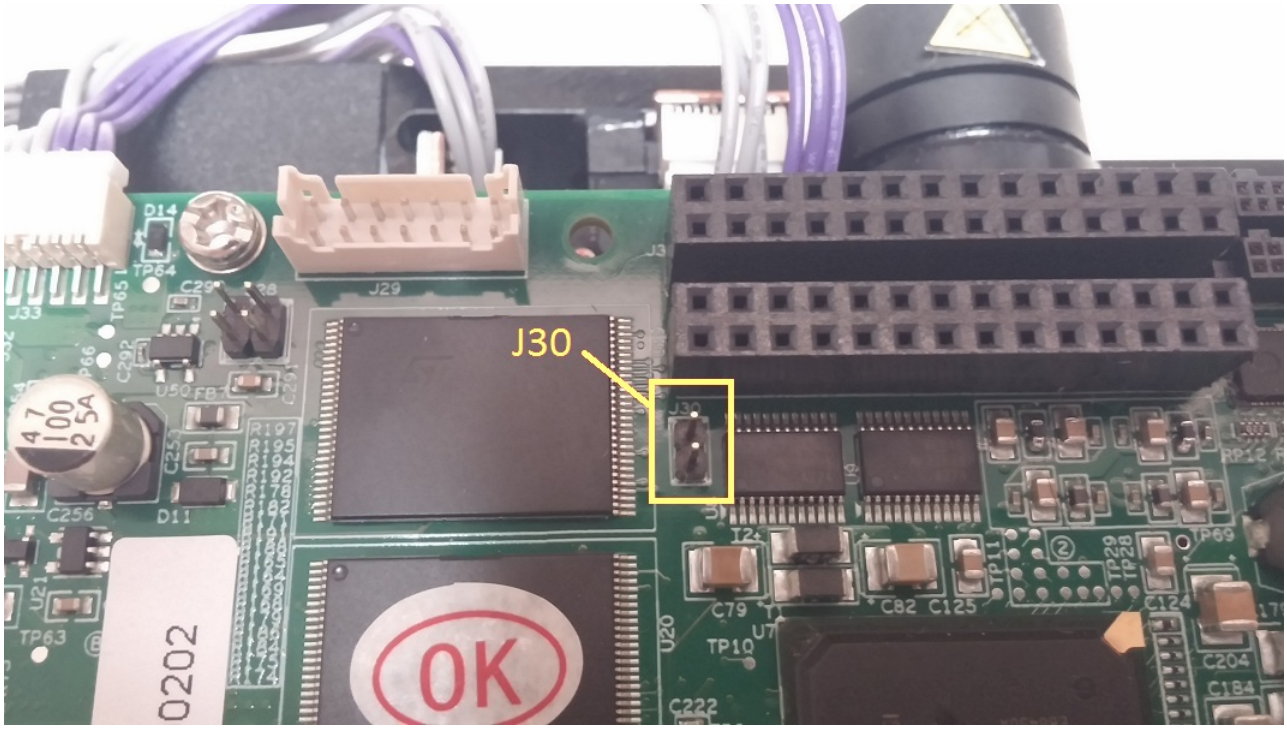

Figure 2. J30 Location on the DLP LightCrafter 4500

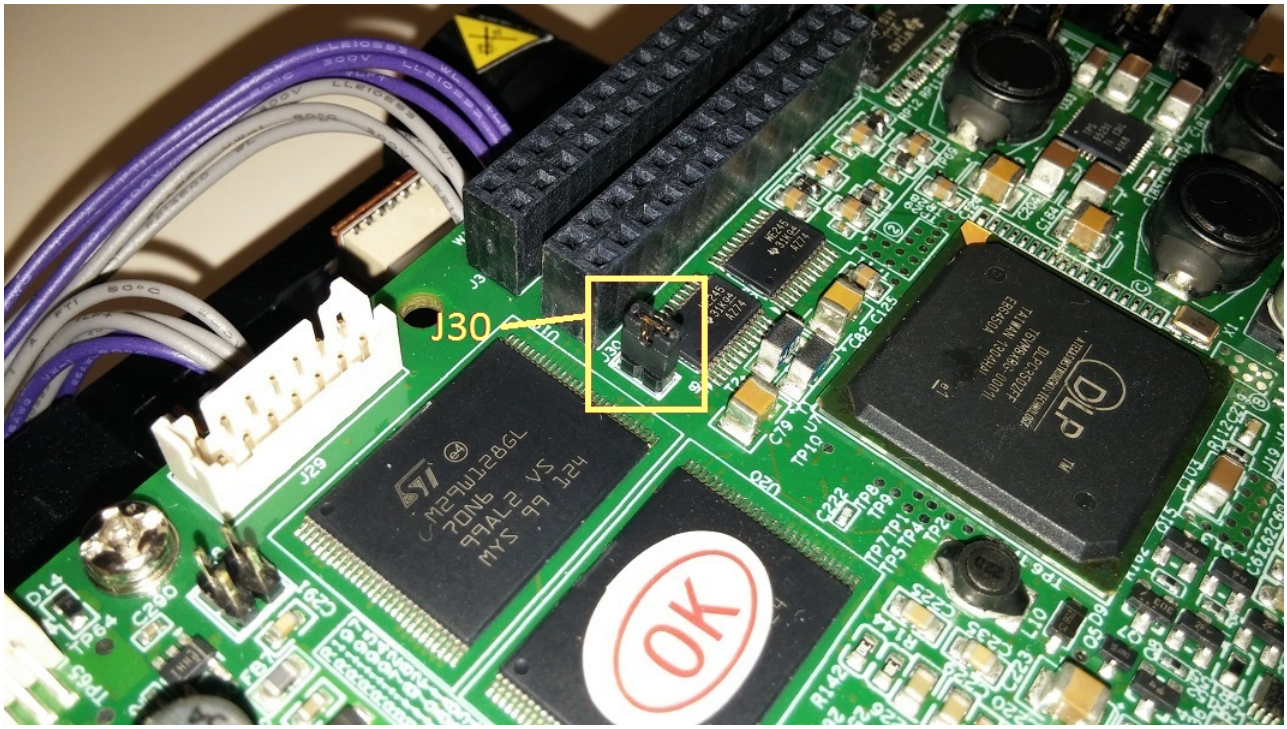

Figure 3. J30 Populated on the DLP LightCrafter 4500

Connect the appropriate power supply to the DLP LightCrafter 4500, as shown in Figure 4. The fan on the rear of the device turns on indicating the board is powered.

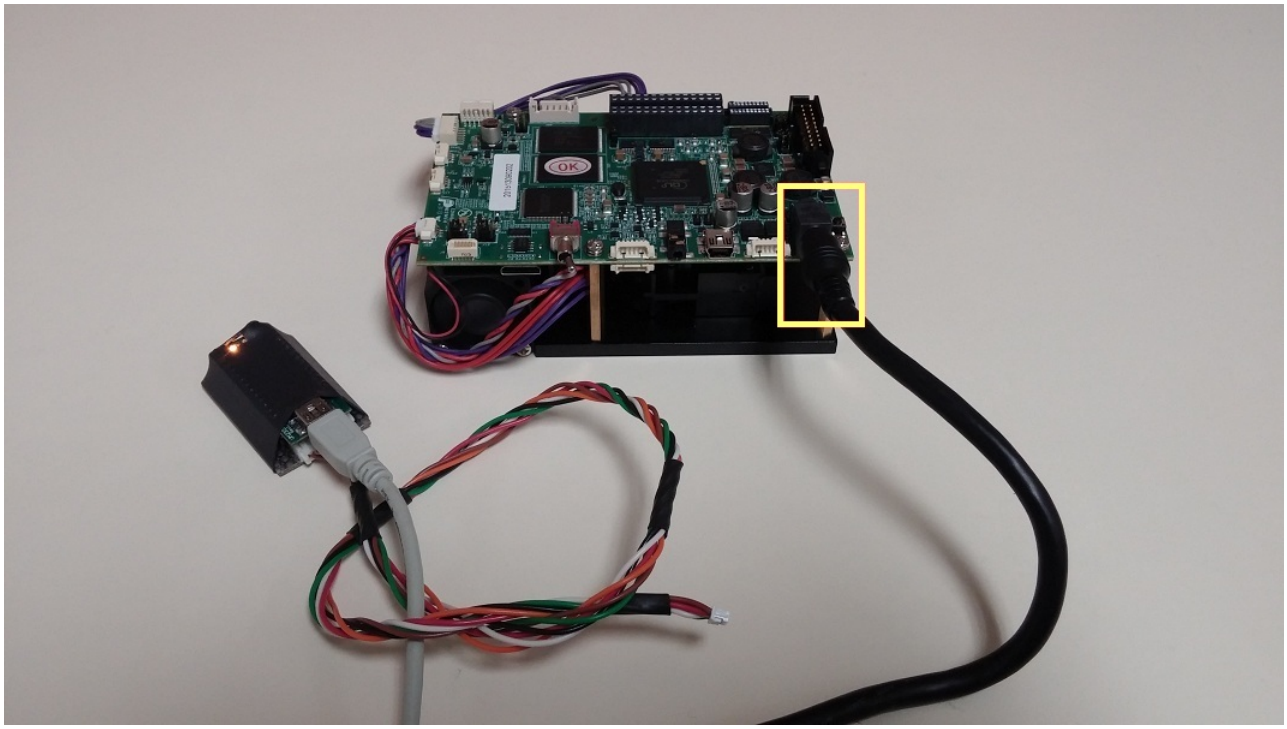

Figure 4. Power Supply Connected to the DLP LightCrafter 4500

Connect the JTAG cable to J25, located on the bottom side of the DLP LightCrafter 4500 board. Connect the UM232H to the computer with an appropriate USB cable, as shown in Figure 5.

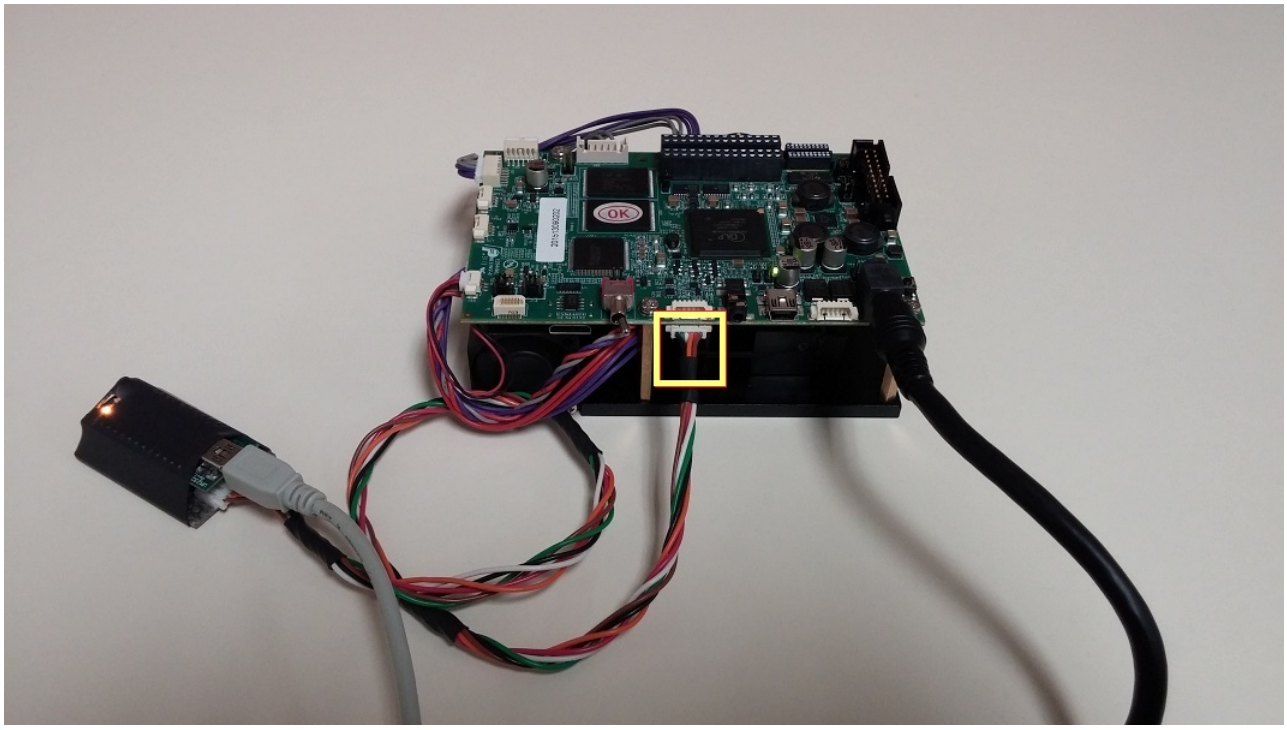

Figure 5. JTAG Cable Connected to the DLP LightCrafter 4500

Start the flash programmer tool, FlashProgrammer.exe, as shown in Figure 6. Ignore any error messages about a missing board file for now.

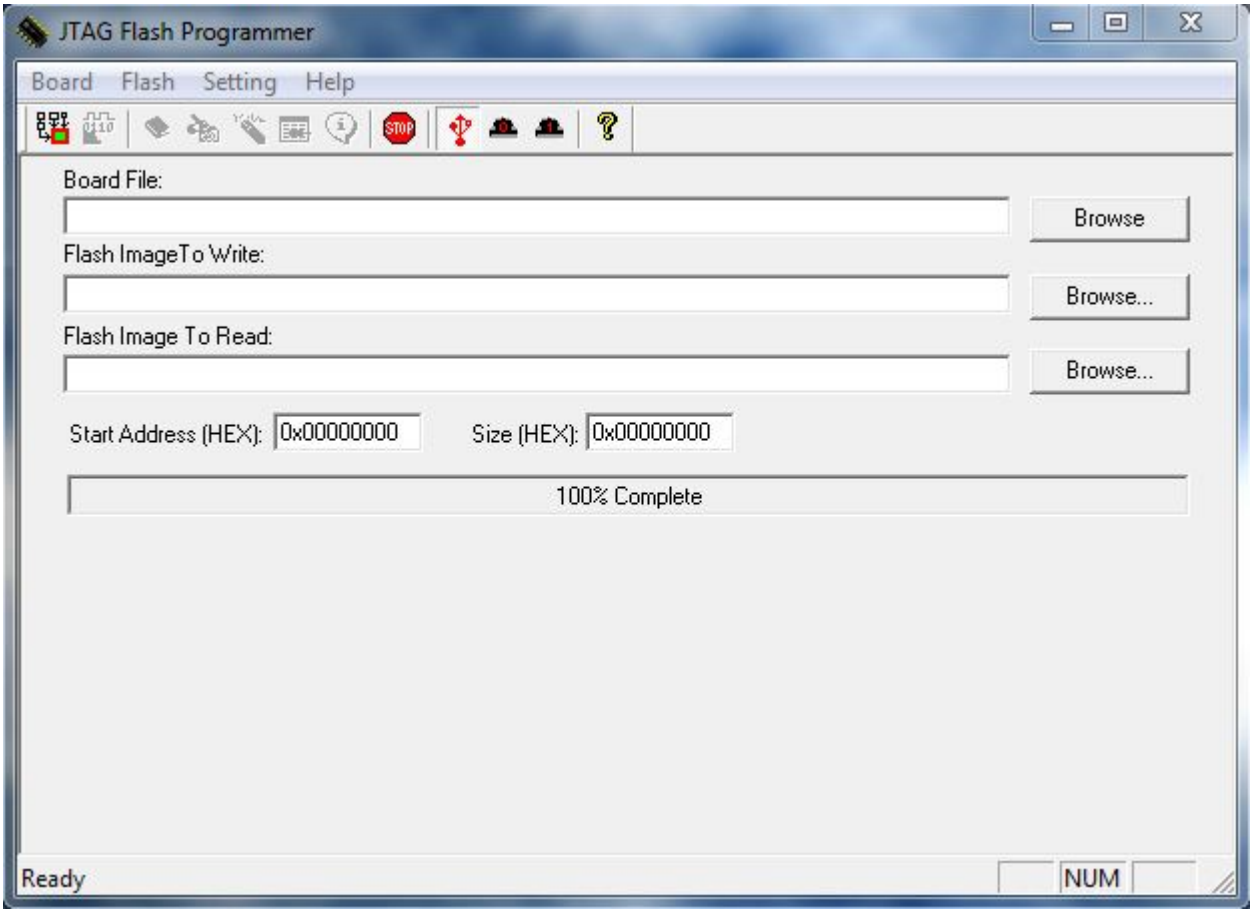

Figure 6. JTAG Flash Programmer First Run

Click the **Browse** button next to the board file path. Select the board file called BoardFile.brd that installed in the flash programmer software tool folder. Figure 7 shows the **Browse** button and the selected board file path.

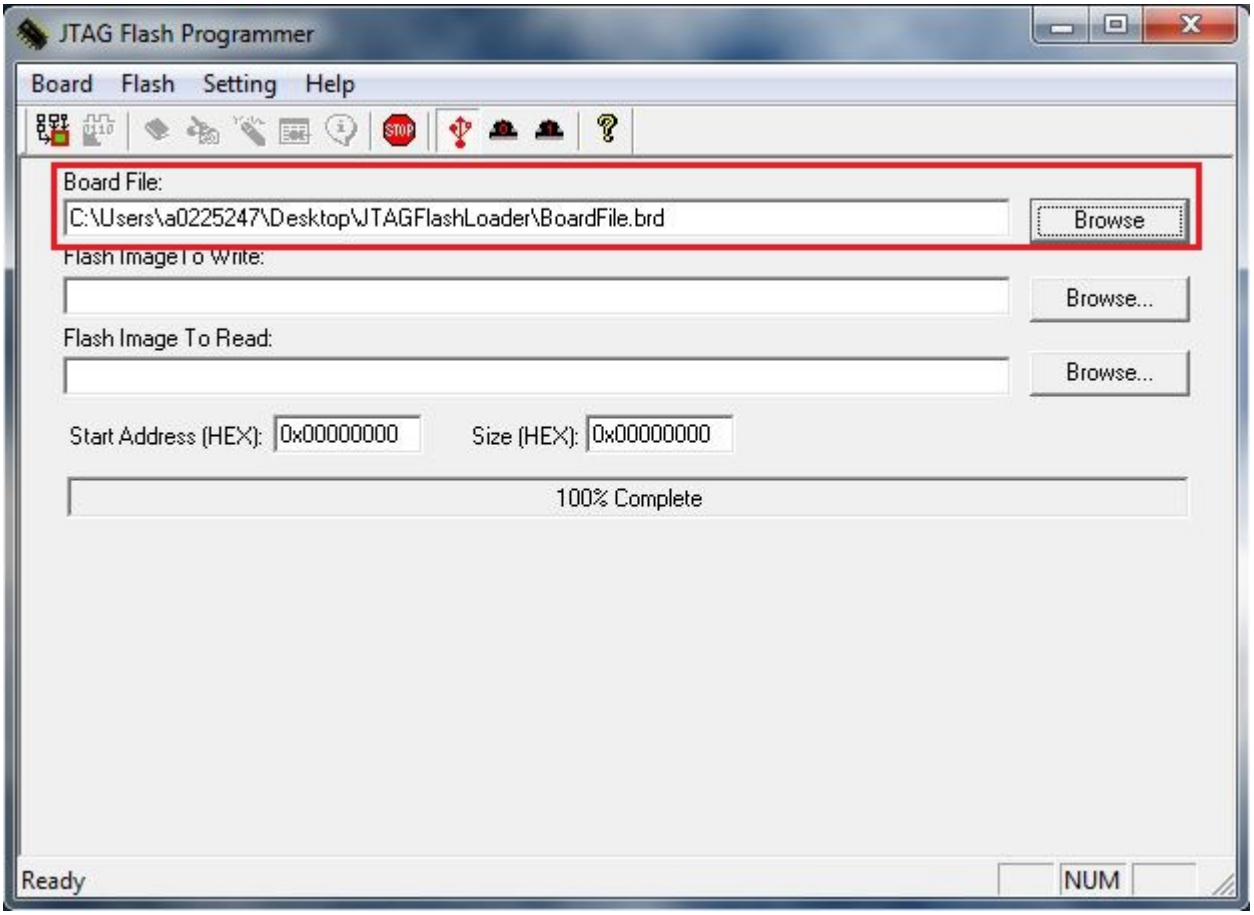

Figure 7. Board File Selection in Flash Programmer Tool

Click the **Browse** button next to the flash image path. Select the flash image called DLPR350PROM_v****.bin that installed in the DLP LightCrafter 4500 firmware installation folder. Figure 8 shows the button and path.

NOTE: The third box (shown in Figure 8) does not need to be populated.

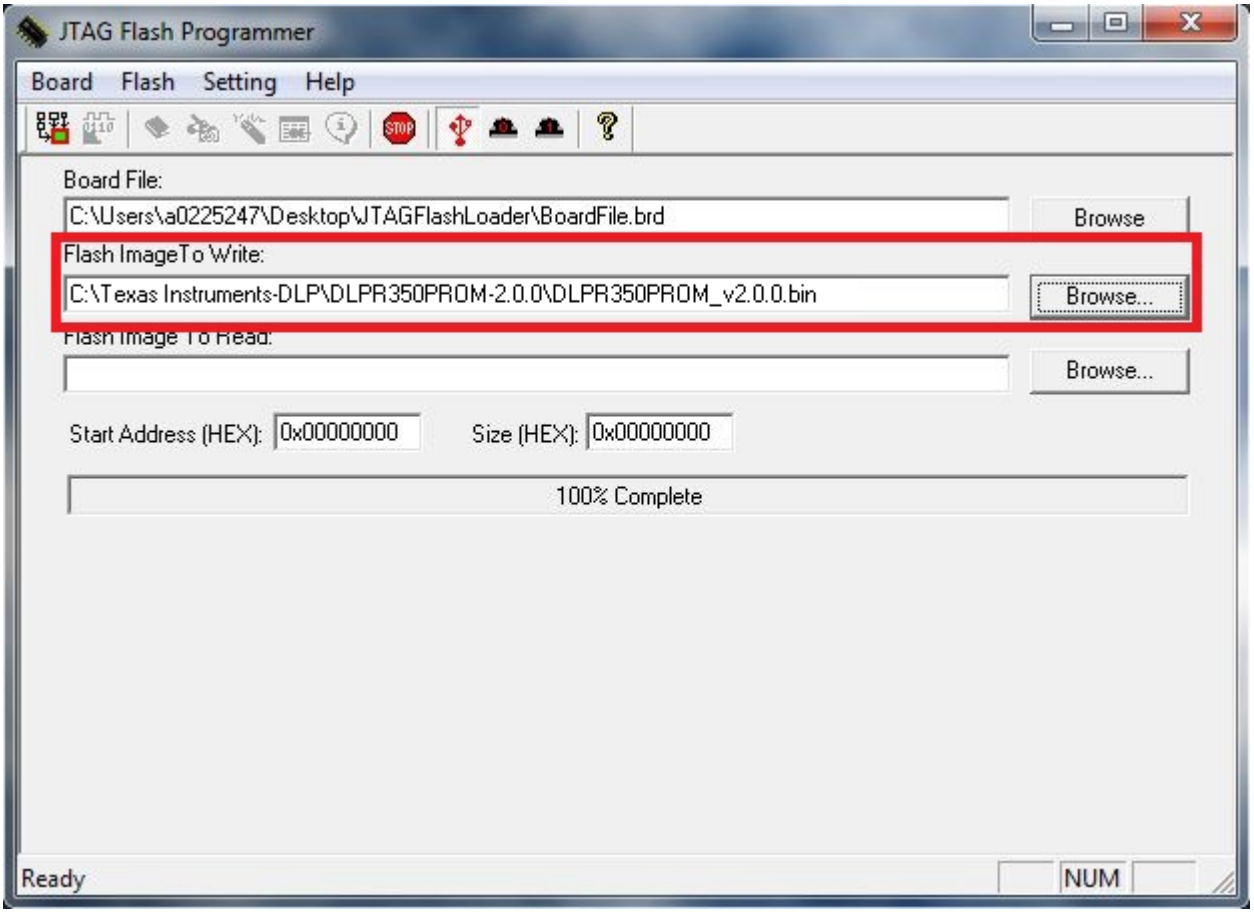

Figure 8. Firmware File Selection in Flash Programmer Tool

Set the size of the image to 0x0020000, as in Figure 9.

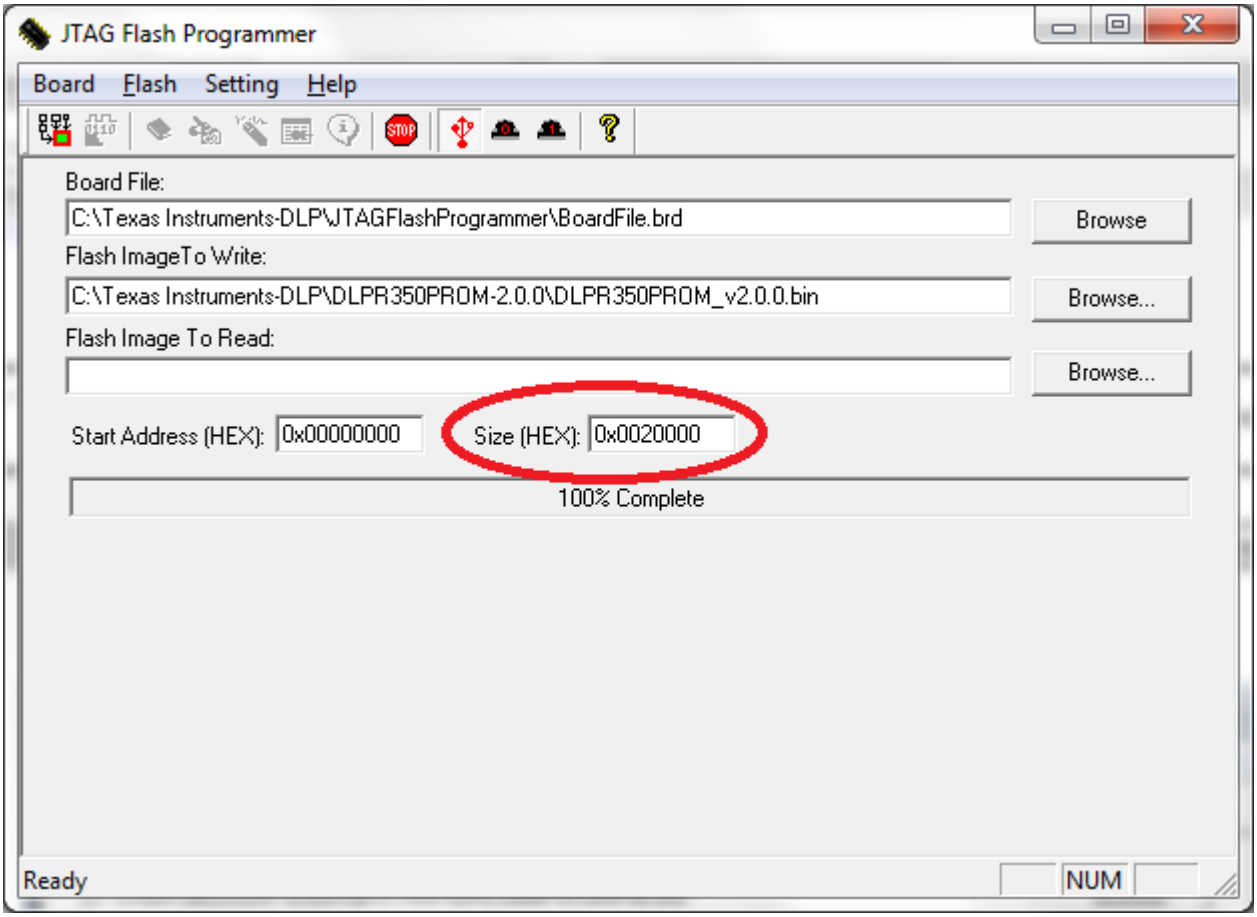

Figure 9. Firmware File Size Selection in Flash Programmer Tool

Click the **Detect Chain** button in the upper left-hand corner of the tool. The **Detect Chain** button is indicated with a red box in Figure 10.

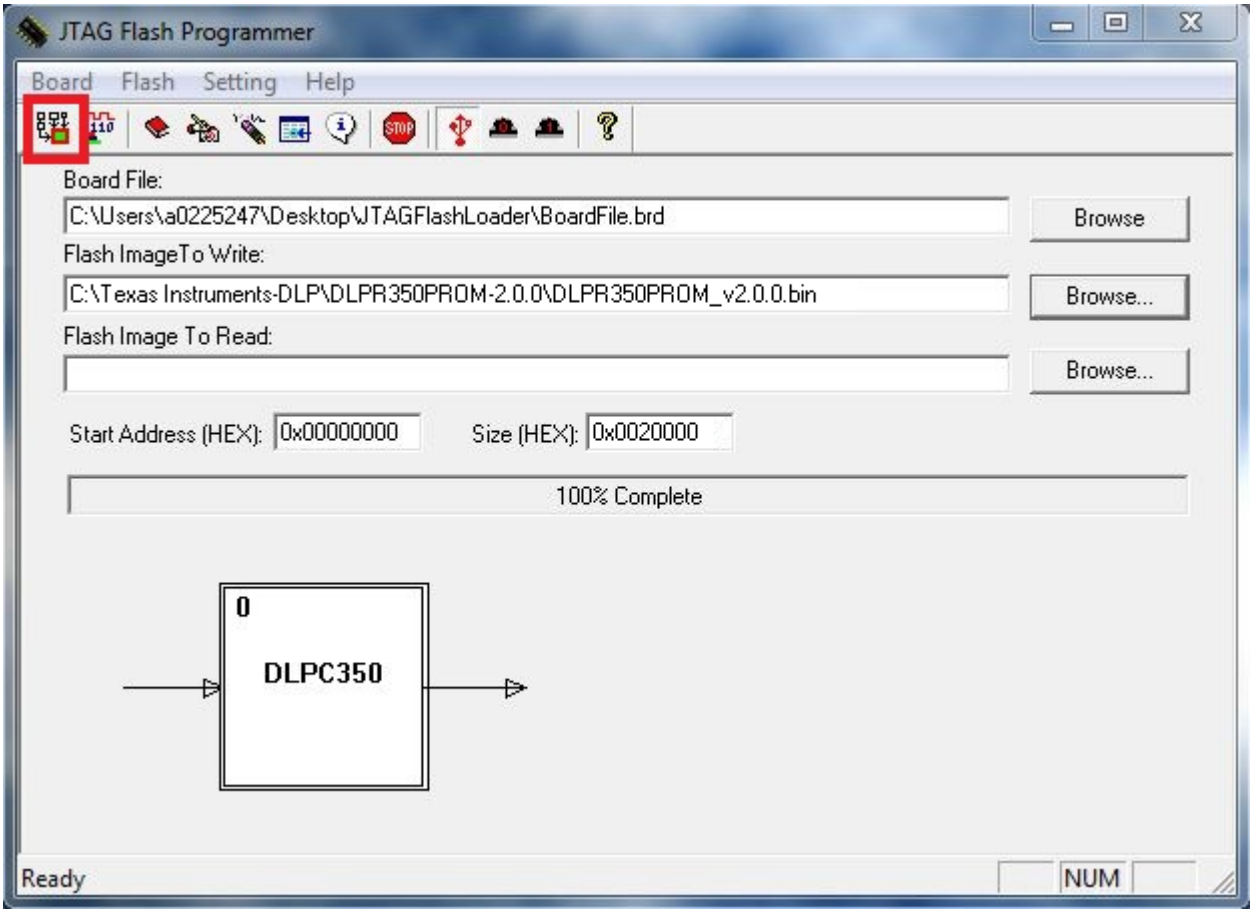

Figure 10. JTAG Chain Detection in Flash Programmer Tool

Click the **Erase** button on the toolbar (see Figure 11).

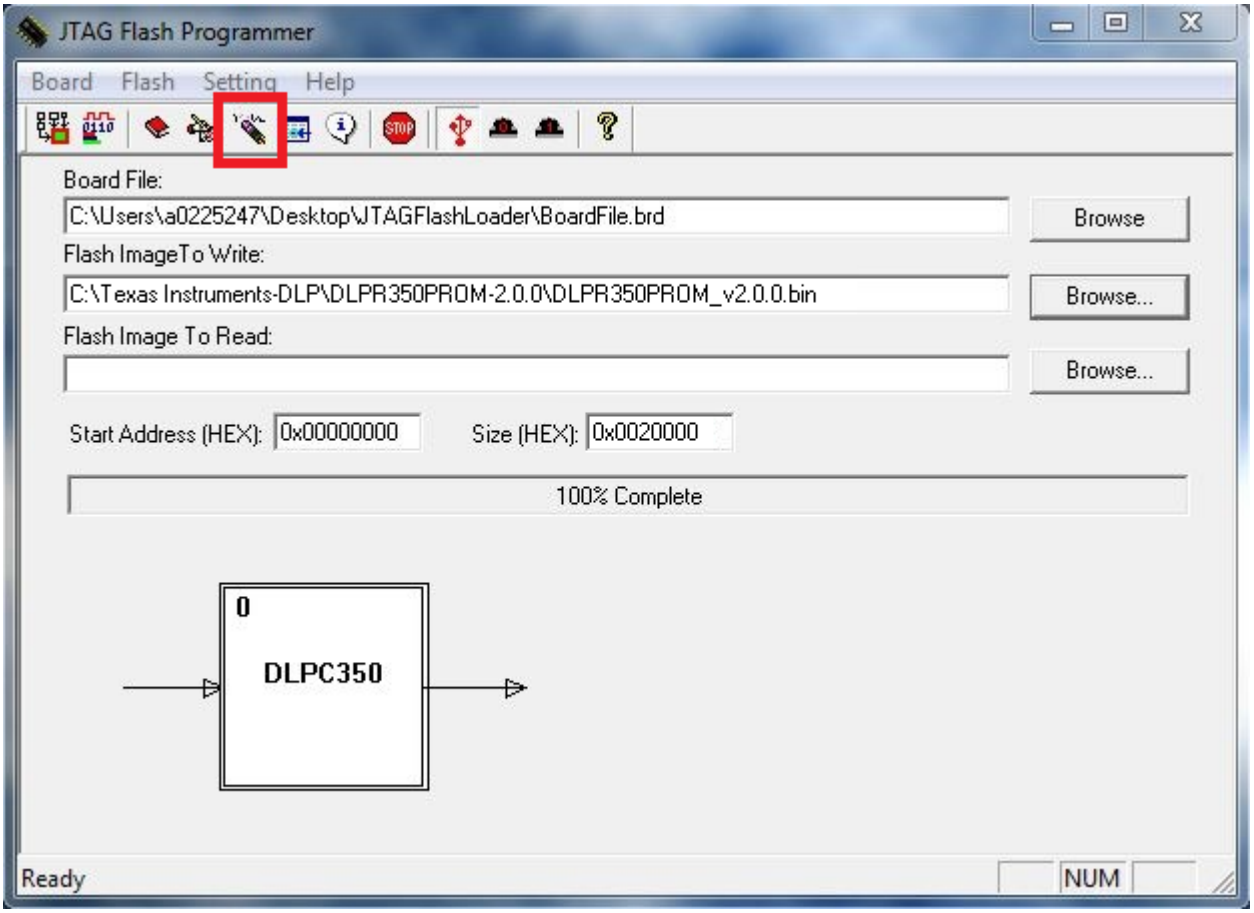

Figure 11. Erase Button in Flash Programmer Tool

Select every block in the displayed list of memory locations, as shown in Figure 12. After all blocks are selected, click the **Erase** button. When the erase process is completed (indicated by the blue bar on the right) close the erase menu with the **Exit** button (see Figure 13).

NOTE: Erasing the flash memory can take a full minute.

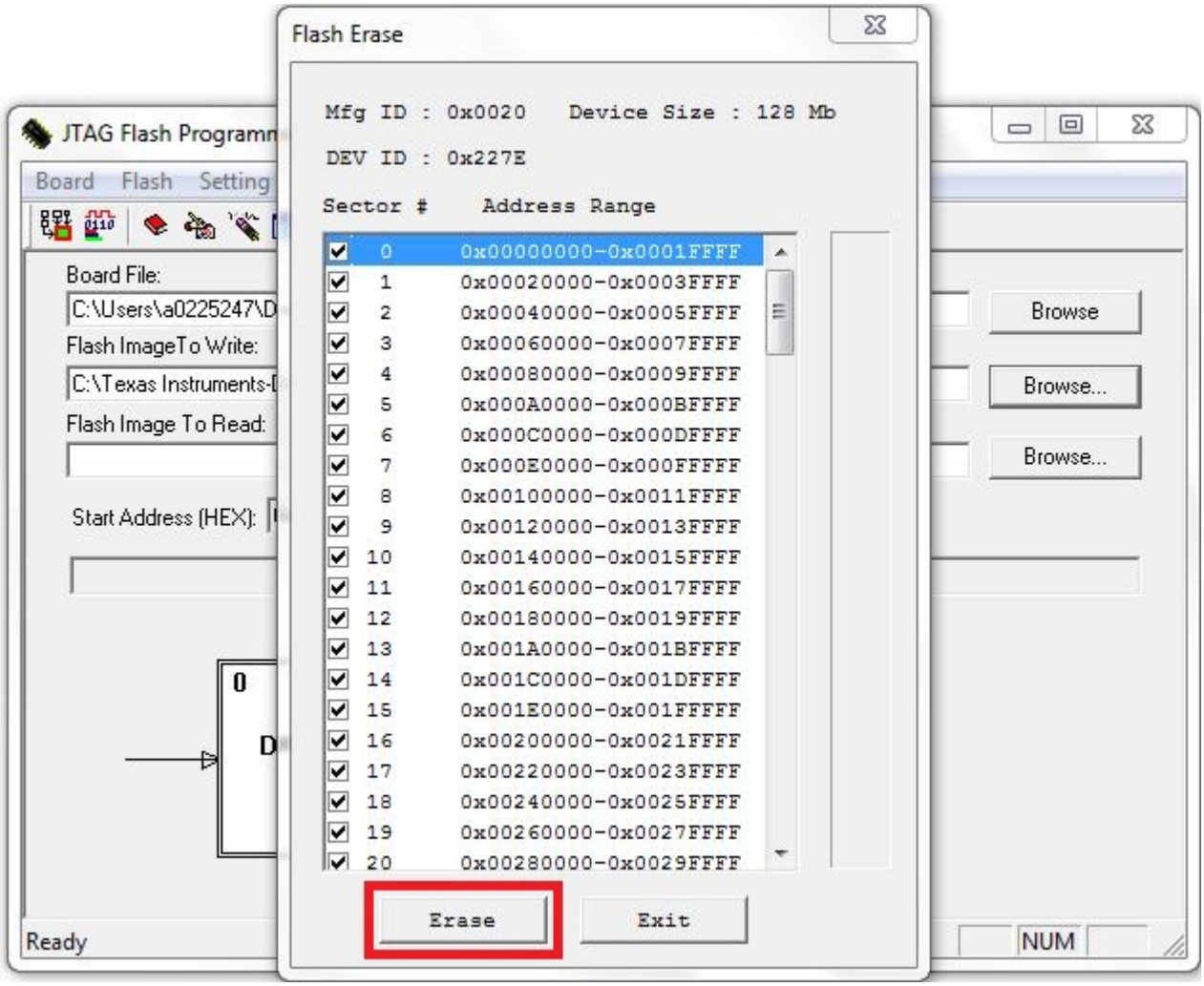

Figure 12. Flash Memory Block Selection and Erase Button

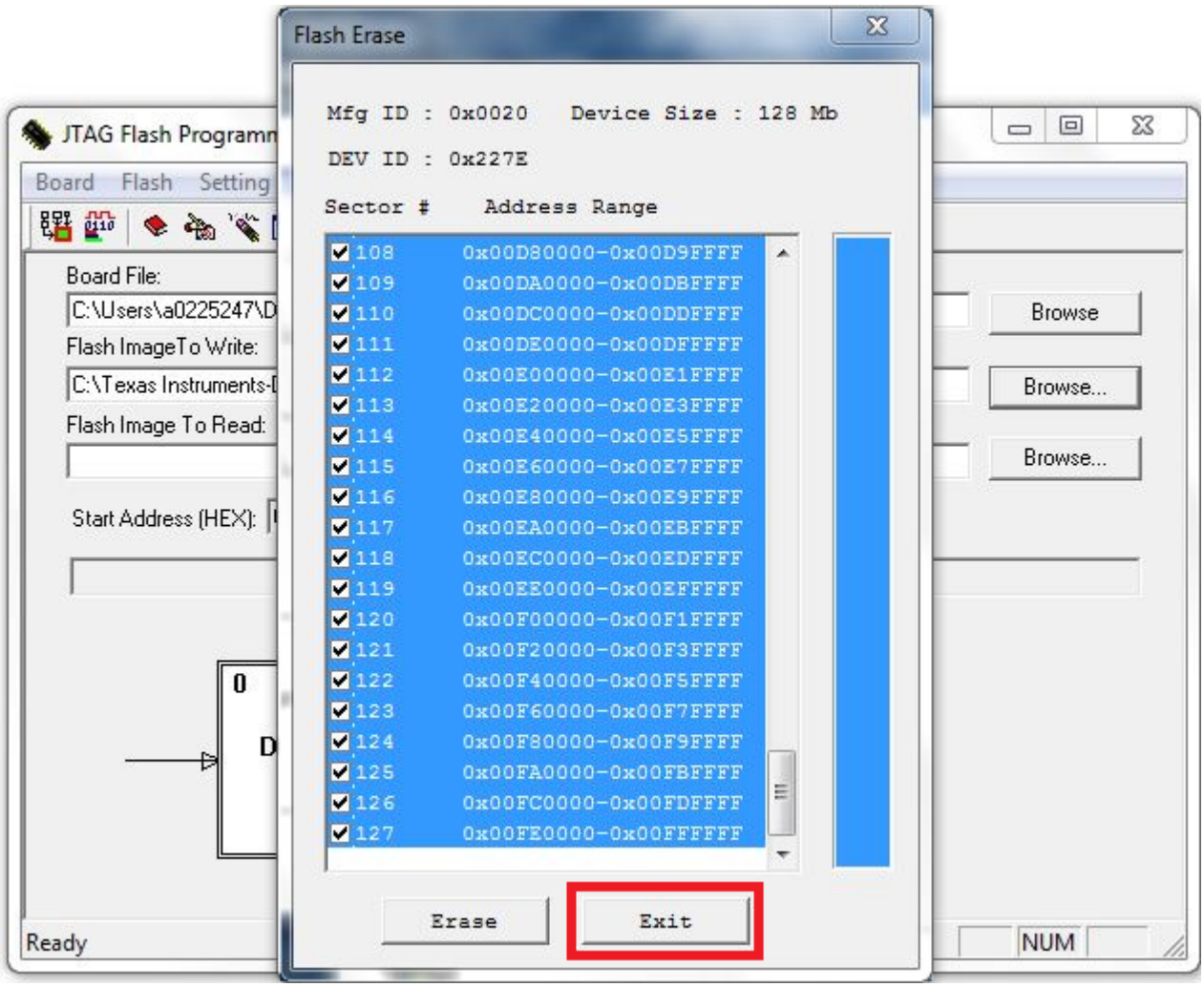

Figure 13. Flash Memory Block Erase Completed and Exit Button

Click the **Program** button on the toolbar (see Figure 14).

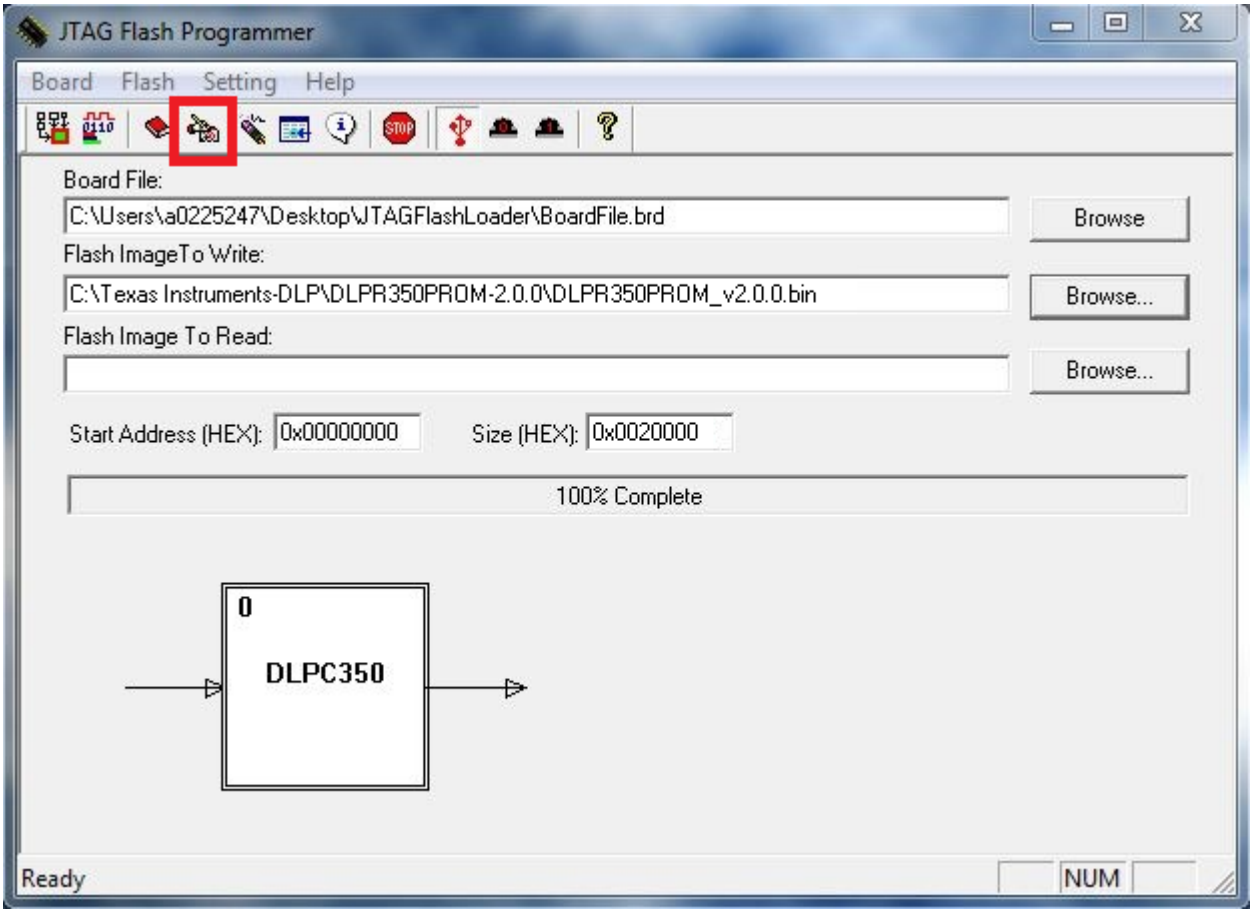

Figure 14. Program Button in Flash Programming Tool

After the flash programmer tool displays the operation is 100% complete, disconnect the JTAG cable, remove the jumper from J30, and disconnect the power supply from the DLP LightCrafter 4500, as shown in Figure 15.

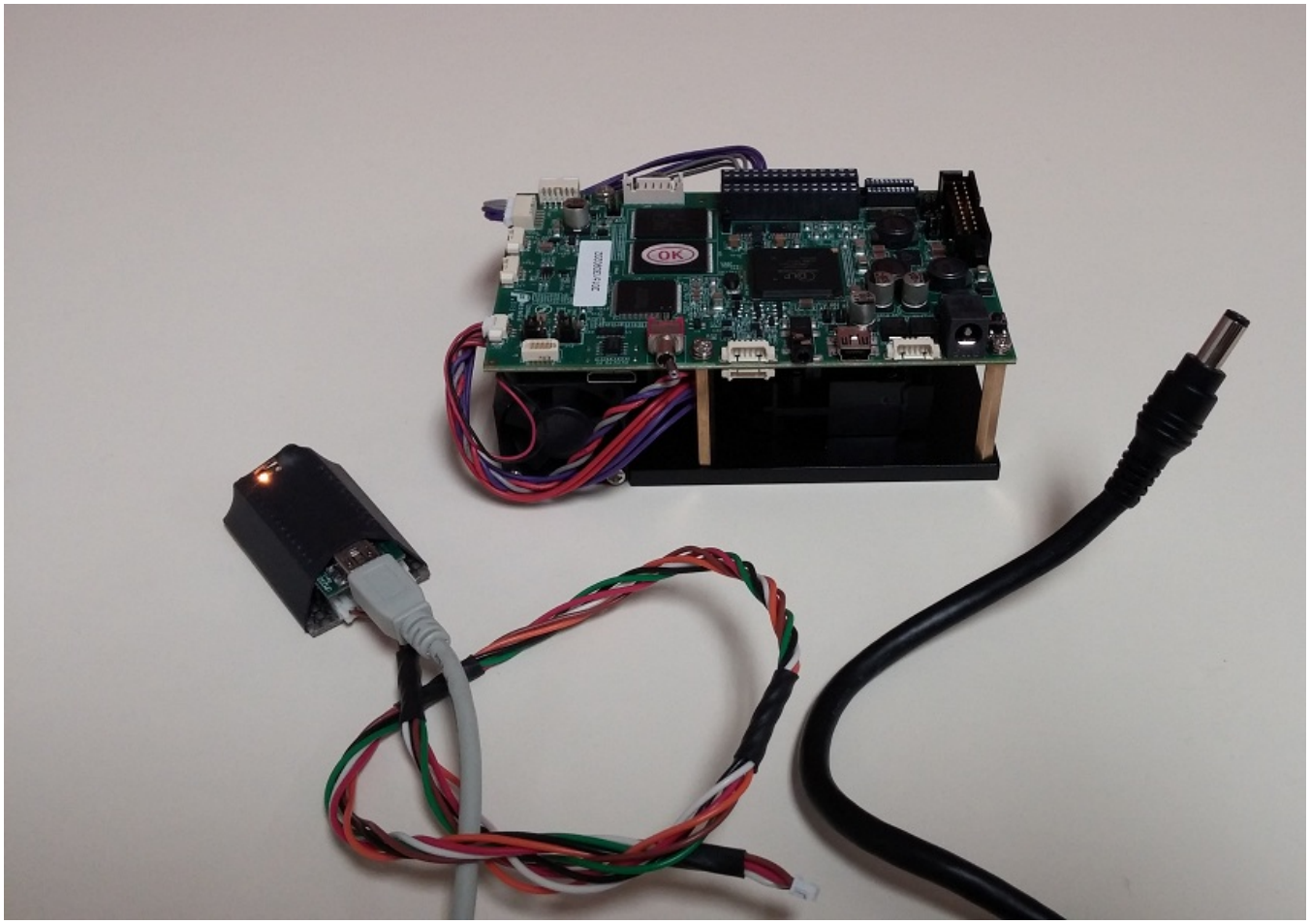

Figure 15. Power and JTAG Cable Removed from the DLP LightCrafter 4500

Connect the LightCrafter 4500 to a PC loaded with the LightCrafter 4500 GUI via USB. Reconnect the power cable to the LightCrafter 4500.

Open the DLP LightCrafter 4500 GUI and wait for the device to connect. If the device does not connect restart at Section 4. After the device is connected click the **Image/Firmware** tab, then click the **Firmware Upload** tab. Click the **Browse** button. Figure 16 shows the firmware upload window and tabs.

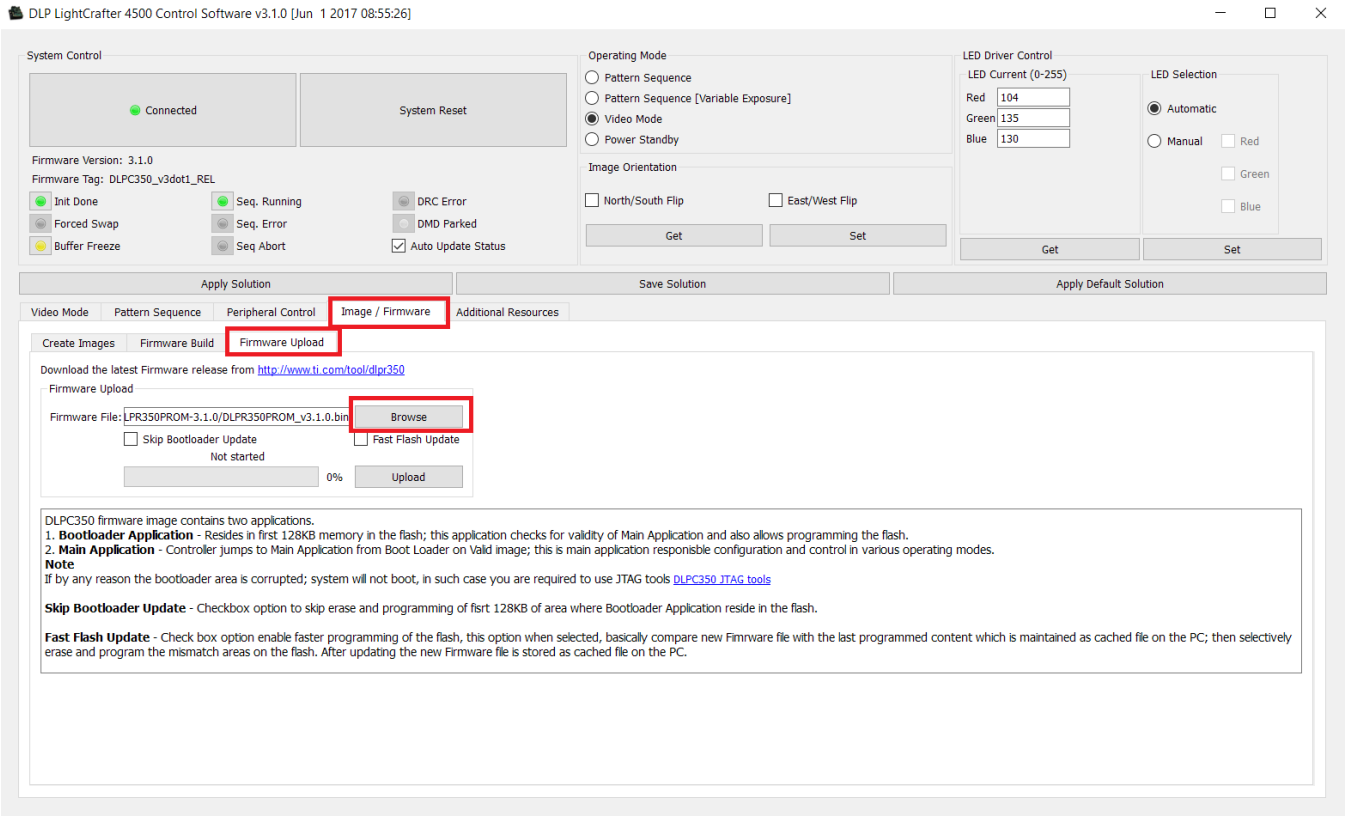

Figure 16. LightCrafter 4500 GUI Firmware Upload Window

When the firmware image is displayed in the **Firmware File** text box, click the **Upload** button, both of which are highlighted in Figure 17.

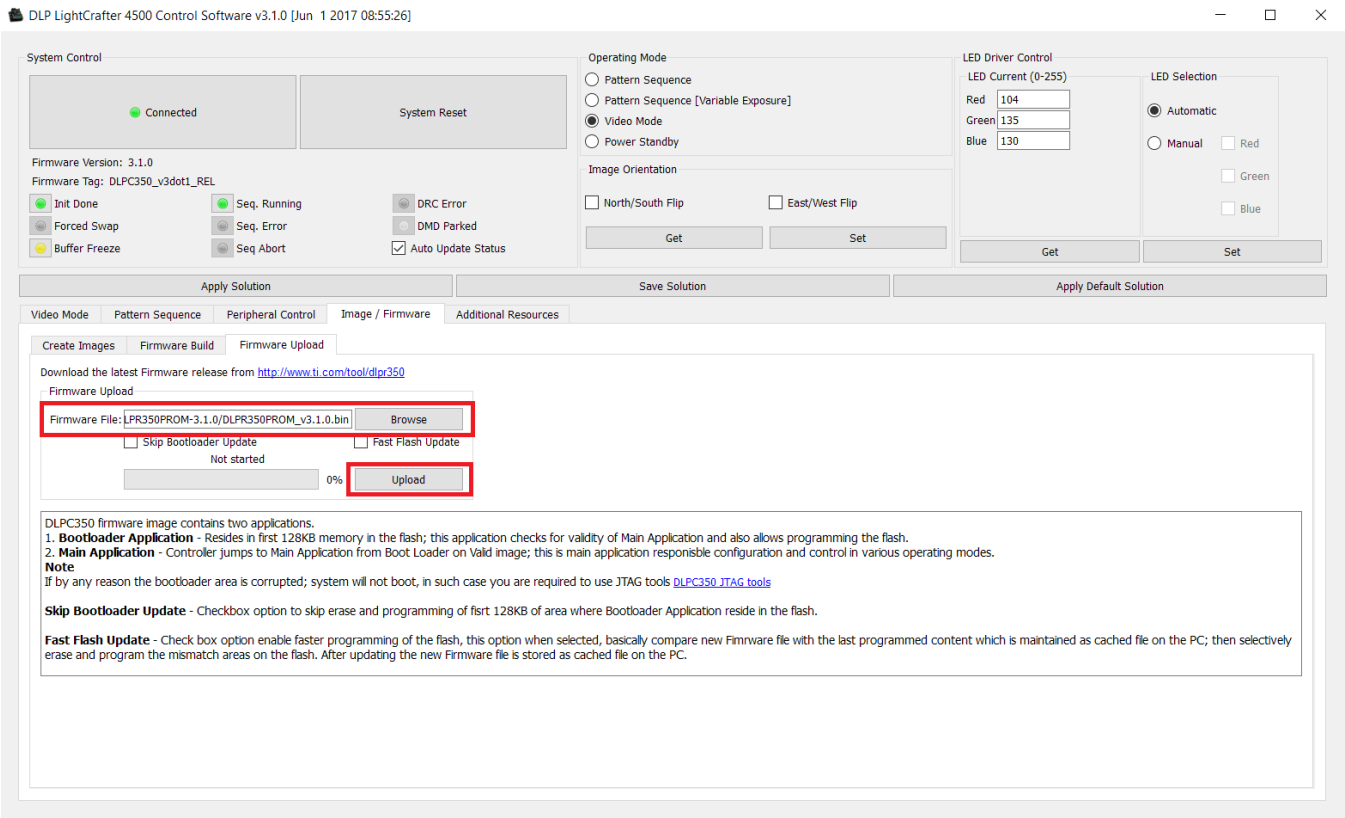

Figure 17. Starting The LightCrafter 4500 Firmware File Upload Process

The GUI will upload the entire firmware image to the LightCrafter 4500 through the USB port. When the process is completed, the LightCrafter will automatically be reset.

The DLP LightCrafter 4500 now contains the DLPR350 firmware distribution. Verify proper operation of the projector with the GUI. If the device does not boot up properly, restart at Section 4 and continue, making sure to erase every block of the flash memory.

5 Troubleshooting

- **Problem:** The JTAG flash programmer tool displays the error message: There are no FTDI devices installed.

  Solution: Check that the JTAG cable is connected to the PC with a USB cable and the proper driver in Section 2.3 is installed.
- **Problem:** The JTAG flash programmer tool displays the error message: No Device found. Please check the board power, USB/LPT port and JTAG connections.

  Solution: Ensure that the target board is receiving power by observing fan operation. Verify that the JTAG cable is connected to the JTAG boundary scan port J25 on the underside of the target board.
- **Problem:** The DLP LightCrafter 4500 does not display the splash screen after the flash is complete.

  Solution: Ensure the 2-mm jumper has been removed from J30. Cycle board power and verify fan operation. If the splash screen still does not display, return to and continue with the procedure, making sure to erase every block of the flash memory.
- **Problem:** The DLP LightCrafter 4500 displays a distorted image after the flash is complete.

  Solution: Restart the procedure at Section 4 and continue, making sure to erase every block of the flash memory.

Revision History

Changes from A Revision (September 2014) to B Revision **Page**

- Added information about what to do if the device does not connect to the GUI 16
- Updated GUI screenshot of the firmware upload window 16
- Updated GUI screenshot of the firmware upload process 17
- Added missing link to the Flash Programming Procedure 17
- Added missing link to the Flash Programming Procedure 18

Changes from Original (March 2014) to A Revision **Page**

- Included installation of LightCrafter 4500 GUI to procedure 2
- Added steps regarding flash programming procedure 4
- Changed procedure to flash only first 128 kB of firmware through JTAG 9
- Added step to connect LightCrafter 4500 to PC 15
- Added step to upload entire DLPR350 PROM through LightCrafter 4500 GUI 16

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