DLP® LightCrafter™ Display EVM GUI Tool

User's Guide

Literature Number: DLPU021B
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Contents

DLP® LightCrafter™ Display EVM GUI Tool

1 Overview

The DLP® LightCrafter™ Display evaluation module (EVM) includes a Windows®-based GUI tool used to control the EVM through SPI and I^2C commands. This document provides instructions on how to use features provided by the GUI tool to communicate with the DLP LightCrafter Display EVM.

2 System Requirements

The minimum recommended system requirements for the DLP LightCrafter Display EVM GUI tool are:

- PC with 1.4-GHz PentiumIV CPU or higher
- Windows XP SP3 or greater
- 1 GB of RAM
- 1920 × 1080
- 45 MB of free HD space
- USB port

3 Software Installation and Driver Installation

Download the installer for the DLP LightCrafter™ Display EVM GUI tool. Execute the DLP LightCrafter Display EVM GUI tool v7.0 Setup.exe and follow the instructions for software installation. The driver needed to communicate with the EVM is part of the installation, so no other installer is needed.

Table 1 shows all variations of the tool that can be installed. To install one or more variations, simply select the checkbox next to the EVM name during the installation of the tool.

Note: The tool used MUST match the EVM being used.

Table 1. Table of Tool Variations

EVM	Simple Mode	Advanced Mode
DLPDLCR2010	DLP LightCrafter Display v7.0	DLP LightCrafter Display v7.0 - Advanced
DLPDLCR3010		
DLPDLCR3010-G2		
DLPDLCR4710	DLP LightCrafter Display v7.0 – 4710EVM	
DLPDLCR4710-G2		
DLPDLCR3310	DLP LightCrafter Display v7.0 – 3310EVM	DLP LightCrafter Display v7.0 – Advanced DLPC3310EVM

4 User Interface Overview

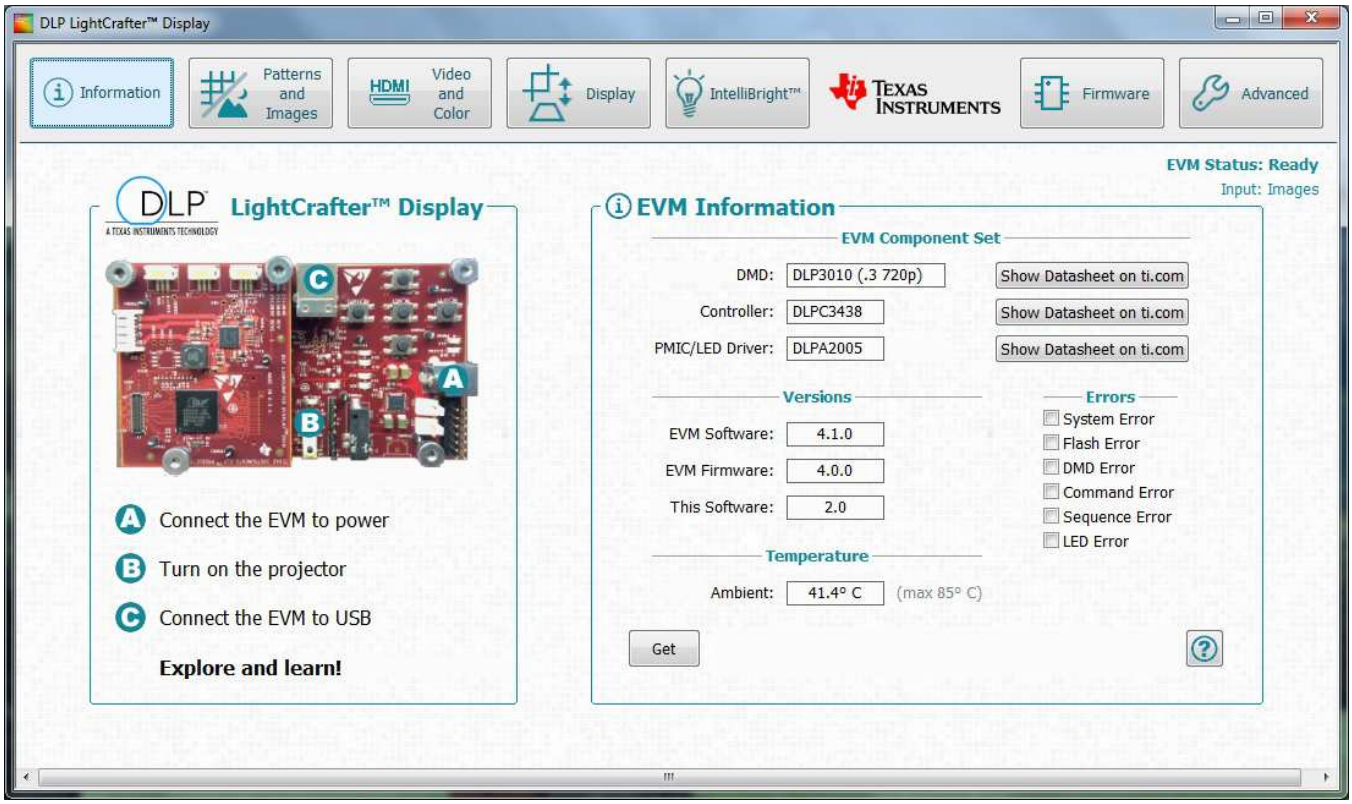

Figure 1. Information Page for 2010/3010 EVMs

Figure 1 shows the DLP LightCrafter™ Display GUI tool. The GUI tool has six pages, which communicate with the EVM by issuing SPI or I^2C commands. To access any of the six pages, select the desired page button at the top of the window. Table 2 provides a brief description of the six pages.

Table 2. Page Description

Page	Description
Information	Lets user get the status of the EVM
Patterns and Images	Lets user set display patterns and images to the device and check which pattern is displayed
Video and Color	Lets user modify the type of video output given to the device and choose from select color temperatures
Display	Lets user modify display and keystone settings
IntelliBright™	Lets user modify IntelliBright settings and LED current settings
Firmware	Lets users back up or update the firmware on the device

In addition to the page buttons, another button opens the advanced mode of the tool. This advanced mode contains additional pages and commands that can be used with the EVM. To learn more about the advanced mode, see Section 4.7.

To access the Menu bar while in this tool, press and release the ALT key. The tool then shows the menu bar as seen in Figure 2. From this menu bar, access the Edit menu for the Preferences or the Help menu for a direct link to the user's guide.

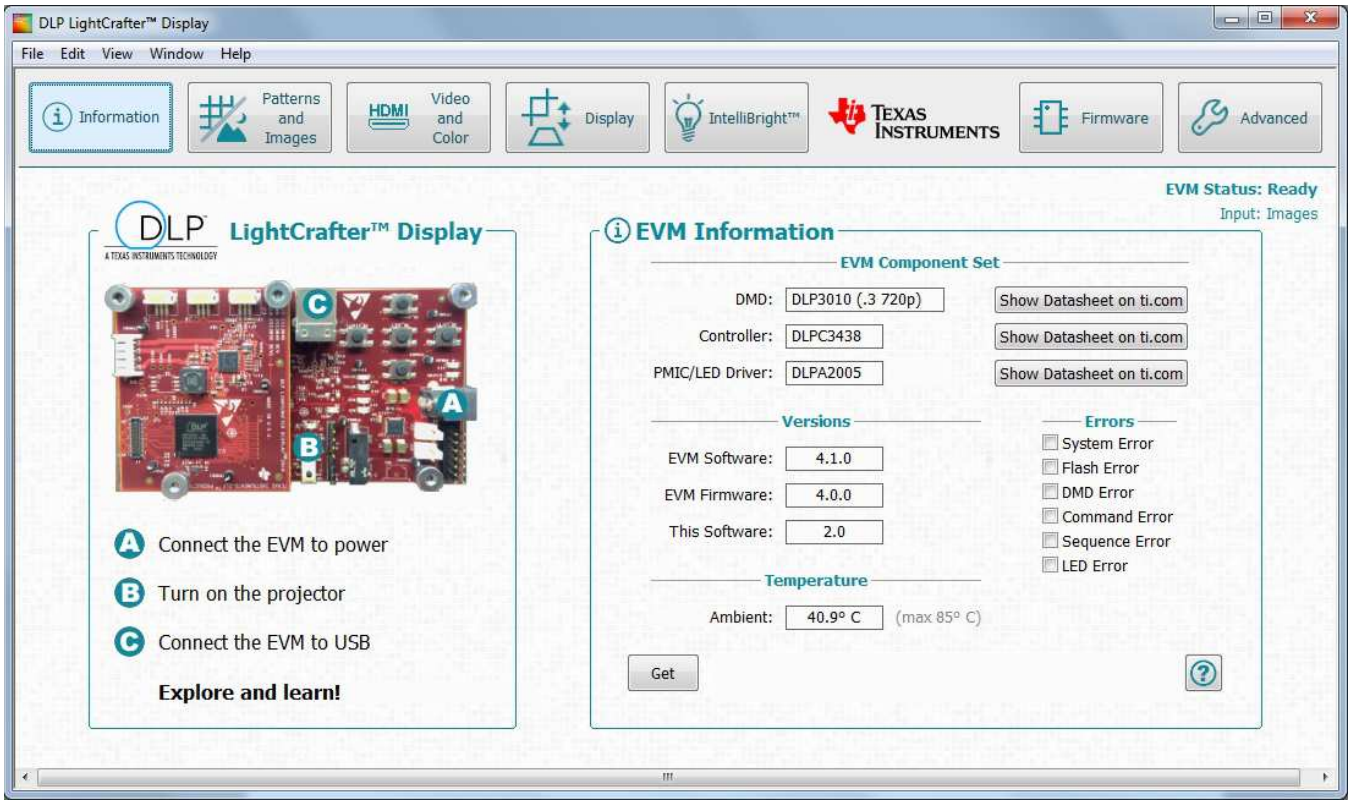

Figure 2. Information Page with Menu Bar

The **?** button in the bottom-right corner of each page is used to provide more information on that section and display the commands used.

4.1 Information Page

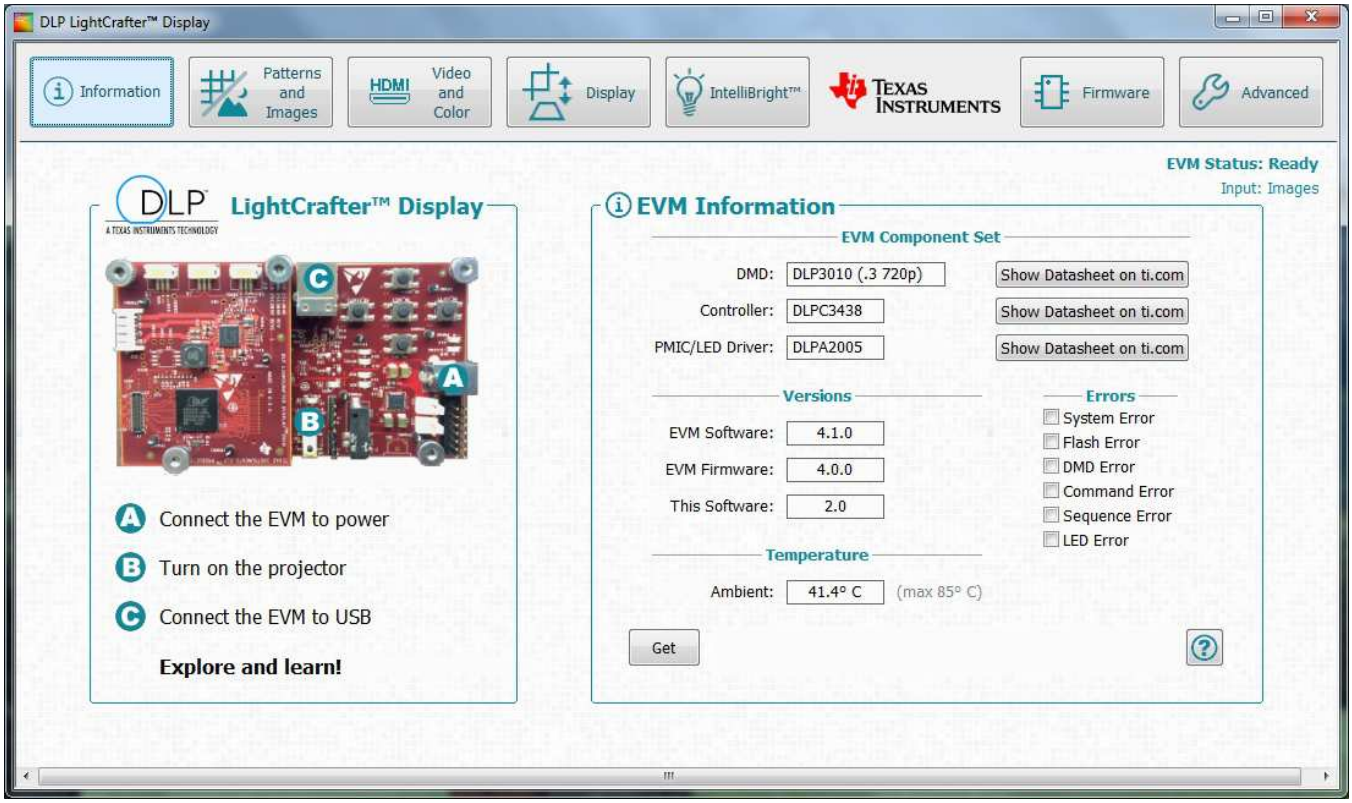

Figure 3. Information Page

Figure 3 shows the information page.

The information page lets users get status information about their EVM once it is connected and powered on. Refer to the guide on the left portion of the Information page to see how to set up the EVM.

The status of the EVM is displayed on the top-right corner of the Information page. The EVM Status section shows one of the following:

- Ready
- Connected, turned off
- Not connected
- Incompatible EVM connected

The Input section shows:

- Video
- Test patterns
- Splash images

If the EVM is communicating properly with the computer, information should appear in the text fields and the status should update.

The Information page also lets users check if any errors have occurred; checkmarks indicate specific errors.

The following commands are used to obtain information about the EVM:

- Read Short Status (0xD0)
- Read System Status (0xD1)
- Read System Software Version (0xD2)
- Read ASIC Device ID (0xD4)
- Read DMD Device ID (0xD5)
- Read System Temperature (0xD6)
- Read Flash Build Version (0xD9)

Figure 4 shows what the Information page will look like for the 4710 EVM. Notice the board has been updated to reflect the 4710 EVM board and the EVM Information title now specifies that this is for 4710.

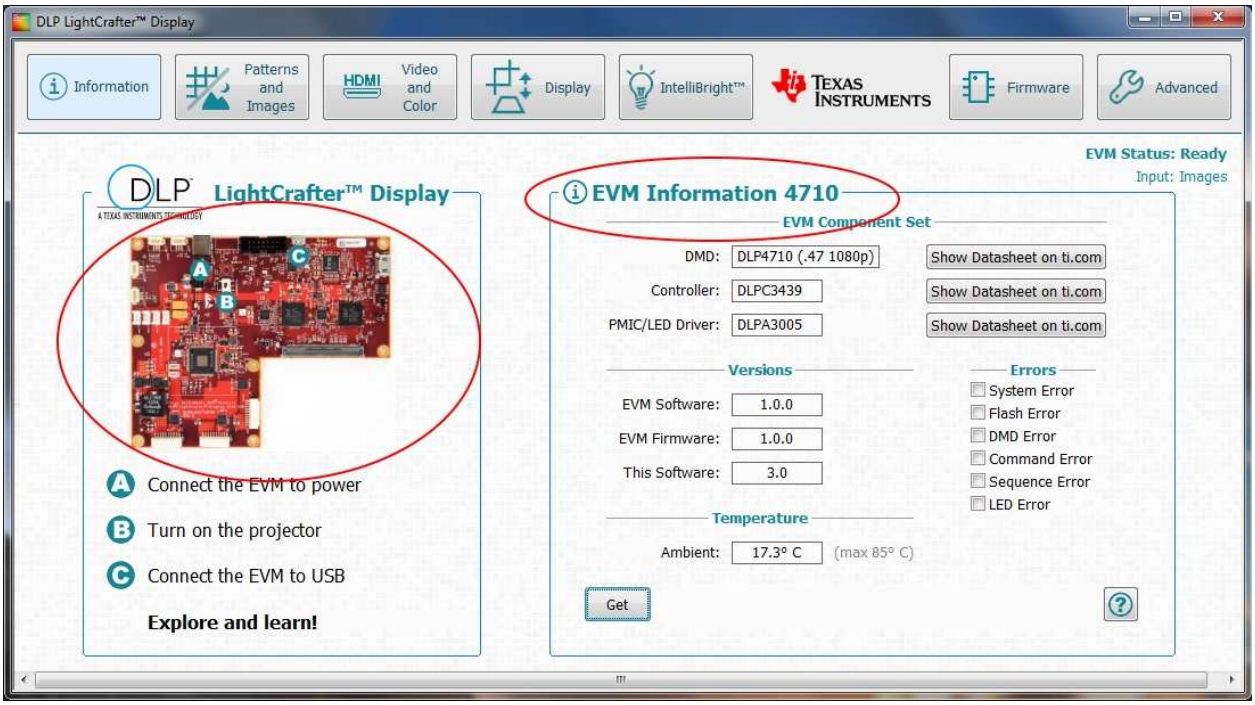

Figure 4. Information Page for 4710 EVM

Click the **?** button on the bottom-right corner of the page to obtain more information about the commands.

4.2 Patterns and Images

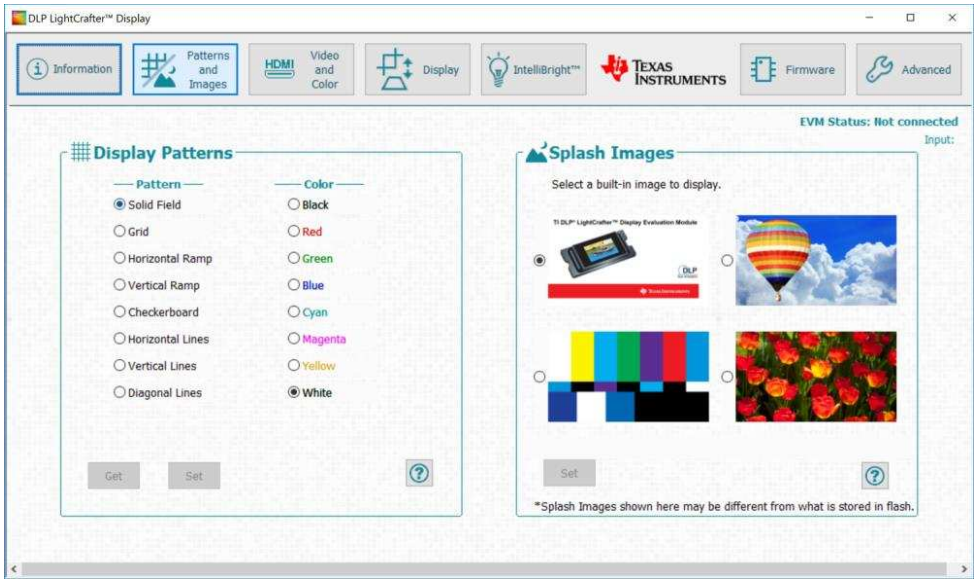

Figure 5. Patterns and Images Page

The Patterns and Images page lets users set display patterns and splash images on the connected EVM.

To set a display pattern, select the desired pattern, foreground, and background color, then click the **Set** button in the Splash Patterns section on the left side of the page. To see which display pattern is displayed, click the **Get** button.

To set a splash image, select the desired image, then click the **Set** button in the Splash Images section on the right side of the page.

The following commands are used to set the display pattern:

- Write Input Source Select (0x05)
- Write Image Crop (0x10)
- Write Test Pattern Select (0x0B)

The following command is used to get the display pattern:

- Read Test Pattern Select (0x0C)

The following commands are used to set the display image:

- Read Splash Screen Header (0x0F)
- Write External Input Image Size (0x2E)
- Write Image Crop (0x10)
- Write Splash Screen Select (0x0E)
- Write Input Source Select (0x05)
- Write Splash Screen Execute (0x35)

For more information about the commands used in each section of the page, click the **?** button on the bottom-right corner of each section.

4.3 Video and Color

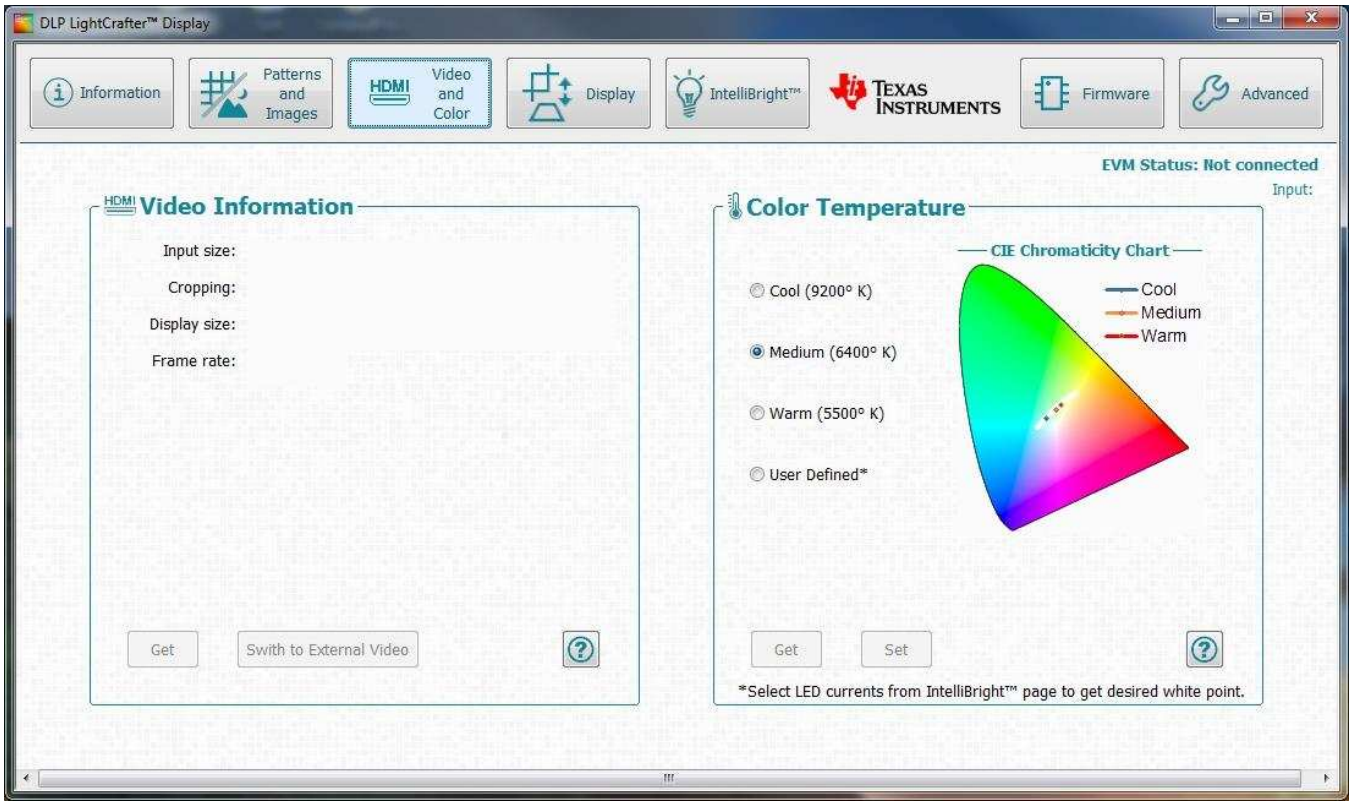

Figure 6. Video and Color Page

The Video and Color page has two sections: The Video Information section and the Color Temperature section.

When the EVM is displaying video, clicking the **Get** button on the Video Information section lets users see the input size, cropping size, display size, and frame rate. Clicking the **Switch to External Video** button switches the EVM back to video mode (HDMI).

The Color Temperature section lets users set the desired look of the EVM to cool, medium, warm, or user defined. The Color Temperature section also lets users check the currently used look. To modify the user defined look, refer to Section 4.6.

The following commands are used in the Video Information section:

- Write Image Crop (0x10)
- Write Display Size (0x12)
- Write Input Image Size (0x2E)
- Write External Input Source Select (0x05)

The following commands are used in the Color Temperature section:

- Write RGB LED Current (0x54)
- Write Look Select (0x22)
- Read Look Select (0x23)

For more information about the commands used in each section of the video and color page, click the **?** button on the bottom-right corner of each section.

4.4 Display

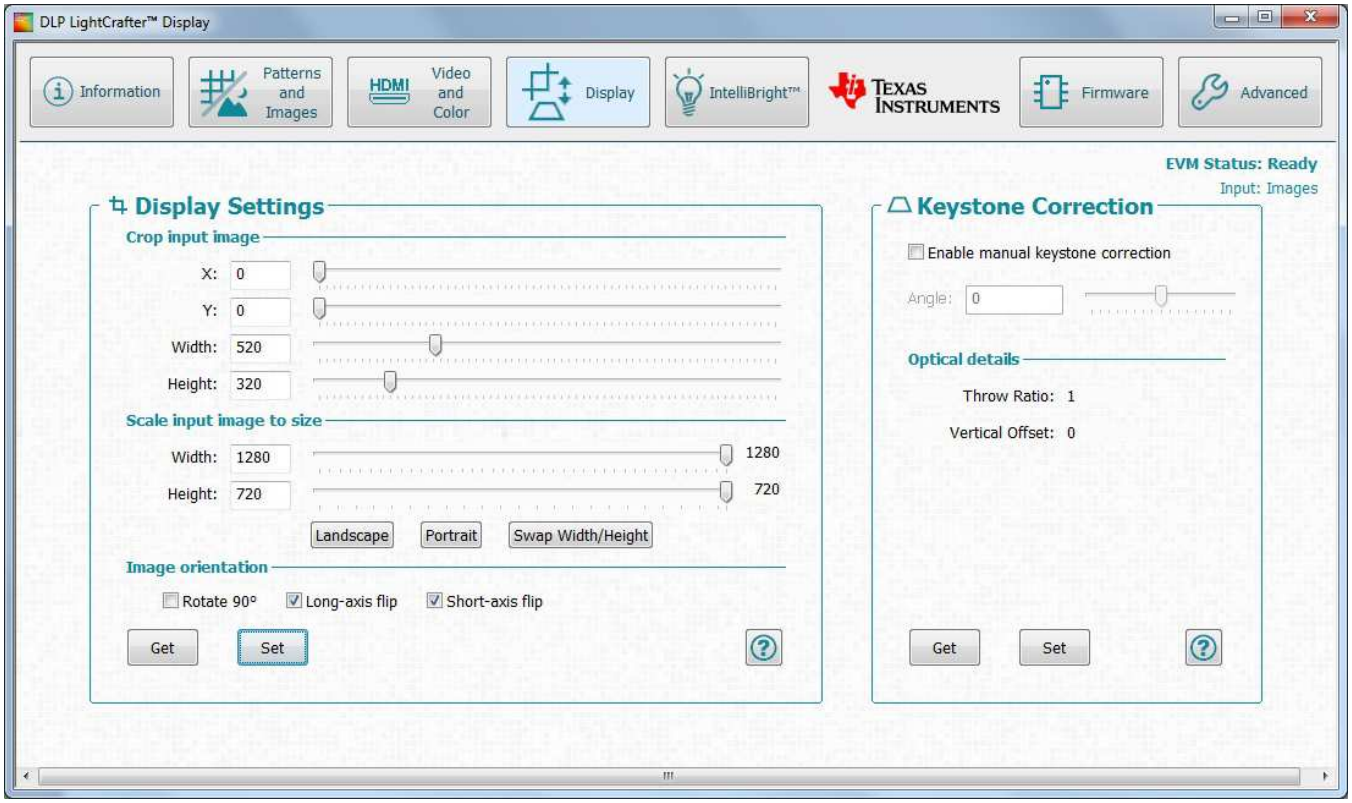

Figure 7. Display Page

The Display page gives users the option to modify display and keystone settings.

The Display Settings on the right give users the option to crop, scale, and rotate the input image. After all the desired values are selected, clicking the **Set** button sends the new information to the EVM. Clicking the **Get** button lets users see the current display settings on the EVM.

The Keystone Correction section lets users enable keystone on the EVM. Keystone is used when the EVM is not located on a flat surface and has a vertical tilt of ±40 degrees. Keystone correction ensures that the image displayed is rectangular.

Please note, not all functions shown on this page are supported on all EVMs.

The following commands are used in the Display Settings section:

- Write Image Crop (0x10)
- Write Display Size (0x12)
- Write External Input Image Size (0x2E)
- Write Display Orientation (0x14)

The following commands are used in the Keystone Correction section:

- Write Keystone Correction Control (0x88)
- Write Keystone Projection Pitch Angle (0xBB)

For more information about the commands used in each section of the display page, select the **?** button on the bottom-right corner of each section.

4.5 IntelliBright™

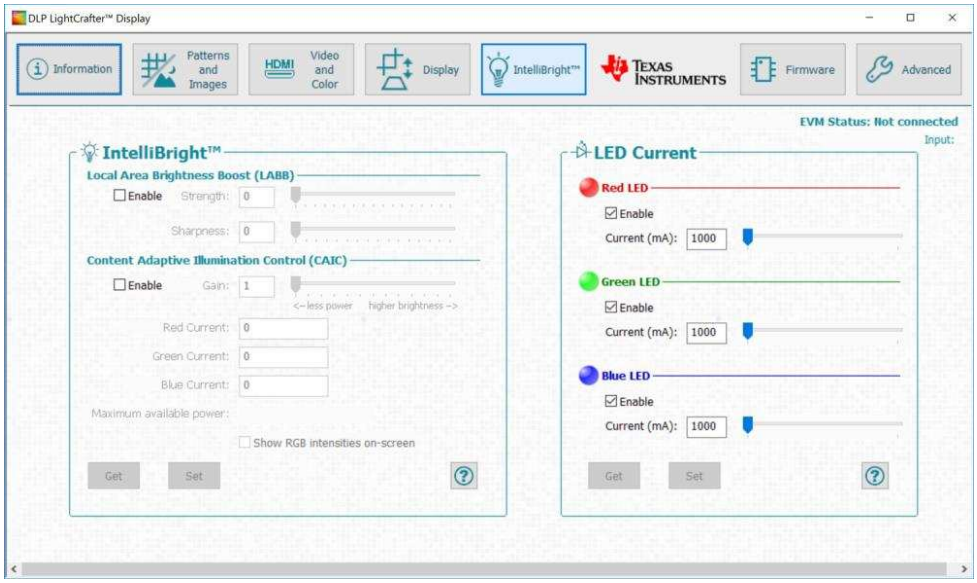

Figure 8. IntelliBright Page

Figure 8 shows the IntelliBright™ page.

The IntelliBright™ page has two sections, one to modify IntelliBright™ settings and the other to modify LED Current settings.

IntelliBright™ is the name given to two image-processing algorithms designed to dynamically optimize the brightness or power consumption on per frame basis. The IntelliBright™ section lets users change settings specific to each algorithm and check which settings are currently running on the EVM.

The EVM has three LEDs whose currents can be changed to reduce power consumption and change the perceived color temperature of the displayed image. The LED Current section lets the user modify the current values and see what the EVM is using at any moment.

The following commands are used in the Display Settings section:

- Write Local Area Brightness Boost Control (0x80)
- Write CAIC Image Processing Control (0x84)
- Write LED Output Control Method (0x50)
- Read CAIC Maximum Available Power (0x57)

The following commands are used in the Keystone Correction section:

- Write RGB LED Enable (0x52)
- Write RGB LED Current (0x54)

For more information about the commands used in each section of the IntelliBright™ page, select the **?** button on the bottom-right corner of each section.

4.6 Firmware

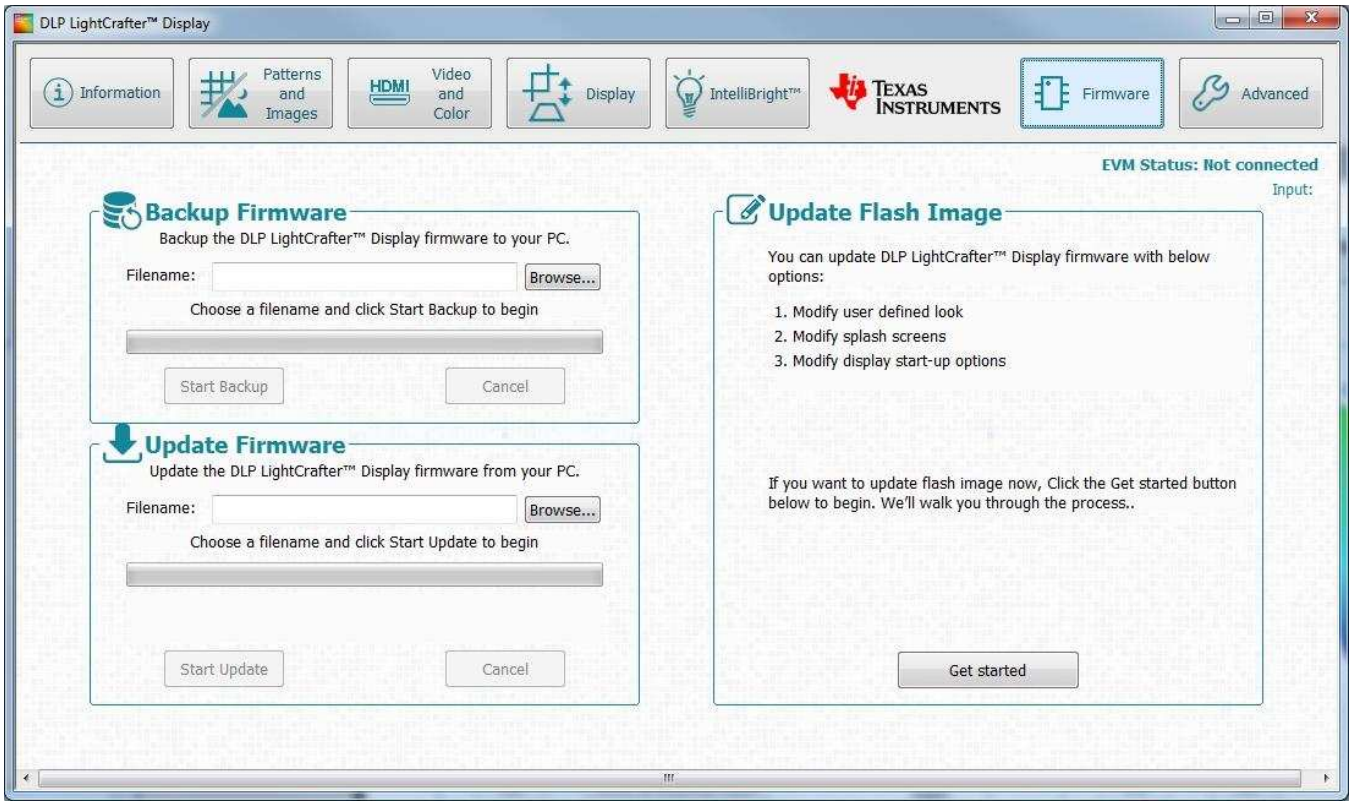

Figure 9. Firmware Page

The Firmware page allows users to back up and update their EVM firmware. In addition, users have the option to modify settings in the flash image provided via ti.com through the Update Flash Image Wizard on the right hand side of the page. Users can also modify the image in Advanced Mode, where they will have an additional option to add their own commands to the auto-initialization process.

The 3310 EVM version of the tool provides an additional option to backup or update the firmware of the on-board FPGA. This is selectable via dropdown control as seen in Figure 10. The option to backup or update the FPGA flash is provided only in Simple mode.

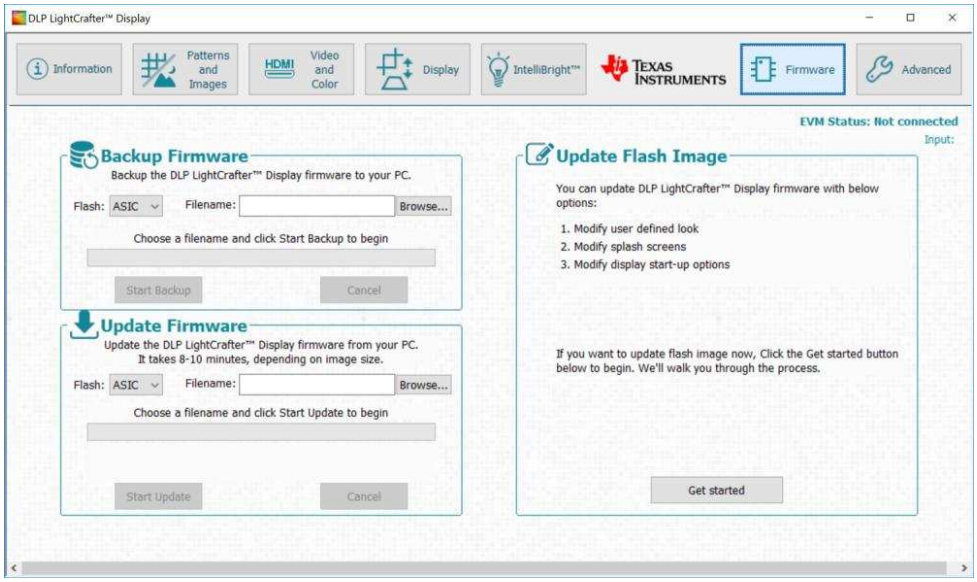

Figure 10. DLPC3310 EVM Firmware Page

4.7 Advanced Mode

Access the tool's advanced mode by clicking the **Advanced** button in simple mode or by opening the Advanced Mode shortcut in the start menu. When opened, the tool appears as shown in Figure 11. Starting with v7.0 of the EVM tool, two versions of Advanced Mode exists. If opening from the Advanced Mode shortcut in the start menu, please look at the name to check which EVM it supports. If the EVM is not present in the name, use the Advanced Mode without any EVMs in its name.

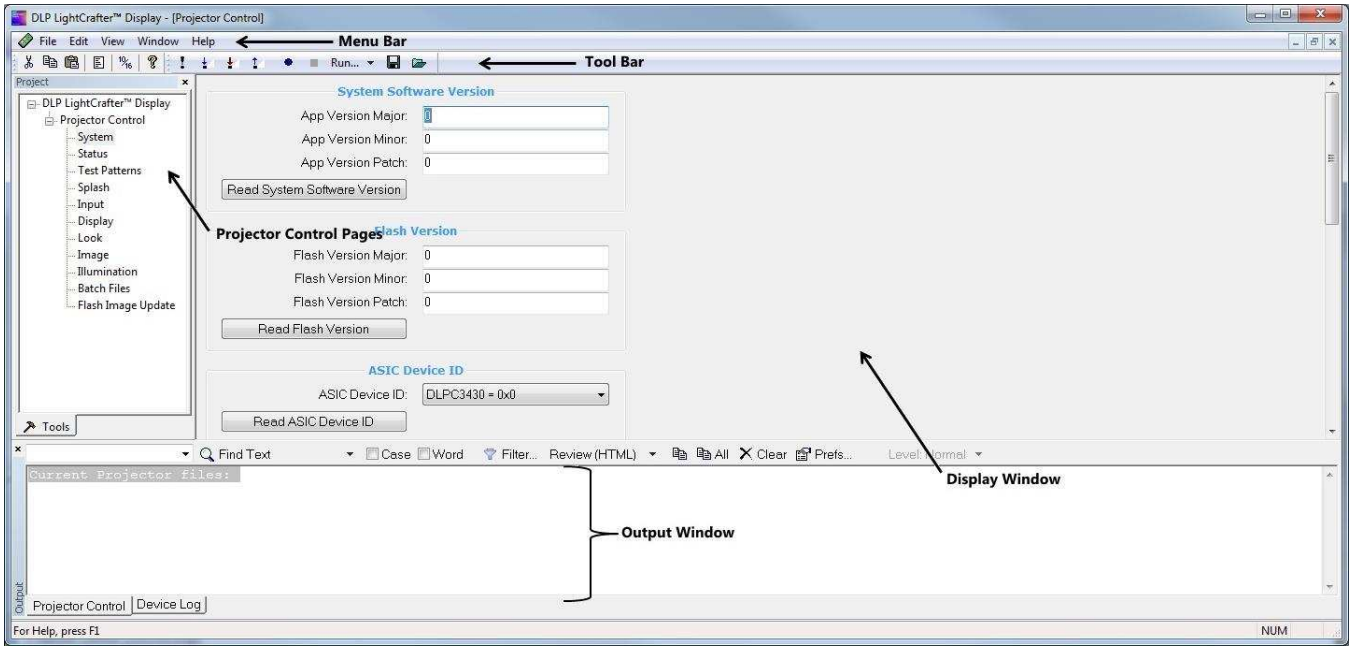

Figure 11. DLP LightCrafter – Advanced Mode

Table 3 shows the Advanced Mode sections.

Table 3. Advanced Mode Sections

Section	Description
Menu Bar	Contains the menus available for accessing other features, such as Preferences (Edit → Preferences)
Tool Bar	Contains common support functions for the project based on the selected project tree page
Projector Control Pages	Contains a list of tools that are used to access and send commands to the EVM. Selecting a tool opens it up in the tool pane.
Display Window	Shows the actively selected tool
Output Log Window	Displays information associated with the project. The information displayed is mainly used for debugging purposes. The output log window has its own set of tabs (on the bottom-left side). This allows the user to toggle through more specific output logs without changing the active page.

To learn more about the commands used in the Advanced Mode's pages, refer to the software programmer's guide found at www.ti.com.

4.7.1 Batch Files

The Batch Files page processes batch files consisting of multiple I^2C (and other commands) to automate simple tasks when developing and testing a new projector.

To run a batch file:

1. Click the **Choose Batch File** button and select a batch file. They are typically named with an extension of .bf.
2. The batch file runs and produces output in the output window.

All displayed output from the batch file is also logged to a disk file. The file will be named the same as the batch file, but will have an extension of .log and be in the same directory as the batch file.

Options:

- Long-running batch files can be stopped using the **Cancel** button.
- Use the **Resume** button to continue a paused batch file.
- To make the batch file stop when it encounters an error, click the **Stop Batch File on first error** checkbox.
- To make a popup message appear when a batch file encounters an error, click the **Display message box on error** checkbox.

4.7.2 Writing Batch Files

Batch files are text files that can be created with any text editor, such as Notepad. Each line of a batch file represents a command. The following commands are supported:

#	Lines starting with # are considered to be comments and are ignored. Comments can also be given on the same line as a command by preceding it with the # character.
ALIAS	Defines a command alias. For example, *'alias brightness w 34 0x42*, followed by *brightness 0x1234' is the same as writing 'w 34 0x42 0x1234*. The aliased command is replaced by the text that follows it, and aliasing only matches commands at the start of a line.
BYTESWAP	Causes bytes to be swapped before they are sent to the projector. Turn on byte swapping using '*byteswap on*, and disable it using '*byteswap off*'. The default is *byteswap off*; bytes are sent in the order written. When byte swapping is turned on, *0x12345678* is sent as *0x78 0x56 0x34 0x12* instead of *0x12 0x34 0x56 0x78*, and *0x1234* is sent as '*0x34 0x12*' instead of '*0x12 0x34*.
CHAIN	Calls another batch file as a subroutine. When the nested batch file is complete, the current batch file resumes. The full path of another batch file should be given as a parameter after the command, for example, chain c:\batch\other.bf. If no other batch file is named, the command is ignored.
DELAY	Wait before continuing to process the batch file. The only parameter should be the number of milliseconds to delay, specified in hexadecimal. If no parameter is given, it defaults to 10 ms.
ECHO	Displays the text after the command to the output window and log file.
GOTO	Simple looping control. A batch file can loop continuously until cancelled by using the *goto begin* command (or, abbreviated as *g begin*). No commands after the goto are processed.
PAUSE	Pauses the batch file. A dialog appears that displays the remainder of the text on the pause command line, and it prompts for input. Any text input is displayed in the output window and log file. After the dialog is dismissed, the batch file can be **Resumed** or **Cancelled** by pressing the button on the **Batch Files** page.
READ	Reads data from an I^2C slave. The parameters are: the slave address, the number of data bytes to read. For example, '*Read 34 4* would read 4 bytes of data from I^2C slave address 0x35.
WRITE	Writes data to an I^2C slave. The parameters are: the slave address, subaddress, zero or more data bytes. All parameters should be 1 byte long separated by spaces. For example, *Write 34 1 12 23* would write 2 bytes to slave address 34, subaddress 1.

NOTE: All batch file commands (except for alias and byteswap) can be abbreviated using the first character of the command name. For example, the read command can be abbreviated r. Also, case is not significant, so Read, READ, read, R, and r are all considered the same command.

5 Flash Image Update

The DLP LightCrafter™ Display EVM GUI Tool gives users the ability to customize the default flash image provided on ti.com. This functionality is available for both Simple and Advanced mode. The customizable components of the flash image are:

- User Defined look
- Splash images
- Start-up image orientation
- Start-up splash image
- Start-up LED current
- Auto-initialization routine

The Flash Image Update behaves differently for Simple and Advanced mode. In Simple mode, the start-up options mentioned above are handled automatically; the user does not have to worry about how to configure the auto-initialization routine. In Advanced Mode, the desired start-up options must be set up via command calls in batch files. These batch files will then be part of the auto-initialization routine that runs once the projector turns on. It is important to note that initial source set up must be performed by one batch file. An example batch file is shown in Figure 12. Please refer to the DLPC3430 or DLPC3439 Software Programmer's Guide for more information on the available commands.

```
#######################################
#            SET UP SPLASH SOURCE            #
#######################################
# Write: ImageCrop
W 36 10 00 00 00 00 05 D0 02
# Write: DisplaySize
W 36 12 80 07 38 04
# Write: InputImageSize
W 36 2E 00 05 D0 02
# Write: SplashScreenSelect
W 36 0D 03
# Write: InputSourceSelect
W 36 05 02

# 100 ms delay
W 36 DB 64 00

# Write: ImageOrientation
W 36 14 00

# WRITE LED CURRENT
W 36 54 07 01 07 01 07 01

# Write: WRITE LED ENABLE = 7. DISABLE = 0
W 36 52 07

# Write: SplashScreenExecute
W 36 35
```

Figure 12. Batch File Example

Revision History

NOTE: Page numbers for previous revisions may differ from page numbers in the current version.

Changes from A Revision (February 2016) to B Revision	Page
• Changed DLP LightCrafter Display EVM GUI tool from v4.0 to v7.0 in Section 3	3
• Number of tool variations increased from two (previously only the 2010/3010 EVM version and the 4710 EVM version). A table of tool variations added to Section 3	3
• Added note that not all functions are supported on all EVMs in Section 4.4	10
• Added additional explanation of the 3310 EVM option to backup or update firmware, including Figure 10	12
• Added description of v7.0 Advanced Mode in Section 4.7	14

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

- Updated recommended system requirement in Section 2 from 'WXGA 1280x800' to '1920 x 1080' 3
- Changed DLP LightCrafter Display EVM GUI tool from v3.0 to v4.0 in Section 3..... 3
- Terminology of 'Display images' is updated to 'splash images' 8
- Updated Section 4.6 description to include user specified settings..... 12
- Added Section 5 Flash Image Update 16

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