

DLP® Display and Light Control EVM GUI Tool

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Trademarks

IntelliBright is a trademark of Texas Instruments. DLP is a registered trademark of Texas Instruments. Windows is a registered trademark of Microsoft Corporation.

1 Overview

The DLP® Display and Light Control evaluation module (EVM) includes a Windows®-based GUI tool used to control the EVM through SPI and I²C commands. This document provides instructions on how to use features provided by the GUI tool to communicate with the DLP Display and Light Control EVM.

2 System Requirements

The minimum recommended system requirements for the DLP Display and Light Control EVM GUI tool are:

- PC with 1.4-GHz Pentium IV CPU or higher
- Windows 7 or greater
- 4 GB of RAM
- 1920 × 1080
- 200 MB of free HD space
- USB port

3 Software Installation and Driver Installation

Download the installer for the DLP Display and Light Control EVM GUI tool. Execute the DLP Display and Light Control EVM GUI tool **DLPPicoDisplayAndLightControl.x.x.x.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 lists all the tools that the file setup.exe installs.

EVM	Simple Mode	Product in Advanced Mode
DLP2010EVM-LC	DLP Pico Display and Light Control x.x.x.x (DLP2010LC)	DLPC347x Pico Display and Light Controller (0.2
DLP3010EVM-LC	DLP Pico Display and Light Control x.x.x.x (DLP3010LC)	WVGA, 0.3 720p)
DLP4710EVM-LC	DLP Pico Display and Light Control x.x.x.x (DLP3010LC)	DLPC347x Pico Display and Light Controller (0.47 1080p)

Table 1. Table of Tool Variations



User Interface Overview

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	DLP® Pico Display and Light Control EVM	Search	X
		(1) EVM Information	
		EVM Component Set	
		DMD : DLP3010 (.3 720p)	E Show Datasheet on TI.com
		Controller : DLPC3478	E Show Datasheet on Tl.com
Display		PMIC/LED Driver : DLPA2005	E Show Datasheet on Tl.com
\bigcirc		Version Information	Errors
((• •) Light Control		EVM Software : 6.2.0	System Error
Eight control	1 Connect the EVM to power	EVM Firmware : 0.0.6	Flash Error
	2) Turn on the projector	This Software : 1.0.0.4	DMD Error
	Connect the EVM to USB		Communication Error
Firmware		Temperature	Sequence Error
	Explore and learn!	Ambient : 27.8° C	LED Error
Debug	Main Navigation Bar	0	🕹 Get
	FVM Status: Ready		
	Insut: External Video Port		
	Input External VIDEO POR		🦊 Texas Instruments

Figure 1. Information Page

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				Search	X
	DLP [®] Pico Disp	lay and Light (Control EVM		
(j)		Patterns and Images	Video and Color	Display Settings	Intellißright ^{we}
Information	Image: Display Paragram	itterns		Splash Images	Page Navigation Bar
	Pattern	Foreground	Background	Select a built-in image to display.	
Display	○ Color Bars	O Black	O Black	C C RECORDED	
	Solid Color	Red	O Red		
\bigcirc	Checkerboard	O Green	⊖ Green		
((•))	O Color Ramp	O Blue	OBlue		
Light control	⊖ Grid	O Cyan	Ocyan		
•		O Magenta	O Magenta		
		O Yellow	O Yellow		C. A. D.
Firmware		○ White	○ White		
				* Splash Image shown here may be	different from what is stored in flash.
Debug	0		↓ Get ► Set	0	► Set
	V EVM Status: Ready				
	Input: External Video Port				👋 Texas Instruments 🔡

Figure 2. Display Pages

Figure 1 shows the DLP Display and Light Control GUI tool. The GUI tool has 5 tabs on the left with 1 or more pages for each tab, which will communicate with the EVM by issuing SPI or I²C commands. To access a specific page, select the desired tab from the Main Navigation bar on the left (Figure 1) and then select the specific page from the Page Navigation bar on the top (Figure 2). Table 2 provides a brief description of the 13 pages.

Table 2. Page Description

Tab	Page	Section	User Control Description	
Information	EVM Information	EVM Information	Get the status of the EVM	
	Patterns and	Display Patterns	Set display patterns and checks which pattern is displayed	
	Images	Display Images	Set display images to the device	
	Video and Color	Video Information	Modify the type of video output given to the device	
Diaplay		Color Temperature	Choose from select color temperatures	
Display	Dianlos Cottingo	Display Settings	Modify display and keystone settings	
	Display Settings	Keystone Correction	Modify display and keystone settings	
	IntolliDrightTM	IntelliBright™	Modify IntelliBright settings	
	Intellibright	LED Current	Modify LED current settings	
External Patterns			Configure and display external patterns	
Light Control	Internal Patterns		Configure and display internal patterns	
	Splash Patterns		Configure and display splash patterns	
	Backup Firmware		Backup the firmware on the device	
Firmware	Update Firmware		Update the firmware on the device	
	Update Flash Image		Create new firmware image for the device	

Tab Page Section User Control Description		User Control Description	
	Event Viewer		View the event occurred on the device
Debug	Command Log		View the command(s) issued to the device with the option to export to a batch file

Table 2. Page Description (continued)

In addition, there is a separate GUI tool installed for the advanced user/mode (Section 4.6). This advanced mode contains additional pages and commands that can be used with the EVM.

Use the questionmark icon (?) in the bottom-left corner of each section to provide access information on that section and display the commands.

4.1 Information Tab

4.1.1 Information Page

	DLP® Pico Display and Light Control EVM	Search	_ □	×
Information Display		EVM Information EVM Component Set DMD: DLP3010 (3 720p) E Show Datasheet Controller: DLPC3478 PMIC/LED Driver: DLPA2005 E Show Datasheet	on Tl.com on Tl.com on Tl.com	
Light Control	 Connect the EVM to power Turn on the projector Connect the EVM to USB Explore and learn! 	Version Information Errors EVM Software : 6.2.0 EVM Firmware : 0.0.6 This Software : 1.0.0.4 DMD Error Communicat Temperature Ambient : 27.8° C	on Error r	
Debug	EVM Status: Ready Input: External Video Port	о • • • •	Get	NTS .::

Figure 3. Information Page

The information page shows status information the EVM after 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 bottom-left corner of the Information page. The EVM Status shows one of the following:

Ready

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- Connected, Incompatible EVM
- Connected, Powered off
- Not connected



In addition to the EVM connection status, the page shows the Input Source or Operating Mode. When connected, the Input shows one of the following:

- External video port
- Test pattern generator
- Splash screen
- External pattern streaming
- Internal pattern streaming
- Space coded pattern streaming

After the EVM is connected, if the tool used (DLPC2010LC or DLPC3010LC) does not match the EVM being accessed (DLP2010EVM-LC or DLP3010EVM-LC) the EVM Status displays "Incompatible".

After the EVM is connected, click **Get** on the bottom-right corner to get the information and status of the EVM. The Information page also lets user checks if any errors have occurred, checkmark(s) indicates specific errors.

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

- Read short status (0xD0)
- Read system status (0xD1)
- Read DMD device ID (0xD5)
- Read controller device ID (0xD4)
- Write PAD register address (0xEC)
- Read PAD register (0xED)
- Read system software version (0xD2)
- Read flash build version (0xD9)
- Read system temperature (0xD6)

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User Interface Overview

4.2 Display Tab

4.2.1 Patterns and Images Page

	DLP [®] Pico Disp	lay and Light (Control EVM	2	Search	_ □	×
Ó		Patterns and Images	Video and Color	Display Settings	IntelliBright™		
Information	Display Pa	atterns		Splash Images			
	Pattern	Foreground	Background	Select a built-in image to display.			
Display	O Color Bars	O Black	O Black				
	O Solid Color	Red	◯ Red		o 📿 💿	0	
	Checkerboard	O Green	O Green	(A			
() Light Control	Color Ramp	O Blue	O Blue				
Light Control	⊖ Grid	O Cyan	Ocyan			T	
·		O Magenta	O Magenta		/ ° 🛒 <		
		O Yellow	O Yellow		6900		
Firmware		○ White	() White				
				* Splash Image shown he	ere may be different from what is stored in	flash.	
Debug	0		↓ Get ► Set	0		► Set	
	V EVM Status: Ready						
	Input: Test Pattern Genera	tor			👋 Tex	as Instrumen	TS .:

Figure 4. Patterns and Images Page

The Patterns and Images page has two sections

- Display Patterns
- Splash Image

To set a display pattern, select the desired pattern, foreground, and background colors, and then click **Set** in the Display Patterns section on the middle of the page. To confirm the display pattern, click **Get** .

To set a splash image, select the desired image, then click Set in the Splash Images section on the right.

Depending on what is stored in the flash memory, the actual image displayed may be different from what is shown on the section.

Use these commands to set the display pattern:

- Write image freeze (0x1A)
- Write operating mode select (0x05)
- Write input image size (0x2E)
- Write image crop (0x10)
- Write test pattern select (0x0B)
- Read Test Pattern Select (0x0C)

The following commands are used to set the display image:

- Write Image Freeze (0x1A)
- Read Splash Screen Header (0x0F)



- Write Input Image Size (0x2E)
- Write Image Crop (0x10)
- Write Display Size (0x12)
- Write Splash Screen Select (0x0D)
- Write Operating Mode Select (0x05)
- Write Splash Screen Execute (0x35)

4.2.2 Video and Color Page

	DLP® Pico Display and Light Control EVM	Search	X
(j)	Patterns and Images Video and Color	Display Settings IntelliBright [™]	
Information	HDMI Video Information	Color Temperature	
ji O Display	Input Size: 1280 pixels x 720 lines Cropping: x=0, y=0, 1280 pixels x 720 lines Display Size: x=0, y=0, 1280 pixels x 720 lines	Cool (9200° K) CIE Chromaticity Chart Medium (6400° K) Medium (6400° K)	
Control	Frame Rate: 60.22	Warm (5500* K) User Defined*	
Firmware		* See Help for more information.	
Debug	Switch to External Video ↓ Get	€ Get	► Set
	💽 EVM Status: Ready		
	Input: External Video Port	👋 Texa	S INSTRUMENTS

Figure 5. Video and Color Page

The Video and Color page has two sections:

- Video information
- Color temperature

When the EVM is displaying video, click **Get** on the Video Information section lets user sees the input size, cropping size, display size, and frame rate. Click **Switch to External Video** to toggle (return) the EVM to video mode (HDMI).

To set the desired look, select cool, medium, warm, or user defined, and then click **Set**. Click **Get** to see the current color temperature setting, To modify the user defined look, refer to Section 4.2.4 to set the LED Current settings.

The following commands are used in the Video Information section:

- Write input image size (0x2E)
- Write display size (0x12)
- Write image crop (0x10)
- Write operating mode select (0x05)



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- Read operating mode select (0x06)
- Read input image size (0x2F)
- Read display size (0x13)
- Read image crop (0x11)
- Read look select (0x23)

The following commands are used in the Color Temperature section:

- Read RGB LED current (0x55)
- Write RGB LED current (0x54)
- Write flash data type select (0xDE)
- Write flash data length (0xDF)
- Read flash start (0xE3)
- Write look select (0x22)
- Read operating mode select (0x06)
- Write splash screen execute (0x35)
- Read look select (0x23)

4.2.3 Display Settings Page

	DLP® Pico Display and Light Control EVM	Search _
(j)	Patterns and Images Video and Color Disp	ay Settings Intelli8right™
Information	박. Display Settings	C Keystone Correction
Display	Crop Input Image X: 0 Y: 0 V: 0	Enable manual keystone correction Angle: 25.31640625 Optical details
	Width: 1280 Height: 720	Throw Ratio: 256 Vertical Offset:
Light Control	Scale Input Image to Size Width: 720 Height: 720	
Firmware	Landscape Portrait Swap Width/Height Image Orientation Image Orientation Image Orientation	
Debug	I kotate su [™] M Long-axis Flip M Short-axis Flip I Get ► Set	
	✔ EVM Status: Ready Input: External Video Port	👯 Texas Instruments

Figure 6. Display Settings Page

The Display Settings page has two sections; the Display Settings section and the Keystone Correction section.

The Display Settings section lets user crops, scales, and rotates the input image. After all the desired values are selected, clicking **Set** to send the new information to the EVM. Click **Get** lets user sees the current display settings on the EVM.

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The Keystone Correction section lets user enables 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 display image orientation (0x14)
- Read operating mode select (0x06)
- Read splash screen select (0x0E, if display splash image)
- Read splash screen header (0x0F, if display splash Image)
- Write input image size (0x2E, if Display Splash Image)
- Write splash screen select (0x0D, if display splash image)
- Write operating mode (0x05; if display splash image)
- Write splash screen execute (0x35; if display splash image)
- Read display size (0x13)
- Read image crop (0x11)
- Read display image orientation (0x15)

The following commands are used in the Keystone Correction section:

- Write image freeze/unfreeze (0x1A)
- Write Keystone correction control (0x88)
- Write Keystone projection pitch angle (0xBB)
- Read operating mode select (0x06)
- Read splash screen select (0x0E; if display splash image)
- Read splash screen header (0x0F; if display splash image)
- Write operating mode (0x05; if display splash image)
- Write splash screen execute (0x35; if display splash image)
- Read Keystone correction control (0x89)
- Read Keystone projection pitch angle (0xBC)



	DLP® Pico Display and Light Control EVM	Search _ 🗆 X
(j)	Patterns and Images Video and Color Dis	splay Settings IntelliBright ^{**}
Information	ن ت ت اntelliBright™	-Â- LED Current
	Local Area Brightness Boost (LABB)	Red LED
<u>ē O</u>	☑ Enable Strength: 60	☑ Enable
Display	Sharpness: 5	Current (mA): 1495
	Content Adaptive Illumination Control (CAIC)	Green LED
(Enable Gain: 1.71875	Inable
Light Control	less power higher brightness Red Current: 0	Current (mA): 1495
	Green Current: 0	e Blue LED
•======	Blue Current: 0	🗹 Enable
	Maximum available Power: 17.55	Current (mA): 1495
Firmware	Show RGB intensities on-screen	
	€ Get ► Set	Ø ↓ Get ► Set
Debug		
	🕖 EVM Status: Ready	
	Input: External Video Port	🔱 Texas Instruments

Figure 7. IntelliBright Page

The IntelliBright[™] page has two sections:

- IntelliBright[™]
- LED Current

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 user changes 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 user modifies the current values and see what the EVM is using at any moment.

The following commands are used in the IntelliBright[™] 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)
- Read CAIC RGB LED current (0x5F)
- Read operating mode select (0x06)
- Read splash screen select (0x0E; if display splash image)
- Read splash screen header (0x0F; if display splash image)
- Write operating mode (0x05; if display splash image)
- Write splash screen execute (0x35; if display splash image)
- Read local area brightness boost control (0x81)



- Read CAIC image processing control (0x85)
- Read LED output control method (0x51)

The following commands are used in the LED Current section:

- Write RGB LED enable (0x52)
- Write RGB LED current (0x54)
- Read RGB LED enable (0x53)
- Read RGB LED current (0x55)

4.3 Light Control Tab

4.3.1 External Patterns Page



Figure 8. External Patterns Page

External pattern streaming mode involves the projection of patterns input via the projector's video parallel port through the DLP controller board onto the DMD.

On the External Patterns page, users define and check these pattern configurations:

- illumination selection
- bit depth
- patterns per frame
- exposure time
- pre-exposure dark time
- post-exposure dark time

On the External Patterns page, users define and confirm these trigger-out settings:



User Interface Overview

- enable
- invert
- delay for trigger out 1
- delay for trigger out 2

4.3.1.1 Set Up External Pattern Mode

Follow these steps to set up External Pattern mode:

- 1. Enter illumination type, bit depth and number of patterns per frame.
- 2. Enter required exposure time and dark time.
- 3. Establish trigger outputs if required.
- 4. Ensure that the EVM is connected and click **Set**. If an invalid timings error message displays, adjust the patterns timings in step 2 to ensure that the timings are within the supported range and click **Set** again.
- 5. To verify that the image projected by the EVM has been updated accordingly, click Get.
- 6. The frame rate field updates. The frame rate field is not editable. The frame rate mentioned in this field is calculated as follows:

Frame Rate (Hz) = $1000/[(Exposure Time (\mu s) + Pre-exposure Dark Time (\mu s) + Post-exposure Dark Time (\mu s)) \times Patterns per Frame]$ (1)

Consult the Help section for more information and the list of commands used in this page. Access the Help section from the bottom left of the page

4.3.2 Internal Patterns Pages

Internal Patterns streaming mode involves projection of patterns created internally by the functional block of the controller. Select a group of one row or one column patterns to be replicated through the array by the Controller. The order of display of groups of patterns is configurable.





Figure 9. Internal Patterns, Pattern Sets Page

On the the Pattern Sets page, user can add or delete pattern sets and add or delete patterns to and from each pattern set. Apreview window on the right shows the pattern selected. Click **Next** on the bottom-right or any of the tab (Pattern Order or Pattern Control) on the left to continue.

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Figure 10. Internal Patterns, Pattern Order Page

On the Pattern Order page, users can configure the default order for pattern sets to display. It also allows users to configure these pattern sets:

- number of patterns
- illumination selection
- exposure time

User Interface Overview

- pre-exposure dark time
- post-exposure dark time

After setting the pattern order table and the pattern orientation, the user can either load the pattern data directly flash to run the patterns or save the pattern data on the computer to update the firmware later. Review the timing diagram to ensure that the patterns and trigger signals are output as desired.

NOTE: Trigger controls available on this page are used to draw the timing diagram only, they do not affect the functionality of the EVM.

Click Next on the bottom-right or any of the tab (Pattern Sets or Pattern Control) on the left to continue.



4.3.2.3 Internal Patterns Pattern Control Page Search X DLP® Pico Display and Light Control EVM $(\mathbf{\hat{l}})$ External Patterns Splash Patterns 6. Define trigger and pattern ready signal settings ≣) Trigger Out 1 Trigger In Pattern Ready Enable 🗹 Enable Enable Pattern Sets Invert Active High Active High Polarity Polarity 0 Delay (us) \bigcirc Trigger Out 2 Enable 🗹 🕹 Get Set Pattern Set Order Invert 0 Delay (us) Firmware 7. Display and control the patt Debua Pattern Control Run Once Run Continuously Pause ₩ Step O Stop 🖒 Restart S < Back EVM Status: Ready; Internal Pattern Streaming 🚸 Texas Instruments

Figure 11. Internal Patterns, Pattern Control Page

On the Pattern Control page, users can configure the trigger out, trigger in and pattern ready signals and to control the display of patterns in internal pattern mode. This page requires the EVM to be connected to the GUI in order to work.

Configure the triggers and pattern ready signal as required and click **Set**. To view the current configuration of these signals, click **Get**. After all the configurations are set, the user can select and control how to run these patterns:

- run once
- run continuously
- pause
- step
- stop
- reset

The following commands are used on this page:

- Write trigger out configuration (0x92)
- Write trigger in configuration (0x90)
- Write pattern ready configuration (0x94)
- Write pattern order table entry (0x98)
- Write operating mode select (0x05)
- Write internal pattern control (0x9E)
- Read trigger out configuration (0x93)
- Read pattern configuration (0x97)

User Interface Overview



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www.ti.com

• Read pattern ready configuration (0x95)

4.3.3 Splash Patterns Page

	DLP® Pico Display and Light C	Control EVM	Search	X
() Information	Б	xternal Patterns Internal Patterns	Splash Patterns	
	1. Define pattern configuration		2. Define trigger out settings	
je Oj Display	Splash Image Index 0 Illumination R ~ Bit Depth 1 ~	Pre-exposure Dark Time (us) 250 Exposure Time (us) 1000 Post-exposure Dark Time (us) 60	Trigger Out 1 Trigger Out	2 Enable 🗹 Invert
Light Control	Patterns Per Frame 1 3. Review the timing diagram to verify the pattern	configuration		
Firmware	Pattern/ Frame	PData[0]		
\$	Trigger 1			
Debug	Trigger 2			
Advanced	0			↓ Get ► Set
	EVM Status: Ready; Splash Pattern Streaming			🜵 Texas Instruments

Figure 12. Space-Coded Patterns Page

Splash Patterns display images stored in flash memory. On the Space-Coded Patterns page, users define these pattern configurations:

- splash image index
- illumination selection
- bit depth
- patterns per frame
- exposure time
- pre-exposure dark time
- post-exposure dark time

On the Space-Coded Patterns page, users define these trigger out settings:

- enable
- invert
- delay for both triggers

The following commands are used on this page:

- Write trigger out configuration (0x92)
- Write pattern configuration (0x96)
- Write operating mode select (0x05)
- Write splash screen select (0x0D)



- Read splash screen header (0x0E)
- Write display size (0x12)
- Write image crop (0x10)
- Write input image size (0x2E)
- Write splash screen execute (0x35)
- Read trigger out configuration (0x93)
- Read pattern configuration (0x97)

4.4 Firmware Tab

4.4.1 Backup Firmware Page

	DLP® Pico Display and Light Control EVM	Search	-	×
Û	Backup Firmware Update Firmware Update Flash Image			
Information				
<u>į O</u>				
Display	Backup Firmware			
Light Control	Filename:			
- J.	Choose a file name and click 'Start Backup' to begin.			
	Cancel Start Backup			
Filliware				
Debug				
	D EVM Stehner Baseler			
	су сум этаных невих			

Figure 13. Backup Firmware Page

On the Backup Firmware page, users can backup the EVM firmware. Click the browser button to select the folder and image filename for the backup.



User Interface Overview

4.4.2	Update Firmware Page				
	DLP® Pico Display and Light Control EVM		Search	_ □	×
i nformation	Backup Firm	are Update Firmware Update Flash Image			l
j O Display		Update Firmware			
Light Control	Filen ghtC	me: after Display/DLPDisplayandLightControl_DLP3010LC_Backup.img 🔹			
Firmware		ancel Start Update			
Debug					
	🕑 EVM Status: Ready				

Figure 14. Update Firmware Page

The Update Firmware page allows the user to update the EVM firmware. Click the browser icon to select folder and image filename for the update.

4.4.3 Update Flash Image Pages

The user has the option to modify settings in the flash image through the Update Flash Image wizard.

The DLP Display and Light Control EVM GUI Tool gives users the ability to customize the default flash image provided on ti.com. The customizable components of the flash image are:

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



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Image: Backup Firmware Update Firmware Update Flash Image Image: Backup Firmware Image: Backup Firmware Image: Backup Firmware Image: Backup Firmware <th></th> <th>DLP[®] Pico Display</th> <th>and Light Control EVM</th> <th></th> <th>_ □</th>		DLP [®] Pico Display	and Light Control EVM		_ □
Start Start Splay Flash Image Vou can update DLP LightCrafter** Display firmware with below options: Nodify user defined block Start Start Start Start Start Start Start Image Start Start Start Start Start Start <td< th=""><th>D</th><th></th><th>Backup Firmware Update Firmware Update Flash Image</th><th></th><th></th></td<>	D		Backup Firmware Update Firmware Update Flash Image		
Step 1- Flash Image Step 2- White Point Step 3- Step 3- Step 4- Step 4- Step 4- Step 4- Step 4- Finish Step 3- Step 4- Step 4- Step 4- Step 5-	nation	Start 🔵	Update Flash Image		
You can update DLP LightCrafter** Display firmware with below options: Step 2 - White Point White Point Step 3 - Splash Image Step 4 - Startup Option If you want to update flash image now, click the get start button below to begin. We'll walk you through the process.	O_ blay	Step 1 -			
Step 2- White Point Step 3- Step 3- Splash Image If you want to update flash image now, click the get start button below to begin. We'll walk you through the process.		Flash Image	You can update DLP LightCrafter™ Display firmware with below options: 1. Modify user defined block		
Step 3 - Splash Image ware Step 4 - Startup Option Finish	Control	White Point	2. Modify splash screens 3. Modify display start-up options		
Step 4 - Startup Option	·····	Step 3 - Splash Image	If you want to update flash image now, click the get start button below to begin. We'll walk you through the process.		
Finish Start	ware	Step 4 - Startup Option			
Start	\$	Finish 🔵			
bug	bug				Start >
		Input: Space Coded Pattern		🖊 Texas	INSTRUME

Figure 15. Update Flash Image - Start Page

The start page for Update Flash Image outlines the options that can be modified in the flash. Click **Start** on the bottom-right corner or **Step 1 - Flash Image** on the left to continue. The user can also select any of the options (Step 1, 2, 3, or 4) on the left to move to the other pages.



	DLP® Pico Display a	nd Light Control EVM	Search _ 🗆
(j)		Backup Firmware Update	Firmware Update Flash Image
Information	Start	🕜 Update Flash Image	
<u>e O</u>			Select the EVM type
Display	Step 1 - Flash Image	To begin the update process:	DLPDLCR3010EVM
		 Select the EVM the image is being generated for. 	
\bigcirc	Step 2 - White Point	2. Provide the input image to be updated.	Select flash image to update (input)
Light Control			07554\AppData\Local\Temp\DLP LightCrafter Display\DLP3010LC_Backup.img
	Step 3 - Splash Image	 Provide the name of the generated output image. 	
			Select the name of the updated flash image (output)
Firmware	Step 4 - Startup Option		7554\AppData\Local\Temp\DLP LightCrafter Display\DLP3010LC_Updated.img
Ö	Finish		
Debug			< Back Next >
	EVM Status: Ready		
	Input: Space Coded Pattern		Texas Instruments

User Interface Overview

Figure 16. Update Flash Image - Flash Image Page

The flash image page for Update Flash Image allows the user select these options:

- EVM Type
- input flash image file
- output flash image file

Click **Next** on the bottom-right corner or **Step 2 - White Point** on the left to continue. Click the **Back** button at the bottom-left of the section to go back to the start page or any of the options (Step 1, 2, 3, or 4) on the left to move to other pages.

DLP® Display and Light Control EVM GUI Tool

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4.4.3.3 Update Flash Image White Point Page \times Search _ DLP® Pico Display and Light Control EVM Update Flash Image Backup Firmware Update Firmware $\widehat{\mathbf{I}}$ Update Flash Image Start ≣) White Point - RGB Duty Cycle Step 1 -Flash Image Red: 30 Green: 40 Blue: 30 The purpose of this page is to allow users to alter the RGB duty cycles associated with the pre-loaded User Defined look. Note: Duty cycle for R,G, and B should be within 14% to 55% range. Step 2 -White Point (\bigcirc) By modifying the RGB duty cycles, users will be able to change the White Point of the look. To achieve a desired White Point, each system has to be measured Note: Sum of duty cycle should be 100%. and calibrated. Step 3 -Splash Image Duty Cycle limits are noted to the right of this page. Note: Each duty cycle combination is associated with sequences stored in the flash. If the given duty cycle selection is not available, the closest and best fit sequence will be selected. This may result in a different RGB duty cycles than the ones entered. Step 4 -Skip changing user defined looks. Finish < Back Next > EVM Status: Ready Input: Space Coded Pattern 🖊 Texas Instruments

Figure 17. Update Flash Image - White Point Page

On the white point page, the user can overwrite the Red, Green, or Blue Duty Cycle values. The user can also opt to not change the values. Click **Next** on the bottom-right corner or **Step 3 - Splash Image** on the left to continue. The user can also click the **Back** button at bottom-left of the section to go back to the Step 1 - Flash Image page or any of the options (Step 1, 2, 3, or 4) on the left to move to other pages.

User Interface Overview



4.4.3.4 Update Flash Image Splash Image Page Search × DLP® Pico Display and Light Control EVM Update Flash Image Backup Firmware Update Firmware (î) Update Flash Image Start ≣) Splash Images Step 1 -Flash Ir Splash 1 :Crafter Display\splash\2010_3010\splash_dlplightcrafterdisplay.png The four default splash images included in the firmware can be replaced by selecting new splash images on the rigth side of this page. Splash 2 fter Display\splash\2010_3010\HD_SMPTE_Color_Bars_854x480.bmp 9 Step 2 -White Point Splash 3 ð The overall amount of space alotted for splash (\bigcirc) images depends on the flash size and the sum of all splash image sizes. If you are unable to fit all splash images into the flash device, please reduce the splash 2 Splash 4 image size. Step 3 nage Splash Ir If you do not want to replace the default splash images, simply select the Skip option on the bottom of the page. Skip Splash image update. User factor default. Step 4 -Note: When replacing default splash images, you can load up to four new splash images. All four default images will be replaced evenif you only selected two new splash images. Finish < Back Next > EVM Status: Ready Input: Space Coded Pattern 🖊 Texas Instruments

User Interface Overview

Figure 18. Update Flash Image - Splash Image Page

On the iplash image page for Update Flash Image, the user can overwrite and select image files to store in flash memory. The user has the option to skip the splash image update screen. Click Next on the bottom-right corner or Step 4 - Startup Option on the left to continue. Click the Back button at the bottom-left of the section to go back to the Step 2 - White Point page or any of the options (Step - 1, 2, 3, or 4) on the left to move to other pages.



User Interface Overview



Figure 19. Update Flash Image - Startup Option Page

on the option page for Update Flash Image, users can overwrite these startup options:

- long or short-axis flip
- startup image file
- startup Red, Green, or Blue LED current

Click **Finish** on the bottom-right corner to build the flash image. The user can also click the **Back** button at the bottom-left of the section to go back to the Step 3 - Splash Image page or any of the oprtions (Step 1, 2, 3, or 4) on the left to move to other pages.



4.3.6 L	Jpdate Flash Imag	e Finish Page	
	DLP® Pico Display	and Light Control EVM	X
()		Backup Firmware Update Firmware Update Flash Image	
Information	Start	Update Flash Image	
EO Display	Step 1 - Flash Image		
@	Step 2 - White Point	Flash Image Update Completed	
ight Control	Step 3 - Splash Image	New Flash Image has been generated and copied to flash output file. Do you want to download new flash to DLP LightCrafter	' Display?
Firmware	Step 4 - Startup Option		
ŭ	Finish 🛑		
Debug	EVM Status: Ready	TES .	ING
	Input: Space Coded Pattern		👋 Texas Instruments

The Finish Page page is not selectable. When the flash image build is completed, the finish page for Update Flash Image display the information. To run the backup, click **Yes** on the bottom-left to go to the Backup Firmware page. Click **No** on the bottom-right to go to the Update Firmware page to update the EVM with the newly created flash image.



4.5 Debug Tab

4.5.1 Event Viewer Page

	DLP® Pico Display and Light Control EVM	Search	_ □	×
()	Event Viewer Command Log]		
Information EO Display	Clear All Timestamp Description 1 7/25/2018 1:35:29 Get EVM Information Error! PM Please make sure that the system is connected, powered on, and the settings are correct. 2 7/25/2018 1:35:29 Warning! EVM Firmware Version does not meet the minimum required!			
Cight Control				
Firmware				
Debug				
	U EVM Status: Not Connected			
	Input: External Video Port	🔑 Texas	INSTRUMENT	s:

Figure 21. Event Viewer Page

The Event Viewer Page lists the timestamp and description of the events occurred on the EVM system.



User Interface Overview

	DLP [®] Pico Disp	lay and Light Contro	EVM	Search	-	
D			Event Viewer	Command Log		
mation	X Clear All Search	h	D - 11 D4	6B	Export to Batch File	
	Time	Command	Transmit Data	Receive Data		^
\bigcirc	07/25/2018 10:14:58.9350	Read Controller Device Id	D4	OB		
plav	07/25/2018 10:14:59.0447	Write Flash Data Type Select	DE A0			
	07/25/2018 10:14:59.0603	Write Flash Data Length	DF 18 00			
	07/25/2018 10:14:59.0758	Read Flash Start	E3	E8 03 E8 03 E8 03 E8 03 E8 03 E8 03 E8 0		
)	07/25/2018 10:14:59.1228	Read Operating Mode Select	06	00		
ol	07/25/2018 10:15:05.4523	Read Short Status	D0	81		
	07/25/2018 10:15:05.5932	Read Operating Mode Select	06	00		
	07/25/2018 10:15:05.6244	Read System Status	D1	00 07 00 00		
	07/25/2018 10:15:05.6554	Read Operating Mode Select	06	00		
	07/25/2018 10:15:05.7804	Read Dmd Device Id	D5 00	60 0D 00 68		
	07/25/2018 10:15:05.8117	Read Operating Mode Select	06	00		
	07/25/2018 10:15:05.8429	Read Controller Device Id	D4	OB		
	07/25/2018 10:15:05.8742	Read Operating Mode Select	06	00		

Figure 22. Command Log Page

The Command Log Page lists the commands sent to the EVM System with the option to clear all entries or export the allowable write commands to a batch file.

4.6 Advanced Tool

Advanced GUI Tool allows more experienced users more control of the EVM system with utilities such as:

- connection settings
- scripting
- direct command communication with the EVM

The tool also offers an Event Viewer and Command Log as does the simple tool, but also includes:

- console
- watch variables
- variable list when working with the scripting tool



4.6.1 Connection Page

DLP Pico Display and Light Control EVM (Advance)	ced)	– D X
Eile Edit View Product Workspace Wi	indow <u>H</u> elp	🗸 Get All 🍺 Set All
Project Explorer ↓ X Connection - Scripting Commands - Display - Source - Test Patterns - General - Illumination - Image - System Information - Flash - Light Control	ection × Connection mand Interface ✓ DLP3010EVM-LC ings Slave Address 0x36 Clock Rate (KHz) 100 Timeout (ms) 500 Enable GPIO Handshake	Connect
Command Log Event Viewer Console Watch	h Variabler Variable List	
command Log Event viewer Console Watch		
Ready		Command Interface V IEXAS INSTRUMENTS

Figure 23. Connection Page

While the EVM is disconnected, the Connection page allows users to select these settings:

- I²C or SPI
- EVM type
- additional interface settings

It then connects or disconnects from the system. Always ensure that the EVM status set to Connected before attempting to send any I^2C commands in Advanced mode.

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User Interface Overview

4.6.2

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DEF FICO Dispidy and	Light Control EVM (A	Advanced)		- 🗆
<u>File Edit View P</u>	roduct <u>W</u> orkspace	e <u>W</u> indow <u>H</u> elp		
5 🖆 💾 🐰 🗇 🖞	10/16	₫ 🗄 🖪 0 0 0 ¥ 5	c 🔳 😳 🗗	🗸 Get All 🕨 Se
Project Explorer	4 🗙 👘	Scripting ×		
😋 🔘 🚉 🛛 Search	5	Scripting		
- Connection				
Scripting		ReadInputImageSize.py 🗙		
 Commands 		C:\DLP_System_SW\DLPC343x\ReadInpu	utImageSize.py	
- Display - Source - Test Patterns - General - Illumination - Image - System Informatio	n	1 from dlpc347x.command 2 3 Summary, PixelsPerLin	s∙ import * e,·LinesPerFroame·=·ReadInputImageSize ()	
Flash Light Control				
Flash Light Control Variable List				-
Flash Light Control Variable List Search	Hex			
Flash Light Control Variable List Search Variable	Hex Value		Туре	÷
- Flash - Light Control Variable List Search Variable > - Summary	Value Read Input Im	age Size Command Execution Success	Type DLPComposer.IO.ExecutionSummary	+
- Flash - Light Control Variable List Search Variable > - Summary - PixelsPerLine	Value Read Input Im 1280	age Size Command Execution Success	Type DLPComposer.IO.ExecutionSummary System.Int32	
 Flash Light Control Variable List Search Variable Summary PixelsPerLine LinesPerFroame 	Value Read Input Im 1280 720	age Size Command Execution Success	Type DLPComposer.IO.ExecutionSummary System.Int32 System.Int32	
Light Control Variable List Search Variable Summary PixelsPerLine LinesPerFroame	Value Read Input Im 1280 720	age Size Command Execution Success	Type DLPComposer.IO.ExecutionSummary System.Int32 System.Int32	
- Flash - Light Control Search Variable > - Summary - PixelsPerLine - LinesPerFroame	Value Read Input Im 1280 720	age Size Command Execution Success	Type DLPComposer.IO.ExecutionSummary System.Int32 System.Int32	
- Flash - Light Control Variable List Search Variable > - Summary - DixelsPerLine - LinesPerFroame	Value Read Input Im 1280 720	age Size Command Execution Success	Type DLPComposer.IO.ExecutionSummary System.Int32 System.Int32	
- Flash - Light Control Search Variable > - Summary - PixelsPerLine - LinesPerFroame	Value Read Input Im 1280 720	age Size Command Execution Success	Type DLPComposer.IO.ExecutionSummary System.Int32 System.Int32	
- Flash - Light Control Variable List Search Variable > - Summary - PixelsPerLine - LinesPerFroame Command Log Event \	Value Read Input Im 1280 720 Viewer Console	age Size Command Execution Success Watch Variables Variable List	Type DLPComposer.IO.ExecutionSummary System.Int32 System.Int32	

Figure 24. Scripting Page

On the Scripting page, users can write command scripts to execute on the EVM system. The user can monitor the execution of the script through the console, watch variables, and variable pages listed on the bottom of the page. Click **Scripting Reference** from the Help menu to see the list of commands available and the syntax for each command.



4.6.3 Command Pages

DLP Pico Display and Light Control EVM (Advance)	0	– 🗆 X
<u>F</u> ile <u>E</u> dit <u>V</u> iew <u>P</u> roduct <u>W</u> orkspace <u>W</u> in	low <u>H</u> elp	
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😋 💿 🚉 Search	🏓 > Commands > Display	
Connection		^
· - Scripting ✓ - Commands	Image Crop	
- Display		
- Source	Capture Start Pixel	
- General	Capture Start Line 0	
Illumination	Pixels Per Line 1280	
Image		
- Flash	Lines Per Frame 720	
Light Control	Set. Cet	
	Sei Gei	
	Display Size	
	Start Pixel 0	
	Start Line 0	
	Divels Dec Line 1290	
	Pixels Per Line	
	Lines Per Frame 720	
	Set Get	
	Display Image Orientation	
	Image Rotation 0x0 - No rotation	~ ~
Command Log Event Viewer Console Watch	'ariables Variable List	
Ready		🕢 Command Interface 🛛 🐺 TEXAS INSTRUMENTS 🚊

Figure 25. Command Pages

On the Command Pages, users can issue the command **Set** or **Get** from the GUI. Click on the command group (for example Display, Source or Test Pattern) on the left to display the list of commands available for that group. Users can set the parameters of the individual commands or get the parameters for the command. Click **Get All** or **Set All** at the top-right corner to send all the commands for the group selected.



Revision History

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

Changes fron	Original	(August	2018) to	A Revision	
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•	Changed free HD space from "60 MB" to "200 MB"	1
•	Updated Table 1	1
•	Updated Table 2	3
•	Updated instructions in Section 4.3.1.1	12

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