User's Guide

Using the DLP4710EVM-LC Light Control Evaluation Module

ABSTRACT

This user's guide presents an overview of the DLP4710 Light Control evaluation module (EVM) and a general description of the main features and functions. It explains the first steps to get started and provides a detailed description of the on board LEDs and the main connectors. (Figure 1-1)

This design incorporates HDMI® technology.

Table of Contents

1 DLP4710 Light Control EVM Overview 2
2 Safety Instructions 3
3 Applicable Documents 4
4 What is in the DLP4710 Light Control EVM ? 5
5 Optical Module 6
6 Quick-Start Procedure 7
7 Connectors, Headers, and Switch Description 9
8 DLP4710 Light Control Trigger 10
9 EVM Setup 11
10 Revision History 14

List of Figures

Figure 1-1. DLP4710 Light Control EVM 2
Figure 4-1. DLP4710 Light Control EVM Block Diagram 5
Figure 6-1. Optical Module With Focus and Zoom Adjustment 7
Figure 9-1. DLP4710 Light Control Board 11
Figure 9-2. LED Connection 12
Figure 9-3. DLP4710 Light Control EVM 13

List of Tables

Table 5-1. EVM Optical Module Parameter Values 6
Table 6-1. DLP4710 Light Control EVM LEDs 8
Table 7-1. DLP4710 Light Control EVM Installed Connectors 9
Table 8-1. DLP4710 Light Control Trigger 10

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1 DLP4710 Light Control EVM Overview

This DLP4710 Light Control EVM includes an example light engine design composed of TI DLP® electronics and optics along with GUI software to provide a flexible light steering solution with large brightness and resolution for industrial, medical and scientifc applications. This EVM features DLP4710, DLPC3479 and DLPA3005 DLP components and offers a compelling combination of resolution, brightness and programmability in a small form factor.

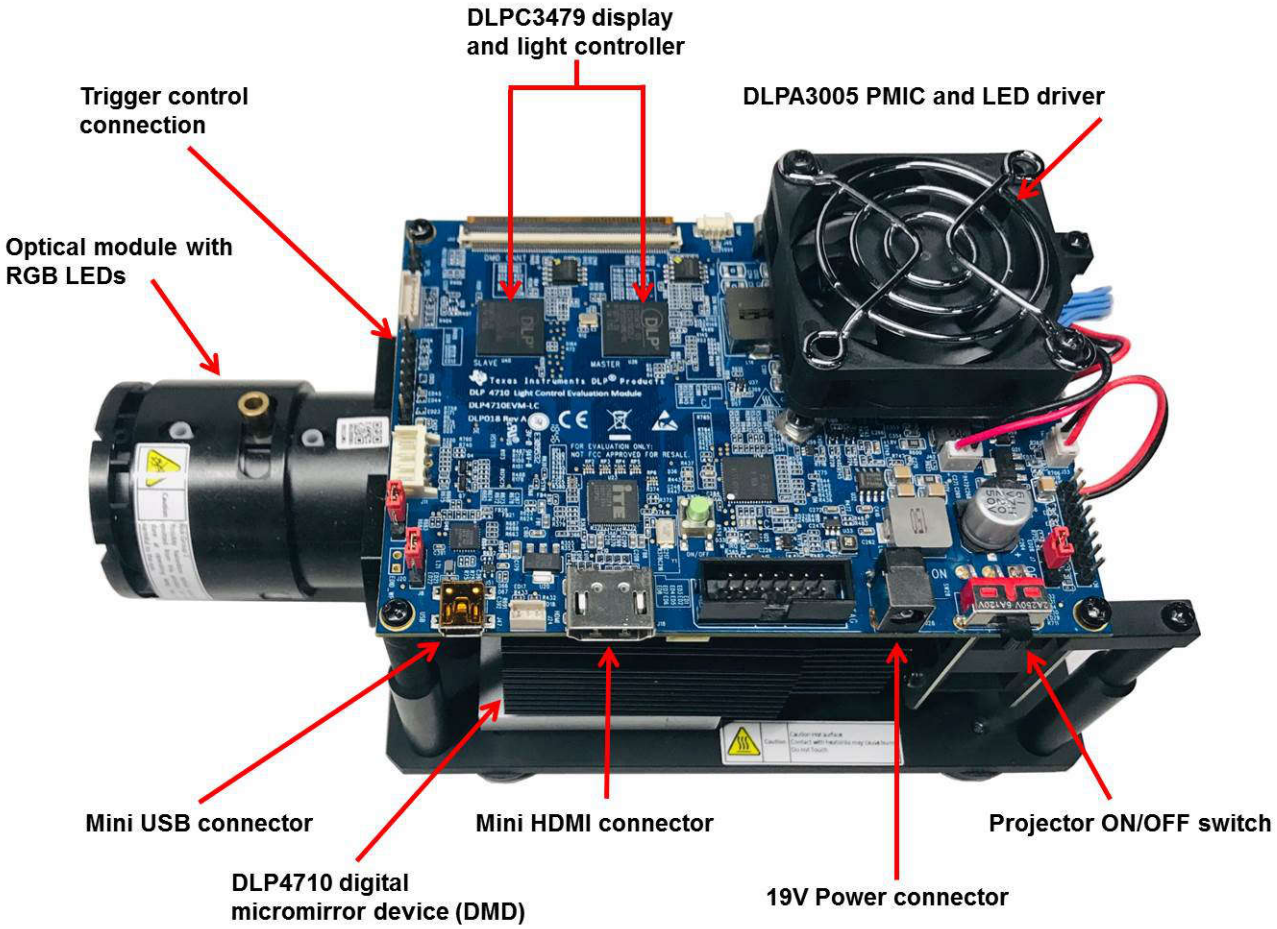

Figure 1-1. DLP4710 Light Control EVM

See Section 3 for other useful documentation.

2 Safety Instructions

CAUTION

Caution hot surface. Contact may cause burns. Do not touch.

WARNING

Possible hazardous optical radiation emitted from this EVM. Do not stare at the operating lamp. There are no user serviceable parts inside the EVM optical module. Never open the optical module, which can expose a risk group 2 LED which may be harmful to the eye.

WARNING

Observe handling precautions. Electrostatic sensitive devices.

WARNING

Always ensure all three fans are running during operation to avoid overheating and ensure reliable operation.

3 Applicable Documents

The following documents are applicable to the DLP4710 Light Control EVM and are available at ti.com:

- DLP4710 (.47 1080p) DMD data sheet, DLPS056
- DLPC3479 controller data sheet, DLPS112
- DLPA3005 PMIC and high-current LED driver data sheet, DLPS071
- Software Programmer's Guide, DLPU081
- DLP Display and Light Control EVM GUI Tool User's Guide, DLPU074

If you need assistance, please refer to the DLP TI E2E community support forums.

4 What is in the DLP4710 Light Control EVM ?

The DLP 4710 Light Control (Figure 4-1) consists of three subsystems:

1. **Optical module** includes the optics, red, green, and blue LEDs, and a 1920 x 1080 (1080p) DMD capable of 600 lumens out-of-the-box.
2. *DLP driver* includes the DLP chipset comprising of the DLPC3479 controller and DLPA3005 PMIC/LED driver. It includes a header to access Trigger IN/OUT signals for camera capture and other system controls.
3. *System front end* includes MSP430, ITE HDMI receiver, USB-Serial Bridge Controller and several connectors for external inputs (such as HDMI and USB).

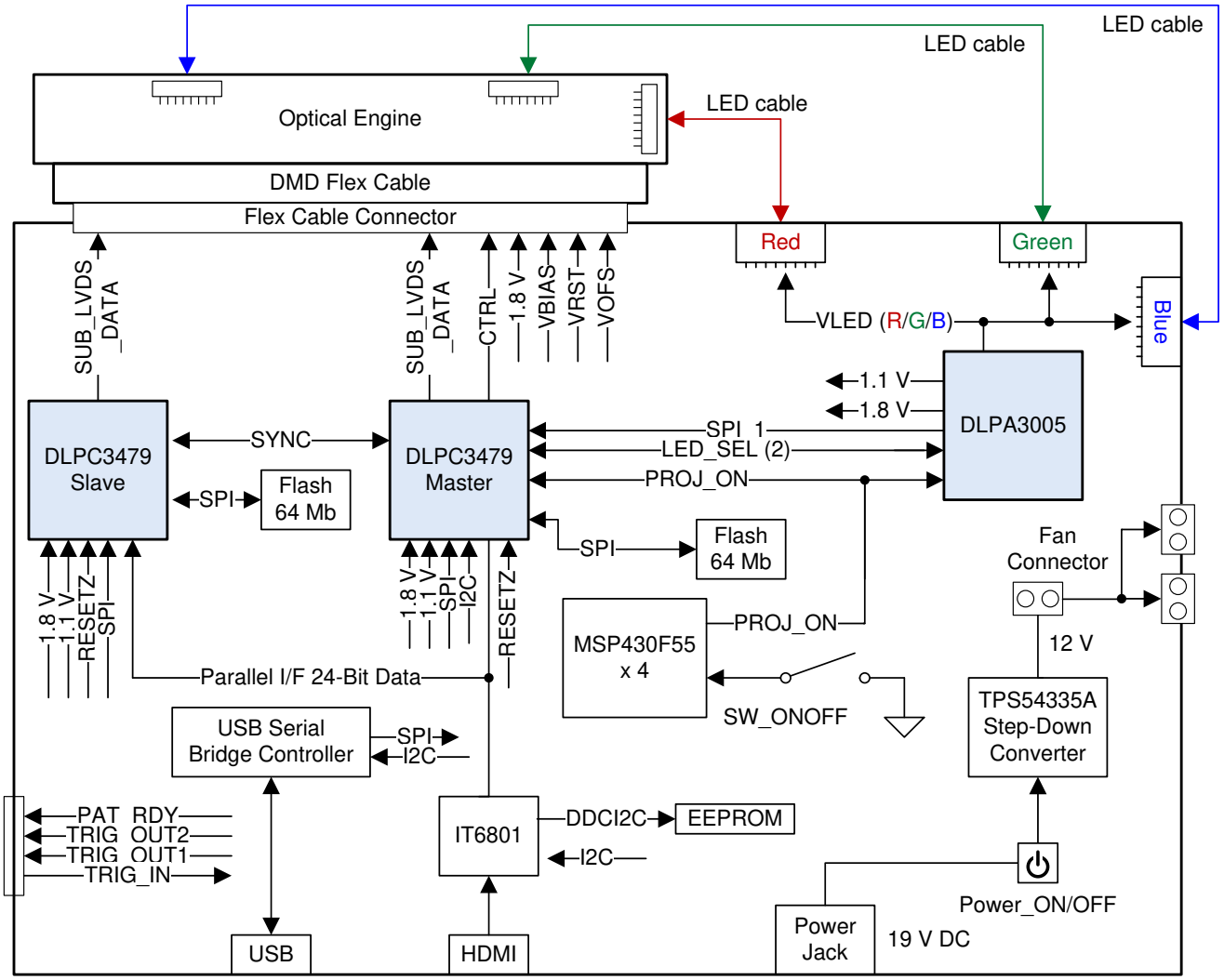

Figure 4-1. DLP4710 Light Control EVM Block Diagram

5 Optical Module

The optical module in the EVM is developed by Young Optics and is production ready. The optical module consists of the following components:

- 0.47-inch 1080p DMD (DLP4710)
- OSRAM P1W red, green and blue LED
- This optical module interfaces with the EVM using DMD pin mapping **Option 2**. Please refer to the DLPC3479 datasheet for more information about the DMD interface.

Table 5-1. EVM Optical Module Parameter Values

PARAMETER	MIN	TYP	MAX	UNIT
Brightness at Red 12A / Green 16A / Blue 16A LED current		600		Lum
Red LED Current		12		A
Green / Blue LED Current		16		A
Brightness Uniformity	73%			
Offset		100%		
Focus Range (Wide)	40		120	inch
Image Diagonal Size	10		100	inch
Throw Ratio		1.39		

6 Quick-Start Procedure

This quick-start assumes that the EVM default conditions are as shipped.

1. Power up the DLP4710 Light Control EVM by applying an external DC power supply (19 V DC, 4.74 A) to PWR_IN connector (J28).
   External Power Supply Requirements:
   - Nom Output Voltage: 19 VDC
   - Max Output Current: 4.74 A
   - Efficiency Level: V

   NOTE: TI recommends using an external power supply that complies with applicable regional safety standards such as UL, CSA, VDE, CCC, PSE, etc.
2. Move SW28 (PS_ON/OFF) slide switch to the ON position.
   LEDs D43 (+3.3V) and D57 (INTZ) light up to indicate 19 V power is applied.
3. Push ON/OFF switch SW21 to turn on the DLP4710 Light Control EVM.
   LEDs D36 (SYS_ON-OFF), D33 (M_IRQ) and D34 (S_IRQ) light up to indicate that the DLP4710 Light Control EVM is turned on.
4. After the DLP4710 Light Control EVM is turned on, a DLP Light Control splash image will be projected.
5. The focus and zoom of the image can be adjusted on the optical module (Figure 6-1).

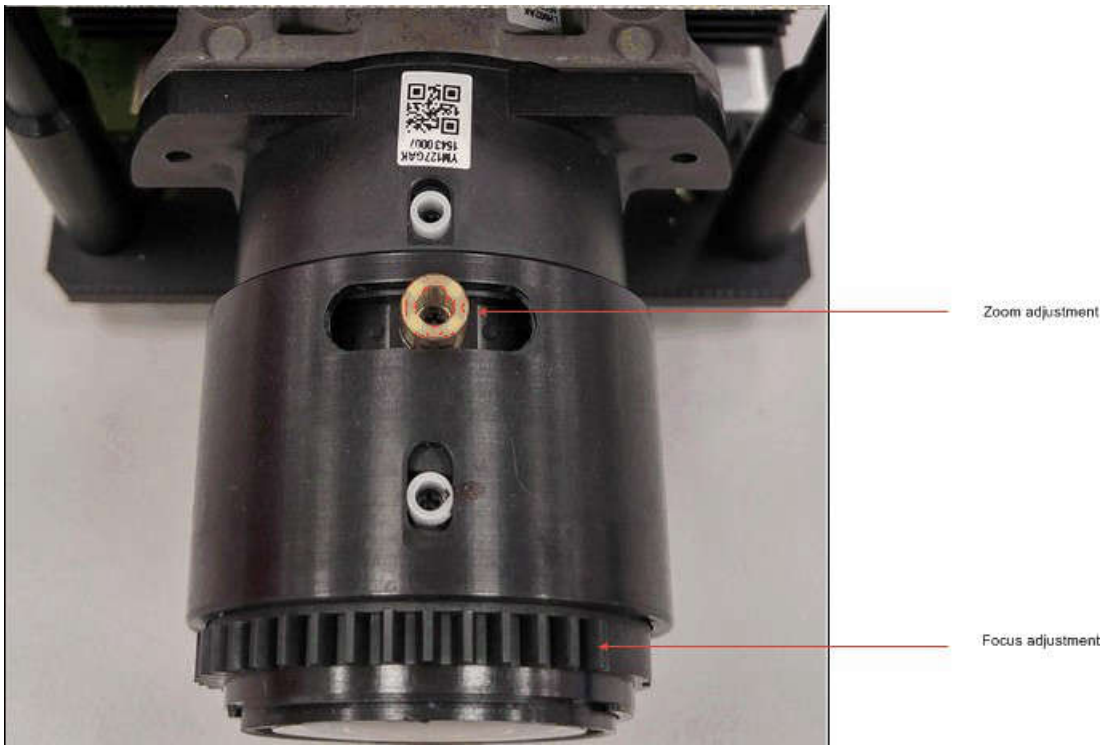

Figure 6-1. Optical Module With Focus and Zoom Adjustment

6. Connect USB to the DLP4710 Light Control EVM and open the DLP4710 Display and Light Control Graphical User Interface (DLPDLC-GUI) on your computer. If needed, connect an HDMI source to the EVM and provide external video input.
   Note: When providing HDMI input from an external source for Light Control applications, ensure that the external source provides input of resolution 1080p (1920x1080). Some laptops/desktops provide 720p (1280x720) resolution input by default, which can result in broken images in External Pattern Streaming mode, as only 1080p resolution is supported in Light Control modes.
7. Via the GUI the EVM can be set to Video Display Mode or Light Control Modes. Refer to the GUI user's guide for further description.
   Note: Install Jumper J7 on the DLP4710 Light Control EVM to set the needed Trigger IN/OUT voltage on the EVM.
8. When turning off the projector, push ON/OFF switch (SW21) and then move slide switch (SW28) to the OFF position prior to removing the power cable.

CAUTION

To avoid potential damage to the DMD, be sure to turn off the projector using the sequence listed in Section 6 before disconnecting the power.

There are eleven LED indicators on the DLP4710 Light Control EVM (Table 6-1):

Table 6-1. DLP4710 Light Control EVM LEDs

Location	Name	Description
D33	M_IRQ	LED OFF during DLPC3479_Master boots LED ON when DLPC3479_Master boot-up process is completed and ready to receive commands
D34	S_IRQ	LED OFF during DLPC3479_Slave boots LED ON when DLPC3479_Slave boot-up process is completed and ready to receive commands
D36	SYS_ON-OFF	LED ON when projector is in normal operation
D43	+3.3V	LED ON when 19 V Power is applied and +3.3 V is working normally
D44	WPC_01	Reserved
D45	WPC_02	Reserved
D46	WPC_03	Reserved
D56	RESETZ	LED ON when DLPC3479 is in RESET
D57	INTZ	LED ON when DMD is in PARK mode
D66	STAT_LED1	LED blinking when PC is communicating to flash over SPI
D67	STAT_LED0	LED blinking when PC is communicating to DLPC3479 over I2C

7 Connectors, Headers, and Switch Description

Table 7-1. DLP4710 Light Control EVM Installed Connectors

Connector	Name	Description
J7	PWER_SEL	Header for voltage level selection for Trigger-IN/OUT
J8	M_3DR	Connector for selecting 3DR signal usage (Display or Light Control) for DLPC3479 Master
J9	S_3DR	Connector for selecting 3DR signal usage (Display or Light Control) for DLPC3479 Slave
J11	I2C	Connector for the I2C interface (DeVaSys USB-I2C/IO board)
J18	HDMI	Connector for HDMI input
J21	SPI	External SPI Programming interface connector
J22	DMD CNNT	Connector for DMD Flex Cable
J23	Spy-Bi-Wire	MSP430 Spy-Bi-Wire Programming interface connector
J24	WPC	Reserved
J26	Color Sensor	Reserved
J28	PWR_IN	Connector for 19 V DC power
J32	Fan1	Connector for 12 V Fan
J33	Fan2	Connector for 12 V Fan
J34	MSP_JTAG	MSP430 JTAG Programming interface connector
J35	SPI_SEL	Header to select Master/Slave SPI flash for external SPI Programming interface
J36	TSTPT	Header for remaining DLPC3479 test points (not used)
J40	RED	Connector for RED LED cable
J41	GREEN	Connector for GREEN LED cable
J42	BLUE	Connector for BLUE LED cable
J43	Fan3	Connector for 12 V Fan
J45	TEMP	Reserved
J47	Mini_USB	Connector for Cypress USB controller
J48	TRIG	Connector for Trigger In and Trigger Out for Light Control Application
SW21	ON/OFF	Projector ON/OFF Switch
SW28	PS_ON/OFF	Power Supply ON/OFF Switch

8 DLP4710 Light Control Trigger

Table 8-1. DLP4710 Light Control Trigger

DLPC3479 PIN	J48 PIN CONNECTOR		I/O	FUNCTION
	NO.	DESC		
3DR	5	TRIG_IN	Input	For light control applications: Reserved for external trigger signal (Input). Applicable to internal pattern streaming mode only. The 3DR pin on the DLPC3479 can be used as a 3D left or right reference indicator or as trigger input signal for light control application. A jumper on J8 and J9 has to be set to determine the use case for this pin. For display application: Connect pin 1 and pin 2 of J8 (DLPC3479 Master) and pin 1 and pin 2 of J9 (DLPC3479 Slave) For light control application: Connect pin 2 and pin 3 of J8 (DLPC3479 Master) and pin 2 and pin 3 of J9 (DLPC3479 Slave).
TSTPT_4	7	TRIG_OUT1	Output	TRIG_OUT_1 signal.
GPIO_06	3	PAT_RDY	Output	Pattern ready signal. Applicable to internal pattern streaming mode only.
GPIO_07	4	TRIG_OUT2	Output	TRIG_OUT_2_signal.
GND	1	GND	GND	Ground pin for trigger signals

9 EVM Setup

The DLP4710 Light Control EVM is comprised of the DLP4710 (.47 1080p) DMD, DLPC3479 display controller, DLPA3005 PMIC/LED driver and other supporting components such as the Cypress Controller, the MSP430 MCU and the ITE HDMI Receiver. All of the above components besides the DLP4710 (located in the optical module) are included on the board. The locations of the named parts are shown in Figure 9-1.

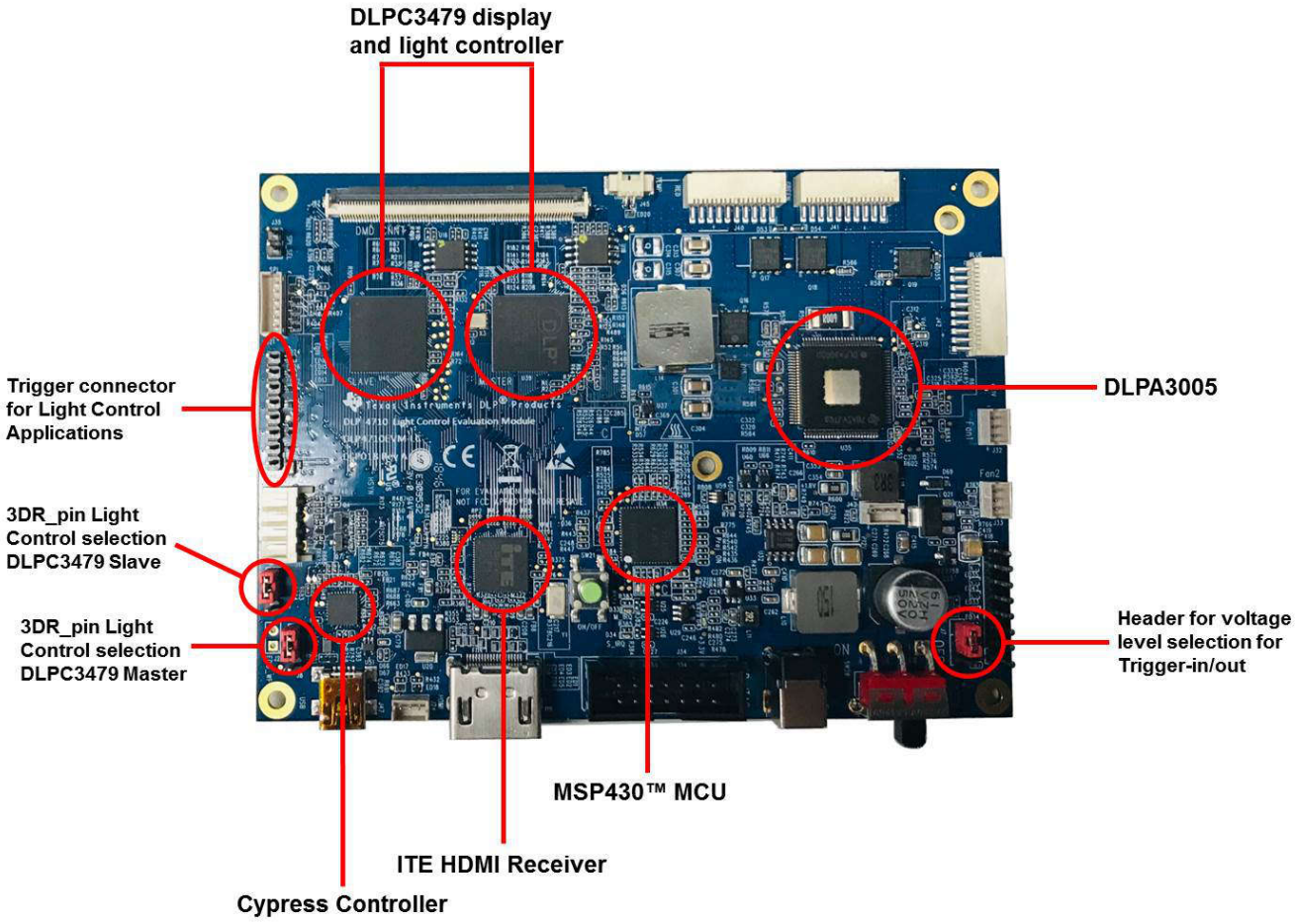

Figure 9-1. DLP4710 Light Control Board

The DLP4710 Light Control board has one connector for the DMD Flex cable to the 0.47-inch 1080p DMD and three LED connectors for red, green and blue LEDs.

The connectors for each LED are named on the board as well as on the light engine. Please refer to Figure 9-2 to see the proper setup.

CAUTION

Ensure a good connection between the LED cable and the DMD flex cable to the DLP4710 Light Control EVM board.

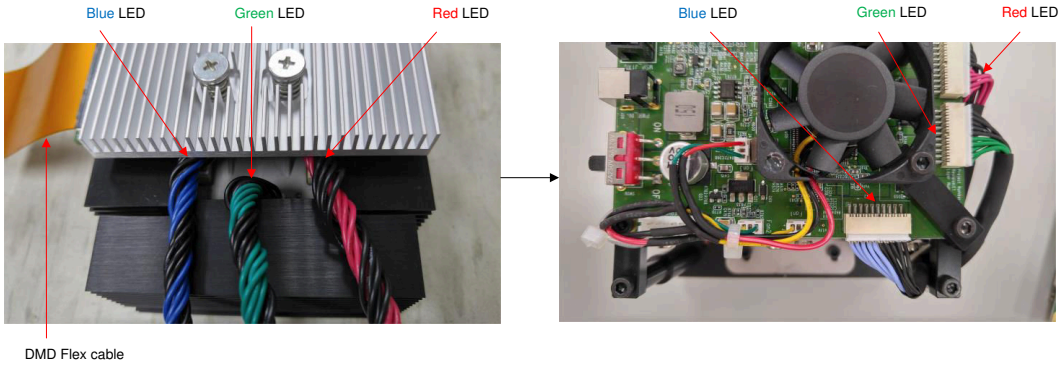

Figure 9-2. LED Connection

Figure 9-3 shows the final setup of all parts.

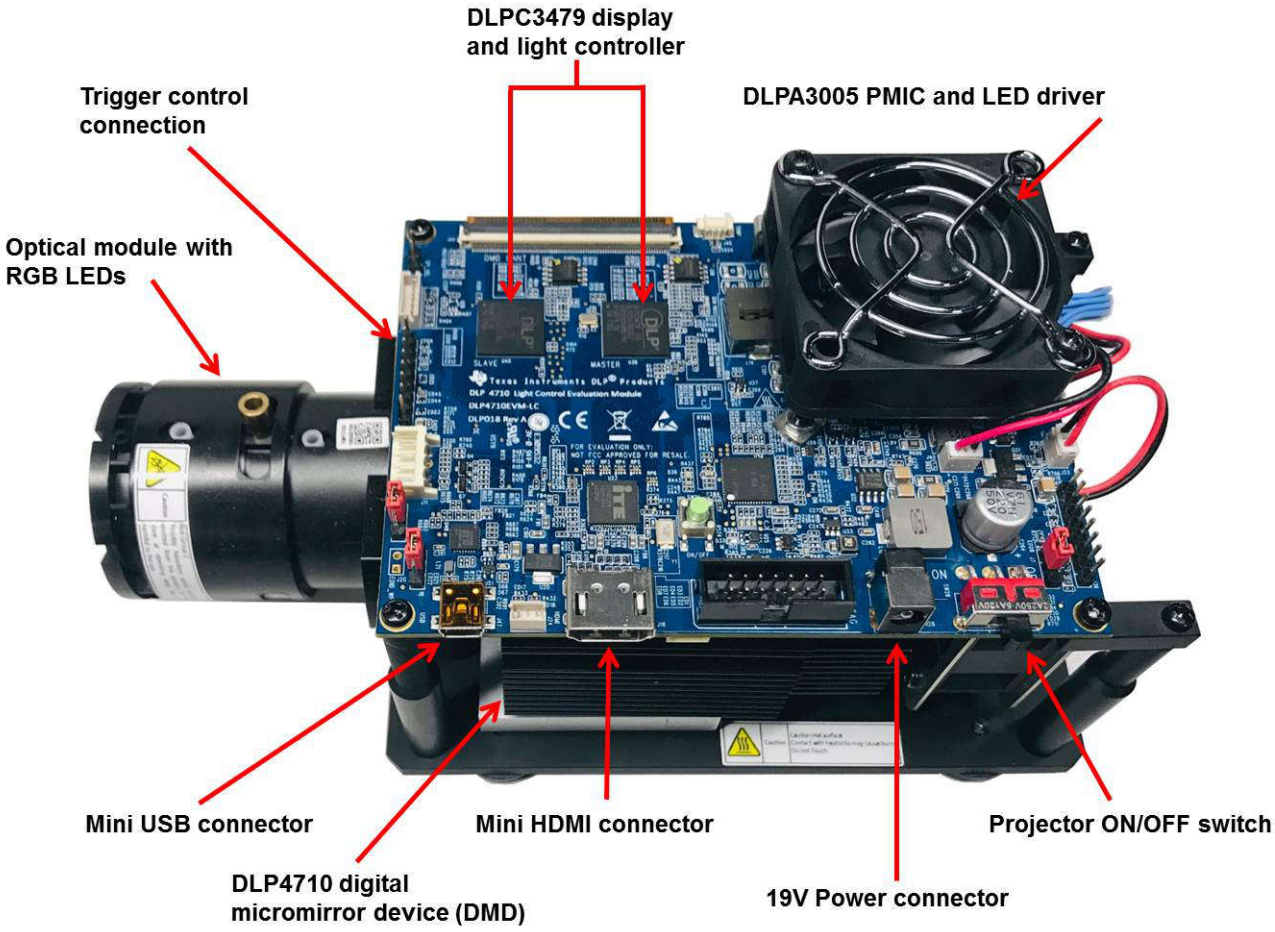

Figure 9-3. DLP4710 Light Control EVM

CAUTION

Make sure to follow all of the initialization procedures listed in this document before connecting the power. Verify that the DMD flex cable is connected correctly to the DLP4710 Light Control board.

10 Revision History

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

Changes from Revision A (July 2019) to Revision B (October 2025)	Page
• Added HDMI trademark information	2

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1. *Delivery:* TI delivers TI evaluation boards, kits, or modules, including any accompanying demonstration software, components, and/or documentation which may be provided together or separately (collectively, an “EVM” or “EVMs”) to the User (“User”) in accordance with the terms set forth herein. User's acceptance of the EVM is expressly subject to the following terms.

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   2.2 TI warrants that the TI EVM will conform to TI's published specifications for ninety (90) days after the date TI delivers such EVM to User. Notwithstanding the foregoing, TI shall not be liable for a nonconforming EVM if (a) the nonconformity was caused by neglect, misuse or mistreatment by an entity other than TI, including improper installation or testing, or for any EVMs that have been altered or modified in any way by an entity other than TI, (b) the nonconformity resulted from User's design, specifications or instructions for such EVMs or improper system design, or (c) User has not paid on time. Testing and other quality control techniques are used to the extent TI deems necessary. TI does not test all parameters of each EVM. User's claims against TI under this Section 2 are void if User fails to notify TI of any apparent defects in the EVMs within ten (10) business days after delivery, or of any hidden defects with ten (10) business days after the defect has been detected.

   2.3 TI's sole liability shall be at its option to repair or replace EVMs that fail to conform to the warranty set forth above, or credit User's account for such EVM. TI's liability under this warranty shall be limited to EVMs that are returned during the warranty period to the address designated by TI and that are determined by TI not to conform to such warranty. If TI elects to repair or replace such EVM, TI shall have a reasonable time to repair such EVM or provide replacements. Repaired EVMs shall be warranted for the remainder of the original warranty period. Replaced EVMs shall be warranted for a new full ninety (90) day warranty period.

WARNING

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User shall operate the Evaluation Kit within TI’s recommended guidelines and any applicable legal or environmental requirements as well as reasonable and customary safeguards. Failure to set up and/or operate the Evaluation Kit within TI’s recommended guidelines may result in personal injury or death or property damage. Proper set up entails following TI’s instructions for electrical ratings of interface circuits such as input, output and electrical loads.

NOTE:

EXPOSURE TO ELECTROSTATIC DISCHARGE (ESD) MAY CAUSE DEGREDATION OR FAILURE OF THE EVALUATION KIT; TI RECOMMENDS STORAGE OF THE EVALUATION KIT IN A PROTECTIVE ESD BAG.

3 *Regulatory Notices:*

3.1 *United States*

3.1.1 *Notice applicable to EVMs not FCC-Approved:*

FCC NOTICE: This kit is designed to allow product developers to evaluate electronic components, circuitry, or software associated with the kit to determine whether to incorporate such items in a finished product and software developers to write software applications for use with the end product. This kit is not a finished product and when assembled may not be resold or otherwise marketed unless all required FCC equipment authorizations are first obtained. Operation is subject to the condition that this product not cause harmful interference to licensed radio stations and that this product accept harmful interference. Unless the assembled kit is designed to operate under part 15, part 18 or part 95 of this chapter, the operator of the kit must operate under the authority of an FCC license holder or must secure an experimental authorization under part 5 of this chapter.

3.1.2 *For EVMs annotated as FCC – FEDERAL COMMUNICATIONS COMMISSION Part 15 Compliant:*

CAUTION

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.

Changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

FCC Interference Statement for Class A EVM devices

NOTE: This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense.

FCC Interference Statement for Class B EVM devices

NOTE: This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- *Reorient or relocate the receiving antenna.*
- *Increase the separation between the equipment and receiver.*
- *Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.*
- *Consult the dealer or an experienced radio/TV technician for help.*

3.2 *Canada*

3.2.1 *For EVMs issued with an Industry Canada Certificate of Conformance to RSS-210 or RSS-247*

Concerning EVMs Including Radio Transmitters:

This device complies with Industry Canada license-exempt RSSs. Operation is subject to the following two conditions:

(1) this device may not cause interference, and (2) this device must accept any interference, including interference that may cause undesired operation of the device.

Concernant les EVMs avec appareils radio:

Le présent appareil est conforme aux CNR d'Industrie Canada applicables aux appareils radio exempts de licence. L'exploitation est autorisée aux deux conditions suivantes: (1) l'appareil ne doit pas produire de brouillage, et (2) l'utilisateur de l'appareil doit accepter tout brouillage radioélectrique subi, même si le brouillage est susceptible d'en compromettre le fonctionnement.

Concerning EVMs Including Detachable Antennas:

Under Industry Canada regulations, this radio transmitter may only operate using an antenna of a type and maximum (or lesser) gain approved for the transmitter by Industry Canada. To reduce potential radio interference to other users, the antenna type and its gain should be so chosen that the equivalent isotropically radiated power (e.i.r.p.) is not more than that necessary for successful communication. This radio transmitter has been approved by Industry Canada to operate with the antenna types listed in the user guide with the maximum permissible gain and required antenna impedance for each antenna type indicated. Antenna types not included in this list, having a gain greater than the maximum gain indicated for that type, are strictly prohibited for use with this device.

Concernant les EVMs avec antennes détachables

Conformément à la réglementation d'Industrie Canada, le présent émetteur radio peut fonctionner avec une antenne d'un type et d'un gain maximal (ou inférieur) approuvé pour l'émetteur par Industrie Canada. Dans le but de réduire les risques de brouillage radioélectrique à l'intention des autres utilisateurs, il faut choisir le type d'antenne et son gain de sorte que la puissance isotrope rayonnée équivalente (p.i.r.e.) ne dépasse pas l'intensité nécessaire à l'établissement d'une communication satisfaisante. Le présent émetteur radio a été approuvé par Industrie Canada pour fonctionner avec les types d'antenne énumérés dans le manuel d'usage et ayant un gain admissible maximal et l'impédance requise pour chaque type d'antenne. Les types d'antenne non inclus dans cette liste, ou dont le gain est supérieur au gain maximal indiqué, sont strictement interdits pour l'exploitation de l'émetteur

3.3 *Japan*

3.3.1 *Notice for EVMs delivered in Japan:* Please see http://www.tij.co.jp/lsds/ti_ja/general/eStore/notice_01.page 日本国内に輸入される評価用キット、ボードについては、次のところをご覧ください。

https://www.ti.com/ja-jp/legal/notice-for-evaluation-kits-delivered-in-japan.html

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If User uses EVMs in Japan, not certified to Technical Regulations of Radio Law of Japan, User is required to follow the instructions set forth by Radio Law of Japan, which includes, but is not limited to, the instructions below with respect to EVMs (which for the avoidance of doubt are stated strictly for convenience and should be verified by User):

1. Use EVMs in a shielded room or any other test facility as defined in the notification #173 issued by Ministry of Internal Affairs and Communications on March 28, 2006, based on Sub-section 1.1 of Article 6 of the Ministry's Rule for Enforcement of Radio Law of Japan,
2. Use EVMs only after User obtains the license of Test Radio Station as provided in Radio Law of Japan with respect to EVMs, or
3. Use of EVMs only after User obtains the Technical Regulations Conformity Certification as provided in Radio Law of Japan with respect to EVMs. Also, do not transfer EVMs, unless User gives the same notice above to the transferee. Please note that if User does not follow the instructions above, User will be subject to penalties of Radio Law of Japan.

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3.4 *European Union*

3.4.1 *For EVMs subject to EU Directive 2014/30/EU (Electromagnetic Compatibility Directive)*:

This is a class A product intended for use in environments other than domestic environments that are connected to a low-voltage power-supply network that supplies buildings used for domestic purposes. In a domestic environment this product may cause radio interference in which case the user may be required to take adequate measures.

4 *EVM Use Restrictions and Warnings:*

4.1 EVMS ARE NOT FOR USE IN FUNCTIONAL SAFETY AND/OR SAFETY CRITICAL EVALUATIONS, INCLUDING BUT NOT LIMITED TO EVALUATIONS OF LIFE SUPPORT APPLICATIONS.

4.2 User must read and apply the user guide and other available documentation provided by TI regarding the EVM prior to handling or using the EVM, including without limitation any warning or restriction notices. The notices contain important safety information related to, for example, temperatures and voltages.

4.3 *Safety-Related Warnings and Restrictions:*

4.3.1 User shall operate the EVM within TI's recommended specifications and environmental considerations stated in the user guide, other available documentation provided by TI, and any other applicable requirements and employ reasonable and customary safeguards. Exceeding the specified performance ratings and specifications (including but not limited to input and output voltage, current, power, and environmental ranges) for the EVM may cause personal injury or death, or property damage. If there are questions concerning performance ratings and specifications, User should contact a TI field representative prior to connecting interface electronics including input power and intended loads. Any loads applied outside of the specified output range may also result in unintended and/or inaccurate operation and/or possible permanent damage to the EVM and/or interface electronics. Please consult the EVM user guide prior to connecting any load to the EVM output. If there is uncertainty as to the load specification, please contact a TI field representative. During normal operation, even with the inputs and outputs kept within the specified allowable ranges, some circuit components may have elevated case temperatures. These components include but are not limited to linear regulators, switching transistors, pass transistors, current sense resistors, and heat sinks, which can be identified using the information in the associated documentation. When working with the EVM, please be aware that the EVM may become very warm.

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