![TEXAS INSTRUMENTS]

DLP® LightCrafter™ Display 3010 EVM Gen2 User's Guide

This user's guide presents an overview of the DLP® LightCrafter™ Display 3010 evaluation module (EVM) Gen2 and a general description of the main features and functions. It explains the first steps to get started, and shows a detailed description of on board LEDs, connectors and overall EVM assembly. It will give the user a successful start with their first DLP LightCrafter Display 3010 Gen2 evaluation module.

Topic   **Page**

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1 DLP® LightCrafter™ Display 3010 EVM Gen2 Overview
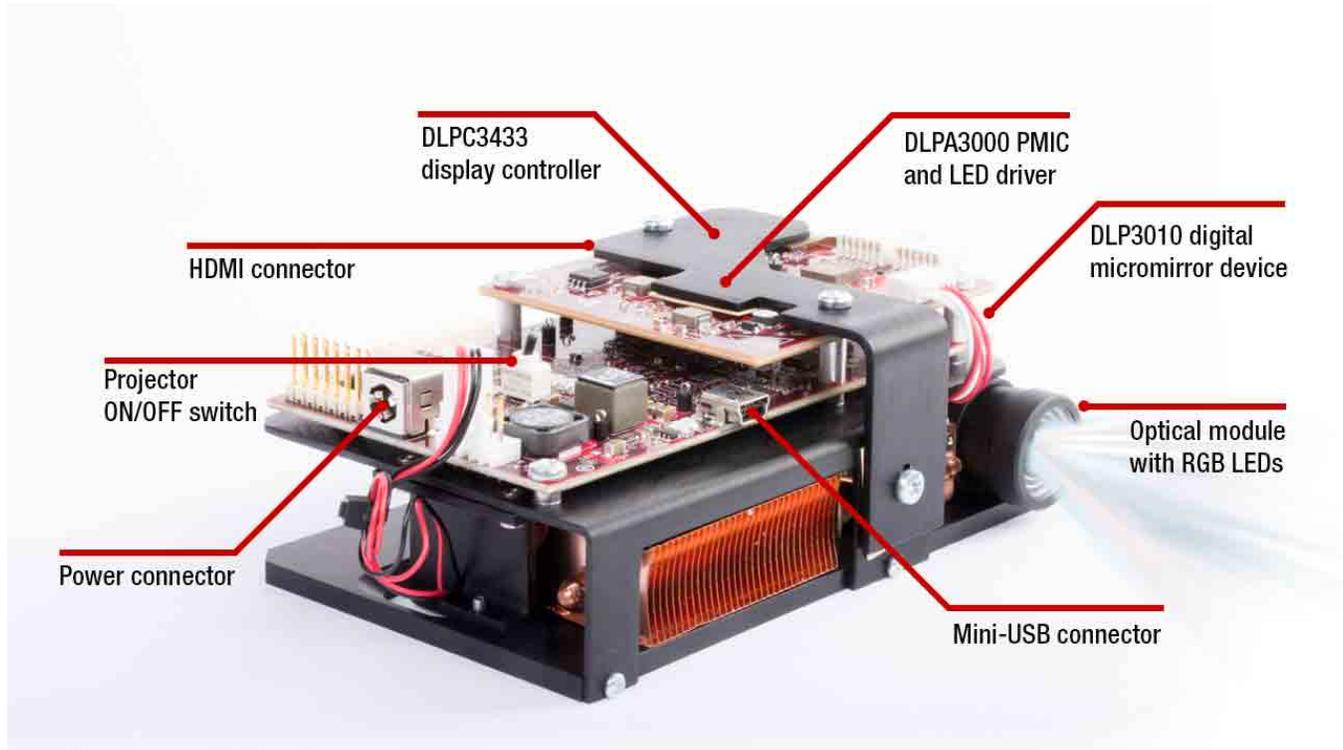
Figure 1. DLP LightCrafter Display Complete EVM

In addition to this document, the following documents shown in Section 3 should be used.

2 Safety Instructions

> **CAUTION**
>
> ⚠️
> Caution hot surface. Contact may cause burns. Do not touch.

> **WARNING**
>
> **Possible hazardous optical radiation emitted from this product. Do not stare at the operating lamp. May be harmful to the eye.**

> **WARNING**
>
> **Observe handling precautions. Electrostatic sensitive devices.**

> **WARNING**
>
> **Always ensure both fans are running during operation to avoid overheating and ensure reliable operation.**

3 Applicable Documents

The following documents are applicable to the DLP LightCrafter Display 3010 EVM and are available at TI.com (www.ti.com).

- DLP3010 (0.3 720p) digital micromirror device (DMD) data sheet (DLPS051)
- DLPA3000 controller data sheet (DLPS052)
- DLPC3433 controller data sheet (DLPS035)
- DLPC3433 Software Programmer's Guide (DLPU020)
- DLP LightCrafter Display EVM GUI Tool User's Guide (DLPU021)

    If you need assistance, refer to the DLP Products and MEMS TI E2E™ community support forums.

4   What is in the DLP LightCrafter Display 3010 EVM?

The DLP LightCrafter Display module consists of three subsystems:

- Light engine – includes the optics, red, green, and blue LEDs, and a 1280 × 720 (720p) DMD capable of 300 lumens out-of-the-box.
- Driver board – includes the DLP chipset comprised of DLPC3433 Controller and DLPA3000 PMIC/LED driver.
- System board – includes MSP430, ITE HDMI receiver, USB-Serial Bridge controller and several connectors for external inputs (HDMI, USB, etc.)
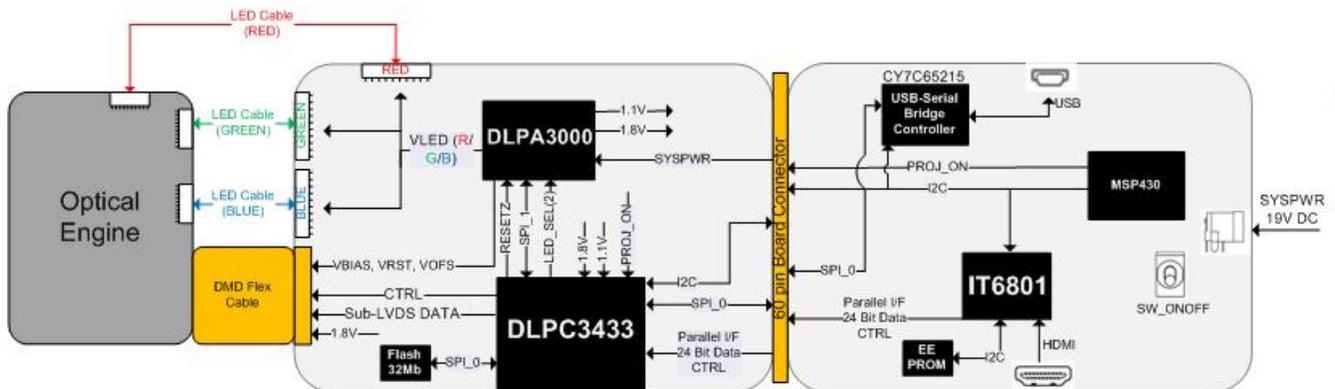

**Figure 2. DLP LightCrafter Display EVM Block Diagram**

5 Light Engine

The optical engine in the EVM is developed by eProtech and is production ready.

The light engine consists of the following components:

- DLP3010 (0.3-inch 720p DMD)
- OSRAM red, green and blue LED
- This light engine interfaces with the EVM using DMD pin mapping **Option 1**. Please refer to the DLPC3433 and DLPC3438 datasheet for more information about the DMD interface.

Table 1. Optical Engine Specifications

| PARAMETER	MIN	TYP	MAX	UNIT
Brightness at Red 4.5-A / Green 6-A / Blue 6-A LED Current		235		Lm
Red LED Current		4.5		A
Green / Blue LED Current		6		A
Brightness Uniformity	75%			
Throw Ratio		1.2		
Offset		100%		
Focus Range	5		50	inch
Image Diagonal Size	5		50	inch
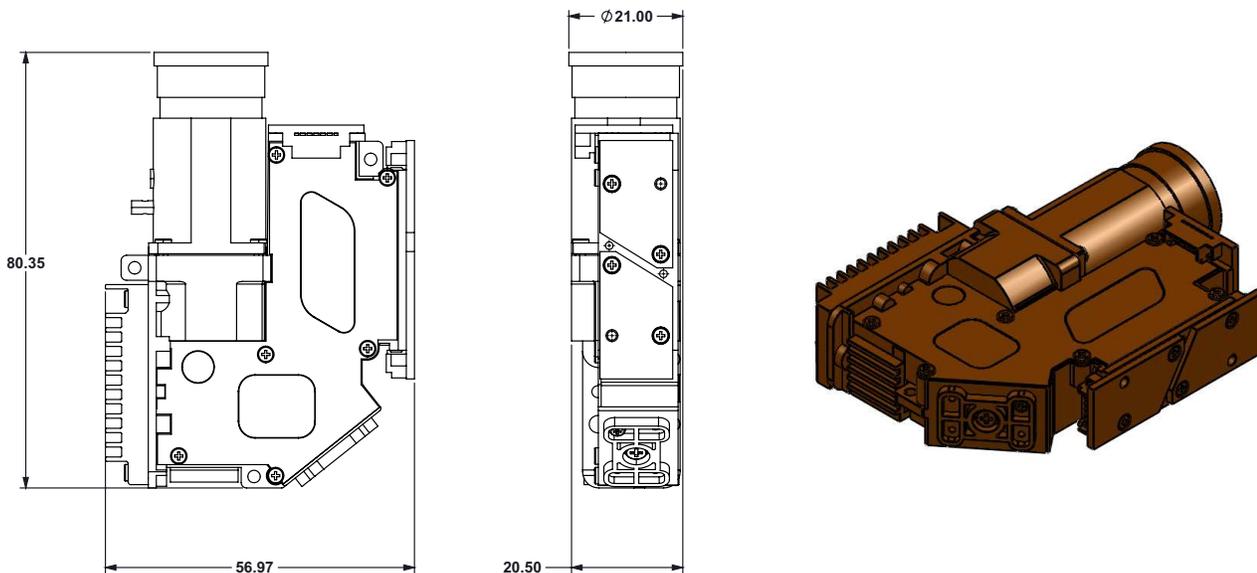
Figure 3. Optical Engine

6 Quick-Start Procedure

This quick-start assumes default conditions as shipped.

1. Power up the DLP LightCrafter™ Display 3010 EVM Gen2 by applying an external DC power supply (19 V DC, 4.75 A) to the J9 connector.
   External Power Supply Requirements:
   - Nominal Output Voltage: 19 VDC
   - Minimum Output Current: 2.5 A; Max Output Current: 4.74 A
   - Efficiency Level: VI

   NOTE: TI recommends using an external power supply that complies with applicable regional safety standards such as UL, CSA, VDE, CCC, PSE, etc.

NOTE: The system is designed to operate also with an external 12-V DC power supply. The P5V_VIN (D9) and P3P3V_SB (D10) LED will turn on to indicate that 5-V and 3.3-V standby power is applied.

2. Move SW2 switch to the ON position to turn on the DLP LightCrafter Display 3010 EVM-G2. When the DLP LightCrafter Display 3010 EVM-G2 is turned on, the PROJ_ON LED (D4) will turn on.

3. After the DLP LightCrafter Display 3010 EVM-G2 is turned on; the projector will default to displaying a DLP LightCrafter Display splash image.

4. The focus of the image can be adjusted manually on the optical engine.
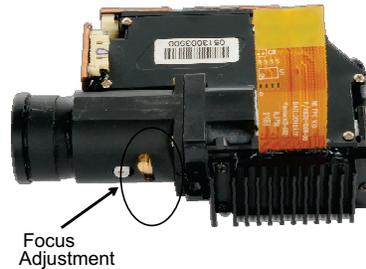
Focus
Adjustment

Figure 4. Optical Engine with Focus Adjustment

5. Connect the USB to the DLP LightCrafter™ Display 3010 EVM-G2 and open the latest GUI on your computer. If needed, connect an HDMI source to the EVM and communicate to the EVM via the GUI software.

6. When turning off the projector, turn off the SW2 switch prior to removing the power cable.
   Note: To avoid potential damage to the DMD, it is recommended to turn off the projector with the SW2 switch before disconnecting the power.

There are ten indicator LEDs on the DLP LightCrafter Display 3010 EVM, and they are defined in Table 2:

Table 2. LEDs on the DLP LightCrafter Display 3010 EVM

LED Reference	Signal Indication	Description
D1	MSP_LED2_ONz	ON when HDMI cable is plugged in and external video is detected. OFF when external video is not detected.
D2	HOST_IRQ	ON during DLPC3433 boot, OFF when projector is running. Indication of DLPC3433 boot-up completed and ready to receive commands
D3	RESETZ	OFF when Projector is turned on via SW_ONOFF
D4	PROJ_ON	On when Projector is turned on via SW_ONOFF
D5	GPIO1	Blinking when PC is communicating to flash over SPI
D6	GPIO0	Blinking when PC is communicating to DLPC3433 over I^{2}C
D7	MSP430_ACK	ON when Cypress CY3420 is I^{2}C master. OFF when MSP430 is I^{2}C master
D8	MSP430_REQ	ON when Cypress CY3420 requests the MSP430 to give Cypress master control of the I^{2}C bus
D9	P5V_VIN	Regulated 5-V power on
D10	P3P3V_SB	Regulated 3.3-V power on

7 Circuit Description

7.1 Connectors and Switches on Main Board

Table 3. Installed Connectors on Main Board

INSTALLED CONNECTORS/HEADERS	DESCRIPTION
J1	MSP430 JTAG Programming interface connector
J2	Connector for DSI interface (not installed by default)
J3	Connector for HDMI input
J4	60-pin connector for DLP LightCrafter Display board
J5	Header for 5-V DC power (not installed by default)
J6	Connector for 19-V external power supply interface
J6a	Header for EDID programming (not installed by default)
J7	Connector for the I^2C interface (DevaSys box, not installed by default)
J8	Header for 5-V DC power (used for LED cooling fans)
J10	Connector for USB cable
SW1	I^2C communication (not installed by default)
SW2	Projector ON/OFF Switch

7.2 Connectors on DLP LightCrafter Display Board

Table 4. Installed Connectors on the DLP LightCrafter Display Board

INSTALLED SWITCHES/PUSH BUTTONS	DESCRIPTION
J1	Connector for the DMD flex cable
J2	Connector for Blue LED cable
J3	Connector for Greem LED cable
J4	Connector for Red LED cable
J5	60-pin connector for DLP LightCrafter Display board

8 EVM Setup

The DLP LightCrafter Display 3010 EVM-G2 is composed of three parts:

- Main board
- DLP LightCrafter Display board
- Engine with LED connection and Flex cable

The main board contains the connector for the power supply, a USB connector to communicate to the DLP LightCrafter Display software, HDMI and the connector for the DLP LightCrafter Display board. The main board also contains a switch to turn on the projector in case the DLP LightCrafter Display board and the engine are connected. Figure 5 shows the main connectors on the main board.
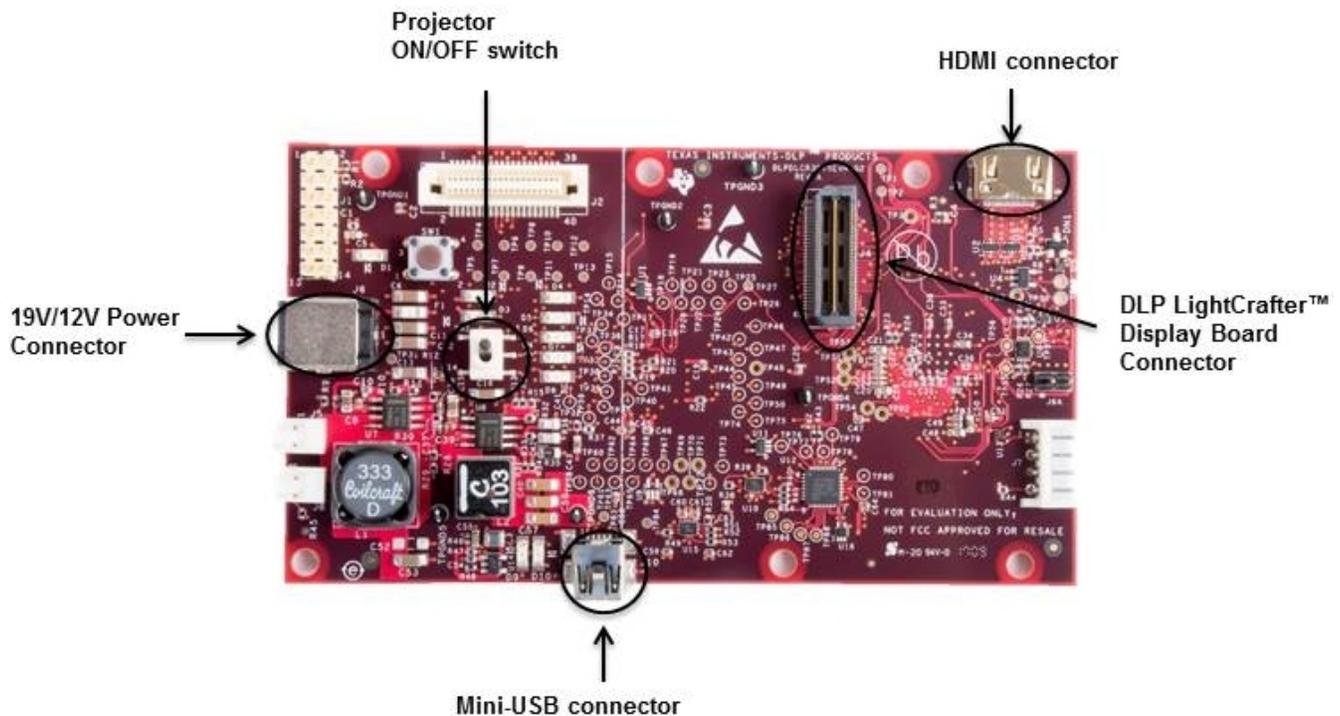
Figure 5. DLP LightCrafter Display Main Board

The DLP LightCrafter Display board contains the RGB LED connectors, the Flex cable connector, and the main board connector. To connect the main board to the DLP LightCrafter Display board, refer to Figure 6. Note that the main board connector on the DLP LightCrafter Display board is on the bottom, while the LED and Flex cable connectors are on the top.
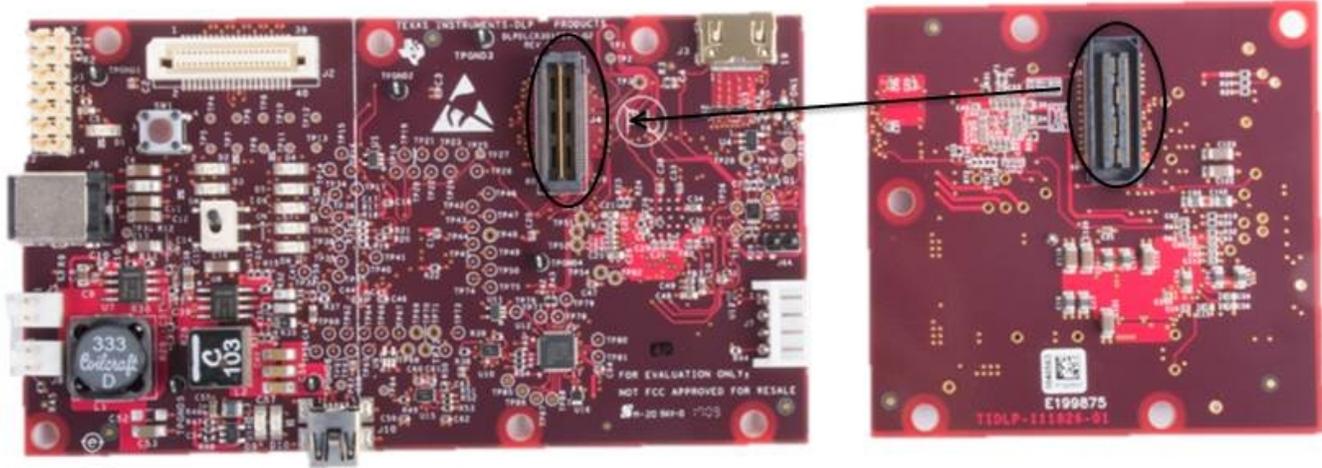
Figure 6. Connection Main Board and DLP LightCrafter Display Board

Figure 7 shows the display board and how it connects to the main board. The different connectors for each LED are named on the board as well as on the light engine.
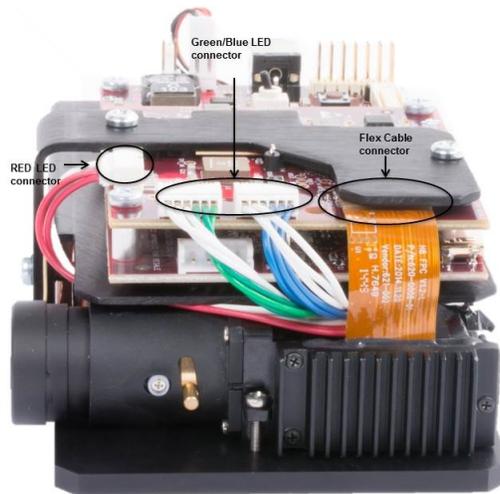
Figure 7. DLP LightCrafter Display EVM

Ensure a good connection of the flex cable and LED cables to the DLP LightCrafter Display board before turning it on.

Revision History

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

Changes from Original (September 2017) to A Revision **Page**

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