

# DLP® Display ≥0.47-in Array WUXGA/1080p/WXGA/XGA/SVGA Evaluation Module



## Description

The DLPC4430EVM provides a design for driving the above DMDs, and allow for testing of customer front end systems. The combination of the DLPC4430EVM with any of these DMD EVMs can display SPLASH, test patterns or video from HDMI™ source on the DMD. The DLPC4430EVM controller evaluation module (EVM) can accelerate the prototyping time of DLP 1080p (1920x1080), WUXGA (1920x1200), WXGA (1280x800), XGA (1024x768), and SVGA (800x600) systems over 2000 lumens when combined with the DLP650NEEVM, DLP780NEEVM, DLP470NEEVM, DLP670REEVM, DLP800REEVM, DLP480REEVM, DLP550JEEVM, DLP550HEEVM, or DLP650LEEVM digital micromirror device (DMD) EVMs.

## Get Started

1. Order [DLPC4430](#) chipset EVMs (controller and DMD) and an applicable power supply.
2. Read this user's guide completely and the DLPC4430 Software Programmer's Guide.
3. Download the DLPC44xx-GUI and the DLPC4430EVM-SW from the product page ([DLPC4430](#)).

4. Download the DMD EVM and the controller [EVM design files](#).

## Features

- Supports up to WUXGA resolution at 1920x1200 at 120 Hz (2D and 3D)
- Designed to be used with a 1080p, WUXGA and SVGA/XGA/WXGA EVM
- Includes one DLPC4430 controller and one DLPA100 controller PMIC and motor driver
- Power supply, optics, illumination source, and extension cables are not included
- Offers several interface options for USB, I2C and trigger inputs and outputs

## Applications

- [Laser TV](#)
- [Educational projectors](#)
- [Digital signage](#)
- [Gaming machines](#)
- [Smart lighting](#)
- [Stage lighting systems](#)



**DLP800REEVM and DLPC4430EVM Evaluation Module**

# 1 Evaluation Module Overview

## 1.1 Introduction

This user's guide explains the hardware and software features of the DLP Products DLP650NEEVM, DLP780NEEVM, DLP470NEEVM, DLP670REEVM, DLP800REEVM, DLP480REEVM, DLP550JEEVM, DLP550HEEVM, DLP650LEEVM, and DLPC4430EVM systems. The EVM architecture and connectors are described along with a quick start guide on how to operate the previous mentioned EVMs using the DLPC44xx-GUI. Specific DLP® chip details and operation can be found in related component documentation.

### Note

Power supply, optics, illumination source, and extension cables are sold separately. See [Section 1.5](#).

The DLP Products listed in paired with DLPC4430EVM offer a reference design to enable faster development cycles for users of the DLPC4430 controllers and allow evaluation of DLPC4430 chipsets. The combination of DMD and controller is referred to as a chipset.

These evaluation kits bring together a set of components providing a great starting point to evaluate a DLP system for applications listed in the above section.

## 1.2 Kit Contents

The DMD EVMs found in [Table 1-1](#) and DLPC4430EVM are designed to be used in pairs. The DMD EVMs cannot be operated with the Controller EVM, DLPC4430EVM.

The DMD EVMs have a board-mounted connector that mates with to the DLPC4430EVM controller board. DLPC4430EVM includes all circuitry required to drive the DMD EVM.

The DLPC4430EVM includes one DLPC4430 controller, two DLPA100s which serve as the power management and motor drivers, and other system circuitry such as the parallel receiver and system fan control.

The DLPC4430EVM can be programmed with any firmware which is available on the [DLPC4430](#) product page. This firmware allows the DLPC4430EVM to drive the desired display chip. [Figure 1-1](#), [Figure 1-2](#), [Figure 1-3](#), [Figure 1-3](#), and [Figure 1-3](#) show the top side of each EVM.



Figure 1-1. DLPC4430EVM

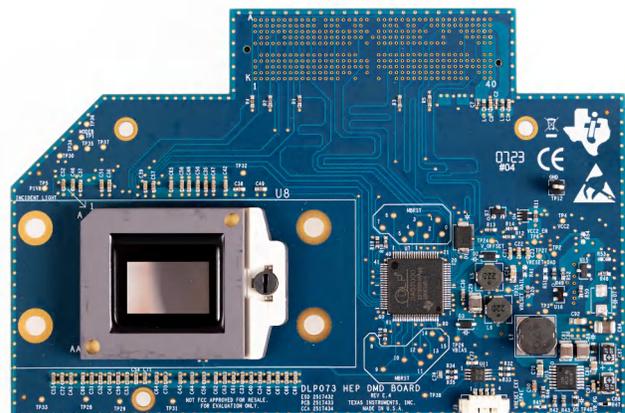


Figure 1-2. DLP780NEEVM/DLP800REEVM



Figure 1-3. DLP470NEEVM/DLP480REEVM



Figure 1-4. DLP550HEEVM/DLP550JEEVM/  
DLP650LEEVM

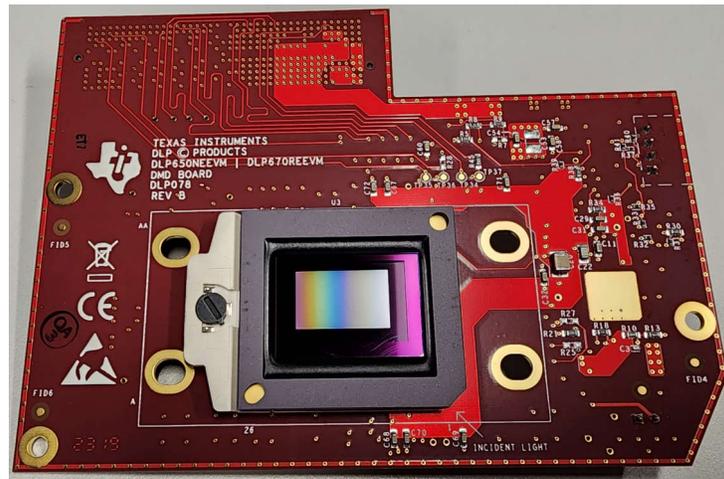


Figure 1-5. DLP650NEEVM/DLP670REEVM

### 1.3 Specification

INPUT PARAMETERS	CONDITIONS	MIN	TYP	MAX	UNIT
$V_{dc}$	<a href="#">Section 3.2</a>	11.4	12	13.2	V
I				7	A

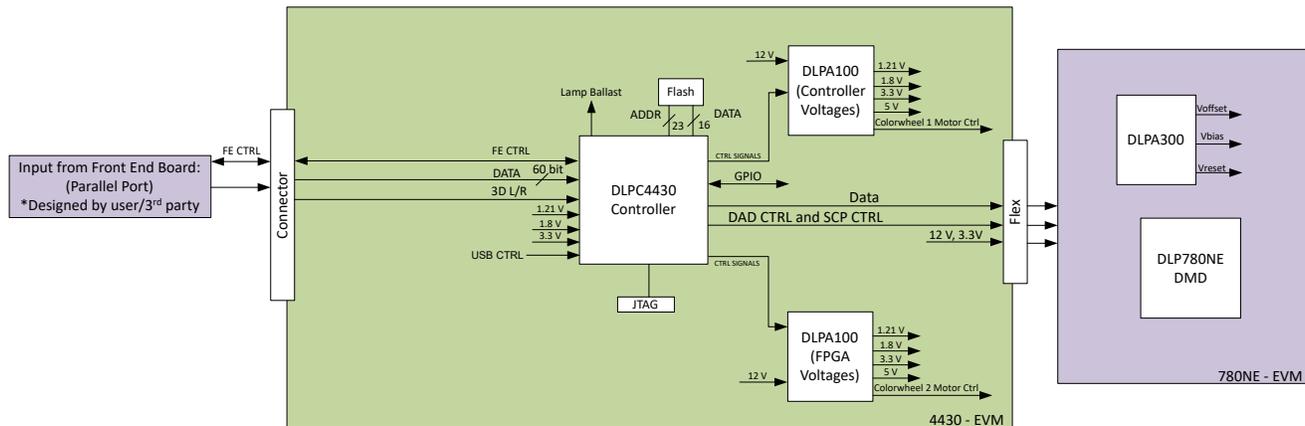
## 1.4 Device Information

The DMD EVMs and DLPC4430EVM contain the electronics required to drive any DMD found in [Table 1-1](#). The DLPC4430EVM offers several interface options for USB, I2C, and trigger inputs and outputs.

**Table 1-1. DMD EVMs**

DMD Covered	Resolution	EVM #
DLP780NE	1080p	DLP073
DLP800RE	WUXGA	DLP098
DLP550HE	SVGA	DLP077
DLP550JE	XGA	DLP100
DLP650LE	WXGA	DLP101
DLP650NE	1080p	DLP078
DLP670RE	WUXGA	DLP102
DLP470NE	1080p	DLP079
DLP480RE	WUXGA	DLP103

The system block diagram [Figure 1-6](#) details the functionality and control when using the DLP650NEEVM and DLPC4430EVM.



**Figure 1-6. EVM System Block Diagram**

The major components of the DLPC4430EVM are:

- One DLPC4430 controller
- Two DLPA100 power management and motor driver chips

The major components of the DLP780NEEVM and DLP800REEVM are:

- DLP780NE 0.78-inch 1080p DMD or DLP800RE 0.8-inch WUXGA DMD
- Connector designed to attach the to the DLPC4430EVM
- DLPA300 used to generate the DMD's reset voltages

The major components of the DLP550HEEVM, DLP550JEEVM, and DLP650LEEVM are:

- DLP550HE 0.55-inch SVGA DMD, DLP550JE 0.55-inch DMD, or DLP650LE 0.65-inch DMD
- Connector designed to attach the to the DLPC4430EVM
- DLPA200 used to generate the DMD's reset voltages

The major components of the DLP650NEEVM and DLP670REEVM are:

- DLP650NE 0.65-inch 1080p DMD or DLP670RE 0.67-inch WUXGA DMD
- Connector designed to attach the to the DLPC4430EVM
- TPS65145 used to generate the DMD's reset voltages

The major components of the DLP470NEVM and DLP480REEVM are:

- DLP470NE 0.47-inch 1080p DMD or DLP480RE 0.48-inch WUXGA DMD
- Connector designed to attach the to the DLPC4430EVM
- TPS65145 used to generate the DMD's reset voltages

## 1.5 Other Items Needed for Operation

The DMD EVMs and the DLPC4430EVM are capable of displaying images on to the DMD. The EVMs are meant to accelerate initial system design. The EVMs are meant to accelerate initial system design. However, these EVMs do not ship with optics, illumination source, cables, power supplies, or additional hardware components.

These are system parameters that are left for the user to design or provide:

- Power supply (See [Section 3.2.1](#))
- Mini-USB cable: USB A or B cable
- Optics
- Illumination module and source
- Front-End Parallel Port source

## 2 Software

### 2.1 Connecting the DMD EVM to the DLPC4430EVM

Before connecting a DLP EVM to the DLPC4420AEVM, identify the male connector on the back of the DMD EVM.

The connectors are keyed by design and must follow an orientation to mate with the female connector (J63) located on the DLPC4430EVM.

The EVM needs to look like [Figure 2-1](#) after the FMC cables have been properly connected between the DLP650NEEVM and the DLPC4430EVM. The process is the same for use with the other DMDs seen in .



Figure 2-1. EVMs Connected

### 2.2 Quick Start

This section details a quick start guide on how to:

- Download the associated software
- Connect a DMD EVM to the DLPC4430EVM
- Power up the DLPC4430EVM
- Program the DLPC4430EVM to display a SPLASH image on the DMD
- Troubleshoot issues

#### 2.2.1 Downloading the Software

Before programming the DLPC4430EVM, make sure the DLPC44xx GUI and DMD firmware have both been downloaded to the PC. The DLPC44xx GUI allows for operation of the EVM and the DMD firmware is required according to DMD being utilized. If the DLP650NEEVM is being used, then the DLP650NE firmware is needed.

The DMD firmware and DLPC44xx GUI can be found under the [Software Development](#) tab of the product pages on TI.com. To get started, these are the product pages for the [DLP780NE](#), [DLP800RE](#), [DLP470NE](#), [DLP480RE](#), [DLP550HE](#), [DLP550JE](#), [DLP650LE](#), [DLP650NE](#), [DLP670RE](#), and the [DLPC4430](#).

## 2.2.2 Powering-up the DLPC4430EVM and Preparing for the DLPC4430EVM to be Programmed

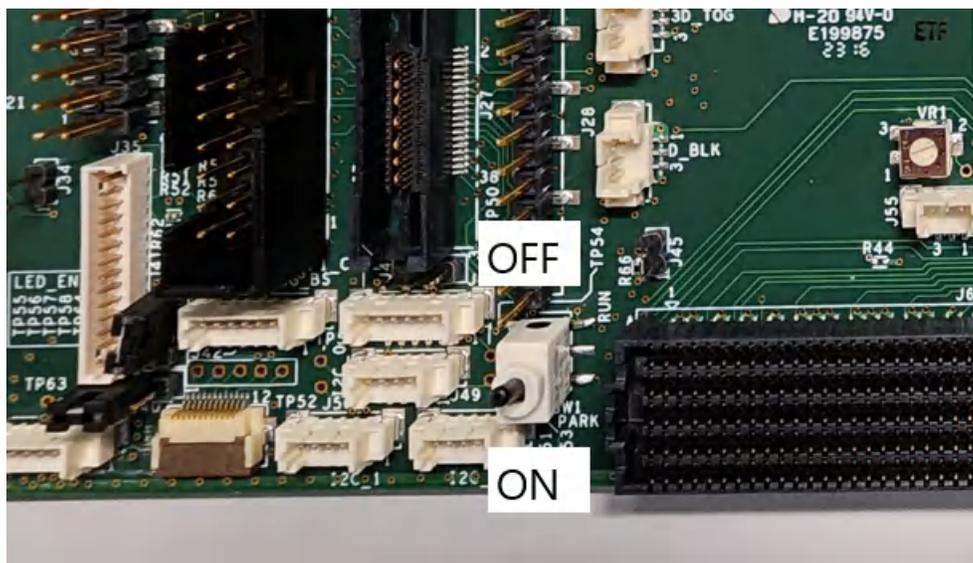
Before powering up the EVM, make sure the included DLPC4430EVM jumpers are in the correct positions. The jumper locations are listed in [Table 2-1](#).

**Table 2-1. Reference Designators**

Jumper	Description (Bold Indicates Default Position)
J9 - Red LED enable or Lamp Ballast	Pins 1, 2 connected Red LED Enable <b>Pins 2,3 connected Lamp Mode</b>
J10 - Daughter Card I2C Clock	Pins 1, 2 connected I2C to SCL1 <b>Pins 2,3 connected I2C to SCL0</b>
J11 - Daughter Card I2C Data	Pins 1, 2 connected I2C to SDA1 <b>Pins 2,3 connected I2C to SDA0</b>
J12 - Front-end DSP Power	<b>Pins 1, 2 connected to 1.8V</b> Pins 2,3 unused
J13 - Front-end Power	<b>Pins 1, 2 connected to 1.1V</b> Pins 2,3 unused
J21 - Controller Sensor selection	<b>Pins 1, 2 connected ADC_SDI</b> Pins 2,3 connected Comparator Sensor I/F
J29 - Controller Sensor selection (Continued)	<b>Pins 1,2 connected ADC_SDO</b> Pins 2,3 connected Light to Frequency Sensor I/F
J46 - DMD Current Selection	<b>Pins 1,2 connected for Low Current DMDs</b> Pins 2,3 connected for High Current DMDs

Jumper J8 is the *Hold BL* jumper. This jumper is used to put the DLPC4430EVM into boot loader mode, which allows the DLPC4430 controllers to be programmed. Connect this jumper to prepare the DLPC4430EVM to be programmed.

To power up the DLPC4430EVM, a 12 V, 5 A power supply is needed. Make sure the power supply is functional and the switch SW1 on the EVM is set to off before connecting the power supply to the EVM. Connecting the power supply when the switch is in the off position can prevent damage to the DLPC4430EVM from poor power connections. The figure below shows SW1 in the on position.



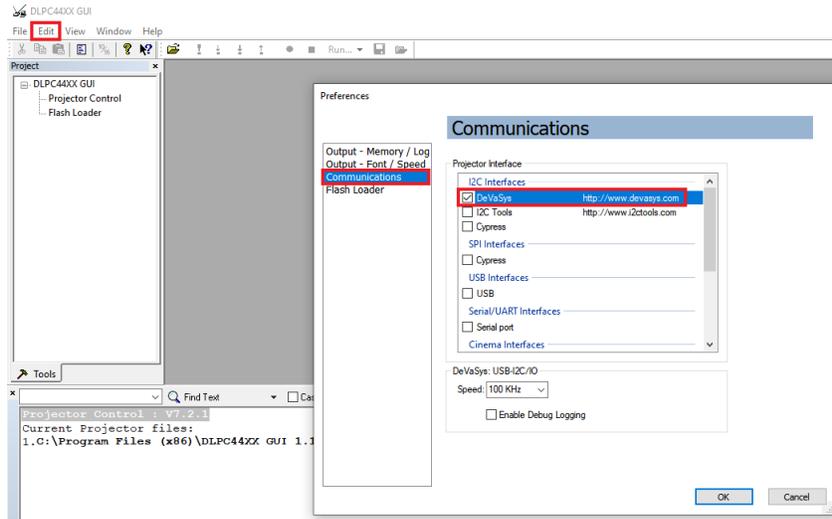
**Figure 2-2. ON/OFF Switch**

Once the power supply has been connected to the DLPC4430EVM, the switch SW1 can be flipped to the “on” position. The user can then plug in the USB cable into the board to prepare for programming the board.

### 2.2.3 Programming the DLPC4430EVM and Displaying a SPLASH Image

Follow these steps to download and configure the DLPC44xx GUI:

1. Download and install the associated Firmware SW package. The Projector Control (.projector) and Firmware binary (.img) files are located in the install directory. The same procedure applies to the other supported DMDs within the appropriate firmware install directory.
2. Setting up Communication Preferences:
  - a. DLPC44xx GUI supports USB and I2C communication. To change these settings, please go to Edit->Preferences->Communication.

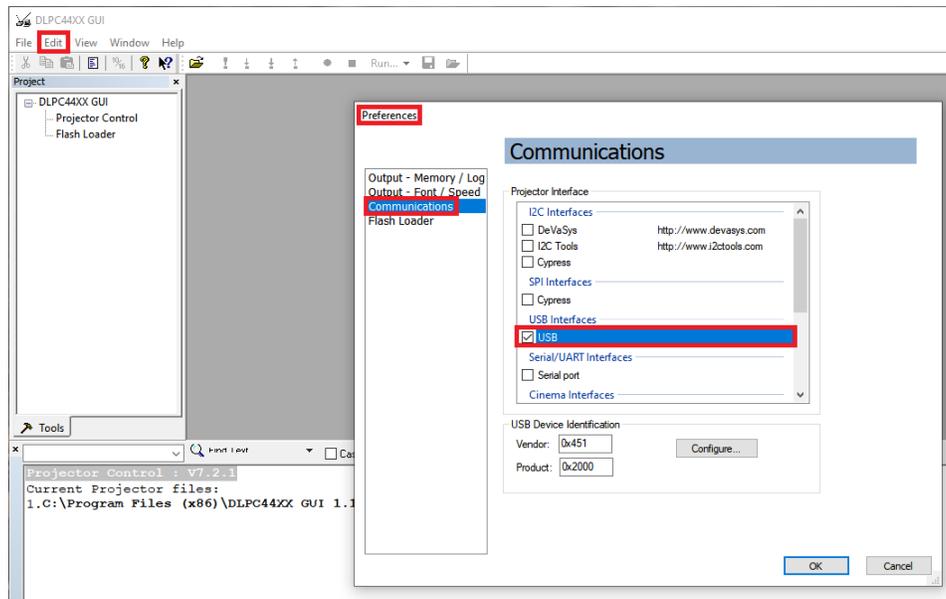


**Figure 2-3. DeVaSys Communication Configuration**

- b. For USB, select the USB interface.

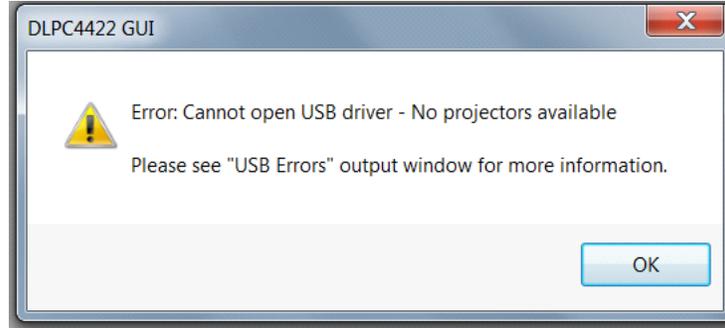
**Note**

USB is the preferred method to download the firmware flash image to the projector as USB is much faster than I2C.



**Figure 2-4. USB Communication Configuration**

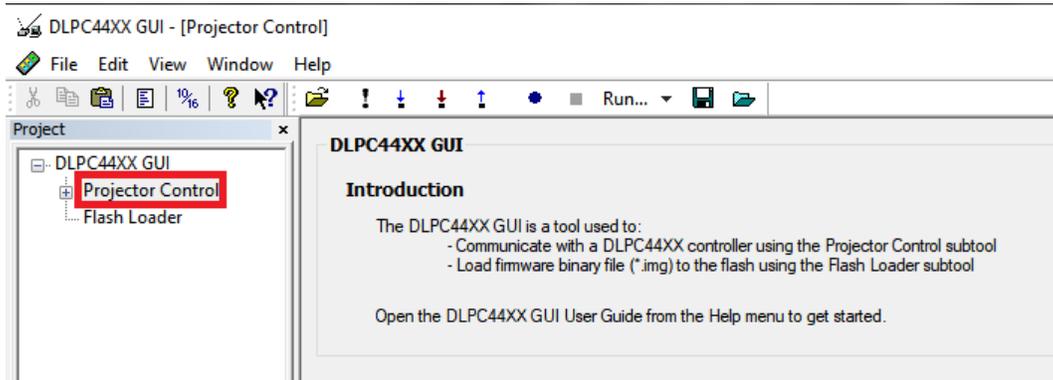
- c. An error message can appear saying the USB driver cannot be opened. This is expected, as TI has not yet enabled communication on the board. Click OK on this error.



**Figure 2-5. Error Message**

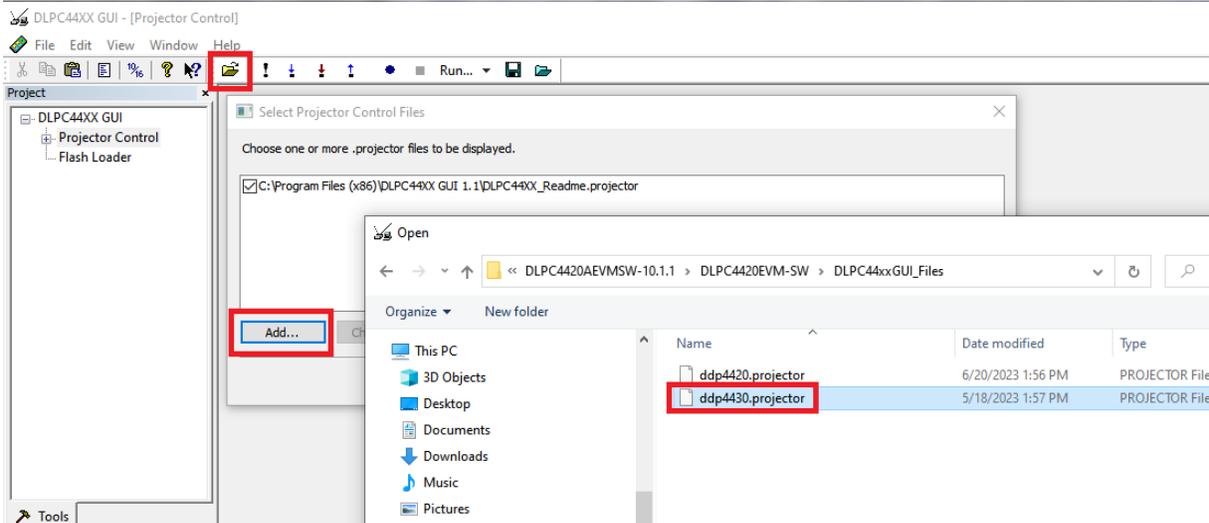
3. Projector Control Configuration:

- a. Run the DLPC44xx GUI tool and select the *Projector Control* sub-tool.



**Figure 2-6. Projector Control Menu**

- b. Select *Open Projector File* then select *Add*. Navigate to the .projector file location installed in step 1.

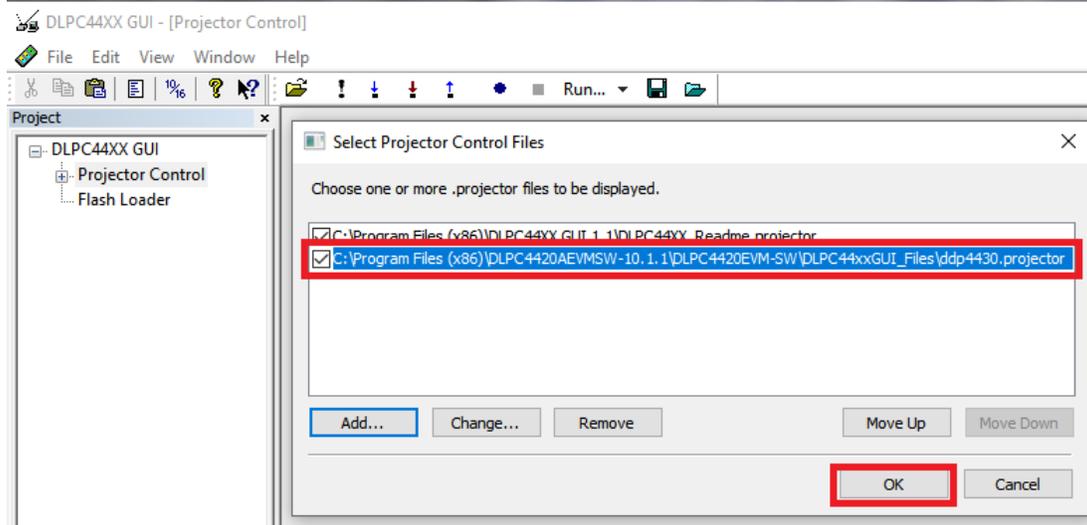


**Figure 2-7. Adding DLPC4430 Projector Control File**

- c. Make sure the desired *Projector Control File* is checked, then select *OK*.

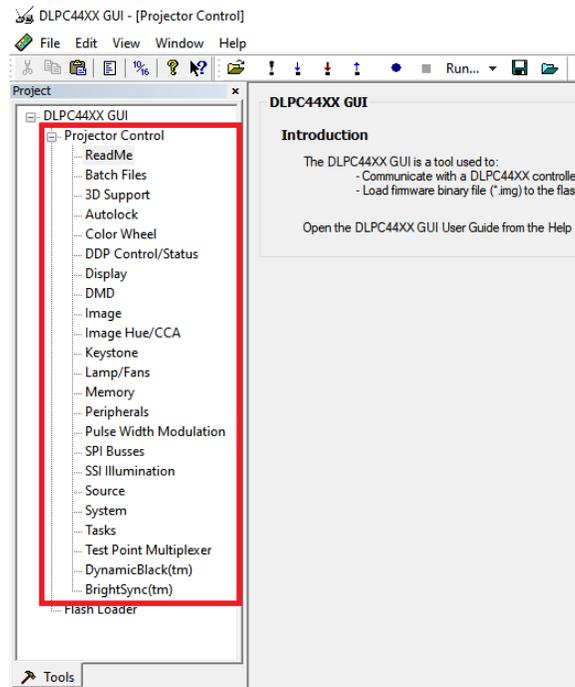
### Note

If the user wants to use one Projector Control file at a time, then de-select the files to hide before selecting *OK*.



**Figure 2-8. Projector Control File for the Chosen Chipset**

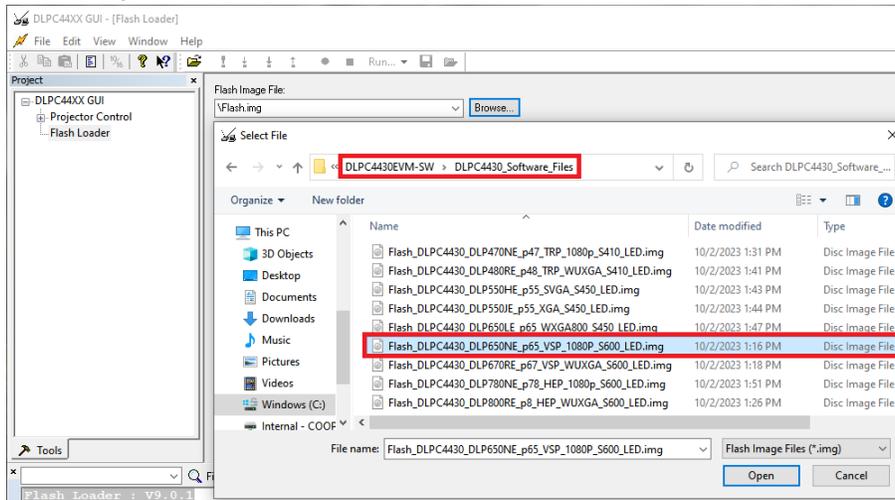
- d. Once this file is loaded, the user can navigate through the pages to control a DLPC4430 controller.



**Figure 2-9. DLPC4430 Projector Control Menu**

4. Flash Loader Configuration:

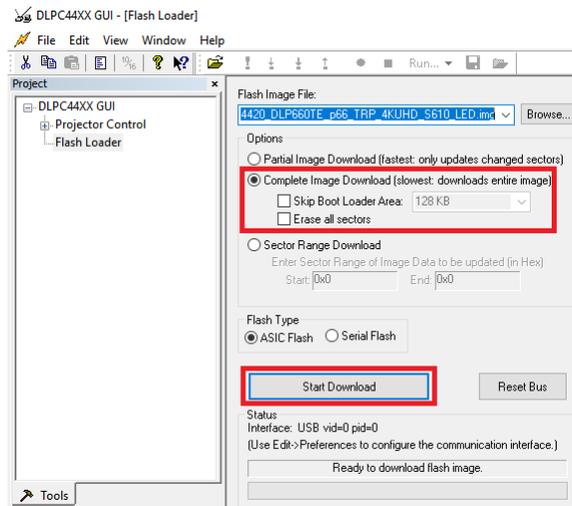
- a. Select the Flash Loader sub-tool, then select the *Browse* button. Navigate to the .img file installed in Step 1 and select *Open*.



**Figure 2-10. Loading the Flash Image**

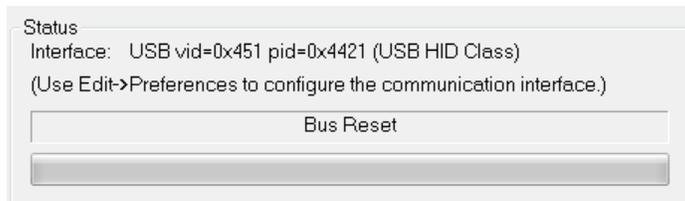
- b. Select *Complete Image Download* if this is the first time download. The flash has the boot loader pre-loaded; uncheck the *Skip Boot Loader Area*.

Check *Skip Boot Loader Area* only if you need to upgrade the bootloader.



**Figure 2-11. Downloading Image into the EVM**

- c. Connect DLPC4420AEMV to PC via USB. Make sure USB communication capability by clicking *Reset Bus* on the bootloader menu in the DLPC44xx GUI. The *Status* field looks as follows:

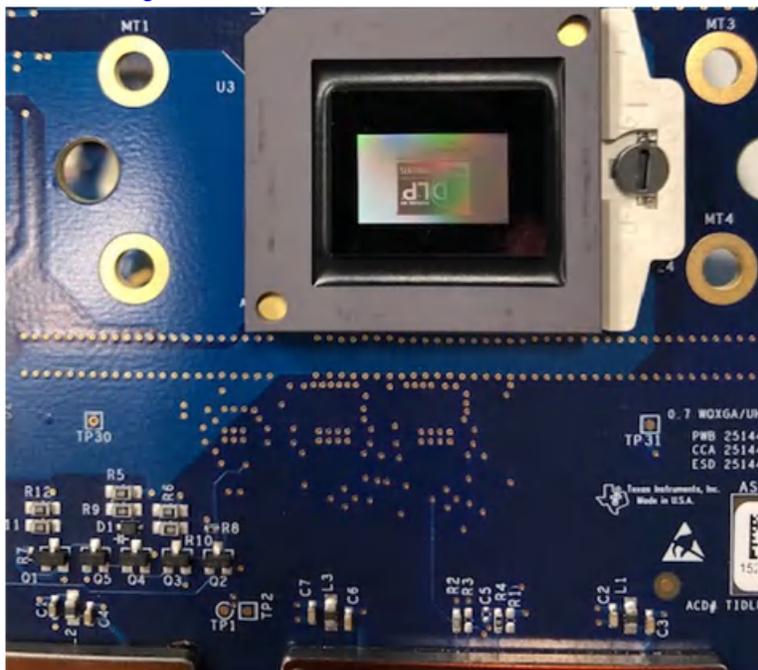


**Figure 2-12. Communication Between GUI and EVMs**

#### Note

If there is an issue with USB communication, then turn off DLPC4430EVM and disconnect then reconnect USB cable and power on board.

- d. Select *Start Download* to begin. The loading process takes about 2 minutes.
- e. After the download has completed, switch SW1 to *OFF* and switch the power to the unit under test (UUT) off. Remove the jumper on J8 from the DLPC4430EVM board.
- f. After removing the jumper, re-enable power to the DLPC4430EVM. Switch SW1 to the “On” position. A Red LED appears after a few seconds. The Red LED shuts off and a green LED begins blinking. After the blinking LED appears, the DLP Texas Instruments logo is visible on the DMD for a few seconds. The DMD appears as seen in [Figure 2-13](#):



**Figure 2-13. Splash Image Displayed on DMD**

Turn the switch back to the *OFF* position before connecting the USB cable to DLPC4430EVM. The power supply does not have to be disconnected before connecting the USB cable. Once the USB cable is connected to the DLPC4430EVM (and the PC), turn the switch on the DLPC4430EVM to the “on” position.

### 2.2.4 JTAG Flash Programming

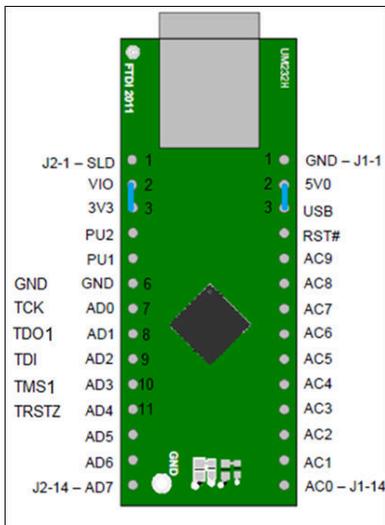
The JTAG Programmer Tool is included in the DLPC4420EVM-SW bundle, and allows a user to program the bootloader image into the flash using the JTAG boundary scan connector if, for example, the bootloader becomes corrupted and the board is rendered inoperable. The tool can also be used for updating the entire firmware image. Programming the entire firmware image using this method takes a long time and is suggested to program only the bootloader using this method. Following, the DLPC44xx GUI with a USB connection to upload the entire firmware image. The following steps are for programming only the bootloader image.

The JTAG Programmer Tool requires the UM232H module with modifications, which is manufactured by Future Technology Devices International Ltd (FTDI Chip), . The UM232H module can be purchased from Digi-key with the following part number: 768-1103-ND. The driver can be downloaded from the FTDI website ([www.ftdichip.com](http://www.ftdichip.com)). Select the VCP CDM WHQL Certified driver for Windows.

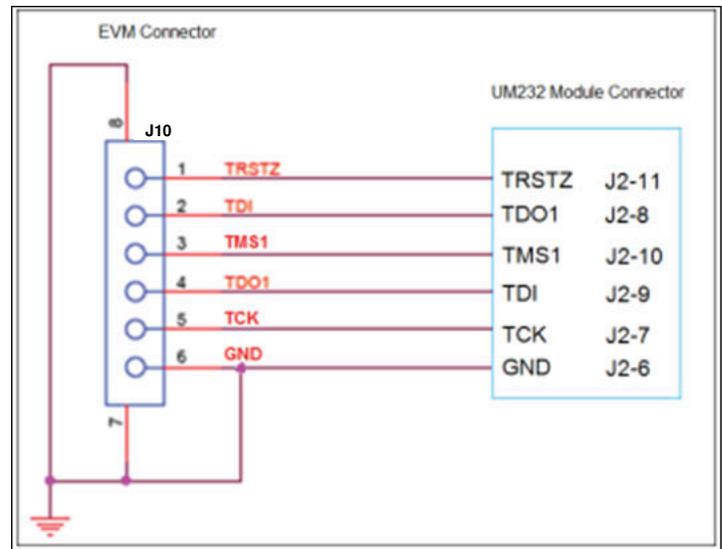
Make the following modifications to the UM232H and use [Figure 2-14](#) and [Figure 2-15](#) as a guide.

**Table 2-2. Connection Details**

UM232H Reference	Description	Connection Type
J1 Bus Power Configuration	Short J1 PIN #2 and PIN # 3	SYS POWER
J2 Bus Power Configuration	Short J2 PIN #2 and PIN #3	I/O POWER
J2-6	GND	POWER
J2-7	TCK	OUTPUT
J2-8	TDO1	OUTPUT
J2-9	TDI	INPUT
J2-10	TMS1	OUTPUT
J2-11	TRSTZ	OUTPUT



**Figure 2-14. UM232H Module**



**Figure 2-15. UM232H Wiring Diagram**

Choose the driver found in the CDM WHQL Certified zip folder and allow driver installation to complete. Install a jumper at J31 on the DLPC4420AEM and connect the JTAG signals at J37 on the DLPC4420AEM to the UM232H module as shown in [Figure 2-15](#). Finally, connect the UM232H to the PC with USB cable.

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**Note**

The JTAG programmer has a copy of the FlashDeviceParameters.txt file, which is located in the DLPC4420EVM-SW\JTAG\_Programmer\_Tool\DLPC44xx-JTAG directory of the DLPC4420AEVMSW-10.1.1 bundle. See [Section 2.2.5](#) for instructions on how to edit this file to match the flash. If the user has already made changes to the FlashDeviceParameters.txt file in the DLPC4420-SW\DLPC44xxGUI\_Files directory that work with the GUI, then the user can copy that file to the DLPC4420EVM-SW\JTAG\_Programmer\_Tool\DLPC44xx-JTAG directory.

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Please see the 'JTAG\_Bootloader\_Programming\_Guide.pdf' within the DLPC4420EVM-SW\JTAG\_Programmer\_Tool directory or follow the below instructions.

Start the Flash Programmer program and select the BoardFile.brd and the bootloader.bin included the install folder. Select USB as communication method from the Settings menu.

Power-up the EVM board and click the *Detect Chain* tool button. The tool detects the DLPC4420 in JTAG chain. On the EVM notice the **Green** LED (D8) lights up to confirm the DLPC4420 is currently connected.

On the Flash Programmer program, click the *Flash Info* button and confirm the correct flash part is detected by the tool. Using the *Flash Erase* button select the first sectors (to cover first 128 kilobytes) and erase these sectors.

Once sector erase is complete, set the *Start Address* (HEX) to 0x00000000 and set the *Size* (HEX) to 0x20000. Then click the *Program Flash* button, and then wait until write is complete.

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**Note**

Make sure that verify is 100% complete!

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Then, remove the UM232H connection at J37 and jumper at J31. Cycle the board power to the EVM. Finally, plug in a USB cable between the EVM and the PC and allow the PC to detect the EVM USB connection.

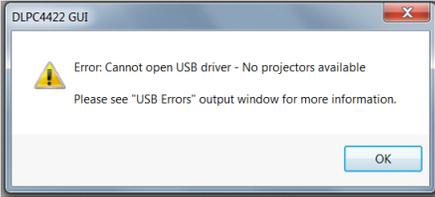
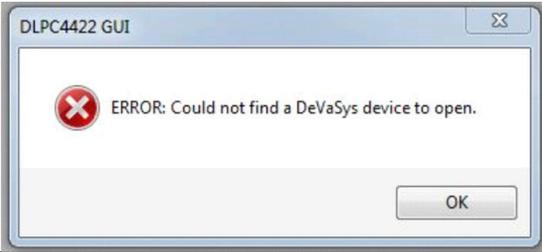
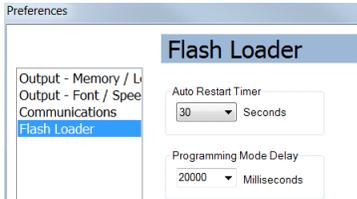
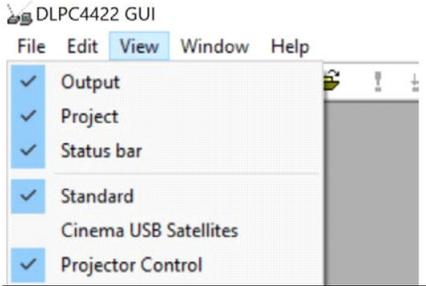
### 2.2.5 Flash Device Parameters

For EVM use with several different flash memory parts, the user can edit the FlashDeviceParameters.txt file to match the flash memory part that has been installed with the EVM. This file is located in the DLPC4430EVM-SW\DLPC44xxGUI\_Files of the DLPC4430EVM-SW bundle. An example with the ISSI IS29GL128P part is shown in [Figure 2-16](#) where the user comments out all lines EXCEPT for the top line which includes the chosen ISSI flash part. More detailed information can be found in the comments at the top of the text file.

```
Version, 3
// Flash Device Information.
// DDP442x
//
// Parameters that need to be setup:
//=====
// Mfg           = Company name.
// MfgId         = Manufacturer ID stored in part
// LMfgId        = Long version of Manufacturer ID stored in part
// Device        = Part number from data sheet.
// DevID         = Device ID stored in part.(short_id - see Note 1.)
// LDevID        = Long Device ID stored in part. (long_id - see Note 1.)
// MB            = size of device in MBits (4, 8, or 16 MBit)
// alg           = A, B or C programming algorithm (0, 1, or 2 - See Note 2.)
// Size          = Number of bytes total.
// #sec          = Number of sectors.
// Sector_Addresses = List of sector addresses.

// Mfg      MfgID  LMfgID,      Device  DevID  LDevID,      Mb Alg  Size #sec  Sector_Addresses
"ISSI",    0x009d, 0x000000000000009d, "IS29GL128P", 0x227E, 0x000022012221227E, 128, 0, 0x100000, 128, 0x0, 0x20000, 0x40000, 0x60000
BC0000, 0xBE0000, 0xC00000, 0xC20000, 0xC40000, 0xC60000, 0xC80000, 0xCA0000, 0xCC0000, 0xCE0000, 0xD00000, 0xD20000, 0xD40000, 0xD60000, 0xD80000, 0xDA0000, 0xDC0000, 0xDE0000, 0xE00000, 0xE20000, 0xE40000, 0xE60000, 0xE80000, 0xEA0000, 0xEC0000, 0xEE0000, 0xF00000, 0xF20000, 0xF40000, 0xF60000, 0xF80000, 0xFA0000, 0xFC0000, 0xFE0000, 0xFF0000, 0x000000, 0x020000, 0x040000, 0x060000, 0x080000, 0x0A0000, 0x0C0000, 0x0E0000, 0x100000, 0x120000, 0x140000, 0x160000, 0x180000, 0x1A0000, 0x1C0000, 0x1E0000, 0x200000, 0x220000, 0x240000, 0x260000, 0x280000, 0x2A0000, 0x2C0000, 0x2E0000, 0x300000, 0x320000, 0x340000, 0x360000, 0x380000, 0x3A0000, 0x3C0000, 0x3E0000, 0x400000, 0x420000, 0x440000, 0x460000, 0x480000, 0x4A0000, 0x4C0000, 0x4E0000, 0x500000, 0x520000, 0x540000, 0x560000, 0x580000, 0x5A0000, 0x5C0000, 0x5E0000, 0x600000, 0x620000, 0x640000, 0x660000, 0x680000, 0x6A0000, 0x6C0000, 0x6E0000, 0x700000, 0x720000, 0x740000, 0x760000, 0x780000, 0x7A0000, 0x7C0000, 0x7E0000, 0x800000, 0x820000, 0x840000, 0x860000, 0x880000, 0x8A0000, 0x8C0000, 0x8E0000, 0x900000, 0x920000, 0x940000, 0x960000, 0x980000, 0x9A0000, 0x9C0000, 0x9E0000, 0xA00000, 0xA20000, 0xA40000, 0xA60000, 0xA80000, 0xAA0000, 0xAC0000, 0xAE0000, 0xB00000, 0xB20000, 0xB40000, 0xB60000, 0xB80000, 0xBA0000, 0xBC0000, 0xBE0000, 0xC00000, 0xC20000, 0xC40000, 0xC60000, 0xC80000, 0xCA0000, 0xCC0000, 0xCE0000, 0xD00000, 0xD20000, 0xD40000, 0xD60000, 0xD80000, 0xDA0000, 0xDC0000, 0xDE0000, 0xE00000, 0xE20000, 0xE40000, 0xE60000, 0xE80000, 0xEA0000, 0xEC0000, 0xEE0000, 0xF00000, 0xF20000, 0xF40000, 0xF60000, 0xF80000, 0xFA0000, 0xFC0000, 0xFE0000, 0xFF0000, 0x000000, 0x020000, 0x040000, 0x060000, 0x080000, 0x0A0000, 0x0C0000, 0x0E0000, 0x100000, 0x120000, 0x140000, 0x160000, 0x180000, 0x1A0000, 0x1C0000, 0x1E0000, 0x200000, 0x220000, 0x240000, 0x260000, 0x280000, 0x2A0000, 0x2C0000, 0x2E0000, 0x300000, 0x320000, 0x340000, 0x360000, 0x380000, 0x3A0000, 0x3C0000, 0x3E0000, 0x400000, 0x420000, 0x440000, 0x460000, 0x480000, 0x4A0000, 0x4C0000, 0x4E0000, 0x500000, 0x520000, 0x540000, 0x560000, 0x580000, 0x5A0000, 0x5C0000, 0x5E0000, 0x600000, 0x620000, 0x640000, 0x660000, 0x680000, 0x6A0000, 0x6C0000, 0x6E0000, 0x700000, 0x720000, 0x740000, 0x760000, 0x780000, 0x7A0000, 0x7C0000, 0x7E0000, 0x800000, 0x820000, 0x840000, 0x860000, 0x880000, 0x8A0000, 0x8C0000, 0x8E0000, 0x900000, 0x920000, 0x940000, 0x960000, 0x980000, 0x9A0000, 0x9C0000, 0x9E0000, 0xA00000, 0xA20000, 0xA40000, 0xA60000, 0xA80000, 0xAA0000, 0xAC0000, 0xAE0000, 0xB00000, 0xB20000, 0xB40000, 0xB60000, 0xB80000, 0xBA0000, 0xBC0000, 0xBE0000, 0xC00000, 0xC20000, 0xC40000, 0xC60000, 0xC80000, 0xCA0000, 0xCC0000, 0xCE0000, 0xD00000, 0xD20000, 0xD40000, 0xD60000, 0xD80000, 0xDA0000, 0xDC0000, 0xDE0000, 0xE00000, 0xE20000, 0xE40000, 0xE60000, 0xE80000, 0xEA0000, 0xEC0000, 0xEE0000, 0xF00000, 0xF20000, 0xF40000, 0xF60000, 0xF80000, 0xFA0000, 0xFC0000, 0xFE0000, 0xFF0000, 0x000000, 0x020000, 0x040000, 0x060000, 0x080000, 0x0A0000, 0x0C0000, 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0xB60000, 0xB80000, 0xBA0000, 0xBC0000, 0xBE0000, 0xC00000, 0xC20000, 0xC40000, 0xC60000, 0xC80000, 0xCA0000, 0xCC0000, 0xCE0000, 0xD00000, 0xD20000, 0xD40000, 0xD60000, 0xD80000, 0xDA0000, 0xDC0000, 0xDE0000, 0xE00000, 0xE20000, 0xE40000, 0xE60000, 0xE80000, 0xEA0000, 0xEC0000, 0xEE0000, 0xF00000, 0xF20000, 0xF40000, 0xF60000, 0xF80000, 0xFA0000, 0xFC0000, 0xFE0000, 0xFF0000, 0x000000, 0x020000, 0x040000, 0x060000, 0x080000, 0x0A0000, 0x0C0000, 0x0E0000, 0x100000, 0x120000, 0x140000, 0x160000, 0x180000, 0x1A0000, 0x1C0000, 0x1E0000, 0x200000, 0x220000, 0x240000, 0x260000, 0x280000, 0x2A0000, 0x2C0000, 0x2E0000, 0x300000, 0x320000, 0x340000, 0x360000, 0x380000, 0x3A0000, 0x3C0000, 0x3E0000, 0x400000, 0x420000, 0x440000, 0x460000, 0x480000, 0x4A0000, 0x4C0000, 0x4E0000, 0x500000, 0x520000, 0x540000, 0x560000, 0x580000, 0x5A0000, 0x5C0000, 0x5E0000, 0x600000, 0x620000, 0x640000, 0x660000, 0x680000, 0x6A0000, 0x6C0000, 0x6E0000, 0x700000, 0x720000, 0x740000, 0x760000, 0x780000, 0x7A0000, 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0x420000, 0x440000, 0x460000, 0x480000, 0x4A0000, 0x4C0000, 0x4E0000, 0x500000, 0x520000, 0x540000, 0x560000, 0x580000, 0x5A0000, 0x5C0000, 0x5E0000, 0x600000, 0x620000, 0x640000, 0x660000, 0x680000, 0x6A0000, 0x6C0000, 0x6E0000, 0x700000, 0x720000, 0x740000, 0x760000, 0x780000, 0x7A0000, 0x7C0000, 0x7E0000, 0x800000, 0x820000, 0x840000, 0x860000, 0x880000, 0x8
```

## 2.2.6 Troubleshooting

Problem	Possible Resolutions
<p style="text-align: center;">USB Communication Error</p>  <p style="text-align: center;"><b>Figure 2-17. USB Communication Error</b></p>	<p>Verify the correct communication settings have been applied. Make sure the USB cable is connected both to the projector and computer.</p>
<p style="text-align: center;">I2C communication error</p>  <p style="text-align: center;"><b>Figure 2-18. I2C communication error</b></p>	<p>Verify the correct communication settings have been applied. Make sure a DeVasys box and the appropriate USB and I2C cables are connected.</p>
<p style="text-align: center;">Programming Mode error</p>  <p style="text-align: center;"><b>Figure 2-19. Programming Mode error</b></p>	<p>Please check your connection settings and try again.</p> <p style="text-align: center;"><b>Note</b></p> <p>If this occurs only occasionally, then increase the programming delay to 20000 ms.</p>  <p style="text-align: center;"><b>Figure 2-20. Device Programming Delay Increase</b></p>
<p style="text-align: center;">Tool bars or panels missing</p>	 <p style="text-align: center;"><b>Figure 2-21. Toolbar and Panel Display Settings</b></p>

If communication with the EVM has been lost, then consider re-flashing the bootloader following the JTAG Flash Programming Guide found within the Software package: [Section 2.2.4](#).

### 3 Hardware

#### 3.1 Connections

This chapter introduces all the connections and test points available on the DLPC4430EVM, DLP780NEEVM, DLP800REEVM, DLP470NEEVM, DLP480REEVM, DLP550HEEVM, DLP550JEEVM, DLP650LEEVM, DLP650NEEVM, and DLP670REEVM.

##### 3.1.1 DLPC4430EVM Connections

Figure 3-1 depicts the switches and connectors with their respective locations. Note that neither cables nor the power supply is included with the module.

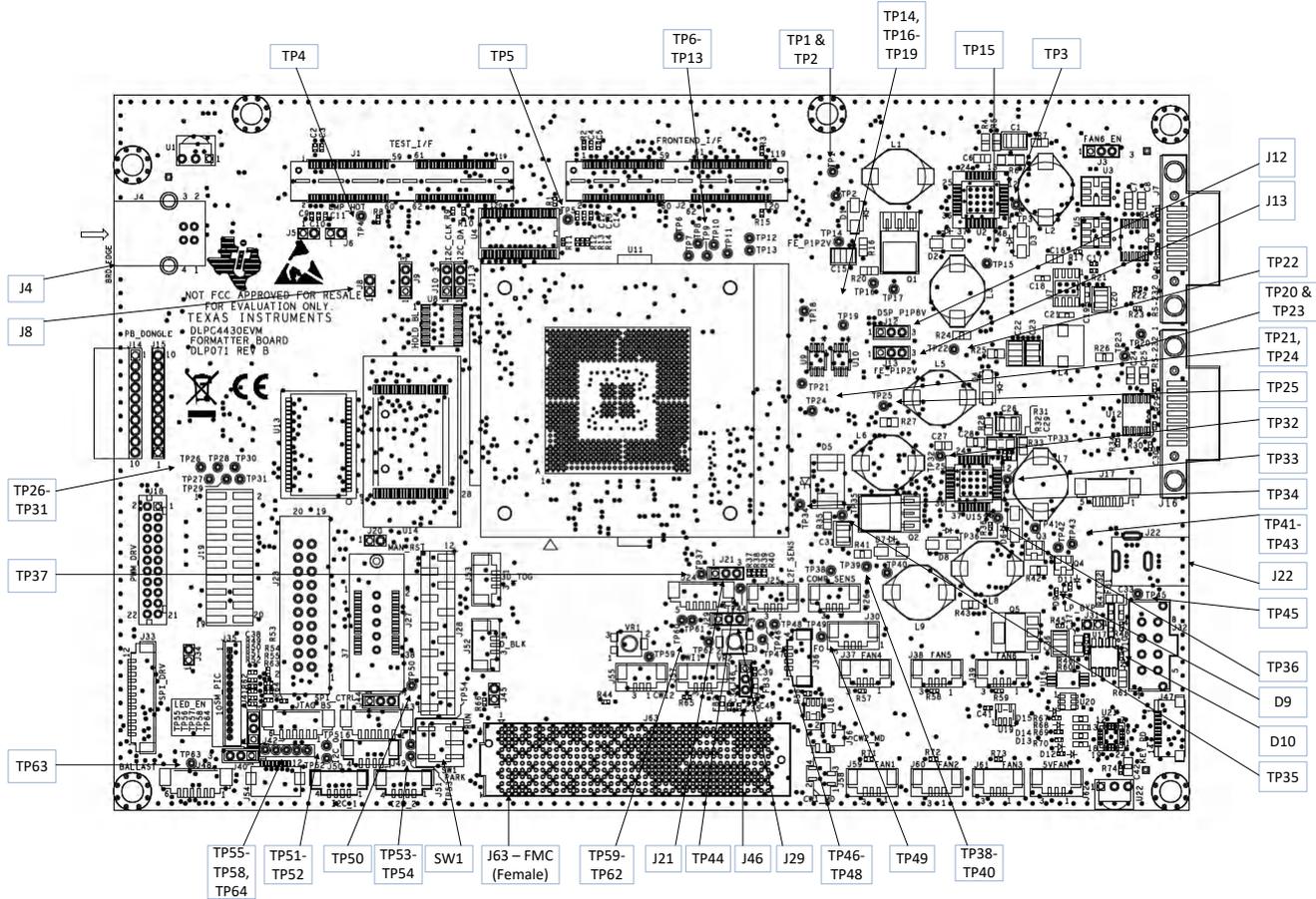


Figure 3-1. DLPC4430EVM Connectors (Top View)

### 3.1.1.1 DLPC4430EVM Connectors

**Table 3-1. Connectors**

Reference Designator	Description	Physical Connection Type
J1	Test_I/F	Connector
J2	Frontend_I/F	Connector
J3	Fan_5/6_Selection	Jumper selection
J4	Mini-USB	Cable
J5	Memory Bus Selection	Jumper (short)
J6	Lamp_state	Jumper (short)
J7	RS_232_0	Cable
J8	HOLD_BL	Jumper (short)
J9	Red LED enable or Lamp Ballast	Jumper selection
J10	Daughter Card I2C Clock	Jumper selection
J11	Daughter Card I2C Data	Jumper selection
J12	Front-end DSP Power	Jumper selection
J13	Front-end Power	Jumper selection
J14	Point Blank Dongle (Right Angle)	Header
J15	Point Blank Dongle	Header
J16	RS_232_1	Cable
J17	MSP430 Communication	Cable
J18	PWM SSI Driver I/F	Cable
J19	LED Test points	Header
J20	Manual Reset Jumper	Jumper (short)
J21	Controller Sensor selection	Jumper selection
J22	12 V Input	Power (Barrel)
J23	ASIC JTAG	Cable
J24	Point Blank/IR	Cable
J25	L2F_Sens	Cable
J26	Comp_Sens	Cable
J27	ARM Port	Cable
J28	Test point MUX	Header
J29	Controller Sensor selection (Continued)	Jumper selection
J30	AC Ballast	Cable
J31	Low-power Bypass	Jumper (short)
J32	Ext_Power	Cable
J33	SPI_DRV	Cable
J34	Lamp_Control	Jumper (short)
J35	SM_PIC	Cable
J36	Formatter Only I/F	Cable
J37	FAN #4	Cable
J38	FAN #5	Cable
J39	FAN #6	Cable
J40	Blue_LED_EN / Lamp Mode	Jumper selection
J41	LED_EN	Cable

**Table 3-1. Connectors (continued)**

Reference Designator	Description	Physical Connection Type
J42	JTAG Boundary Scan	Cable
J43	SSI SPI Control	Cable
J44	SSP2/LED_DIN	Jumper selection
J45	Bus_Mode	Jumper (short)
J46	DMD Current Selection	Cable
J47	Keyboard Interface	Cable
J48	L2F_Sens	Cable
J49	SSI SPI Control	Cable
J52	D_BLK	Cable
J53	3D_TOG	Cable
J54	ADC Integrating Sensor Board I/F	Cable
J55	Colorwheel #2 Index Sensor	Cable
J56	Colorwheel #2 motor drive	Cable
J57	Colorwheel #1 Index Sensor	Cable
J58	Colorwheel #1 motor drive	Cable
J59	FAN #1	Cable
J60	FAN #2	Cable
J61	FAN #3	Cable
J62	5 V FAN	Cable
J63	FMC Connector	CableBlue_LED_EN / Lamp Mode

### 3.1.1.2 DLPC4430EVM Test Points

Reference Designator	Description
TP1	ALF_HSYNC
TP2	ALF_VSYNC
TP3	CW_PWM2/SPD4
TP4	EXT_ARSTZ
TP5	HDMI_CEC
TP6	P_CLK1
TP7	P2_HSYNC
TP8	P_CLK2
TP9	P_DATAEN2
TP10	P2_HSYNC
TP11	P_CLK3
TP12	P1_VSYNC
TP13	P_DATAEN1
TP14	1.2V SWREG
TP15	MTR_ARSTZ
TP16	2.5V SWREG (PMD2)
TP17	1.8V SWREG (PMD2)
TP18	HDMI_INT
TP19	P2_VSYNC
TP20	3.3V REG (Low-power)
TP21	POINTBLANK_INDEX
TP22	LAMPCONTROL
TP23	3.3V (External)
TP24	ALF_HSYNC
TP25	5 V
TP26	SSP1_CLK
TP27	SSP1_DO
TP28	SSP1_DI
TP29	SSP1_CSZ0
TP30	PACKET_READY
TP31	PLUG_DETECT
TP32	1.8V REG
TP33	CW_PWM1
TP34	SSP0_CSZ3
TP35	1.1V SWREG
TP36	GND
TP37	SSP0_CSZ1
TP38	ADC_RST/COMP_PWM
TP39	2.5V SWREG
TP40	1.8V
TP41	SSP0_CSZ2
TP42	3.3V SWREG
TP43	12V_FIL
TP44	SSP0_CSZ0
TP45	12V_SOURCE
TP46	SSP0_CLK

Reference Designator	Description
TP47	DADSTRB
TP48	SSP0_TXD
TP49	SSP0_RXD
TP50	SSP2/LED_DIN
TP51	LED_DIR
TP52	LED_OE
TP53	LED_DOUT
TP54	LED_SCLK
TP55	ADC_RST/COMP_PWM
TP56	ADC_SCLK
TP57	ADC_SDIN
TP58	ADC_SDO
TP59	CW2_Potentiometer
TP60	CW_INDEX2
TP61	CW_INDEX1
TP62	CW1_Potentiometer
TP63	LAMPLITZ_FILTER
TP64	ADC_CSZ

### 3.1.2 DLP780NEEVM/DLP800REEVM Connections

Figure 3-2 depicts the switches and connectors with their respective locations.

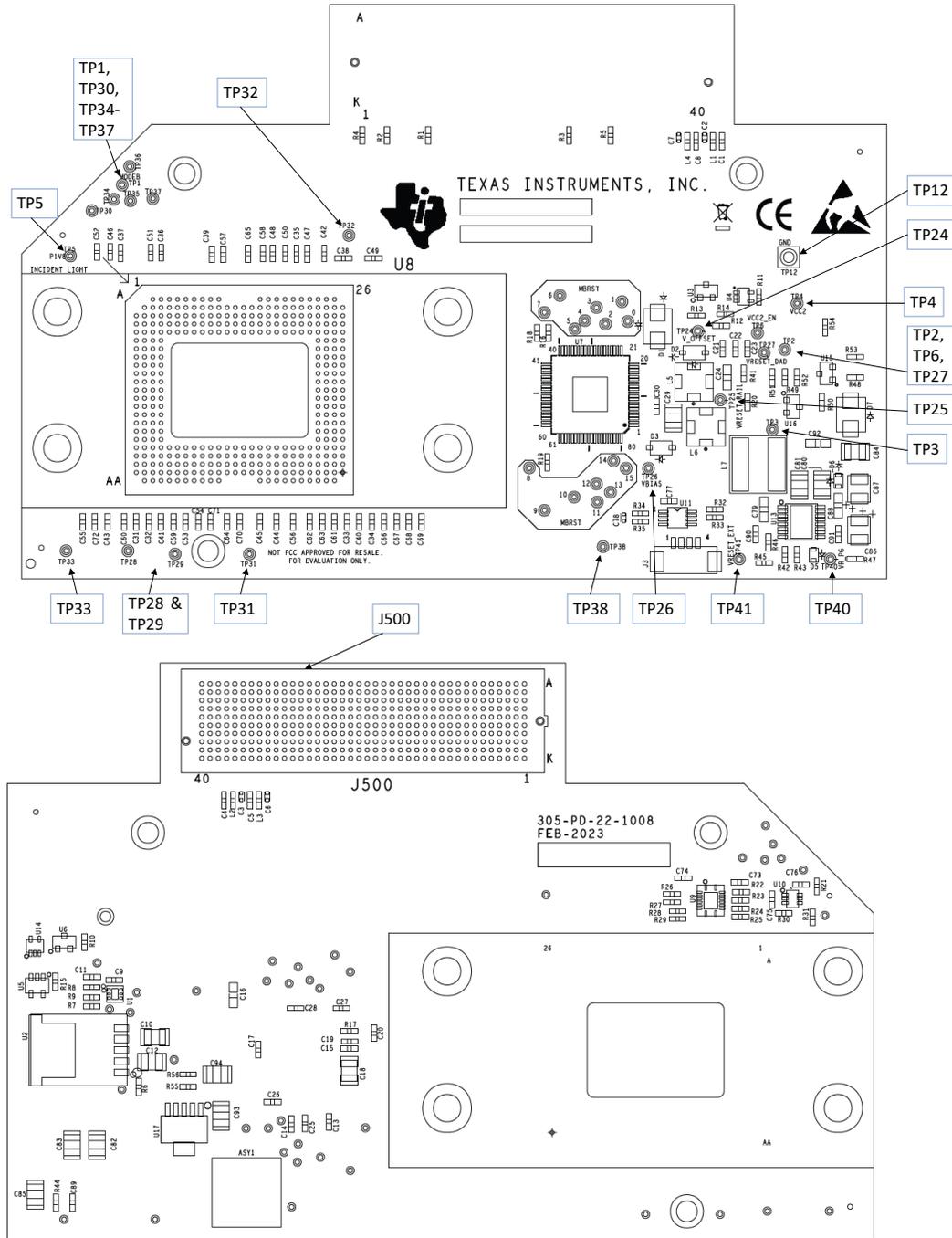


Figure 3-2. DLP780NEEVM/DLP800REEVM Test Points and Connectors

#### 3.1.2.1 DLP780NEEVM/DLP800REEVM Connectors

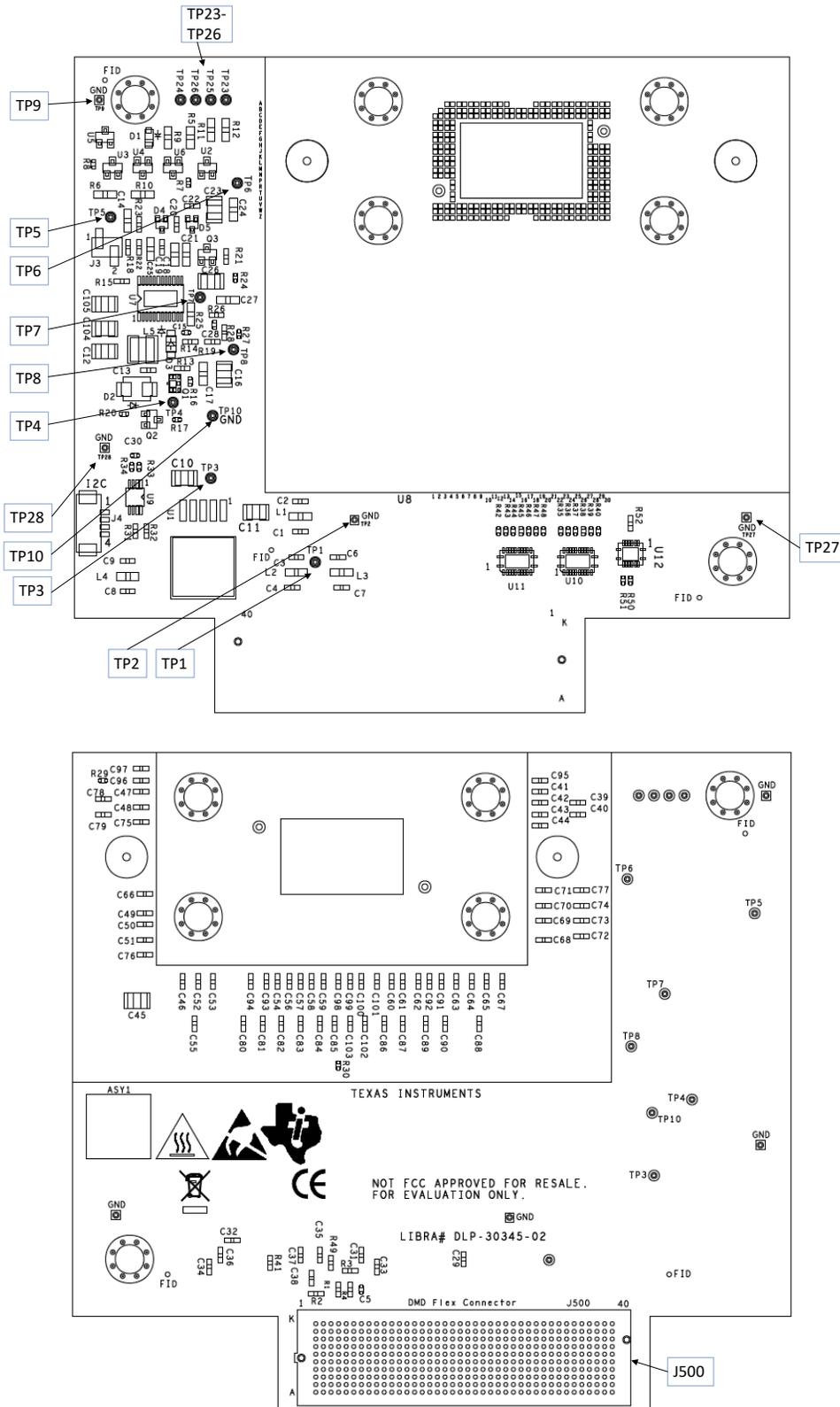
Reference Designator	Description	Physical Connection Type
J3	I2C	Cable
J500	FMC Connector	Cable

### 3.1.2.2 DLP780NEEVM/DLP800REEVM Test Points

Reference Designator	Description
TP1	DMD Mode
TP2	DMD_P3V3
TP3	DMD_P3V3
TP4	VCC2
TP5	DMD_P1V8
TP6	VCC2_EN
TP7	MBRST15
TP8	MBRST14
TP9	MBRST13
TP10	MBRST12
TP11	MBRST11
TP12	GND
TP13	MBRST10
TP14	MBRST9
TP15	MBRST8
TP16	MBRST7
TP17	MBRST6
TP18	MBRST5
TP19	MBRST4
TP20	MBRST3
TP21	MBRST2
TP22	MBRST1
TP23	MBRST0
TP24	V_OFFSET
TP25	VRESET_RAIL
TP26	VBIAS
TP27	VRESET_DAD
TP30	PROG_FUSE_EN
TP33	SCP_TEST_MUX
TP37	TEMP_ALERT
TP38	THERMAL_FLAG
TP41	VRESET_EXT

### 3.1.3 DLP470NEEVM/DLP480REEVM Connections

Figure 3-3 depicts the switches and connectors with their respective locations.



**Figure 3-3. DLP470NEEVM/DLP480REEVM Test Points and Connectors**

### 3.1.3.1 DLP470NEEVM/DLP480REEVM Connectors

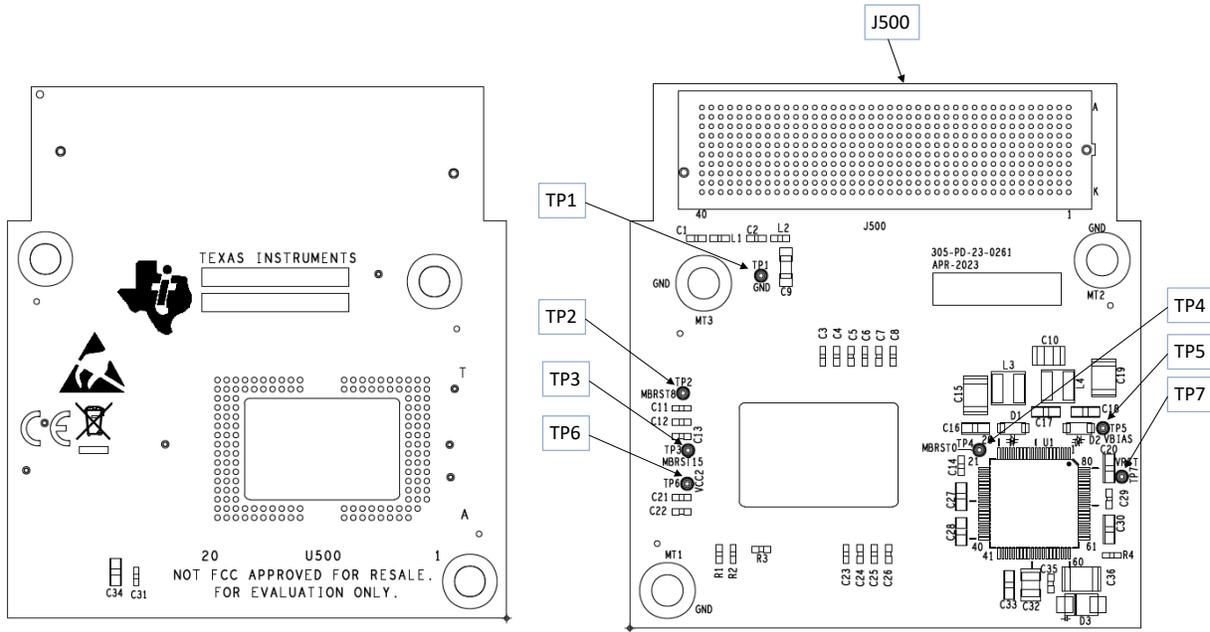
Reference Designator	Description	Physical Connection Type
J4	I2C	Cable
J500	FMC Connector	Cable

### 3.1.3.2 DLP470NEEVM/DLP480REEVM Test Points

Reference Designator	Description
TP1	DMD_P3P3V
TP2	GND
TP3	DMD_P1P8V
TP4	VOFFSET
TP5	EN_OFFSET
TP6	VRESET
TP7	VBIAS
TP8	PG_OFFSET
TP9	GND
TP10	GND
TP23	BIST_A
TP24	BIST_B
TP25	BIST_C
TP26	BIST_D
TP27	GND
TP28	GND

### 3.1.4 DLP550HEEVM/DLP550JEEVM/DLP650LEEVM Connections

Figure 3-4 depicts the switches and connectors with their respective locations.



**Figure 3-4. DLP550HEEVM/DLP550JE/DLP650LE Test Points and Connectors**

#### 3.1.4.1 DLP550HEEVM/DLP550JEEVM/DLP650LEEVM Connectors

Reference Designator	Description	Physical Connection Type
J500	FMC Connector	Cable

#### 3.1.4.2 DLP550HEEVM/DLP550JEEVM/DLP650LEEVM Test Points

Reference Designator	Description
TP1	GND
TP2	MBRST8
TP3	MBRST15
TP4	MBRST0
TP5	VBIAS
TP6	VCC2
TP7	VRESET

### 3.1.5 DLP650NEEVM/DLP670REEVM Connections

Figure 3-5 depicts the switches and connectors with their respective locations.

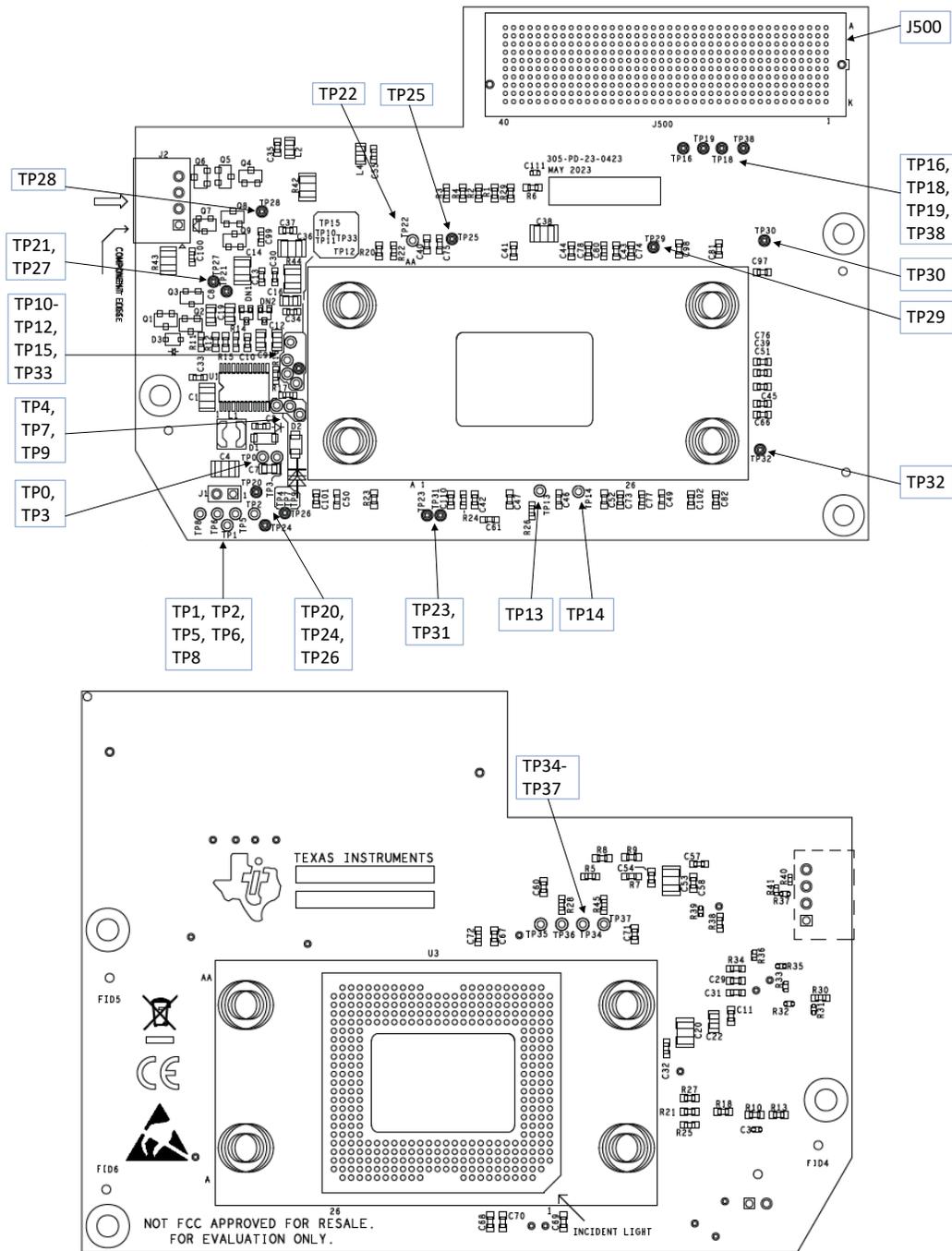


Figure 3-5. DLP650NEEVM/DLP670REEVM Test Points and Connectors

### 3.1.5.1 DLP650NEEVM/DLP670REEVM Connectors

Reference Designator	Description	Physical Connection Type
J1	3.3V to EN_OFFSET	Jumper (short)
J2	Power (Ext)	Cable (Unpopulated)
J500	FMC Connector	Cable

### 3.1.5.2 DLP650NEEVM/DLP670REEVM Test Points

Reference Designator	Description
TP[0:15]	MBRST[0:15]
TP16	DMDSPARE0
TP18	SSP_DAD2CSZ
TP19	SSP_DAD1CSZ
TP20	VOFFSET
TP21	VRESET
TP22	BIST_A
TP23	BIST_B
TP24	TEMP
TP25-TP32	GND
TP33	VBIAS
TP34	M_SSP1_CLK
TP35	M_SSP1_TXD
TP36	M_SSP1_CSZ0
TP37	M_SSP1_RXD
TP38	MODE_B

## 3.2 Power Supply Requirements

### 3.2.1 External Power Supply Requirements

The DLPC4430EVM does not include a power supply. The external power supply requirements are:

- Nominal voltage: 12-V DC -5%/+10%
- Maximum Output Current: 7 A
- DC connector size:
  - Inner diameter: 2.5 mm
  - Outer diameter: 5.5 mm
  - Shaft: 9.5-mm female, center positive
- Efficiency level: V
- A recommended power supply is
- [Digi-Key part number 993-1009-ND](#), or equivalent

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#### Note

External Power Supply Regulatory Compliance Certifications: Recommend selection and use of an external power supply, which meets TI's required minimum electrical ratings in addition to complying with applicable regional product regulatory and safety certification requirements such as (by example) UL, CSA, VDE, CCC, PSE, and so forth.

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## 4 Hardware Design Files

### 4.1 Schematics

Please see design files referenced in controller or associated DMD on the product page of [DLPC4430EVM](#).

### 4.2 PCB Layouts

Please see design files referenced in controller or associated DMD on the product page of [DLPC4430EVM](#).

### 4.3 Bill of Materials (BOM)

Please see design files referenced in controller or associated DMD on the product page of [DLPC4430EVM](#).

## 5 Additional Information

### 5.1 If You Need Assistance

Refer to the [DLP E2E Community support forums](#).

### 5.2 Caution Labels

**CAUTION**



The kit contains ESD-sensitive components.  
Handle with care to prevent permanent damage.

**WARNING**



Eye or skin irritation can result from exposure. Use appropriate shielding. Do not look at the operating lamp. Eye injury can result.

### Trademarks

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## 6 Related Documentation

DLP550HE Data Sheet: DLP550HE Digital Micromirror Device (DMD), [DLPS238](#)  
DLP550JE Data Sheet: DLP550JE Digital Micromirror Device (DMD), [DLPS101](#)  
DLP650LE Data Sheet: DLP650LE Digital Micromirror Device (DMD), [DLPS095](#)  
DLP470NE Data Sheet: DLP470NE Digital Micromirror Device (DMD), [DLPS159](#)  
DLP480RE Data Sheet: DLP480RE Digital Micromirror Device (DMD), [DLPS160](#)  
DLP650NE Data Sheet: DLP650NE Digital Micromirror Device (DMD), [DLPS097](#)  
DLP670RE Data Sheet: DLP670RE Digital Micromirror Device (DMD), [DLPS241](#)  
DLP780NE Data Sheet: DLP780NE Digital Micromirror Device (DMD), [DLPS188](#)  
DLP800RE Data Sheet: DLP800RE Digital Micromirror Device (DMD), [DLPS209](#)  
DLPC4430 Data Sheet: DLPC4430 DLP Display Controller, [DLPS036](#)  
DLPA100 Data Sheet: DLPA100 Power Management and Motor Driver, [DLPS040](#)  
DLPA200 Data Sheet: DLPA200 DLP DMD Driver, [DLPS015](#)  
DLPA300 Data Sheet: DLPA300 DLP HEP DMD Driver, [DLPS227](#)  
TPS65145 Data Sheet: TPS65145 Triple Output LCD Supply with Linear Regulator and Power, [DLPS053](#)

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