DLP3030-Q1 Electronics EVM
DLP3030Q1EVM

User's Guide

Literature Number: DLPU056
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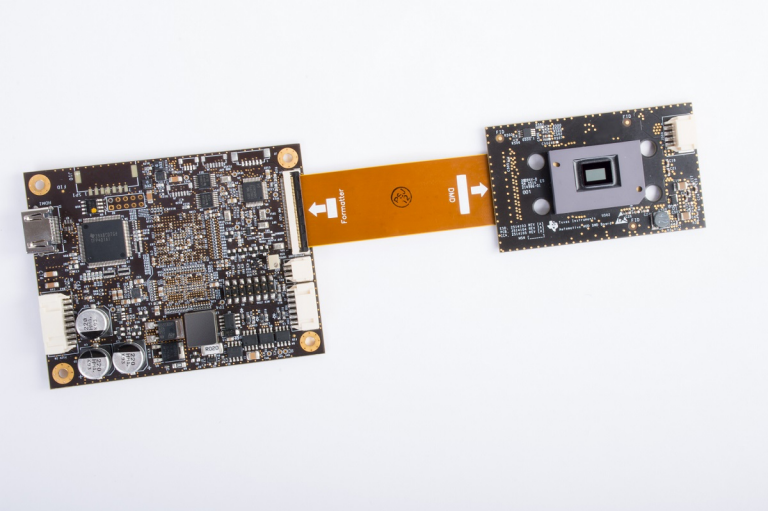
Introduction

1.1 EVM Overview

The DLP3030Q1EVM evaluation module (EVM) is a complete electronic subsystem designed to drive the DLP3030-Q1 automotive chipset. The DLP3030-Q1 chipset consists of a 0.3-in WVGA (854 × 480) DMD and the DLPC120-Q1 digital controller. When combined with illumination and projection optics, RGB LEDs and a photodiode, this EVM can be used to develop an automotive grade TI DLP® projector, or picture generation unit (PGU), for applications such as head-up display (HUD) or interior projection systems.

The EVM's major functional blocks include the DLP3030-Q1 chipset, LED control and drive circuitry, and power management. Except for the DMD, there are no optical elements provided with this EVM. It is expected that this EVM is procured in order to mount to a custom designed PGU.

The EVM runs off of a nominal 12-V supply (not provided; see Section 2.3 for details) and accepts an HDMI input video interface.



1.2 Warnings

CAUTION

Caution Hot surface.

Contact may cause burns.

Do not touch.

1.3 Specifications

Table 1-1. Performance Specifications

Resolution	WVGA (864 × 480)
Video Input	HDMI
Control Interface	SPI (via Cheetah USB to SPI adapter)

Table 1-2. Power Specifications

PARAMETER	TEST CONDITIONS	MIN	NOM	MAX	UNIT
Vbatt Input Voltage		6	12	18	V
Power Consumption	Q8WP RGB LEDs operating at 70/30 DMD duty cycle	2(1)	5.6(2)	13.9(3)	W

(1) This value defines minimum white-balanced brightness setting. With LEDs off, power consumption drops to 1.44 W.
(2) Produces 15,000 cd/m^2 on DLP3030CHUDQ1EVM or 32 lumens on DLP3030PGUQ1EVM.
(3) Produces 34,000 cd/m^2 on DLP3030CHUDQ1EVM or 70 lumens on DLP3030PGUQ1EVM.

Table 1-3. Temperature Specifications

PARAMETER	MIN	NOM	MAX	UNIT
Operational Ambient Temperature Range	–40		105	°C
Storage Ambient Temperature Range	–40		105	°C

1.4 Kit Contents

Table 1-4. DLP3030Q1EVM Kit Contents

ITEM NO.	ITEM
1	DMD Interface Board
2	Formatter Controller Board
3	Total Phase Cheetah USB to SPI Adapter
4	3-in DMD Ribbon Cable (2×)
5	Photodiode Cable
6	RGB LED Power and Thermistor Cable
7	Cheetah SPI Interface Cable
8	Power Input Cable
9	6-ft HDMI cable

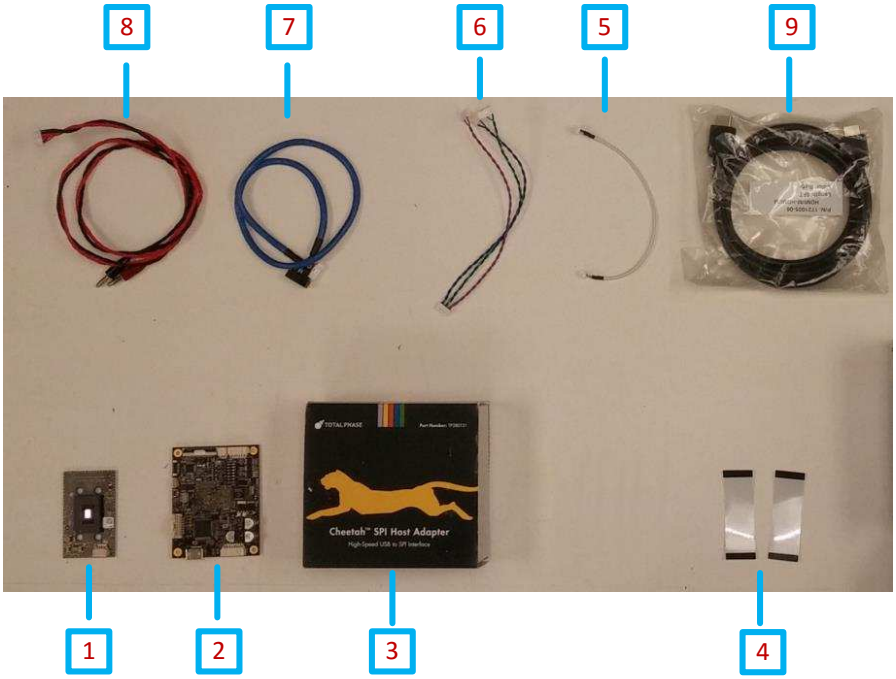


Figure 1-1. DLP3030Q1EVM Kit Contents

1.5 Electronic Boards Overview

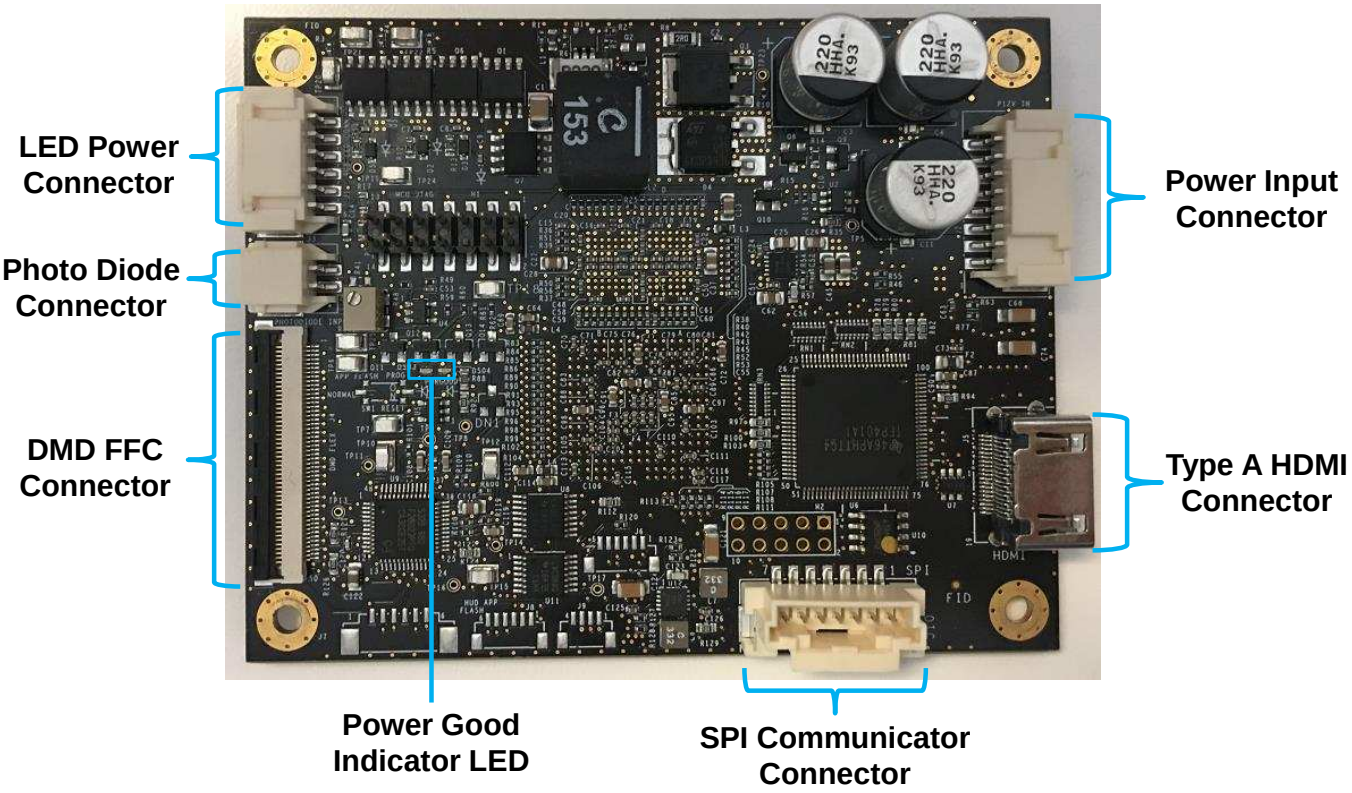


Figure 1-2. Formatter Controller Board Front

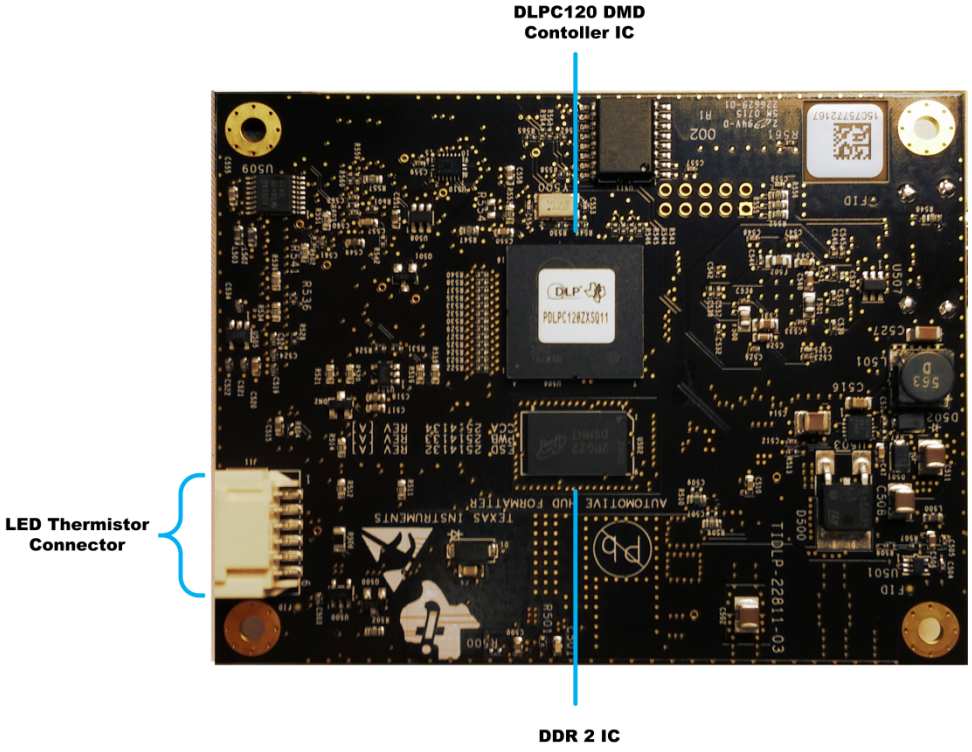


Figure 1-3. Formatter Controller Board Back

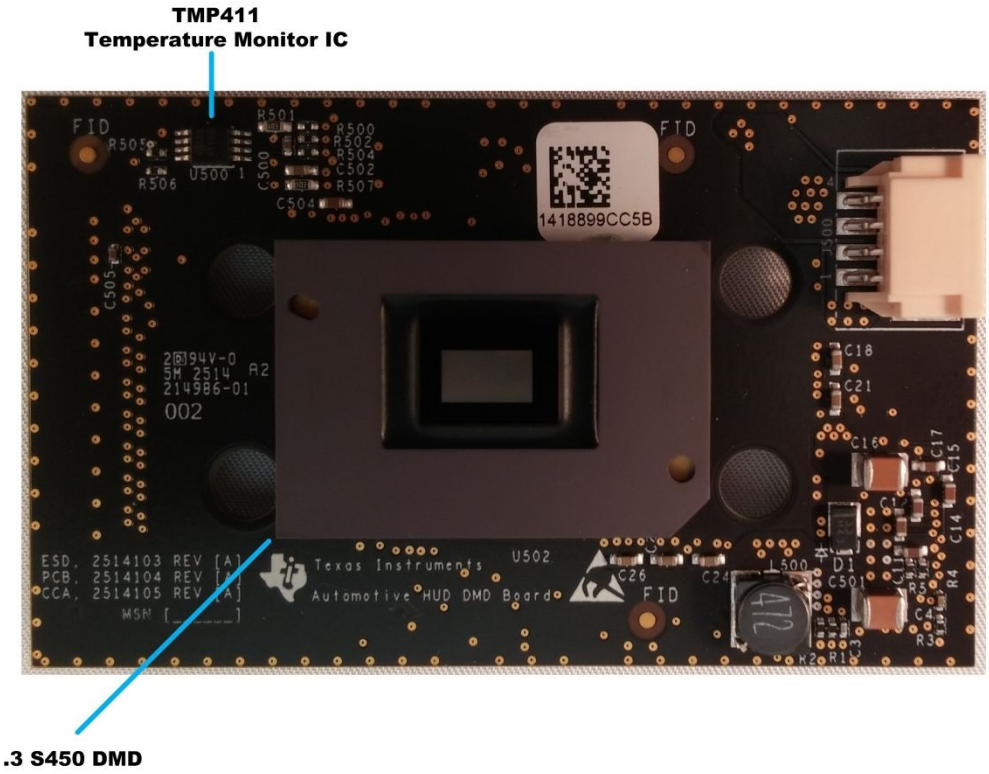


Figure 1-4. DMD Interface Board Front

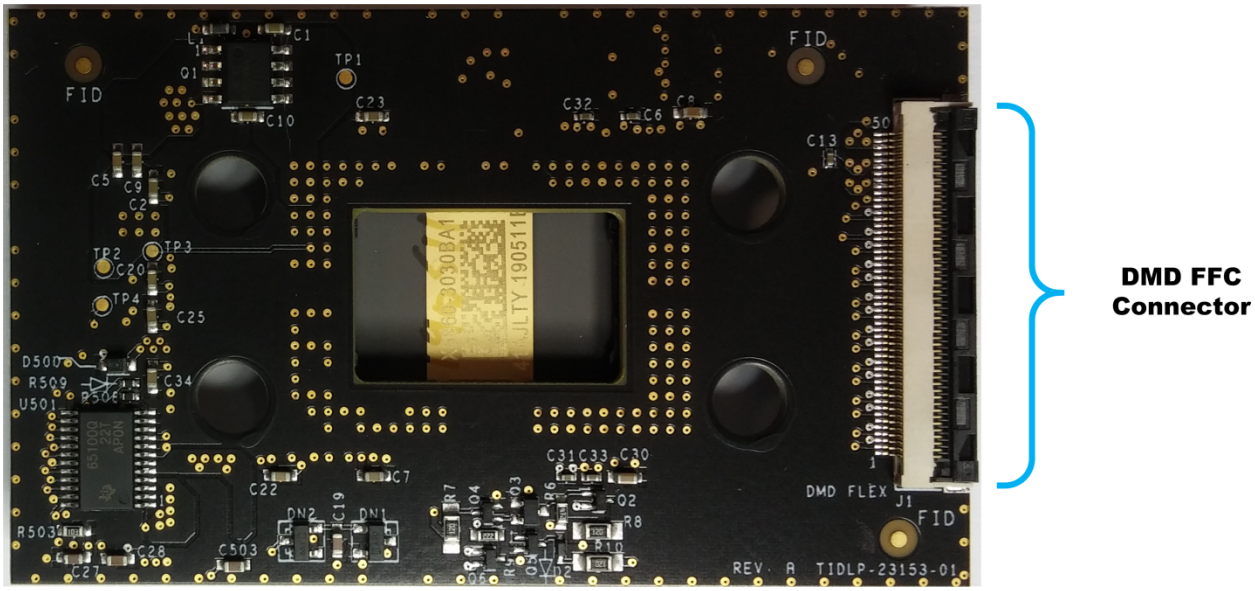


Figure 1-5. DMD Interface Board Back

Getting Started

2.1 Section Overview

This section will provide step-by-step instructions to power on the electronics and display an image on the DMD. The customer is responsible for mounting these electronics to a custom designed optical engine in order to create a complete projector.

2.2 Kit Assembly

Table 2-1. Required Tools and Items

ITEM NO.	ITEM
1	12 V @ 3-A Power Supply

2.2.1 Instructions to Assemble EVM

- Install the DMD Ribbon Cable between the DMD Board and the Formatter Board, ensuring that it is inserted evenly across the entire connector, as shown on the right in Figure 2-1.

  Note: This connector has a latch that must be lifted when installing the cable and then clamped down to secure its position.

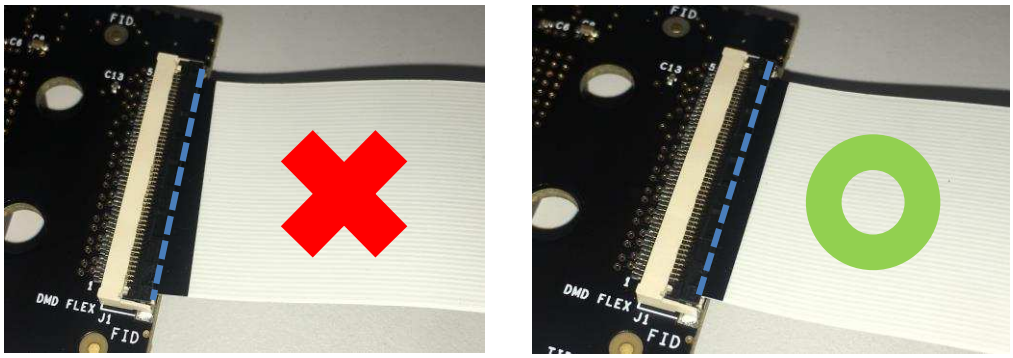


Figure 2-1. DMD Flex Cable Installation Alignment

- Install the HDMI cable into the HDMI Connector on the Formatter Board.

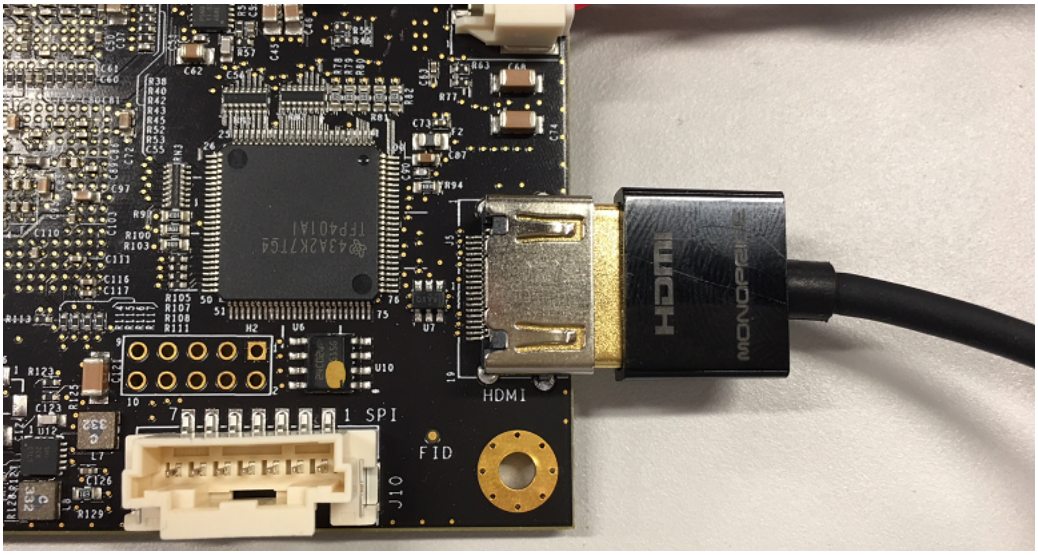


Figure 2-2. Installation of HDMI Cable into Formatter Board

- Install the Power Cable into the Power Input Connector on the Formatter Board.

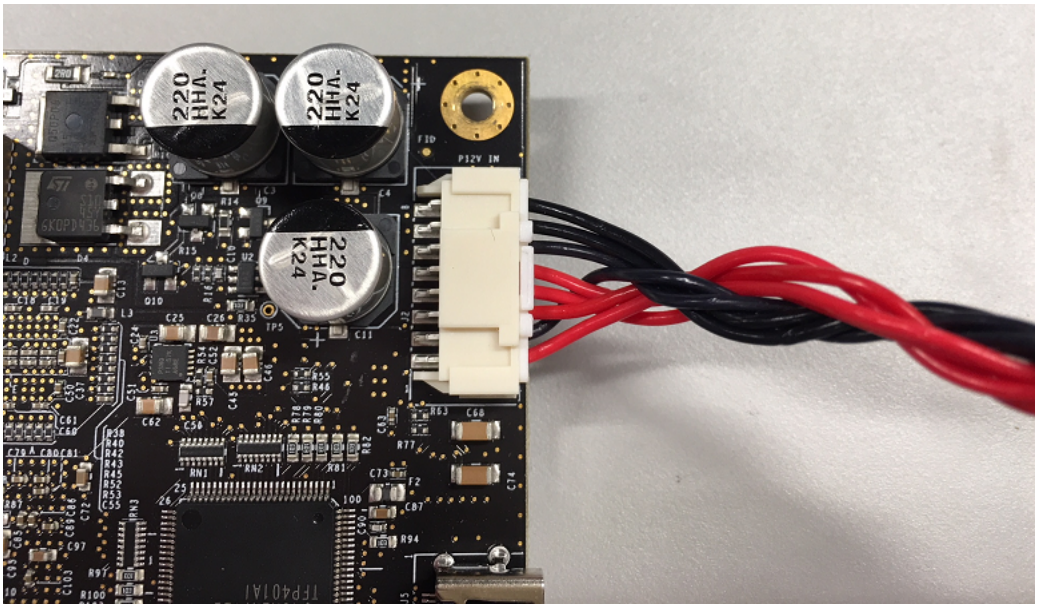


Figure 2-3. Installation of Power Cable into Formatter Board

- It is expected that this EVM will be mounted to a customer-supplied projector, or picture generation unit (PGU). This guide does not address the PGU mounting instructions. Refer to Figure 1-2 and Figure 1-3 for the location of the connectors on the formatter boards, and please use caution to get these connections correct on the PGU.
- Continue to Section 2.3 for instructions on how to power up the system.

2.3 First Power Up

Instructions to Power on HUD Package

- Procure a 12-V (3-A) supply.
- Power off the supply.
- Install the banana connectors on the Power Input Cable into the power supply. The red cable goes to the V+ terminal, and the black cable goes to the V– terminal.
- Power on the supply.
- Once the system is powered up, a green indicator light on the Formatter Board will illuminate, and the computer will detect an additional display called DLP_WVGA. See Figure 1-2 to locate the indicator LED.
- If the PC is trying to duplicate the image on the EVM and the monitor, then the PC resolution can be changed. To fix this, change the PC's external monitor setting to "Extend."
  - Press "Windows + P" key combination, then select "Extend" as shown in Figure 2-4.

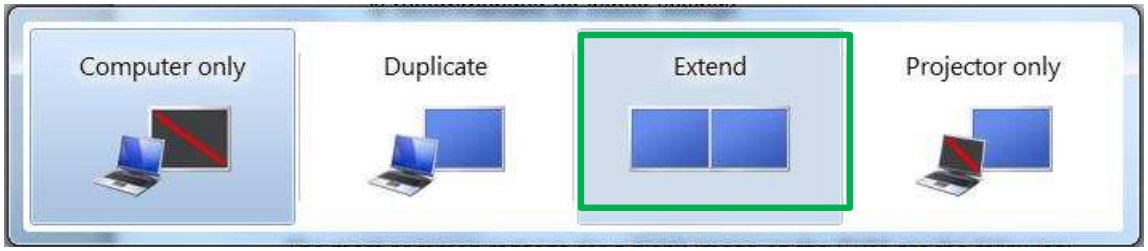


Figure 2-4. PC Video Output Mode Configuration

- The EVM will now be displaying the video content.

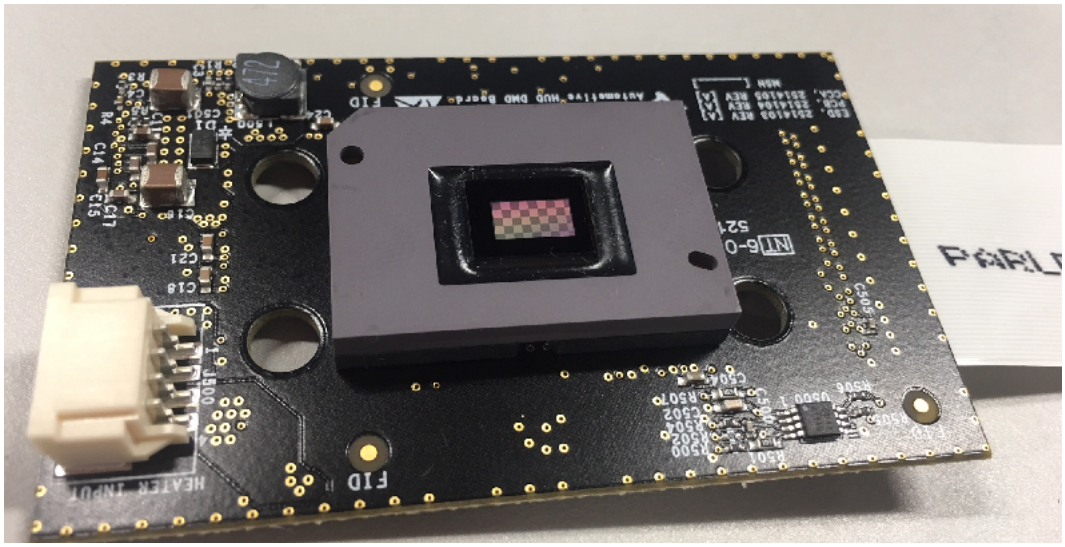


Figure 2-5. Example of DMD Displaying Video Content

2.4 Connector Pinouts

This section describes the pinout signals for each of the connectors of the electronics boards. Refer to Figure 1-2 and Figure 1-3 for the location of each connector.

Table 2-2. Power Input Connector

REFERENCE DESIGNATOR		CONNECTOR	
J2		MOLEX 5023520800	
PIN #	SIGNAL NAME	TYPE	NOTES
1	Vbatt	Power Input for Digital Circuits	6-V to 18-V Input (0.3-A max @ 12 V)
2	Ground	Ground for Digital Circuits	Ground 0.3-A max @ 12 V
3	Vbatt LED	Power Input for LED Driver Circuit	6-V to 18-V Input (2-A max @ 12 V)
4			
5			
6	Power Ground	Ground for LED Driver Circuit	Ground (2-A max @ 12 V)
7			
8			

Table 2-3. SPI Communication Connector

REFERENCE DESIGNATOR		CONNECTOR	
J10		MOLEX 5600200700 (1)	
PIN #	SIGNAL NAME	TYPE	NOTES
1	SPI CLK	SPI Clock	100-Ω Impedance Matched to Pin 4, Ground
2	3.3V	Power	
3	SPI SOMI	SPI Master In Slave Out	100-Ω Impedance Matched to Pin 3, 3.3
4	Ground	Ground	
5	SPI SIMO	SPI Master Out Slave In	100-Ω Impedance Matched to Pin 6, Ground
6	Ground	Ground	
7	SPI CSZ	SPI Chip Select	

(1) This connector is used for general system controls, such as dimming and video mode configuration.

Table 2-4. Photodiode Connector

REFERENCE DESIGNATOR		CONNECTOR	
J3		MOLEX 5023520200	
PIN #	SIGNAL NAME	TYPE	NOTES
1	PD Cathode	Cathode	The cathode is connected to the cable shield
2	PD Anode	Anode	The anode is noise sensitive and connected to the cable center conductor

Table 2-5. LED Power Connector

REFERENCE DESIGNATOR		CONNECTOR	
J1		MOLEX 5023520600	
PIN #	SIGNAL NAME	TYPE	NOTES
1	Blue LED Cathode	Cathode	
2	Blue LED Anode	Anode	Common Anode
3	Green LED Cathode	Cathode	
4	Green LED Anode	Anode	Common Anode
5	Red LED Cathode	Cathode	
6	Red LED Anode	Anode	Common Anode

Table 2-6. MCU JTAG Connector

REFERENCE DESIGNATOR		CONNECTOR	
H1		FCI 95278-101A14LF[1]	
PIN #	SIGNAL NAME	TYPE	NOTES
1	TMS	Piccolo JTAG Mode Select	
2	TRSTn	Piccolo JTAG Reset	Active Low
3	TDI	Piccolo JTAG Data Input	
4	Ground	Ground	
5	3.3V	Power	
6	No Connect	No Connect	This pin is cut off to key the connector
7	TDO	Piccolo JTAG Data Out	
8	Ground	Ground	
9	TCK	Piccolo JTAG Clock	
10	Ground	Ground	
11	TCK	Piccolo JTAG Clock	
12	Ground	Ground	
13	EMU0	Piccolo Programmer Output	Not used, pulled high to 3.3 V
14	EMU1	Piccolo Programmer Output	Not used, pulled high to 3.3 V

(1) This connector was designed to be compatible with the XDS100 and XDS510 programmers from Spectrum Digital.

Table 2-7. LED Thermistor Connector

REFERENCE DESIGNATOR		CONNECTOR	
J11		MOLEX 5023520600	
PIN #	SIGNAL NAME	TYPE	NOTES
1	Ground	Ground	
2	Blue Thermistor	Anode	
3	Ground	Ground	
4	Green Thermistor	Anode	
5	Ground	Ground	
6	Red Thermistor	Anode	

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