

Revision: September 18, 2012

Note: This document applies to REV B of the board.

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Overview

The PmodOLED2 features a parallel controlled, 4-bit gray scale OLED display, perfect for embedded applications requiring complex visual output.

Features include:

- a 256x64 pixel WiseChip/Univision UG-5664ASGGF01 OLED graphic display panel
- 5 3/8" x 1 3/8" display area
- 8080 Parallel interface
- clock speeds of up to 10MHz
- internal display buffer

Functional Description

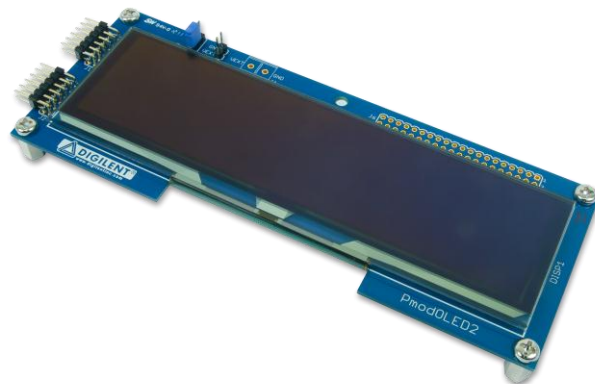
The PmodOLED2 uses a standard 12-pin connector to display output on a 256x64 pixel organic LED (OLED) panel. The graphic display panel uses the Solomon Systech SSD1322 display controller.

A parallel interface is used to configure the display, as well as to send the bitmap data to the device.

The PmodOLED2 displays the last image drawn on the screen until it is powered down or a new image is drawn to the display. Refreshing and updating is handled internally.

Power Supply

The PmodOLED2 has two field-effect transistors (FETs) that control the display's two power supplies. The VCI/VDDIO control toggles the power to the logic of the display, and the I/O pins, respectively. The VCC control toggles the power to the OLED display itself.



These two pins have pull-up resistors that turn off their respective power supplies when they're not being driven. These pins are configured as outputs and driven high to turn on the power supply.

The UG-5664 display requires a 15V supply. Header J5 can be used to connect a 15V supply directly to the 15V supply line. To use this option, jumper JP1 must be coving "EXT".

Alternatively, the PmodOLED2 is equipped with a step-up DC-DC converter, and therefore, the 15V supply can be generated from the supply voltage coming from the development board's Pmod header. That supply voltage should be set so that it is drawing from the 5V rail. There should be a jumper next to the Pmod header for selecting between the 3.3V and the 5V supply rail.

The PmodOLED2 has a particular power-on/power-off sequence that must be followed to prolong the life of the display.

Power-on sequence:

1. Apply power to VCI.
2. Wait 300ms.
3. Send Display Off command.
4. Initialize display to desired operating mode.
5. Clear screen.
6. Apply power to VCC.
7. Delay 100ms.
8. Send Display On command.

Power-off sequence:

1. Send Display Off command.
2. Power off VCC.
3. Delay 100ms.
4. Power off VDD.

There are some considerations while operating the PmodOLED2 while powering the board in one of the two aforementioned ways.

If the PmodOLED2 is being powered from an external source (i.e., JP1 is set to EXT), do not remove, and then reconnect, power to the PmodOLED2 while the development board is still powered. The development board will not know that the PmodOLED2 has been reset, and therefore, the correct power-on sequence will not be executed and the PmodOLED2 may be damaged.

Gray Scale

The display on the PmodOLED2 is a 4-bit grayscale display. This means that there are 16 levels of pixel brightness.

The grayscale level data (GS Level) for a pixel is fetched from one half of a byte (a nibble) stored in the on board Graphic Display Data RAM (GDDRAM). The value will range from 0-15 (0x0 – 0xF).

The value stored in GDDRAM is then decoded as a pulse width for the pixel's driving current. The pulse width values are stored in the Gray Scale Table, which is defined upon initialization of the device. This table will hold 16 values ranging from 0-180. Gray Scale level 0 (pixel off) is always set to 0, and cannot be changed. Gray Scale levels 1-15 can have any value between 0 and 180.

Interface

The display has a D/C pin (display or command select) that determines whether bytes sent to the display are interpreted as commands or as display data. The D/C pin is

set high for display buffer access and low for command access.

The RES pin is used to reset the SSD1322 display controller. The RES pin is driven low for reset and driven high for normal operation. The low-going reset pulse must be a minimum of 3us (microseconds) in duration for the display controller to reset correctly.

The UG5664 display has been designed as a parallel device. The maximum parallel clock frequency is 3.3MHz. The CS (Chip Select) pin has to be held low for the display to receive data over the parallel interface.

Digilent has libraries for the PmodOLED2 that provide functions for initializing the display and rendering simple text and graphics onto the display. These libraries can be used as-is or as a starting point for a more sophisticated graphics library. They are available, with documentation, on the PmodOLED2 product page at www.digilentinc.com.

The OLED2 display uses a compatible command set from the SSD1322 device. For more information, see the SSD1306 datasheet available at www.solomon-systech.com.

Interface Connector Signal Description

Connector J1		
Pin	Signal	Description
1	D0	Parallel data bit 0
2	D1	Parallel data bit 1
3	D2	Parallel data bit 2
4	D3	Parallel data bit 3
7	D4	Parallel data bit 4
8	D5	Parallel data bit 5
9	D6	Parallel data bit 6
10	D7	Parallel data bit 7
5, 11	GND	Power Supply Ground
6, 12	VCC	Power Supply

Connector J2		
Pin	Signal	Description
1	VCI/VD DIO	V_{CI} and V_{DDIO} Voltage Control
2	RES	Power Reset
3	None	Unused Pin
4	VCC	V_{BAT} Battery Voltage Control
7	D/C	Data/Command Control
8	E/RD	Read Data Enable
9	R/W	Write Data Enable
10	VDDC	V_{DD} Logic Voltage Control
5, 11	GND	Power Supply Ground
6, 12	VCC	Power Supply