

## PmodOLED™ Reference Manual

Revised May 24, 2016

This manual applies to the PmodOLED rev. A

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### Overview

The PmodOLED features an SPI-controlled monochrome OLED display, perfect for embedded applications requiring small, complex visual output.



*The PmodOLED.*

Features include:

- 128x32 pixel graphic OLED display
- Clock speeds of up to 10 MHz
- Internal display buffer
- 16 different brightness settings
- Small PCB size for flexible designs
- 12-pin Pmod connector with SPI interface
- Library and example code available in [resource center](#)

## 1 Functional Description

The PmodOLED uses a standard 12-pin connector to display output on a 128x32 pixel organic LED (OLED) panel. The graphic display panel uses the Solomon Systech SSD1306 display controller.

An SPI interface is used to configure the display, as well as to send the bitmap data to the device.

The PmodOLED 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.

## 1.1 Power Supply

The PmodOLED has two field-effect transistors (FETs) that control the display's two power supplies. The VDDC control toggles the power to the logic of the display. The VBATC 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 low to turn on the power supply.

The PmodOLED 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 VDD.
2. Send Display Off command.
3. Initialize display to desired operating mode.
4. Clear screen.
5. Apply power to VBAT.
6. Delay 100ms.
7. Send Display On command.

### Power-off sequence:

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

## 2 Interfacing with the Pmod

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 SSD1306 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 3 $\mu$ s (microseconds) in duration for the display controller to reset correctly.

The UG2832 display is a serial device that is accessed using SPI. It is a write-only device, so it is not possible to read the display buffer contents or status from the panel. The maximum SPI clock frequency is 10Mhz. The CS (Chip Select) pin has to be held low for the display to receive data over the SPI interface.

Digilent has libraries for the PmodOLED 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 on the PmodOLED product page at [www.digilentinc.com](http://www.digilentinc.com).

Connector J1		
Pin	Signal	Description
1	CS	SPI Chip Select (Slave Select)
2	SDIN	SPI Data In (MOSI)
3	None	Unused Pin
4	SCLK	SPI Clock
7	D/C	Data/Command Control
8	RES	Power Reset
9	VBATC	V <sub>BAT</sub> Battery Voltage Control
10	VDDC	V <sub>DD</sub> Logic Voltage Control
5, 11	GND	Power Supply Ground
6, 12	VCC	Power Supply

Table 1. Interface connector signal description.

For more information on the OLED display interface, see the UG-2832HSWEG04 datasheet available online or from Univisio.

The OLED display uses a compatible command set from the SSD1306 device. For more information, see the SSD1306 datasheet available at [www.solomon-systech.com](http://www.solomon-systech.com).

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