

Using 128x32 OLED Display Pmod

Please read one of the two 3 page documents “PmodOLED_rm-521056.pdf” or “pmodoled_rm.pdf” (both are identical in content, but different in format) before reading this document.

Power-on and Power-off sequences and the SPI interface signals are described in the above documents. For timing details of the interface signals, see sub-section 8.1.3 titled “MCU Serial Interface (4-wire SPI)” in document “SSD1306.pdf”.

The power on/off sequences are further elaborated here based on information contained in “SSD1306.pdf”.

Power-on sequence:

| S. No. | Step | Explanation |
|--------|---|--|
| 1 | Apply power to VDD. | Make VDDC signal (pin 10 in interface) '0' |
| 2 | Send Display Off command. | Display Off command is AEh. |
| 3 | Initialize display to desired operating mode. | Make RES signal (pin 8 in interface) '0' for at least 3 μ s (microseconds) and then make it '1'. |
| 4 | Clear screen. | |
| 5 | Apply power to VBAT. | Make VBATC signal (pin 9 in interface) '0' |
| 6 | Delay 100ms. | Wait for 100 ms (milliseconds). |
| 7 | Send Display On command. | Display On command is AFh. |

Power-off sequence:

| S. No. | Step | Explanation |
|--------|---------------------------|---|
| 1 | Send Display Off command. | Display Off command is AEh. |
| 2 | Power off VBAT. | Make VBATC signal (pin 9 in interface) '1'. |
| 3 | Delay 100ms. | Wait for 100 ms (milliseconds). |
| 4 | Power off VDD. | Make VDDC signal (pin 10 in interface) '1'. |

Note: Letter 'h' in command codes (e.g. AEh, Afh etc denotes hexadecimal)

Effect of performing **Reset operation** (step 3 in power-on sequence) is to initialize various parameters to their default values, as explained in section 8.5 of “SSD1306.pdf”. Most of these should work for you, except for the “Multiplex Ratio”, which needs to be set to 32 using command A8h (see section 8.1.11 of “SSD1306.pdf”) because you are using 128x32 display whereas the default display size for SSD1306 is 128x64.

Display memory

The signals driving the 128 columns and 64 rows of the display are referred to as segments (SEG0 to SEG127) and commons (COM0 to COM 63). The graphic display memory (GDDRAM) in SSD1306 stores a 128x64 bit map to be displayed. The memory is divided into 8 “pages” (PAGE0 to PAGE7) of size 128x8 (see section 8.7 of “SSD1306.pdf” for more details). Thus, a page corresponds to 8 rows of the display which may be used for one text line, if the information you propose to display contains text. Data and commands are sent to SSD1306 through SPI interface. Signal D/C (pin 7 in interface) indicates whether data is being sent or command (D/C = ‘0’ for command and ‘1’ for data).

SSD1306 commands

You would need to use these commands primarily to set the memory addressing modes and range of addresses. There are 3 addressing modes, selectable by command 20h – (i) Page addressing mode, (ii) Horizontal addressing mode and (iii) Vertical addressing mode, as described in sub-section 10.1.3 of “SSD1306.pdf”. If you propose to fill the entire memory, you may set the addressing mode to Vertical or Horizontal (Page mode is the default), leaving the *column start* and *column end* addresses to their default values (00h and 7Fh), but setting the *page start* and *page end* addresses to 00h and 03h using the command 22h since there are only 32 rows in your display. After doing this, data for 128x32 pixels (512 bytes) can be sent across the SPI interface.

As and when the information to be displayed changes, modified data can be sent to the display device. If only a part of the display is to change, data for an appropriate rectangular region only may be updated by setting the column and page start and end addresses accordingly.