



# Grove - OLED Display 0.96"

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Wiki: [http://www.seeedstudio.com/wiki/Grove - OLED Display 96\\*96](http://www.seeedstudio.com/wiki/Grove_-_OLED_Display_96*96)

Bazaar: <http://www.seeedstudio.com/depot/Grove-OLED-Display-096-p-824.html>

## Document Revision History

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Revision	Date	Author	Description
1.0	Sep 21, 2015	Victor.He	Create file

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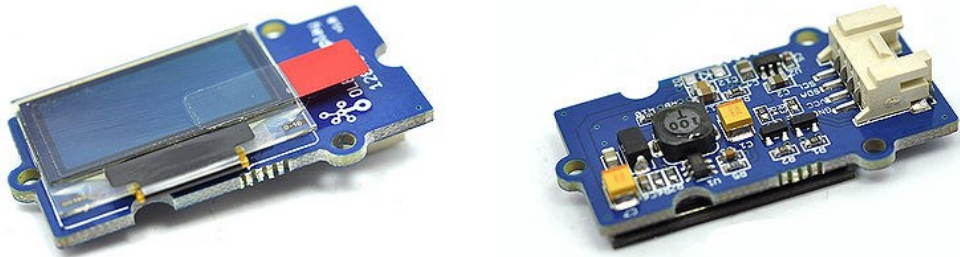
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## 1. Introduction

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It is a 16 color grayscale 128×64 dot matrix OLED display module with Grove compatible 4pin I2C interface. Grove - OLED 128 x 64 is constructed with 128 x 64 dot matrix OLED module LY120 and SSD1327 driver IC. Comparing to LCD, OLED screens are more competitive, which has a number of advantages such as high brightness, self-emission, high contrast ratio, slim / thin outline, wide viewing angle, wide temperature range, and low power consumption.

- Communicate Mode: I2C
- Grayscale Display: 16 Gray shades.
- Supports both Normal and Inverse Color Display.
- Supports Continuous Horizontal Scrolling.
- Grove compatible Interface



**Please notice: heavy impact or stress on the OLED will cause the breakdown of screen.**

## 2. Specifications

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Operating Voltage	3.3~5V
Dot Matrix	128 x 64
Display Color	16 Grayscale
OLED Display	LY120-96096
Driver IC	SSD1327Z
Dot Size	0.15(W)mm X 0.15 (H)mm
Dot Pitch	0.17(W)mm X 0.175 (H)mm
Operating Temperature	-40°C~70°C

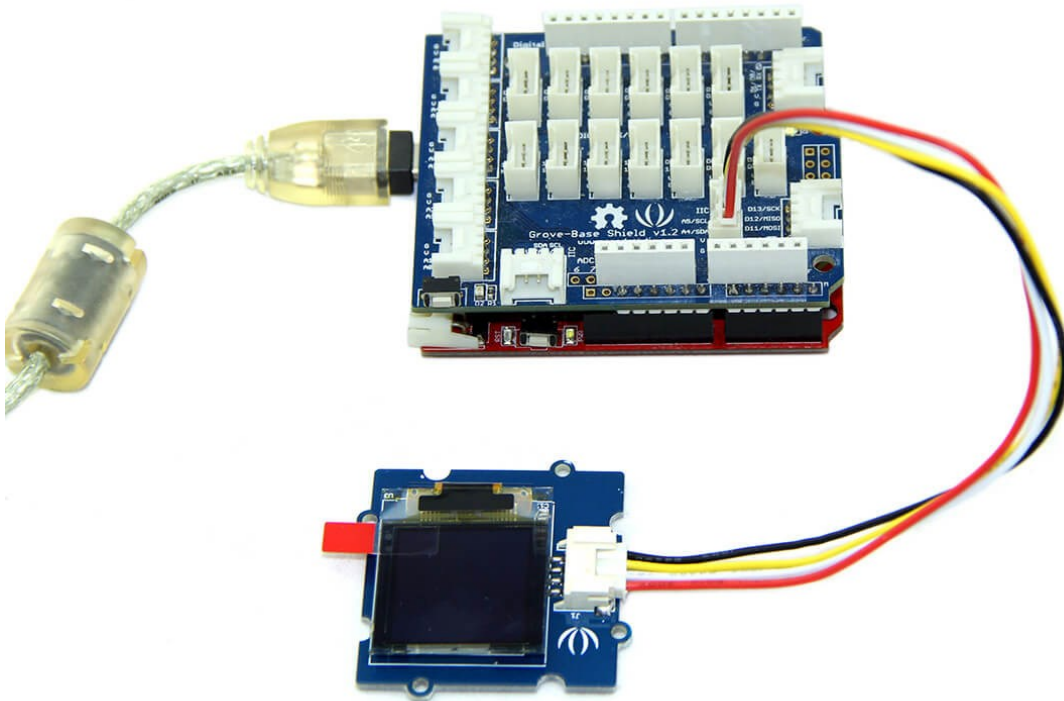
## 3. Demonstrations

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### 3.1 With Arduino

**NOTE:**

- Grove OLED 128 x 64 module is very compact and fragile. Handle the display with care.
- Do not stress or drop the display to ground.
- Do not scratch the surface.
- Ensure the correct polarity for 4pin connection



Download the [LCD Display Library](#) and Unzip it into the libraries file of Arduino IDE by the path: ..\arduino-1.0.1\libraries, then you can play with your own display system.

#### 3.1.1 Demo 1: Display 'Hello World' In Normal Mode

```
#include <Wire.h>
#include <SeeedGrayOLED.h>
#include <avr/pgmspace.h>

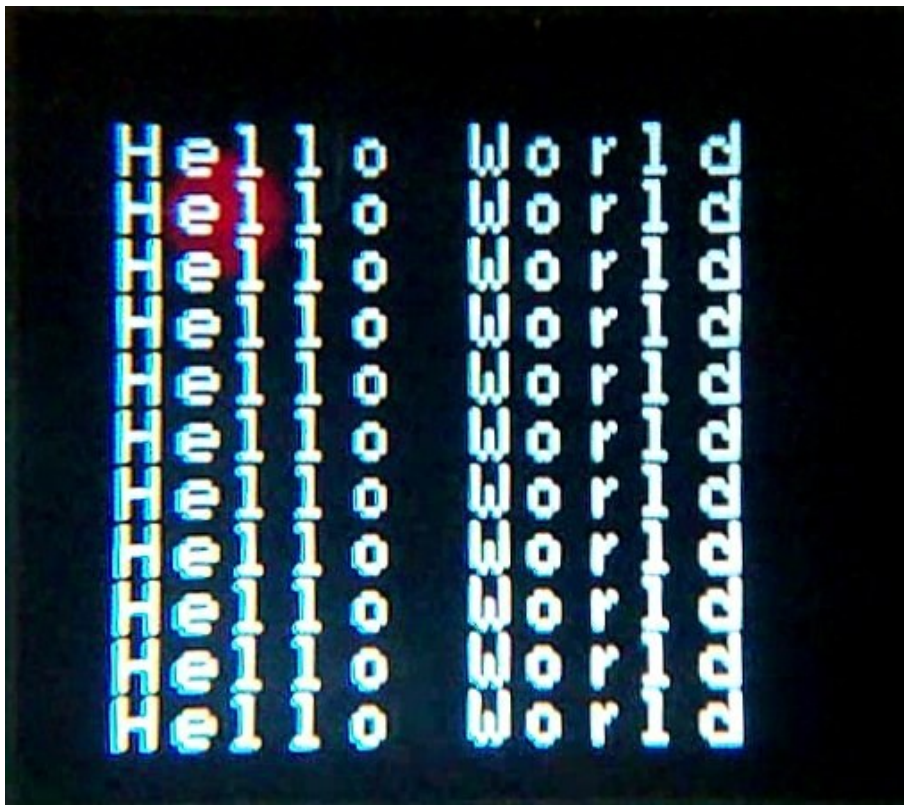
void setup()
{
```

```
Wire.begin();
SeedGrayOled.init();           //initialize SEED OLED display
SeedGrayOled.clearDisplay();   //Clear Display.
SeedGrayOled.setNormalDisplay();//Set Normal Display Mode
SeedGrayOled.setVerticalMode();// Set to vertical mode for displaying text

for(char i=0; i < 12 ; i++)
{
    SeedGrayOled.setTextXY(i,0); //set Cursor to ith line, 0th column
    SeedGrayOled.setGrayLevel(i); //Set Grayscale level. Any number between 0 - 15.
    SeedGrayOled.putString("Hello World");//Print Hello World
}
}

void loop()
{
}
}
```

**Output**



Hello World on Normal Display



### 3.1.2 Demo 2: Display Hello World in Inverse Mode

```
#include <Wire.h>
#include <SeeedGrayOLED.h>
#include <avr/pgmspace.h>

void setup()
{
  Wire.begin();
  Serial.begin(9600);
  SeeedGrayOled.init();           // initialize SEEED OLED display
  SeeedGrayOled.setInverseDisplay(); // Set display to inverse mode
  SeeedGrayOled.clearDisplay();   // Clear Display.
  SeeedGrayOled.setVerticalMode(); // Set to vertical mode for displaying text

  for(char i=0; i < 12 ; i++)
  {
    SeeedGrayOled.setTextXY(i,0); //set Cursor to ith line, 0th column
    SeeedGrayOled.setGrayLevel(i); //Set Grayscale level. Any number between 0 - 15.
    SeeedGrayOled.putString("Hello World"); //Print Hello World
  }
}

void loop()
{
}
```

#### Output



Hello World on Normal Display

### 3.1.3 Demo 3: Print Numbers

```
#include <Wire.h>
#include <SeeedGrayOLED.h>

void setup()
{
  Wire.begin();
  SeeedGrayOled.init(); //initialize SEEED Gray OLED display

  SeeedGrayOled.clearDisplay(); //clear the screen and set start position to top left corner
  SeeedGrayOled.setNormalDisplay(); //Set display to Normal mode
  SeeedGrayOled.setVerticalMode(); // Set to vertical mode for displaying text

  SeeedGrayOled.setTextXY(0,0); //Set the cursor to 0th line, 0th Column
  SeeedGrayOled.putNumber(123); //Print number
  SeeedGrayOled.setTextXY(1,0); //Set the cursor to 1st line, 0th Column
  SeeedGrayOled.putNumber(0xFFFF); //Print number
}
```

```

SeedGrayOled.setTextXY(2,0);           //Set the cursor to 2nd line, 0th Column
SeedGrayOled.putNumber(0xFFFFFFFF);   //Print number
SeedGrayOled.setTextXY(3,0);           //Set the cursor to 3rd line, 0th Column
SeedGrayOled.putNumber(-12345);        //Print number

}

void loop()
{
}

```

### Output



Hello World on Normal Display

### 3.1.4 Demo 4: Draw Binary Bitmap

```

#include <Wire.h>
#include <SeedGrayOLED.h>
#include <avr/pgmspace.h>

static unsigned char SeedLogo[] PROGMEM =
{

  0x00, 0x00, 0x00, 0x00, 0x00, 0x20, 0x08, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00,
  0x00, 0x60, 0x04, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0xC0, 0x06, 0x00,
  0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x01, 0xC0, 0x07, 0x00, 0x00, 0x00, 0x00, 0x00,
  0x00, 0x00, 0x00, 0x00, 0x01, 0xC0, 0x07, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00,
  0x03, 0x80, 0x03, 0x80, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x03, 0x80, 0x03, 0x80,
  0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x07, 0x80, 0x03, 0xC0, 0x00, 0x00, 0x00, 0x00,

```



```

0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00,
0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00,
0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00,
0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00,
0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x7C, 0x00,
0x00, 0x20, 0x82, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x44, 0x00, 0x00, 0x20, 0x82, 0x00,
0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x6C, 0xF3, 0xCF, 0x70, 0x9E, 0x79, 0xE7, 0x80, 0x00, 0x00,
0x00, 0x00, 0x7D, 0x9E, 0x68, 0x20, 0xB2, 0xC8, 0x64, 0x00, 0x00, 0x00, 0x00, 0x47, 0x9E,
0x6F, 0x20, 0xB2, 0xF9, 0xE7, 0x80, 0x00, 0x00, 0x00, 0x00, 0x46, 0x9A, 0x61, 0x20, 0xB2, 0xCB,
0x60, 0x80, 0x00, 0x00, 0x00, 0x00, 0x7C, 0xF3, 0xCF, 0x30, 0x9E, 0x79, 0xE7, 0x90, 0x00, 0x00,
0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x10, 0x00, 0x00, 0x00, 0x00, 0x00,
0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00,
0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00,
0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00,
0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x7C, 0x02, 0x00, 0x00, 0x82, 0x60, 0x00, 0x00,
0xF8, 0x00, 0x00, 0x40, 0x40, 0x02, 0x00, 0x00, 0x83, 0x60, 0x00, 0x00, 0x8C, 0x00, 0x00, 0x40,
0x60, 0xB7, 0x79, 0xE7, 0x81, 0xC7, 0x92, 0x70, 0x89, 0xE7, 0x9E, 0x78, 0x7C, 0xE2, 0xC9, 0x2C,
0x81, 0xCC, 0xD2, 0x40, 0xFB, 0x21, 0xB2, 0x48, 0x40, 0x62, 0xF9, 0x2C, 0x80, 0x8C, 0xD2, 0x40,
0x8B, 0xE7, 0xB0, 0x48, 0x40, 0xE2, 0xC9, 0x2C, 0x80, 0x84, 0xD2, 0x40, 0x8B, 0x2D, 0x92, 0x48,
0x7D, 0xB3, 0x79, 0x27, 0x80, 0x87, 0x9E, 0x40, 0x8D, 0xE7, 0x9E, 0x48, 0x00, 0x00, 0x00, 0x00,
0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00,
0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00,
};

void setup()
{
  Wire.begin();
  SeededGrayOled.init();           // initialize SEED OLED display

  SeededGrayOled.clearDisplay();   // clear the screen and set start position to top
  left corner
  //Draw binary Bitmap
  SeededGrayOled.drawBitmap(SeededLogo, 96*96/8); // Draw binary Bitmap (96 pixels *96 pixels /
8) bytes
}

void loop()
{
}

```

**Output**



**Note:** You can make a gray 96\*96 image arbitrary that can be shown on OLED 96\*96. The manufacturing procedure can reference [it\(include associated software\)](#).

## 4. Reference

---

- Seeed Gray OLED library provides complete software interfaces to exercise the capabilities of SSD1327Z driver with a 96x96 gray OLED. Almost all useful features are implemented and all functions are in public scope. This makes Seeed Gray OLED Library extensible. Seeed Gray OLED library uses Arduino Wire library. Hence initialize wire library before initializing Seeed OLED library.

### Function Description:

#### 1. init()

Initializes the Seeed OLED frame and sets the display to Normal mode.

Example:

```
SeeedGrayOled.init(); //initialize SEEED Gray OLED display
```

#### 2. clearDisplay()

Clears the whole screen. Should be used before starting a fresh start or after scroll deactivation.

This function also sets the cursor to top left corner.

Example:

```
SeeedGrayOled.clearDisplay(); //clear the screen and set start position to top left corner
```

#### 3. setNormalDisplay()

Configures the display to normal mode(non-inverse) mode.

```
SeeedGrayOled.setNormalDisplay();//Set display to normal mode (i.e non-inverse mode)
```

#### 4. setContrastLevel(unsigned char ContrastLevel)

Set the contrast ratio of OLED display. ContrastLevel can be any number from 0 - 255.

Example:

```
SeeedGrayOled.setContrastLevel(127); //Set display contrast ratio to half level( i.e 256/2 - 1 ).
```

#### 5. setInverseDisplay()

Configures the display to inverse mode.

Example:

```
SeeedGrayOled.setInverseDisplay(); //Set display to inverse mode
```

#### 6. setHorizontalMode()

Configures the display to horizontal addressing mode.

Example:

```
SeeedGrayOled.setHorizontalMode(); //Set addressing mode to Horizontal Mode
```

7. setVerticalMode()

Configures the display to vertical addressing mode. Texts are drawn in vertical mode. Please set the display to vertical mode before printing text.

Example:

```
SeeedGrayOled.setVerticalMode(); //Set addressing mode to Vertical Mode
```

8. setTextXY(X,Y)

Set the text's position (cursor) to Xth Text Row, Yth Text Column. 96x96 OLED is divided into 12 rows and 12 Columns of text. This row and column should not be confused with OLED Row and Column.

- X can be any number from 0 - 11.
- Y can be any number from 0 - 11.

Example:

```
SeeedGrayOled.setTextXY(0,0); //Set the cursor to 0th Text Row, 0th Text Column
```

9. putChar(unsigned char c)

Print a character to OLED display starting from current address-pointer set by setTextXY(X,Y). This function is internally used by putString().

Example:

```
SeeedGrayOled.putChar('S'); //Print the character S
```

10. putString(const char \*string)

Print string to OLED display starting from current address-pointer set by setTextXY(X,Y)

Example:

```
SeeedGrayOled.putString("Hello World!"); //Print the String
```

11. putNumber(long n)

Print numbers to OLED display starting from current address-pointer set by setTextXY(X,Y).

Number can be any char,int or long datatype. It also takes care of -ve sign.

Example:

```
SeeedGrayOled.putNumber(-56123); //Print number -56123
```

12. drawBitmap(unsigned char \*bitmaparray,int bytes)

Display a binary bitmap on the OLED matrix. The data is provided through a pointer to



unidimensional array holding bitmap. The bitmap data is available in continuous rows of columns as like Horizontal Addressing mode.

bytes is size of bitmap in bytes.

Example:

```
SeedGrayOled.drawBitmap(SeedLogo,96*96/8); // Draw binary Bitmap (96 pixels  
*96 pixels / 8) bytes
```

13. setHorizontalScrollProperties(bool direction,unsigned char startRow, unsigned char endRow,unsigned char startColumn, unsigned char endColumn, unsigned char scrollSpeed)

Set the properties of horizontal scroll.

- Direction can be any of Scroll\_Left and Scroll\_Right.
- startRow can be 0 - 127
- endRow can be 0 - 127. It should be greater than startRow
- startColumn can be 0 - 63
- endColumn can be 0 - 63. It should be greater than startRow
- scrollSpeed can be any of

defines:Scroll\_2Frames,Scroll\_3Frames,Scroll\_4Frames,Scroll\_5Frames,Scroll\_25Frames,Scroll\_64Frames,Scroll\_128Frames,Scroll\_256Frames.

Example:

```
SeedGrayOled.setHorizontalScrollProperties(Scroll_Left,72,95,0,47,Scroll_5Frames);  
//Set the properties of Horizontal Scroll
```

14. activateScroll()

Enable scrolling. This should be used only after setting horizontal scroll properties.

Example:

```
SeedGrayOled.activateScroll(); //Enable scrolling.
```

15. deactivateScroll()

Disable scrolling. This should be used after activateScroll();

Example:

```
SeedGrayOled.activateScroll(); //Disable scrolling.
```

## 5. With [Raspberry Pi](#)

---

1. You should have got a raspberry pi and a grovepi or grovepi+.
2. You should have completed configuring the development environment, otherwise follow [here](#).
3. Connection. Plug the sensor to grovepi socket i2c-x(1~3) by using a grove cable.
4. Navigate to the demos' directory:

```
cd yourpath/GrovePi/Software/Python/grove_oled
```

To see the code

```
nano grove_i2c_oled_96x96_hello_world.py # "Ctrl+x" to exit #
```

```
import grove_oled
import time

grove_oled.oled_init()
grove_oled.oled_clearDisplay()
grove_oled.oled_setNormalDisplay()
grove_oled.oled_setVerticalMode()
time.sleep(.1)

for i in range(0,12):
    grove_oled.oled_setTextXY(i,0)
    grove_oled.oled_putString("Hello World")
```

5. Run the demo.

```
sudo python grove_i2c_oled_96x96_hello_world.py
```

## 6. Resources

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[LCD Display Library](#)

[github repository for OLED Display 96\\*96](#)

[Grove OLED 96x96 Schematic PDF](#)

[SSD1327 Datasheet](#)

[LY120 Datasheet](#)

[Reference for Make a 96\\*96 Image](#)

[File:Grove - 96x96 OLED Display v2.1 eagle.zip](#)

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