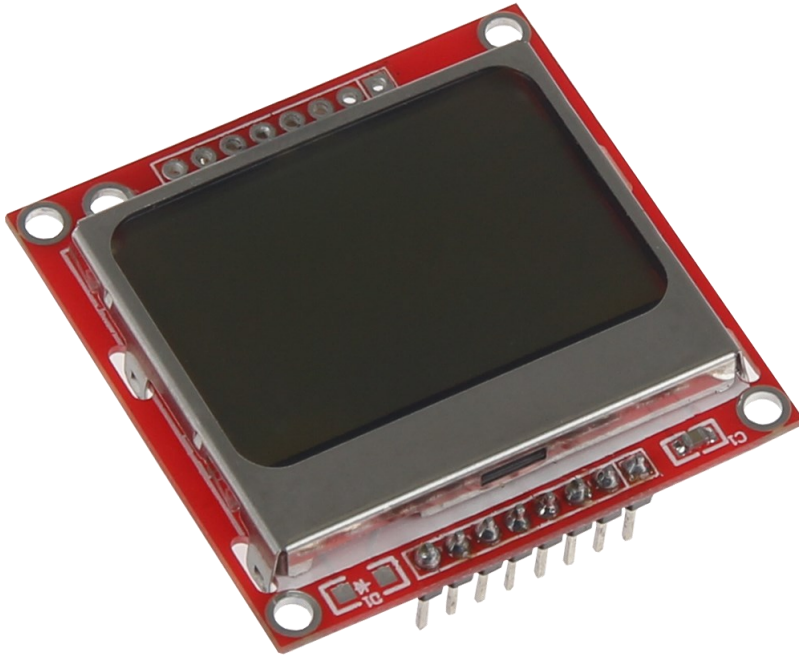# 84X48 LCD DISPLAY

SBC-LCD84x48
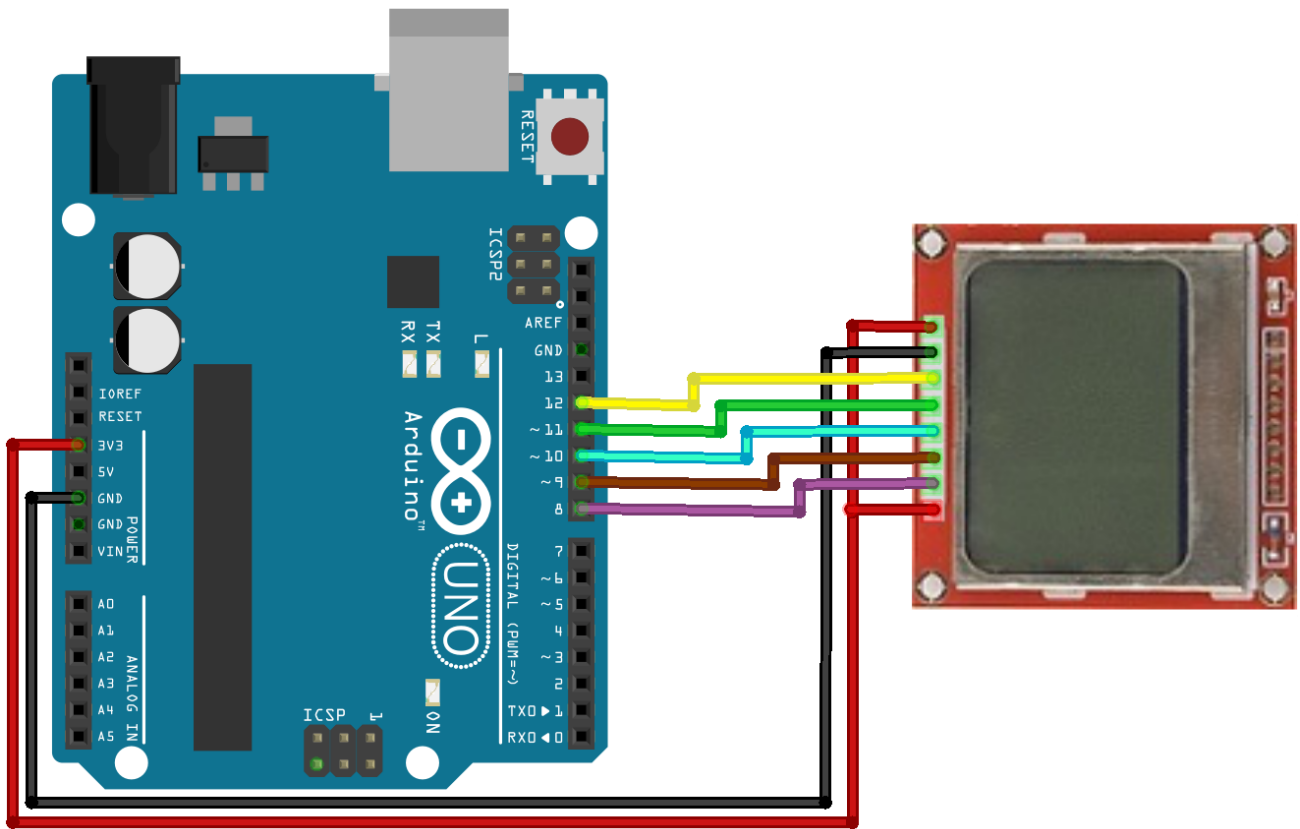
1. GENERAL INFORMATION

Dear customer,

Thank you for purchasing our product. In the following, we will show you which things should be noted during the use.

Should you encounter any unexpected problems, do not hesitate to contact us

Connecting the display

Connect the display to the pins of your Arduino like shown in the picture or rather in the chart.

84 x 48 LCD	Arduino® Uno
8 - LED	3.3 V
7 - SCLK	8
6 - DN < MOSI >	9
5 - D/C	10
4 - RST	11
3 - SCE	12
2 - GND	GND
1 - VCC	3.3 V

Code example

With the following code example, you can test your LCD module.
Please transfer this code completely onto your Ardunio.
In the *void loop()* method, you can issue the text you desire with the help
of *LCDString*.

```c
//PIN assignment

#define PIN_SCE 12

#define PIN_RESET 11

#define PIN_DC 10

#define PIN_SDIN 9

#define PIN_SCLK 8

#define LCD_COMMAND 0

#define LCD_DATA 1

//Setting the screen size (84x48 pixels)

#define LCD_X 84

#define LCD_Y 48


//Hexadecimal values for pixel assignment of characters and letters

static const byte ASCII[][5] = {
                {0x00, 0x00, 0x00, 0x00, 0x00}, // 20 ,
                {0x00, 0x00, 0x5f, 0x00, 0x00}, // 21 ! ,
                {0x00, 0x07, 0x00, 0x07, 0x00}, // 22 " ,
                {0x14, 0x7f, 0x14, 0x7f, 0x14}, // 23 # ,
                {0x24, 0x2a, 0x7f, 0x2a, 0x12}, // 24 $ ,
                {0x23, 0x13, 0x08, 0x64, 0x62}, // 25 % ,
                {0x36, 0x49, 0x55, 0x22, 0x50}, // 26 & ,
                {0x00, 0x05, 0x03, 0x00, 0x00}, // 27 ' ,
                {0x00, 0x1c, 0x22, 0x41, 0x00}, // 28 ( ,
                {0x00, 0x41, 0x22, 0x1c, 0x00}, // 29 ) ,
                {0x14, 0x08, 0x3e, 0x08, 0x14}, // 2a * ,
                {0x08, 0x08, 0x3e, 0x08, 0x08}, // 2b + ,
                {0x00, 0x50, 0x30, 0x00, 0x00}, // 2c , ,
                {0x08, 0x08, 0x08, 0x08, 0x08}, // 2d - ,
                {0x00, 0x60, 0x60, 0x00, 0x00}, // 2e . ,
                {0x20, 0x10, 0x08, 0x04, 0x02}, // 2f / ,
                {0x3e, 0x51, 0x49, 0x45, 0x3e}, // 30 0 ,
                {0x00, 0x42, 0x7f, 0x40, 0x00}, // 31 1 ,
```

```
{0x42, 0x61, 0x51, 0x49, 0x46}, // 32 2 ,
{0x21, 0x41, 0x45, 0x4b, 0x31}, // 33 3 ,
{0x18, 0x14, 0x12, 0x7f, 0x10}, // 34 4 ,
{0x27, 0x45, 0x45, 0x45, 0x39}, // 35 5 ,
{0x3c, 0x4a, 0x49, 0x49, 0x30}, // 36 6 ,
{0x01, 0x71, 0x09, 0x05, 0x03}, // 37 7 ,
{0x36, 0x49, 0x49, 0x49, 0x36}, // 38 8 ,
{0x06, 0x49, 0x49, 0x29, 0x1e}, // 39 9 ,
{0x00, 0x36, 0x36, 0x00, 0x00}, // 3a : ,
{0x00, 0x56, 0x36, 0x00, 0x00}, // 3b ; ,
{0x08, 0x14, 0x22, 0x41, 0x00}, // 3c < ,
{0x14, 0x14, 0x14, 0x14, 0x14}, // 3d = ,
{0x00, 0x41, 0x22, 0x14, 0x08}, // 3e > ,
{0x02, 0x01, 0x51, 0x09, 0x06}, // 3f ? ,
{0x32, 0x49, 0x79, 0x41, 0x3e}, // 40 @ ,
{0x7e, 0x11, 0x11, 0x11, 0x7e}, // 41 A ,
{0x7f, 0x49, 0x49, 0x49, 0x36}, // 42 B ,
{0x3e, 0x41, 0x41, 0x41, 0x22}, // 43 C ,
{0x7f, 0x41, 0x41, 0x22, 0x1c}, // 44 D ,
{0x7f, 0x49, 0x49, 0x49, 0x41}, // 45 E ,
{0x7f, 0x09, 0x09, 0x09, 0x01}, // 46 F ,
{0x3e, 0x41, 0x49, 0x49, 0x7a}, // 47 G ,
{0x7f, 0x08, 0x08, 0x08, 0x7f}, // 48 H ,
{0x00, 0x41, 0x7f, 0x41, 0x00}, // 49 I ,
{0x20, 0x40, 0x41, 0x3f, 0x01}, // 4a J ,
{0x7f, 0x08, 0x14, 0x22, 0x41}, // 4b K ,
{0x7f, 0x40, 0x40, 0x40, 0x40}, // 4c L ,
{0x7f, 0x02, 0x0c, 0x02, 0x7f}, // 4d M ,
{0x7f, 0x04, 0x08, 0x10, 0x7f}, // 4e N ,
{0x3e, 0x41, 0x41, 0x41, 0x3e}, // 4f O ,
{0x7f, 0x09, 0x09, 0x09, 0x06}, // 50 P ,
{0x3e, 0x41, 0x51, 0x21, 0x5e}, // 51 Q ,
{0x7f, 0x09, 0x19, 0x29, 0x46}, // 52 R ,
{0x46, 0x49, 0x49, 0x49, 0x31}, // 53 S ,
{0x01, 0x01, 0x7f, 0x01, 0x01}, // 54 T ,
{0x3f, 0x40, 0x40, 0x40, 0x3f}, // 55 U ,
{0x1f, 0x20, 0x40, 0x20, 0x1f}, // 56 V ,
```

```
{0x3f, 0x40, 0x38, 0x40, 0x3f}, // 57 W ,
{0x63, 0x14, 0x08, 0x14, 0x63}, // 58 X ,
{0x07, 0x08, 0x70, 0x08, 0x07}, // 59 Y ,
{0x61, 0x51, 0x49, 0x45, 0x43}, // 5a Z ,
{0x00, 0x7f, 0x41, 0x41, 0x00}, // 5b [ ,
{0x02, 0x04, 0x08, 0x10, 0x20}, // 5c BACKSLASH ,
{0x00, 0x41, 0x41, 0x7f, 0x00}, // 5d ] ,
{0x04, 0x02, 0x01, 0x02, 0x04}, // 5e ^ ,
{0x40, 0x40, 0x40, 0x40, 0x40}, // 5f _ ,
{0x00, 0x01, 0x02, 0x04, 0x00}, // 60 ` ,
{0x20, 0x54, 0x54, 0x54, 0x78}, // 61 a ,
{0x7f, 0x48, 0x44, 0x44, 0x38}, // 62 b ,
{0x38, 0x44, 0x44, 0x44, 0x20}, // 63 c ,
{0x38, 0x44, 0x44, 0x48, 0x7f}, // 64 d ,
{0x38, 0x54, 0x54, 0x54, 0x18}, // 65 e ,
{0x08, 0x7e, 0x09, 0x01, 0x02}, // 66 f ,
{0x0c, 0x52, 0x52, 0x52, 0x3e}, // 67 g ,
{0x7f, 0x08, 0x04, 0x04, 0x78}, // 68 h ,
{0x00, 0x44, 0x7d, 0x40, 0x00}, // 69 i ,
{0x20, 0x40, 0x44, 0x3d, 0x00}, // 6a j ,
{0x7f, 0x10, 0x28, 0x44, 0x00}, // 6b k ,
{0x00, 0x41, 0x7f, 0x40, 0x00}, // 6c l ,
{0x7c, 0x04, 0x18, 0x04, 0x78}, // 6d m ,
{0x7c, 0x08, 0x04, 0x04, 0x78}, // 6e n ,
{0x38, 0x44, 0x44, 0x44, 0x38}, // 6f o ,
{0x7c, 0x14, 0x14, 0x14, 0x08}, // 70 p ,
{0x08, 0x14, 0x14, 0x18, 0x7c}, // 71 q ,
{0x7c, 0x08, 0x04, 0x04, 0x08}, // 72 r ,
{0x48, 0x54, 0x54, 0x54, 0x20}, // 73 s ,
{0x04, 0x3f, 0x44, 0x40, 0x20}, // 74 t ,
{0x3c, 0x40, 0x40, 0x20, 0x7c}, // 75 u ,
{0x1c, 0x20, 0x40, 0x20, 0x1c}, // 76 v ,
```

```
                    {0x3c, 0x40, 0x30, 0x40, 0x3c}, // 77 w ,
                    {0x44, 0x28, 0x10, 0x28, 0x44}, // 78 x ,
                    {0x0c, 0x50, 0x50, 0x50, 0x3c}, // 79 y ,
                    {0x44, 0x64, 0x54, 0x4c, 0x44}, // 7a z ,
                    {0x00, 0x08, 0x36, 0x41, 0x00}, // 7b { ,
                    {0x00, 0x00, 0x7f, 0x00, 0x00}, // 7c | ,
                    {0x00, 0x41, 0x36, 0x08, 0x00}, // 7d } ,
                    {0x10, 0x08, 0x08, 0x10, 0x08}, // 7e ~ ,
                    {0x78, 0x46, 0x41, 0x46, 0x78}, // 7f DEL
                    };
//Initialization of the display
void setup() {
    LCDInit();
}
void loop() {
    LCDClear();
    LCDString("joy-IT ");
    LCDString("84x48");
    LCDString(" LED-Modul");
    delay(1000);
}
//Move cursor to specified position
void positionXY(int x, int y) {
    LCDWrite(0, 0x80 | x);
    LCDWrite(0, 0x40 | y);
}
```

```c
//Accepts a single character and searches in the table for the
//matching hexadecimal value
void LCDCharacter(char character) {

    LCDWrite(LCD_DATA, 0x00);

    for (int index = 0 ; index < 5 ; index++)

    {

        LCDWrite(LCD_DATA, ASCII[character - 0x20][index]);

    }

    LCDWrite(LCD_DATA, 0x00);

}
//Accepts the input and forwards it letter by letter
void LCDString(char *characters) {

    while (*characters)

    {

    LCDCharacter(*characters++);

    }

}


//resets all entries on the display
void LCDClear() {

    for (int index = 0 ; index < (LCD_X * LCD_Y / 8) ; index++)

    {

        LCDWrite(LCD_DATA, 0x00);

    }

    positionXY(0, 0);

}
```

```
//Initialization of the display

void LCDInit() {

    pinMode(PIN_SCE, OUTPUT);

    pinMode(PIN_RESET, OUTPUT);

    pinMode(PIN_DC, OUTPUT);

    pinMode(PIN_SDIN, OUTPUT);

    pinMode(PIN_SCLK, OUTPUT);

    digitalWrite(PIN_RESET, LOW);

    digitalWrite(PIN_RESET, HIGH);

    LCDWrite(LCD_COMMAND, 0x21);

    LCDWrite(LCD_COMMAND, 0xB0);

    LCDWrite(LCD_COMMAND, 0x04);

    LCDWrite(LCD_COMMAND, 0x14);

    LCDWrite(LCD_COMMAND, 0x20);

    LCDWrite(LCD_COMMAND, 0x0C);

}


void LCDWrite(byte data_or_command, byte data) {

    digitalWrite(PIN_DC, data_or_command);

    digitalWrite(PIN_SCE, LOW);

    shiftOut(PIN_SDIN, PIN_SCLK, MSBFIRST, data);

    digitalWrite(PIN_SCE, HIGH);

}
```

Connecting the display

Connect the display to the pins of your Arduino like shown in the picture or rather in the chart.
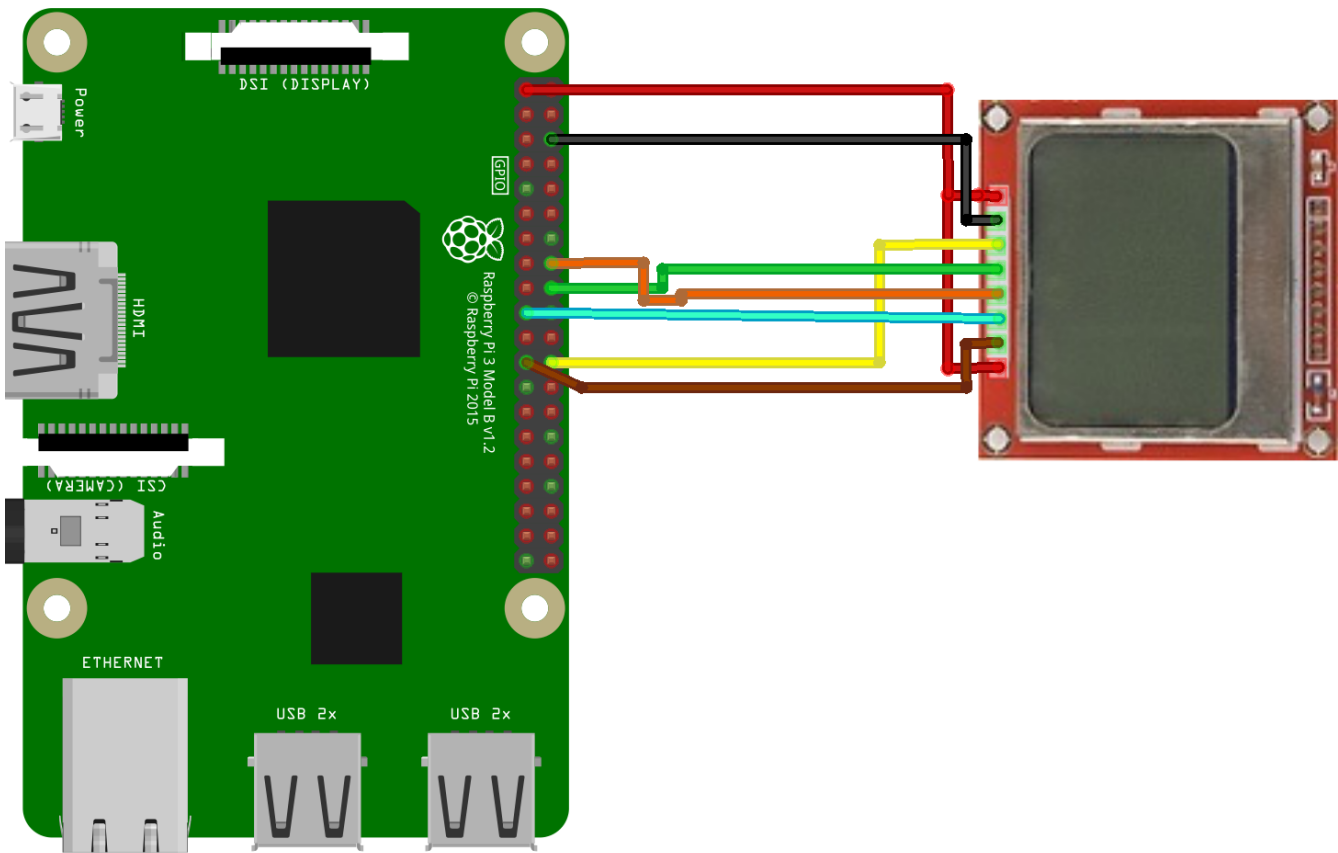
84 x 48 LCD	Raspberry Pi
8 - LED	Pin 1 (3.3 V)
7 - SCLK	Pin 23 (BCM 11 / SCLK)
6 - DN < MOSI >	Pin 19 (MCM 10 / MOSI)
5 - D/C	Pin 16 (BCM 23)
4 - RST	Pin 18 (BCM 24)
3 - SCE	Pin 24 (BCM 8)
2 - GND	Pin 6 (GND)
1 - VCC	Pin 1 (3.3 V)

Installation of the software

Should you already have the latest Raspbian system on your Raspberry Pi, you can skip this step and you can continue with the next step.
Install on your SD card the latest Raspbian with the help of the Win32-Disk-Imager which you can find with the following link.
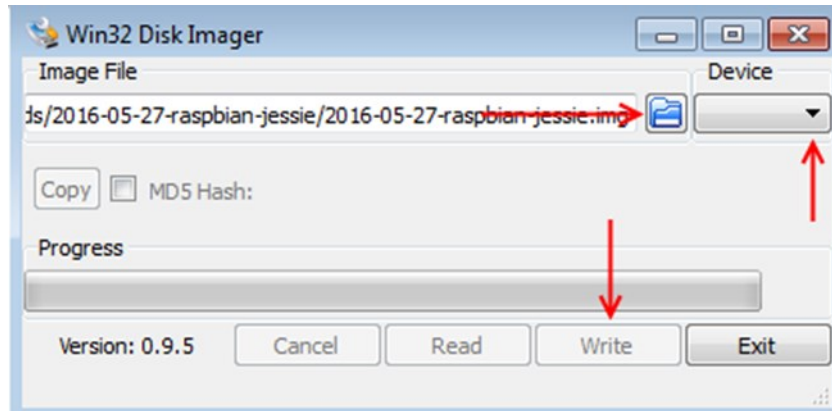
Installation of the libraries

In order to enable you to use the display as quickly and easily as possible, we use a library from Adafruit, which was published under the MIT license. To do this, open the console and execute the following commands:

```
sudo apt-get install git
git clone https://github.com/adafruit/Adafruit_Nokia_LCD.git
cd Adafruit_Nokia_LCD
sudo python setup.py install
```

Use of the code examples

The installation of the display is now completed. Open now the folder of the library which includes the code examples, with the following command:

```
cd examples
```

Now you can test different code examples on your display. You can of course modify these examples after your wishes and desires.

```
sudo python animate.py
```

```
sudo python image.py
```

```
sudo python shapes.py
```

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Return Options:
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Telephone: +49 (0)2845 98469 – 66 (10 - 17 o'clock)

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www.joy-it.net

Published: 30.06.2020