INTELLIGENT
DISPLAY SOLUTIONS

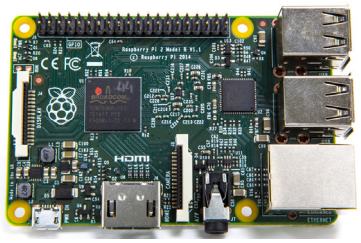
CI064-4001 LCD – Raspberry PI application note for 8bit and 4bit control

Overview

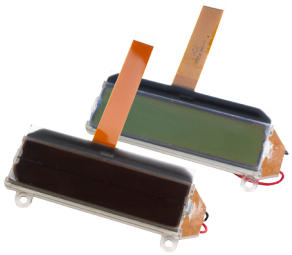
This guide will show you how to connect the CI064-4001-xx series of COG displays to your Raspberry PI. By adding an LCD to your projects this will allow you to display messages and also debug issues easier. The guide will show you both 4Bit control as well as 8Bit control.

What you need

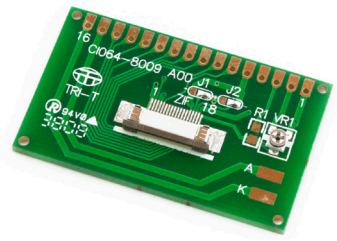
- Raspberry Pi 2 model B



- CI064-4001 16x2 LCD

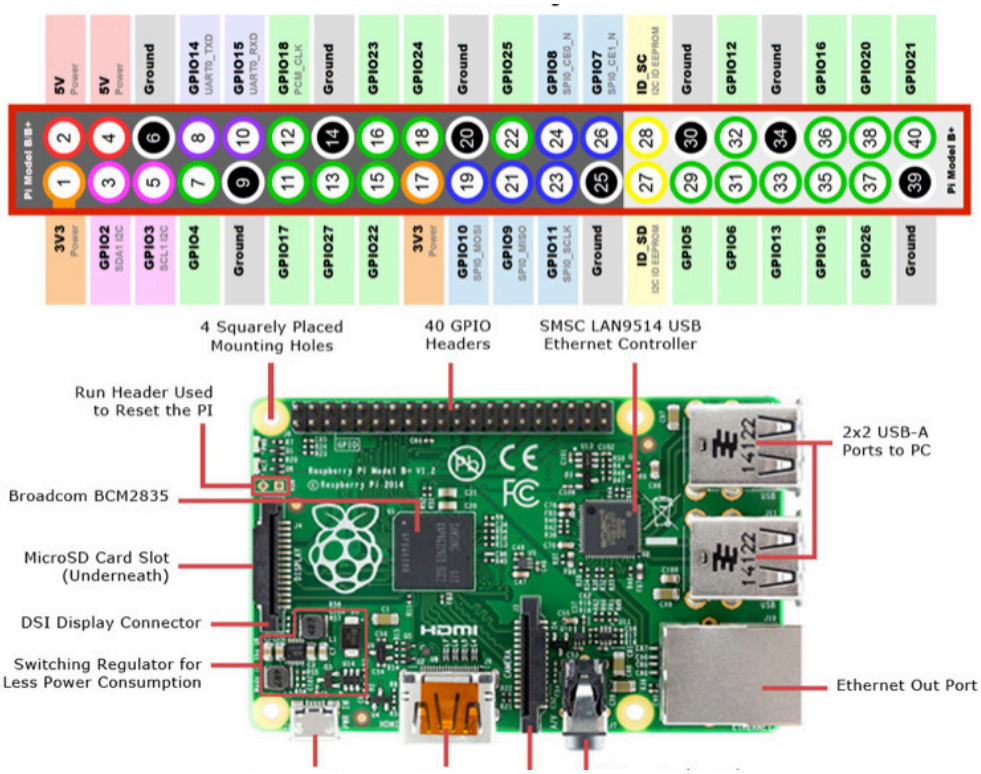


- IDB-CI064-4001-xx-01



- Jumper Wires

Raspberry Pi Pinout



Intelligent Display Solutions, Unit 2, Berkshire Business Centre, Berkshire Drive, Thatcham, Berkshire, RG19 4EW
Telephone : +44 (0)1635 294600 Fax : +44 (0)1635 869200 Email: info@i-lcd.com www.i-lcd.com
A division of Intelligent Group Solutions Ltd

QUICK START

Wiring the LCD to the Pi

The following wiring connections need to be made to allow the LCD to work with the Raspberry Pi in 8Bit mode.

LCD pin number	Raspberry Pi pin number	Comment
1	6	Vss
2	2	Vdd
3	N/C	VD
4	26	Register Select
5	N/C	R/W
6	24	Enable
7	32	DB0
8	36	DB1
9	40	DB2
10	38	DB3
11	22	DB4
12	18	DB5
13	16	DB6
14	12	DB7
15		BACKLIGHT+
16	6	BACKLIGHT-

Note: If the Raspberry Pi is only going to be configure for 4bit control then DB0-DB3 do not need to be connected.

There are 8 data lines called DB0-DB7. These pins will either send high or low to the LCD.

The enable pin toggle to allow for data to be wrote to the LCD.

The register select pin can either be to send commands to the LCD such as clear the display or to move to a new line. To send this data the pin must be low. When the pin is high the pin will go into data send mode and allow for data to be send to the display.

Intelligent Display Solutions, Unit 2, Berkshire Business Centre, Berkshire Drive, Thatcham, Berkshire, RG19 4EW
Telephone : +44 (0)1635 294600 Fax : +44 (0)1635 869200 Email: info@i-lcd.com www.i-lcd.com
A division of Intelligent Group Solutions Ltd

Software Testing

To ensure that the LCD will operate correctly please make sure that all relevant files have been downloaded and placed into the Raspberry Pi's root directory.

Once all the necessary connections have been made, the next stage is to test that the display works correctly. To test that the display works correctly the following code will need to be run.

Open Pi the Raspberry Pi's terminal, LX Terminal, this is to download the most recent software, by typing into the terminal 'sudo apt-get install python-dev' as shown in figure 1.

```
pi@raspberrypi ~ $ sudo apt-get install python-dev
Reading package lists... Done
Building dependency tree
Reading state information... Done
python-dev is already the newest version.
0 upgraded, 0 newly installed, 0 to remove and 110 not upgraded.
```

Figure 1.Raspberry Pi Update

Next stage is to download, or if already downloaded to up the Raspberry Pi's GPIO library, figure 2. This library allows for the use of the pins as inputs and outputs. This is vital for the LCD to operate correctly. Please type into the terminal 'sudo pip install rpi.gpio'

```
pi@raspberrypi ~ $ sudo pip install rpi.gpio
```

Figure 2. RPIO Update

With all the necessary updates complete, now it's time to test the LCD with a basic function. Make sure that all files are installed onto the Raspberry Pi. First thing to do is to change to the correct directory with the command 'ch LCD' as shown in the figure 3.

```
pi@raspberrypi ~ $ cd 16x2LCD
```

Figure 3. Change Directory

Once the directory has been changed then the code can run, figure 4. Once again in the terminal type the following 'sudo python test_16x2.py'.

```
pi@raspberrypi ~ $ cd 16x2LCD
pi@raspberrypi ~/16x2LCD $ sudo python test_16x2.py
/home/pi/16x2LCD/LCD/lcd.py:213: RuntimeWarning: This channel is already in use, continuing anyway.  Use GPIO.setw
 warnings.
  GPIO.setup(pin, GPIO.OUT)
Display should be blank.
```

Figure 4. Run Test Program

Intelligent Display Solutions, Unit 2, Berkshire Business Centre, Berkshire Drive, Thatcham, Berkshire, RG19 4EW
Telephone : +44 (0)1635 294600 Fax : +44 (0)1635 869200 Email: info@i-lcd.com www.i-lcd.com
A division of Intelligent Group Solutions Ltd

The test program will demonstrate what the LCD is capable of and run through a few functions. First thing you will see is a blank screen, coupled with a message inside the terminal 'Display should be blank'. The terminal will display what the screen should be presenting. To move onto the next demonstration function, press the return button on your keyboard. The second function is the cursor blinking. Press return to run through the sequence of pre-set functions which demonstrate what the LCD is capable of. All of the functions are showed in figure 5.

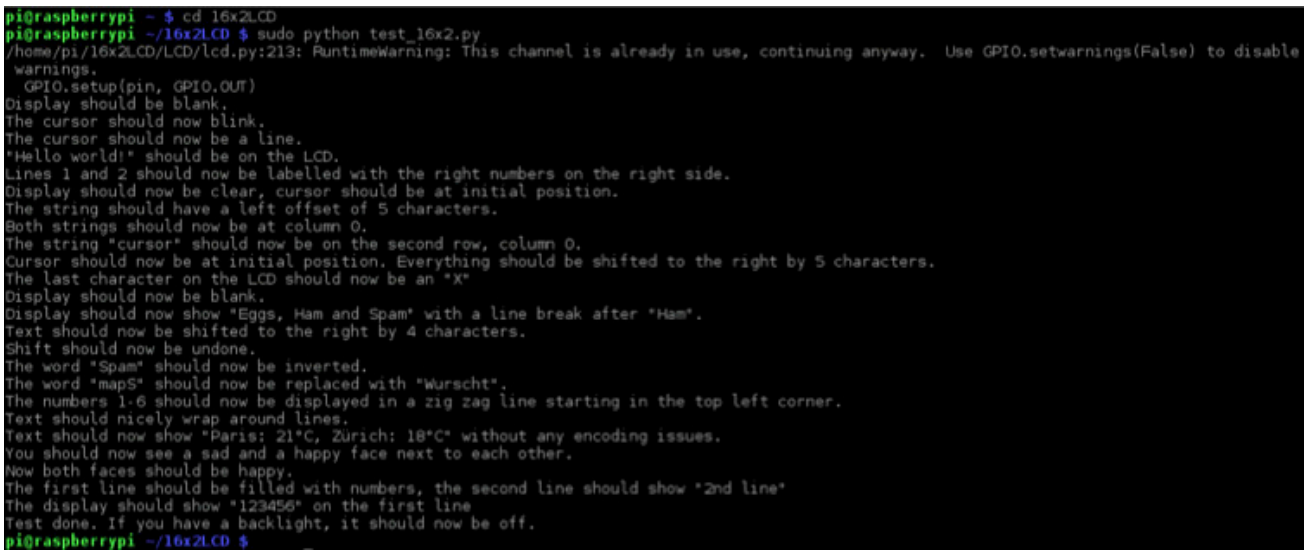


Figure 5. Full Test Program

If you wish to end the test code before all of the functions have been demonstrating, press ctrl+C. This will stop running the python code and return to the terminal.

4Bit Control

To enable your LCD to operate with 4Bit control, the following changes need to be made. The python script needs to be altered. To alter the python script to 4Bit control please open 16x2LCD > LCD > lcd.py

Within the lcd.py script at line 136 there is a line of code which initialises each pin to the corresponding pin on the LCD. Currently the script is set up for 8Bit control, this is observed with pins_data=[12, 16, 21, 20, 25, 24, 23, 18]. Each number presents a pin number together with a data line. So to change the control to 4Bit mode, the first four numbers inside this function need to be removed. This will result in the line of code reading pin_data=[25, 24, 23, 18]. Then save the script.

This is all that is needed to change the display from 8Bit mode into 4Bit mode. The python script will detect that only 4 data lines have been set and then change accordingly. Then repeat the steps to run the test code.