5inch HDMI LCD

From Waveshare Wiki
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Introduction

5 inch Resistive Touch Screen LCD, HDMI interface,
Designed for Raspberry Pi.

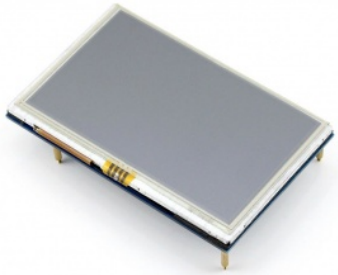
More (http://www.waveshare.com/5inch-HDMI-LCD.htm)

Features

- 800 x 480 hardware resolution.
- Resistive touch control.
- Compatible and Direct-connect with any revision of Raspberry Pi. (If you are using a Raspberry Pi Zero / Zero 2 W, an additional HDMI cable is required).
- Supports Raspberry Pi OS/Ubuntu/Kali and Retropie systems.
- Also works as a computer monitor, in this case, touch panel is unavailable and HDMI cable is required.
- HDMI interface for displaying, no I/Os required (however, the touch panel still needs I/Os).
- Support backlight control, more power saving.

5inch HDMI LCD

Designed for Raspberry Pi



(http://www.waveshare.com/5inch-HDMI-LCD.htm)

5 inch Resistive Touch Screen LCD, HDMI interface
Designed for Raspberry Pi

5inch HDMI LCD (with bicolor case)

(http://www.waveshare.com/5inch-hdmi-lcd-with-bicolor-case.htm)

5inch HDMI LCD + Bicolor case

Getting Started

Hardware Connection

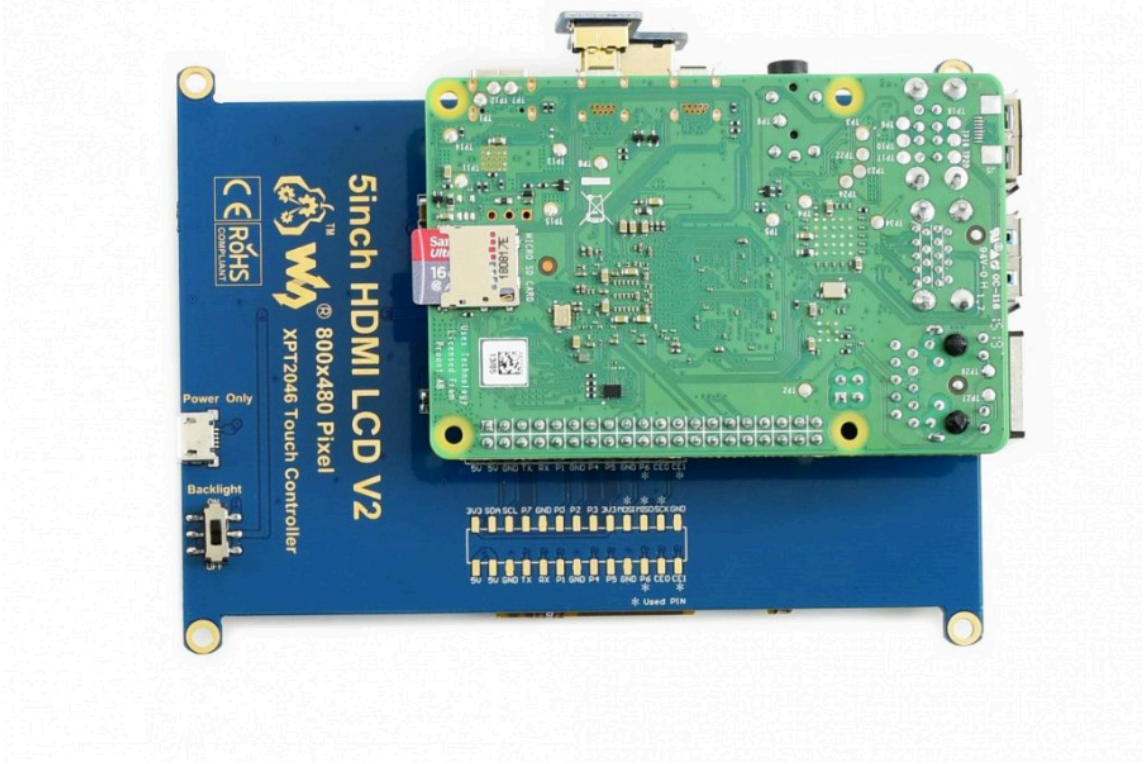
1. Connect the GPIO interface:

Raspberry Pi leads out 40 GPIO pins, while the screen leads out 26 pins. When connecting, pay attention to the corresponding pins and Raspberry Pi pins.

2. Connect the HDMI connector to the HDMI port of the screen and the Pi.

Note: Raspberry Pi Zero/Zero 2 W needs an additional HDMI cable for connection.

3. Turn the Backlight on the back of the LCD to "ON".



(/wiki/File:5inch-HDMI-LCD-Manual-02-Pi-4B.jpg)

(/wiki/File:5inch-HDMI-LCD-Manual-02-Pi3B%2B.jpg)

Software Setting

This LCD can support Raspberry Pi OS / Ubuntu / Kali / Retropie systems.

Please download the latest version of the image on the Raspberry Pi official website. (https://www.raspberrypi.com/software/operating-systems/)

1) Download the compressed file to the PC, and unzip it to get the .img file.

2) Connect the TF card to the PC, and use SDFormatter (https://files.waveshare.com/upload/d/d7/Panasonic_SDFormatter.zip) software to format the TF card.

3) Open the Win32DiskImager (https://files.waveshare.com/upload/7/76/Win32DiskImager.zip) software, select the system image downloaded in step 1, and click 'Write' to write the system image.

4) After the image has finished writing, open the config.txt file in the root directory of the TF card, add the following code at the end of config.txt, then save and quit the TF card safely.

```
hdmi_group=2
hdmi_mode=87
hdmi_cvt 800 480 60 6 0 0 0
hdmi_drive=1
dtoverlay=waveshare-ads7846,penirq=25,xmin=200,xmax=3900,ymin=200,ymax=3900,speed=50000
```

5) Download the waveshare-ads7846.dtbo (https://files.waveshare.com/wiki/10.1inch%20HDMI%20LCD/waveshare-ads7846.dtbo) file . Copy these files to the overlays directory (/boot/overlays/).

6) Insert the TF card into the Raspberry Pi, power on the Raspberry Pi, and wait for more than 10 seconds to display normally.

Touch calibration

Modify the parameters of the config.txt file:
① If the left edge of the X-axis cannot be touched, adjust the x_min parameter. For example, adjusting the default value of x_min from 200 to 100 extends the touch range to the left by 100.
② If the right edge of the X-axis cannot be touched, adjust the x_max parameter. For example, adjusting the default value of x_max from 3900 to 4000 extends the touch range to the right by 100.
③ If the top edge of the Y-axis cannot be touched, adjust the y_min parameter. For example, adjusting the default value of y_min from 200 to 100 extends the touch range to the top by 100.
④ If the bottom edge of the Y-axis cannot be touched, adjust the y_max parameter. For example, adjusting the default value of y_max from 3900 to 4000 extends the touch range to

the bottom by 100.

For the value of the x_min, x_max, y_min, and y_max, you can refer to the evtest tool to define:

```
sudo apt-get install evtest
sudo evtest
```

```
pi@raspberrypi:~ $ sudo evtest
No device specified, trying to scan all of /dev/input/event*
Available devices:
/dev/input/event0:      pwr_button
/dev/input/event1:      vc4-hdmi-0
/dev/input/event2:      vc4-hdmi-1
/dev/input/event3:      ADS7846 Touchscreen
Select the device event number [0-3]:
```

(/wiki/File:Calibration_1.png)

Here, you can select the third one (The serial number displayed on different users' Raspberry Pi's may not be the same, depending on the user's actual serial number)

Put your finger on each of the four edges of the touch screen (x_min on the left, x_max on the right, y_min on the top, y_max on the bottom).

- Put your finger on "x_min":

```
Event: time 1709037389.807721, type 3 (EV_ABS), code 0 (ABS_X), value 164
Event: time 1709037389.807721, type 3 (EV_ABS), code 1 (ABS_Y), value 2234
Event: time 1709037389.807721, type 3 (EV_ABS), code 24 (ABS_PRESSURE), value 92
```

(/wiki/File:Calibration_2.png)

- Put your finger on "x_max":

```
Event: time 1709037495.203695, type 3 (EV_ABS), code 0 (ABS_X), value 4010
Event: time 1709037495.203695, type 3 (EV_ABS), code 1 (ABS_Y), value 2192
Event: time 1709037495.203695, type 3 (EV_ABS), code 24 (ABS_PRESSURE), value 121
```

(/wiki/File:Calibration_3.png)

- Put your finger on "y_min":

```
Event: time 1709037668.160619, type 3 (EV_ABS), code 0 (ABS_X), value 1954
Event: time 1709037668.160619, type 3 (EV_ABS), code 1 (ABS_Y), value 154
Event: time 1709037668.160619, type 3 (EV_ABS), code 24 (ABS_PRESSURE), value 26
```

(/wiki/File:Calibration_4.png)

- Put your finger on "y_max":

```
Event: time 1709037708.228681, type 3 (EV_ABS), code 0 (ABS_X), value 2022
Event: time 1709037708.228681, type 3 (EV_ABS), code 1 (ABS_Y), value 3758
Event: time 1709037708.228681, type 3 (EV_ABS), code 24 (ABS_PRESSURE), value 103
```

(/wiki/File:Calibration_5.png)

```
sudo nano /boot/firmware/config.txt
```

Add the following content:

```
dtoverlay=waveshare-ads7846,x_min=164,x_max=4010,y_min=154,y_max=3758
```

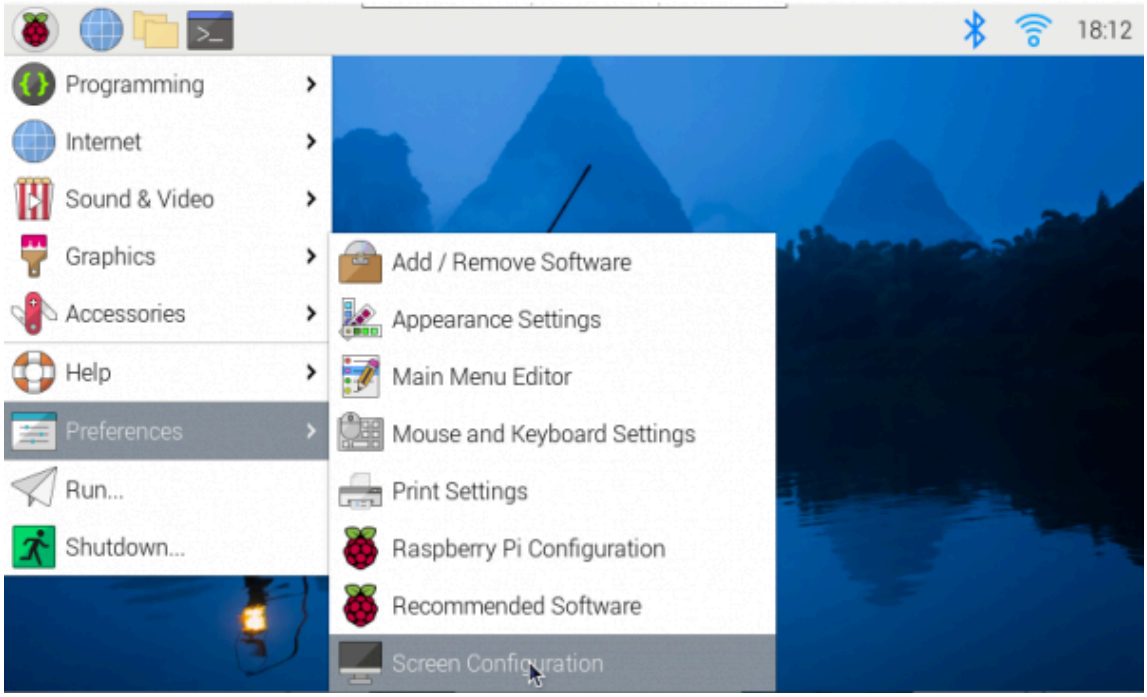
This is the more accurate touch range of the current touch device, and finally typing "sudo reboot" to reboot to take effect the current configuration.

Rotation

Add Rotation Parameters

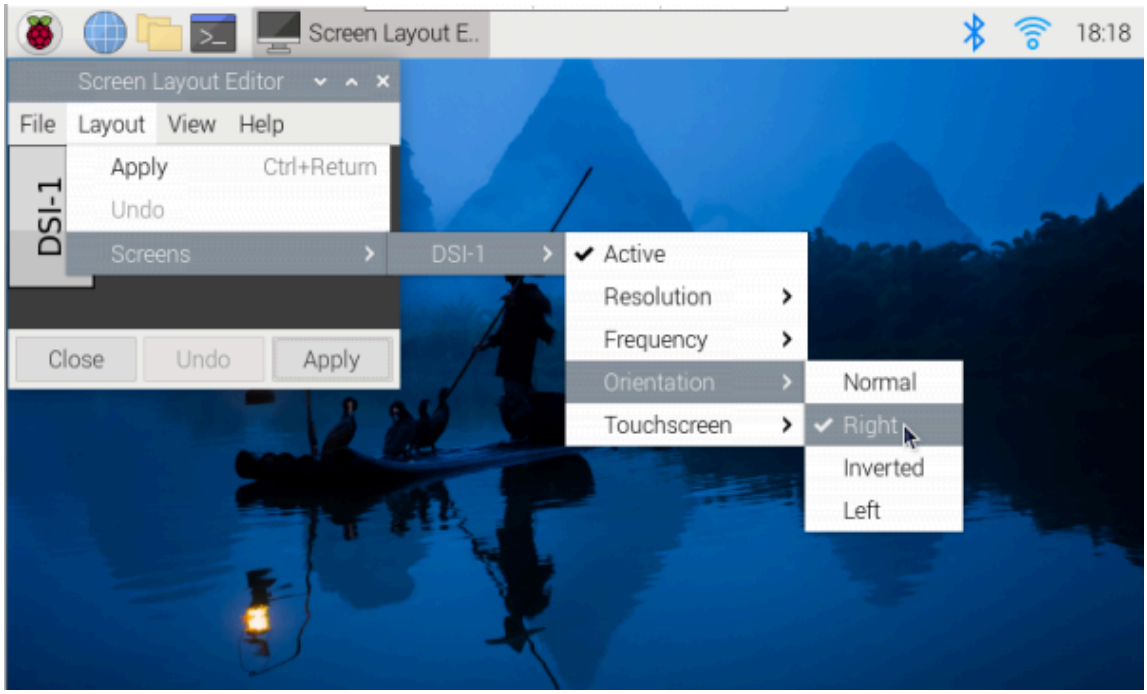
Bookworm Touchscreen Rotation:

1. Open "Screen Configuration" application:



(/wiki/File:DSI-LCD-Bookworm-Rotate-01.png)

2. Enter "Screen" -> "HDMI-1" -> "Orientation", select the rotation orientation and click on "Apply". Then, the touch can be rotated aligning with the display.



(/wiki/File:DSI-LCD-Bookworm-Rotate-04.png)

After rotation, you need to switch the corresponding positions of xmin, xmax, ymin and ymax to rotate the touch orientation.

For the lite version, you can adopt the following way to rotate:

```
sudo nano .config/wayfire.ini
```

Add the following sentence to the end of the file:

```
[output:HDMI-A-1]
mode = 800x480@60
transform = 270
```

For "transform" parameter, you can select normal, 90, 180 and 270.

For Bullseye and Kali systems:

First check if the system you are using has the KMS or FKMS driver loaded.
How to check: in /boot/config.txt, check whether the corresponding board has opened "dtoverlay=vc4-kms-v3d" or "dtoverlay=vc4-fkms-v3d". If it opens, you can use the following command to display rotation:

```
sudo nano /etc/xdg/lxsession/LXDE-pi/autostart
#Enter the command corresponding to the angle of rotation at the end of the "autostart" f
ile, reboot it to take effect
#0: rotate 0 degree; 1: rotate 90 degrees; 2: rotate 180 degrees; 3: rotate 270 degrees
xrandr -o 1
```

If it does not open, you can use the following command to display:

```
sudo nano /boot/config.txt
#Enter the command corresponding to the angle of rotation at the end of the "config.txt"
file, reboot it to take effect
#0: rotate 0 degree; 1: rotate 270 degrees; 2: rotate 180 degrees; 3: rotate 90 degrees
display_rotate=3
```

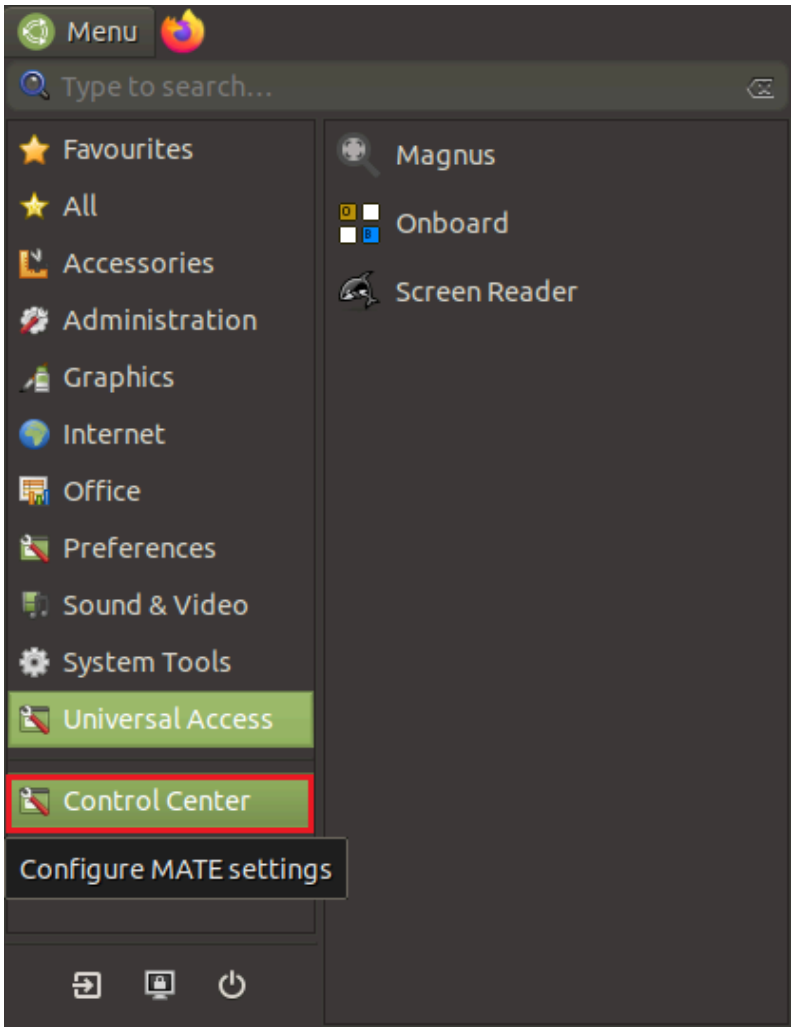
For Ubuntu System

First check whether the KMS or FKMS driver is loaded on the system you are using.

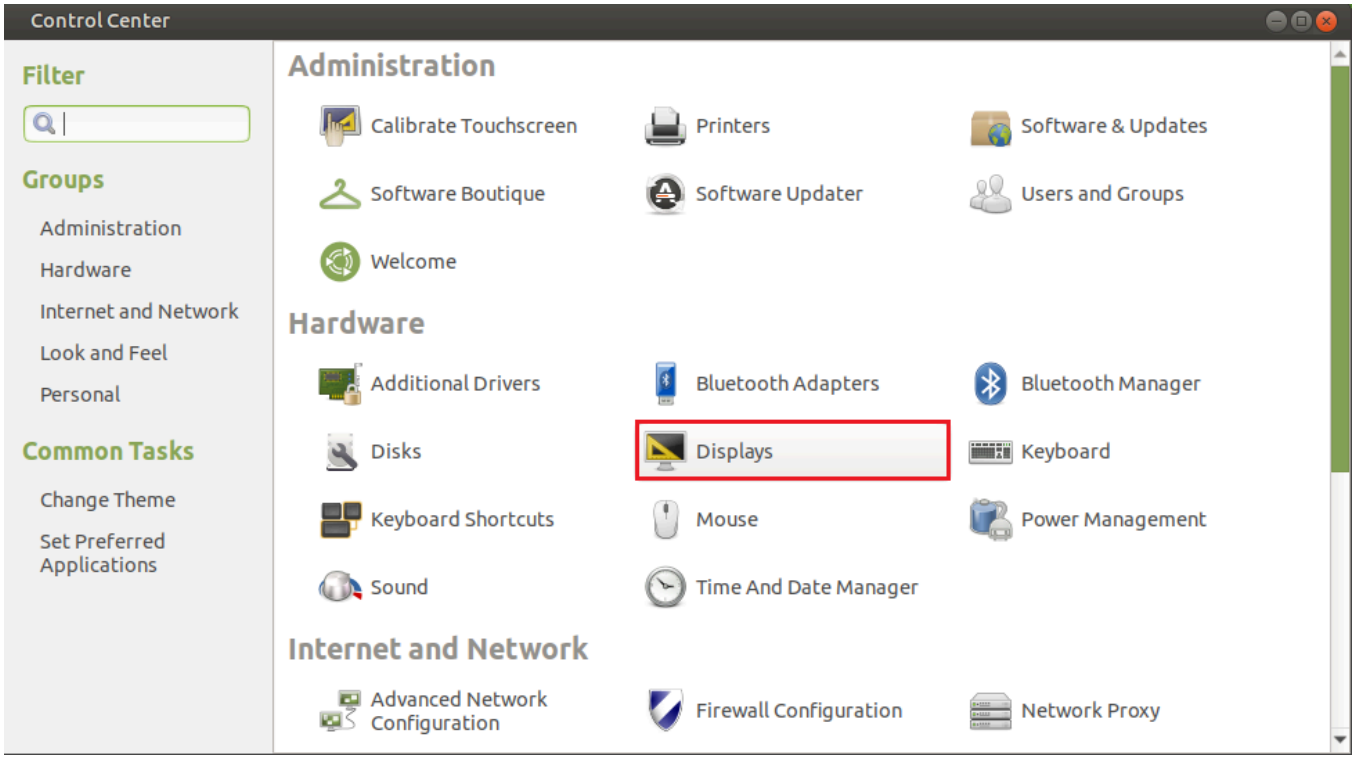
Check method: In /boot/firmware/config.txt, check whether the line dtoverlay=vc4-kms-v3d or dtoverlay=vc4-fkms-v3d is turned on.

If the driver is loaded, you can use the following method to rotate:

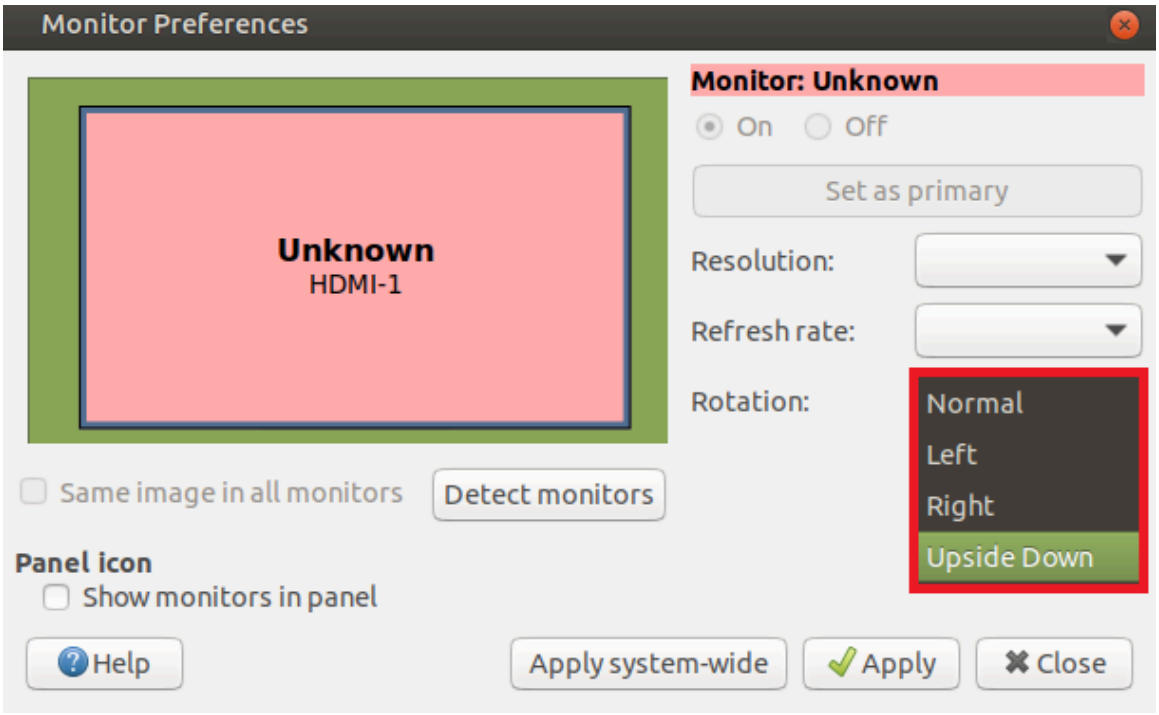
Note: For different versions of Ubuntu systems, the interface may be different. Generally, you can find the "Displays" application and rotate it.



(/wiki/File:GPIO-HDMI-Manual-01.png)



(/wiki/File:GPIO-HDMI-Manual-02.png)



(/wiki/File:GPIO-HDMI-Manual-03.png)

Execute the command to rotate the Ubuntu login interface. If the Ubuntu login interface is not opened, this step can be omitted:

```
#For 32-bit systems, execute the following command, replace your_user with the currently lo
gged-in user name
sudo cp /home/<your_user>/.config/monitors.xml /var/lib/lightdm/.config
#For 64-bit systems, execute the following command, replace your_user with the currently lo
gged-in user name
sudo cp /home/<your_user>/.config/monitors.xml /var/lib/gdm3/.config
sudo chown gdm:gdm /var/lib/gdm3/.config/monitors.xml
```

Execute the following command to rotate the command line display during startup:

```
sudo nano /boot/firmware/cmdline.txt
#Add the following code at the end to rotate the command line
#rotate 0 degree
fbcon=rotate:0 video=HDMI-A-1:800x480M@60,rotate=0
#rotate 90 degrees
fbcon=rotate:3 video=HDMI-A-1:800x480M@60,rotate=90
#rotate 180 degrees
fbcon=rotate:2 video=HDMI-A-1:800x480M@60,rotate=180
#rotate 270 degrees
fbcon=rotate:1 video=HDMI-A-1:800x480M@60,rotate=270
```

No KMS or FKMS driver loaded

Rotation is relatively simple, just use the following command to display rotation:

```
sudo nano /boot/firmware/config.txt
#Enter the command corresponding to the display rotation angle at the end of the config.txt file, and it will take effect after rebooting the system.
#0: rotate 0 degrees; 1: rotate 270 degrees; 2: rotate 180 degrees; 3: rotate 90 degrees
display_rotate=1
```

Add touch rotation parameter

```
sudo nano /usr/share/X11/xorg.conf.d/99-calibration.conf
#Modify the relevant command line in the 99-calibration.conf file, and it will take effect after rebooting the system. The following are the default calibration parameters. If you need to use specific calibration parameters, please pay attention to the order of the Calibration parameter values.
#touch rotates 0 degree:
Option  "Calibration"   "208 3905 288 3910"
Option  "SwapAxes"      "0"
#touch rotates 90 degrees:
Option  "Calibration"   "3905 208 288 3910"
Option  "SwapAxes"      "1"
#touch rotates 180 degrees:
Option  "Calibration"   "3905 208 3910 288"
Option  "SwapAxes"      "0"
#touch rotates 270 degrees:
Option  "Calibration"   "208 3905 3910 288"
Option  "SwapAxes"      "1"
```

Disable power saving

If you want to keep the display turning on all the time, you can disable the power saving function.

Modify file lightdm.conf

```
sudo nano /etc/lightdm/lightdm.conf
```

Find the [SeatDefaults] option and uncomment the line"xserver-command", modify it as below:

```
#xserver-command=X
```

Modify this code to

```
xserver-command=X -s 0 -dpms
```

- -s # –Disable the display protecting.
- dpms Disable power saving.

Reboot

```
sudo reboot
```

Interface

PIN NO.	SYMBOL	DESCRIPTION
1, 17	3.3V	Power positive (3.3V power input)
2, 4	5V	Power positive (5V power input)
3, 5, 7, 8, 10, 11, 12, 13, 15, 16, 18, 24	NC	NC
6, 9, 14, 20, 25	GND	Ground
19	TP_SI	SPI data input of Touch Panel
21	TP_SO	SPI data output of Touch Panel
22	TP_IRQ	Touch Panel interrupt, low level while the Touch Panel detects touching
23	TP_SCK	SPI clock of Touch Panel
26	TP_CS	Touch Panel chip selection, low active

Some possible problems

Touch jitter so obvious, how to solve it?

De-jitter parameters can be set to solve the problem of touch jitter, but at the cost of sacrificing a part of the sensitivity.

Since the ads7846.dtbo provided by Raspberry Pi by default has no de-jitter parameters, you can increase the de-jitter parameters by modifying and replacing ads7846.dtbo

Specifically, the anti-shake function can be added in the following method:

1. Execute the following command:

```
wget https://files.waveshare.com/upload/2/29/Ads7846_waveshare.zip
unzip Ads7846_waveshare.zip
cd ads7846_waveshare
sudo cp ads7846_waveshare.dtbo /boot/overlays/
```

2. Execute the following command:

```
sudo nano /boot/config.txt
#Comment out the following line:
#dtoverlay=ads7846,cs=1,penirq=25,penirq_pull=2,speed=50000,keep_vref_on=0,swapxy=0,pmax=25
5,xohms=150,xmin=200,xmax=3900,ymin=200,ymax=3900
#Add the following command at the end of the config.txt file, it will take effect after reb
ooting the system.
dtoverlay=ads7846_waveshare
```

Related reference documents：ads7846-overlay.dts (https://raw.githubusercontent.com/raspberrypi/linux/rpi-5.10.y/arch/arm/boot/dts/overlays/ads7846-overlay.dts) ads7846.txt (https://www.kernel.org/doc/Documentation/devicetree/bindings/input/ads7846.txt)

The installation of xserver-xorg-input-evdev and xinput-calibrator in Ubuntu system reports an error, so the touch cannot be used normally. How to solve it?

Note: The Ubuntu system may not be able to access the default source due to network problems in some regions, resulting in an installation error.

Solution 1. update the source:

1. Execute the command to view the current version:

```
lsb_release -c -s
```

For example, after execution, the system version may be: groovy

2. Execute the commands:

```
#backup the original source
sudo mv /etc/apt/syntaxhighlights.list /etc/apt/syntaxhighlights.list.old
sudo nano /etc/apt/syntaxhighlights.list
```

Add the following code and save:

```
#If your system version is not groovy, please replace the following groovy with the version
name obtained in step 1
deb http://old-releases.ubuntu.com/ubuntu/ groovy universe main
deb http://old-releases.ubuntu.com/ubuntu/ groovy-security main universe
deb http://old-releases.ubuntu.com/ubuntu/ groovy-updates main universe
```

3. Execute the command to update:

```
sudo apt-get update
```

4. After the update is complete, run #Touch calibration again.

If the above source fails, the following methods can be used:

Solution 2. directly find the download address of the two applications, download and install directly

For 32-bit systems, execute the following commands:

```
wget http://deb.debian.org/debian/pool/main/x/xserver-xorg-input-evdev/xserver-xorg-input-evdev_2.10.6-2_armhf.deb
sudo dpkg -i xserver-xorg-input-evdev_2.10.6-2_armhf.deb
wget wget http://mirrors.ustc.edu.cn/debian/pool/main/x/xinput-calibrator/xinput-calibrator_0.7.5+git20140201-1+b2_armhf.deb
sudo dpkg -i xinput-calibrator_0.7.5+git20140201-1+b2_armhf.deb
```

For 64-bit systems, execute the following commands:

```
wget http://deb.debian.org/debian/pool/main/x/xserver-xorg-input-evdev/xserver-xorg-input-evdev_2.10.6-2_arm64.deb
sudo dpkg -i  xserver-xorg-input-evdev_2.10.6-2_arm64.deb
wget http://mirrors.ustc.edu.cn/debian/pool/main/x/xinput-calibrator/xinput-calibrator_0.7.5+git20140201-1+b2_arm64.deb
sudo dpkg -i xinput-calibrator_0.7.5+git20140201-1+b2_arm64.deb
```

The installation of xserver-xorg-input-evdev and xinput-calibrator in Kali system reports an error, so the touch cannot be used normally. How to solve it?

Note: The Kali system may not be able to access the default source due to network problems in some regions, resulting in an installation error.

Solution 1. update the source:

1. Execute sudo su to obtain administrator privileges. The default password is kali.

2. Execute the command:

```
wget -q -O - https://archive.kali.org/archive-key.asc | apt-key add
```

3. Execute the command to modify the source:

```
nano /etc/apt/syntaxhighlights.list
```

Comment out the original source and modify it to:

```
deb http://mirrors.ustc.edu.cn/kali kali-rolling main contrib non-free
```

Save and exit.

4. Execute the command to update:

```
apt-get update --fix-missing
```

5. After the update is complete, run #Touch calibration again.

If the above source fails, the following methods can be used:

Solution 2. directly find the download address of the two applications, download and install directly

For 32-bit systems, execute the following commands:

```
wget http://deb.debian.org/debian/pool/main/x/xserver-xorg-input-evdev/xserver-xorg-input-evdev_2.10.6-2_armhf.deb
sudo dpkg -i xserver-xorg-input-evdev_2.10.6-2_armhf.deb
wget wget http://mirrors.ustc.edu.cn/debian/pool/main/x/xinput-calibrator/xinput-calibrator_0.7.5+git20140201-1+b2_armhf.deb
sudo dpkg -i xinput-calibrator_0.7.5+git20140201-1+b2_armhf.deb
```

For 64-bit systems, execute the following commands:

```
wget http://deb.debian.org/debian/pool/main/x/xserver-xorg-input-evdev/xserver-xorg-input-evdev_2.10.6-2_arm64.deb
sudo dpkg -i  xserver-xorg-input-evdev_2.10.6-2_arm64.deb
wget http://mirrors.ustc.edu.cn/debian/pool/main/x/xinput-calibrator/xinput-calibrator_0.7.5+git20140201-1+b2_arm64.deb
sudo dpkg -i xinput-calibrator_0.7.5+git20140201-1+b2_arm64.deb
```

Resources

Software

- Panasonic SDFormatter (https://files.waveshare.com/upload/d/d7/Panasonic_SDFormatter.zip)
- Win32DiskImager (https://files.waveshare.com/upload/7/76/Win32DiskImager.zip)
- PuTTY (https://files.waveshare.com/upload/5/56/Putty.zip)

Resources

- 5inch HDMI LCD panel dimension (https://files.waveshare.com/upload/e/e6/5inch-hdmi-lcd-%26-5inch-hdmi-lcd-b-panel-dimension.pdf)
- 5inch HDMI LCD Display Area (https://files.waveshare.com/upload/4/4a/5inch_HDMI_LCD%265inch_HDMI_LCD_B_panel_dimension.pdf)
- 5inch HDMI LCD 3D drawing (https://files.waveshare.com/upload/1/1f/5inch_HDMI_LCD_3D_Drawing.zip)
- 5inch HDMI LCD 3D Preview (https://files.waveshare.com/upload/6/60/5inch_HDMI_LCD_3D_Preview.zip)

- Assembly tutorial with 5inch HDMI LCD (with bicolor case) (https://files.waveshare.com/upload/e/ef/5inch-HDMI-LCD-Bicolor-Holder-LCD-assemble.jpg)

FAQ

Question:How could I disable the rainbow screen?

Answer:
Please add the following command to /boot/config.txt:

```
dusable_splash=1
```

Question:How to change the splash screen of Pi?

Answer:
You can replace the splash.png from the path /usr/share/plymouth/themes/pix/splash.png to yours.

Question:What is the working current for the 5-inch HDMI LCD when it works normally?

Answer:
When working with 5V input, the current is about 235mA with backlight on and 45mA with backlight off.

Question:What is the operating temperature of the 10.1inch HDMI LCD?

Answer:
The working temperature is 0°C -- 70°C.

Question:Can 5-inch HDMI LCD be connected to a computer as a display screen?

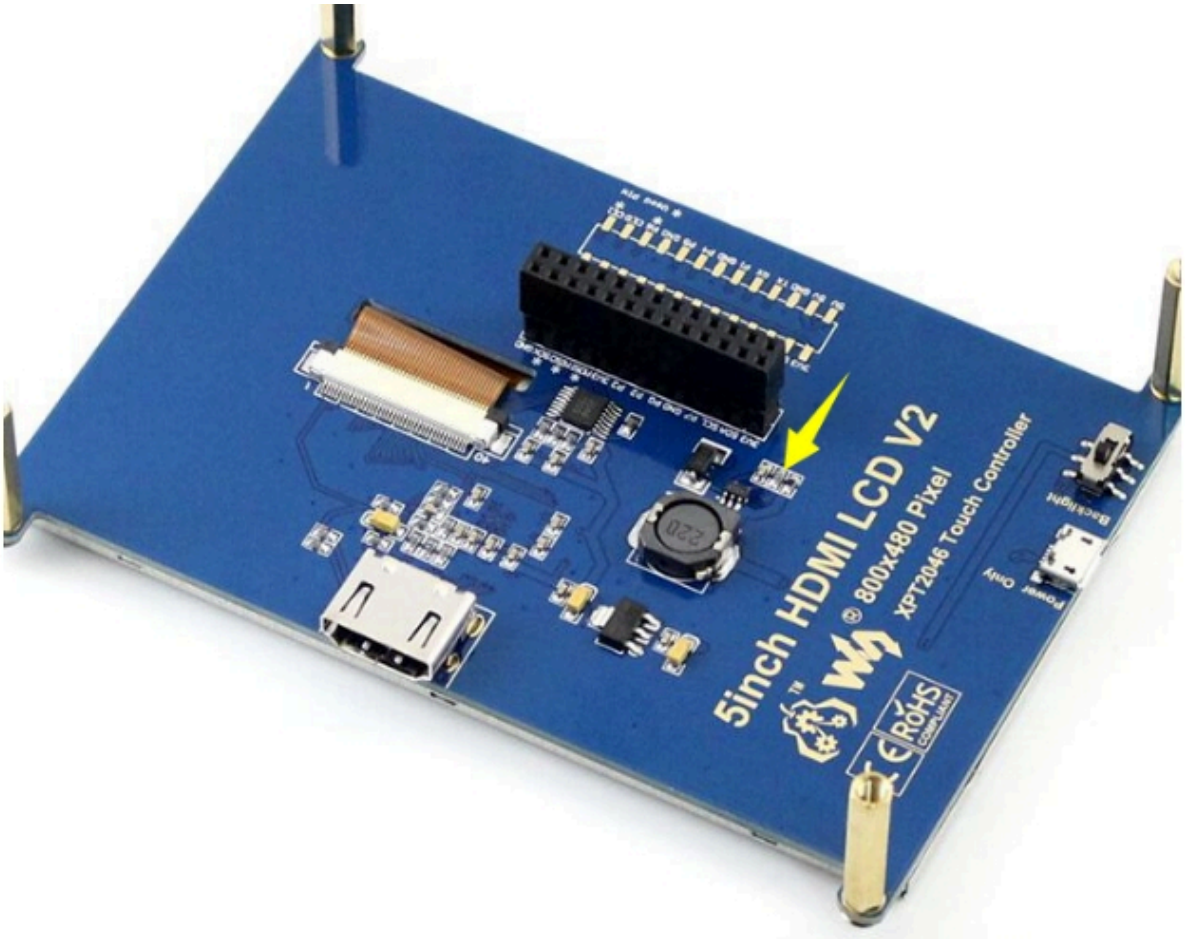
Answer:
It can only support Raspberry Pi, not suitable for connecting to a computer as a monitor.

Question:How to use PWM backlight adjustment in the 5inch HDMI LCD?

Answer:

Rev2.1:

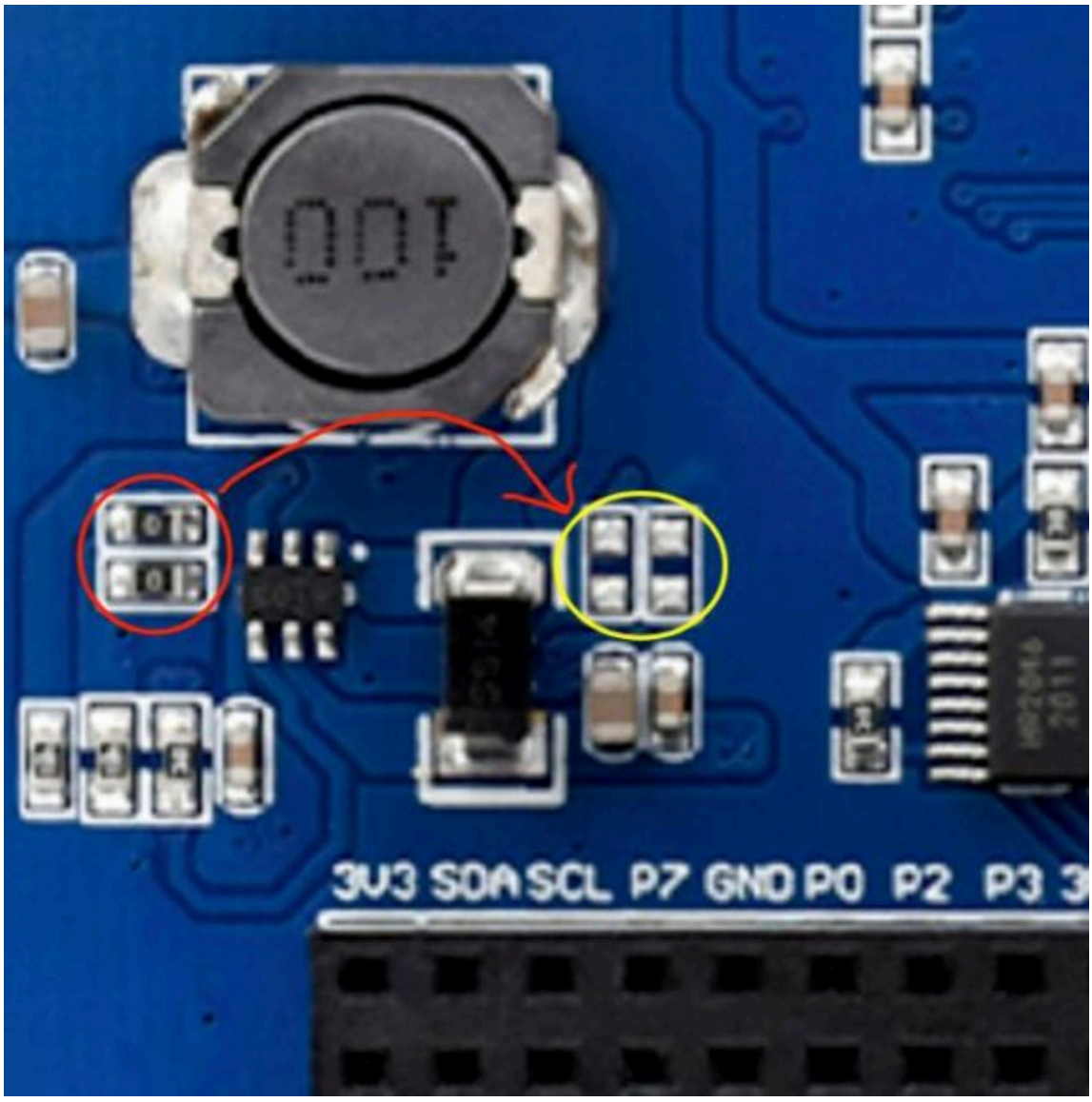
As shown below, connect the following pads to the P1 pin of the Raspberry Pi:



(/wiki/File:5inch_HDMI_LCD_FAQ01.jpg)

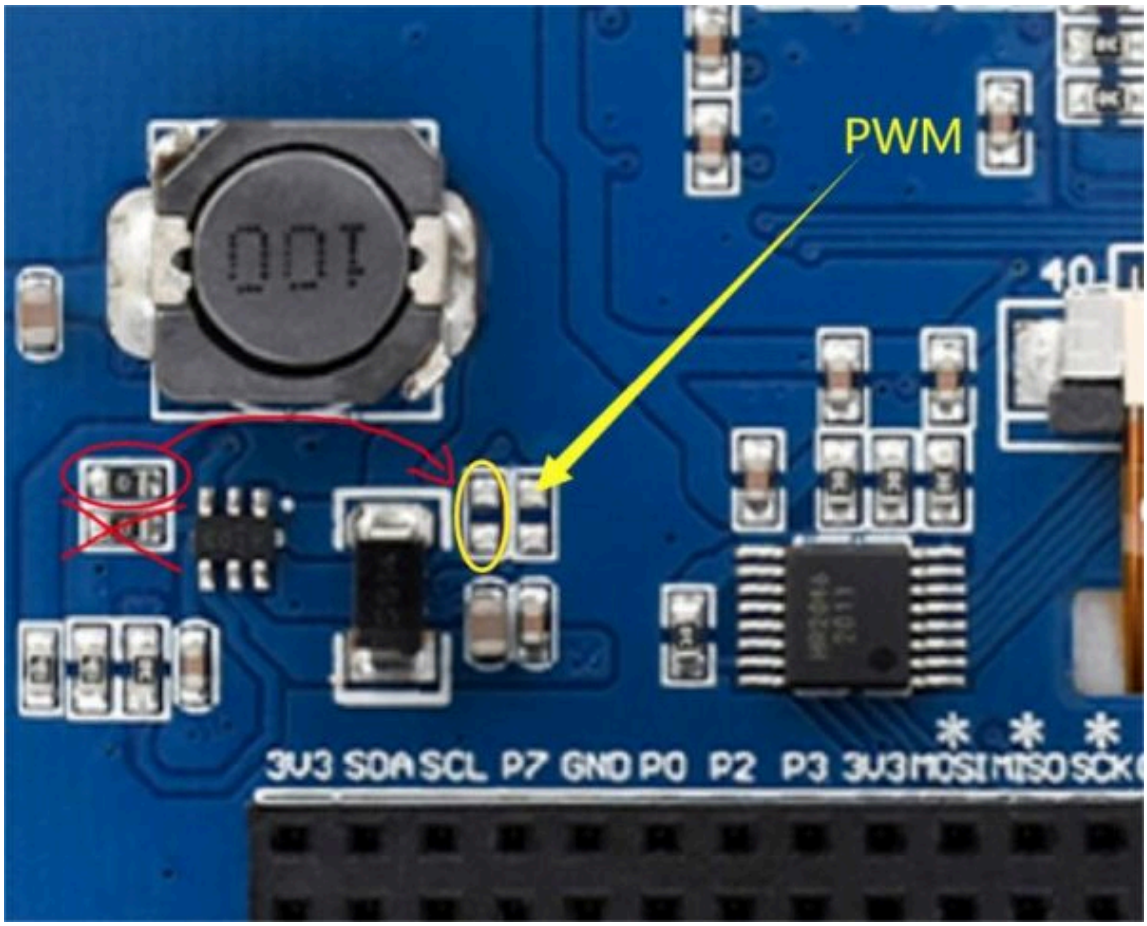
Rev3.1:

- If the main control is Raspberry Pi, you need to move the two 0 ohm resistors in the red circle shown below to the position of the yellow circle to directly implement the PWM control of Raspberry Pi BCM18.



(/wiki/File:5inch_HDMI_LCD_FAQ02.jpg)

- If you want to connect to other external PWM signals, you need to move the 0-ohm resistor in the red circle shown below to the yellow circle and remove the 0-ohm resistor below the red circle. Connect the external PWM signal to the pad above the resistor indicated by the yellow arrow.



(/wiki/File:5inch_HDMI_LCD_FAQ03.jpg)

Question:I want to know the voltage and current value of 5inch Resistive Touch Screen LCD, 800×480, HDMI, Low Power for our project design

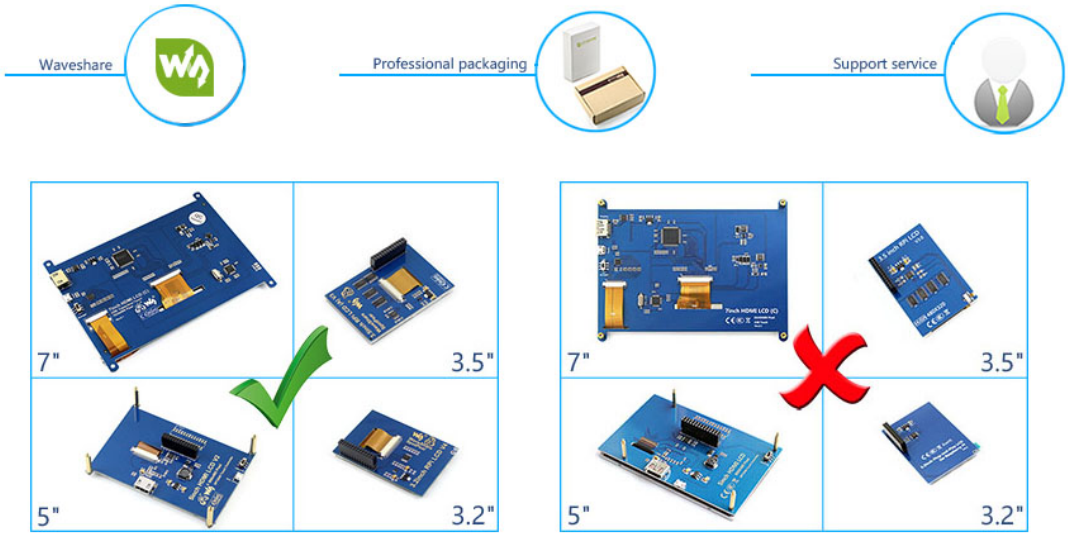
Answer:

When working with 5V input, the current is about 235mA with the backlight on and 45mA with the backlight off.

Anti-Piracy

Since the first-generation Raspberry Pi released, Waveshare has been working on designing, developing, and producing various fantastic touch LCDs for the Pi. Unfortunately, there are quite a few pirated/knock-off products in the market. They're usually some poor copies of our early hardware revisions, and comes with none support service.

To avoid becoming a victim of pirated products, please pay attention to the following features when purchasing:



(https://www.waveshare.com/w/upload/6/6d/RPi-LCD-Anti-Piracy-l.jpg)

(Click to enlarge (https://www.waveshare.com/w/upload/6/6d/RPi-LCD-Anti-Piracy-l.jpg))

Beware of knock-offs

Please note that we've found some poor copies of this item in the market. They are usually made of inferior materials and shipped without any testing.

You might be wondering if the one you're watching or you've purchased in other non-official stores is original, feel free to contact us.

Support

Technical Support

If you need technical support or have any feedback/review, please click the **Submit Now** button to submit a ticket, Our support team will check and reply to you within 1 to 2 working days. Please be patient as we make every effort to help you to resolve the issue.
Working Time: 9 AM - 6 PM GMT+8 (Monday to Friday)

Submit Now (https://service.waveshare.com/)