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Statement

This manual is used only for our Elegoo 3.5 inch screen for Raspberry Pi and Raspbian system. If you are using Linux system this manual wouldn't be a perfect reference and if you are using no-Linux system then you can skip this manual.

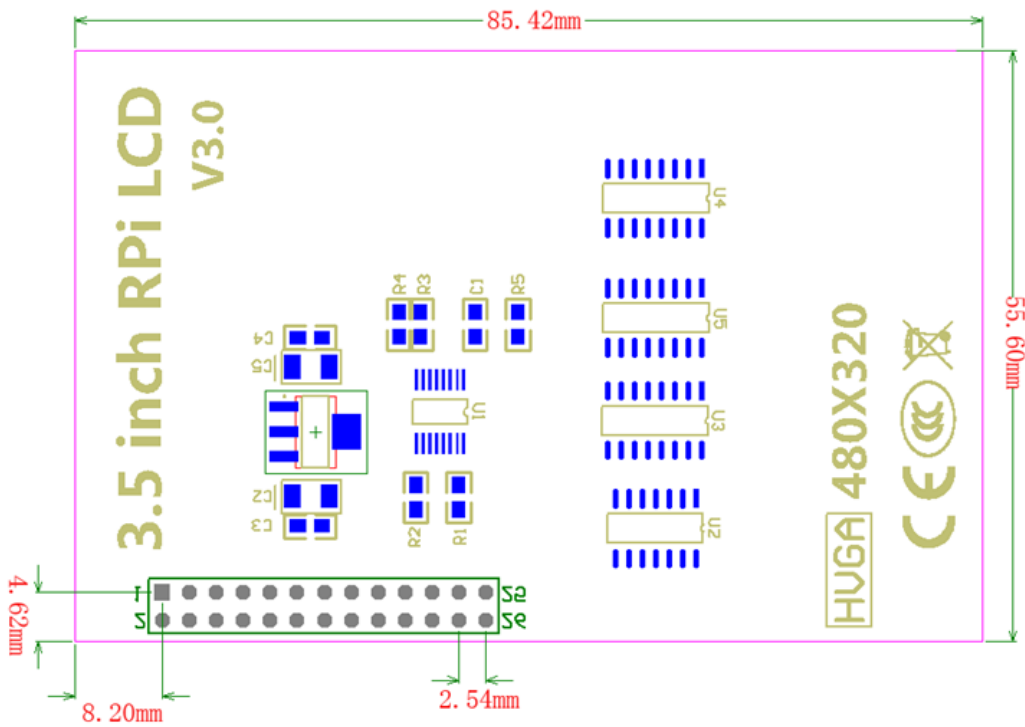
1. Get Prepared

1.1. Product Description

(1) Product Features:

- 3.5inch touch screen, 480×320 resolution ratio
- Resistive touch screen function
- Compatible with all versions of Raspberry Pi
- CE and RoHS certificated

(2) 3.5 inch touch screen size:



(3) Specifications:

Type	TFT Touch Screen
Interface	SPI
Touch panel control IC	XPT2046
Color gradation index	65536 colors
Back Light style	LED
Resolution	320 X 480 (Pixel)
Size Ratio	8 : 5

Power Consumption	TBD
Back-light current	TBD
Operating temperature(°C)	TBD

(4) Raspberry Pi GPIOs used by 3.5 inch touch screen

INTERFACE		
RPI PIN NO.	SYMBOL	DESCRIPTION
1,17	3.3V	Power positive(3.3V input)
2,4	5V	Power positive(5V input)
3,5,7,8,10,12,13,15,16	NC	NC
6,9,14,20,25	GND	GND
11	TP_IRQ	Touch Panel interrupt, low level while the Touch Panel detects touching
18	LCD_RS	LCD instruction control, Instruction/Data Register selection
19	LCD_SI/TP_SI	SPI data input of LCD/Touch Panel
21	TP_SO	SPI data output Touch Panel
22	RST	Reset
23	LCD_SCK/TP_SCK	SPI clock of LCD/Touch Panel
24	LCD_CS	LCDs chip selection, low active
26	TP_CS	Touch Panel's chip selection, low active

1.2. Hardware Preparation

- (1) A computer(better with desktop):
- (2) A Raspberry Pi (Pi3 is recommended which is also used in next tutorial)



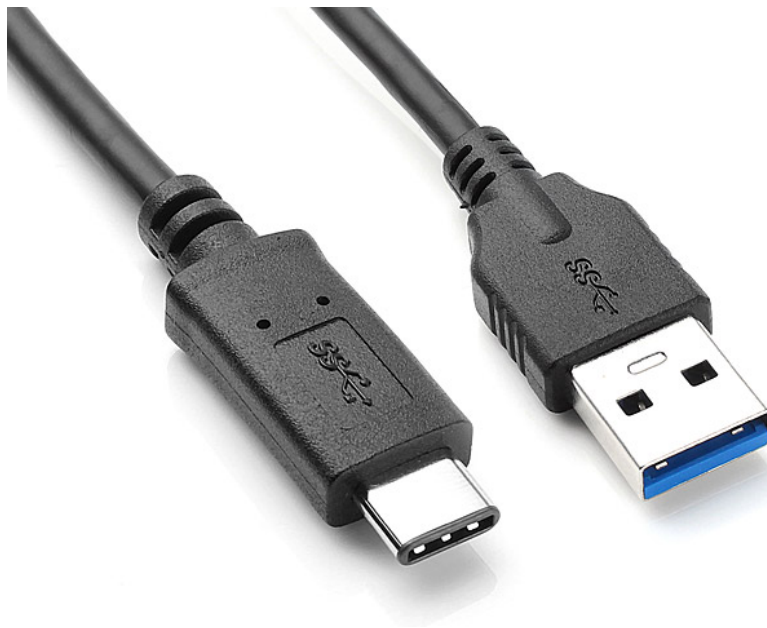
(3) Elegoo 3.5 inch TFT screen;



(4) One Micro SD with at least 4 GB space, 32GB is preferred;



(5) One Micro USB cable (USB type-A to USB type B Micro)



(6) One SD card reader



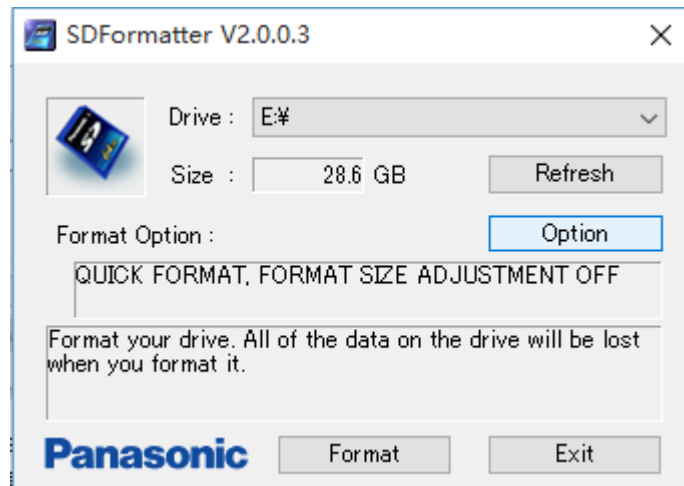
(7) One network cable



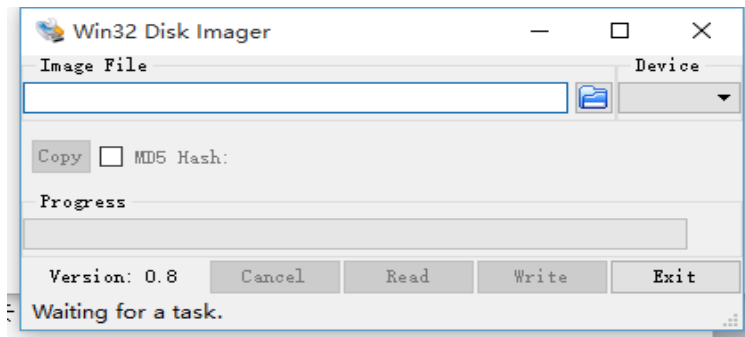
1.3. Software Preparation

1.3.1. Software Needed

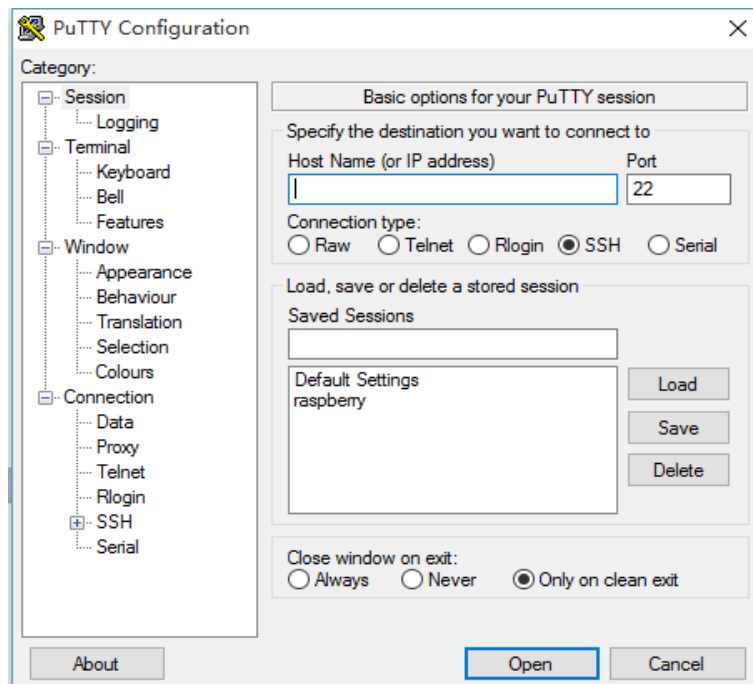
(1) SDFormatter.exe, used to format SD card



(2) Win32DiskImager.exe, used to write system into SD card

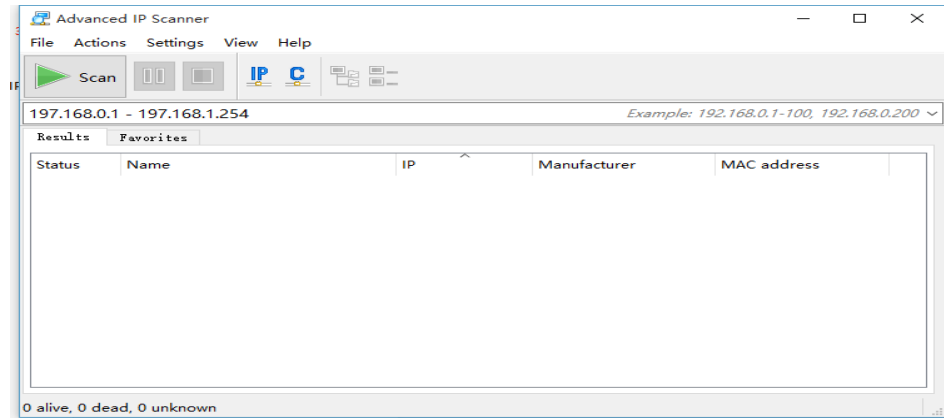


(3) Putty.exe, textual interface used on PC



Attention: The above 3 software are available in CD Where there is a file named Software

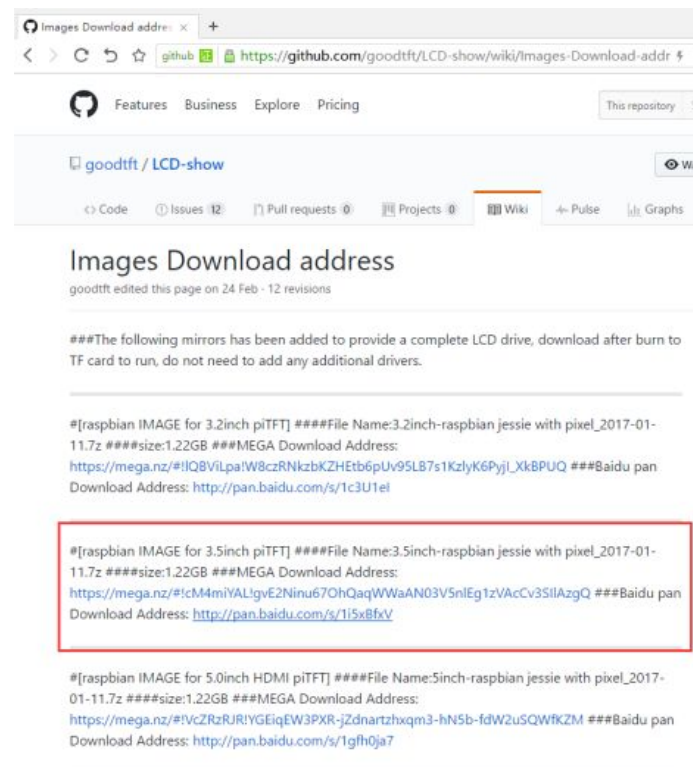
(4) Advanced IP Scanner, go to http://download.cnet.com/Advanced-IP-Scanner/3000-18508_4-10115592.html and download the local area network (LAN) IP scanner software which can be used directly.



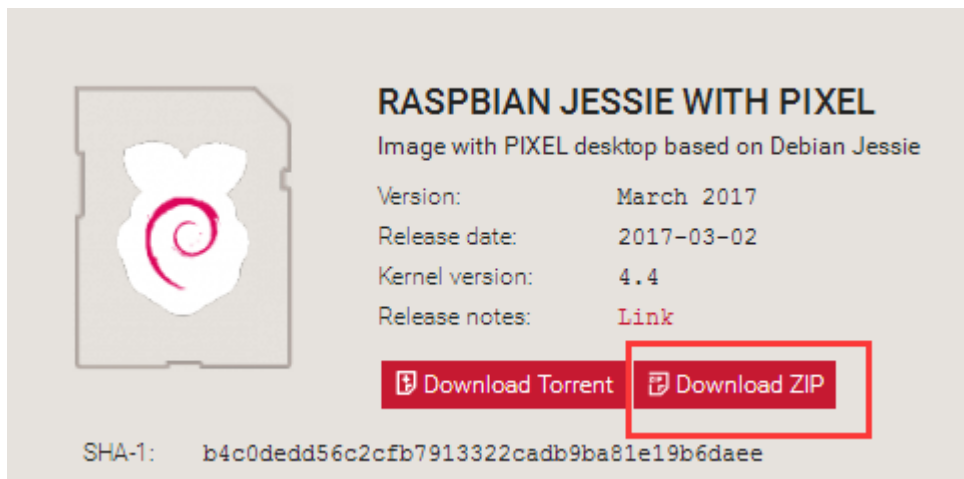
1.3.2. Download System Image

(1) Download the configured Raspbian system image (with drivers pre-installed) from below link:

<https://github.com/goodtft/LCD-show/wiki/Images-Download-address>



(2) Download the official Raspbian System Image from Raspberry official website -- <https://www.raspberrypi.org/downloads/raspbian/> and choose the zip file with PIXEL.



Attention: You will only need to use one of the above system.

2. Installation System

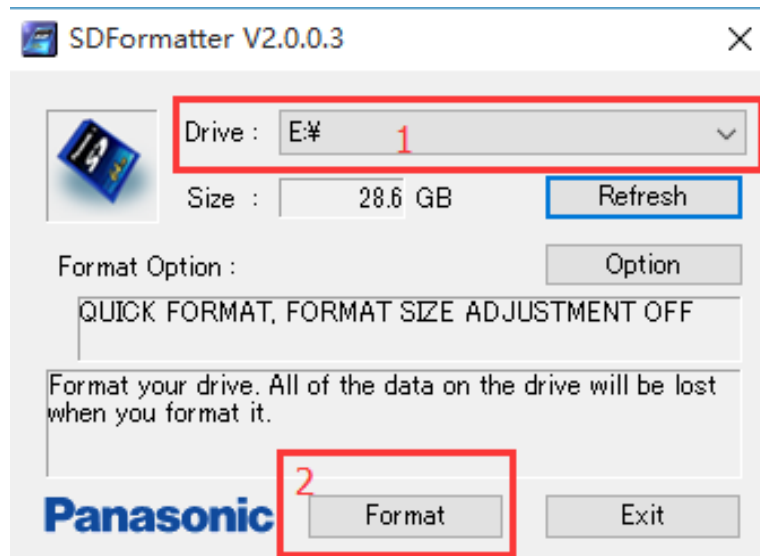
2.1. Install Configured Raspbian system

- (1) Put SD card into SD card reader and connect it with your PC

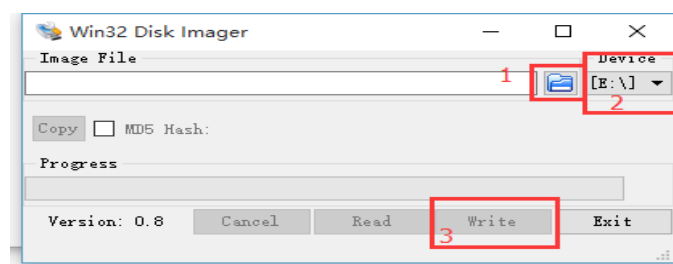


- (2) Run SDFormatter.exe and choose your SD card on your computer. Click *Format*

and there will be notifications popping up and click **Yes** until you click **Complete**.



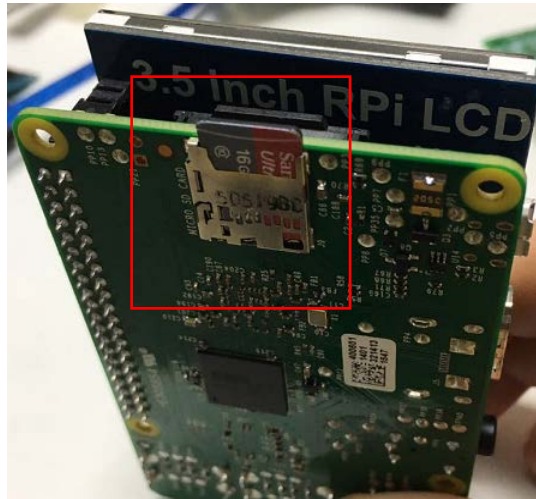
(3) Unzip the system image downloaded and run Win32DiskImager.exe. Choose the *.img file you just unzipped and choose your SD card then click write till it finish and exit.



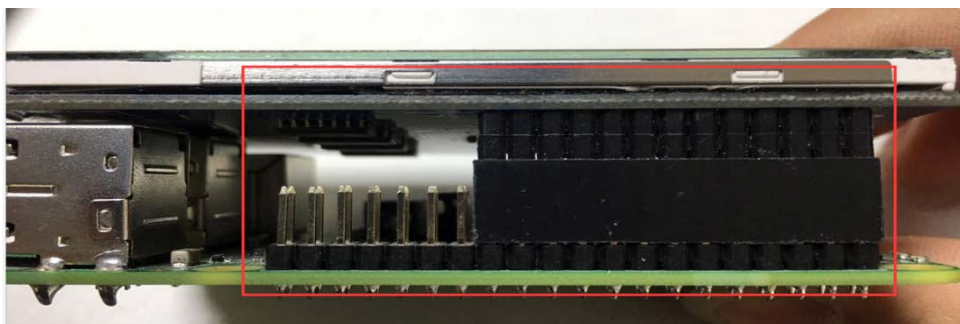
(4) Open your CD or tutorial downloaded from our web(Elegoo.com/download) Copy SSH file to your SD card and paste.



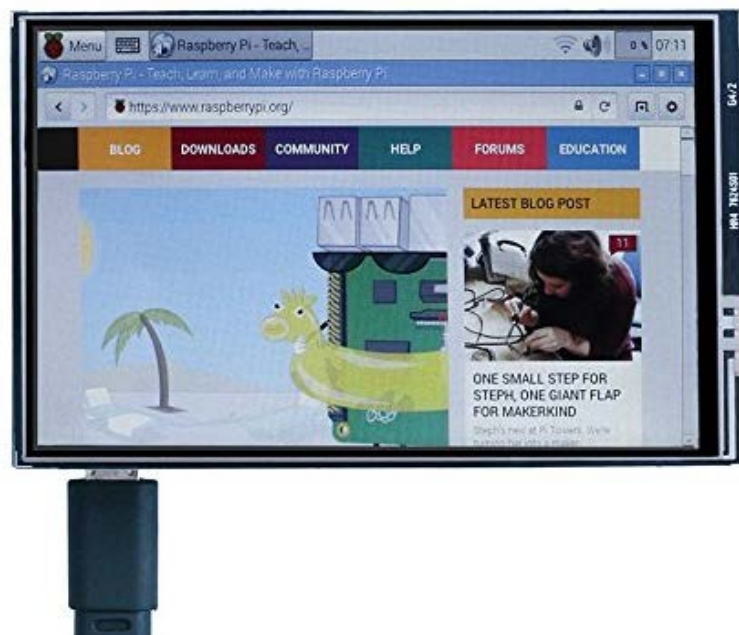
(5) Take out SD card and insert into Raspberry Pi and then plug 3.5 inch screen. Use your USB cable to connect the Raspberry Pi with your computer and wait a few seconds your system will start successfully.



Pic 2.5



Pic 26



Pic 27

FAQ: I got blank/white screen in this step, what should I do?

(1) Your SD card might be defective. Please change a new SD card and re-write the system

(2) If the screen still keeps black/white please contact us with your order number at service@elegoo.com / euservice@elegoo.com

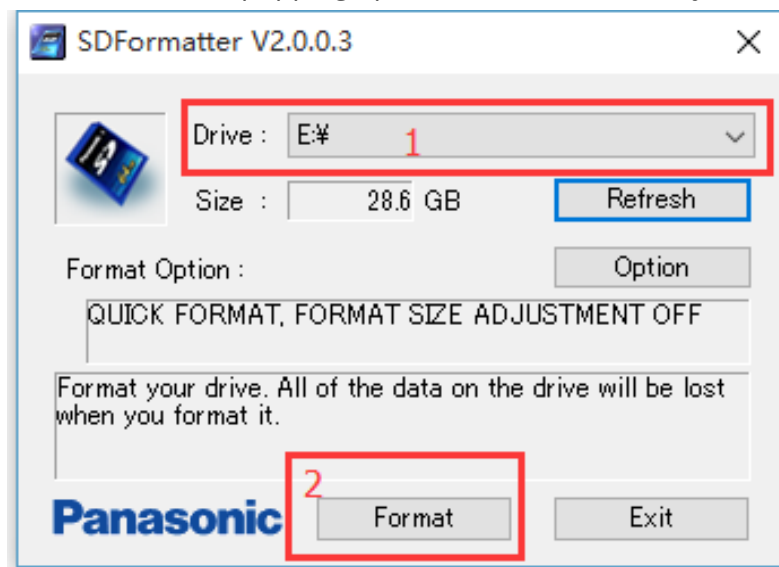
2.2. Install Official Raspbian System

Official Raspbian system means you will need to download the pure system image from Raspberry website (<https://www.raspberrypi.org>) which doesn't have drivers pre-installed.

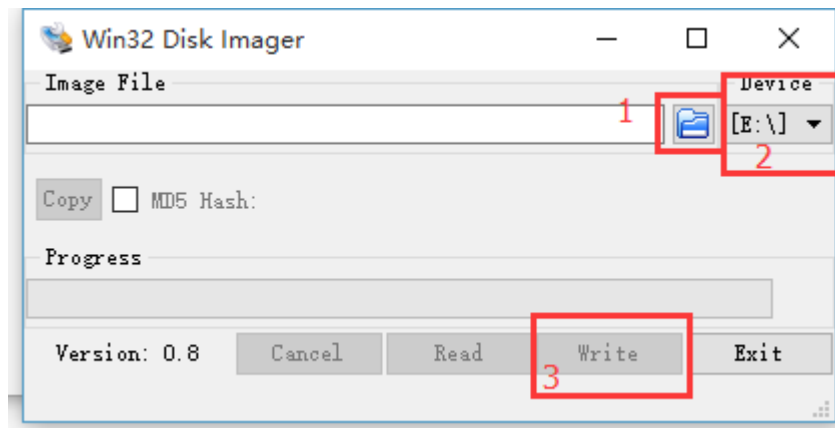
(1) Put SD card into SD card reader and connect it with your PC;



(2) Run SDFormatter.exe and choose your SD card on your computer. Click Format and there will be notifications popping up and click confirm until you click complete.



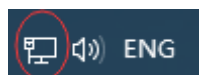
(3) Unzip the system image downloaded and run Win32DiskImager.exe. Choose the *.img file you just unzipped and choose your SD card then click write till it finish and exit.



(4) Open your SD card and you will find the system image. Right click and create a new .txt file and name it SSH (NO suffix, like below)



(5) Check your IP address on your computer and click the network icon on the below right area and choose network setting. Check your IP address as below:



Attribut

IPv4 address : 197.168.1.17

IPv4 DNS server : 114.114.114.114

114.114.115.115

Manufacturer : Realtek

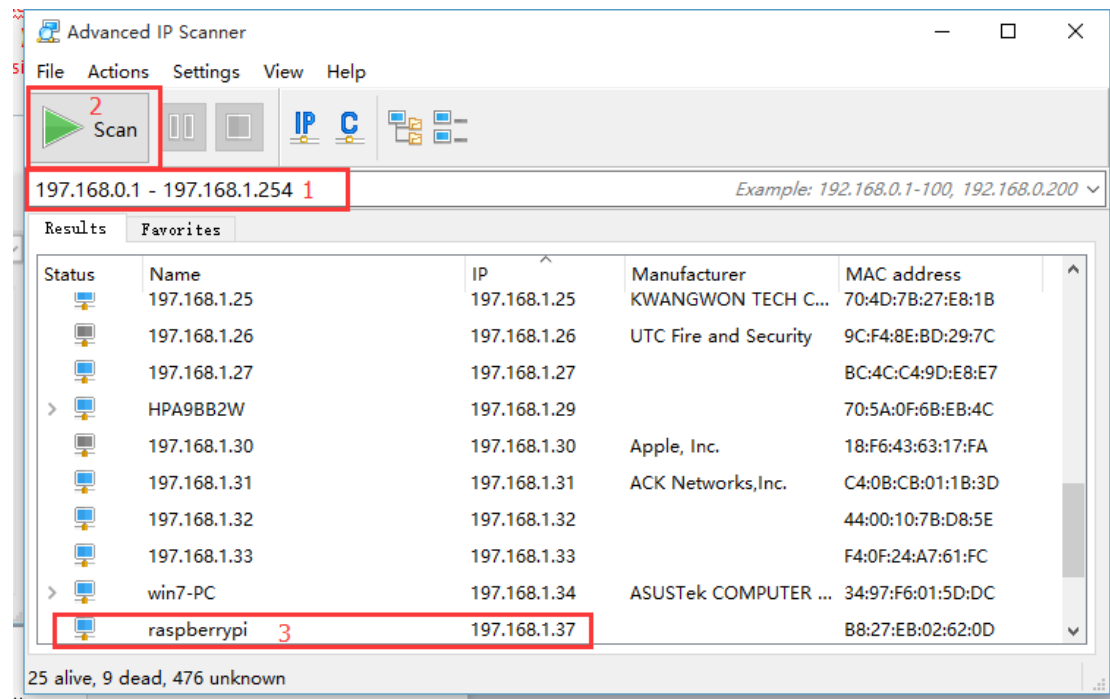
Description : Realtek PCIe GBE Family Controller

Driver version : 10.12.1007.2016

Physical address: 4C-CC-6A-2F-C5-34

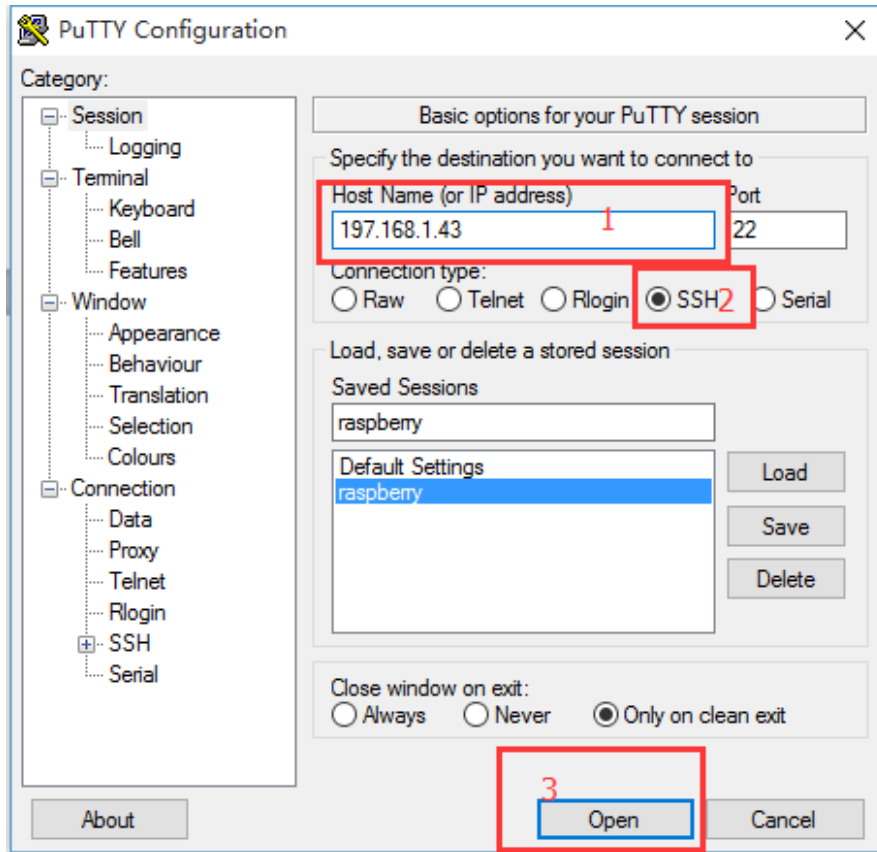
(6) Take out SD card and plug your Raspberry Pi. Use your USB cable to connect your Pi with your computer and wait for a while then run ipscan24.exe, input the LAN segment of your computer and Pi as shown in Pic2.13 to acquire the IP address of

your Pi.

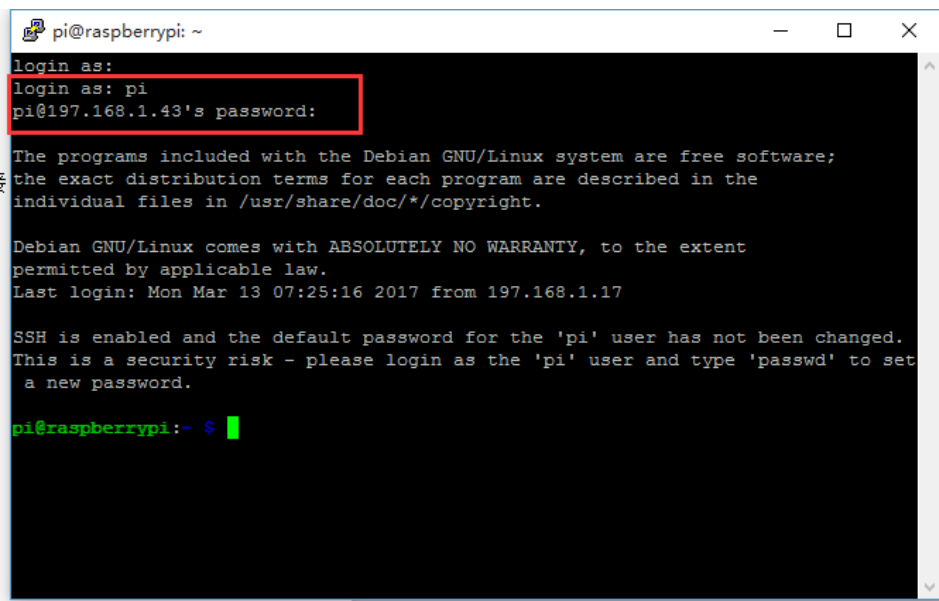


Pic 2.13

(6) Input the IP address you acquired into putty and select SSH, click **Open**. There will be notifications popping up in your first connection, just click **Yes** as shown in Pic 2.14. You will need to login in account and password as shown in Pic 2.15, input **pi** for login as and the password is **raspberry**. Then you will get in the textual interface for your Raspbian remote login.



Pic 2.14



Pic 2.15

- (9) Input below commands in turn:
- sudo apt-mark hold raspberrypi-bootloader
 - sudo apt-get update
 - sudo apt-get upgrade
 - git clone https://github.com/goodtft/LCD-show.git
 - chmod -R 755 LCD-show

```
cd LCD-show/  
sudo ./LCD35-show
```

It will take a while updating so please choose Y when you were asked to make a choice. Raspberry Pi will restart once you input your last command and then the Pi and touch screen will work properly.



FAQ: I got blank/white screen in this step, what should I do ?

Solution:

(1) Please refer Chapter 2.0 and use our configured system and make sure there is no error in the function of your screen. If anything please change your SD card to a new one and rewrite our configured system and then test again. If the blank/white screen still exists please contact us at service@elegoo.com for further technical support.

(2) If your touch screen works fine with our configured system, it means the driver program is not compatible with system. In this case you can use our configured system or send us an email at service@elegoo.com and we will inform you when the driver program updates at the first place. You will need remote login and delete previous driver files (`sudo rm -rf LCD-show`) and input below commands in turn:

```
sudo apt-mark hold raspberrypi-bootloader  
sudo apt-get update  
sudo apt-get upgrade  
git clone https://github.com/goodtft/LCD-show.git  
chmod -R 755 LCD-show  
cd LCD-show/
```

```
sudo ./LCD35-show
```

3. Advanced Function

3.1. Touch Screen Calibration

(1) Open the where the driver is and install Xinput then input below commands:
cd LCD-show

```
sudo dpkg -i -B xinput-calibrator_0.7.5-1_armhf.deb
```

You will get results as shown in Pic 3.1:

```
pi@raspberrypi:~ $ cd /boot
pi@raspberrypi:/boot $ cd LCD-show
pi@raspberrypi:/boot/LCD-show $ sudo dpkg -i -B xinput-calibrator_0.7.5-1_armhf.
deb
Selecting previously unselected package xinput-calibrator.
(Reading database ... 120289 files and directories currently installed.)
Preparing to unpack xinput-calibrator_0.7.5-1_armhf.deb ...
Unpacking xinput-calibrator (0.7.5-1) ...
Setting up xinput-calibrator (0.7.5-1) ...
Processing triggers for gnome-menus (3.13.3-6) ...
Processing triggers for desktop-file-utils (0.22-1) ...
Processing triggers for mime-support (3.58) ...
Processing triggers for man-db (2.7.0.2-5) ...
```

Pic 3.1

(2) calibrate touch screen and input:

```
DISPLAY=:0.0 xinput_calibrator
```

Use your stylus pen and click the red cross that appears on the screen (as shown in Pic 3.2) to get calibration data(as shown in Pic 3.3)



Pic 3.2

```
pi@raspberrypi:~ $ DISPLAY=:0.0 xinput_calibrator
Calibrating EVDEV driver for "ADS7846 Touchscreen" id=6
  current calibration values (from XInput): min_x=3936, max_x=856 and min_
y=838, max_y=3880

Doing dynamic recalibration:
  Setting new calibration data: 3901, 428, 407, 3859

--> Making the calibration permanent <--
  copy the snippet below into '/etc/X11/xorg.conf.d/99-calibration.conf'
Section "InputClass"
  Identifier      "calibration"
  MatchProduct   "ADS7846 Touchscreen"
  Option "Calibration" "3901 428 407 3859"
EndSection
```

Pic 3.3

(3) Record your calibration data and open your configuration files

```
sudo nano /etc/X11/xorg.conf.d/99-calibration.conf
```

Replace the data after "Calibration" (as shown in Pic 3.4) and press **Ctrl+X**, then press **Y** and then press **Enter**, then save and exit.

```
pi@raspberrypi: ~
GNU nano 2.2.6 File: /etc/X11/xorg.conf.d/99-calibration.conf
Section "InputClass"
  Identifier      "calibration"
  MatchProduct   "ADS7846 Touchscreen"
  Option "Calibration" "3901 428 407 3859"
  Option "SwapAxes" "1"
EndSection
```

Pic 3.4

(4) Restart your Raspberry Pi and now your touch screen will respond to each touch correctly.

FAQ:

(1) There are errors or no response after I input `DISPLAY=:0.0 xinput_calibrator` in putty, what should I do?

Solution: Calibration command must run in the file of LCD-show, which means before you run calibration command you will need first input `cd:/LCD-show` then input calibration command.

(2) After calibration the touch function works very well but after I restart system, the screen is back to old problems again?

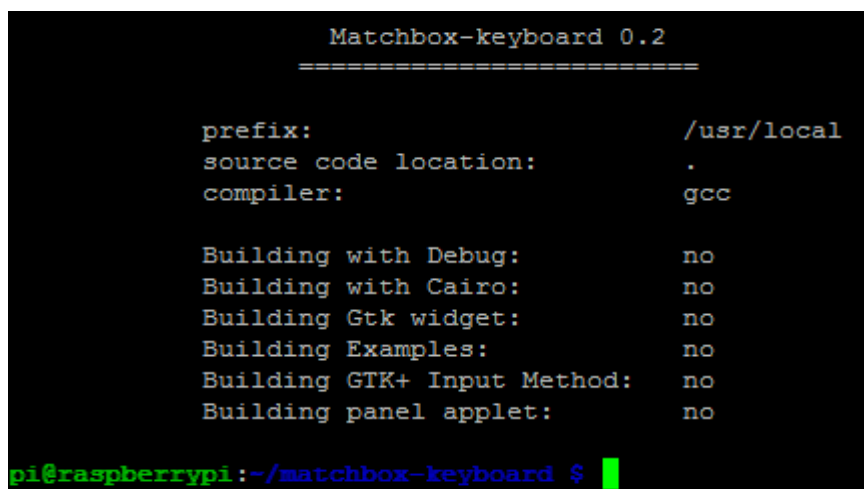
Solution: This happens because might forgot to save in step 3. Please go try again and if problems still exists please contact us at service@elegoo.com

3.2. Install Virtual Keyboard

(1) Install and download the virtual keyboard code below and compile:

```
sudo apt-get update
sudo apt-get install libfakekey-dev libpng-dev autoconf libxft-dev libtool automake -y
git clone https://github.com/mwilliams03/matchbox-keyboard.git
cd matchbox-keyboard
./autogen.sh
```

Attention: *./autogen.sh will take several minutes to run and you will get results like below if everything goes well. If you didn't get below results you will need to check whether there are any error options.*



```
Matchbox-keyboard 0.2
=====

prefix:                /usr/local
source code location:  .
compiler:              gcc

Building with Debug:   no
Building with Cairo:   no
Building Gtk widget:   no
Building Examples:     no
Building GTK+ Input Method: no
Building panel applet: no

pi@raspberrypi:~/matchbox-keyboard $
```

(2) Install Virtual Keyboard

```
sudo make
sudo make install
```

(3) Install shared library for virtual keyboard

```
sudo apt-get install libmatchbox1
```

```

pi@raspberrypi:~/matchbox-keyboard $ sudo apt-get install libmatchbox1
Reading package lists... Done
Building dependency tree
Reading state information... Done
The following extra packages will be installed:
  libxsettings-client0
The following NEW packages will be installed:
  libmatchbox1 libxsettings-client0
0 upgraded, 2 newly installed, 0 to remove and 147 not upgraded.
Need to get 57.6 kB of archives.
After this operation, 126 kB of additional disk space will be used.
Do you want to continue? [Y/n] y
Get:1 http://mirrordirector.raspbian.org/raspbian/ jessie/main libxsettings-clie
nt0 armhf 0.17-6 [8,724 B]
Get:2 http://mirrordirector.raspbian.org/raspbian/ jessie/main libmatchbox1 armh
f 1.9-osso8-3.1 [48.9 kB]

```

(4) Create the startup script for virtual keyboard

```
sudo nano /usr/bin/toggle-matchbox-keyboard.sh
```

Copy and paste below content and press **Ctrl+X**, then **Y** then **Enter** then save and exit.

```

#!/bin/bash
#This script toggle the virtual keyboard
PID=`pidof matchbox-keyboard`
if [ ! -e $PID ]; then
killall matchbox-keyboard
else
matchbox-keyboard -s 100 extended&
fi

```

Grant the oggle-matchbox-keyboard.sh script executable permissions

```
sudo chmod +x /usr/bin/toggle-matchbox-keyboard.sh
```

(5) Add the script in step 4 into Start menu.

```
sudo nano /usr/share/applications/toggle-matchbox-keyboard.desktop
```

Copy and paste below content and press **Ctrl+X**, then **Y** then **Enter** then save and exit.

```

[Desktop Entry]
Name=Toggle Matchbox Keyboard
Comment=Toggle Matchbox Keyboard
Exec=toggle-matchbox-keyboard.sh
Type=Application
Icon=matchbox-keyboard.png
Categories=Panel;Utility;MB

```

X-MB-INPUT-MECHANSIM=True

(6) Create icon on task bar

Please noted that you must use Pi user permission in the step which means you don't need to add sudo before nano; if you use admin permission you won't be able to find this file.

Input below command:

```
nano ~/.config/lxpanel/LXDE-pi/panels/panel
```

Find below codes in the file:

```
Plugin {  
  type=launchbar  
  Config {  
    Button {  
      id=/usr/share/applications/lxde-x-www-browser.desktop  
    }  
    Button {  
      id=/usr/share/raspi-ui-overrides/applications/pcmanfm.desktop  
    }  
    Button {  
      id=/usr/share/raspi-ui-overrides/applications/lxterminal.desktop  
    }  
    Button {  
      id=/usr/share/applications/wolfram-mathematica.desktop  
    }  
    Button {  
      id=/usr/share/applications/wolfram-language.desktop  
    }  
  }  
}
```

Add below codes before the first "Button"

```
Button {  
  id=toggle-matchbox-keyboard.desktop  
}
```

Press **Ctrl+X**, then **Y** then **Enter** then save and exit.

Input command:

```
sudo reboot
```


And Raspberry Pi will restart to complete installation. Click the icon in the red box (see Pic 3.7) and you are free to use the virtual keyboard.



Pic 3.7

Extra Skills:

Login via SSH and input below commands to change the size of virtual keyboard

```
DISPLAY=:0.0 matchbox-keyboard -s 50 extended
```

```
DISPLAY=:0.0 matchbox-keyboard -s 100 extended
```

If you are using mouse and keyboard please input below commands in the terminal console marked in yellow circle in Pic 3.7:

```
matchbox-keyboard -s 50 extended
```

```
matchbox-keyboard -s 100 extended
```

FAQ:

When I use virtual keyboard to input and click no-keyboard area, the keyboard disappeared, what should I do?

Solution: Technically virtual keyboard is a software so if you click no-keyboard area the keyboard will “disappear” or hide because it’s under other windows or interfaces. Click the keyboard icon again or change the upper window or interface to a smaller one then you will find the keyboard again.

3.3. Modify Display Orientation

(1) Open configuration file – config.txt and input

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

(2) Find "dtoverlay=tft35a" in config.txt and add rotate parameter in below formats:

```
dtoverlay=tft35a:rotate=value
```

When value is 0, it means to rotate 0 degree, in this case screen is vertical display

When value is 90, it means to rotate 90 degree, in this case screen is horizontal display

When value is 180, it means to rotate 180 degree, in this case screen is vertical display

When value is 270, it means to rotate 270 degree, in this case screen is horizontal display

(3) Press **Ctrl + X** and choose **Y**. Save and exit and restart you will see changes accordingly to your modification.

FAQ:

After I changed the display orientation, the touch screen function is not working, what should I do?

Solution: Please refer Chapter 3.0 and calibrate your screen again.

4. FAQ

4.1. Compatible Systems

Elegoo 3.5 inch touch screen can work with Raspbian system, Ubuntu-mate system and kali Linux system.

Systems that won't work with this screen are recalbox, RetroPie, Kodi because this 3.5 inch screen is connected with Raspberry Pi through SPI buses not HDMI buses and those systems that won't work require HDMI buses for display and touch screen. Besides as a starter screen, its frame rate and image quality may not be suitable for arcade game simulator or multimedia playback center.

4.2. White /Blank Screen

Problem: When charged, the screen is white and shows nothing in there.

Analysis: White/blank screen might happen because of below reasons:

- Quality issue of screen
- Drivers are not compatible with system
- Failure in writing system
- SD card format error or SD card is defective
- Drivers are not installed
- System is out of date or the firmware program of bootloader was changed when updating system

(1) Failure in writing system

Connect your Raspberry Pi with your desktop display using HDMI cable and the system won't show up in the display.

Solution: Rewrite system and if problem still exists after rewriting then you SD card format might be wrong or SD card is defective.

(2) SD card format error or SD card is defective:

Rewrite system many times and system still won't start

Solution: Wrong SD card format: Run SDFormatter.exe and format your card. Choose SD card in your computer and right click --choose property—make sure your SD card format is FAT32. If SD card is defective please change it to a new and

functional one.

(3) System is out of date or the firmware program of bootloader was changed when updating system:

Solution: You will need to update system when you first start system. Input below commands before updating:

```
sudo apt-mark hold raspberrypi-bootloader
```

Make sure bootloader won't be changed and then input below commands:

```
sudo apt-get upgrade  
sudo apt-get update
```

Update system in the right way and restart then reinstall drivers.

(4) Drivers are not installed:

3.5 inch screen works with the configured Raspbian system but not on the official Raspbian system.

Solution: Please refer Chapter2.2 and install drivers.

(5) Drivers are not compatible with system:

3.5 inch screen works with the configured Raspbian system. After installing drivers for official Raspbian system the screen is still white/blank.

Solution: Please install the latest version of Raspbian system and contact us at service@elegoo.com. We will inform you once the drivers is updated and show you how to install drivers.

(6) Quality issue of screen:

Excluding reason (1) to (5) then you might have received a defective scree.

Solution: Please send us an email with your order ID at service@elegoo.com and tell us where you bought this screen. We will arrange a replacement and send it to you for free very soon.

4.3. Kernel Crash

Problem: after installing drivers and restart, the system won't start. On the screen there are some start info on the screen but in the last line it says kernel crash.

Analysis: There are 3 reasons from Kernel crash: First, drivers are not compatible with your system; Second, SD card functionality is not stable and has bad contact. Third, your Raspbian system is out of date and not compatible with drivers.

(1) Drivers not compatible with system:

If your screen works well with our configured Raspbian system, it means the system you installed before is not compatible with our drivers.

Solution: Our drivers are compatible with Raspbian system, Ubuntu-mate and Kali as well. The latter two system will need some adjustments to installing commands. We recommend systems of Raspbian, Ubuntu-mate and Kali. As to the other systems please contact us for solutions and we'll try our best to help out.

(2) SD card functionality is not stable and has bad contact:

SD card takes a very long time to be recognized by computer even can't be recognized sometimes. Or the files in SD card cannot open and some are broken.

Solution: Please get a new SD card.

(3) Raspbian system is not compatible with drivers:

Please install the configured Raspbian system and test whether you can use the screen.

Solution: Please install the latest Raspbian system and contact us for the latest drivers.

4.4. Touch Screen Issue

Drivers installed and screen shows system windows but touch screen function is not working, cursor and touch point doesn't match.

Analysis: There are 3 reasons for this issue: One, Compatibility issue between drivers and system; Two, Didn't calibrate screen after modifying screen orientation; Three, Quality issue.

(1) Compatibility issue between drivers and system:

Install the configured system and if touch screen function works well it means

the drivers you installed are not compatible with the system you installed previously.

Solution:

- (1) Use the configured system we provided;
- (2) Install the latest Raspbian system and contact us for the latest drivers.

(2) Didn't calibrate screen after modifying screen orientation:

Touch screen function is working well before modifying screen orientation.

Solution: After modifying screen orientation please refer Chapter 3.1 to calibrate screen.

(3) Quality issue:

After installing configured system the touch screen function is still not working.

Solution: Please send us an email with your order ID and tell us which Amazon marketplace you bought this screen. We will send you a new one for free.

4.5. Performance Issue

(1) This 3.5 inch screen has taken up too many GPIO ports.

Analysis: Please use Raspberry Pi extension board to use those GPIO ports (with NC symbol) taken up by screen (Please refer to the chart in Chapter 1.1 Section (4) Raspberry Pi GPIOs used by 3.5 inch touch screen)

(2) Arcade game systems like RetroPie, recalbox won't work well on this screen

Analysis: 3.5 inch screen use SPI buses to communicate and the speed is kind of slow so the frame rate is not very fast and the image quality is of ordinary level. RetroPie and recalbox requires HDMI buses communication and fast frame rate. So if you use this screen with these arcade game system there would be frame drop and not smooth in playing games.

(3) Multimedia playback center like Kodi won't work on this screen

Analysis: The same reason as above, Kodi system also uses HDMI buses to communicate while this screen uses SPI buses.

(4) Cannot play HD videos on this 3.5 inch screen

Analysis: This screen is a starter screen for Raspberry Pi and has only 480*320 resolution ratio so playing HD videos on this screen won't be a pleasant experience.

We suggest to use average quality videos and play on this screen.

4.6. NOOBS Issue

Problem: There is NOOBS in SD card, Raspberry Pi can start but after installing drivers the screen is still white.

Solution: NOOBS is short got New Out of Box Software and it's a software not a system, just like installation boot software on Windows system. So we cannot install drivers on NOOBS. We could install Raspbian system using NOOBS then install drivers on Raspbian. This way you can use Raspbian system on the screen.