



Makerbase

Guangzhou Qianhui Information technology Co., Ltd

Duet2 WiFi Mainboard Datasheet

Makerbase

QQ Group : 489095605 232237692

Email : Huangkaida@makerbase.com.cn

Document Version 1.0

Release Date: February 28th, 2019

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Version Update

version	modified time	modification	Remark
V1.0	Feb 2th,2019	original version	

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I Overview

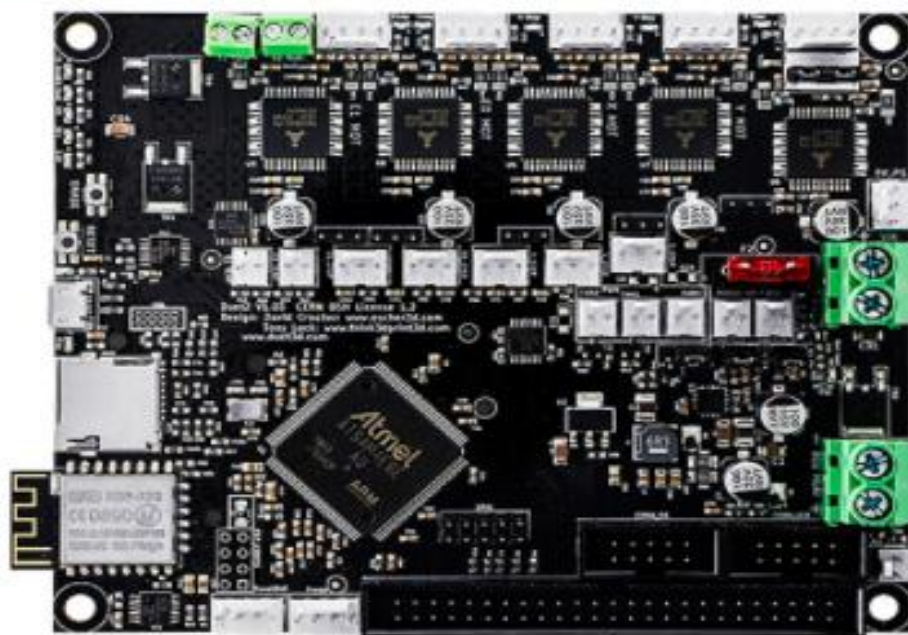
Duet2 WiFi is a motherboard for market demand. It adopts ARM Cortex-M4 ATSAM4E8E as main chip and runs at up to 120 MHz. With Reprap firmware, configuration files are directly configured on the web page for easier operation. Support for connecting to the Panel Due touch screen. WiFi module is integrated to motherboard that can be controlled and printed via a web page. It adopts TMC2660 driver to support high subdivision current. It is suitable for large machines that require large current. Reserve external ports to connected the stepper driver and sd card, which is convenient for expansion.

II Features

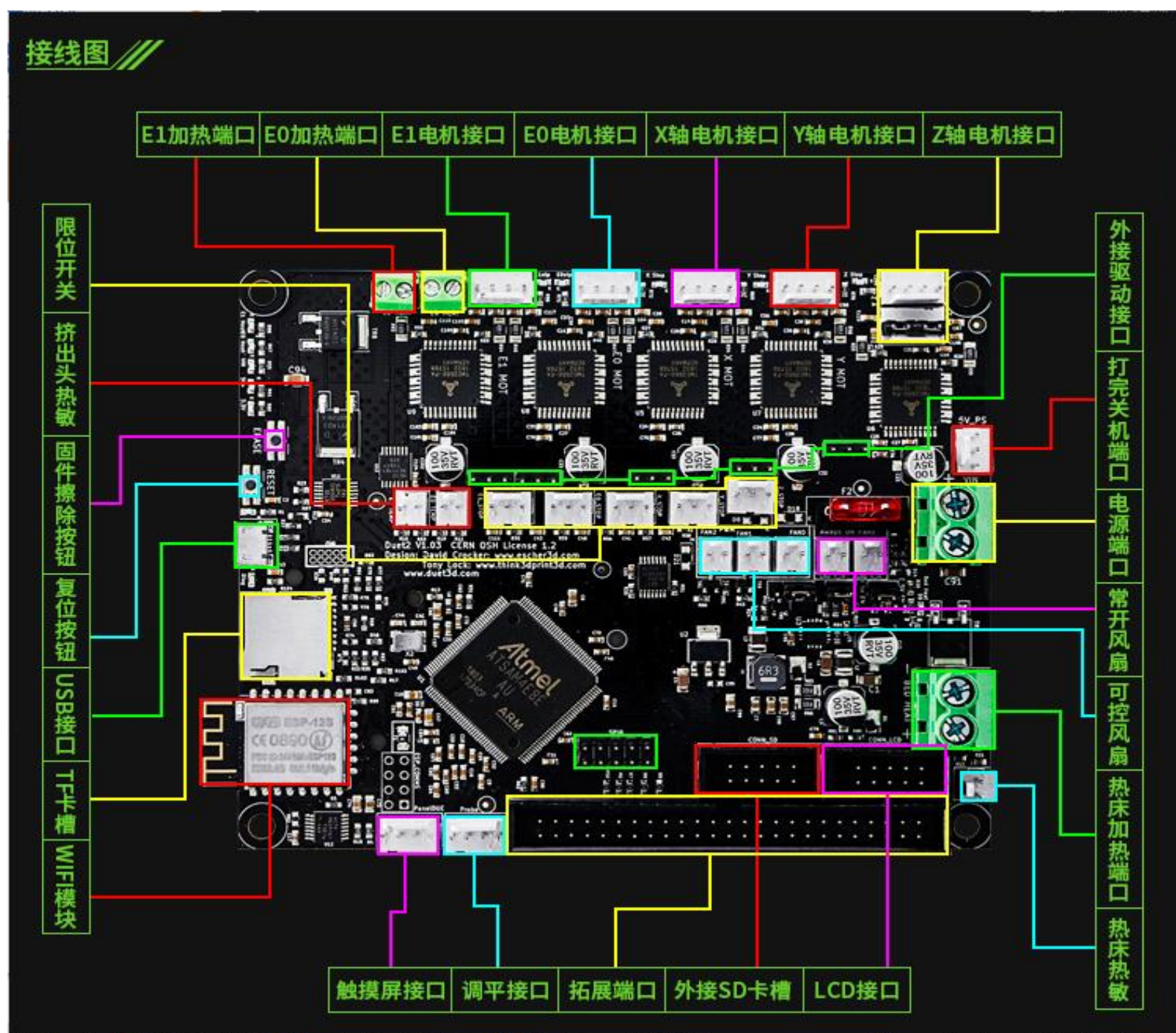
1. Adopt ARM Cortex-M4 ATSAM4E8E as main chip, running frequency is up to 120 MHz, and bring own FPU floating-point arithmetic unit.
2. Support TMC2660 stepper drivers, up to 256 micro stepping, Stepper driver current up to 4A.
3. Directly set the stepper driver current on the firmware, don't need to adjust the current by hands.
4. Dedicated WIFI module on board
5. Open sourced Reprap firmware, it can be updated through the web interface.
6. Support for the Panel Due touch screen, simple interface and easy operation.
7. Support double Z on the hardware, don't need to separately set on the firmware. Each axis has a reserved port for external stepper driver, which is convenient for expansion.
8. High speed SD card and support for a second SD external card if required.
9. High quality 4-layer PCB and special designed for cooling.

III The Connection Description and Size Chart

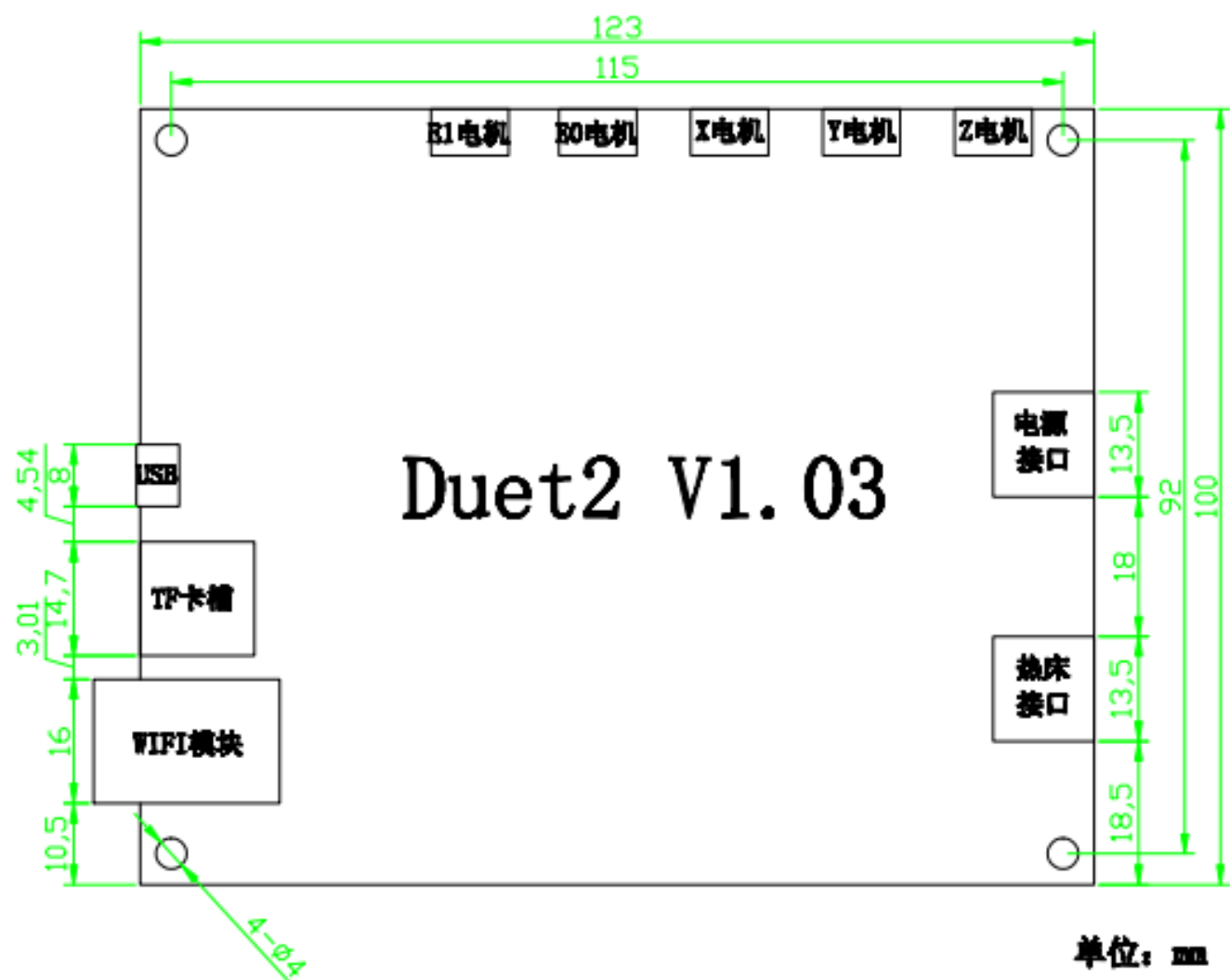
1. Duet2 WiFi Motherboard



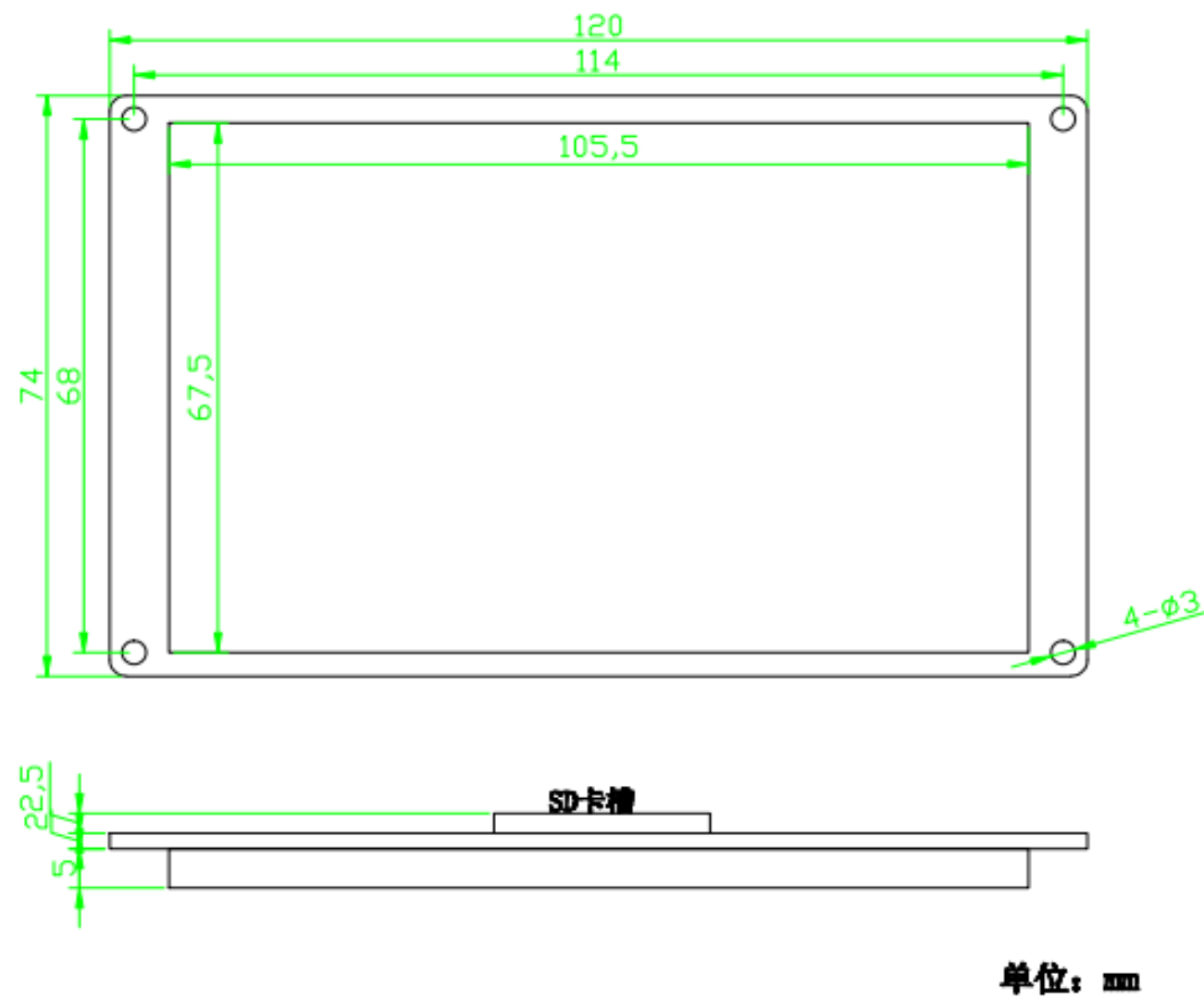
2. System Connection Diagram



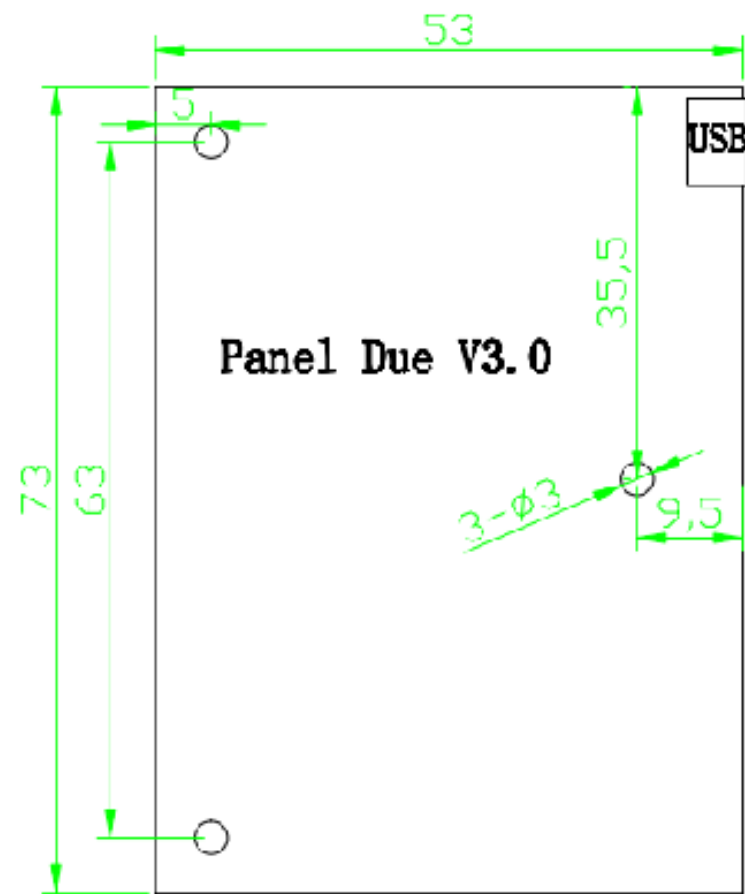
3. Duet2 Wifi Installation Dimensional Drawing



4. Screen Installation Size Diagram



5. Panel Due Installation Size Diagram



单位: mm

IV Instruction

4.1 The ways to get the Firmware and driver:

★ Get firmware from customer service or technician

★ Download on web: <https://github.com/makerbase-mks?tab=repositories>

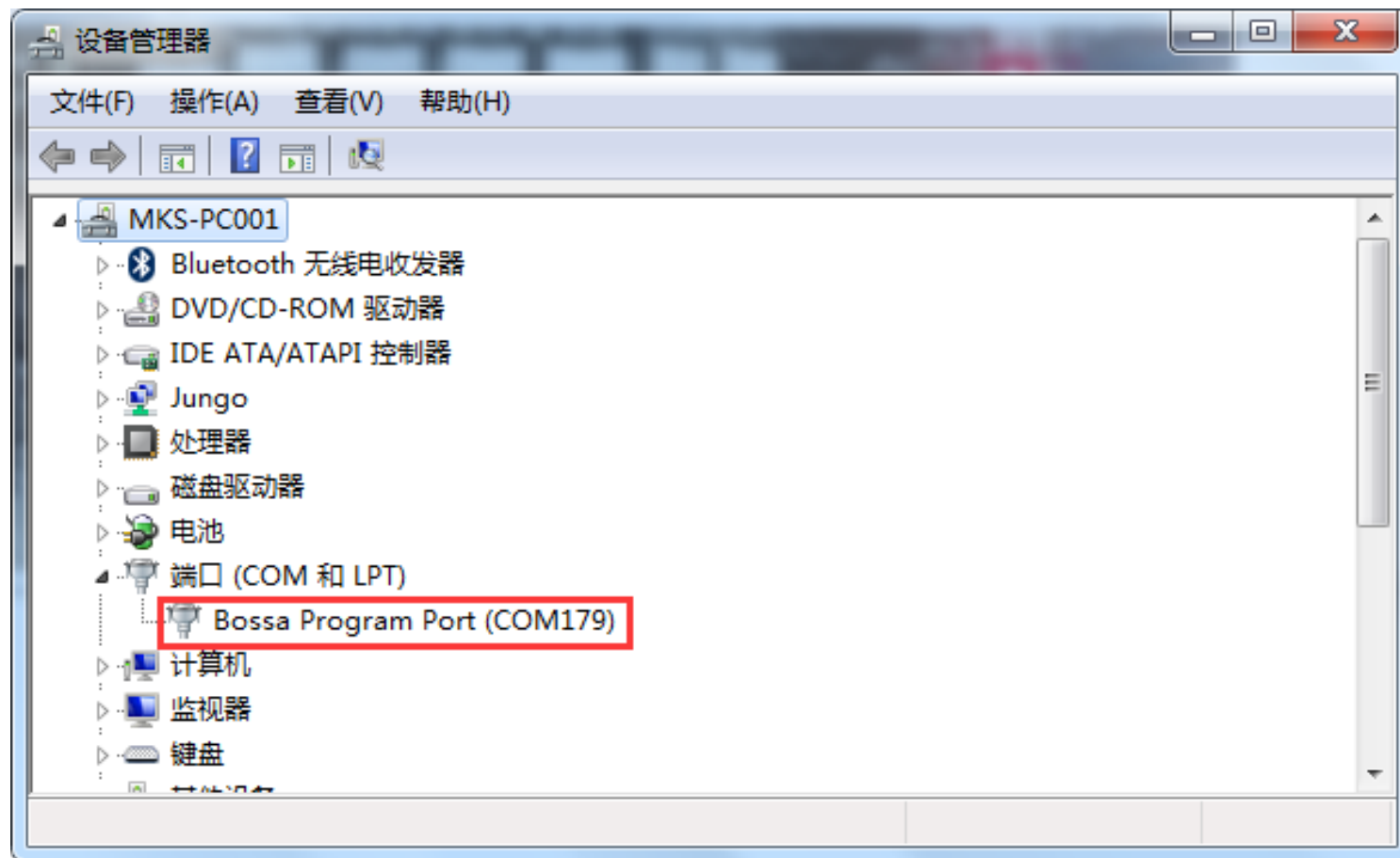
Panel screen: <https://github.com/dc42/PanelDueFirmware/releases>

Mainboard: <https://github.com/dc42/RepRapFirmware/releases>

4.2 Firmware update and driver installation

4.2.1 Install SAM-BA v2.18,





Connect the motherboard through the USB serial port, the computer can recognize the serial port (if the COM port is not recognized, press the motherboard “ERASE” button for more than 1S, and power on again)

4.2.2 Firmware update by software

1. Before we use Duet Board and Panel Screen, firmware needs to be updated by SAM-BA software.

Attention: different sizes of screen matches different firmwares. The firmware we provide by default is 4.3-inch firmware.

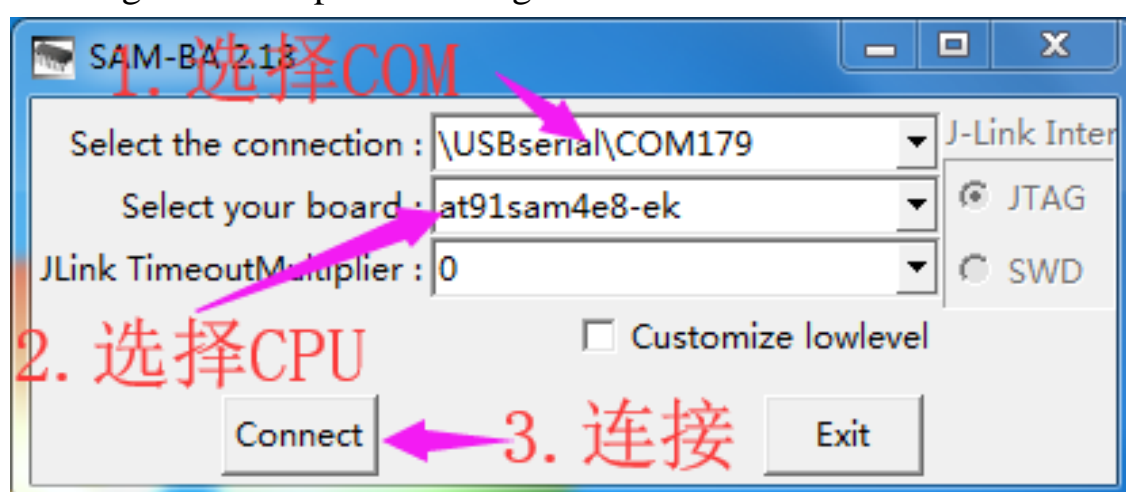
It is important to note that the firmware must be matched to the screen you are using.

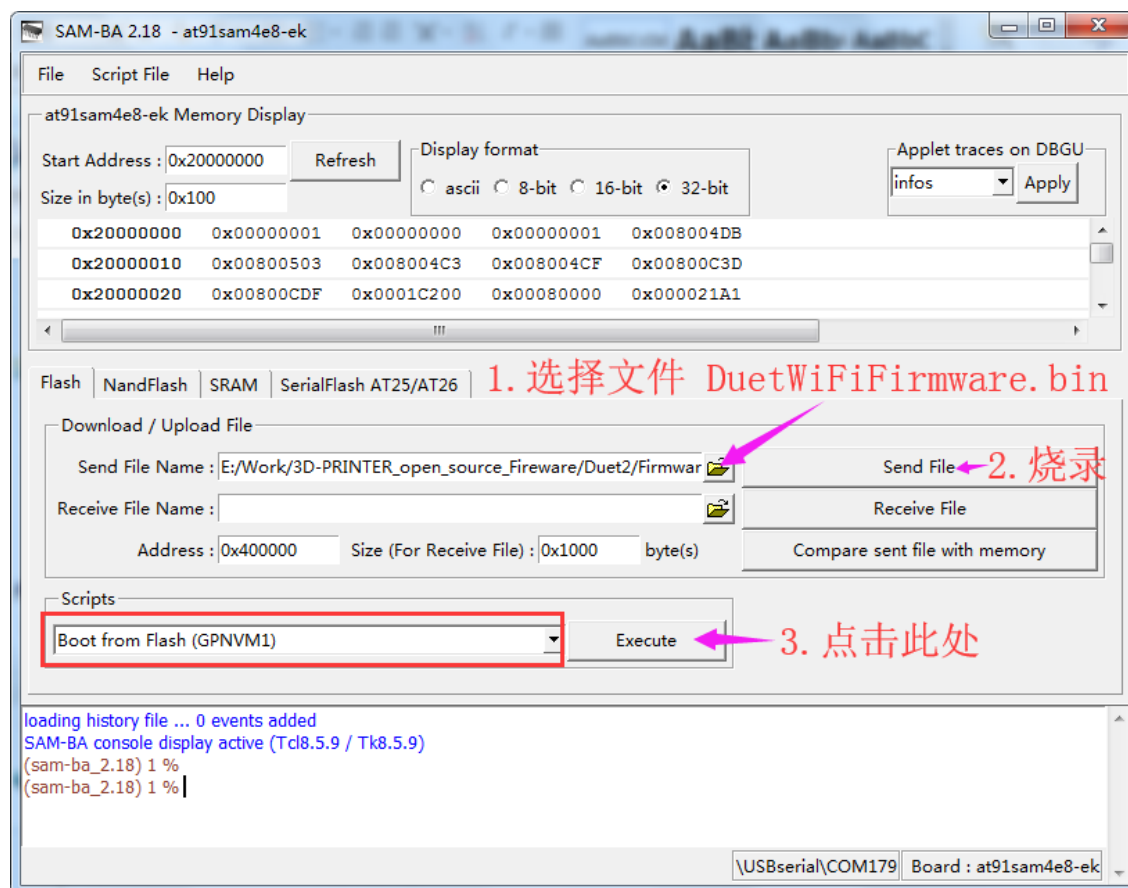
Motherboard and screen flashing steps: Pay attention to firmware and CPU type selection

Duet motherboard: firmware: Duet WiFi Firmware.bin motherboard CPU type: at91sam4e8-ek

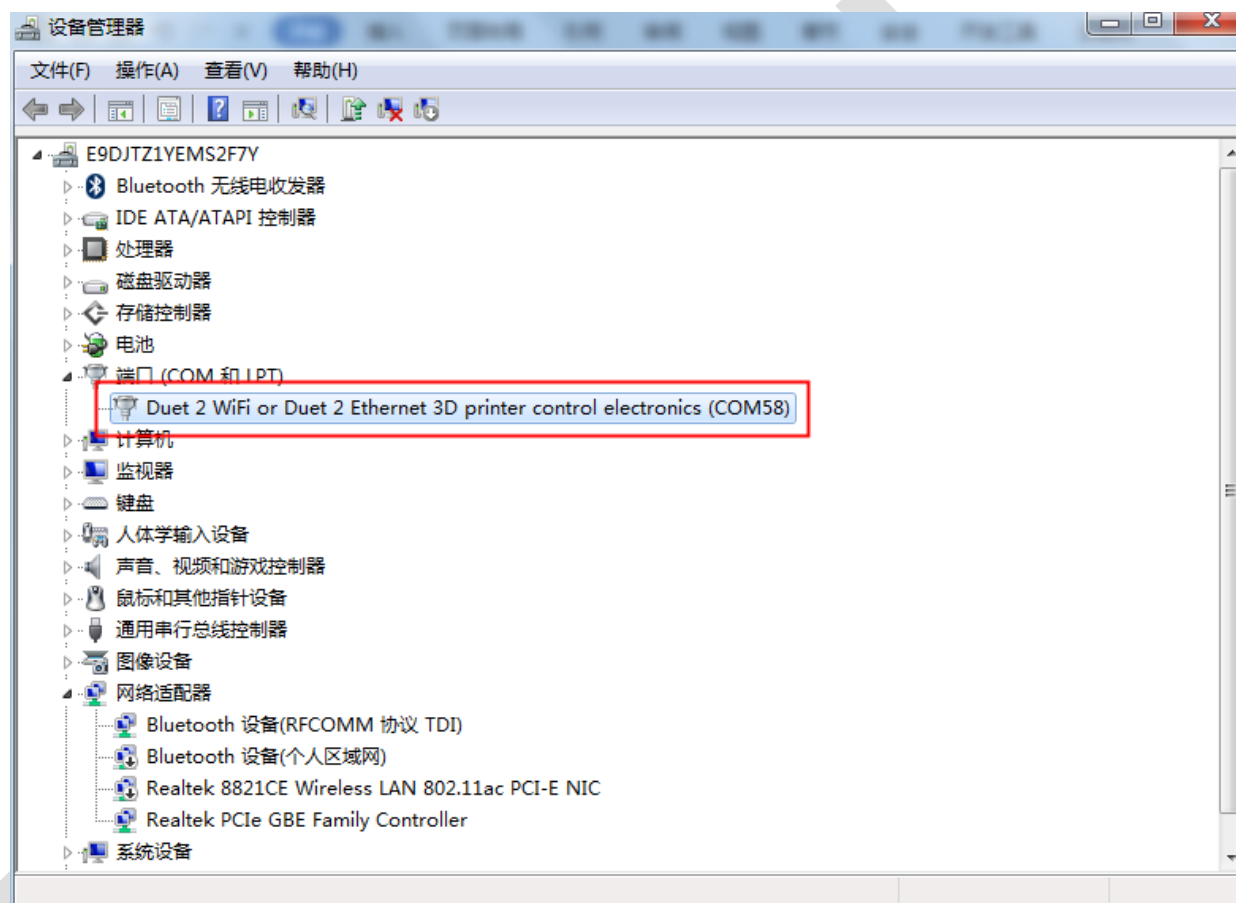
Panel screen: Firmware: PanelDue-v3-4.3 Motherboard CPU type: at91sam4s4-ek

The following are the steps of flashing



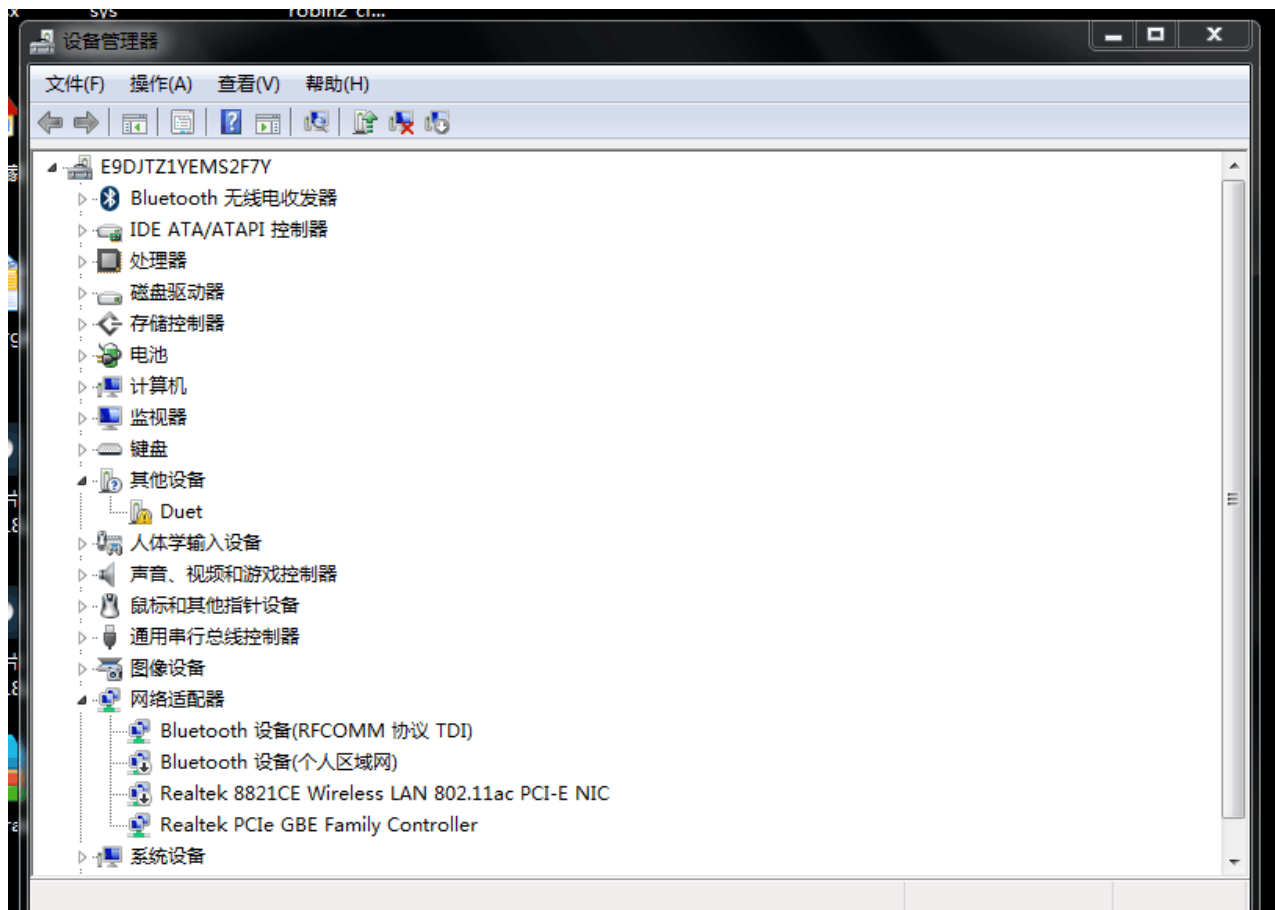


2, After flashing firmware, The USB port will change to

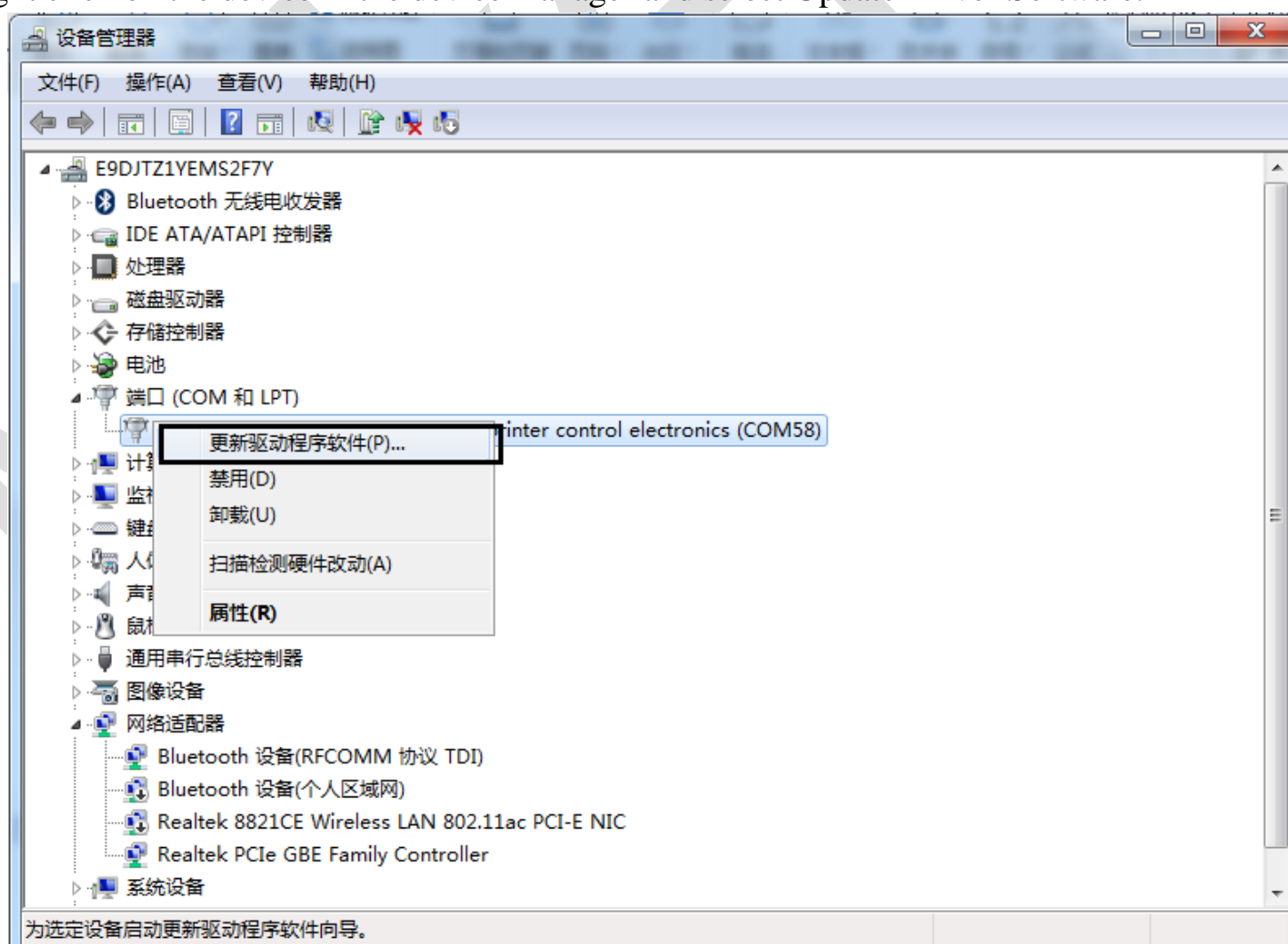


4.2.3. Driver update

If finishing firmware update, but above picture doesn't appear, you need to update the USB driver.

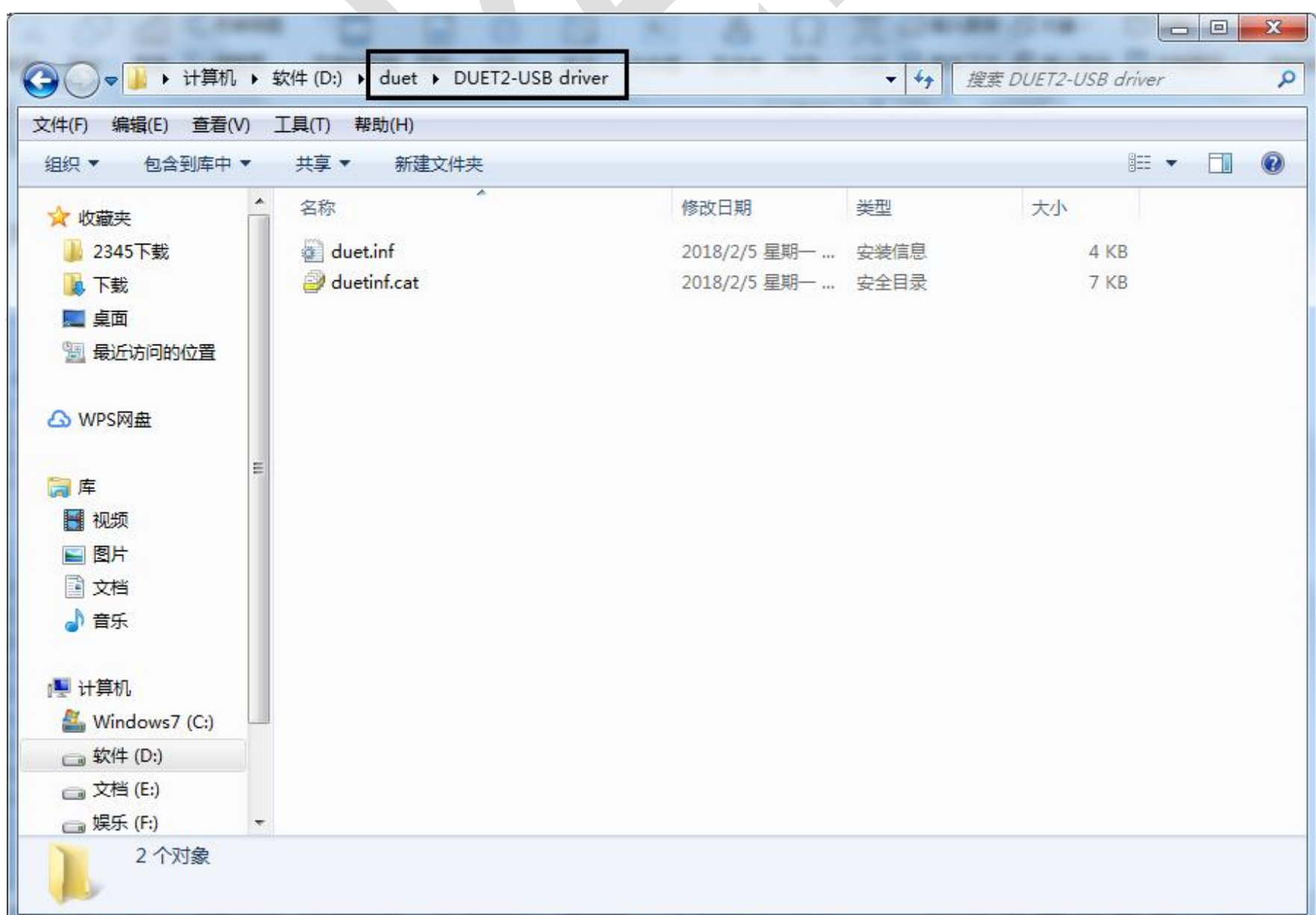
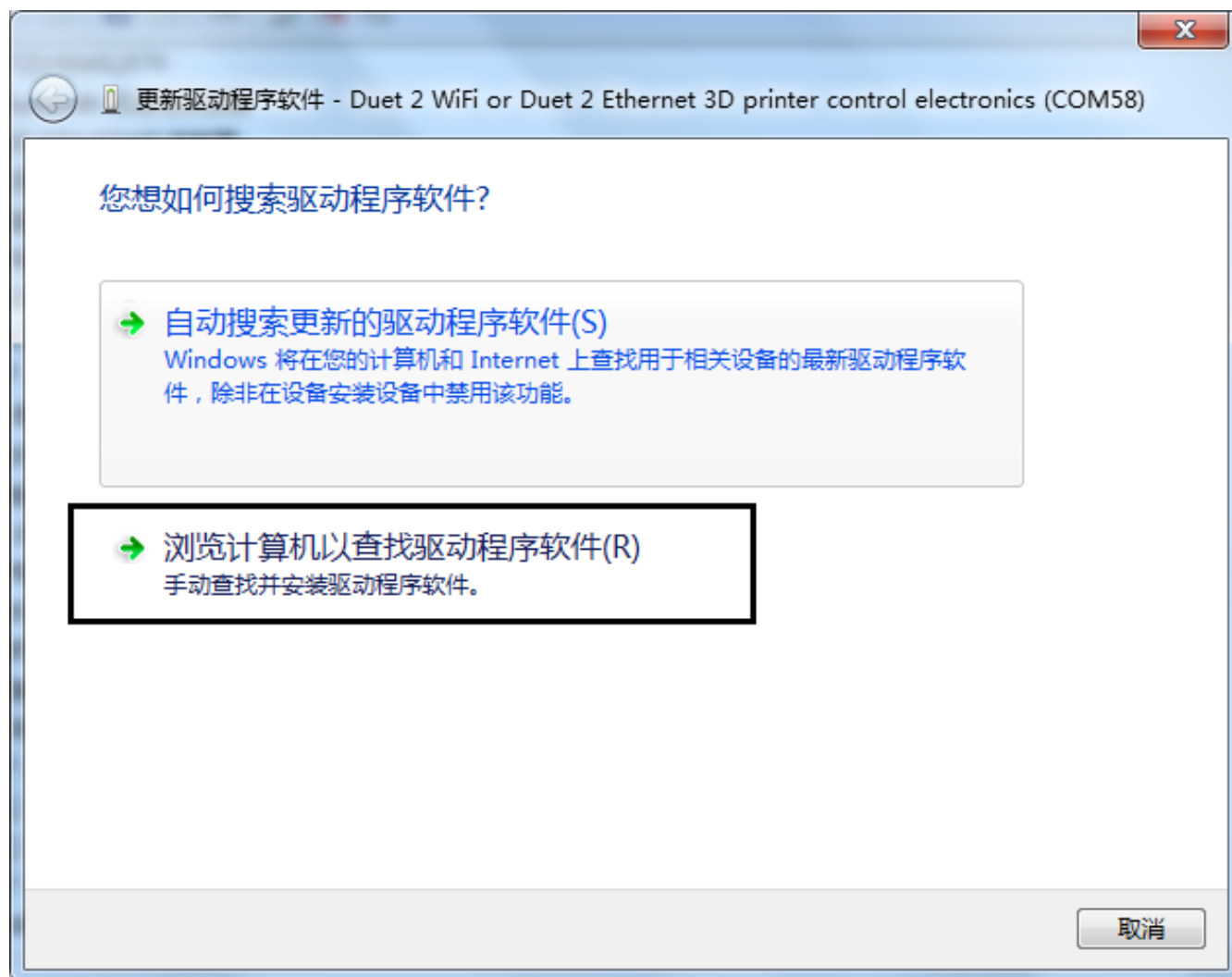


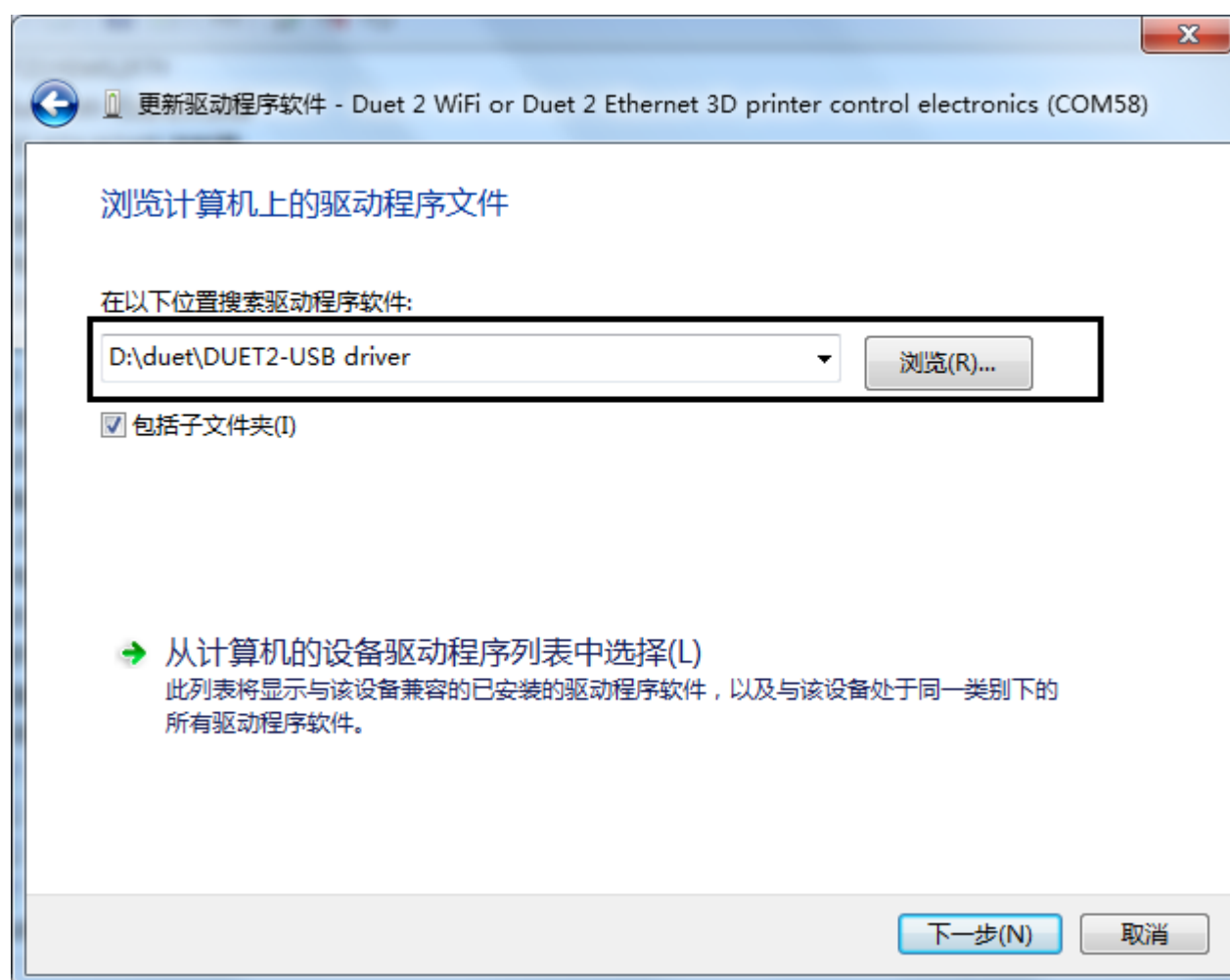
1. Right click on the device in the device manager and select Update Driver Software.



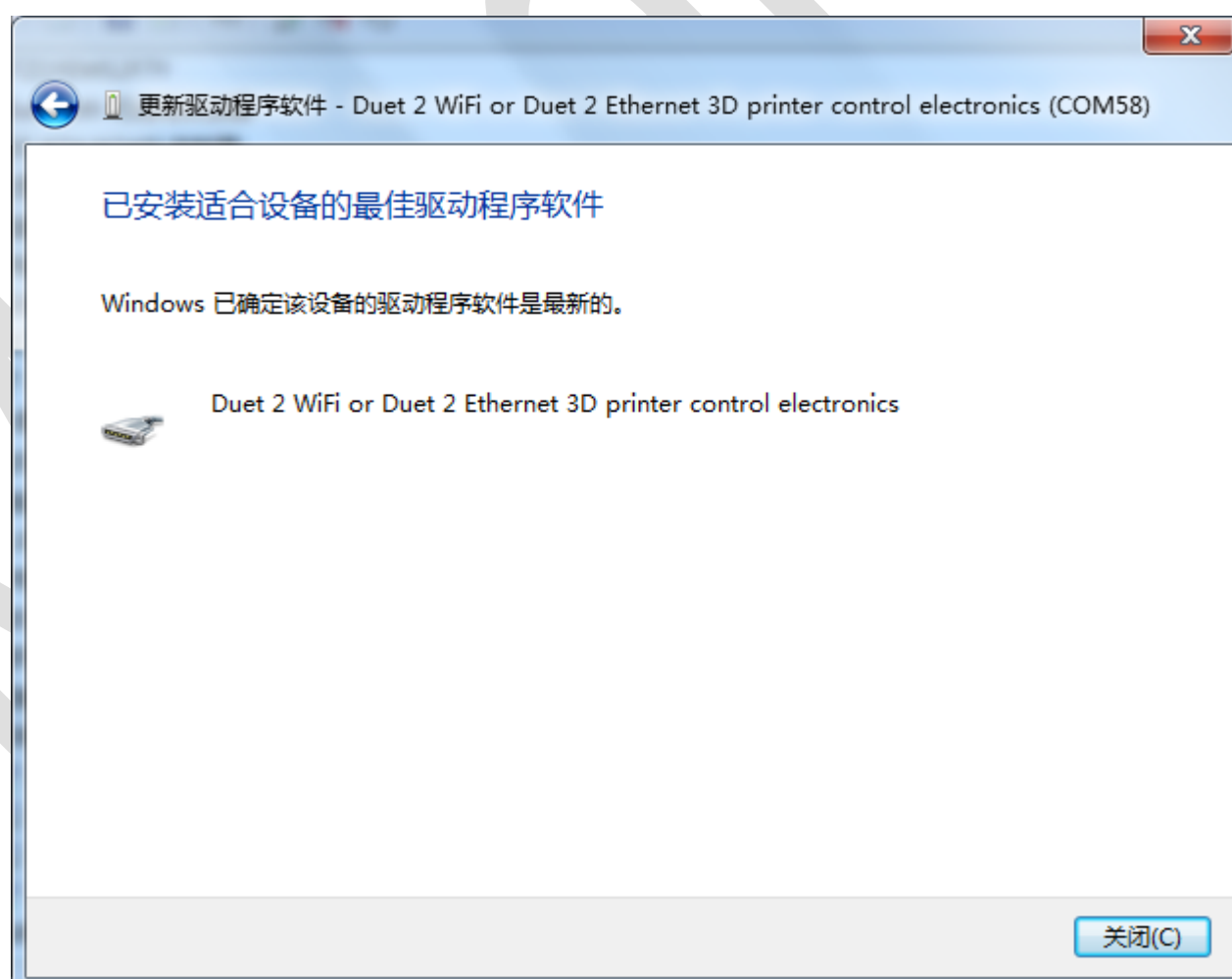
2. Browse to the folder where the usb driver is stored (the driver file can be obtained from the provided website)

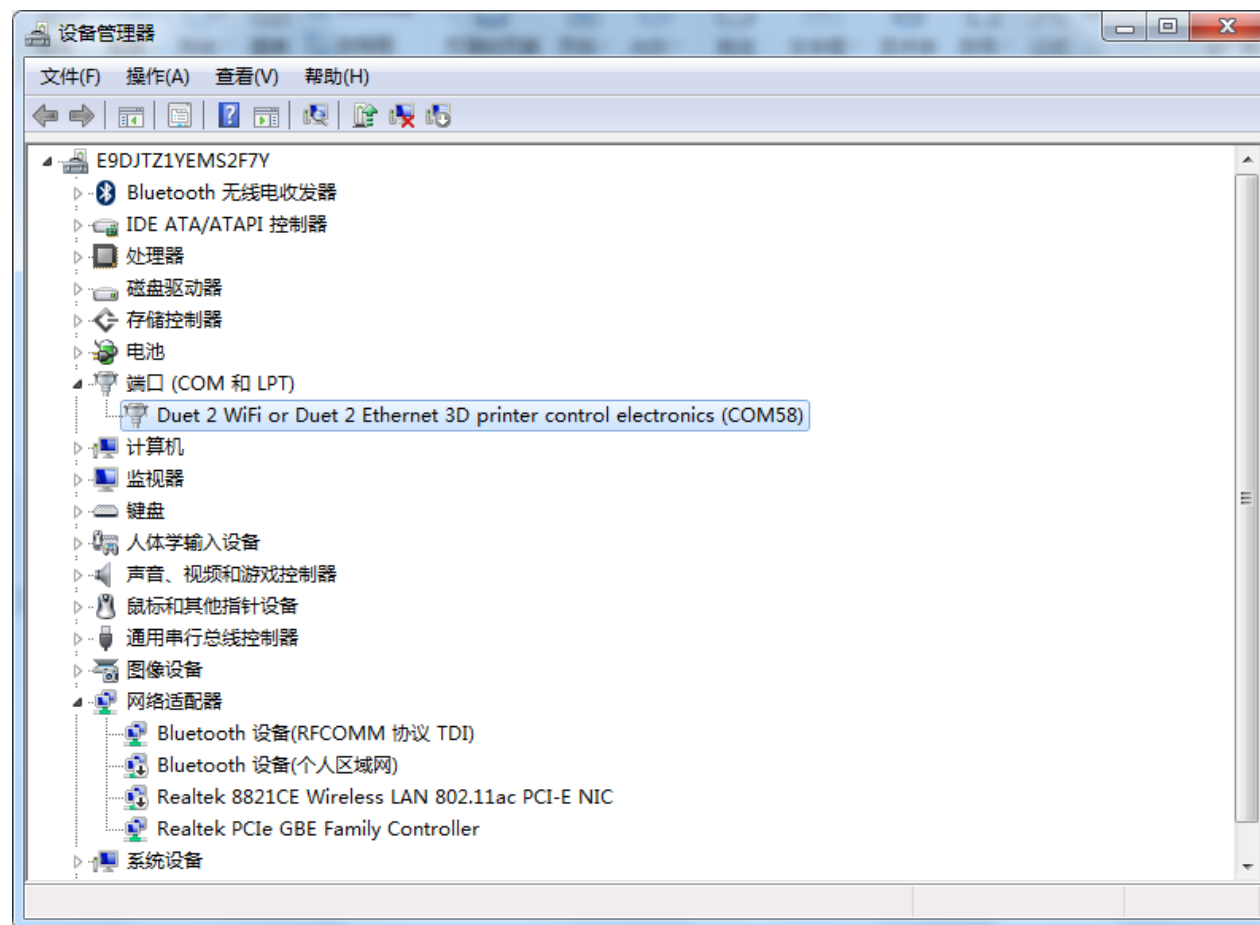
<https://github.com/dc42/RepRapFirmware/blob/dev/Driver/DuetDriverFiles.zip>





3.As shown in the figure below, the driver installation is successful.





V Configuration Profile creation and update

The configuration file of Duet2 WiFi is created directly on the web page and updated via the TF card.

Website for your reference: <https://configurator.reprapfirmware.org/Start>

1. If your machine meets its provided model, you can enter the preset template for configuration.

The following is a custom configuration.

Welcome to the new RepRapFirmware Configuration Tool

Please follow this wizard to obtain an individual configuration bundle for your printer

If you are using a printer that was originally shipped with RepRapFirmware, you can select a predefined template here:

- ☐ T3P3 Mini Kossel
- ☐ RepRapPro Ormerod 1
- ☐ RepRapPro Ormerod 2
- ☐ RepRapPro Fisher

The following machine templates were contributed by users and have not been thoroughly tested:

- ☐ Distech Prometheus System
- ☐ Reach3D Printer
- ☐ Wanhao Duplicator i3

Alternatively you can create your own individual configuration by creating a new one from scratch or by loading an existing JSON template:

- ☒ Custom configuration
- ☐ Use existing configuration

Note: This version is still experimental. If you encounter problems, please use the [old config tool](#) and report back on the [Duet3D forums](#).

This web app is fully open-source and licensed under the terms of the [GPLv3](#). Check out [GitHub](#) for the source files.

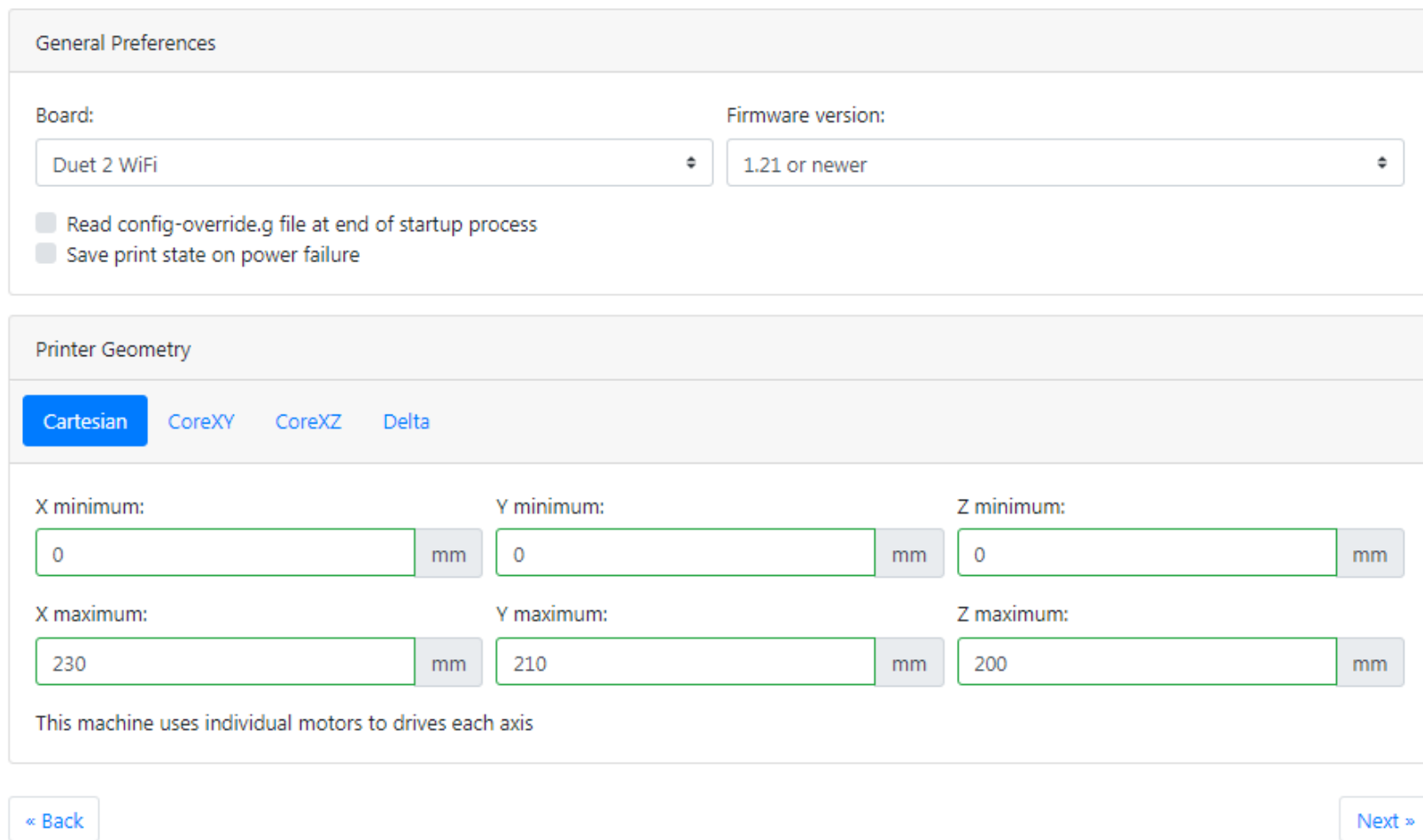
< Back

Next >

2. Motherboard parameter and machine parameter setting

The motherboard type selects Duet2 WiFi, and the firmware version generally selects default (if the version is too old, there is a drop-down option to select the corresponding version)

Select the the model you are using and set the maximum and minimum value for each axis.



The screenshot shows the Makerbase configuration interface. The 'General Preferences' section includes a 'Board' dropdown set to 'Duet 2 WiFi' and a 'Firmware version' dropdown set to '1.21 or newer'. There are two checkboxes: 'Read config-override.g file at end of startup process' and 'Save print state on power failure'. The 'Printer Geometry' section has tabs for 'Cartesian', 'CoreXY', 'CoreXZ', and 'Delta'. The 'Cartesian' tab is active, showing input fields for X, Y, and Z minimum and maximum values in mm. The X minimum is 0, X maximum is 230, Y minimum is 0, Y maximum is 210, Z minimum is 0, and Z maximum is 200. A note at the bottom states 'This machine uses individual motors to drives each axis'. Navigation buttons 'Back' and 'Next' are at the bottom.

3. Motor parameter setting

The direction of the motor, the maximum speed and acceleration are adjusted according to the actual situation.

Microstepping (interpolation): Support TMC2660 stepper drivers, up to 256 microstepping, according to actual needs.

Steps per: You can click on the pulse setting box to set the corresponding parameters of the motor, belt and screw, and it will generate a corresponding pulse value. You can also calculate the settings yourself by formula

Formula of the number of pulses of the synchronous wheel motor / mm: $(360 \div \text{step angle}) \times \text{subdivision}$ 直径 (diameter $\times 3.14$)

Formula of the number of pulses of the screw motor / mm: $(360 \div \text{step angle}) \times \text{subdivision} \div \text{lead}$

If the pulse is not accurate, it will cause the print size to be abnormal.

Motor current: The maximum current of the driver chip is 4000mA, and the setting should not exceed or be too close to the maximum current.

Also note the maximum current of the motor used and make the settings. (Overload or full load may cause the motor or the chip to overheat, affecting the operation)

Extruders: If you are using a double extrusion head or multiple extrusion heads, you can increase or decrease here (ADD Extruders, Remove Extruders)

Motor idle setting: Idle Current Percentage: In the current case of the motor, the current will decrease to the percentage you set.

Idle Timeout: When the motor does not move for more than the time you set, the current will be turned off (M84).

Drive	Direction	Microstepping (interpolation)	Steps per mm	Max. Speed Change (mm/s)	Max. Speed (mm/s)	Acceleration (mm/s ²)	Motor Current (mA)	Motor Driver
X	Forwards ▾	x16 (on) ▾ interpolated to x256	80	15	100	500	800	0 (X) ▾
Y	Forwards ▾	x16 (on) ▾ interpolated to x256	80	15	100	500	800	1 (Y) ▾
Z	Forwards ▾	x16 (on) ▾ interpolated to x256	4000	0.2	3	20	800	2 (Z) ▾

Extruders
+ Add Extruder
— Remove Extruder

Drive	Direction	Microstepping (interpolation)	Steps per mm	Max. Speed Change (mm/s)	Max. Speed (mm/s)	Acceleration (mm/s ²)	Motor Current (mA)	Motor Driver
E0	Forwards ▾	x16 (on) ▾ interpolated to x256	420	2	20	250	800	3 (E0) ▾

Motor Current Reduction

☒ Reduce motor currents when idle

Idle Current Percentage:
 %

Idle Timeout:
 s

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Next »

4. Automatic leveling and limit setting

Offset value setting: The leveling switch is cheated compared to the extrusion head (X Offset, Y Offset)

Leveling switch: Set the type of switch (Probe type), select NO Z probe if you are not using automatic leveling. Use the automatic leveling to set the corresponding parameters.

Limit setting: NC is normally closed and NO is normally open. NONE is not enabling the limit.

Endstop Location: The direction of zero return.

Zero setting: Homing speed

Z-Probe

Probe X Offset:
mm

Probe Y Offset:
mm

Probing Speed:
mm/s

☒ Deploy/Retract Probe

Probe Type

No Z Probe

Switch

Unmodulated or Smart IR Probe

Simple Modulated IR Probe

Smart Effector or Piezo

BLTouch

Trigger Height:
mm

Trigger Value:

A switch is used to determine the distance between nozzle and bed.

This switch must be connected to the Z probe terminal and **not** to the Z endstop switch terminal!

Endstop Configuration
Note

Axis	Endstop Type				Endstop Location	
X	None	Active high (NC switch)	Active low (NO switch)	Z-Probe	Motor Stall Detection	At low end At high end
Y	None	Active high (NC switch)	Active low (NO switch)	Z-Probe	Motor Stall Detection	At low end At high end
Z	None	Active high (NC switch)	Active low (NO switch)	Z-Probe	Motor Stall Detection	At low end At high end

Homing Preferences

Homing Speed (First Pass):
mm/s

Homing Speed (Second Pass):
mm/s

Travel Speed:
mm/s

Z Dive Height:
mm

☐ Set dive height to 30mm for initial calibration

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5. Temperature function setting

Heated bed setting: Output port, temperature control (generally by default)

Heating setting: Set the maximum temperature value and select the type of thermal sensor.

General Heater Settings

☒ Heated Bed

Bed Heater Output:

Bed Heater

Control Method:

PID

Bang-Bang

☐ Assign Bed Heater to First Nozzle

☐ Heated Chamber

Heater Configuration

+ Add Nozzle

— Remove Nozzle

Heater	Type	Temp. Limit		PWM Limit		R25		β		C	Sensor Channel
Bed	Heated Bed	<div>280</div>	<div>C</div>	<div>100</div>	<div>%</div>	<div>100000</div>	<div>Ω</div>	<div>4138</div>	<div>K</div>	<div>0</div>	Bed Thermistor
E0	Nozzle	<div>280</div>	<div>C</div>	<div>100</div>	<div>%</div>	<div>100000</div>	<div>Ω</div>	<div>4138</div>	<div>K</div>	<div>0</div>	E0 Thermistor

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Next »

6. Double nozzle setting

Set the offset value of the dual nozzle. If single nozzle is used, ignore this setting.

Tool Preferences

☒ Wait for Temperatures to be Reached on Tool Change

☐ Select First Tool on Start-Up

Tools

+ Add Tool

— Remove Tool

Number	Name	Extruders	Heaters	XYZ Offsets (mm)			Mixing Ratio
<div>0</div>	<div>optional</div>	<div>E0</div> <div>E1</div>	<div>E0</div> <div>E1</div>	<div>0</div>	<div>0</div>	<div>0</div>	n/a

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7. Leveling range and dot pitch

Note: 3/4/5 Point Bed Compensation has been deprecated. It has been replaced by the new Mesh Bed Compensation.

Bed Probing for Mesh Bed Compensation

X Minimum:	X Maximum:	Y Minimum:	Y Maximum:	Grid Spacing:
<input type="text" value="15"/> mm	<input type="text" value="215"/> mm	<input type="text" value="15"/> mm	<input type="text" value="195"/> mm	<input type="text" value="20"/> mm

Orthogonal Axis Compensation

☐ Enable Orthogonal Axis Compensation

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8. Network setting

Set the name and password of the WIFI connected to the printer.

Network Settings

☒ Enable Network

Printer Name:	Password:
<input type="text" value="My Printer"/>	<input type="text" value="reprap"/>
WiFi Access Point Name:	Password:
<input type="text" value="configure manually"/>	<input type="text" value="none"/>

☒ Acquire Dynamic IP Address via DHCP ☒ Enable HTTP (required for Duet Web Control) ☐ Enable FTP ☐ Enable Telnet

[< Back](#) [Next >](#)

9. Configuration fan parameter and custom instruction

Select the fan output value and trigger temperature

Custom Settings for config.g: If you need to add a custom feature, you can add code directly to define it here.

Cooling Fans

+ Add Fan - Remove Fan

Name	Value	Inverted	Frequency	Thermostatic Control	Monitored Heaters	Thermostatic Mode Trigger Temperature
FAN0	<input type="text" value="30"/> %	<div>Yes No</div>	<input type="text" value="500"/> Hz	<div>Yes No</div>	<div>Bed E0</div>	<div><input type="text" value="45"/> C</div>

Miscellaneous

Custom Settings for config.g:

Full list of all available G-codes

« Back

Finish »

10. Configuration file creation and download

As shown in the figure below

Configuration Ready

The following files will be generated:

- bed.g
- config.g
- homeall.g
- homex.g
- homey.g
- homez.g
- pause.g
- resume.g
- sleep.g
- stop.g
- tfree0.g
- tpre0.g
- tpost0.g

If you are already using Duet Web Control, you can upload the generated ZIP file without extracting on the Settings page.

Alternatively you can unzip the contents of this file to the "sys" directory on your SD card.

See [this page](#) for further information about the purpose of these files.

Download JSON template

Download configuration bundle as ZIP file

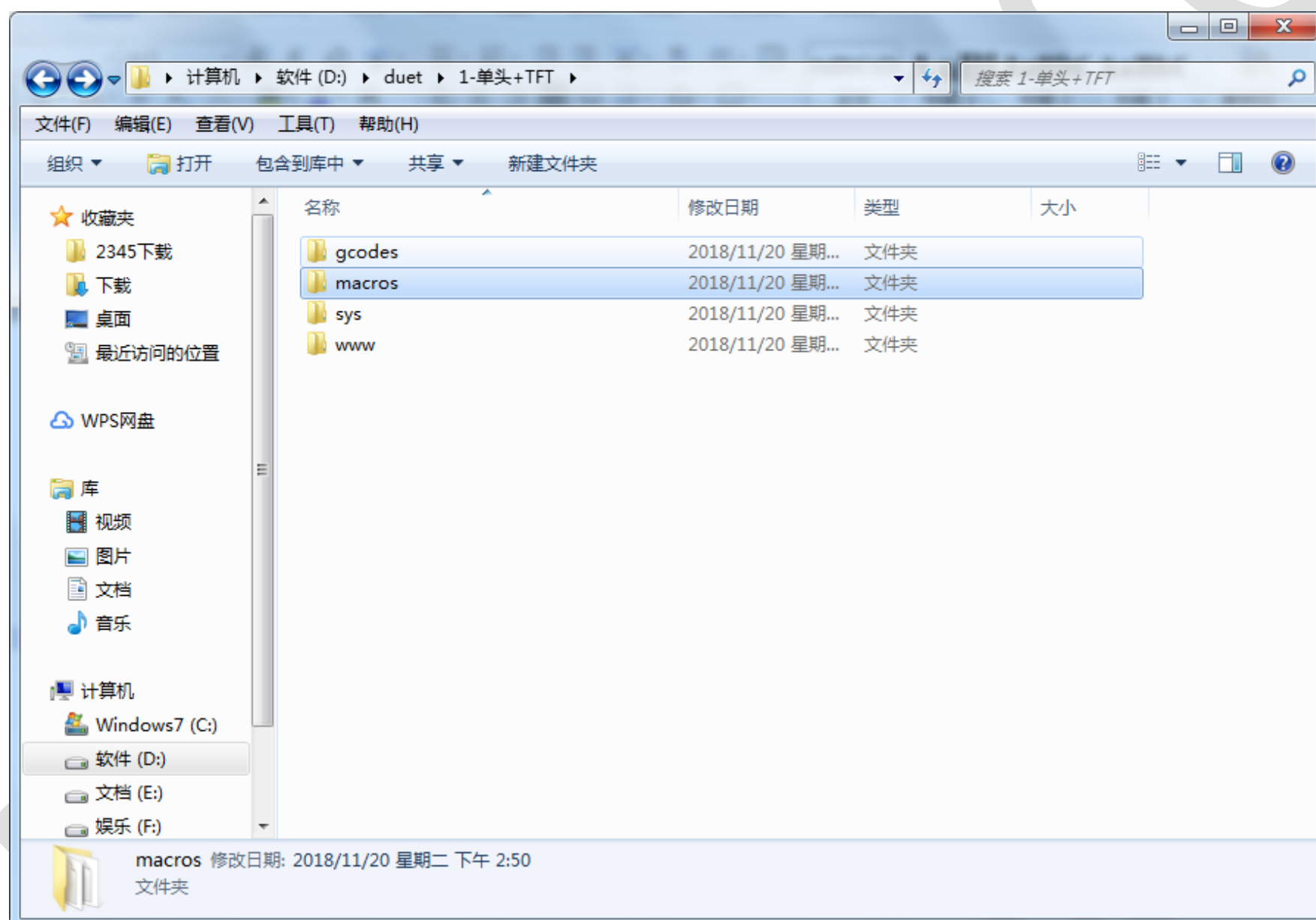
VI. Configuration Profile update and web operation

The configuration file is updated via the sd card, the motherboard will be readable the configuration file when it is on power, so be ensure that there is a configuration file on each sd card. File directory needs to be set as required

6.1 SD card file directory

File directory, save different types of files as required (you can directly download the directory, then replace sys (configuration file))

download link:



The folder should be set as required.

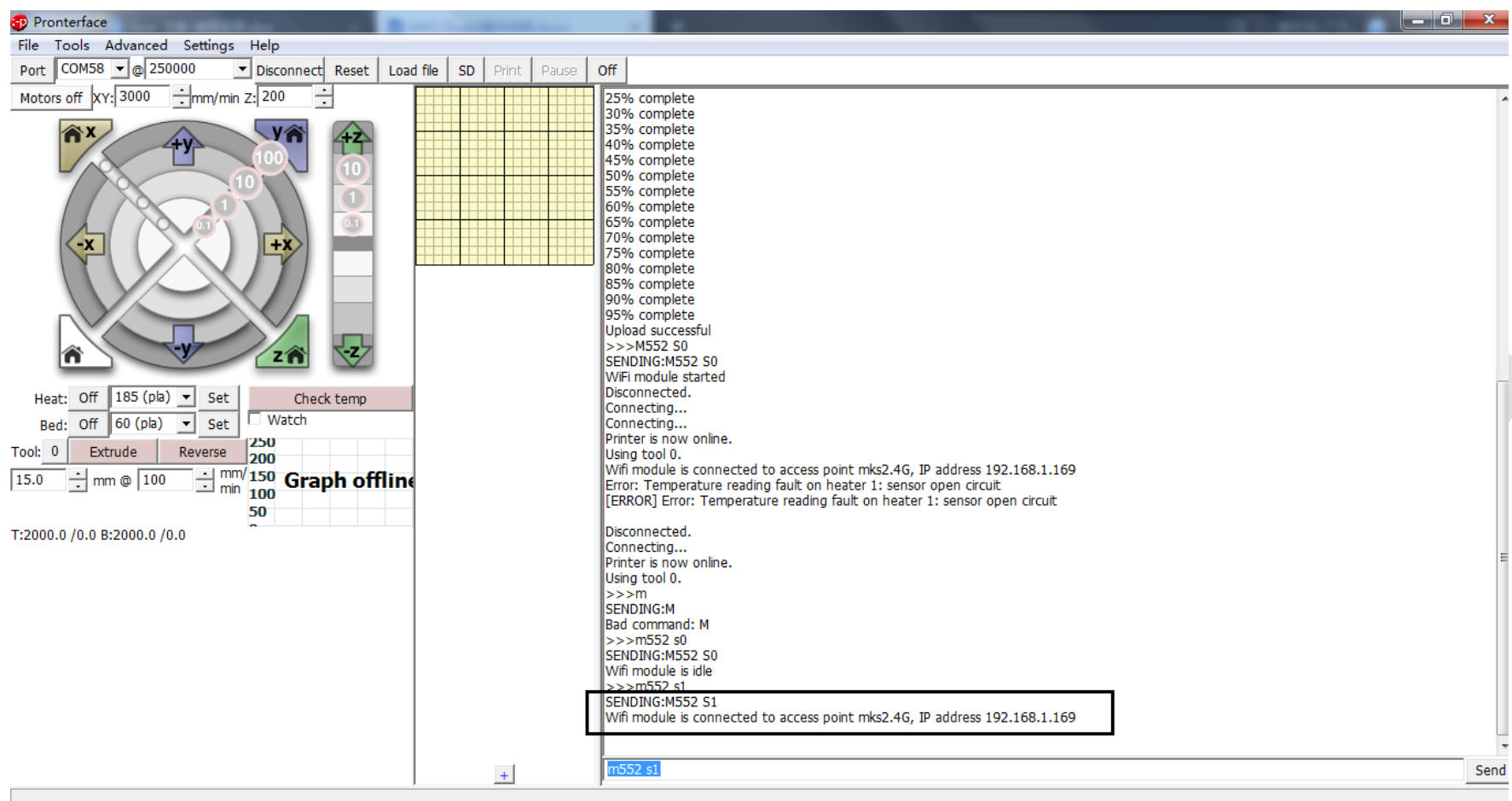
Gcode is a folder for placing gcode print files.

Macros: some macro files of touch screen and firmware (usually by default)

Sys:sys is the configuration file generated by the above web page (can be directly replaced after the web page is generated)

Www: web interface file (generally by default)

6.2 Host computer connection and setting



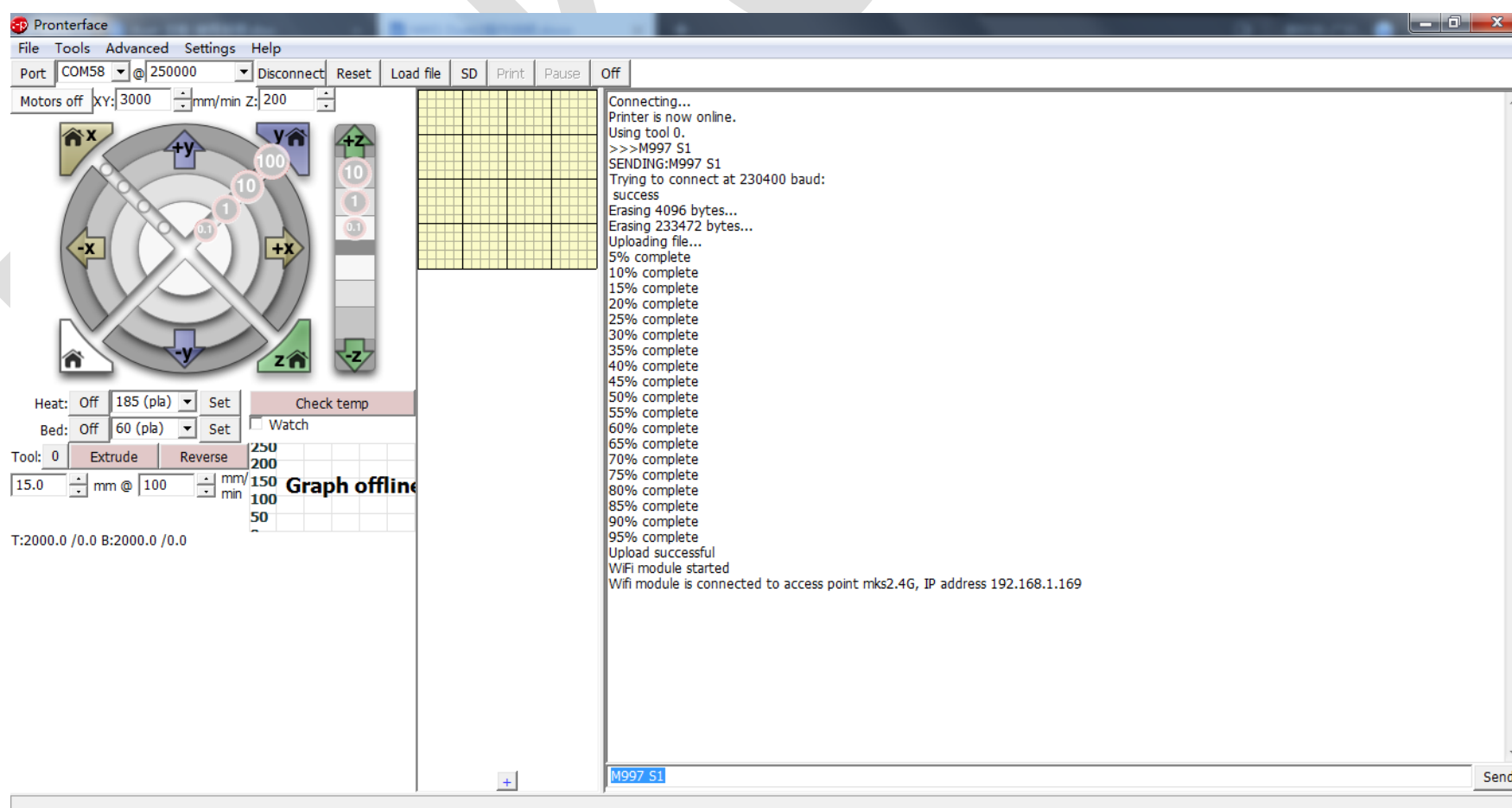
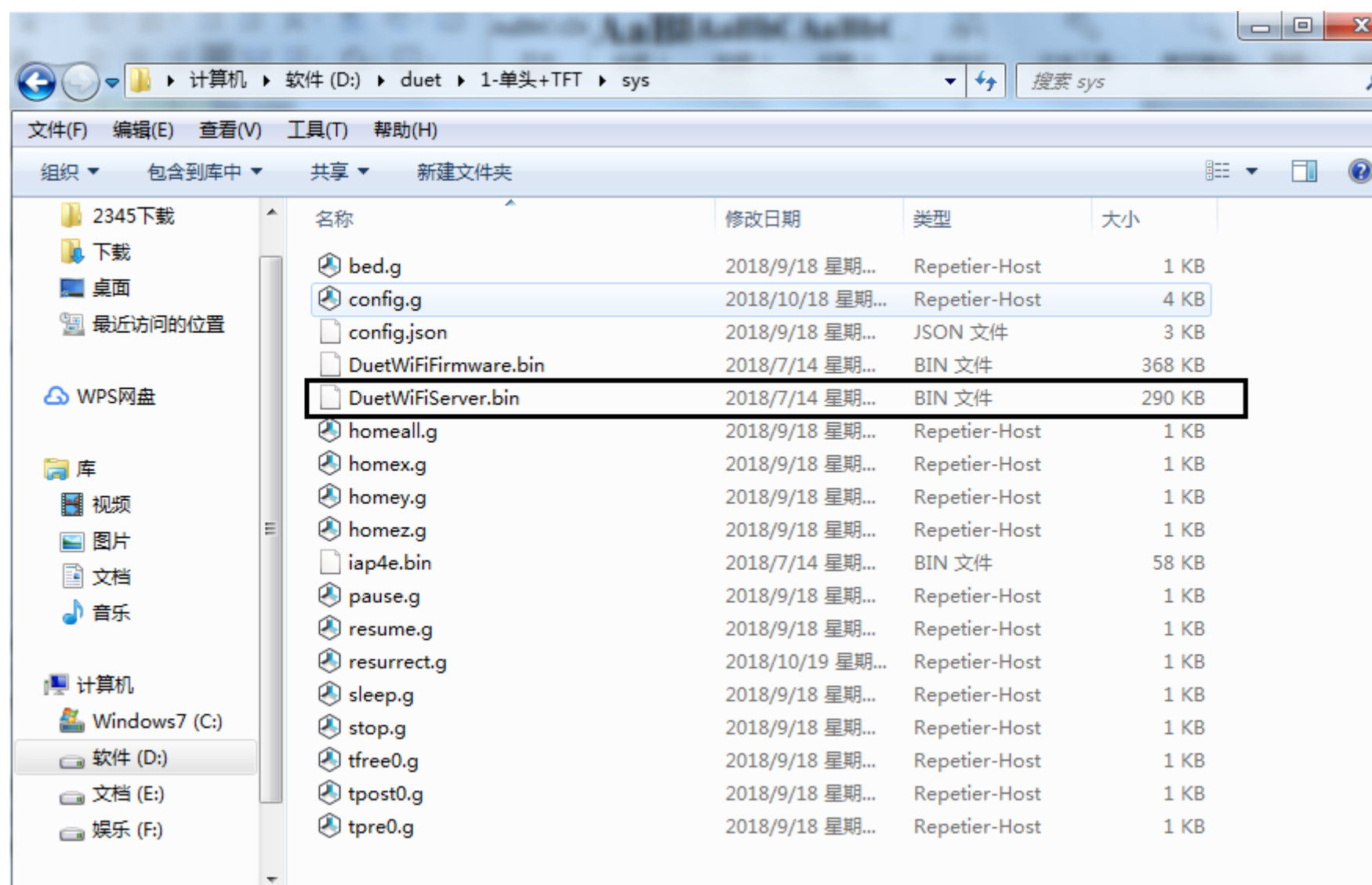
Generally, when the wifi account and password are set correctly, and within the use range of wifi, after connecting to the host computer, or returning an IP, it is the IP of the motherboard wifi.

It is also possible to send commands through the host computer to modify the wifi.

6.3 WIFI command setting

M997 S1 Update WIFI firmware (the firmware of wifi needs to be placed in the sys folder of the sd card)

If the IP is not returned after connecting to the host computer, the wifi setting may not be normal, or it may not be within the range.



M552 S1 turns on WIFI (the LED on the module is lit. If the IP is not returned after connecting to the

host computer, the wifi setting may not be normal, or it is not within the range)

M552 S0 Turns off WIFI (LED on the module is off)

M587 S" WIFI name "P" password" Add WIFI network to module example: M587 S" mks2.4G" P" 12345678"

(M587 command must first execute M552 S0 to turn off WIFI, remove the original wifi by M588 command, and then set a new wifi name and password)

M588 S "WIFI Name" Remove the WIFI from the list, including password, SSID

```

Wifi module is connected to access point mks2.4G, IP address 192.168.1.169
>>>M588 S"mks2.4G"
SENDING:M588 S"mks2.4G"
M588: Bad or missing parameter
>>>M588 S"mks2.4G"
SENDING:M588 S"mks2.4G"
Disconnected.
Connecting...
Printer is now online.
Using tool 0.
Wifi reported error: no known networks found
Wifi module is idle
Error: Temperature reading fault on heater 1: sensor open circuit
[ERROR] Error: Temperature reading fault on heater 1: sensor open circuit

>>>M588 S"mks2.4G"
SENDING:M588 S"mks2.4G"
Wifi reported error: SSID not found
>>>m552 s1
SENDING:M552 S1
Wifi reported error: no known networks found
Wifi module is idle
>>>M587 S"MKS sales" P"makerbase"
SENDING:M587 S"MKS sales" P"makerbase"
>>>M587 S"MKS sales" P"makerbase"
SENDING:M587 S"MKS sales" P"makerbase"
>>>m552 s1
SENDING:M552 S1
Wifi module is connected to access point MKS sales, IP address 192.168.0.104
  
```

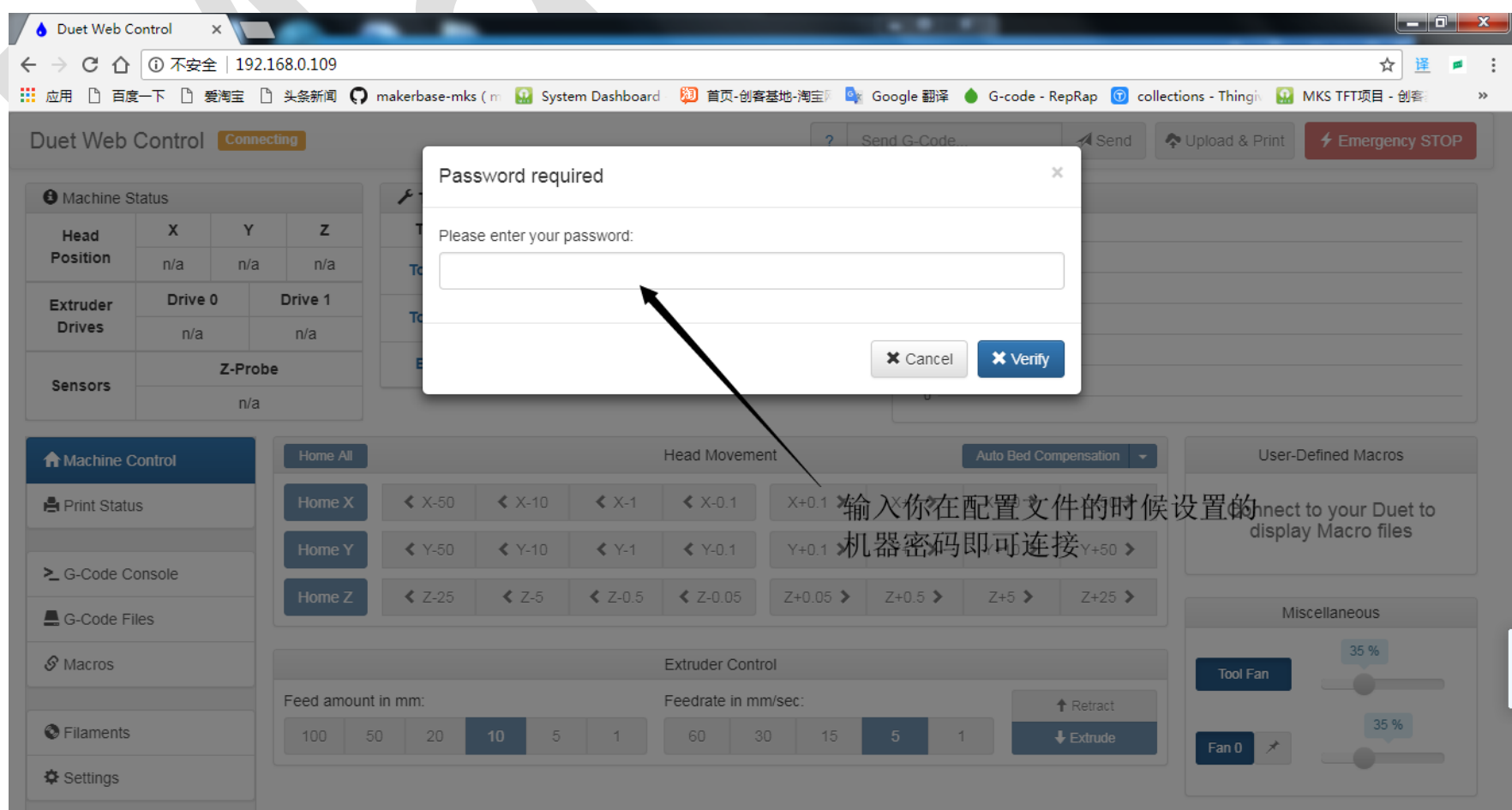
擦除原先mks2.4G的wifi

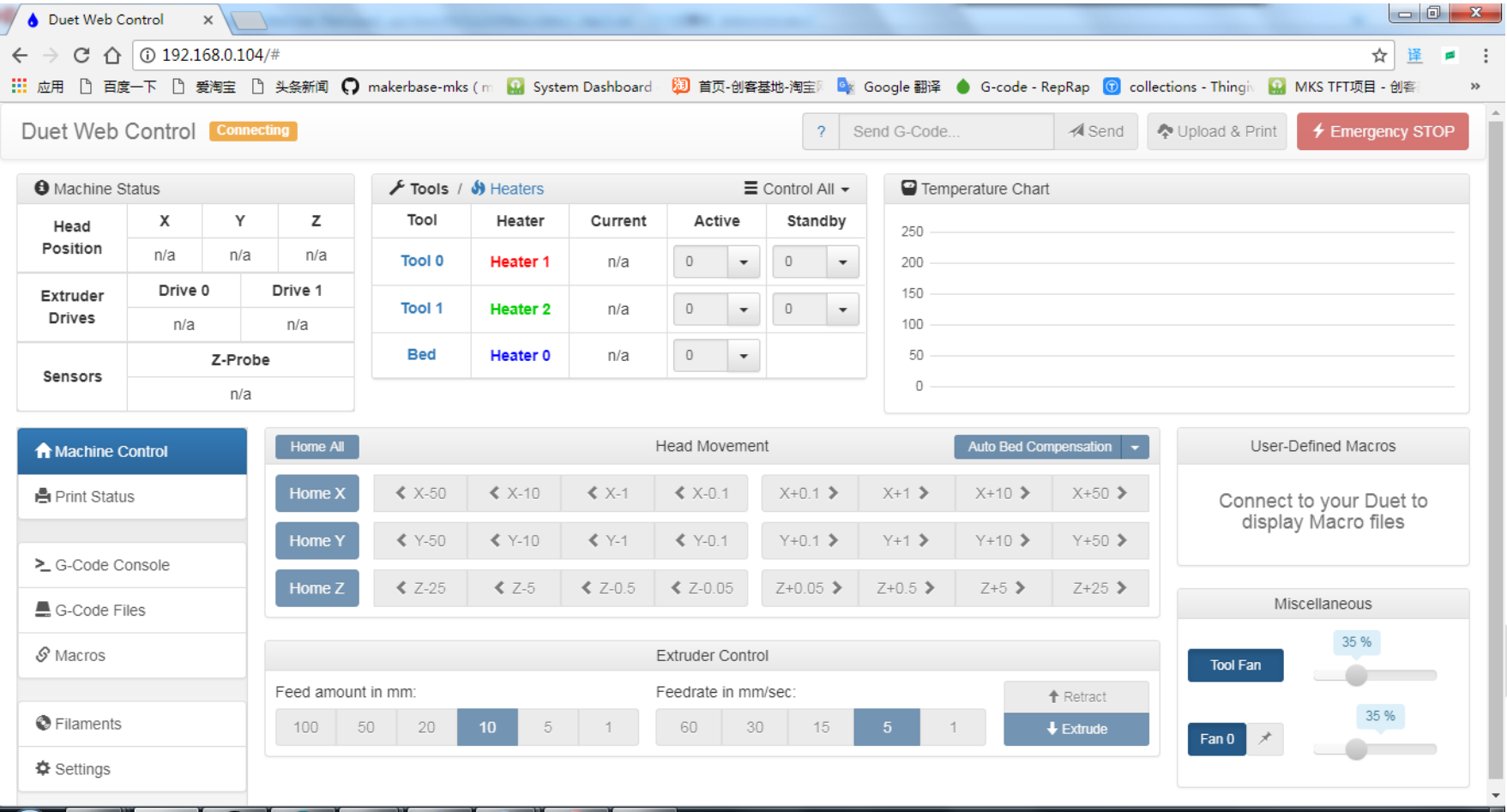
重新连接之后会显示未知网络

然后输入M587添加新的wifi, 添加过后, 开启wifi 就会有新设置的名称和ip (注意输入指令中的双引号应为英文的, 中文的可能会识别不正常)

6.4 Web page connection

You can enter the corresponding ip through the browser to enter the control interface. You also need to enter the machine password set in the configuration file to control it.



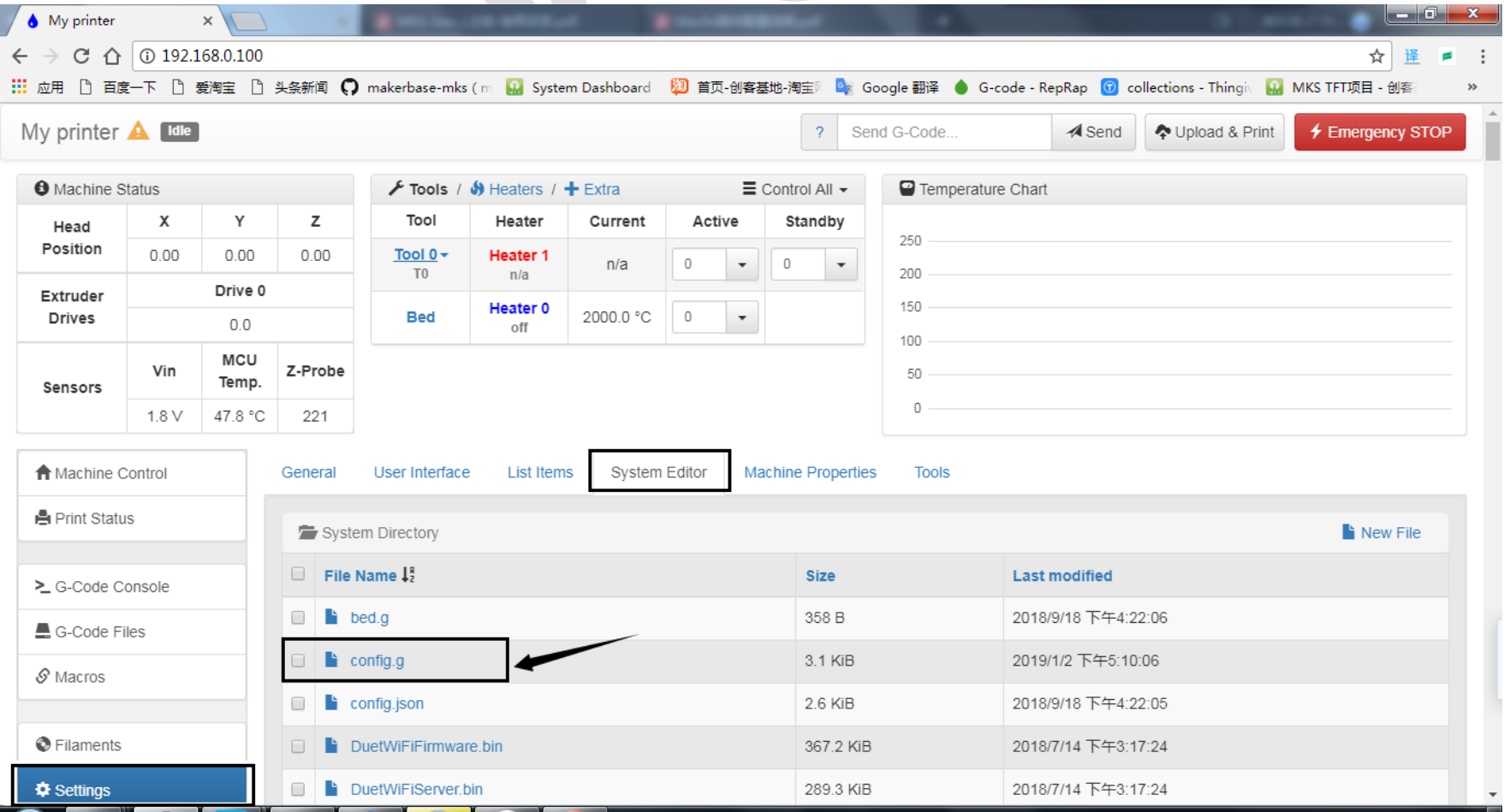


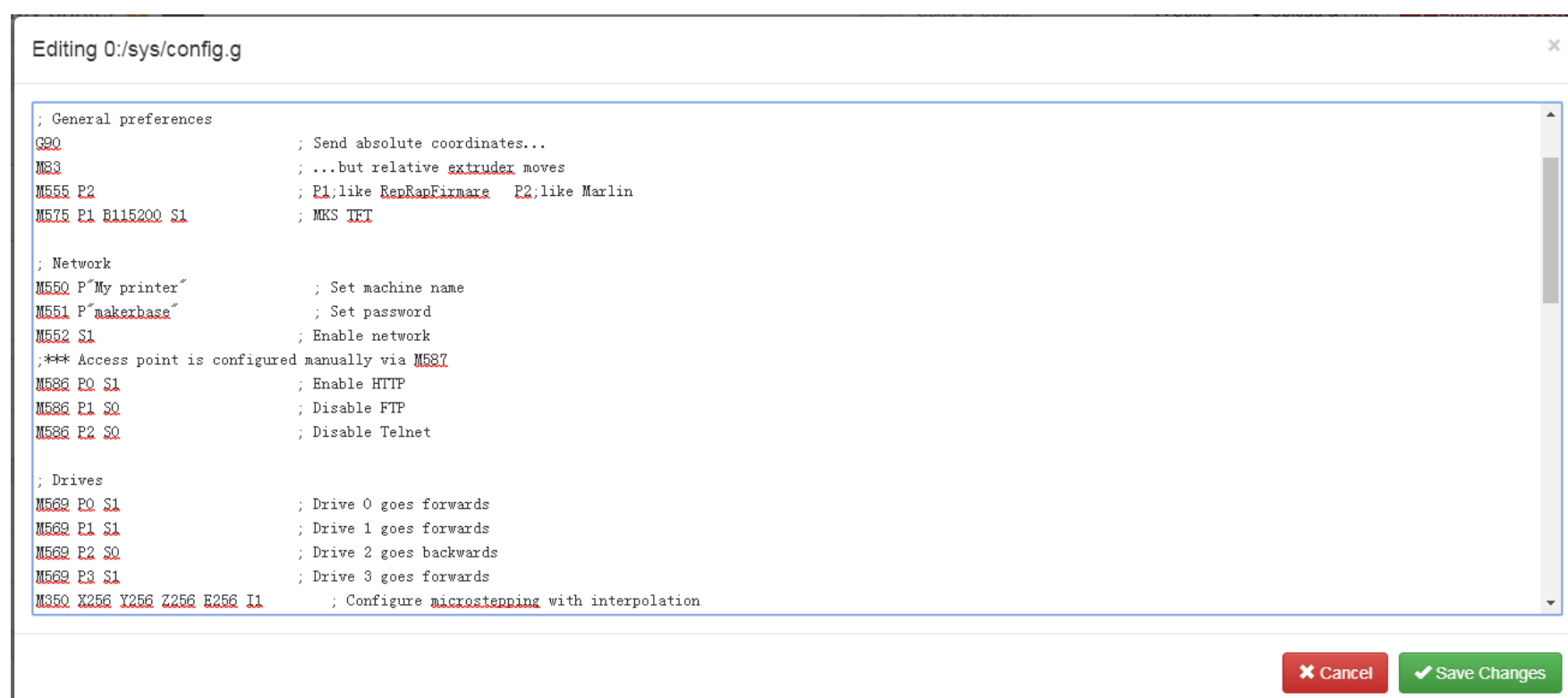
6.5 Configuration File Modification

If you need to re-adjust the parameter after updating the firmware and configuration files,It can be modified through a web page or a document editor. (If you are not familiar with the configuration file or G code, you can re-set the configuration file on the web page, you can not do it).

1. Modify configuration file on web page.

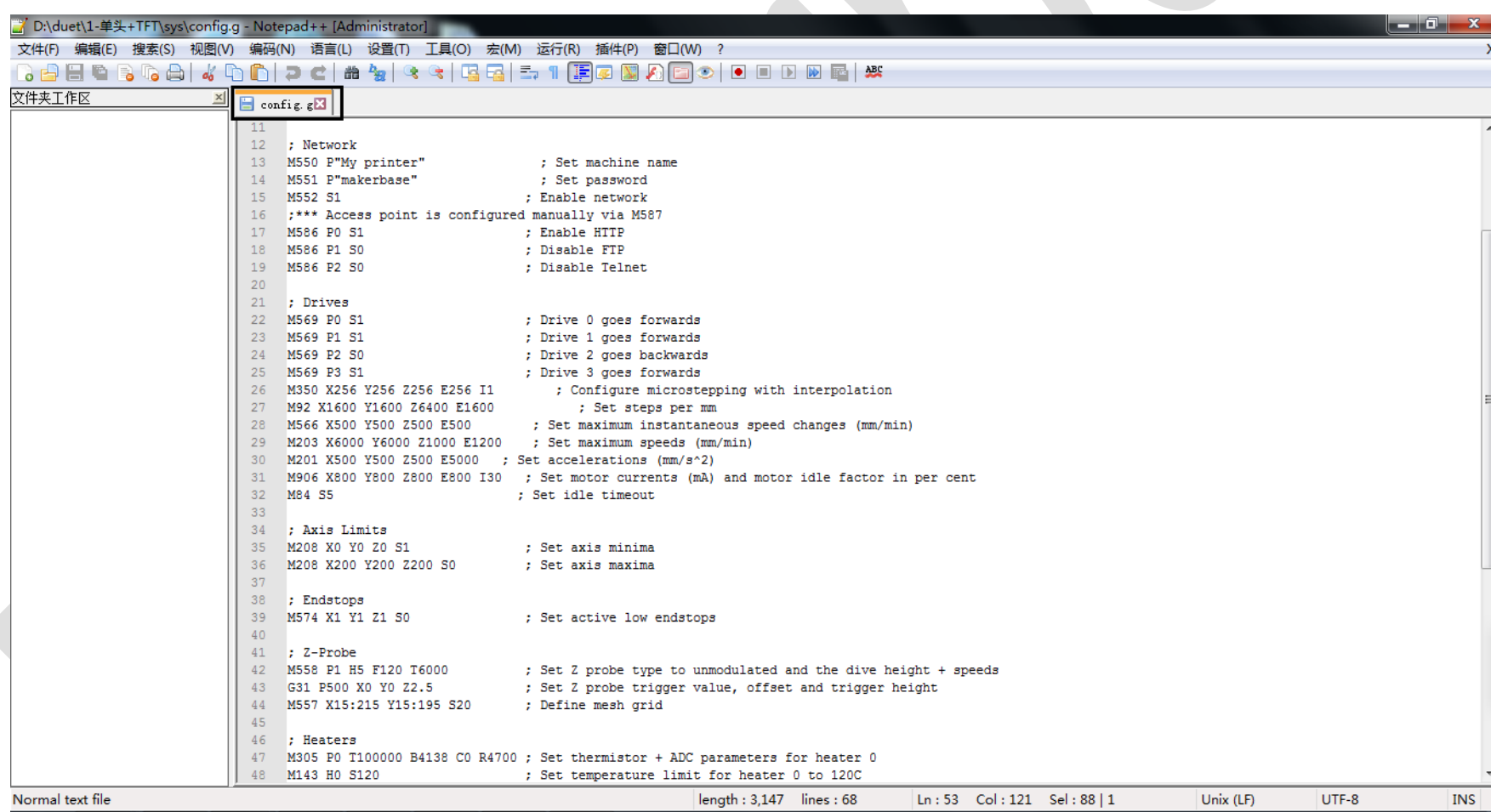
When the web page is connected to the printer, the configuration file that can be read and modified





2. Notepad++

It can also be edited by the editor Notepad++, then save it to the sd card and insert it into the motherboard to update.



Suitable for people who are familiar with the code to modify, edit and save

Detailed correspondence can refer to the URL:

Configuration instruction

<https://duet3d.dozuki.com/Wiki/ConfiguringRepRapFirmwareCartesianPrinter>

Hardware instyruction

https://duet3d.dozuki.com/Wiki/Hardware_Overview

VII Technical support and guarantee

1. Power test will be done before shipping to ensure normal use of the product.

2. Welcome friends to join the QQ discussion group: 232237692

3. Welcome to blog exchange: <http://flyway97.blog.163.com>

4. 3D printer motherboard contact

Huang Sheng: 13148923315

Tan Sheng: 15521190023

Peng Sheng: 13427958535

5. If you have any questions, contact our customer service or technical support staff in the group. We will be happy to help you.



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