BIGTREETECH/BIQU SKR V1.3 instruction guide by Jupa Creations

All official information like schematics and hardware about this 32 bits 3D printer mainboard can be found on the BIGTREETECH official GITHUB site.

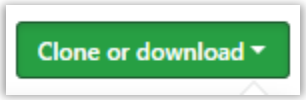
This instruction guide is to show you how to install Marlin 2.0 firmware to the SKR V1.3 board in general and some extra stuff. It does not take in account machine and other hardware specific settings!

This document is based for Windows OS systems.

You can use VSCode or Atom.IO + Platform IO to compile Marlin2.0 to BIGTREETECH SKR V1.3

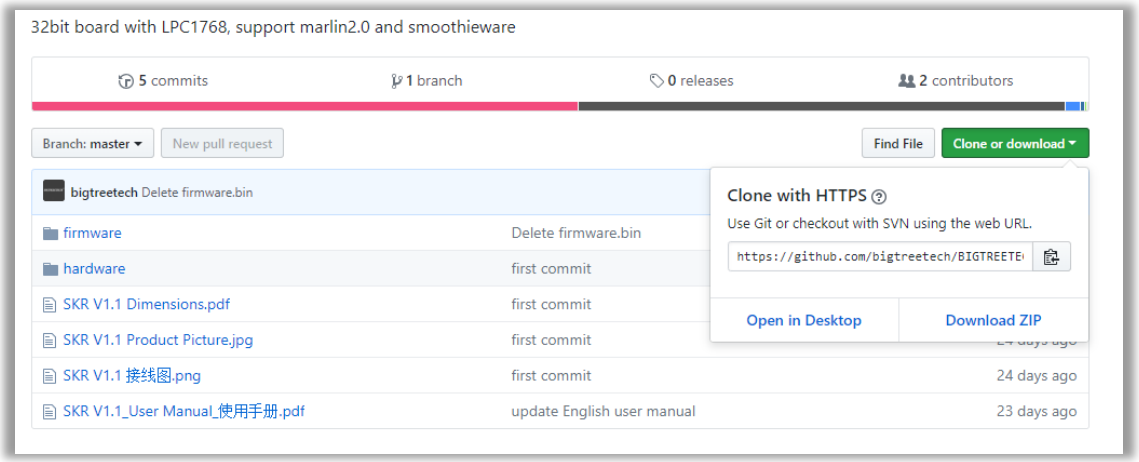
Intended for use with a REPRAP_DISCOUNT_FULL_GRAPHIC_SMART_CONTROLLER 128x64 LCD display by standard with two 10 pin wire ribbon cables.

Download the Marlin2.0 firmware from Marlin 2.0 github firmware version and click.



Click “Download ZIP”

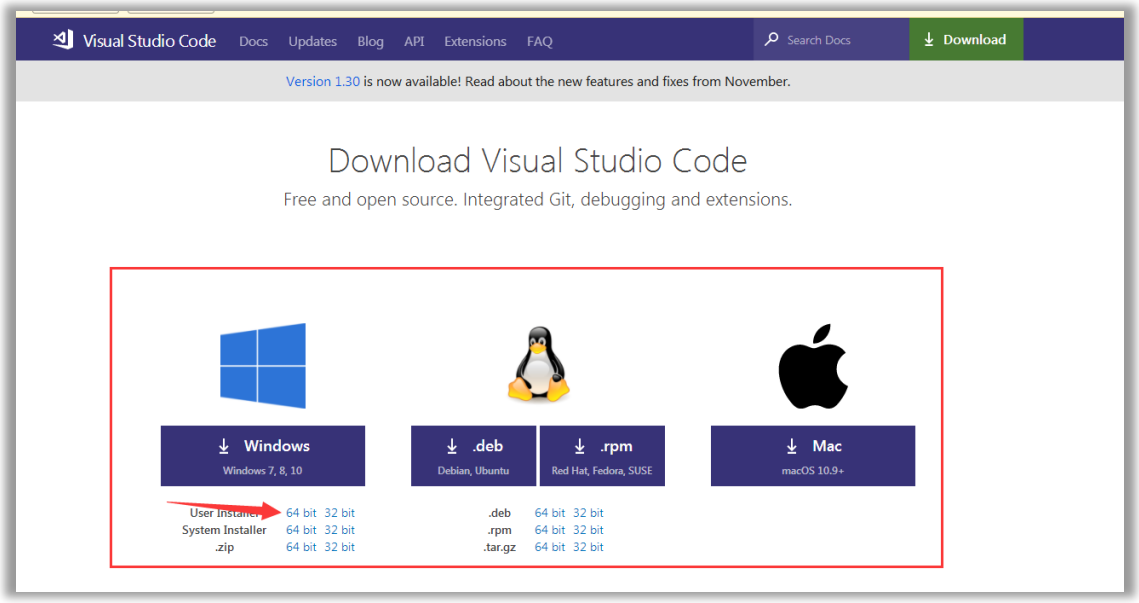
In general the BIGTREETECH firmware version on their Github page is outdated, so do not use it. In any case download Marlin 2.0 github firmware version and modify it to your needs.



When the download is complete, unzip the file to a known place.

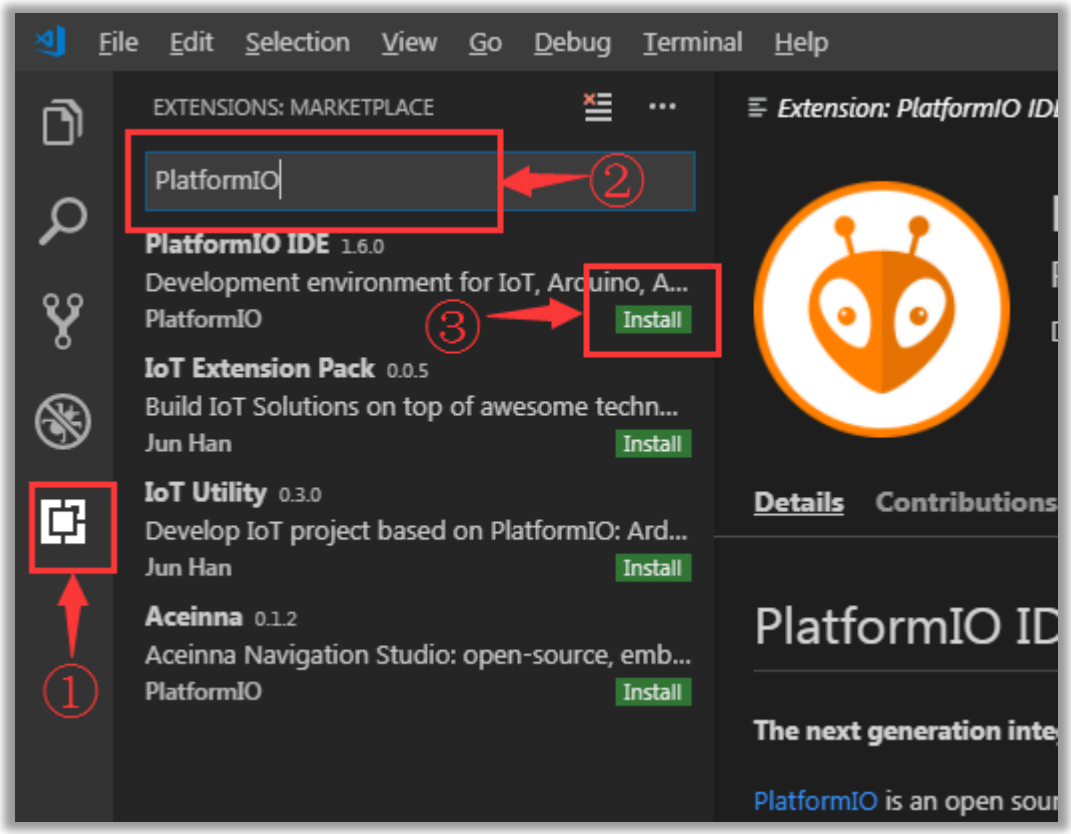
In this example we use VScode

Download the VScode from https://code.visualstudio.com/Download.
Choose the version which is compliant with your PC operating system.

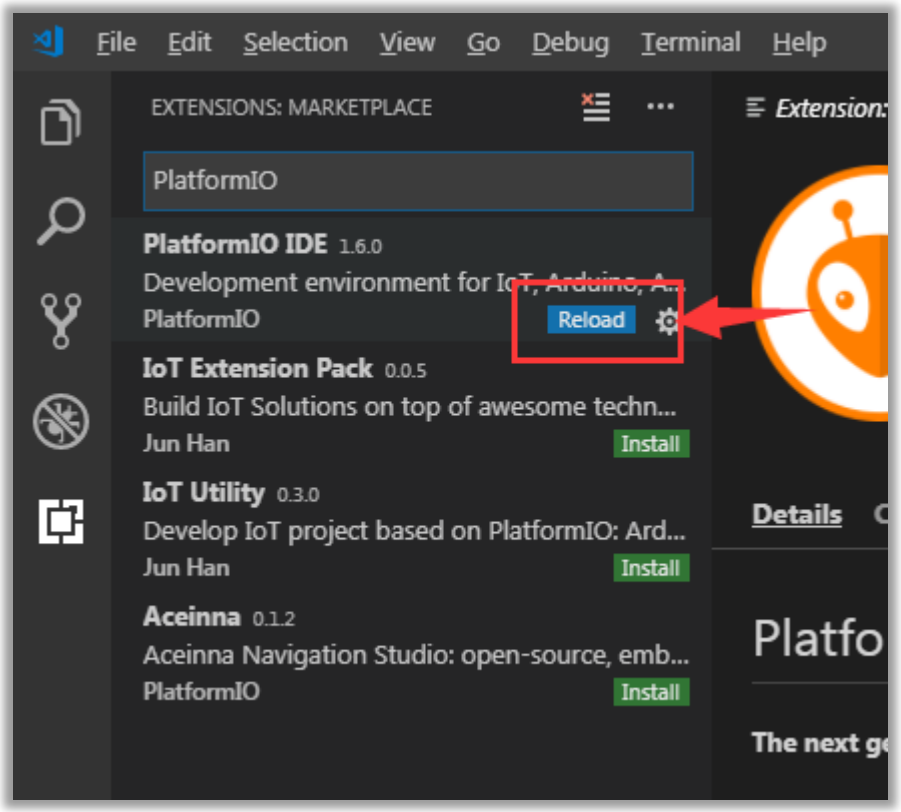


After the download is completed, double-click the installation. After the installation, open VSCode.

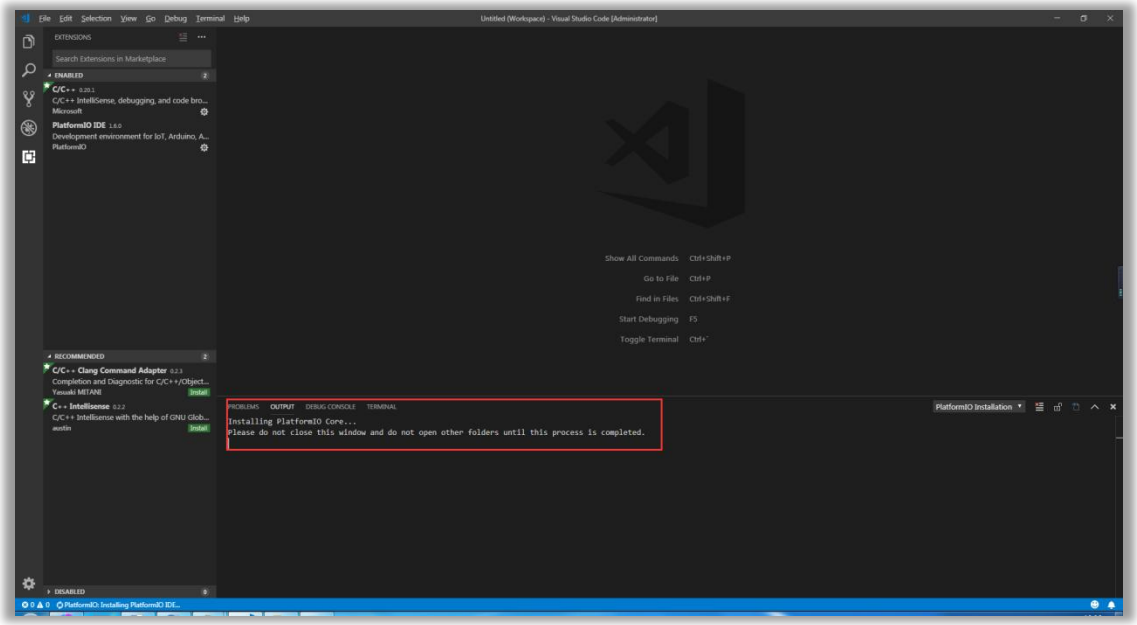
You also need to install the PlatformIO plugin, click on the steps below . Click on the step 1 in the figure below, enter PlatformIO in step 2 and click step 3 Install to install.



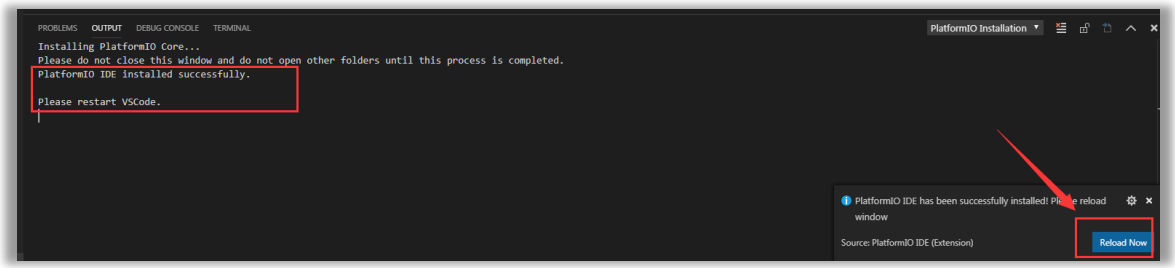
After the download is complete, you need to Reload.



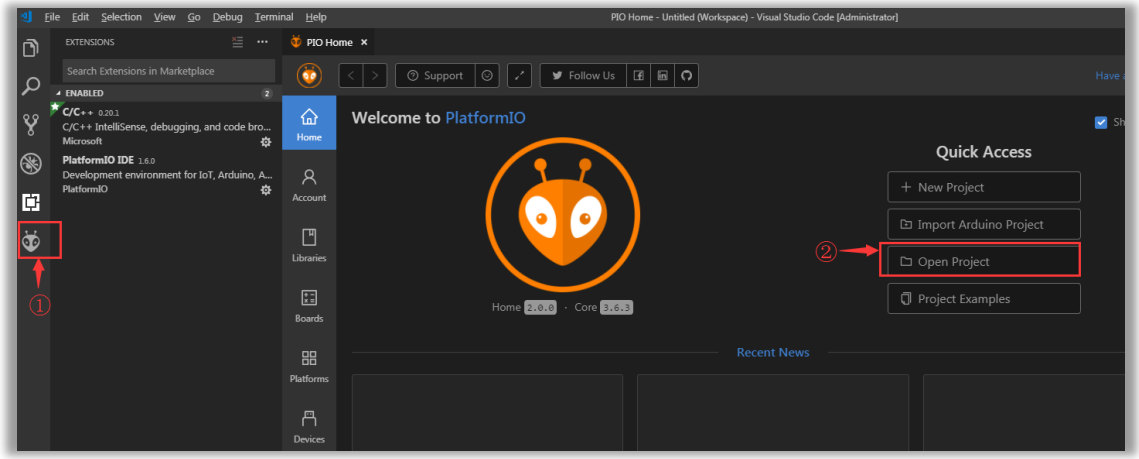
After Reload, you will be prompted to install PlatformIO Core. Please wait.



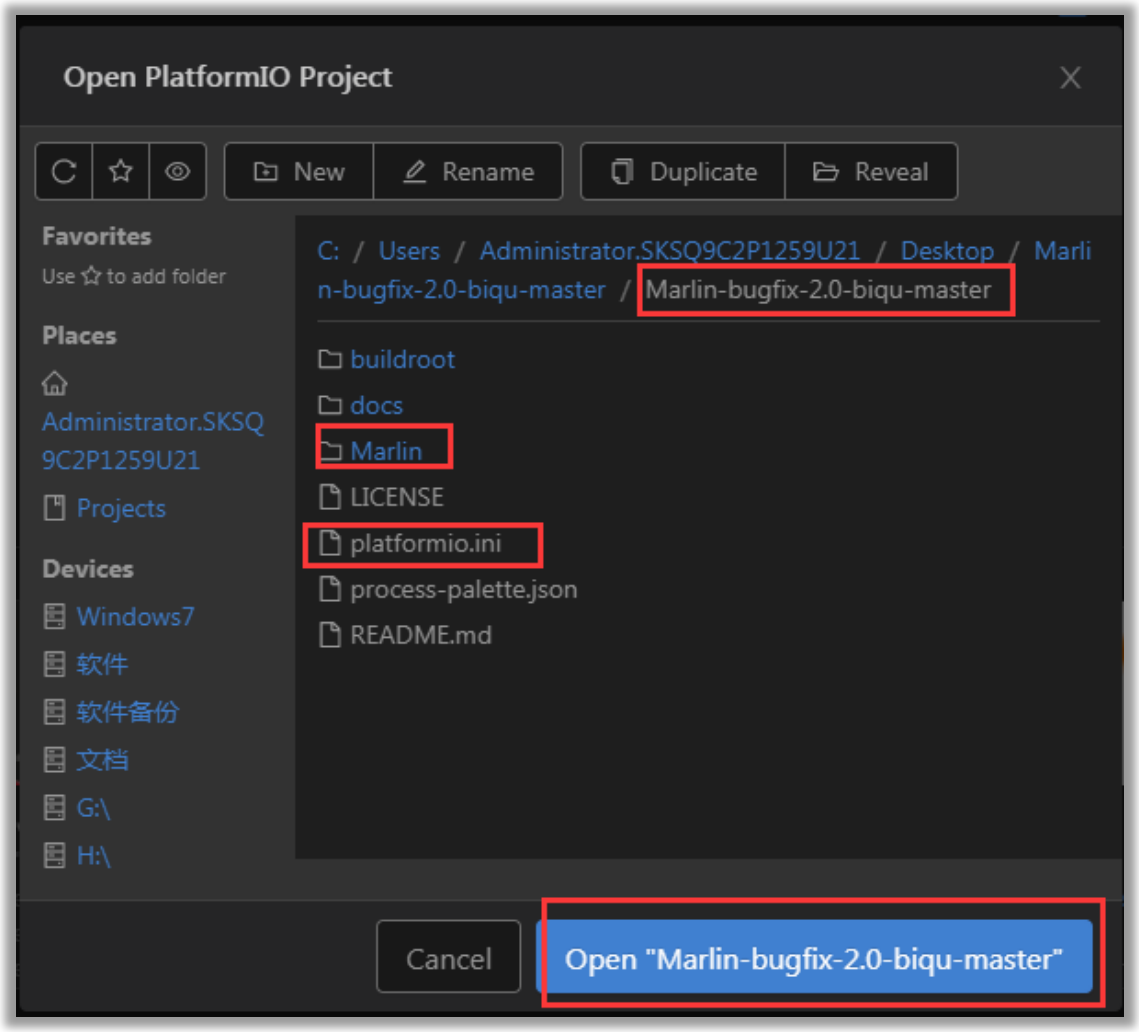
After the installation is successful, you need to Reload it again, and then PlatformIO is installed.



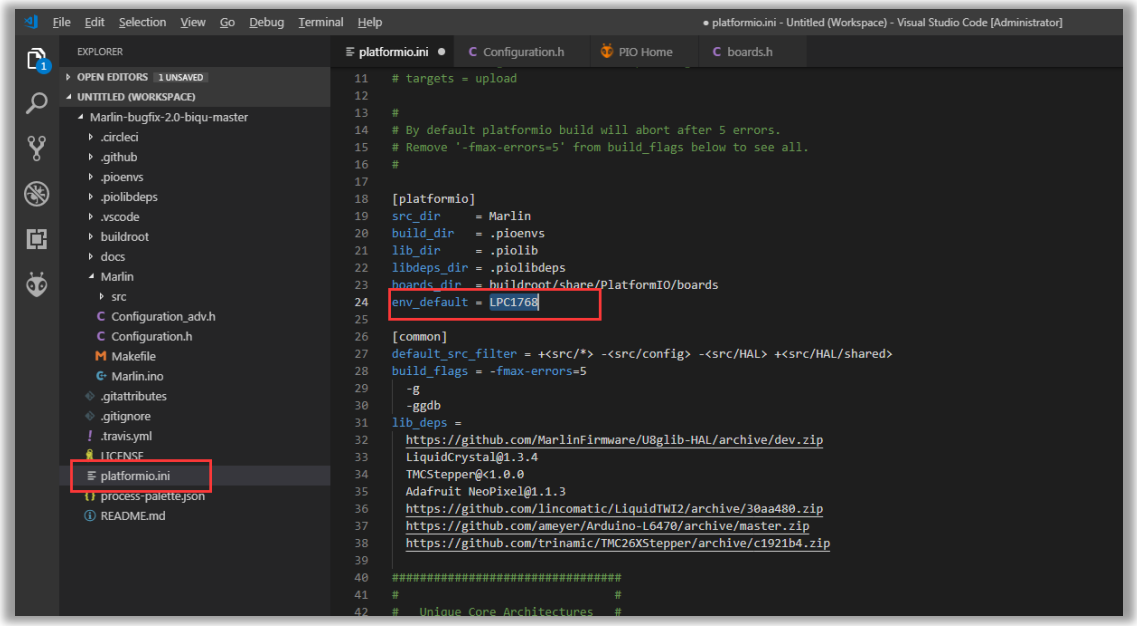
In the lower left corner of VSCode, you can see the icon (1), which is PlatformIO plug-in. Click (2) Open Project to Open the Project.



Find the marlin2.0 source directory where you extracted in the very first step, and click Open.



After opening the project, go to the PlatformIO.ini file and change the default environment from megaatmega2560 to LPC1768, env_default = LPC1768. The next steps might be already done.



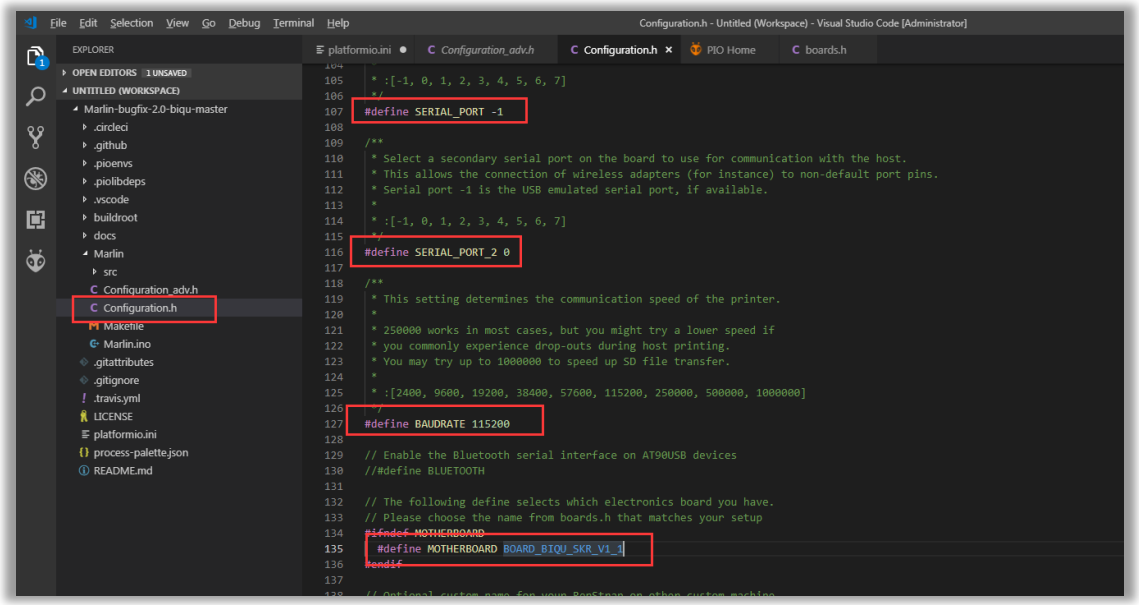
Then go to the configuration.h file and if not yet done modify it to

#define SERIAL_PORT -1

#define SERIAL_PORT_2 0

#define BAUDRATE 115200 or 250000 depending on your needs.

#define MOTHERBOARD BOARD_BIGTREE_SKR_V1_3



If you like to use a BL-touch you have to change some code.

In the same Configuration.h

Modify the following lines:

//#define BLTOUCH and change to
#define BLTOUCH

//#define AUTO_BED_LEVELING_BILINEAR and change to
#define AUTO_BED_LEVELING_BILINEAR

// #define Z_SAFE_HOMING and change to
#define Z_SAFE_HOMING

// #define ENCODER_PULSES_PER_STEP 4 and change to
#define ENCODER_PULSES_PER_STEP 4

// #define REVERSE_ENCODER_DIRECTION and change to
#define REVERSE_ENCODER_DIRECTION

//#define REPRAP_DISCOUNT_FULL_GRAPHIC_SMART_CONTROLLER and change to
#define REPRAP_DISCOUNT_FULL_GRAPHIC_SMART_CONTROLLER

If you like to activate Babystepping switch to Configuration_adv.h

//#define BABYSTEPPING and change to
#define BABYSTEPPING

//#define DOUBLECLICK_FOR_Z_BABYSTEPPING and change to
#define DOUBLECLICK_FOR_Z_BABYSTEPPING

//#define BABYSTEP_ZPROBE_OFFSET and change to
#define BABYSTEP_ZPROBE_OFFSET

//#define BABYSTEP_ZPROBE_GFX_OVERLAY and change to
#define BABYSTEP_ZPROBE_GFX_OVERLAY

#define BABYSTEP_MULTIPLICATOR 1 and change to
#define BABYSTEP_MULTIPLICATOR 20

If your original BL-touch, clone TL-touch or clone BT-touch is dropping the pin during printing switch to Marlin/scr/inc/conditionals_LCD.h and change the following code:

#define BLTOUCH_STOW   100 // was 90
#define BLTOUCH_SELFTEST 130 // was 120

Fan setup

Layer fan

If you like to use a layer fan, connect it to the FAN connector.

Heater fan

If you like to make the heater cooling fan controlled with automatic ON/OFF @ 50 degrees Celsius. Connect the fan to the HE1 output and go to configuration_adv.h file.

//#define E0_AUTO_FAN_PIN -1 and change to
 #define E0_AUTO_FAN_PIN FAN1_PIN

Driver fan

If you like a board, case or driver fan controlled when drivers are activated go to the configuration_adv.h file

Change to

```
#define USE_CONTROLLER_FAN
#if ENABLED(USE_CONTROLLER_FAN)
  #define CONTROLLER_FAN_PIN P1_26       // Set a custom pin for the controller fan
  #define CONTROLLERFAN_SECS 60          // Duration in seconds afterrun
  #define CONTROLLERFAN_SPEED 255        // 255 == full speed
#endif
```

On the Y-max endstop input connect a small mosfet switch with a JST XH2.54 connector on P1-26 and GND.

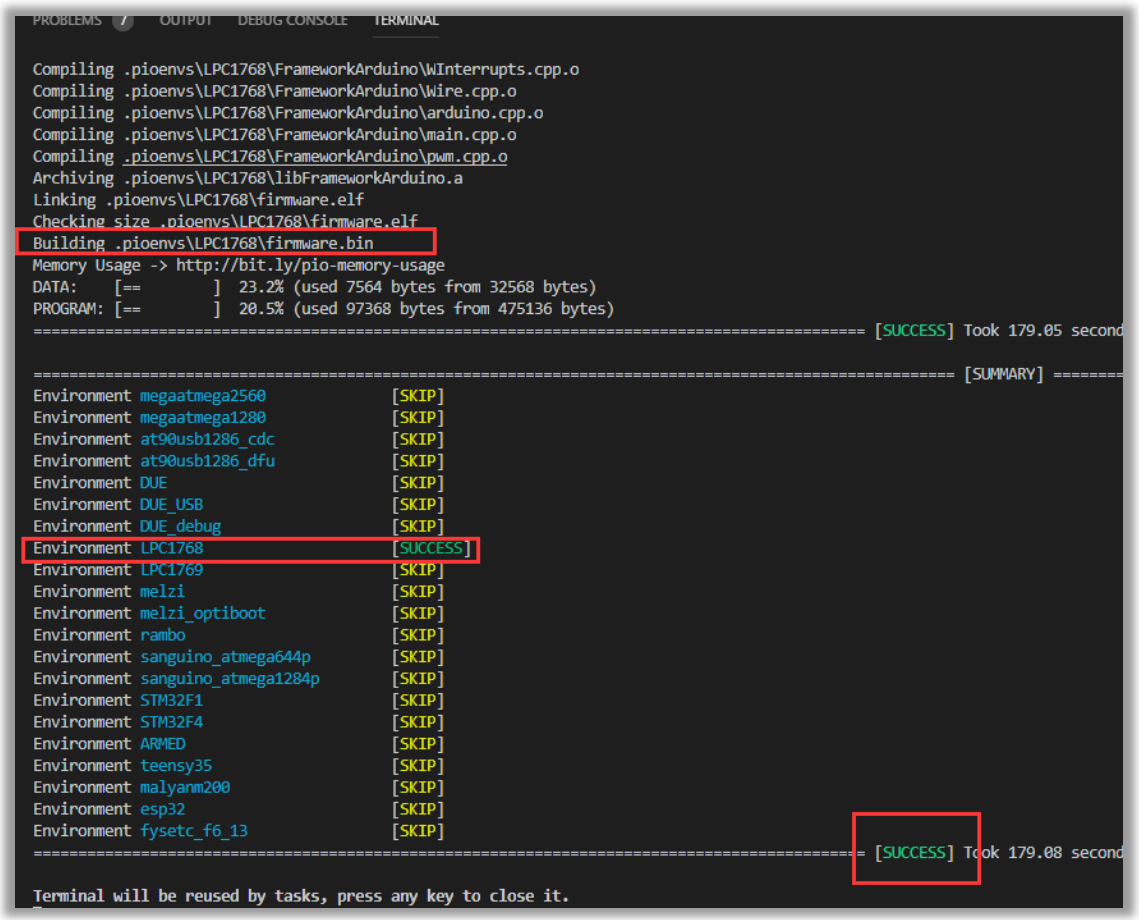
Sample picture and link

After the modification is completed, for VScode press the Ctrl+Shift+B keys or the build icon to start the compiling.
PlatformIO will automatically download the compile component and then compile.

Compiling can take up to 5 minutes, so be patient.

When you use to print from SD card and connect your machine by USB or serial connection the following setting must be made in “configuration_adv.h”

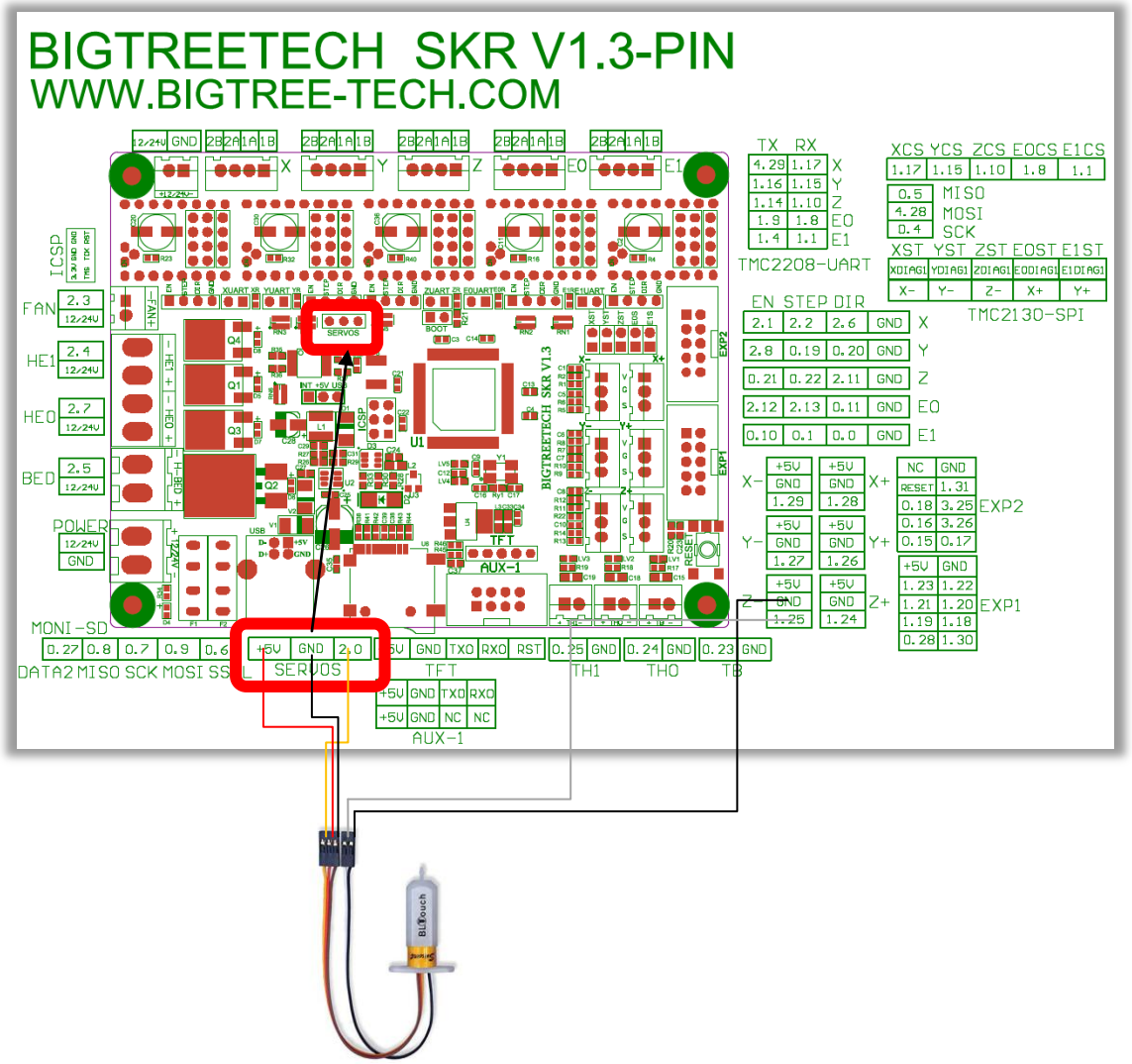
```
// LPC-based boards have on-board SD Card options. Override here or defaults apply.
#ifdef TARGET_LPC1768
  //#define LPC_SD_LCD          // Use the SD drive in the external LCD controller.
  #define LPC_SD_ONBOARD      // Use the SD drive on the control board. (No SD_DETECT_PIN. M21 to init.)
  //#define LPC_SD_CUSTOM_CABLE // Use a custom cable to access the SD (as defined in a pins file).
  //#define USB_SD_DISABLED     // Disable SD Card access over USB (for security).
  #if ENABLED(LPC_SD_ONBOARD)
    #define USB_SD_ONBOARD    // Provide the onboard SD card to the host as a USB mass storage device.
  #endif
#endif
```



After the compiling is successful, a “firmware.bin” file will be generated in the \pioenvs\LPC1768 directory. Copy this file to the TF card of the motherboard and reset or powercycle the motherboard, so that the firmware is burned into the motherboard.

Once the firmware is burned to the motherboard it is not needed for working.

Pin diagram by BIGTHREETECH

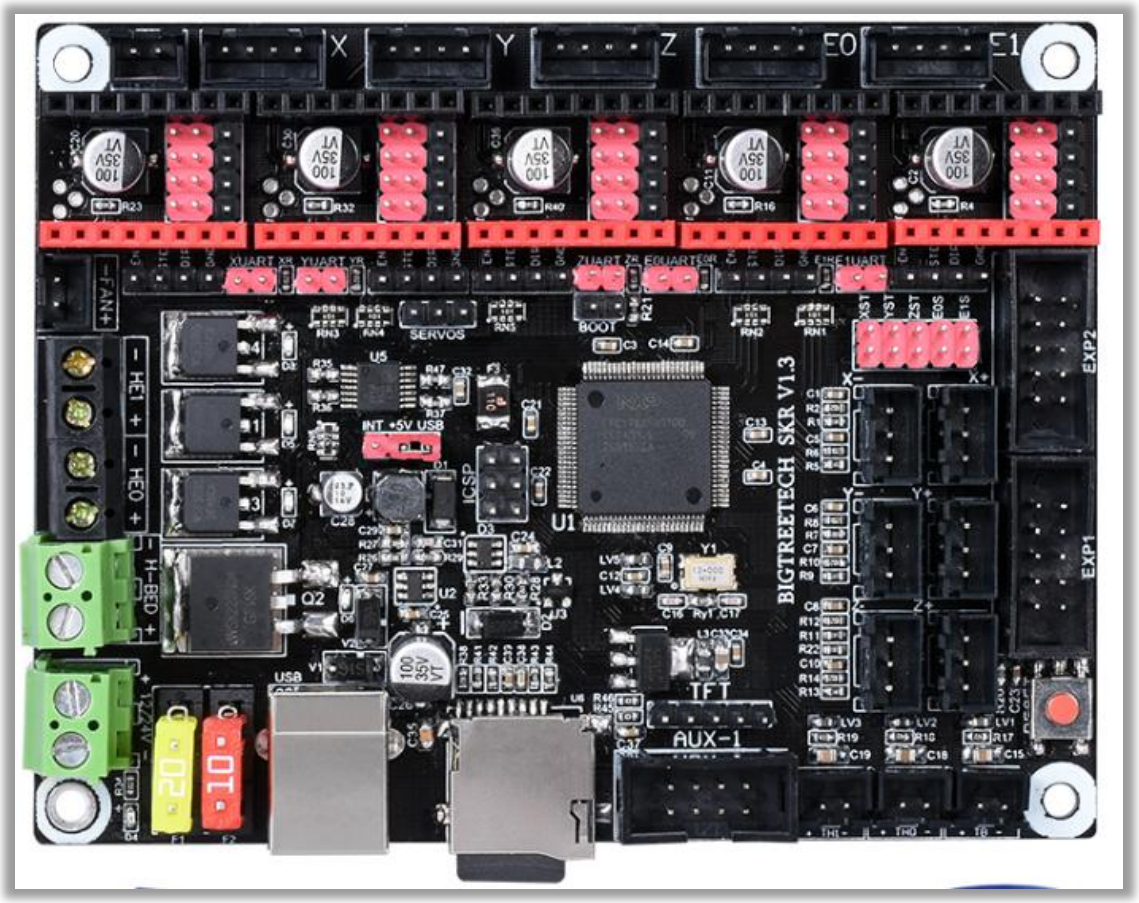


BL-Touch

The SKR V1.3 board has a dedicated Servo port.

Wire connections need to be checked before use!

For connecting the ANTCLABS BL-touch three wire cable to the Servo port.
SKR V1.3 Board servo port = (+)(-)(puls) and BL-touch = (-)(+)(puls)
Positive (+) and Minus (-) need to be swapped in the BL-Touch connector or an intermediate connection cable need to be made. The two wire sensor cable connects to the (Z-) port.



LCD

If your REPRAP_DISCOUNT_FULL_GRAPHIC_SMART_CONTROLLER is not working check following:
If the back-lit is illuminated on the display but no characters are shown you have selected the wrong display in the firmware configuration.h file. Please change.
If the display stays darkyou might have connected EXP1 to EXP2. Connect EXP1 to EXP1
If the display stays dark and EXP1 is connected to EXP1 remove the lock tab from the EXP1 and EXP2 connectors at one side so you can place them reversed in the connector. You cannot blow the board or LCD by wrong orientation of the connectors.

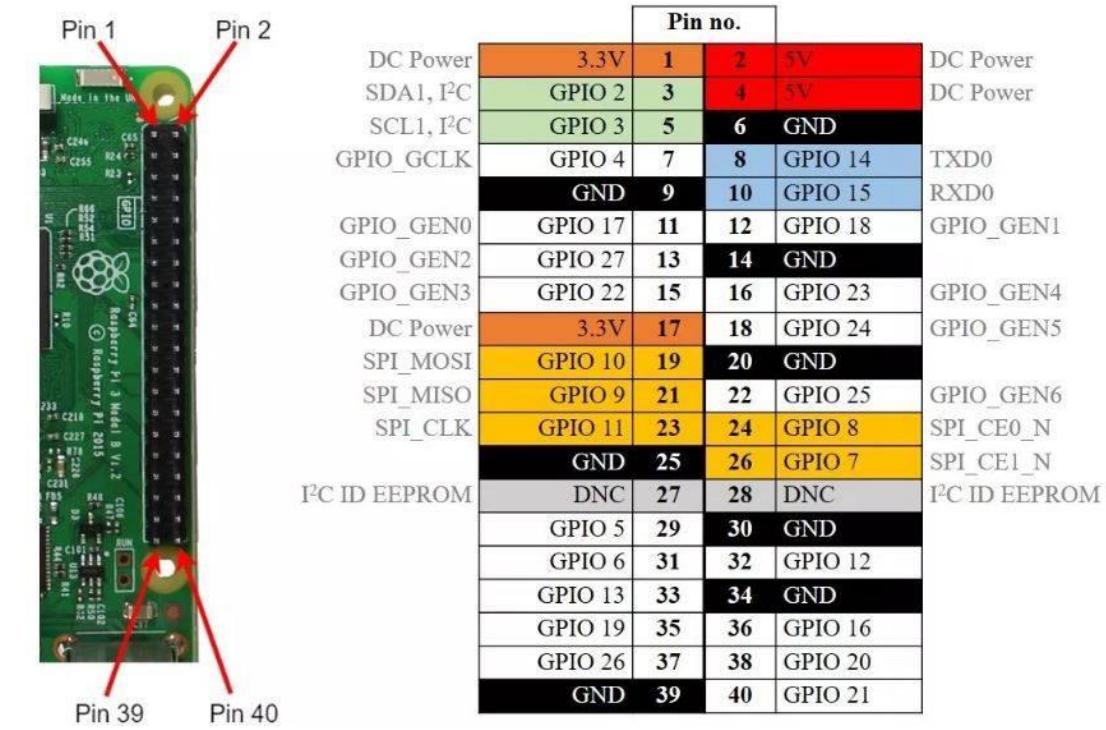
Connecting SKR V1.3 with Pi3B+ by 3 2wire serial connection without USB cable.

Connect TXD0 to RX and RXD0 to TX (cross linked) and GND

No need to connect V+

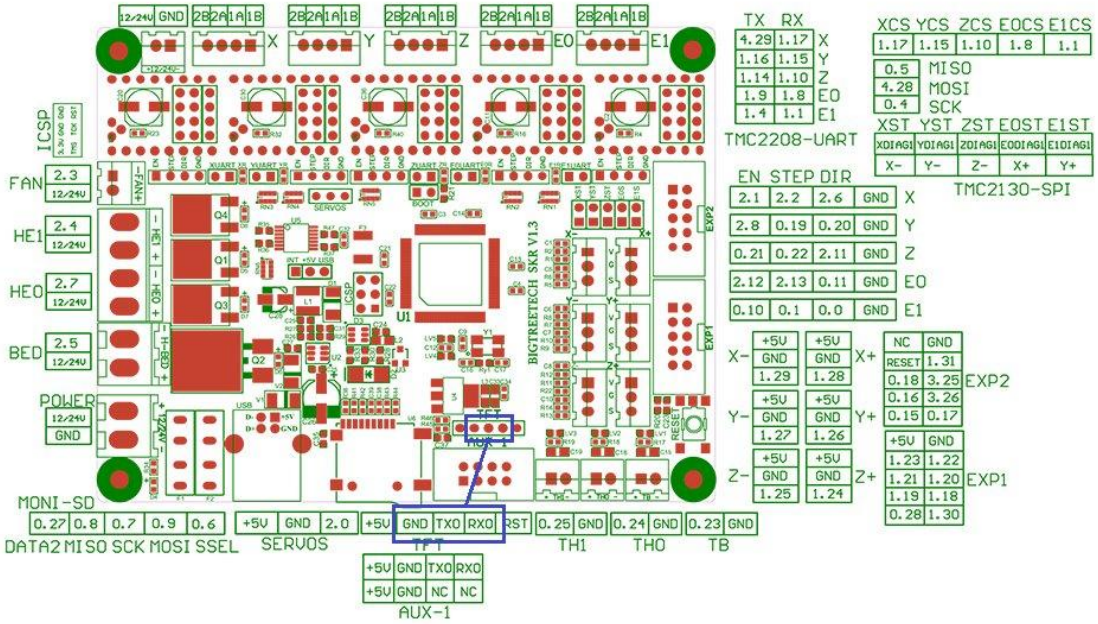
Rasberry Pi 3 and SKR V1.3 both with 3.3V logic.

PI 3B+ @ GPIO connector TXD0 - RXD0 – GND (8-0-10)



		Pin no.			
DC Power	3.3V	1	2	5V	DC Power
SDA1, I²C	GPIO 2	3	4	5V	DC Power
SCL1, I²C	GPIO 3	5	6	GND	
GPIO_GCLK	GPIO 4	7	8	GPIO 14	TXD0
	GND	9	10	GPIO 15	RXD0
GPIO_GEN0	GPIO 17	11	12	GPIO 18	GPIO_GEN1
GPIO_GEN2	GPIO 27	13	14	GND	
GPIO_GEN3	GPIO 22	15	16	GPIO 23	GPIO_GEN4
DC Power	3.3V	17	18	GPIO 24	GPIO_GEN5
SPI_MOSI	GPIO 10	19	20	GND	
SPI_MISO	GPIO 9	21	22	GPIO 25	GPIO_GEN6
SPI_CLK	GPIO 11	23	24	GPIO 8	SPI_CE0_N
	GND	25	26	GPIO 7	SPI_CE1_N
I²C ID EEPROM	DNC	27	28	DNC	I²C ID EEPROM
	GPIO 5	29	30	GND	
	GPIO 6	31	32	GPIO 12	
	GPIO 13	33	34	GND	
	GPIO 19	35	36	GPIO 16	
	GPIO 26	37	38	GPIO 20	
	GND	39	40	GPIO 21	

SKR V1.3 @ TFT connector TX – Rx - GND



You also have to change some settings in the Raspi 3.

Swapping ports used by GPIO and Bluetooth

The first thing to change in the serial connection is to swap the ports used by the GPIO pins and the internal Bluetooth chip. We need to add a line in the boot config file on the boot partition.

Log in to the Pi3 with SSH on the IP address used.

Type in sudo nano /boot/config.txt

Move the cursor to the end of the file by cursor and add:

dtoverlay=pi3-miniuart-bt

save the file and exit the editor by control+O and control+X

Disabling the serial console

Moving to another config file, where part of the code must be deleted to disable serial console.

Type in sudo nano /boot/cmdline.txt

Look for following string (text) and delete it

console=serial0,115200

save the file and exit the editor by control+O and control+X

Rebooting RPi

For all changes to take effect, please reboot your Raspberry Pi 3

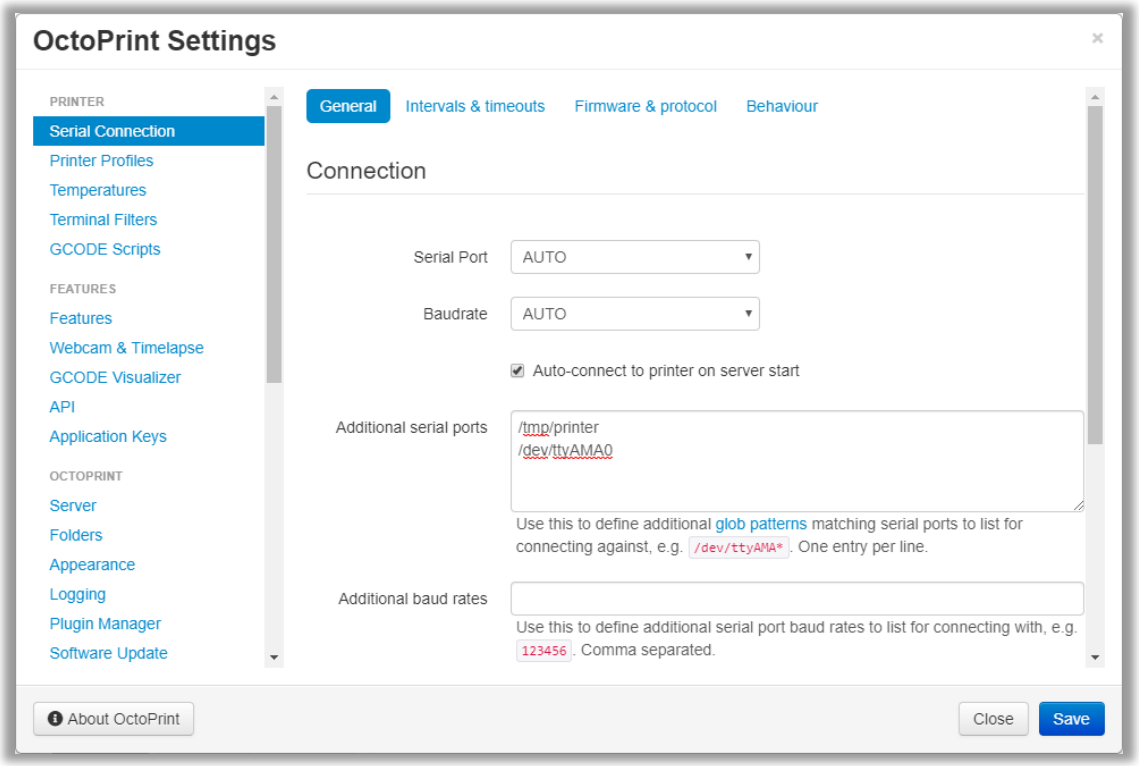
Type in Sudo reboot

Adding the serial port in Octoprint

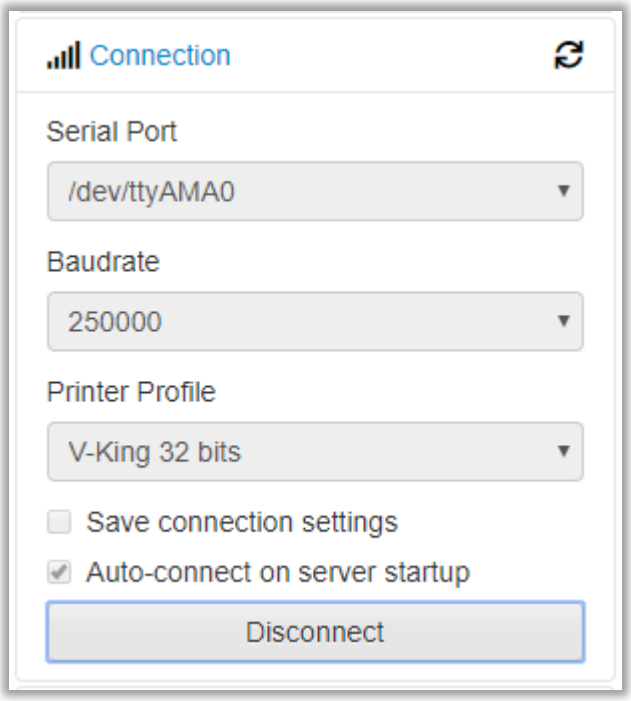
Last part of the configuration is in the Octoprint web interface. Open your browser and type either "octoprint.local" or the IP address of the Pi 3. You might be greeted with the welcome wizard, please go through it first.

As soon as you arrive at the home screen, open "Settings" (top right), head to "Serial Connection", then "Additional serial ports" and insert following:

/dev/ttyAMA0



Save the change and reboot OctoPrint. After reboot, select the new port and connect to your printer. Making connection might take a few seconds longer then with USB.

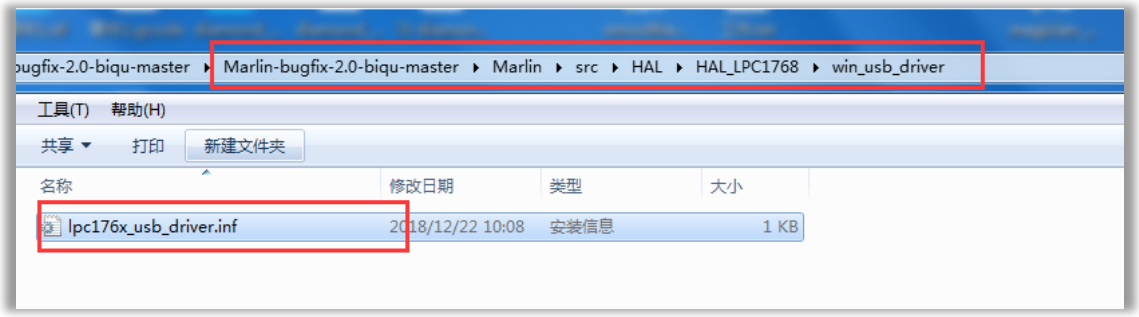


Windows 10

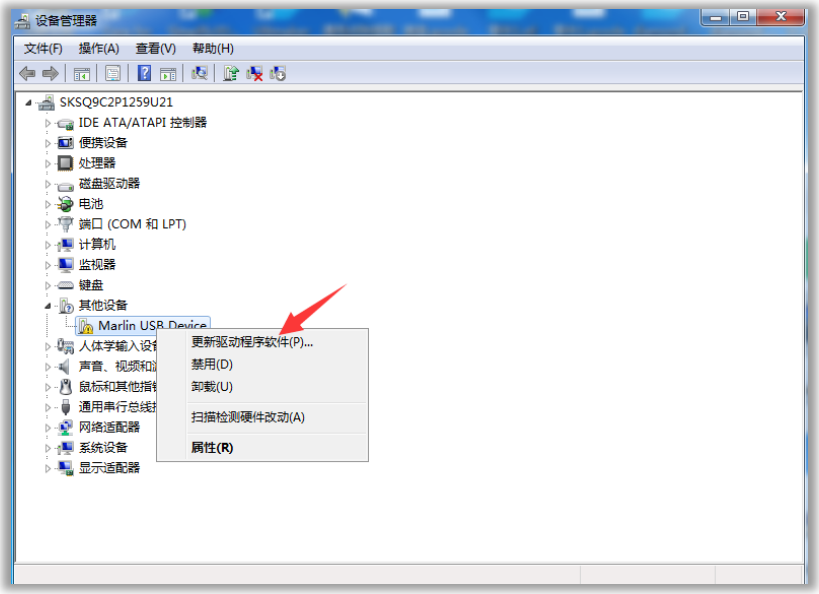
In Windows 10 a driver called MARLIN will be automatically installed by plug & play when a USB cable is connected to the motherboard. It will show as a MARLIN port. Do not install any other USB driver or Smoothie drivers while using Windows 10!

For other Windows operating systems the computer identification motherboard needs to

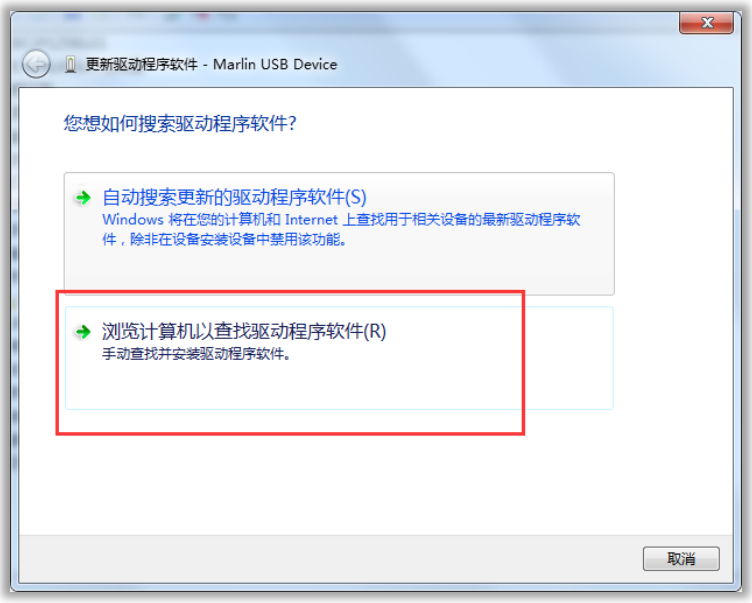
install USB to serial port driver manually in the directory of the firmware as shown below. Because its path is too long, copy it to an easy to find location like to the desktop.



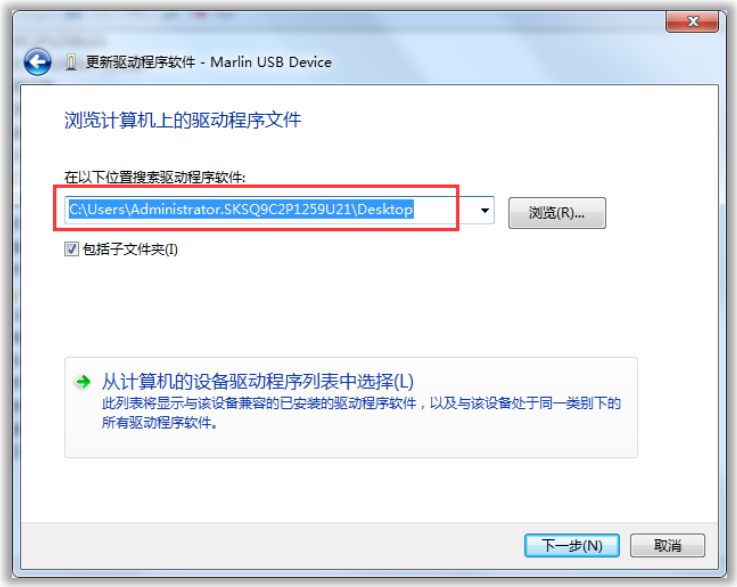
Open the Device manager, you can see that there is an unrecognized Marlin USB Device, click to update the driver software.



Browse the computer to find the driver software.

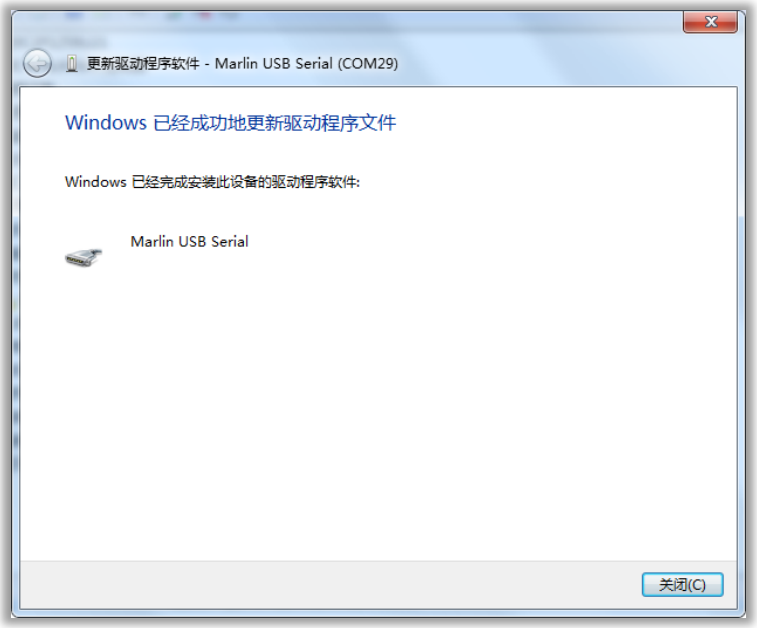


Select the path as the directory where the lpc176x_usb_driver.inf driver is located. We copied it to the desktop before, so select the desktop location: C:\Users\(Users Name)\Desktop and click Next. Check with the below picture.



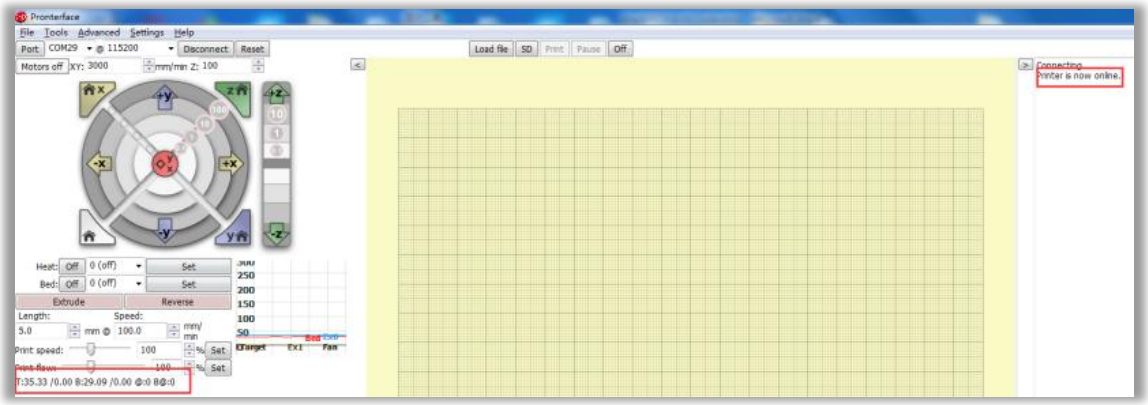
If you have firewall alerts, choose to always install this driver software.

If the install was successful, then the driver has been selected successfully. Remember the port number.

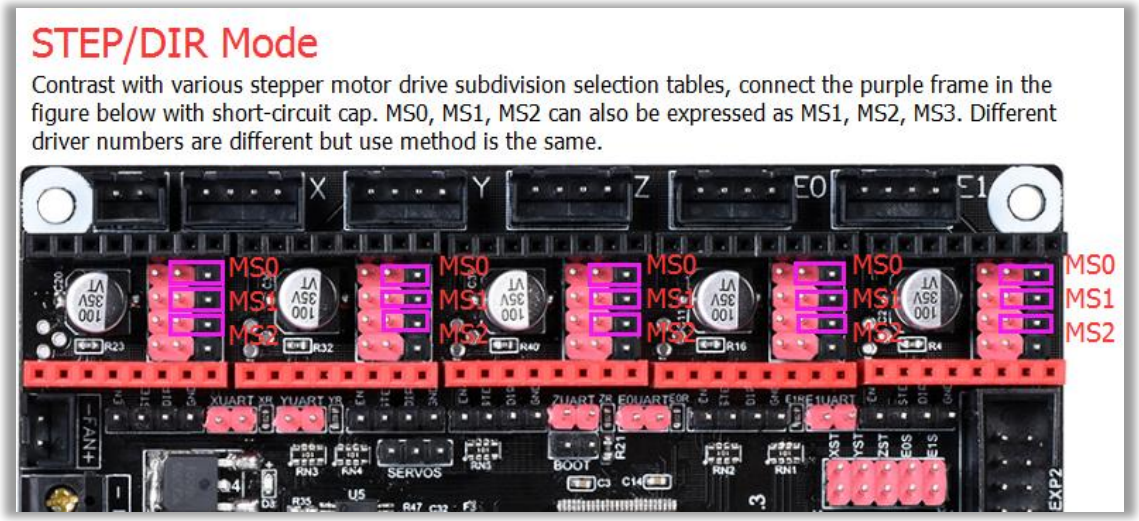


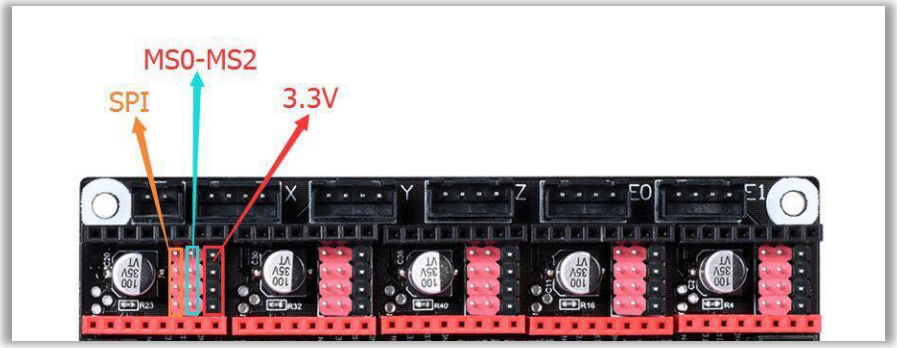
Open the Printrun/Pronterface online printing software as an example, select your com Port @115200, and then click Connect. Your COM port may be a different number.

On the right, you can see the printer is now online. This means that you have successfully connected to the printer. Now you can use your computer to control the printer



Driver jumper settings for standalone usage (No UART or SPI)





Note TMC 2100 drivers are controlled by 3 states
0 = pin needs to be connected to Ground with jumperwire
1 = pin needs to be connected to V+ with jumper
OPEN = no jumper used

TMC2100	steps	MS0	MS1	MS2	Interpolation	Mode
	Full	0	0	Open	No	Spreadcycle
	1/2	1	0	Open	No	Spreadcycle
	¼	Open	1	Open	1/256	Spreadcycle
	1/16	0	1	Open	No	Spreadcycle

	1/4	1	1	Open	No	Spreadcucle
	¼	Open	1	Open	1/256	Spreadcycle
	1/16	0	1	Open	1/256	Spreadcycle
	¼	1	Open	Open	1/256	Stealthchop1
	1/16	Open	Open	Open	1/256	Stealthchop1

Note TMC2208 drivers are controlled by 2 states
0 = no jumper needs to be placed between pink and black
1 = pin needs to be connected to V+ with jumper between pink and black

TMC2208	steps	MS0	MS1	MS2	Interpolation	Mode
	1/2	0	0	0	1/256	Stealthchop2
	¼	0	1	0	1/256	Stealthchop2
	1/8	0	0	0	1/256	Stealthchop2
	1/16	1	1	0	1/256	Stealthchop2

Note TMC 2130 drivers are controlled by 3 states
0 = pin needs to be connected to Ground with jumperwire
1 = pin needs to be connected to V+ with jumper between pink and black
OPEN = no jumper used

TMC2130	steps	MS0	MS1	MS2	Interpolation	Mode
	Full	0	0	Open	No	Spreadcycle
	½	1	0	Open	No	Spreadcycle
	½	Open	1	Open	1/256	Spreadcycle
	¼	0	1	Open	No	Spreadcycle
	1/16	1	1	Open	No	Spreadcycle
	¼	Open	1	Open	1/256	Spreadcycle
	1/16	0	Open	Open	1/256	Spreadcycle
	¼	1	Open	Open	1/256	Stealthchop1
	1/16	Open	Open	Open	1/256	Stealthchop1

Drivers below only have 2 states

0 = no jumper needs to be placed between pink and black
1 = pin needs to be connected to V+ with jumper between pink and black

A4988	steps	MS0	MS1	MS2	Interpolation	Mode
	Full	0	0	0	No	None
	½	1	0	0	No	None
	¼	0	1	0	No	None
	1/8	0	1	0	No	None
	1/16	1	1	1	No	None

DRV8825	steps	MS0	MS1	MS2	Interpolation	Mode
	Full	0	0	0	No	None
	½	1	0	0	No	None
	¼	0	1	0	No	None
	1/8	1	1	0	No	None
	1/16	0	0	1	No	None
	1/32	1	1	1	No	None

ST820	steps	MS0	MS1	MS2	Interpolation	Mode
	Full	0	0	0	No	None
	½	0	0	1	No	None
	¼	1	0	0	No	None
	1/8	0	1	1	No	None
	1/16	1	0	0	No	None
	1/32	1	0	1	No	None
	1/128	1	1	0	No	None
	1/256	1	1	1	No	None

LV8729	Steps	MS0	MS1	MS2	Interpolation	Mode
	Full	0	0	0	No	None
	½	0	0	1	No	None
	¼	1	0	0	No	None
	1/8	0	1	1	No	None
	1/16	0	0	1	No	None
	1/32	1	0	1	No	None
	1/64	1	1	0	No	None
	1/128	1	1	1	No	None

Windows 10: Disable Signed Driver Enforcement

How can I install drivers that are not digitally signed?

Windows 10 enforces driver signatures by default. This can be disabled to install drivers that are not digitally signed. Use the following steps to disable driver signature enforcement.

1. Click the **Start** **menu** and select **Settings**.
2. Click **Update and Security**.
3. Click on **Recovery**.
4. Click **Restart now** under **Advanced Startup**.
5. Click **Troubleshoot**.
6. Click **Advanced options**.
7. Click **Startup Settings**.
8. Click on **Restart**.
9. On the Startup Settings screen press 7 or F7 to disable driver signature enforcement.

Your computer will restart and you will be able to install non-digitally signed drivers. If you restart your computer again the driver signature enforcement will be re-enabled.

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