

# 广州谦辉信息科技有限公司

Guangzhou Qianhui Information Technology Co., Ltd.

# MKS Gen\_L Motherboard Manual

MAKER BASE

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## 创客基地

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## Firmware version update

Firmware	Modified	Modify Content	Note
version	Time		
V1.0	2016. 12	1.Initial version	

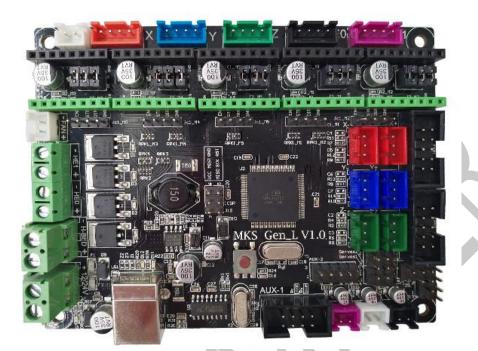
# Directory

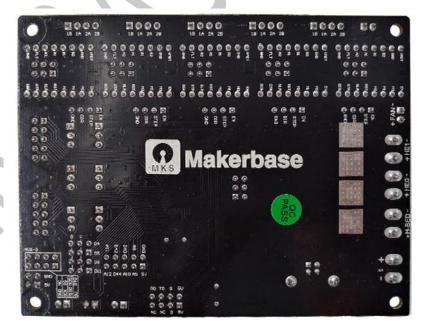
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# I Overview

MKS Gen-L is a product developed by MKS .For the problems of the ramps1.4 open source motherboard, especially optimized R & D.Suitable for mass production of 3D printer manufacturers as the main control board, replaceable motor drive, support 4988 drive and 8825 drive and other drivers, to meet your needs.Reserve the motor pulse and direction output port to facilitate the external storage of large electrical motor drive circuit, retain the Ramps 1.4 Servos, AUX-1, AUX-2 interface, provide a 5V interface, provide flexible and diverse options.





## II Features

1. The 2560 and ramps1.4 are assembled on one board, which solves the cumbersome and troublesome problem of the Ramps1.4 combination interface.

Users can replace the motor drive by themselves, support 4988 drive and 8825 drive, TMC2100 drive,
8729 drive;

3. The external drive signal is reserved, and the 57 and 86 motors can be driven by a large external drive.

4. The high quality MOSFET tube has better heat dissipation effect and ensures stable work for a long time.

5. Using dedicated power chip , support 12V-24V power input;Solve the problem of heat and power shortage of Ramps voltage conversion chip.

6. The stable and reliable filter circuit greatly reduces the possibility of interference, and the most likely to avoid the phenomenon of crashes and runaways during the printing process.

7. The use of CH340 serial chip, under the premise of ensuring stability and reliability, reduce costs, but also solve the problem of the previous 16U2 hard-to-install drive.

8. Can accept 24V input, the same system power can reduce the hot bed current to 1/4, effectively solve the hot bed MOS tube heating problem;

9. Using open source firmware Marlin, the configuration is exactly the same as ramps1.4, which can directly replace Ramps1.4 and is more stable.

10. It can directly connect 2004LCD display and 12864LCD display and MINI12864 display to support TFT28 and TFT32 touch screen developed by Maker.

11. The XYZ axes use different color terminals to correspond to the motor and limit switches for easy wiring.

12. User-friendly design, use different color terminals to distinguish the driving direction, reduce the

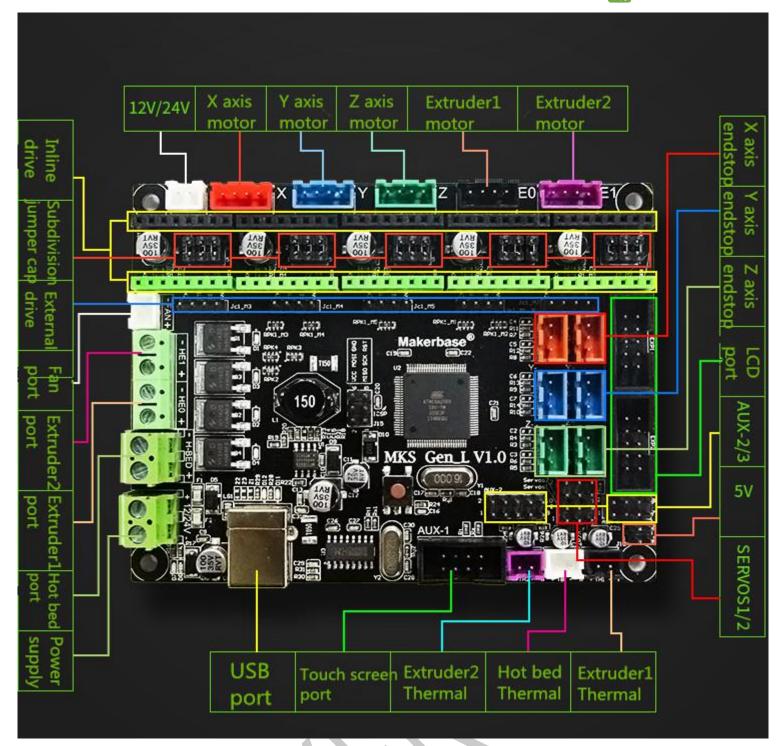
probability of insertion and reverse, and prevent the motherboard from being damaged due to the drive

insertion.

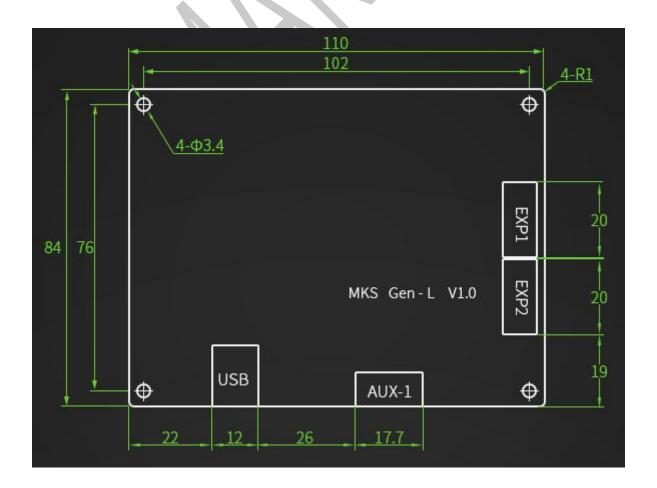
# ${\rm III}~$ The connection description and size chart

1 MKS GEN\_L motherboard product

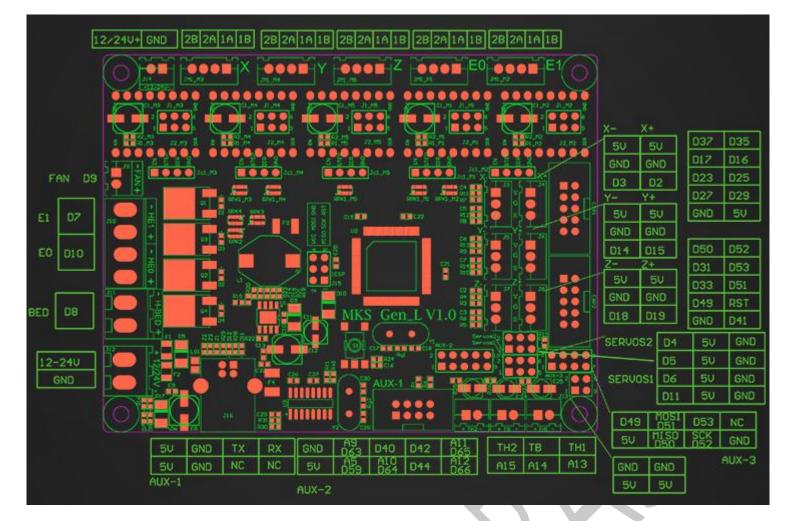




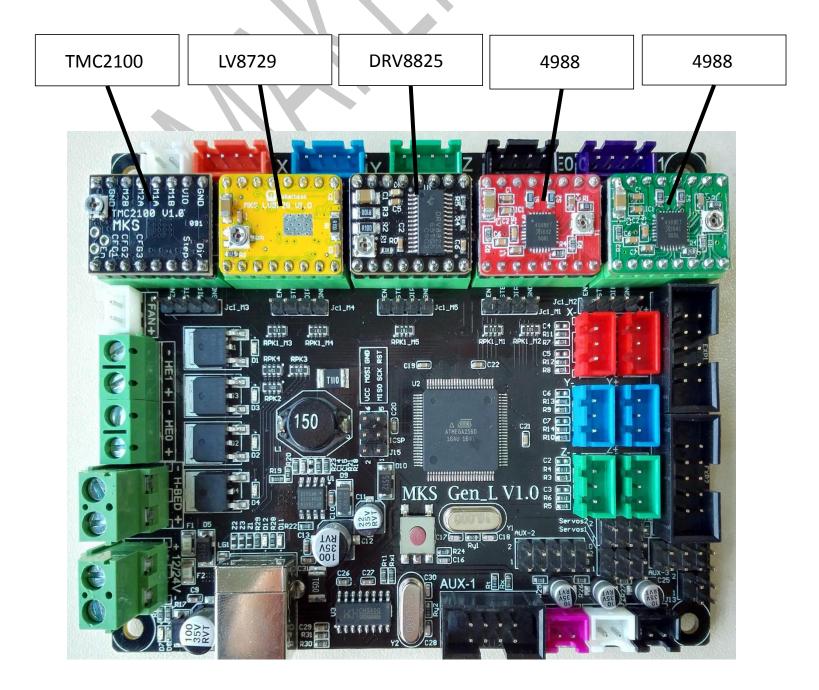
3 MKS Gen\_L Installation Dimensional Drawing



### 4 MKS GEN\_L PIN Port



5. each driver is connected to the MKS Gen-L motherboard: (attention to drive, do not plug in!!)



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Drive subdivision table: (Motherboard subdivision jumper caps are M1, M2, M3 from left to right, where jumper cap is inserted High, jumper cap is removed to Low)

498	4988Drive subdivision			8825Drive subdivision				8729Drive subdivision			
M1	M2	M3	subdivisi	M1	M2	M3	subdivisi	M1	M2	M3	subdivision
			on				on				
Low	Low	Low	Full Step	Low	Low	Low	Full Step	Low	Low	Low	Full Step
High	Low	Low	1/2 Step	High	Low	Low	1/2 Step	High	Low	Low	1/2 Step
Low	High	Low	1/4 Step	Low	High	Low	1/4 Step	Low	High	Low	1/4 Step
High	High	Low	1/8 Step	High	High	Low	1/8 Step	High	High	Low	1/8 Step
High	High	High	1/16	Low	Low	High	1/16	Low	Low	High	1/16 Step
			Step				Step				
				High	Low	High	1/32	High	Low	High	1/32 Step
							Step				
				Low	High	High	1/32	Low	High	High	1/64 Step
				V			Step				
				High	High	High	1/32	High	High	High	1/128 Step
							Step				

The TMC2100 driver chip internally uses a differential algorithm to extend the 16 subdivisions to 256 subdivisions, and the step values are calculated in 16 subdivisions.

# **IV** Instructions

- 1 The ways to get the MKS GEN-L Latest Firmware.
- Get firmware from customer service or technician
- Download the firmware from the makerbase discussion group.
- Download on Web:

https://github.com/makerbase-mks?tab=repositories

### 2 USB driver Installation

Device Driver Inst			
	all / Uninstall	Device Driver Inst	all / Uninstall
Select INF File :	CH341SER.INF ~	Select INF File :	CH341SER.INF ~
INSTALL	WCH.CN   USB-SERIAL CH340   11/04/2011, 3.3.2011.11	DriverSetup	×
UNINSTALL	[], 11/04/2011, 3.3.2011.11	The drive	is successfully Pre-installed in advance!
HELP		1	
			确定
文件(F) 操作(A) 查看(V) ■ ●   記   2 記   2 > ■ IDE ATA/ATAPI 控 > 兩 人体学输入设备 > 1 回件 > ↓ 声音、视频和游戏 > ① 处理器 > 金 存储控制器 > 二 打印队列	制器		^

## 3 Upload the marlin firmware

Start uploading the marlin firmware, open the Arduino, execute "File" "Open", select the marlin firmware to

be uploaded, and select the file with the suffix \*\*\*.pde or \*\*\*.ino to open;

查找范围(I):	🍶 Marlin	- G	+ 🖽 😢 🏂		
Ca.	名称		修改日期	类型	大 1
★ 最近使用的项目	🗋 leds.h		2018/5/2 星期三下	H 文件	
RULEMINAL	M100_Free_Mem_Chk.cpp		2018/5/2 星期三下	CPP 文件	
	📄 macros.h		2018/5/2 星期三下	H文件	
桌面	Makefile		2018/5/2 星期三下	文件	
<u>ж</u> щ	Marlin.h		2018/5/2 星期三下	H 文件	
Ta	💿 Marlin.ino		2018/5/2 星期三下…	Arduino file	
我的文档	Marlin_main.cpp		2018/5/2 星期三 下	CPP 文件	
1442/14	MarlinConfig.h		2018/5/2 星期三下	H文件	
	MarlinSerial.cpp		2018/5/2 星期三下	CPP 文件	
计算机	MarlinSerial.h		2018/5/2 星期三下	H文件	
19701	MarlinSPI.h		2018/5/2 星期三下	H文件	
6	A		1010/E/1 B#AT T		
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	对象类型(T): All Files (*.*)			•	取消

After opening, select the board type in the toolbar on the Arduino software and select the COM port of the

port.

ile Edit	Sketch Tool	ls Help		_					
20		Auto Format	Ctrl+T						
		Archive Sketch							
Marlin	Cont	Fix Encoding & Reload		ion	.h Configuration_adv.h	G26_Mesh_V	alidation_Tool.cpp	I2CPositionEncoder.cpp	12CPositionEnco
1 🖂 /**		Serial Monitor	Ctrl+Shift+M						
	arlin 31	Serial Plotter	Ctrl+Shift+L						
* 0	opyr i gh'	WiFi101 Firmware Updater							
	ased on opyright	Board: "Arduino/Genuino Mega or M	ega 2560" I		Δ				
*	opji i bit	Processor: "ATmega2560 (Mega 2560	))" I		Boards Manager				
* T	his prog	Port: "COM13"	1		Arduino AVR Boards				
* i	t under	Get Board Info			Arduino Yún				
1 * t	he Free				Arduino/Genuino Uno				
	at your	Programmer: "AVRISP mkII"	,		Arduino Duemilanove or I	Diecimila			
*		Burn Bootloader			Arduino Nano				
		is distributed in the hope that it wi		•	Arduino/Genuino Mega o	r Mega 2560			
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	ou should hav	we received a copy of the GNU General	Public License		Arduino/Genuino Micro				
* a	long with th	uis program. If not, see < <u>http://www.</u>	gnu. org/licenses/>.		Arduino Esplora				
*					Arduino Mini				
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					Arduino Pro or Pro Mini				
					Arduino NG or older				
					Arduino Robot Control				
					Arduino Robot Motor				

Arduino Robot Motor





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	Archive Sketch	
lin Con	Fix Encoding & Reload	ion.h Configuration_adv.h
/**	Serial Monitor	Ctrl+Shift+M
* Marlin 31	Serial Plotter	Ctrl+Shift+L
* Copyright	WiFi101 Firmware Updater	
* Based on		
* Copyright	Board: "Arduino/Genuino Mega or M	
*	Processor: "ATmega2560 (Mega 2560	
* This prog	Port: "COM13"	Serial ports
* it under * the Free	Get Board Info	COM13
* (at your	Programmer: "AVRISP mkII"	
*	Burn Bootloader	
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17	
18	* You should have received a copy of the GIN General Public License
19	* along with this program. If not, see < <u>http://www.gnu.org/licenses/</u> >.
20	*
21	*/

## 创客基地

After clicking upload, it will compile and download again. When downloading, you can see that the indicator light of the motherboard will flash, indicating that the firmware is being uploaded. After the firmware upload is completed, the indicator light stops flashing, and Arduino shows that the upload is successful.

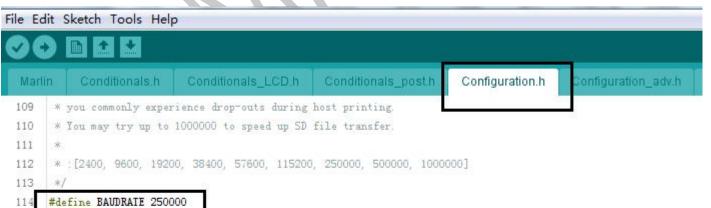


# V modify the firmware

The basic configuration of Marlin firmware is generally carried out in the configuration.h file. I need to modify it to list it in the table. Download the corresponding firmware in the group file only need to modify the sensor type, motor direction, maximum stroke, pulse. That's it.

Number	Туреѕ	explanation
1	Baud rate	The baud rate must be consistent with the host computer to
		communicate.
2	Motherboard type	The type for mks is BOARD_RAMPS_14_EFB
3	Sensor type	Sensor type for temperature detection
4	End stop switch type	Set the switch type to normally open or normally closed
5	Motor direction	Set the direction in which each motor returns to zero
6	Maximum stroke of	Set according to the size of the model itself
	each axis	
7	Pulse	Set the number of pulses per mm for each axis
8	LCD display type	The type of display used when printing offline (if the touch screen is
		defined by any one of them)

1. Select the baud rate, generally 115200 and 250,000, the baud rate should be consistent with the baud rate selected by the host computer to communicate.



115

116 // Enable the Bluetooth serial interface on AT90USB devices

117 //#define BLUETOOTH

118

- 119 // The following define selects which electronics board you have.
- 120 // Please choose the name from boards h that matches your setup

121 #ifndef MOTHERBOARD

122 #define MOTHERBOARD BOARD\_MKS\_BASE

123 #endif

124

## 2. Motherboard type, the motherboard of the maker base selects BOARD\_RAMPS\_14\_EFB.



3. The sensor type is generally NTC 100K thermistor, PT100 thermocouple, AD597 thermocouple and so on.

You can choose according to your own thermal type.

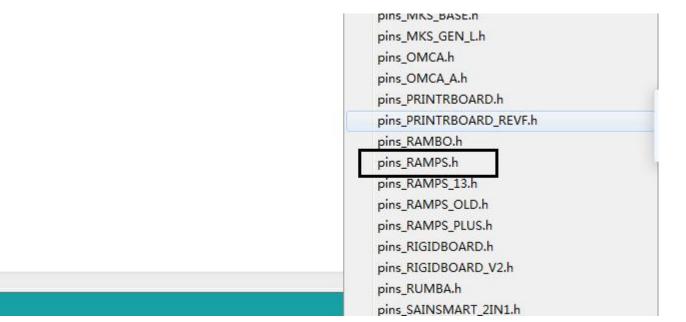
		-			
	rlin - Configuration.h   A			100 011	THE OWNER.
ile Ed	dit Sketch Tools Help	2			
0(					
Mar	lin Conditionals.h	Conditionals_LCD.h	Conditionals_post.	Configuration.h §	Configurati
286	*				
287	* :{ '0': "Not used",	'1':"100k / 4.7k - EF	COS", '2':"200k / 4.7k	a - ATC Semited 2046	I-2″, ′3′;″Me
288	*/				
289	<pre>#define TEMP_SENSOR_0</pre>	1			
290	<pre>#define TEMP_SENSOR_1</pre>	0			
291	<pre>#define IEMP_SENSOR_2</pre>	0			
292	<pre>#define TEMP_SENSOR_3</pre>	0			
293	#define TEMP_SENSOR_4	0			
294	#define TEMP_SENSOR_BI	ED 1			
295					
202		100 million - 100 - 10	ner over en	a	

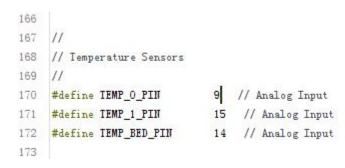
If using a PT100 thermocouple, you need to modify the PIN port to be connected in pins\_RAMPS.h, for example, the A9 pin of the MKS Gen-L motherboard. Modify as follows:

🥺 Marlin - Configuration.h   Arduino 1.8.5	 and march	in the second
File Edit Sketch Tools Help		

Marli	n Conditionals.h	Conditionals_LCD.h	Conditionals_post.h	Configuration.h §	Configuration_adv.h	G26_
286	*					
287	* :{ '0': "Not used	", '1':"100k / 4.7k - EH	PCOS", '2':"200k / 4.7k	- ATC Semitec 204GI	-2", '3':"Mendel-parts	/ 4.7k
288	*/					
289	<pre>#define TEMP_SENSOR_(</pre>	0 20				
290	<pre>#define TEMP_SENSOR_:</pre>	1 0				
291	#define TEMP_SENSOR_3	2 0				
292	#define TEMP_SENSOR_3	3 0				
293	#define TEMP_SENSOR_	4 0				
294	#define TEMP_SENSOR_D	BED 1				
295						







4. The endstop switch type is divided into normally open and normally closed. If the endstop switch is mechanical and normally open, it is "true" here. If it is photoelectric switch (normally closed), it is "false" here.

		Configuration & C		COR MARK VARIABLE TASK
Marlin Conditionals.h Conditionals_	CD.h Conditionals_post.h	Configuration.h §	Configuration_adv.h	G26_Mesh_Validation_Tool.
// Mechanical endstop with CC				
#define X_MIN_ENDSTOP_INVERTI	NG <mark>false</mark> // set to	true to invert	the logic of	the endstop.
<pre>#define Y_MIN_ENDSTOP_INVERTI</pre>	WG <mark>false</mark> // set to	true to invert	the logic of	the endstop.
#define Z_MIN_ENDSTOP_INVERTI	NG <mark>false</mark> // set to	true to invert	the logic of	the endstop.
#define X_MAX_ENDSTOP_INVERTI	WG <mark>true</mark> ,/ set to t	rue to invert	the logic of t	he endstop.
#define Y_MAX_ENDSTOP_INVERTI	WG <mark>true</mark> // set to t	rue to invert	the logic of the	he endstop.
#define Z_MAX_ENDSTOP_INVERTI	NG <mark>true</mark> ,/ set to t	rue to invert	the logic of t	he endstop.
<pre>#define Z_MIN_PROBE_ENDSTOP_I</pre>	NVERTING <mark>false</mark> // s	et to true to	invert the log	ic of the probe.

5. Motor movement direction control. Due to the different origin positions of each printer, the uncertainty

of the motor's zero return direction. If the motor moves in the opposite direction, the following parameter

values can be true or false, or the same group of stepper motors can be replaced. For example, 1A and 1B

are swapped.



## 6. The maximum stroke of each axis, which is the maximum print size of the printer

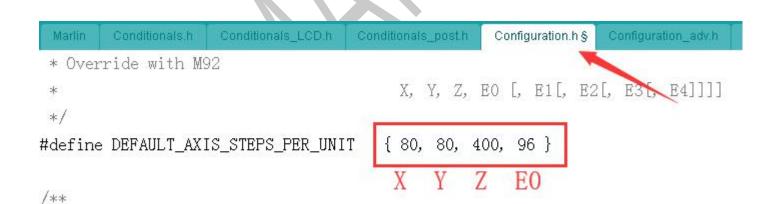


7. Set the number of pulses corresponding to each axis to move 1mm, and calculate the number of pulses for each axis motor as follows:

Formula of pulse number/mm of synchronous wheel motor: (360  $\div$  step angle)  $\times$  Subdivision  $\div$  (Diameter

×3.14)

The formula of the pulse number/mm of The screw rod Motor:  $(360 \div \text{step angle}) \times \text{Subdivision} \div \text{lead}$ 



8. The type setting of the display is also relatively easy to make mistakes, so it is recommended that you

download the firmware of the corresponding display directly in the group to make some basic modifications.

(Cannot be defined together with two LCD screen types, otherwise it will compile, but only one LCD can be

defined.

Screen type, if it is a touch screen, define any one of them)

(1) Define LCD2004 display

#### File Edit Sketch Tools Help

Mar	lin Conditionals.h	Conditionals_LCD.h	Conditionals_post.h	Configuration.h §	Configuration_a		
1466	// http://reprap.org	/wiki/RepRapDiscount Sms	art Controller		R.		
1467	11						
1468	// Note: Usually sol	d with a white PCB.					
1469	11						
14'0	#define REPRAP_DISCO	JNT_SMART_CONTROLLER					
1471							
1472	11						
1473	// GADGETS3D G3D LCD/SD Controller						
1474	// http://reprap.org	wiki/RAMPS 1.3/1.4 GADG	EIS3D Shield with Panel	<u>-</u>			
1475	11						
1.476	// Weber Wenellin and	1 13 DCD					

## (2) Define LCD12864 display

File E	dit Sketch Tools Help	17						
0								
					The second s			
Mar	and the second second second second	Conditionals_LCD.h	Conditionals_post.h	Configuration.h §	Configuration_			
1478	//#define G3D_PANEL							
1479								
1480	11							
1481								
1482	1948	<u>wiki/RepRapDiscount Ful</u>	11 Graphic Smart Control	ller				
1483	11							
1484	#define REPRAP_DISCOU	NT_FULL_GRAPHIC_SMART_C	CONTROLLER					
1485								
1486	11							
ile E	dit Sketch Tools Help	N)						
Mar	lin Conditionals.h	Conditionals_LCD.h	Conditionals_post.h	Configuration.h §	lier			
1487	// MakerLab Mini Panel	COLUMN AND ADDRESS		3				
1488		support - <u>http://reprap</u>	org/wiki/Mini nanel					
1489	11							
149	#define MINIPANEL							
149								
1492	11							
1493	// RepRapWorld REPRAPN	WORLD_KEYPAD v1.1						
1494	이 전다. 영상 전망 이 것 않는 요구가 많은 것 같은 것		Aproducts id=202&cPath=1	1591 1626				
1495	11							
1496	// REPRAPWORLD_KEYPAD	_MOVE_SIEP sets how mur	ch should the robot move	e when a key				
1497	A REAL PROPERTY AND A REAL	e of 10.0 means 10mm pe						
1498	11							

Define the type of display, just delete the "//" if you find the corresponding type.

## **VI** the main matters before loading the machine

According to the connection diagram introduced by Taobao, all the lines are connected to debug the printer and test the printing. There are a few points to note after connecting the line:

1. Never reverse the power supply, drive and fan! !!

2. The position of the endstop is to be inserted. Generally, the XYZ and I3 are connected to the minimum value, the delta is connected to the maximum value; the 2pin endstop switch is connected to the S and -, and the 3Pin limit switch is connected to the S, -, and +.

3. Must be connected to the thermal to operate, otherwise "Err: MINITEMP" will appear;

4. Before moving each axis, you must first return to zero.



# **VII** Adjust the drive current

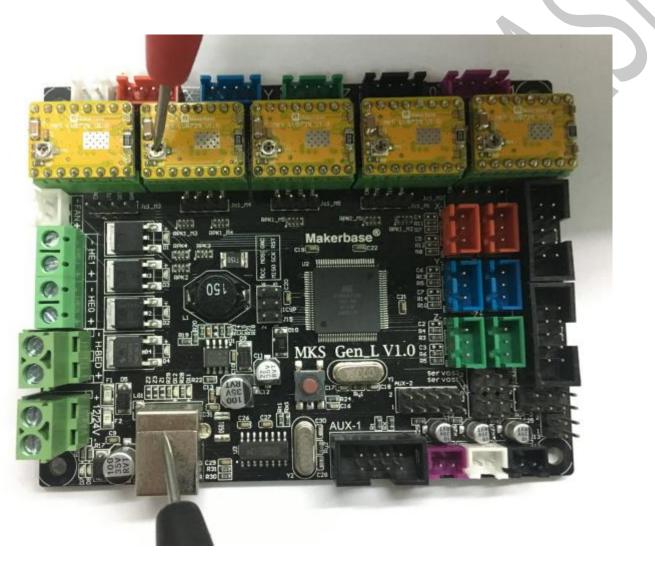
Connect the 12V power supply, measure the intermediate pin voltage of the corresponding drive potentiometer with a multimeter, and calculate the maximum load current according to the drive module;

- 1 4988 Green: Drive current algorithm: i = vref /0.8, the default Vref is about 0.8v, so the default current is
- 1.0A, the maximum current is 2.0A!
- 2 4988 red: drive current algorithm: i = vref /1.6, the default Vref is about 0.8v, so the default current is

0.5A, the maximum current is 1.0A!

3 8825: Drive current algorithm: i = vref  $\times$  2, the default Vref is about 0.65v, so the default current is 1.3A, the maximum current is 2.5A!

4 8729: Drive current algorithm: i=Vref/0.5, the default Vref is about 0.4v, so the default current is 0.8A and the maximum current is 1.5A!



Note: Please do not plug or unplug the motor when the power is on, it is easy to cause the drive to burn out;

do not adjust the current during the running of the motor. The correct way is to disconnect the power

supply, unplug the motor, re-power it, adjust the potentiometer, and test the voltage of the potentiometer

until the measured voltage is the same as expected!!!

# $\mathbb{W}$ . Technical support and protection

- 1. Power test will be done prior to shipment to ensure normal use of the product
- 2. Welcome friends to join the discussion group: 232237692.
- 3. Welcome to Blog Exchange : http://flyway97.blog.163.com.
- 4. 3D printer motherboard contact

Miss Zhong: 15521638375 Mr. Huang: 13148932315 Mr. Tan: 13640262556.

### Mr.Peng: 13427595835

5. If you have any questions you can contact our customer service or find technical

support staff in the group, we will be happy to serve you.



MKS official website



MKS Taobao website