SMD258C

User Manual

OVERVIEW

The SMD258C is a two-phase motor driver for hybrid stepper motors, supports 16 grades setting for both drive current and stepping subdivision, resolution up to 40000S/R. It is widely used in CNC equipment, sculpturing machine, cutting machine, etc.

FEATURES

- Wide range voltage input (DC 24V~80V)
- 16 grades stepping subdivision setting, resolution up to 40000S/R
- 16 grades drive current setting, adjustable between 0.5A/Phase and 5.0A/Phase
- Supports three control modes: common cathode, common anode, and differential
- Supports alerts for undervoltage, overvoltage, overheat, overcurrent
- Supports phase memory when power down
- Optical isolation for both I/O signal and input signal
- When the stepping pulse stops over 100ms, coil current will be halved automatically
- Comes with development resources and manual (examples for Raspberry Pi, STM32， Arduino)

SPECIFICATIONS

- Operating voltage: DC 24V ~ 80V
- Signal voltage: 4.2V ~ 24V
- Drive current: 0.5A ~ 5A
- Signal frequency: ≤150KHz
- Control mode: common cathode, common anode, and differential

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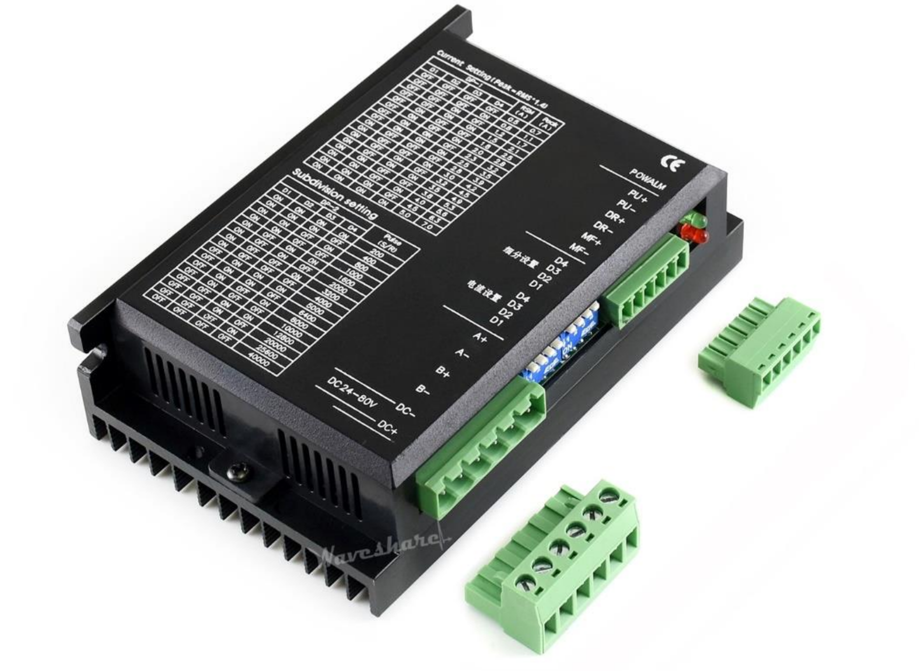
HARDWARE



PINOUT

There are two sets of sockets and DIP switches.

PIN	Description
PU+	Optical isolation positive port of pulse signals
PU-	Optical isolation negative port of pulse signals
DR+	Optical isolation positive port of direction signals
DR-	Optical isolation negative port of direction signals
MF+	Optical isolation positive port of motor-enable signals
MF-	Optical isolation negative port of motor-enable signals
A+	Positive port of stepper motor winding A
A-	Negative port of stepper motor winding A
B+	Positive port of stepper motor winding B

B-	Negative port of stepper motor winding B
DC+	24~80V Power input
DC-	Ground

PU+/PU-: Pulse signals. The width of signal should larger than 2.5us. Motor move one step for one signal

DR+/DR-: Direction signal

MF+/MF-: Motor enable signal

Connection ways:

Common Cathode: Connect PU-, DR- and MF- to GND, connect PU+, DR+ and MF+ to GPIO, high active;

Common Anode: Connect PU+, DR+ and MF+ to 5~24V, connect PU-, DR- and MF- to GPIO, low active;

Differential: Combine Command Cathode and Common Anode.

【Note】Recommend Common Cathode connection

SUBDIVISION

Support microsteppering subdivision and current subdivision.

MICROSTEPPERING SUBDIVISION

User DIP switches to control microsteppering.

REV/PULSE	D1	D2	D3	D4
200	ON	ON	ON	ON
400	ON	ON	ON	OFF

800	ON	ON	OFF	ON
1000	ON	ON	OFF	OFF
1600	ON	OFF	ON	ON
2000	ON	OFF	ON	OFF
3200	ON	OFF	OFF	ON
4000	ON	OFF	OFF	OFF
5000	OFF	ON	ON	ON
6400	OFF	ON	ON	OFF
8000	OFF	ON	OFF	ON
10000	OFF	ON	OFF	OFF
12800	OFF	OFF	ON	ON
20000	OFF	OFF	ON	OFF
25600	OFF	OFF	OFF	ON
40000	OFF	OFF	OFF	OFF

D1/D2/D3/D4 are DIP switches used to control microsteppering, support 16 level subdividing, default 200 pulse/circle.

Generally, step angle for two-phase stepper motor is 1.8 degree, so if it is set to 200, it requires 200 pulse signals for every circle. 200*1.8 = 360

【Note】You should re-power on module to take effect.

CURRENT SUBDIVISION

User DIP switches to control driving current.

Ip(A)	Im(A)	D1	D2	D3	D4
0.7	0.5	OFF	OFF	OFF	OFF
1.1	0.8	OFF	OFF	OFF	ON
1.7	1.2	OFF	OFF	ON	OFF
2.1	1.5	OFF	OFF	ON	ON
2.5	1.8	OFF	ON	OFF	OFF
2.8	2.0	OFF	ON	OFF	ON
3.2	2.3	OFF	ON	ON	OFF
3.5	2.5	OFF	ON	ON	ON
3.9	2.8	ON	OFF	OFF	OFF
4.2	3.0	ON	OFF	OFF	ON
4.5	3.2	ON	OFF	ON	OFF
4.9	3.5	ON	OFF	ON	ON
5.3	3.8	ON	ON	OFF	OFF
5.6	4.0	ON	ON	OFF	ON
6.3	4.5	ON	ON	ON	OFF
7.0	5.0	ON	ON	ON	ON

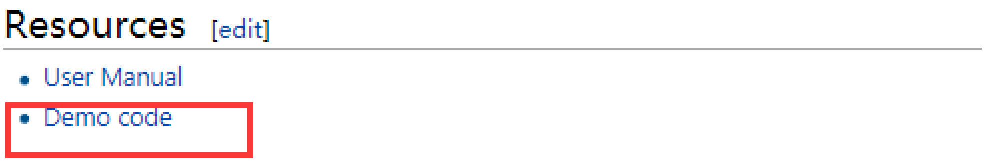
D1\D2\D3\D4 are DIP switches used to control driving current, support 16 level controlling. Larger the current, larger the torque.

【Note】You should re-power to take effect.

USE GUIDES

DOWNLOAD DEMO CODES

Please visit Waveshare Wiki, search with key words "SMD258C" . Download the demo code from wiki,



Resources [edit]

- User Manual
- Demo code

Extract it and you can get these folders:

Arduino	2018/11/26 19:18	文件夹
RaspberryPi	2018/11/24 17:27	文件夹
STM32	2018/11/26 19:18	文件夹

Arduino[1]: Demo code for Arduino UNO;

RaspberryPi: Demo codes for Raspberry Pi. (BCM2835, wiringPi and python)

STM32: Demo code for STM32, control board is STM32F103RBT6

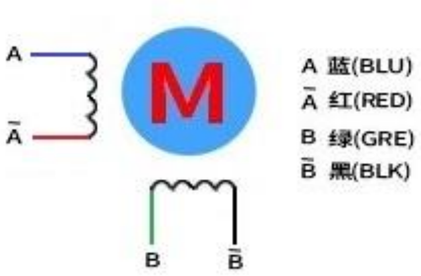
CONNECT STEPPER MOTORS

SMD258C is two-phase stepper motor driver, can drive two-phase or four-phase stepper motors.

Two-phase four lines:

Standard two-phase four lines stepper motor: blue, red, green, black. Blue line and red line are set to one set, green line and black line are one set. The corresponding pins are: A+\A-\B+\B-

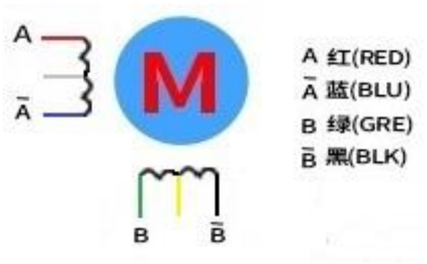
[1] If you use other Arduino board, you should check if it is compatible with Arduino Uno, or modification is required.



Two-phase six lines:

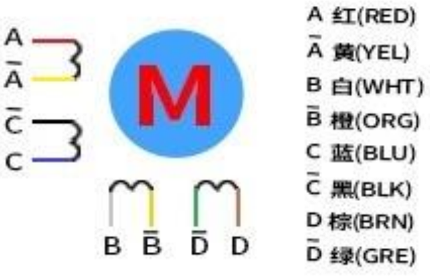
Standard two-phase six lines stepper motor: blue, red, green, black, white and yellow.

White and yellow lines are common terminals. The corresponding pins are: A+/A-/B+/B-



Four-phase eight lines:

Standard four-phase eight lines stepper motor: blue, red, yellow, black, white, blown, orange and green. There are four sets: red and yellow, blue and black, white and orange, blown and green.

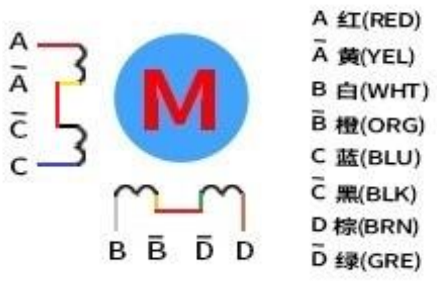


You can use two ways to connect four-phase eight lines stepper motor:

Series connection:

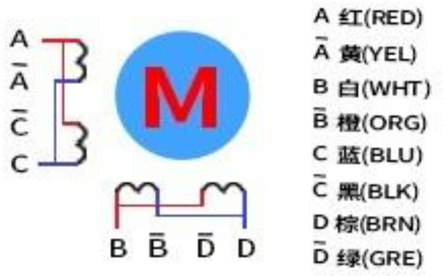
Inductance of coils turns larger, motor is stable, noise and hot reduces when in low speed.

Series connect yellow line and black line, orange line and green line, connect red line to A+ of driver board, blue line to A-. white line to B+ and blown line is connected to B- of driver board separately. Usually used for low speed situation.



Parallel connection:

Inductance of coils turns smaller, high speeding performance, high torque. However, motor requires about two times of rating current and get hot. Usually used for high speed situation.



There are also motors which have non-standard line color, in this case, you can try to detect resistance of every two lines. If resistance is detected, set these two lines to one set.

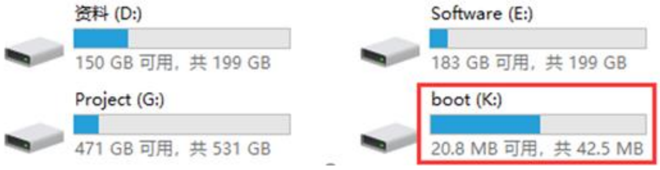
For examples, there are four lines: a, b, c, d. By detecting, we found that when detecting a and b line, it is about 1Ω, so we set a and b line to one set, c and d to one set.

Connect a and b line of motor to A+ and A- pins of driver board, c and d lines to B+ and B- pins. Run demo codes to test if motor works. If the motor cannot move, exchange B+ and B- and try again.

RASPBERRYPI EXAMPLES

COPY EXAMPLES TO RASPBERRY PI

1. Insert SD card which has Raspbian installed to your PC



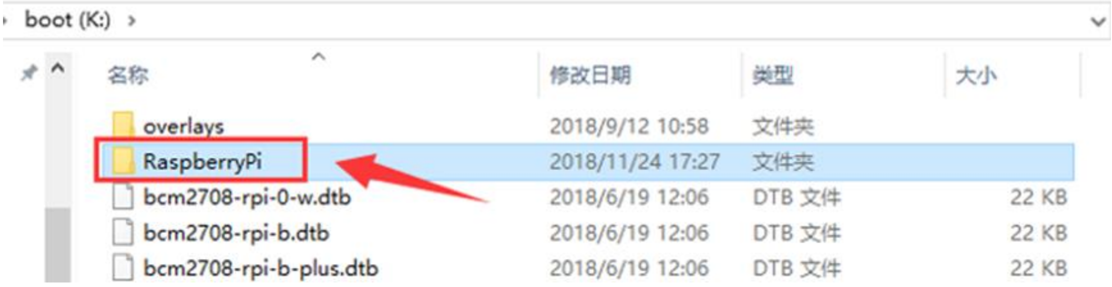
资料 (D:)
150 GB 可用，共 199 GB

Software (E:)
183 GB 可用，共 199 GB

Project (G:)
471 GB 可用，共 531 GB

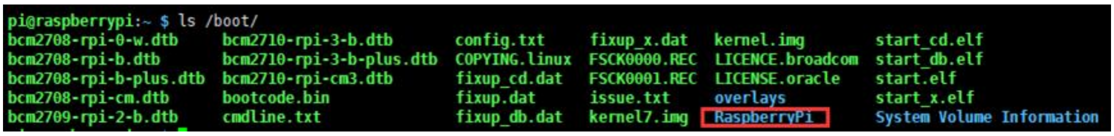
boot (K:)
20.8 MB 可用，共 42.5 MB

2. Copy RaspberryPi extracted to root directory (BOOT) of SD card



名称	修改日期	类型	大小
overlays	2018/9/12 10:58	文件夹	
RaspberryPi	2018/11/24 17:27	文件夹	
bcm2708-rpi-0-w.dtb	2018/6/19 12:06	DTB 文件	22 KB
bcm2708-rpi-b.dtb	2018/6/19 12:06	DTB 文件	22 KB
bcm2708-rpi-b-plus.dtb	2018/6/19 12:06	DTB 文件	22 KB

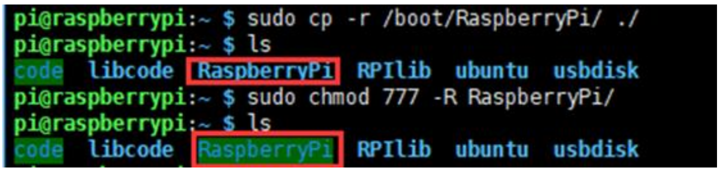
3. Power on your Raspberry Pi and open Terminal, you can find that the examples is listed in boot directory



```
pi@raspberrypi:~ $ ls /boot/
bcm2708-rpi-0-w.dtb     bcm2710-rpi-3-b.dtb       config.txt    fixup_x.dat   kernel.img        start_cd.elf
bcm2708-rpi-b.dtb       bcm2710-rpi-3-b-plus.dtb  COPYING.linux FSCK0000.REC  LICENCE.broadcom  start_db.elf
bcm2708-rpi-b-plus.dtb  bcm2710-rpi-cm3.dtb       fixup_cd.dat  FSCK0001.REC  LICENSE.oracle    start.elf
bcm2708-rpi-cm.dtb      bootcode.bin              fixup.dat     issue.txt     overlays          start_x.elf
bcm2709-rpi-2-b.dtb     cmdline.txt               fixup_db.dat  kernel7.img   RaspberryPi       System Volume Information
```

4. Copy the RaspberryPi folder to /home/pi and change its execute permission.

```
sudo cp -r /boot/RaspberryPi/ ./

sudo chmod 777 -R RaspberryPi/
```



```
pi@raspberrypi:~ $ sudo cp -r /boot/RaspberryPi/ ./
pi@raspberrypi:~ $ ls
code  libcode  RaspberryPi  RPIlib  ubuntu  usbdisk
pi@raspberrypi:~ $ sudo chmod 777 -R RaspberryPi/
pi@raspberrypi:~ $ ls
code  libcode  RaspberryPi  RPIlib  ubuntu  usbdisk
```

LIBRARIES INSTALLATION

To use demo codes, libraries should be installed first.

BCM2835 LIBRARY

Download link of the bcm2835 library: http://www.airspayce.com/mikem/bcm2835/

Download the library and copy it to raspberry pi without extracting. Open terminal of raspberry pi and install:

```
sudo tar zxvf bcm2835-1.xx.tar.gz

cd bcm2835-1.xx

sudo ./configure

make

sudo make check

sudo make install
```

Note: xx is version of the library you download. For example, if the version is bcm2835-1.52, you should complete the command to: sudo tar zxvf bcm2835-1.52.tar.gz

WIRINGPI LIBRARY

Open Terminal and install wiringPi with commands below:

```
sudo apt-get install git

sudo git clone git://git.drogon.net/wiringPi

cd wiringPi

sudo ./build
```

PYTHON LIBRARY

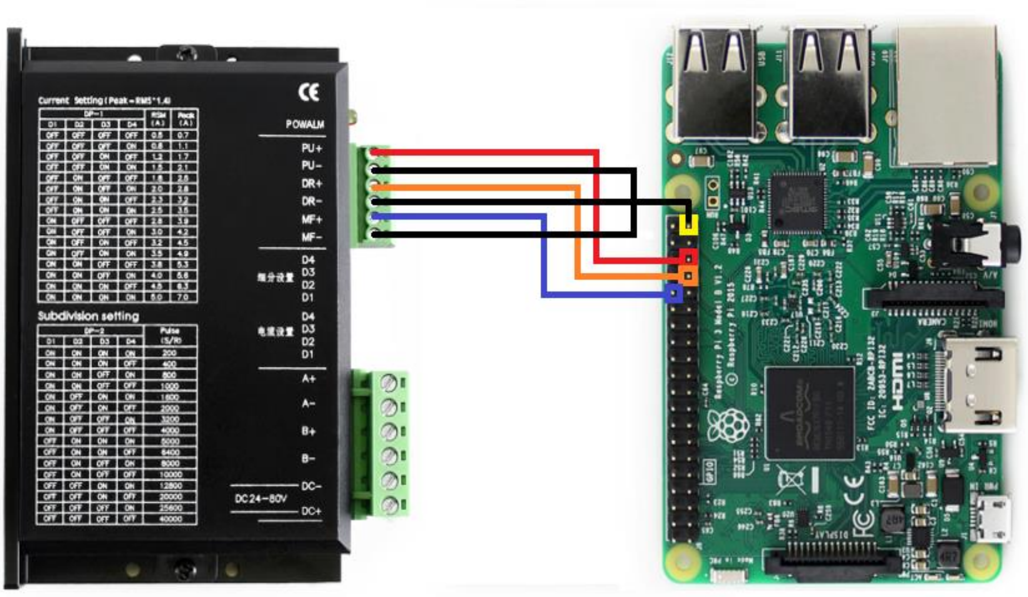
Open Terminal and execute commands to install:

```
sudo apt-get install python-pip

sudo pip install RPi.GPIO

sudo pip install spidev
```

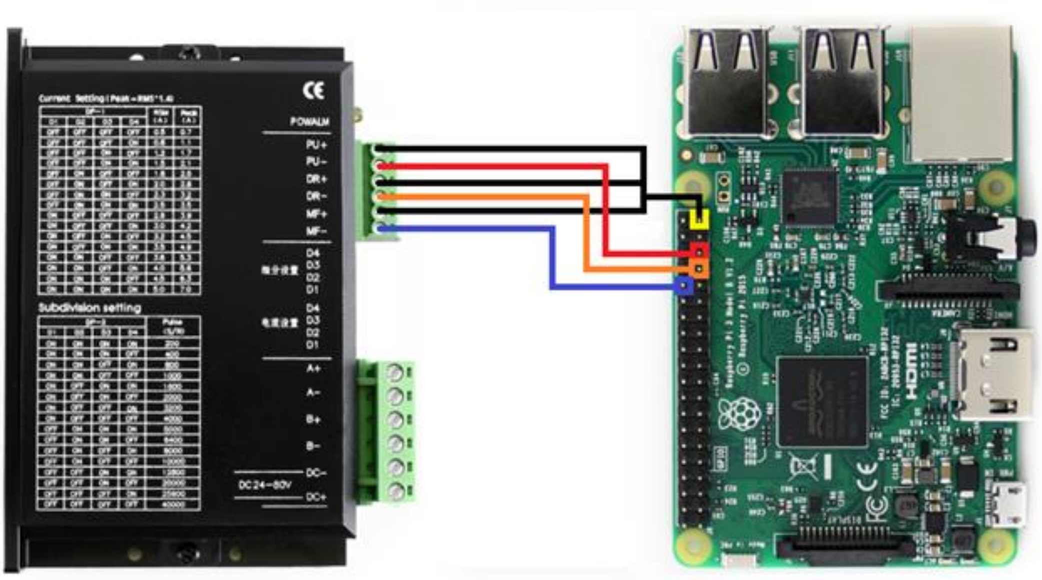
HARDWARE CONNECTION

Driver	**RaspberryPi(BCM2835)**	
	Common Cathode	**Common Anode**
PU+	19	5V
PU-	GND	19
DR+	13	5V
DR-	GND	13
MF+	12	5V
MF-	GND	12

Common Cathode



Common Anode



【Note】Common Cathode: High active; Common Anode: Low active

RUNNING DEME CODE

- BCM2835：

```
cd bcm2835

sudo ./motor
```

- wiringpi：

```
cd wiringpi
sudo ./motor
```

- python：

```
cd python
sudo python main.py
```

- Expected result:

  Motor will rotate a circle clockwise and then rotate two circles anticlockwise

STM32 EXAMPLE

The development board used is XNUCLEO-F103RB. Project is based on HAL library

Driver	**XNUCLEO-F103RB**	
	Common Cathode	**Common Anode**
PU+	PB4	5V
PU-	GND	PB4
DR+	PB10	5V
DR-	GND	PB10
MF+	PB8	5V
MF-	GND	PB8

【Note】Common Cathode: High active; Common Anode: Low active

ARDUINO EXAMPLES

Driver	Arduino UNO	
	Common Cathode	Common Anode
PU+	5	5V
PU-	GND	5
DR+	6	5V
DR-	GND	6
MF+	7	5V
MF-	GND	7

【Note】Common Cathode: High active; Common Anode: Low active

FAQ

1. Why motor and driver board get very hot?

   Energy efficiency of stepper motor is very low, has only 20%~30% useful work, others become heat. So, stepper motor will get very hot after running for long time. Do not touch!!!

2. Why doesn' t motor work and only be shaking?

   Motor shake when lack-phase, try to connect motor with Dupont lines if both interfaces of module cannot work properly

3. Why do motor desynchronize?

   The phase current is based on torsion of stepper motor. You can adjust the blue potentiometer if motor desynchronize.

4. Why do motor sound "si, si" when stopping?

   It is normal phenomenon.

5. How to use RS232 interface on board.

   The RS232 interface is used to factory configure driver board, which is unavailable for users.