Datasheet-M542H Stepper Motor Driver

1.Introduction

The M542H is an economical microstepping driver based on patented technology of Sunwind. It is suitable for driving 2-phase and 4-phase hybrid stepping motors. By using the advanced bipolar constant-current chopping technique, it can output more speed and torque from the same motor,compared with traditional drivers, such as L/R drivers. Its 3-state current control technology allows coil currents to be well controlled and with relatively small current ripple, therefore less motor heating is achieved.

2.Features

- Low cost and good high-speed torque
- Supply voltage up to +100VDC
- Output current up to 4.5A
- Pulse frequency up to 300 KHz
- 3-state current control technology
- Suitable for 2-phase and 4-phase motors
- Over-voltage and short-circuit protection
- Automatic idle-current reduction
- 16 selectable resolutions
- DIP switch current setting with 8 different values
- CW/CCW mode available (optional)
- Optically isolated input signals
- Slim size (118x75.5x33mm)

3.Applications

Applications

Suitable for a wide range of stepping motors from NEMA size 17 to 34. It can be used in various kinds of machines, such as X-Y tables, labeling machines, laser cutters, engraving machines,pick-place devices, and so on. Particularly adapt to the applications desired with low vibration,high speed and high precision.

4. Specifications and Operating Environment

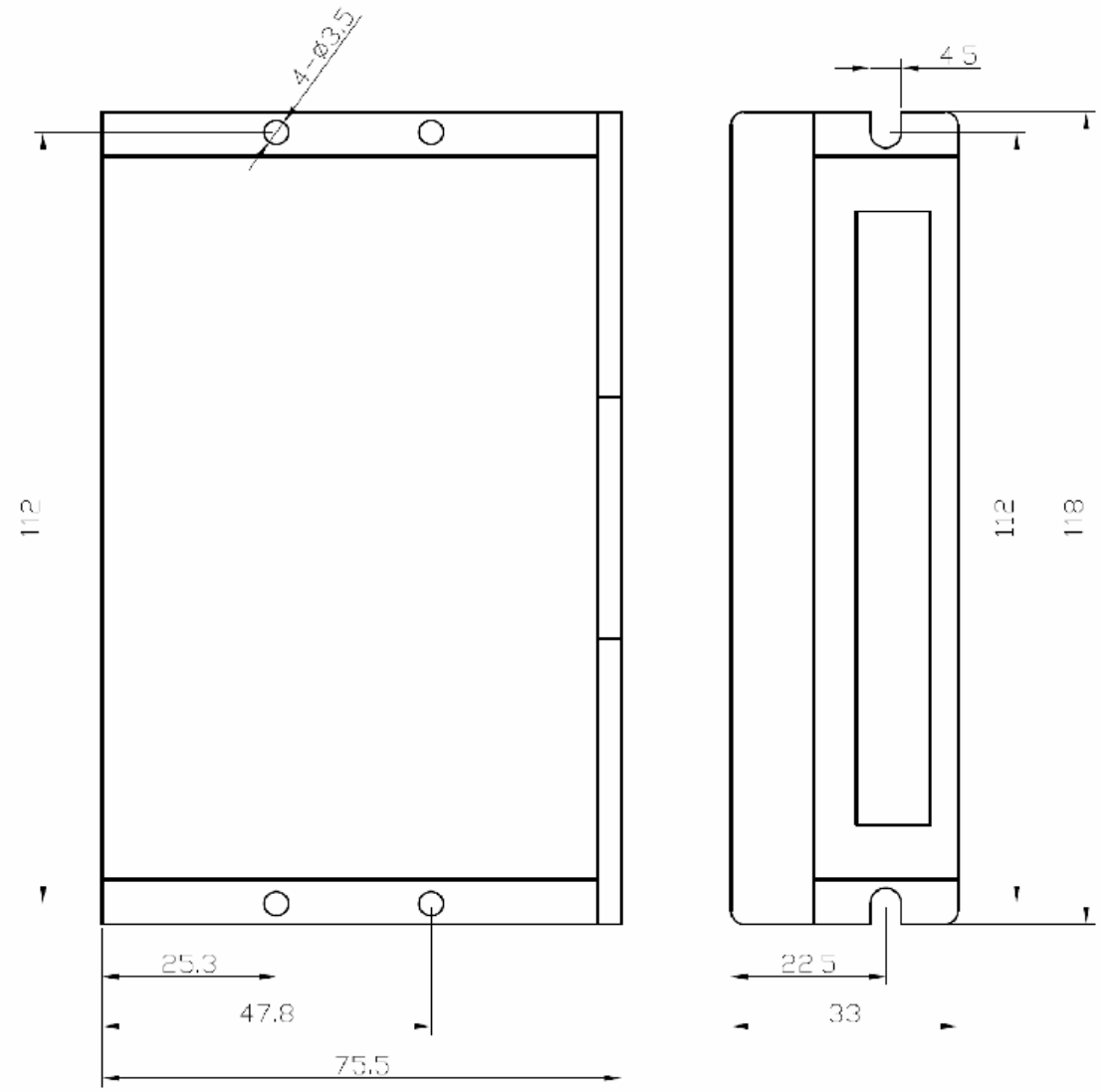
Electrical Specifications(Tj=25°C)

Parameters	DM542H			
	Min	Typical	Max	Unit
Output Current	1.00	-	5.00 (3.0 RMS)	A
Input Voltage	+20	+50	+100	VDC
Logic Signal Current	7.00	10	16	Ma
Pulse input frequency	0.00	-	300	KHz
PulseWidth	2.50	-	-	Us
Pulse Voltage	5.00	-	24	VDC
Isolation resistance	500.00			MΩ

Operating Environment and other Specifications

Cooling	Natural Cooling or Forced cooling	
Operating Environment	Environment	Avoid dust,oil fog,conosive gases
	Ambient Temperature	0℃ — 50℃
	Humidity	40%RH — 90%RH
	Operatiing Temperature	70℃ Max
	Vibration	5.9m/s2 Max
Storage Temperature	-20℃ — 65℃	
Weight	280gram(9.9oz)	

Mechanical Specifications (unit:mm, 1 inch = 25.4 mm)



Front View Side View

Figure 1: Mechanical specifications

***Recommended to use side mounting for better heat dissipation**

Elimination of Heat

Driver's reliable working temperature should be <65℃, and motor working temperature should be <80℃;

It is recommended to use automatic idle-current reduction mode, namely current automatically reduce to 60% when motor stops, so as to reduce driver heating and motor heating;

It is recommended to side mounting to maximize heat sink area.

5. Pin Assignment and Description

The M542H has two connectors, connector P1 for control signals connections, and connector P2 for power and motor connections. The following tables are brief descriptions of the two connectors of the M542H.

Connector P1 Configurations

Pin Function	Details
PUL+(+5V)	Pulse signal: In single pulse pulse/direction) mode, this input represents pulse signal, effective for each rising or falling edge (set by inside jumpers in JP1); 4-5V when PUL-HIGH, 0-0.5V when PUL-LOW. In double pulse mode (pulse/pulse) , this input represents clockwise (CW) pulse, effective for high level or low level (set by inside jumpers in JP1). For reliable response, pulse width should be longer than 1.5μ s. Series connect resistors for current-limiting when +12V or +24V used.
PUL-(PUL)	
DIR+(+5V)	DIR signal: In single-pulse mode, this signal has low/high voltage levels,representing two directions of motor rotation; in double-pulse mode (set by inside jumper J3), this signal is counter-clock (CCW) pulse, effective for high level or low level (set by inside jumper J1). For reliable motion response, DIR signal should be ahead of PUL signal by 5μ s at least. 4-5V when DIR-HIGH,0-0.5V when DIR-LOW.
DIR-(DIR)	
ENA+(+5V)	Enable signal: This signal is used for enabling/disabling the driver. High level (NPN control signal, PNP and Differential control signals are on the contrary,namely Low level for enabling.) for enabling the driver and low level for disabling the driver. Usually left UNCONNECTED (ENABLED).
ENA-(ENA)	

Single pulse and double pulses mode switch

There are two jumpers inside the M542H specifically for switch Single pulse and double pulses mode,as shown in figure 2. Default setting is Single pulse mode.

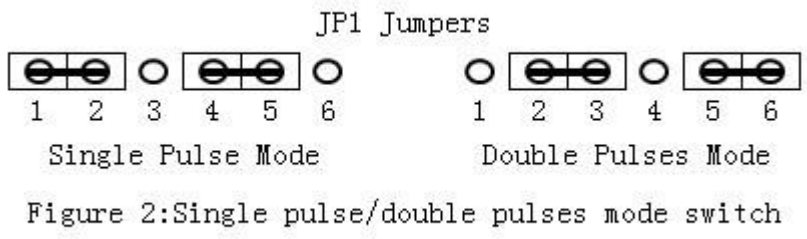


Figure 2:Single pulse/double pulses mode switch

Connector P2 Configurations

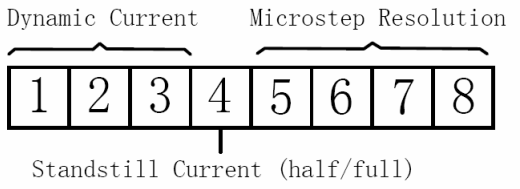
Pin Function	Details
GND	DC power ground
+V	DC power supply, 20~100VDC, Including voltage fluctuation and EMF voltage.
A+, A-	Motor Phase A
B+, B-	Motor Phase B

Control Signal Connector (P1) Interface

The M542H can accept differential and single-ended input signals (including open-collector and PNP output). The M542H has 3 optically isolated logic inputs which are located on connector P1 to accept line driver control signals. These inputs are isolated to minimize or eliminate electrical noises coupled onto the drive control signals. Recommend use line driver control signals to increase noise immunity of the driver in interference environments. In the following figures, connections to open-collector and PNP signals are illustrated.

6. Selecting Microstep Resolution and Driver Output Current

This driver uses an 8-bit DIP switch to set microstep resolution, and motor operating current, as shown below:



Microstep Resolution Selection

Microstep resolution is set by SW5, 6, 7, 8 of the DIP switch as shown in the following table:

Step Angle	Pulse/Rev	SW5	SW6	SW7	SW8
0.9	400	ON	ON	ON	ON
0.45	800	ON	OFF	ON	ON
0.225	1600	ON	ON	OFF	ON
0.1125	3200	ON	OFF	OFF	ON
0.05625	6400	ON	ON	ON	OFF
0.028125	12800	ON	OFF	ON	OFF
0.014063	25600	ON	ON	OFF	OFF
0.007031	51200	ON	OFF	OFF	OFF
0.36	1000	OFF	ON	ON	ON
0.18	2000	OFF	OFF	ON	ON
0.072	5000	OFF	ON	OFF	ON
0.036	10000	OFF	OFF	OFF	ON
0.0144	25000	OFF	ON	ON	OFF
0.0072	50000	OFF	OFF	ON	OFF

Current Settings

The first three bits (SW1, 2, 3) of the DIP switch are used to set the dynamic current. Select a setting closest to your motor's required current.

Dynamic Current Setting

Peak current (A)	RMS(A)	SW1	SW2	SW3
1.50	0.71	on	on	on
2.00	1.00	off	on	on
2.40	1.18	on	off	on
2.80	1.35	off	off	on
3.20	1.60	on	on	off
3.70	1.82	off	on	off
4.20	2.10	on	off	off
4.50	2.22	off	off	off

Notes: Due to motor inductance, the actual current in the coil may be smaller than the dynamic current setting, particularly under high speed condition.

Standstill Current Setting

SW4 is used for this purpose. OFF meaning that the standstill current is set to be half of the selected dynamic current, and ON meaning that standstill current is set to be the same as the selected dynamic current.

The current automatically reduced to 60% of the selected dynamic current one second after the last pulse.Theoretically, this will reduce motor heating to 36% (due to $P=I_2*R$) of the original value. If the application needs a different standstill current, please contact Sunwind.

Wiring Notes

In order to improve anti-interference performance of the driver, it is recommended to use twisted pair shield cable.

To prevent noise incurred in PUL/DIR signal, pulse/direction signal wires and motor wires should not be tied up together. It is better to separate them by at least 10 cm, otherwise the disturbing signals generated by motor will easily disturb pulse direction signals, causing motor position error, system instability and other failures.

If a power supply serves several drivers, separately connecting the drivers is recommended instead of daisy-chaining.

It is prohibited to pull and plug connector P2 while the driver is powered ON, because there is high current flowing through motor coils (even when motor is at standstill). Pulling or plugging connector P2 with power on will cause extremely high back-EMF voltage surge, which may damage the driver.

7. Typical Connection

A complete stepping system should include stepping motor, stepping driver, power supply and controller (pulse generator). A typical connection is shown following.

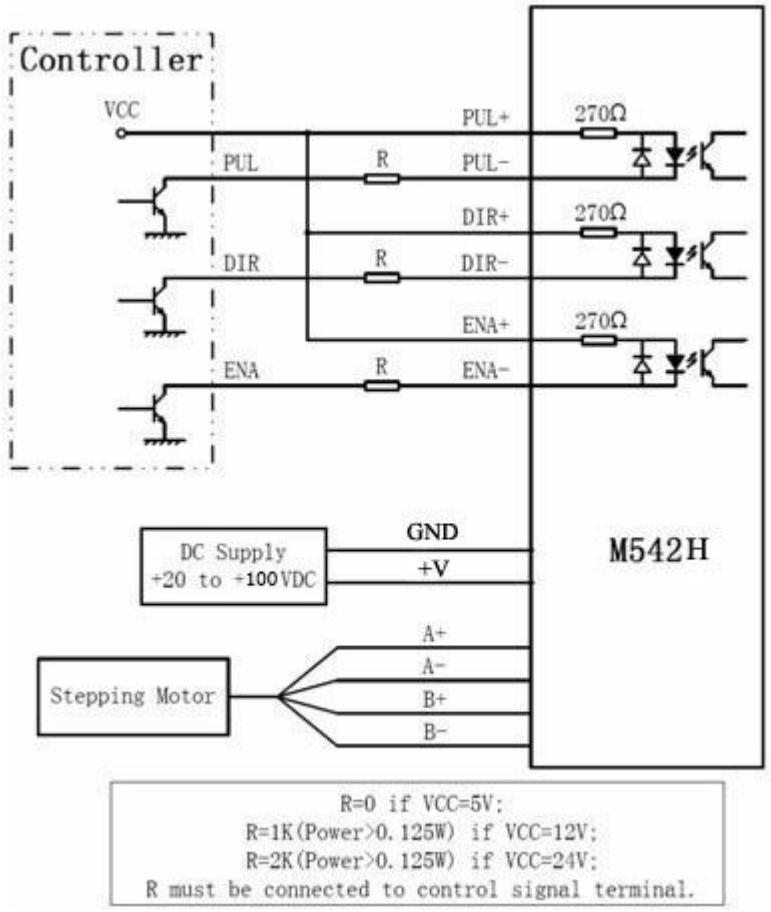


Figure 3: Typical connection

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