MD882 Microstepping Driver

1. Introduction

The MD882 is a high performance microstepping driver using pure-sinusoidal current control technology. It is particularly suitable for the applications desired with extremely low noise and low heating, compared with microstepping drivers which apply pseudo-sinusoidal current control technology. Because pseudo-sinusoidal current control technology may make the output current to be a distorted sine wave or generates larger current ripple, and both of them may cause the motor working in a higher noise, bigger vibration and higher temperature condition. If the motor works in that condition for a long time, that may decrease motor torque, accelerate motor aging and short motor's operating life. However the pseudo-sine precise current control technology applied by the MD882 can solve above problems very well and therefore the M882 can make stepping motors offer servo-like performances.

2. Features

- Pure-sinusoidal precise current control technology
- Extremely low motor noise
- Both driver and motor are low heating
- High performance, low cost
- Supply voltage up to +80VDC
- Peak current up to 8.2A (5.86A RMS)
- Optically isolated differential inputs
- Pulse frequency up to 300 KHz
- Automatic idle-current reduction
- 16 selectable resolutions
- Suitable for 2-phase and 4-phase motors
- DIP switch current setting with 8 different values
- Over-voltage and short-circuit protection
- CW/CCW and PUL/DIR mode selectable

3. 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 carving machines, laser cutters, laser phototypesetting systems, plotting instruments, NC machines, pick-place devices, and etc. It is specially adapted to extremely low noise, low vibration and high precision equipments.

4. Specifications

Electrical Specifications (T_j = 25℃)

Parameters	MD882			
	Min	Typical	Max	Unit
Output current	1.8	-	8.2 (5.86A RMS)	A
Supply voltage	24	68	80	VDC
Logic signal current	7	10	16	mA
Pulse input frequency	0	-	300	KHz
Isolation resistance	500			MΩ

Operating Environment and Other Specifications

Cooling	Natural Cooling or Forced cooling	
Operating Environment	Environment	Avoid dust, oil fog and corrosive gases
	Ambient Temperature	0℃ — 50℃
	Humidity	40%RH — 90%RH
	Operating Temperature	70℃ Max
	Vibration	5.9m/s^2 Max
Storage Temperature	-20℃ — 65℃	
Weight	Approx. 550 gram (19.5 oz)	

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

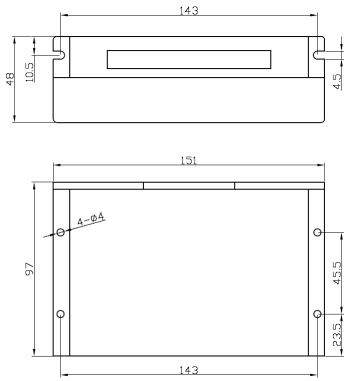


Figure 1: Mechanical dimensions

*Recommend use side mounting for better heat dissipation

5. Pin Assignment and Description

The MD882 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 MD882.

Connector P1 Configurations

Pin Function	Details
PUL+(+5V)	Pulse signal: In single pulse (pulse/direction) mode, this input represents pulse signal, active at each rising or falling edge (set by inside R13&R14); 4-5V when PUL-HIGH, 0-0.5V when PUL-LOW. In double pulse mode (pulse/pulse) , this input represents clockwise (CW) pulse，active at high level or low level (set by inside R13&R14). For reliable response, pulse width should be longer than 1.2μs. 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 R31&R32), this signal is counter-clock (CCW) pulse，active for high level or low level (set by inside R13&R14). For reliable motion response, DIR signal should be ahead of PUL signal by 5μs at least. 4-5V when DIR-HIGH, 0-0.5V when DIR-LOW. Please note that motion direction is also related to motor-driver wiring match. Exchanging the connection of two wires for a coil to the driver will reverse motion direction.
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)	

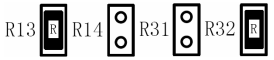
Selecting Active Edge or Active Level and Control Signal Mode

There are four resistances (R13/R14/R31/R32) inside the MD882 specifically for selecting active edge or active level and control signal mode, as shown in figure 2. Default setting is PUL/DIR mode and upward-rising edge active.

(a) R13, R32 open circuit
PUL/DIR mode and active at upward-rising edge

(b) R14, R32 open circuit
PUL/DIR mode and active at downward-falling edge

(c) R13, R31 open circuit
CW/CCW mode and active
at high level (The fixed level)



(d) R14, R31 open circuit
CW/CCW mode and active
at low level (The fixed level)

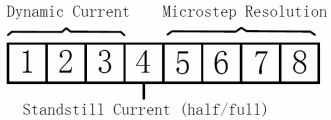
Figure 2: R13, R14, R31 and R32

Connector P2 Configurations

Pin Function	Details
GND	DC power ground
+V	DC power supply, 24~80VDC, Including voltage fluctuation and EMF voltage.
A+, A-	Motor Phase A
B+, B-	Motor Phase B

6. Selecting Microstep Resolution and Driver Output Current

The MD882 uses an 8-bit DIP switch to set microstep resolution, and motor operating current, as shown in the following figure:



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
1.80	1.29	OFF	OFF	OFF
2.70	1.93	ON	OFF	OFF
3.60	2.57	OFF	ON	OFF
4.60	3.29	ON	ON	OFF
5.50	3.93	OFF	OFF	ON
6.40	4.57	ON	OFF	ON
7.30	5.27	OFF	ON	ON
8.20	5.86	ON	ON	ON

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 be 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 Leadshine.

Microstep Resolution Selection

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

Steps/rev.(for 1.8°motor)	SW5	SW6	SW7	SW8
400	ON	ON	ON	ON
500	OFF	ON	ON	ON
600	ON	OFF	ON	ON
800	OFF	OFF	ON	ON
1000	ON	ON	OFF	ON
1200	OFF	ON	OFF	ON
1600	ON	OFF	OFF	ON
2000	OFF	OFF	OFF	ON
2400	ON	ON	ON	OFF
3200	OFF	ON	ON	OFF
4000	ON	OFF	ON	OFF
5000	OFF	OFF	ON	OFF
6000	ON	ON	OFF	OFF
6400	OFF	ON	OFF	OFF
8000	ON	OFF	OFF	OFF
10000	OFF	OFF	OFF	OFF

7. Typical Connection

A complete stepping system should include stepping motor, stepping driver, power supply and controller (pulse generator). A typical connection is shown as figure 3.

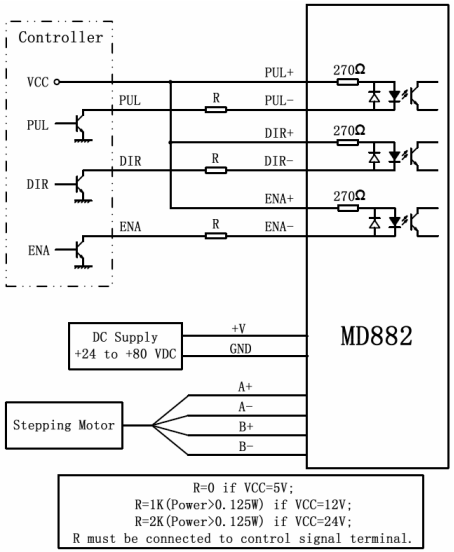


Figure 3: Typical connection