ME742 Economical Microstepping Driver

1. Introduction

The ME742 is an economical microstepping driver based on patented technology of Leadshine. 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 +70VDC
- Output current up to 4.2A
- Optically isolated input signals
- Pulse frequency up to 200 KHz
- Automatic idle-current reduction
- 3-state current control technology
- 15 selectable resolutions
- Suitable for 2-phase and 4-phas motors
- DIP switch current setting with 8 different values
- CW/CCW mode available (optional)
- Over-voltage and short-circuit protection
- Small size (118*75.5*33mm)

3. Applications

Suitable for a wide range of stepping motors from NEMA size 16 to 23. 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 ($T_j = 25℃$)

Parameters	ME742			
	Min	Typical	Max	Unit
Output current	1.0	-	4.2 (3.0A RMS)	A
Supply voltage	20	48	70	VDC
Logic signal current	7	10	16	mA
Pulse input frequency	0	-	200	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. 280 gram (9.9 oz)	

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

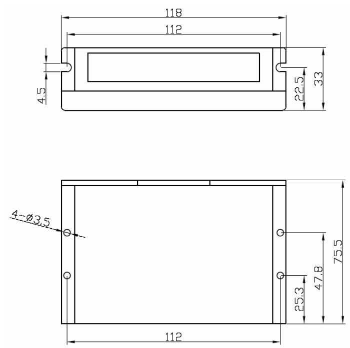


Figure 1: Mechanical specifications

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

5. Pin Assignment and Description

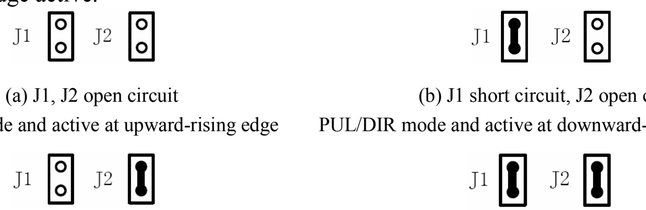
The ME742 has two connectors, connector P1 for control signals connections, and connector P2 for power and motor connections. The following tables are brief descriptions of the two connectors of the ME742.

Connector P1 Configurations

Pin Function	Details
PUL+(+5V)	Pulse signal: In single pulse (pulse/direction) mode, this input represents pulse signal, active for each rising or falling edge (set by inside jumper J1); 4-5V when PUL-HIGH, 0-0.5V when PUL-LOW. In double pulse mode (pulse/pulse) , this input represents clockwise (CW) pulse，active for high level or low level (set by inside jumper J1). For reliable response, pulse width should be longer than 2.5μs. 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 J2), this signal is counter-clock (CCW) pulse，active for high level or low level (set by inside jumper J1). 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.
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 two jumpers J1 and J2 inside the ME742 specifically for selecting active pulse 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) J1, J2 open circuit
PUL/DIR mode and active at upward-rising edge

(b) J1 short circuit, J2 open circuit
PUL/DIR mode and active at downward-falling edge

(c)J1 open circuit, J2 short circuit
CW/CCW mode and active
at high level (The fixed level)

(d) J1, J2short circuit
CW/CCW mode and active
at low level (The fixed level)

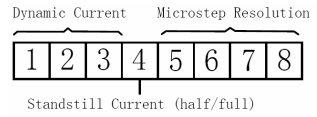
Figure 2: J1 and J2 jumpers

Connector P2 Configurations

Pin Function	Details
Gnd	DC power ground
+V	DC power supply, 20~70VDC, Including voltage fluctuation and EMF voltage.
A+, A-	Motor Phase A
B+,B-	Motor Phase B

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:

Microstep	Steps/rev.(for 1.8°motor)	SW5	SW6	SW7	SW8
2	400	OFF	ON	ON	ON
4	800	ON	OFF	ON	ON
8	1600	OFF	OFF	ON	ON
16	3200	ON	ON	OFF	ON
32	6400	OFF	ON	OFF	ON
64	12800	ON	OFF	OFF	ON
128	25600	OFF	OFF	OFF	ON
5	1000	ON	ON	ON	OFF
10	2000	OFF	ON	ON	OFF
20	4000	ON	OFF	ON	OFF
25	5000	OFF	OFF	ON	OFF
40	8000	ON	ON	OFF	OFF
50	10000	OFF	ON	OFF	OFF
100	20000	ON	OFF	OFF	OFF
125	25000	OFF	OFF	OFF	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
1.00A	0.71A	ON	ON	ON
1.46A	1.04A	OFF	ON	ON
1.91A	1.36A	ON	OFF	ON
2.37A	1.69A	OFF	OFF	ON
2.84A	2.03A	ON	ON	OFF
3.31A	2.36A	OFF	ON	OFF
3.76A	2.69A	ON	OFF	OFF
4.20A	3.00A	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 0.4 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.

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.

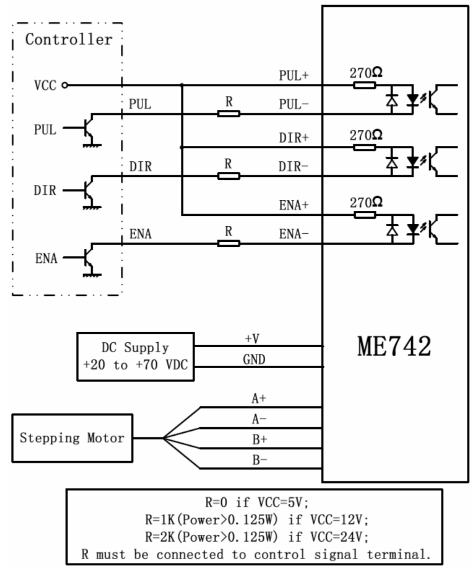


Figure 3: Typical connection