

MSD556 Microstepping Drive

Introduction

The MSD556-V2.0 is a high performance, microstepping drive using pure-sinusoidal current control technology. Compared with other microstepping drives which use pseudo-sinusoidal current control technology, it exhibits extremely low motor noise combined with low heating in both the motor and drive.

Pseudo-sinusoidal current control technology can distort output current and generate larger current ripple – resulting in higher noise, increased vibration and higher running temperature. Operation in that condition for longer periods can decrease motor torque and motor life. However the pure-sinusoidal current control technology utilised by the MSD556-V2.0 greatly reduces such problems - allowing stepper motors to provide servo-like performance. The MSD556-V2.0 offers an even better performance/price ratio than its predecessor alongside these technical application benefits.



Features

- Pure-sinusoidal precise current control technology
- Extremely low motor noise
- Both drive and motor are low heating
- Supply voltage up to +50VDC and Peak current up to 5.6A (4.0A RMS)
- Optically isolated differential inputs
- Pulse frequency up to 400 KHz
- Automatic idle-current reduction
- 15 selectable resolutions in decimal and binary
- Suitable for 2-phase and 4-phase motors
- DIP switch current setting with 8 different values
- Over-voltage and short-circuit protection
- Small size (118x75.5x34mm)

Applications

It is suitable for a wide range of stepping motors of NEMA 17 and 34 and can be used for various kinds of machines, such as carving machines, laser cutters, laser phototypesetting systems, plotting instruments, CNC machines, pick-place devices and so forth. It is particularly useful for the applications where low vibration, high speed and high precision are desired.

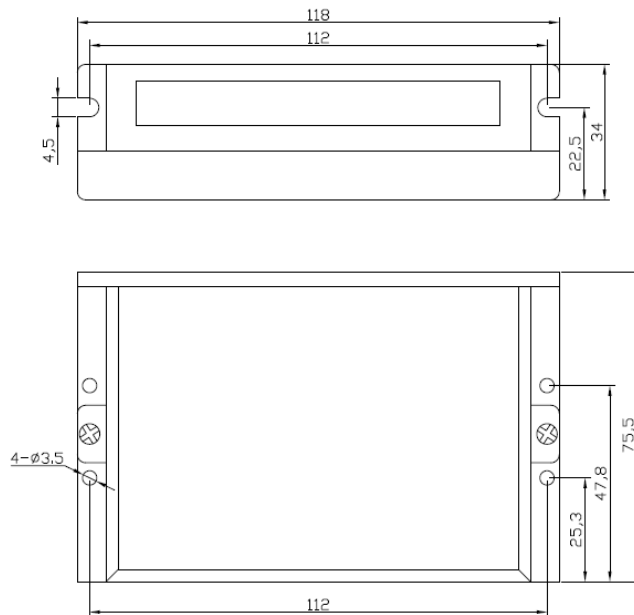
Electronic Specification (T_j = 25°C/77°F)

Parameters	MSD556-V2.0			
	Unit	Min	Typical	Max
Output Current	Amps	1.4	-	5.6
Supply voltage (DC)	VDC	+20	+36	+50
Logic signal current	mA	7	10	16
Pulse input frequency	KHz	0	-	400
Isolation resistance	MΩ	500	-	-

Operating Environment and Other Specifications

Cooling	Natural Cooling or Forced cooling	
Operating Environment	<i>Environment</i>	Avoid dust, oil fog and corrosive gases
	<i>Ambient Temperature</i>	0°C ~ 50°C
	<i>Humidity</i>	40%RH—90%RH
	<i>Operational Temperature</i>	70 °C Max.
	<i>Vibration</i>	5.9m/s ² Max
Storage Temperature	-20°C ~ 65°C	
Weight	Approx. 280g (10oz)	

Mechanical Specifications (in mm, 1 inch = 25.4 mm)



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

Pin Assignment and Description

The MSD556-V2.0 stepper drive 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 on MSD556 stepper drive. For more details, please refer to our **MSD556-V2.0 Stepper Drive Manual Version 1.0**

Connector P1 configurations

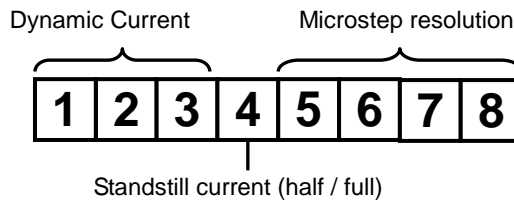
Pin Function	Details
PUL + (+5V)	Pulse signal: This input represents pulse signal, effective for each rising edge; 4-5V when PUL-HIGH, 0-0.5V when PUL-LOW. For reliable response, pulse width should be longer than 1.2 μ s. Series connect resistors for current-limiting when +12V or +24V used.
PUL- (PUL)	
DIR+ (+5V)	Direction signal: HIGH/LOW level signal, correlative to motor rotation direction. For reliable response, DIR must be ahead of PUL by 5 μ s at least. 4-5V when DIR- HIGH, 0-0.5V when DIR-LOW. Please note that motor rotation direction also depends upon the connection of the motor windings, exchange any motor phase can reverse motor rotation direction.
DIR- (DIR)	
ENA+ (+5V)	Enable signal: This signal is used for enabling/disabling the drive. High level (NPN control signal, PNP and Differential control signals are on the contrary, namely Low level for enabling,) for enabling the drive and low level for disabling the drive. Usually left UNCONNECTED (ENABLED) .
ENA- (ENA)	

Connector P2 Configurations

Signal	Functions
GND	DC Power ground
+V	DC power supply +20VDC ~ +50VDC, including voltage fluctuation and EMF voltage.
A+, A-	Motor Phase A
B+, B-	Motor Phase B

Setting Drive Output Current and Microstep Resolution

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



Current Setting

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
1.4	1.0	OFF	OFF	OFF
2.1	1.5	ON	OFF	OFF
2.7	1.9	OFF	ON	OFF
3.2	2.3	ON	ON	OFF
3.8	2.7	OFF	OFF	ON
4.3	3.1	ON	OFF	ON
4.9	3.5	OFF	ON	ON
5.6	4.0	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

SW4 is used for standstill current setting. **OFF** means the standstill current is set to be half of the selected dynamic current and **ON** means standstill current is set to be the same as the selected dynamic current.

The standstill current of MSD556-V2.0 will be automatically reduced to 60% of the selected dynamic current setting 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 Motion Control Products Ltd for more advice.

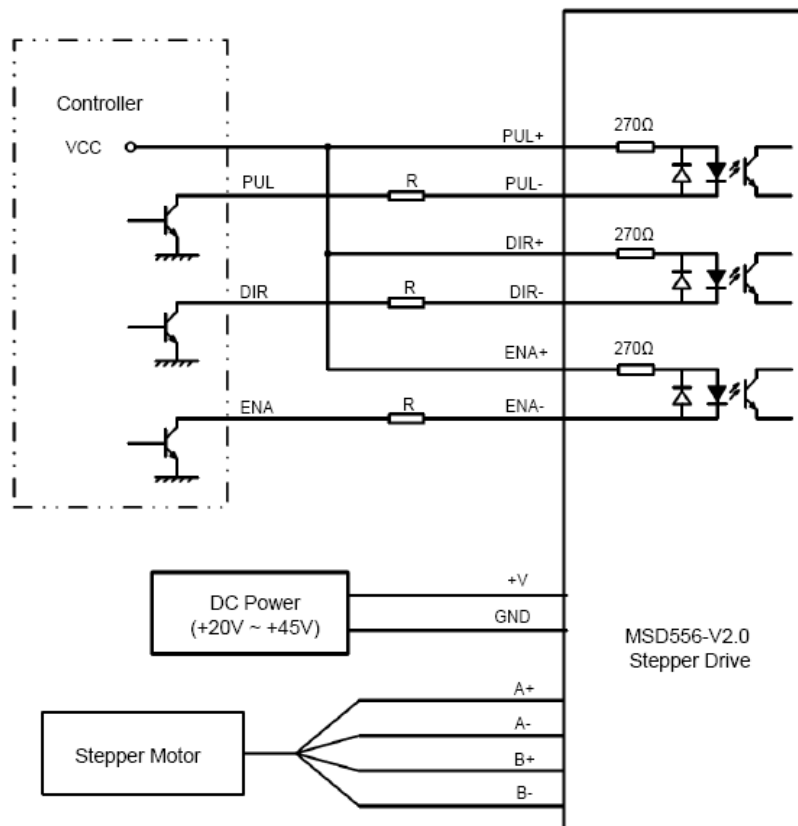
Microstep Resolution Selection

Microstep resolution is set by SW5, SW6, SW7 and SW8 of the DIP switch as shown in the following table:

Microsteps/Full Step	Microsteps/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

Typical Connections

A complete stepper system should include stepper motor, stepper drive, power supply and controller (pulse generator). The following figure is the typical connections of MSD556-V2.0 stepper drive.



R=0 if VCC=5V;
 R=1K (Power > 0.125W) if VCC=12V;
 R=2K (Power > 0.125W) if VCC=24V;
 R must be connected to control signal terminal.