

User's Manual

For

2MA2278

High Performance Microstepping Driver

Version 1.0

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Attention: Please read this manual carefully before using the driver!



Easy Commercial Global Technology Co., LTD

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1. Introduction, Features and Applications

Introduction

The 2MA2278 is a high performance and low noise microstepping driver based on pure-sinusoidal current control technology. It's suitable for driving 2-phase and 4-phase hybrid stepping motors. By using advanced bipolar constant-current chopping technique, the 2MA2278 can output more torque than other drivers at high speed. The microstep capability allows stepping motors to run at higher smoothness, less vibration and lower noise. Its pure-sinusoidal current control technology allows coil current to be well controlled with relatively small current ripple, therefore smaller motor noise and less motor heating can be achieved.

Features

- High quality, cost-effective
- Low motor & driver heating
- Supply voltage from “80V AC to 240V(peak) AC” or “110V DC to 350V(peak) DC”
- Output current from 0.45A (0.32A AVG) to 7.8A (5.57A AVG)
- TTL compatible and opto-isolated inputs
- Automatic idle-current reduction
- Input frequency up to 400 KHz
- 16 microstep resolutions selectable
- Suitable for 2-phase and 4-phase stepping motors
- DIP switch microstep & current settings
- Support PUL/DIR & CW/CCW modes

Applications

Suitable for large and medium automation machines and equipments, such as engraving machines, labeling machines, cutting machines, laser phototypesetting systems, plotting instruments, CNC machines, pick-place devices, and so on. Particularly adapt to the applications desired with low noise, low vibration, high speed and high precision.

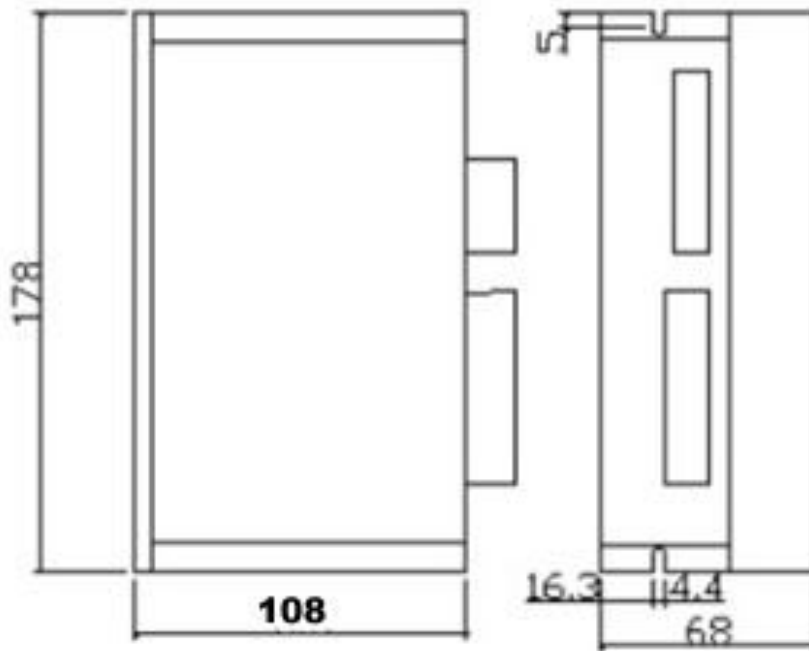
2. Specifications

Electrical Specifications ($T_j = 25^\circ\text{C}/77^\circ\text{F}$)

Parameters	NC-2MA2278			
	Min	Typical	Max	Unit
Output current	0.45(0.32A avg)	-	7.8(5.57A avg)	A
Supply voltage	80	180	220	VAC
Logic signal current	7	10	16	mA
Pulse input frequency	0	-	400	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 °C — 50°C (32°F — 122°F)
	Humidity	40%RH — 90%RH
	Operating Temperature	70°C (158°F) Max
	Vibration	5.9m/s ² Max
Storage Temperature	-20 °C — 65°C (-4°F — 149°F)	
Weight	Approx. 1000g	

Mechanical Specifications (unit: mm)**Figure 1: Mechanical specifications**

*Recommend use side mounting for better heat dissipation **Elimination of Heat**

- Driver's reliable working temperature should be $<70^{\circ}\text{C}$ (158°F), and motor working temperature should be $<80^{\circ}\text{C}$ (176°F);
- It is recommended to use automatic idle-current mode, namely current automatically reduce to 60% when motor stops, so as to reduce driver heating and motor heating;
- It is recommended to mount the driver vertically to maximize heat sink area. Use forced cooling method to cool the system if necessary.

3. Pin Assignment and Description

The 2MA2278 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 2MA2278.

Connector P1 Configurations

Pin Function	Details
PUL+	Pulse signal: In single pulse (pulse/direction) mode, this input represents pulse signal; 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 jumper J1 & J2). For reliable response, pulse width should be longer than 1.5 μ s. Series connect resistors for current-limiting when +12V or +24V used. The same as DIR and ENA signals.
PUL-	
DIR+	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 J1 & J2), this signal is counter-clock (CCW) pulse. For reliable motion response, DIR signal should be ahead of PUL signal by 5 μ s 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-	
ENA+	Enable signal: This signal is used for enabling/disabling the driver. High level (NPN control signal, PNP and

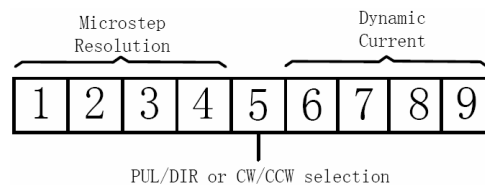
ENA-	Differential control signals are on the contrary, namely Low level for enabling.) for enabling the driver and low level for disabling the driver. Usually left UNCONNECTED (ENABLED)
READY+	Alarm signal positive: READY+ is an opto-coupler output from open-collector circuit, maximum permitted input voltage is 30VDC; maximum output current 20mA. It generally can be serial connected to PLC input terminal.
READY-	Alarm signal negative.

Connector P2 Configurations

Pin Function	Details
AC	AC power supply inputs. Recommend use isolation transformers with theoretical output voltage of 80~180
AC	VAC, leaving room for power fluctuation and back-EMF.
A+, A-	Motor Phase A
B+, B-	Motor Phase B
PE	Ground terminal. Recommend connect this port to the ground for better safety.

4. Selecting Microstep Resolution and Driver Output Current

This driver uses a 9-bit DIP switch to set microstep resolution, motor operating current and control signal mode as shown in the following figure:



Notes: SW5 ON means CW/CCW (pulse/pulse) mode, and SW5 OFF means PUL/DIR mode

Microstep Resolution Selection

Microstep resolution is set by SW1, 2, 3, 4 of the DIP switch as shown in the following table:

Microstep	Steps/rev.(for1.8° motor)	SW1	SW2	SW3	SW4
2	400	ON	ON	ON	ON
2.5	500	OFF	ON	ON	ON
3	600	ON	OFF	ON	ON
4	800	OFF	OFF	ON	ON
5	1000	ON	ON	OFF	ON
6	1200	OFF	ON	OFF	ON
8	1600	ON	OFF	OFF	ON
10	2000	OFF	OFF	OFF	ON
12	2400	ON	ON	ON	OFF
16	3200	OFF	ON	ON	OFF
20	4000	ON	OFF	ON	OFF
25	5000	OFF	OFF	ON	OFF
30	6000	ON	ON	OFF	OFF
32	6400	OFF	ON	OFF	OFF
40	8000	ON	OFF	OFF	OFF
50	10000	OFF	OFF	OFF	OFF

Current Settings

The latter four bits (SW6, 7, 8, 9) 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)	SW6	SW7	SW8	SW9
0.45	0.32	OFF	OFF	OFF	OFF
0.63	0.45	OFF	OFF	OFF	ON
1.41	1.00	OFF	OFF	ON	OFF
1.88	1.34	OFF	OFF	ON	ON
2.33	1.66	OFF	ON	OFF	OFF
2.85	2.04	OFF	ON	OFF	ON
3.23	2.31	OFF	ON	ON	OFF
3.75	2.68	OFF	ON	ON	ON
4.26	3.04	ON	OFF	OFF	OFF
4.65	3.32	ON	OFF	OFF	ON
5.18	3.70	ON	OFF	ON	OFF
5.55	3.96	ON	OFF	ON	ON
6.15	4.39	ON	ON	OFF	OFF
6.60	4.71	ON	ON	OFF	ON
7.20	5.14	ON	ON	ON	OFF
7.80	5.57	ON	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

The NC-2MA2278 has automatic idle-current reduction function. The current automatically be reduced to 60% of the selected dynamic current setting 0.2 second after the last pulse. Theoretically, this will reduce motor heating to 36% (due to $P=I_2^2R$) of the original value. If the application needs a different standstill current, please contact with us.

Control Signal Mode Setting

SW5 is used for this purpose. SW5 ON means CW/CCW (pulse/pulse) mode, and SW5 OFF means PUL/DIR mode.

5. 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 2.

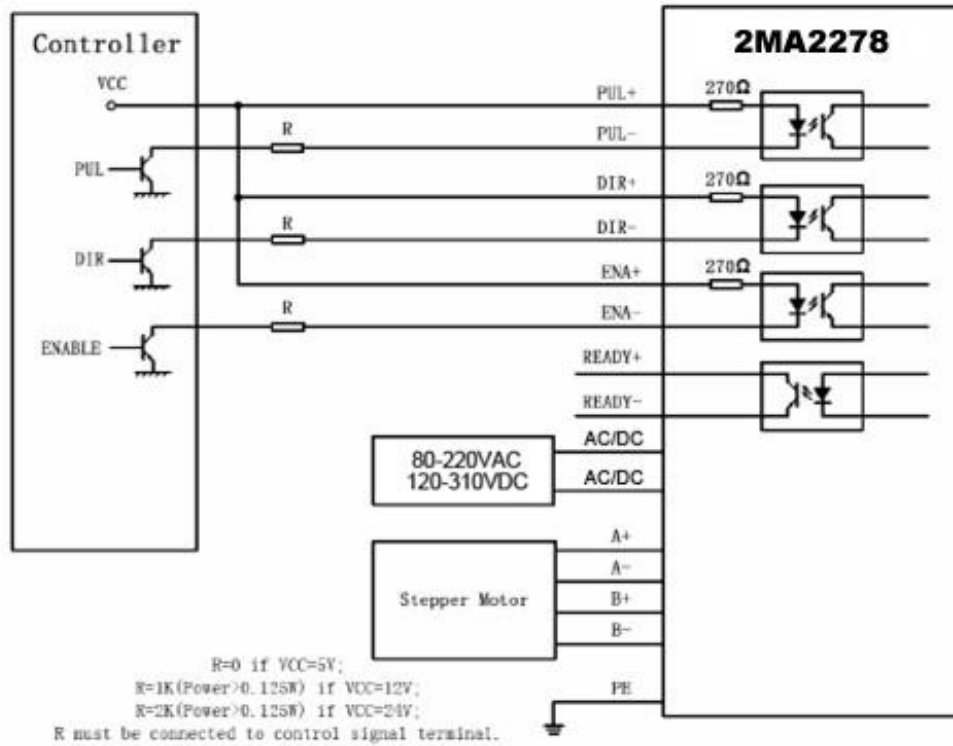


Figure 2: Typical connection