

EMD4988M Micro Stepper Motor Driver

1 Features

- 8-35V Motor Power Supply
- 2A Output Current
- Three optocouplers isolated for input signals – STEP, DIRECTION, DISABLE
- Based on driver chip A4988
- Polarity protection circuit
- Thermal Shutdown
- Overcurrent Protection
- Undervoltage Lockout
- Mountable on DIN-rail PCB holder
- PCB dimensions: 42.50 x 72.50 mm

The EMD4988M is a micro stepper motor driver. It is designed around the chip A4988. It features up to 2A of motor current and operating voltage range 8-35V of motor. The board has three input signals STEP, DIRECTION and DISABLE. The three input signals are electrically isolated from the driver chip using optocouplers. The board is designed to be mountable on a DIN-rail PCB holder.

2 Diagram

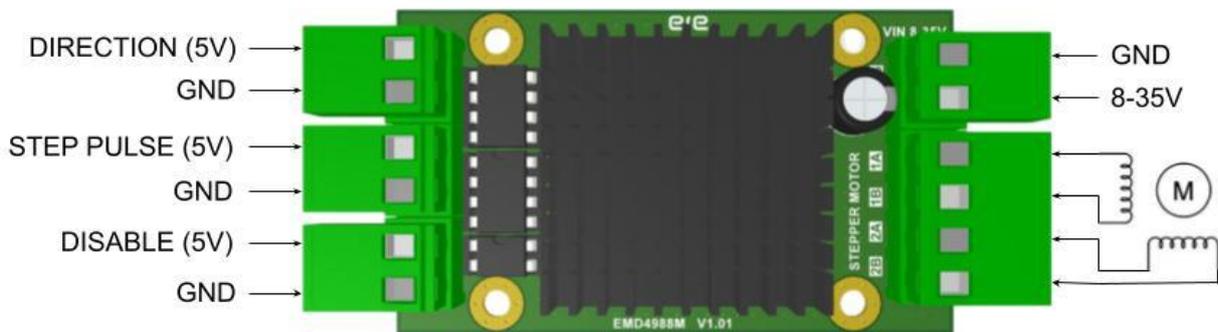


Figure 1: Diagram (TOP)

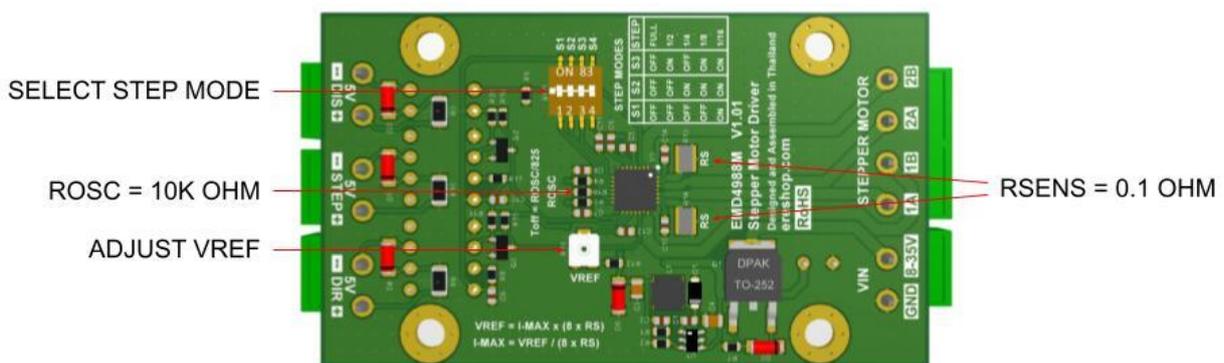


Figure 2: Diagram (BOTTOM)

3 Fixed Off-Time

The internal PWM current control circuit of A4988 uses tOFF time to keep DMOS FETs turned off. The board sets this Fixed Off-Time through a fixed value external resistor, called ROSC. On this board, the ROSC resistor has a value of this board is 10K. The tOFF time is determined by the following formula.

$$tOFF = ROSC/825 \text{ (unit in micro-seconds)}$$

$$tOFF = 10K / 825$$

$$tOFF = 12\mu s$$

The decay mode is Mixed for all step modes except full step which is set to slow decay mode. For more details about the decay mode, see the A4988's data sheet.

4 Step Modes

SWITCH1	SWITCH2	SWITCH3	SWITCH4	STEP MODES
OFF	OFF	OFF	Don't care	Full Step
OFF	OFF	ON	Don't care	Half Step (1/2)
OFF	ON	OFF	Don't care	Quarter Step (1/4)
OFF	ON	ON	Don't care	Eighth Step (1/8)
ON	ON	ON	Don't care	Sixteenth Step (1/16)

Figure 3: Step modes

5 Current Limit Adjustment

The maximum value of current limit is adjusted using VREF (a variable resistor). The relationship between the maximum current limit and VREF is

$$I_{max} = VREF / (8 * RS)$$

$$VREF = I_{max} * (8 * RS)$$

Where RS = 0.1 Ohm

In practice, the maximum value of current limit should be set at about 90-95% of 2A

Example1. The 95% of 2A is 1.9A, so VREF should be

$$VREF = 1.9 * (8 * 0.1)$$

$$VREF = 1.52V$$

Example2. For small stepper motor needs current about 1A

$$VREF = 1 * (8 * 0.1)$$

$$VREF = 0.8V$$

*Use a multimeter to measure the VREF voltage and adjust it with a screwdriver.

7 Dimensions

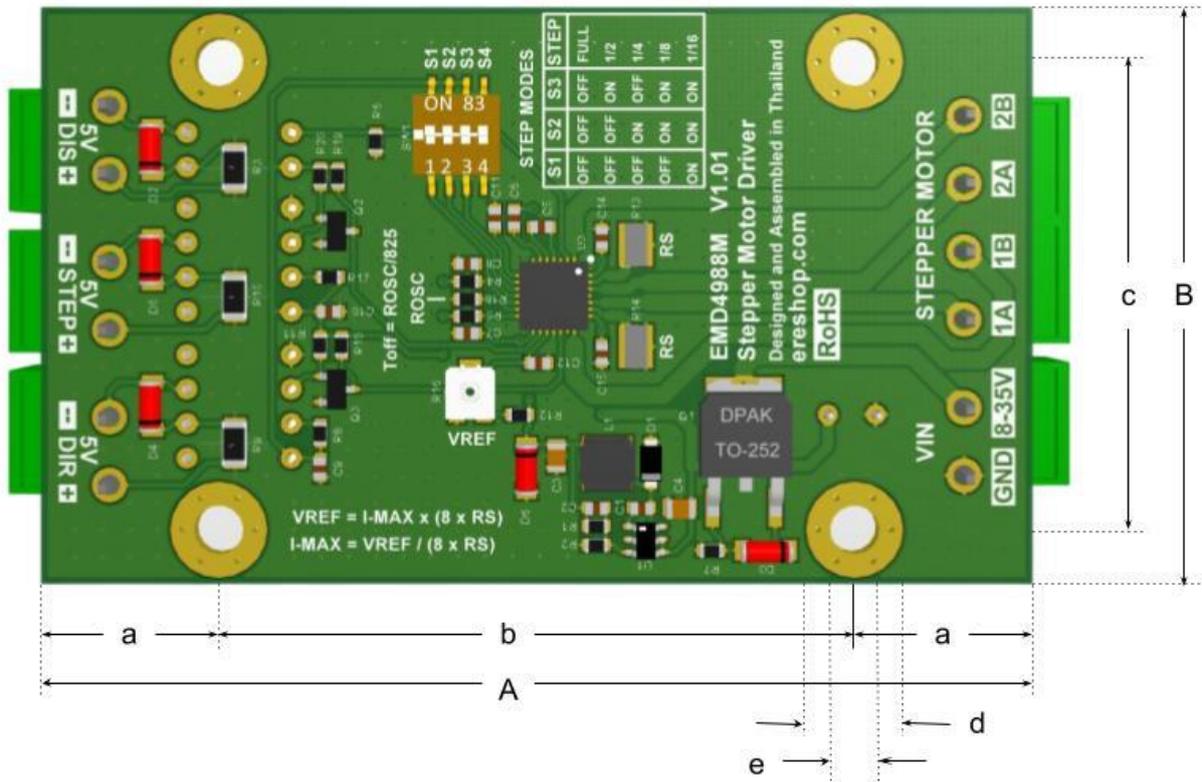


Figure 5: Dimensions

	mm	Inch
A	72.50	2.854
B	42.50	1.673
a	13.00	0.512
b	46.50	1.831
c	34.50	1.358
d	7.10	0.280
e	3.60	0.142

Figure 6: Dimensions

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