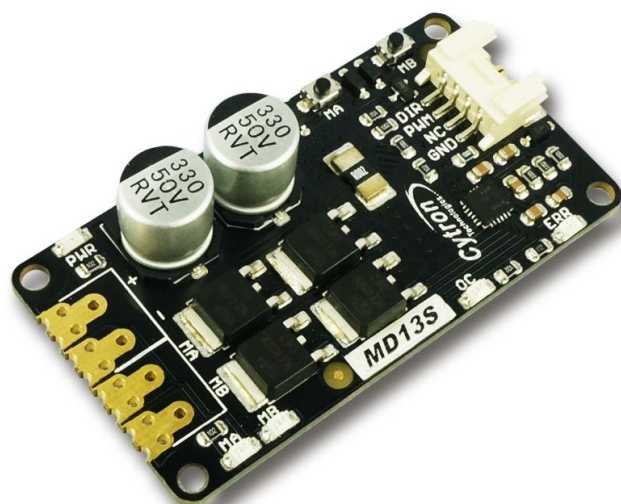




## MD13S 13Amp DC Motor Driver



## User's Manual

V1.1

June 2018

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## 1. INTRODUCTION/OVERVIEW

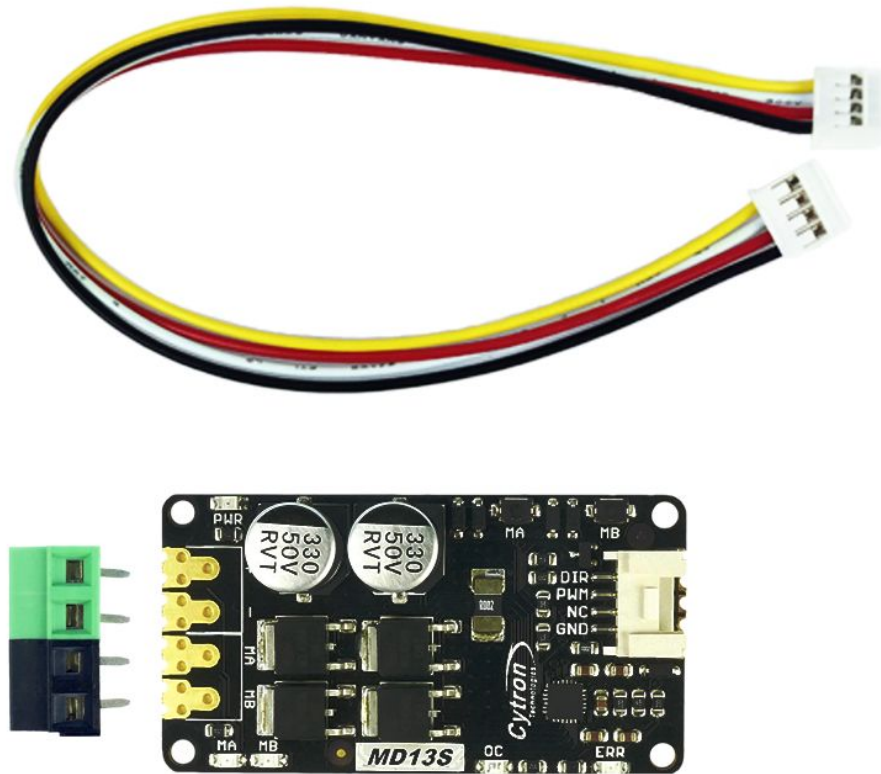
MD13S is designed to drive high current brushed DC motor up to 13A continuously. It offers several enhancements such as support for both locked-antiphase and sign-magnitude PWM signal because it uses full solid state components which is able to provide faster response time and eliminate the wear and tear of the mechanical relay.

The MD13S has been designed with the capabilities and features of:

- Bi-directional control for one brushed DC motor.
- Support motor voltage ranges from **6V to 30V**.
- Maximum current up to **13A continuous** (without heatsink at 25°C) and 30A peak (10 second).
- Current limiting at **30A**.
- 3.3V and 5V logic level input.
- [GROVE](#) compatible connector.
- Solid state components provide faster response time and eliminate the wear and tear of mechanical relay.
- Fully NMOS H-Bridge for better efficiency and no heat sink is required.
- Speed control PWM frequency up to 20KHz (Actual output frequency is same as input frequency).
- Support both locked-antiphase and sign-magnitude PWM operation.
- Support TTL PWM from microcontroller, **not PWM from RC receiver**.
- SMD Compatible
- **Dimension:**61mm x 33mm

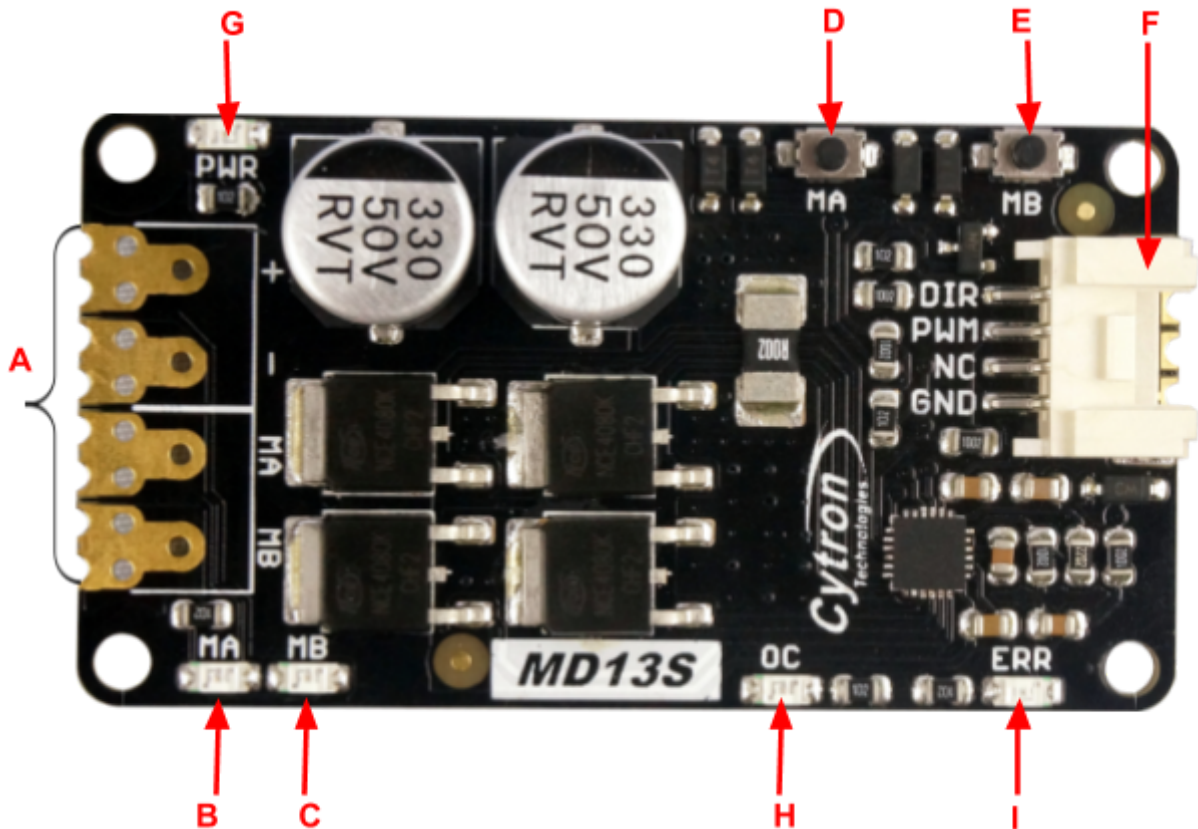
## 2. PACKING LIST

Please check the parts and components according to the packing list. If there are any parts missing, please contact us at [sales@cytron.com.my](mailto:sales@cytron.com.my) immediately.



1. 1 x MD13S 13A DC Motor Driver.
2. 2 x Terminal socket, Black for power and Green for Motor.
3. Grove connector with cable.
4. User's manual can be downloaded from [here](#)
5. If you like to get MD13S, please get it from our online store here: <https://www.cytron.io/p-md13s>

### 3. BOARD LAYOUT AND SPECIFICATION



Label	Function
A	Terminal Block
B	MA LED Indicator
C	MB LED Indicator
D	MA Test Switch
E	MB Test Switch
F	Input pin
G	Power LED Indicator
H	OC LED Indicator
I	ERR LED Indicator
J	SMD Compatible

1. Terminal Block – Connect to motor and power source.

Pin No.	Pin Name	Description
1	POWER +	Positive Supply (6V to 30V)
2	POWER -	Negative Supply
3	Motor Output A	Connect to motor terminal A
4	Motor Output B	Connect to motor terminal B

2. MA LED Indicator – Turns on when the output A is high and output B is low. Indicates the current flows from output A to B.

3. MB LED Indicator – Turns on when the output A is low and output B is high. Indicates the current flows from output B to A.

4. MA Test Switch – When this button is pressed, current flows from output A to B and motor will turn CW (or CCW depending on the connection).

5. MB Test Switch – When this button is pressed, current flows from output B to A and motor will turn CCW (or CW depending on the connection).

6. Input

Pin No.	Pin Name	Description
1	GND	Logic ground.
2	**PWM	PWM input for speed control
3	DIR	Direction control.

**\*\*Note that it is not for RC PWM operation**

The truth table for the control logic is as follow:

Pin 2 (PWM)	Pin 3 (DIR)	Output A	Output B
Low	X (Don't care)	Low	Low
High	Low	High	Low
High	High	Low	High

7. Power LED Indicator – Power LED. Should be on when the board is powered on.

8. OC (Over Current)LED Indicator, Output current is over 30A limit.

9. ERR LED Indicator - Error LED Indicator, it will illuminate when fault detected in on board MOSFET driver.

10. SMD compatible

#### 4. PRODUCT SPECIFICATION AND LIMITATIONS

##### Absolute Maximum Rating

No.	Parameters	Min	Typical	Max	Unit
1	Power Input Voltage	6	-	30	V
2	$I_{MAX}$ (Maximum Continuous Motor Current)	-	-	13	A
3	$I_{PEAK}$ – (Peak Motor Current) *	-	-	30	A
4	$V_{IOH}$ (Logic Input – High Level)	3	-	5.5	V
5	$V_{IOL}$ (Logic Input – Low Level)	0	0	0.5	V
6	Maximum PWM Frequency **	-	-	20	KHz

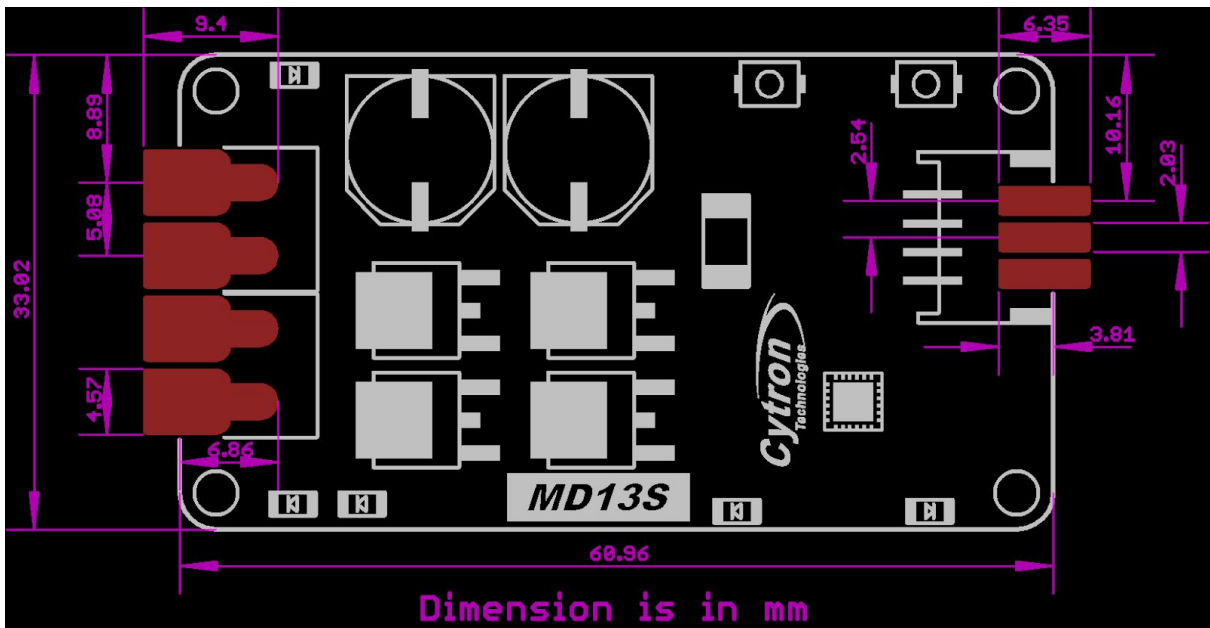
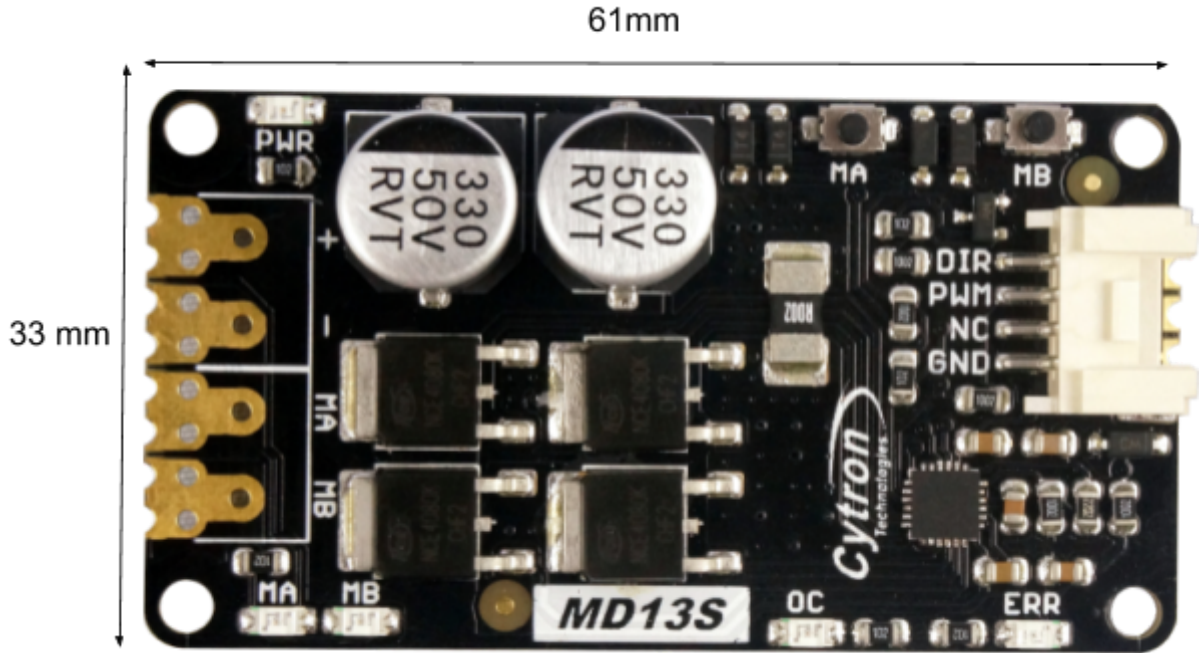
\* **Must not exceed 10 seconds.**

\*\* **Actual output frequency is same as input frequency.**

\*\*\* **Tested in room temperature.**



## 5. DIMENSION



Footprint Dimension

\*[Eagle CAD Library](#)

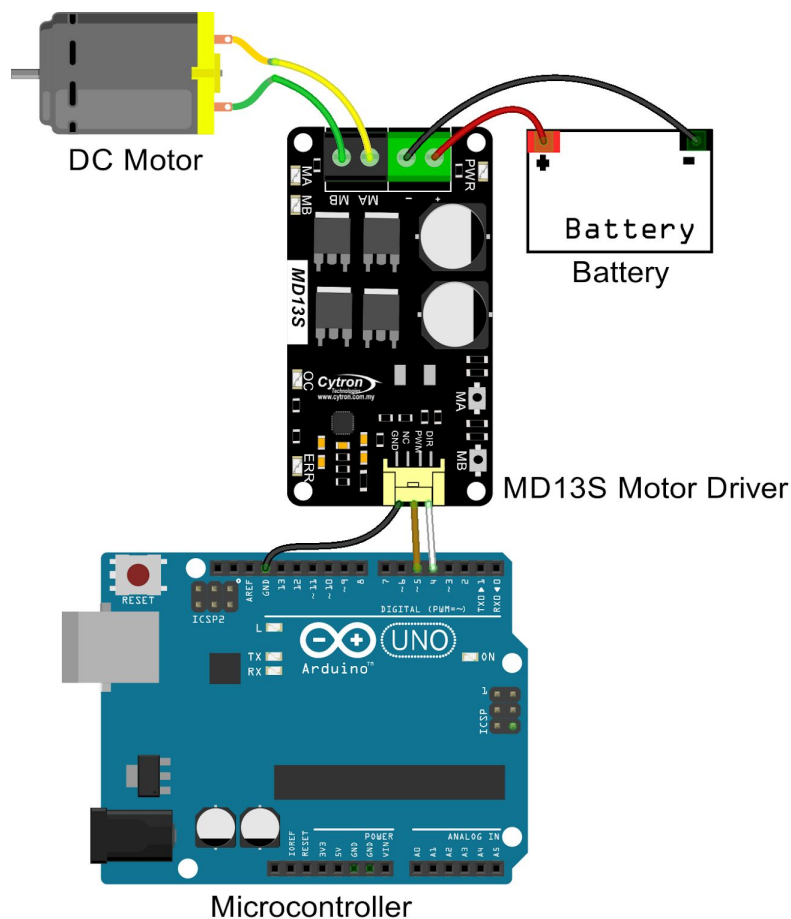


## 6. GETTING STARTED

MD13S is compatible with 2 types of PWM operation, which are:

1. Sign-Magnitude PWM – For sign-magnitude PWM operation, 2 control signals are used to control the speed and direction of the motor. PWM is feed to the PWM pin to control the speed while DIR pin is used to control the direction of the motor.
2. Locked-Antiphase PWM – For locked-antiphase PWM operation, only 1 control signal is needed to control the speed and direction of the motor. PWM pin is connected to logic high while the DIR pin is being feed with the PWM signal. When the PWM signal has 50% duty cycle, the motor stops running. If the PWM has less than 50% duty cycle, the motor will turn CW (or CCW depending on the connection). If the PWM signal has more than 50% duty cycle, motor will turn CCW (or CW depending on the connection).

Sample connection diagram is as follow:



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## 7. WARRANTY

- Product warranty is valid for 12 months.
- Warranty only applies to manufacturing defect.
- Damaged caused by misuse is not covered under warranty
- Warranty does not cover freight cost for both ways.

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