



## **MD10C R3.0 10Amp DC Motor Driver**



## **User's Manual Rev3.0 V1.0 Aug 2018**

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## 1. INTRODUCTION/OVERVIEW

[MD10C](#) is another version of the MD10B(Launched in 2008, uses mechanical relays) which is designed to drive high current brushed DC motor up to 13A continuously. It offers several enhancements over the MD10B such as support for both locked-antiphase and sign-magnitude PWM signal as well as using full solid state components which result in faster response time and eliminate the wear and tear of the mechanical relay.

The MD10C has been designed with the capabilities and features of:

- Bi-directional control for one DC Brushed motor, single channel.
- Support motor voltage ranges from 5V to 30V.
- Maximum current up to 13A continuous and 30A peak (10 second).
- 3.3V and 5V logic level input, which support signal from [Arduino](#), [Raspberry Pi](#) and any controller that can produces PWM or logic signal of that voltage, 3.3V or 5.0.
- Solid state components provide faster response time and eliminate the wear and tear of mechanical relay.
- Full NMOS H-Bridge for better efficiency and no heat sink is required.
- Speed control PWM frequency up to 20KHz (output frequency is same as input frequency).
- Support both [Locked-Antiphase and Sign-Magnitude PWM](#) operation.
- The new MD10C should be powered from a single power source, the Vmotor only. No additional Vin is required.
- Support TTL PWM from microcontroller, **not PWM from RC receiver**.
- **Dimension:**75mm x 43mm

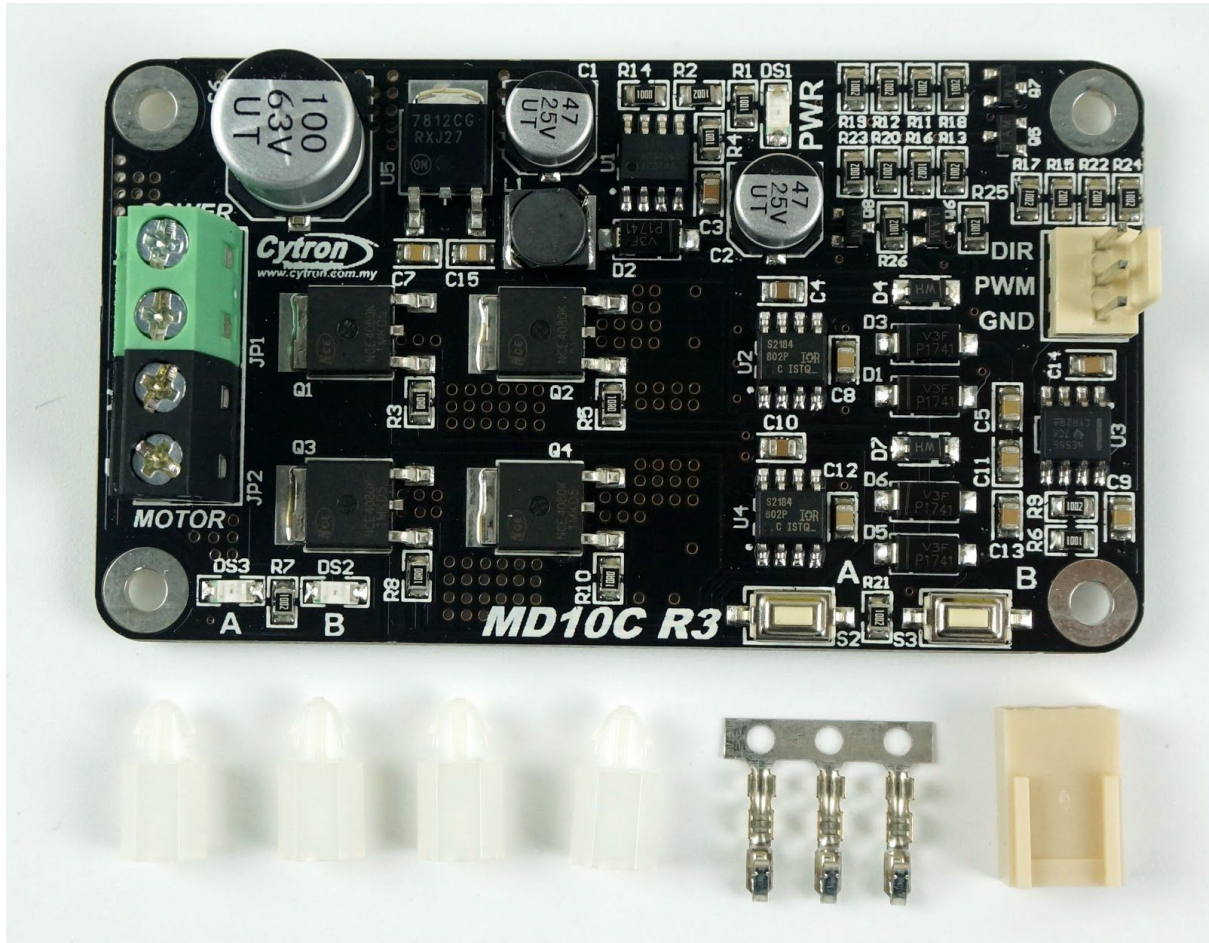
***\*MD10C is now Revision 3.0.***





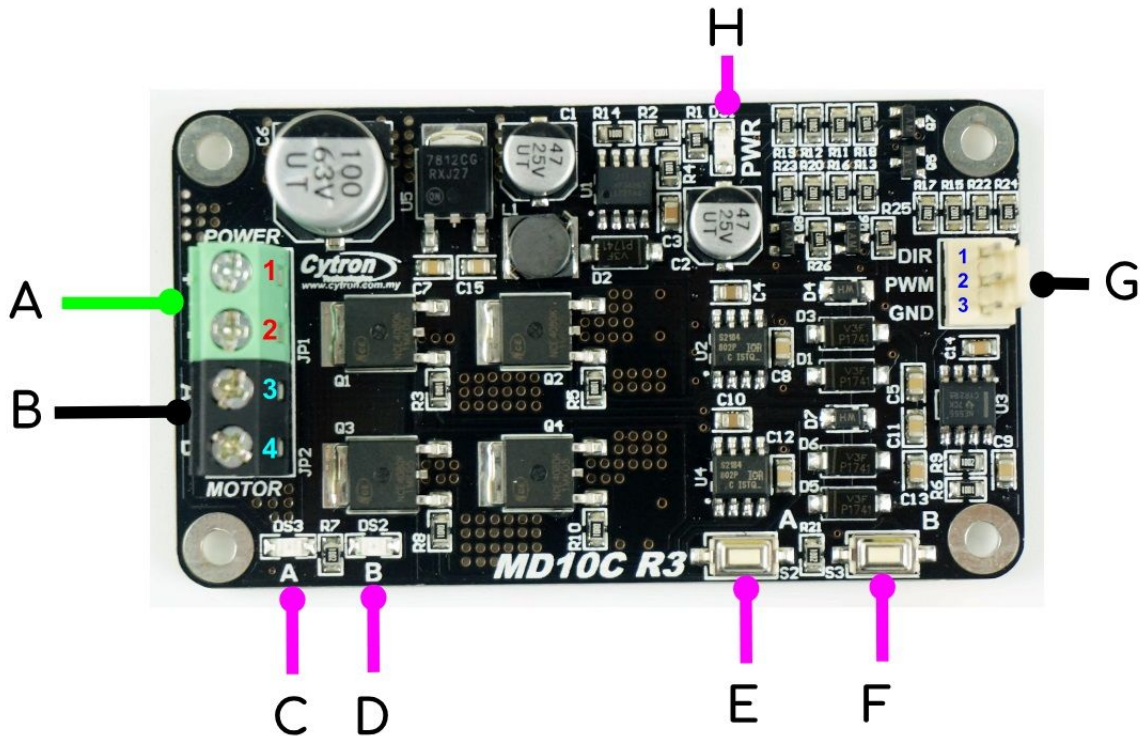
## 2. PACKING LIST

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



- 1 x [MD10C R3.0](#) 10A DC Motor Driver
- 1x [2510 PCB Connector](#) - 3 Ways (Female)
- 3 x [2510 Terminal Pin](#)
- 4 x plastic spacer (~7mm)
- User's manual can be downloaded from <https://www.cytron.io>

### 3. BOARD LAYOUT AND SPECIFICATION



- A. Terminal Block (**GREEN**) - For Vmotor, should be connected to power source example battery with voltage ranging from 5V to 30VDC. Please ensure the **voltage polarity (Positive and Negative) is correctly connected** before applying power. MD10C does not come with Reverse Polarity Protection.

Pin No.	Pin Name	Description
1	V motor Power +	Positive Supply (5V to 30VDC)
2	V motor Power -	Negative Supply or Ground terminal

- B. Terminal Block (Black) - Connect to DC brushed motor, or load.

Pin No.	Pin Name	Description
3	Motor Output A	Connect to motor terminal A
4	Motor Output B	Connect to motor terminal B

- C. **Red LED A** – Turns on when the output A is high and output B is low. Indicates the current flows from output A to B.
- D. **Red LED B** – Turns on when the output A is low and output B is high. Indicates the current flows from output B to A.

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

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

G. Control Input Signal Pin

Pin No.	Pin Name	Description
1	GND	Logic ground.
2	*PWM	PWM input for speed control, support upto 20KHz
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	Operation
Low	X (Don't care)	Low	Low	Brake Low
High	Low	High	Low	Forward
High	High	Low	High	Reverse

H. **Green** LED – Power LED. Should be illuminate when the board is powered on.

Absolute Maximum Rating

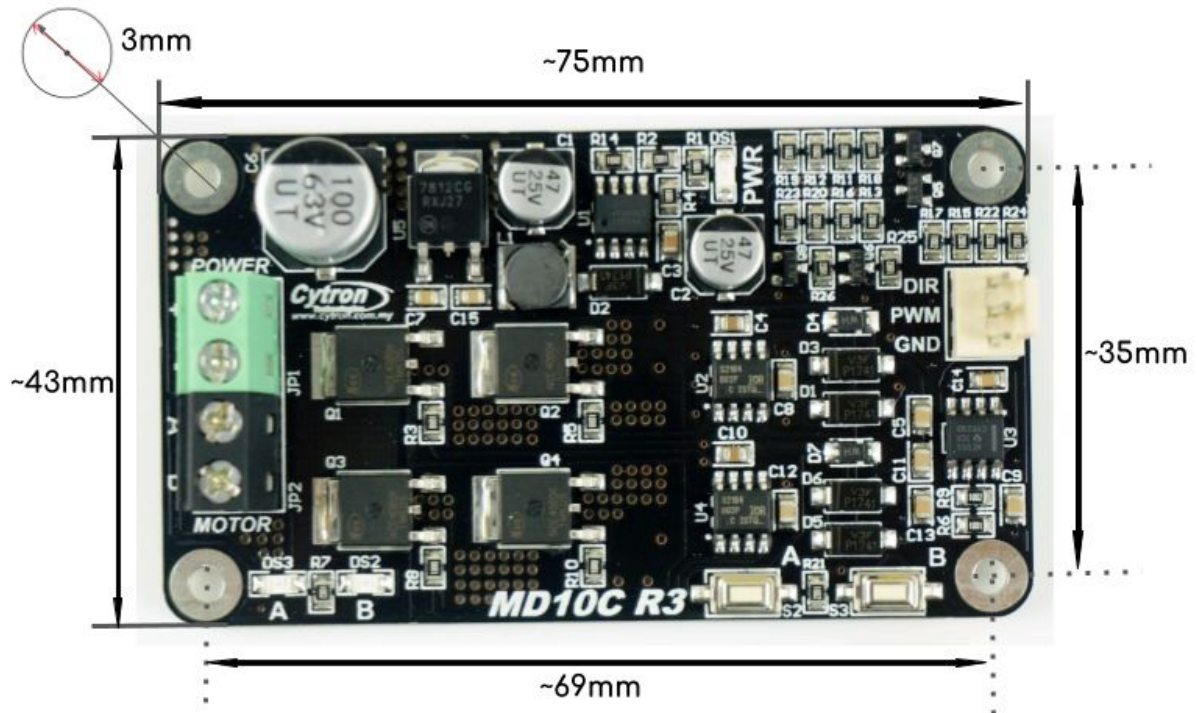
No.	Parameters	Min	Typical	Max	Unit
1	Power Input Voltage	5	-	30	V
2	$I_{MAX}$ (Maximum Continuous Motor Current)*	-	-	13	A
3	$I_{PEAK}$ – (Peak Motor Current) **	-	-	30	A
4	$V_{IOH}$ (Logic Input – High Level)	3	-	5.5	V
5	$V_{IOL}$ (Logic Input – Low Level)	0	0	0.5	V
6	Maximum PWM Frequency ***	-	-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

**\* Tested under 25 °C (room temperature) environment, without airflow and heatsink.**

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

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

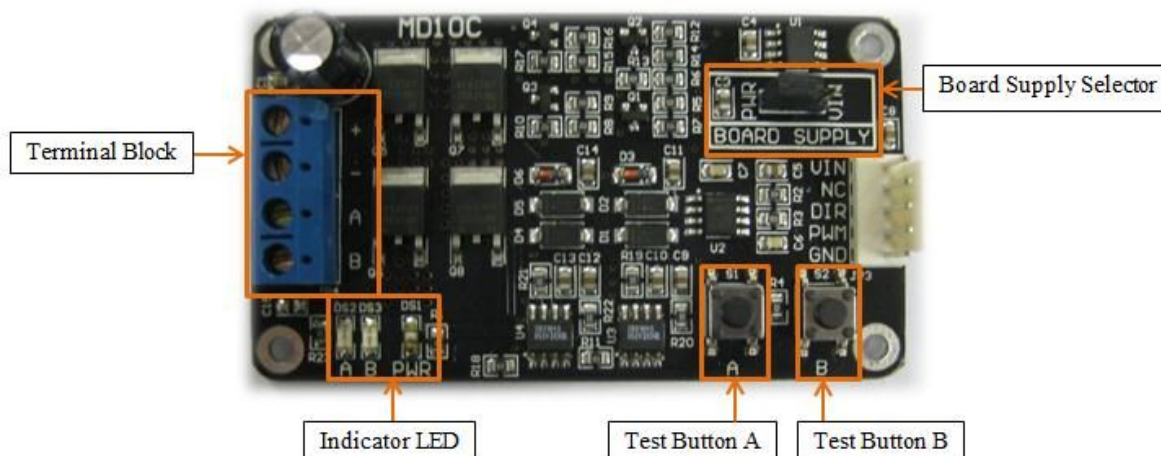
#### 4. DIMENSION





## 5. GETTING STARTED

You can actually use MD10C even without any controller, check this [tutorial](#) out. Though is MD10C Rev1.0 :) But the manual/test buttons are still there for the same purpose.



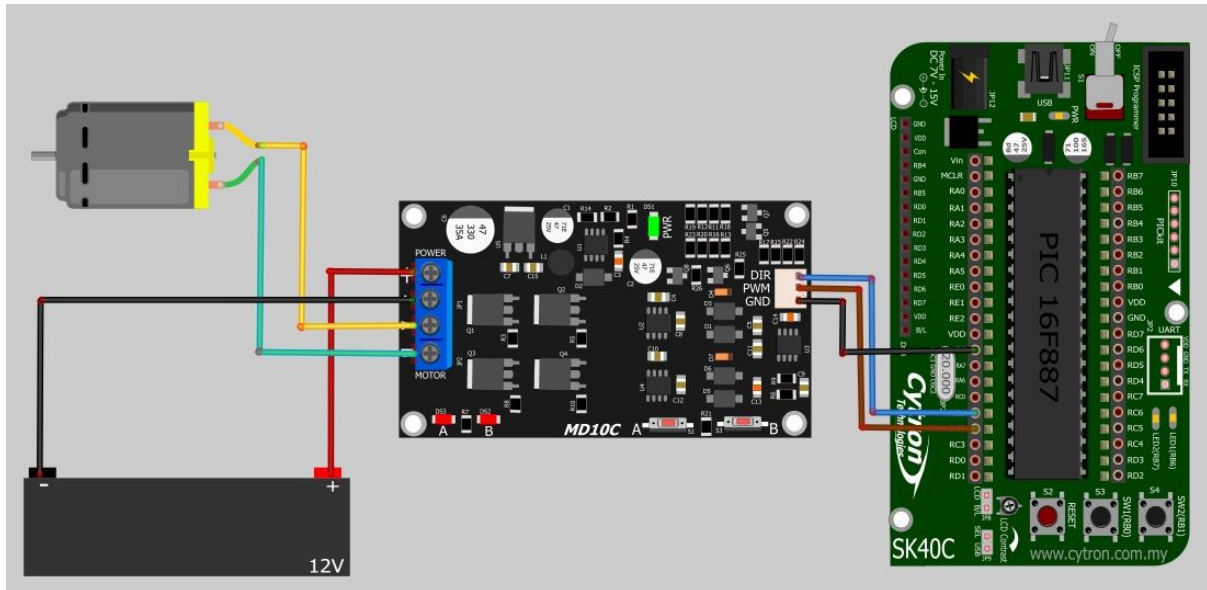
MD10C Rev1.0

[MD10C](#) 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).

And both the DIR and PWM input can accept **3.3V to 5.0V logic**, in some case, user use it with 24V logic from PLC (Programmable Logic Controller).

[Sample source code](#) for using [PIC16F877A](#) to control the motor with MD10C is provided and is available for download at Cytron's website under the product page. [SK40C](#) is used in the demonstration and the connection diagram is as follow:



1. Connect MD10C and SK40C as shown in the schematic above and select the board supply for MD10C, in the diagram, we are using 12V from a SLA battery.
2. Upload the hex file into SK40C using [UIC00A/B](#). The hex file can be downloaded [here](#), or [MD10C product page](#). Please refer [SK40C](#) or [UIC00B](#) User's Manual to upload the hex code into SK40C.
3. Do also check out other tutorials which are based on MD10C and SK40C:
  - a. [Driving Two DC Geared Motors with MD10C by Using SKPS + SK40C](#)
  - b. [Driving DC Brush Motor with MD10C + SK40C](#)

Since Arduino is popular, we have also prepared tutorials of using MD10C with Arduino:

- [Controlling MD10C with Arduino](#) - Explain Sign-Magnitude and Locked-Antiphase too.
- [Using MDD10A with Arduino UNO](#) - MDD10A is just two channel MD10C :)
- [Controlling 10A DC Motor Driver Using Arduino Nano](#)
- [Measuring DC Motor RPM Through Built-in Hall Sensor Encoder](#)

## 6. 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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