SINGLE CHANNEL 20A MOTOR DRIVER

INTRODUCTION

For those guys who likes building robots, a small and powerful motor driver could offer great help. And we are always trying to supply this kind of motor drivers. So here comes this new driver.

This small single-channel motor driver module can control the motor's direction and speed. It could offer large current to motors. In open area and without any heating dissipation device, it could work stably at 20A current, with temperature rising around 20 Celsius. The driver's performance far exceeds MC33886 or L298N motor drive. Comparing with BTS7960, its continuous current capability is twice, and the peak current is 4 times, with only half of on-resistance.

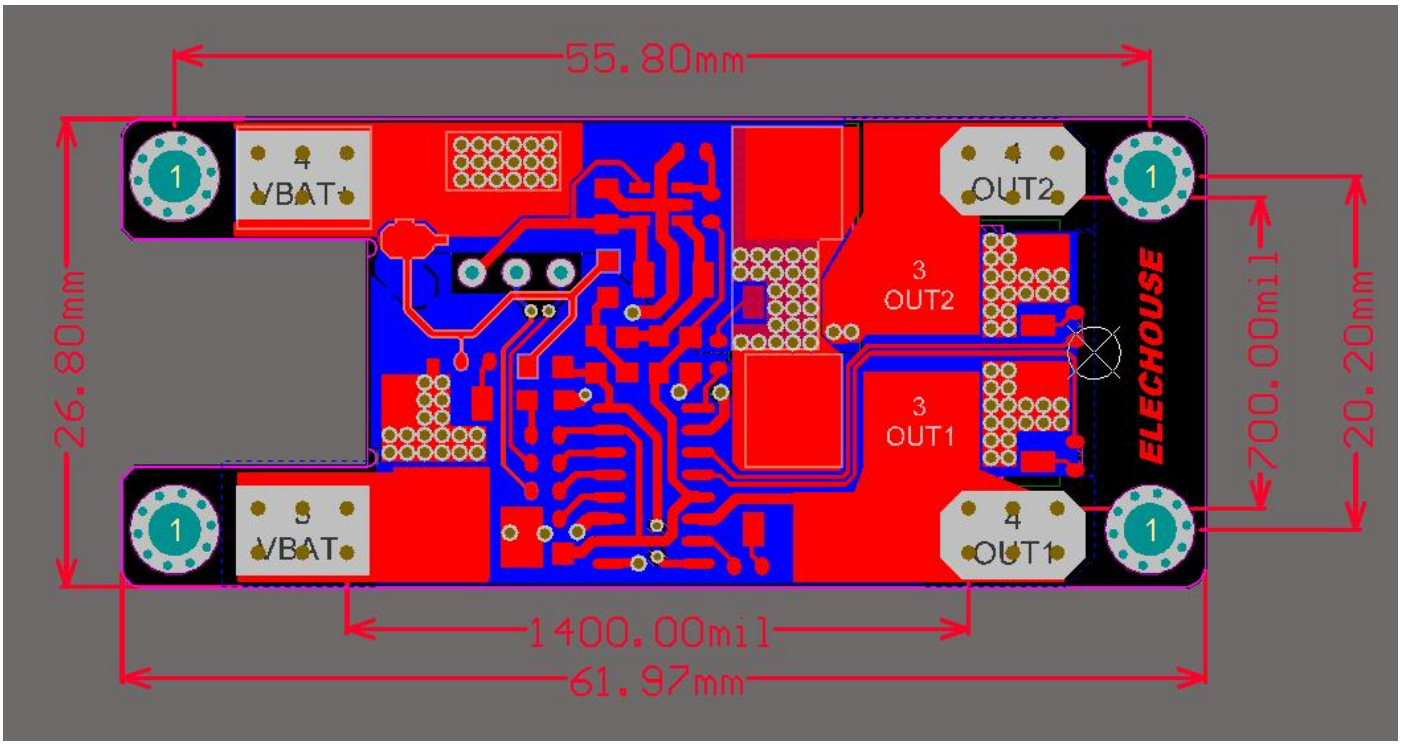
This module consists of a full-bridge chip and four low-resistance MOSFET tubes. The MOSFET's on-resistance is only 0.003 ohms. This driver could start the motor in short time.

This motor driver module can work full at 0% - 100% of PWM duty. In fact, it is more more than a motor driver. It could also serves as a power controlling module.

PARAMETER

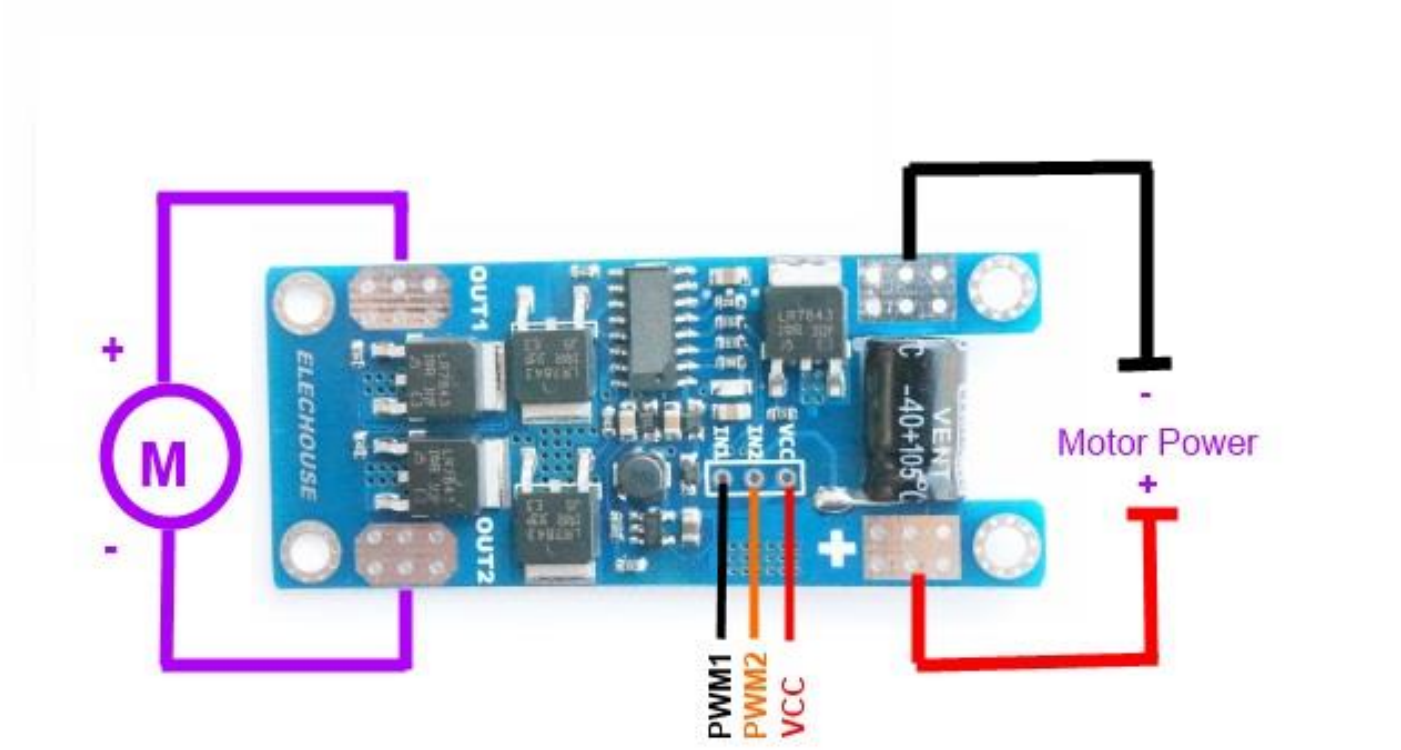
Parameter	Value	Note
Peak current (Load)	161 A	
No heat maximum continuous current (on load)	20A	It is easy to rise the current by adding external heat radiators on the board.
Motor Power Input voltage (Limit Value)	4V ~ 22 V	While 4V, one chip might get hot
Motor Power Input voltage (Recommend Value)	5 V ~ 18 V	Considering voltage fluctuation, we recommend your power supply should not be less than 5V
Static current	25mA @PWM = 0Hz 7.2V 53 mA @PWM = 25KHz 7.2V 100mA@PWM= 100kHz 7.2V	
Controlling VCC	3.3V~5.5V	
PWM Control Signal Voltage	2.5V ~ 12V	The HIGH TTL level of control signal
PWM Duty Range	0% ~ 100%	
Maximum PWM Frequency	100KHz	Over 100KHZ frequency would damage the driver
power reversal protection	YES	
OVER-current protection	NO	
OVER-voltage protection	NO	
External Heat radiator	NO	
Dimensions	62mm(L)*26.8mm(W)*8mm(H)	

DIMENSION



Those vias on VIN and OUT pads have spacing which is compatible with 2.54mm spacing bead board. With male pins soldered on it, it could plug in breadboard.

PIN DESCRIPTION



Pin	I/O	Description
VIN +	Input	Power supply positive pin, recommend 5 V ~ 18 V. This pin is marked “+” on the board.
VIN -	Input	Power supply negative pin. This pin is marked “-” at the back side on the board.
OUT1	Output	To one terminal of the motor
OUT2	Output	To another terminal of the motor
VCC	Input	Controlling circuit input, 3.3V~5.5V Controlling circuit GND should be connected to VIN-.
IN1	Input	PWM input pin If this pin doesn’t connect to anything, it would be regarded as HIGH. Range: -0.3V ~ 12V. Identifying low voltage ≤ 1V, identifying high voltage ≥ 2.5V.
IN2	Input	PWM input pin If this pin doesn’t connect to anything, it would be regarded as HIGH. Range: -0.3V ~ 12V. Identifying low voltage ≤ 1V, identifying high voltage ≥ 2.5V.

CONTROL RULES

Status	IN1	IN2	OUT1	OUT2	Note
Full-speed Forward	H	L	L	H	
Full-speed reverse	L	H	H	L	
Brakes	L	L	H	H	
Brakes	H	H	H	H	
Forward Speed	PWM	L	~ PWM	H	
Reverse Speed	PWM	H	~ PWM	L	
Forward speed	H	PWM	L	~ PWM	
Reverse speed	L	PWM	H	~ PWM	

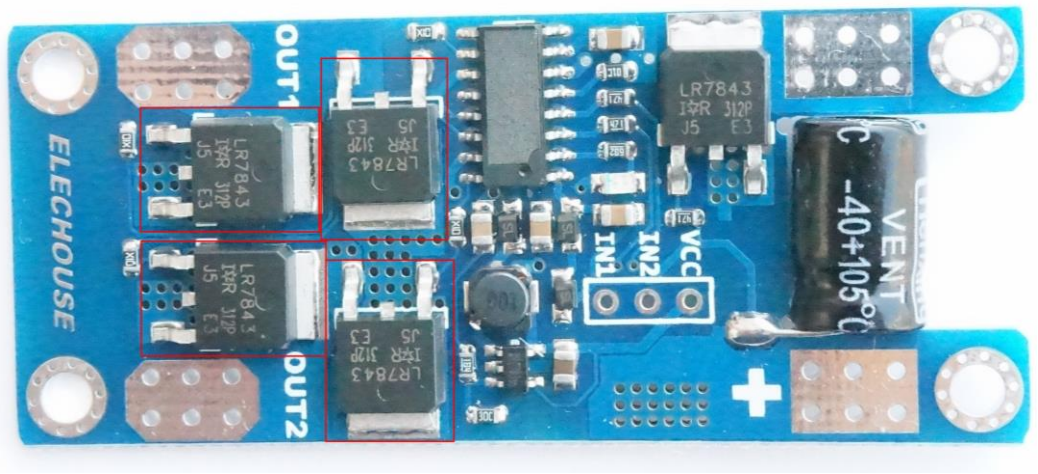
Note:

- *H means HIGH. For IN1 and IN2, if it is connected to nothing, it would also be HIGH.*
- *Working rule: OUT1 = ~ IN1; OUT2 = ~ IN2*

HARDWARE EXTENDING

ADD HEAT RADIATORS

The 4 chips marked below would become hot if the working current is high. Heat radiator could be added on the surface of those chips.



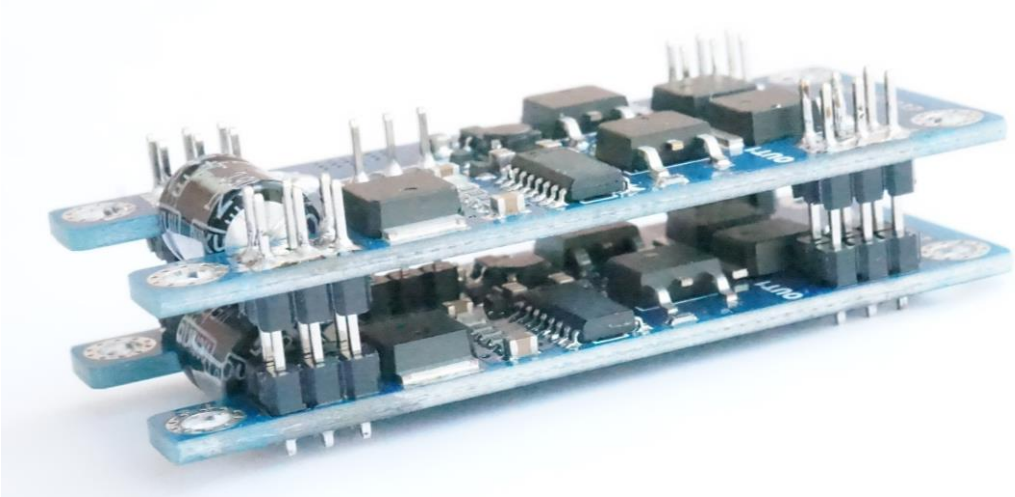
MERGE TWO DRIVERS

Another way to build a more powerful driver is that you could merge two board as one.

Connect all the pins together

Board A	Board B
VIN+	VIN+
VIN-	VIN-
OUT1	OUT1
OUT2	OUT2
VCC	VCC
IN1	IN1
IN2	IN2

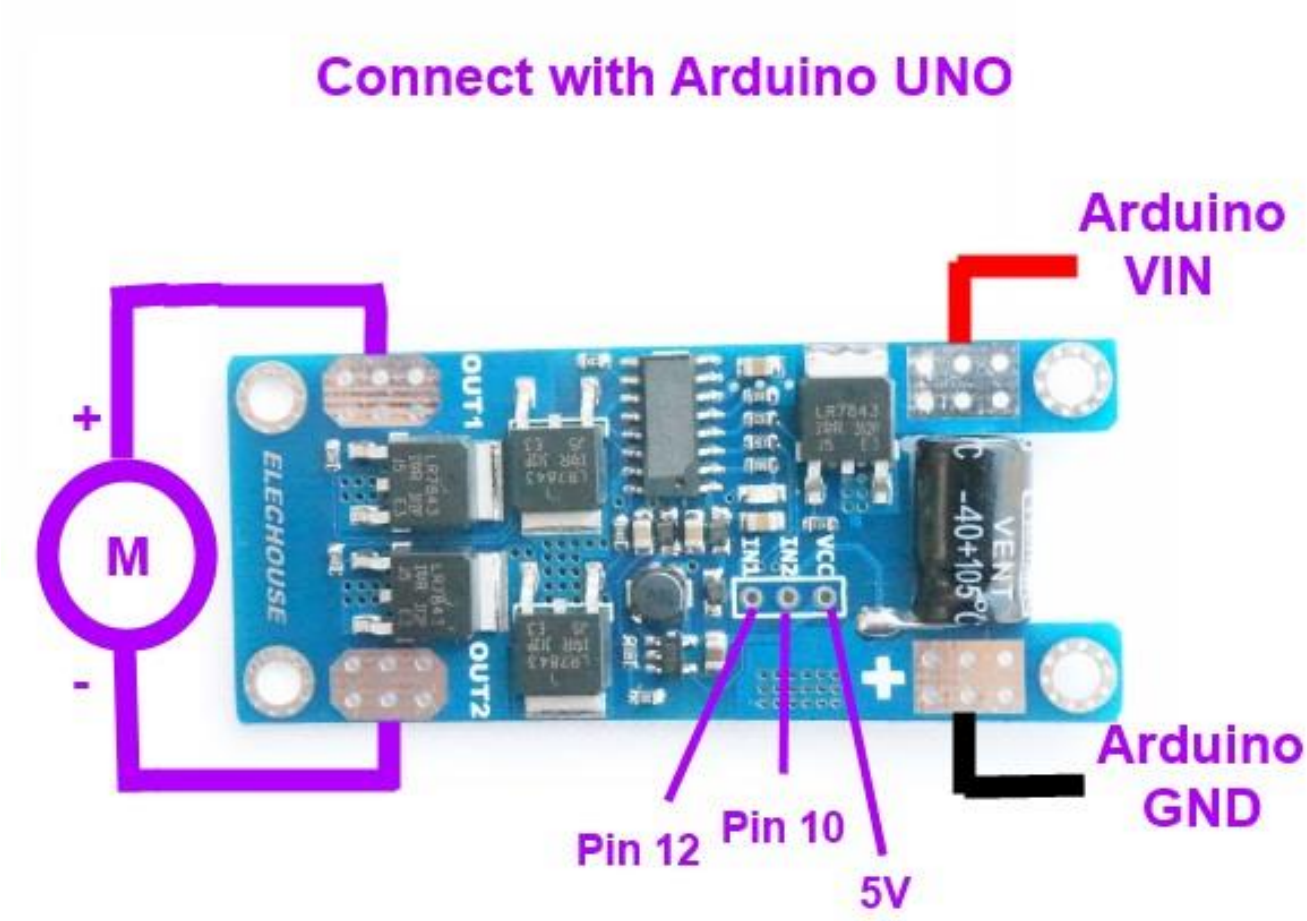
In this way, the drive could work at high current.



SOFTWARE

We have examples for Arduino.

Connect Arduino and motor to this driver board in the following way:



Click here to download the code.

```
/*ELECHOUSE*/
int RPWMB = 10;
int LPWMB = 12;
int led= 13;

void setup()
{
pinMode(RPWMB,OUTPUT);
pinMode(LPWMB,OUTPUT);
pinMode(led, OUTPUT);
}

void loop()
{
   //RUN BOTH CHANNELS SIMULTANEOUSLY FORWARD
   digitalWrite(led,HIGH);
```

```
  analogWrite(RPWMB,127); // RUN AT 50% SPEED
  digitalWrite(LPWMB,HIGH);//RUN RORWARD
  delay(2000);// WAIT FOR 2 SECONDS

   // STOP AND BRAKE
  digitalWrite(led,LOW);

  digitalWrite(RPWMB,HIGH);//RPWM
  digitalWrite(LPWMB,HIGH);//LPWM
  delay(2000);// WAIT FOR 2 SECONDS

  // RUN IN REVSERSE
  digitalWrite(led,HIGH);
  digitalWrite(RPWMB,HIGH);//RUN MOTOR REVERSE
  digitalWrite(LPWMB,LOW);//RUN BOTH MOTORS AT 100% SPEED
  delay(2000);// WAIT FOR 2 SECONDS

 // STOP AND BRAKE
  digitalWrite(led,LOW);

  digitalWrite(RPWMB,HIGH);//RPWM    CHANNEL A,B = HIGH
  digitalWrite(LPWMB,HIGH);//LPWM CHANNEL A,B =HIGH
  delay(2000);// WAIT FOR 2 SECONDS
}
```

Note: by default Arduino PWM frequency is 500HZ. For better performance, you could change PWM frequency. Please refer to those 2 pages: Secrets of Arduino PWM and PWM frequency of Arduino.

DISCLAIMER AND REVISIONS

The information in this document may change without notice. Please visit www.elechouse.com for new information.

Revision History

Rev.	Date	Author	Description
A	Jan 3rd, 2014	Wilson	Initial version