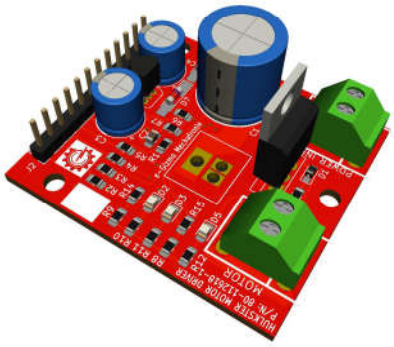
Little Hulkster DC Motor Driver

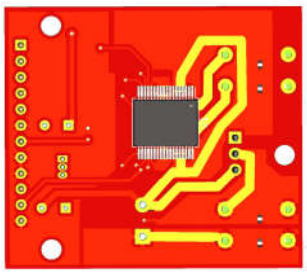
Harware Manual

Rev. 1r0

It's small in size, yet has the power capability to drive really big DC motors. This little hulkster can take 30Amps in current surges and, mounted on an ample heatsink, it can sustrain drives to a motor running at 8A. It is protected in every way imaginable: It will not self destruct when the power supply is connected the wrong way, or the voltage becomes too high or too low, or when the output is shorted or overloaded, or when subjected to thermal overloads (i.e. no heatsink). In other words, this Little Hulkster can be a tough one to kill.

The Little Hulkster will work with any brush type DC motors.





Typical Performance Characteristics

Operating Voltage :
- 6V to 24VDC

Device :
- VNH5050A

Peak Drive:
- 30 Amps (internally limited)

Drive Ampacity:
- 8 Amps w/ heatsink
- 4 Amps no Heatsink

Overload Ampacity:
- 8 Amps for 25 secs (no heatsink)
- 10 Amps for 45 secs (with heatsink)

Fault Indicators:
- Output Short Circuit
- Thermal Shutdown

Board Dimensions: 42x47.5 mm aprox

TERMINALS LOCATOR GUIDE

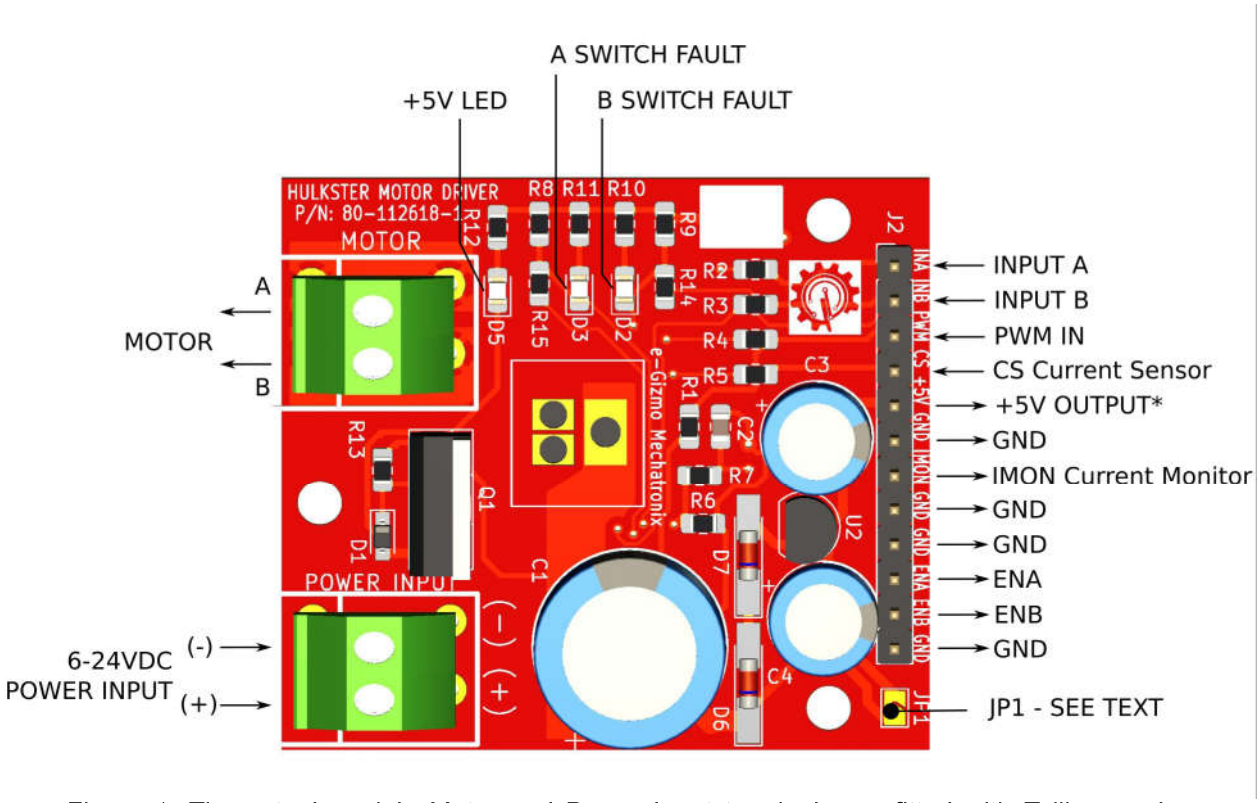


Figure 1. The actual module Motor and Power Input terminals are fitted with Teilbar push connect terminal connectors that are rated at up to 12A load.

Table 1. J2 Control Port

This is a 5V logic control port. The output are activated when PWM input is driven high. A pull down resistor is provided in the PWM input to keep the output off until it is driven by the host controller. The motor outputs are braked to +Vmotor when both INA and INB are driven high, and to GND when both are driven low.

Pin	ID	Description
1	INA	Input A (CW)
2	INB	Input B (CCW)
3	PWM	PWM Speed Control Input
4	CS	Current Sense Disable
5	+5V	Internal +5V Output
6	GND	Ground
7	IMON	Current Output (Analog)
8	GND	Ground
9	GND	Ground
10	ENA	Fault A Side Switches
11	ENB	Fault B Side Switches
12	GND	Ground

Fault Indicators ENA ENB

Fault indicators ENA and ENB are both high during normal operations. When the detectors sense a problem occurring on the output switches (short circuit, overload, over-temperature), it will shutdown the chip to prevent it from being damaged, and then drive the output corresponding to the affected switch low (led ON) to indicate the presence of a fault condition.

You can connect the fault outputs to your host controller if you want your controller to monitor fault conditions.

IMON Current Monitor

This analog output produces 0.2mA for every amps the motor. With the installed 1.5K resistor R6, the IMON output will produce a 3V output with the motor driver delivering a 10Amp load to the motor.

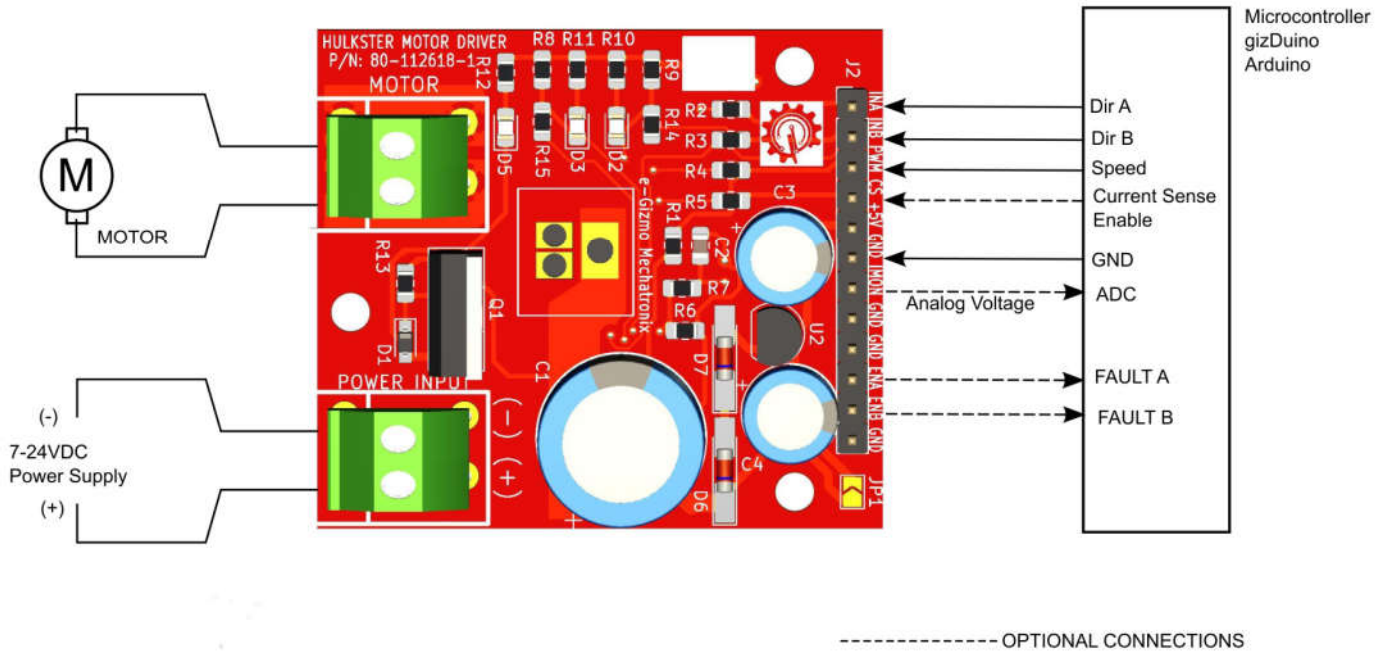


Figure 2. INA, INB and PWM need to be wired and driven as a minimum. The other lines enhances control and functionality of the driver but are not required for operation.

APPLICATION GUIDE

You can use just about any microcontroller to control operating at 3.3V to 5V logic to control and operate a DC motor with The Little Hulkster. As a minimum, 3 controlling I/O lines will be needed to drive the INA, INB, and PWM control inputs:

PWM Input: A and B outputs are activated when driven to logic H. Logic L puts both outputs to floating (OFF) state.

Motor Braking and Free Stop

You can stop the motor three ways:

- By holding the PWM in to a logic low level - Little Hulkster will deactivate its output and let the motor coast to a stop.
- By driving both INA and INB low - Little Hulkster will effectively shunt the motor terminals to ground and stop it with the electromagnetic braking.
- By driving both INA and INB High - Motor terminals are effectively shunted to the +Vmotor side, and is likewise stopped with electromagnetic braking.

Drawing Larger Amp

The Little HulkIster, right off the box, can provide an 8Amp drive for 20 secs, or 4 Amps continous drive. The factor that limits the Little Hulkster to this performance is thermal, that is, without the aid of heatsink, the chip will heat fast, in fact, it will take only 20 secs @ 8 Amps before its thermal protection circuit says "enough!" and shuts itself off to protect itself from damage. If you wish to use Little Hulkster far longer in this high region of the load, you need to mount it in an adequate heatsink.

The Little Hulkster when mounted on a heatsink (available as an option) as shown in fig. 3 will drive a motor @ 8Amps for as long as an half hour with continuous drive. Pick this option if you have some real big motor and expects the driver to work near 8 Amps most of the time.

JP1 Low Voltage Operation

If the Little Hulkster is to be used in applications where Vmotor does not go higher than 18V, JP1 must be shorted with a blob of solder. This will ensure proper operation of the on-board 5V regulator.

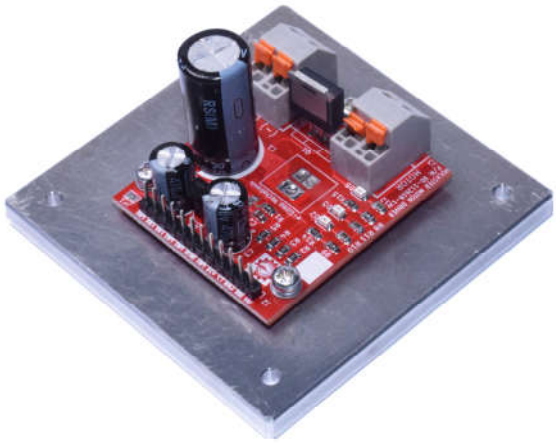


Figure 3. The Little Hulkster mounted on a aluminum heatsink. This 72.5 square x 6mm thick aluminum heatsink enables the driver to drive even bigger motor that requires more amps.

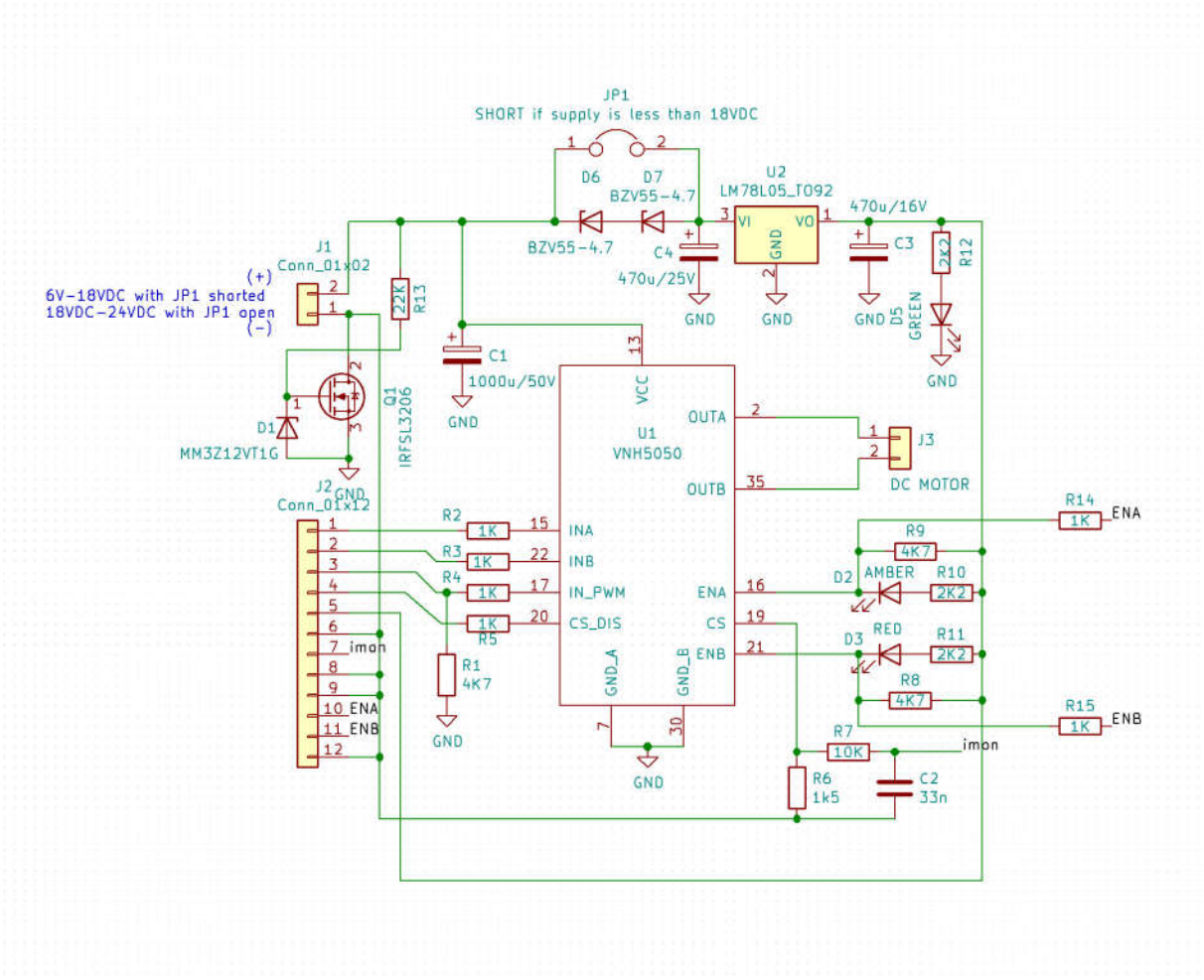


Figure 4. Full Schematic diagram of the Little Hulskter. It is designed around a VNH5050A automotive driver chip made by ST. Automotive qualified components are designed to work in harsh operating environments, and are known for their excellent reliability.