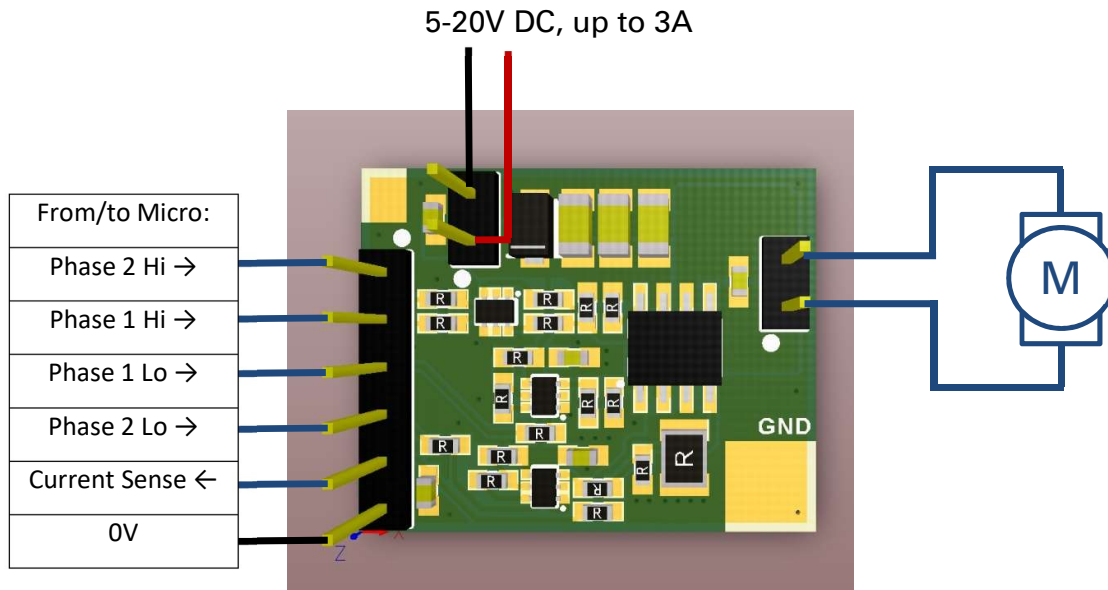


MOSFET H-bridge with gate buffering demo board

DDB078R2 User Guide

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Quick Start Guide

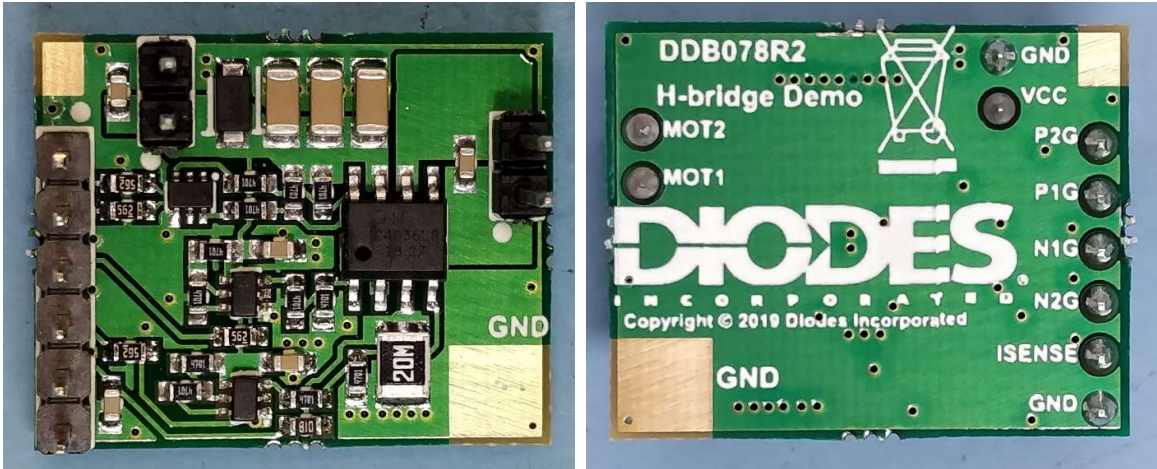


- 1) Connect power supply, 5-20V DC, up to 3A, to J1 (see page 3 for pin tables)
- 2) Connect micro / controller inputs for the H-bridge, and current sense return to J2 (see p3).
- 3) Connect motor to J3 (see p3)
- 4) Switch on power supply
- 5) Control outputs from micro/controller inputs (active high. Any pin left floating will default to the off state)

Note that this board is only an output stage and buffer. Control of shoot-through currents lies with the controller.

Description

DDB078R2 is a simple, compact H-bridge demo board that works up to 20V and 3A, driven from a 3.3V microprocessor – ideal for brushed and single-phase brushless DC motors. All semiconductor components on the PCB are automotive qualified and PPAP compliant, offering a ready-to-go solution for small motors in an automotive environment.



The board interfaces to the outside world through three connectors:

- J1 is the DC power input
- J2 is the control signal input and current sense feedback
- J3 is the motor connection

The DC power input on J1 will accept up to 20V (limited by the TVS device – an alternative TVS can extend this range up to 36V) and 3A.

All 4 H-bridge FETs can be individually controlled through the pins of J2. All 4 signals are active high (ie when the input is driven high then that FET will be switched on), and are designed so that if left floating then the FETs in the output stage will default to an off-state. The inputs require less than 1mA and can be driven from a micro as they are buffered on board by the bipolar transistors. These inputs will tolerate input voltages up to V_{in} .

There is a current-sense feedback available on J2 also. This is taken from a 20m Ω sense resistor at the bottom of the H-bridge, and filtered through 1k/100nF. The host controller can use this to detect over-current situations. 2.5A output current will give a 50mV feedback voltage.

The H-bridge can be used to control a brushed motor in either direction, or used to commutate a single-phase brushless DC motor. Hall sensor feedback would be taken directly back to the host controller.

This board is a simple buffer and output stage solution – it does not include protections against shoot-through or over-current. These functions would be handled by the host controller.

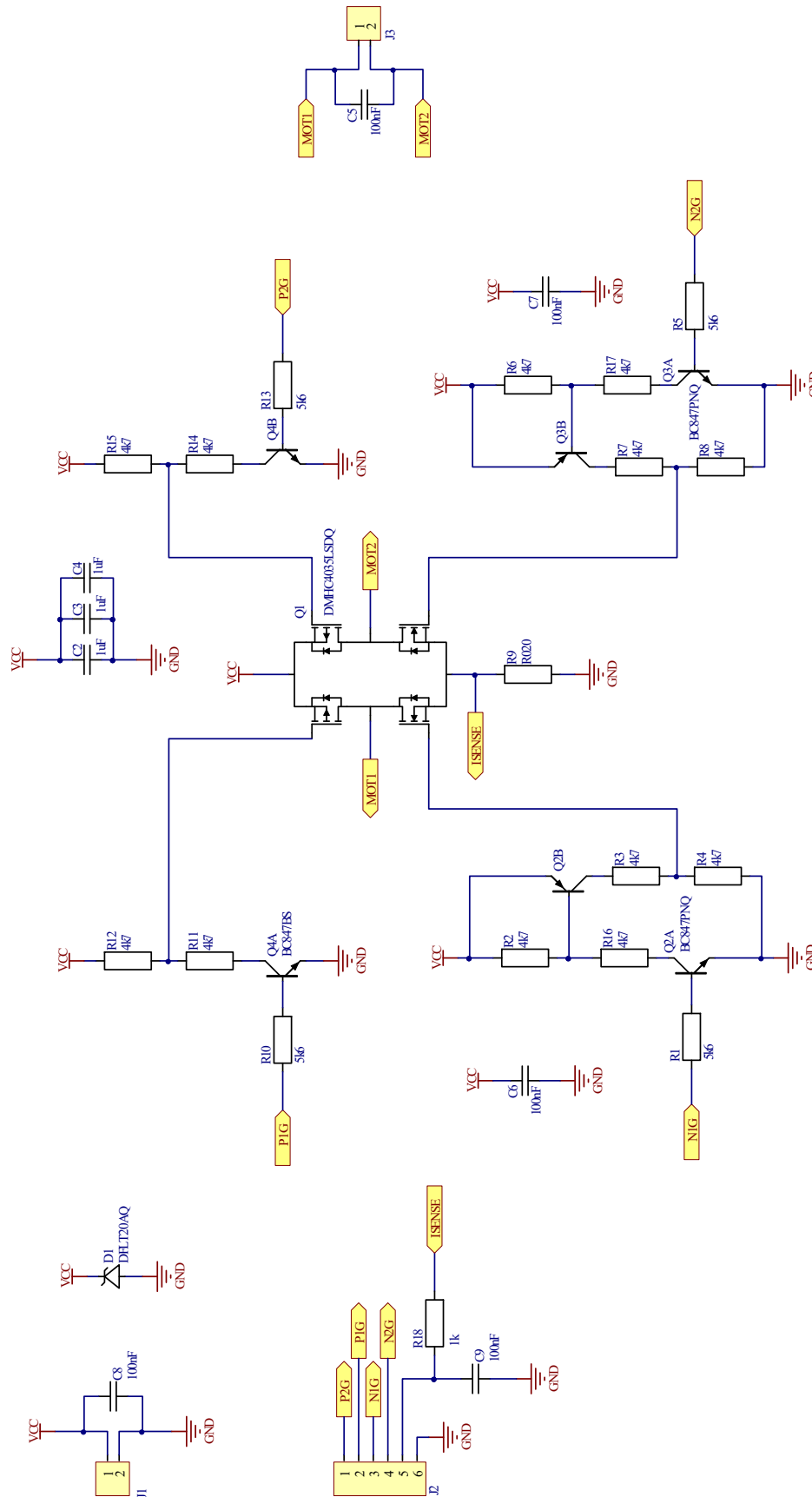
Pin Description Tables

Connector Name	Orientation	Pin Number	Pin Name	Description
J1		2	0V	0V GND Input
		1	VIN	DC Power Input 5-20V DC Up to 3A

Connector Name	Orientation	Pin Number	Pin Name	Description
J2		1	P2G	Control input for Phase 2 P-channel (top) FET
		2	P1G	Control input for Phase 1 P-channel (top) FET
		3	N1G	Control input for Phase 1 N-channel (bottom) FET
		4	N2G	Control input for Phase 2 N-channel (bottom) FET
		5	ISENSE	Current-sense feedback output to controller
		6	0V	GND 0V

Connector Name	Orientation	Pin Number	Pin Name	Description
J3		2	MOT2	Phase 2 Motor connection
		1	MOT1	Phase 1 Motor connection

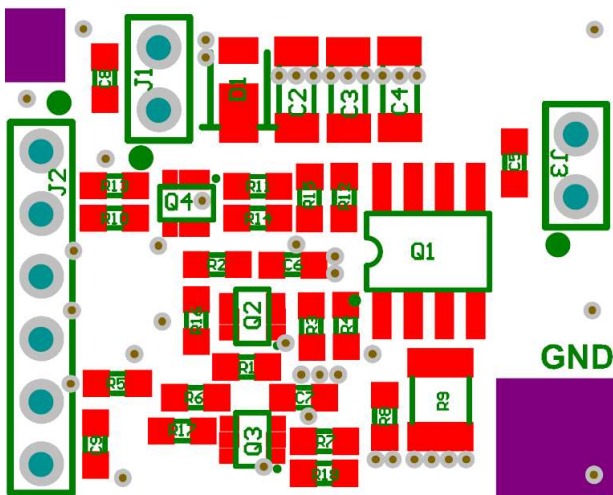
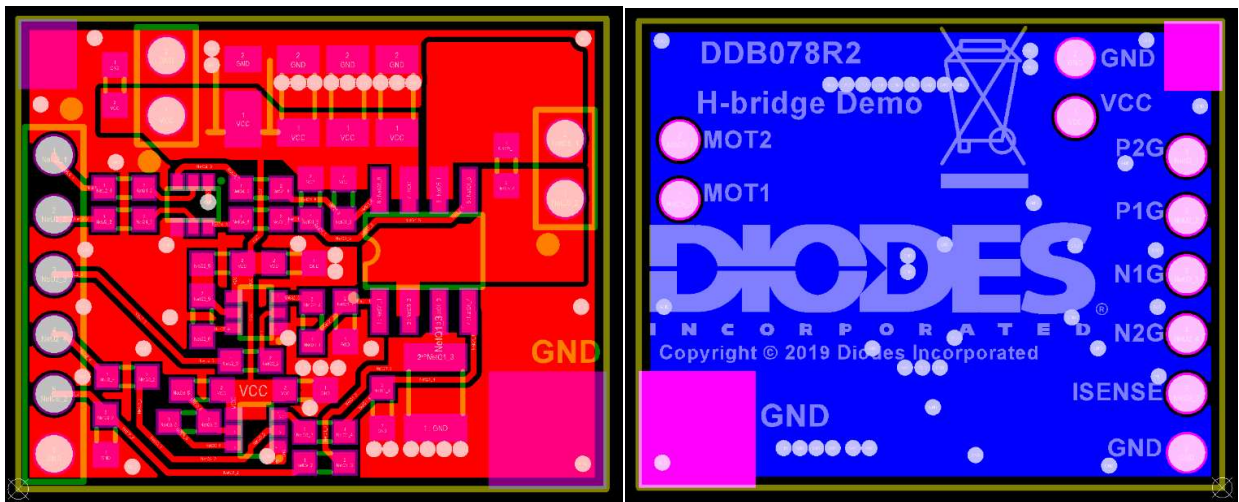
Schematic



Bill of Materials

Qty	Idents	Description	Footprint
1	Q1	DMHC4035LSDQ Complementary MOSFET H-Bridge	SO8
2	Q2, Q3	BC847PNQ NPN+PNP dual bipolar transistor	SOT363
1	Q4	BC847BSQ dual NPN bipolar transistor	SOT363
1	D1	DFLT20AQ 20V automotive TVS	PowerDI123
3	C2, C3, C4	1 μ F X7R 50V capacitor	1206
5	C5, C6, C7, C8, C9	100nF X7R 50V capacitor	0603
4	R1, R5, R10, R13	5k6 Ω Thick film resistor 1%	0603
12	R2, R3, R4, R6, R7, R8, R11, R12, R14, R15, R16, R17	4k7 Ω Thick film resistor 1%	0603
1	R9	20m Ω Thick film resistor 1%	1210
1	R18	1k Ω Thick film resistor 1%	0603
2	J1, J3	0.1" 2-way header	
1	J2	0.1" 6-way header	

Top Layer, Bottom layer and Component plots



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