EMS

30 A H-Bridge
rev. 1

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1. INTRODUCTION

Embedded Module Series (EMS) 30 A H-Bridge is a VNH3SP30 based H-Bridge driver that is designed to generate two ways drive with continuous current up to 30 A at 5.5 Volts to 36 Volts Voltage (up to 16 V for IC VNH2SP30). This module is equipped with a current sensor that can be used as a feedback to the controller. This module can drive inductive loads such as relay, solenoid, DC motor, motor stepper, and other kinds of load.

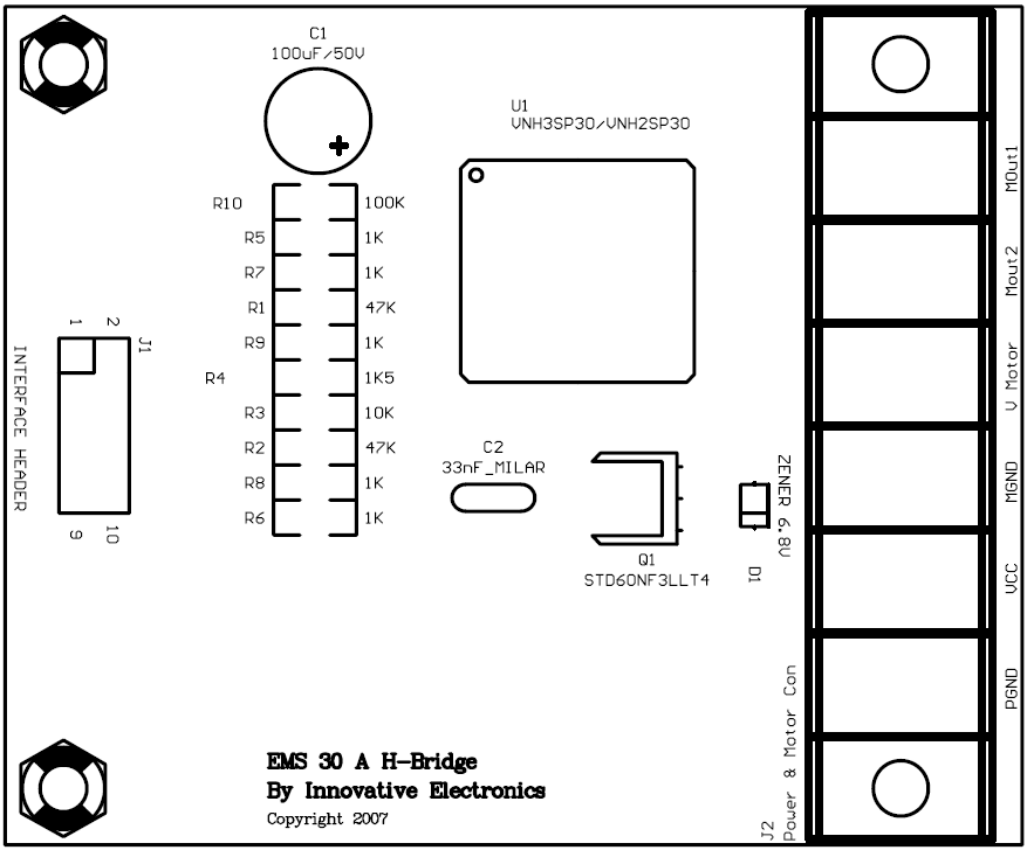
2. SPECIFICATIONS

- Consists of 1 full H-Bridge driver. A current sense circuitry for IC VNH2SP30 is available.
- Can pass 30 A continuous current.
- Load voltage ranges from 5.5 V to 36 V (up to 16 V for IC VNH2SP30).
- Compatible with TTL and CMOS input level.
- Power supply input for the driver (VCC) is separated from power supply input for the loads (V Mot).
- Tri-state output.
- PWM frequency up to 20 KHz.
- Fault Detection.
- Short circuit protection.
- Overtemperature protection.
- Undervoltage and Overvoltage Shutdown.
- Reverse Battery Protection.

Note!

A more detailed specifications can be seen in IC datasheet (included in CD/DVD).

3. LAYOUT



4. INTERFACE DESCRIPTION

The H-Bridge Module possesses 1 set headers (J1) and 1 set of terminal connectors (J2). This section will explain the description and function of each header and connector.

Interface Header (J1) functions as input and analog output of H-Bridge driver. The following is the descriptions of each pin of **Interface Header**:

Pin	Name	I/O	Function
1	MIN1	I	Input pin to determine the **MOUT1** output
2	MIN2	I	Input pin to determine the **MOUT2** output
3	MEN1	I/O	Enable pin for **MOUT1** output Give High logic to activate half H-Bridge 1, give Low logic externally to deactivate half H-Bridge 1 If there is a faulty condition (thermal shutdown, undervoltage, overvoltage, etc.), then this pin will be pulled low internally by H-Bridge module to report the faulty condition
4	MEN2	I/O	Enable pin for **MOUT2** output Give High logic to activate half H-Bridge 2, give Low logic externally to deactivate half H-Bridge 2 If there is a faulty condition (thermal shutdown, undervoltage, overvoltage, etc.), then this pin will be pulled low internally by H-Bridge module to report the faulty condition
5	MCS	O	Analog output voltage proportional to load current (output range 0-5 V) Available for IC VNH2SP30
6	MPWM	I	Input pin to control H-Bridge by PWM
7, 9	VCC	-	Connected to power supply for input (5 Volts)
8, 10	PGND	-	Reference point for power supply input

The current (In Ampere) passing through H-Bridge can be calculated with the following equation:

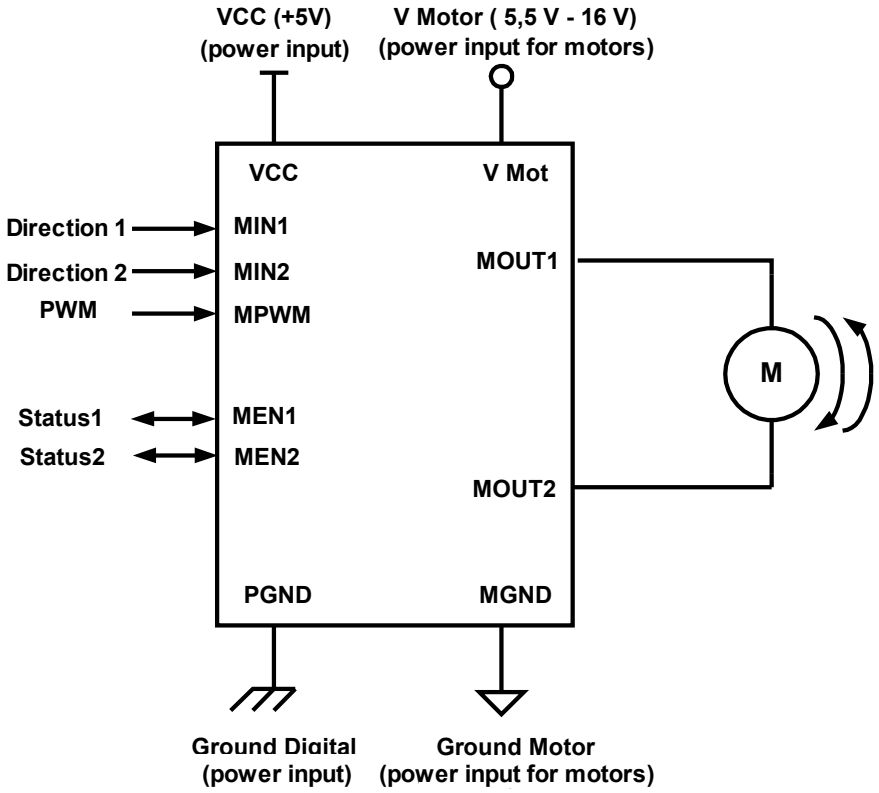
$$I = \frac{Output\_voltages\_on\_MCS\_pin}{1500} \times 11370$$

Power & Motor Con (J2) functions as a connector for power supply and load. The following is the descriptions of each terminal of **Power & Motor Con**:

Name	Function
PGND	Ground reference for power supply input
VCC	Connected to power supply input (5 Volt)
MGND	Ground reference for power supply for the load
V MOTOR (V MOT)	Connected to power supply for the load
MOUT2	Output of second half H-Bridge
MOUT1	Output of first half H-Bridge

5. CONNECTION EXAMPLE

A 30A H-Bridge Module can be used to manage the performance of 2 two-way DC motors. The example can be seen in the following figure:



6. TRUTH TABLE

H-Bridge module work status	Input and Status					Output	
	MPWM	MIN1	MIN2	MEN1	MEN2	MOUT1	MOUT2
Forward	H	H	L	H	H	V MOT	MGND
Reverse	H	L	H	H	H	MGND	V MOT
Brake to GND	H	L	L	H	H	MGND	MGND
Brake to VCC	X	H	H	H	H	V MOT	V MOT
Free Running Stop	L	L	L	H	H	OPEN	OPEN
Free Running Stop	L	H	L	H	H	V MOT	OPEN
Free Running Stop	L	L	H	H	H	OPEN	V MOT
Fault on OUT1 and OUT2	X	X	X	L	L	OPEN	OPEN
Fault on OUT1	H	X	H	L	H	OPEN	V MOT
Fault on OUT1	H	X	L	L	H	OPEN	MGND
Fault on OUT2	H	H	X	H	L	V MOT	OPEN
Fault on OUT2	H	L	X	H	L	MGND	OPEN

A more detailed description about the word status can be seen at IC datasheet (included in CD/DVD).

Description:

H = High L = Low

X = don't care Z = High Impedance (Tri-state)

7. TESTING PROCEDURE

7.1 Without Motor

1. Connects the power supply source for input (VCC) and the power supply for load (V Mot).
2. Perform testing by giving a High logic (+5V) or Low (0V) to the input (**MIN1, MIN2, MEN1, MEN2,** and **MPWM**) that matches the truth table in **Section 6**.
3. Output terminals (**MOUT1** and **MOUT2**) will produce output voltage that matches the functions stated in the truth table.

7.2 With Motor

1. Connects the H-Bridge Module with motor load as shown in **Section 5**.
2. Connects the power supply source for input (VCC) and the power supply for load (V Mot).
3. Perform testing by giving a High logic (+5V) or Low (0V) to the input (**MIN1, MIN2, MEN1, MEN2,** and **MPWM**) that matches the truth table in **Section 6**.
4. The motor will work and output terminals (**MOUT1** and **MOUT2**) will produce output voltage that matches the functions stated in the truth table.

Attachment
EMS 30 A H-Bridge Schematic