## 20A/40V Integrated Power Module for DC Brushless Motors

The project is based on STK984-090A fully-integrated inverter with current rating 20Amps and supply 40V DC has been designed to drive the Brushless DC Motors (BLDC) and permanent magnet synchronous motors (PMSM), the module work as output driver which include power stage and current sense circuitry, header connector provided to interface with Arduino or other micro-controller for PWM inputs and current feedback. Screw terminals help to connector the motor and power supply. INA168 IC is a current sensor and measure current across the internal sense resistor and provides output voltage. This voltage can be feed to Arduino analog pins to detect the current flowing across the MOSFET's. LM317 voltage regulator provides 5V DC to power the current sense IC INA168 and other logic circuitry. D1 motor power LED. Maximum PWM frequency 20 KHz and duty cycle 10 to 90 % or 100%.

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## **Current Feedback Output**

The device INA168 converts a differential input voltage to a current output. This current is converted back to a voltage with an external load resistor that sets any gain from 1 to over 100.

Current feedback Output voltage can be set using this formula V = Current X 3mohms X R1/5K ohms (Is.Rs.RL/5Kohms) Note : 3mOhms Internal Shunt Resistor of STK984-090A

## **Output Voltage Range**

The output of the INA168 device is a current that is converted to a voltage by the load resistor, R1, RX. The output current remains accurate within the compliance voltage range of the output circuitry. The shunt voltage and the input common-mode and power-supply voltages limit the maximum possible output swing. The maximum output voltage (Vout max) compliance is limited by either Equation (*Vout max = VIN- – 0.5 V*)

The project is a fully-integrated inverter power stage consisting of gate driver, 6 Mosfets and high side current shunt resistor, suitable for driving permanent magnet synchronous motors and brushless DC (BLDC) motors. The MOSFET's are configured in a 3-phase bridge with a single drain connection for the lower legs. The power stage has a full range of protections including cross conduction protections, external shutdown and under voltage lockout. Built-in charge pump for operation with low battery voltage, over current protection on both high side and low side Mosfets, over temperature shutdown, under voltage and over voltage shutdown for defined operation at all input voltages, integrated high side resistor for external current sensing.

Note : Refer STK984-090A data sheet for more information, C7-C12 capacitors are optional used as RC filters and recommended in noisy environment.

## Features

- Supply 8-18V DC
- Maximum Current 20Amps
- On Board LM317 Regulator Provides 5V
- INA168 Current Feedback output
- D1 Motor Power LED
- 14 Pin Header Connector for PWM input and Micro-Controller Interface
- CN3 3Pin Screw Terminals to Connect the Motor
- CN4 2 Pin Screw Terminal for Power Input
- Diag 1 Fault Diagnosis Output 1 (Over Current)
- Diag 2 Fault Diagnosis Output 2 (Over Temperature)







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PCB DIMENSIONS 65.86MM X 31.12MM

BOM			
RS.	QNTY.	REF.	DESC.
1	1	CN1	INA168 SMD SOT223-5P
2	1	CN2	14 PIN MALE HEADER CONNECTOR
3	1	CN3	3 PIN SCREW TERMINALS
4	1	CN4	2 PIN SCREW TERMINAL
5	3	C1,C2,C6	0.1uF SMD 0805
6	2	C3,C4	470uF/35V
7	1	C5	10uF/16V SMD 1210
8	6	C7,C8,C9,C10,C11,C12	100PF SMD 0805
9	1	D1	LED SMD 0805
10	1	R1	RX REFER NOTE
11	6	R2,R3,R4,R5,R6,R7	100E SMD 0805
12	2	R8,R9	10K SMD 0805
13	2	R10,R11	0E SMD 0805
14	6	R12,R13,R14,R15,R16,R17	OMIT
15	1	R18	2K2 SMD 0805
16	1	R19	680E SMD 0805
17	1	R20	220E SMD 0805
18	1	U1	STK984-090A
19	1	U2	LM317 SMD DPAK
20	1	C13	10uF/50V SMD 1210





