

## Sensorless FOC 3 Phase Low Power Brushless Motor Driver

Driving a 3-phase brushless DC motor is very easy with this project. It is a simple and easy-to-build project that requires only a few external components. The circuit is based on AMT49400 IC which is an advanced 3-phase, Sensorless, brushless DC (BLDC) motor driver with integrated power MOSFETs. The chip includes the field-oriented control (FOC) algorithm which is fully integrated to achieve the best efficiency and acoustic noise performance. The motor speed is controlled by applying a duty cycle signal to the PWM input. Users may use Arduino, microcontroller, or discrete circuit to generate PWM for the speed controller. It is a hassle-free easy to use board, just connect the 3 phase brushless motor, connect the power supply and feed PWM to control the speed of the motor. This project is the best choice to drive a FAN motor, small pumps, and brushless toy motors, etc. The circuit also outputs FG speed output information which can be used for feedback. Chip also has a short circuit protection feature that prevents damage to the IC or motor. Any of these three conditions: phase to GND, phase to VBB, and phase to phase will trigger the OCP event, and the AMT49400 will stop supplying current to the motor immediately. The OCP can recover after a power cycle or PWM demand cycle. If the OCP restart mode (EEPROM setting) is "time", the OCP can recover after 5 seconds.

The integrated field-oriented control (FOC) algorithm achieves the best efficiency and dynamic response and minimizes acoustic noise. Allegro's proprietary non-reverse start-up algorithm improves start-up performance. The motor will start up towards the target direction after power-up without reverse shaking or vibration. The Soft-On Soft-Off (SOSO) feature gradually increases the current to the motor at "on" command (windmill condition), and gradually reduces the current from the motor at the "off" command, further reducing the acoustic noise and operating the motor smoothly.

Lock Detect: A logic circuit monitors the motor position to determine if motor is running as expected. If a lock condition is detected, the motor drive will be disabled for 5 seconds before an auto-restart is attempted.

**Note 1:** Note 1: We have tested this project in stand-alone mode with PWM input. IC also features a simple I2C interface for setting motor-rated voltage, rated current, rated speed, resistance, and start-up profiles etc. The I2C interface is also used for on/off control, speed control, and speed readback. Refer to the datasheet to configure the chip in I2C mode, The PWM pin is used as SCL in the I2C mode, FG pin is used as SDA in I2C mode.

**Note 2:** The board has been designed to use A5936 or AMT49400 IC but it is tested with AMT49400 IC, all optional components are provided to use with A5936 3-Phase Sensorless Sinusoidal Fan Driver IC, refer the datasheet to configure this board for A5936 IC.

## Features

- Operating Power Supply 12V DC (Range 4V to 16V)
- Load Current 500mA (2Amps Maximum)
- Duty Cycle 10% to 100%
- Standby Current 10uA
- Lock Detection
- Short Circuit Protection
- PWM Frequency Range 80Hz to 100Khz













BOM						
NO.	QNTY.	REF.	DESC.	MANUFACTURER	SUPPLIER	SUPPLIER PART NO
1	1	CN1	5 PIN MALE HEADER 2.54MM PITCH	WURTH	DIGIKEY	732-5318-ND
2	1	CN2	3 PIN MALE HEADER 2.54MM PITCH	WURTH	DIGIKEY	732-5316-ND
3	1	C1	0.1uF/50V SMD SIZE 0805	MURATA/YAGEO	DIGIKEY	
4	1	C2	100uF/16V SMD SIZE 1210	MURATA/YAGEO	DIGIKEY	
5	1	C3	0.22uF/25V SMD SIZE 0805	MURATA/YAGEO	DIGIKEY	
6	4	R1,J1,R2,R3	DNP			
7	1	U1	AMT49400	ALLEGRO	DIGIKEY	620-2055-1-ND















PCB DIMENSION 30.16MM X 20MM





