

BLDC Motor and DC Brushed Motor Driver

This BLDC motor driver board is equipped with a smart IFX007T half-bridge. The BLDC motor control project is capable to drive one BLDC motor. Alternatively, it can be used to drive one or two bi-directional DC motors (H-Bridge configuration, cascaded to support the second motor) or up to three uni-directional DC motors (half-bridge configuration). The implemented integrated IFX007T half-bridges can be controlled by a PWM via the IN Pin. Interfacing to a microcontroller or Arduino is easy by the integrated driver IC which features logic level inputs, diagnosis with current sense, slew rate adjustment, and dead time generation, etc. The three IFX007T half-bridges are also fully protected against over-temperature, under-voltage, overcurrent, and short circuit events. The project is capable of high-frequency PWM e.g., 30Khz. All inputs are logic level, current sense outputs are for diagnosis purposes, and slew rates are adjustable using R7, R8, R9. This is able to be used for fast and inexpensive prototyping of (BL)DC motor control, easy testing of half-and full-bridge motor control Status flag diagnosis with current sense capability, Over-temperature shut down with latch behavior and under-voltage shut down. It is advisable to use forced cool air to control the temperature of the IFX007 chip.

Arduino Code is provided to test the board. The user will be able to drive a single brushed DC motor with speed control function.

• Connections: Arduino Digital Pin D5 = VH Pin 5 of Connector CN5, Arduino Digital Pin D10 = VI Pin 4 of Connector CN5, Arduino GND = GND Pin 8 of CN5, Motor Supply 8 to 40V DC = Cn1

Controller Can drive Brushed or BLDC Motor

- One BLDC Motor with Hall Sensor or FOC
- Three Unidirectional Brushed DC Motor
- One Bidirectional and One Unidirectional

Note 1: This board supports Hall sensor-based BLDC motor, Use following optional components R19, R20, R21, R22, R 23, R24, C14, C15, C16 to drive FOC based sensor-less motor

Note 2: R28, R29, and C17 divider resistors circuit is provided to monitor the motor supply voltage, the user may install f ollowing components if required.

Features

- Brushed and brushless DC motor control up to 300W continuous load
- 8–40V nominal input voltage (optimized for 24V)
- Average motor current 30A restricted due to PCB (IFX007T current limitation @ 55A min.)
- PCB Dimensions 81.44 x 44.77 mm







Applications

- Can be used to drive motors in various industrial applications
- Power Tools
- Healthcare (e.g., hospital beds)
- Robots
- Pumps
- Massage chairs
- Fans
- Multi-copter
- CAV
- Vacuum cleaners
- Home & garden
- 3D printer
- Industrial automation

The IFX007T is an integrated high current half bridge for motor drive applications. It is part of the Industrial & Multi-Purpose NovalithIC[™] family containing one p-channel high-side MOSFET and one n-channel low-side MOSFET with an integrated driver IC in one package. Due to the p-channel high-side switch the need for a charge pump is eliminated thus minimizing EMI. Interfacing to a microcontroller is made easy by the integrated driver IC which features logic level inputs, diagnosis with current sense, slew rate adjustment, dead time generation and protection against overtemperature, undervoltage, overcurrent and short circuit. The IFX007T provides a cost optimized solution for protected high current PWM motor drives with very low board space consumption.

Short circuit protection

The device provides embedded protection functions against

- output short circuit to ground
- output short circuit to supply voltage
- short circuit of the oad

The short circuit protection is realized by the previously described current limitation in combination with the overtemperature shutdown of the device.

Input circuit

The control inputs IN and INH consist of TTL/CMOS compatible schmitt triggers with hysteresis which control the integrated gate drivers for the MOSFETs. Setting the INH pin to high enables the device. In this condition one of the two power switches is switched on depending on the status of the IN pin. To deactivate both switches, the INH pin has to be set to low. No external driver is needed. The IFX007T can be interfaced directly to a microcontroller.

Dead time generation

In bridge applications it has to be assured that the high-side and low-side MOSFET are not conducting at the same time, connecting directly the battery voltage to GND. This is assured by a circuit in the driver IC, generating a so-called dead time between switching off one MOSFET and switching on the other. The dead

time generated in the driver IC is automatically adjusted to the selected slew rate

Adjustable slew rate (Adjustable Using External Resistor R7, R8, R9) Refer Data Sheet of IFX007 for more Info

In order to optimize electromagnetic emission, the switching speed of the MOSFETs is adjustable by an external resistor R7, R8, R9. The slew rate pin SR allows the user to optimize the balance between emission and power dissipation within his own application by connecting an external resistor RSR to GND.

Status flag diagnosis with current sense capability

The sense pin IS is used as a combined current sense and error flag output. In normal operation (current sense mode), a current source is connected to the status pin, which delivers a current proportional to the forward load current flowing through the active high-side switch.















0 7 0 0 5









www.electronics-lab.com





Three DC Motor Speed Controller

















0 7 0 0 5



07005



PCB DIMENSIONS 81.44MM X 44.77MM





BOM						
NO	QNTY.	REF	DESC	MANUFACTURER	SUPPLIER	SUPPLIER PART NO
1	1	CN1	2 PIN SCREW TERMINAL PITCH 5.08MM	PHOENIX	DIGIKEY	277-1247-ND
2	1	CN2	3 PIN SCREW TERMINAL PITCH 5.08MM	PHOENIX	DIGIKEY	277-1248-ND
3	1	CN3	5 PIN MALE HEADER CONNECTOR PITCH 2.54MM	WURTH	DIGIKEY	732-5318-ND
4	1	CN4	8 PIN MALE HEADER PITCH 2.54MM	WURTH	DIGIKEY	732-5321-ND
5	1	CN5	8 PIN MALE HEADER PITCH 2.54MM	WURTH	DIGIKEY	732-5321-ND
6	6	C1,C2,C3,C4,C5,C6	0.22uF/50V SMD SIZE 1206	MURATA/YAGEO	DIGIKEY	
7	5	C7,C8,C9,C12,C21	0.1uF/50V SMD SIZE 0805	MURATA/YAGEO	DIGIKEY	
8	1	C10	220uF/50V ELECTROLYTIC	MURATA/YAGEO	DIGIKEY	
9	1	C11	10KPF/50V SMD SIZE 0805	MURATA/YAGEO	DIGIKEY	
10	7	R1,R2,R3,R4,R5,R6,C13	10K 5% SMD SIZE 0805	MURATA/YAGEO	DIGIKEY	
11	12	C14,C15,C16,C17,R19,R20,R21,R22,R23,R24,R28,R29	DNP			
12	3	C18,C19,C20	1uF/50V SMD SIZE 1206	MURATA/YAGEO	DIGIKEY	
13	1	D1	LED SMD SIZE 0805	MURATA/YAGEO	DIGIKEY	160-1427-1-ND
14	З	R7,R8,R9	510E 1% SMD SIZE 0805	MURATA/YAGEO	DIGIKEY	
15	2	R10,R12	1K 1% SMD SIZE 0805	MURATA/YAGEO	DIGIKEY	
16	4	R11,R13,R14,R15	3K3 5% SMD SIZE 0805	MURATA/YAGEO	DIGIKEY	
17	3	R16,R17,R18	11K 5% SMD SIZE 0805	MURATA/YAGEO	DIGIKEY	
18	3	R25,R26,R27	0E SMD SIZE 0805	MURATA/YAGEO	DIGIKEY	
19	3	U1,U2,U3	IFX007T	INFINION	DIGIKEY	IFX007TAUMA1CT-ND



electronics-lab

000 00000 00000 00