

Development board for Brushless Motor, DC Brushed Motor, AC Motors (Pre-Driver)



The project described here is a pre-driver for brushless motors with a hall sensor. The board incorporates many features like current monitor, fault, speed control, direction control motor start/stop using tactile switches, various function LEDs, 6 PWM LEDs. By combining it with a hybrid IC or IPM module large size high voltage and high current motor can be driven. The project is compatible with the Microchip PICDEM MCLV motor development board, HEX firmware of the MCLV board can directly work with this board. This board is mainly targeted to control brushless DC (BLDC) motors in hall sensor operations. The board supports a free, ready-to-use MC-GUI (Motor Control – Graphical User Interface) from Microchip. Using the MC-GUI, the user can easily set and/or change motor parameters. This greatly helps the user in developing customized drive solutions. Temperature sensor chip U3 is optional so do not populate. The fault pin has to be high for normal operation, bring it to GND to disable the operations. This pin can be used as over current input from ITRIP pin or an over-current comparator of the IPM module. Overcurrent can be monitored using the IMO (RA0) pin of IC in the range 0 to 3V. PWM Frequency default 20Khz with example HEX code. Hex code is available as a download.

This flexible and low-cost board can be configured in different ways to use with Microchip's specialized motor control microcontrollers. This low-cost board has the facility to use either the PIC18F2331/2431, this hardware can be used to drive AC motor, Brush DC motor, Brushless DC motor, and solenoid. Various inputs and outputs pins are available, microcontroller has dedicated 8 power module PWM, Motion feedback Optical encoder or hall sensors, ADC to connect with a potentiometer, current feed, voltage feedback, and FOC signals. Project is compatible with microchip PICDEM MCLV board, HEX firmware of MCLV board directly can work with this board. This board is mainly targeted to control brushless DC (BLDC) motors in hall sensor operations.

Note 1: This board is Compatible with PIC DEM MCLV (Only Pre-Driver), Please refer user guide of PIC DEM MCLV before assemble and use this board.

Note 2: This board is compatible with our IPM module.

<https://www.electronics-lab.com/project/10a-400v-dc-intelligent-power-module-ipm/>

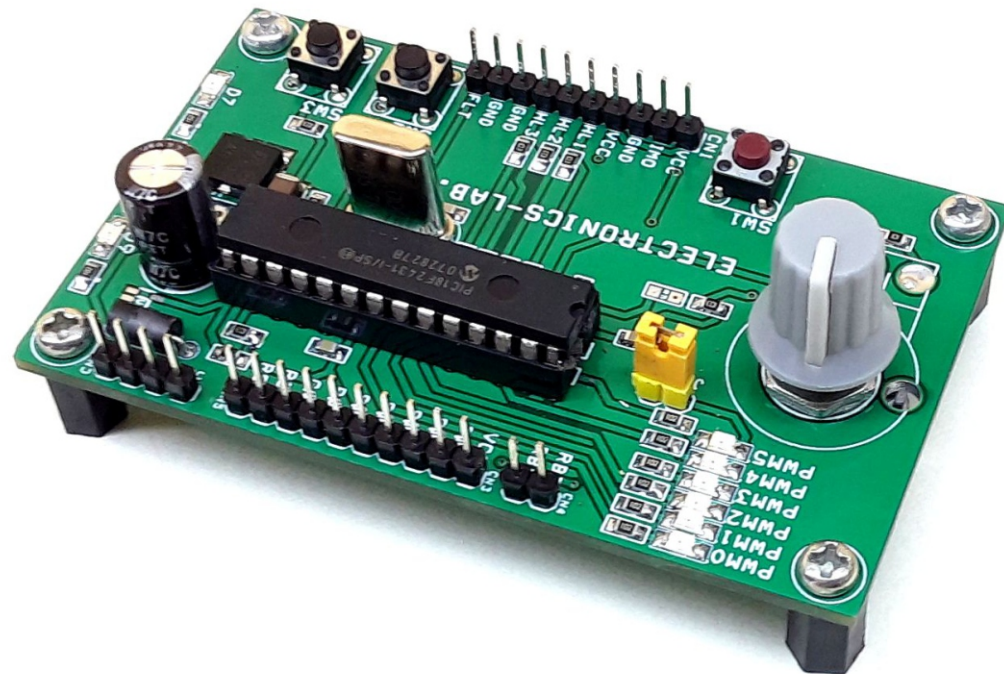
Board Connectors

Connector CN1 (Inputs and Outputs)

- Pin1>>VCC-5V DC Output,
- Pin2>> IMO-Current feedback
- Pin3>>GND
- Pin4>>VCC-5V DC Out
- Pin5>> Hall Sensor 1 (Input)
- Pin6>> Hall Sensor 2 (Input)
- Pin7>> Hall Sensor 3 (Input)
- Pin8>> GND
- Pin9>>GND
- Pin10>>Fault Input (From IPM Trip)

Connector CN2 (DC Supply Input)

- Pin1 >> 7-18V DC
- Pin2 >> 7-18V DC
- Pin3>> GND
- Pin4>> GND





Connector CN3 (PWM Outputs for Hybrid IC, IPM Module)

- Pin1>> VCC
- Pin2>> PWM5
- Pin3>> PWM4
- Pin4>> PWM3
- Pin5>> PWM2
- Pin6>> PWM1
- Pin7>> PWM0
- Pin8>> GND

Connector CN4

- PIN1 >> RB7
- Pin2>> RB6

Connector CN5

- Pin1>>RC7 >> RX RS232
- Pin2>>RC6>> TX RS232

Other Components

- SW1>>Reset Switch
- SW2>>Run/Stop
- SW3>>Direction Change
- Potentiometer R4 >> Speed Control
- Jumper J1 >> Disables PWM LEDs

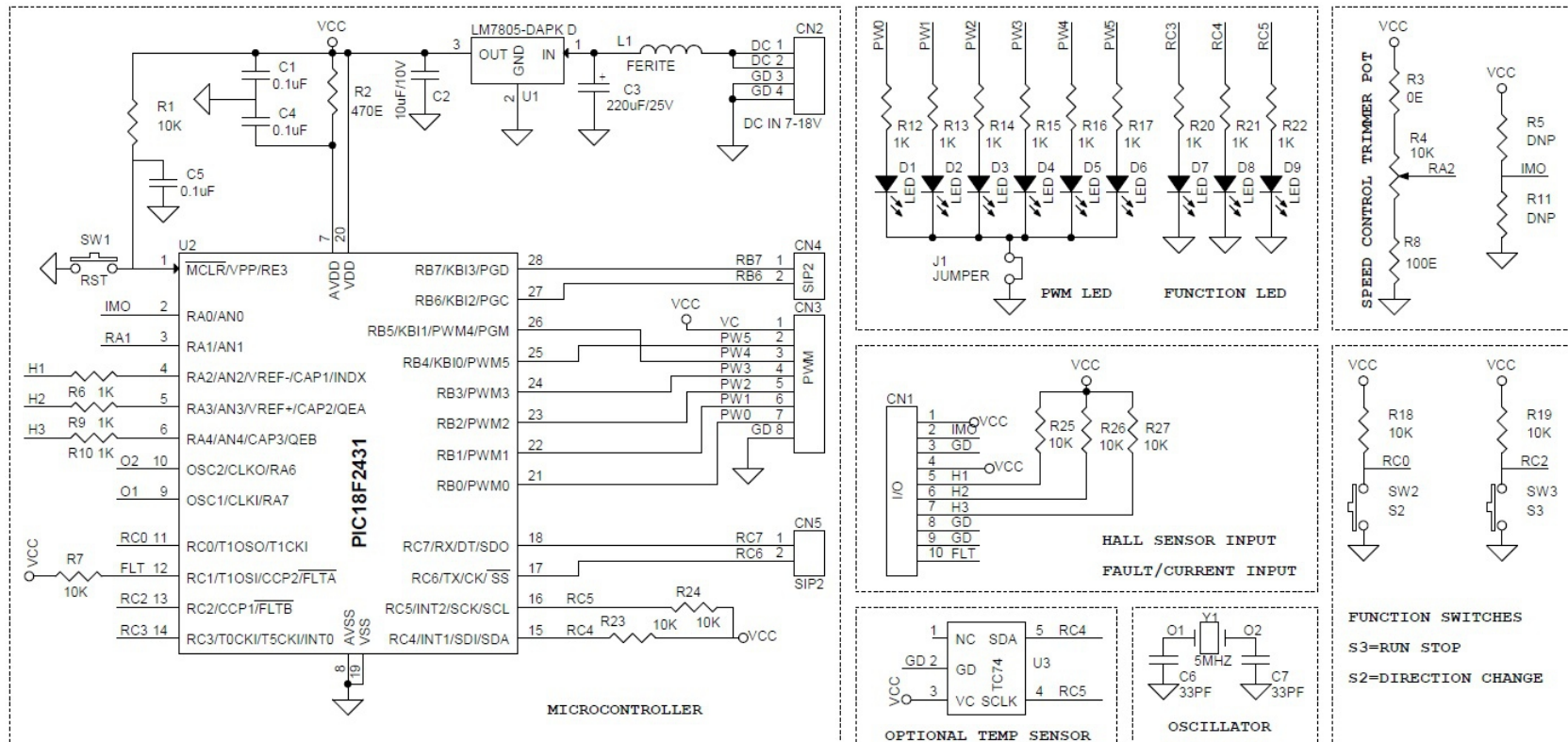
LED

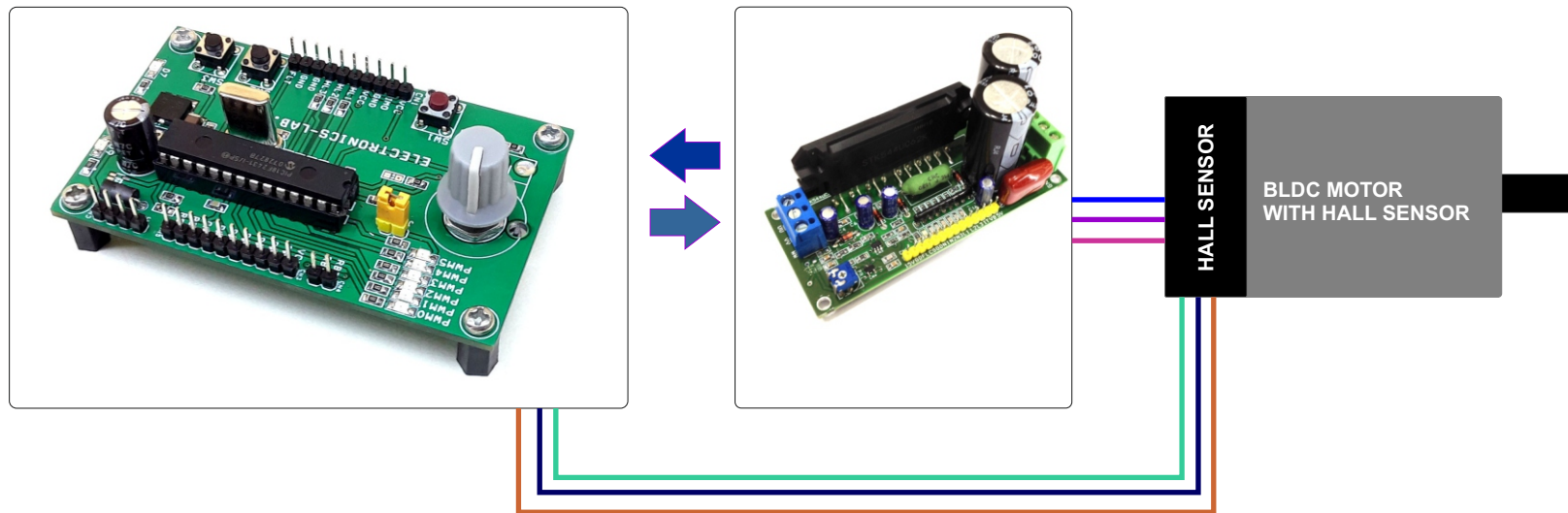
- 6 PWM LEDs =D1, D2, D3, D4, D5, D6
- D7>> Switch Function S2 and S3
- D8>> Switch Function S2 and S3
- D9>> Over Current Fault – If this LED blinks

Operations

- Connect the board with IPM, Hybrid IC Board 6PWM, ITRIP and Current Sense
- Keep the potentiometer “REF” turned counter clockwise.
- Connect the Power Supply 7 to 18V
- Press and release switch S2 once.
- Turn the potentiometer “REF” clockwise, the motor should rotate.
- Each press of S2 toggles the control between Run and Stop conditions.
- To change the direction of rotation, press S3.
- If the motor stops and LED D1 blinks, it indicates that there was an overcurrent
- Fault. Reduce the speed “REF” and press either S2 or S3 to clear the Fault and resume operation





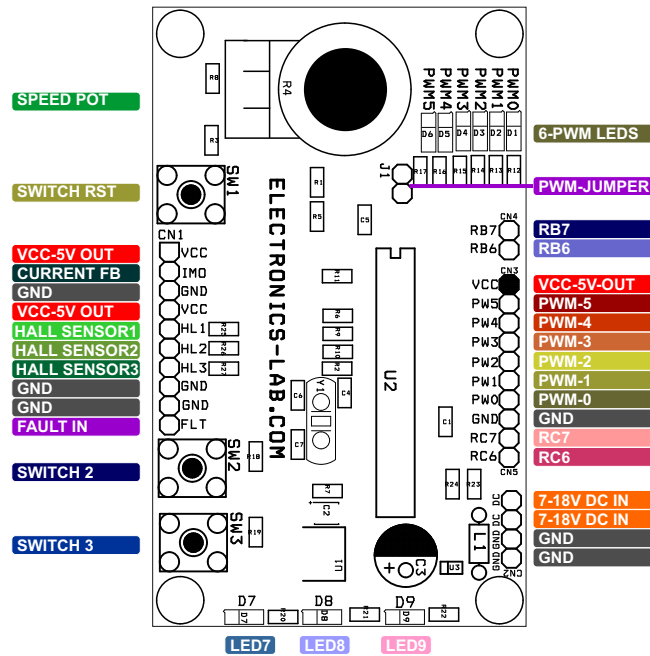


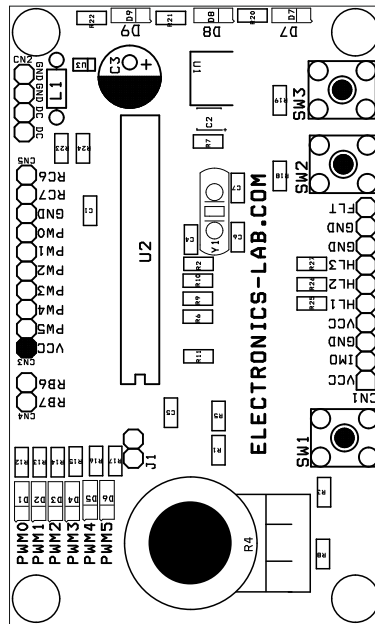


BOM

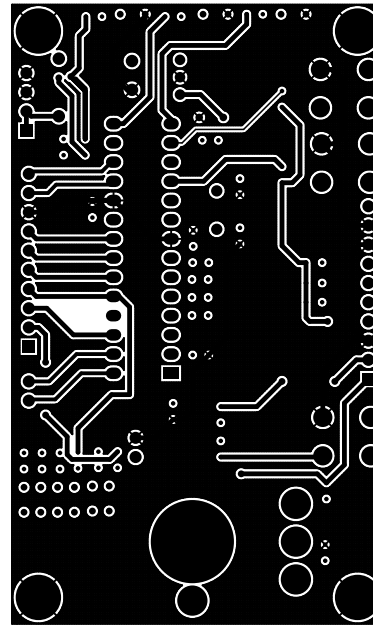
NO.	QNTY	REF.	DESC.	MANUFACTURER	SUPPLIER	SUPPLIER PART NO
1	1	CN1	10 PIN MALE HEADER PITCH 2.54MM	WURTH	DIGIKEY	732-2670-ND
2	1	CN2	2 PIN MALE HEADER PITCH 2.54MM	WURTH	DIGIKEY	732-5315-ND
3	1	CN3	8 PIN MALE HEADER PITCH 2.54MM	WURTH	DIGIKEY	732-5321-ND
4	2	CN4,CN5	2 PIN MALE HEADER PITCH 2.54MM	WURTH	DIGIKEY	732-5315-ND
5	3	C1,C4,C5	0.1uF/50V SMD SIZE 0805	MUARATA/YAGEO	DIGIKEY	
6	1	C2	10uF/10V SMD SIZE 1206 OR 1210	MUARATA/YAGEO	DIGIKEY	
7	1	C3	220uF/25V ELECTROLYTIC	NICHICON	DIGIKEY	493-15236-3-ND
8	2	C6,C7	33PF/50V SMD SIZE 0805	MUARATA/YAGEO	DIGIKEY	
9	9	D1,D2,D3,D4,D5,D6,D7,D8,D9	LED SMD RED COLOR SIZE 1206	EVERLIGHT	DIGIKEY	1080-1417-2-ND
10	1	J1	JUMPER AND SHUNT	SHULINS	DIGIKEY	S9001-ND
11	1	L1	FERITE/THT	KEMET	MOUSER	80-B-01-A
12	10	R1,R4,R7,R18,R19,R23,R24,R25,R26,R27	10K 5% SMD SIZE 0805	MUARATA/YAGEO		
13	1	R2	470E 5% SMD SIZE 0805	MUARATA/YAGEO		
14	1	R3	0E SMD SIZE 0805	MUARATA/YAGEO		
15	2	R5,R11	DNP			
16	12	R6,R9,R10,R12,R13,R14,R15,R16,R17,R20,R21,R22	1K 5% SMD SIZE 0805	MUARATA/YAGEO		
17	1	R8	100E 5% SMD SIZE 0805	MUARATA/YAGEO		
18	1	SW1	TACT SWITCH	C&K	DIGIKEY	CKN9085CT-ND
19	1	SW2	TACT SWITCH	C&K	DIGIKEY	CKN9085CT-ND
20	1	SW3	TACT SWITCH	C&K	DIGIKEY	CKN9085CT-ND
21	1	U1	LM7805-DAPK D	ON SEMI	DIGIKEY	MC78M05CDTGOS-ND
22	1	U2	PIC18F2431	MICROCHIP	MOUSER	579-PIC18F2431-I/SP
23	1	U3	DNP			
24	1	Y1	5MHZ	ECS INC	DIGIKEY	XC1738-ND
25	1	J1	2 PIN MALE HEADER PITCH 2.54MM	WURTH	DIGIKEY	732-5315-ND
26	1	SOCKET	28 PIN DIP IC SOCKET	ON SHORE TECH	DIGIKEY	ED3050-5-ND



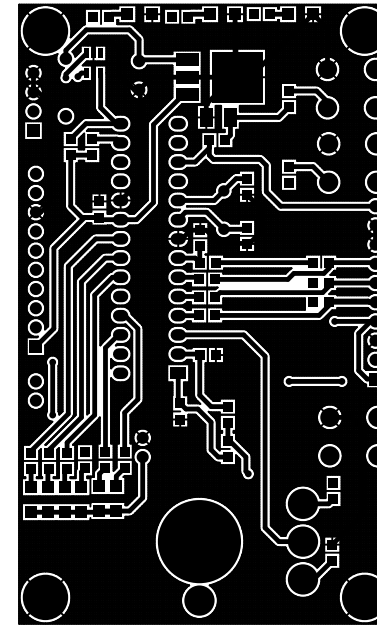




SILK SCREEN TOP



BOTTOM LAYER



TOP LAYER

PCB DIMENSIONS 82.55MM X 49.85MM