High Current Half Bridge with Over Current Shutdown

The project presented here is a versatile high voltage Half-Bridge with Over current shutdown. The project is built using LT1158 IC from Analog Devices. It is suited for many applications as listed below. A single input pin on the LT1158 synchronously controls two N-channel power MOSFETs IRF3710 in a totem pole configuration. Unique adaptive protection against shoot-through currents eliminates all matching requirements for the two MOSFETs. This greatly eases the design of high efficiency motor control and switching regulator systems. A continuous current limit loop in the LT1158 regulates short-circuit current in the top power MOSFET. Higher start-up currents are allowed as long as the MOSFET VDS does not exceed 1.2V. By returning the FAULT output to the enable input, the LT1158 will automatically shut down in the event of a fault and retry when an internal pull-up current has recharged the enable capacitor. An on-chip charge pump is switched in when needed to turn on the top N-channel MOSFET continuously. Special circuitry ensures that the top side gate drive is safely maintained in the transition between PWM and DC operation. The gate-to-source voltages are internally limited to 14.5V when operating at higher supply voltages. Circuit required single PWM signal, duty cycle 0 to 99%, frequency 0 to 100Khz. Working supply range 12V to 24V DC.

Note: The Half-bridge driver is configured as over-current shutdown, don't install R7 resistor and C8 capacitor if this feature is not required. In this case, Fault and Enable pins are available for the external interface. Read the datasheet of LT1158 for more information.

Connections

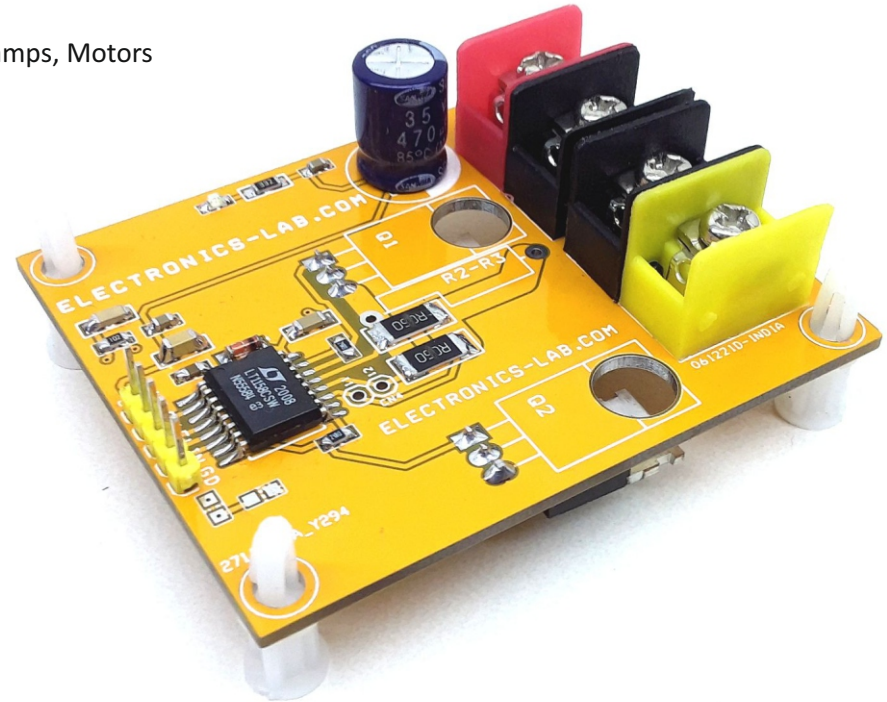
- CN1 Connector: DC Supply input 12V to 24V DC
- CN2 Connector: Load (Motor, Lamp, LED, DC-DC Converter)
- CN3 Connector: Pin 1 VCC, Pin 2 Enable, Pin 3 Fault, Pin 4 PWM In, Pin 5 GND

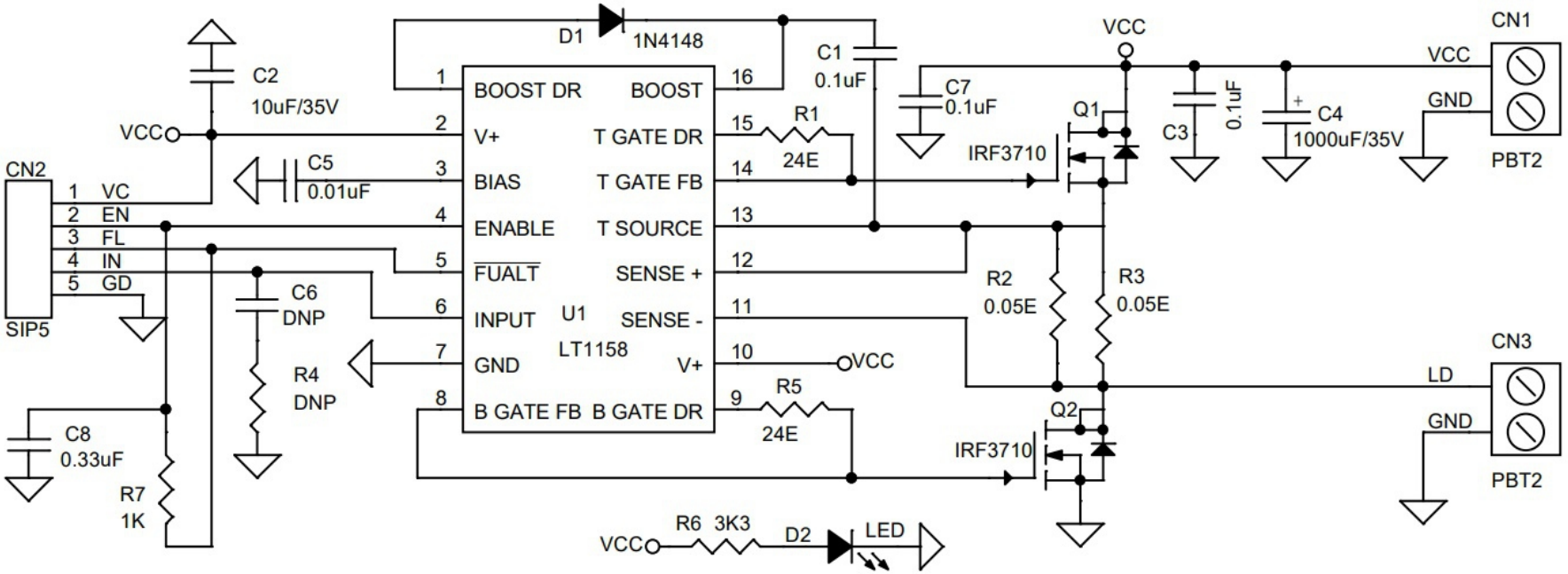
Applications

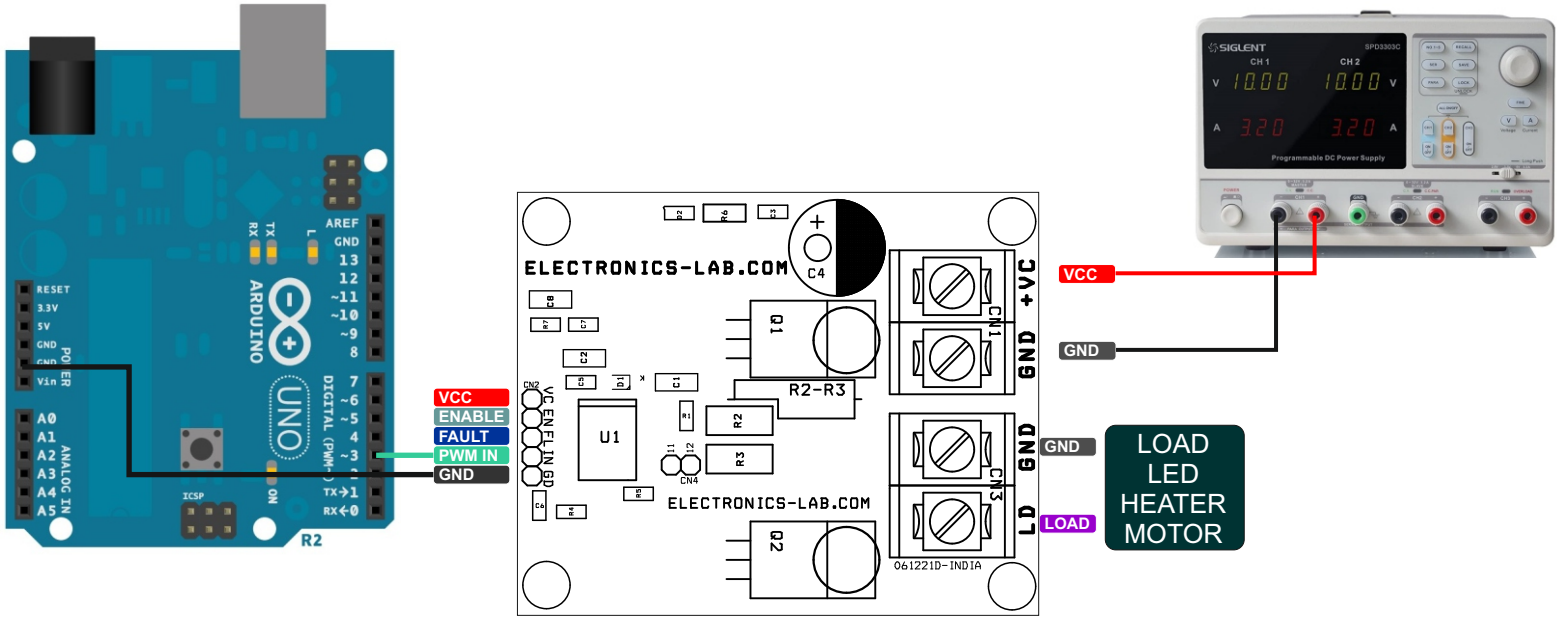
- PWM of High Current Resistive and Inductive Loads, Such as Heaters, LED, Lamps, Motors
- Half Bridge and Full Bridge Motor Control
- Synchronous Step-Down Switching Regulators
- Three-Phase Brushless Motor Drive
- High Current Transducer Drivers

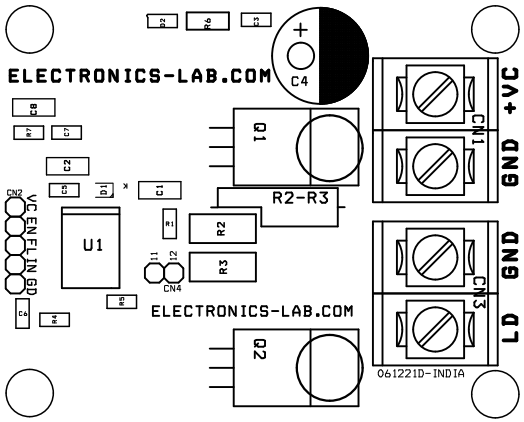
Features

- Supply Range 12V to 24V
- Load up to 7Amps
- Over Current Shutdown Approx. 7.5Amps
- PWM Frequency Input Range 0 to 100Khz
- PWM Duty Cycle 0 to 99%
- D2 Power LED
- Continuous Current Limit Protection
- Auto Shutdown and Retry Capability
- Built-In Gate Voltage Protection
- Compatible with Current-Sensing MOSFETs
- TTL/CMOS Input Levels
- PCB Dimensions 69.22 x 55.88 mm

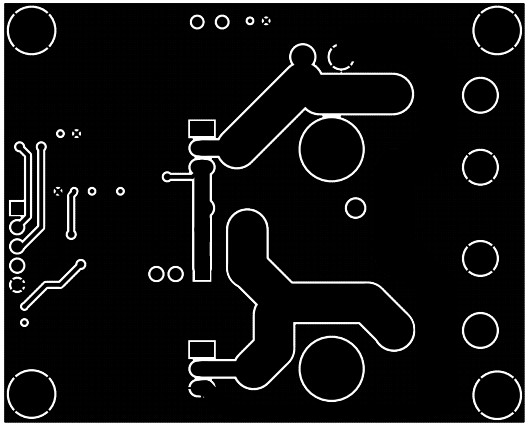



D1
1N4148
C1
0.1uF
C2
10uF/35V
VCC
C7
0.1uF
Q1
IRF3710
C3
0.1uF
C4
1000uF/35V
CN1
VCC
GND
PBT2
CN2
1 VC
2 EN
3 FL
4 IN
5 GD
SIP5
C5
0.01uF
C6
DNP
R4
DNP
C8
0.33uF
R7
1K
1 BOOST DR
2 V+
3 BIAS
4 ENABLE
5 FUALT
6 INPUT
7 GND
8 B GATE FB
U1
LT1158
16 BOOST
15 T GATE DR
14 T GATE FB
13 T SOURCE
12 SENSE +
11 SENSE -
10 V+
9 B GATE DR
R1
24E
R5
24E
R2
0.05E
R3
0.05E
Q2
IRF3710
CN3
LD
GND
PBT2
R6 3K3
D2
LED

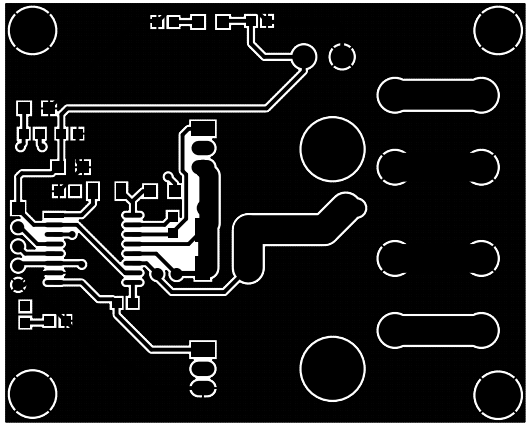

VCC
ENABLE
FAULT
PWM IN
GND
ELECTRONICS-LAB.COM
R2-R3
U1
VCC
GND
GND
LOAD
LOAD
LED
HEATER
MOTOR
061221D-INDIA



SILK SCREEN TOP



BOTTOM LAYER



TOP LAYER

PCB DIMENSIONS 69.22 X 55.88

BOM						
NO.	QNTY.	REF.	DESC	MANUFACTURER	SUPPLIER	SUPPLIER PART NO
1	2	CN1,CN3	2 PIN BARRIER BLOCK PITCH 9.53MM	TE CONNECTIVITY	DIGIKEY	A98481-ND
2	1	CN2	5 PIN MALE HEADER PITCH 2.54MM	WURTH	DIGIKEY	732-5318-ND
3	2	C3,C7	0.1uF/50V SMD SIZE 0805	MURATA/YAGEO	DIGIKEY	
4	1	C2	10uF/35V SMD SIZE 1206	MURATA/YAGEO	DIGIKEY	
5	1	C4	1000uF/35V	ILLINIOS	DIGIKEY	1572-1316-ND
6	1	C5	0.01uF/50V SMD SIZE 0805	MURATA/YAGEO	DIGIKEY	
7	2	R4,C6	DNP			
8	1	C8	0.33uF/35 SMD SIZE 1206	MURATA/YAGEO	DIGIKEY	
9	1	D1	1N4148 SMD	MICROCHIP	DIGIKEY	1086-15170-ND
10	1	D2	LED SMD SIZE 0805	LITE ON INC	DIGIKEY	160-1427-1-ND
11	2	Q1,Q2	IRF3710	INFINION	DIGIKEY	IRF3710PBF-ND
12	2	R1,R5	24E 1% SMD SIZE 0805	MURATA/YAGEO	DIGIKEY	
13	2	R2,R3	0.05E 1% SMD SIZE 2512	MURATA/YAGEO	DIGIKEY	
14	1	R6	3K3 5% SMD SIZE 1206	MURATA/YAGEO	DIGIKEY	
15	1	R7	1K 5% SMD SIZE 0805	MURATA/YAGEO	DIGIKEY	
16	1	U1	LT1158	ANALOG DEVICE	DIGIKEY	LT1158CSW#TRPBFTR-ND
17	1	C1	0.1uF/50V SMD SIZE 1206	MURATA/YAGEO	DIGIKEY	