

1200V High-Current Half-Bridge using FAN73912

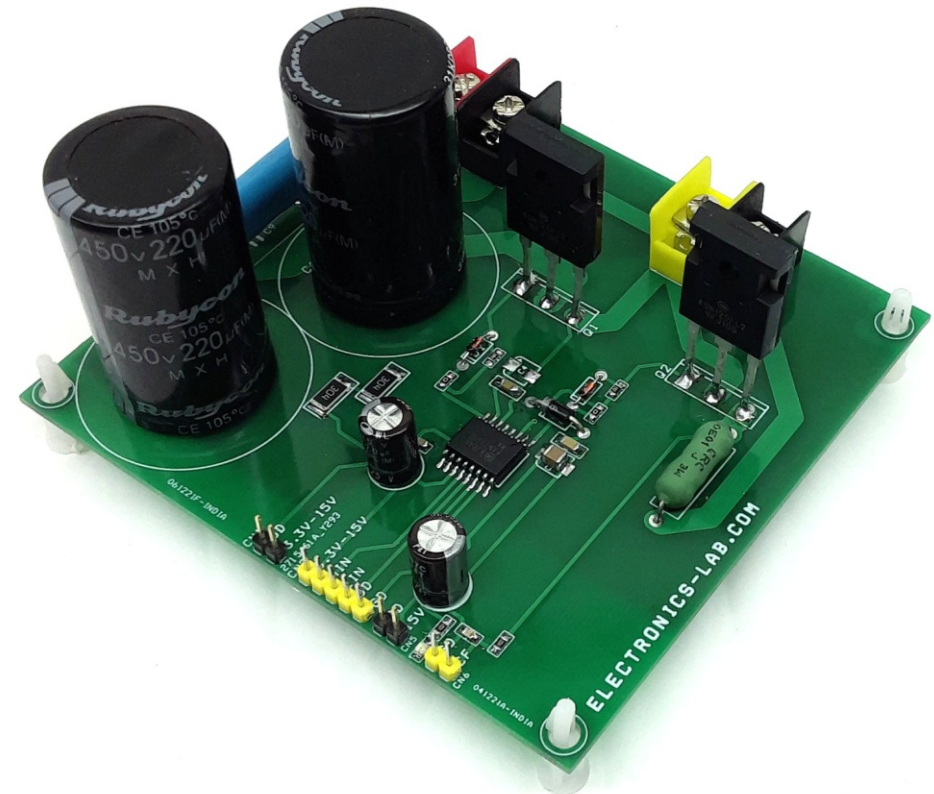
The project presented here is designed for high-voltage and high-speed driving for MOSFETs and IGBTs that operate up to +1200V. The project consists of a FAN73912 gate driver chip and 2 x IGBTs, DC bus capacitors, current sense resistor for current feedback etc. The advanced input filter of HIN provides protection against short-pulsed input signals caused by noise. An advanced level-shift circuit offers high-side gate driver operation up to $V_{S} = -9.8$ V (typical) for $V_{BS} = 15$ V. The UVLO circuit prevents malfunction when VCC and VBS are lower than the specified threshold voltage. R8 is the current sense resistor.

We have tested this board with 1200V/40Amps NGTB40N120FL2WG IGBT. The user may install any other MOSFET or IGBT as per power requirements. The value of resistors R1, R2, R3, R5, and C3 (C4) will depend on MOSFET and IGBT selected. Refer to the datasheet of FAN73912 for more information. Choose DC bus Capacitor C6, C7, C8, C9 as per operating power supply. The FAN73912 Output drivers typically source and sink 2 A and 3 A, respectively. Resistors R4 and R6 are bleeding resistors. D4 power LED for VCC, header connector CN2 for signal inputs.

The bootstrap resistor, RBOOT, must be considered in sizing the bootstrap resistance and the current developed during the initial bootstrap charge. If the resistor is needed in series with the bootstrap diode, verify that V_B does not fall below COM (ground). Recommended use is typically 5 – 10 Ohms. That increases the V_{BS} time constant. If the voltage drop of the bootstrap resistor and the diode is too high or the circuit topology does not allow a sufficient charging time, a fast recovery or ultra-fast recovery diode can be used

Features

- Floating Channel for Bootstrap Operation to +1200 V
- Logic Power Supply VDD 3.3V to 15V DC (Range 3V to 20V)
- Gate Driver Power Supply VCC 15V DC (Range 12V to 20V)
- Built-in Cycle-by-Cycle Edge-Triggered Shutdown Logic
- Built-in Shoot-Through Protection Logic
- Common-Mode dv/dt Noise Cancelling Circuit
- UVLO Functions for Both Channels
- Built-in Advanced Input Filter
- Matched Propagation Delay Below 50 ns
- Outputs in-Phase with Input Signal
- Logic and Power Ground +/- 10 V Offset
- UVLO Functions for Both Channels
- On Board Shunt Resistor for Current Feedback
- PCB Dimensions 99.70 x 106.68 mm





Connections

- **CN2:** Pin 1 = Logic + 3.3V to 15V, Pin 2 = High Input, Pin 3 Low Input, Pin 4= Shutdown (High-in =Shutdown, Low Normal Operation), Pin 5 = GND
- **CN1:** Pin 1= + 3.3V to 15 V Logic Supply, Pin 2 = GND
- **CN3:** Pin 1 = OP Load, Pin 2 GND
- **CN4:** Pin 1= +DC Load Power Supply Input, Pin2= GND
- **CN5:** Pin 1 = + 15V Gate Driver Power Supply, Pin 2 = GND
- **CN6:** Pin1= + Current Feed Back Output, Pin 2= GND

Application

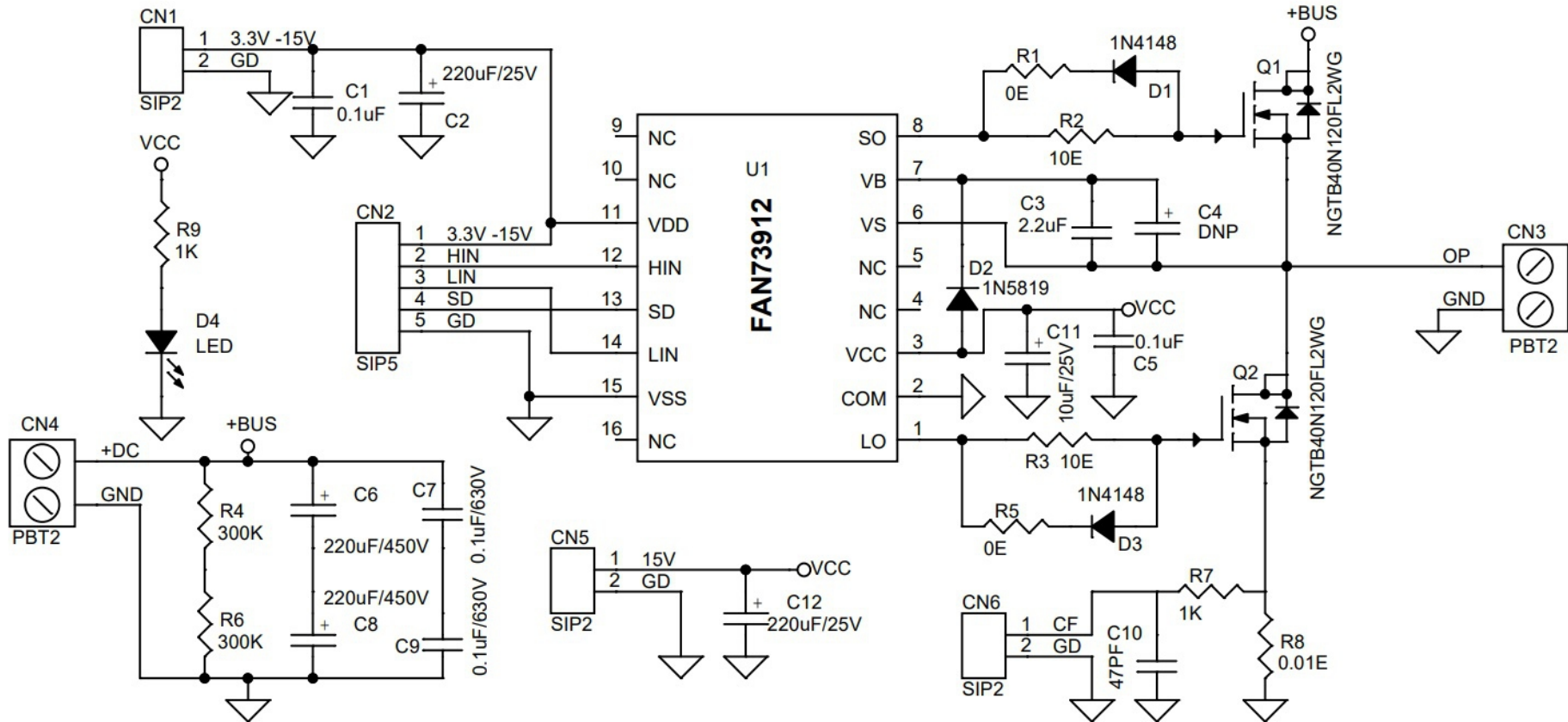
- High Current Resistive and Inductive Loads, Such as Heaters, LED, Lamps, Motors
- Half-Bridge and Full-Bridge Motor Control
- Synchronous Step-Down Switching Regulators
- Three-Phase Brushless Motor Drivers
- High Current Transducer Drivers
- Electrical Contactor
- UPS
- Solar Inverter
- Ballast
- General-Purpose Half-Bridge Topology

This board can be tested using an Arduino. Example code is provided for testing purposes. This code provides 20Khz Dual Output , Phase shift 180 Degrees, 50% duty cycle.

Credits Author of the Arduino Code **Ted Burke**

<https://batchloaf.wordpress.com/2018/04/27/h-bridge-control-example-for-arduino-nano-atmega328-2-phase-displaced-square-waves/>

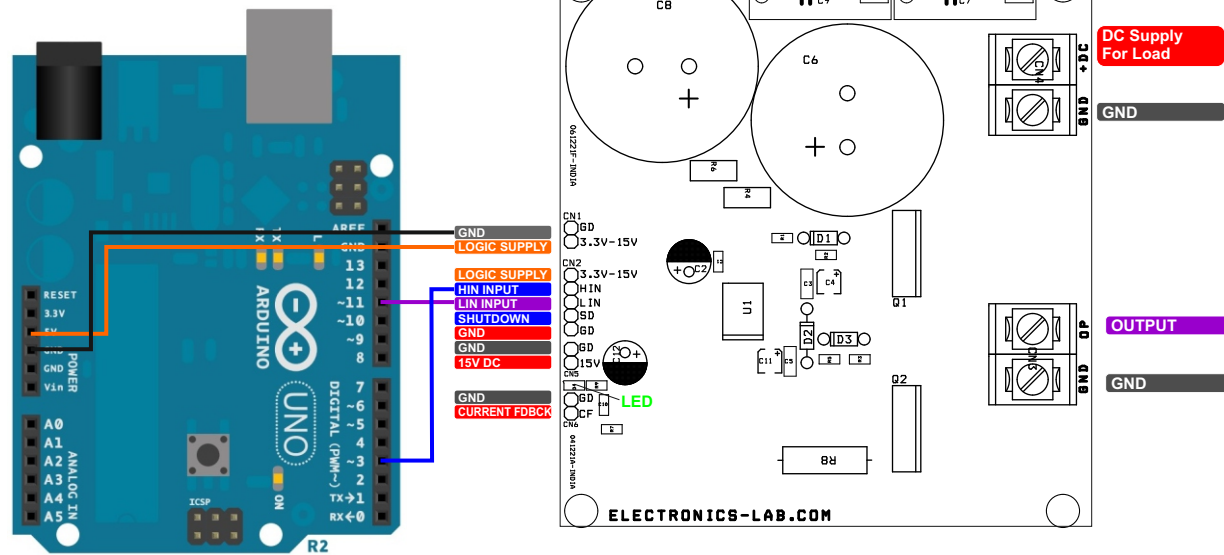


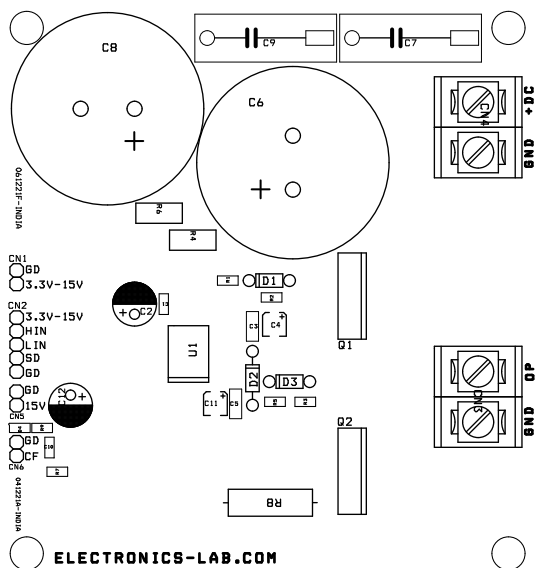




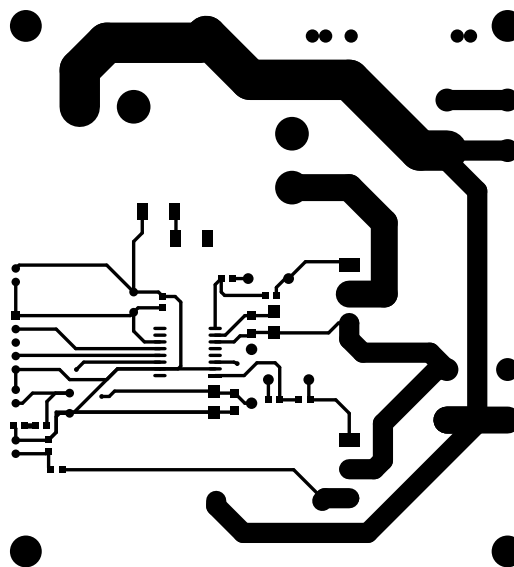
NO	QNTY	REF	DESC.	MANUFACTURER	SUPPLIER	SUPPLIER PART NO
1	3	CN1,CN5,CN6	2 PIN MALE HEADER PITCH 2.54MM	WURTH	DIGIKEY	732-5315-ND
2	1	CN2	5 PIN MALE HEADER PITCH 2.54MM	WURTH	DIGIKEY	732-5318-ND
3	2	CN3,CN4	2 PIN BARRIER CONNECTOR PITCH 9.53MM	TE CONNECTIVITY	DIGIKEY	1437664-6-ND
4	2	C1,C5	0.1uF/50V SMD SIZE 0805	MURATA/YAGEO	DIGIKEY	
5	2	C2,C12	220uF/25V	RUBYCON	DIGIKEY	1189-3720-1-ND
6	1	C3	2.2uF/25V SMD SIZE 1206	MURATA/YAGEO	DIGIKEY	
7	1	C4	DNP			DO NOT INSTALL
8	2	C6,C8	220uF/450V	RUBYCON	DIGIKEY	1189-2034-ND
9	2	C7, C9	0.1uF/630V	RUBYCON	DIGIKEY	1189-1836-ND
10	1	C10	47PF/50V	MURATA/YAGEO	DIGIKEY	
11	1	C11	10uF/25V	MURATA/YAGEO	DIGIKEY	
12	2	D1,D3	1N4148	ON SEMI	DIGIKEY	1N4148FS-ND
13	1	D2	1N5819	ON SEMI	DIGIKEY	1N5819GOS-ND
14	1	D4	LED	LITE ON INC	DIGIKEY	160-1427-1-ND
15	2	Q1,Q2	NGTB40N120FL2WG	ON SEMI	DIGIKEY	NGTB40N120FL2WGOS-ND
16	2	R1,R5	0E SMD SIZE 0805	MURATA/YAGEO	DIGIKEY	
17	2	R2,R3	10E 5% SMD SIZE 0805	MURATA/YAGEO	DIGIKEY	
18	2	R4,R6	300K 5% SMD SIZE 2512	STAKEPOLE	DIGIKEY	RMCF2512JT300KCT-ND
19	2	R7,R9	1K 5% SMD SIZE 0805	MURATA/YAGEO	DIGIKEY	
20	1	R8	0.01E/3W	OHMLITE	DIGIKEY	13FR010E-ND
21	1	U1	FAN73912	ON SEMI	DIGIKEY	FAN73912MXCT-ND



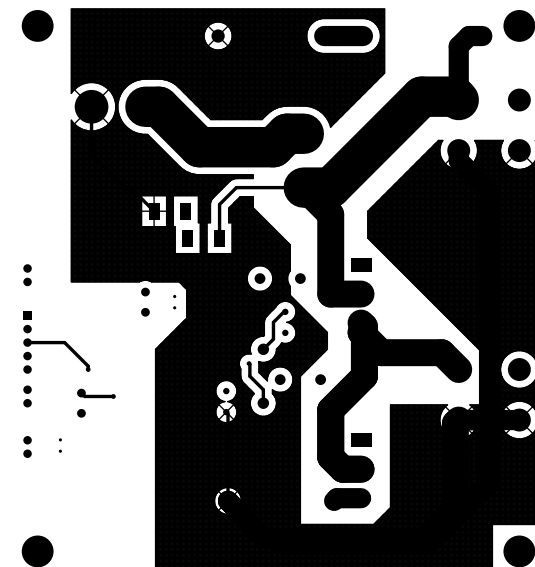




SILK SCREEN TOP



BOTTOM LAYER



TOP LAYER

PCB DIMENSIONS 99.70MM X 106.68MM

