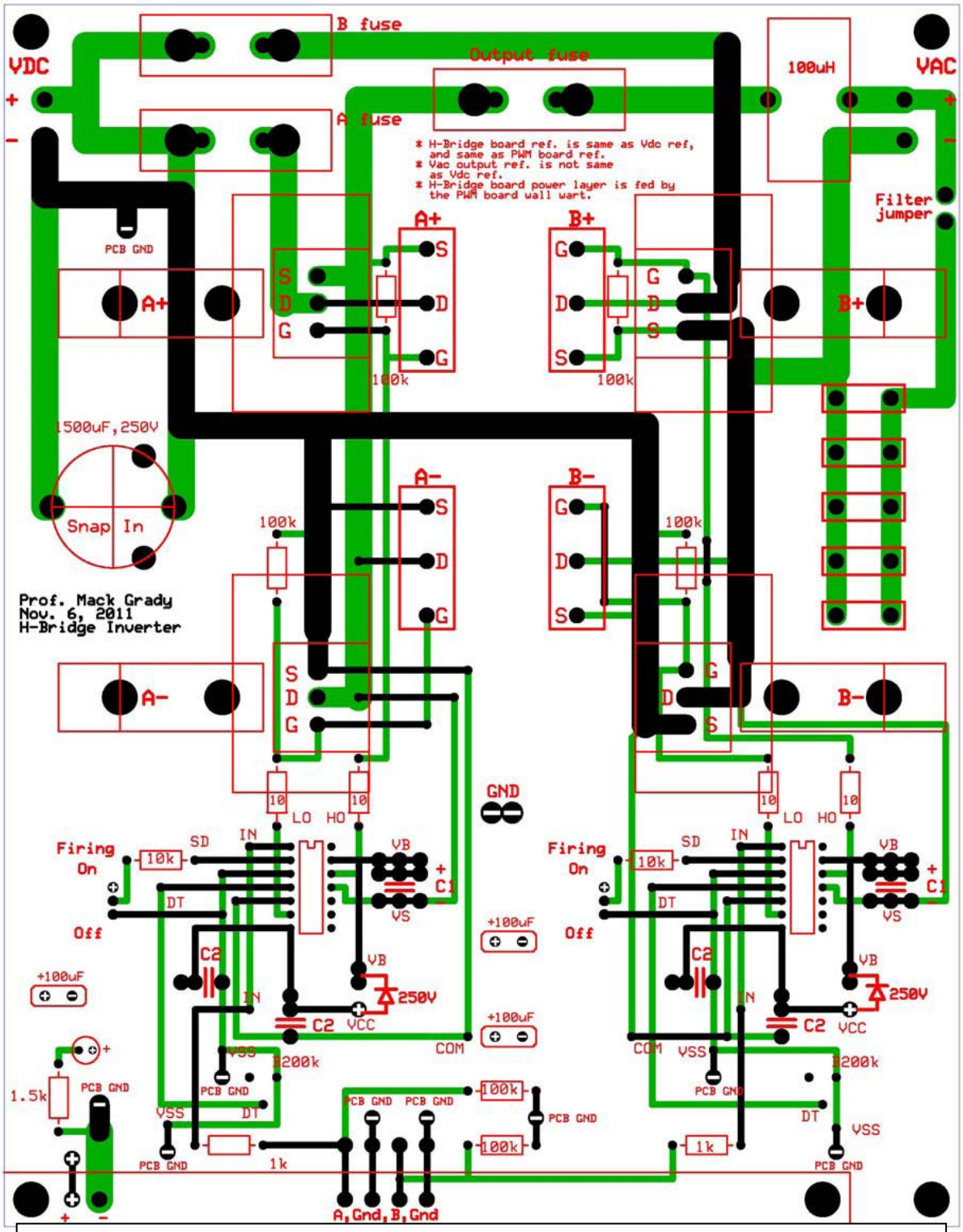
EE462L, Power Electronics, H-Bridge Inverter
Version March 30, 2014

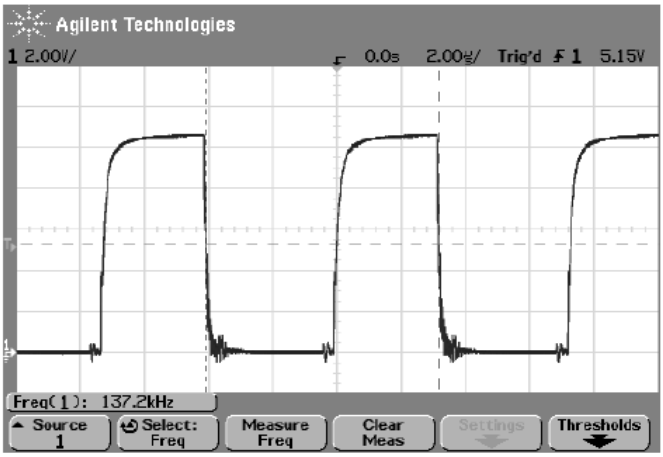
I. Introduction. In this experiment, you will build the H-Bridge portion of your inverter, connect your PWM control circuit to it, and then convert 35-40Vdc power to 60Hz ac, 100 – 200W.

II. Build the Circuit. DO NOT use the optional output filter.

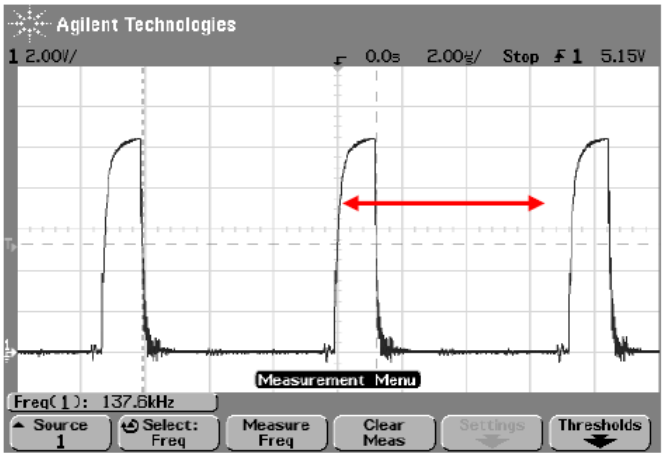


C1's are 100µF, 160V low ESR. C2's are 0.01µF, 50-100V ceramic.
Others 100µF caps are 25V, low ESR.

1. No DBR yet.
2. Join your PWM controller to the H-Bridge using two sets of nylon screws and threaded spacers. To connect the +,-,A,GND,B,GND holes, lay small #22 wires from hole to hole, soldering them on top of the boards.
3. Power up the PWM controller, using an AC wall wart for Vcont. The AC wall warts have yellow paint, and some have audio plug outputs.
4. Make sure your PWM controller is working properly, e.g., Vtridc, VAB symmetry, in linear and overmodulation.
5. One by one, use a scope to view VGS on each MOSFET. With Vcont = 0, you should see 50% duty cycle waveforms. As you increase Vcont, the VGS waveforms begin to sweep through the duty cycle variation as determined by the H-Bridge comparator logic.



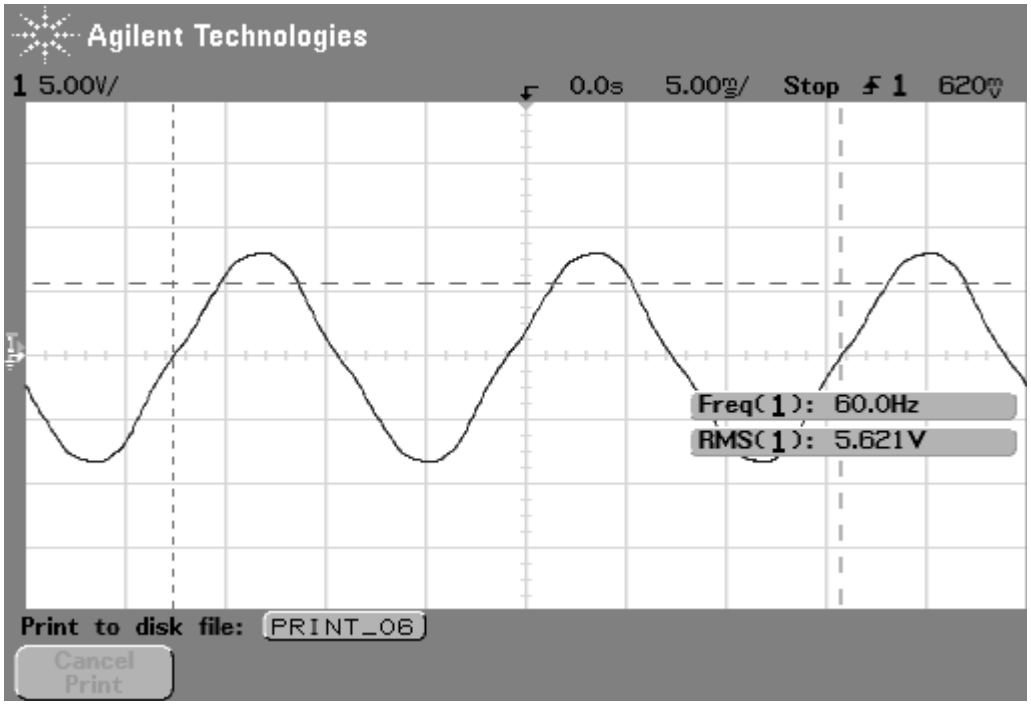
With Vcont = 0, each VGS is steady as shown Above



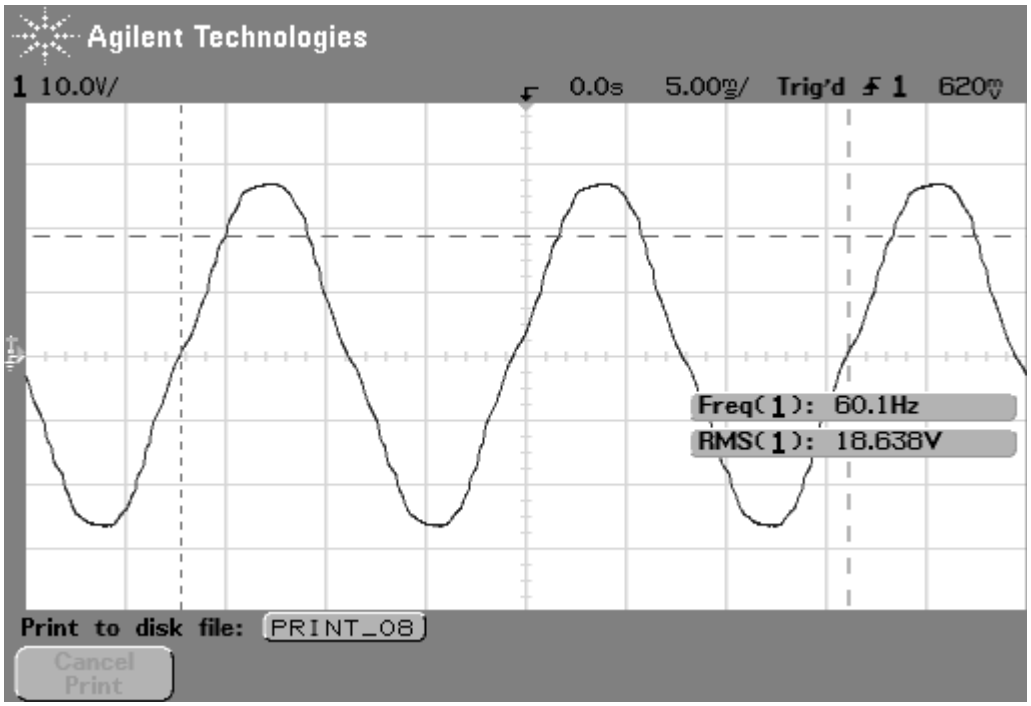
As you raise Vcont, each VGS takes on the periodic duty cycle width as determined by the PWM control logic

6. With no load on the H-Bridge output, slowly raise variac/transformer/DBR to the usual 35-40Vdc. If you see any steady variac ammeter reading, or blow a fuse, you have a short circuit someplace that must be resolved. View H-Bridge output Vac on a scope.
7. Turn off the variac and rotate the dial to zero.
8. Connect a 5Ω power resistor to the H-Bridge output, then turn it on and raise the variac so that the DBR output voltage is 10V.

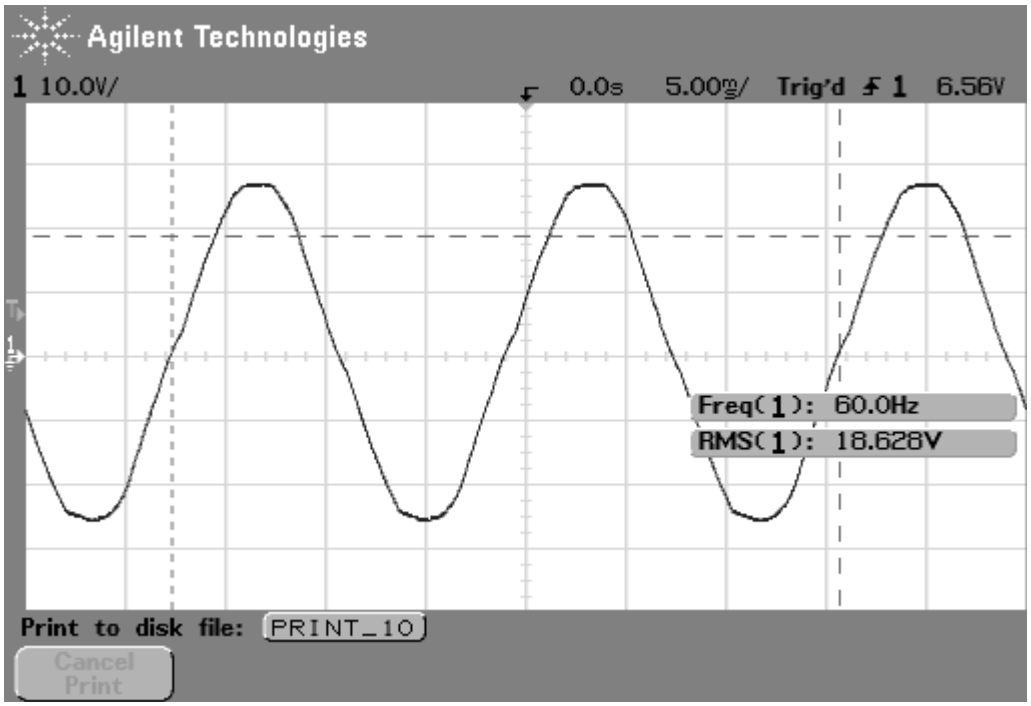
9. View the PWM controller's VAB output, and adjust Vcont so that you are just below the overmodulation point. Then, move the scope probe to view Vac across the 5 Ω load resistor. My multimeter reading was 5.6Vrms.



10. Slowly increase Vdc to about 35V. The AC voltage on my 5Ω load resistor rose to about 18.6Vrms, which corresponds to 69W. Operate for about 5 minutes and feel the MOSFET heat sinks. They should be slightly and uniformly warm.



11. My AC voltage waveform improved considerably when I used C_F = 4.7nF, which corresponded to a triangle wave frequency of 44 kHz.



International
IOR Rectifier

Data Sheet No. PD60252 revA

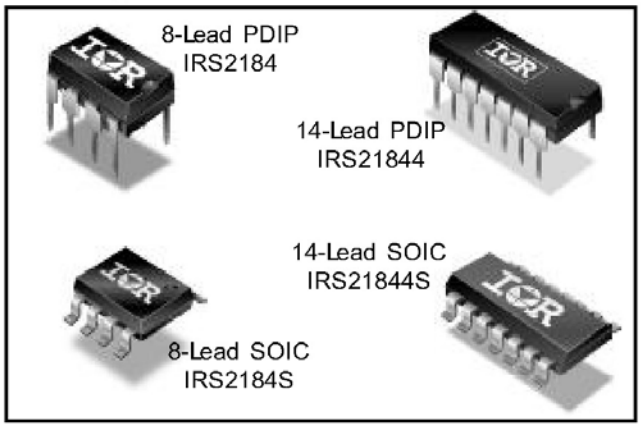
IRS2184/IRS21844(S)PbF

HALF-BRIDGE DRIVER

Features

- Floating channel designed for bootstrap operation
- Fully operational to +600 V
- Tolerant to negative transient voltage, dV/dt immune
- Gate drive supply range from 10 V to 20 V
- Undervoltage lockout for both channels
- 3.3 V and 5 V input logic compatible
- Matched propagation delay for both channels
- Logic and power ground +/- 5 V offset
- Lower di/dt gate driver for better noise immunity
- Output source/sink current capability 1.4 A/1.8 A
- RoHS compliant

Packages



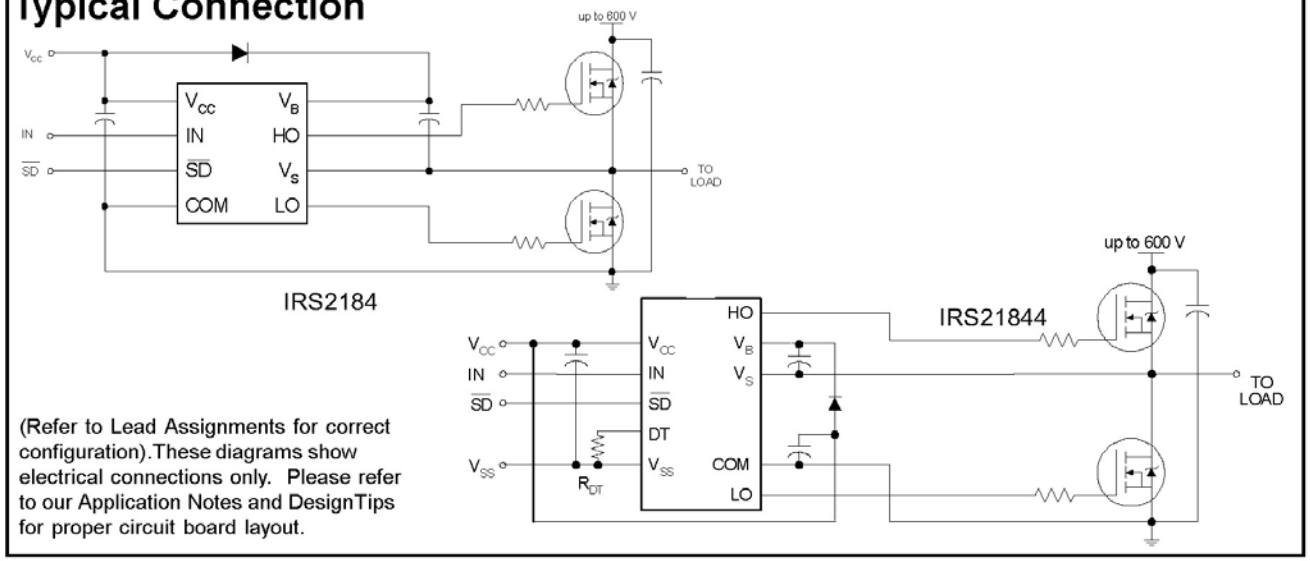
Description

The IRS2184/IRS21844 are high voltage, high speed power MOSFET and IGBT drivers with dependent high- and low-side referenced output channels. Proprietary HVIC and latch immune CMOS technologies enable ruggedized monolithic construction. The logic input is compatible with standard CMOS or LSTTL output, down to 3.3 V logic. The output drivers feature a high pulse current buffer stage designed for minimum driver cross-conduction. The floating channel can be used to drive an N-channel power MOSFET or IGBT in the high-side configuration which operates up to 600 V.

Feature Comparison

Part	Input logic	Cross-conduction prevention logic	Deadtime (ns)	Ground Pins	t_{on}/t_{off} (ns)
2181	HIN/LIN	no	none	COM	180/220
21814				V_{SS}/COM	
2183	HIN/$\overline{\text{LIN}}$	yes	Internal 400	COM	180/220
21834			Program 400-5000	V_{SS}/COM	
2184	IN/$\overline{\text{SD}}$	yes	Internal 400	COM	680/270
21844			Program 400-5000	V_{SS}/COM	

Typical Connection



(Refer to Lead Assignments for correct configuration). These diagrams show electrical connections only. Please refer to our Application Notes and DesignTips for proper circuit board layout.