

Construction of a single phase inverter

Note: you should work in pairs, each student should construct one inverter arm.

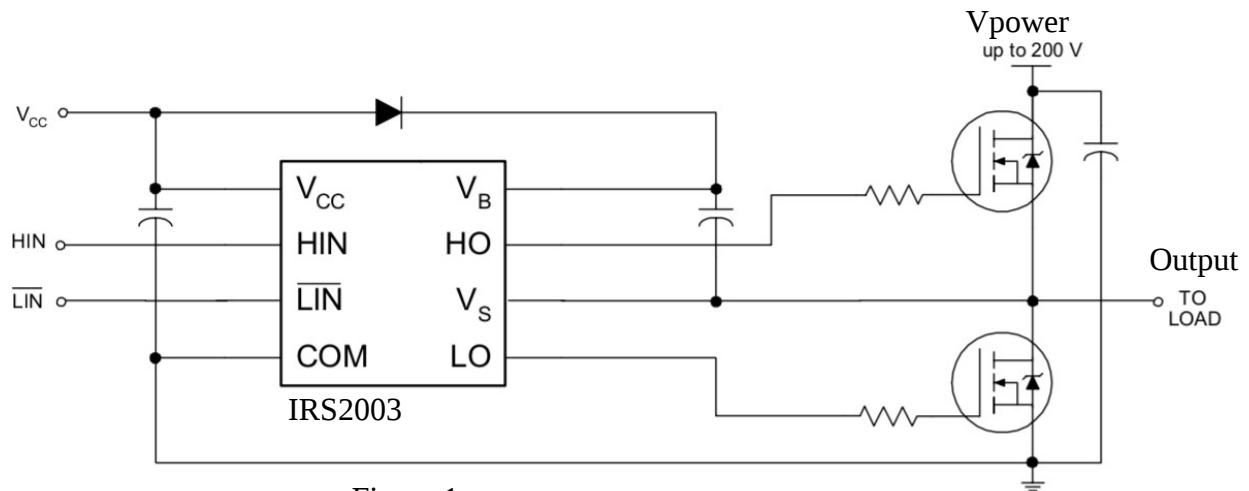


Figure 1

Introduction

In this lab, you will construct and test a single phase inverter. Each inverter will consist of two inverter arms as shown above. The IRS2003 half bridge driver IC allows a microcontroller control the upper and lower transistors in the inverter arm.

Procedure.

Using the breadboard and components provided, each student should construct an inverter arm as shown in Figure 1. The two inverter arms are then combined to form a full single phase inverter.

Two power supplies are required: One for the “power side” labelled as “Vpower” in the figure; the other labelled “Vcc”.

Vcc should be set to 15V

Vpower should be set to 30V.

Connect an RL load (provided in lab) between the outputs of the inverter arms. Connect the HIN and LIN inputs together. These should then be connected to the “pulse out” or “logic out” output from a signal generator. The output of the signal generator should be set to square wave, 1kHz.

Using an oscilloscope, measure the voltage across the load and the current through the load.

Include photographs of the waveforms in your report with a brief explanatory note.

The output of the circuit is approximately a square wave. Use Matlab to plot the spectrum of output and include this in your report. What is the Total Harmonic Distortion (THD) of the output (square wave)?

If time permits a pre-programmed microcontroller will replace the signal generator leading to a sinusoidal PWM output. Include photos of the output current and voltage waveforms.