EXPERIMENT 5 PRELAB

ECEN 5517 (Spring 2017)
Power electronics and Photovoltaic Power Systems Laboratory

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TEAM MUSE
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Converter Design

MOSFET

- Worst case blocking voltage across each MOSFET in a full bridge is V_{IN}. Thus we use 4 FQP11N40C mosfets.
- MOSFET rated blocking voltage: **400V**; MOSFET rated drain current: **10A**

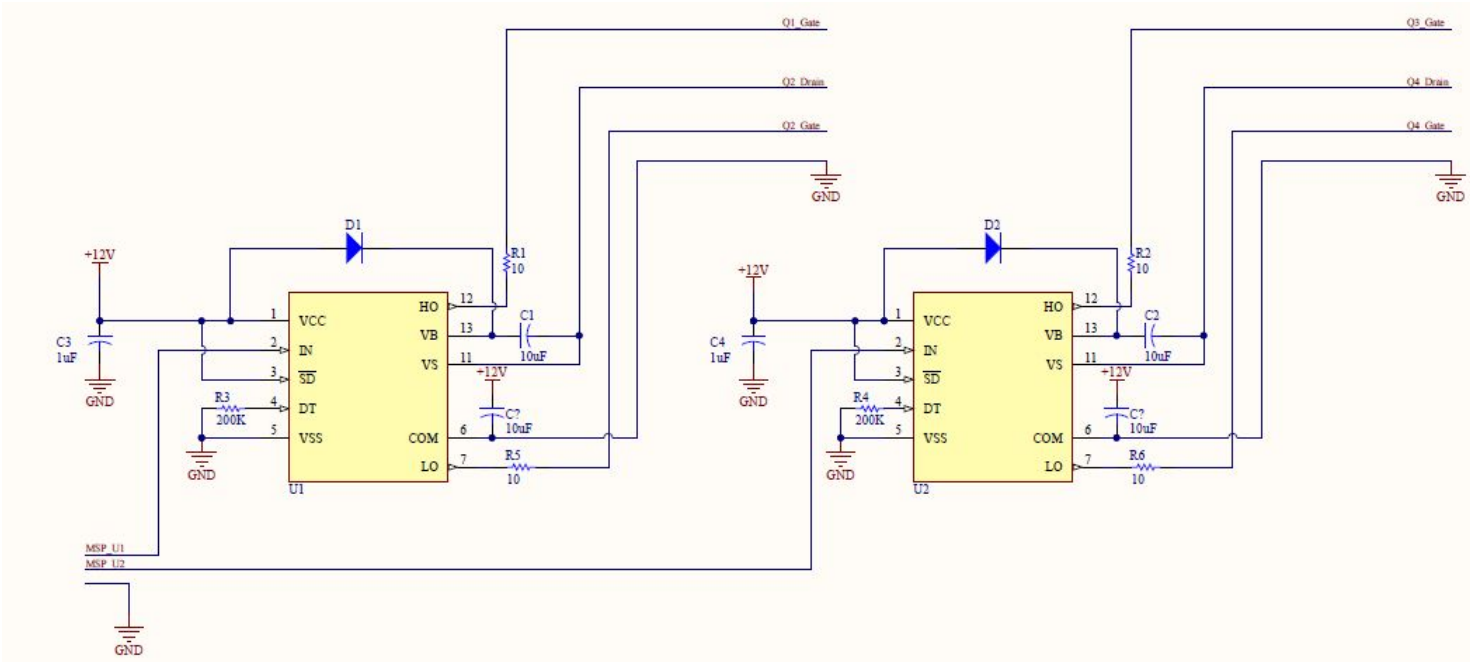
DIODE

- Diodes will be placed across each MOSFET to conduct current in modified sine wave inverters for reactive loads. The must have ratings similar to MOSFETS used. Thus we use 4 UF4004 diodes.
- Diode rated blocking voltage: **400V**; Diode rated drain current: **1A**

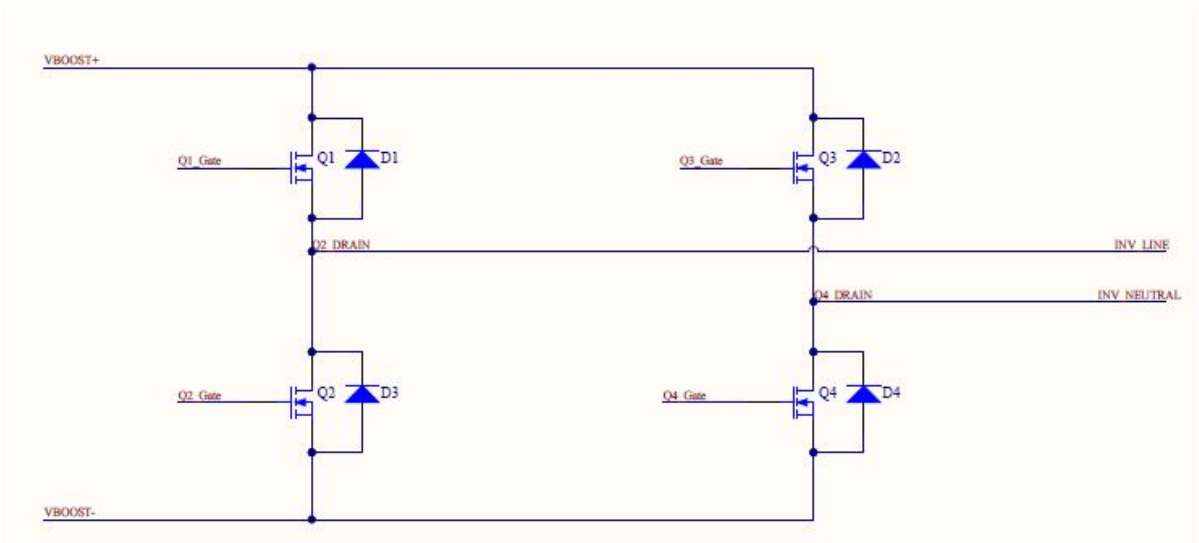
FILTER

- For modified sinewave inverters filter is not required since the switches are operated directly at 60Hz.
- An LC filter is required for a sinewave inverter to filter out switching harmonics and pass the underlying 60Hz component. The LC corner is placed at 100Hz. (Switching frequency for sinewave inverter will be 10KHz).
  C = 22uF; **L = 115mH**

Gate Drive Circuit



Inverter Circuit



Gate drive code

```
/* port initialisation is not shown in the code snippet */

#define FREQUENCY_IN_COUNTS		52083;		// Value corresponding to 60Hz
timerB_init()
{
	TB2CTL = TBCLGRP_0 + CNTL_0 + TBSSEL_SMCLK + ID_3 + MC_1;

	TB2CCTL0 = OUTMOD_4;
	TB2CCR0 = FREQUENCY_IN_COUNTS;

	/* Left half-Bridge */
	TB2CCTL1 = OUTMOD_3;

	/* Right half_bridge */
	TB2CCTL2 = OUTMOD_7;
}

Uint16_t duty_counts = 20833; // Set to 40% duty cycle for now
while(1)
{
	TB2CCR1 = duty_counts;
	TB2CCR2 = FREQUENCY_IN_COUNTS - duty_counts;
}
```