

### Exercise 24.1.2

I chose  $1k\Omega$  for the resistor which connect the phototransistor.

### Exercise 24.2.1

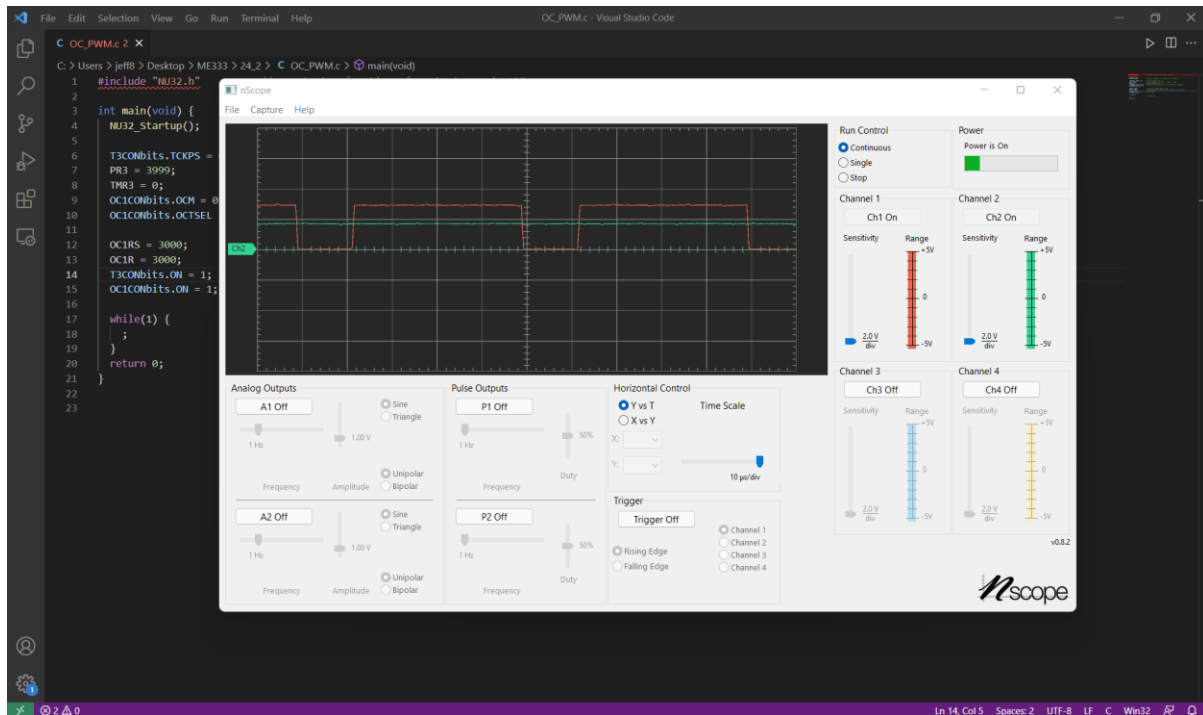
The prescaler is 1 and we want 20kHz PWM on OC1.

$$80,000,000/20,000/1-1=3999$$

### Exercise 24.2.2

(a)

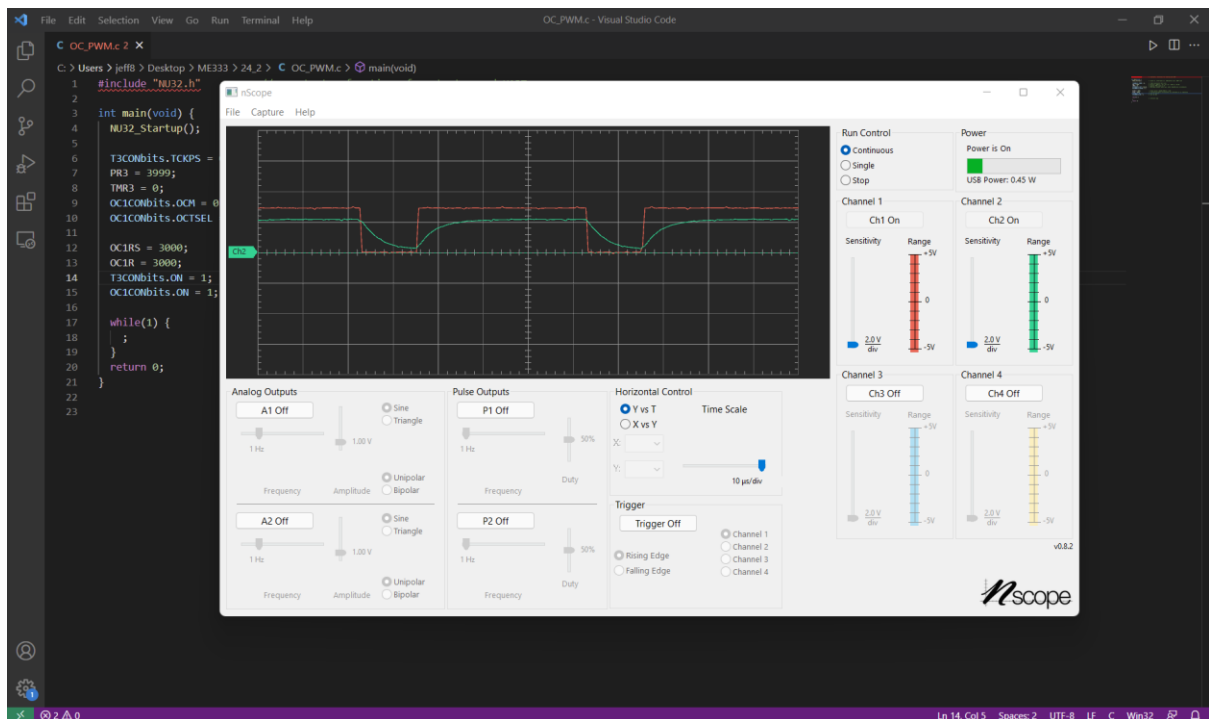
OC1 waveform with duty cycle 75%.



(b)

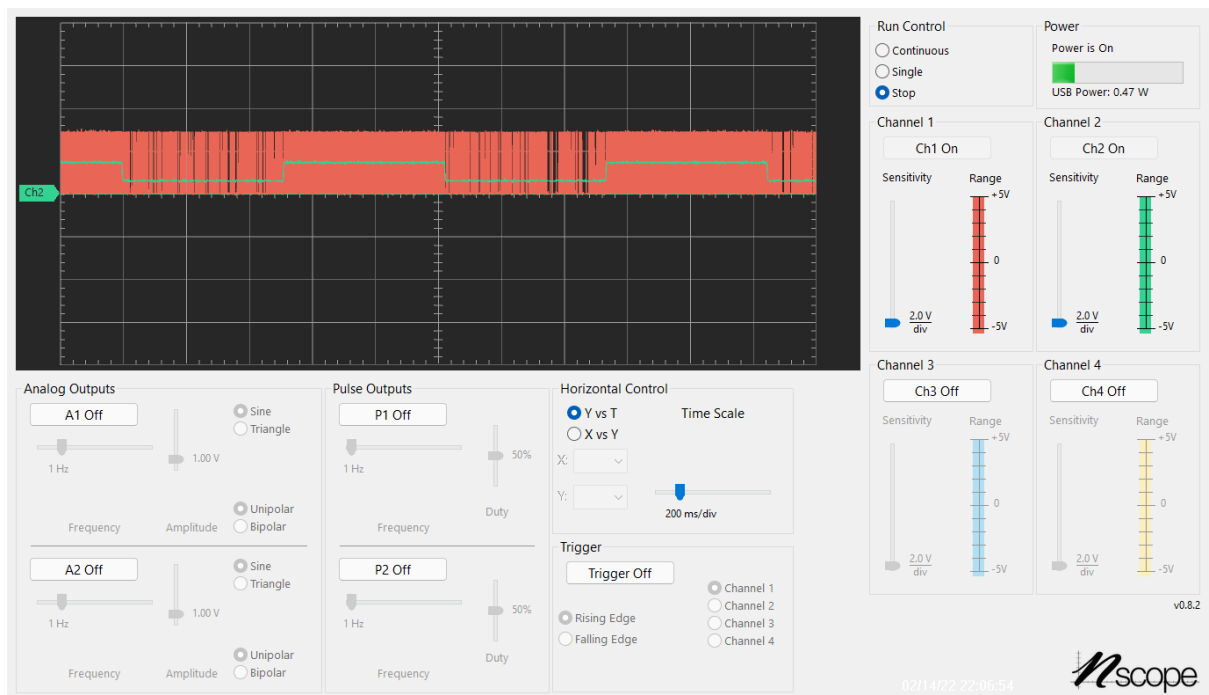
Shown on the above figure.

(c)



The capacitor is being charge during the high voltage and while the low voltage occurs it will release some voltage from the capacitor to maintain the voltage. If we remove the capacitor, the voltage will drop sine the low voltage.

### Exercise 24.3.1



### Exercise 24.3.2

The code is in 24-3-2. Zip file.