

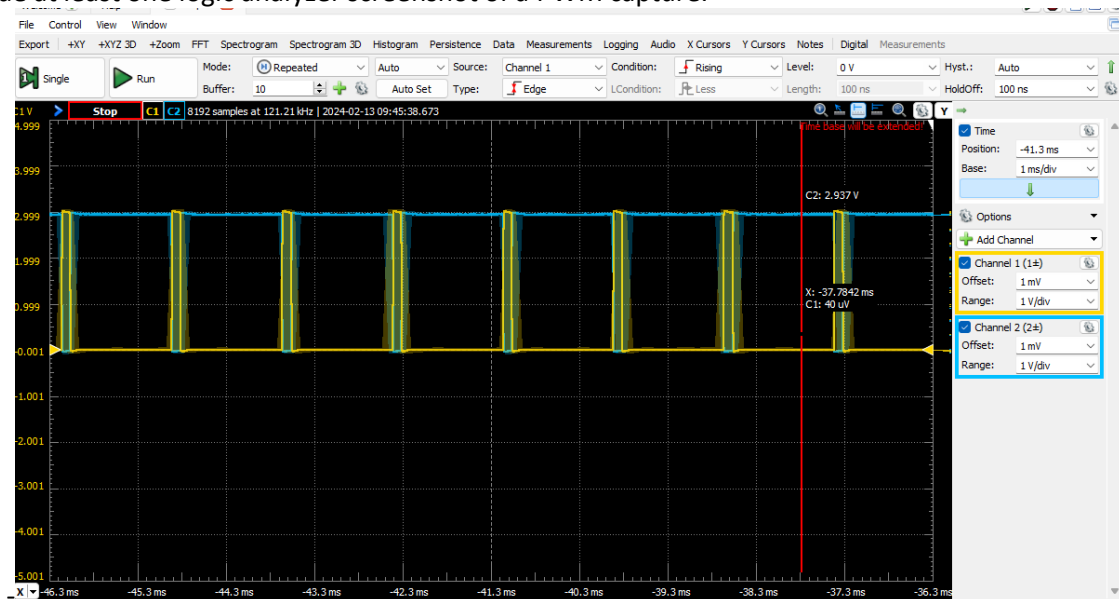
Pre and Post Lab 3 Questions

Pre Lab:

1. List two things you can learn from a peripheral's functional description in the peripheral reference manual?
 - Two examples are you can learn about the purpose of each operating mode and the basic theory of operation.
2. What is the title of the first sub-section in the functional description of timers 2 and 3?
 - Not mentioned in the lab manual; look it up!
 - The first title of the section "TIM2 and TIM3 functional description" is "Time-base unit"
3. What is the purpose of the Prescaler (PSC) register?
 - The purpose is to divide the input clock frequency causing it to change clock frequency at a slower rate. One use of this is when you are trying to see a change in a screen or LED so that it is slow enough that your eyes can see the change.
4. What is the purpose of the Auto-Reload (ARR) register?
 - It is a trigger point for when the timer will reset and start over.
5. What is the purpose of the Capture/Compare (CCRx) register while the timer is operating in Output Compare mode?
 - The purpose is to create digital waveforms that are arbitrary to when the timers count matches the value in this register.
6. What does the duty-cycle of a PWM signal represent?
 - It represents an analog voltage that ranges from high to low from the digital signal.
7. What is the purpose of the Alternate Function mode for a GPIO pin?
 - This allows a pin to connect into the internal peripherals directly. Some pins do not have arbitrary access pins so this function can be very helpful.
8. In what document can you find the documentation for what GPIO pins have which alternate functions?
 - This information is found on the device datasheet because it is specific to the device used.

Post Lab:

- Using a timer clock source of 8 MHz, calculate PSC and ARR values to get a 60 Hz interrupt.
 - This is tricky because precisely 60 Hz is impossible with our system; instead, think about the process and minimize the error. Many combinations of PSC and ARR values work—not just one!
 - PSC = 7999 and ARR = 167. This gets our frequency to about 59.88Hz which is close to the 60Hz.
 - Look through the Table 13 "STM32F072x8/xB pin definitions" in the chip datasheet and list all pins that can have the timer 3 capture/compare channel 1 alternate function.
 - If the pin is included on the LQFP64 package that we are using, list the alternate function number that you would use to select it.
 - The names of the pins that have TIM3_CH1 are PE3(No pin number), PA6 (Pin 22), PC6 (Pin 37), and PB4 (Pin 56).
 - List your measured value of the timer UEV interrupt period from first experiment.
 - I measured 3.98Hz. I will add the picture below.
 - Describe what happened to the measured duty-cycle as the CCRx value increased in PWM mode 1.
 - The frequency got wider for the "ON" section in mode 1 on PC7 when I increased the value for mode 1.
 - Describe what happened to the measured duty-cycle as the CCRx value increased in PWM mode 2.
 - The frequency got wider for the "OFF" section in mode 2 when I increased the value for mode 2.
- 2.
- Include at least one logic analyzer screenshot of a PWM capture.



- What PWM mode is shown in figure 3.6 of the lab manual (PWM mode 1 or 2)?
 - This is Mode 2 because as the CCRx goes up the amount of time spent "OFF" is longer which is the same as what I got for the measurement from part 4 and 5.