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ECE 6780-003

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Postlab Questions 03

3.2 — Postlab 3. Please answer the following questions and hand in as your postlab for Lab 3.

1. 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!

$ARR = \frac{f_{CLK}}{(PSC+1) * f_{TARGET}}$ $\quad ARR = \frac{8E6}{800 \times 60} = 166.6\overline{6}$ ← ERROR INTRODUCED

WE CAN USE A $PSC = 799$

$ARR = 16667/100$ ← SMALL ERROR

2. 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.

Table 14. STM32F072x8/xB pin definitions

Pin numbers						Pin name (function upon reset)	Pin type	I/O structure	Notes	Pin functions	
UFBGA100	LQFP100	UFBGA64	LQFP64	LQFP48/UFQFPN48	WLCSP49					Alternate functions	Additional functions
B2	1	-	-	-	-	PE2	I/O	FT	-	TSC_G7_IO1, TIM3_ETR	-
A1	2	-	-	-	-	PE3	I/O	FT	-	TSC_G7_IO2, TIM3_CH1	-
B1	3	-	-	-	-	PE4	I/O	FT	-	TSC_G7_IO3, TIM3_CH2	-

L4	31	G4	22	16	F4	PA6	I/O	TTa	-	SPI1_MISO, I2S1_MCK, TIM3_CH1, TIM1_BKIN, TIM16_CH1, COMP1_OUT, TSC_G2_IO3, EVENTOUT, USART3_CTS	ADC_IN6
E12	63	F6	37	-	-	PC6	I/O	FT	(3)	TIM3_CH1	-
A7	90	A4	56	40	A4	PB4	I/O	FT	-	SPI1_MISO, I2S1_MCK, TIM17_BKIN, TIM3_CH1, TSC_G5_IO2, EVENTOUT	-

PA6 – LQFP64 AF number 22

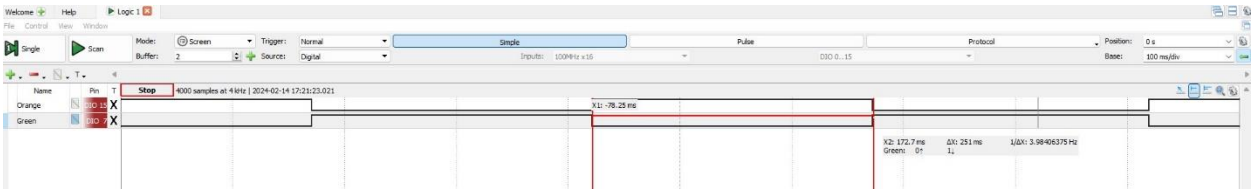
PB4 – LQFP64 AF number 56

PC6 – LQFP64 AF number 37

PE3 – N/A

3. List your measured value of the timer UEV interrupt period from first experiment.

251ms ----- Approximately ~3.98 Hz



4. Describe what happened to the measured duty-cycle as the CCRx value increased in PWM mode 1.

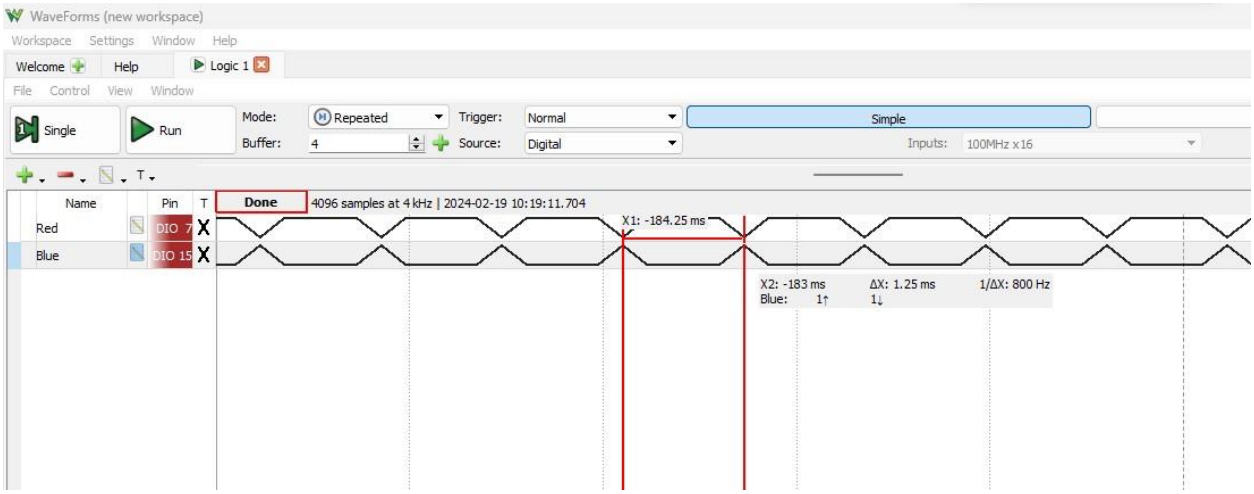
As the CCR value increases, the rate of the duty-cycle increases. Mode 1 stretches.

5. Describe what happened to the measured duty-cycle as the CCRx value increased in PWM mode 2.

Same as above, but it appears to increase even faster based on looking at my analyzer. Mode 2 compresses.

6. Include at least one logic analyzer screenshot of a PWM capture.

Screenshot of the working lab submission for 800 Hz.



7. What PWM mode is shown in figure 3.6 of the lab manual (PWM mode 1 or 2)?

It’s PWM mode 2.