

TI-RSLK **MAX**

Texas Instruments Robotics System Learning Kit



Module 16

Quiz: Tachometer



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Q1 Timer_A

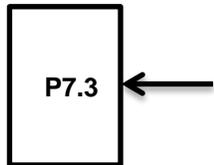
Part a) What determines the resolution that can be measured with Timer_A in period measurement mode?

Part b) What determines the maximum possible period that can be measured with Timer_A in period measurement mode?

Part c) What determines the minimum possible period that can be measured with Timer_A in period measurement mode?

Q2 Timer_A

Part a) Explain in general how you could use two timers to measure frequency in Hz. Hint: this is a direct measure of frequency, not “measure period and invert the output”. You will need one timer to create a periodic interrupt (Timer A1) and a second timer that uses input capture to create an interrupt on every edge of the input (Timer A0).



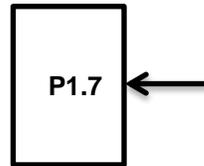
Part b) Show the initialization including mailbox.

Part c) Show the Timer A1 periodic interrupt ISR.

Part d) Show the Timer A0 input capture ISR.

Q3 Fundamentals

Assume an input wave is connected to P1.7, and you wish to measure its period without using input capture. You must use P1.7 as a GPIO input. Write a C program that measures the period without any timer or interrupts. In fact, you can assume the system has no interrupts at all. You can implement any range, resolution or precision that you wish. You may assume the MSP432 bus clock is 48 MHz.



Part a) Show the initialization software.

Part b) Show the function that measures period and returns the result.

Part c) Estimate the resolution of your measurement. Explain your answer.

Part d) Estimate the precision of your measurement. Explain your answer.

Part e) Estimate the smallest possible period your system can measure. Explain your answer.

Part f) Estimate the largest possible period your system can measure. Explain your answer.

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