 **ECE 09342**

**Lab #5 (TIMER & PWM)**

Q1: Using the WDT timer interrupt process, Toggle your Red and Green LED with 256msec interval.

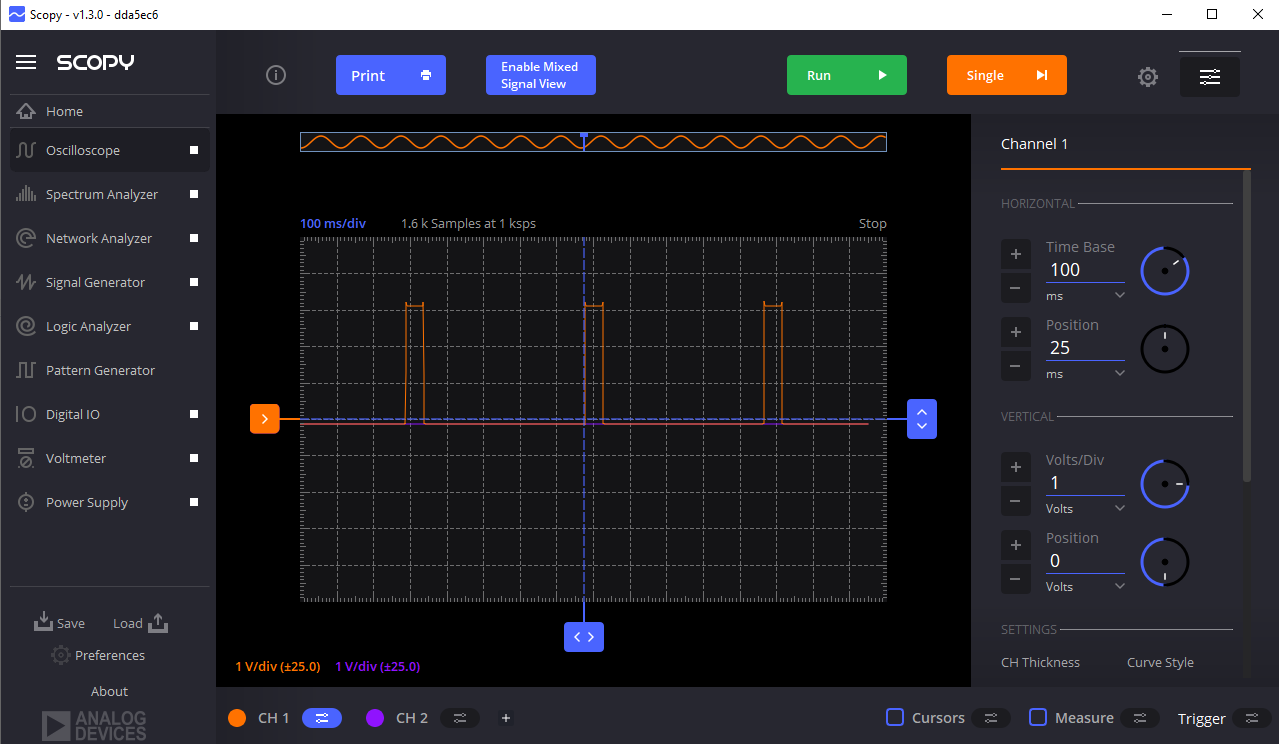
on. How do you configure your clock, check that value, interrupts flag, GIE bit in the register, and add a screenshot of this register value (25 pts)?

Graphical user interface, application

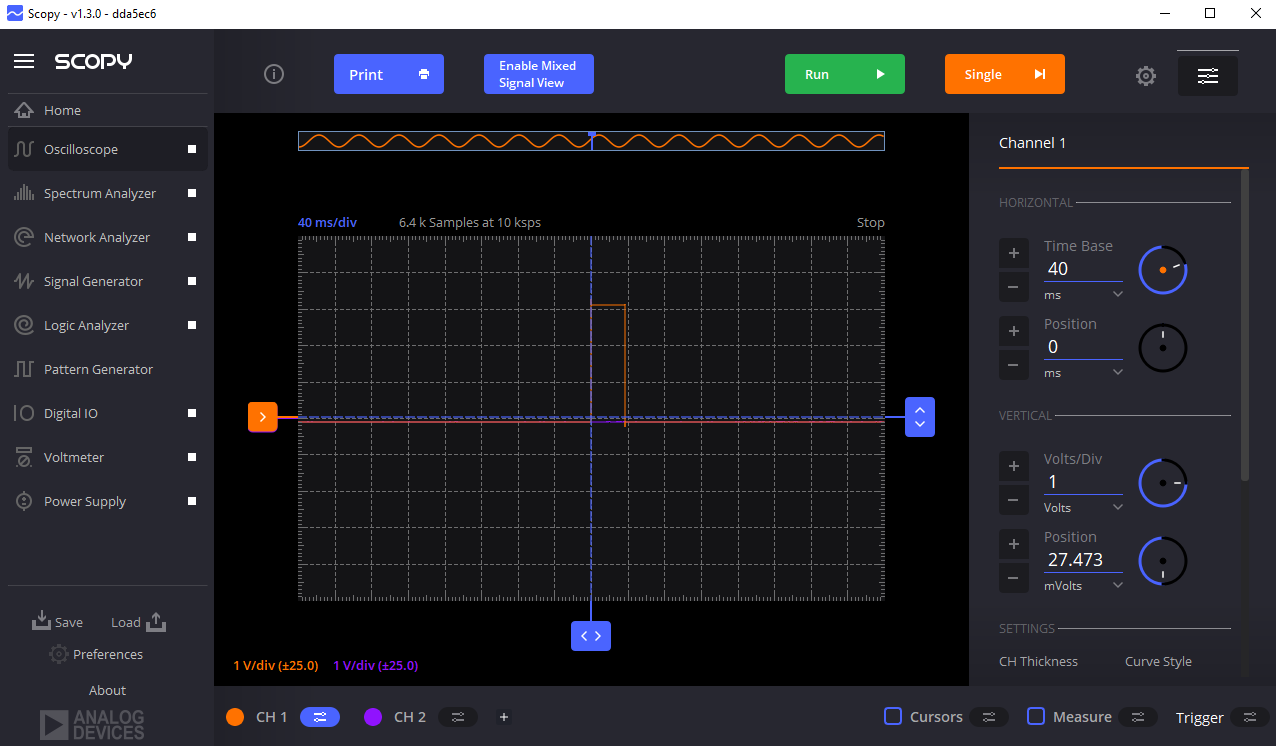
Description automatically generated

Q2: Generate a software PWM, controlling the LED brightness with a 10% duty cycle and 500ms period.

1. Visualize your PWM signal using an oscilloscope. What are the total period and duty cycle here you observed? Did it match your calculation? Show the calculation (handwritten image is fine). Make a table with the calculated and observed values. Add the image of your signal with a proper description. (20 pts)



As seen above the calculated values when compared to the measured values are very similar. The adalm2k was able to show the signals under the given values of a 10% duty cycle and 500ms period. The signal being generated is contant between each clock cycle.



This shows the signal on a smaller time base scale to show how the duty cycle comapers to the calculated. The duty cycle can be seen as .5 less than the calculated but that could be due to delayed signal generation.

|  |  |  |
| --- | --- | --- |
|  | Calculated | Measured |
| Duty Cycle | 10% | 9.5% |
| Period | 500 | 500 |
| Frequency | 1MHz | 1MHz |

Text

Description automatically generated

1. Draw a level 0 block diagram and UML diagram for the above implementation (5+10=15 pts) A picture containing text, clipart

   Description automatically generated

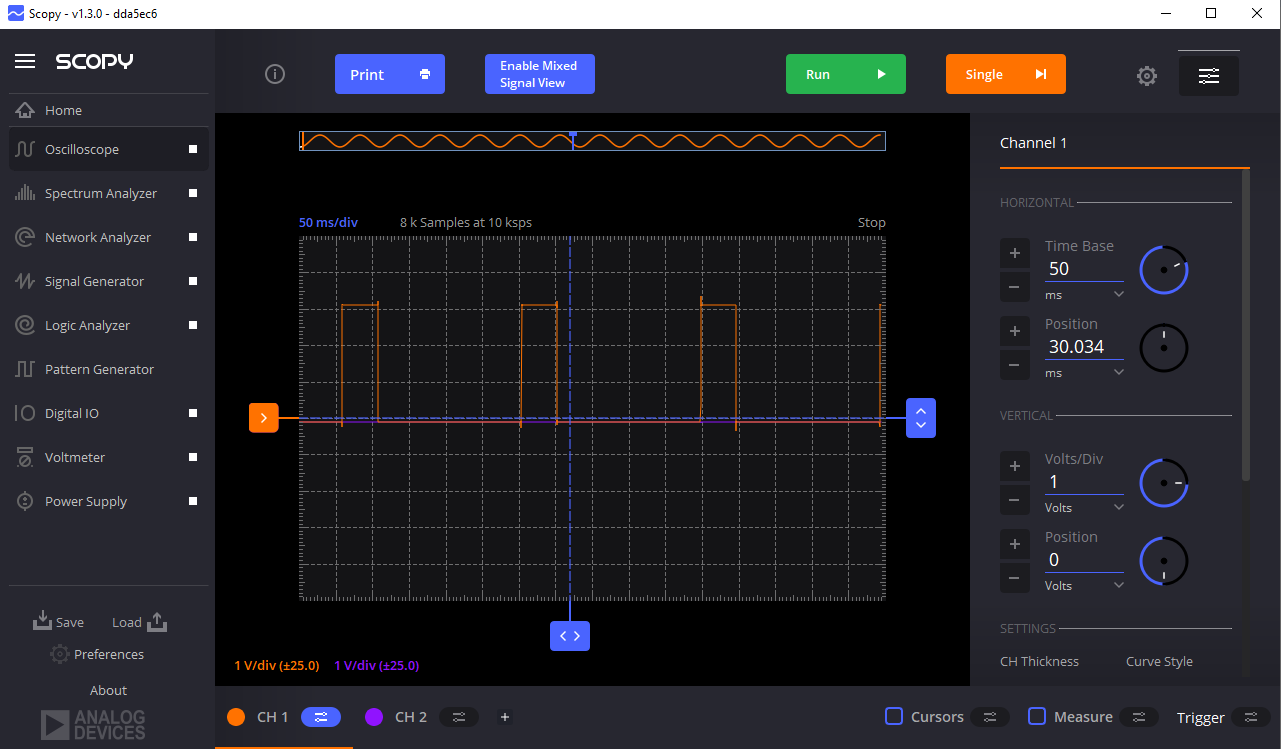
Text

Description automatically generated

1. Upload your code in your GitHub account with a ReadMe file and proper comment. (10 pts)

Q3: Generate a hardware PWM, controlling the LED brightness with a 20% duty cycle and 250ms period.

1. Visualize your PWM signal using a logic analyzer (you already have ADALM2000 from your previous class). What are the total period and duty cycle here you observed? Did it match your calculation? Show the calculation (handwritten image is fine). Make a table with the calculated and observed values. Add the image of your signal with a proper description. (20 pts)



|  |  |  |
| --- | --- | --- |
|  | Calculated | Measured |
| Duty Cycle | 20% | 20% |
| Period | 250 | 250 |
| Frequency | 12KHz | 12KHz |

Text

Description automatically generated with medium confidence

1. Upload your code in your GitHub account with a ReadMe file and proper comment. (10 pts)