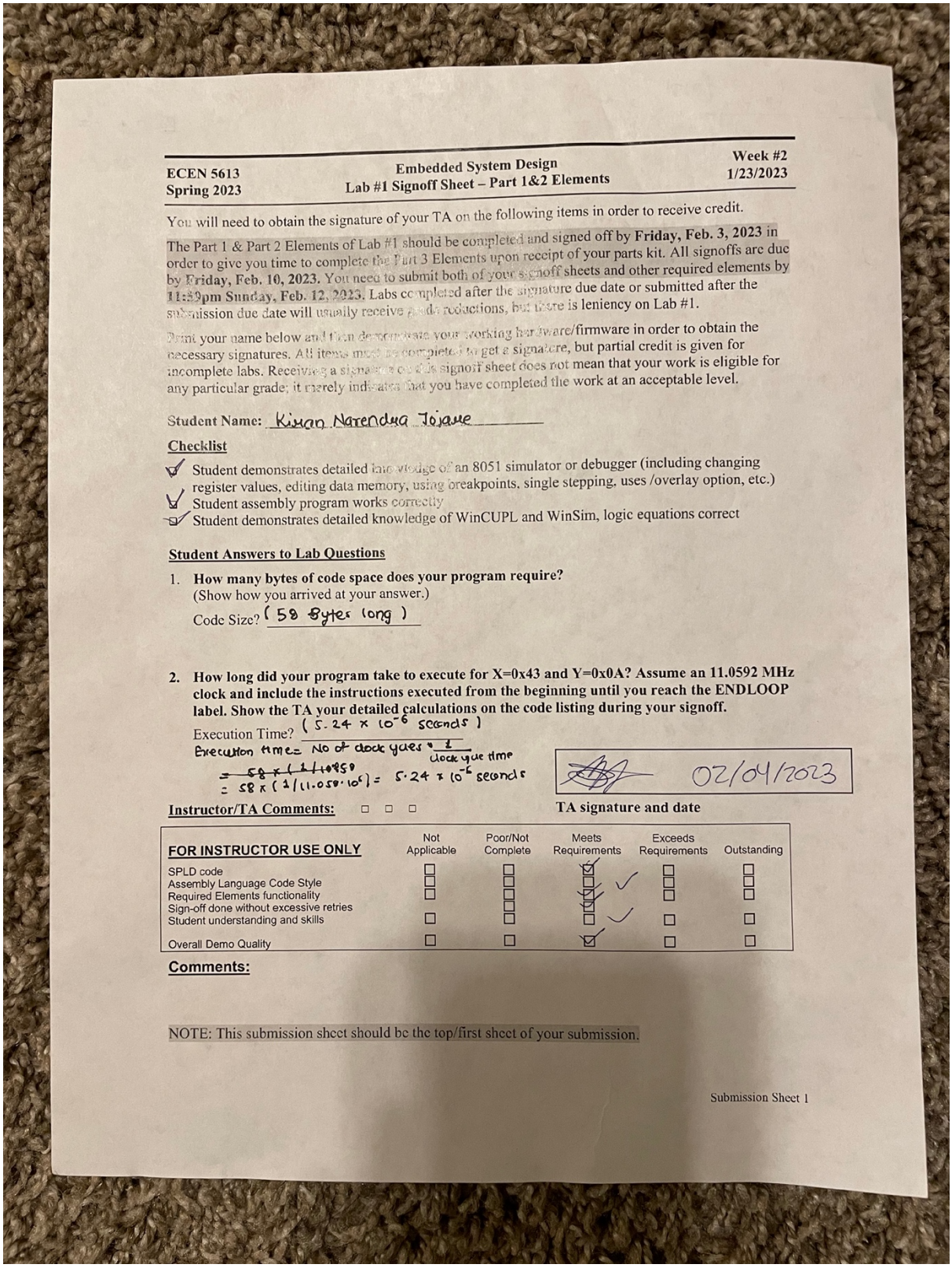
LAB 1 Write Off

1.1 : Lab 1 Part 1 & 2 Sign Off Sheet



ECEN 5613 **Embedded System Design** **Week #2**
Spring 2023 **Lab #1 Signoff Sheet – Part 1&2 Elements** **1/23/2023**

You will need to obtain the signature of your TA on the following items in order to receive credit.

The Part 1 & Part 2 Elements of Lab #1 should be completed and signed off by **Friday, Feb. 3, 2023** in order to give you time to complete the Part 3 Elements upon receipt of your parts kit. All signoffs are due by **Friday, Feb. 10, 2023.** You need to submit both of your signoff sheets and other required elements by **11:59pm Sunday, Feb. 12, 2023.** Labs completed after the signature due date or submitted after the submission due date will usually receive grade reductions, but there is leniency on Lab #1.

Print your name below and then demonstrate your working hardware/firmware in order to obtain the necessary signatures. All items must be completed to get a signature, but partial credit is given for incomplete labs. Receiving a signature on this signoff sheet does not mean that your work is eligible for any particular grade; it merely indicates that you have completed the work at an acceptable level.

Student Name: Kiran Narendra Jojare

Checklist

- ☑ Student demonstrates detailed knowledge of an 8051 simulator or debugger (including changing register values, editing data memory, using breakpoints, single stepping, uses /overlay option, etc.)
- ☑ Student assembly program works correctly
- ☑ Student demonstrates detailed knowledge of WinCUPL and WinSim, logic equations correct

Student Answers to Lab Questions

1. **How many bytes of code space does your program require?**
   (Show how you arrived at your answer.)
   Code Size? (58 Bytes long)

2. **How long did your program take to execute for X=0x43 and Y=0x0A? Assume an 11.0592 MHz clock and include the instructions executed from the beginning until you reach the ENDLOOP label. Show the TA your detailed calculations on the code listing during your signoff.**
   Execution Time? (5.24×10^{-6} seconds)
   Execution time = No of clock cycles * $\frac{1}{\text{clock cycle time}}$
   = 58 * (1/10850)
   = 58 * ($1/(11.059 \cdot 10^6)$) = 5.24×10^{-6} seconds

02/04/2023

Instructor/TA Comments: ☐ ☐ ☐ **TA signature and date**

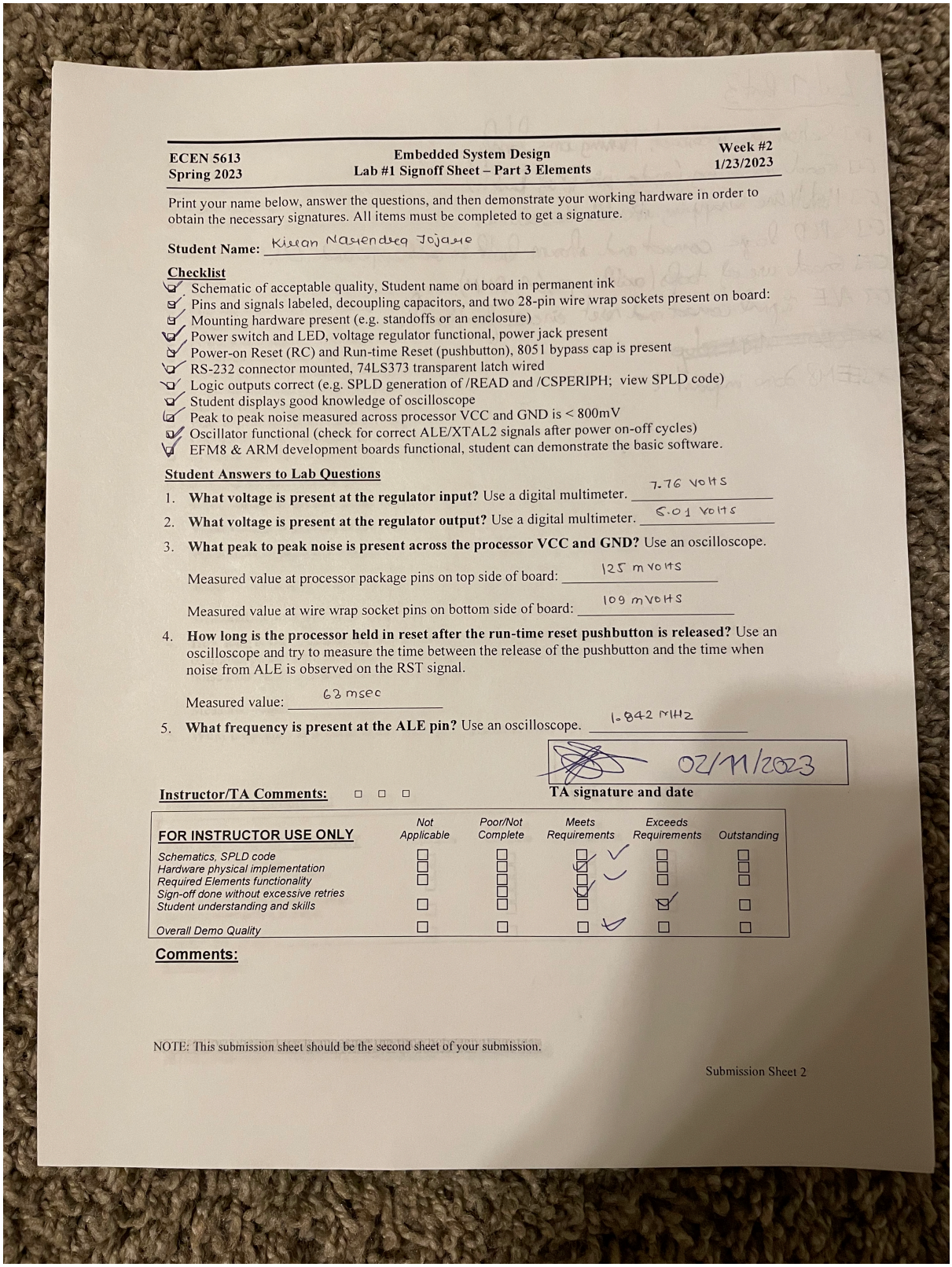
FOR INSTRUCTOR USE ONLY	Not Applicable	Poor/Not Complete	Meets Requirements	Exceeds Requirements	Outstanding
SPLD code	☐	☐	☑	☐	☐
Assembly Language Code Style	☐	☐	☐ ✓	☐	☐
Required Elements functionality	☐	☐	☑	☐	☐
Sign-off done without excessive retries		☐	☑		
Student understanding and skills	☐	☐	☐ ✓	☐	☐
Overall Demo Quality	☐	☐	☑	☐	☐

Comments:

NOTE: This submission sheet should be the top/first sheet of your submission.

Submission Sheet 1

1.2 Lab 1 Part 3 Sign Off Sheet



ECEN 5613 **Embedded System Design** **Week #2**
Spring 2023 **Lab #1 Signoff Sheet – Part 3 Elements** **1/23/2023**

Print your name below, answer the questions, and then demonstrate your working hardware in order to obtain the necessary signatures. All items must be completed to get a signature.

Student Name: Kiran Nasendra Jojare

Checklist

- ☑ Schematic of acceptable quality, Student name on board in permanent ink
- ☑ Pins and signals labeled, decoupling capacitors, and two 28-pin wire wrap sockets present on board:
- ☑ Mounting hardware present (e.g. standoffs or an enclosure)
- ☑ Power switch and LED, voltage regulator functional, power jack present
- ☑ Power-on Reset (RC) and Run-time Reset (pushbutton), 8051 bypass cap is present
- ☑ RS-232 connector mounted, 74LS373 transparent latch wired
- ☑ Logic outputs correct (e.g. SPLD generation of /READ and /CSPERIPH; view SPLD code)
- ☑ Student displays good knowledge of oscilloscope
- ☑ Peak to peak noise measured across processor VCC and GND is < 800mV
- ☑ Oscillator functional (check for correct ALE/XTAL2 signals after power on-off cycles)
- ☑ EFM8 & ARM development boards functional, student can demonstrate the basic software.

Student Answers to Lab Questions

1. **What voltage is present at the regulator input?** Use a digital multimeter. 7.76 Volts
2. **What voltage is present at the regulator output?** Use a digital multimeter. 5.01 Volts
3. **What peak to peak noise is present across the processor VCC and GND?** Use an oscilloscope.

   Measured value at processor package pins on top side of board: 125 mVolts

   Measured value at wire wrap socket pins on bottom side of board: 109 mVolts
4. **How long is the processor held in reset after the run-time reset pushbutton is released?** Use an oscilloscope and try to measure the time between the release of the pushbutton and the time when noise from ALE is observed on the RST signal.

   Measured value: 62 msec
5. **What frequency is present at the ALE pin?** Use an oscilloscope. 1.842 MHz

02/11/2023
TA signature and date

Instructor/TA Comments: ☐ ☐ ☐

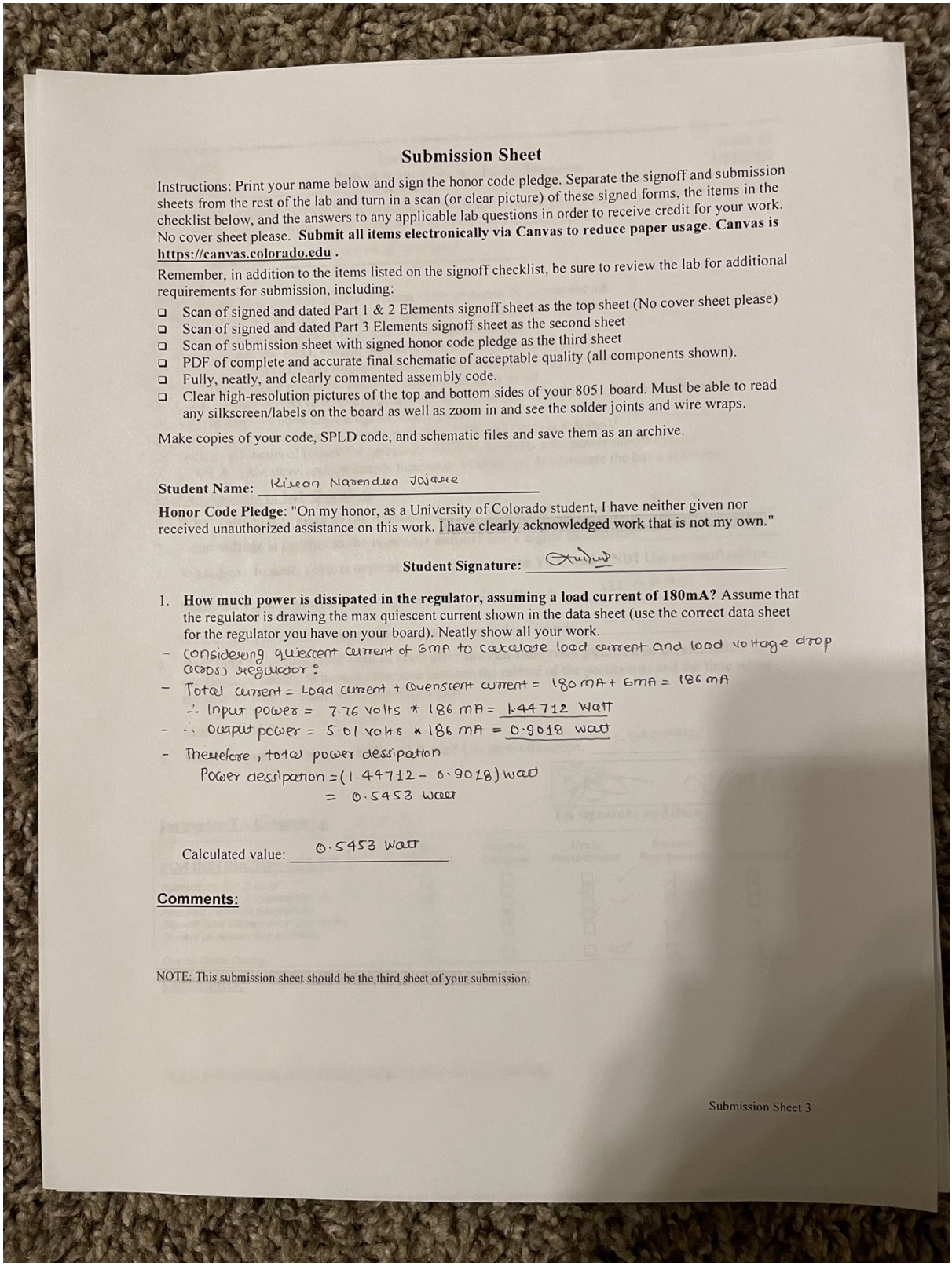
FOR INSTRUCTOR USE ONLY	Not Applicable	Poor/Not Complete	Meets Requirements	Exceeds Requirements	Outstanding
Schematics, SPLD code	☐	☐	☐ ✓	☐	☐
Hardware physical implementation	☐	☐	☑	☐	☐
Required Elements functionality	☐	☐	☐ ✓	☐	☐
Sign-off done without excessive retries		☐	☑		
Student understanding and skills	☐	☐	☐	☑	☐
Overall Demo Quality	☐	☐	☐ ✓	☐	☐

Comments:

NOTE: This submission sheet should be the second sheet of your submission.

Submission Sheet 2

1.3 Lab 1 Submission Sheet



Submission Sheet

Instructions: Print your name below and sign the honor code pledge. Separate the signoff and submission sheets from the rest of the lab and turn in a scan (or clear picture) of these signed forms, the items in the checklist below, and the answers to any applicable lab questions in order to receive credit for your work. No cover sheet please. **Submit all items electronically via Canvas to reduce paper usage. Canvas is https://canvas.colorado.edu .**

Remember, in addition to the items listed on the signoff checklist, be sure to review the lab for additional requirements for submission, including:

- ❑ Scan of signed and dated Part 1 & 2 Elements signoff sheet as the top sheet (No cover sheet please)
- ❑ Scan of signed and dated Part 3 Elements signoff sheet as the second sheet
- ❑ Scan of submission sheet with signed honor code pledge as the third sheet
- ❑ PDF of complete and accurate final schematic of acceptable quality (all components shown).
- ❑ Fully, neatly, and clearly commented assembly code.
- ❑ Clear high-resolution pictures of the top and bottom sides of your 8051 board. Must be able to read any silkscreen/labels on the board as well as zoom in and see the solder joints and wire wraps.

Make copies of your code, SPLD code, and schematic files and save them as an archive.

Student Name: Kiran Narendra Jojare

Honor Code Pledge: "On my honor, as a University of Colorado student, I have neither given nor received unauthorized assistance on this work. I have clearly acknowledged work that is not my own."

Student Signature: Kiran Jojare

1. **How much power is dissipated in the regulator, assuming a load current of 180mA?** Assume that the regulator is drawing the max quiescent current shown in the data sheet (use the correct data sheet for the regulator you have on your board). Neatly show all your work.

- considering quiescent current of 6mA to calculate load current and load voltage drop across regulator :
- Total current = Load current + Quenscent current = 180 mA + 6mA = 186 mA
  ∴ Input power = 7.76 volts * 186 mA = 1.44712 Watt
- ∴ Output power = 5.01 volts * 186 mA = 0.9018 watt
- Therefore, total power dessipation
  Power dessipation = (1.44712 − 0.9018) watt
  = 0.5453 watt

Calculated value: 0.5453 watt

Comments:

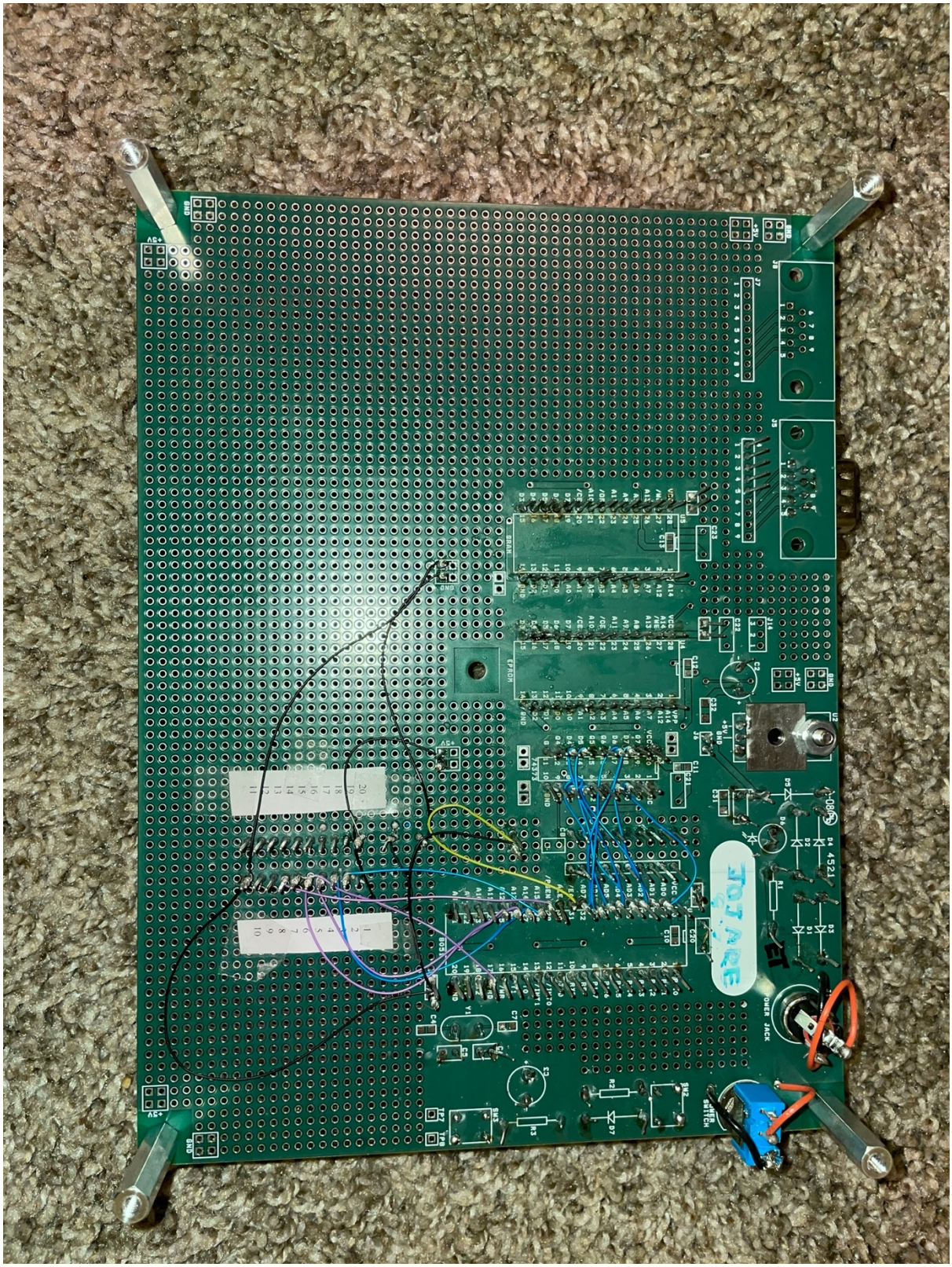
NOTE: This submission sheet should be the third sheet of your submission.

Submission Sheet 3

1.4 Board Layout

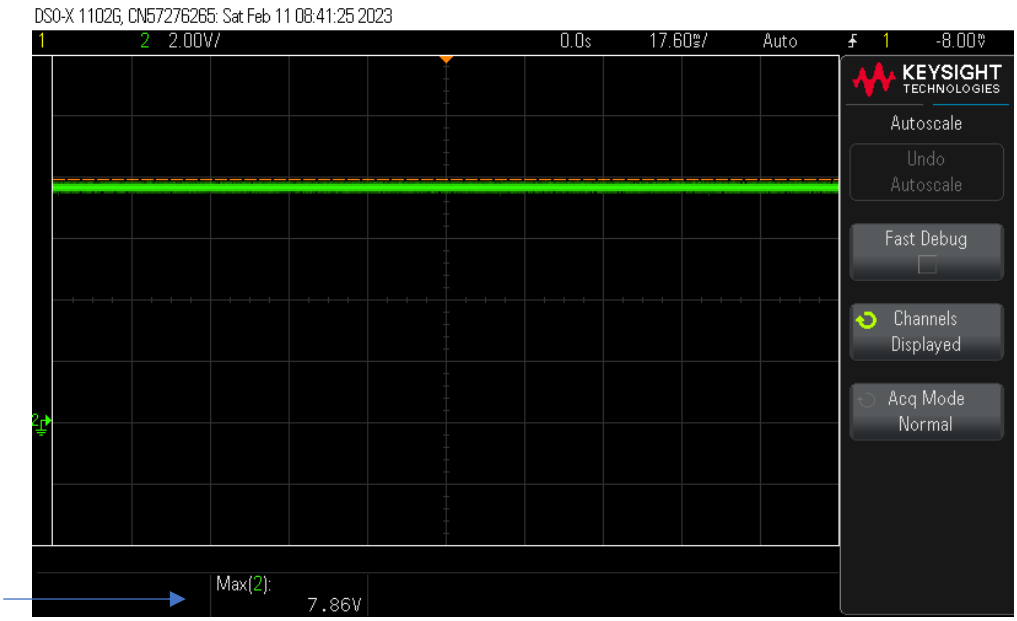
Top View

Bottom view

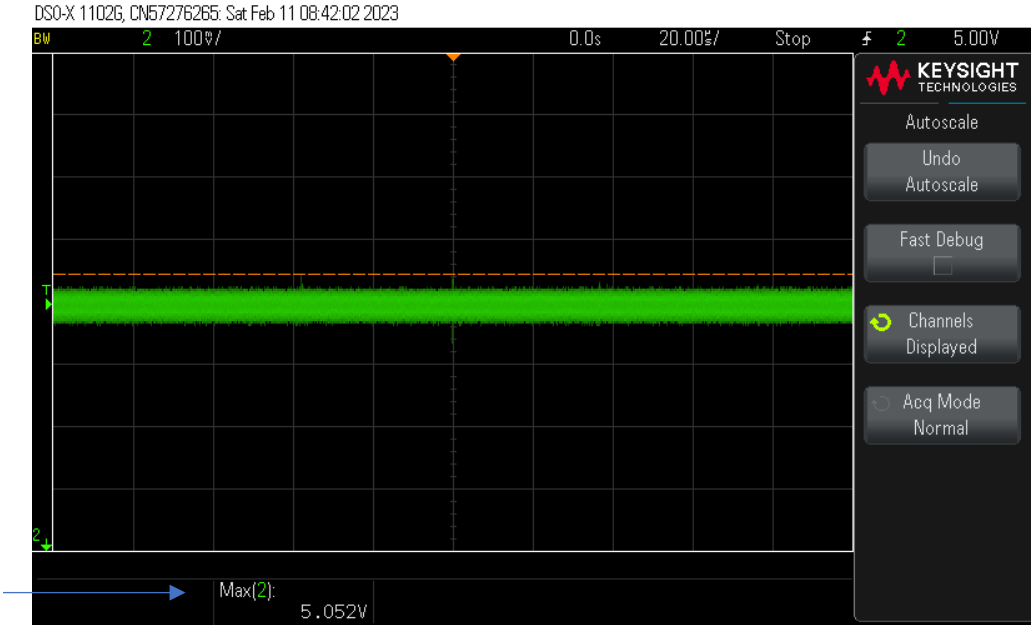


1.5 Calculations

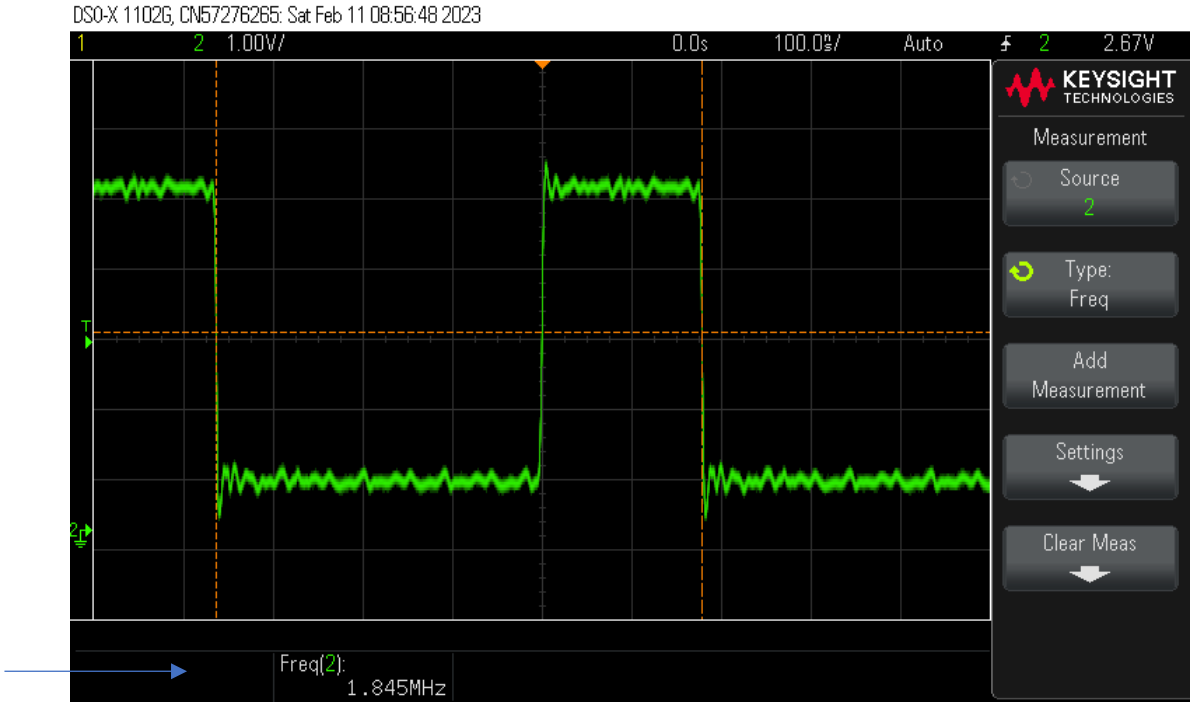
- Voltage Present at Input of Regulator **- 7.76 Volts**



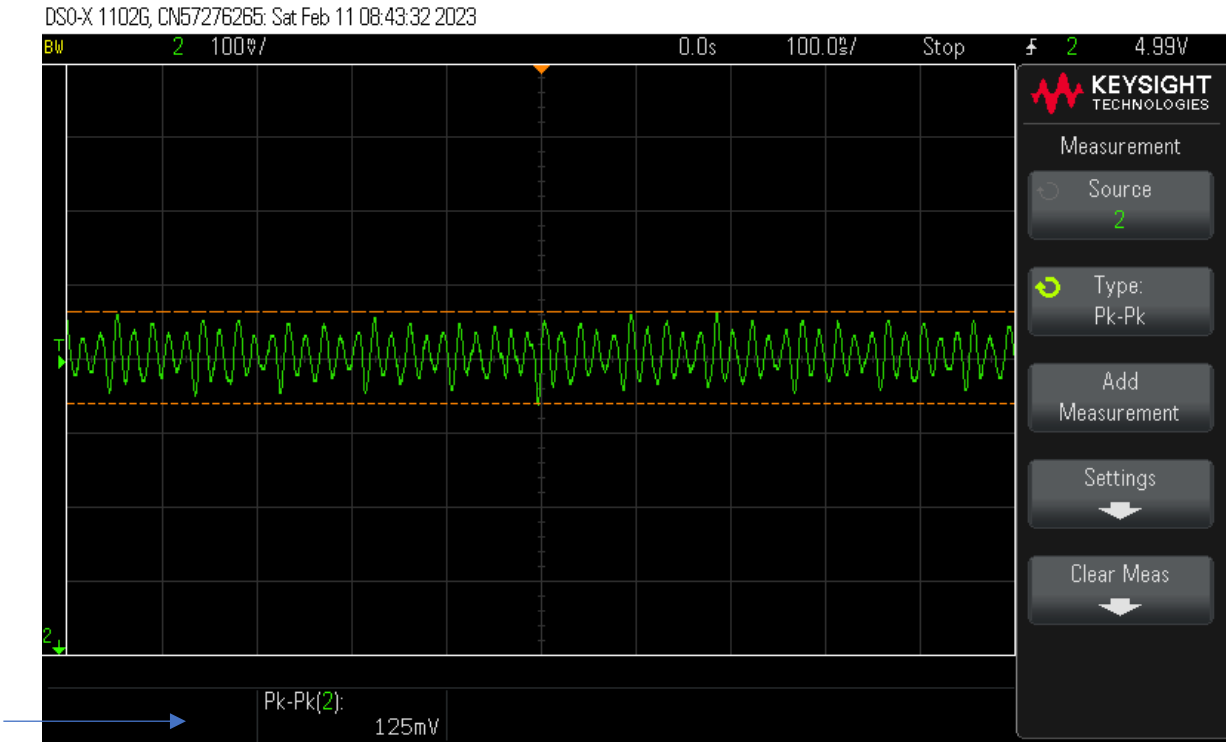
- Voltage Present at Input of Regulator **- 5.01 Volts**



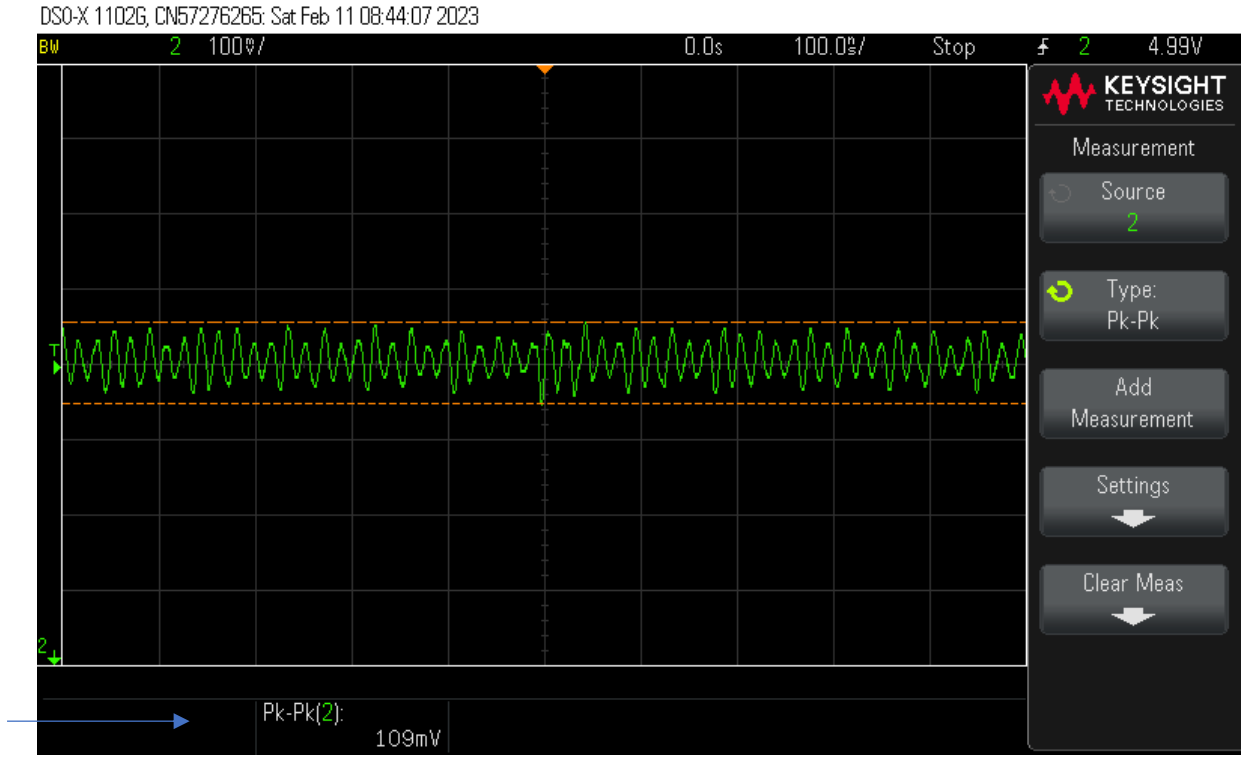
- Frequency at ALE Pin **- 1.842 MHz**



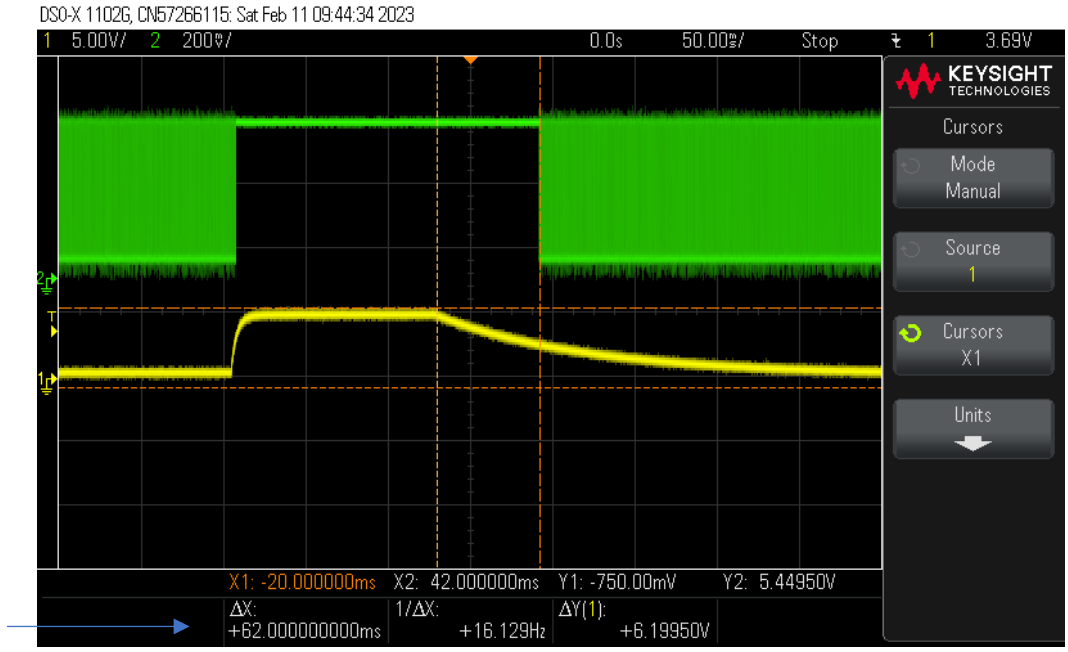
- Peak to Peak Noise Present at top and bottom of the board between VCC and GND
  1. Top Side - 125 mVolts



2. Bottom Side **- 109 mVolts**



- How long is the processor held in reset after the run-time reset pushbutton is released? Use an oscilloscope and try to measure the time between the release of the pushbutton and the time when noise from ALE is observed on the RST signal.
  62 mSec



1.6 Learning

- Got significant hands-on experience with schematics creations.
- Got significant hands-on experience in soldering and wire wrapping techniques.
- Understood the working of logic analyzer for verification and validation of system.
- Understood different concepts such as reset circuitry and power supply circuitry.
- Got better understanding on assembly language code development and testing.