**Lab 1 Signoff Part 1 Elements**

**Assembly Program**

• For the assembly program, I used Edsim to write the program on a Linux Virtual Machine, as it was not operation on Windows 11. Generated a .ASM file and formatted it to run on the Emily52 emulator.

• I used the ‘asm51 filename.asm -f’ command on DOSBOX to generate the. LST and .HEX files on Emily52.

• I used the ‘emily52 filename.HEX /overlap’ command to open the emily52 simulator.

• I obtained the program size based on the last memory location the program executed at and deduced that is 87 bytes. I also verified this by checking the size of each instruction.

I verified the time taken for execution using two clocks, the 12MHz and 11.0592MHz. For both clocks, I obtained the time taken for the program to execute and converted this to instruction cycles. Both programs had the same number of instructions during execution due to which I could conclude correct operation. I also verified this by manually counting the time taken per instruction.

A picture containing graphical user interface

Description automatically generated

**WinCupl**

I used the Atmel WinCUPL tool to write the SPLD logic.

• I simulated the logic using WinSim.

• I also changed the Compiler and Devices options to select the ATF16V8B device and generate the JEDEC files.

• I used ‘Device Dependent compile’ to generate the .sim file.

• On Winsim I simulated the .sim file created on WinCupl

• I tested the output for 6 test vectors.

Text

Description automatically generated

**WinCUPL**

**Background pattern

Description automatically generated**

**Output on WinSim**

**Lab 1 Signoff Part 3 Elements**

**Schematic:**

* I designed the schematic using EasyEDA. Based on the connections made on the PCBA and instructions provided I modified the schematic accordingly. I created a new library for the Resistor Network, 8051, SPLD and the latch.

**8051 Development Board**

* Based on the schematic, I mounted, soldered and wire wrapped the IC holders, passive components and other discrete components.
* I soldered IC holders for the 8051, pull-up resistor network, LS373 latch, EPROM, SRAM and SPLD chip.
* I wire wrapped connections from 8051 to pins on the SPLD and pins on the latch.
* In sequence, I tested the Power supply components including the reverse polarity diode array, the LED and output on the regulator side. I tested the oscillator circuit by verifying the frequency at the ALE pin of the 8051. I also tested my reset circuit. Here are my answers to the lab questions:

1. *What voltage is present at the regulator input? Use a digital multimeter.*

**A: 7.68V**

1. *What voltage is present at the regulator output? Use a digital multimeter.*

**A: 4.97V**

1. *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:*

**A: 130mV** *Measured value at wire wrap socket pins on bottom side of board:*

**A: 100mV**

1. *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.*

**A: 108ms**

1. What frequency is present at the ALE pin? Use an oscilloscope

**A: 1.843MHz**

1. *How much power is dissipated in the regulator, assuming a load current of 135mA? 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.*

**A:**

**P = 0.4119W**

**Reasoning:**

Iq or Quiscent current is the current drawn by the IC when it is not loaded. In this case, the regulator has an Iq of 6mA. The input voltage measured is 7.68V. Therefore, the current drawn regardless of a load being present will be (Iq \* Vin). This amounts to **0.04608W.**

The load current is specified to be 135mA. The voltage dropped across the load can be determined by subtracting the output voltage from the input voltage, as this is a linear regulator. Vin – Vout = **2.71V.**

**IL(Vin – Vout) = 0.36585W.**

Adding the power dissipation across the load and the regulator input, we get 0.4119W.

**Tools Used:**

* **SPLD Programmer**: I used the Phyton ChipProg-48 programmer to load the .JED file created using WinCUPL to load onto the ATF16V8C chip.
* **Logic Analyzer**: I used the INTRONIX Logic analyzer to verify the SPLD logic on the 8051 board.
* **Oscilloscope**: I used the Keysight Oscilloscope for multiple measurements.

**PCB Photos**

**MSP432 programming**

* I used the MSP432 development board to load a simple example code onto the board that rapidly blinks an LED using a hard-spin loop.
* I used Code Composer studio to load the code onto the device.