

Dawson College – Electronics Engineering Technology
243-698-DW Computer Network Project

Project Report

Configuring and Monitoring System for Server Room

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Date created: February 19, 2018

Date submitted: February 22, 2019

Submitted to: Nick Markou

**STATEMENT OF ORIGINAL WORK: I HEREBY ATTEST THAT THIS REPORT IS
ENTIRELY MY OWN ORIGINAL WORK, EXCEPT FOR EXCERPTS THAT HAVE BEEN
EXPRESSLY CITED AND ATTRIBUTED TO THE ORIGINAL AUTHOR.**

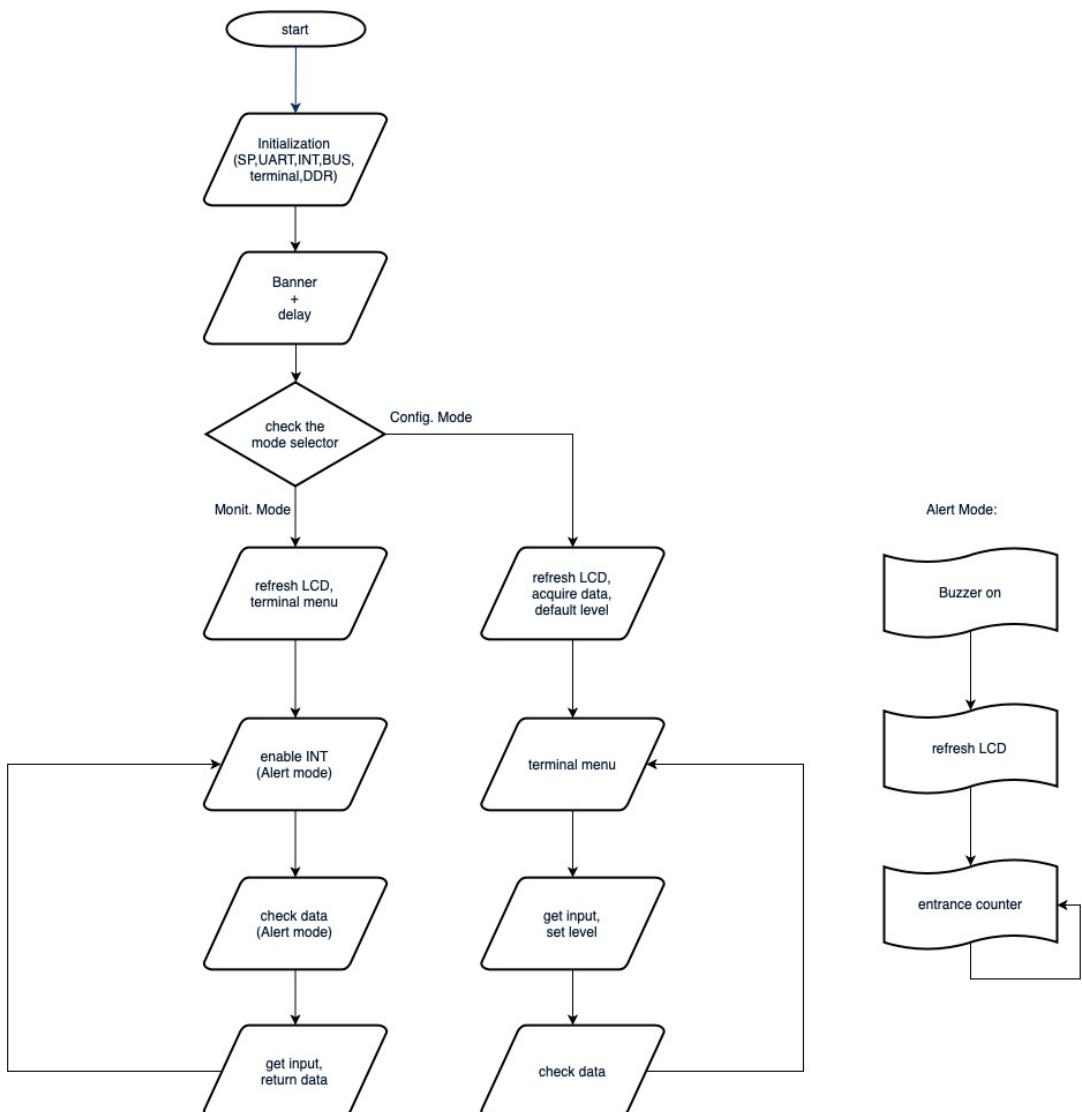
Objective

- To determine the sensors, to code the LCD display and to test serial.
- To finish the prototype of embedded system and the switching power supply.
- To install and configure the Raspberry Pi as well as tasting the GPIO.
- To build the web server (finishing HTML and starting of PHP).

Results

Embedded System

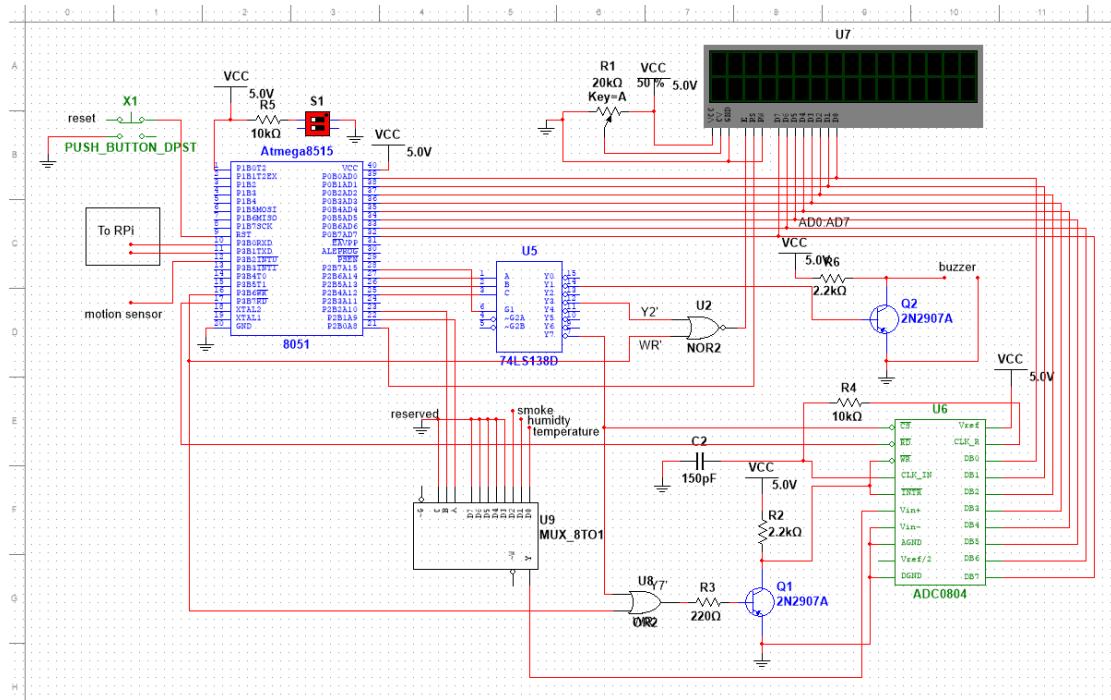
During the last four weeks, the embedded part is the primary task I have been focusing on. The program is written in assembly language, hardware (Micro Controller) is ATmega8515, and the develop environment is Atmel Studio. The flow chart of this program is shown as below:



(The flowchart of the program)

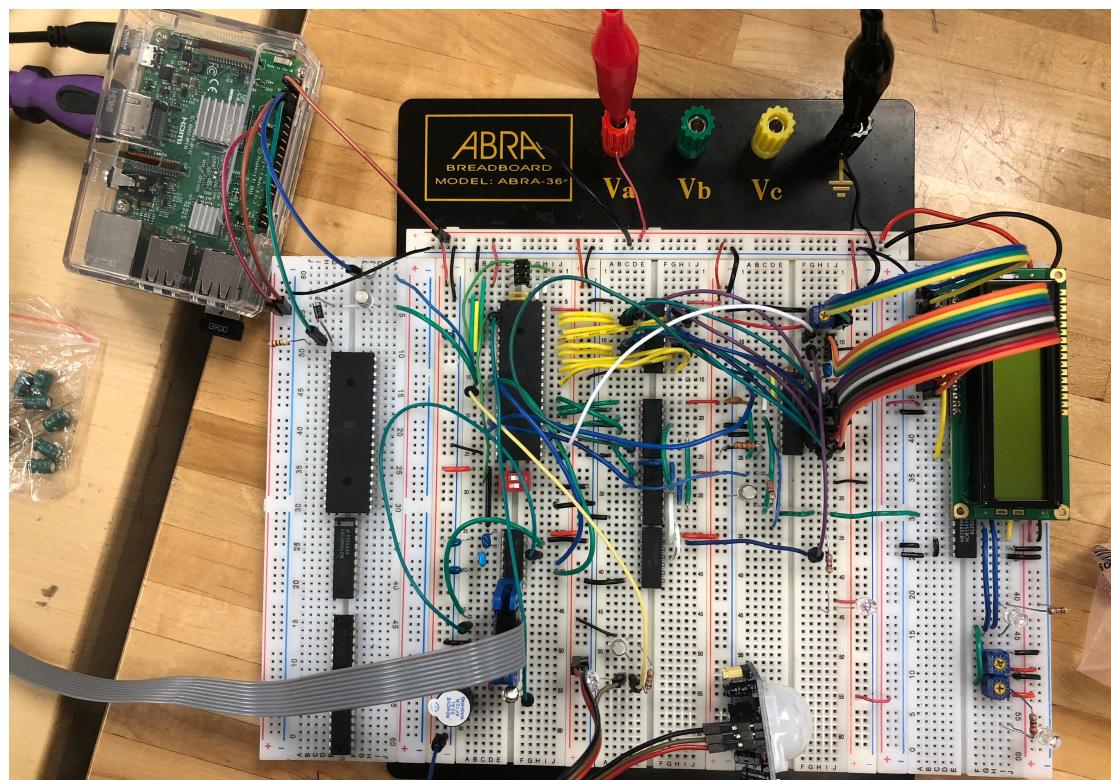
according to the prototype, there are 2 main working modes the monitoring system would be working as. In the “Monitoring Mode”, interrupt is enabled and triggered by a motion sensor, and the data would be checked periodically with comparing to the reference level (to see if the parameters exceed the peak). Either way would push the system into the

"Alert Mode" which enables the buzzer, sends alert message and starts counting the unauthorized entering time. In "Configuring Mode", the interrupt is disabled, the terminal menu would be prompt in every loop turn, and the data would be displayed on the LCD in a real time.



(The wiring diagram in Multisim)

The hardware design has been finished as well as been tested on breadboard, however the LCD is not always functioning properly, assumed reason is that the jumper wires are not solidly interconnected and are interfered with each other. The two sensors (temperature and humidity) are simulated by two potentiometers.

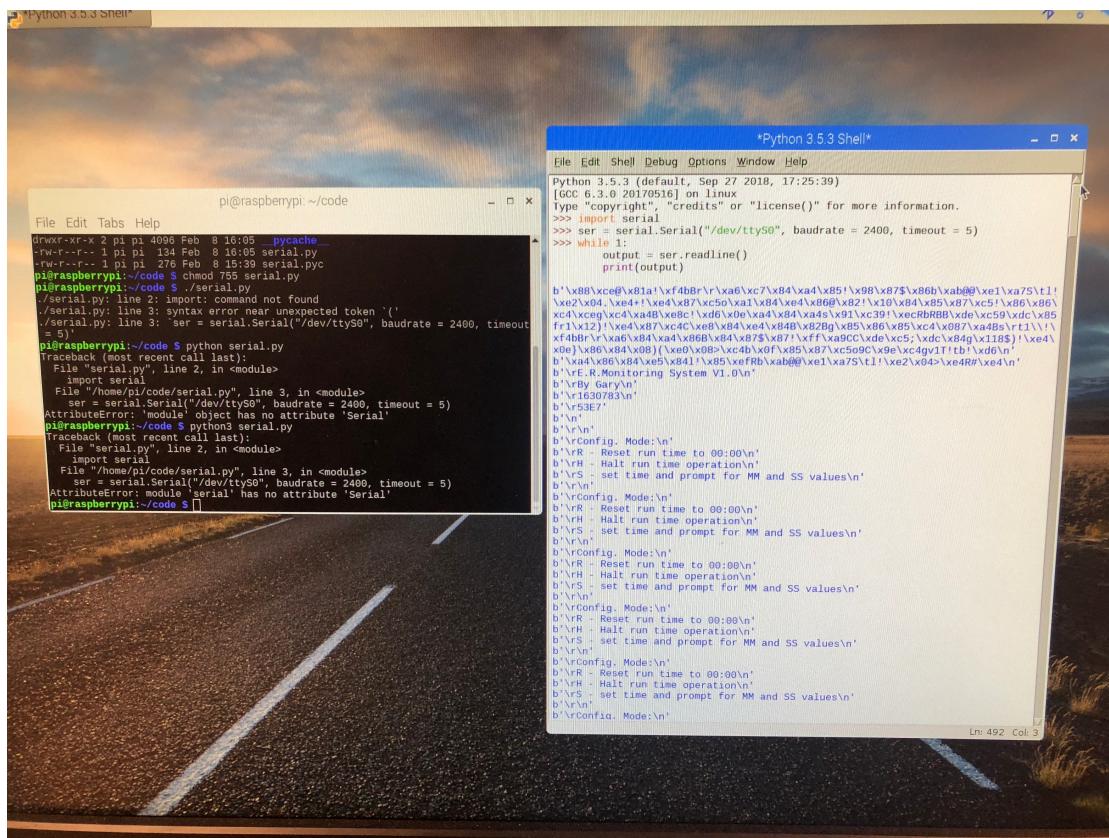


(The testing prototype on the breadboard)

On the board, there are two serial interfaces reserved in a parallel way: one is using voltage shifter (in monitoring mode), the other one is MAX232 (in configuring mode). The ground level and the Vcc (5V) are shared with the Raspberry Pi through GPIO, the reset pin to GPIO is to be connected.

Raspberry Pi

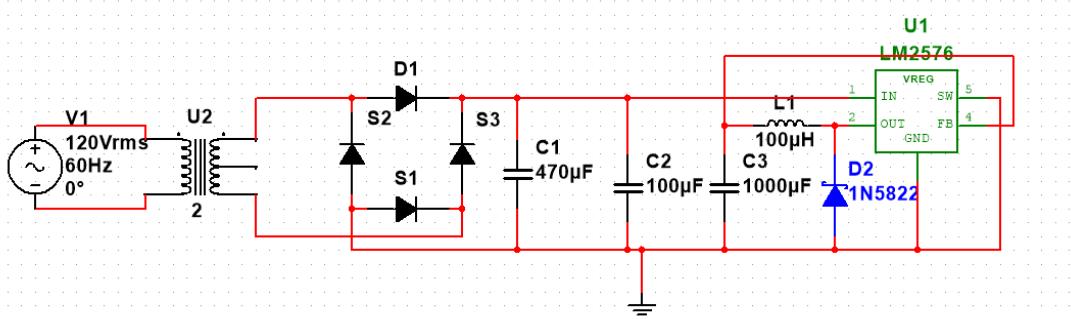
The Linux distribution “Raspbian” has been installed on the Raspberry Pi, basic packages including networking and programming (Python3.7) have been deployed as default. The library “PySerial” is used for serial communication (ttyS0) with embedded system through GPIO (pin8 and pin10).



(The testing program for serial communication)

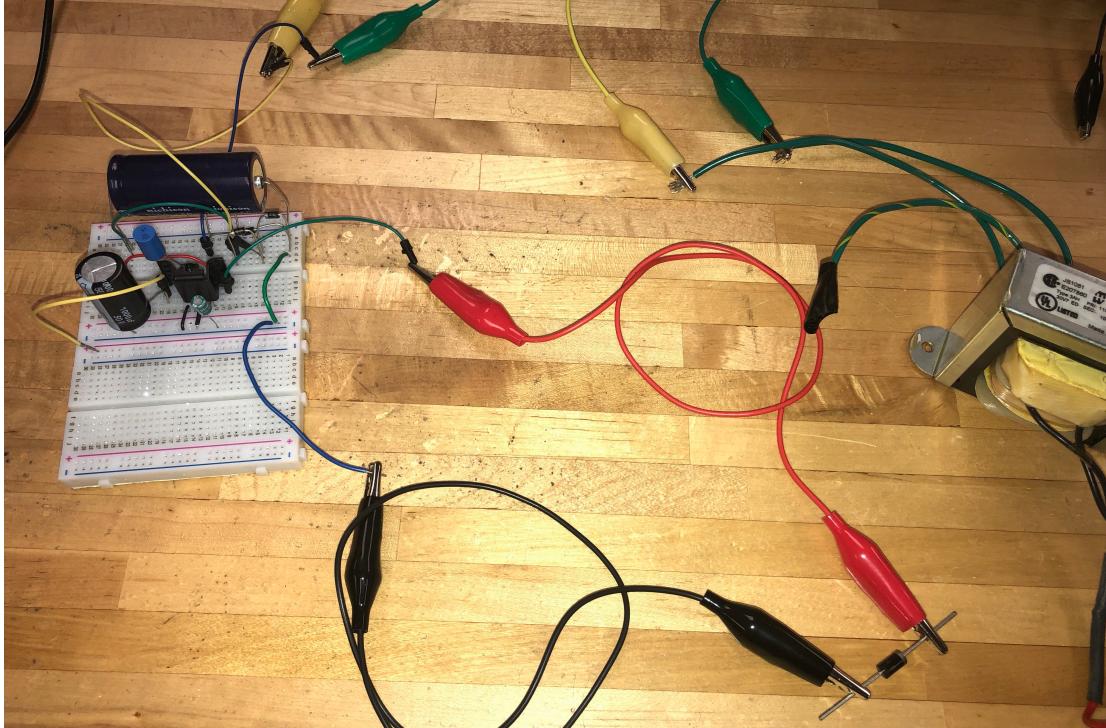
The Python program that bridges users (on a web page) with the monitoring system needs to be finished. This program will take a character from users' input (HTTP PUT) as the option and return the value back to the users. Another GPIO pin controls the reset pin of the embedded system. Both the front-end (HTML) and the back-end (PHP) would be deployed on this Raspberry Pi.

Power Supply



(The wiring diagram of the power supply)

The switching power supply had been determined to provide 10W power, but later as I found that the Raspberry Pi and embedded system only consume less than 5W in total, I chose the LM2576 step-down voltage regulator.



(The prototype of power supply)

In general, the power supply is separated into two part, the first part converts the AC to DC using a full-bridge rectifier and filtering capacitor, the second part brings down the voltage from 14V to 5V. The filtering capacitor C1 has been changed to 3300uF.

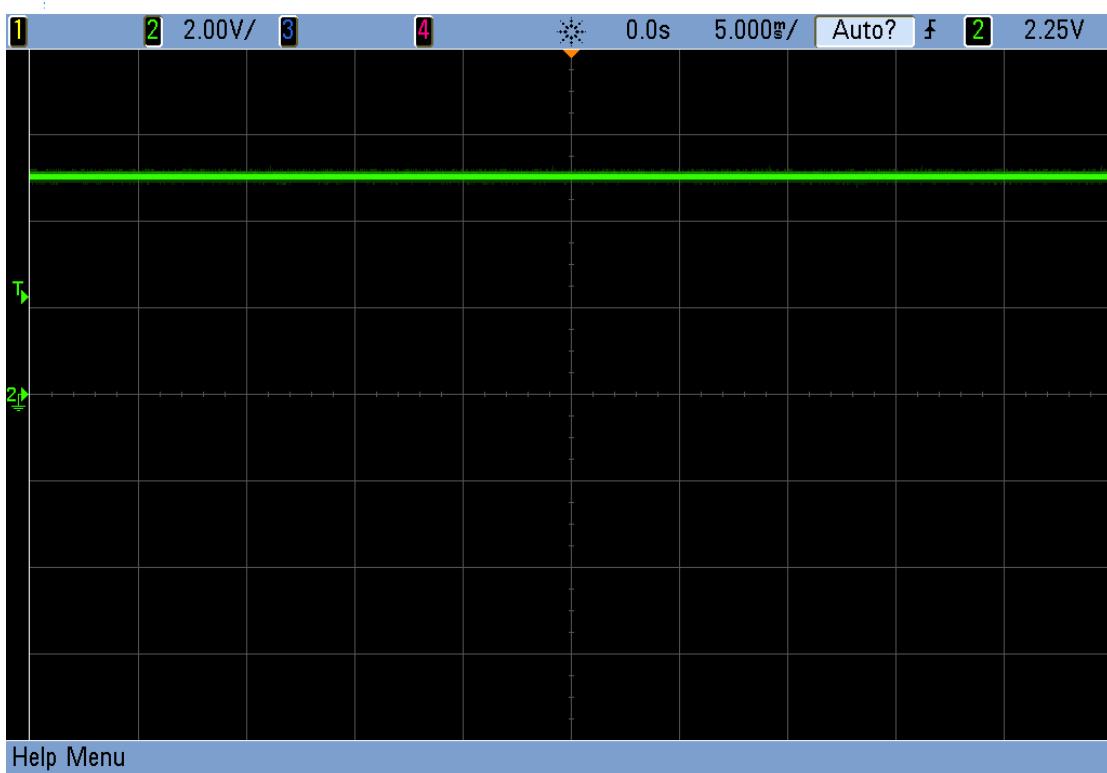
The efficiency of the DC-to-DC step down converter is shown below:
(temporary missing data)

As for the AC-to-DC converter, the output waveforms with different electrical load values are shown below:



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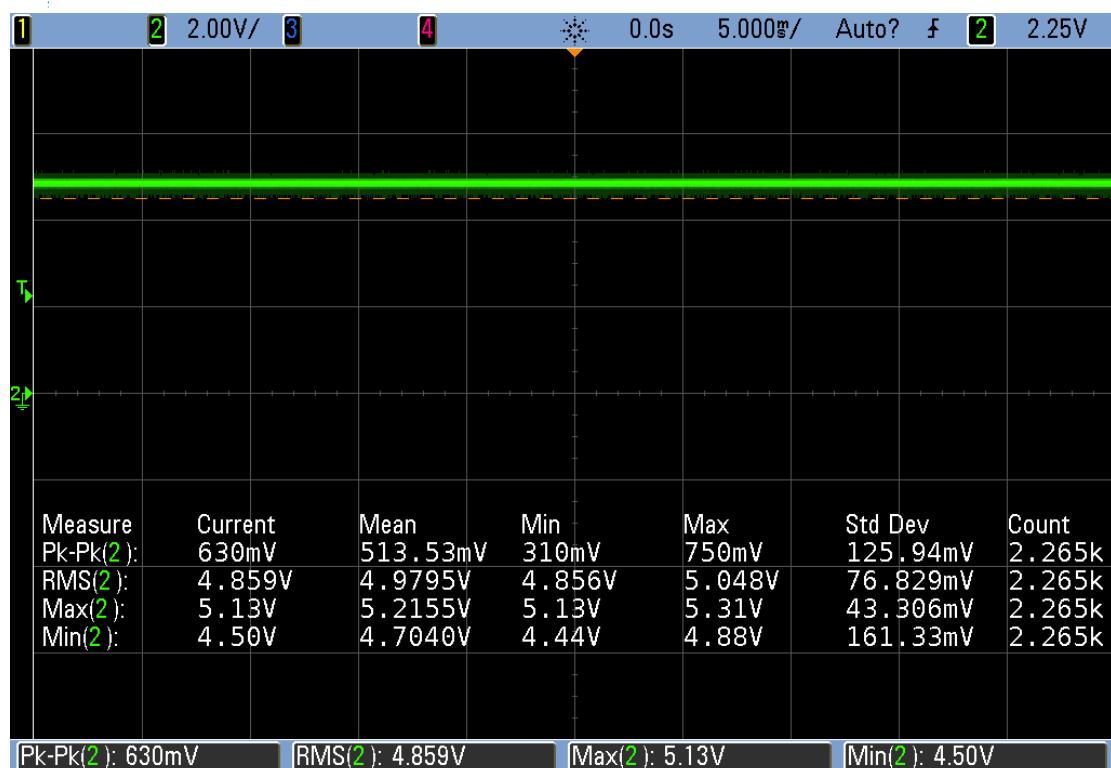


(the DC-to-DC output @5V 0.25A)



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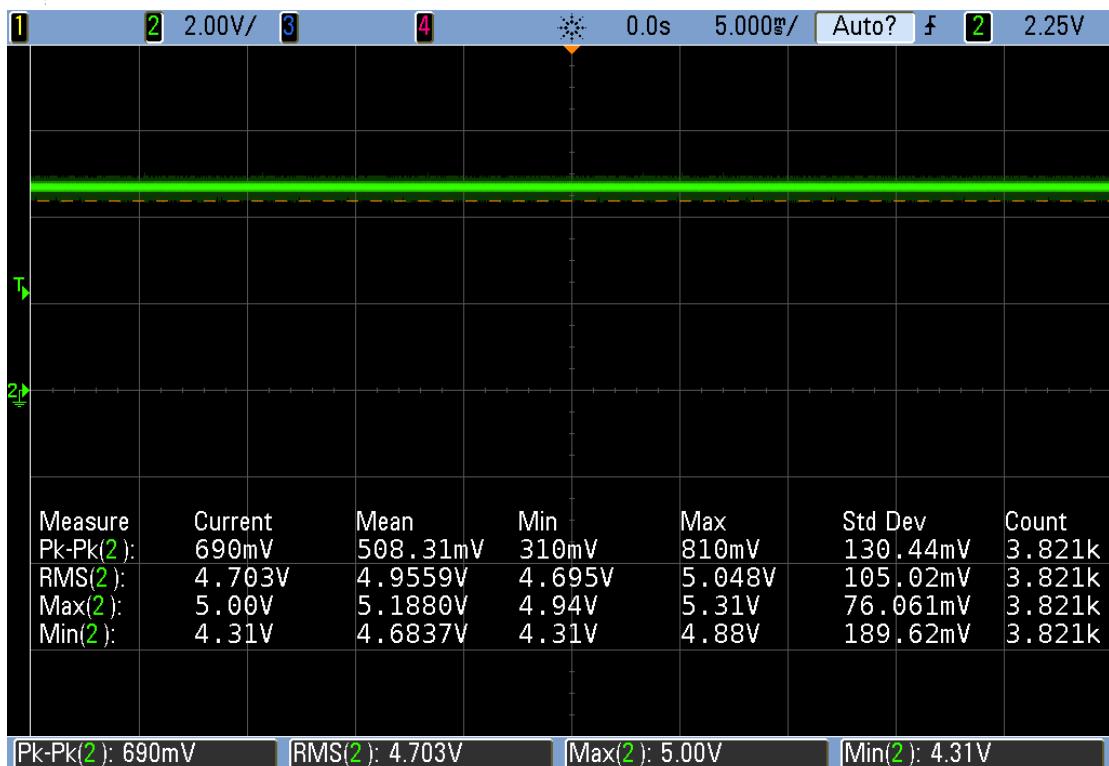


(the DC-to-DC output @5V 1A)



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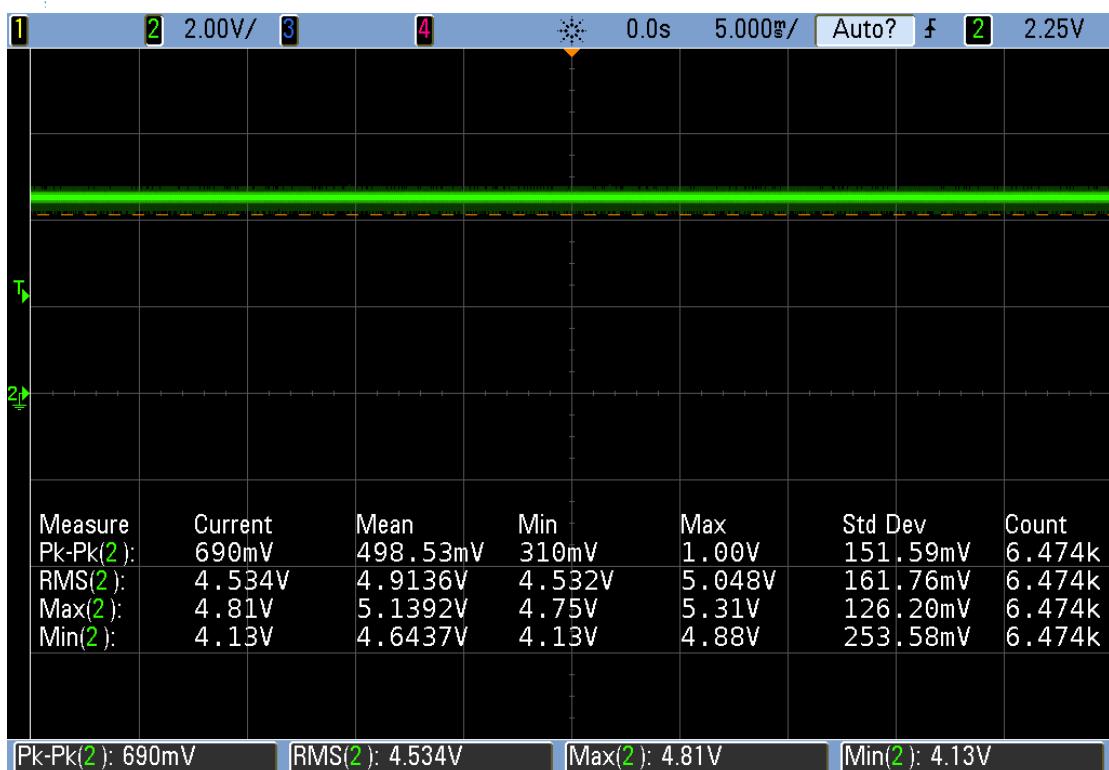


(the DC-to-DC output @5V 1.5A)



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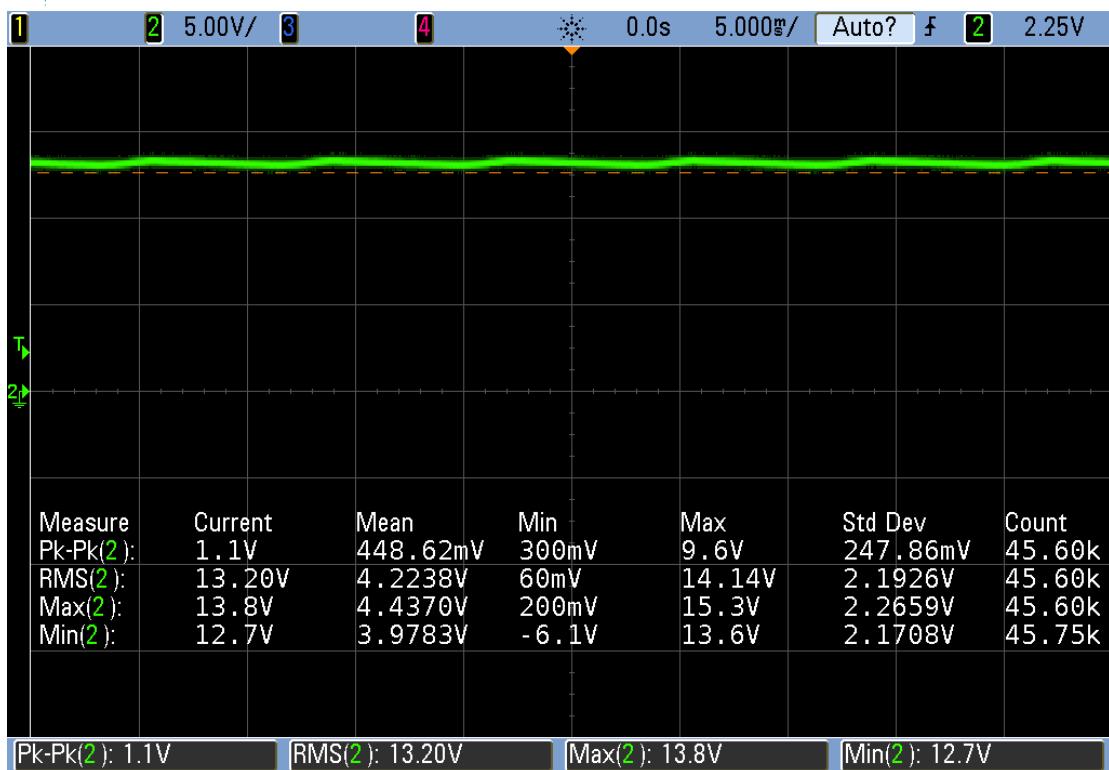


(the DC-to-DC output @5V 2A)



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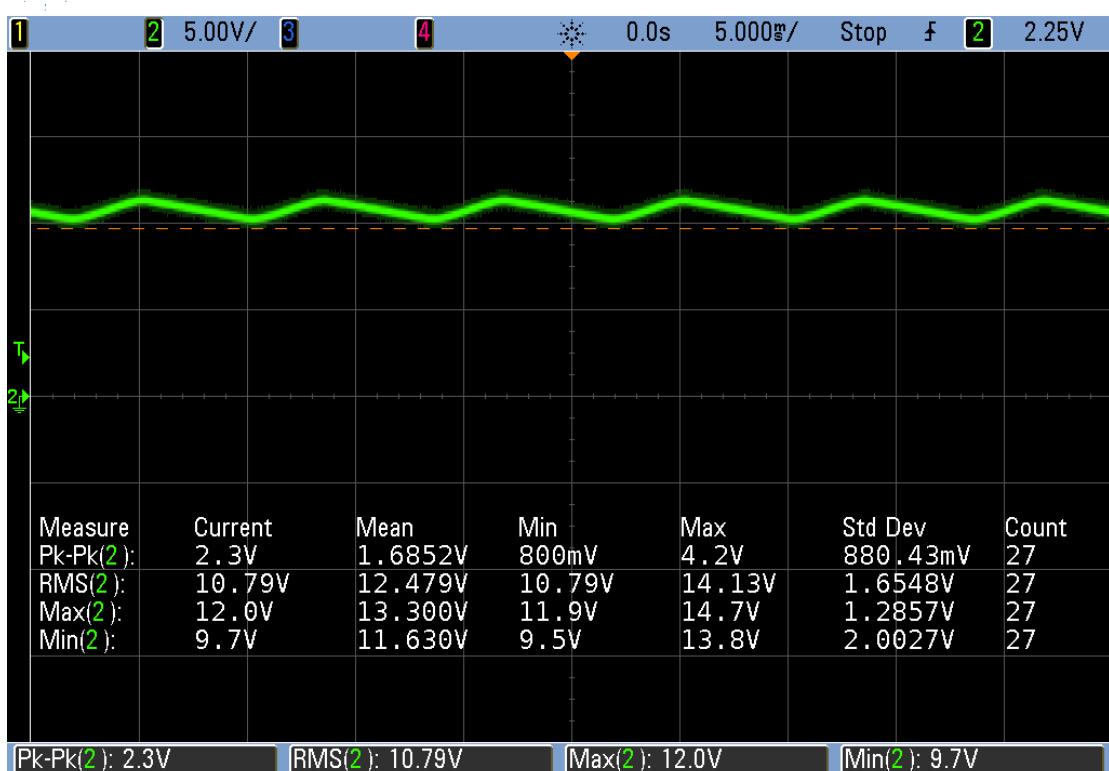


(the AC-to-DC soutput waveform @1.25W)



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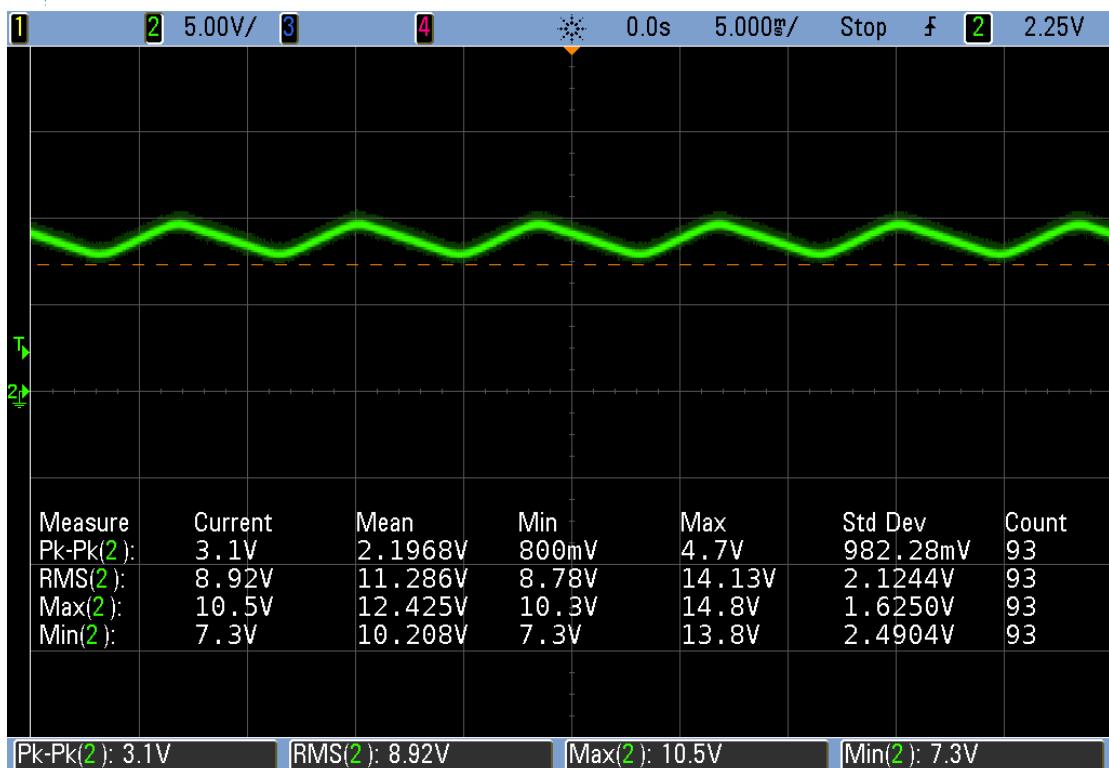


(the AC-to-DC output waveform @5W)



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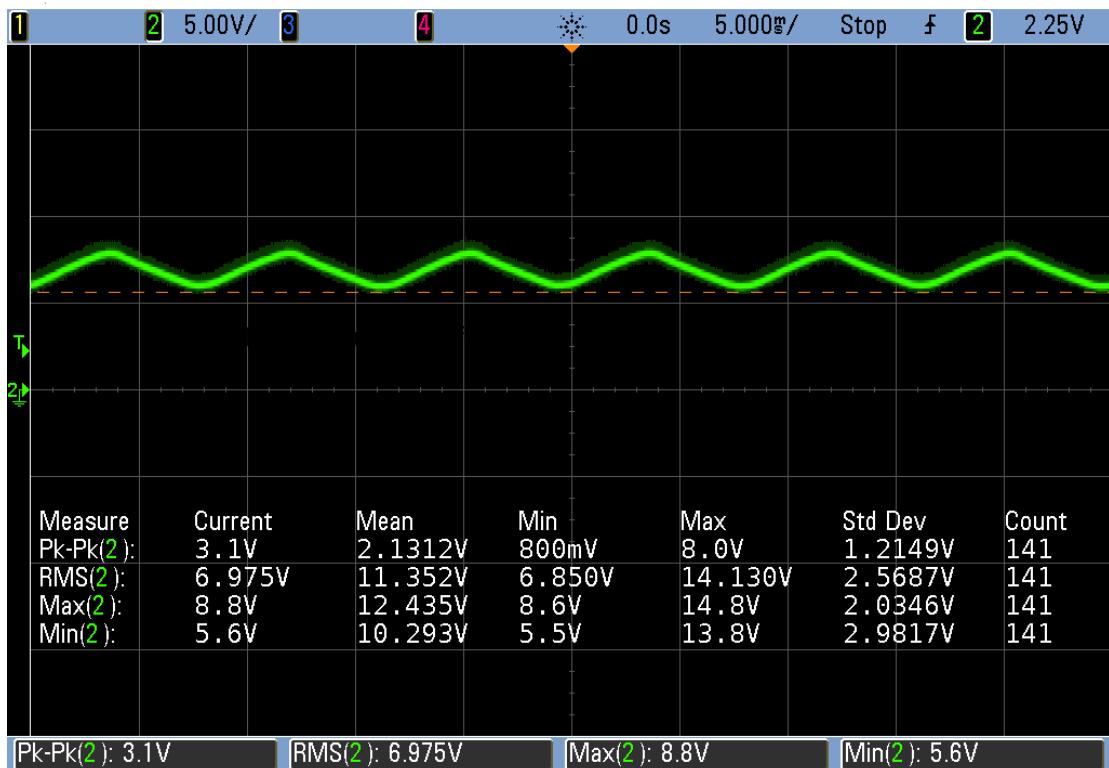


(the AC-to-DC output waveform @7.5W)



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(the AC-to-DC output waveform @10W)
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