**IT 327 - Lab #1**

**Ohm’s Law and Series Circuit**

# Objective

To learn Ohm’s law to predict its different components such as current, Voltage, and resistance. Also this lab is to learn about resistors in series and its characteristics using devices to measure them.

# Procedures

The first step is to measure all the resistors with a DMM device; it is done by reaching each end of the resistor and measured its resistance. The following table describes the resistance measured by a DMM device.

Table describing the resistors measured:

|  |  |  |
| --- | --- | --- |
| Resistors | DMM resistance measurement | Within Tolerance |
| 33 Ω | 33.34 Ω | 1% |
| 100 Ω | 99.8 Ω | 0.2% |
| 330 Ω | 0.33 k Ω | 0% |
| 1.0 k Ω | 0.99 k Ω | 1% |
| 3.3 k Ω | 3.33 k Ω | 0.9% |

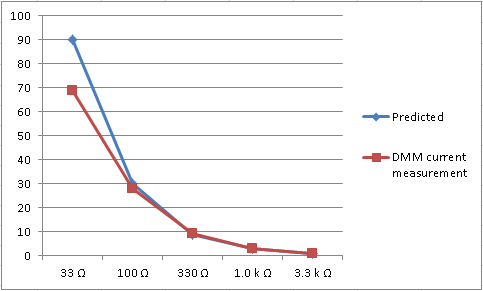
The resistors measured were all within the rate tolerance. The next step is to set the DC power to supply to 3V, then get a bread board for this next measure in order to get the current that goes through each resistors, cables to connect from one section of the bread board to another section is also needed as well. The following table describes the current that goes through each resistor:

Table describing the current that goes through each resistor:

|  |  |  |  |
| --- | --- | --- | --- |
| Resistors | Predicted | DMM current measurement | % difference |
| 33 Ω | 90 mA | 69 mA | 23.33 % |
| 100 Ω | 30 mA | 28.15 mA | 6.17% |
| 330 Ω | 9 mA | 9.2 mA | 2.17% |
| 1.0 k Ω | 3 mA | 3.16 mA | 5.06% |
| 3.3 k Ω | 0.9 mA | 0.95 mA | 5.26% |

All resistors measured were well within tolerance except 33 Ω resistor which is well above tolerance of 5%. Also the 100 Ω was a little bit higher than the allowed 5% tolerance; they all had the Gold stripe.

Graph describing the predicted and measured calculations, the y-axis is measured in mA.



Now the next step for the lab is to decrease the voltage by 1V, so in my case since I have chosen 3V, I am now making the same calculations using 2V, the following table and graph describes my findings:

|  |  |  |  |
| --- | --- | --- | --- |
| Resistors | Predicted | DMM current measurement | % difference |
| 33 Ω | 60.6 mA | 46.37 mA | 23.48 % |
| 100 Ω | 20 mA | 19.2 mA | 4% |
| 330 Ω | 6.06 mA | 6.26 mA | 3.2% |
| 1.0 k Ω | 2 mA | 2.14 mA | 6.54% |
| 3.3 k Ω | 0.606 mA | 0.664 mA | 8.73% |

The current as expected went down, because current is directly proportional to Voltage.

Next I have set up a circuit using breadboard with 5Vconnected a 330 Ω resistor, and measured the current with the DMM device, the current turned out to be 15.78 mA.

Next I have added a 1 k Ω to the circuit in series with the 330 Ω; the current using DMM is now down to 3.850 mA, which is a really good approximation from the predicted calculation which is 3.759 mA. The result was expected since the current from both measurement methods are close from what it should be.

Now the next step was to add another 100 Ω to the circuit in series that already have 330 Ω as well as 1 k Ω. Then measure the voltage drop on each resistor, please see the following table for more information:

|  |  |  |
| --- | --- | --- |
| Resistors | Volts Measured with DMM | Volts predicted calculation |
| 330 Ω | 1.1899 V | 1.15385 V |
| 1 k Ω | 3.58 V | 3.4965 V |
| 100 Ω | 0.3581 | 0.34965 V |

Total voltage measured by DMM is equal to 5.128 which is close to the predicted voltage of 5 V. I was expecting 5V because the system has 5 V initially and going through different resistors the voltage still remains the same through the circuit.

# Equipment Used

* Fluke 45 Dual Display Multimeter
* Sorensen LT 30-3 Laboratory DC power Supply.
* Resistors: 33 Ω, 100 Ω, 330 Ω, 1 k Ω, 3.3 k Ω.

# Report

All my findings from calculating current and voltage drops were pretty accurate with the measured with DMM device, except the 33 Ω resistor which gives some strange readings with the DMM device comparing with the predicted current reading. My findings and measurements were very close to where it should be according to Ohm’s law.

# Conclusion

This lab has reinforced me the principles of ohm’s law, how applicable it is to measure components and know before even measuring what the component should be reading given some data found in the formula V = R\*I. I now know how to use the DMM device and the power supply. It also taught me how to feed power into the breadboard and connect resistors in series. This lab was very educational and I look forward the next labs.

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