

MEASURING DC CURRENT

Digital Multimeter

Introduction

This experiment introduces the use of **digital multimeters** for current measurement. Digital multimeters, or **DMMs**, perform a variety of functions. The DMM operates as an **ammeter** when measuring current in a circuit. More information relative to DMMs and their use in current measurement are provided in the links to the right.

Current is a rate at which charge passes a particular point in a circuit. DMMs generally have two **terminals**, or **leads**. When the DMM is operating as an ammeter, these leads must be placed so that the current being measured passes *through* the DMM—the DMM displays this current. Therefore, when measuring a current, it is generally necessary to break your circuit apart at the appropriate point and insert the DMM leads between the two ends of the break.

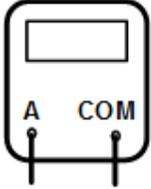
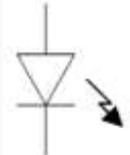
Before you begin, you should:

- Be able to use the Voltage instrument on the Analog Discovery™ to apply $\pm 5V$ relative to the Analog Discovery's ground.
- Be able to state how the reference voltage polarity and connection of voltmeter terminals are related to the sign of the measured voltage.

After you're done, you should:

- Be able to use the Analog Discovery Voltmeter instrument to measure constant voltages.

Inventory:

Qty	Description	Typical Image	Schematic Symbol	Breadboard Image
1	Digital multimeter			
1	LED			
1	100Ω resistor			

Procedures

Shortcut!

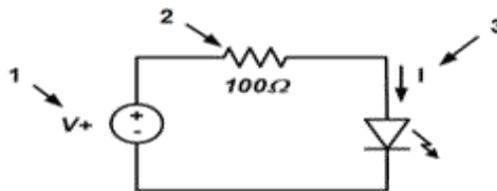
Parts A, B, and D of this experiment are similar to the Voltmeter

Instrument project and the DMM Voltage measurement project. If you have already completed either of those exercises, simply follow these steps:

- ❖ Disconnect the Analog Discovery or DMM Voltmeter connections.
- ❖ Break the connection between the resistor and diode and add the DMM ammeter connections (as shown in **Part C** of this exercise).
- ❖ Apply power to the circuit and read the current using the DMM.

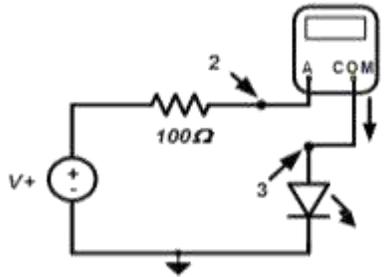
Step 1: Understanding the Circuit

A. Circuit Schematic



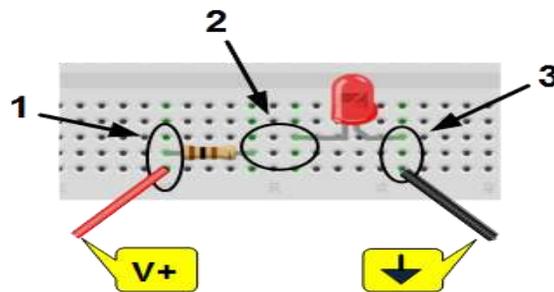
1. Use $V+$ to apply **5V** across the LED to light it up.
2. The resistor limits the current.
3. We want to measure the current, I , through the diode. Our sign convention is as shown; positive current is from the anode to the cathode of the diode.

B. Modified Circuit Schematic Including DMM



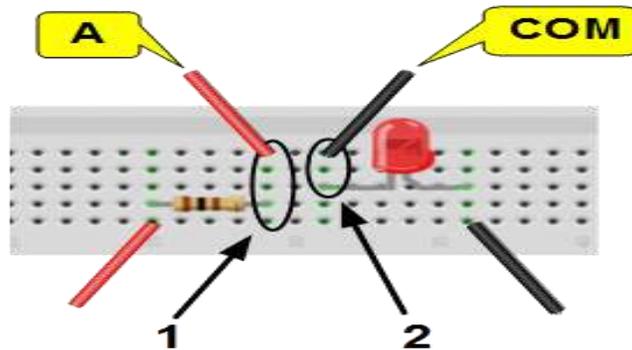
1. Break the circuit apart between the resistor and the LED.
2. Connect **A** terminal of the DMM to the resistor terminal shown.
3. Connect the **COM** terminal of the DMM to the diode's anode as shown.

C. Create Basic Circuit



1. Connect **V+** (red wire) to the **100Ω** resistor.
2. Make sure the resistor and LED anode are unconnected—they should be in holes in two different rows on the breadboard.
3. Connect ground (, the black wire) to the cathode of the LED.

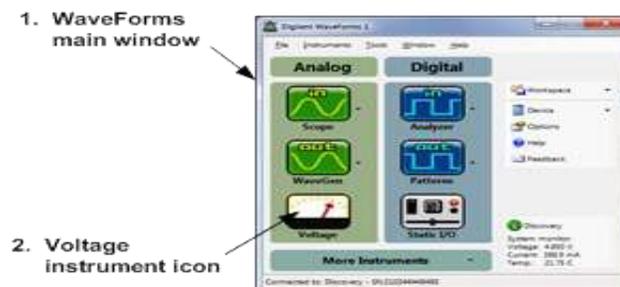
D. DMM Setup and Connections



1. Connect the **A** terminal of the DMM to the resistor's cathode.
2. Connect the **COM** terminal of the DMM to the diode's anode.
3. Turn the function selection knob on the front of the DMM to the **A** position.

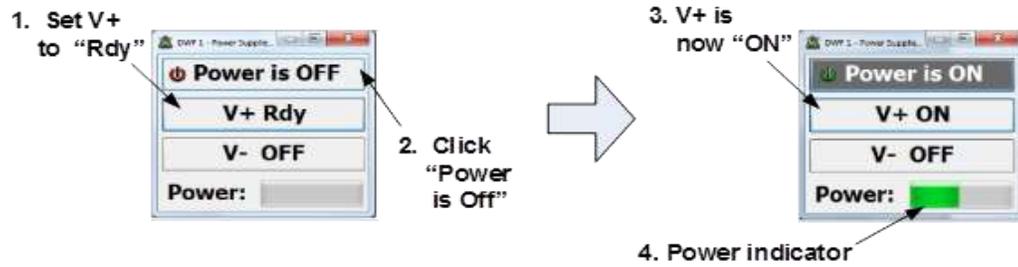
Step 2: Set up Instruments

A. Open Voltage Instrument



1. Open **WaveForms™** to view the main window.
2. Click on the **Voltage** instrument icon to open the **Power Supplies** window.

B. Turn on Power and Determine Diode Current



The above screenshots are of Digilent WaveForms running on Microsoft Windows 7.

- The LED should light up and the DMM should display the current through the diode.

Source: <https://learn.digilentinc.com/Module/105?position=1>