

EZ-Volt: A Handy LED Digital Voltmeter You Can Build in an Evening

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Take a quick look around your shack. How much of your equipment runs on batteries or a DC power supply? If you're like most of us, the answer is "most of it." And also if you're like most of us, you probably have a multimeter that you can pull out for checking these power sources out. So why do you need another meter?

An extra voltmeter can be quite handy. Perhaps you've got a "go kit" for public service and emergency communications. Wouldn't it be handy to have a voltmeter dedicated to this kit so that you can always know that it's truly ready? How about the condition of those rechargeable batteries you keep around for emergency power? Or the performance of that solar energy system? Or even the battery in your daily driver? These are just a few places where an extra meter can be quite practical.

The EZ-Volt is an accurate digital meter you can construct in just a couple of hours. It's based on a prefabricated LED digital voltmeter module. But the really cool part about EZ-Volt is that it is powered by the circuit it's measuring. It otherwise requires no battery or power supply of its own. And amazingly, it uses only 10 to 20 mA of current from the circuit being tested. That's a very low current draw - - so low, in fact, that it will hardly affect the operation of whatever you connect it to. This makes it perfect for dozens of applications, including the venerable "go kit."



Figure 1: The EZ-Volt Meter Measuring a 12 Volt SLA Battery

The EZ-Volt meter will directly measure any DC source from 4 to 30 volts. (4 volts is the minimum required to operate the meter's electronics). The schematic is quite simple, as shown in Figure 2. The DC power from the device being measured is applied to the *Vcc* and *GND* terminals of the meter module through D₁, which is present to protect against accidental polarity reversal. The meter module reads the DC voltage placed on the *Sense* terminal, which is connected to the DC input through R₁, which provides additional polarity reversal protection.

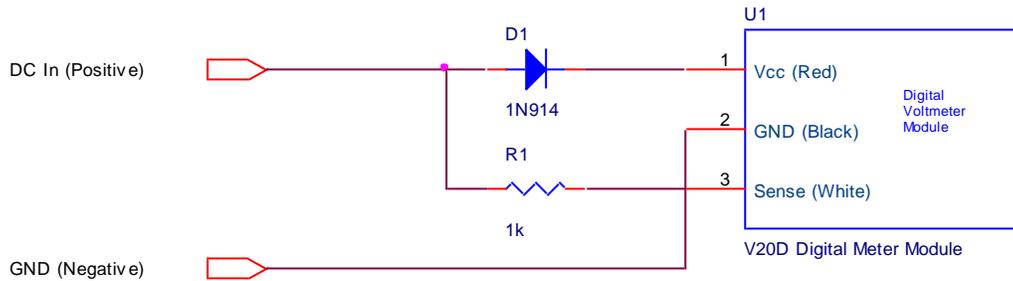


Figure 2: Schematic of EZ-Volt Digital Voltmeter

Construction

The meter can be constructed in about an hour's time; components should be laid out as shown in Figure 3. There's nothing critical here - - just make sure to insulate your wiring with heat shrink tubing or electrical tape before final assembly. Of course, make sure you install D₁ correctly - - it's a polarized part.

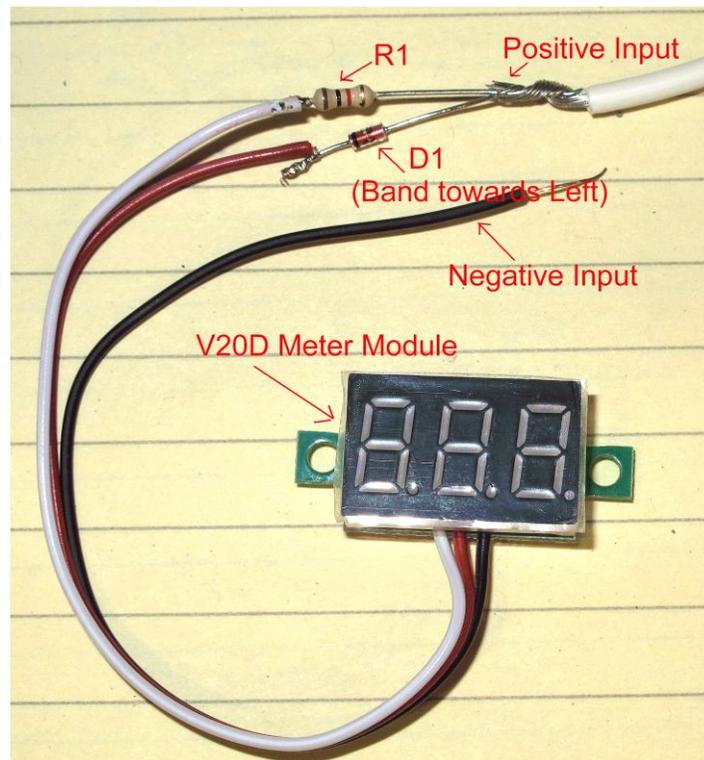


Figure 3: Component Electrical Layout

Figure 4 is the inside view of the EZ-Volt prototype, which was placed in a small Radio Shack plastic project box. As you can see there's hardly anything in there! The diode and resistor are within the black shrink-wrapped "Y" connection that feeds the red and white meter module wires. An Anderson Power Pole connector provides the DC input connection. All the components are simply hot-glued in place.

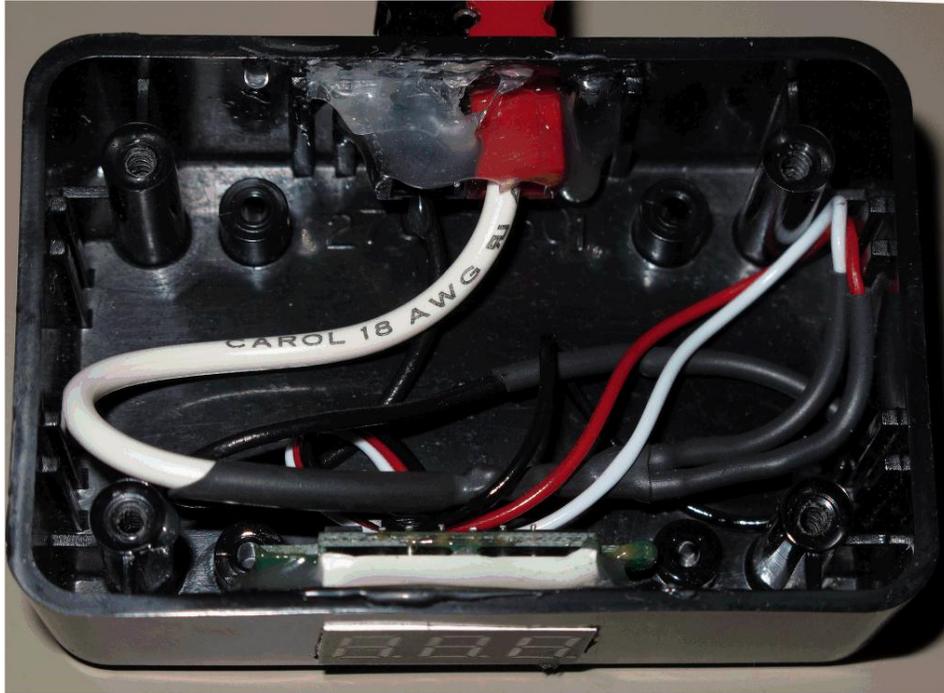


Figure 4: Inside the EZ-Volt Meter

Operation

Using the EZ-Volt meter is easy. Simply connect the meter's leads to any DC source you're interested in checking, between 4 and 30 volts. The display will instantly show the voltage you've connected to. The display updates only about twice a second, so checking rapidly changing voltages is probably out of the question.

Once you've tried the EZ-Volt, you'll probably wonder how you ever got along without it - - and you'll discover many other uses for it as well.

Parts List

Designator	Description
R1	1 k ohm 1/4 watt fixed resistor
D1	1N914 switching diode
U1	<p>Surmen V20D three-lead DVM module, 0-30V option.</p> <p>Available from the following vendors:</p> <p>Associated Radio http://www.associatedradio.com SKU: DVM.BLUE (Blue), DVM.RED (Red)</p> <p>Universal Radio http://www.universal-radio.com/catalog/meters/0794.html SKU: #0794 (Blue), #6165 (Red)</p>