Some information related to using batteries with IRMimic and IRMimic2 R. Grieb Updated 5/25/10

Several people have expressed interest in using batteries to power the IRMimic and/or IRMimic2 boards for portable operation. There are several options for doing this, but first, here is some information that may be helpful:

1) A reasonable assumption for voltage from a standard 1.5 volt AA or AAA battery is 1.55 volts when new, and something like 0.9 or perhaps 1.0 volts at end-of-life.

2) The 78L05 voltage regulator supplied with the kit requires a minimum input of about 6.5 volts to generate 5.0 volts output. This regulator draws on the order of 3 mA by itself, even if the load is not drawing any current. Some ("low-dropout") regulators, such as the LP2950, can provide 5V with an input as low as perhaps 5.1 or 5.2 volts. Some regulators draw only a few tenths of a mA when idling.

3) A 9V battery cannot supply the current needed by the IR LED, even for a short time.

4) The IR LED will draw approximately 140 mA (in pulses) using a 5V supply and a 22 ohm series resistor. If a different supply voltage is used, such as a regulated 4V supply, for instance, the 22 ohm resistor should be adjusted to maintain the LED current at 140 mA for best range.

Battery option #1: Use four AA or AAA NiMH rechargeable batteries in series. These batteries put out a fairly constant voltage of about 1.2-1.3 volts, providing 4.8 to 5.2 volts to the circuit. The 78L05 voltage regulator would not be installed in this case, so both zero ohm resistors would be installed, thereby shorting across it. This is probably the best option. Since no voltage regulator is used, the standby current of the voltage regulator will not degrade battery life.

Battery option #2: Use three 1.5V AA or AAA alkaline batteries in series. This would give 4.65 volts to around 3.0 volts over the life of the batteries. The circuit should operate over this range, but the IR LED current would decrease considerably as the batteries discharge. This may be acceptable for some applications where maximum range is not required. The voltage regulator would be removed as in option #1. Since no voltage regulator is used, the standby current of the voltage regulator will not degrade battery life.

Battery option #3: Use five AA or AAA batteries. This would give 7.75V to around 5.0V over the life of the batteries. The 7.75V value is too high to apply directly to the board without using a voltage regulator, but the 5.0V voltage is not enough to supply the 78L05 regulator. A low-dropout 5V regulator could be used in place of the 78L05. The IR LED current could be supplied either from the regulator output or from the batteries directly if the regulator cannot supply adequate current. A low-standby-current voltage regulator could be used to maximize battery life, or a power switch could be added to power down the voltage regulator (and the rest of the circuitry) between uses.

Battery option #4: Use four AA or AAA batteries. This would give 6.2V to around 4.0V over the life of the batteries. The 6.2V value is too high to apply directly to the board without using a voltage regulator, so a low-dropout 5V, or perhaps 4V regulator could be used. The IR LED current could be supplied either from the regulator output or from the batteries directly if the regulator cannot supply adequate current. A low-standby-current voltage regulator could be used to maximize battery life, or a power switch could be added to power down the voltage regulator (and the rest of the circuitry) between uses.

Note: The newer 1.5V Lithium batteries could also be used in place of alkaline batteries. They should give a much longer battery life and a more constant voltage as they discharge.