

AN01-Power Supply Options

Description

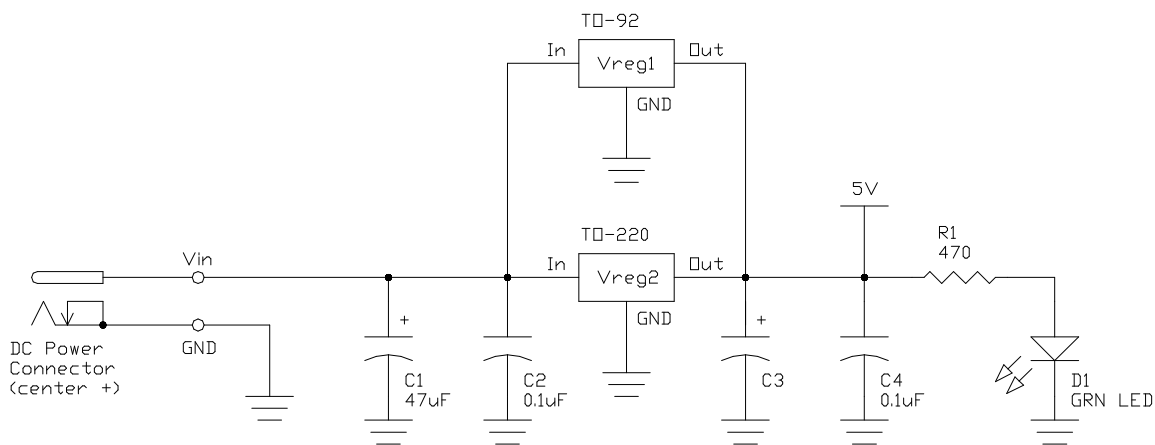
This appnote discusses power supply options available for our **RapidNN** and **RapidNNXL** series PIC prototyping boards. This appnote covers both series equally as both series of prototyping boards use identical power supply designs

Note 1: this appnote discusses several alternative voltage regulators and other discrete components which are not stocked in our kits and are not currently

available for purchase from DH MicroSystems, Inc. Alternate voltage regulators and related components are available from other electronic component distributors.

Note 2: the voltage regulators discussed in this appnote are not the only possible alternatives. Any voltage regulator that is pin compatible with the TO220 7805 or the TO92 78L05 can be used. Refer to voltage regulator manufacturers websites and datasheets for other compatible devices.

Power Supply Schematic



Basic Construction

Partlist:

If you purchased this prototyping PCB as a kit, then it included the following power supply components:

- VREG1-78L05 voltage regulator (TO-92)
- VREG2-**not included** (TO-220)
- DC power receptacle
- C1-47uF electrolytic capacitor
- C2-0.1uF capacitor
- C3, **not included**
- C4-0.1uF capacitor
- R1-470 Ohm, 1/8W, resistor
- D1-Green LED

Note that parts are *not* provided to fill all power supply circuit PCB footprints, namely VREG2 (TO-220 voltage regulator) and C3 (electrolytic cap.). These components are not required for basic 78L05 usage.

If the power supply circuit is built out of these stock components, then the user will have a basic 5V regulator circuit that will provide up to 100mA of current to both the microprocessor and application circuitry.

User Options:

All user options are discussed on the following 2 pages.

Copyright © 2003 DH MicroSystems, Inc.

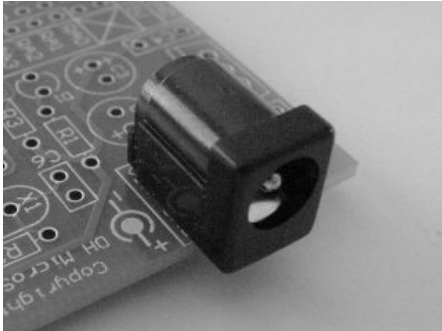
All trademarks mentioned in this document are the property of their respective companies.

AN01-Power Supply Options

Power Supply Options

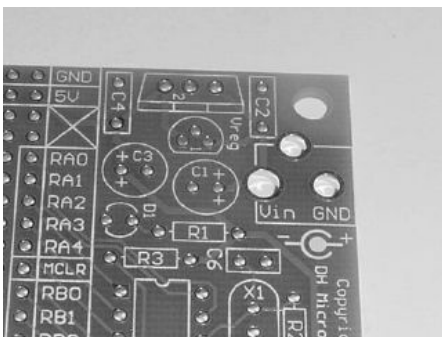
Power Entry Options:

If the user desires to power the PIC prototyping PCB with a wall adapter then the DC power receptacle can be installed where indicated on the PCB as pictured below:



This option is especially useful if portability or low cost is important (i.e. for student usage in the classroom or hobbyist usage). Your wall adapter should have a 2.1mm ID, 5MM OD DC power plug with a positive center conductor. The wall adapters output should be in the 7.5-12VDC range and be able to comfortably handle any current load demanded by the microprocessor and application circuit. DH MicroSystems, Inc. does sell a 9VDC 350mA wall adapter which is compatible with its these prototyping boards.

The user can also power the PIC prototyping board through the use of a bench DC power supply. In this case the user will not install the DC power receptacle, but will instead solder in a red wire and a black wire to the pins labeled **Vin** and **GND** respectively. These pins are located on the footprint for the DC power receptacle and are pictured below:

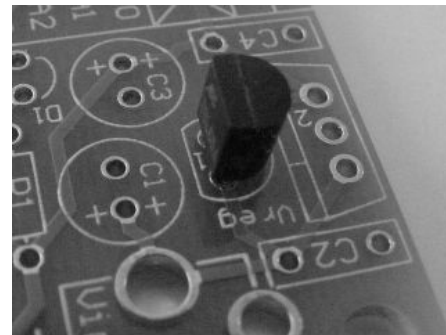


Again, the bench supply should be set within the 7.5-12VDC range, and should be able to supply the

sufficient current for the microprocessor and application circuitry.

TO-92 Voltage Regulator Options:

By Stocking the TO-92 78L05 voltage regulator VREG1, the PCB has a power supply that can source 100mA of current. This voltage regulator installs on the PCB as pictured below:



The 78L05 is not the only TO-92 packaged voltage regulator compatible with these PCBs. An ultra low quiescent current, low dropout voltage option is the LM2936-5.0. This regulator consumes <15uA and provides a regulated 5VDC output down to 5.5VDC input. Due to its low quiescent current and low drop out voltage, this regulator is a good choice for low power, or battery powered applications. To use this regulator C3 should be stocked with a 10uF electrolytic capacitor; C1 in most cases can be omitted. See device datasheet for full details and circuit recommendations. Note: This regulators output is only 50mA, keep this in mind when considering using this regulator for your applications.

For automotive applications requiring 100mA or less, you might also consider the LM2931Z-5.0 voltage regulator. It is also a low quiescent current (1mA), low dropout voltage (0.3V), which also protects downstream electronic components from common automotive transients like load dumping, reverse polarity, 2 battery jumps, etc. Stock C3 with a 100uF low ESR electrolytic capacitor when using this regulator (C1 can be omitted). See datasheet for additional details.

There are a number of other compatible TO-92 voltage regulators available, refer to voltage regulator manufacturers websites and datasheets for other compatible devices.

Copyright © 2003 DH MicroSystems, Inc.

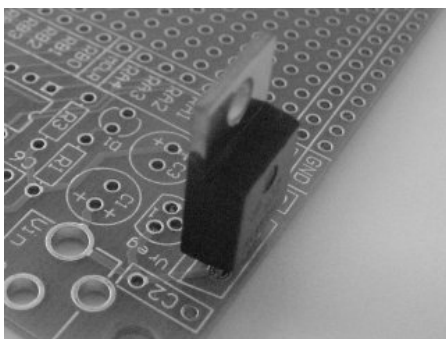
All trademarks mentioned in this document are the property of their respective companies.

AN01-Power Supply Options

Power Supply Options (Cont.)

TO-220 Voltage Regulator Options:

If more than 100mA of current is required, then the TO-220 7805 regulator VREG2 can be installed instead as pictured below:



Note: install *only one* voltage regulator—either VREG1 or VREG2—*never both*.

The installation of the TO-220 7805 means that the power supply circuit on the PCB can now source current in excess of 1A.

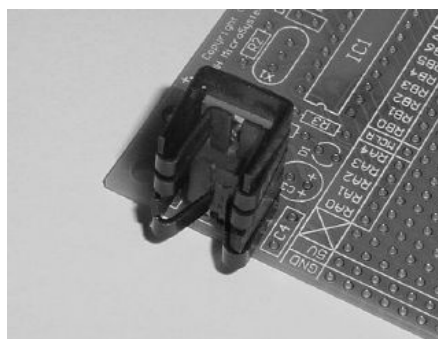
Alternative TO-220 voltage regulators are also available. The LM2931 automotive regulator mentioned on the previous page is also available in a TO-220 package (LM2931T-5.0). It still only allows for 100mA output, and requires the same 100uF low ESR capacitor installed in C3.

Another automotive voltage regulator in the TO-220 package is the LM2940CT-5.0. Like the LM2931, it protects from common automotive

transients, but sources up to 1A of output current. It requires C3 to be at least a 22uF low ESR electrolytic capacitor, and C2 to be a 0.47 ceramic capacitor (C1 can be omitted). See device datasheet for full details.

Heatsinking:

In the event that a TO-220 voltage regulator is getting too hot, our prototyping PCBs have been laid out to allow for a slip-on heatsink to be installed on the voltage regulator as pictured below:



Conclusion:

There are a number of other compatible voltage regulators both in TO-92 and TO-220 packages. Such regulators need to be pin compatible with the common 7805 and 78L05 devices. Refer to voltage regulator manufacturers websites and datasheets for other compatible devices and specific requirements.

Contact Us

We maintain a website where you can get information on our products, obtain literature, and download support files. Visit us online at:

www.dhmicro.com

Email your technical support questions to **support@dhmicro.com**. We try to respond to your questions within an hour if it is received Monday through Friday between the hours of 8am to 5pm (Mountain Time).

For sales questions or to place an order, direct your emails to **sales@dhmicro.com**. Refer to the order form and price list available on our website for product pricing, shipping rates, payment instructions, and for other info we need to complete your order.

Our mailing address:

DH MicroSystems, Inc.
P.O. Box 2272
Pocatello, ID 83206-2272

Disclaimer: DH MicroSystems, Inc. reserves the right to modify its products or literature, or to discontinue any product at any time without prior notice. The customer is responsible for determining the suitability of any device for any application developed using DH MicroSystems, Inc. components.

Copyright © 2003 DH MicroSystems, Inc.

All trademarks mentioned in this document are the property of their respective companies.