QUASAR ELECTRONICS KIT No. 1061

12 V/0.5 A STABILIZED POWER SUPPLY

General Description

This is one of the most popular Kits in our range as it is the ideal power supply for many other projects available from QUASAR ELECTRONICS Kit. It can deliver 12 VDC in its output with a current rating of 0.5 A. This is a very conservative current rating as the circuit is capable of delivering 1-1.5A if the regulator is properly cooled. As it is, without using a heatsink on the regulator IC it is quite safe to draw 500 mA continuously.

Technical Specifications - Characteristics

Input voltage: 12 V AC
Current: 500 mA

How it Works

The circuit is very simple really as it makes use of a voltage regulator IC, in this case the 7812, which keeps the output voltage at exactly 12 VDC. This a revolutionary device which has simplified power supply designs very much as it has eliminated the need for complicated transistor regulated supplies, has lowered power consumption and the current handling capability of the circuits which make use of IC regulators is much better (for similar size and cost) than their transistor equivalents. The regulator is short-circuit proof and has a thermal shut-down protection circuit which makes the circuit practically indestructible. The use of the regulator which looks like a thyristor is very simple. In its input is connected the unstabilised DC voltage which should be a few volts above the required output voltage and from its output is taken the regulated DC voltage. There is a third pin which is always grounded. The input voltage should be slightly higher than the desired output (by 3-4 V) and usually this is automatically taken care of if the transformer used has the same secondary voltage as the required DC output from the circuit. As the rectified DC voltage is approximately 1.4 times higher than the AC input there is plenty of headroom for the regulator's needs.

Construction

First of all let us consider a few basics in building electronic circuits on a printed circuit board. The board is made of a thin insulating material clad with a thin layer of conductive copper that is shaped in such a way as to form the necessary conductors between the various components of the circuit. The use of a properly designed printed circuit board is very desirable as it speeds construction up considerably and reduces the possibility of making errors. QUASAR ELECTRONICS Kit boards also come pre-drilled and with the outline of the components and their identification printed on the component side to make construction easier. To protect the board during storage from oxidation and assure it gets

to you in perfect condition the copper is tinned during manufacturing and covered with a special varnish that protects it from getting oxidised and also makes soldering easier. Soldering the components to the board is the only way to build your circuit and from the way you do it depends greatly your success or failure. This work is not very difficult and if you stick to a few rules you should have no problems. The soldering iron that you use must be light and its power should not exceed the 25 Watts. The tip should be fine and must be kept clean at all times. For this purpose come very handy specially made sponges that are kept wet and from time to time you can wipe the hot tip on them to remove all the residues that tend to accumulate on it.
DO NOT file or sandpaper a dirty or worn out tip. If the tip cannot be cleaned, replace it. There are many different types of solder in the market and you should choose a good quality one that contains the necessary flux in its core, to assure a perfect joint every time. DO NOT use soldering flux apart from that which is already included in your solder. Too much flux can cause many problems and is one of the main causes of circuit malfunction. If nevertheless you have to use extra flux, as it is the case when you have to tin copper wires, clean it very thoroughly after you finish your work.
In order to solder a component correctly you should do the following:
- Clean the component leads with a small piece of emery paper.
- Bend them at the correct distance from the component's body and insert the component in its place on the board.
- You may find sometimes a component with heavier gauge leads than usual, that are too thick to enter in the holes of the p.c. board. In this case use a mini drill to enlarge the holes slightly. Do not make the holes too large as this is going to make soldering difficult afterwards.
- Take the hot iron and place its tip on the component lead while holding the end of the solder wire at the point where the lead emerges from the board. The iron tip must touch the lead slightly above the p.c. board.
- When the solder starts to melt and flow, wait till it covers evenly the area around the hole and the flux boils and gets out from underneath the solder. The whole operation should not take more than 5 seconds. Remove the iron and leave the solder to cool naturally without blowing on it or moving the component. If everything was done properly the surface of the joint must have a bright metallic finish and its edges should be smoothly ended on the component lead and the board track. If the solder looks dull, cracked, or has the shape of a blob then you have made a dry joint and you should remove the solder (with a pump, or a solder wick) and redo it.
- Take care not to overheat the tracks as it is very easy to lift them from the board and break them. - When you are soldering a sensitive component it is good practice to hold the lead from the component side of the board with a pair of long-nose pliers to divert any heat that could possibly damage the component.
- Make sure that you do not use more solder than it is necessary as you are running the risk of short-circuiting adjacent tracks on the board, especially if they are very close together.
- When you finish your work cut off the excess of the component leads and clean the board thoroughly with a suitable solvent to remove all flux residues that may still remain on it.
There is nothing especially difficult with the construction of this project. The components are few and their places are clearly marked on the P.C. board. Some care however should be taken to avoid overheating the semiconductors and to place the polarised components correctly in their places.
To avoid the above mistakes and consequent problems please do not be tempted from the projects apparent simplicity to do a haphazard construction. Keep your work as clean as possible and follow an order as you place and solder the components on the board. An

order we suggest is to place the pins first, follow with the resistors, capacitors, electrolytic and finally complete your work with the placement of the semiconductors in their assigned places on the P.C. board.
When you had finished soldering the components clean the P.C. board thoroughly and inspect it for dry joints and solder bridges. If everything seems to be OK connect the input (points 1 & 2) to the secondary winding of a 12 V transformer and a voltmeter across the output (pins 3 + and 4 -). If you connect the primary of the transformer to the mains the LED should start glowing and the voltmeter should register exactly 12 VDC.
If you are only going to draw a maximum current of 500 mA from the circuit there is no need to use a heatsink. If however you need heavier currents please use a heatsink and a transformer that is accordingly rated. Keep in mind that the maximum current the circuit can supply is up to 1.5A if the regulator is mounted on an adequate heatsink.

Adjustments

This kit does not need any adjustments, if you follow the building instructions.

Warning

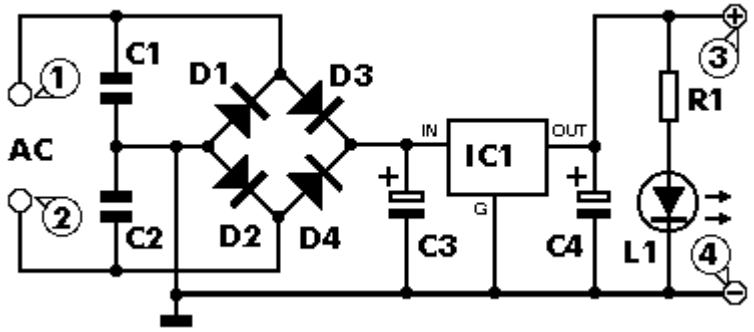
QUASAR ELECTRONICS kits are sold as stand alone training kits.
If they are used as part of a larger assembly and any damage is caused, our company bears no responsibility.

While using electrical parts, handle power supply and equipment with great care, following safety standards as described by international specs and regulations.

If it does not work

- Check your work for possible dry joints, bridges across adjacent tracks or soldering flux residues that usually cause problems.
- Check again all the external connections to and from the circuit to see if there is a mistake there.
- See that there are no components missing or inserted in the wrong places.
- Make sure that all the polarised components have been soldered the right way round.
- Check your project for faulty or damaged components.
- If everything checks out and your project still fails to work, please contact us for information on our Get-You-Going service.

Schematic Diagram



Parts List

All components including printed circuit board, assembly instructions including schematics and detailed parts list are supplied when you purchase the kit.

Ordering

For pricing info and online ordering please visit:

http://www.quasarelectronics.com/1061.htm

For further info please contact us by e-mail:

mailto: sales@QuasarElectronics.com
