

CK403 - POSITIVE ADJUSTABLE POWER SUPPLY MODULE

INTRODUCTION

This kit is a compact, easy to build and use positive variable power supply module. It is ideal for powering any application requiring a DC supply at current levels up to 1.5A

FEATURES:

- Output reverse polarity and back-voltage protection
- LED power on indication
- On board heatsink for IC regulator
- Variable output voltage
- AC or DC input voltage
- Low noise (uses linear regulator)
- Screw terminals for input, output and LED indicator
- Compact dimensions (84 x 37 mm)

The kit is constructed on a single-sided printed circuit board (PCB). Protel Autotrax & Schematic were used to design the board.

ASSEMBLY INSTRUCTIONS

Follow the overlay on the PCB when inserting components. Start with the lowest height components first. Leave the 2200uF capacitor, heatsink and regulator IC until last. Make sure that the polarised components, diodes and electrolytic capacitors, are inserted the correct way round.

Note: Take care when bending the diode leads. Use a pair of long nose pliers to hold the lead close to the body to avoid stressing the diode itself. Make sure that the diode leads are bent accurately to fit into the PCB.

Lightly secure the regulator IC to the heatsink using the screw and nut provided. Use some heatsink compound if available. Fit the whole assembly to the PCB and solder into position. Tighten the screw and nut. Now fit the 2200uF capacitor.

CIRCUIT DESCRIPTION

Diodes D1-4 form a bridge rectifier which converts the AC input voltage into a DC level. They also allow a DC input voltage to be connected either way around. Capacitor C1 smooths the DC output of the bridge whilst C2 provides high frequency decoupling. The LM317T is an adjustable regulator IC providing the desired output voltage. Diode D5 is reversed biased during normal operation and is used to protect the regulator if the output is connected to a voltage of the same polarity (eg battery). Diode D6 protects the regulator if a reverse polarity voltage is connected to the output.

The regulator develops a nominal 1.25V reference voltage between the output and adjust terminals. This constant voltage is applied across R1, causing a constant current to flow. This constant current flows through trimpot VR1. By varying VR1, the voltage across it will vary and hence the output voltage can be set.

The output voltage is calculated by:

$$V_{OUT} = 1.25(1 + \frac{VR1}{R1})$$

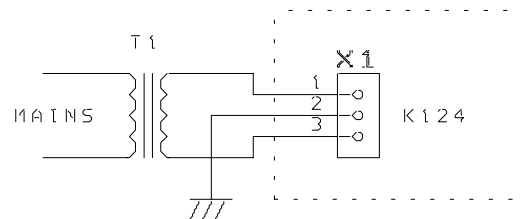
Capacitor C3 improves the ripple rejection of the regulator while capacitorS C4 and C5 provide high and low frequency decoupling respectively.

The LED indicates that power is present at the output. The current through the LED should be between 5 and 20mA and is set by resistor R2. The value of R2 varies depending on the required output voltage and is calculated by

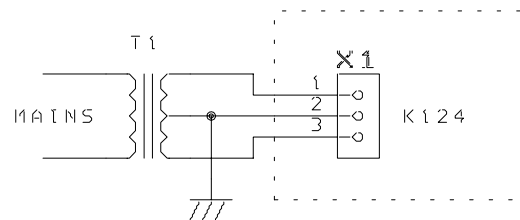
$$R_2 = \frac{V_{OUT} - V_{LED}}{10 \times 10^{-3}} \quad \text{where } V_{LED} \approx 2V$$

INPUT CONFIGURATION

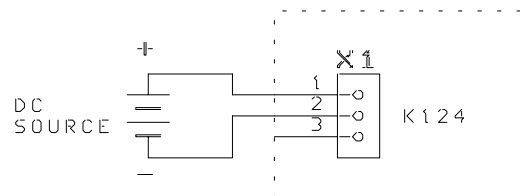
There are a number of different input configurations that can be used with this kit. The configuration chosen will depend on the available voltage source. Wherever possible, keep the input voltage as low as possible to achieve the required output. This minimises the heat dissipation on the regulator.



AC Transformer - single output



AC Transformer - centre-tapped output



DC input source

