Global® Specialties

Instruction Manual

GSK-135 Step Up DC Voltage Converter

INTRODUCTION

This kit converts any DC input voltage from 6 to 12V up to an output of 16.5V DC. Nominal output current is 100mA. More current is available but with a corresponding increase in output voltage ripple.

Most 12V DC '**unregulated'** plug packs have an open circuit output of 16 to 18 volts. This is sufficient to drive the programmers. However, in some countries, only **'regulated'** plug packs are available. These give an exact 12V DC output. This kit aims to overcome that problem.

The following table gives performance specifications for this kit.

Test	Conditions	Results
Line Regulation	V_{IN} = 6V - 12V I_O = 100 mA	40 mV
Load Regulation	V_{IN} = 12V I_O = 50 – 300 mA	30 mV
Output Ripple	V_{IN} = 12V I_O = 100 mA	150 mV

Line Regulation – the change in the output voltage in response to a change in the input voltage at a given current.

Load Regulation – the change in the output voltage in response to a change in the average load current at a given input voltage.

Output Ripple – the AC component of a steady DC output.

ASSEMBLY INSTRUCTIONS

Use the component overlay on the PCB to place the components, in the following order:

- Resistors and diode
- Ceramic capacitor and IC socket
- DC power jacks
- Electrolytic capacitors. Make sure they are the right way around
- Inductor

CIRCUIT DESCRIPTION

The circuit is based on a Motorola MC34063A DC-DC converter IC. Data on this chip is available from the Motorola web site at

http://mot-sps.com

The input voltage is applied to pin 6 of the IC and also to the 170uH inductor via resistors R1-4. These resistors provide current monitoring and the IC shuts down if the voltage across them exceeds 0.3V.

An internal oscillator, its operating frequency set by capacitor C3, drives a high current switch whose output appears at pin 1. When this output goes low it switches current through the 170uH inductor. Each time the switch turns off, the collapsing magnetic field associated with the inductor will try to maintain the current through it. With the switch off the only available current path is via the 1N5819 diode, D1, to the 470uF capacitor C3. This capacitor charges to a higher voltage than the input voltage.

Pin 5 is the negative input of an internal voltage comparator, while an internal 1.25V reference is connected to the positive input. Negative feedback, via the resistor network R6 and R7, is used to set the output voltage.

When the voltage at pin 5 is just above 1.25V the output (pin 1) is off and when it is below 1.25V the output is switching on and off at a high frequency. This will regulate the output voltage to within ± 50mV.

The formula to set the output voltage is:

$$V_{OUT} = 1.25(1 + \frac{R7}{R6})$$

IF IT DOES NOT WORK

Poor soldering ("dry joints") is the most common reason for the circuit not working. Check all soldered joints carefully under a good light. Re-solder any that look suspicious. Check that all components are in their correct position. Are the electrolytic capacitors and diodes the right way round?

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PARTS LIST For GSK- 135
Resistors (0.25W carbon)
1Ω, R1, 2, 3 & 4: 4
180Ω, R5: 1
1KΩ, R6: 1
22KΩ, R7: 1
Capacitors
1nF ceramic, C1: 1
100uF 25V electrolytic, C2: 1
470uF 25V electrolytic, C3: 1
Semiconductors
1N5819, D1: 1
Schottky diode MC34063A, IC1: 1
DC-to-DC Converter Control Circuit
Miscellaneous
Inductor, 170uH, L1: 1
2.5mm DC jack X1 & 2: 2
PCB mounting
8-pin IC socket for IC1: 1
2.5mm DC plugs: 2
PCB, GSK-135: 1