

Introduction

The Supertex SR037 is an inductorless switching power supply controller intended for 120/240VAC line operation. The operating principle is to activate a pass element between line and load only when the input voltage is lower than a certain value. Thus conduction only occurs with a low voltage drop across the pass element, resulting in more efficient operation compared to a standard linear regulator.

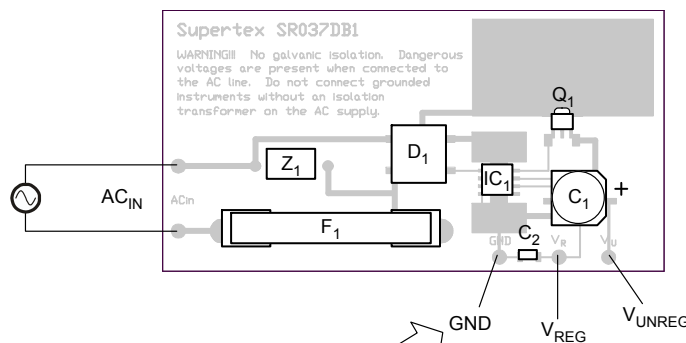
The SR037DB1 demo board contains all the circuitry needed to supply a low-current (<40mA) load. Included is input protection circuitry, a full wave bridge rectifier, a pass element, and output capacitors.

Specifications

AC Input	24VAC to 264VAC 40Hz to 100Hz
Output Voltages	12V to 22V 5.0V \pm 10%
Output Current	40mA @120VAC 30mA @ 240VAC
Efficiency	40% typ

AC_{IN}=120VAC 60Hz, I_U=40mA, I_R=0mA

Board Layout and Connections



WARNING!!!
 Do not connect to scope ground or to the ground of other earth-grounded instruments. Doing so will short the AC line, resulting in damage to the circuit and/or instrument. Either use an isolation transformer on the AC line, use a differential probe, or use a floating, battery-powered instrument to make measurements.

WARNING!!!
 No galvanic isolation. Dangerous voltages are present when connected to the AC mains.

AC_{IN}

Connect to the AC line. The AC input is protected by a 400V transient voltage suppressor and a 250mA fuse.

GND

Circuit common.

Note that since galvanic isolation is not provided, connecting this point to an earth-grounded instrument (such as an oscilloscope) will short the AC line, resulting in circuit and/or instrument damage.

Also note that GND may be at a higher potential with respect to earth ground, even if the AC is switched off. Use caution!

Do not connect to earth ground. This ground must remain floating when supplied from the AC line!

V_{UNREG}

The unregulated output. Nominal output voltage is 18 volts. This output will have a certain amount of 120Hz ripple, depending on load.

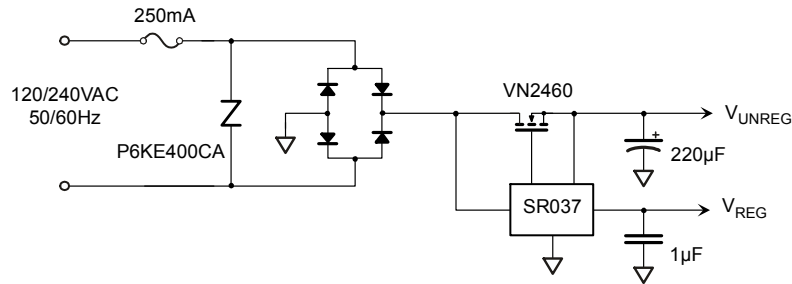
Do not connect to earth-grounded loads.

V_{REG}

The regulated output. 5.0V nominal output voltage.

Do not connect to earth-grounded loads.

SR037 Schematic



Parts List

Desig	Desc	Part Number
F ₁	Fuse, 3AG, 250mA, 250V	
Z ₁	Transient voltage suppressor, 400V	P6KE400CA
D ₁	Diode bridge, 1A, 600V	
IC ₁	HV Supply Controller	Supertex SR037SG
Q ₁	MOSFET, 600V N-channel	Supertex VN2460N8
C ₁	Capacitor, alum, 220µF, 35V	
C ₂	Capacitor, cer, 1µF, 16V	

Modifications

The SR037DB1 may be modified to provide higher output current. Remove Q1 and replace with a D-Pak N-channel MOSFET with a voltage rating appropriate for the input voltage. The on resistance of the replacement FET is not as important as the gate threshold voltage – the lower the threshold voltage, the more efficient the converter.

To reduce ripple at the higher output current, C1 may be replaced with a higher value capacitor.