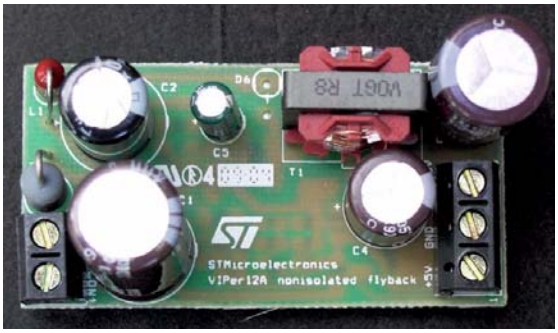
STEVAL-ISA006V1

6W non-isolated fly-back topology power supply with VIPer12AS

Data Brief

Features

- Switch mode general purpose power supply
- Input: 90 to 264Vac @ 50/60Hz
- Main Output (regulated): 5V, 500mA @ 50/60Hz
- Second output: 15V, 200mA
- Output power (pick): 5.5W



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Description

This reference design is an auxiliary power supply based on the VIPer12AS monolithic device and can be used to produce multiple non isolated positive or negative voltage outputs.

This solution is based on an offline discontinuous current mode fly-back converter without isolation between input and output. The fly-back topology allows the exploitation of the VIPer12AS current capability when compared with the buck converter based power supply. To ensure power supply low cost, the isolation between input and output is not provided. This greatly simplifies the transformer design and production. The VIPer12AS incorporates the PWM controller with a 60kHz internal oscillator and the vertical Power MOSFET switch in a SO-8 package. The presented power supply has four variants. All the variants have been incorporated in the presented reference board through different assembly options.

ST Components

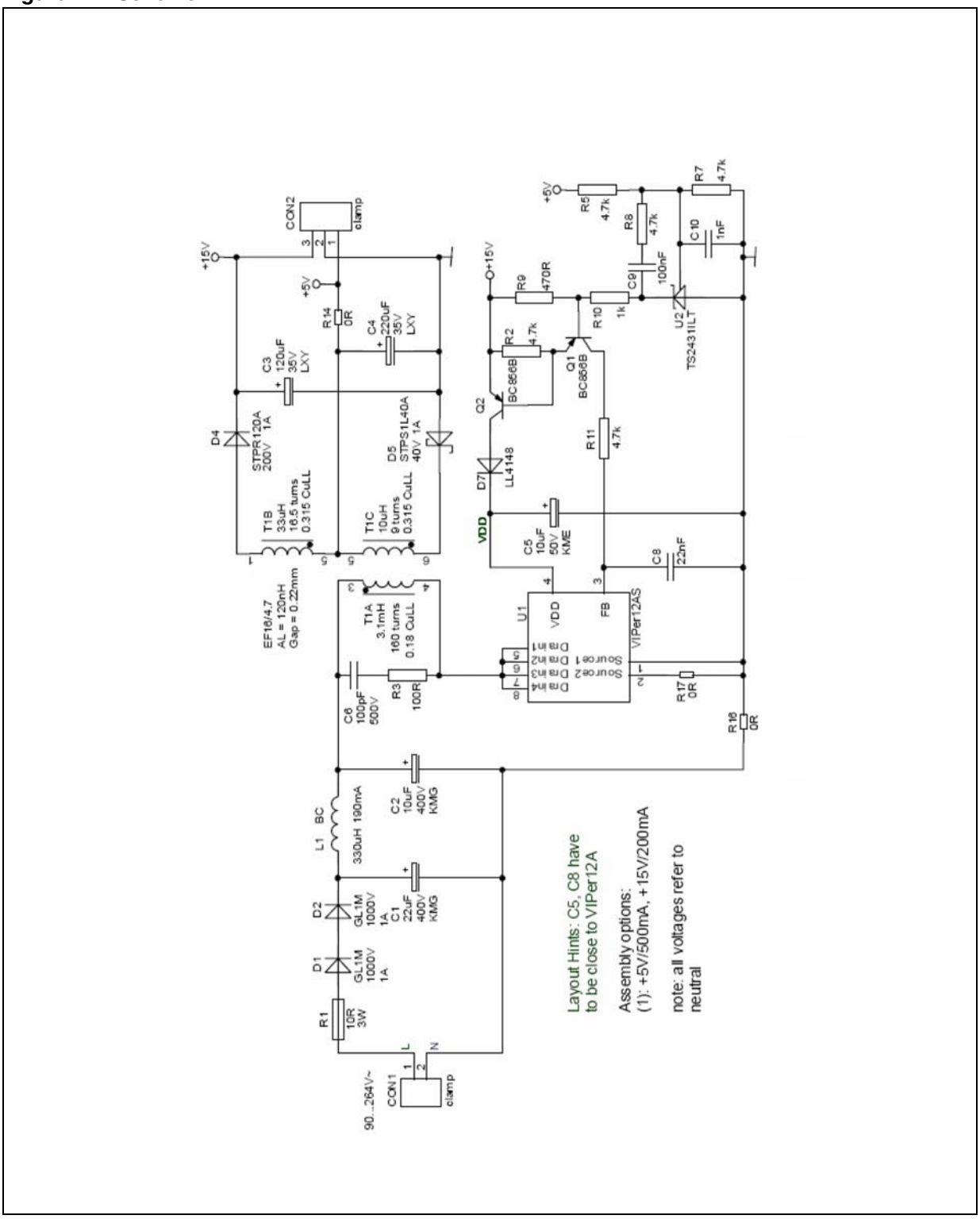
- VIPer12AS off-line SMPS primary
- STPR120A diode, fast recovery trr =25ns 200V 1A SMA
- STPS1L40A diode, schottky, 40V 1A,
- TS2431ILT programmable shunt voltage reference

1 General circuit description

The output of the converter is not isolated from the input. For this reason the reference ground is common for an input and output connection terminal. The input capacitor C1 is charged from the mains by single rectification consisting of diodes D1 and D2. Two diodes in series are used for EMI reasons to sustain burst pulses of 2kV. Capacitor C1 together with capacitor C2 and inductor L1 form an EMI filter. The DC voltage at C2 is then applied to the transformer primary winding through the internal Power MOSFET switch of VIPer12 during the switching period ON time. The snubber circuit consisting of resistor R3 and capacitor C6 reduces the voltage spike across the transformer primary winding due to the parasitic leakage inductance. Through rectifiers D4 and D5 and through smoothing capacitors C3 and C4, the power supply provides two outputs from two transformer windings. The VIPer12AS is supplied by a 15V output voltage through transistor Q2 and diode D7. The voltage feedback loop senses the 5V output through resistor divider R5, R7. The control IC U2 compares the resistor divider output voltage to the internal reference voltage of 2.5V and changes the cathode voltage accordingly to keep 5V output stable. The FB pin current will decrease the peak primary current to reduce the power delivered to the outputs.

2 Board schematic

Figure 1. Scheme



3 Revision history

Table 1. Revision history

Date	Revision	Changes
20-Jul-2007	1	Initial release.

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