



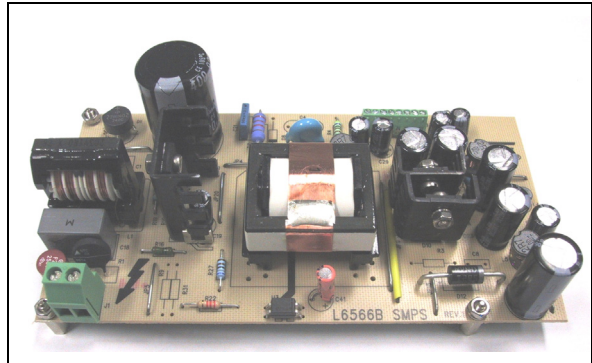
EVL6566B-40WSTB

EVL6566B-40WSTB demonstration board 40 W wide input range flyback converter for digital consumer equipments using the L6566B

Data brief

Features

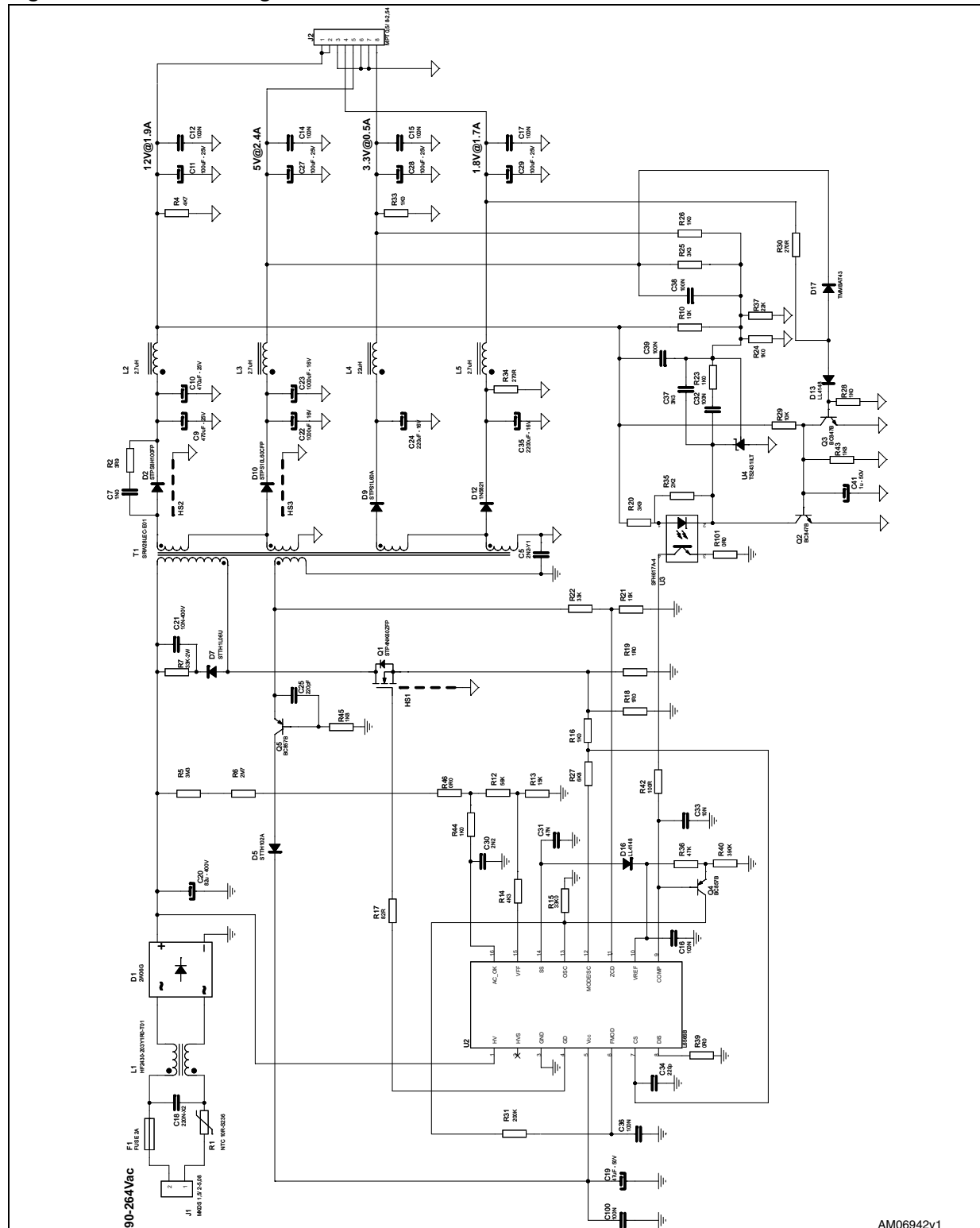
- Input voltage: V_{in} : 90 - 264 Vrms, f: 45-66 Hz
- Output voltages:
 - 1.8 V/1.73 A, dedicated to digital circuitry and to 1.2 V local post regulators
 - 3.3 V/0.5 A, dedicated to analog peripherals and 2.5 V regulators
 - 5 V/2.4 A, dedicated to HDD/DVD and 5 V circuitry
 - 12V/ 1.9A Avg ÷2.9A pk , dedicated to HDD/DVD, SCART and LNBP21 for satellite stb. Average load is 1.9 A, 2.9 A is dedicated to HDD/DVD spin-up
- Standby: better then 800 mW @ 230 V in and 50 mA load
- No-load: better then 250 mW @ 230 V in
- Short circuit protection: on all outputs, with auto-restart at short removal
- PCB type and size: Single side 70 μm (2-Oz), CEM-1, 150 x 75 mm
- Safety: Acc. to EN60065, creep age and clearance minimum distance 6.4 mm
- EMI: Acc. to with EN50022-Class B



Application

- Set-top box
- Auxiliary SMPS

Figure 1. Electrical diagram



2 Description

The board implements a reference design of a 40W Switch Mode Power Supply dedicated to Set-Top Box, DVD and Auxiliary SMPS for Flat TV or small size Flat screen equipment. The board accepts wide range input voltage (90 to 265Vrms) and delivers 4 voltages. It is based on the L6566B, a new current mode fixed frequency or QR controller. High efficiency and low standby consumption are the main characteristics of this board. This joined to minimal part count required and low cost approach of the global solution makes it a very interesting solution for powering Digital Consumer Equipment, capable of meeting worldwide standby rules.

The topology of this converter is the classical Flyback, working in continuous and discontinuous conduction mode with fixed frequency, capable of achieving the best trade-off between the peak/rms current ratio and output capacitors size. The nominal switching frequency, 62 KHz, has been chosen to get a compromise between the transformer size and the harmonics of the switching frequency, optimizing the input filter size and its cost. The input EMI filter is a classical Pi-filter, 1-cell for differential mode noise. The MOSFET is a standard and inexpensive 600V-2Ω_{max}, TO-220FP, needing a just small heat sink. The transformer is a layer type, using a standard ferrite type EER28L. It has been designed according to the EN60065. The reflected voltage is 70V, providing enough room for the leakage inductance voltage spike with still margin for reliability of the MOSFET.

The output rectifiers have been selected according to the maximum reverse voltage, forward voltage drop and power dissipation. The rectifiers for 5V and 12V outputs are Schottky, low forward voltage drop type, hence dissipating less power with respect to standard types. They are housed in TO-220 package. A small heat sink for both devices is required. The other two output rectifiers are Schottky too but with a smaller package. The snubber R2 and C7 damps the oscillation produced by the diode D2 at MOSFET turn-on. A small LC filter has been added on all output in order to filter the high frequency ripple without increasing the output capacitors and a capacitor (100nF) has been placed on each output, to limit the spike amplitude.

The output voltage regulation is performed by secondary feedback sensing the 12V, 5V and 3.3V outputs, while for 1.8V output the regulation is achieved by the transformer coupling. The feedback network uses a TS2431 as error amplifier which drives an optocoupler SFH617A-4, insuring the required insulation between primary and secondary. The opto-transistor modulates directly the voltage on COMP pin of the L6566B.

The controller, the new L6566B, is an extremely versatile current mode primary controller embedding all functions needed to get very high performances power supplies. It integrates also all protections are needed by a power supply offering a very high degree of flexibility to the designer.

Table 1. Output voltages

Vout	I _{out} MAX	I _{out} MIN	P _{MAX}	Stability
1.8V	1.73A	0.20A	3.1 W	±7%
3.3V	0.5A	0.03A	1.65 W	±5%
5V	2.4A	0.3A	12 W	±10%
12V	1.9Avg, 2.9Apk	0.05A	34.8 W	±8%
P _{OUT} (W) = 40W Avg / 51W pk				

3 Revision history

Table 2. Document revision history

Date	Revision	Changes
18-May-2011	1	Initial release

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