

Switched Mode Power Supply

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Abstract: In the paper is discussing switched mode power supply pulse-width-modulation (PWM) for PC, ensuring high security on exit voltage and protection of power supply in failure.

Keywords- switched mode power supply.

INTRODUCTION

Power supply source is the 'hearth' in the electronic apparatuses. For a long time in the field of sources had been used linear power supplies, but nowadays in practice are using power supply, working in switched regime or the so-called switched mode power supply.

In using of high fundamental frequency of switching the sizes of transformer or filtering elements decrease too much. That give us a chance to make many compact and light powers supply, which is one of the main requirement in most of the devices.

The main priority of switched mode power supply are the receiving for bigger capacity under the burden in smaller sizes and bigger coefficient of performance. The failings are the radiating of bigger radio frequency interference and more difficult projecting which needs more time.

The aim of this paper is to offer switched mode power supply pulse-width-modulation for PC, providing high quality of the outer voltages and protection for the power supplies in failure.

For this aim it must ensure following output constant voltages:

- +3.3V in maximal current 18A and minimal current 1A;
- +5V in maximal current 23A and minimal current 1A;
- +12V in maximal current 11A and minimal current 1A;
- 5V 0.4A in maximal current and minimal current 0.1A;
- 12V in maximal current 1A and minimal current 0.1A.

Pulsation of voltage ripple 50mV.

Instability of the output voltage $\pm 2\%$.

The stabilizer will be supplied with variable voltage with value 220V and frequency-50/60Hz.

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II. SCHEME OF THE SWITCHED MODE POWER SUPPLY

Block diagram of the switched mode power supply is shown on figure 1.

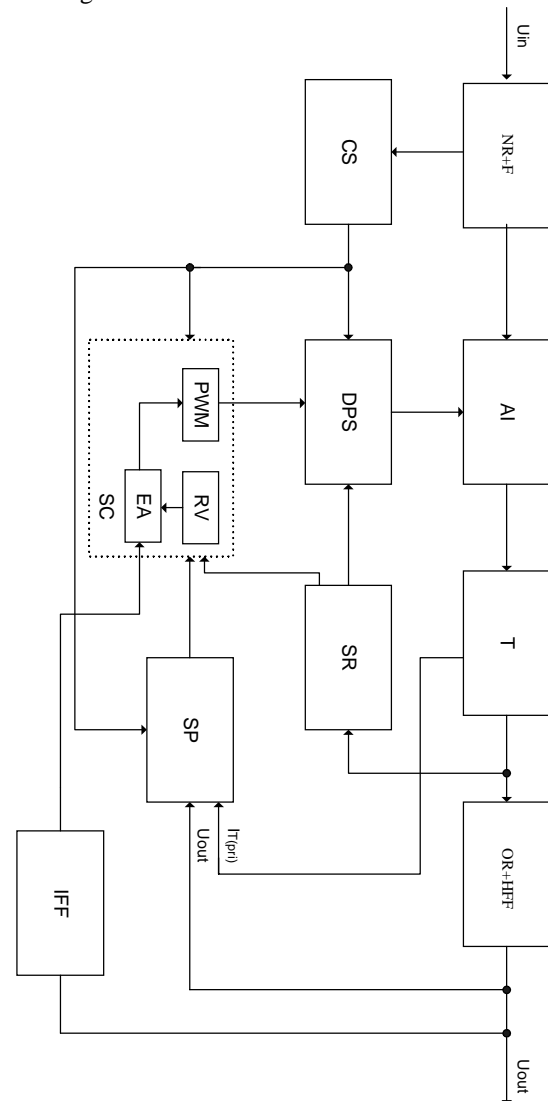


Fig.1. Block diagram

- The symbols have the following meaning:
- NR+F – network rectifier and filter;
 - AI – adjustable inverter;
 - T – transformer;
 - OR+HFF – output rectifier and high-frequency filter;
 - CS – circuit starting ;
 - DPS – driver of power switch;
 - SR – secondary rectifier;
 - SC – scheme for control;

SP – scheme for protection;
 IFF – inverse feedback factor;
 PWM-pulse-width-modulation;
 RV-reference voltage;
 EA-error amplifiers ;

Circuit diagram is shown on figure 2.

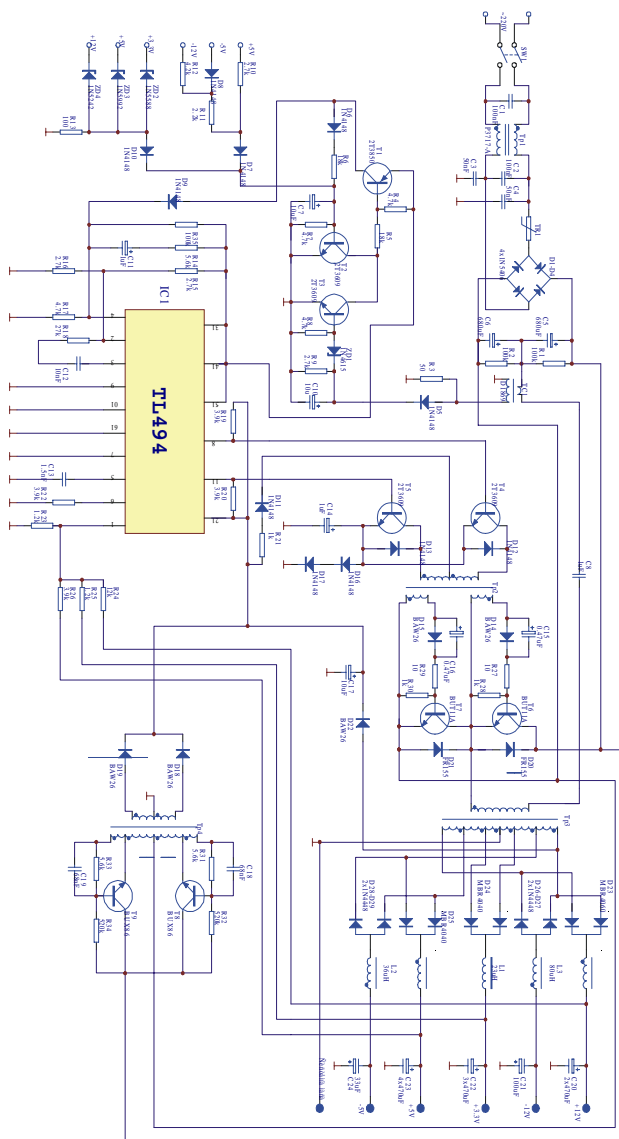


Fig.2. Circuit diagram

The heart of the stabilizer is high-frequency control inverter. With the inverter output voltage is transforming in voltage with high frequency /20-200KHz for existing supplies/. After that is completing rectification and ripple smoothing, to be produced constantly voltage..

As scheme for controlling is using integrated circuit(IC) TL494.It is intended for designing switched mode power supply pulse-width-modulation (PWM) controlled with voltage. It contains: error amplifiers, inner adjustable oscillator, dead-time control comparator, control trigger , source of reference voltage and output-control circuit.

Output transistor's stages may work in common emitter scheme or as emitter follower. Output transistor's stage may work in single-ended or push-pull regime. The regime of work is chosen by detached pin. The inner scheme controls each of pins in process of working in push-pull regime. It don't permits supplying double impulses.

The transformer has two purposes—to ensure galvanic division in the entry and exit and to decrease the input pulse-width-modulation voltage.

Magnetic core is E35/18/10 type of 3C90 material made by Ferroxcube with 37 turns of primary winding and 2, 3,7 turns corresponding for 3,3; 5; 12 V.

The final stage includes the elements which ensure rectification and filtration of voltage.

The voltage in exit of the scheme for controlling intensifies its capacity by driver stage and in appropriate linkwork supply in base of power transistor.

The function of the linkwork for negative feed-back for voltage is to support constant value of output voltage. Its main part is Operational amplifier with big coefficient of amplification, called error amplifiers.

As a trigger circuit we use Self Oscillating transistor inverter in scheme with central tap.

The scheme for protection has the aim to provide protection of regulator in fault of load, or to safe the load, if the regulator damaged . Of the scheme depends regulator reliability.

Anti suction filter on input and inner rectifier consist of 3 to 5 blocks – anti suction filter against electromagnetic interference, eventually circuit starting with current limitation, scheme for suppressing of voltage overshoots, rectifier and input filtering capacitor.

III.CONCLUSION

In the paper is discussing switched mode power supply pulse-width-modulation (PWM) for PC, ensuring high security on exit voltage and protection of power supply in failure.

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