Middle East Technical University

Electrical and Electronics Engineering

EE464 Static Power Conversion-II



Project-1: Simulation and Design of the Hardware Project

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# Introduction

In this project, simulation and design of the hardware project is completed. We chose the flyback converter topology which has 10V output voltage and 60W output power. Moreover, output voltage ripple must be smaller than the 4% and line & load regulation must be smaller than the 2%. In this report simulation results of our design and analysis of them can be found. Furthermore, magnetic design and analysis of transformer is also considered. In addition to them, preliminary components are selected.

# Design of an Isolated Power Supply

Specifications of the chosen topology which is Flyback Converter are:

* Input Voltage: 24V – 48V
* Output Voltage: -10V
* Output Power: 60W
* Output voltage ripple: 4%
* Line regulation: 2%
* Load reglation: 2%

## Part-a

Following simulation results shows the steady-state operation of the flyback converter with given specifications. Calculation of magnetizing inductance (Lm=27.75µH), transformer turns ratio and duty cycle will be shown in the following parts. Figure-1 shows the circuit diagram of the simulation and Figure-2&3 shows the output voltage & current waveforms for 24V input. Also, Figure-5&6 shows the output voltage & current waveforms for 48V input. Input current waveforms are also shown in Figure-4&7 for 24V&48V input voltage respectively.

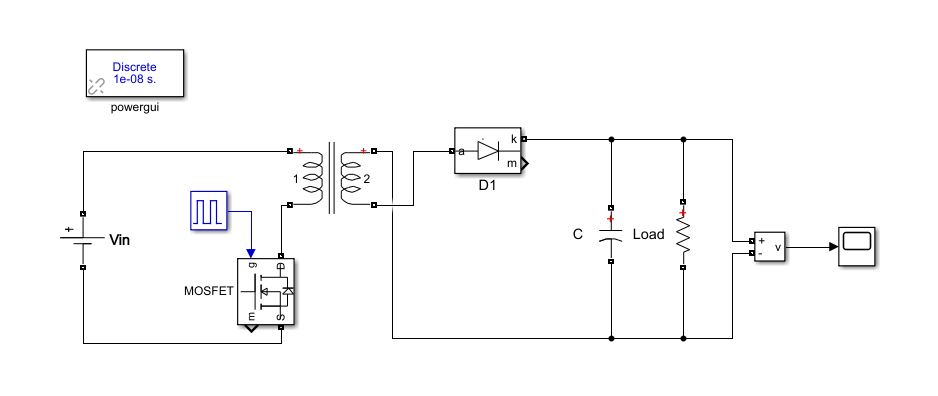


Figure 1: Circuit diagram of the flyback converter simulation

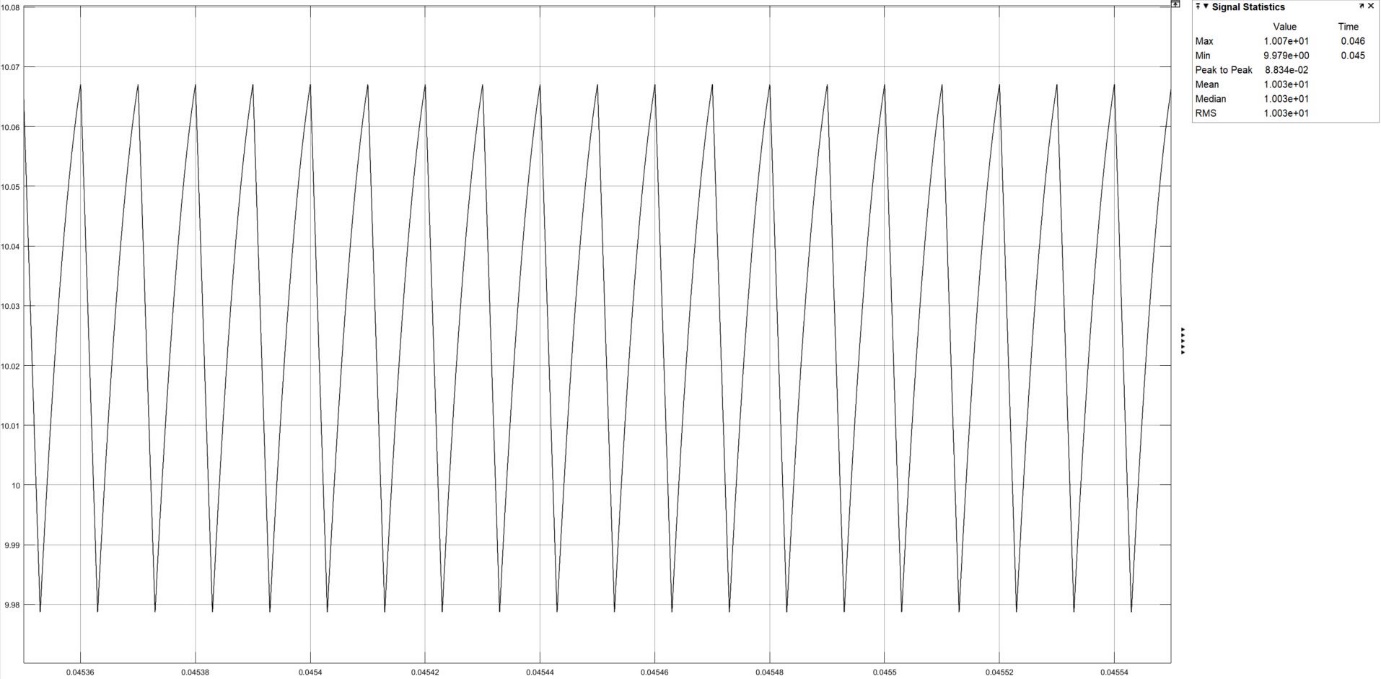


Figure 2: Output voltage waveform of the flyback converter (Vin=24V)

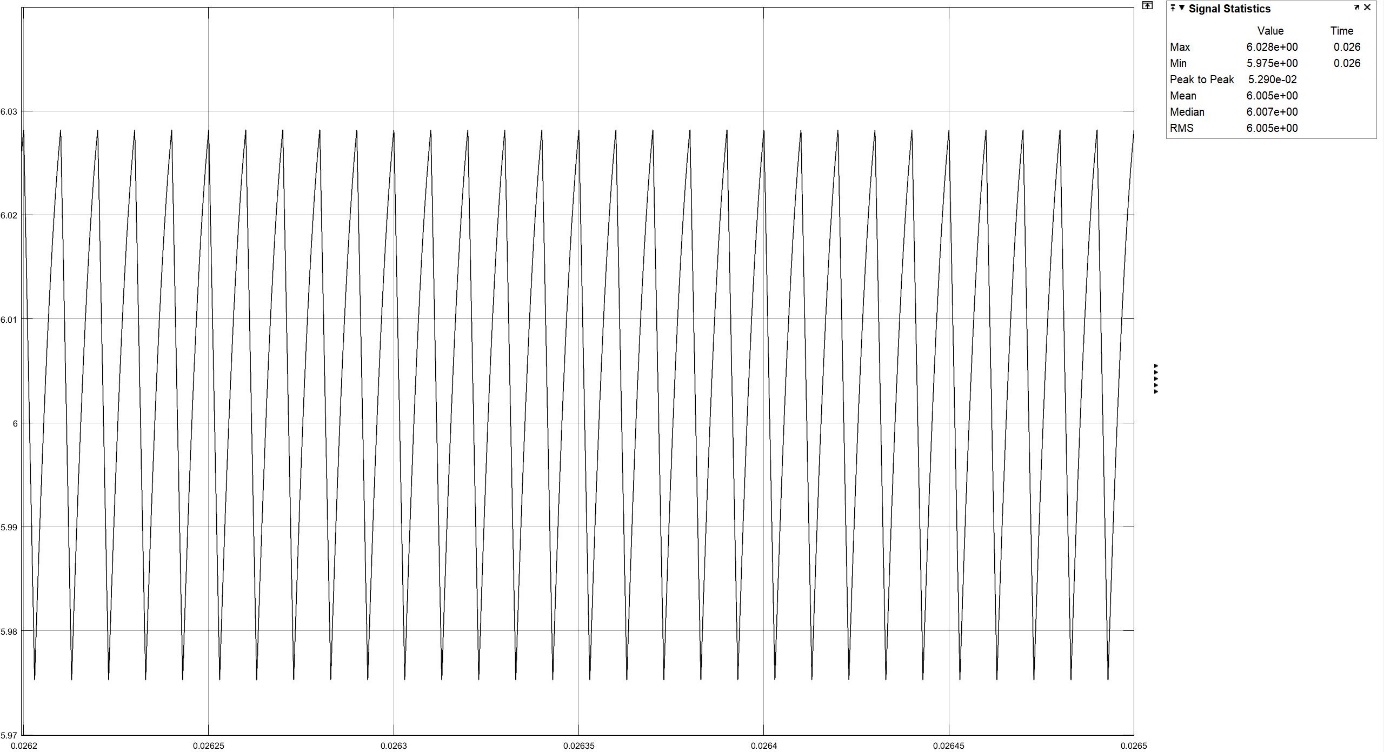


Figure 3: Output current waveform of the flyback converter (Vin=24V)

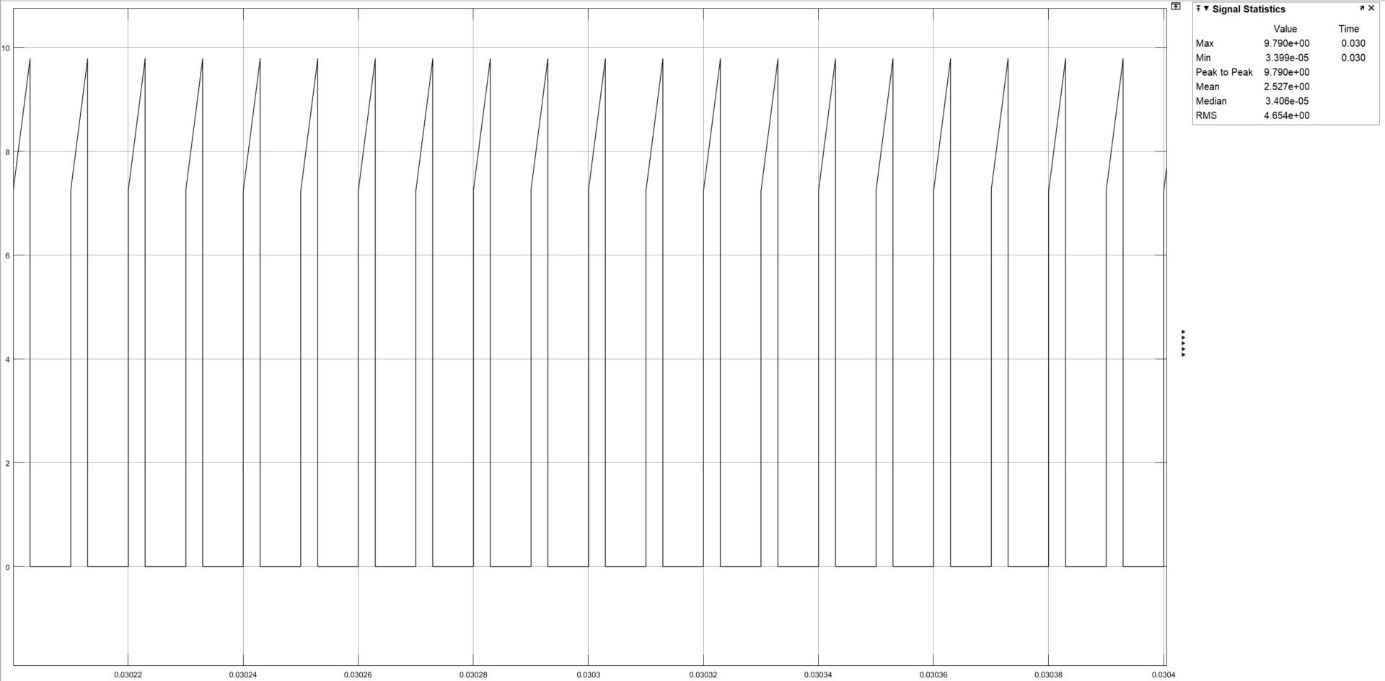


Figure 4: Input current waveform of the flyback converter (Vin=24V)

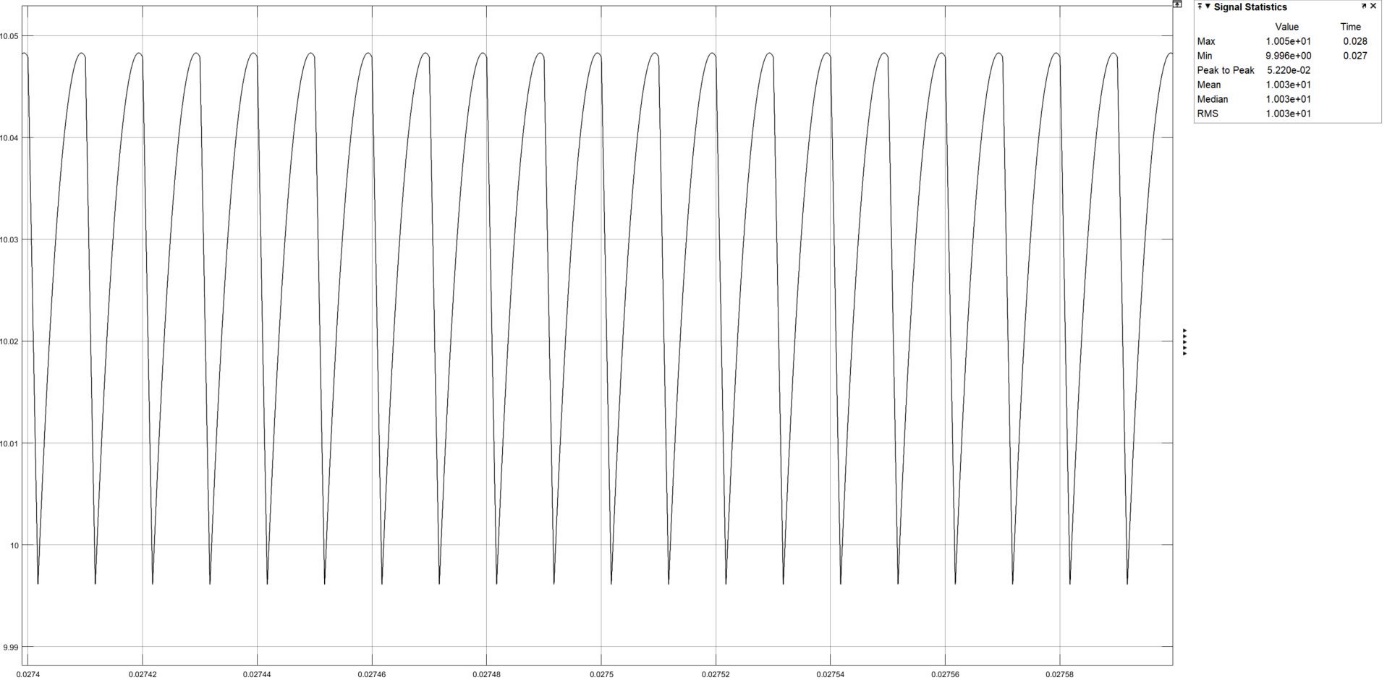


Figure 5: Output voltage waveform of the flyback converter (Vin=48V)

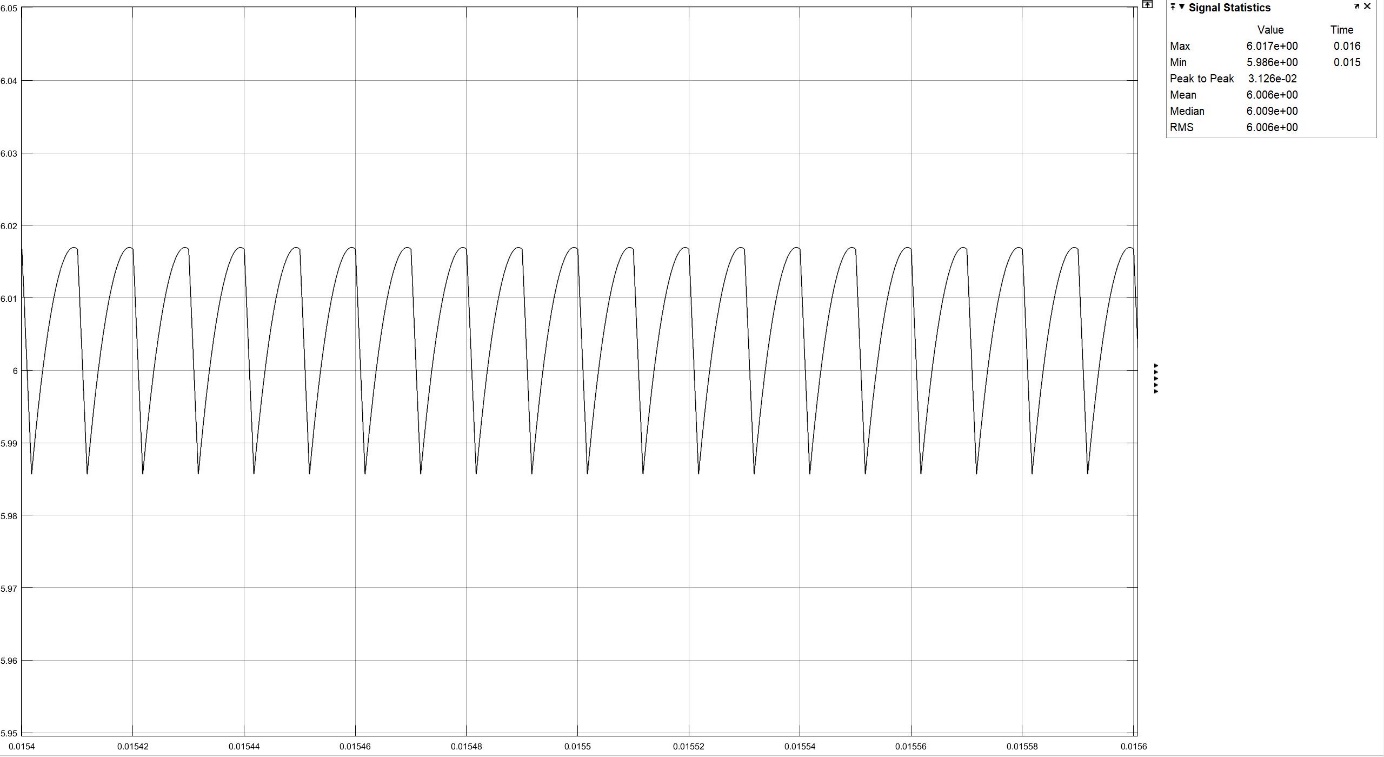


Figure 6: Output current waveform of the flyback converter (Vin=48V)

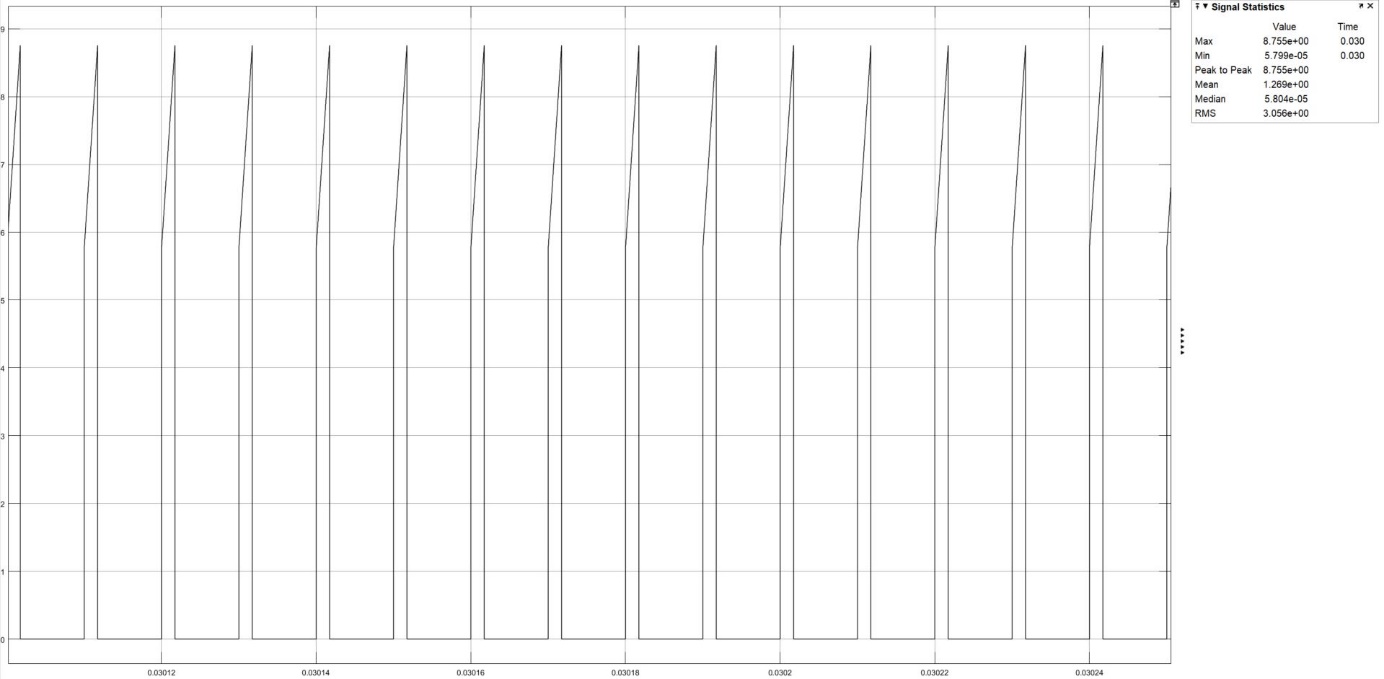


Figure 7: Input current waveform of the flyback converter (Vin=48V)

## Part-b

# Reference