Buck Converter

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Abstract

A Buck Converter is the basic switched-mode power supply topology. Buck converter is a DC-DC converter which will step down a higher voltage to a lower voltage level, that means output voltage magnitude is less than the input voltage magnitude. The Buck Converter produces voltage ranging from the input voltage to down to Zero voltage. It is widely used throughout the industry to convert higher DC input voltage into lower DC output voltage.

1 Reference Circuit Details

As shown in figure 1, we will be connecting the DC source to the transistor, where transistor is driven by a pulse signal which will convert the DC voltage to PWM voltage signal.

The PWM voltage signal will be provided to the LC sub-circuit which steps down the PWM to lower DC value(anything between 0-V_{in} can be achieved by varying duty cycle).

The main focus while building the circuit was to keep the ripple voltage as low as possible and get maximum efficiency from circuit.

2 Implemented Reference Circuit

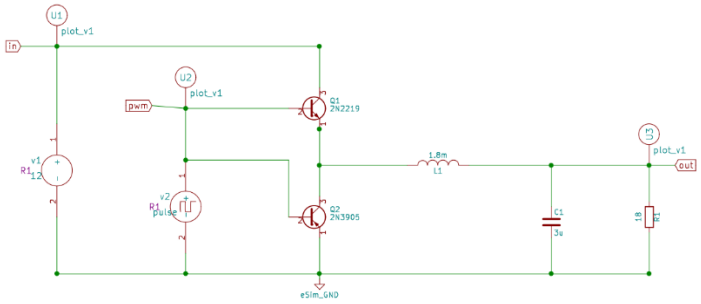

Figure 1: Implemented circuit diagram

3 Implemented Circuit Waveforms

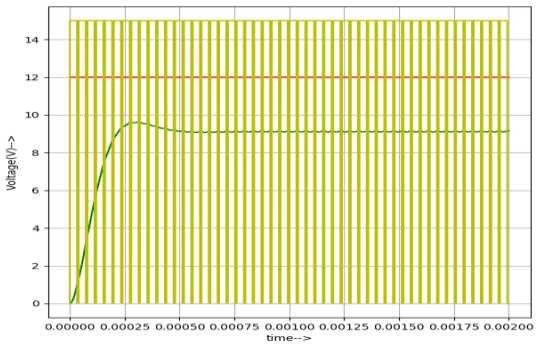

Figure 2: Implemented waveform.

References

1. Power electronics: converters, applications, and design / Ned Mohan, Tore M. Undeland, William P. Robbins.-2nd ed. p. cm. Includes bibliographical references and indexes. ISBN 0-471-58408-8 (cloth)
2. https://www.powerelectronicsnews.com/power-supply-design-notes-simulating-a-buck-converter/