# Single-Ended Primary Inductor Converter (SEPIC)

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## Abstract

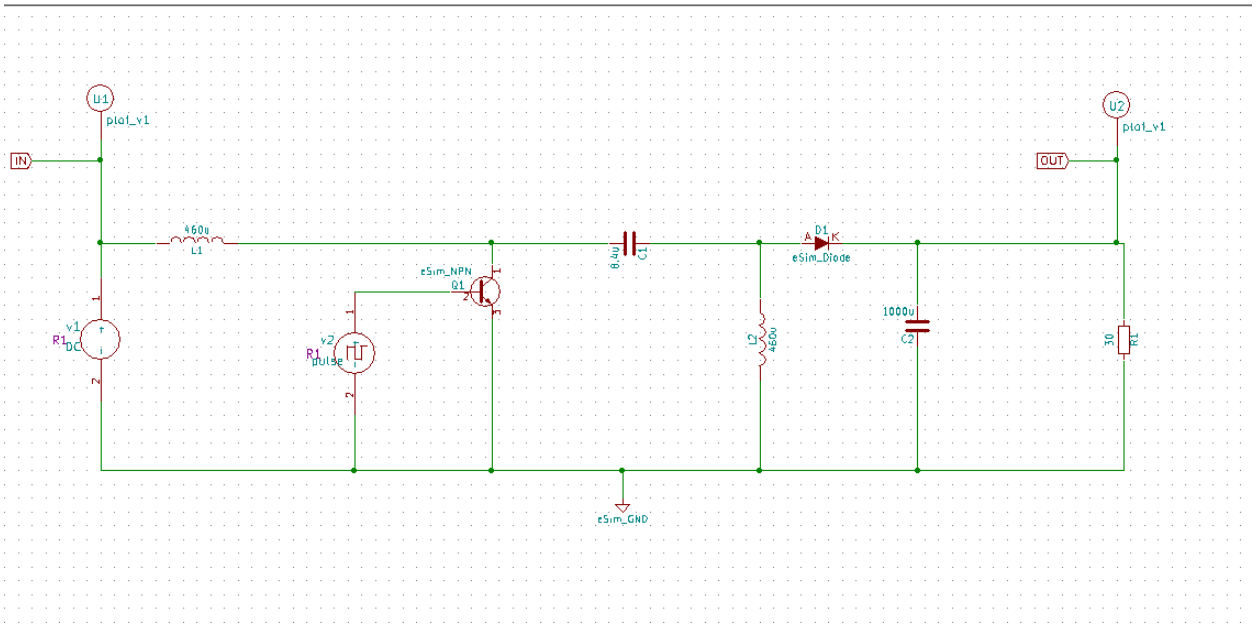
In the field of DC-DC Converters, A **single-ended primary-inductor converter** or **SEPIC converter** is a type of converter that uses a boost type control topology to step up or step down the input voltage. After reading this, the first question that will come to your mind would be, is it like a glorified Classic Buck-Boost Converter? The answer is yes and no. A **classic buck-boost converter** consists of two inductors and two switches that increase the cost, so to reduce it, a much more complex topology known as the Inverting buck-boost converter is used. We have discussed it in one of our previous articles. In an **Inverting buck-boost converter**, the output polarity of the inverting buck-boost converter is opposite to that of the input. A **sepic converter** addresses these issues by introducing a coupled inductor that reduces the overall cost and also takes less space in the actual circuit board.

## Components Required

Components required for building the **SEPIC Buck-Boost Converter** are listed below. The components used in this project are very generic and you can find most of them in your local store.

- 1000uF, capacitor - 1
- 8.4uF capacitor - 1
- Diode - 1
- 30 Resistor - 1
- 460uH Inductor - 2
- NPN Transistor
- DC Power Source
- Voltage Probe - 2
- Square Pulse Generator

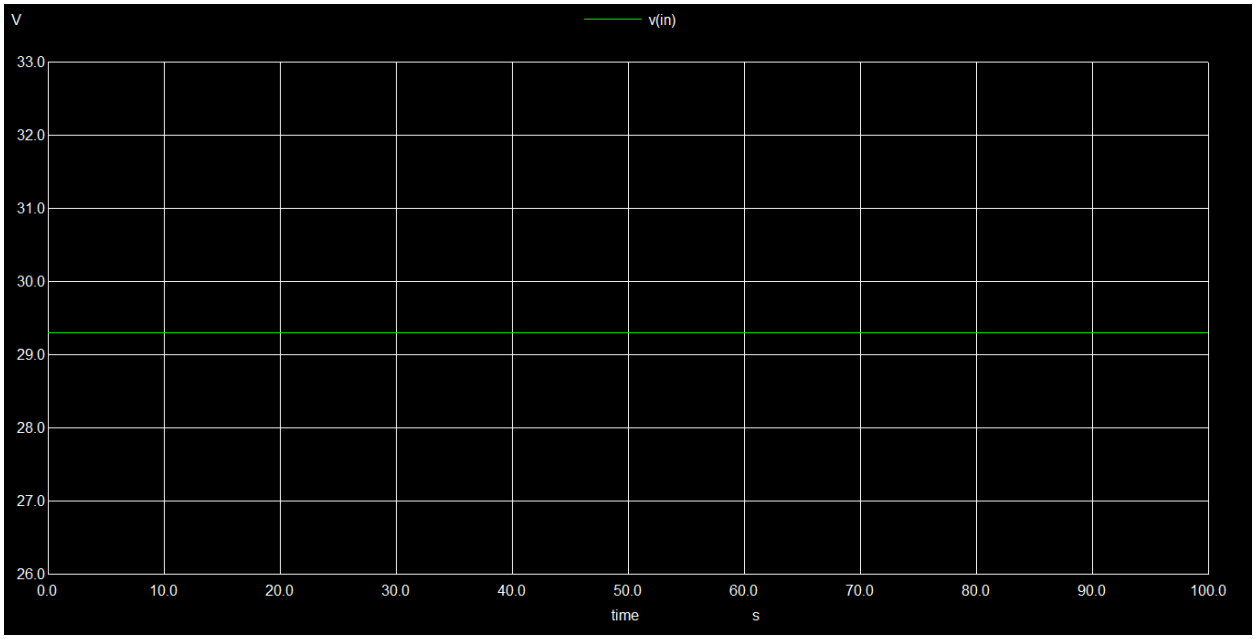
# Schematic Diagram




# Waveforms

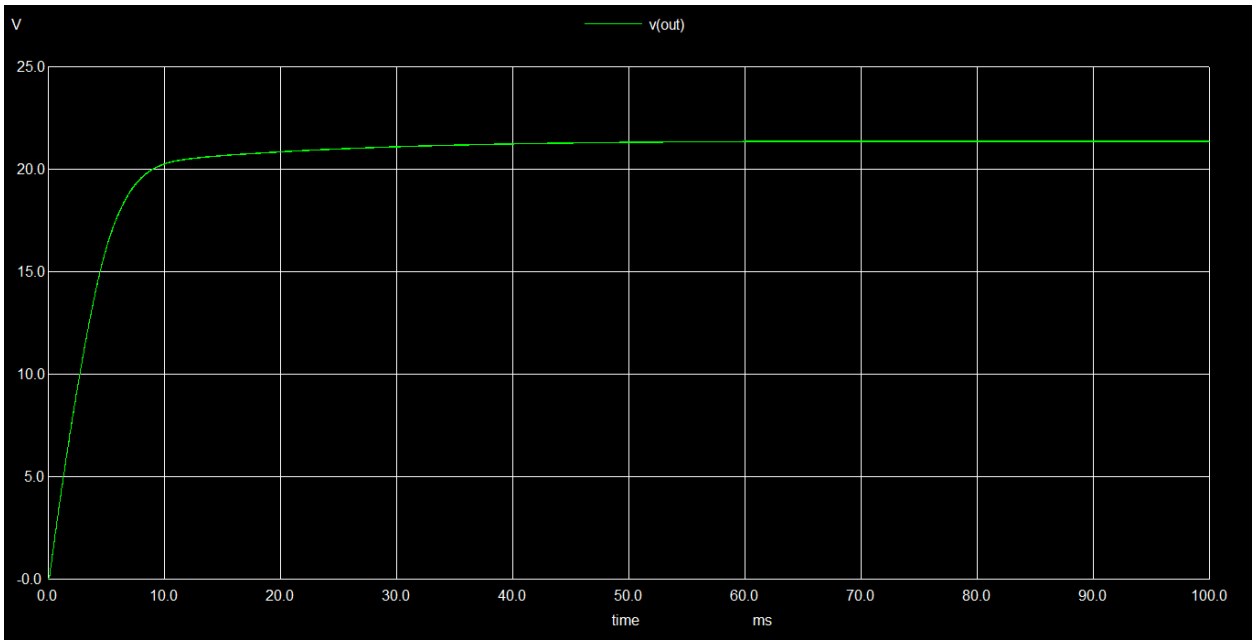
## Input Voltage Waveform

## Vin = 29.3V



**Output Voltage Waveform**

**Vout = 24V**




If the duty cycle is from 0 to 50%, the above circuit acts as a buck converter.

When the duty cycle is above 50% (i.e, from 50% to 100%), the circuit acts as a boost converter.

## References

Wurth Elektronik - https://www.we-online.com/en/components/applicationguide/sepic_converter

Texas Instrumentation - https://www.ti.com/lit/an/slyt309/slyt309.pdf

Muhammad H.Rashid,Ph.D - Power Electronics Handbook, chapter-13, chapter-14