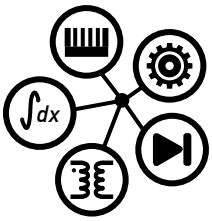

PLECS

DEMO MODEL

Single-Ended Primary Inductance Converter

Last updated in PLECS 4.3.1

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1 Overview

This example demonstrates an unregulated single-ended primary inductance converter (SEPIC).

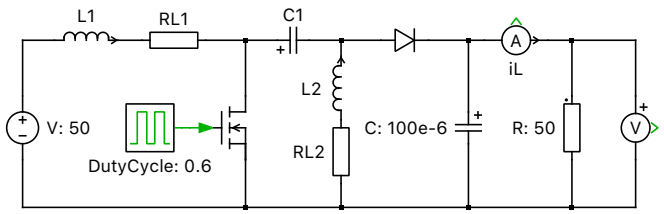

Figure 1: Schematic of the single-ended primary inductance DC/DC converter (SEPIC)

2 Model

The SEPIC converter converts a DC input voltage to an output voltage of lower, equal, or higher DC voltage. This function closely resembles a non-inverting buck-boost converter; however a capacitor couples the input and output rather than an inductor. When the switch is off, energy is transferred from the input side of capacitor C1 to the output side. The converter's transfer function is influenced primarily by the duty cycle of the switch.

3 Simulation

Run the simulation with the model as provided to view the signals. Verify by inspecting the current through inductor L1 at steady state that the converter operates in continuous conduction mode (CCM). Also, change the equivalent series resistances (ESR) of the two inductors or the diode parameters and observe the effect on the efficiency of the converter. The results for two simulations with different ESR (nominal value and scaled by a factor of 2) of the system efficiency η are are given in Fig. 2.

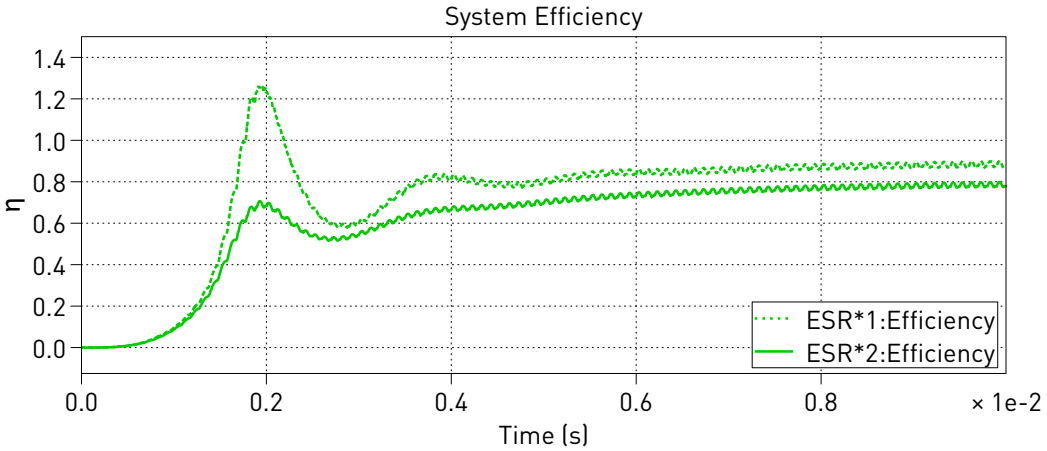

Figure 2: Results of the system efficiency for different ESR values

Revision History:

PLECS 4.3.1	First release

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PLECS Demo Model