DC/DC Boost Converter Design

Design Requirements:

- Design a PWM Boost converter operating in CCM to meet the following specifications:

  $20V \leq V_{in} \leq 28V, V_{in(nom)} = 24V$

  $8A \leq i_O \leq 16A$

  $f_S = 100kHz$

  $V_O = 48V$

  $\frac{V_r}{V_O} = 4\%$

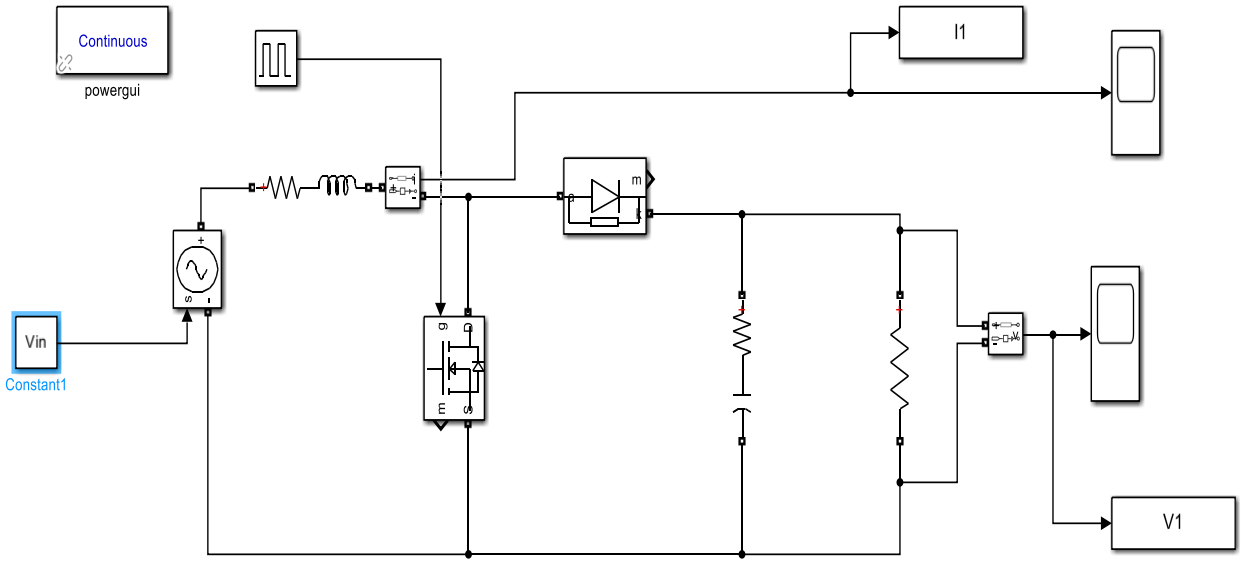
After detailed design calculation, the following Boost converter parameters are obtained.

DC-DC Boost Parameters		
Parameter Name	Symbol	Value
Inductance	L	$100\mu H$
Capacitance	C	$1\ \mathrm{m}F$
Maximum Load Resistance	$R_L(max)$	6Ω
Minimum Load Resistance	$R_L(min)$	3Ω
Inductor ESR	r_L	0.08Ω
Capacitor ESR	r_C	0.005Ω
MOSFET on Resistance	r_{Ds}	0.055Ω
Diode Forward Resistance	R_F	0.01Ω
Diode Threshold Voltage	V_F	$0.70V$
Input Voltage	V_{in}	$24 \pm 4V$
Output Voltage	V_O	$48V$
Switching frequency	$\mathrm{f_s}$	100kHz

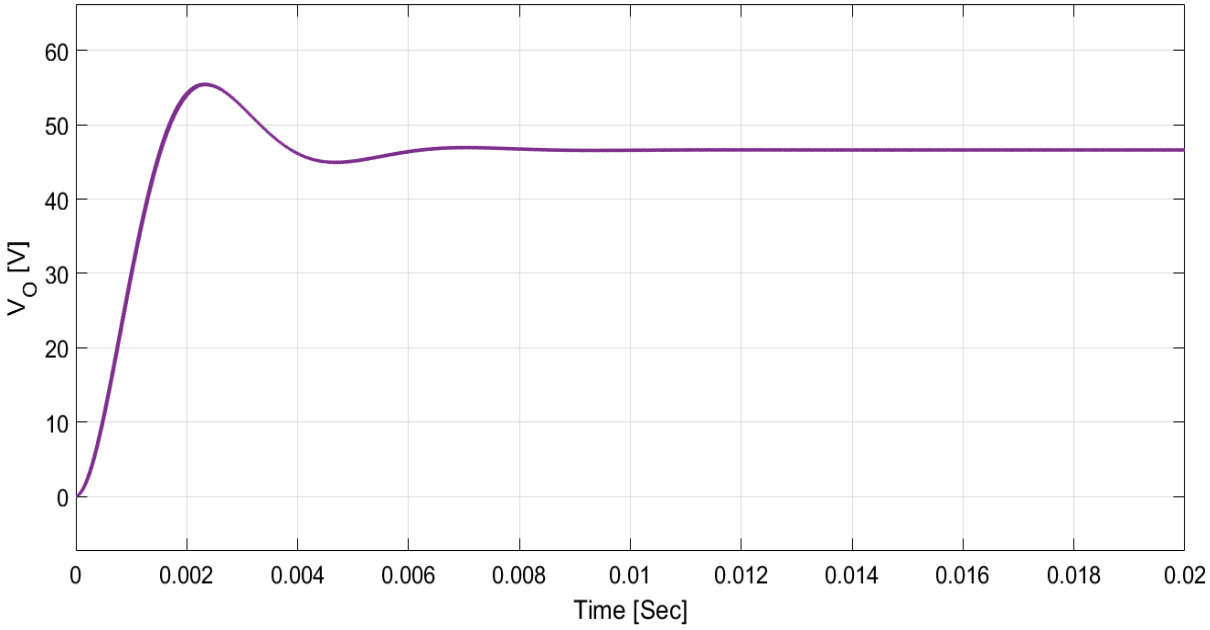
For step-by-step design tutorial or for questions about how to design the DC/DC boost converter based on your design requirements, you can email me for further discussion via

yes42d@gmail.com

Boost converter implemented using SIMULINK using SimPower components



DC/DC Boost converter voltage simulation test at nominal condition



DC/DC Boost converter Inductor current simulation test at nominal condition