

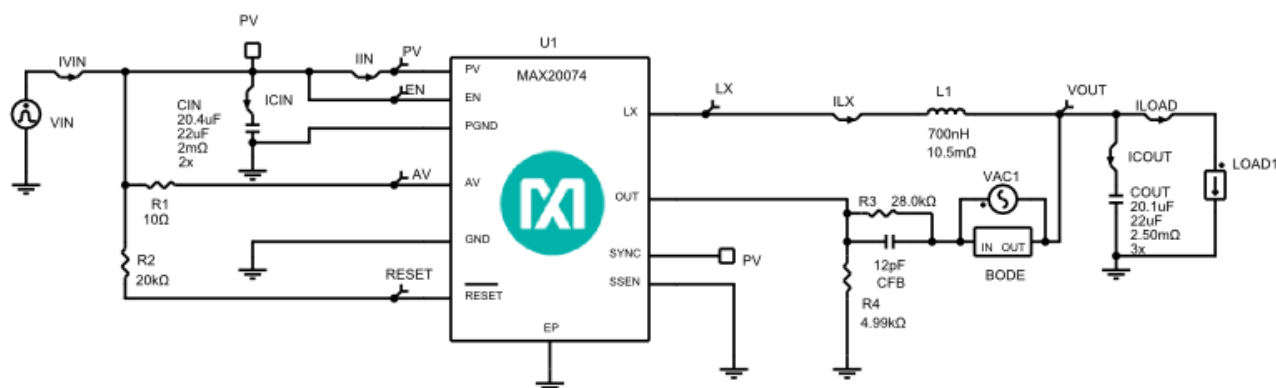
Initial Design

1.0

Design Requirements

Parameter	Value
Minimum Input Voltage	4.5V
Maximum Input Voltage	5.5V
Nominal Input Voltage	5V
Input Voltage Ripple	1%
Output Voltage Control	External Resistive Divider
Output Voltage	3.3V
Output Current	3A
Load Step Start Current	1.5A
Load Step Current	3A
Output Voltage Ripple	1%
Output Voltage Load Step Over/Undershoot	5%
Load Step Edge Rate	5A/us
Performance Priority	Balance Efficiency and Size
BOM Priority	Cost
External Synchronization Enable	PV - FPWM Mode
Switching Frequency	2200KHz
Inductor Current Ratio (LIR)	0.3
Ambient Temperature	25°C

Schematic



A. If the current level (starting current for Load Steps) is too low, AC, Steady State, Load Step and Line Transient analyses may fail.

BOM

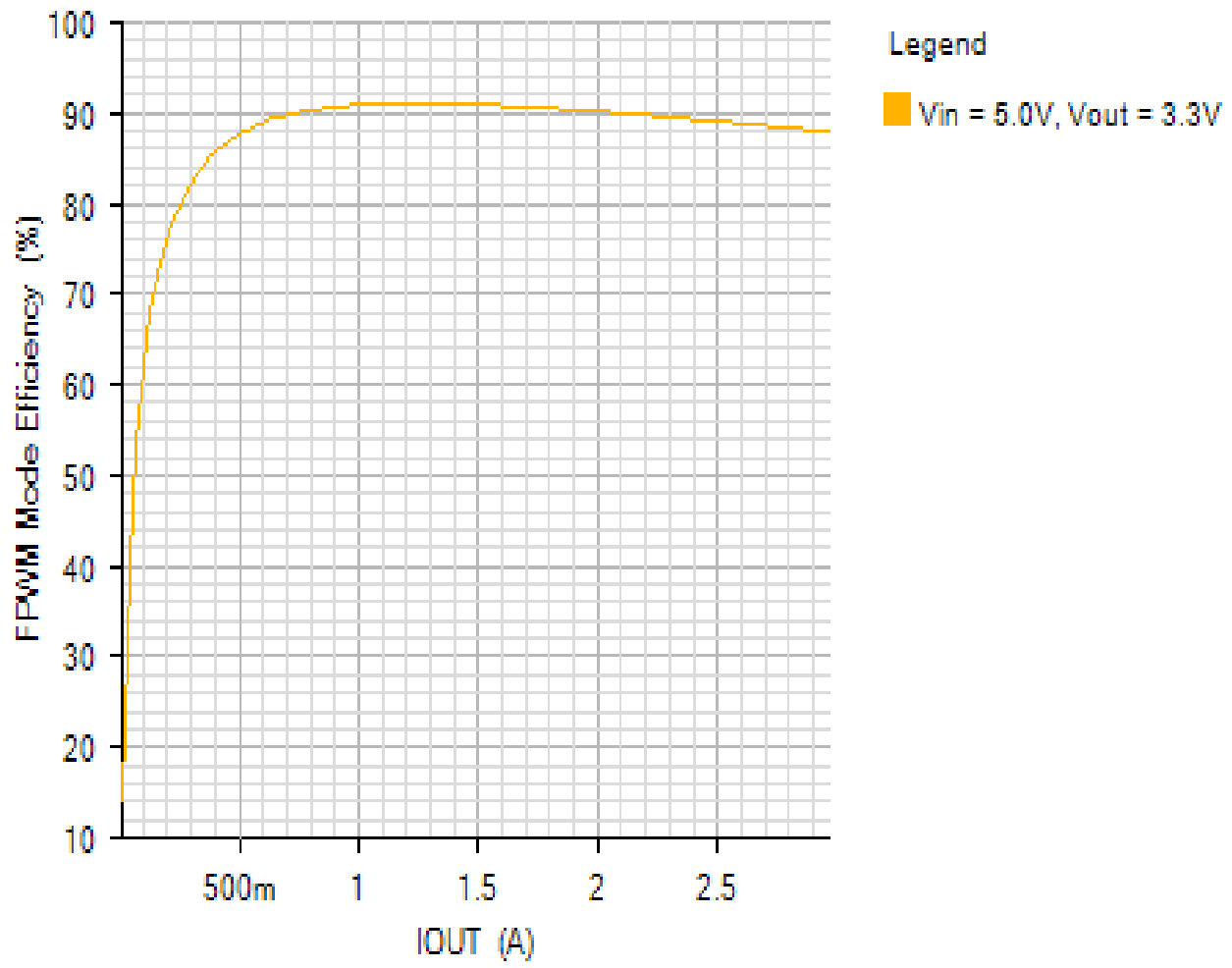
Ref	Qty	Part Number	Manufacturer	Description
U1	1	MAX20074	Maxim Integrated	Single 3A 2.2MHz Low-Voltage Step-Down DC-DC Converters
CFB	1	02013A120JAT2A	AVX	Cap Ceramic 12pF 25V C0G 5% Pad SMD 0201 125°C T/R
CIN	2	GRM32ER71E226ME15	Murata	Cap Ceramic 22uF 25V 1210 125C
COUT	3	GRM32DR61C226KE18L	Murata	Cap Ceramic 22uF 16V X5R 10% SMD 1210 85C Embossed T/R
L1	1	XFL4015-701MEB	Coilcraft	Inductor 700nH 20% 9.5mOhm 6.1A Isat 10.1A Irms
R1	1	ERJ2RKF10R0X	Panasonic	Res Thick Film 0402 10 Ohm 1% 0.1W(1/10W) ±100ppm/°C Pad SMD Automotive T/R
R2	1	ERJ3EKF2002V	Panasonic	Res Thick Film 0603 20K Ohm 1% 0.1W(1/10W) ±100ppm/°C Pad SMD Automotive T/R
R3	1	ERJ3EKF2802V	Panasonic	Res Thick Film 0603 28K Ohm 1% 0.1W(1/10W) ±100ppm/°C Pad SMD Automotive T/R
R4	1	ERJ2RKF4991X	Panasonic	Res Thick Film 0402 4.99K Ohm 1% 0.1W(1/10W) ±100ppm/°C Pad SMD Automotive T/R

Simulation Results

Efficiency - Tue Nov 20 2018 12:33:48

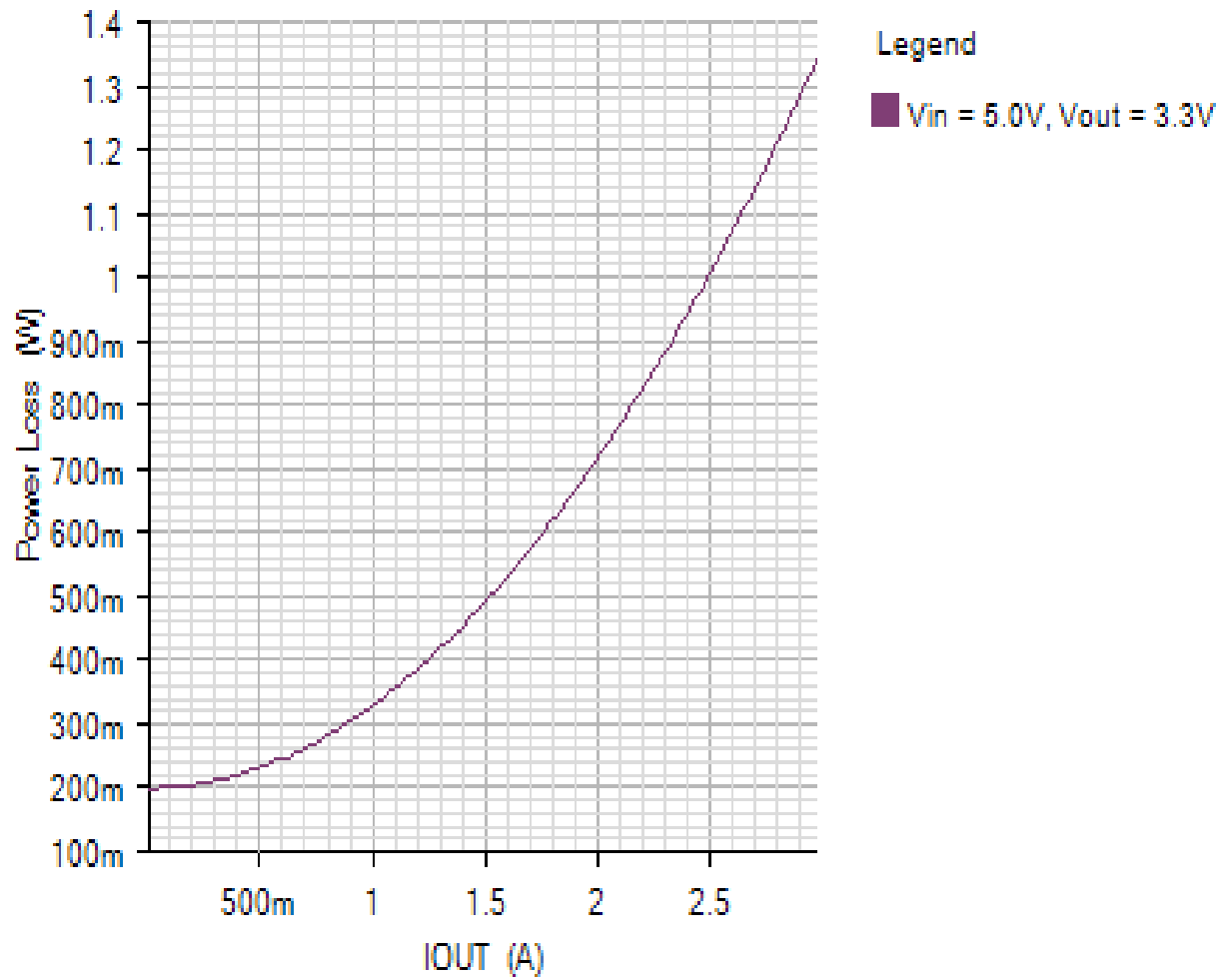
EFFICIENCY_PLOT

Default



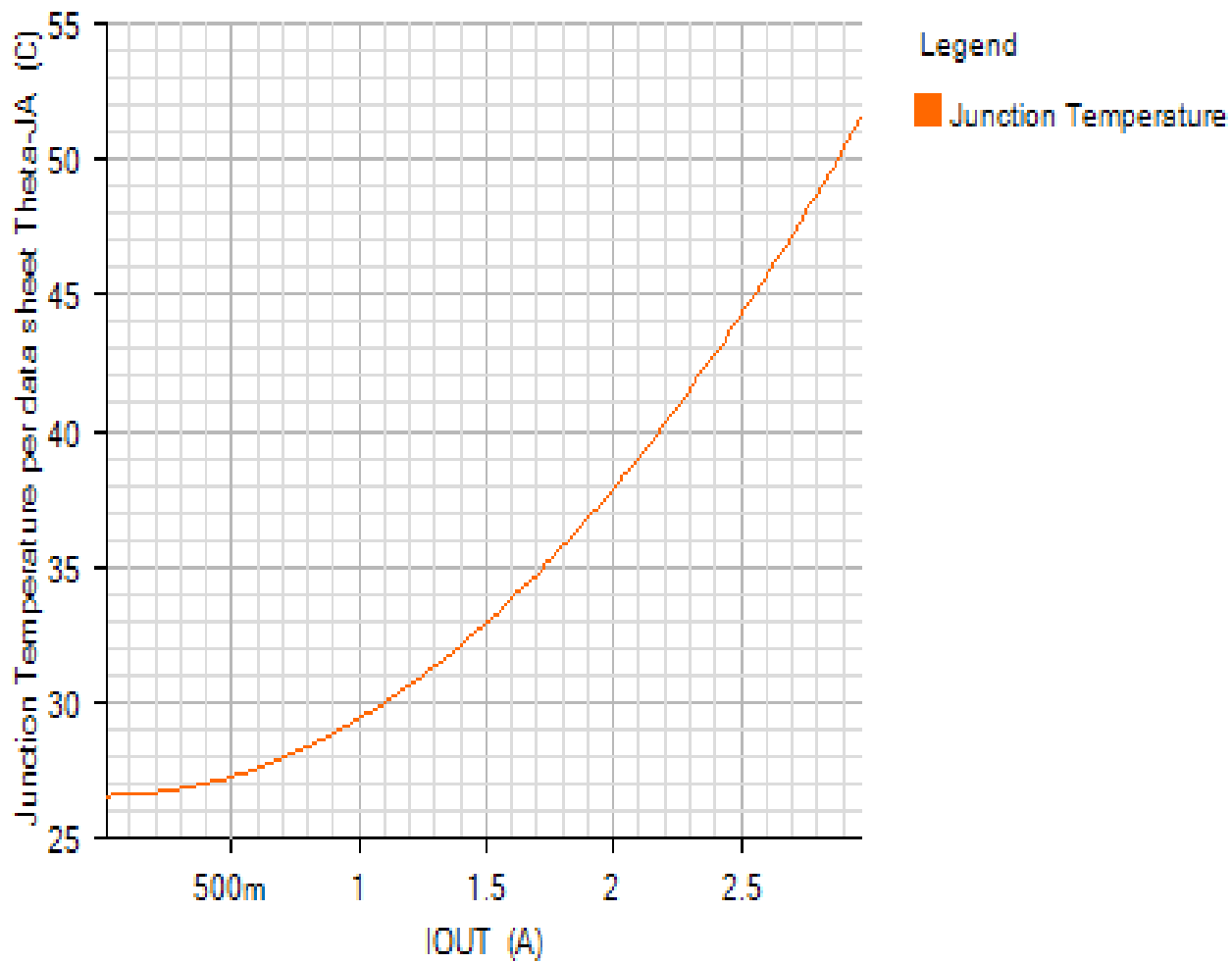
POWER_LOSS_PLOT

Default

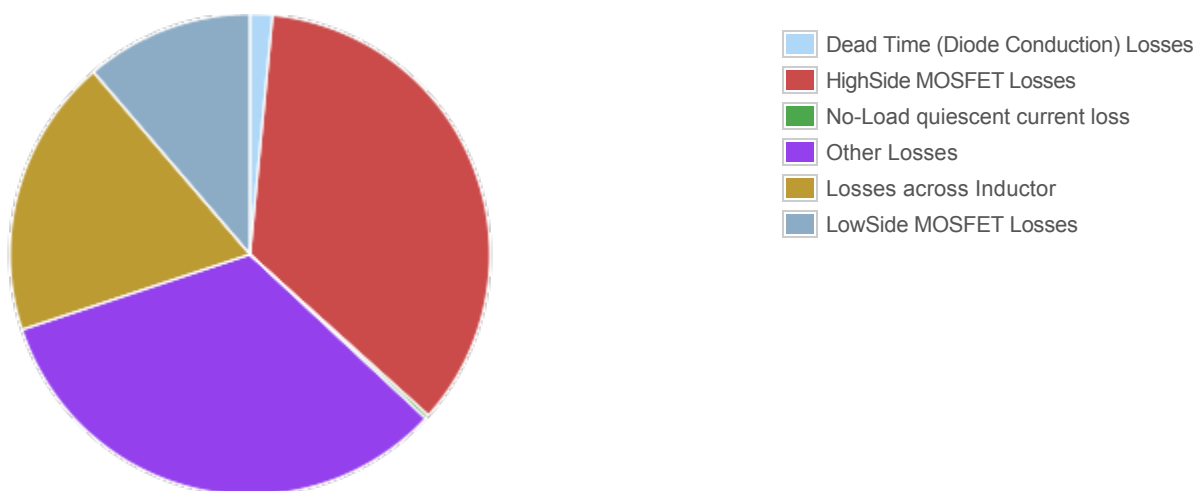


JUNCTION_TEMPERATURE_PLOT

Default



Losses



Component

Loss (W)

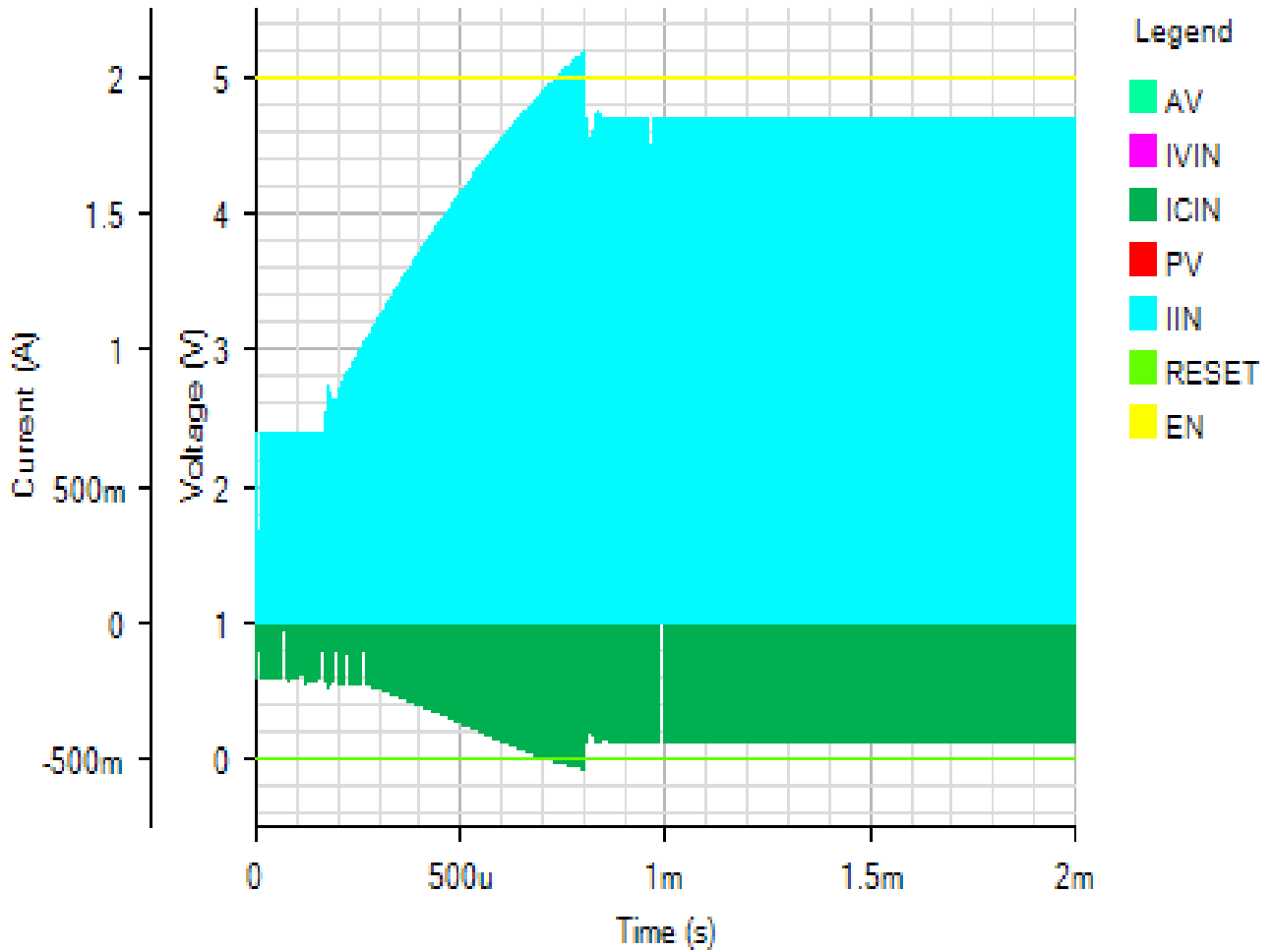
% of total

Component	Loss (W)	% of total
Dead Time (Diode Conduction) Losses	0.020196	1.5
HighSide MOSFET Losses	0.47202	35.2
No-Load quiescent current loss	0.0035	0.3
Other Losses	0.443197	33
Losses across Inductor	0.251852	18.8
LowSide MOSFET Losses	0.151754	11.3
Total	1.342519	100

Start Up - Tue Nov 20 2018 12:33:48

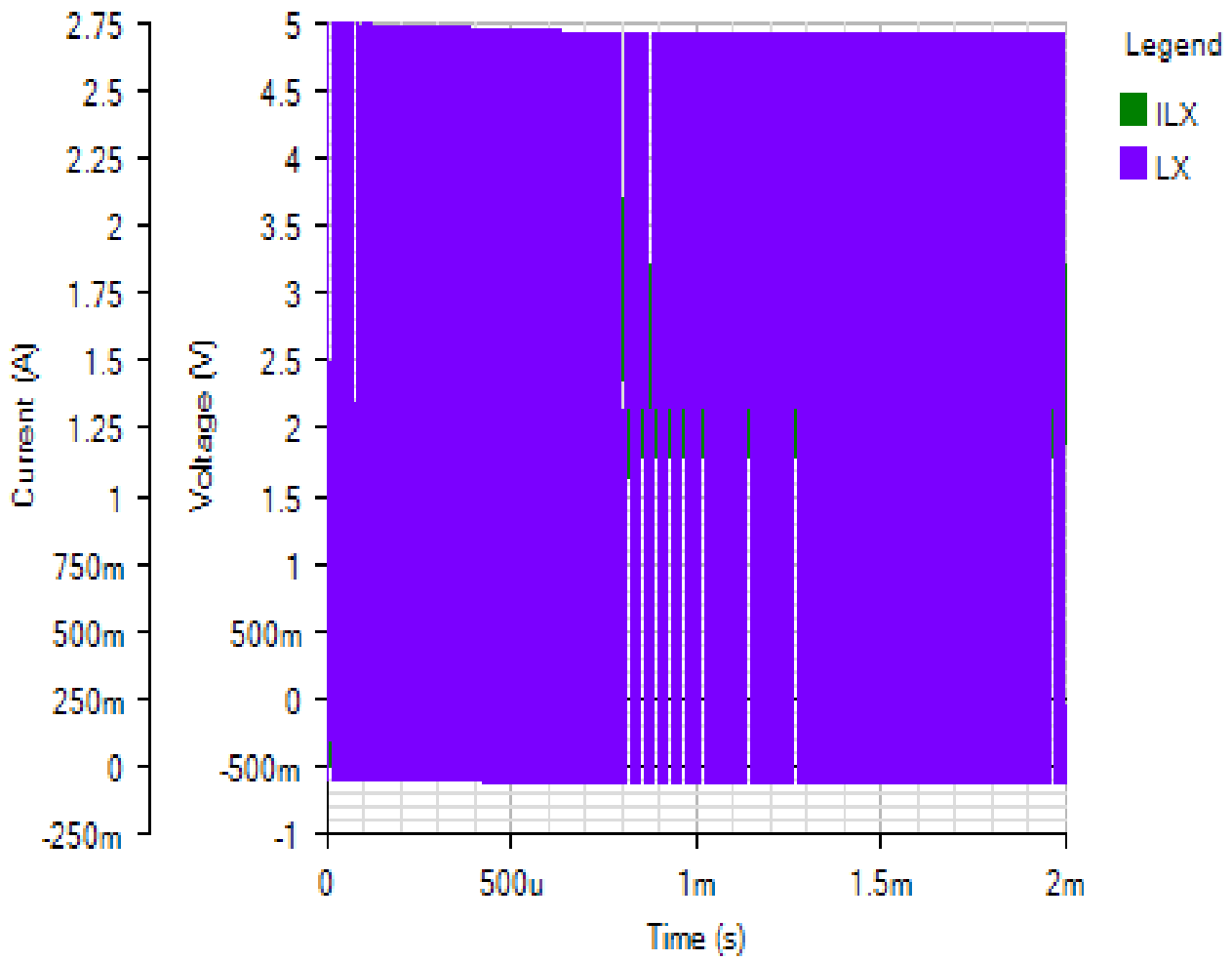
INPUT

Default



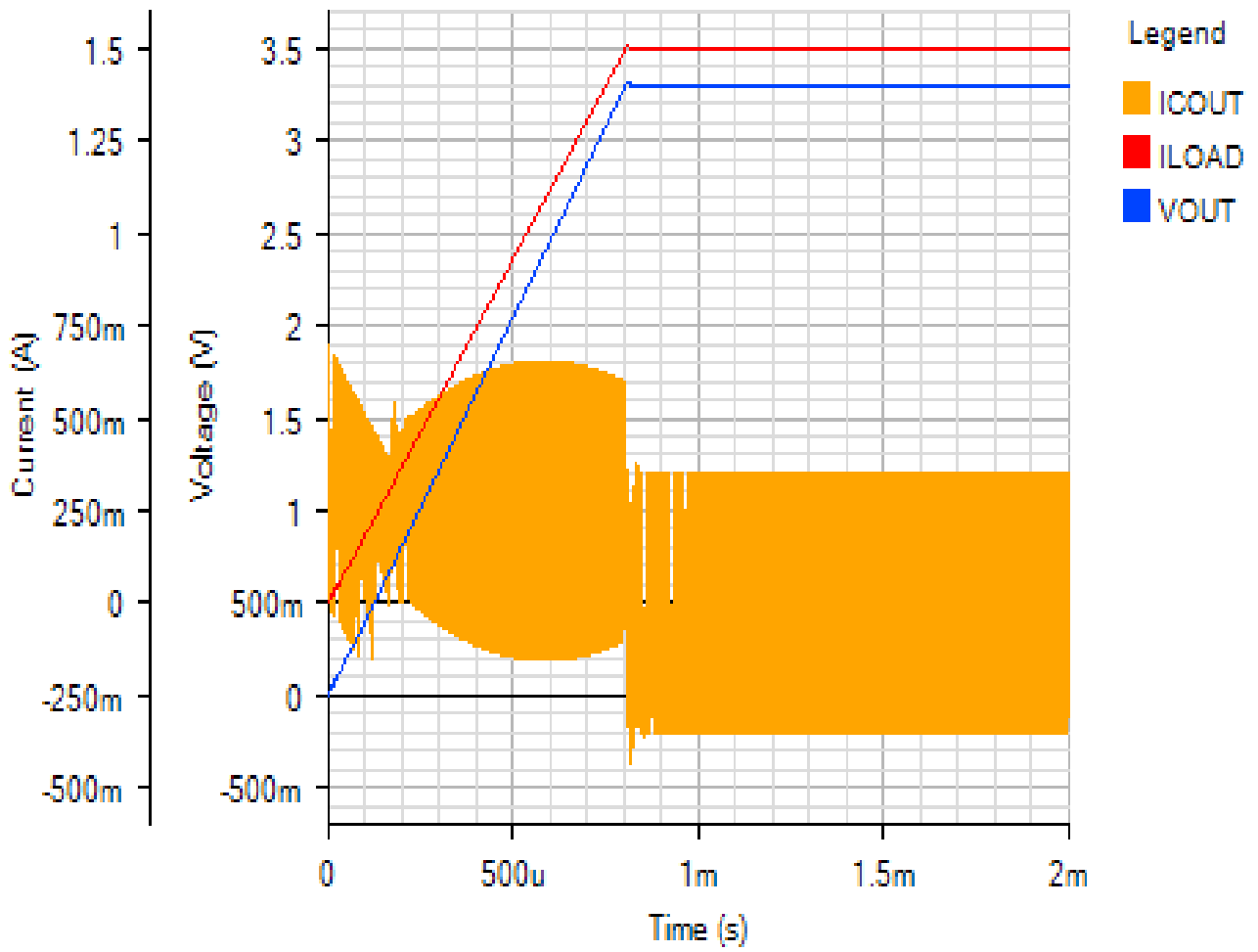
SWITCHING

Default



OUTPUT

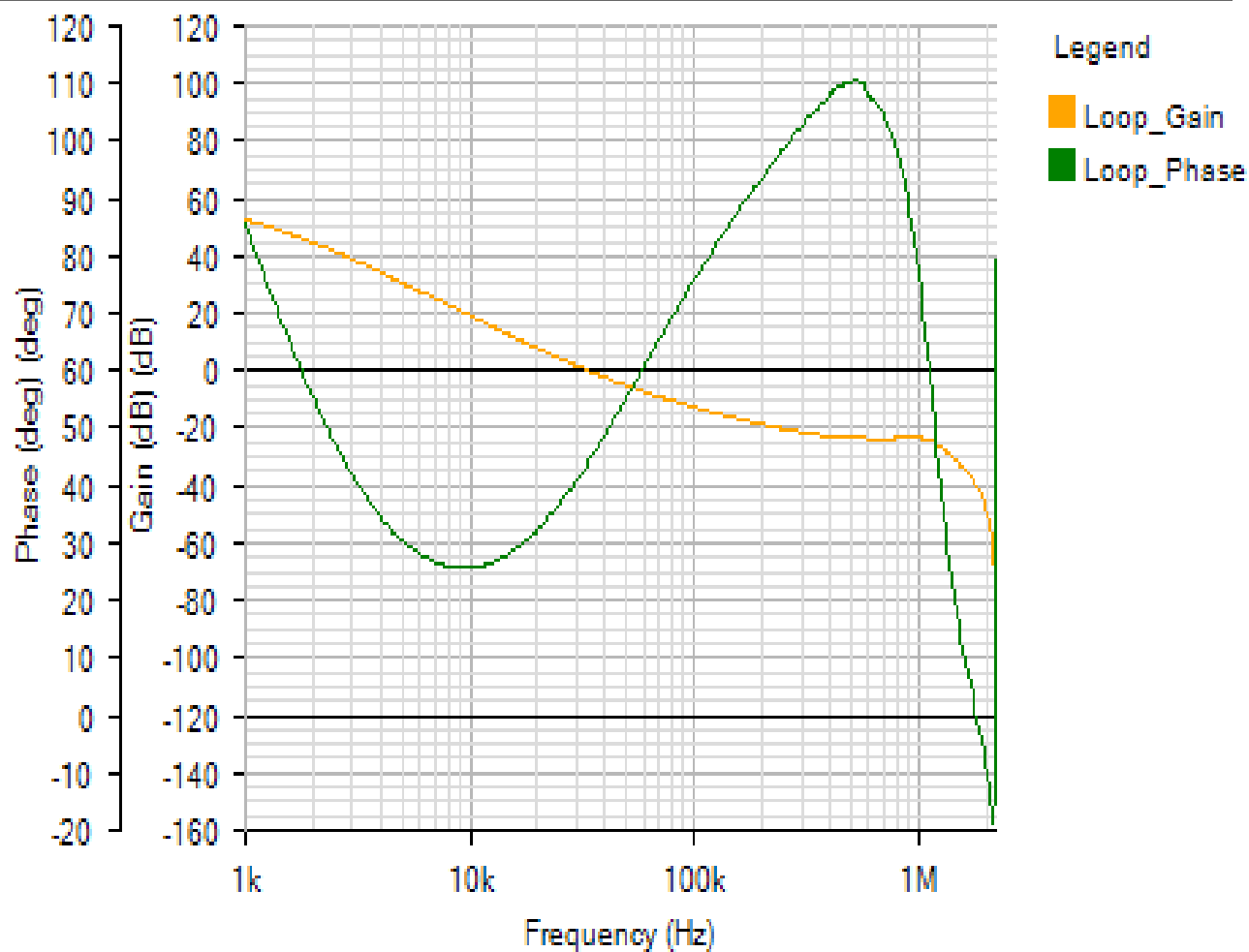
Default



AC Loop - Tue Nov 20 2018 12:33:48

BODE

Default



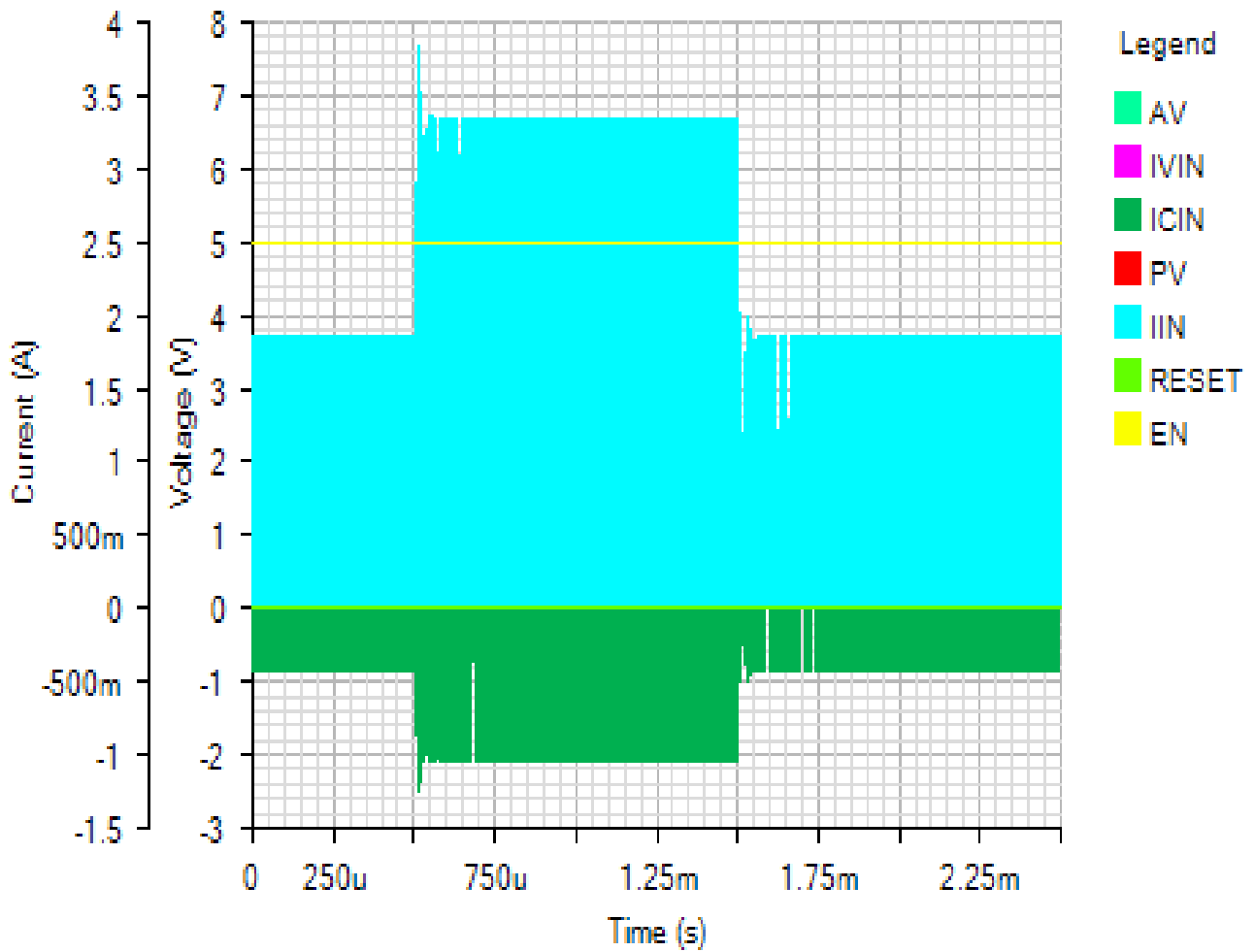
Phase Margin: 44.16° at a crossover frequency of 33.8kHz



Load Step - Tue Nov 20 2018 12:33:48

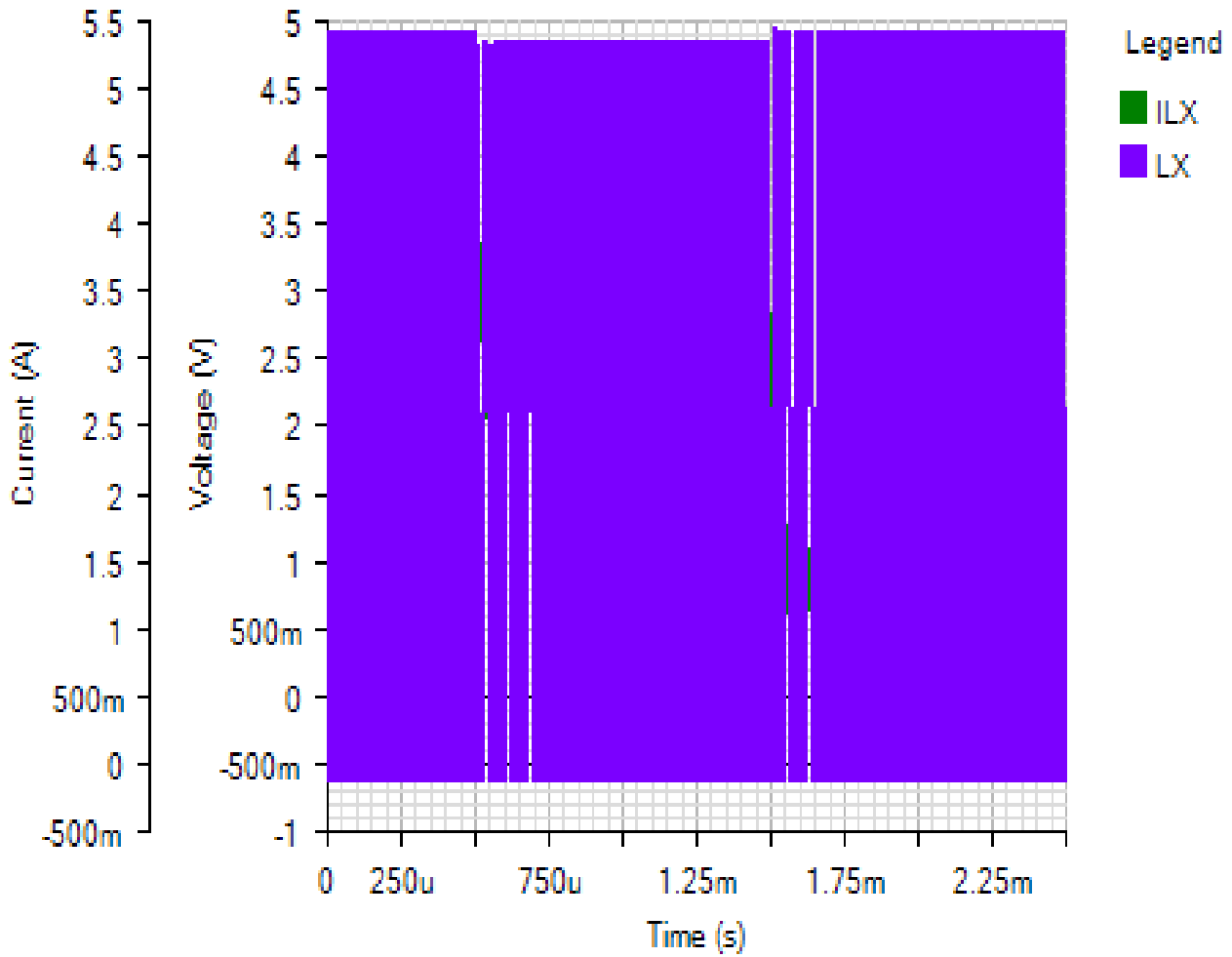
INPUT

Default



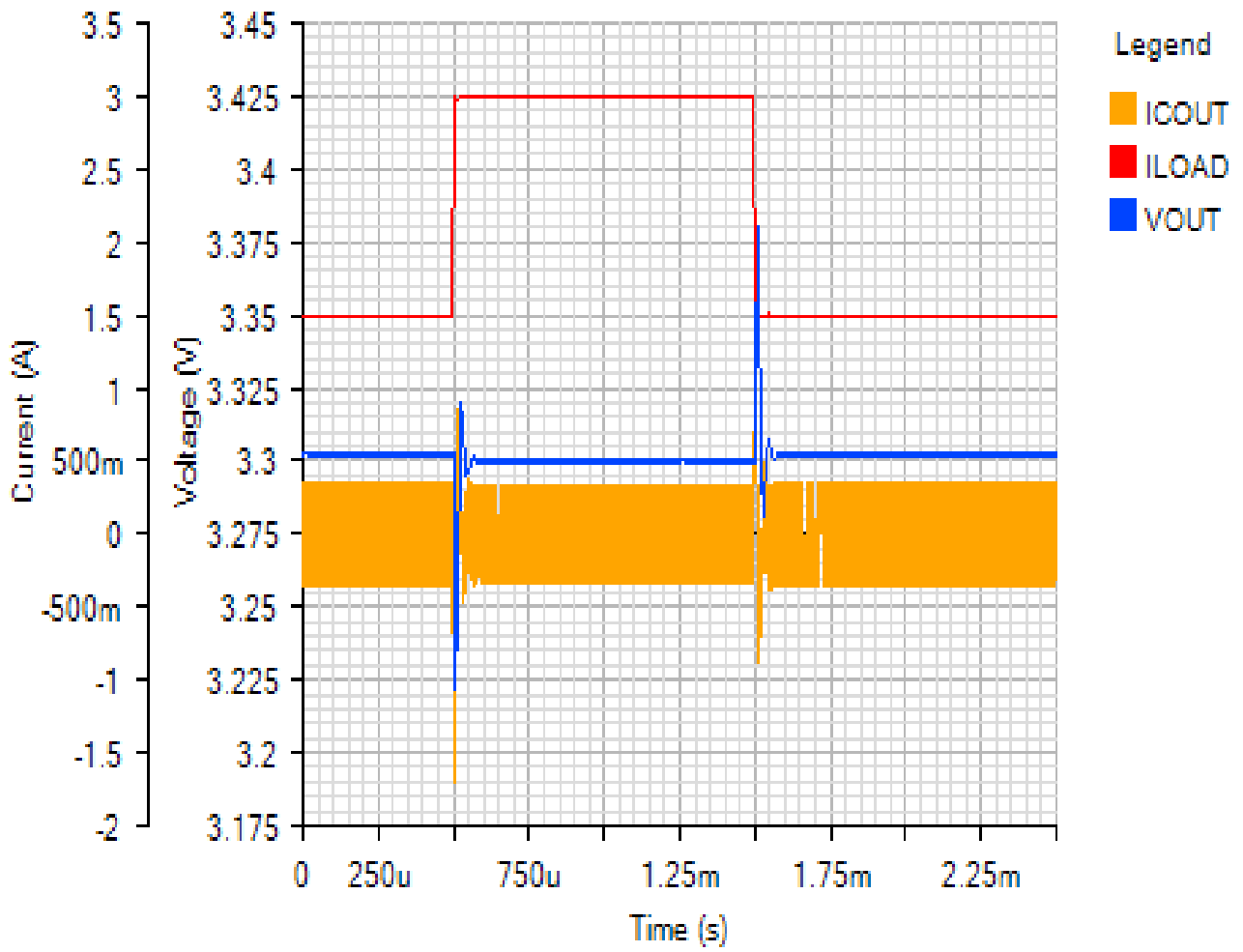
SWITCHING

Default



OUTPUT

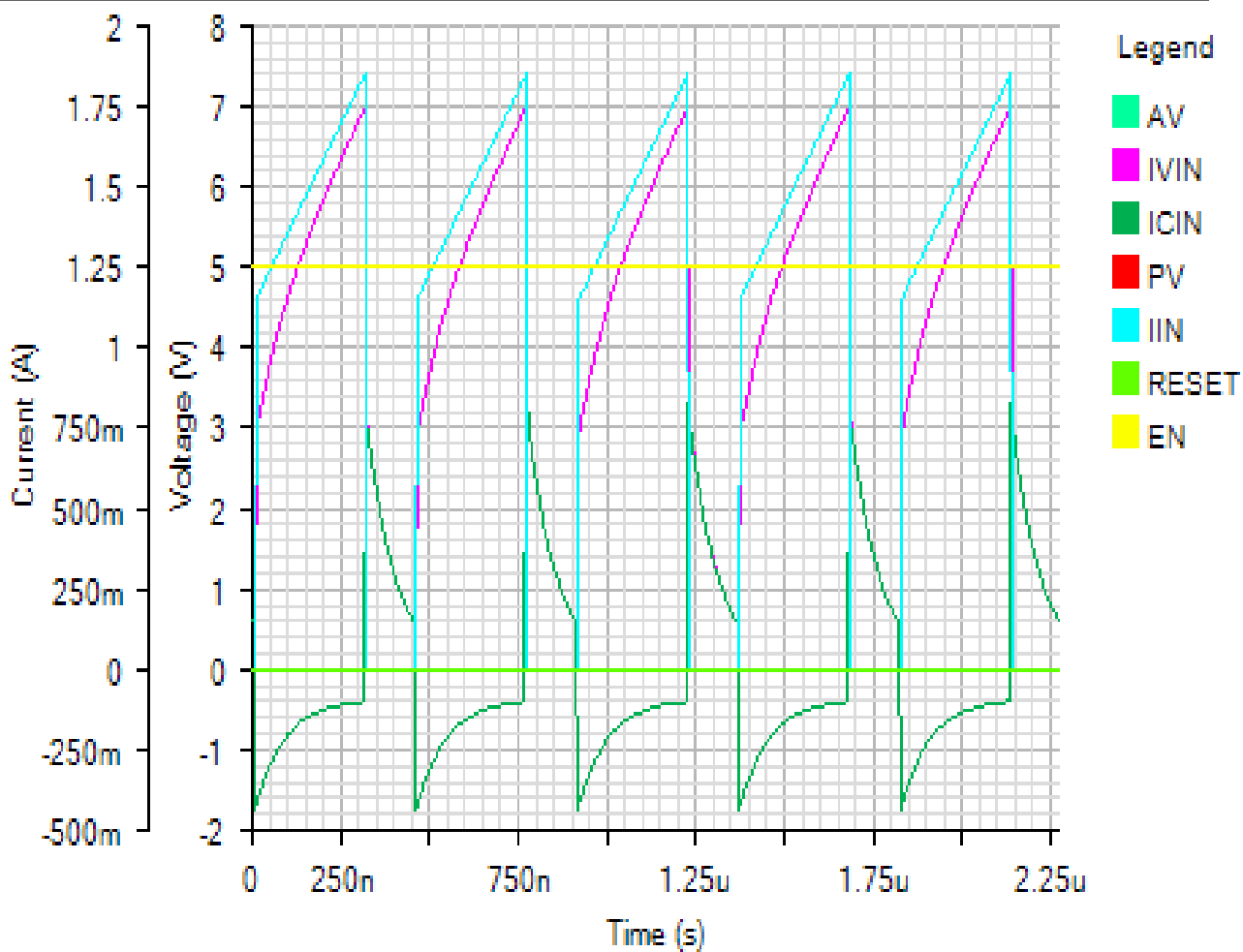
Default



Steady State - Tue Nov 20 2018 12:33:48

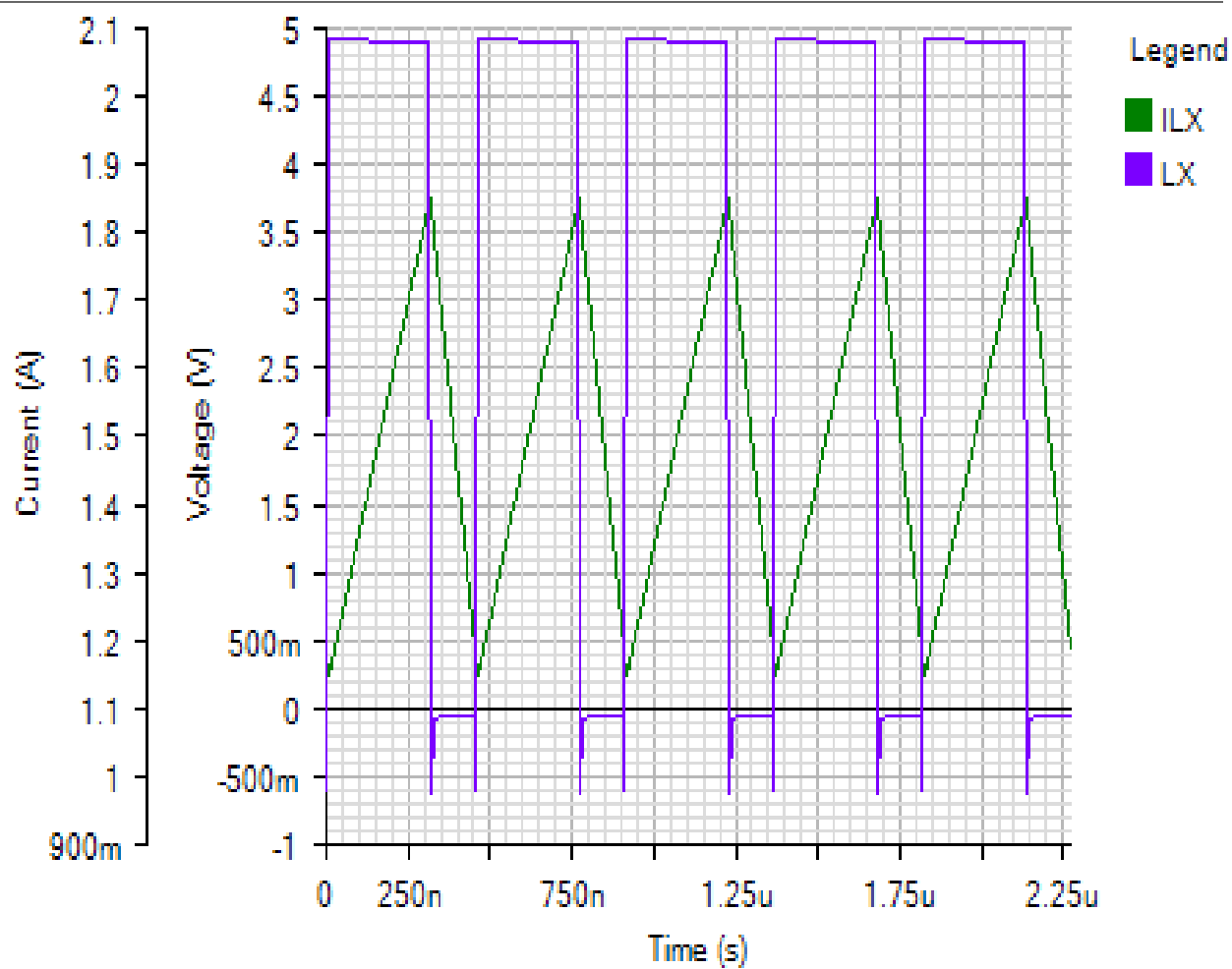
INPUT

Default



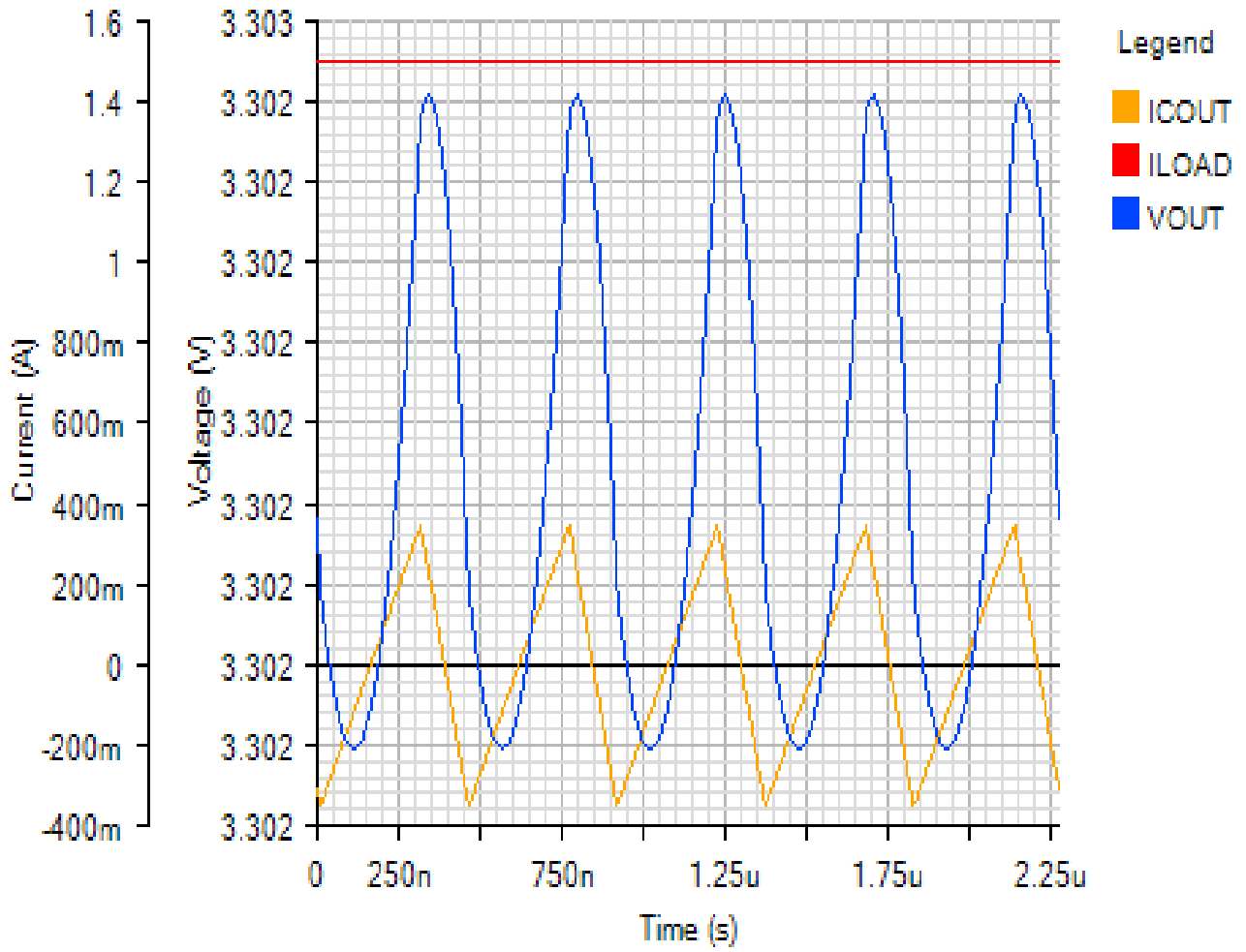
SWITCHING

Default

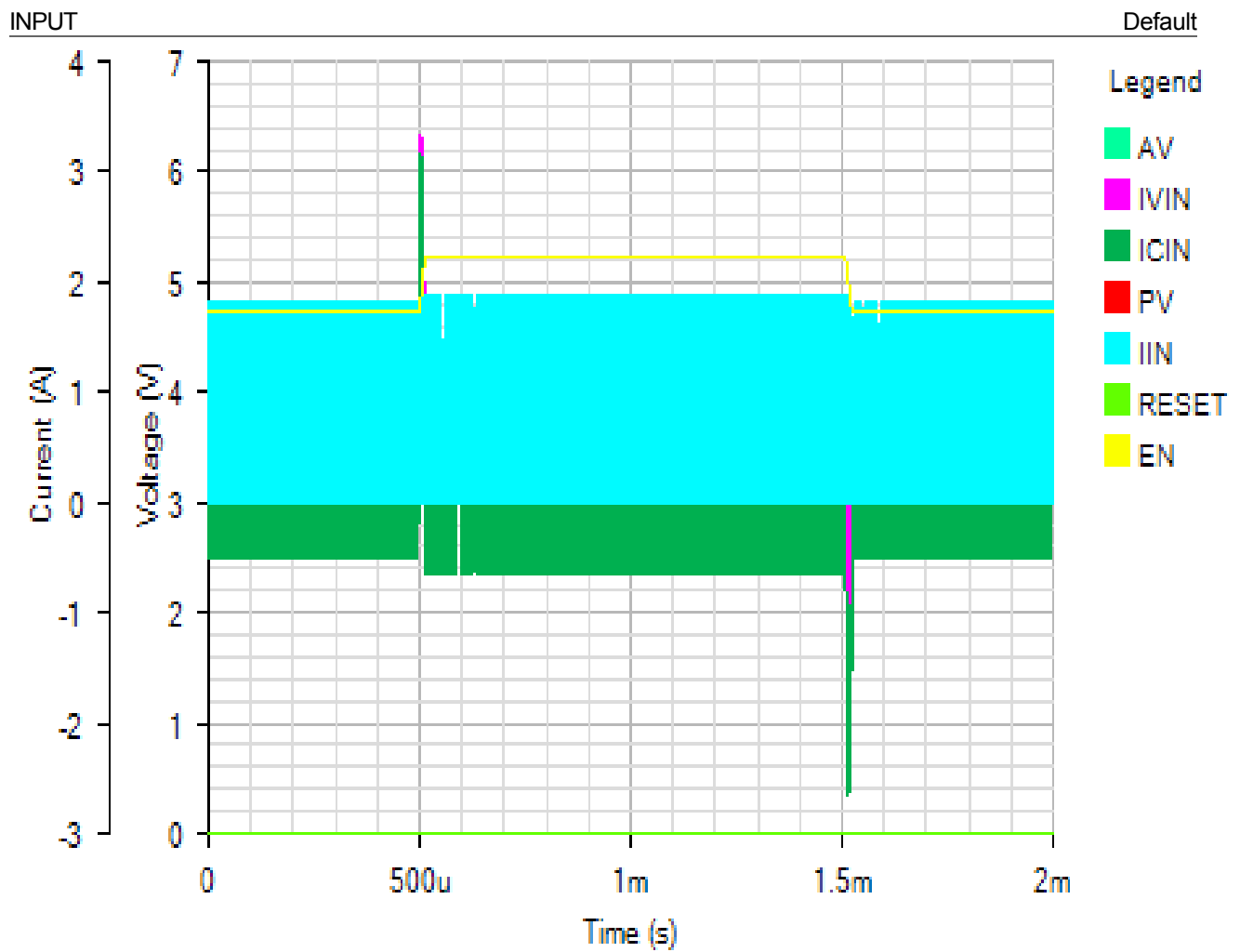


OUTPUT

Default

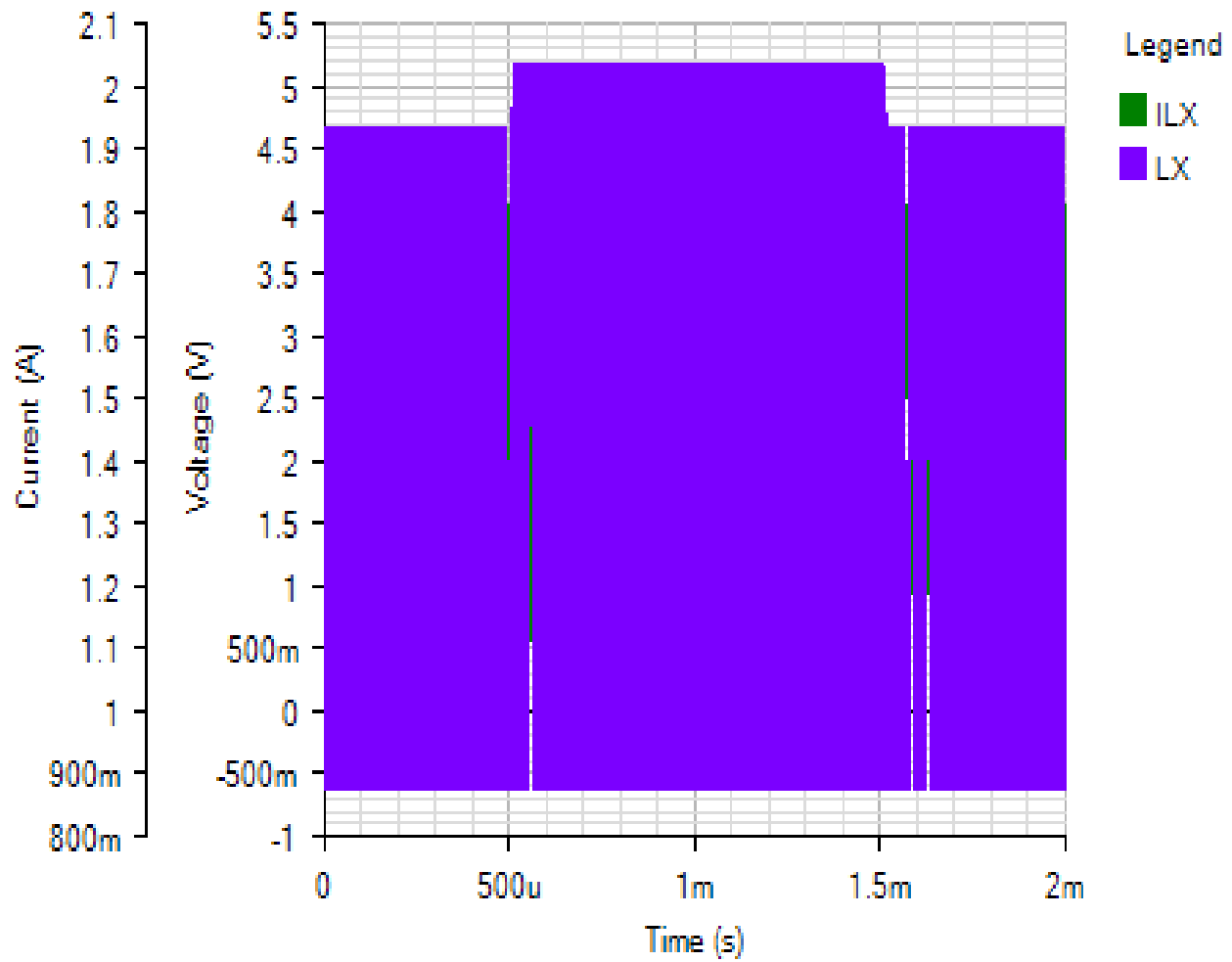


Line Transient - Tue Nov 20 2018 12:33:48



SWITCHING

Default



OUTPUT

Default

