

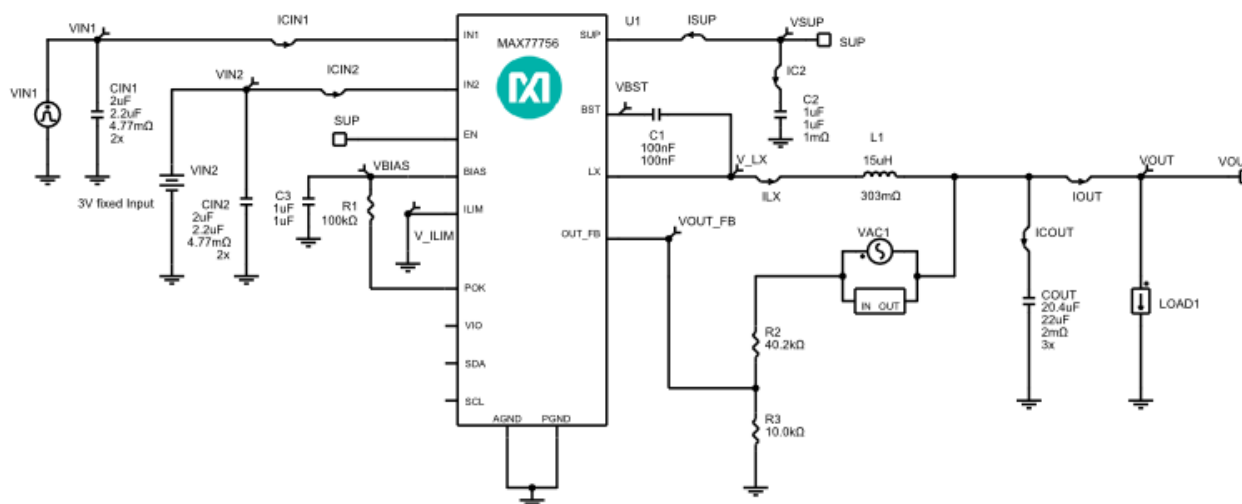
Initial Design

1.0

Design Requirements

Parameter	Value
Minimum Input Voltage	10V
Maximum Input Voltage	14V
Nominal Input Voltage	12V
Input Voltage Ripple	1%
Output Voltage Control	External Resistive Divider
Output Voltage	5V
Output Current	0.5A
Load Step Start Current	0.5A
Load Step Current	0.25A
Output Voltage Ripple	2%
Output Voltage Load Step Over/Undershoot	5%
ILX-PEAK Programming Method	Hardware
ILX-PEAK Level (high-side MOSFET current limit)	700 mA
Load Step Edge Rate	5A/us
Performance Priority	Balance Efficiency and Size
BOM Priority	Cost
Soft Start Ramp Time	0.008s
Inductor Current Ratio (LIR)	0.4
Ambient Temperature	25°C

Schematic



For the online EE-Sim design tool, VIN2 is set to 3V and the input voltage is applied to VIN1. To simulate switching between two inputs, download the completed design and simulate using EE-Sim SE or SIMPLIS.

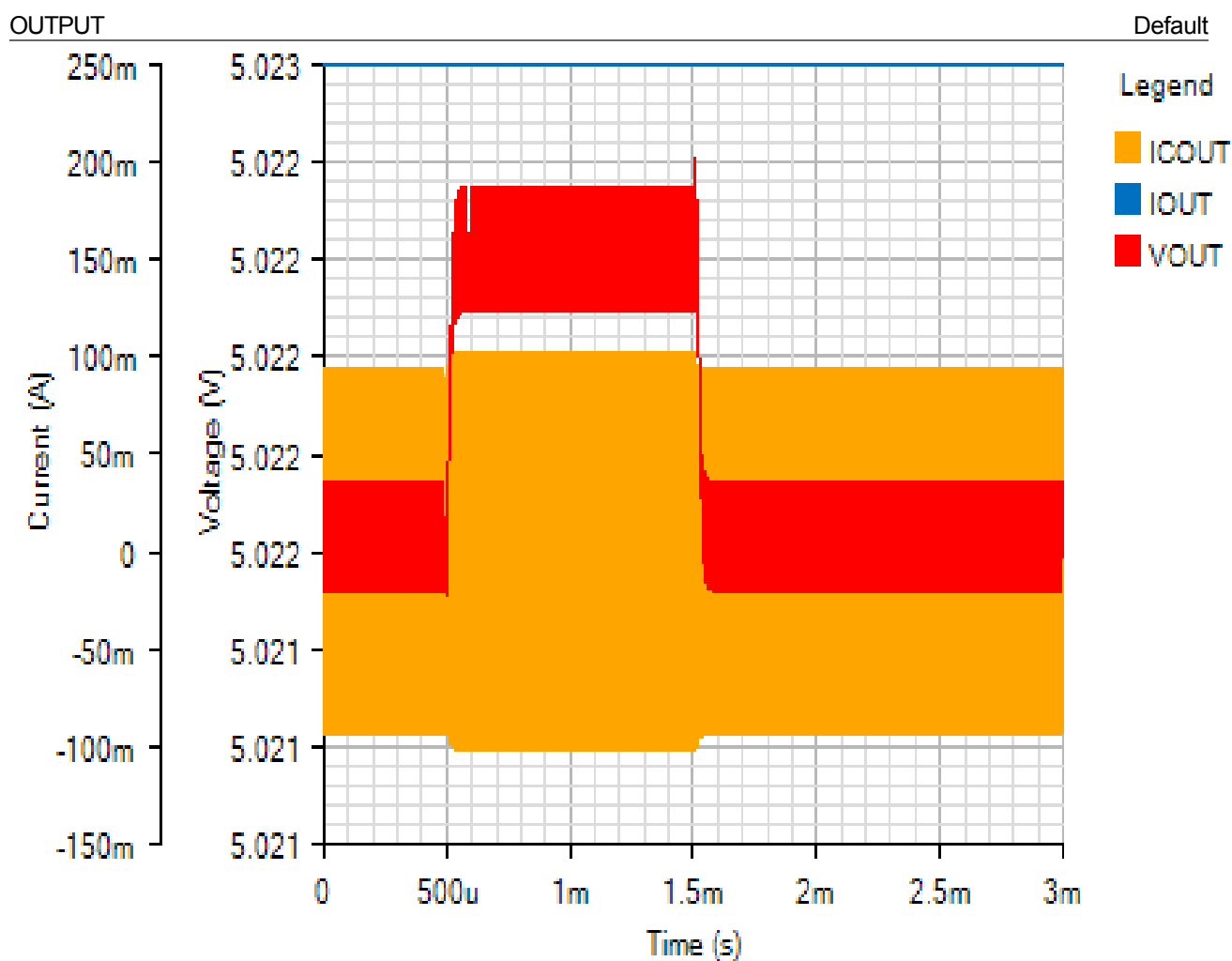
If the peak inductor current is less than 230mA, the PWM portion of burst mode has an effective load of at least 230mA. Therefore, AC Loop simulations must be run with at least this much load current.

BOM

Ref	Qty	Part Number	Manufacturer	Description
U1	1	MAX77756	User-Defined	IC
C1	1	GMD033R60J104KE11D	Murata Manufacturing	Cap Ceramic 0.1uF 6.3V X5R 10% Pad SMD 0201 85°C T/R
C2	1	EMK105BJ105KV-F	Taiyo Yuden	Cap Ceramic 1uF 16V X5R 10% Pad SMD 0402 85°C T/R
C3	1	EMK105BJ105KV-F	Taiyo Yuden	Cap Ceramic 1uF 16V X5R 10% Pad SMD 0402 85°C T/R
CIN1	2	GRM31MR71E225KA93	Murata	Cap Ceramic 2.2uF 25V X7R 10% SMD 1206 125C
CIN2	2	GRM31MR71E225KA93	Murata	Cap Ceramic 2.2uF 25V X7R 10% SMD 1206 125C
COUT	3	GRM32ER71E226ME15	Murata	Cap Ceramic 22uF 25V 1210 125C
L1	1	VLCF4020T-150MR68	TDK	Inductor Power Shielded Wirewound 15uH 20% 100KHz Ferrite 1A 303mOhm DCR T/R
R1	1	CRCW0603100KFKEAHP	Vishay	Res Thick Film 0603 100K Ohm 1% 0.25W(1/4W) ±100ppm/°C Pad SMD Automotive T/R
R2	1	ERJ3EKF4022V	Panasonic	Res Thick Film 0603 40.2K Ohm 1% 0.1W(1/10W) ±100ppm/°C Pad SMD Automotive T/R
R3	1	ERJ2RKF1002X	Panasonic	Res Thick Film 0402 10K Ohm 1% 0.1W(1/10W) ±100ppm/°C Pad SMD Automotive T/R

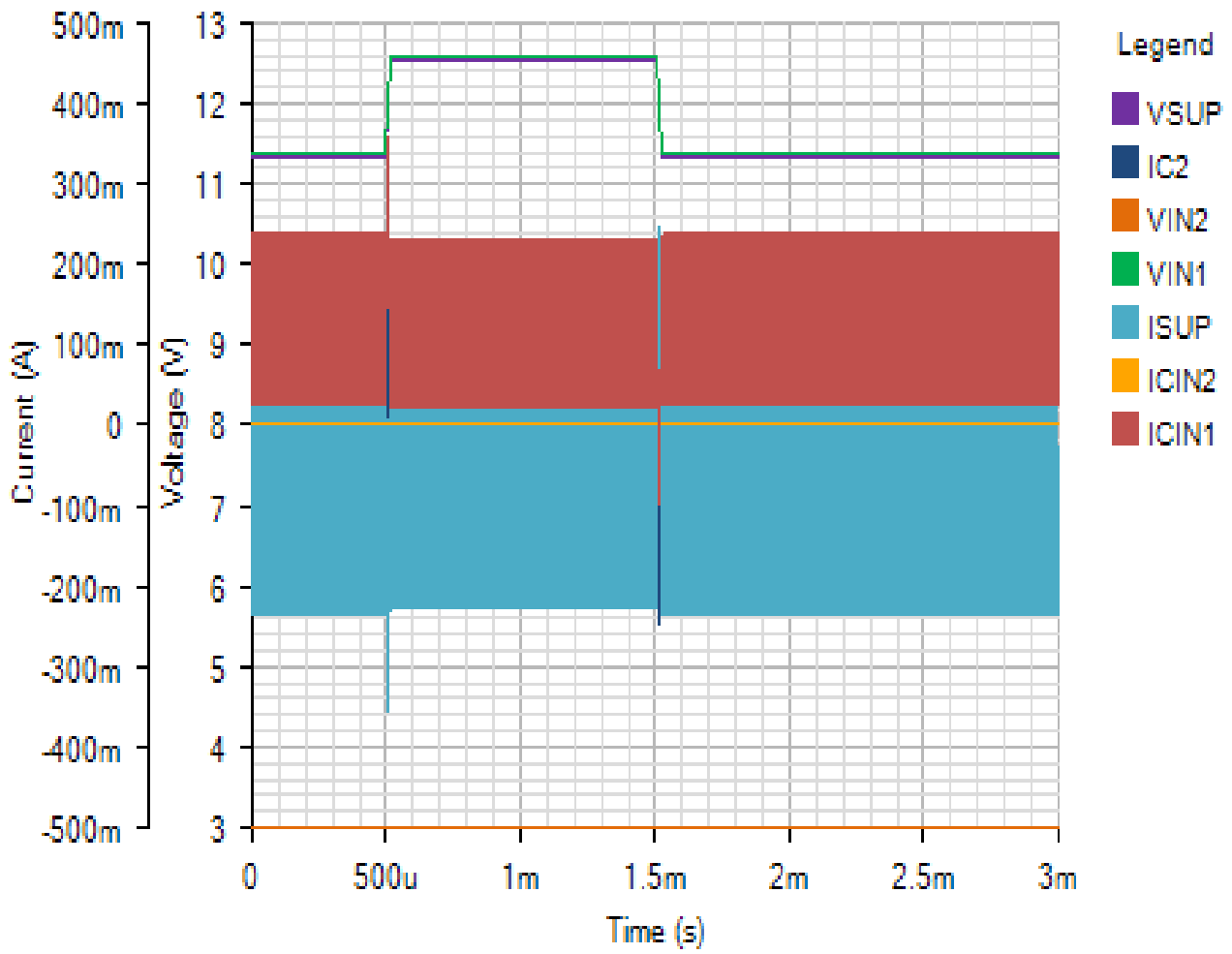
Simulation Results

Line Transient - Sun Nov 18 2018 17:49:31



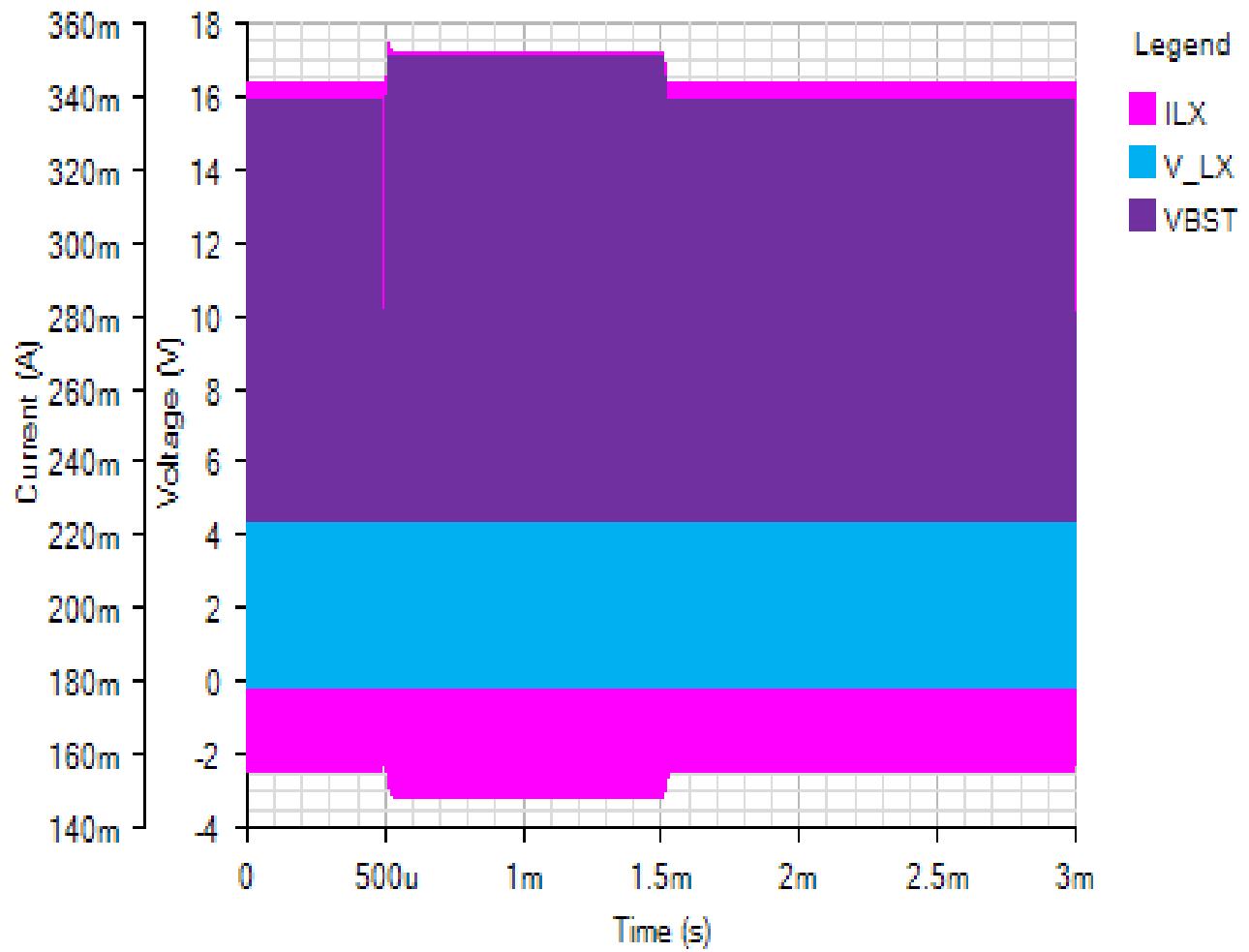
INPUT

Default



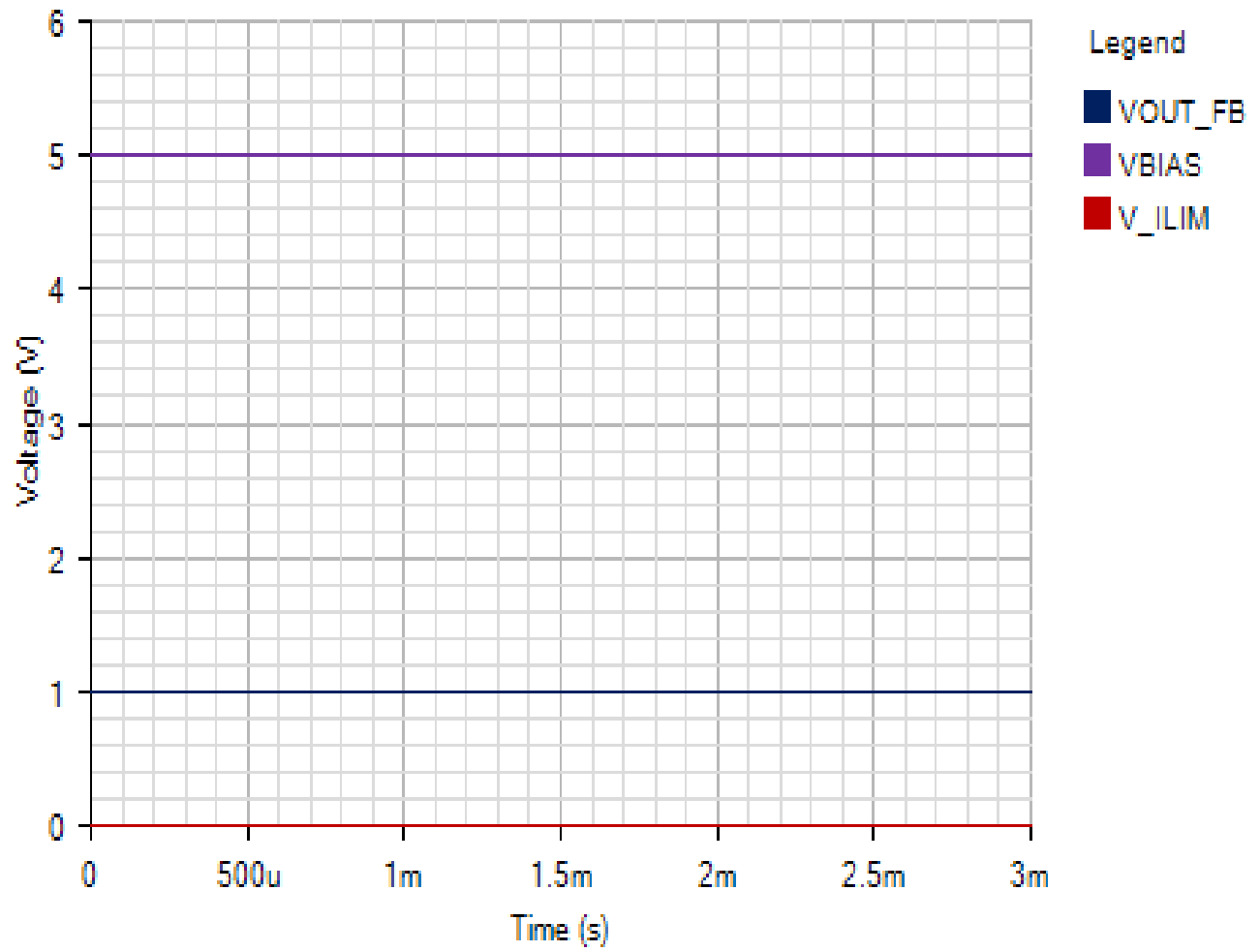
SWITCHING

Default



IC

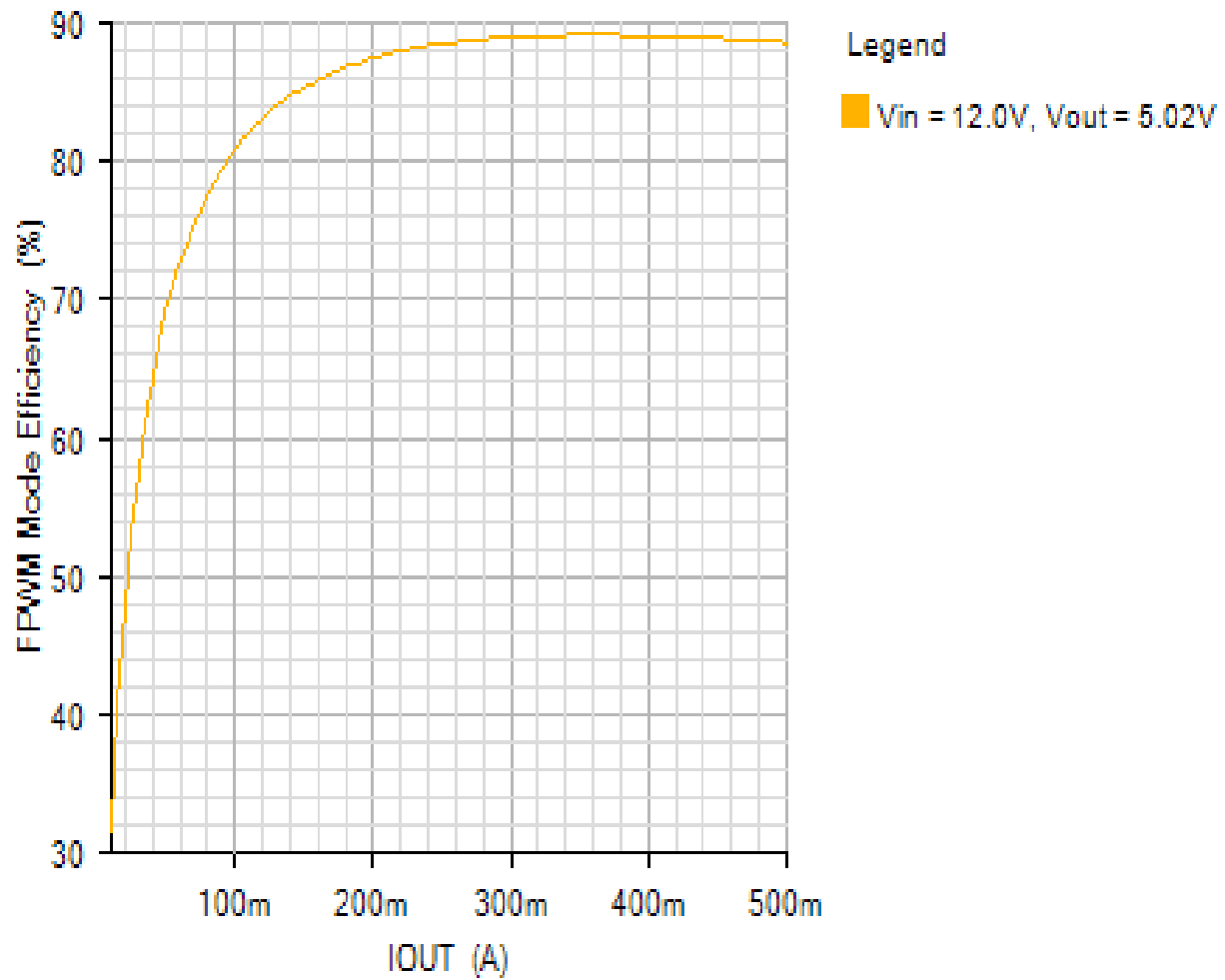
Default



Efficiency - Sun Nov 18 2018 17:49:31

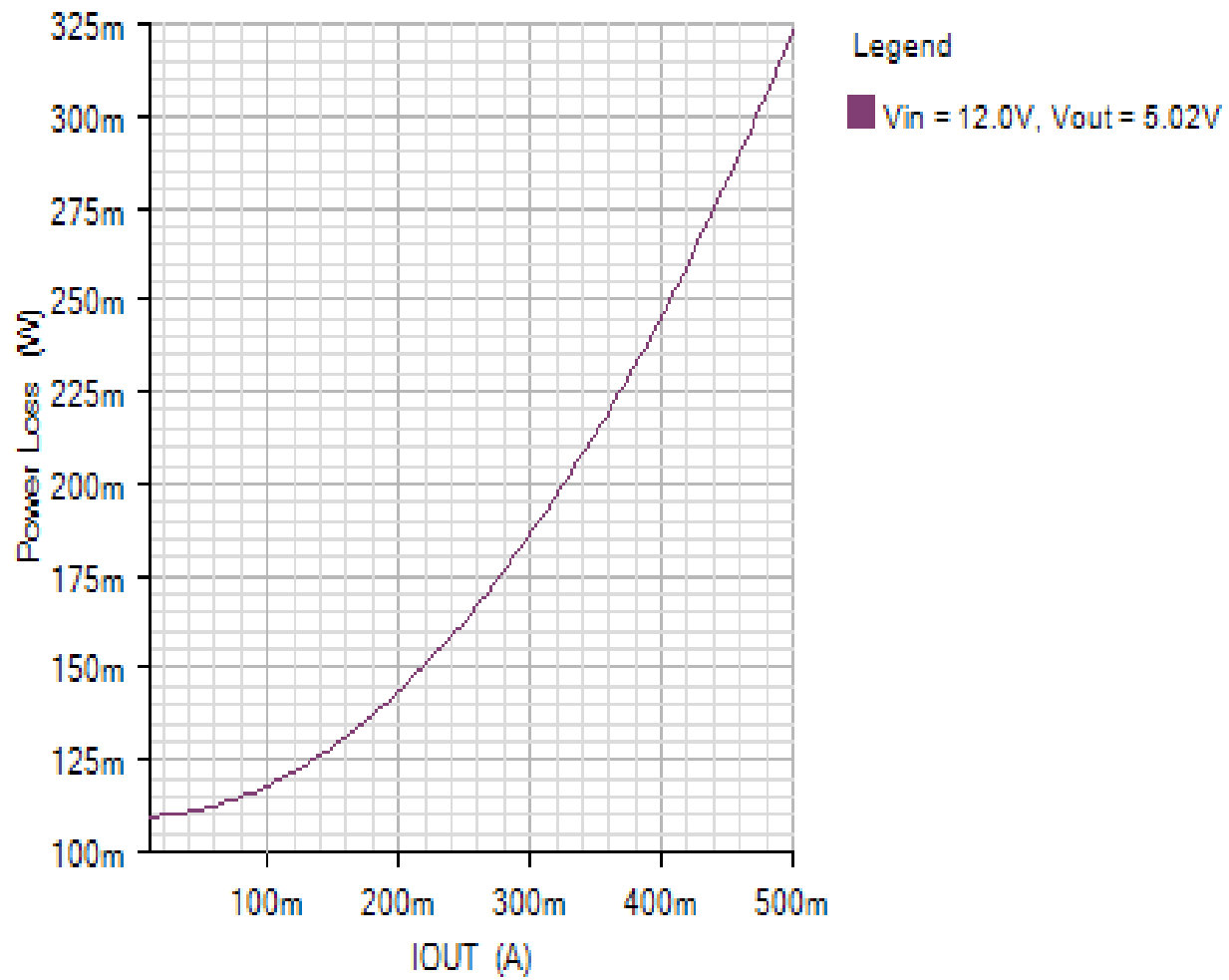
EFFICIENCY_PLOT

Default



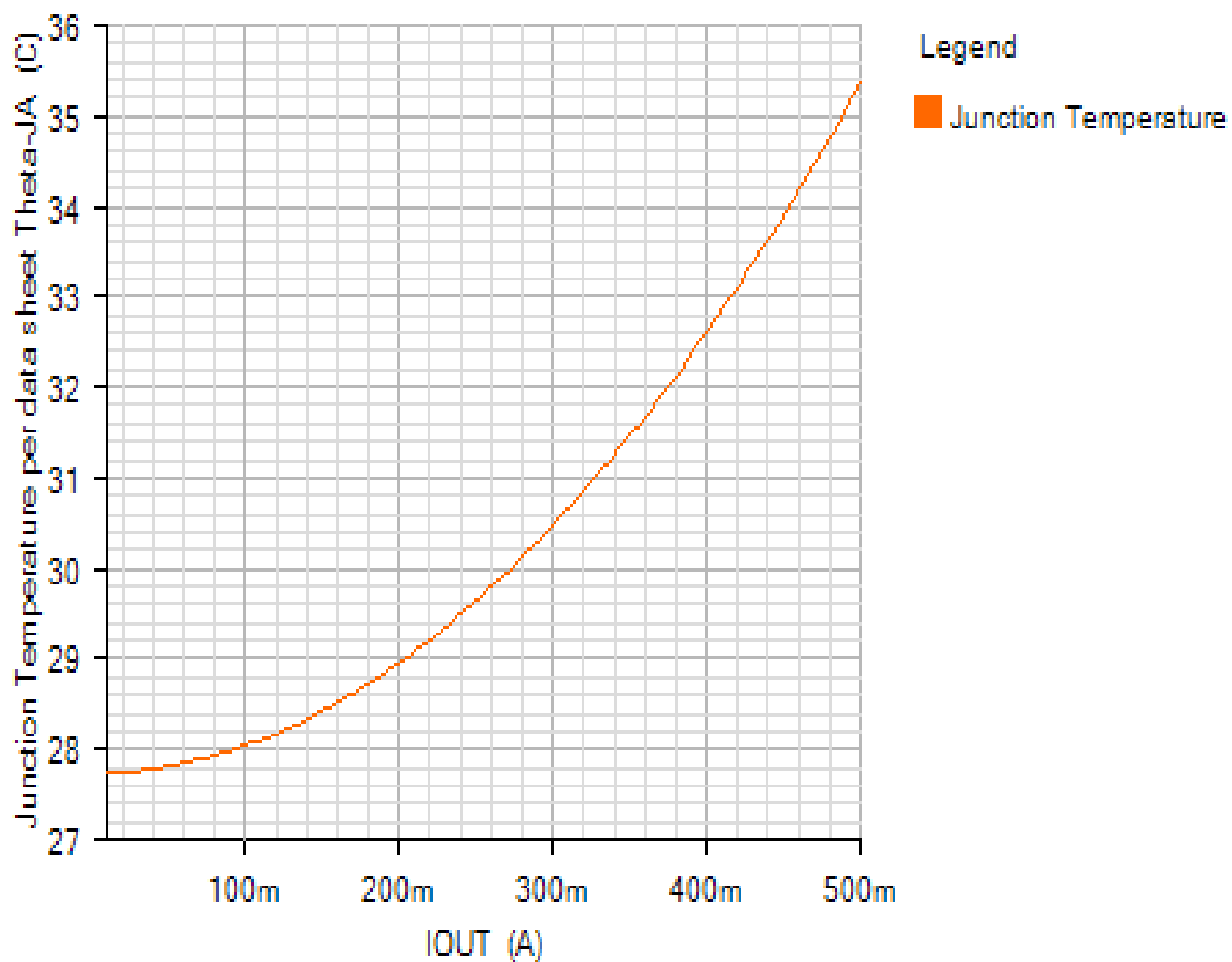
POWER_LOSS_PLOT

Default

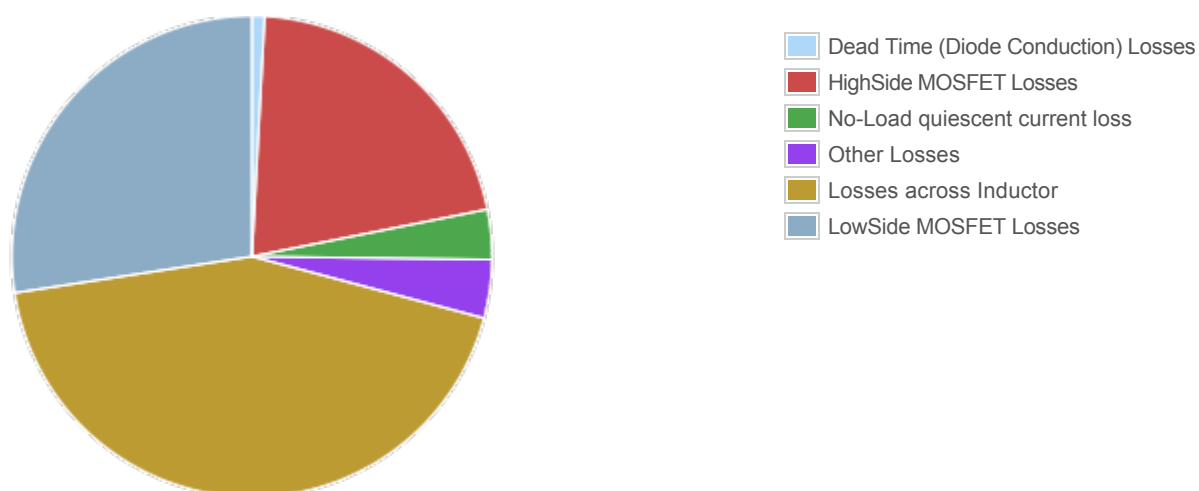


JUNCTION_TEMPERATURE_PLOT

Default



Losses



Component

Loss (W)

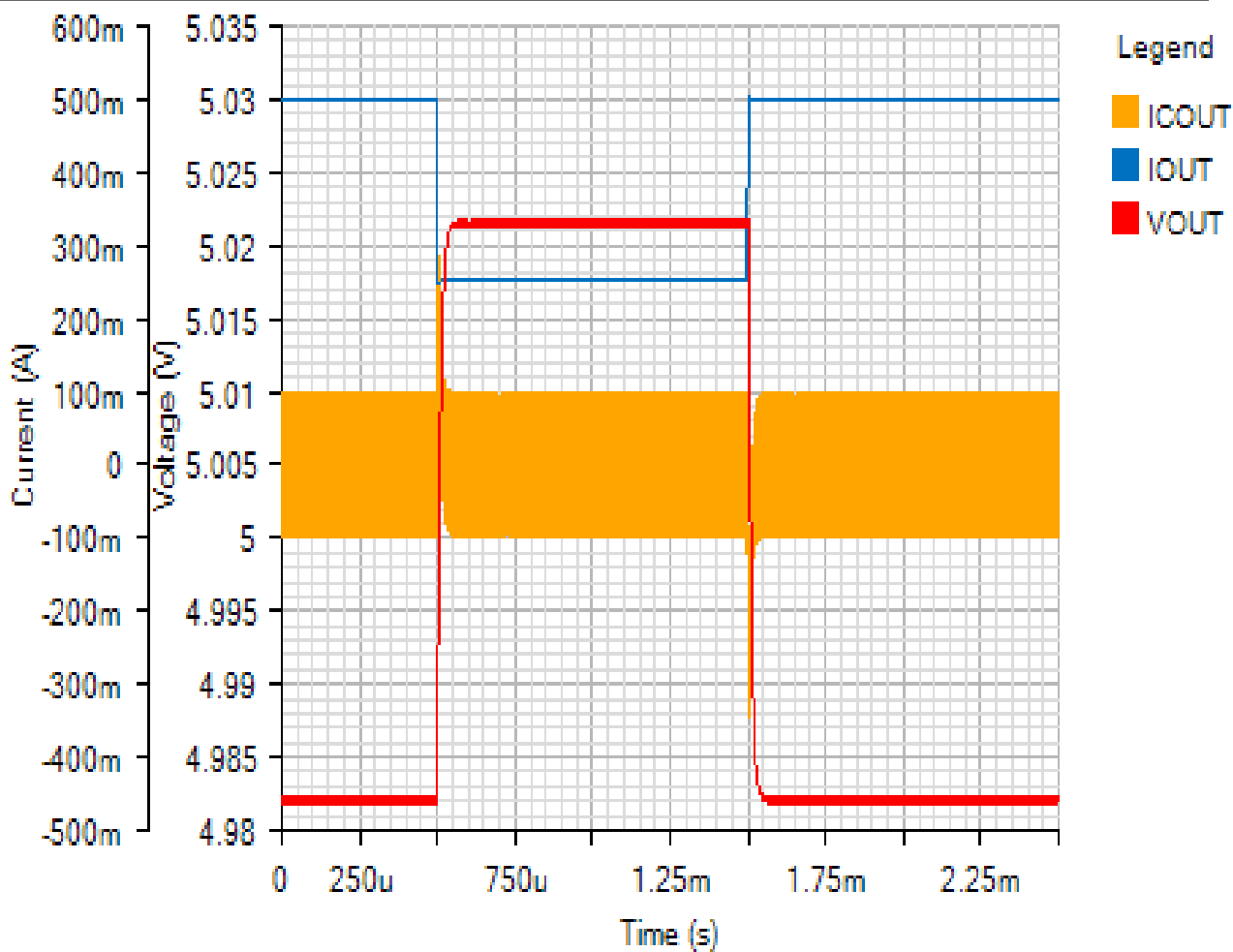
% of total

Component	Loss (W)	% of total
Dead Time (Diode Conduction) Losses	0.002725	0.8
HighSide MOSFET Losses	0.067825	21
No-Load quiescent current loss	0.0108	3.3
Other Losses	0.012658	3.9
Losses across Inductor	0.140246	43.5
LowSide MOSFET Losses	0.0885	27.4
Total	0.322754	100

Load Step - Sun Nov 18 2018 17:49:31

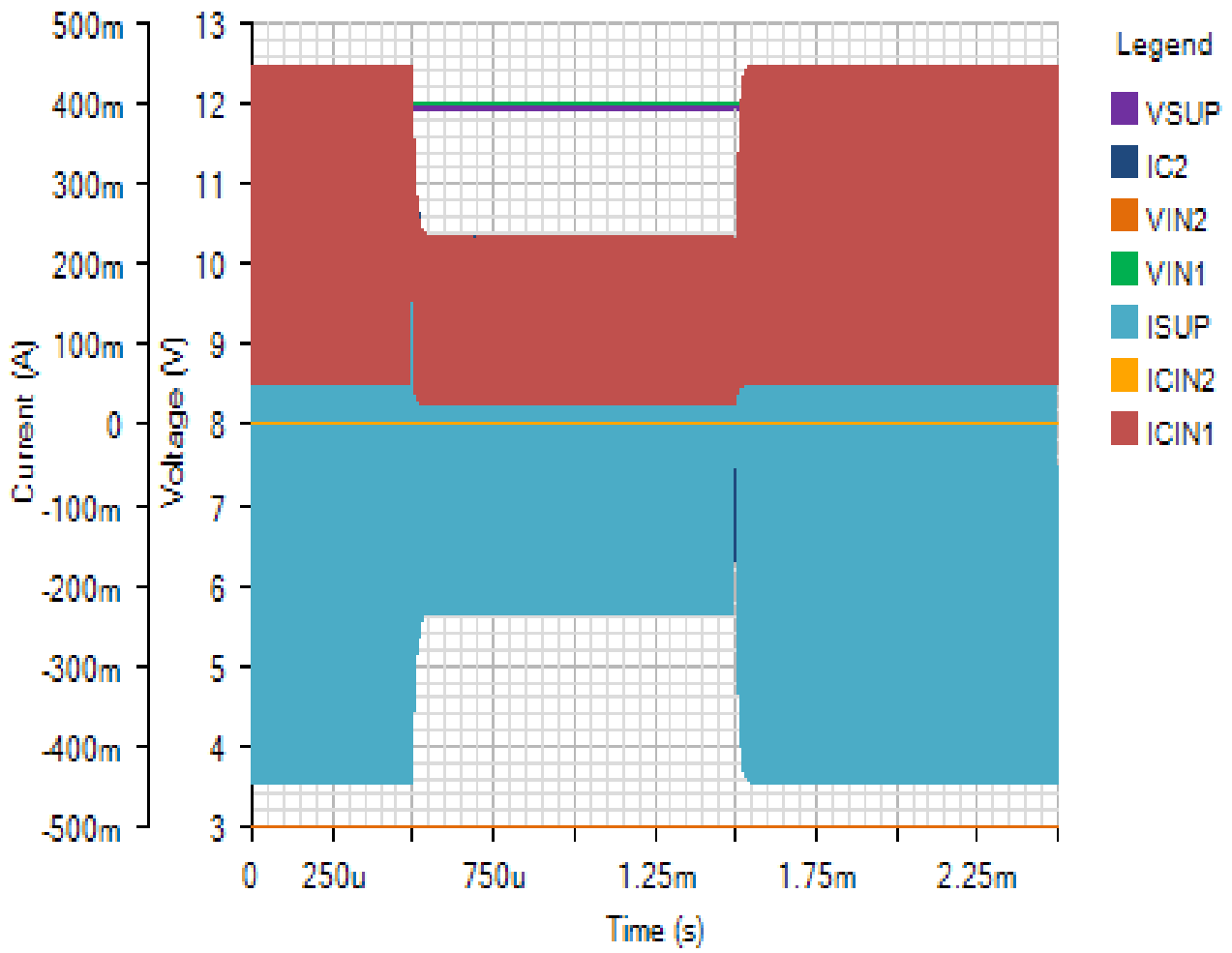
OUTPUT

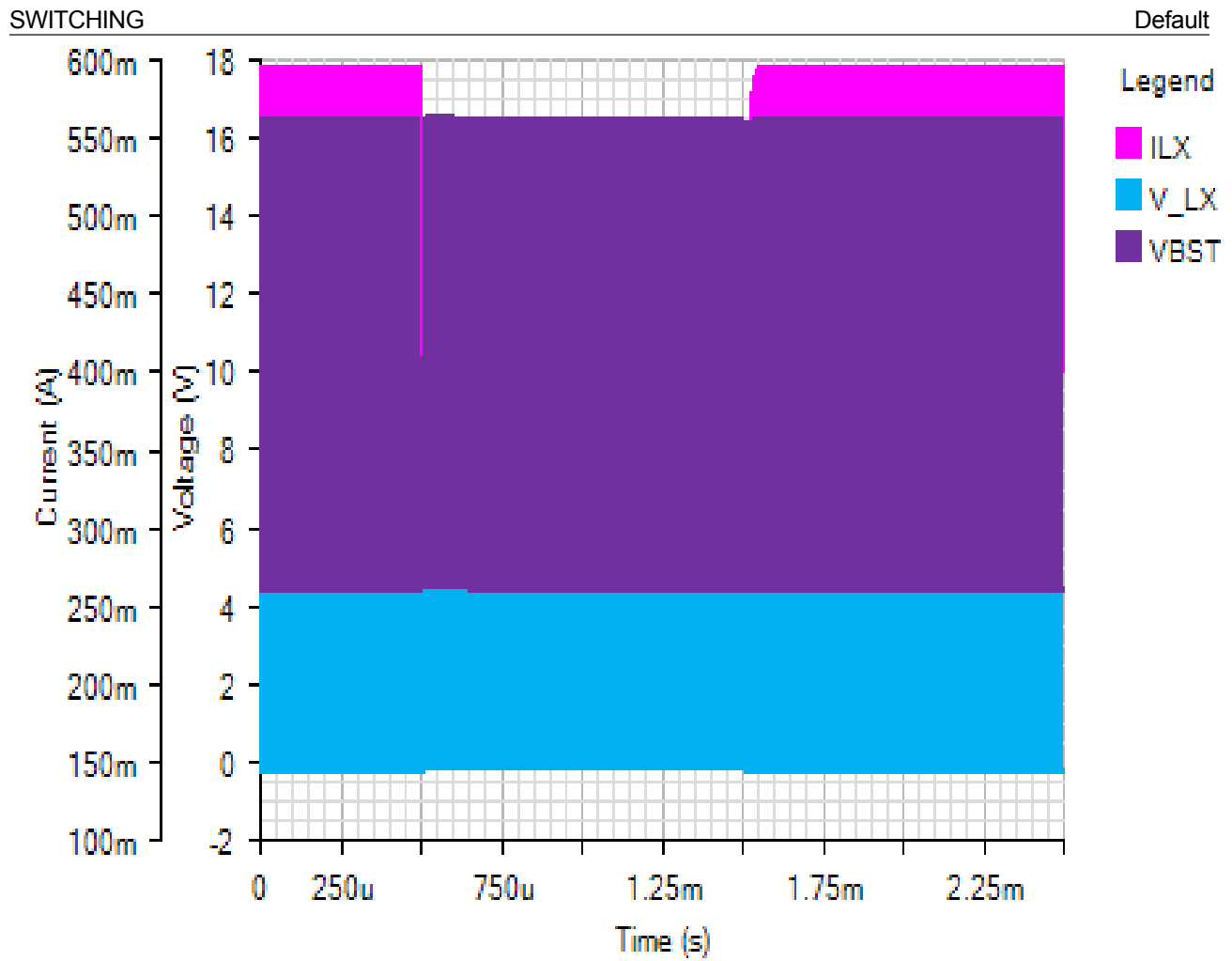
Default



INPUT

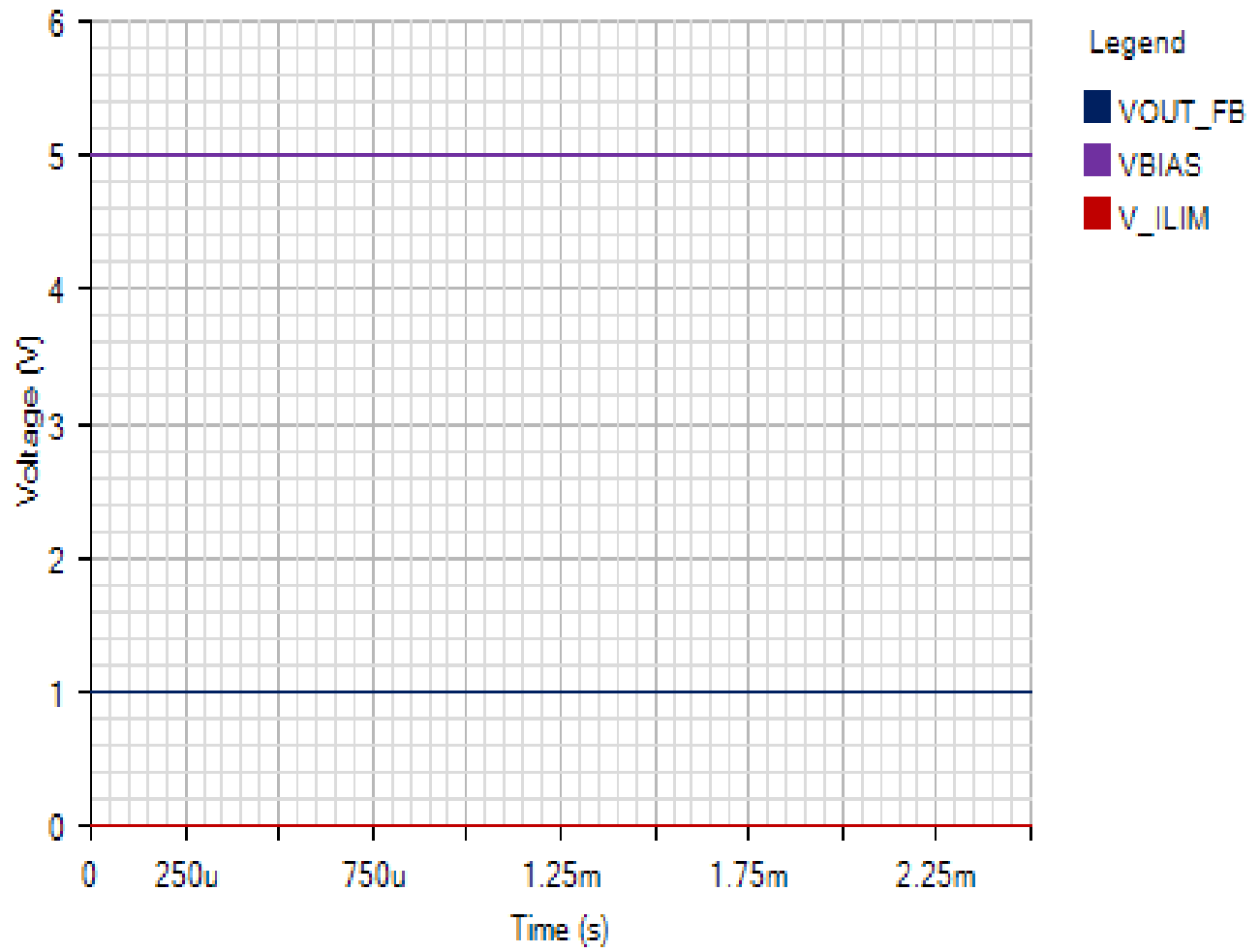
Default





IC

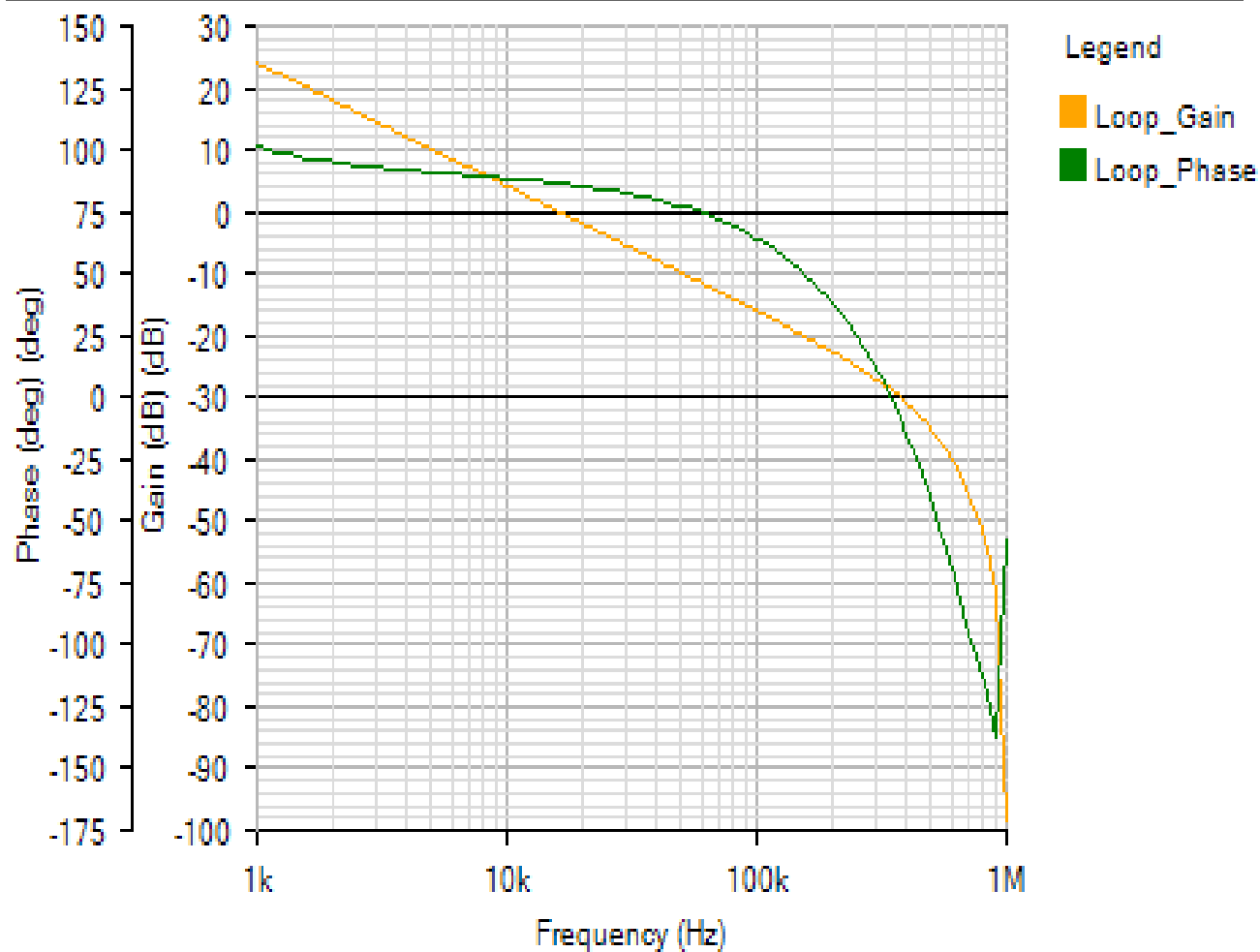
Default



AC Loop - Sun Nov 18 2018 17:49:31

BODE

Default



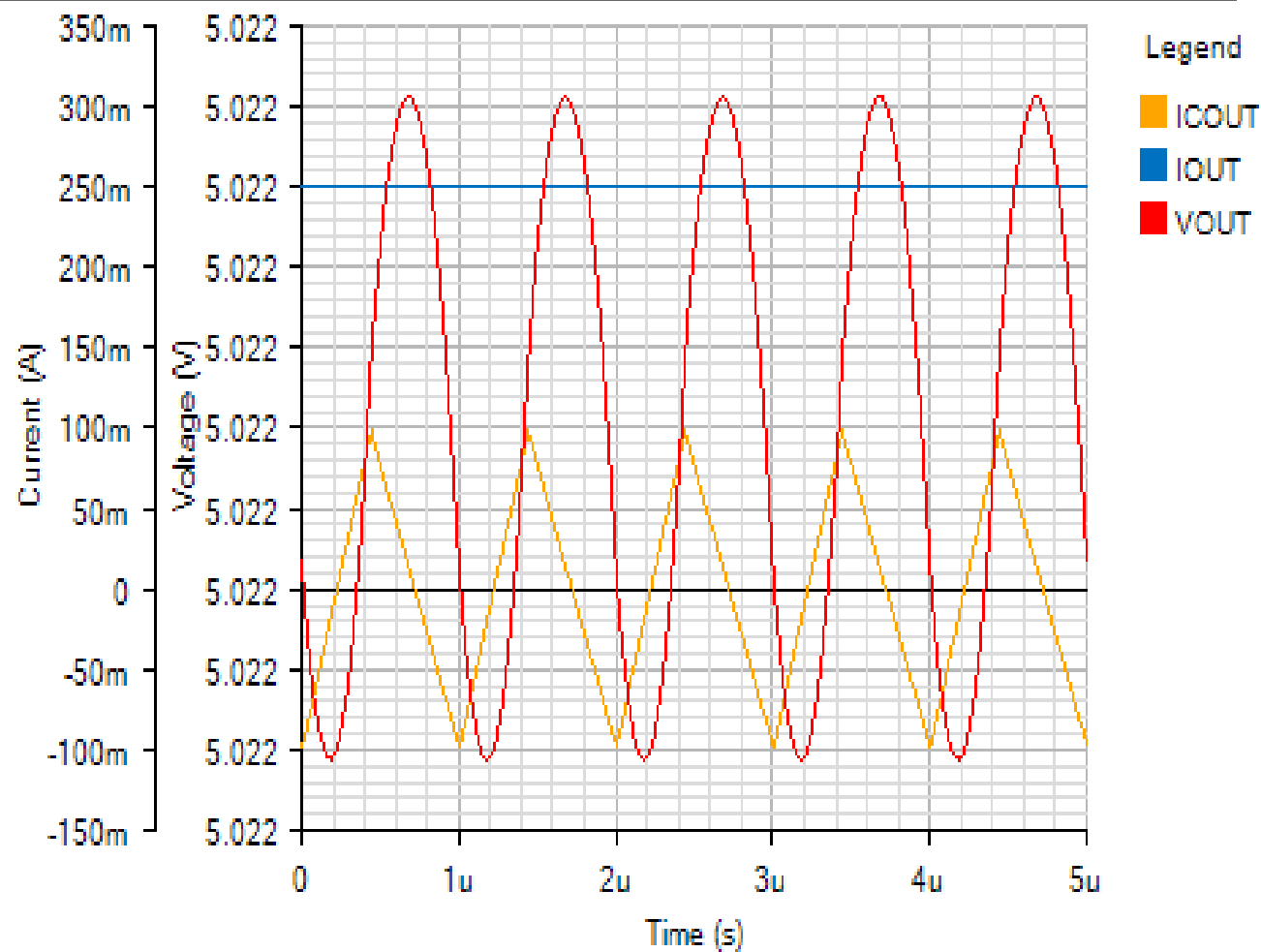
Phase Margin: 86.54° at a crossover frequency of 16.1kHz



Steady State - Sun Nov 18 2018 17:49:31

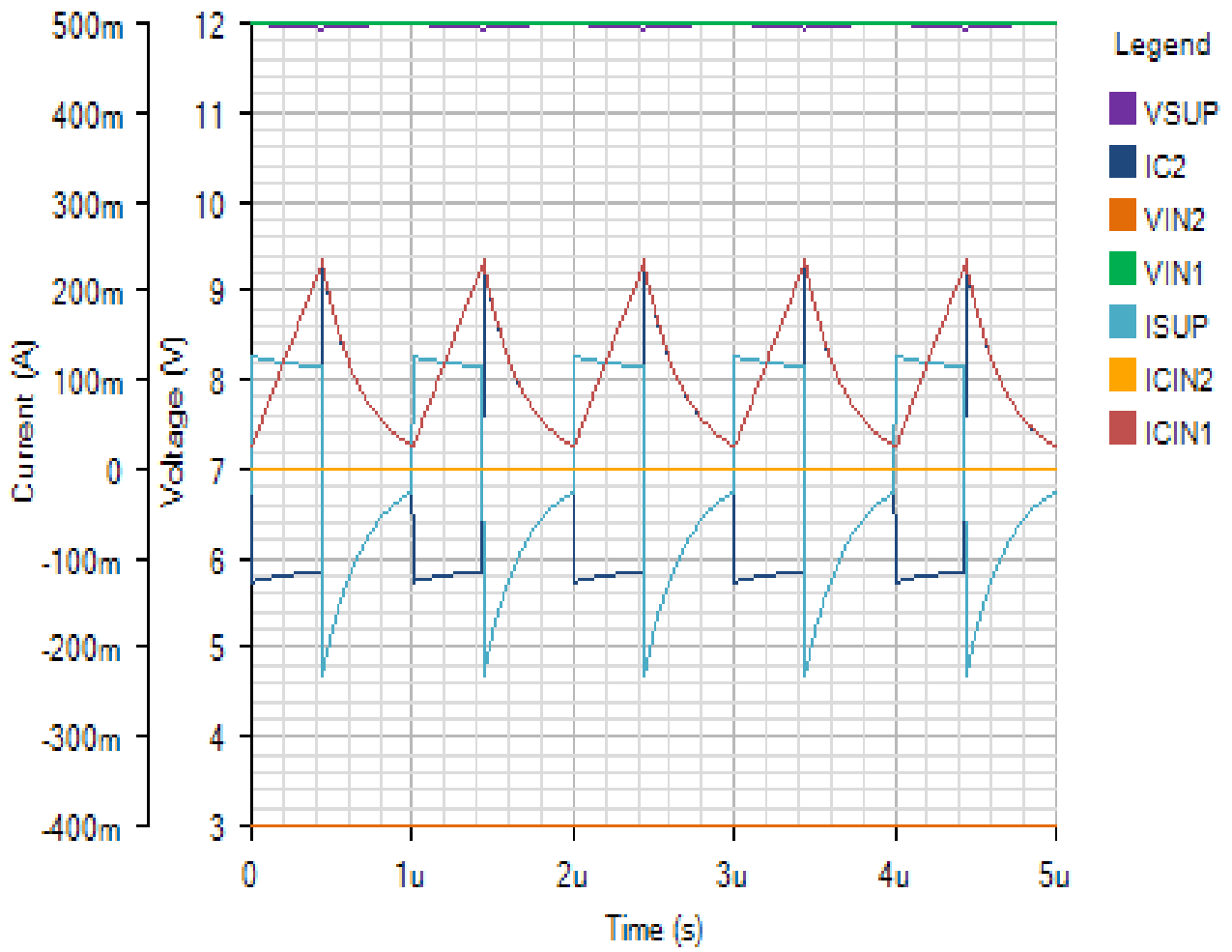
OUTPUT

Default



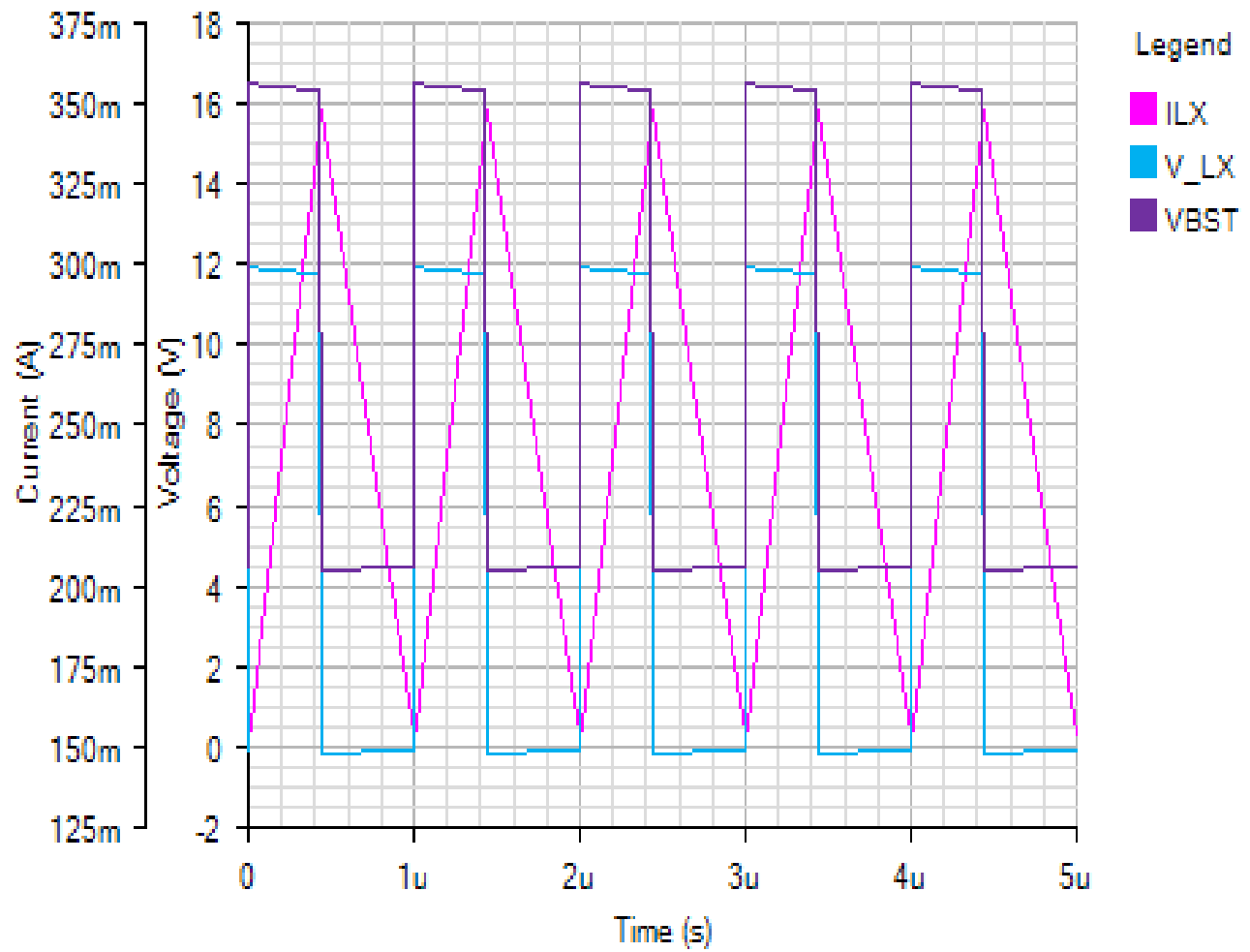
INPUT

Default



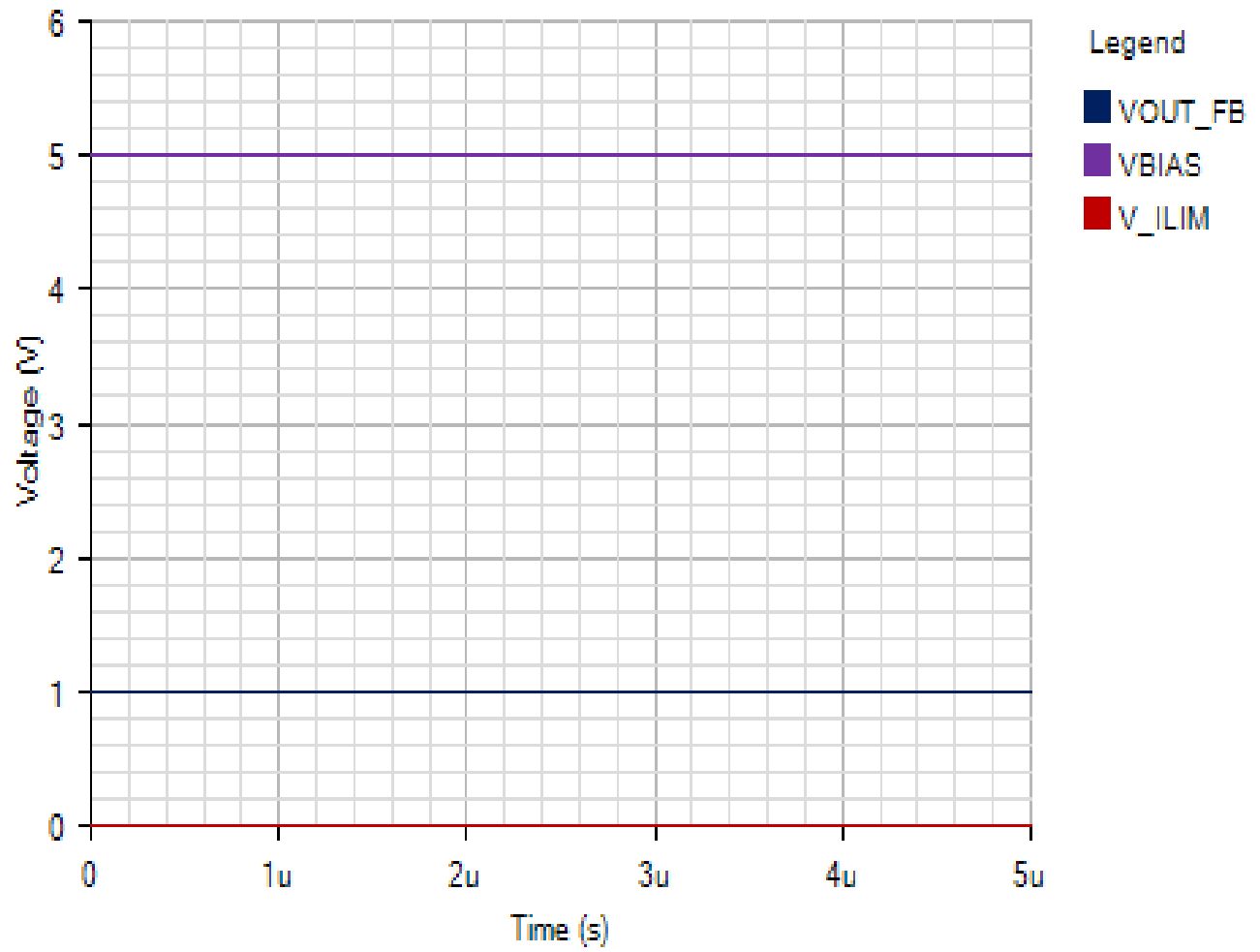
SWITCHING

Default



IC

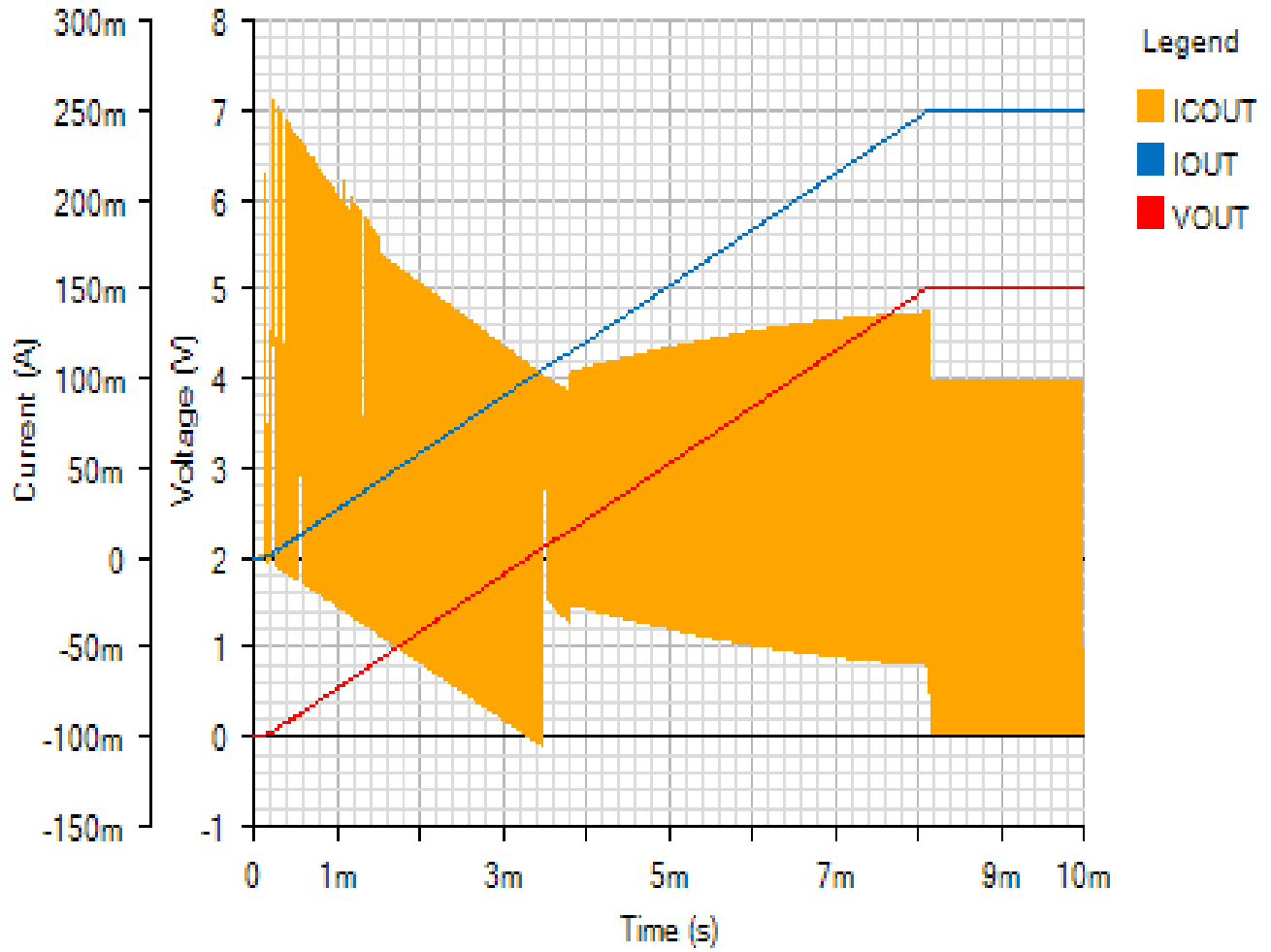
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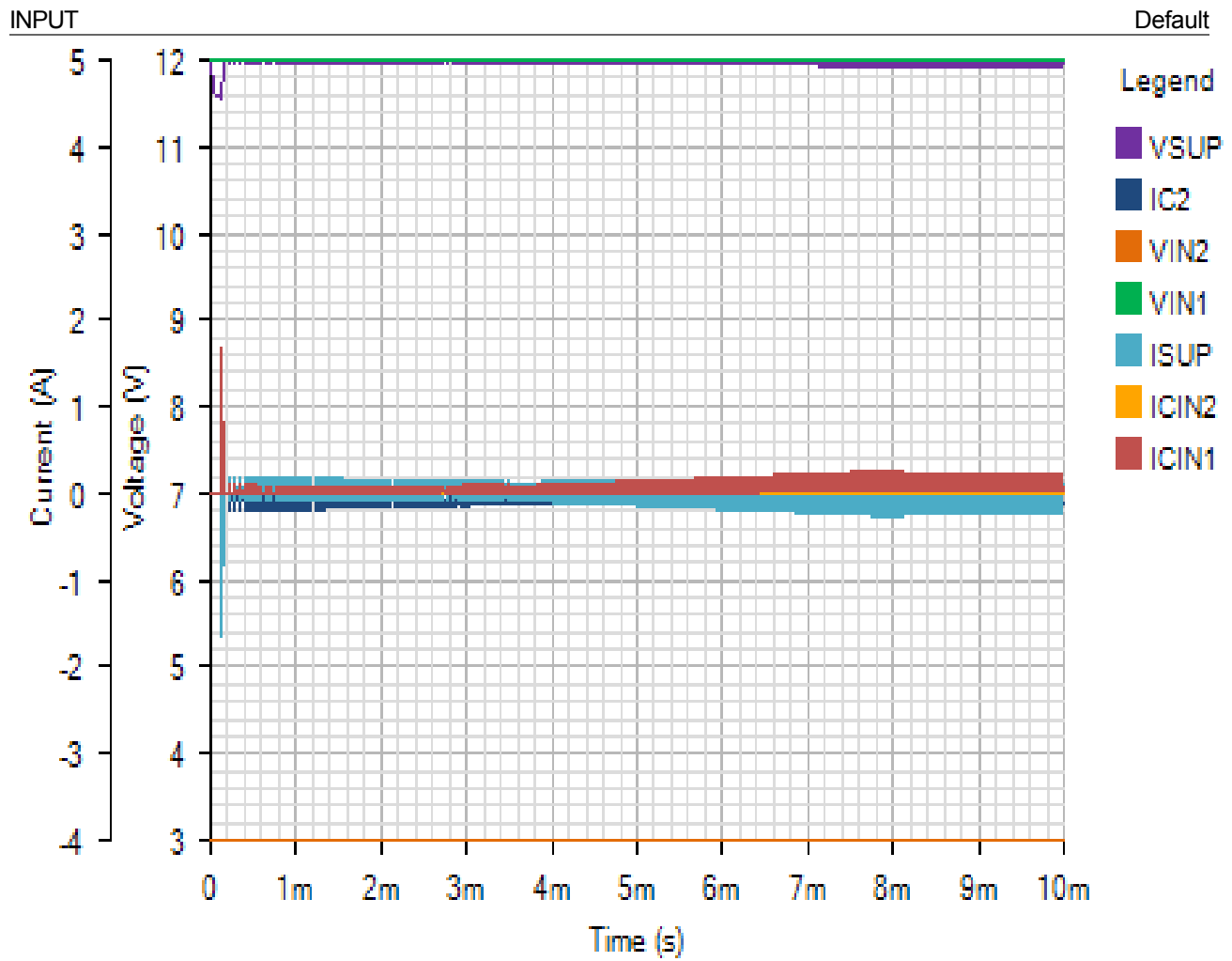


Start Up - Sun Nov 18 2018 17:49:31

OUTPUT

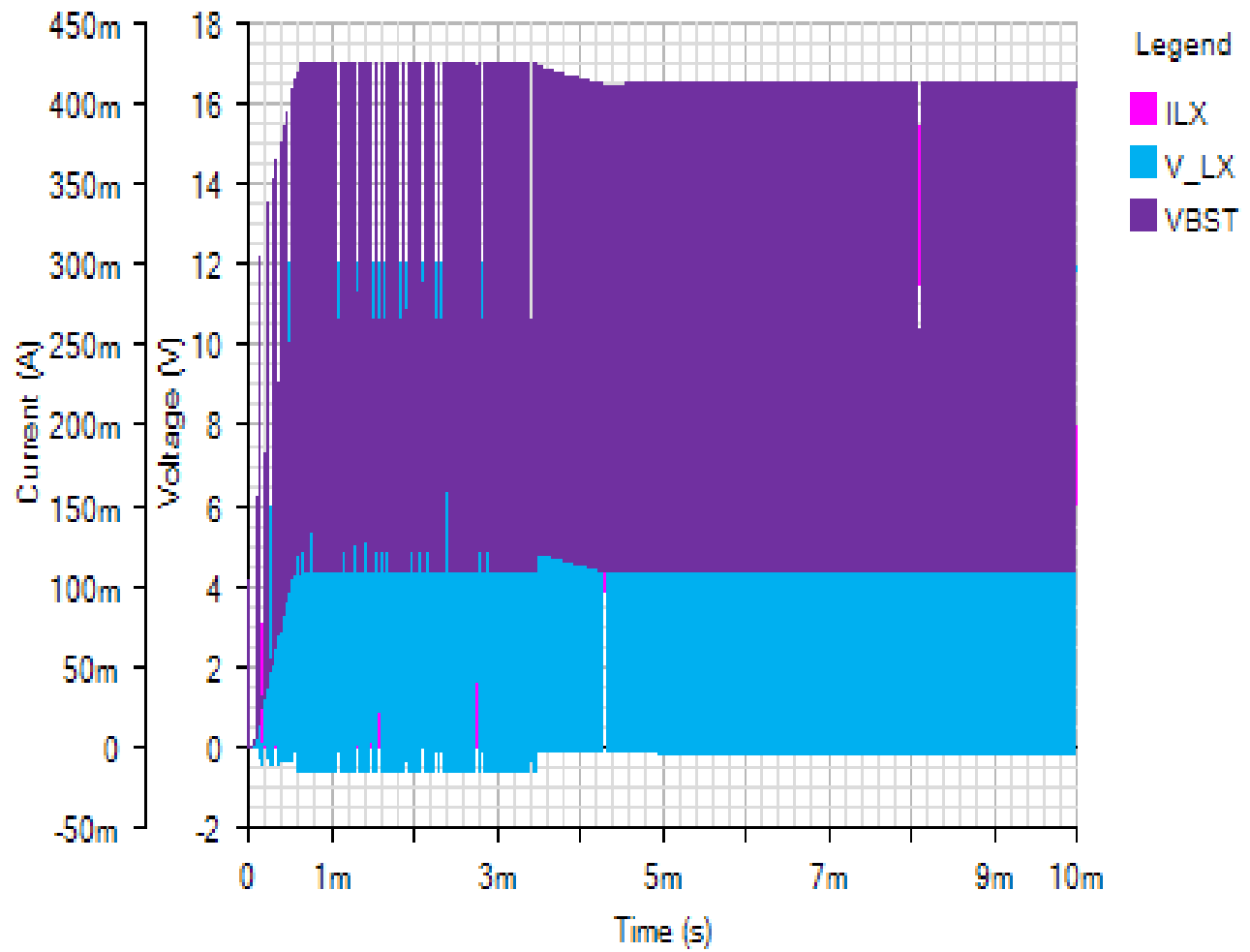
Default





SWITCHING

Default



IC

Default

