

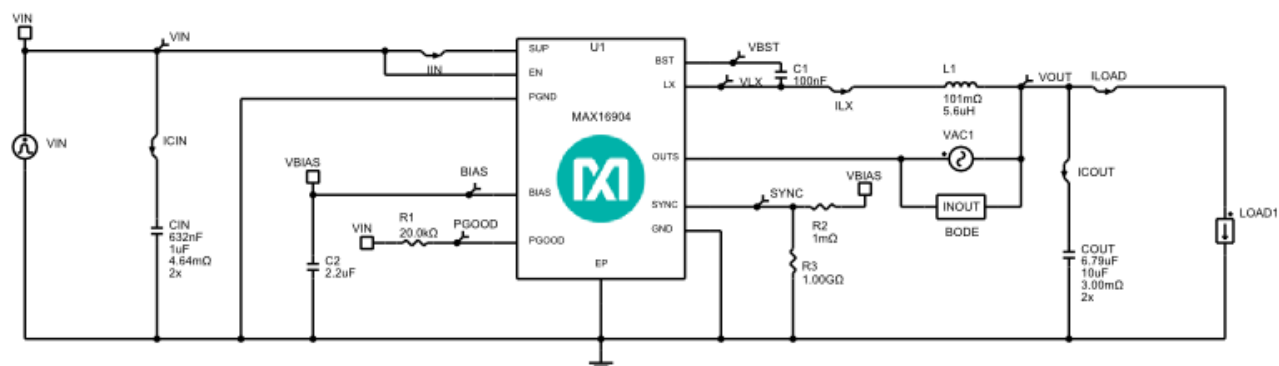
Initial Design

1.0

Design Requirements

Parameter	Value
Minimum Input Voltage	11.6V
Maximum Input Voltage	12.5V
Nominal Input Voltage	12V
Input Voltage Ripple	1%
Output Voltage	5V
Output Current	0.6A
Output Voltage Ripple	1%
Load Step Start Current	0.6A
Load Step Current	0.3A
Output Voltage Load Step Over/Undershoot	5%
Load Step Edge Rate	5A/us
Performance Priority	Balance Efficiency and Size
BOM Priority	Cost
Mode of Operation	Forced-PWM Mode
Switching Frequency	2100KHz
Package	TDFN
Automotive Qualified	Yes
Spread Spectrum	No
Ambient Temperature	25°C

Schematic



1. SKIP Mode - Connect SYNC I/O pin to GND or leave unconnected
2. FPWM Mode - Connect SYNC I/O pin to VBIAS
3. External PWM - Connect SYNC I/O pin to external clock

Note 1: When Skip mode is selected, AC Loop simulation may fail if the Load Current is low enough to engage Skip mode, because Skip mode is hysteretic and there is no AC Loop to measure

BOM

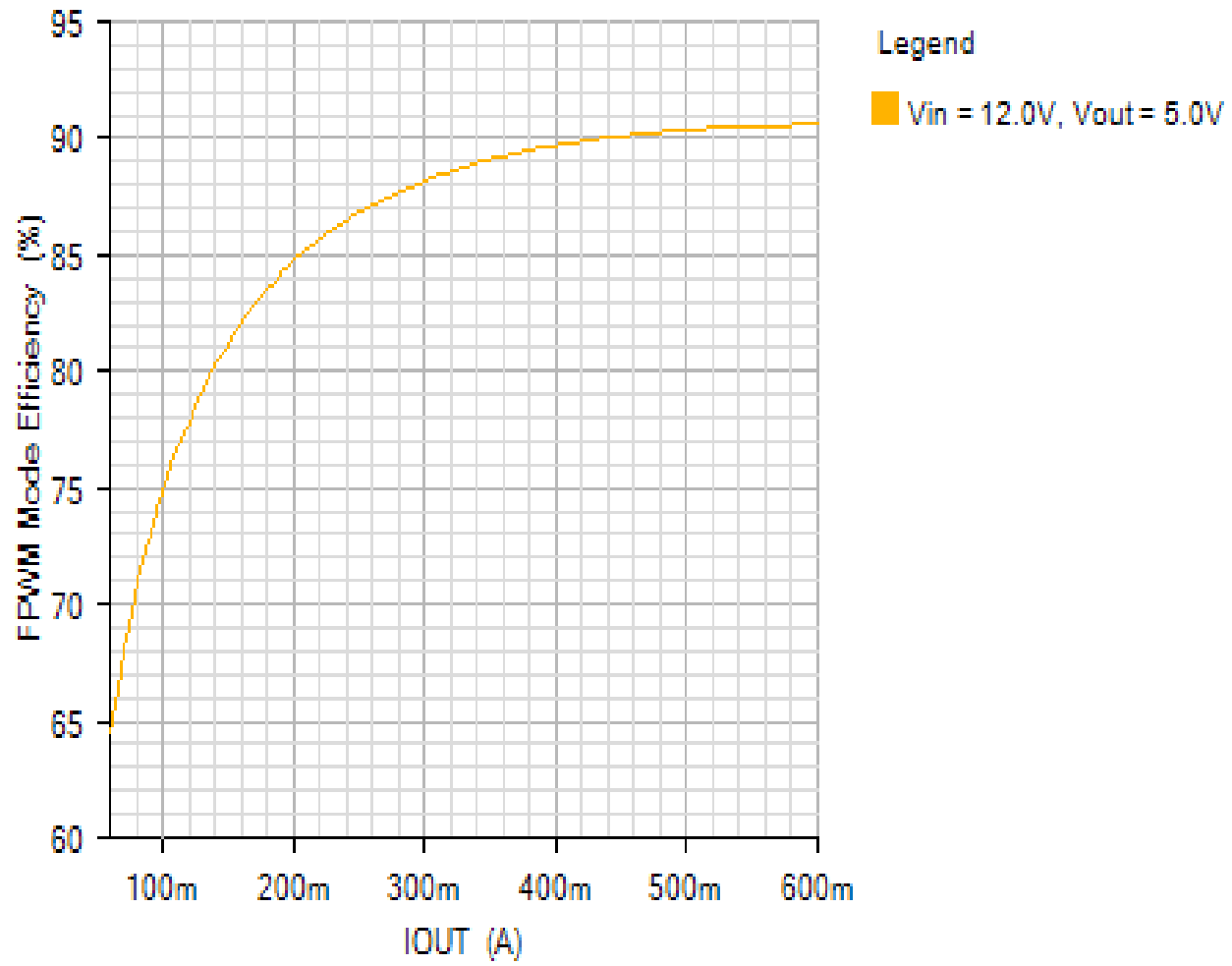
Ref	Qty	Part Number	Manufacturer	Description
U1	1	MAX16904RATB50/V+	User-Defined	IC
C1	1	0805YC104KAT2A	AVX	Cap Ceramic 0.1uF 16V X7R 10% Pad SMD 0805 125°C T/R
C2	1	CGA4J3X7R1C225K125AB	TDK	Cap Ceramic 2.2uF 16V X7R 10% Pad SMD 0805 125°C Automotive T/R
CIN	2	C1608X7R1V105K080AC	TDK	Cap Ceramic 1uF 35V X7R 10% SMD 0603 125C Paper T/R
COUT	2	GRM21BZ71E106KE15	Murata	Cap Ceramic 10uF 25V 0805 125C
L1	1	SD43-562MLB	Coilcraft	Inductor 5.6uH 20% 90.9mOhm 2.5A Isat 2.8A Irms
R1	1	ERJ3GEYJ203V	Panasonic	Res Thick Film 0603 20K Ohm 5% 0.1W(1/10W) ±200ppm/°C Pad SMD Automotive T/R

Simulation Results

Efficiency - Mon Nov 19 2018 13:30:51

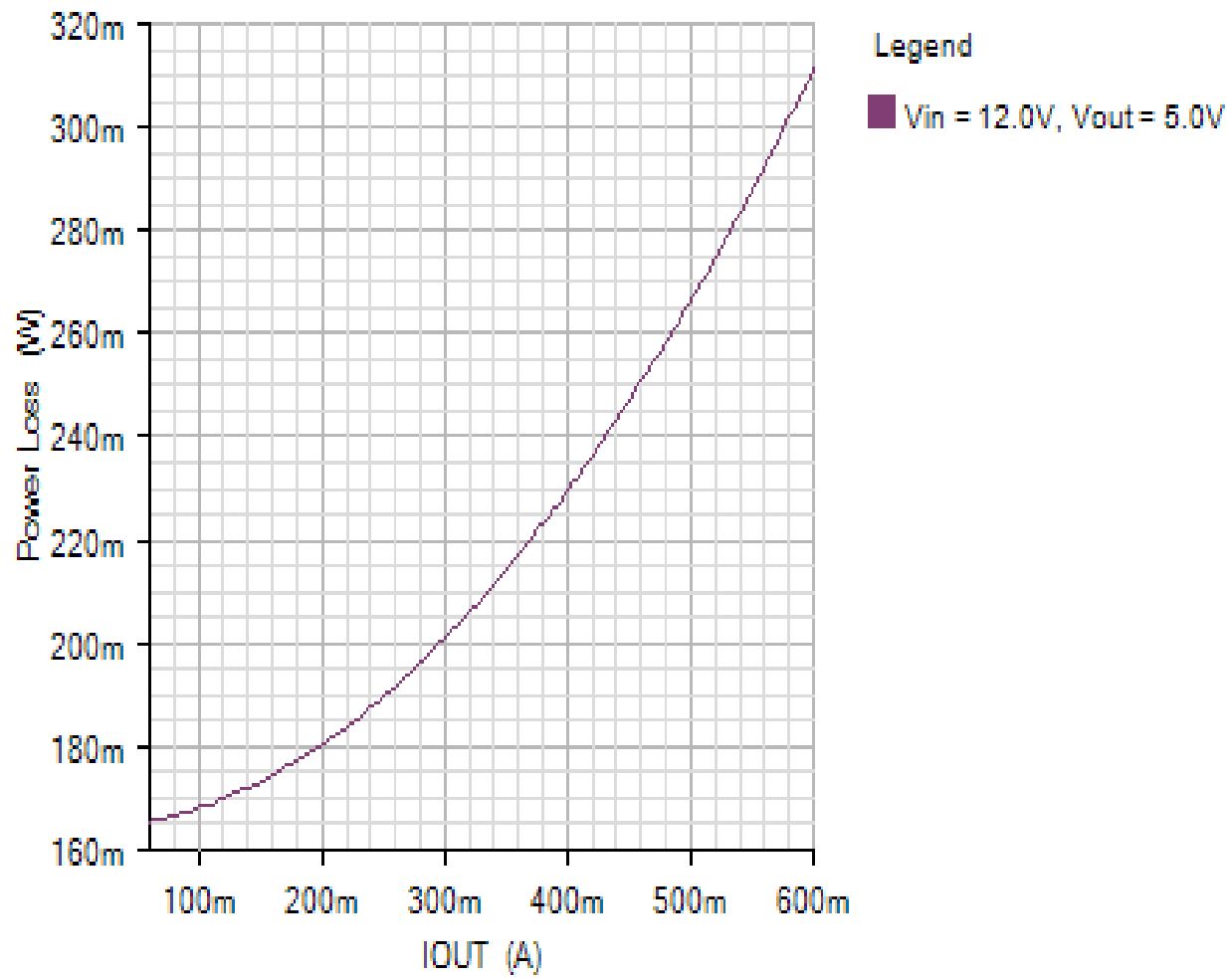
EFFICIENCY_PLOT

Default



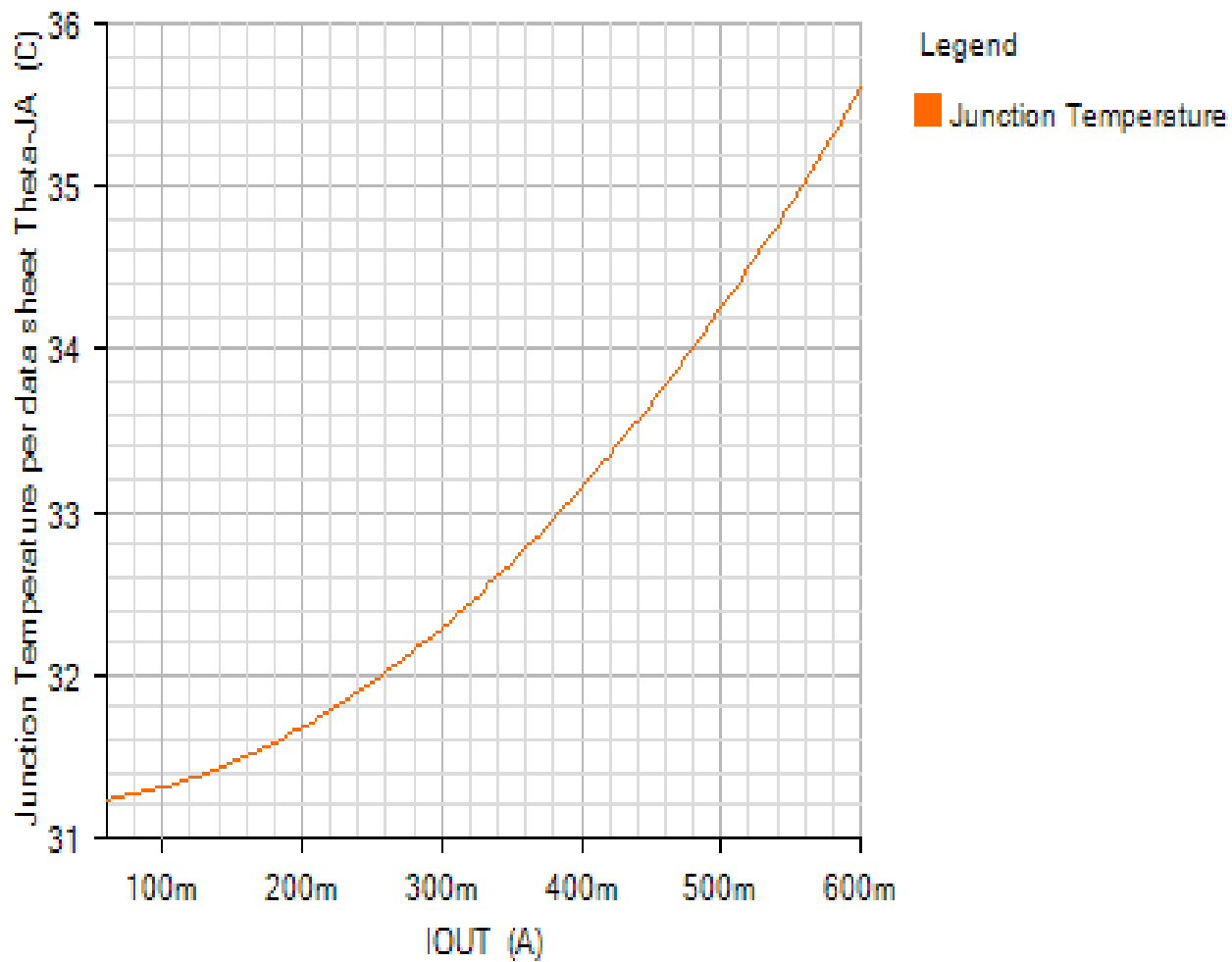
POWER_LOSS_PLOT

Default

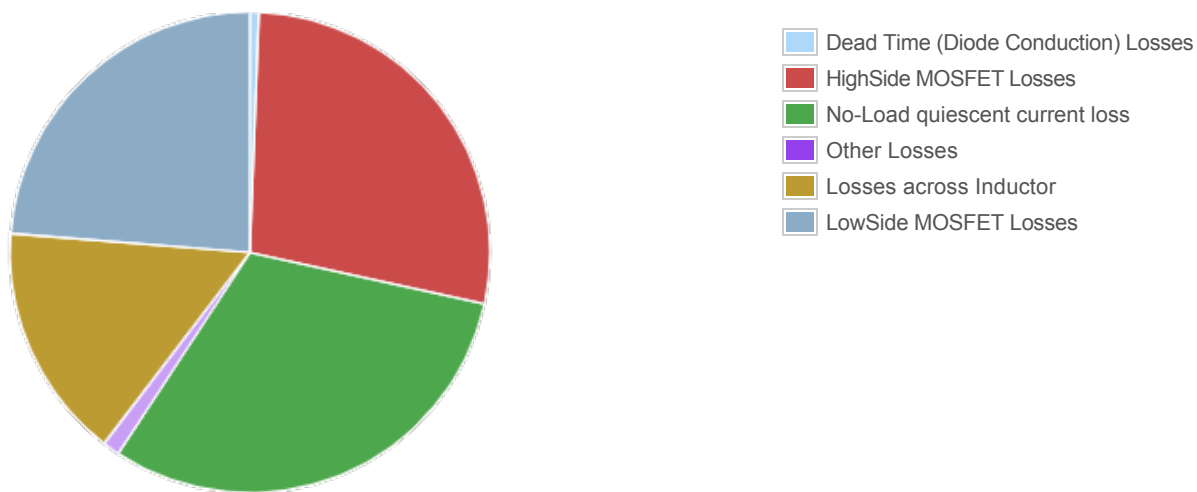


JUNCTION_TEMPERATURE_PLOT

Default



Losses



Component

Loss (W)

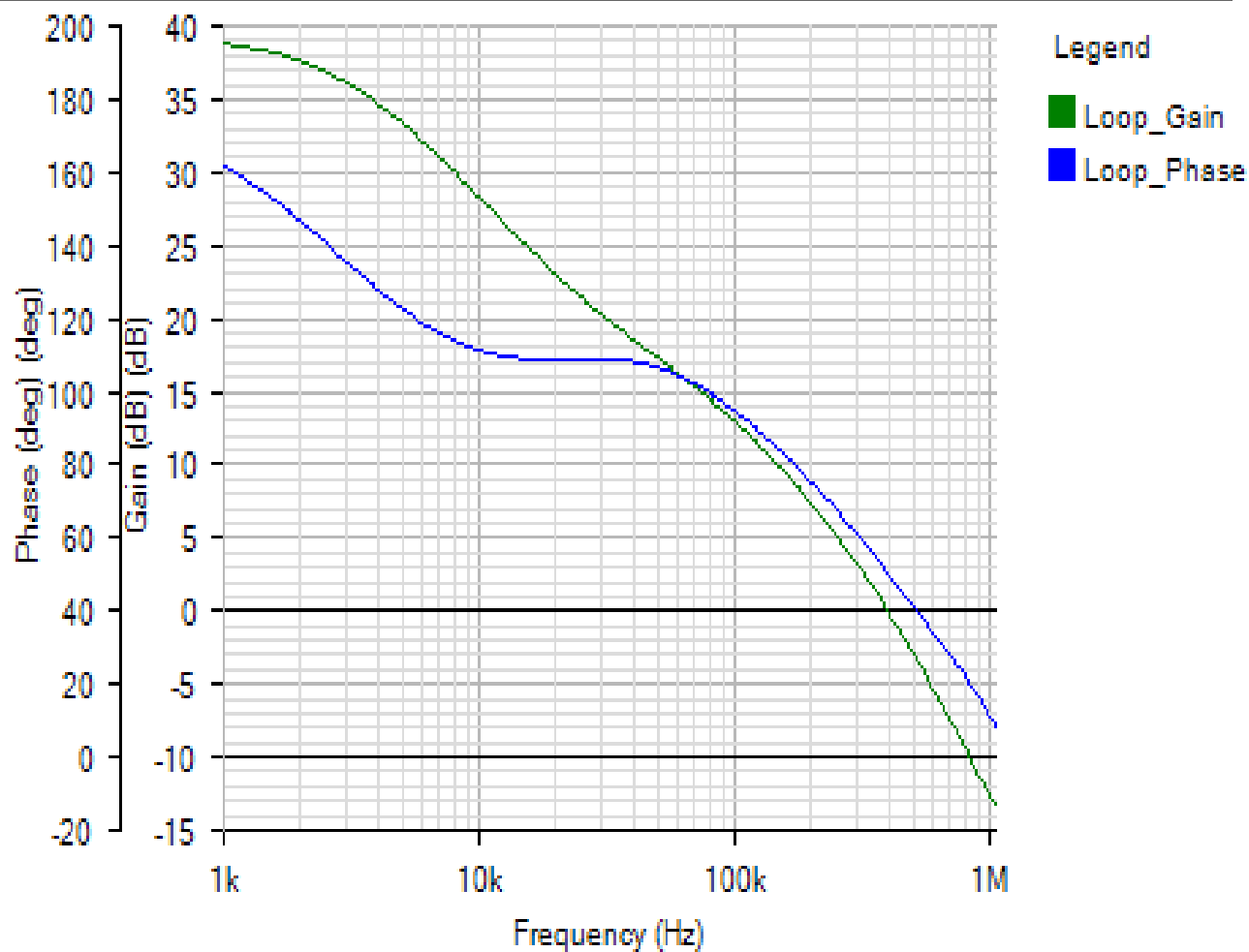
% of total

Component	Loss (W)	% of total
Dead Time (Diode Conduction) Losses	0.001823	0.6
HighSide MOSFET Losses	0.086759	27.8
No-Load quiescent current loss	0.096	30.8
Other Losses	0.003651	1.2
Losses across Inductor	0.049382	15.8
LowSide MOSFET Losses	0.074018	23.8
Total	0.311634	100

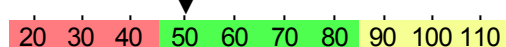
AC Loop - Mon Nov 19 2018 13:30:51

BODE

Default



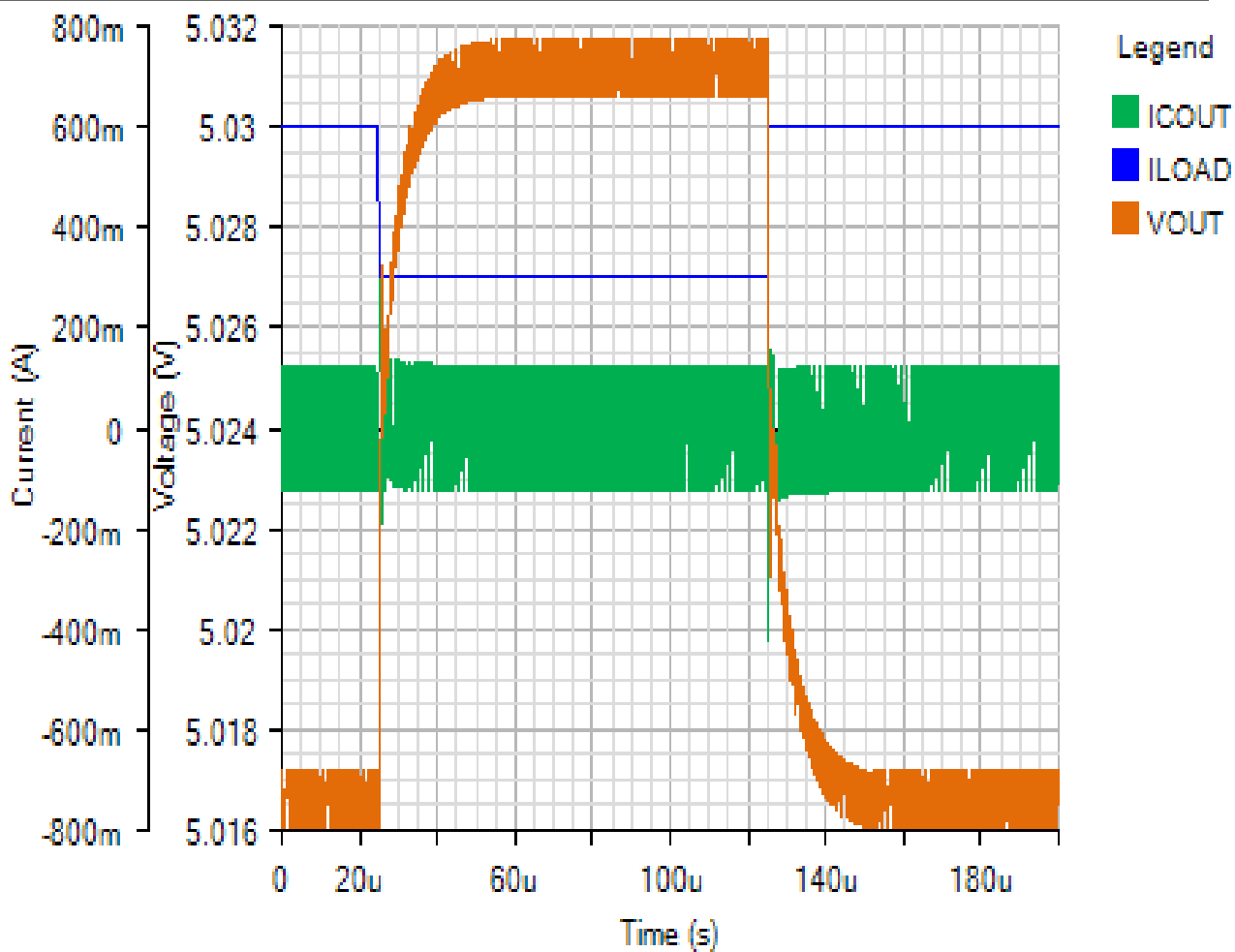
Phase Margin: 50.2° at a crossover frequency of 398.4kHz



Load Step - Mon Nov 19 2018 13:30:51

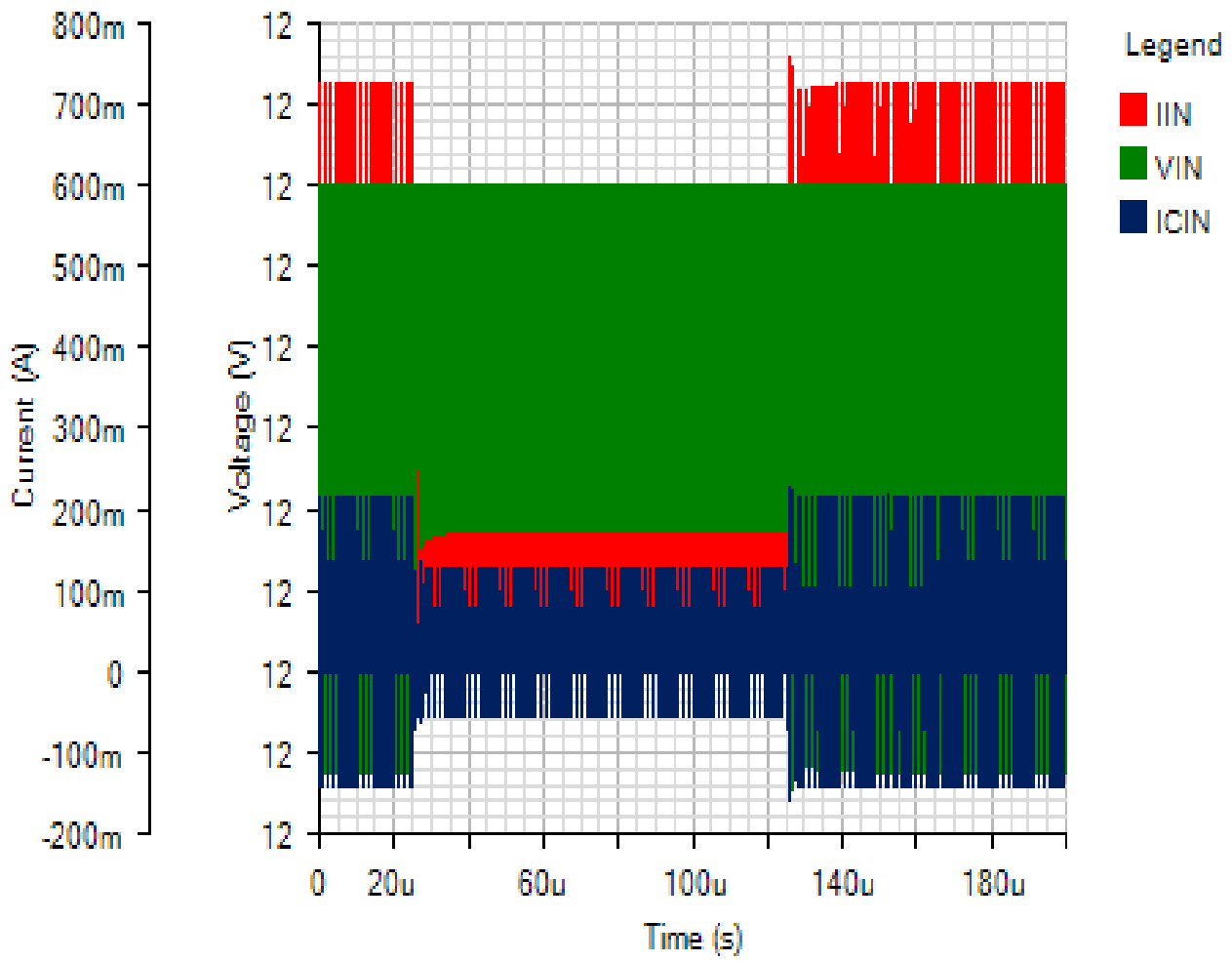
OUTPUT

Default



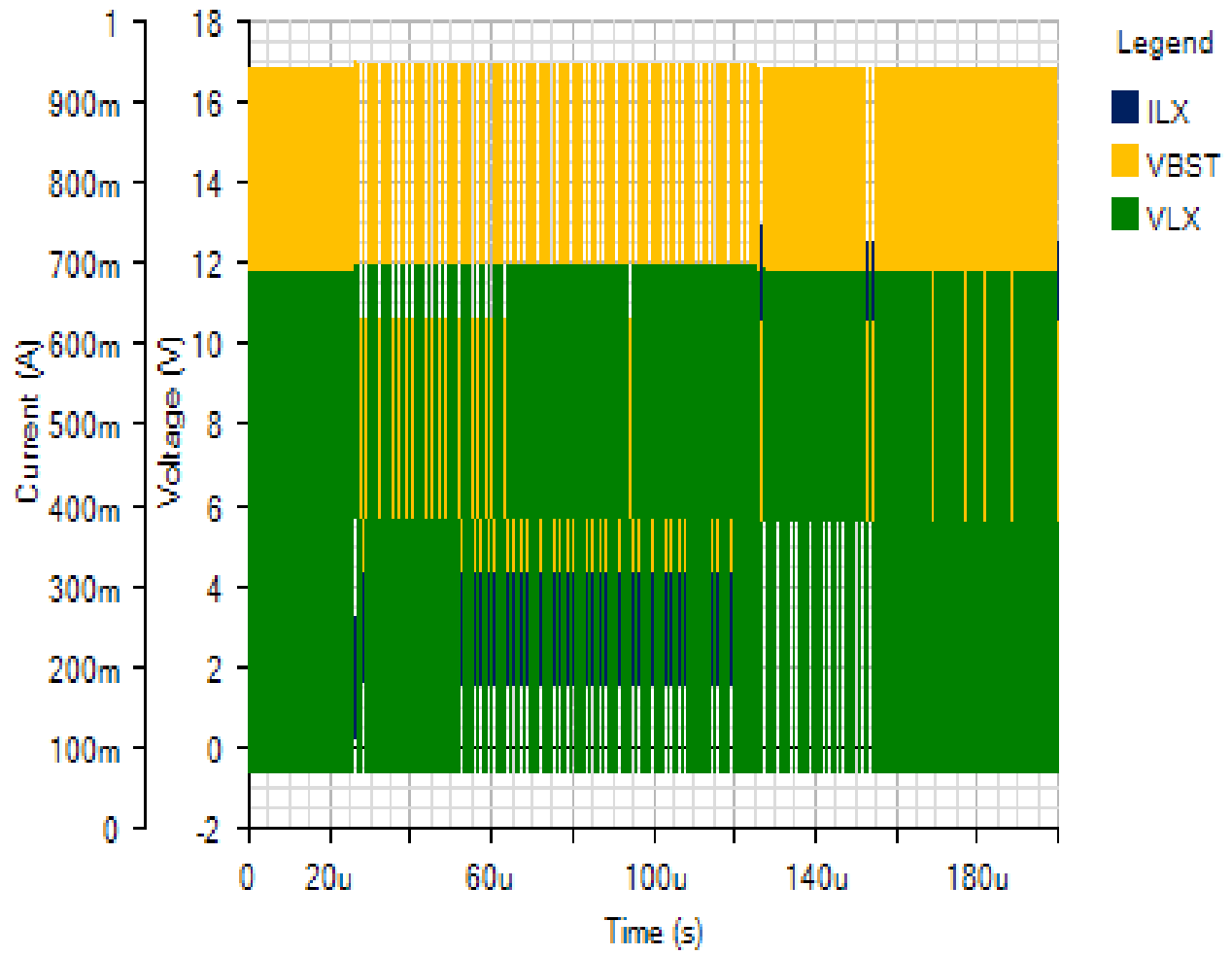
INPUT

Default



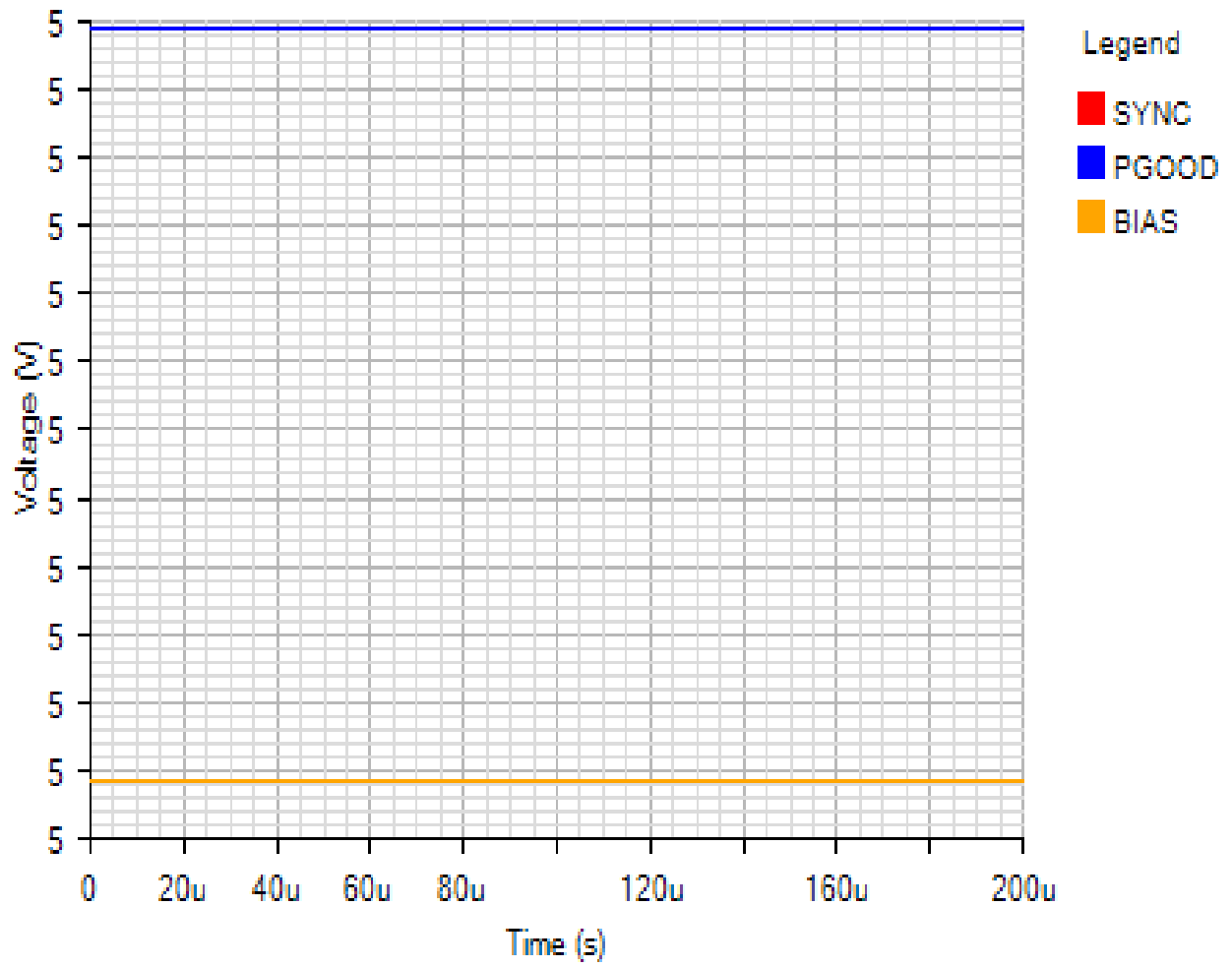
SWITCHING

Default

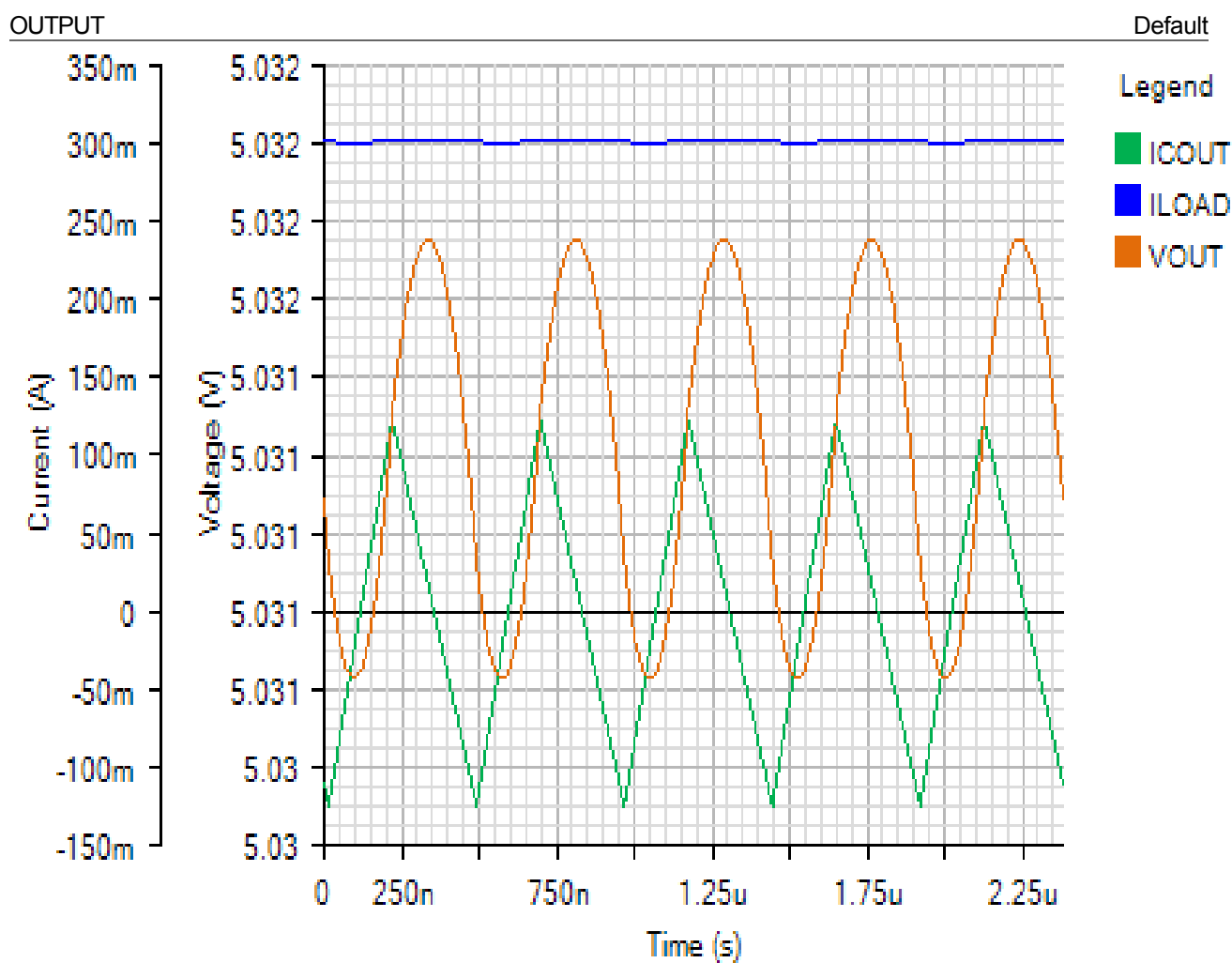


IC

Default

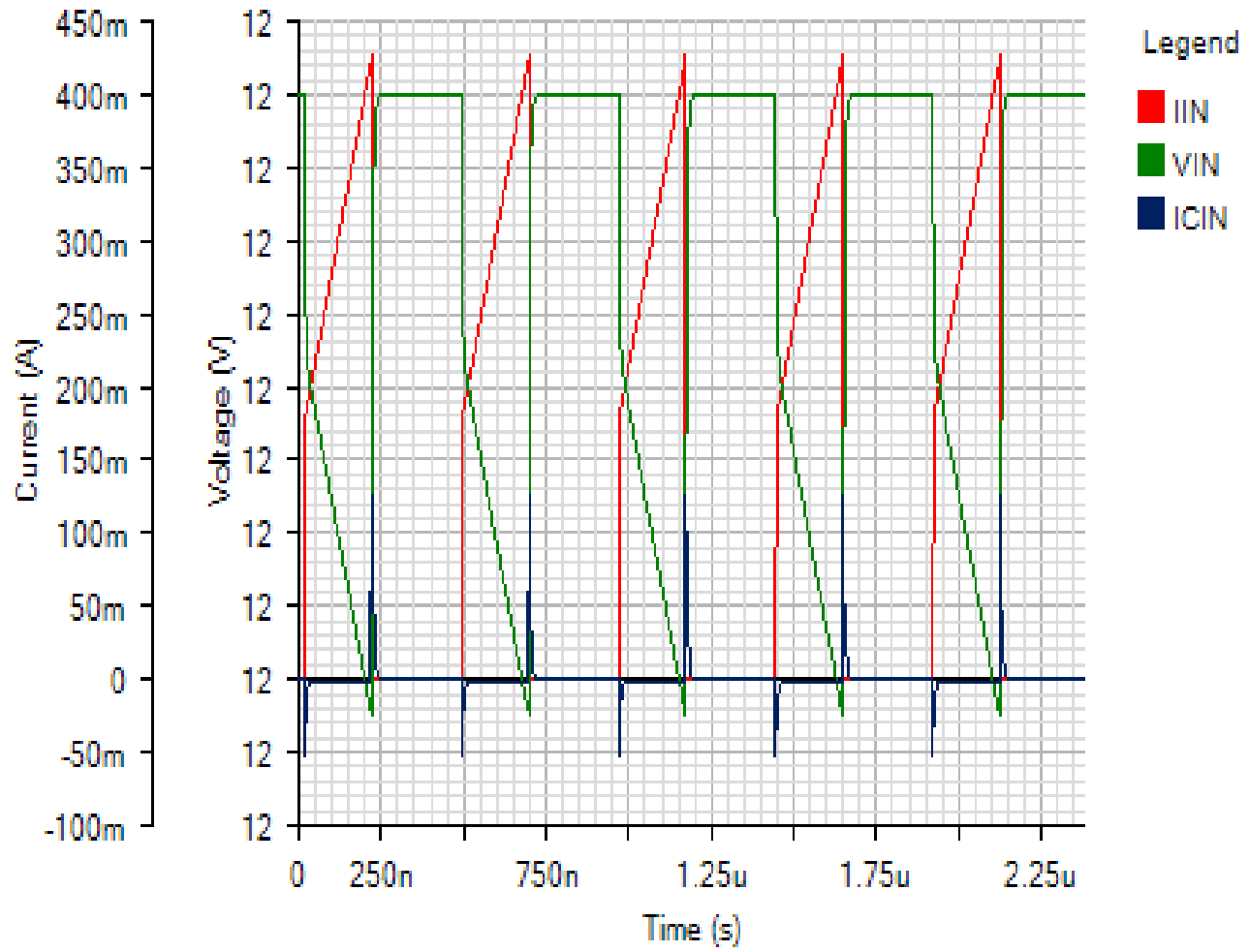


Steady State - Mon Nov 19 2018 13:30:51



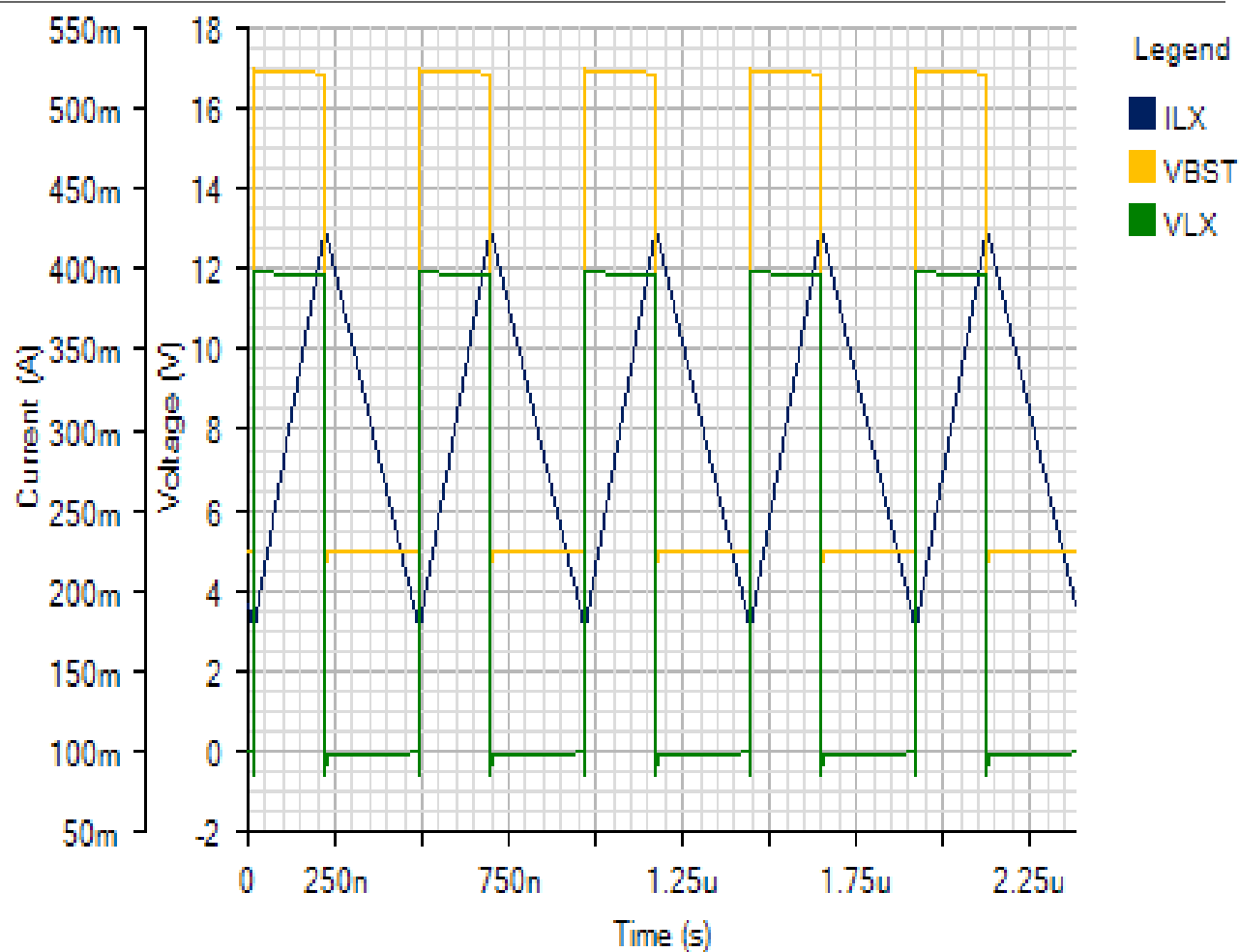
INPUT

Default



SWITCHING

Default



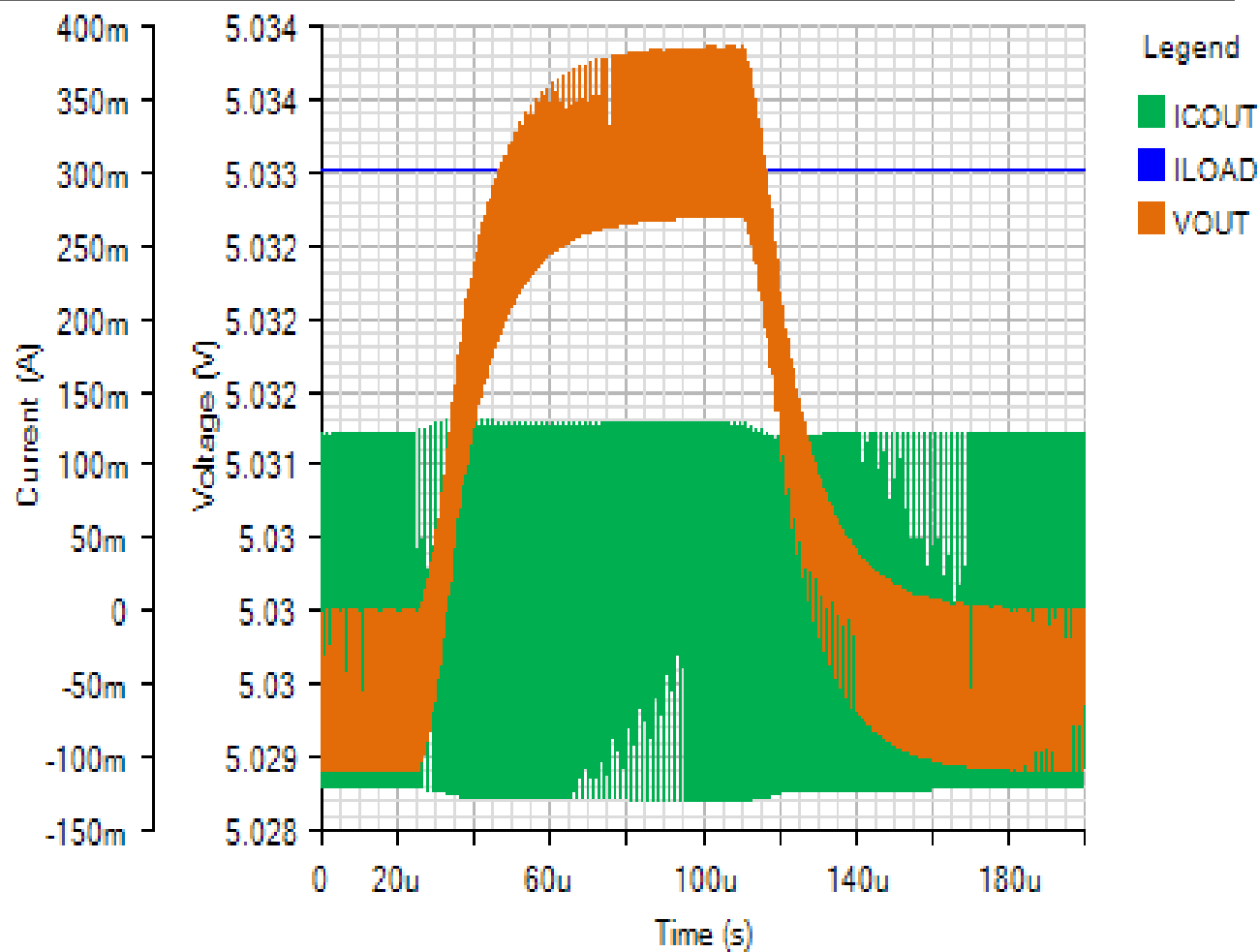
Default



Line Transient - Mon Nov 19 2018 13:30:51

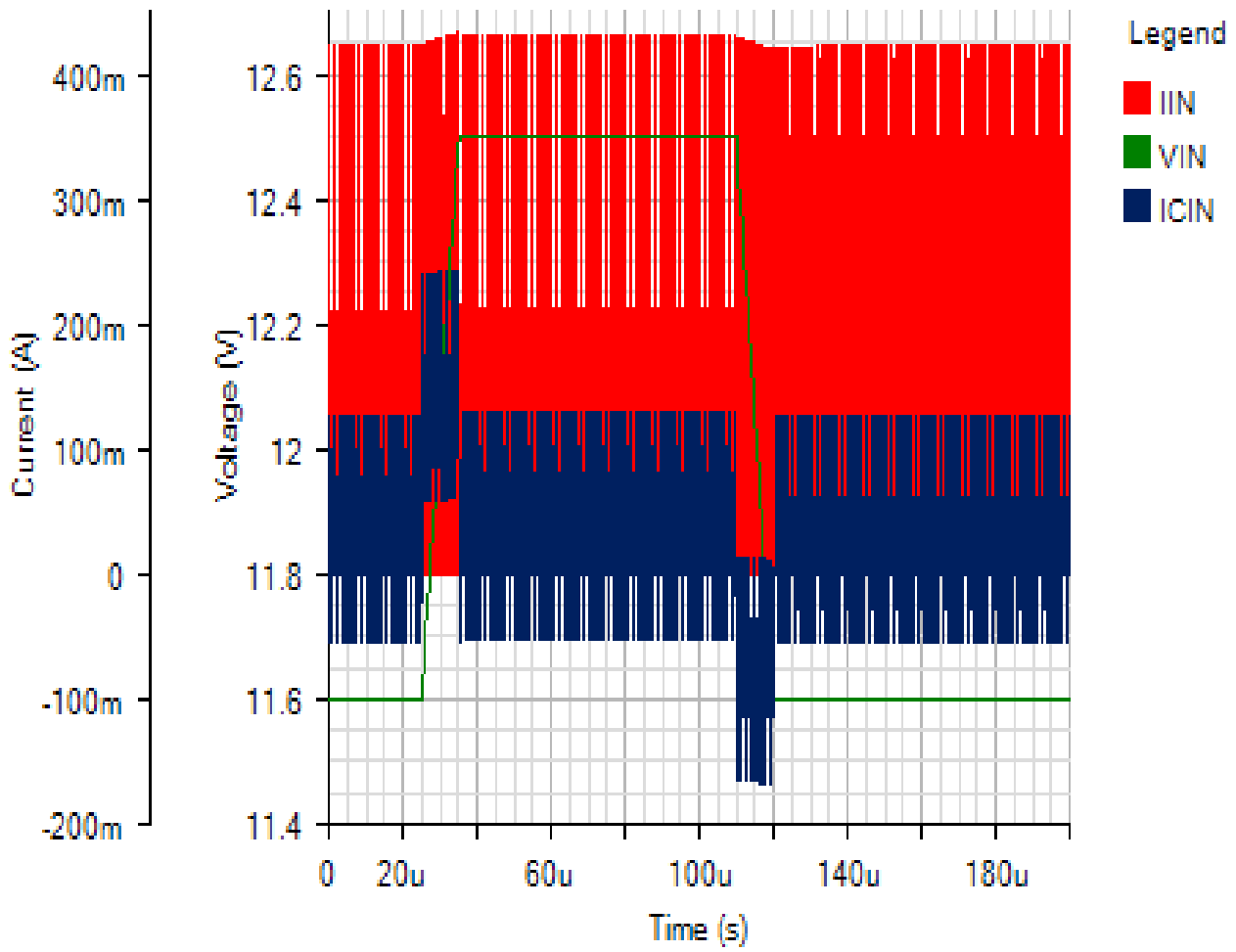
OUTPUT

Default



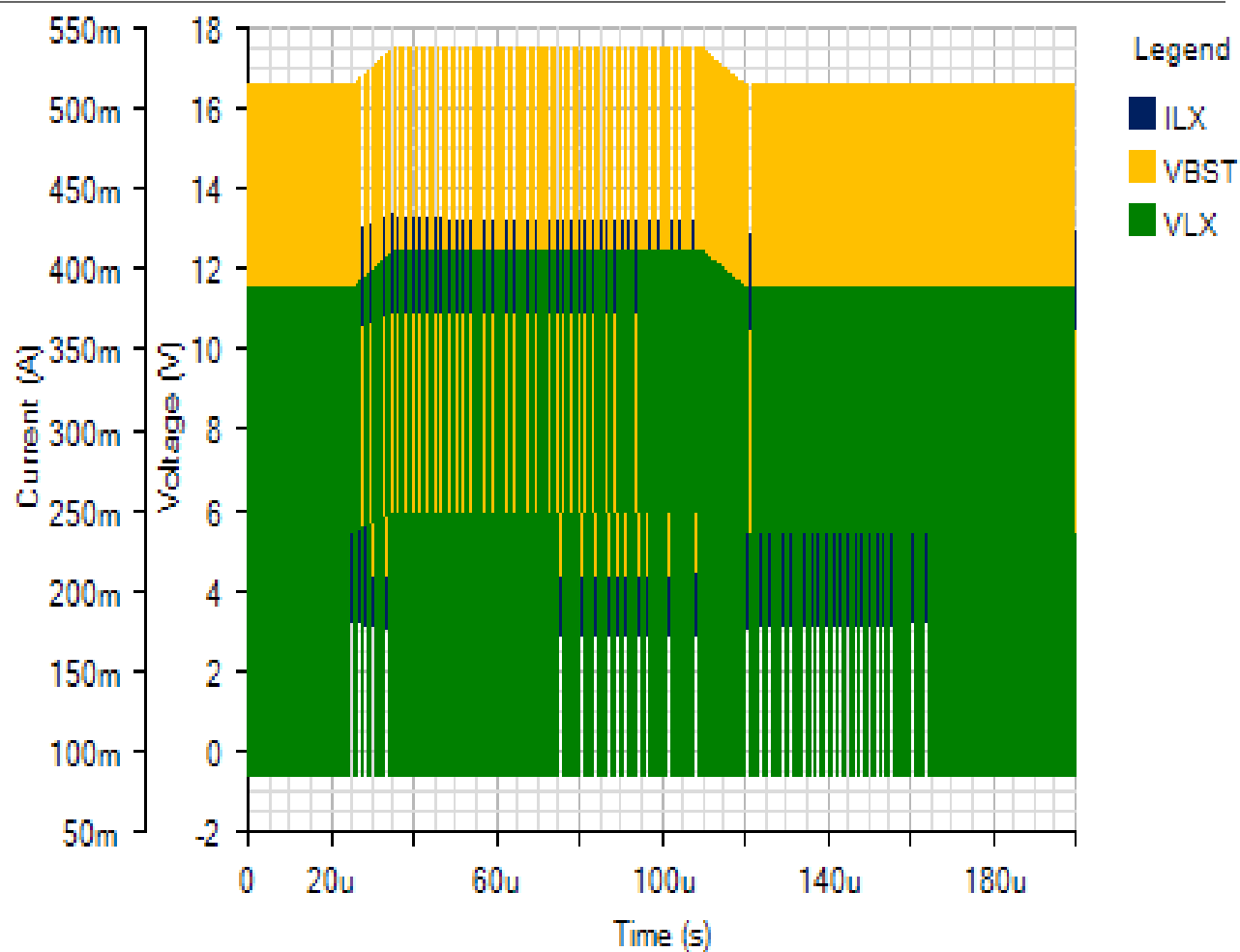
INPUT

Default



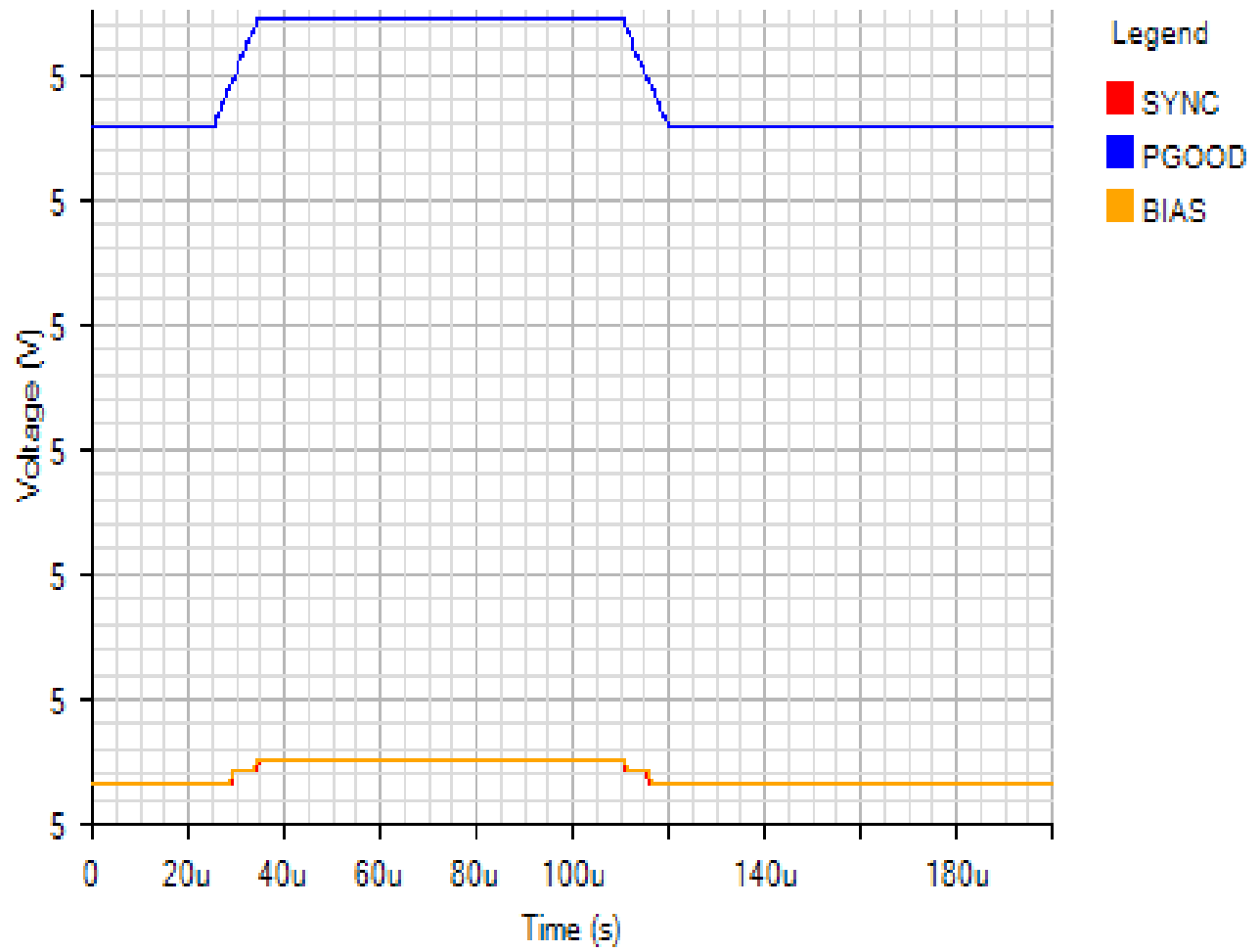
SWITCHING

Default



IC

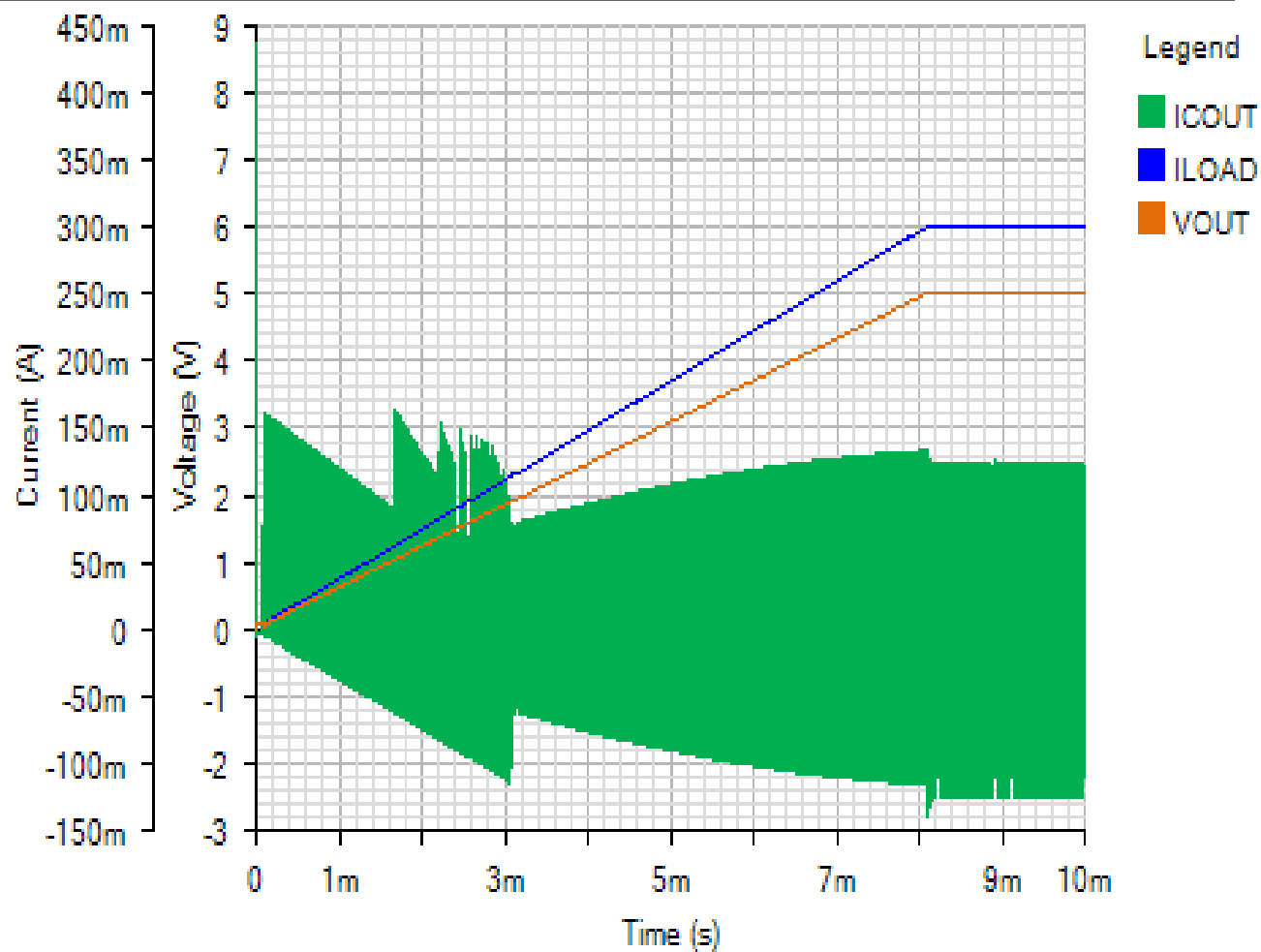
Default



Start Up - Mon Nov 19 2018 13:30:51

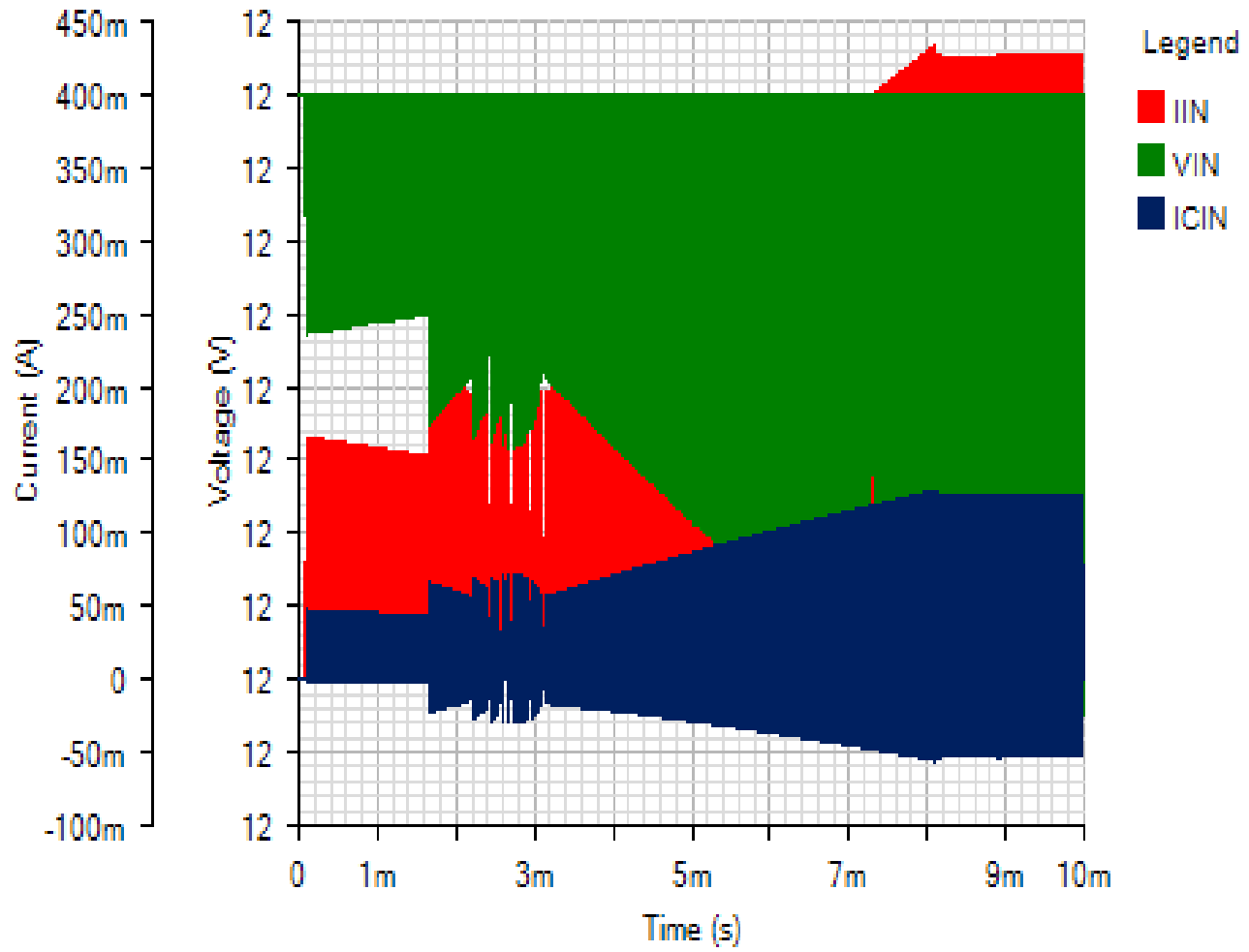
OUTPUT

Default



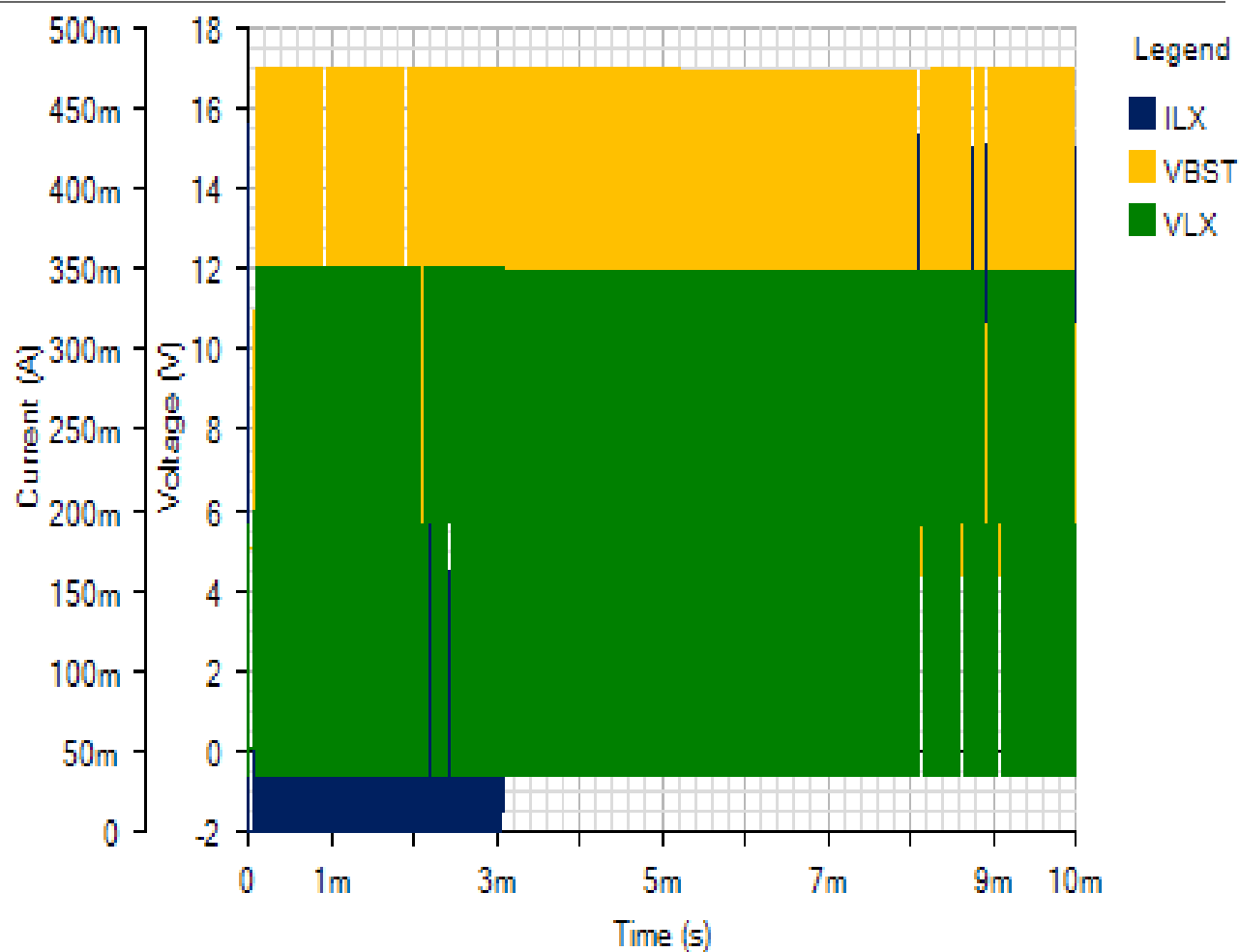
INPUT

Default



SWITCHING

Default



IC

Default

