

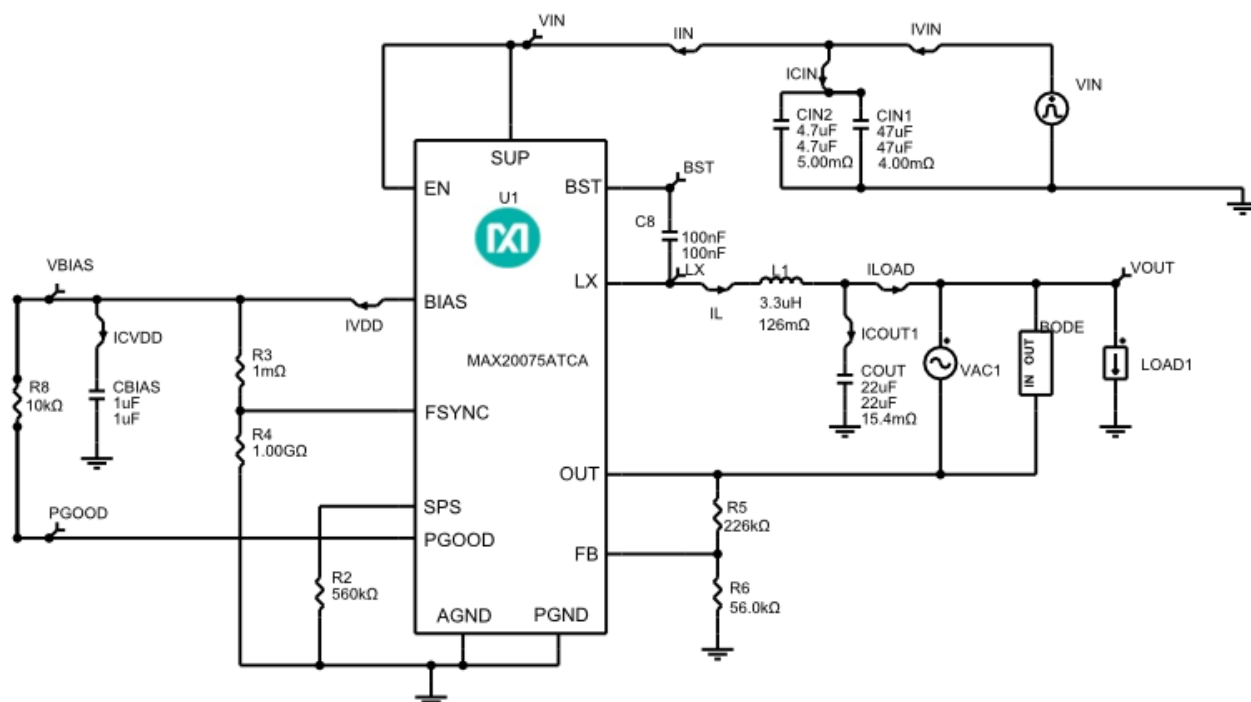
Initial Design

1.0

Design Requirements

Parameter	Value
Minimum Input Voltage	6V
Maximum Input Voltage	18V
Nominal Input Voltage	14V
Input Voltage Ripple	1%
Output Voltage Control	External Resistive Divider
Output Voltage	5V
Output Current	0.5A
Load Step Start Current	0.25A
Load Step Current	0.5A
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	2100000KHz
Inductor Current Ratio (LIR)	0.3
Ambient Temperature	25°C

Schematic



SYNC IMPLEMENTATION

For internal clock frequency:
 SYNC tied HIGH = FPWM
 SYNC tied LOW = SKIP

For external clock frequency:
MODEL ONLY: float SYNC and enter desired frequency using FOSC parameter.
(No external source needed for model)

POP SIMULATION FAILURES

If current level (starting current for Load Steps) is too low, AC, Steady State and Load Step analyses may fail in SKIP mode.
ie simulations may also fail in the Extended Input Voltage Range (VIN=18V or approaching dropout). For this range please see the datasheet for detailed description.

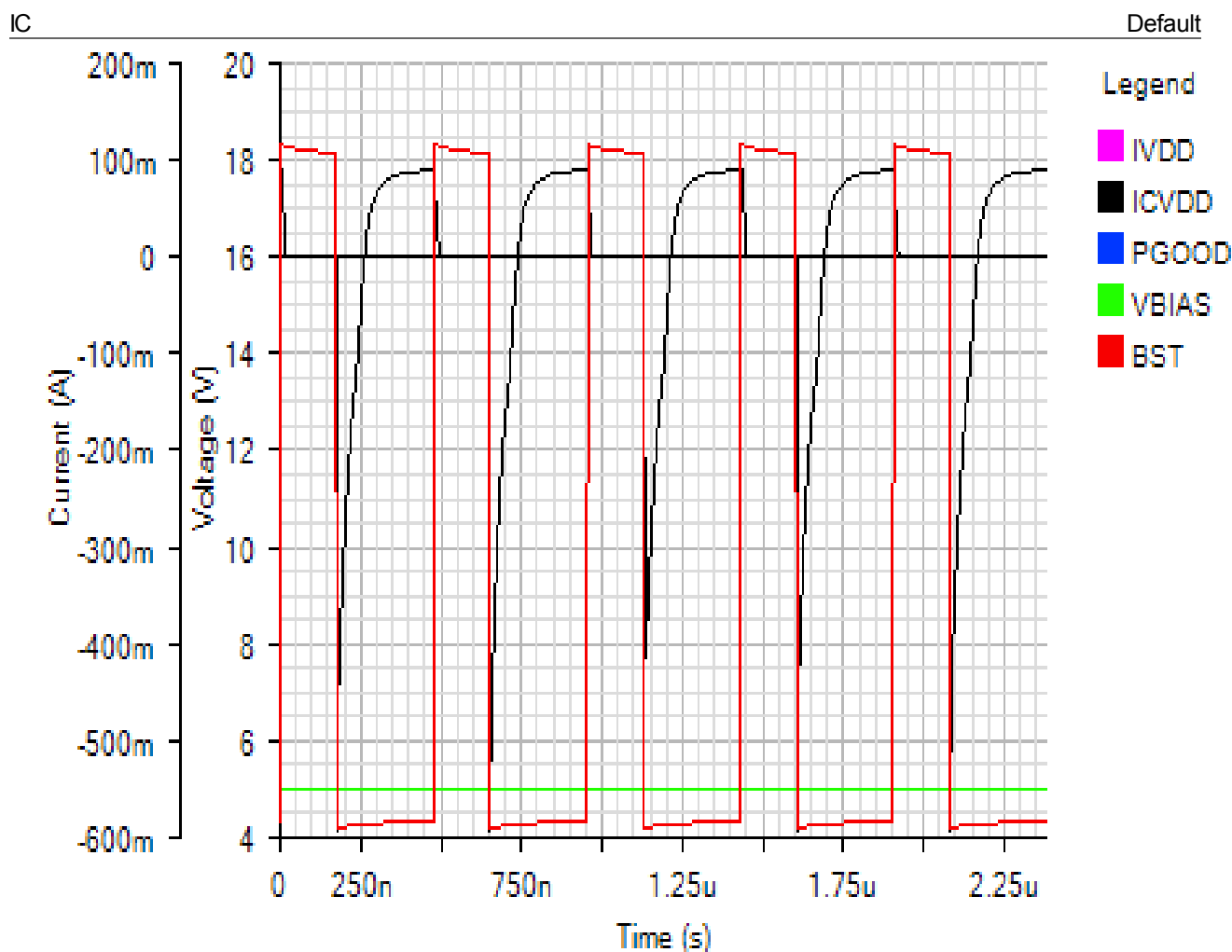
BOM

Ref	Qty	Part Number	Manufacturer	Description
U1	1	MAX20075ATCA	User-Defined	IC
C8	1	LLL185R71A104MA01L	Murata Manufacturing	Cap Ceramic 0.1uF 10V X7R 20% Wide Terminal SMD 0306 125°C T/R
CBIAS	1	LMK212B7105KD-T	Taiyo Yuden	Cap Ceramic 1uF 10V X7R 10% Pad SMD 0805 125°C T/R
CIN1	1	511D476M050BB4D	Vishay	Cap Aluminum Lytic 47uF 50V 20% (8 X 12mm) Radial 3.5mm 0.004 Ohm 137mA 1000h 105°C Ammo
CIN2	1	C5750X7R2A475K230KA	TDK	Cap Ceramic 4.7uF 100V X7R 10% Pad SMD 2220 125°C T/R

COUT	1	GCM32ER71A226KE12L	Murata Manufacturing	Cap Ceramic 22uF 10V X7R 10% Pad SMD 1210 125°C Automotive T/R
L1	1	1277AS-H-3R3M=P2	Murata	3.3uH 20% 105mOhm 2.6Asat 2.1Arms
R2	1	ERJ3EKF5603V	Panasonic	Res Thick Film 0603 560K Ohm 1% 0.1W(1/10W) ±100ppm/°C Pad SMD Automotive T/R
R5	1	ERJ2RKF2263X	Panasonic	Res Thick Film 0402 226K Ohm 1% 0.1W(1/10W) ±100ppm/°C Pad SMD Automotive T/R
R6	1	ERJ3EKF5602V	Panasonic	Res Thick Film 0603 56K Ohm 1% 0.1W(1/10W) ±100ppm/°C Pad SMD Automotive T/R
R8	1	ERJ2RKF1002X	Panasonic	Res Thick Film 0402 10K Ohm 1% 0.1W(1/10W) ±100ppm/°C Pad SMD Automotive T/R

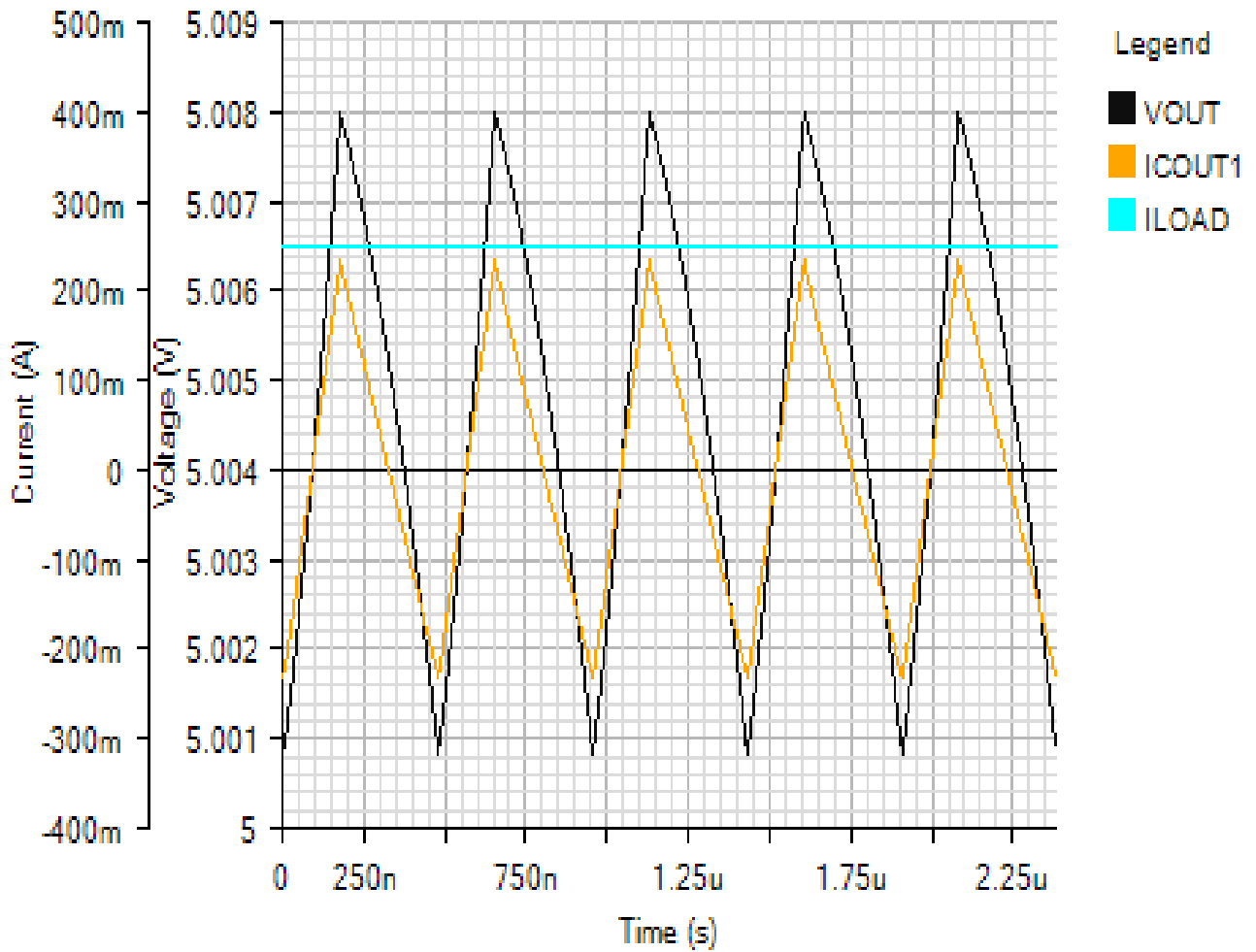
Simulation Results

Steady State - Tue Nov 20 2018 12:52:46



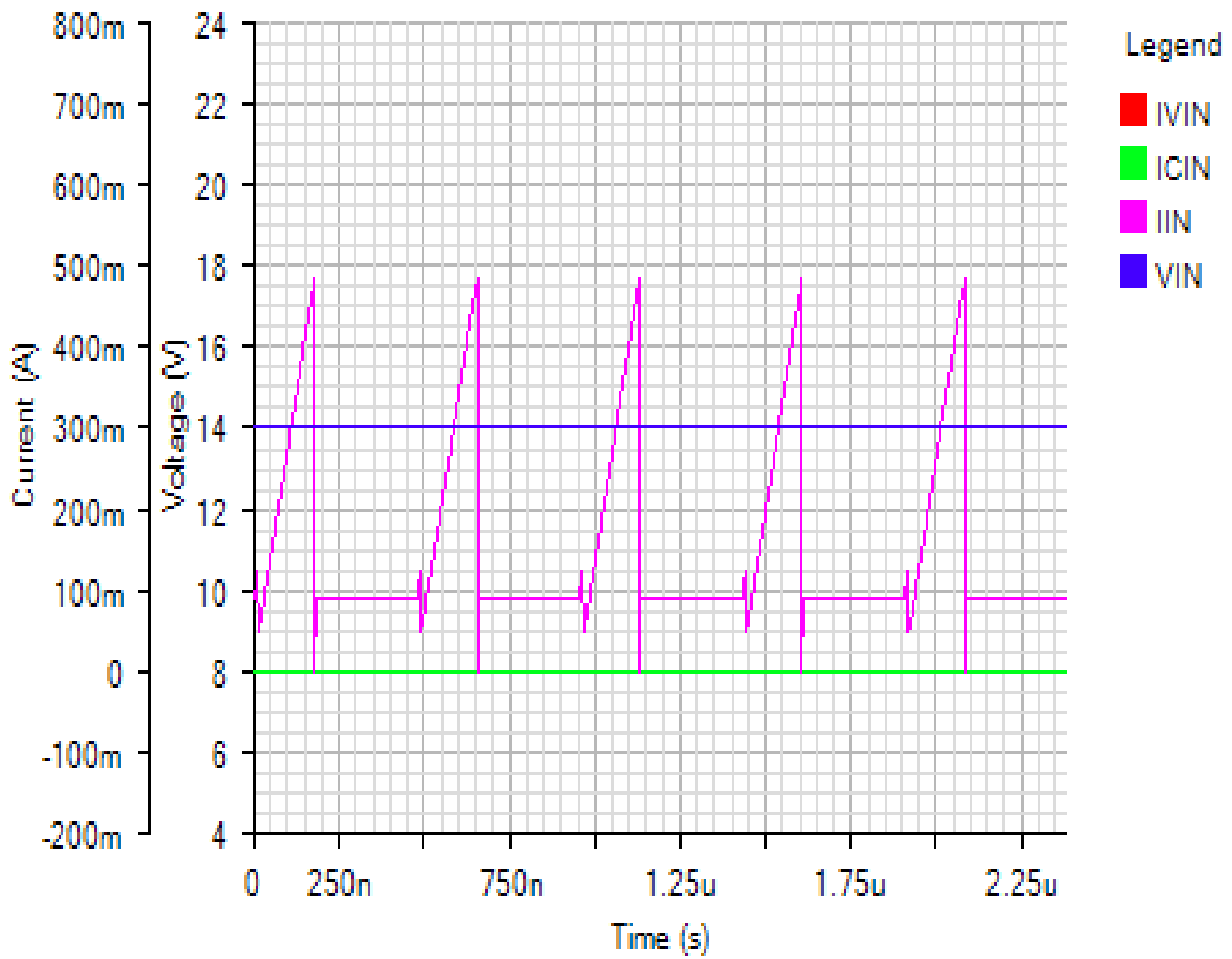
OUTPUT

Default



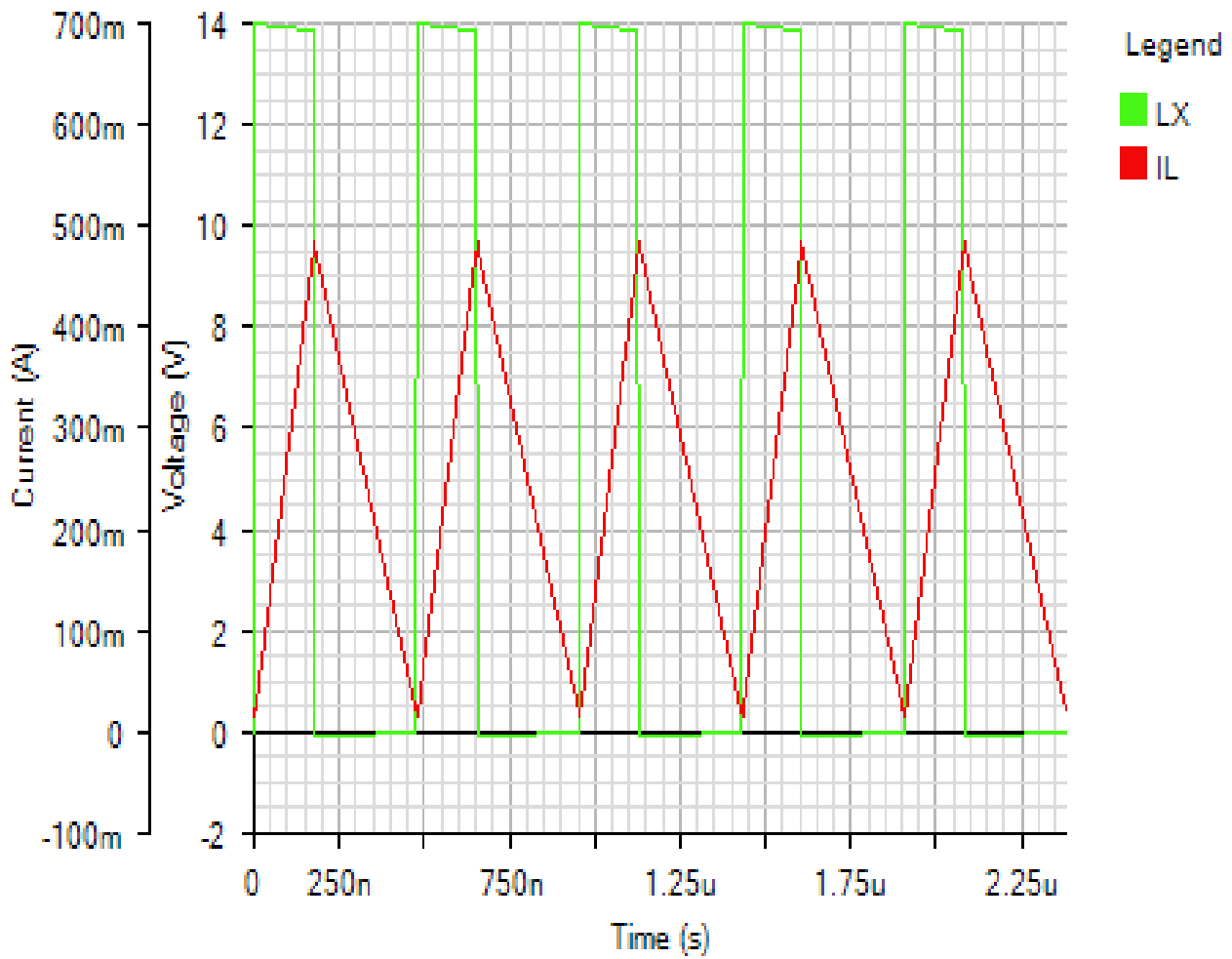
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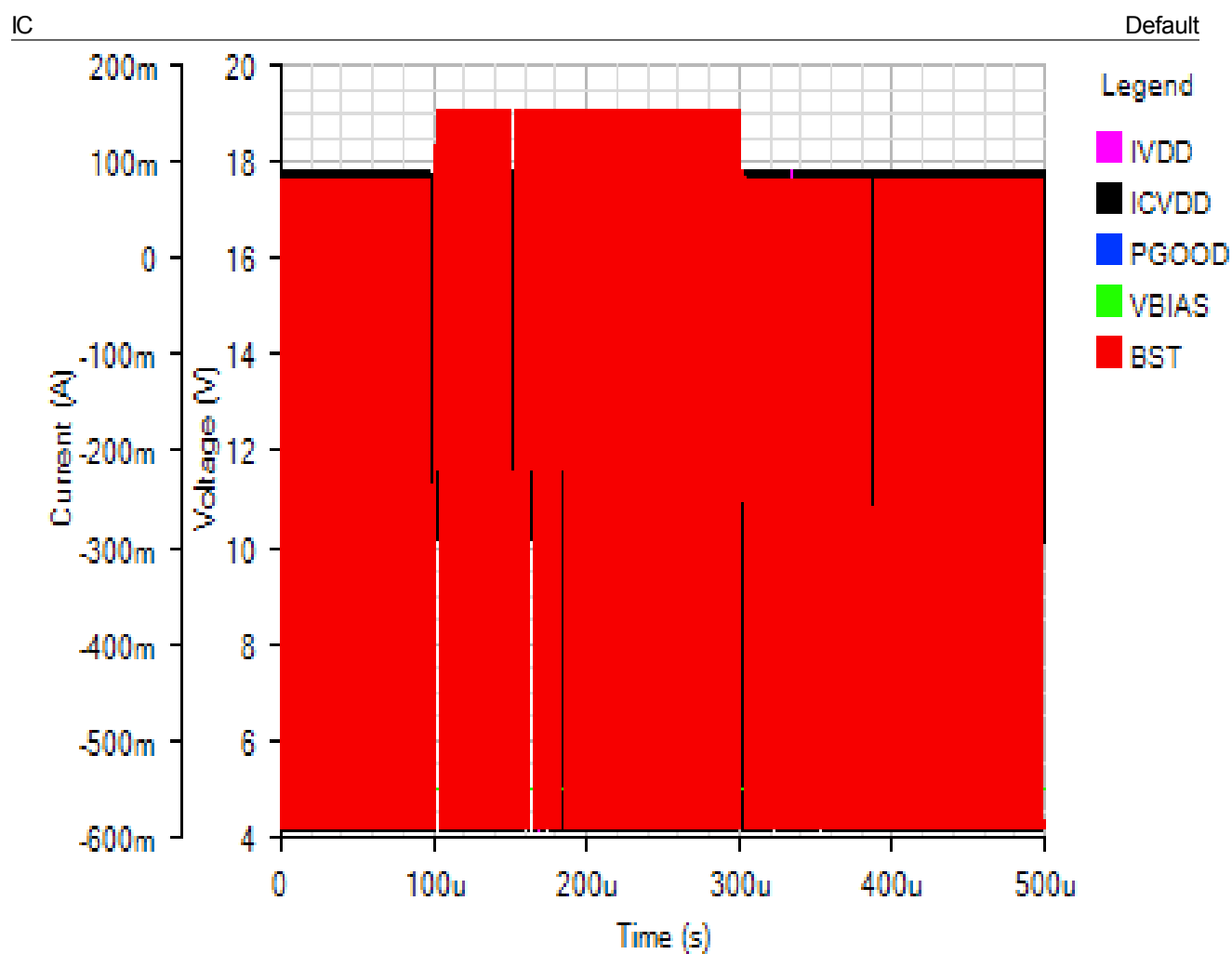


SWITCHING

Default

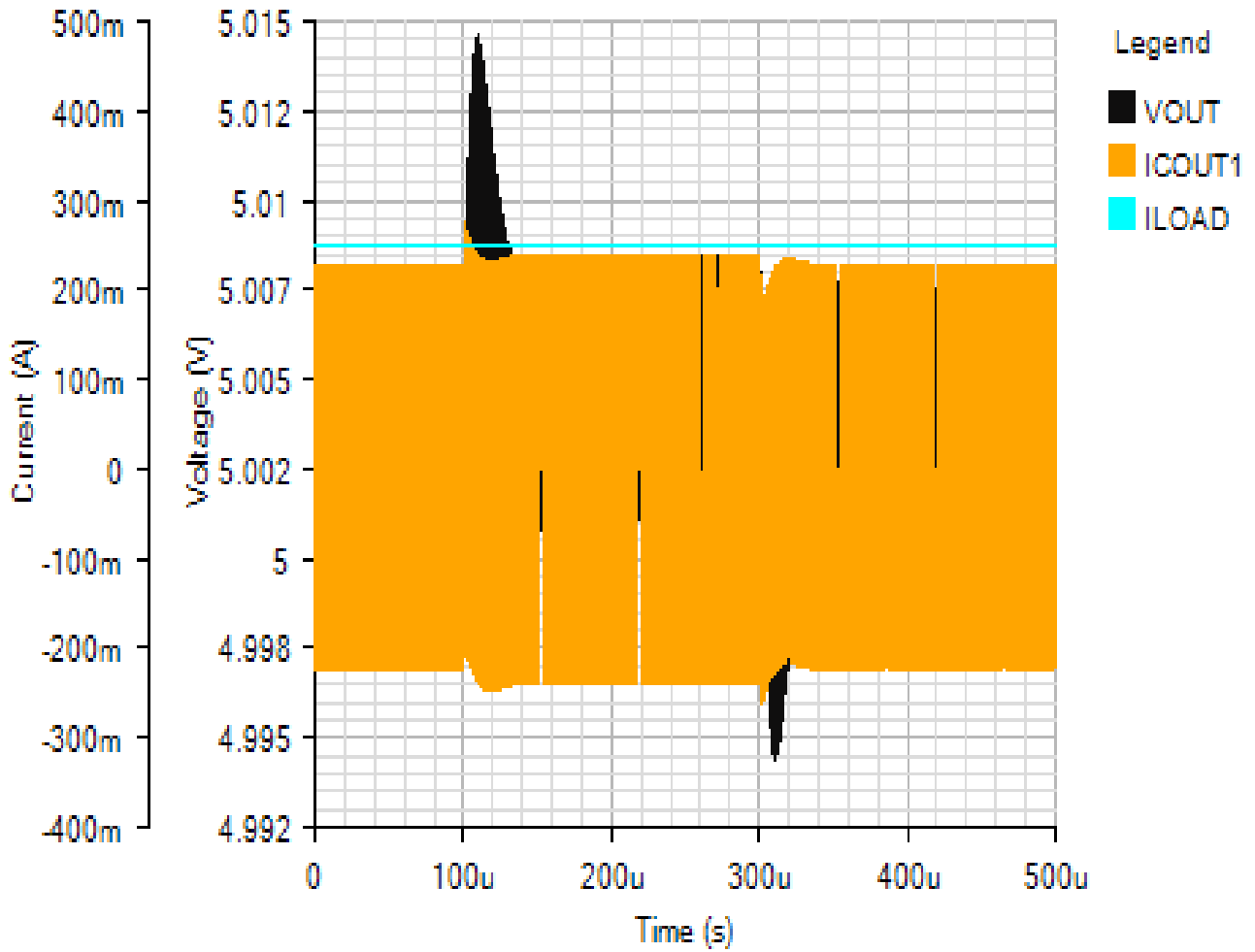


Line Transient - Tue Nov 20 2018 12:52:46



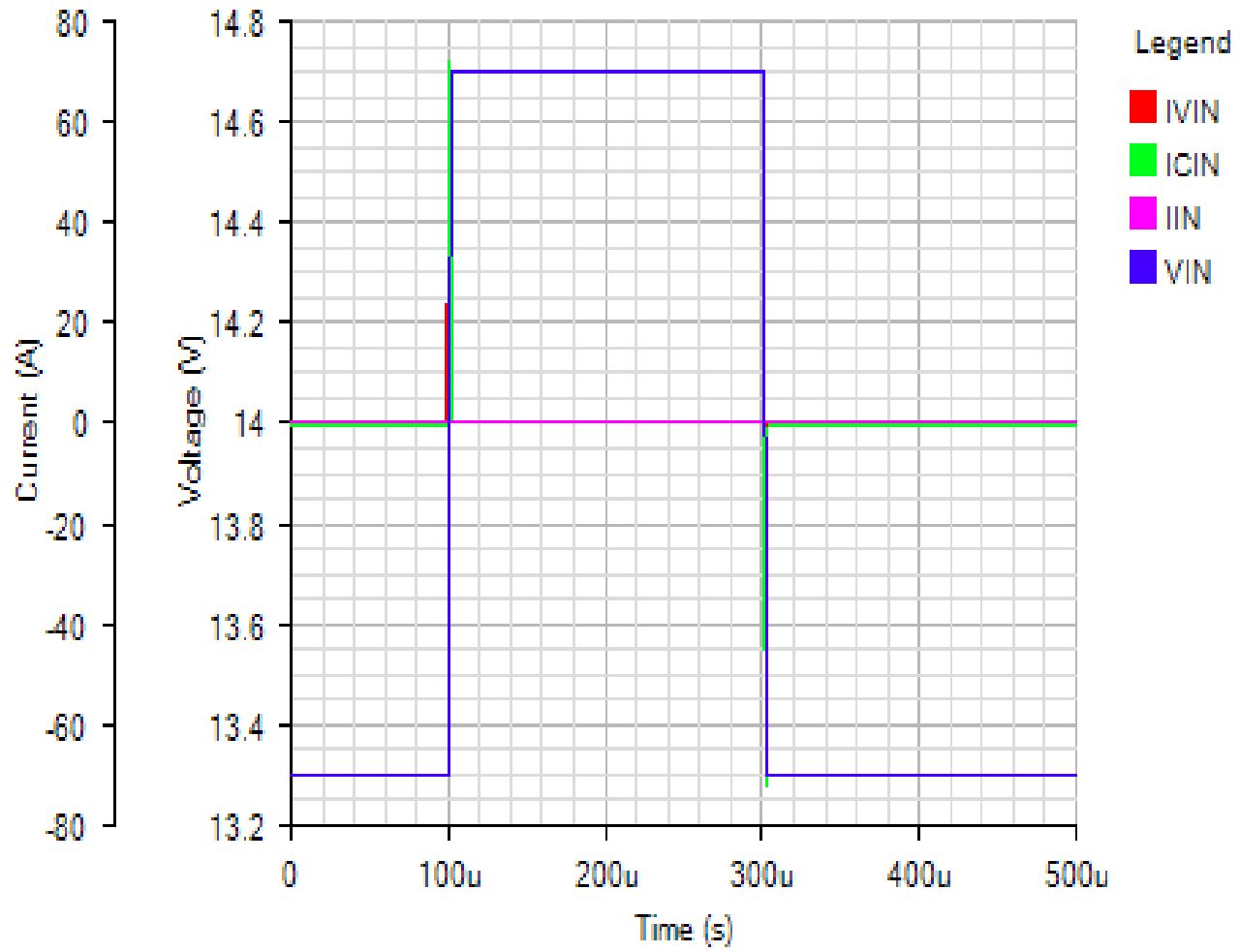
OUTPUT

Default



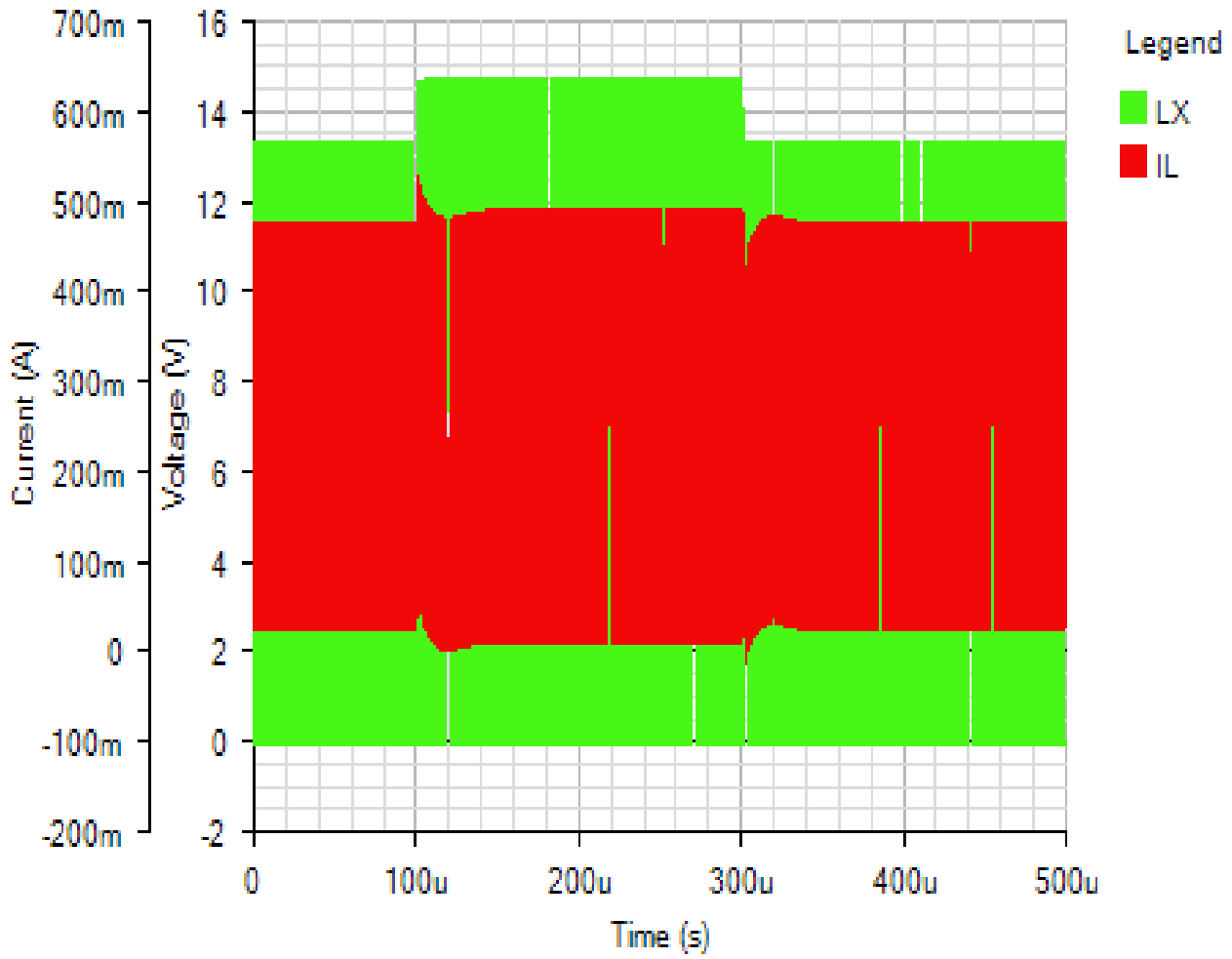
INPUT

Default

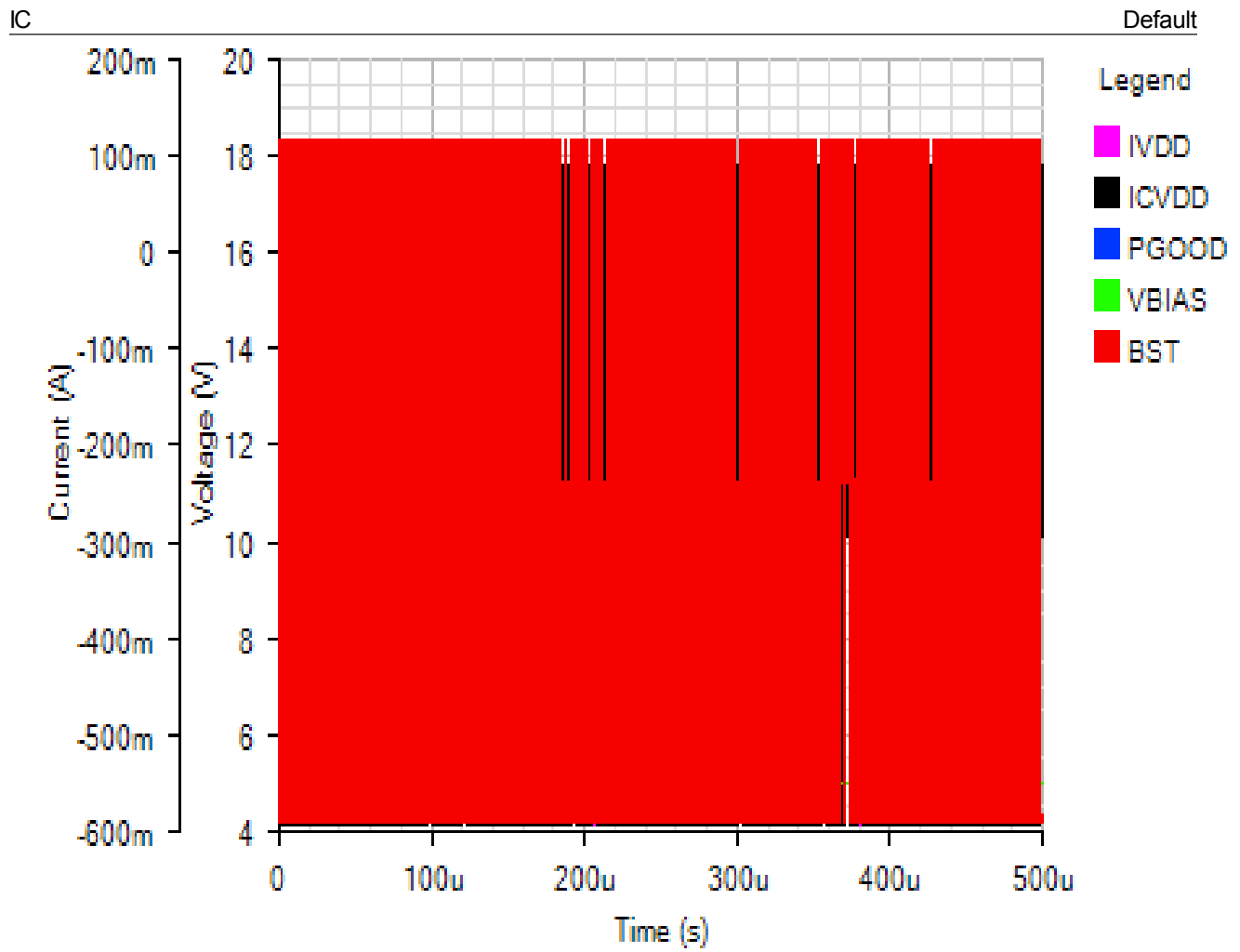


SWITCHING

Default

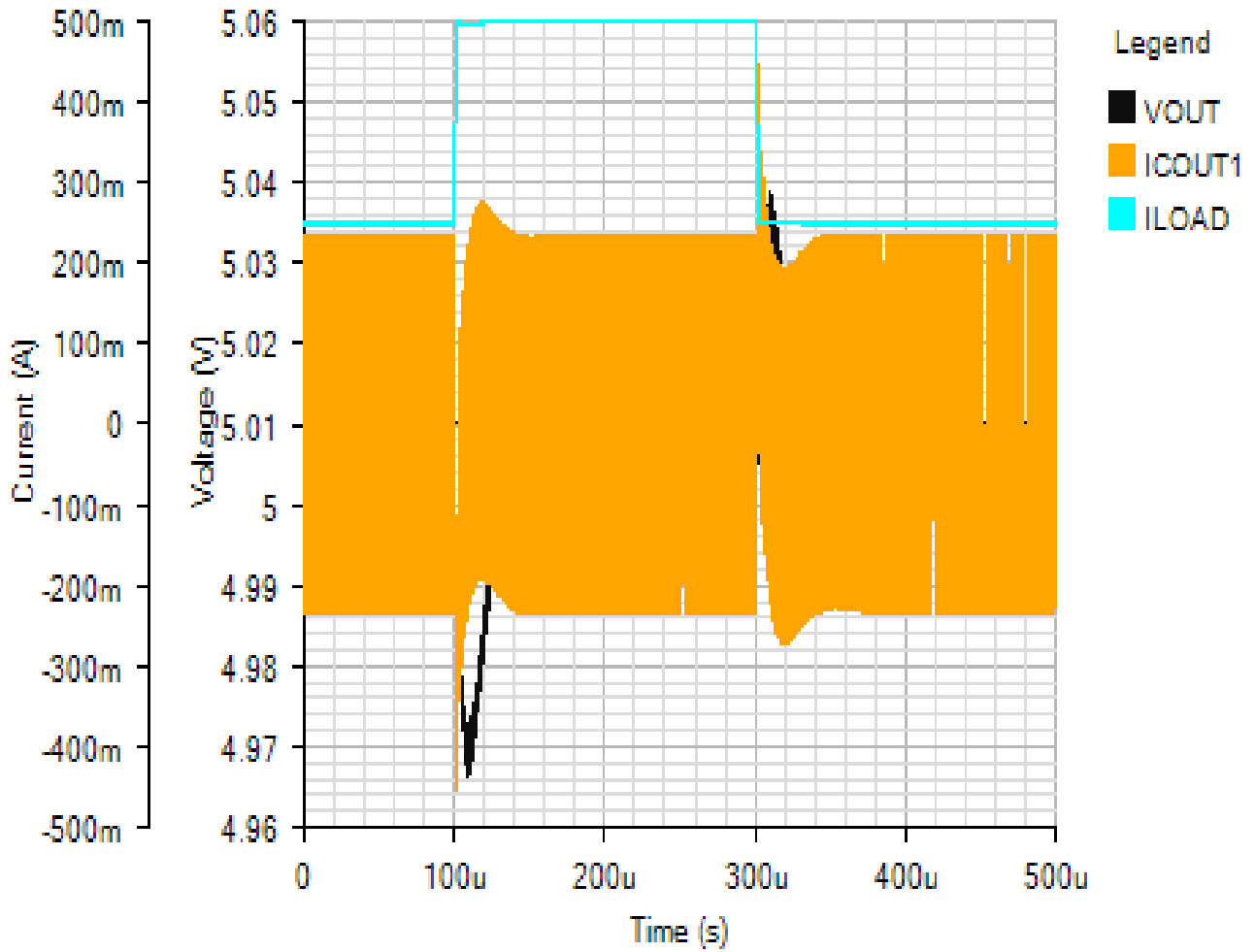


Load Step - Tue Nov 20 2018 12:52:46



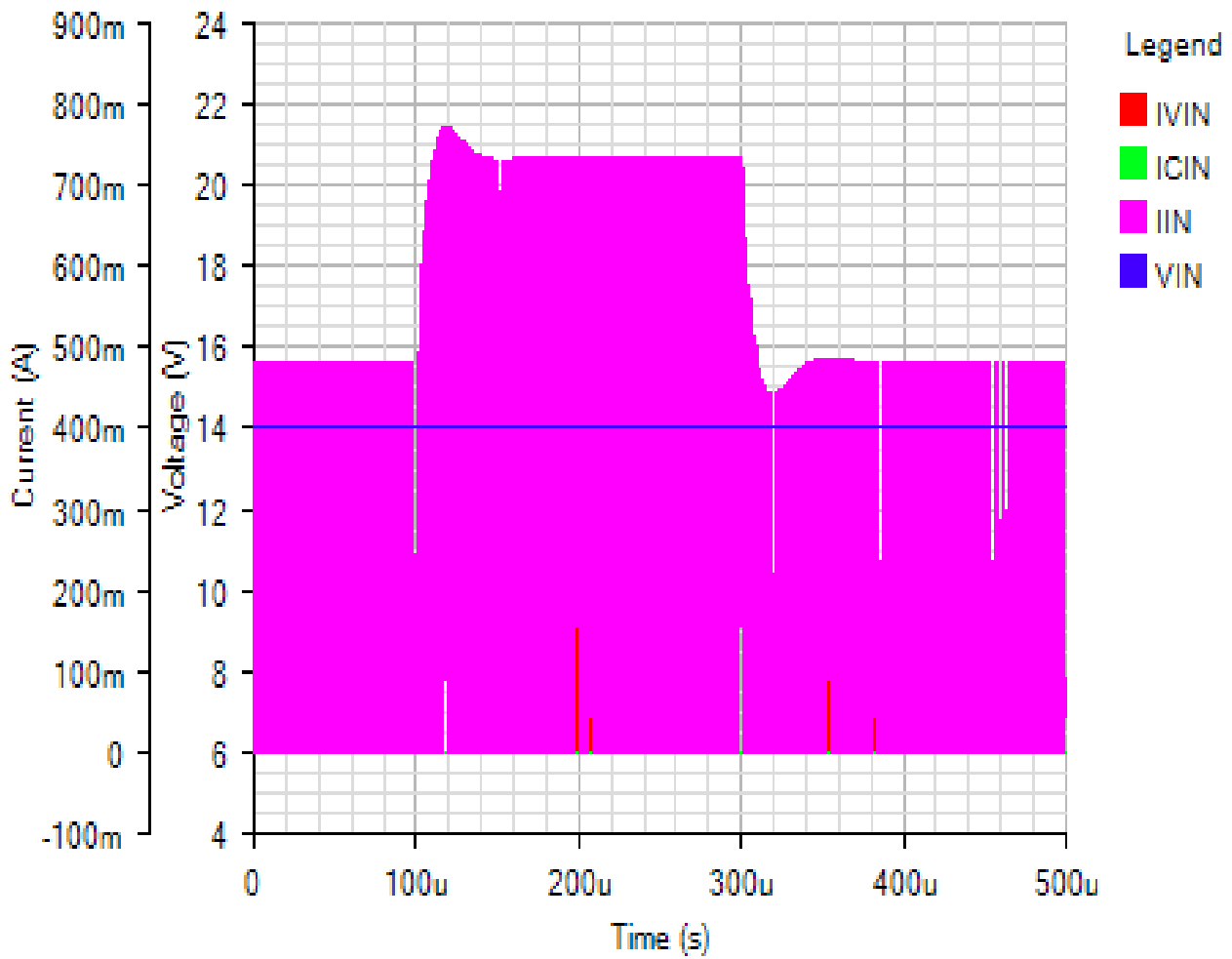
OUTPUT

Default



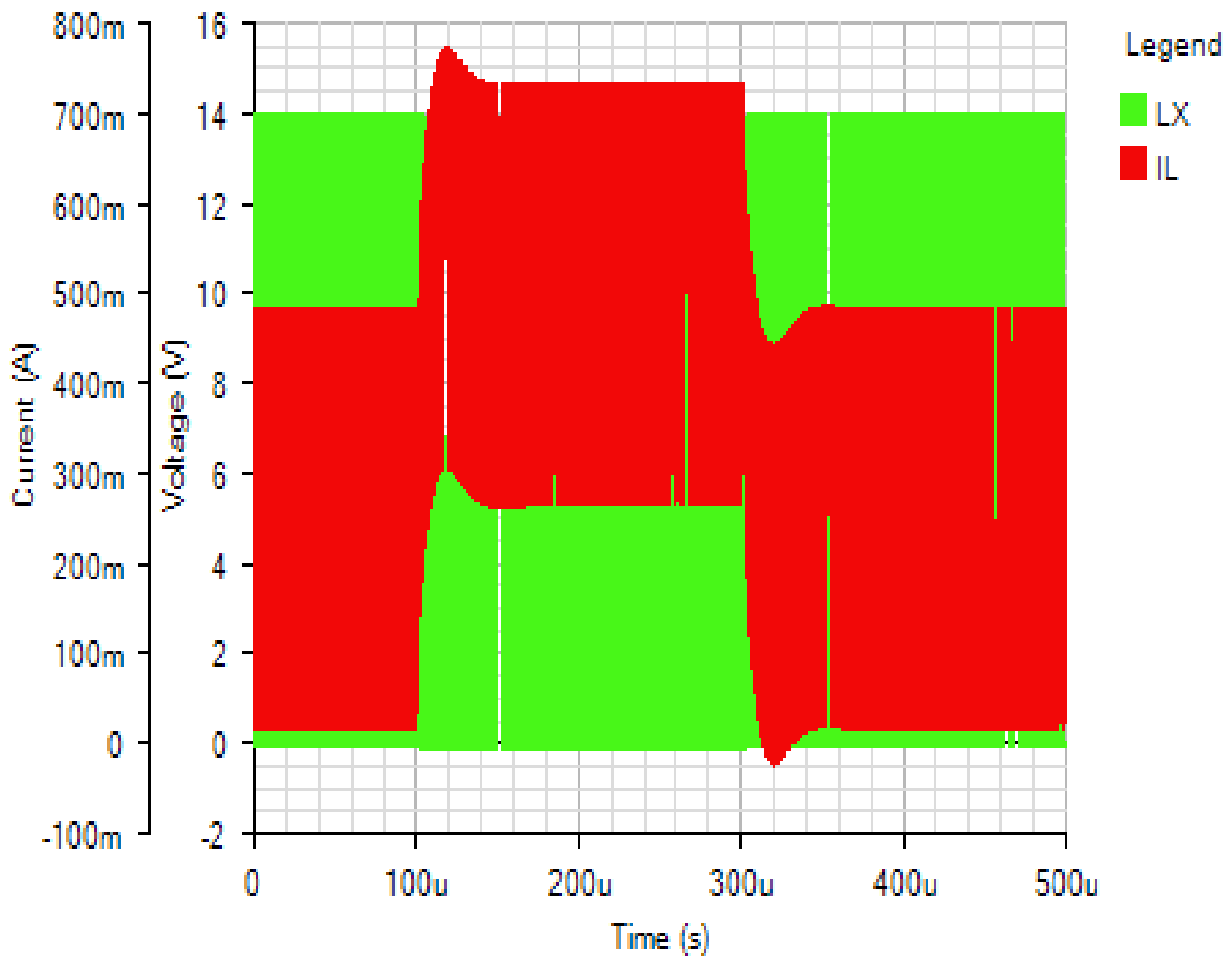
INPUT

Default



SWITCHING

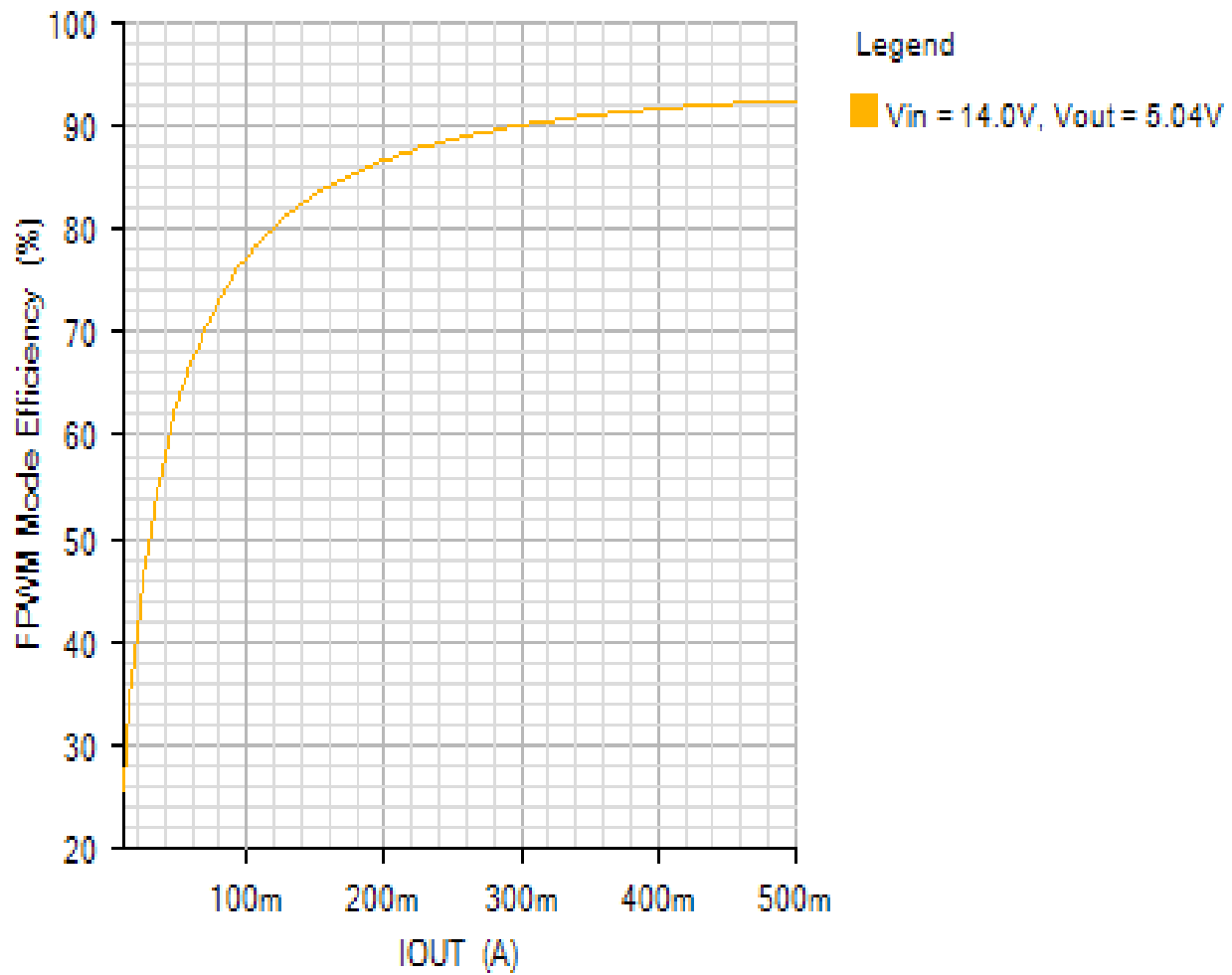
Default



Efficiency - Tue Nov 20 2018 12:52:46

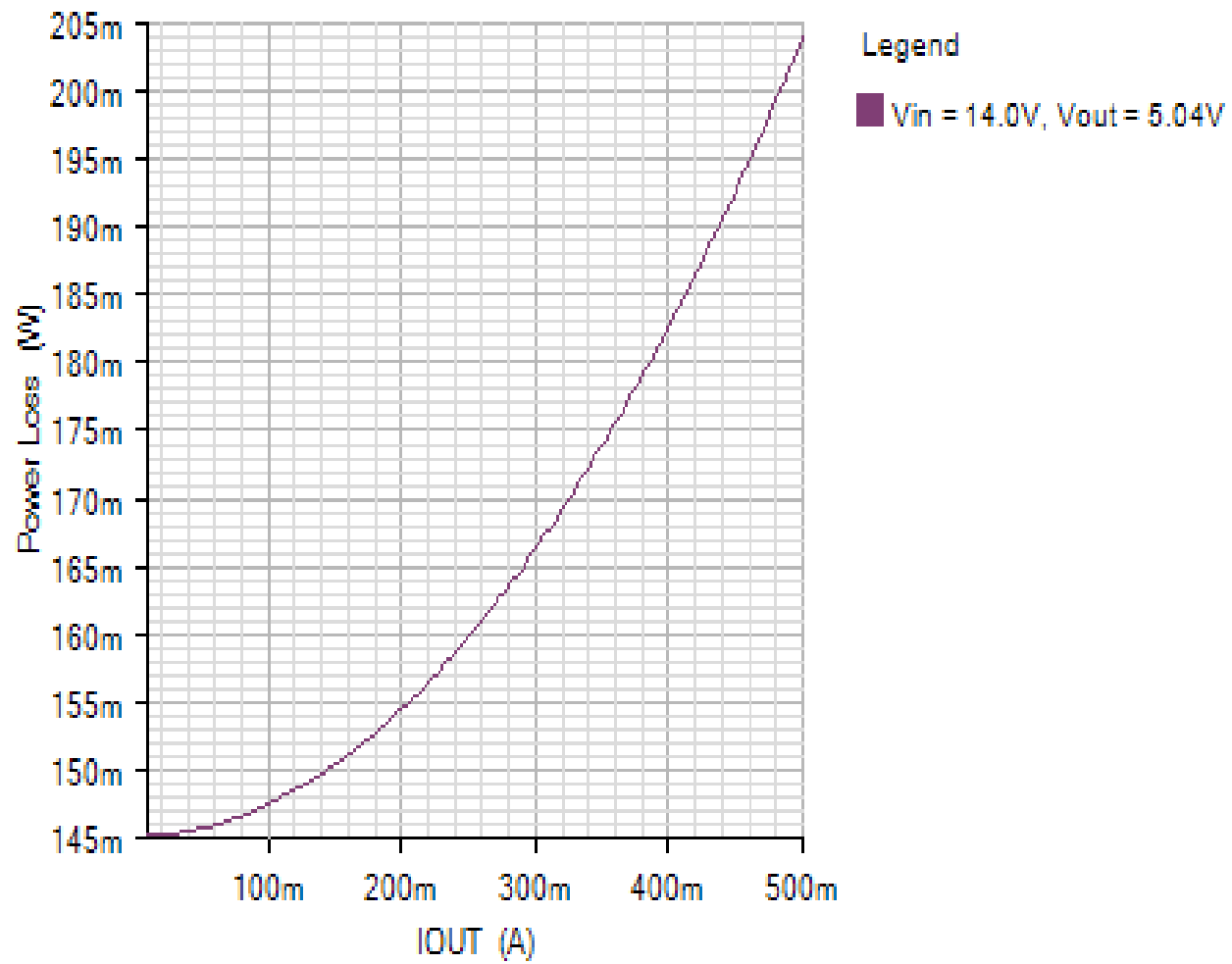
EFFICIENCY_PLOT

Default



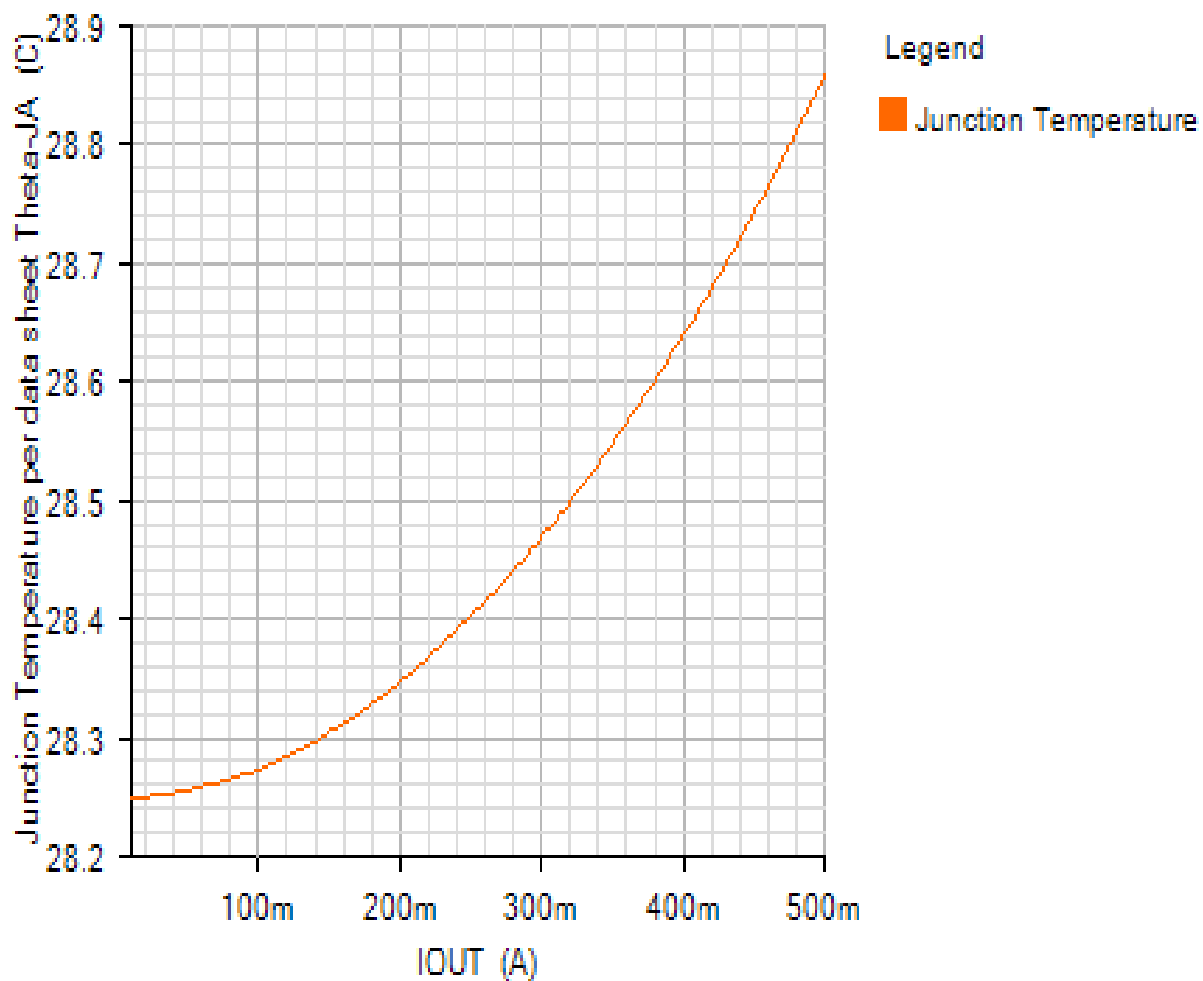
POWER_LOSS_PLOT

Default

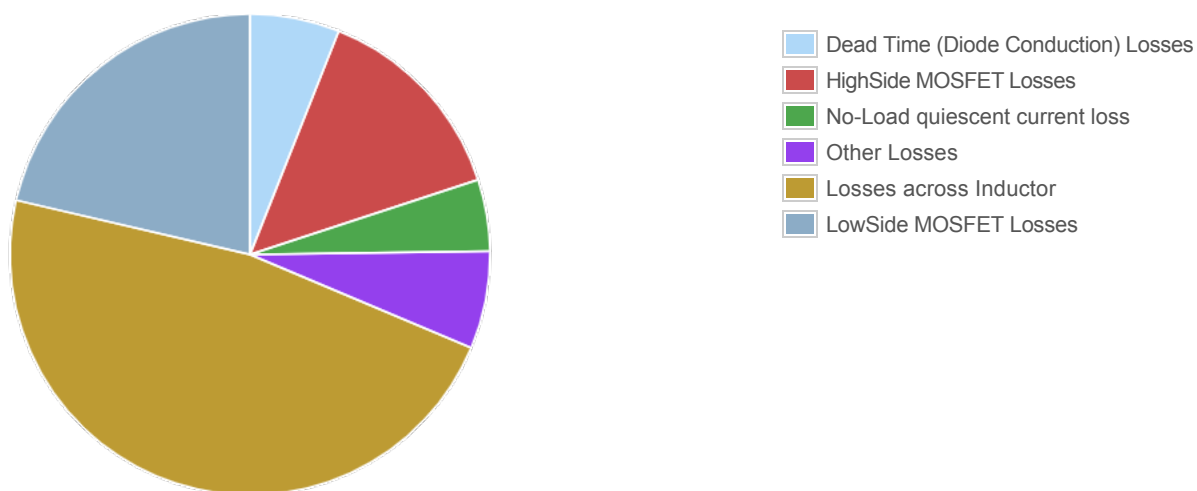


JUNCTION_TEMPERATURE_PLOT

Default



Losses



Component

Loss (W)

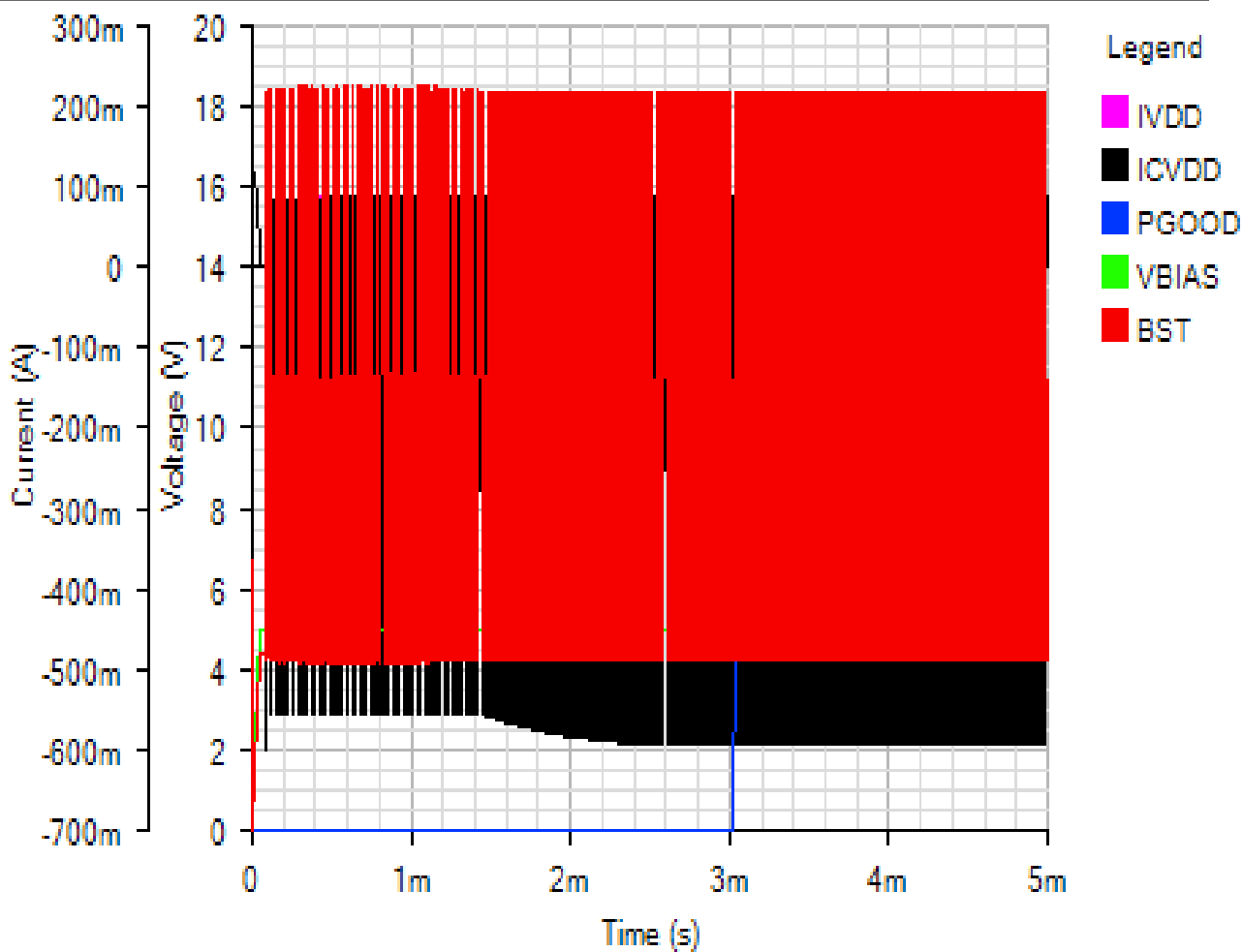
% of total

Component	Loss (W)	% of total
Dead Time (Diode Conduction) Losses	0.012311	6
HighSide MOSFET Losses	0.028416	13.9
No-Load quiescent current loss	0.0098	4.8
Other Losses	0.013402	6.6
Losses across Inductor	0.096446	47.3
LowSide MOSFET Losses	0.043606	21.4
Total	0.203982	100

Start Up - Tue Nov 20 2018 12:52:46

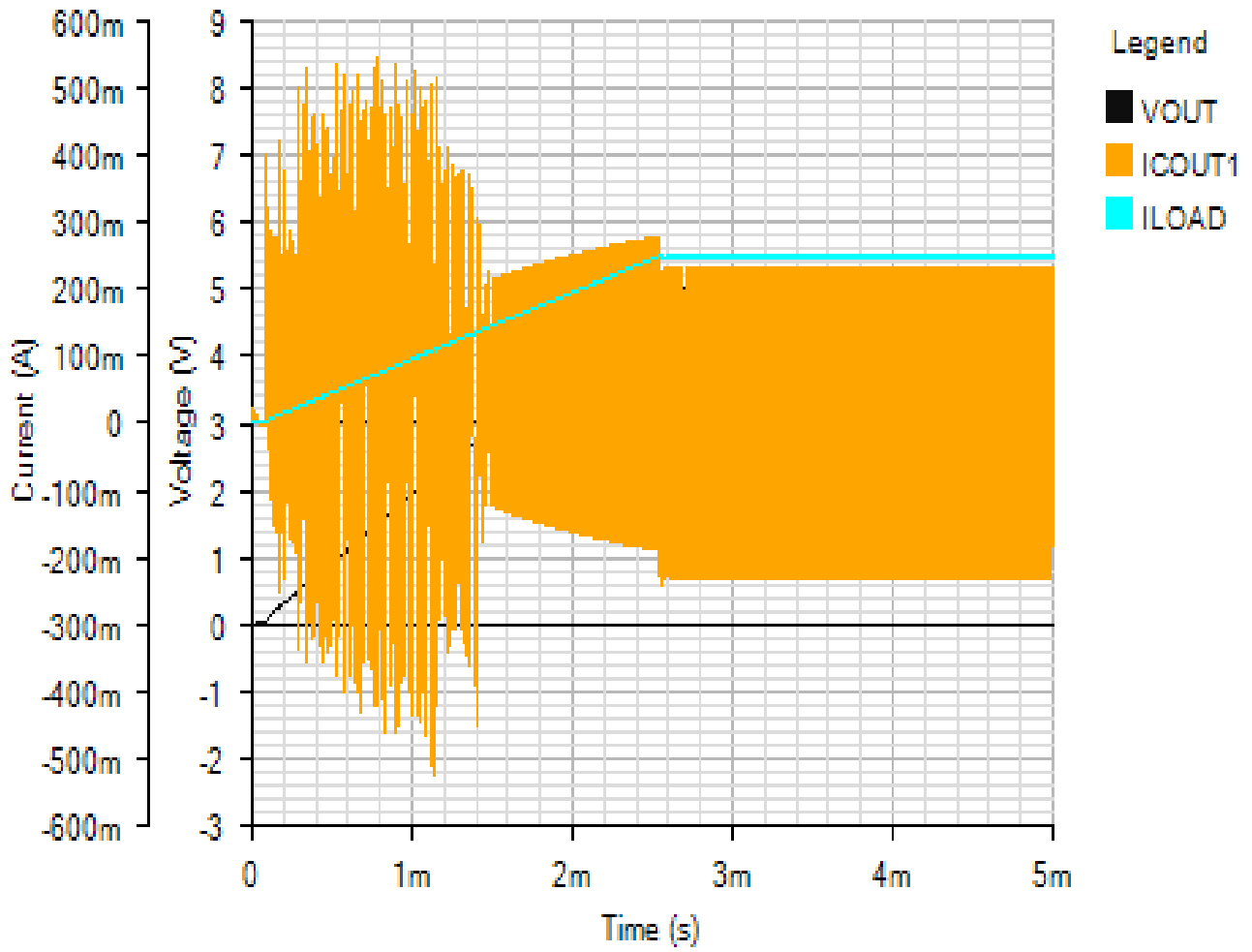
IC

Default



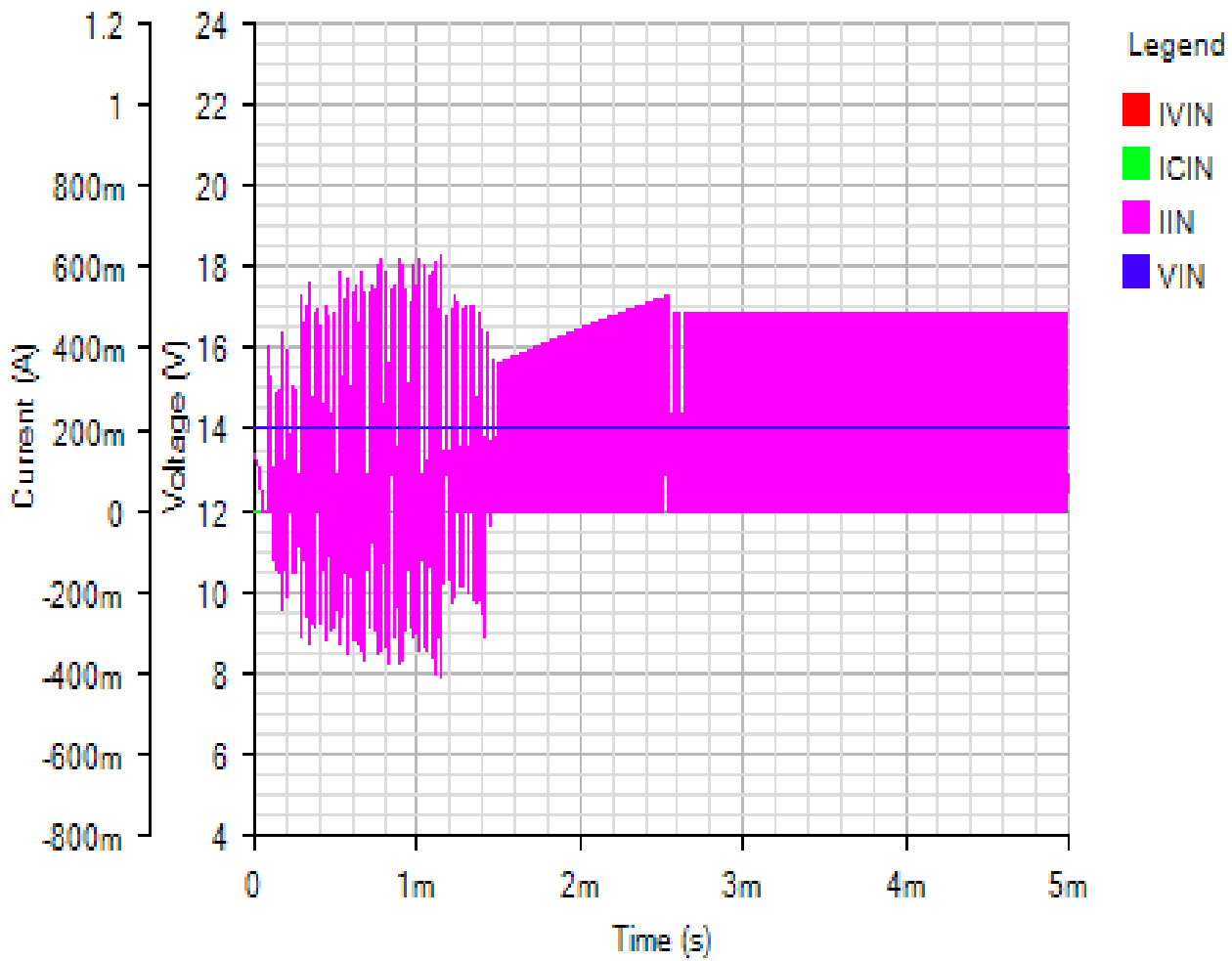
OUTPUT

Default



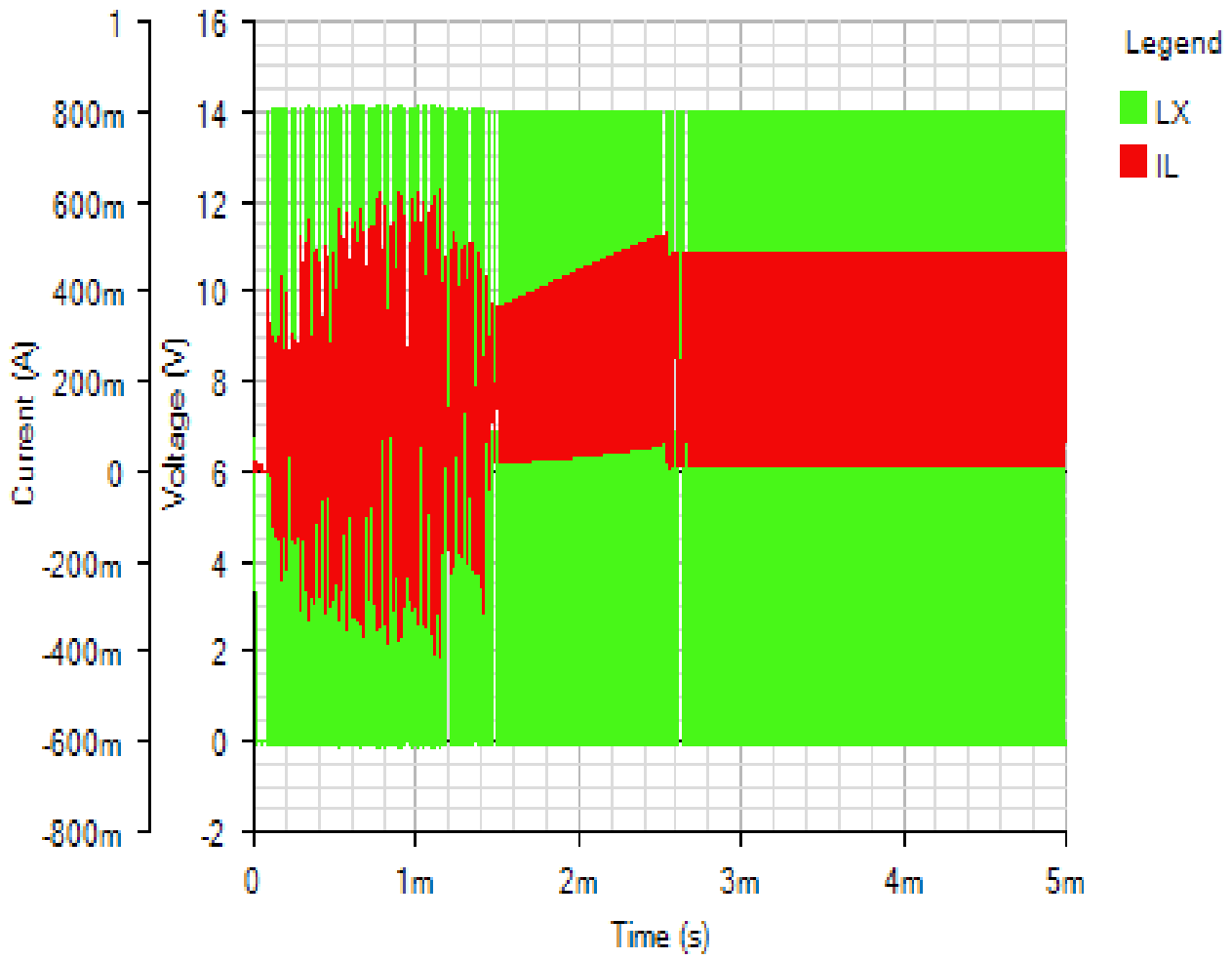
INPUT

Default



SWITCHING

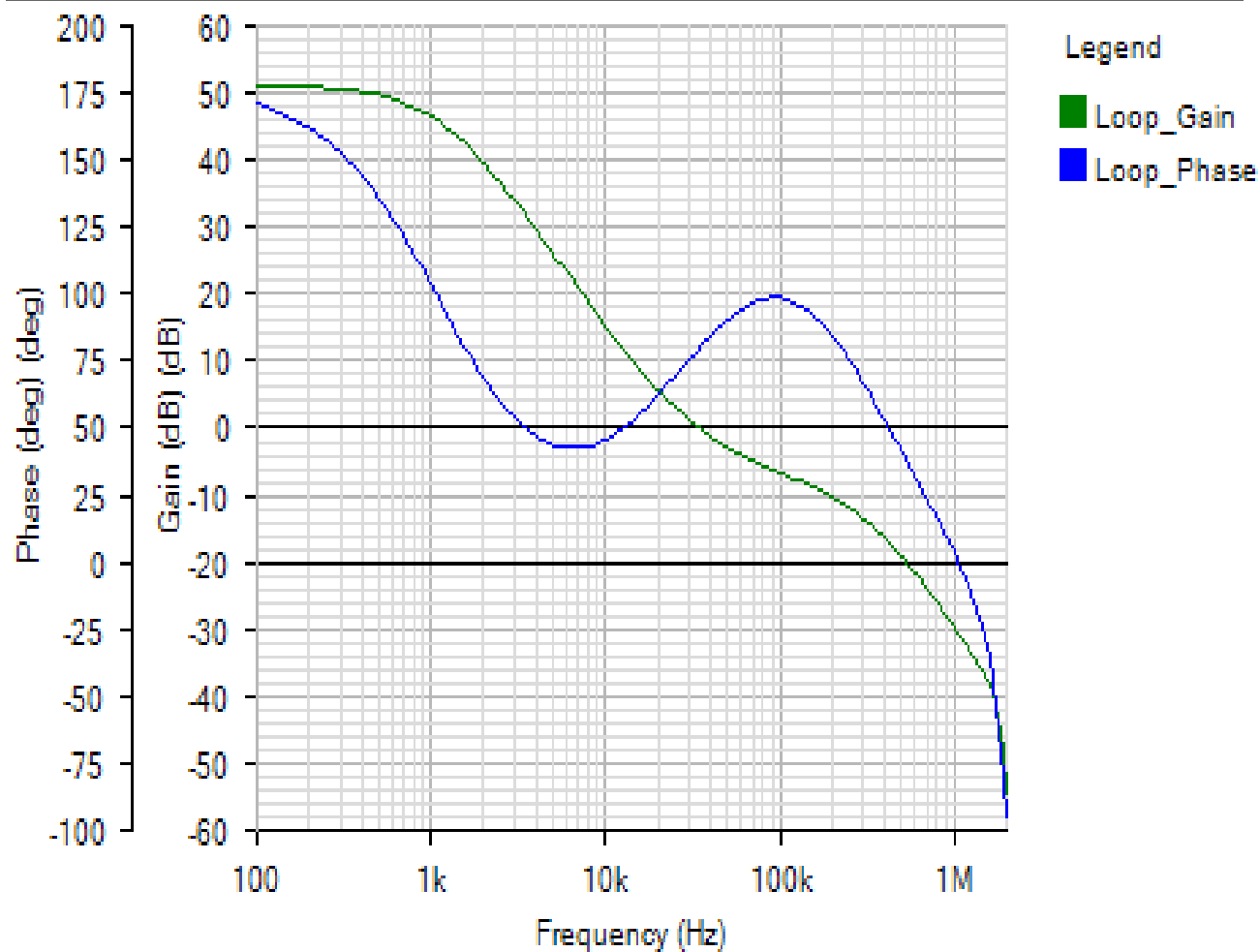
Default



AC Loop - Tue Nov 20 2018 12:52:46

BODE

Default



Phase Margin: 79.8° at a crossover frequency of 34.5kHz

