

## Initial Design

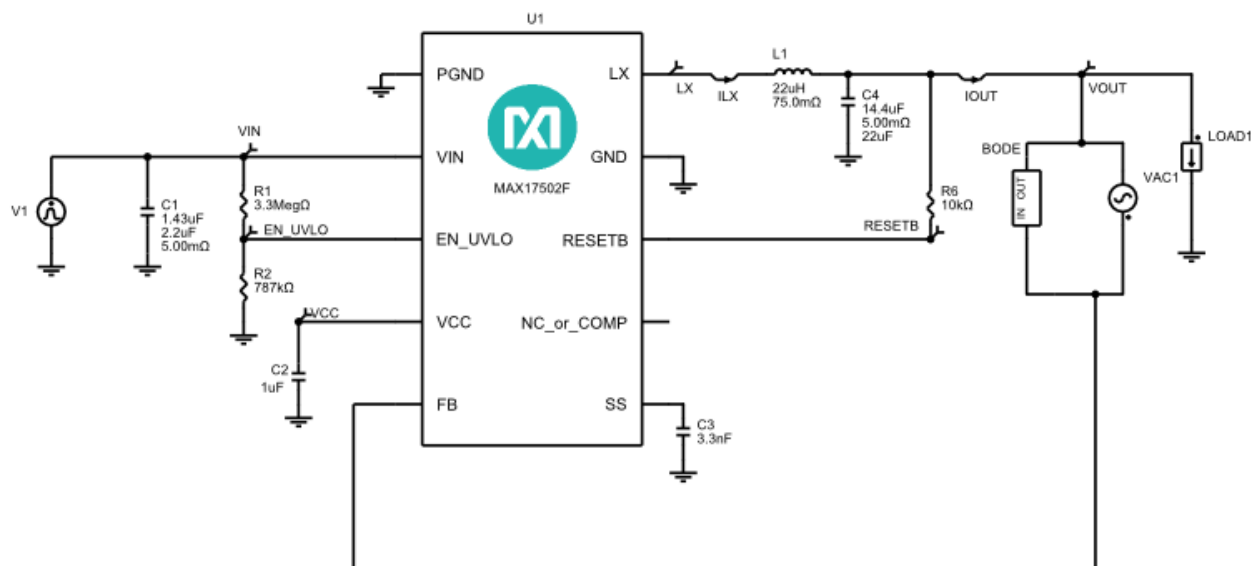
1.0

**Design Requirements**

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Parameter	Value
Maximum Input Voltage	42V
Minimum Input Voltage	7V
Nominal Input Voltage	24V
Input Steady-State Ripple	0.48V
Input Undervoltage Lockout Level	6.3V
Output Voltage	5V
Output Current	1A
Output Voltage Load Step Over/Undershoot	0.15V
Performance Priority	Balance Efficiency and Size
BOM Priority	Cost
Ambient Temperature	25°C
Output Soft Start Time	0.0006s

## Schematic



\*\*\*\*\* Notes \*\*\*\*\*  
- Decreasing the output capacitance below recommended value might degrade the transient response or loop stability.

## BOM

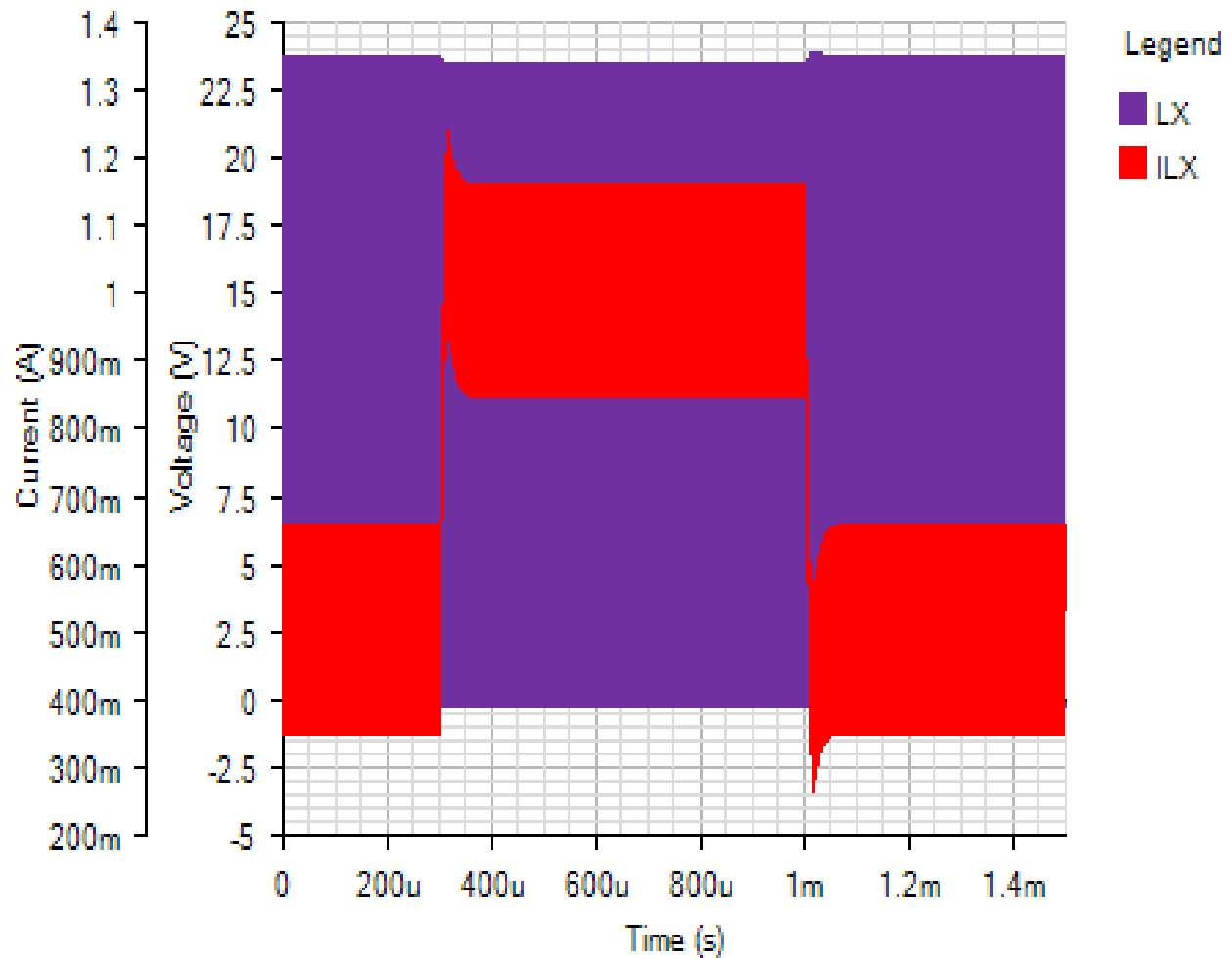
Ref	Qty	Part Number	Manufacturer	Description
U1	1	<a href="#">MAX17502FATB+</a>	Maxim Integrated	60V, 1A, Ultra-Small, High-Efficiency, Synchronous Step-Down DC-DC Converter
C1	1	<a href="#">GRM31CR71H225KA88</a>	Murata	Cap Ceramic 2.2uF 50V X7R 10% SMD 1206 125C
C2	1	<a href="#">CGB3B3X7R0J105K055AB</a>	TDK	Cap Ceramic 1uF 6.3V X7R 10% Pad SMD 0603 125°C T/R
C3	1	<a href="#">GCJ188R71E332KA01D</a>	Murata Manufacturing	Cap Ceramic 0.0033uF 25V X7R 10% Pad SMD 0603 Soft Termination 125°C Automotive T/R
C4	1	<a href="#">GRM31CR70J226KE19L</a>	Murata	Cap Ceramic 22uF 6.3V X7R 10% SMD 1206 125C Embossed T/R
L1	1	<a href="#">VLP8040T-220M</a>	TDK	Inductor Power Shielded Wirewound 22uH 20% 100KHz Ferrite 2.5A 75mOhm DCR Embossed Carrier T/R
R1	1	<a href="#">RC0402FR-073M3L</a>	Yageo	Res Thick Film 0402 3.3M Ohm 1% 0.063W(1/16W) ±100ppm/°C Epoxy Pad SMD T/R
R2	1	<a href="#">ERJ2RKF7873X</a>	Panasonic	Res Thick Film 0402 787K Ohm 1% 0.1W(1/10W) ±100ppm/°C Pad SMD Automotive T/R
R6	1	<a href="#">ERJ2RKF1002X</a>	Panasonic	Res Thick Film 0402 10K Ohm 1% 0.1W(1/10W) ±100ppm/°C Pad SMD Automotive T/R

## Simulation Results

Load Step - Fri Nov 16 2018 09:40:06

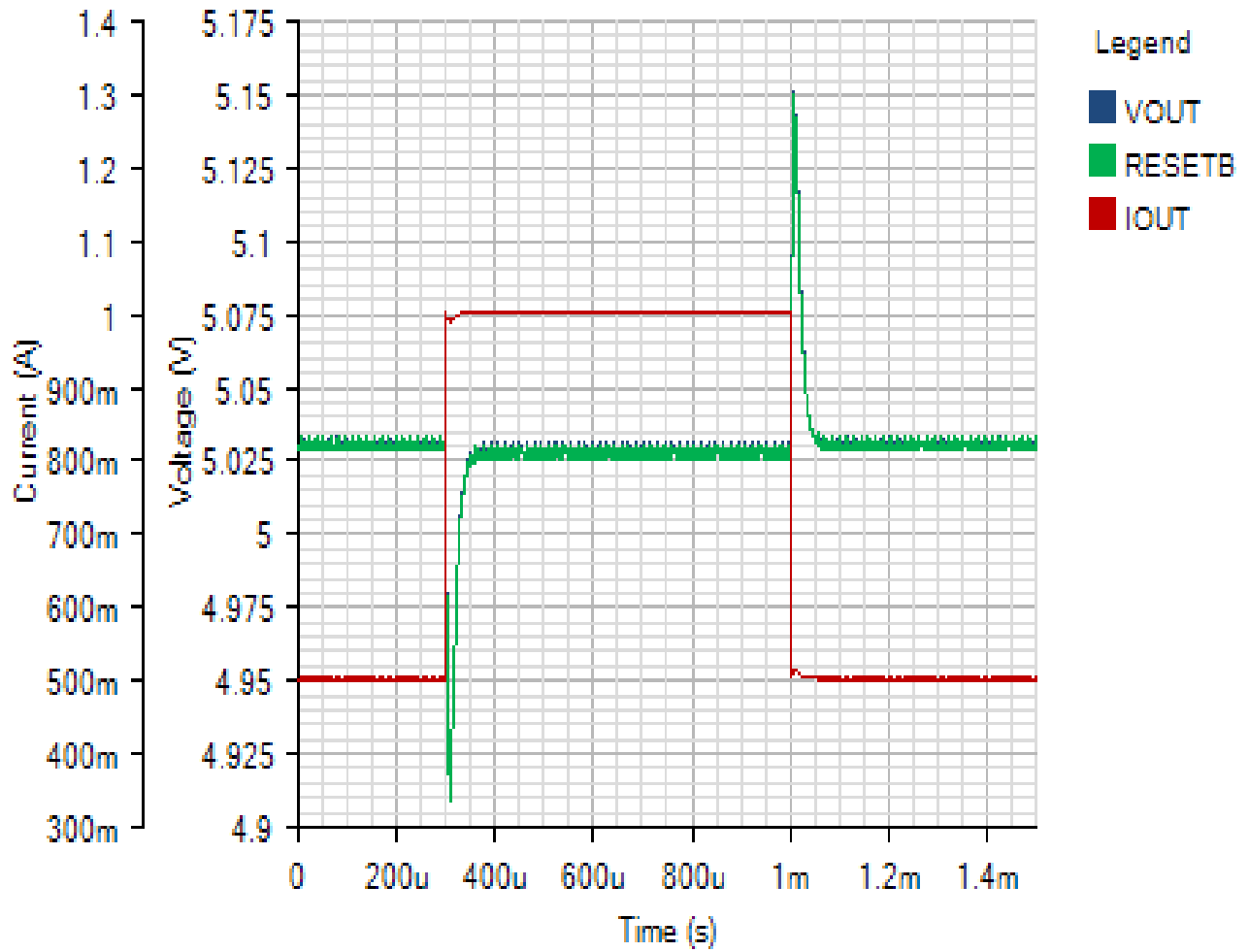
SWITCHING

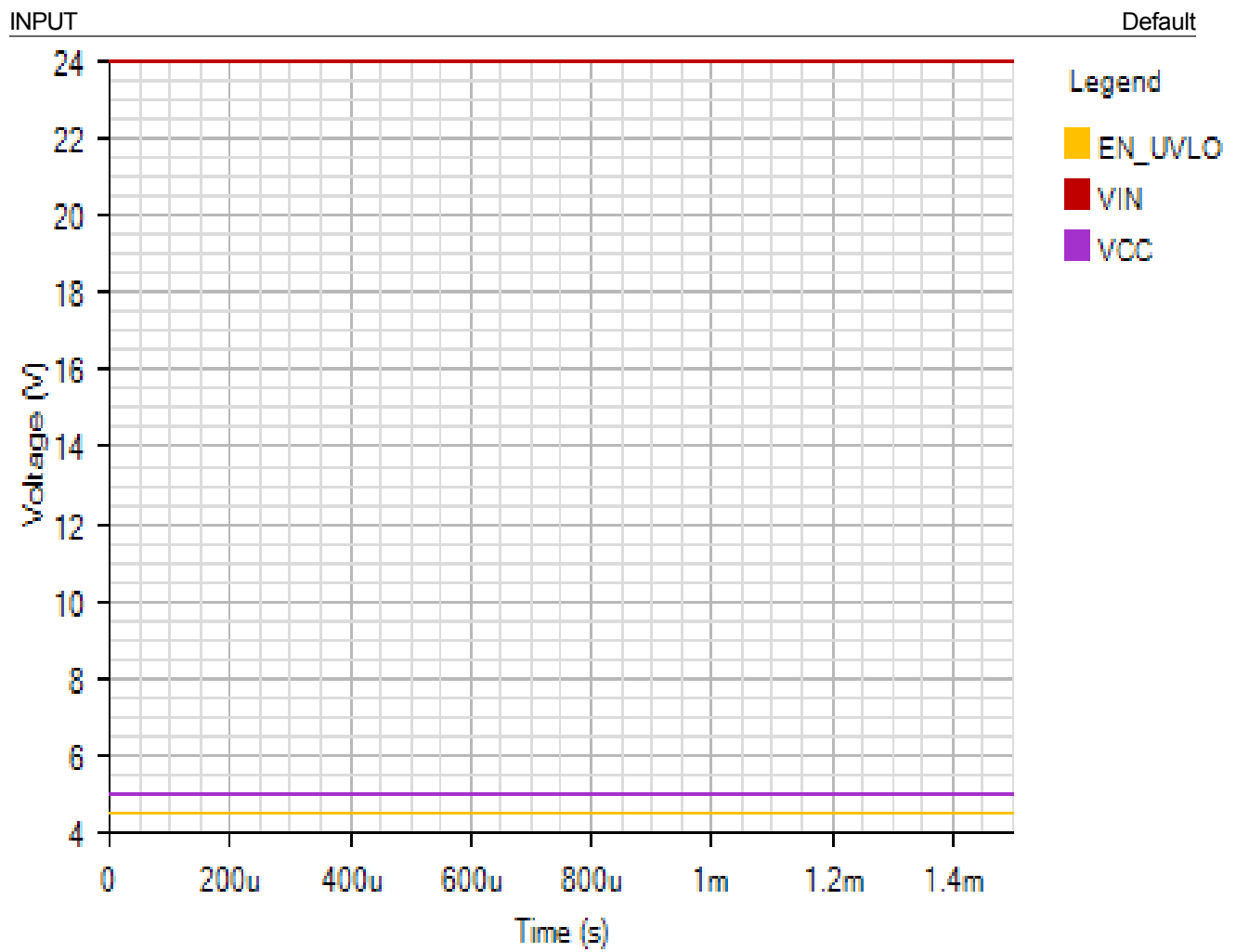
Default



OUTPUT

Default

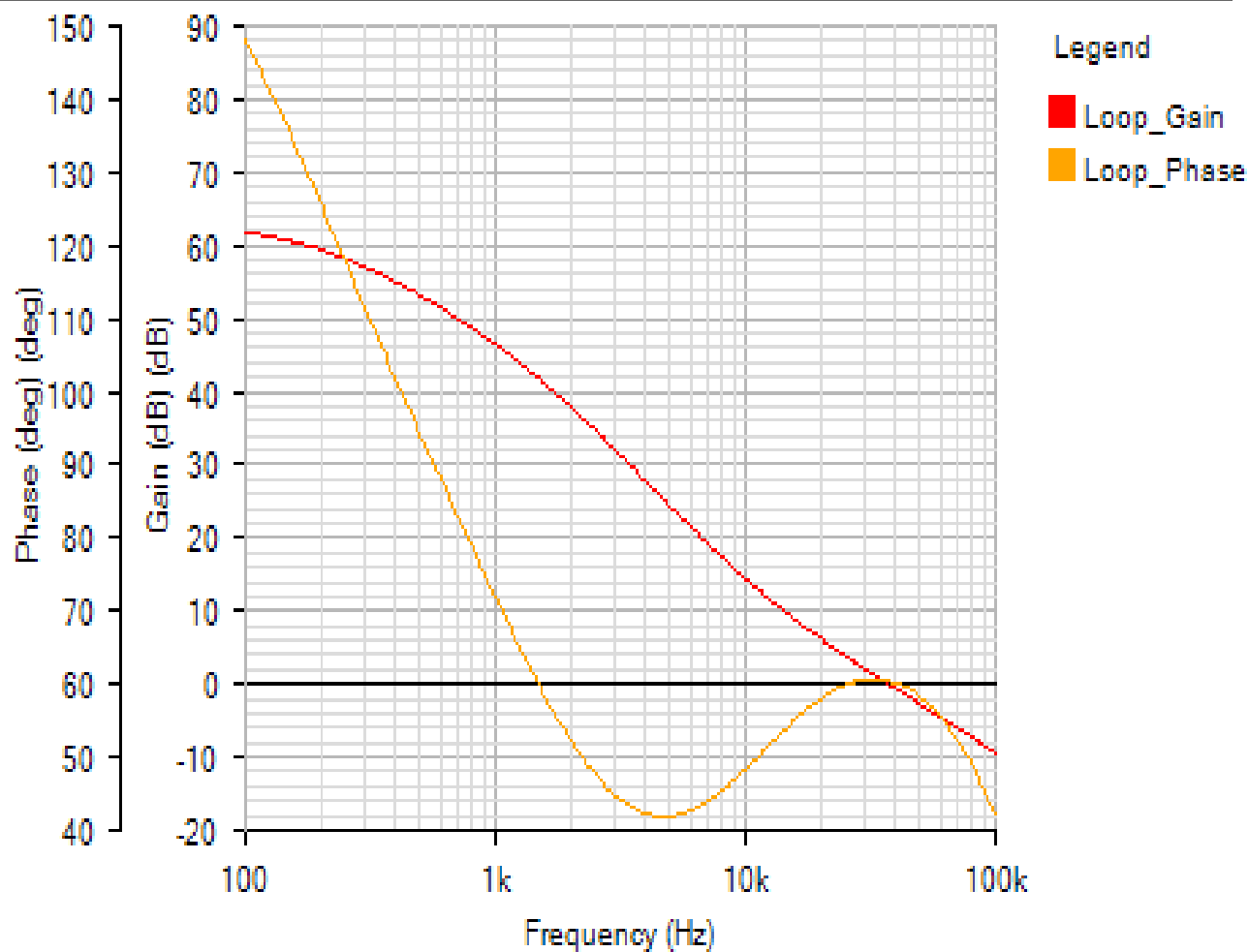




AC Loop - Fri Nov 16 2018 09:40:06

BODE

Default



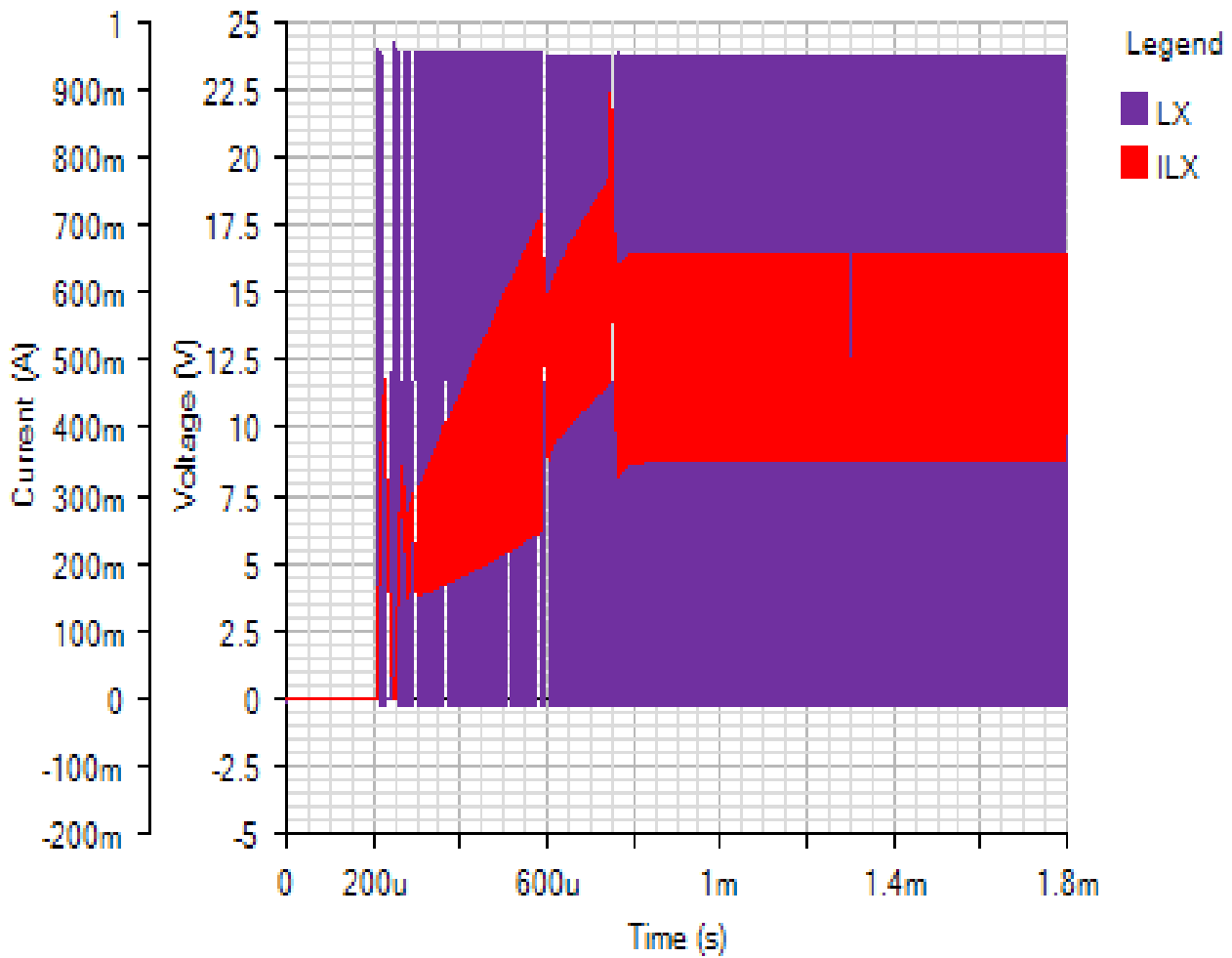
Phase Margin: 60.46° at a crossover frequency of 37.4kHz



Start Up - Fri Nov 16 2018 09:40:06

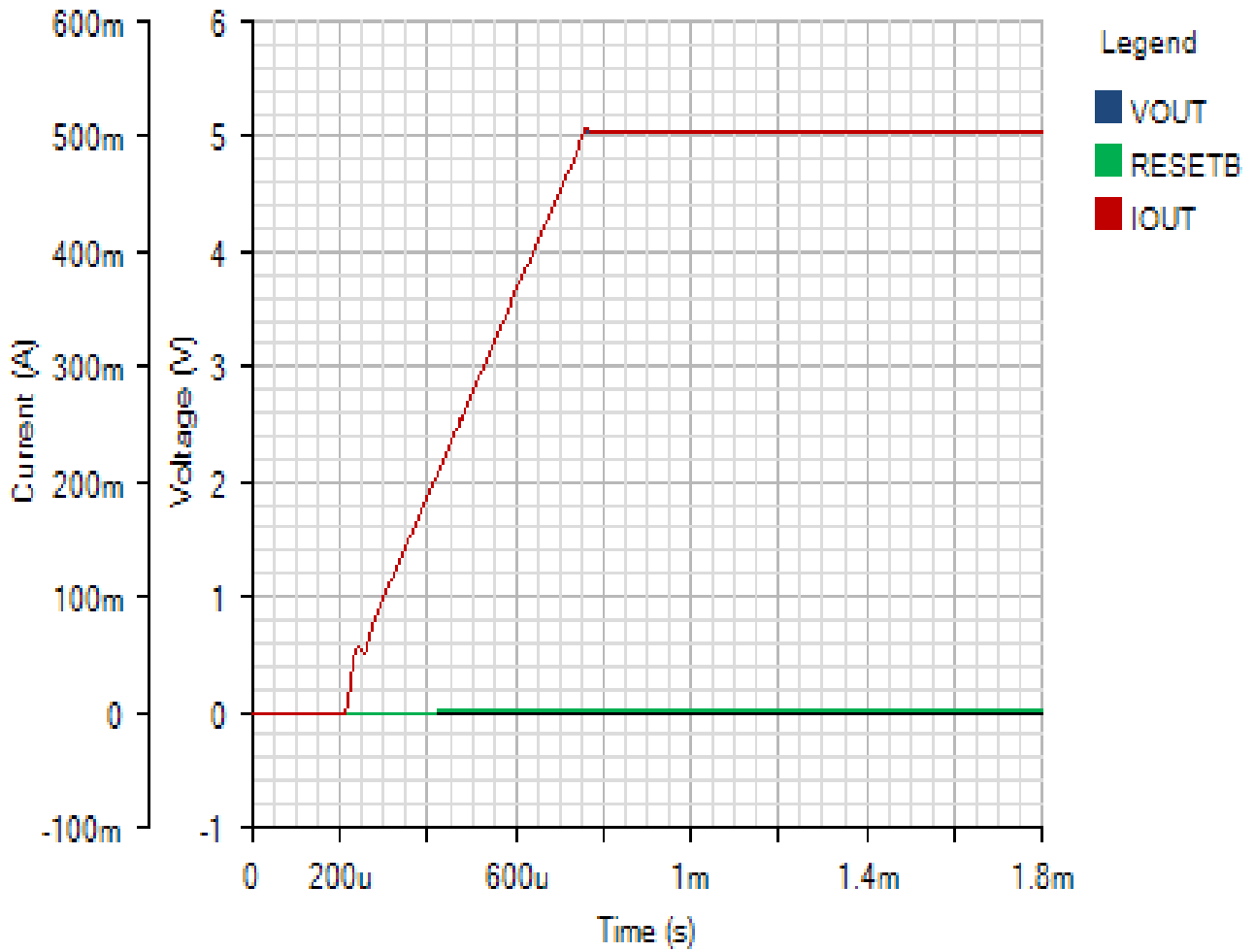
SWITCHING

Default

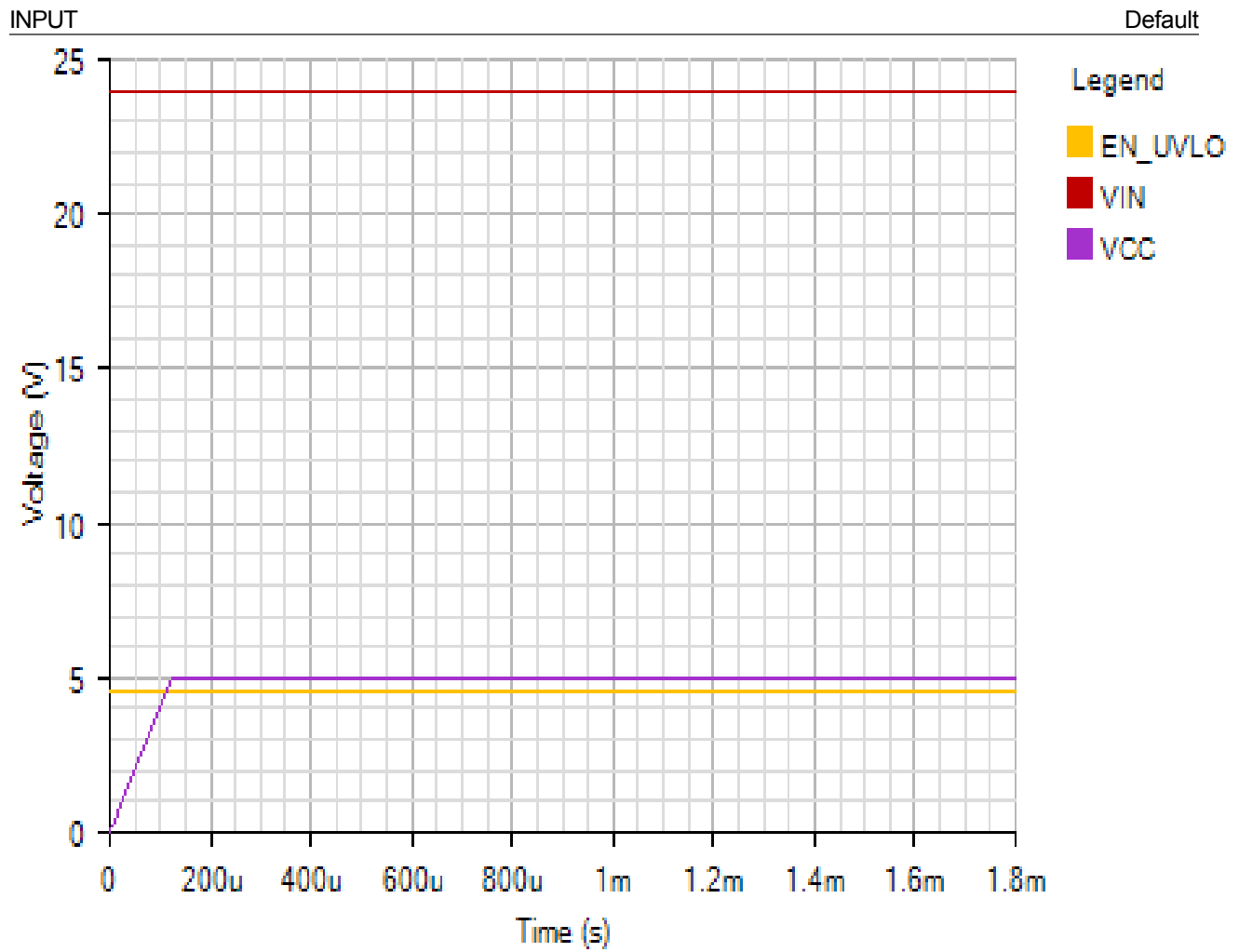


OUTPUT

Default



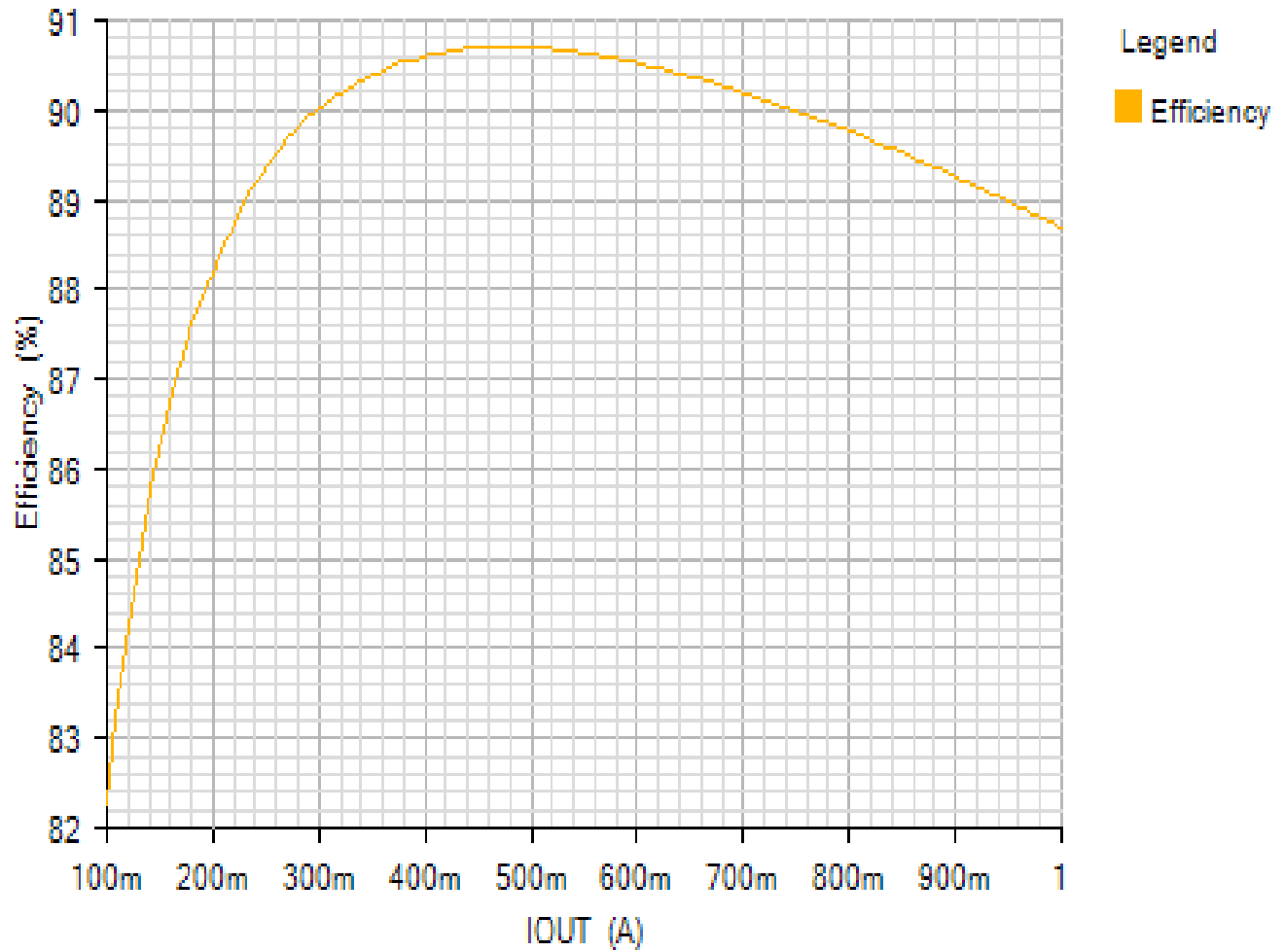




Efficiency - Fri Nov 16 2018 09:40:06

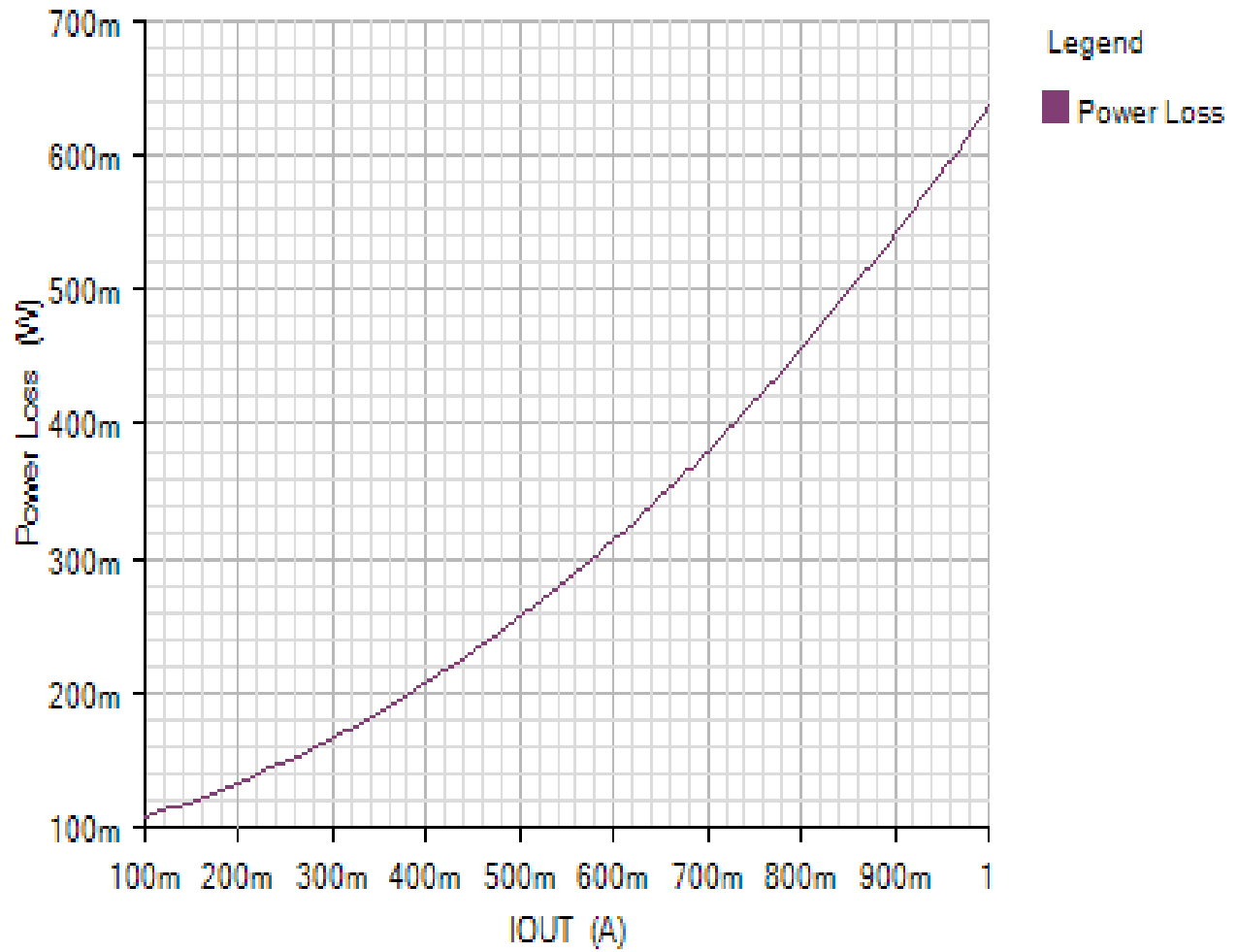
EFFICIENCY\_PLOT

Default



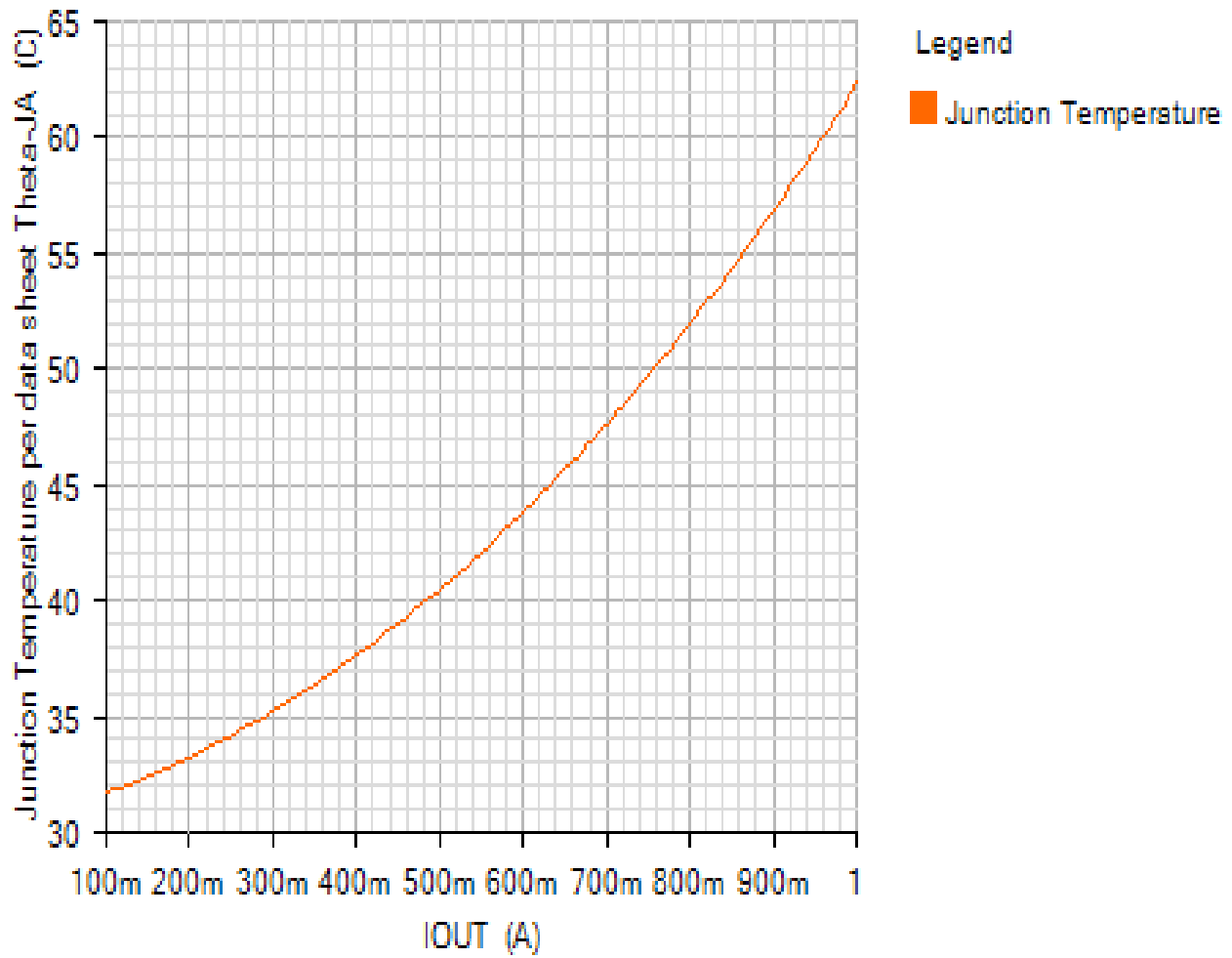
POWER\_LOSS\_PLOT

Default

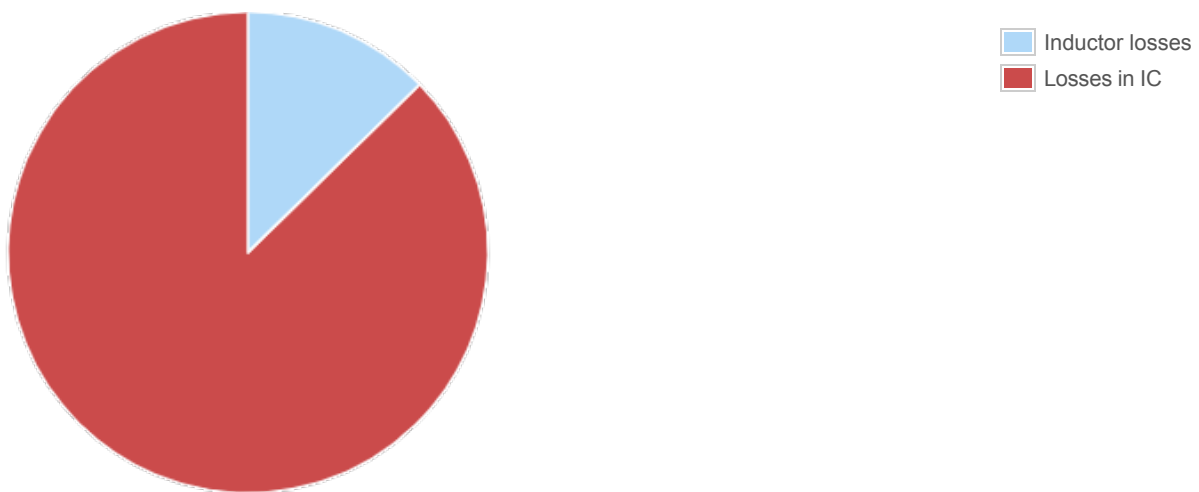


JUNCTION\_TEMPERATURE\_PLOT

Default



Losses



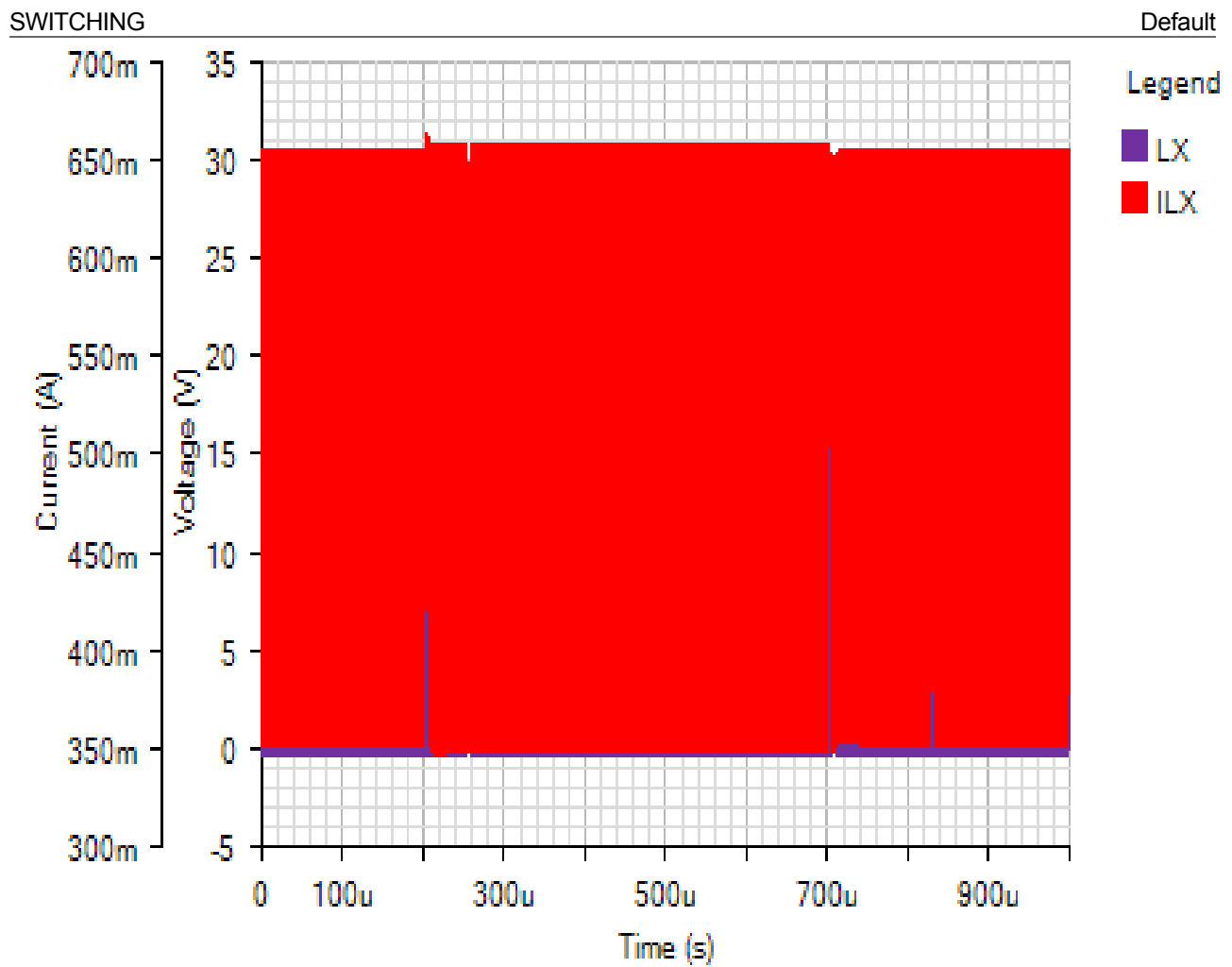
Component

Loss (W)

% of total

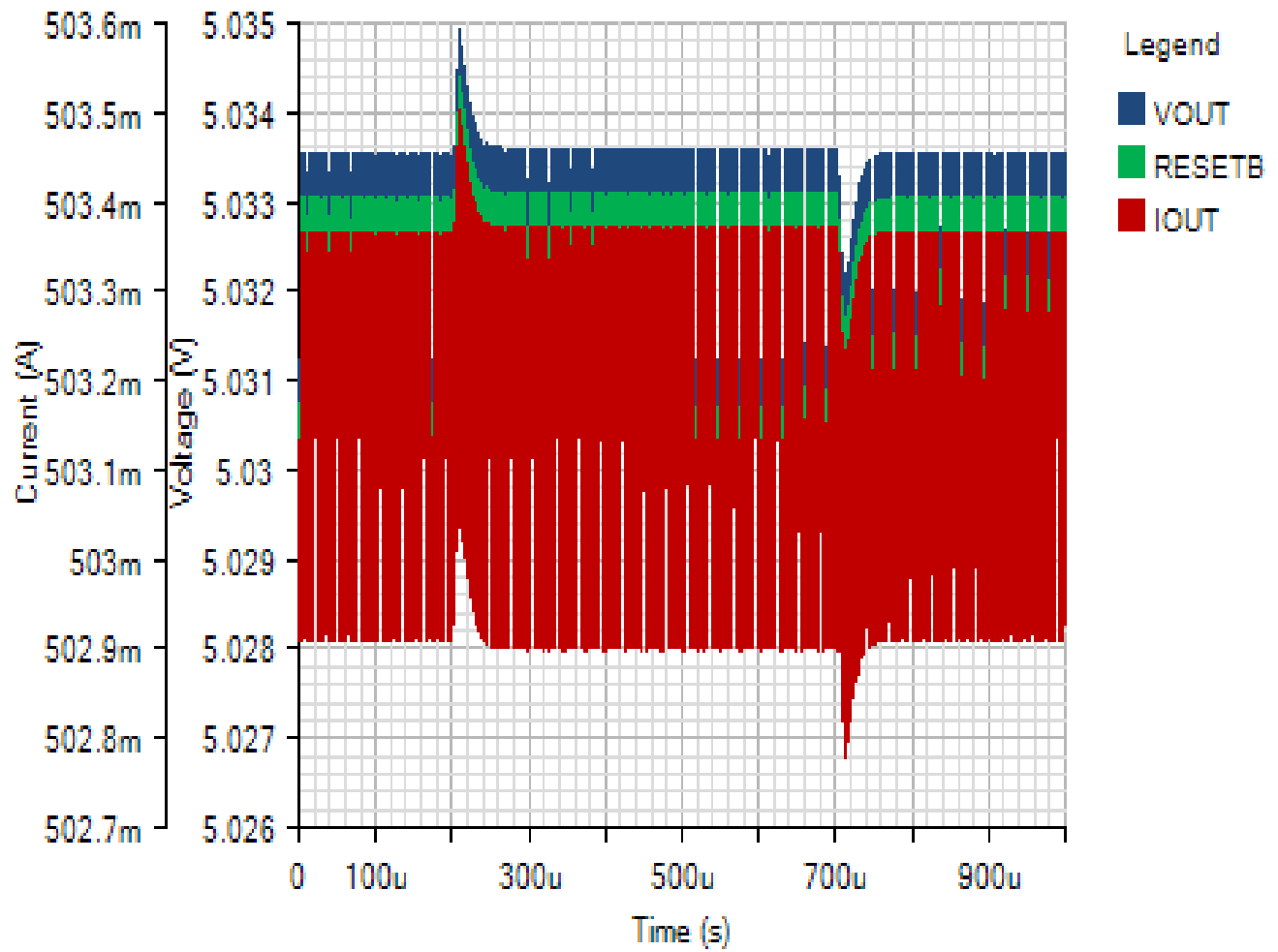
Component	Loss (W)	% of total
Inductor losses	0.08	12.7
Losses in IC	0.55	87.3
Total	0.63	100

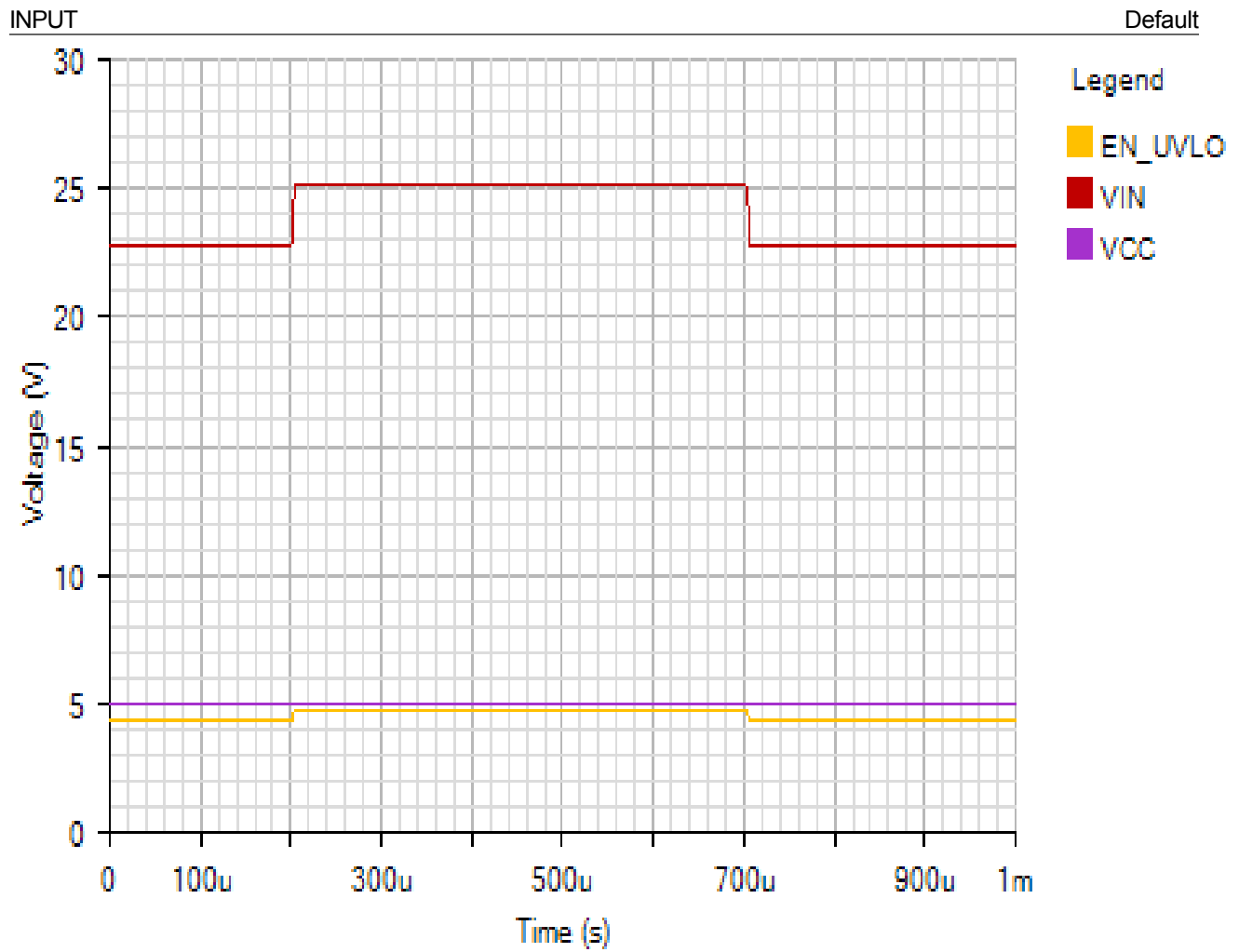
Line Transient - Fri Nov 16 2018 09:40:06



OUTPUT

Default



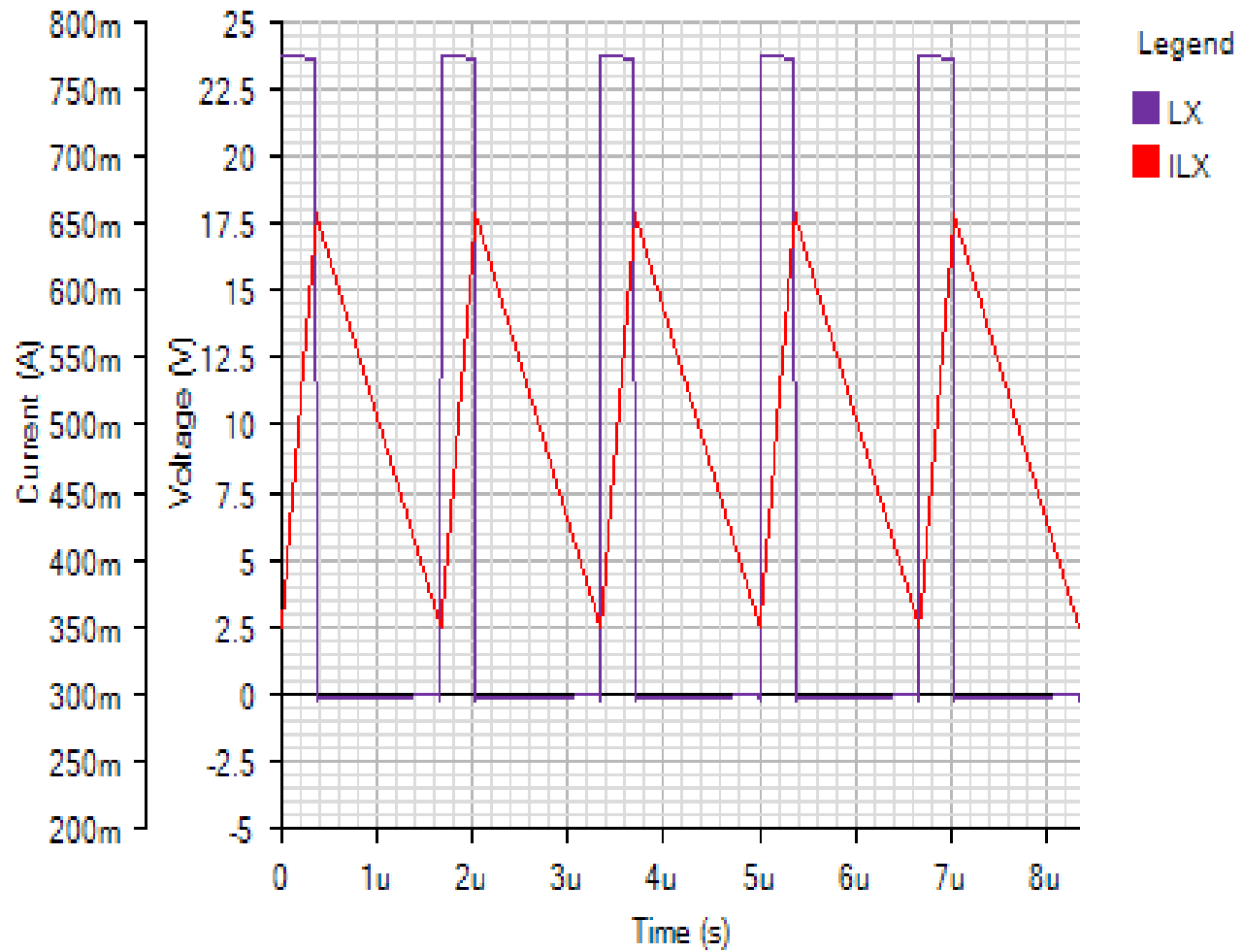




Steady State - Fri Nov 16 2018 09:40:06

SWITCHING

Default



OUTPUT

Default

