

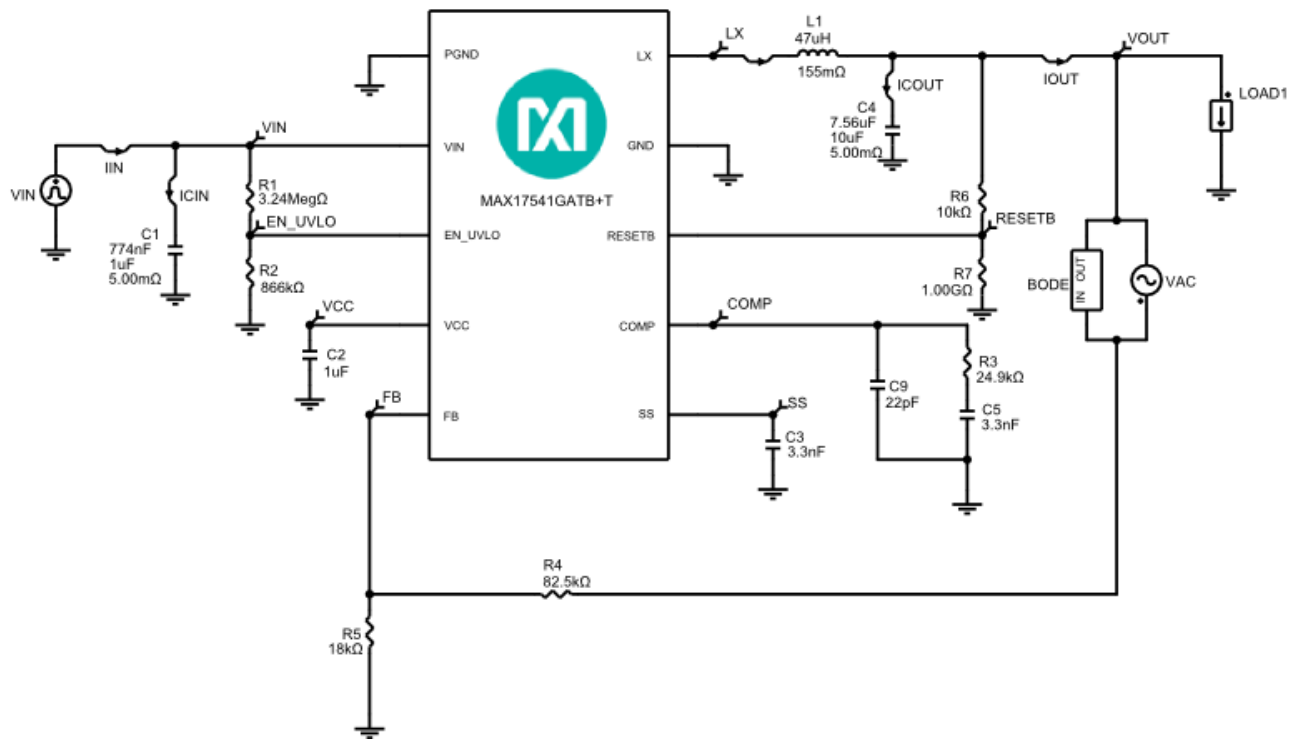
Initial Design

1.0

Design Requirements

Parameter	Value
Maximum Input Voltage	42V
Minimum Input Voltage	6.5V
Nominal Input Voltage	24V
Input Steady-State Ripple	0.25V
Input Undervoltage Lockout Level	5.9V
Output Voltage	5V
Output Current	0.5A
Output Voltage Load Step Over/Undershoot	0.15V
Performance Priority	Balance Efficiency and Size
BOM Priority	Cost
Ambient Temperature	25°C
Soft Start time	0.0006s

Schematic



Note

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

BOM

Ref	Qty	Part Number	Manufacturer	Description
U1	1	MAX17541G	Maxim Integrated	Voltage Regulators - Switching Regulators 42V, 0.5A, Ultra-Small, High efficiency, Synchronous Step-Down DC/DC converter
C1	1	C3216X7R2A105K160AA	TDK	Cap Ceramic 1uF 100V X7R 10% SMD 1206 125C Plastic T/R
C2	1	CGB3B3X7R0J105K055AB	TDK	Cap Ceramic 1uF 6.3V X7R 10% Pad SMD 0603 125°C T/R
C3	1	UMK105B7332KV-F	Taiyo Yuden	Cap Ceramic 0.0033uF 50V X7R 10% Pad SMD 0402 125°C T/R
C4	1	C2012X7R1A106K125AC	TDK	Cap Ceramic 10uF 10V X7R 10% SMD 0805 125C Plastic T/R
C5	1	UMK105B7332KV-F	Taiyo Yuden	Cap Ceramic 0.0033uF 50V X7R 10% Pad SMD 0402 125°C T/R
C9	1	GCM1555C1H220JA16D	Murata Manufacturing	Cap Ceramic 22pF 50V C0G 5% Pad SMD 0402 125°C Automotive T/R
L1	1	MSS7341-473MLB	Coilcraft	Inductor 47uH 20% 127mOhm 1A Isat 1.85A Irms
R1	1	CRCW06033M24FKEA	Vishay	Res Thick Film 0603 3.24M Ohm 1% 0.1W(1/10W) ±100ppm/°C Pad SMD

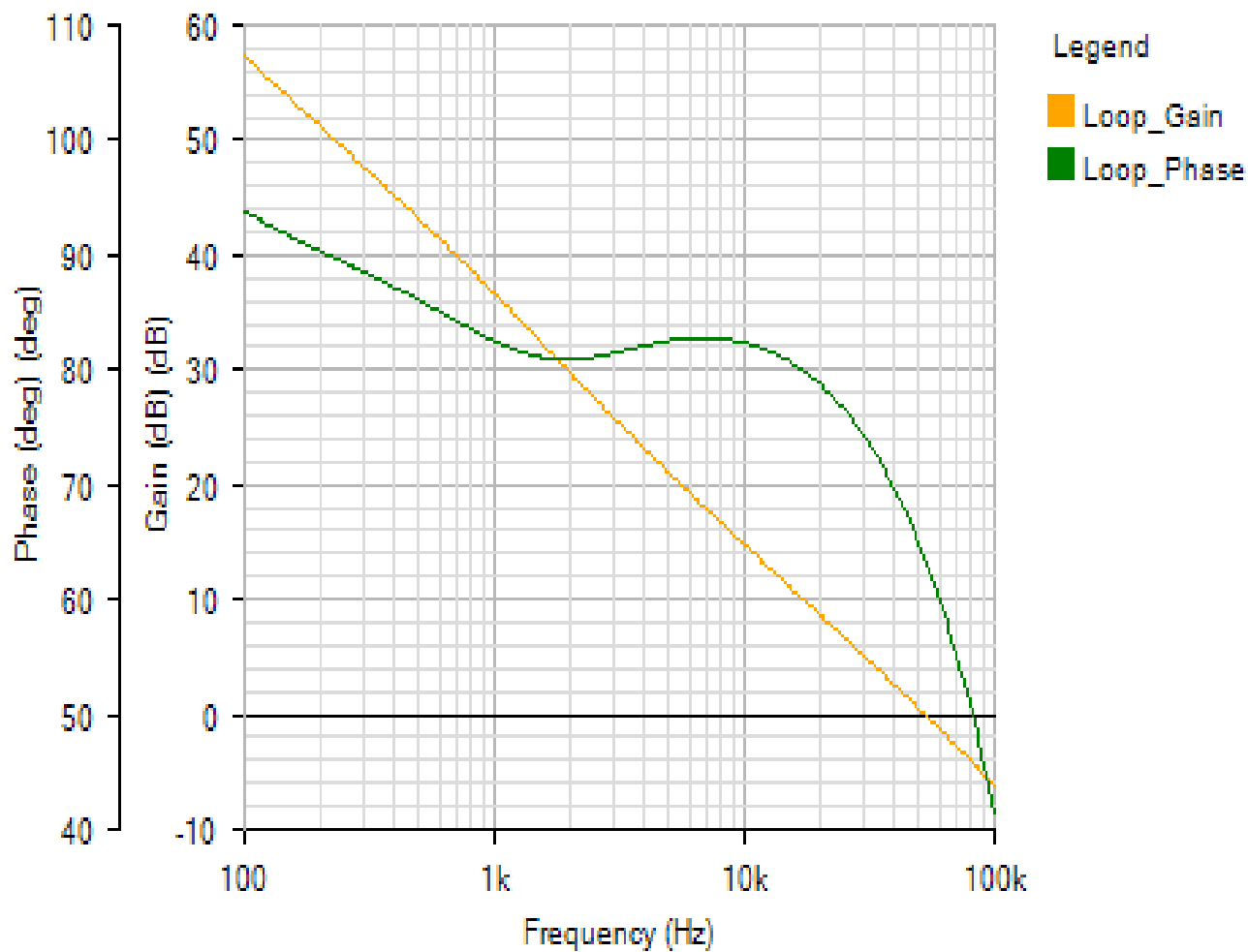
R2	1	CRCW0603866KFKEA	Vishay	Automotive T/R Res Thick Film 0603 866K Ohm 1% 0.1W(1/10W) ±100ppm/°C Pad SMD Automotive T/R
R3	1	CRCW060324K9FKEA	Vishay	Res Thick Film 0603 24.9K Ohm 1% 0.1W(1/10W) ±100ppm/°C Pad SMD Automotive T/R
R4	1	CRCW060382K5FKEA	Vishay	Res Thick Film 0603 82.5K Ohm 1% 0.1W(1/10W) ±100ppm/°C Pad SMD Automotive T/R
R5	1	MCT06030C1802FP500	Vishay	Res Thin Film 0603 18K Ohm 1% 0.125W(1/8W) ±50ppm/°C Sulfur Resistant Pad SMD Automotive Medical T/R
R6	1	CRCW040210K0FKED	Vishay	Res Thick Film 0402 10K Ohm 1% 0.063W(1/16W) ±100ppm/°C Pad SMD Automotive T/R

Simulation Results

AC Loop - Tue Nov 20 2018 15:43:34

BODE

Default



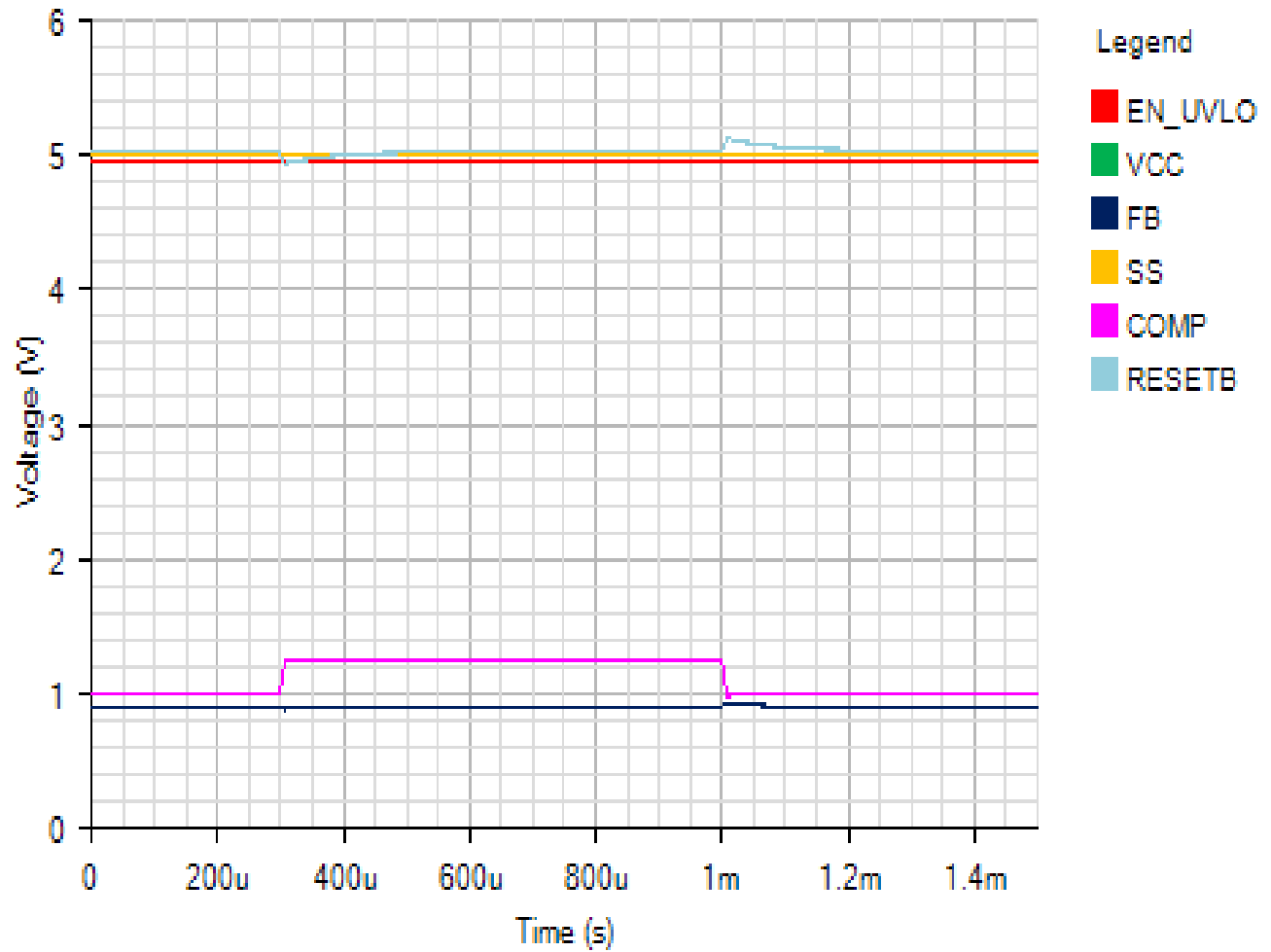
Phase Margin: 63.64° at a crossover frequency of 52.8kHz



Load Step - Tue Nov 20 2018 15:43:34

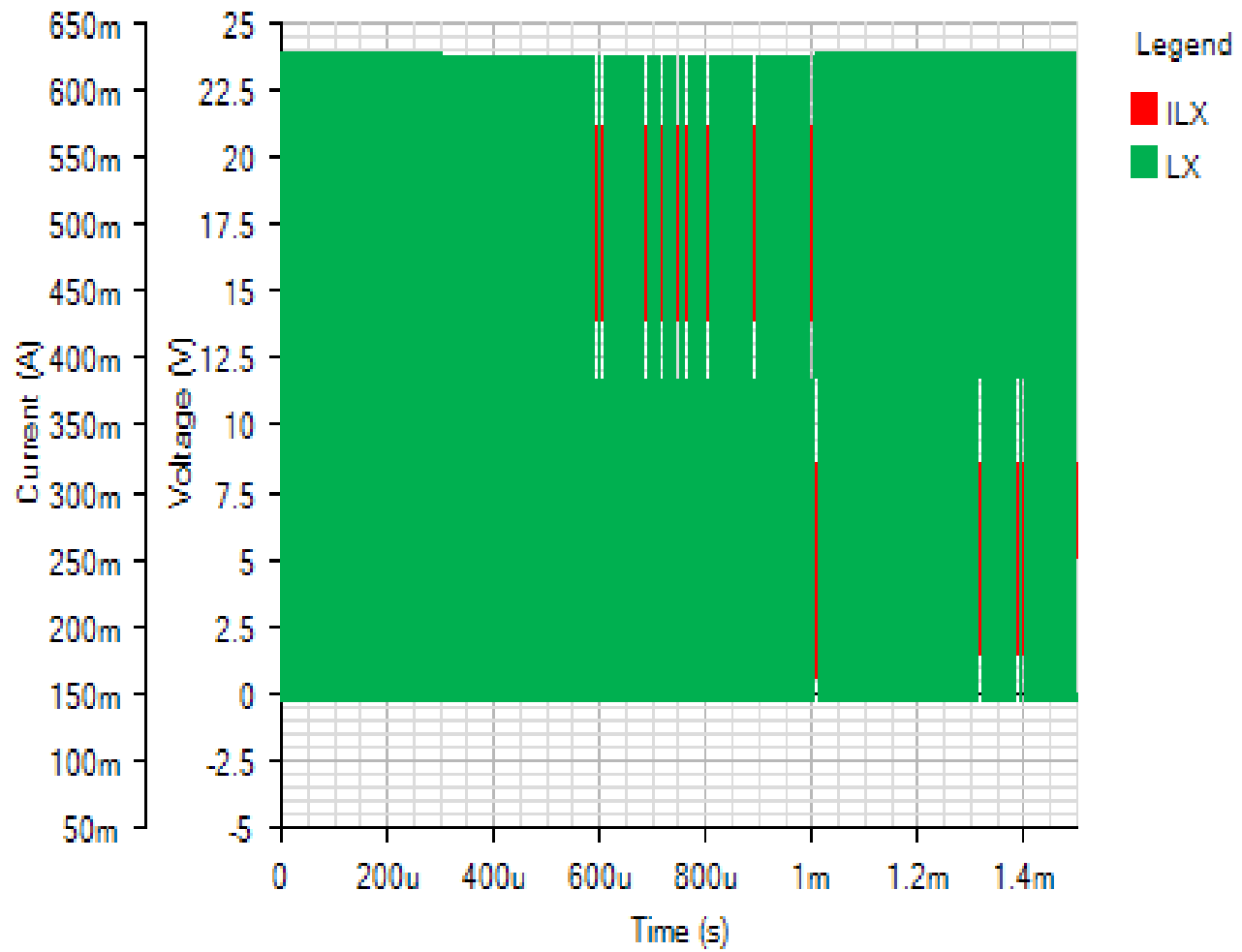
IC

Default



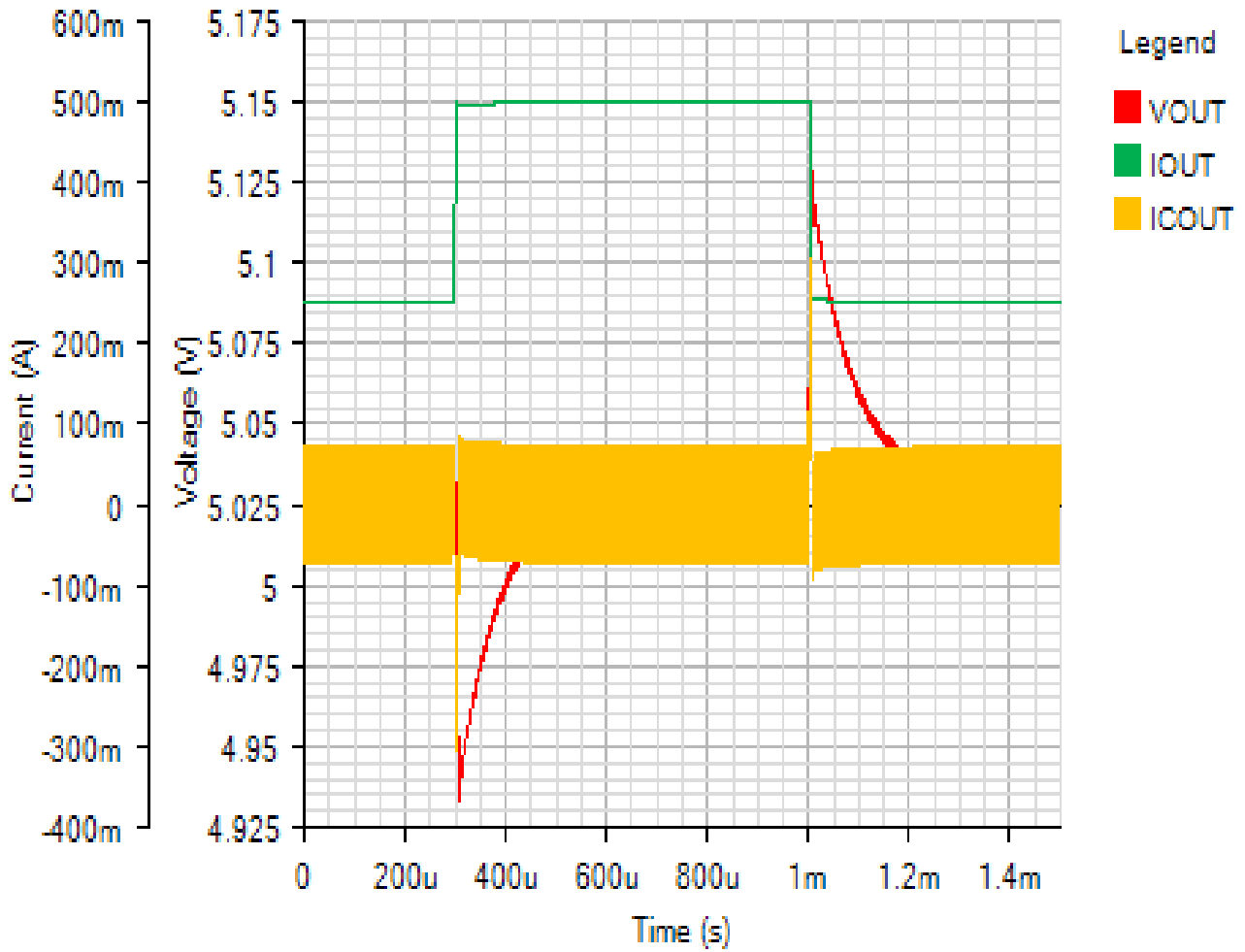
SWITCHING

Default



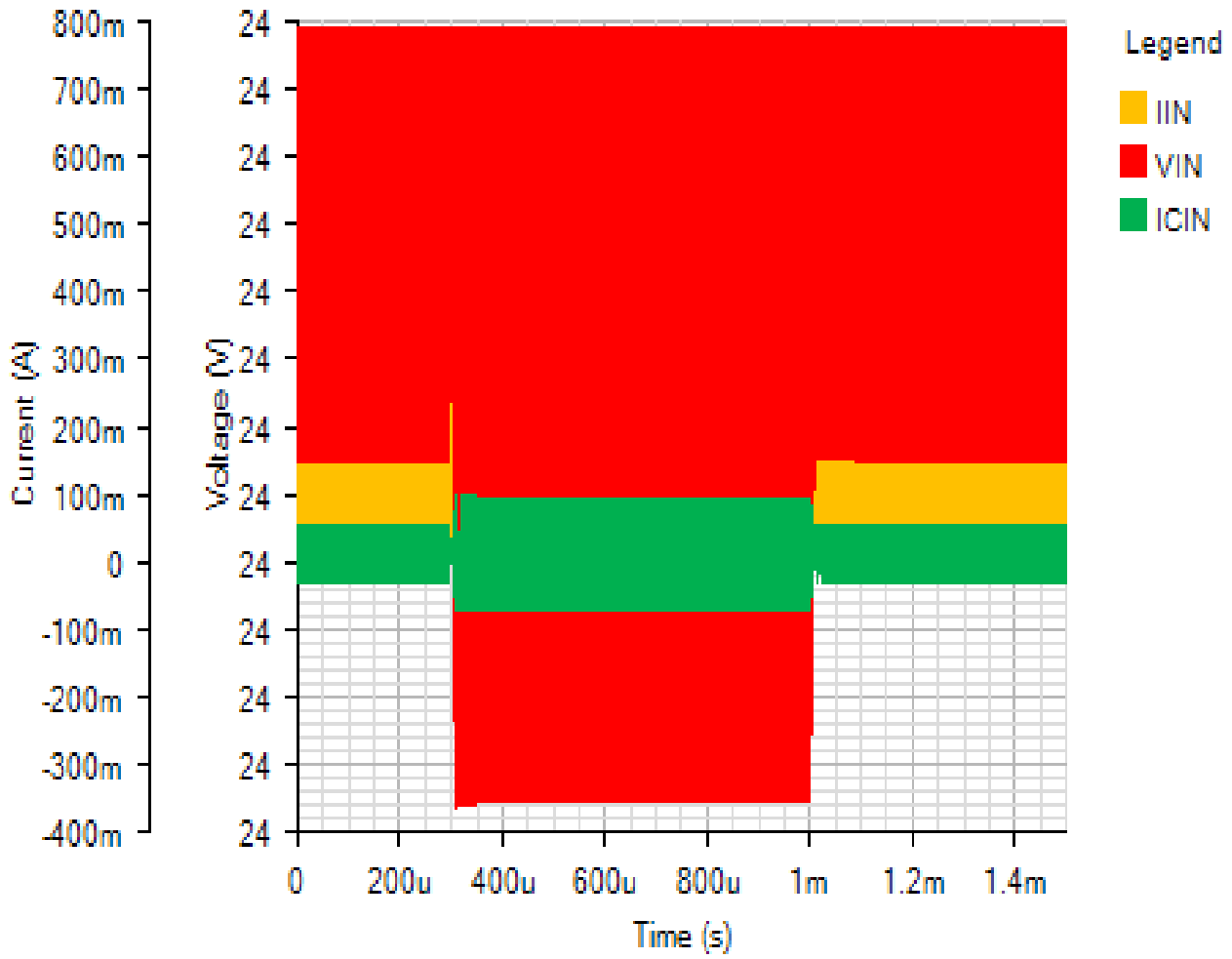
OUTPUT

Default



INPUT

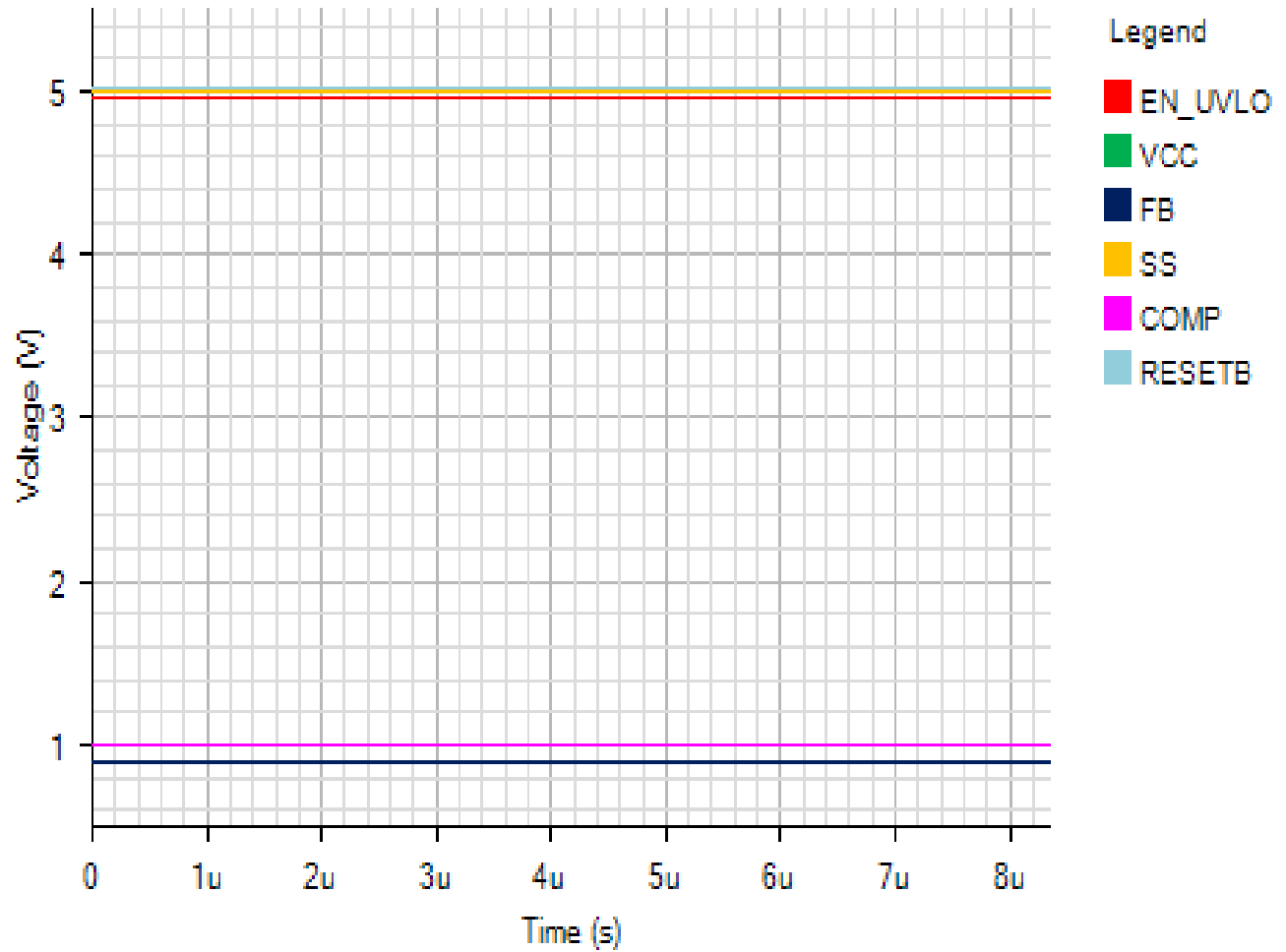
Default



Steady State - Tue Nov 20 2018 15:43:34

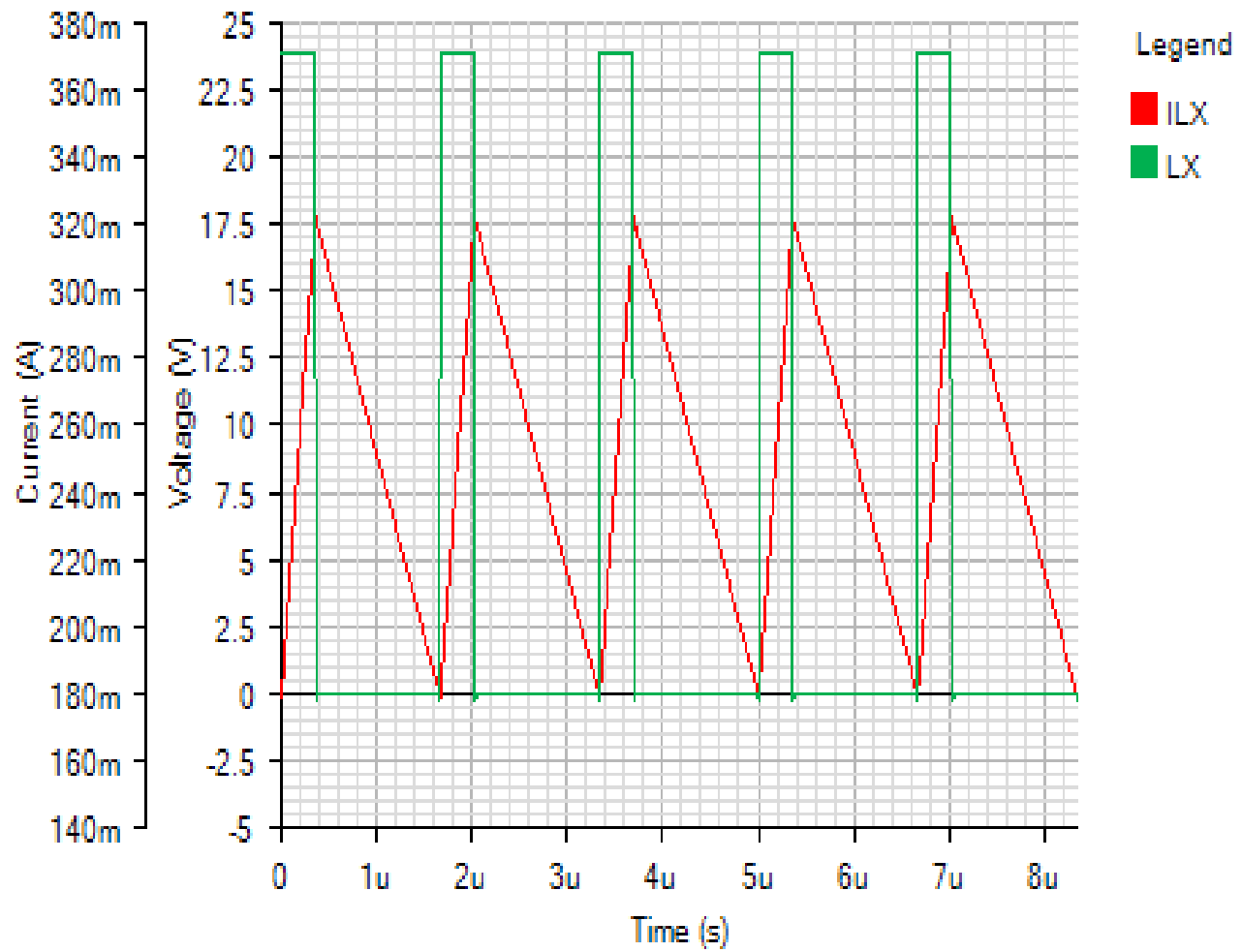
IC

Default



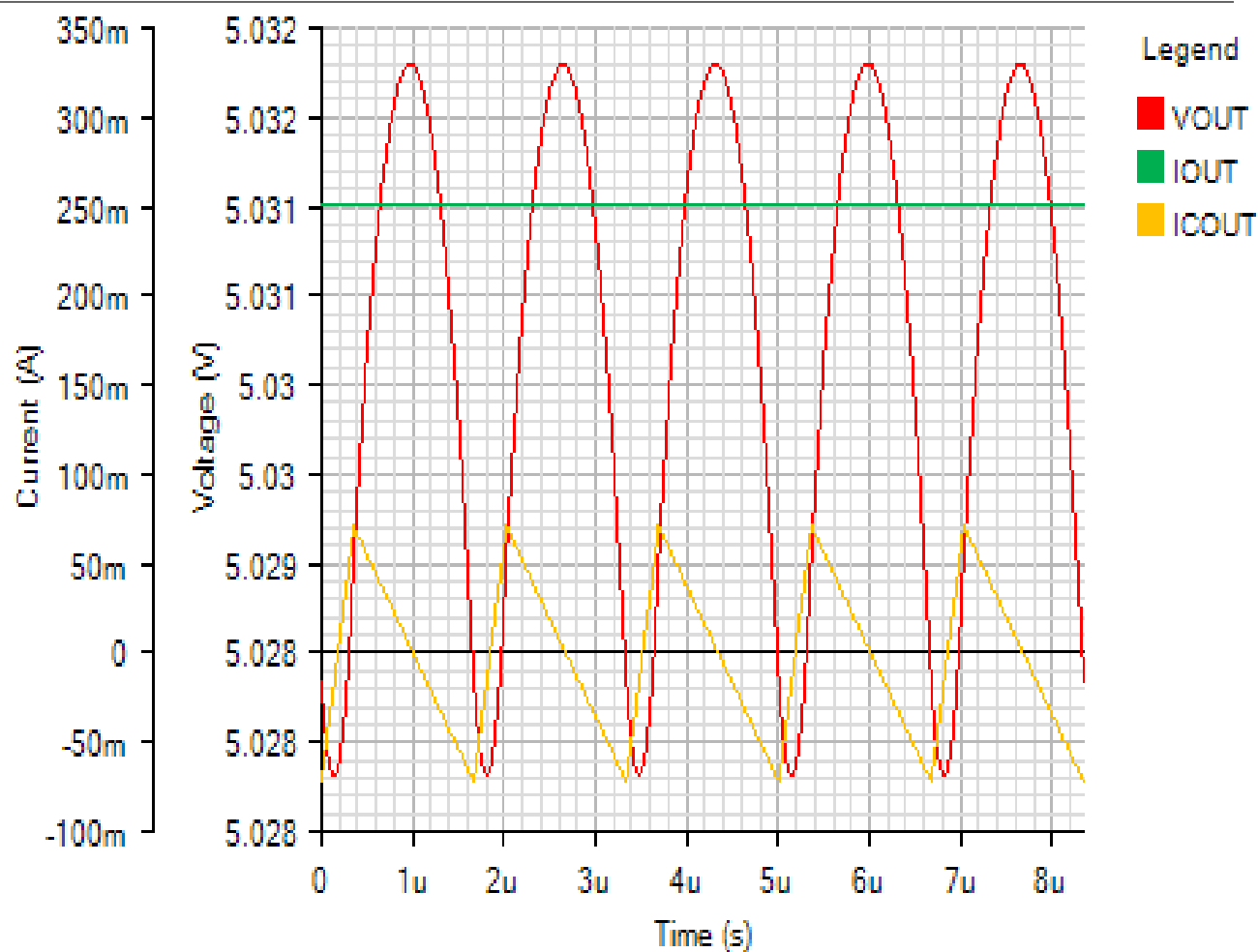
SWITCHING

Default



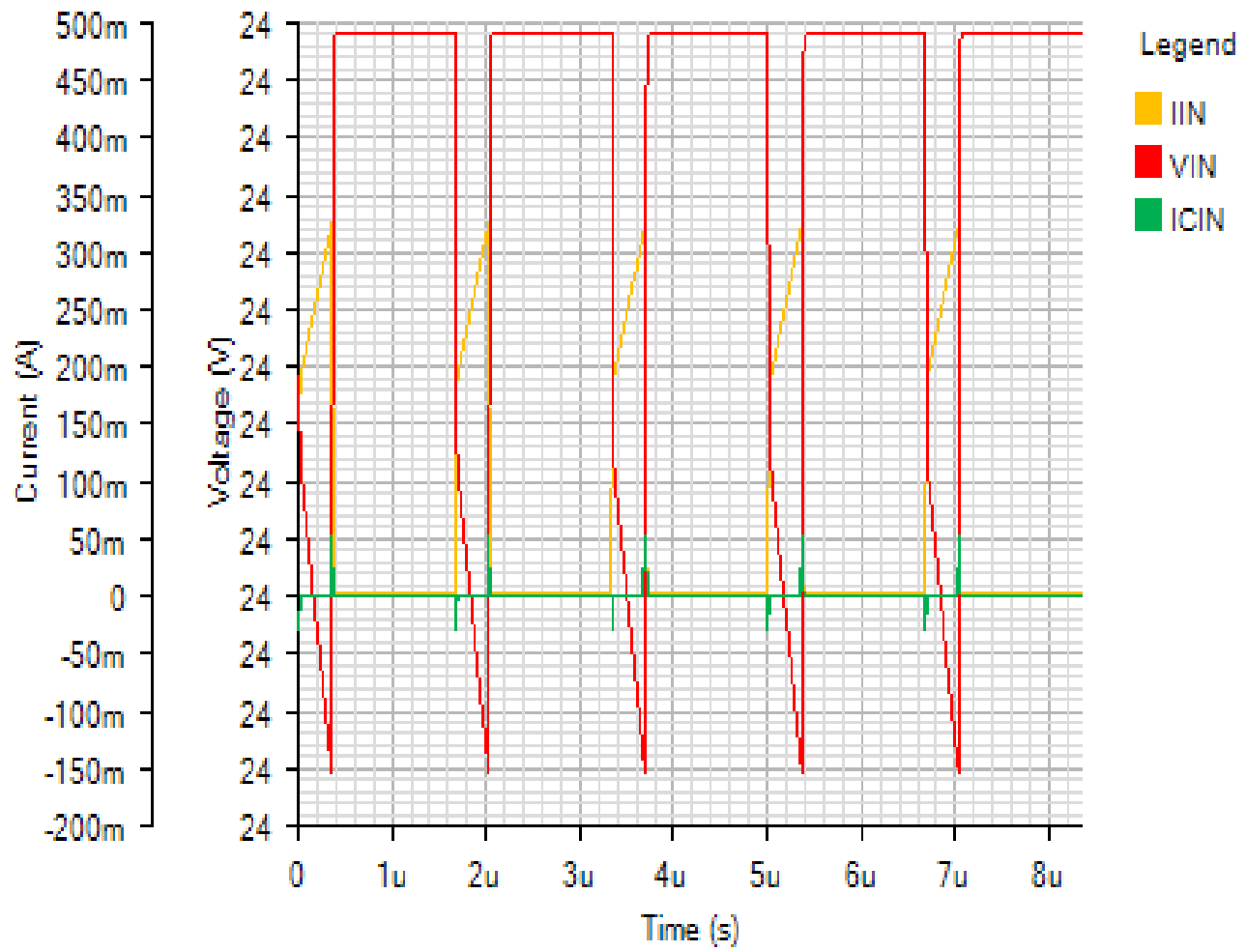
OUTPUT

Default



INPUT

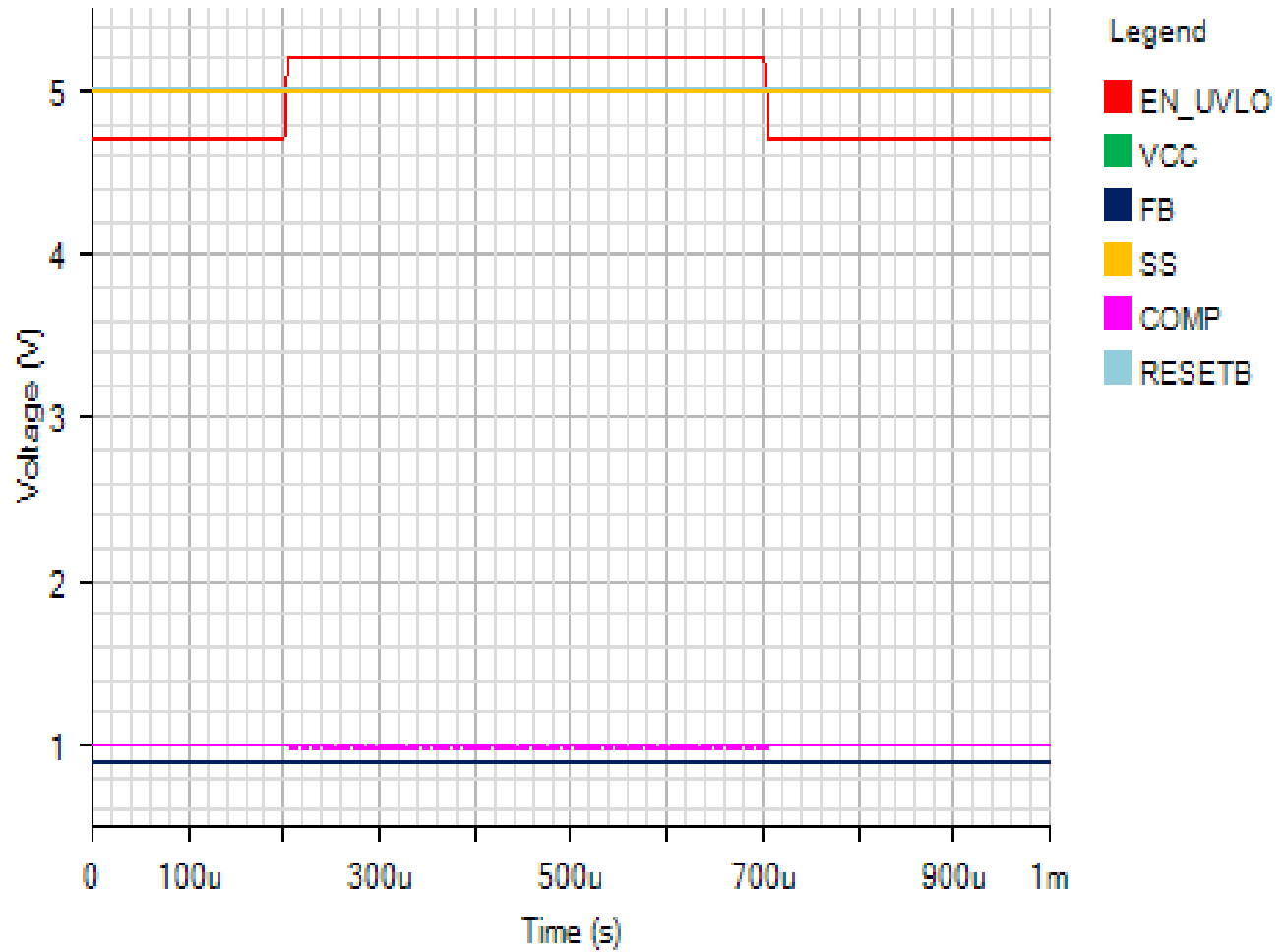
Default



Line Transient - Tue Nov 20 2018 15:43:34

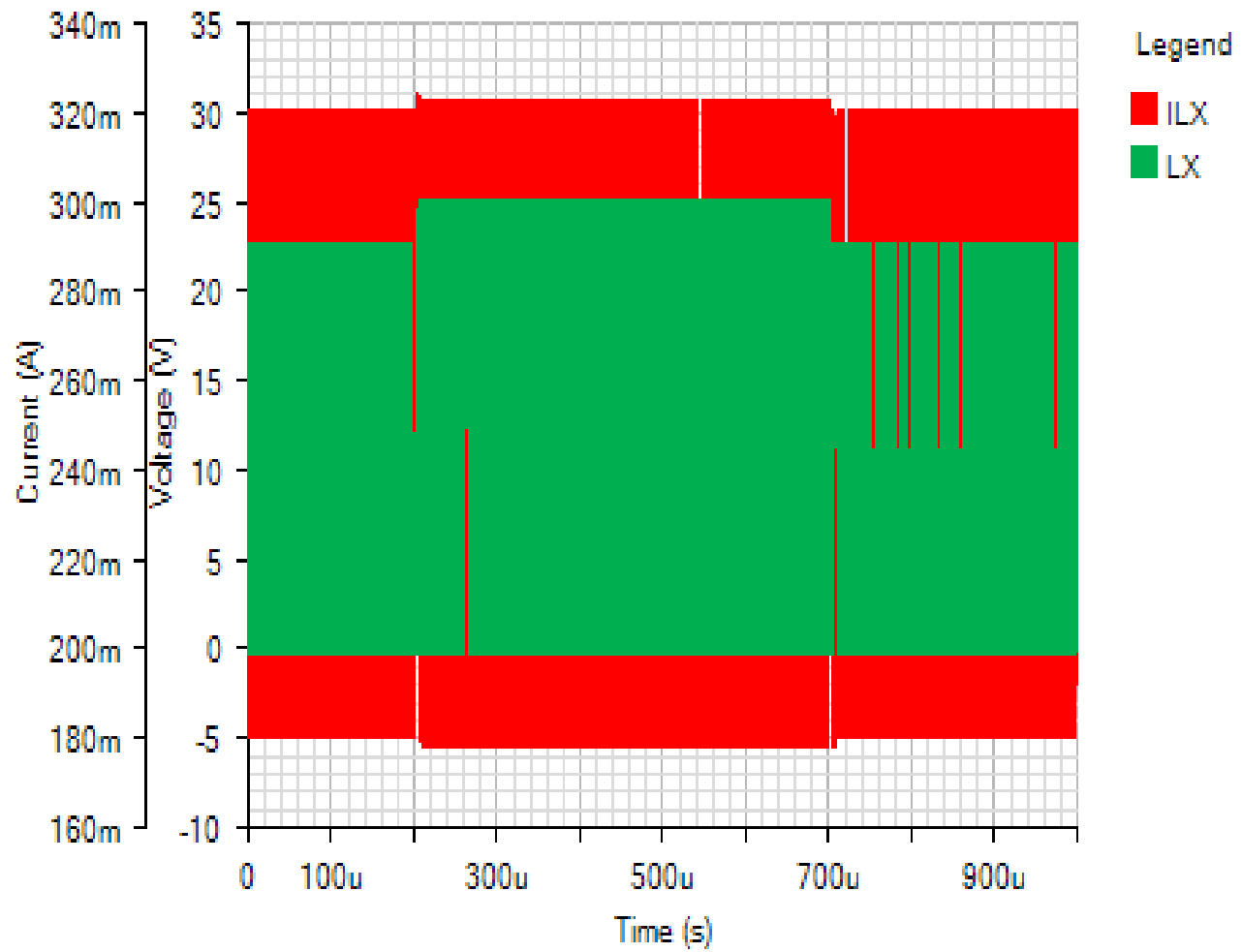
IC

Default



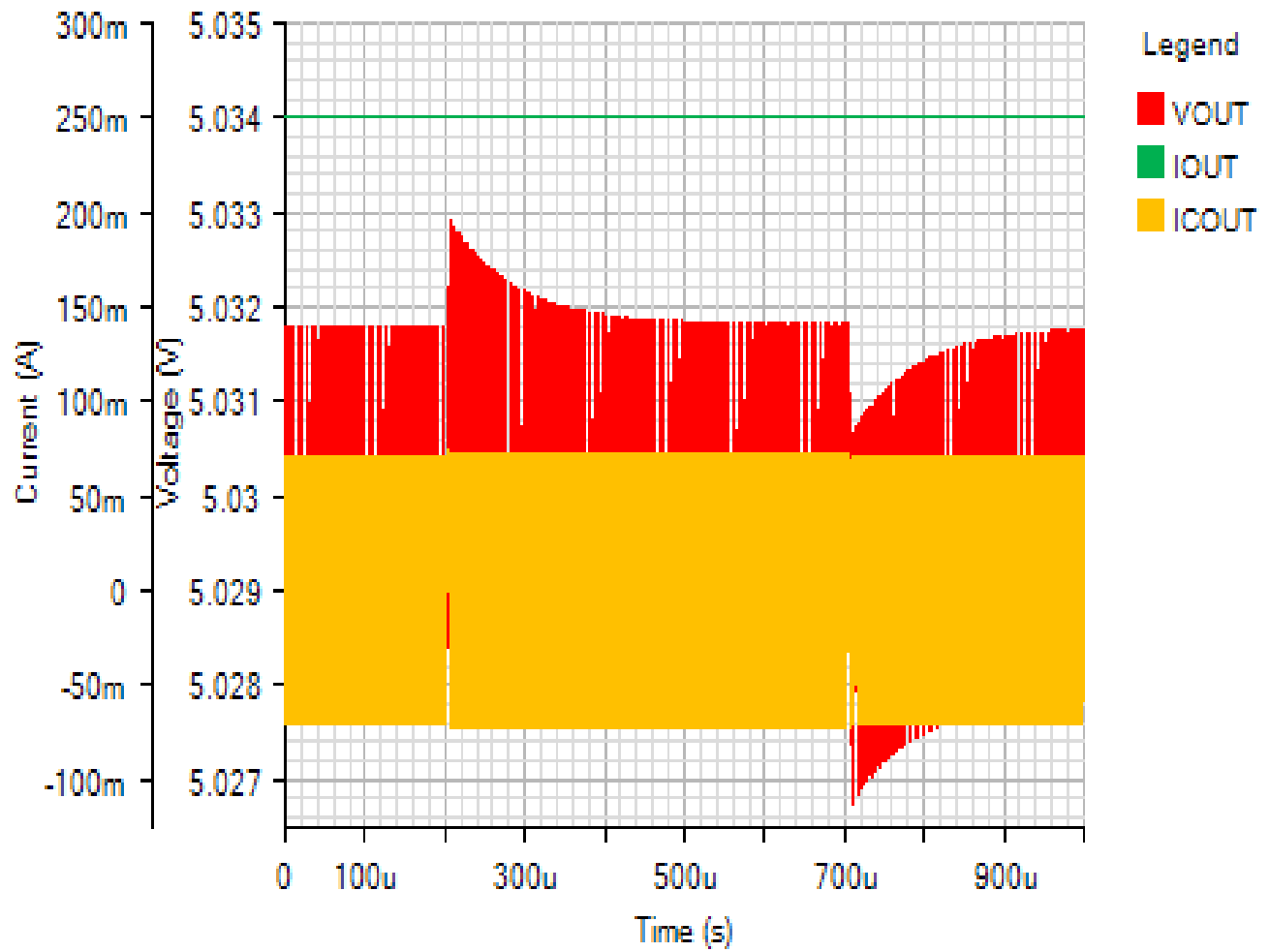
SWITCHING

Default



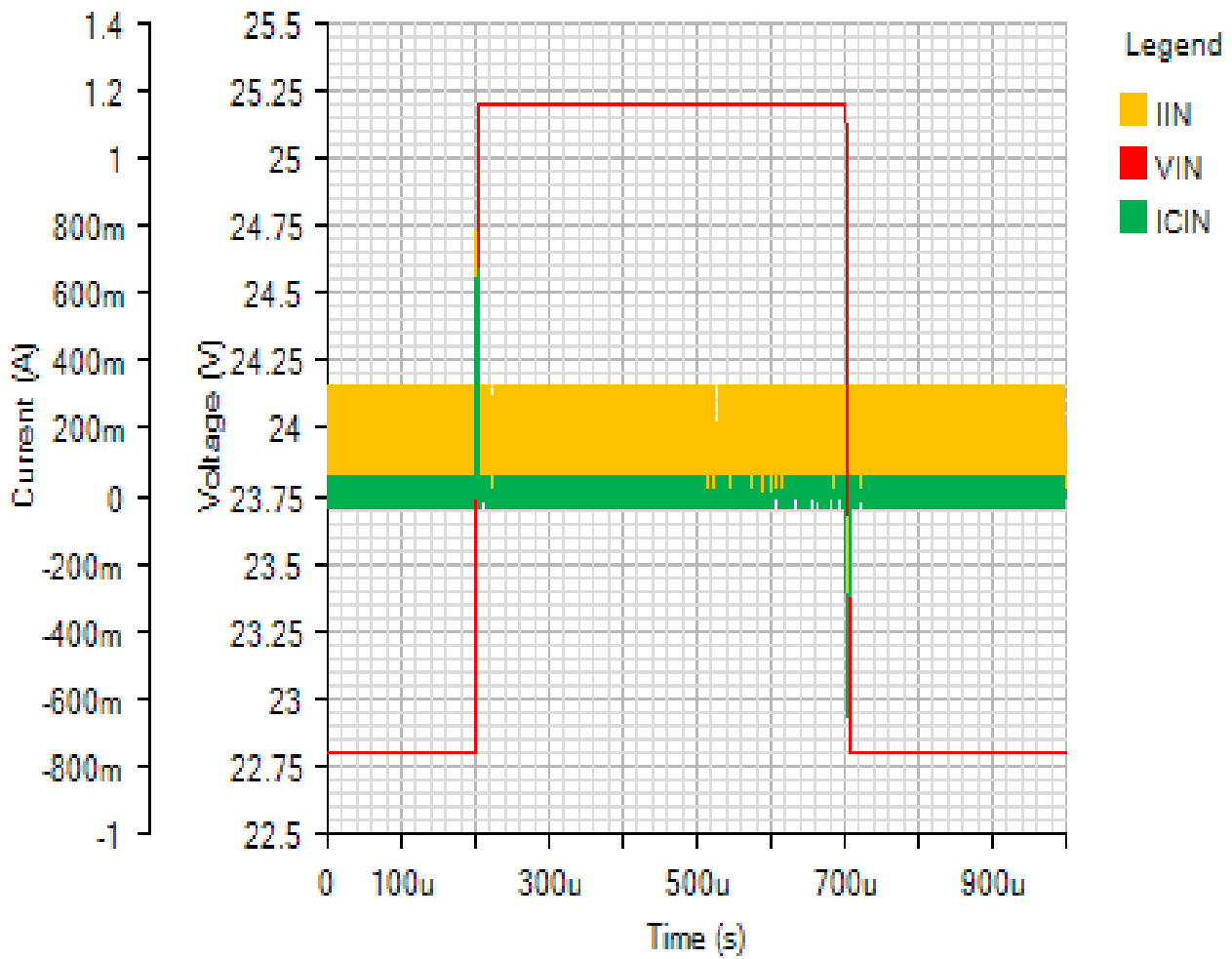
OUTPUT

Default



INPUT

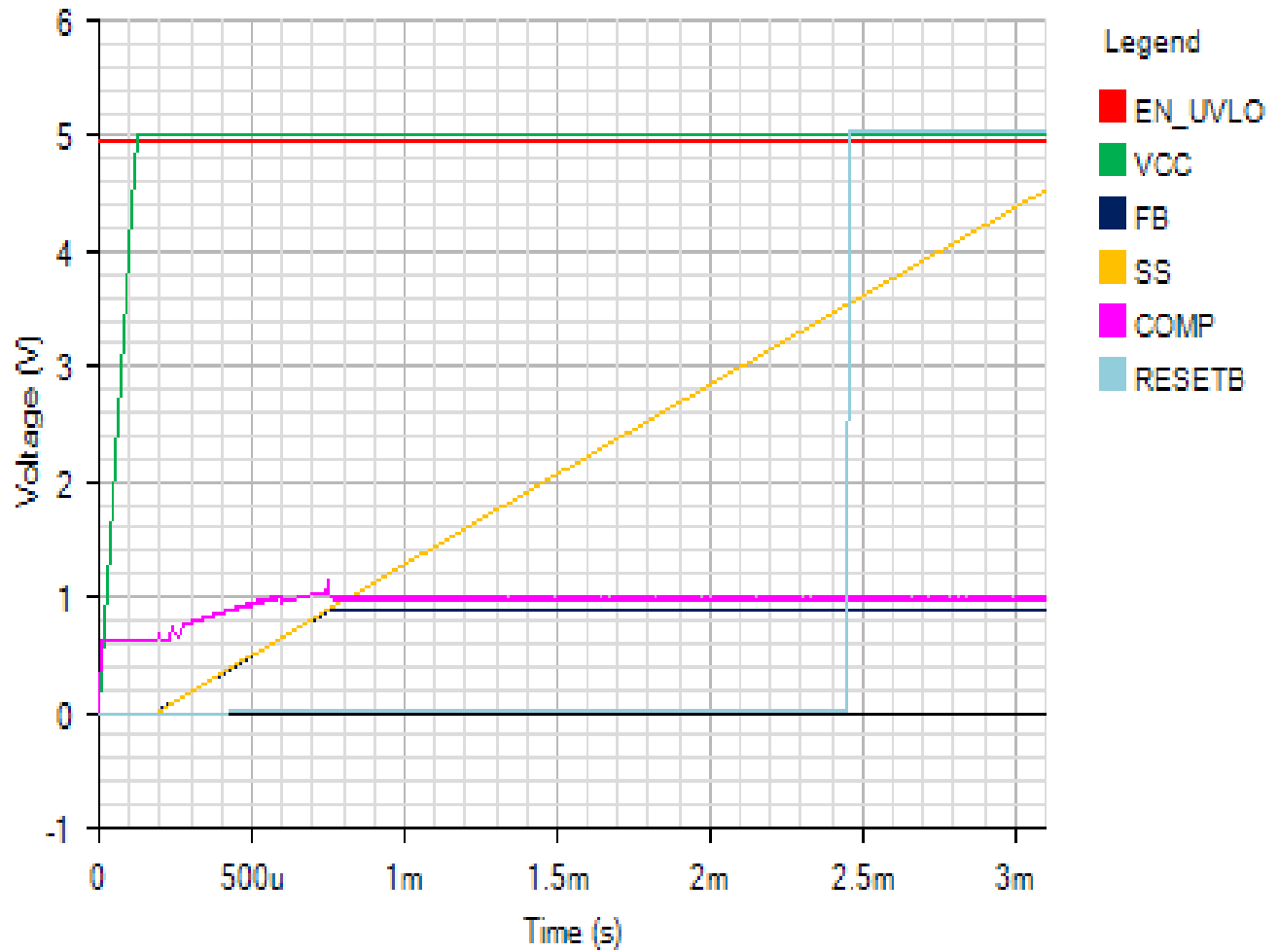
Default



Start Up - Tue Nov 20 2018 15:43:34

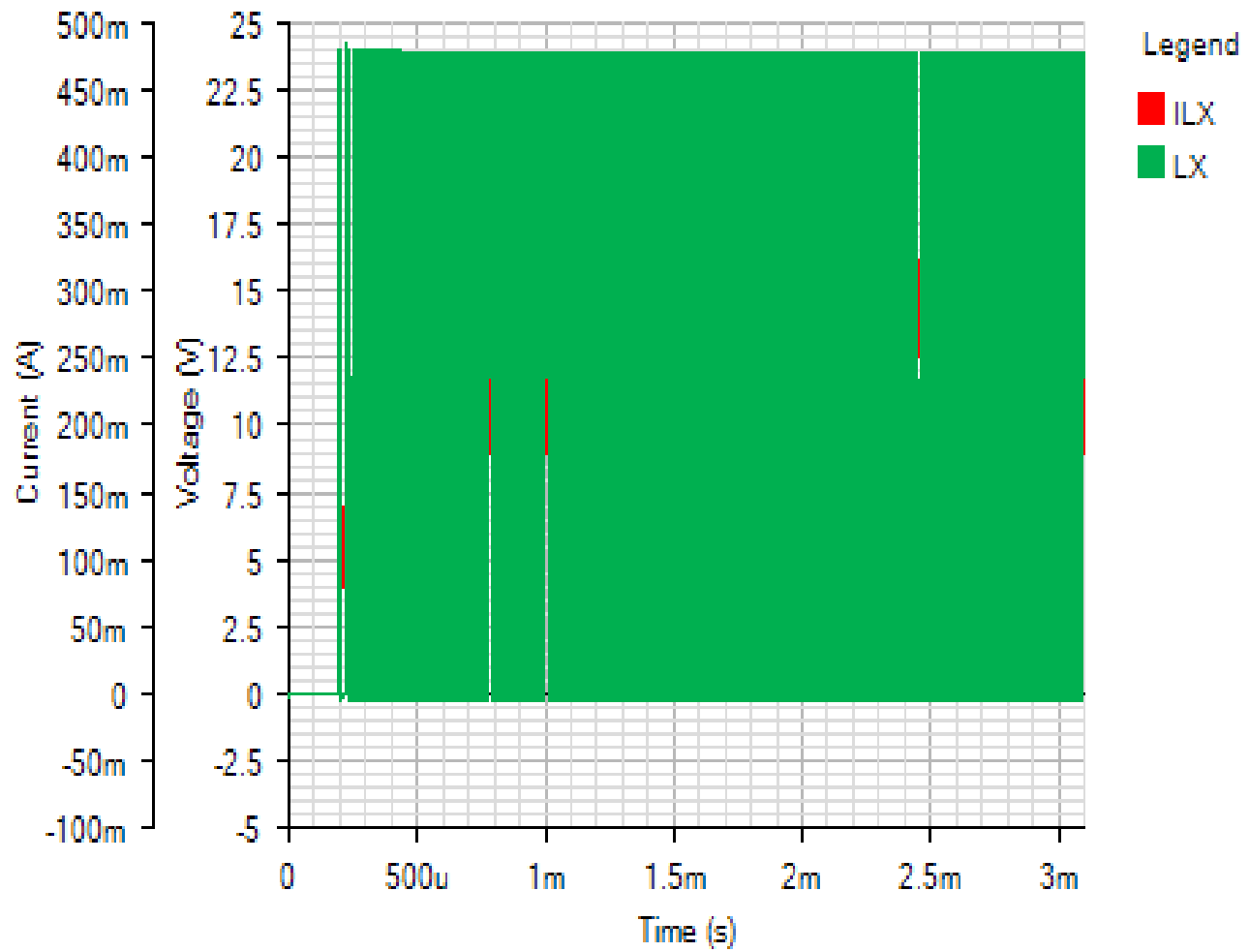
IC

Default



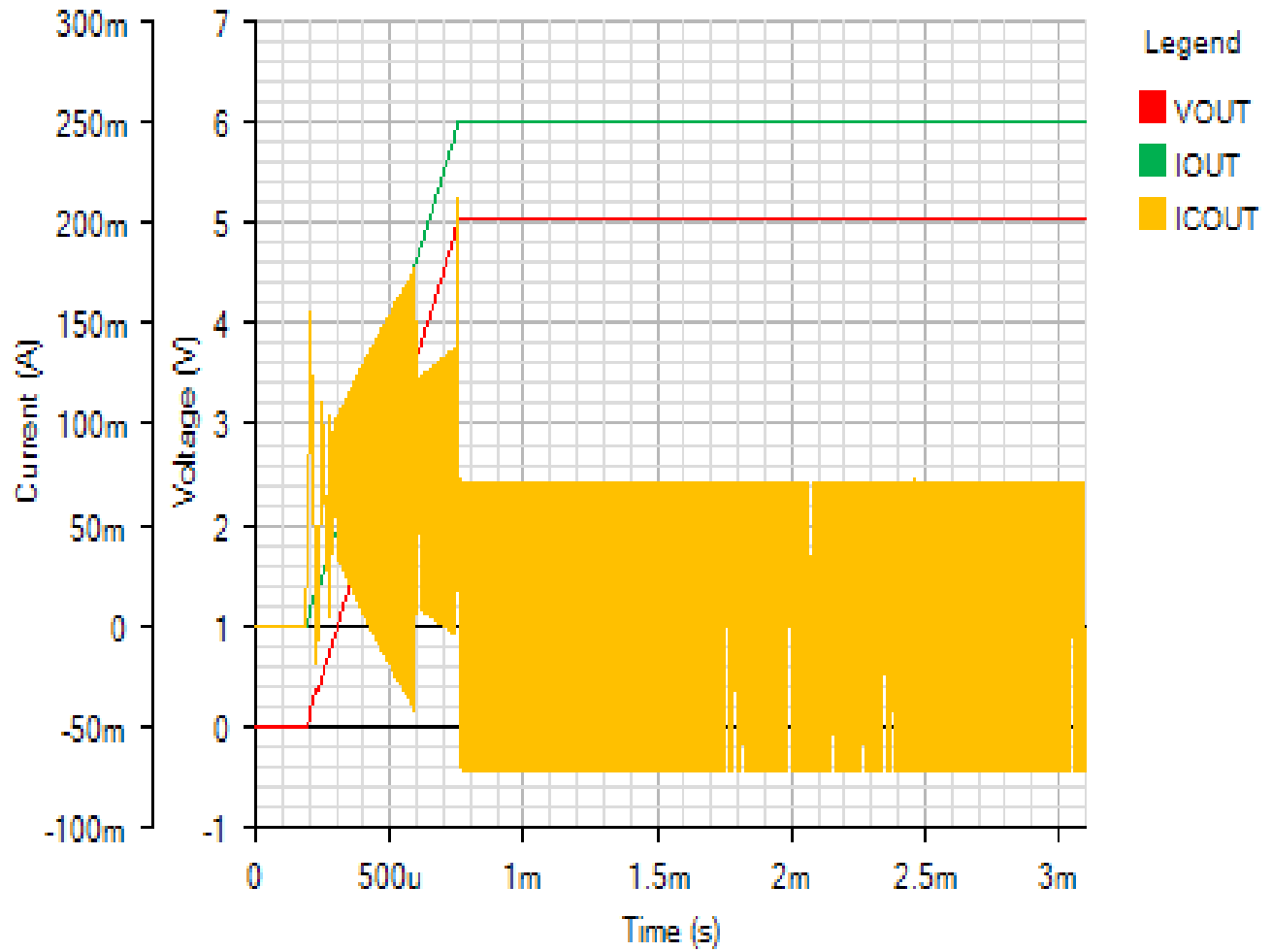
SWITCHING

Default



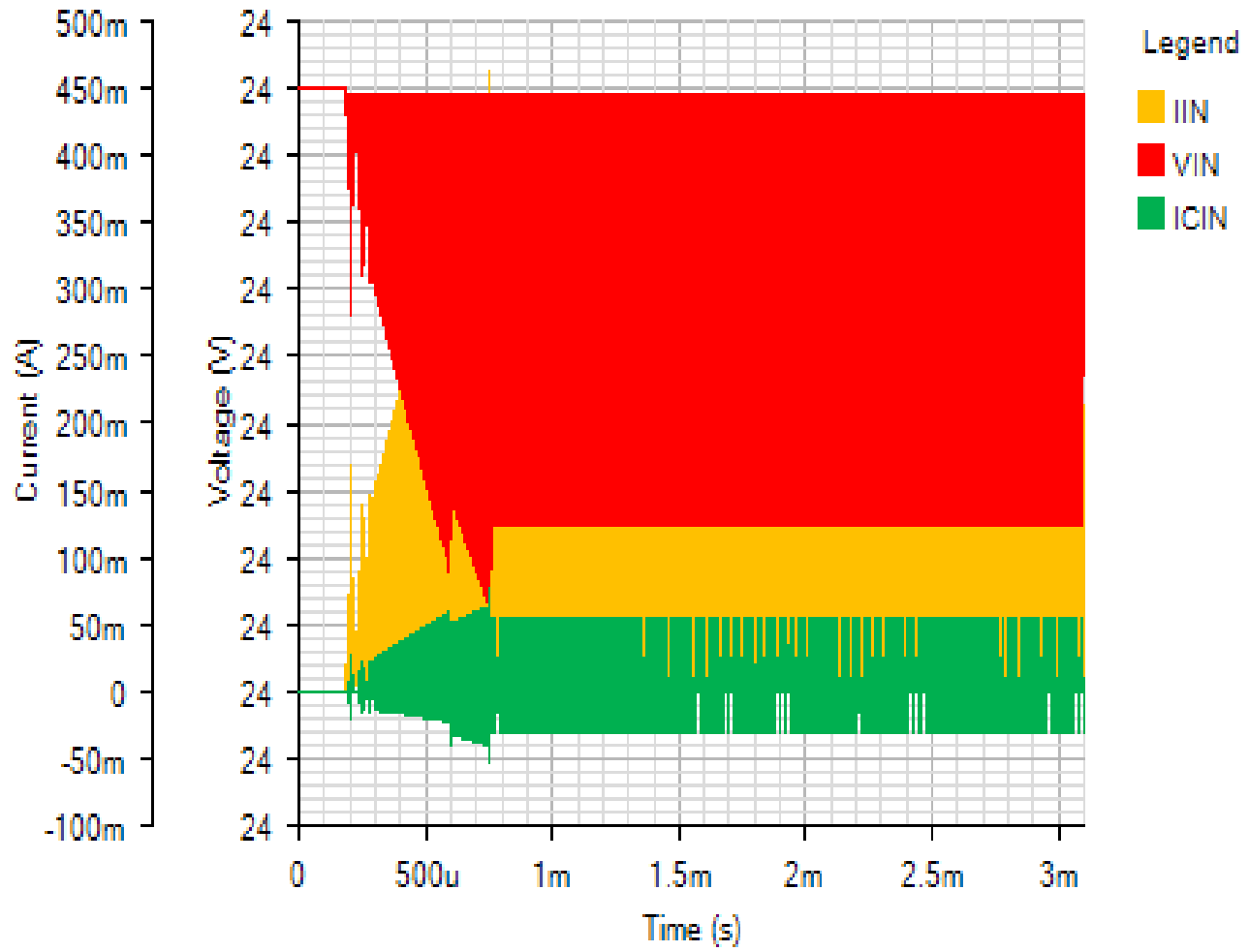
OUTPUT

Default



INPUT

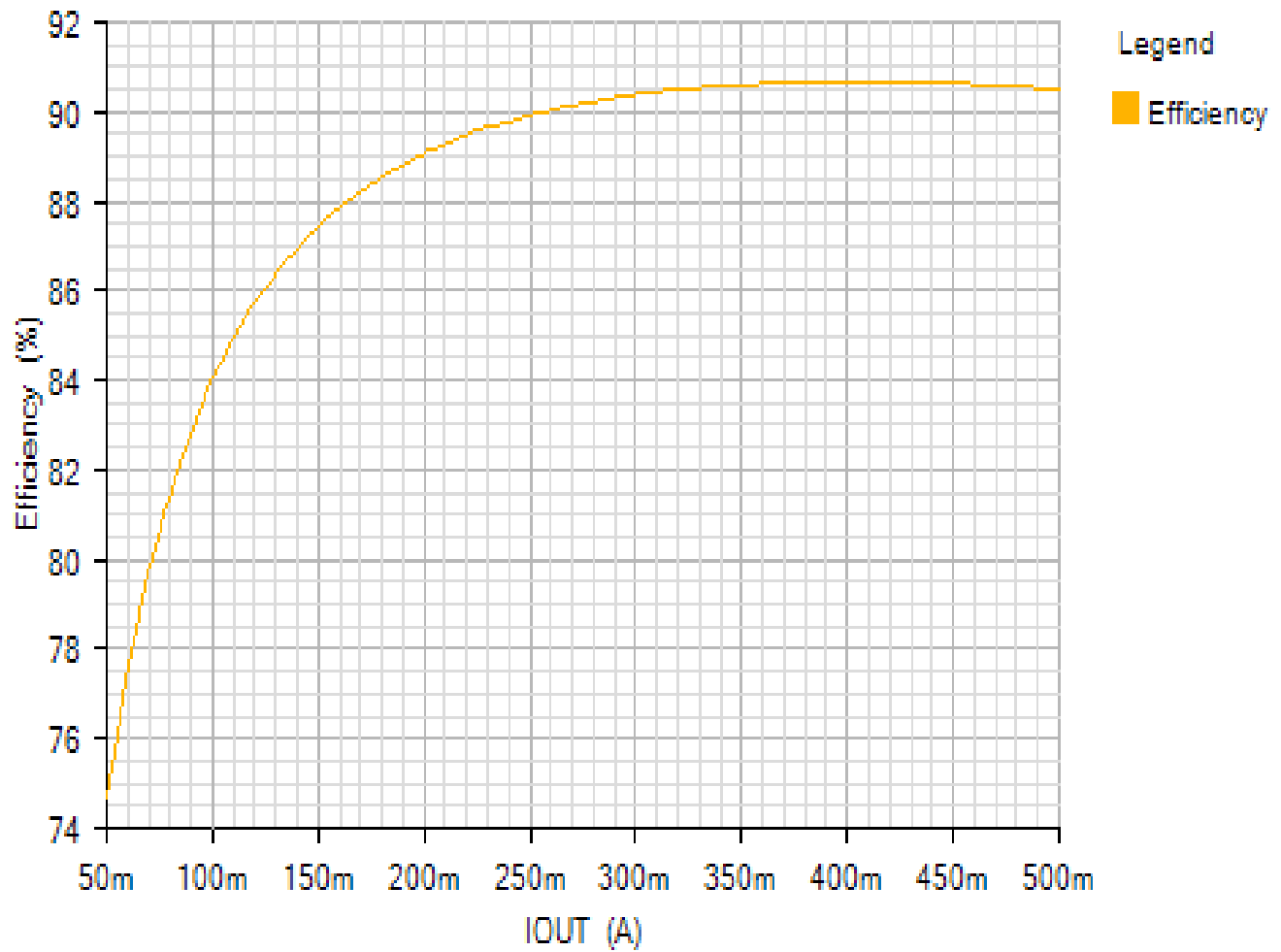
Default



Efficiency - Tue Nov 20 2018 15:43:34

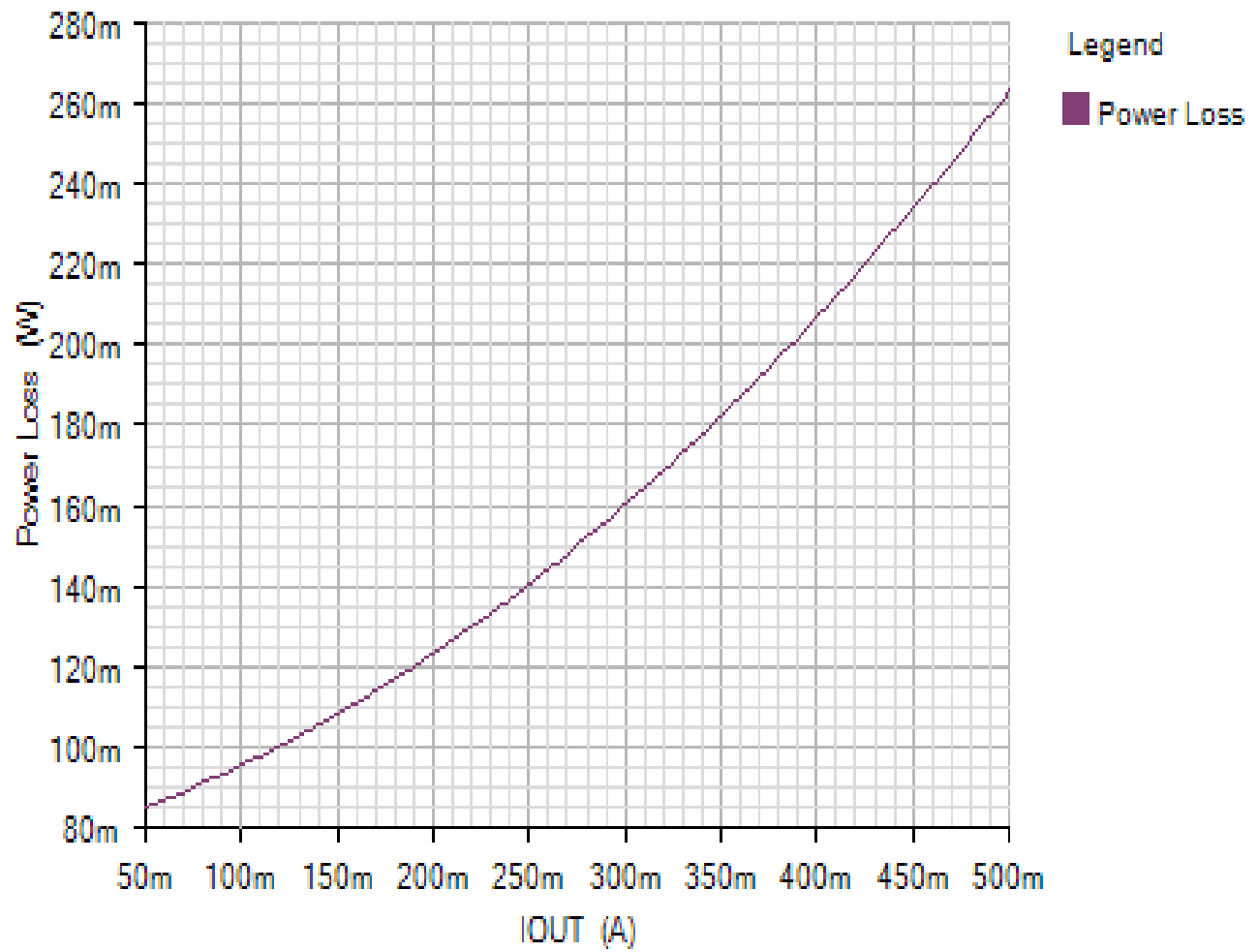
EFFICIENCY_PLOT

Default



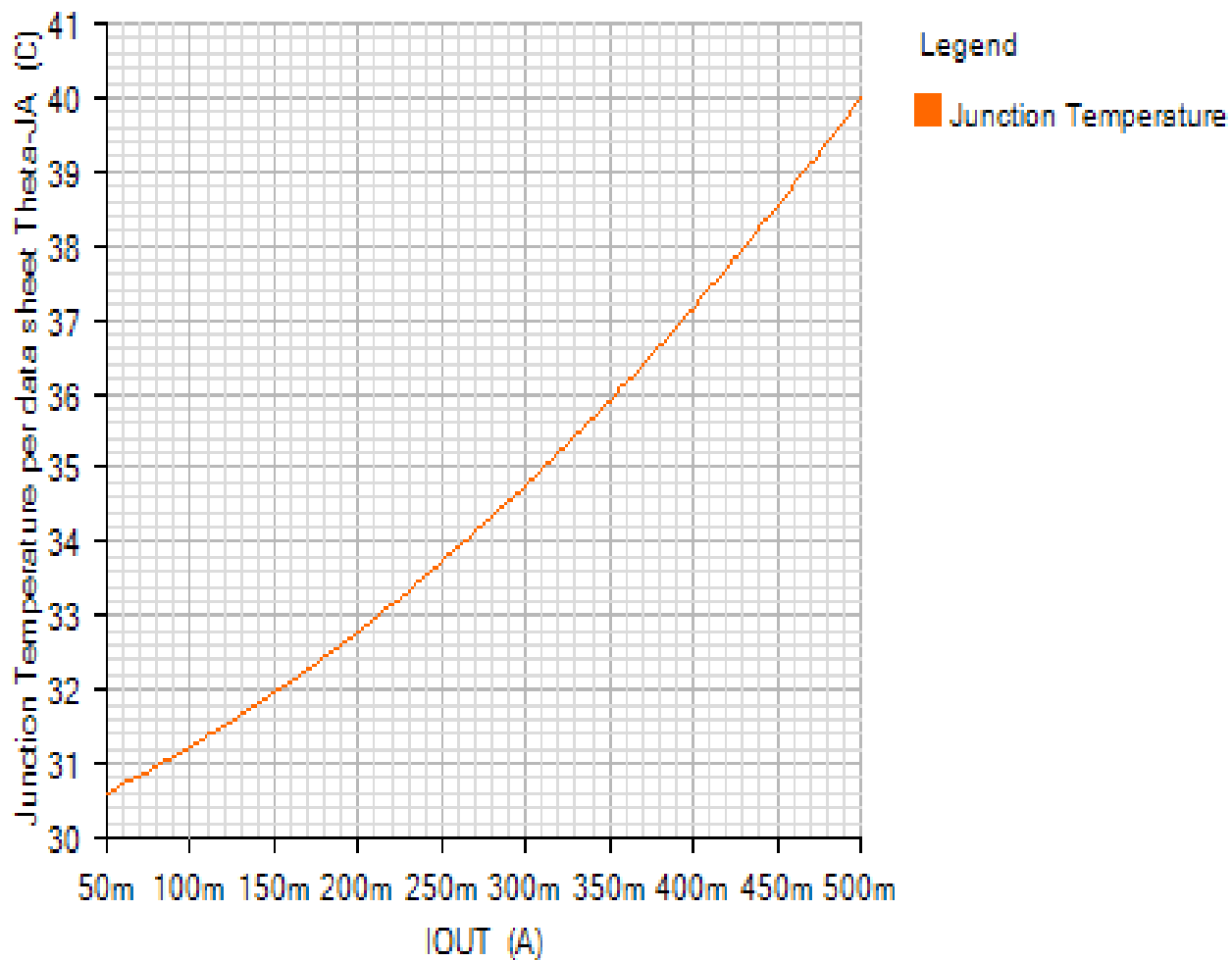
POWER_LOSS_PLOT

Default

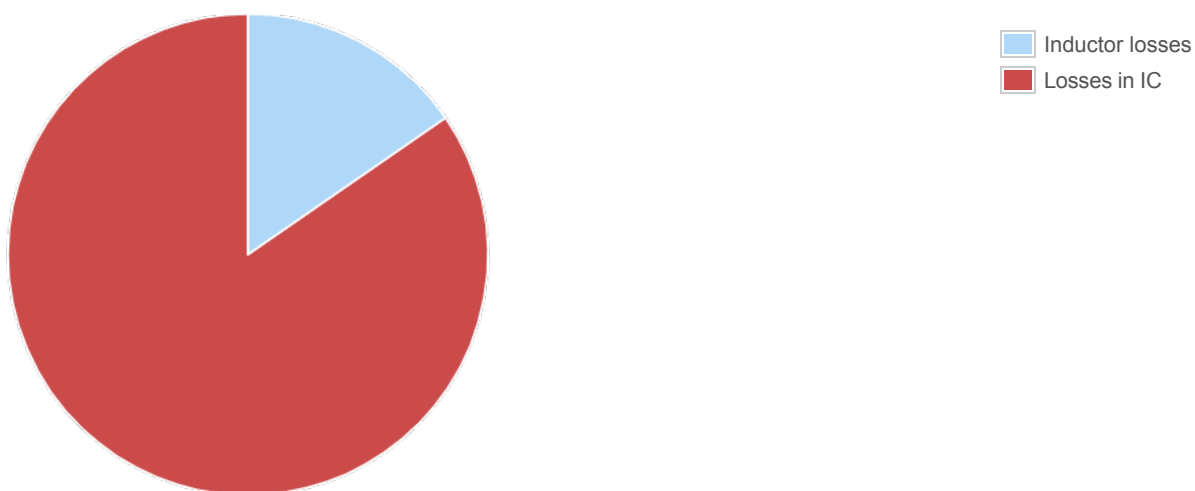


JUNCTION_TEMPERATURE_PLOT

Default



Losses



Component

Loss (W)

% of total