

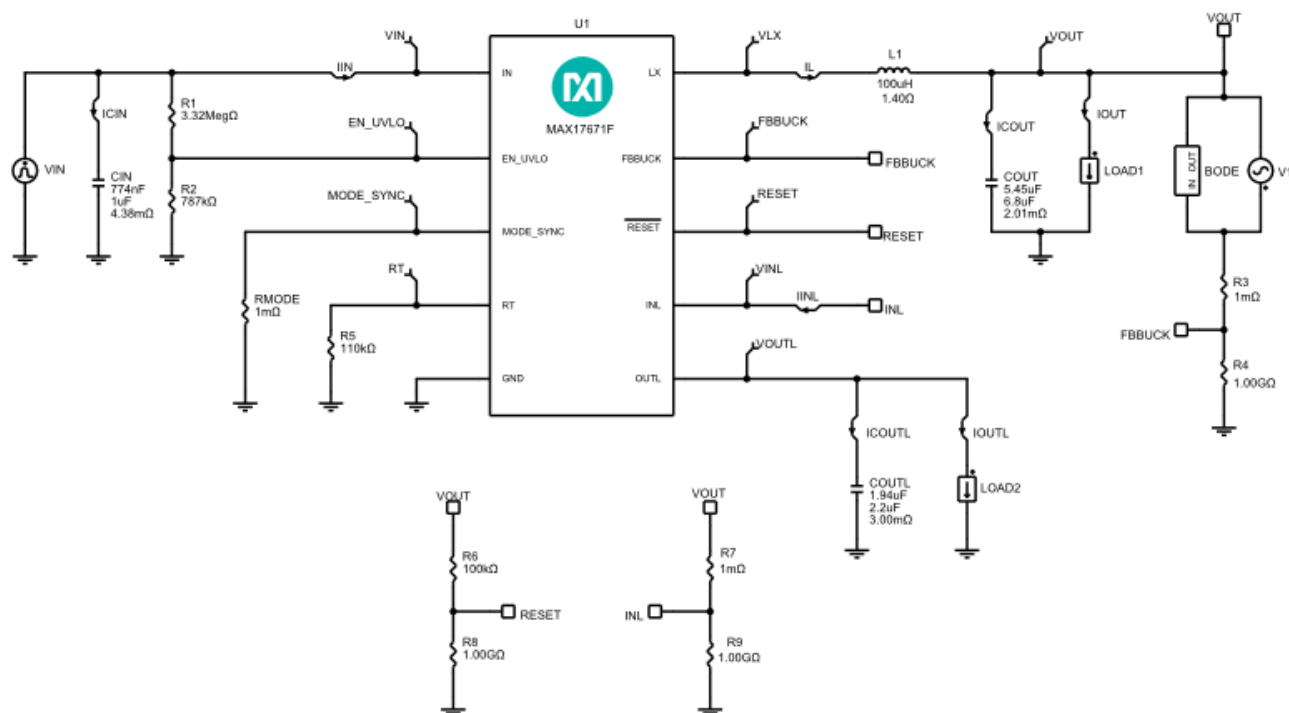
Initial Design

1.0

Design Requirements

Parameter	Value
Device Variant	MAX17671F (3.3V Linear Regulator)
Configuration	Step-Down Converter and Linear Regulator
Minimum Input Voltage	6.5V
Maximum Input Voltage	60V
Nominal Input Voltage	24V
Input Steady-State Ripple	3%
Input Undervoltage Lockout Level	6.4V
Step-Down Converter Output Voltage	5V
Linear Regulator Output Voltage	3.3V
Step-Down Converter Output Current	0.1A
Linear Regulator Output Current	0.05A
Step-Down Converter Load Start Current	0.1A
Linear Regulator Load Start Current	0.05A
Step-Down Converter Load Pulse Current	0.05A
Linear Regulator Load Pulse Current	0.025A
Step-Down Converter Load Pulse Edge Rate	10A/us
Linear Regulator Load Pulse Edge Rate	10A/us
Performance Priority	Balance Efficiency and Size
BOM Priority	Low Cost
Mode of Operation	PWM
Switching Frequency	426kHz
Ambient Temperature	25°C

Schematic



Note 1: When PFM mode is selected, AC Loop simulation may fail when the Load Current is low enough to engage PFM operation. PFM mode is hysteretic and there is no AC Loop to measure.

Note 2: When the Step-Down Converter Output Voltage is greater than 5V, EE-sim shorts INL to ground to avoid exceeding the maximum for INL. Similarly, when the Step-Down output voltage is greater than 5.5V, EE-SIM shorts RESET to ground. In your target system, RESET can be pulled up to any available voltage that is 5.5V or less and INL can be connected to any voltage that does not exceed 5V.

BOM

Ref	Qty	Part Number	Manufacturer	Description
U1	1	MAX17671F	User-Defined	IC
CIN	1	C3216X7R2A105K160AA	TDK	Cap Ceramic 1uF 100V X7R 10% SMD 1206 125C Plastic T/R
COUT	1	C2012X7R1A685K125AC	TDK	Cap Ceramic 6.8uF 10V 0805 125C
COUTL	1	C1608X7R1A225K080AC	TDK	Cap Ceramic 2.2uF 10V X7R 10% SMD 0603 125C Paper T/R
L1	1	VLCF4020T-101MR26	TDK	Inductor Power Shielded Wirewound 100uH 20% 100KHz Ferrite 450mA 1.4Ohm DCR T/R
R1	1	RC0402FR-073M32L	Yageo	Res Thick Film 0402 3.32M Ohm 1% 0.063W(1/16W) ±100ppm/°C Epoxy Pad SMD T/R
R2	1	ERJ2RKF7873X	Panasonic	Res Thick Film 0402 787K Ohm 1% 0.1W(1/10W) ±100ppm/°C Pad SMD Automotive T/R
R5	1	ERJ2RKF1103X	Panasonic	Res Thick Film 0402 110K Ohm 1% 0.1W(1/10W) ±100ppm/°C Pad SMD

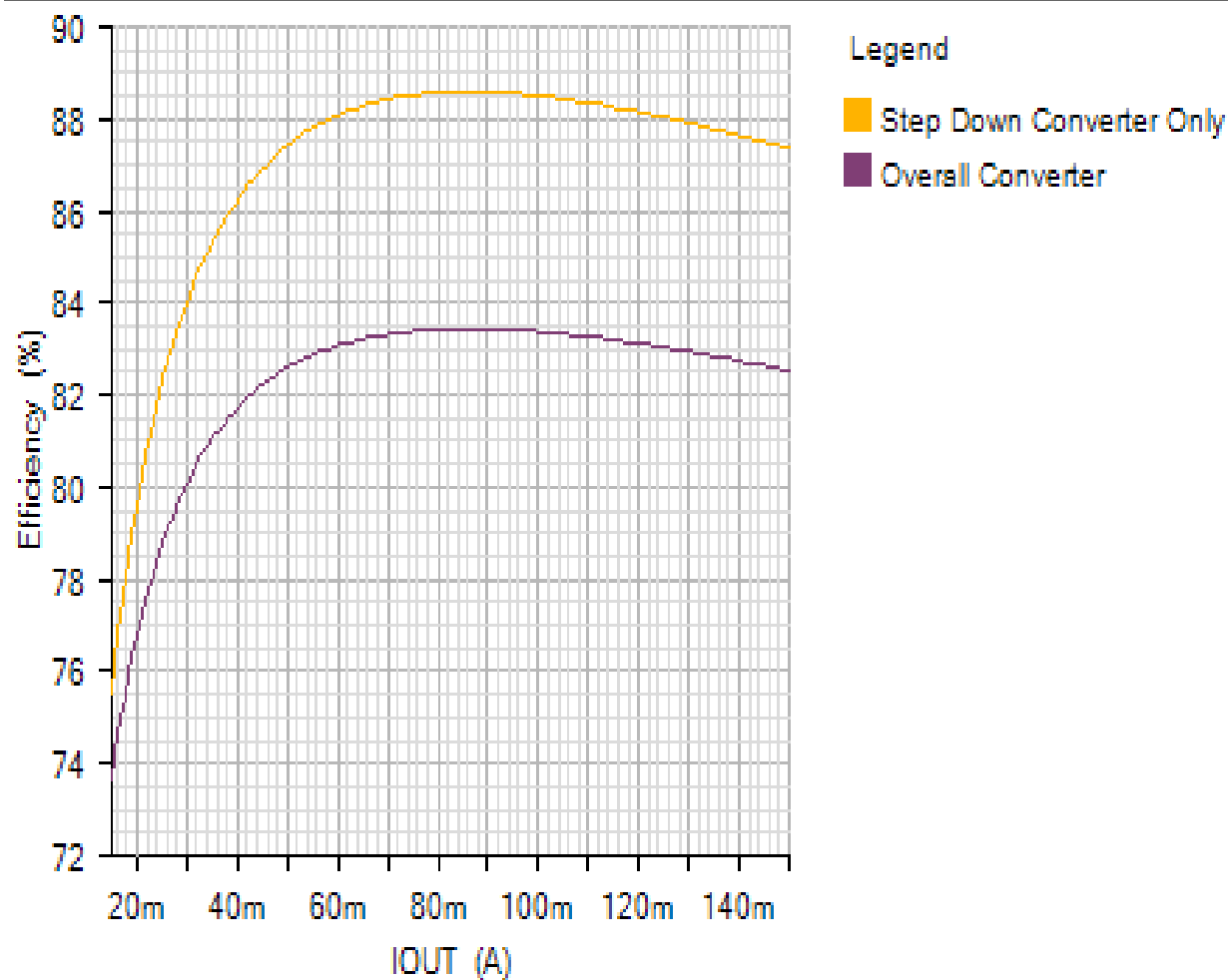
				Automotive T/R
R6	1	ERJ2RKF1003X	Panasonic	Res Thick Film 0402 100K Ohm 1% 0.1W(1/10W) $\pm 100\text{ppm}/^{\circ}\text{C}$ Pad SMD Automotive T/R

Simulation Results

Efficiency - Wed Dec 19 2018 15:14:21

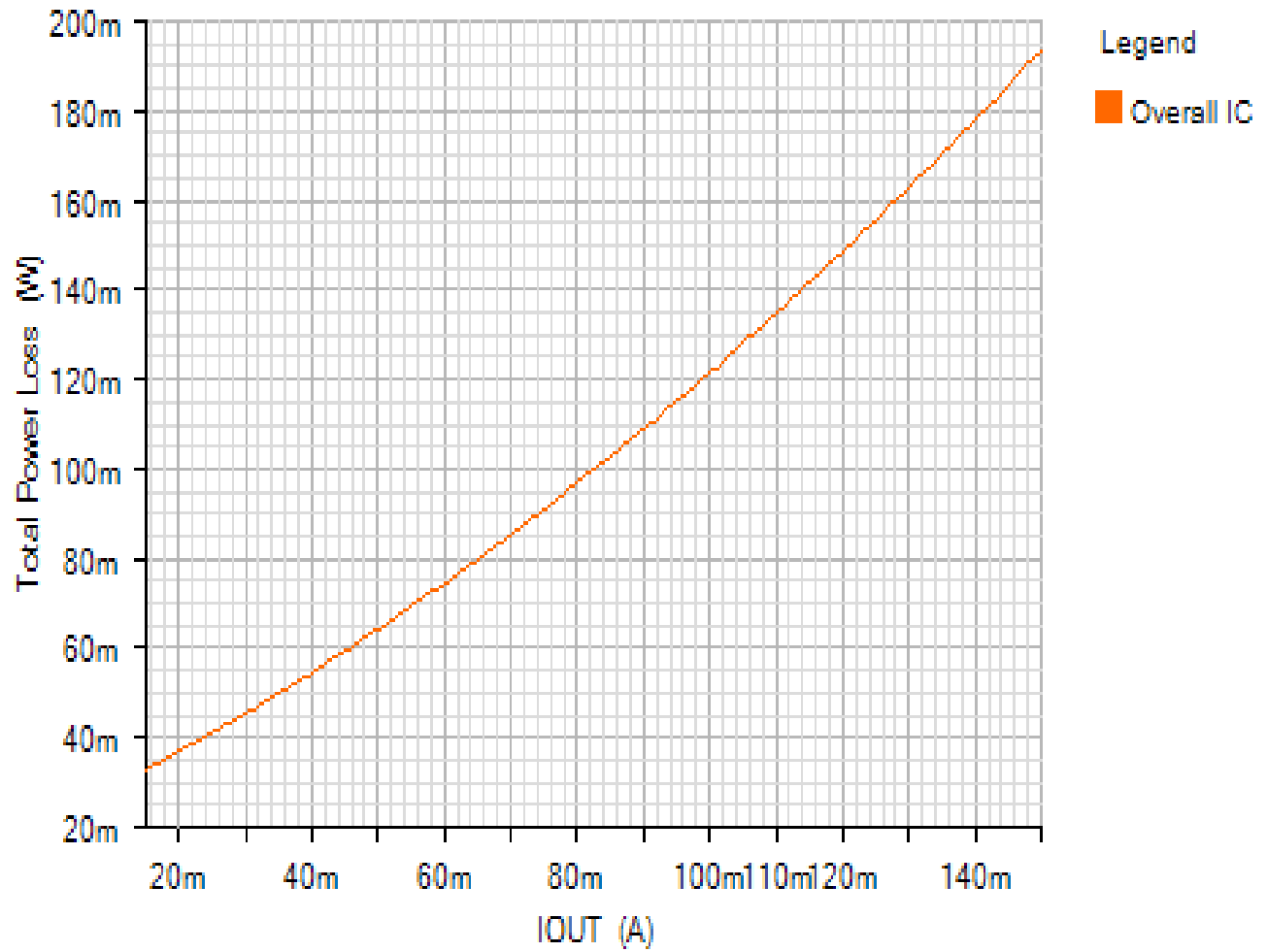
EFFICIENCY_PLOT

Default



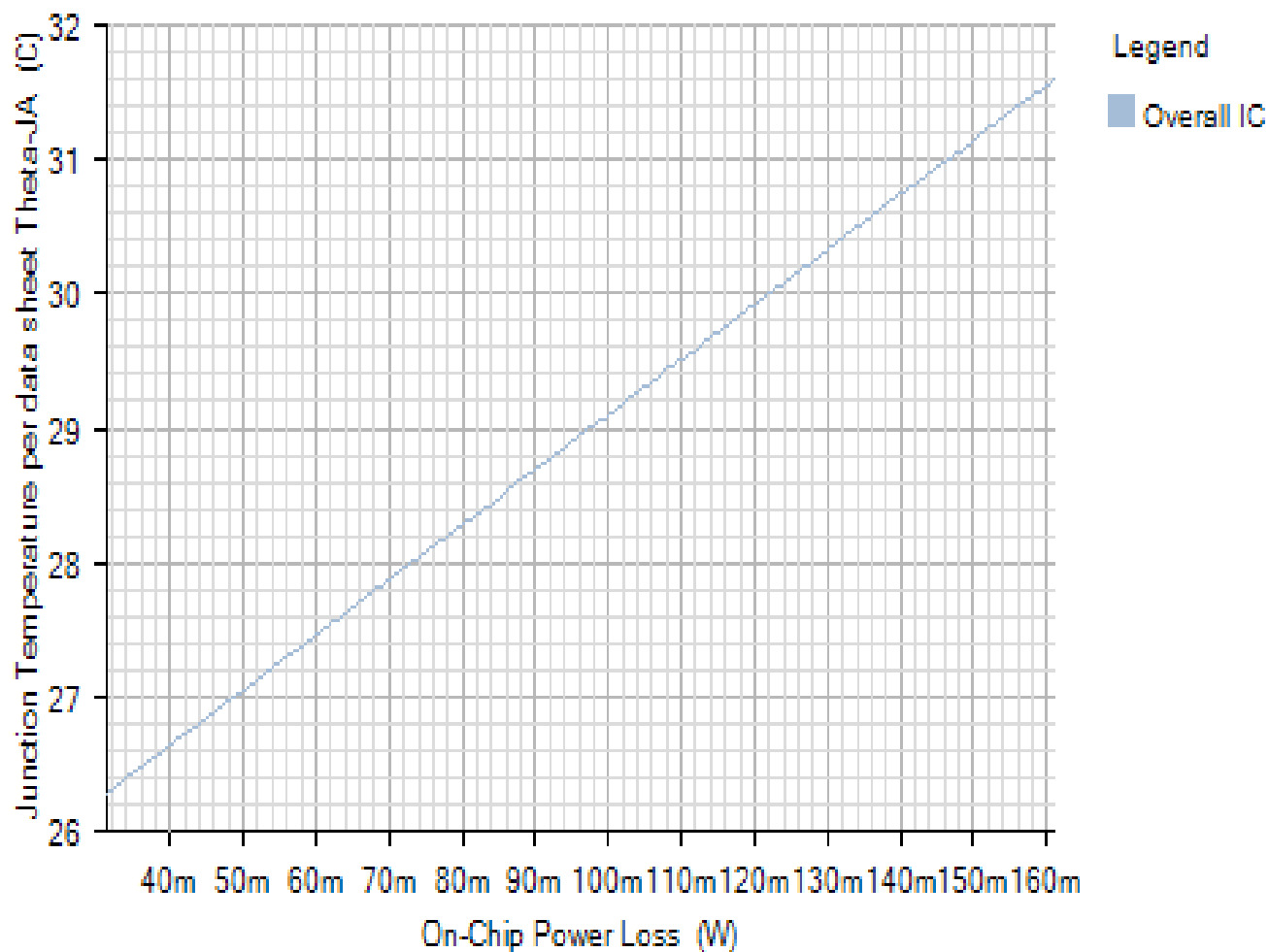
POWER_LOSS_PLOT

Default

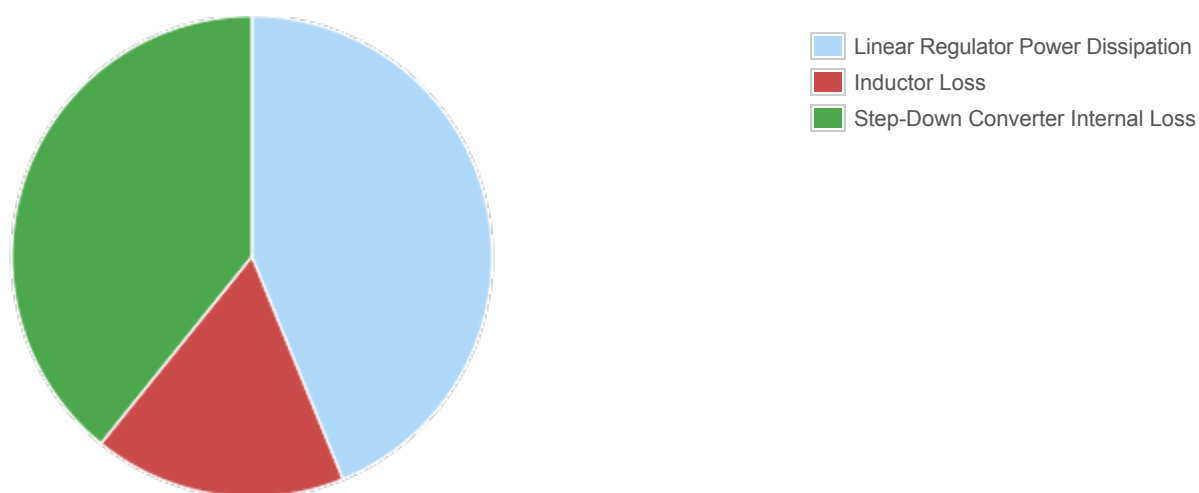


JUNCTION_TEMPERATURE_PLOT

Default



Losses



Component

Loss (W)

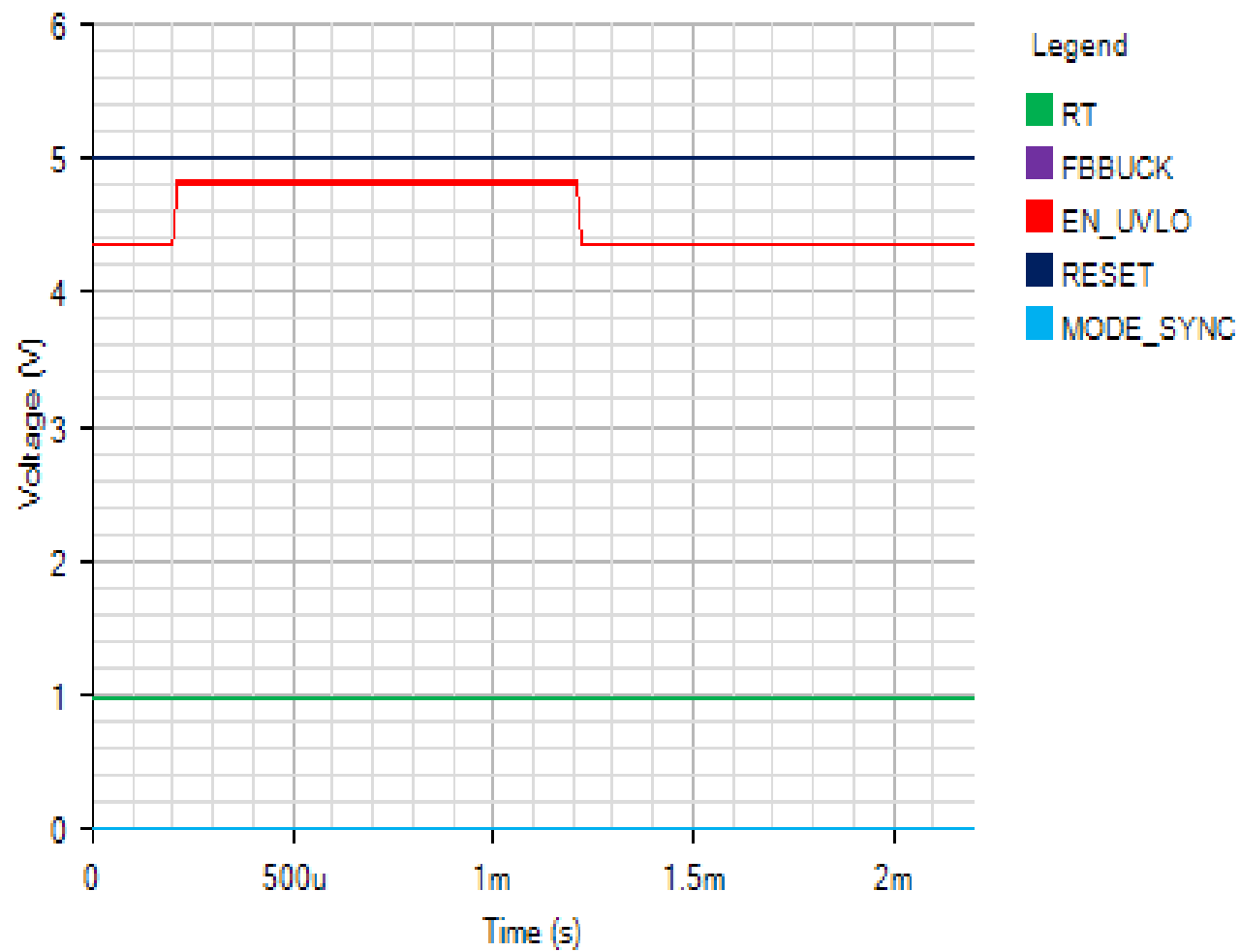
% of total

Component	Loss (W)	% of total
Linear Regulator Power Dissipation	0.085	43.8
Inductor Loss	0.033	17
Step-Down Converter Internal Loss	0.076	39.2
Total	0.194	100

Line Transient - Wed Dec 19 2018 15:14:21

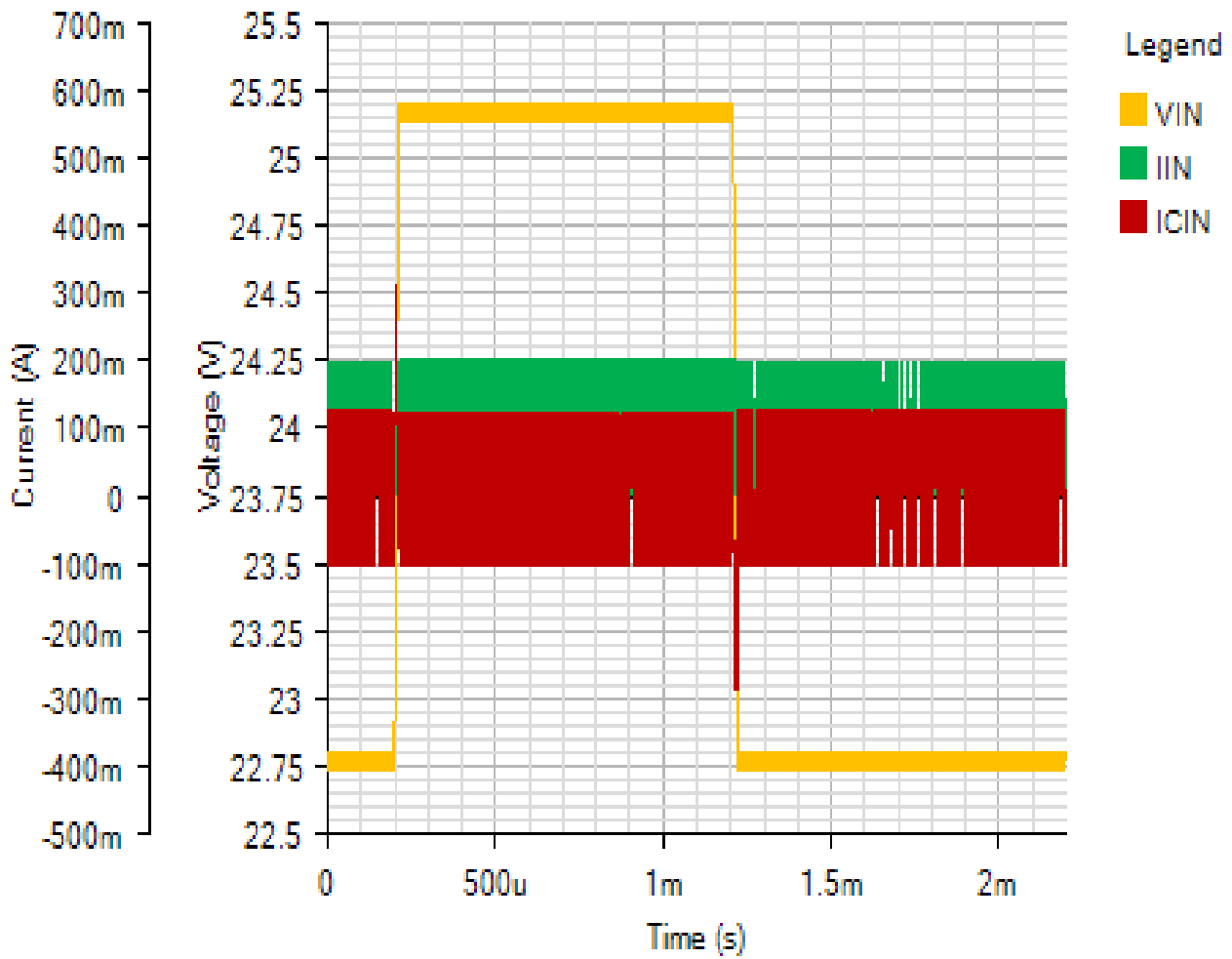
IC

Default



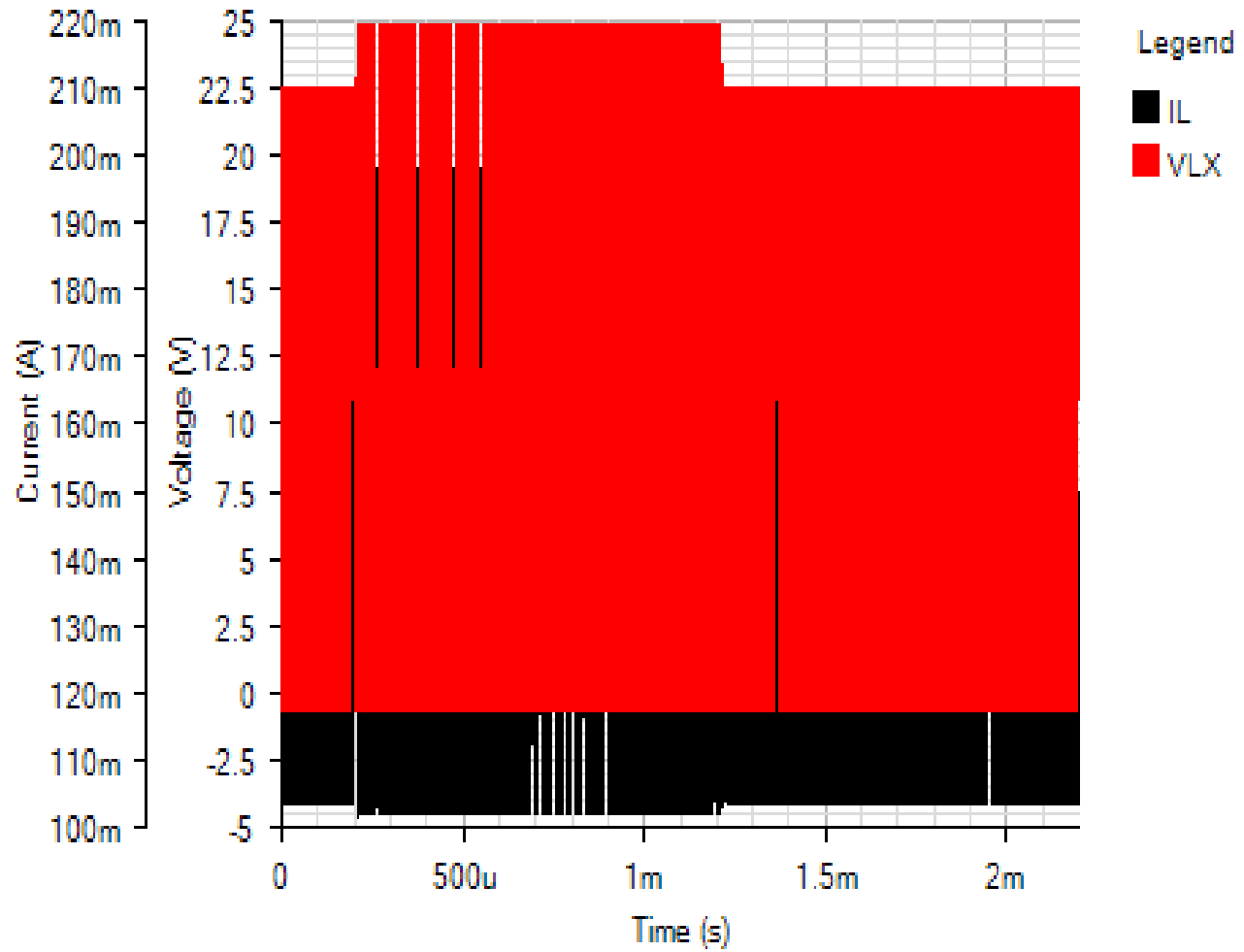
INPUT

Default



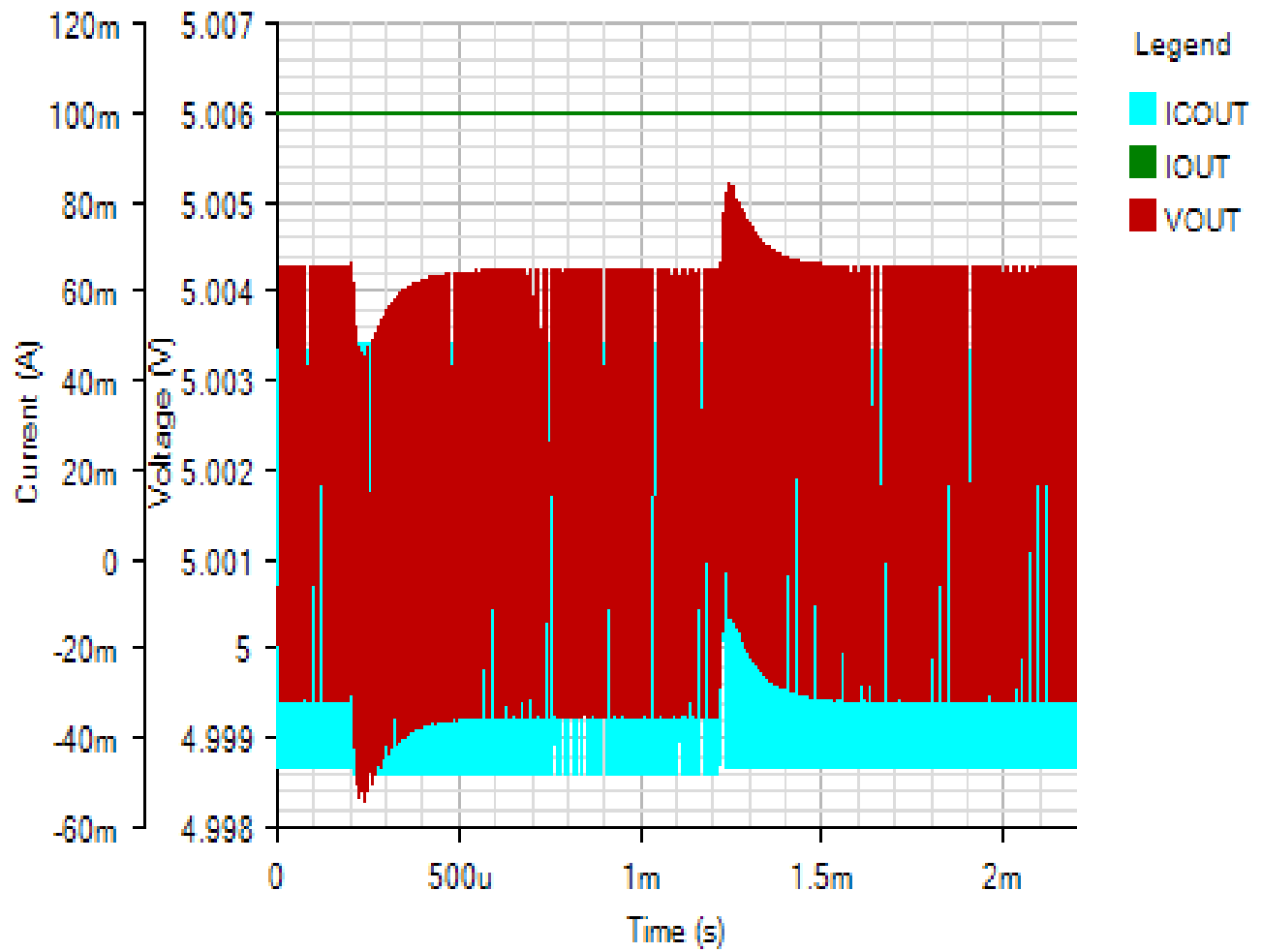
SWITCHING

Default



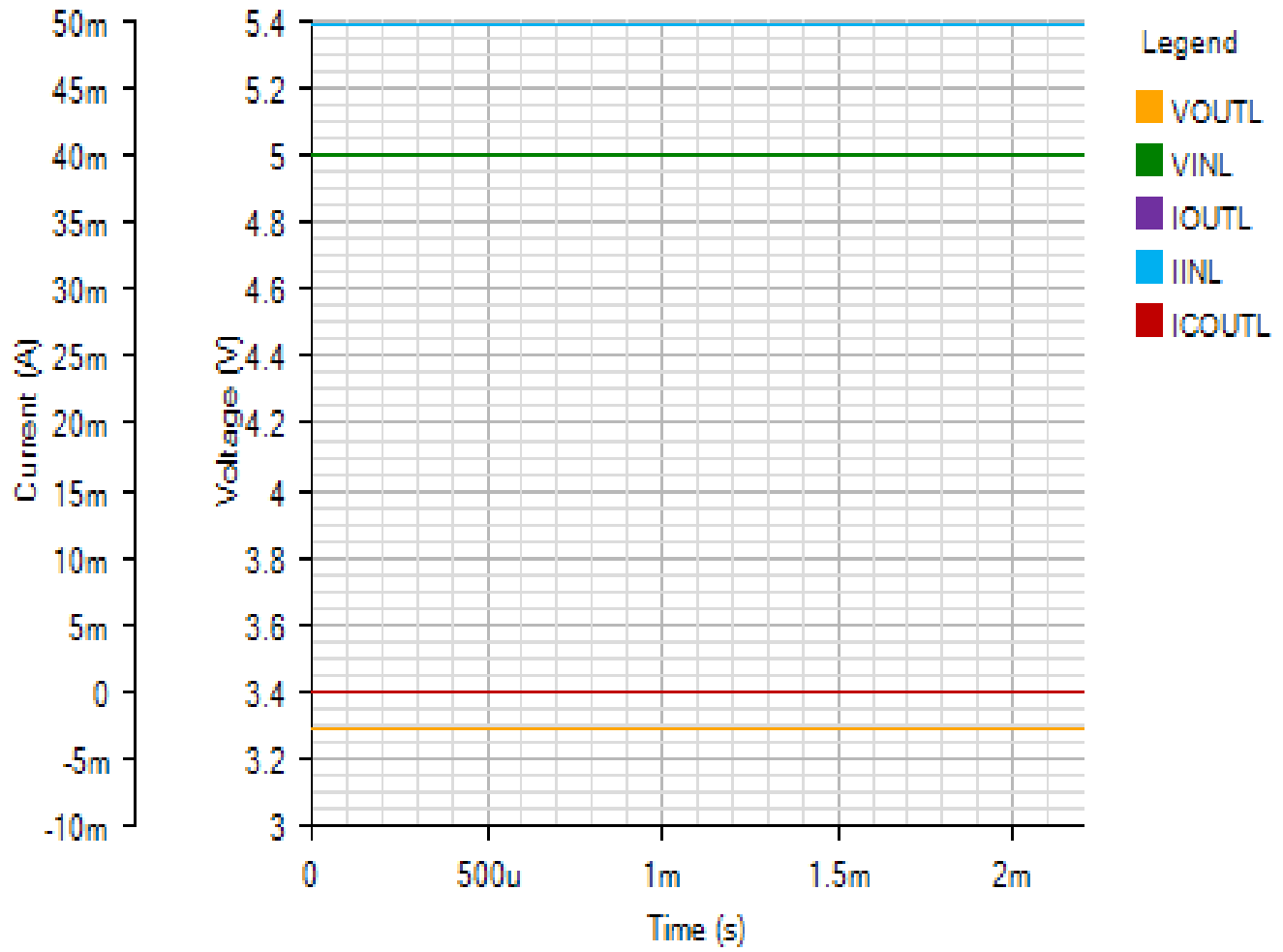
OUTPUT1

Default



LINEAR_REGULATOR

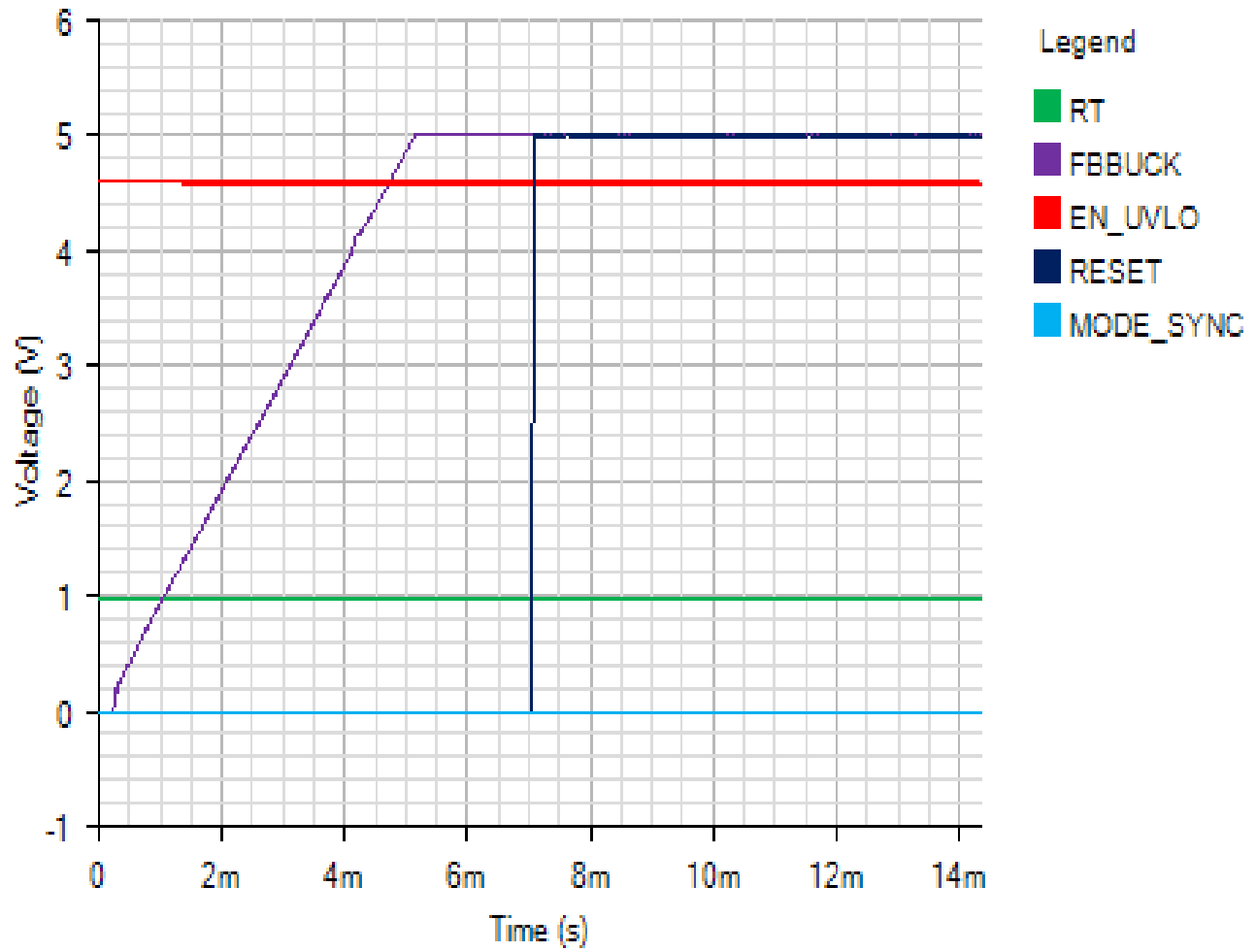
Default



Start Up - Wed Dec 19 2018 15:14:21

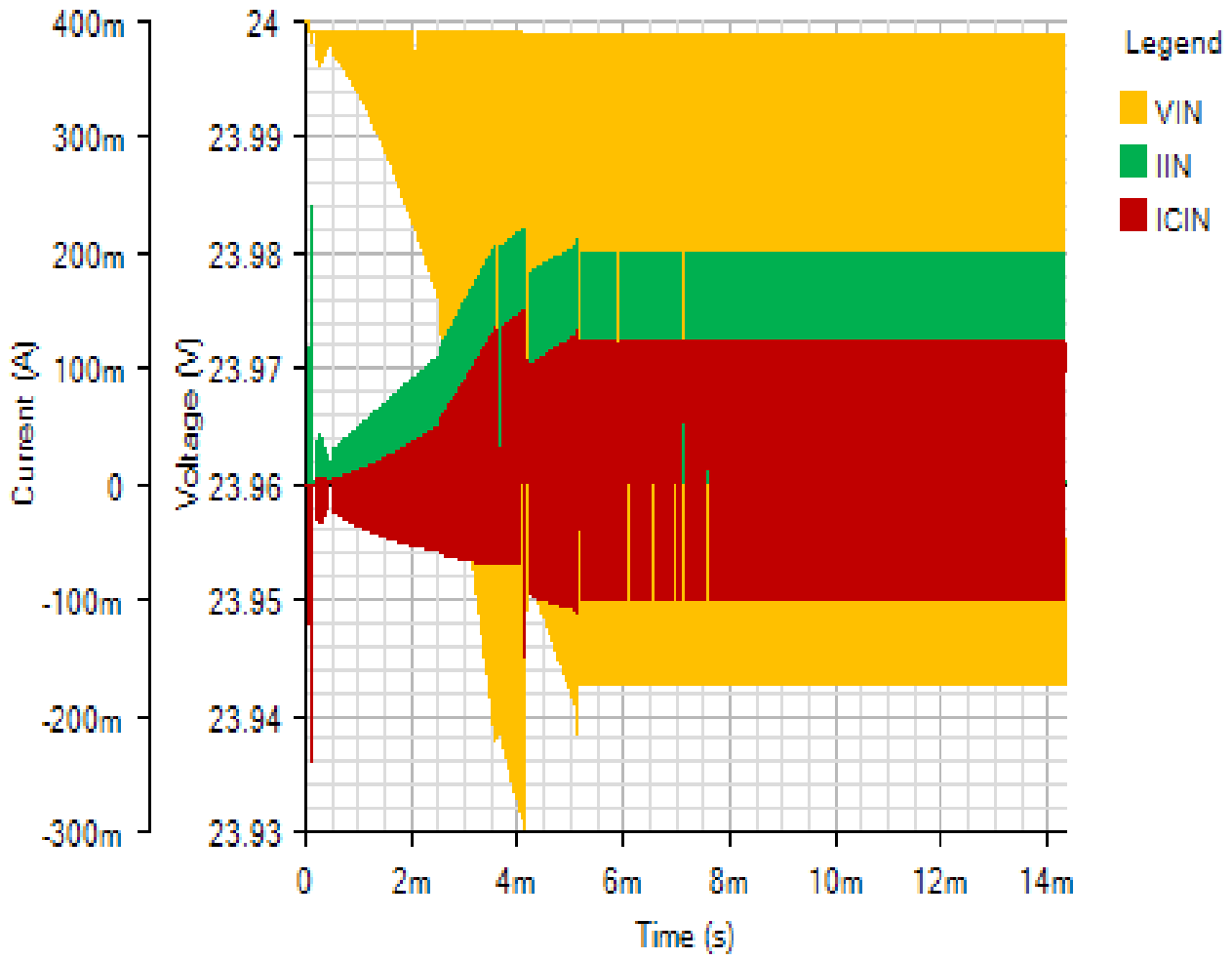
IC

Default



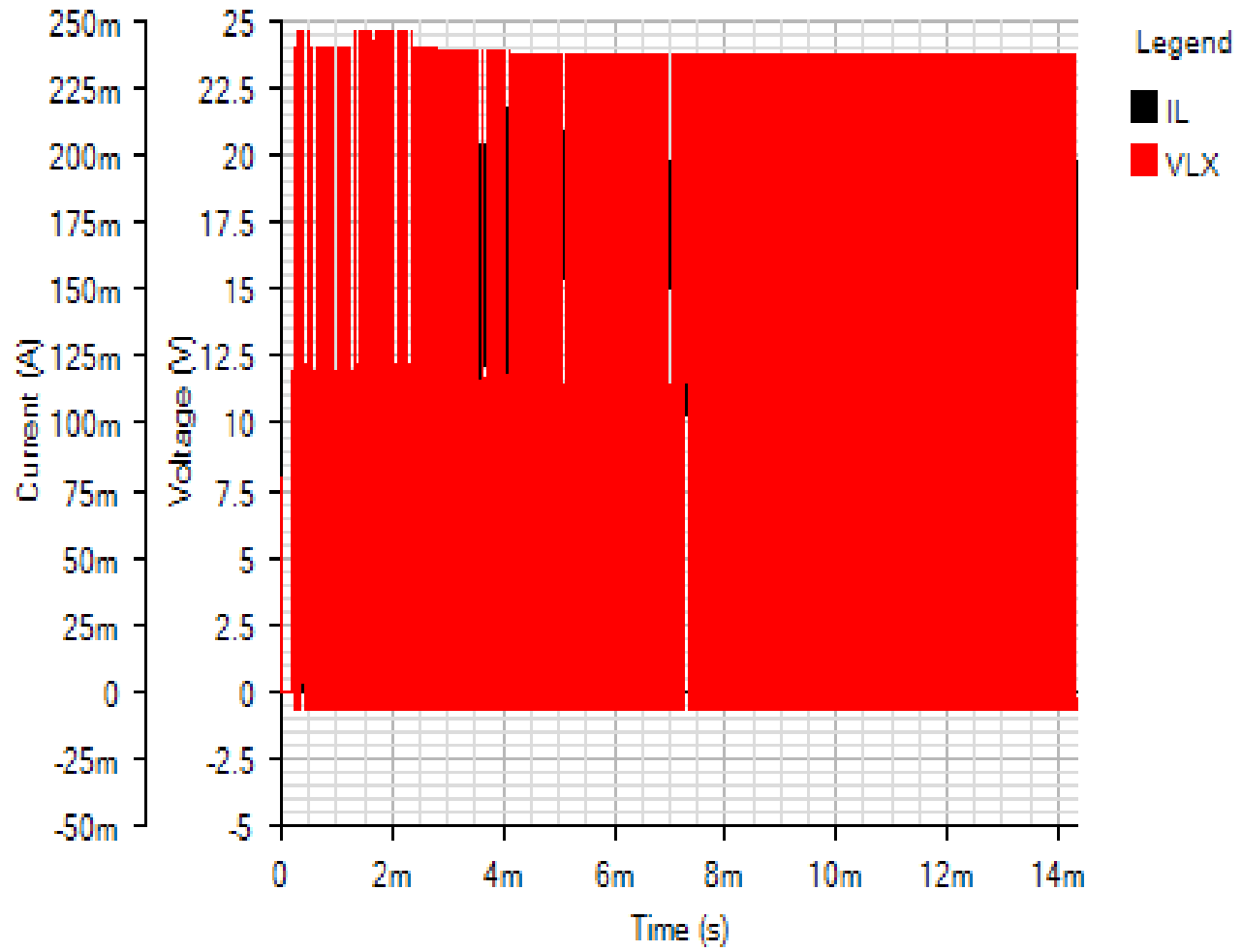
INPUT

Default



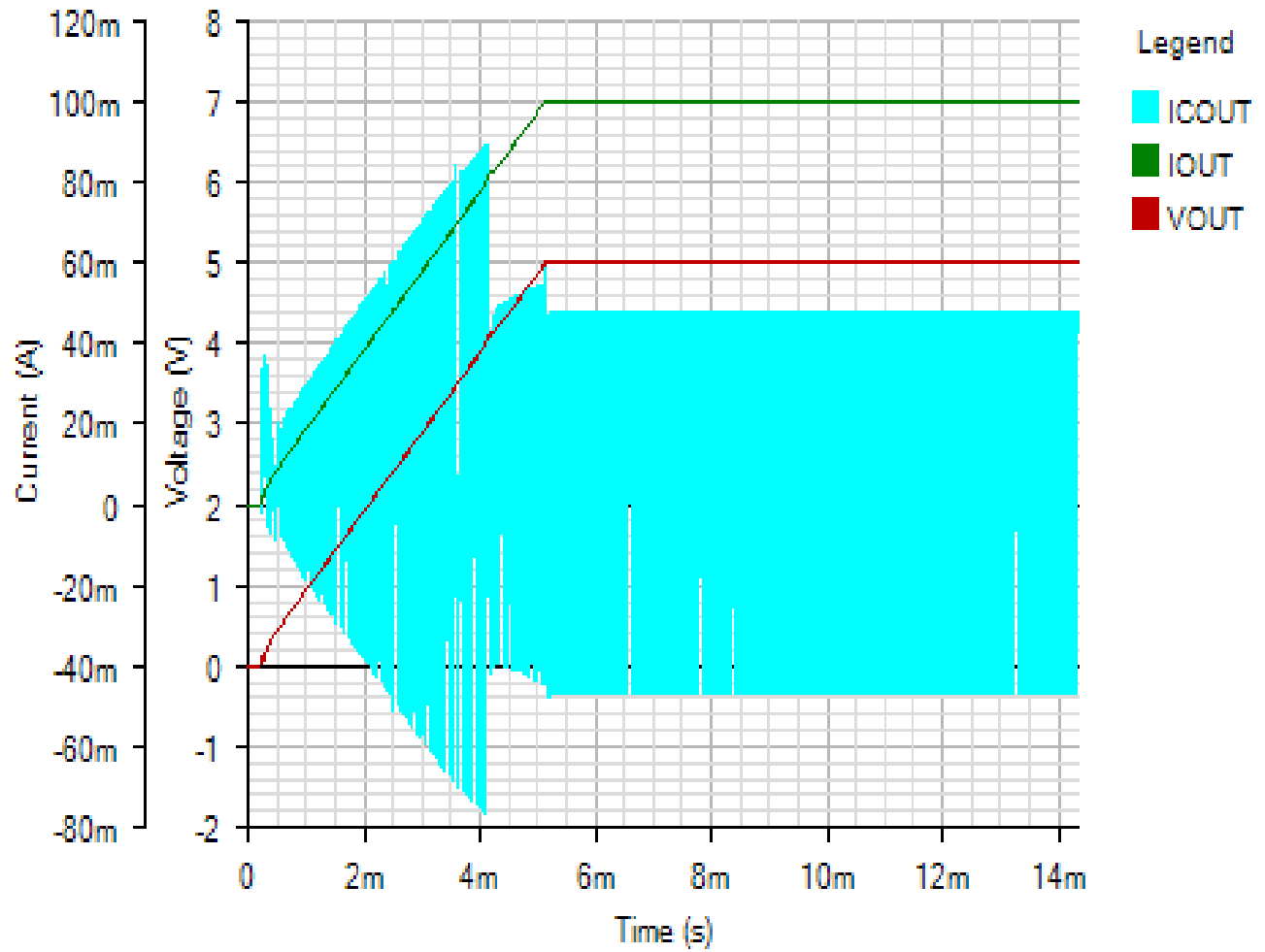
SWITCHING

Default



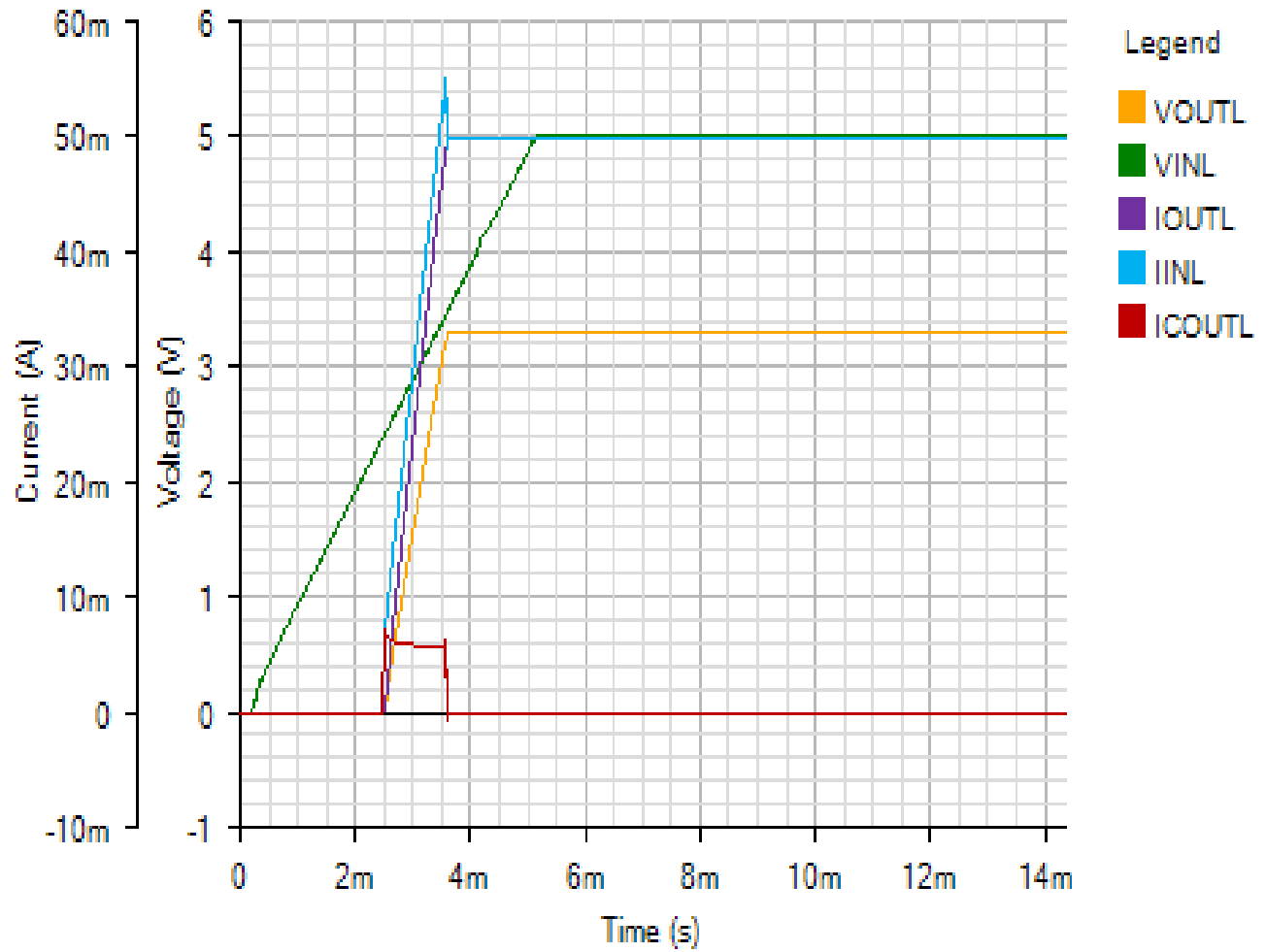
OUTPUT1

Default



LINEAR_REGULATOR

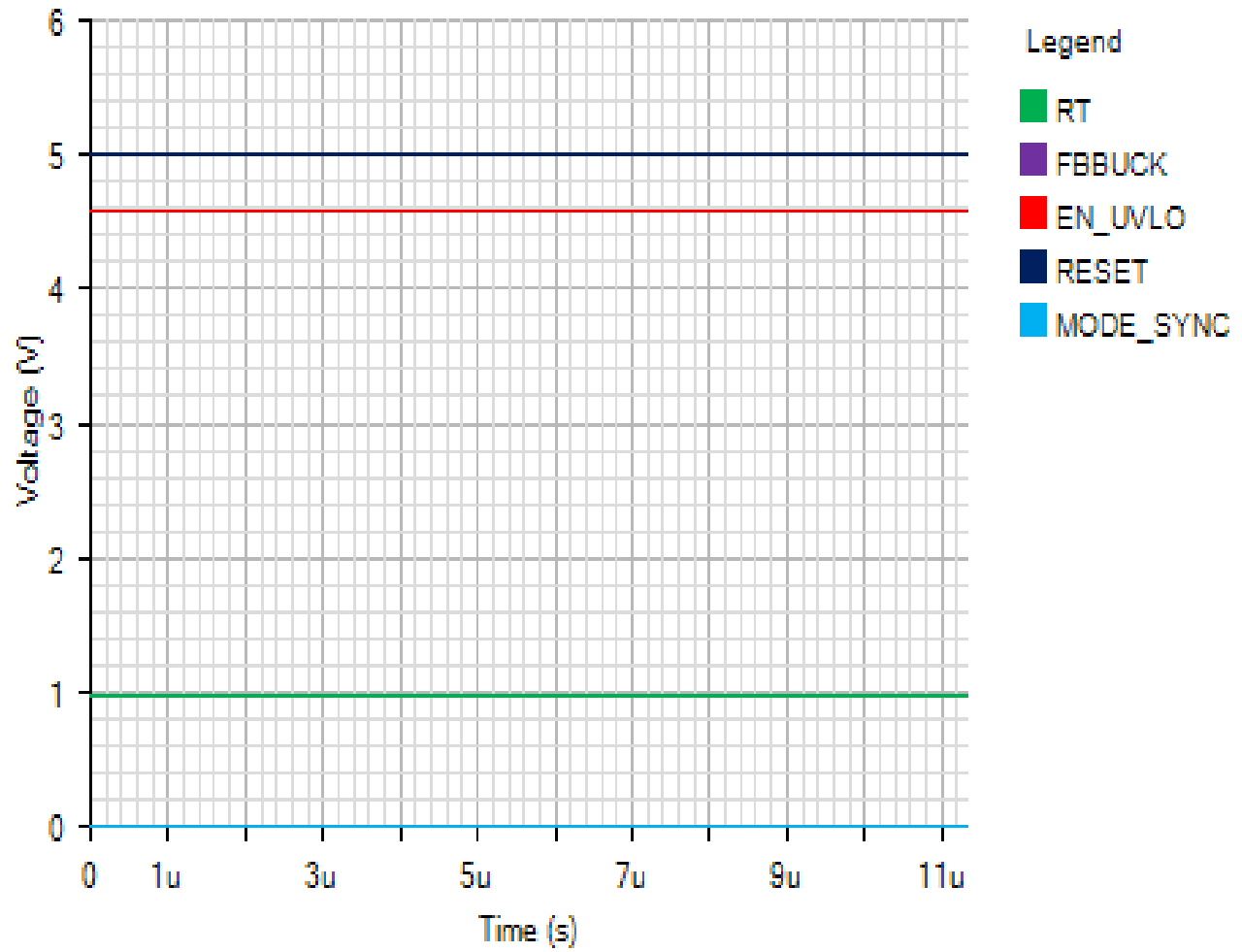
Default



Steady State - Wed Dec 19 2018 15:14:21

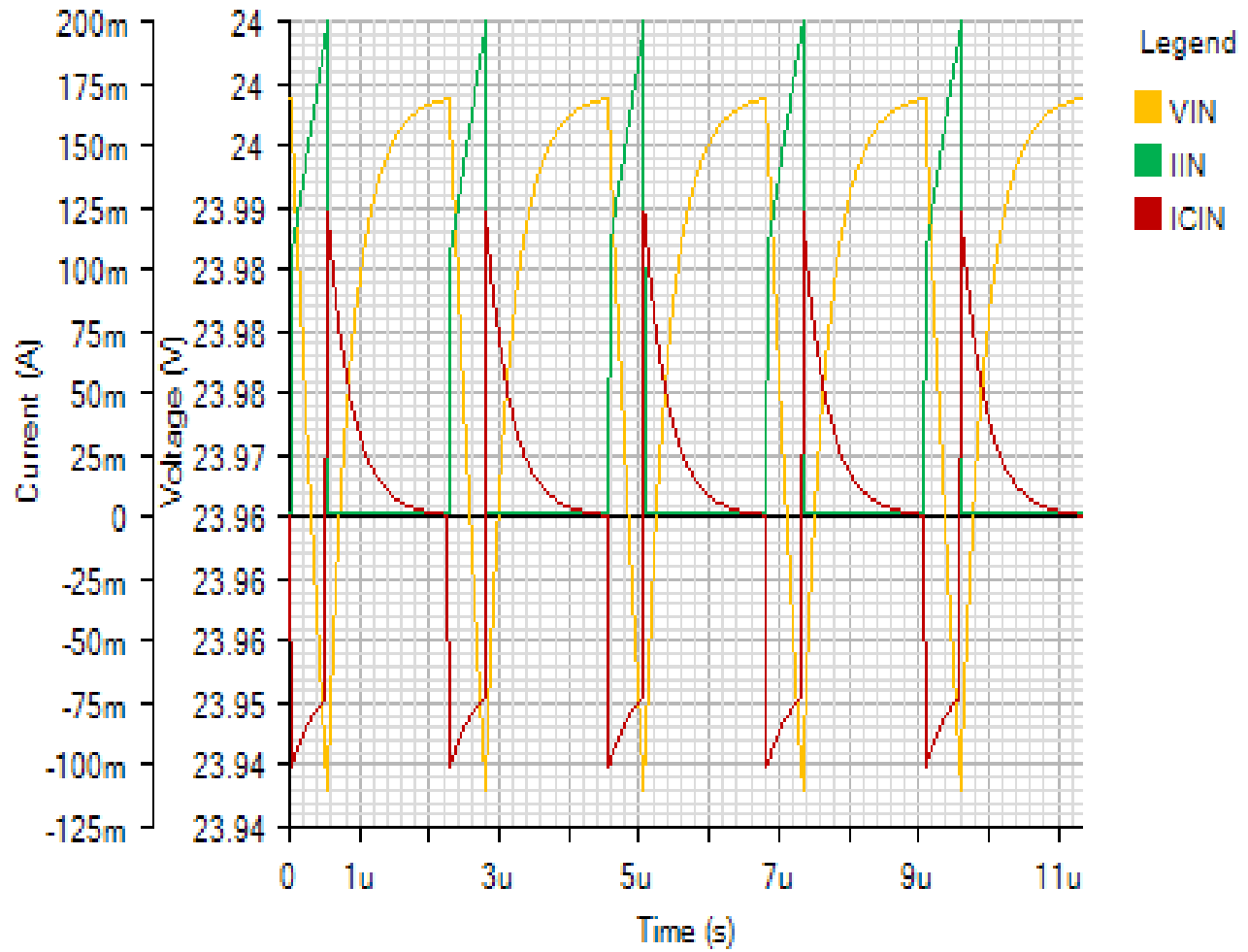
IC

Default



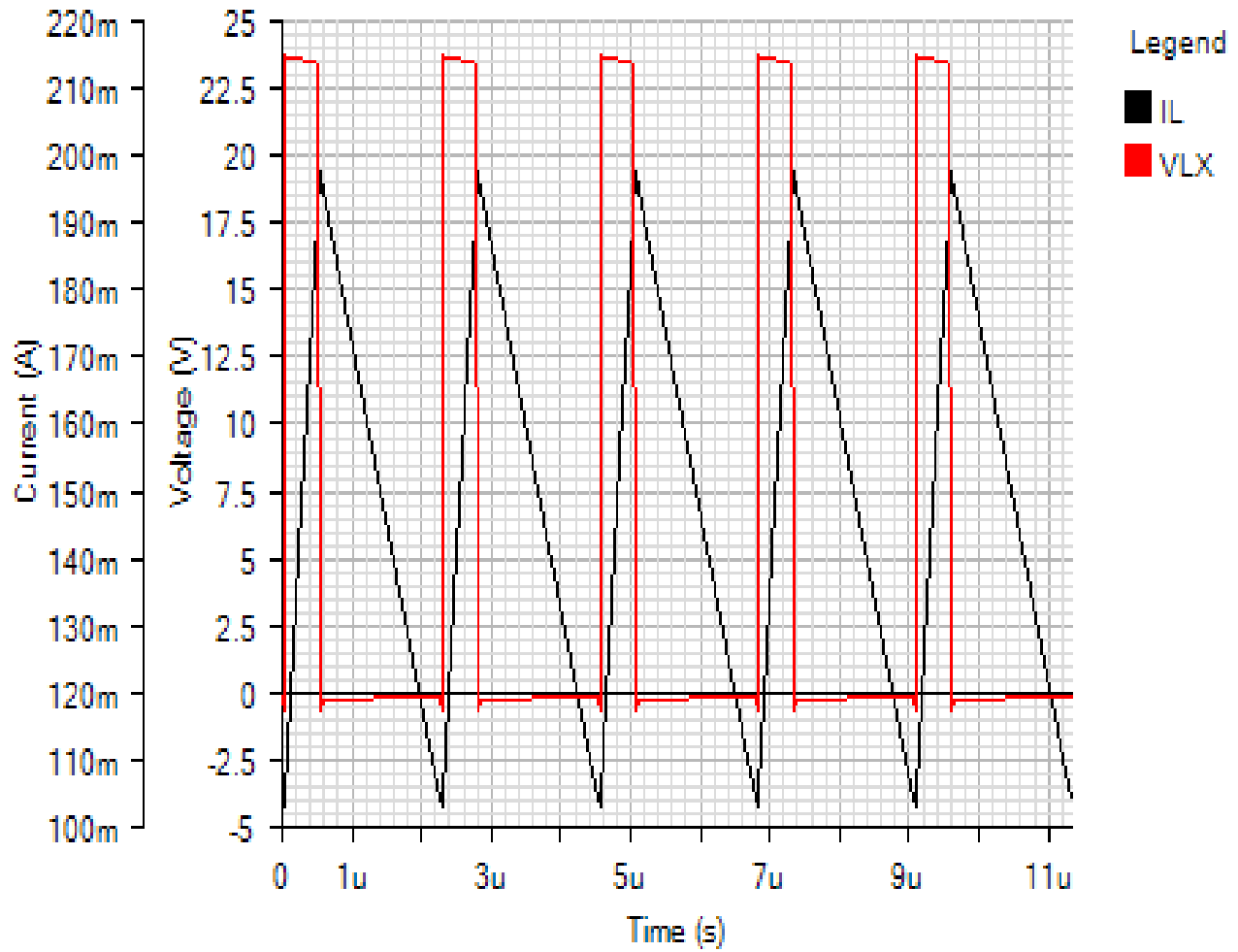
INPUT

Default



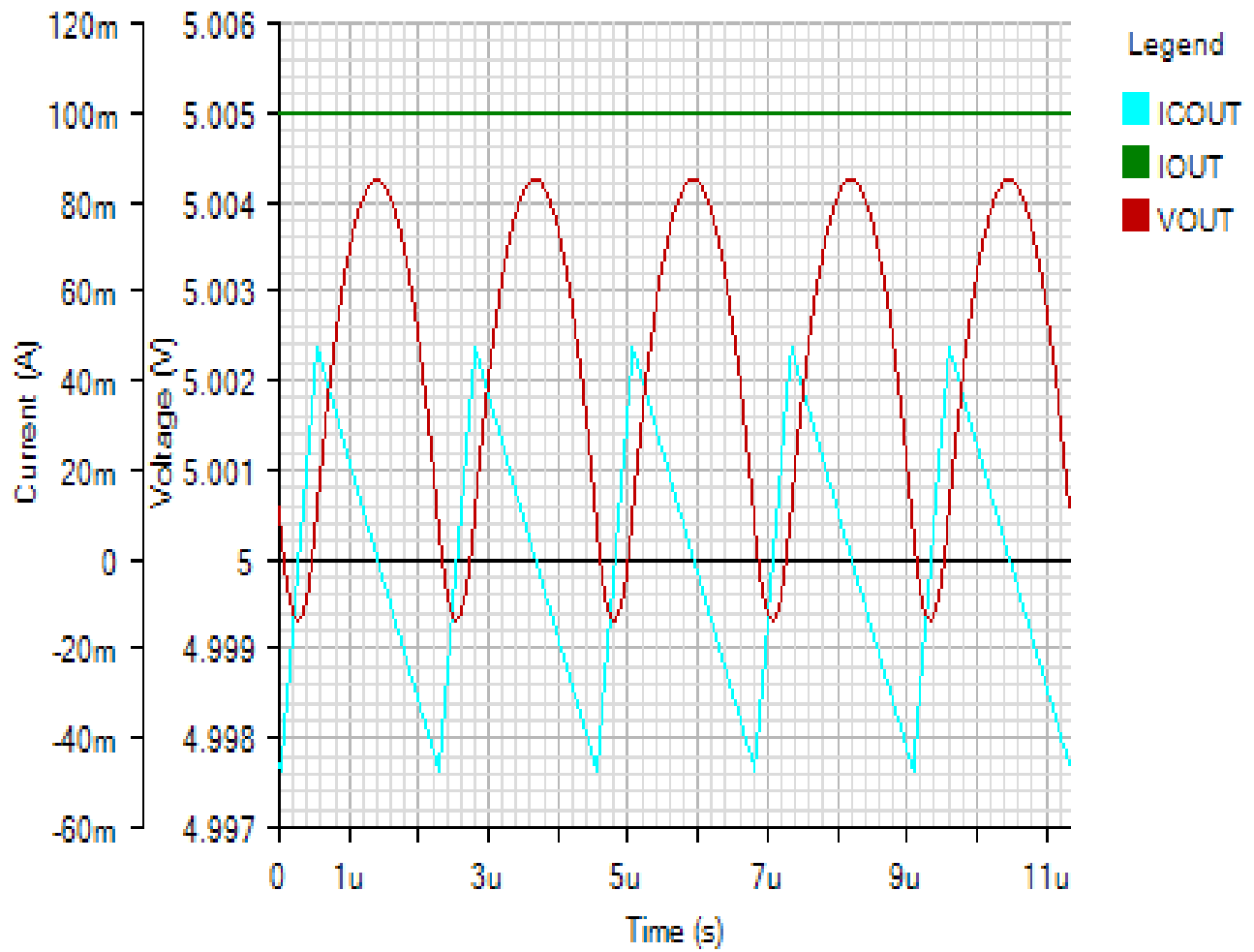
SWITCHING

Default



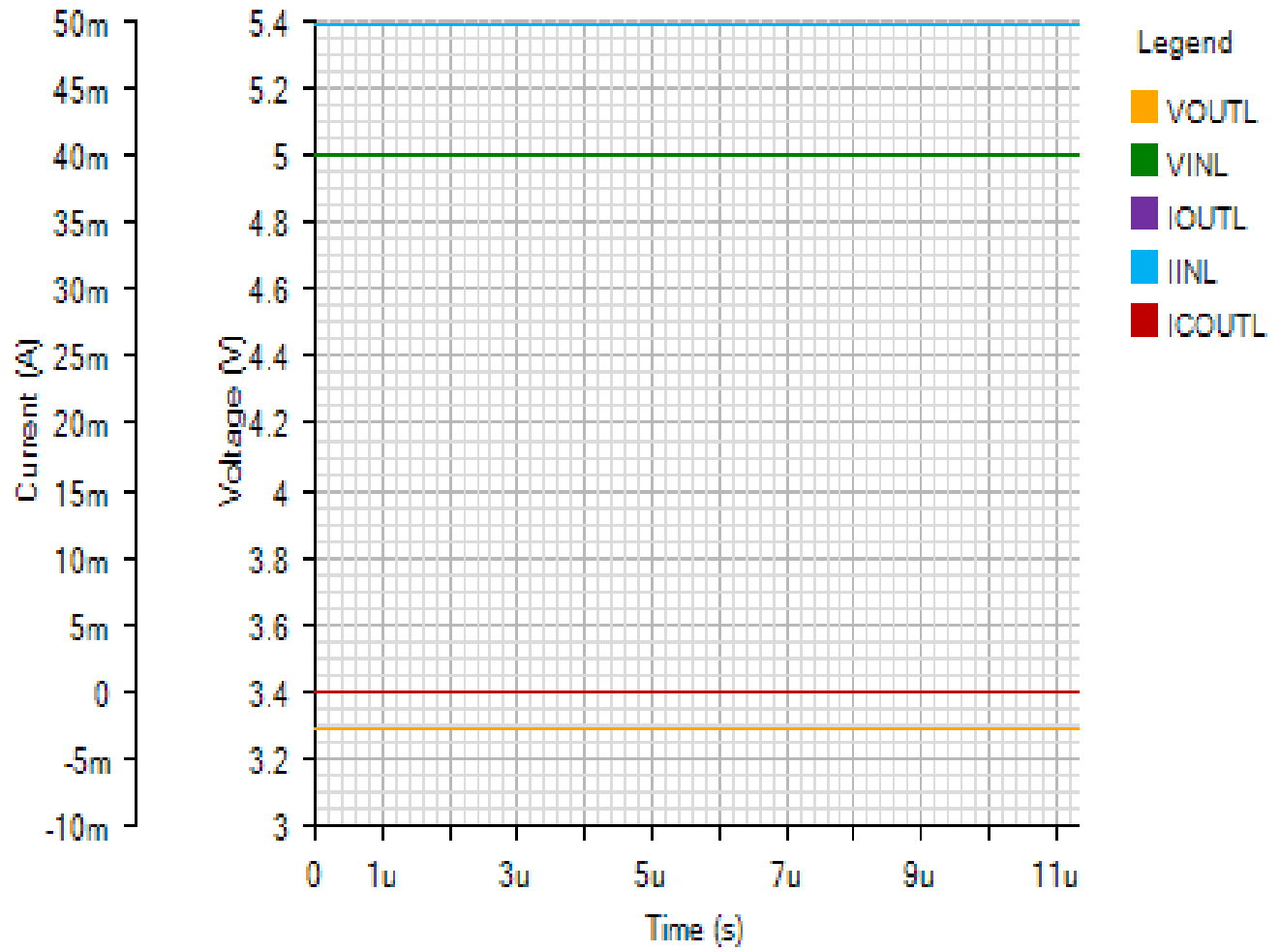
OUTPUT1

Default



LINEAR_REGULATOR

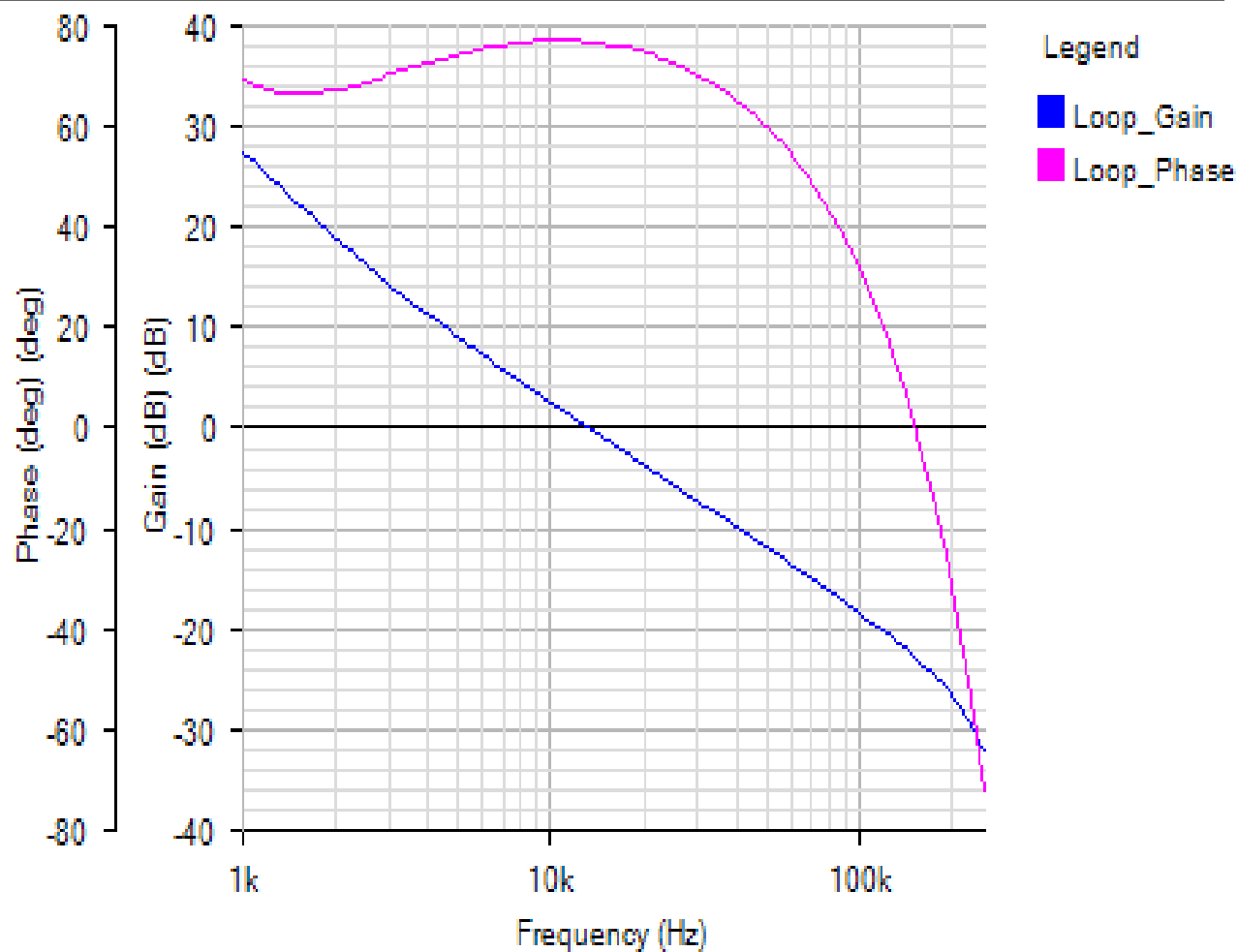
Default



AC Analysis - Wed Dec 19 2018 15:14:21

BODE

Default



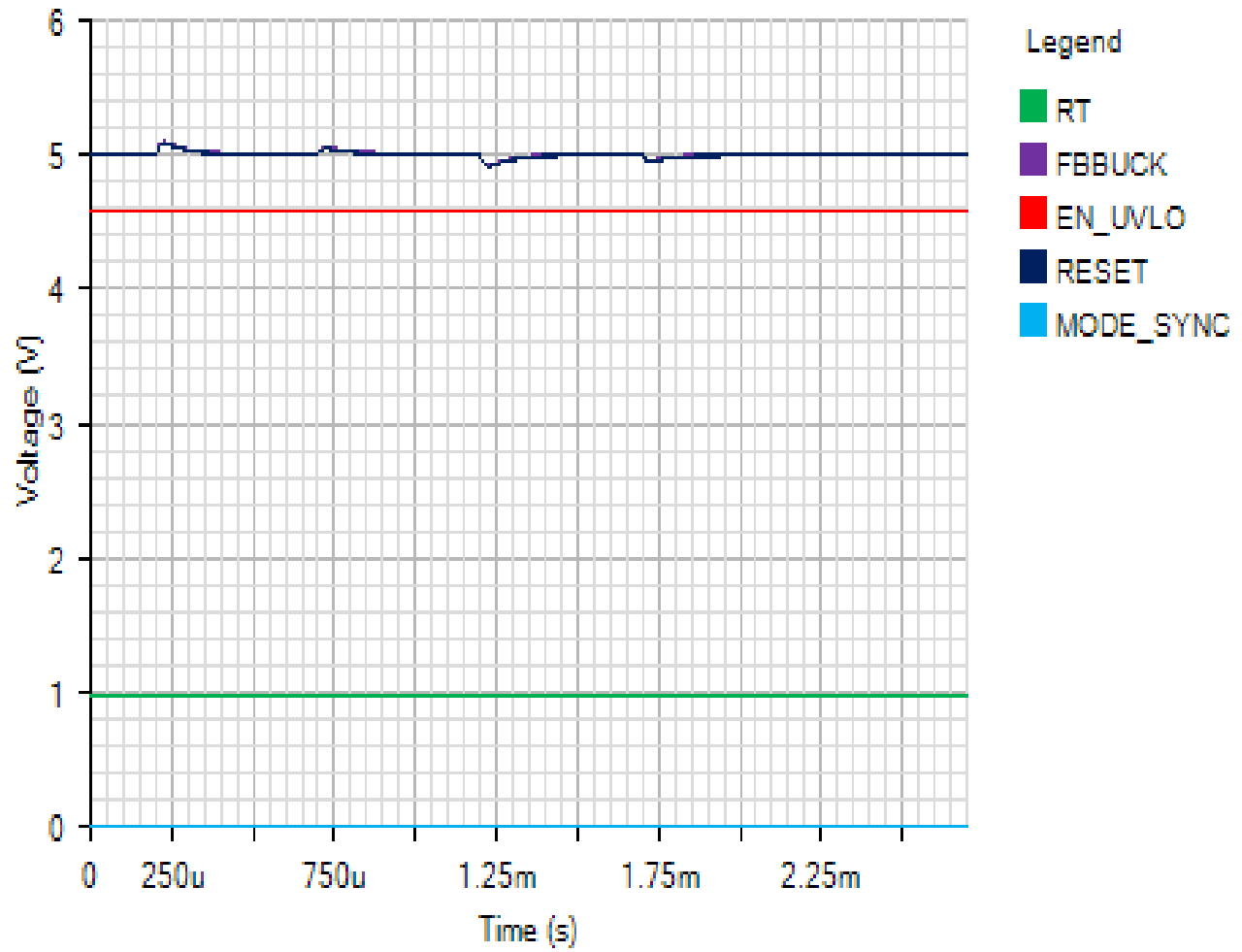
Phase Margin: 76.94° at a crossover frequency of 13.3kHz

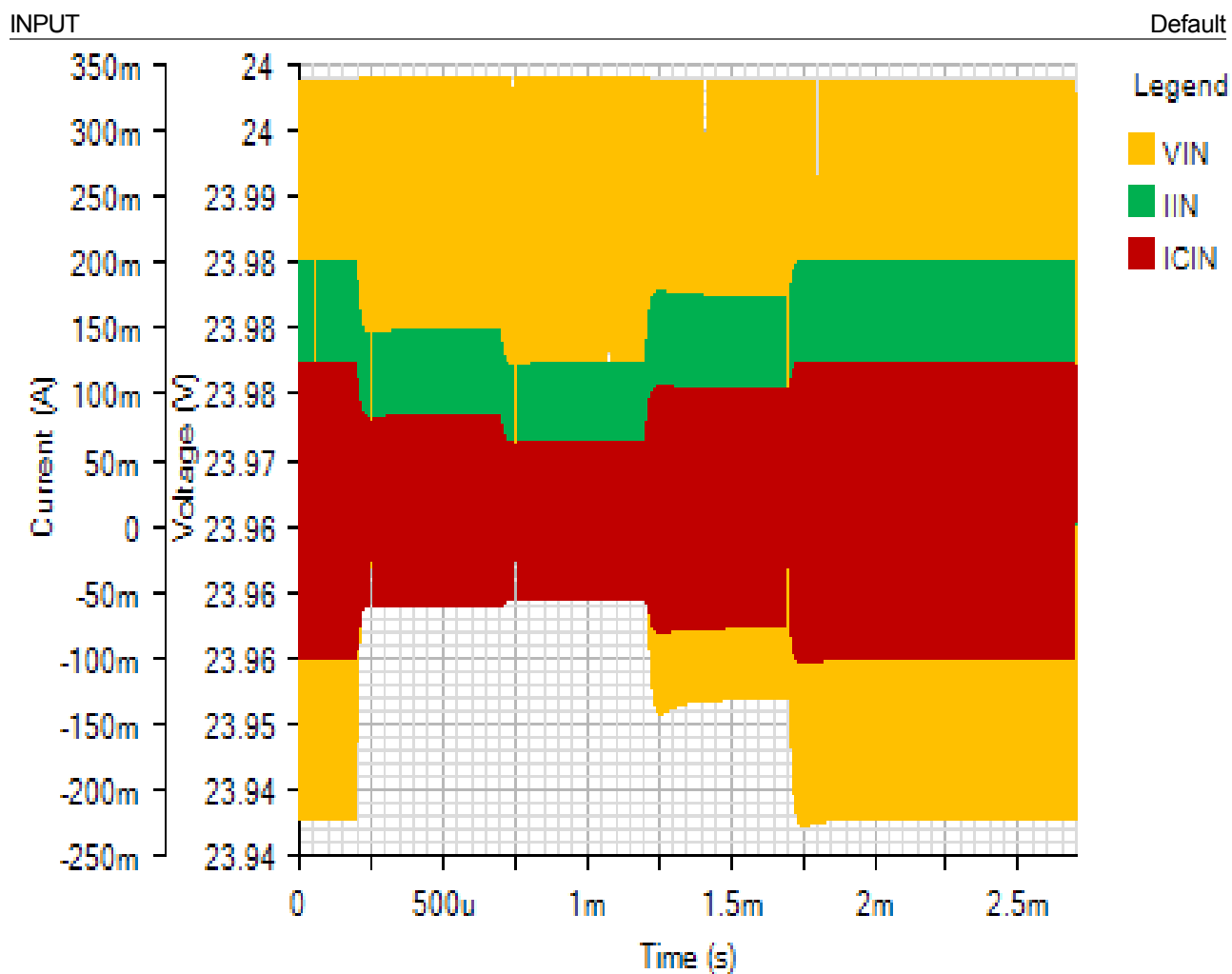


Load Step - Wed Dec 19 2018 15:14:21

IC

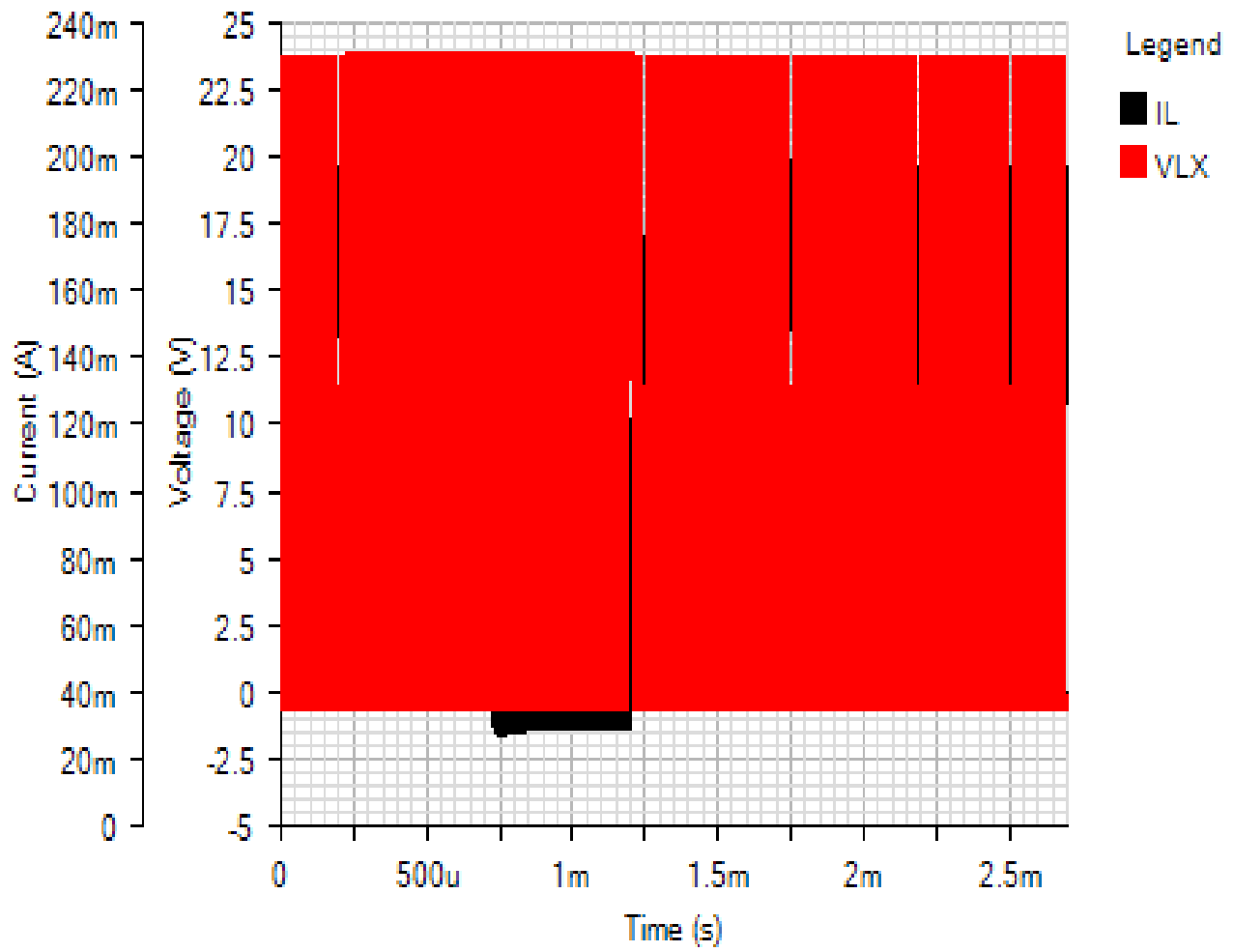
Default





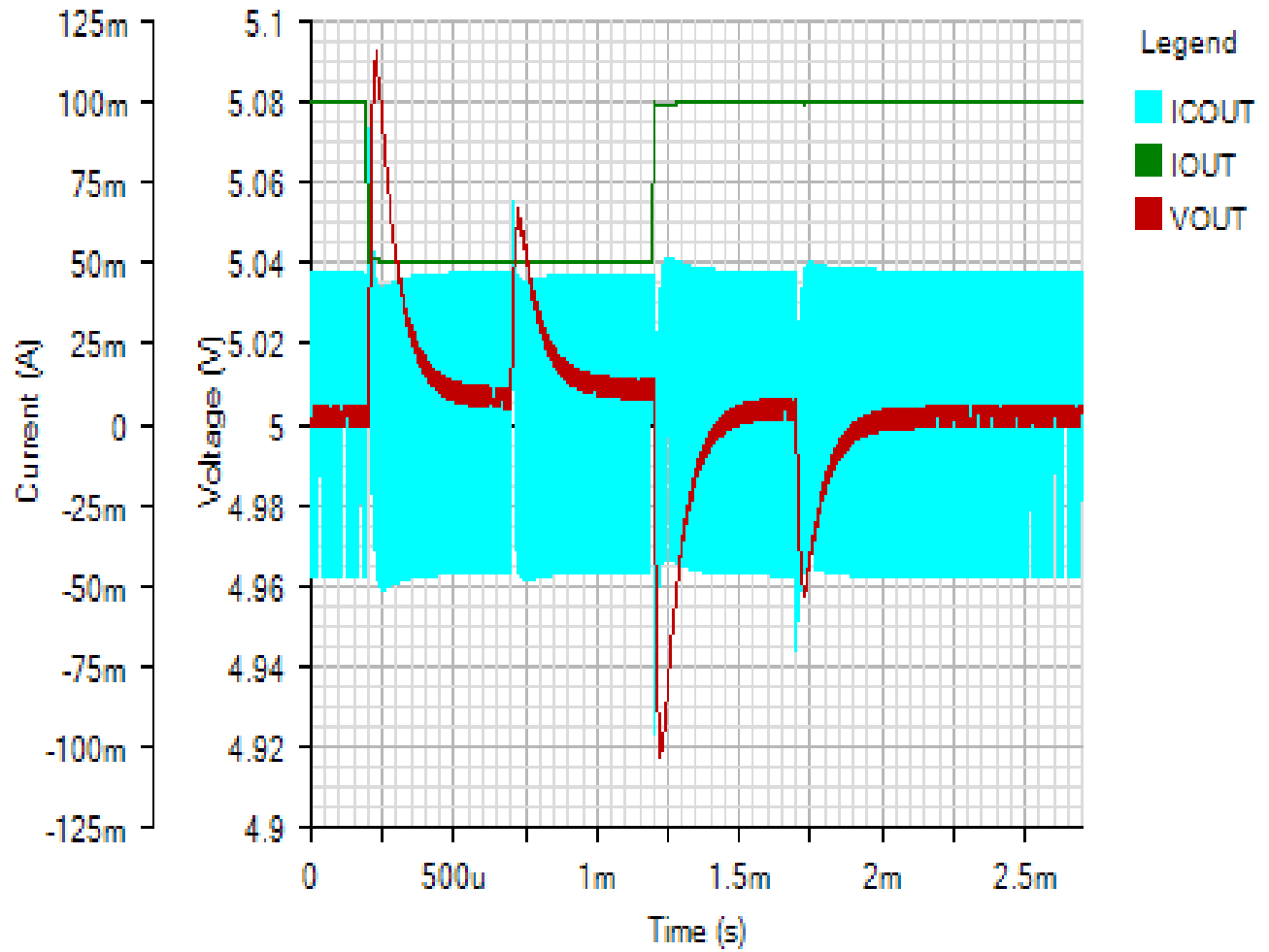
SWITCHING

Default



OUTPUT1

Default



LINEAR_REGULATOR

Default

