

## Initial Design

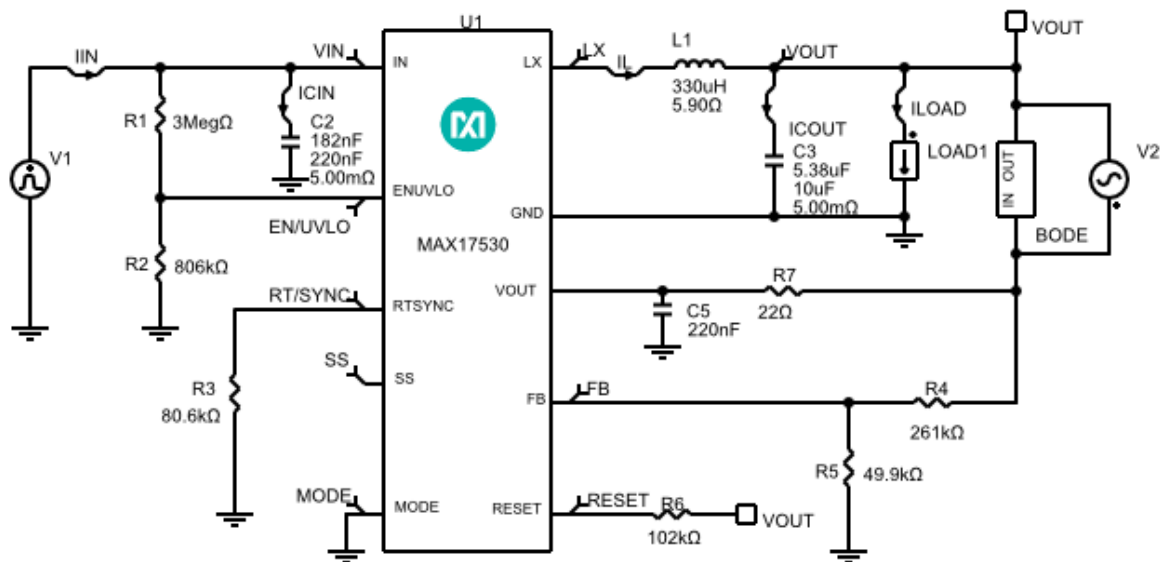
1.0

**Design Requirements**

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Parameter	Value
Minimum Input Voltage	6.5V
Maximum Input Voltage	42V
Typical Input Voltage	24V
Input Ripple Voltage	0.5V
Input Undervoltage Lockout Level	5.9V
Output Voltage	5V
Load Current	0.025A
Transient Output Ripple Voltage	0.15V
Performance Tradeoff	Balance Efficiency and Size
Cost Tradeoff	Cost
Mode of Operation	PWM
Switching Frequency	520kHz
Soft-start time	5ms
Ambient Temperature	25°C

## Schematic



### \*\*\*\*\* Notes \*\*\*\*\*

- Decreasing the output capacitance below recommended value might degrade the transient response or loop stability.
- If the current level (starting current for Load Steps) is too low, AC, Steady State and Load Step analyses may fail when PFM mode is selected.

## BOM

Ref	Qty	Part Number	Manufacturer	Description
U1	1	<a href="#">MAX17530</a>	Maxim Integrated	42V, 25mA, Ultra-Small, High-Efficiency Synchronous Step-Down DC-DC Converter with 22μA No-Load Supply Current
C2	1	<a href="#">C0805C224K5RAC</a>	Kemet	Cap Ceramic 0.22uF 50V X7R 10% SMD 0805 125C Bulk
C3	1	<a href="#">GRM21BR71A106KA73</a>	Murata	Cap Ceramic 10uF 10V 0805 125C
C5	1	<a href="#">CGA2B3X7R1E224K050BB</a>	TDK	Cap Ceramic 0.22uF 25V X7R 10% Pad SMD 0402 125°C Automotive T/R
L1	1	<a href="#">LPS4018-334MRB</a>	Coilcraft	Inductor 330uH 20% 5.31Ohm 0.2A Isat 0.23A Irms
R1	1	<a href="#">CRCW06033M00FKEA</a>	Vishay	Res Thick Film 0603 3M Ohm 1% 0.1W(1/10W) ±100ppm/°C Pad SMD Automotive T/R
R2	1	<a href="#">ERJ3EKF8063V</a>	Panasonic	Res Thick Film 0603 806K Ohm 1% 0.1W(1/10W) ±100ppm/°C Pad SMD Automotive T/R

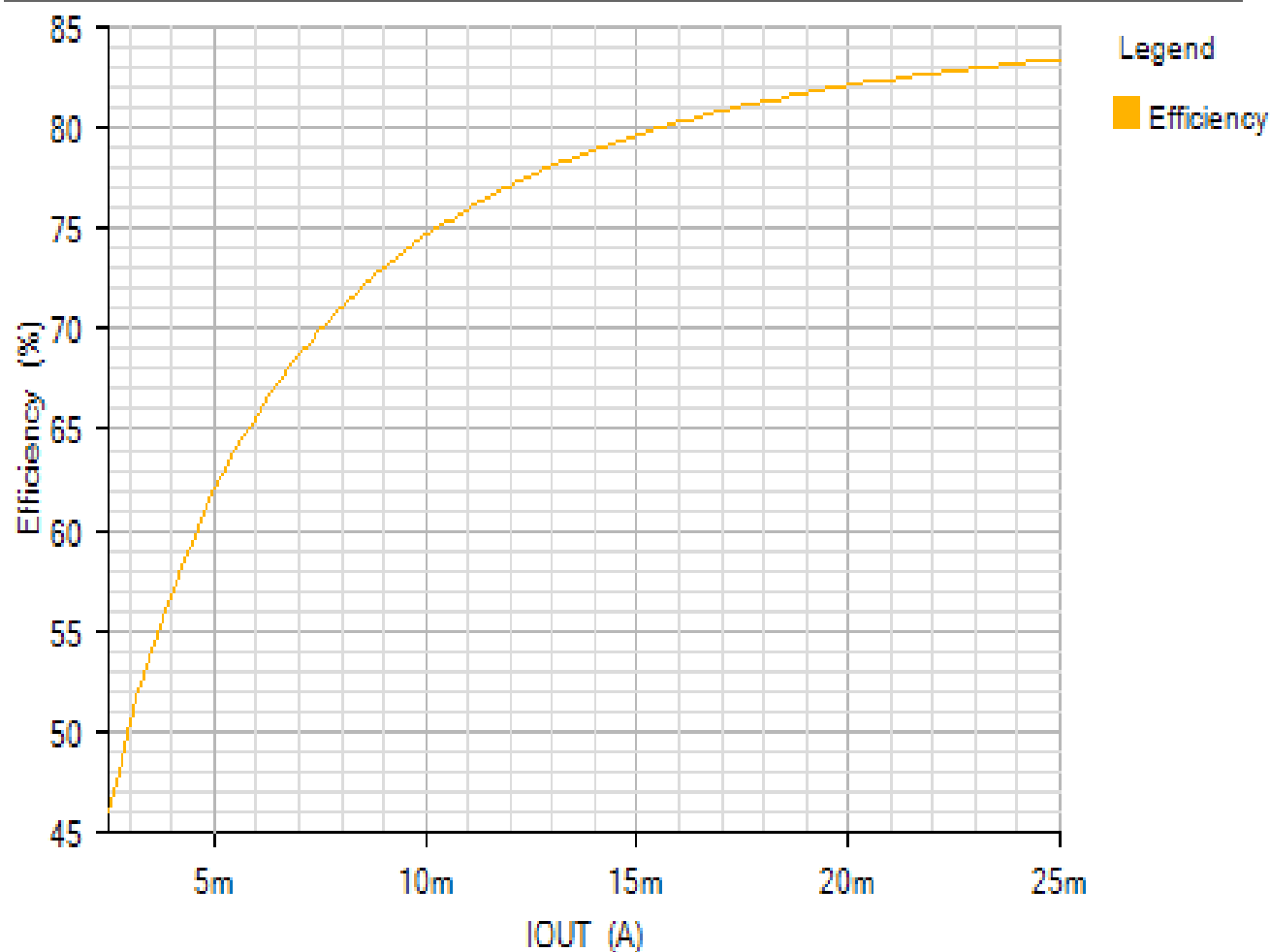
R3	1	ERJ2RKF8062X	Panasonic	Res Thick Film 0402 80.6K Ohm 1% 0.1W(1/10W) ±100ppm/°C Pad SMD Automotive T/R
R4	1	ERJ2RKF2613X	Panasonic	Res Thick Film 0402 261K Ohm 1% 0.1W(1/10W) ±100ppm/°C Pad SMD Automotive T/R
R5	1	ERJ2RKF4992X	Panasonic	Res Thick Film 0402 49.9K Ohm 1% 0.1W(1/10W) ±100ppm/°C Pad SMD Automotive T/R
R6	1	ERJ2RKF1023X	Panasonic	Res Thick Film 0402 102K Ohm 1% 0.1W(1/10W) ±100ppm/°C Pad SMD Automotive T/R
R7	1	ERJ2RKF22R0X	Panasonic	Res Thick Film 0402 22 Ohm 1% 0.1W(1/10W) ±100ppm/°C Pad SMD Automotive T/R

## Simulation Results

Efficiency - Tue Nov 20 2018 14:29:23

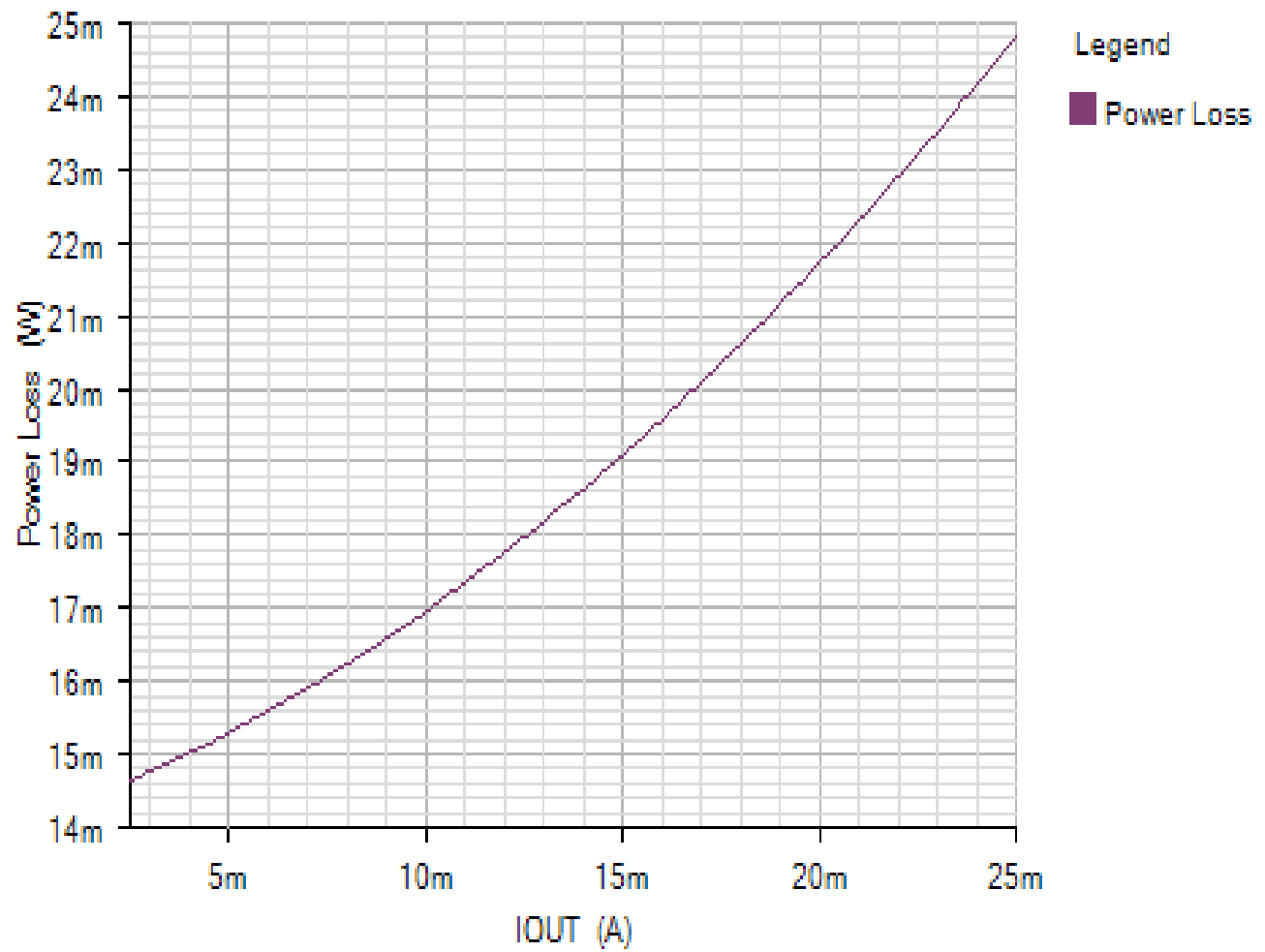
EFFICIENCY\_PLOT

Default



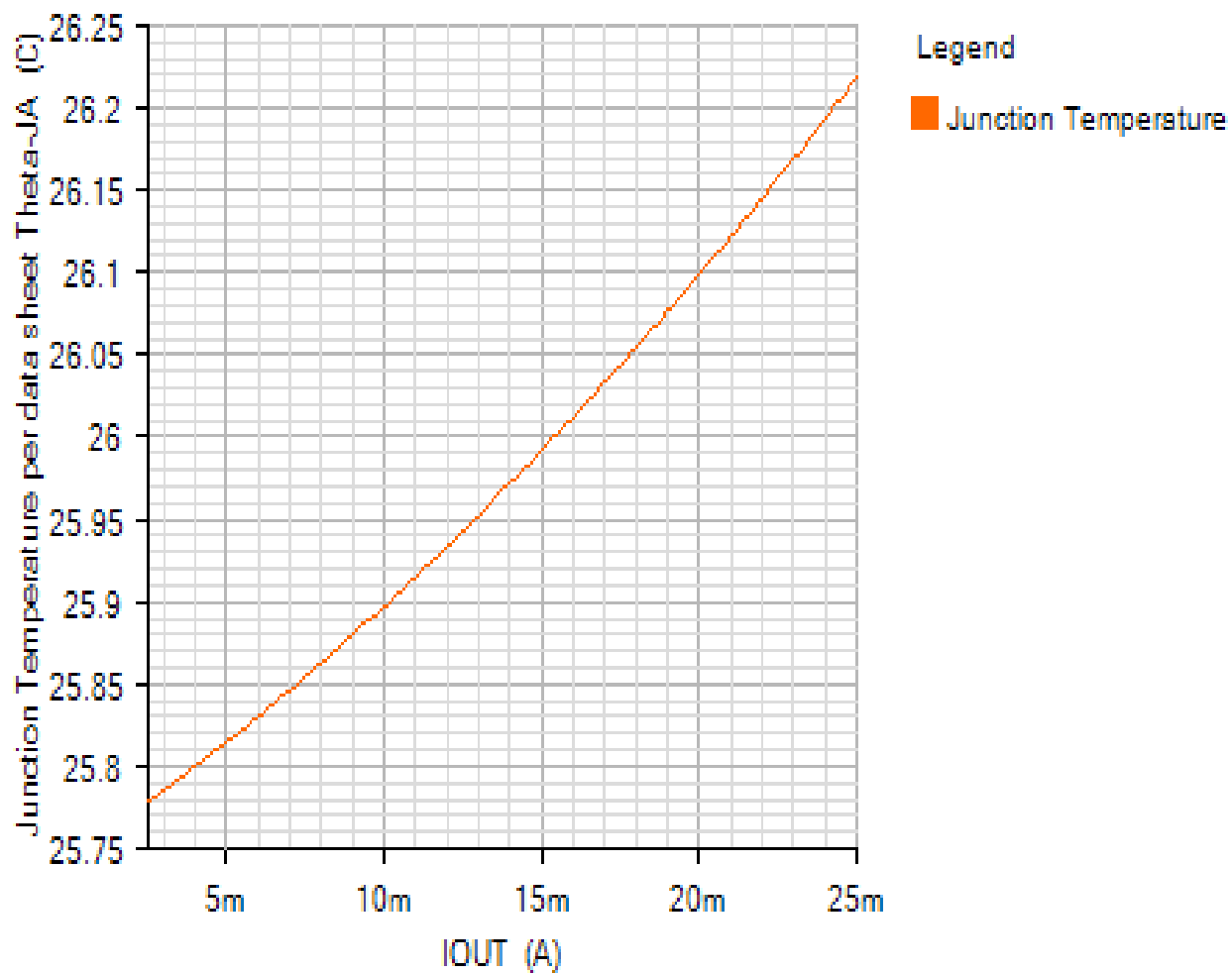
POWER\_LOSS\_PLOT

Default

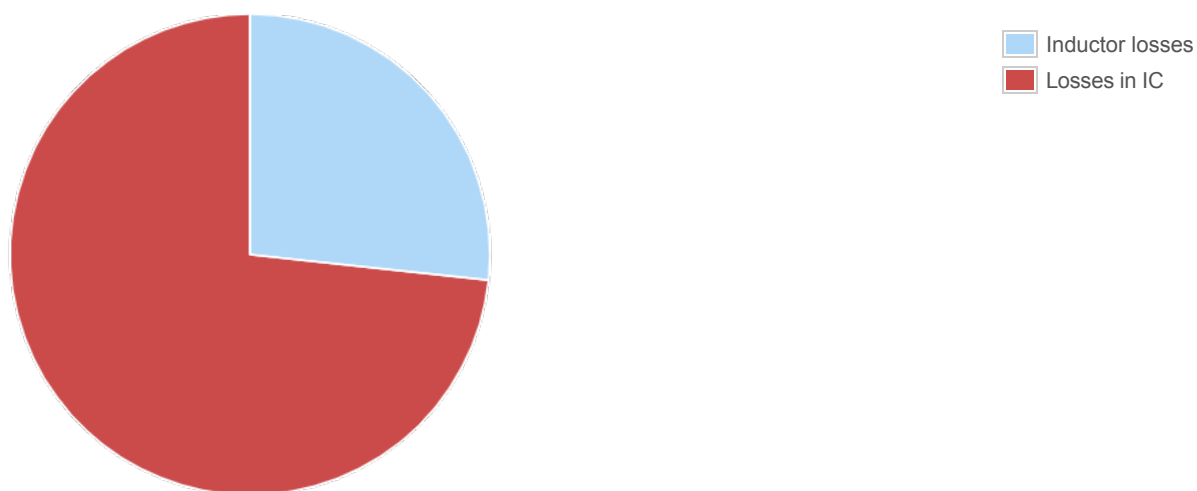


JUNCTION\_TEMPERATURE\_PLOT

Default



Losses



Component

Loss (W)

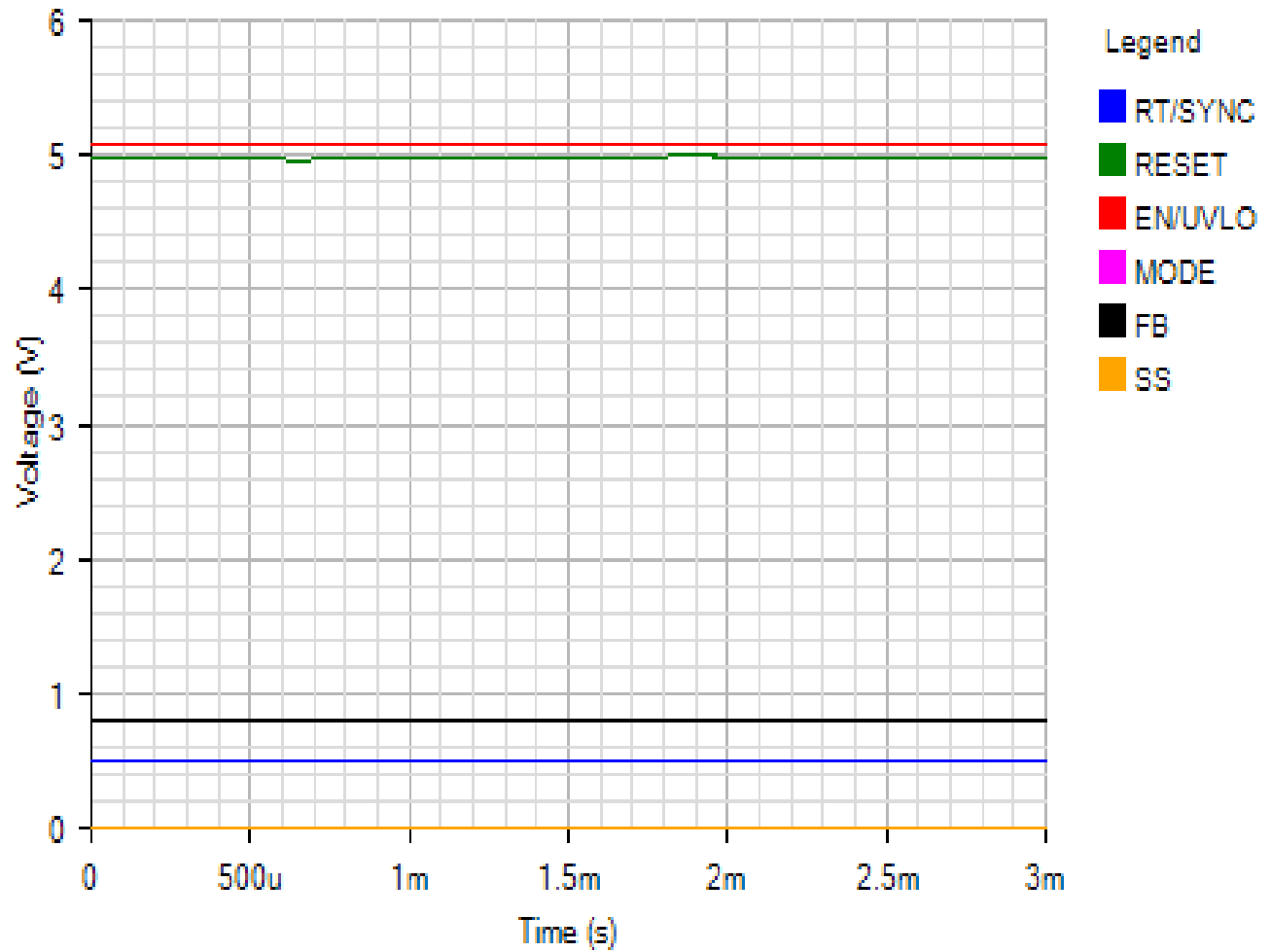
% of total

Component	Loss (W)	% of total
Inductor losses	0.00663	26.7
Losses in IC	0.01819	73.3
Total	0.02482	100

Load Step - Tue Nov 20 2018 14:29:23

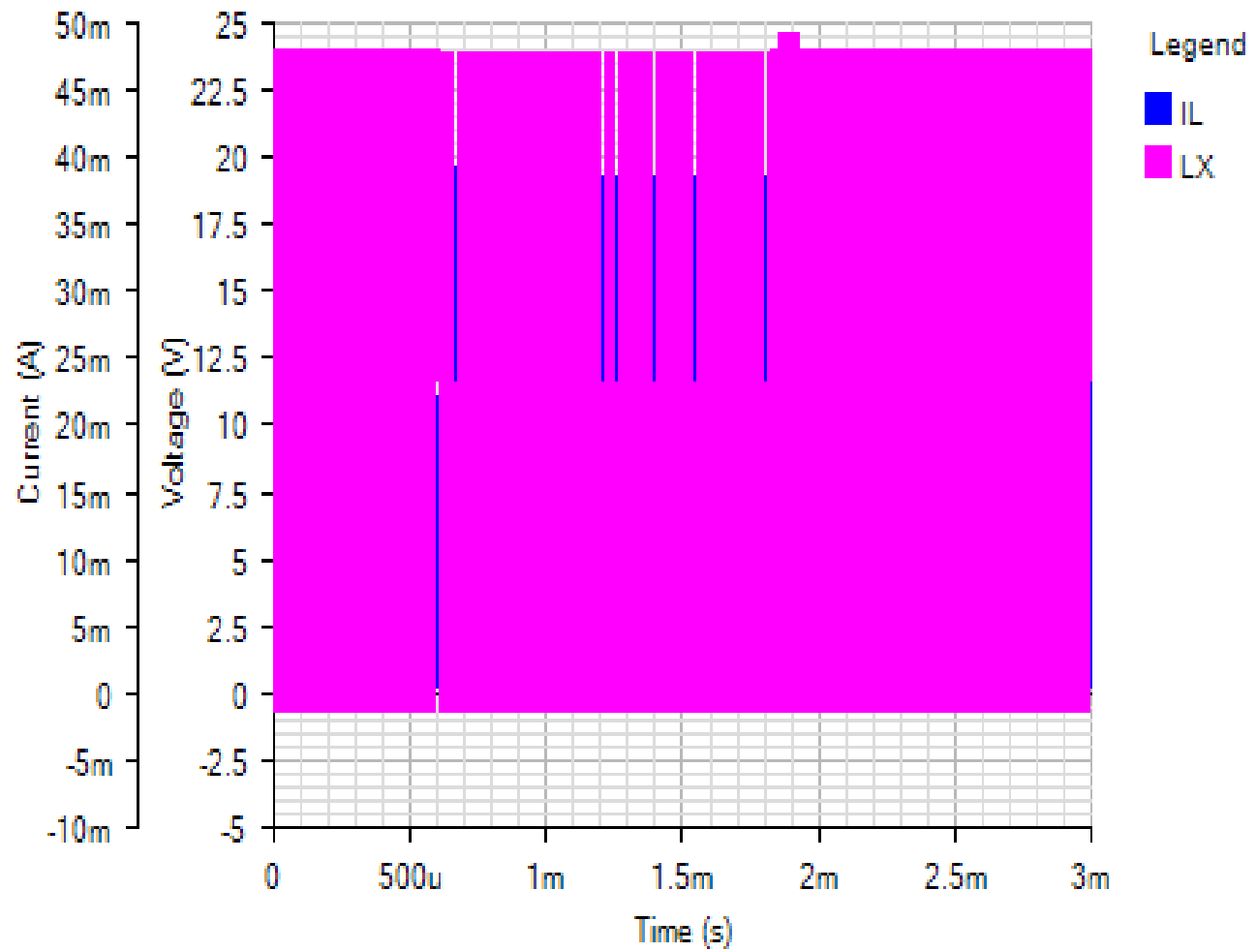
IC

Default



SWITCHING

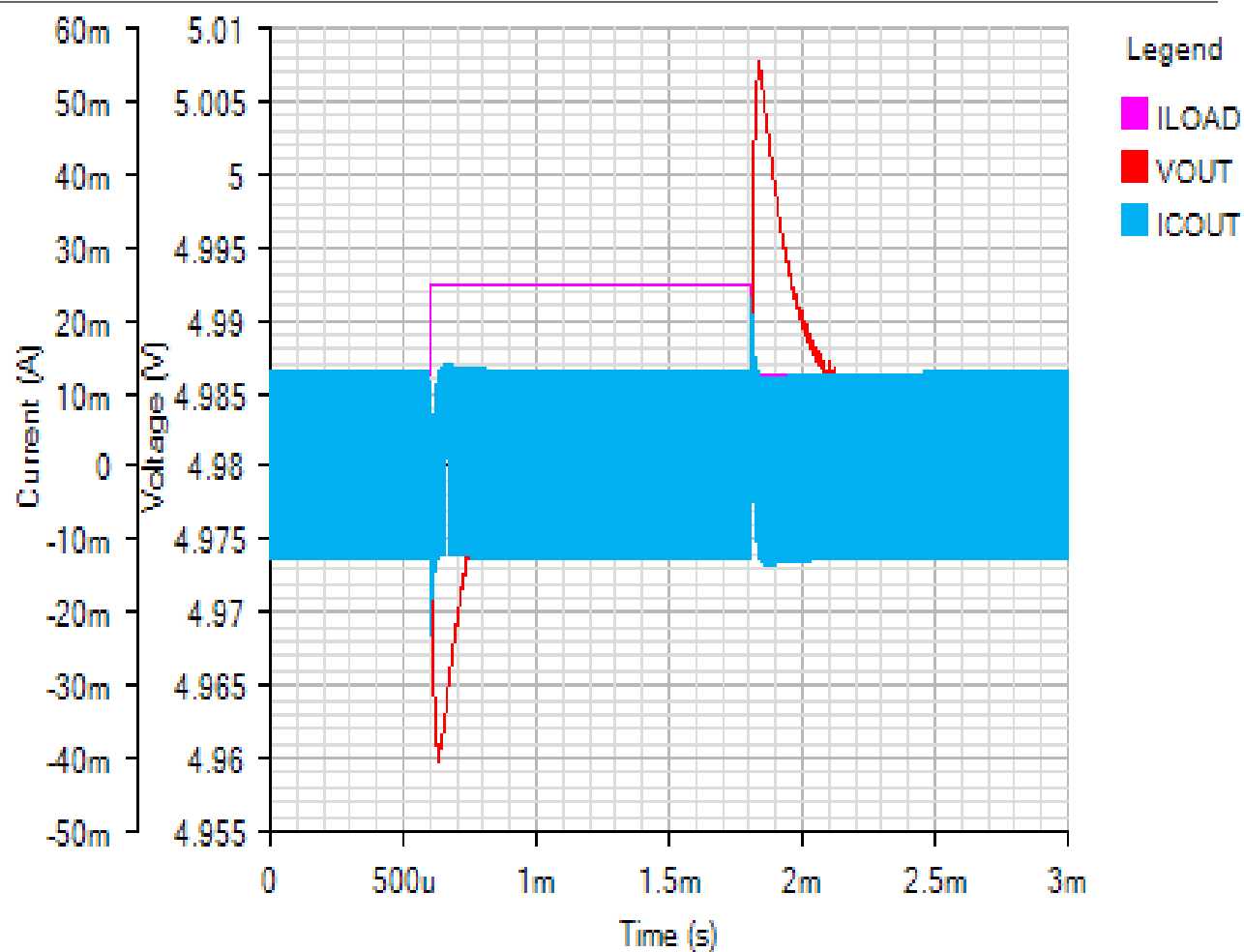
Default

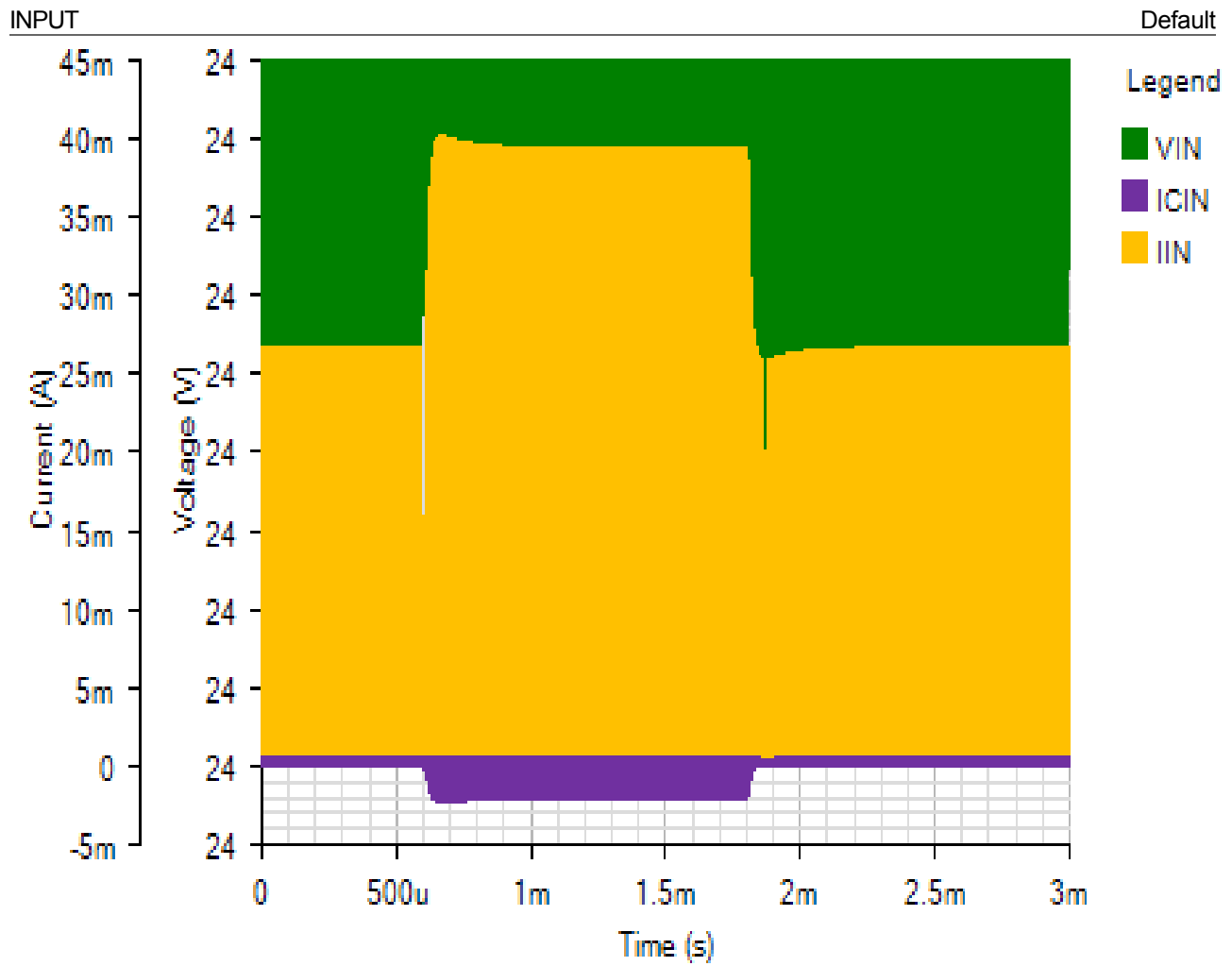




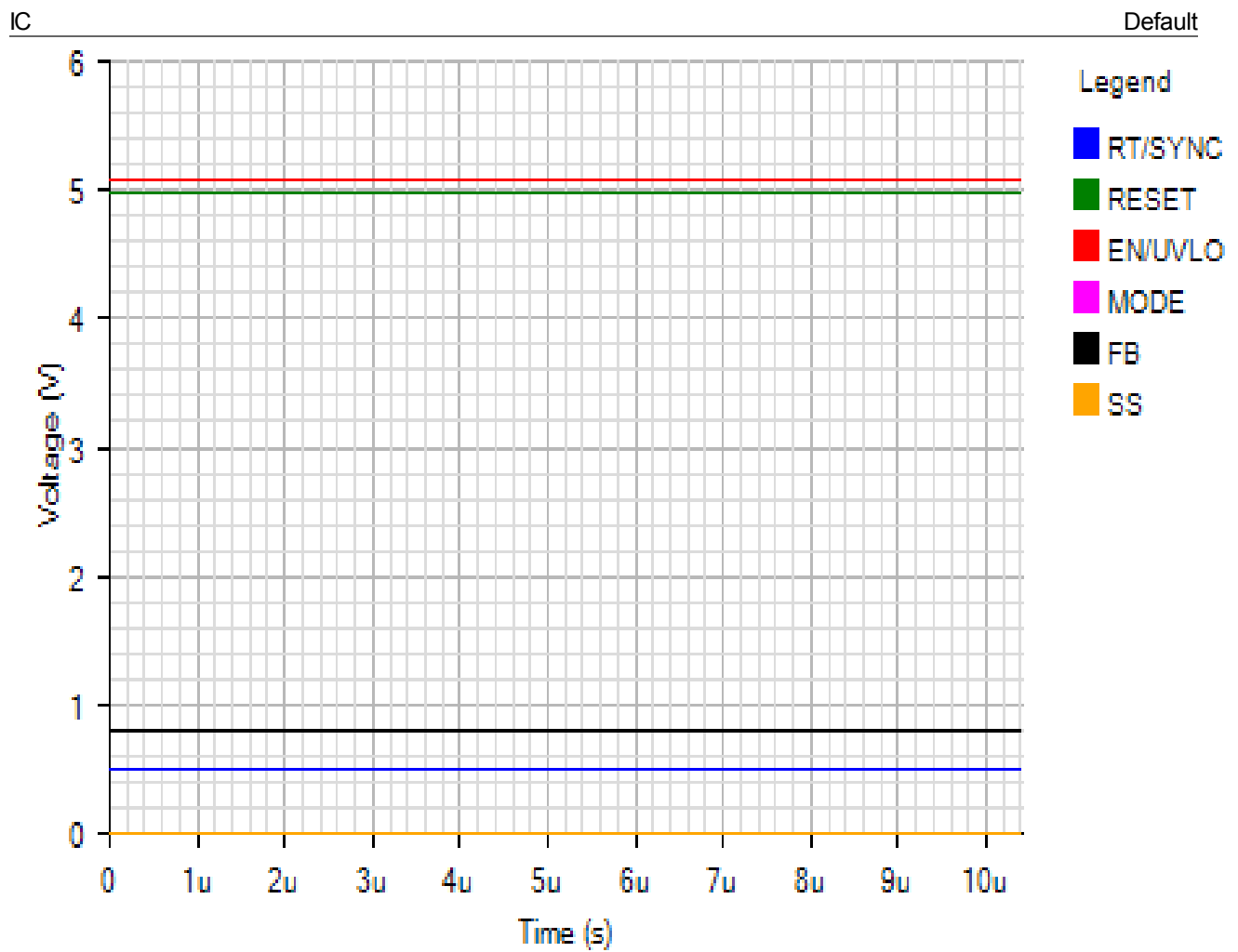
OUTPUT

Default



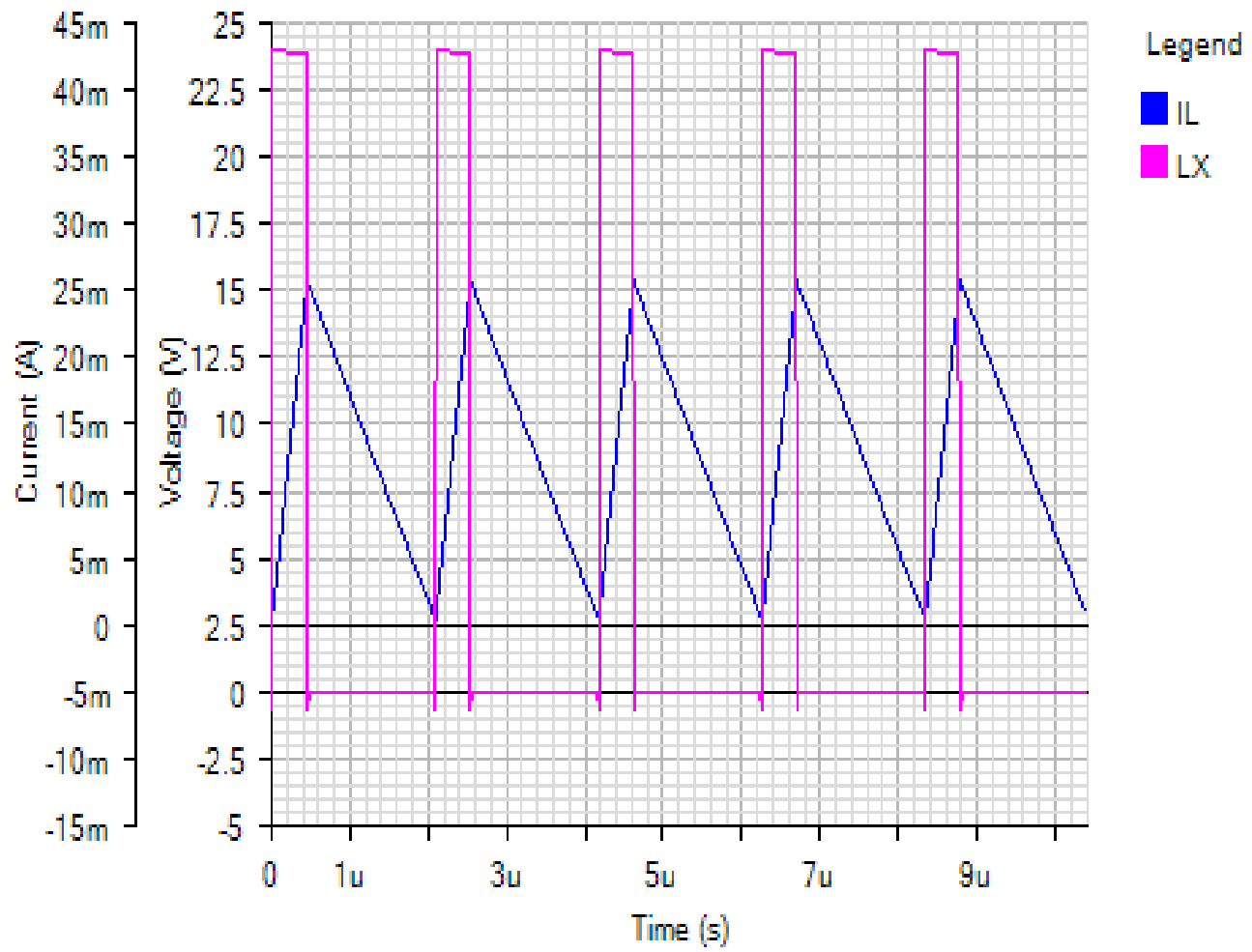


Steady State - Tue Nov 20 2018 14:29:23



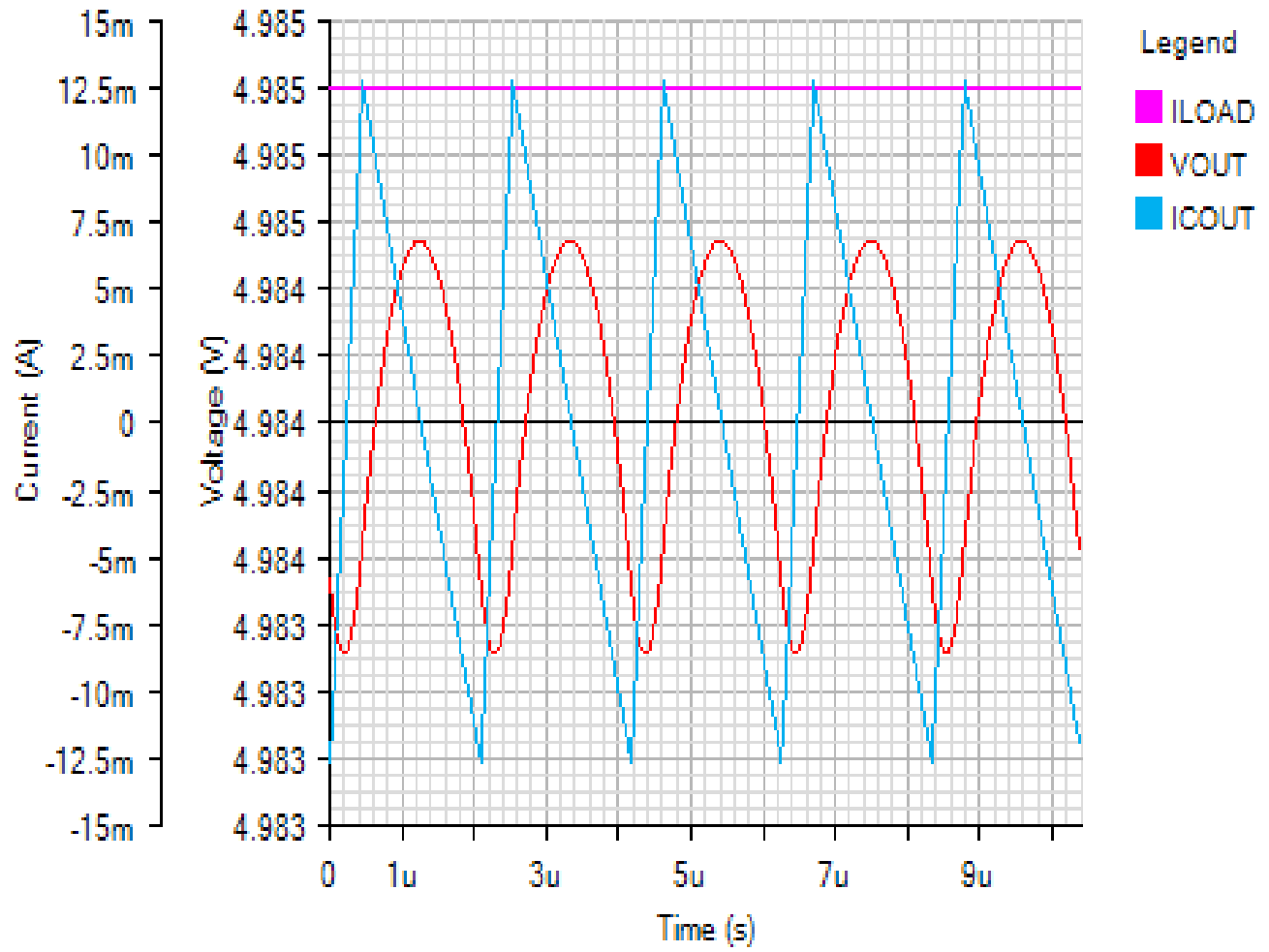
SWITCHING

Default



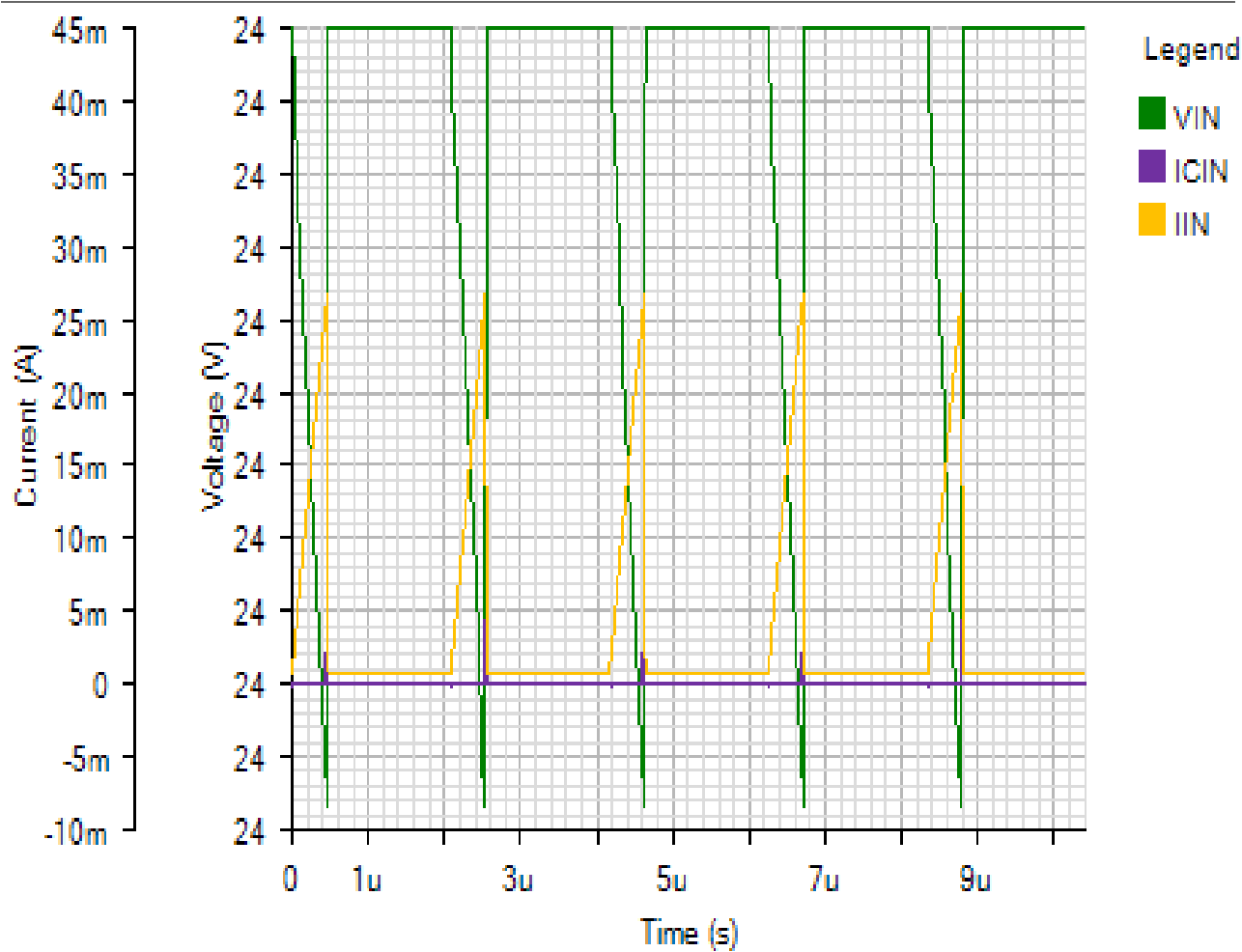
OUTPUT

Default

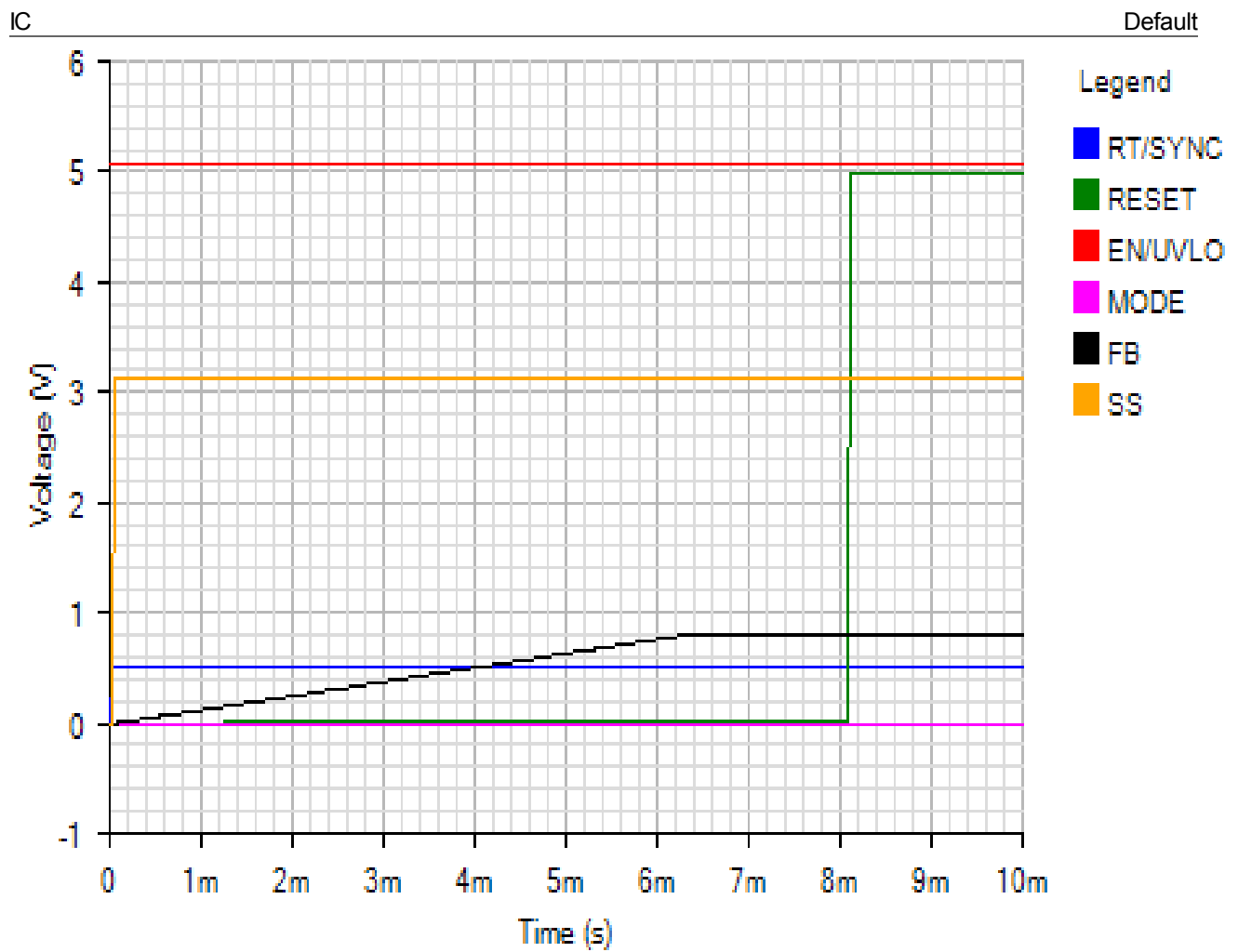


INPUT

Default

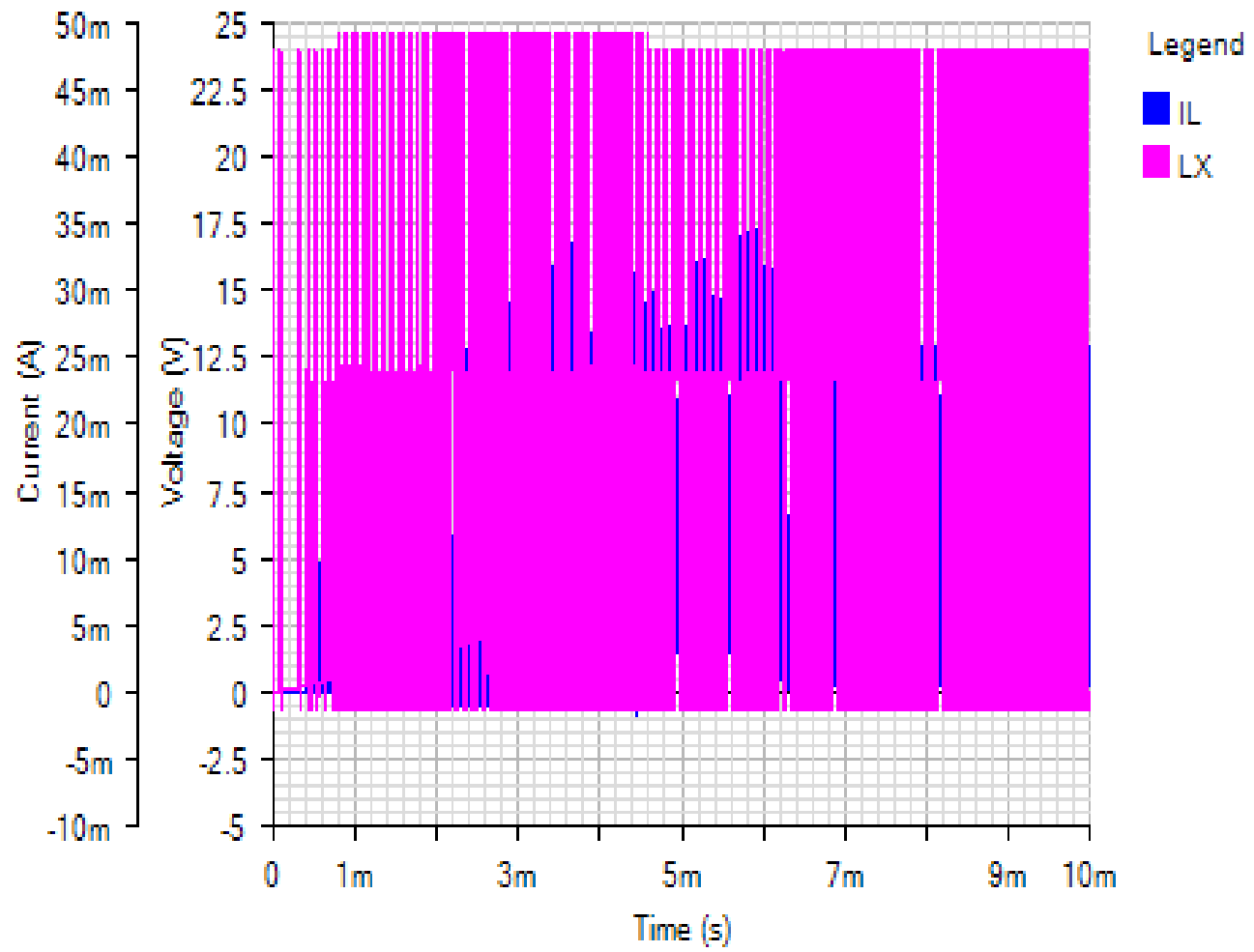


Start Up - Tue Nov 20 2018 14:29:23



SWITCHING

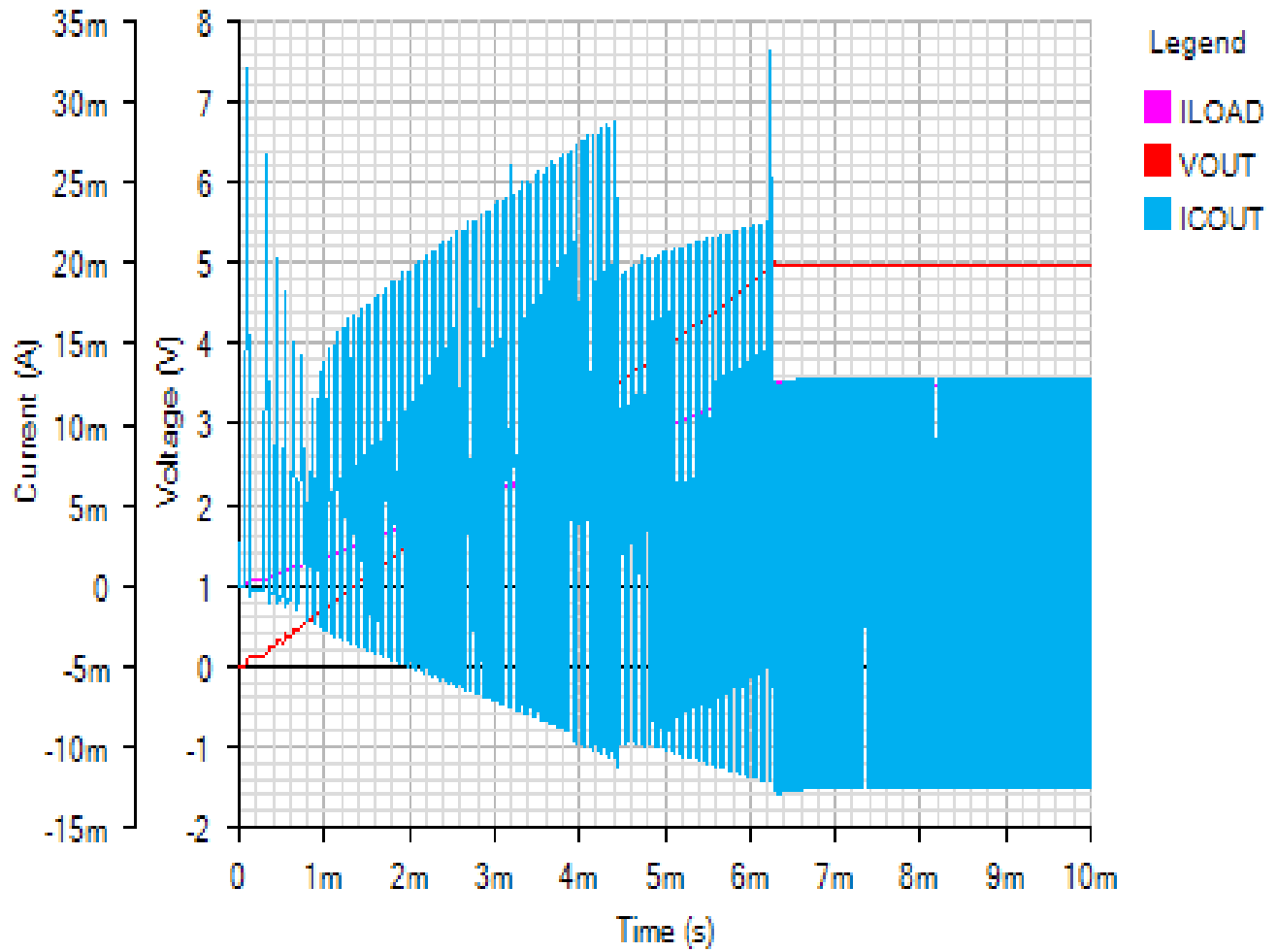
Default





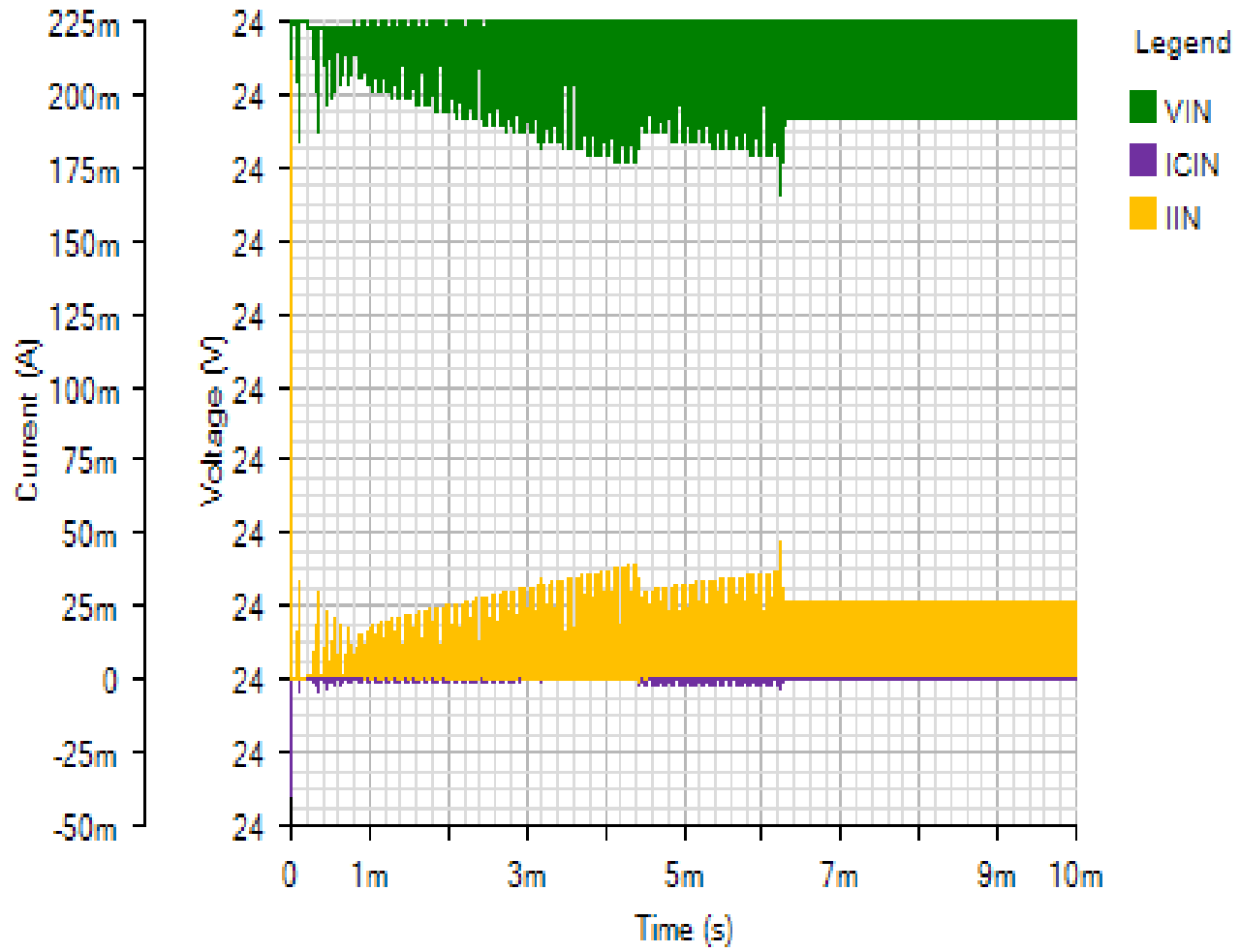
OUTPUT

Default



INPUT

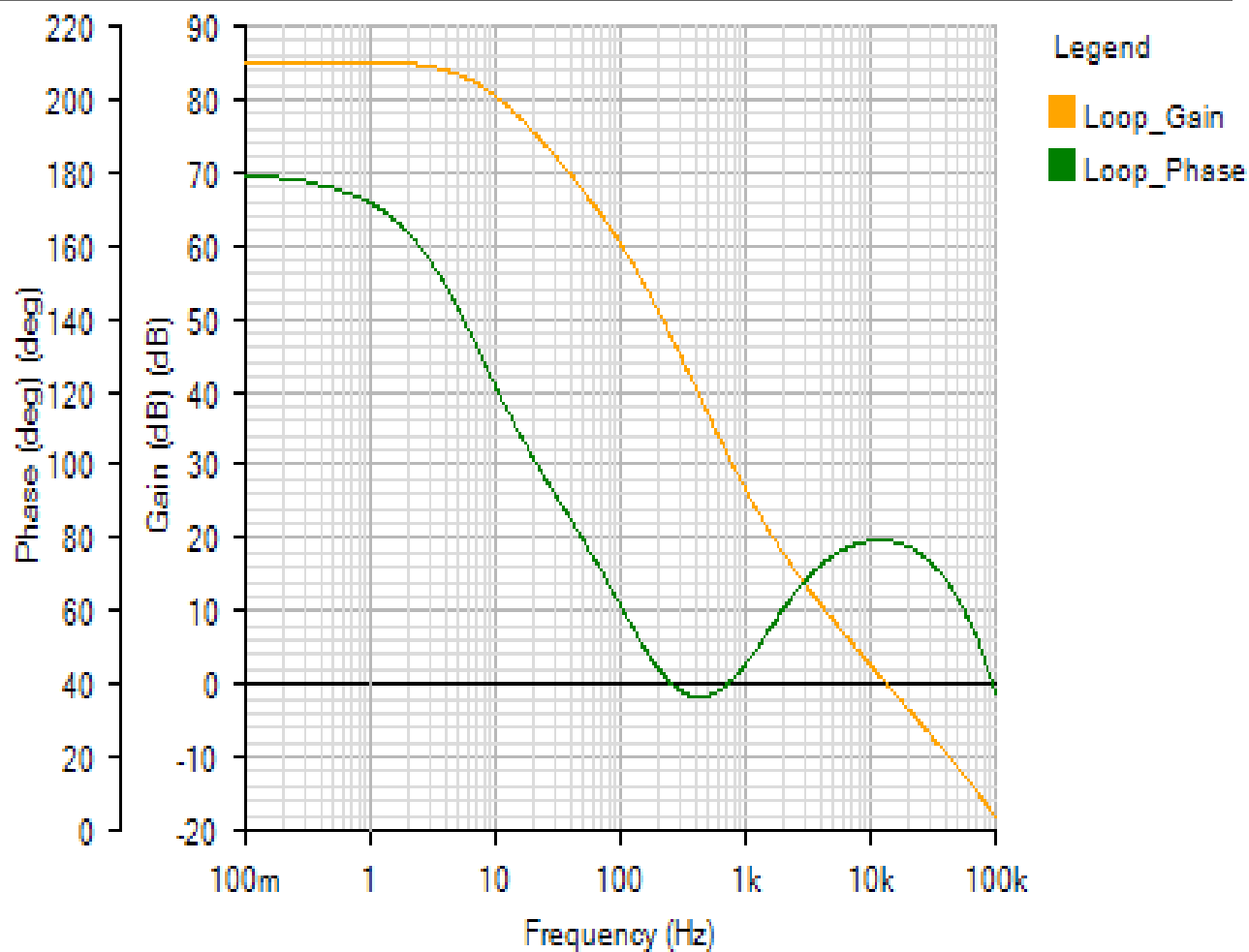
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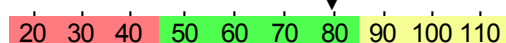
AC Loop - Tue Nov 20 2018 14:29:23

BODE

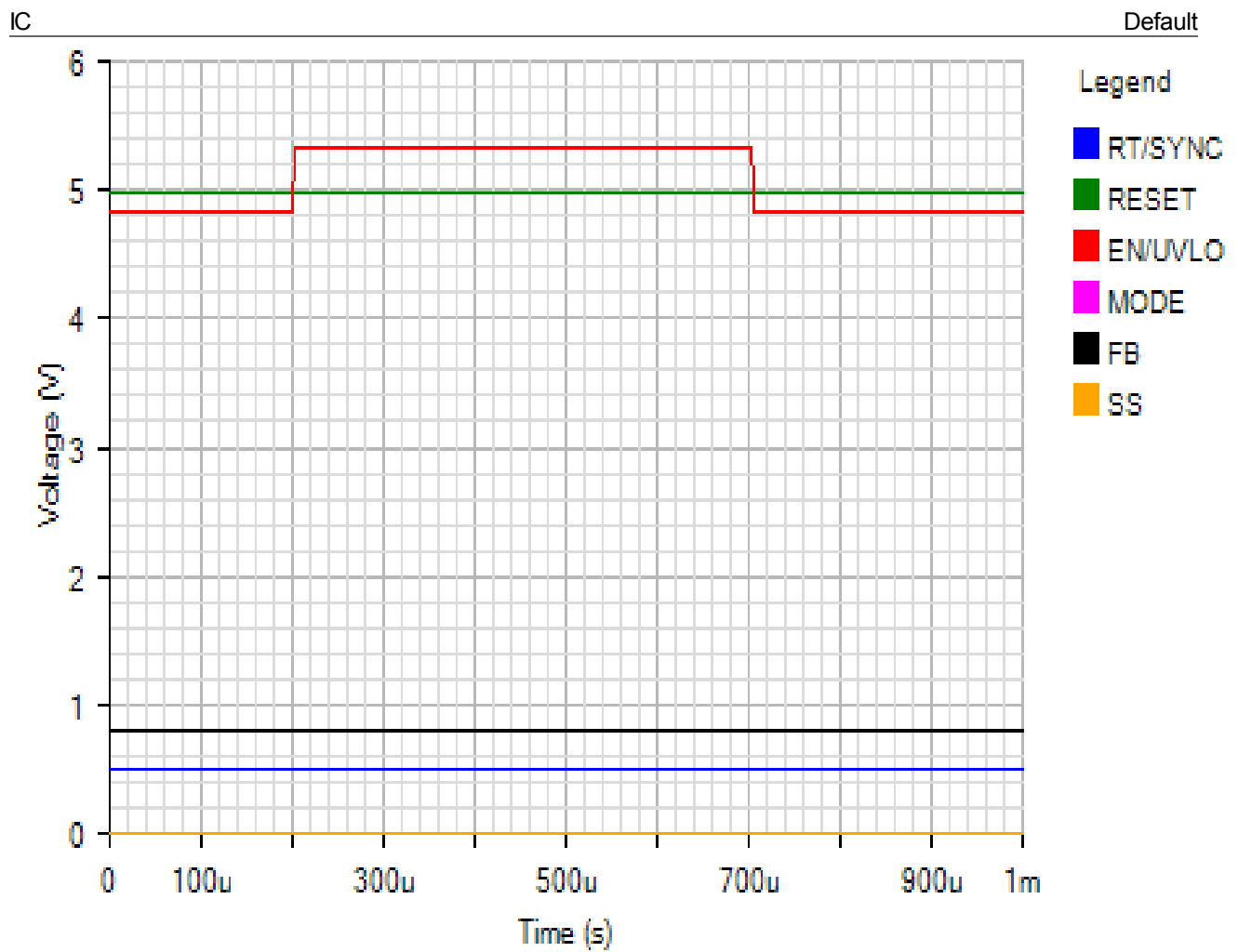
Default



Phase Margin: 79.25° at a crossover frequency of 13.5kHz

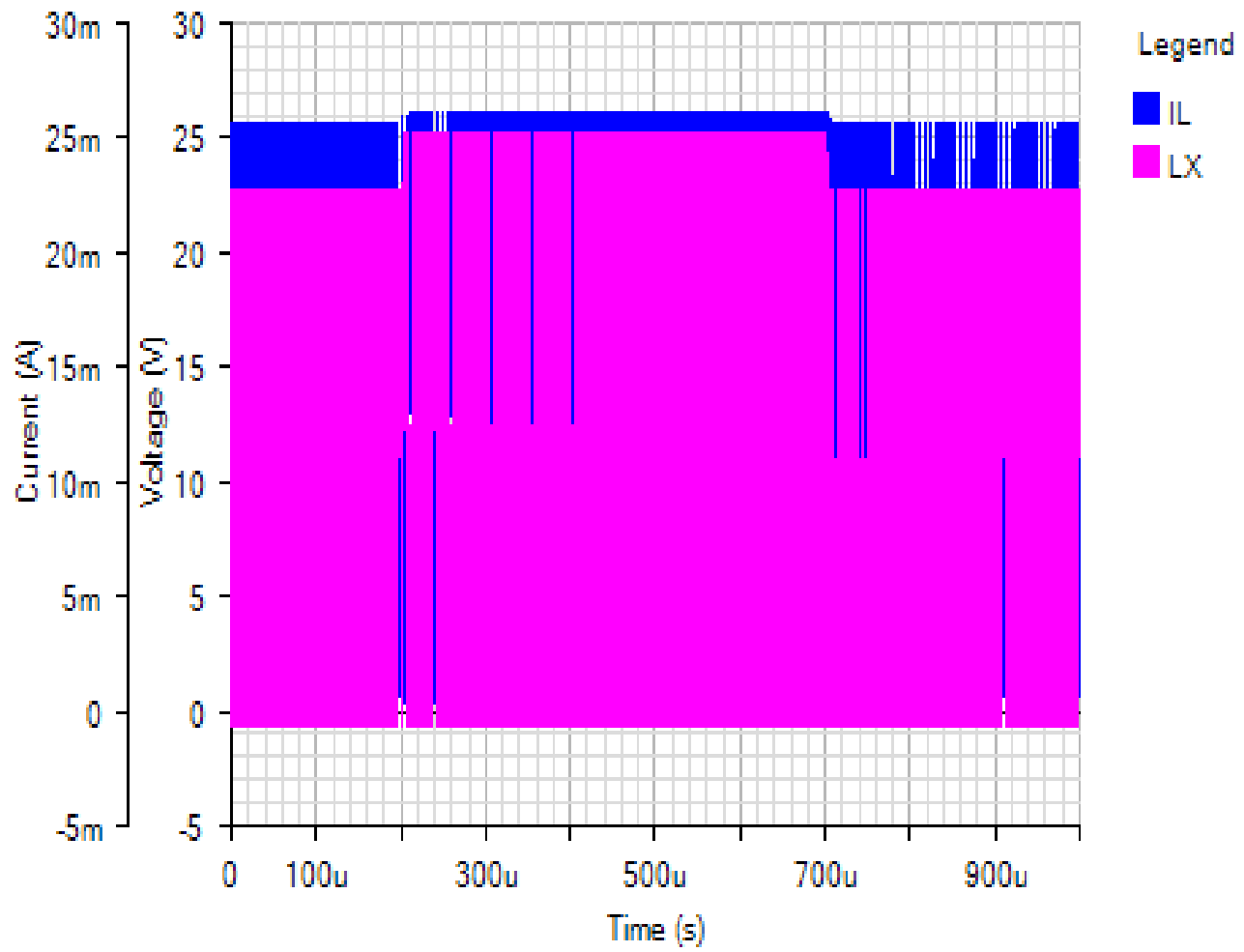


Line Transient - Tue Nov 20 2018 14:29:23



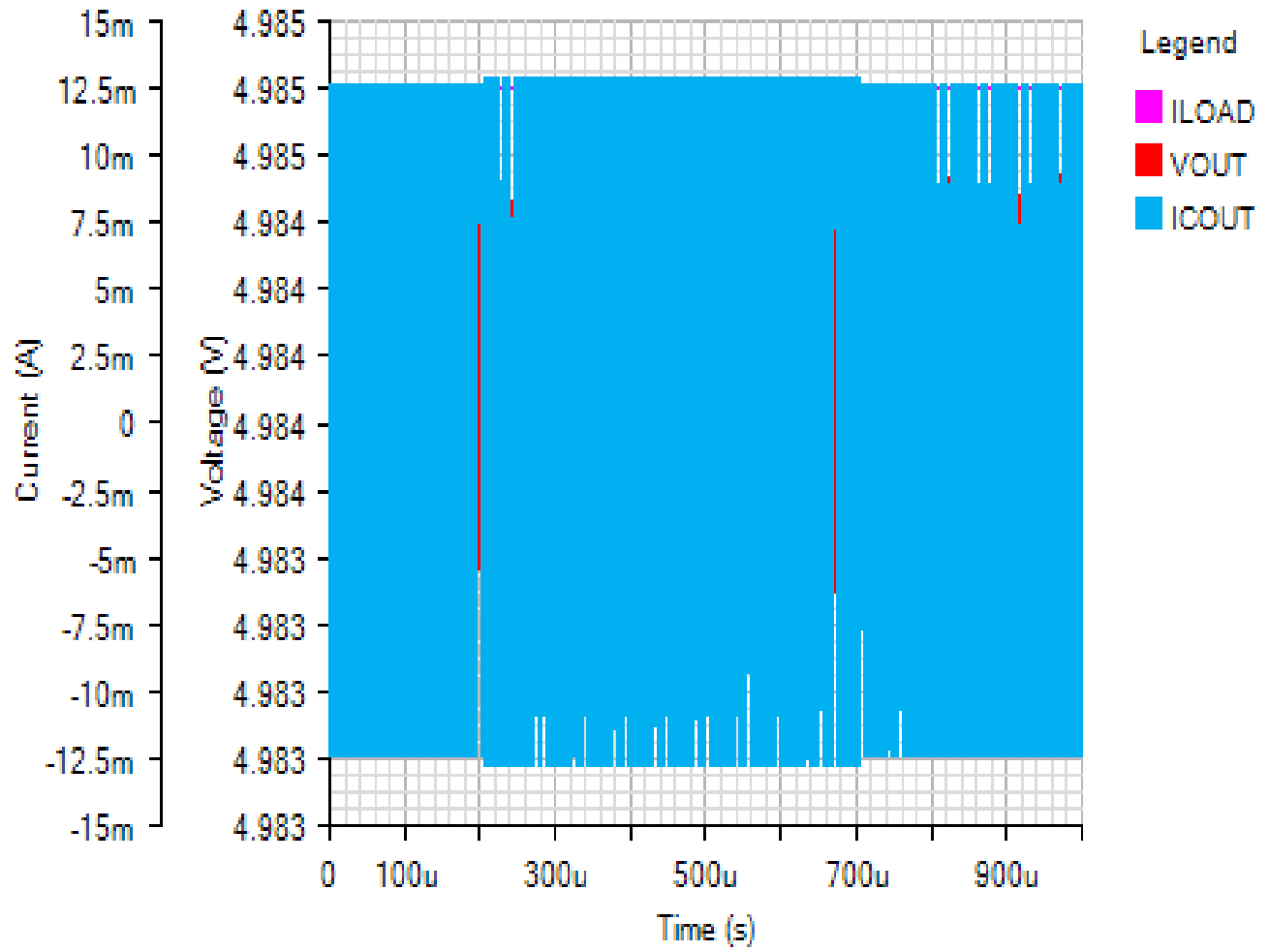
SWITCHING

Default



OUTPUT

Default



INPUT

Default

