

## Initial Design

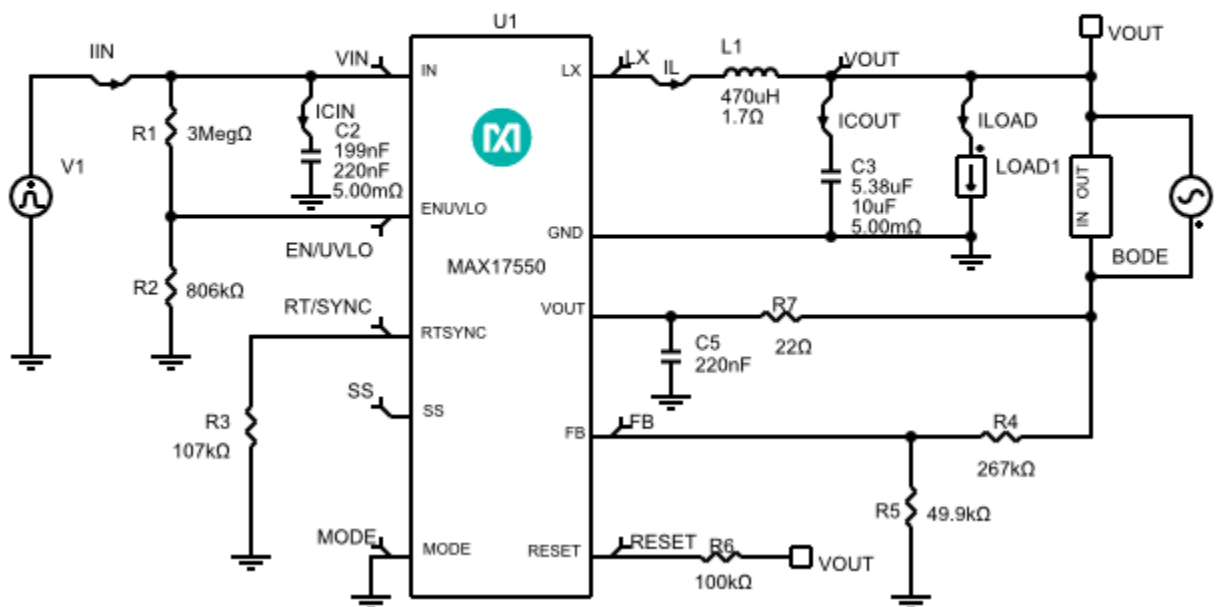
1.0

**Design Requirements**

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Parameter	Value
Maximum Input Voltage	60V
Minimum Input Voltage	6.5V
Typical Input Voltage	24V
Input Ripple Voltage	0.5V
Input Undervoltage Lockout Level	5.9V
Output Voltage	5V
Load Current	0.025mA
Transient Output Ripple Voltage	0.15V
Performance Tradeoff	Balance Efficiency and Size
Cost Tradeoff	Cost
Mode of Operation	PWM
Switching Frequency	380kHz
Soft-start time	5ms
Ambient Temperature	25°C

## Schematic



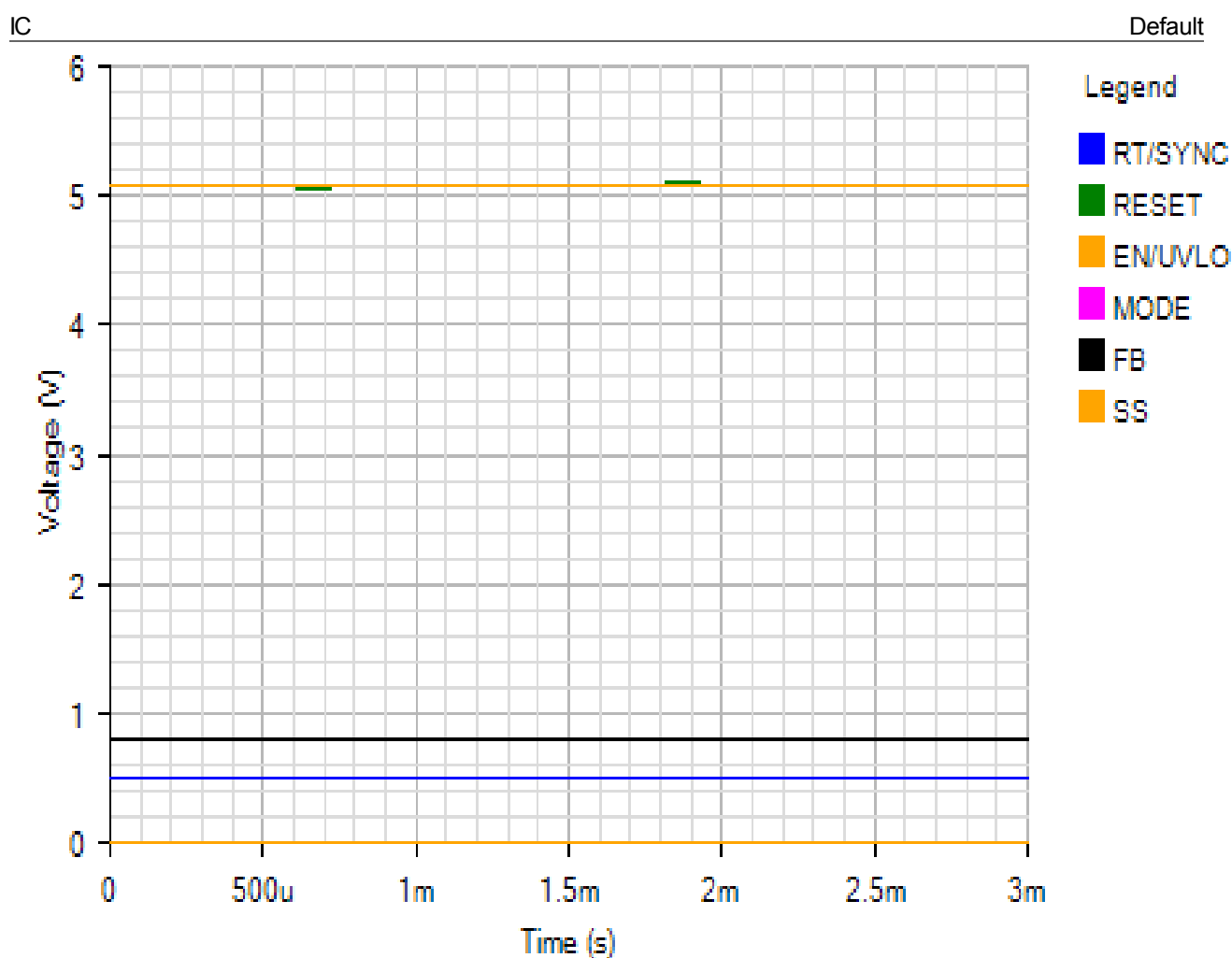
## BOM

Ref	Qty	Part Number	Manufacturer	Description
U1	1	<a href="#">MAX17550</a>	Maxim Integrated	60V, 25mA, Ultra-Small, High-Efficiency Synchronous Step-Down DC-DC Converter with 22μA No-Load Supply Current
C2	1	<a href="#">C3216X7R2A224K115AA</a>	TDK	Cap Ceramic 0.22uF 100V X7R 10% SMD 1206 125C Plastic T/R
C3	1	<a href="#">GRM21BR71A106KA73</a>	Murata	Cap Ceramic 10uF 10V 0805 125C
C5	1	<a href="#">EMK105B7224KV-FR</a>	Taiyo Yuden	Cap Ceramic 0.22uF 16V X7R 10% Pad SMD 0402 125°C T/R
L1	1	<a href="#">CLF6045T-471M</a>	TDK	Inductor 470uH 20% 1.42Ohm 0.3A Isat 0.37A 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	<a href="#">ERJ3EKF1073V</a>	Panasonic	Res Thick Film 0603 107K Ohm 1% 0.1W(1/10W) ±100ppm/°C Pad SMD Automotive T/R

R4	1	ERJ3EKF2673V	Panasonic	Res Thick Film 0603 267K Ohm 1% 0.1W(1/10W) ±100ppm/°C Pad SMD Automotive T/R
R5	1	ERJ3EKF4992V	Panasonic	Res Thick Film 0603 49.9K Ohm 1% 0.1W(1/10W) ±100ppm/°C Pad SMD Automotive T/R
R6	1	ERJ2GEJ104X	Panasonic	Res Thick Film 0402 100K Ohm 5% 0.1W(1/10W) ±200ppm/°C Pad SMD Automotive T/R
R7	1	ERJ3GEYJ220V	Panasonic	Res Thick Film 0603 22 Ohm 5% 0.1W(1/10W) ±200ppm/°C Pad SMD Automotive T/R

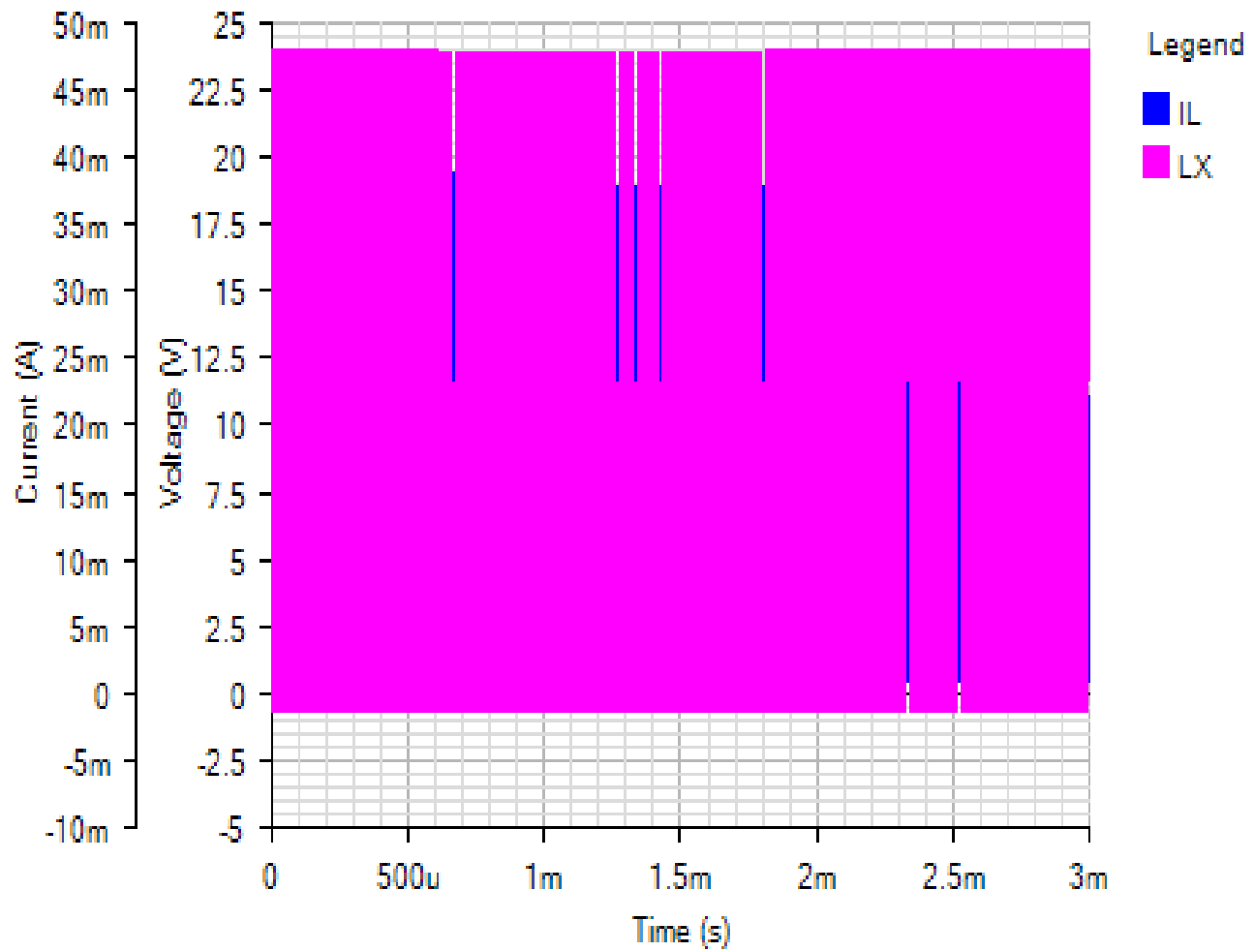
## Simulation Results

### Load Step - Mon Nov 19 2018 17:18:40



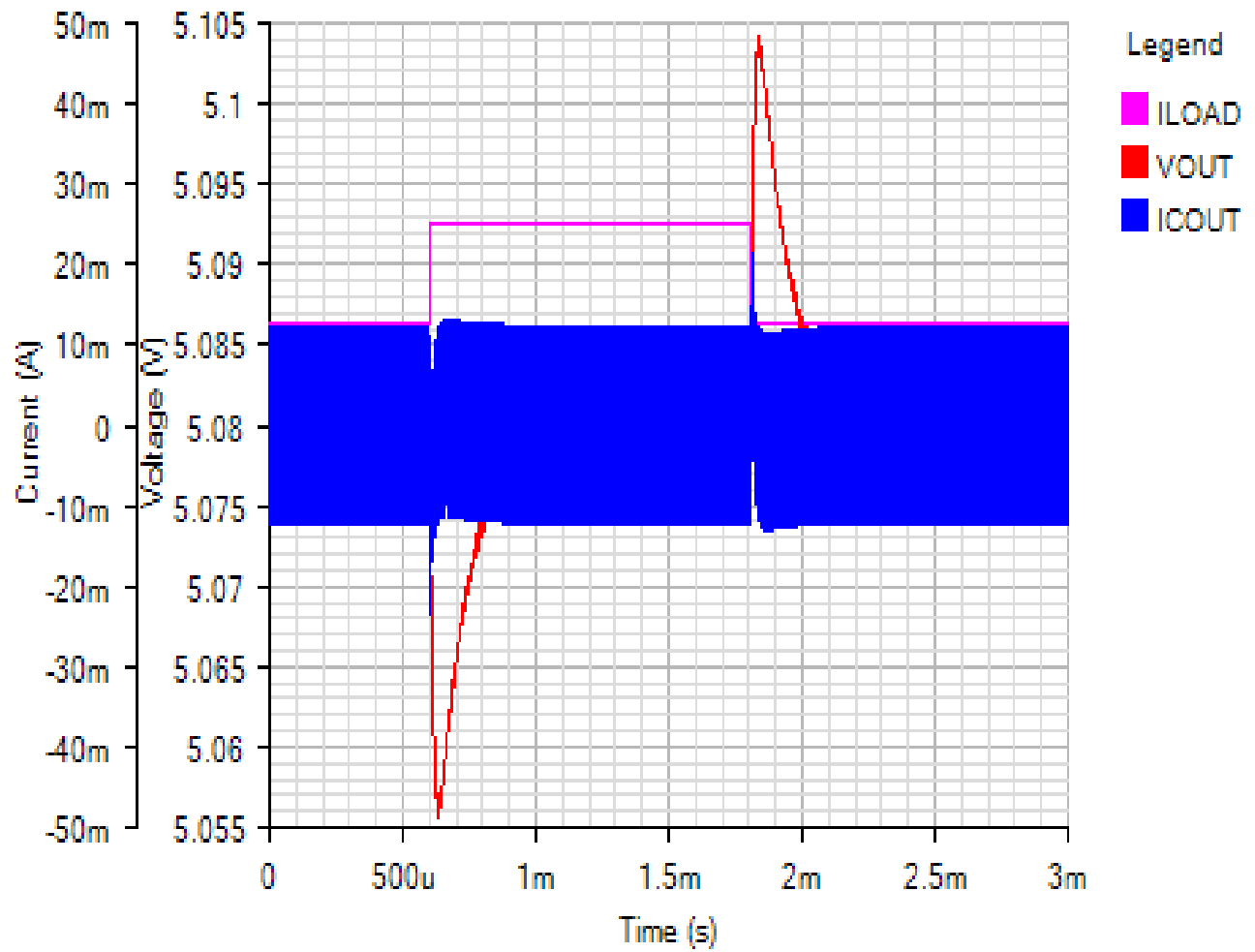
SWITCHING

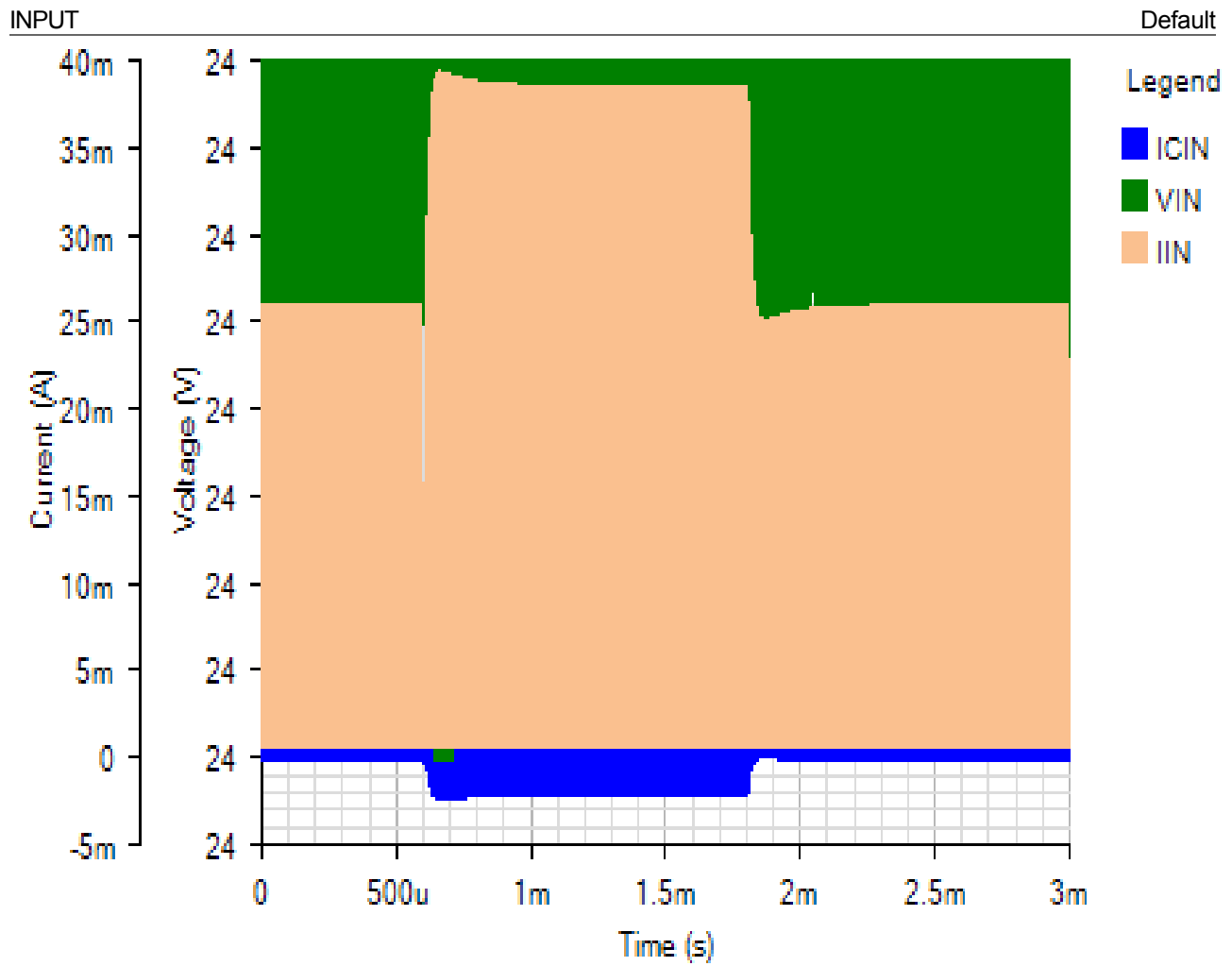
Default



OUTPUT

Default

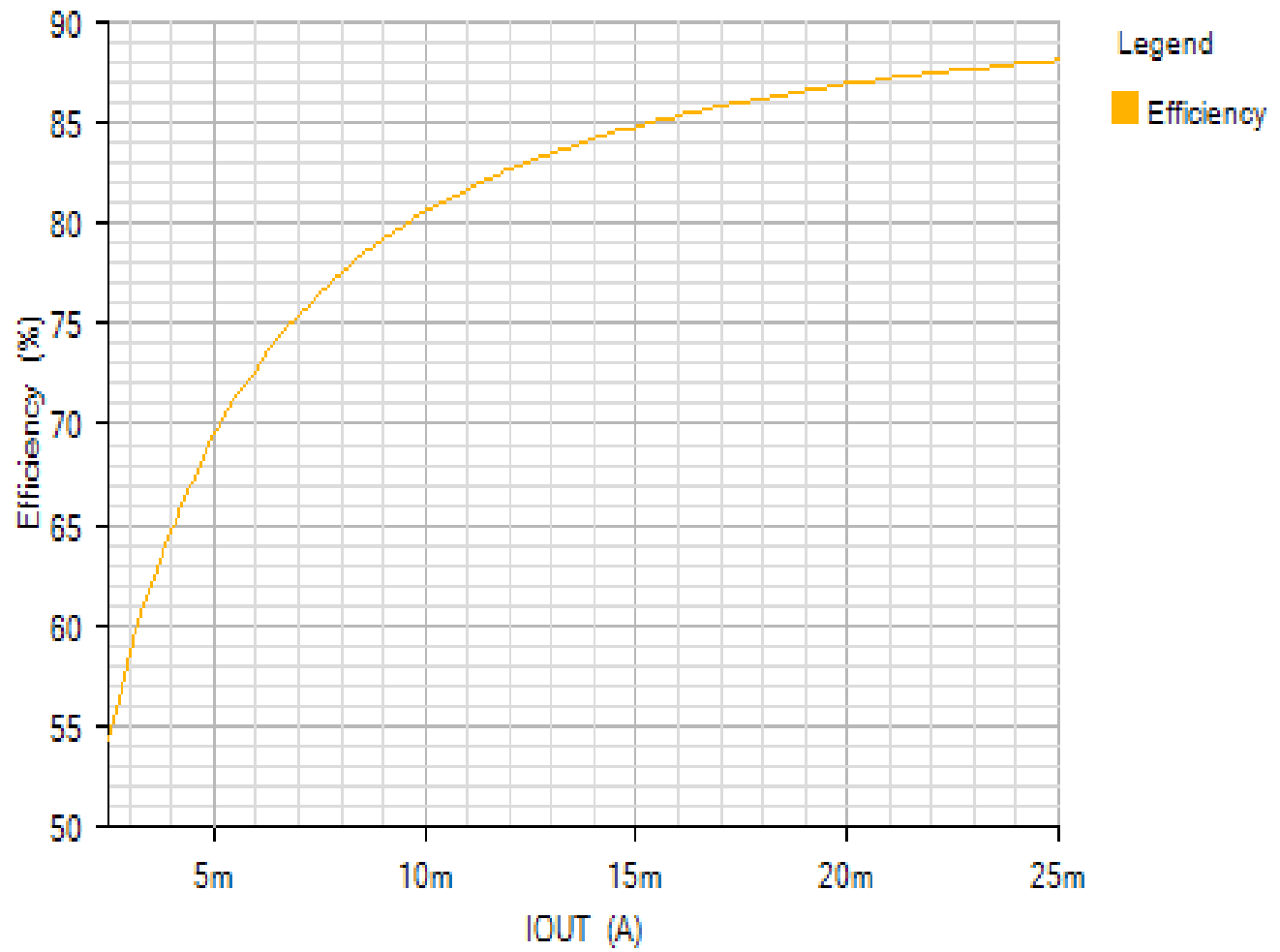




Efficiency - Mon Nov 19 2018 17:18:40

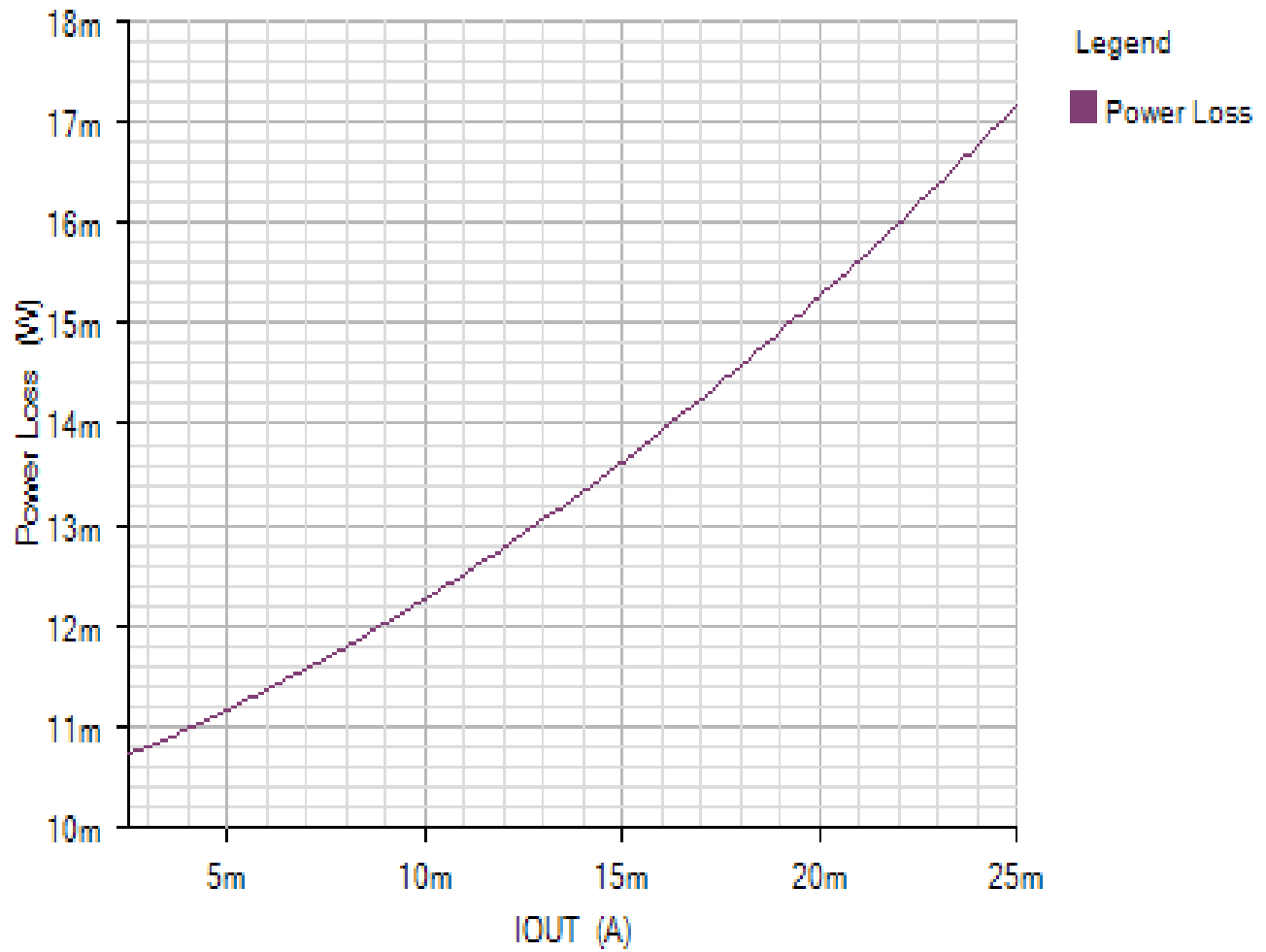
EFFICIENCY\_PLOT

Default



POWER\_LOSS\_PLOT

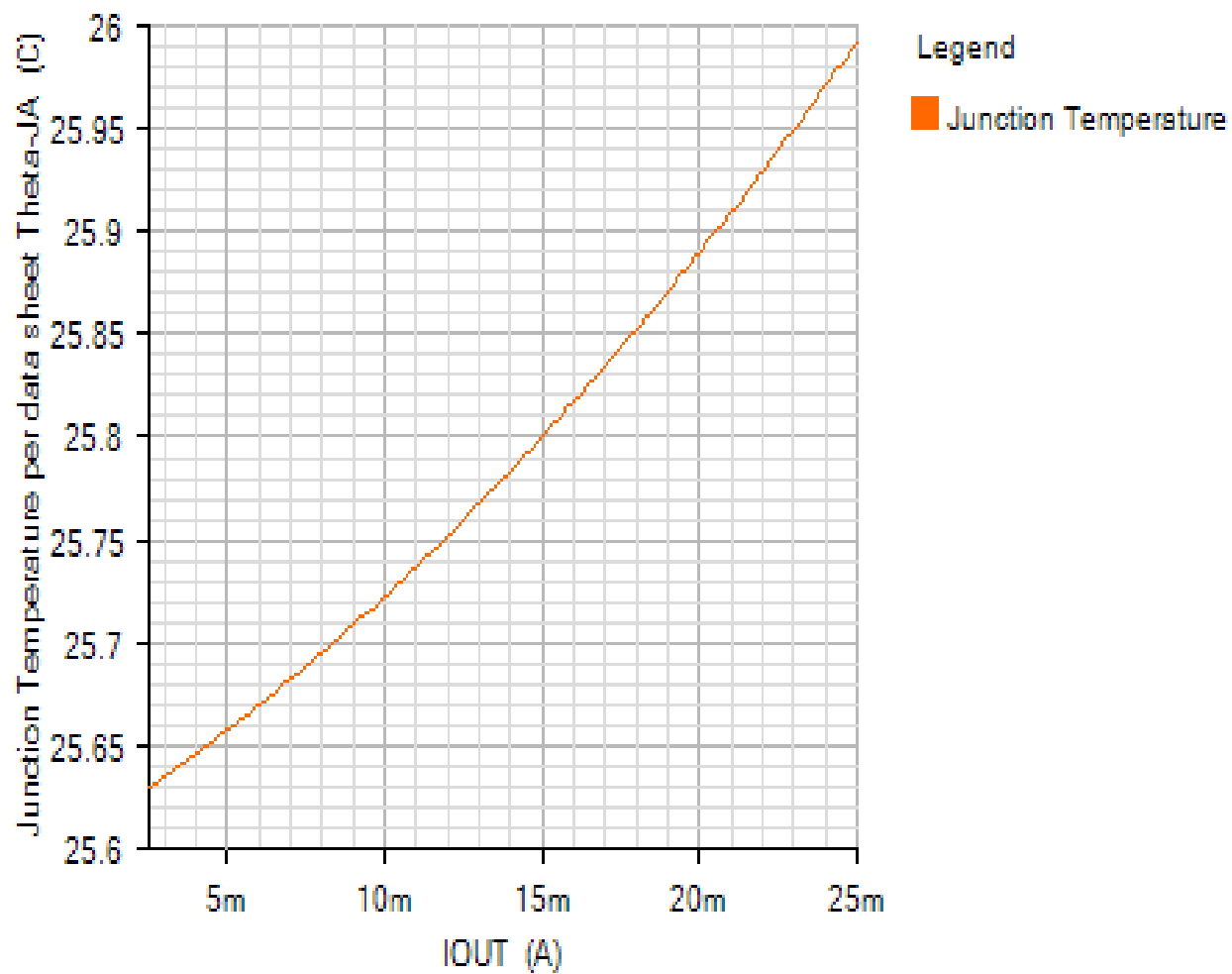
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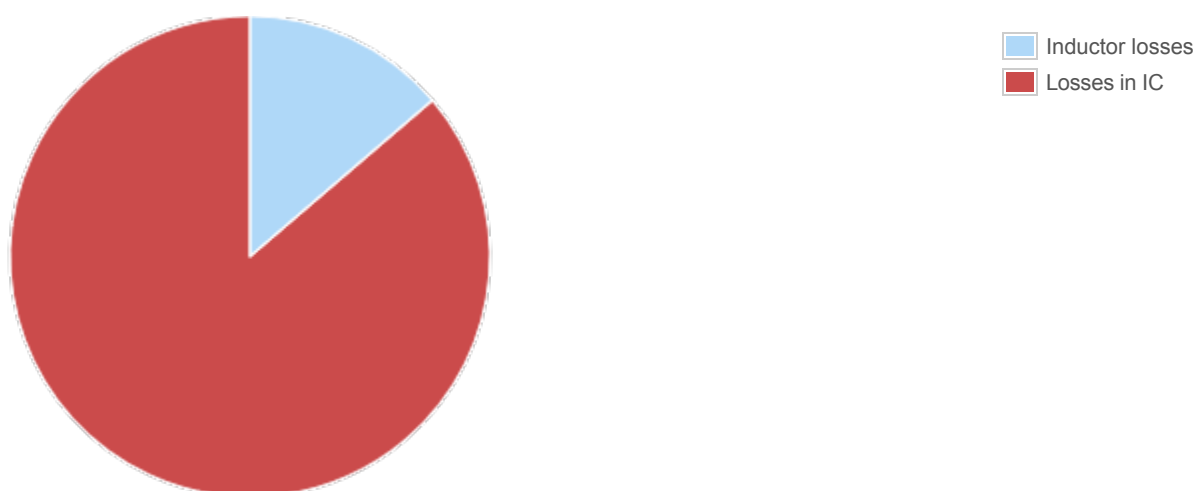


JUNCTION\_TEMPERATURE\_PLOT

Default



Losses



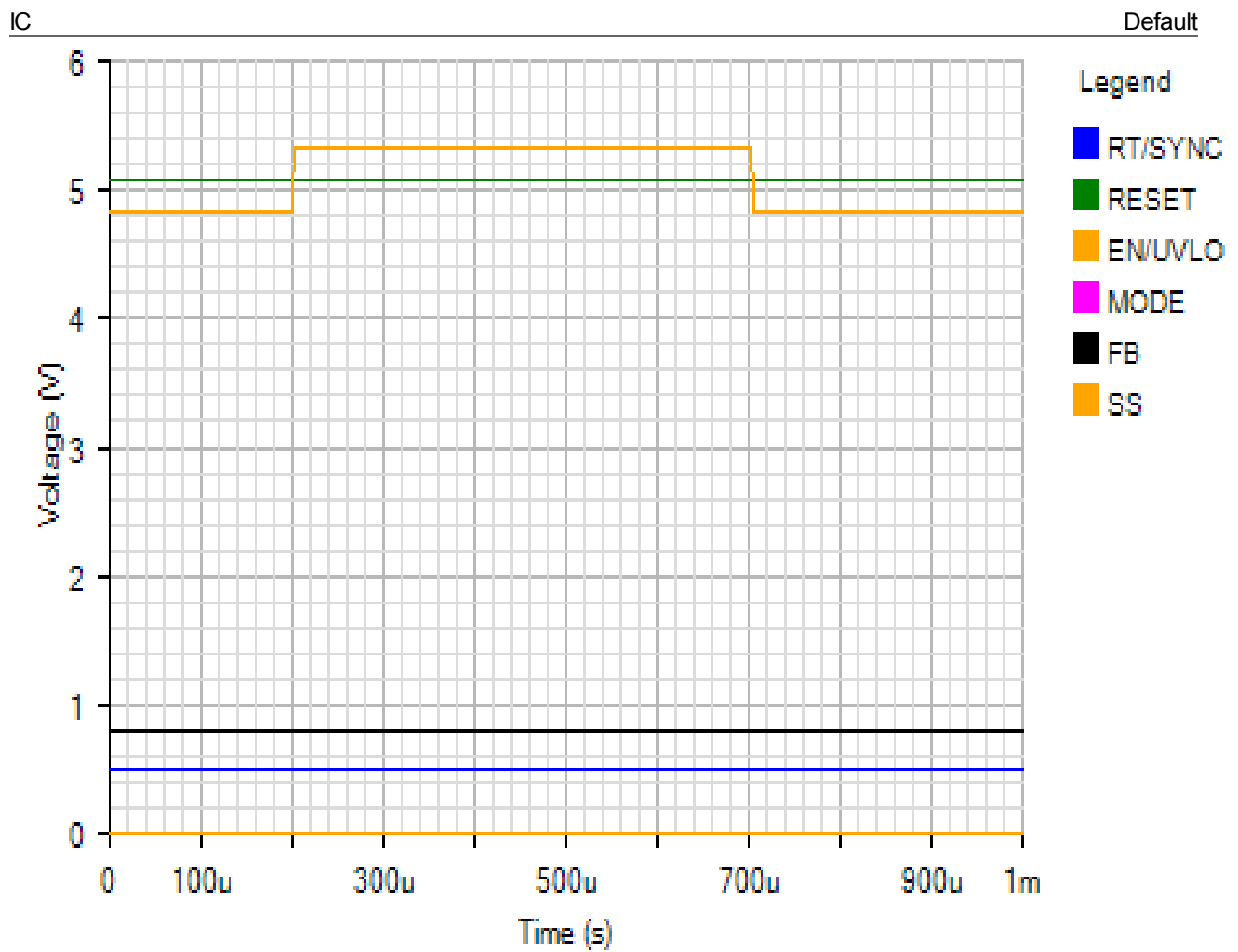
Component

Loss (W)

% of total

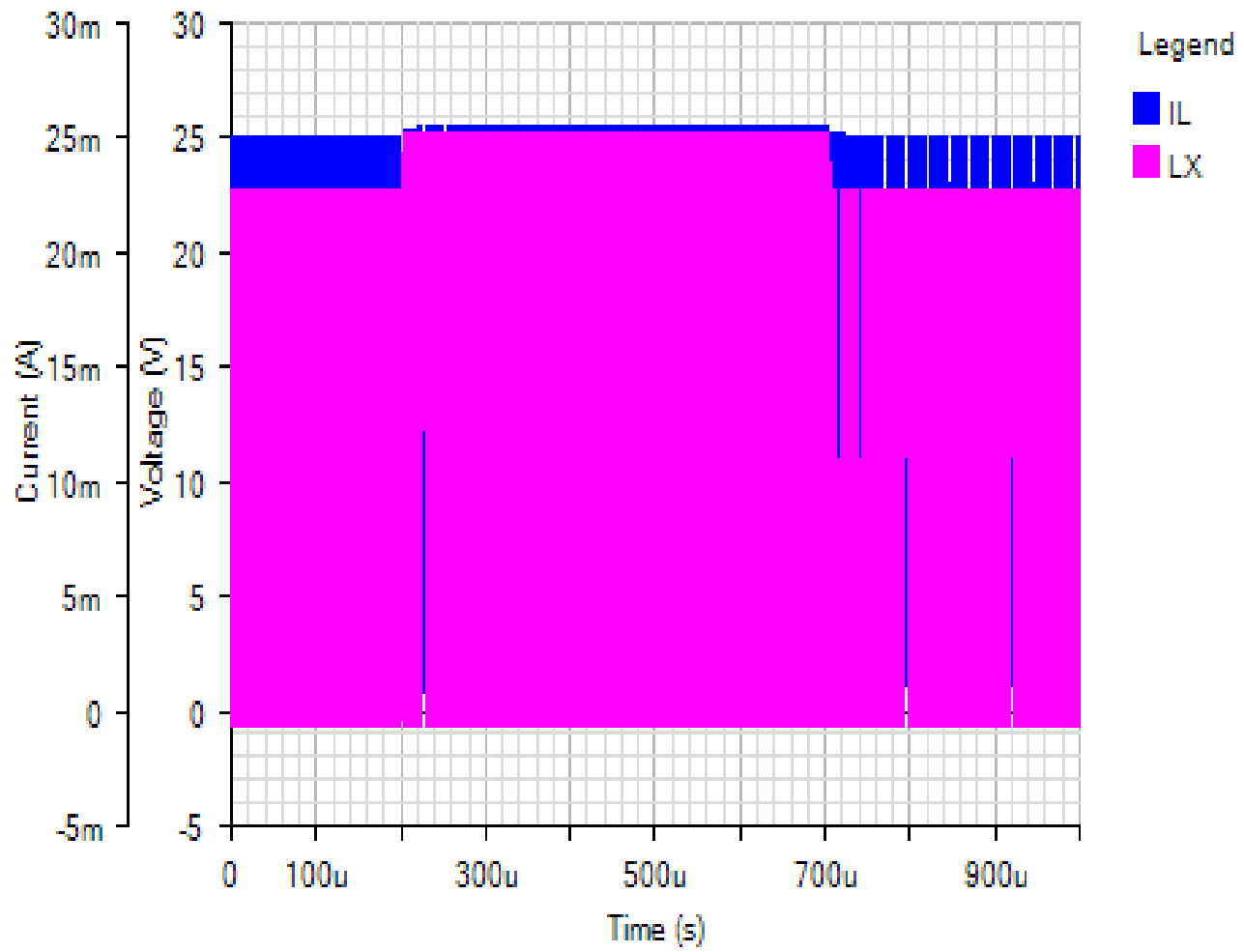
Component	Loss (W)	% of total
Inductor losses	0.00236	13.7
Losses in IC	0.01481	86.3
Total	0.01717	100

Line Transient - Mon Nov 19 2018 17:18:40



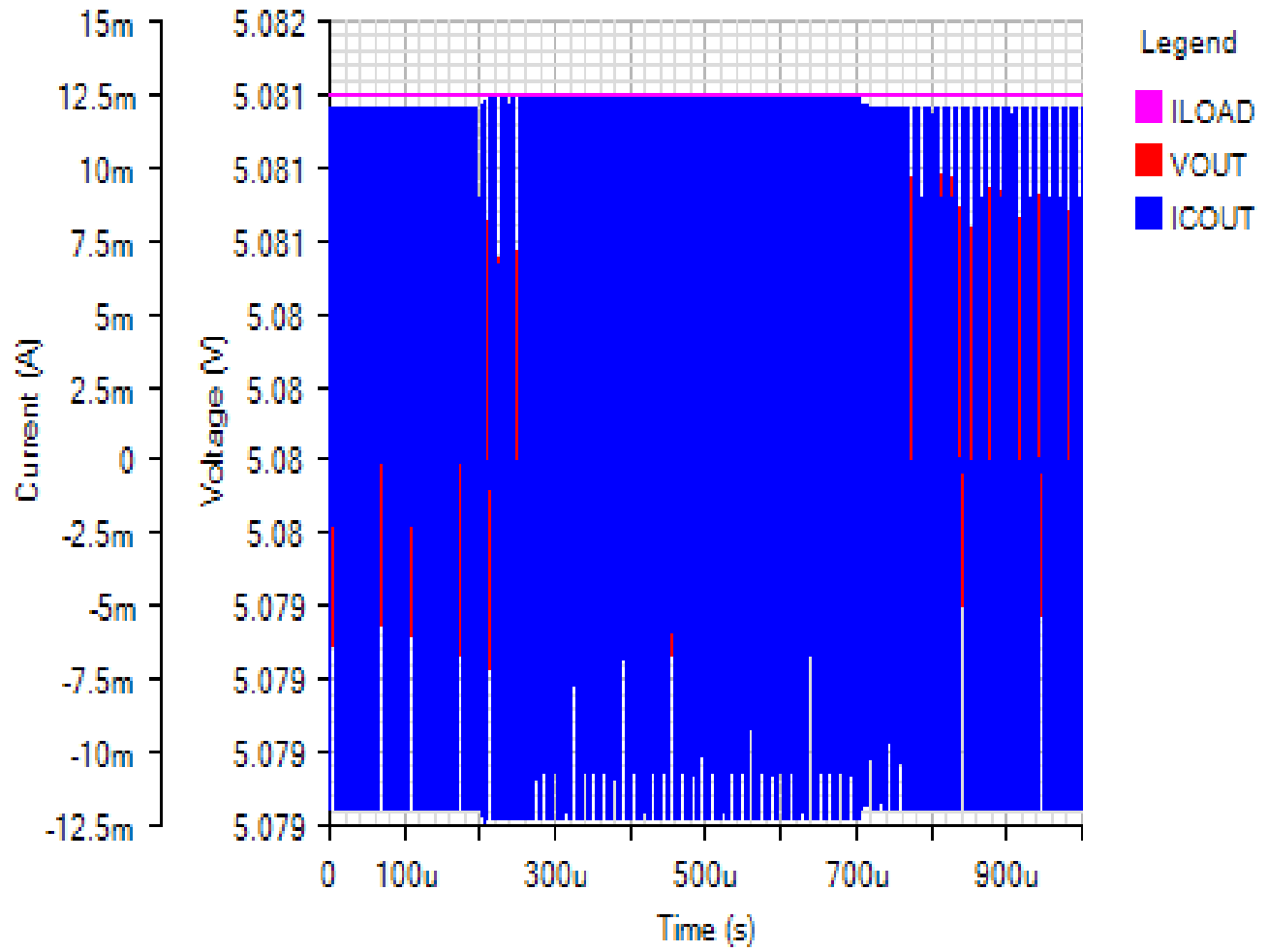
SWITCHING

Default



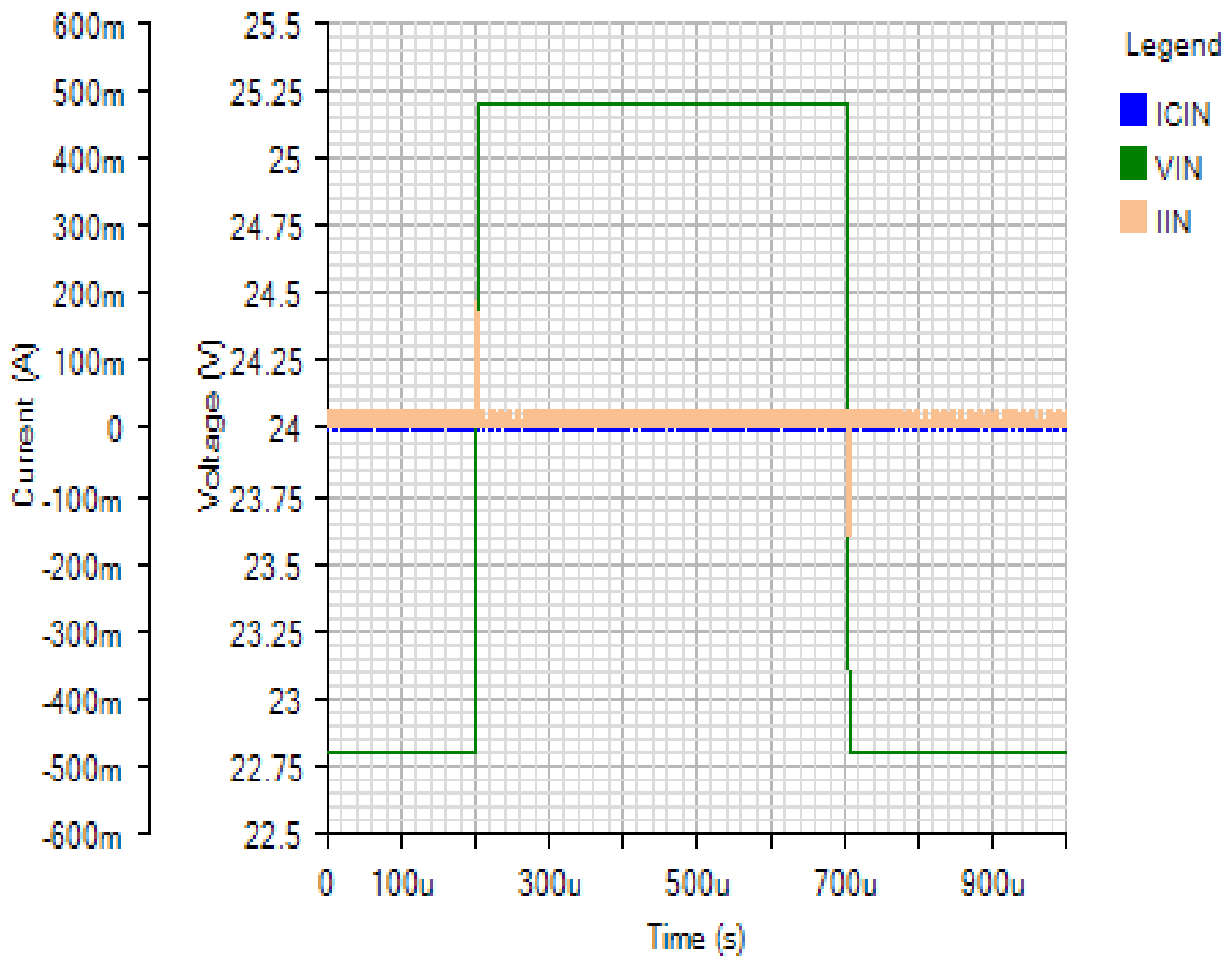
OUTPUT

Default



INPUT

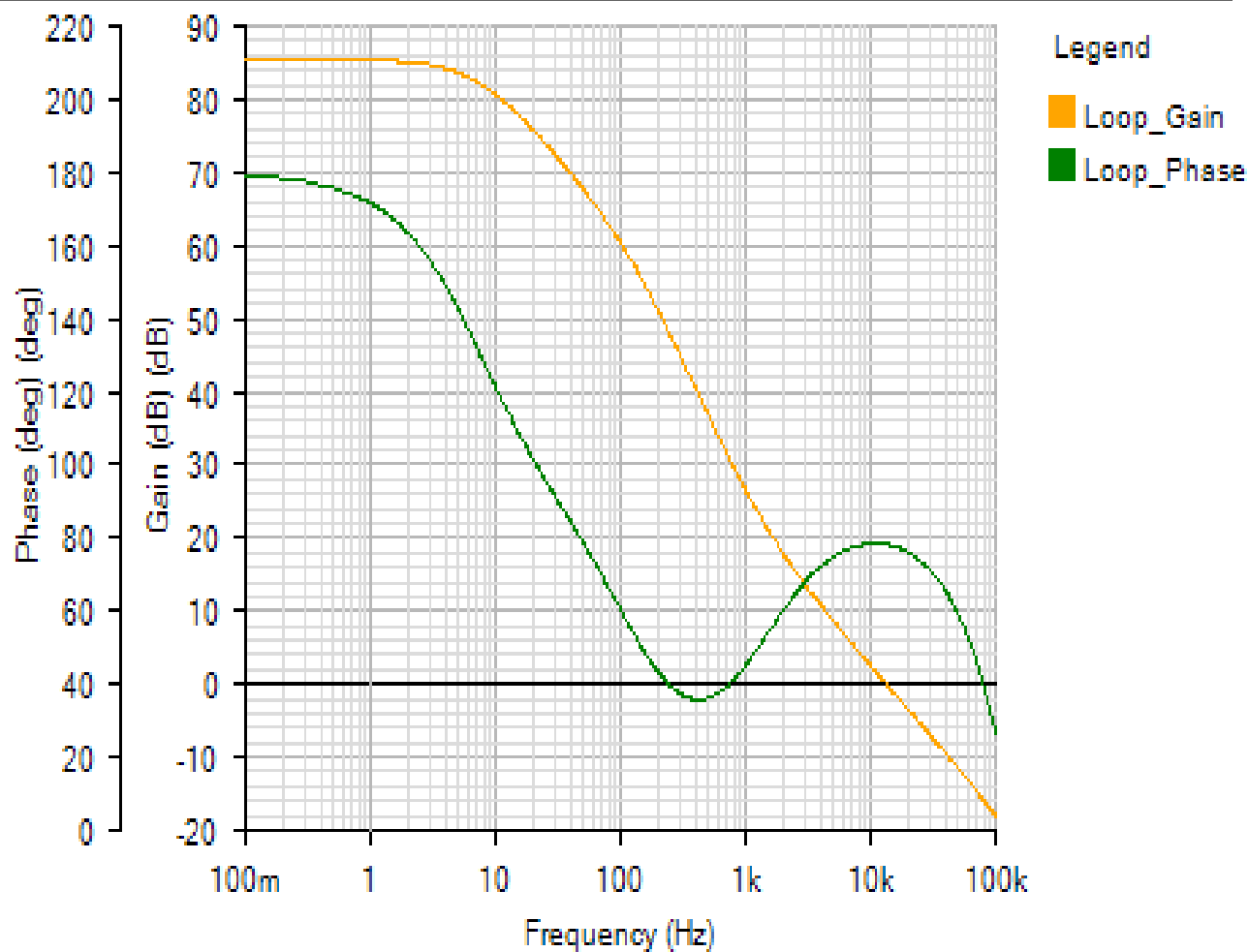
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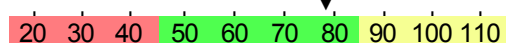
AC Loop - Mon Nov 19 2018 17:18:40

BODE

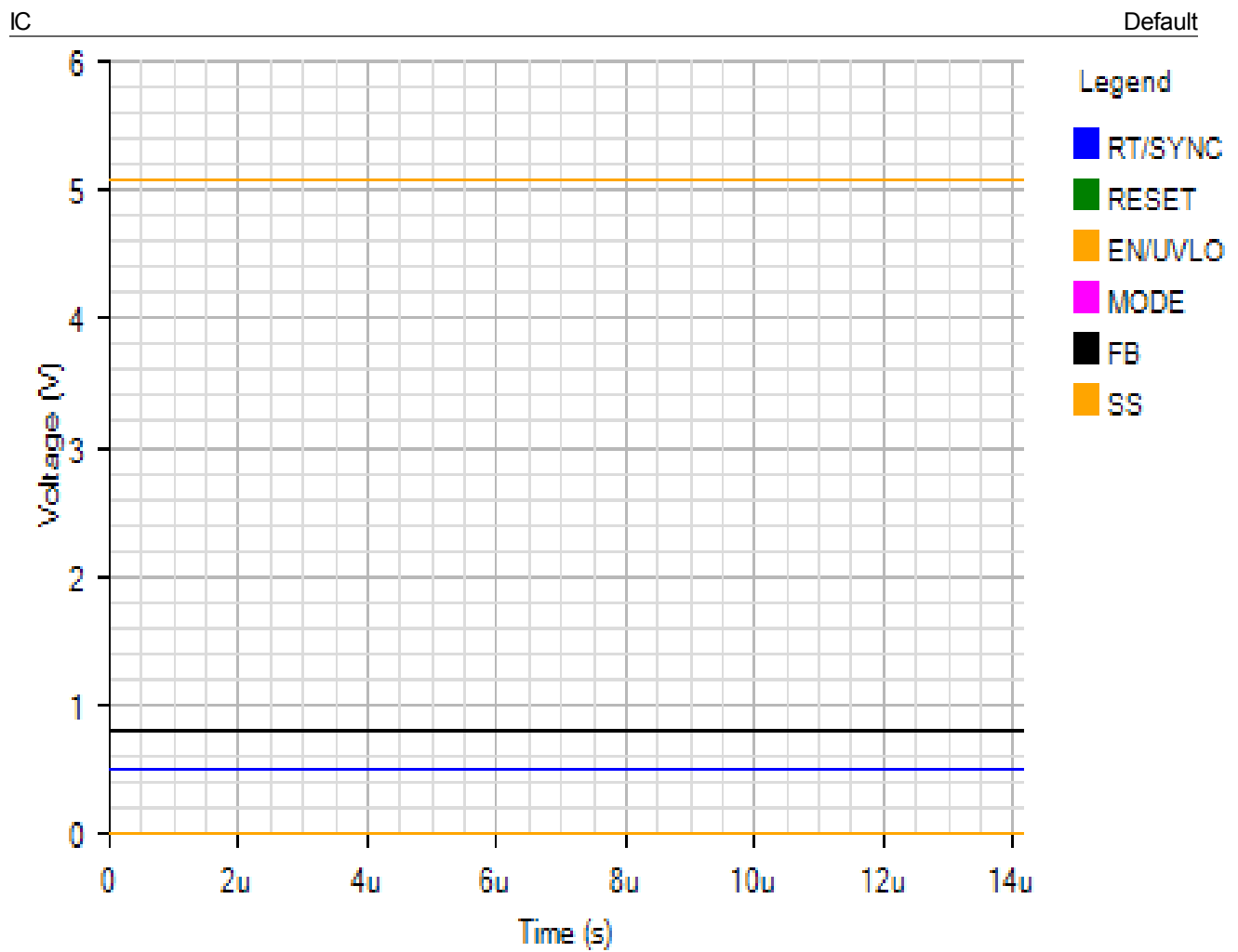
Default



Phase Margin: 78.22° at a crossover frequency of 13.4kHz



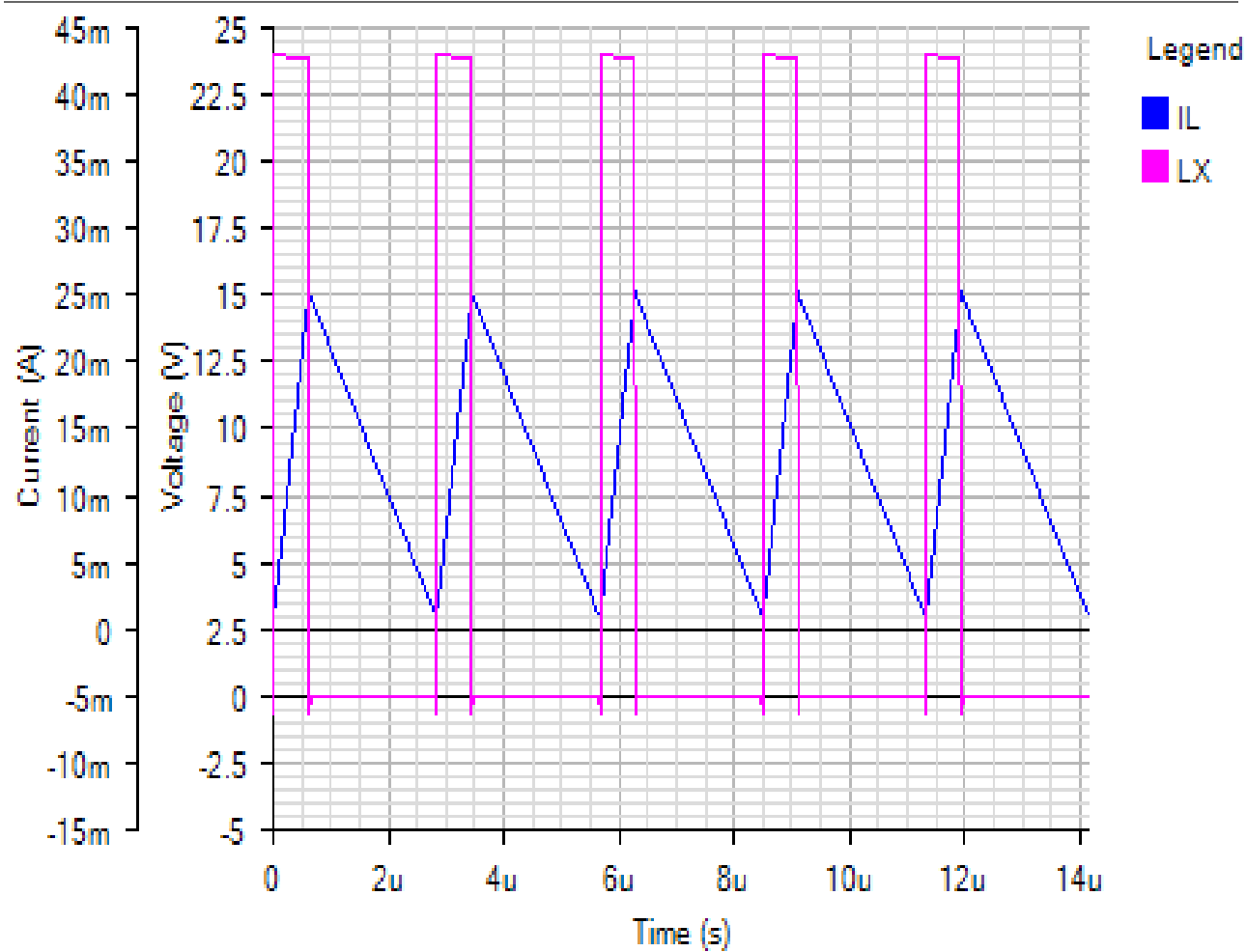
Steady State - Mon Nov 19 2018 17:18:40





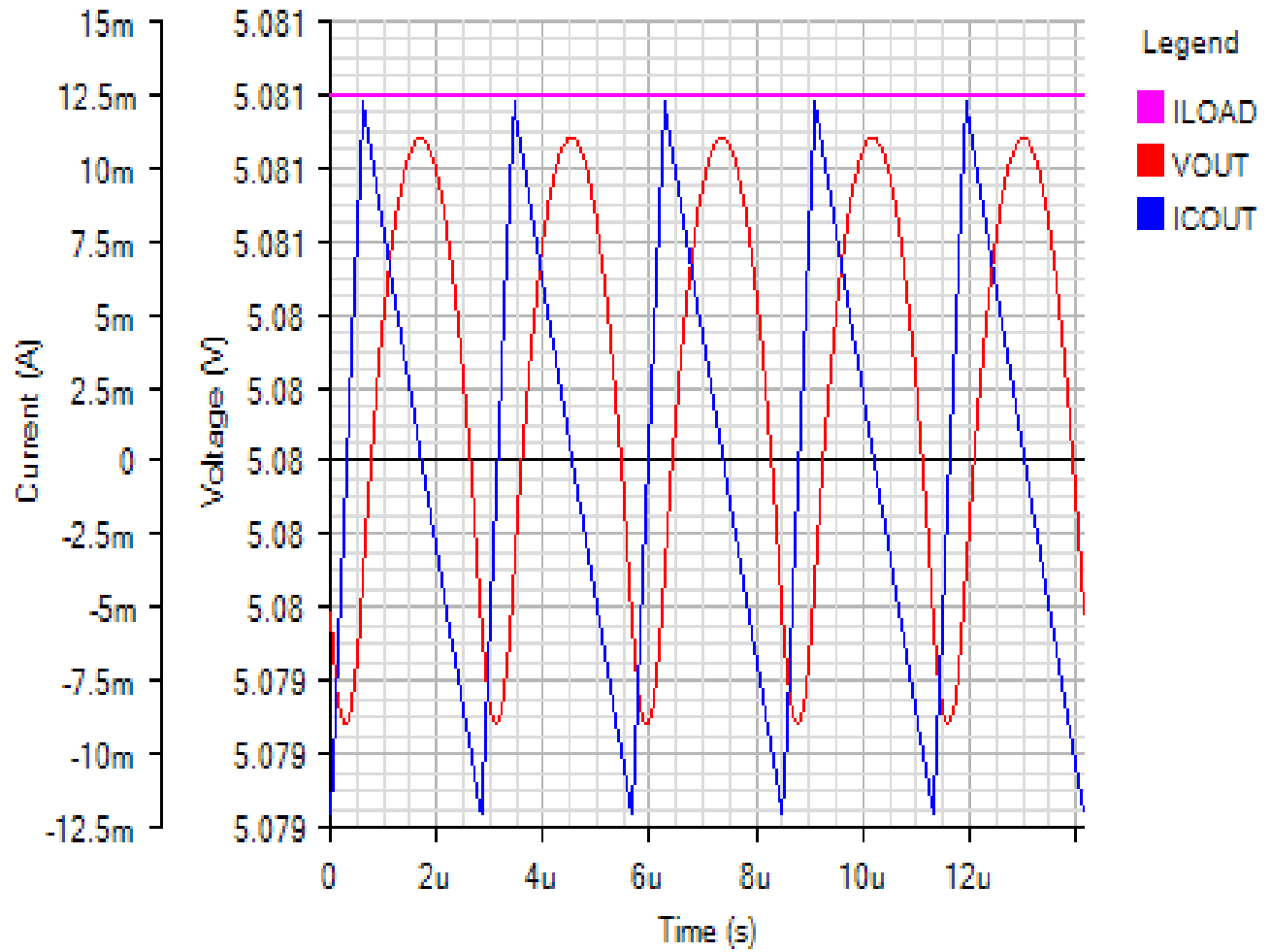
SWITCHING

Default



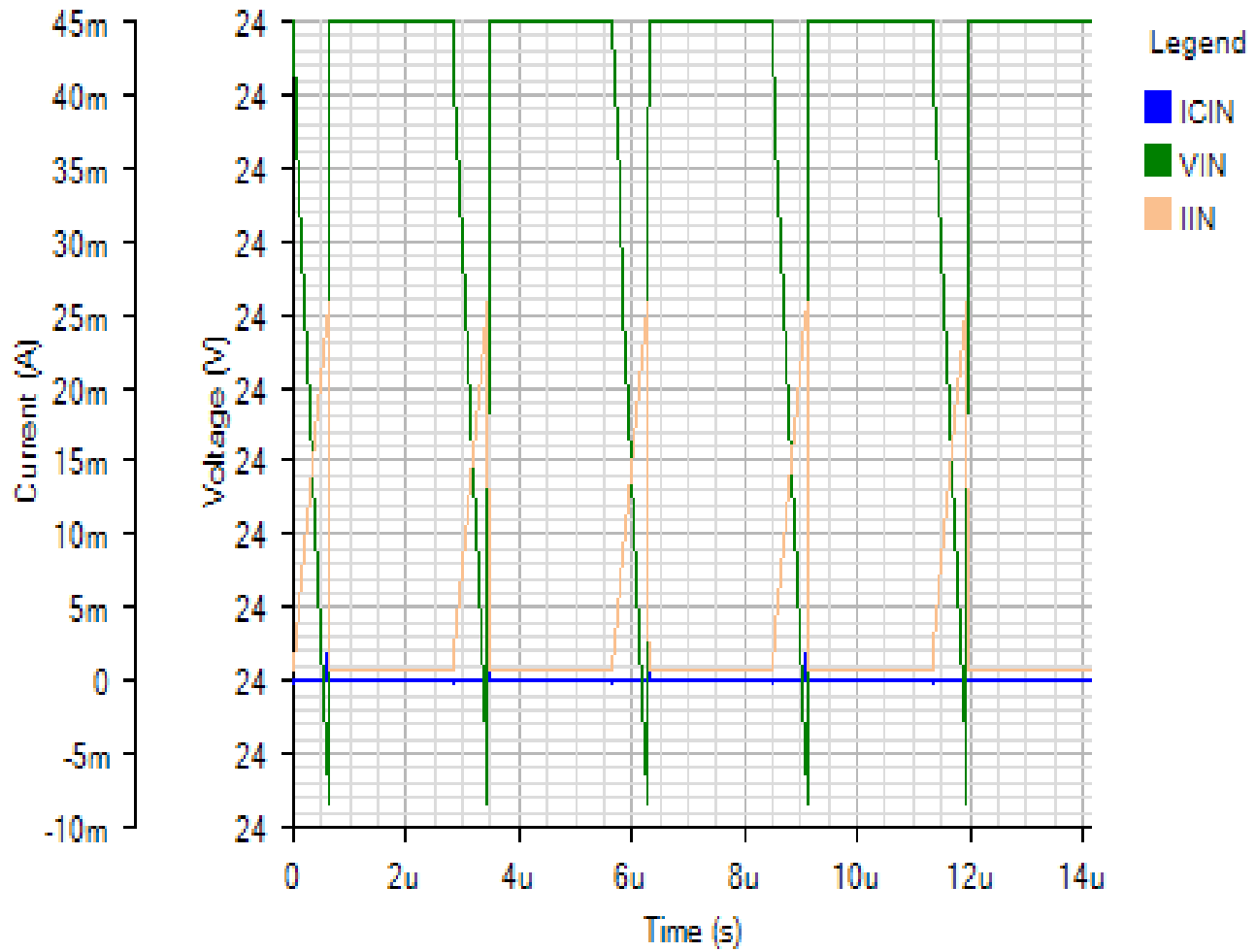
OUTPUT

Default

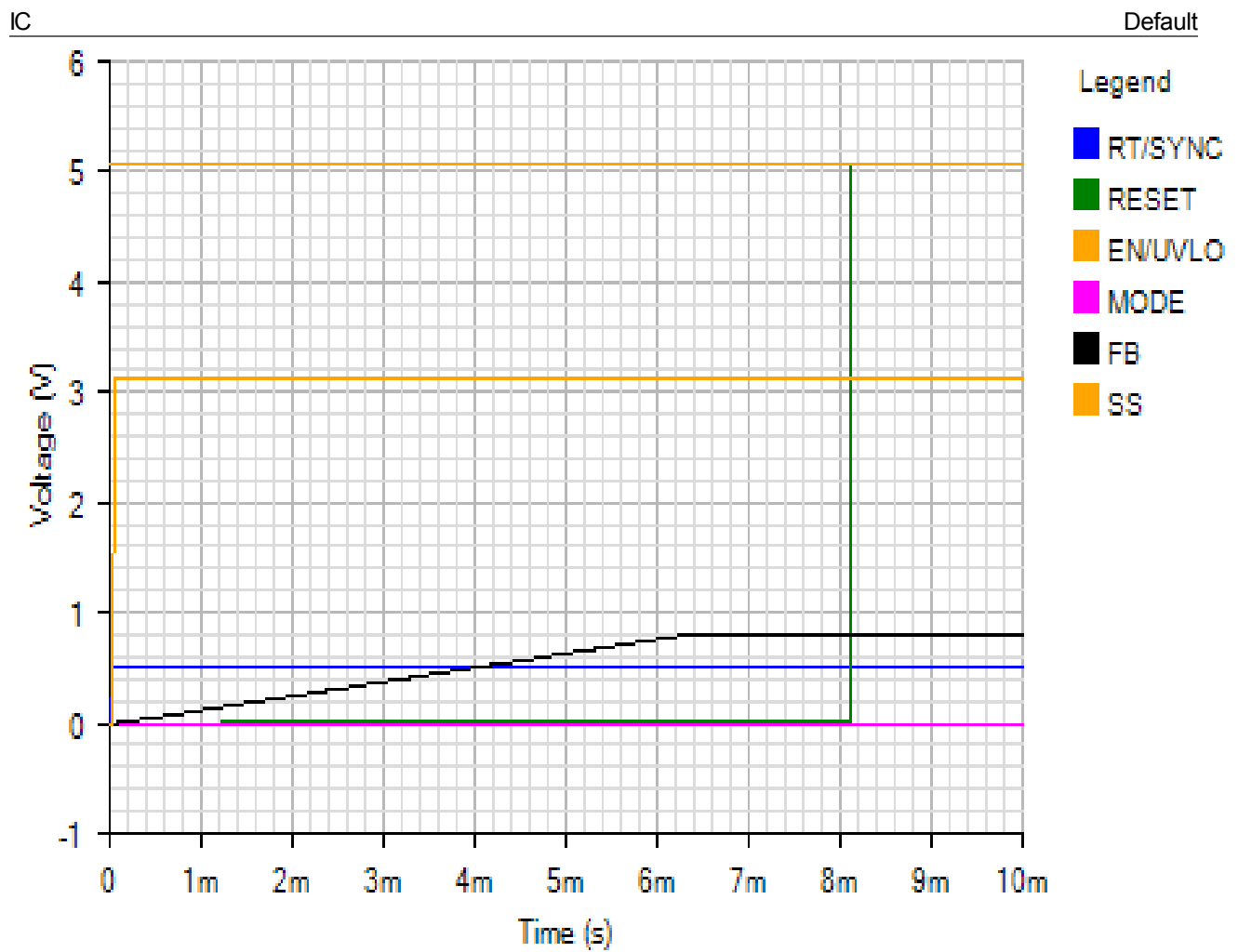


INPUT

Default

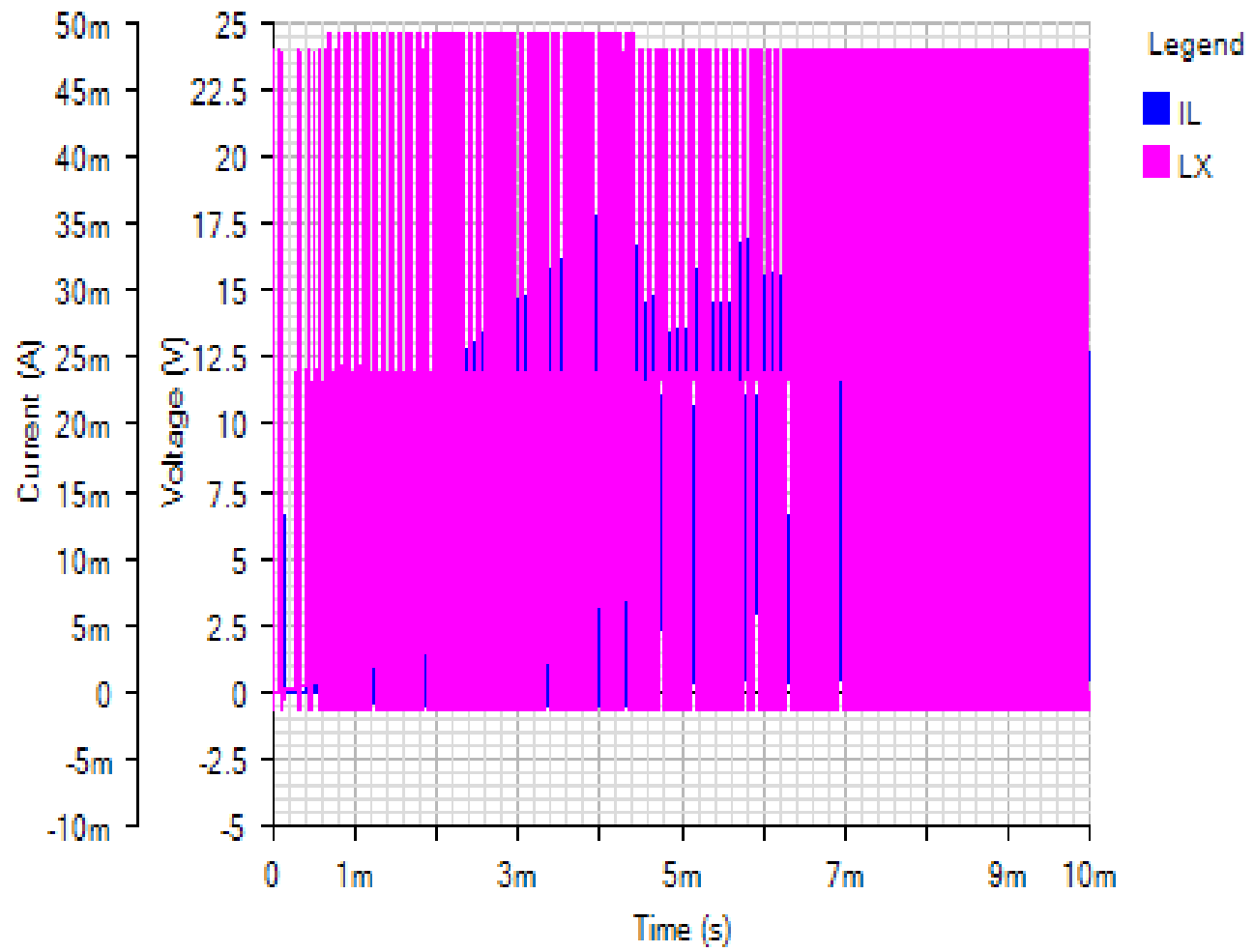


Start Up - Mon Nov 19 2018 17:18:40



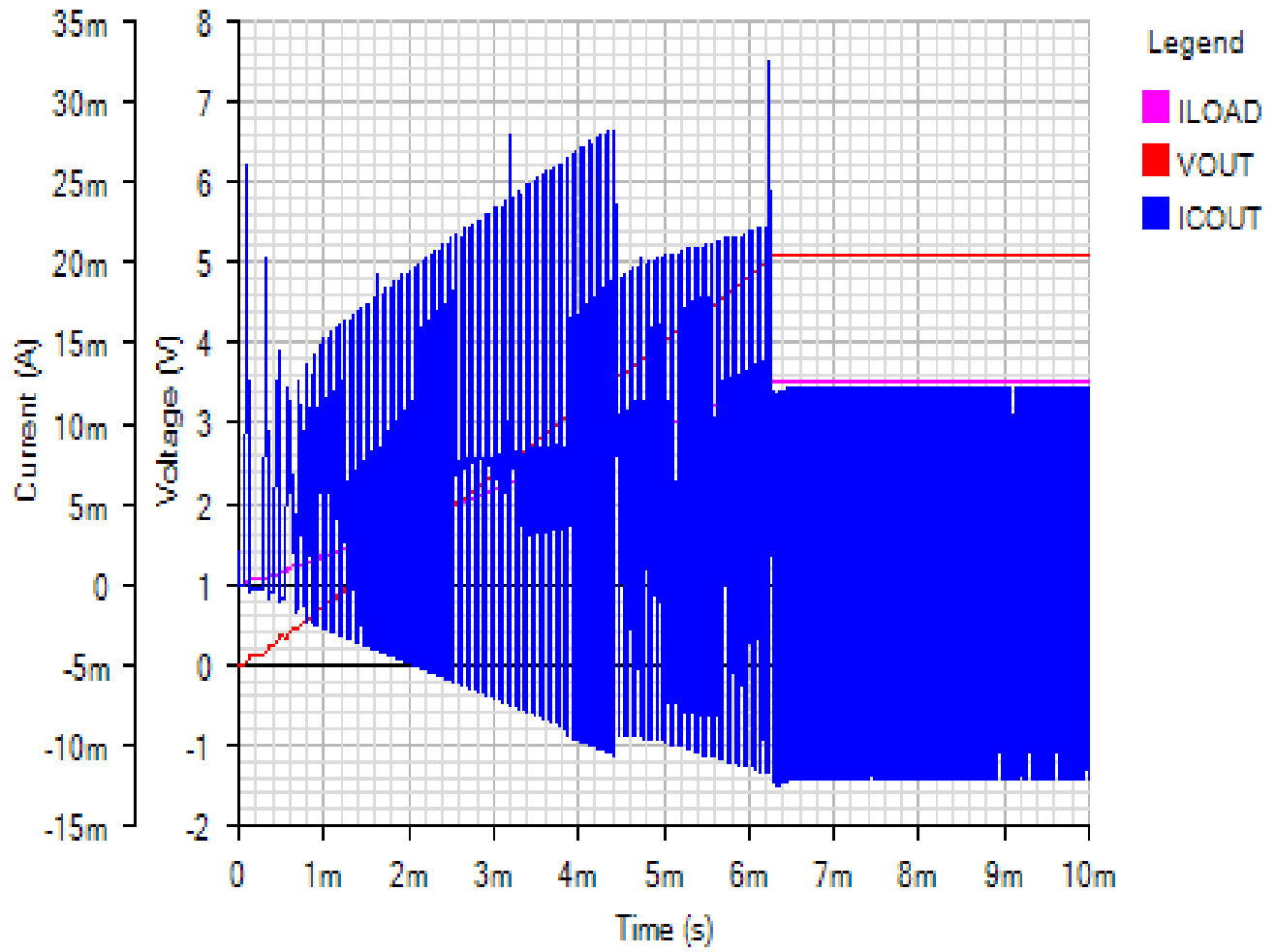
SWITCHING

Default



OUTPUT

Default



INPUT

Default

