

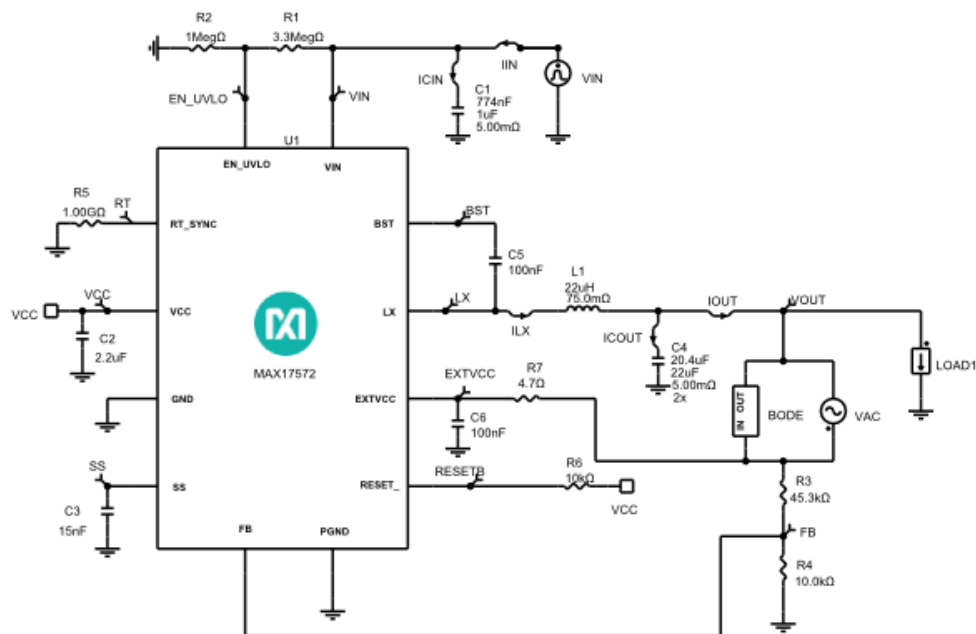
Initial Design

1.0

Design Requirements

Parameter	Value
Minimum Input Voltage	6.5V
Maximum Input Voltage	60V
Nominal Input Voltage	24V
Input Steady-State Ripple	0.5V
Input Undervoltage Lockout Level	5V
Output Voltage	5V
Output Current	1A
Output Voltage Load Step Over/Undershoot	0.15V
Performance Priority	Balance Efficiency and Size
BOM Priority	Cost
Switching Frequency	500kHz
Soft Start time	3ms
Ambient Temperature	25°C

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	MAX17572	Maxim Integrated	4.5V-60V, 1A, High-Efficiency, Synchronous Step-Down DC-DC Converter with Internal Compensation.
C1	1	C3216X7R2A105K160AA	TDK	Cap Ceramic 1uF 100V X7R 10% SMD 1206 125C Plastic T/R
C2	1	C1608X7R1A225K080AC	TDK	Cap Ceramic 2.2uF 10V X7R 10% Pad SMD 0603 125°C T/R
C3	1	CGA2B2X7R1E153K050BA	TDK	Cap Ceramic 0.015uF 25V X7R 10% Pad SMD 0402 125°C Automotive T/R
C4	2	GRM32ER71E226ME15	Murata	Cap Ceramic 22uF 25V 1210 125C
C5	1	CGA2B3X7R1H104K050BB	TDK	Cap Ceramic 0.1uF 50V X7R 10% Pad SMD 0402 125°C Automotive T/R
C6	1	CGA2B3X7R1H104K050BB	TDK	Cap Ceramic 0.1uF 50V X7R 10% Pad SMD 0402 125°C Automotive T/R
L1	1	VLP8040T-220M	TDK	Inductor Power Shielded Wirewound 22uH 20% 100KHz Ferrite 2.5A 75mOhm DCR Embossed Carrier T/R
R1	1	ERJ2GEJ335X	Panasonic	Res Thick Film 0402 3.3M Ohm 5% 0.1W(1/10W) -400ppm/°C to 150ppm/°C Pad SMD Automotive T/R
R2	1	ERJ3GEYJ105V	Panasonic	Res Thick Film 0603 1M Ohm 5% 0.1W(1/10W) ±200ppm/°C Pad SMD

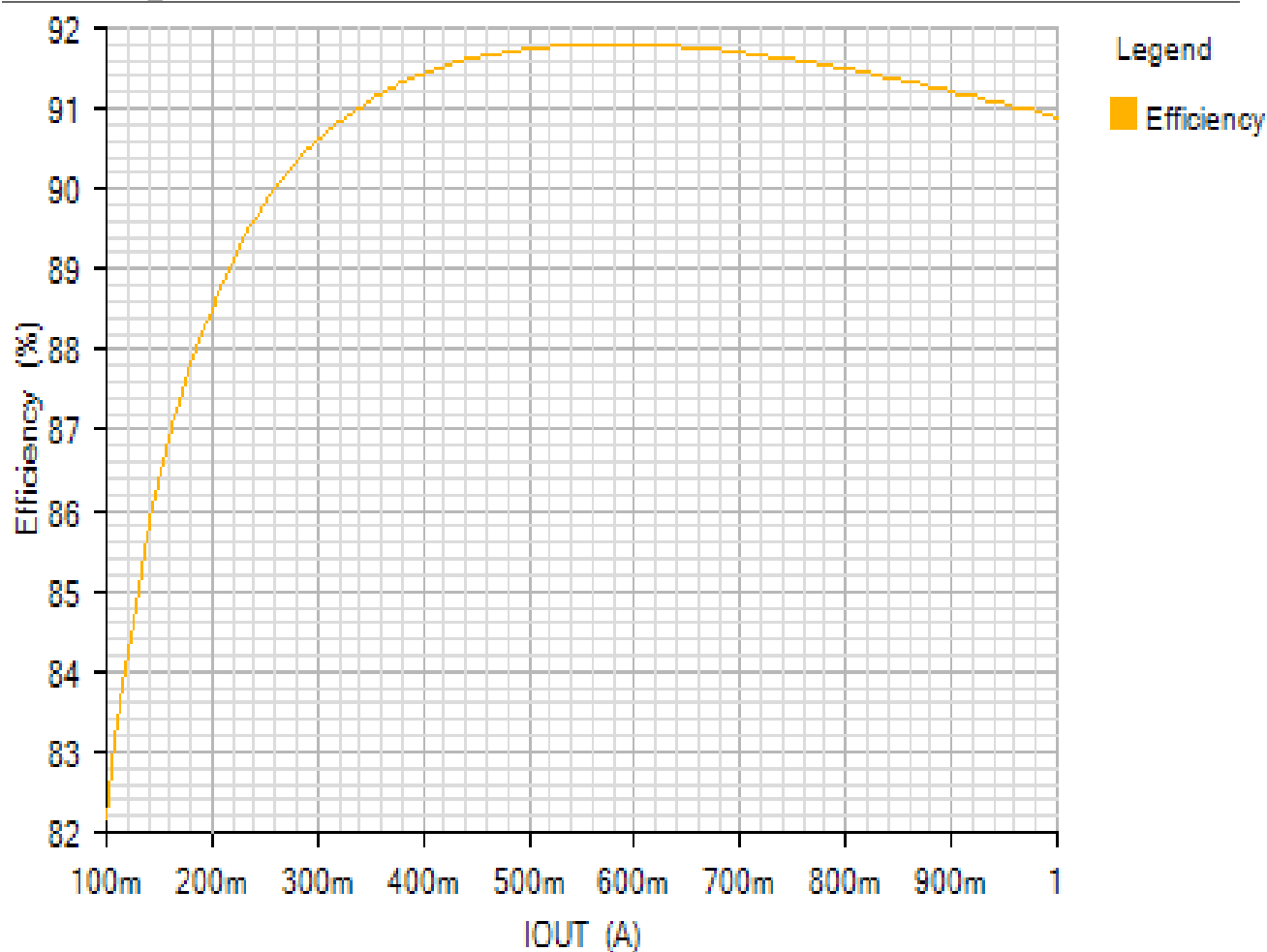
R3	1	ERJ2RKF4532X	Panasonic	Automotive T/R Res Thick Film 0402 45.3K Ohm 1% 0.1W(1/10W) ±100ppm/°C Pad SMD
R4	1	ERJ2RKF1002X	Panasonic	Automotive T/R Res Thick Film 0402 10K Ohm 1% 0.1W(1/10W) ±100ppm/°C Pad SMD
R6	1	ERJ2RKF1002X	Panasonic	Automotive T/R Res Thick Film 0402 10K Ohm 1% 0.1W(1/10W) ±100ppm/°C Pad SMD
R7	1	RC0402FR-074R7L	Yageo	Automotive T/R Res Thick Film 0402 4.7 Ohm 1% 0.063W(1/16W) ±200ppm/°C Epoxy Pad SMD T/R

Simulation Results

Efficiency - Tue Nov 20 2018 09:51:29

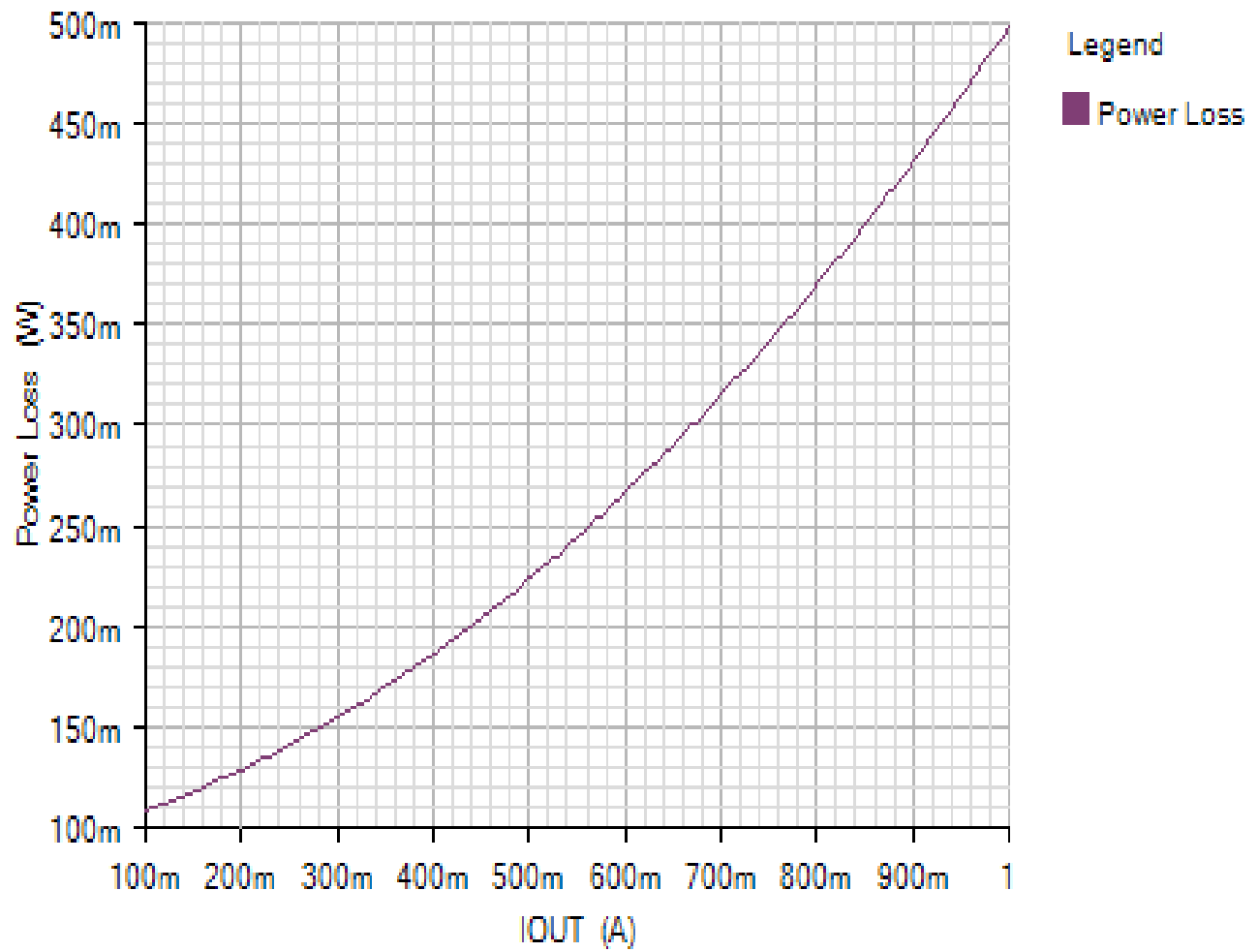
EFFICIENCY_PLOT

Default



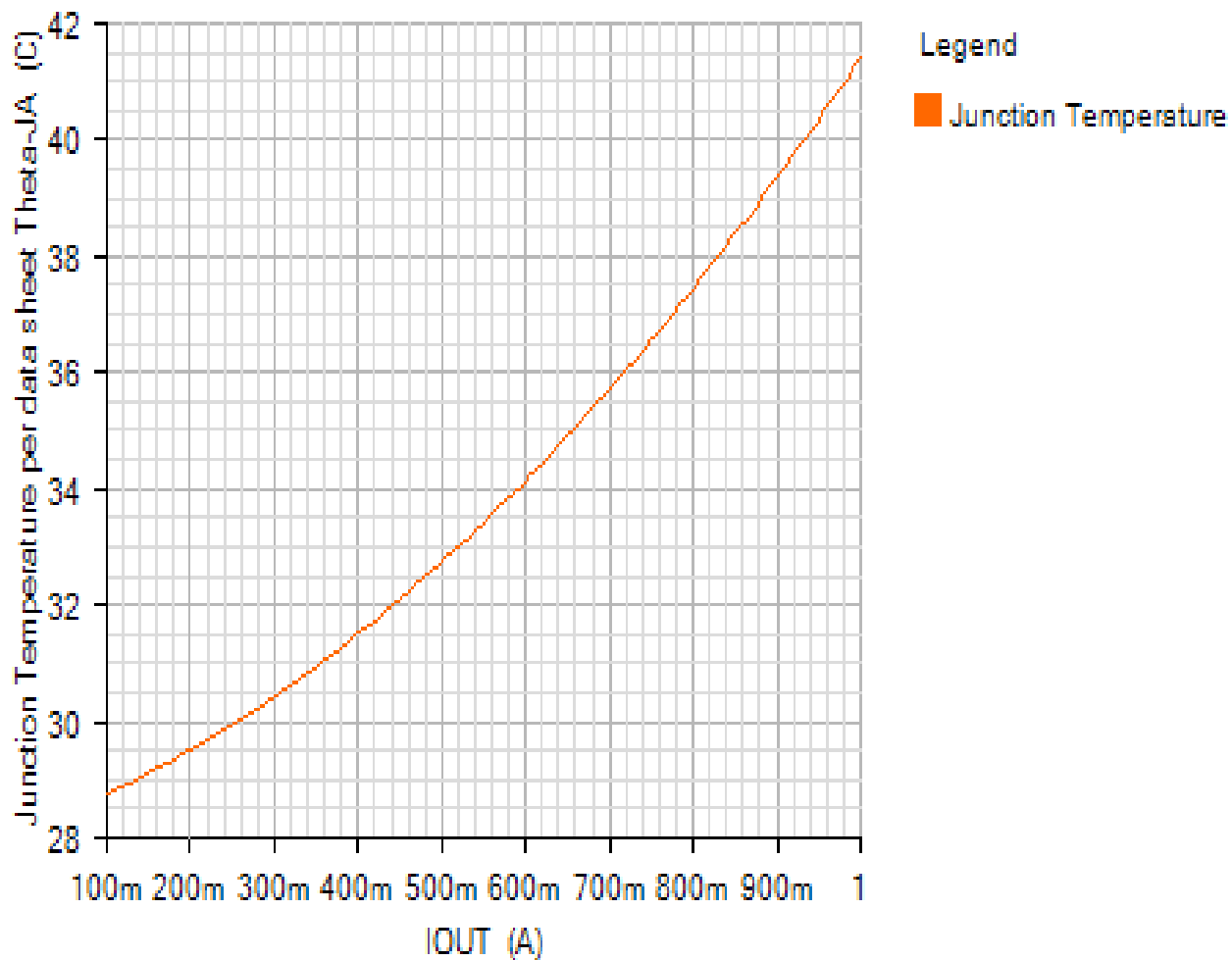
POWER_LOSS_PLOT

Default

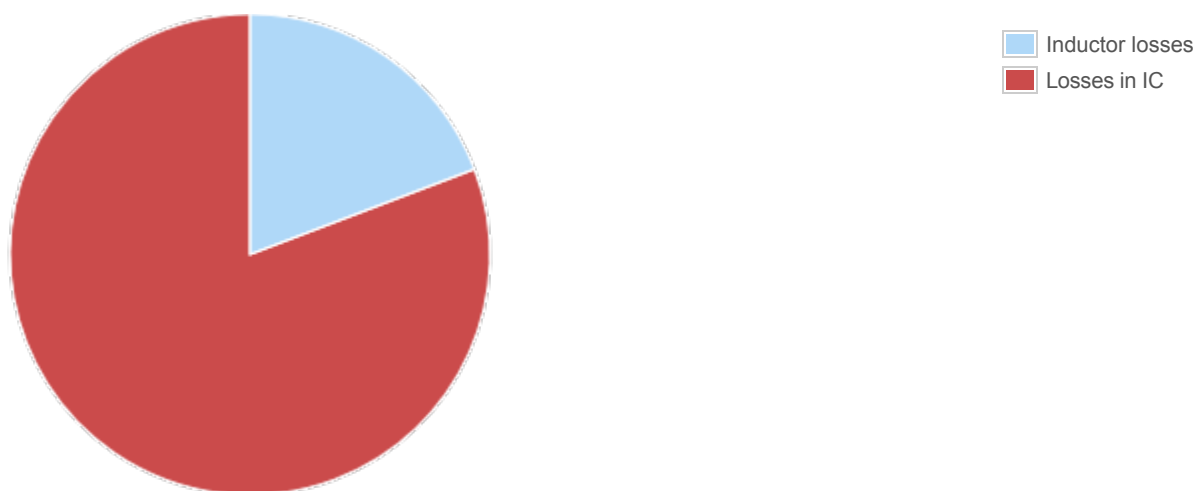


JUNCTION_TEMPERATURE_PLOT

Default



Losses



Component

Loss (W)

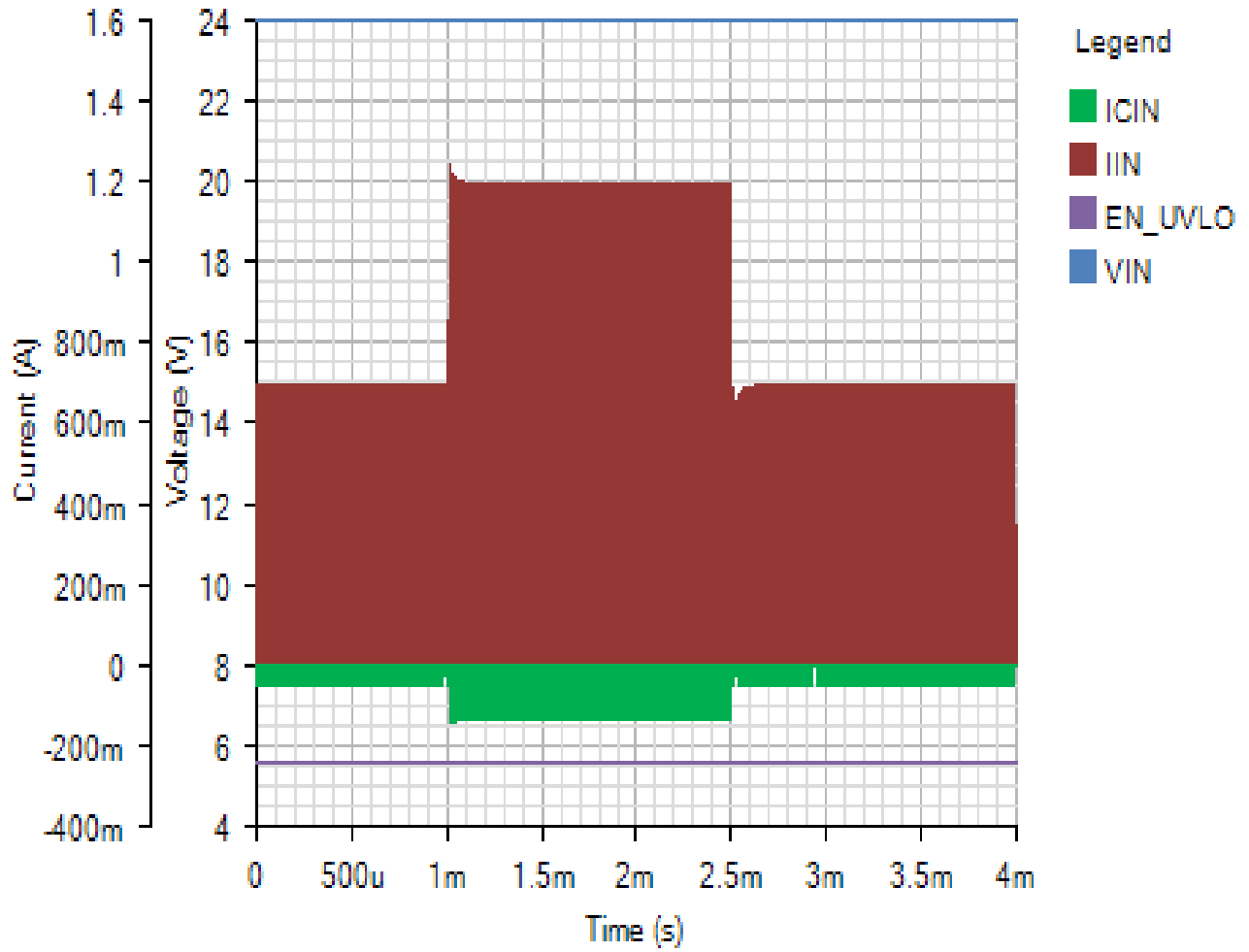
% of total

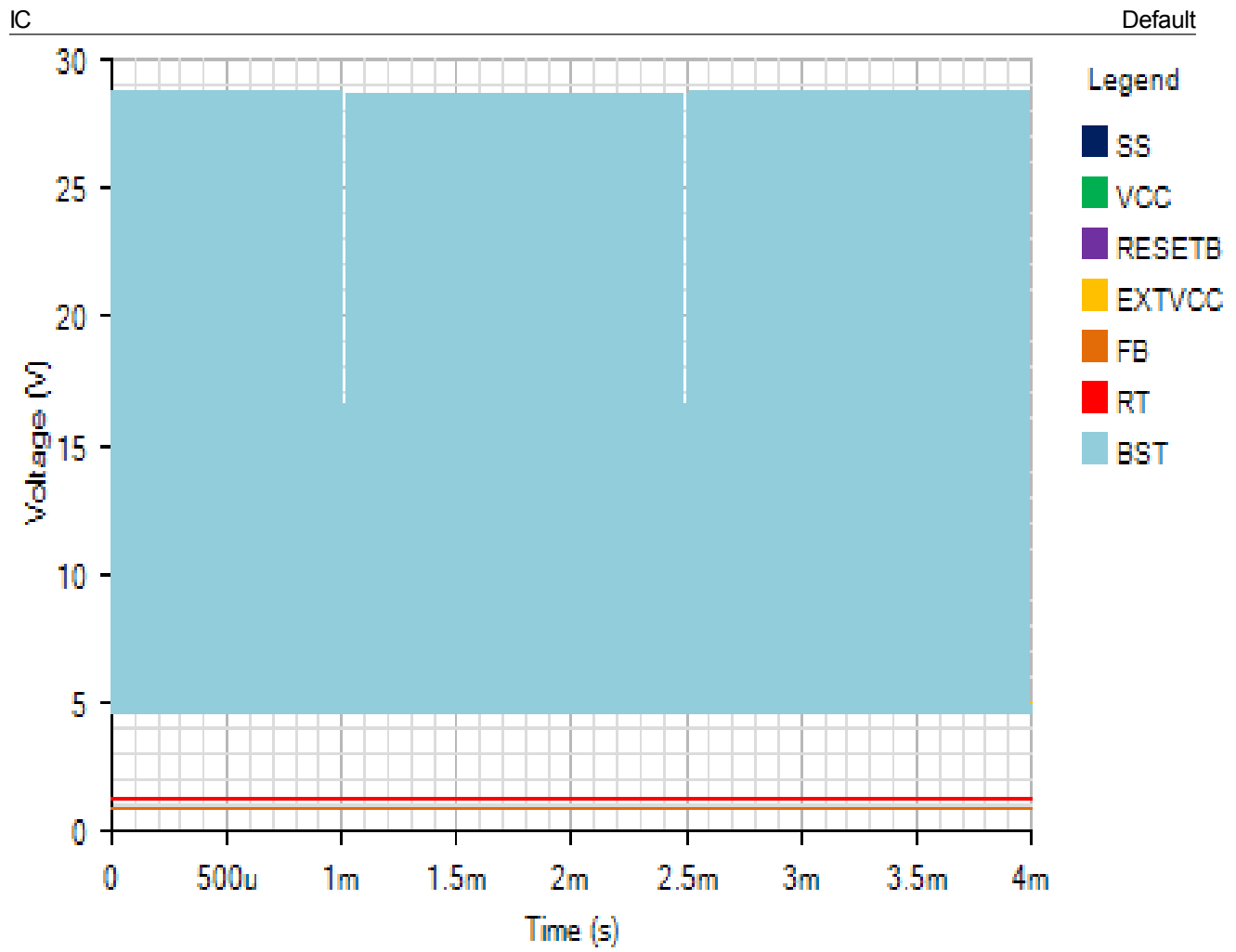
Component	Loss (W)	% of total
Inductor losses	0.1	19.2
Losses in IC	0.42	80.8
Total	0.52	100

Load Step - Tue Nov 20 2018 09:51:29

INPUT

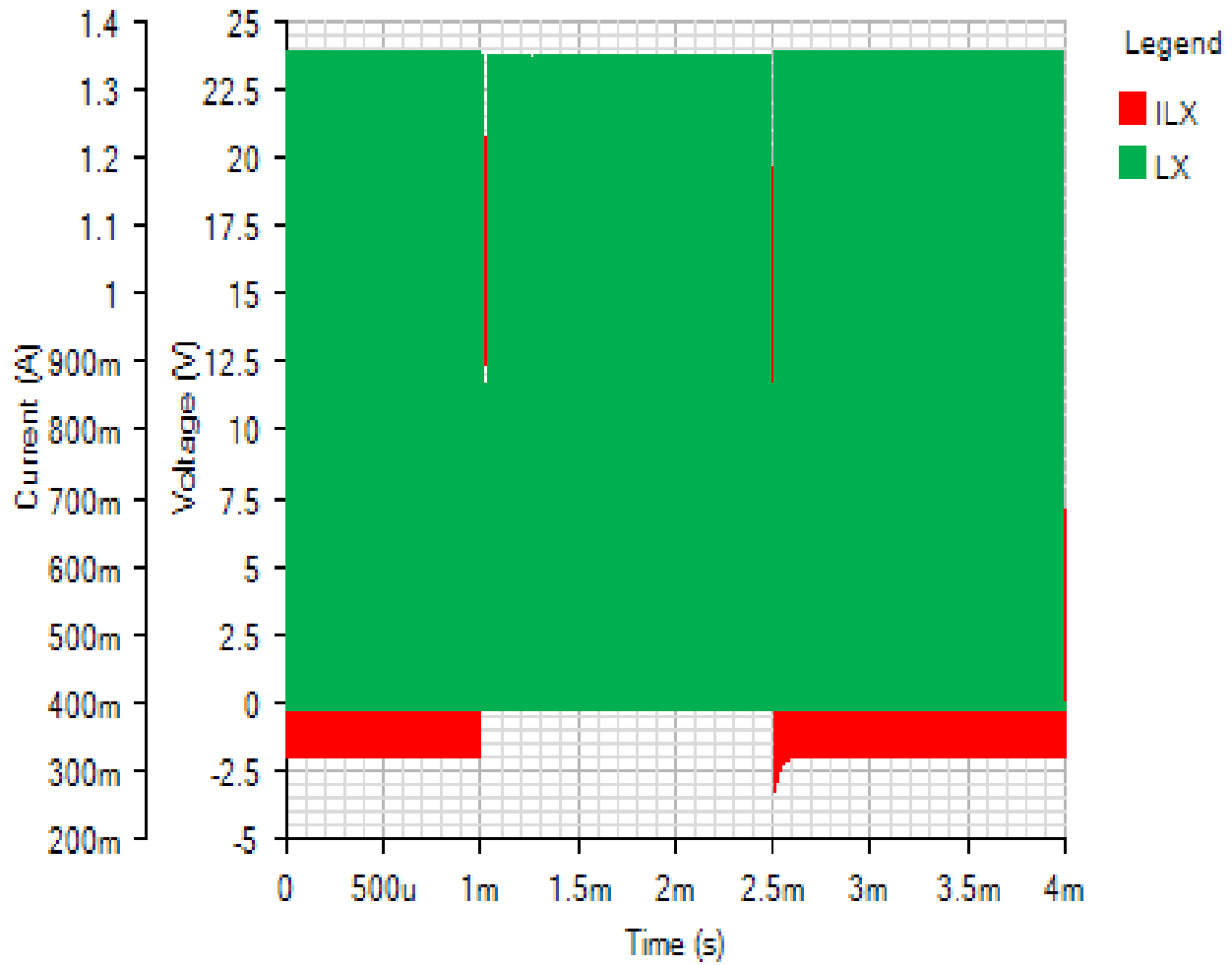
Default





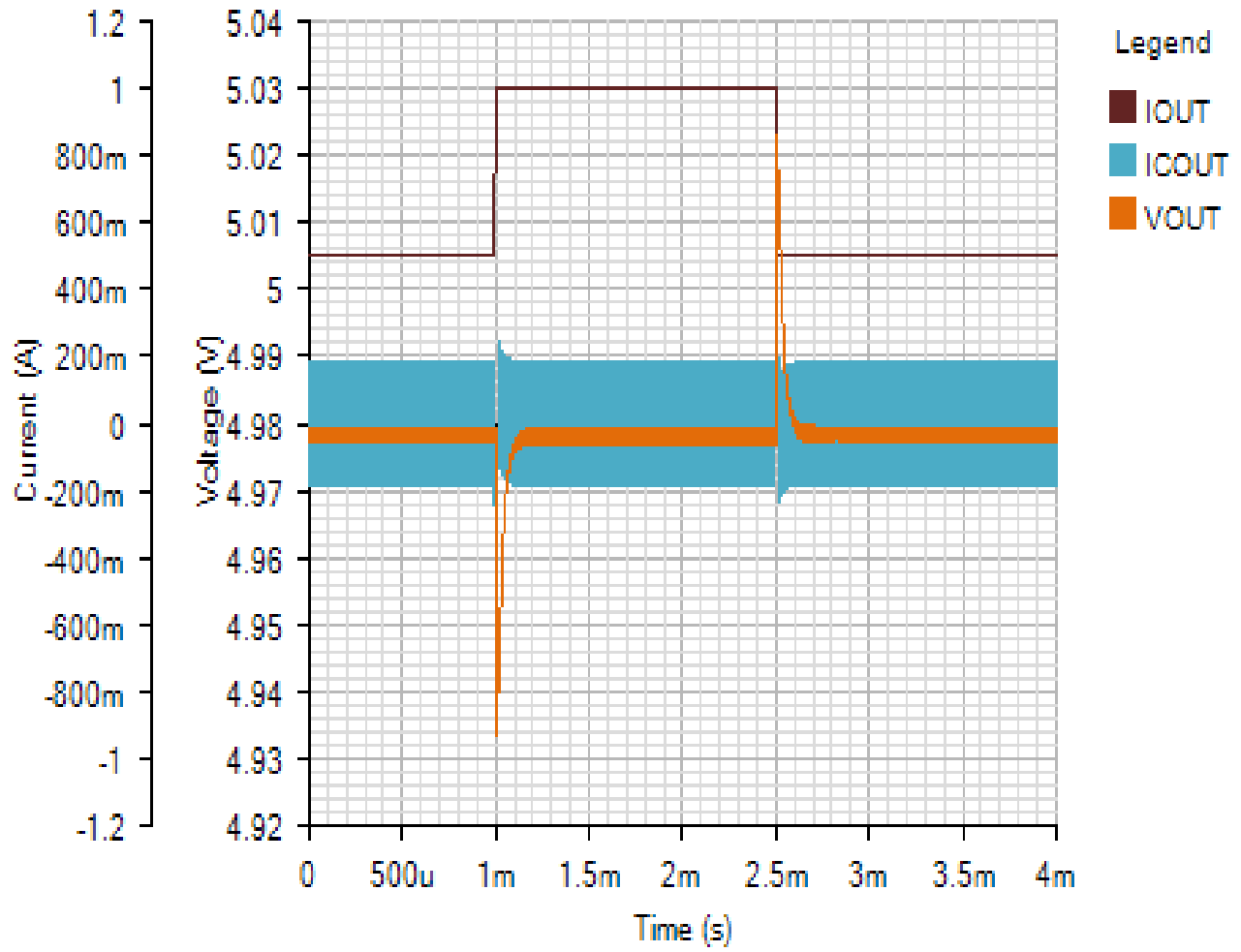
SWITCHING

Default



OUTPUT

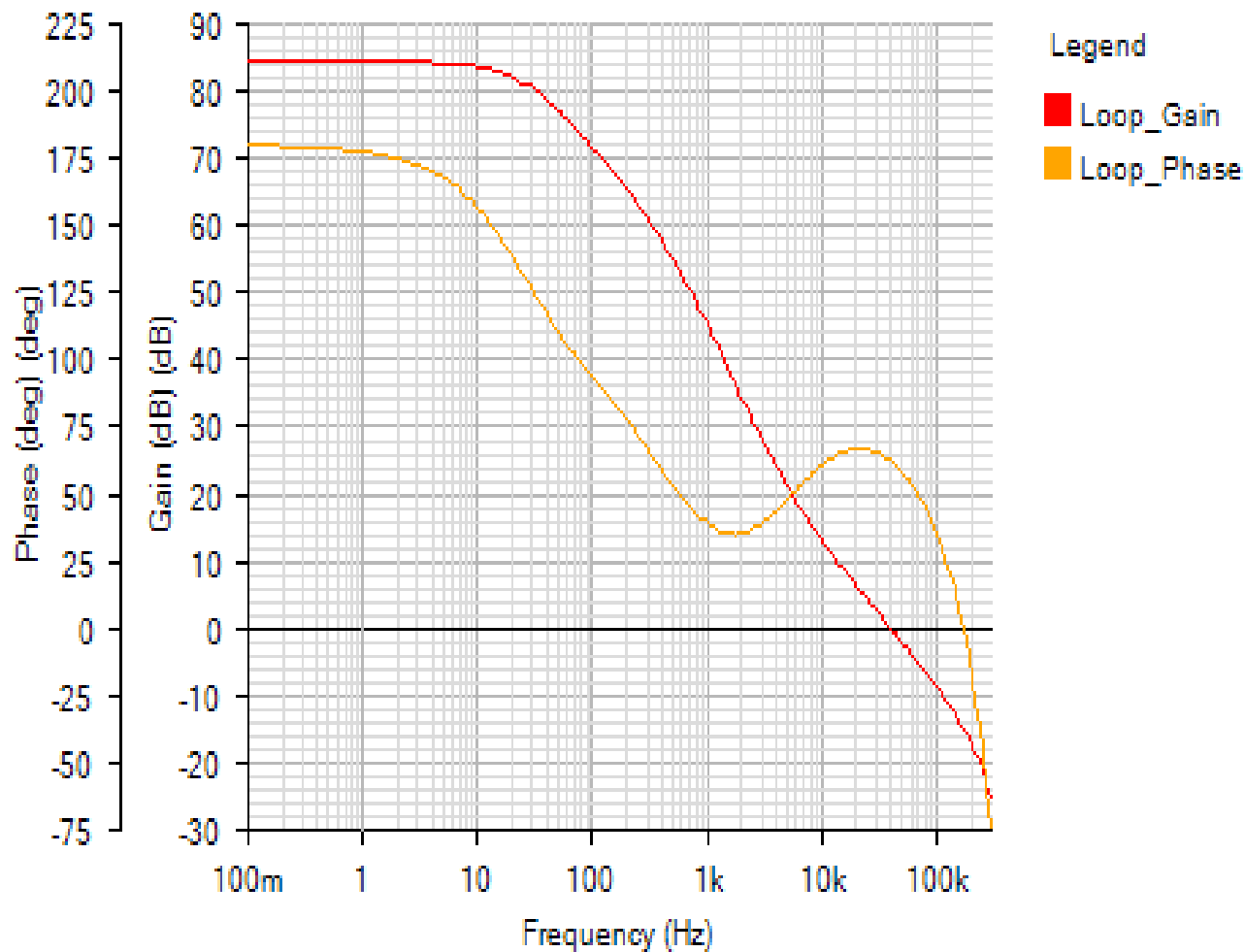
Default



AC Loop - Tue Nov 20 2018 09:51:29

BODE

Default



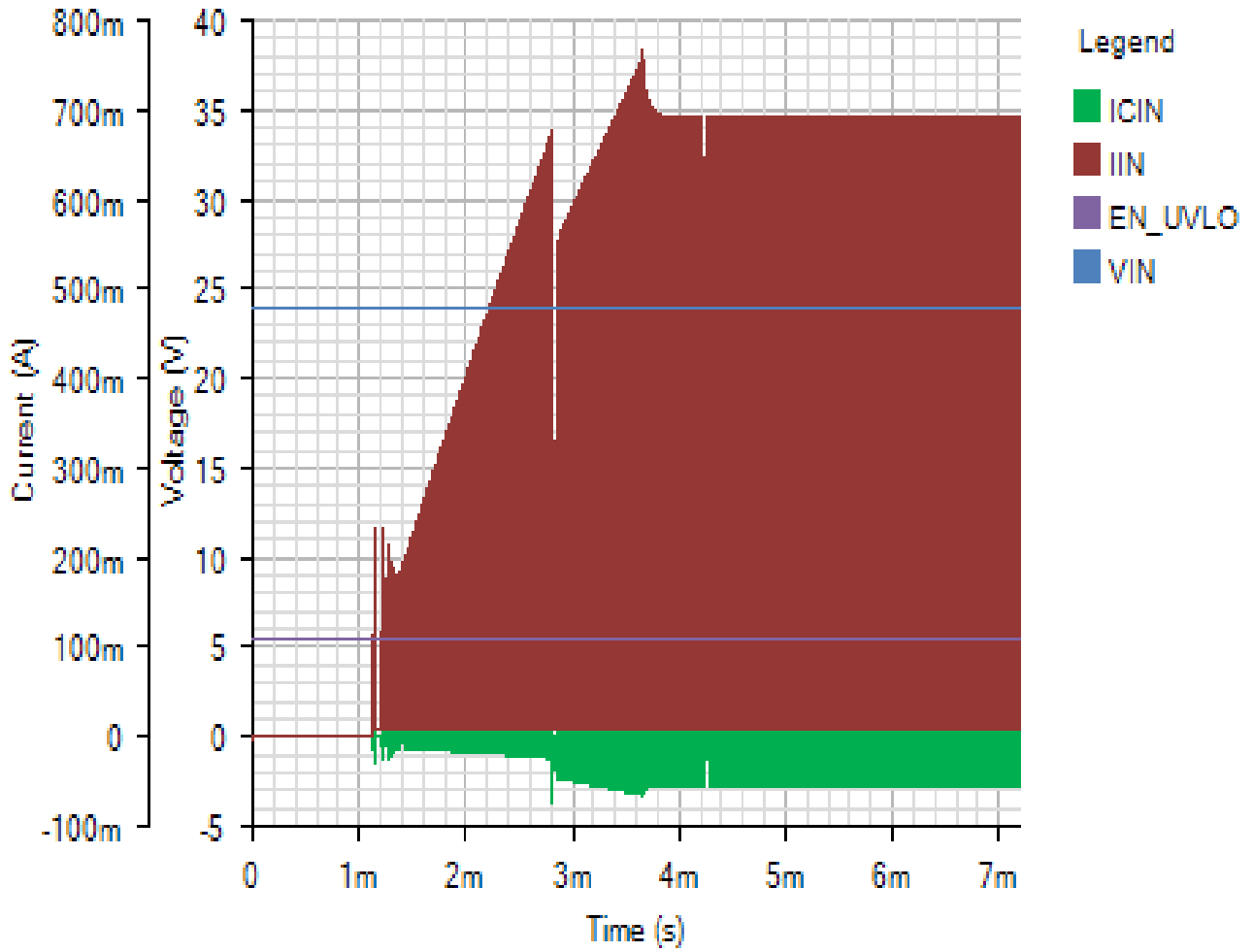
Phase Margin: 62.38° at a crossover frequency of 40.3kHz

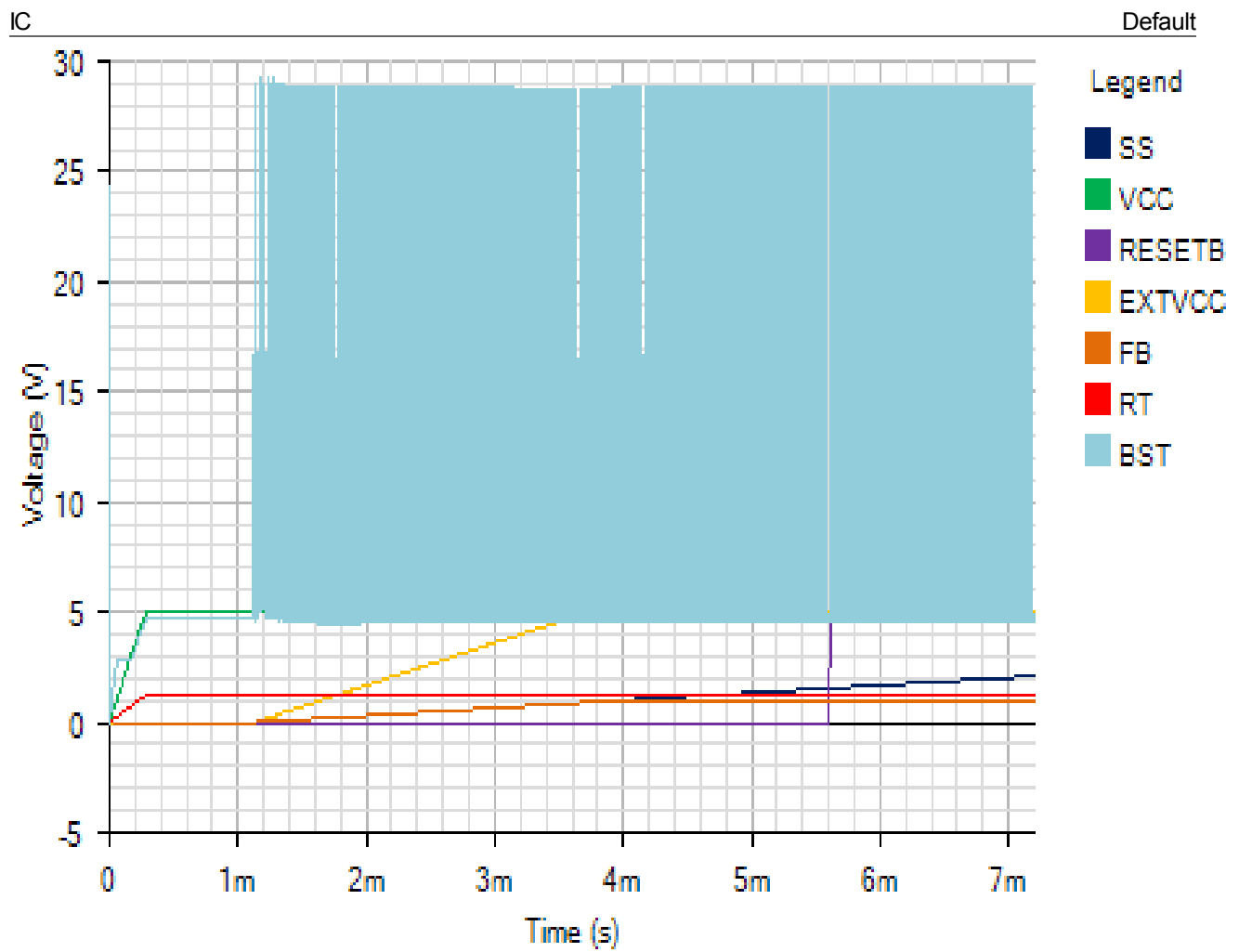


Start Up - Tue Nov 20 2018 09:51:29

INPUT

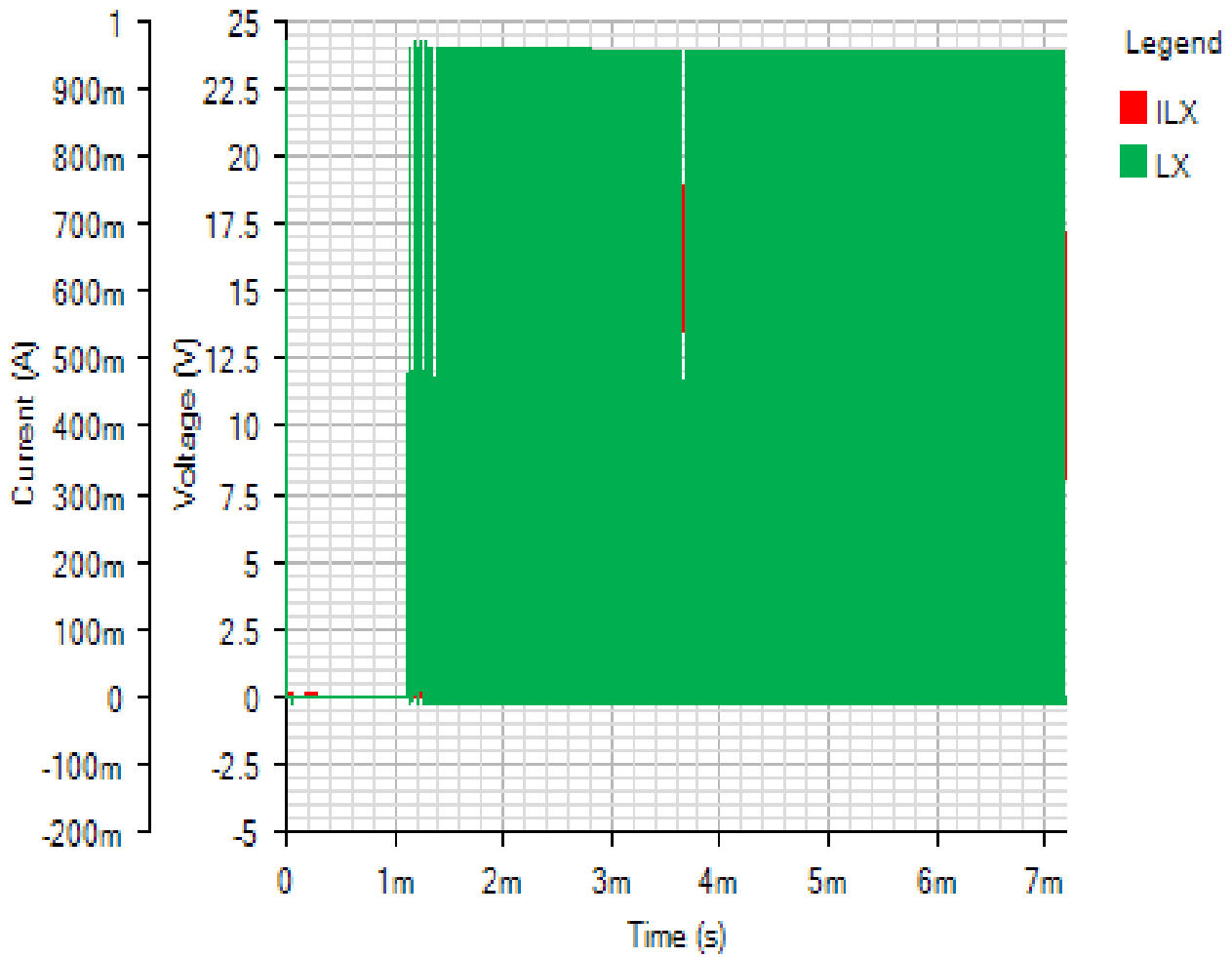
Default





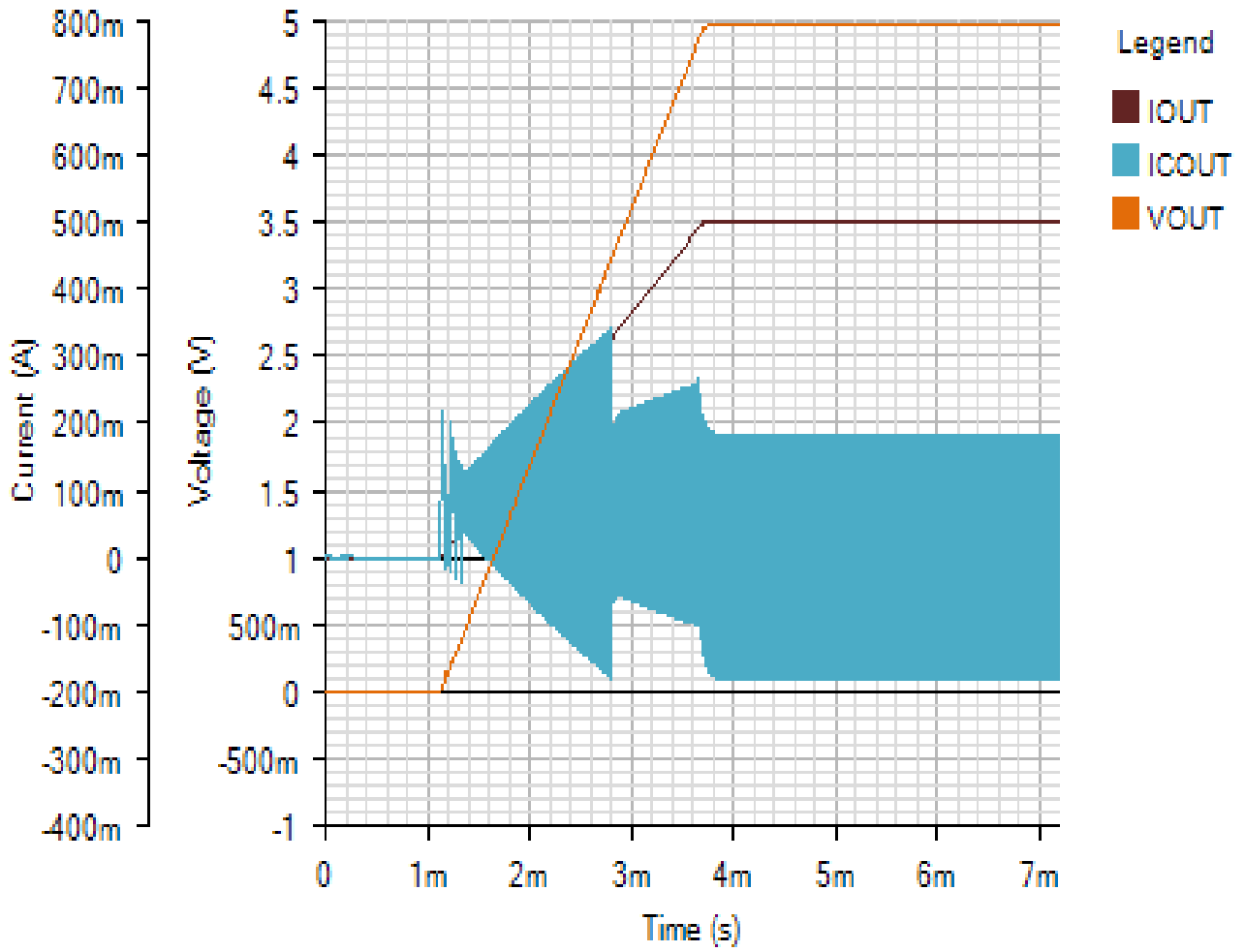
SWITCHING

Default



OUTPUT

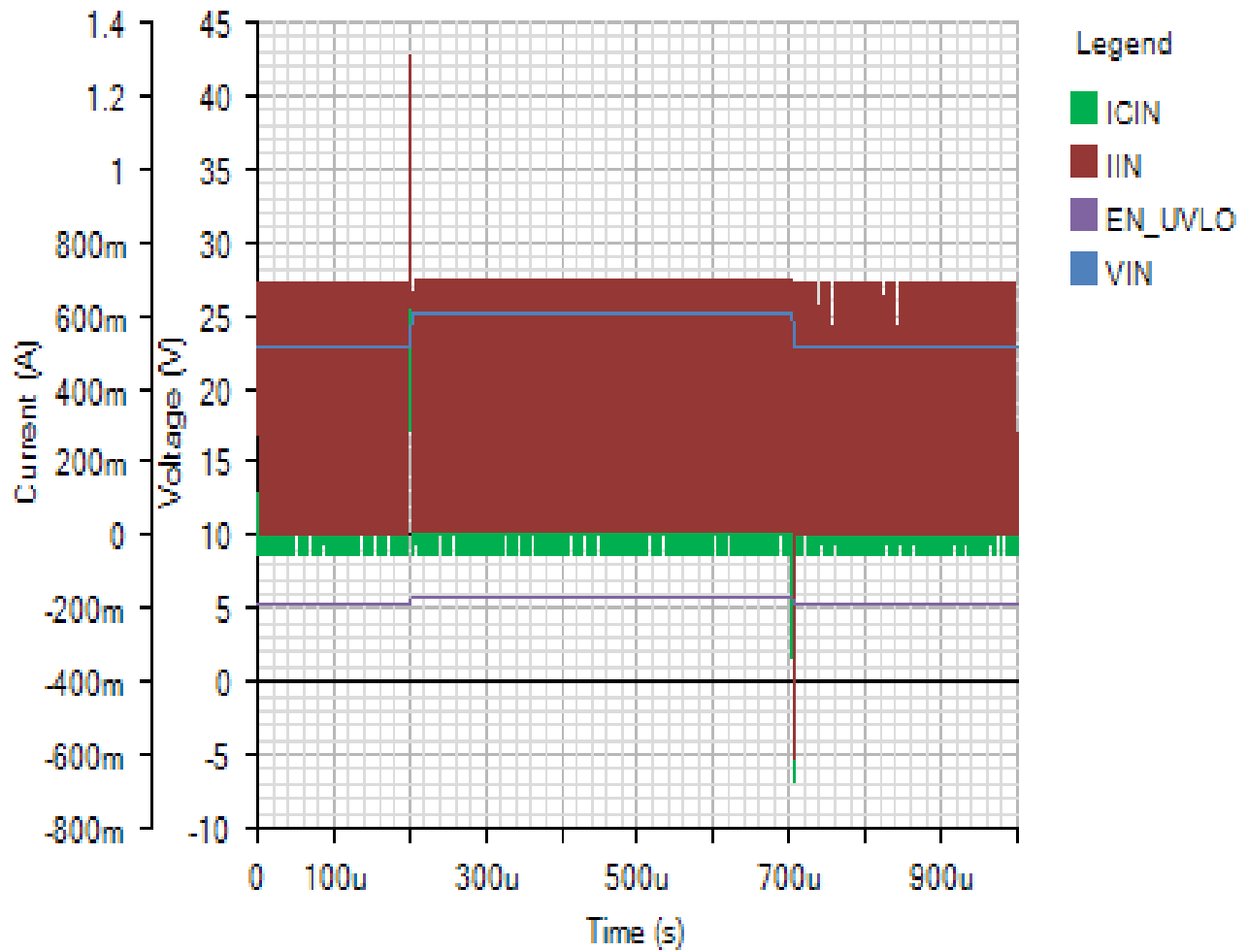
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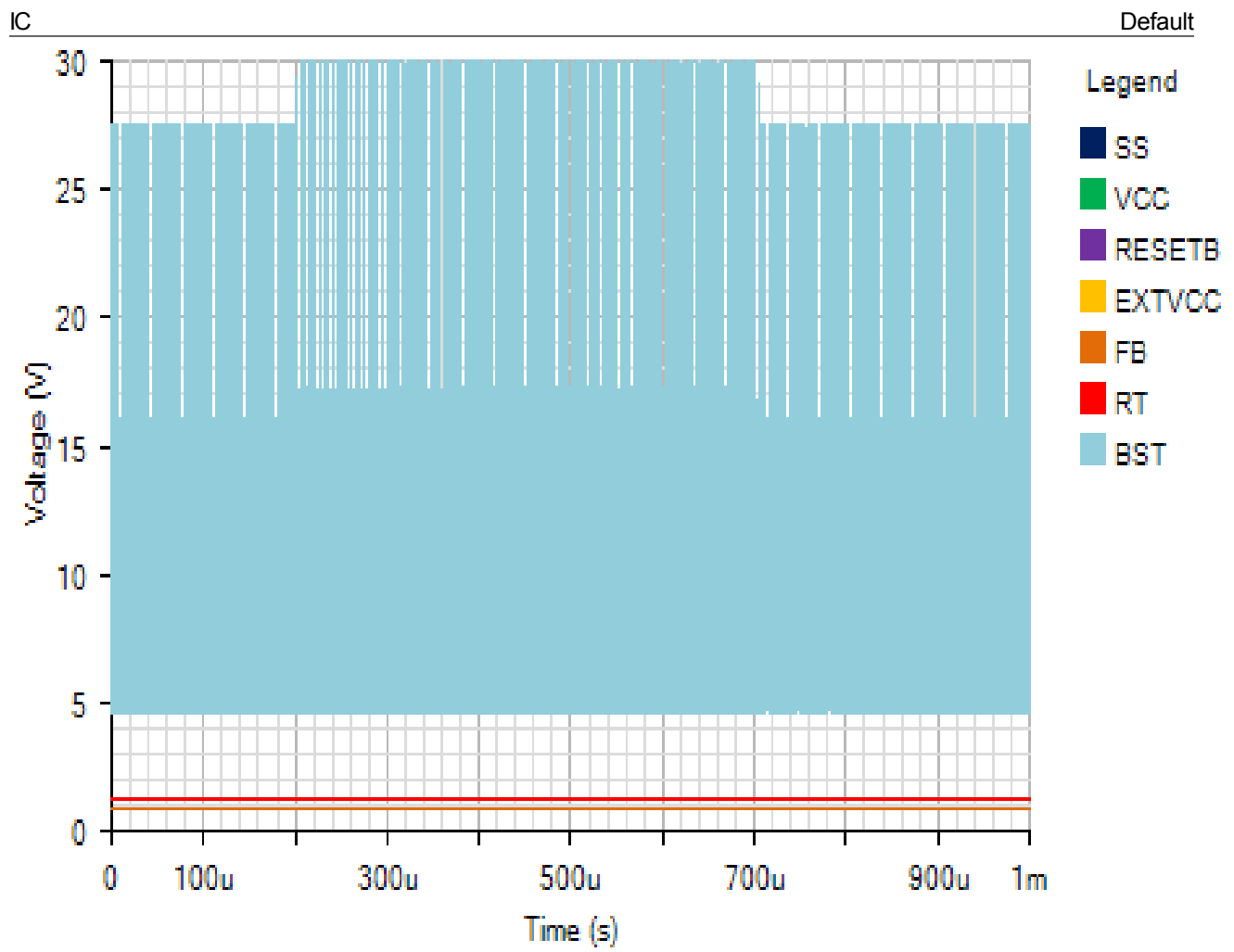


Line Transient - Tue Nov 20 2018 09:51:29

INPUT

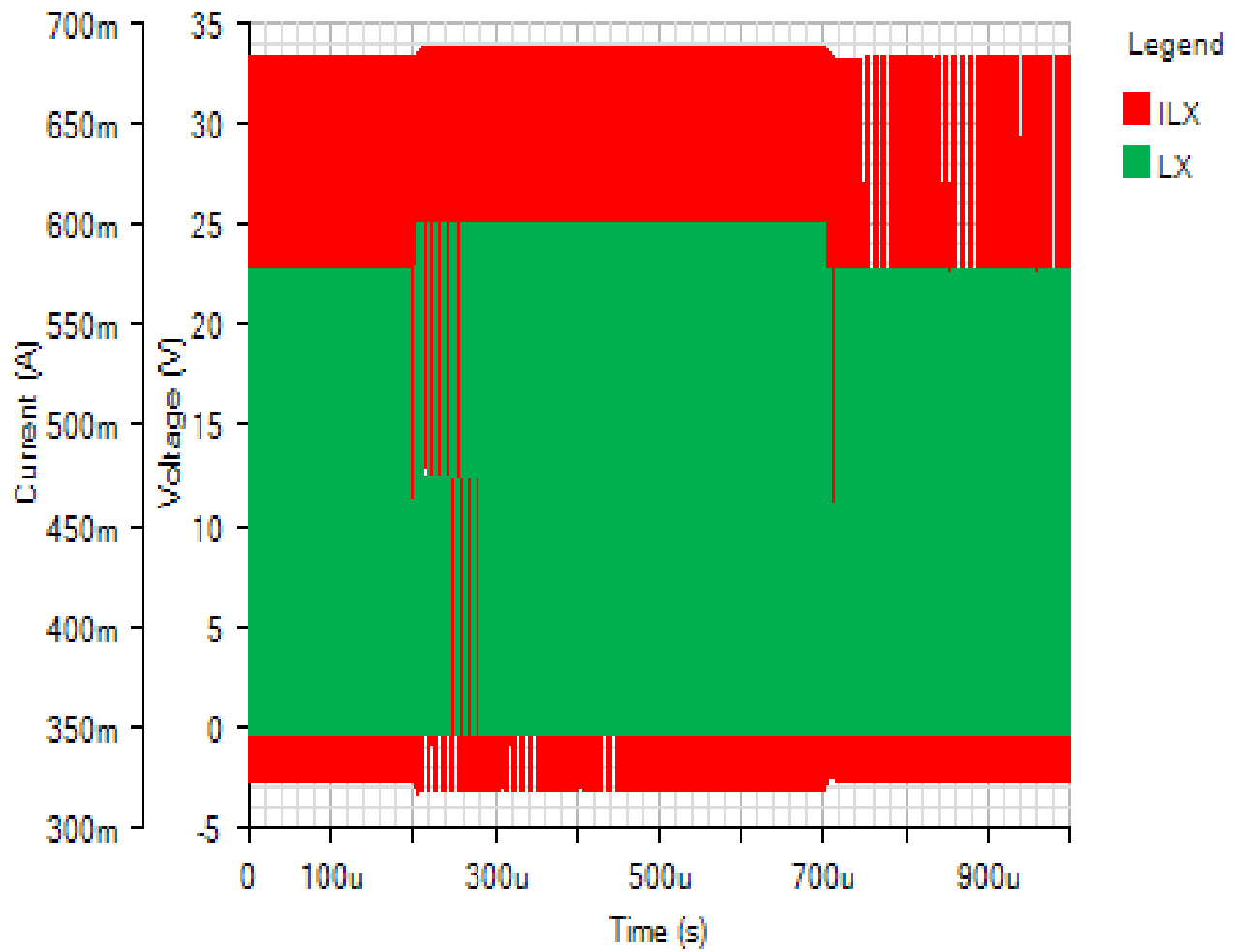
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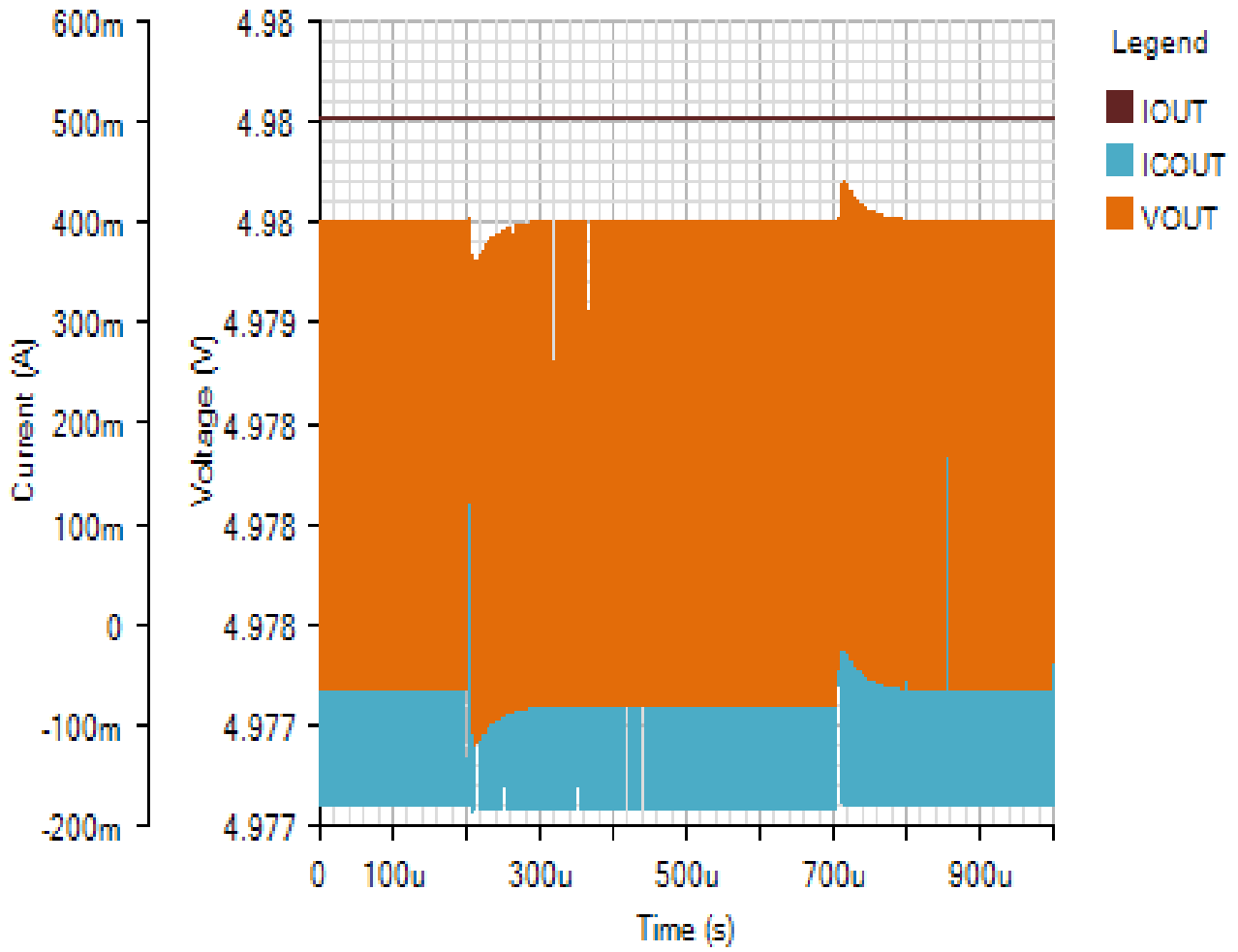
SWITCHING

Default



OUTPUT

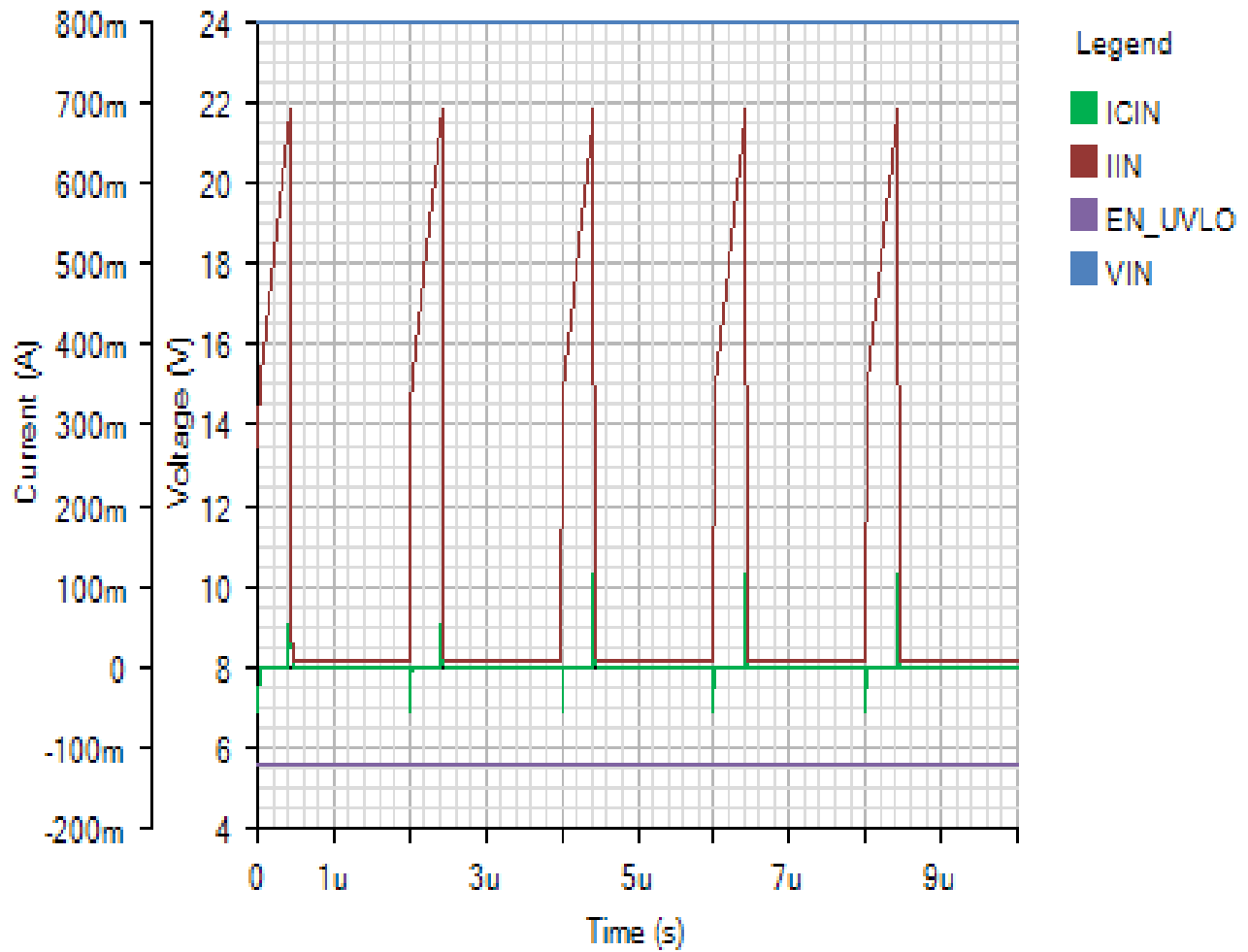
Default



Steady State - Tue Nov 20 2018 09:51:29

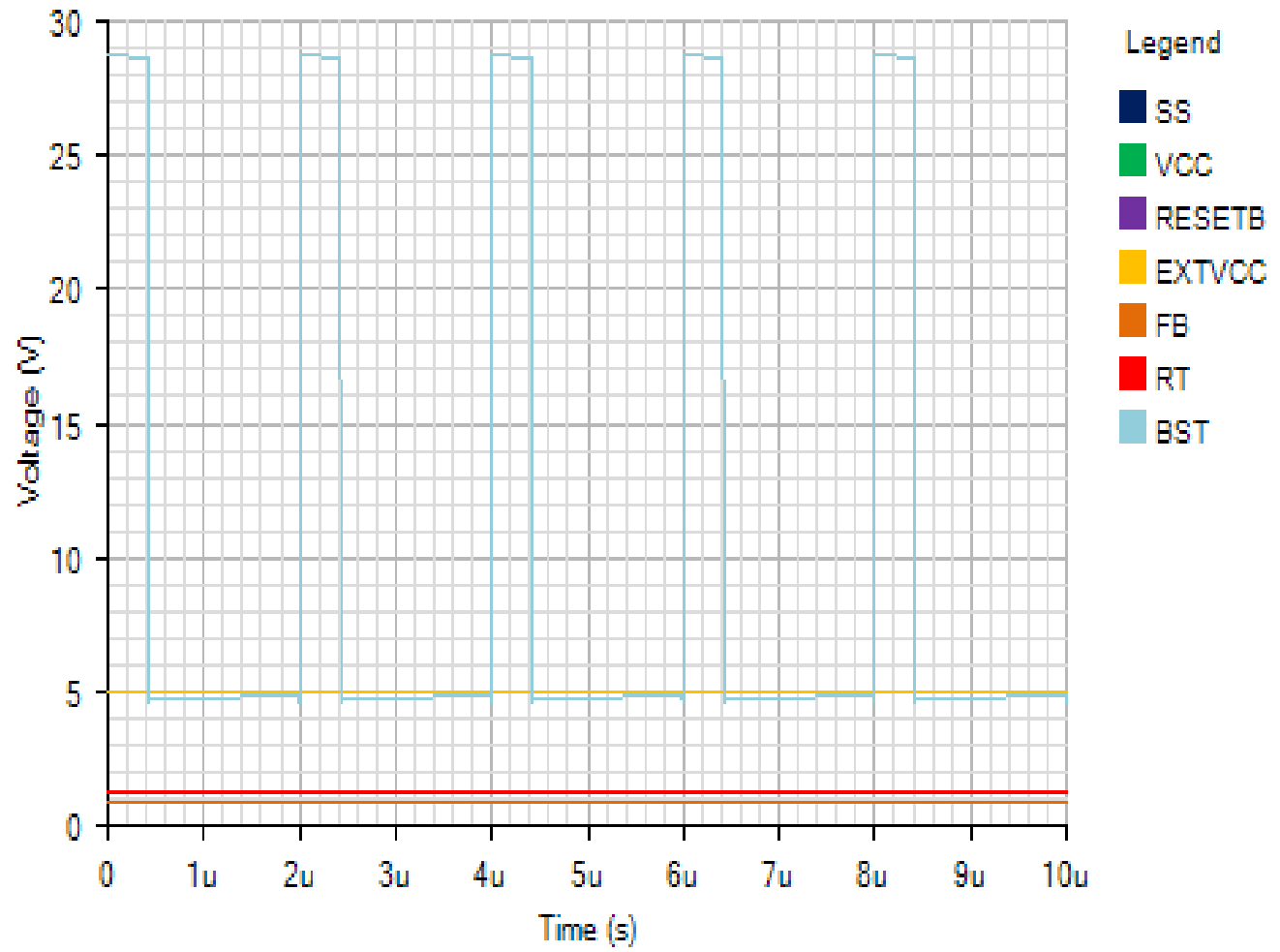
INPUT

Default



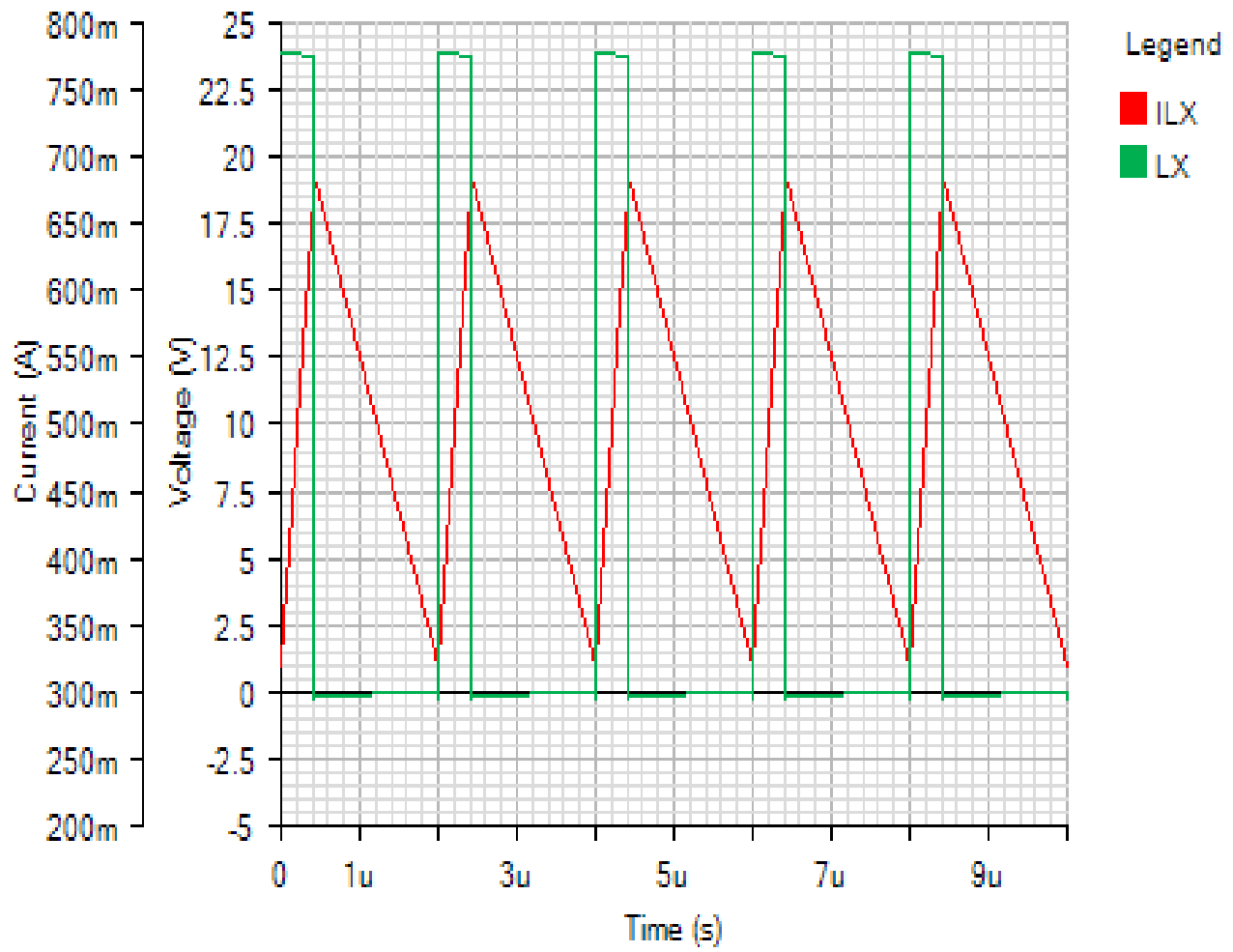
IC

Default



SWITCHING

Default



OUTPUT

Default

