

## Initial Design

1.0

**Design Requirements**

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Parameter	Value
Minimum Input Voltage	7.5V
Maximum Input Voltage	42V
Nominal Input Voltage	24V
Input Undervoltage Lockout	6.5V
Output Voltage	5V
Load Current	5A
Output Voltage Load Step Over/Undershoot	3%
Load Step Start Current	2.5A
Load Step Current	5A
BOM Priority	Low Cost
Switching Frequency	450kHz
Mode of Operation	PWM
Soft Start Time	4ms
Ambient Temperature	25°C



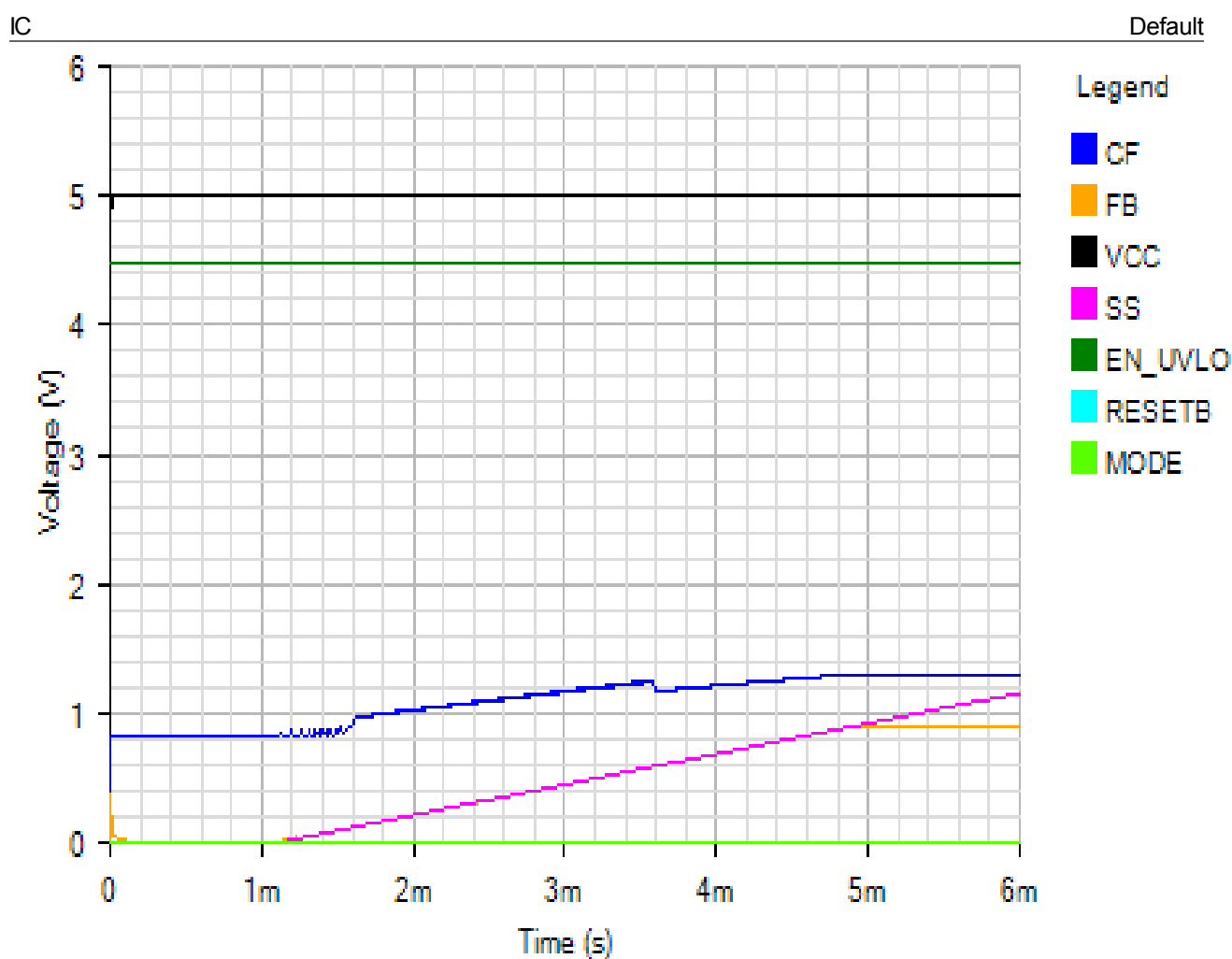
Decreasing the output capacitance below recommended value might degrade the transient response or loop stability.  
If minimum load is too low, AC, steady state analysis may fail when PFM/DCM mode is selected.

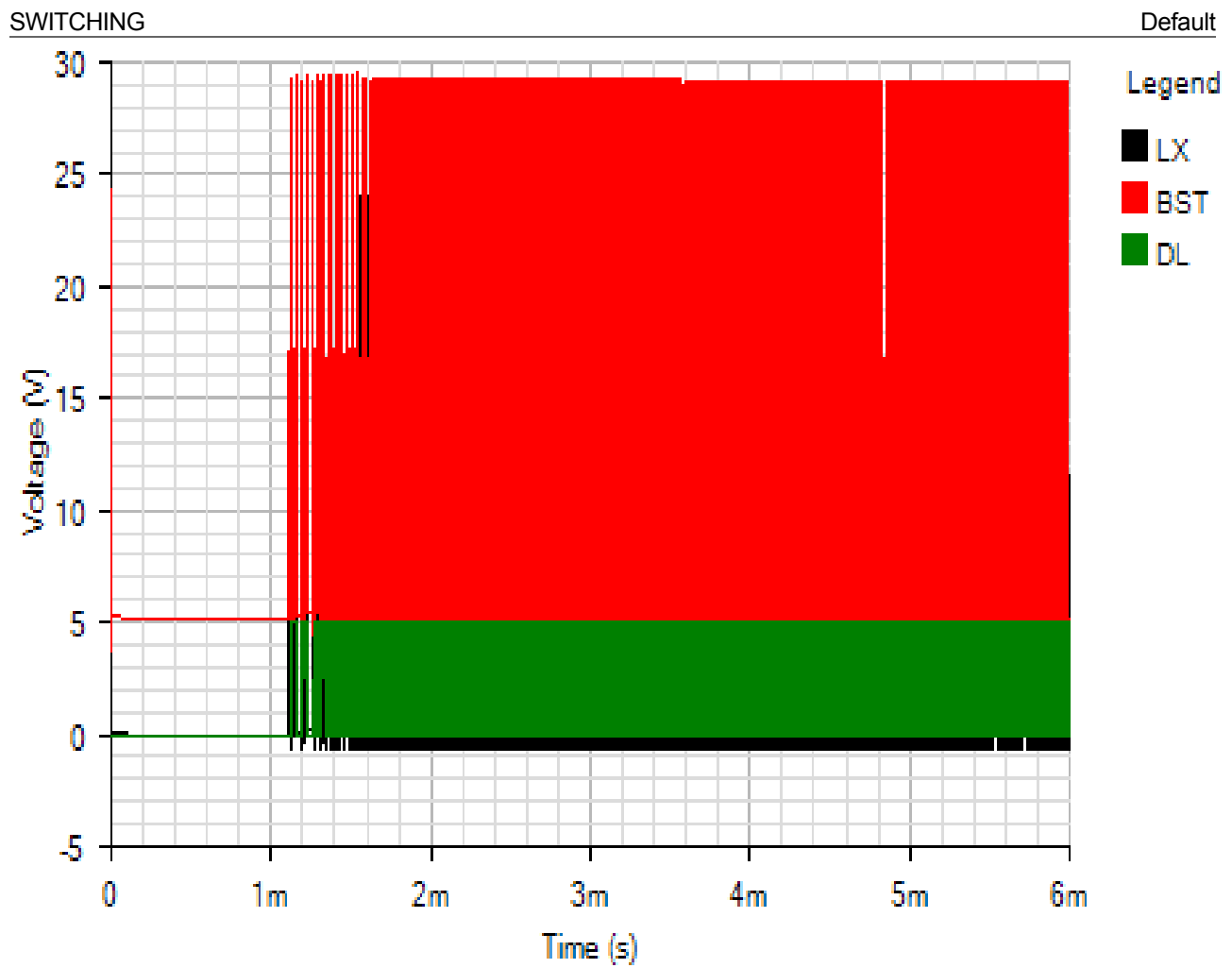
Ref	Qty	Part Number	Manufacturer	Description
U1	1	MAXM17546	User-Defined	IC
C3	1	C0603C223K5RACTU	KEMET Corporation	Cap Ceramic 0.022uF 50V X7R 10% Pad SMD 0603 125°C T/R
C4	1	0603YA2R2JAT2A	AVX	Cap Ceramic 2.2pF 16V C0G 5% Pad SMD 0603 125°C T/R
CIN	2	C3225X7R1H106M250AC	TDK	Cap Ceramic 10uF 50V X7R 20% SMD 1210 125C Plastic T/R
COUT	4	GRM32ER71A226KE20L	Murata	Cap Ceramic 22uF 10V X7R 10% SMD 1210 125C Embossed T/R
R2	1	ERJ3EKF7683V	Panasonic	Res Thick Film 0603 768K Ohm 1% 0.1W(1/10W) ±100ppm/°C Pad SMD Automotive T/R
R3	1	ERJ3EKF1913V	Panasonic	Res Thick Film 0603 191K Ohm 1% 0.1W(1/10W) ±100ppm/°C Pad SMD Automotive T/R
R4	1	ERJ3EKF4222V	Panasonic	Res Thick Film 0603 42.2K Ohm 1% 0.1W(1/10W) ±100ppm/°C Pad SMD

				Automotive T/R
R6	1	ERJ2RKF1002X	Panasonic	Res Thick Film 0402 10K Ohm 1% 0.1W(1/10W) $\pm 100\text{ppm}/^{\circ}\text{C}$ Pad SMD Automotive T/R

## Simulation Results

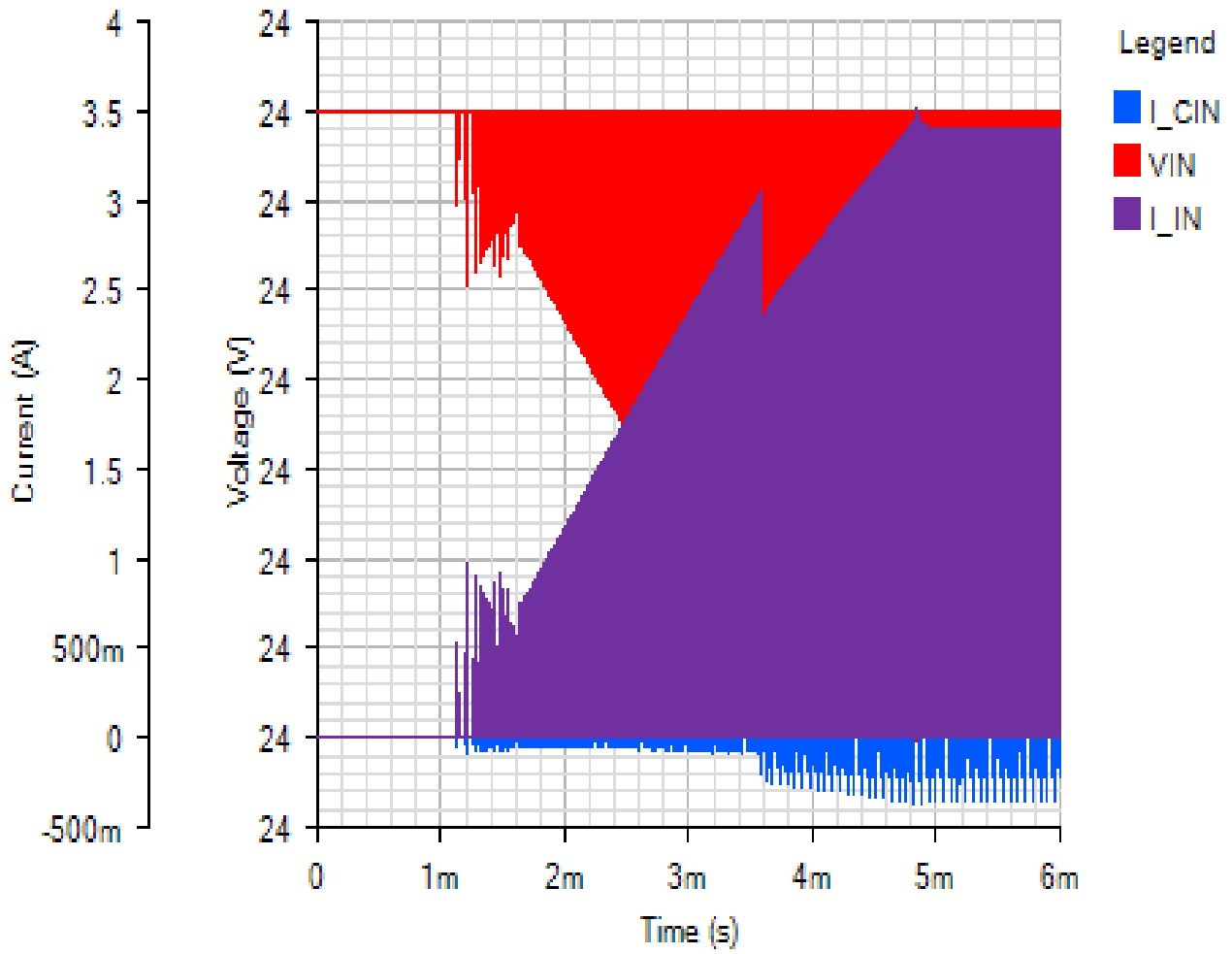
Start Up - Sun Nov 25 2018 20:45:24





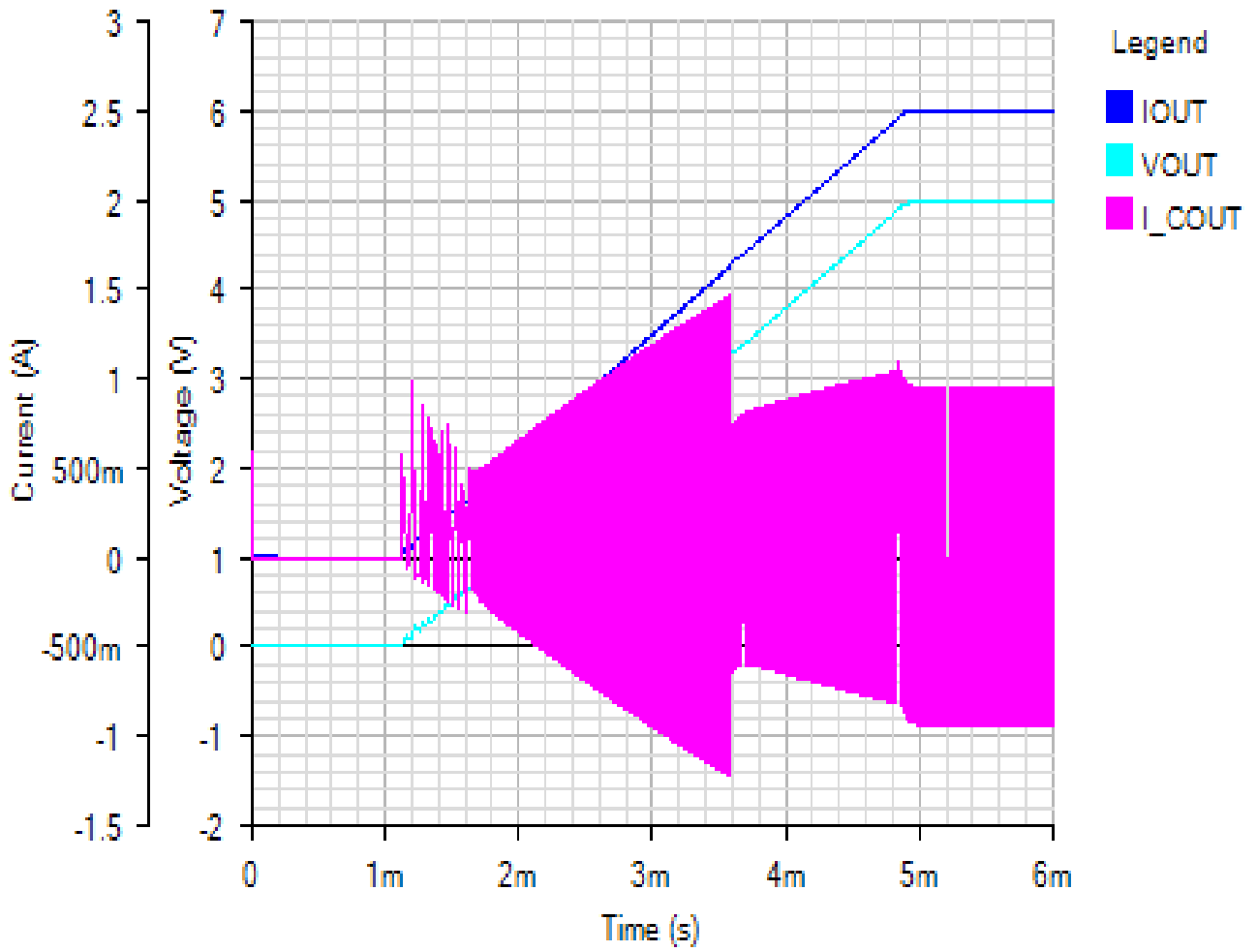
INPUT

Default



OUTPUT

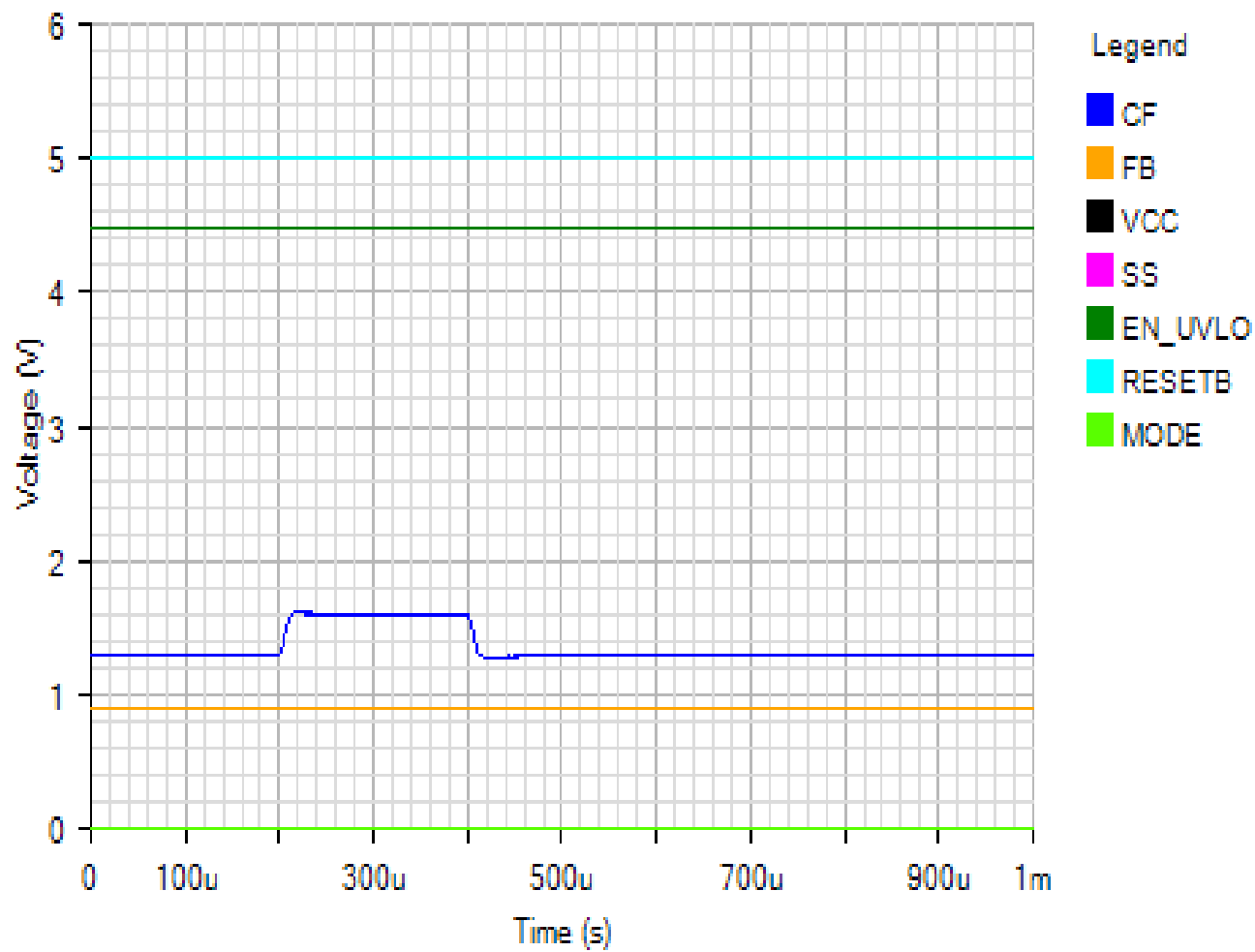
Default

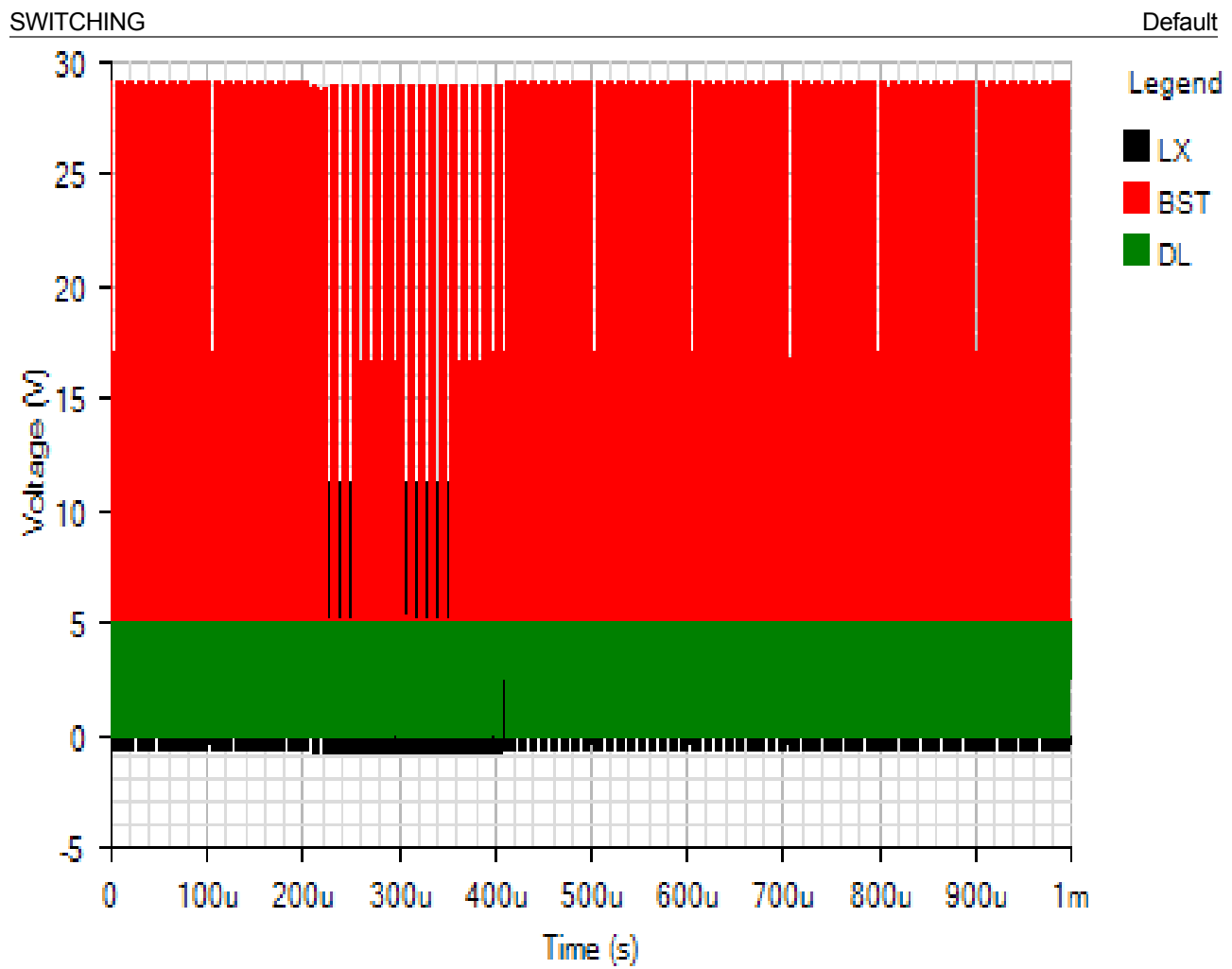


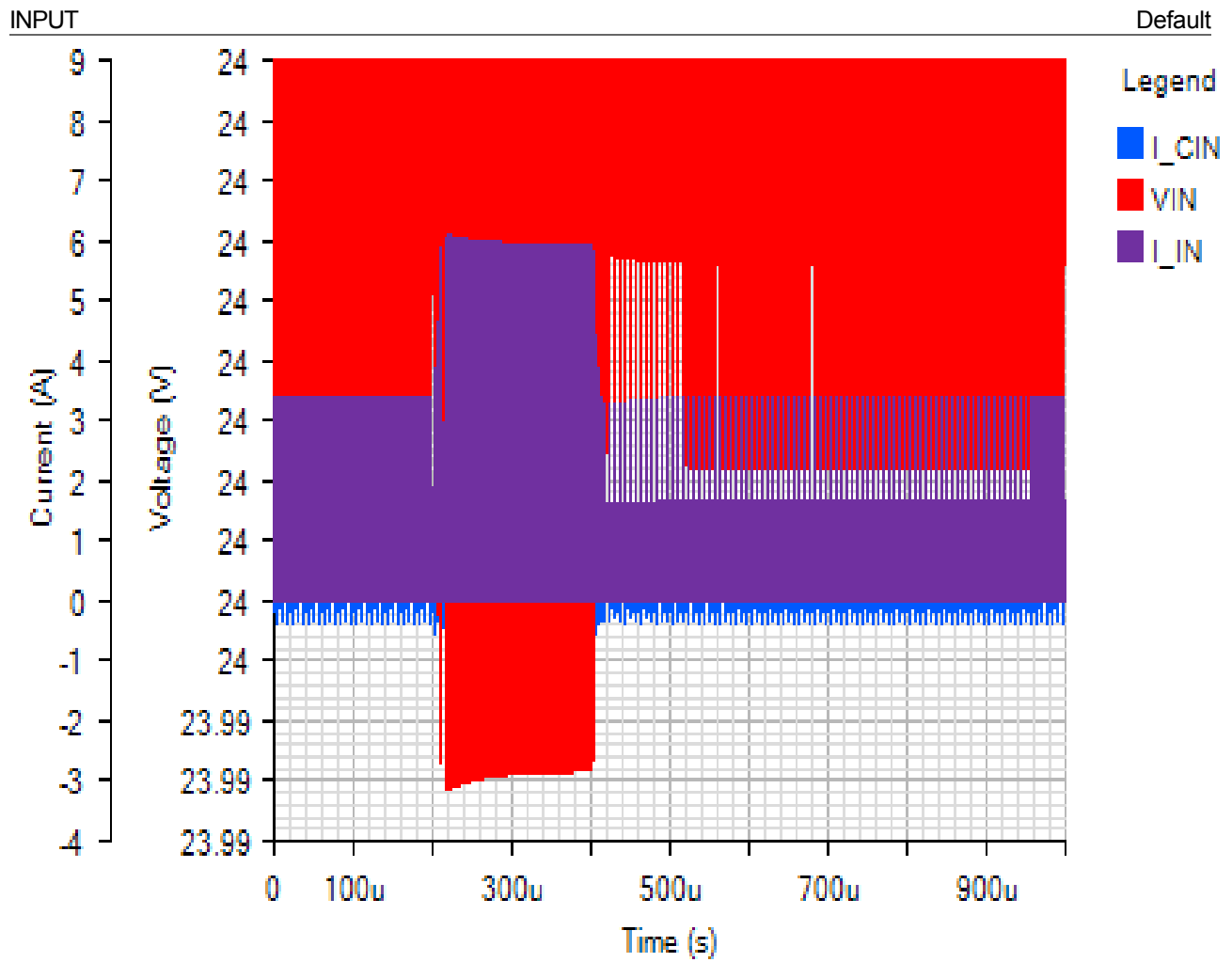
Load Step - Sun Nov 25 2018 20:45:24

IC

Default

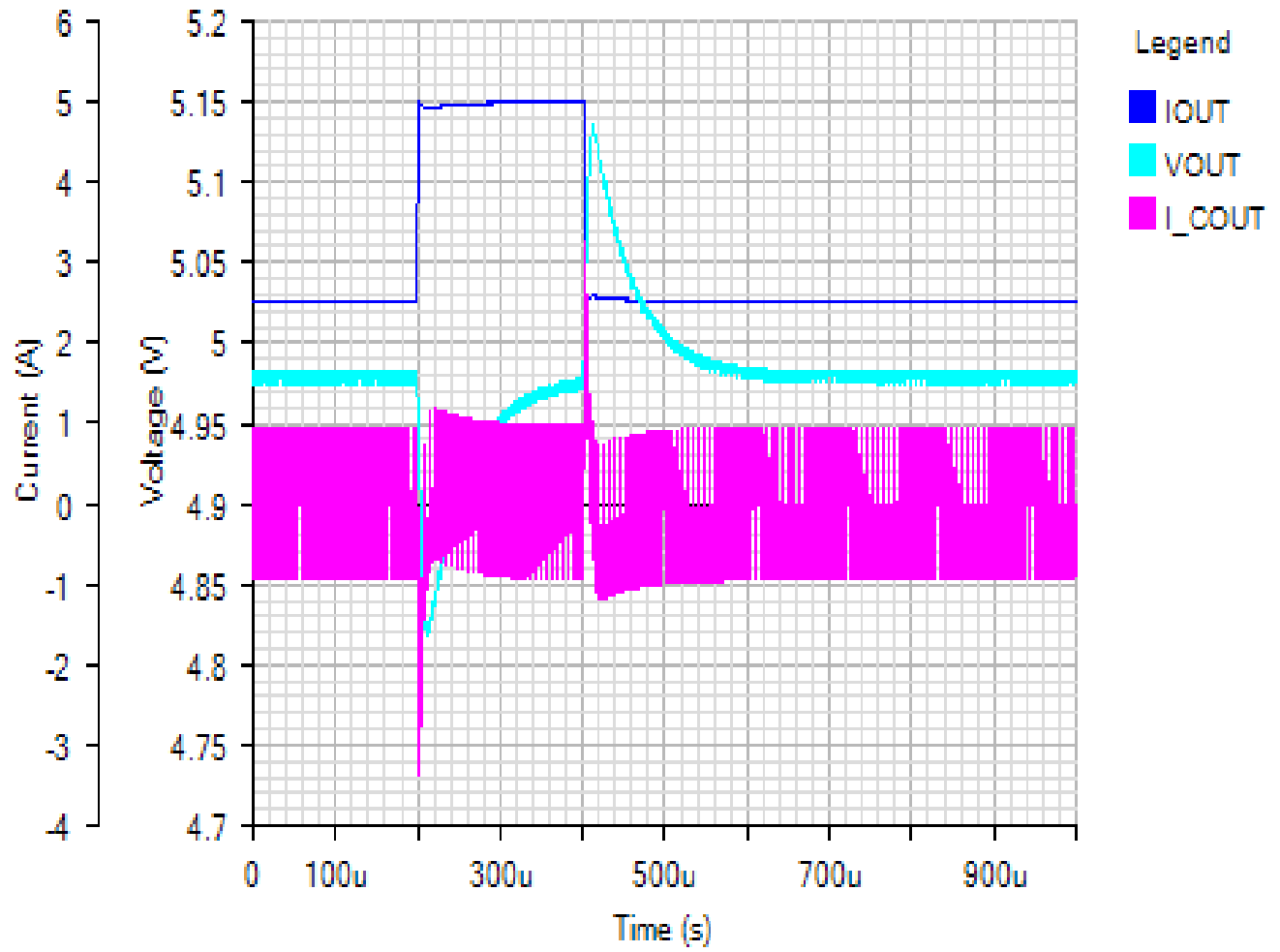






OUTPUT

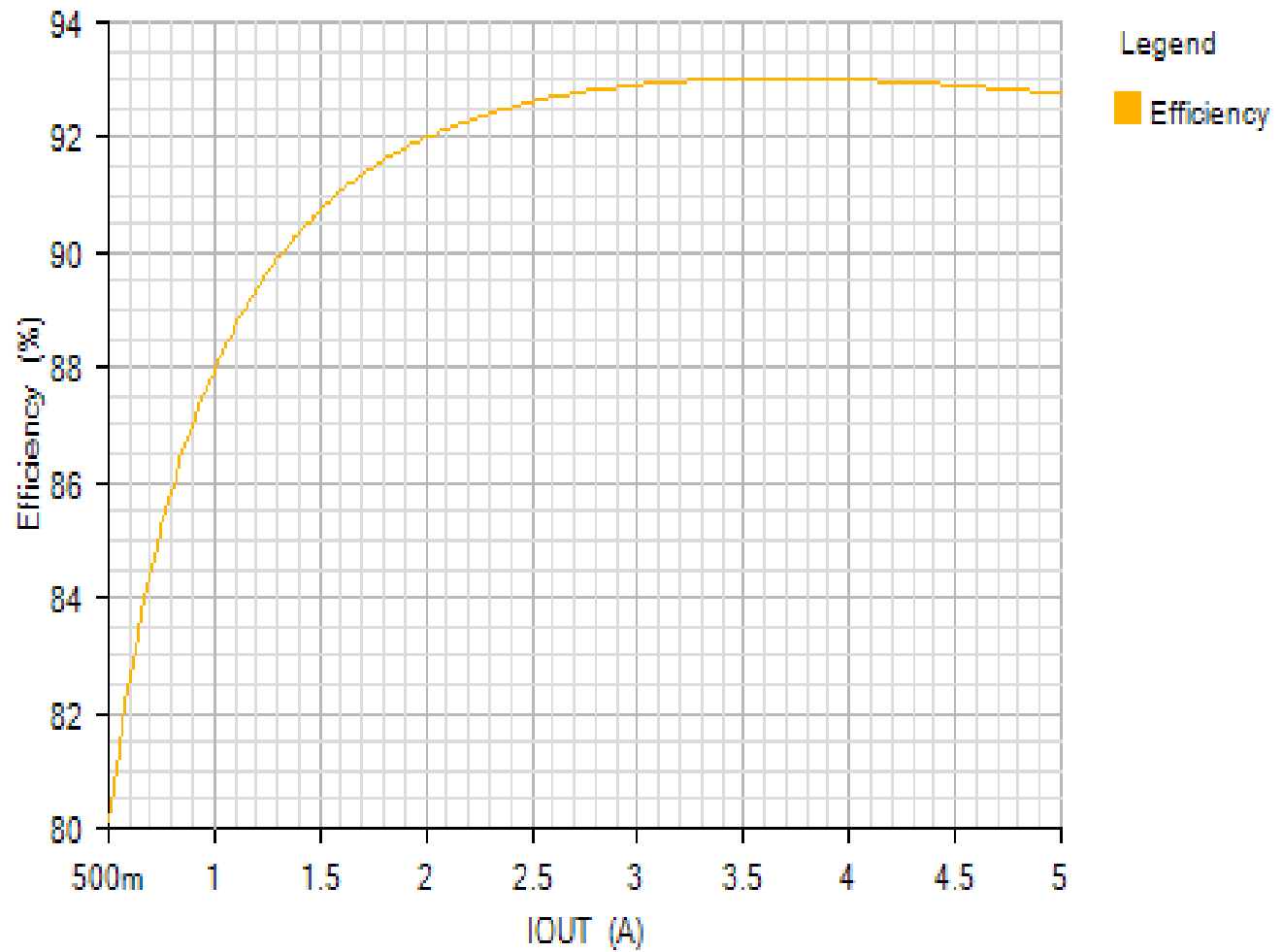
Default



Efficiency - Sun Nov 25 2018 20:45:24

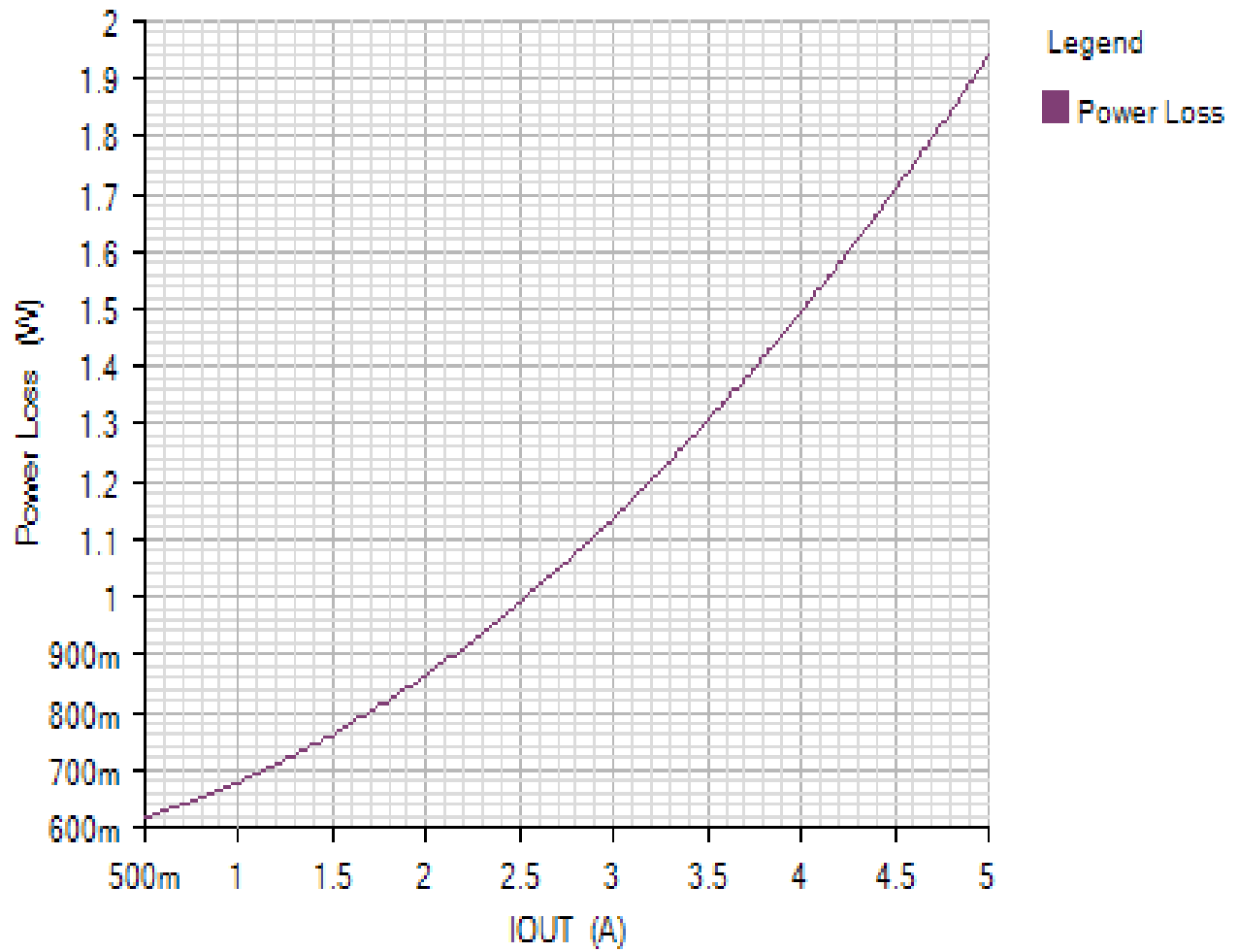
EFFICIENCY\_PLOT

Default



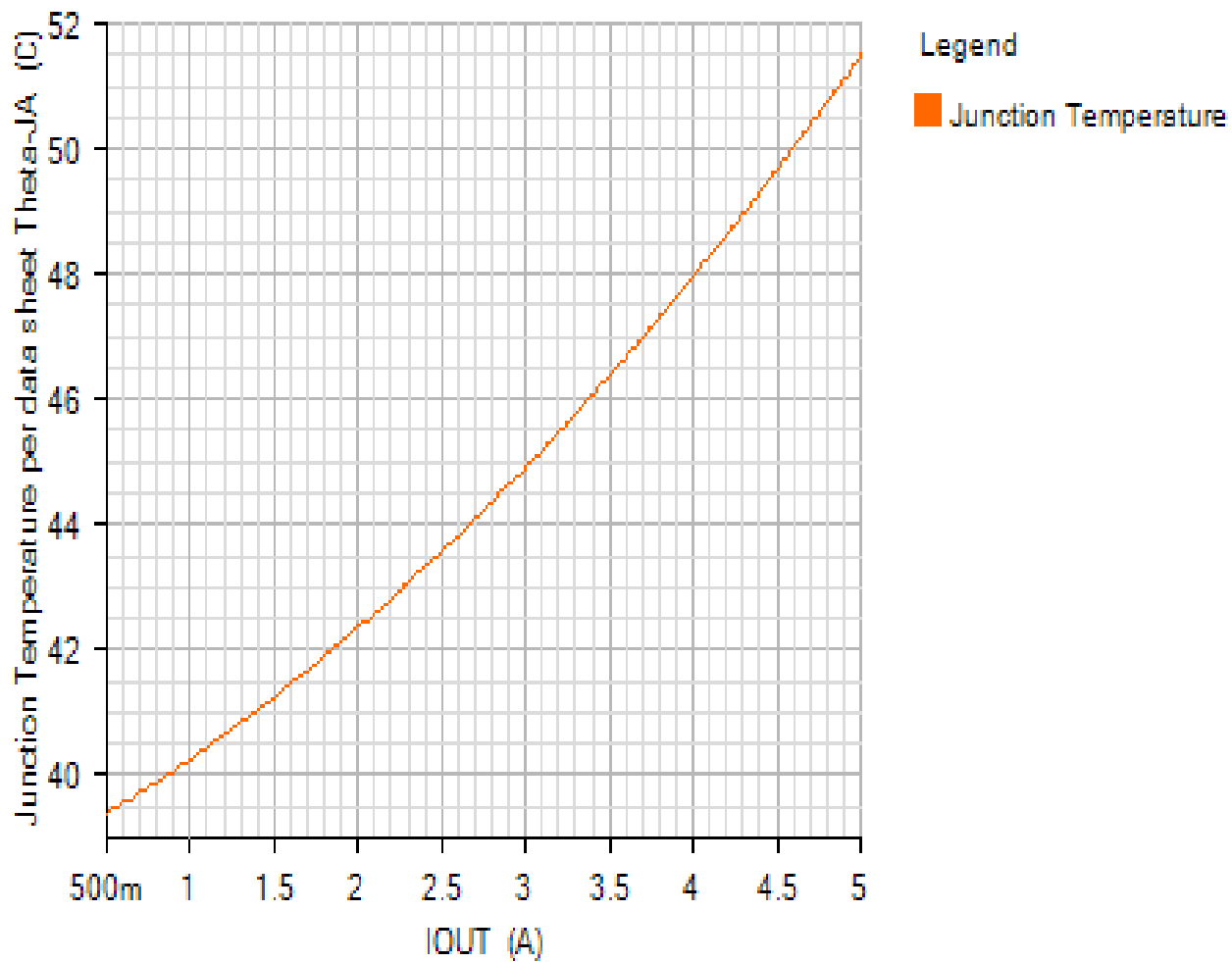
POWER\_LOSS\_PLOT

Default

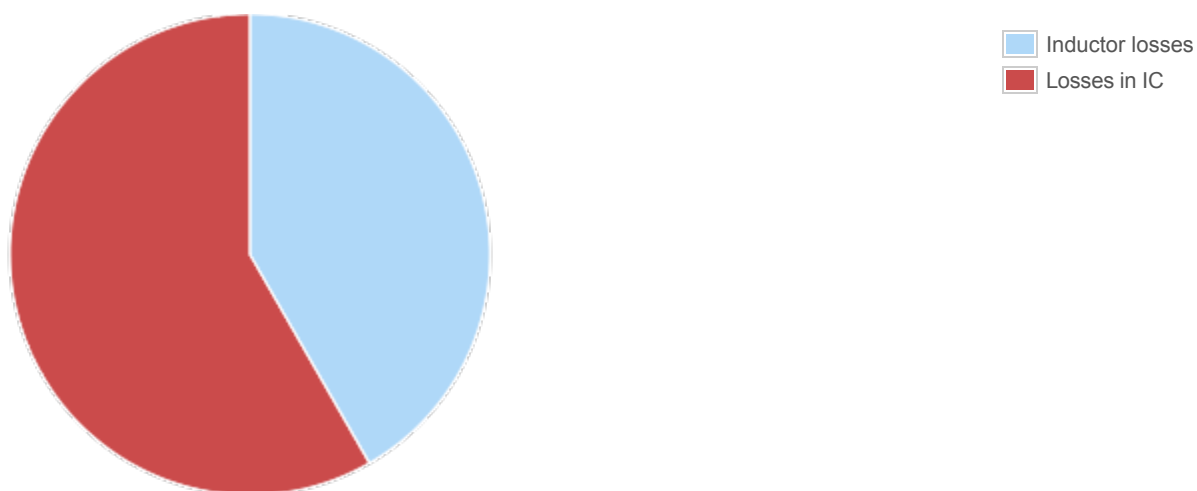


JUNCTION\_TEMPERATURE\_PLOT

Default



Losses



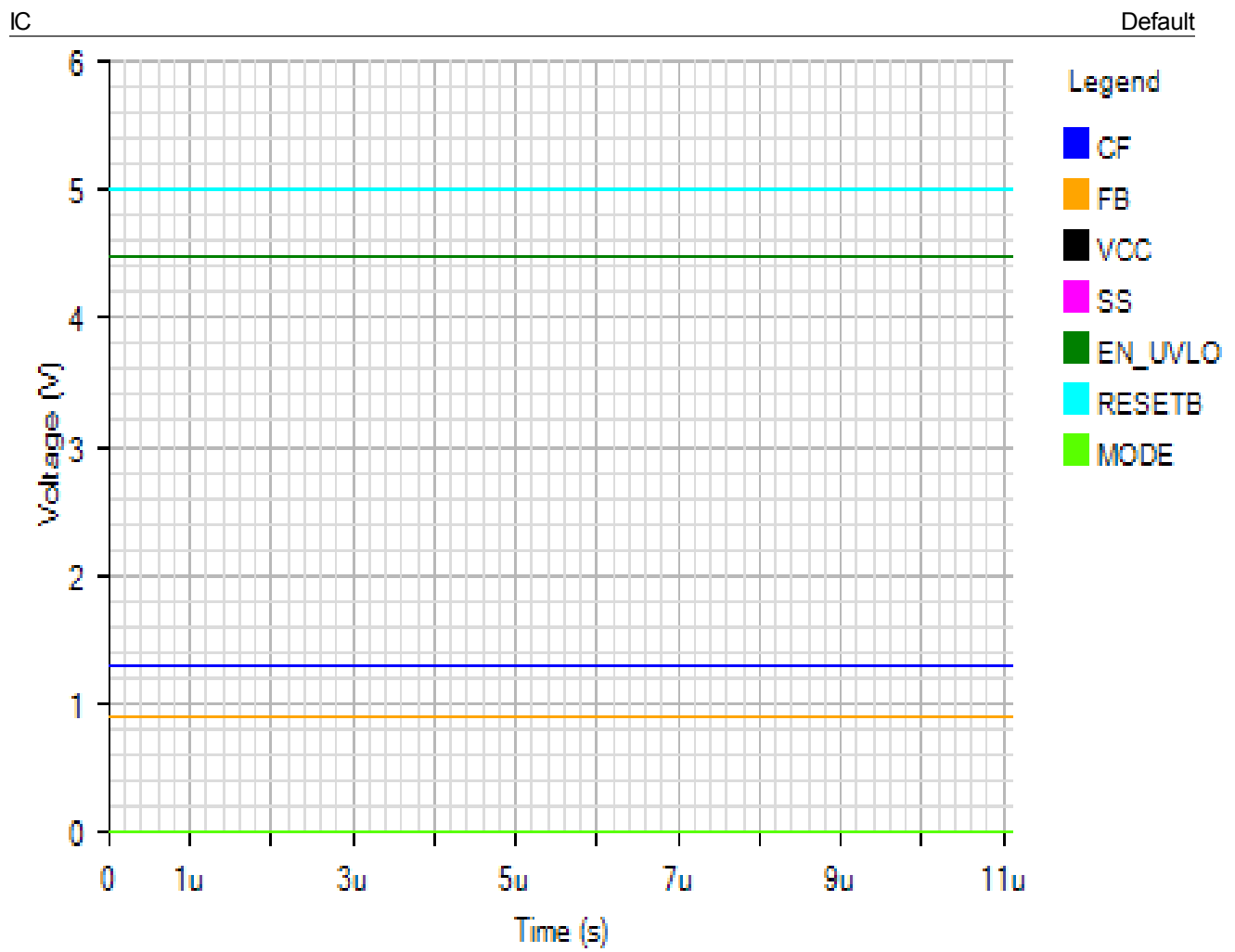
Component

Loss (W)

% of total

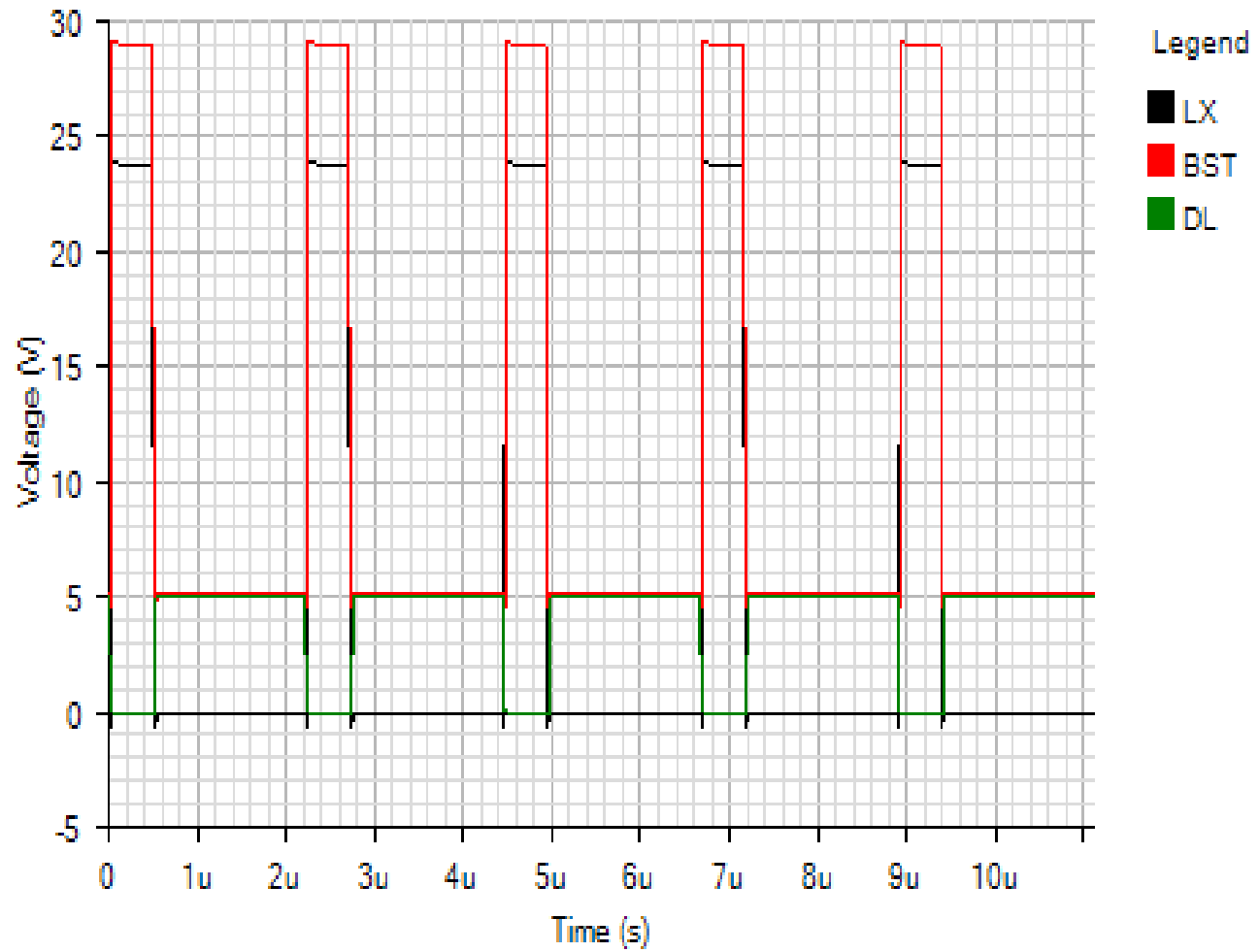
Component	Loss (W)	% of total
Inductor losses	0.81	41.7
Losses in IC	1.132	58.3
Total	1.942	100

Steady State - Sun Nov 25 2018 20:45:24



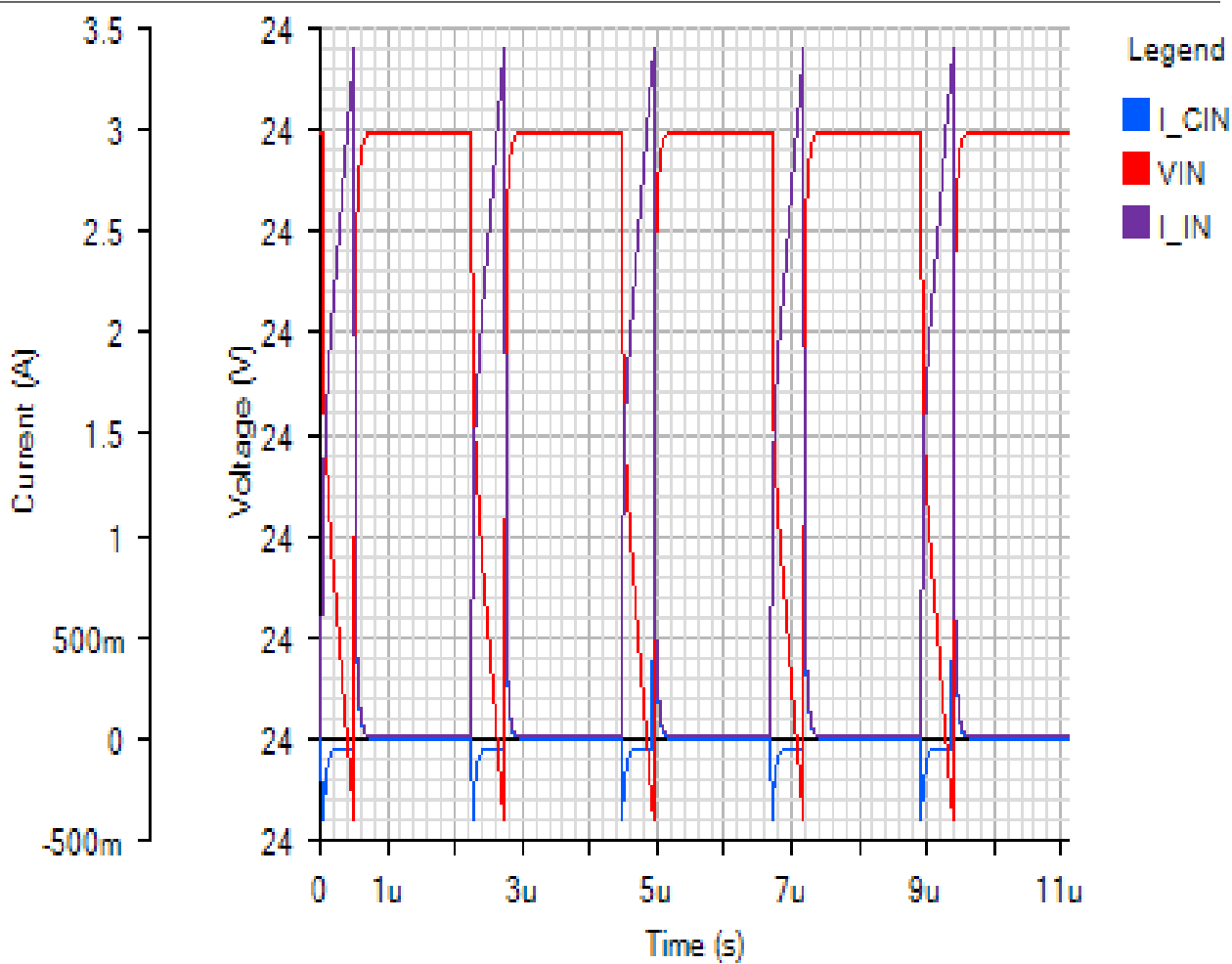
SWITCHING

Default



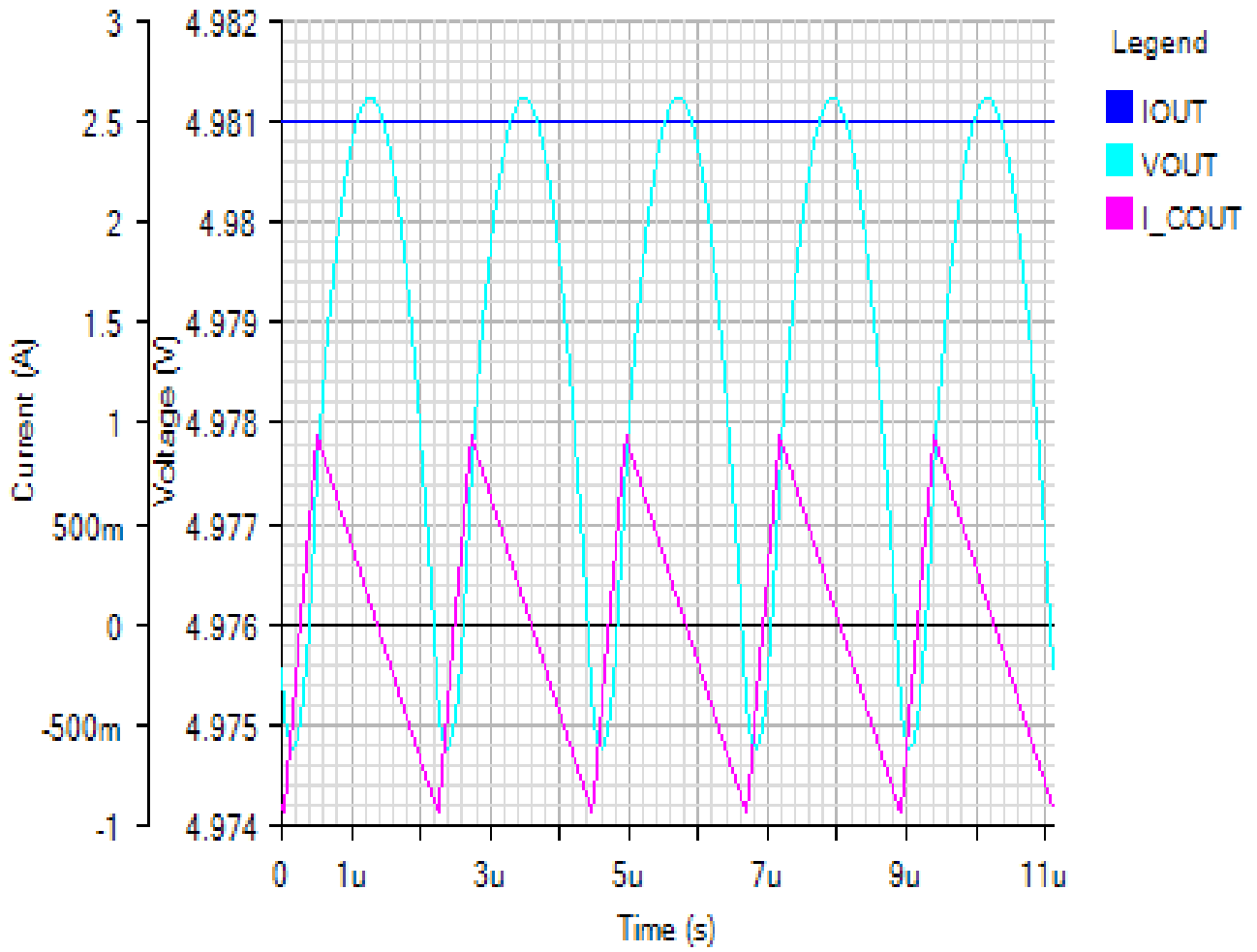
INPUT

Default



OUTPUT

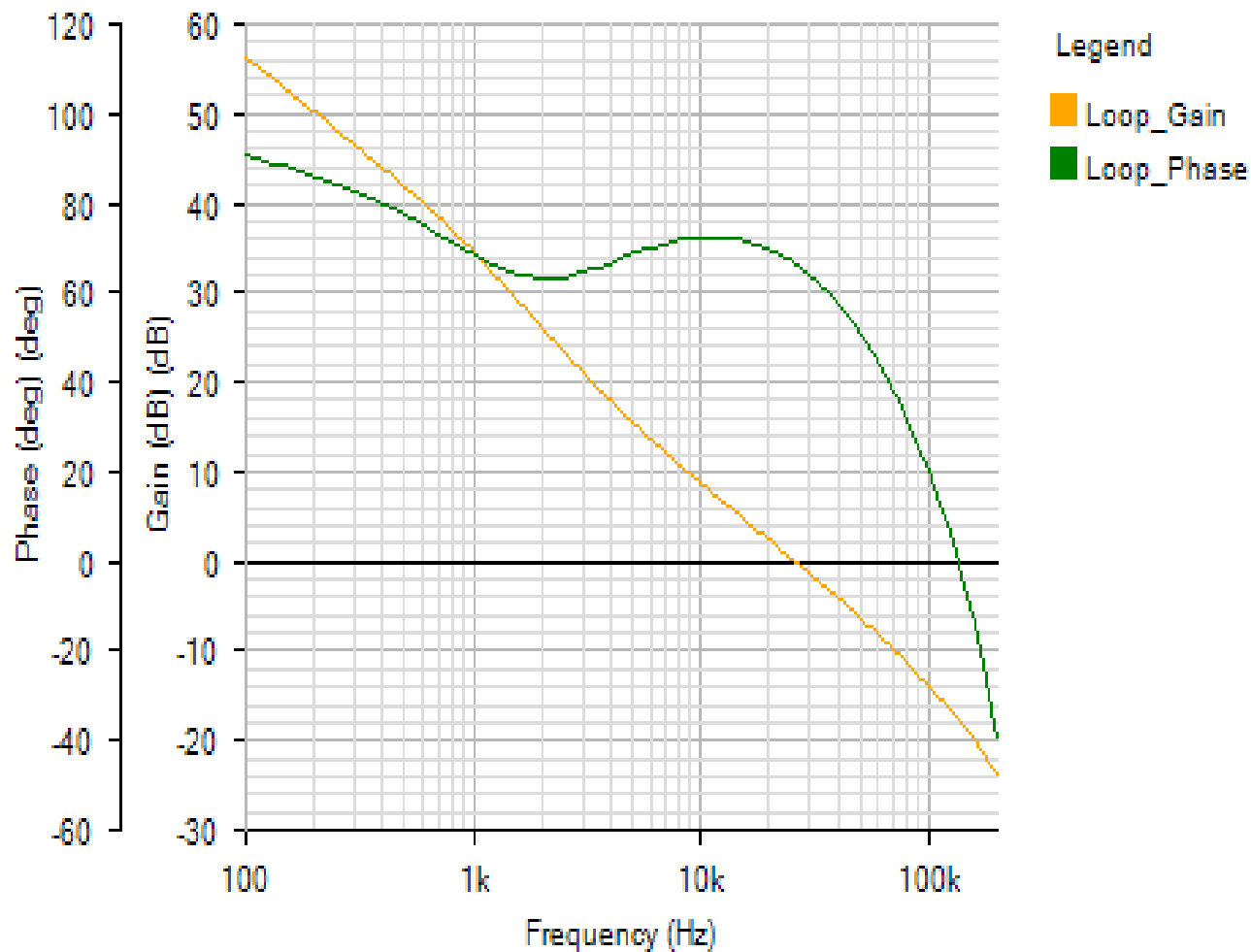
Default



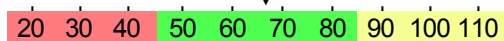
AC Loop - Sun Nov 25 2018 20:45:24

BODE

Default



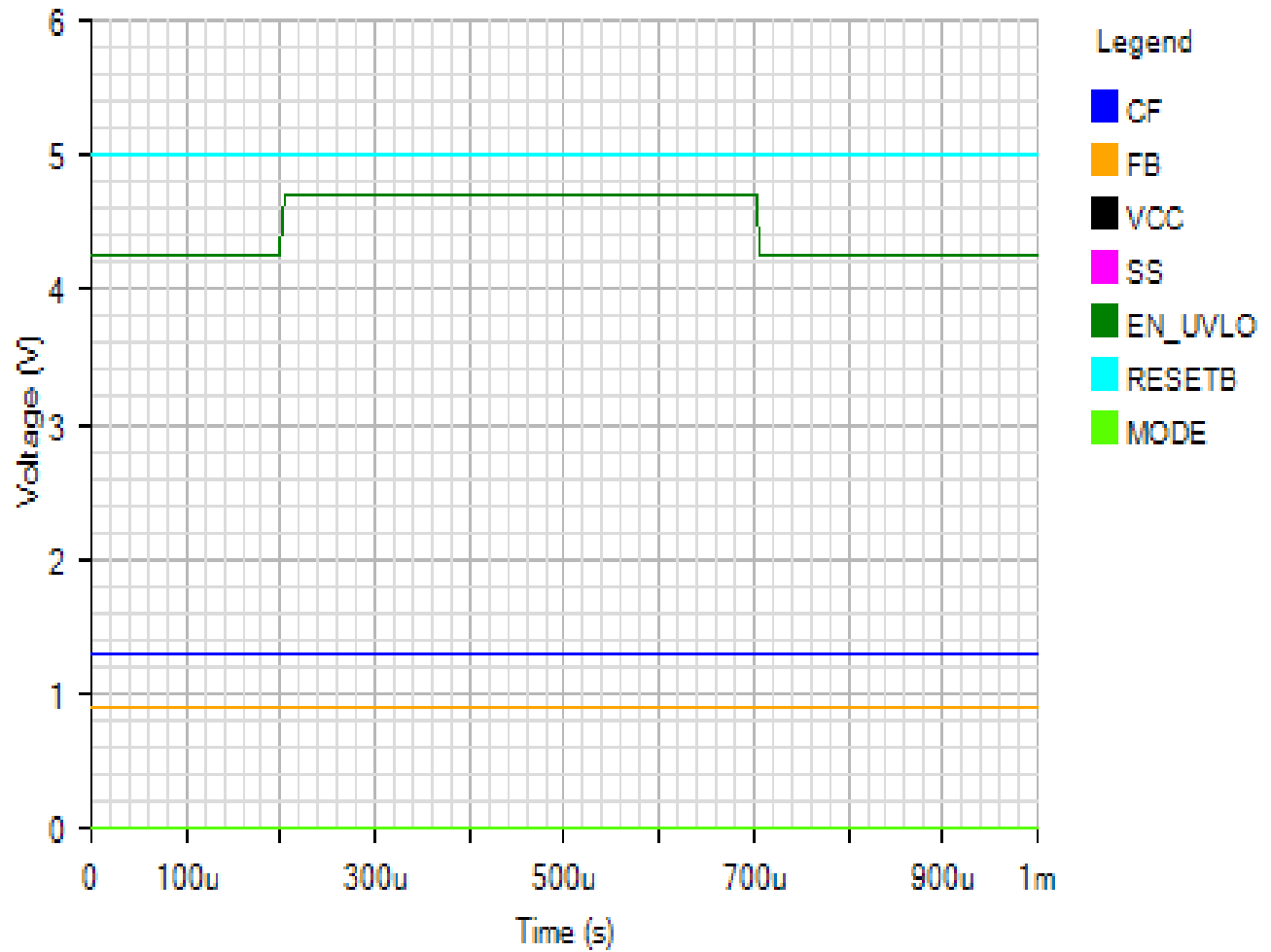
Phase Margin: 66.45° at a crossover frequency of 25.9kHz



Line Transient - Sun Nov 25 2018 20:45:24

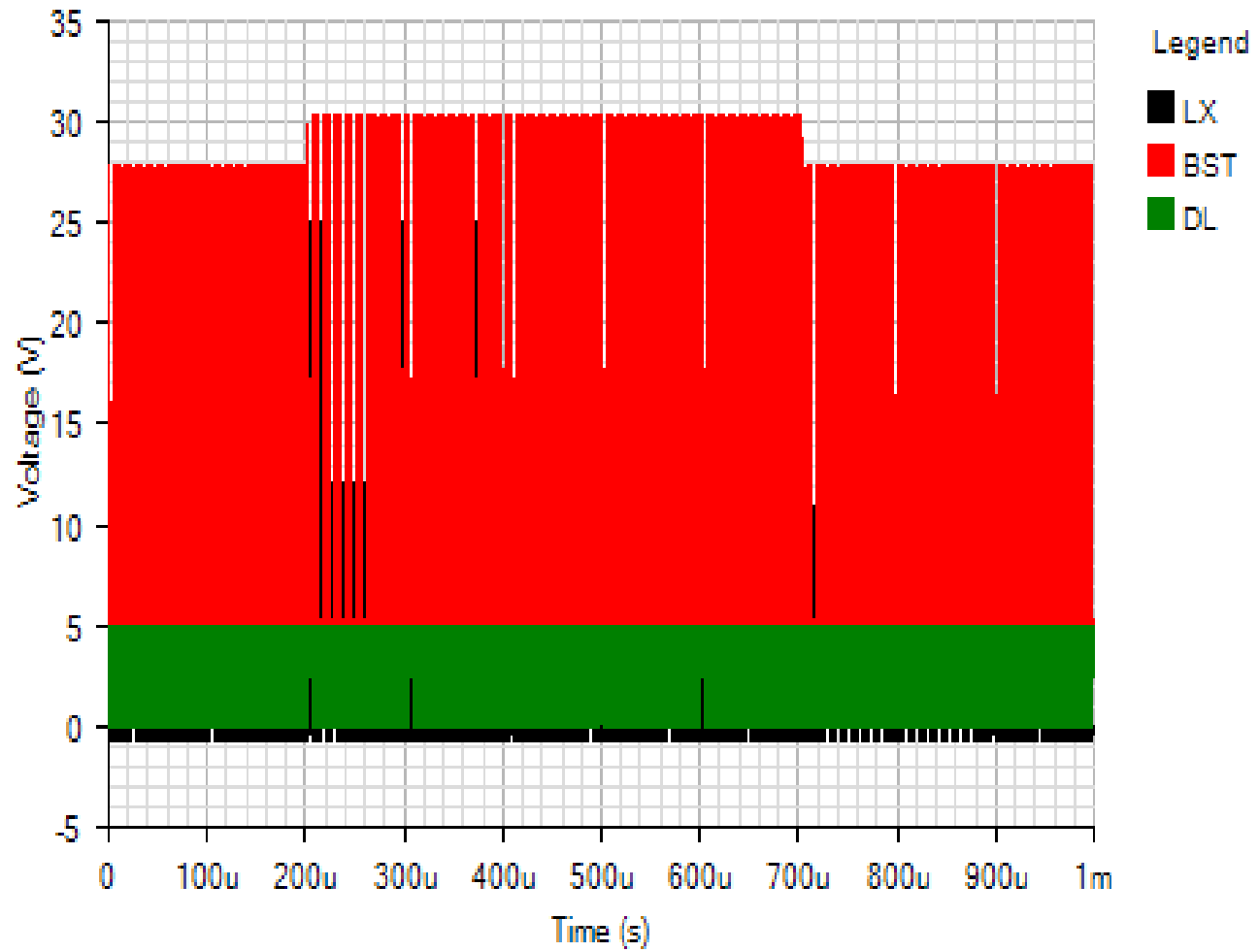
IC

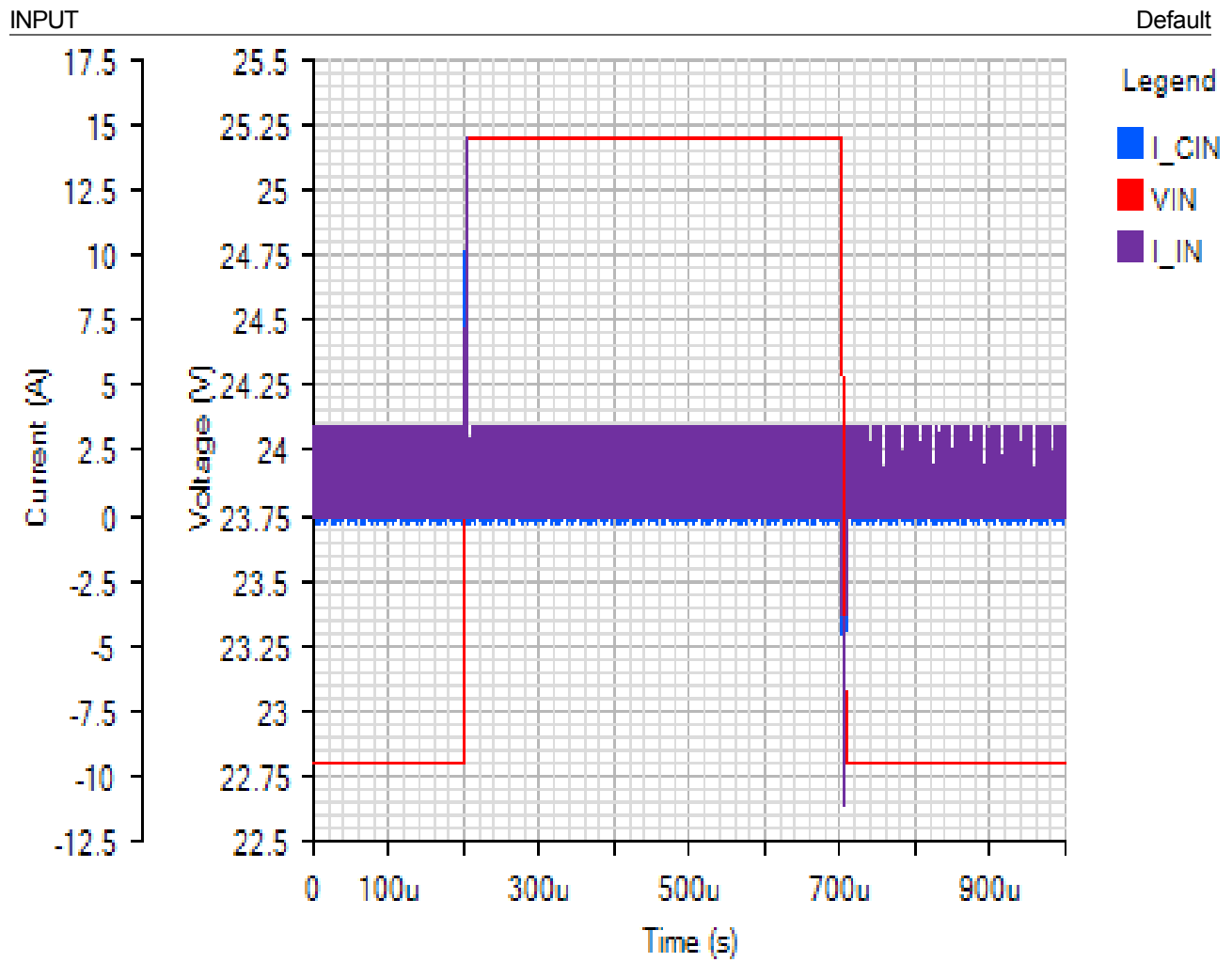
Default



SWITCHING

Default





OUTPUT

Default

