

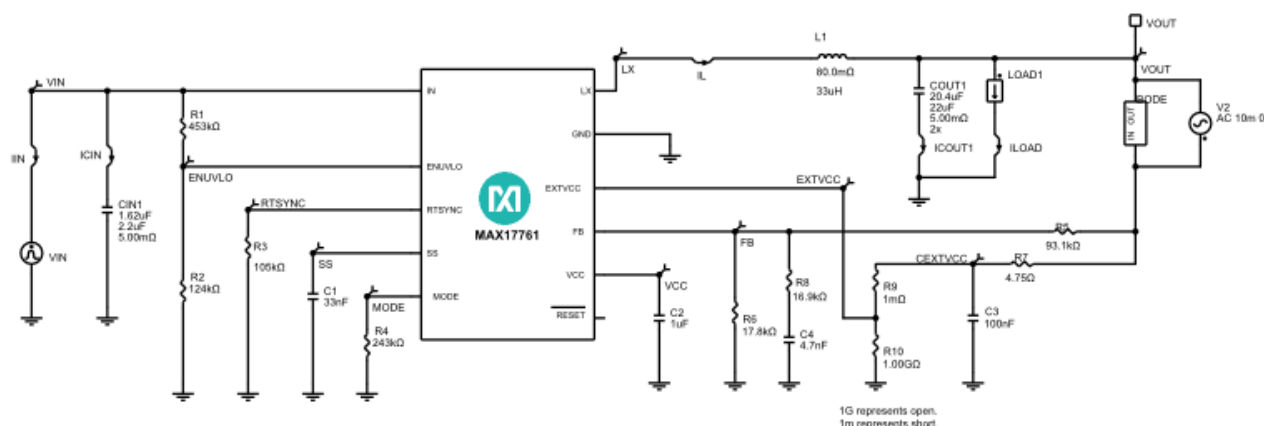
## Initial Design

1.0

**Design Requirements**

Parameter	Value
Minimum Input Voltage	7
Maximum Input Voltage	76
Nominal Input Voltage	24
Input Steady-state Voltage Ripple	1
Input Under Voltage Lockout Level	4.1
Output Voltage	5
Output Current	1
Output Voltage Transient Ripple	3
Load Step	50
Performance Priority	Balance Efficiency and Size
BOM Priority	Cost
Mode of Operation	PWM
Peak Current Limit	1.6
Switching Frequency	400
Ambient Temperature	25
Soft Start Time	5

## Schematic



The MAX17781 employs PFM mode at light loads when this feature is selected. If the starting load current is too low, PFM will occur and the POP analysis will fail. It is difficult to predict across all circuit parameter variations precisely at what load current this will occur. Typically the SIMPLIS feature which runs a short transient simulation when POP fails will allow all but AC simulations to run.

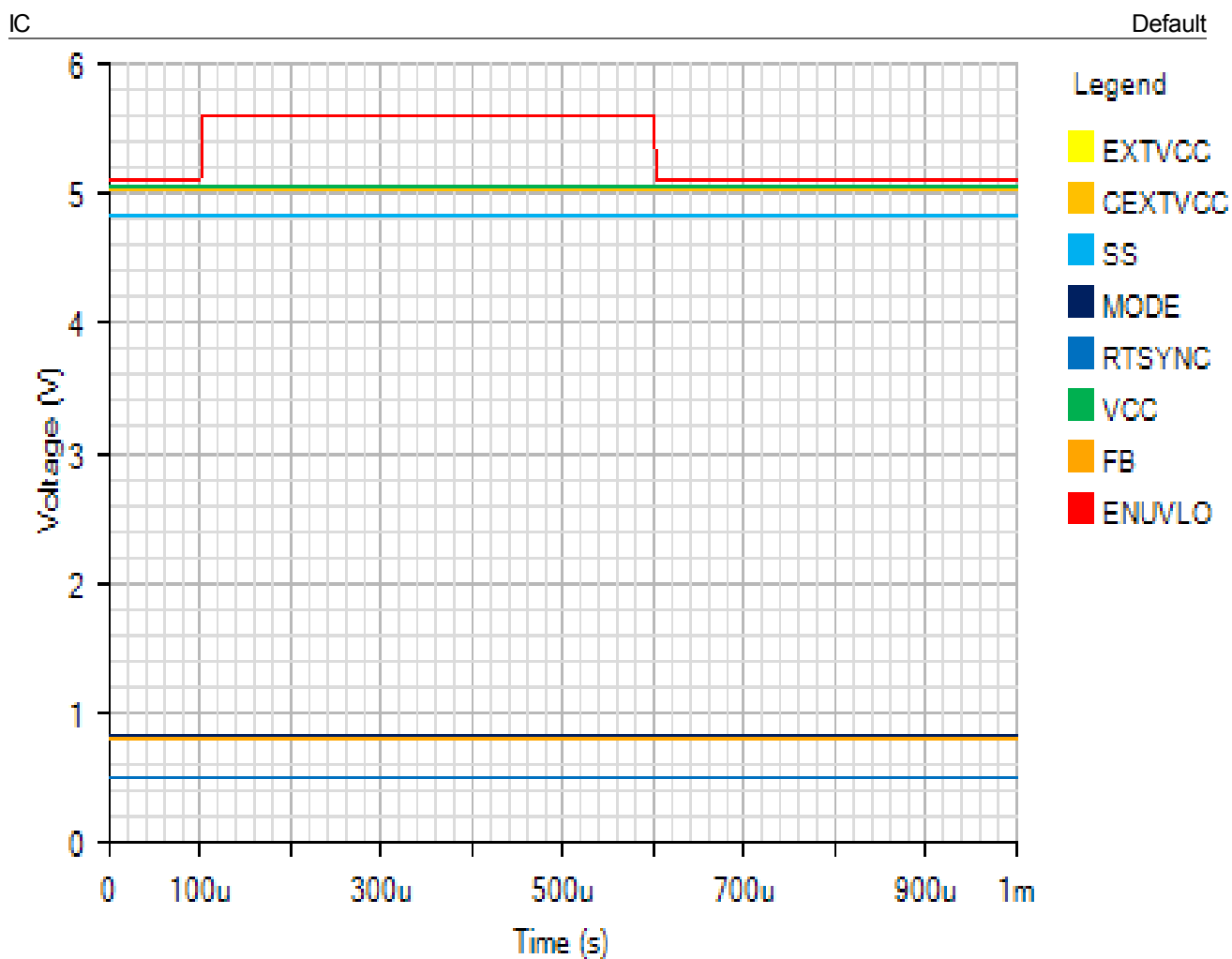
## BOM

Ref	Qty	Part Number	Manufacturer	Description
U1	1	MAX17761	User-Defined	IC
C1	1x	0402ZC333MAT2A	AVX	Cap Ceramic 0.033uF 10V X7R 20% Pad SMD 0402 125°C T/R
C2	1x	CC0603KRX7R6BB105	Yageo	Cap Ceramic 1uF 10V X7R 10% Pad SMD 0603 125°C T/R
C3	1x	C0402C104M4RACTU	KEMET Corporation	Cap Ceramic 0.1uF 16V X7R 20% Pad SMD 0402 125°C T/R
C4	1	UMK105B7472MVHF	Taiyo Yuden	Cap Ceramic 0.0047uF 50V X7R 20% Pad SMD 0402 125°C Automotive T/R
CIN1	1	C1210C225K1RAC	Kemet	Cap Ceramic 2.2uF 100V X7R 10% SMD 1210 125C Bulk
COUT1	2	GRM32ER71E226ME15	Murata	Cap Ceramic 22uF 25V 1210 125C
L1	1	DR0810-333L	Coilcraft	Inductor 33uH 10% 72mOhm 3.5A Isat 3.9A Irms
R1	1	CRG1210-U-4533FT	Venkel	Res Thick Film 1210 453K Ohm 1% 0.33W(1/3W) ±100ppm/°C Pad SMD T/R
R2	1	CRG0402-P-1243FT	Venkel	Res Thick Film 0402 124K Ohm 1% 0.063W(1/16W) ±100ppm/°C Pad SMD T/R
R3	1	CRG0402-P-1053FT	Venkel	Res Thick Film 0402 105K Ohm 1% 0.063W(1/16W) ±100ppm/°C Pad SMD T/R
R4	1	CRG0402-P-2433FT	Venkel	Res Thick Film 0402 243K Ohm 1% 0.063W(1/16W) ±100ppm/°C Pad SMD T/R
R5	1	NTR04F9312CTRF	NIC Components	Res Thin Film 0402 93.1K Ohm 1% 0.063W(1/16W) ±25ppm/°C Pad SMD T/R

R6	1	CRG0402-P-1782FT	Venkel	Res Thick Film 0402 17.8K Ohm 1% 0.063W(1/16W) ±100ppm/°C Pad SMD T/R
R7	1	CRG0402-P-4R75FT	Venkel	Res Thick Film 0402 4.75 Ohm 1% 0.063W(1/16W) -300ppm/°C to 500ppm/°C Pad SMD T/R
R8	1	TFCR0402-16W-E-1692FT	Venkel	Res Thin Film 0402 16.9K Ohm 1% 0.063W(1/16W) ±25ppm/°C Pad SMD T/R

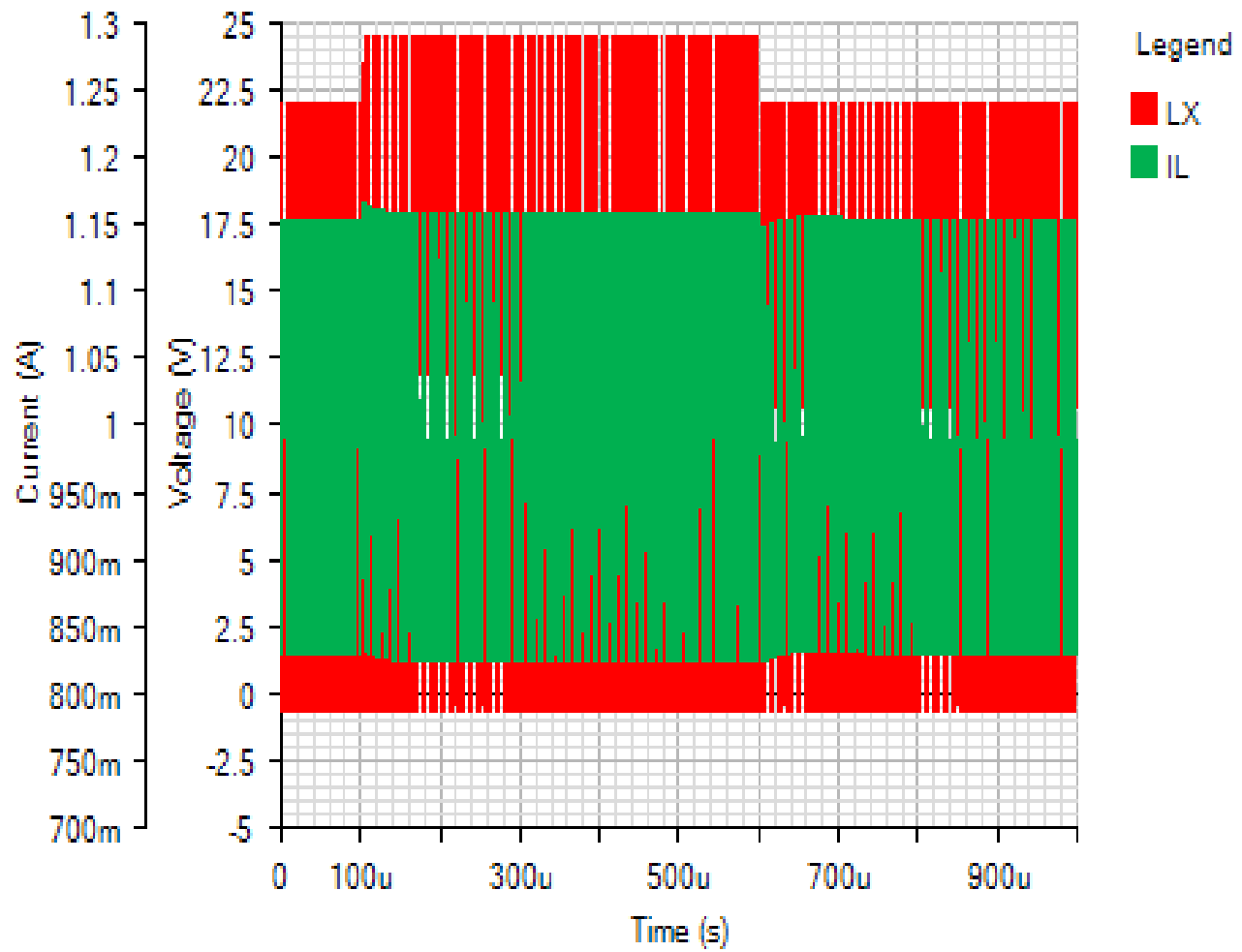
## Simulation Results

### Line Transient - Tue Nov 20 2018 13:38:51



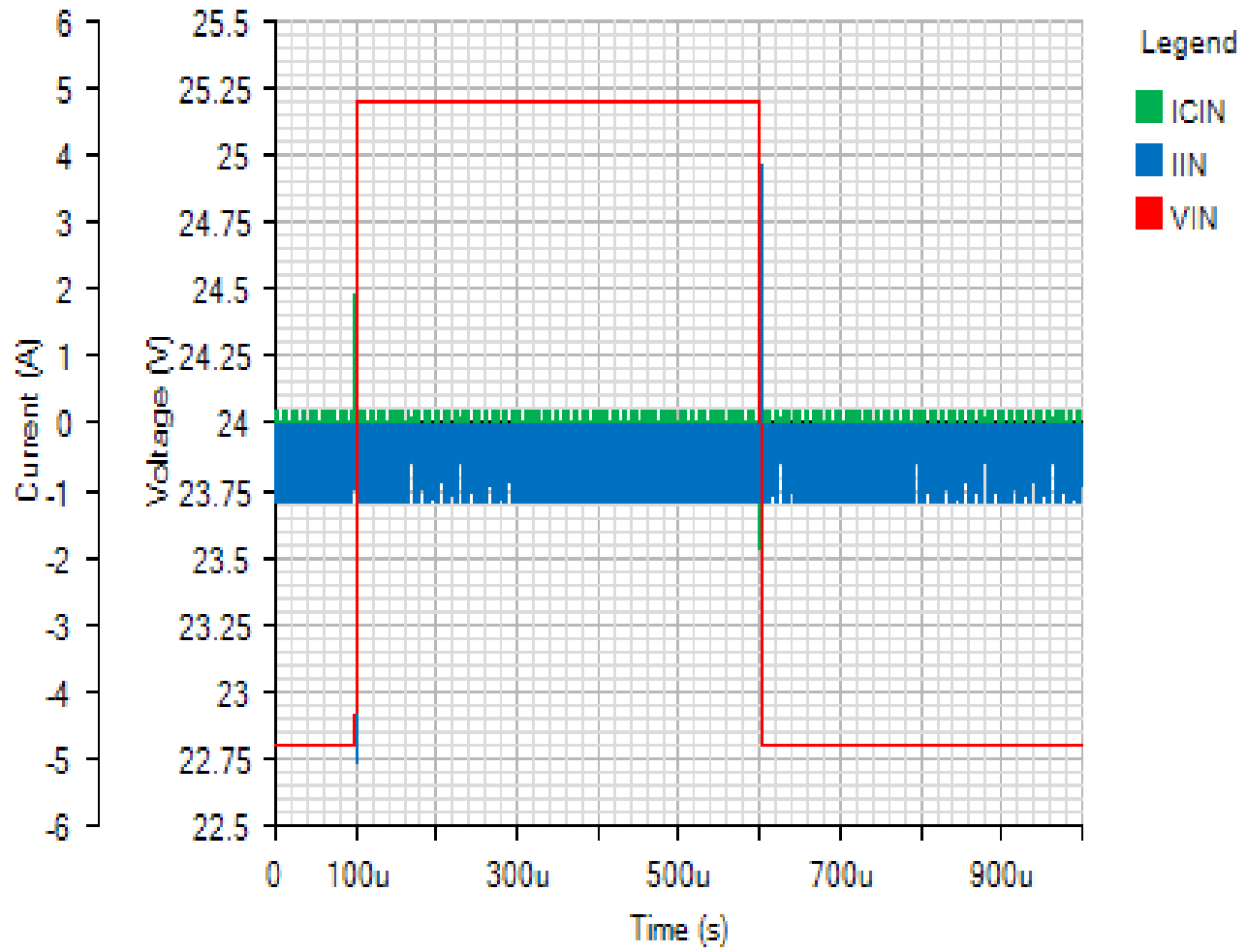
SWITCHING

Default



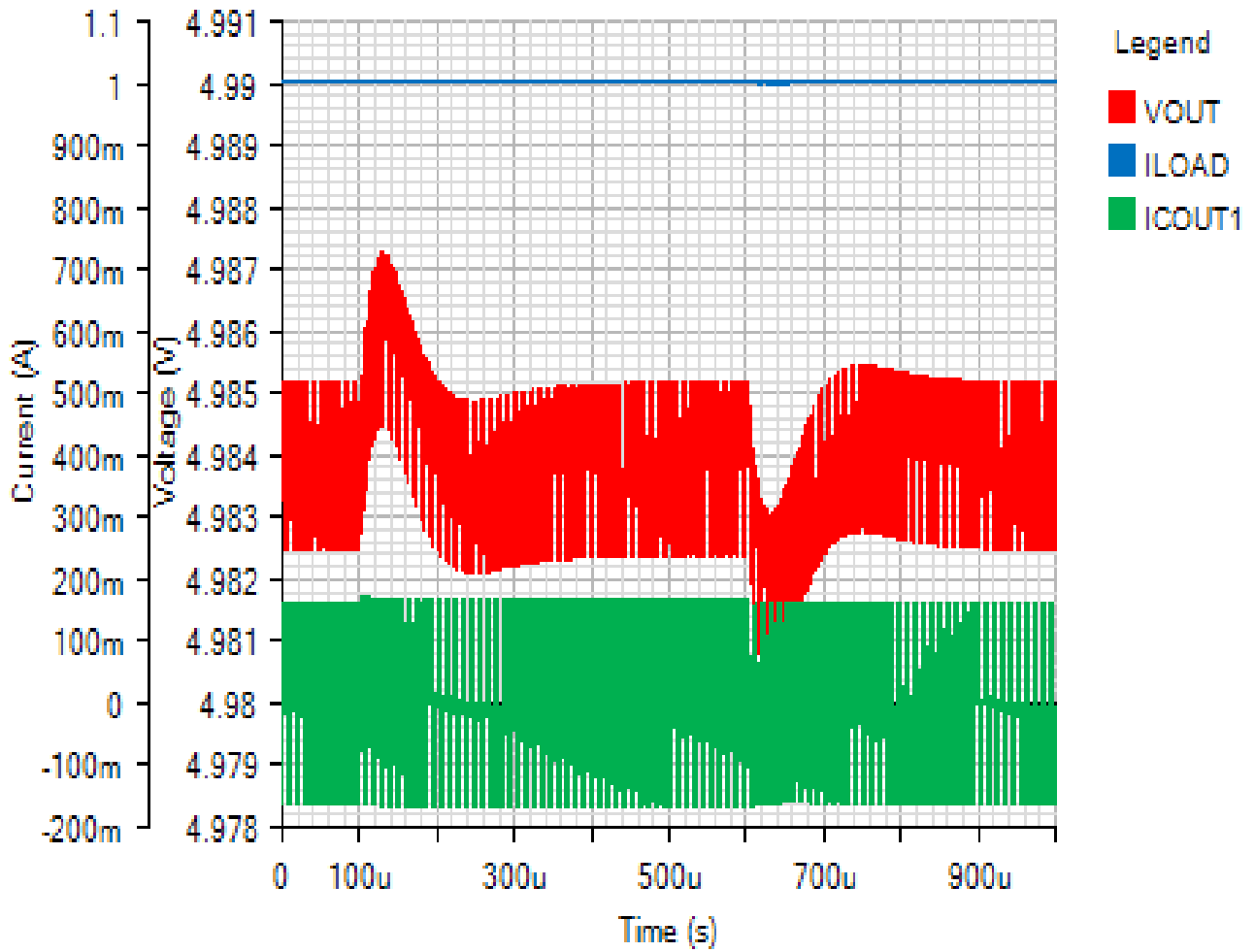
INPUT

Default



OUTPUT

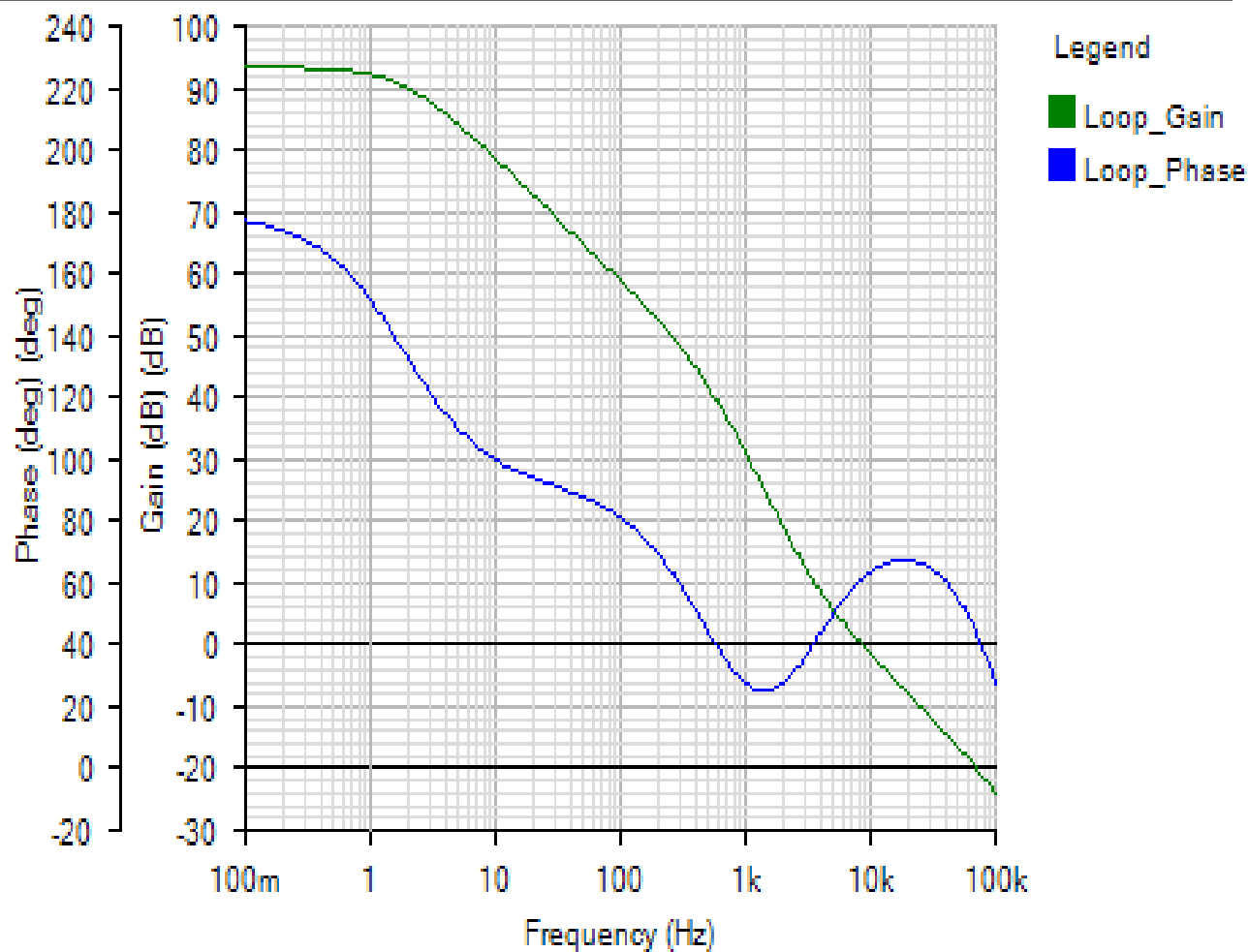
Default



AC Loop - Tue Nov 20 2018 13:38:51

BODE

Default



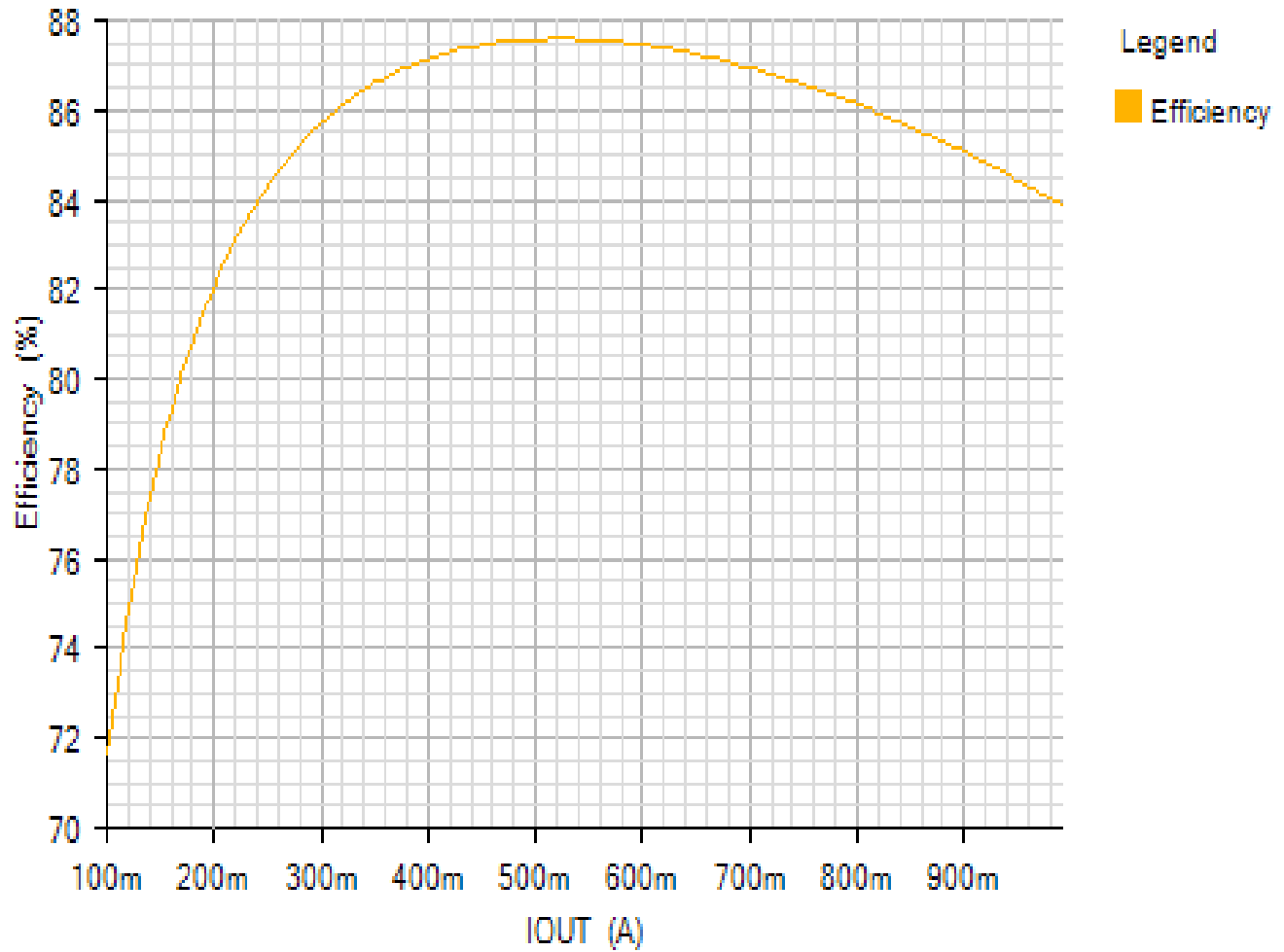
Phase Margin: 61.26° at a crossover frequency of 8.5kHz



Efficiency - Tue Nov 20 2018 13:38:51

EFFICIENCY\_PLOT

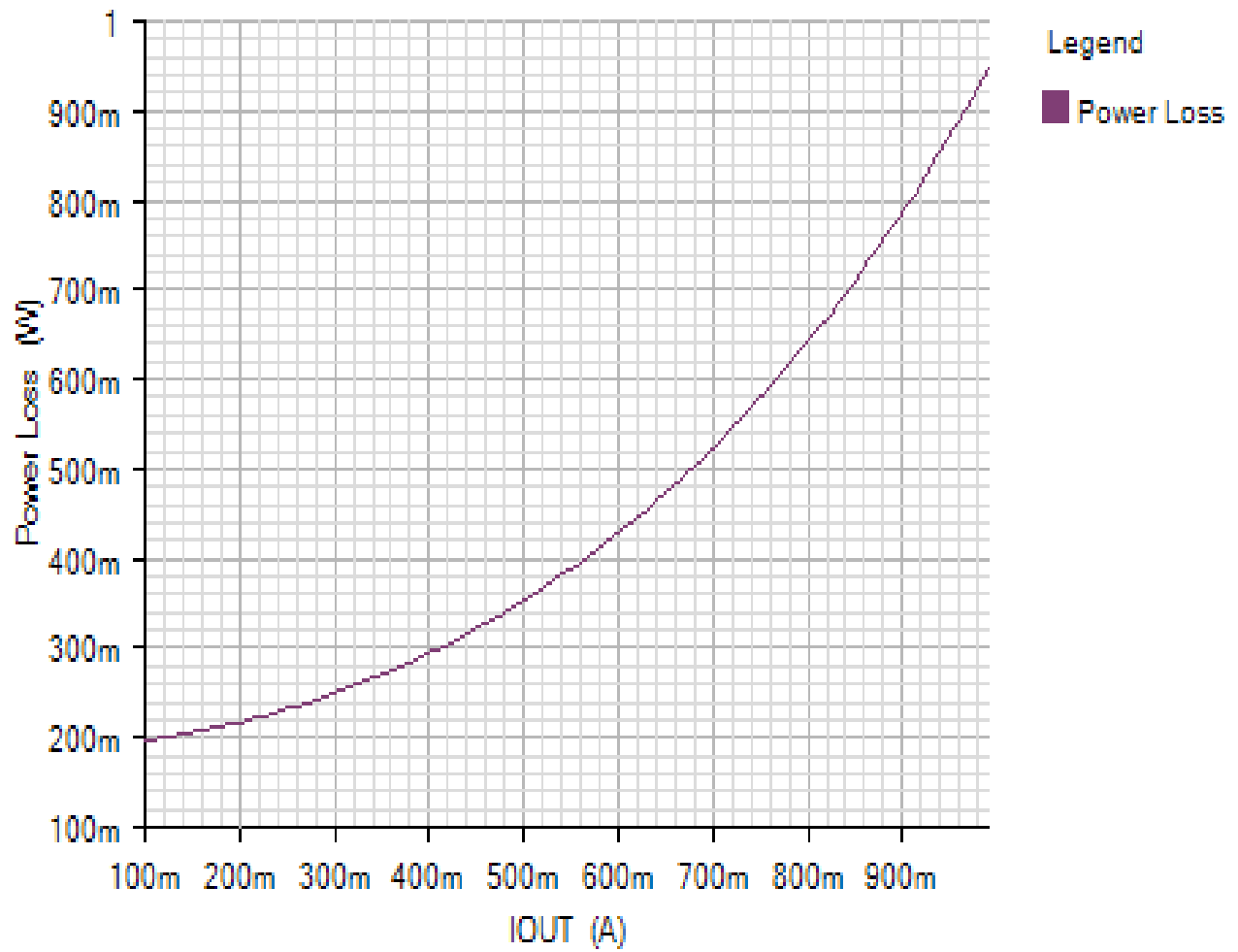
Default





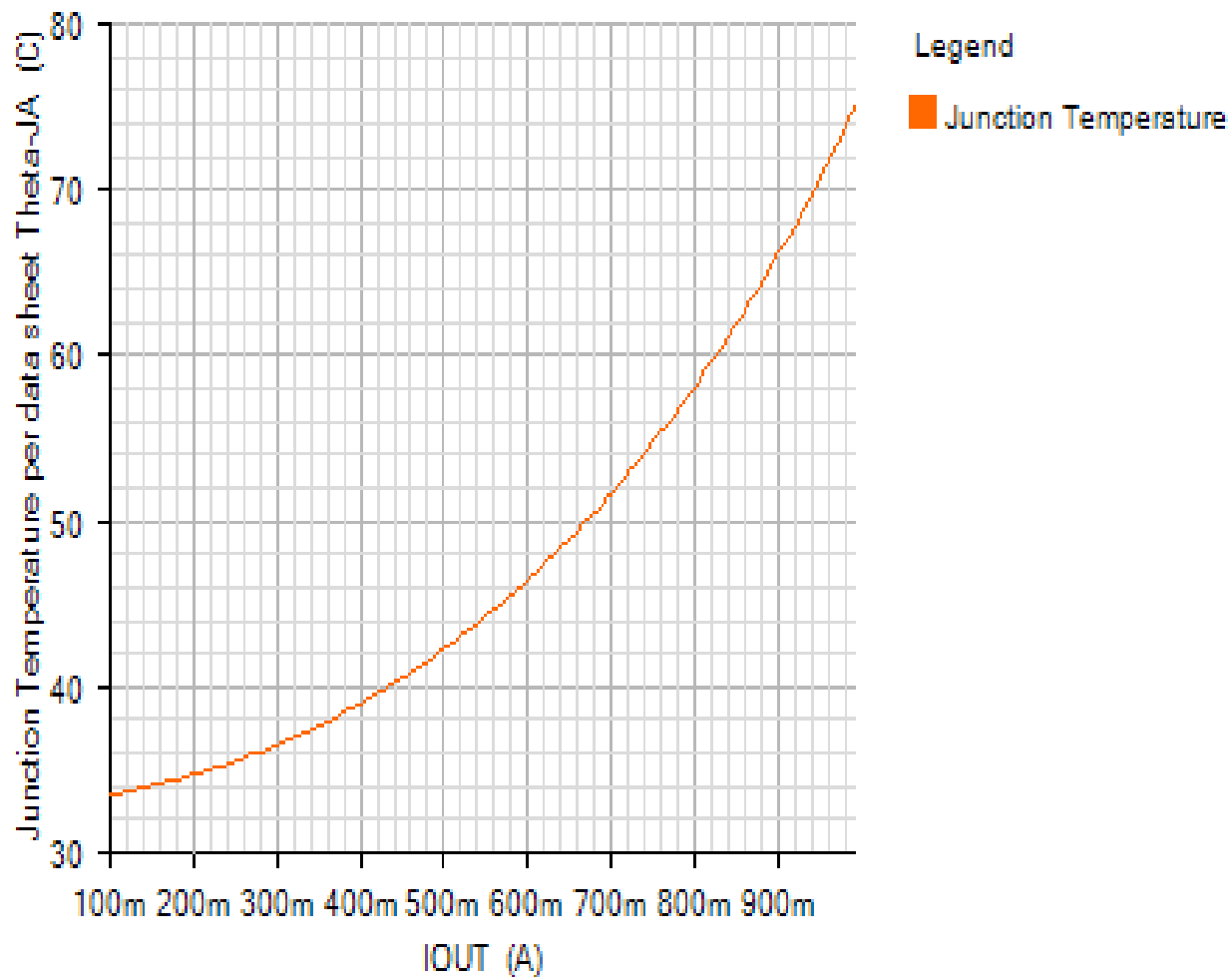
POWER\_LOSS\_PLOT

Default

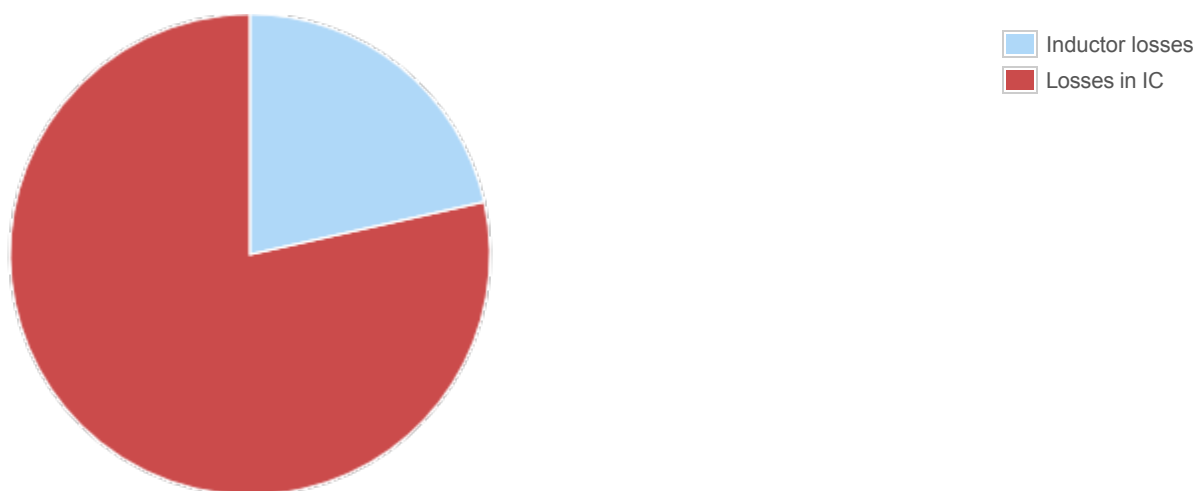


JUNCTION\_TEMPERATURE\_PLOT

Default



Losses



Component

Loss (W)

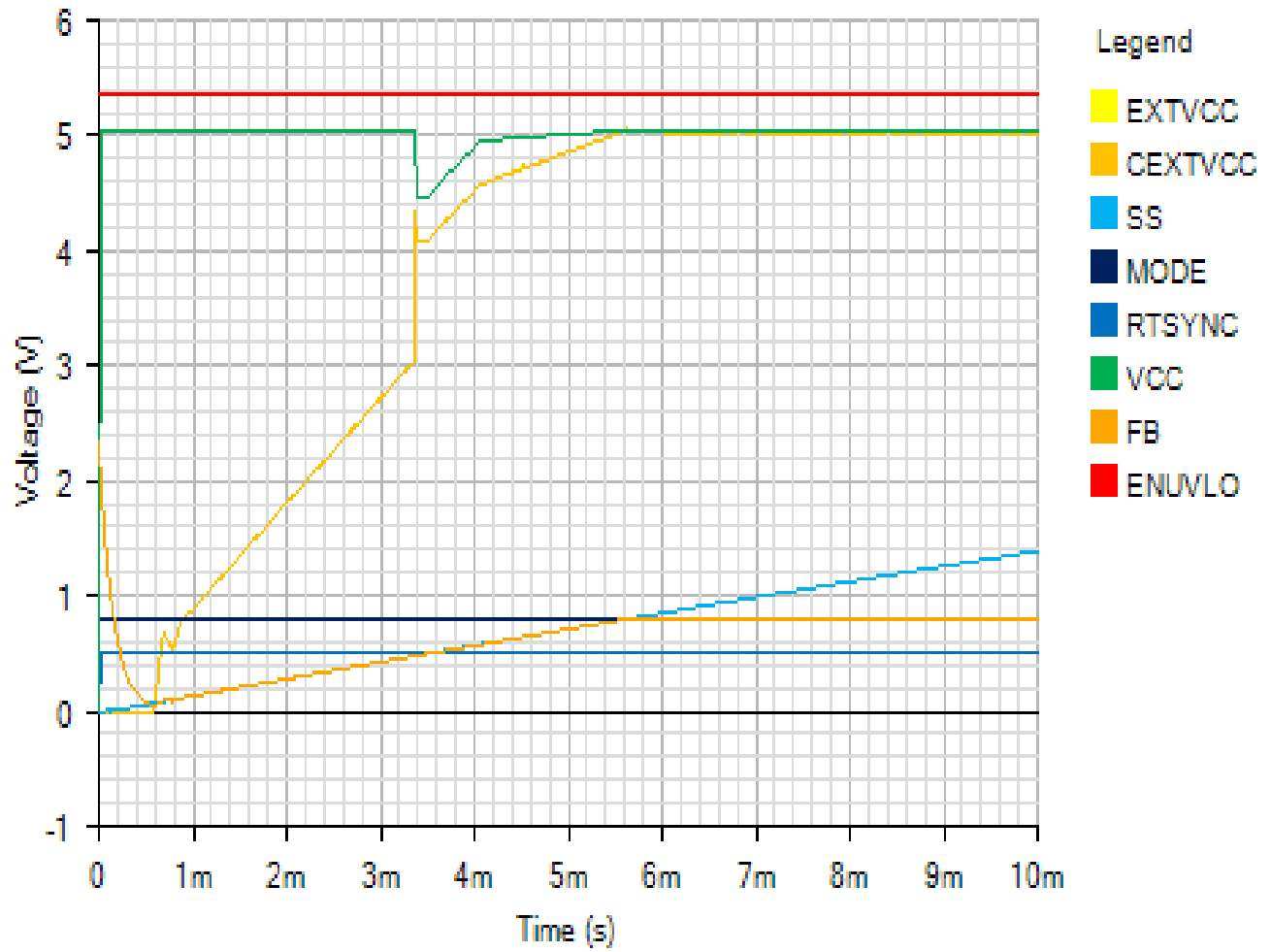
% of total

Component	Loss (W)	% of total
Inductor losses	0.20401	21.5
Losses in IC	0.74529	78.5
Total	0.9493	100

Start Up - Tue Nov 20 2018 13:38:51

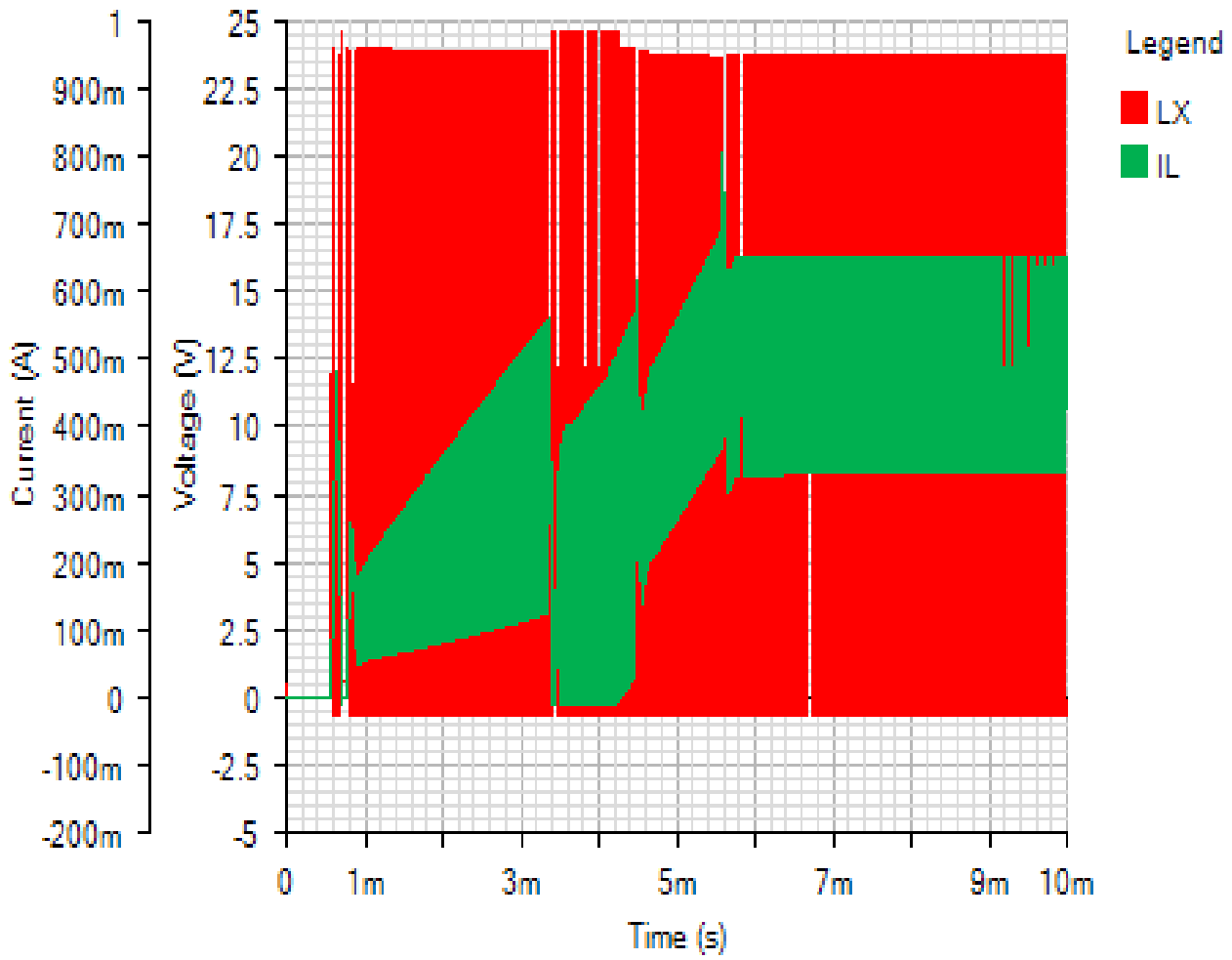
IC

Default



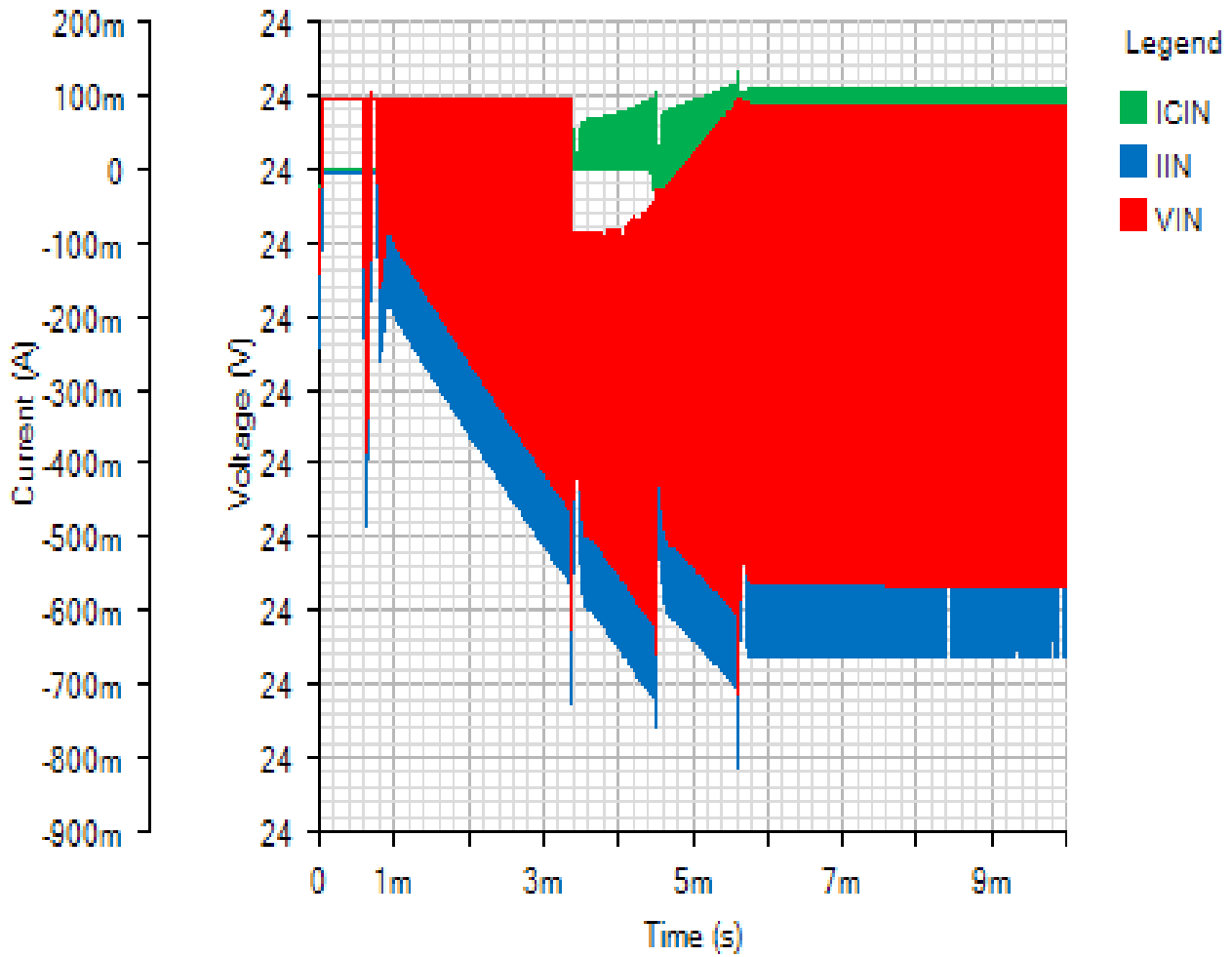
SWITCHING

Default



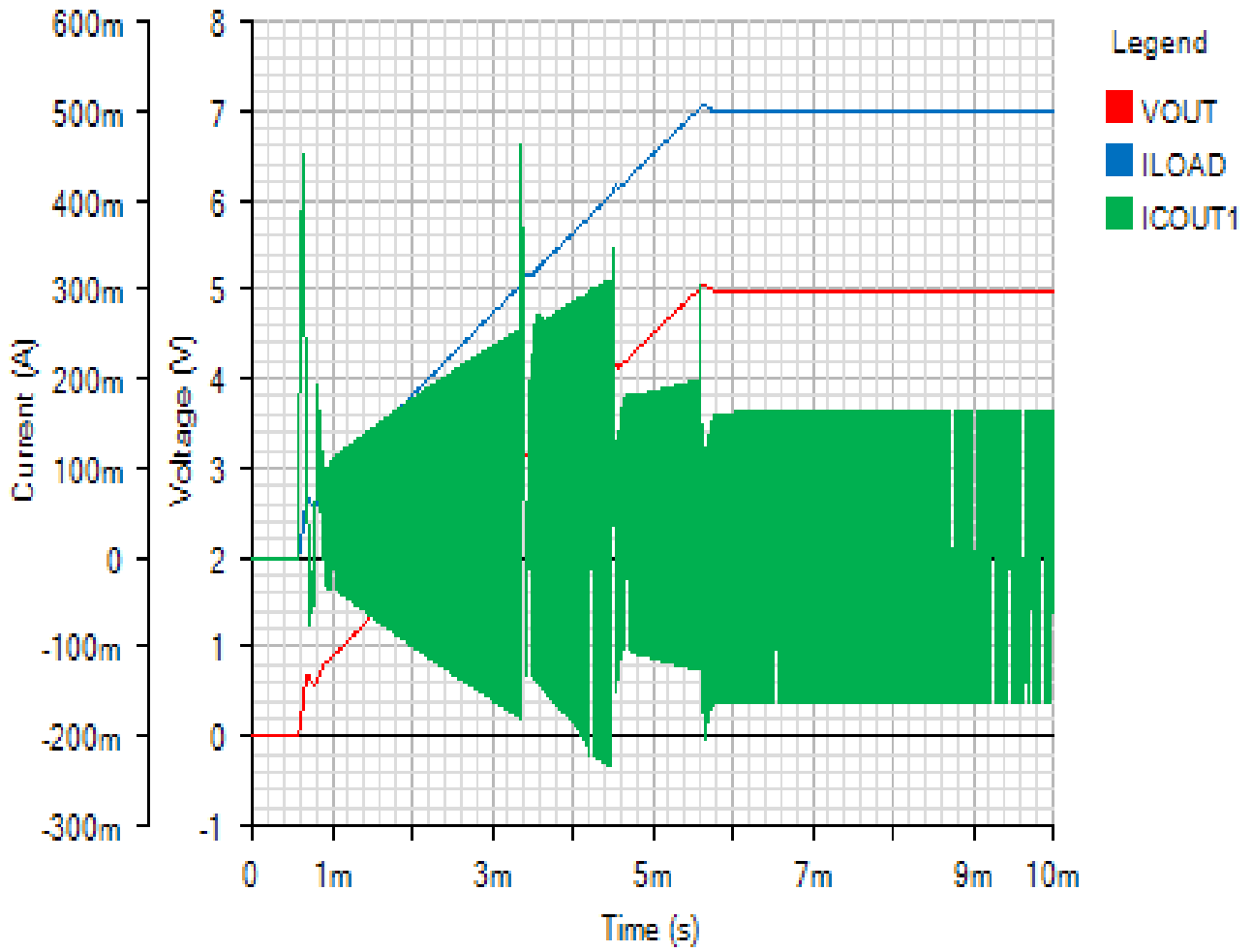
INPUT

Default



OUTPUT

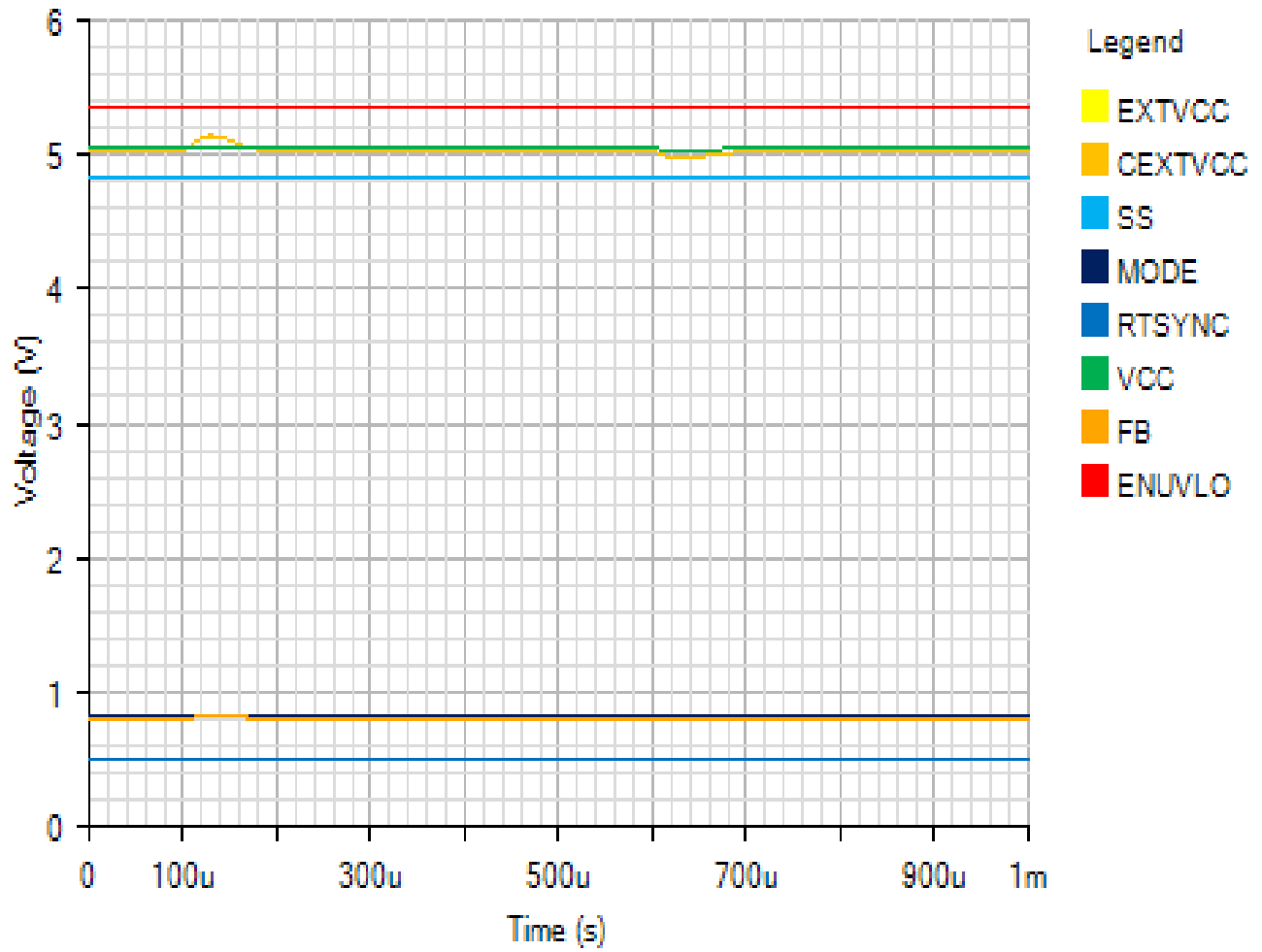
Default



Load Transient - Tue Nov 20 2018 13:38:51

IC

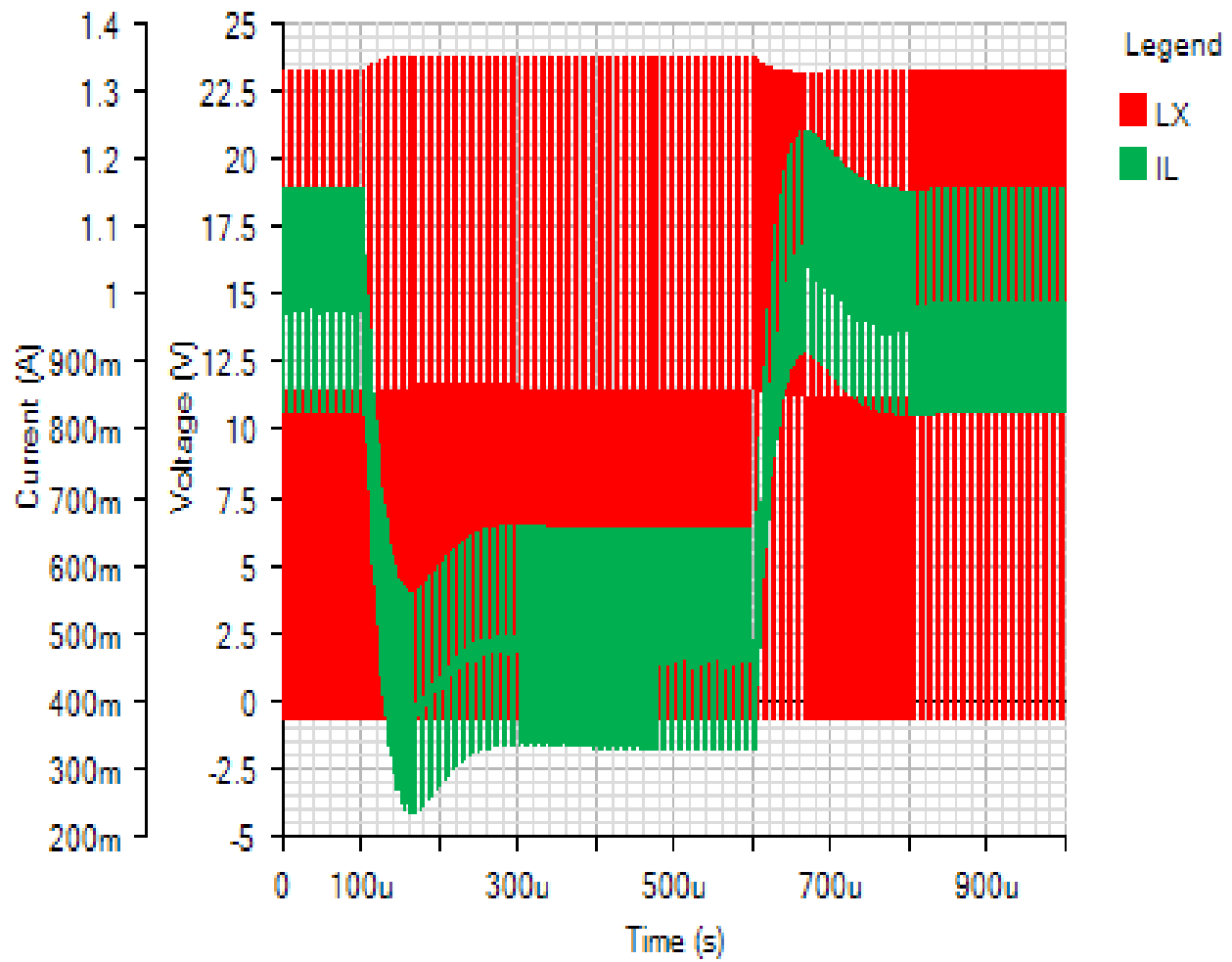
Default





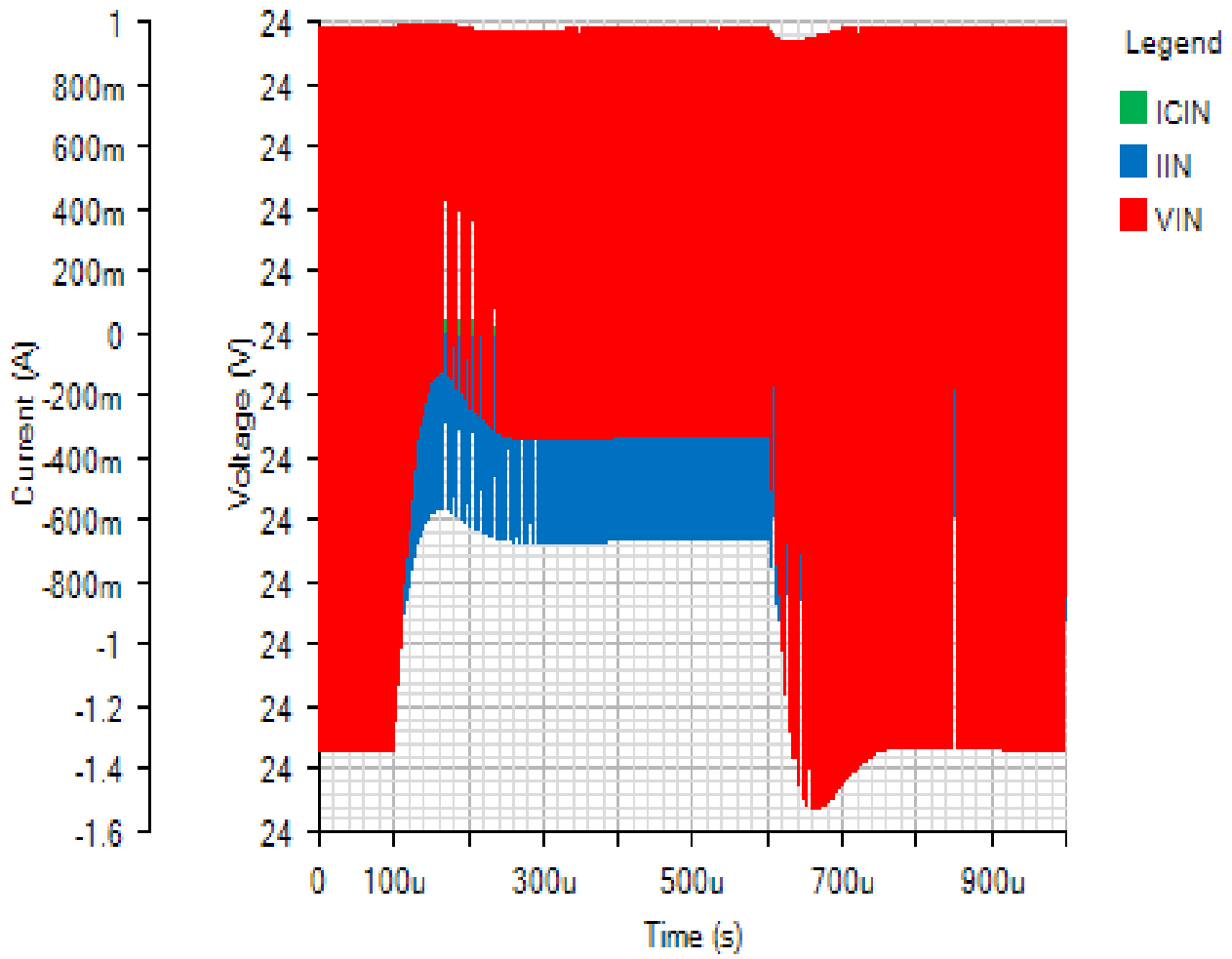
SWITCHING

Default



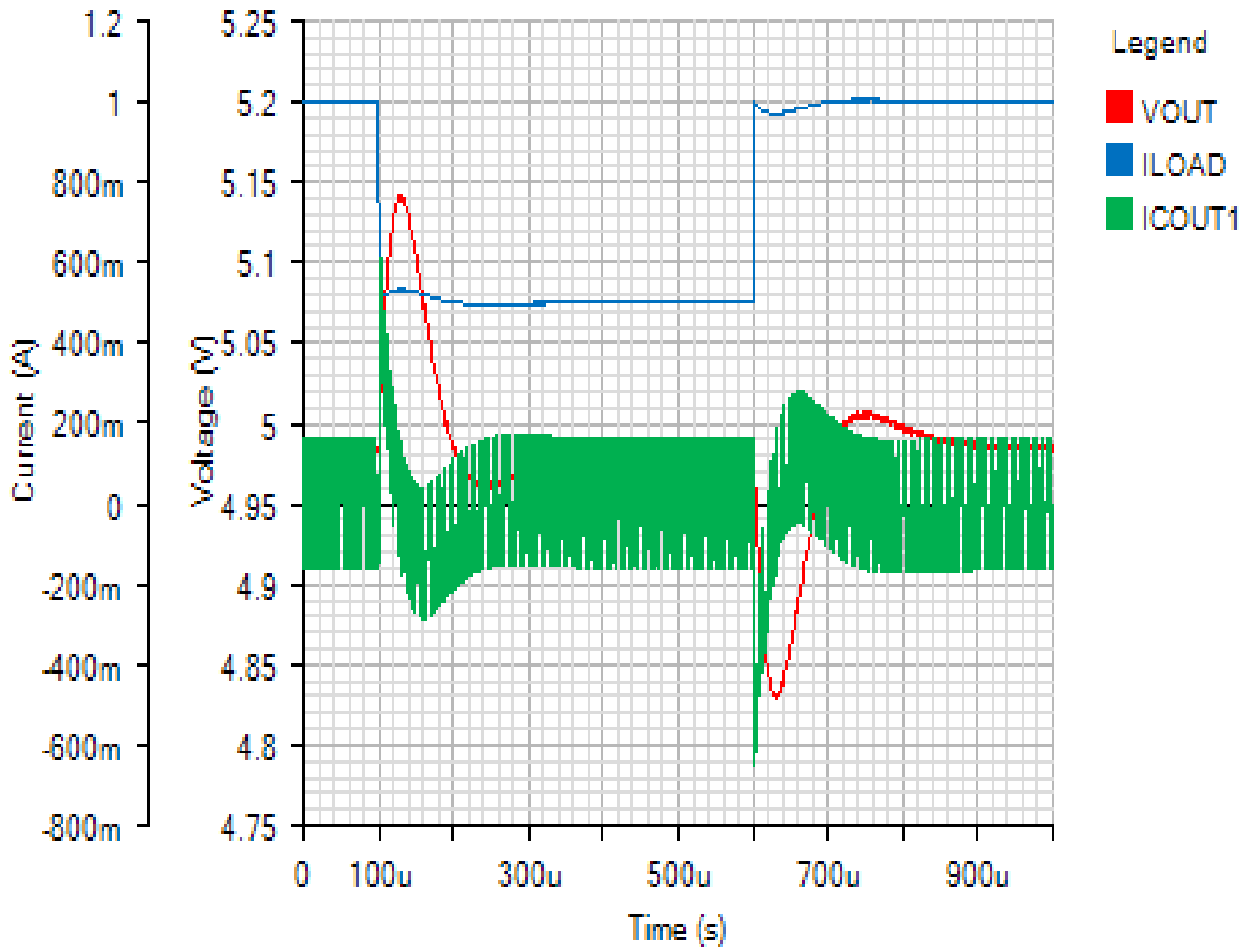
INPUT

Default

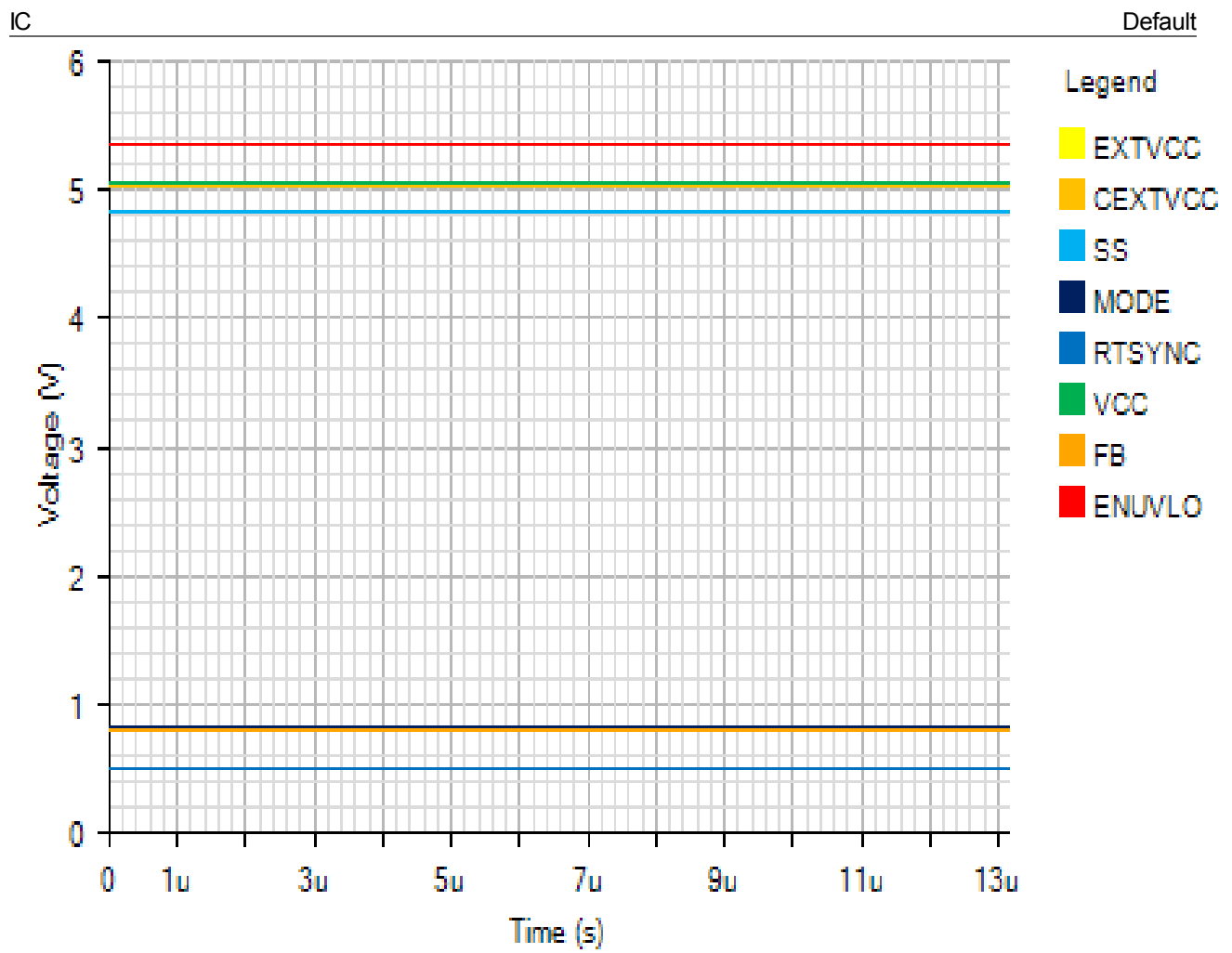


OUTPUT

Default

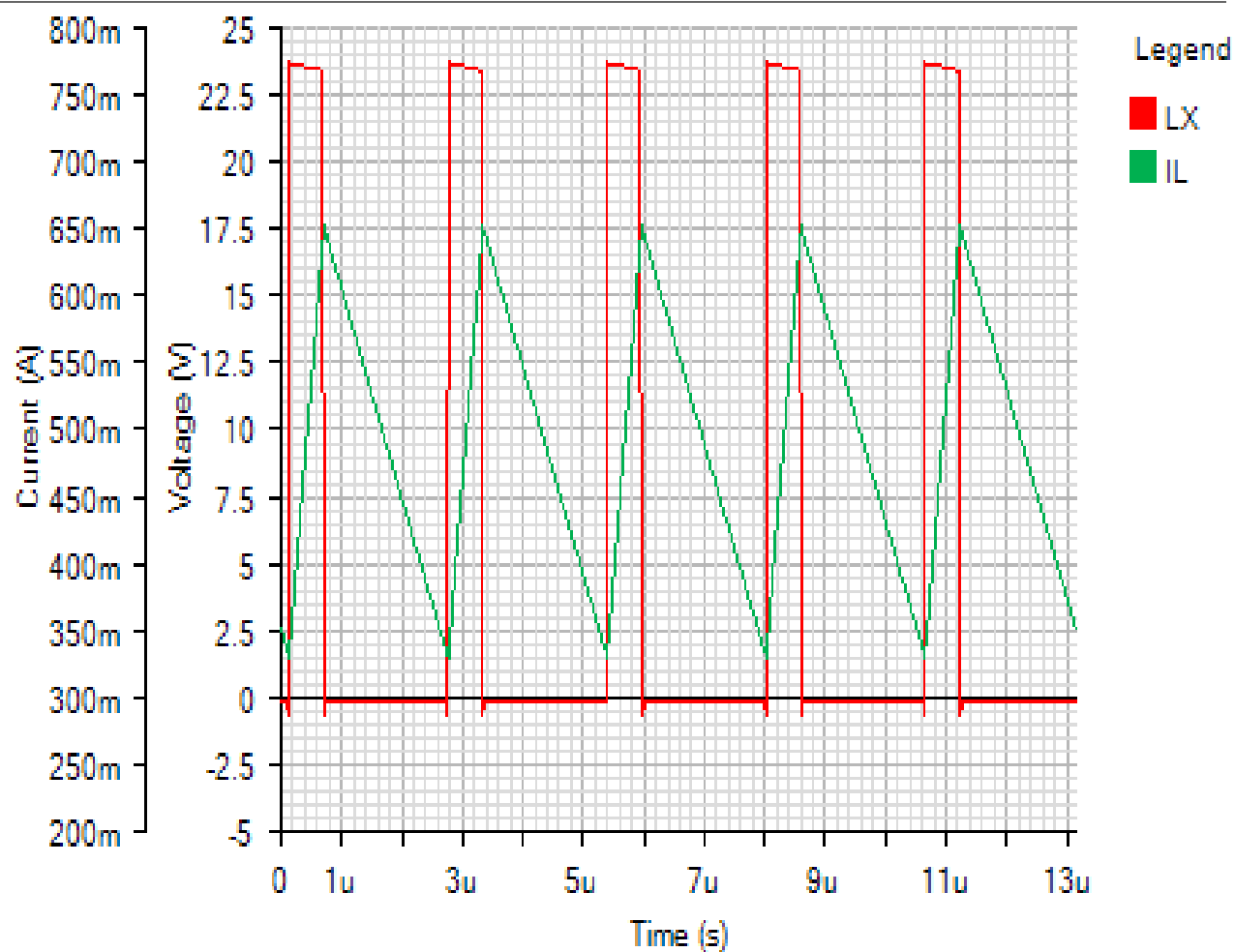


Steady State - Tue Nov 20 2018 13:38:51



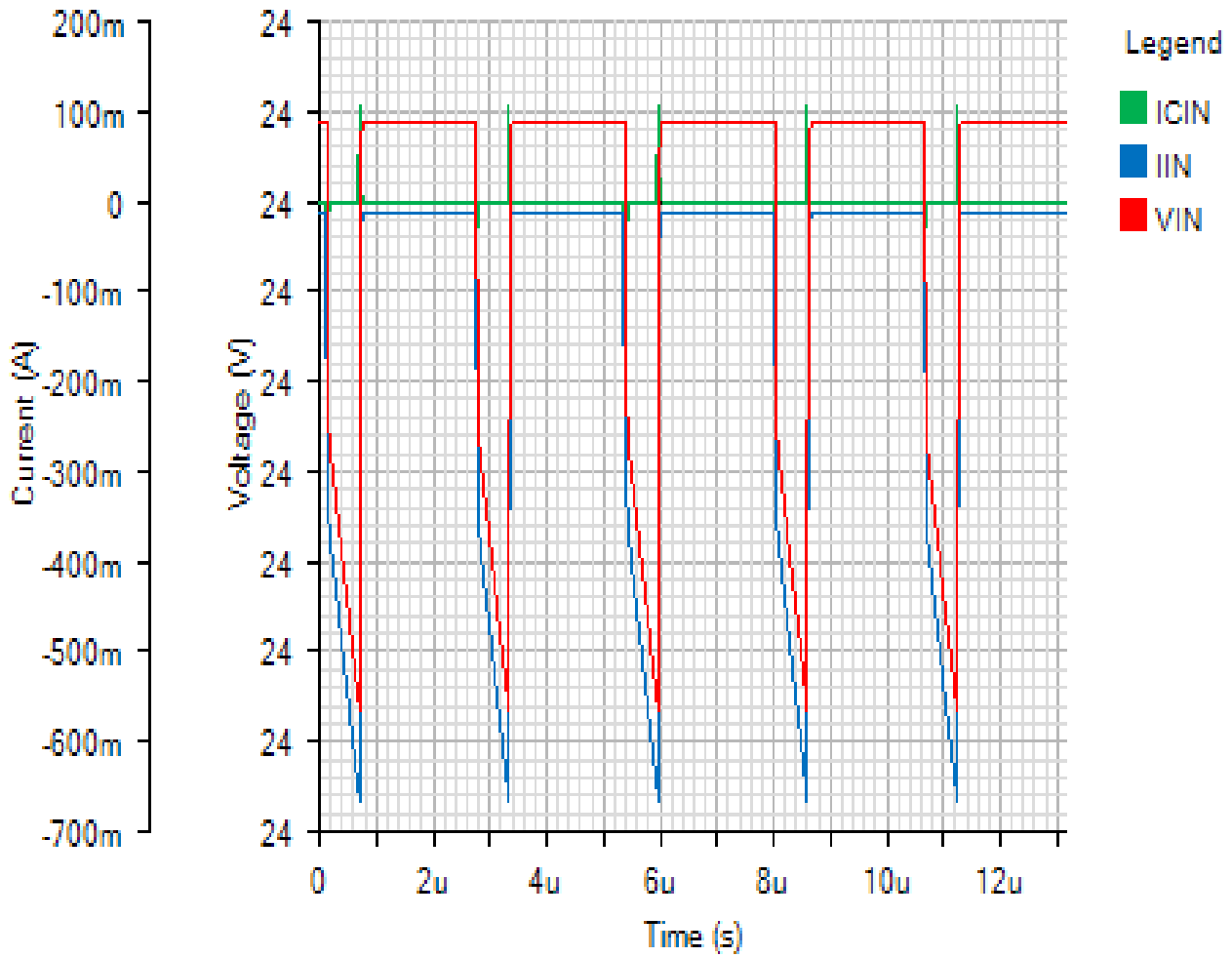
SWITCHING

Default



INPUT

Default



OUTPUT

Default

