

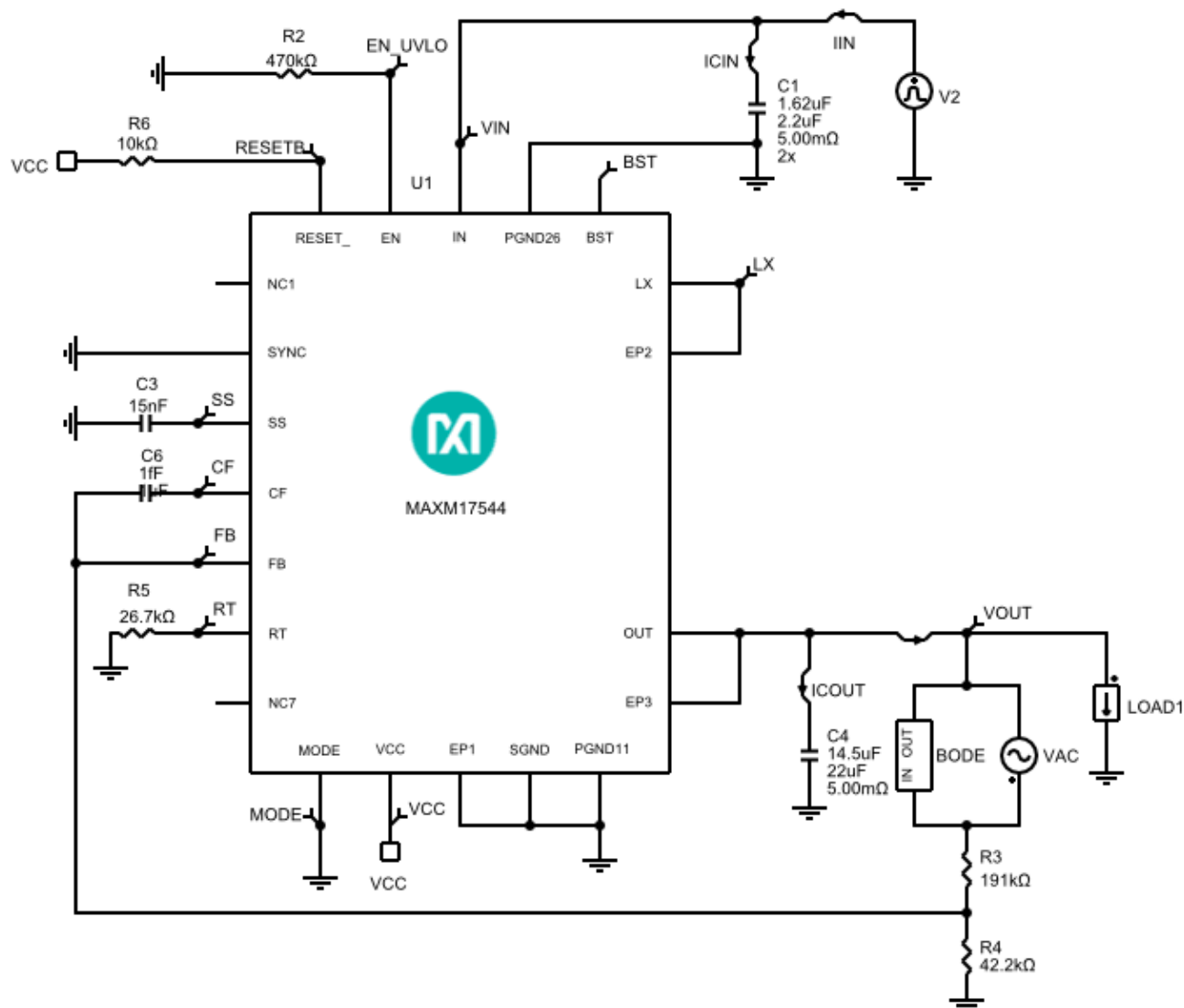
Initial Design

1.0

Design Requirements

Parameter	Value
Minimum Input Voltage	11V
Maximum Input Voltage	42V
Nominal Input Voltage	24V
Input Steady-State Ripple	0.48V
Input Undervoltage Lockout Level	9.9V
Output Voltage	5V
Output Current	3.5A
Output Voltage Load Step Over/Undershoot	0.15V
BOM Priority	Cost
Mode of Operation	PWM
Switching Frequency	500kHz
Soft-start time	3ms
Ambient Temperature	25°C

Schematic



***** Notes *****

- Changing the input or output capacitance value is not recommended. It 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/DCM mode is selected.

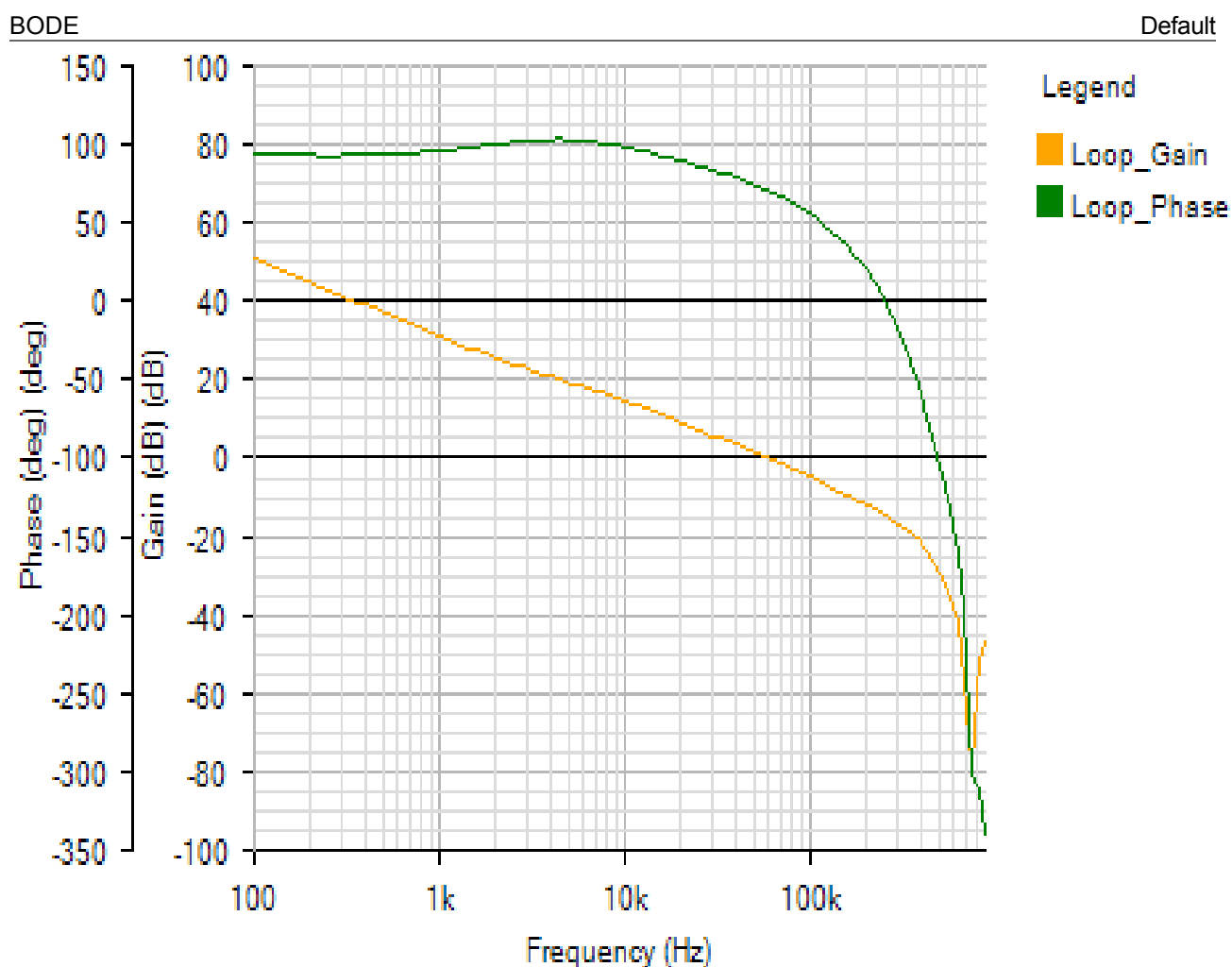
BOM

Ref	Qty	Part Number	Manufacturer	Description
U1	1	MAXM17544ALJ+	Maxim Integrated	4.5-42V, 3.5A, High-Efficiency, DC-DC Step-Down Power Module with Integrated Inductor
C1	2	C1210C225K1RAC	Kemet	Cap Ceramic 2.2uF 100V X7R 10% SMD 1210 125C Bulk
C3	1	CC0402KRX7R8BB153	Yageo	Cap Ceramic 0.015uF 25V X7R 10% Pad SMD 0402 125°C T/R
C4	1	GRM31CR71A226KE15L	Murata	Cap Ceramic 22uF 10V X7R 10% SMD 1206 125C Embossed T/R

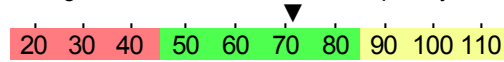
R2	1	ERJ2GEJ474X	Panasonic	Res Thick Film 0402 470K Ohm 5% 0.1W(1/10W) ±200ppm/°C Pad SMD Automotive T/R
R3	1	ERJ2RKF1913X	Panasonic	Res Thick Film 0402 191K Ohm 1% 0.1W(1/10W) ±100ppm/°C Pad SMD Automotive T/R
R4	1	ERJ2RKF4222X	Panasonic	Res Thick Film 0402 42.2K Ohm 1% 0.1W(1/10W) ±100ppm/°C Pad SMD Automotive T/R
R5	1	ERJ2RKF2672X	Panasonic	Res Thick Film 0402 26.7K Ohm 1% 0.1W(1/10W) ±100ppm/°C Pad SMD Automotive T/R
R6	1	ERJ2GEJ103X	Panasonic	Res Thick Film 0402 10K Ohm 5% 0.1W(1/10W) ±200ppm/°C Pad SMD Automotive T/R

Simulation Results

AC Loop - Sun Nov 25 2018 20:18:27



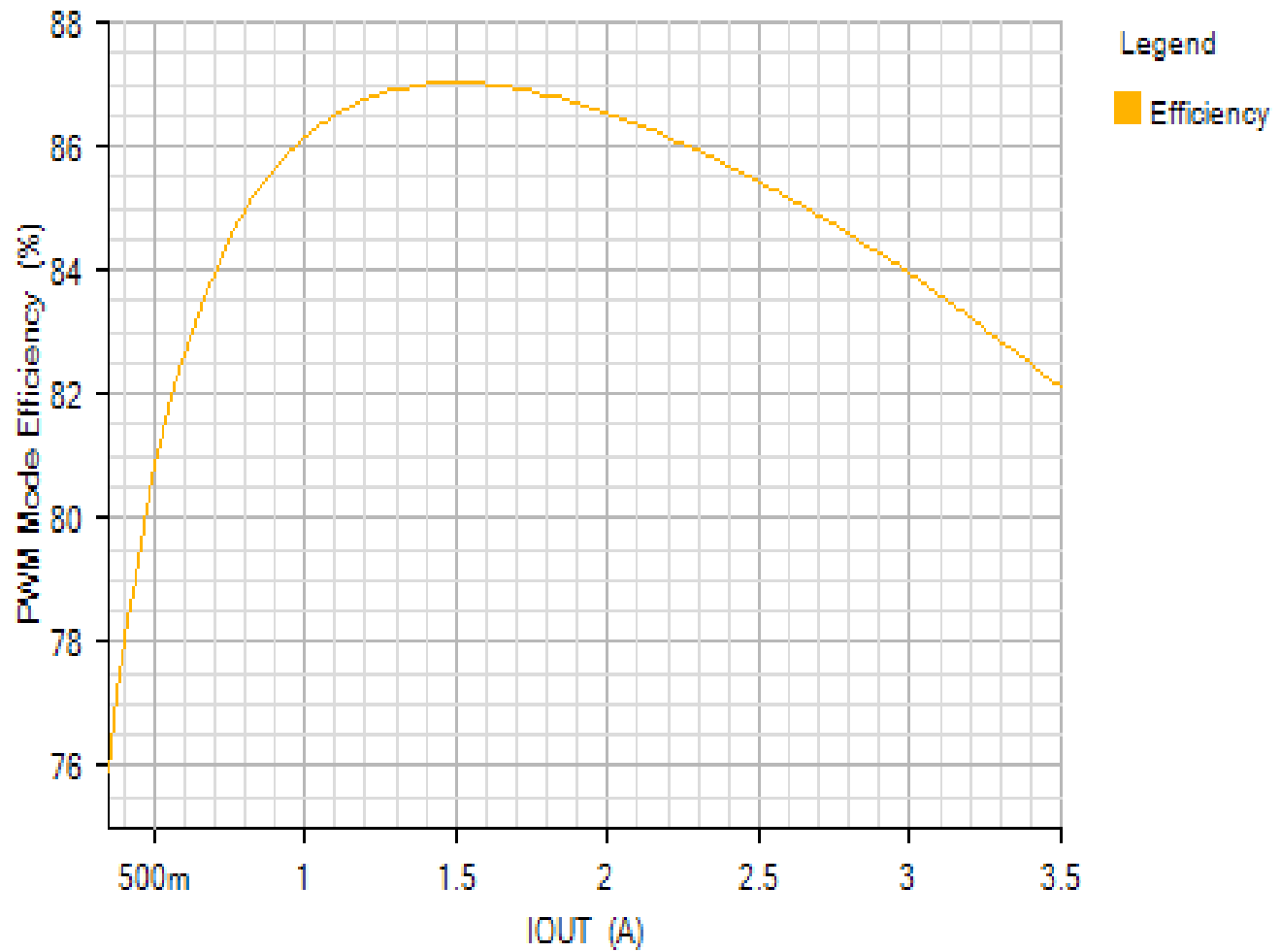
Phase Margin: 71.59° at a crossover frequency of 58.7kHz



Efficiency - Sun Nov 25 2018 20:18:27

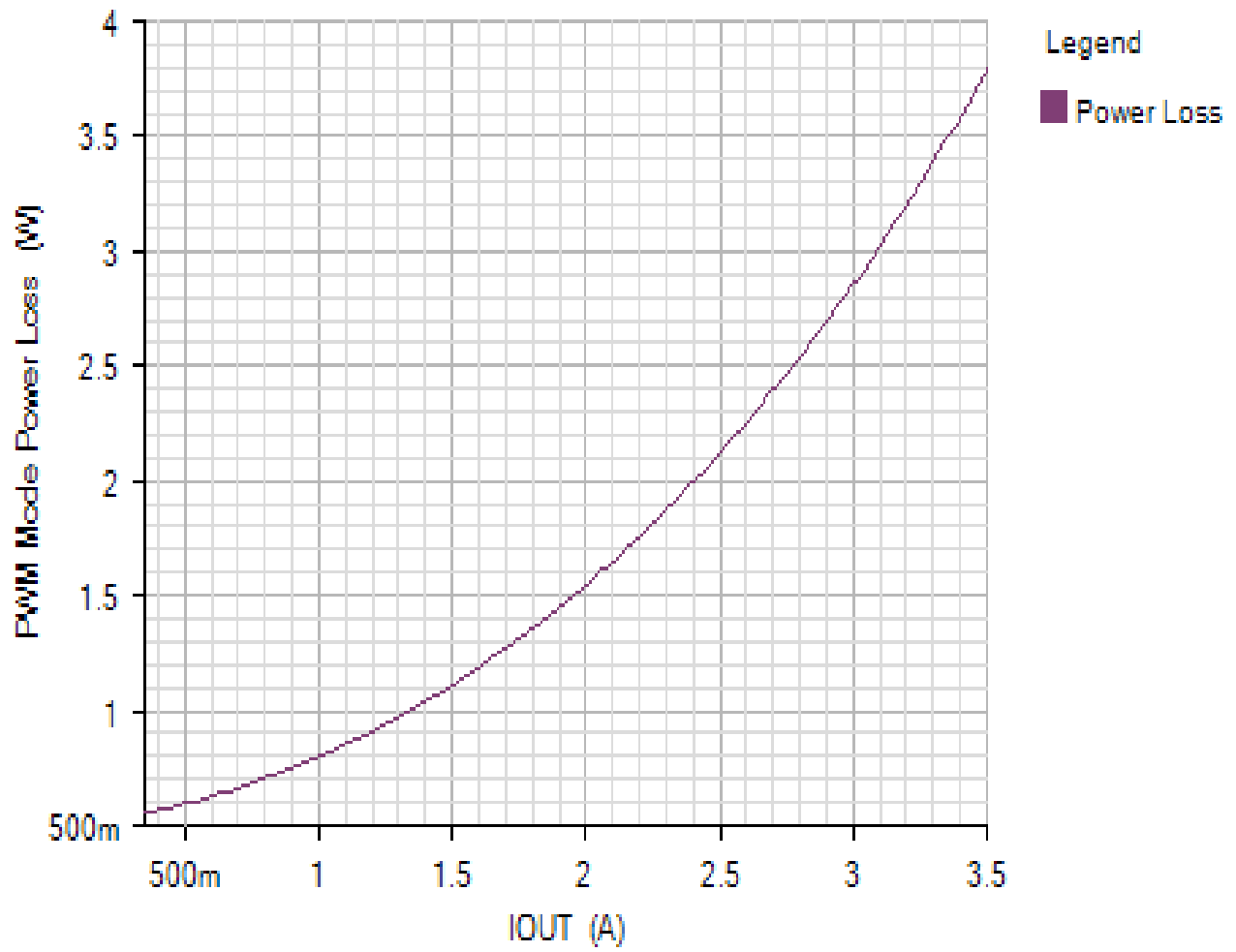
EFFICIENCY_PLOT

Default



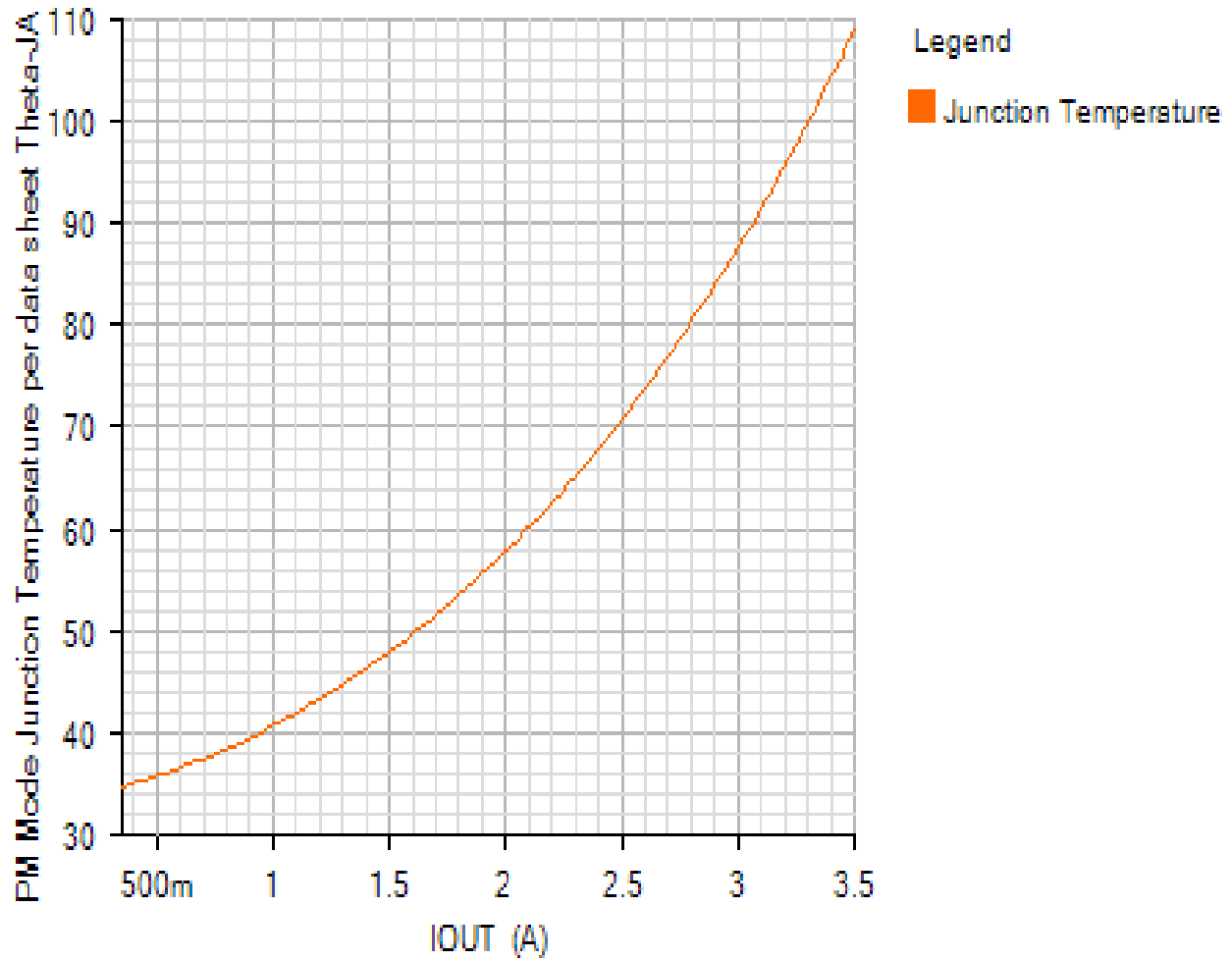
POWER_LOSS_PLOT

Default

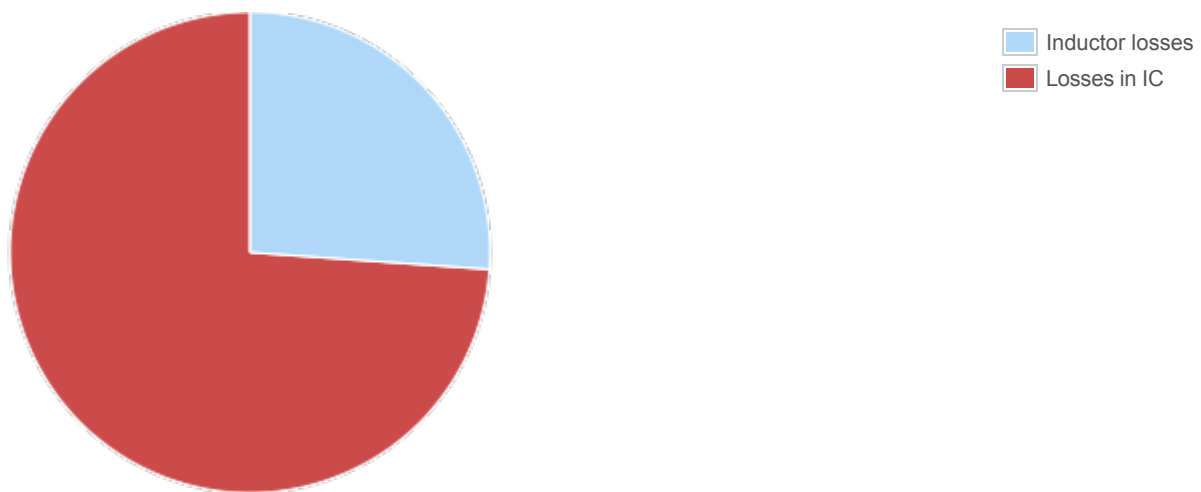


JUNCTION_TEMPERATURE_PLOT

Default



Losses



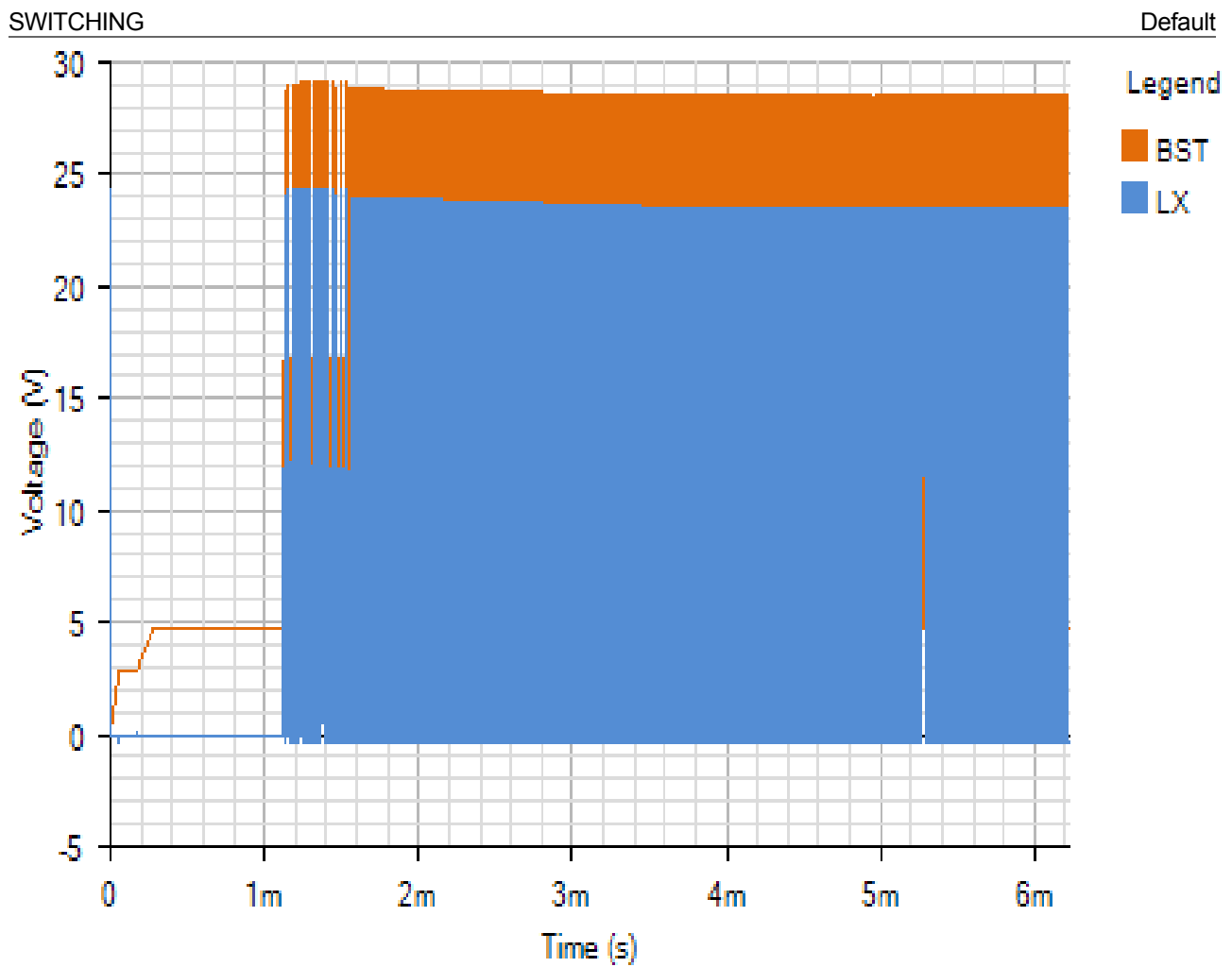
Component

Loss (W)

% of total

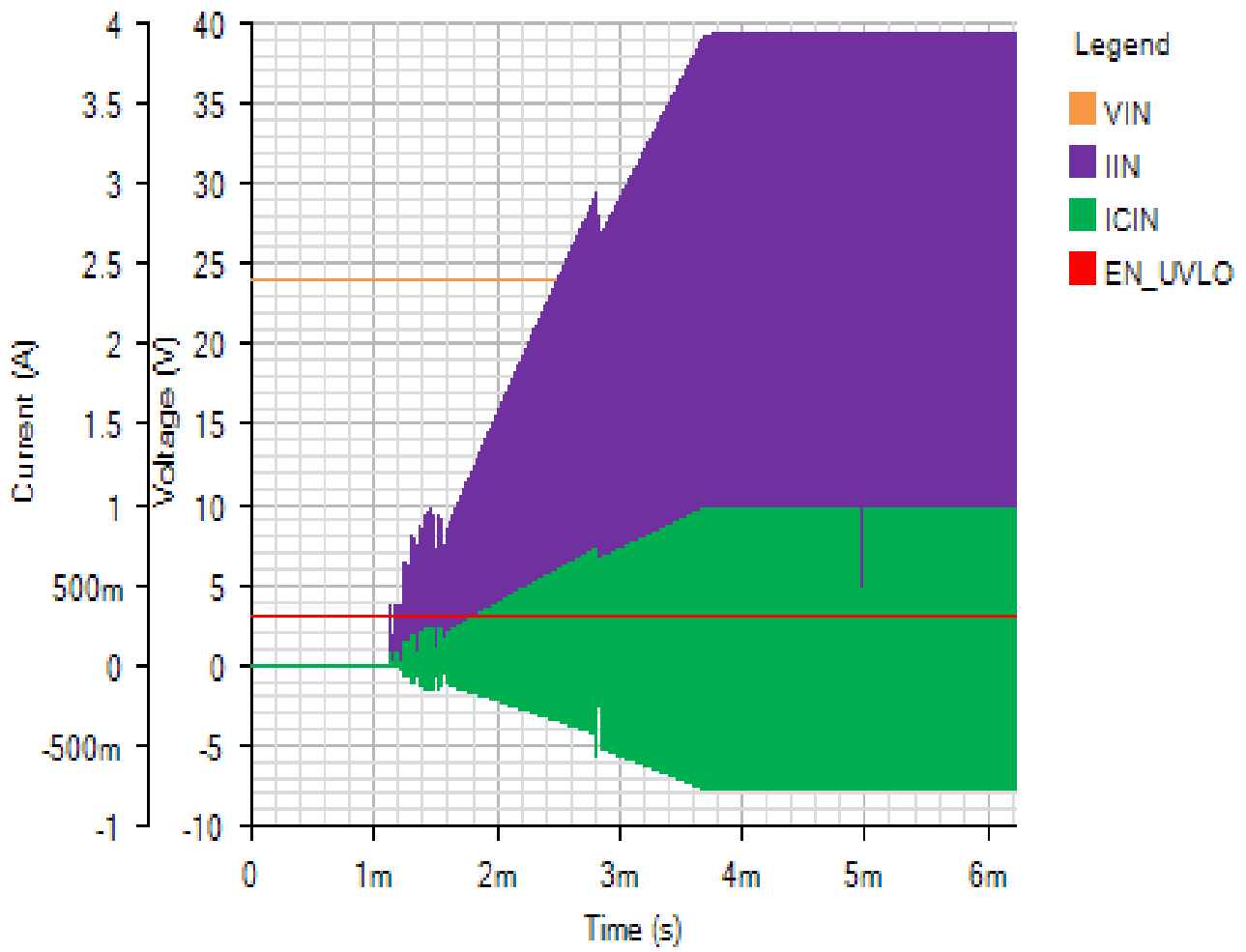
Component	Loss (W)	% of total
Inductor losses	0.99	26.1
Losses in IC	2.8	73.9
Total	3.79	100

Start Up - Sun Nov 25 2018 20:18:27



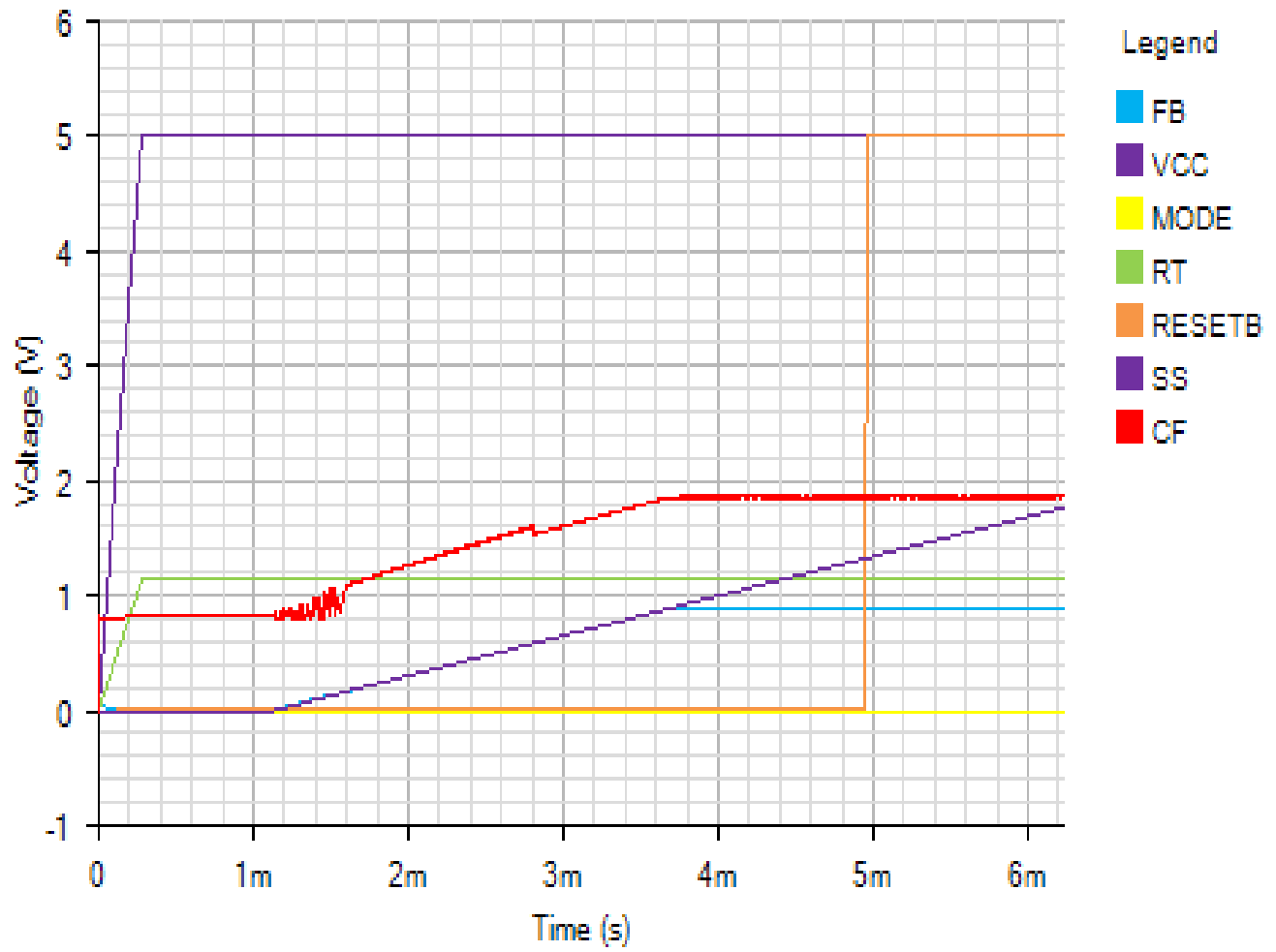
INPUT

Default



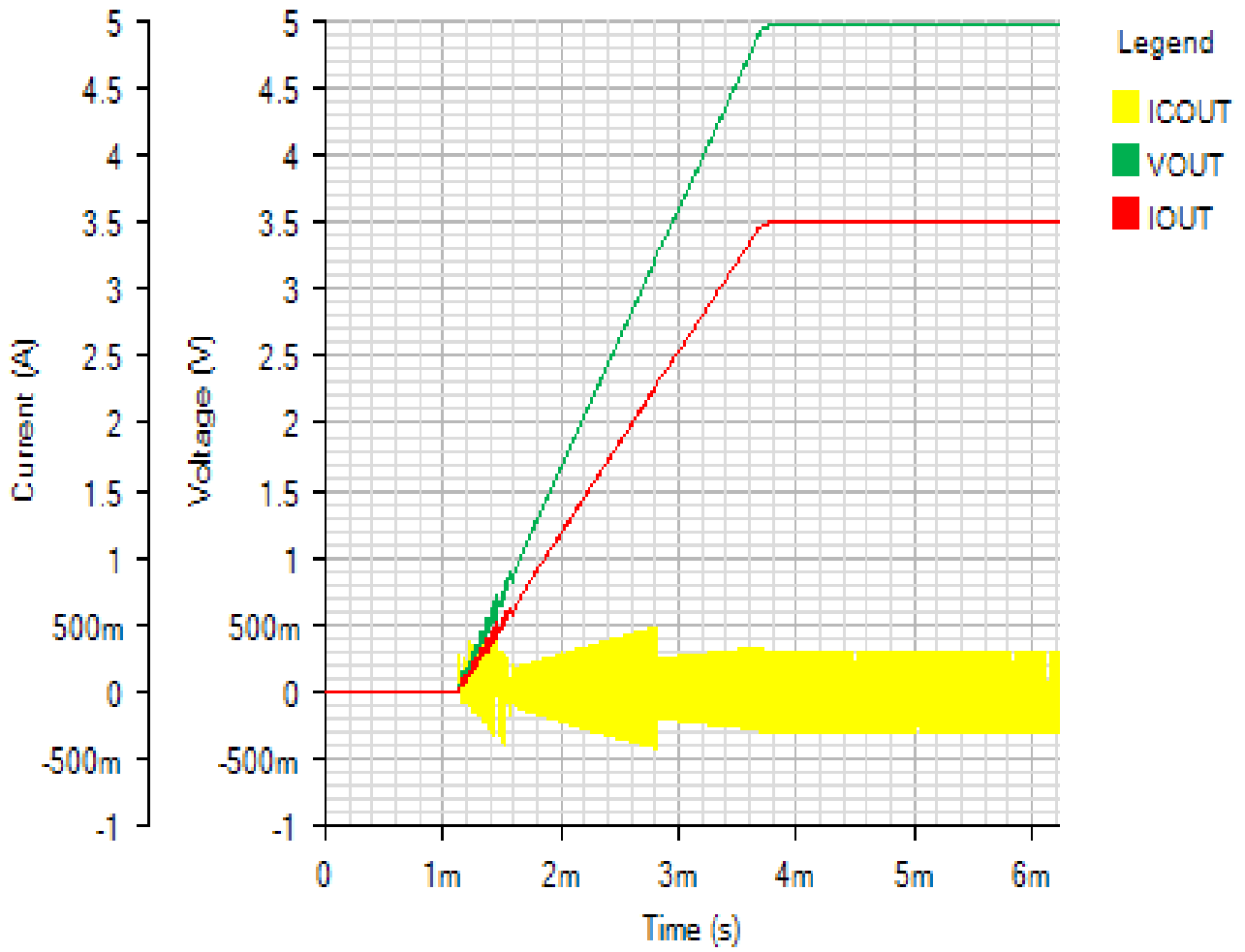
IC

Default

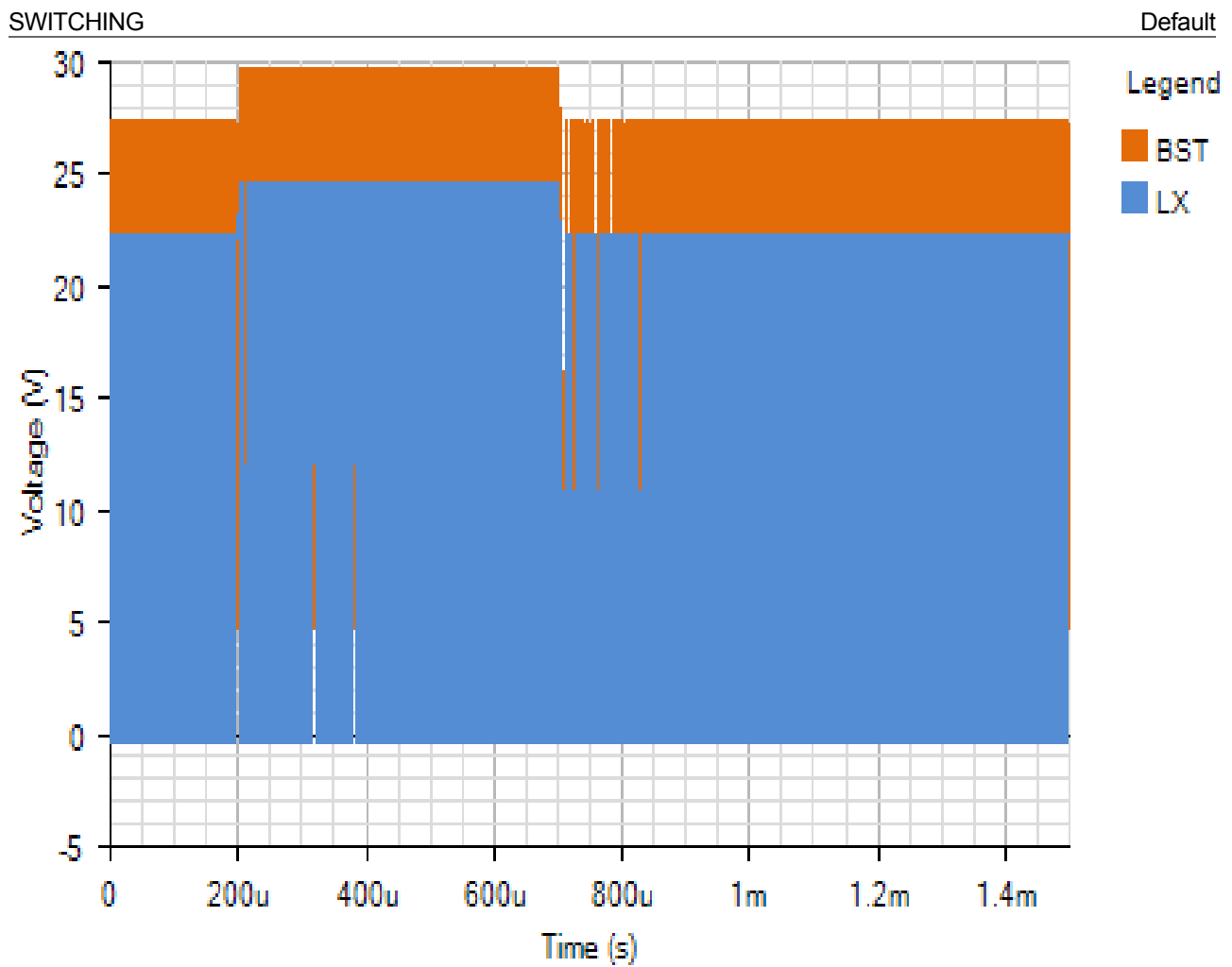


OUTPUT

Default

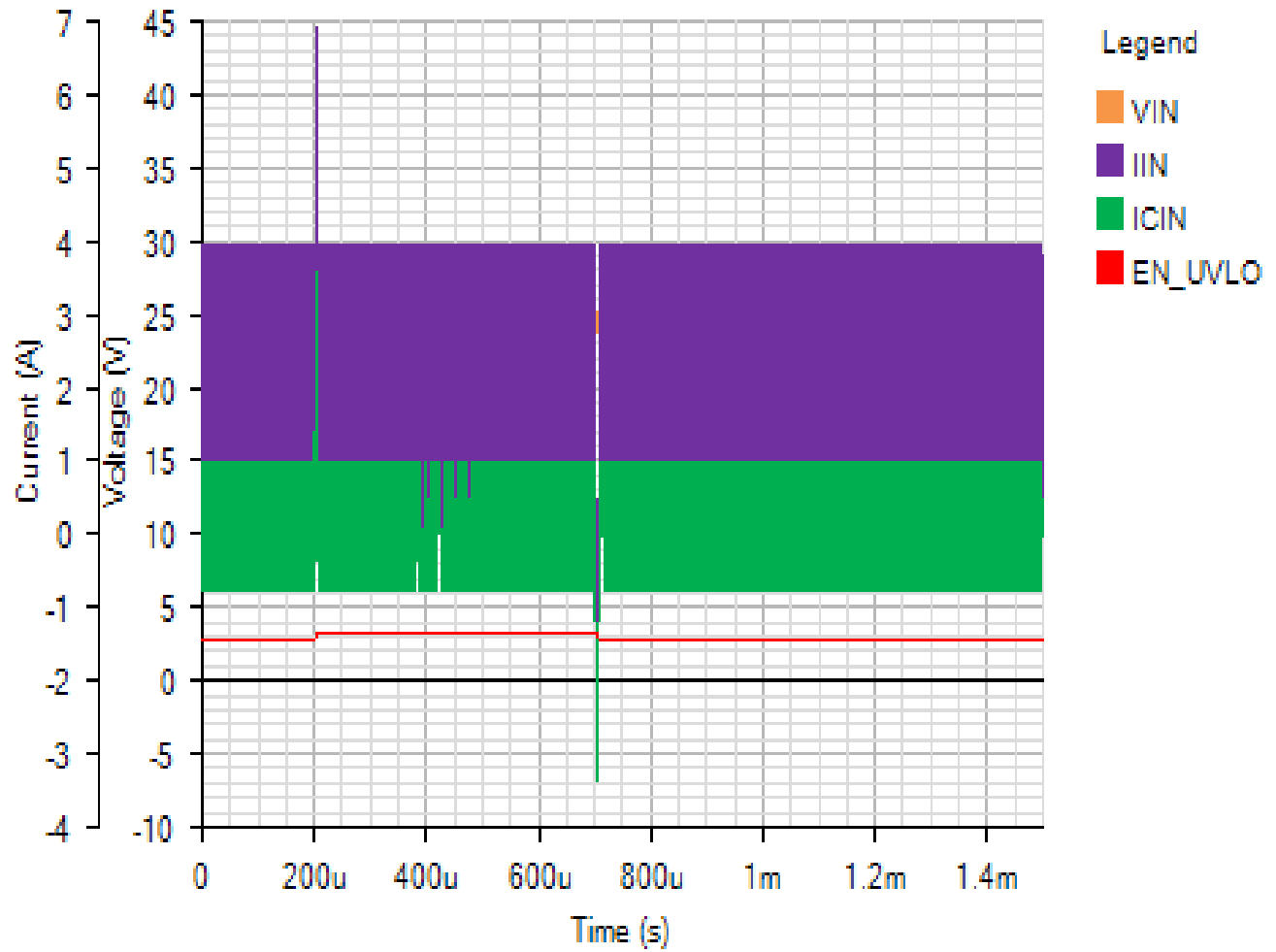


Line Transient - Sun Nov 25 2018 20:18:27



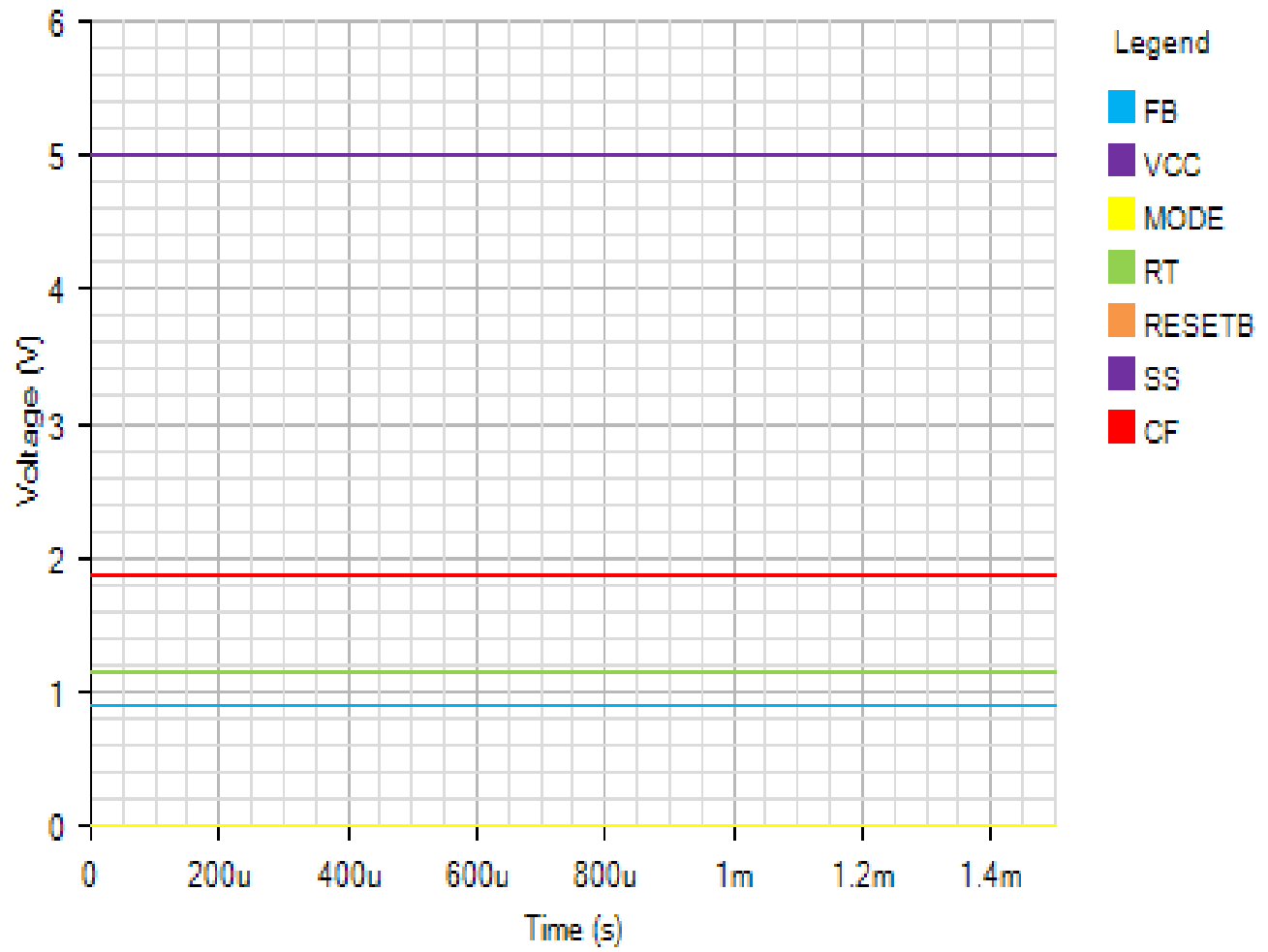
INPUT

Default



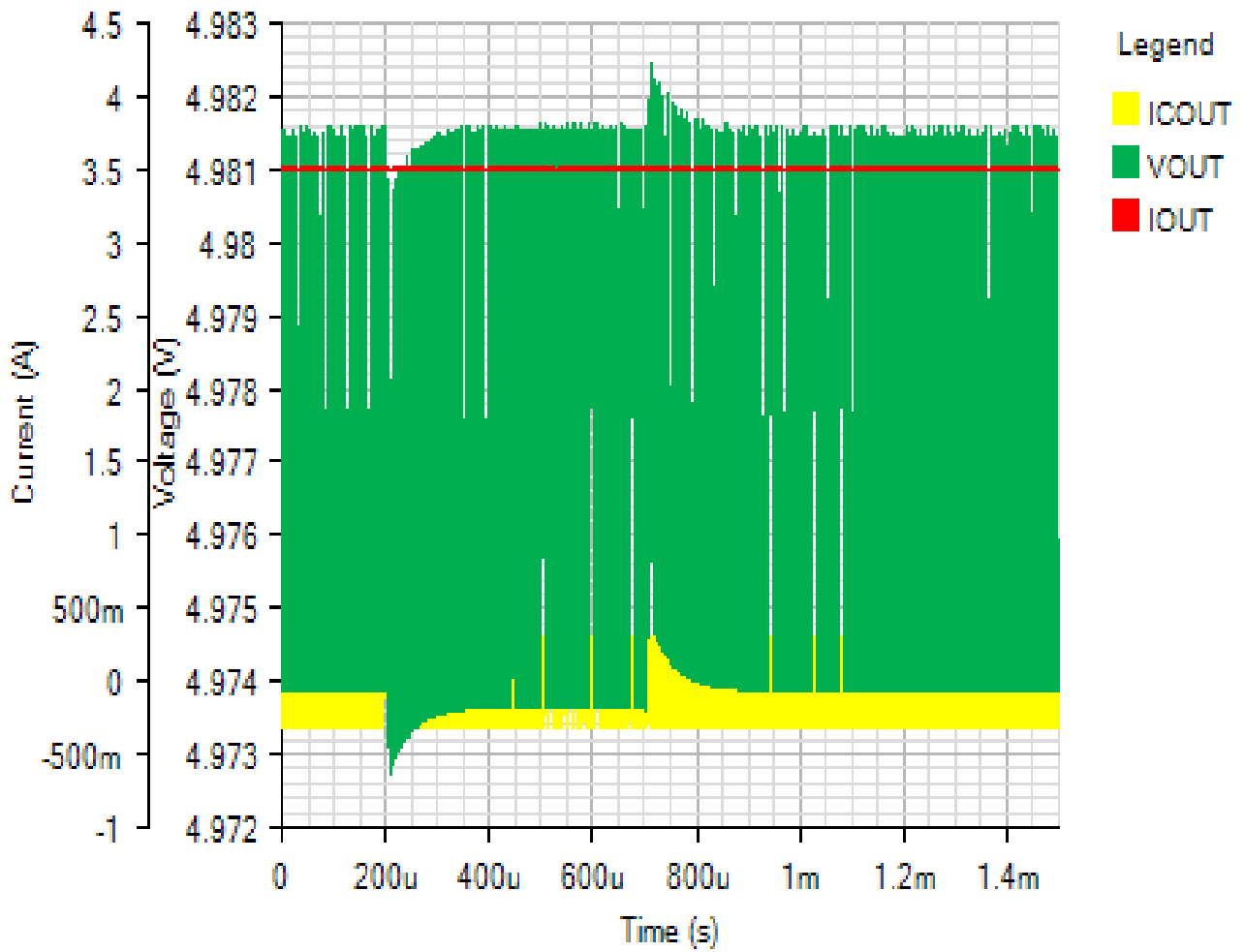
IC

Default

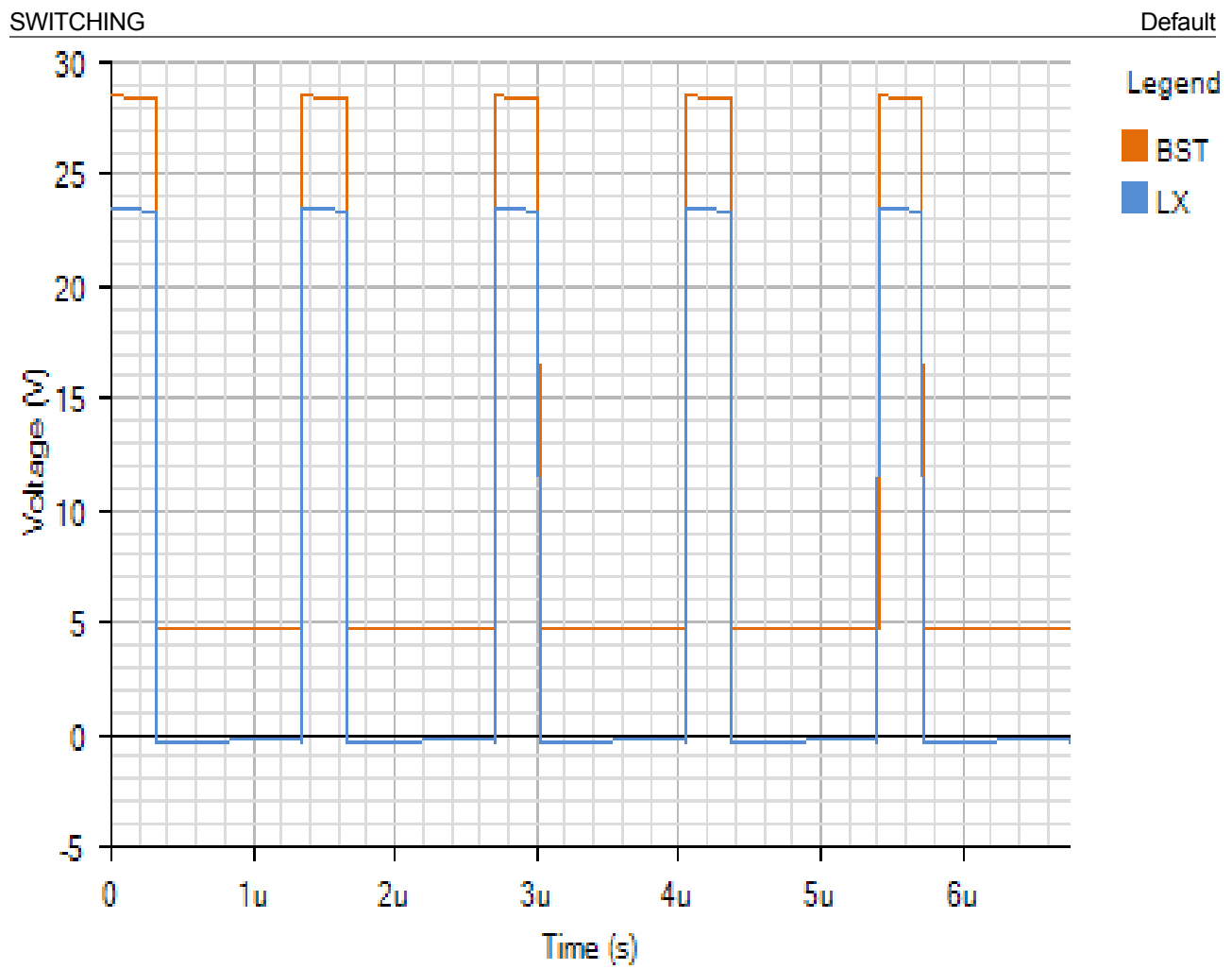


OUTPUT

Default

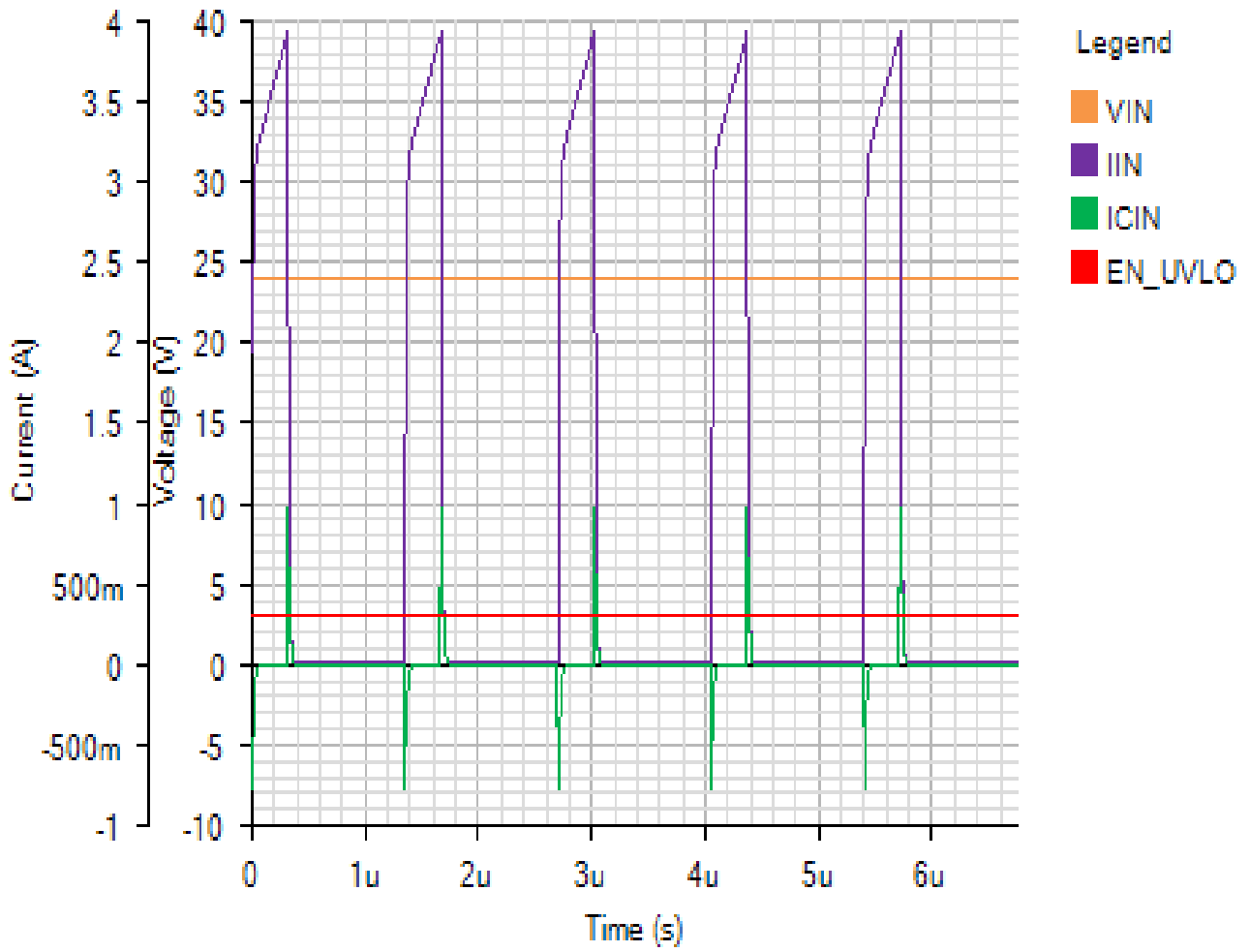


Steady State - Sun Nov 25 2018 20:18:27



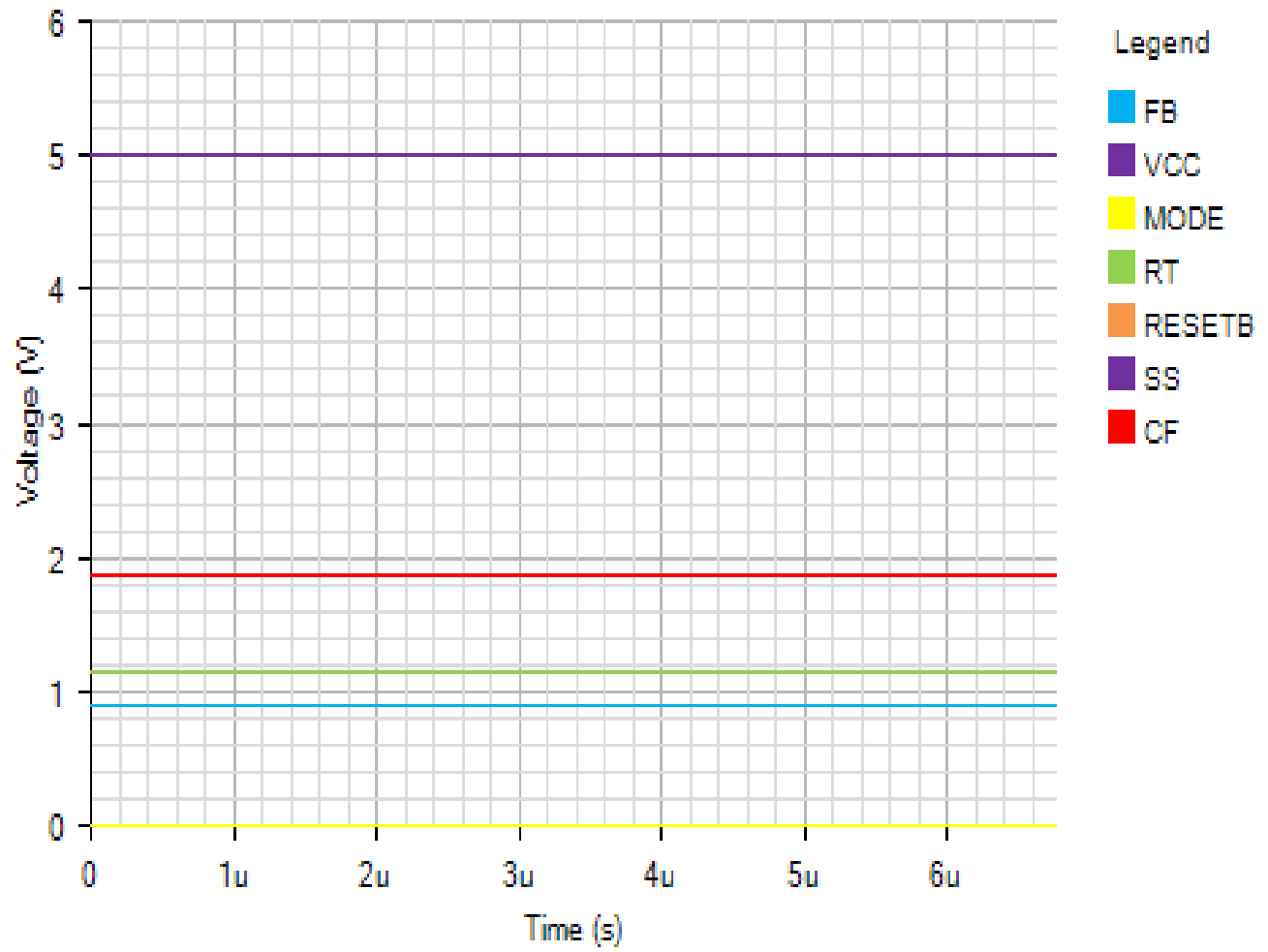
INPUT

Default



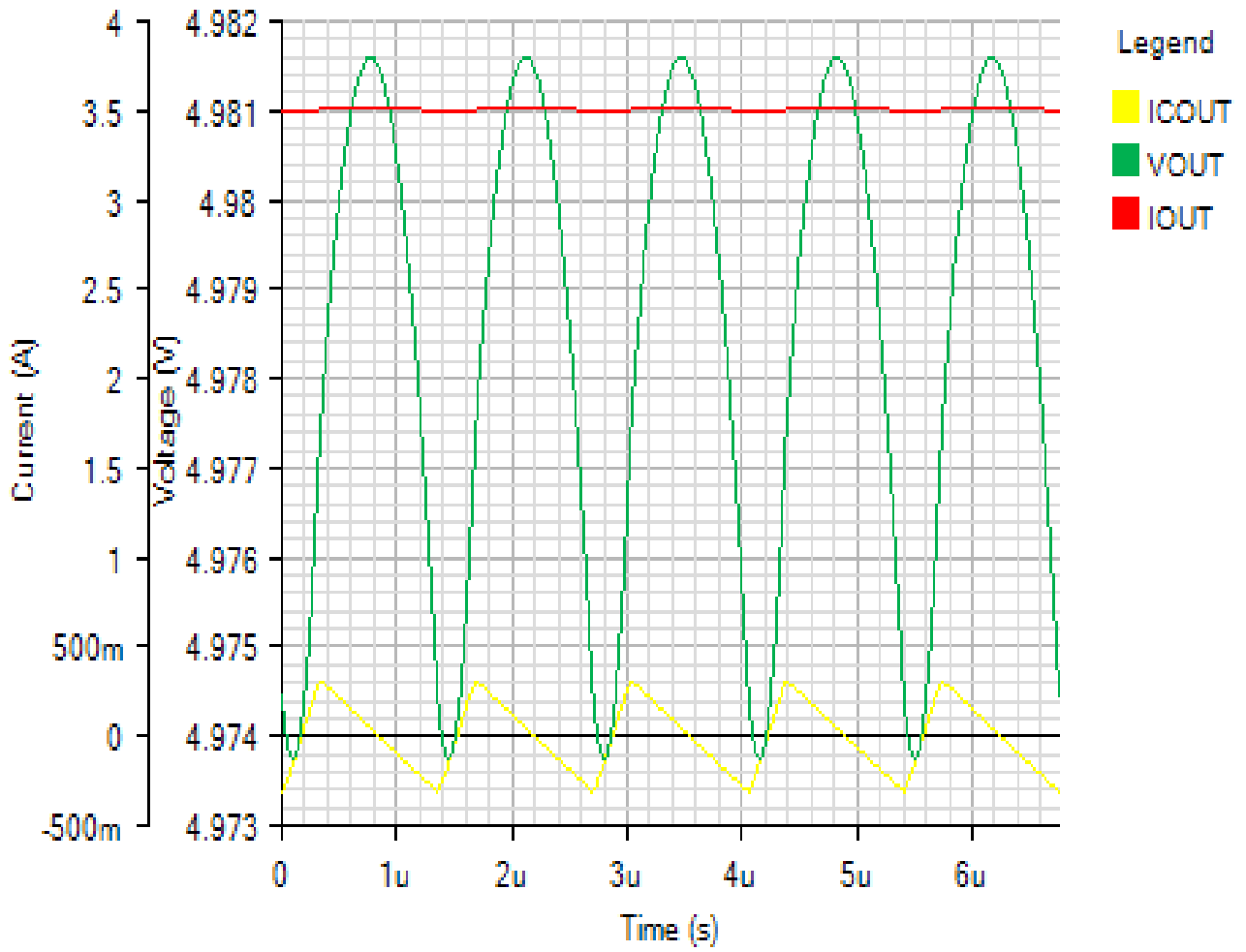
IC

Default

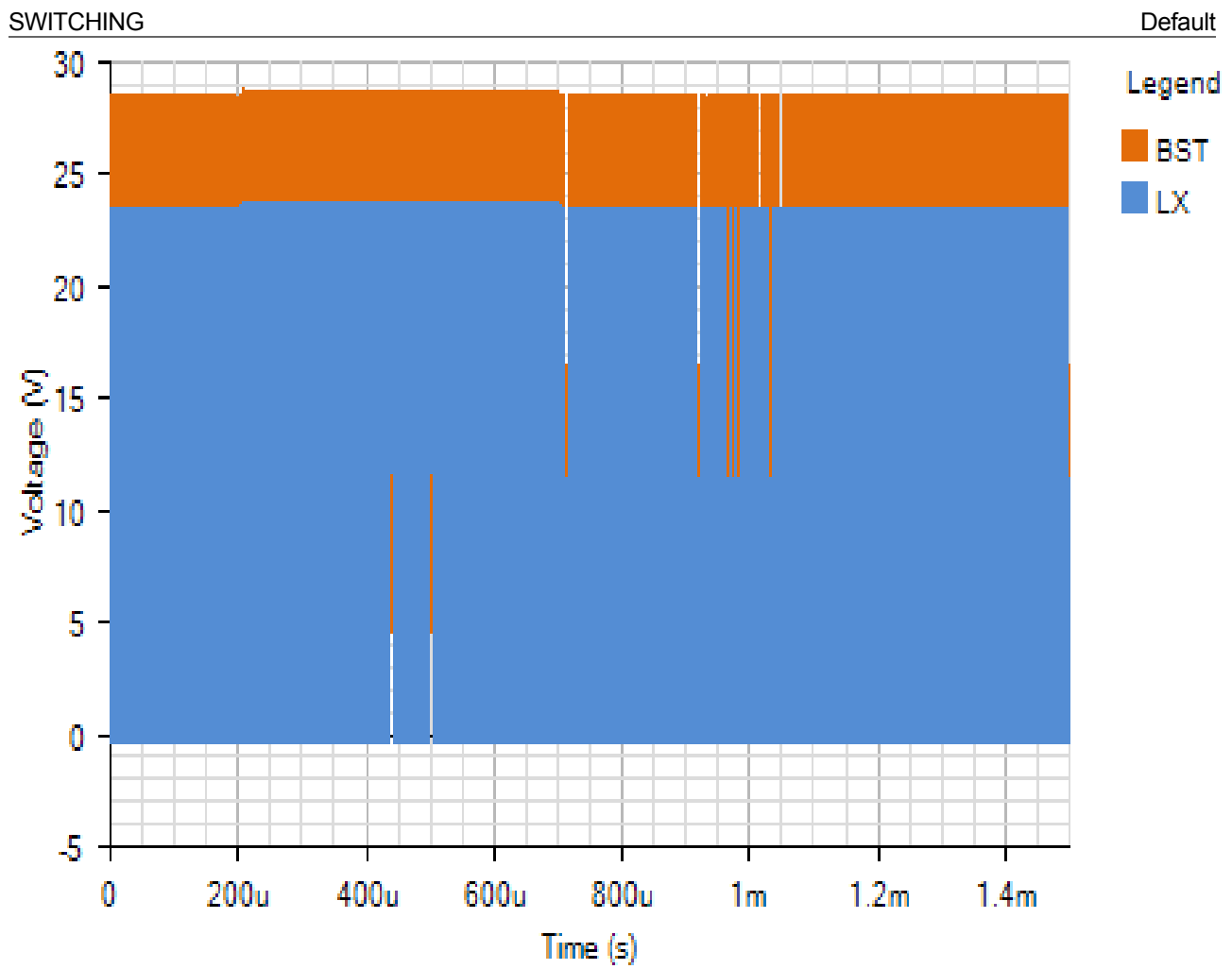


OUTPUT

Default

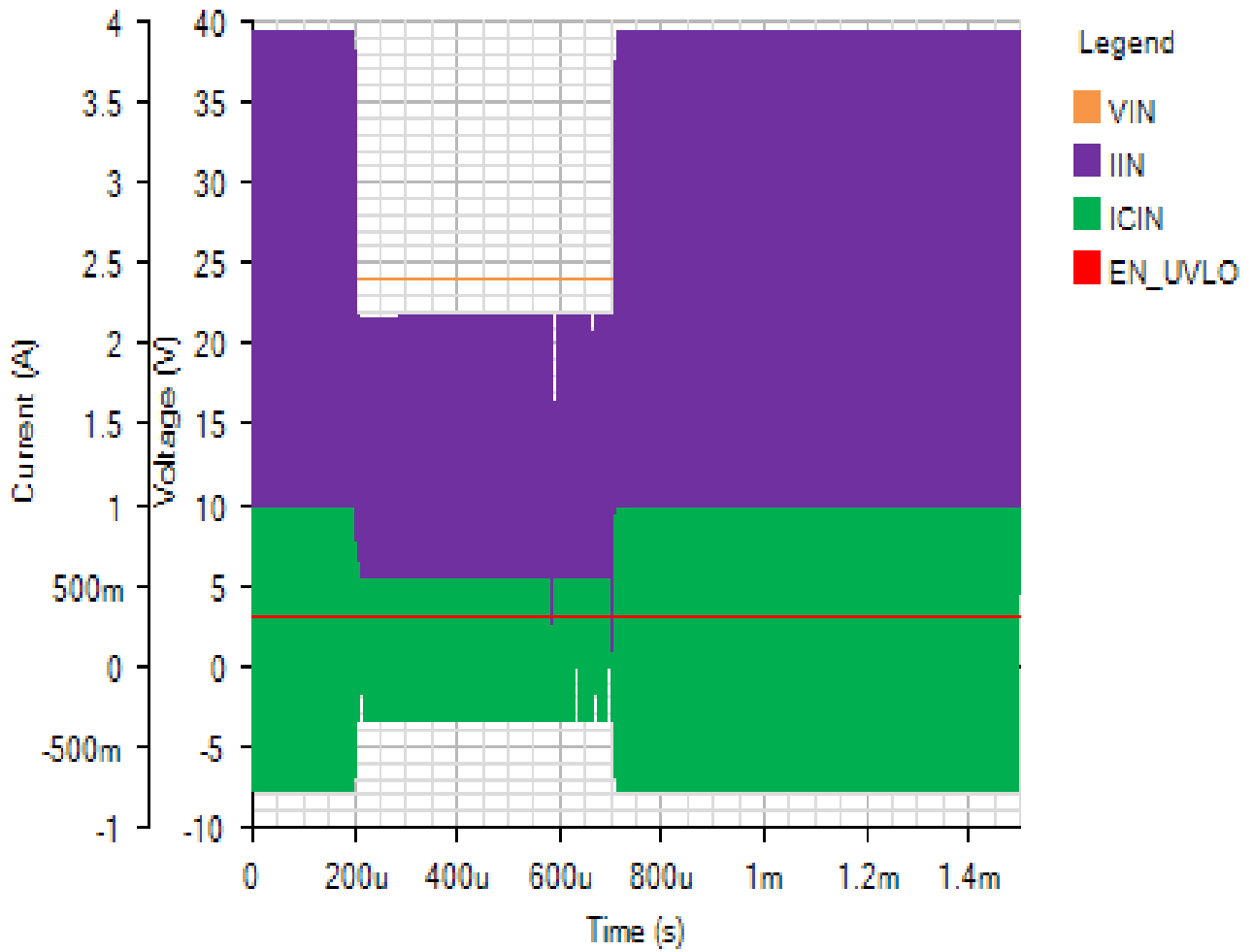


Load Step - Sun Nov 25 2018 20:18:27



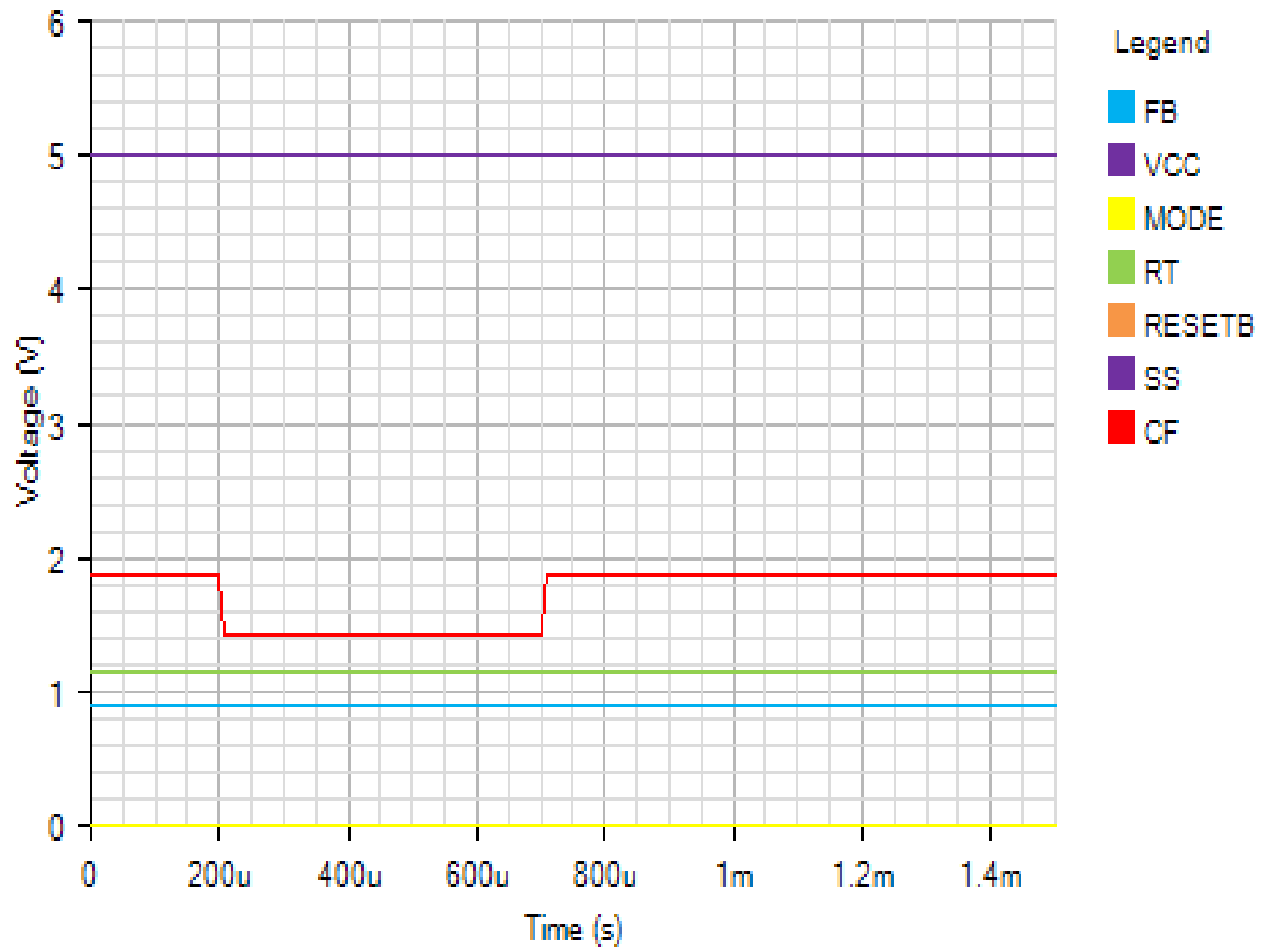
INPUT

Default



IC

Default



OUTPUT

Default

