

## Initial Design

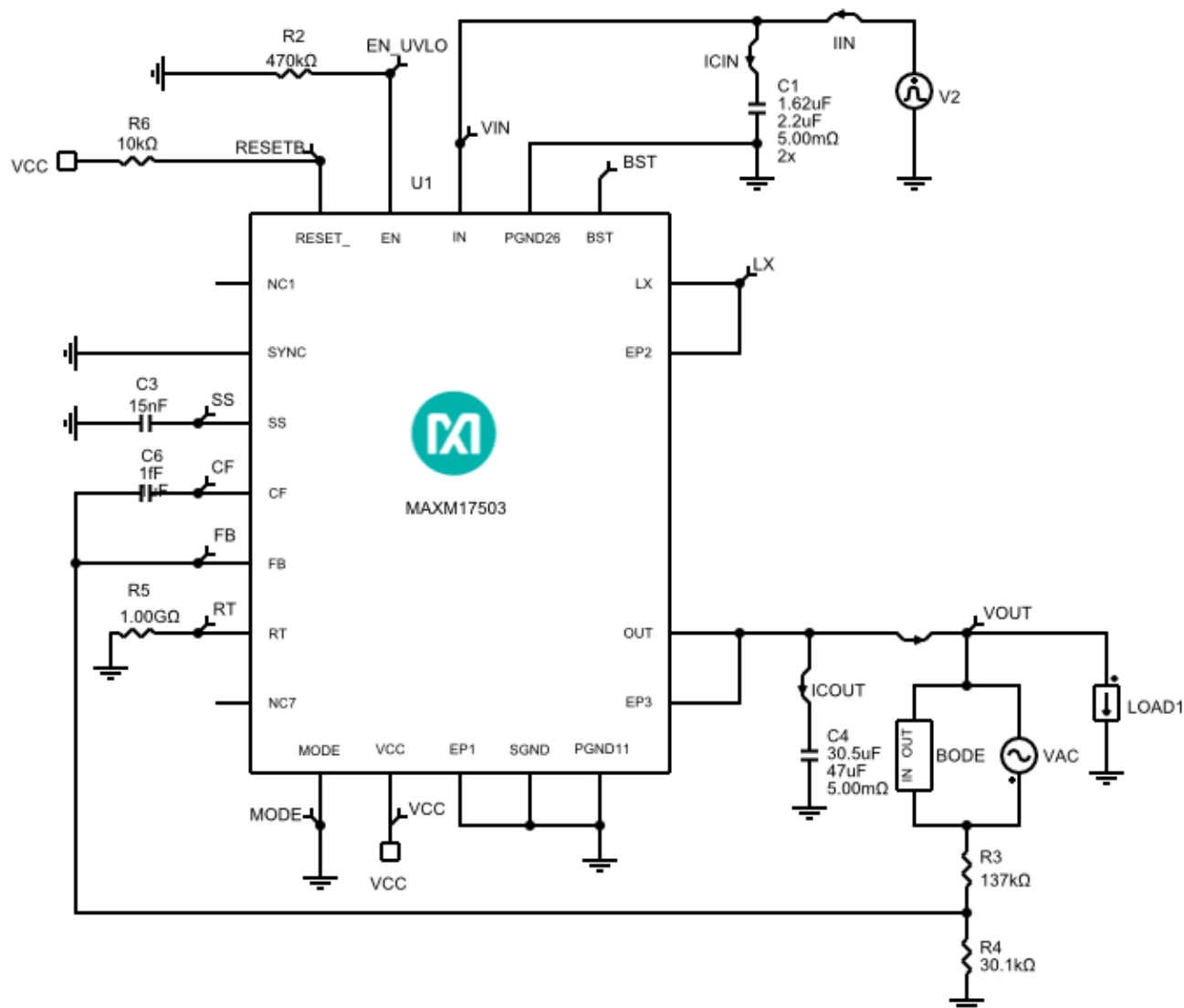
1.0

**Design Requirements**

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Parameter	Value
Minimum Input Voltage	11V
Maximum Input Voltage	60V
Nominal Input Voltage	24V
Input Steady-State Ripple	0.48V
Input Undervoltage Lockout Level	9.9V
Output Voltage	5V
Output Current	2.5A
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.

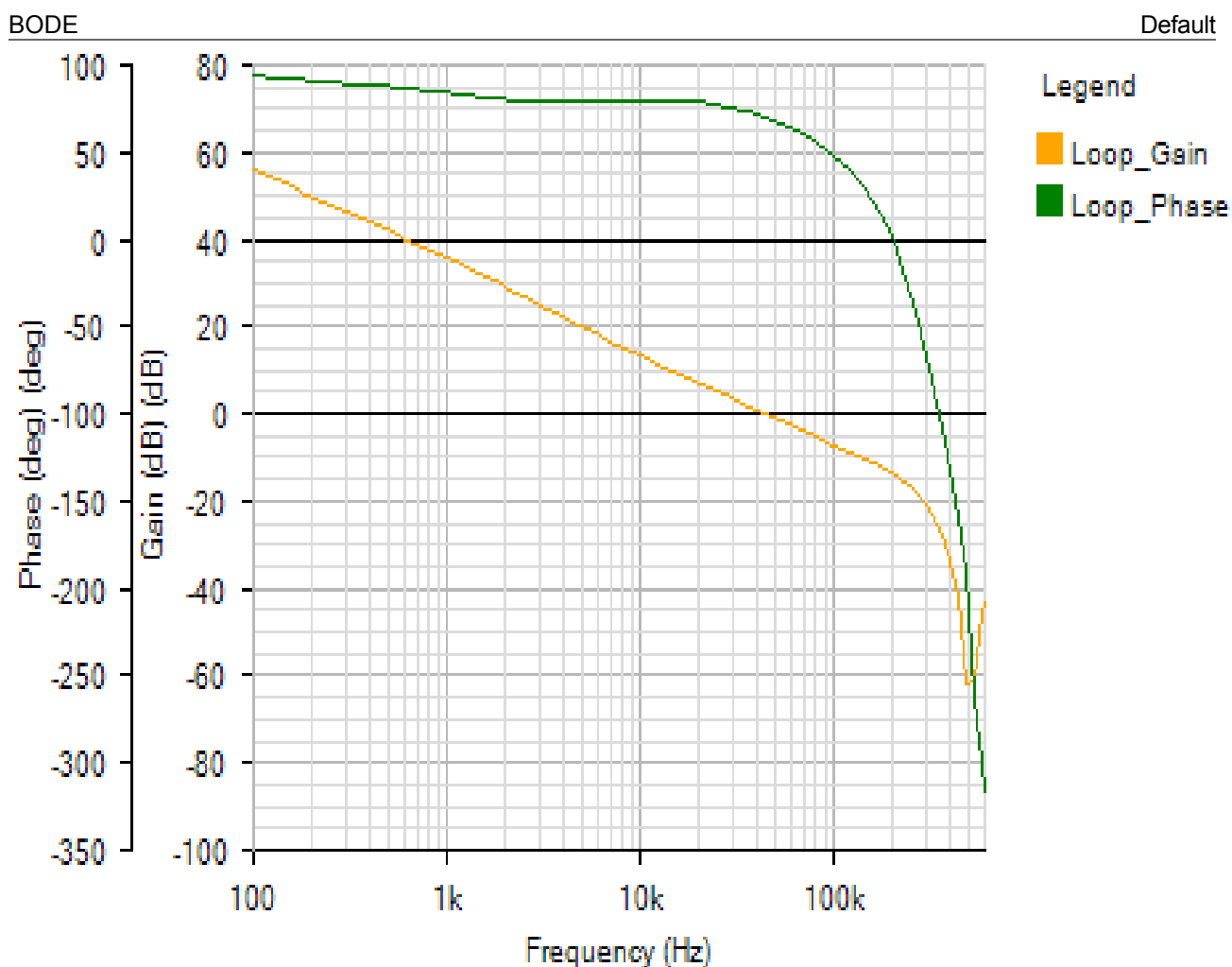
## BOM

Ref	Qty	Part Number	Manufacturer	Description
U1	1	<a href="#">MAXM17503ALJ+</a>	Maxim Integrated	4.5-60V, 2.5A, High-Efficiency, DC-DC Step-Down Power Module with Integrated Inductor
C1	2	<a href="#">C1210C225K1RAC</a>	Kemet	Cap Ceramic 2.2uF 100V X7R 10% SMD 1210 125C Bulk
C3	1	<a href="#">CC0402KRX7R8BB153</a>	Yageo	Cap Ceramic 0.015uF 25V X7R 10% Pad SMD 0402 125°C T/R

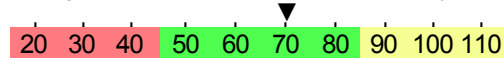
C4	1	<a href="#">GRM32ER71A476KE15L</a>	Murata	Cap Ceramic 47uF 10V X7R 10% SMD 1210 125C Embossed T/R
R2	1	<a href="#">ERJ2GEJ474X</a>	Panasonic	Res Thick Film 0402 470K Ohm 5% 0.1W(1/10W) ±200ppm/°C Pad SMD Automotive T/R
R3	1	<a href="#">ERJ2RKF1373X</a>	Panasonic	Res Thick Film 0402 137K Ohm 1% 0.1W(1/10W) ±100ppm/°C Pad SMD Automotive T/R
R4	1	<a href="#">ERJ2RKF3012X</a>	Panasonic	Res Thick Film 0402 30.1K Ohm 1% 0.1W(1/10W) ±100ppm/°C Pad SMD Automotive T/R
R6	1	<a href="#">ERJ2GEJ103X</a>	Panasonic	Res Thick Film 0402 10K Ohm 5% 0.1W(1/10W) ±200ppm/°C Pad SMD Automotive T/R

## Simulation Results

AC Loop - Mon Nov 26 2018 13:56:30



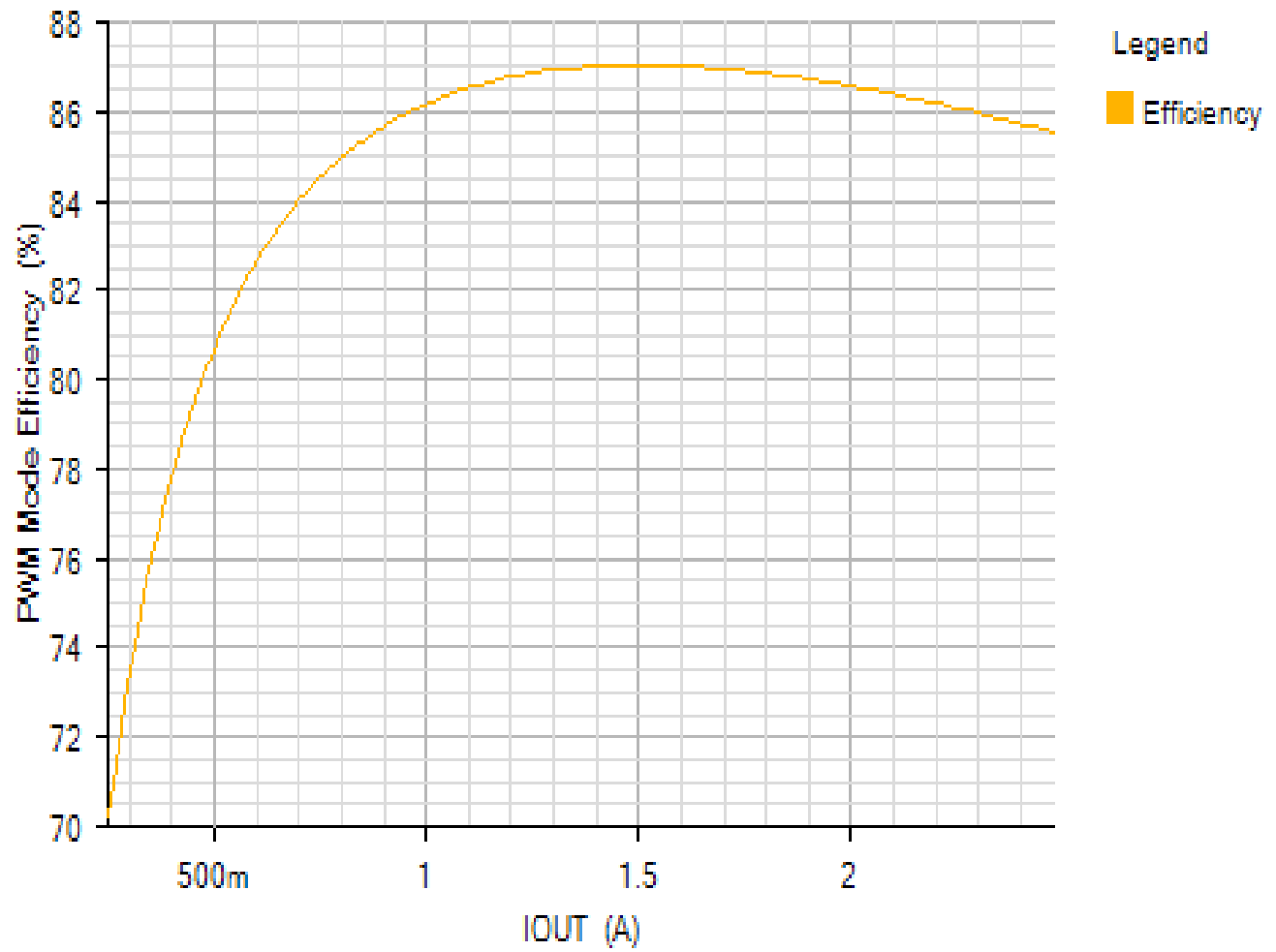
Phase Margin: 70.24° at a crossover frequency of 44.8kHz



Efficiency - Mon Nov 26 2018 13:56:30

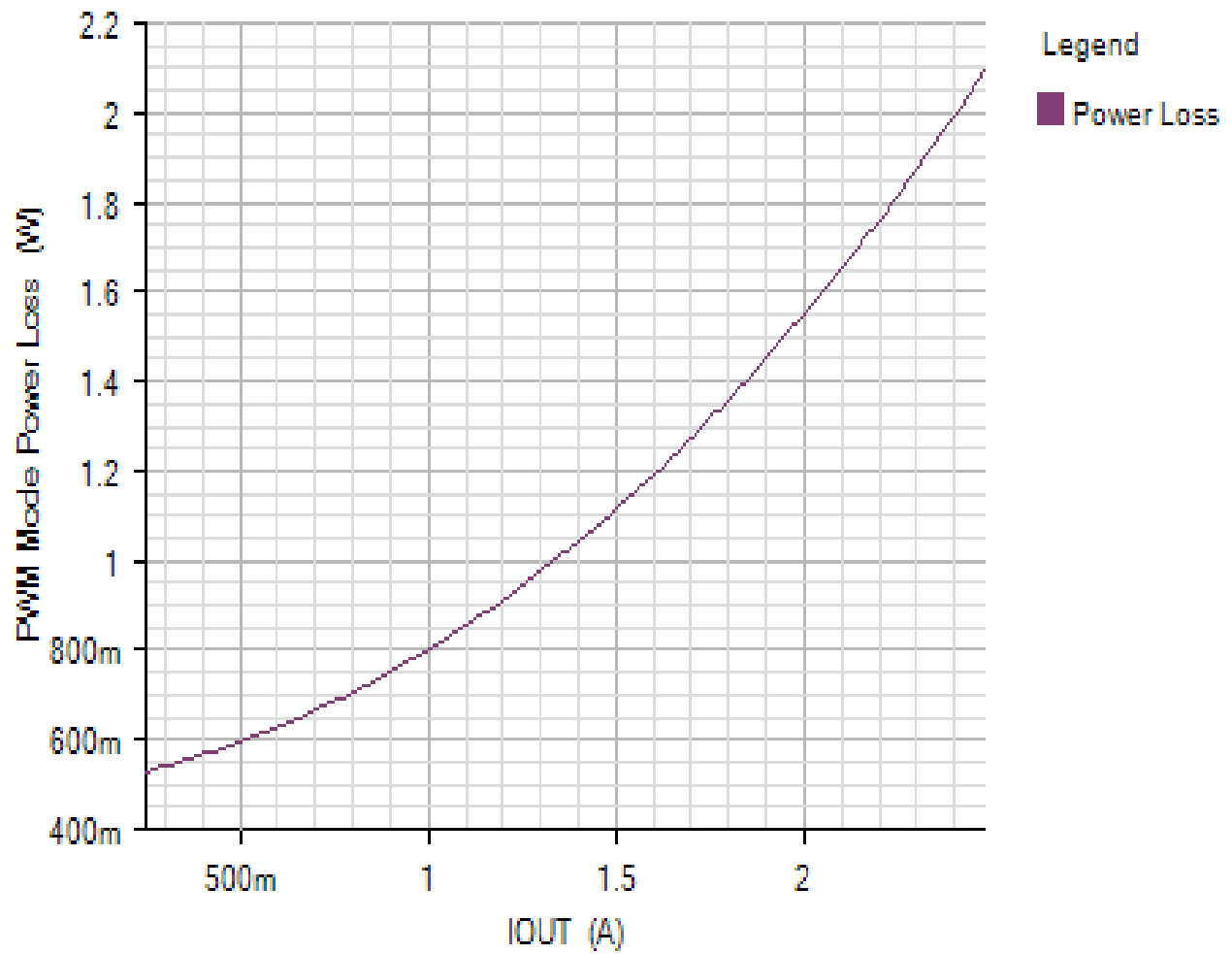
EFFICIENCY\_PLOT

Default



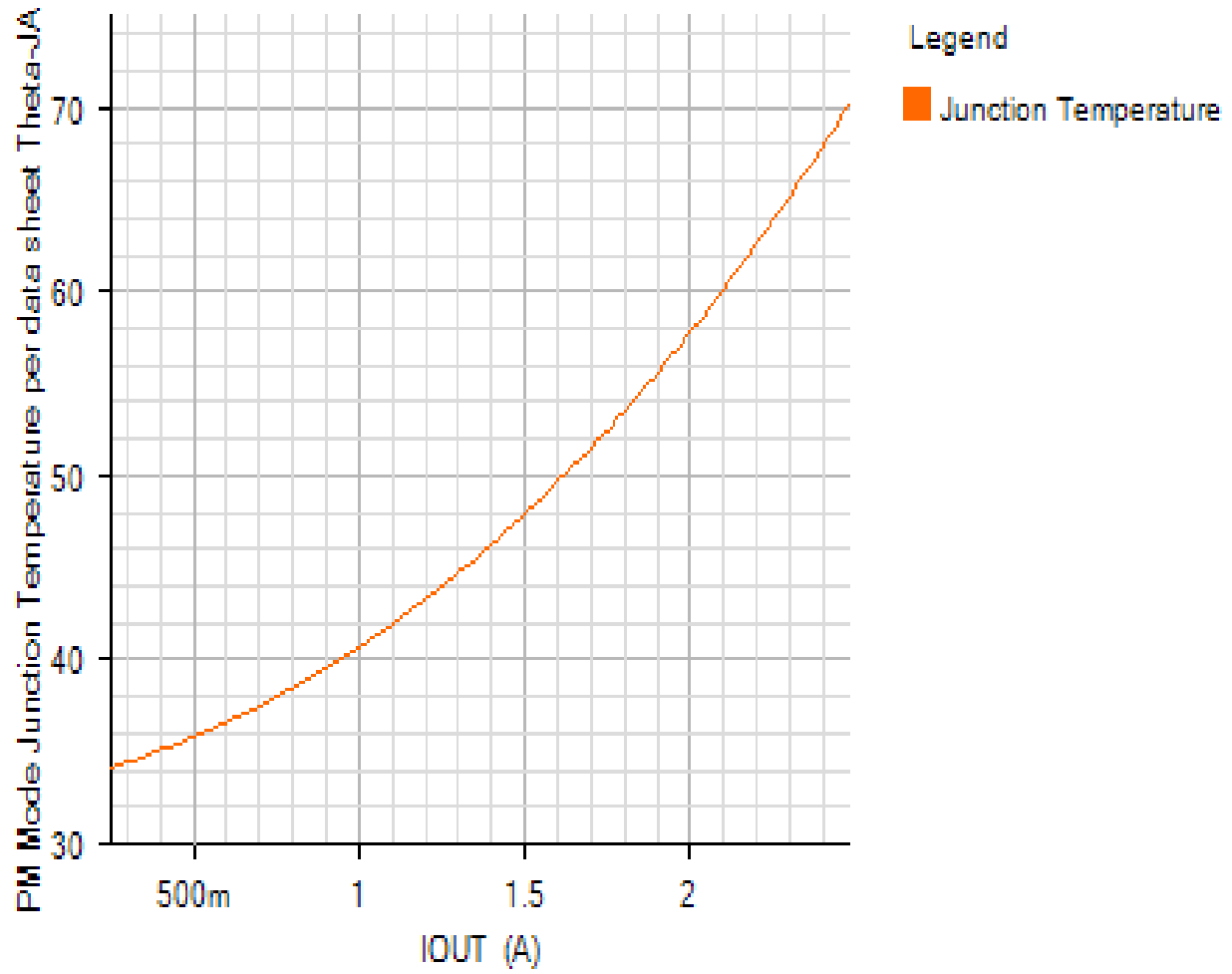
POWER\_LOSS\_PLOT

Default

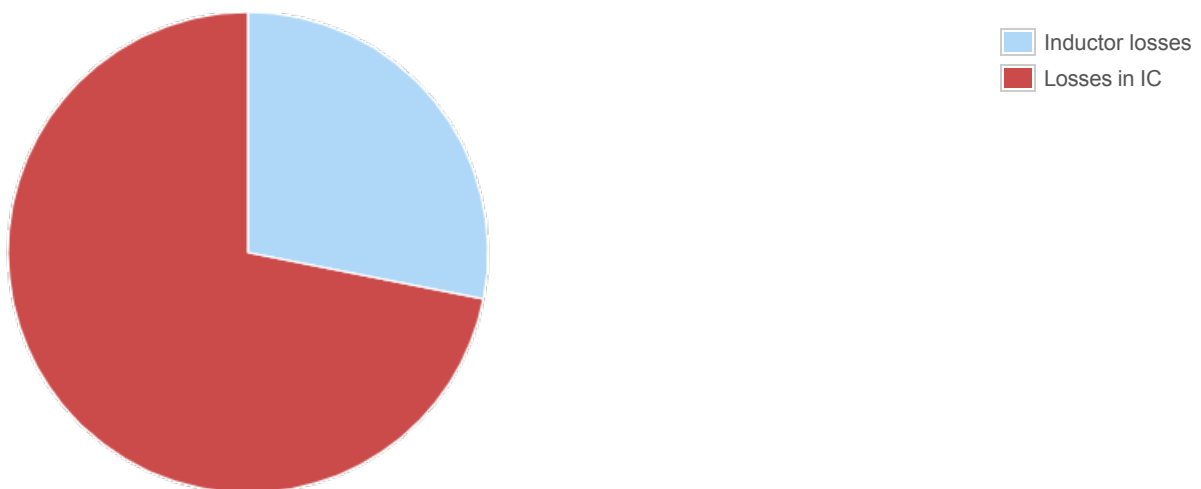


JUNCTION\_TEMPERATURE\_PLOT

Default



Losses



Component

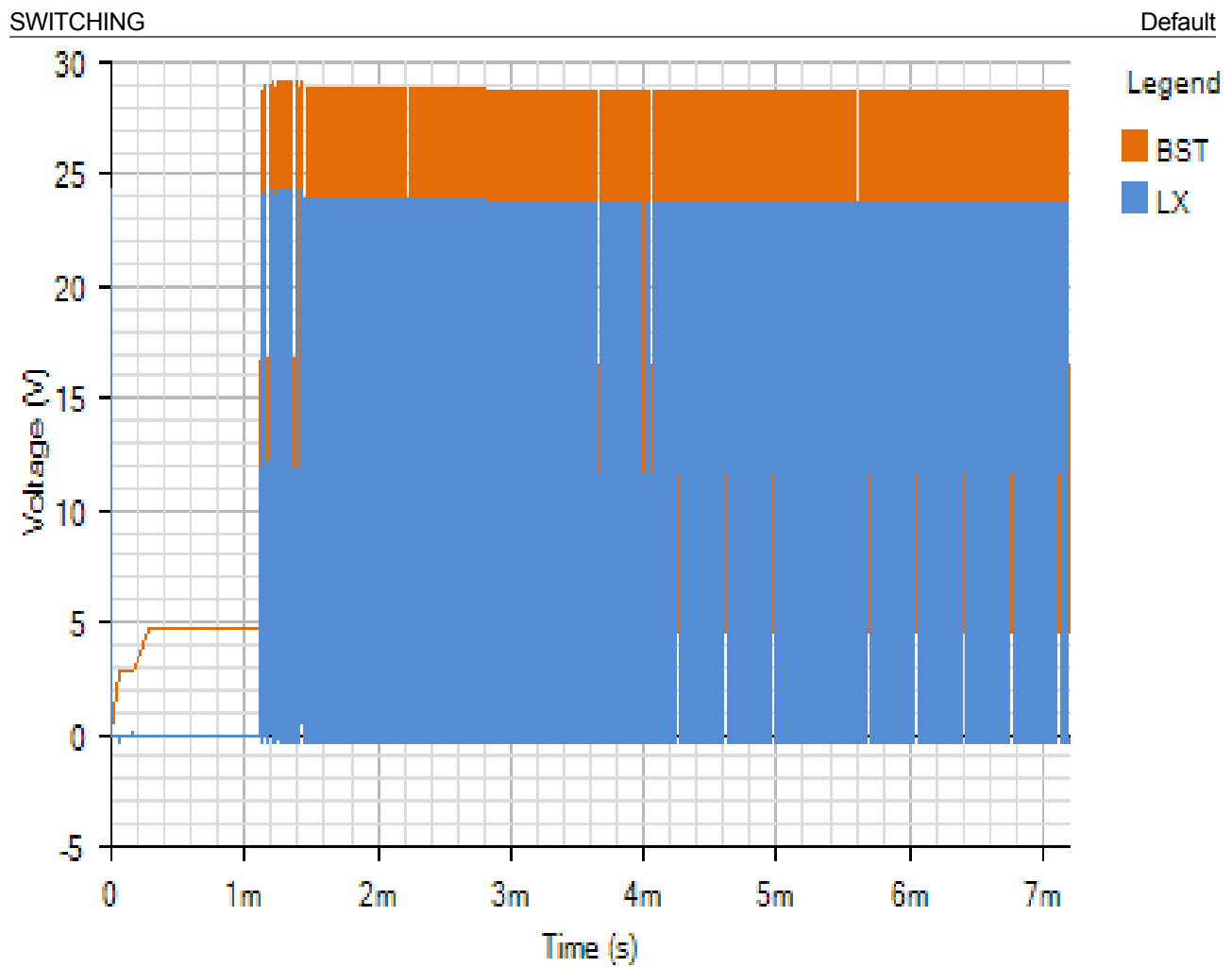
Loss (W)

% of total

Component	Loss (W)	% of total
Inductor losses	0.59	28.1
Losses in IC	1.51	71.9
Total	2.1	100

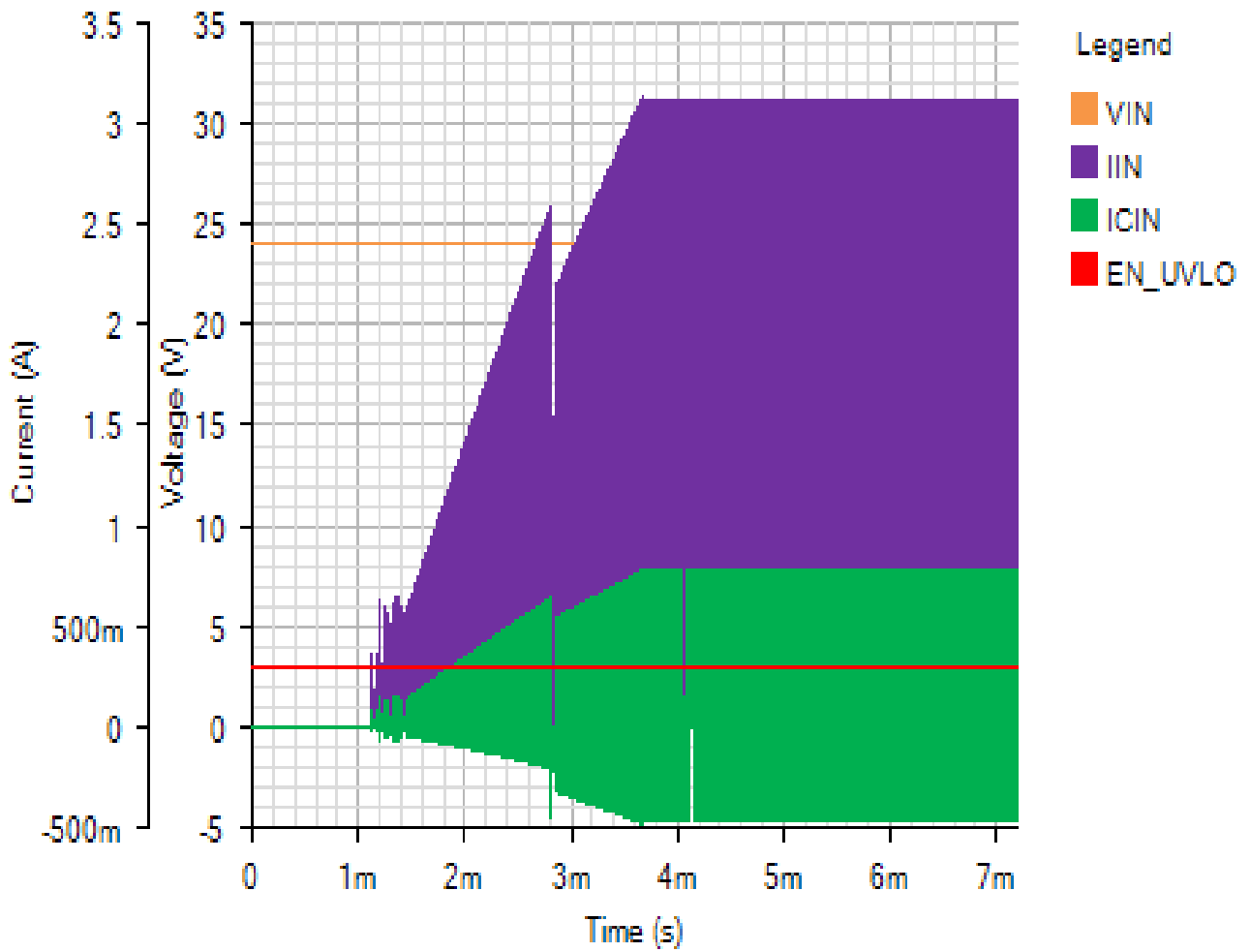


Start Up - Mon Nov 26 2018 13:56:30



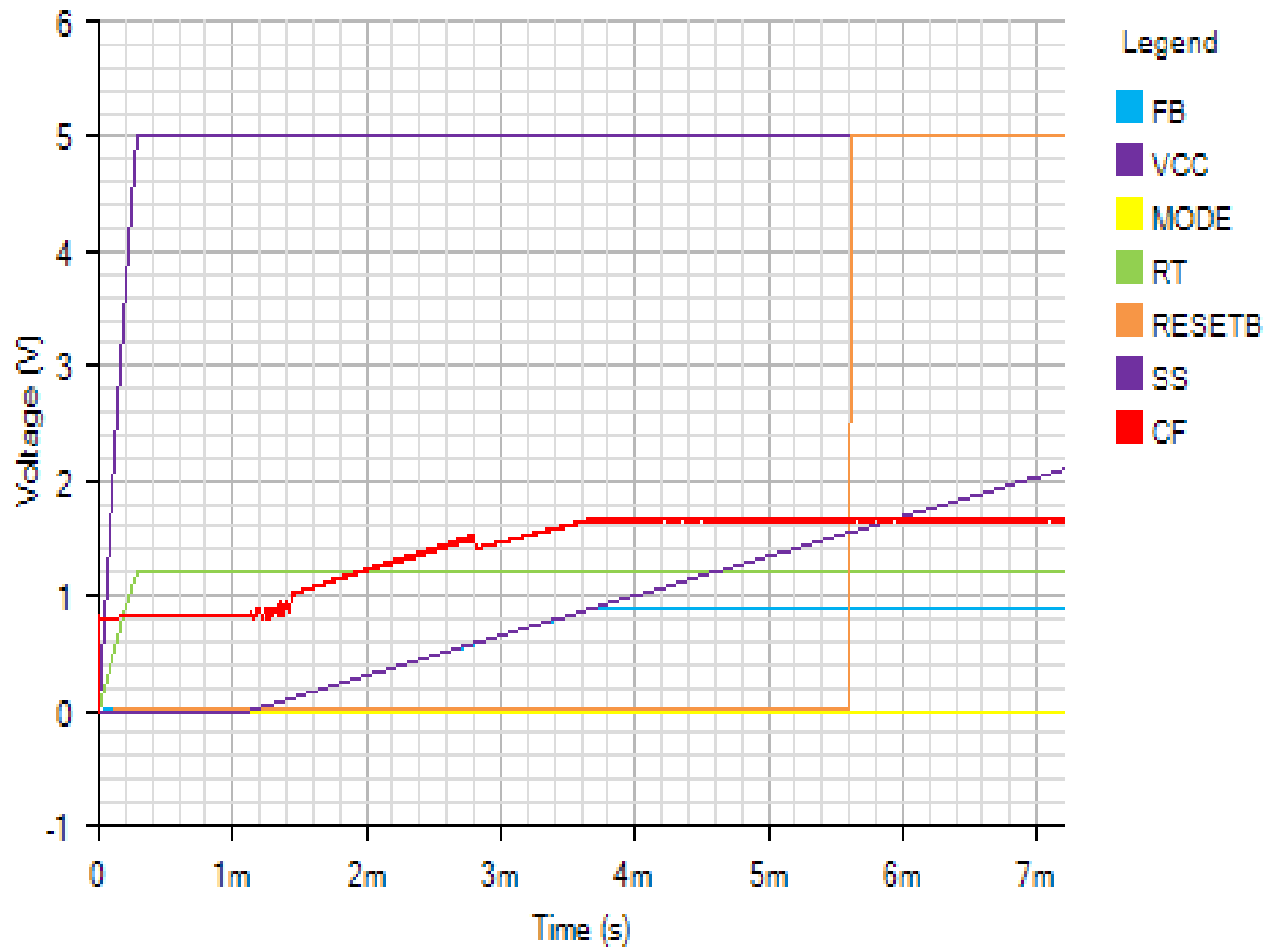
INPUT

Default



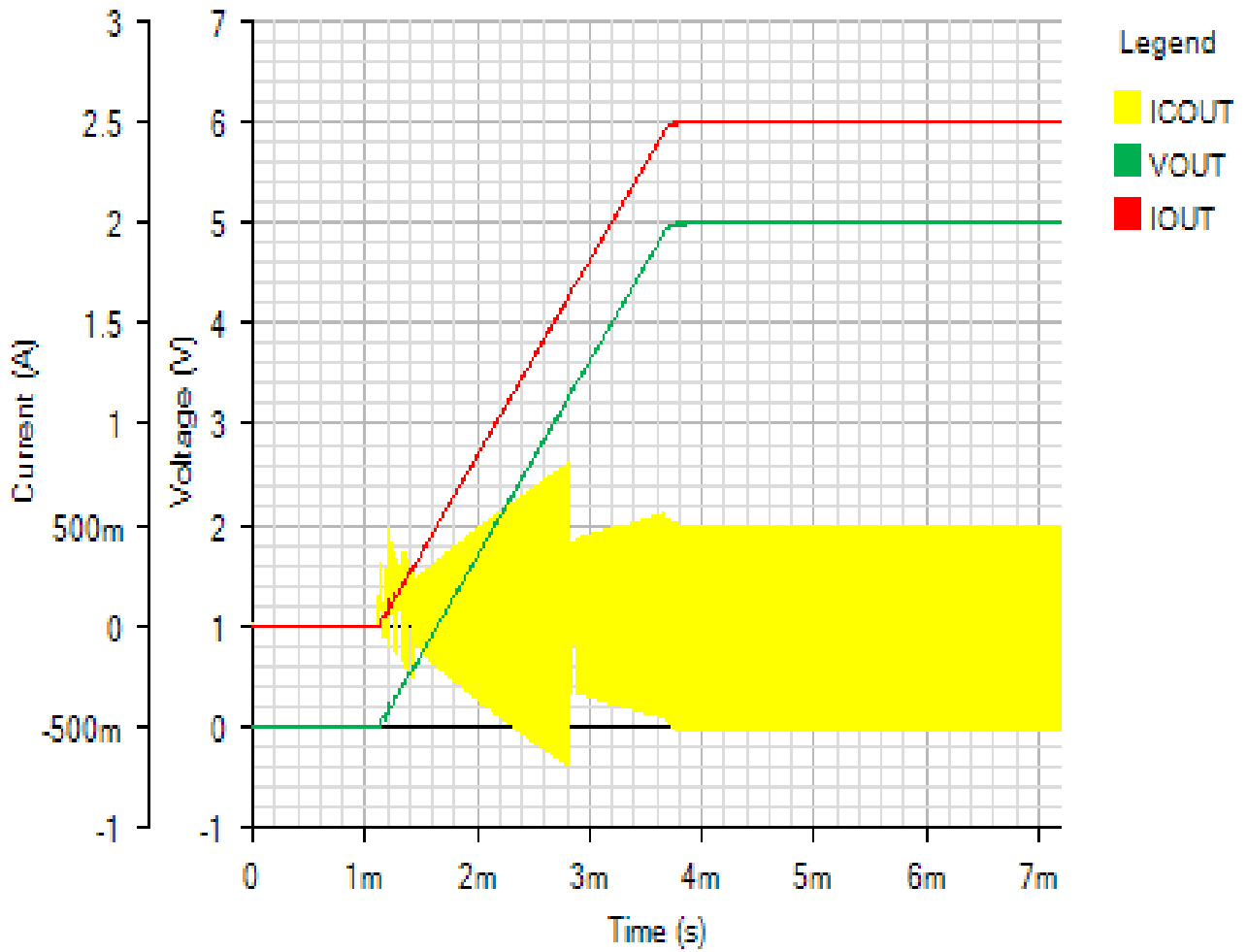
IC

Default

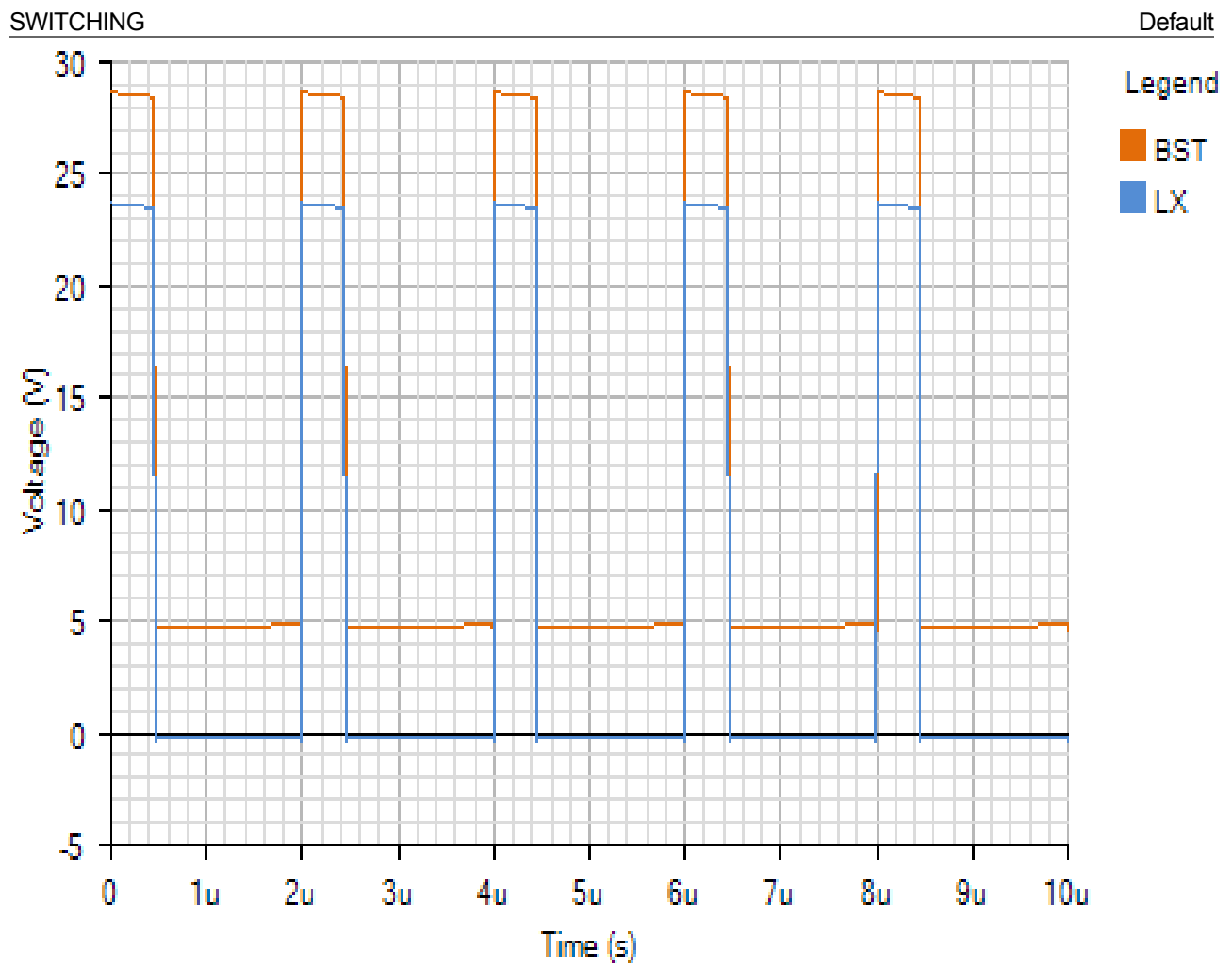


OUTPUT

Default

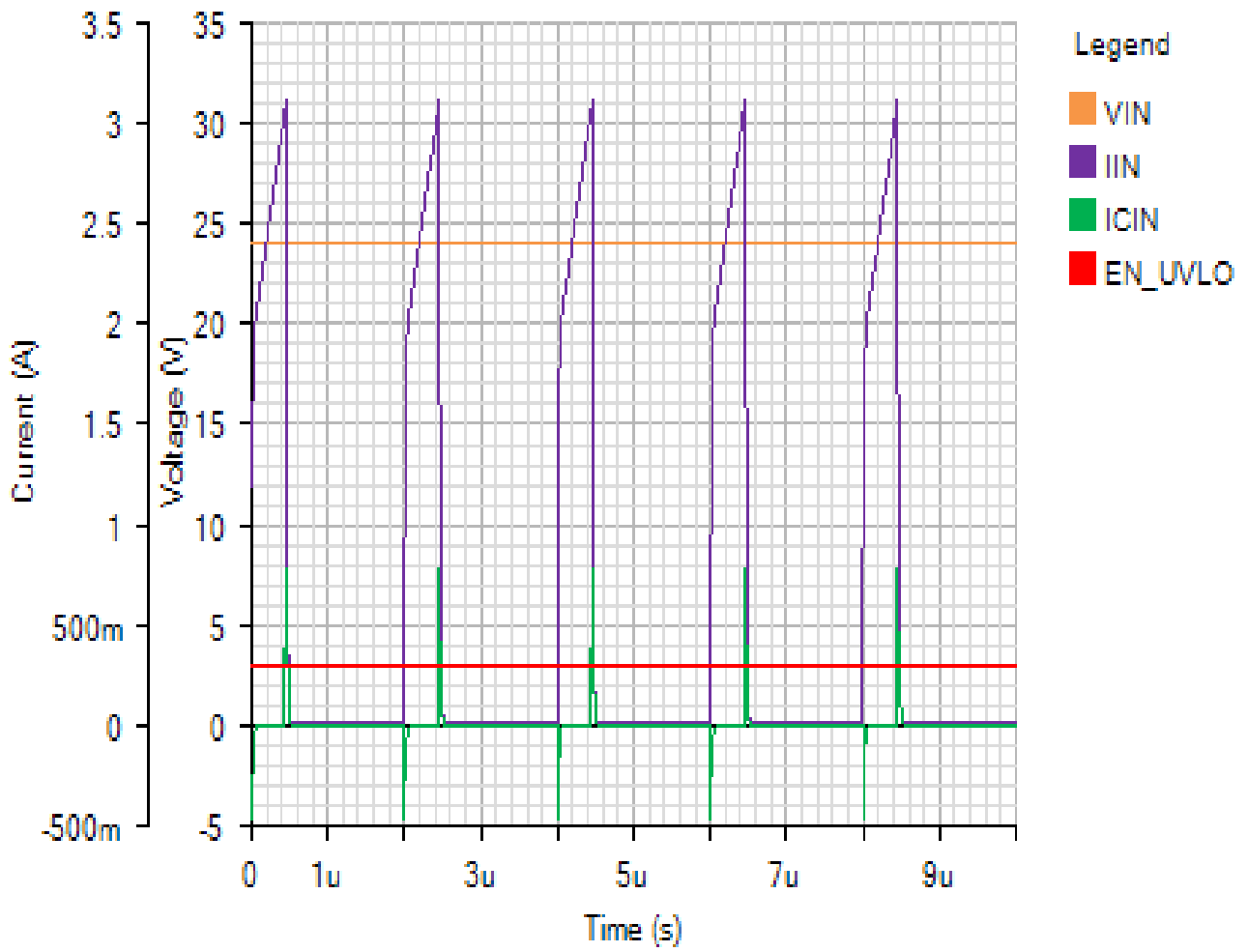


Steady State - Mon Nov 26 2018 13:56:30



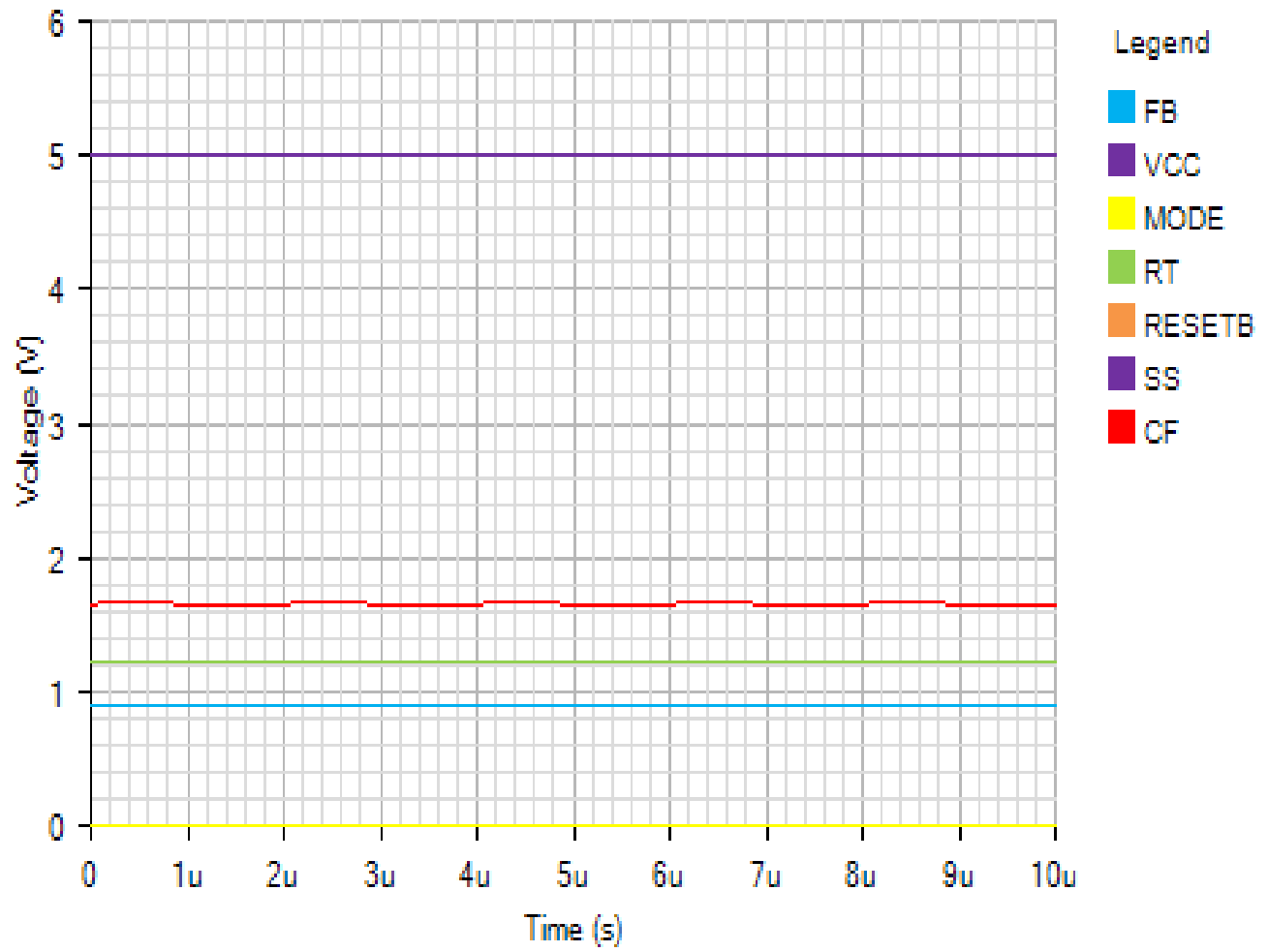
INPUT

Default



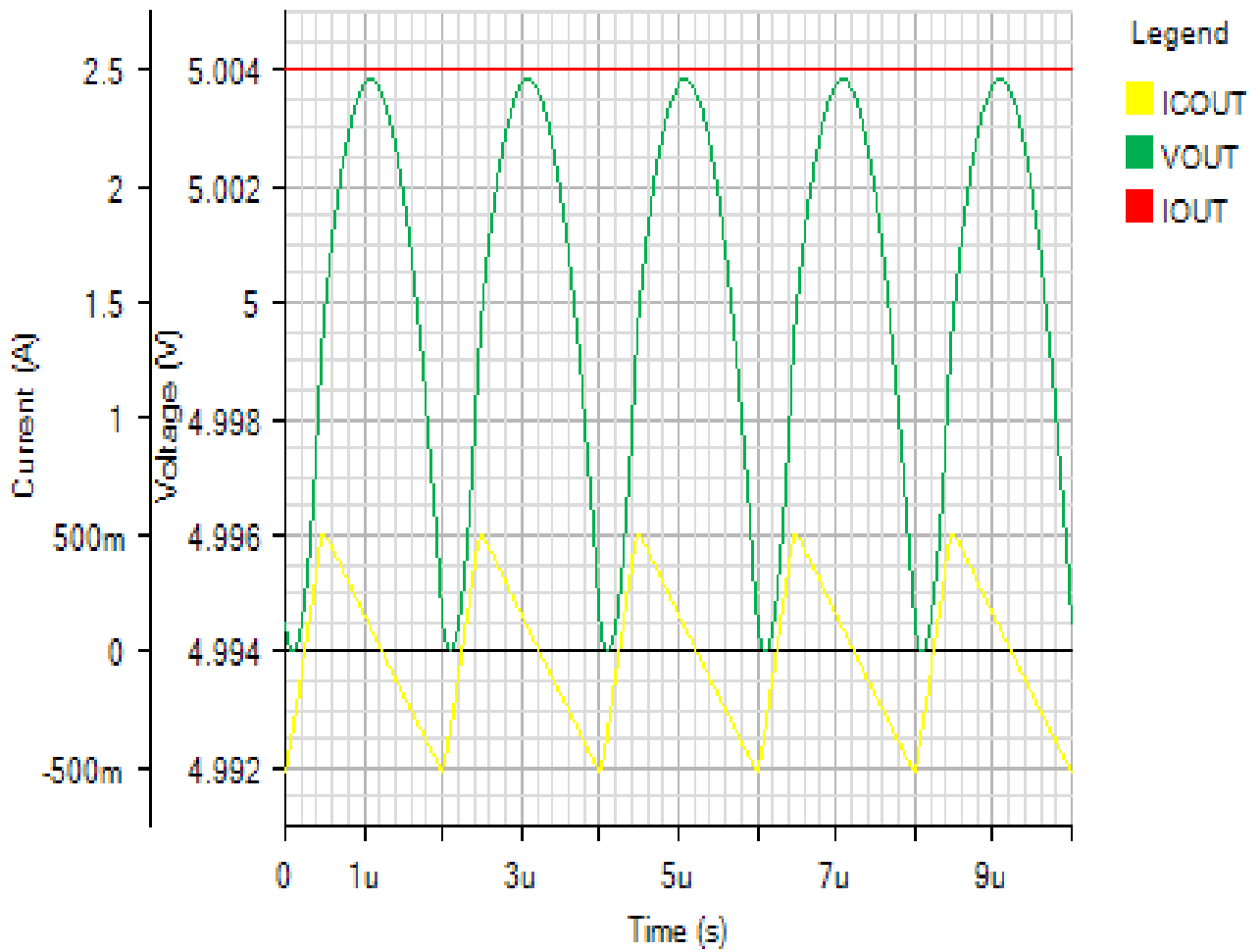
IC

Default



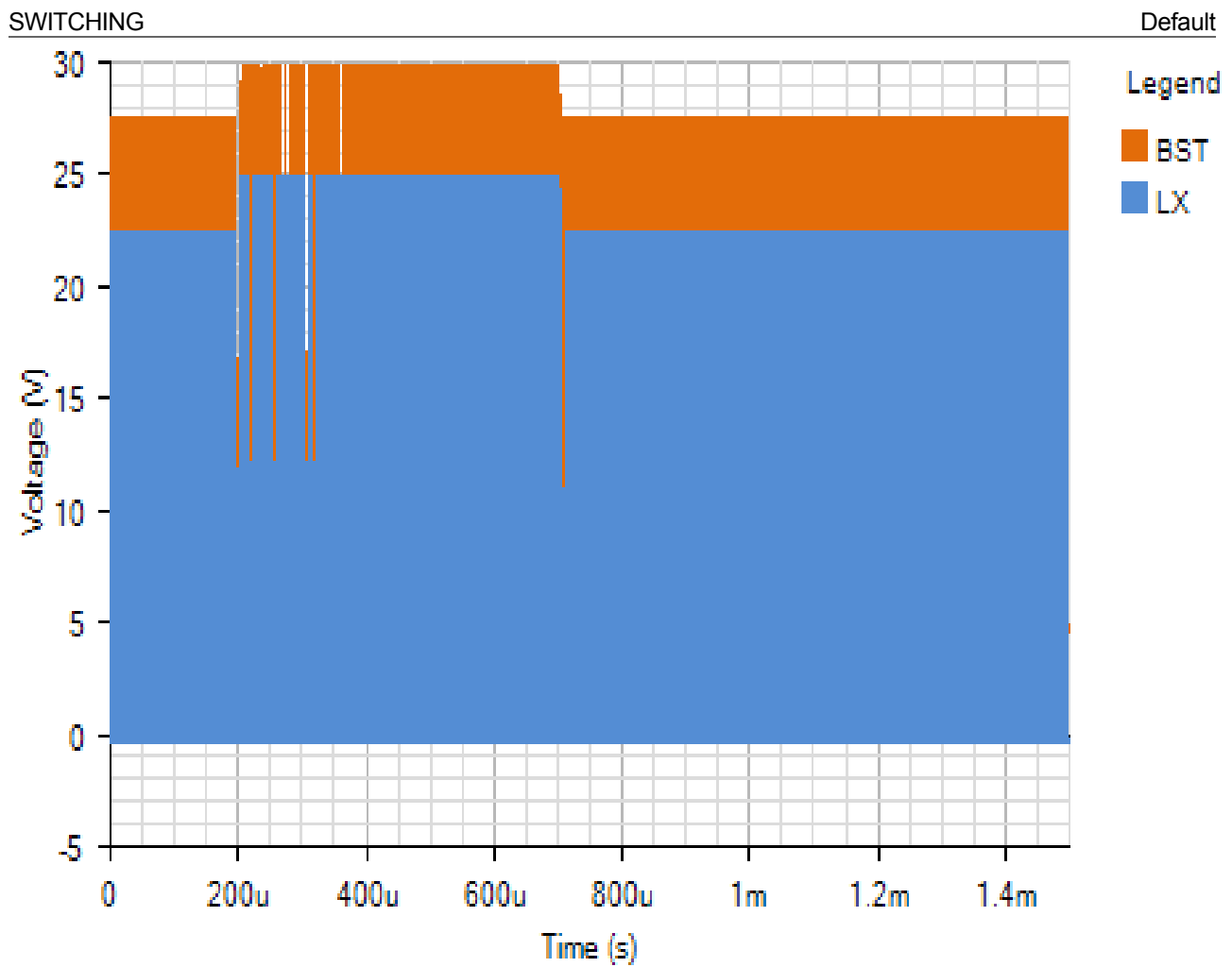
OUTPUT

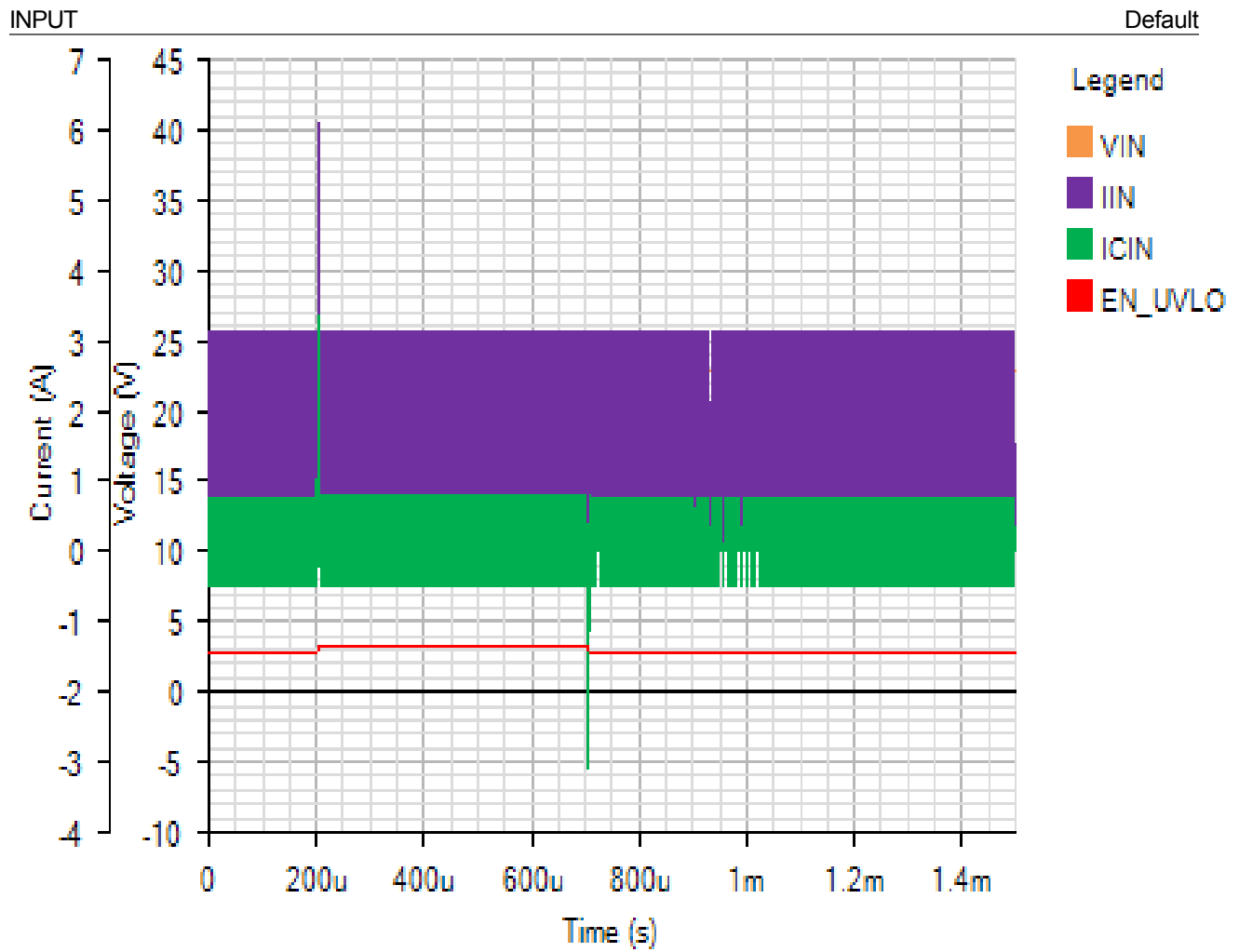
Default





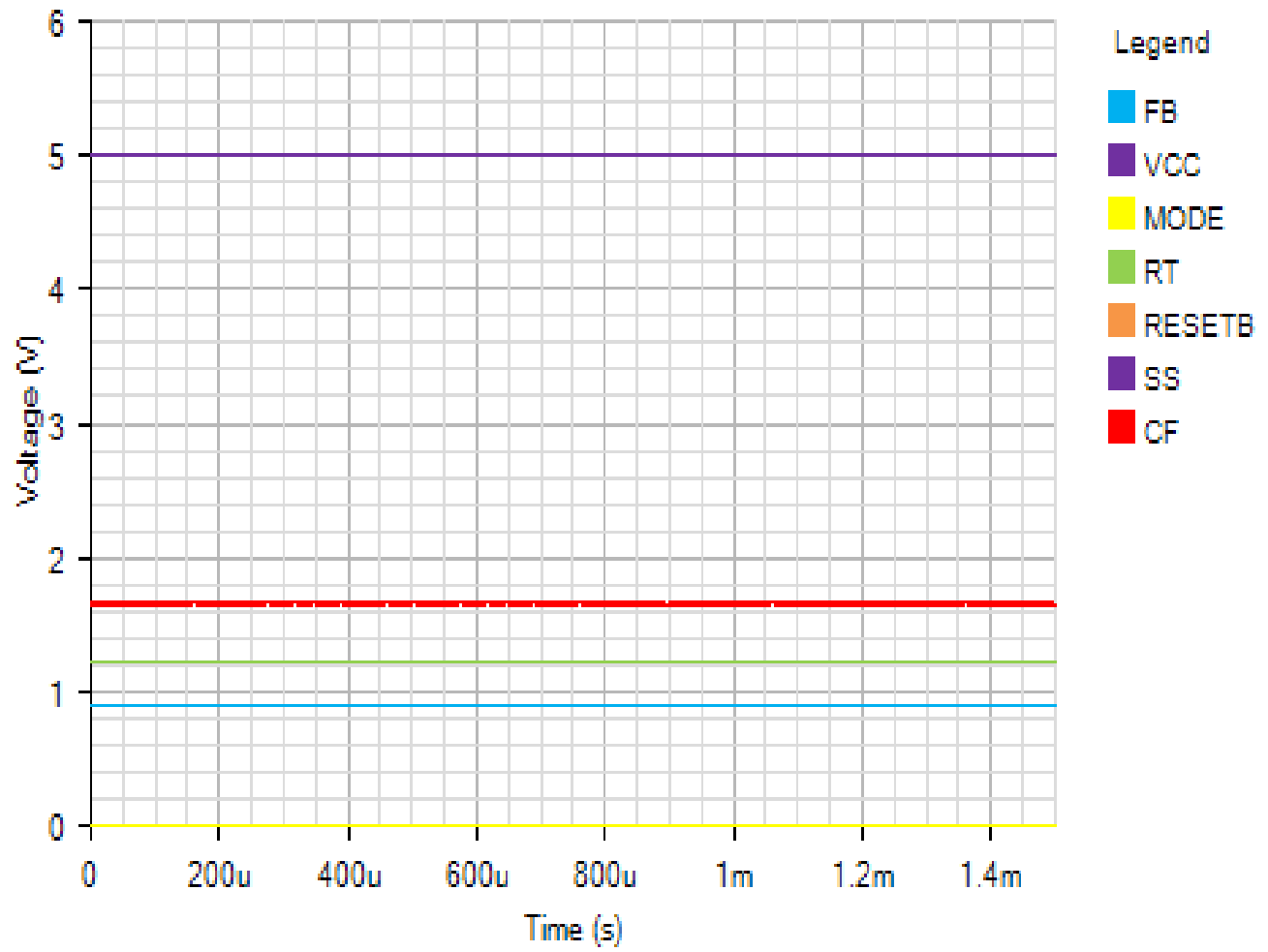
Line Transient - Mon Nov 26 2018 13:56:30





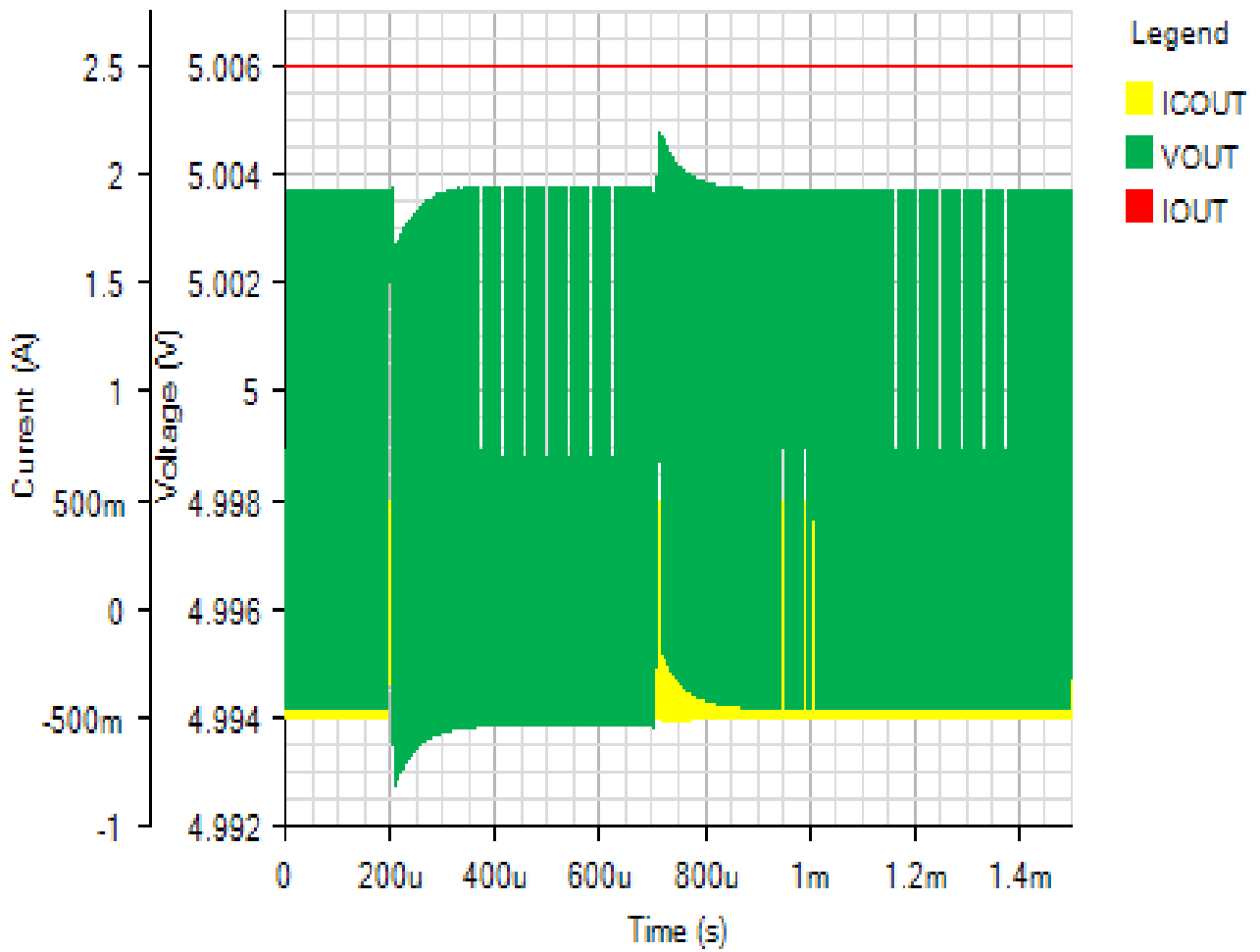
IC

Default

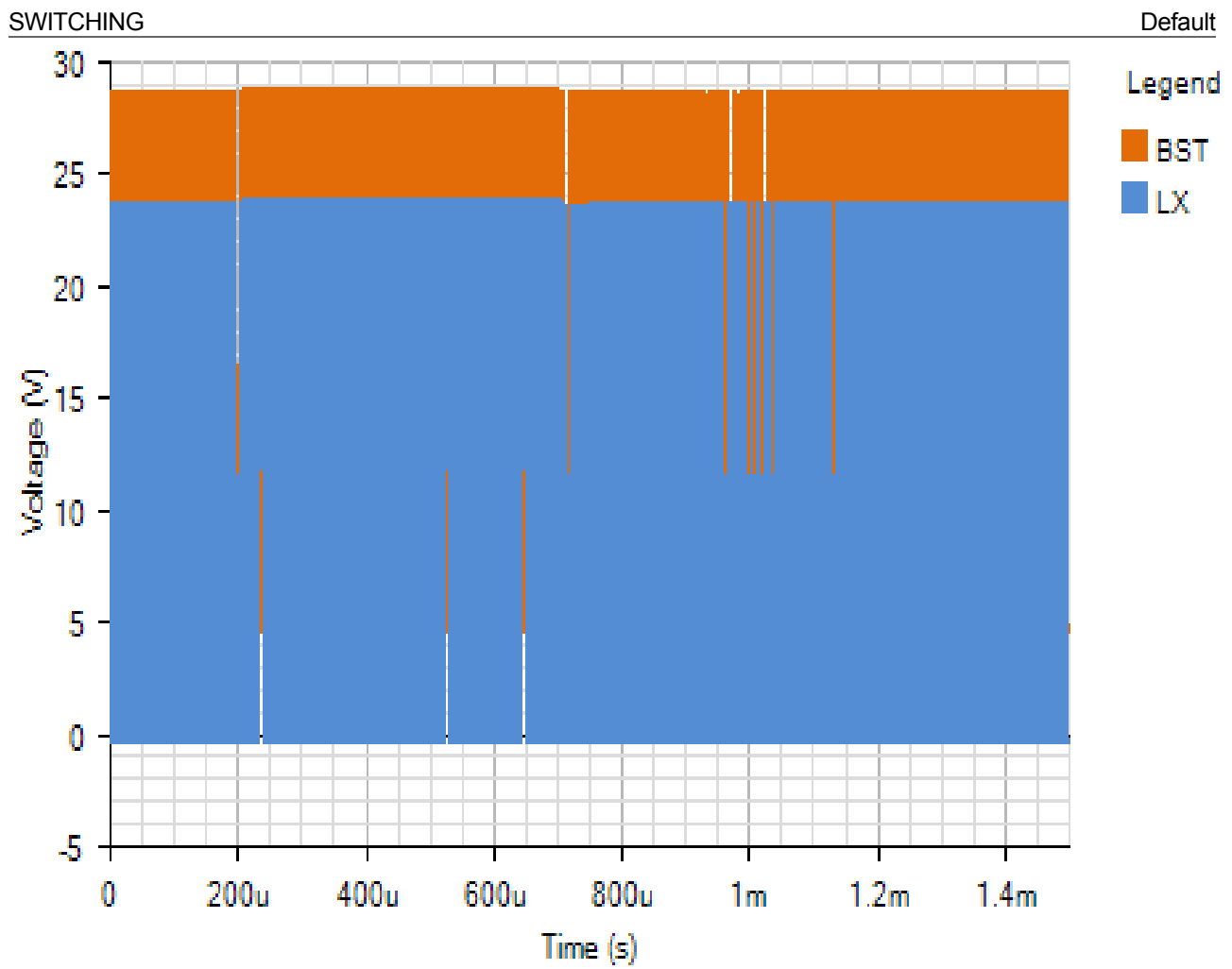


OUTPUT

Default

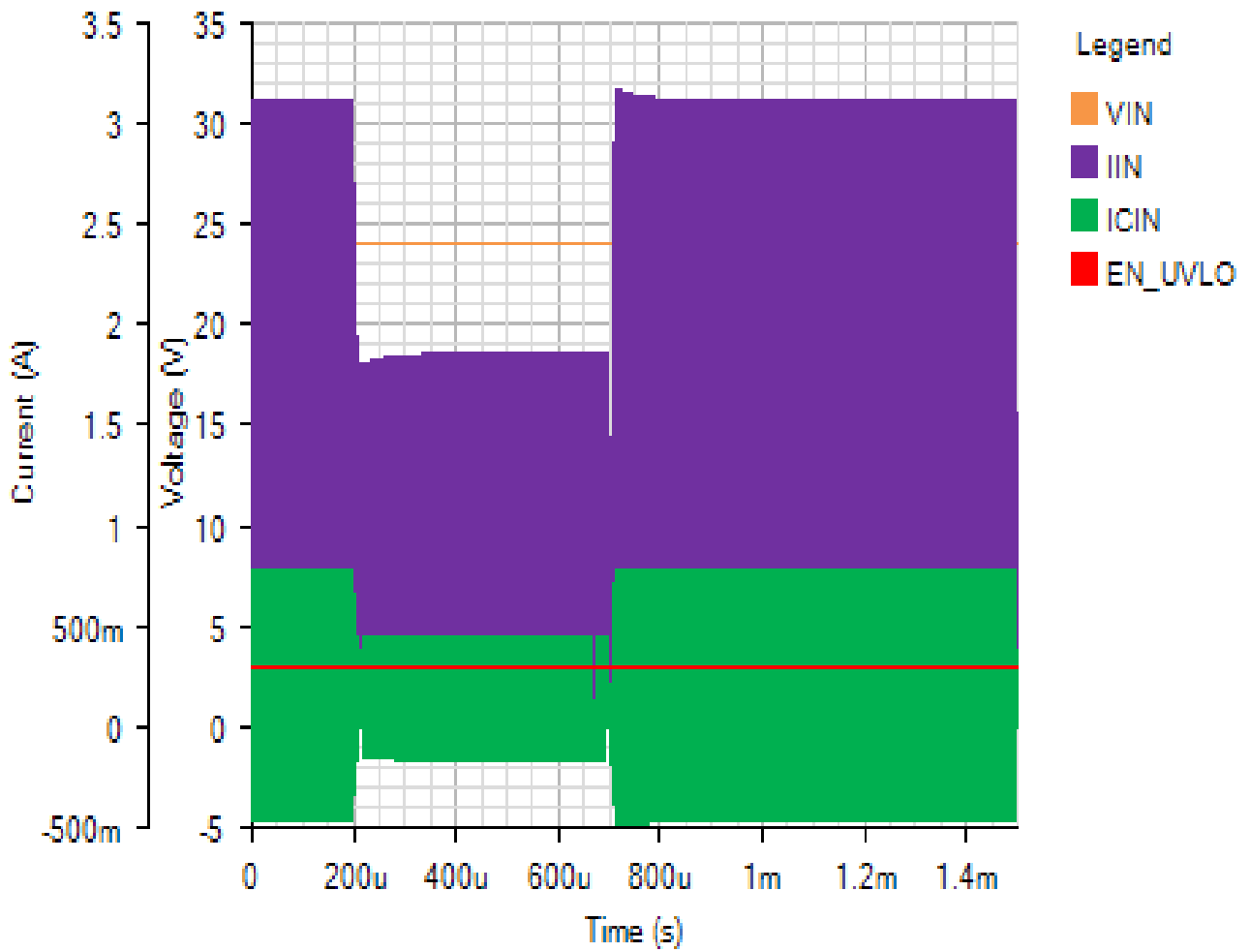


Load Step - Mon Nov 26 2018 13:56:30



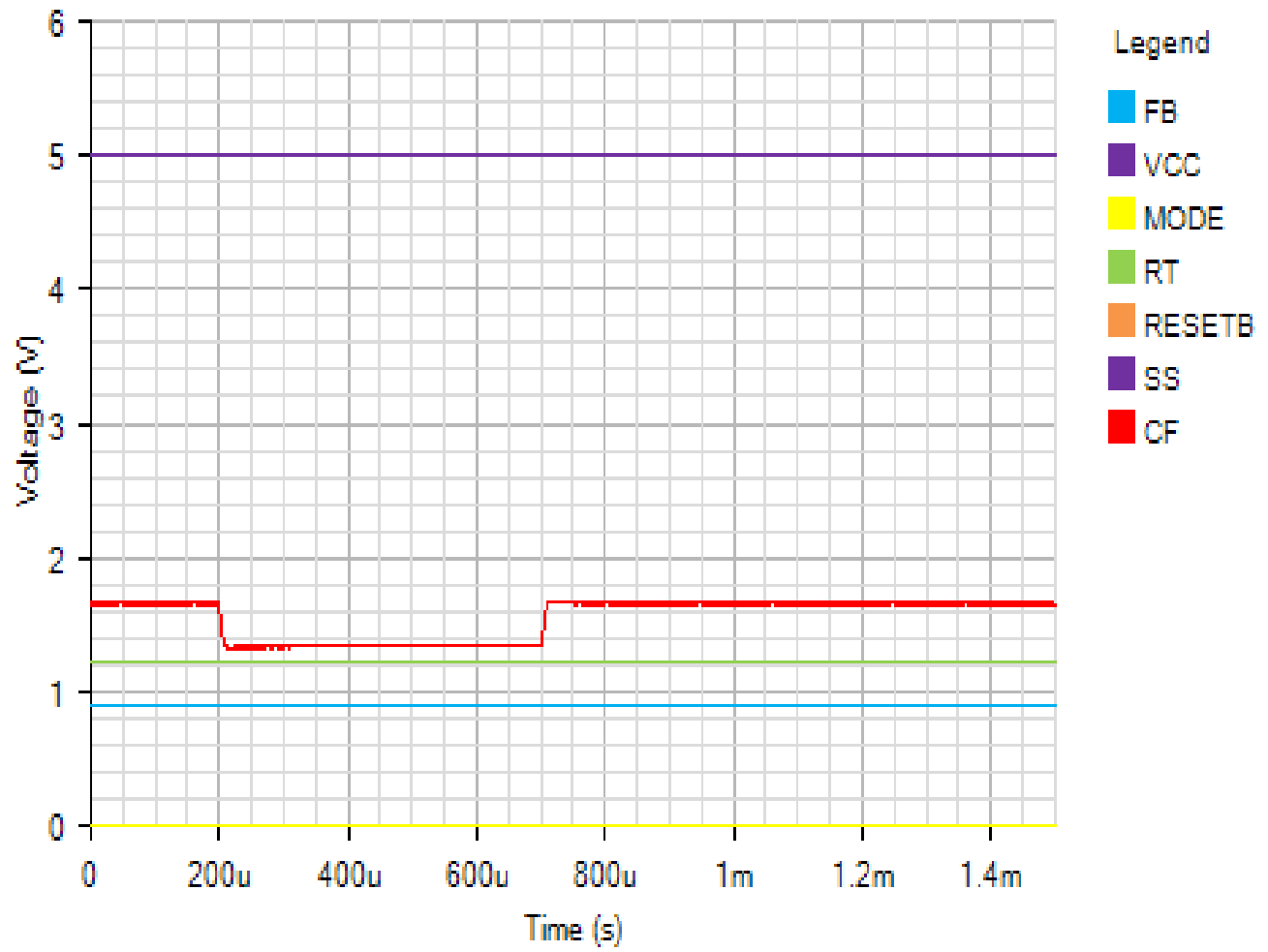
INPUT

Default



IC

Default



OUTPUT

Default

