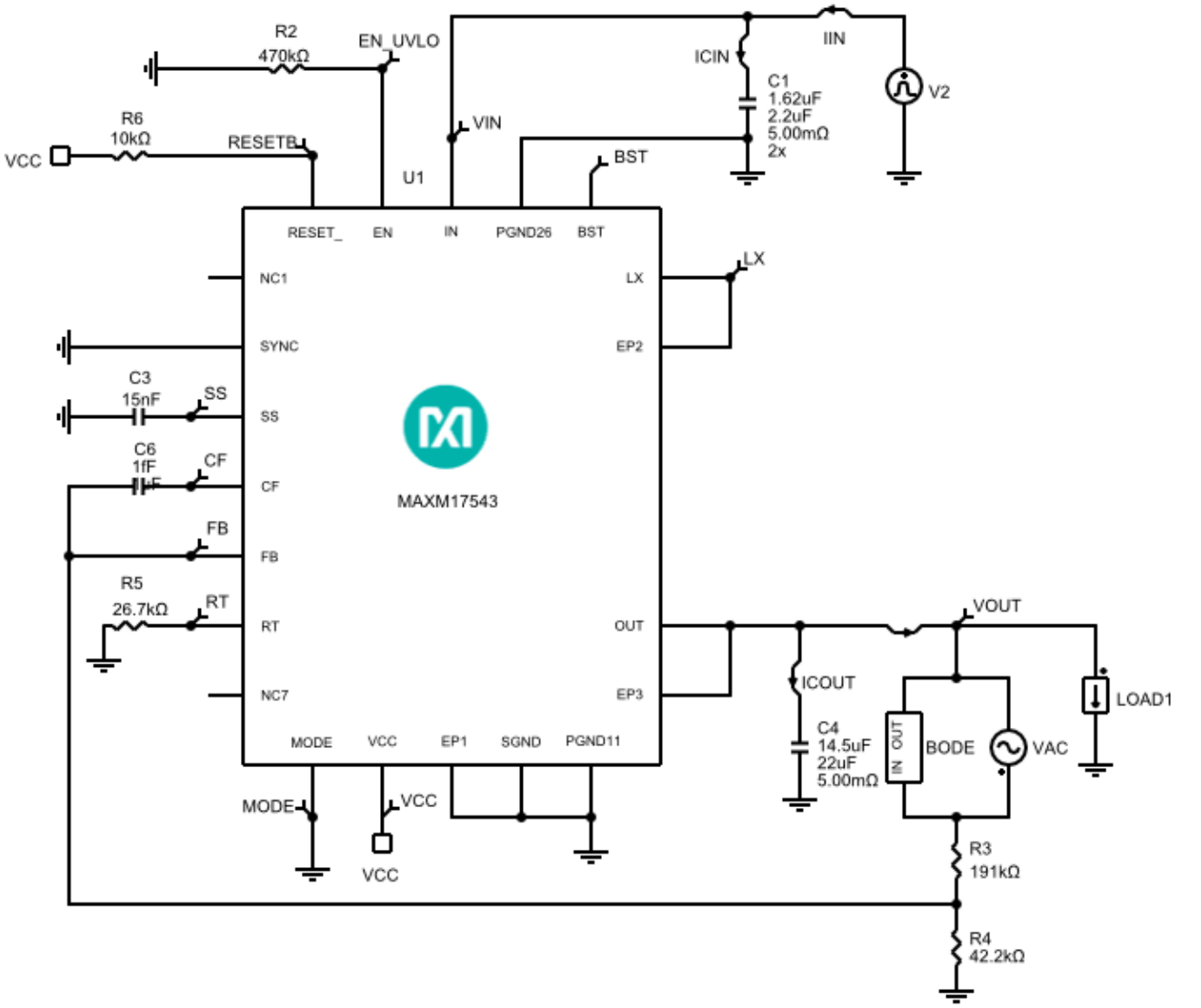
Initial Design

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	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 recomended. 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 selectec

BOM

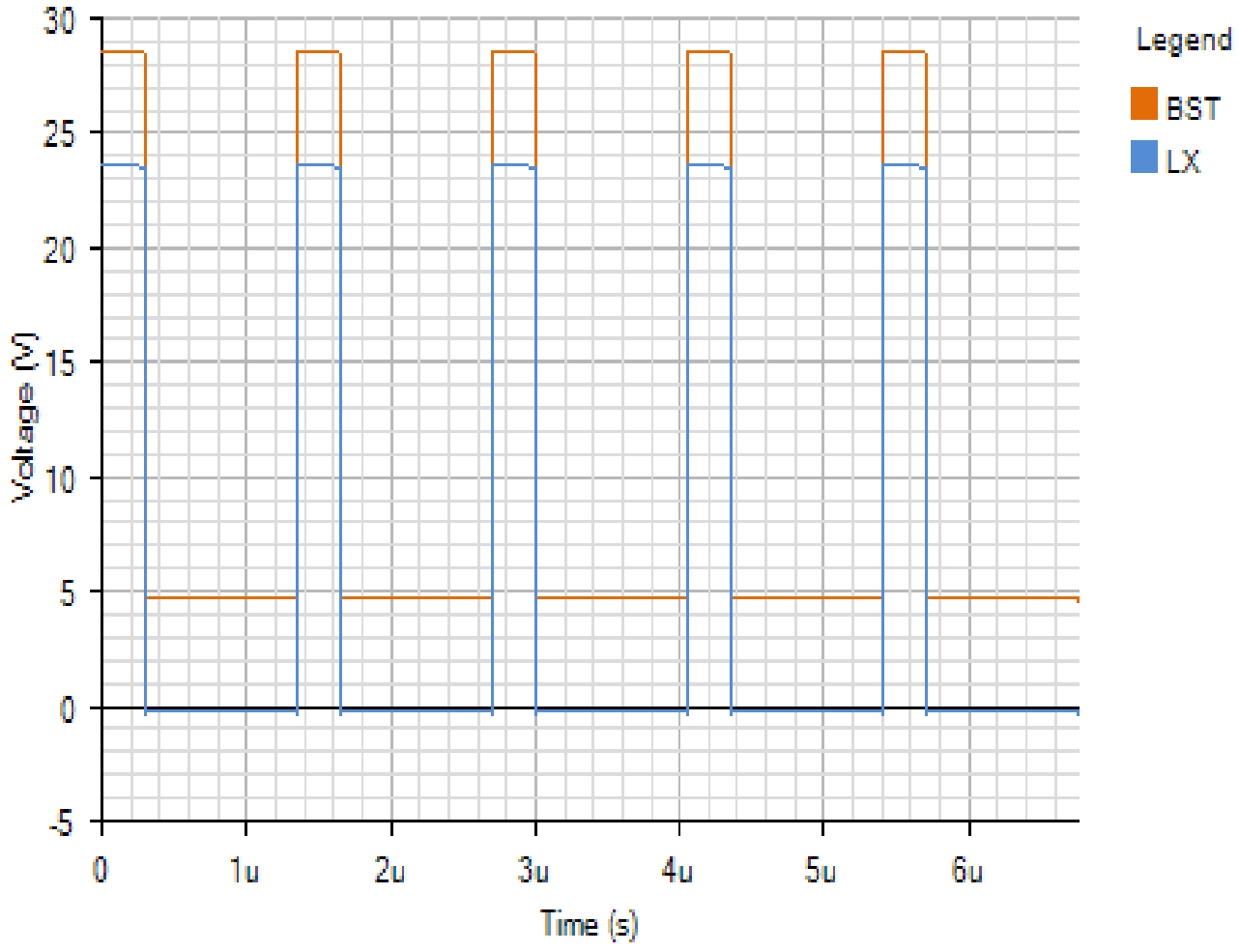
Ref	Qty	Part Number	Manufacturer	Description
U1	1	MAXM17543ALJ+	Maxim Integrated	4.5-42V, 2.5A, High-Efficiency, DC-DC Step-Down Power Module with Integrated Inductor
C1	2	C1210C225K1RAC	Kemet	Cap Ceramic 2.2uF 100V X7R 10% SMD 1210 125C Bulk
C3	1	CC0402KRX7R8BB153	Yageo	Cap Ceramic 0.015uF 25V X7R 10% 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

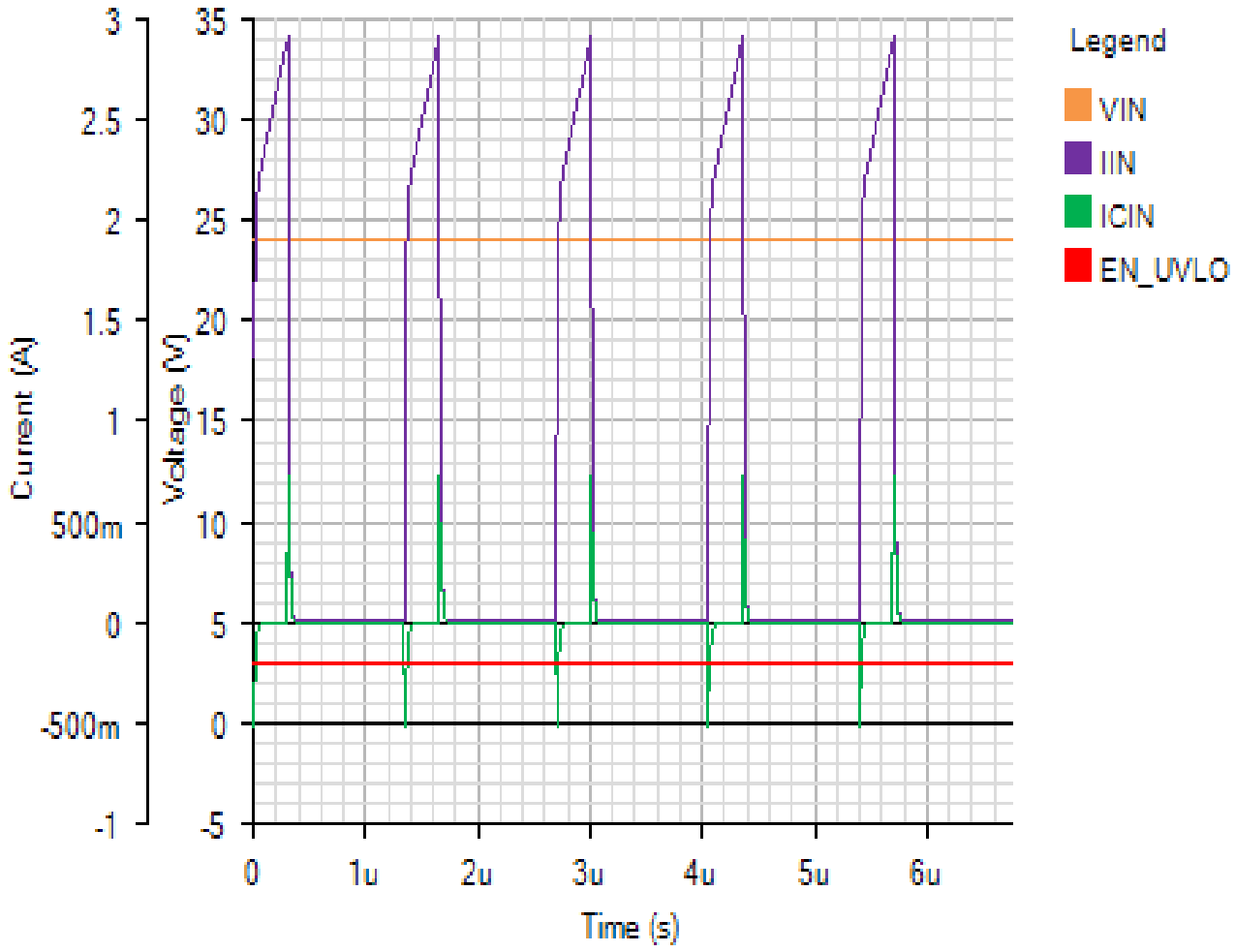
Simulation Results

Steady State - Mon Nov 26 2018 14:44:37

SWITCHING Default



INPUT Default



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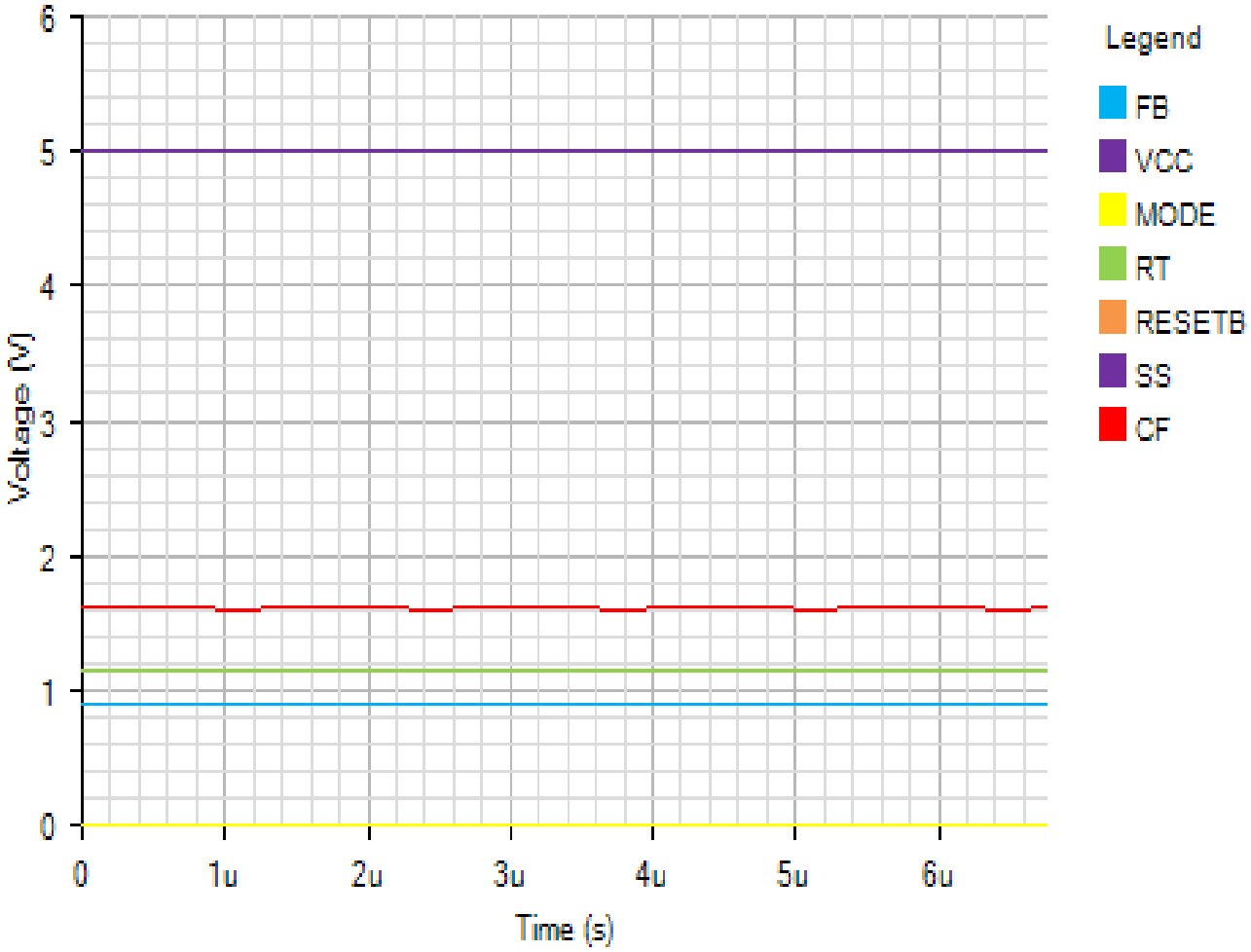

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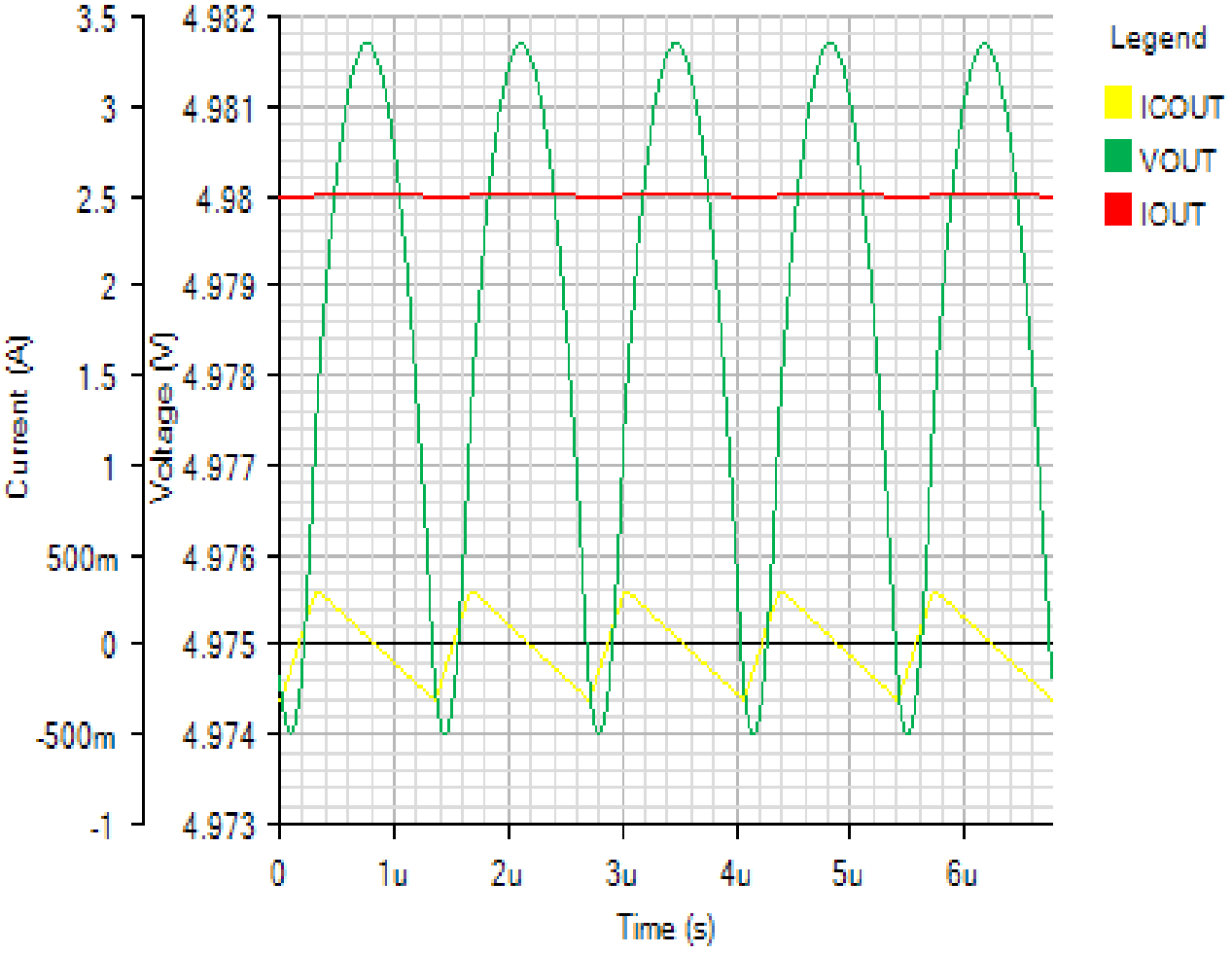
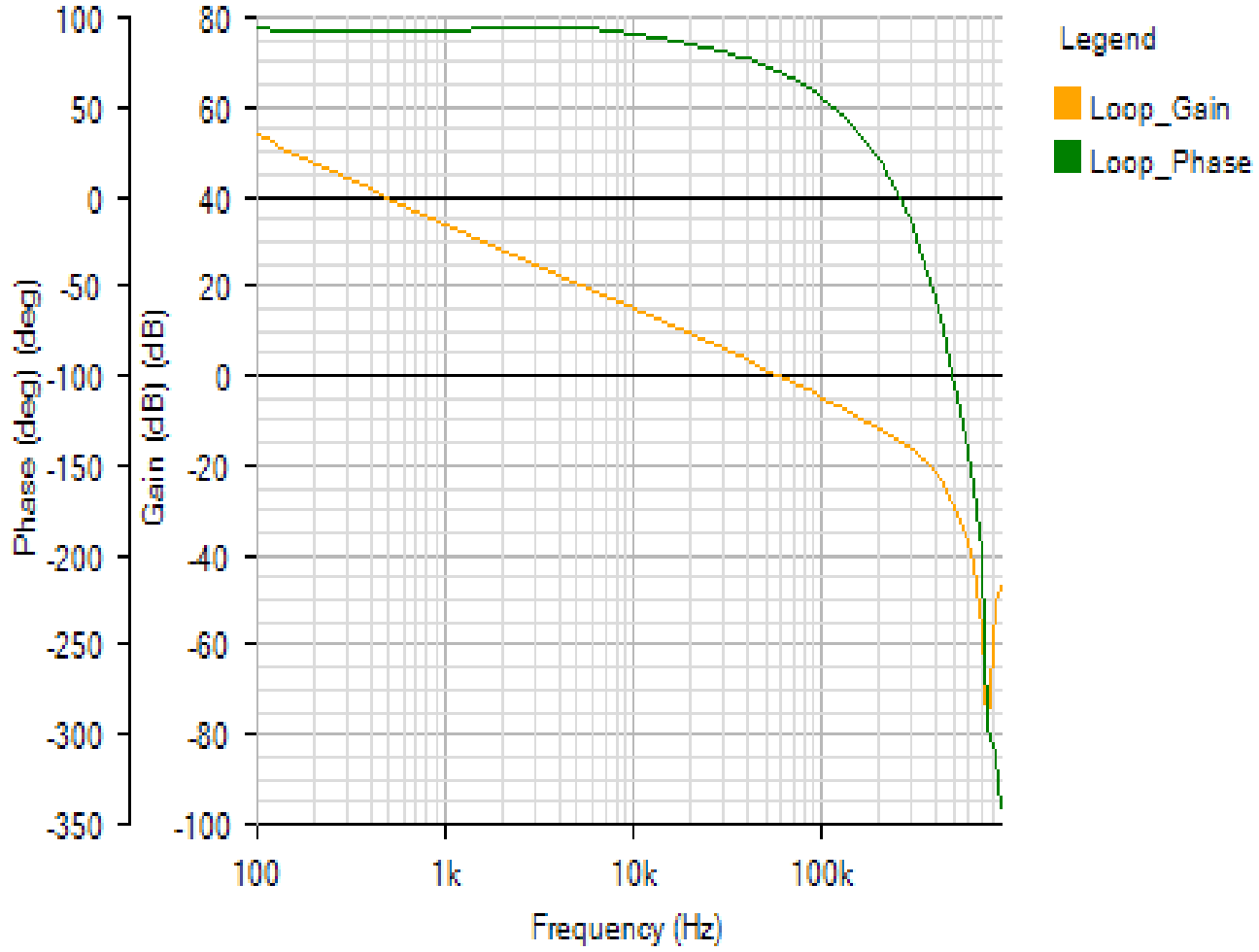
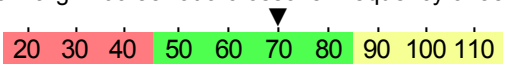


AC Loop - Mon Nov 26 2018 14:44:37

BODE Default



Phase Margin: 69.88° at a crossover frequency of 58.8kHz



Efficiency - Mon Nov 26 2018 14:44:37

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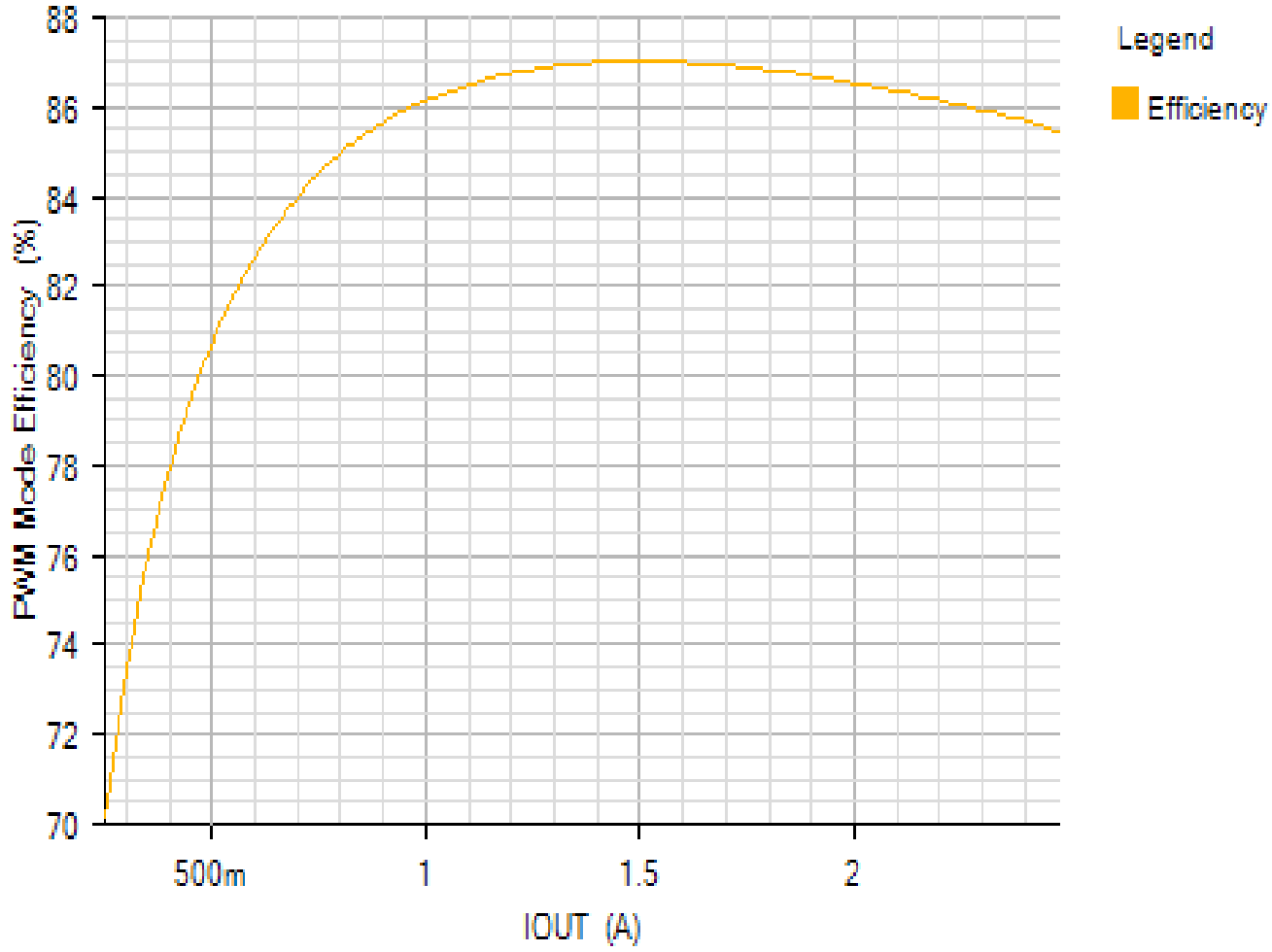
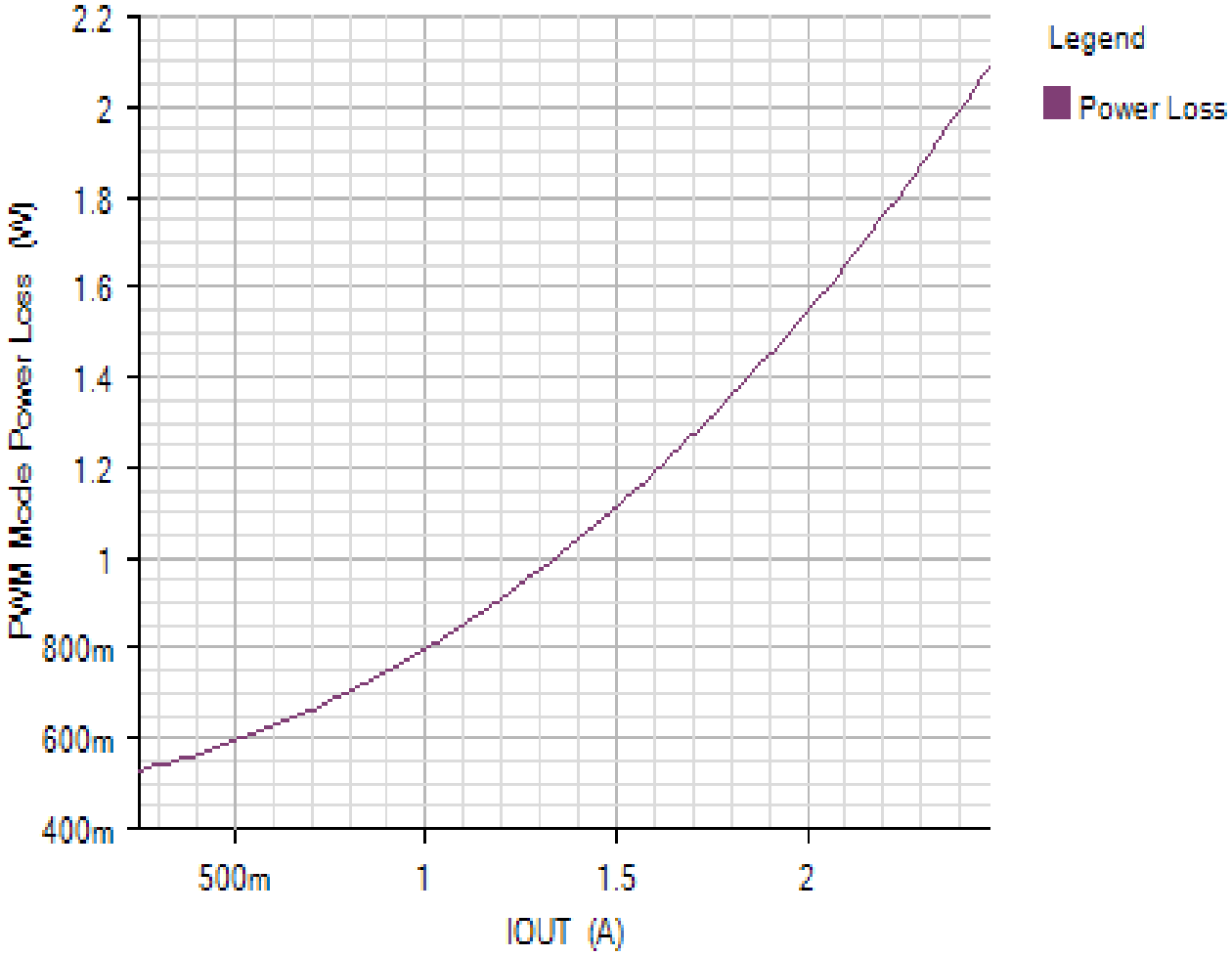
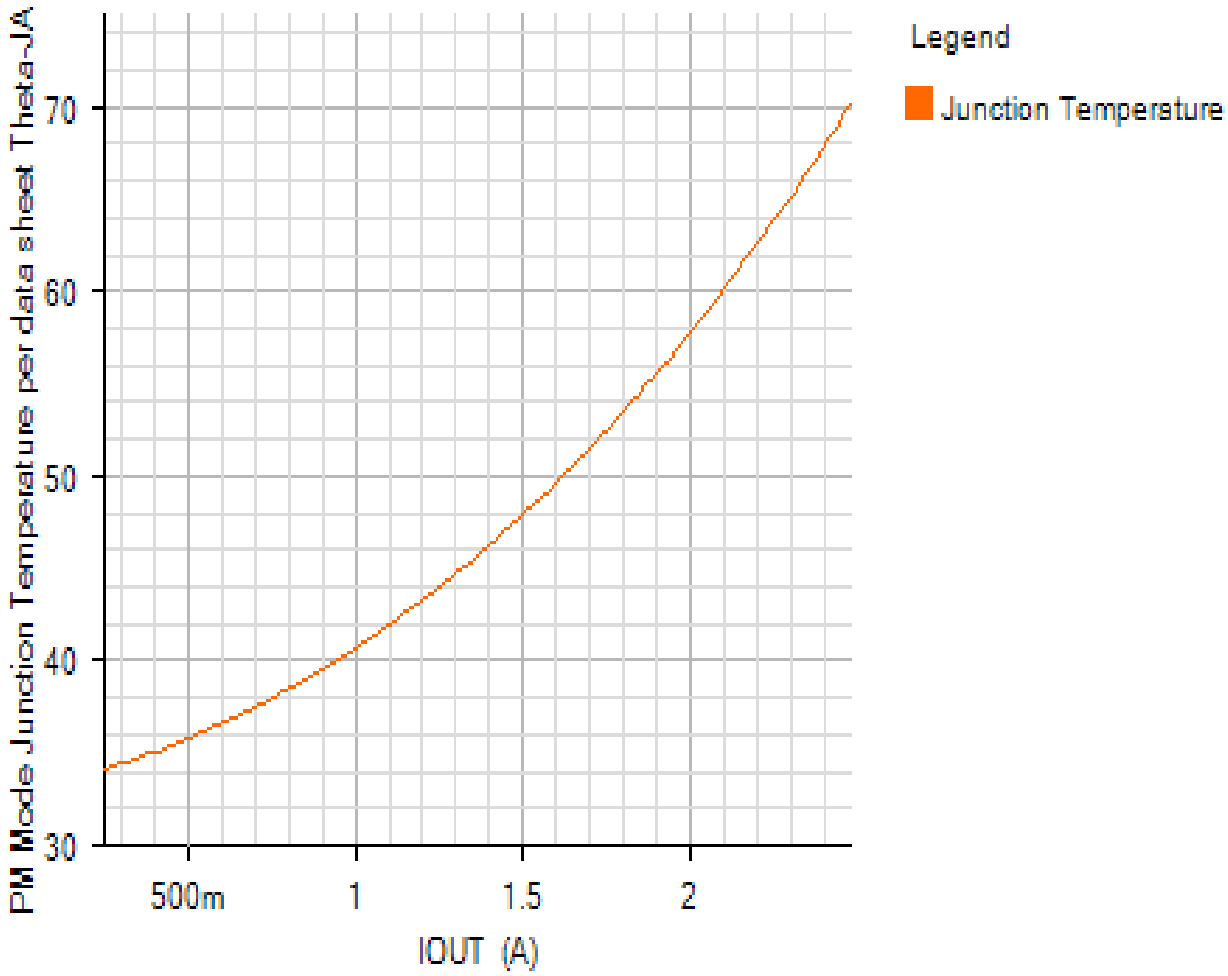


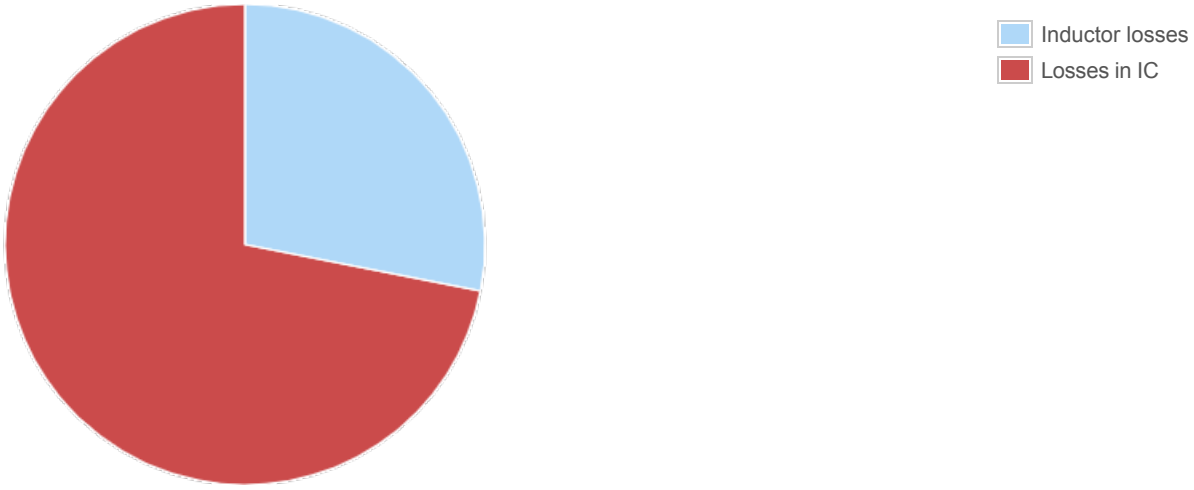
POWER_LOSS_PLOT Default



JUNCTION_TEMPERATURE_PLOT Default



Losses

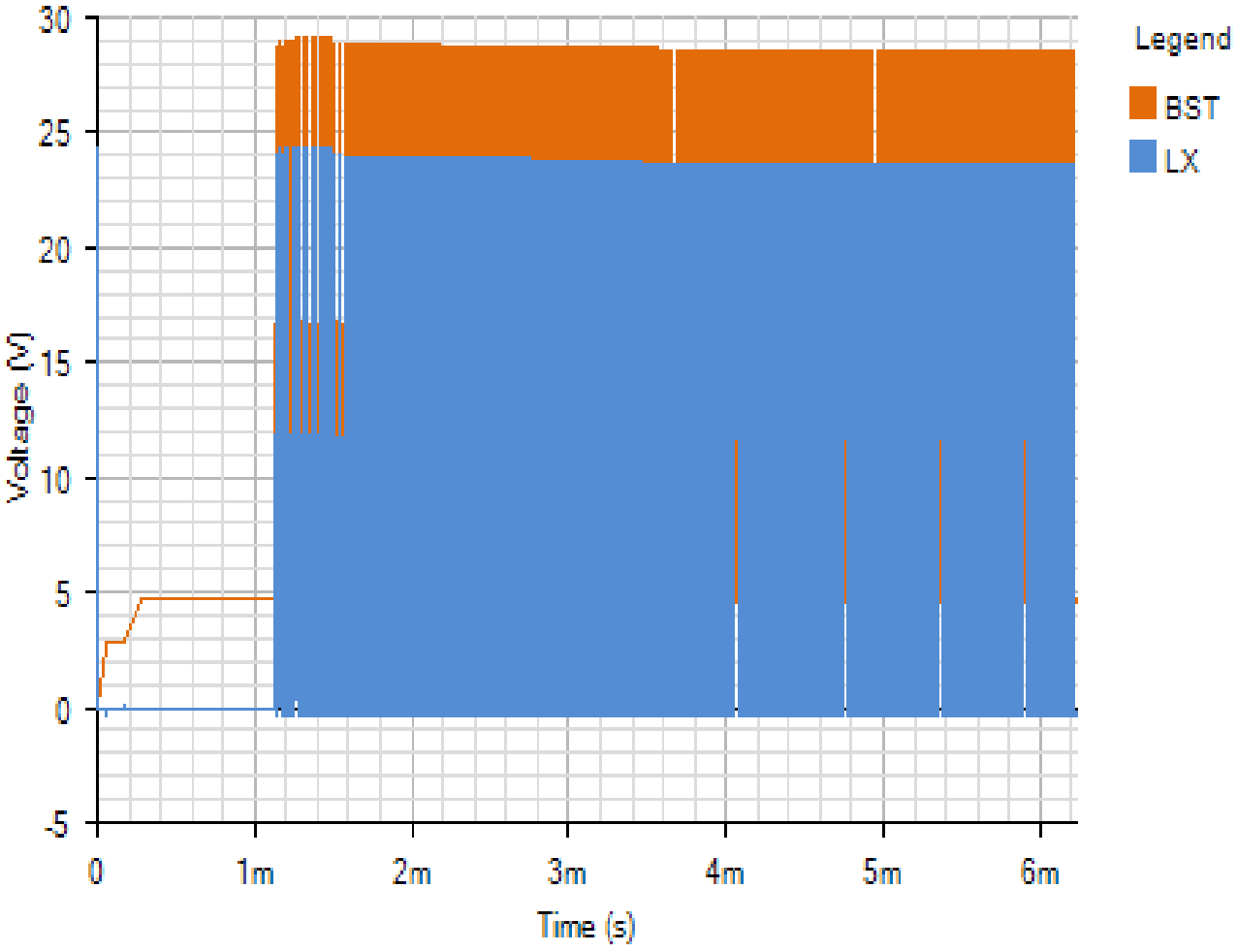


Component	Loss (W)	% of total

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 14:44:37

SWITCHING Default



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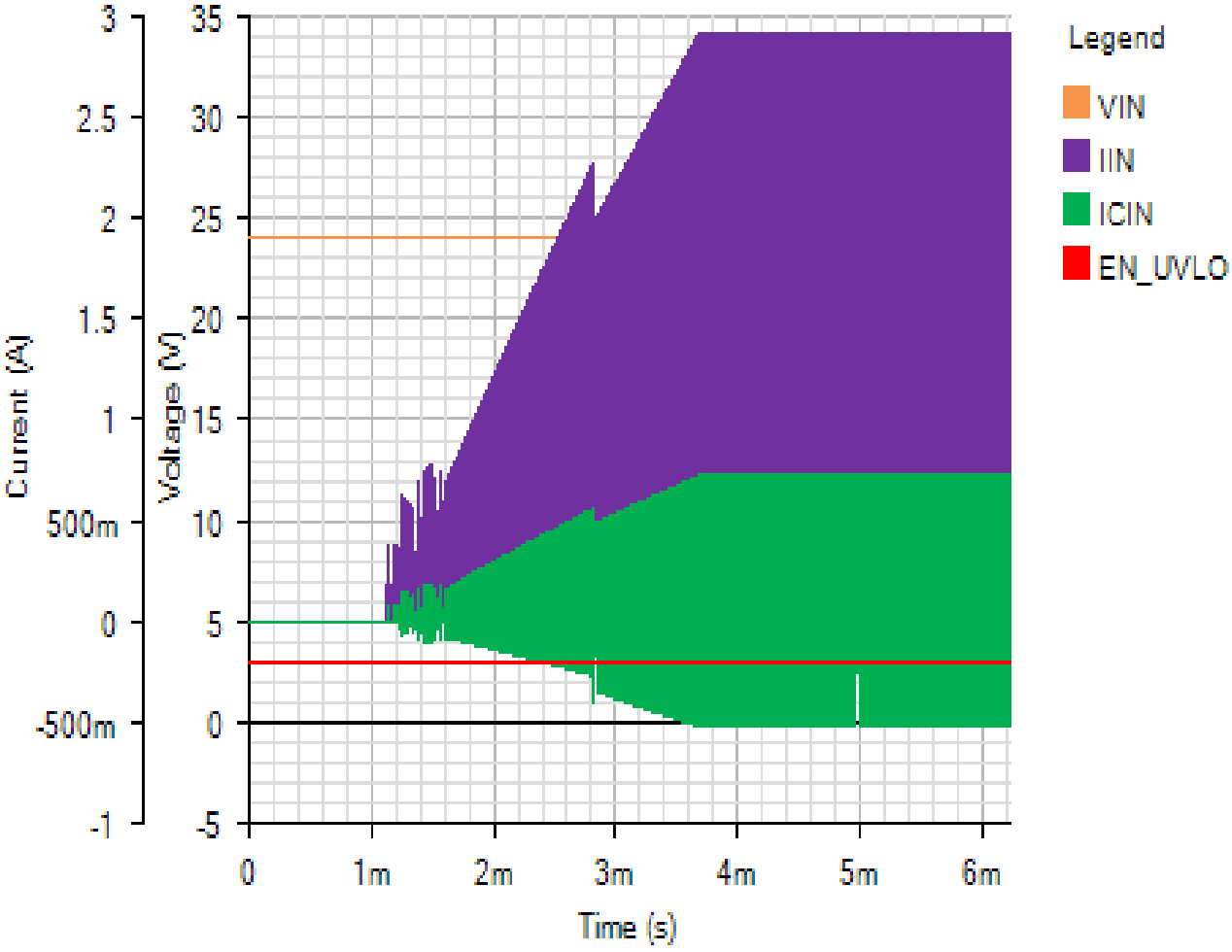
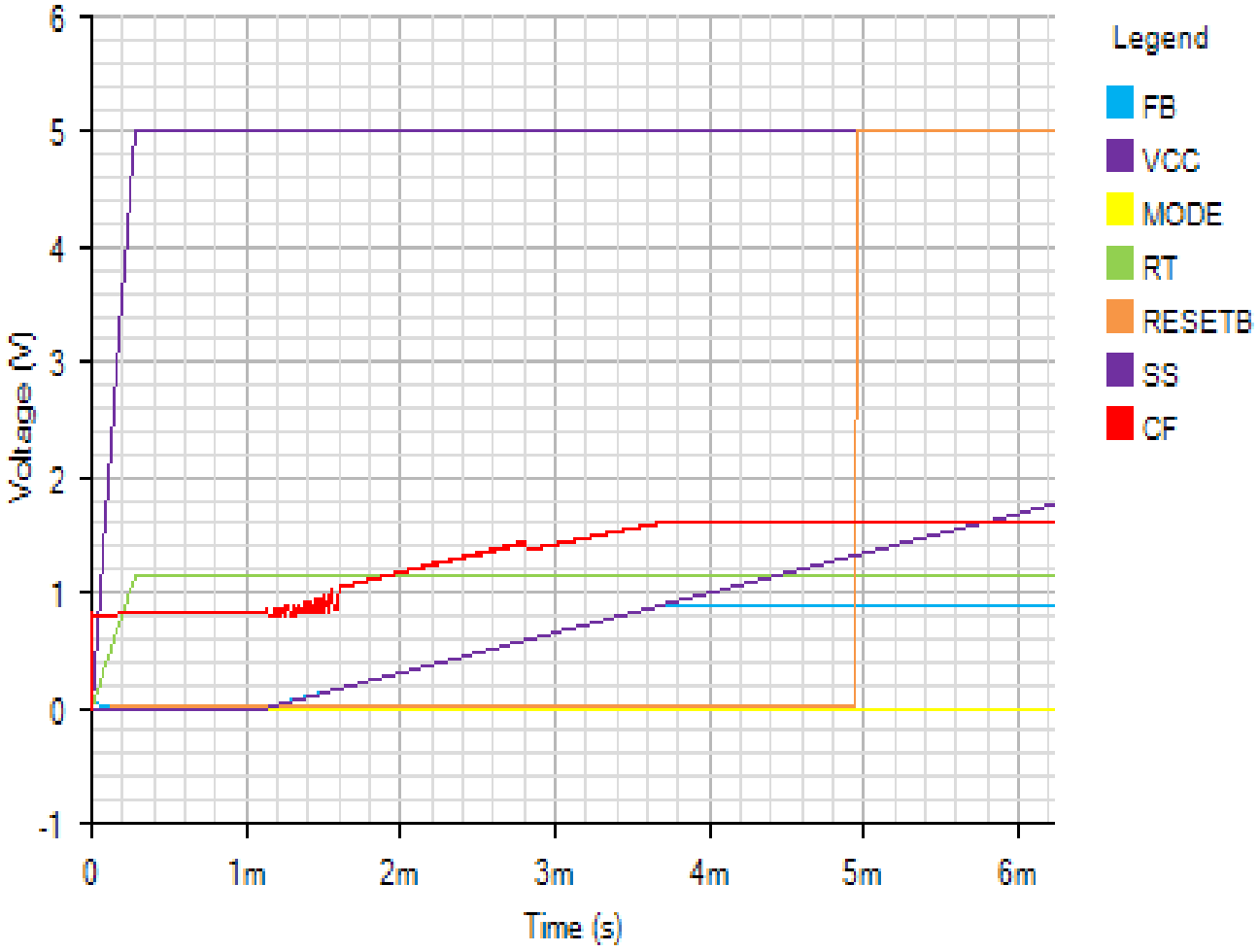
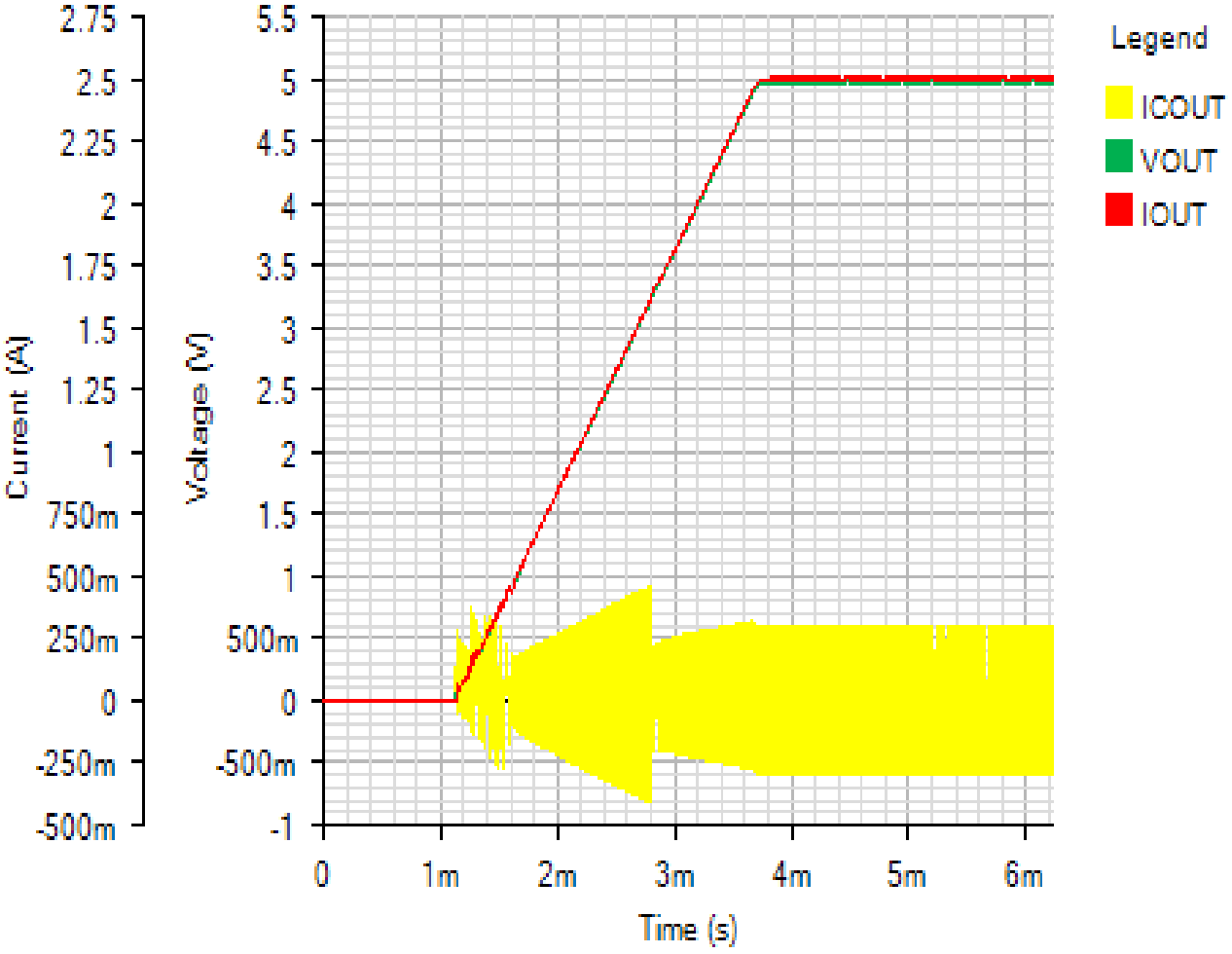


IC Default

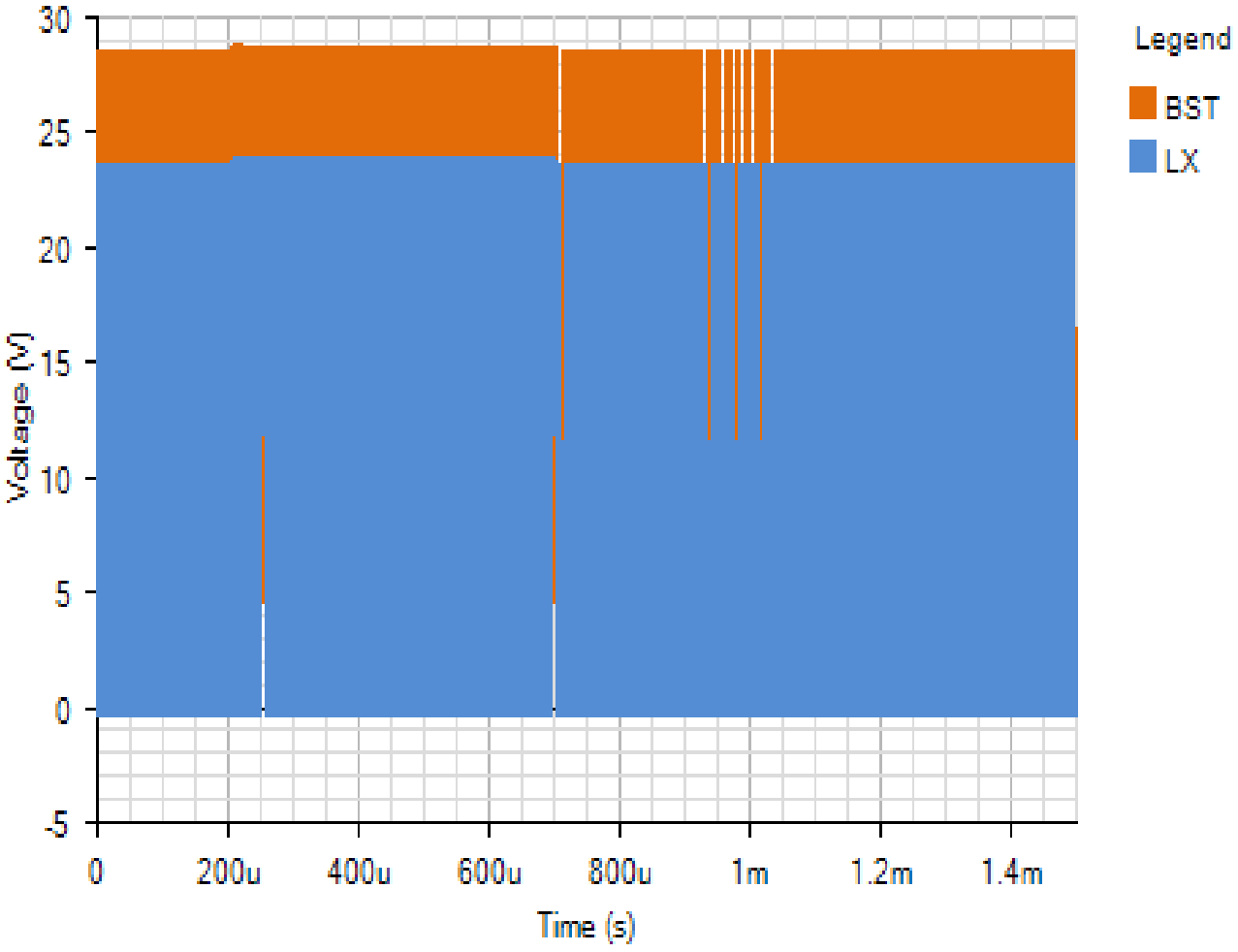


OUTPUT Default



Load Step - Mon Nov 26 2018 14:44:37

SWITCHING Default



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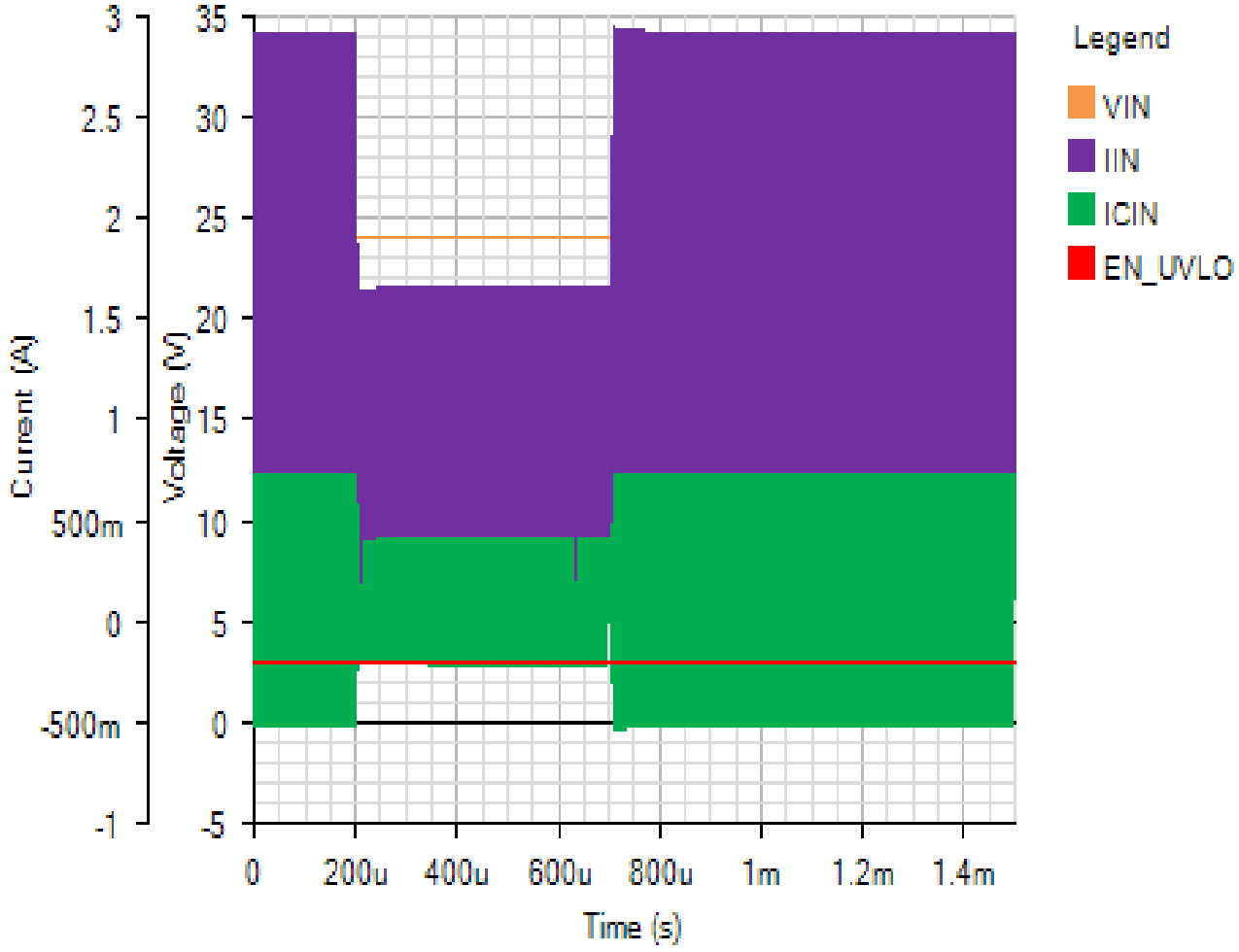

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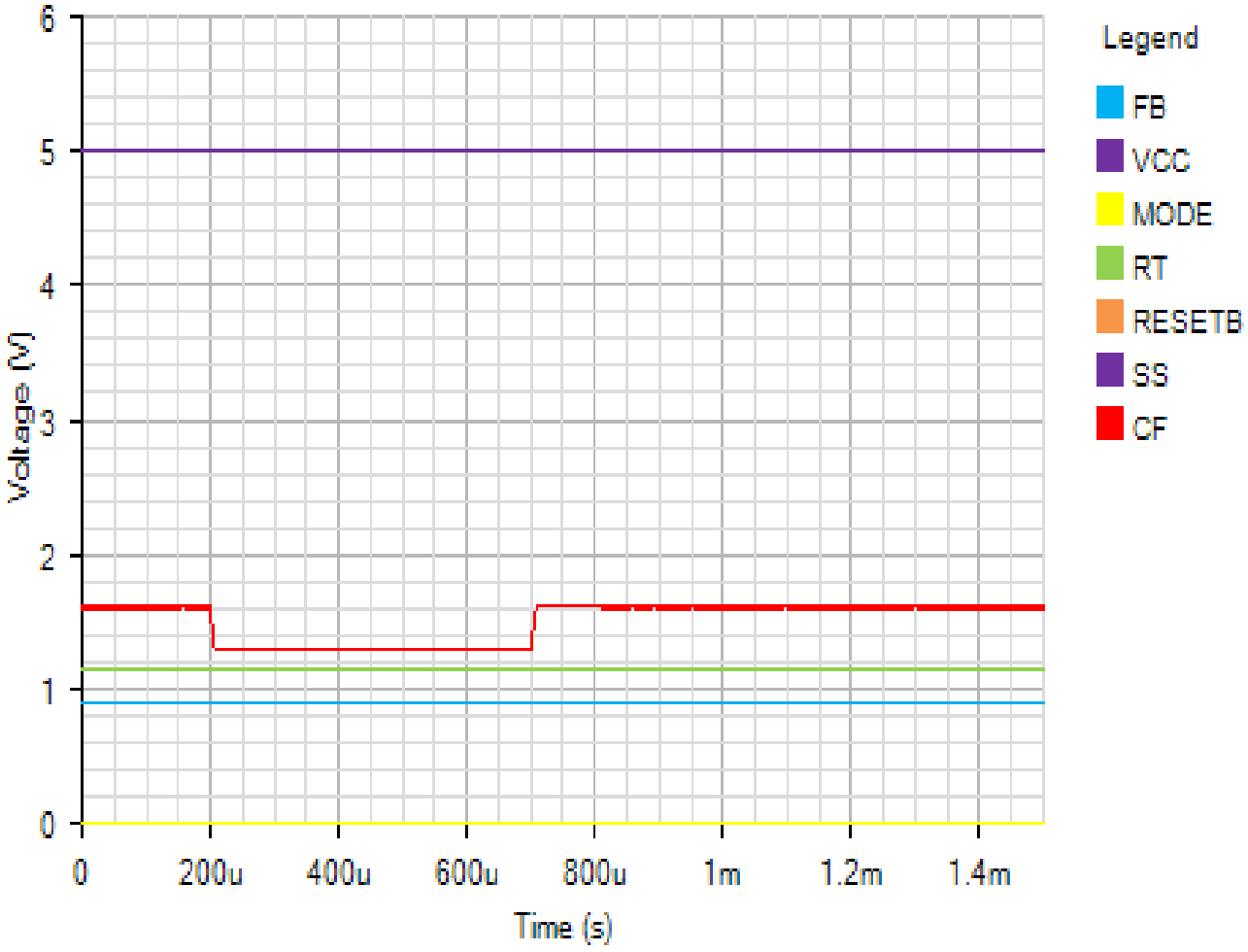
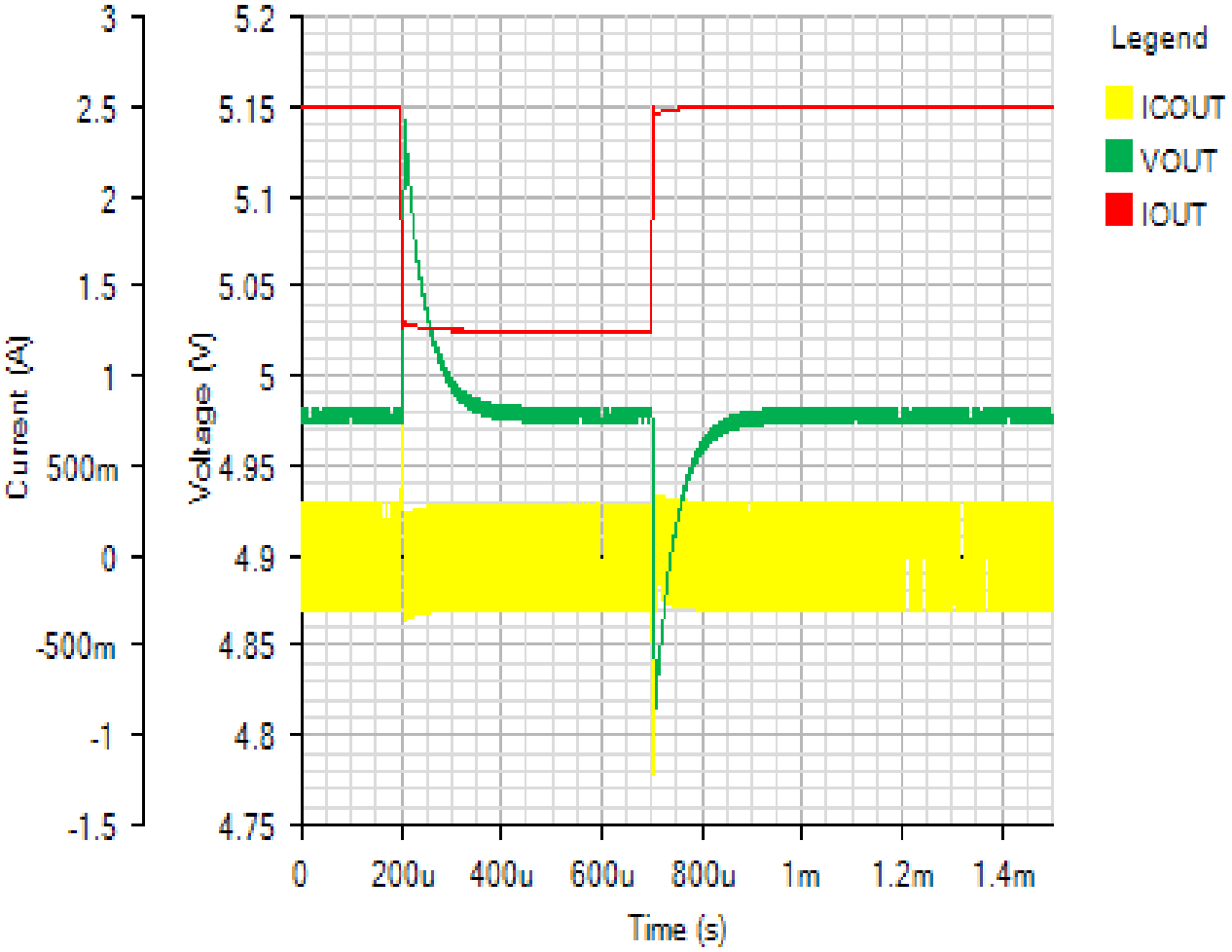
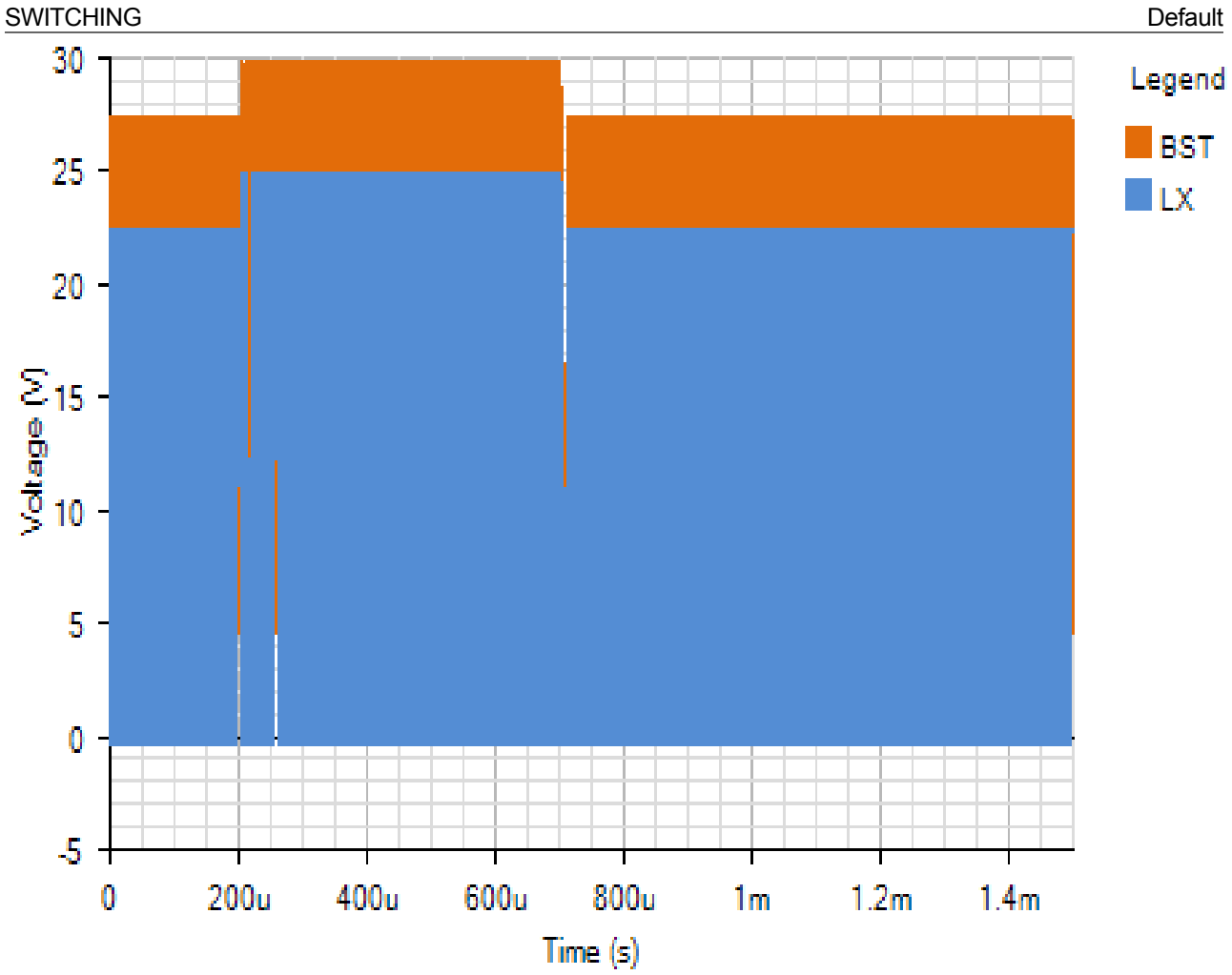


OUTPUT Default



Line Transient - Mon Nov 26 2018 14:44:37



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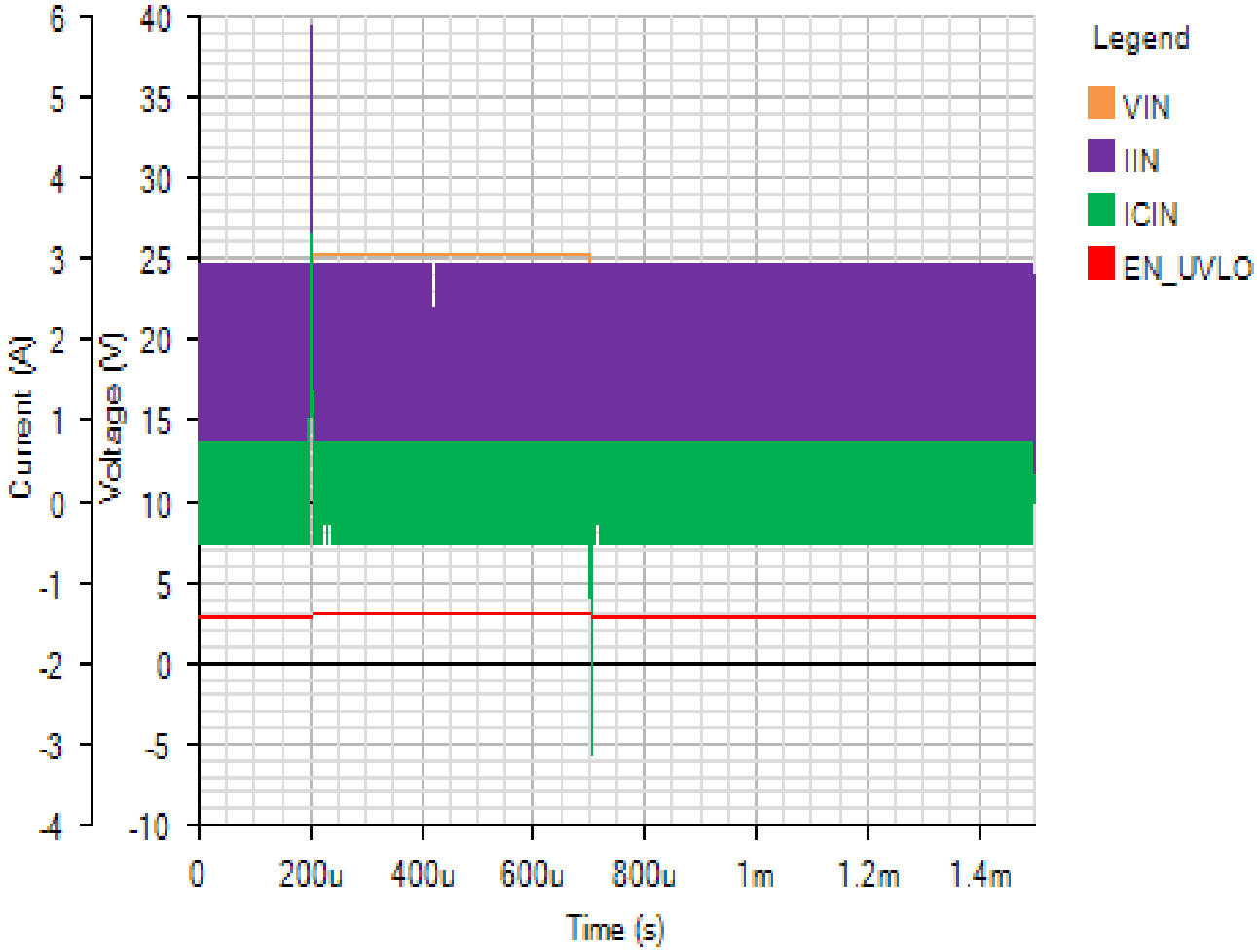

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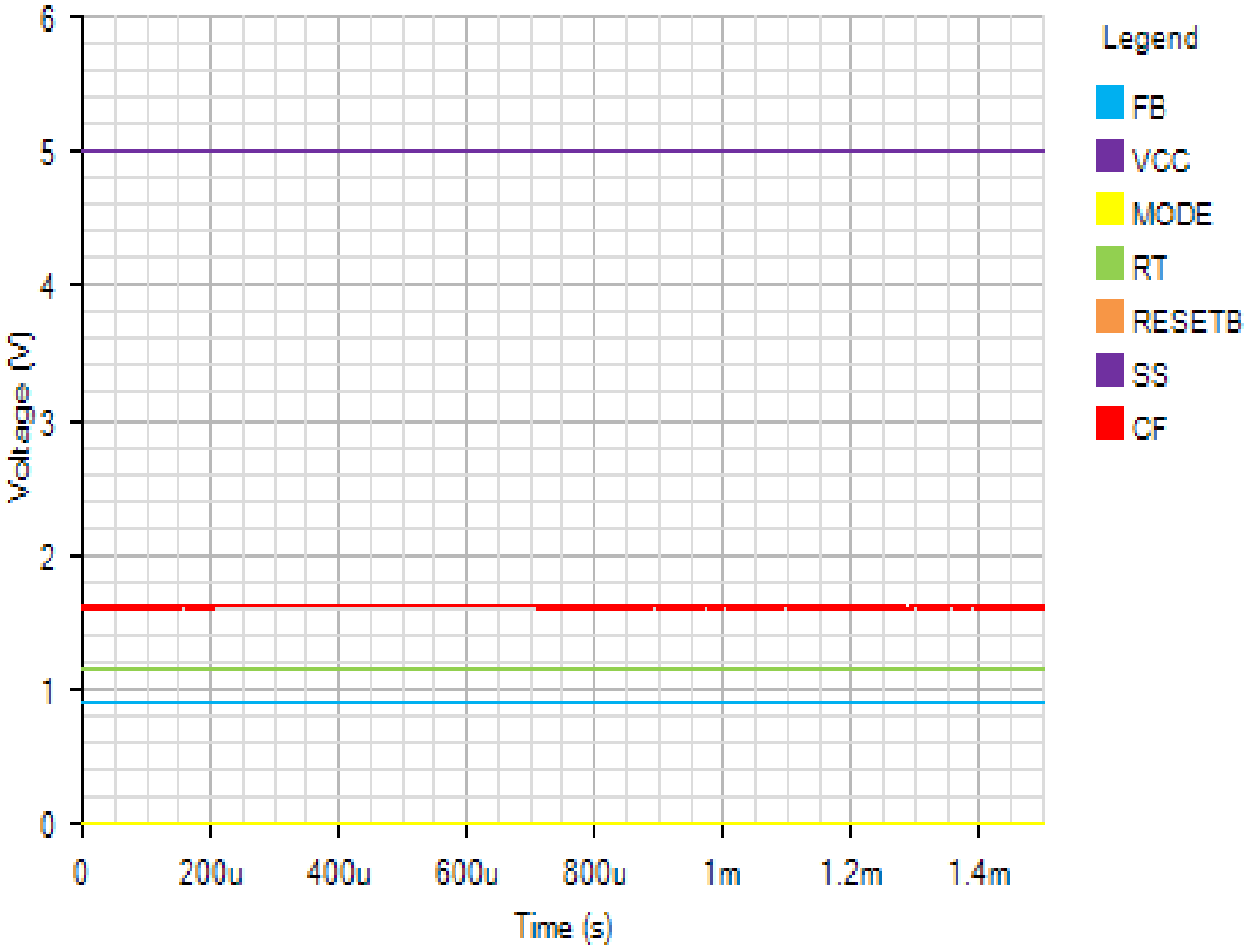

OUTPUT Default