

Initial Design

1.0

Design Requirements

Parameter	Value
Minimum Input Voltage	13V
Maximum Input Voltage	15V
Nominal Input Voltage	14V
Input Voltage Ripple	1%
Output Voltage Programming	Externally Resistor Adjustable
Output Voltage	5V
Output Current	1.5A
Output Voltage Ripple	1%
Load Step Start Current	0.75A
Load Step Current	1.5A
Load Step Edge Rate	5A/us
Output Voltage Load Step Over/Undershoot	3%
Performance Priority	Balance Efficiency and Size
BOM Priority	Cost
Switching Frequency	695kHz
Mode of Operation	PWM
Inductor Current Ratio (LIR)	0.3
Ambient Temperature	25°C

1. A mode for Maximum Duty Cycle Operation which is engaged when V_{out} is within a few percent of V_{in} .
2. Spread Spectrum - the model will always operate with Spread Spectrum turned off, regardless of whether the SPS pin is pulled high or low.

Ref	Qty	Part Number	Manufacturer	Description
U1	1	MAX17243	Maxim Integrated	3.5V - 36V, 2A/3A, Synchronous Buck Converter with 15µA Quiescent Current and Reduced EMI
C1	1	C3216X7R1V106K160AC	TDK	Cap Ceramic 10uF 35V 1206 125C
C2	1	06035C104KAT2A	AVX	Cap Ceramic 0.1uF 50V X7R 10% Pad SMD 0603 125°C T/R
C3	1	C0402C150K5GACTU	KEMET Corporation	Cap Ceramic 15pF 50V C0G 10% Pad SMD 0402 125°C T/R
C4	1	C1608X7R1A225K080AC	TDK	Cap Ceramic 2.2uF 10V X7R 10% Pad SMD 0603 125°C T/R
C8	1	06035C104KAT2A	AVX	Cap Ceramic 0.1uF 50V X7R 10% Pad SMD 0603 125°C T/R

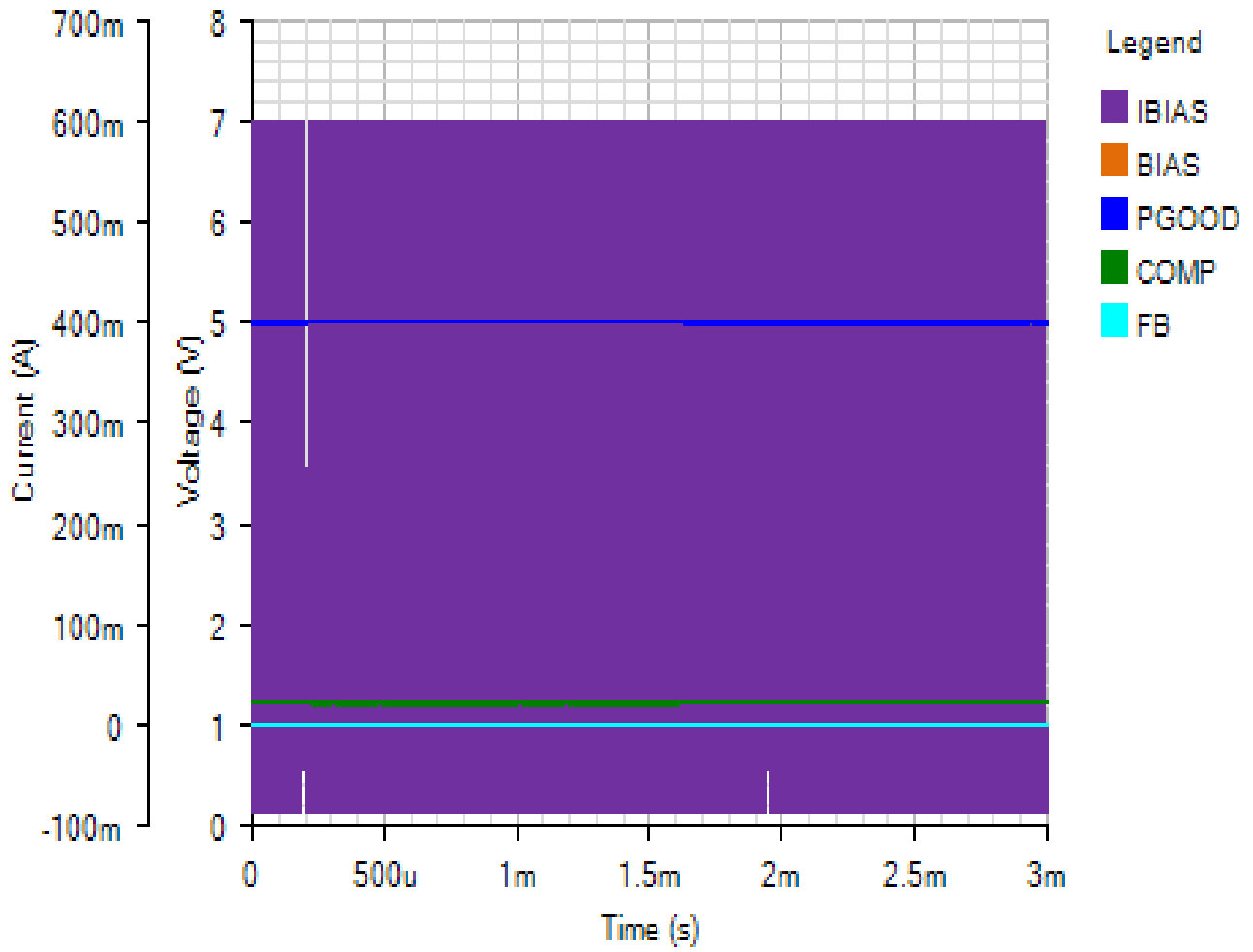
C9	1	C3225X7R1C226K250AC	TDK	Cap Ceramic 22uF 16V X7R 10% SMD 1210 125C Plastic T/R
C13	1	04025C103KAT2A	AVX	Cap Ceramic 0.01uF 50V X7R 10% Pad SMD 0402 125°C T/R
L1	1	VLP8040T-100M	TDK	Inductor Power Shielded Wirewound 10uH 20% 100KHz Ferrite 3.5A 38mOhm DCR Embossed Carrier T/R
R1	1	ERJ2RKF3922X	Panasonic	Res Thick Film 0402 39.2K Ohm 1% 0.1W(1/10W) ±100ppm/°C Pad SMD Automotive T/R
R5	1	ERJ2RKF2263X	Panasonic	Res Thick Film 0402 226K Ohm 1% 0.1W(1/10W) ±100ppm/°C Pad SMD Automotive T/R
R6	1	ERJ2RKF5622X	Panasonic	Res Thick Film 0402 56.2K Ohm 1% 0.1W(1/10W) ±100ppm/°C Pad SMD Automotive T/R
R7	1	ERJ2RKF6811X	Panasonic	Res Thick Film 0402 6.81K Ohm 1% 0.1W(1/10W) ±100ppm/°C Pad SMD Automotive T/R
R8	1	ERJ2GEJ103X	Panasonic	Res Thick Film 0402 10K Ohm 5% 0.1W(1/10W) ±200ppm/°C Pad SMD Automotive T/R

Simulation Results

Line Transient - Fri Nov 16 2018 09:02:19

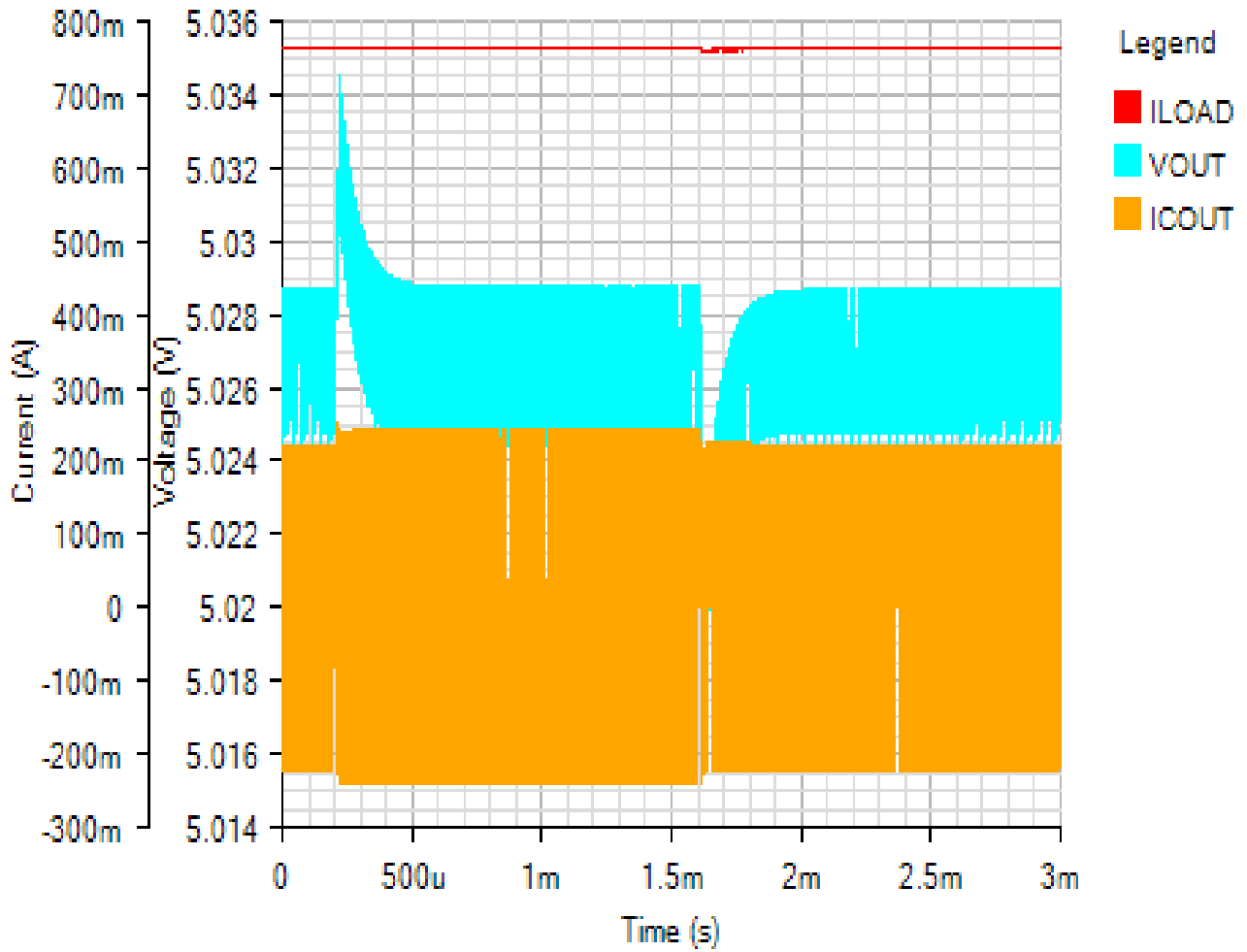
IC

Default



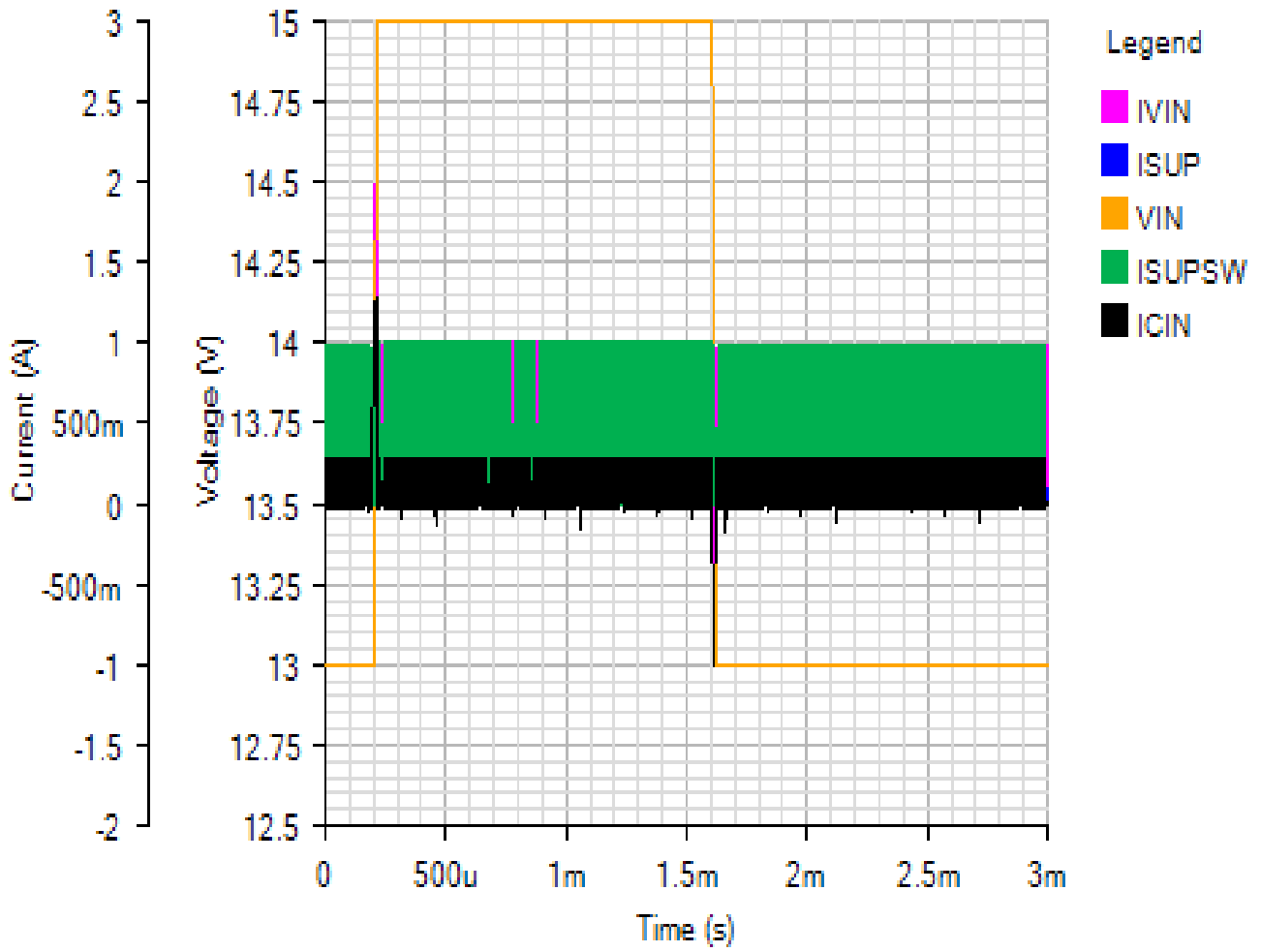
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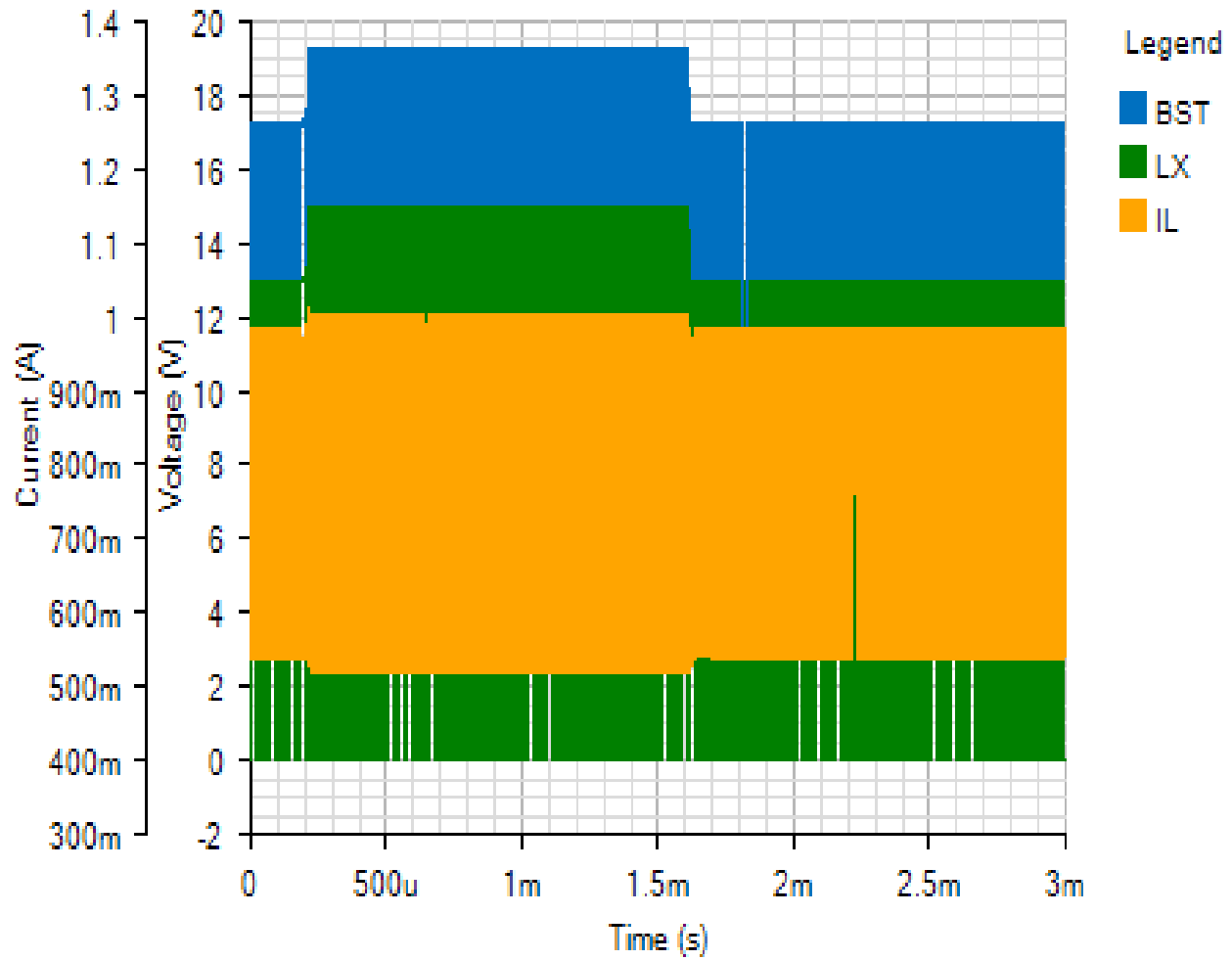
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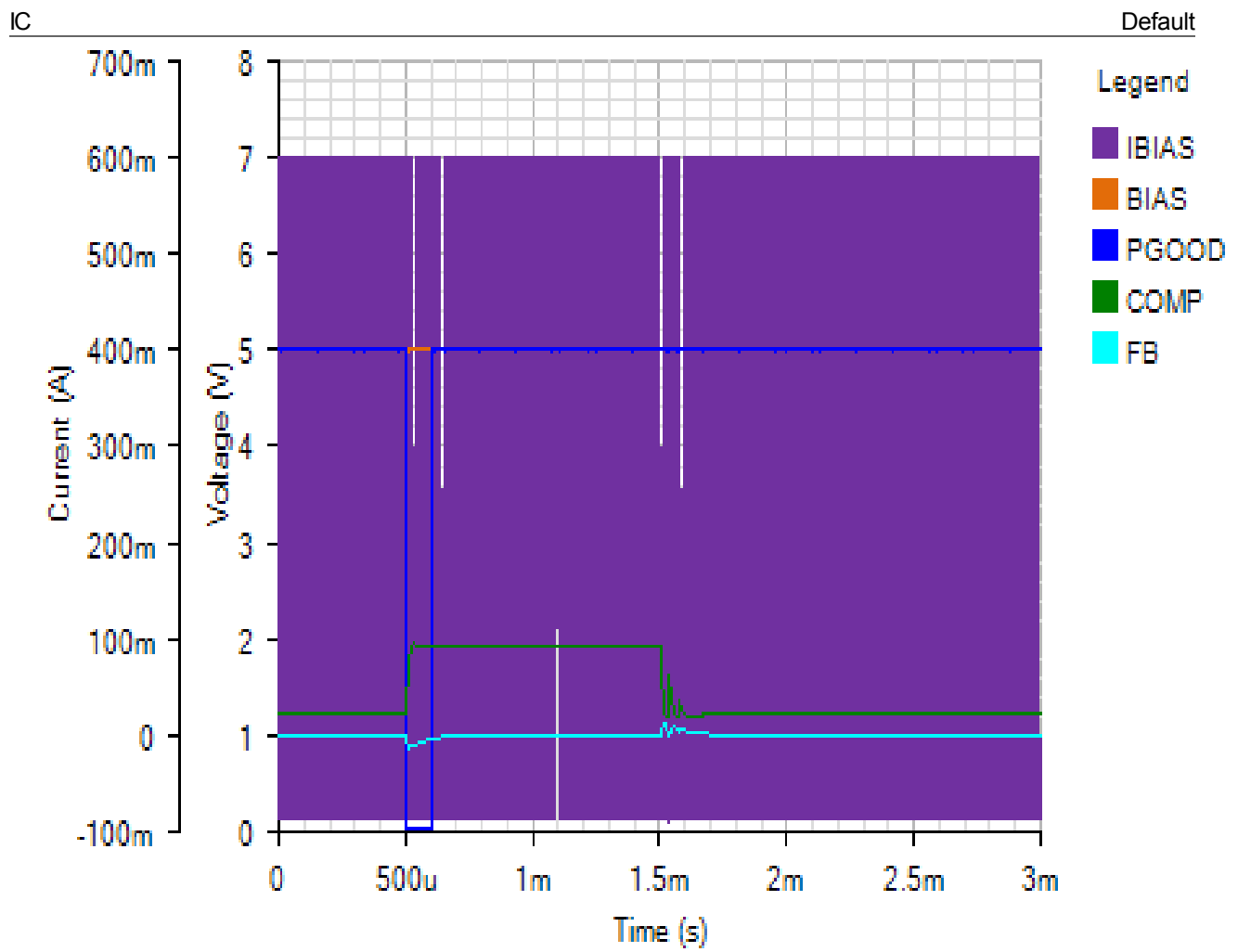


SWITCHING

Default

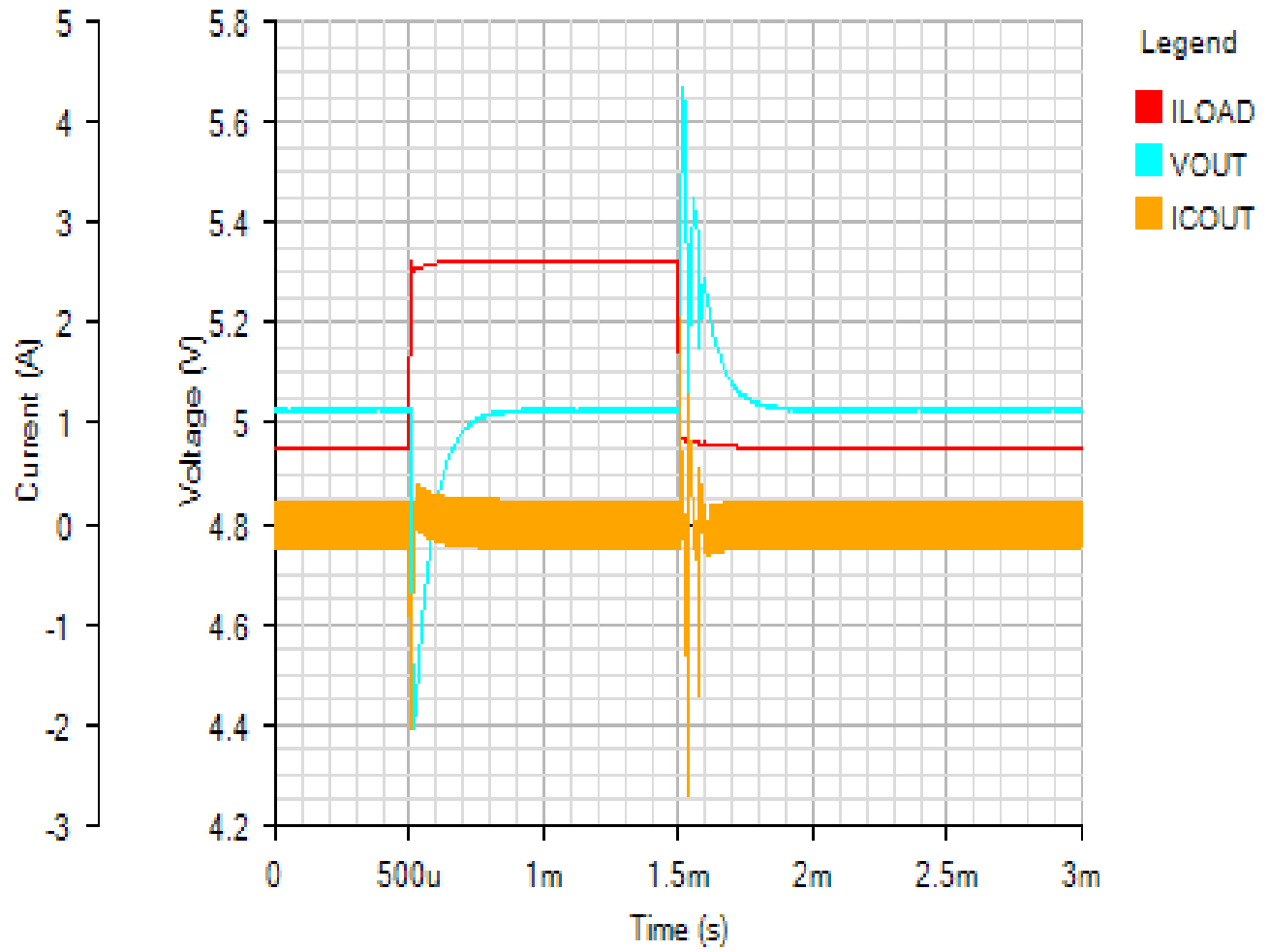


Load Step - Fri Nov 16 2018 09:02:19



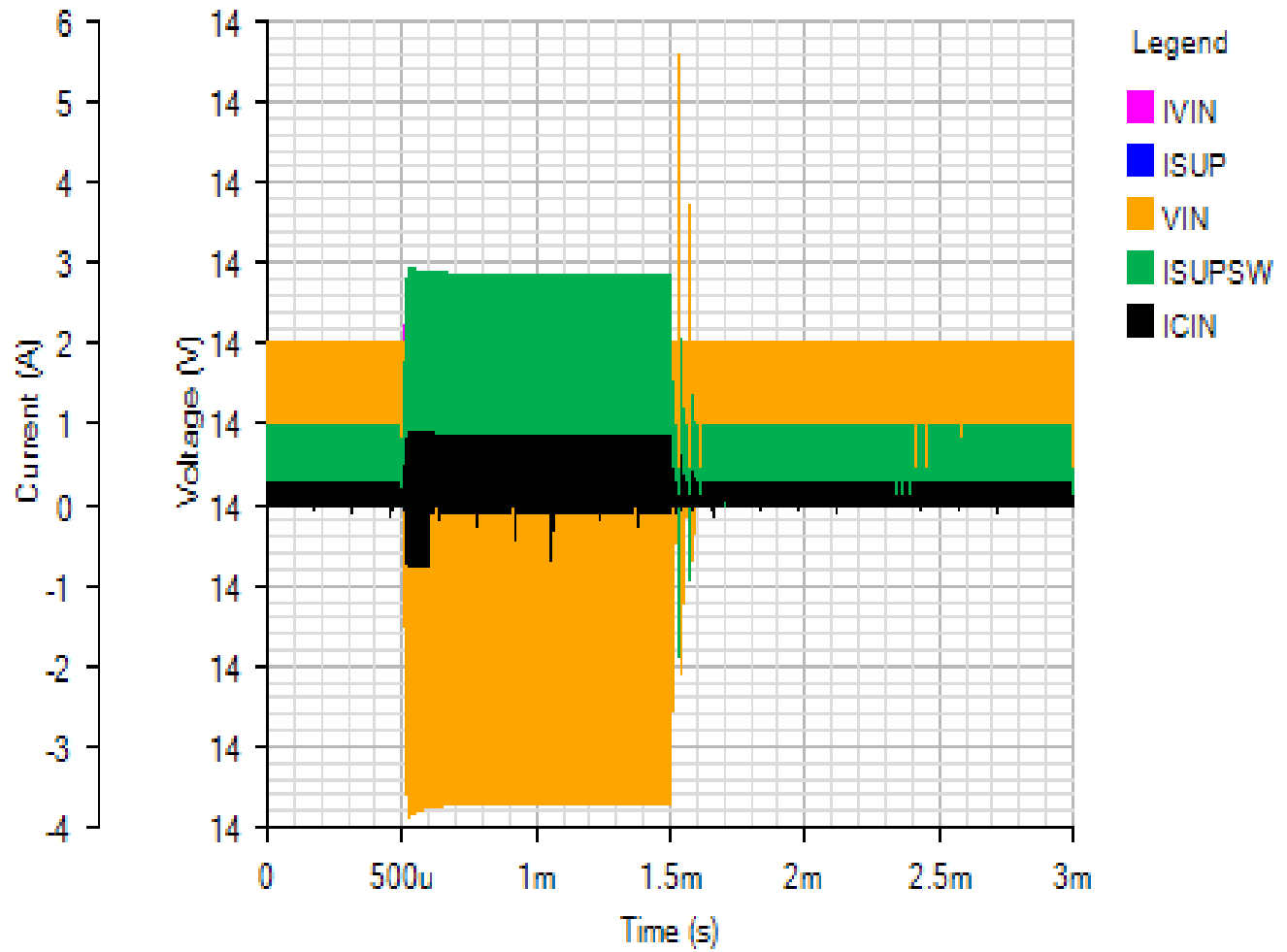
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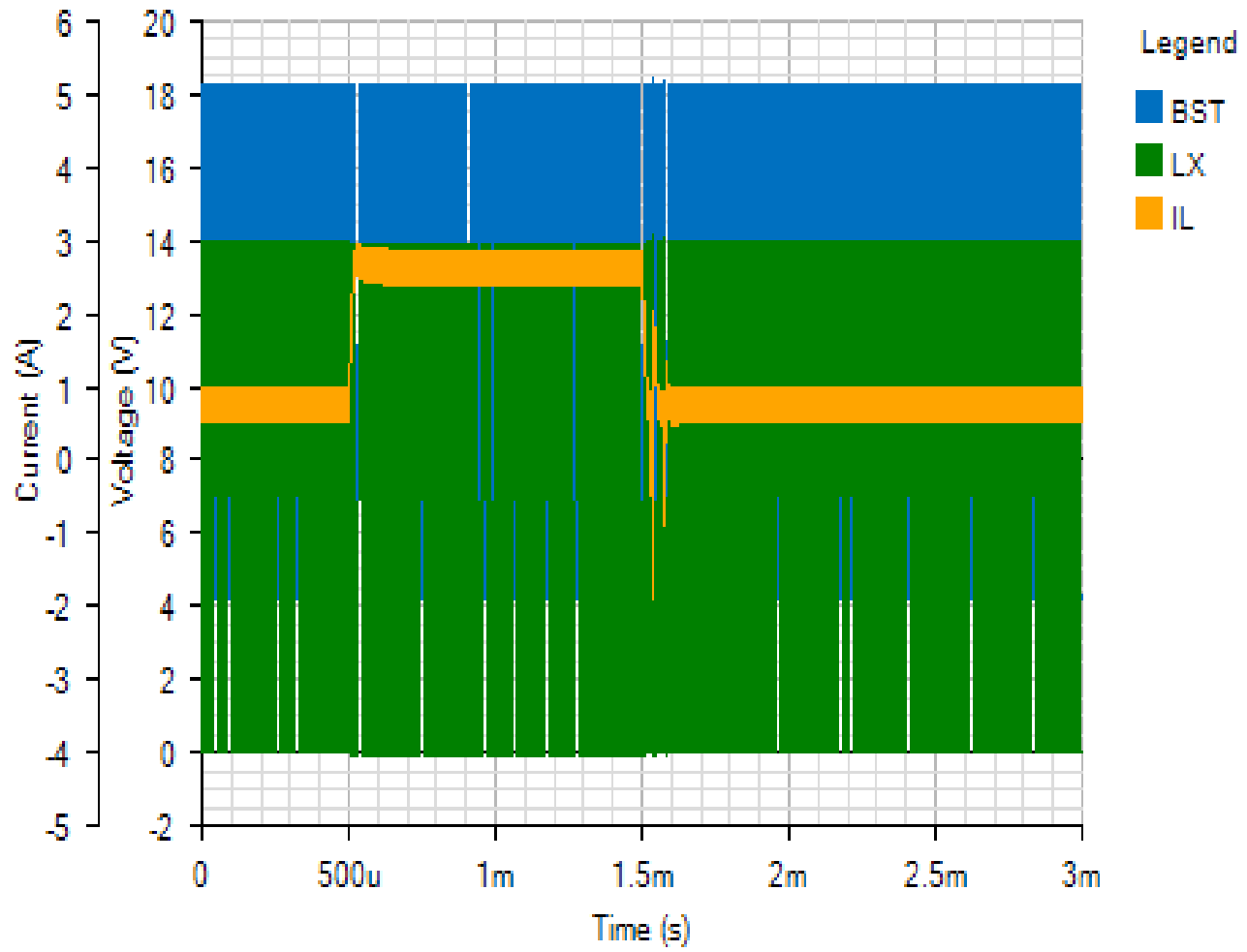
INPUT

Default



SWITCHING

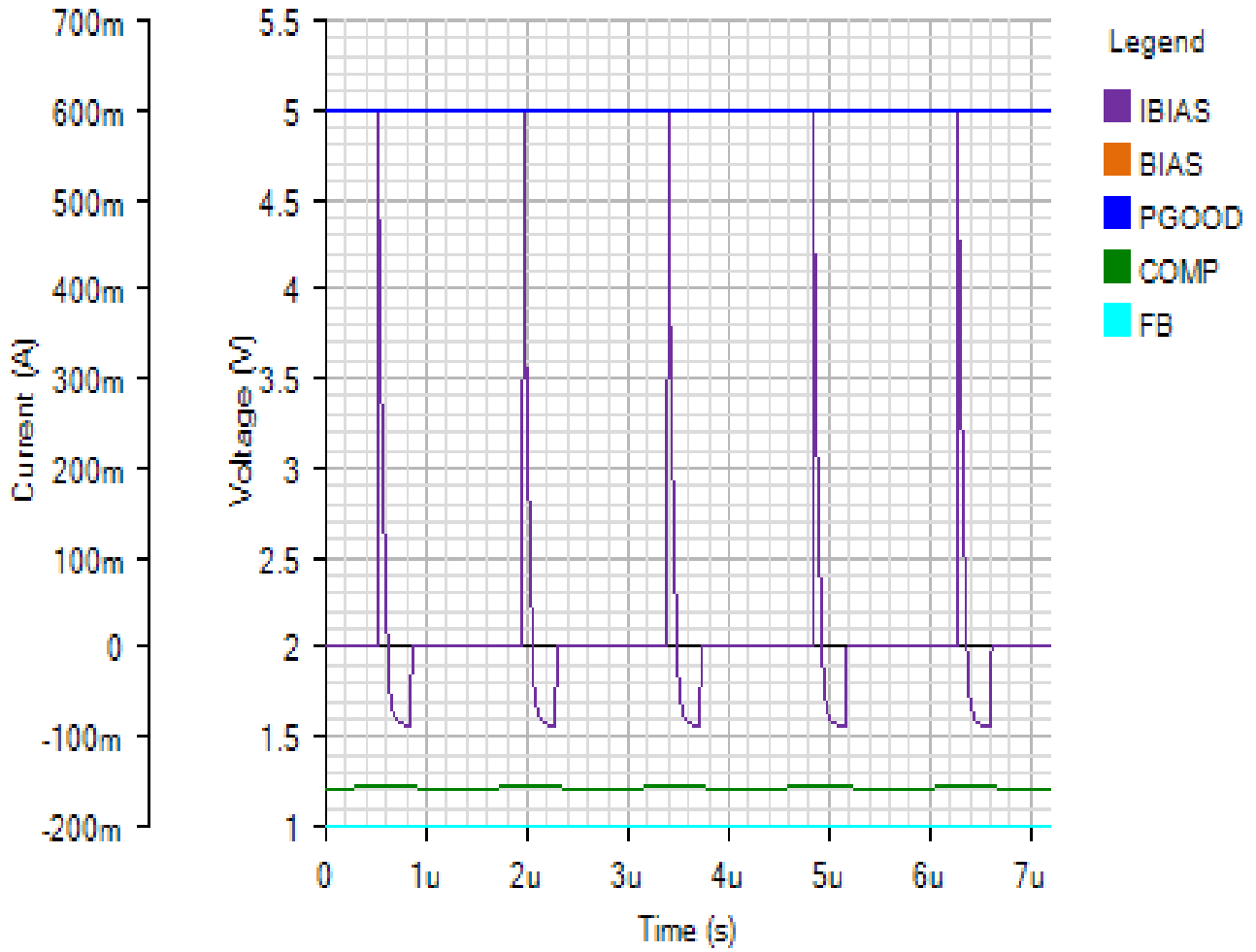
Default



Steady State - Fri Nov 16 2018 09:02:19

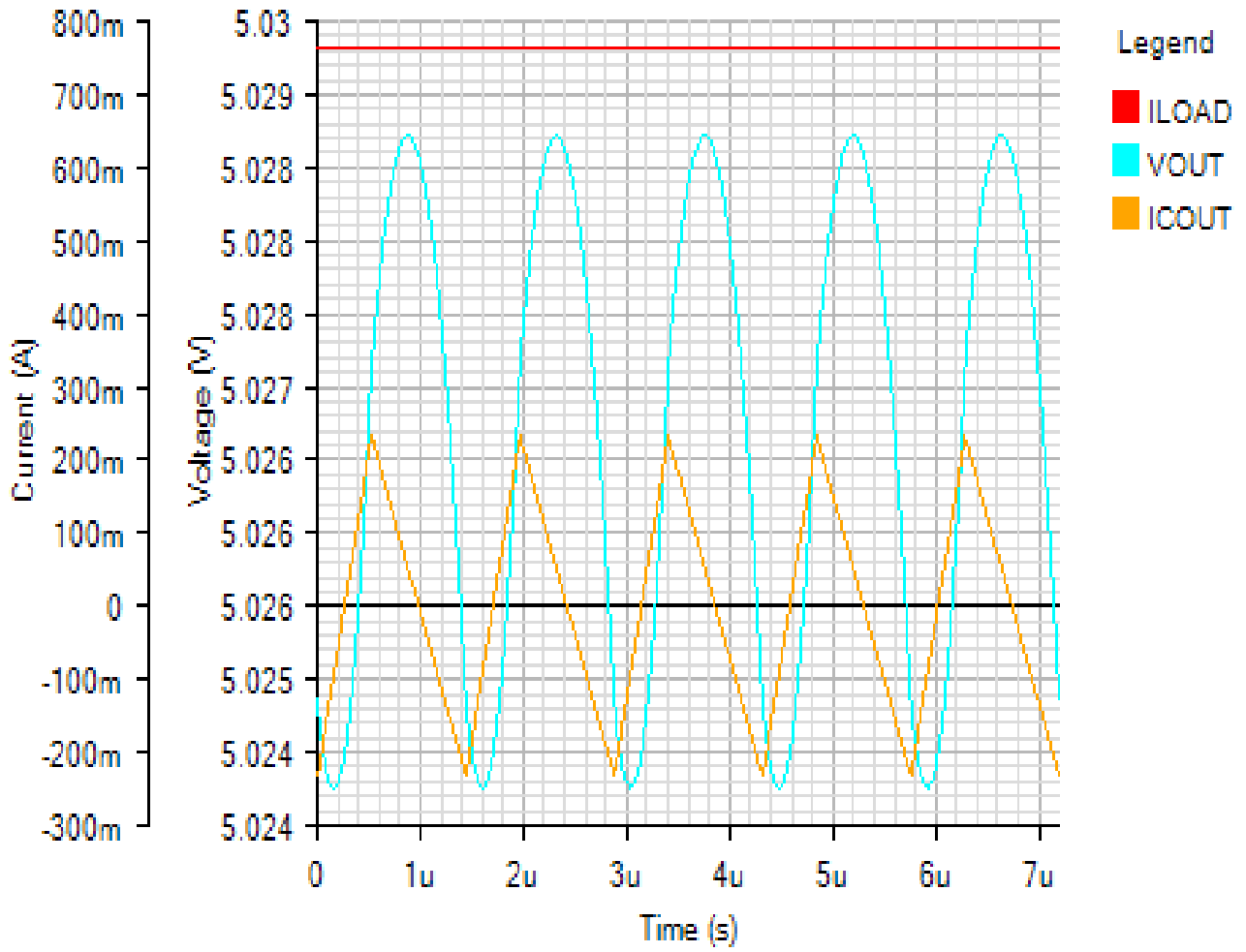
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Default



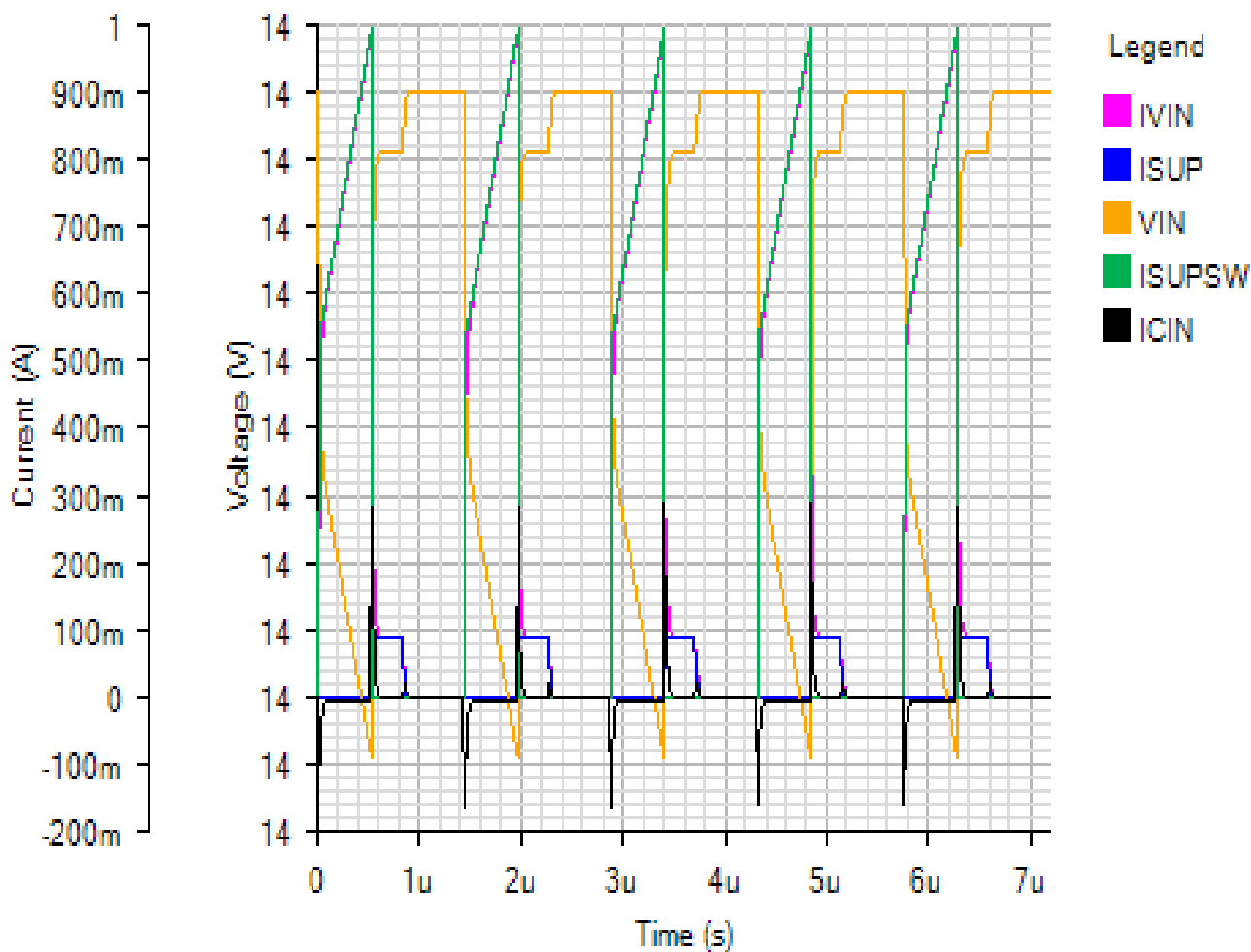
OUTPUT

Default



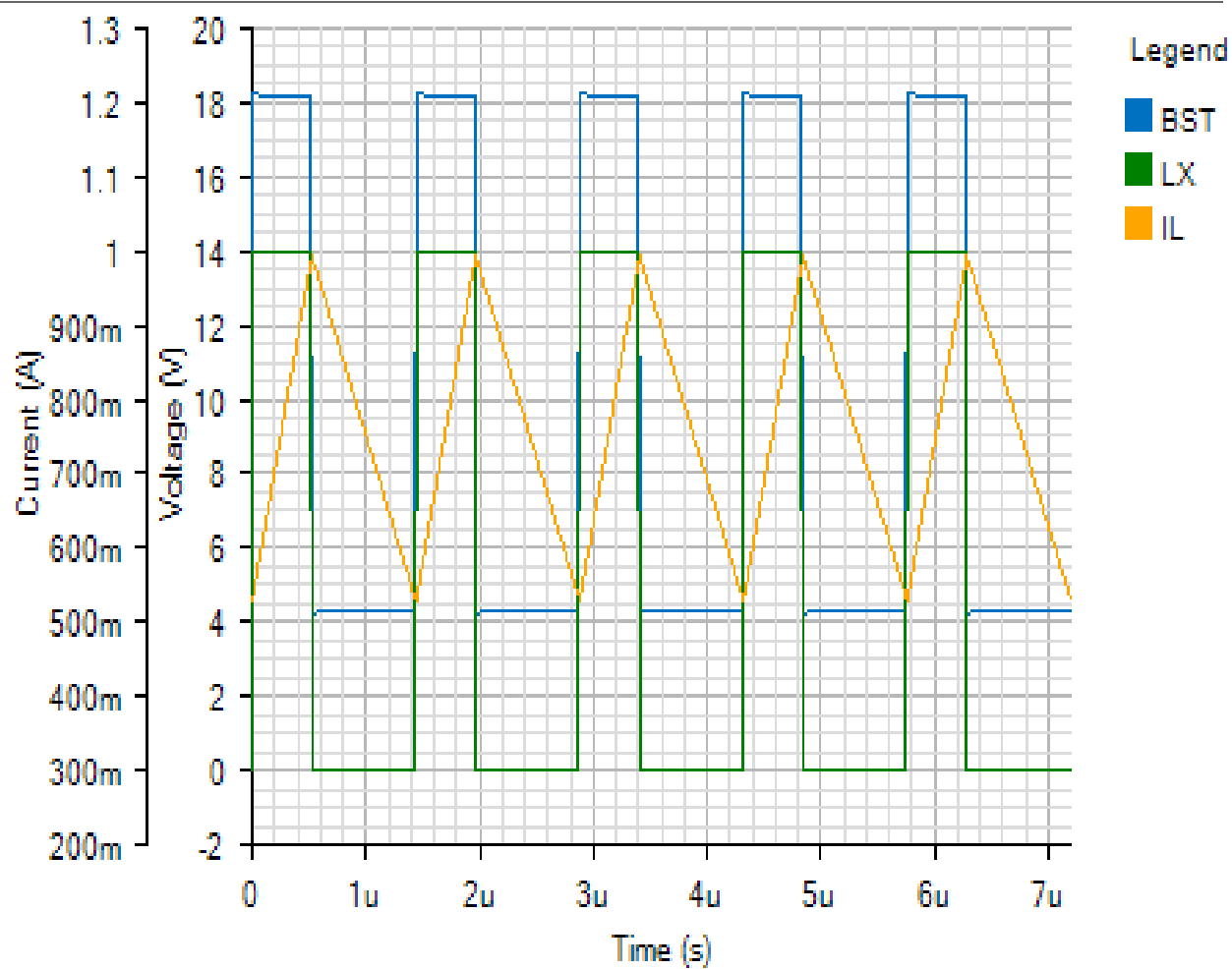
INPUT

Default



SWITCHING

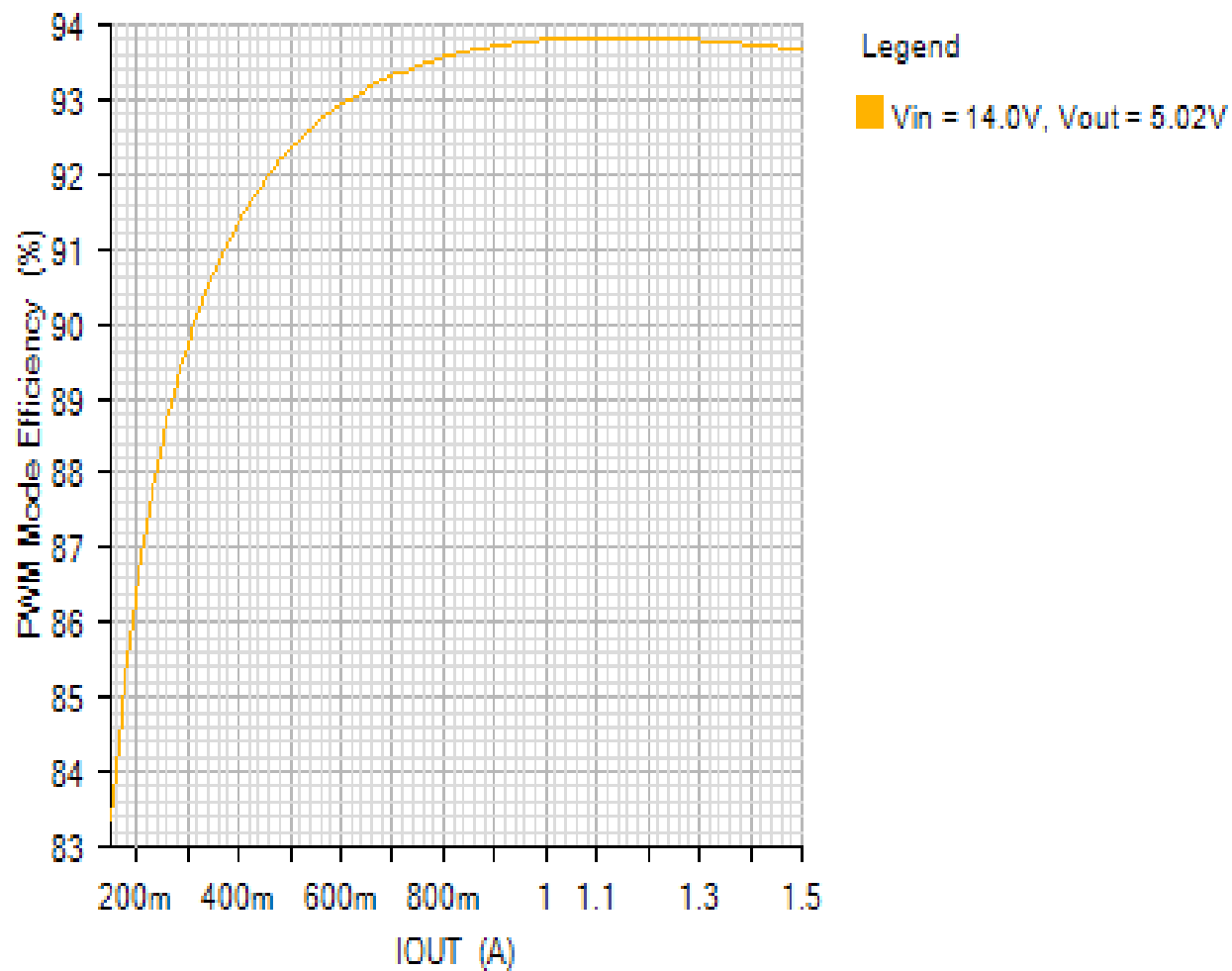
Default



Efficiency - Fri Nov 16 2018 09:02:19

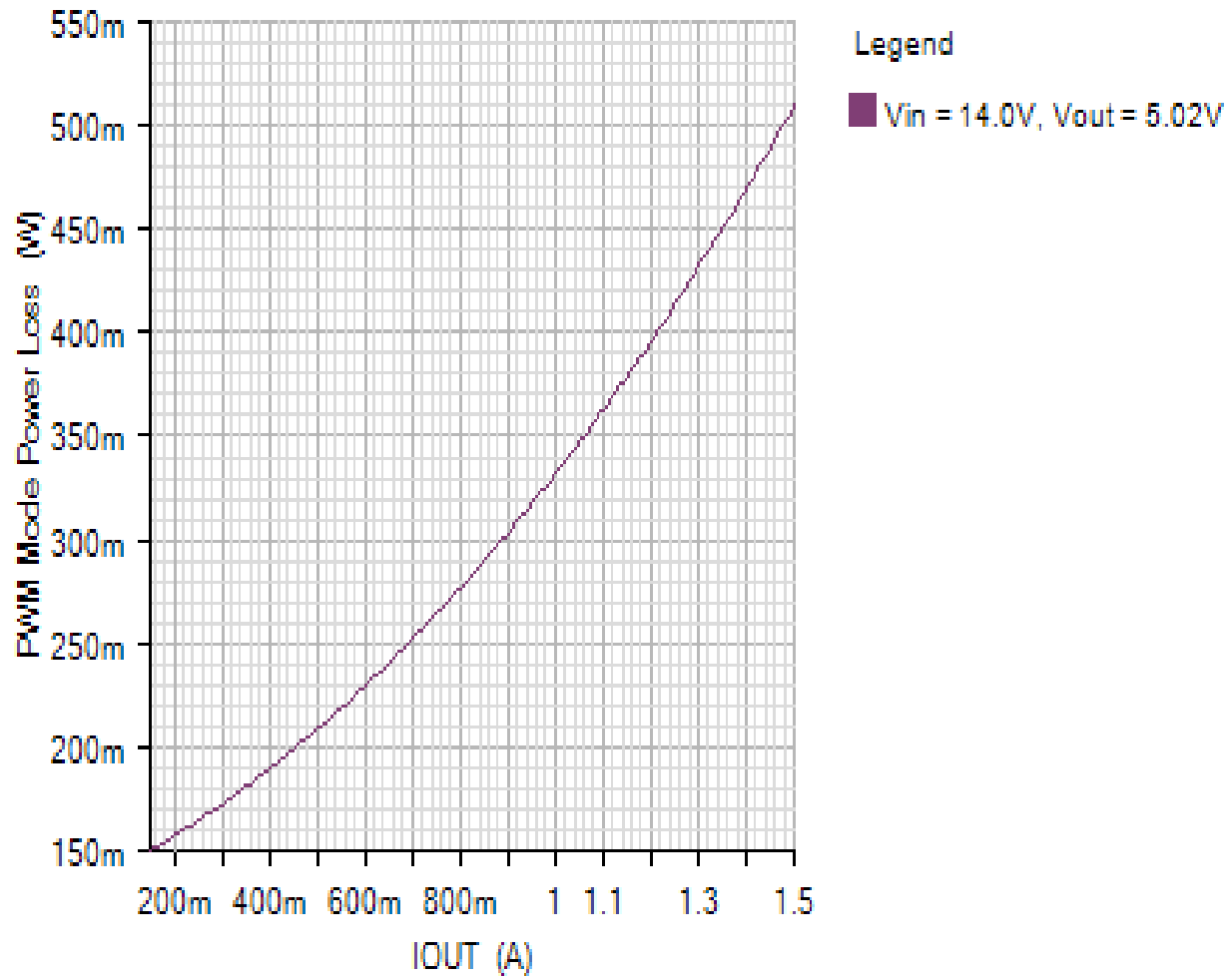
EFFICIENCY

Default



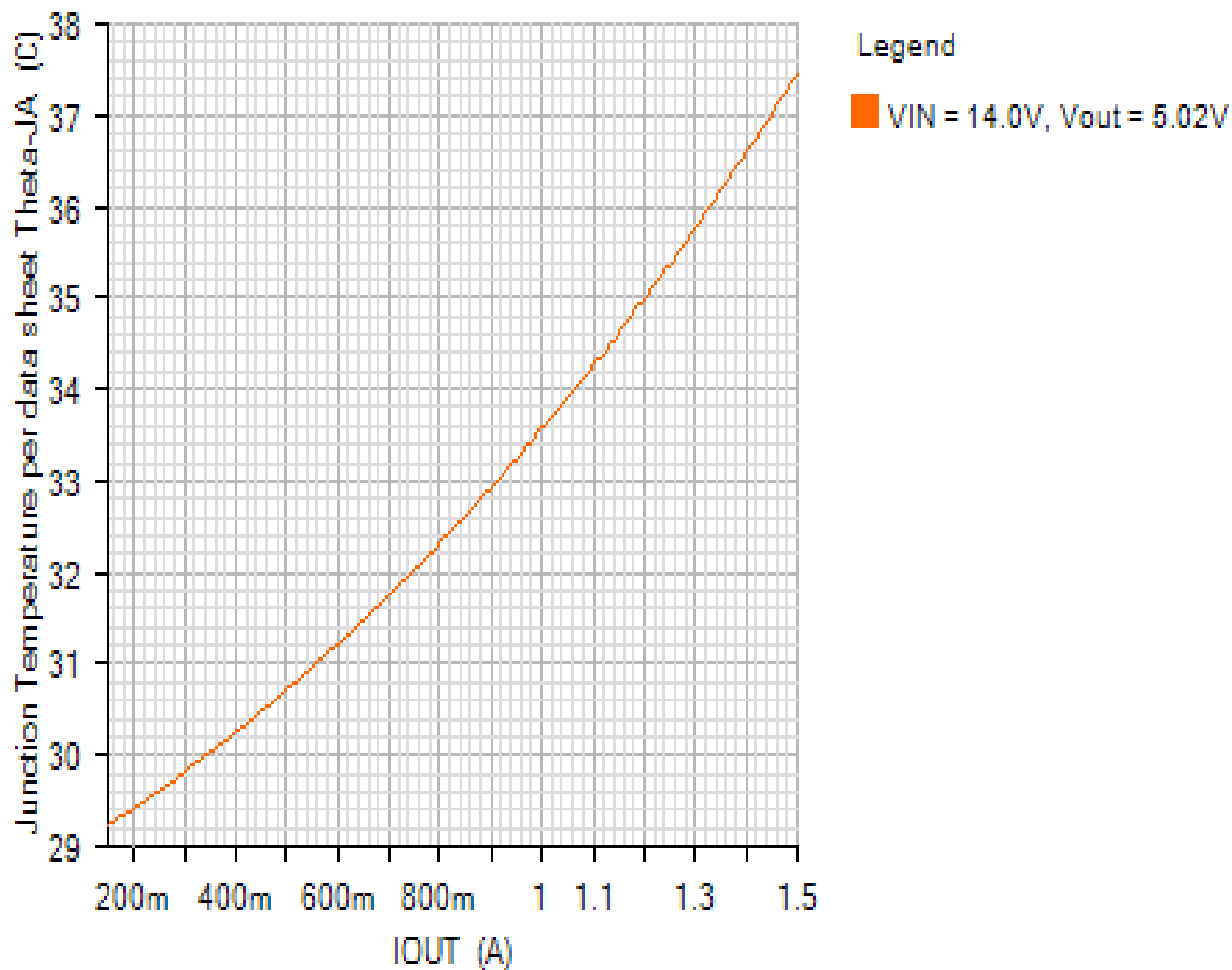
POWER_LOSS

Default

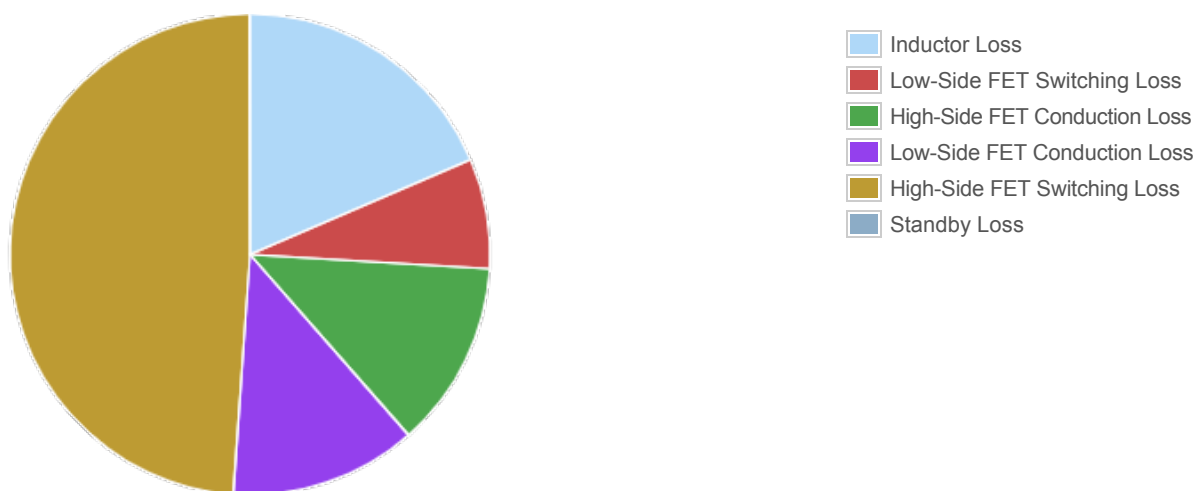


JUNCTION_TEMPERATURE

Default



Losses



Component

Loss (W)

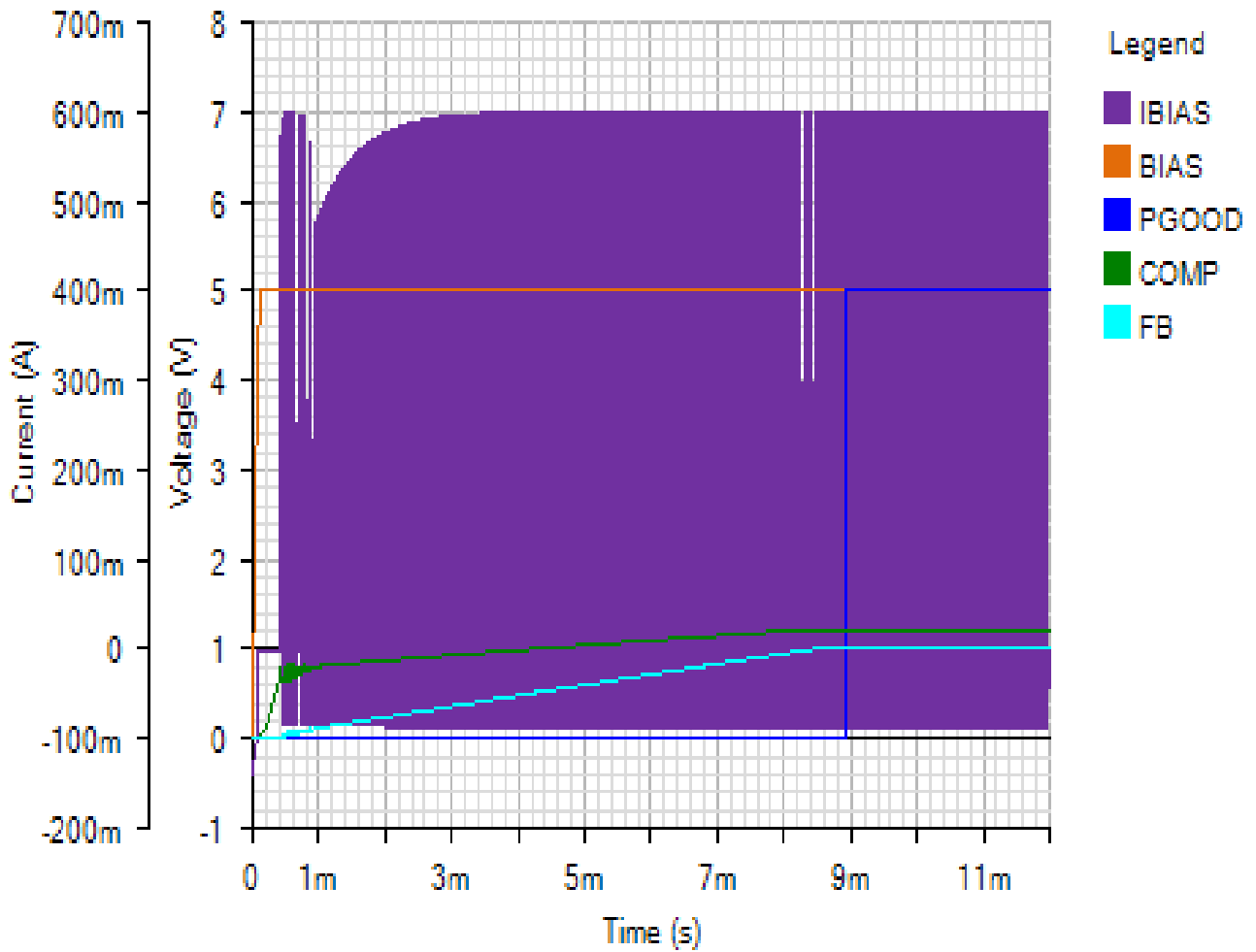
% of total

Component	Loss (W)	% of total
Inductor Loss	0.185594	18.6
Low-Side FET Switching Loss	0.073896	7.4
High-Side FET Conduction Loss	0.125542	12.6
Low-Side FET Conduction Loss	0.126067	12.6
High-Side FET Switching Loss	0.488351	48.8
Standby Loss	0.000549	0.1
Total	1	100

Start Up - Fri Nov 16 2018 09:02:19

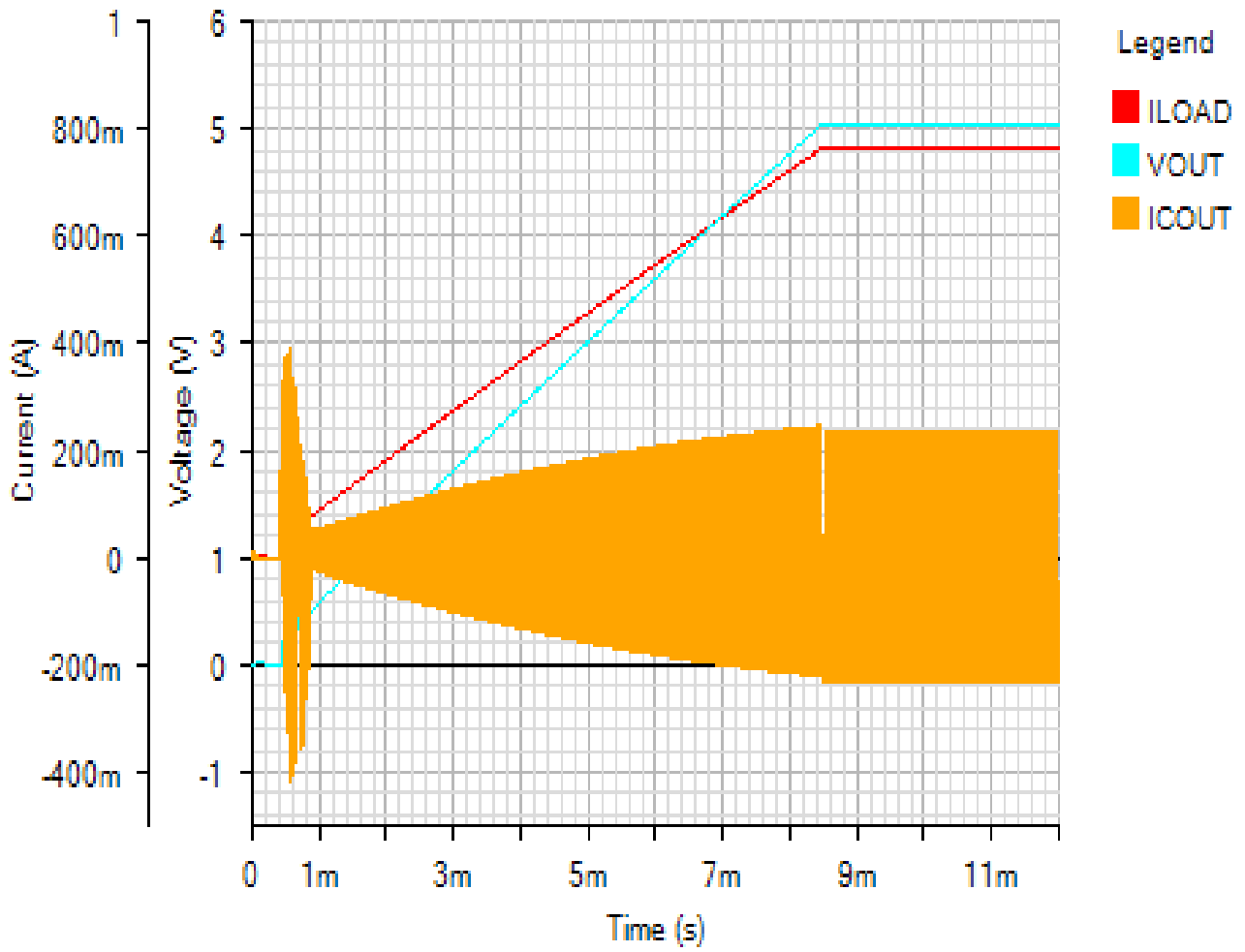
IC

Default



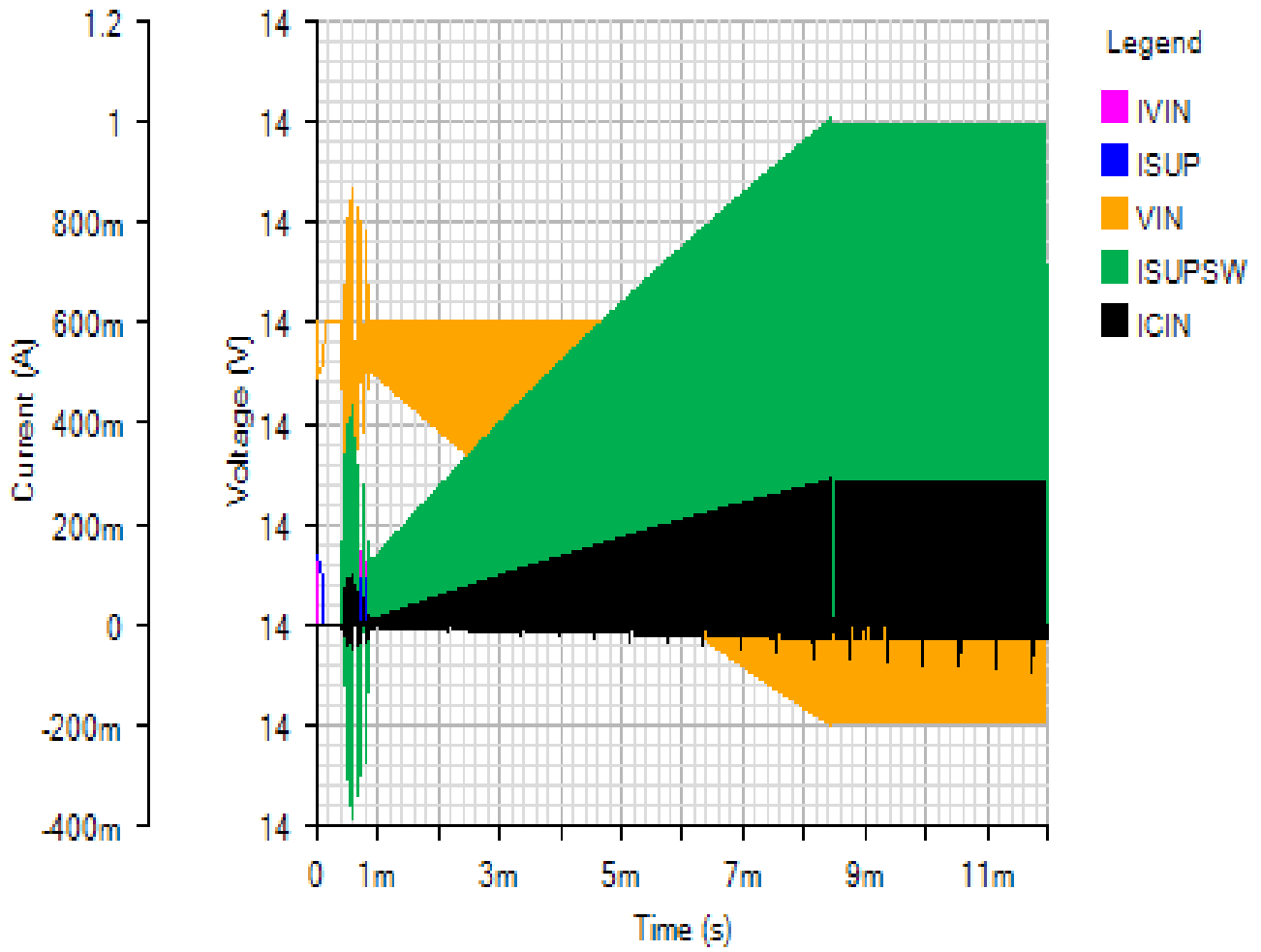
OUTPUT

Default



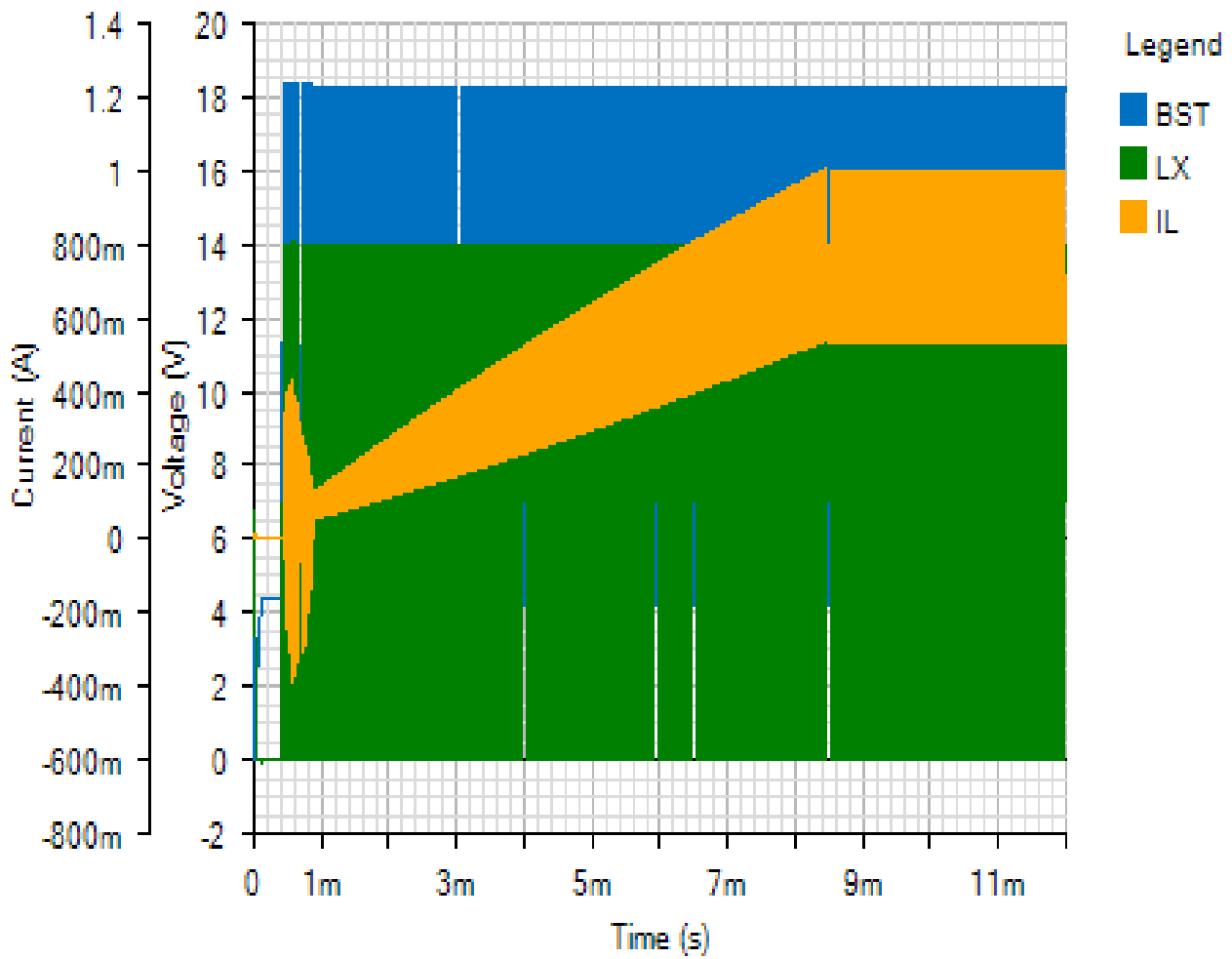
INPUT

Default



SWITCHING

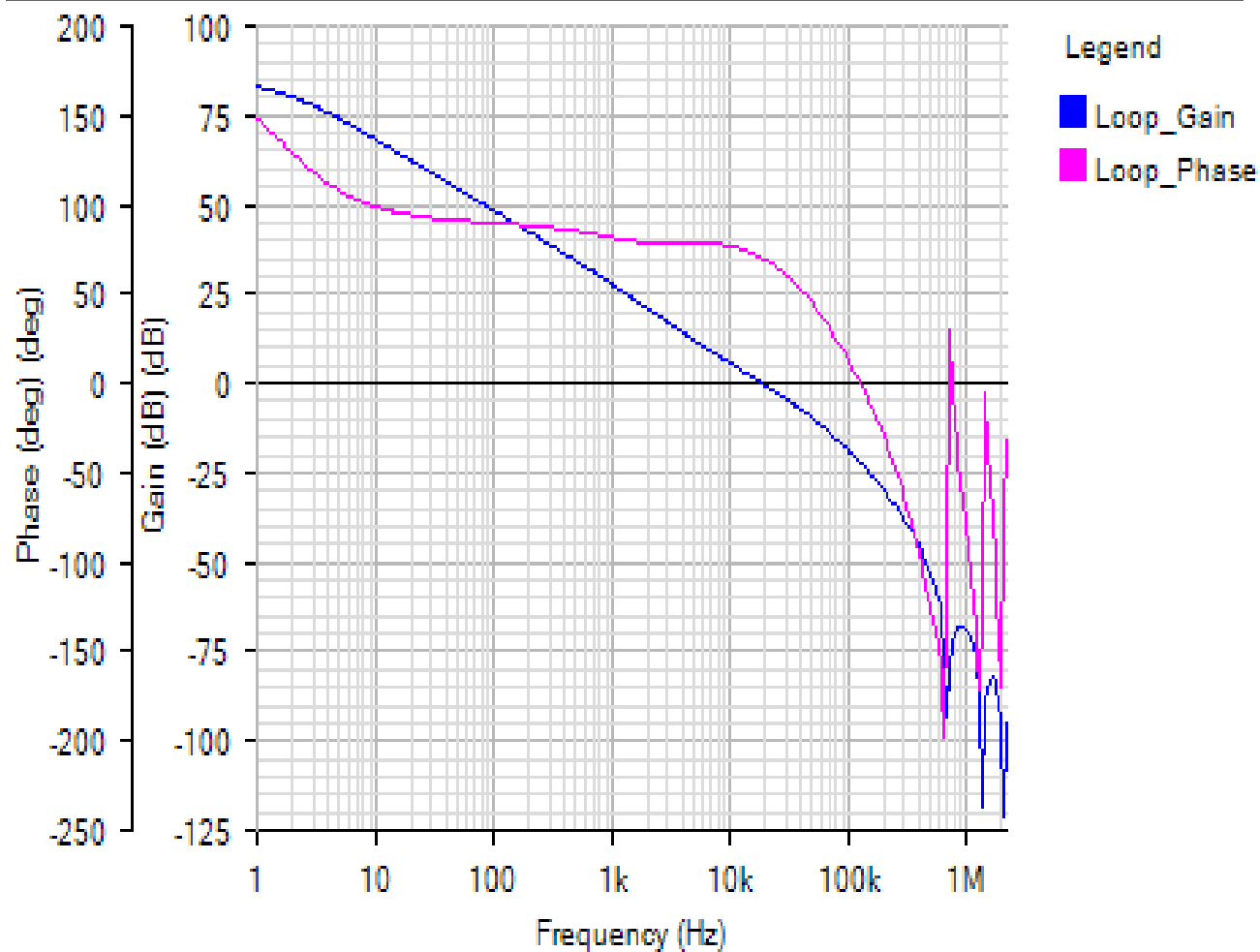
Default



AC Loop - Fri Nov 16 2018 09:02:19

BODE

Default



Phase Margin: 70.21° at a crossover frequency of 18.9kHz

