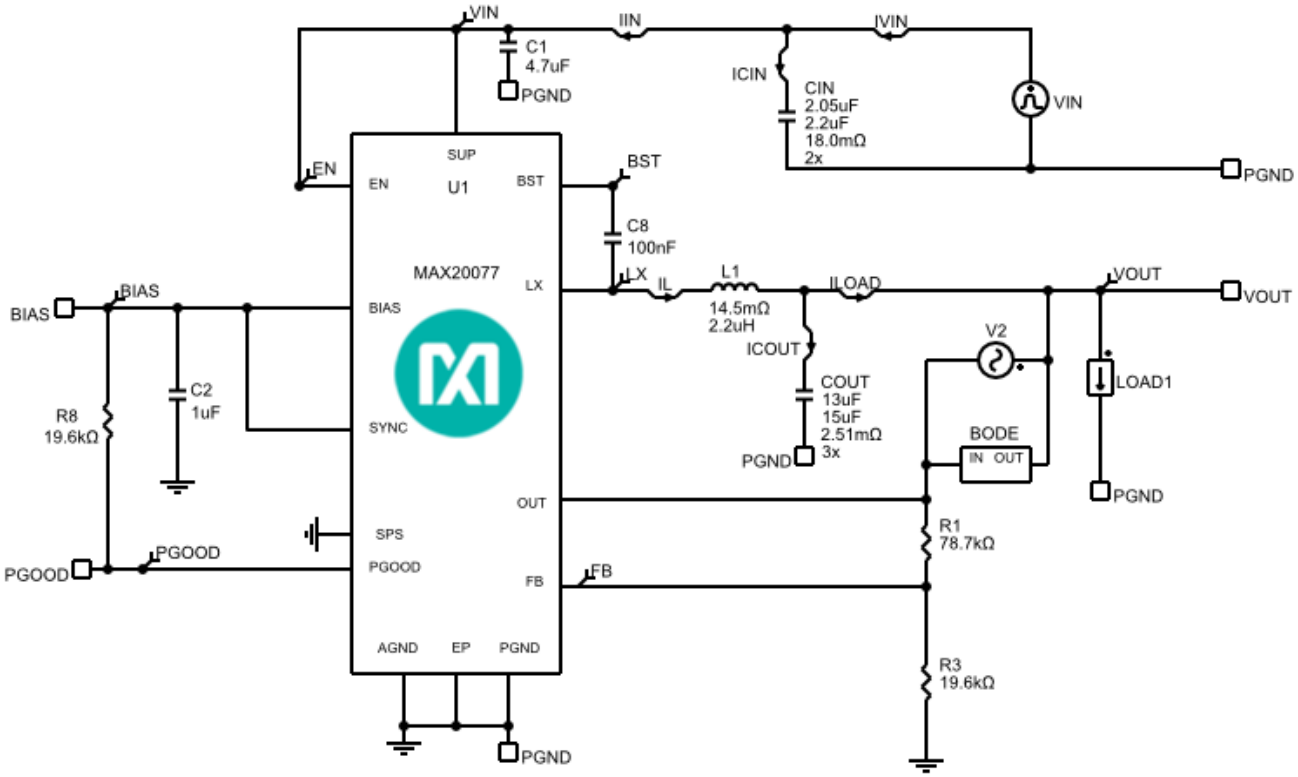
Initial Design

1.0

Design Requirements

Parameter	Value
Part Version	MAX20077ATCA
Minimum Input Voltage	10V
Maximum Input Voltage	14V
Nominal Input Voltage	12V
Input Voltage Ripple	1%
Output Configuration	Adjustable Output Voltage
Output Voltage	5V
Output Current	1A
Output Voltage Ripple	1%
Load Step Current	0.5A
Load Step Start Current	1A
Load Step Edge Rate	1A/us
Output Voltage Load Step Over/Undershoot	5%
Performance Priority	Balance Efficiency and Size
BOM Priority	Cost
Mode	Forced-PWM Mode
Switching Frequency	2.1MHz
Ambient Temperature	25°C

Schematic



When Skip mode is selected, AC Loop simulation may fail if the Load Current is low enough to engage Skip mode,because Skip mode is hysteretic and there is no AC Loop to measure.

The following features described in the data sheet have not been modeled:
1. A mode for Maximum Duty Cycle Operation which is engaged when Vout is within a few percent of Vin.
2. Spread Spectrum - the model will always operate with Spread Spectrum turned off, regardless of whether the SPS pin is pulled high or low.

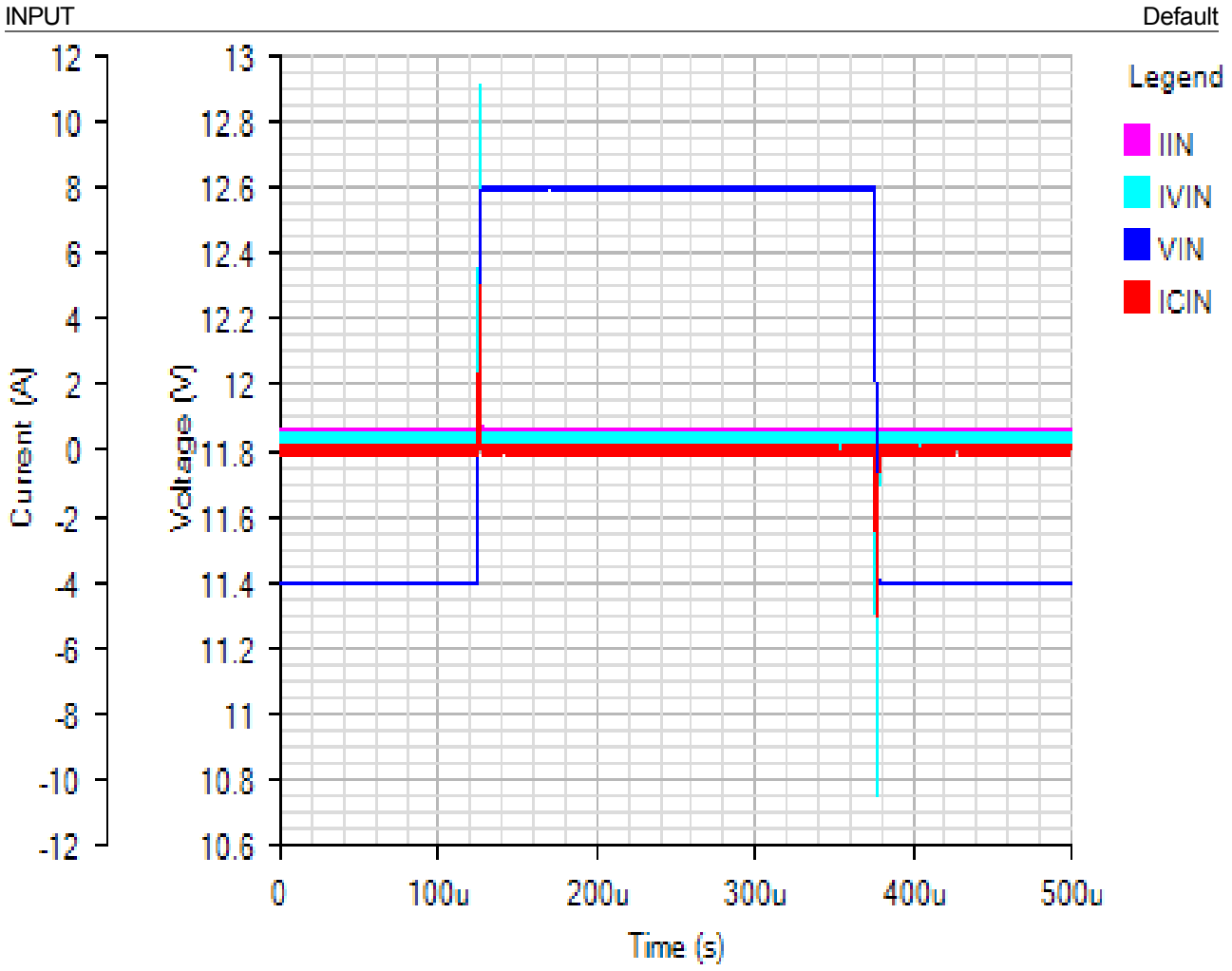
BOM

Ref	Qty	Part Number	Manufacturer	Description
U1	1	MAX20077ATCA	User-Defined	IC
C1	1	EEUFC1H4R7	Panasonic	Cap Aluminum Lytic 4.7uF 50V 20% (5 X 11mm) Radial 2mm 95mA 1000h 105°C Automotive Bulk
C2	1	CC0603KRX7R7BB105	Yageo	Cap Ceramic 1uF 16V X7R 10% Pad SMD 0603 125°C T/R
C8	1	UMK105B7104KVHF	Taiyo Yuden	Cap Ceramic 0.1uF 50V X7R 10% Pad SMD 0402 125°C Automotive T/R
CIN	2	C1210C225K1RAC	Kemet	Cap Ceramic 2.2uF 100V X7R 10% SMD 1210 125C Bulk
COUT	3	C3225X7R1C156M250AB	TDK	Cap Ceramic 15uF 16V 1210 125C
L1	1	XAL5030-222MEB	Coilcraft	Ind Power Shielded 2.2uH 20% 100KHz 9.7A T/R
R1	1	ERJ3EKF7872V	Panasonic	Res Thick Film 0603 78.7K Ohm 1% 0.1W(1/10W) ±100ppm/°C Pad SMD Automotive T/R

R3	1	ERJ2RKF1962X	Panasonic	Res Thick Film 0402 19.6K Ohm 1% 0.1W(1/10W) ±100ppm/°C Pad SMD Automotive T/R
R8	1	AR0402JR-0719K6	Yageo	Res Thick Film 0402 19.6K Ohm 5% 0.063W(1/16W) ±100ppm/°C Epoxy Pad SMD Automotive T/R

Simulation Results

Line Transient - Mon Jan 14 2019 12:43:40



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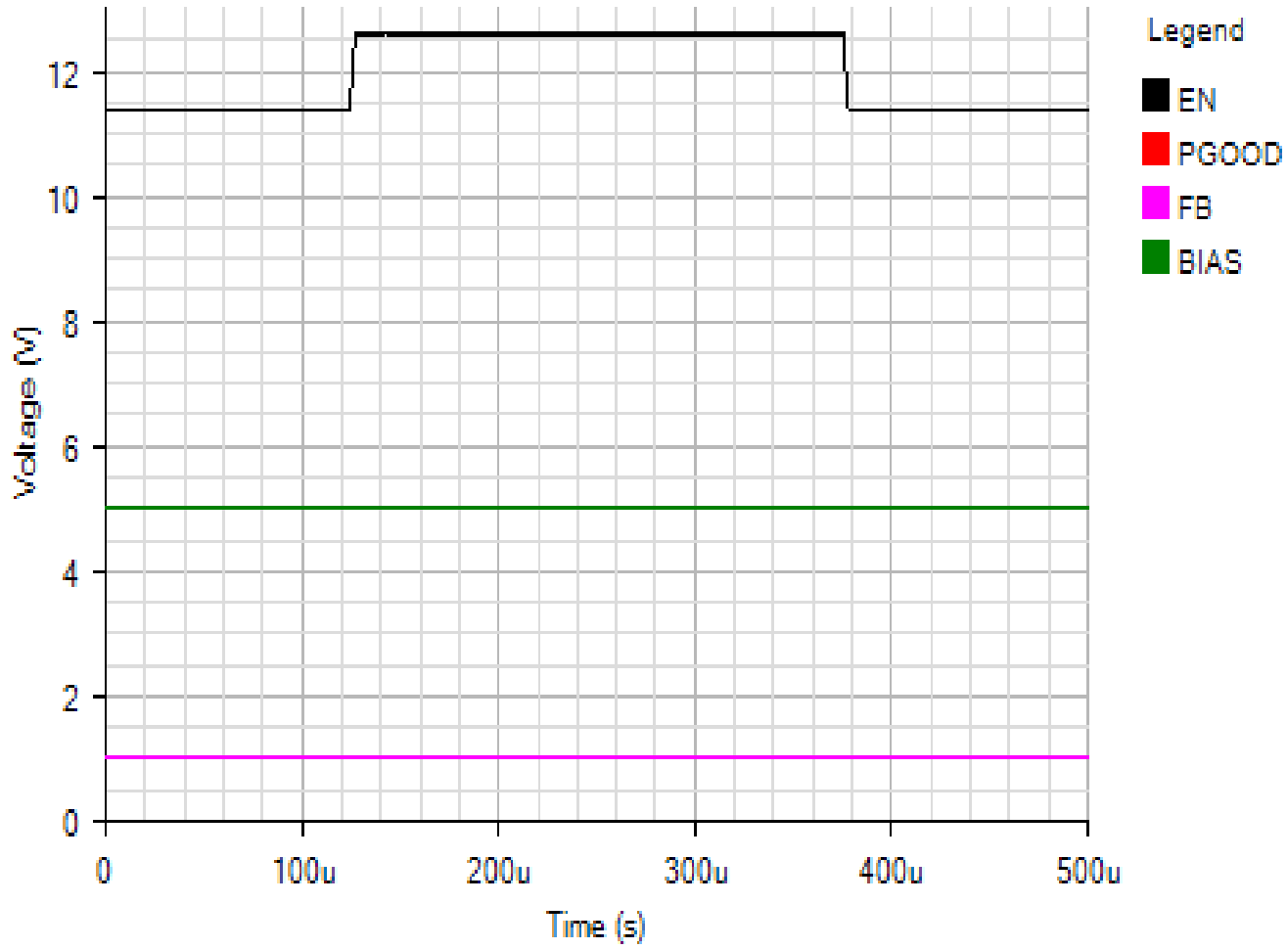

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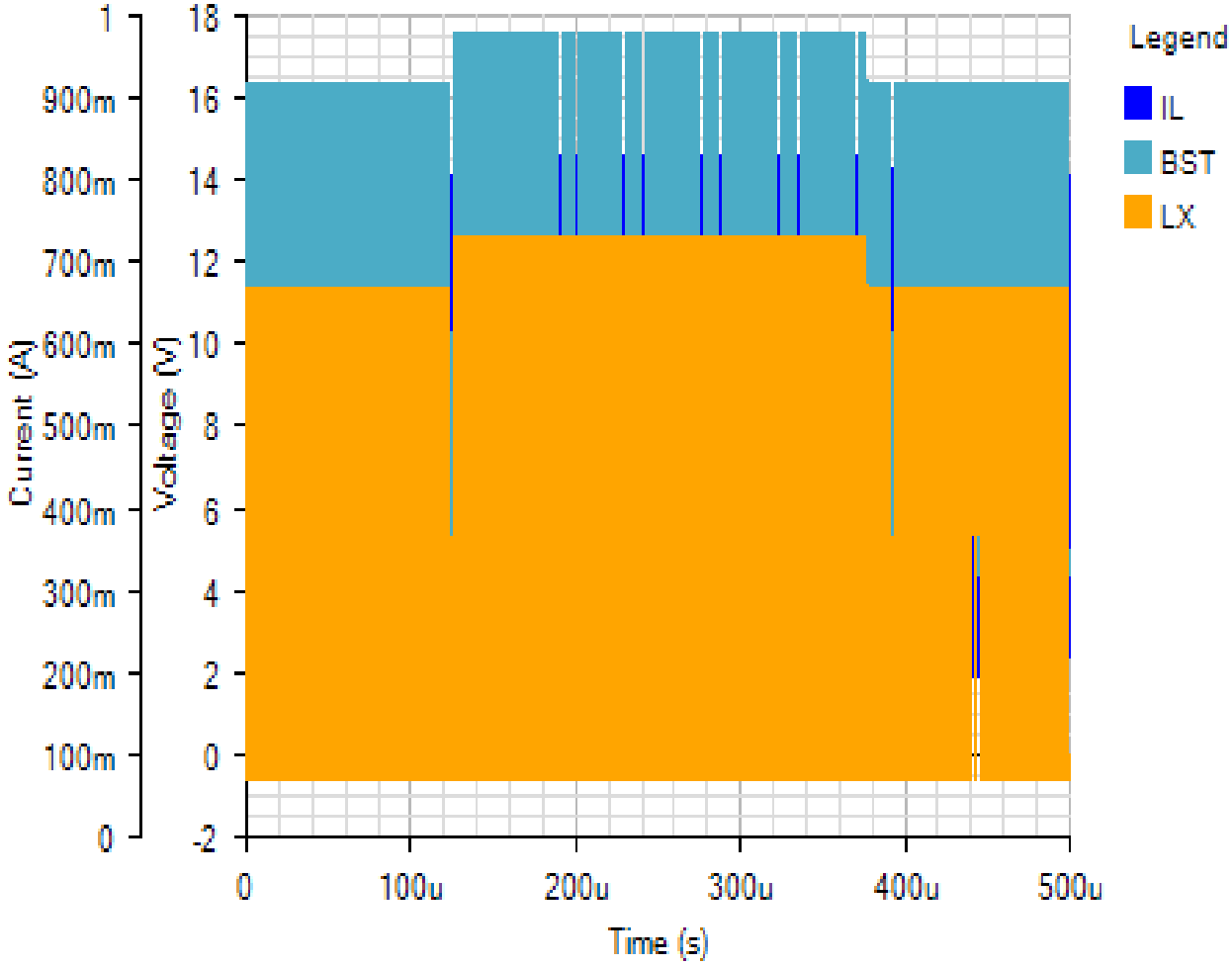

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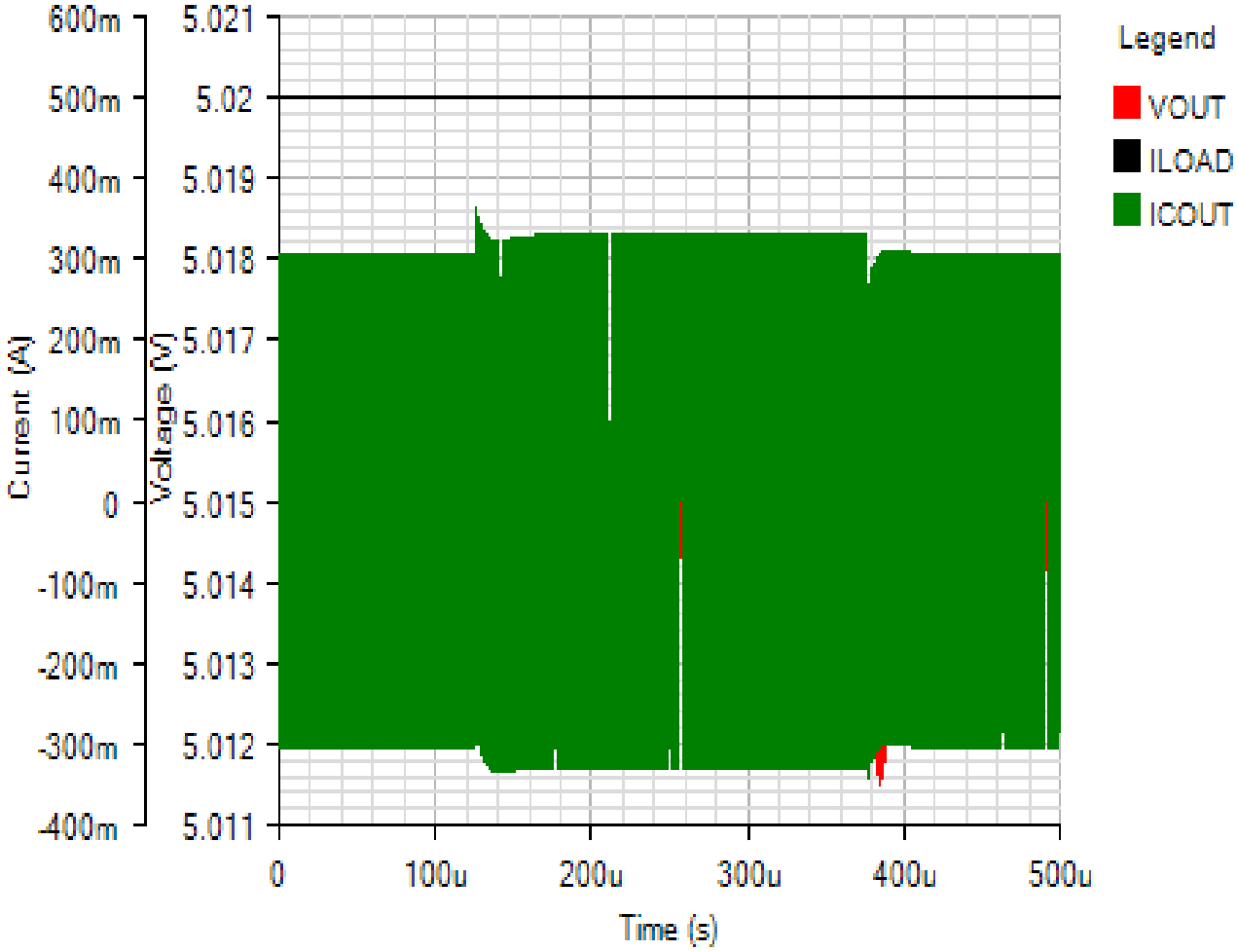
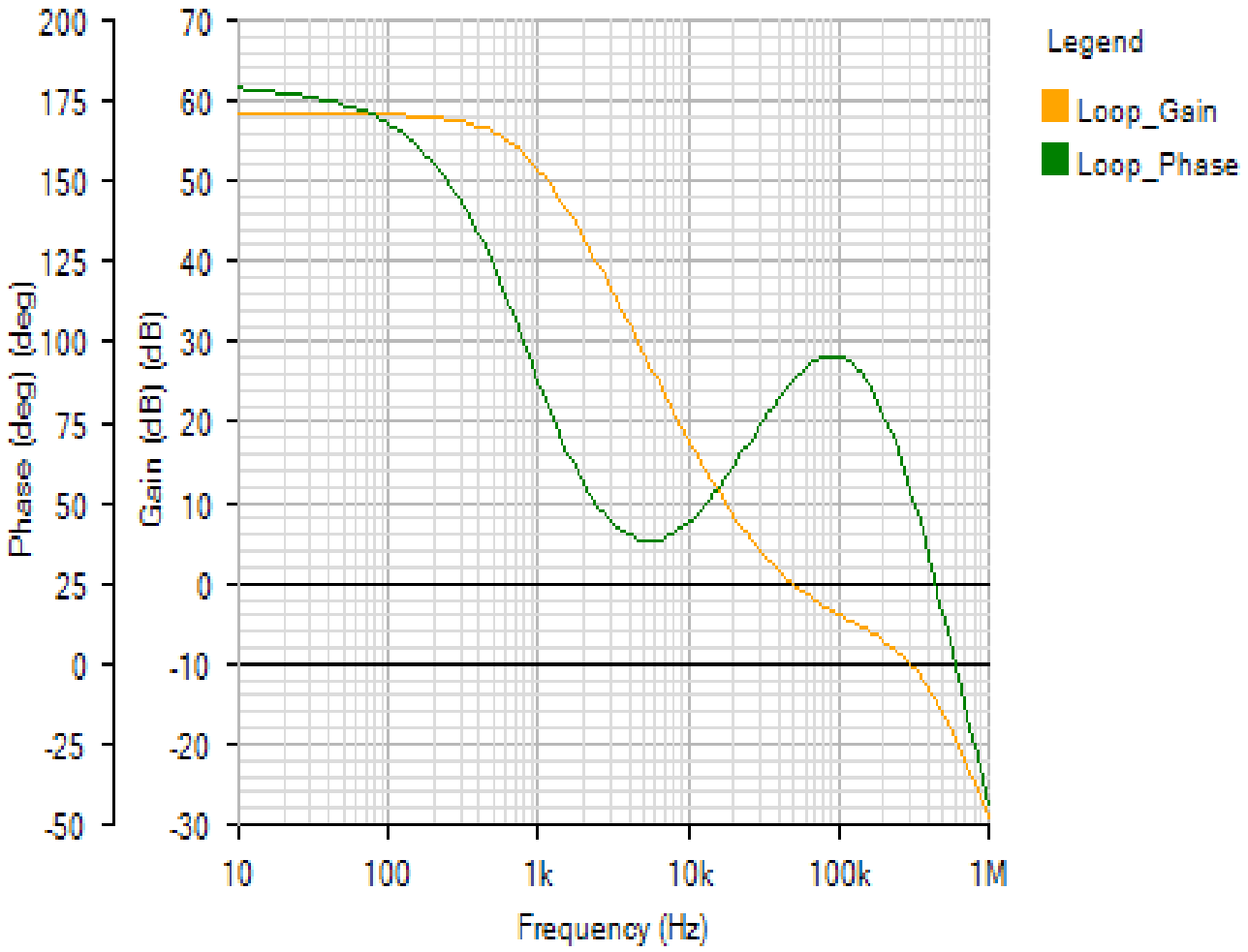
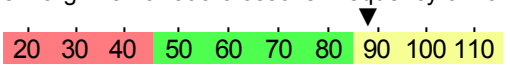


AC Loop - Mon Jan 14 2019 12:43:40

BODE Default



Phase Margin: 87.9° at a crossover frequency of 49.5kHz



Steady State - Mon Jan 14 2019 12:43:40

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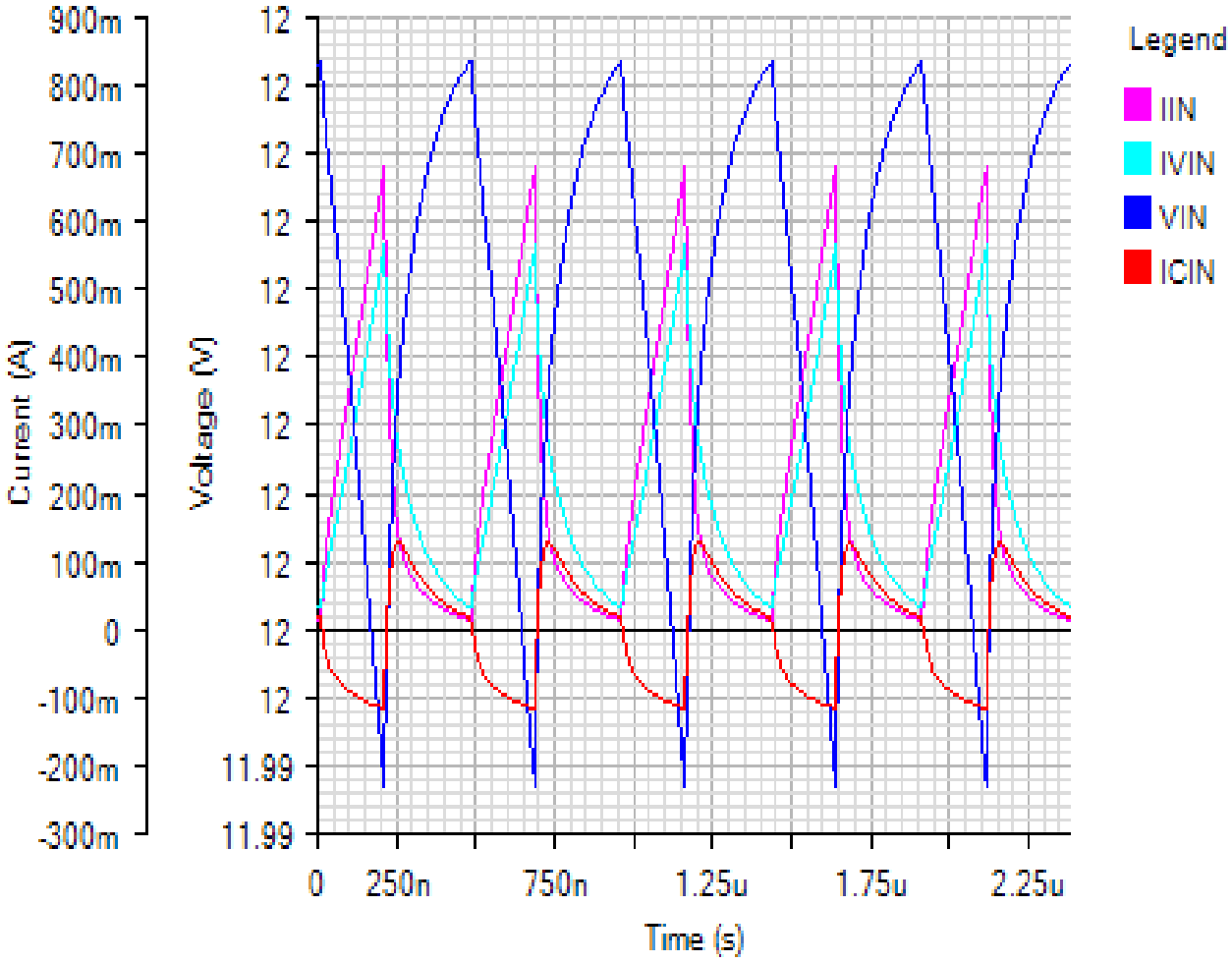

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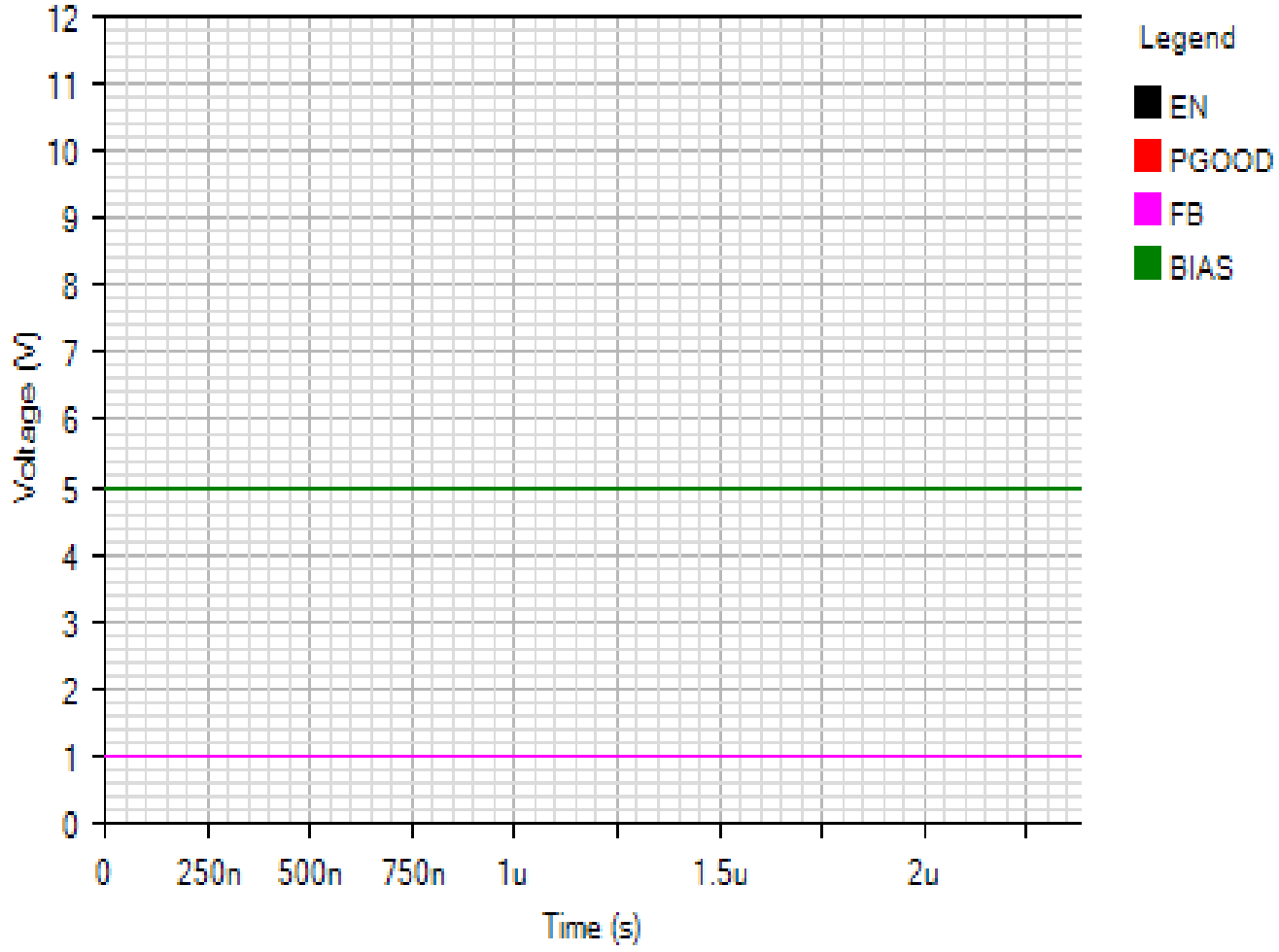

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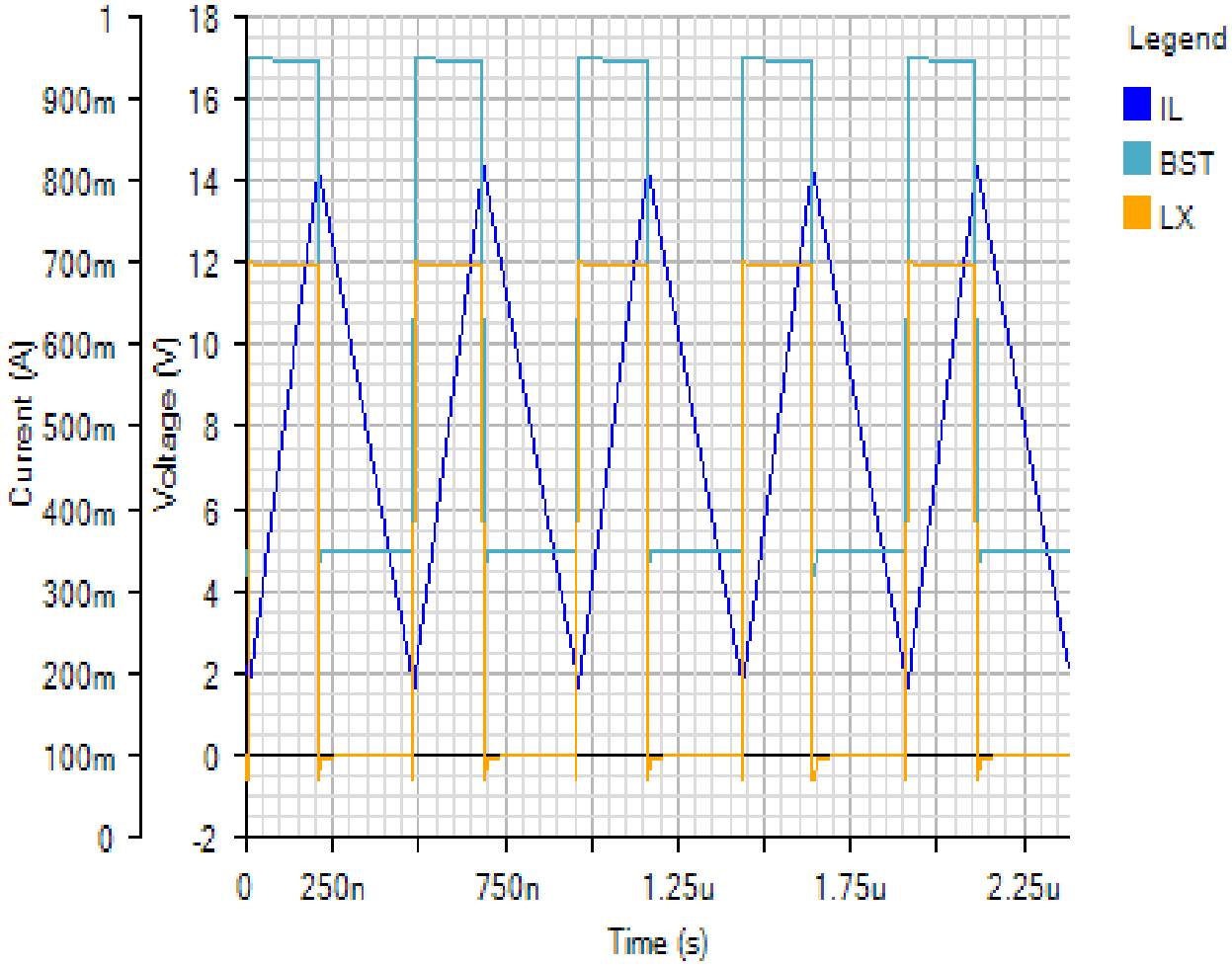

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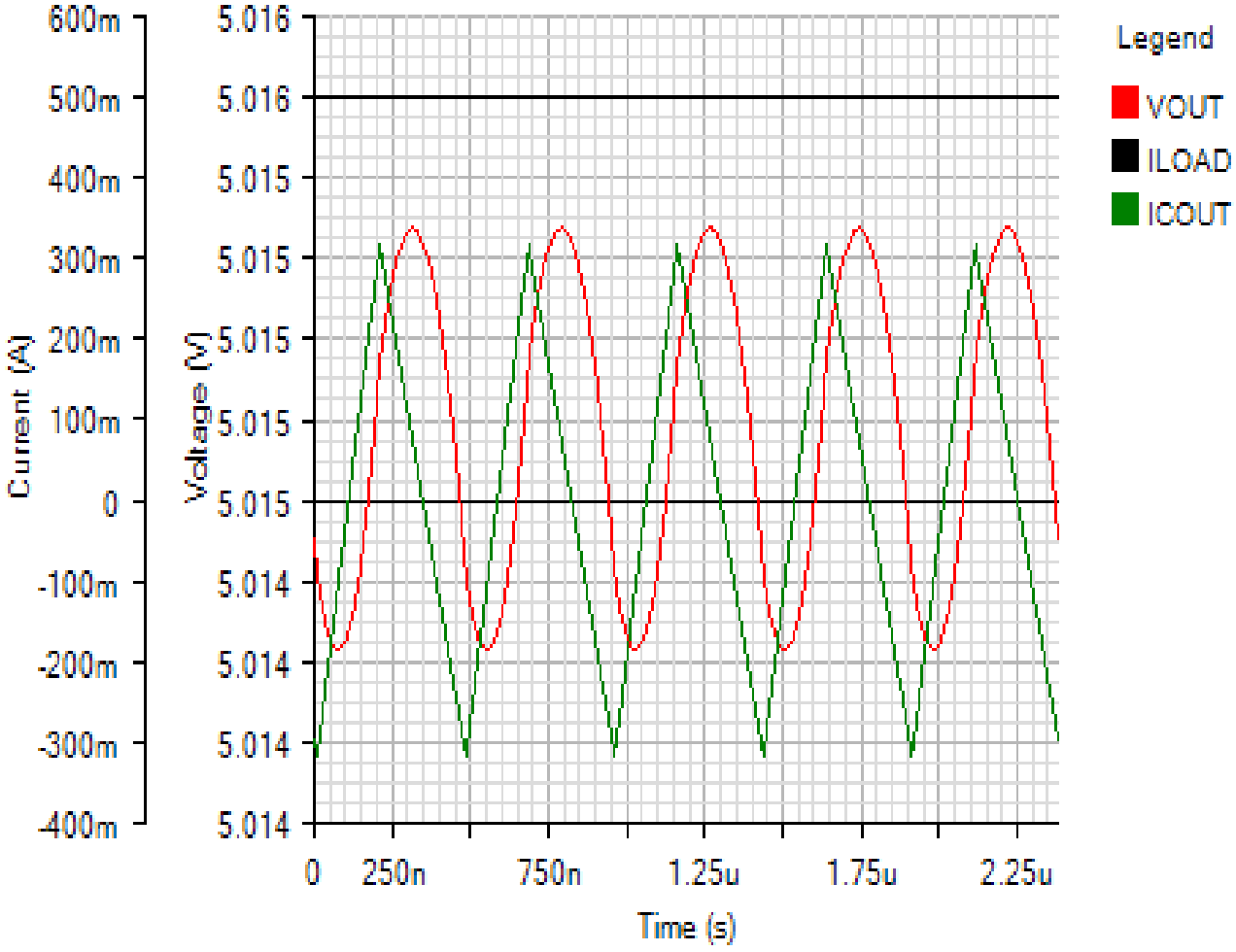
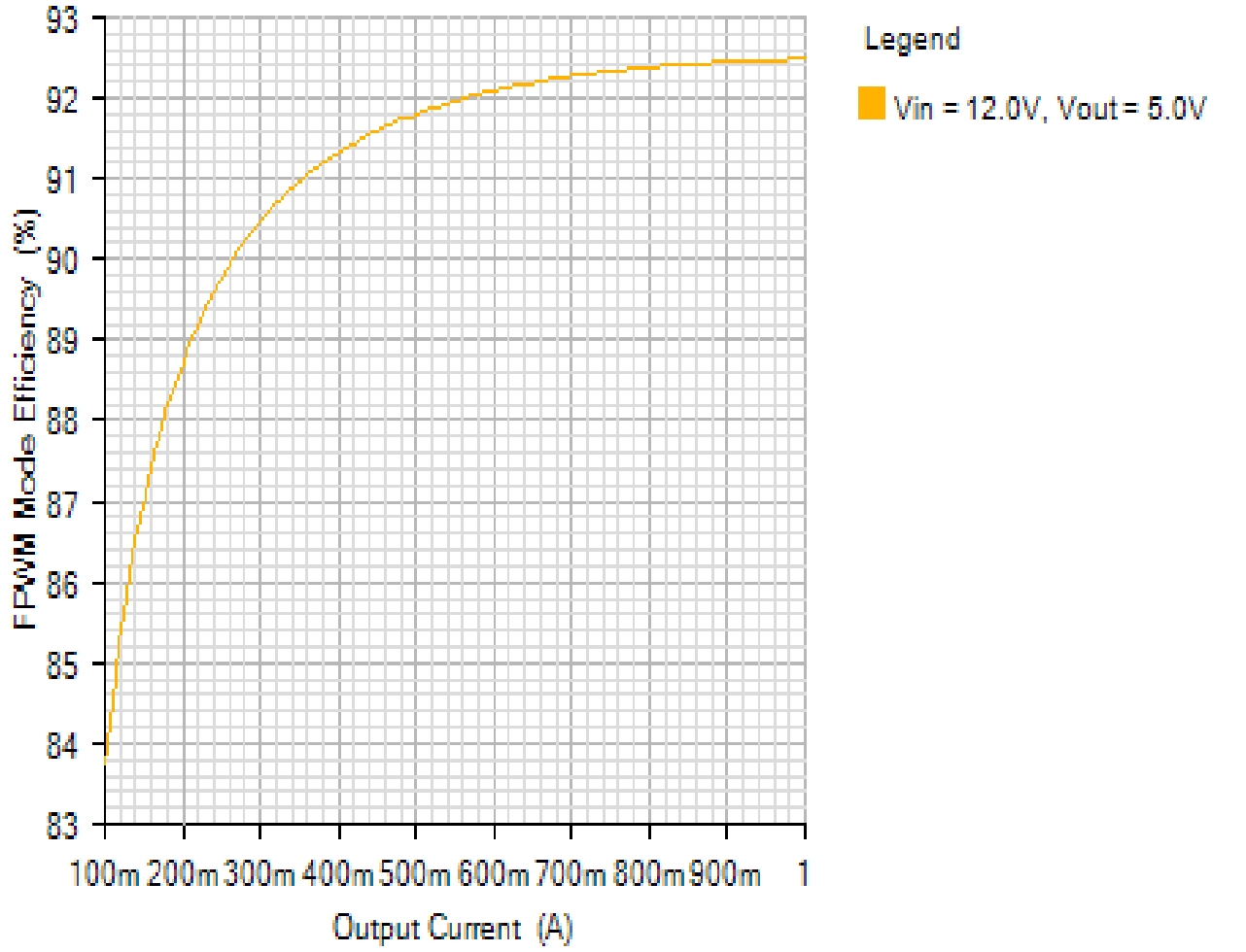
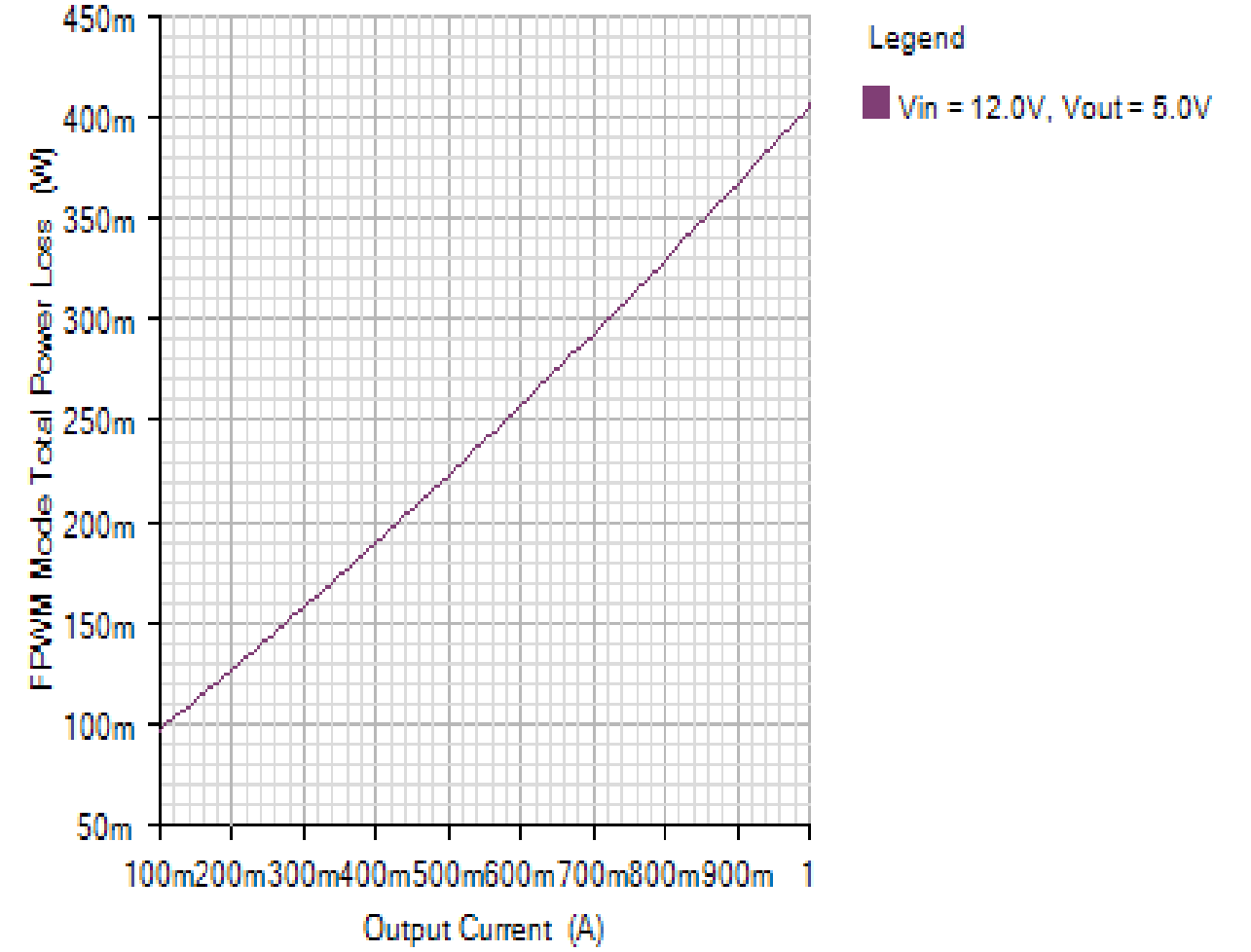


Efficiency - Mon Jan 14 2019 12:43:40

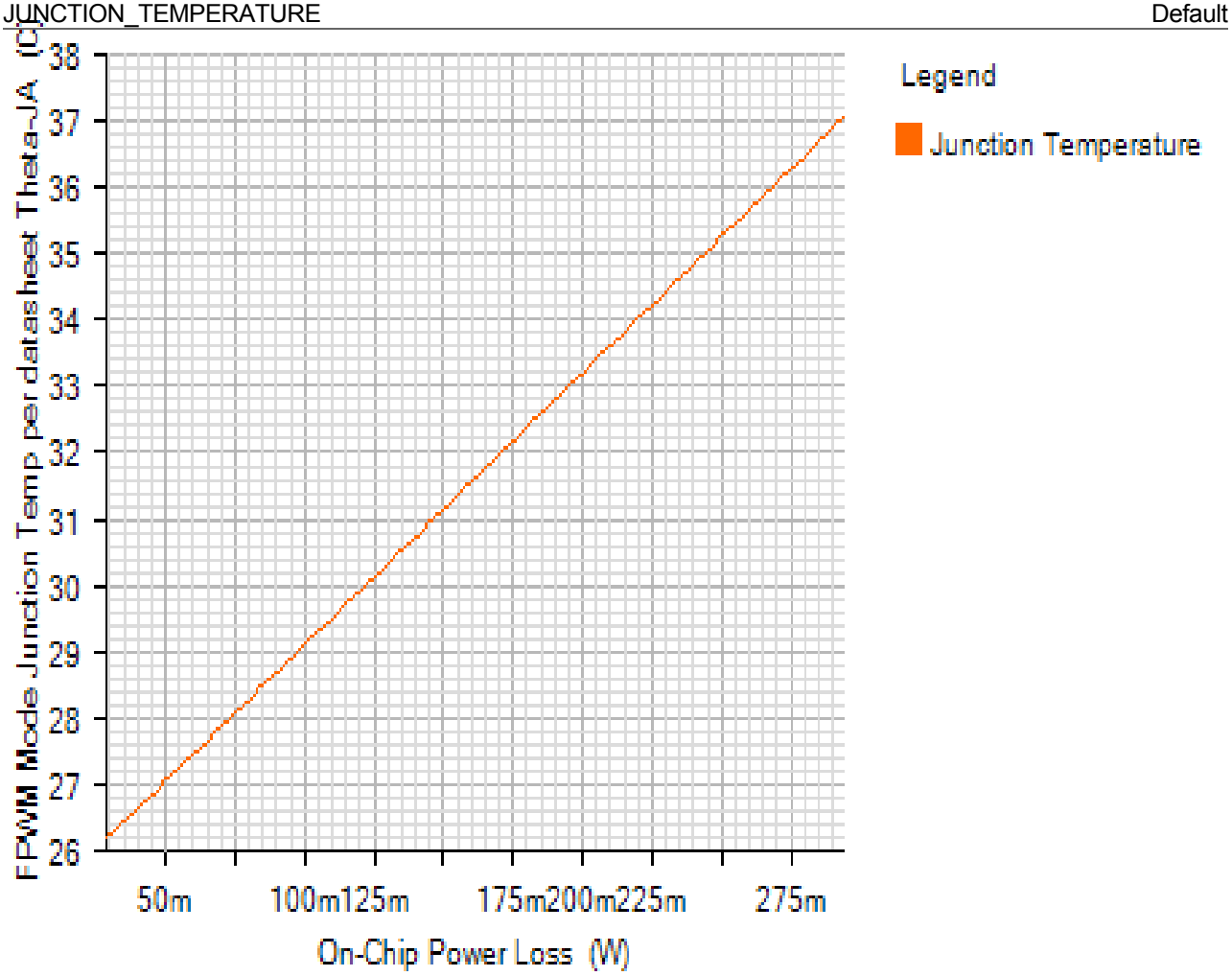
EFFICIENCY Default



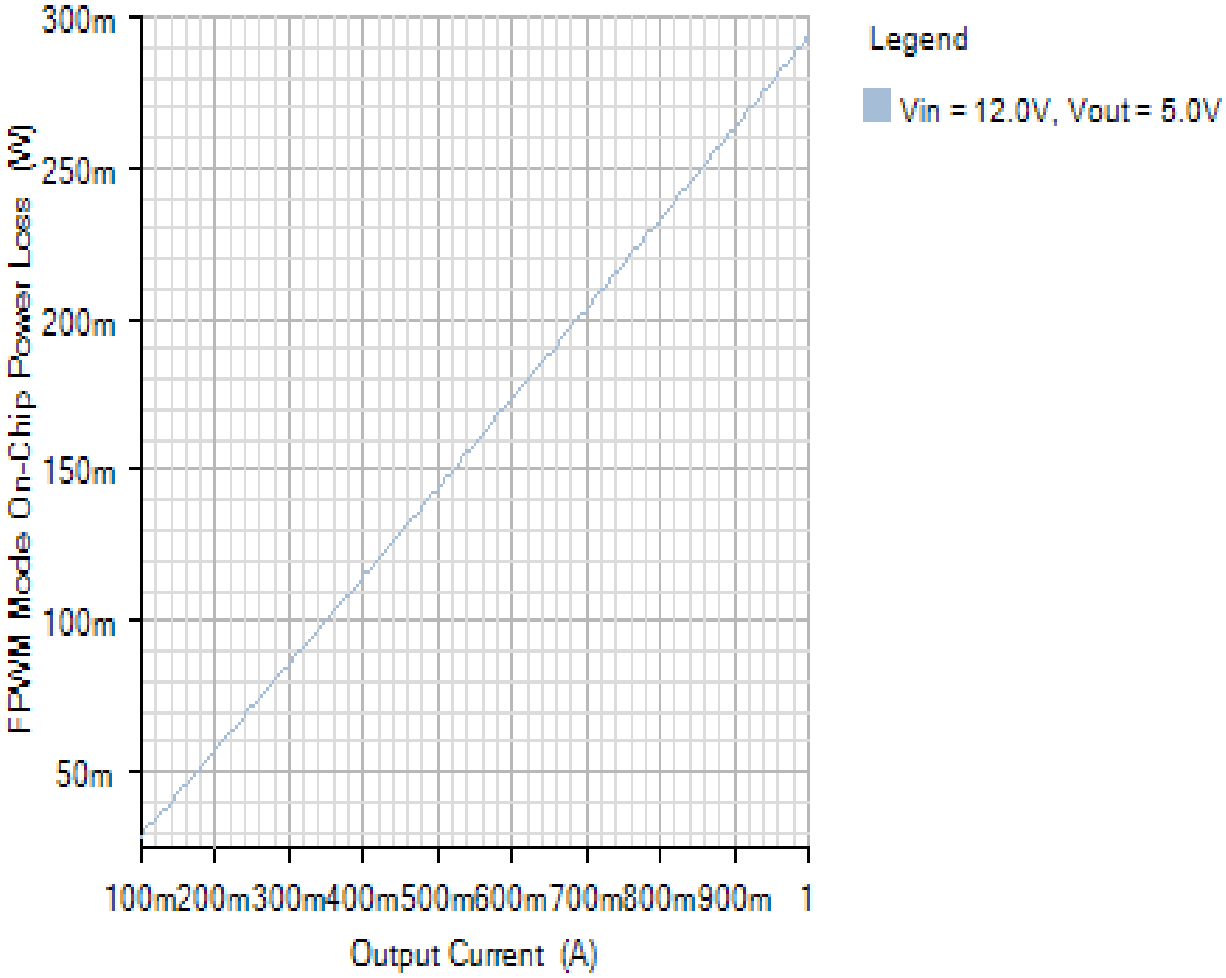
TOTAL_POWER_LOSS Default



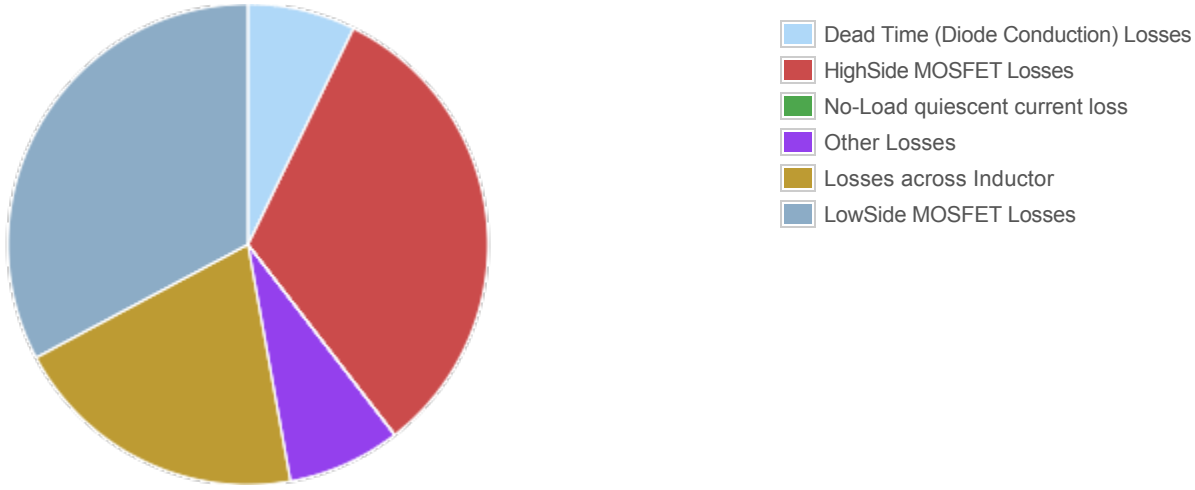
JUNCTION_TEMPERATURE Default



ON-CHIP_POWER_LOSS Default



Losses



Component	Loss (W)	% of total

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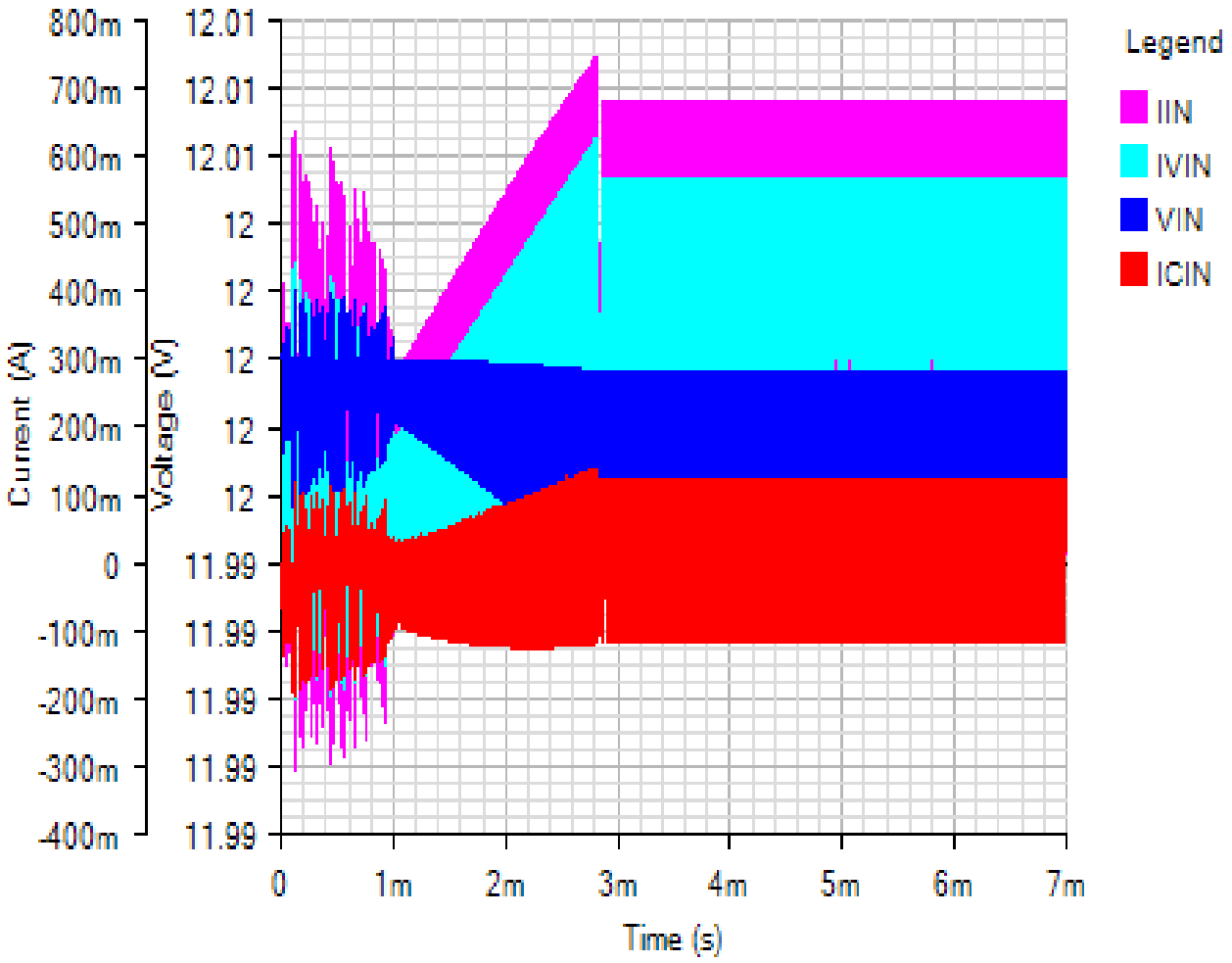
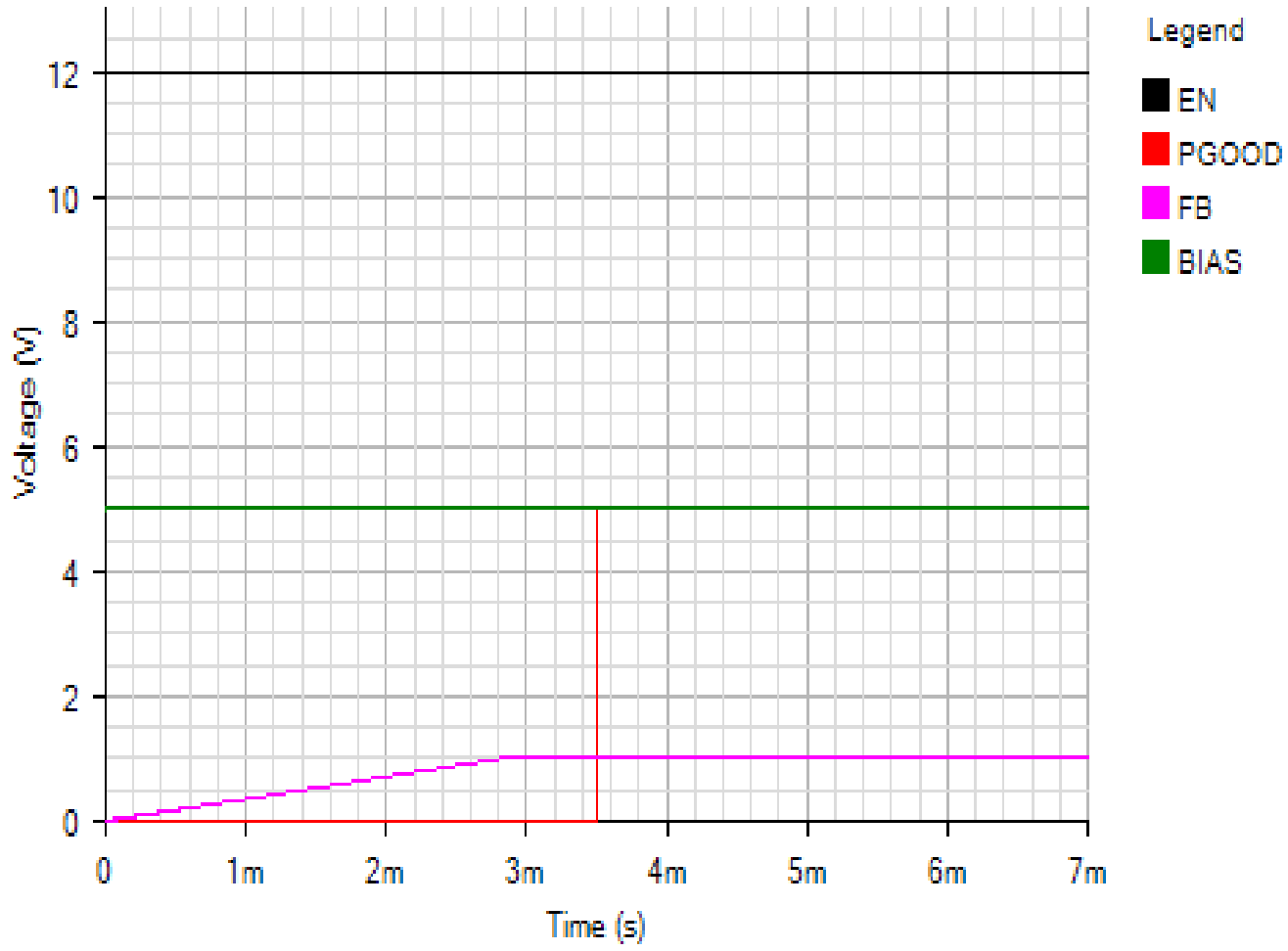
Dead Time (Diode Conduction) Losses	0.0588	7.2
HighSide MOSFET Losses	0.262332	32.3
No-Load quiescent current loss	0.000084	0
Other Losses	0.061993	7.6
Losses across Inductor	0.162815	20
LowSide MOSFET Losses	0.266465	32.8
Total	0.812489	100

Start Up - Mon Jan 14 2019 12:43:40

INPUT Default



IC Default



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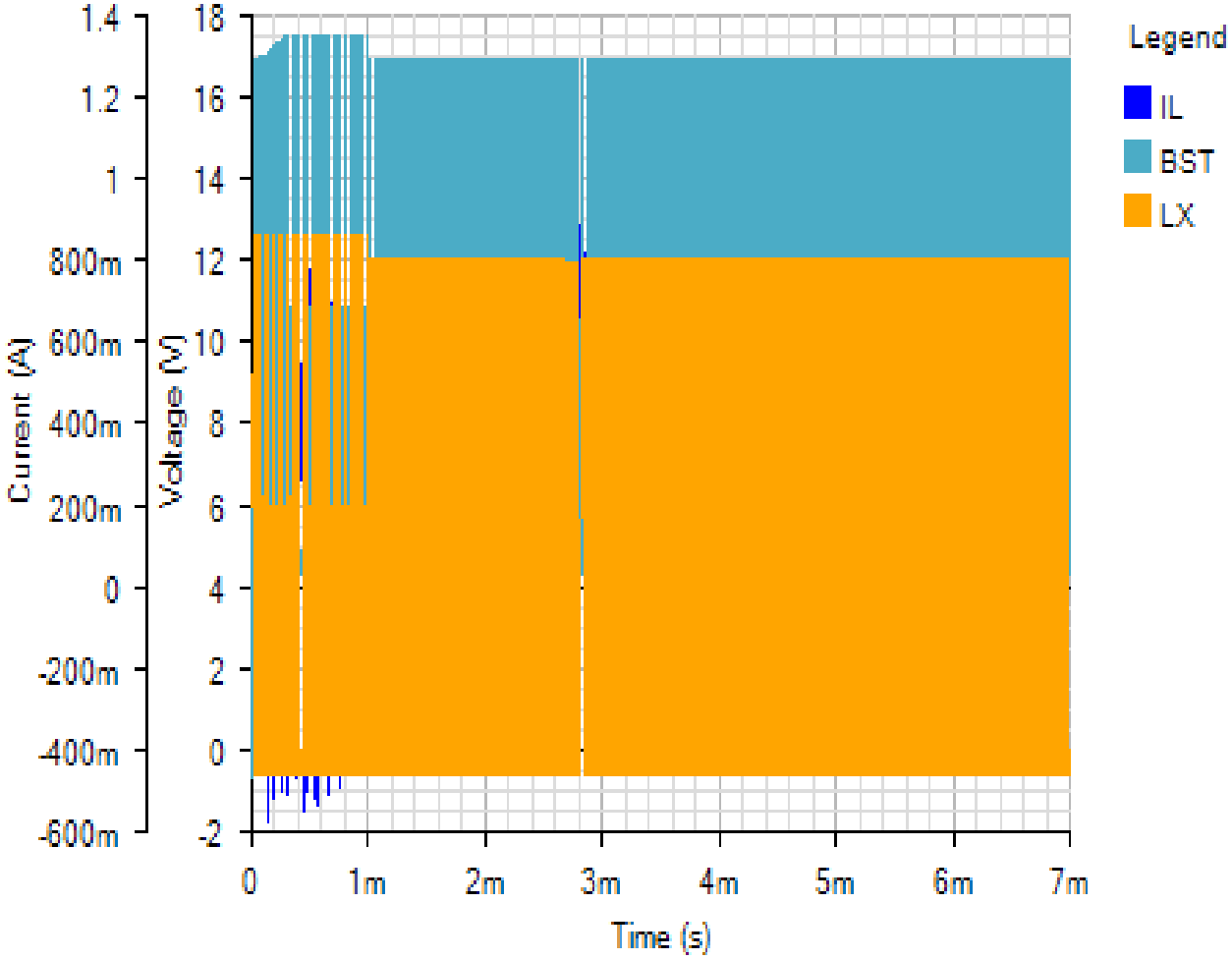
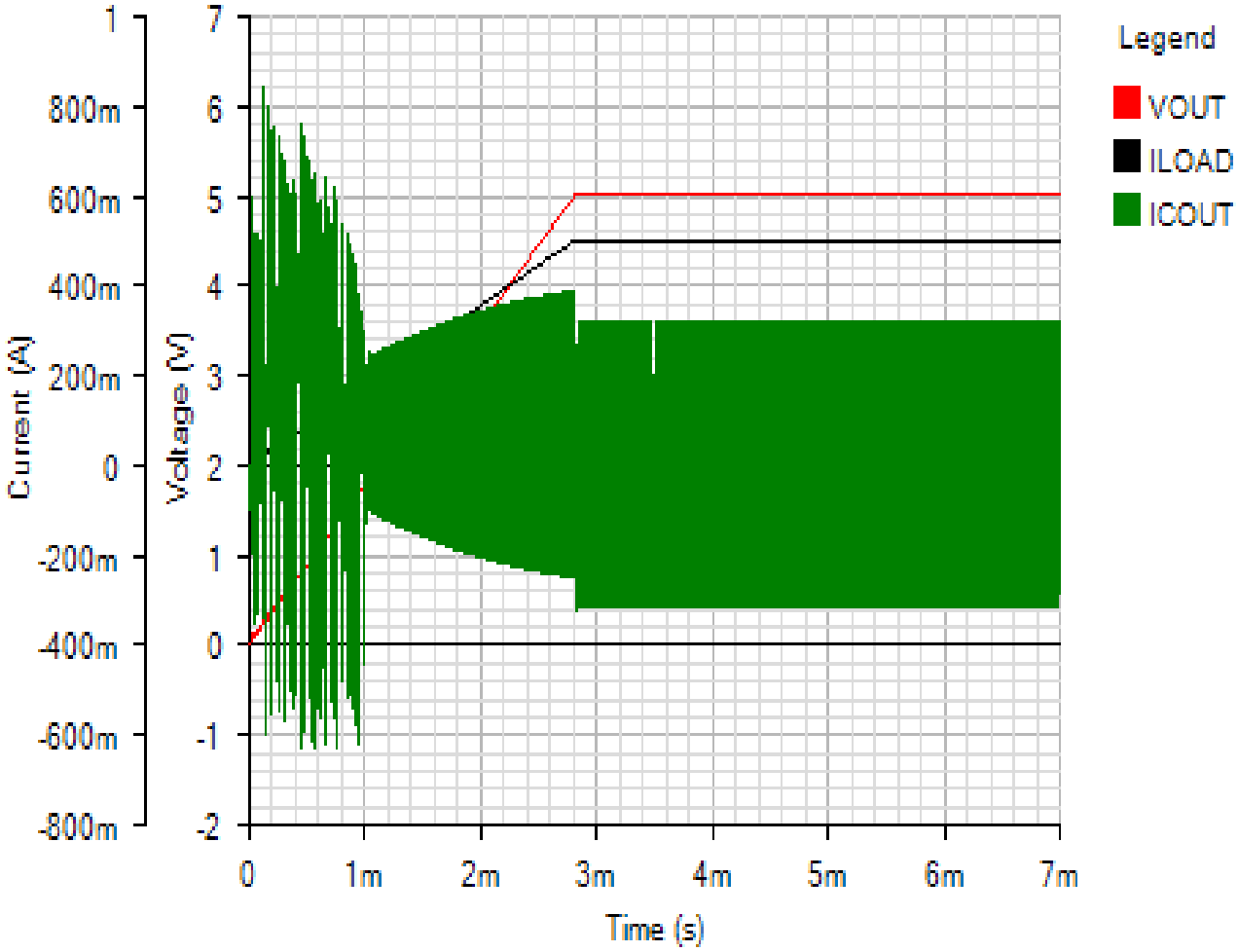


OUTPUT Default



Load Step - Mon Jan 14 2019 12:43:40

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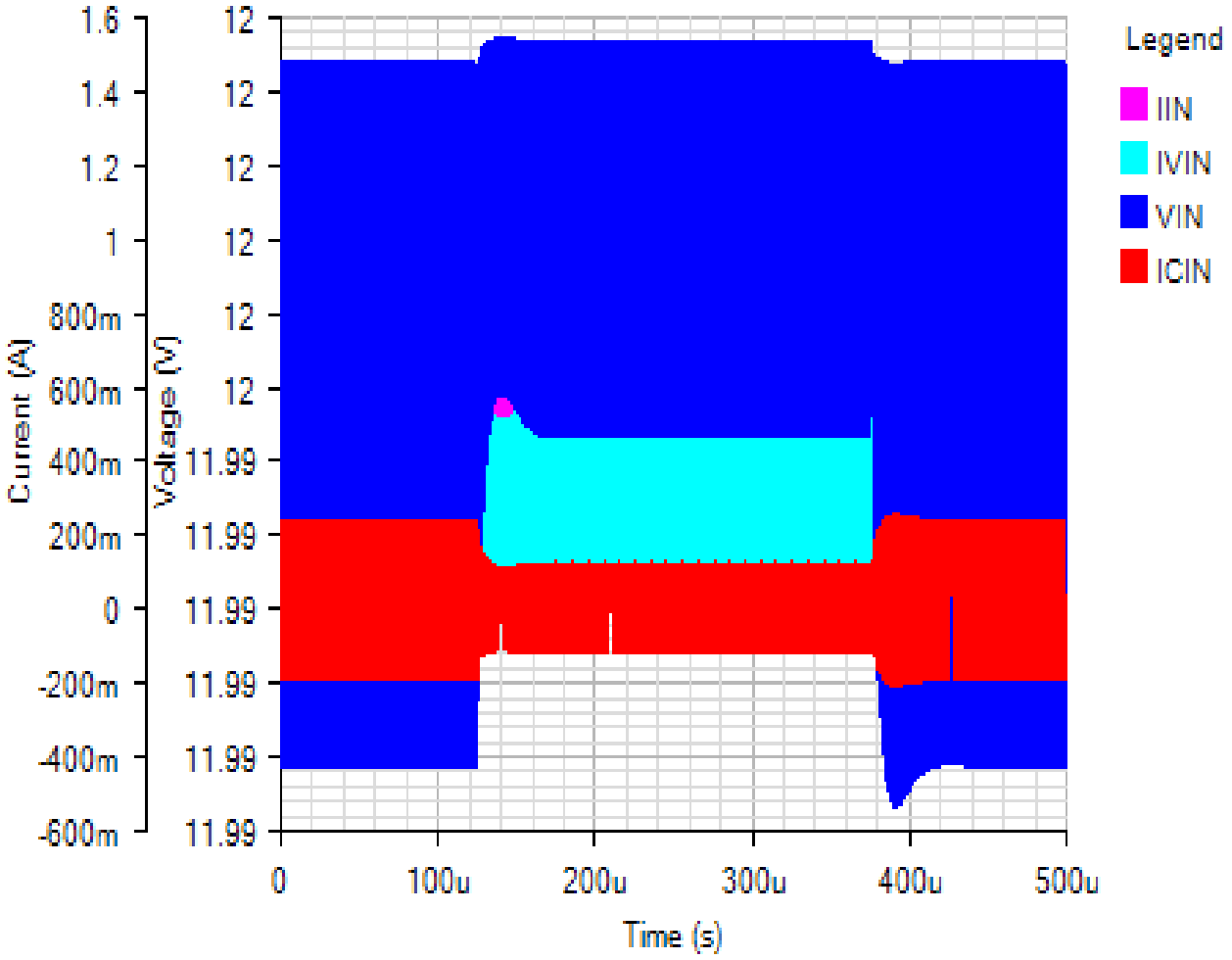

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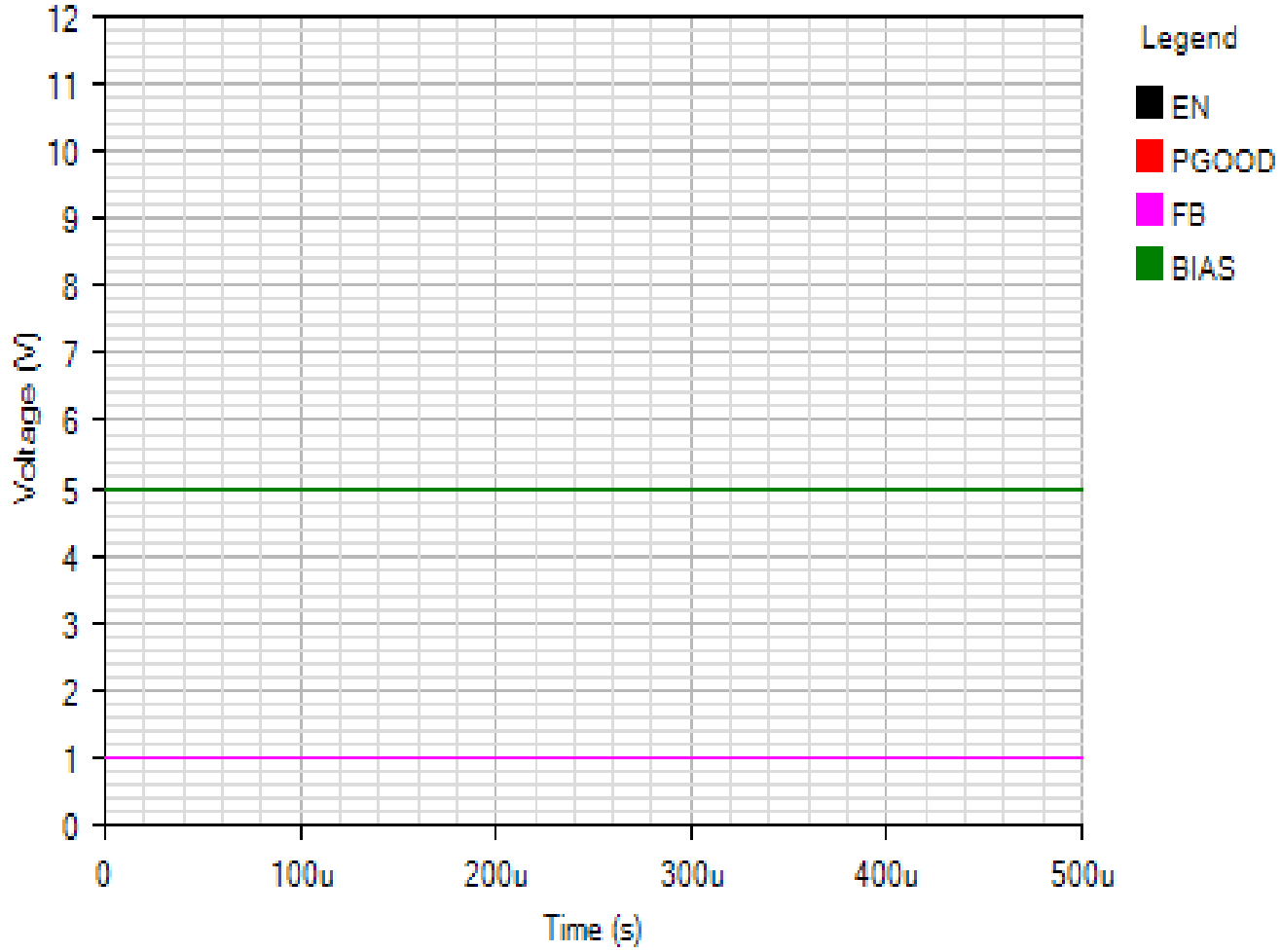

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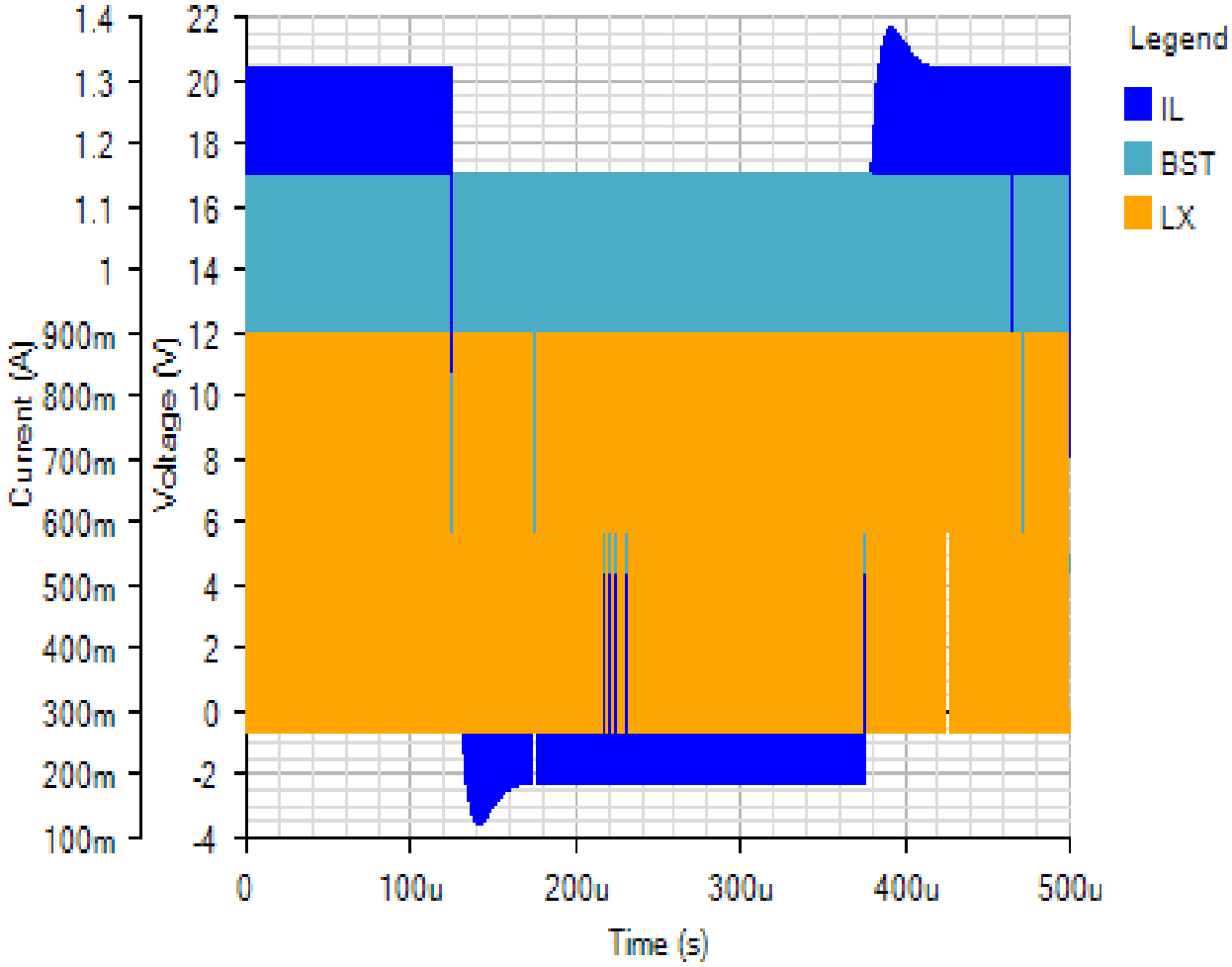

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