

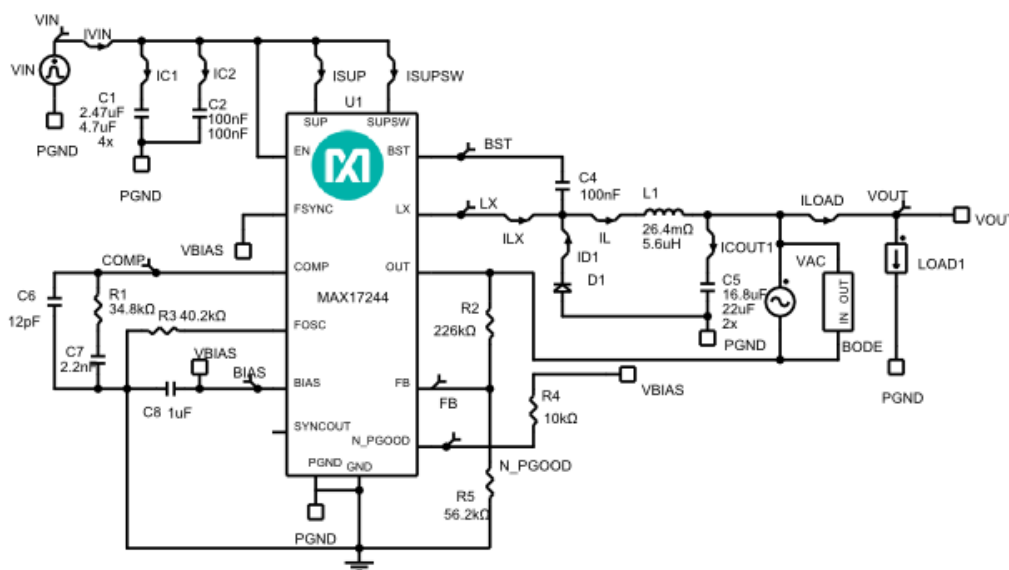
Initial Design

1.0

Design Requirements

Parameter	Value
Minimum Input Voltage	10V
Maximum Input Voltage	14V
Nominal Input Voltage	12V
Input Voltage Ripple	1%
Output Voltage Programming	External Resistive Divider
Output Voltage	5V
Output Current	2.5A
Load Step Start Current	1.25A
Load Step Current	2.5A
Output Voltage Ripple	2%
Output Voltage Load Step Over/Undershoot	5%
Performance Priority	Balance Efficiency and Size
BOM Priority	Cost
Inductor Current Ratio (LIR)	0.3
Mode of operation	PWM
Switching Frequency	700000Hz
Ambient Temperature	25°C

Schematic



- The data sheet describes a mode for Maximum Duty Cycle Operation which is engaged when Vout is within a few percent of Vin. This feature is not yet modeled in EE-Sim.

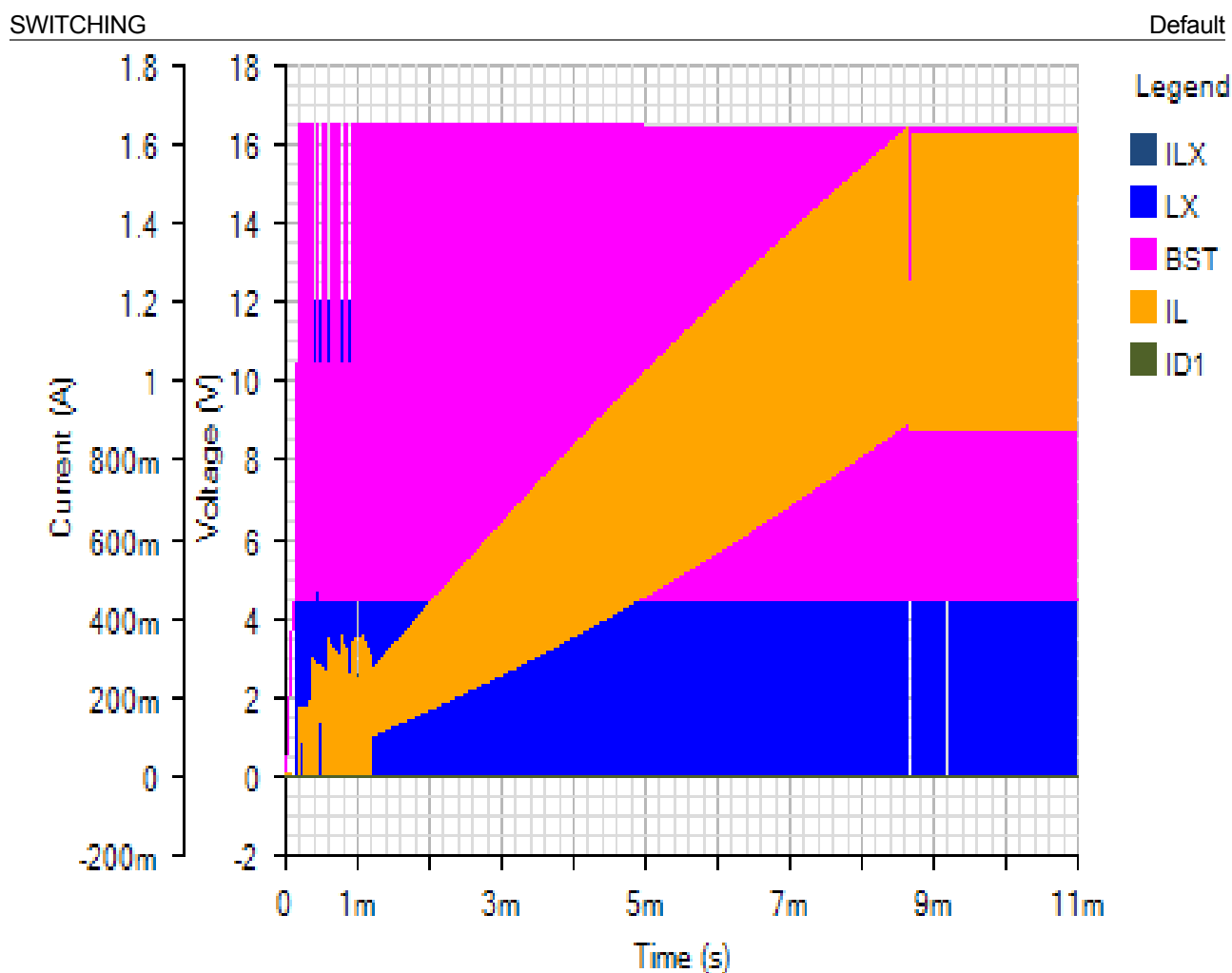
BOM

Ref	Qty	Part Number	Manufacturer	Description
U1	1	MAX17244	Maxim Integrated	3.5V-36V, 220KHz to 2.2MHz, 2.5A, High-Efficiency, Current Mode Step-Down DC-DC Converter
C1	4	C0805C475K4PAC	Kemet	Cap Ceramic 4.7uF 16V X5R 10% SMD 0805 85C Bulk
C2	1	0402YD104KAT2A	AVX	Cap Ceramic 0.1uF 16V X5R 10% Pad SMD 0402 85°C T/R
C4	1	0402YD104KAT2A	AVX	Cap Ceramic 0.1uF 16V X5R 10% Pad SMD 0402 85°C T/R
C5	2	GRM32DR61C226KE18L	Murata	Cap Ceramic 22uF 16V X5R 10% SMD 1210 85C Embossed T/R
C6	1	C0603C120K5GACTU	KEMET Corporation	Cap Ceramic 12pF 50V C0G 10% Pad SMD 0603 125°C T/R
C7	1	UMK105BJ222KVHF	Taiyo Yuden	Cap Ceramic 0.0022uF 50V X5R 10% Pad SMD 0402 85°C Automotive T/R
C8	1	EMK105BJ105KV-F	Taiyo Yuden	Cap Ceramic 1uF 16V X5R 10% Pad SMD 0402 85°C T/R
D1	1	B330B-13-F	Multicomp Company	Diode Schottky 30V 3A 2-Pin SMB T/R
L1	1	SLF10145T-5R6M3R2-PF	TDK	Inductor Power Shielded Wirewound 5.6uH 20% 1KHz Ferrite 3.2A 22mOhm DCR T/R
R1	1	ERJ3EKF3482V	Panasonic	Res Thick Film 0603 34.8K Ohm 1% 0.1W(1/10W) ±100ppm/°C Pad SMD

				Automotive T/R
R2	1	ERJ2RKF2263X	Panasonic	Res Thick Film 0402 226K Ohm 1% 0.1W(1/10W) ±100ppm/°C Pad SMD Automotive T/R
R3	1	ERJ3EKF4022V	Panasonic	Res Thick Film 0603 40.2K Ohm 1% 0.1W(1/10W) ±100ppm/°C Pad SMD Automotive T/R
R4	1	ERJ2RKF1002X	Panasonic	Res Thick Film 0402 10K Ohm 1% 0.1W(1/10W) ±100ppm/°C Pad SMD Automotive T/R
R5	1	ERJ3EKF5622V	Panasonic	Res Thick Film 0603 56.2K Ohm 1% 0.1W(1/10W) ±100ppm/°C Pad SMD Automotive T/R

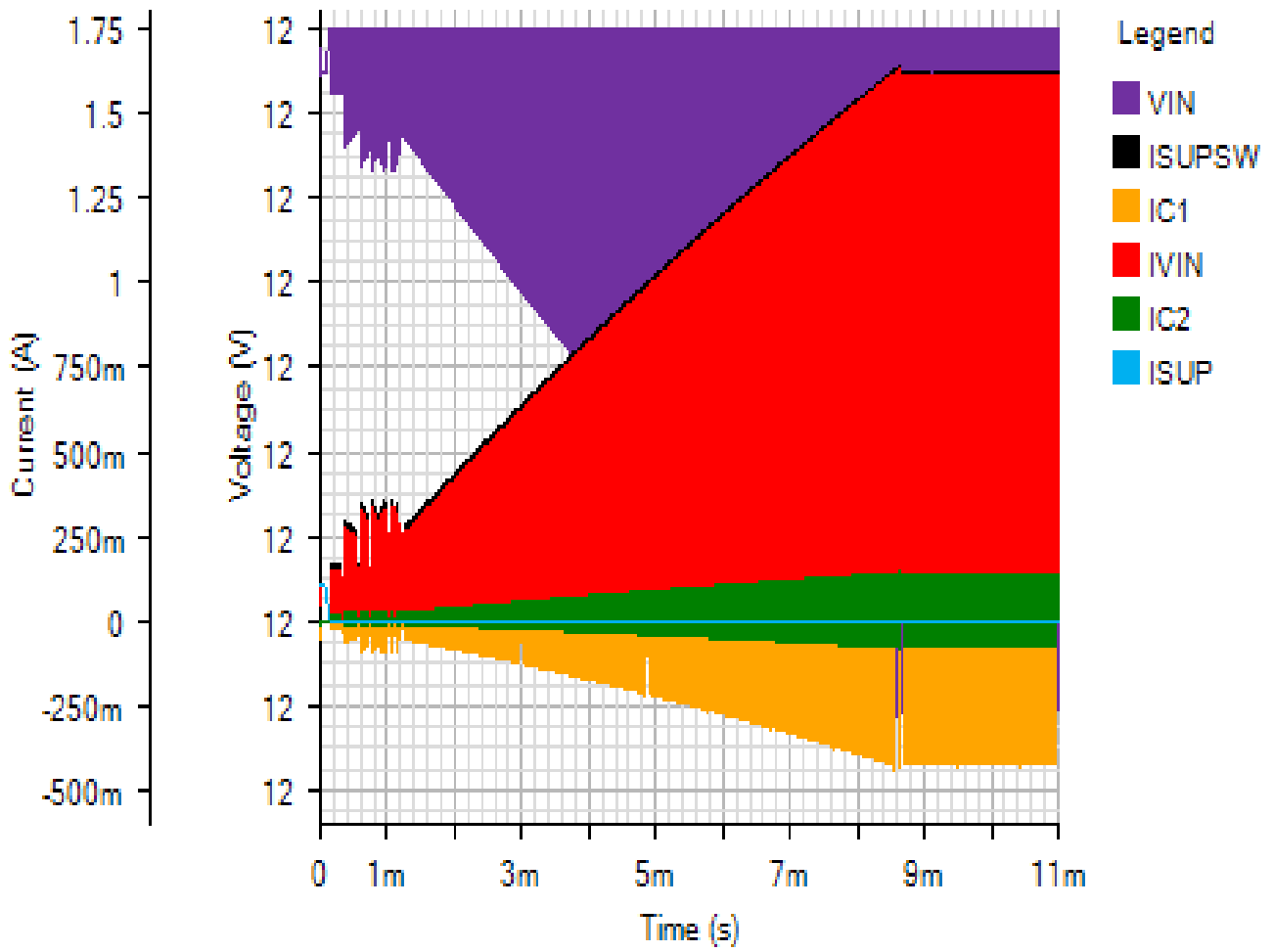
Simulation Results

Start Up - Fri Nov 16 2018 09:21:50



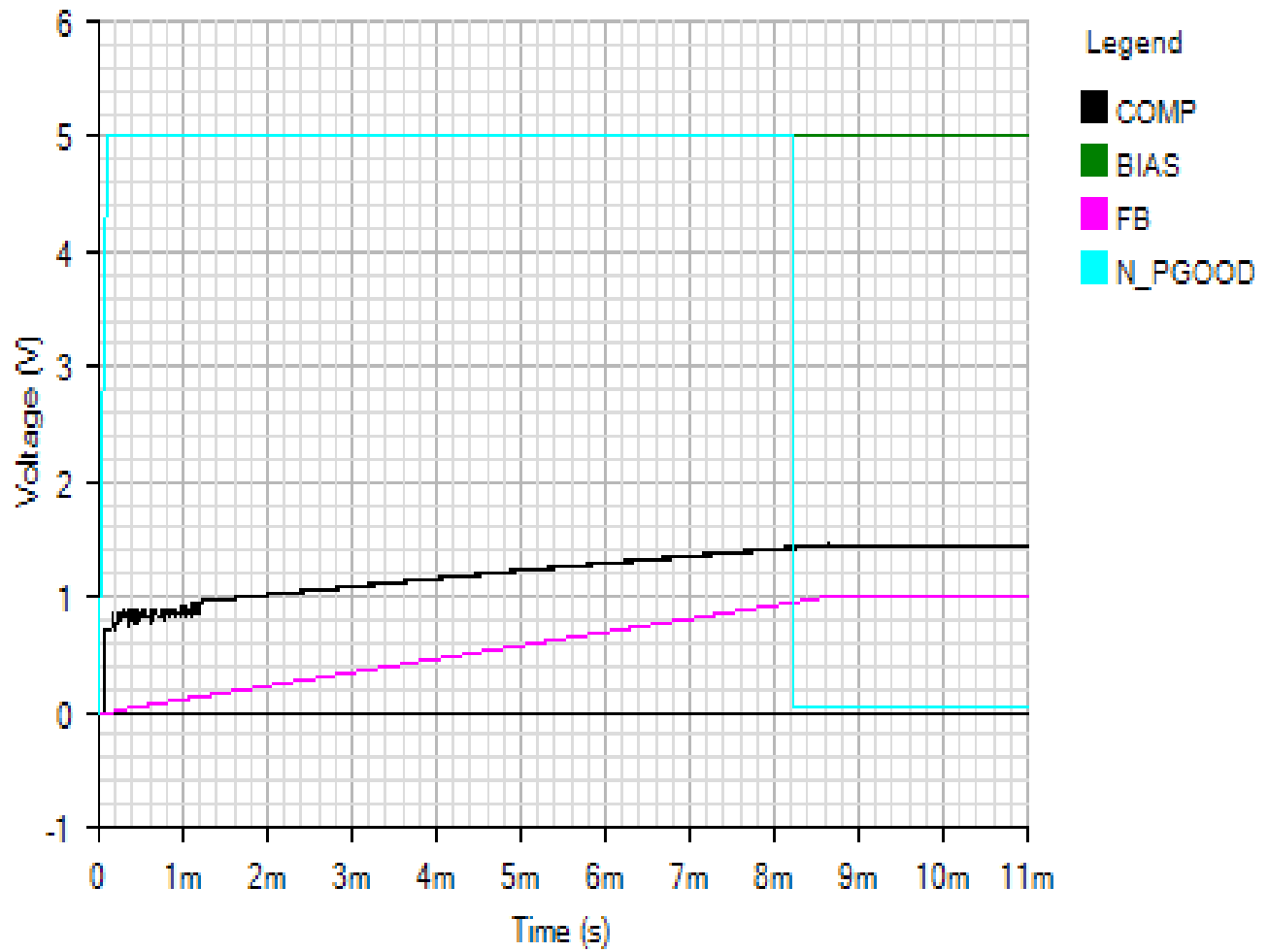
INPUT

Default



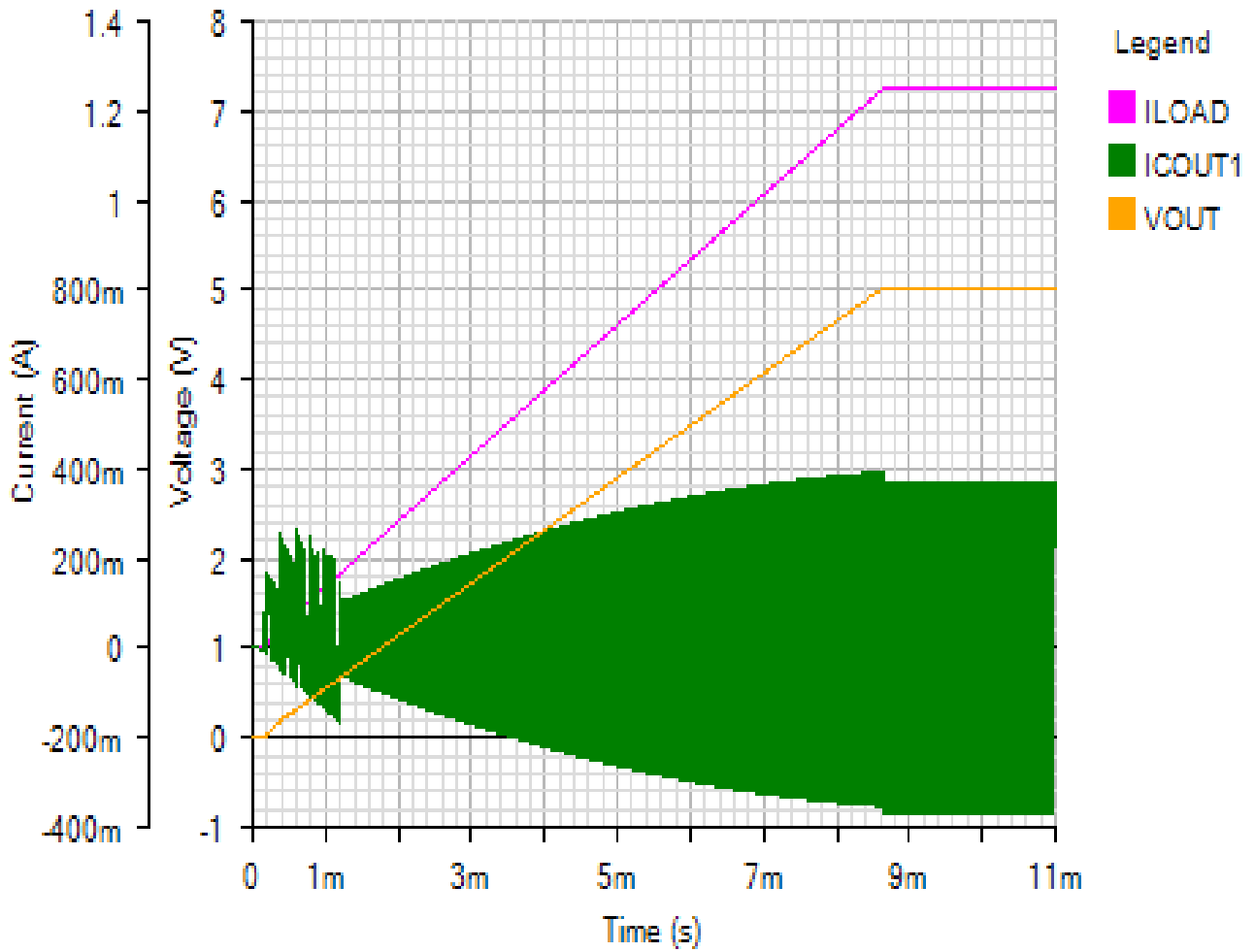
IC

Default



OUTPUT

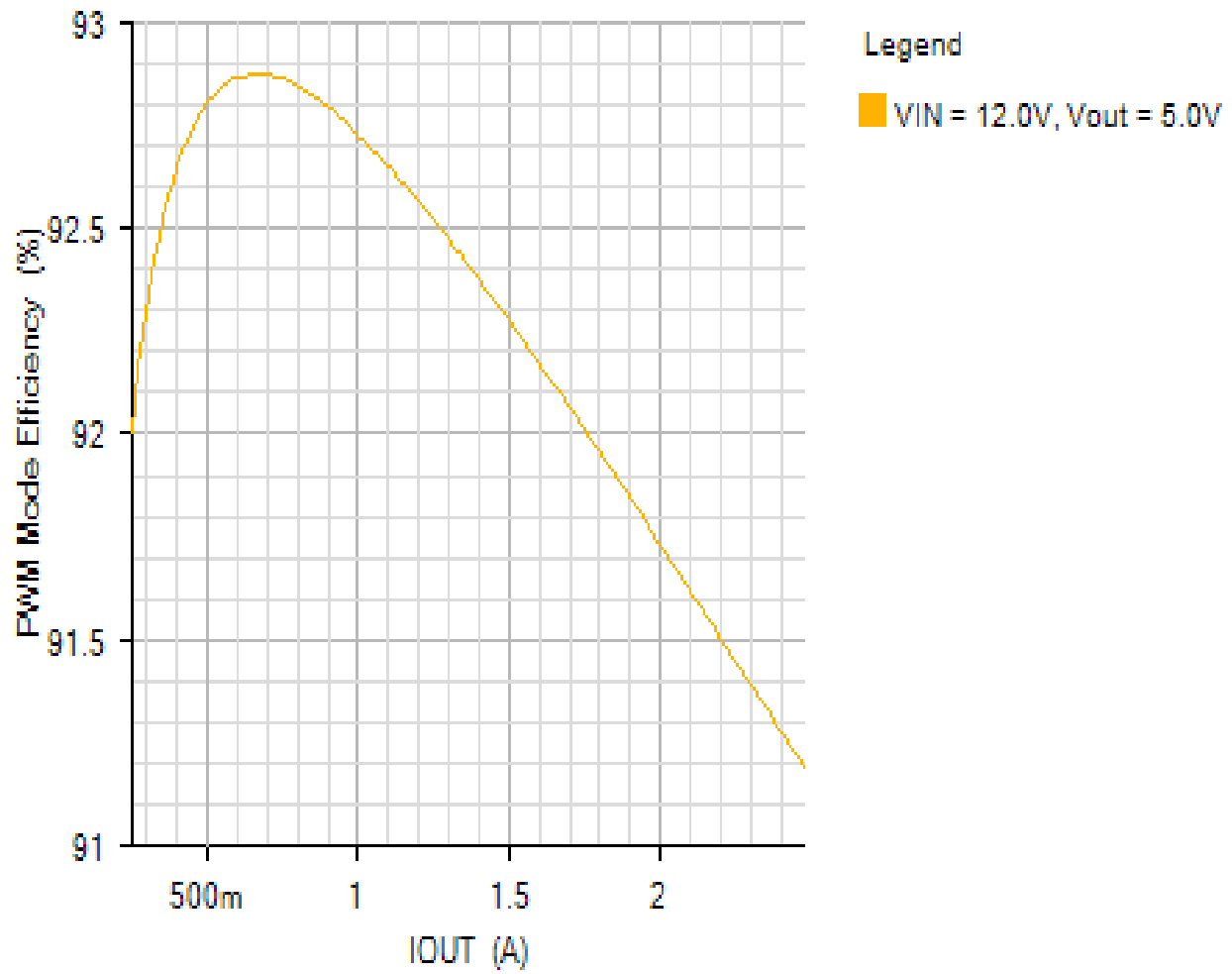
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Efficiency - Fri Nov 16 2018 09:21:50

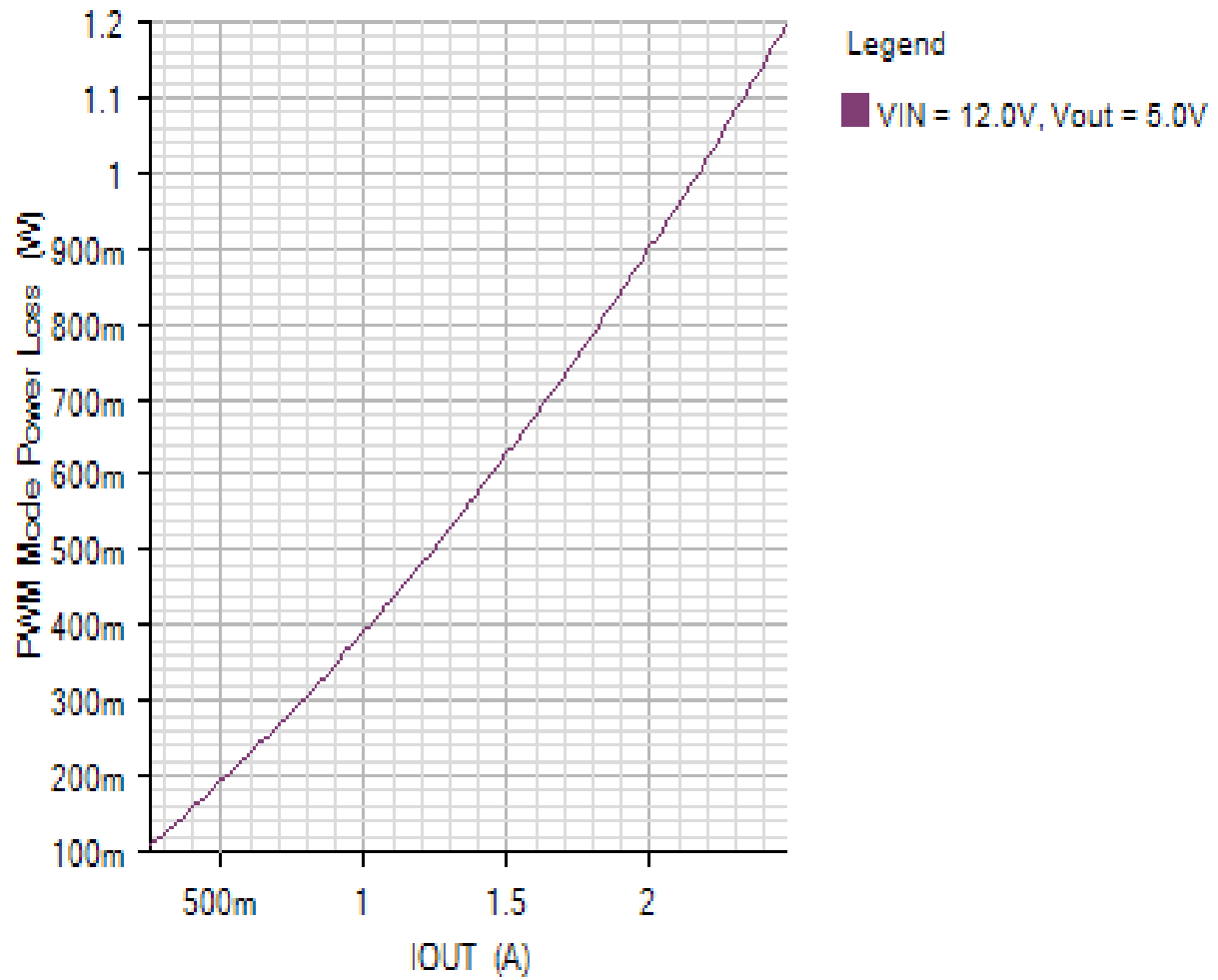
EFFICIENCY_PLOT

Default



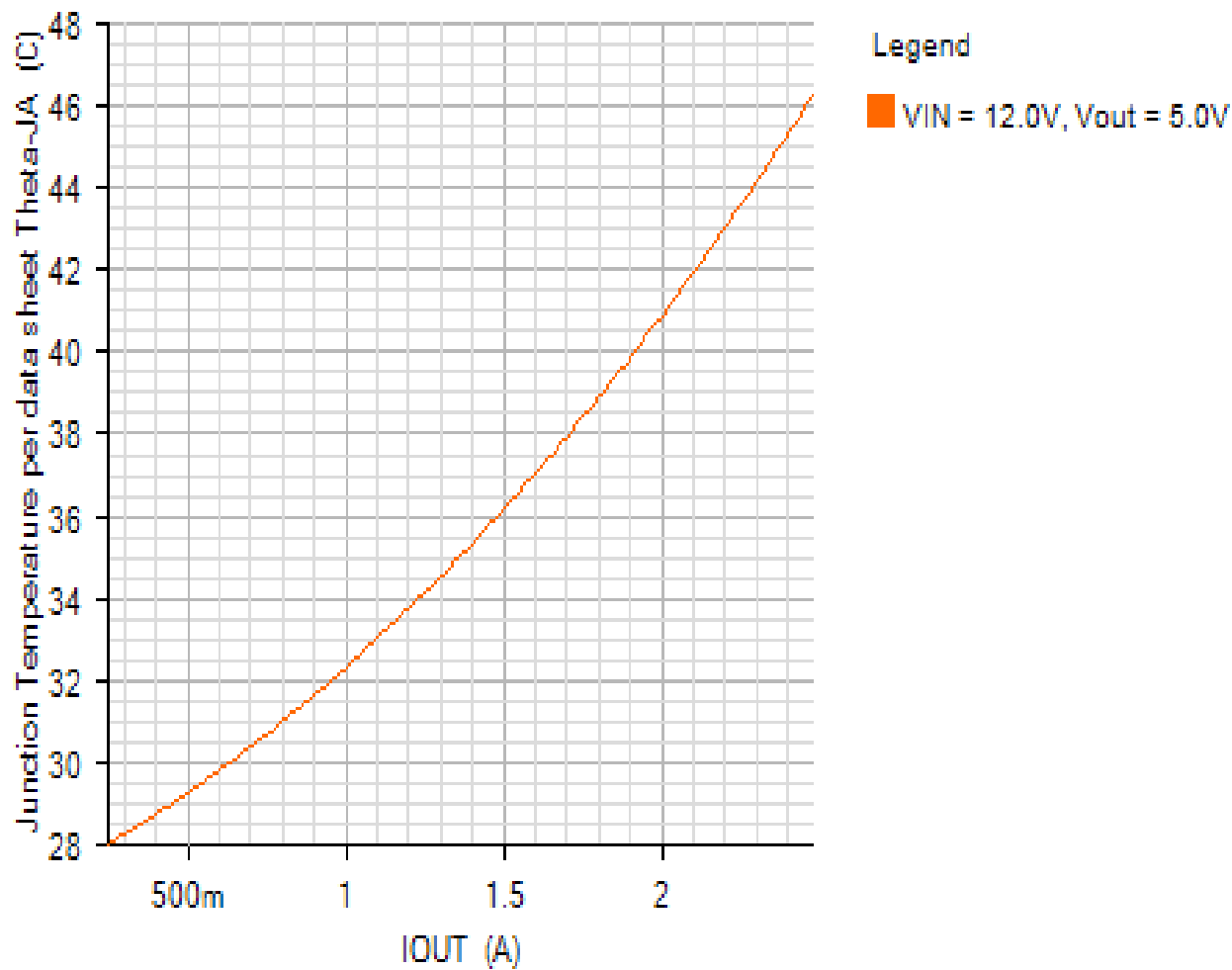
POWER_LOSS_PLOT

Default

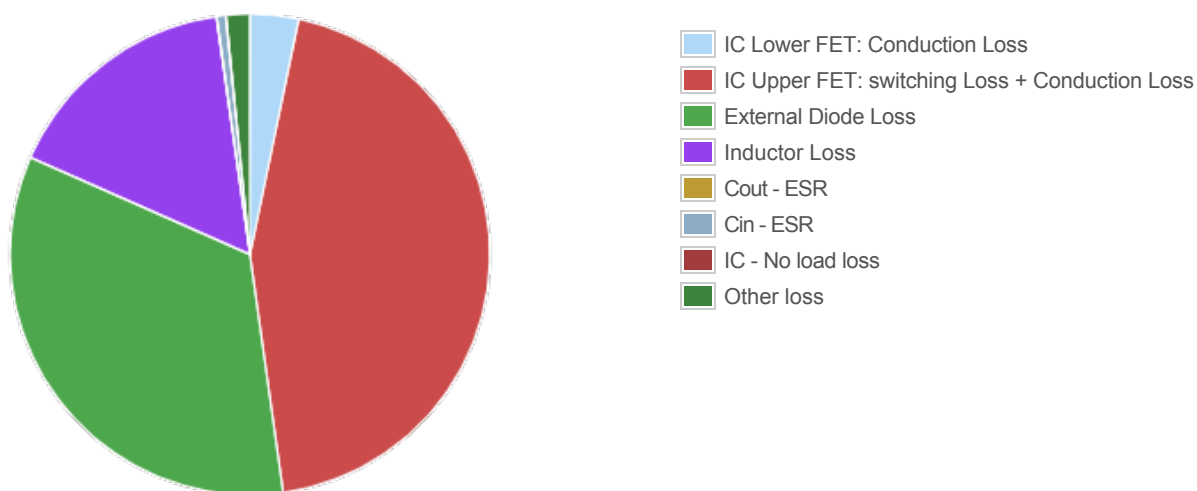


JUNCTION_TEMPERATURE_PLOT

Default



Losses



Component

Loss (W)

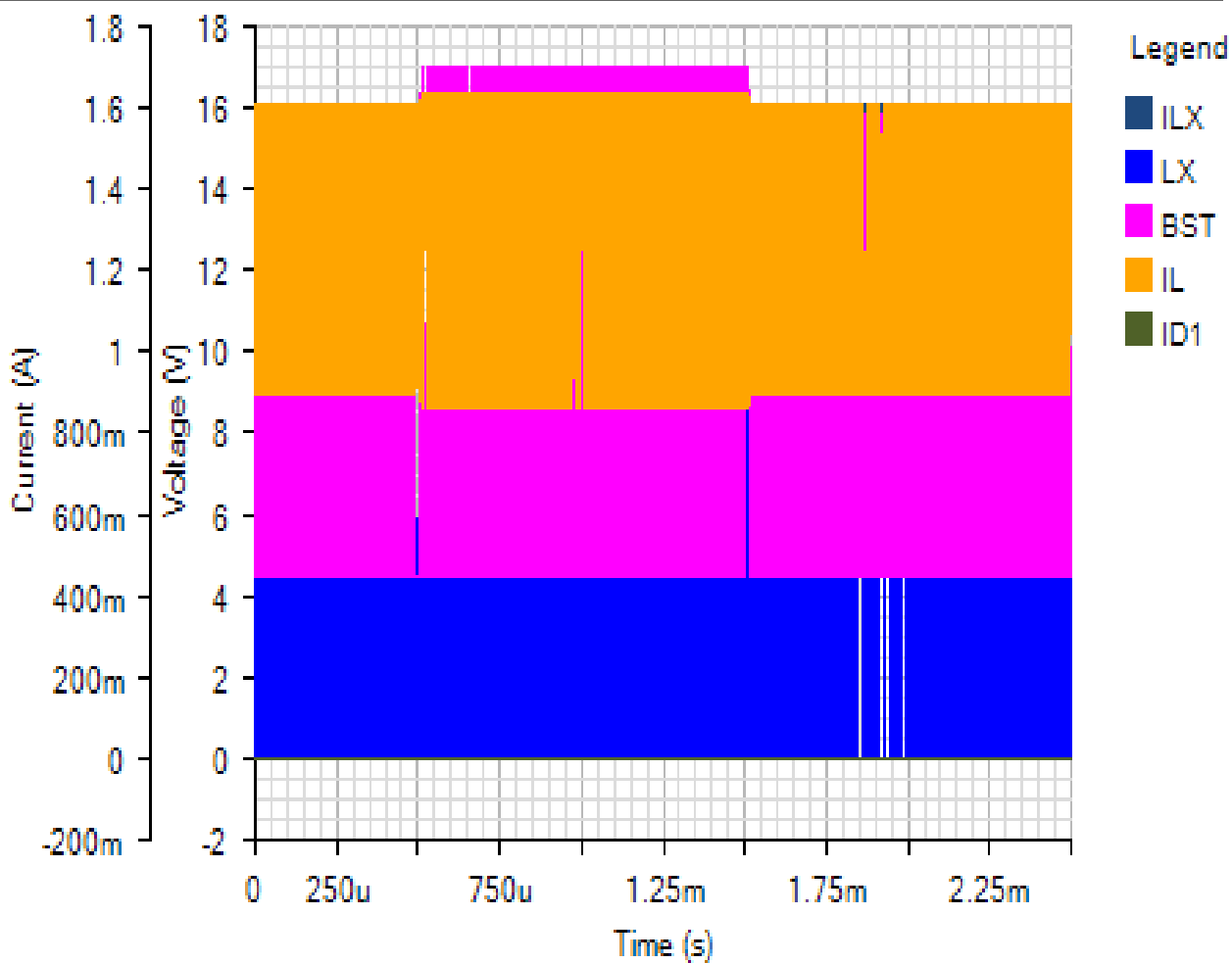
% of total

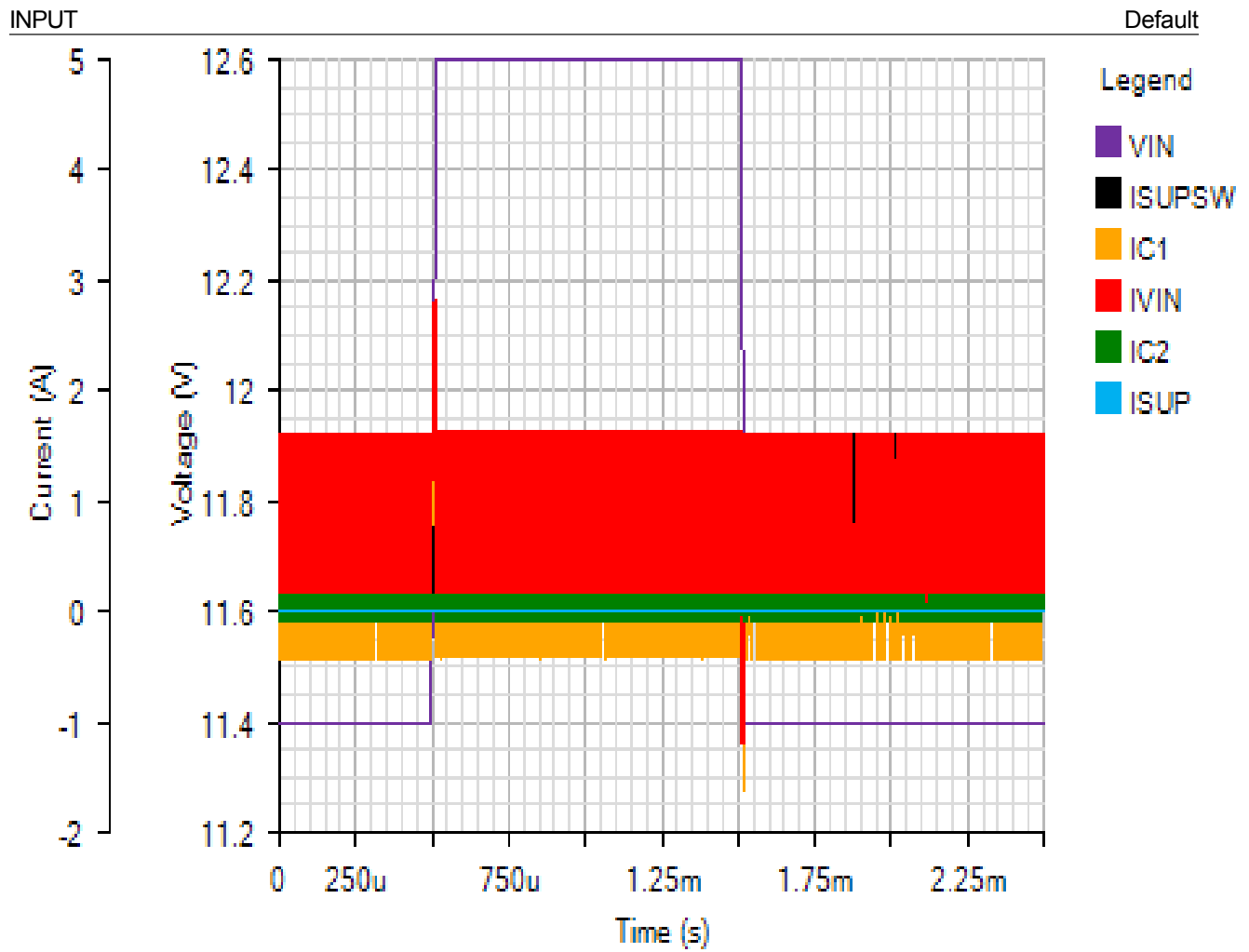
Component	Loss (W)	% of total
IC Lower FET: Conduction Loss	0.039	3.3
IC Upper FET: switching Loss + Conduction Loss	0.533	44.5
External Diode Loss	0.405	33.8
Inductor Loss	0.193	16.1
Cout - ESR	0.0001	0
Cin - ESR	0.0075	0.6
IC - No load loss	0.0003	0
Other loss	0.019	1.6
Total	1.1969	100

Line Transient - Fri Nov 16 2018 09:21:50

SWITCHING

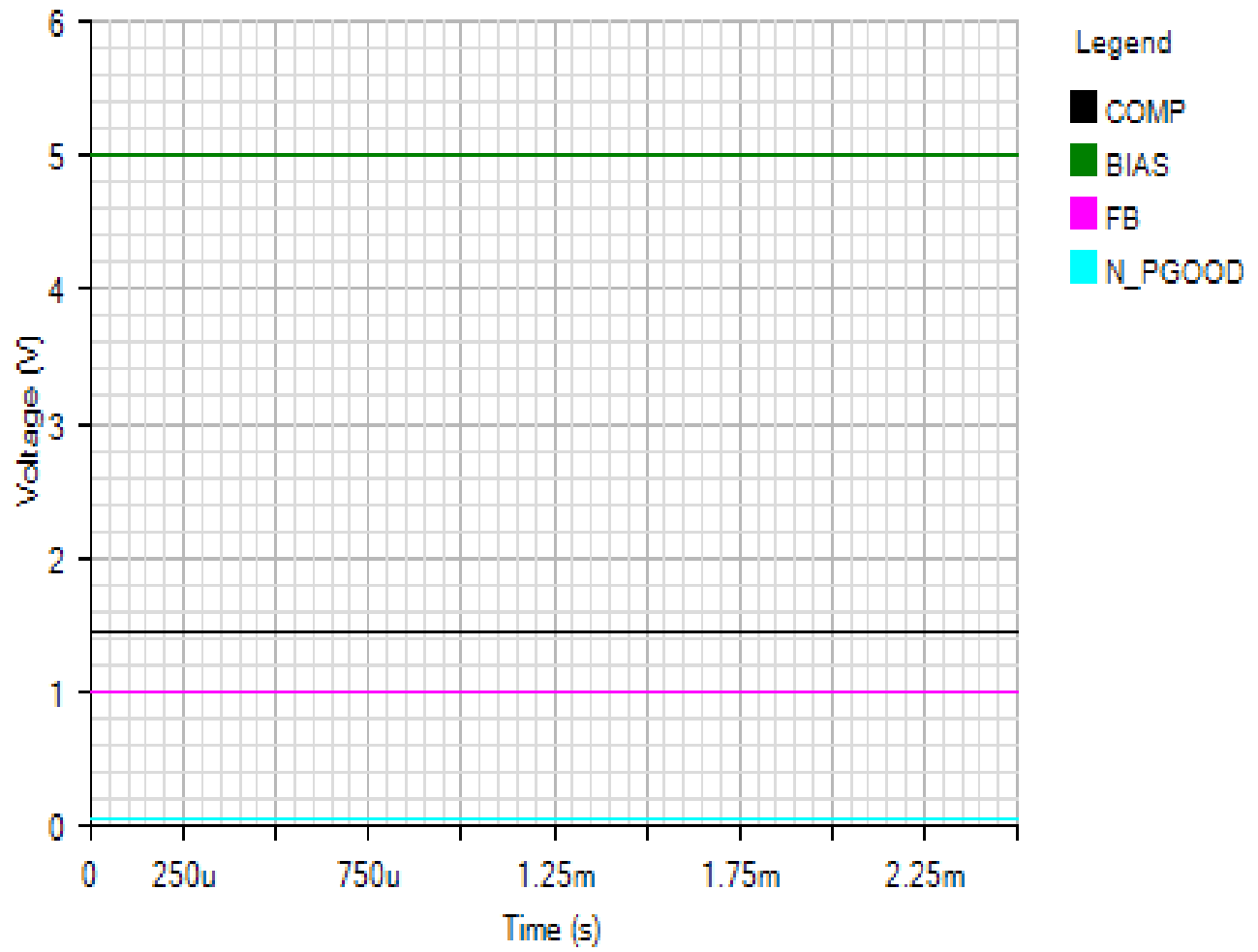
Default





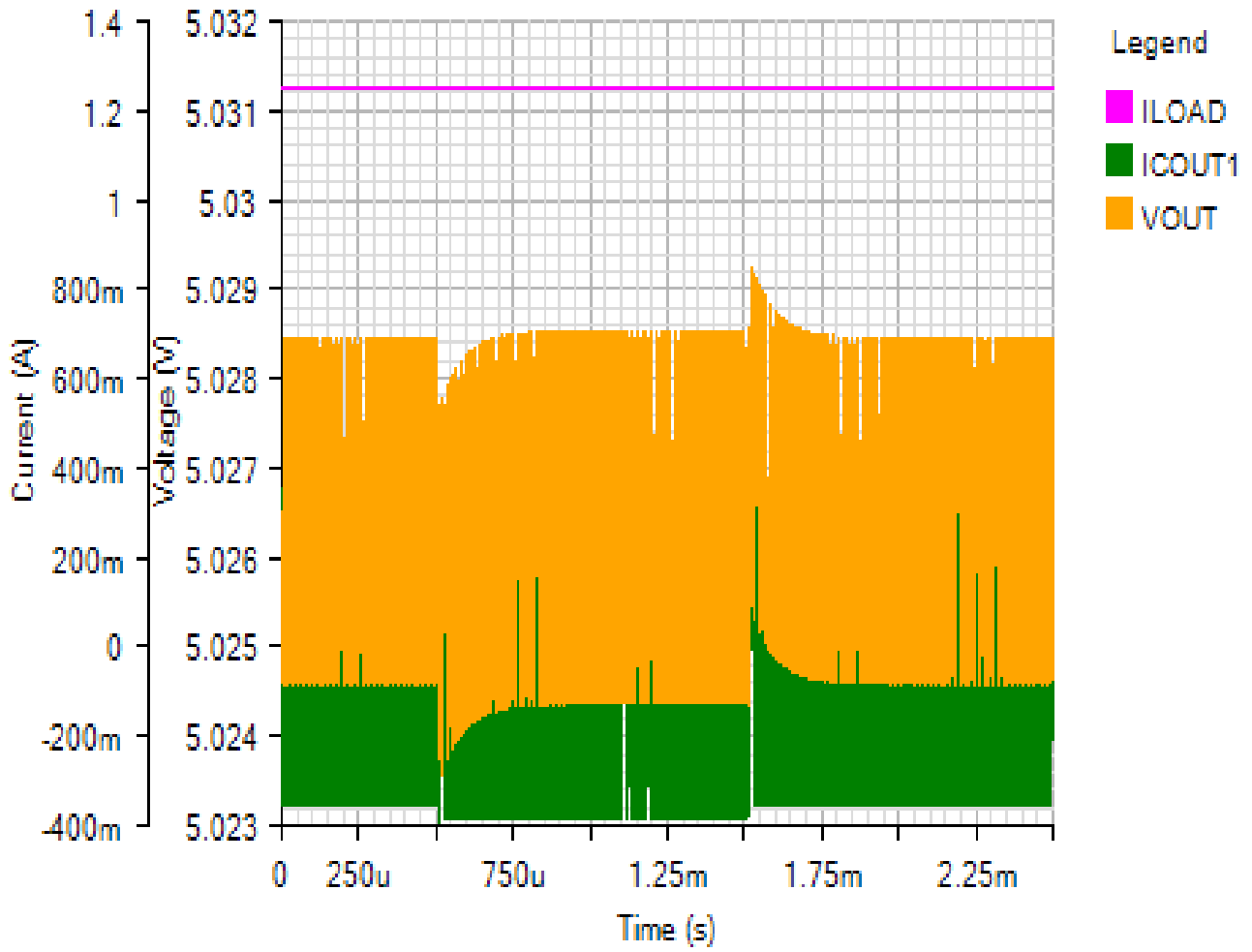
IC

Default



OUTPUT

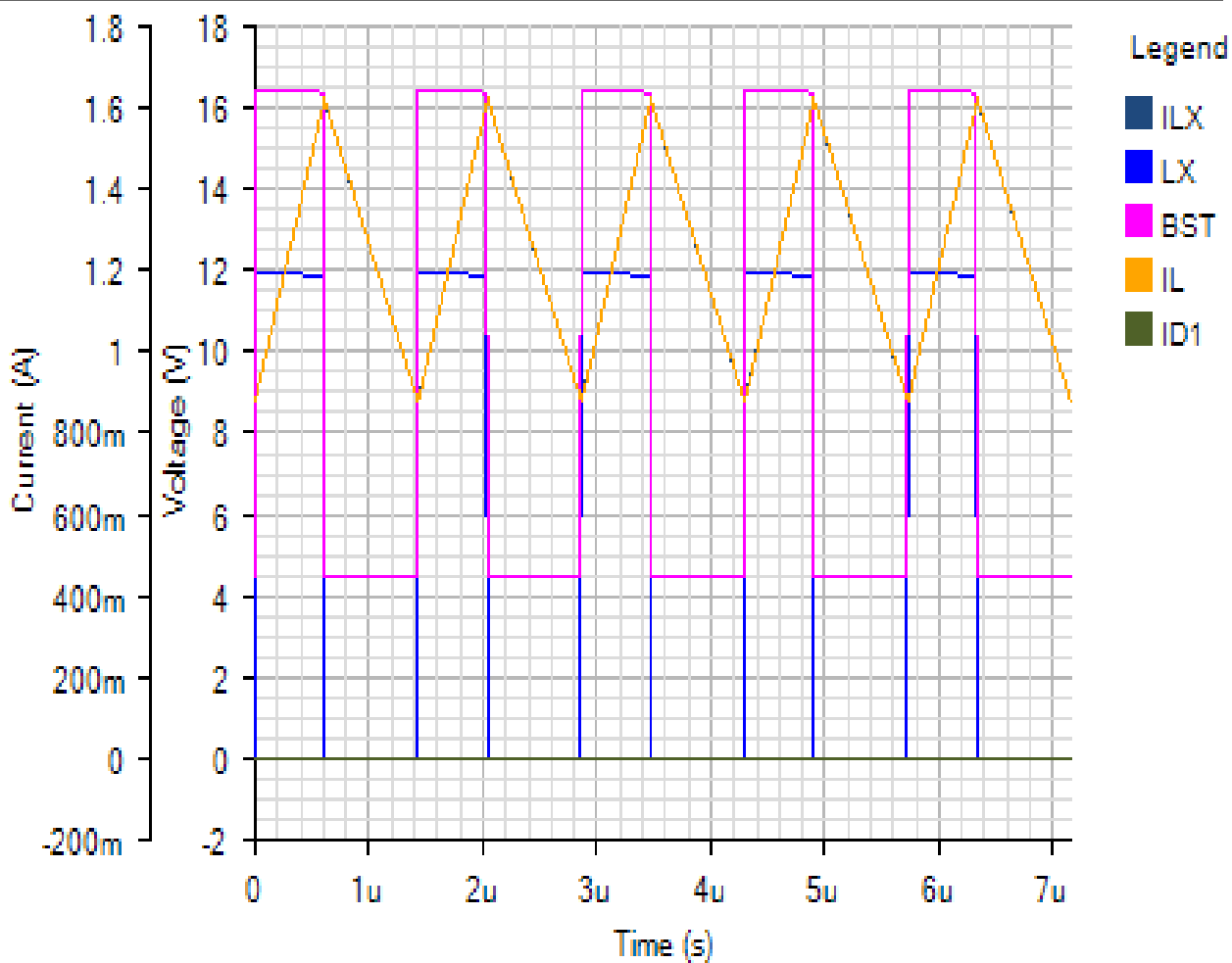
Default



Steady State - Fri Nov 16 2018 09:21:50

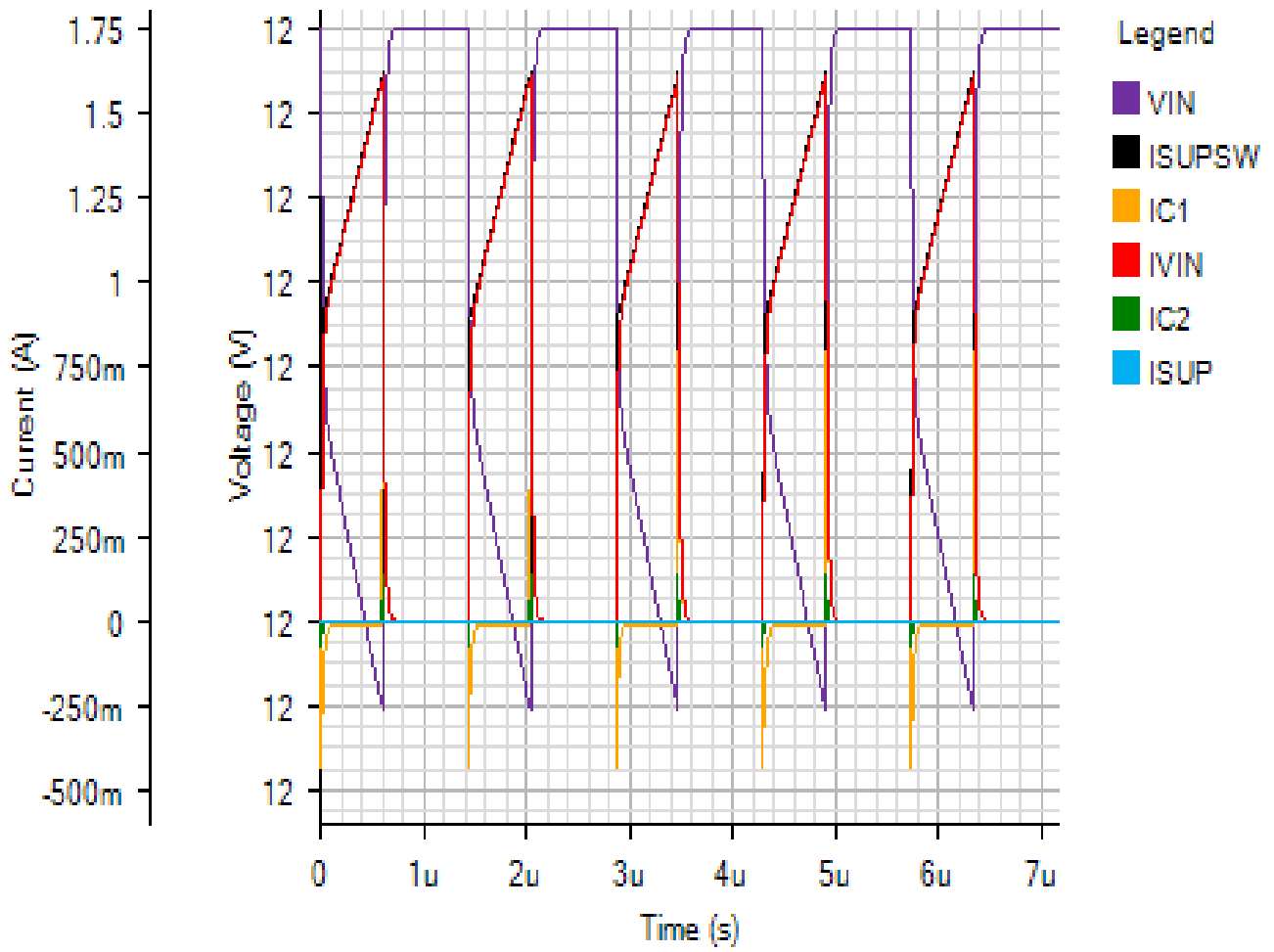
SWITCHING

Default



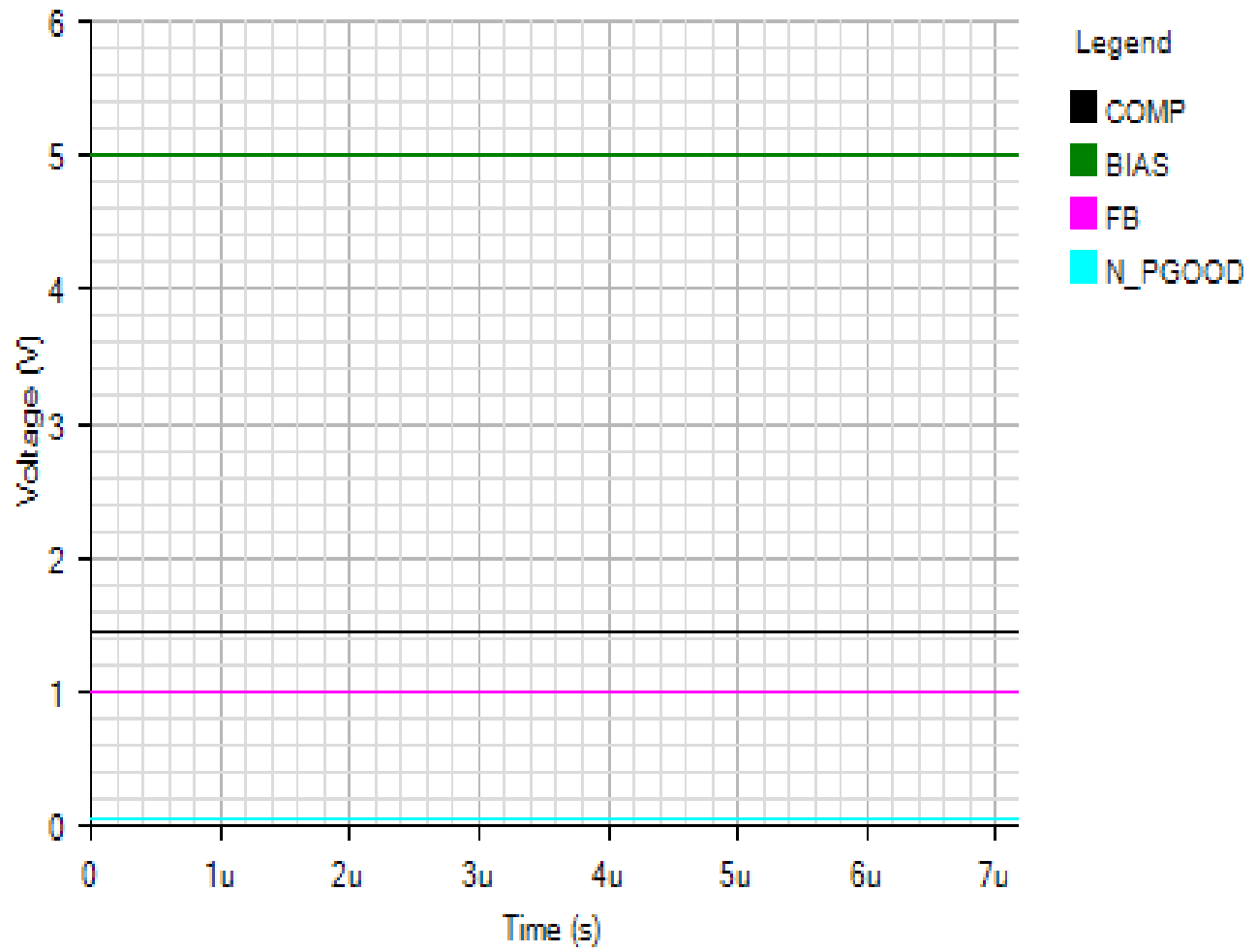
INPUT

Default



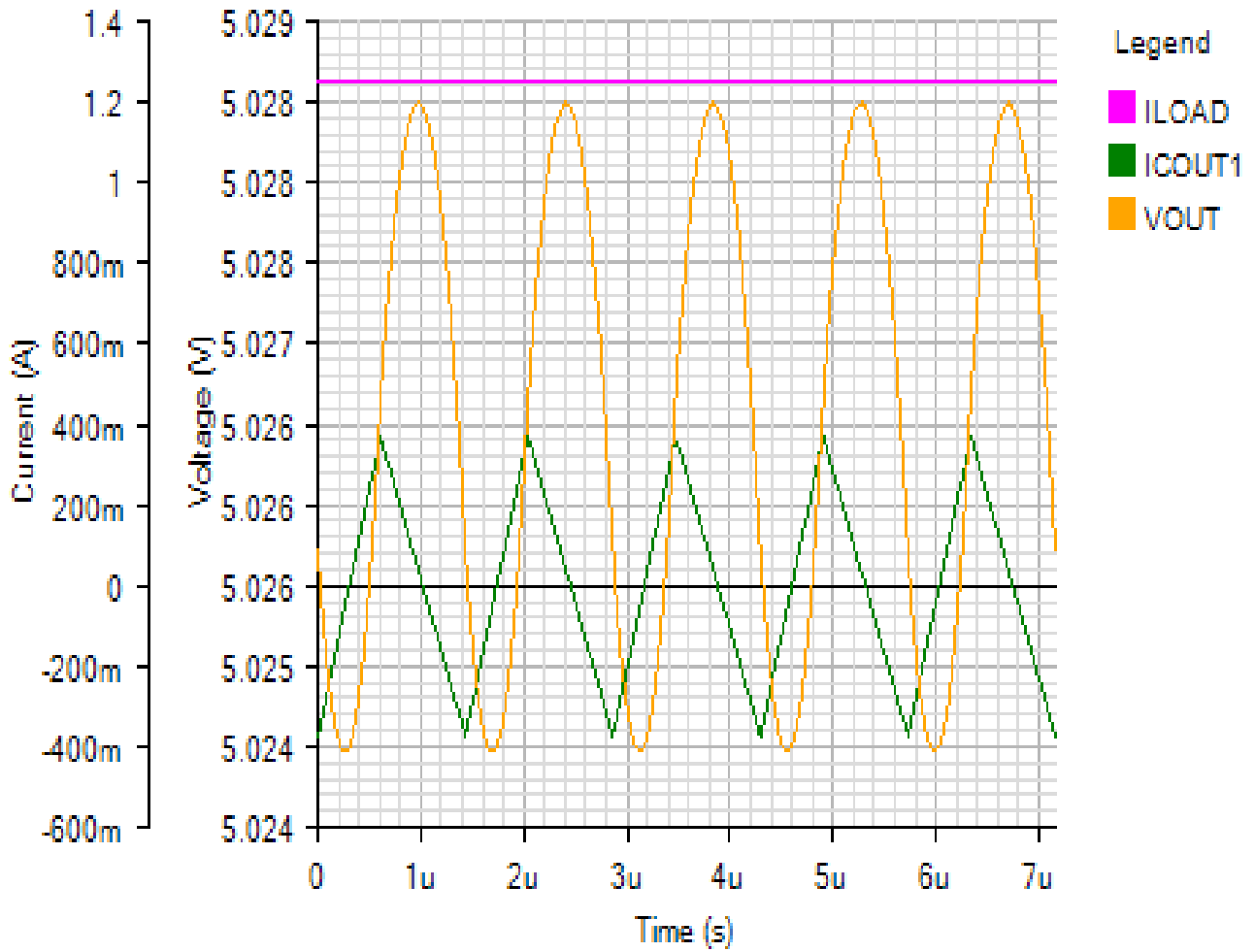
IC

Default



OUTPUT

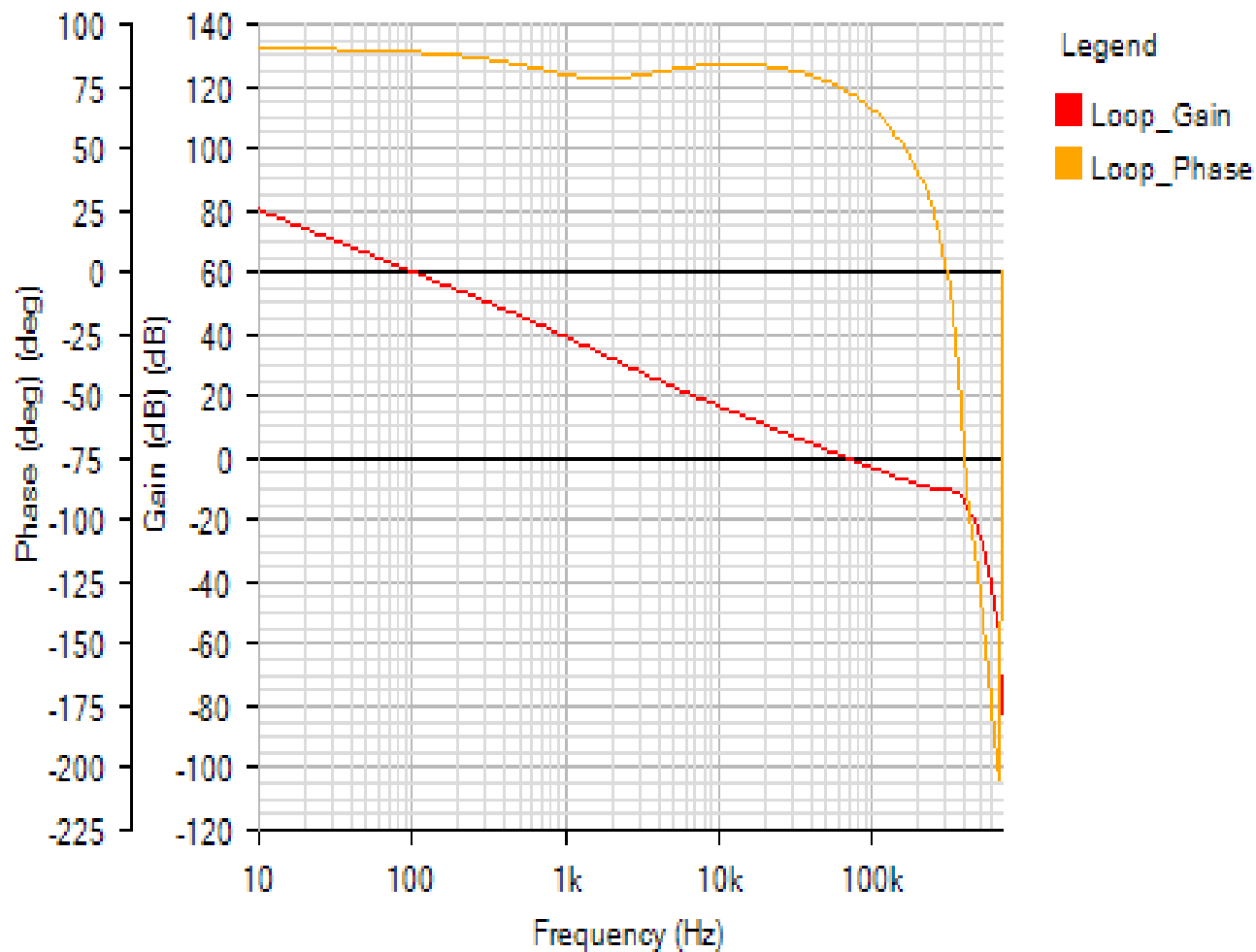
Default



AC Loop - Fri Nov 16 2018 09:21:50

BODE

Default



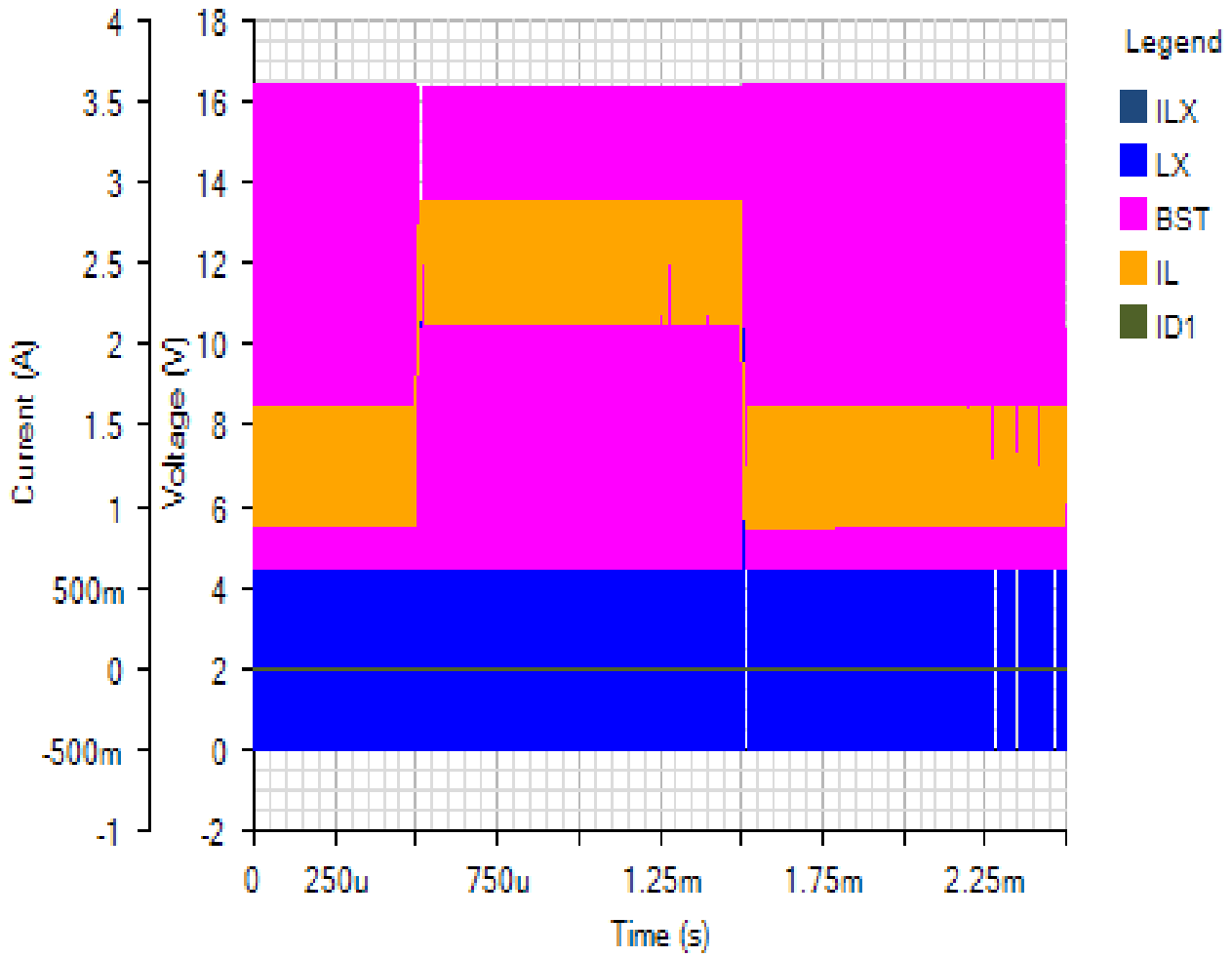
Phase Margin: 72.91° at a crossover frequency of 68.8kHz



Load Step - Fri Nov 16 2018 09:21:50

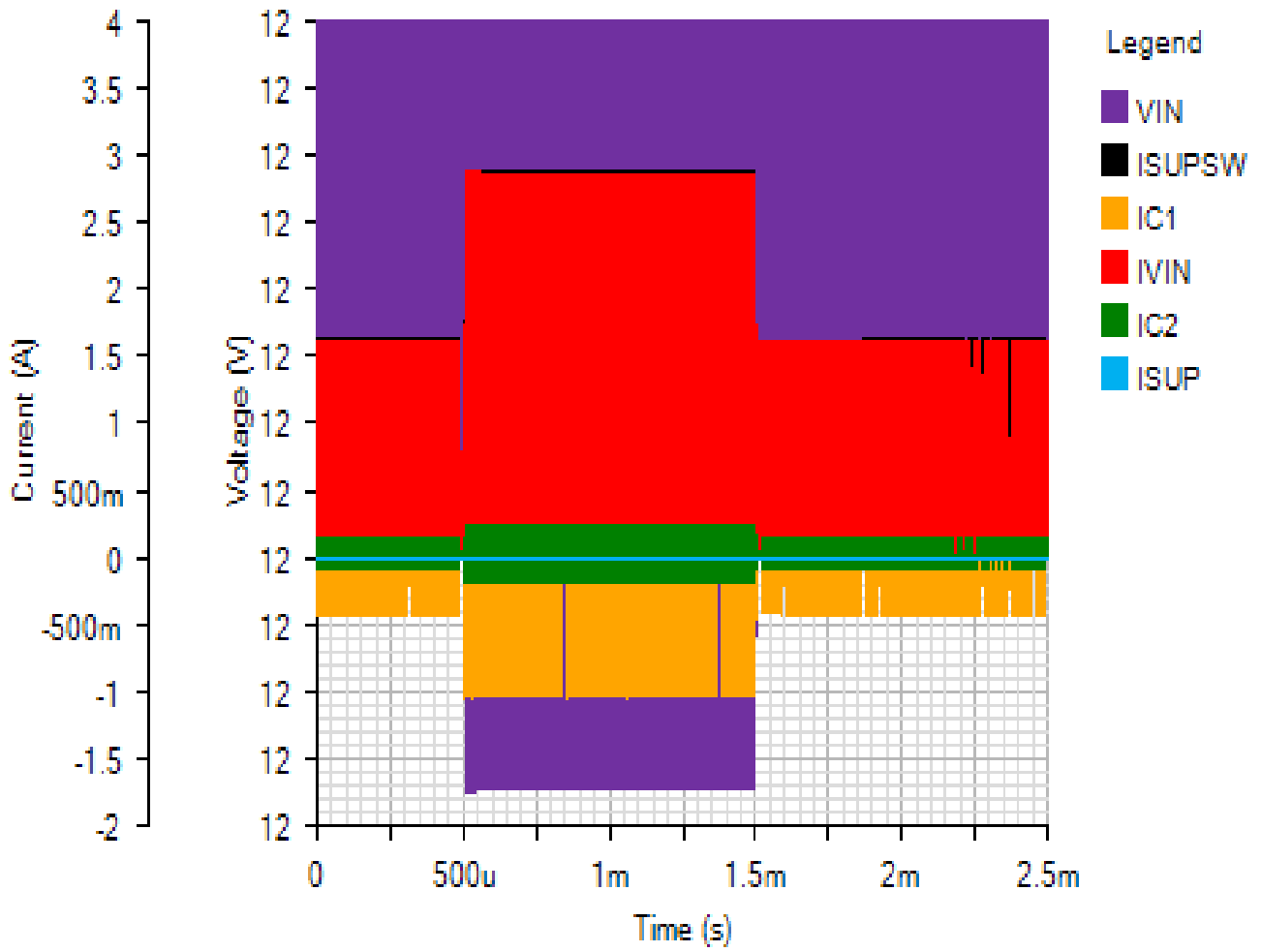
SWITCHING

Default



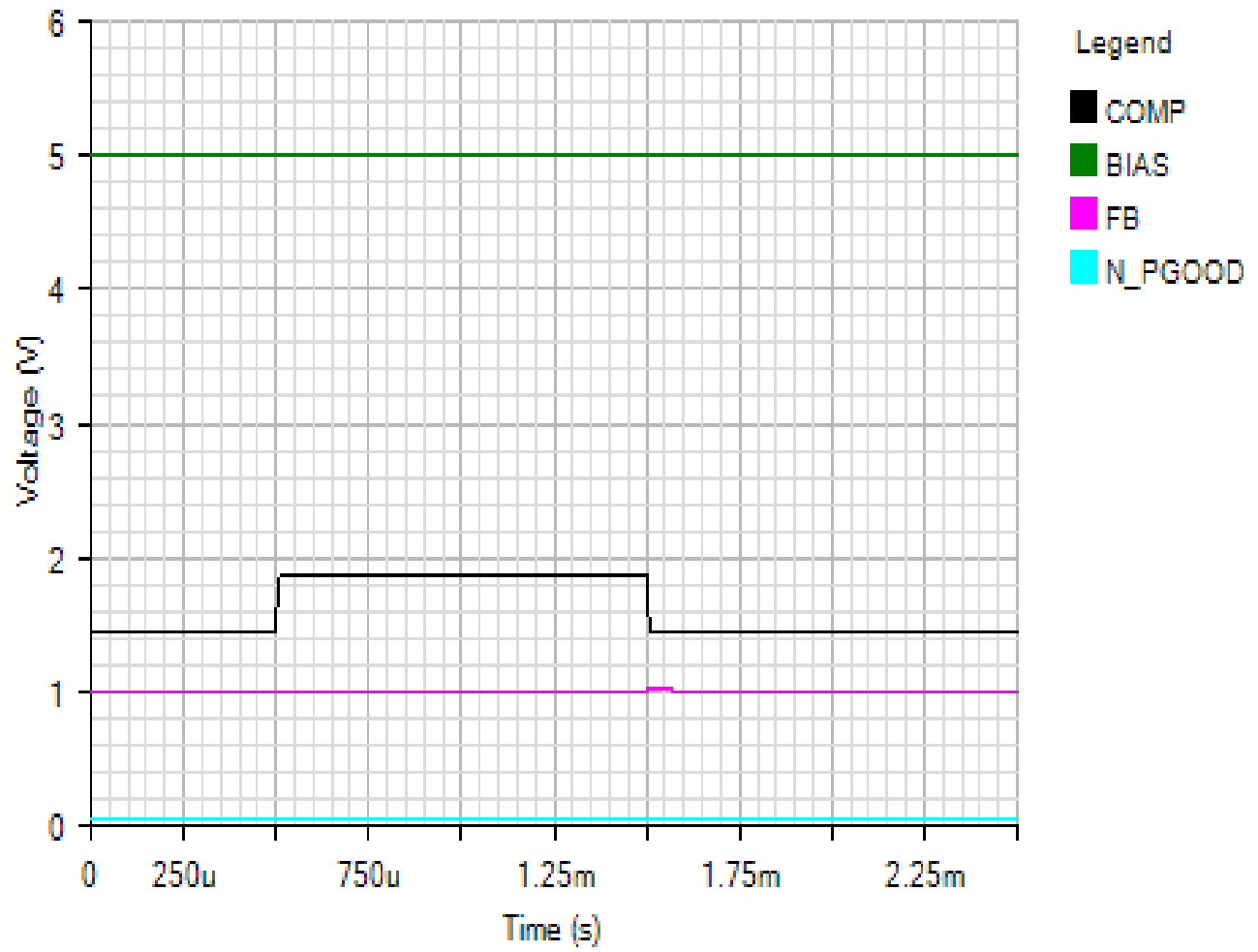
INPUT

Default



IC

Default



OUTPUT

Default

