

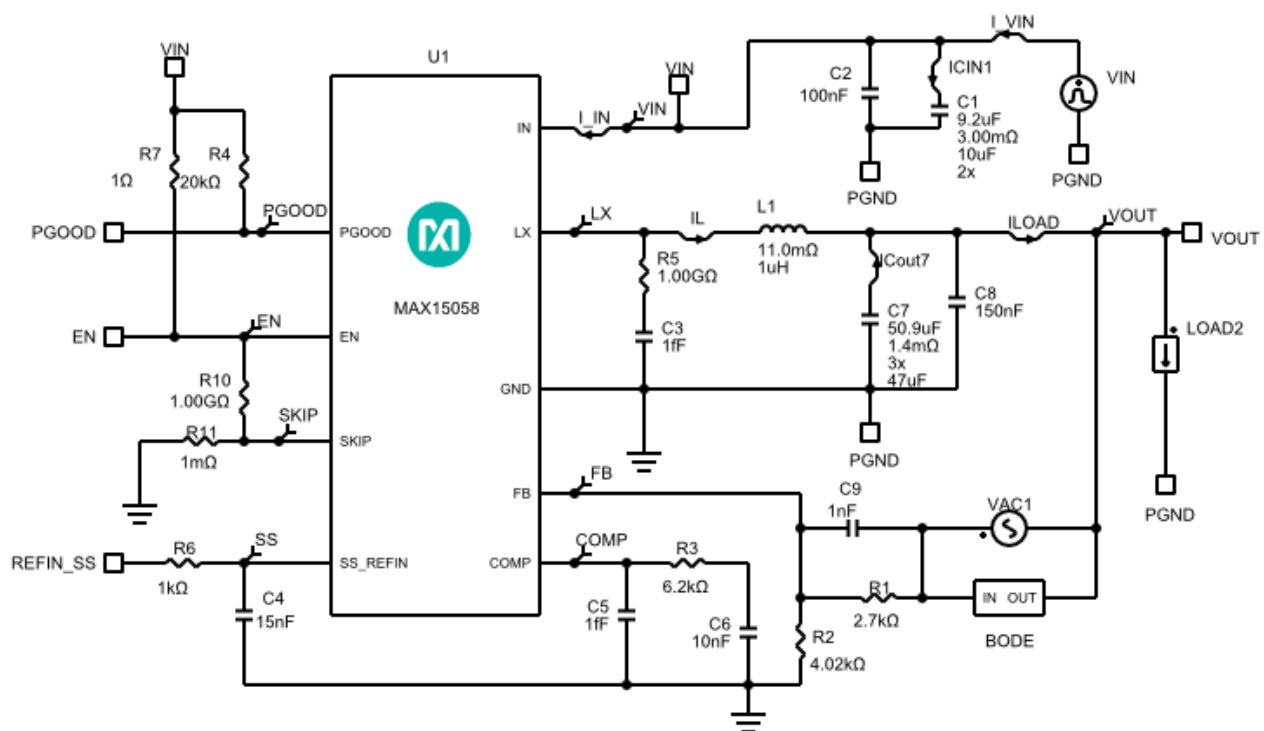
## Initial Design

1.0

**Design Requirements**

Parameter	Value
Minimum Input Voltage	4.5V
Maximum Input Voltage	5.5V
Nominal Input Voltage	5V
Input Voltage Ripple	1%
Output Voltage	1V
Output Current	3A
Output Voltage Ripple	1%
Load Step Start Current	1A
Load Step Current	3A
Output Voltage Load Step Overshoot	5%
Performance Priority	Balance Efficiency and Size
BOM Priority	Cost
Operation Mode	PWM
Inductor Current Ratio (LIR)	0.3

## Schematic



Notes:  
 SKIP Mode: R10 = "Short"; R11 = "Open"  
 PWM Mode: R10 = "Open"; R11 = "Short"  
 If the current level (starting current for Load Steps) is too low,  
 AC, Steady State and Load Step analyses may fail when SKIP mode is selected.

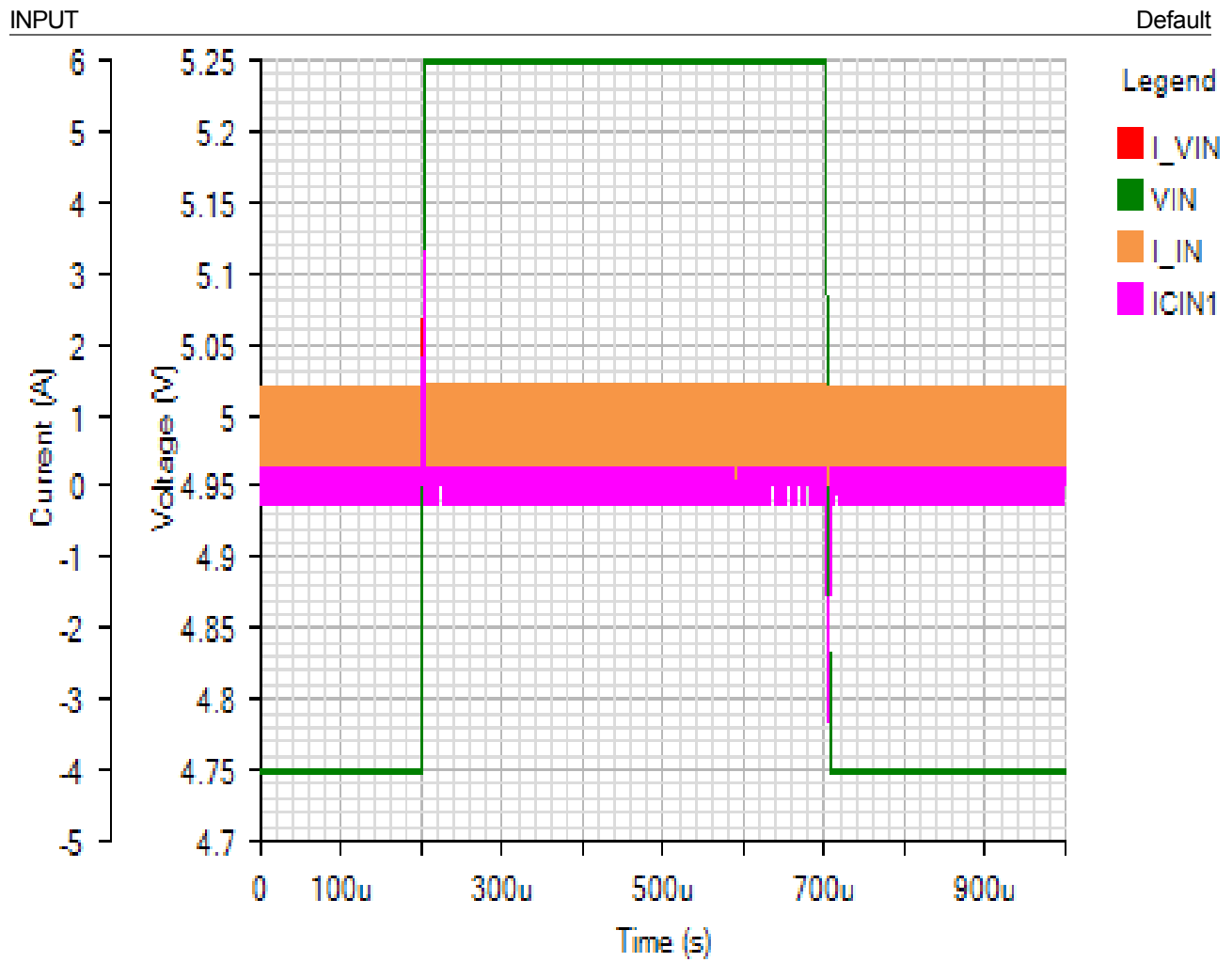
## BOM

Ref	Qty	Part Number	Manufacturer	Description
U1	1	<a href="#">MAX15058EWL+T</a>	Maxim Integrated	DC-DC Switching Regulators 3A Current-Mode Synchronous
C1	2	<a href="#">C1206C106K4PAC</a>	Kemet	Cap Ceramic 10uF 16V X5R 10% SMD 1206 85C Bulk
C2	1	<a href="#">GCM188L81H104KA57D</a>	Murata Manufacturing	Cap Ceramic 0.1uF 50V X8L 10% Pad SMD 0603 150°C Automotive T/R
C4	1	<a href="#">06035C153KAT2A</a>	AVX	Cap Ceramic 0.015uF 50V X7R 10% Pad SMD 0603 125°C T/R
C6	1	<a href="#">GCM188R72A103KA37D</a>	Murata Manufacturing	Cap Ceramic 0.01uF 100V X7R 10% Pad SMD 0603 125°C Automotive T/R
C7	3	<a href="#">GRM32EE70J476ME20L</a>	Murata	Cap Ceramic 47uF 6.3V 1210 125C
C8	1	<a href="#">0603ZC154KAT2A</a>	AVX	Cap Ceramic 0.15uF 10V X7R 10% Pad SMD 0603 125°C T/R
C9	1	<a href="#">GRM1885C1H102JA01D</a>	Murata Manufacturing	Cap Ceramic 0.001uF 50V C0G 5% Pad SMD 0603 125°C T/R

L1	1	VLP8040T-1R0N	TDK	Power Inductors 1uH
R1	1	ERJ3EKF2701V	Panasonic	Res Thick Film 0603 2.7K Ohm 1% 0.1W(1/10W) ±100ppm/°C Pad SMD Automotive T/R
R2	1	ERJ3EKF4021V	Panasonic	Res Thick Film 0603 4.02K Ohm 1% 0.1W(1/10W) ±100ppm/°C Pad SMD Automotive T/R
R3	1	ERJ3EKF6201V	Panasonic	Res Thick Film 0603 6.2K Ohm 1% 0.1W(1/10W) ±100ppm/°C Pad SMD Automotive T/R
R4	1	ERJ3GEYJ203V	Panasonic	Res Thick Film 0603 20K Ohm 5% 0.1W(1/10W) ±200ppm/°C Pad SMD Automotive T/R
R6	1	ERJ3GEYJ102V	Panasonic	Res Thick Film 0603 1K Ohm 5% 0.1W(1/10W) ±200ppm/°C Pad SMD Automotive T/R
R7	1	ERJ3GEYJ1R0V	Panasonic	Res Thick Film 0603 1 Ohm 5% 0.1W(1/10W) -100ppm/°C to 600ppm/°C Pad SMD Automotive T/R

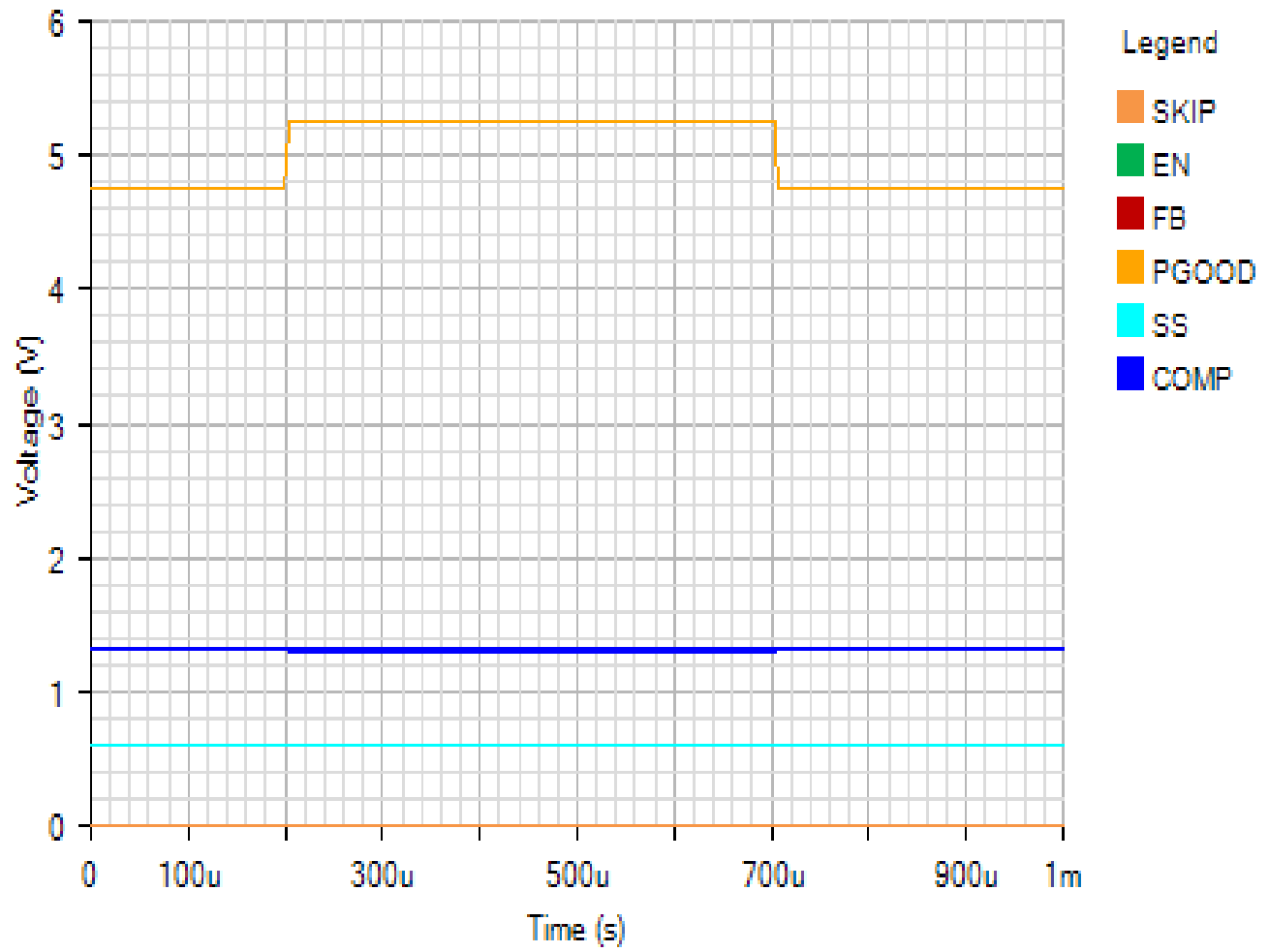
## Simulation Results

Line Transient - Mon Nov 19 2018 11:30:47



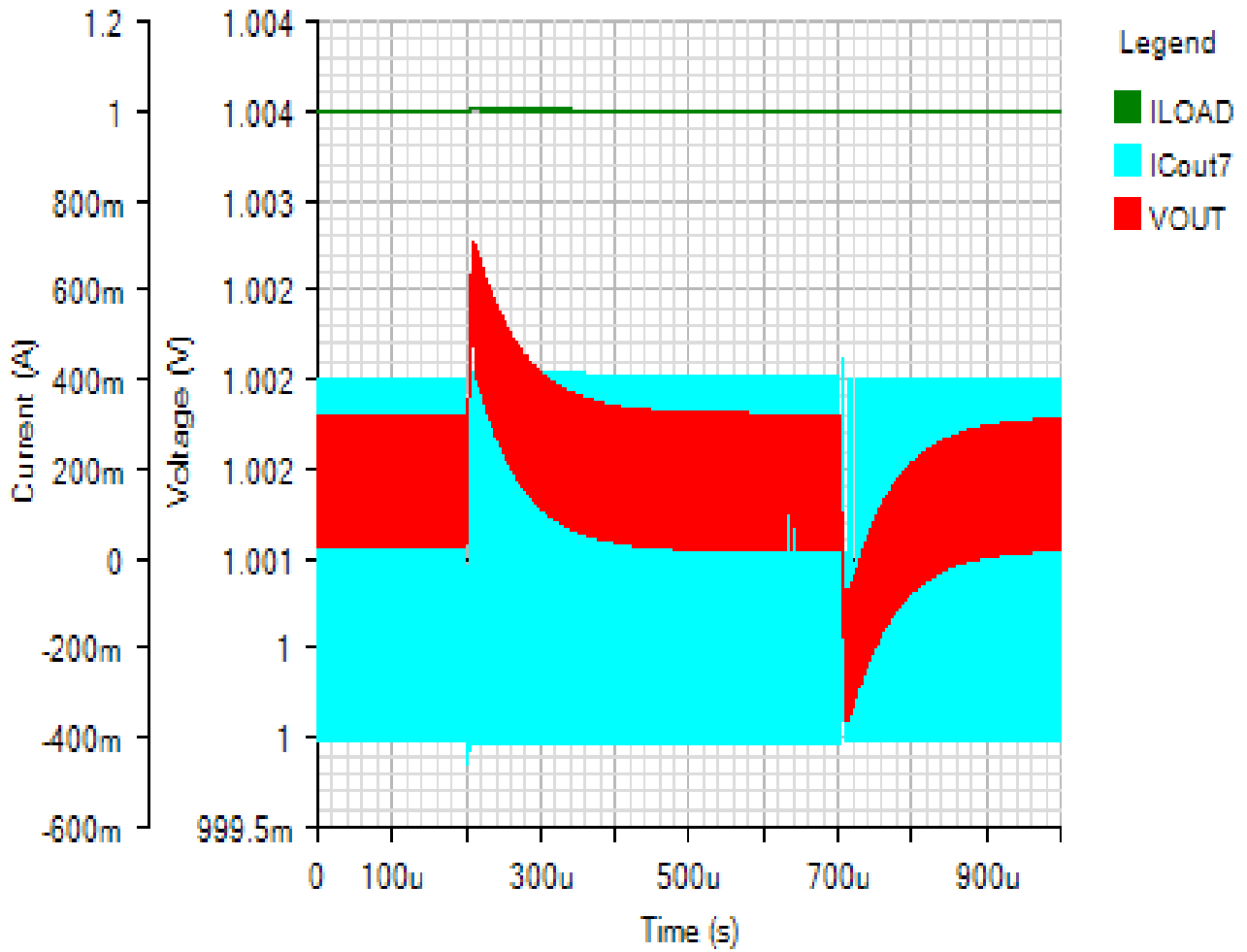
IC

Default



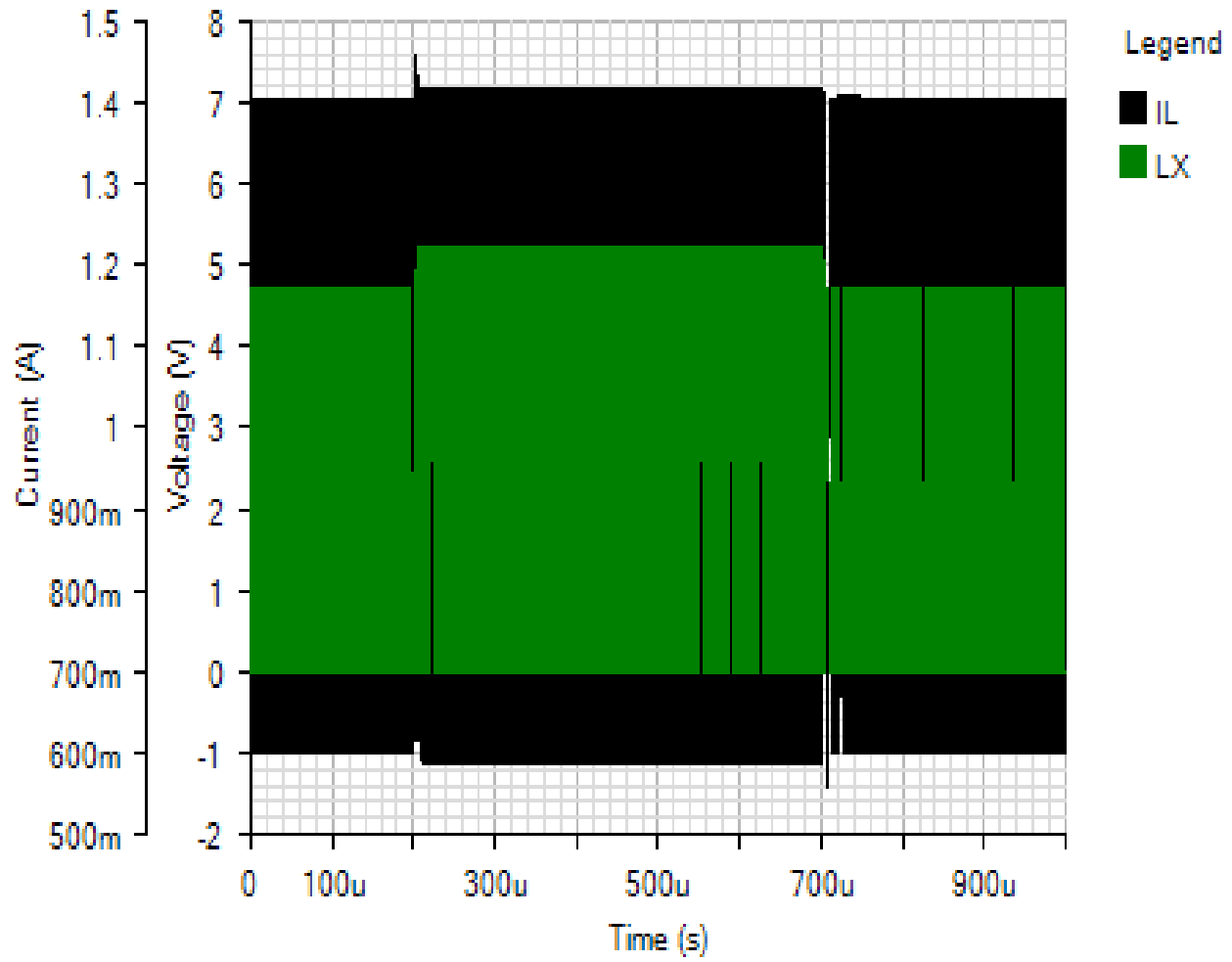
OUTPUT

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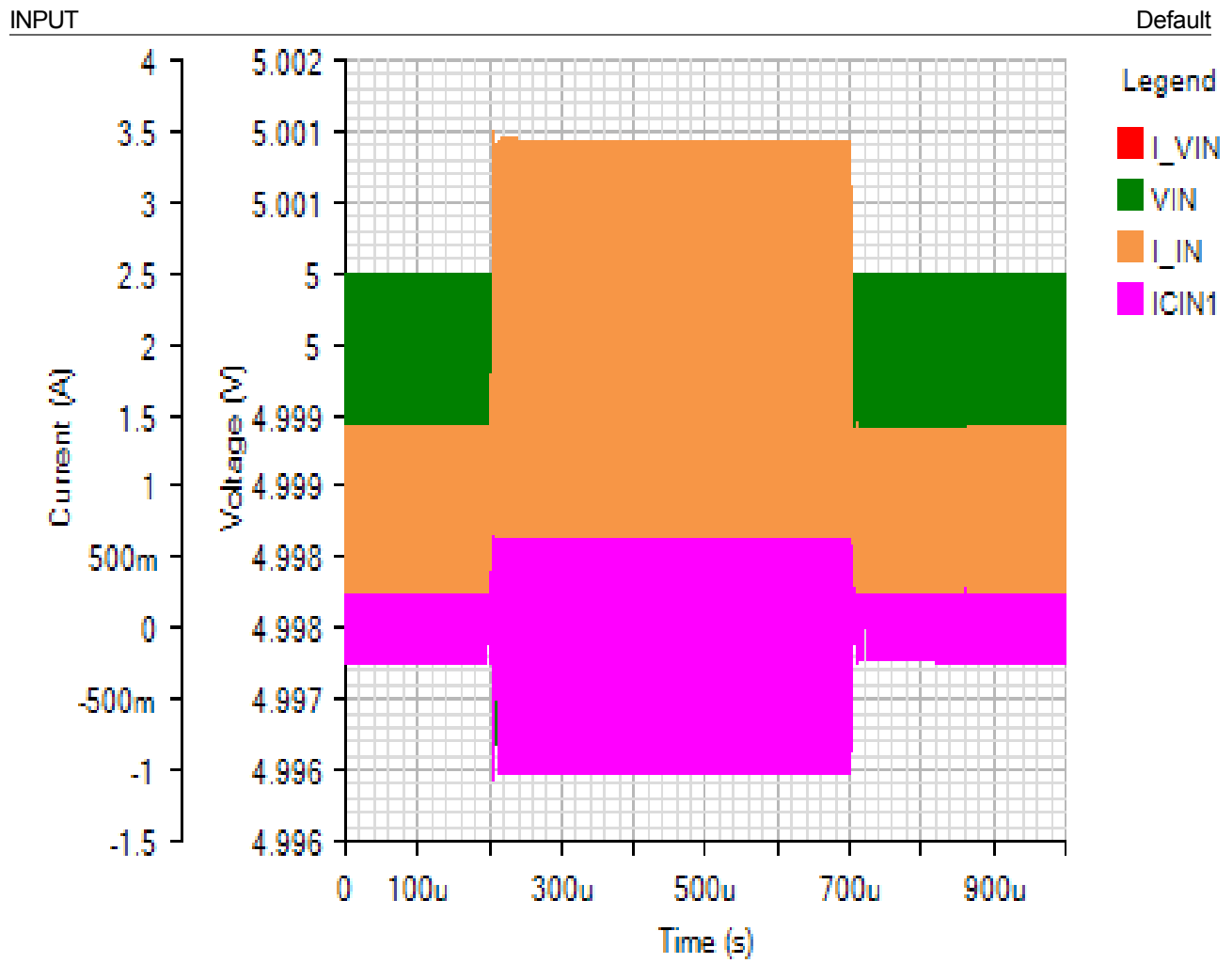


SWITCHING

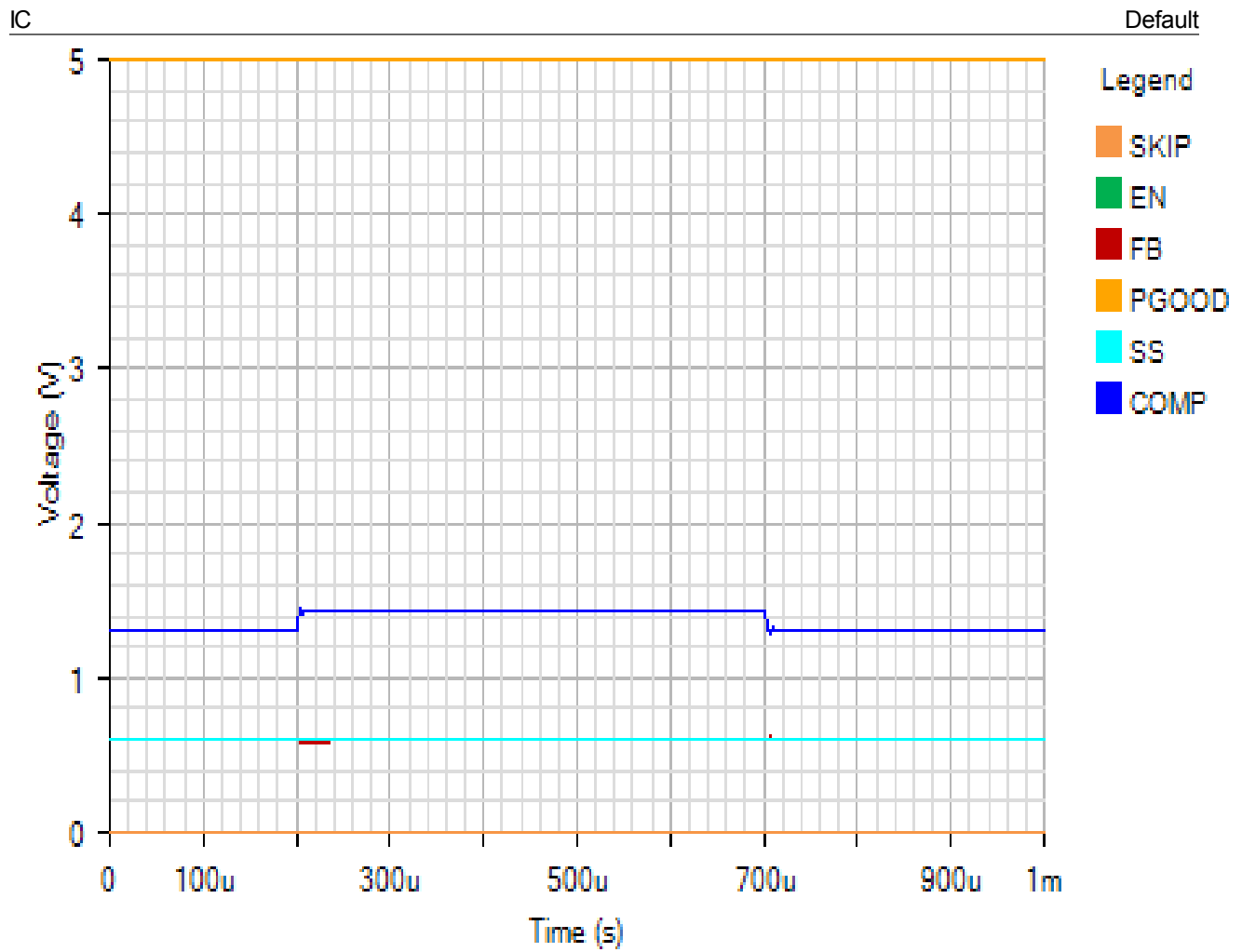
Default



Load Step - Mon Nov 19 2018 11:30:47

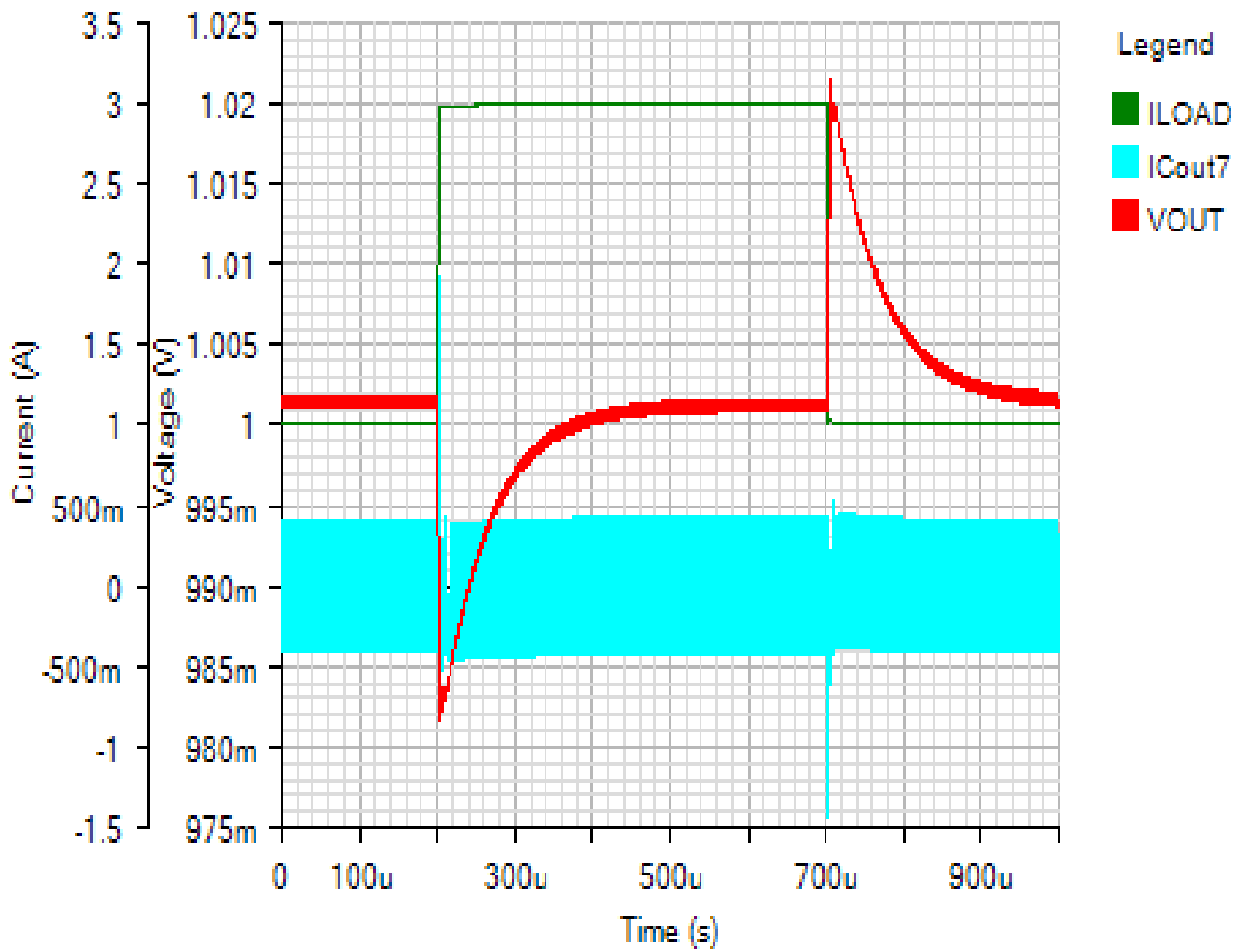






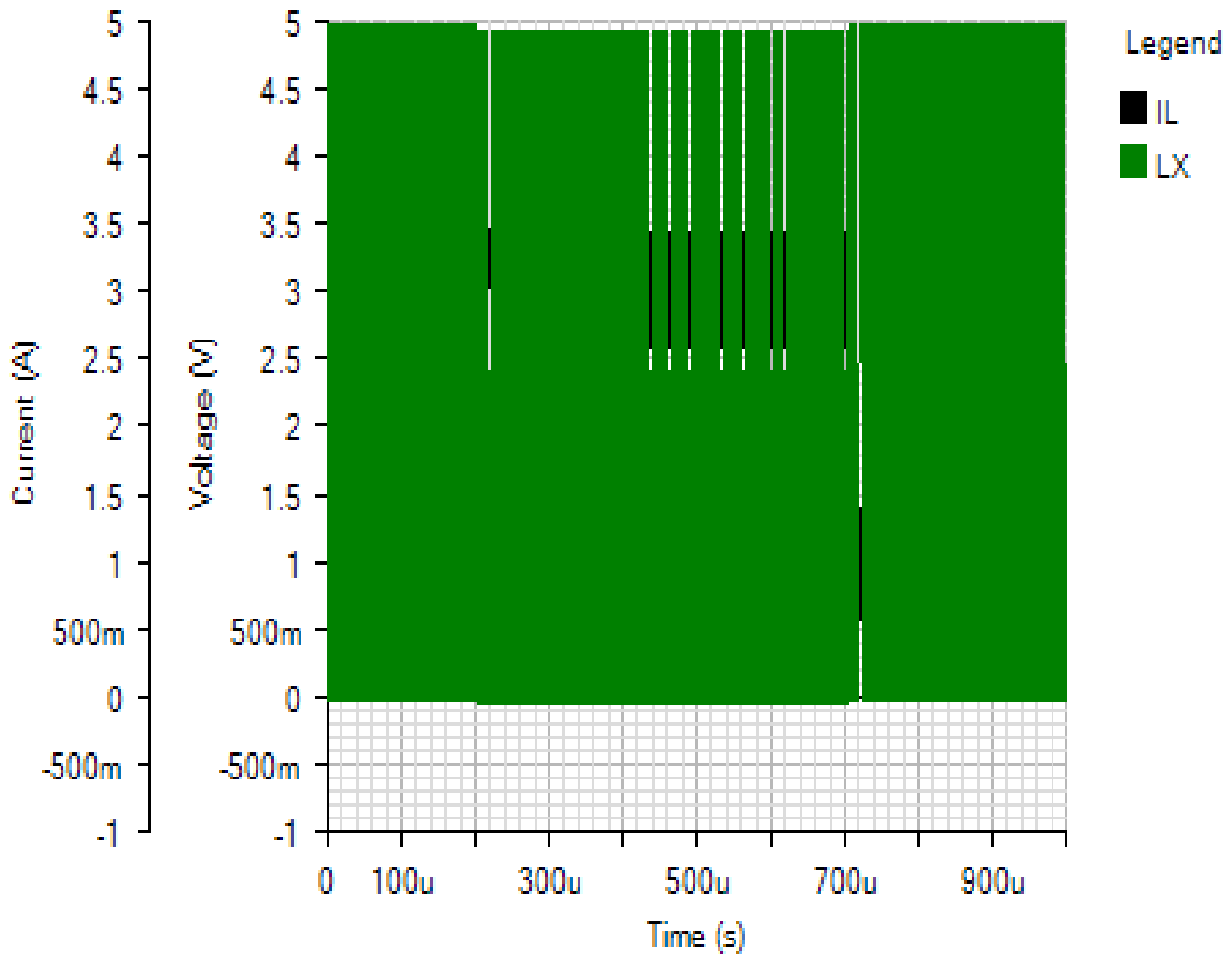
OUTPUT

Default



SWITCHING

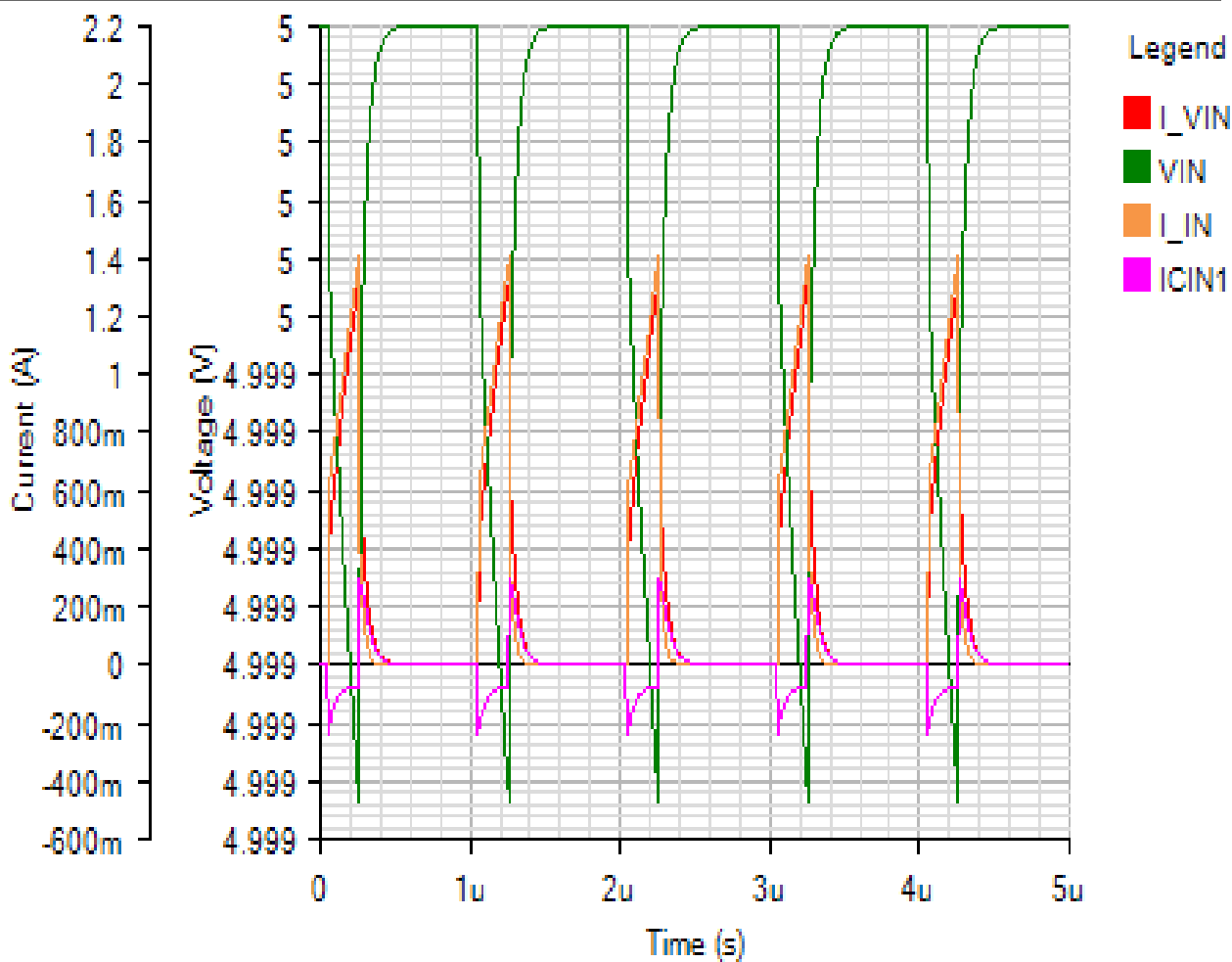
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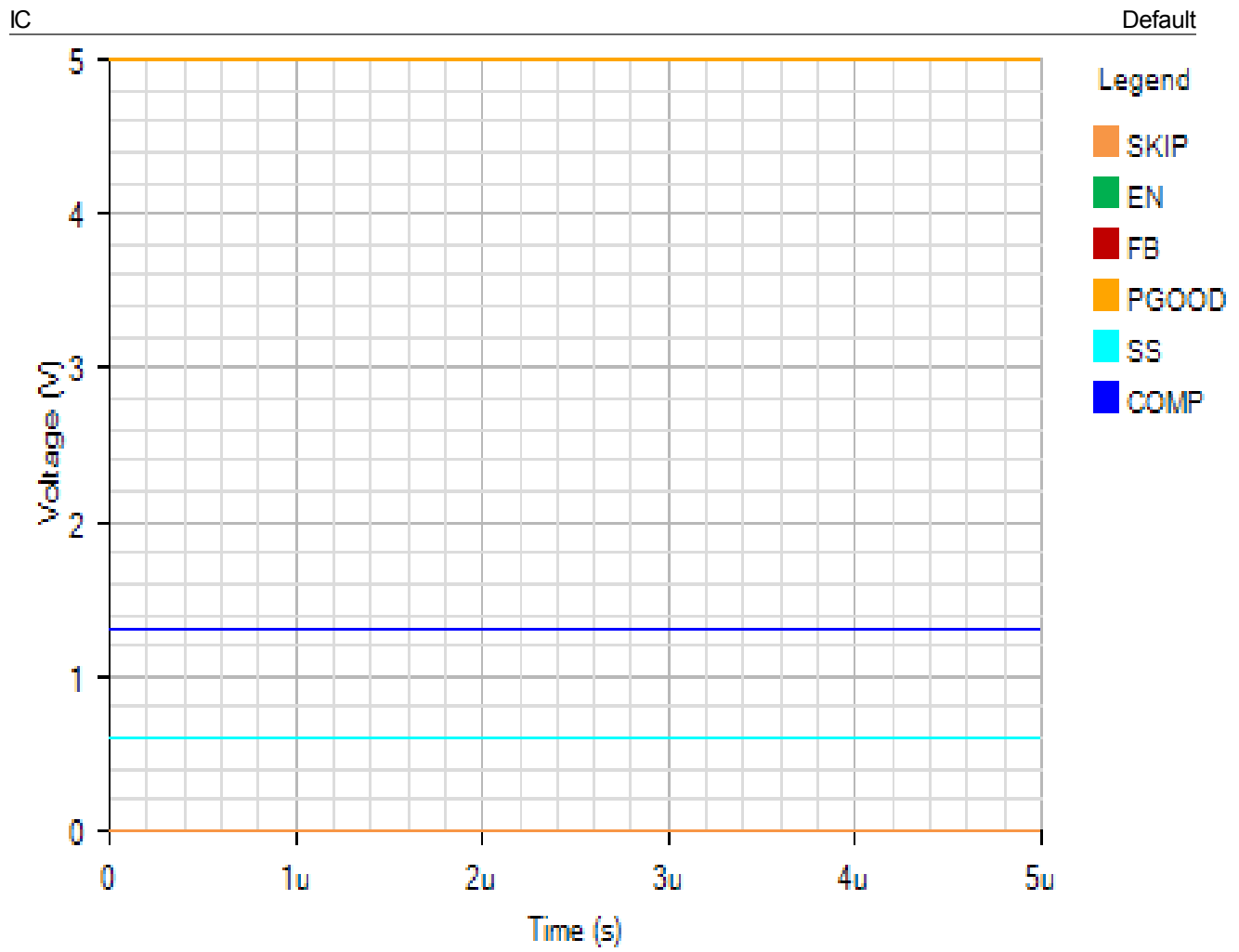


Steady State - Mon Nov 19 2018 11:30:47

INPUT

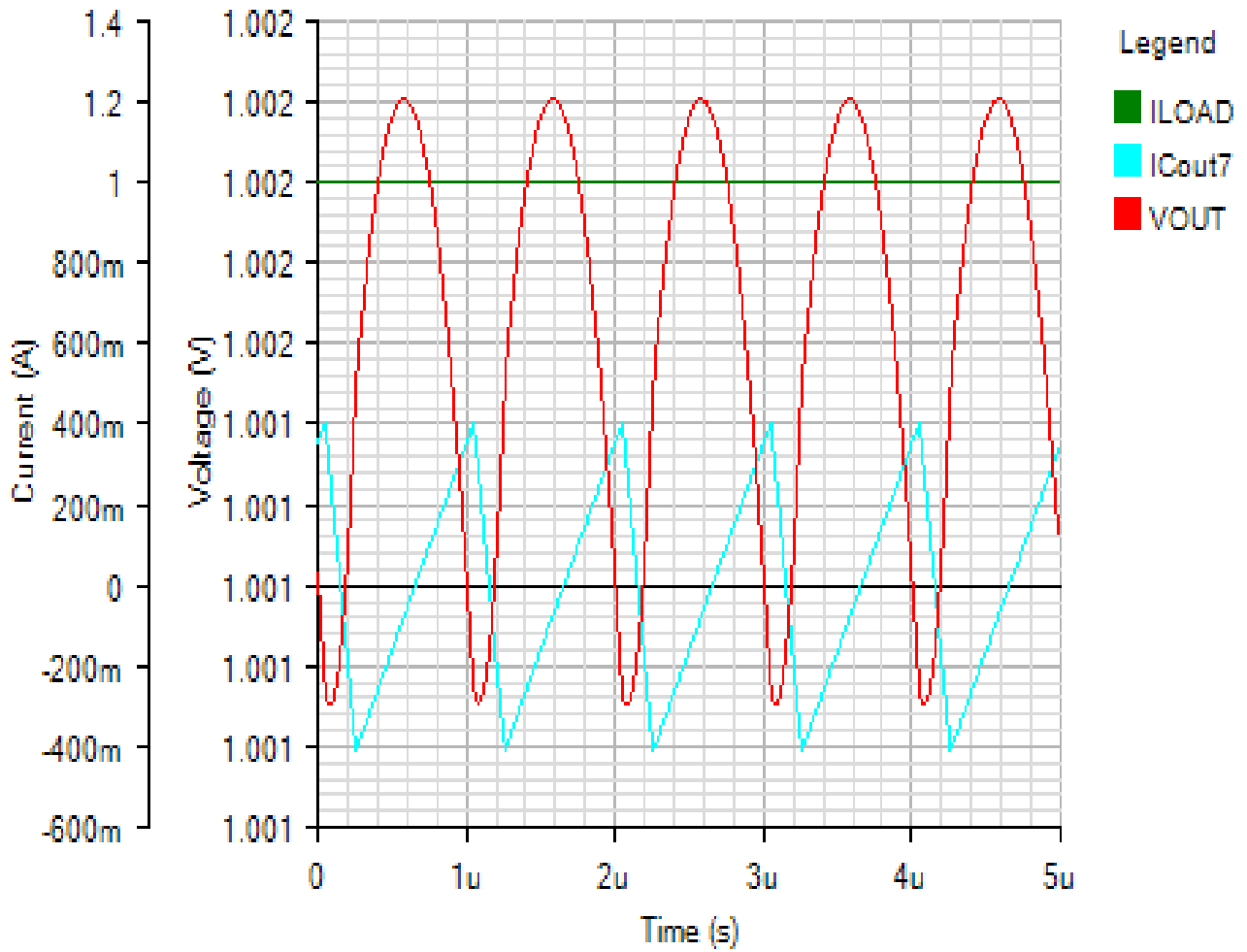
Default





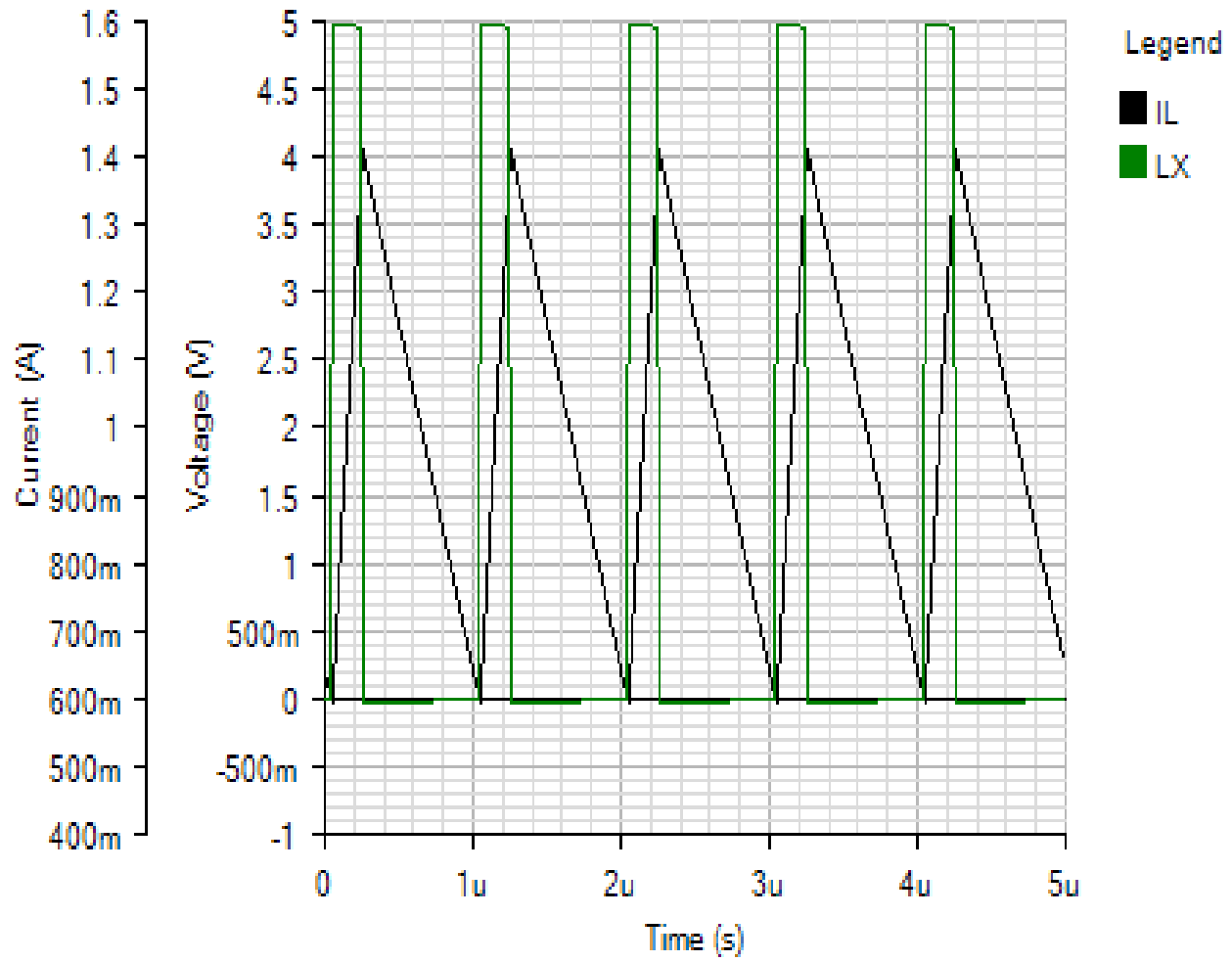
OUTPUT

Default



SWITCHING

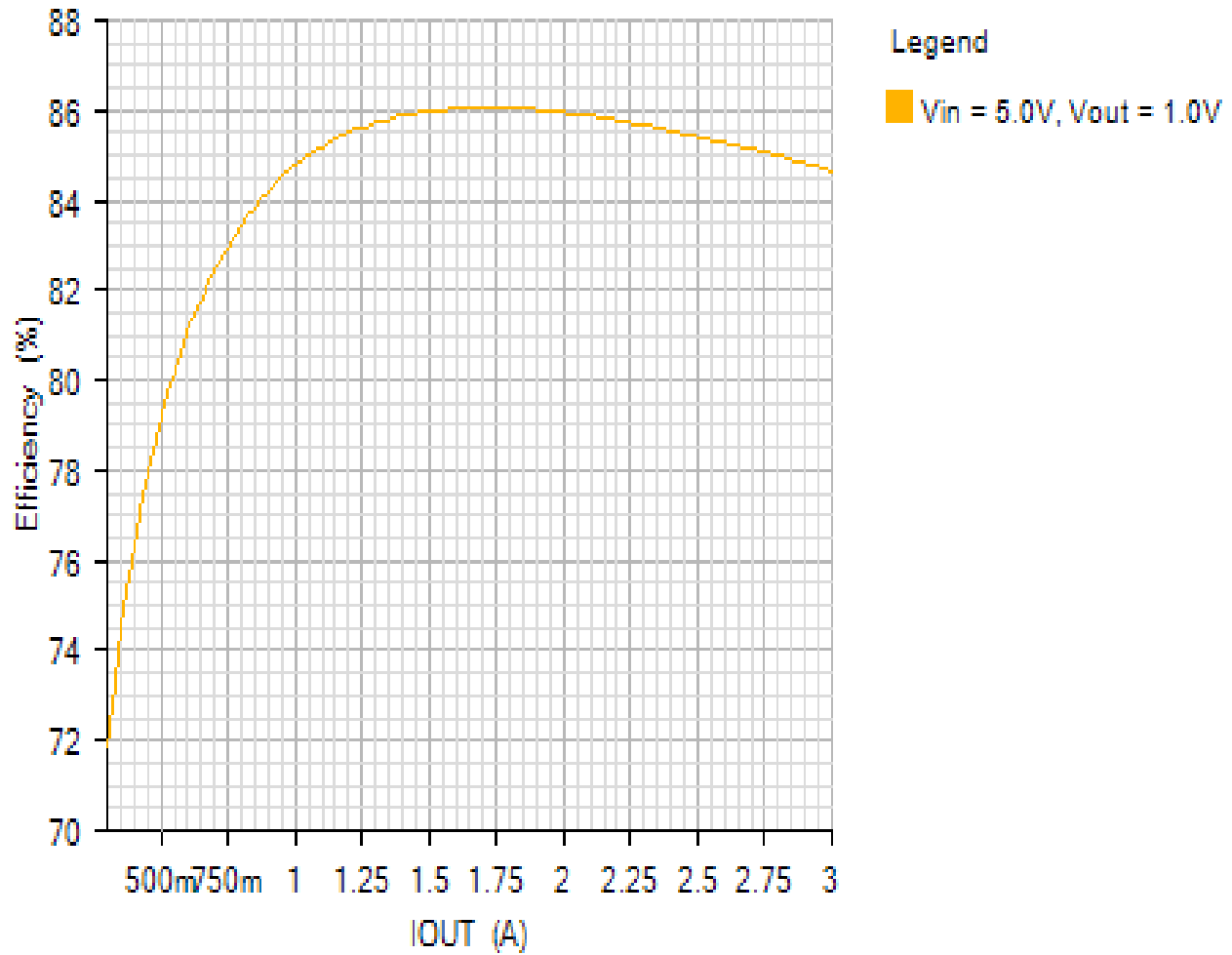
Default



Efficiency - Mon Nov 19 2018 11:30:47

EFFICIENCY\_PLOT

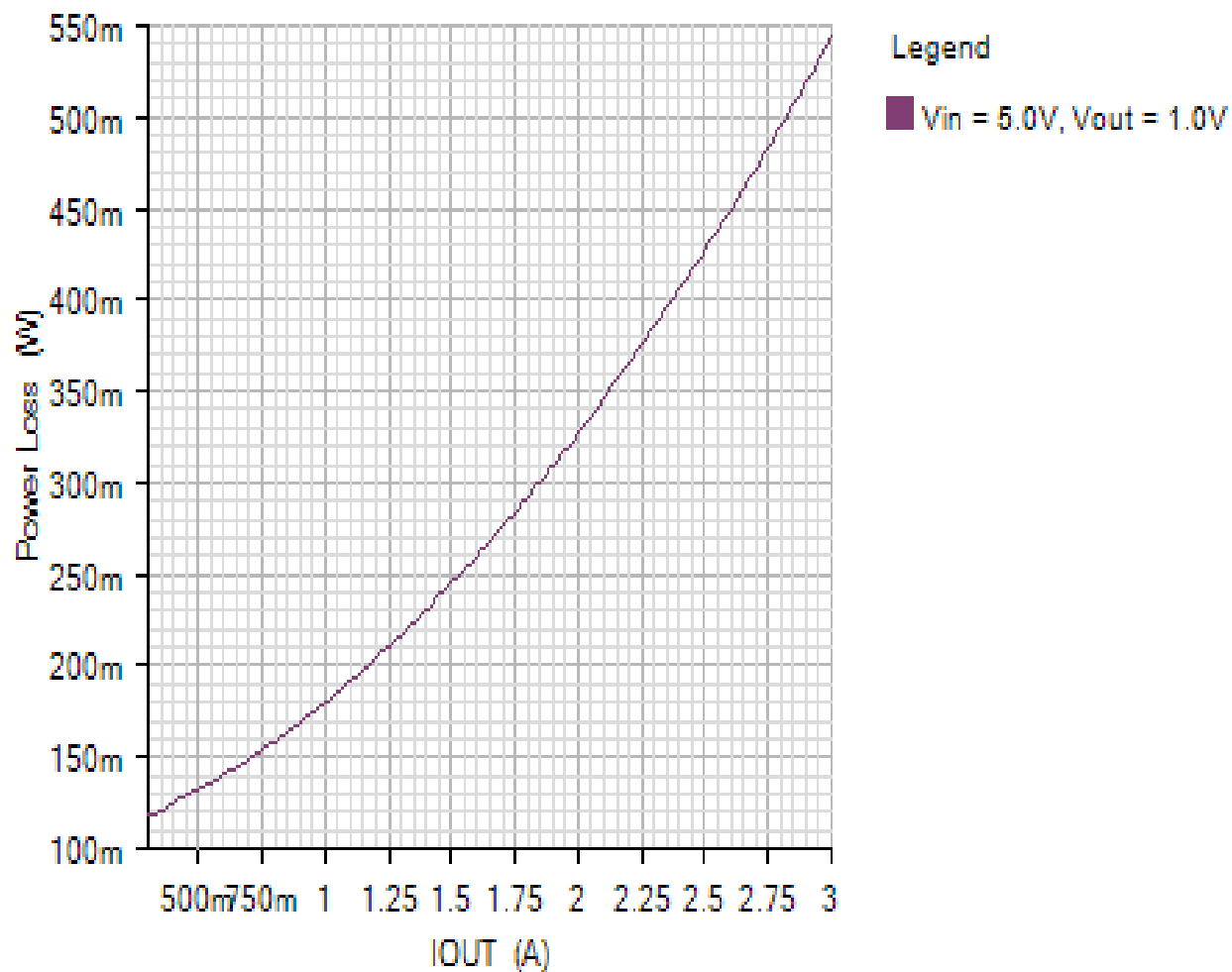
Default



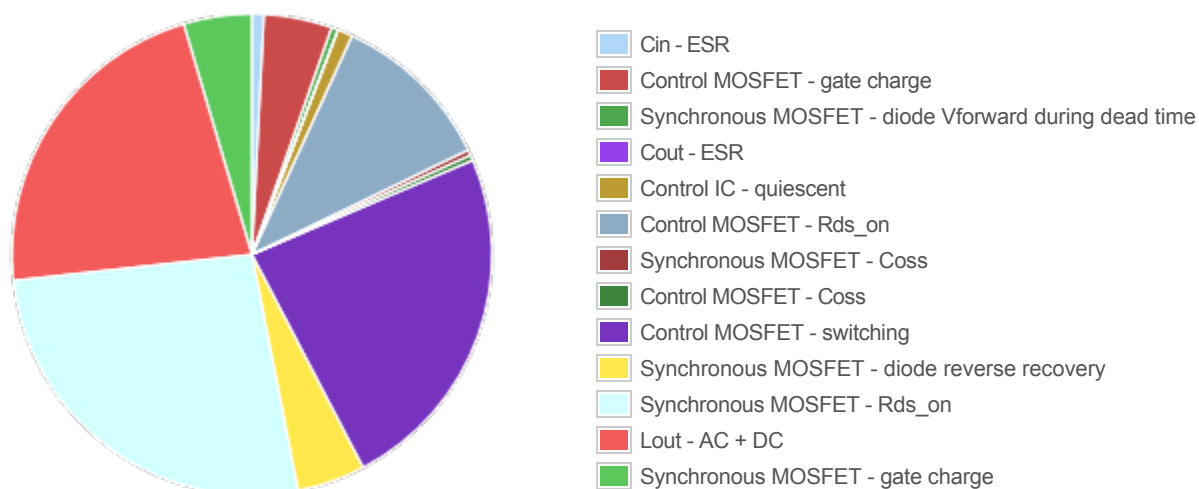


POWER\_LOSS\_PLOT

Default



Losses



Component

Loss (W)

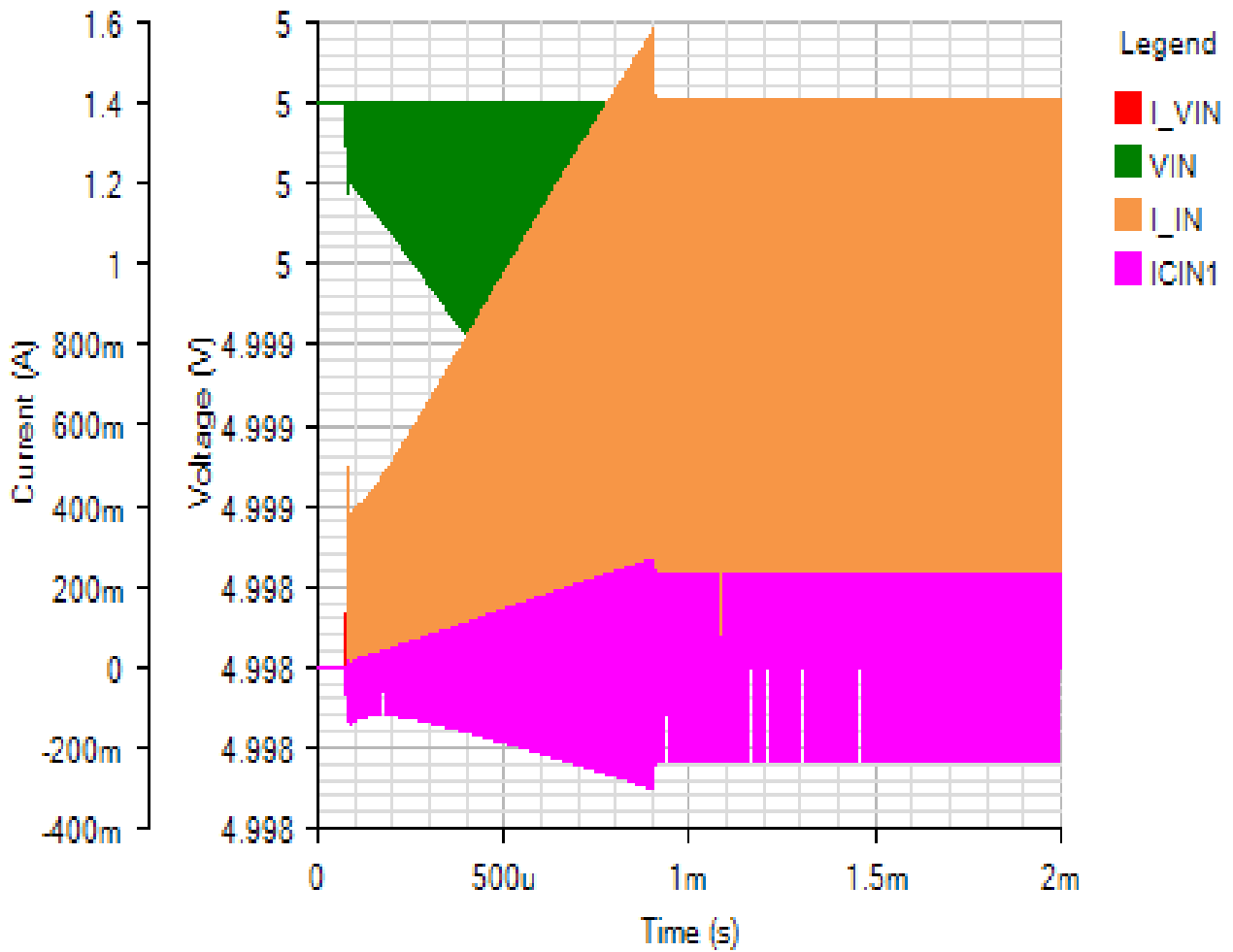
% of total

Component	Loss (W)	% of total
Cin - ESR	0.00433	0.8
Control MOSFET - gate charge	0.025	4.6
Synchronous MOSFET - diode Vforward during dead time	0.0024	0.4
Cout - ESR	0.000075	0
Control IC - quiescent	0.0055	1
Control MOSFET - Rds_on	0.059932	11
Synchronous MOSFET - Coss	0.002025	0.4
Control MOSFET - Coss	0.002025	0.4
Control MOSFET - switching	0.12931	23.7
Synchronous MOSFET - diode reverse recovery	0.025	4.6
Synchronous MOSFET - Rds_on	0.143533	26.3
Lout - AC + DC	0.120609	22.1
Synchronous MOSFET - gate charge	0.025	4.6
Total	0.54474	100

Start Up - Mon Nov 19 2018 11:30:47

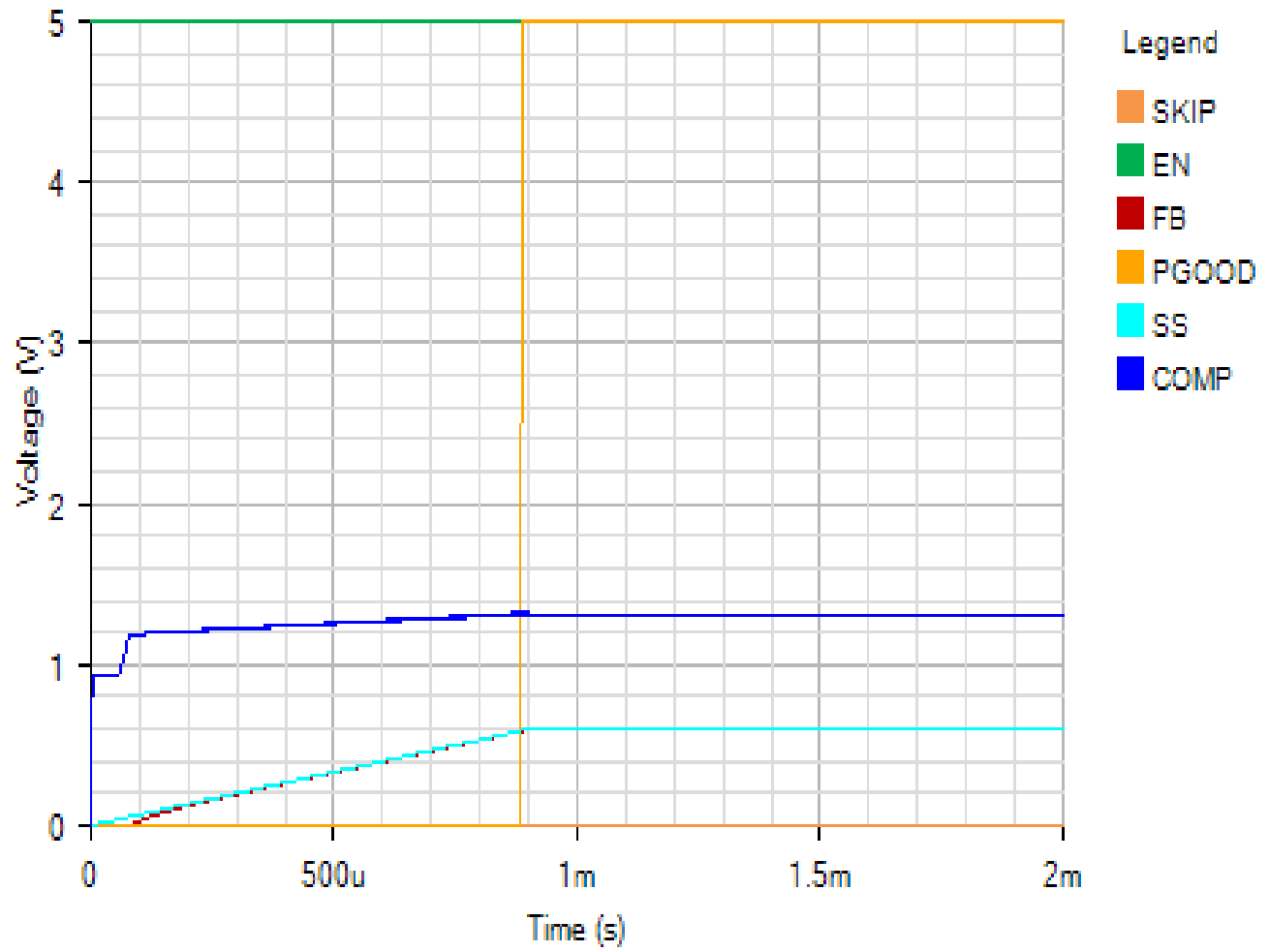
INPUT

Default



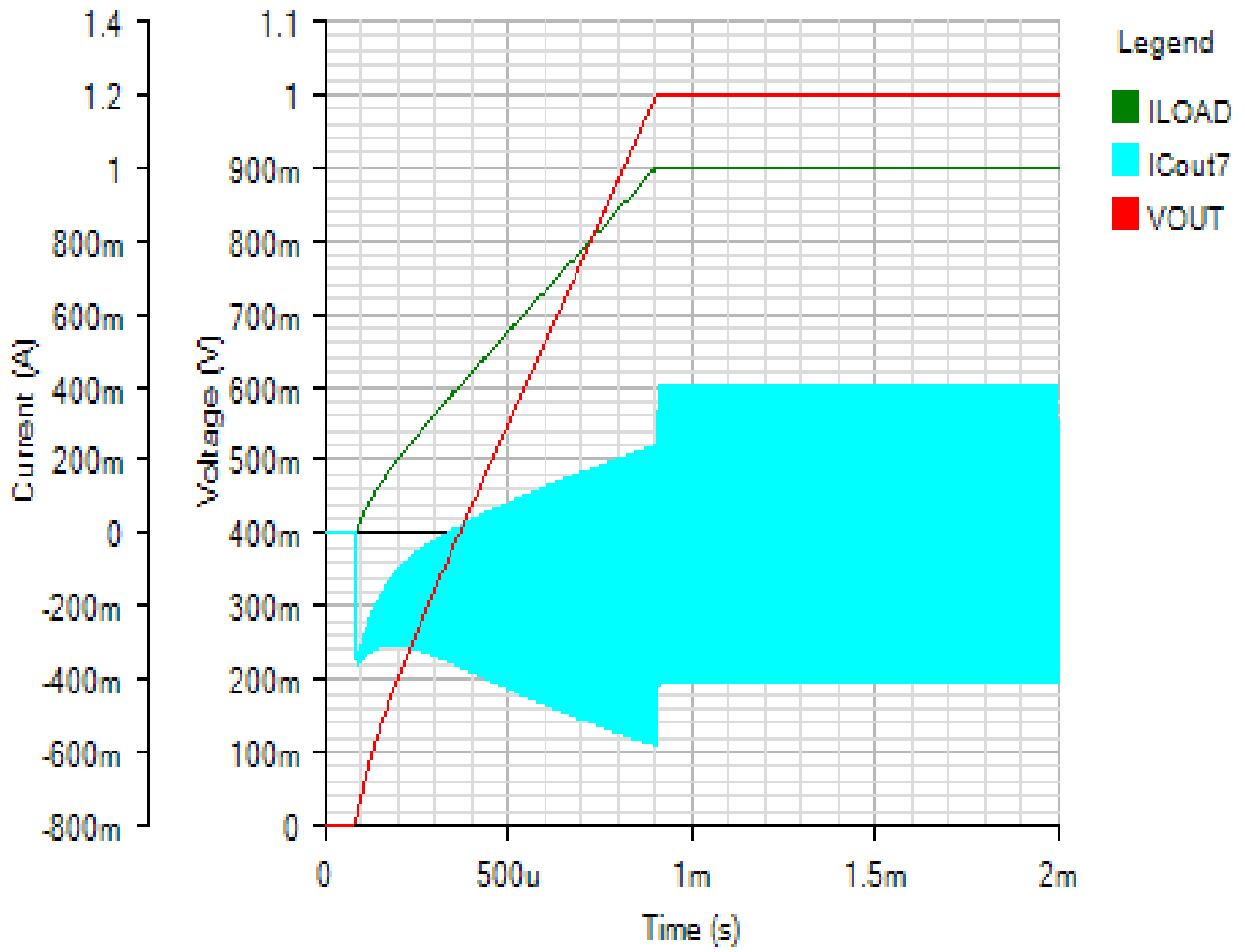
IC

Default



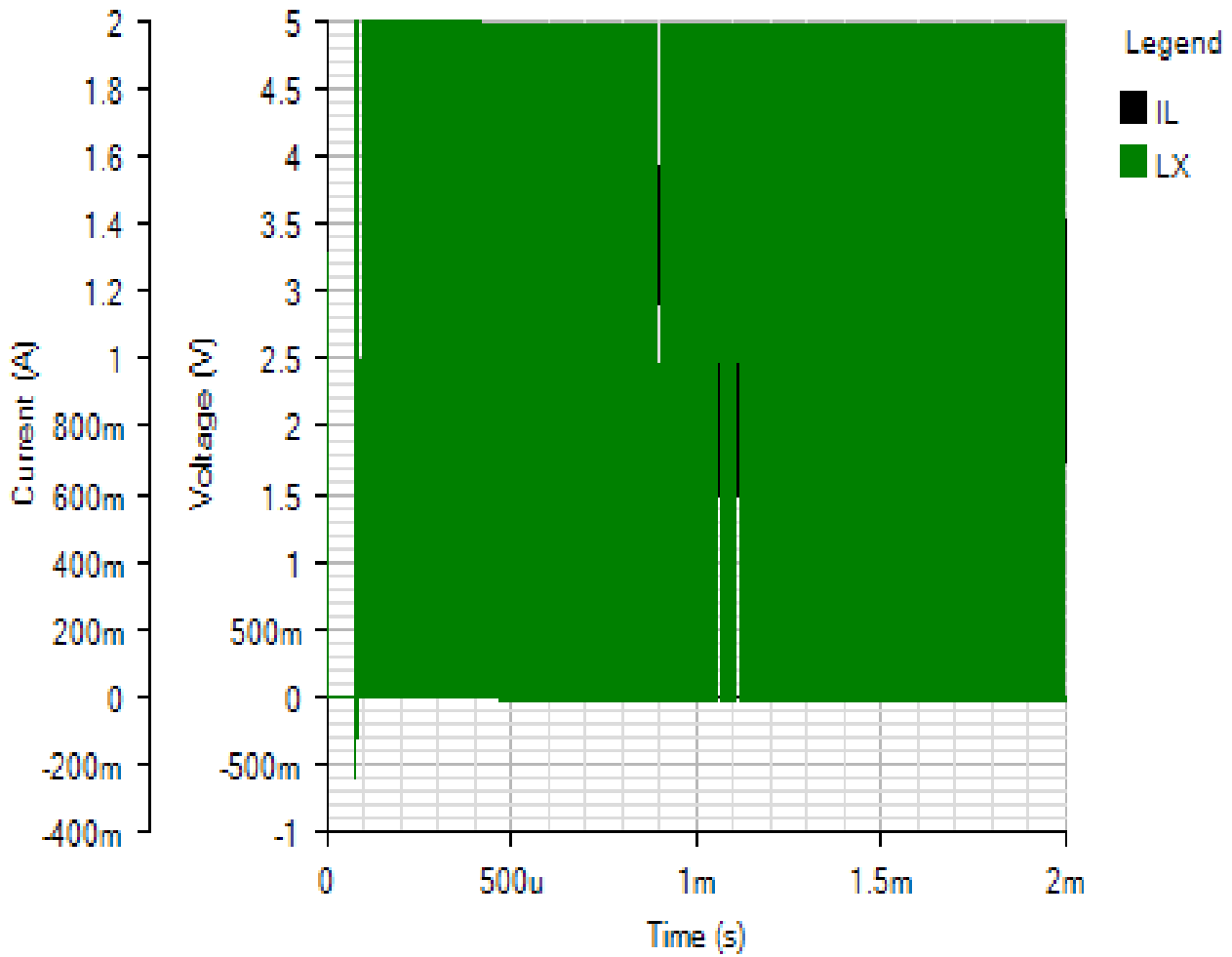
OUTPUT

Default



SWITCHING

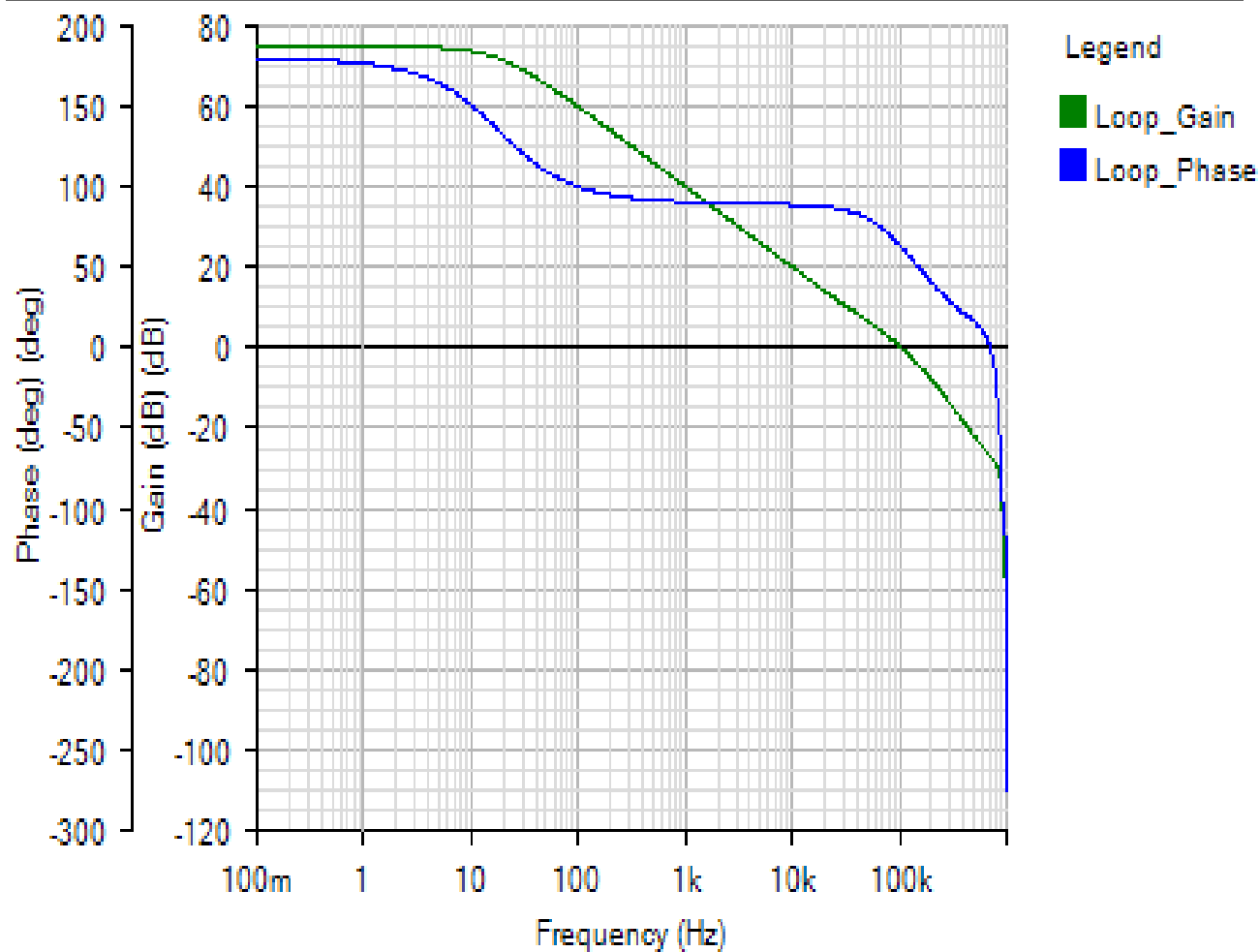
Default



AC Loop - Mon Nov 19 2018 11:30:47

BODE

Default



Phase Margin: 62.44° at a crossover frequency of 104.6kHz

