

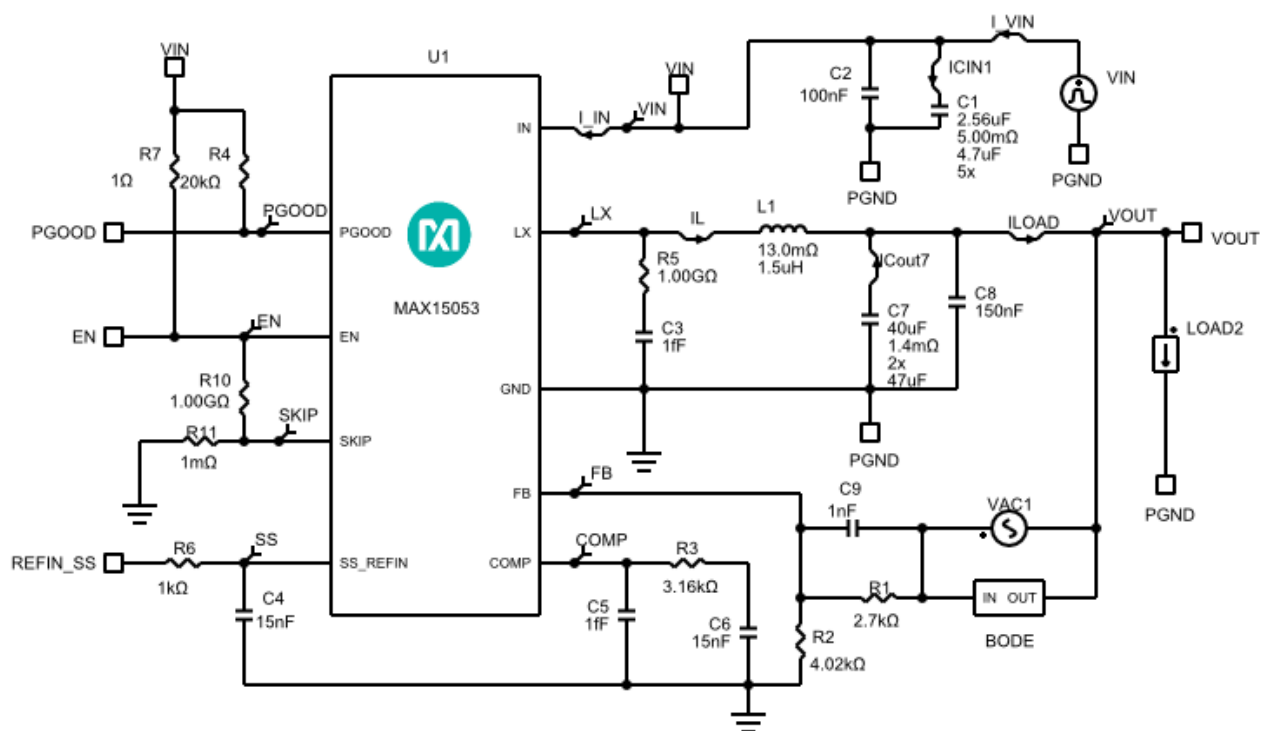
Initial Design

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	2A
Output Voltage Ripple	1%
Load Step Start Current	1A
Load Step Current	2A
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	MAX15053EWL+T	Maxim Integrated	DC-DC Switching Regulators 2A Current-Mode Synchronous
C1	5	GRM188C81C475KE11	Murata	Cap Ceramic 4.7uF 16V 0603 105C
C2	1	GCM188L81H104KA57D	Murata Manufacturing	Cap Ceramic 0.1uF 50V X8L 10% Pad SMD 0603 150°C Automotive T/R
C4	1	06035C153KAT2A	AVX	Cap Ceramic 0.015uF 50V X7R 10% Pad SMD 0603 125°C T/R
C6	1	06035C153KAT2A	AVX	Cap Ceramic 0.015uF 50V X7R 10% Pad SMD 0603 125°C T/R
C7	2	GRM32EC80J476ME64L	Murata	Cap Ceramic 47uF 6.3V X6S 20% SMD 1210 105C Embossed T/R
C8	1	0603ZC154KAT2A	AVX	Cap Ceramic 0.15uF 10V X7R 10% Pad SMD 0603 125°C T/R
C9	1	GRM1885C1H102JA01D	Murata Manufacturing	Cap Ceramic 0.001uF 50V C0G 5% Pad SMD 0603 125°C T/R

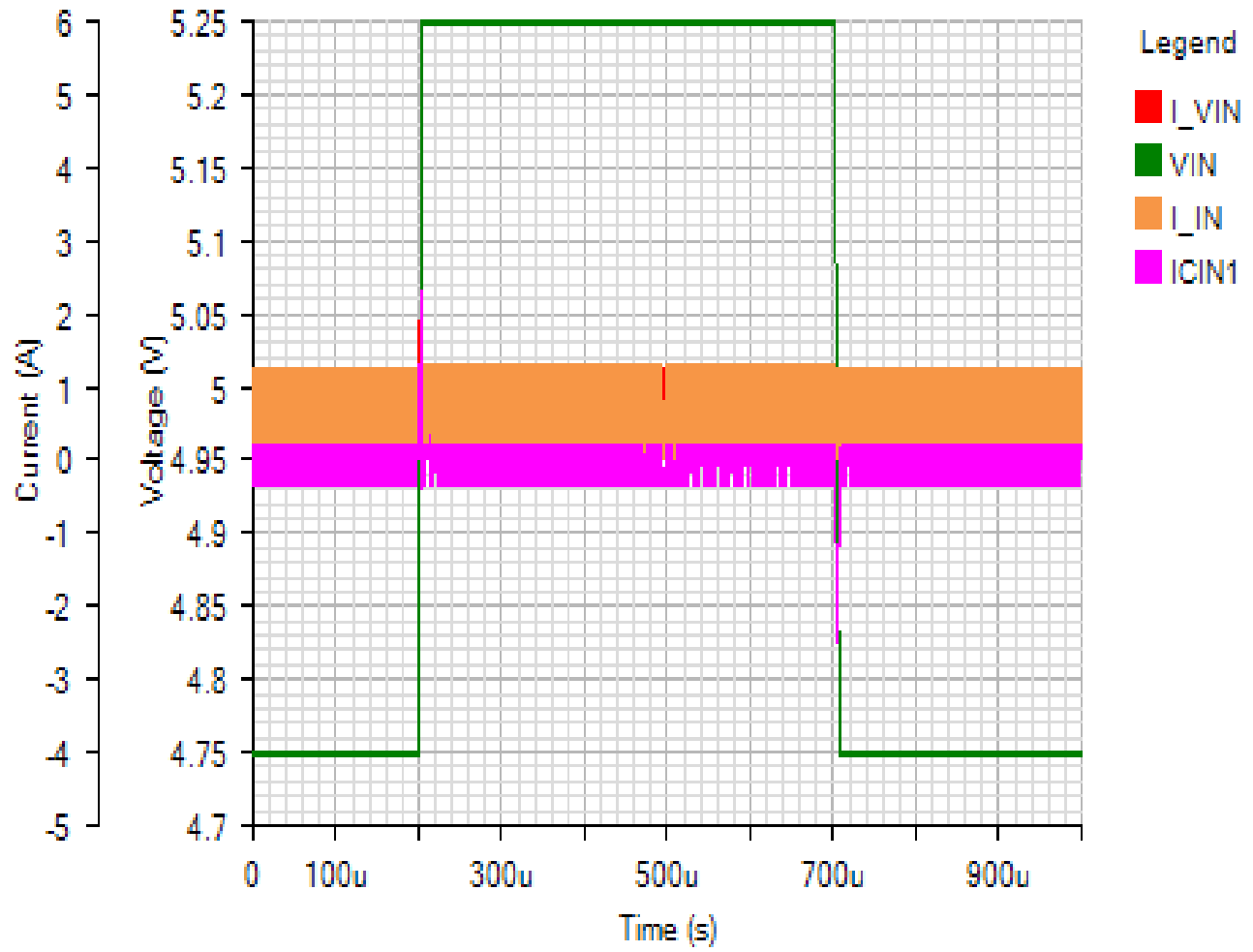
L1	1	VLP8040T-1R5N	TDK	Power Inductors 1.5uH
R1	1	ERJ3EKF2701V	Panasonic	Res Thick Film 0603 2.7K Ohm 1% 0.1W(1/10W) ±100ppm/°C Pad SMD Automotive T/R
R2	1	ERJ3EKF4021V	Panasonic	Res Thick Film 0603 4.02K Ohm 1% 0.1W(1/10W) ±100ppm/°C Pad SMD Automotive T/R
R3	1	ERJ3EKF3161V	Panasonic	Res Thick Film 0603 3.16K 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 11:26:56

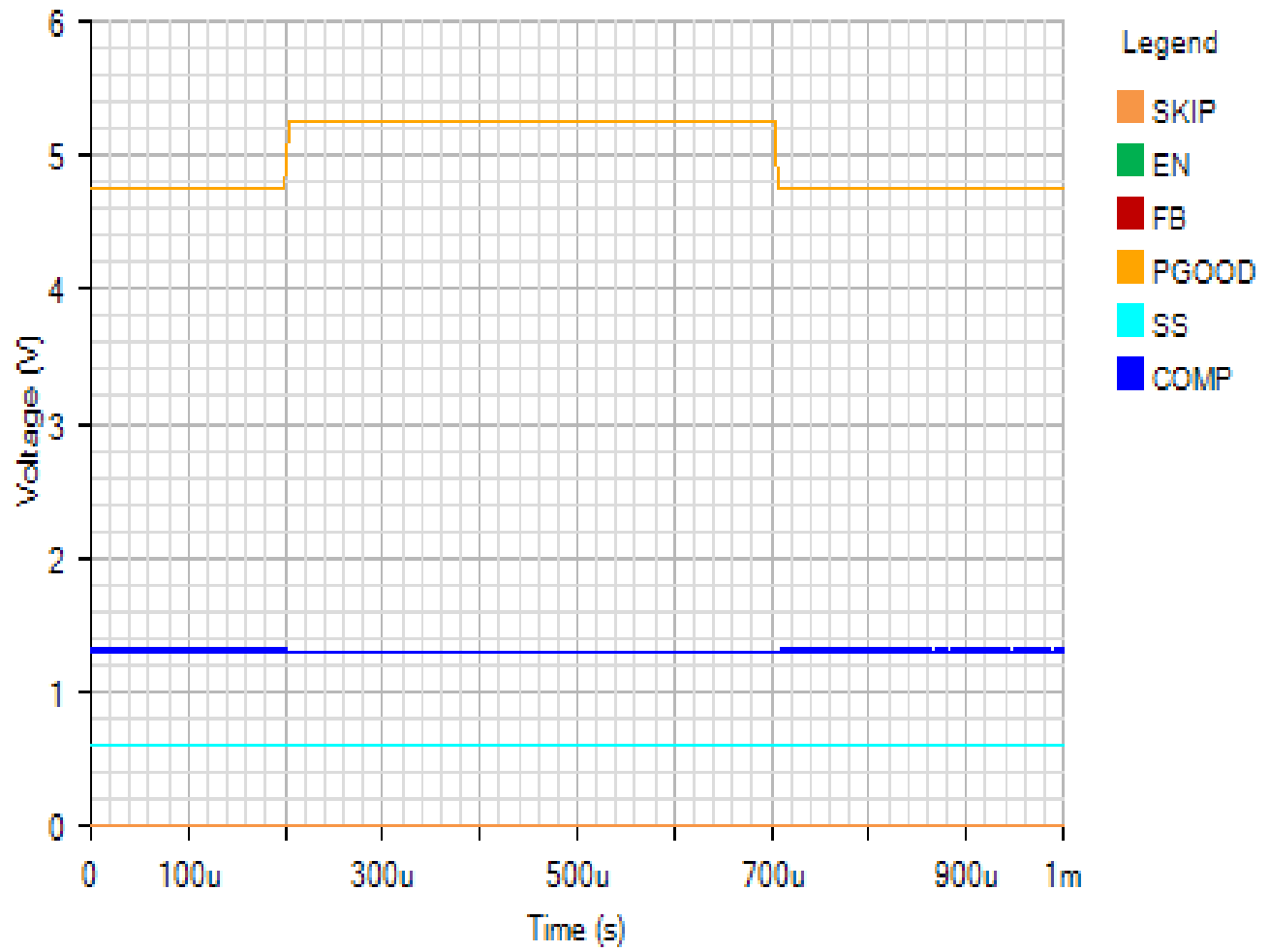
INPUT

Default



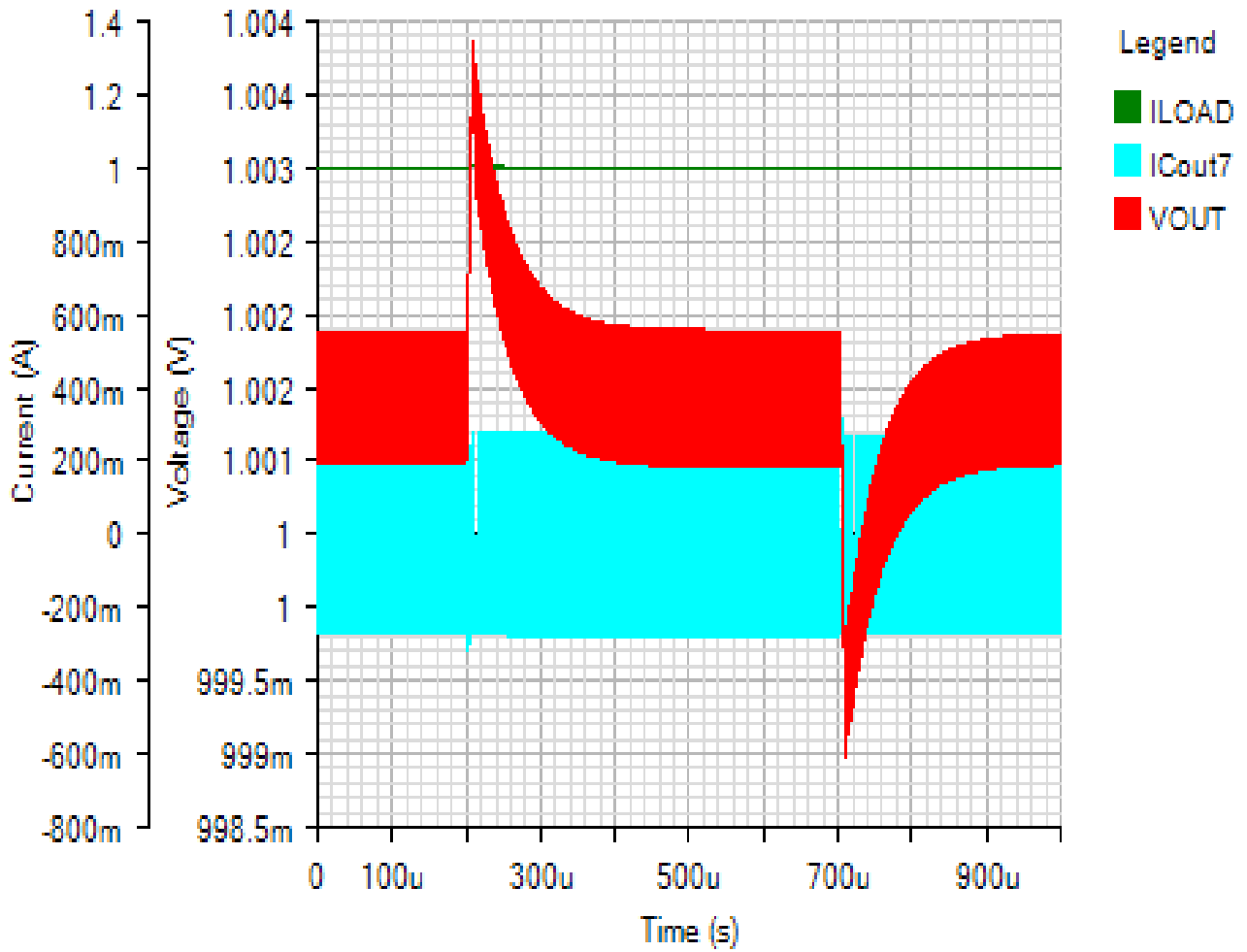
IC

Default



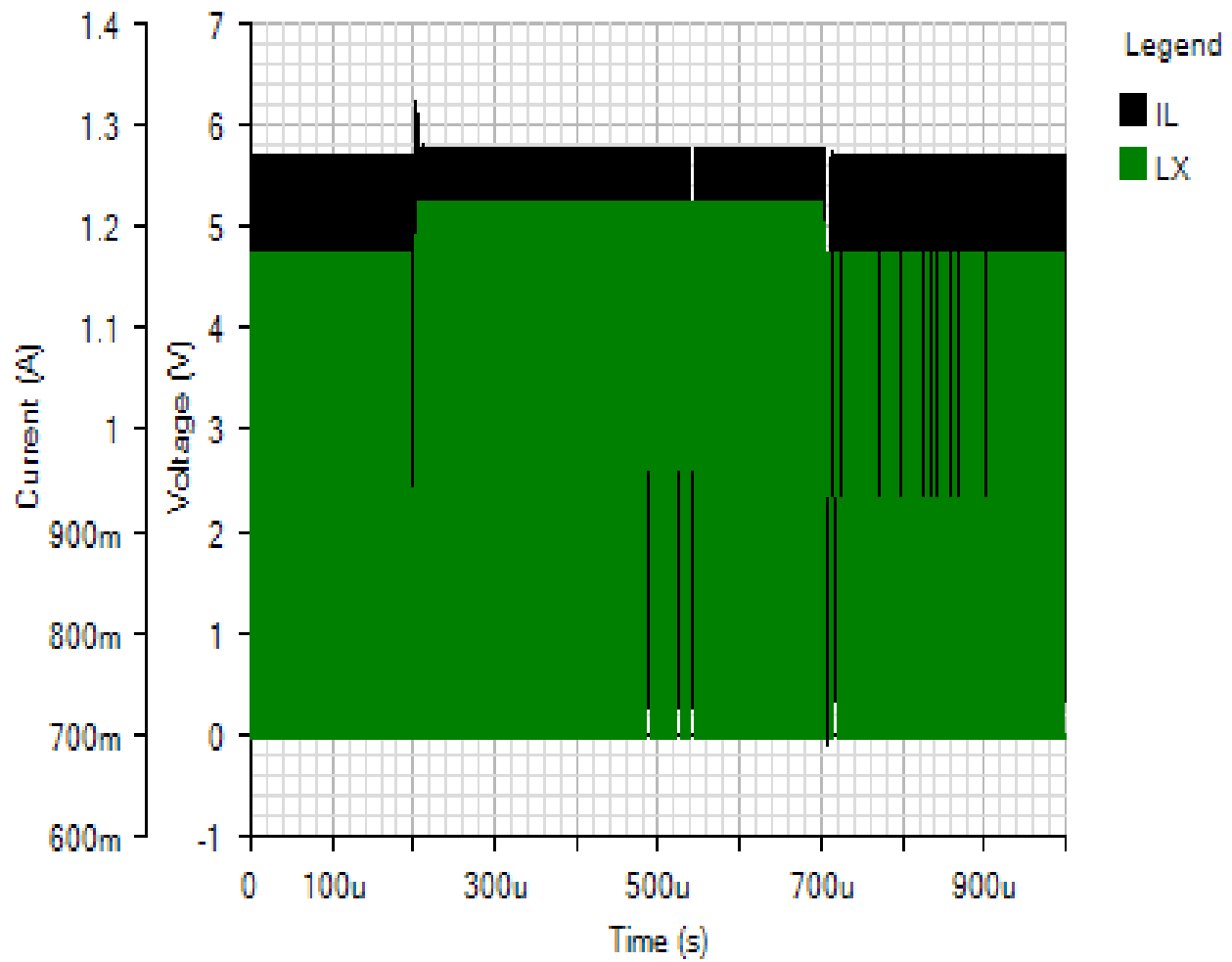
OUTPUT

Default



SWITCHING

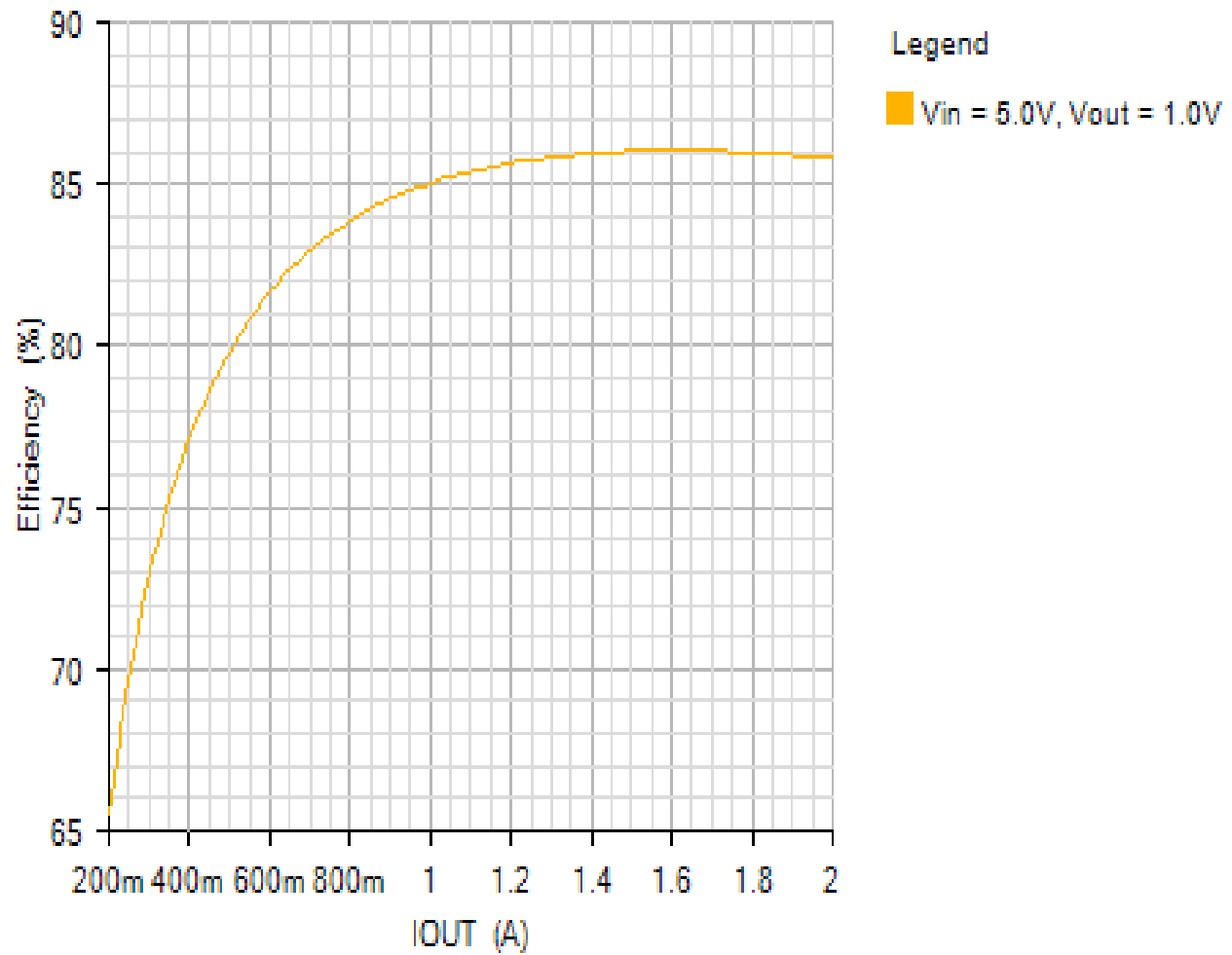
Default



Efficiency - Mon Nov 19 2018 11:26:56

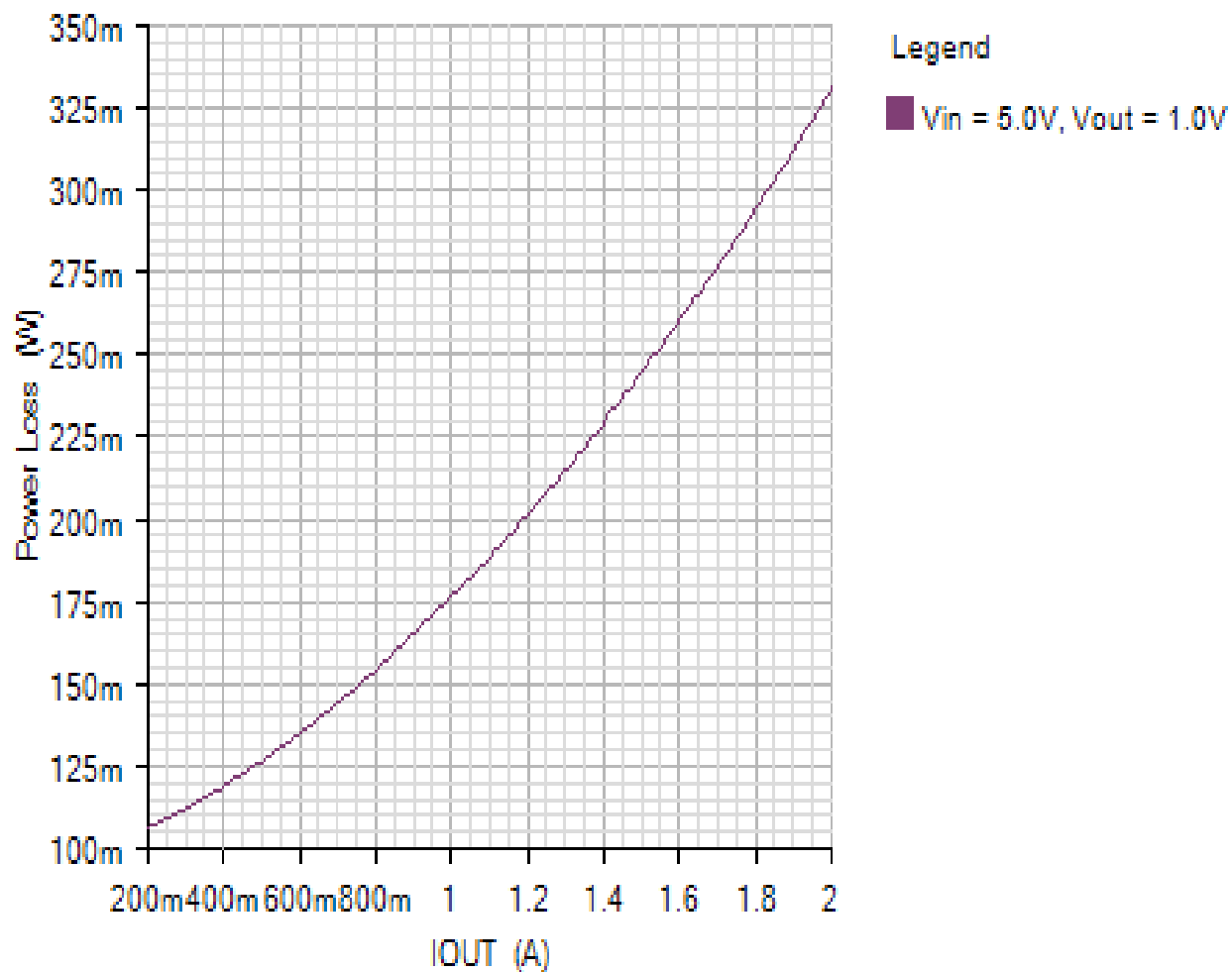
EFFICIENCY_PLOT

Default

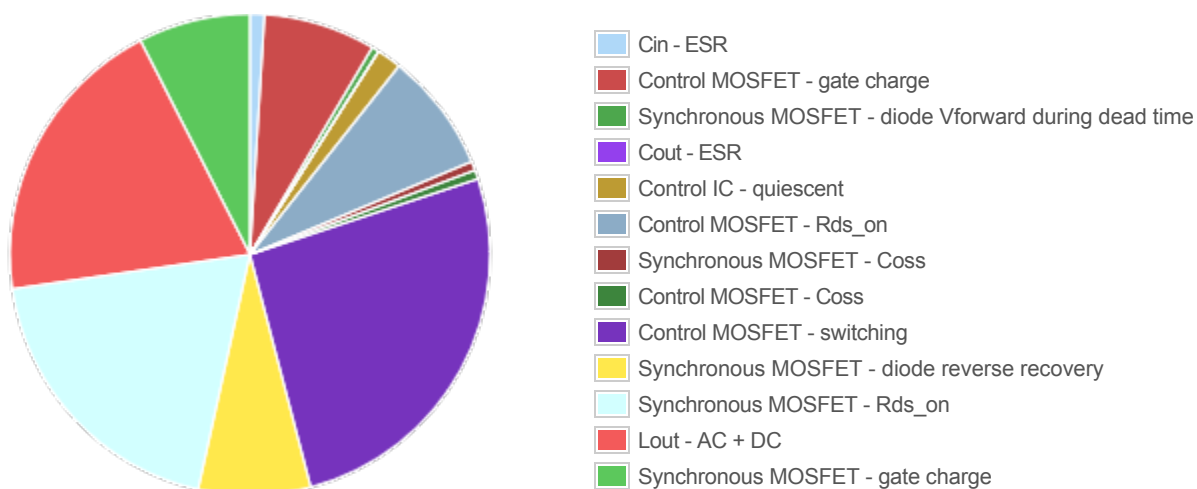


POWER_LOSS_PLOT

Default



Losses



Component

Loss (W)

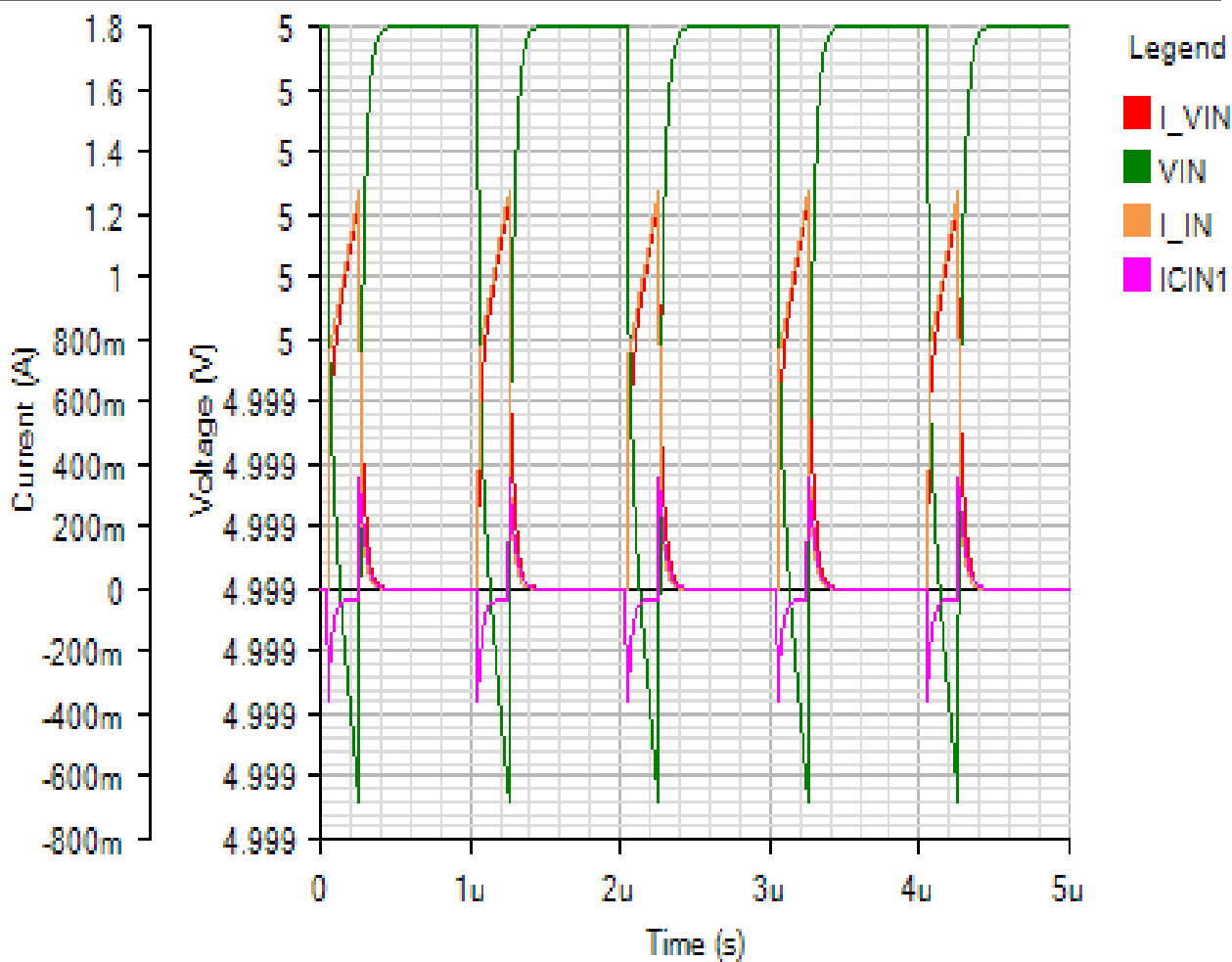
% of total

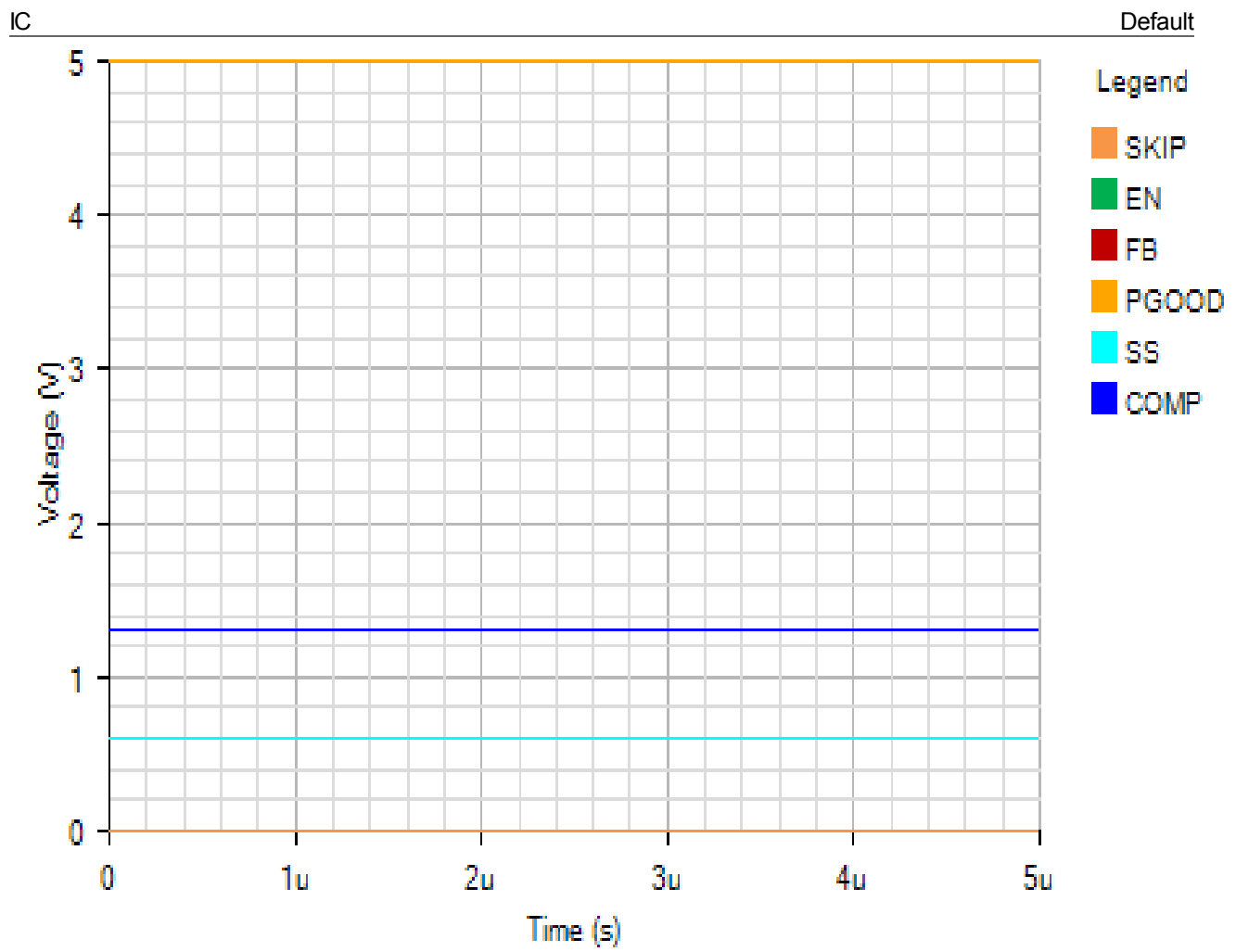
Component	Loss (W)	% of total
Cin - ESR	0.003207	1
Control MOSFET - gate charge	0.025	7.5
Synchronous MOSFET - diode Vforward during dead time	0.0016	0.5
Cout - ESR	0.000033	0
Control IC - quiescent	0.0055	1.7
Control MOSFET - Rds_on	0.026636	8
Synchronous MOSFET - Coss	0.002025	0.6
Control MOSFET - Coss	0.002025	0.6
Control MOSFET - switching	0.086207	26
Synchronous MOSFET - diode reverse recovery	0.025	7.5
Synchronous MOSFET - Rds_on	0.063793	19.2
Lout - AC + DC	0.065478	19.8
Synchronous MOSFET - gate charge	0.025	7.5
Total	0.331504	100

Steady State - Mon Nov 19 2018 11:26:56

INPUT

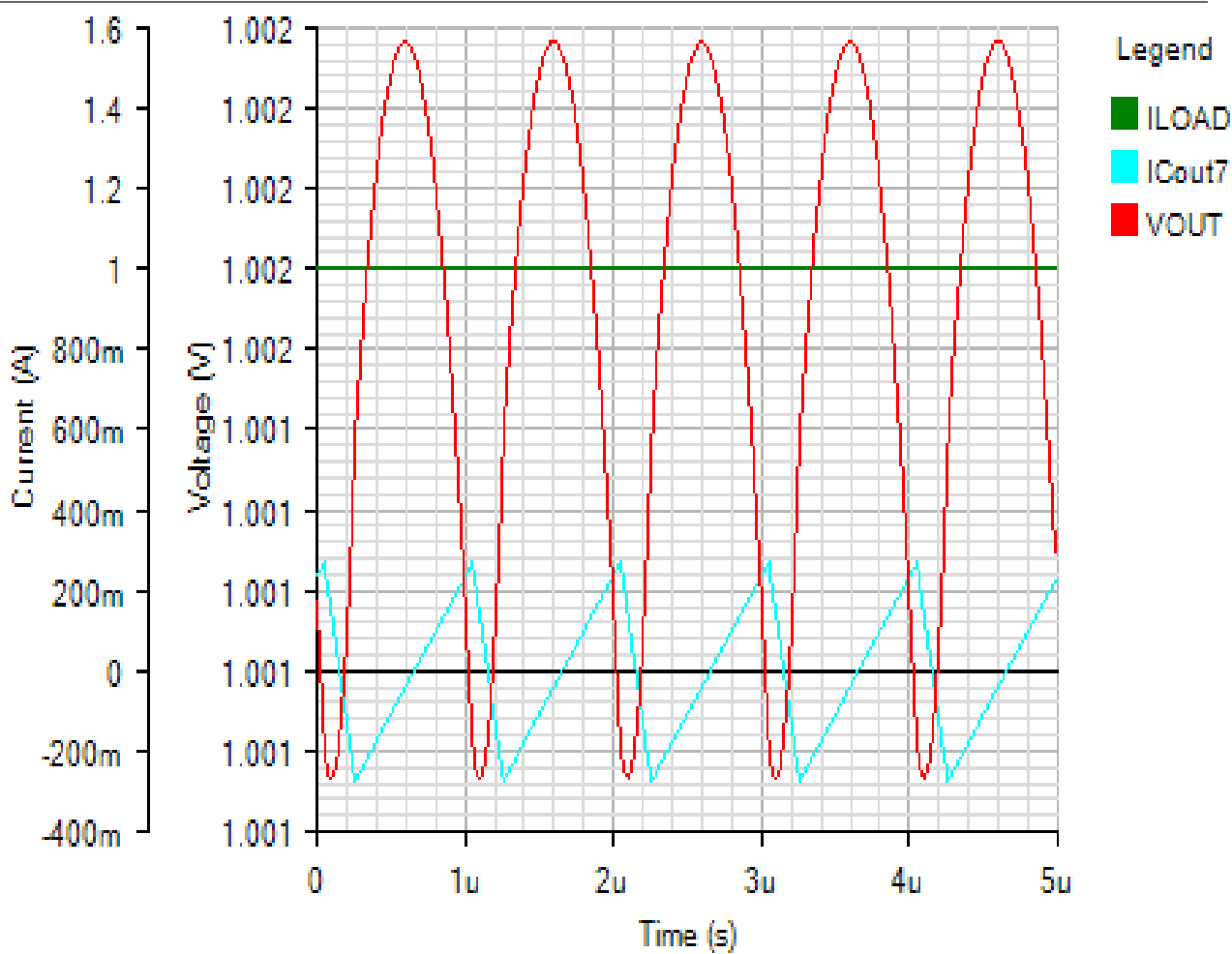
Default





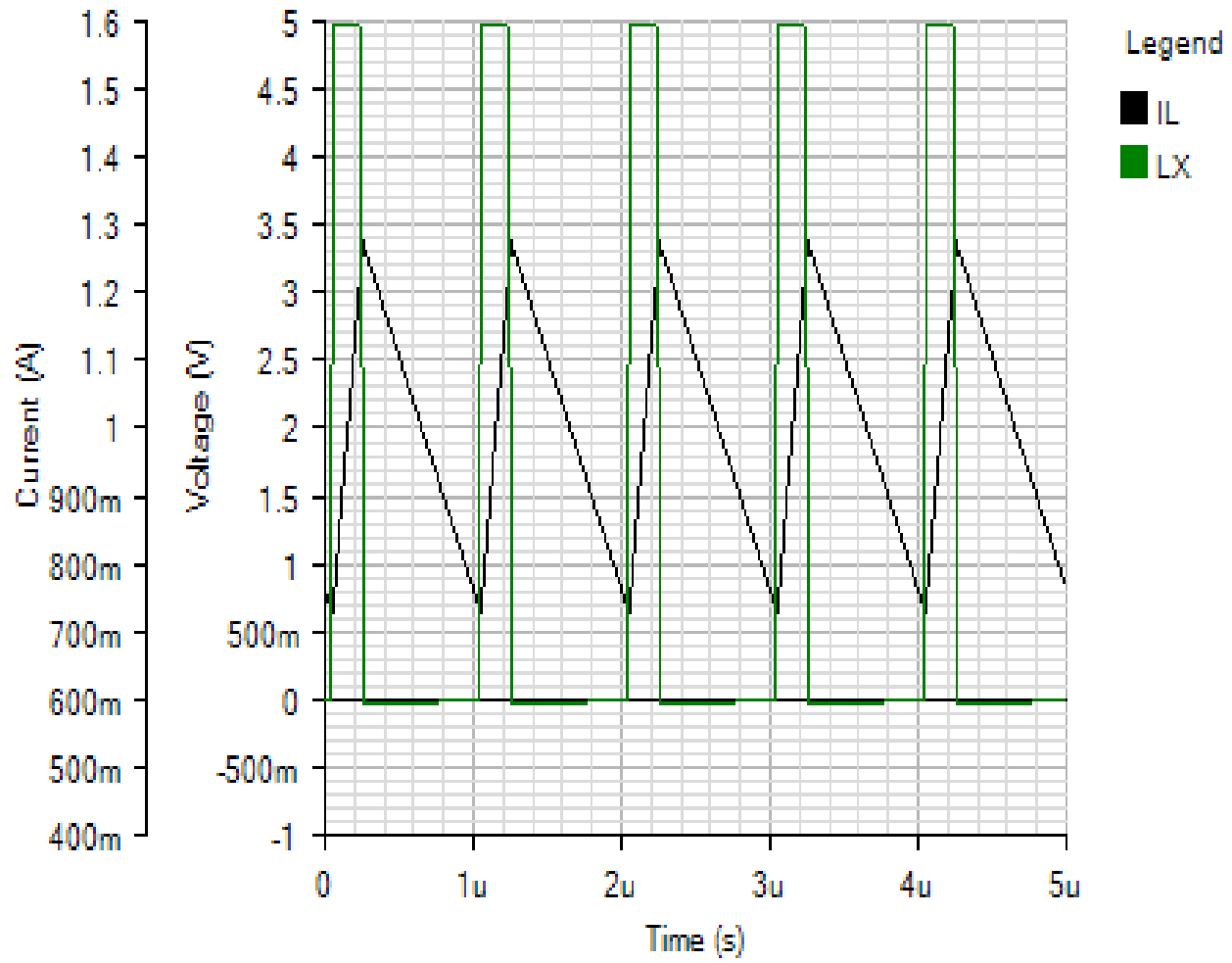
OUTPUT

Default

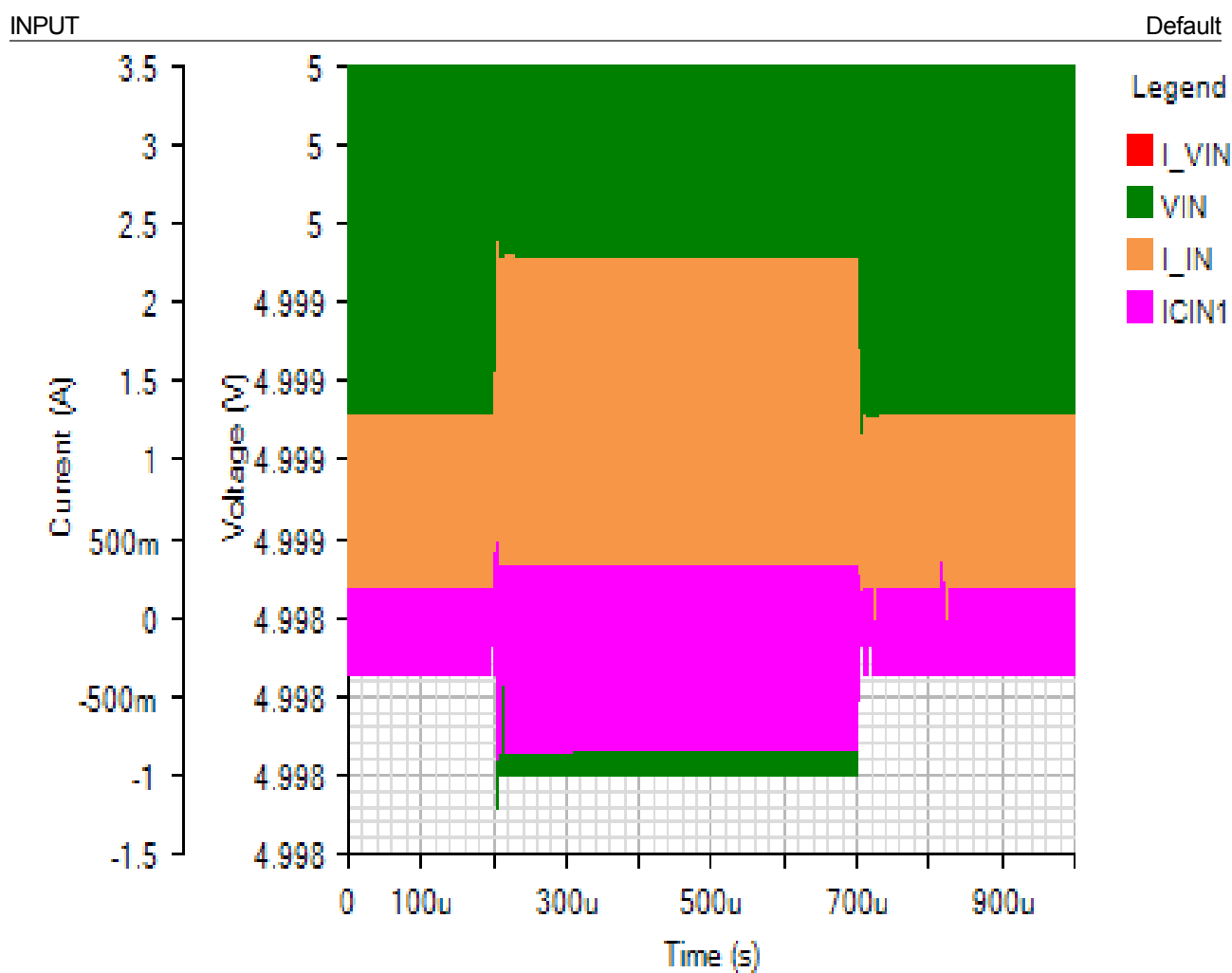


SWITCHING

Default

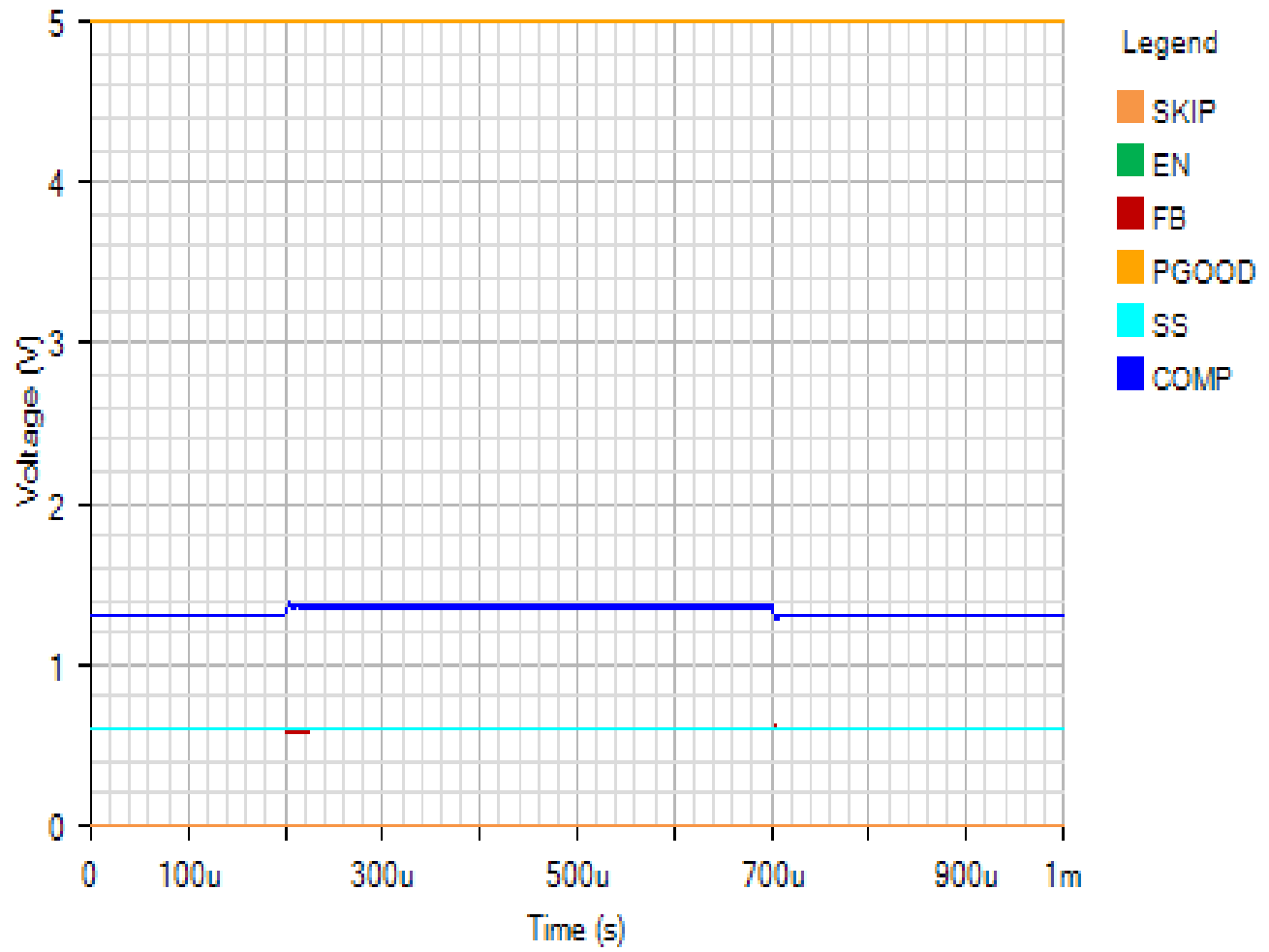


Load Step - Mon Nov 19 2018 11:26:56



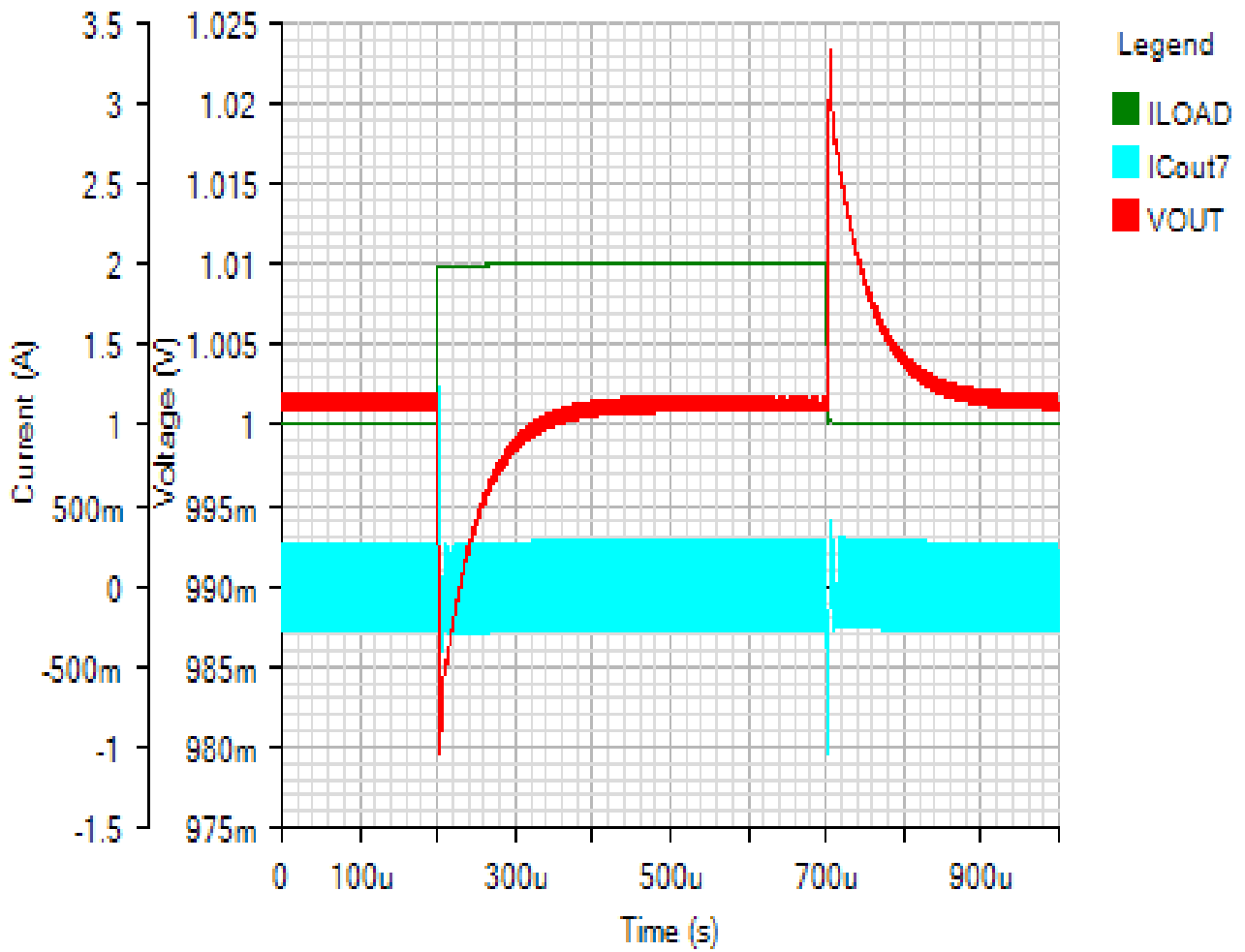
IC

Default



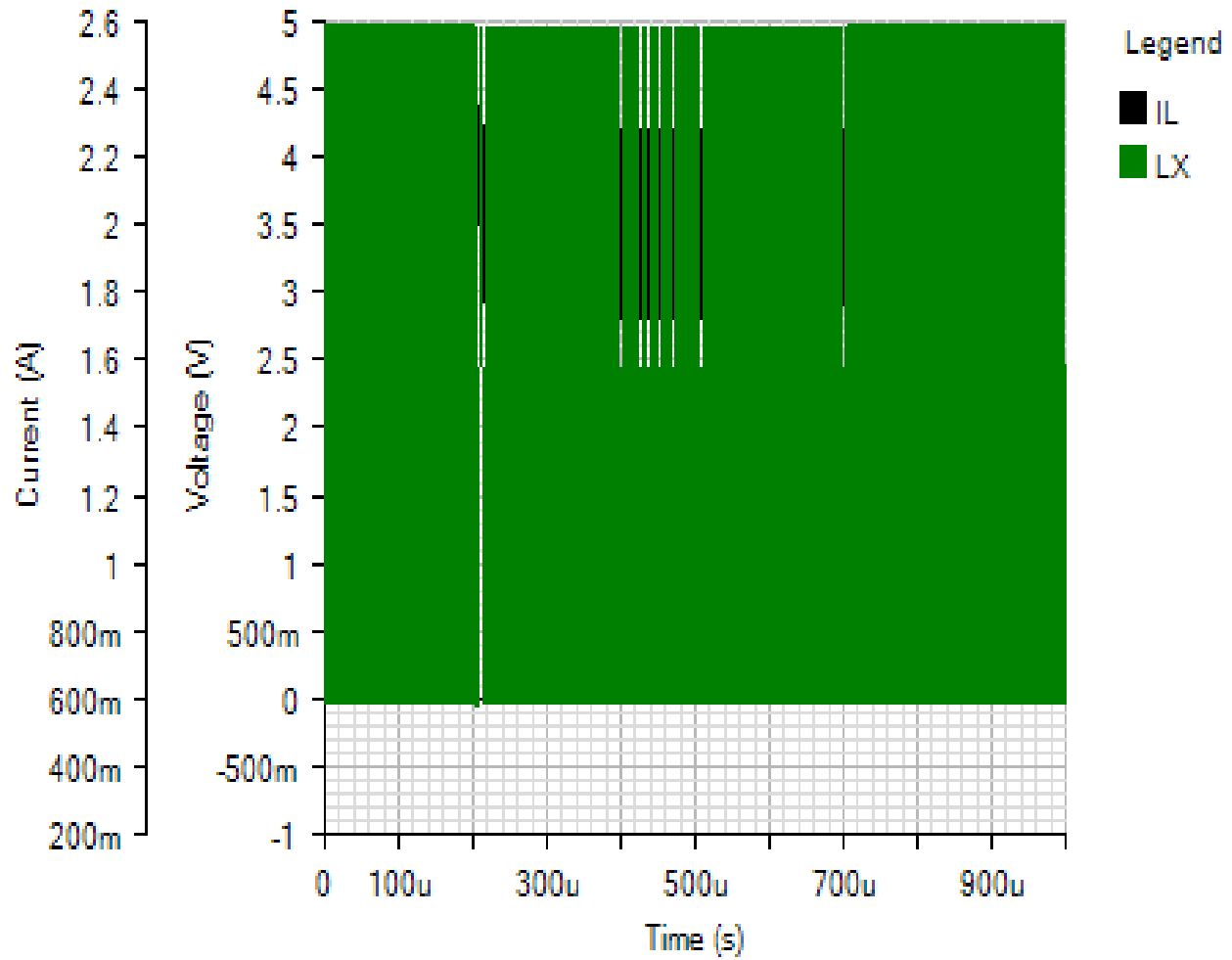
OUTPUT

Default



SWITCHING

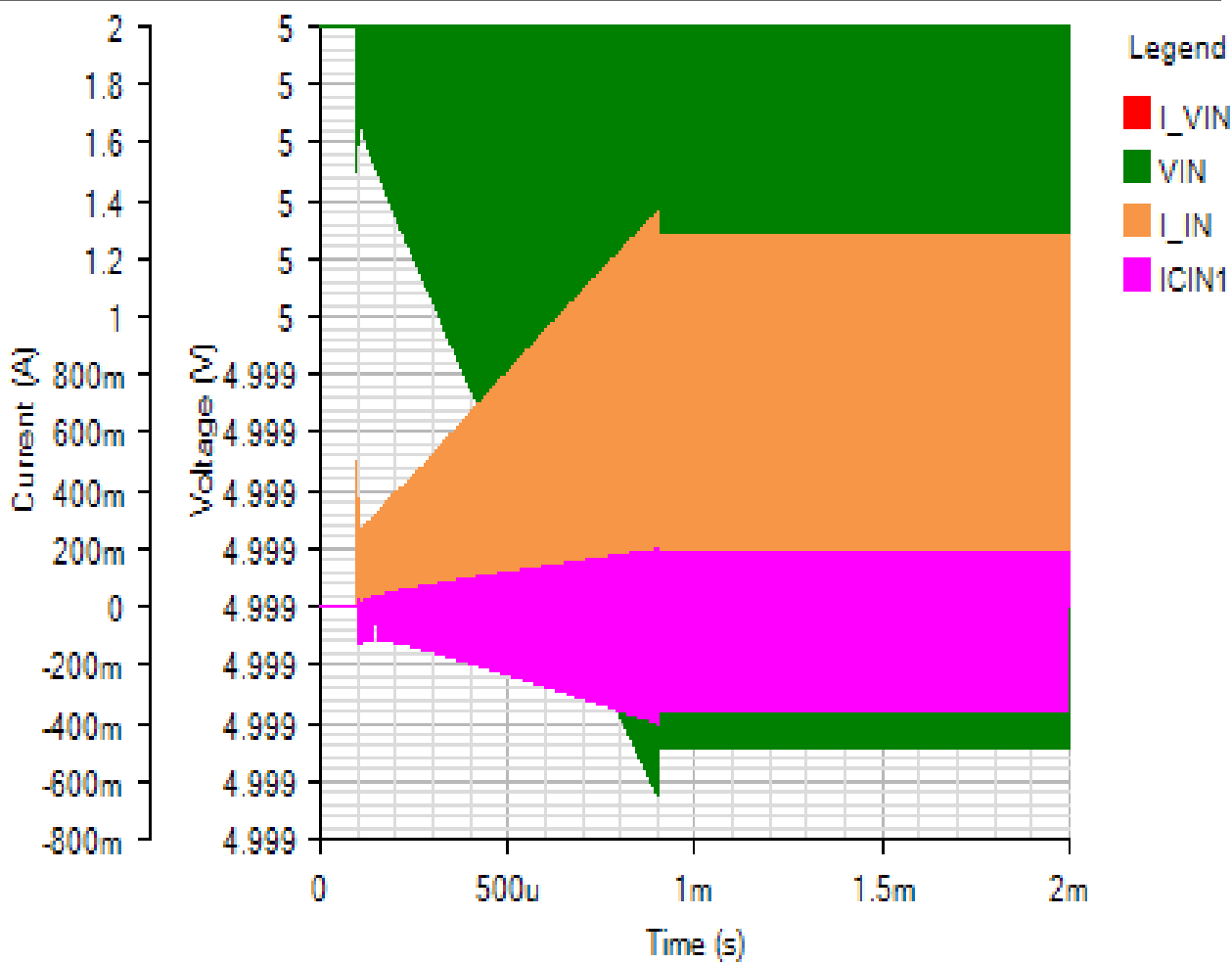
Default



Start Up - Mon Nov 19 2018 11:26:56

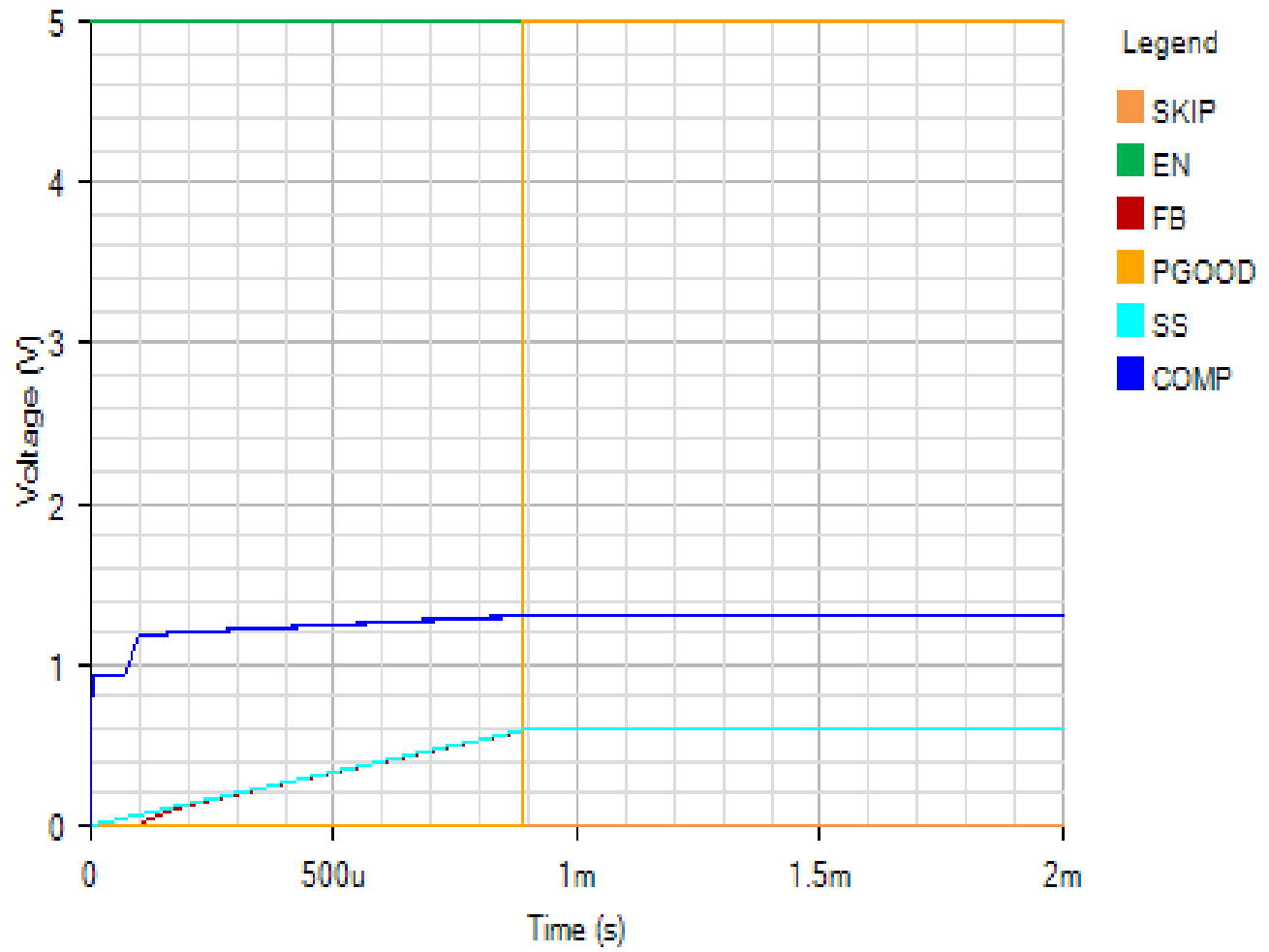
INPUT

Default



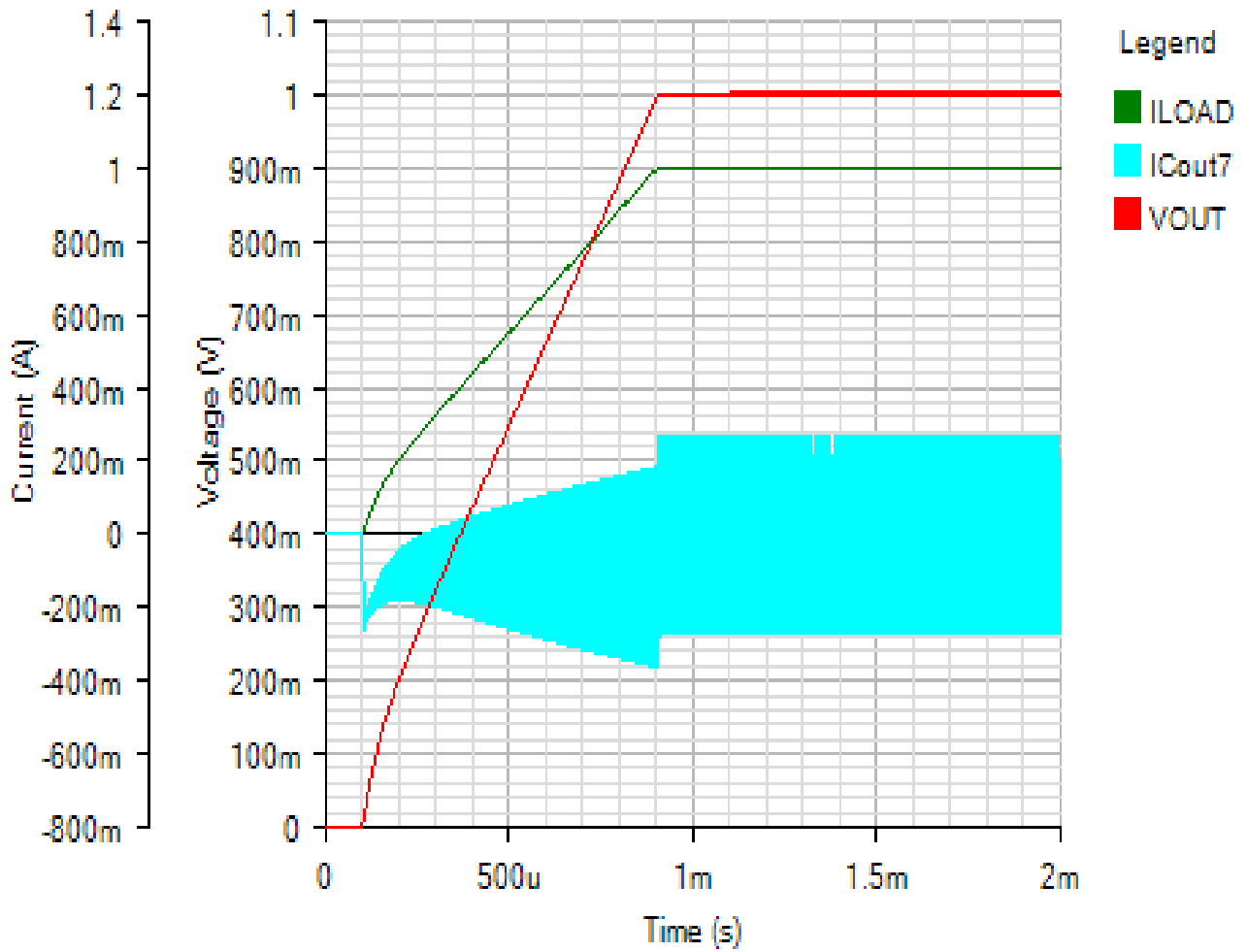
IC

Default



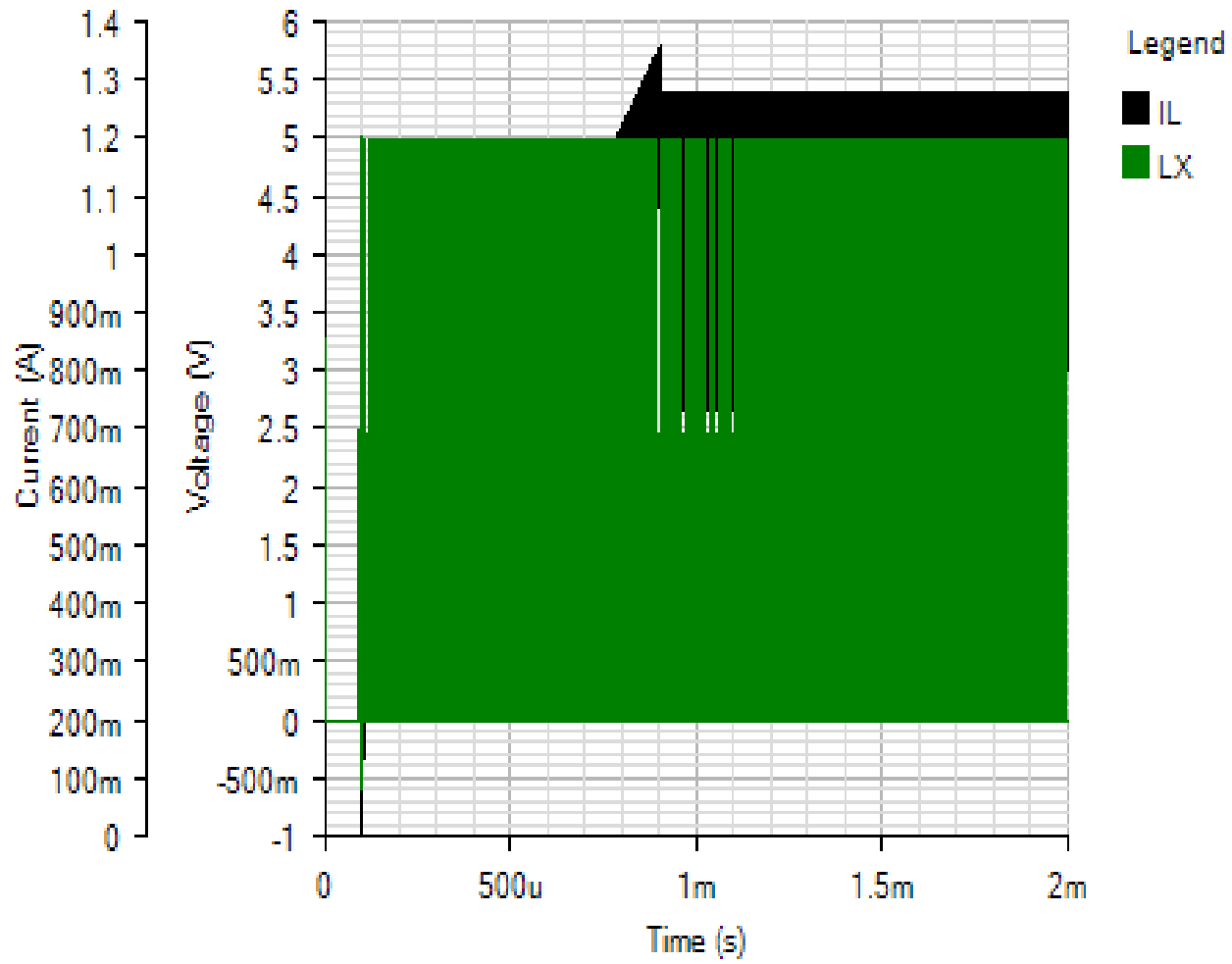
OUTPUT

Default



SWITCHING

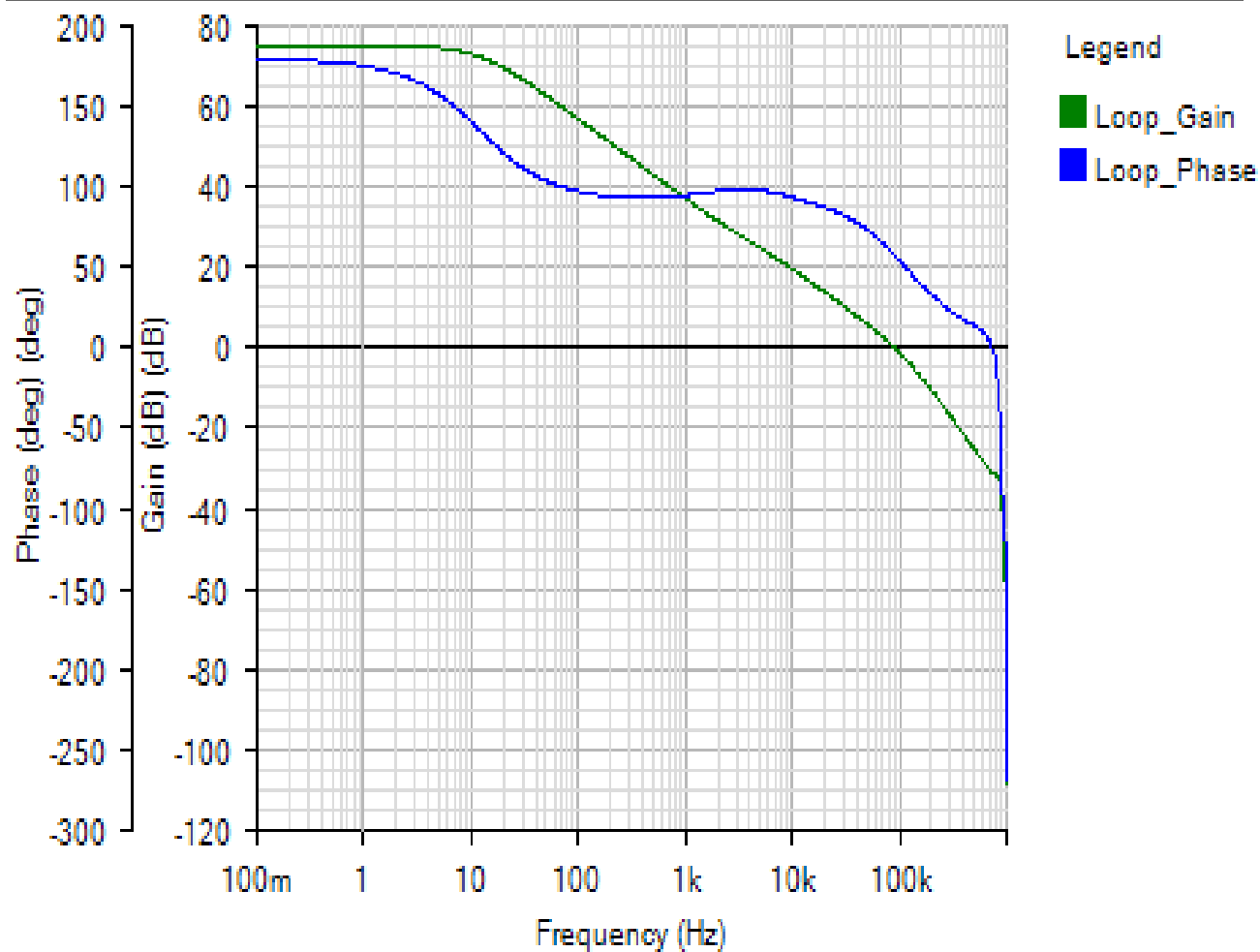
Default



AC Loop - Mon Nov 19 2018 11:26:56

BODE

Default



Phase Margin: 57.61° at a crossover frequency of 89.9kHz

