

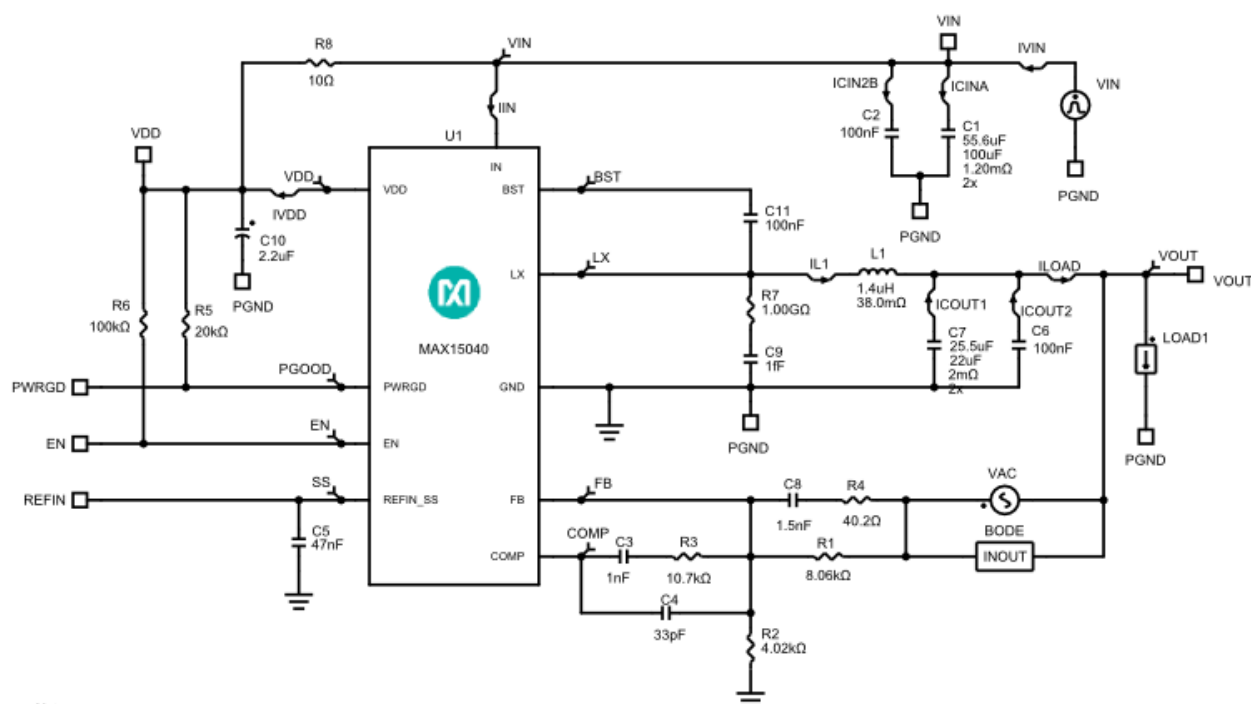
Initial Design

1.0

Design Requirements

Parameter	Value
Min. Input Voltage	3V
Max. Input Voltage	3.6V
Typ. Input Voltage	3.3V
Input Voltage Ripple	1%
Output Voltage	1.8V
Output Current	2A
Output Voltage Ripple	1%
Load Step Start Current	1A
Load Step Current	2A
Load Step Edge Rate	1A/us
Output Voltage Load Step Over/Undershoot	5%
Performance Priority	Balance Efficiency and Size
BOM Priority	Cost
Inductor Current Ratio (LIR)	0.3
Compensator Type	Type II: One less capacitor

Schematic



Notes.
 1. Snubber components R7 and C9 are optional. Values are dependent on circuit parasitics, layout, etc.

BOM

Ref	Qty	Part Number	Manufacturer	Description
U1	1	MAX15040EWE+T	Maxim Integrated	High-Efficiency, 4A, Step-Down Regulator with Integrated Switches
C1	2	GRM32EC70J107ME15L	Murata	Cap Ceramic 100uF 6.3V 1210 125C
C2	1	CL10B104MB8NNNC	Samsung Electro-Mechanics	Cap Ceramic 0.1uF 50V X7R 20% Pad SMD 0603 125°C T/R
C3	1	GRM1885C1H102JA01D	Murata Manufacturing	Cap Ceramic 0.001uF 50V C0G 5% Pad SMD 0603 125°C T/R
C4	1	C0603C330J5GACTU	KEMET Corporation	Cap Ceramic 33pF 50V C0G 5% Pad SMD 0603 125°C T/R
C5	1	C0603C473M5RACAUTO	KEMET Corporation	Cap Ceramic 0.047uF 50V X7R 20% Pad SMD 0603 125°C Automotive T/R
C6	1	CL10B104MB8NNNC	Samsung Electro-Mechanics	Cap Ceramic 0.1uF 50V X7R 20% Pad SMD 0603 125°C T/R
C7	2	GRM32ER71E226ME15	Murata	Cap Ceramic 22uF 25V 1210 125C
C8	1	C1608C0G1H152J080AA	TDK	Cap Ceramic 0.0015uF 50V C0G 5% Pad SMD 0603 125°C T/R

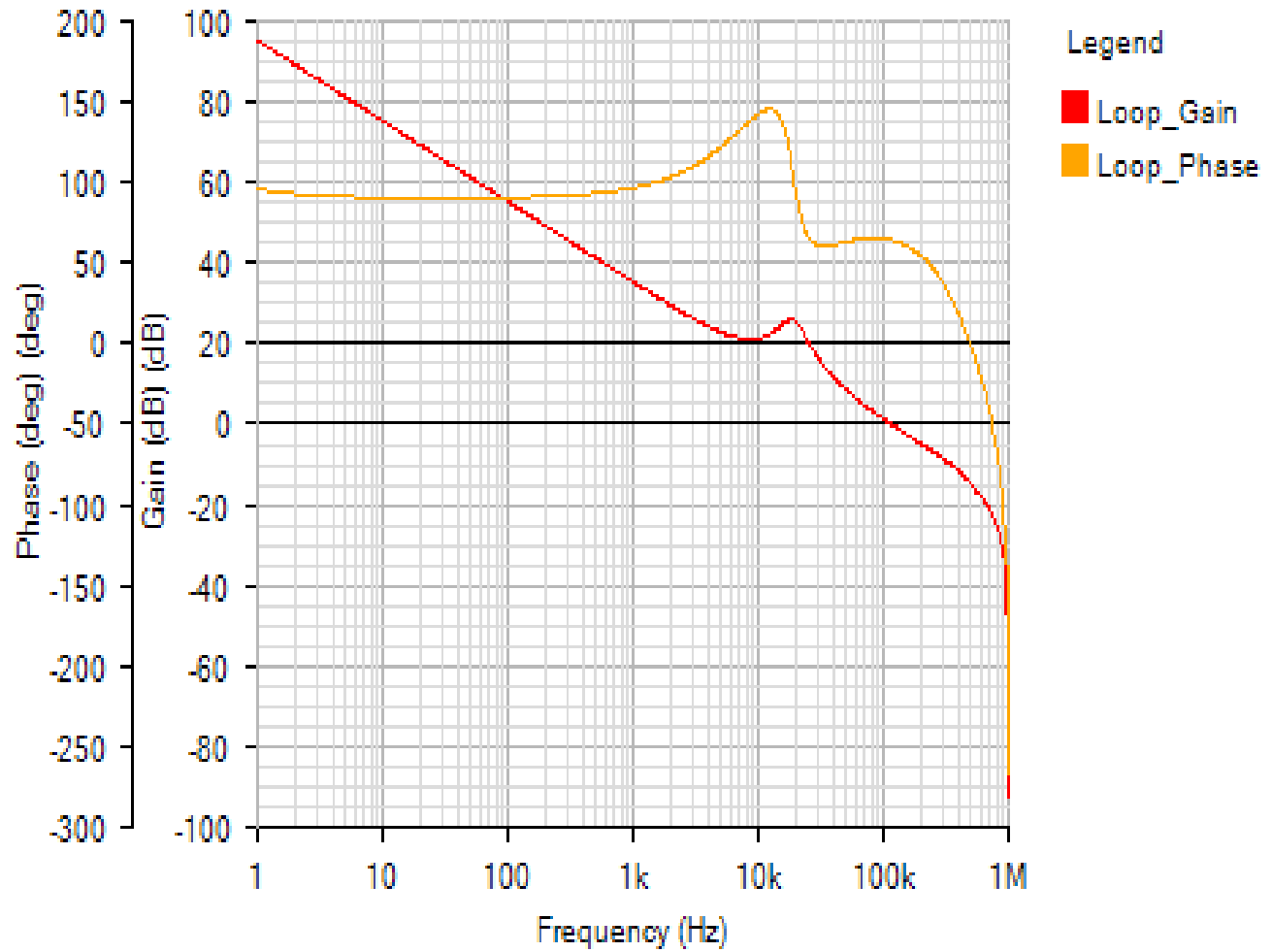
C10	1	CL10A225MQ8NNNC	Samsung Electro-Mechanics	Cap Ceramic 2.2uF 6.3V X5R 20% Pad SMD 0603 85°C T/R
C11	1	CL10B104MB8NNNC	Samsung Electro-Mechanics	Cap Ceramic 0.1uF 50V X7R 20% Pad SMD 0603 125°C T/R
L1	1	SD43-142MLB	Coilcraft	Inductor 1.4uH 20% 34.2mOhm 5.5A Isat 5.8A Irms
R1	1	ERJ3EKF8061V	Panasonic	Res Thick Film 0603 8.06K 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	ERJ3EKF1072V	Panasonic	Res Thick Film 0603 10.7K Ohm 1% 0.1W(1/10W) ±100ppm/°C Pad SMD Automotive T/R
R4	1	ERJ3EKF40R2V	Panasonic	Res Thick Film 0603 40.2 Ohm 1% 0.1W(1/10W) ±100ppm/°C Pad SMD Automotive T/R
R5	1	ERJ3GEYJ203V	Panasonic	Res Thick Film 0603 20K Ohm 5% 0.1W(1/10W) ±200ppm/°C Pad SMD Automotive T/R
R6	1	ERJ3GEYJ104V	Panasonic	Res Thick Film 0603 100K Ohm 5% 0.1W(1/10W) ±200ppm/°C Pad SMD Automotive T/R
R8	1	ERJ3EKF10R0V	Panasonic	Res Thick Film 0603 10 Ohm 1% 0.1W(1/10W) ±100ppm/°C Pad SMD Automotive T/R

Simulation Results

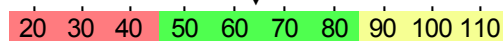
AC Loop - Mon Nov 19 2018 10:51:32

BODE

Default



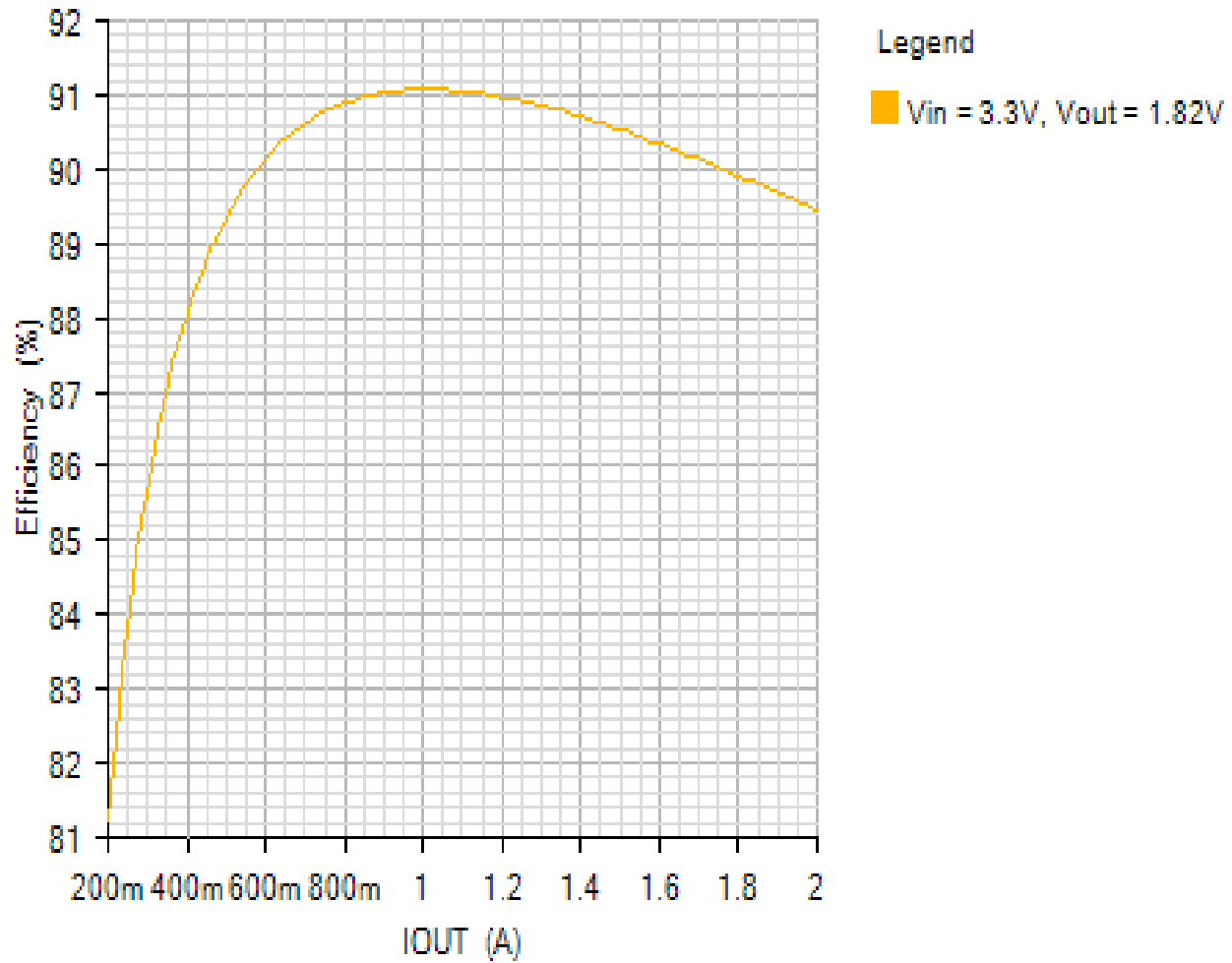
Phase Margin: 64.28° at a crossover frequency of 115.3kHz



Efficiency - Mon Nov 19 2018 10:51:32

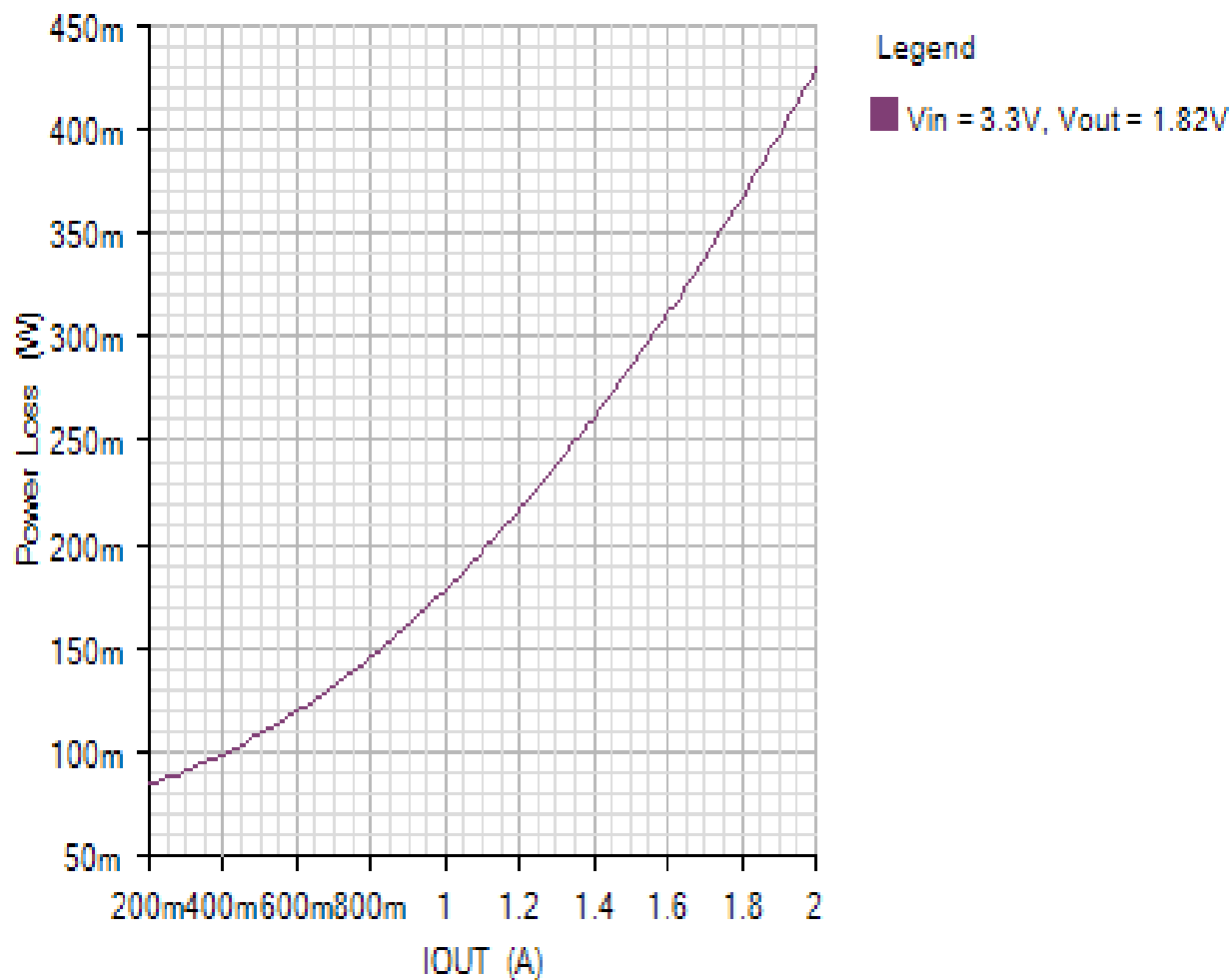
EFFICIENCY_PLOT

Default

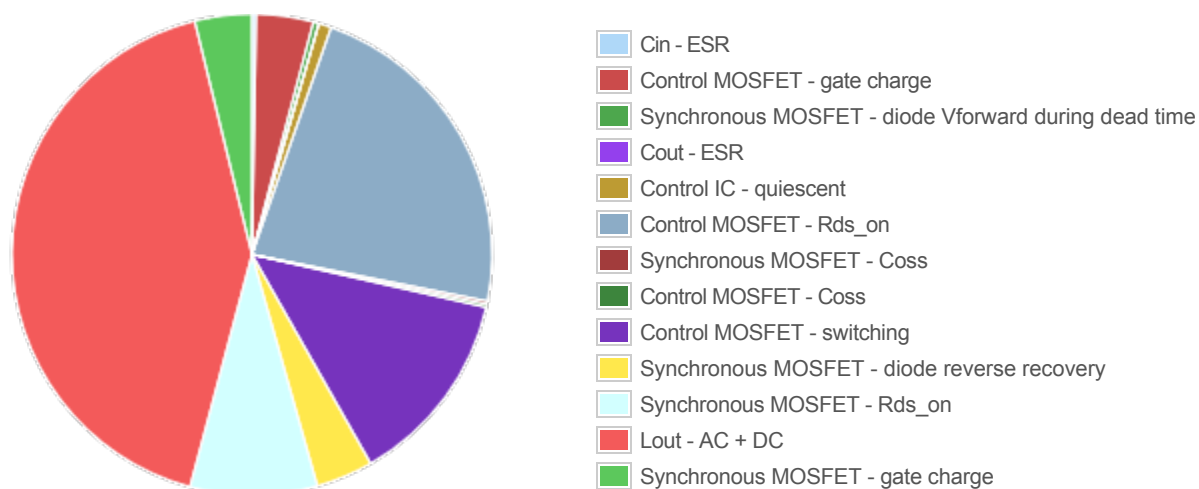


POWER_LOSS_PLOT

Default



Losses



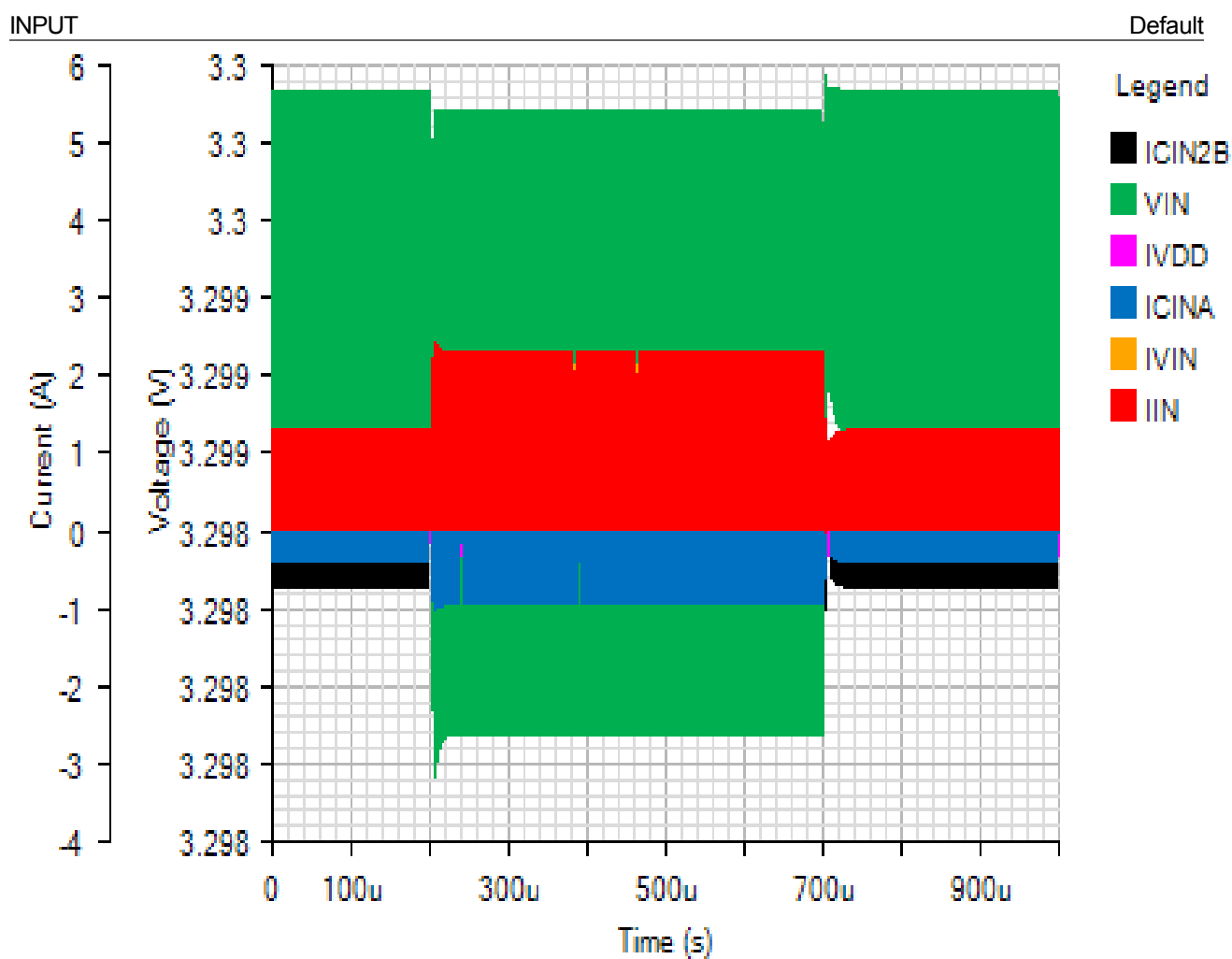
Component

Loss (W)

% of total

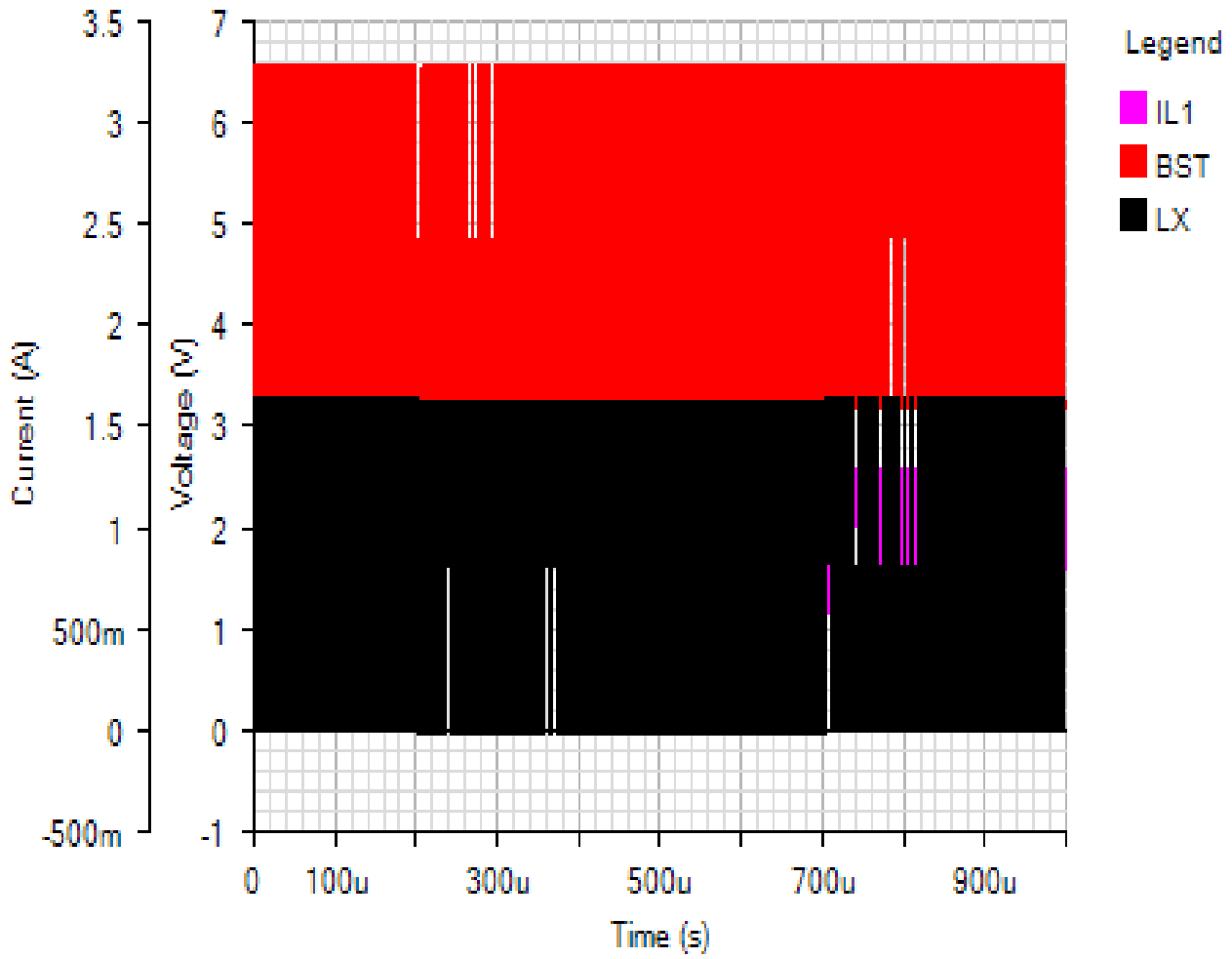
Component	Loss (W)	% of total
Cin - ESR	0.001187	0.3
Control MOSFET - gate charge	0.0165	3.8
Synchronous MOSFET - diode Vforward during dead time	0.0016	0.4
Cout - ESR	0.000057	0
Control IC - quiescent	0.00363	0.8
Control MOSFET - Rds_on	0.097808	22.8
Synchronous MOSFET - Coss	0.000882	0.2
Control MOSFET - Coss	0.000882	0.2
Control MOSFET - switching	0.056897	13.2
Synchronous MOSFET - diode reverse recovery	0.0165	3.8
Synchronous MOSFET - Rds_on	0.03674	8.6
Lout - AC + DC	0.180471	42
Synchronous MOSFET - gate charge	0.0165	3.8
Total	0.429654	100

Load Step - Mon Nov 19 2018 10:51:32



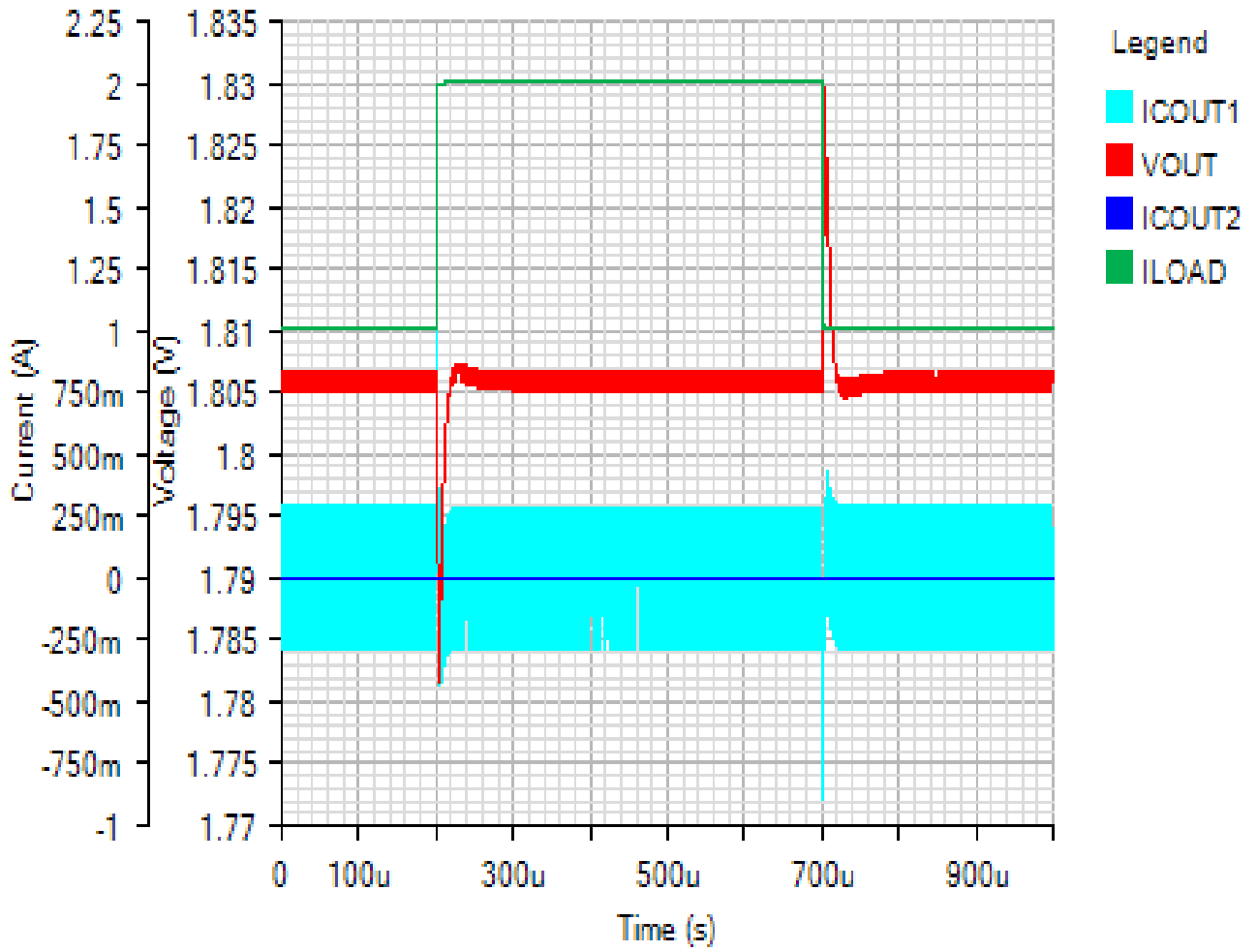
SWITCHING

Default



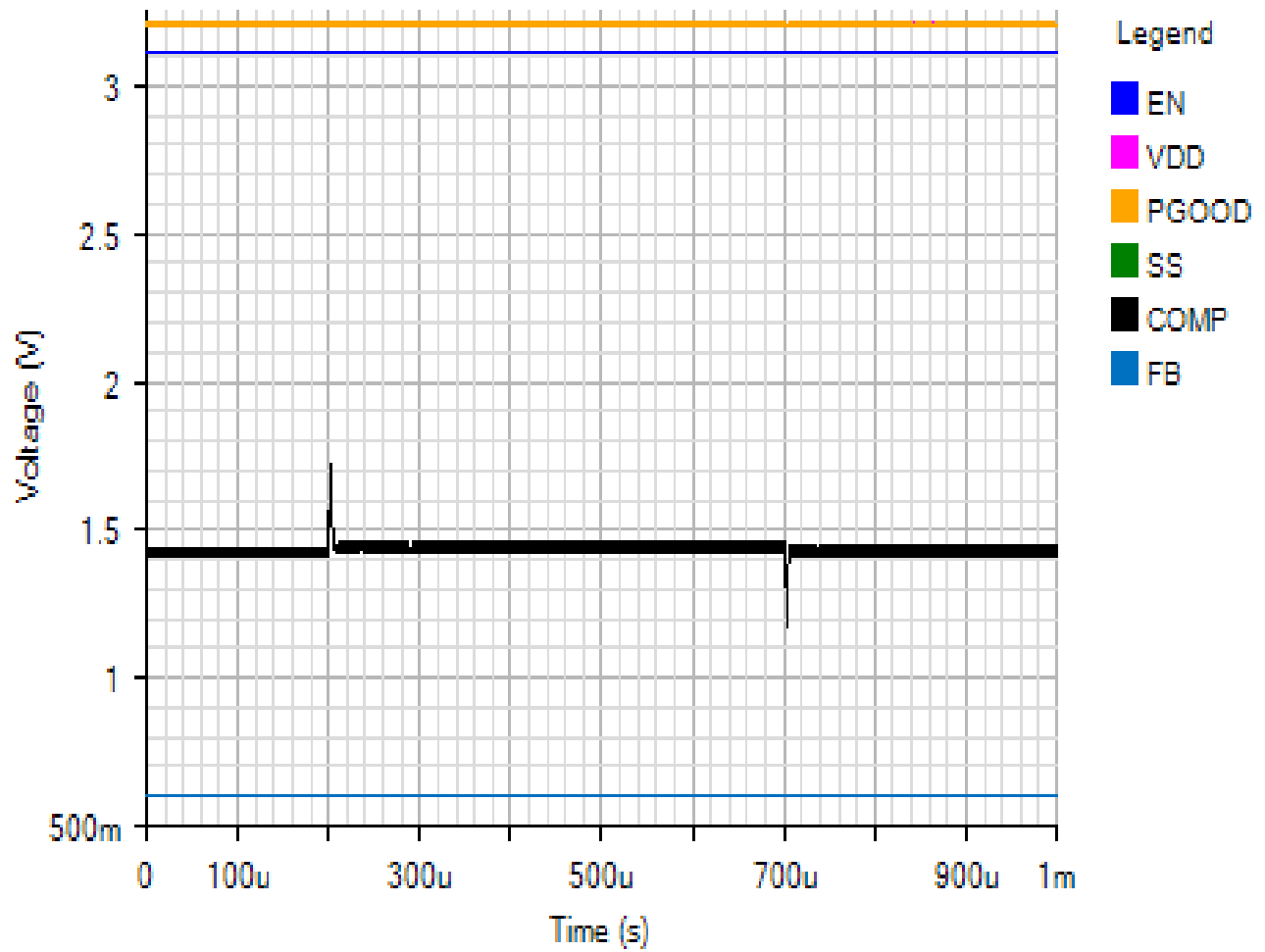
OUTPUT

Default



IC

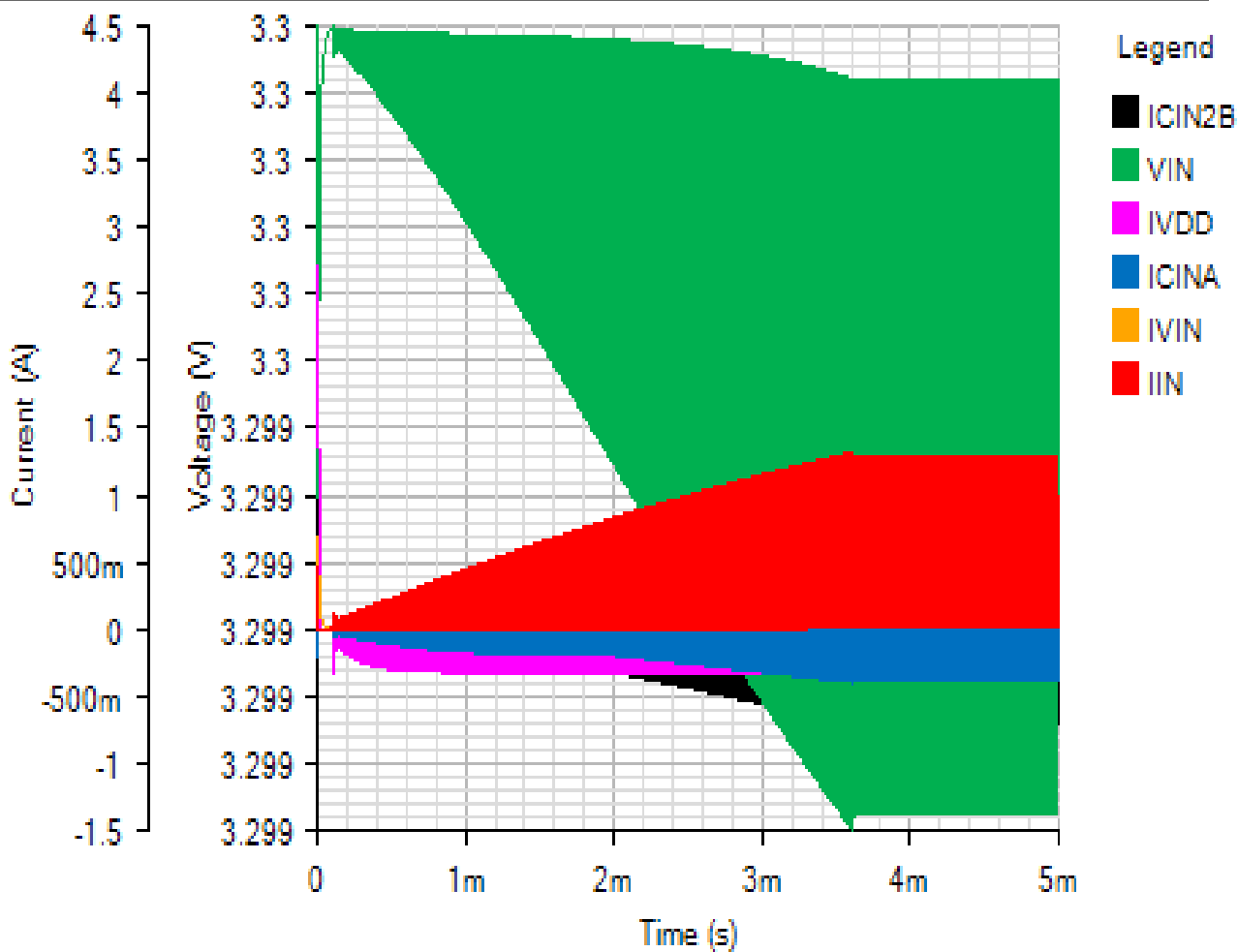
Default



Start Up - Mon Nov 19 2018 10:51:32

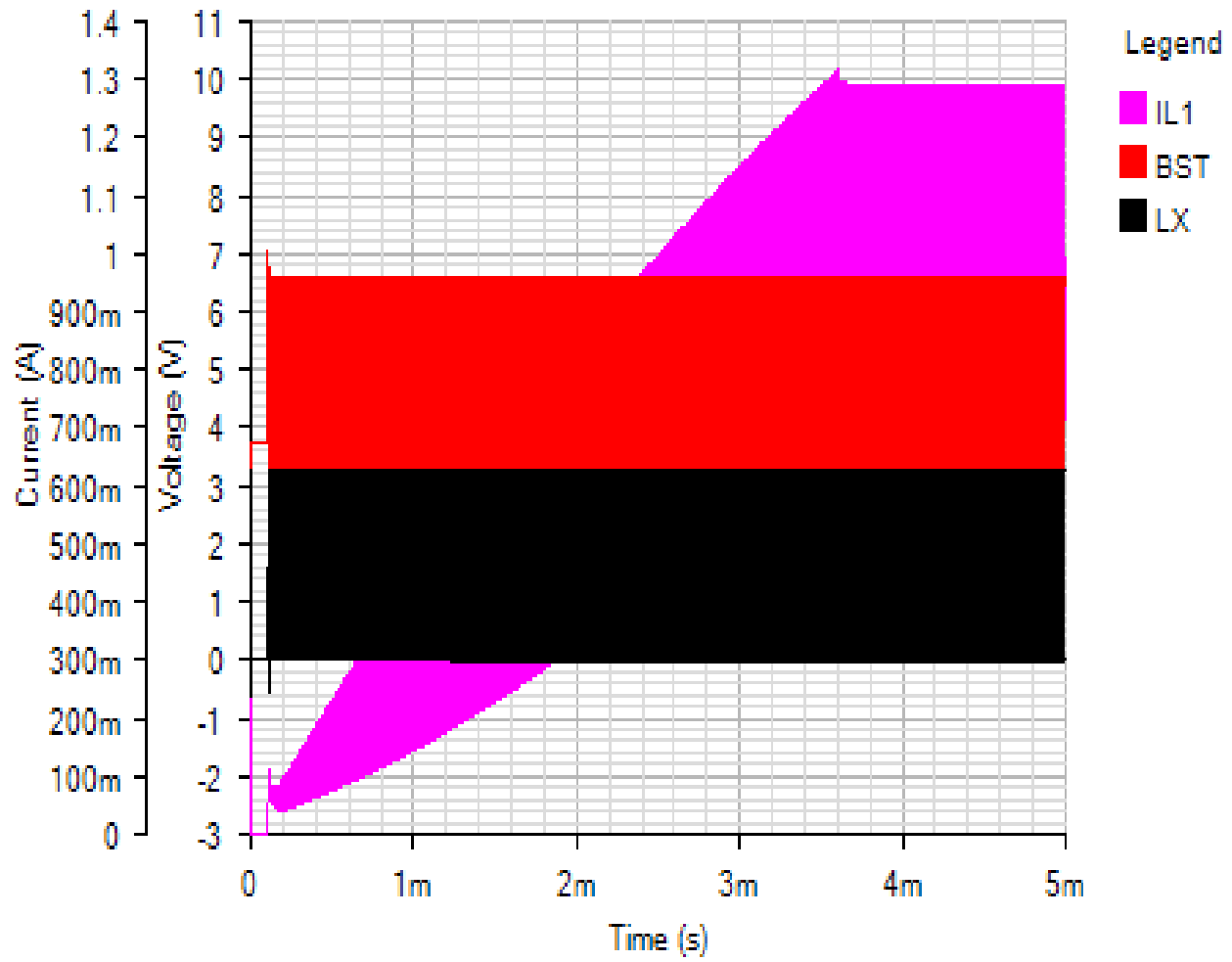
INPUT

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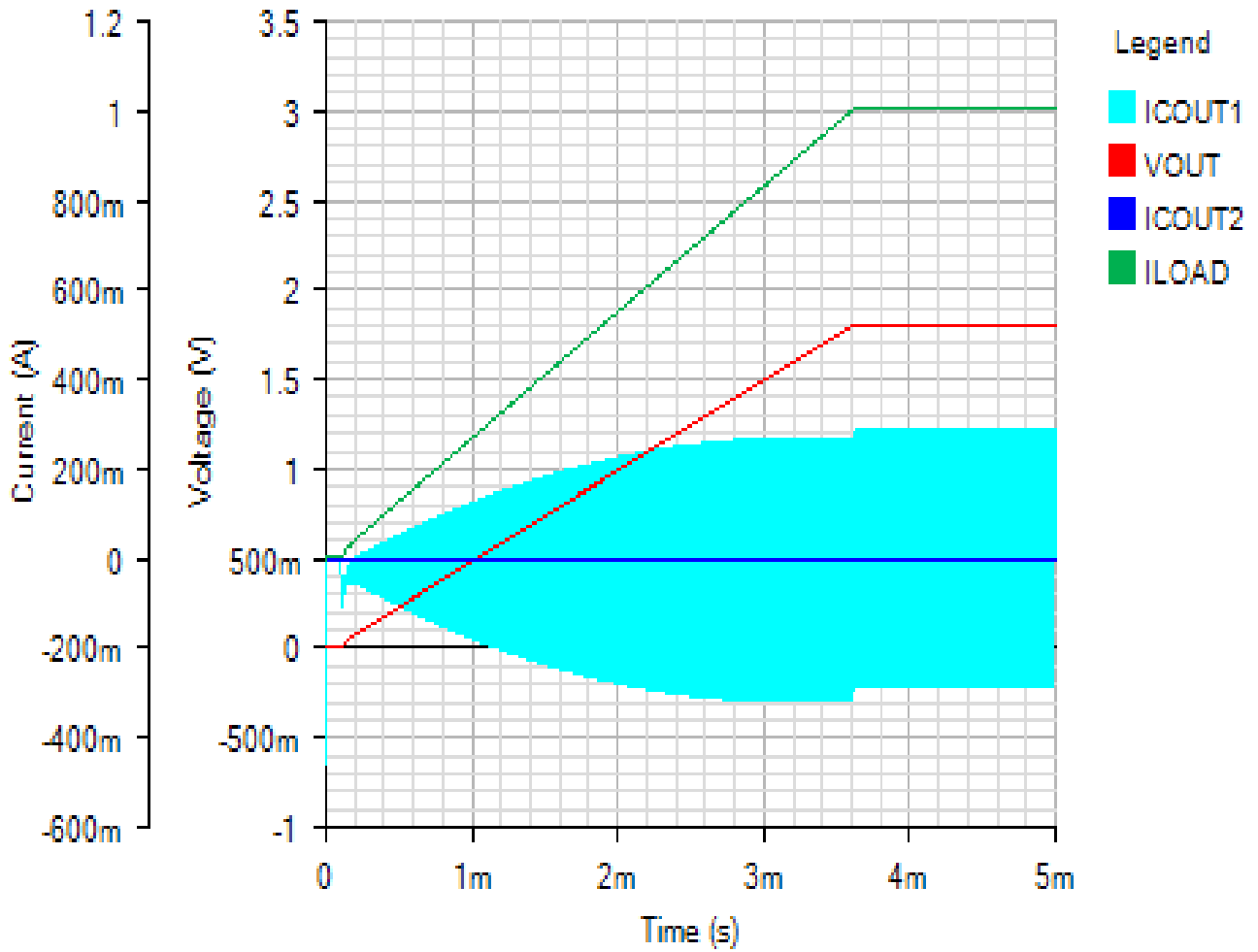
SWITCHING

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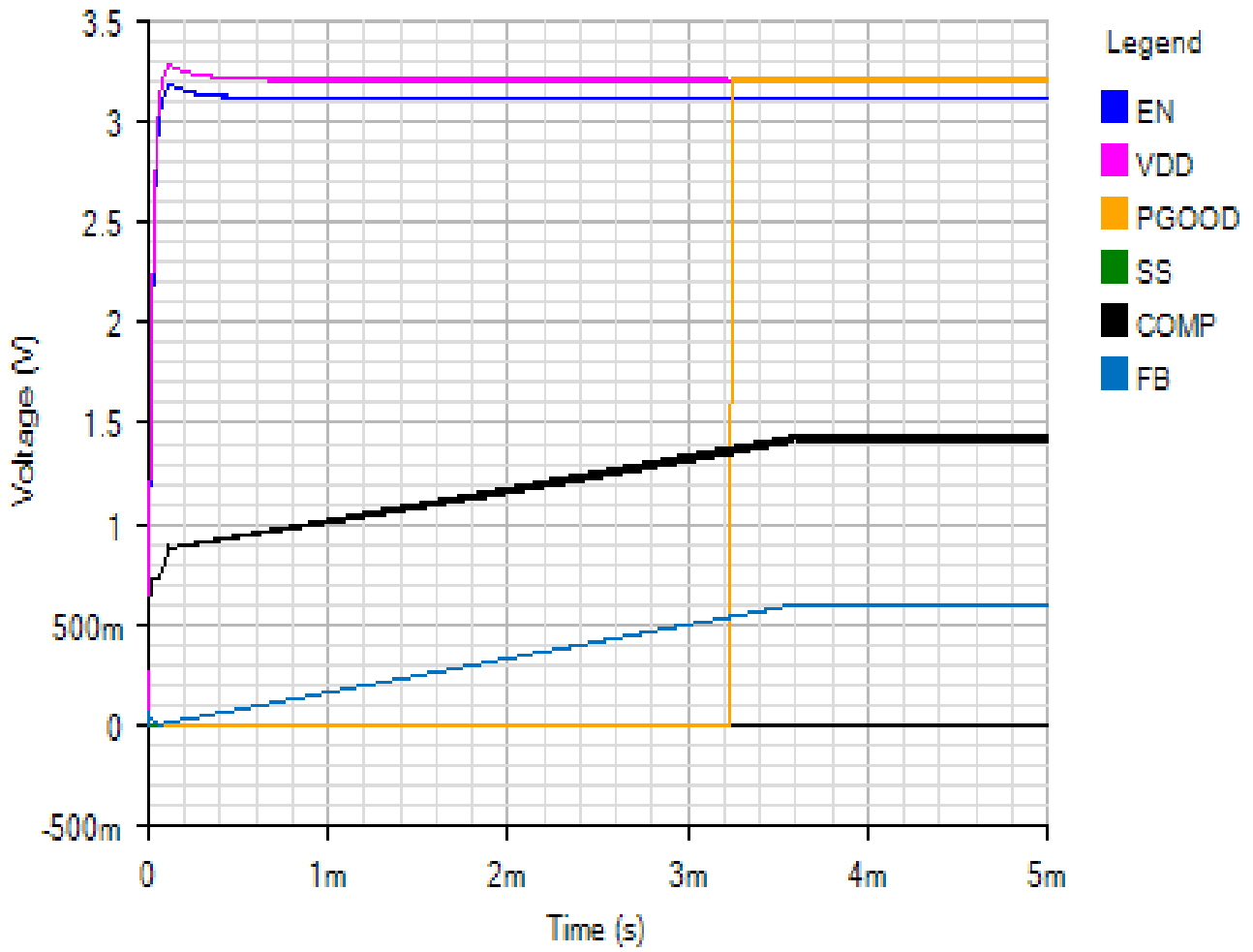
OUTPUT

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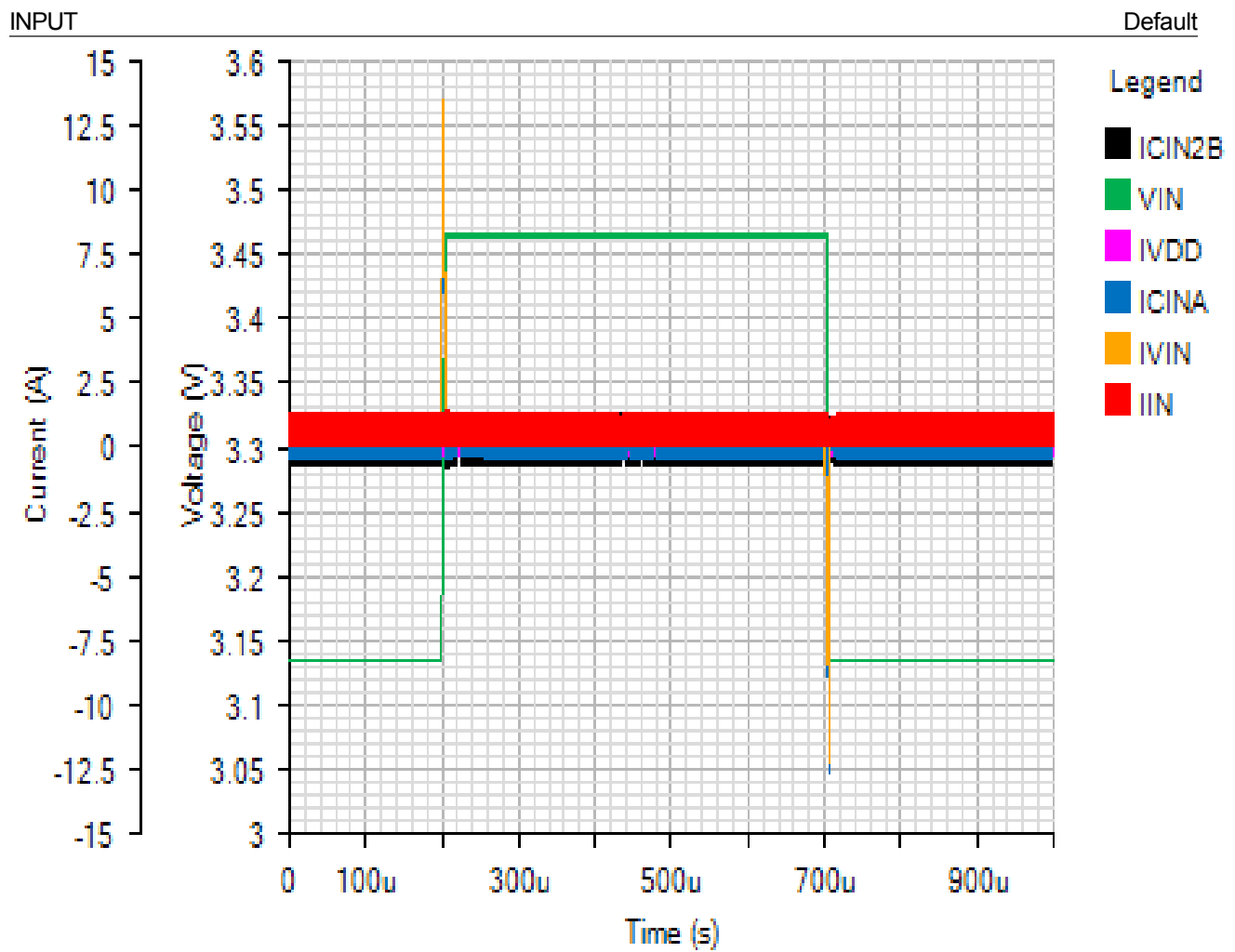


IC

Default

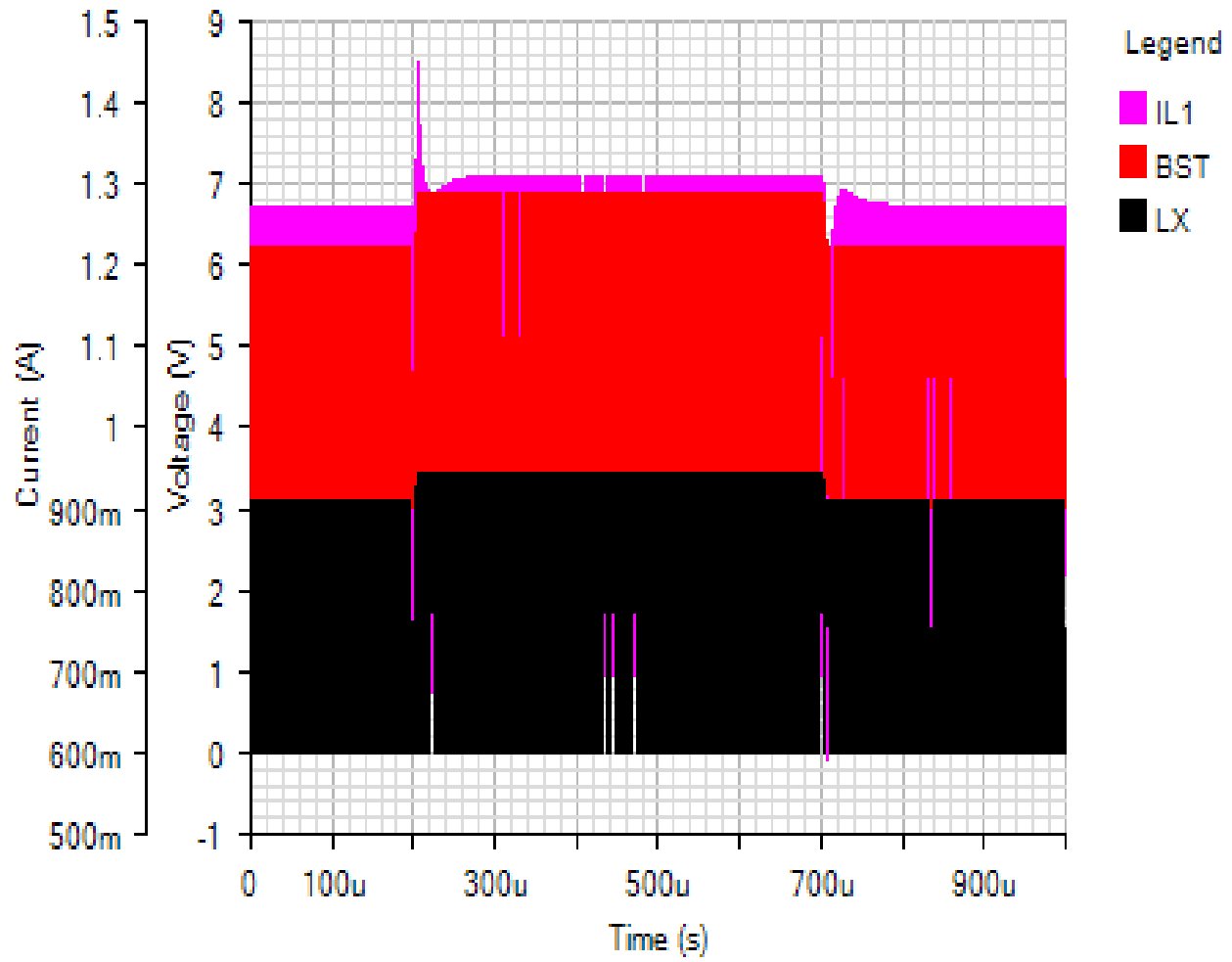


Line Transient - Mon Nov 19 2018 10:51:32



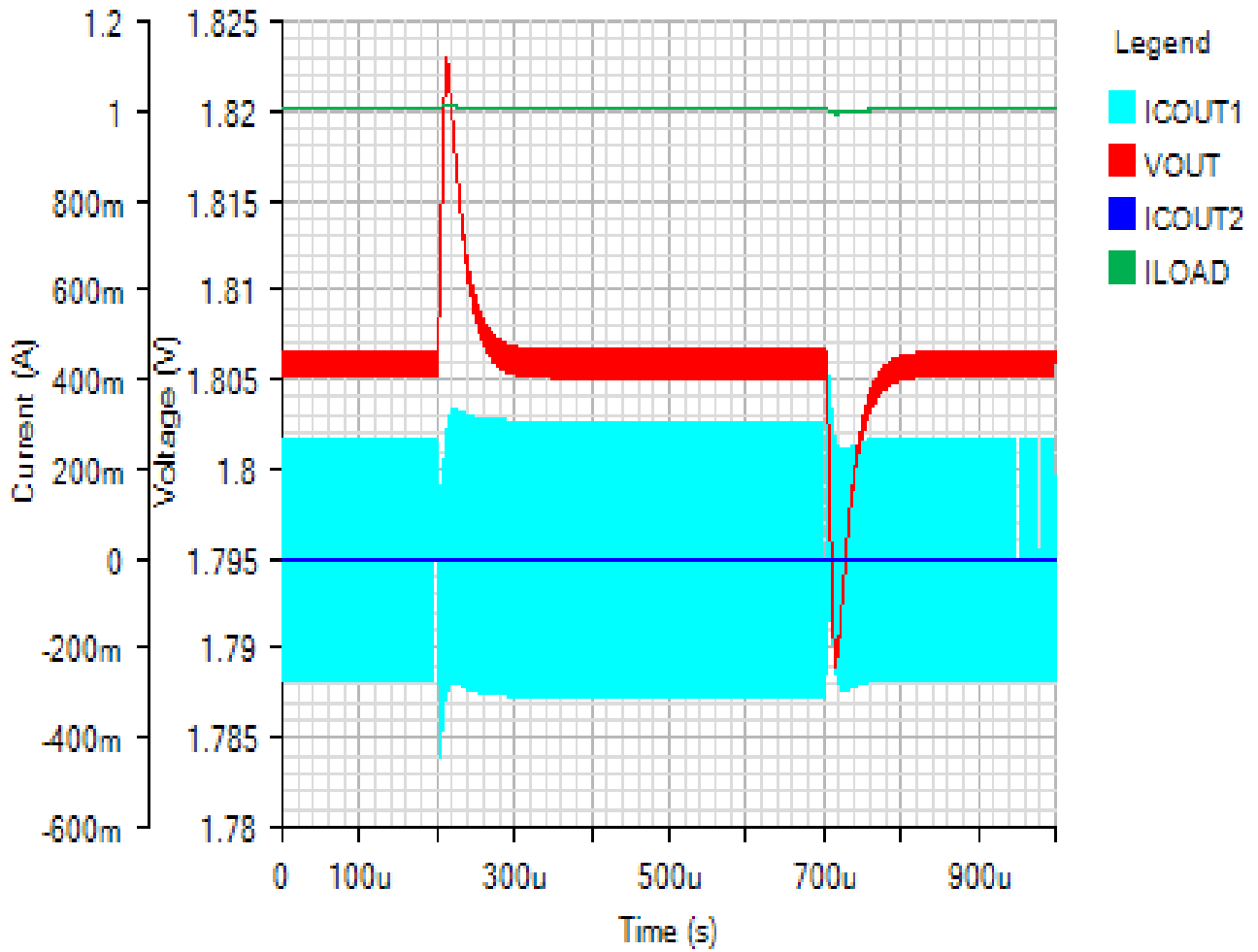
SWITCHING

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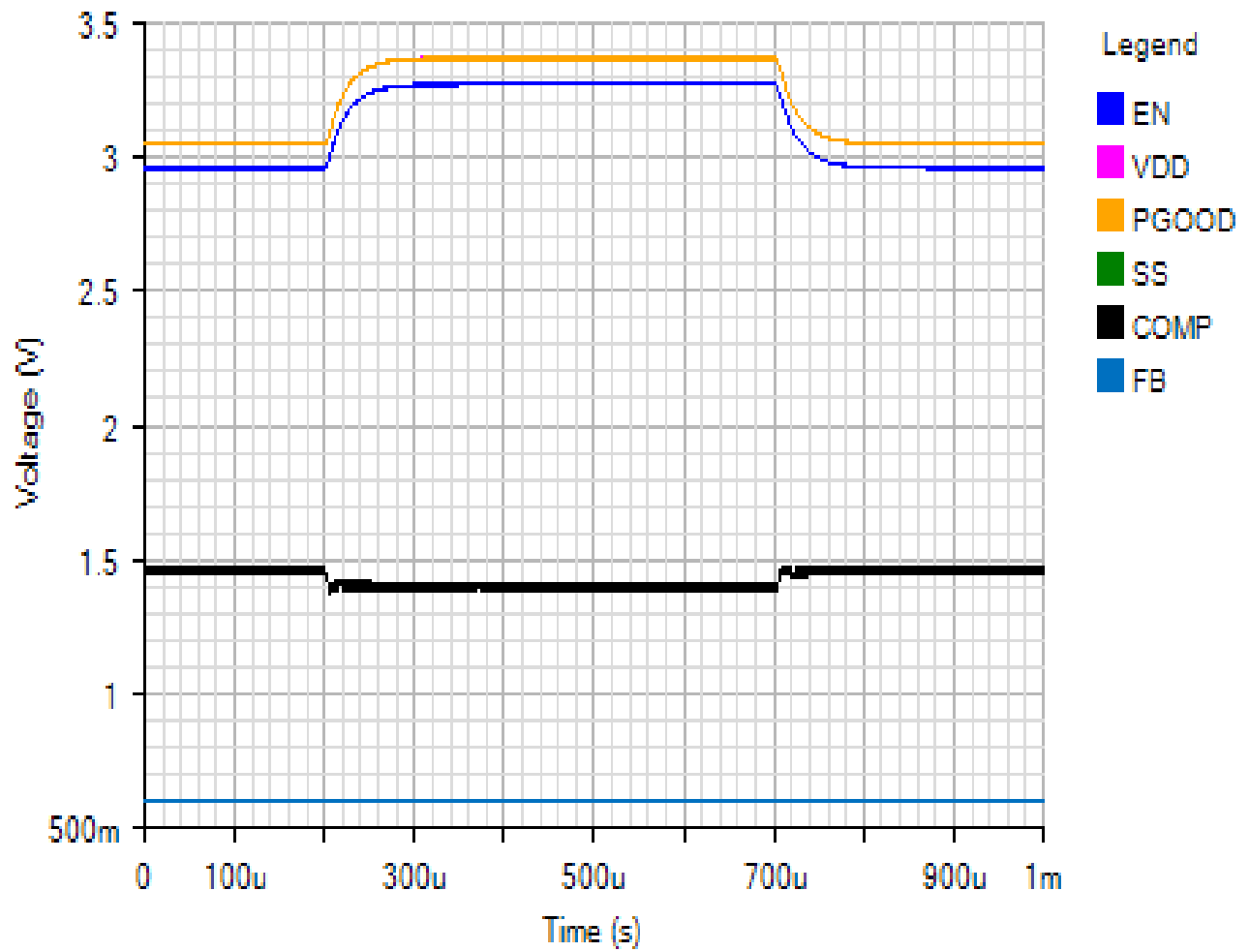
OUTPUT

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IC

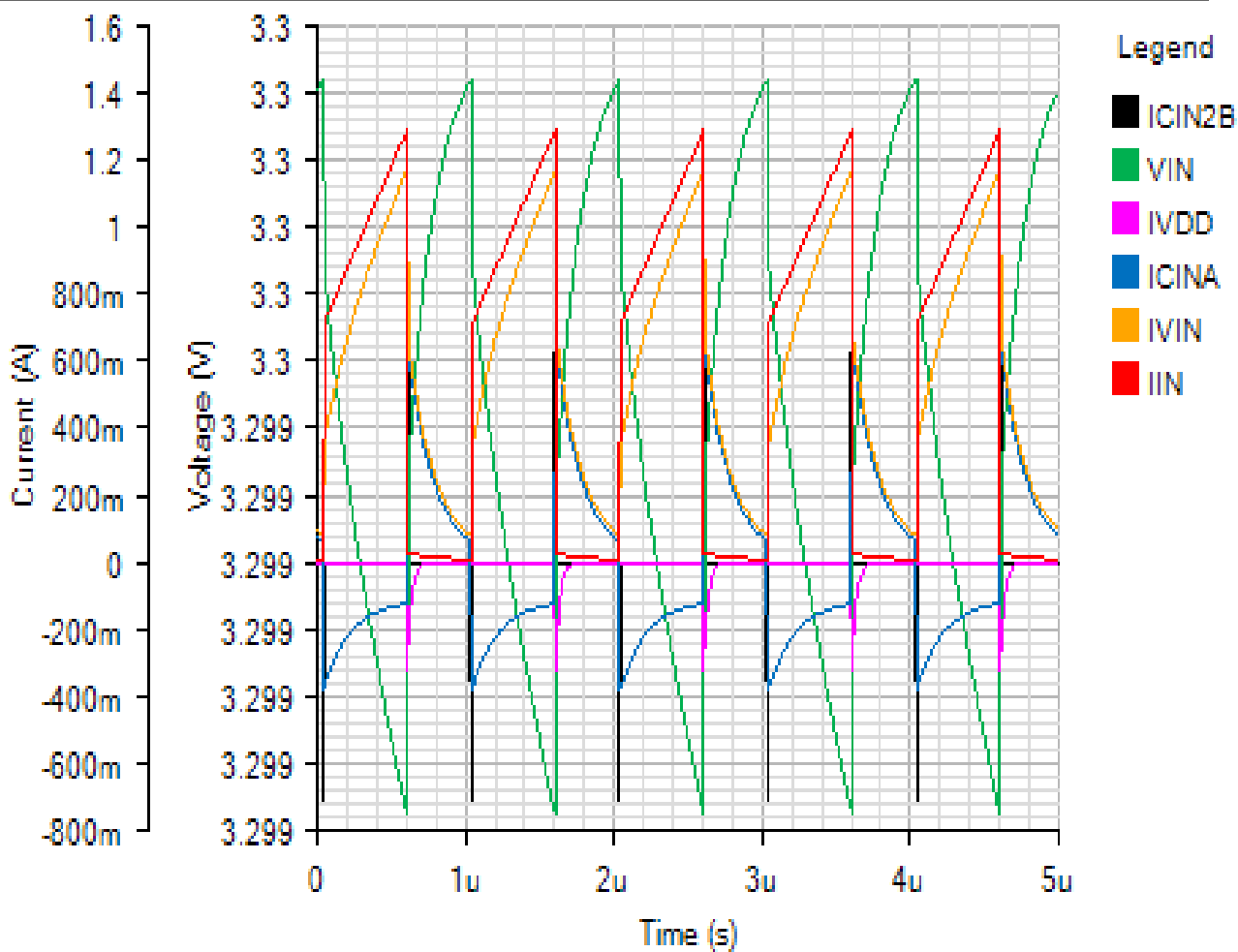
Default



Steady State - Mon Nov 19 2018 10:51:32

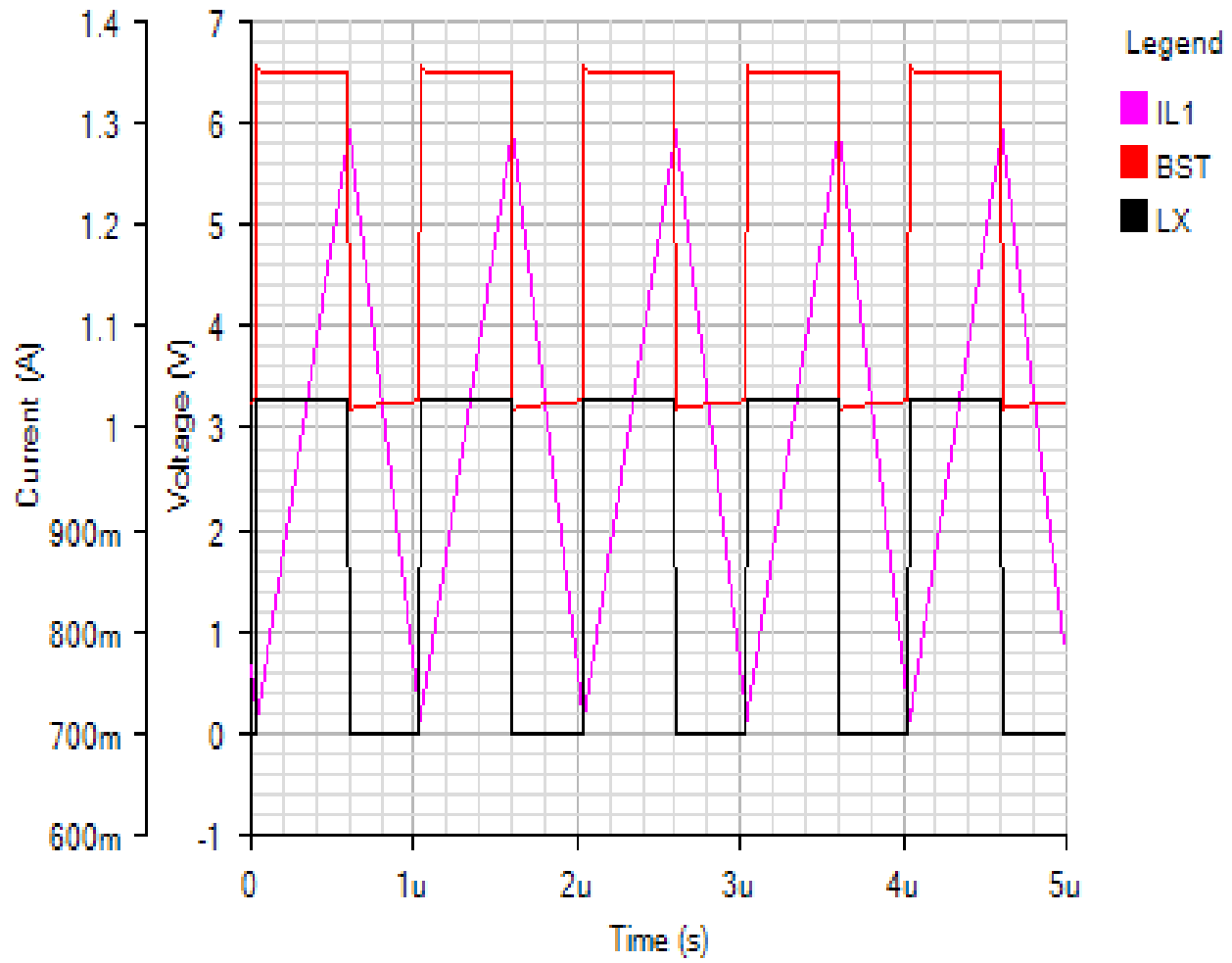
INPUT

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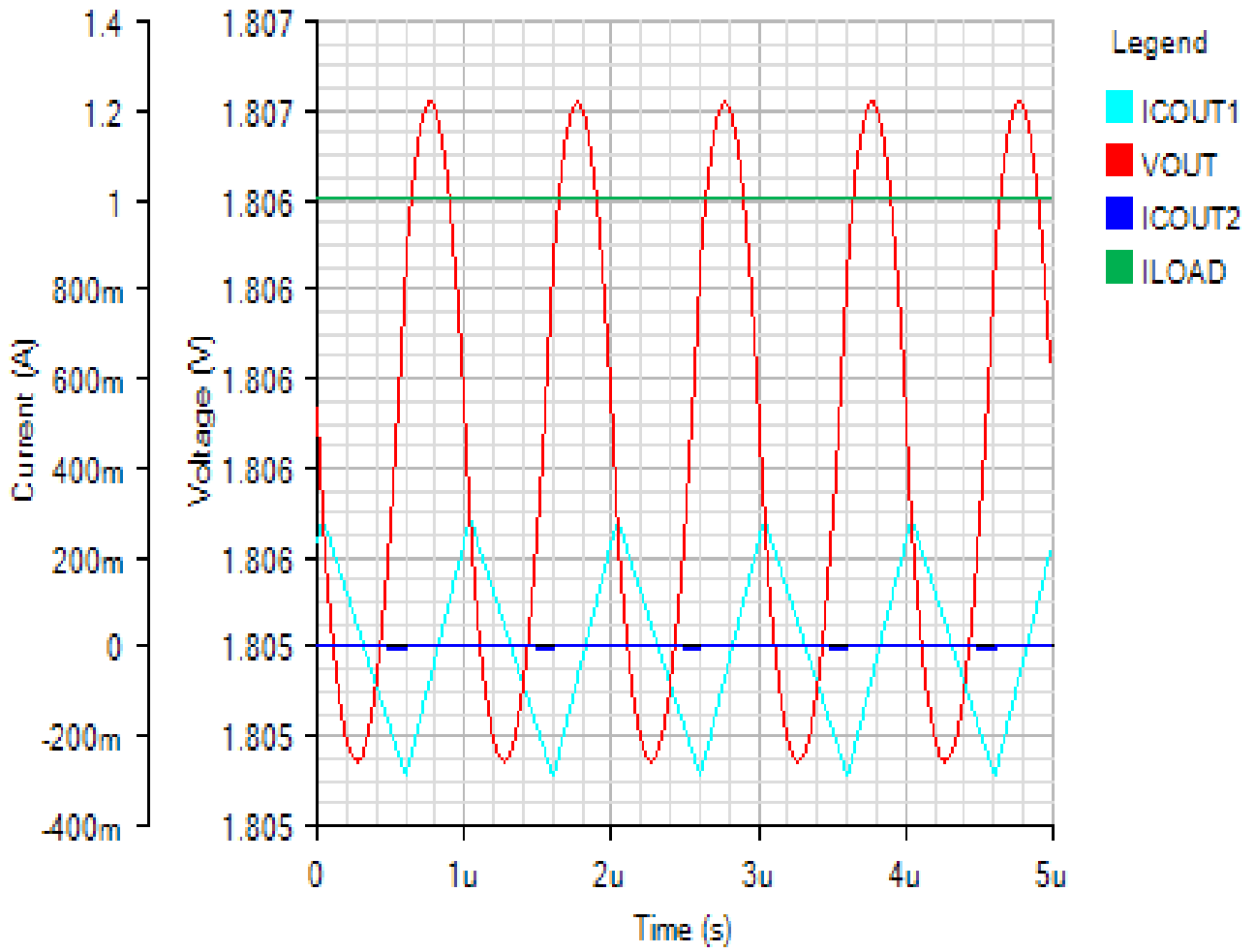
SWITCHING

Default



OUTPUT

Default



IC

Default

