

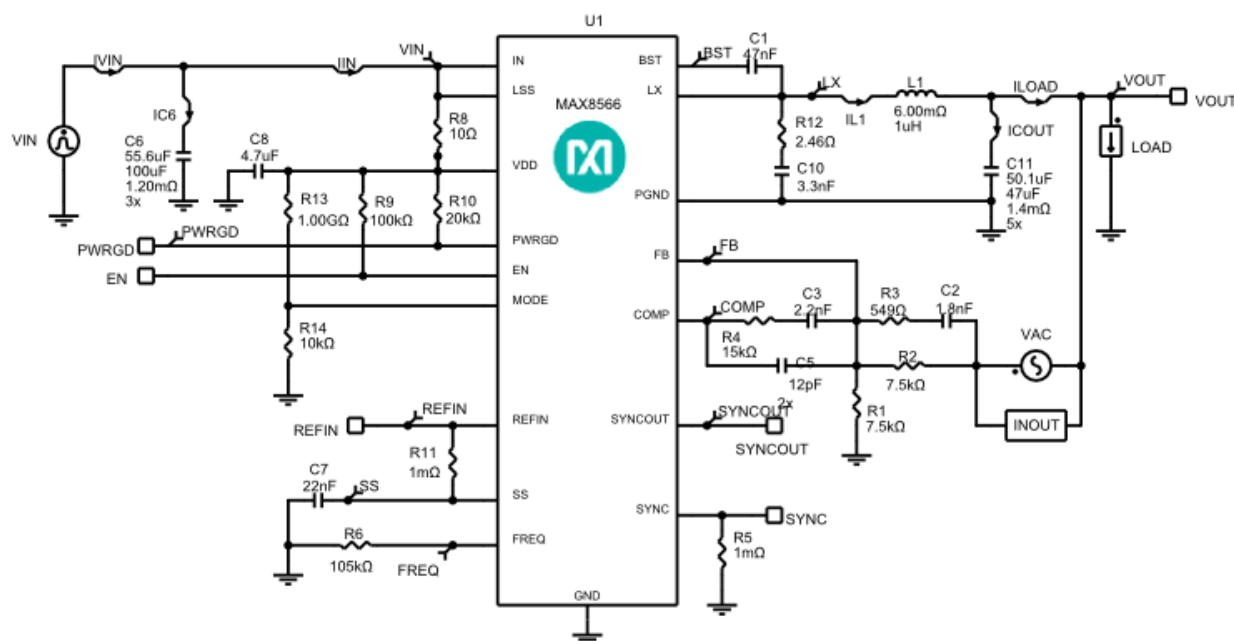
Initial Design

1.0

Design Requirements

Parameter	Value
Min. Input Voltage	3.2V
Max. Input Voltage	3.4V
Typ. Input Voltage	3.3V
Input Voltage Ripple	1V
Output Voltage	1.2V
Output Current	5A
Output Voltage Ripple	1V
Load Step Start Current	2.5A
Load Step Current	5A
Performance Priority	Balance Efficiency and Size
BOM Priority	Cost
Switching Frequency	500000Hz
Inductor Current Ratio (LIR)	0.3

Schematic



BOM

Ref	Qty	Part Number	Manufacturer	Description
U1	1	MAX8566ETJ+	Maxim Integrated	High-Efficiency, 10A, PWM Internal-Switch Step-Down Regulator
C1	1	06033C473JAT2A	AVX	Cap Ceramic 0.047uF 25V X7R 5% Pad SMD 0603 125°C T/R
C2	1	CC0603KRX7R9BB182	Yageo	Cap Ceramic 0.0018uF 50V X7R 10% Pad SMD 0603 125°C T/R
C3	1	CGA3E2X7R1H222K080AA	TDK	Cap Ceramic 0.0022uF 50V X7R 10% Pad SMD 0603 125°C Automotive T/R
C5	2	06031A120JAT2A	AVX	Cap Ceramic 12pF 100V C0G 5% Pad SMD 0603 125°C T/R
C6	3	GRM32EC70J107ME15L	Murata	Cap Ceramic 100uF 6.3V 1210 125C
C7	1	C1608X7R2A223K080AA	TDK	Cap Ceramic 0.022uF 100V X7R 10% Pad SMD 0603 125°C T/R
C8	1	GRM188R61C475KAAJD	Murata Manufacturing	Cap Ceramic 4.7uF 16V X5R 10% Pad SMD 0603 85°C T/R
C10	1	GCM1885C1H332JA16D	Murata Manufacturing	Cap Ceramic 0.0033uF 50V C0G 5% Pad SMD 0603 125°C Automotive T/R
C11	5	GRM32EE70J476ME20L	Murata	Cap Ceramic 47uF 6.3V 1210 125C
L1	1	MSS1038-102NLB	Coilcraft	Inductor 1uH 30% 5.4mOhm 13A Isat 10A Irms
R1	1	ERJ3EKF7501V	Panasonic	Res Thick Film 0603 7.5K Ohm 1% 0.1W(1/10W) ±100ppm/°C Pad SMD Automotive T/R
				Res Thick Film 0603 7.5K Ohm 1%

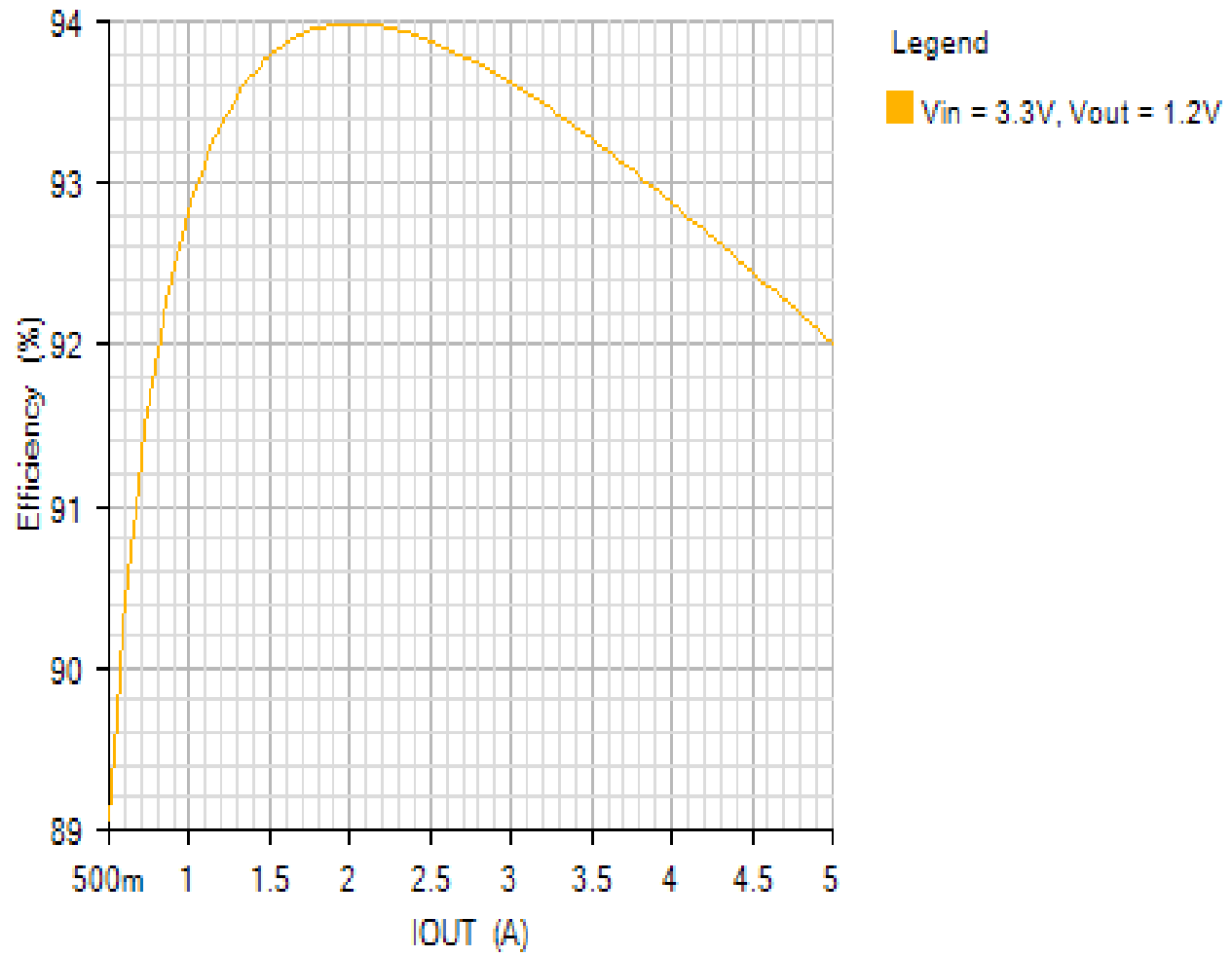
R2	1	ERJ3EKF7501V	Panasonic	0.1W(1/10W) ±100ppm/°C Pad SMD Automotive T/R
R3	1	PFC-W0603R-06-5490-J	TT Electronics	Res Thin Film 0603 549 Ohm 5% 0.1W(1/10W) ±50ppm/°C Pad SMD Automotive T/R
R4	1	ERJ3EKF1502V	Panasonic	Res Thick Film 0603 15K Ohm 1% 0.1W(1/10W) ±100ppm/°C Pad SMD Automotive T/R
R6	1	ERJ3EKF1053V	Panasonic	Res Thick Film 0603 105K Ohm 1% 0.1W(1/10W) ±100ppm/°C Pad SMD Automotive T/R
R8	1	ERJ3GEYJ100V	Panasonic	Res Thick Film 0603 10 Ohm 5% 0.1W(1/10W) ±200ppm/°C Pad SMD Automotive T/R
R9	1	ERJ3GEYJ104V	Panasonic	Res Thick Film 0603 100K Ohm 5% 0.1W(1/10W) ±200ppm/°C Pad SMD Automotive T/R
R10	1	ERJ3GEYJ203V	Panasonic	Res Thick Film 0603 20K Ohm 5% 0.1W(1/10W) ±200ppm/°C Pad SMD Automotive T/R
R12	1	AR0603JR-072R46	Yageo	Res Thick Film 0603 2.46 Ohm 5% 0.1W(1/10W) ±200ppm/°C Epoxy Pad SMD Automotive T/R
R14	1	ERJ3GEYJ103V	Panasonic	Res Thick Film 0603 10K Ohm 5% 0.1W(1/10W) ±200ppm/°C Pad SMD Automotive T/R

Simulation Results

Efficiency - Mon Jan 07 2019 10:09:37

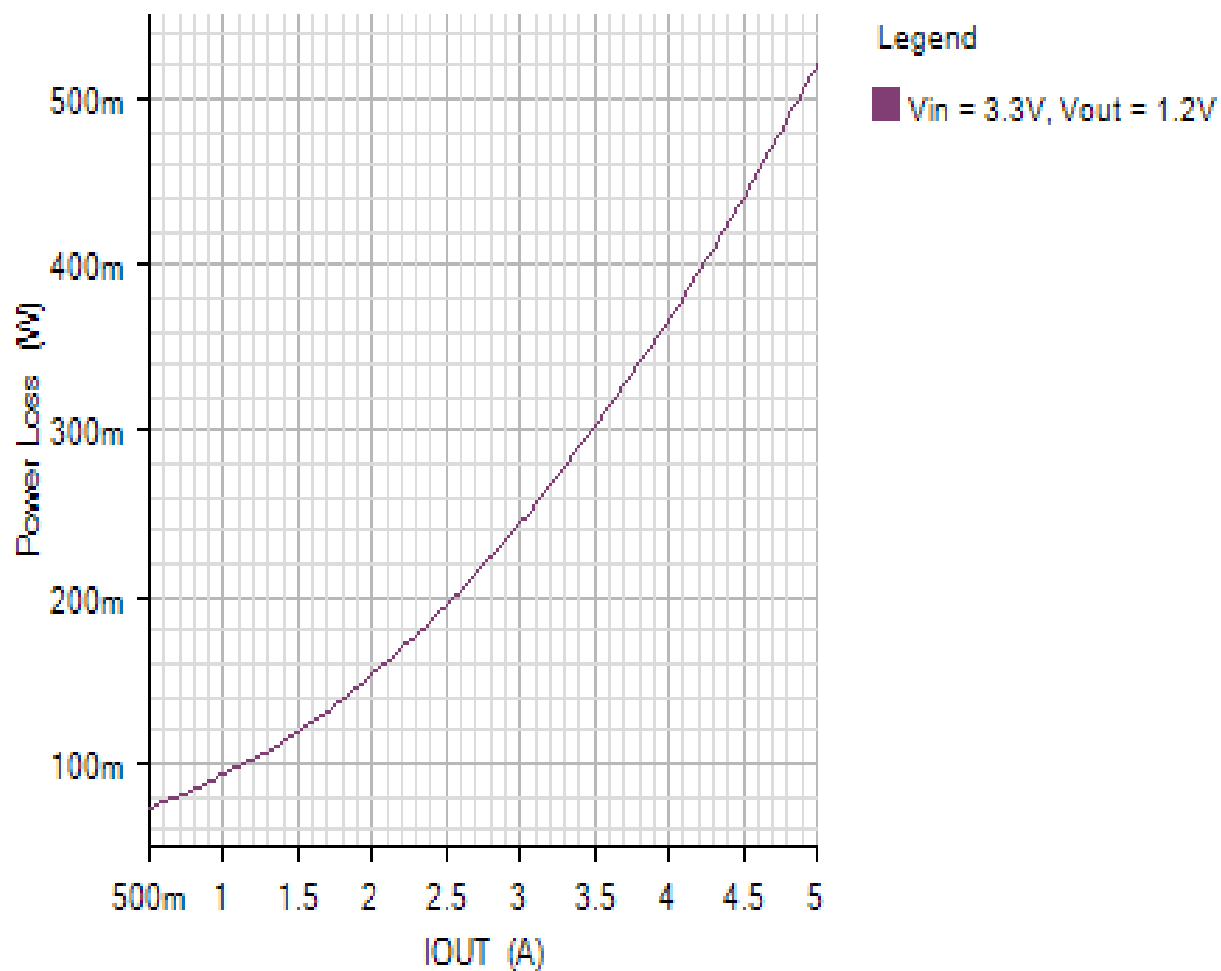
EFFICIENCY_PLOT

Default

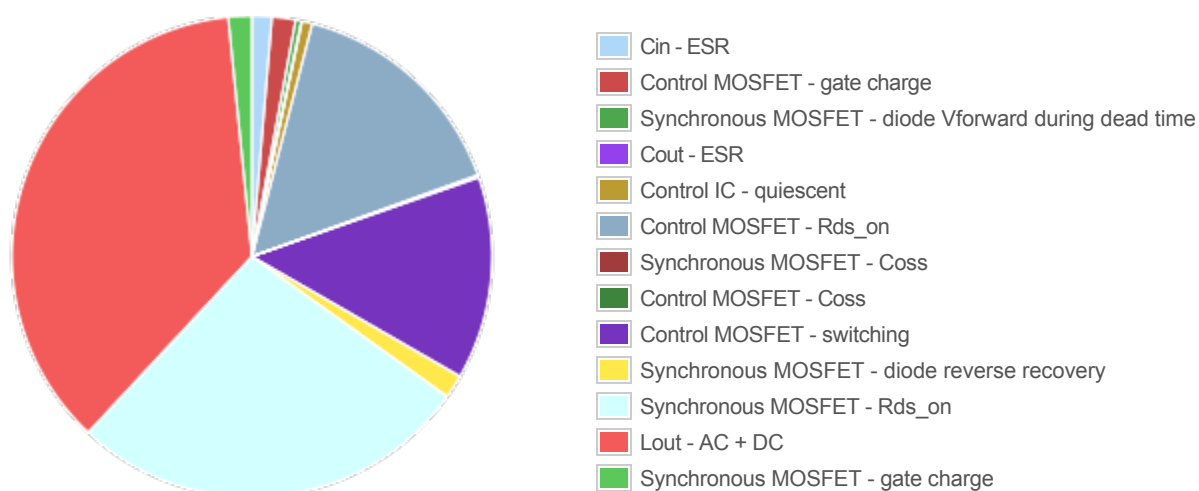


POWER_LOSS_PLOT

Default



Losses



Component

Loss (W)

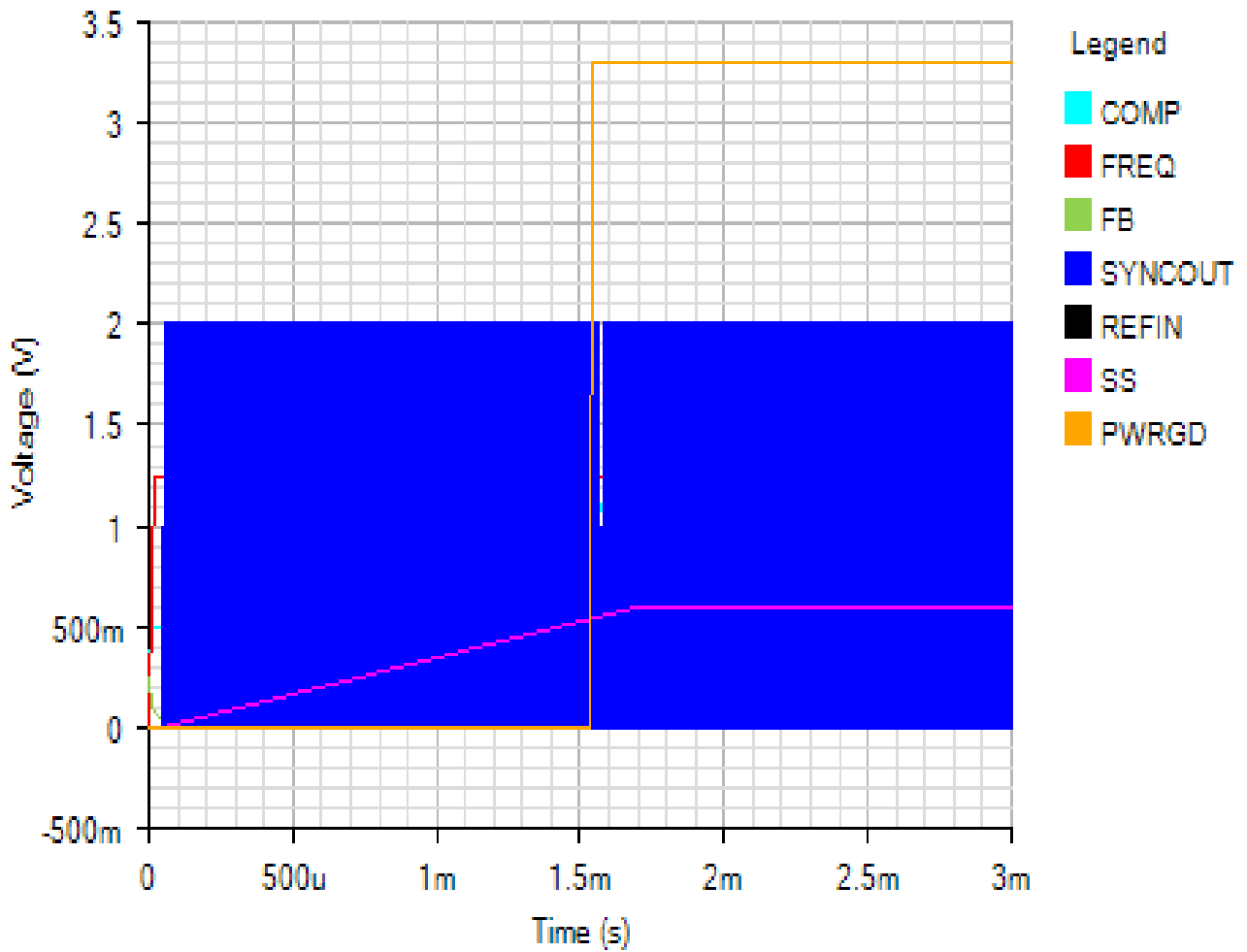
% of total

Component	Loss (W)	% of total
Cin - ESR	0.006942	1.3
Control MOSFET - gate charge	0.00825	1.6
Synchronous MOSFET - diode Vforward during dead time	0.002	0.4
Cout - ESR	0.000272	0.1
Control IC - quiescent	0.00363	0.7
Control MOSFET - Rds_on	0.080622	15.5
Synchronous MOSFET - Coss	0.000441	0.1
Control MOSFET - Coss	0.000441	0.1
Control MOSFET - switching	0.071121	13.6
Synchronous MOSFET - diode reverse recovery	0.00825	1.6
Synchronous MOSFET - Rds_on	0.141089	27.1
Lout - AC + DC	0.190236	36.5
Synchronous MOSFET - gate charge	0.00825	1.6
Total	0.521544	100

Start Up - Mon Jan 07 2019 10:09:37

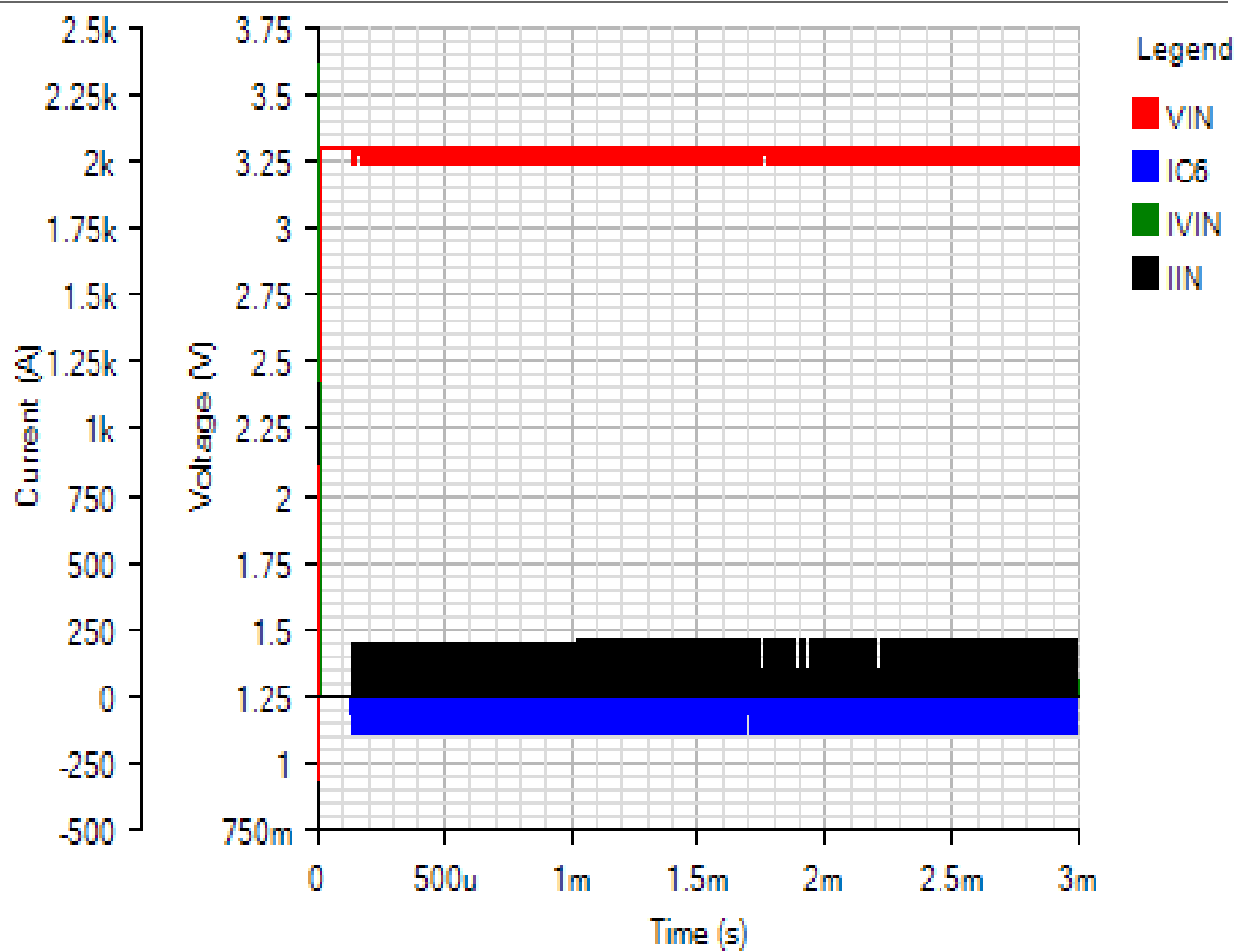
IC

Default



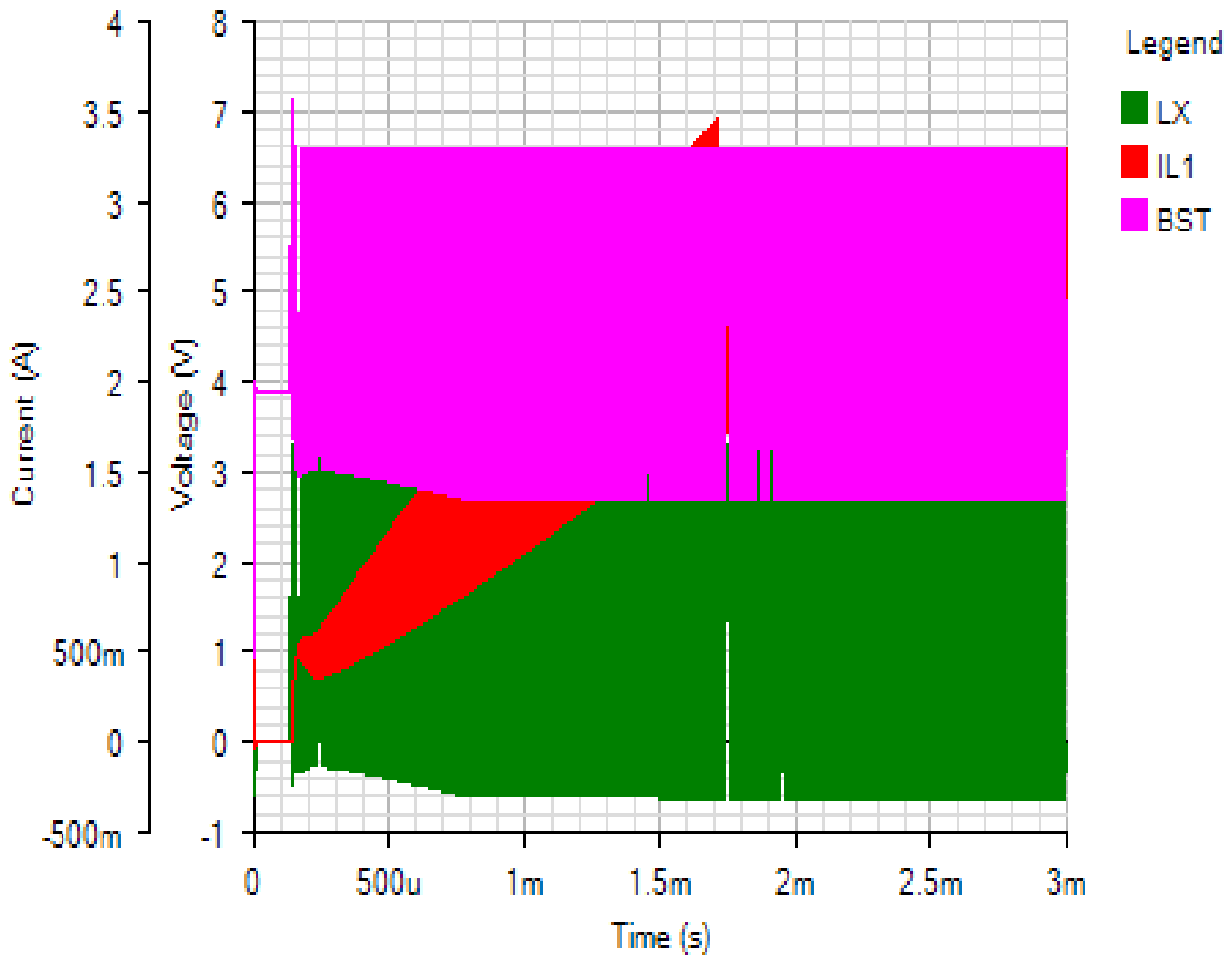
INPUT

Default



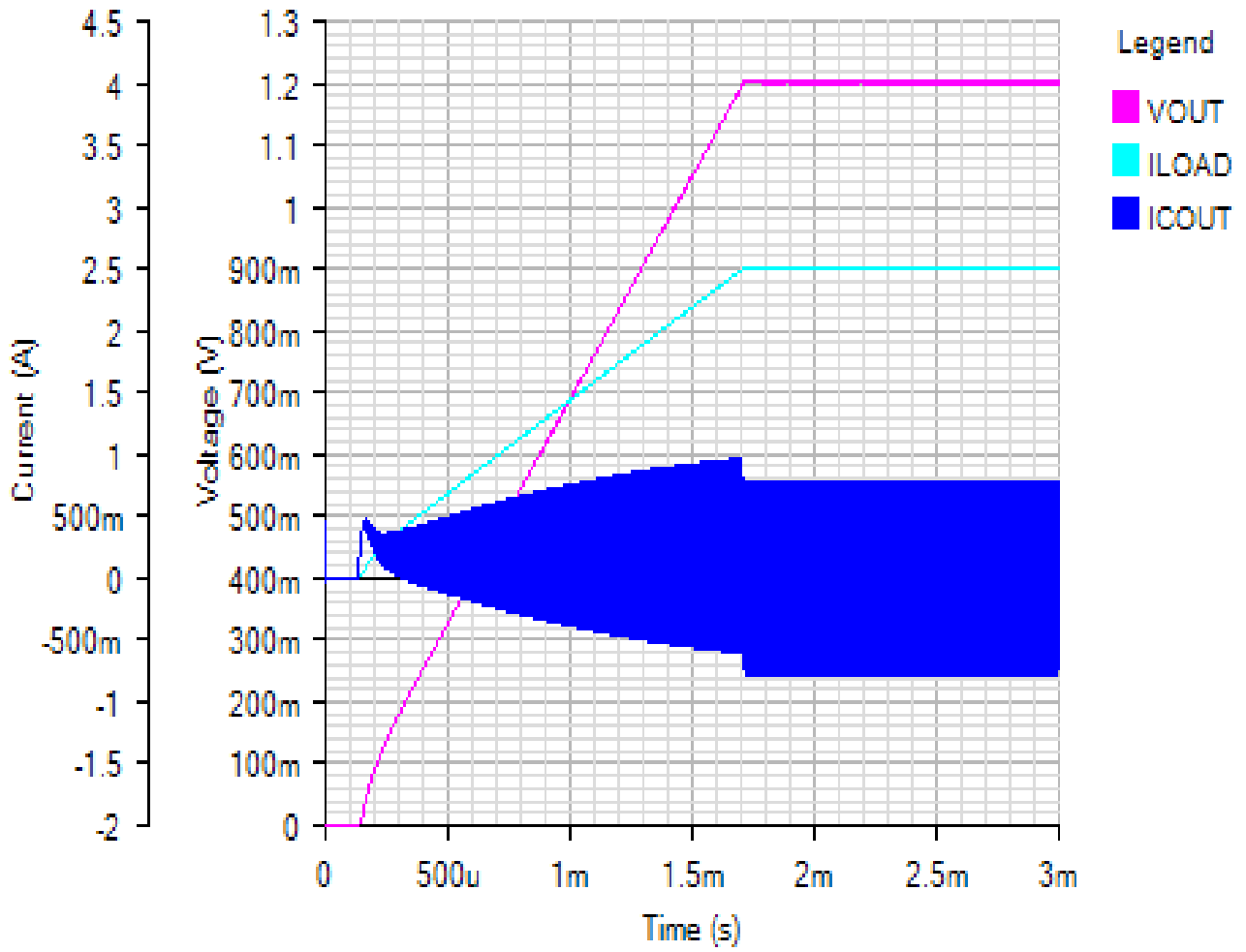
SWITCHING

Default



OUTPUT

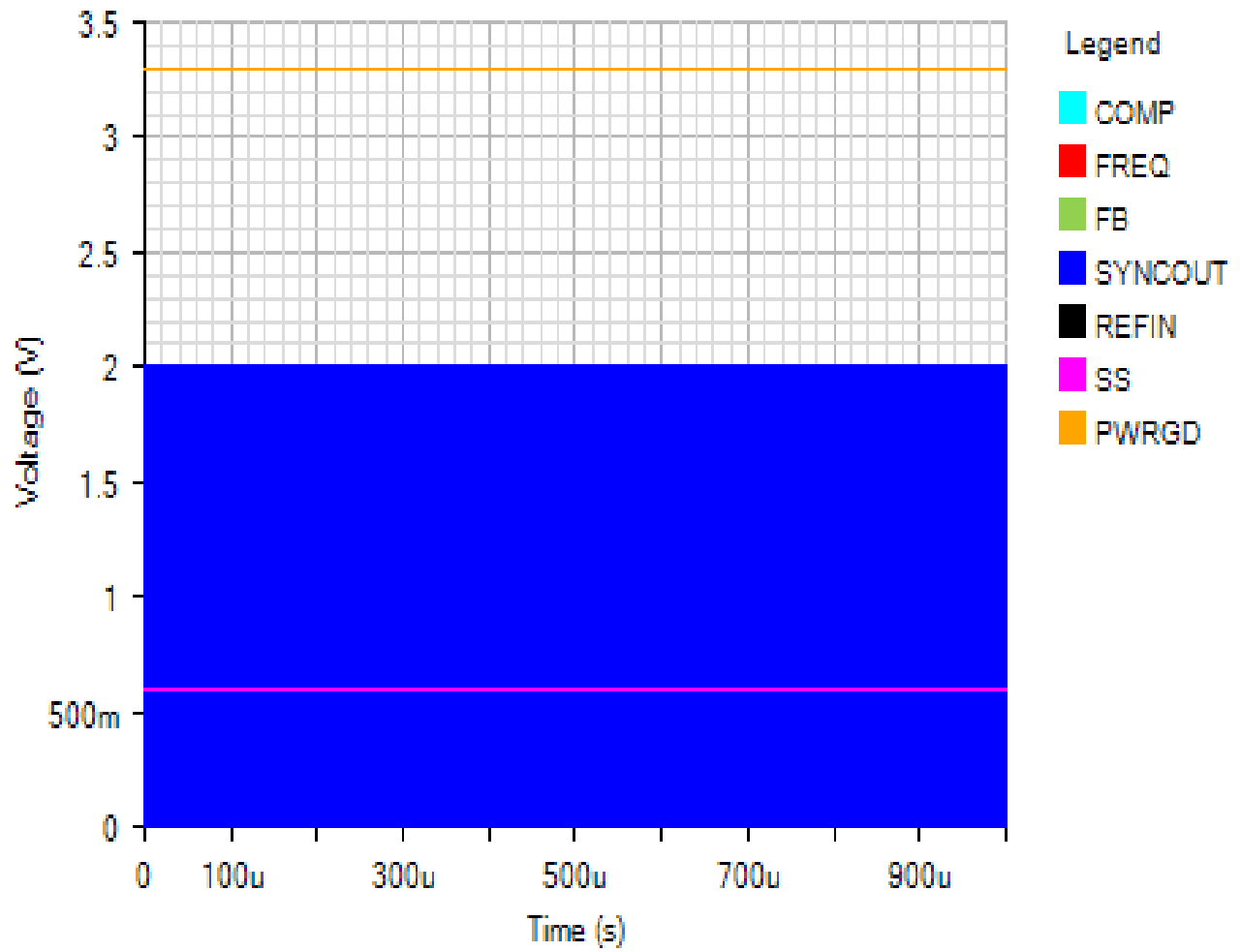
Default

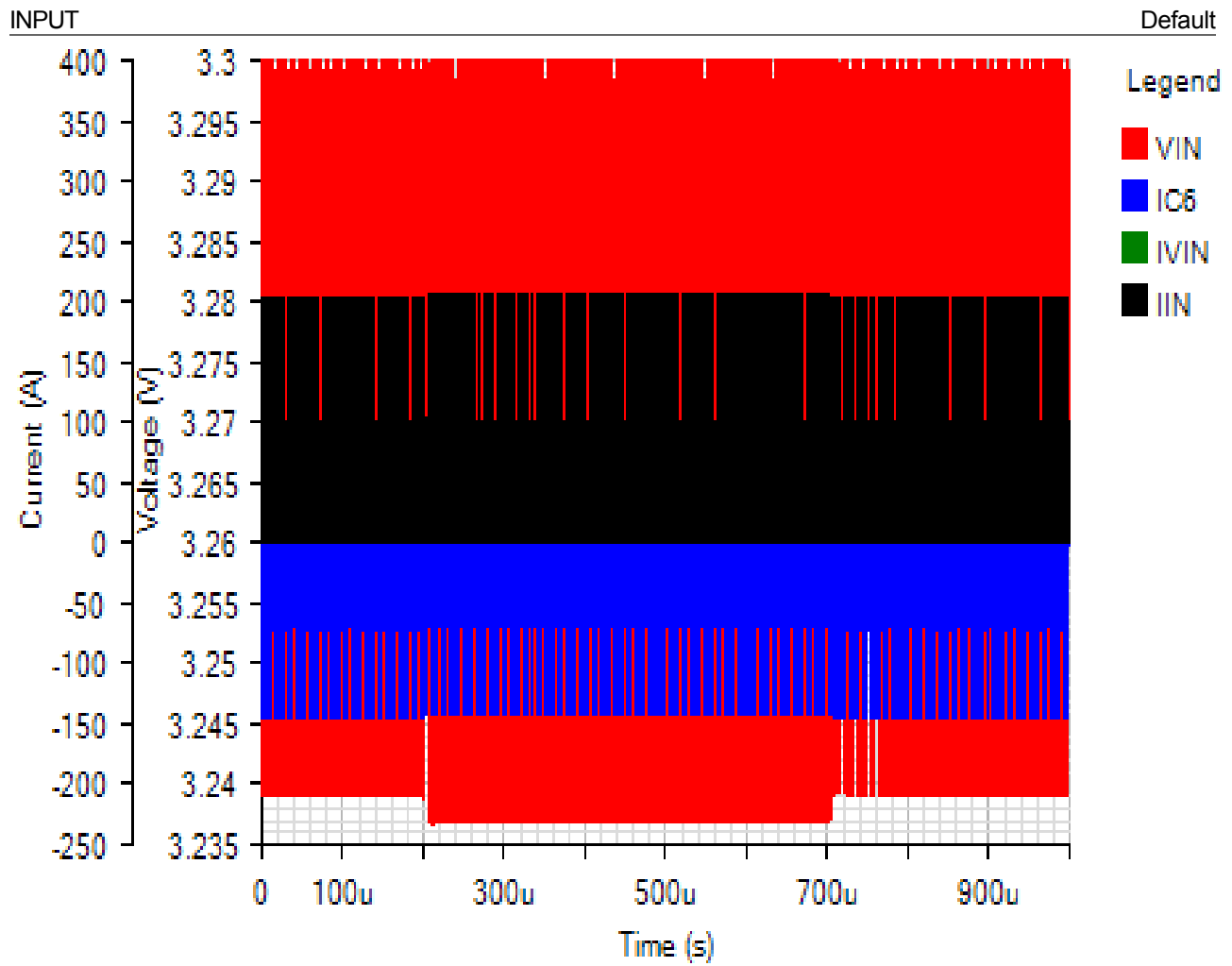


Load Step - Mon Jan 07 2019 10:09:37

IC

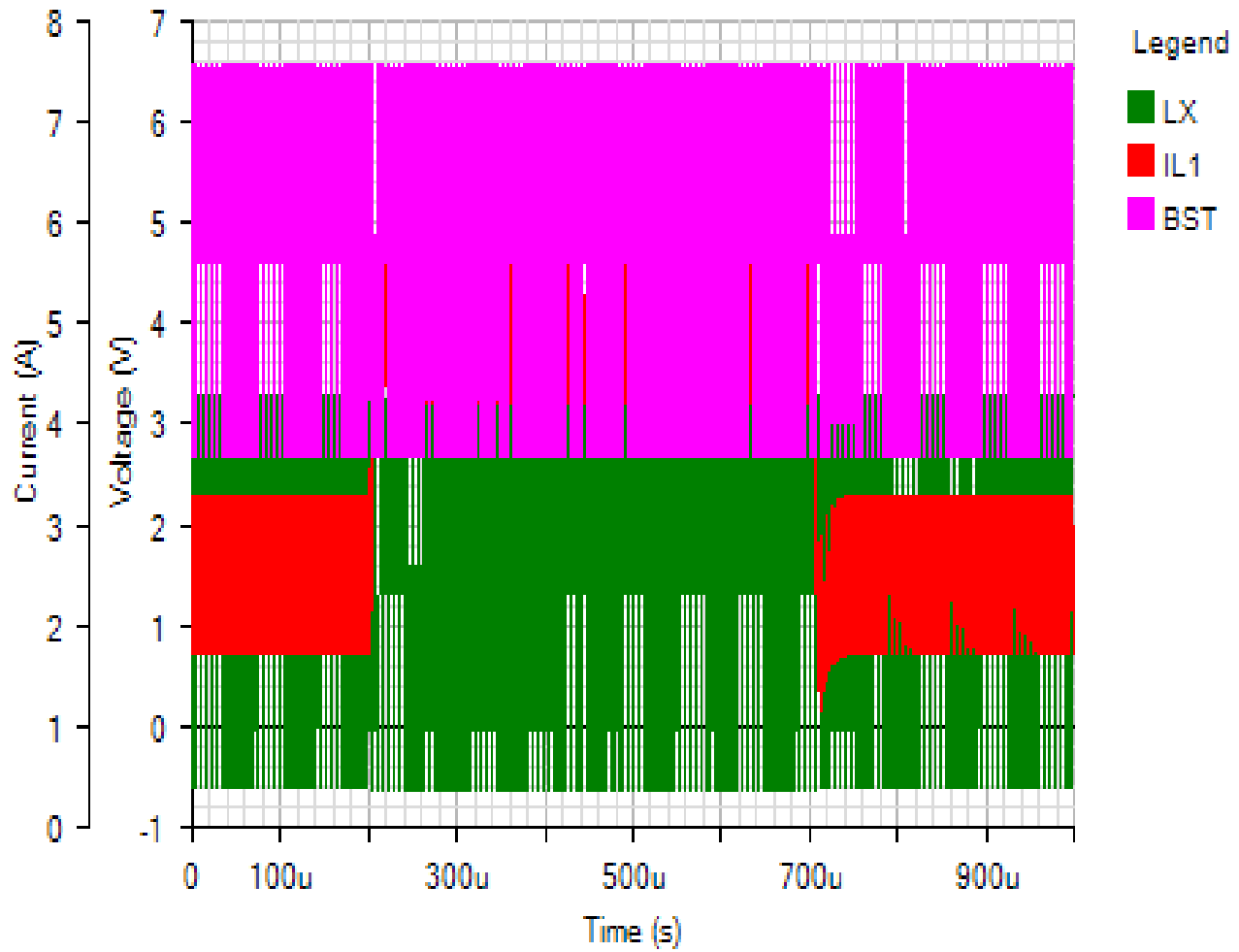
Default





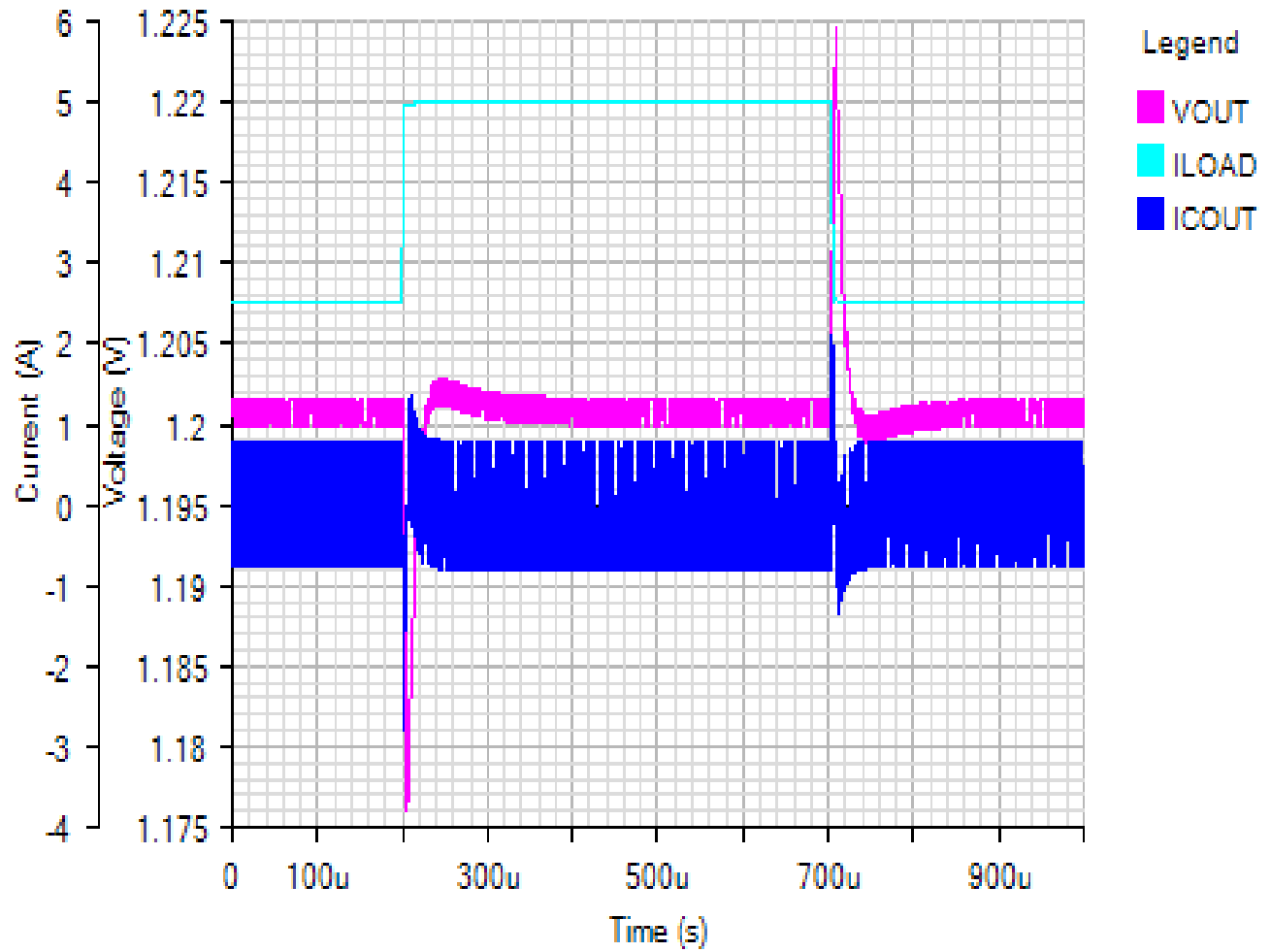
SWITCHING

Default



OUTPUT

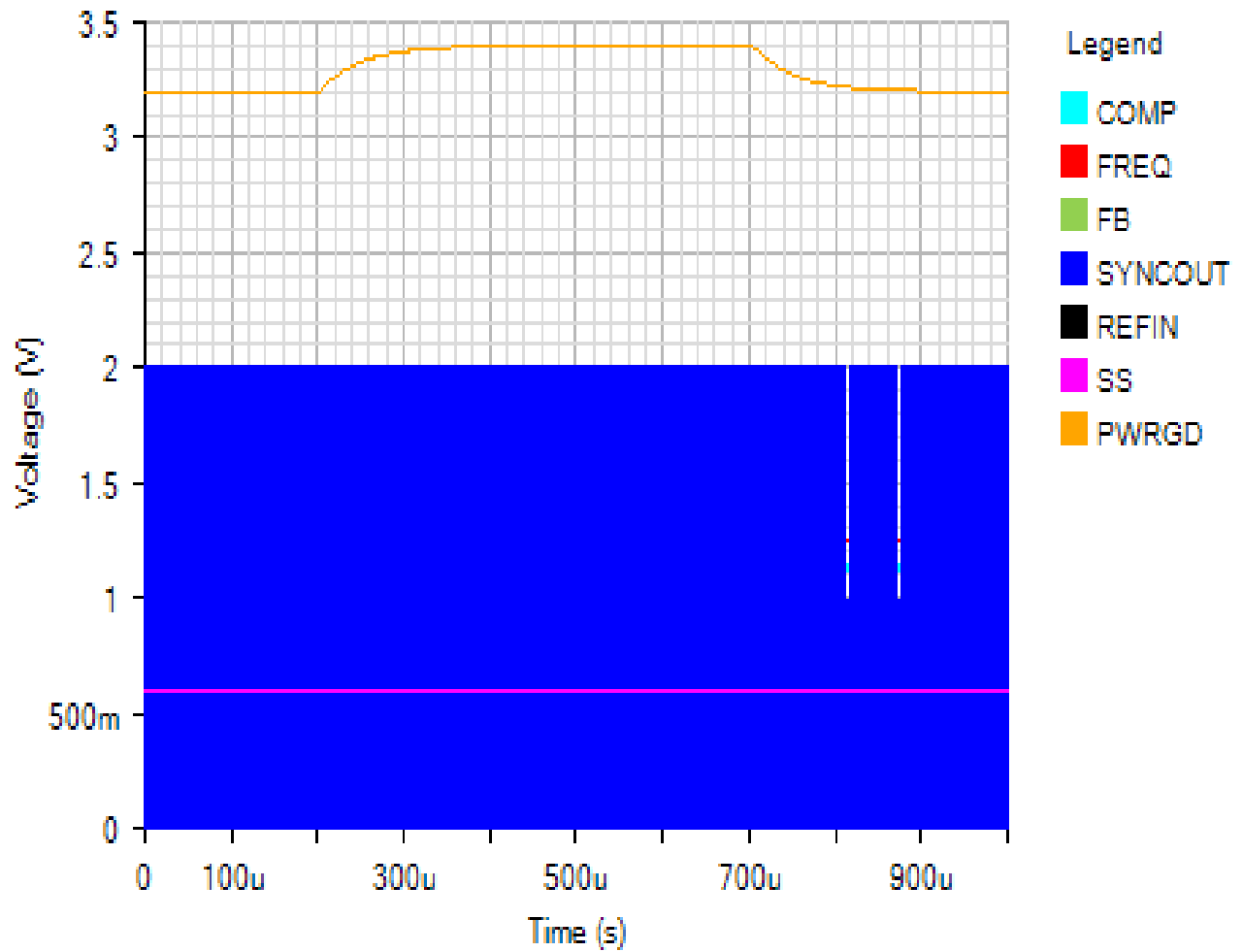
Default

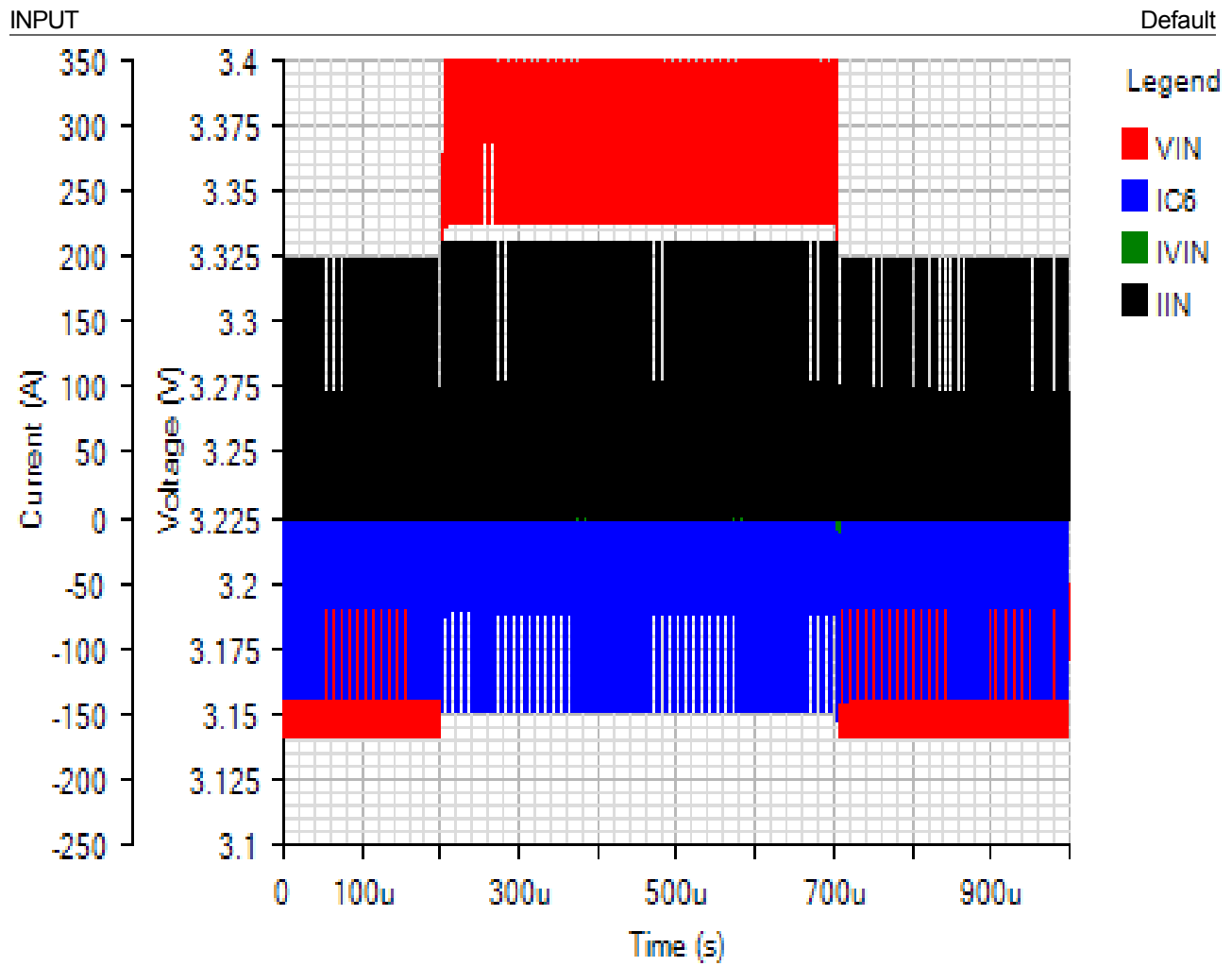


Line Transient - Mon Jan 07 2019 10:09:37

IC

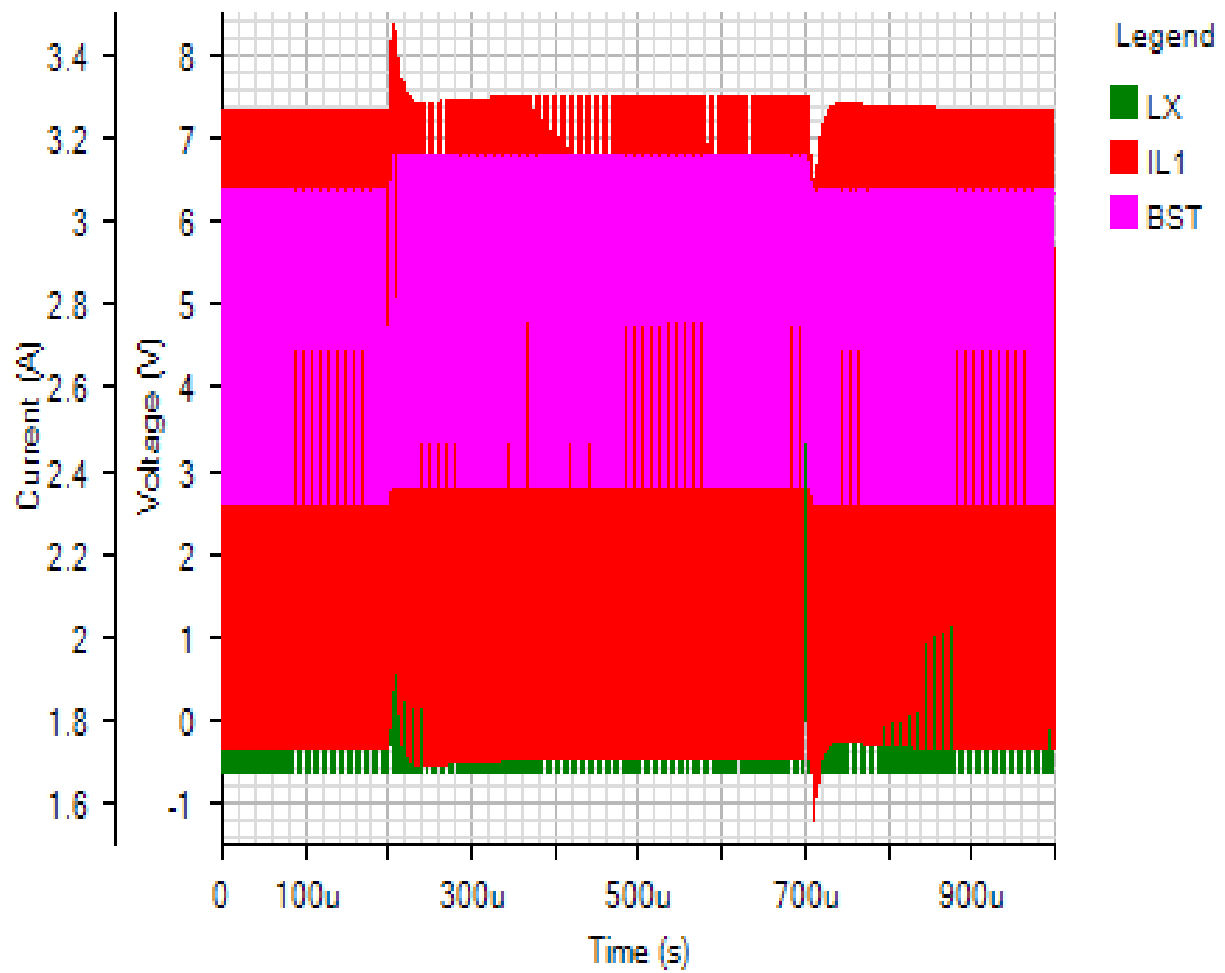
Default





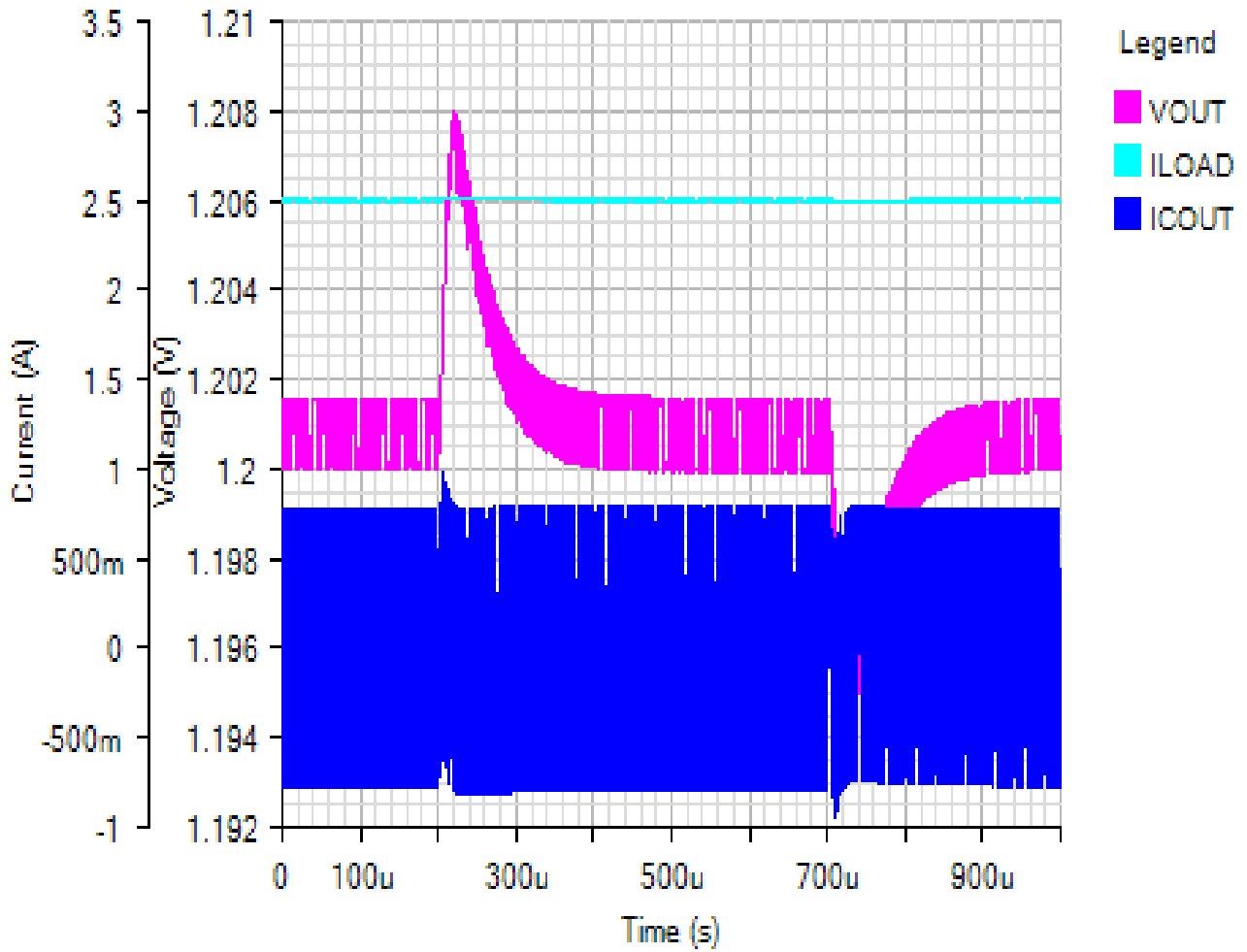
SWITCHING

Default



OUTPUT

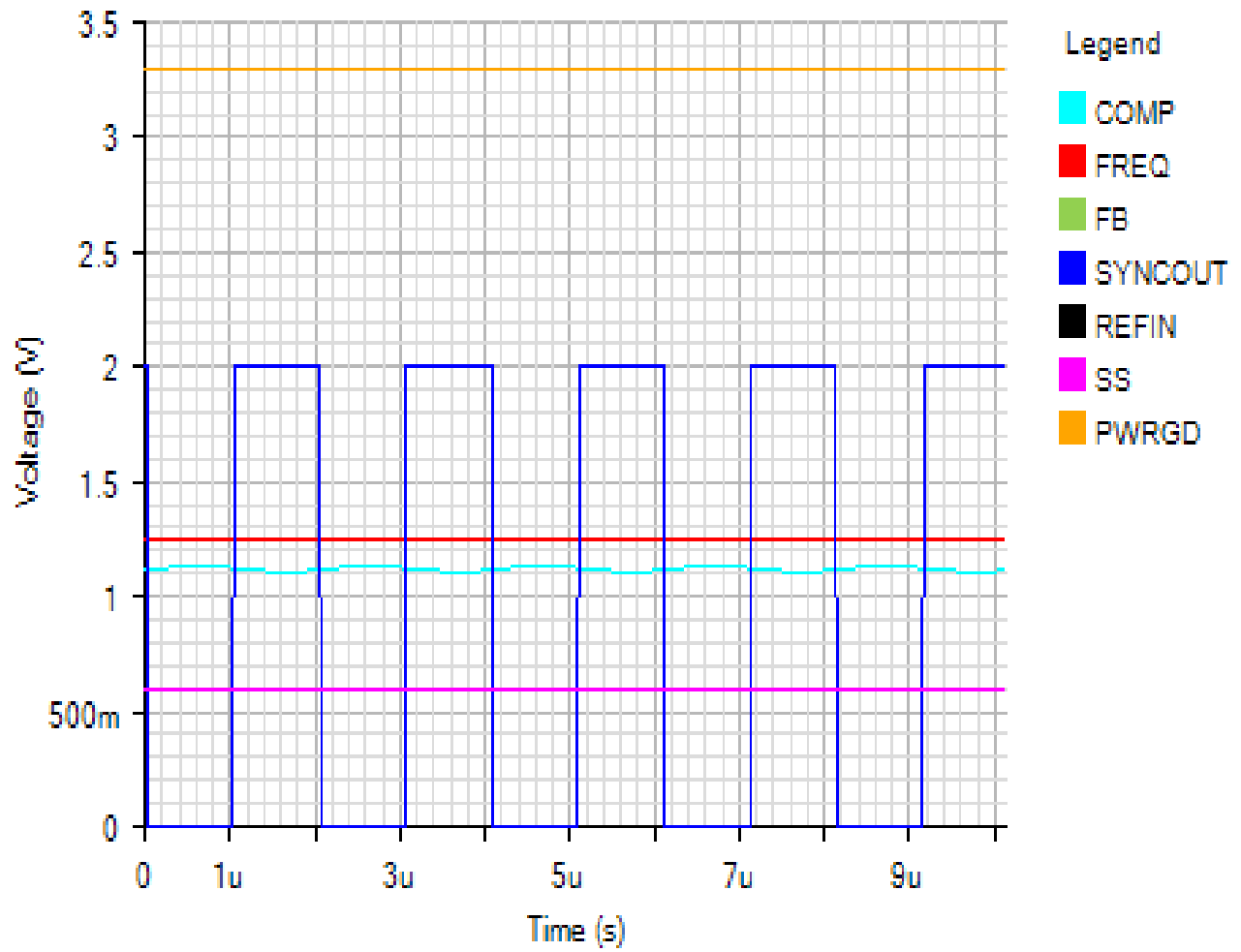
Default

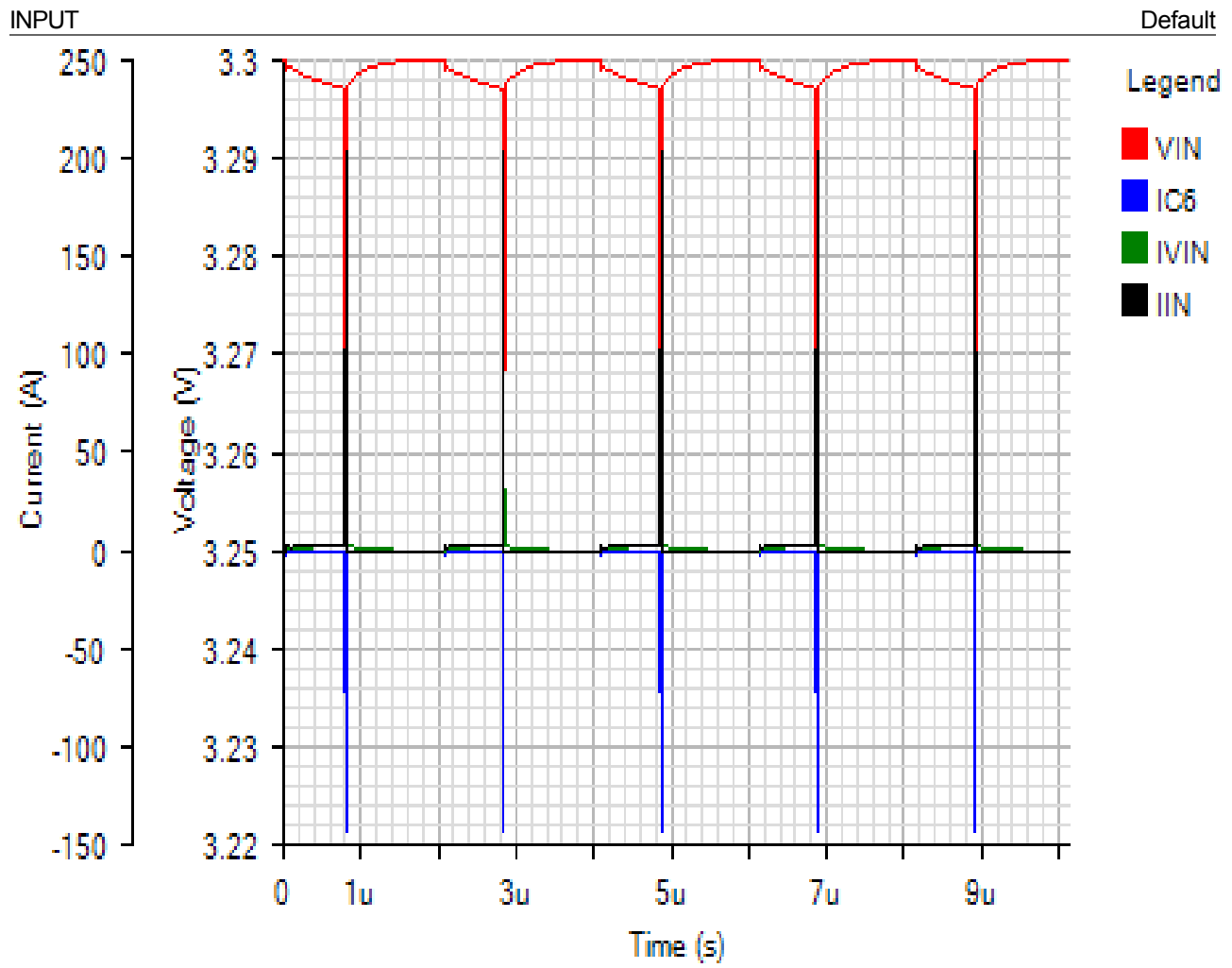


Steady State - Mon Jan 07 2019 10:09:37

IC

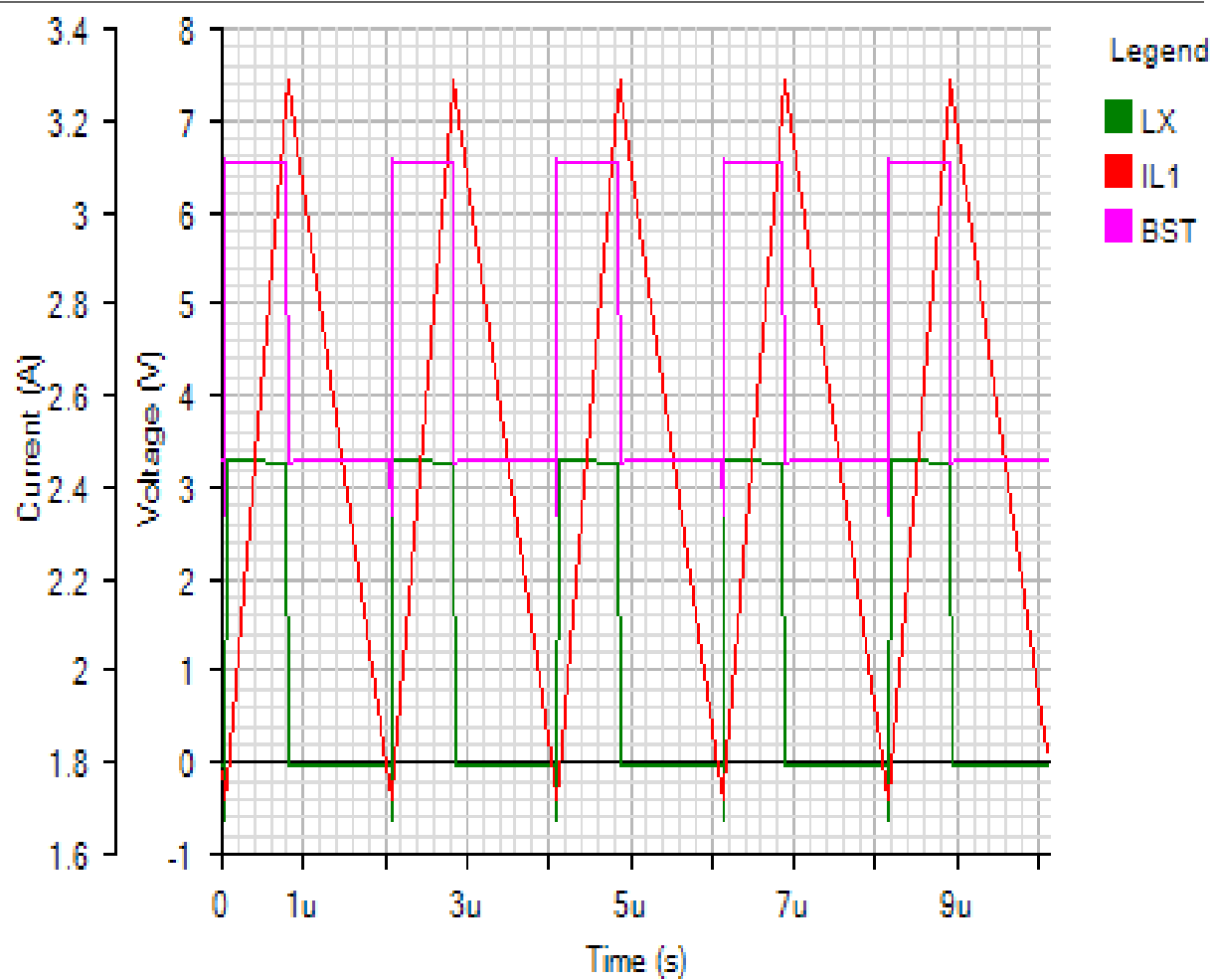
Default





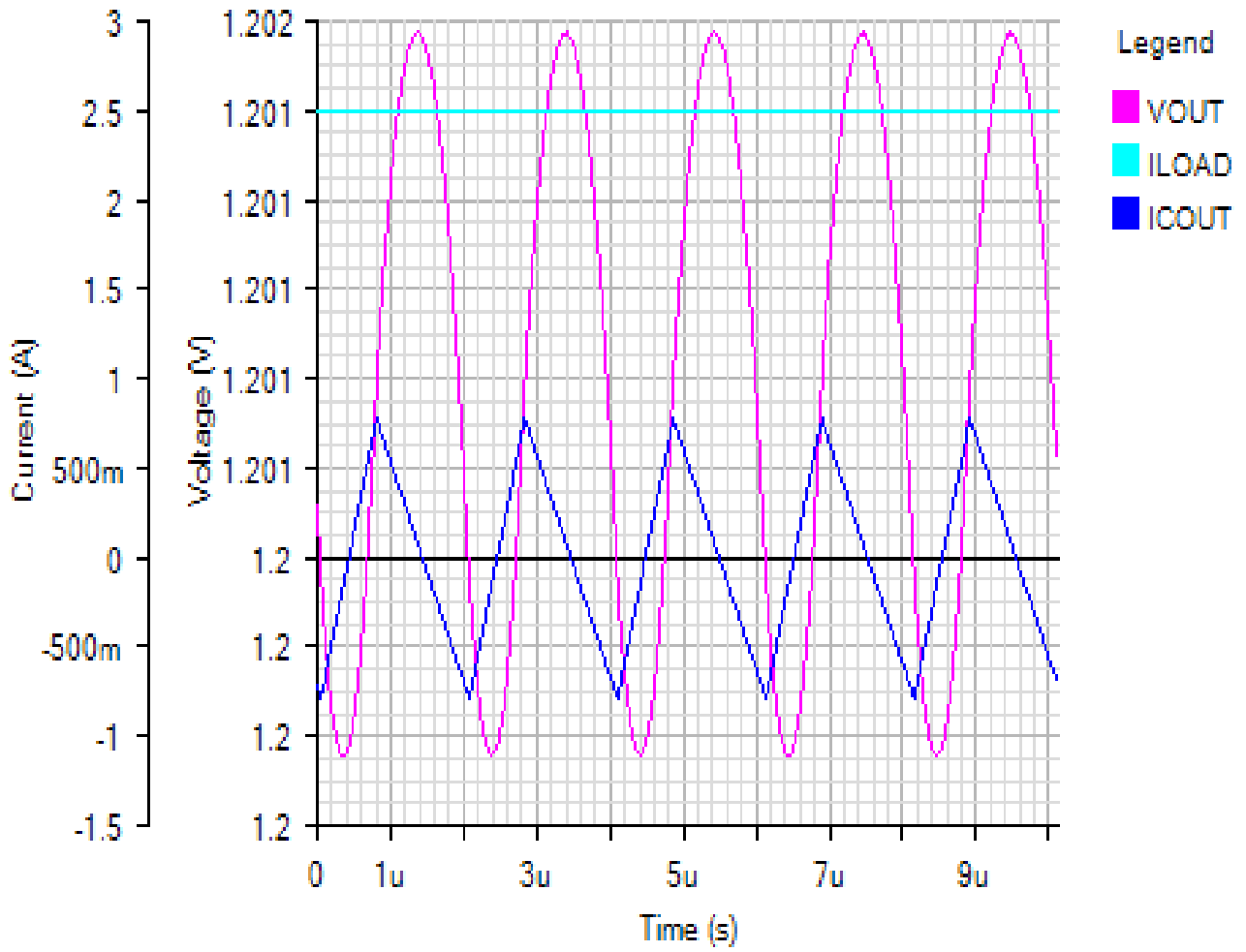
SWITCHING

Default



OUTPUT

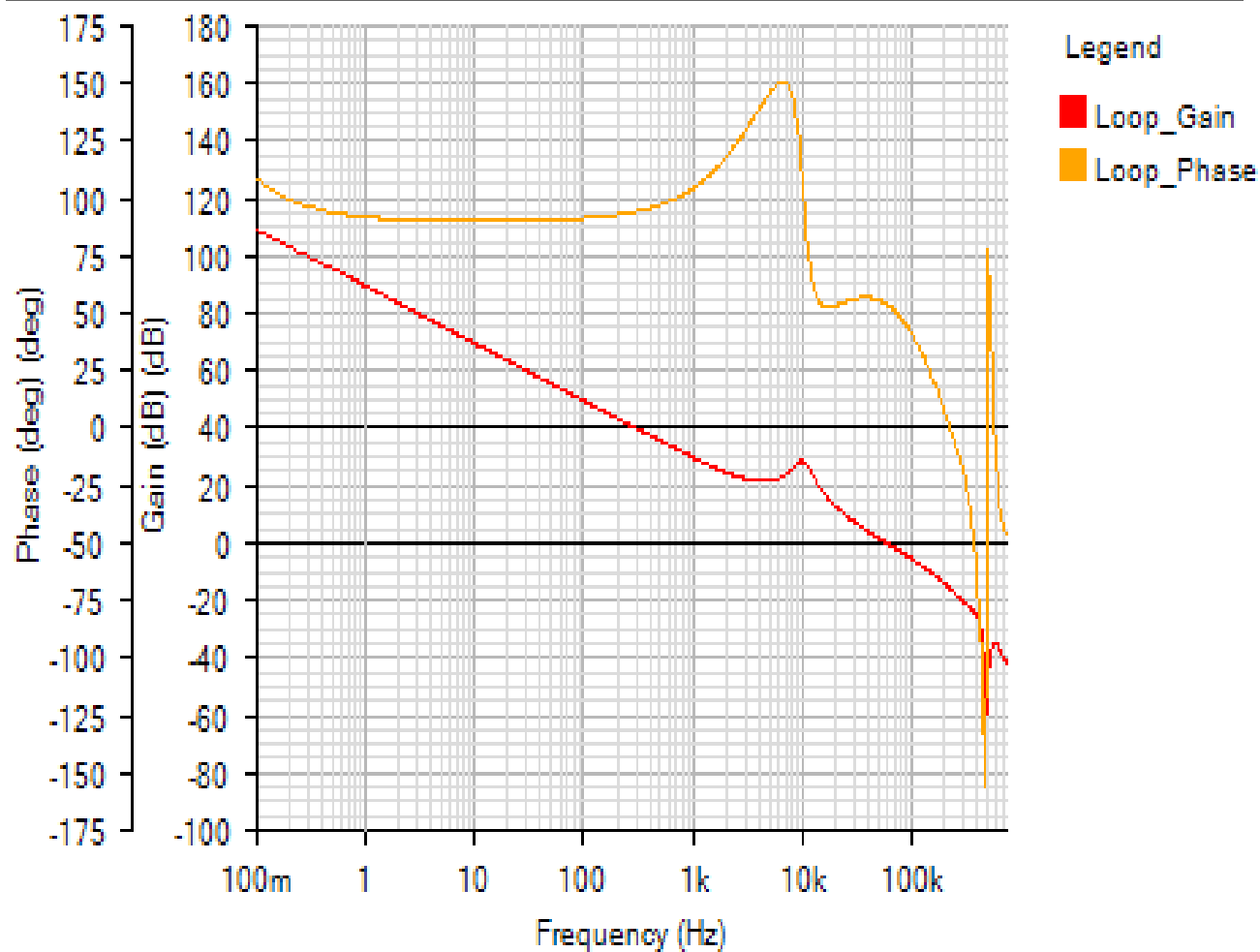
Default



AC Loop - Mon Jan 07 2019 10:09:37

BODE

Default



Phase Margin: 53.88° at a crossover frequency of 59.8kHz

