

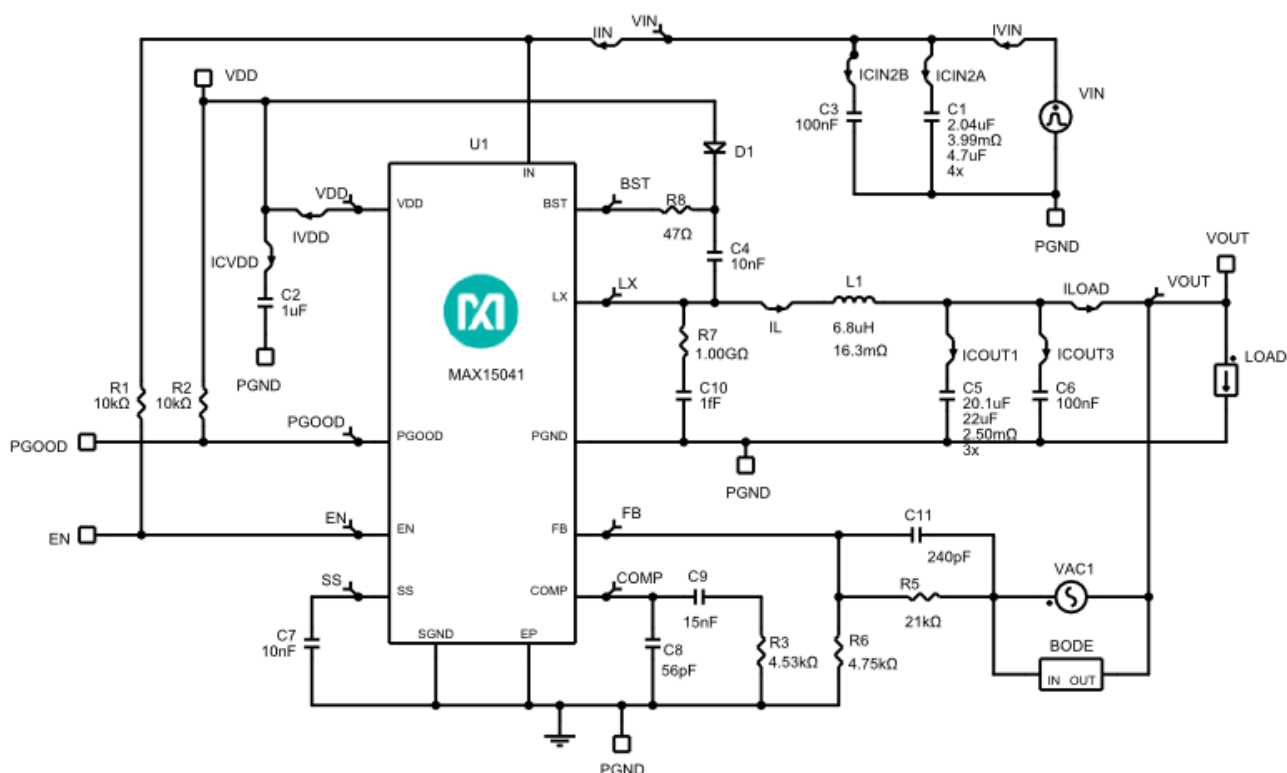
Initial Design

1.0

Design Requirements

Parameter	Value
Min. Input Voltage	10.8V
Max. Input Voltage	13.2V
Typ. Input Voltage	12V
Input Voltage Ripple	3%
Output Voltage	3.3V
Output Current	3A
Output Voltage Ripple	1%
Load Step Start Current	1.5A
Load Step Current	3A
Performance Priority	Balance Efficiency and Size
BOM Priority	Cost
Compensator Type	Type 2
Ambient Temperature	25C
Inductor Current Ratio (LIR)	0.3

Schematic



BOM

Ref	Qty	Part Number	Manufacturer	Description
U1	1	MAX15041ETE+	Maxim Integrated	Low cost, Small, 3A DC-DC Converter in 3mm by 3mm TQFN
C1	4	GRM21BC71H475KE11	Murata	Cap Ceramic 4.7uF 50V 0805 125C
C2	1	EMK107B7105MA-T	Taiyo Yuden	Cap Ceramic 1uF 16V X7R 20% Pad SMD 0603 125°C T/R
C3	1	CL10B104MB8NNNC	Samsung Electro-Mechanics	Cap Ceramic 0.1uF 50V X7R 20% Pad SMD 0603 125°C T/R
C4	1	C1608X7R2A103M080AA	TDK	Cap Ceramic 0.01uF 100V X7R 20% Pad SMD 0603 125°C T/R
C5	3	GRM32DR61C226KE18L	Murata	Cap Ceramic 22uF 16V X5R 10% SMD 1210 85C Embossed T/R
C6	1	CL10B104MO8NNNC	Samsung Electro-Mechanics	Cap Ceramic 0.1uF 16V X7R 20% Pad SMD 0603 125°C T/R
C7	1	C1608X7R2A103M080AA	TDK	Cap Ceramic 0.01uF 100V X7R 20% Pad SMD 0603 125°C T/R
C8	1	06035A560JAT2A	AVX	Cap Ceramic 56pF 50V C0G 5% Pad SMD 0603 125°C T/R

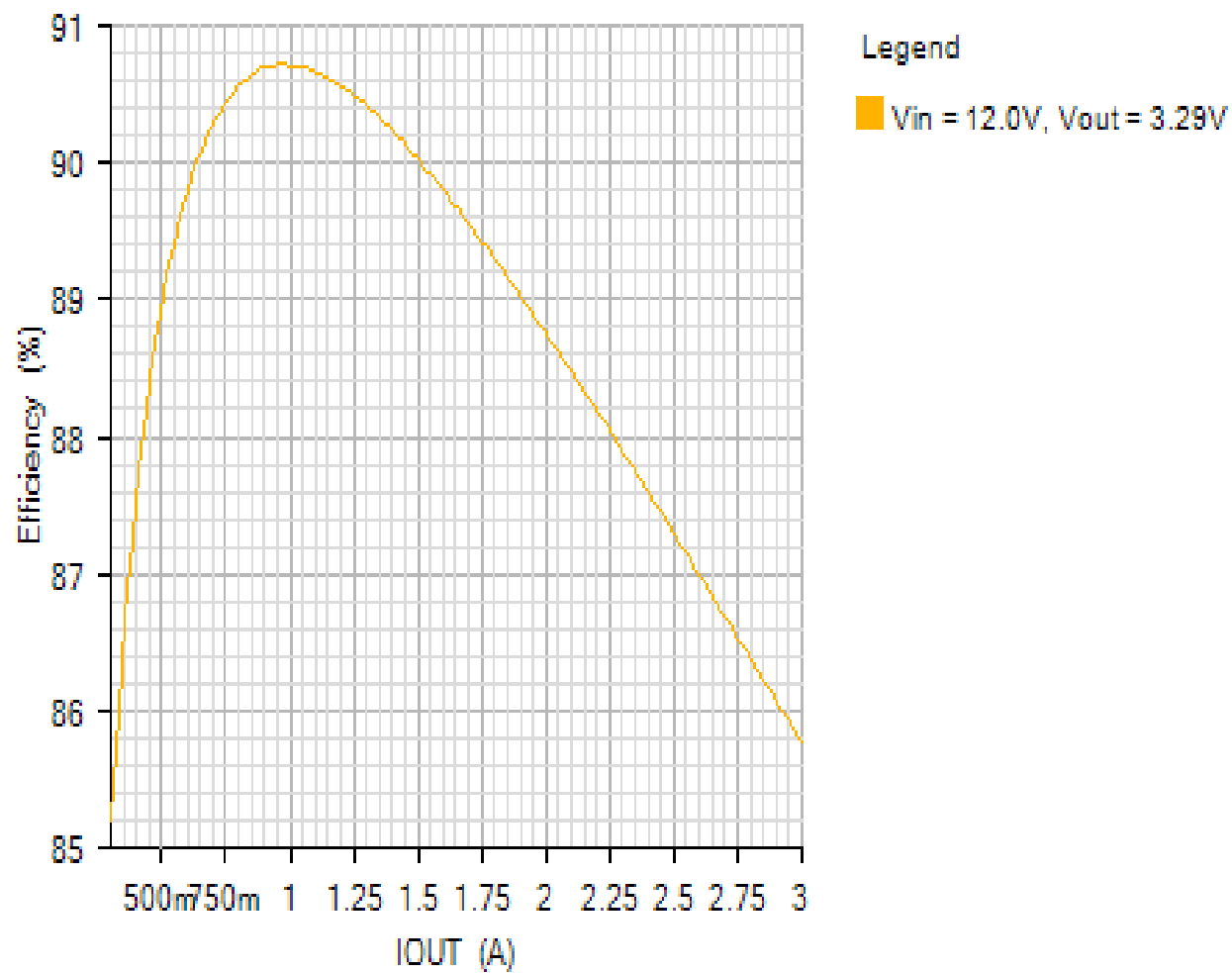
C9	1	06035C153JAT2A	AVX	Cap Ceramic 0.015uF 50V X7R 5% Pad SMD 0603 125°C T/R
C11	1	CL10C241JB8NNNC	Samsung Electro-Mechanics	Cap Ceramic 240pF 50V C0G 5% Pad SMD 0603 125°C T/R
D1	1	1N4148W-E3-08	Vishay	Diode Small Signal Switching 100V 0.15A 2-Pin SOD-123 T/R
L1	1	MSS1048-682NLB	Coilcraft	Inductor 6.8uH 30% 14.67mOhm 5.6A Isat 6.01A Irms
R1	1	ERJ3GEYJ103V	Panasonic	Res Thick Film 0603 10K Ohm 5% 0.1W(1/10W) ±200ppm/°C Pad SMD Automotive T/R
R2	1	ERJ3GEYJ103V	Panasonic	Res Thick Film 0603 10K Ohm 5% 0.1W(1/10W) ±200ppm/°C Pad SMD Automotive T/R
R3	1	ERJ3EKF4531V	Panasonic	Res Thick Film 0603 4.53K Ohm 1% 0.1W(1/10W) ±100ppm/°C Pad SMD Automotive T/R
R5	1	ERJ3EKF2102V	Panasonic	Res Thick Film 0603 21K Ohm 1% 0.1W(1/10W) ±100ppm/°C Pad SMD Automotive T/R
R6	1	ERJ3EKF4751V	Panasonic	Res Thick Film 0603 4.75K Ohm 1% 0.1W(1/10W) ±100ppm/°C Pad SMD Automotive T/R
R8	1	ERJ3GEYJ470V	Panasonic	Res Thick Film 0603 47 Ohm 5% 0.1W(1/10W) ±200ppm/°C Pad SMD Automotive T/R

Simulation Results

Efficiency - Mon Nov 19 2018 11:00:49

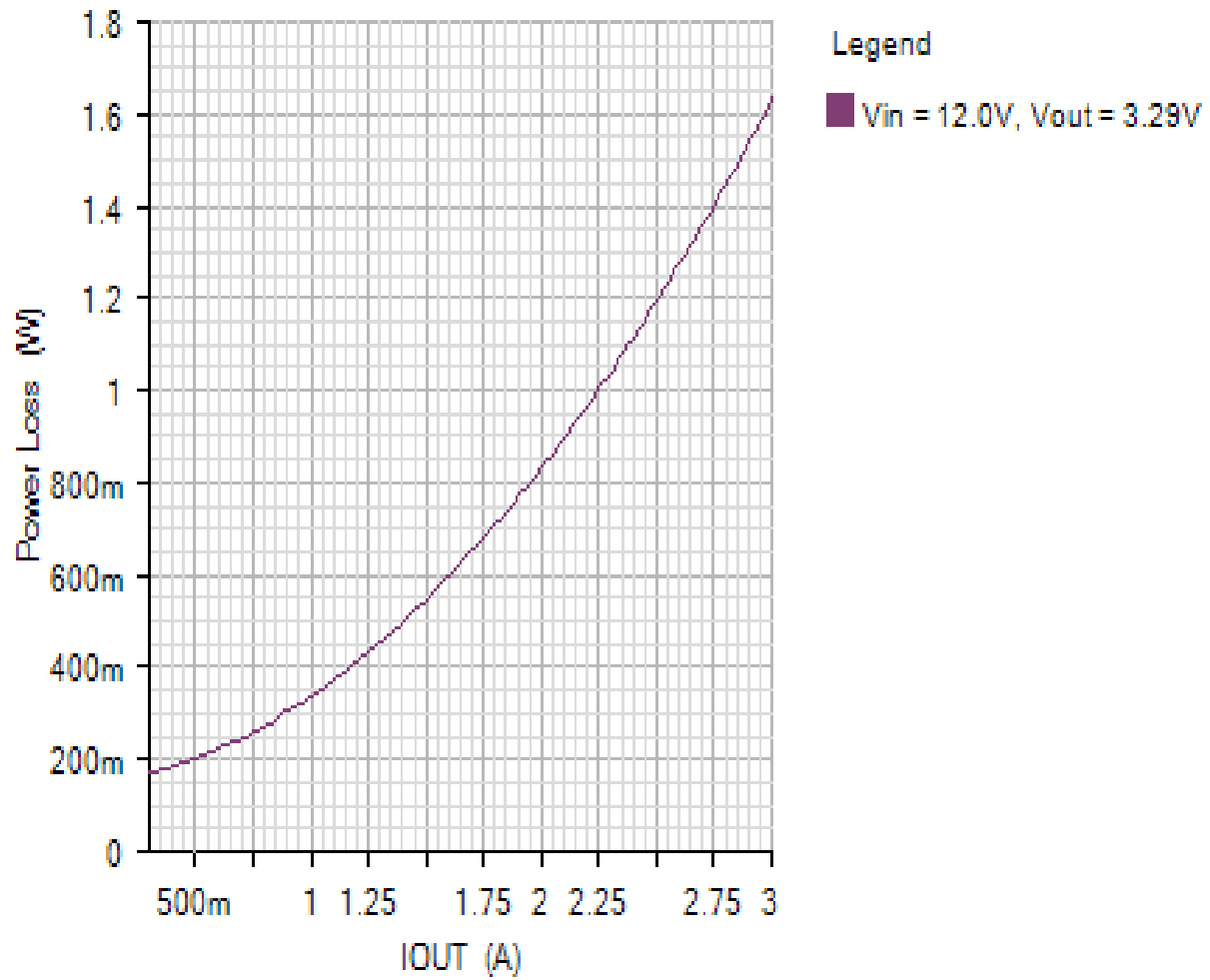
EFFICIENCY_PLOT

Default



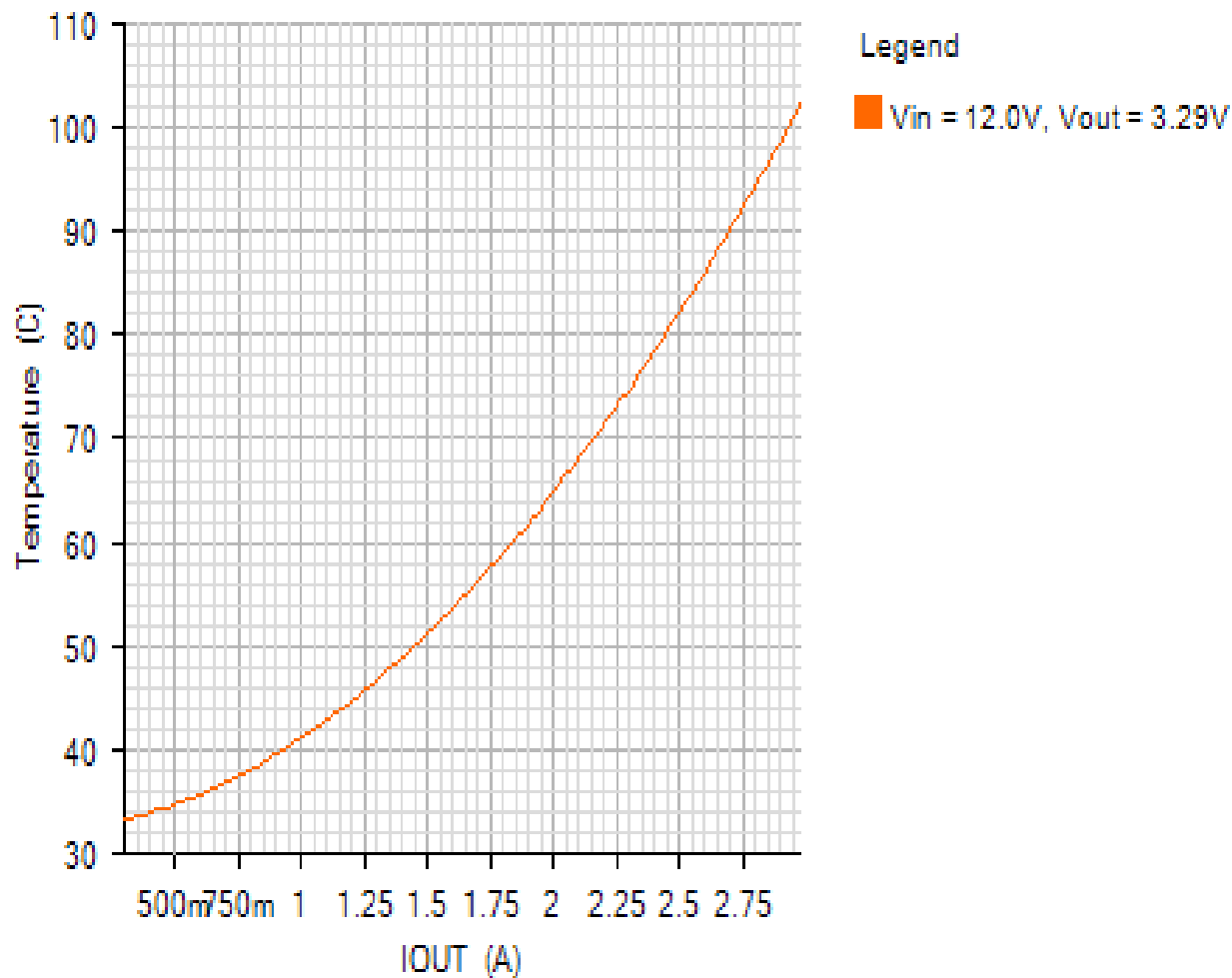
POWER_LOSS_PLOT

Default

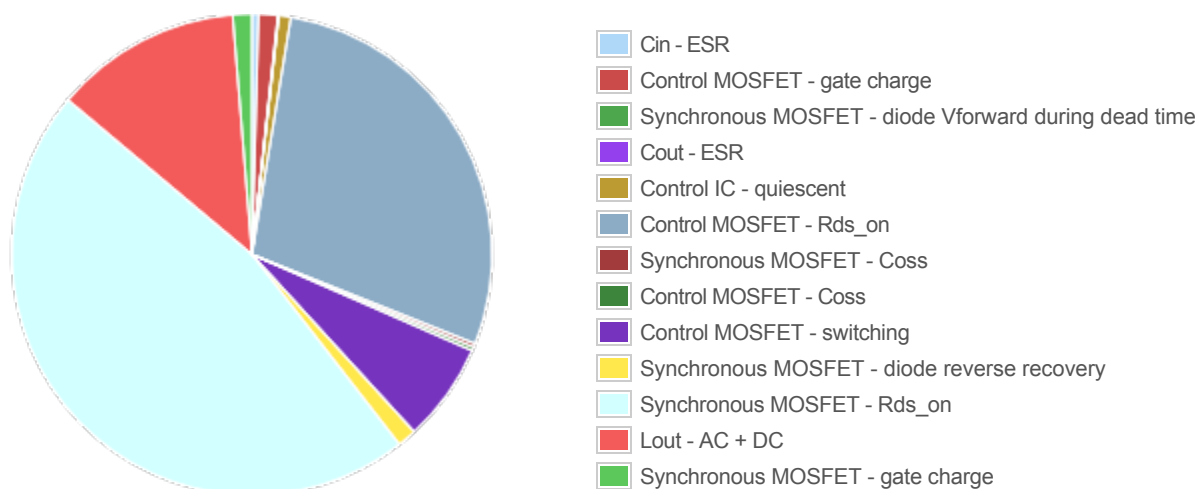


JUNCTION_TEMPERATURE_PLOT

Default



Losses



Component

Loss (W)

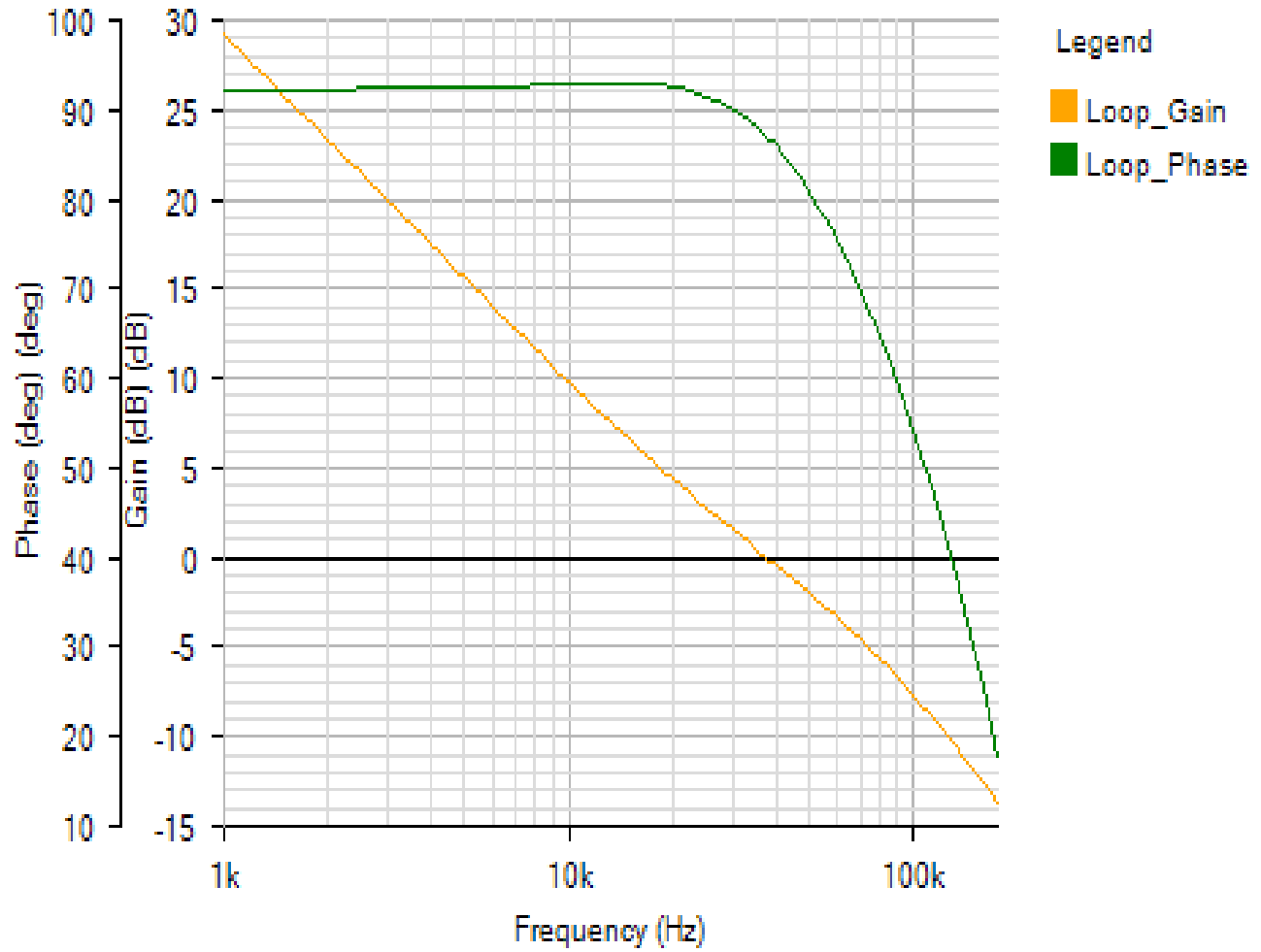
% of total

Component	Loss (W)	% of total
Cin - ESR	0.00714	0.4
Control MOSFET - gate charge	0.021	1.3
Synchronous MOSFET - diode Vforward during dead time	0.00084	0.1
Cout - ESR	0.000209	0
Control IC - quiescent	0.0132	0.8
Control MOSFET - Rds_on	0.46503	28.5
Synchronous MOSFET - Coss	0.004082	0.2
Control MOSFET - Coss	0.004082	0.2
Control MOSFET - switching	0.108621	6.6
Synchronous MOSFET - diode reverse recovery	0.021	1.3
Synchronous MOSFET - Rds_on	0.761947	46.6
Lout - AC + DC	0.206226	12.6
Synchronous MOSFET - gate charge	0.021	1.3
Total	1.634378	100

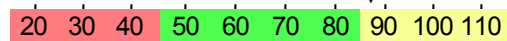
AC Loop - Mon Nov 19 2018 11:00:49

BODE

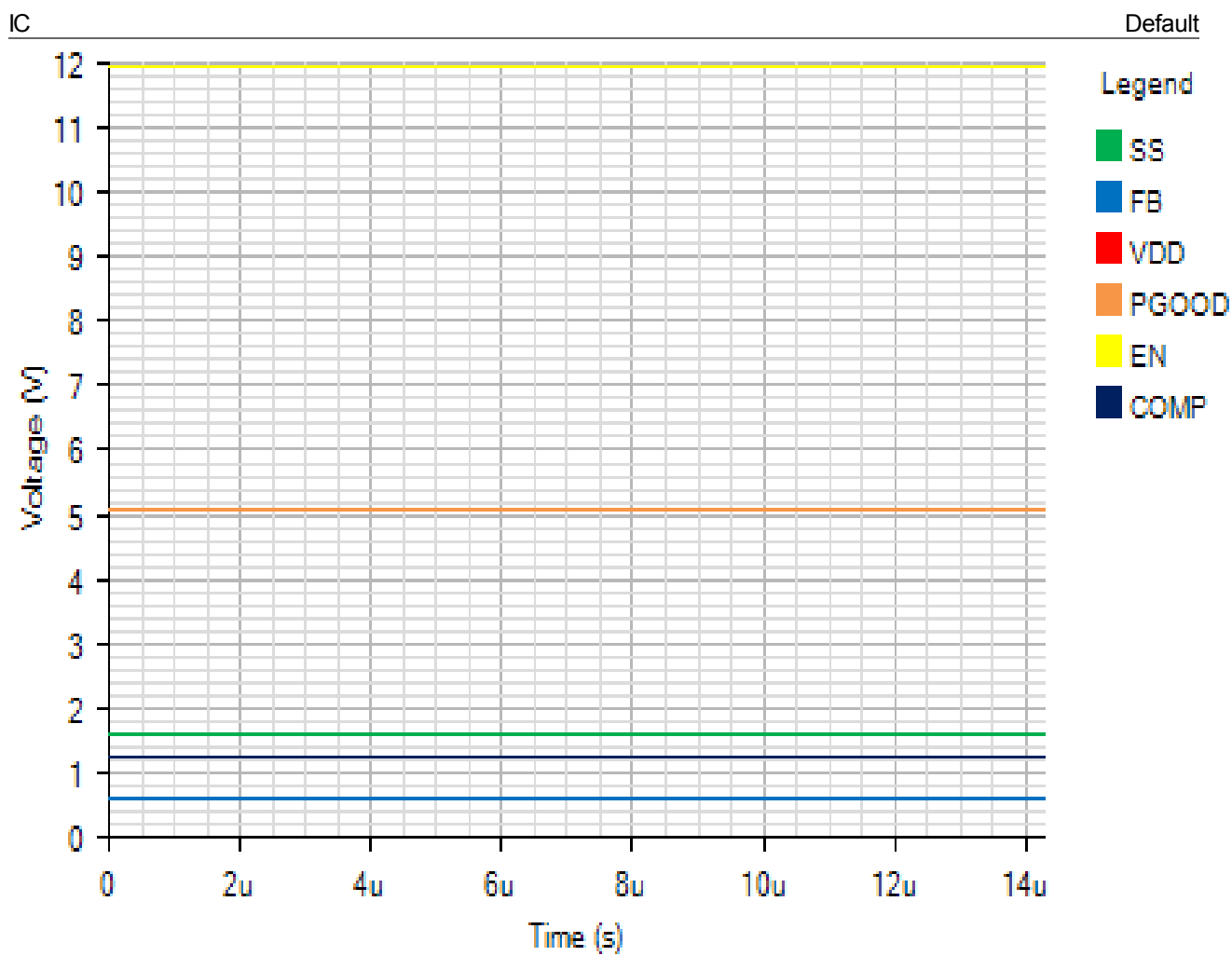
Default



Phase Margin: 87.02° at a crossover frequency of 37.6kHz

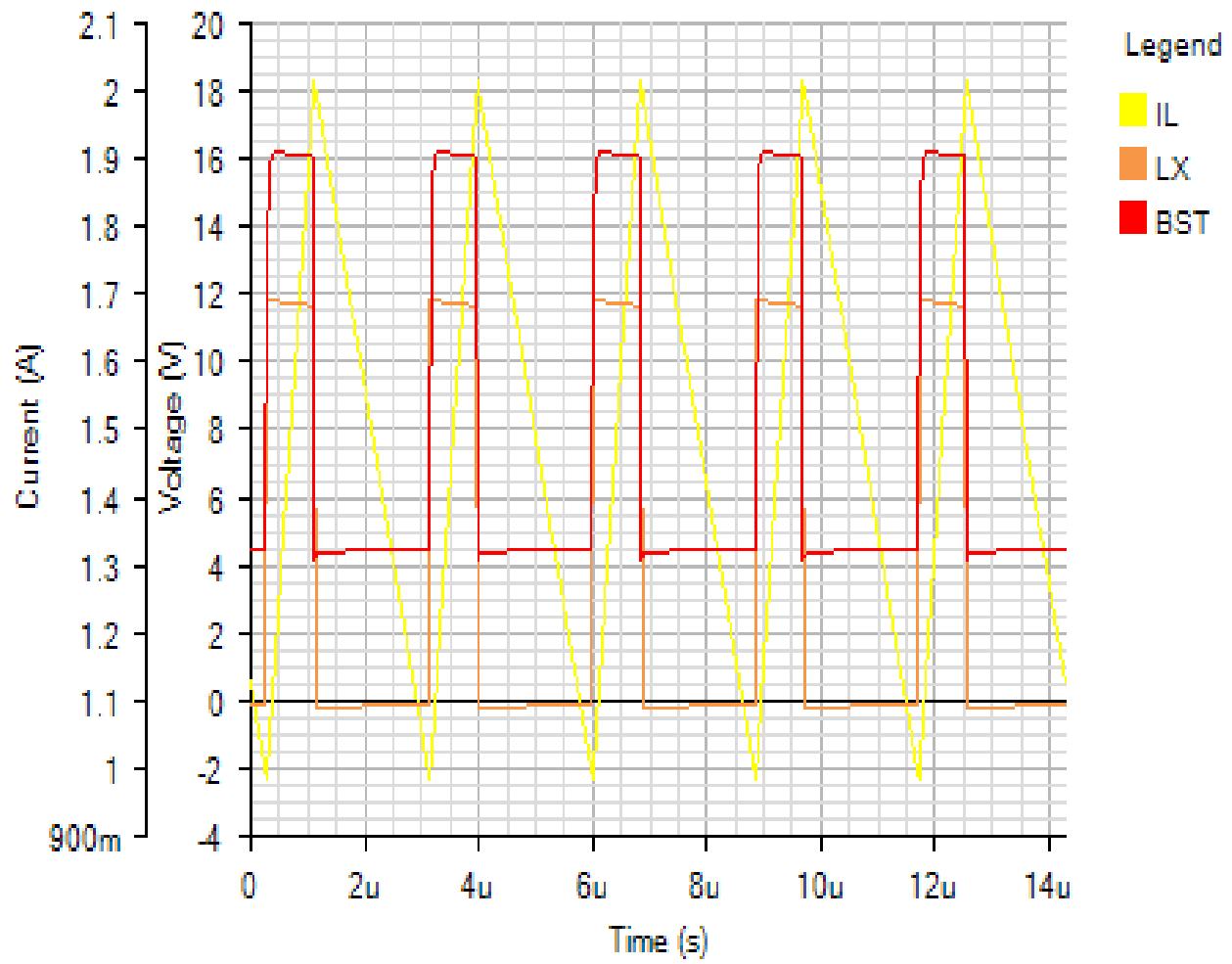


Steady State - Mon Nov 19 2018 11:00:49



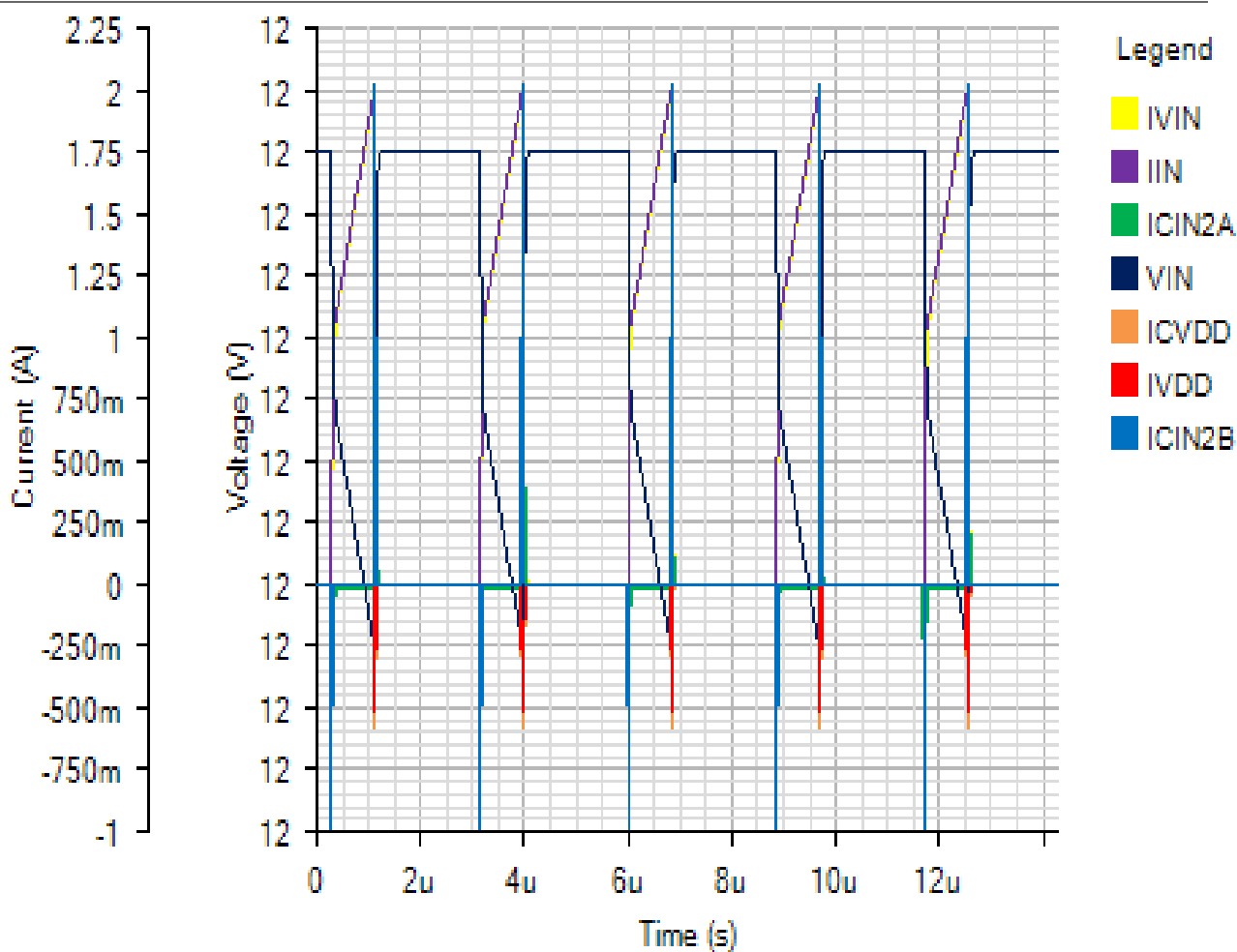
SWITCHING

Default



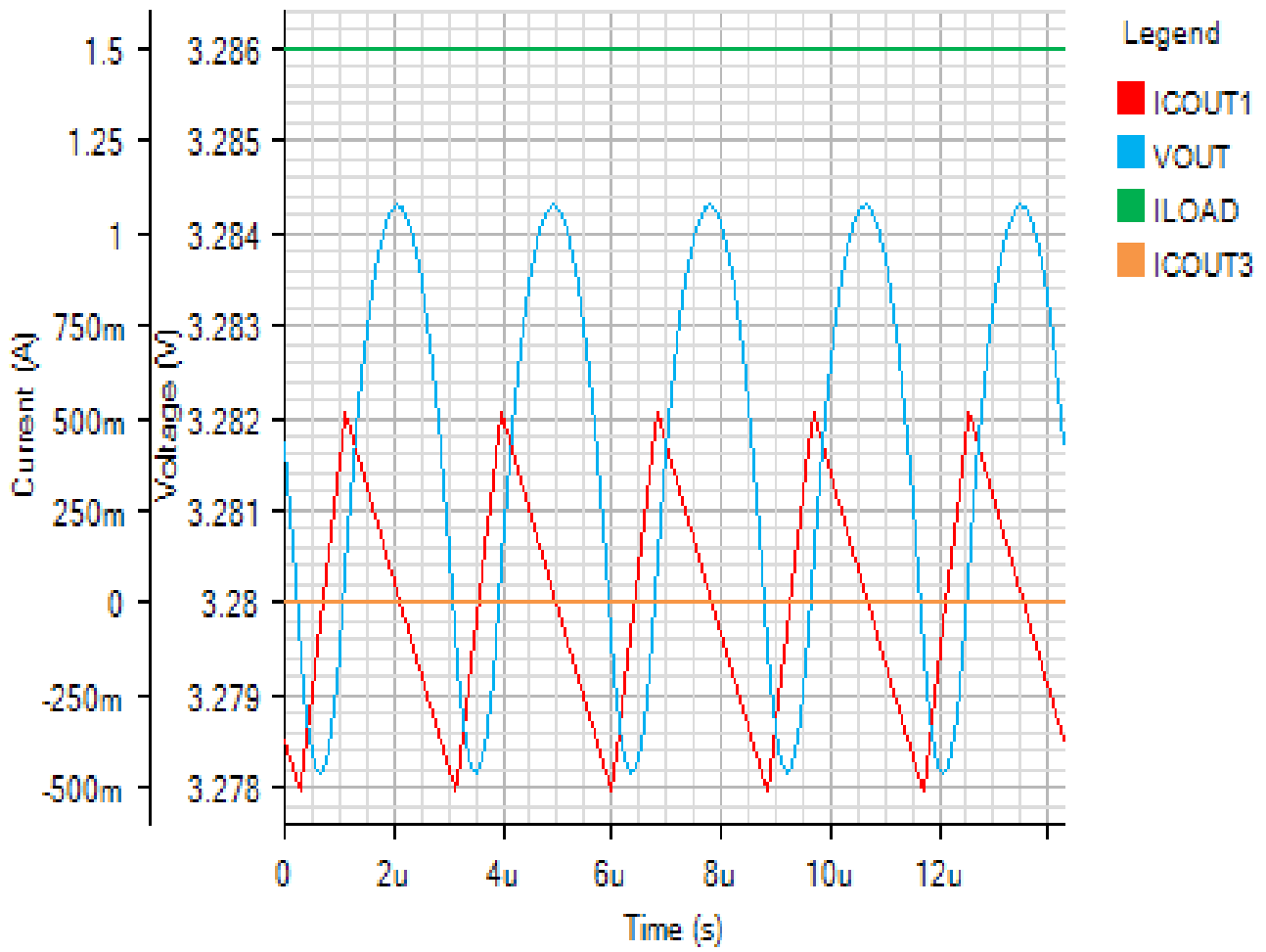
INPUT

Default

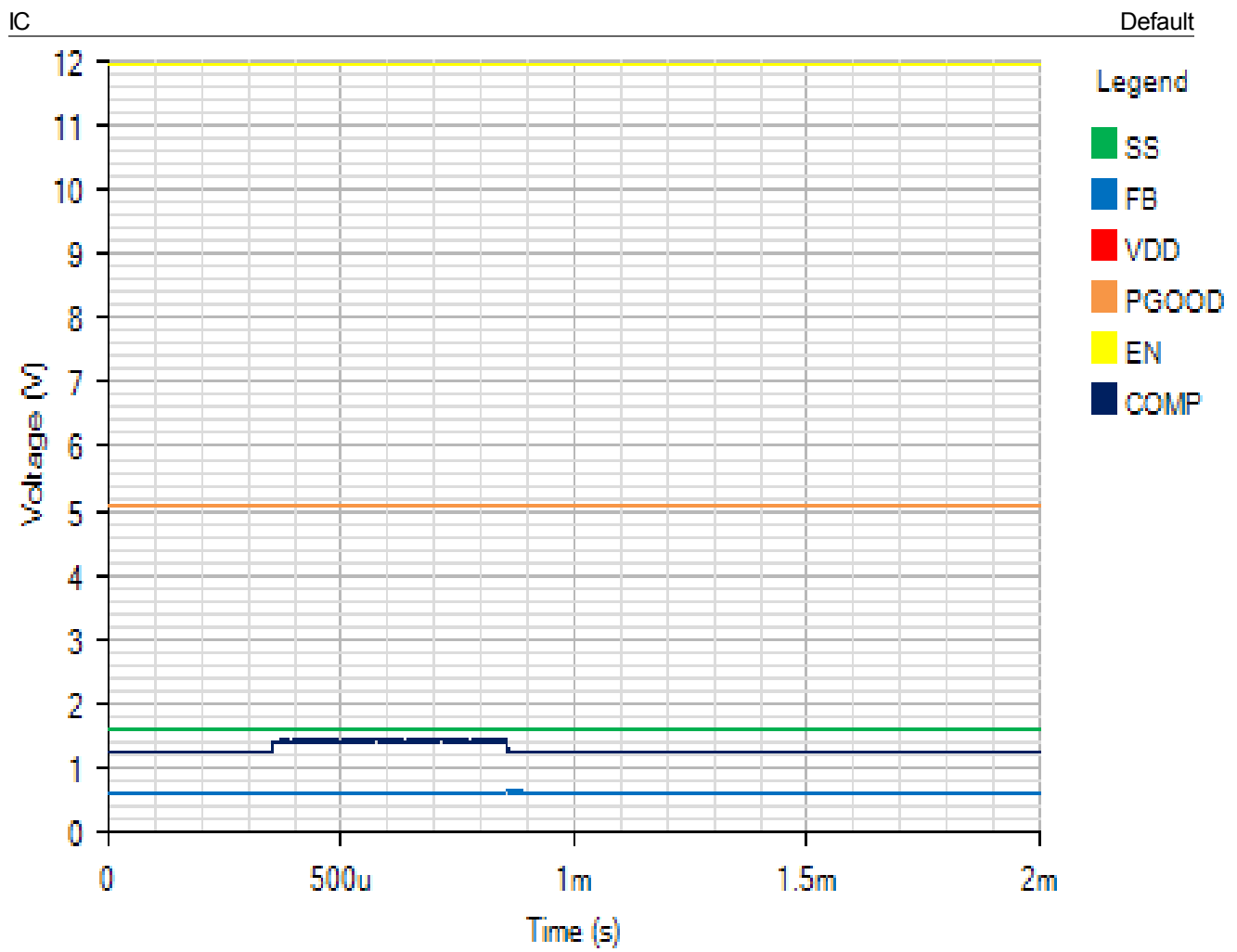


OUTPUT

Default

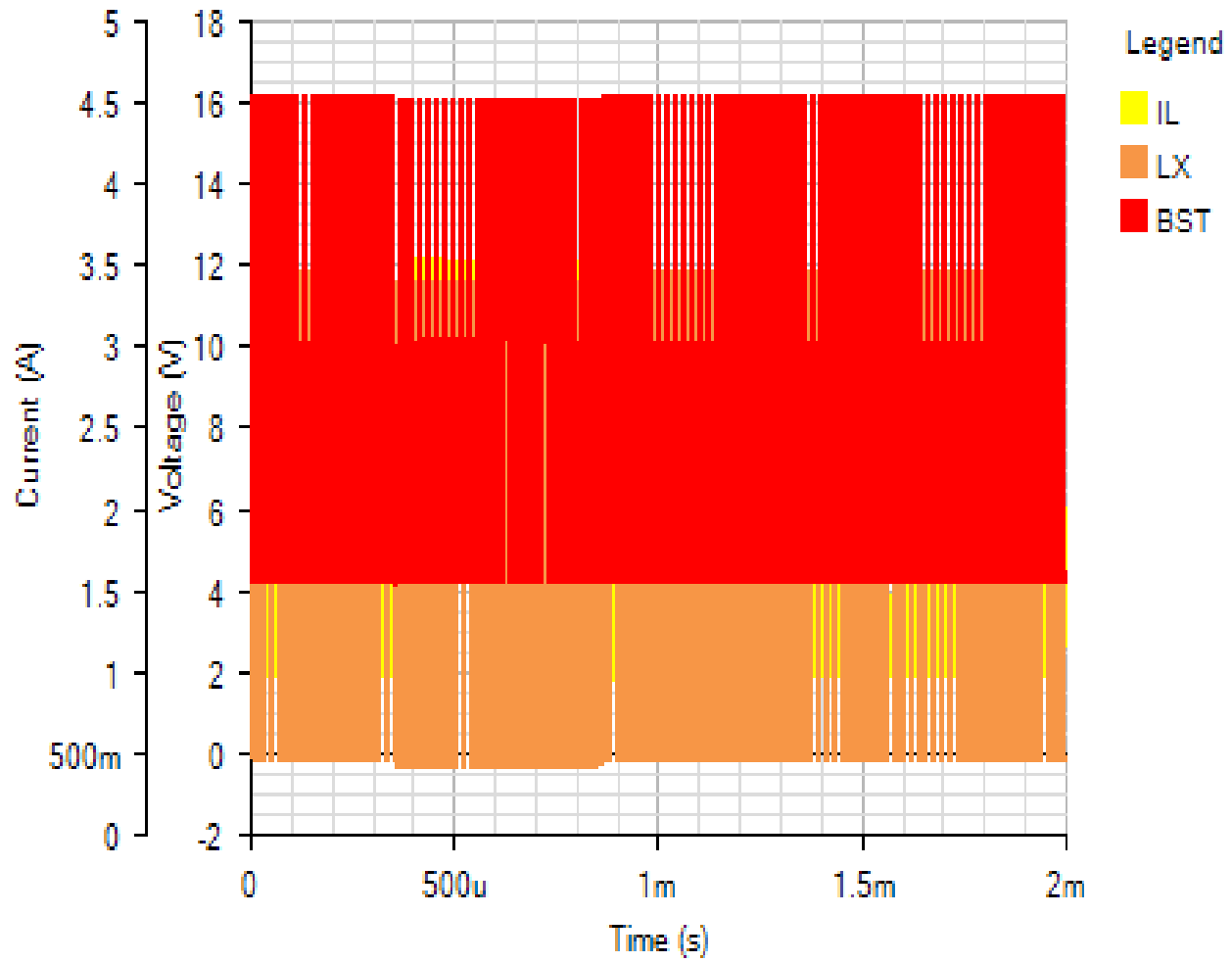


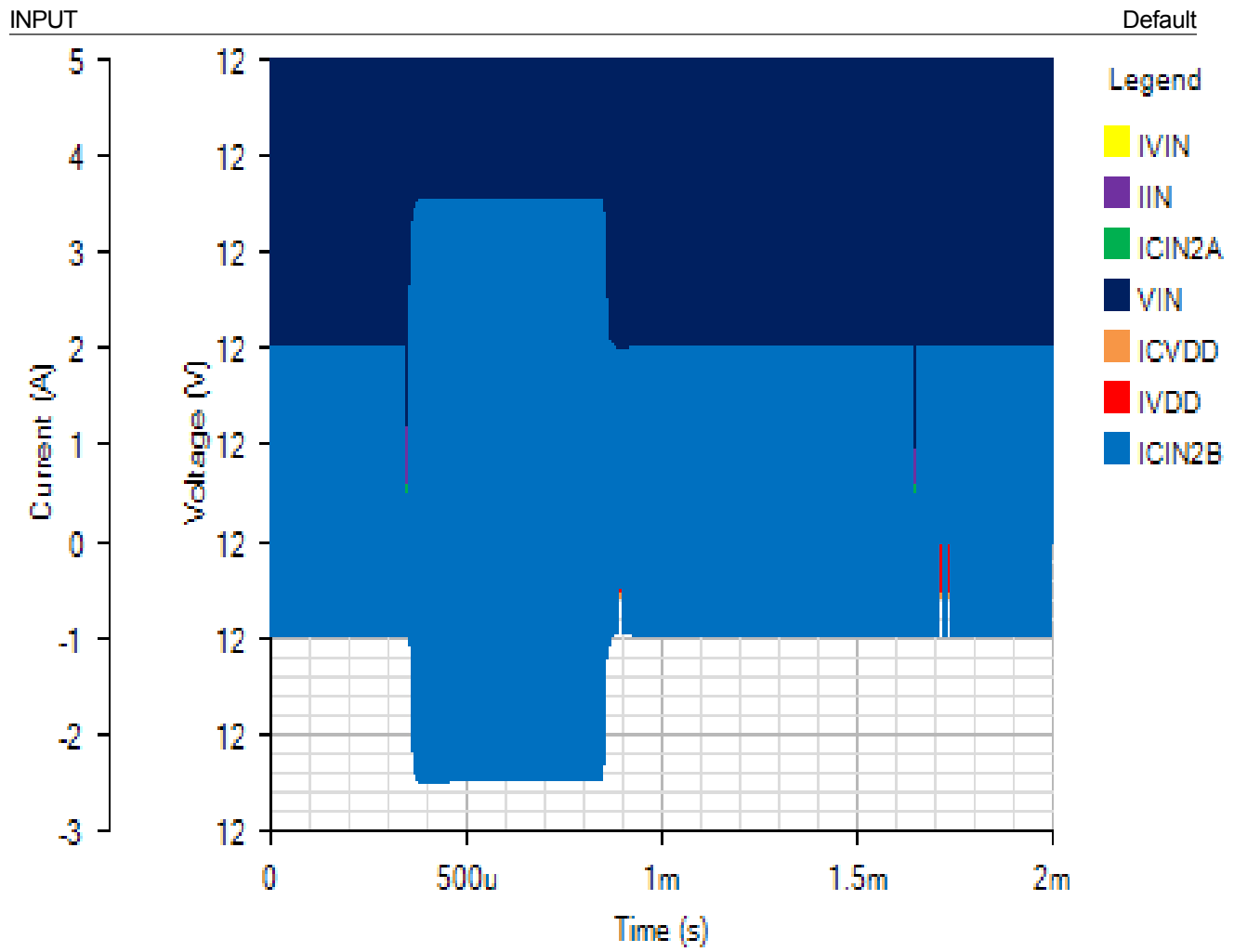
Load Step - Mon Nov 19 2018 11:00:49



SWITCHING

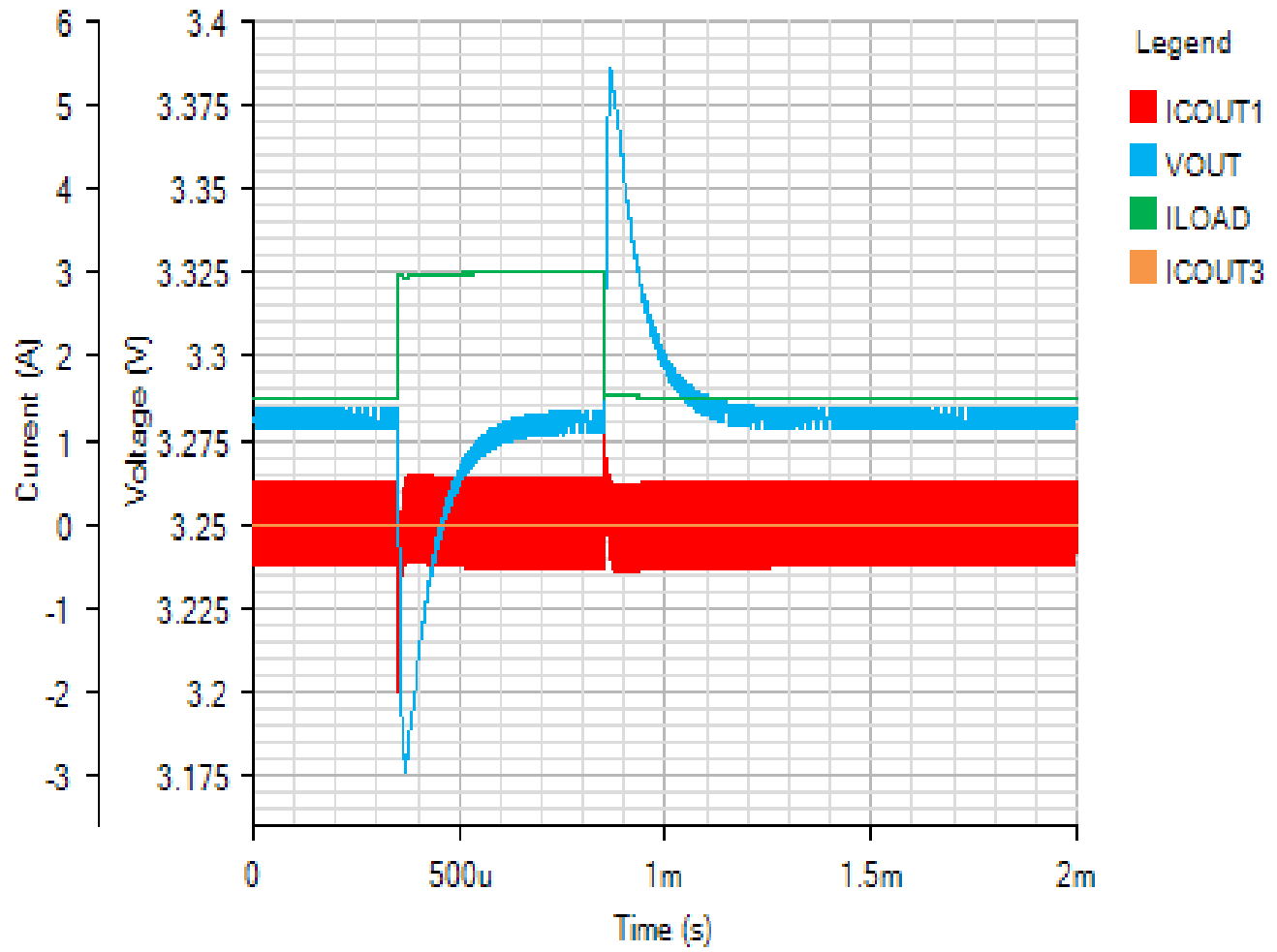
Default



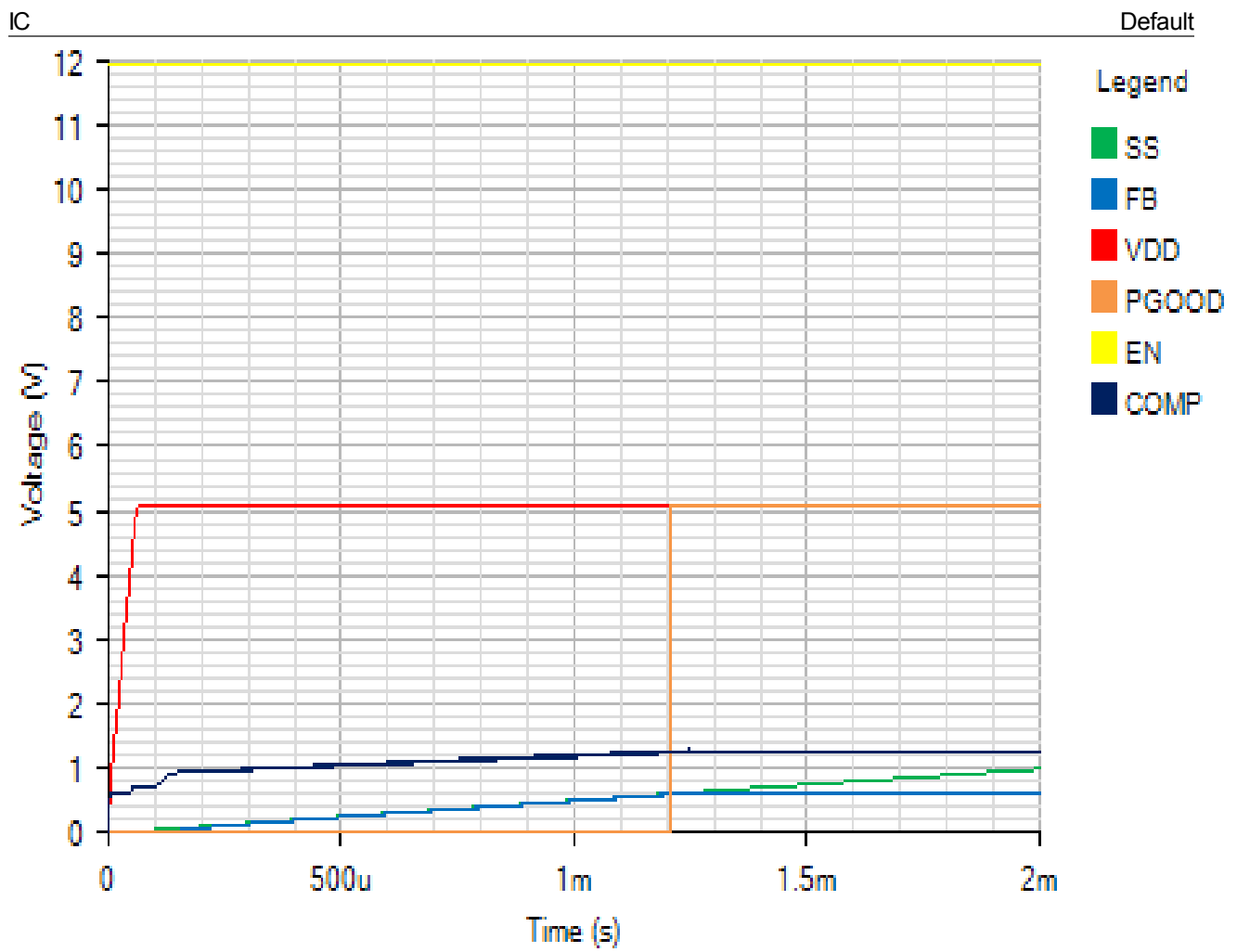


OUTPUT

Default

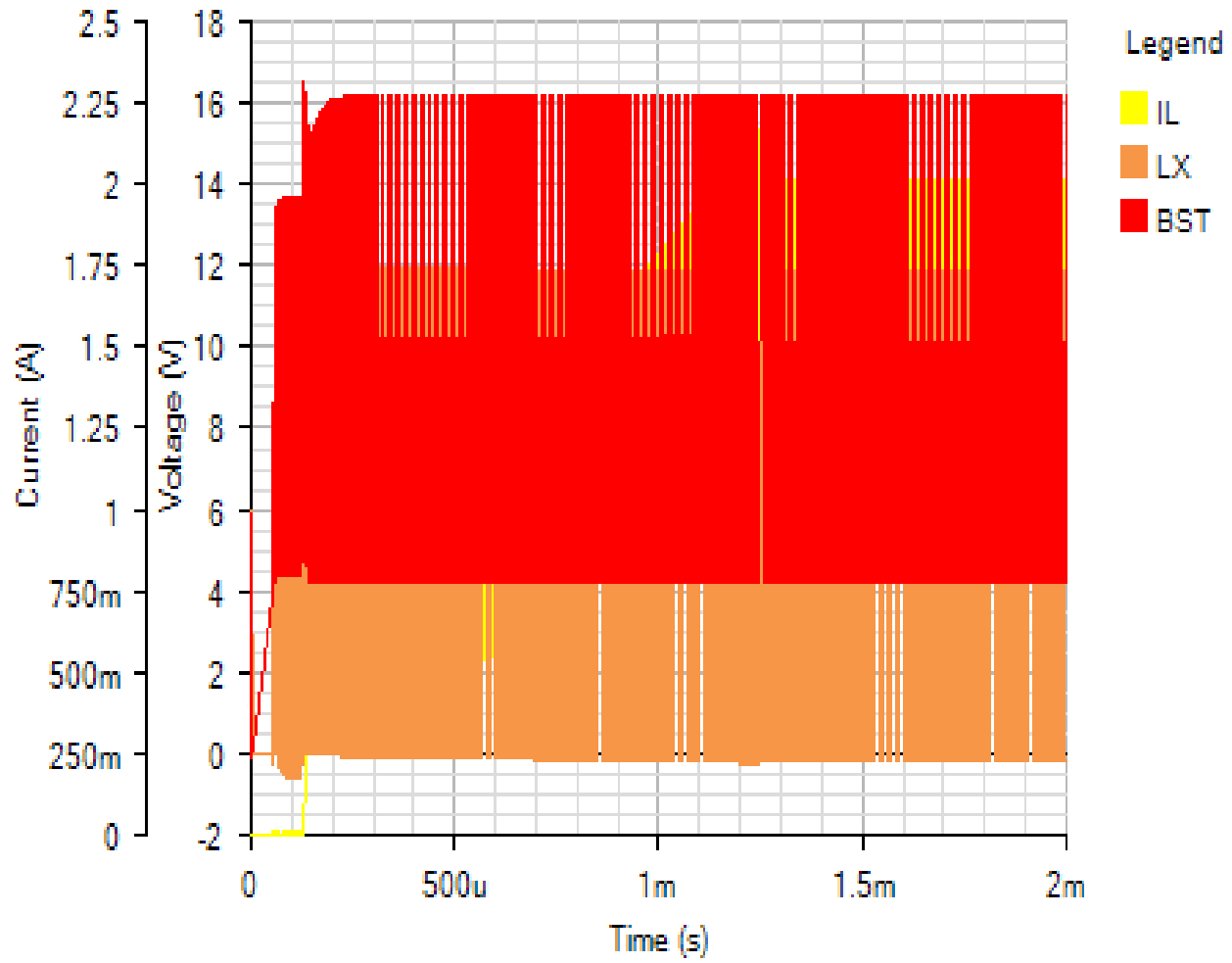


Start Up - Mon Nov 19 2018 11:00:49



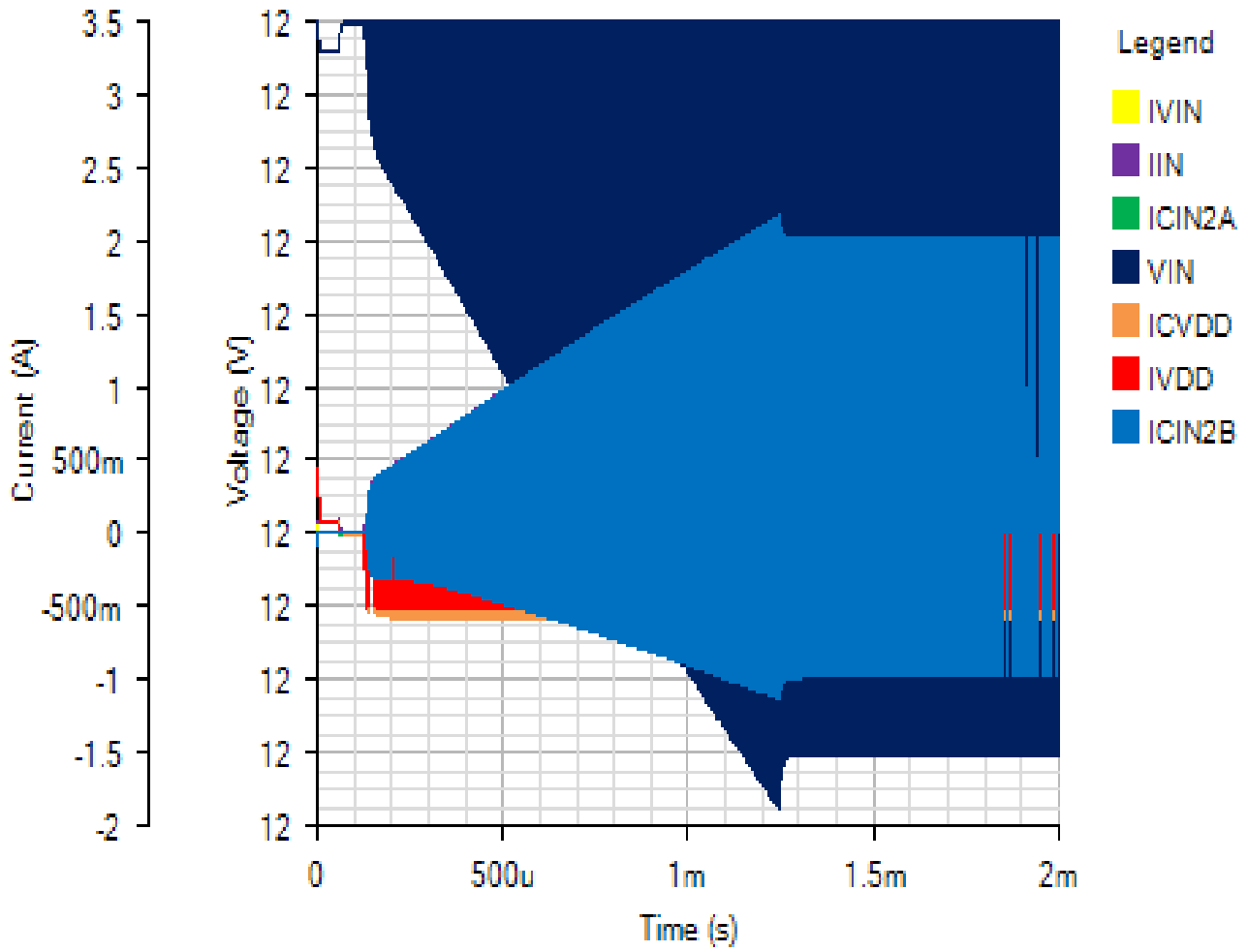
SWITCHING

Default



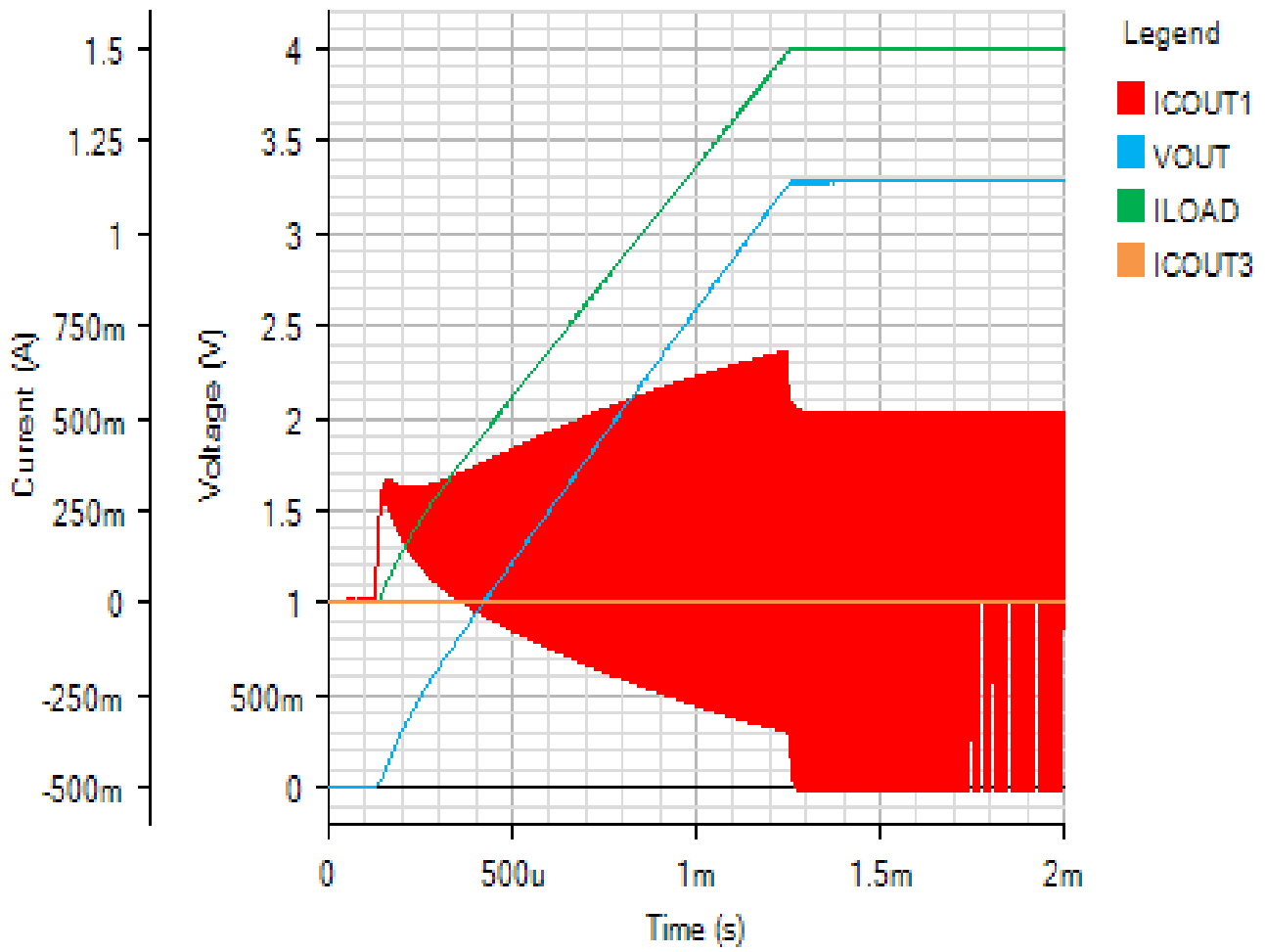
INPUT

Default



OUTPUT

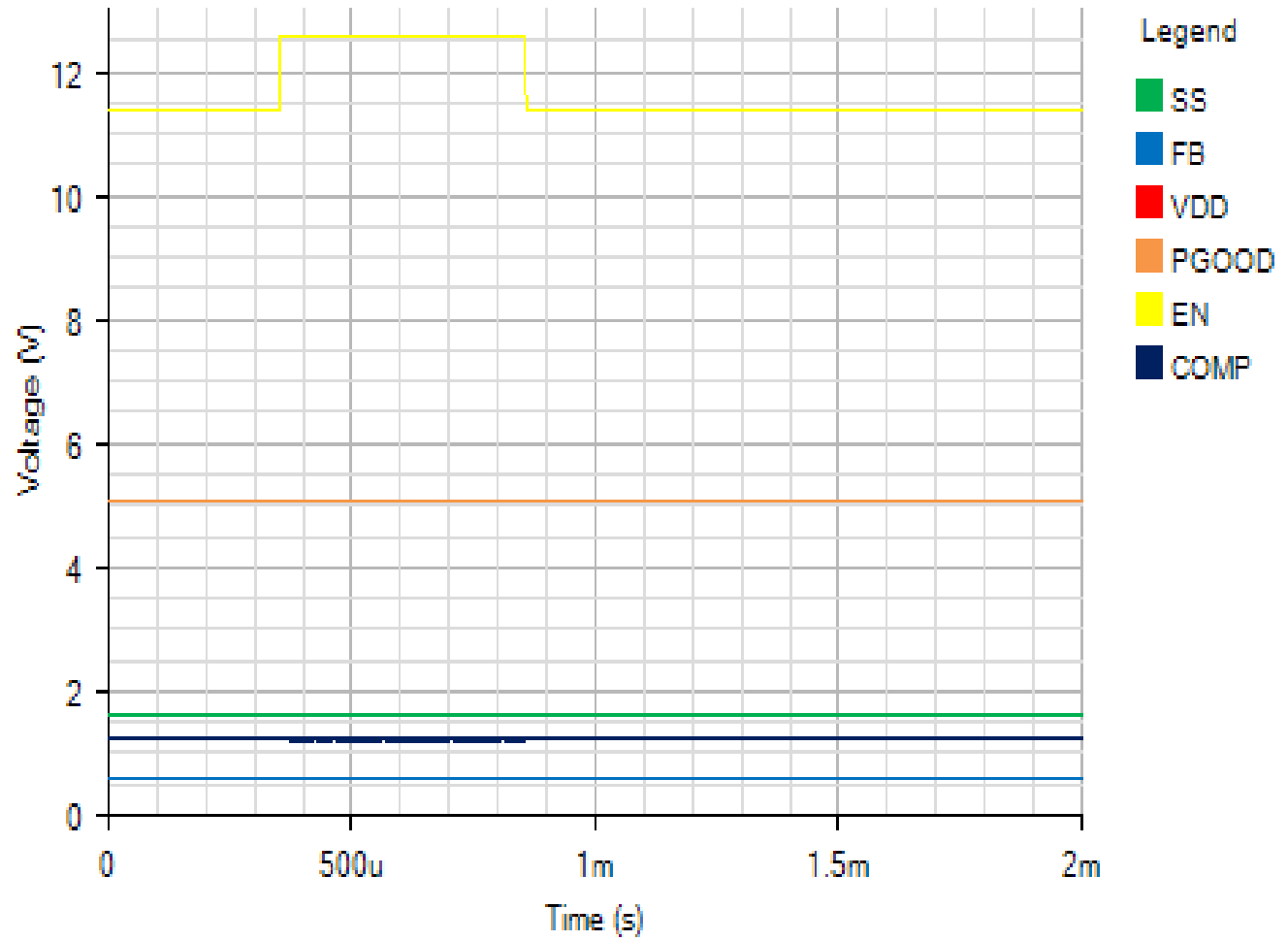
Default



Line Transient - Mon Nov 19 2018 11:00:49

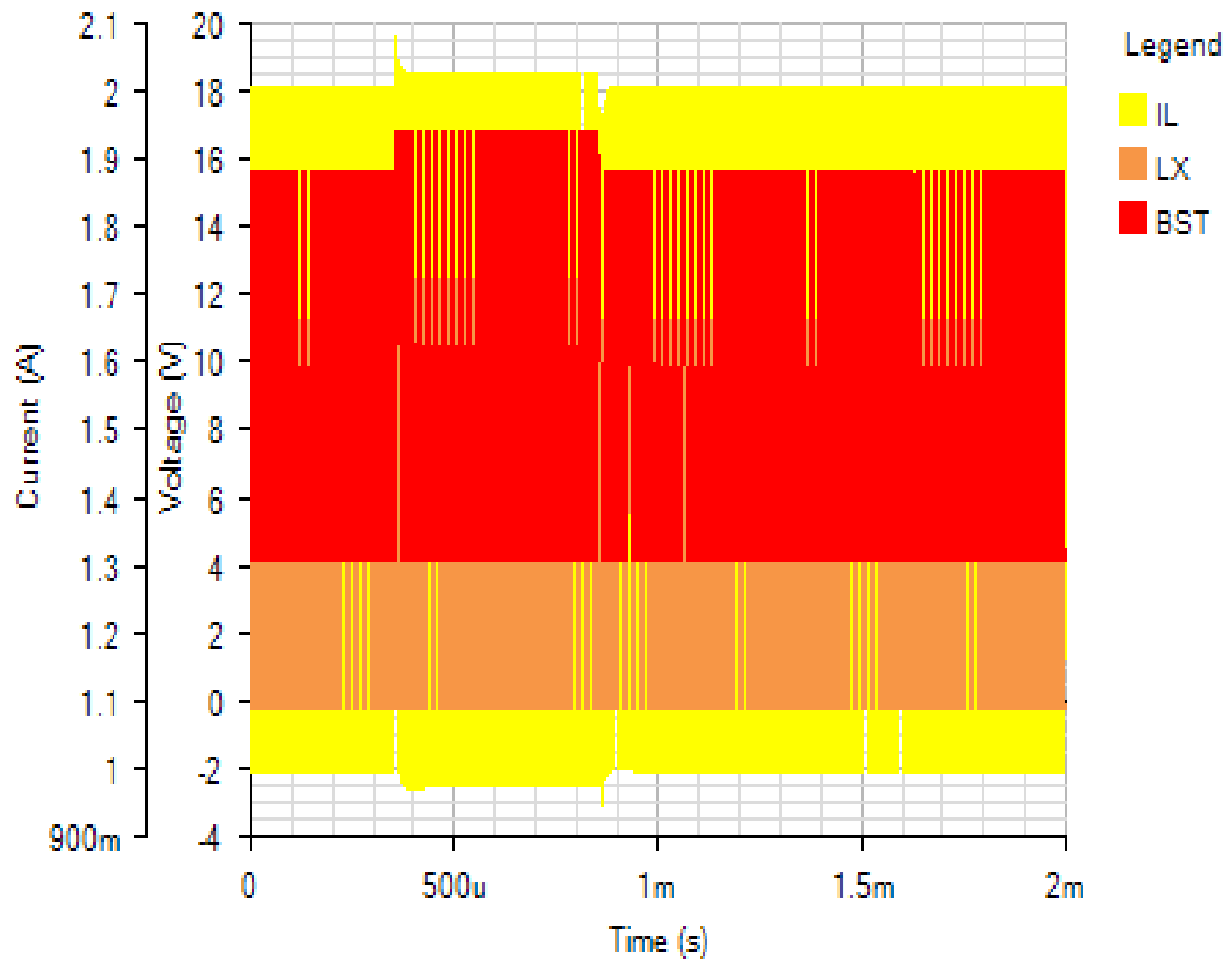
IC

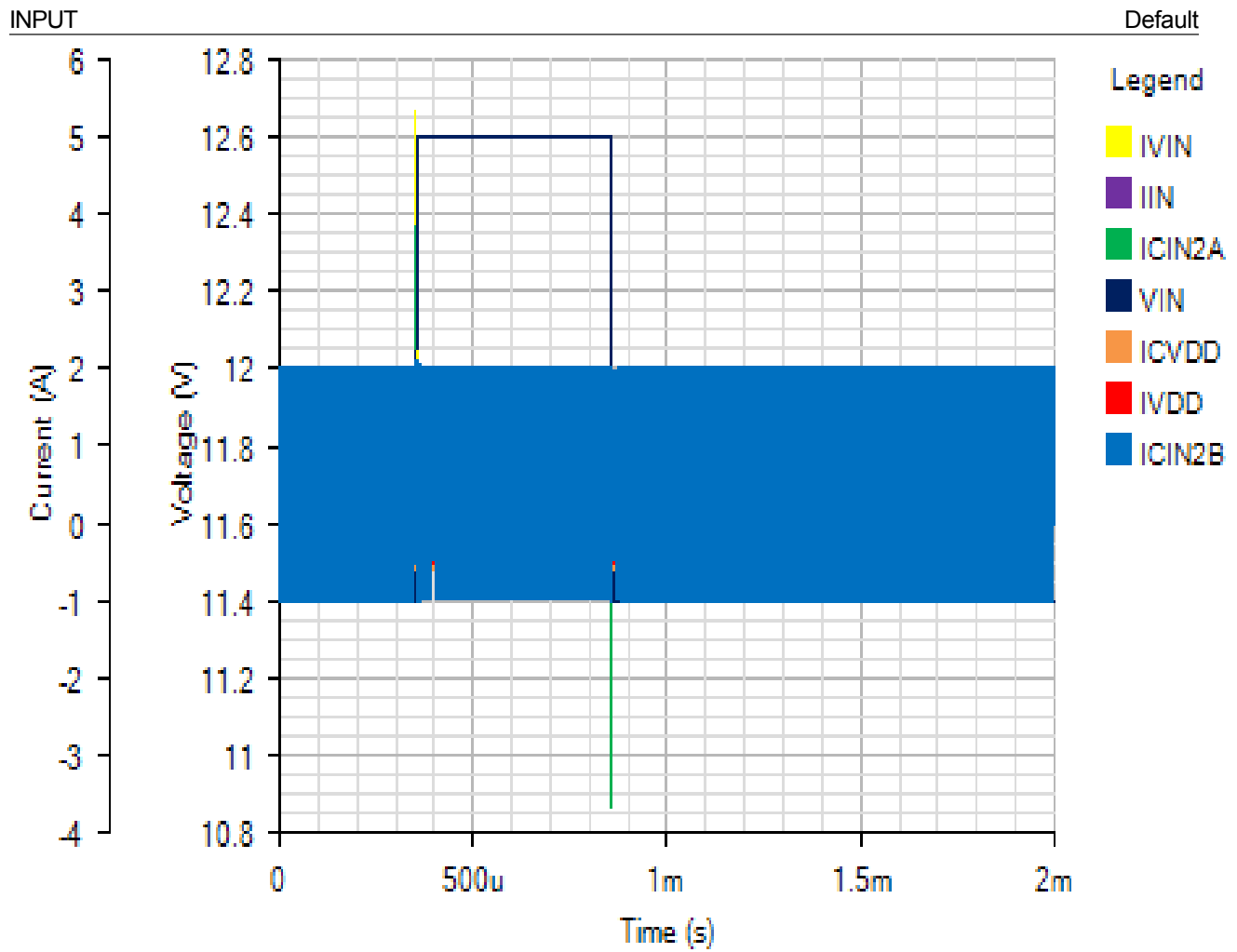
Default



SWITCHING

Default





OUTPUT

Default

