

Initial Design

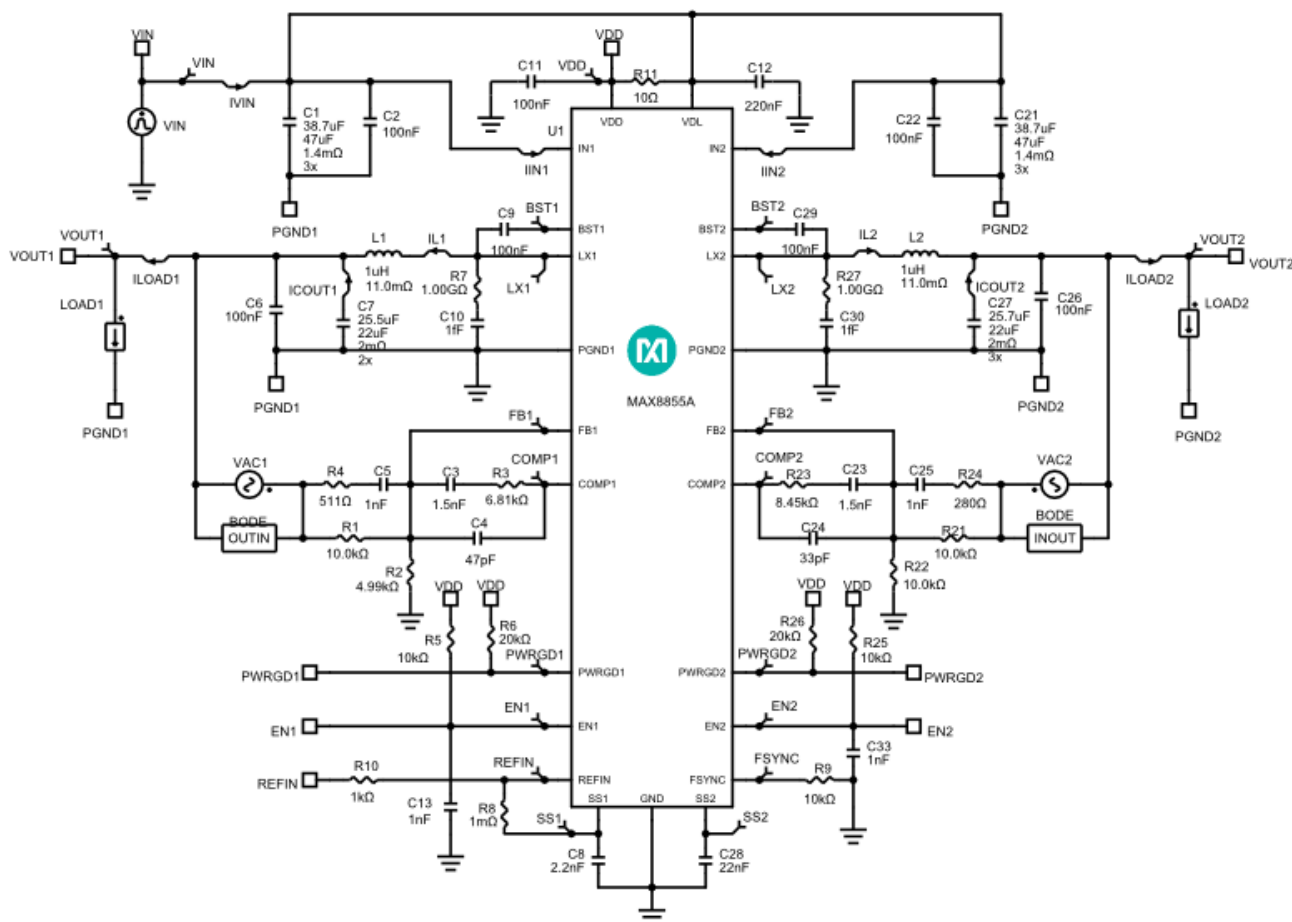
1.0

Design Requirements

Parameter	Value
Part Number	MAX8855A (Vin = 2.25 to 3.6V)
Minimum Input Voltage	3V
Maximum Input Voltage	3.6V
Nominal Input Voltage	3.3V
Input Voltage Ripple	1%
Output Voltage 1	1.8V
Output Voltage 2	1.2V
Output Current 1	3A
Output Current 2	3A
Output Voltage Ripple 1	1%
Output Voltage Ripple 2	1%
Load Step Start Current 1	1.5A
Load Step Start Current 2	1.5A
Load Step Current 1	3A
Load Step Current 2	3A
Load Step Edge Rate 1	1A/us
Load Step Edge Rate 2	1A/us
Output Voltage Load Step Over/Undershoot 1	5%
Output Voltage Load Step Over/Undershoot 2	5%
Performance Priority	Balance Efficiency and Size
BOM Priority	Cost
Inductor Current Ratio (LIR) 1	0.3
Inductor Current Ratio (LIR) 2	0.3

Parameter	Value
Switching Frequency	1000kHz

Schematic



BOM

Ref	Qty	Part Number	Manufacturer	Description
U1	1	MAX8855AETJ+	Maxim	Dual, 5A, 2MHz Step-Down Regulator
C1	3	GRM32EE70J476ME20L	Murata	Cap Ceramic 47uF 6.3V 1210 125C
C2	1	CL10B104MO8NNNC	Samsung Electro-Mechanics	Cap Ceramic 0.1uF 16V X7R 20% Pad SMD 0603 125°C T/R
C3	1	06035C152JAT2A	AVX	Cap Ceramic 0.0015uF 50V X7R 5% Pad SMD 0603 125°C T/R
C4	1	C0603C470K5RACTU	KEMET Corporation	Cap Ceramic 47pF 50V X7R 10% Pad SMD 0603 125°C T/R

C5	1	C1608X7R2A102K080AA	TDK	Cap Ceramic 0.001uF 100V X7R 10% Pad SMD 0603 125°C 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	C0603C222M5RACTU	KEMET Corporation	Cap Ceramic 0.0022uF 50V X7R 20% Pad SMD 0603 125°C T/R
C9	1	CL10B104MB8NNNC	Samsung Electro-Mechanics	Cap Ceramic 0.1uF 50V X7R 20% Pad SMD 0603 125°C T/R
C11	1	CL10B104MB8NNNC	Samsung Electro-Mechanics	Cap Ceramic 0.1uF 50V X7R 20% Pad SMD 0603 125°C T/R
C12	1	GCM188R71H224MA64D	Murata Manufacturing	Cap Ceramic 0.22uF 50V X7R 20% Pad SMD 0603 125°C Automotive T/R
C13	1	C0603C102M3RACTU	KEMET Corporation	Cap Ceramic 0.001uF 25V X7R 20% Pad SMD 0603 125°C T/R
C21	3	GRM32EE70J476ME20L	Murata	Cap Ceramic 47uF 6.3V 1210 125C
C22	1	CL10B104MO8NNNC	Samsung Electro-Mechanics	Cap Ceramic 0.1uF 16V X7R 20% Pad SMD 0603 125°C T/R
C23	1	06035C152JAT2A	AVX	Cap Ceramic 0.0015uF 50V X7R 5% Pad SMD 0603 125°C T/R
C24	1	C0603C330K5RACTU	KEMET Corporation	Cap Ceramic 33pF 50V X7R 10% Pad SMD 0603 125°C T/R
C25	1	C1608X7R2A102K080AA	TDK	Cap Ceramic 0.001uF 100V X7R 10% Pad SMD 0603 125°C T/R
C26	1	CL10B104MB8NNNC	Samsung Electro-Mechanics	Cap Ceramic 0.1uF 50V X7R 20% Pad SMD 0603 125°C T/R
C27	3	GRM32ER71E226ME15	Murata	Cap Ceramic 22uF 25V 1210 125C
C28	1	C0603C223M3RACTU	KEMET Corporation	Cap Ceramic 0.022uF 25V X7R 20% Pad SMD 0603 125°C T/R
C29	1	CL10B104MB8NNNC	Samsung Electro-Mechanics	Cap Ceramic 0.1uF 50V X7R 20% Pad SMD 0603 125°C T/R
C33	1	C0603C102M3RACTU	KEMET Corporation	Cap Ceramic 0.001uF 25V X7R 20% Pad SMD 0603 125°C T/R
L1	1	VLP8040T-1R0N	TDK	Power Inductors 1uH
L2	1	VLP8040T-1R0N	TDK	Power Inductors 1uH
R1	1	ERJ2RKf1002X	Panasonic	Res Thick Film 0402 10K Ohm 1% 0.1W(1/10W) ±100ppm/°C Pad SMD Automotive T/R
R2	1	ERJ2RKf4991X	Panasonic	Res Thick Film 0402 4.99K Ohm 1% 0.1W(1/10W) ±100ppm/°C Pad SMD Automotive T/R
R3	1	ERJ3EKf6811V	Panasonic	Res Thick Film 0603 6.81K Ohm 1% 0.1W(1/10W) ±100ppm/°C Pad SMD Automotive T/R

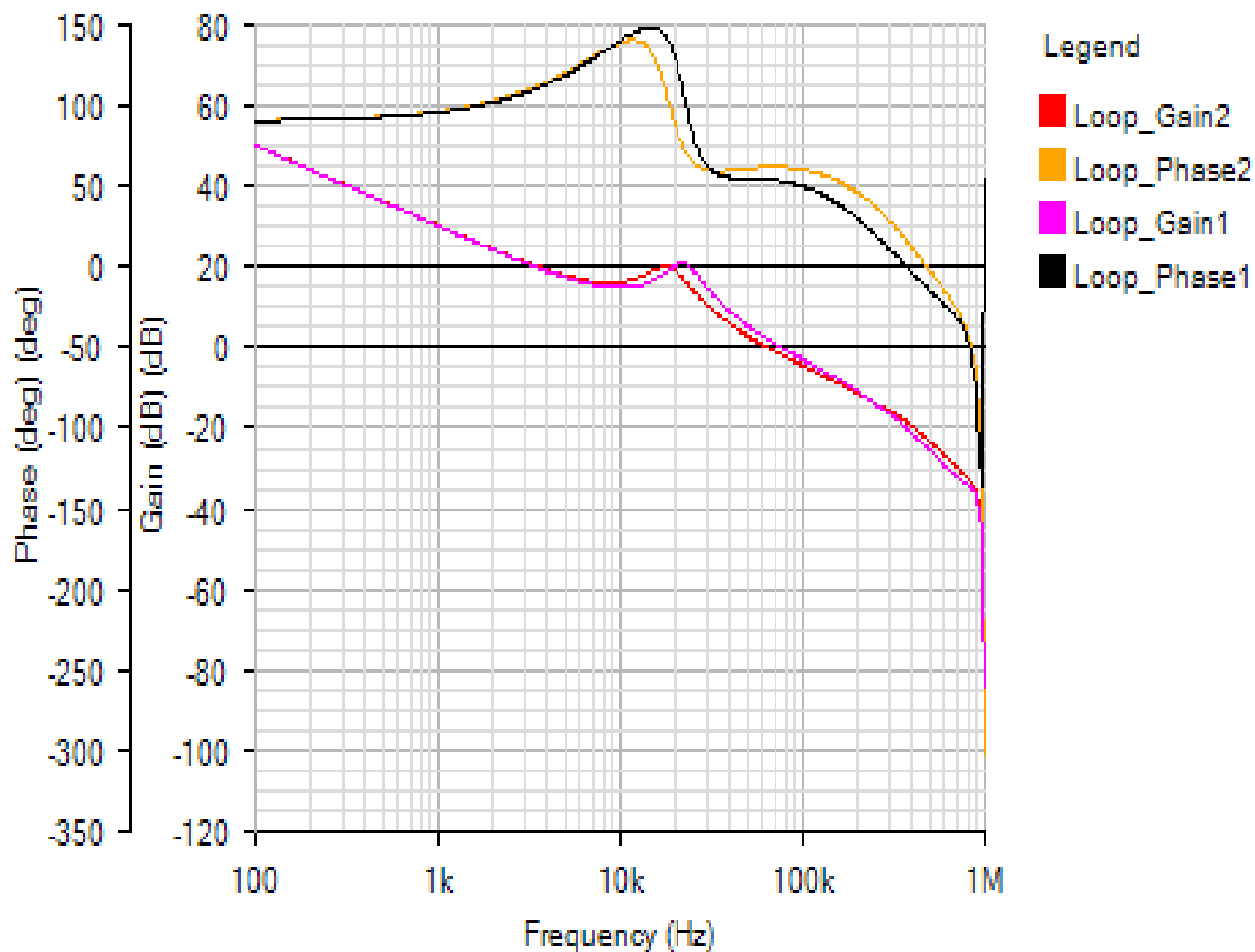
R4	1	ERJ3EKF5110V	Panasonic	Res Thick Film 0603 511 Ohm 1% 0.1W(1/10W) ±100ppm/°C Pad SMD Automotive T/R
R5	1	ERJ2GEJ103X	Panasonic	Res Thick Film 0402 10K Ohm 5% 0.1W(1/10W) ±200ppm/°C Pad SMD Automotive T/R
R6	1	ERJ3GEYJ203V	Panasonic	Res Thick Film 0603 20K Ohm 5% 0.1W(1/10W) ±200ppm/°C Pad SMD Automotive T/R
R9	1	ERJ2GEJ103X	Panasonic	Res Thick Film 0402 10K Ohm 5% 0.1W(1/10W) ±200ppm/°C Pad SMD Automotive T/R
R10	1	ERJ3GEYJ102V	Panasonic	Res Thick Film 0603 1K Ohm 5% 0.1W(1/10W) ±200ppm/°C Pad SMD Automotive T/R
R11	1	ERJ3GEYJ100V	Panasonic	Res Thick Film 0603 10 Ohm 5% 0.1W(1/10W) ±200ppm/°C Pad SMD Automotive T/R
R21	1	ERJ2RKF1002X	Panasonic	Res Thick Film 0402 10K Ohm 1% 0.1W(1/10W) ±100ppm/°C Pad SMD Automotive T/R
R22	1	ERJ2RKF1002X	Panasonic	Res Thick Film 0402 10K Ohm 1% 0.1W(1/10W) ±100ppm/°C Pad SMD Automotive T/R
R23	1	ERJ2RKF8451X	Panasonic	Res Thick Film 0402 8.45K Ohm 1% 0.1W(1/10W) ±100ppm/°C Pad SMD Automotive T/R
R24	1	ERJ3EKF2800V	Panasonic	Res Thick Film 0603 280 Ohm 1% 0.1W(1/10W) ±100ppm/°C Pad SMD Automotive T/R
R25	1	ERJ2GEJ103X	Panasonic	Res Thick Film 0402 10K Ohm 5% 0.1W(1/10W) ±200ppm/°C Pad SMD Automotive T/R
R26	1	ERJ3GEYJ203V	Panasonic	Res Thick Film 0603 20K Ohm 5% 0.1W(1/10W) ±200ppm/°C Pad SMD Automotive T/R

Simulation Results

AC Loop - Wed Nov 21 2018 16:31:05

BODE

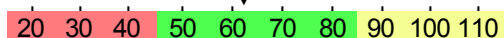
Default



Phase Margin (output #1): 53.28° at a crossover frequency of 76.6kHz



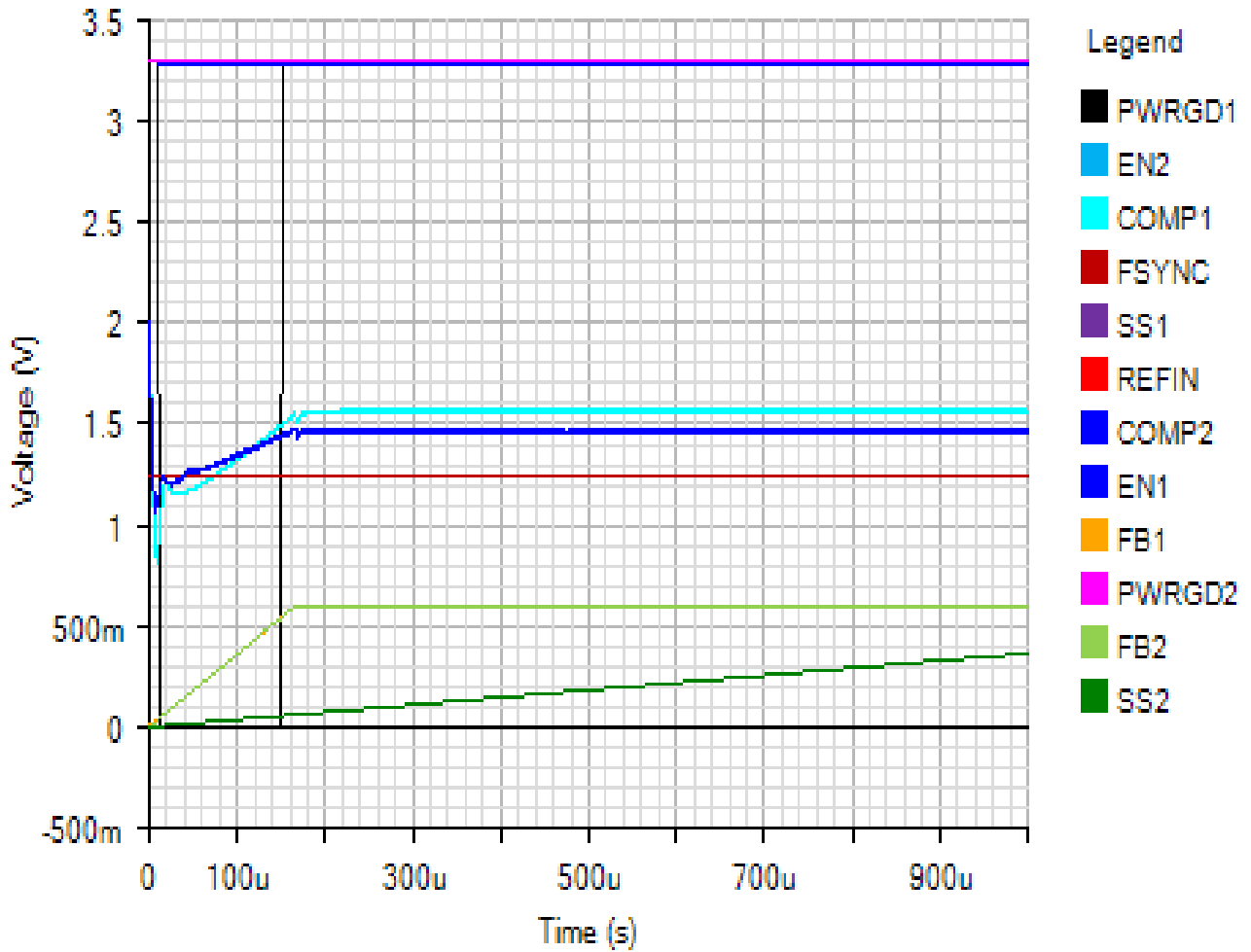
Phase Margin (output #2): 62.12° at a crossover frequency of 64.4kHz



Start Up - Wed Nov 21 2018 16:31:05

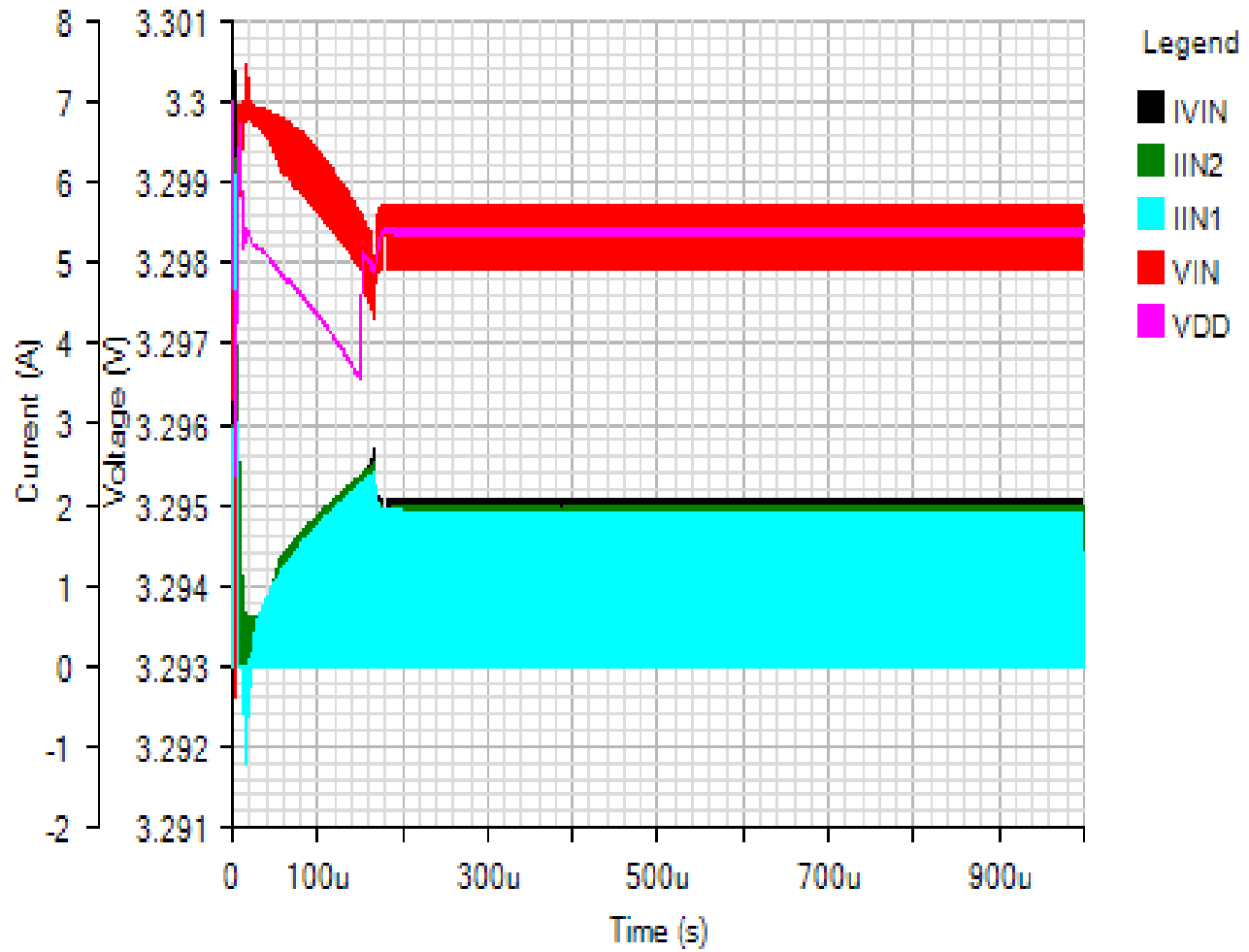
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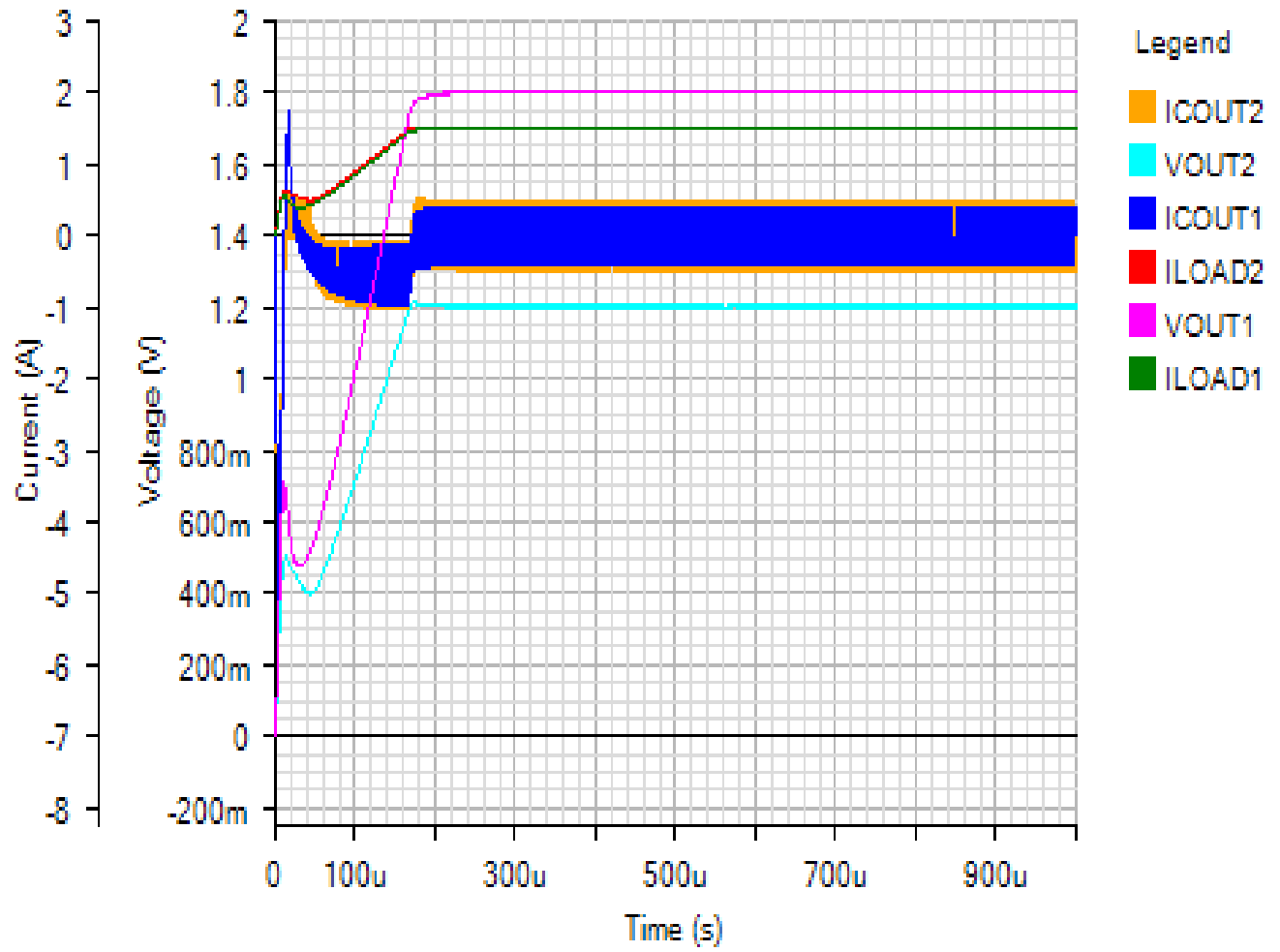
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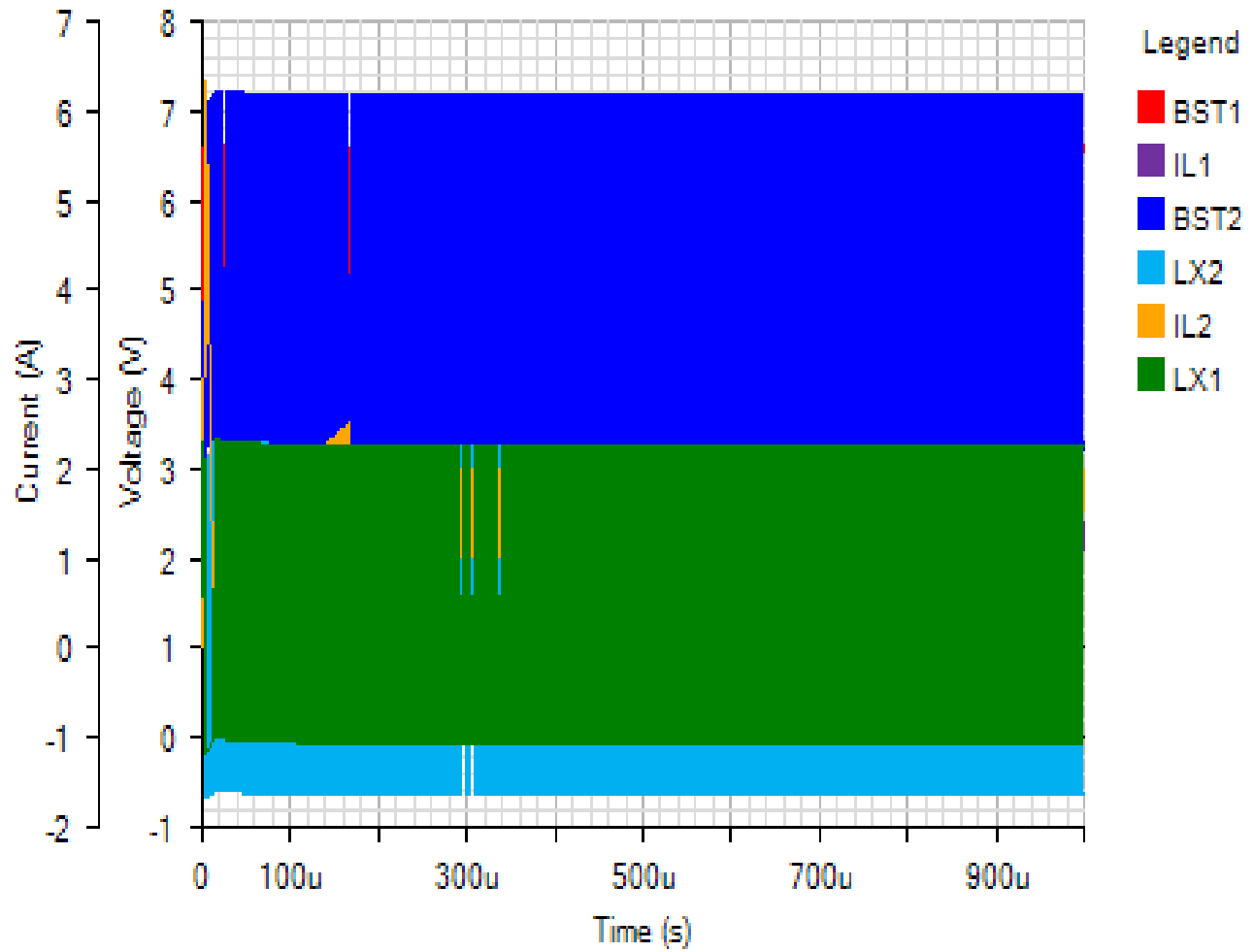
OUTPUT

Default



SWITCHING

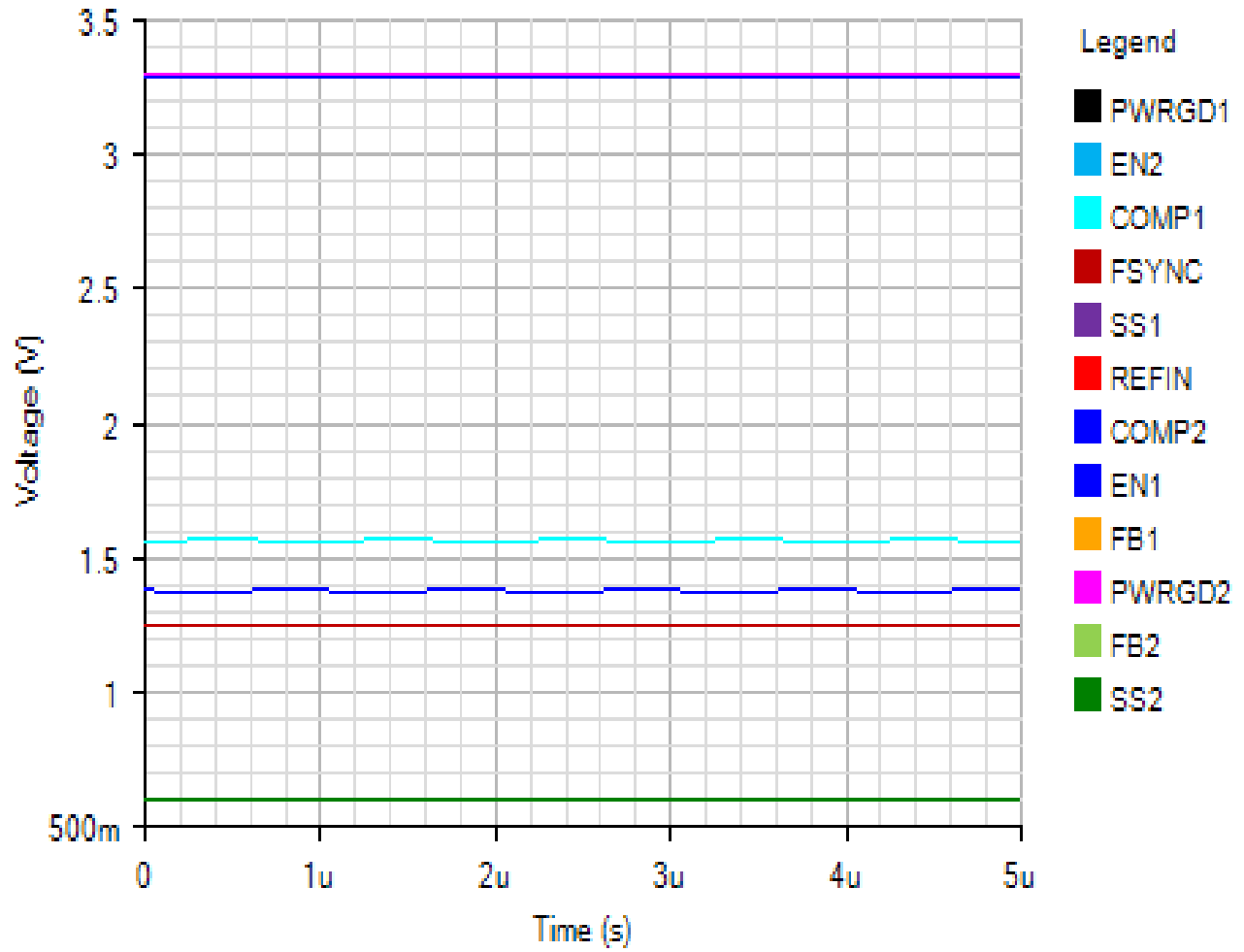
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Steady State - Wed Nov 21 2018 16:31:05

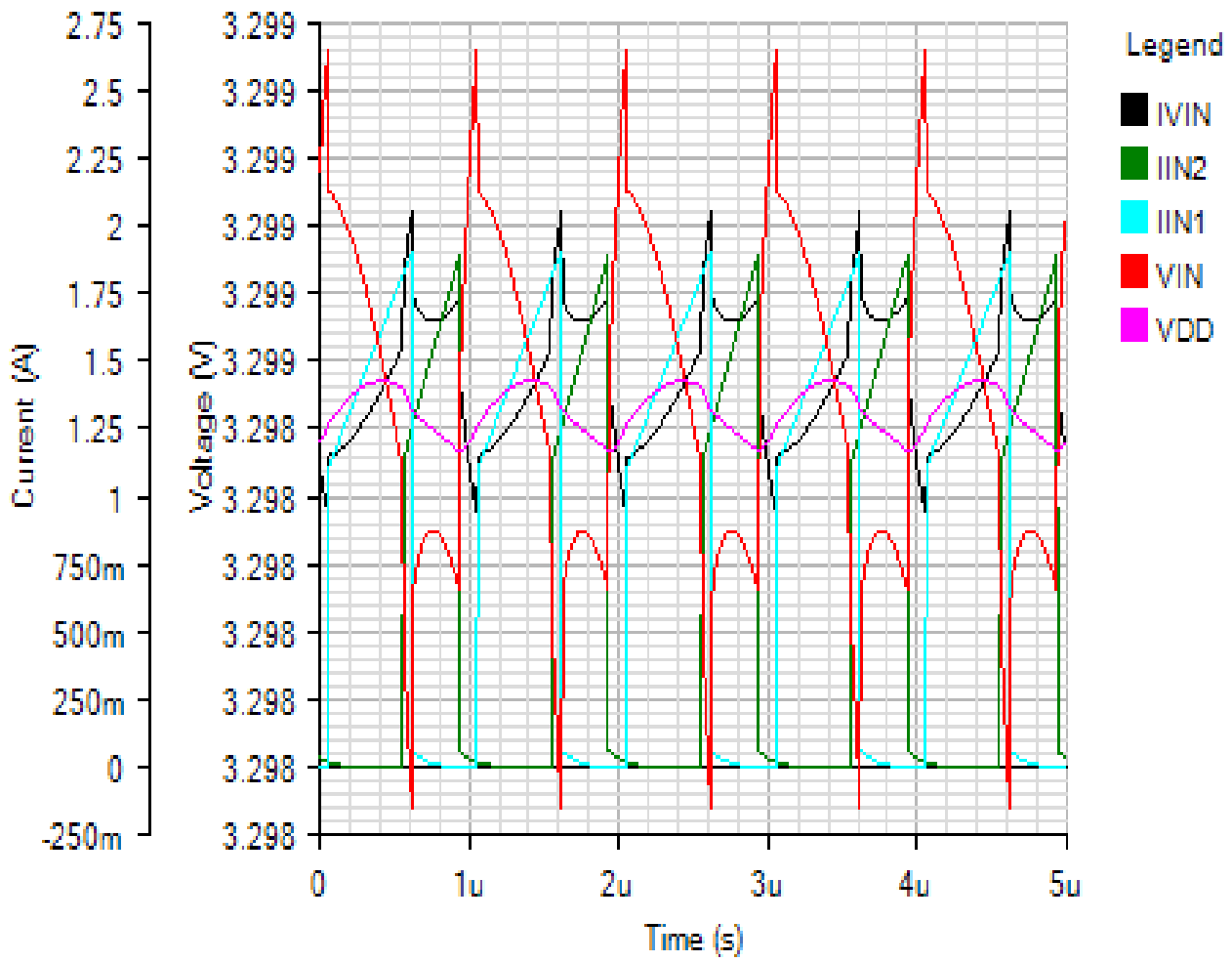
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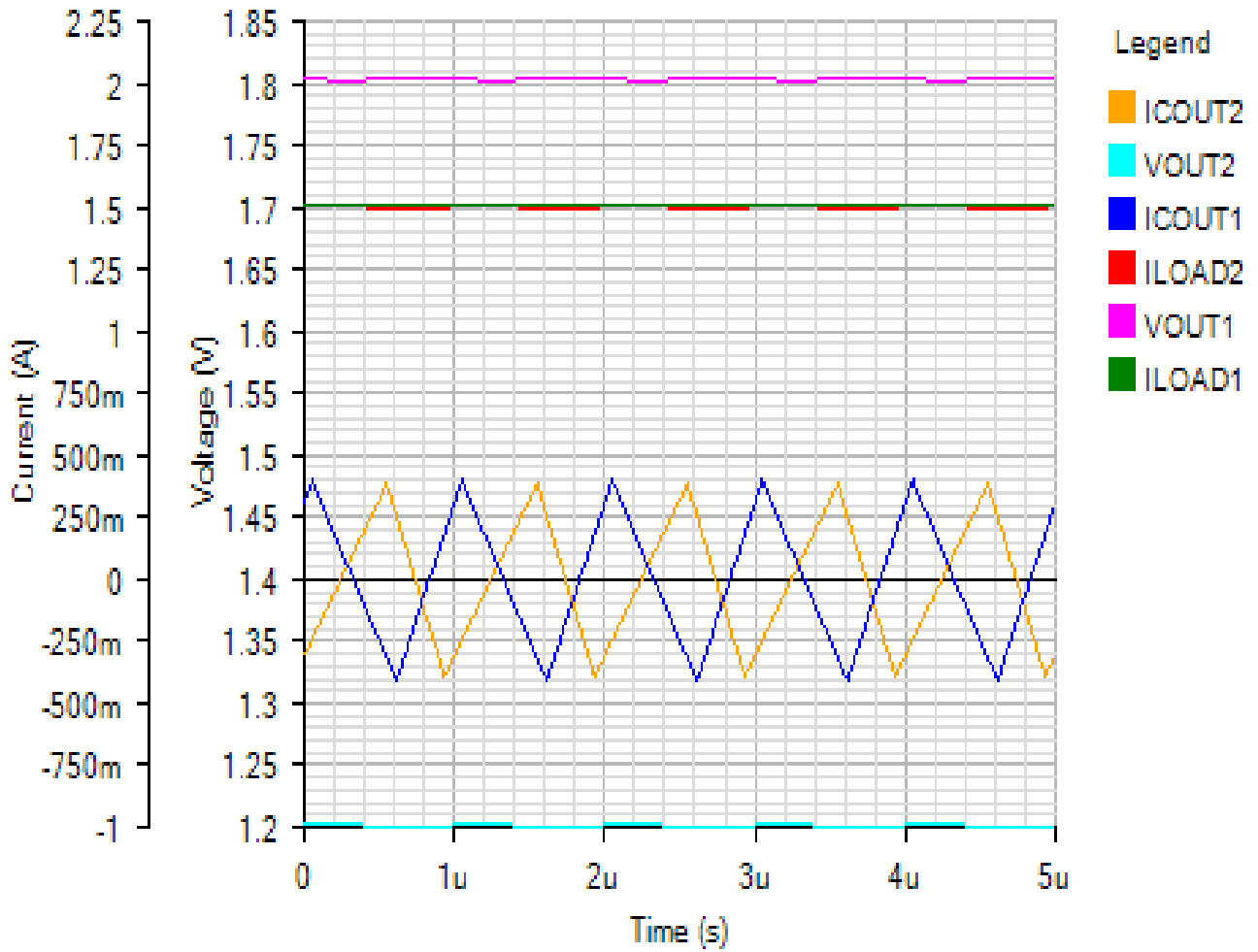
INPUT

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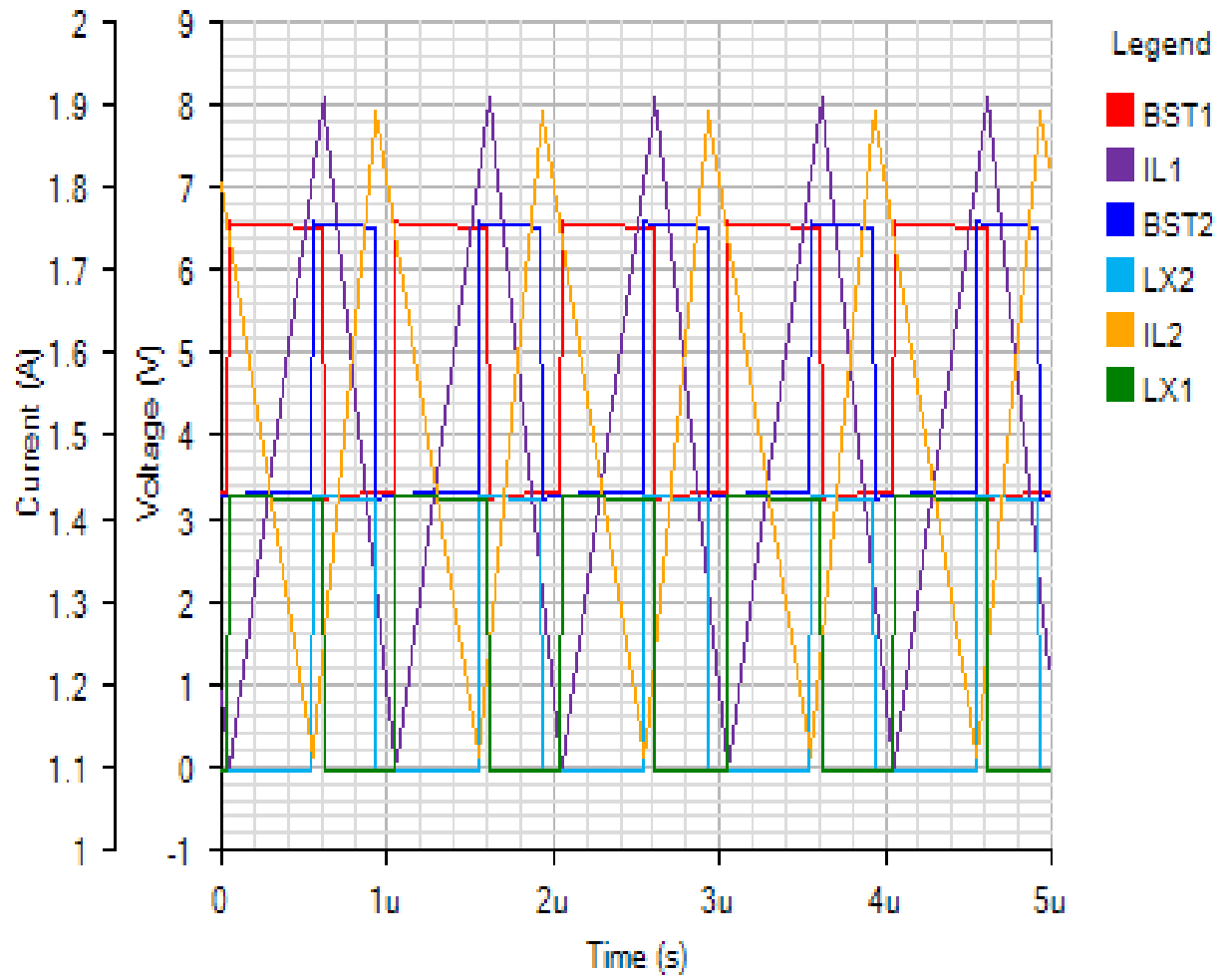
OUTPUT

Default



SWITCHING

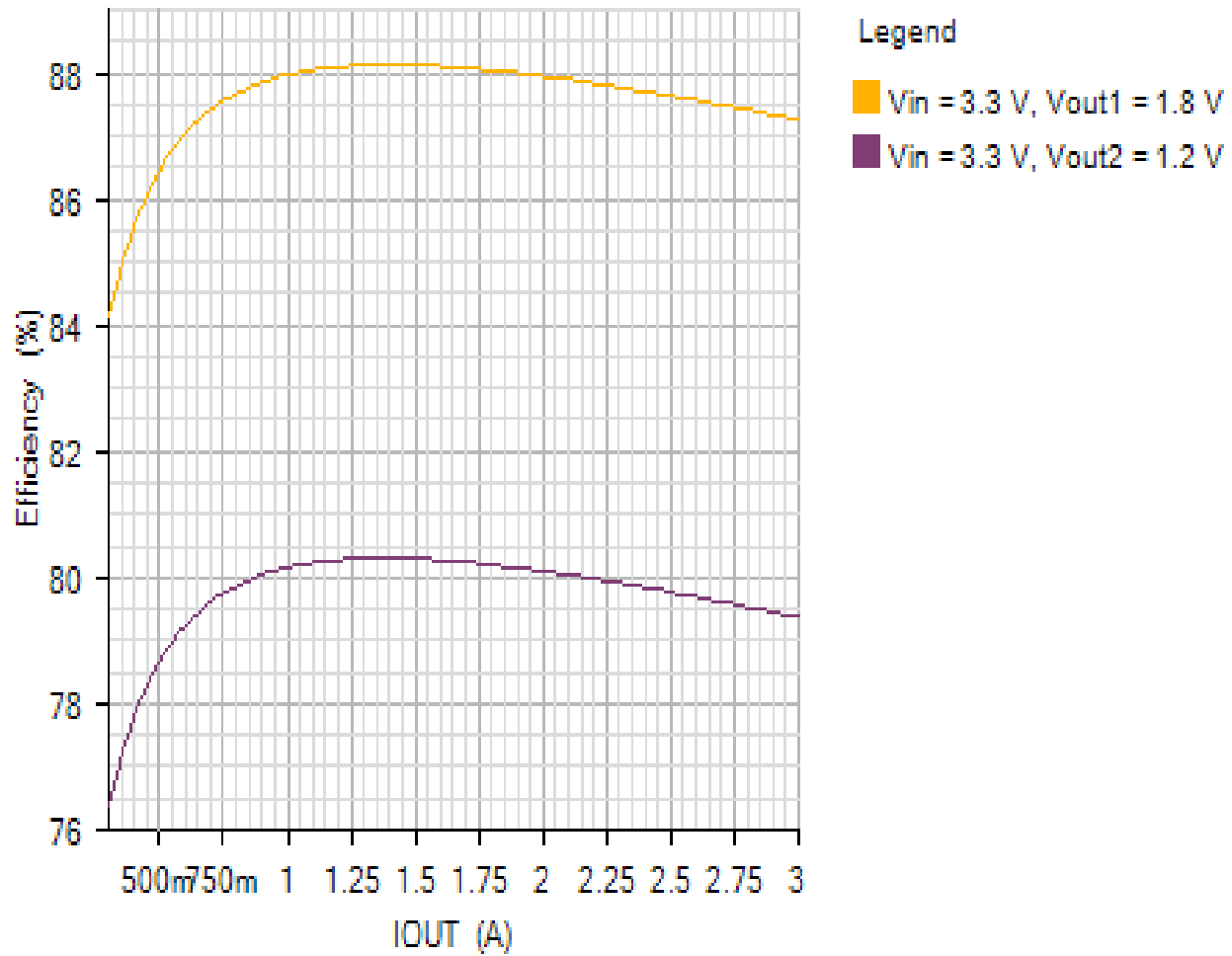
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Efficiency - Wed Nov 21 2018 16:31:05

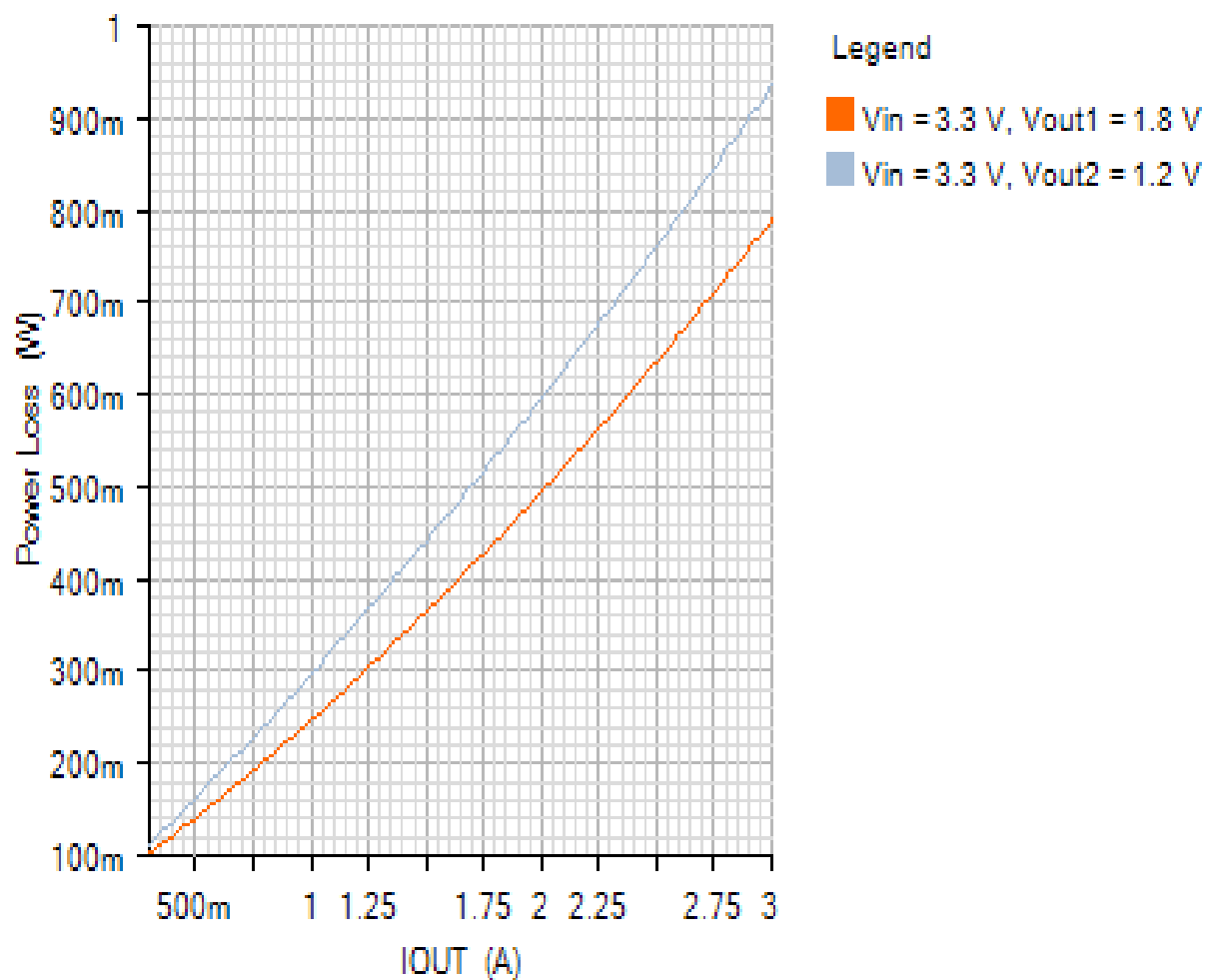
EFFICIENCY_PLOT

Default

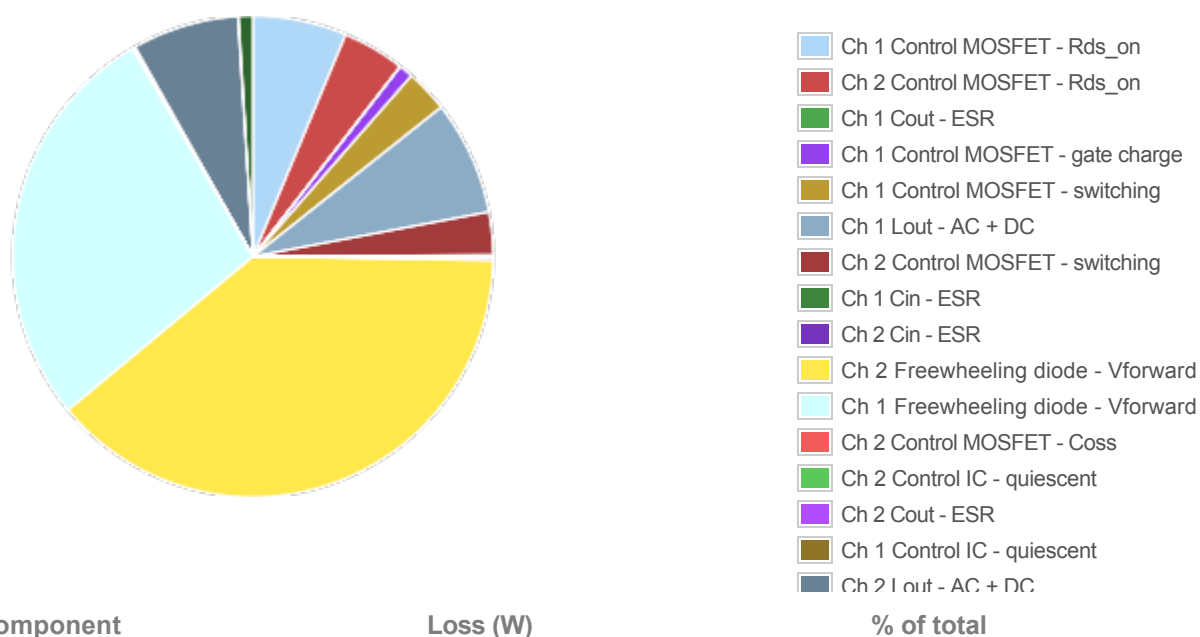


POWER_LOSS_PLOT

Default



Losses

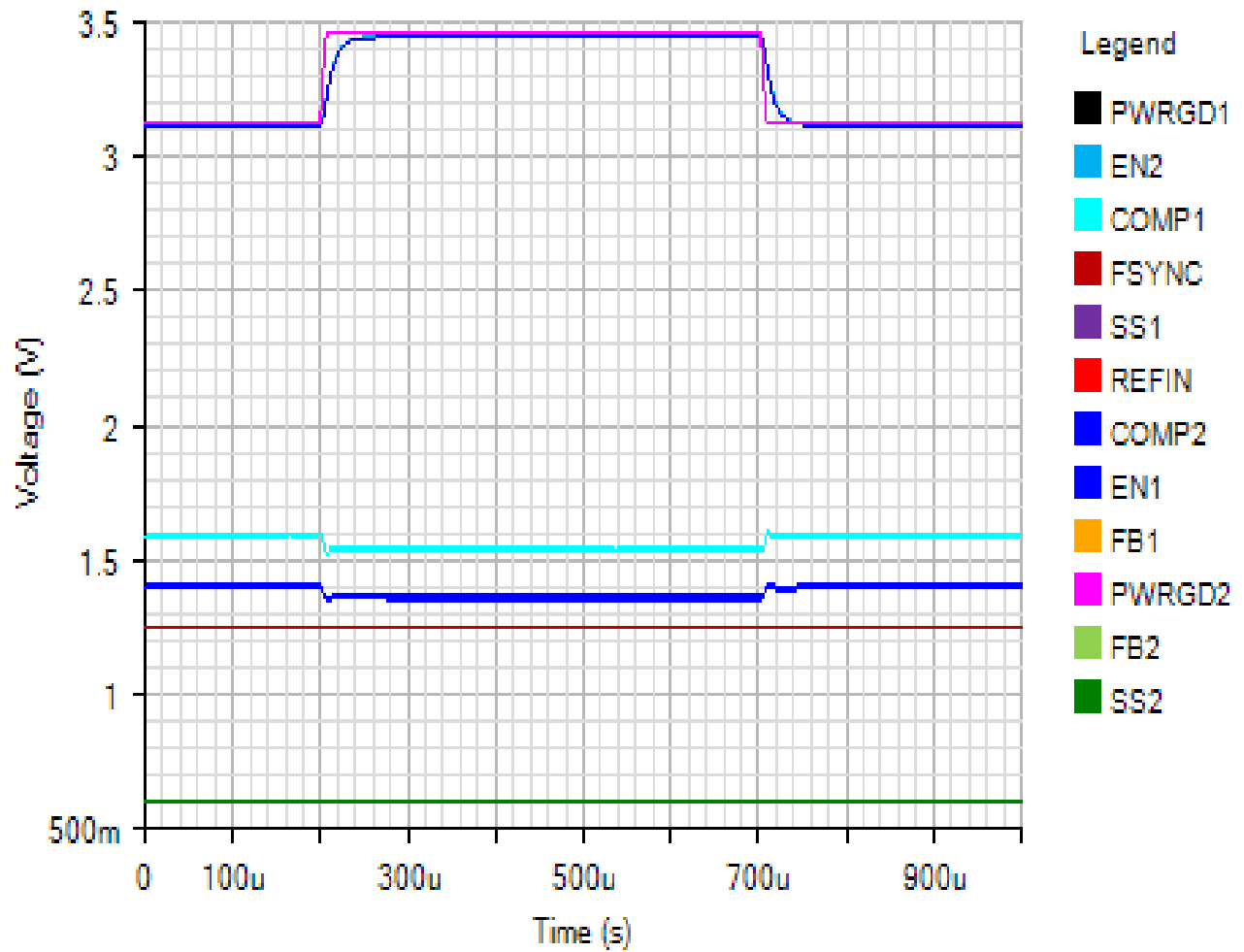


Ch 1 Control MOSFET - Rds_on	0.108814	6.3
Ch 2 Control MOSFET - Rds_on	0.072389	4.2
Ch 1 Cout - ESR	0.000112	0
Ch 1 Control MOSFET - gate charge	0.0165	1
Ch 1 Control MOSFET - switching	0.0495	2.9
Ch 1 Lout - AC + DC	0.132626	7.7
Ch 2 Control MOSFET - switching	0.0495	2.9
Ch 1 Cin - ESR	0.003123	0.2
Ch 2 Cin - ESR	0.002916	0.2
Ch 2 Freewheeling diode - Vforward	0.668182	38.7
Ch 1 Freewheeling diode - Vforward	0.476508	27.6
Ch 2 Control MOSFET - Coss	0.000882	0.1
Ch 2 Control IC - quiescent	0.00132	0.1
Ch 2 Cout - ESR	0.000097	0
Ch 1 Control IC - quiescent	0.00132	0.1
Ch 2 Lout - AC + DC	0.123507	7.2
Ch 1 Control MOSFET - Coss	0.000882	0.1
Ch 2 Control MOSFET - gate charge	0.0165	1
Total	1.724677	100

Line Transient - Wed Nov 21 2018 16:31:05

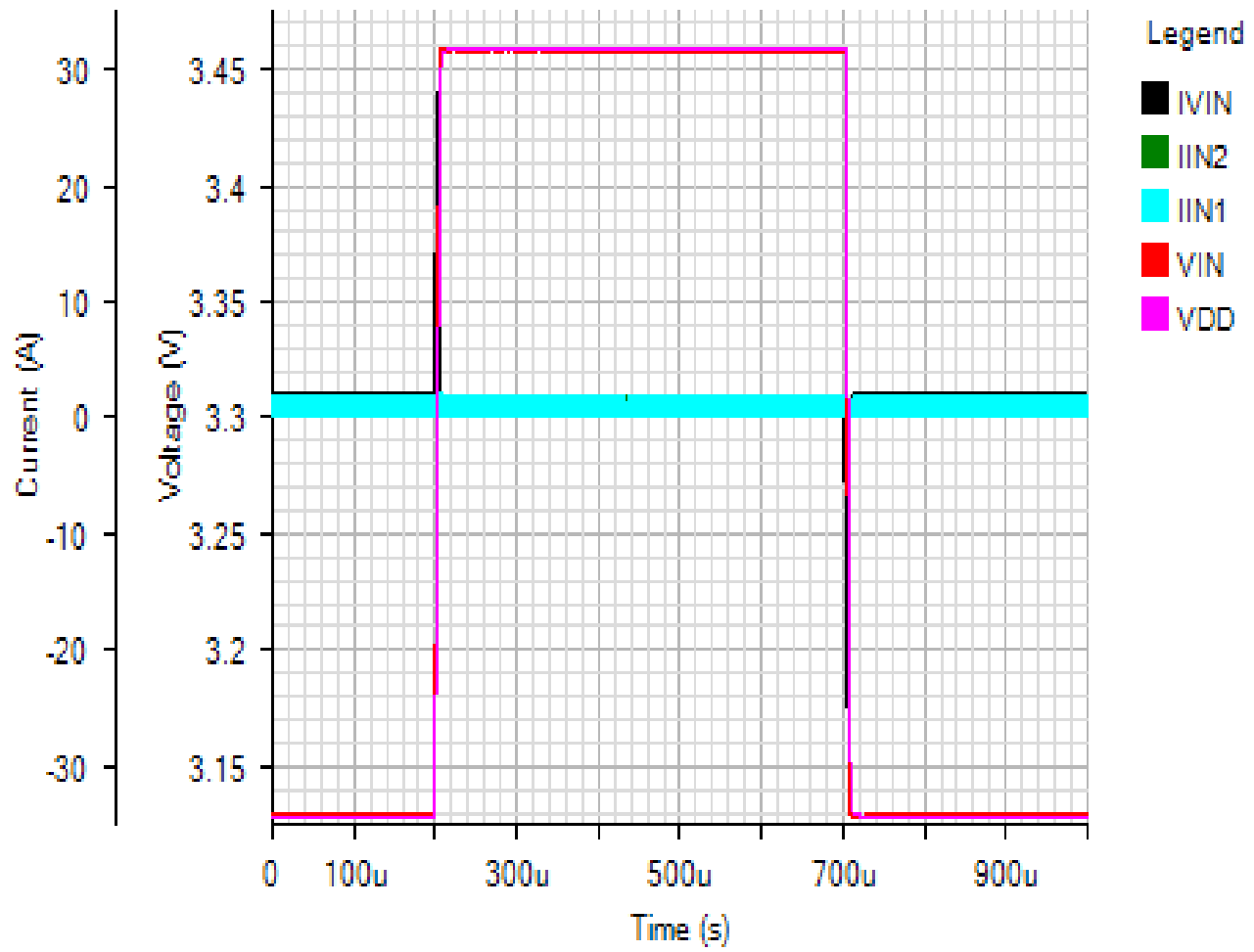
IC

Default



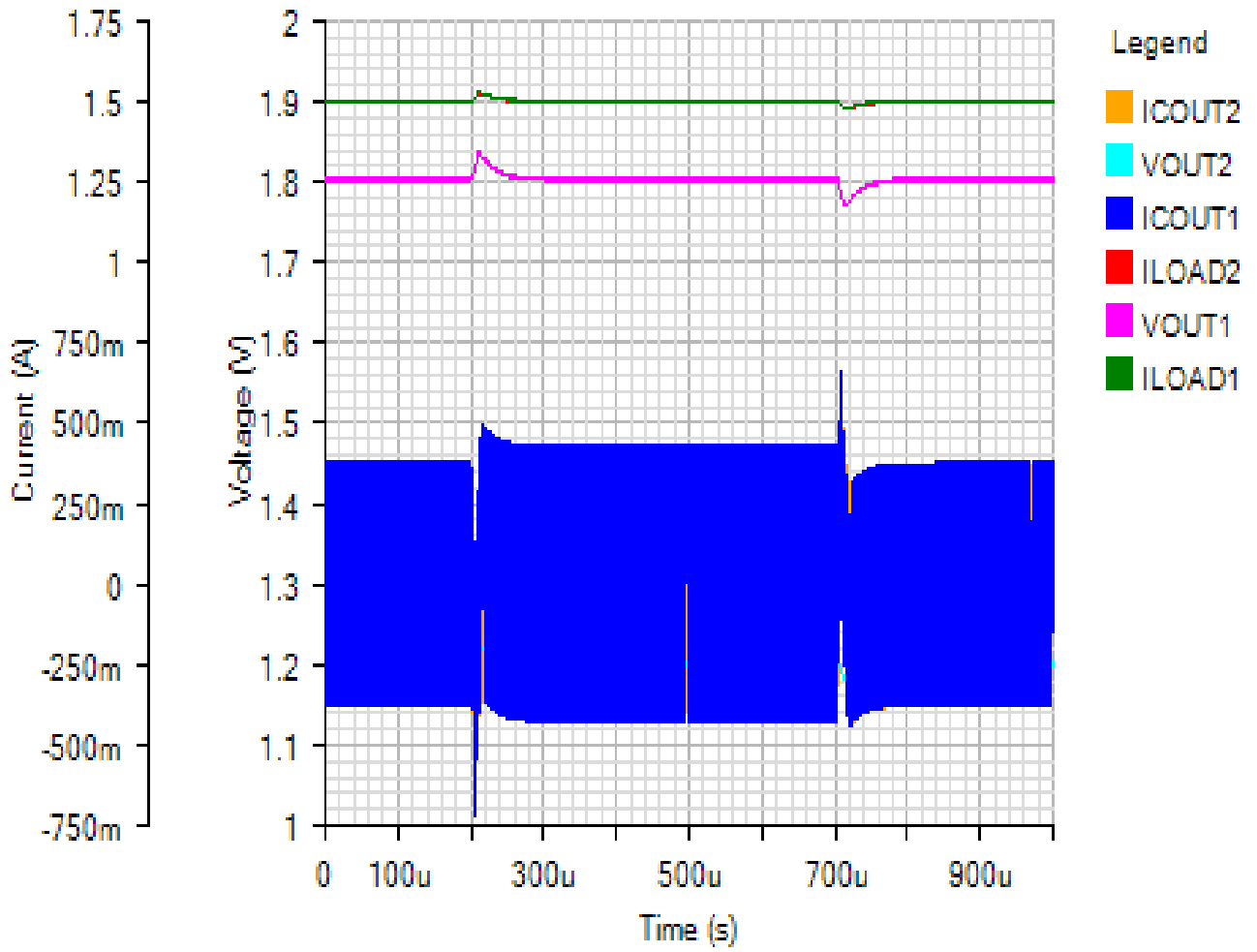
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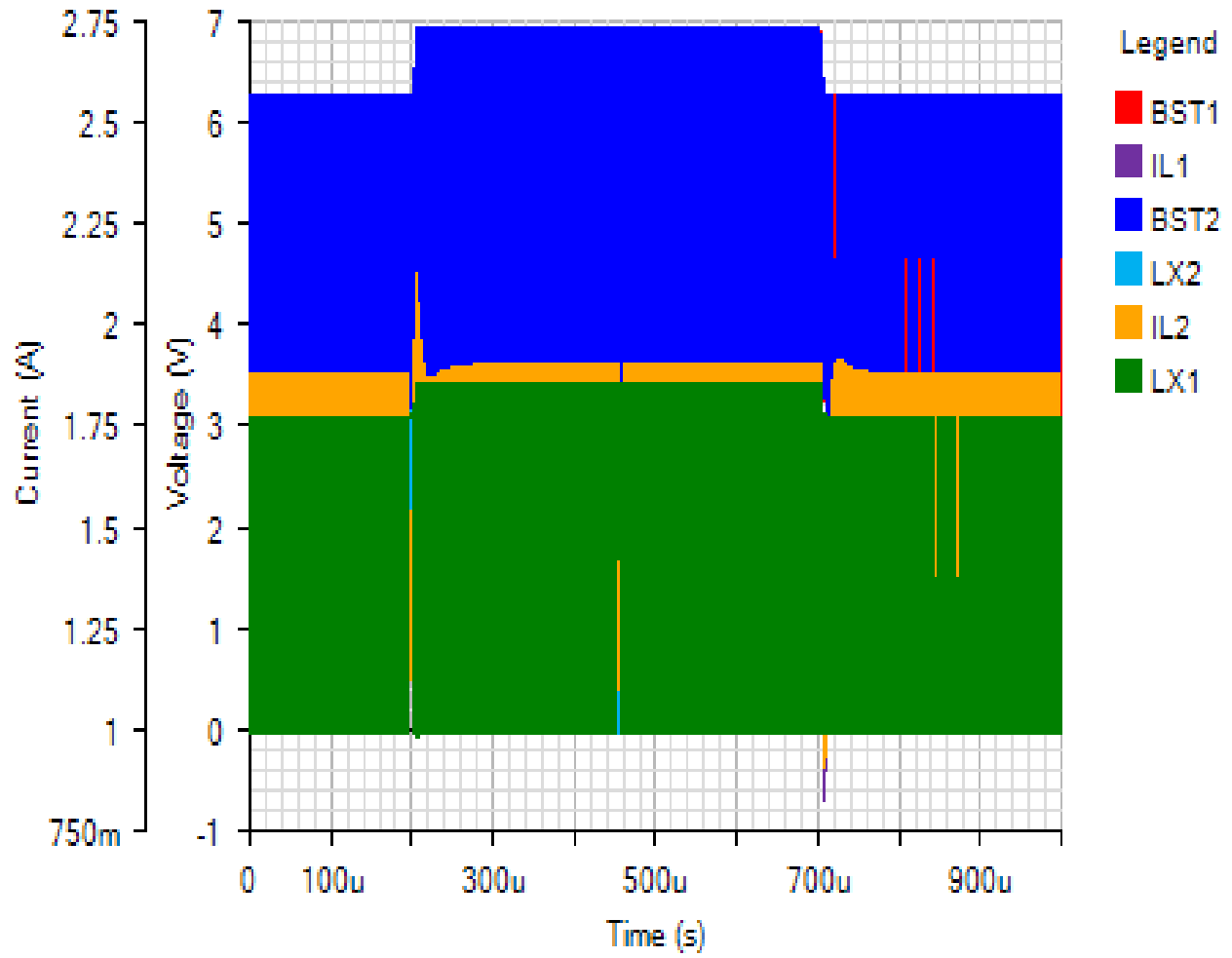
OUTPUT

Default



SWITCHING

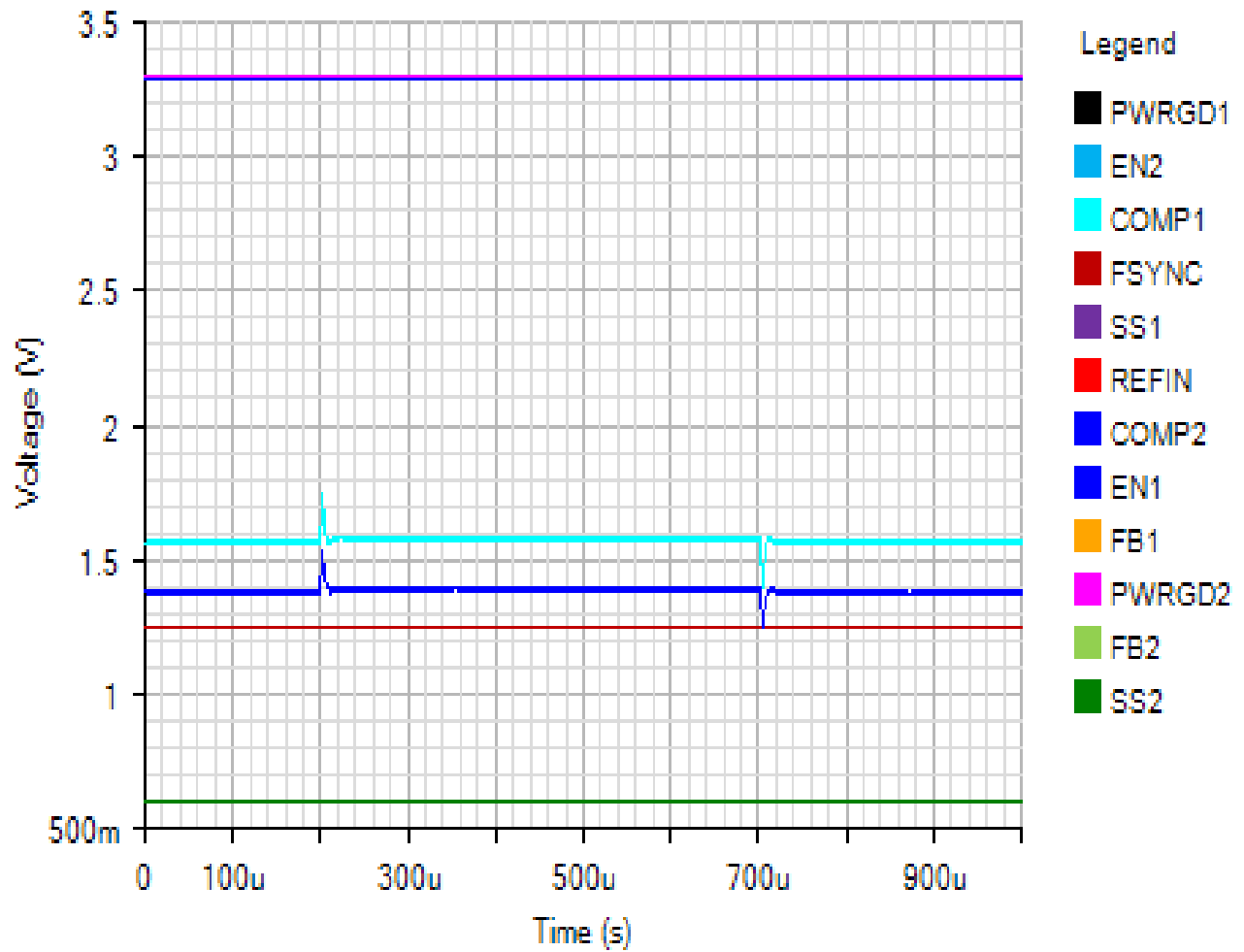
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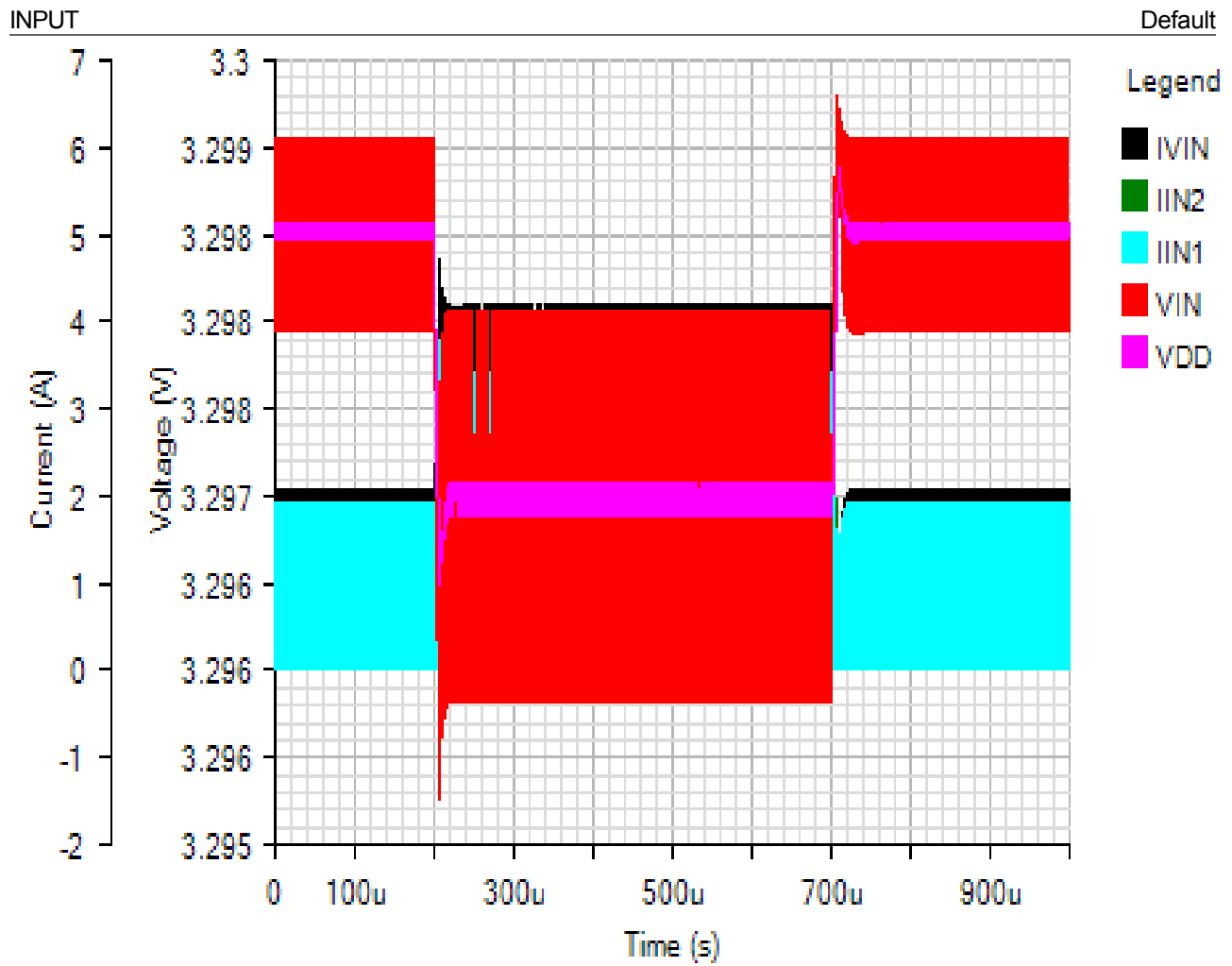


Load Step - Wed Nov 21 2018 16:31:05

IC

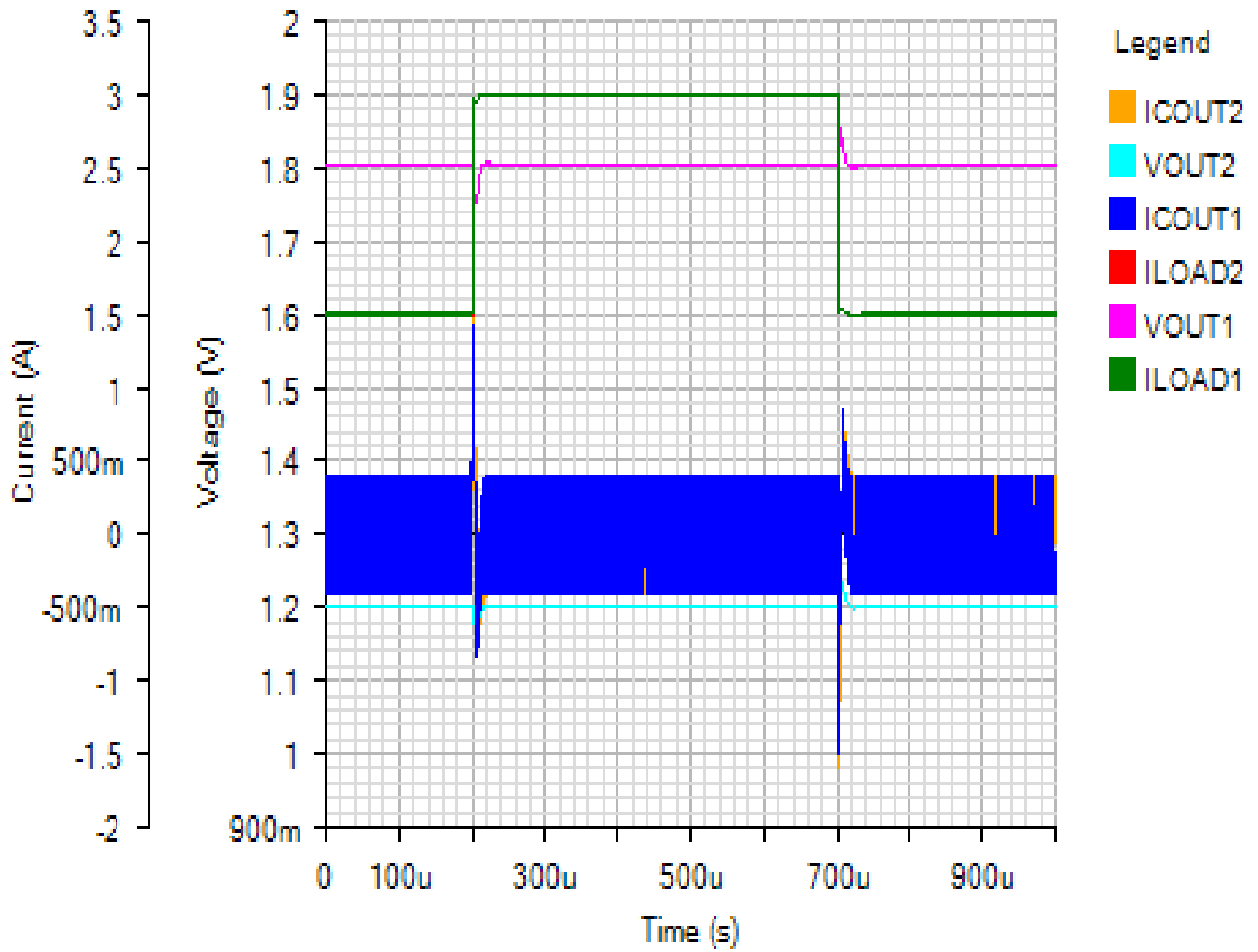
Default





OUTPUT

Default



SWITCHING

Default

