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	1.8V
Output Current	2A
Output Voltage Ripple	1%
Load Step Start Current	1A
Load Step Current	2A
Load Step Edge Rate	5A/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

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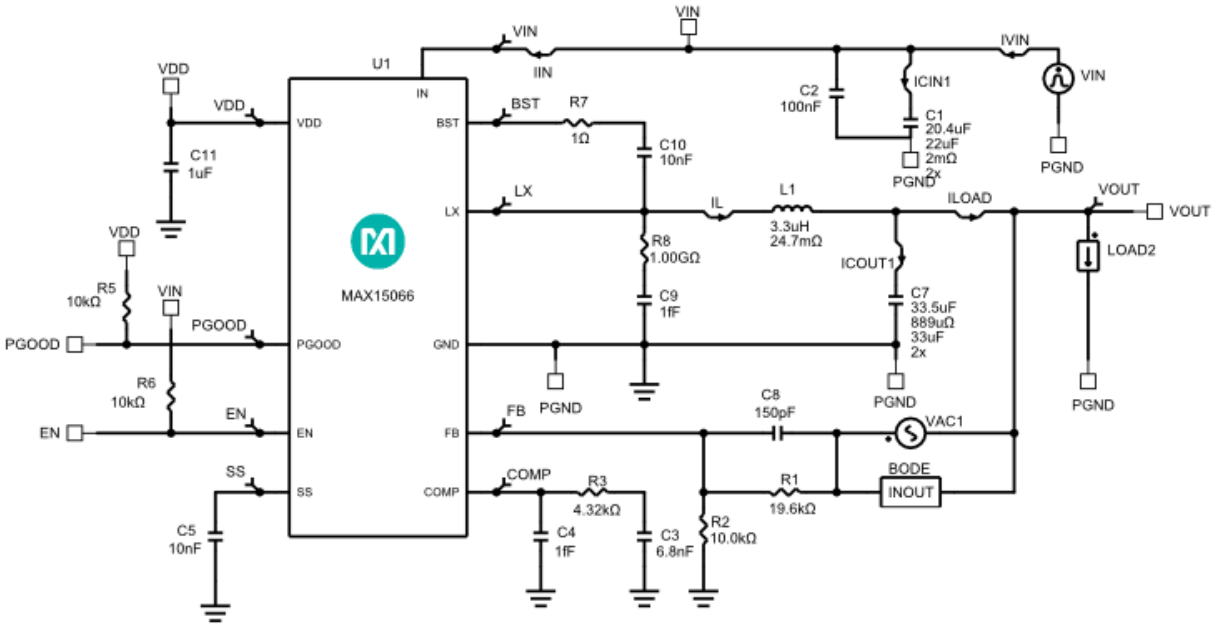
Schematic



If the current level (starting current for Load Steps) is too low, AC, Steady State and Load Step analyses may fail due to skip mode operation

BOM

Ref	Qty	Part Number	Manufacturer	Description
U1	1	MAX15066EWE+T	Maxim Integrated	High-Efficiency, 4A, Step-Down DC-DC Regulator with Internal Power Switches
C1	2	GRM32ER71E226ME15	Murata	Cap Ceramic 22uF 25V 1210 125C
C2	1	C4532X7R2J104K230KA	TDK	Cap Ceramic 0.1uF 630V X7R 10% Pad SMD 1812 125°C T/R
C3	1	08051C682KAT2A	AVX	Cap Ceramic 0.0068uF 100V X7R 10% Pad SMD 0805 125°C T/R
C5	1	C2012X7R2E103K125AA	TDK	Cap Ceramic 0.01uF 250V X7R 10% Pad SMD 0805 125°C T/R
C7	2	C4532X7R1C336M250KC	TDK	Cap Ceramic 33uF 16V X7R 20% SMD 1812 125C Plastic T/R
C8	1	0201YC151KAT2A	AVX	Cap Ceramic 150pF 16V X7R 10% Pad SMD 0201 125°C T/R
C10	1	C2012X7R2E103K125AA	TDK	Cap Ceramic 0.01uF 250V X7R 10% Pad SMD 0805 125°C T/R
C11	1	C5750X7R2E105K230KA	TDK	Cap Ceramic 1uF 250V X7R 10% Pad SMD 2220 125°C T/R
L1	1	CLF6045T-3R3N	TDK	Inductor 3.3uH 30% 19mOhm 3.1A Isat 3.5A Irms
R1	1	TFCR0603-10W-E-1962FT	Venkel	Res Thin Film 0603 19.6K Ohm 1% 0.1W(1/10W) ±25ppm/°C Pad SMD T/R

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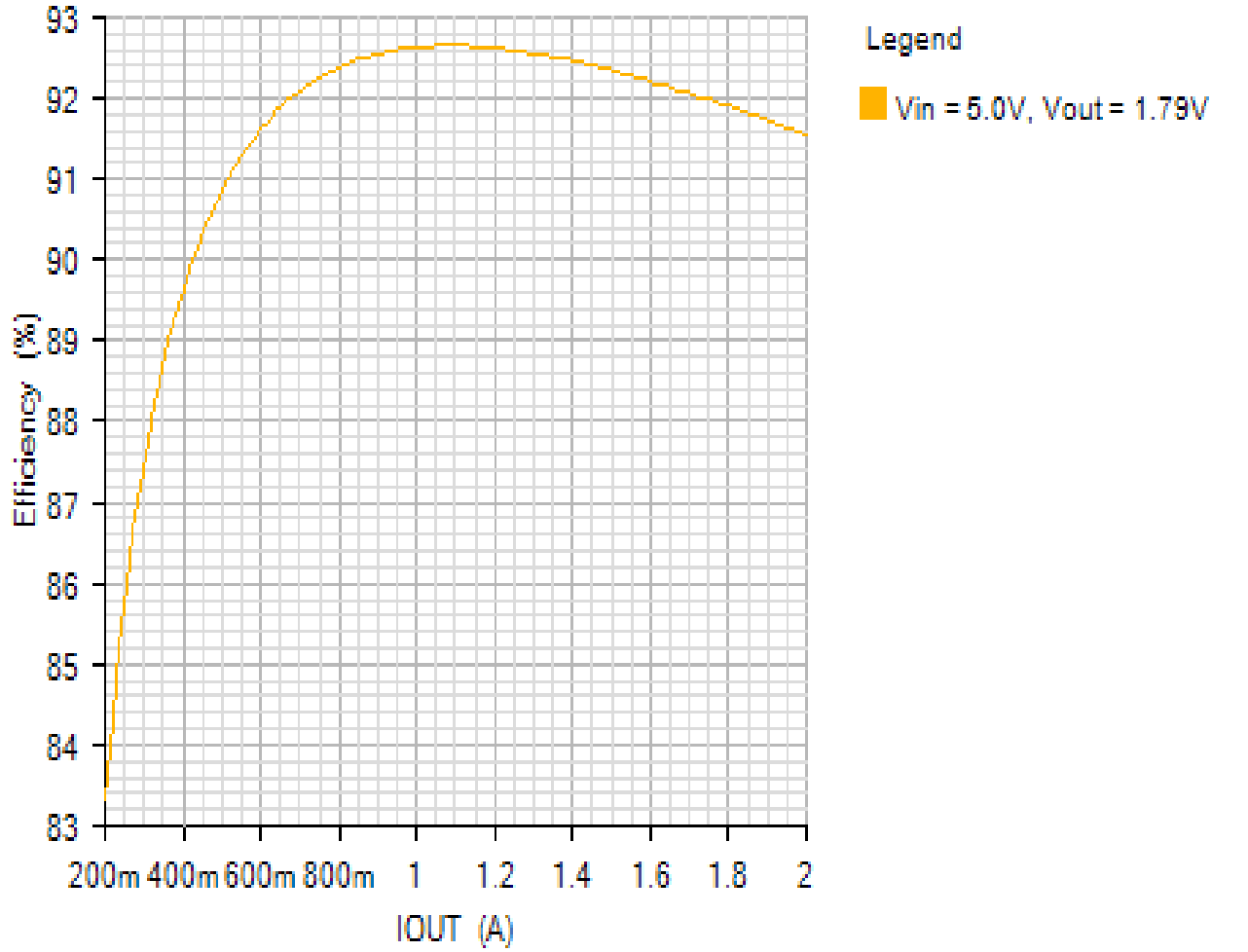
R2	1	CPF0603F10KC1	TE Connectivity	Res Thin Film 0603 10K Ohm 1% 0.063W(1/16W) ±50ppm/°C Epoxy Pad SMD T/R
R3	1	TFCR0603-16W-E-4321FT	Venkel	Res Thin Film 0603 4.32K Ohm 1% 0.063W(1/16W) ±25ppm/°C Pad SMD T/R
R5	1	CPF0603F10KC1	TE Connectivity	Res Thin Film 0603 10K Ohm 1% 0.063W(1/16W) ±50ppm/°C Epoxy Pad SMD T/R
R6	1	CPF0603F10KC1	TE Connectivity	Res Thin Film 0603 10K Ohm 1% 0.063W(1/16W) ±50ppm/°C Epoxy Pad SMD T/R
R7	1	CRL0603-FW-1R00ELF	Bourns	Res Thick Film 0603 1 Ohm 1% 0.1W(1/10W) ±200ppm/°C Pad SMD T/R

Simulation Results

Efficiency - Mon Nov 19 2018 11:14:08

EFFICIENCY_PLOT Default



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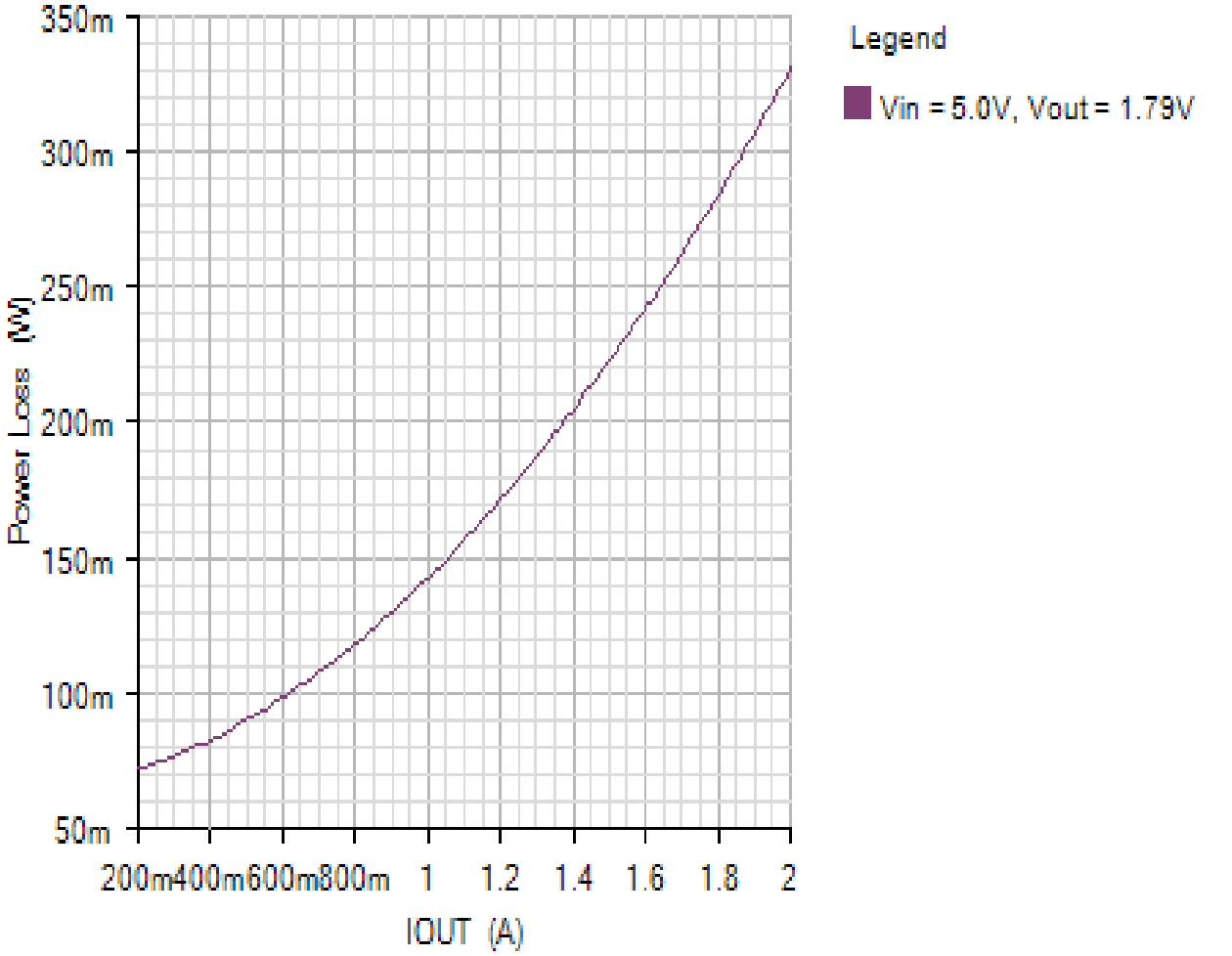
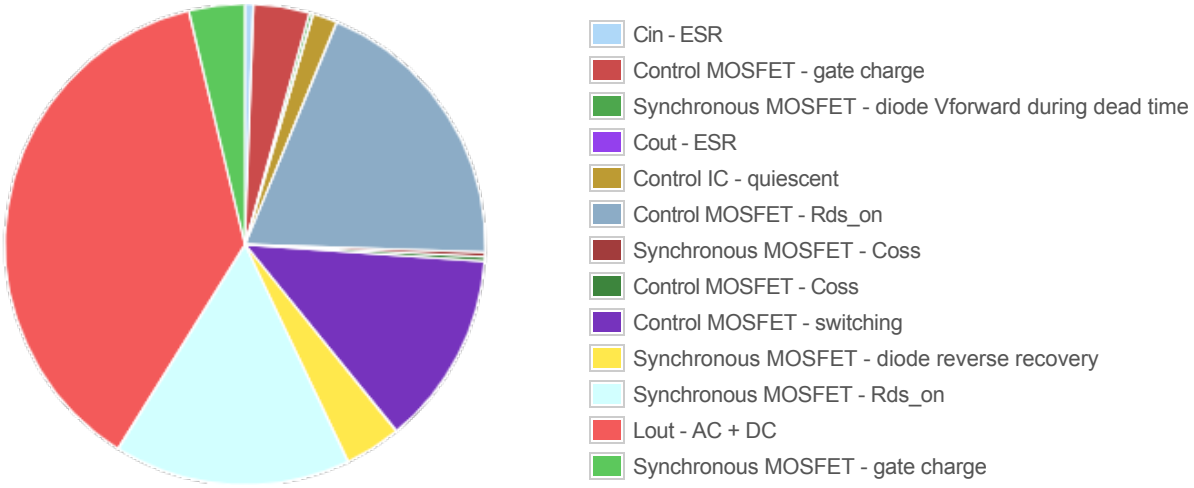
POWER_LOSS_PLOT Default



Losses



Component	Loss (W)	% of total

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Component	Loss (W)	% of total
Cin - ESR	0.00184	0.6
Control MOSFET - gate charge	0.0125	3.8
Synchronous MOSFET - diode Vforward during dead time	0.0008	0.2
Cout - ESR	0.000036	0
Control IC - quiescent	0.0055	1.7
Control MOSFET - Rds_on	0.06378	19.3
Synchronous MOSFET - Coss	0.001013	0.3
Control MOSFET - Coss	0.001013	0.3
Control MOSFET - switching	0.043103	13
Synchronous MOSFET - diode reverse recovery	0.0125	3.8
Synchronous MOSFET - Rds_on	0.052726	15.9
Lout - AC + DC	0.123726	37.4
Synchronous MOSFET - gate charge	0.0125	3.8
Total	0.331036	100

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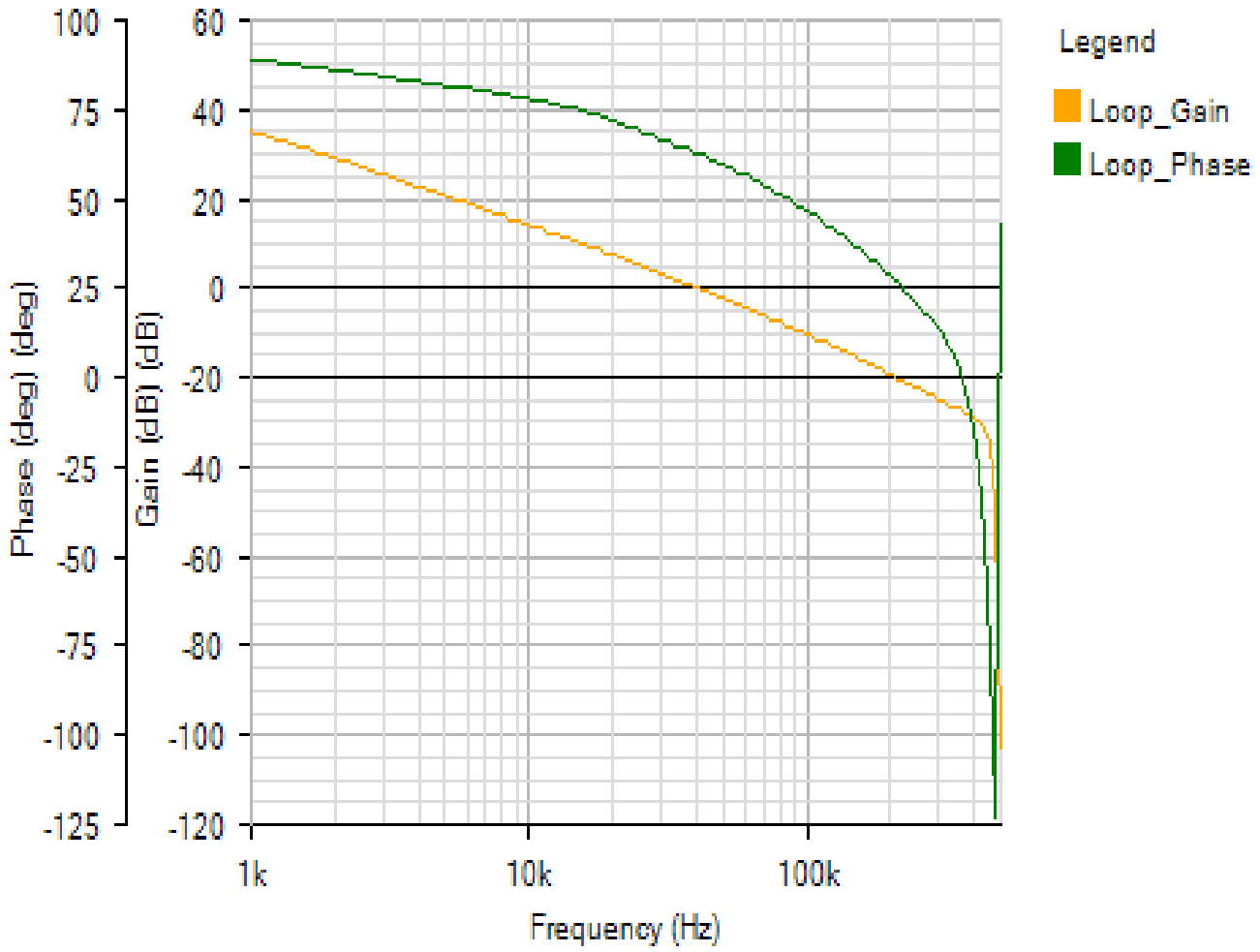
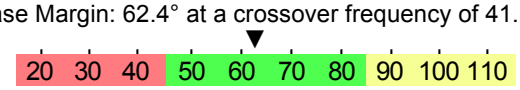
AC Loop - Mon Nov 19 2018 11:14:08

BODE Default



Phase Margin: 62.4° at a crossover frequency of 41.1kHz



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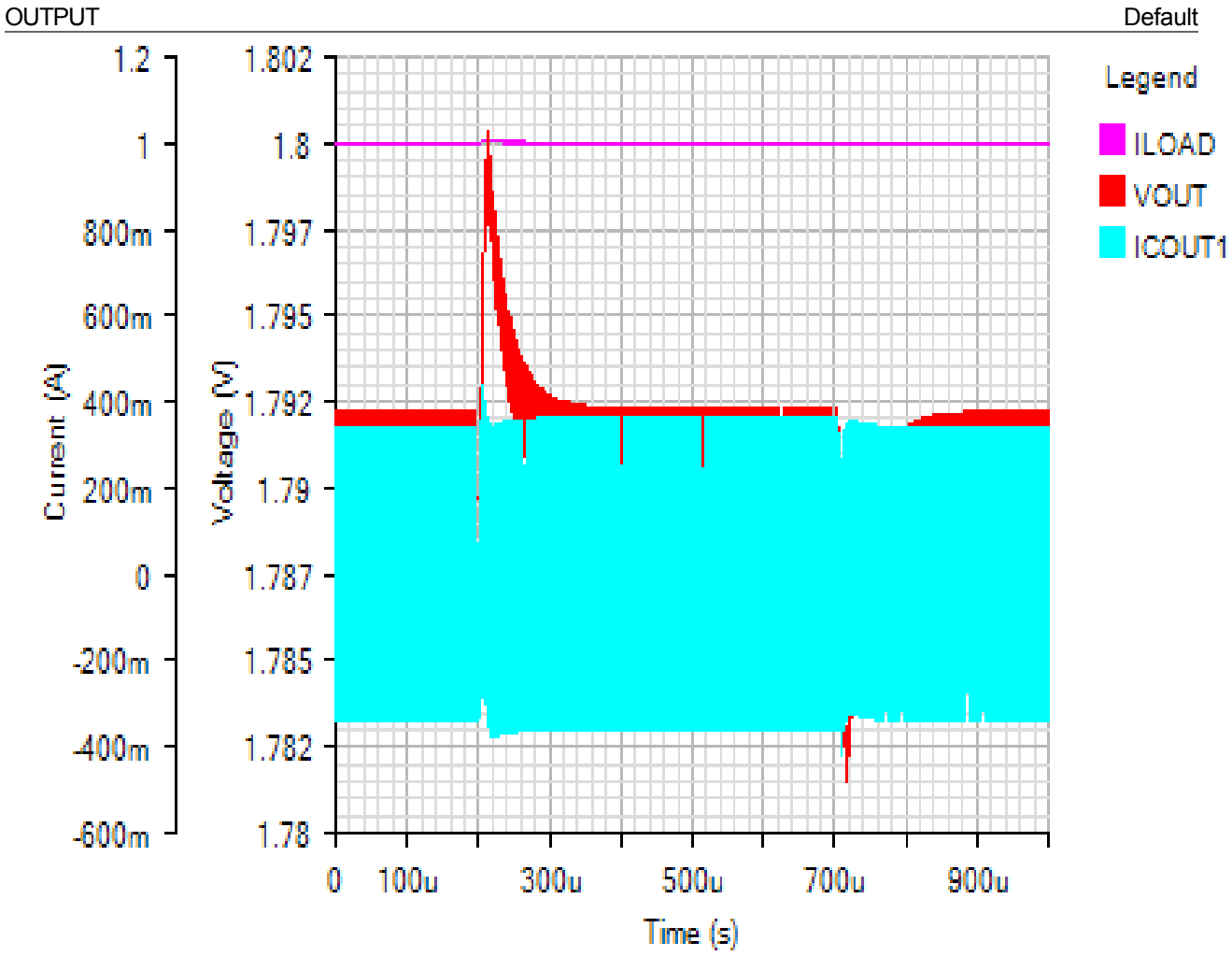
Line Transient - Mon Nov 19 2018 11:14:08



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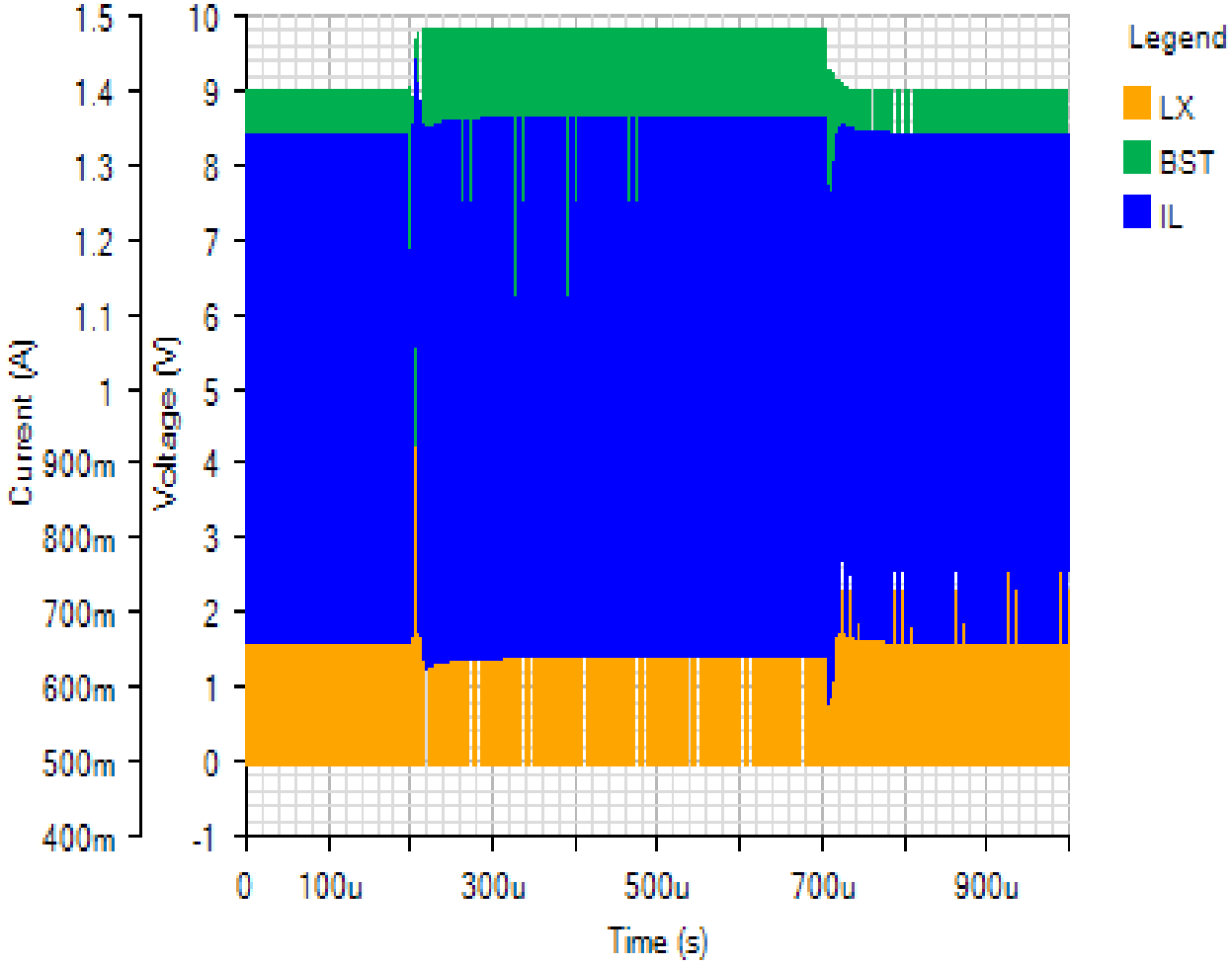
SWITCHING Default



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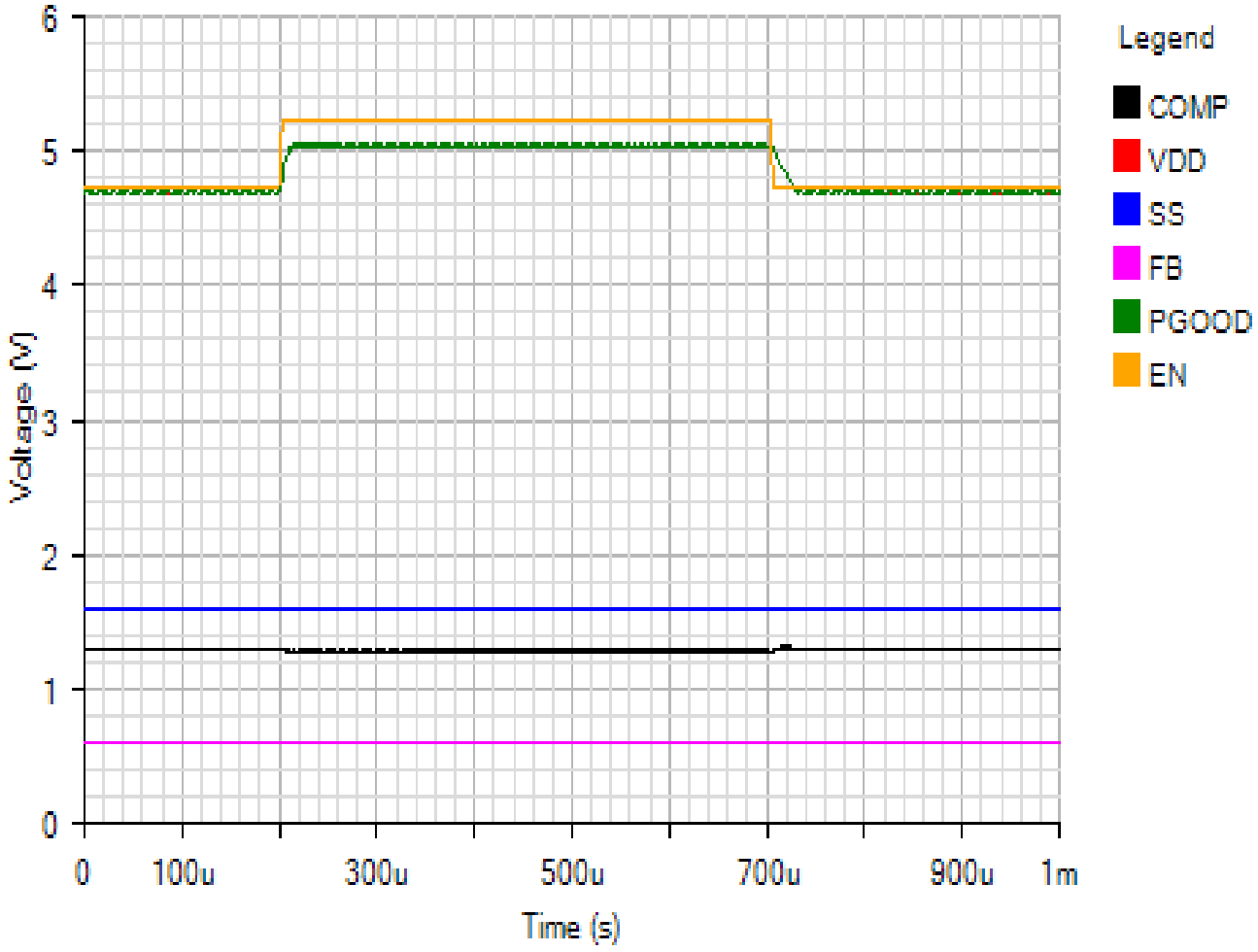

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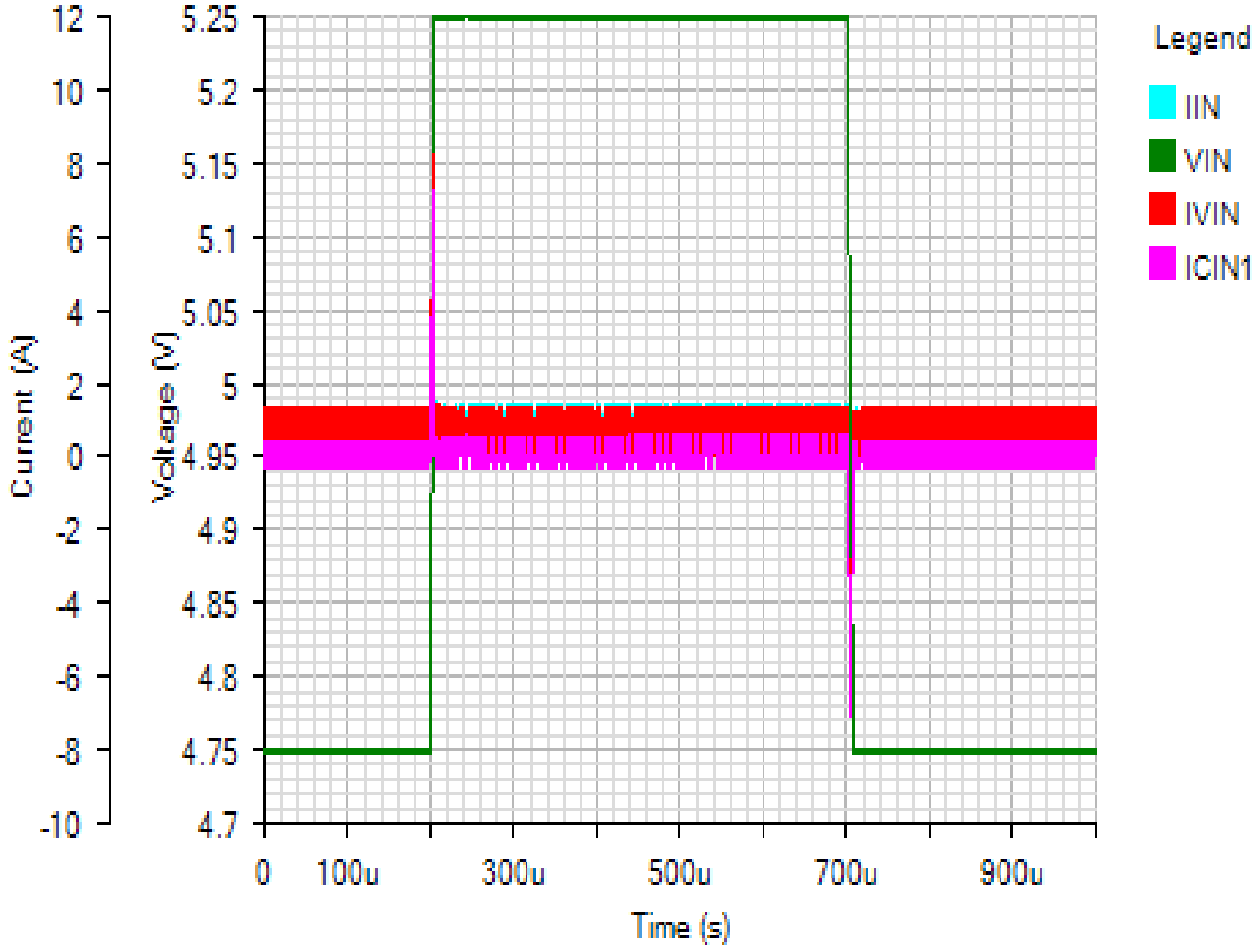

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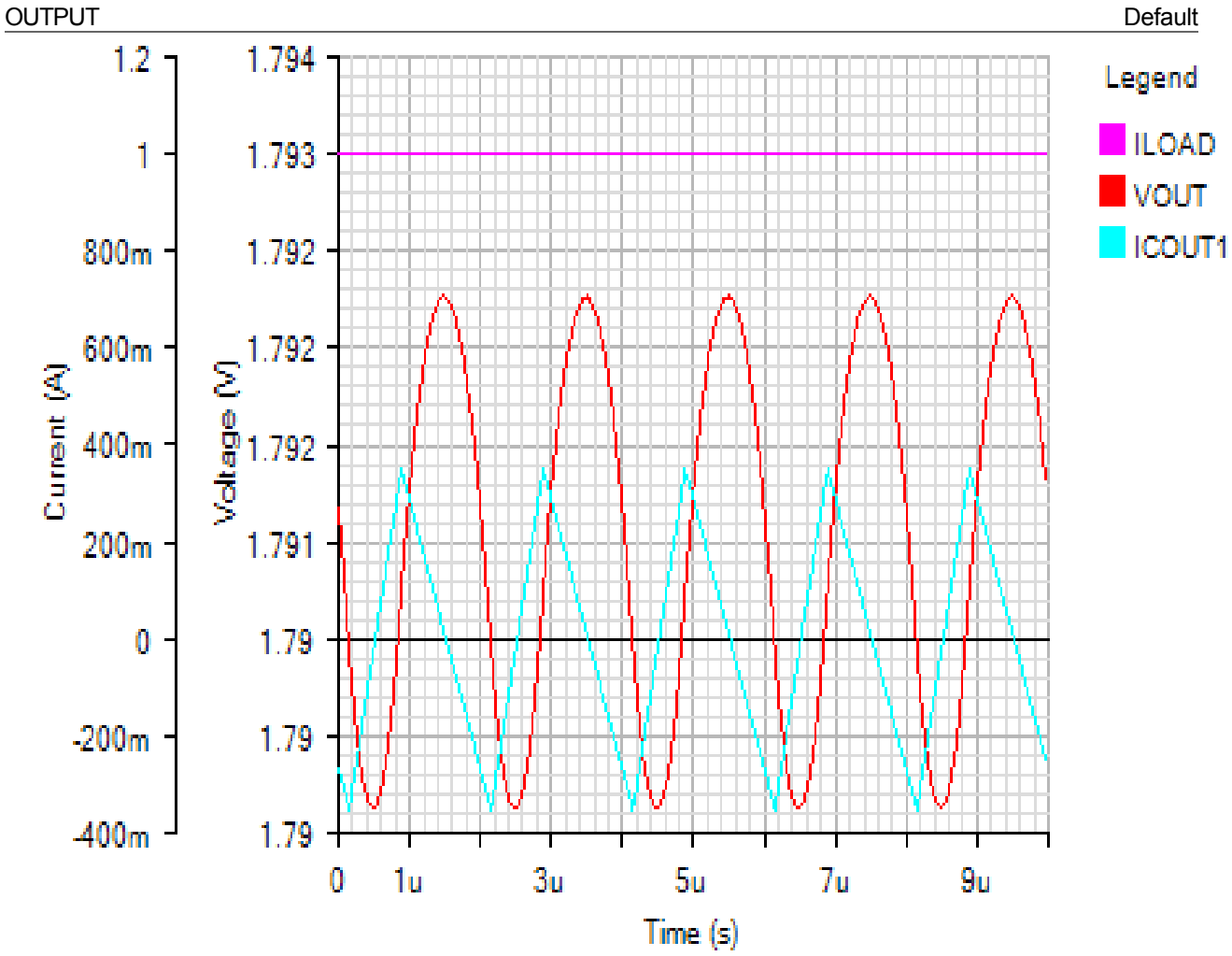
Steady State - Mon Nov 19 2018 11:14:08



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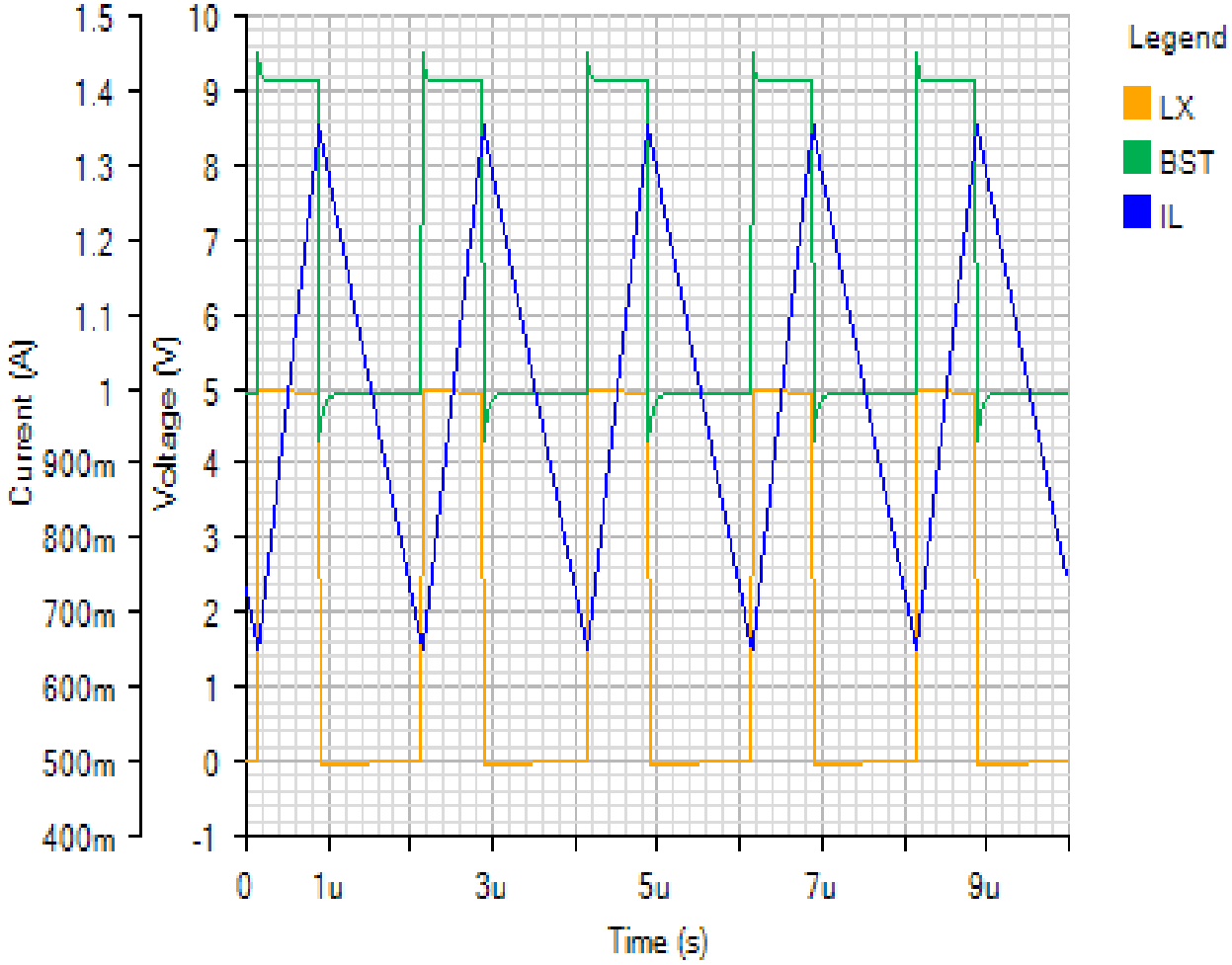

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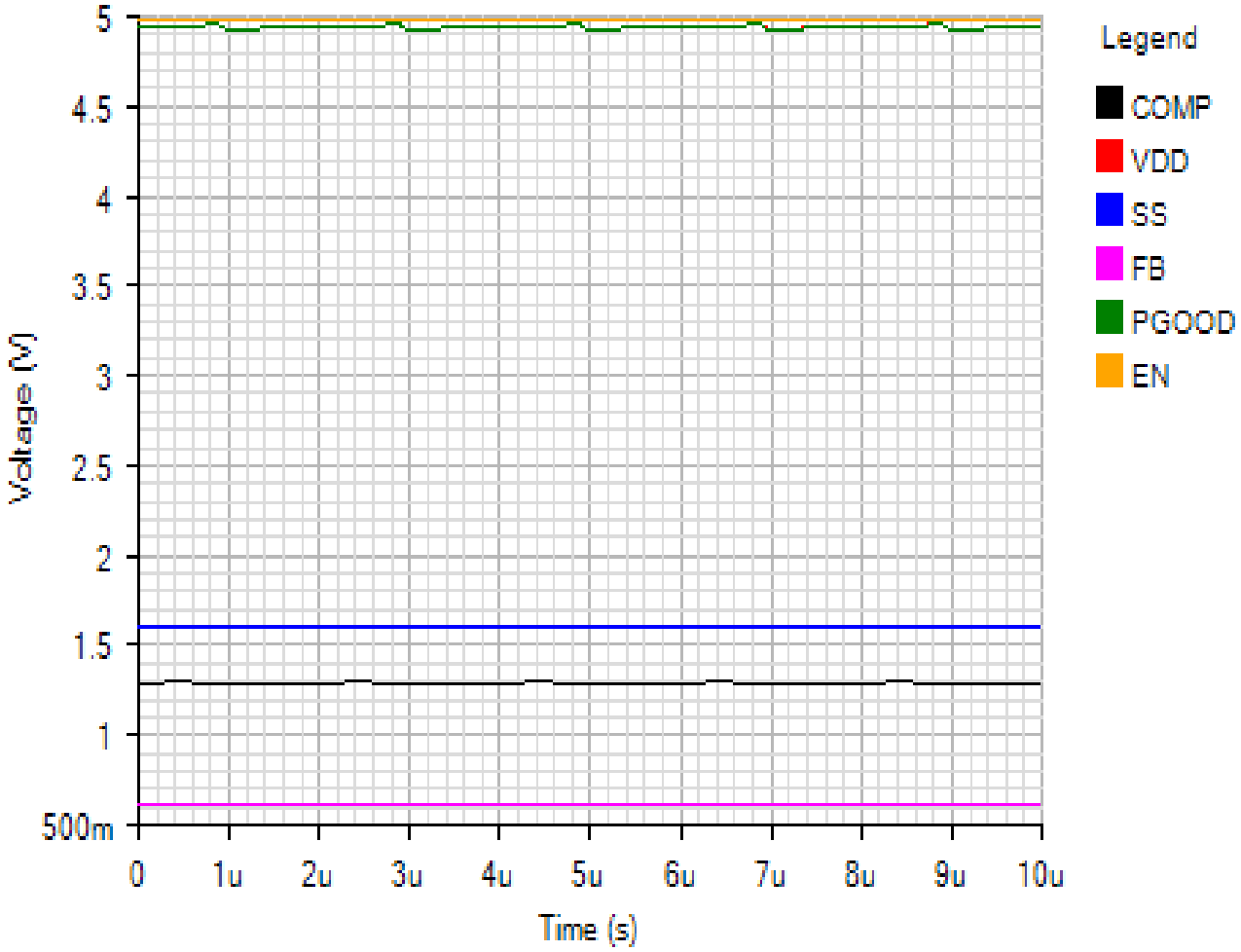

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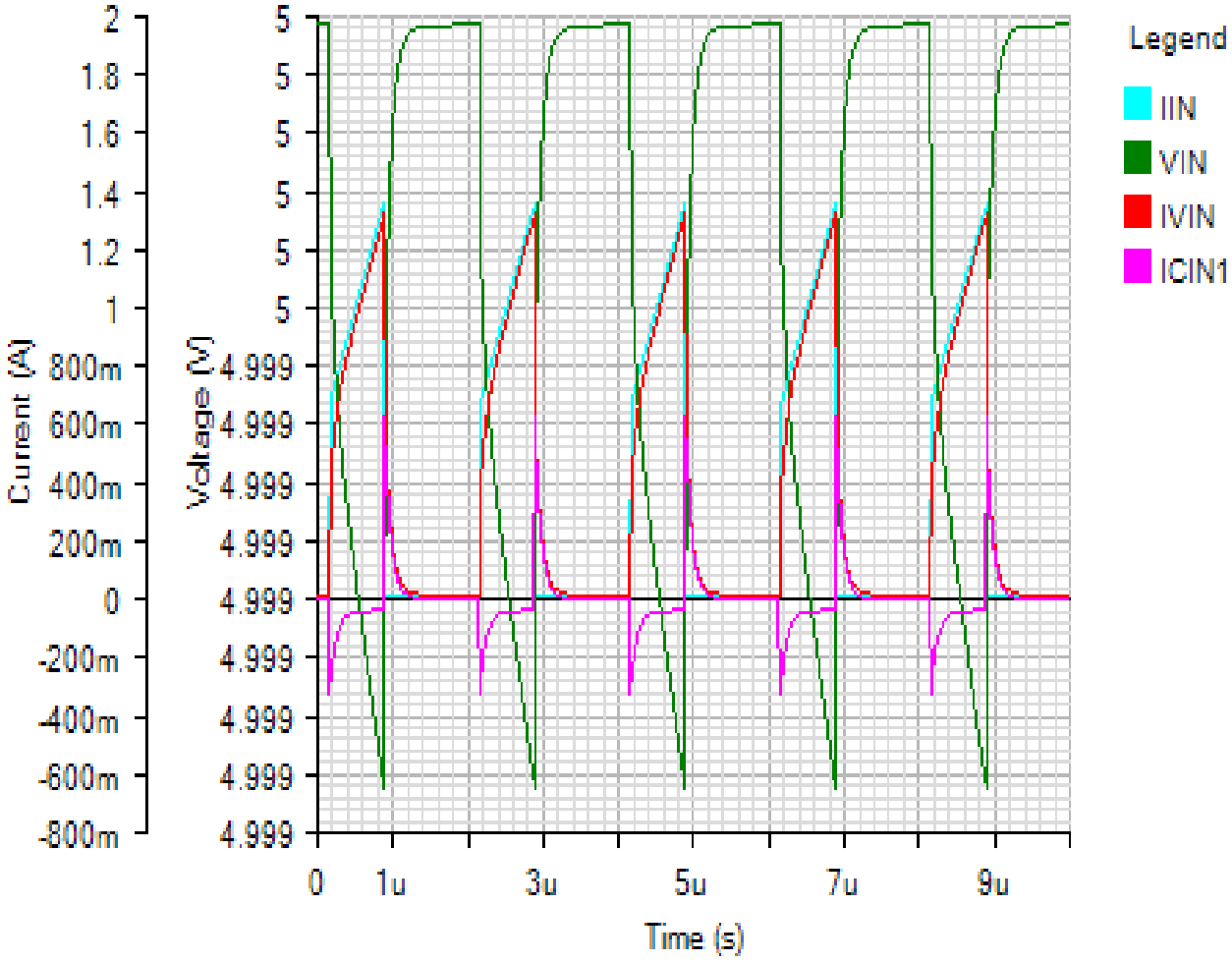

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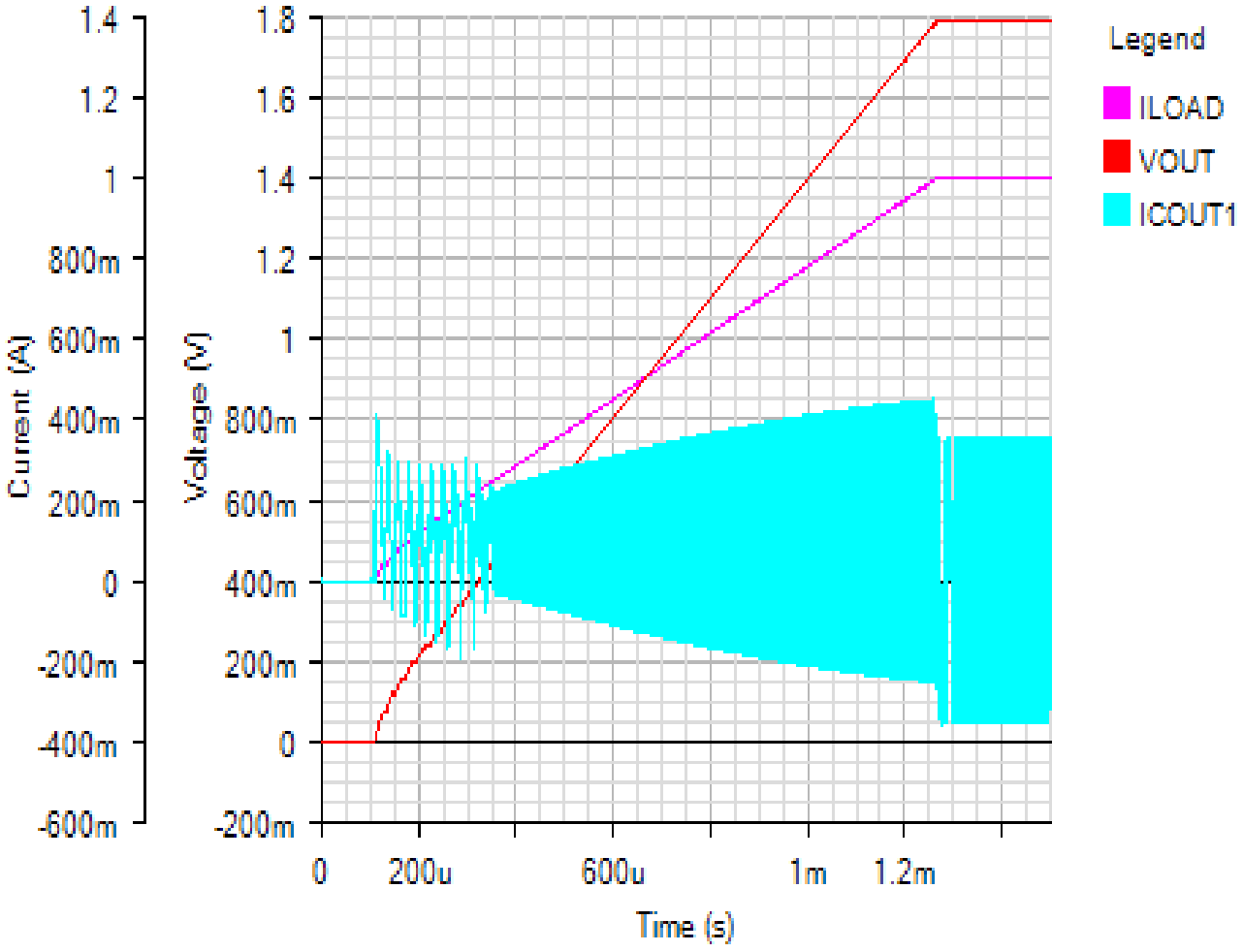
Start Up - Mon Nov 19 2018 11:14:08

OUTPUT Default



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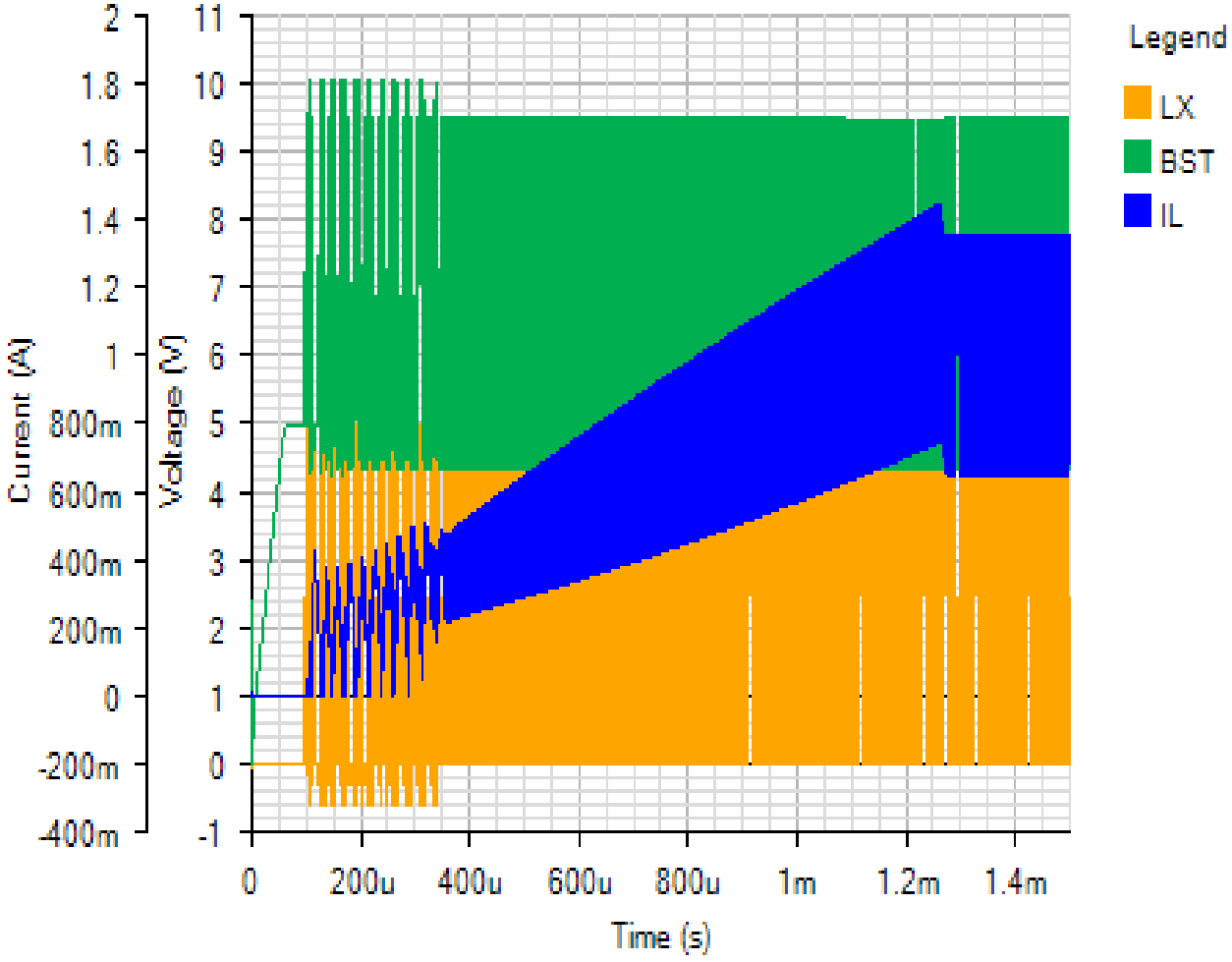

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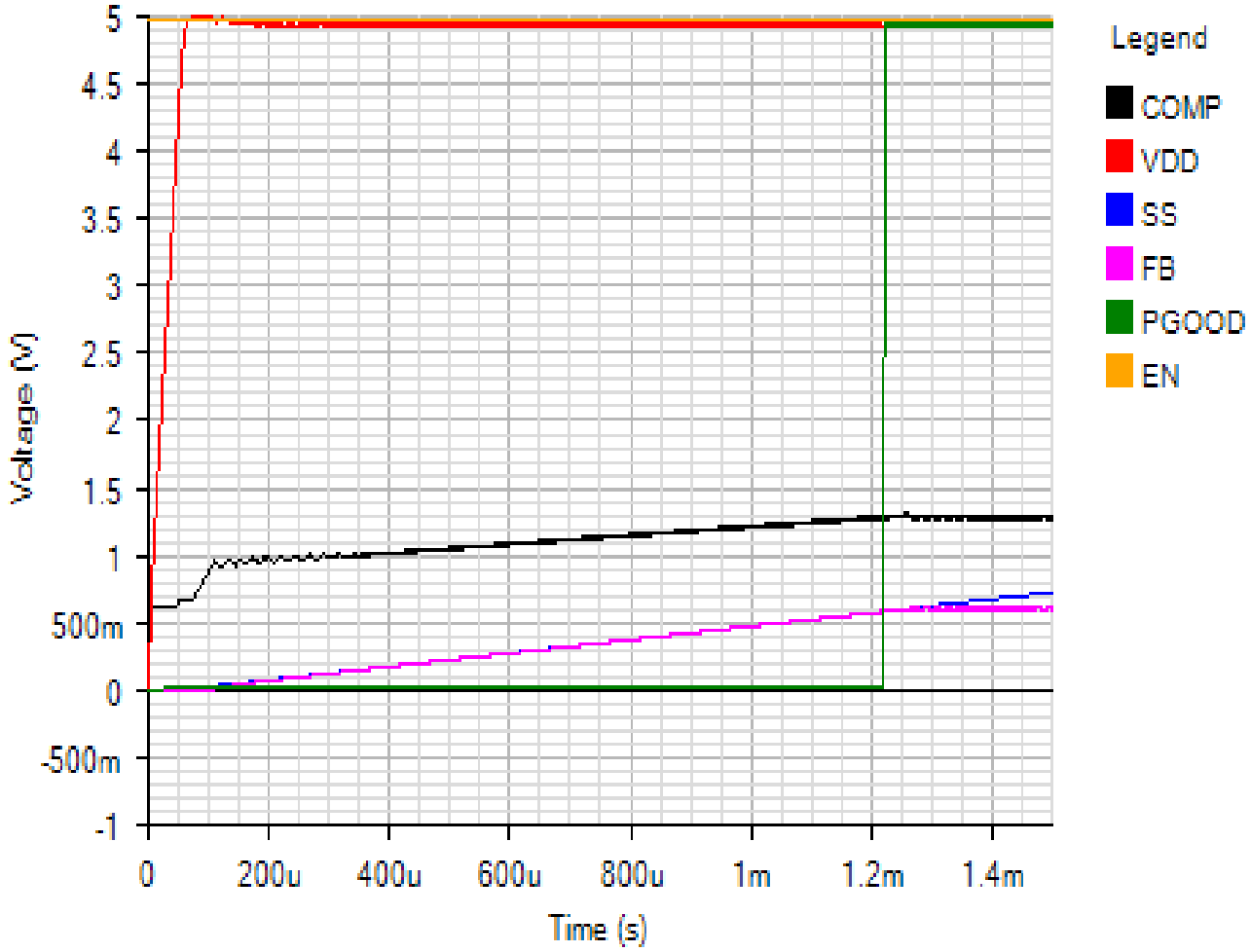

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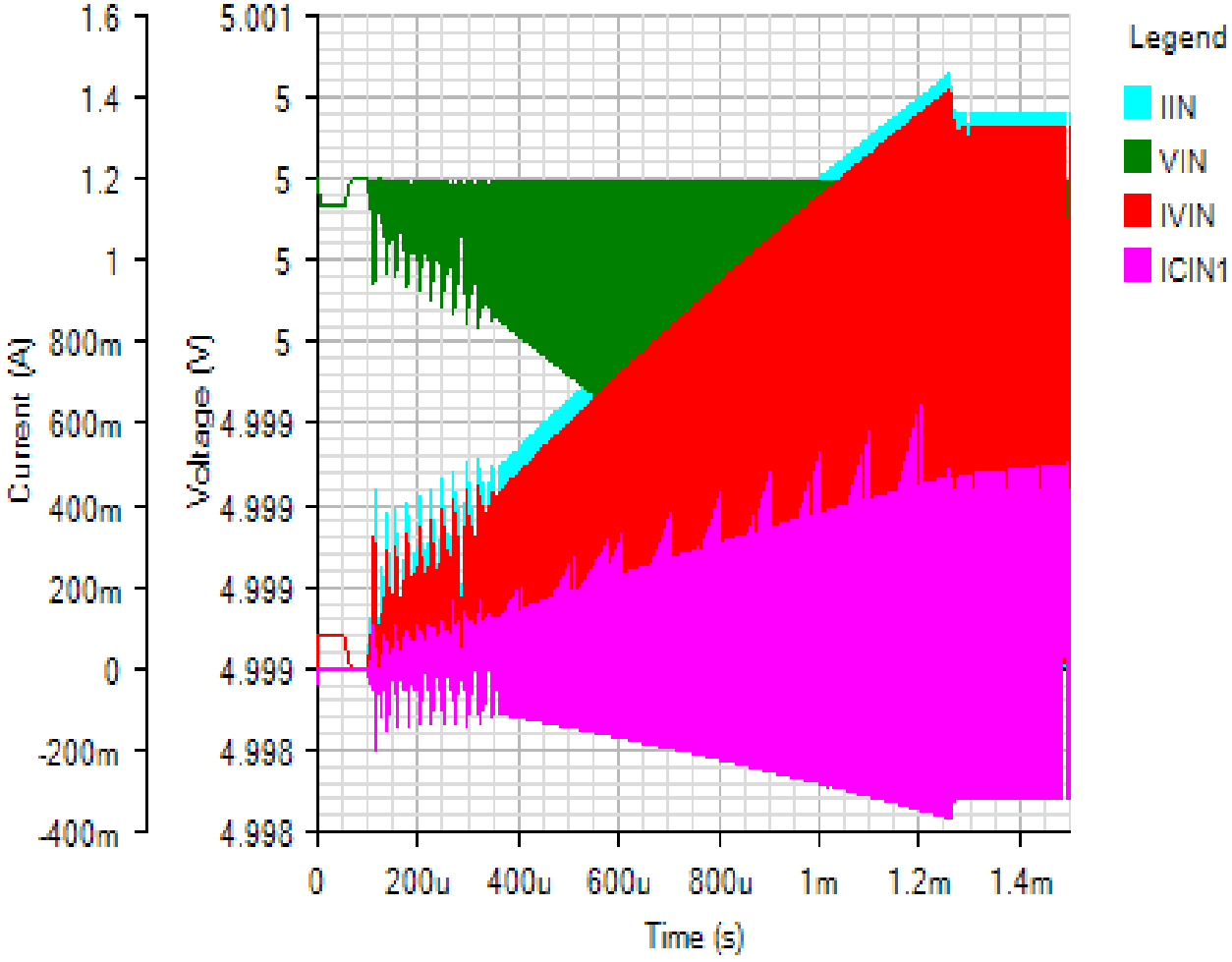

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Load Step - Mon Nov 19 2018 11:14:08

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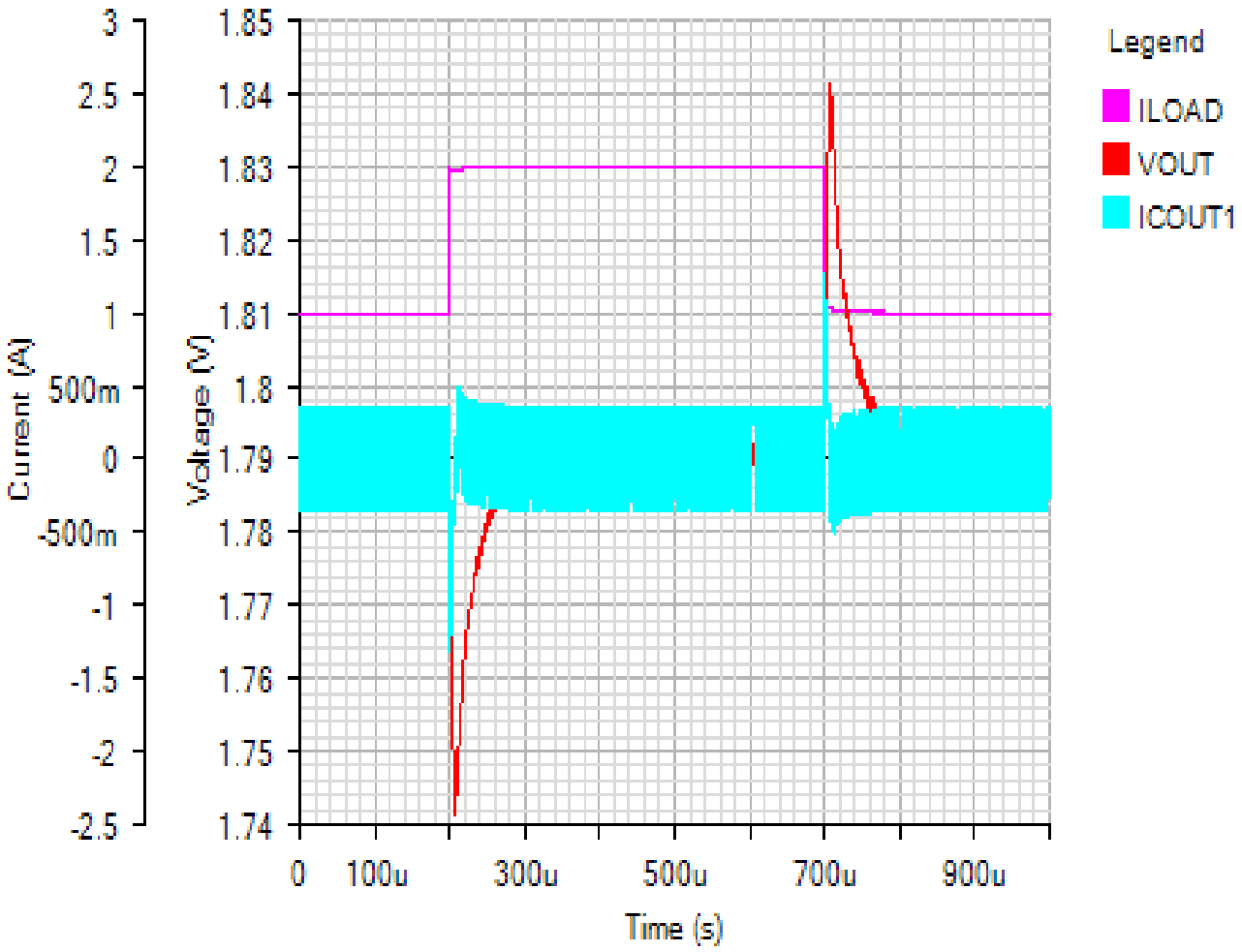

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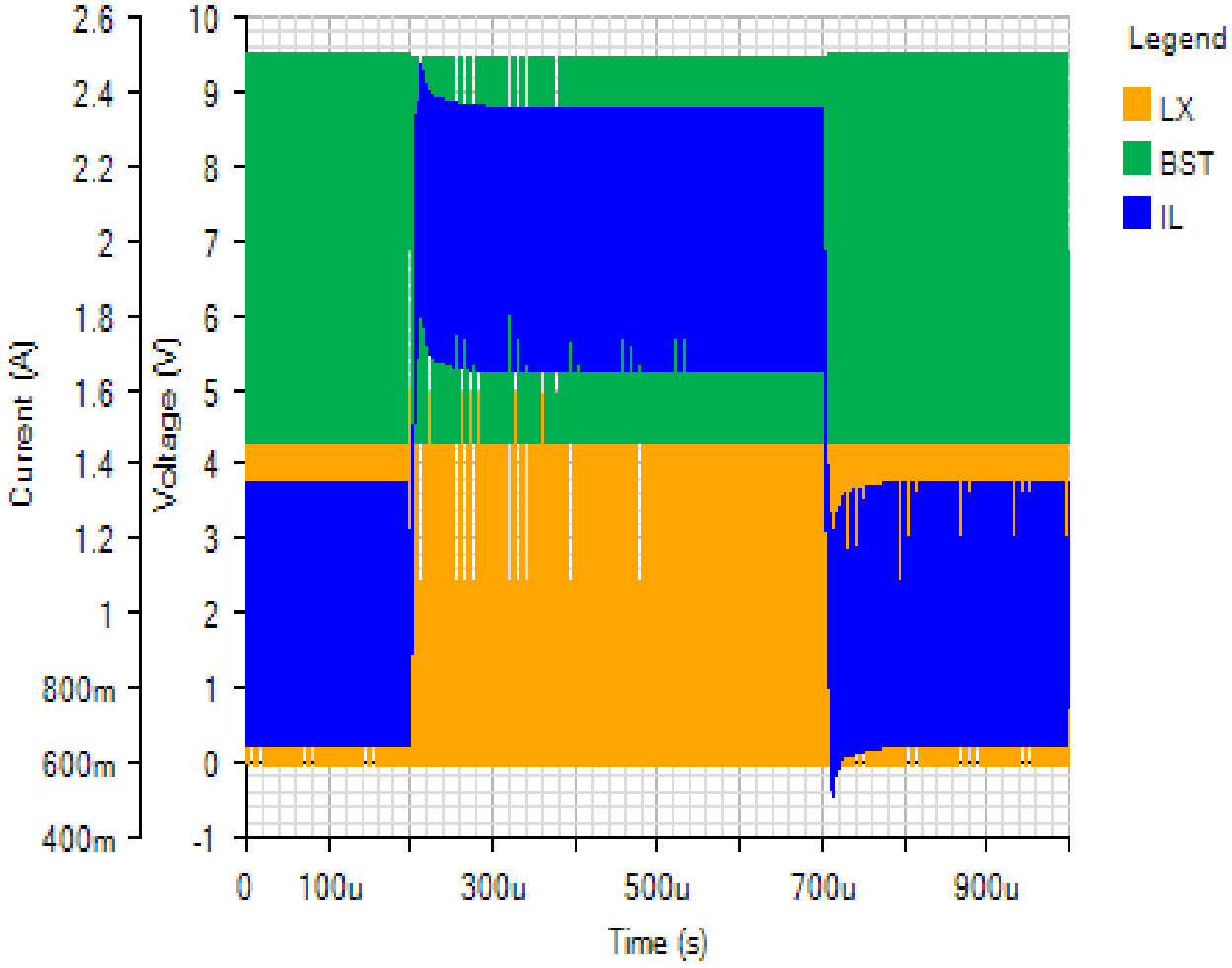

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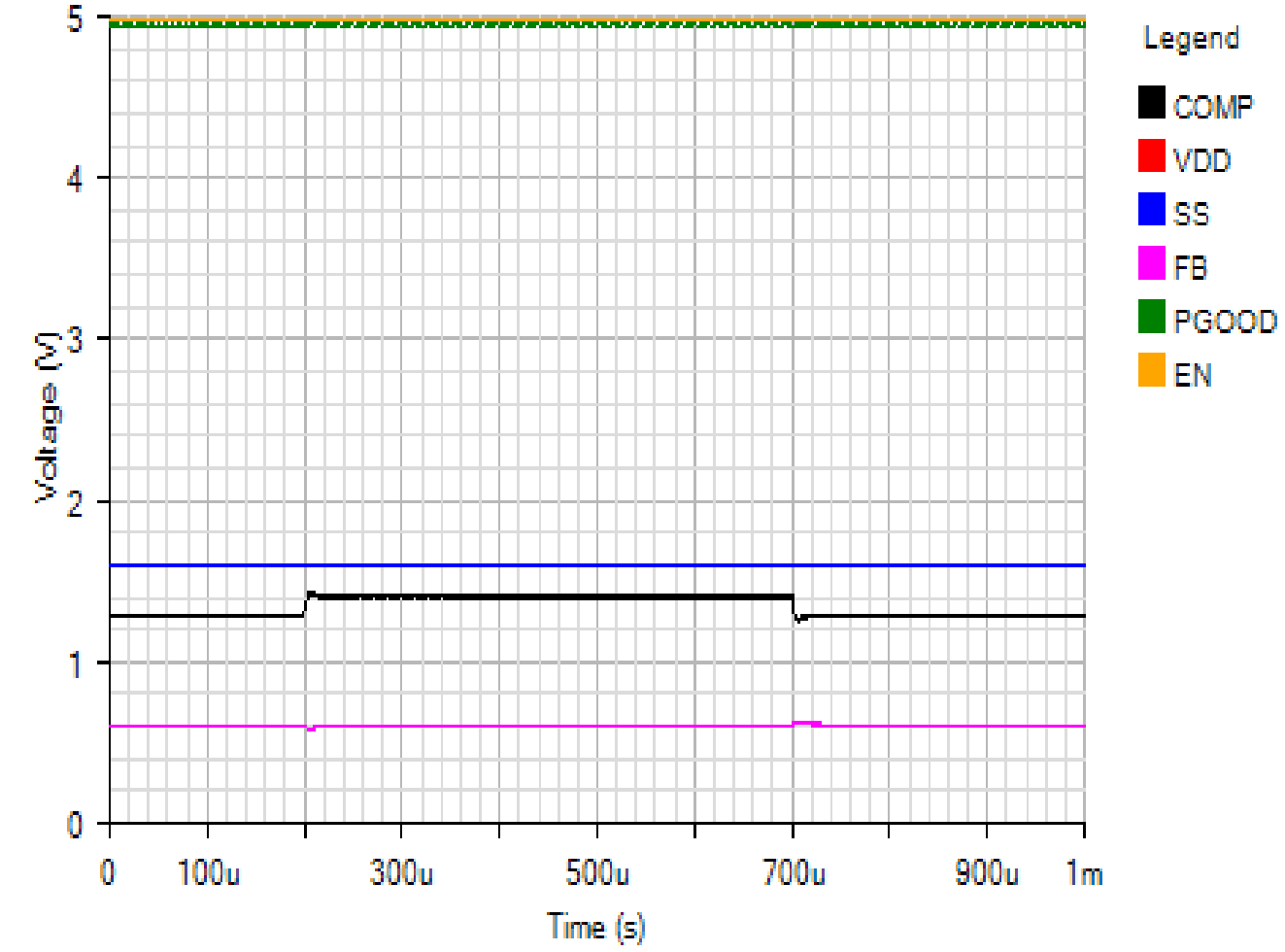

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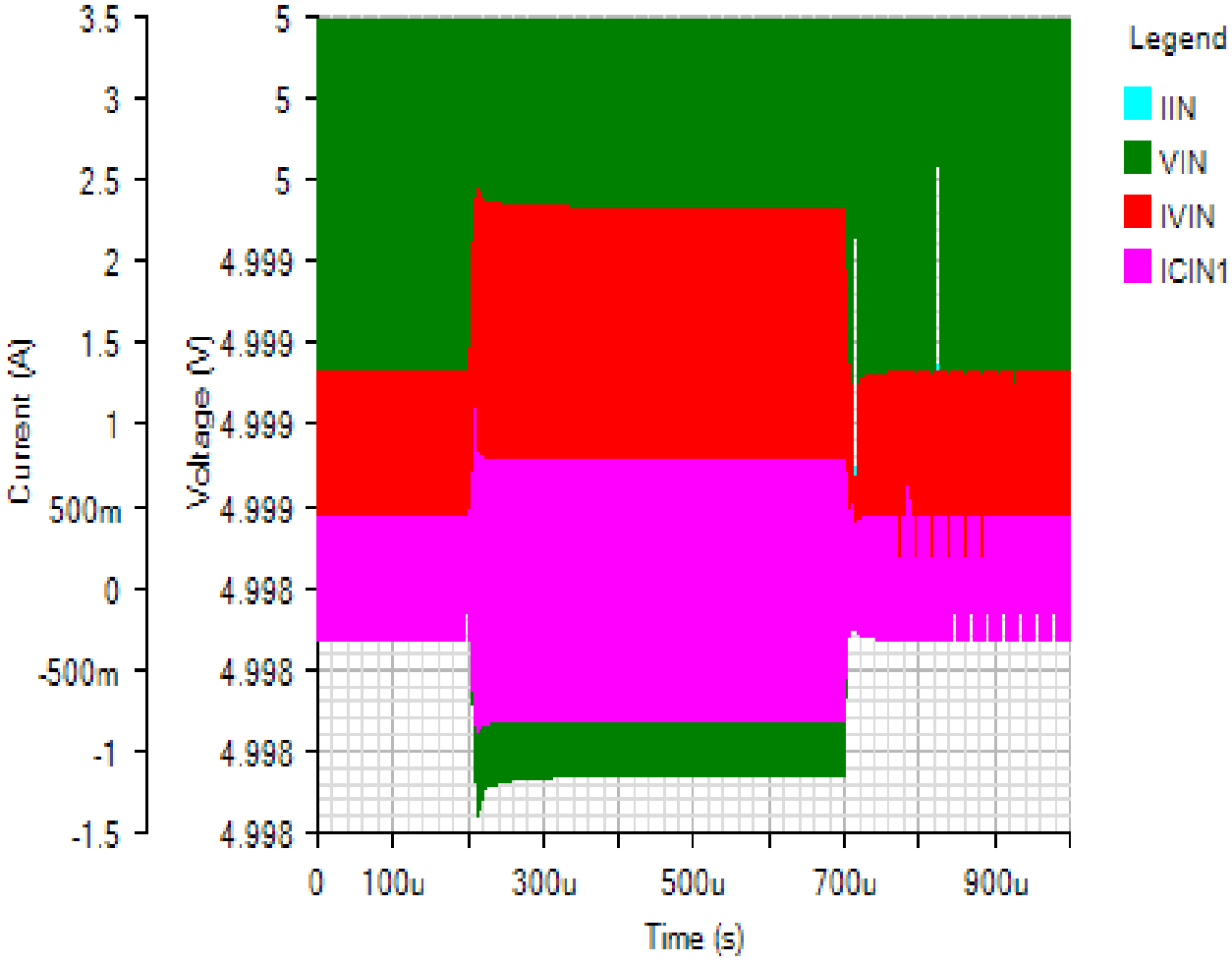

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