

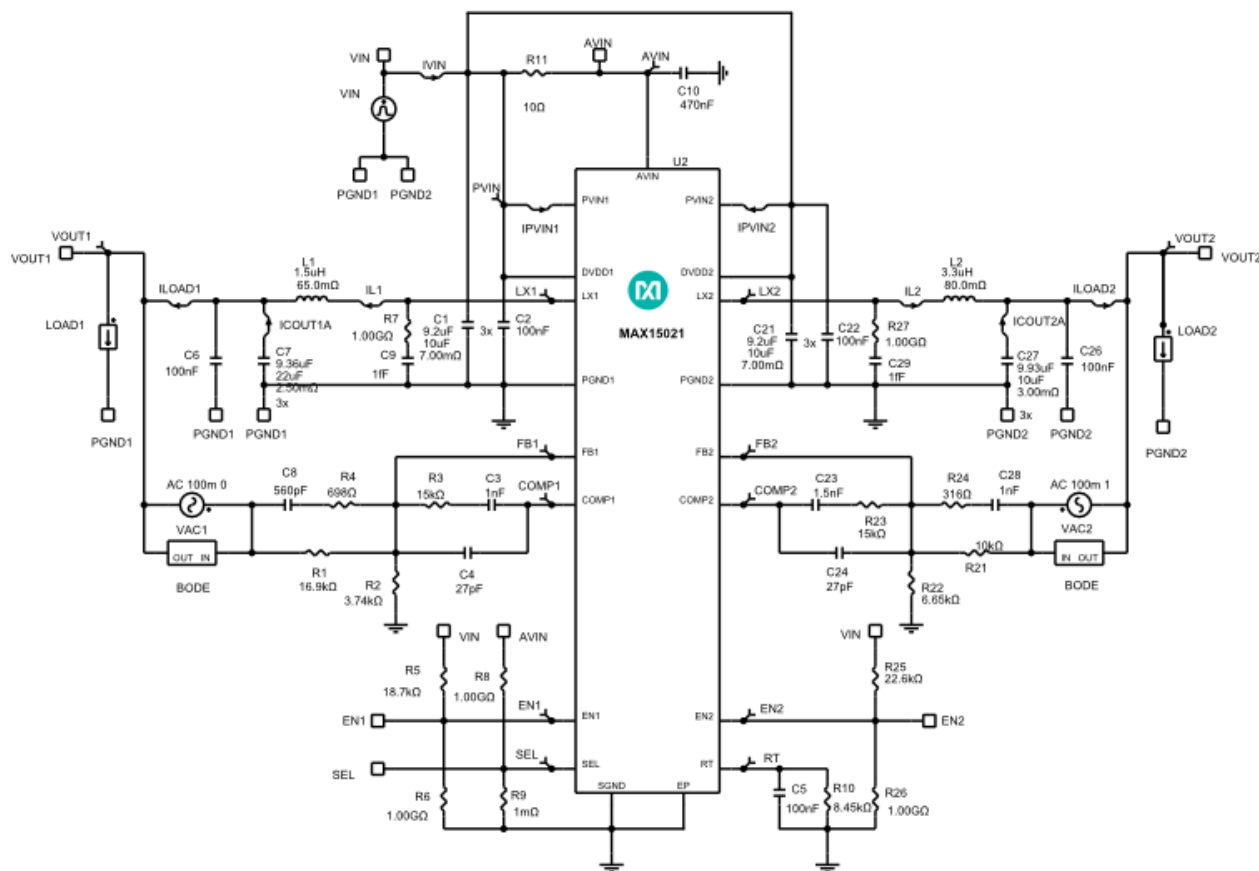
Initial Design

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	3.3V
Output Voltage 2	1.5V
Output Current 1	2A
Output Current 2	1A
Output Voltage Ripple 1	1%
Output Voltage Ripple 2	1%
Load Step Start Current 1	1A
Load Step Start Current 2	0.5A
Load Step Current 1	2A
Load Step Current 2	1A
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
Switching Frequency	1000Hz
Inductor Current Ratio (LIR) 1	0.3
Inductor Current Ratio (LIR) 2	0.3

Schematic



BOM

Ref	Qty	Part Number	Manufacturer	Description
U1	1	MCP2551-I/P	Microchip Technology	CAN 1Mbps Sleep/Standby 5V 8-Pin PDIP Tube
U2	1	MAX15021ATI+	Maxim Integrated	Dual, 4A/2A, 4MHz, Step-Down DC-DC Regulator with Tracking/Sequencing Capability
C1	3	C1206C106K4PAC	Kemet	Cap Ceramic 10uF 16V X5R 10% SMD 1206 85C Bulk
C2	1	GCM188L81H104KA57D	Murata Manufacturing	Cap Ceramic 0.1uF 50V X8L 10% Pad SMD 0603 150°C Automotive T/R
C3	1	GRM1885C1H102JA01D	Murata Manufacturing	Cap Ceramic 0.001uF 50V C0G 5% Pad SMD 0603 125°C T/R
C4	1	06031A270JAT2A	AVX	Cap Ceramic 27pF 100V C0G 5% Pad SMD 0603 125°C T/R
C5	1	GCM188L81H104KA57D	Murata Manufacturing	Cap Ceramic 0.1uF 50V X8L 10% Pad SMD 0603 150°C Automotive T/R
C6	1	GCM188L81H104KA57D	Murata Manufacturing	Cap Ceramic 0.1uF 50V X8L 10% Pad SMD 0603 150°C Automotive T/R

C7	3	GRM187R61A226ME15D	Murata	Cap Ceramic 22uF 10V 0603 85C
C8	1	06035A561JAT2A	AVX	Cap Ceramic 560pF 50V C0G 5% Pad SMD 0603 125°C T/R
C10	1	GCM188R71E474KA64D	Murata Manufacturing	Cap Ceramic 0.47uF 25V X7R 10% Pad SMD 0603 125°C Automotive T/R
C21	3	C1206C106K4PAC	Kemet	Cap Ceramic 10uF 16V X5R 10% SMD 1206 85C Bulk
C22	1	GCM188L81H104KA57D	Murata Manufacturing	Cap Ceramic 0.1uF 50V X8L 10% Pad SMD 0603 150°C Automotive T/R
C23	1	C1608C0G1H152J080AA	TDK	Cap Ceramic 0.0015uF 50V C0G 5% Pad SMD 0603 125°C T/R
C24	1	06031A270JAT2A	AVX	Cap Ceramic 27pF 100V C0G 5% Pad SMD 0603 125°C T/R
C26	1	GCM188L81H104KA57D	Murata Manufacturing	Cap Ceramic 0.1uF 50V X8L 10% Pad SMD 0603 150°C Automotive T/R
C27	3	GRM21BR71A106KA73	Murata	Cap Ceramic 10uF 10V 0805 125C
C28	1	GRM1885C1H102JA01D	Murata Manufacturing	Cap Ceramic 0.001uF 50V C0G 5% Pad SMD 0603 125°C T/R
L1	1	1277AS-H-1R5M=P2	Murata	1.5uH 20% 50mOhm 3.7Asat 3Arms
L2	1	LPS4018-332MRB	Coilcraft	Inductor 3.3uH 20% 72mOhm 2.2A Isat 1.9A Irms
R1	1	ERJ3EKF1692V	Panasonic	Res Thick Film 0603 16.9K Ohm 1% 0.1W(1/10W) ±100ppm/°C Pad SMD Automotive T/R
R2	1	ERJ3EKF3741V	Panasonic	Res Thick Film 0603 3.74K Ohm 1% 0.1W(1/10W) ±100ppm/°C Pad SMD Automotive T/R
R3	1	ERJ3EKF1502V	Panasonic	Res Thick Film 0603 15K Ohm 1% 0.1W(1/10W) ±100ppm/°C Pad SMD Automotive T/R
R4	1	PATT0603L6980JGT1	Vishay	Res Thin Film 0603 698 Ohm 5% 0.15W ±200ppm/°C Sulfur Resistant Pad SMD Automotive T/R
R5	1	PATT0603H1872JGT1	Vishay	Res Thin Film 0603 18.7K Ohm 5% 0.15W ±50ppm/°C Sulfur Resistant Pad SMD Automotive T/R
R10	1	PATT0603E8451JGTS	Vishay	Res Thin Film 0603 8.45K Ohm 5% 0.15W ±25ppm/°C Sulfur Resistant 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	ERJ3EKF1002V	Panasonic	Res Thick Film 0603 10K Ohm 1% 0.1W(1/10W) ±100ppm/°C Pad SMD Automotive T/R
R22	1	ERJ3EKF6651V	Panasonic	Res Thick Film 0603 6.65K Ohm 1% 0.1W(1/10W) ±100ppm/°C Pad SMD Automotive T/R
R23	1	ERJ3EKF1502V	Panasonic	Res Thick Film 0603 15K Ohm 1% 0.1W(1/10W) ±100ppm/°C Pad SMD Automotive T/R
				Res Thin Film 0603 316 Ohm 5% 0.15W

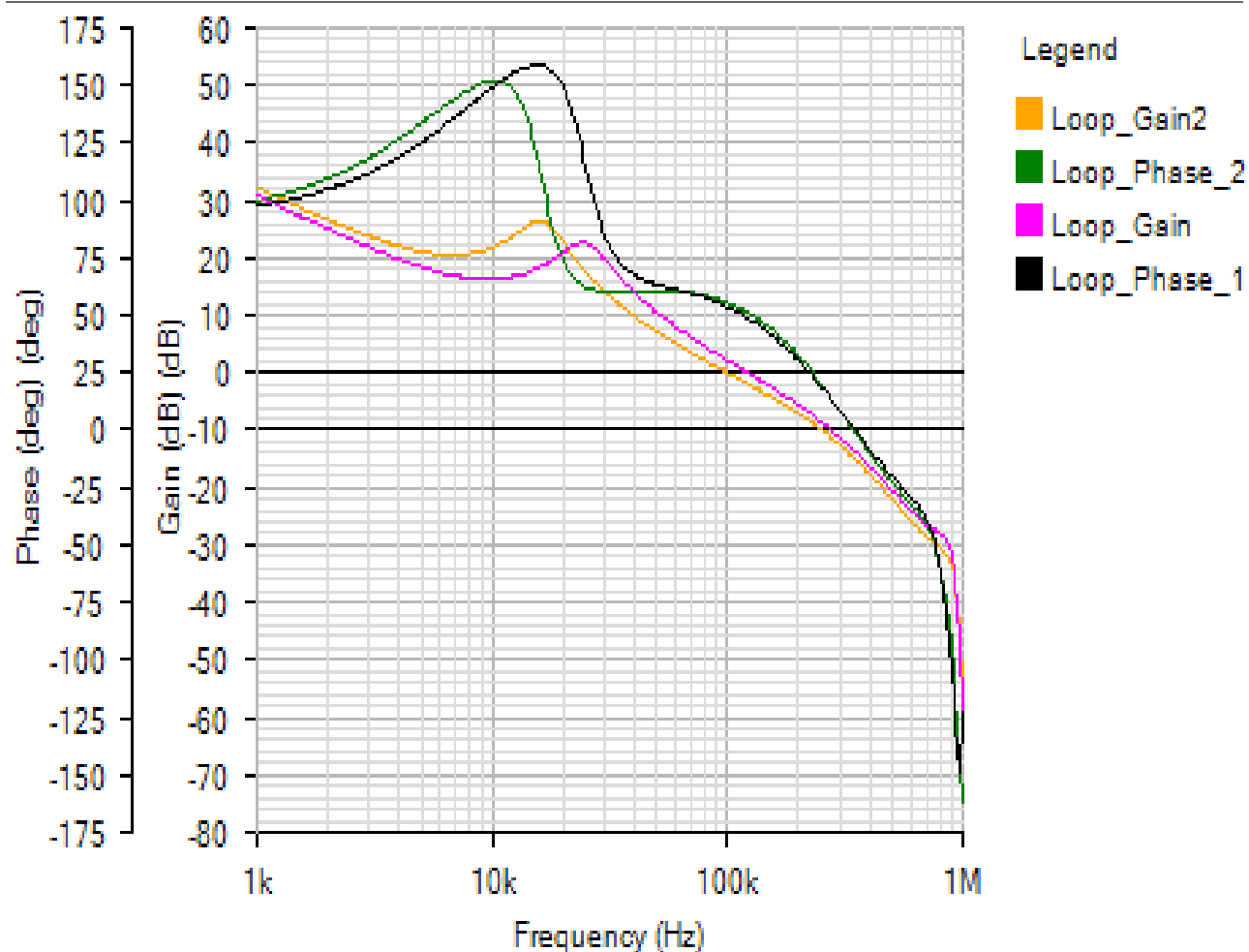
R24	1	PATT0603K3160JGTS	Vishay	±100ppm/°C Sulfur Resistant Pad SMD Automotive T/R
R25	1	PATT0603L2262JGT1	Vishay	Res Thin Film 0603 22.6K Ohm 5% 0.15W ±200ppm/°C Sulfur Resistant Pad SMD Automotive T/R

Simulation Results

AC Loop - Mon Nov 19 2018 10:21:22

BODE

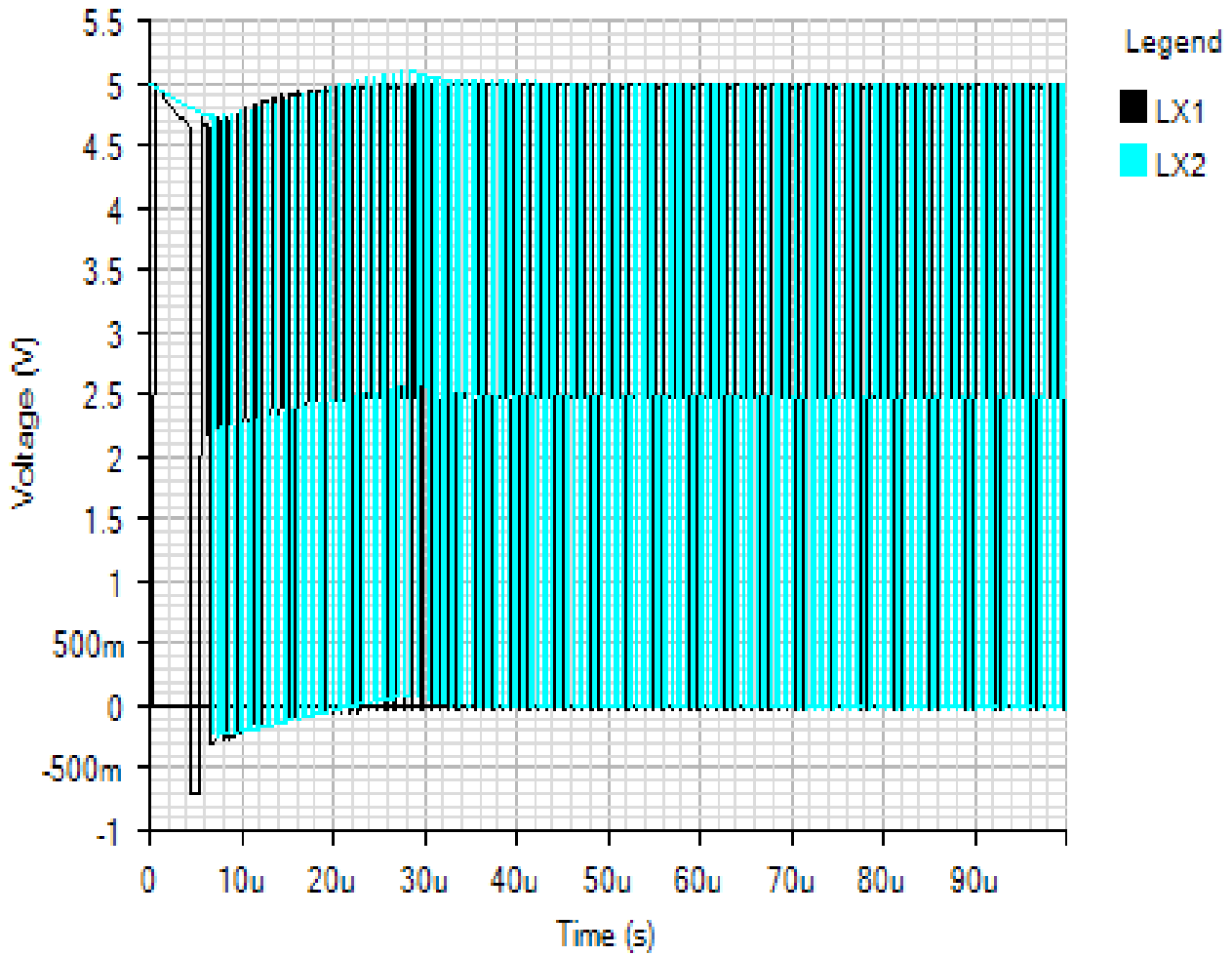
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Start Up - Mon Nov 19 2018 10:21:22

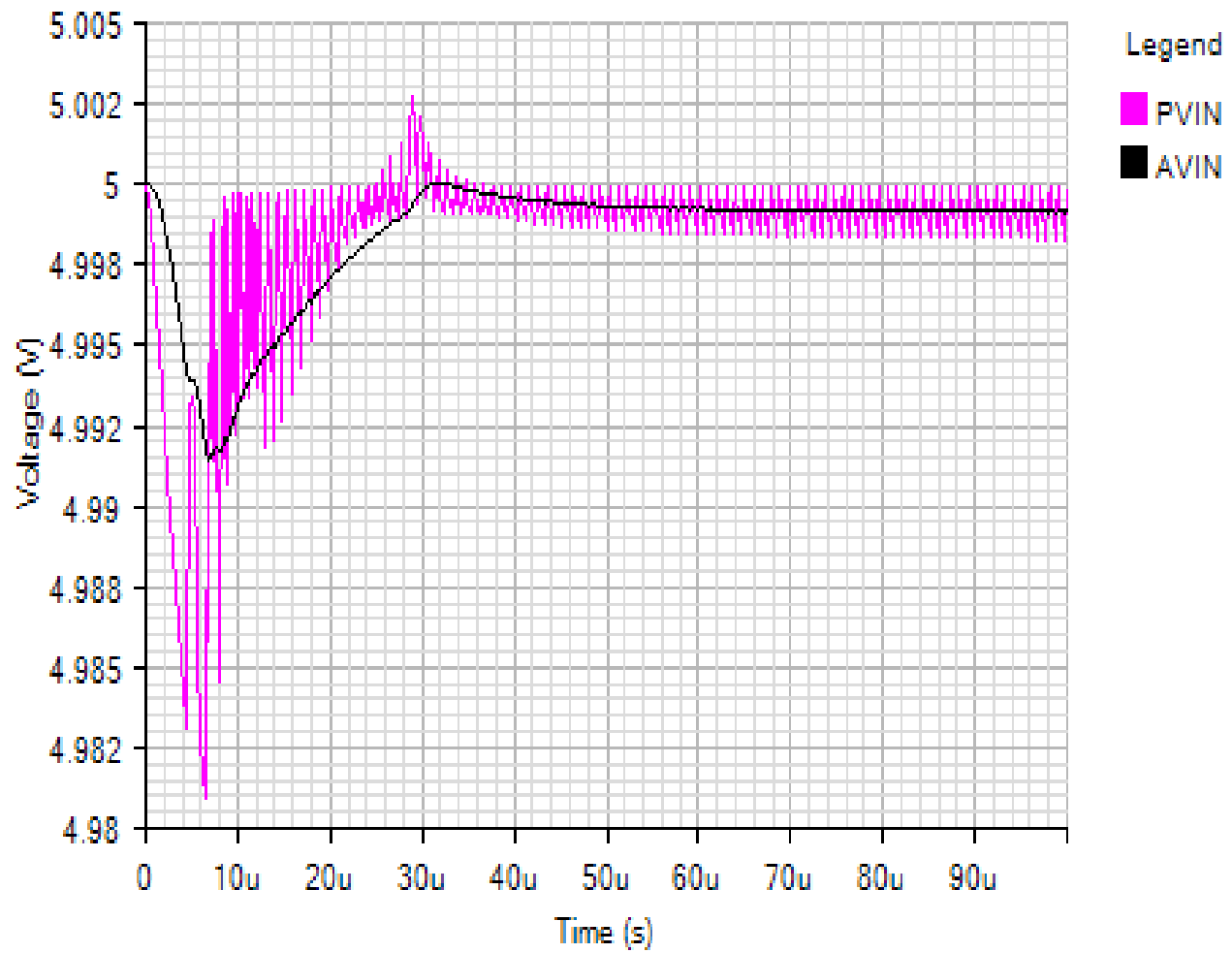
SWITCHING

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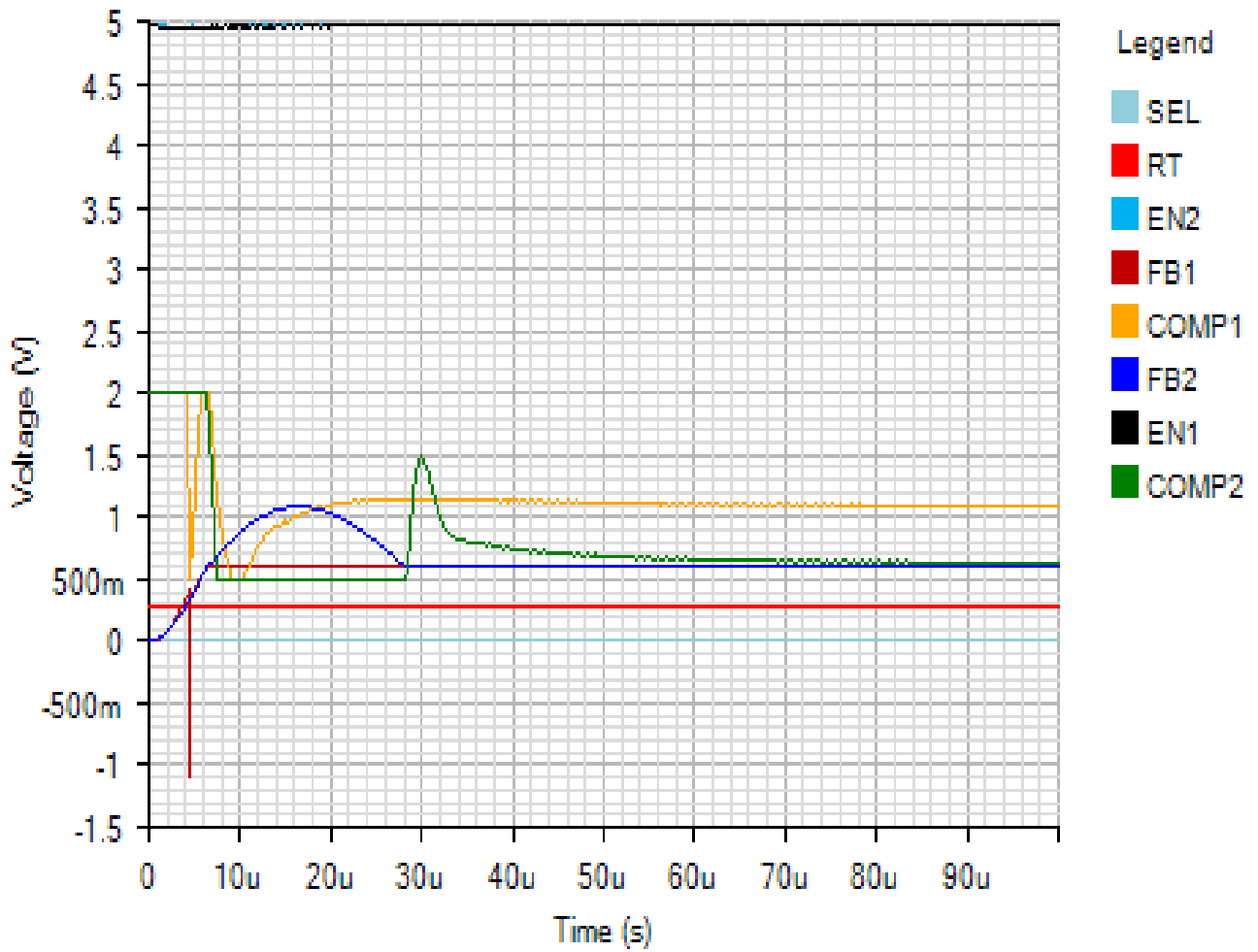
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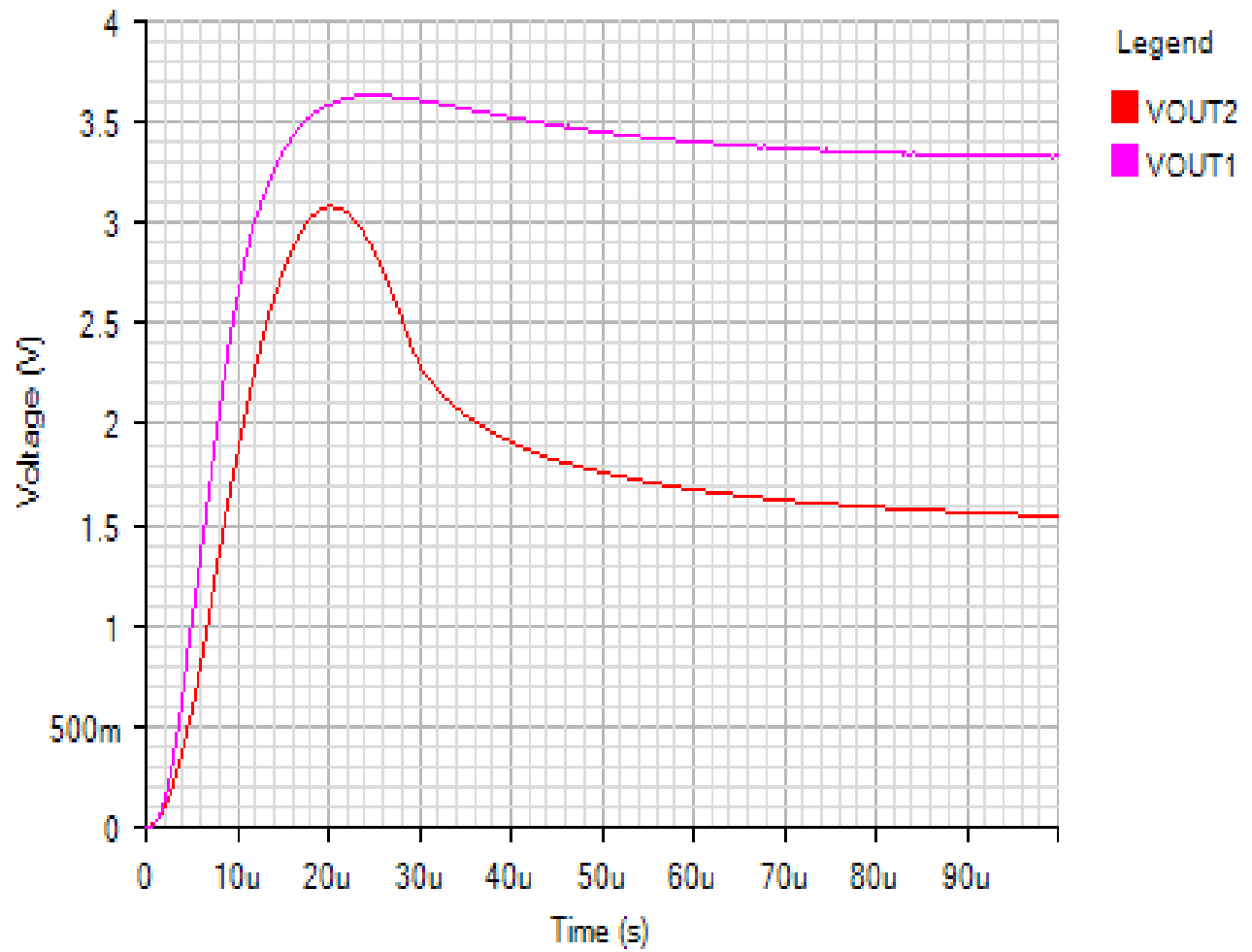
IC

Default



OUTPUT

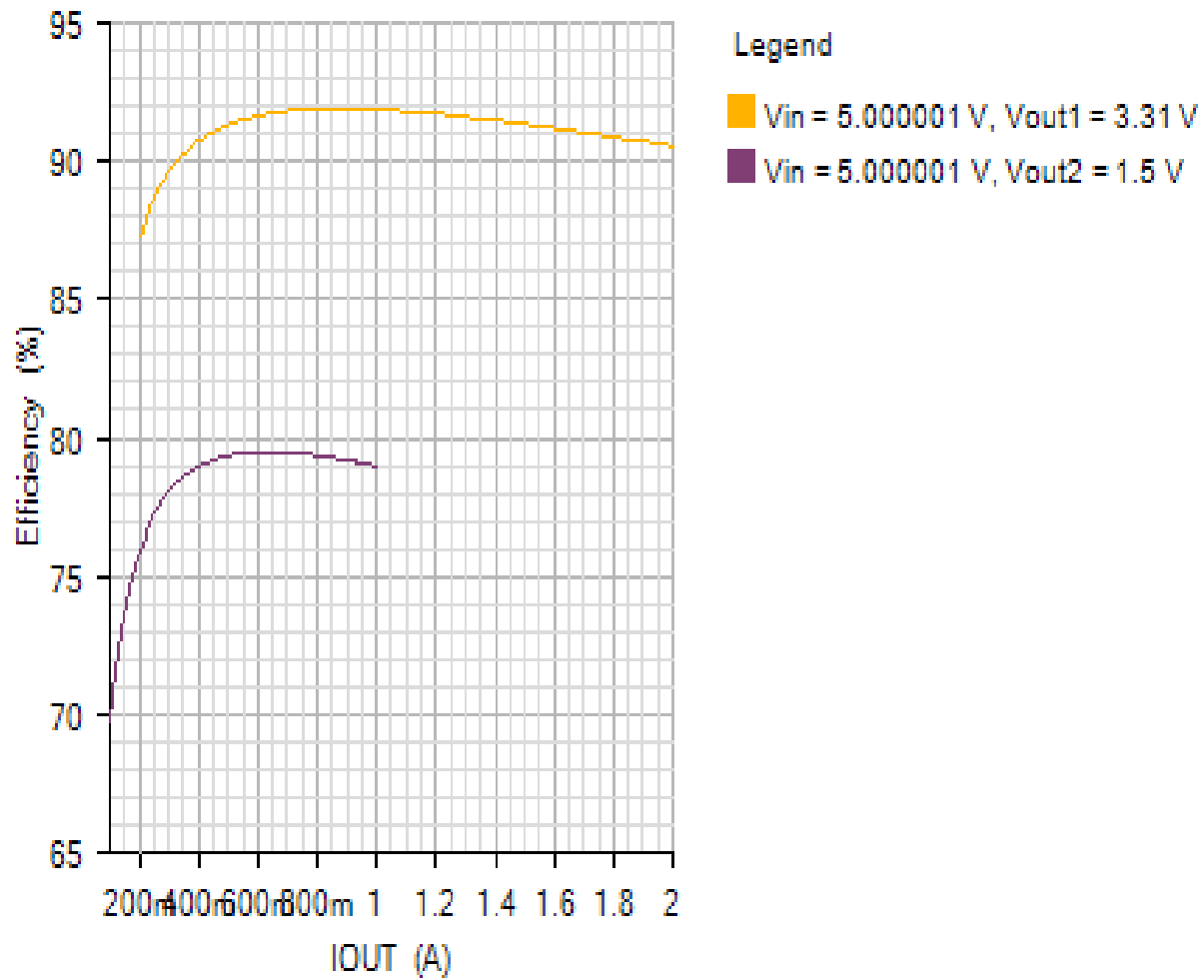
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Efficiency - Mon Nov 19 2018 10:21:22

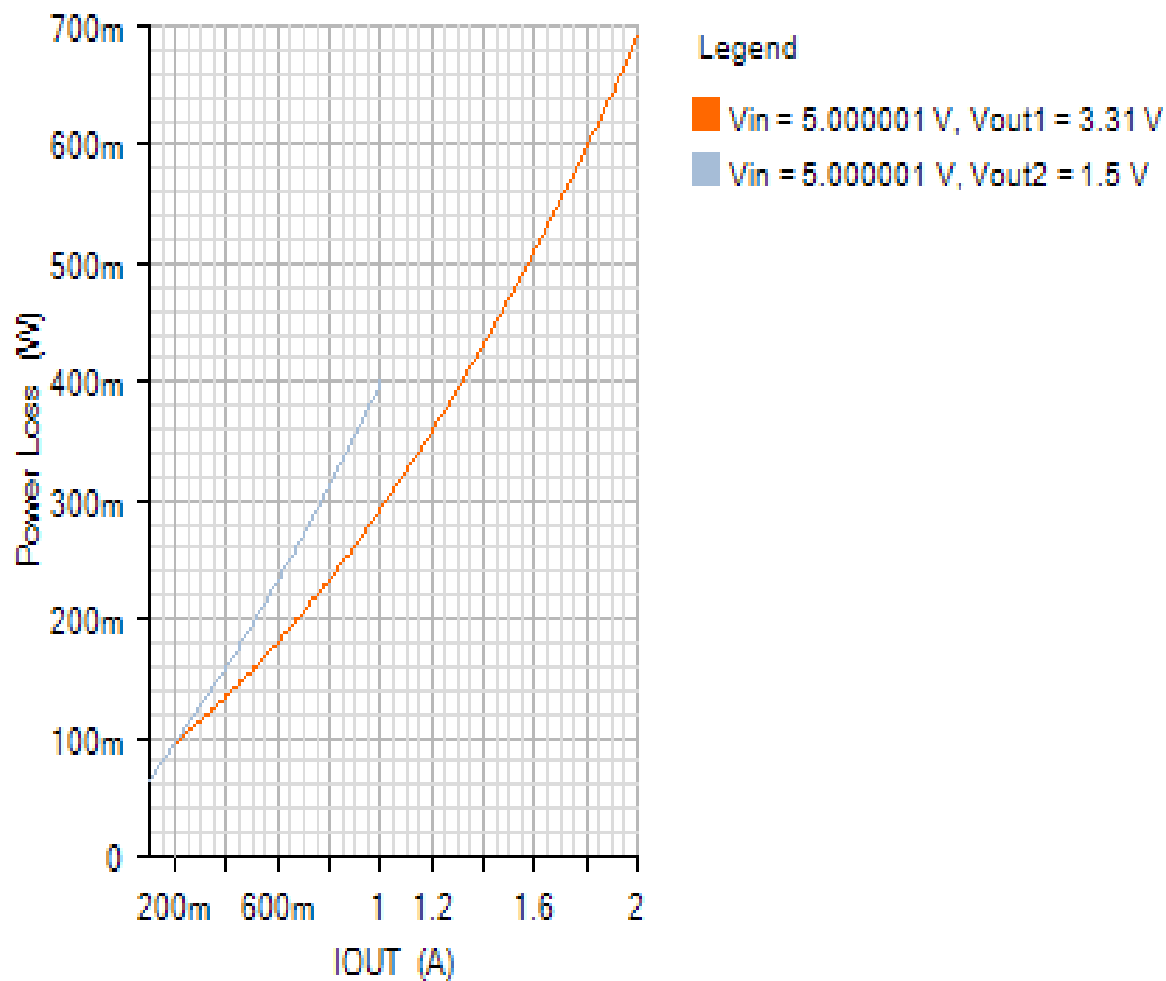
EFFICIENCY_PLOT

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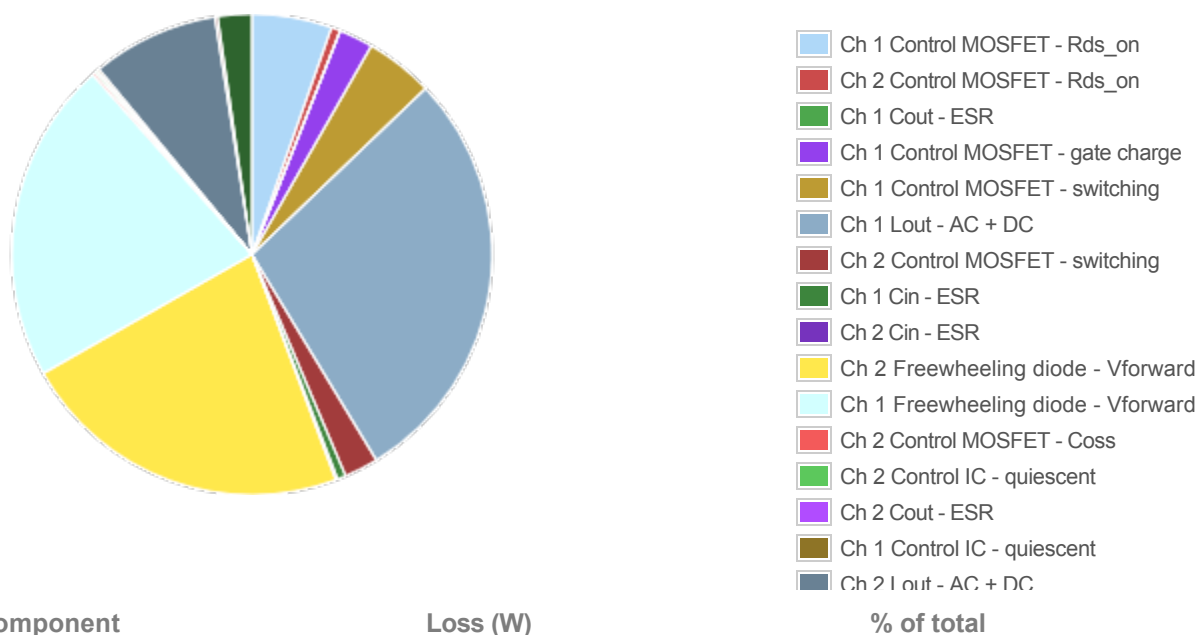


POWER_LOSS_PLOT

Default



Losses

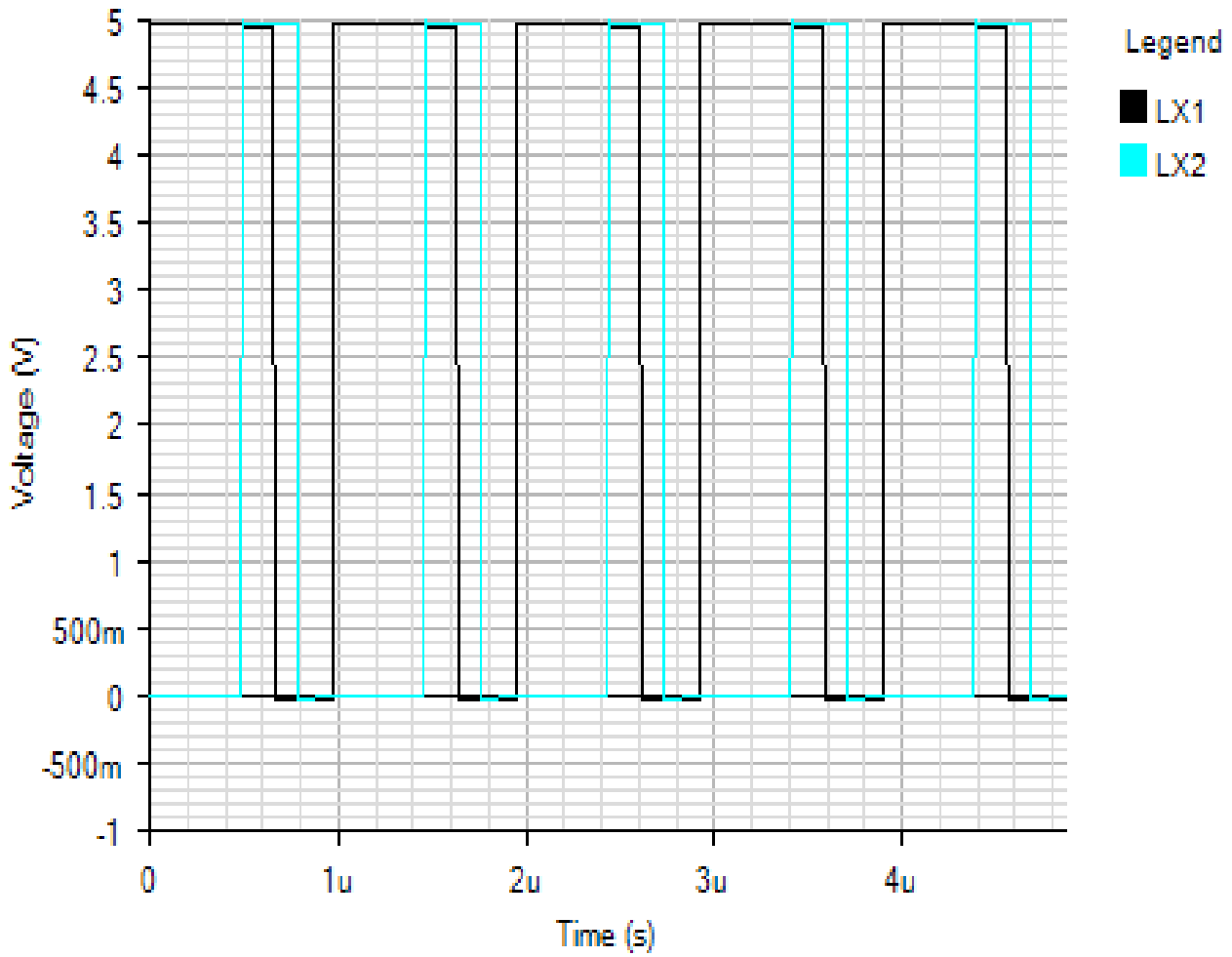


Ch 1 Control MOSFET - Rds_on	0.058657	5.4
Ch 2 Control MOSFET - Rds_on	0.006666	0.6
Ch 1 Cout - ESR	0.000065	0
Ch 1 Control MOSFET - gate charge	0.025	2.3
Ch 1 Control MOSFET - switching	0.05	4.6
Ch 1 Lout - AC + DC	0.310508	28.5
Ch 2 Control MOSFET - switching	0.025	2.3
Ch 1 Cin - ESR	0.006263	0.6
Ch 2 Cin - ESR	0.001471	0.1
Ch 2 Freewheeling diode - Vforward	0.244842	22.4
Ch 1 Freewheeling diode - Vforward	0.236428	21.7
Ch 2 Control MOSFET - Coss	0.002025	0.2
Ch 2 Control IC - quiescent	0.002	0.2
Ch 2 Cout - ESR	0.000025	0
Ch 1 Control IC - quiescent	0.002	0.2
Ch 2 Lout - AC + DC	0.093028	8.5
Ch 1 Control MOSFET - Coss	0.002025	0.2
Ch 2 Control MOSFET - gate charge	0.025	2.3
Total	1.091003	100

Steady State - Mon Nov 19 2018 10:21:22

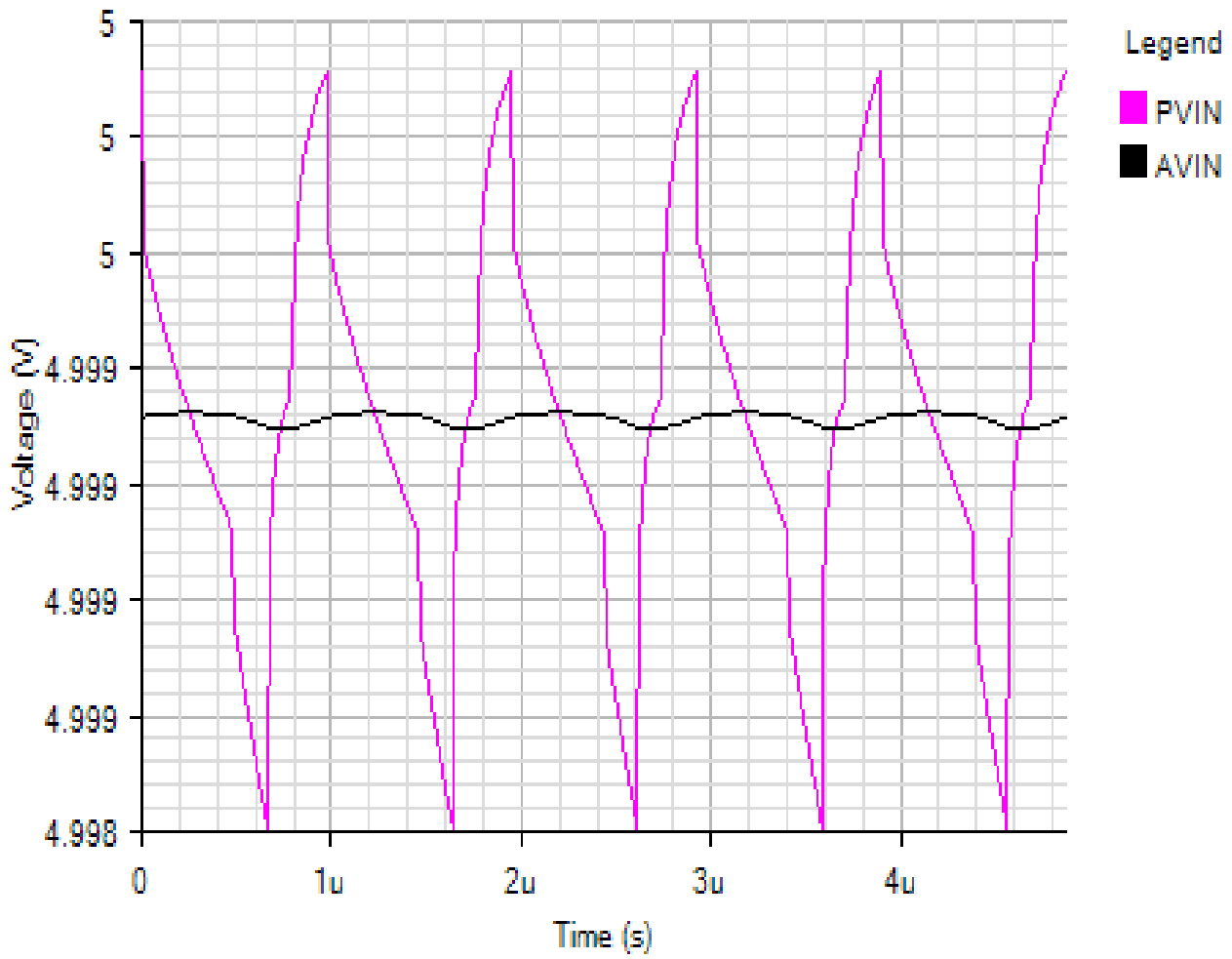
SWITCHING

Default



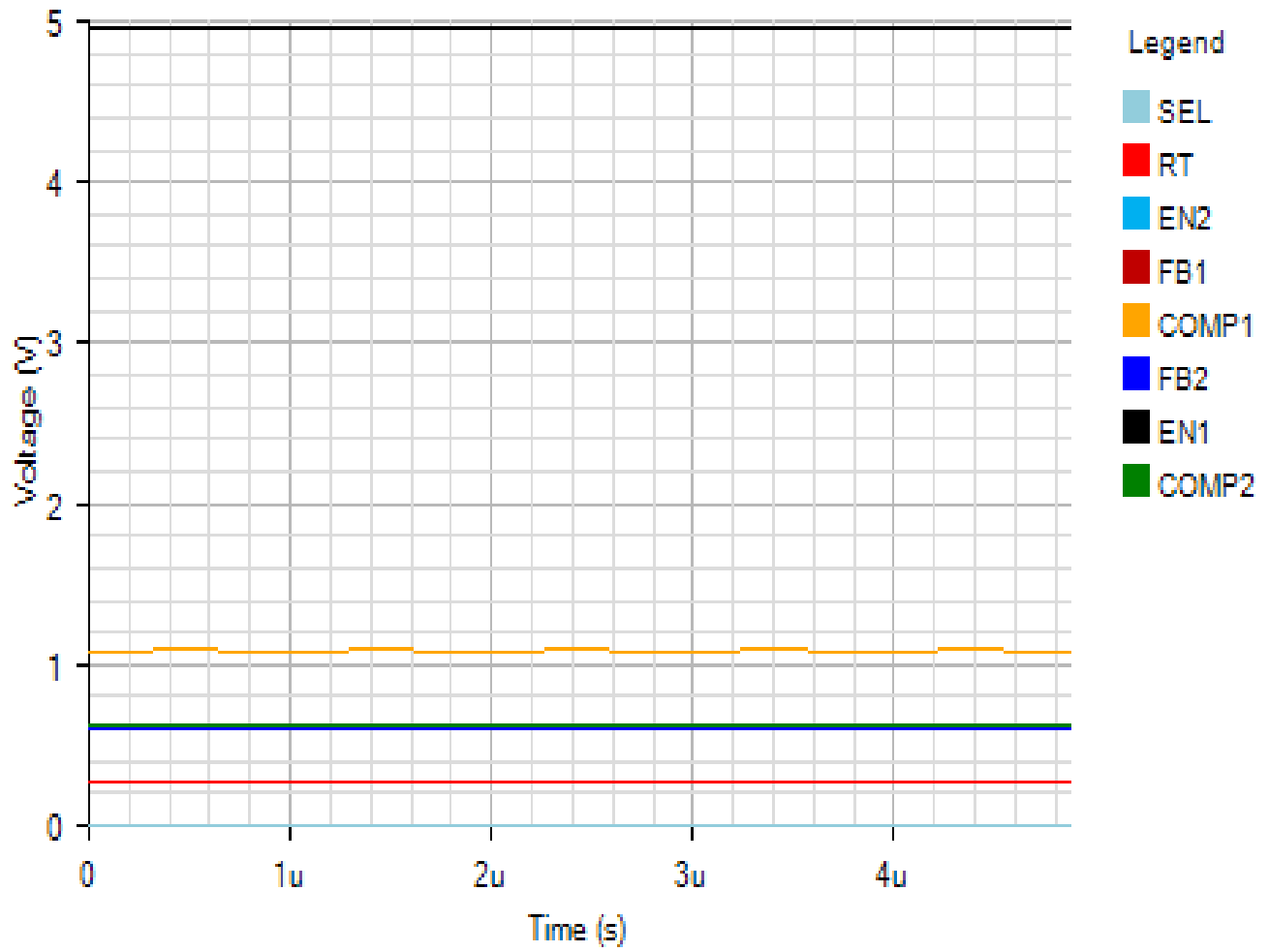
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Default



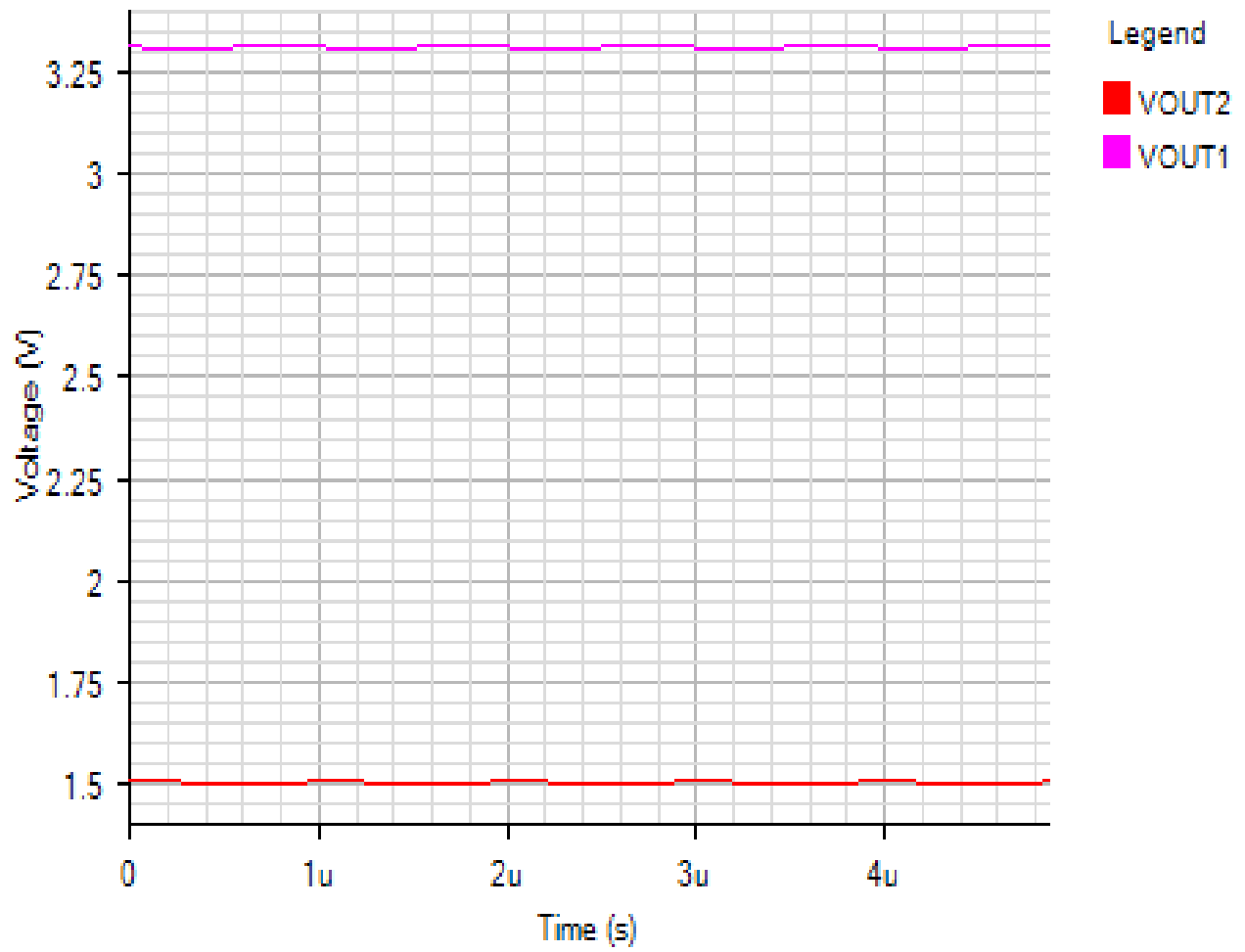
IC

Default

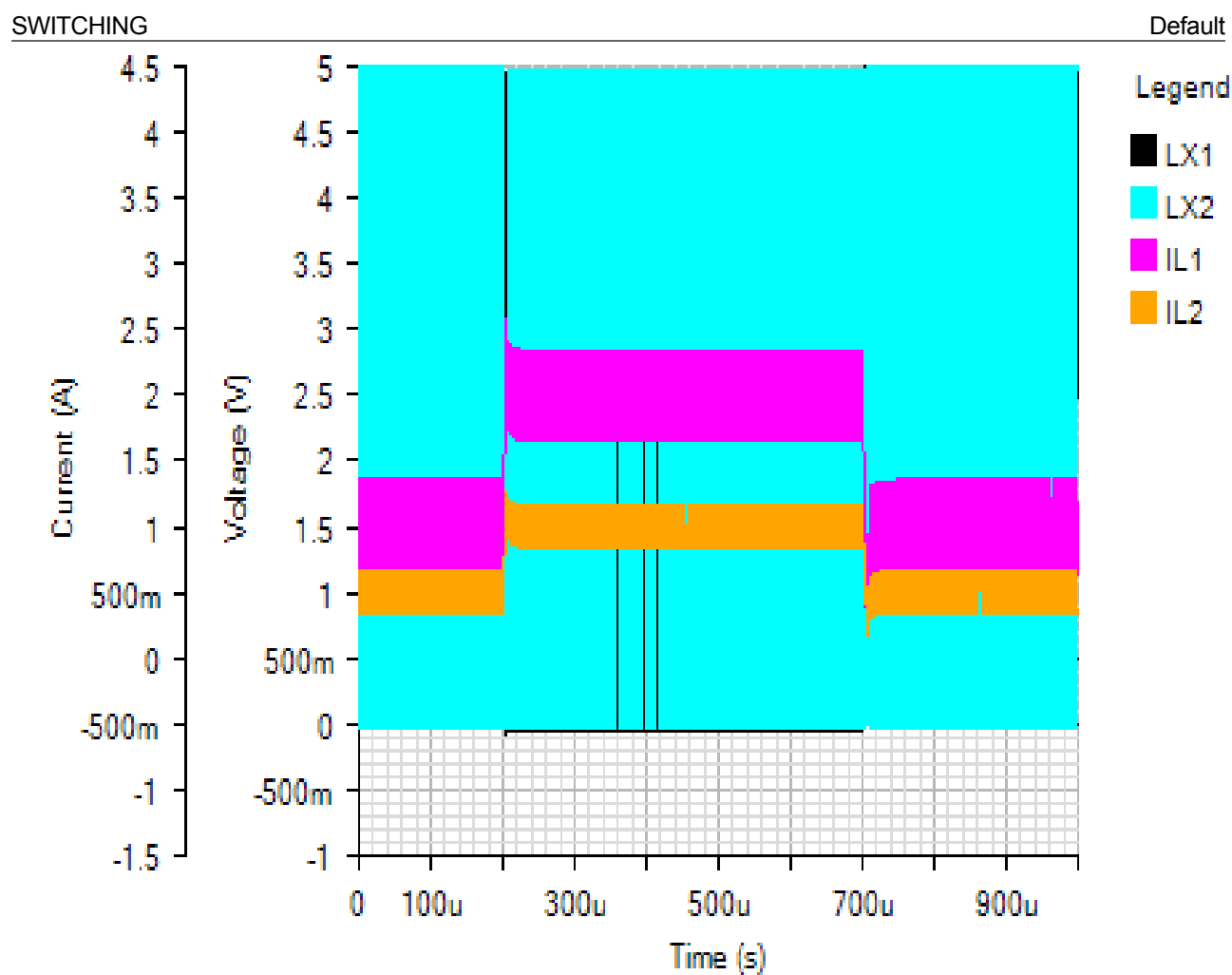


OUTPUT

Default

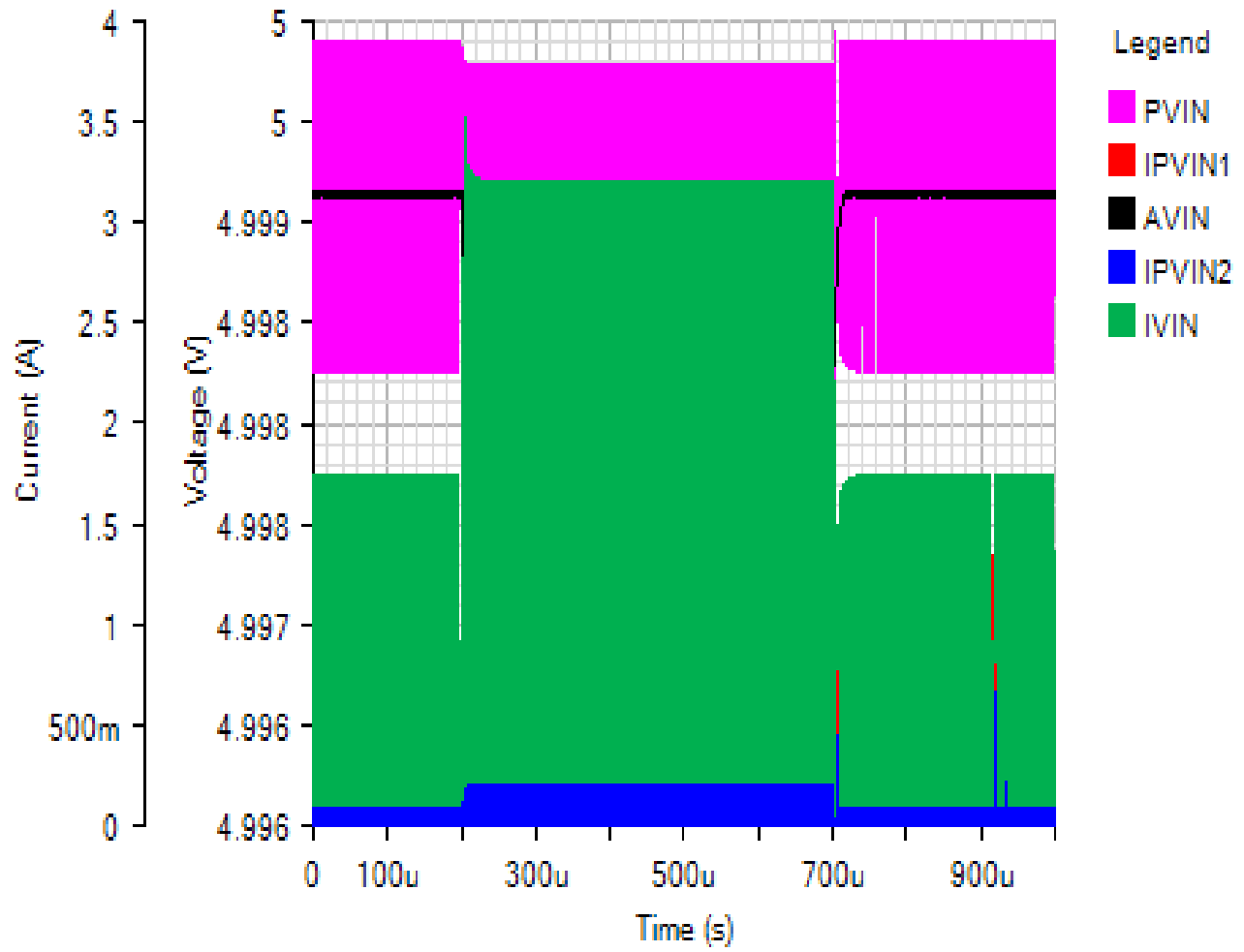


Load Step - Mon Nov 19 2018 10:21:22



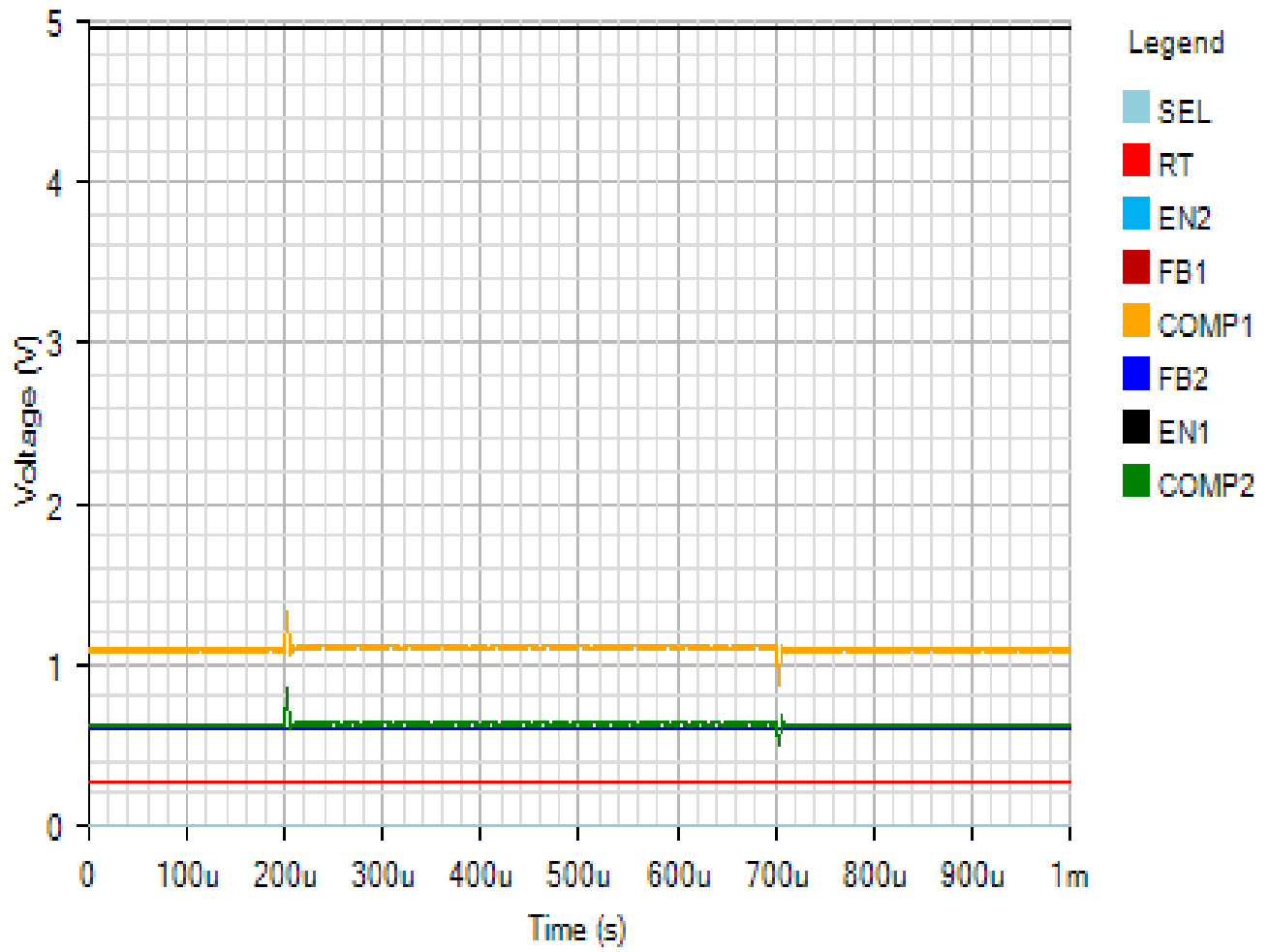
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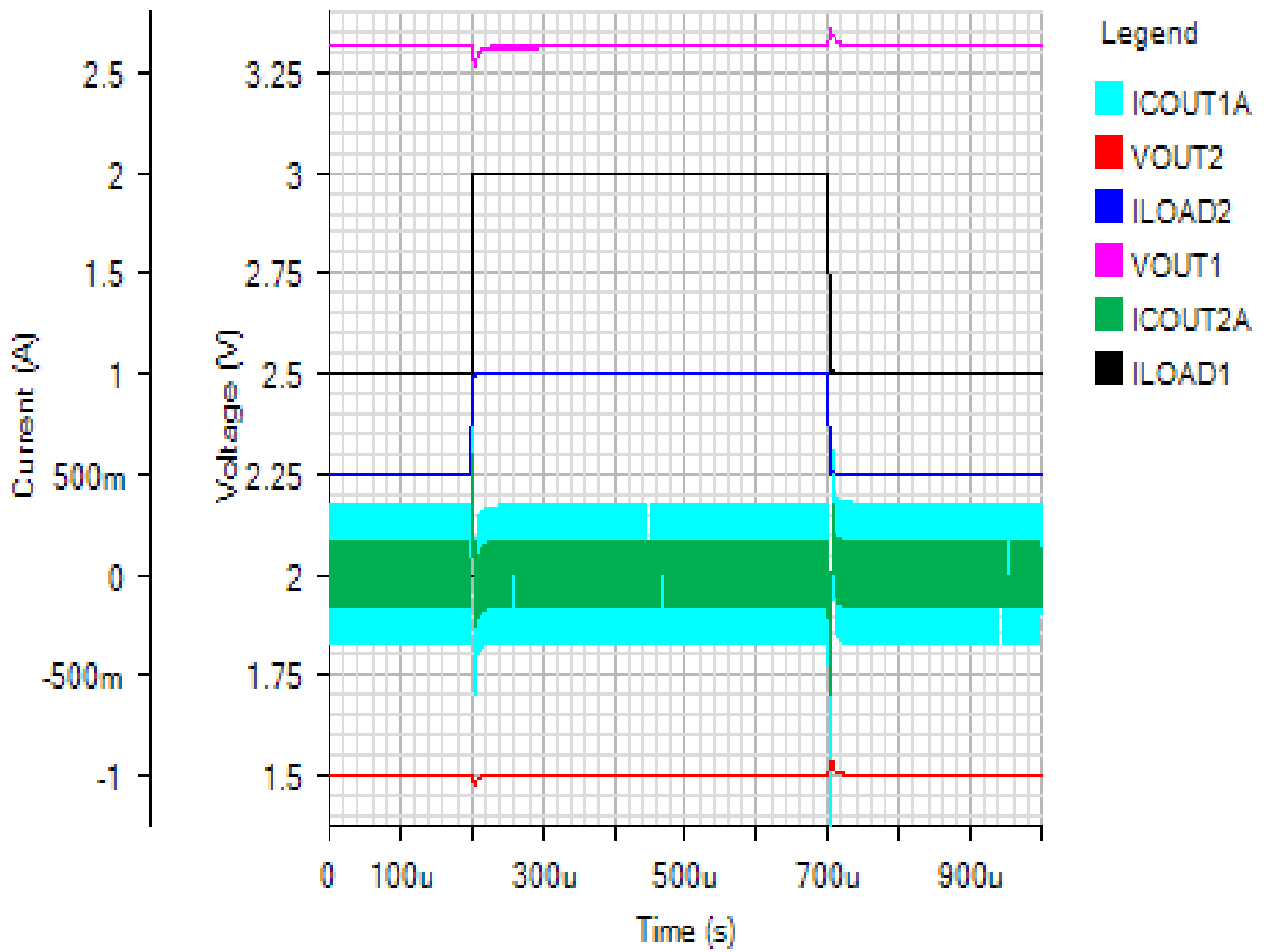
IC

Default



OUTPUT

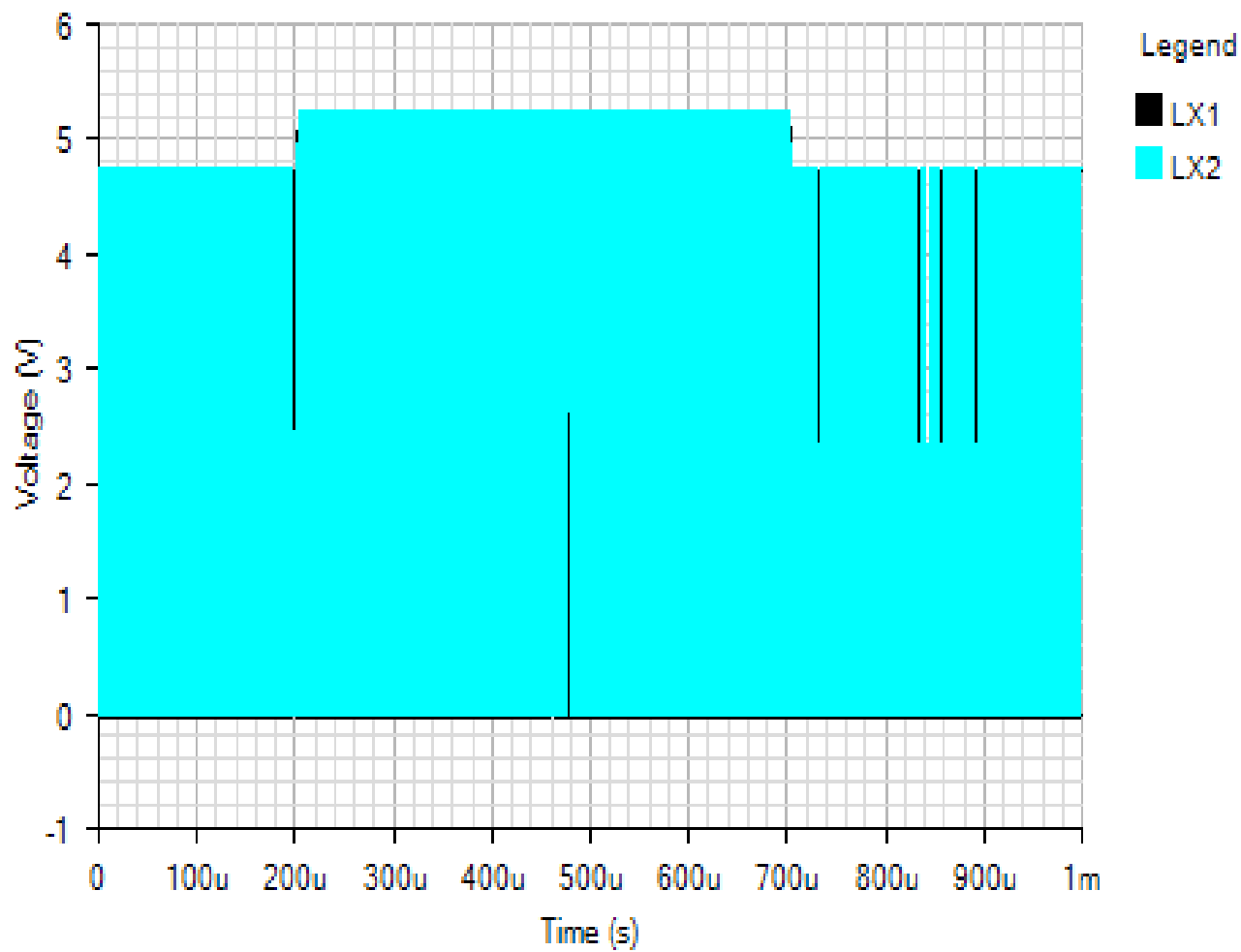
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Line Transient - Mon Nov 19 2018 10:21:22

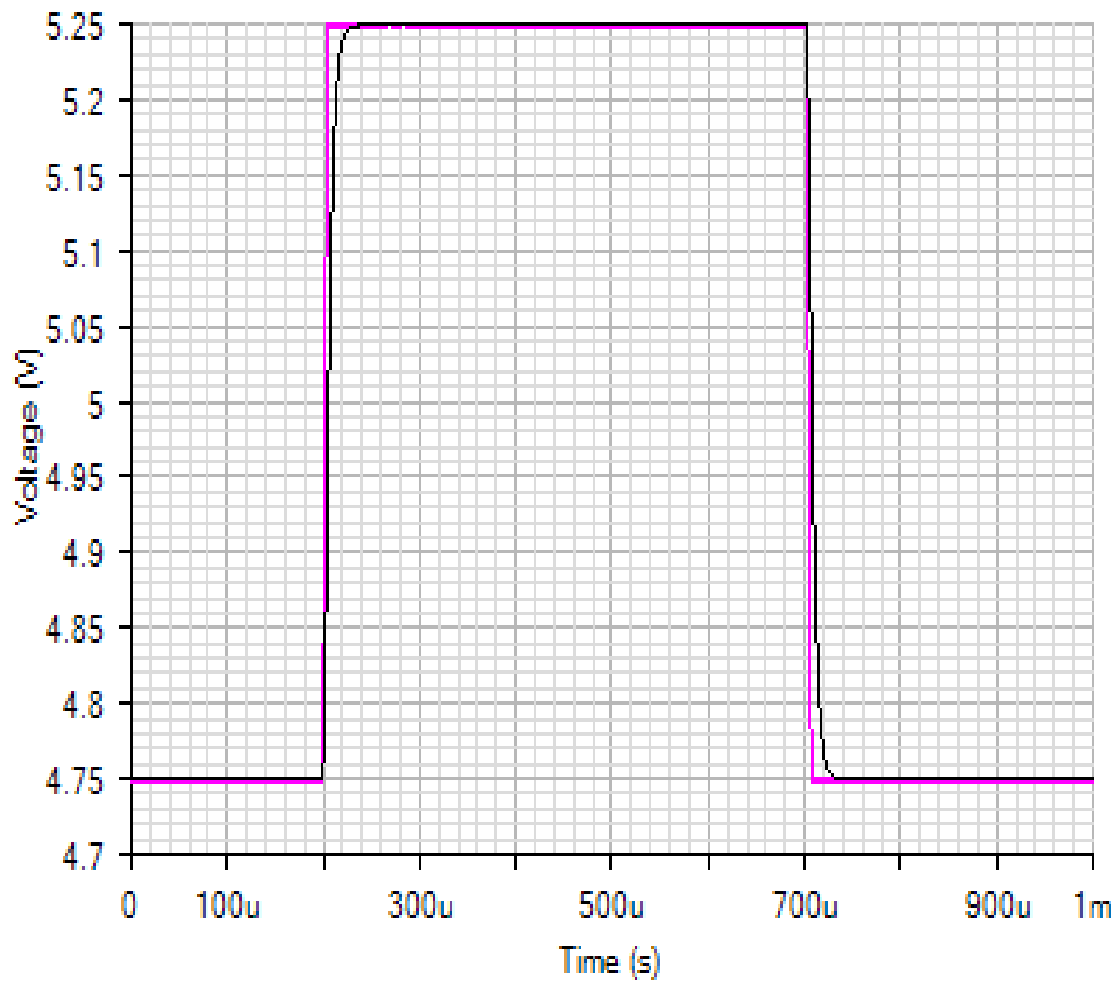
SWITCHING

Default



INPUT

Default



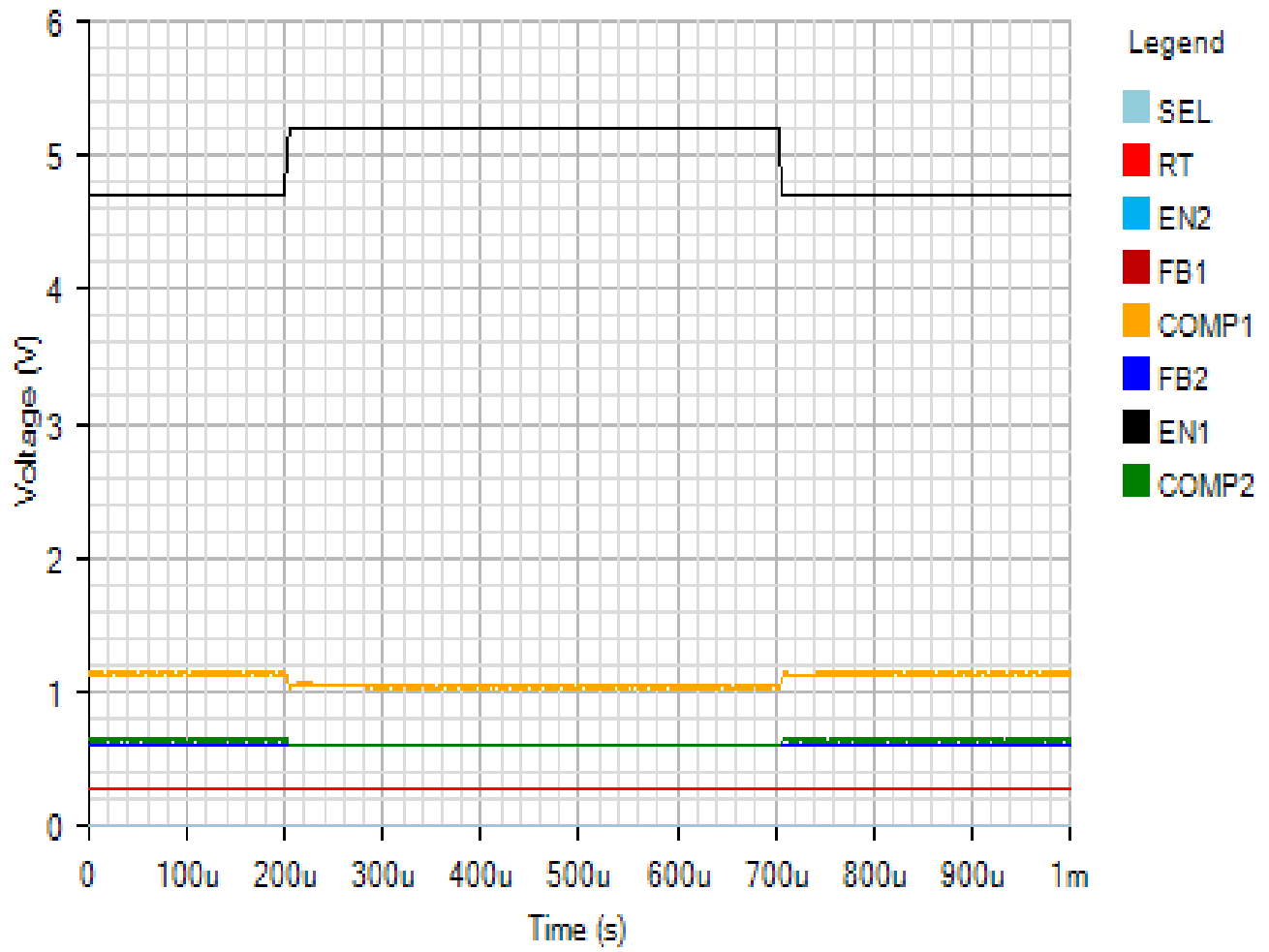
Legend

PVIN

AVIN

IC

Default



OUTPUT

Default

