Initial Design

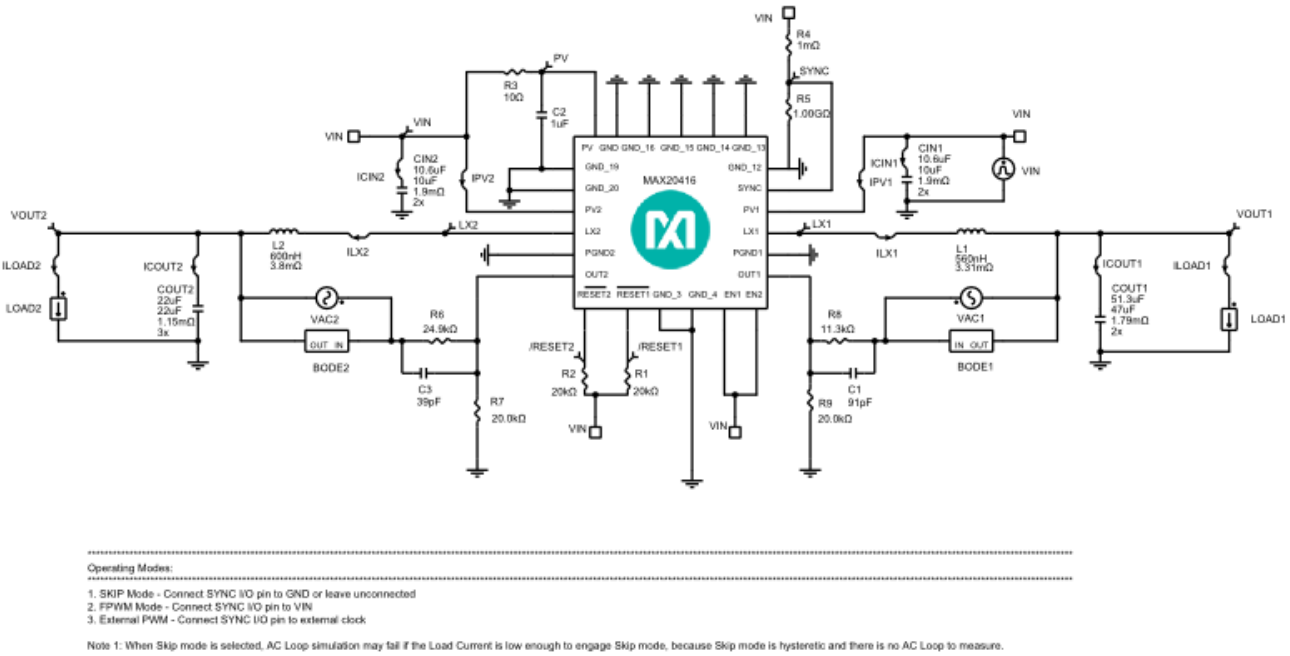
1.0

Design Requirements

Parameter	Value
Min. Input Voltage	3.3V
Max. Input Voltage	3.8V
Nominal Input Voltage	3.6V
Input Voltage Ripple	1%
Output Voltage Configuration	Resistor-Adjustable
Output Voltage 1	1.25V
Output Voltage Ripple 1	1%
Output Current 1	1.5A
Load Step Start Current 1	1.5A
Load Step Current 1	0.75A
Load Step Edge Rate 1	1A/µs
Output Voltage Load Step Undershoot 1	1%
Output Voltage Load Step Overshoot 1	1%
Output Voltage 2	1.8V
Output Voltage Ripple 2	1%
Output Current 2	1.5A
Load Step Start Current 2	1.5A
Load Step Current 2	0.75A
Load Step Edge Rate 2	1A/µs
Output Voltage Load Step Undershoot 2	1%
Output Voltage Load Step Overshoot 2	1%
Performance Priority	Balance Efficiency and Size
BOM Priority	Cost

Parameter	Value
Ambient Temperature	25°C
Method of Operation	Forced-PWM Mode
Switching Frequency	2.2MHz
Buck 1 Inductor Current Ratio (LIR)	0.3
Buck 2 Inductor Current Ratio (LIR)	0.3

Schematic



Operating Modes:

1. SKIP Mode - Connect SYNC I/O pin to GND or leave unconnected
2. FPWM Mode - Connect SYNC I/O pin to VIN
3. External PWM - Connect SYNC I/O pin to external clock

Note 1: When Skip mode is selected, AC Loop simulation may fail if the Load Current is low enough to engage Skip mode, because Skip mode is hysteretic and there is no AC Loop to measure.

BOM

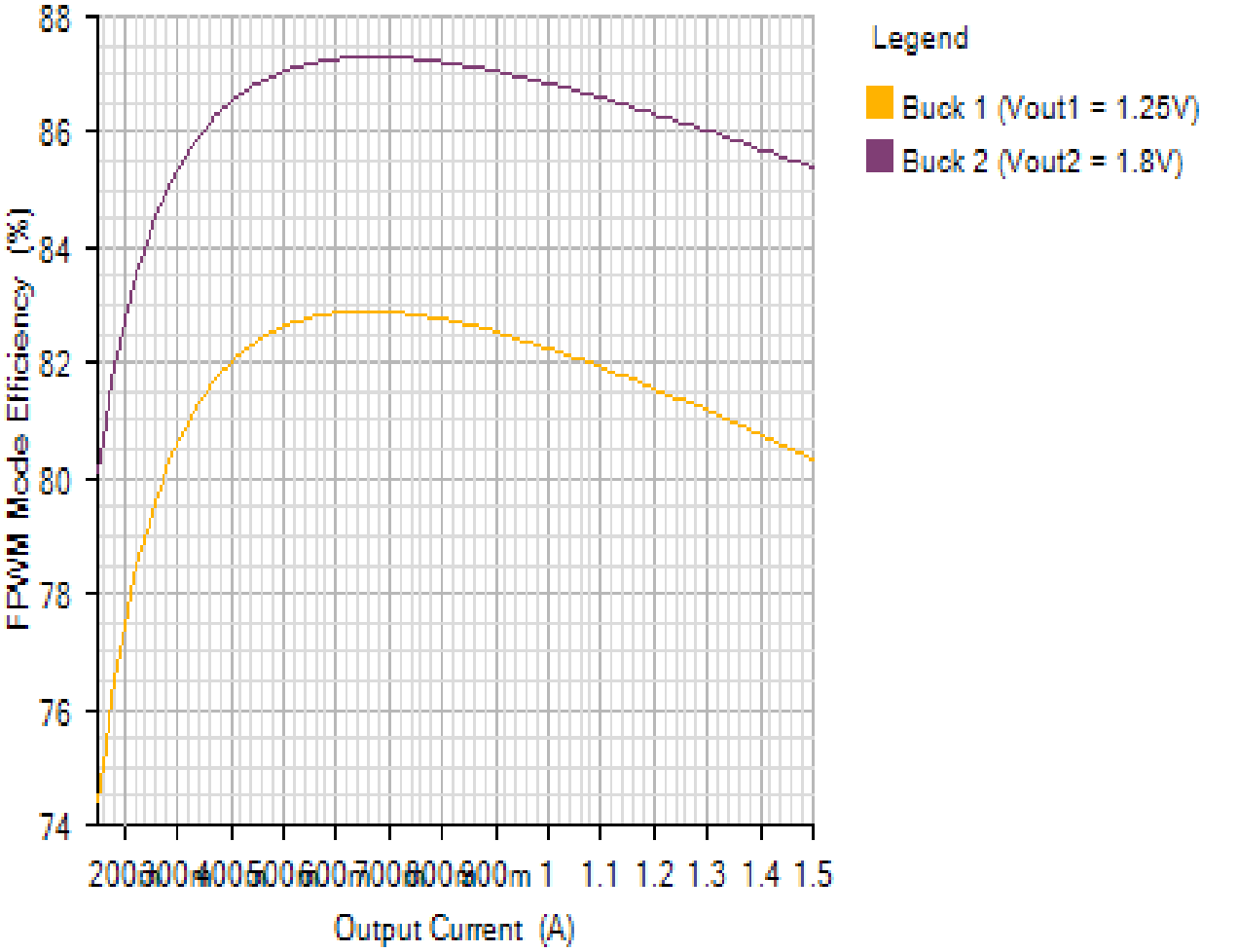
Ref	Qty	Part Number	Manufacturer	Description
U1	1	MAX20416ATGD/V+	User-Defined	IC
C1	1	NMC0402NPO910J50TRPF	NIC Components	Cap Ceramic 91pF 50V C0G 5% Pad SMD 0402 125°C T/R
C2	1	CC0603KRX7R6BB105	Yageo	Cap Ceramic 1uF 10V X7R 10% Pad SMD 0603 125°C T/R
C3	1	C0402C390J5GACTU	KEMET Corporation	Cap Ceramic 39pF 50V C0G 5% Pad SMD 0402 125°C T/R
CIN1	2	GRM32DR71A106KA01	Murata	Cap Ceramic 10uF 10V 1210 125C
CIN2	2	GRM32DR71A106KA01	Murata	Cap Ceramic 10uF 10V 1210 125C

COUT1	2	GRM32ER71A476KE15	Murata	Cap Ceramic 47uF 10V 1210 125C
COUT2	3	CGA5L1X7R0J226M160AC	TDK	Cap Ceramic 22uF 6.3V X7R 20% SMD 1206 125C Plastic T/R
L1	1	XAL6030-561MEB	Coilcraft	Ind Power Shielded 560nH 20% 100KHz 22A T/R
L2	1	MLC7542-601MEB	Coilcraft	Inductor 600nH 20% 2.95mOhm 15.7A Isat 21.9A Irms
R1	1	ERJ3GEYJ203V	Panasonic	Res Thick Film 0603 20K Ohm 5% 0.1W(1/10W) ±200ppm/°C Pad SMD Automotive T/R
R2	1	ERJ3GEYJ203V	Panasonic	Res Thick Film 0603 20K Ohm 5% 0.1W(1/10W) ±200ppm/°C Pad SMD Automotive T/R
R3	1	ERJ3GEYJ100V	Panasonic	Res Thick Film 0603 10 Ohm 5% 0.1W(1/10W) ±200ppm/°C Pad SMD Automotive T/R
R6	1	ERJ3EKF2492V	Panasonic	Res Thick Film 0603 24.9K Ohm 1% 0.1W(1/10W) ±100ppm/°C Pad SMD Automotive T/R
R7	1	ERJ3EKF2002V	Panasonic	Res Thick Film 0603 20K Ohm 1% 0.1W(1/10W) ±100ppm/°C Pad SMD Automotive T/R
R8	1	ERJ3EKF1132V	Panasonic	Res Thick Film 0603 11.3K Ohm 1% 0.1W(1/10W) ±100ppm/°C Pad SMD Automotive T/R
R9	1	ERJ3EKF2002V	Panasonic	Res Thick Film 0603 20K Ohm 1% 0.1W(1/10W) ±100ppm/°C Pad SMD Automotive T/R

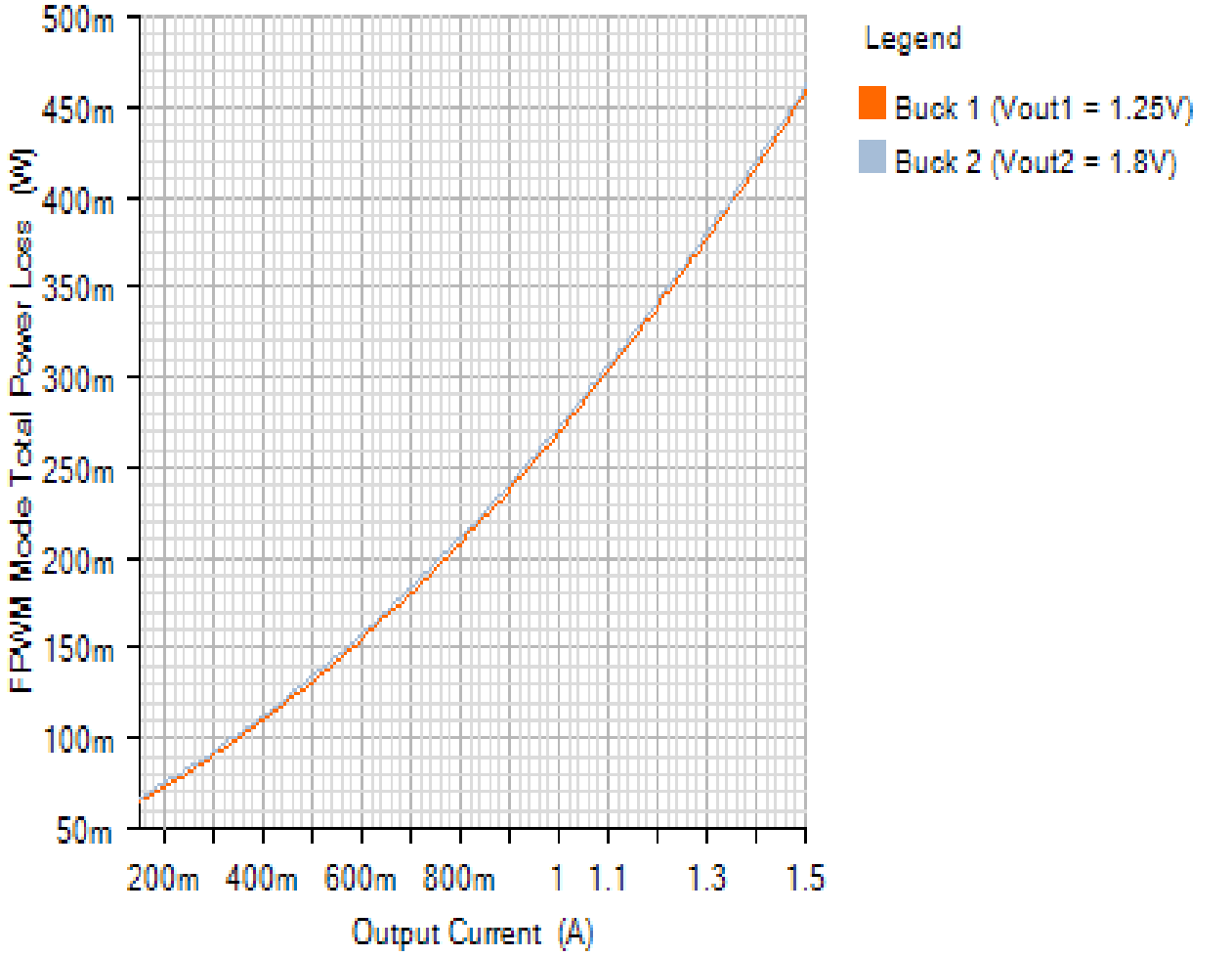
Simulation Results

Efficiency - Tue Nov 20 2018 13:40:31

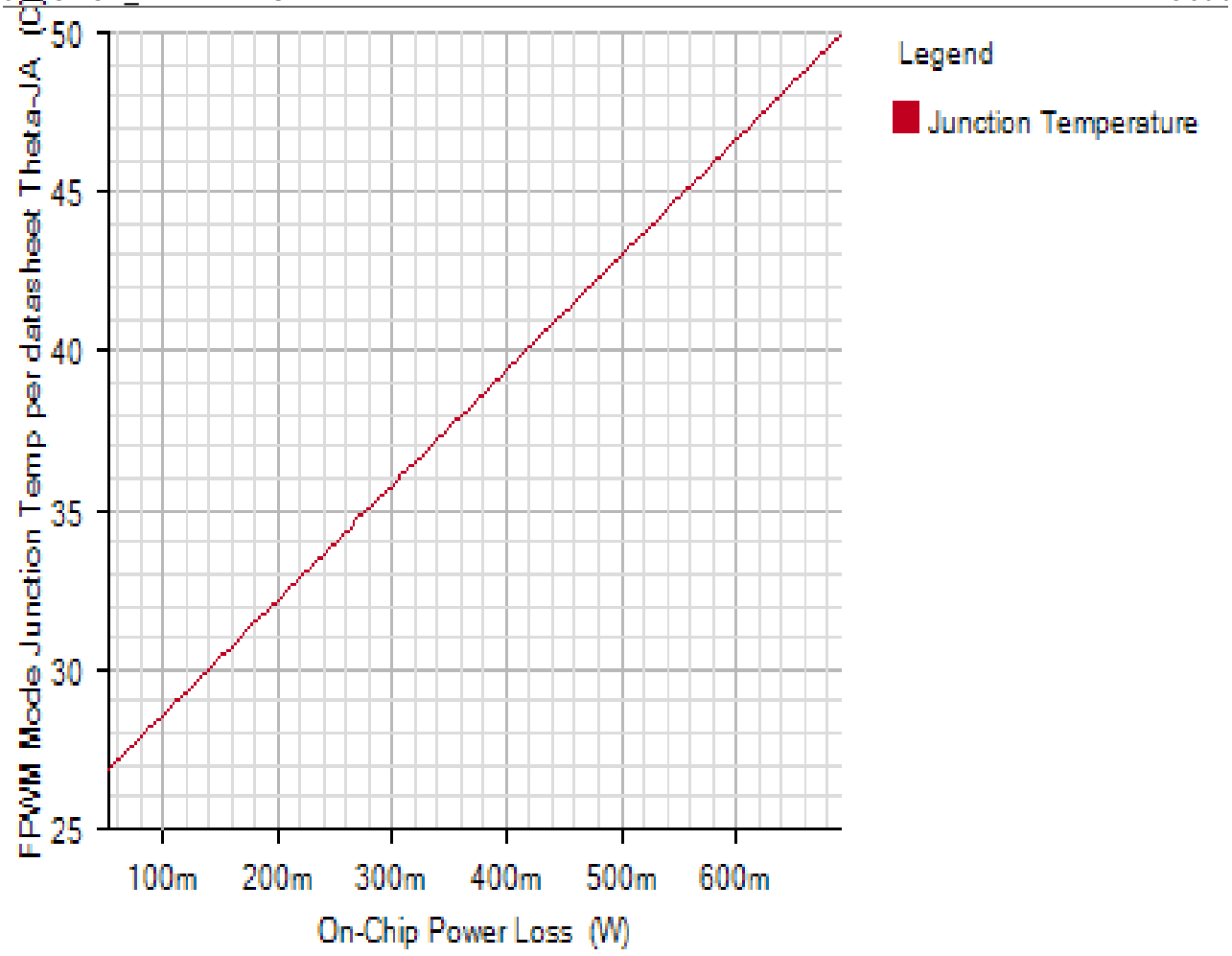
EFFICIENCY Default



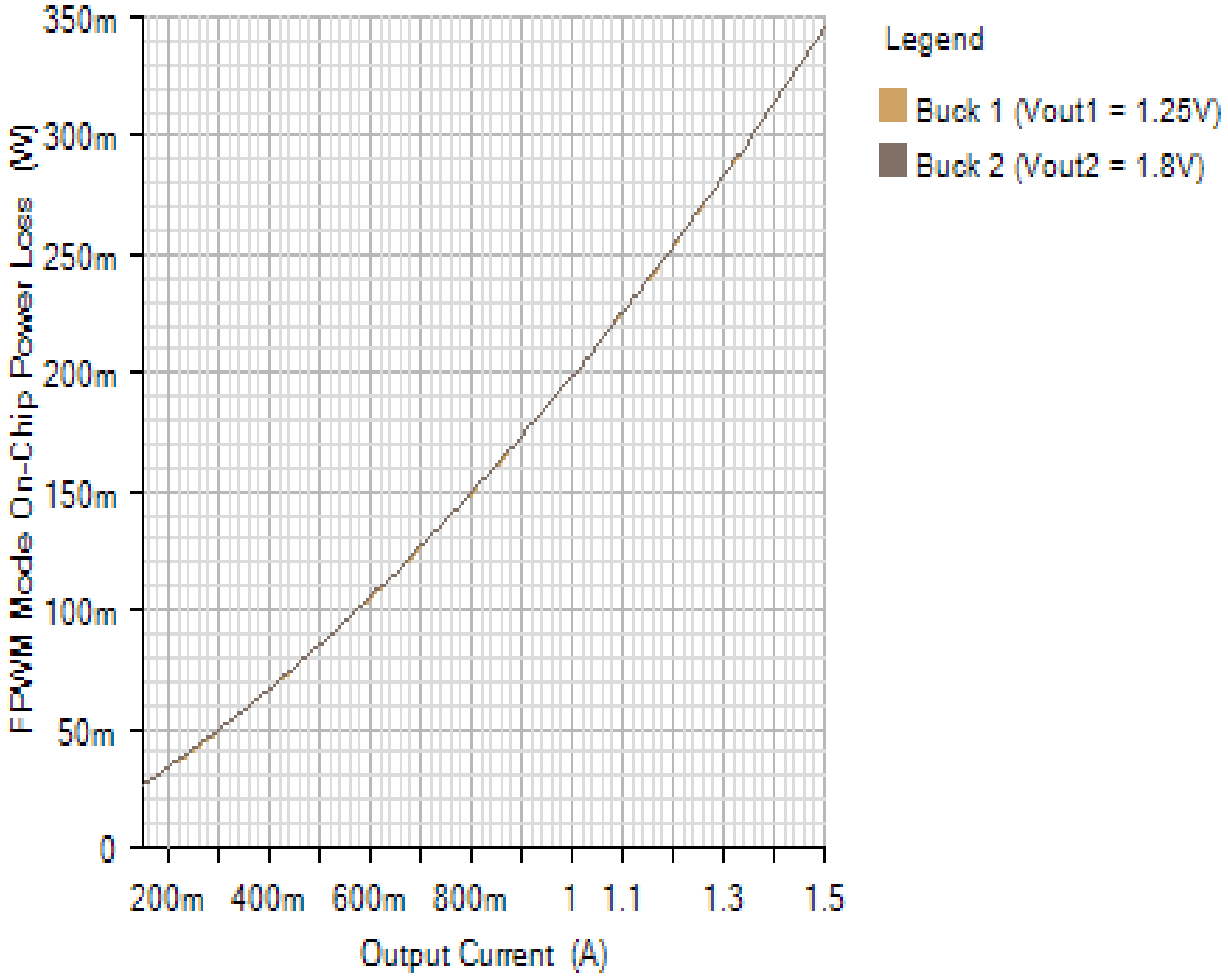
TOTAL_POWER_LOSS Default



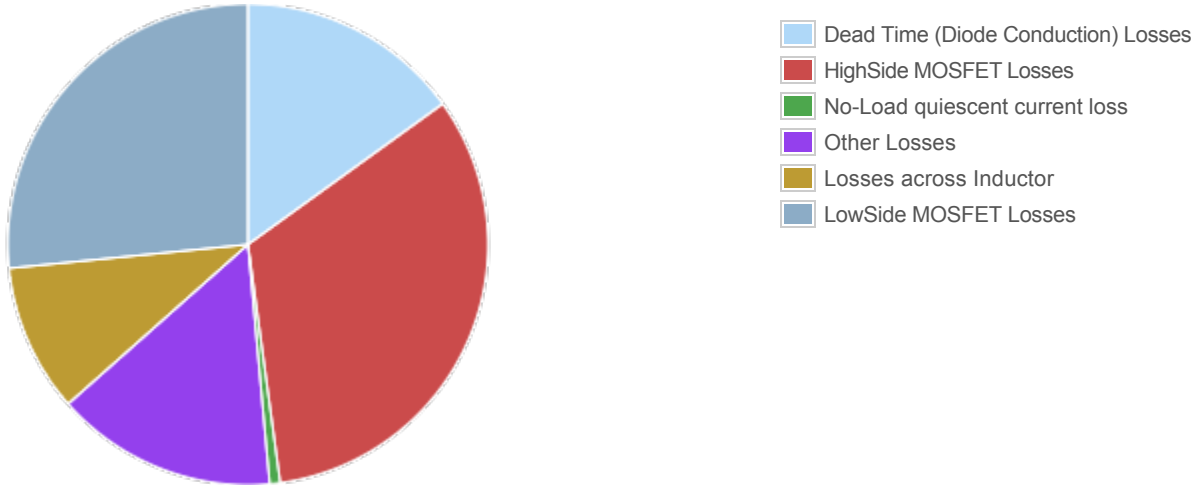
JUNCTION_TEMPERATURE Default



ON-CHIP_POWER_LOSS Default



Losses

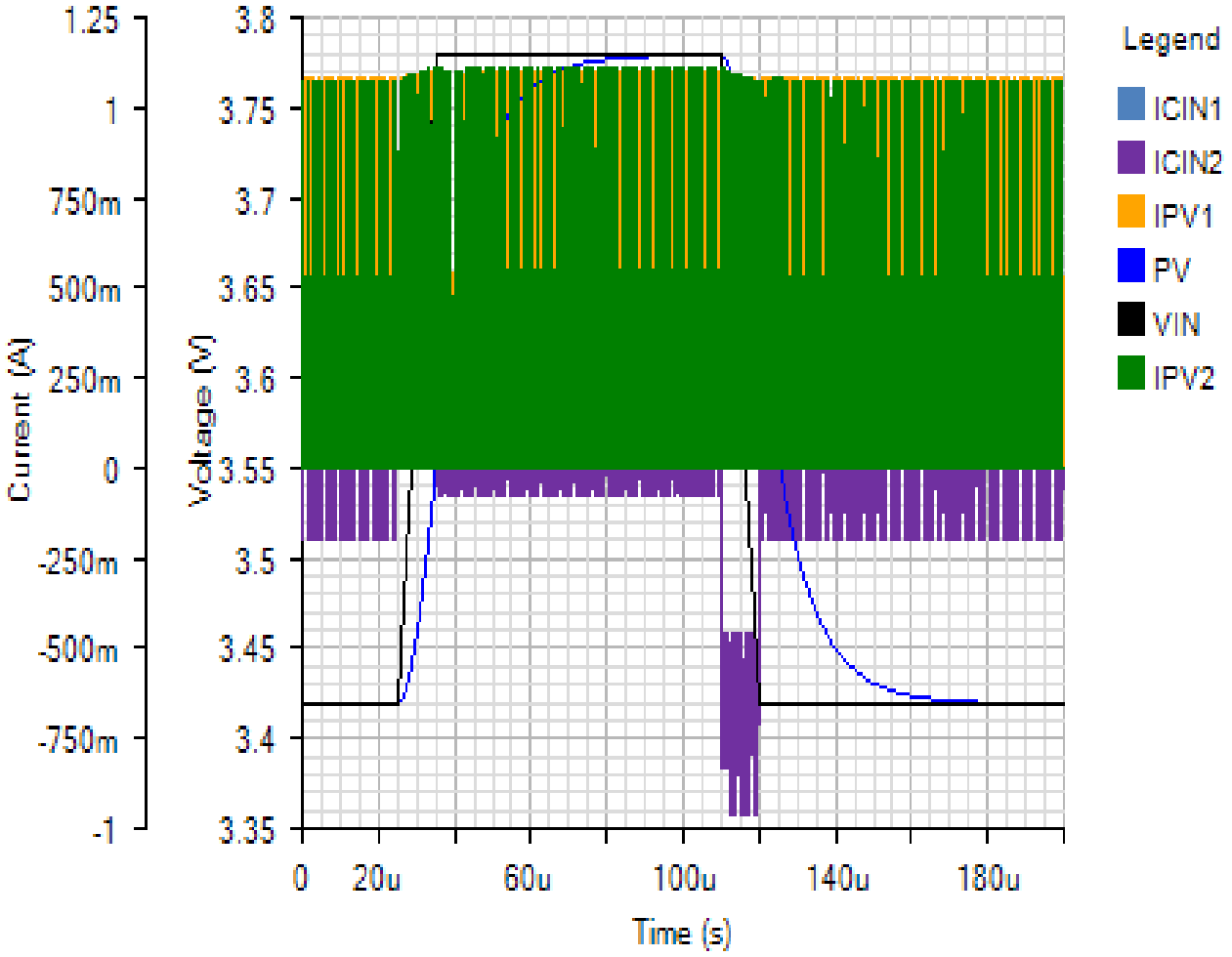


Component	Loss (W)	% of total

Component	Loss (W)	% of total
Dead Time (Diode Conduction) Losses	0.1386	15.1
HighSide MOSFET Losses	0.301812	32.8
No-Load quiescent current loss	0.00648	0.7
Other Losses	0.137259	14.9
Losses across Inductor	0.09156	9.9
LowSide MOSFET Losses	0.244621	26.6
Total	0.920332	100

Line Transient - Tue Nov 20 2018 13:40:31

INPUT Default



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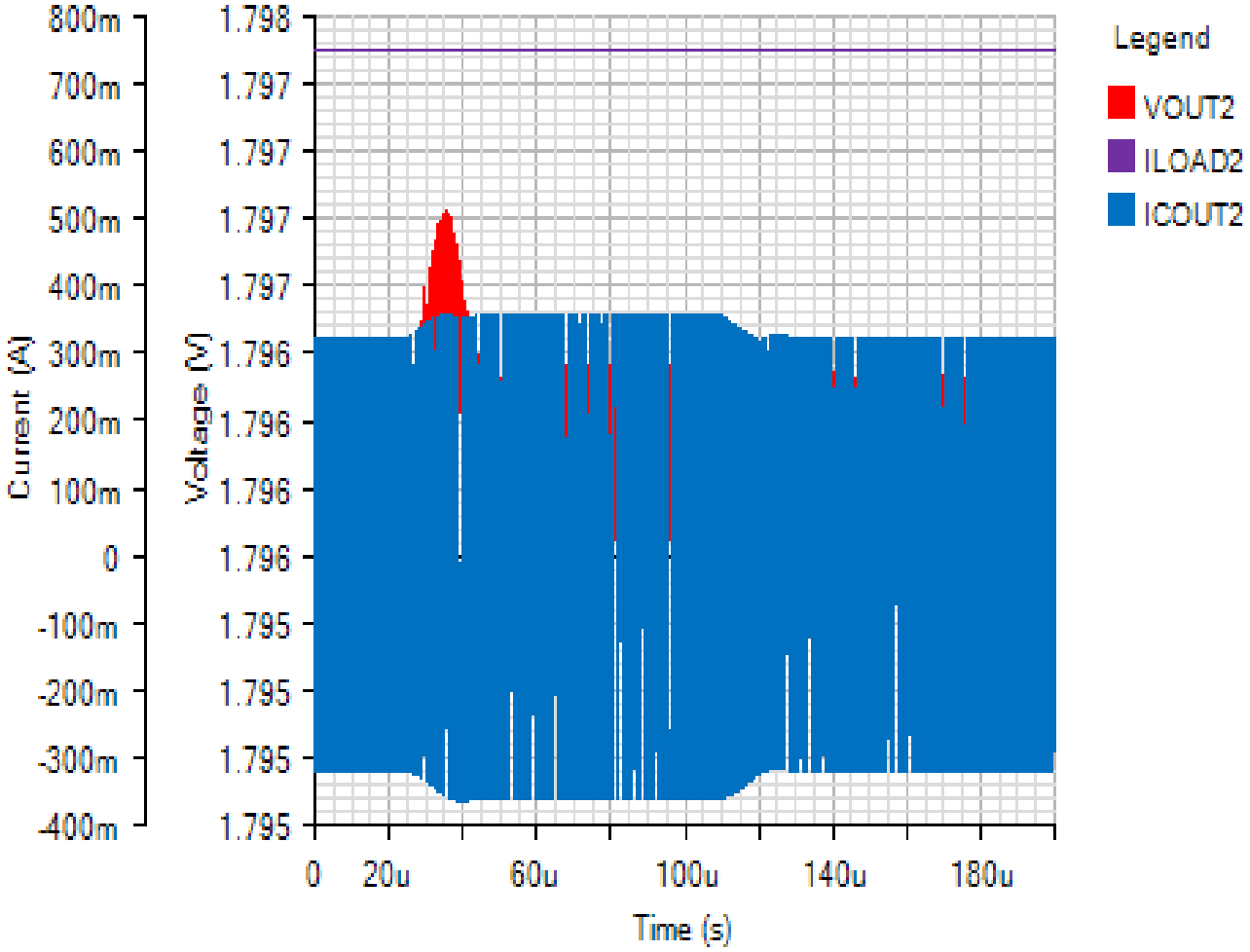

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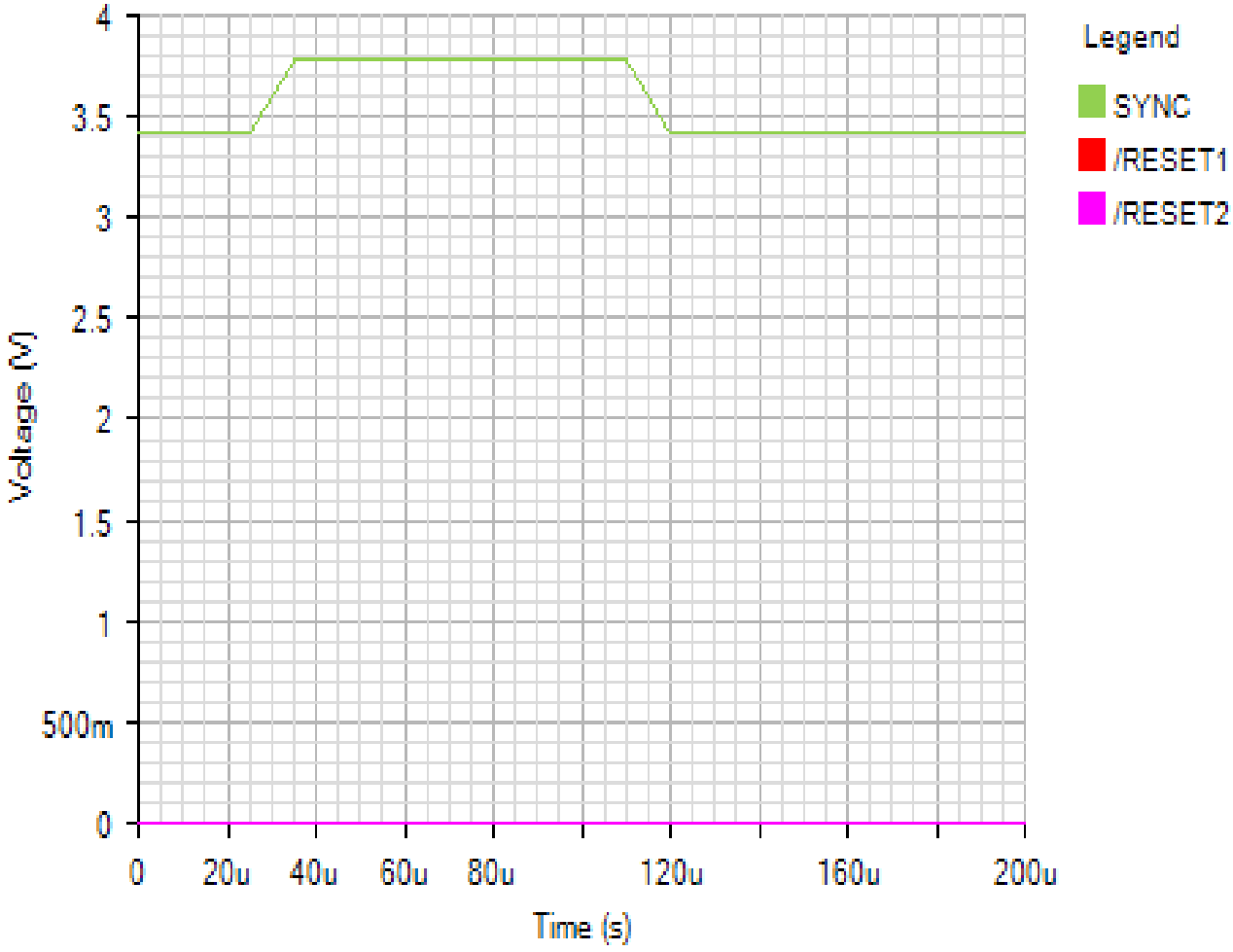
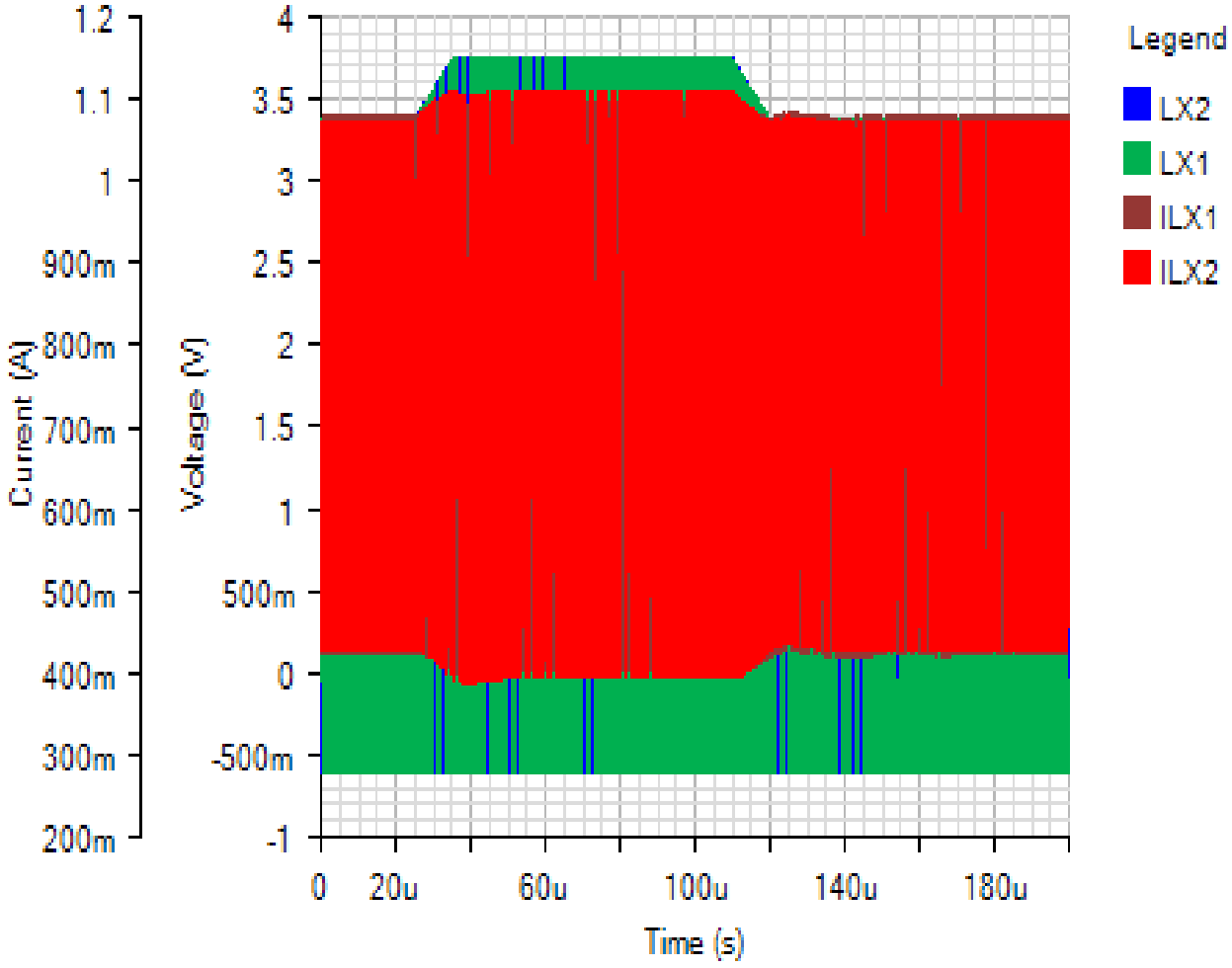


SWITCHING Default



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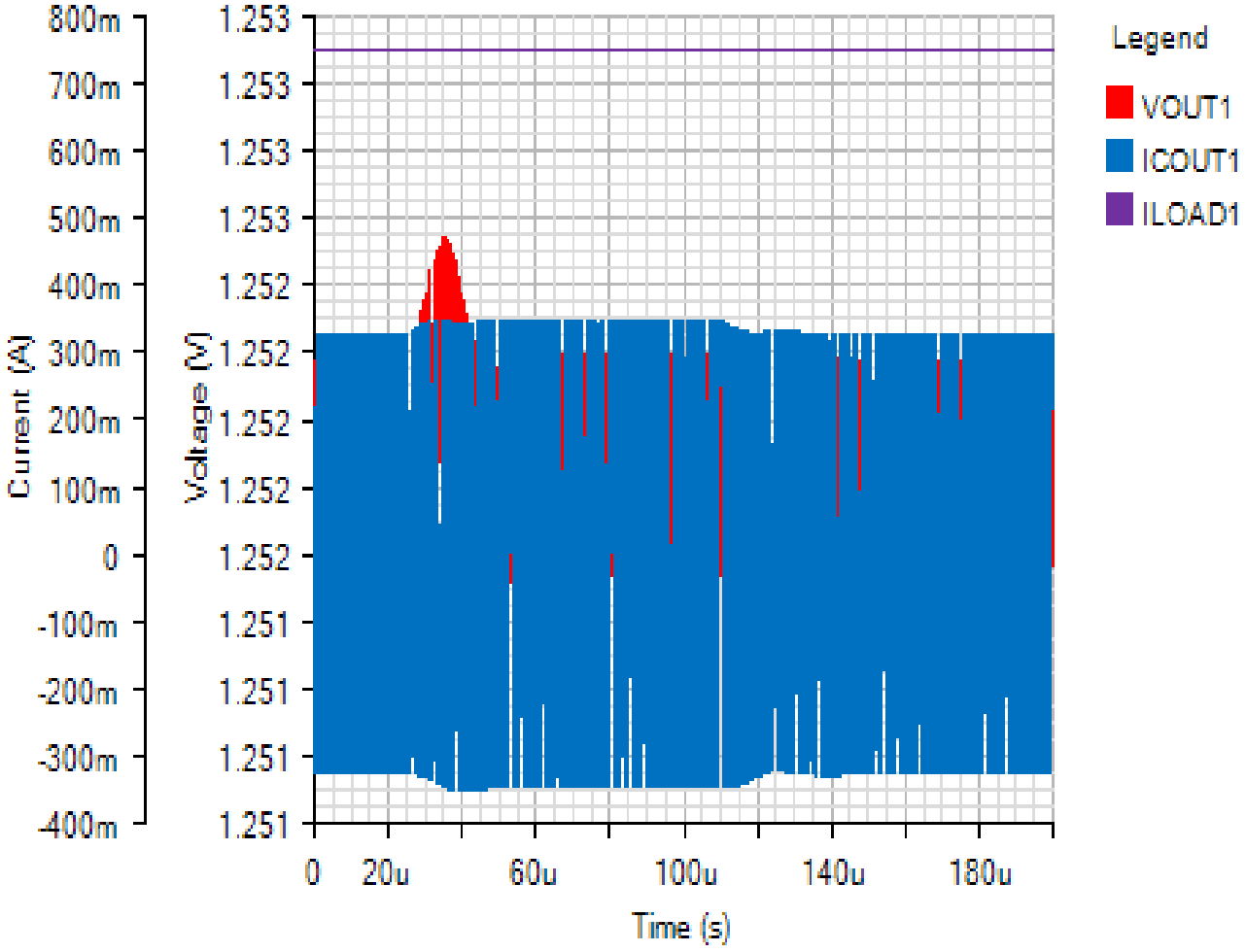
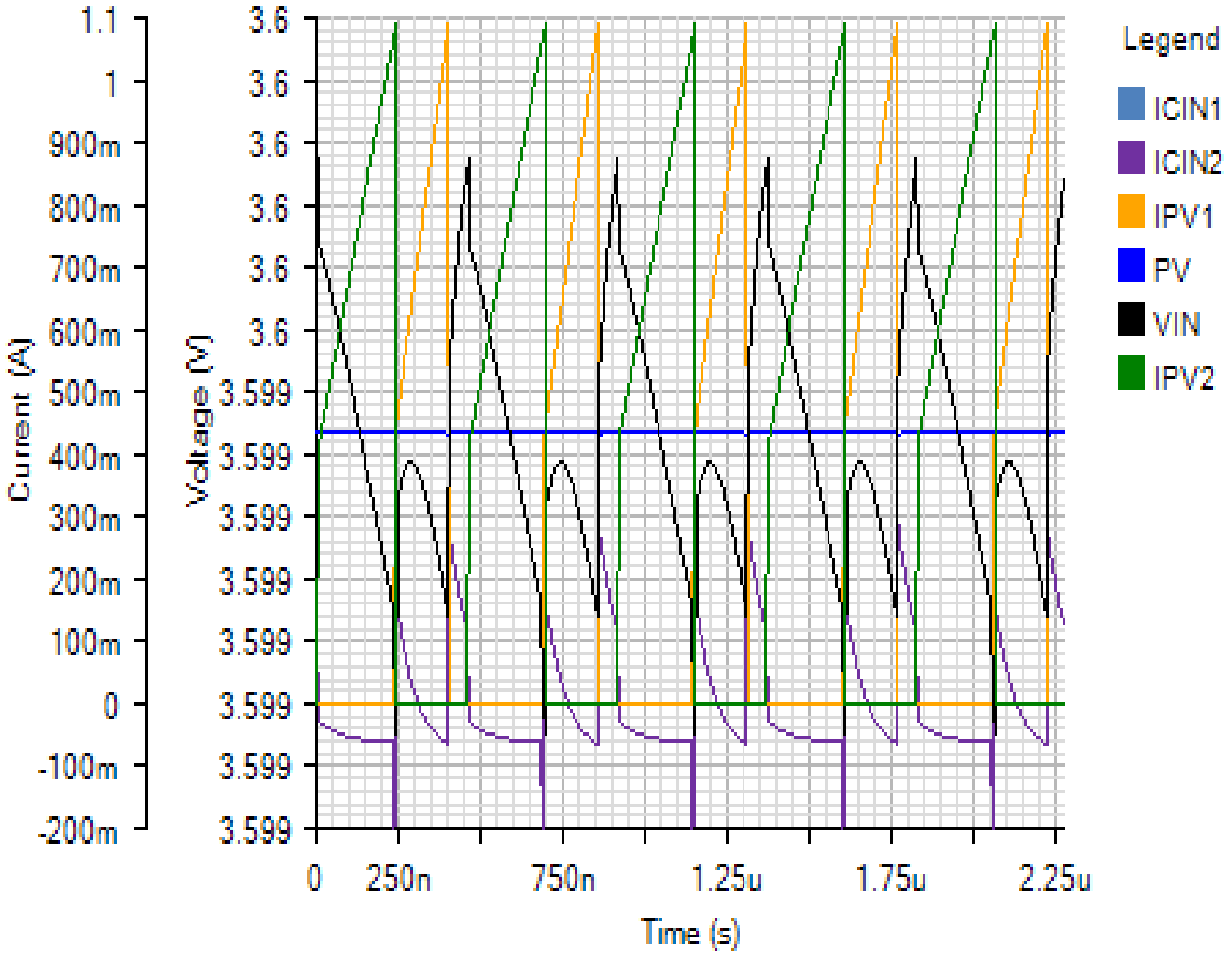
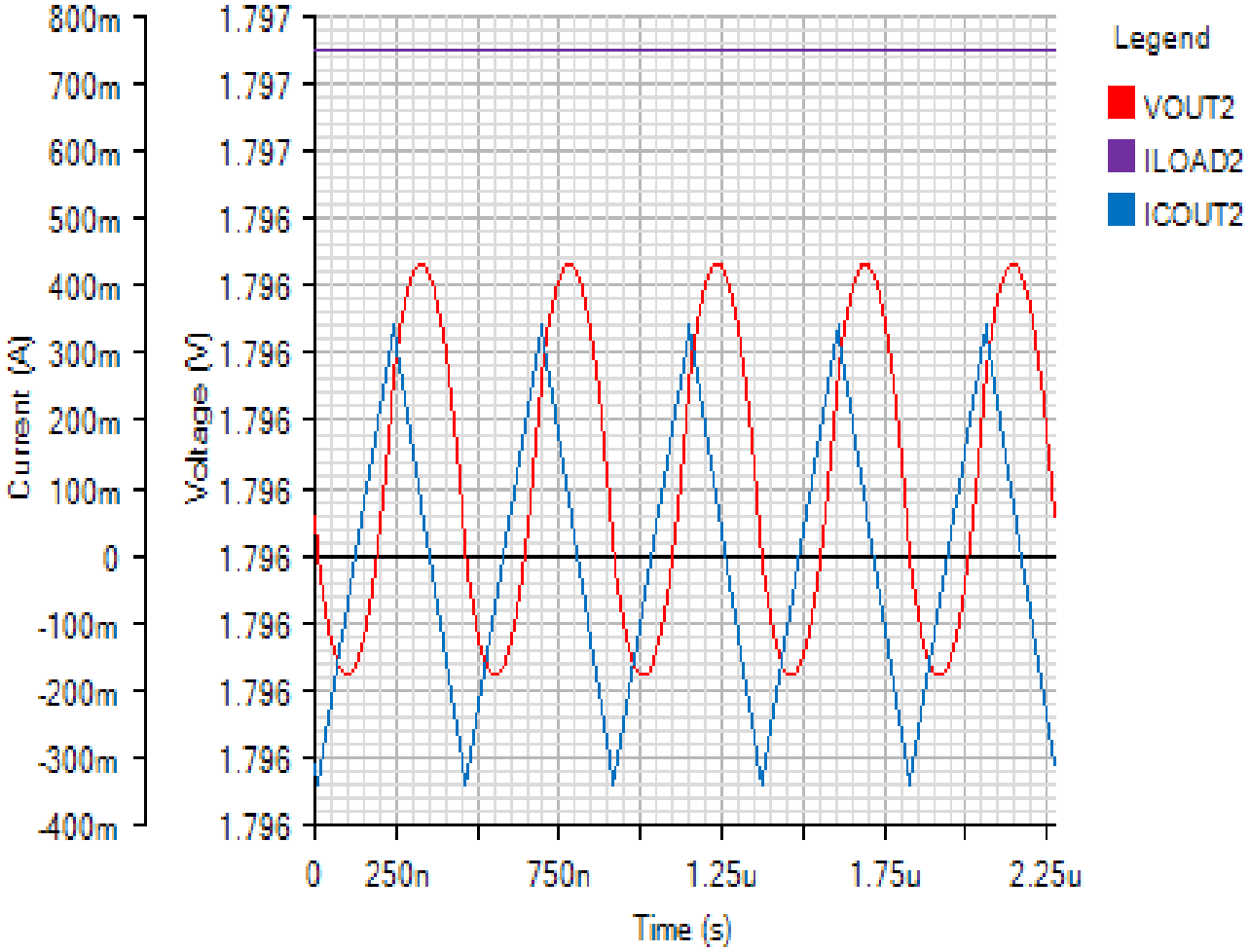


Steady State - Tue Nov 20 2018 13:40:31

INPUT Default



OUTPUT_2 Default



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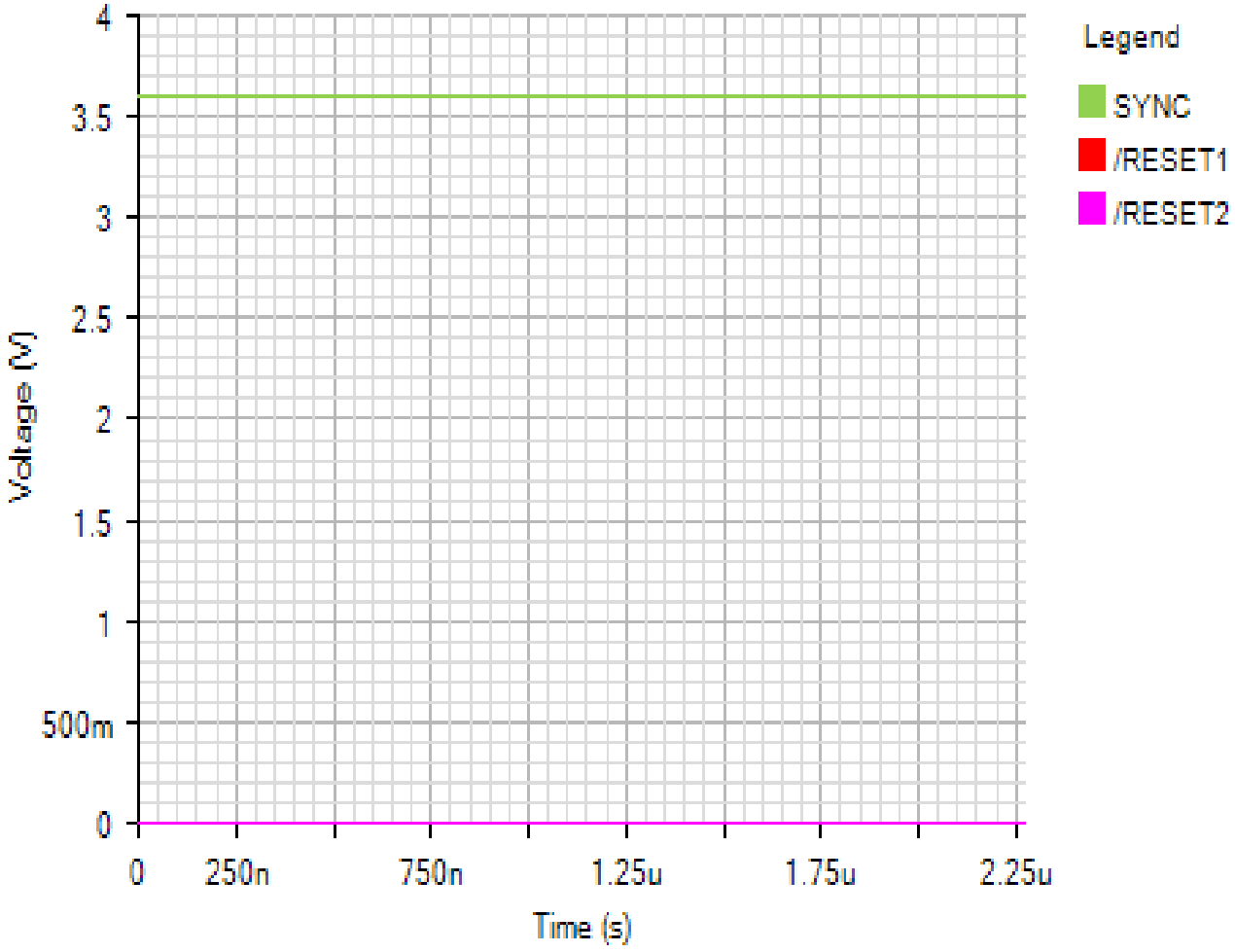

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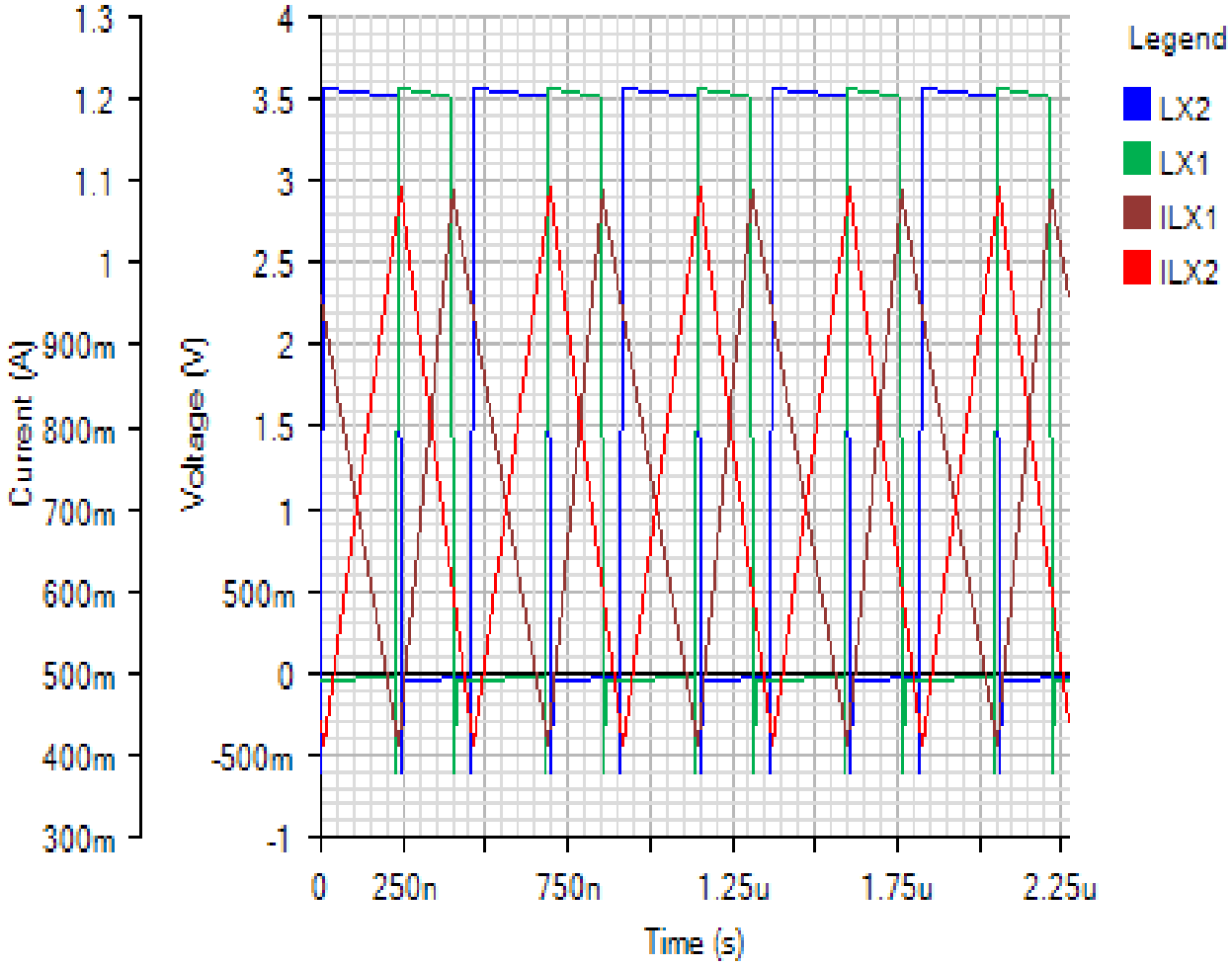
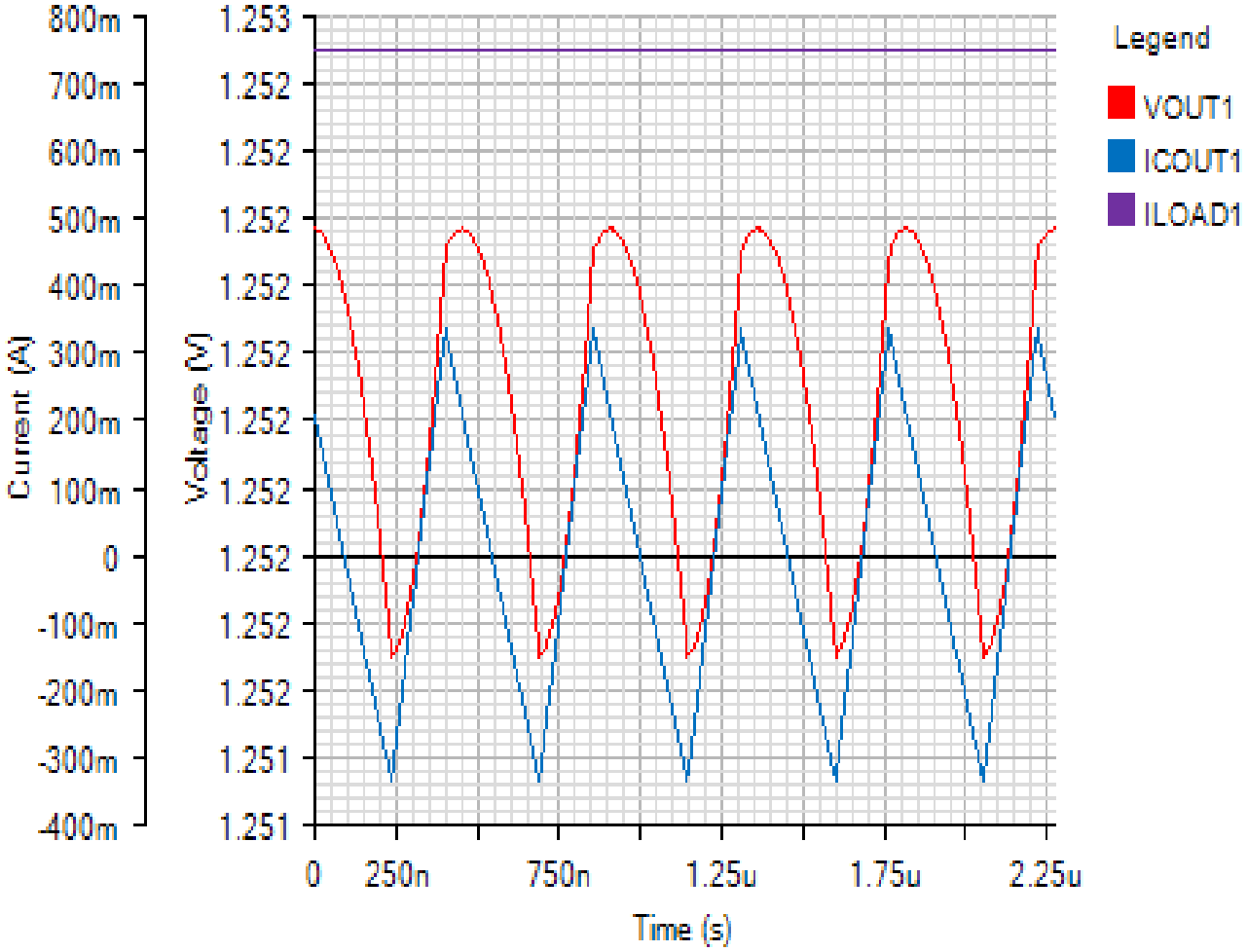
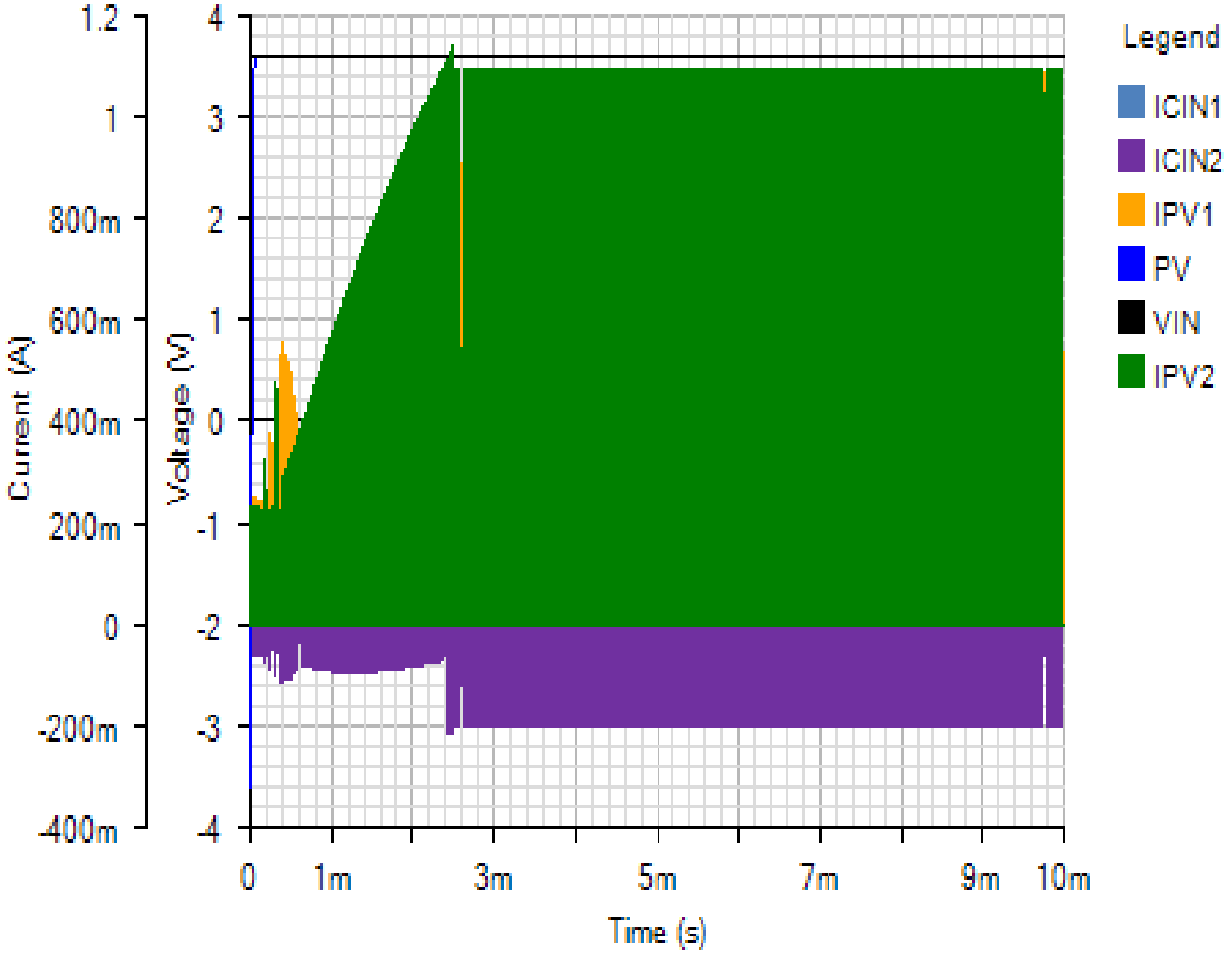


OUTPUT_1 Default

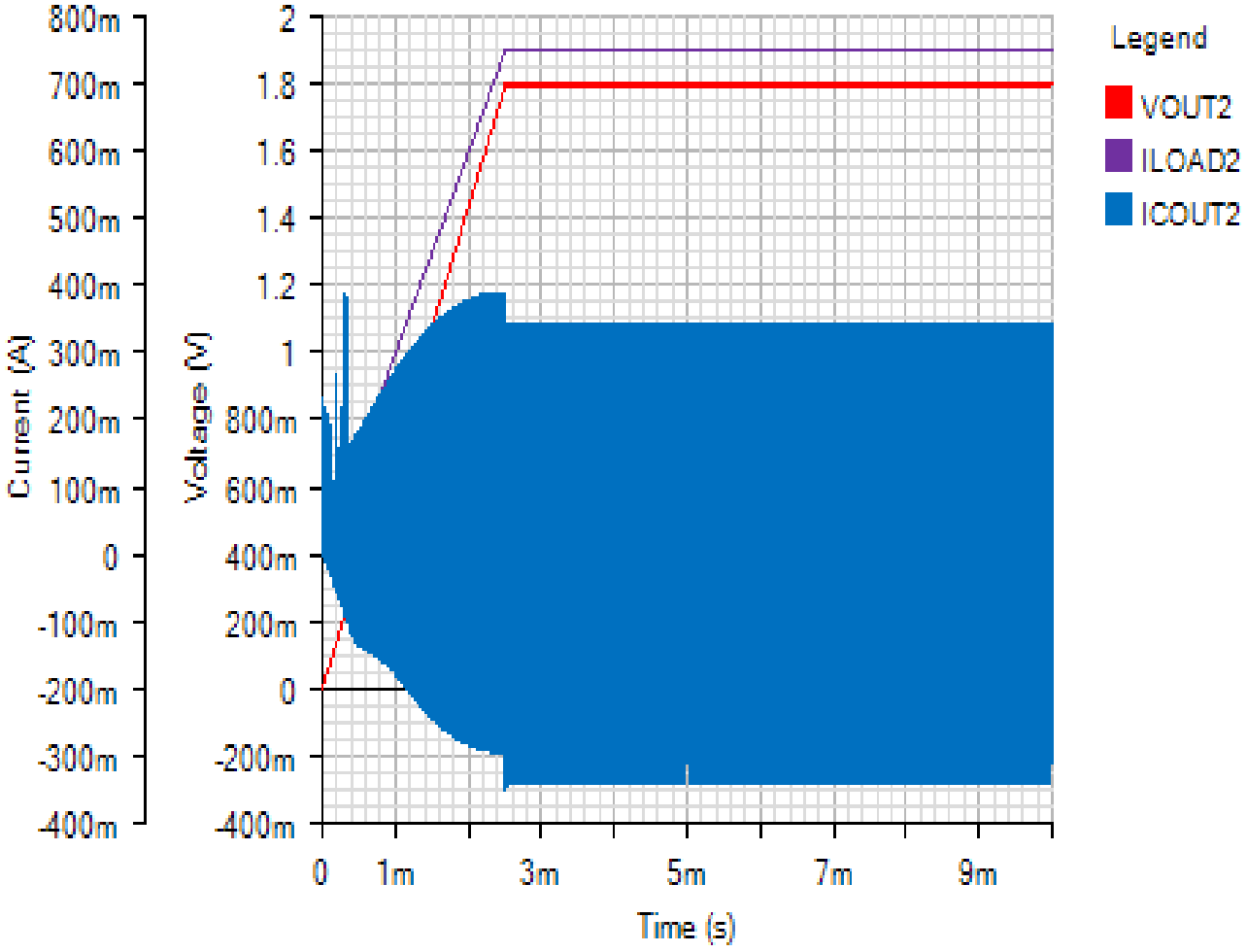


Start Up - Tue Nov 20 2018 13:40:31

INPUT Default



OUTPUT_2 Default



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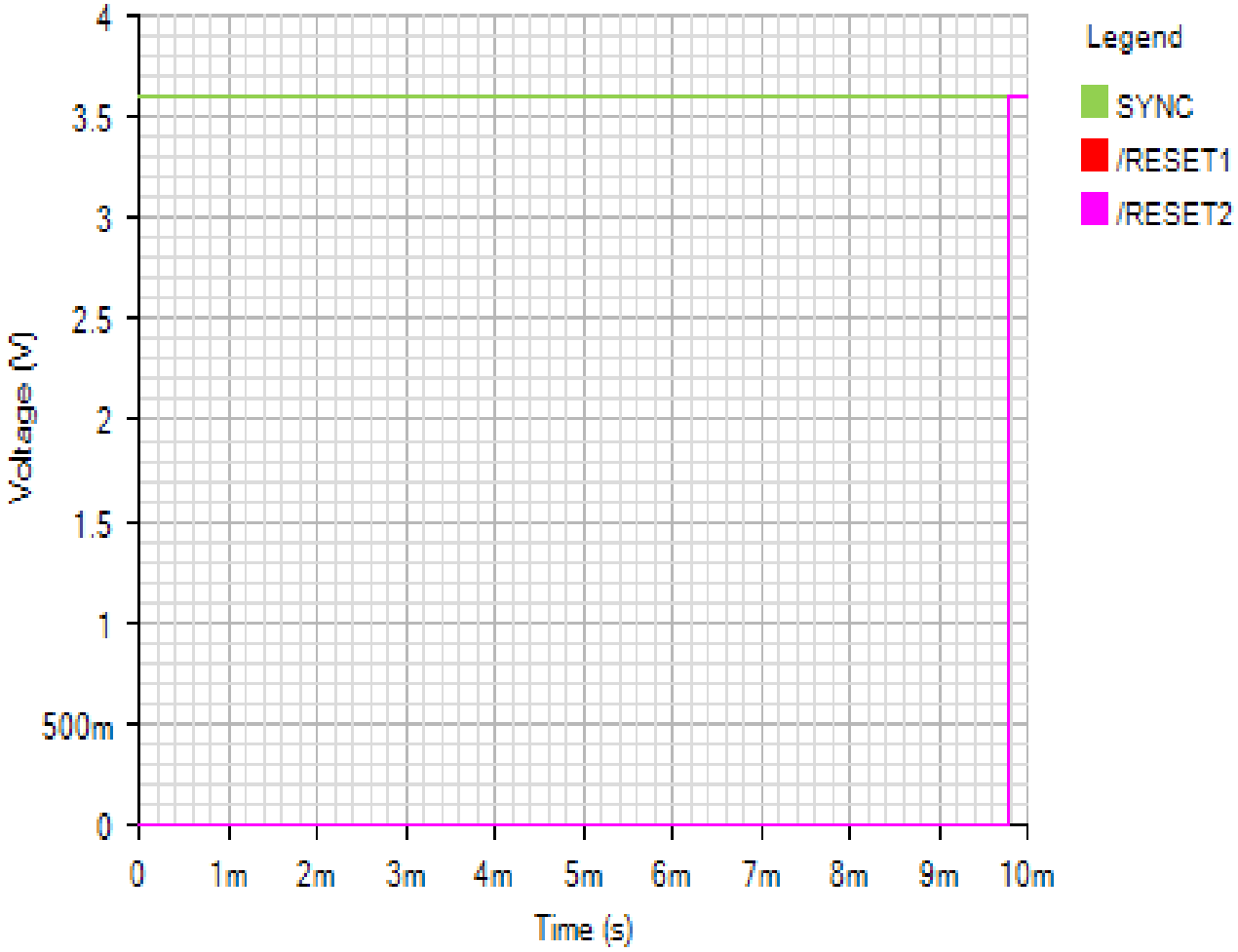

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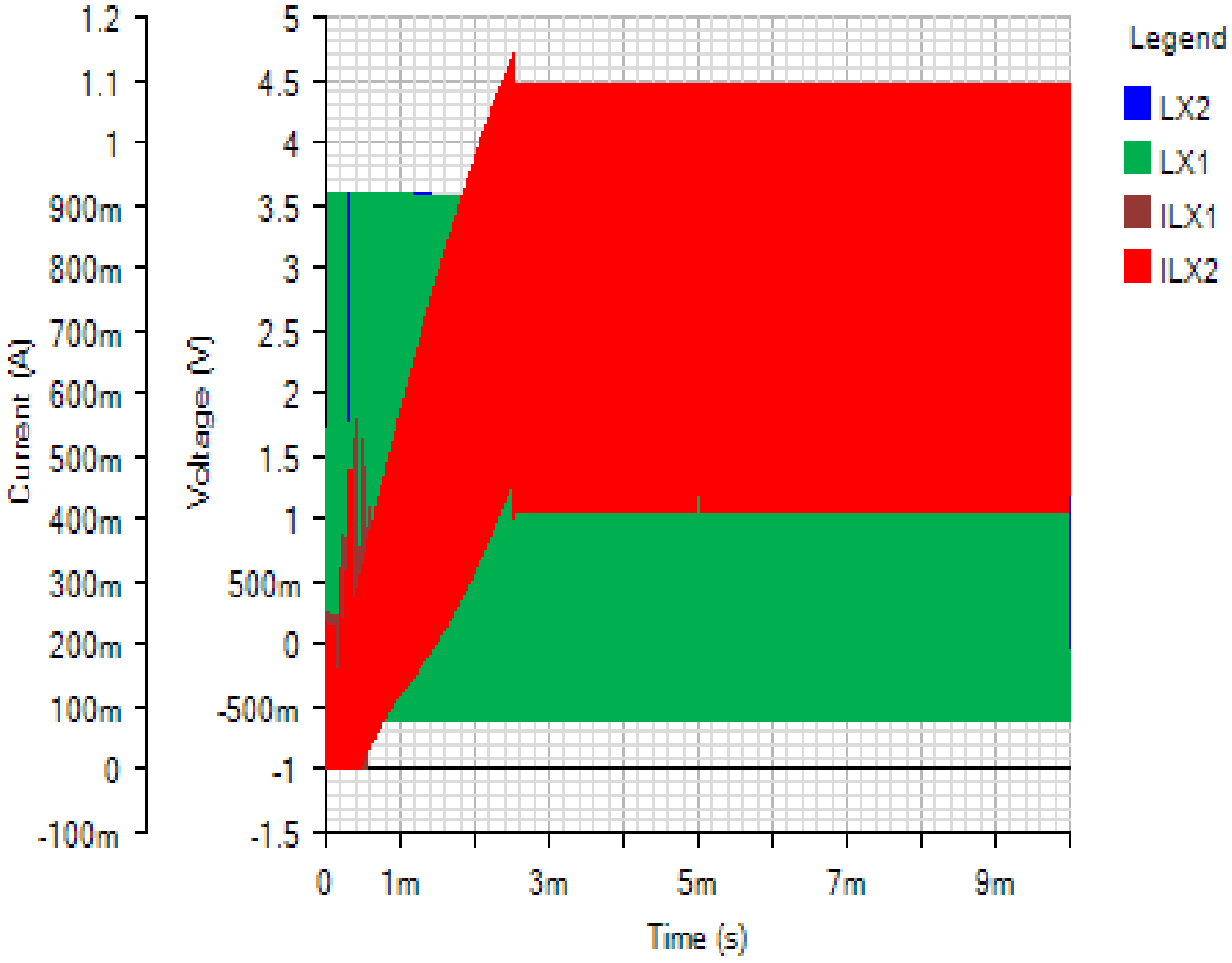
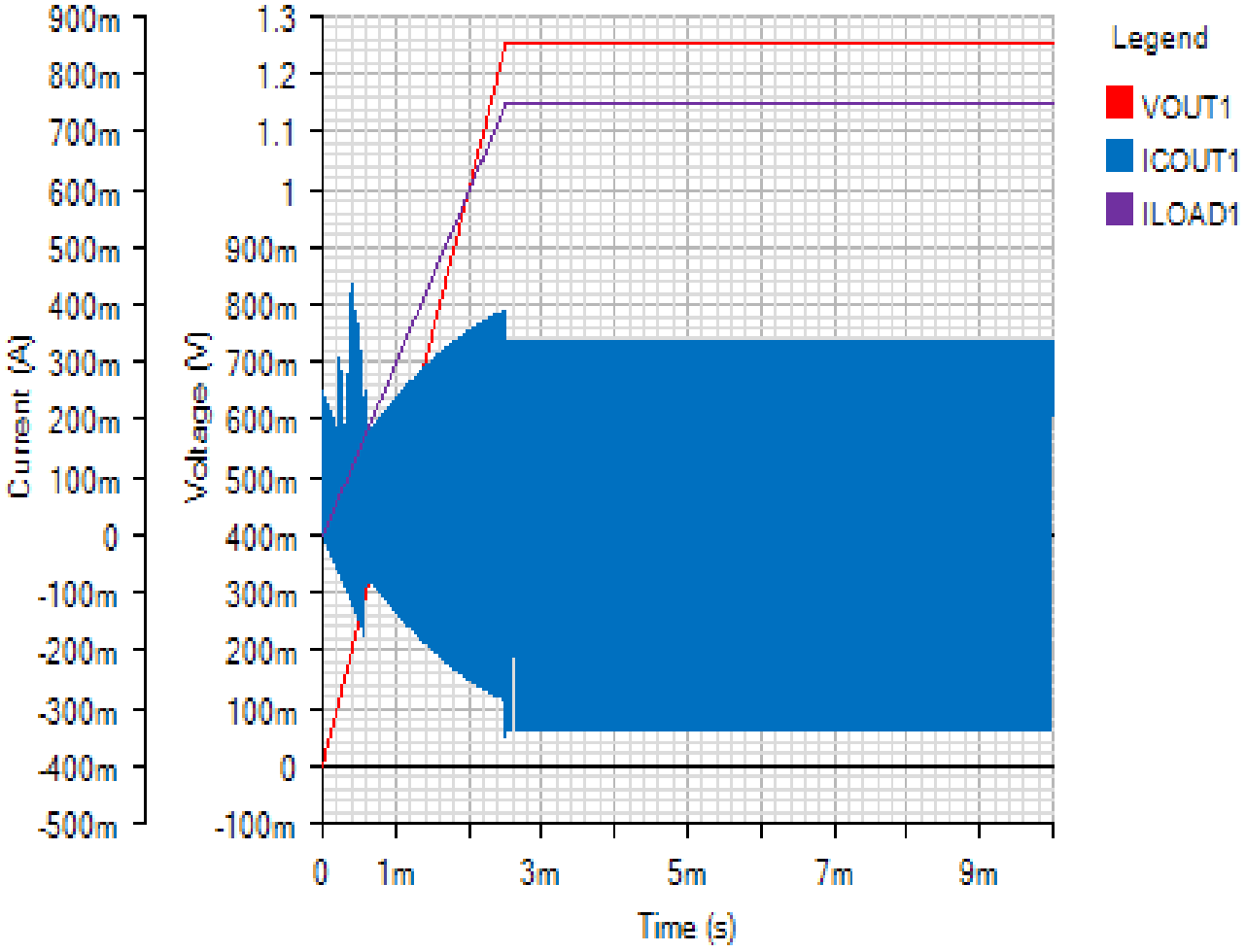
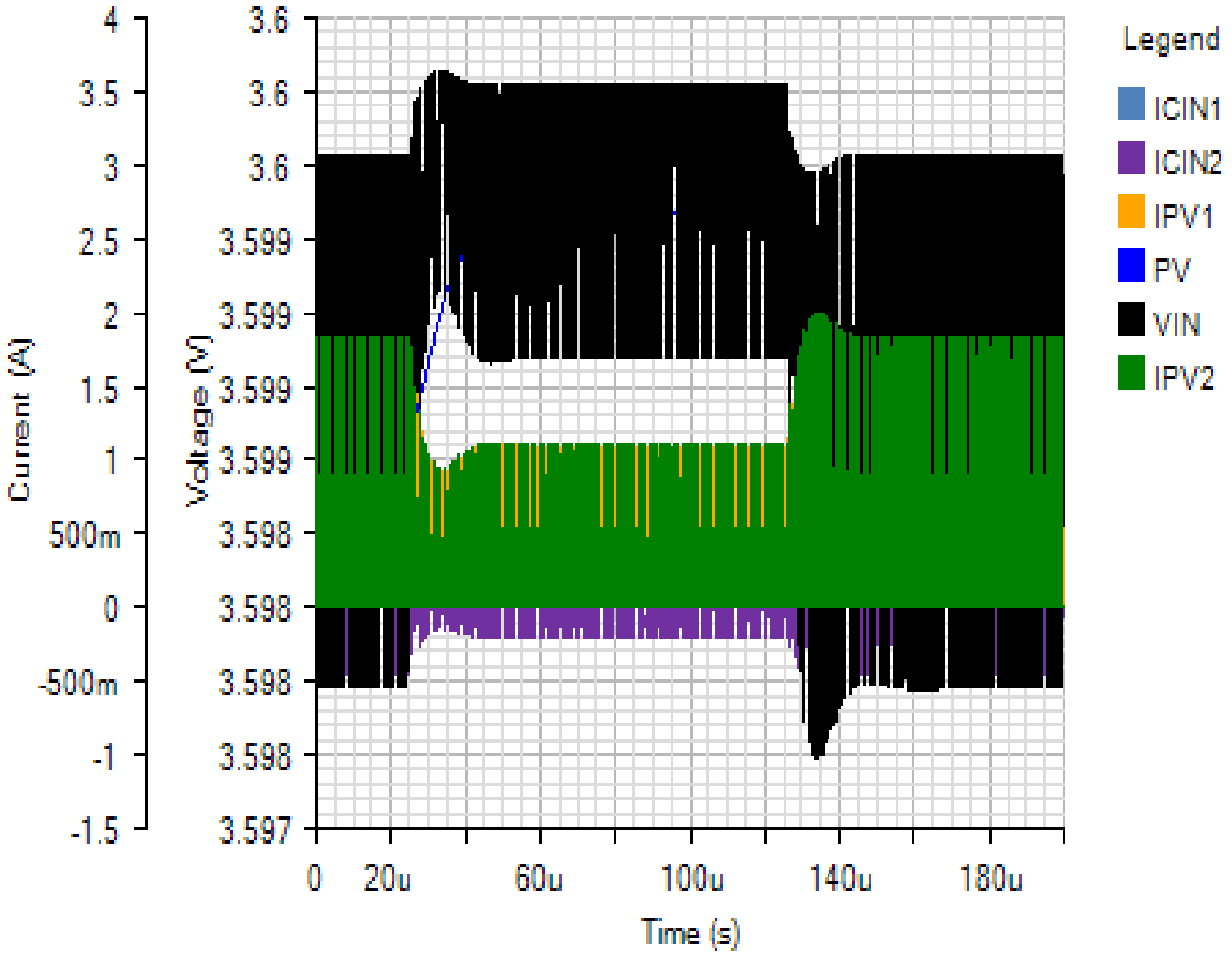


OUTPUT_1 Default

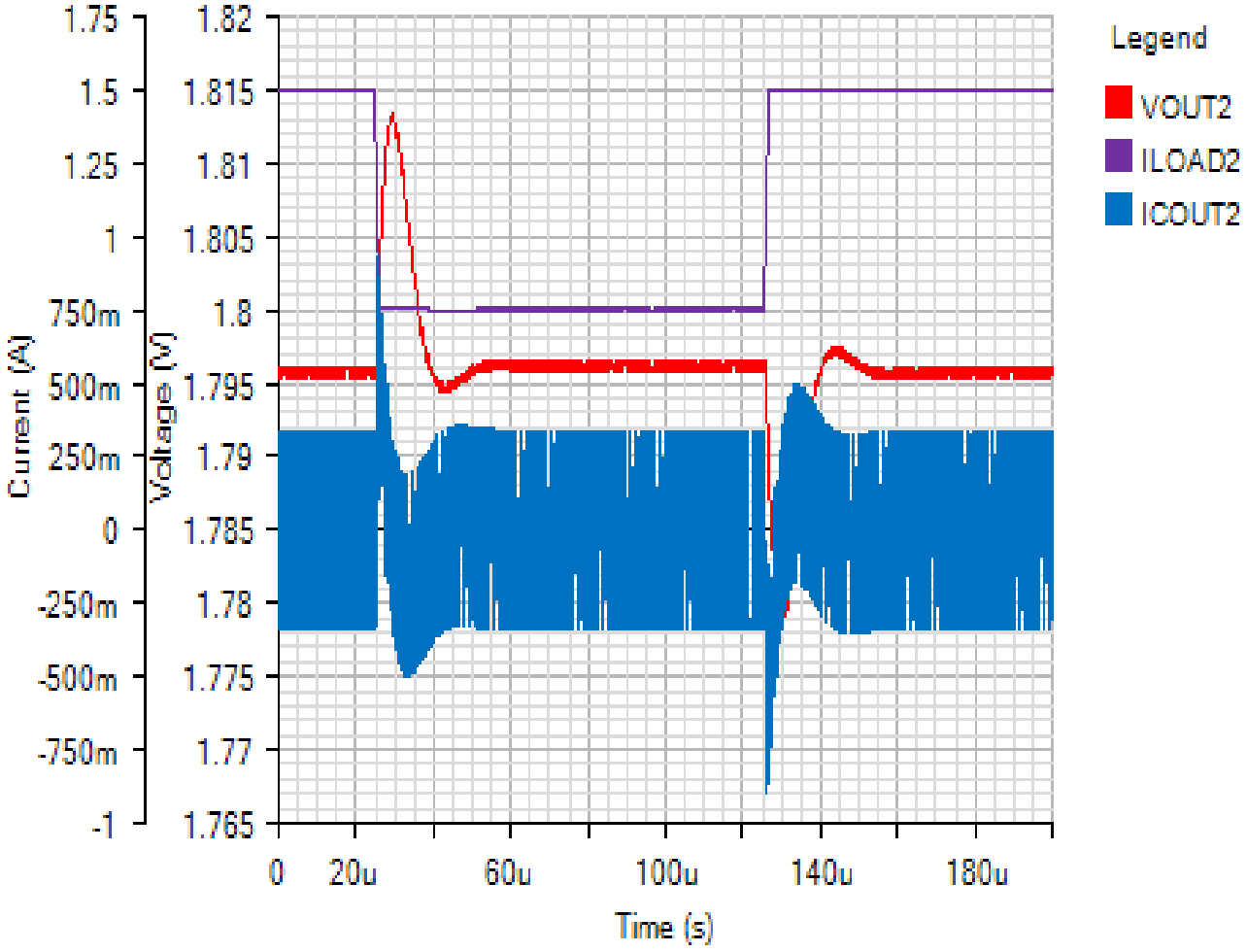


Load Step - Tue Nov 20 2018 13:40:31

INPUT Default



OUTPUT_2 Default



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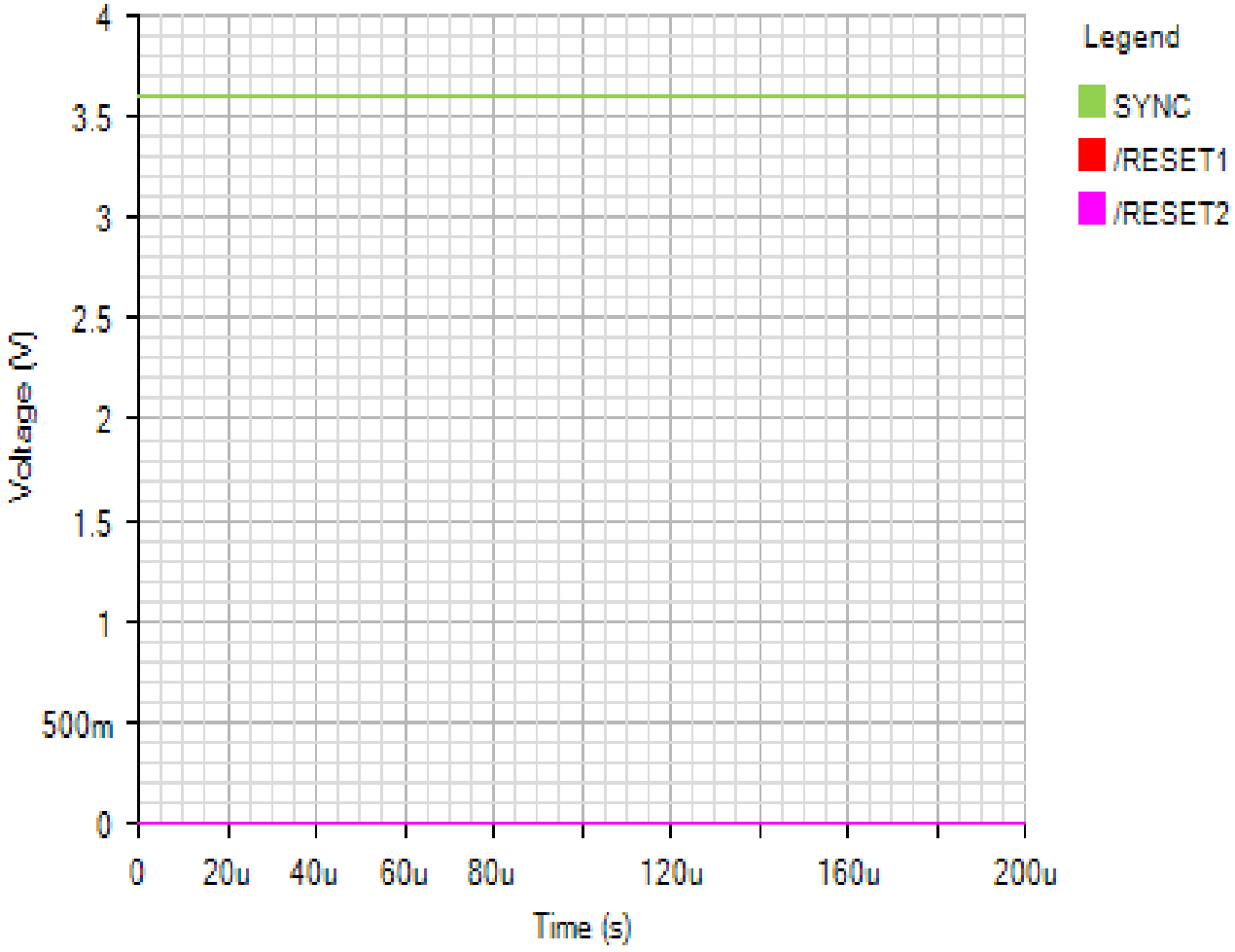
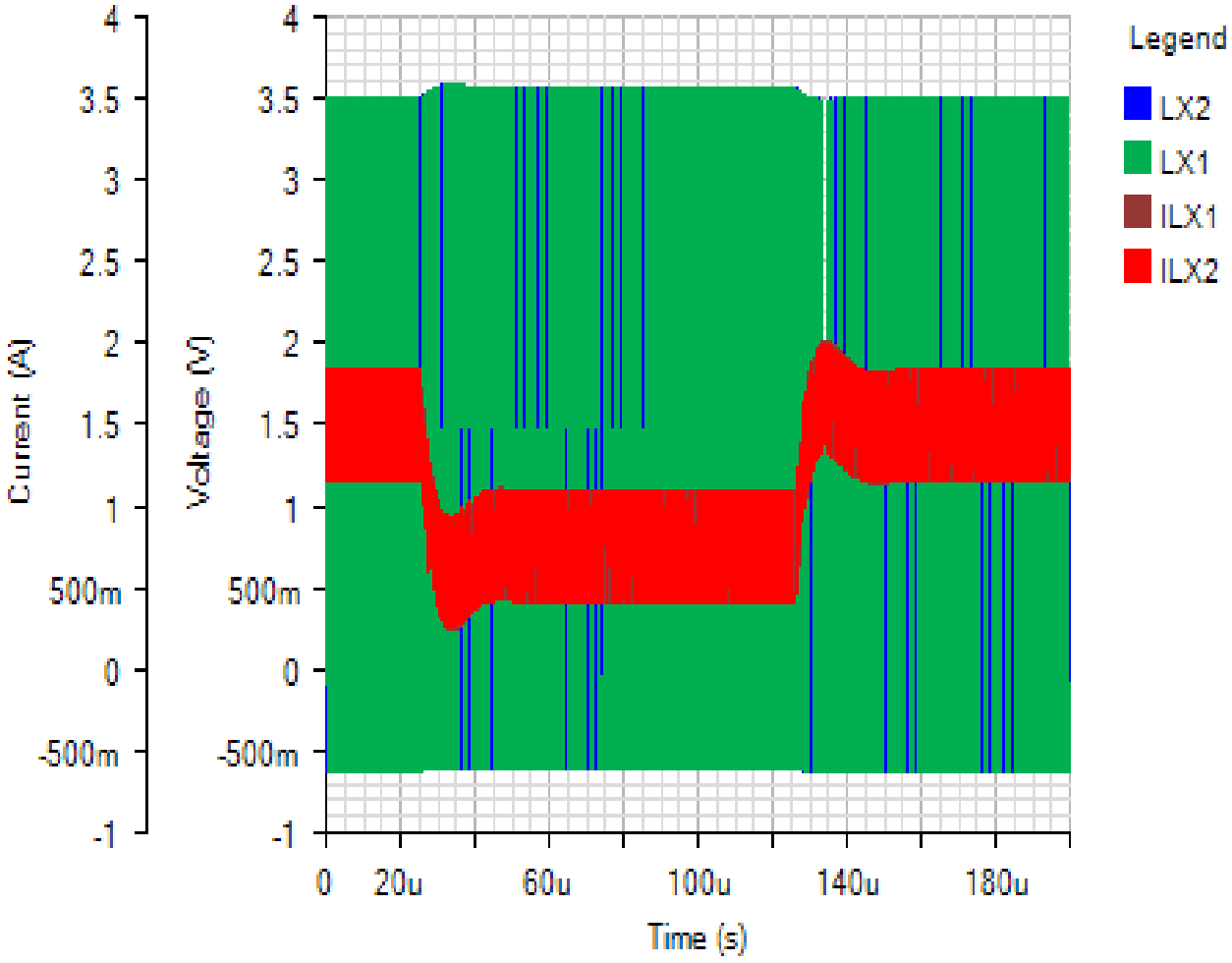
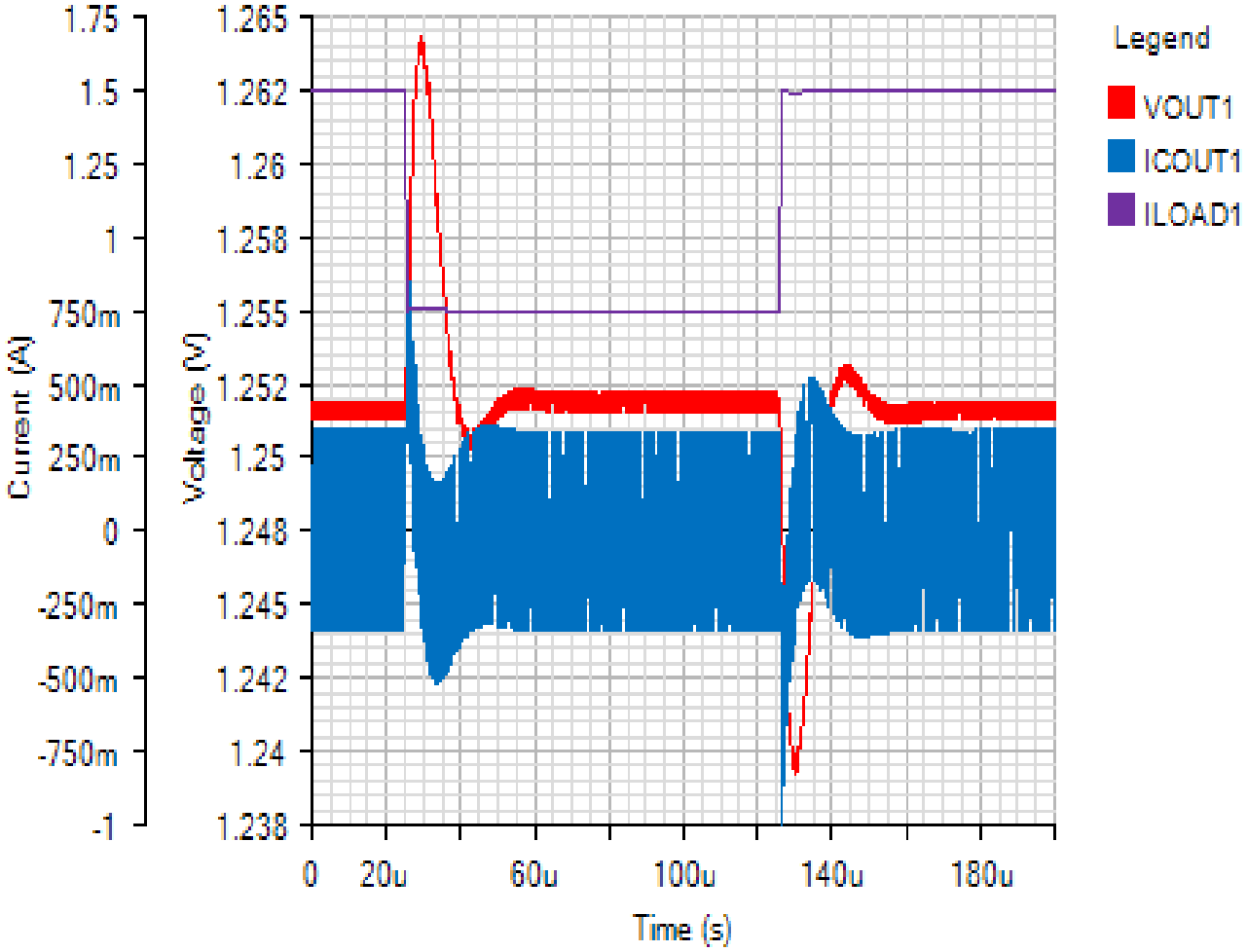


SWITCHING Default

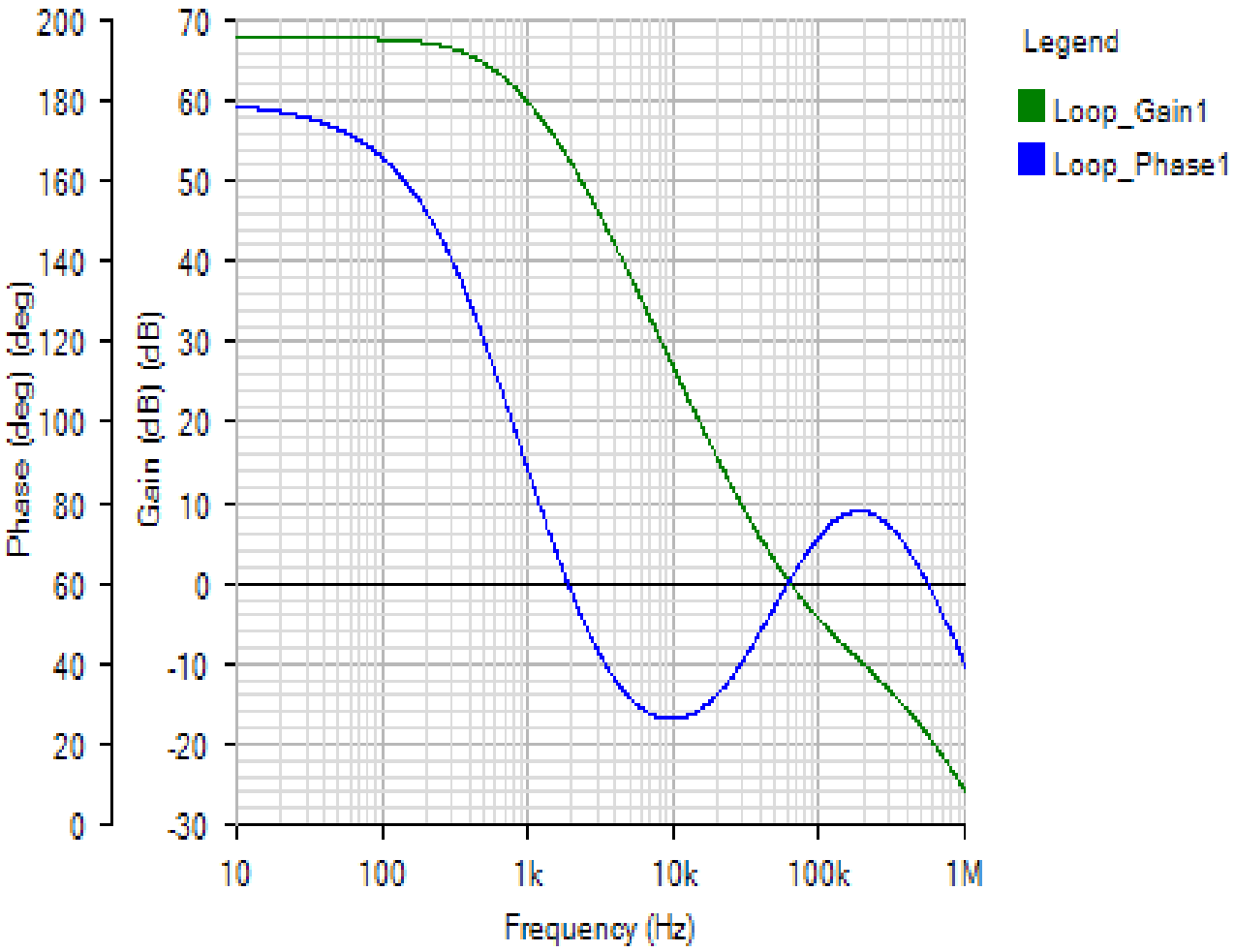


OUTPUT_1 Default

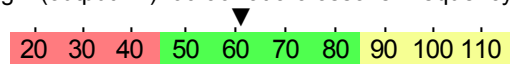


AC Loop - Tue Nov 20 2018 13:40:31

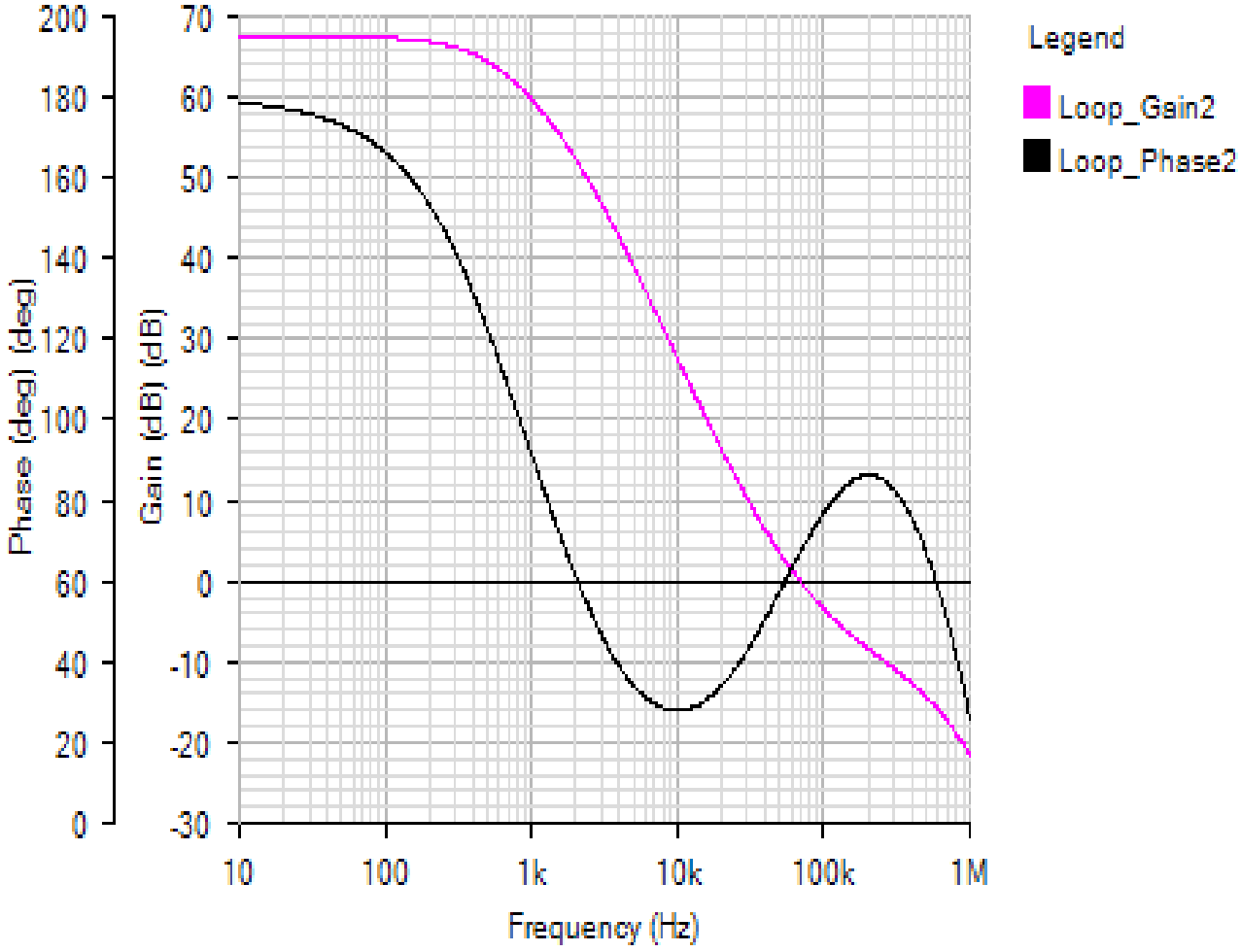
BODE1 Default



Phase Margin (output #1): 60.96° at a crossover frequency of 63.5kHz



BODE2 Default



Phase Margin (output #2): 67.08° at a crossover frequency of 69kHz