

Initial Design

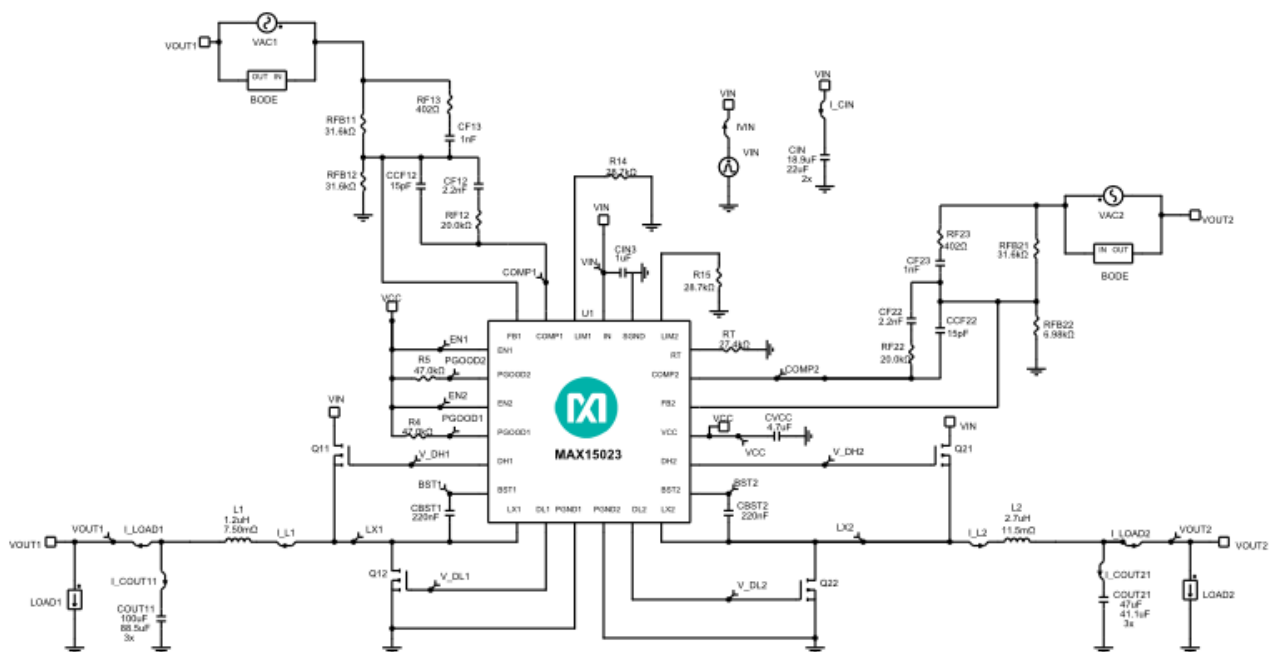
1.0

Design Requirements

Parameter	Value
Minimum Input Voltage	8.1V
Maximum Input Voltage	9.9V
Nominal Input Voltage	9V
Input Voltage Ripple	1%
Output 1 Voltage	1.2V
Output 2 Voltage	3.3V
Output 1 Current	5A
Output 2 Current	5A
Output 1 Voltage Ripple	1%
Output 2 Voltage Ripple	1%
Load 1 Step Start Current	2.5A
Load 2 Step Start Current	2.5A
Load 1 Step Current	5A
Load 2 Step Current	5
Load 1 Step Edge Rate	5A/uS
Load 2 Step Edge Rate	5A/uS
Output 1 Voltage Load Step Over/Undershoot	3%
Output 2 Voltage Load Step Over/Undershoot	3%
Performance Priority	Balance Efficiency and Size
BOM Priority	Cost
Switching Frequency	600kHz
Compensation Type	Type III (Ceramic Output Capacitor)
Ambient Temperature	25°C

Parameter	Value
Inductor 1 Current Ratio(LIR)	0.3
Inductor 2 Current Ratio(LIR)	0.3
Enable High Power Design	No

Schematic



BOM

Ref	Qty	Part Number	Manufacturer	Description
U1	1	MAX15023ETG+	Maxim Integrated	Wide 4.5V to 28V Input, Dual-Output Synchronous Buck Controller
CBST1	1	GCM188R71E224KA55D	Murata Manufacturing	Cap Ceramic 0.22uF 25V X7R 10% Pad SMD 0603 125°C Automotive T/R
CBST2	1	GCM188R71E224KA55D	Murata Manufacturing	Cap Ceramic 0.22uF 25V X7R 10% Pad SMD 0603 125°C Automotive T/R
CCF12	1	C0402C150K5GACTU	KEMET Corporation	Cap Ceramic 15pF 50V C0G 10% Pad SMD 0402 125°C T/R
CCF22	1	C0402C150K5GACTU	KEMET Corporation	Cap Ceramic 15pF 50V C0G 10% Pad SMD 0402 125°C T/R
CF12	1	CGA3E2X7R1H222K080AA	TDK	Cap Ceramic 0.0022uF 50V X7R 10% Pad SMD 0603 125°C Automotive T/R

CF13	1	C1608X7R2A102K080AA	TDK	Cap Ceramic 0.001uF 100V X7R 10% Pad SMD 0603 125°C T/R
CF22	1	CGA3E2X7R1H222K080AA	TDK	Cap Ceramic 0.0022uF 50V X7R 10% Pad SMD 0603 125°C Automotive T/R
CF23	1	C1608X7R2A102K080AA	TDK	Cap Ceramic 0.001uF 100V X7R 10% Pad SMD 0603 125°C T/R
CIN	2	GRM32ER61C226ME20L	Murata	Cap Ceramic 22uF 16V X5R 20% SMD 1210 85C Embossed T/R
CIN3	1	ECPU1C105MA5	Panasonic	Cap Film 1uF 16V 20% (3.2 X 2.5 X 1.4mm) SMD 85°C T/R
COUT11	3	GRM32EC80G107KE20L	Murata	Cap Ceramic 100uF 4V 1210 105C
COUT21	3	GRM32ER71A476ME15L	Murata	Cap Ceramic 47uF 10V X7R 20% SMD 1210 125C Embossed T/R
CVCC	1	C2012X7R1A475M125AC	TDK	Cap Ceramic 4.7uF 10V X7R 20% Pad SMD 0805 125°C T/R
L1	1	XAL6030-122MEB	Coilcraft	Ind Power Shielded 1.2uH 20% 100KHz 16A T/R
L2	1	MSS1246T-272MLB	Coilcraft	Inductor 2.7uH 20% 10.3mOhm 13.6A Isat 6.8A Irms
Q11	1	NVMFS5C468NL	ON Semiconductor	Trans MOSFET N-CH 40VDS 17.6mOhm@4.5V 15.6mOhm@6V 3.4nC 1.8nC 0.57nF 0.23nF 175°C 37A 28W 5.3°C/W 1.75mm 36mm^2 SO-8FL
Q12	1	FDS6294	Fairchild Semiconductor	Trans MOSFET N-CH 30VDS 14.4mOhm@4.5V 14mOhm@6V 10nC 4.75nC 1.21nF 0.323nF 175°C 13A 3W 25°C/W 1.75mm 31mm^2 SO 8L NB
Q21	1	NVMFS5C468NL	ON Semiconductor	Trans MOSFET N-CH 40VDS 17.6mOhm@4.5V 15.6mOhm@6V 3.4nC 1.8nC 0.57nF 0.23nF 175°C 37A 28W 5.3°C/W 1.75mm 36mm^2 SO-8FL
Q22	1	FDS6294	Fairchild Semiconductor	Trans MOSFET N-CH 30VDS 14.4mOhm@4.5V 14mOhm@6V 10nC 4.75nC 1.21nF 0.323nF 175°C 13A 3W 25°C/W 1.75mm 31mm^2 SO 8L NB
R4	1	ERJ6GEYJ473V	Panasonic	Res Thick Film 0805 47K Ohm 5% 0.125W(1/8W) ±200ppm/°C Pad SMD Automotive T/R
R5	1	ERJ6GEYJ473V	Panasonic	Res Thick Film 0805 47K Ohm 5% 0.125W(1/8W) ±200ppm/°C Pad SMD Automotive T/R
R14	1	ERJ2RK2F2872X	Panasonic	Res Thick Film 0402 28.7K Ohm 1% 0.1W(1/10W) ±100ppm/°C Pad SMD Automotive T/R
R15	1	ERJ2RK2F2872X	Panasonic	Res Thick Film 0402 28.7K Ohm 1% 0.1W(1/10W) ±100ppm/°C Pad SMD Automotive T/R
RF12	1	ERJ3EKF2002V	Panasonic	Res Thick Film 0603 20K Ohm 1% 0.1W(1/10W) ±100ppm/°C Pad

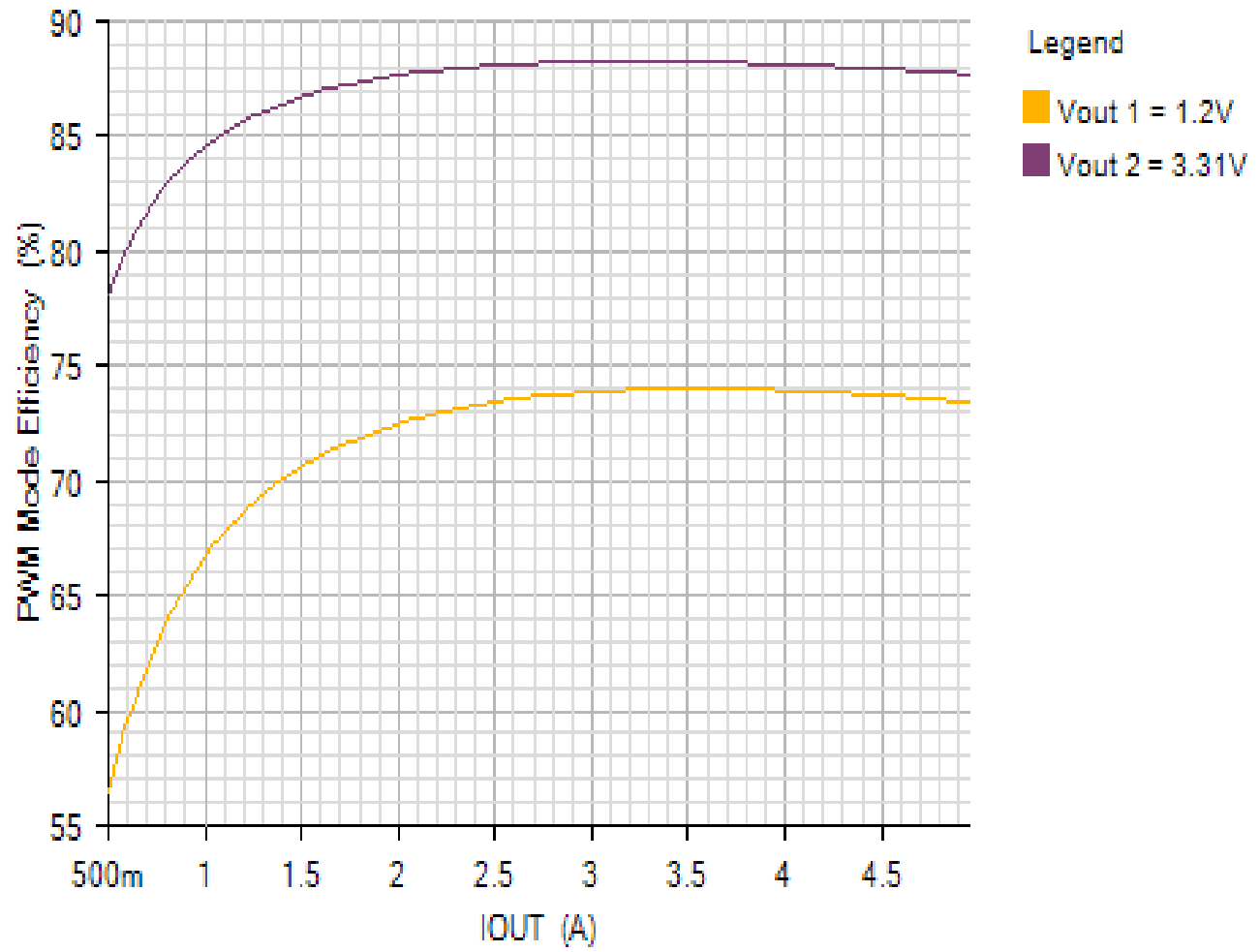
				SMD Automotive T/R
RF13	1	ERJ3EKF4020V	Panasonic	Res Thick Film 0603 402 Ohm 1% 0.1W(1/10W) ±100ppm/°C Pad SMD Automotive T/R
RF22	1	ERJ3EKF2002V	Panasonic	Res Thick Film 0603 20K Ohm 1% 0.1W(1/10W) ±100ppm/°C Pad SMD Automotive T/R
RF23	1	ERJ3EKF4020V	Panasonic	Res Thick Film 0603 402 Ohm 1% 0.1W(1/10W) ±100ppm/°C Pad SMD Automotive T/R
RFB11	1	ERJ3EKF3162V	Panasonic	Res Thick Film 0603 31.6K Ohm 1% 0.1W(1/10W) ±100ppm/°C Pad SMD Automotive T/R
RFB12	1	ERJ3EKF3162V	Panasonic	Res Thick Film 0603 31.6K Ohm 1% 0.1W(1/10W) ±100ppm/°C Pad SMD Automotive T/R
RFB21	1	ERJ3EKF3162V	Panasonic	Res Thick Film 0603 31.6K Ohm 1% 0.1W(1/10W) ±100ppm/°C Pad SMD Automotive T/R
RFB22	1	ERJ2RKF6981X	Panasonic	Res Thick Film 0402 6.98K Ohm 1% 0.1W(1/10W) ±100ppm/°C Pad SMD Automotive T/R
RT	1	ERJ3EKF2742V	Panasonic	Res Thick Film 0603 27.4K Ohm 1% 0.1W(1/10W) ±100ppm/°C Pad SMD Automotive T/R

Simulation Results

Efficiency - Mon Nov 19 2018 10:25:56

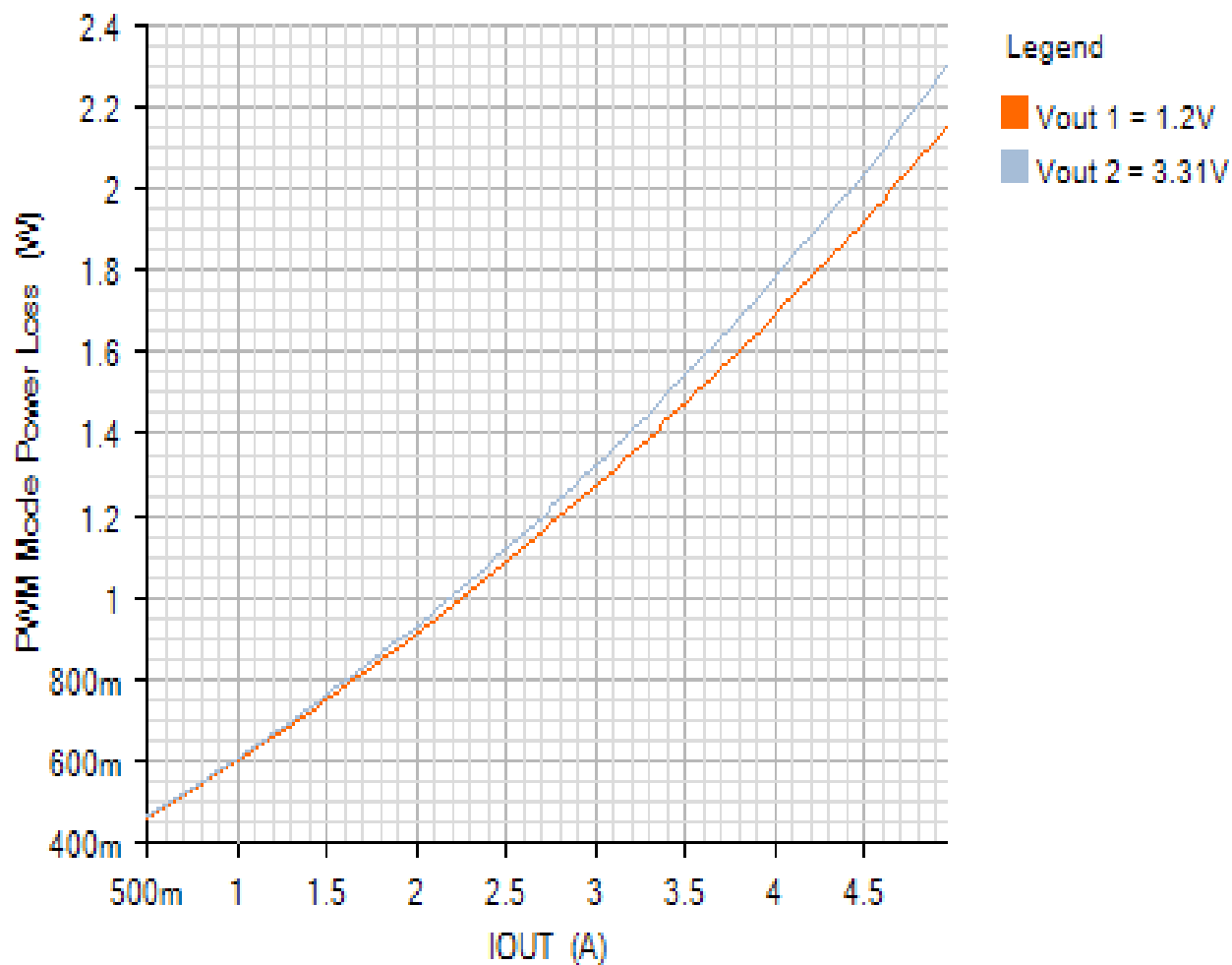
EFFICIENCY

Default

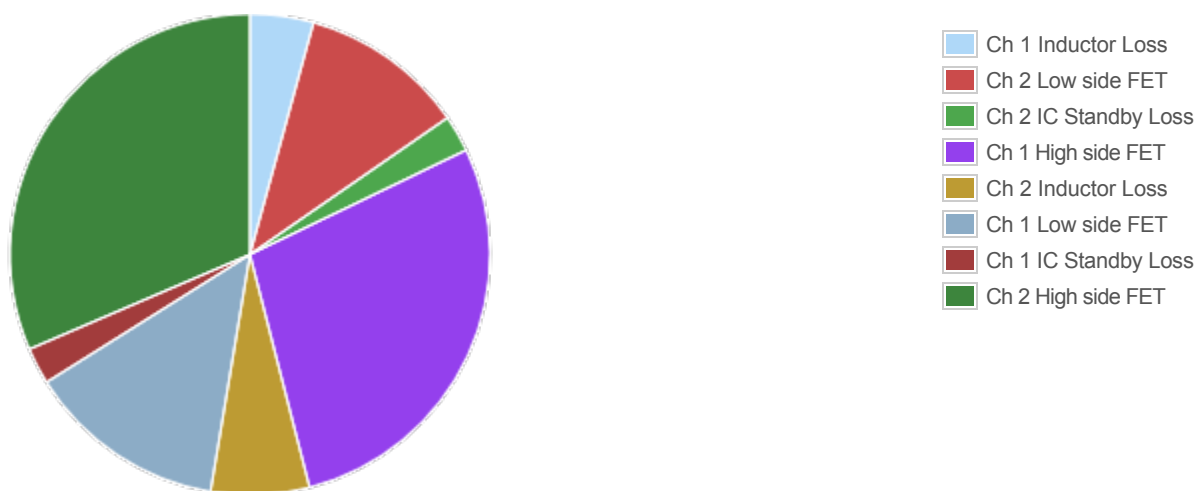


POWER_LOSS

Default



Losses



Component

Loss (W)

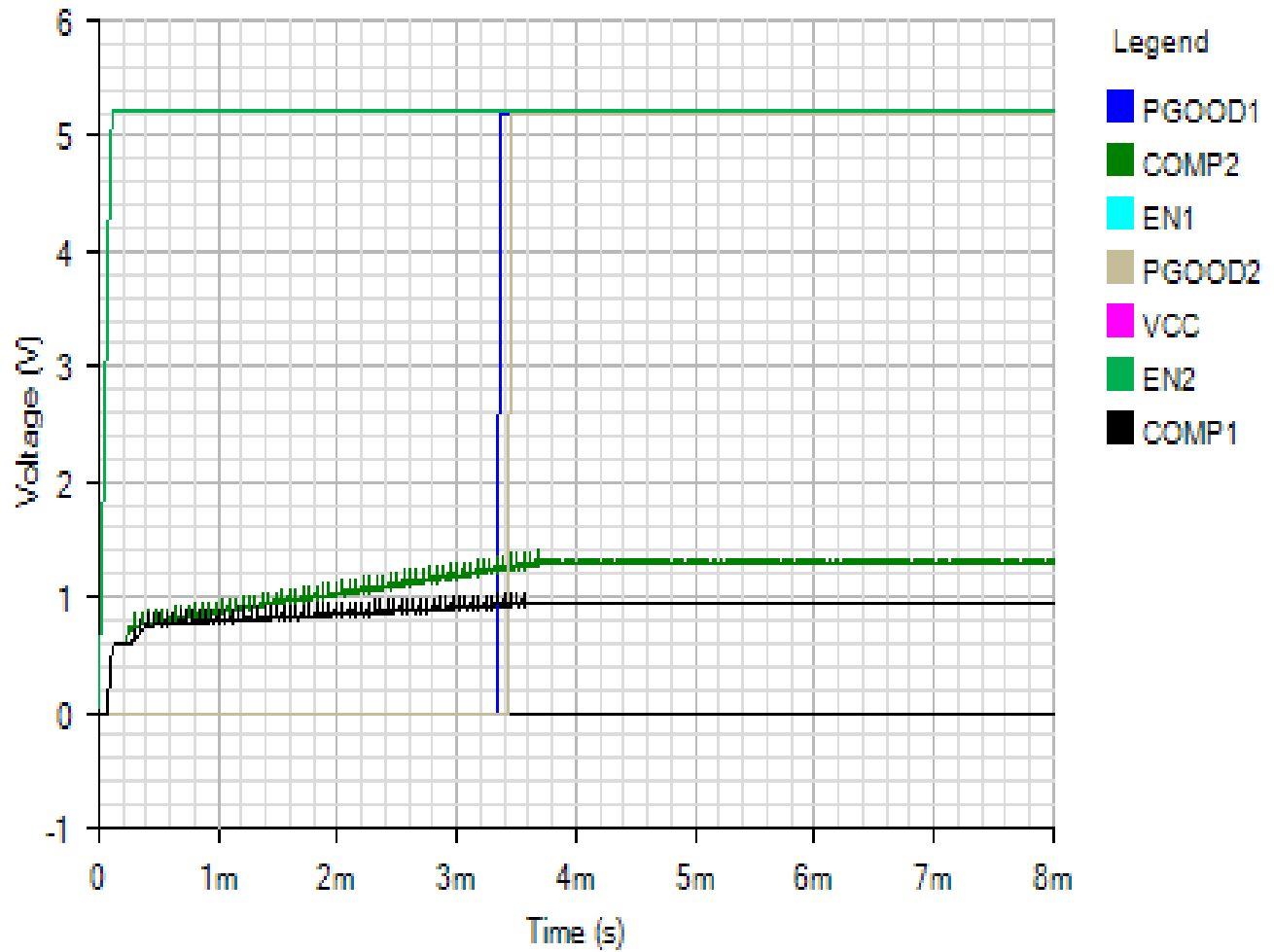
% of total

Component	Loss (W)	% of total
Ch 1 Inductor Loss	0.190015	4.3
Ch 2 Low side FET	0.494155	11.1
Ch 2 IC Standby Loss	0.109818	2.5
Ch 1 High side FET	1.252617	28.2
Ch 2 Inductor Loss	0.294809	6.6
Ch 1 Low side FET	0.598814	13.5
Ch 1 IC Standby Loss	0.109818	2.5
Ch 2 High side FET	1.398784	31.4
Total	4.44883	100

Start Up - Mon Nov 19 2018 10:25:56

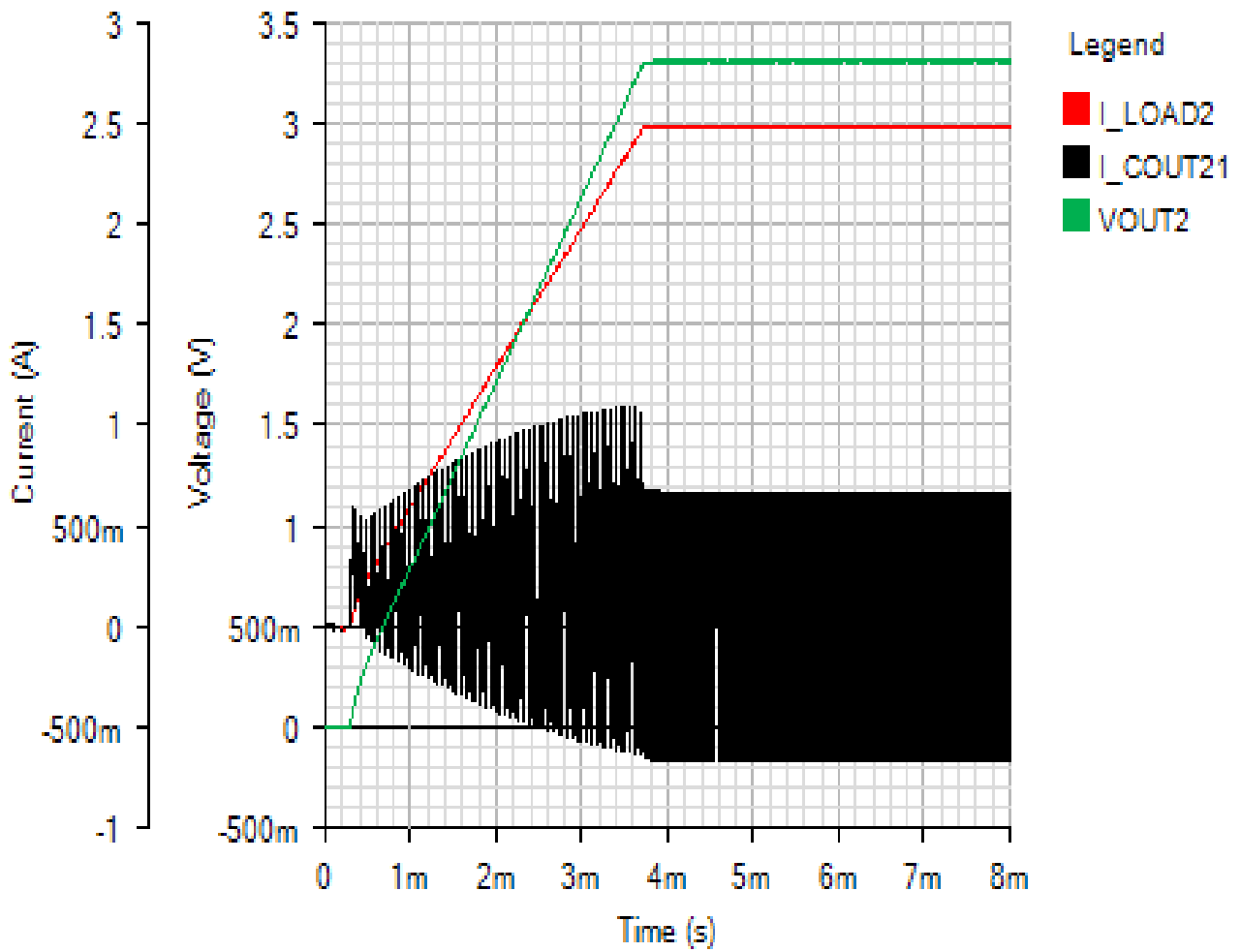
IC

Default



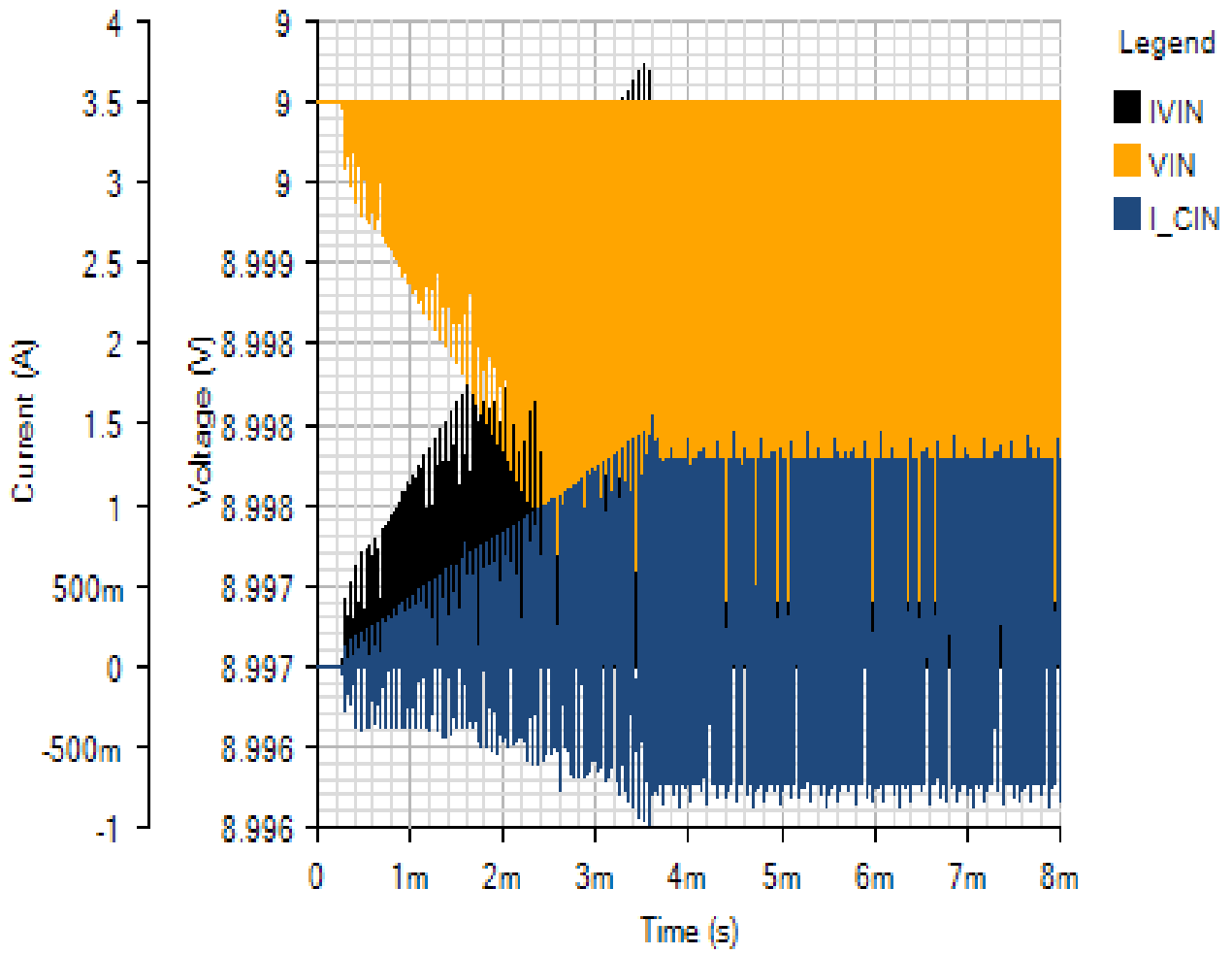
OUT2

Default



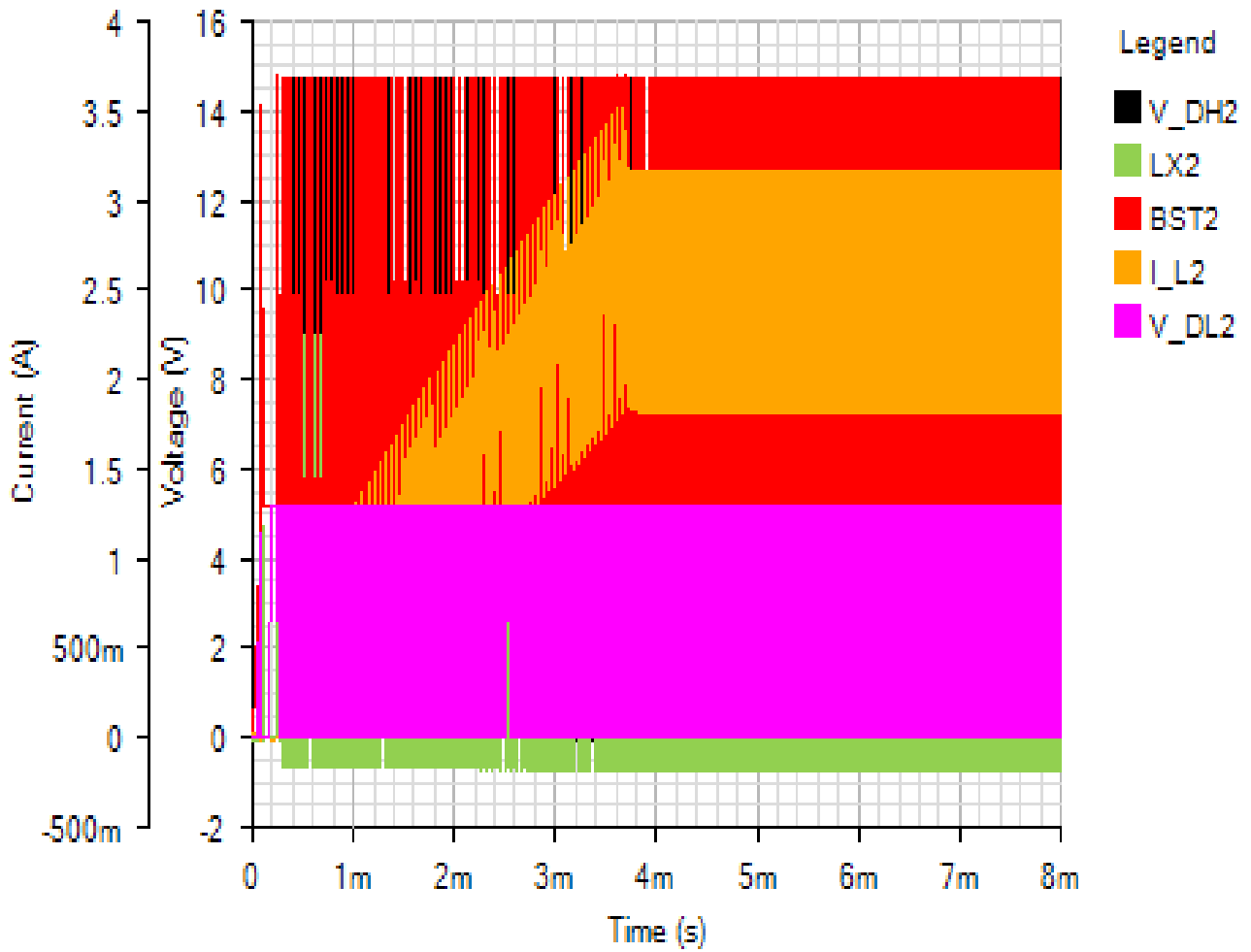
INPUT

Default



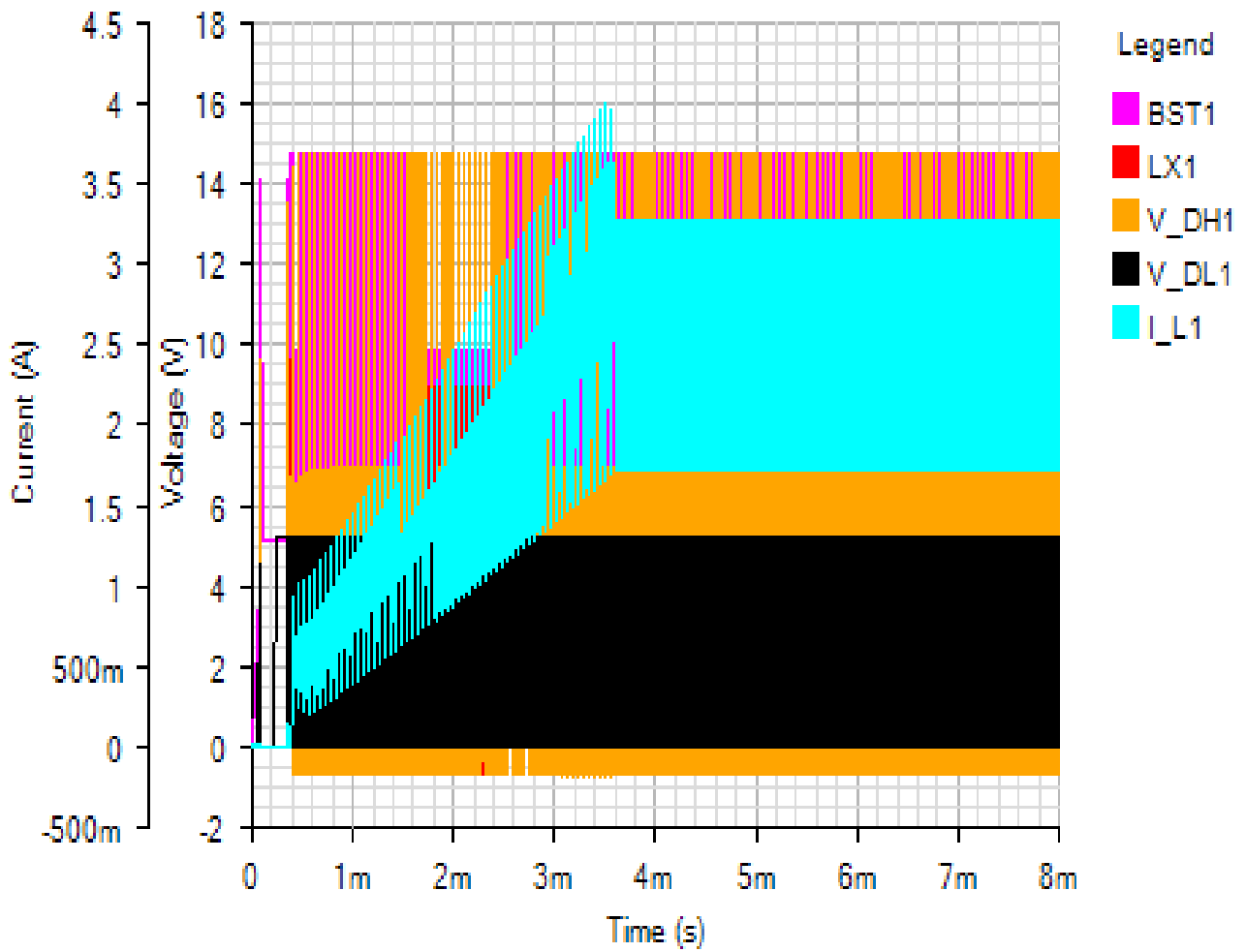
SW2

Default



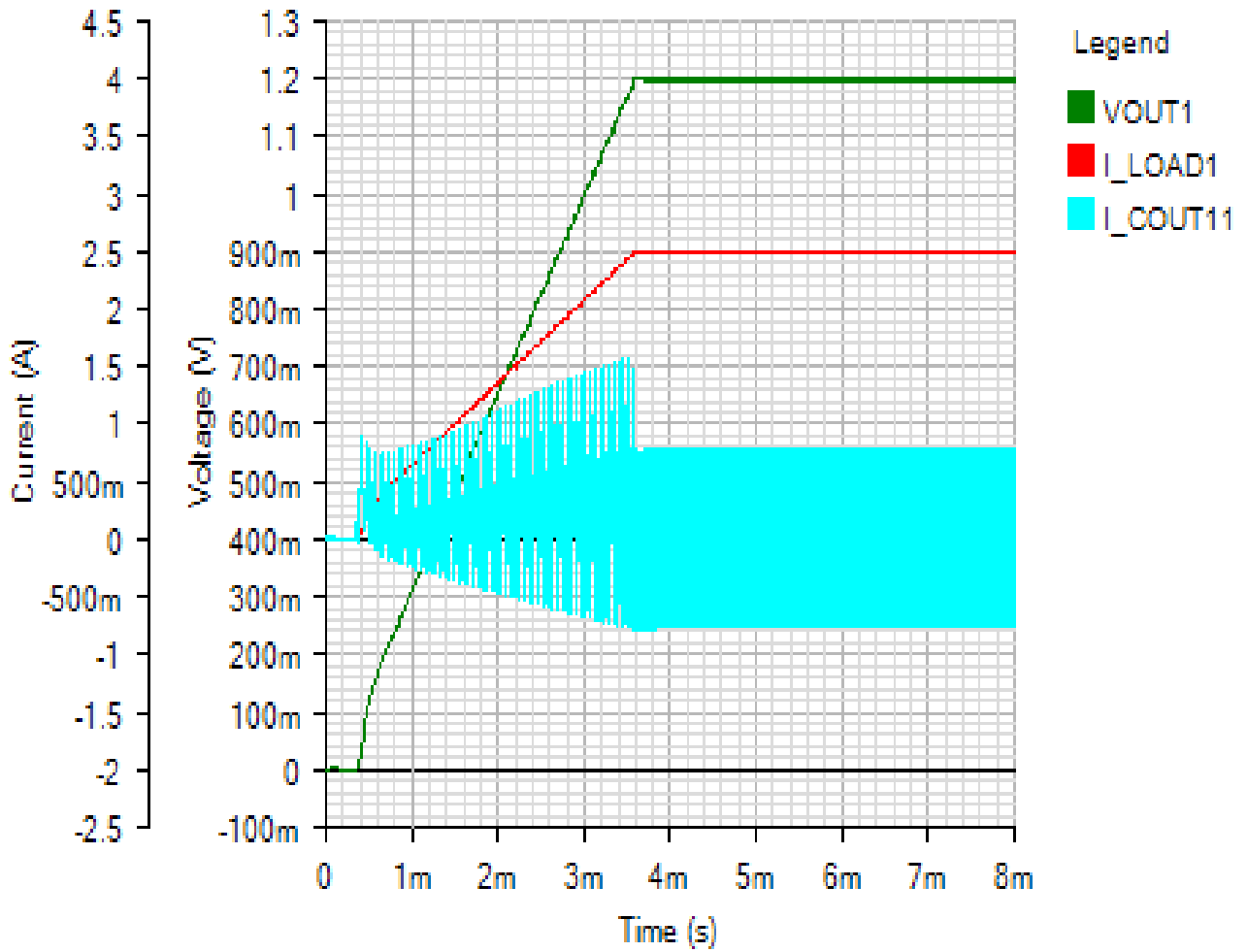
SW1

Default



OUT1

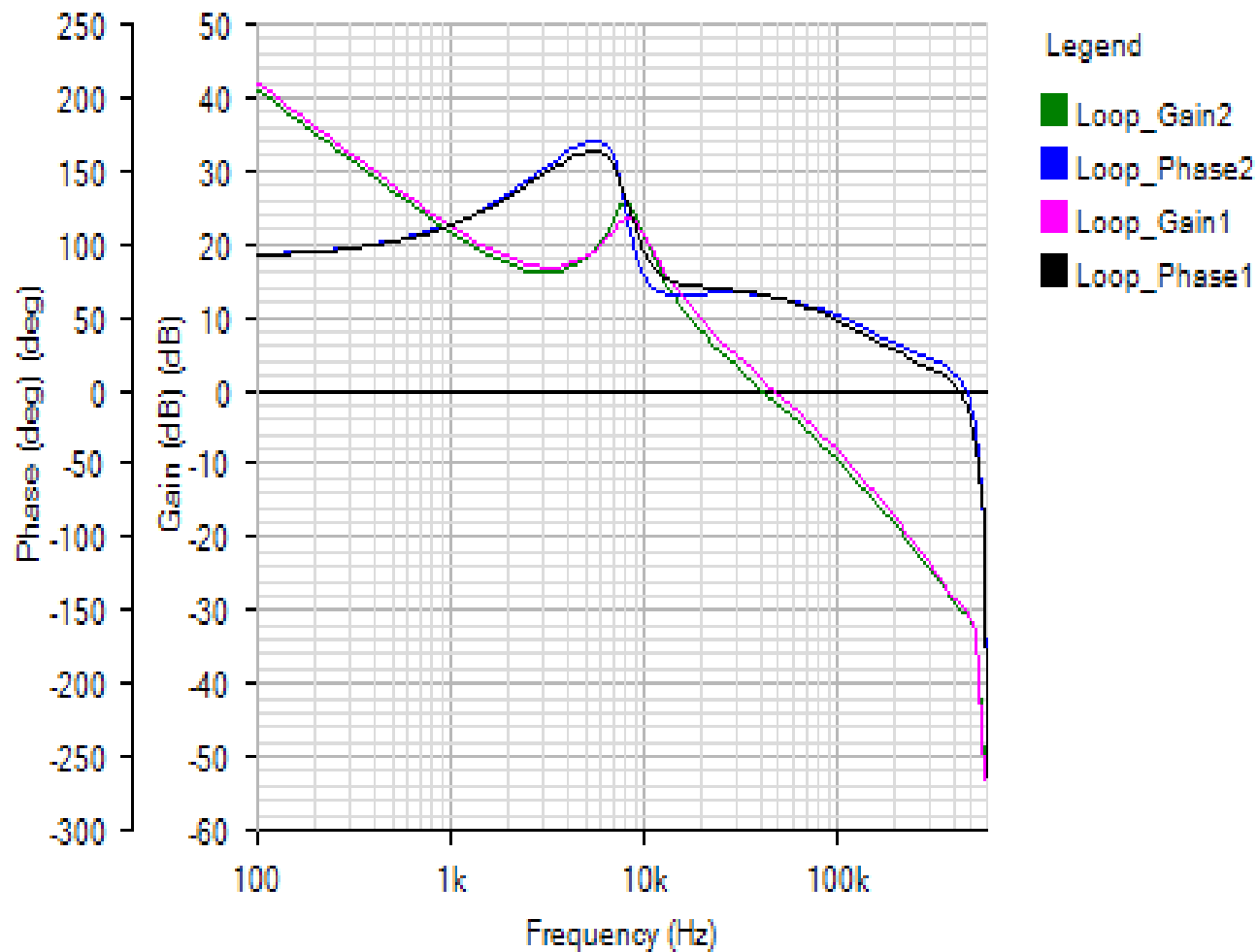
Default



AC Loop - Mon Nov 19 2018 10:25:56

BODE

Default



Phase Margin (output #1): 63.7° at a crossover frequency of 47.7kHz



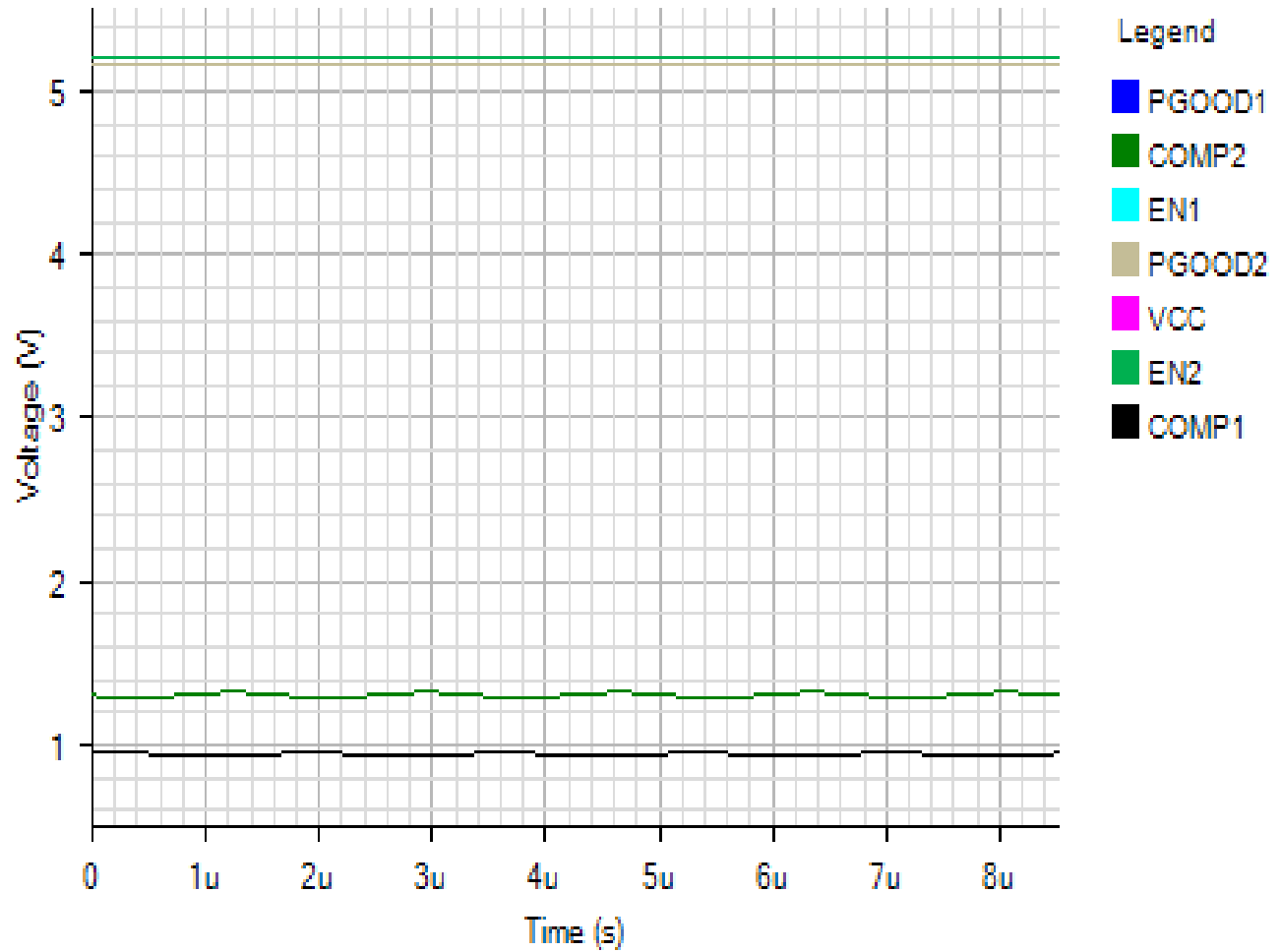
Phase Margin (output #2): 65.21° at a crossover frequency of 41.2kHz



Steady State - Mon Nov 19 2018 10:25:56

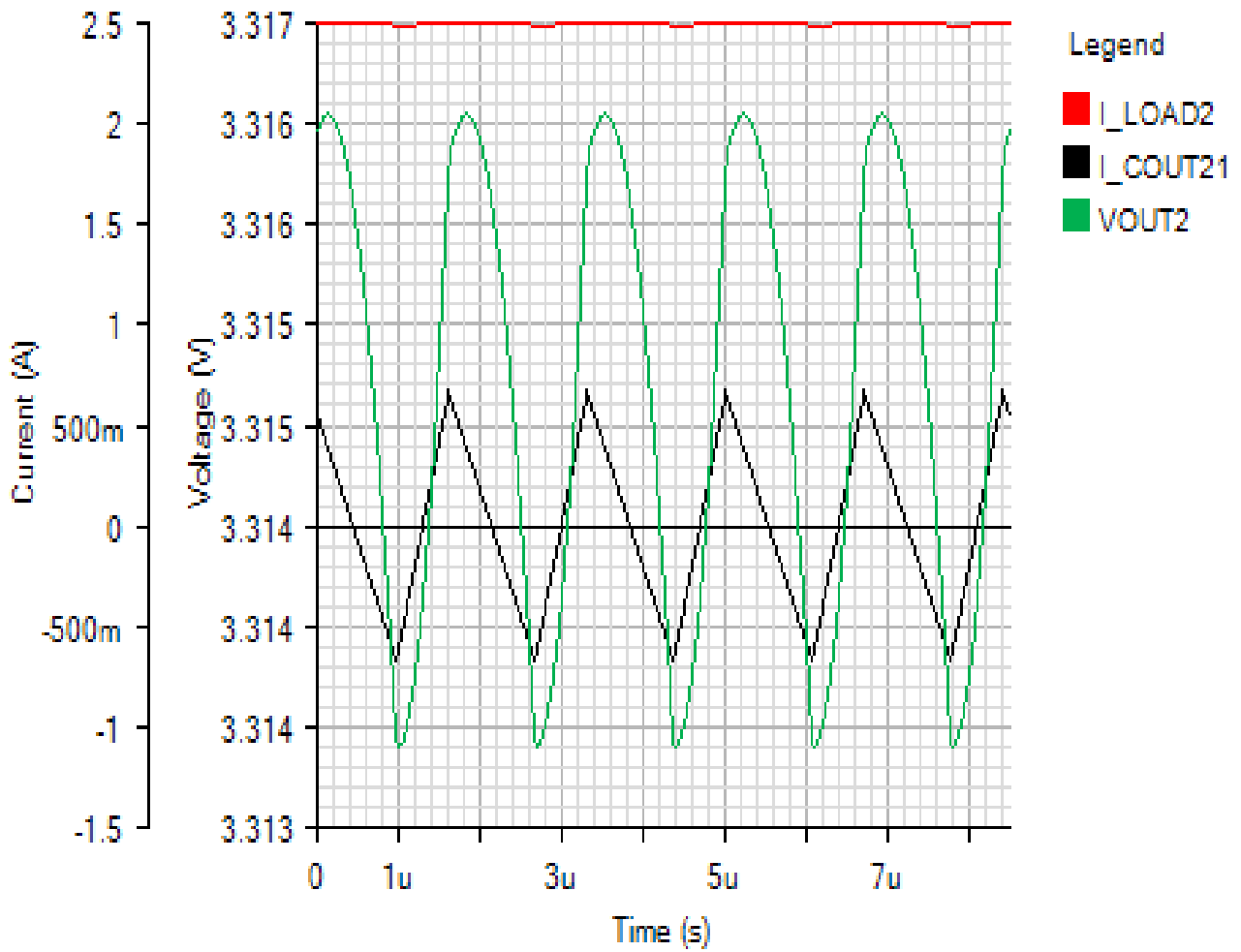
IC

Default



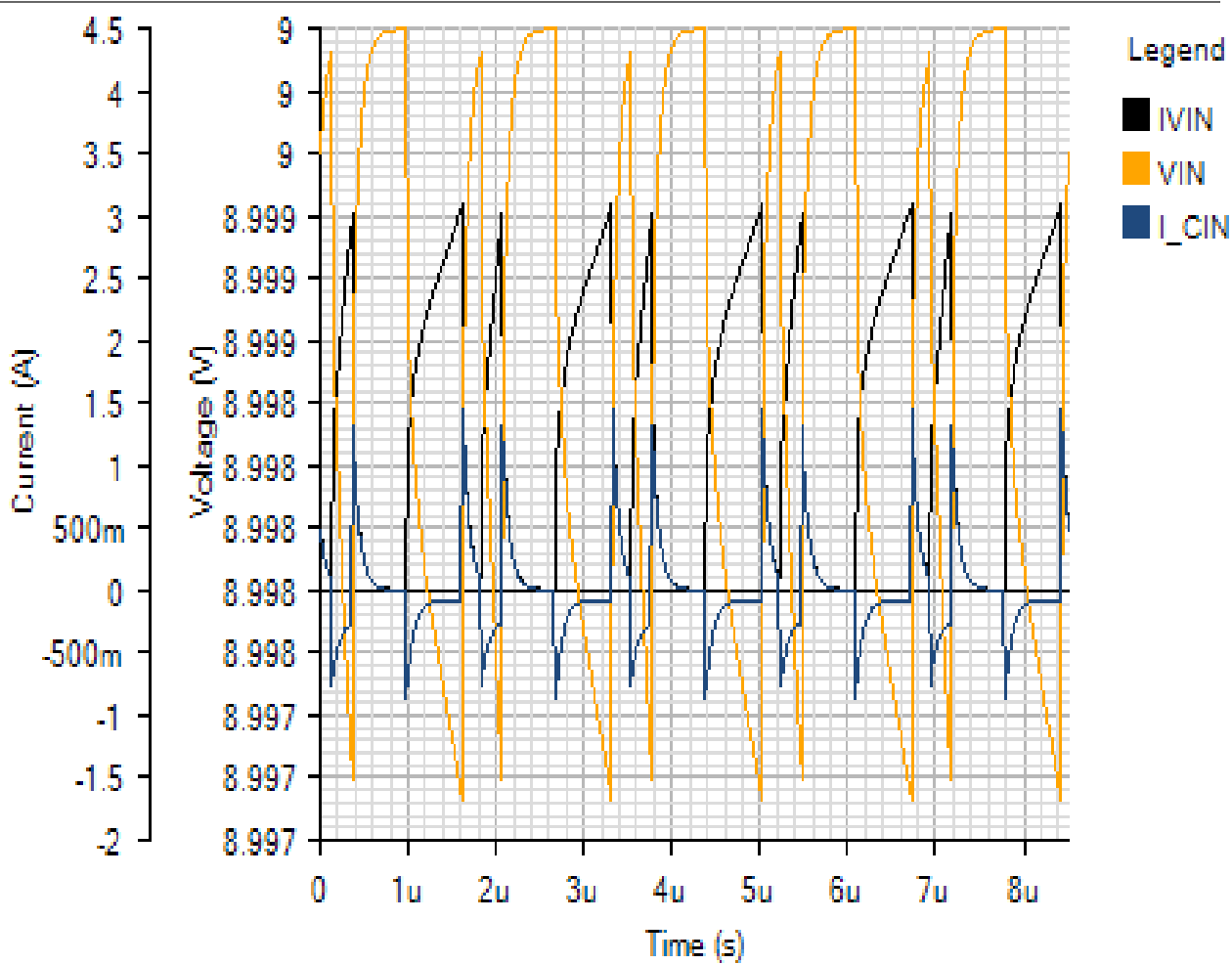
OUT2

Default



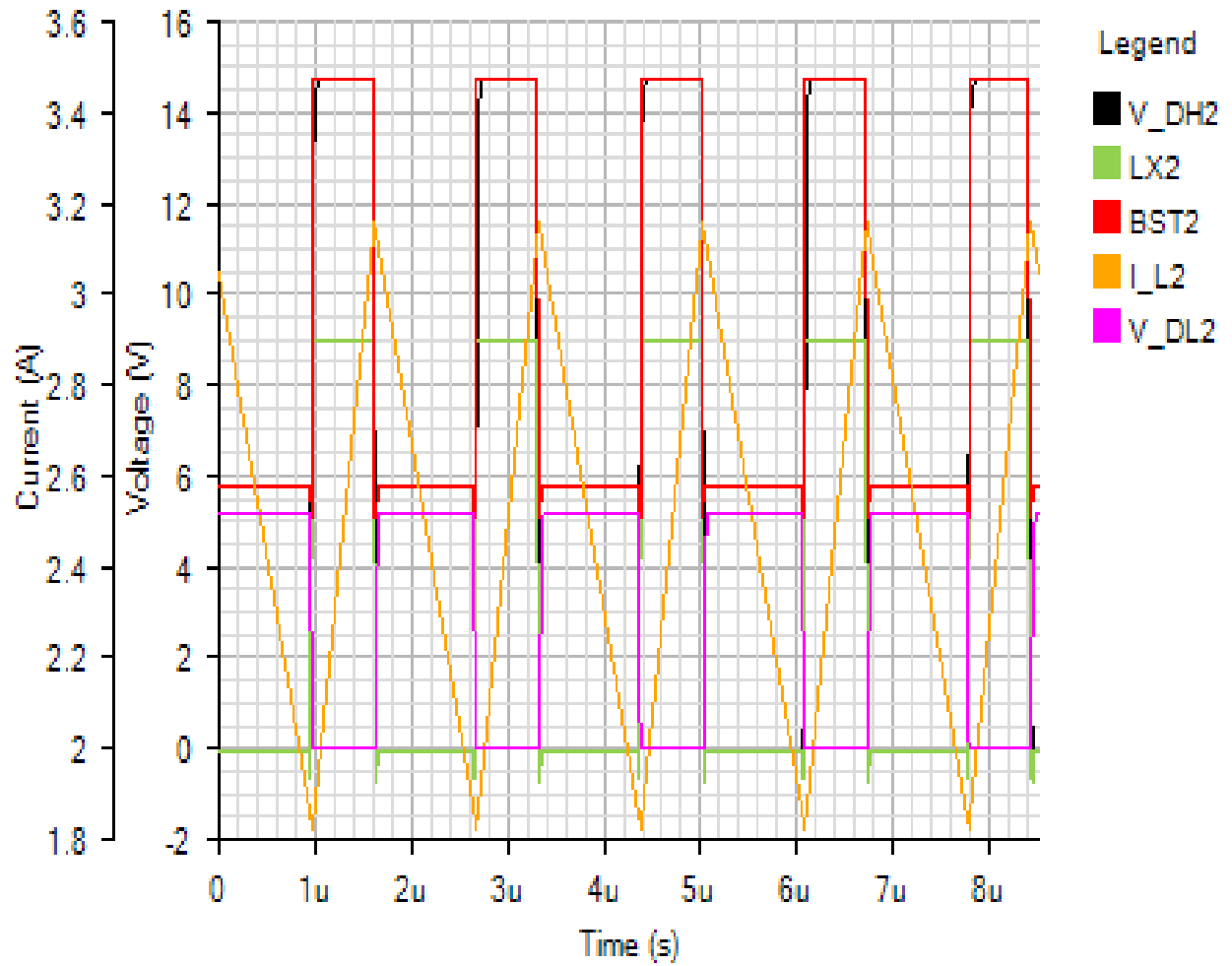
INPUT

Default



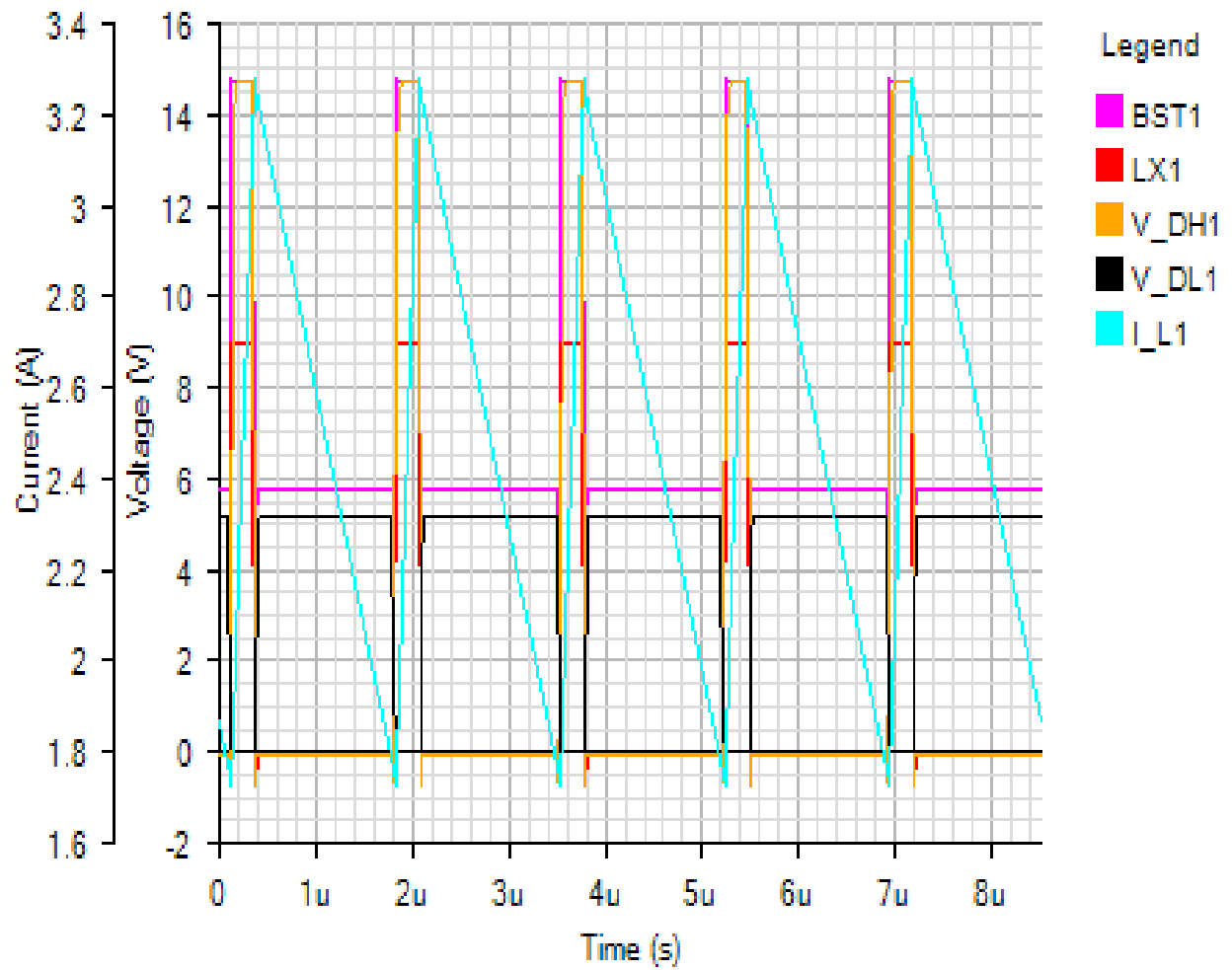
SW2

Default



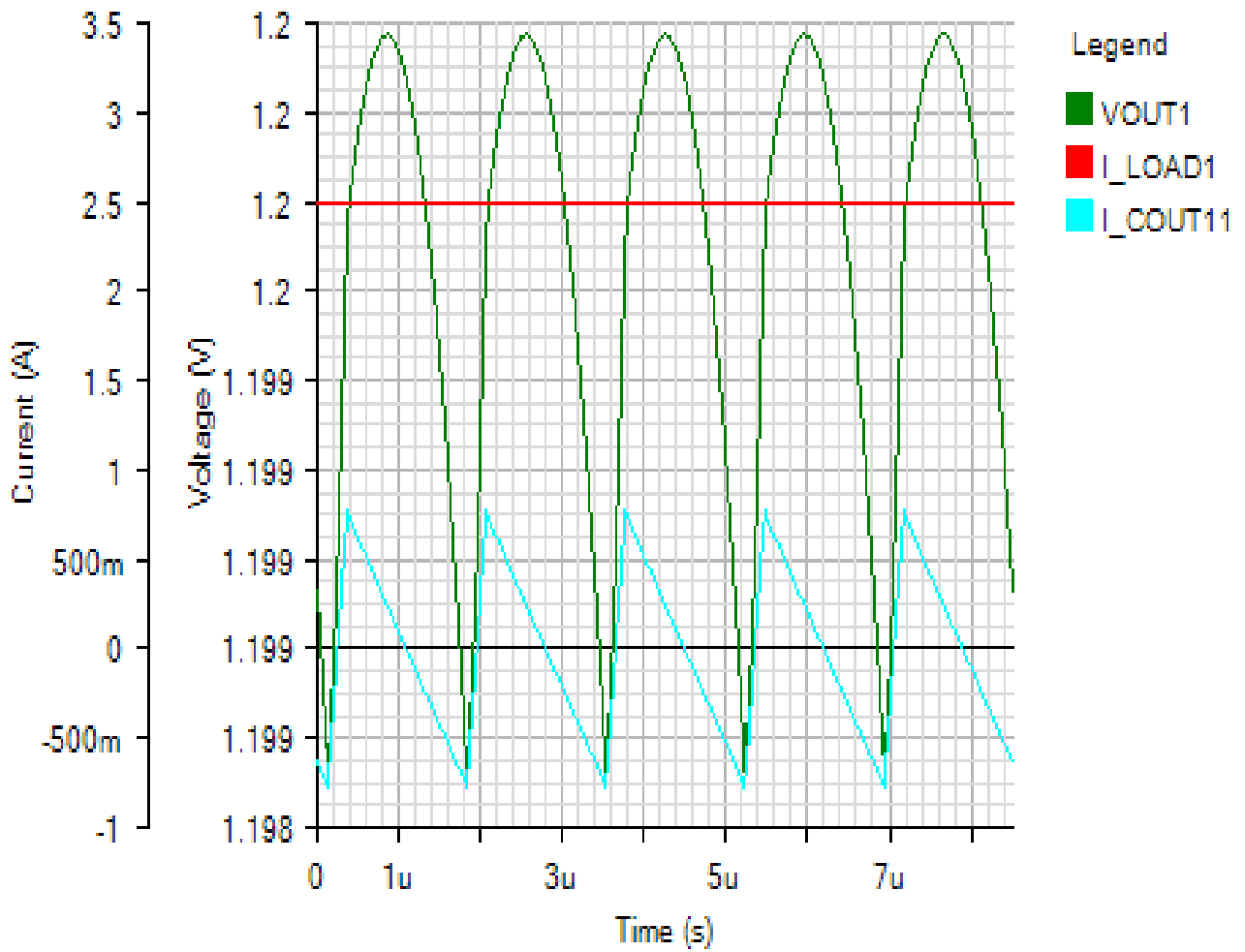
SW1

Default



OUT1

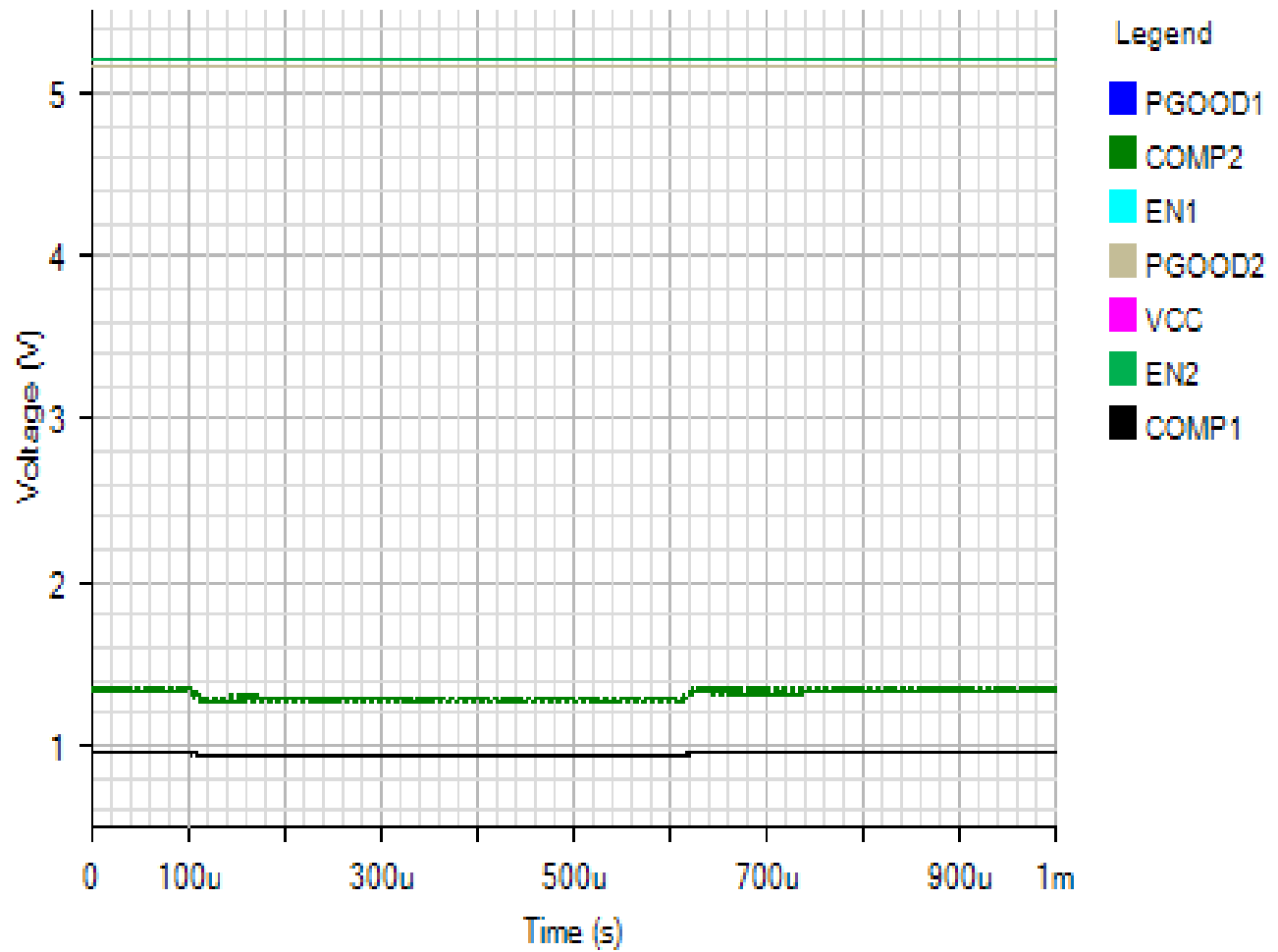
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Line Transient - Mon Nov 19 2018 10:25:56

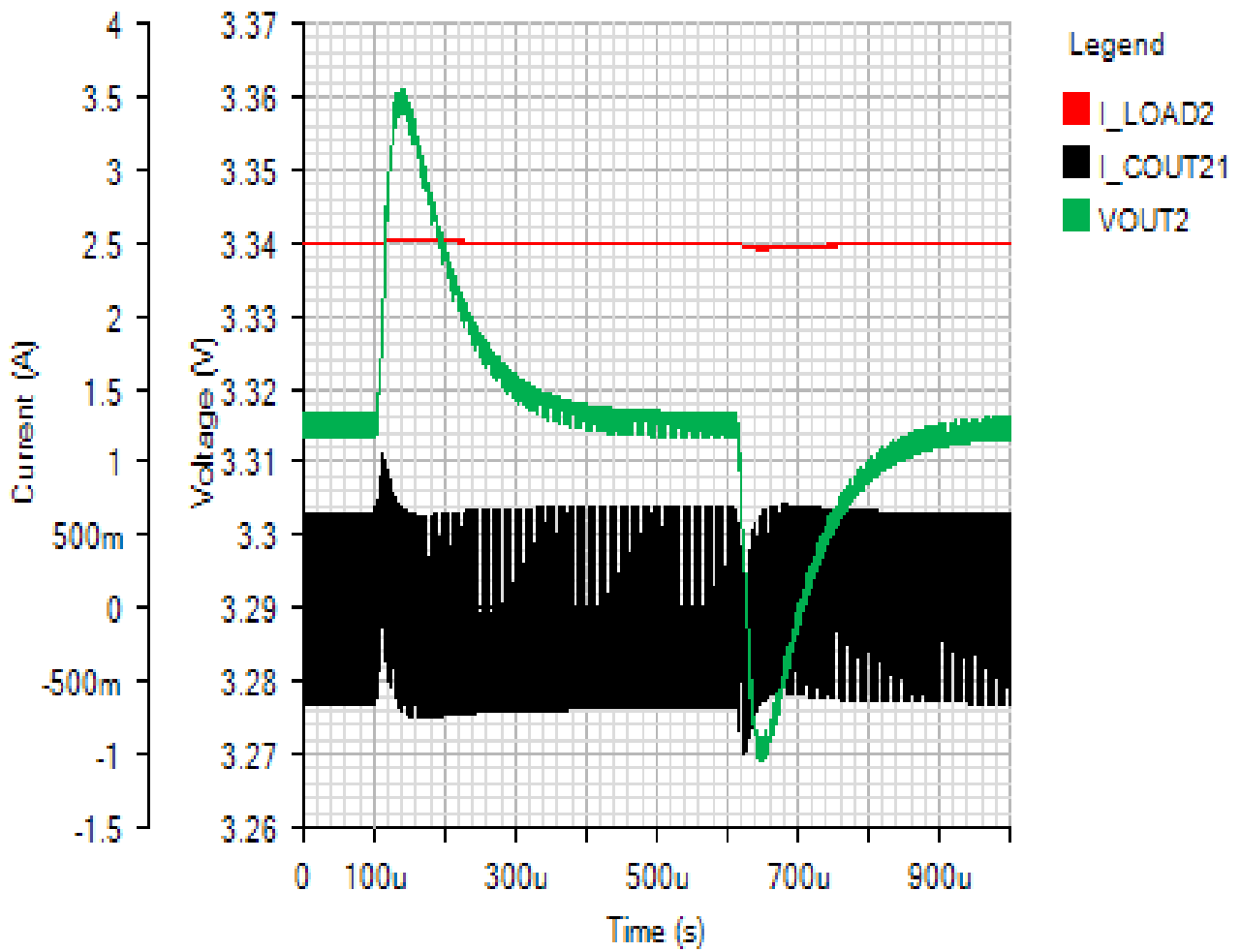
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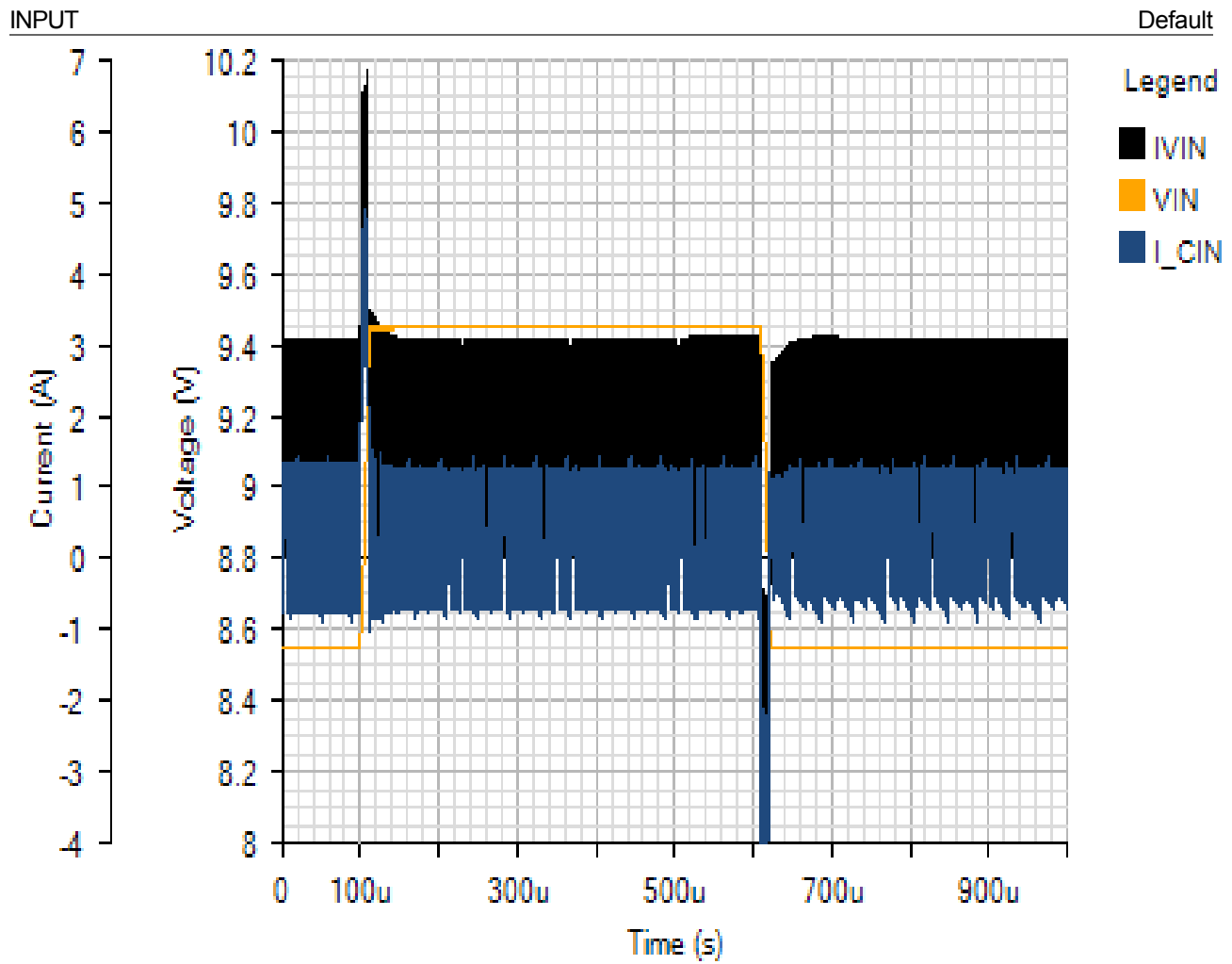
Default



OUT2

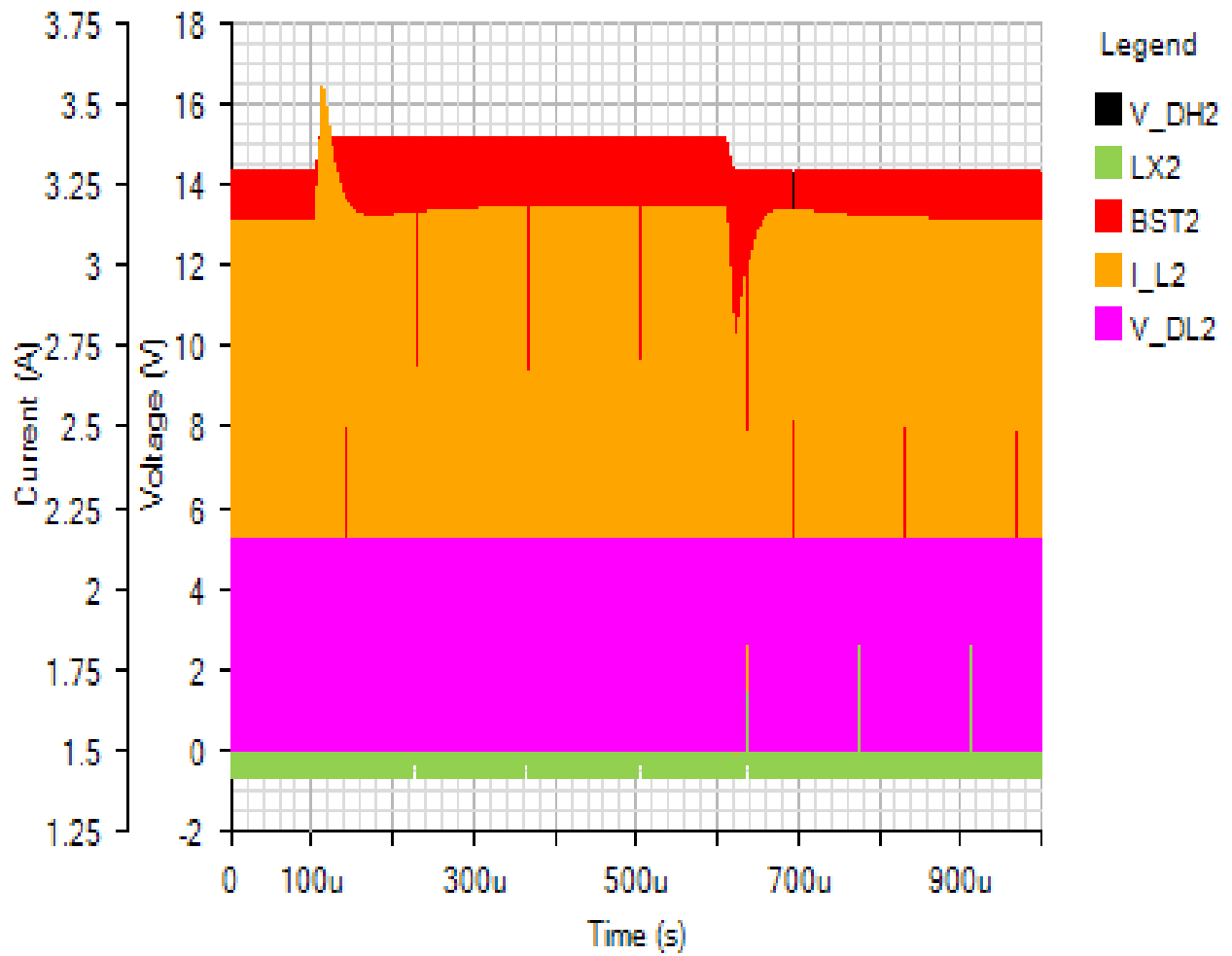
Default





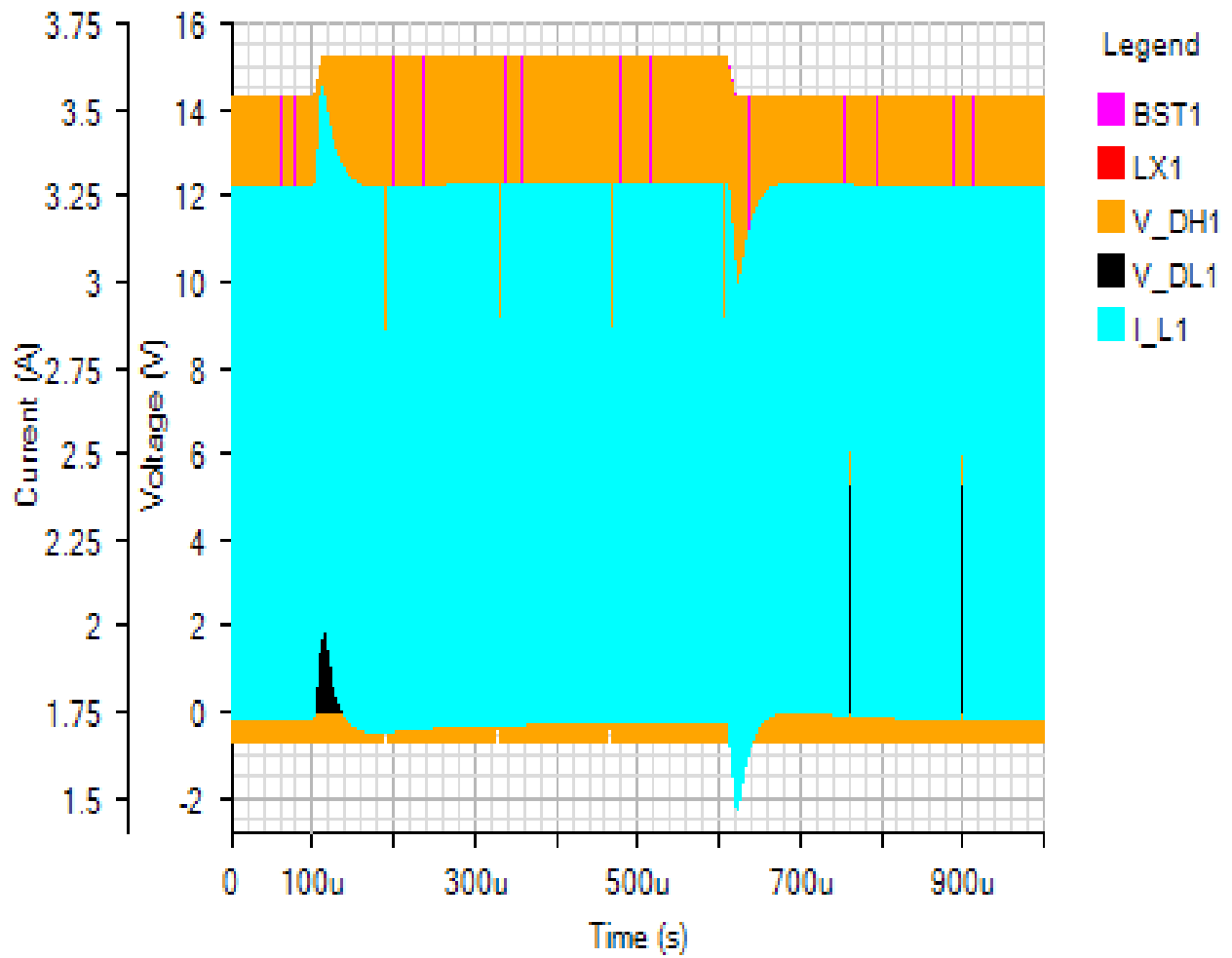
SW2

Default



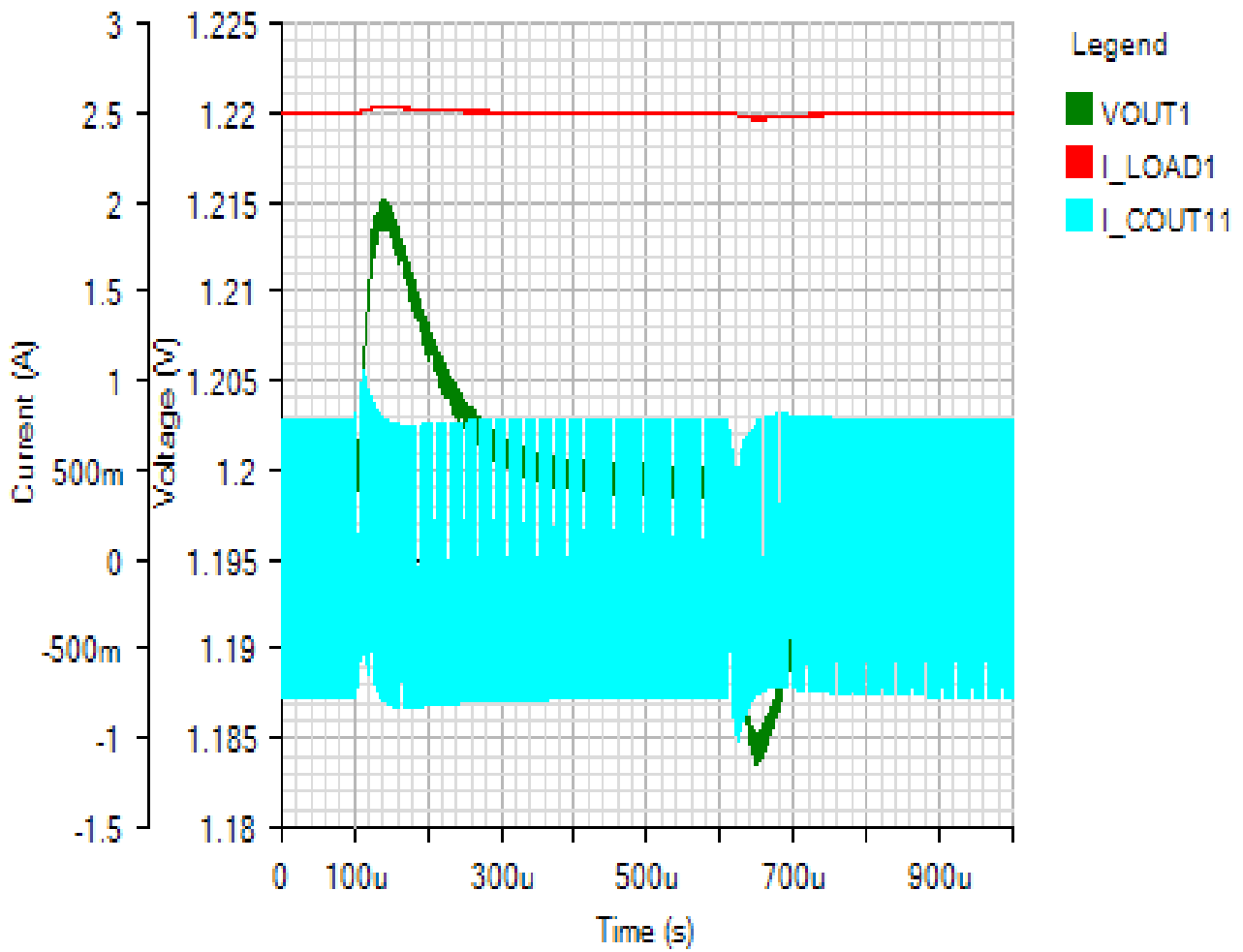
SW1

Default



OUT1

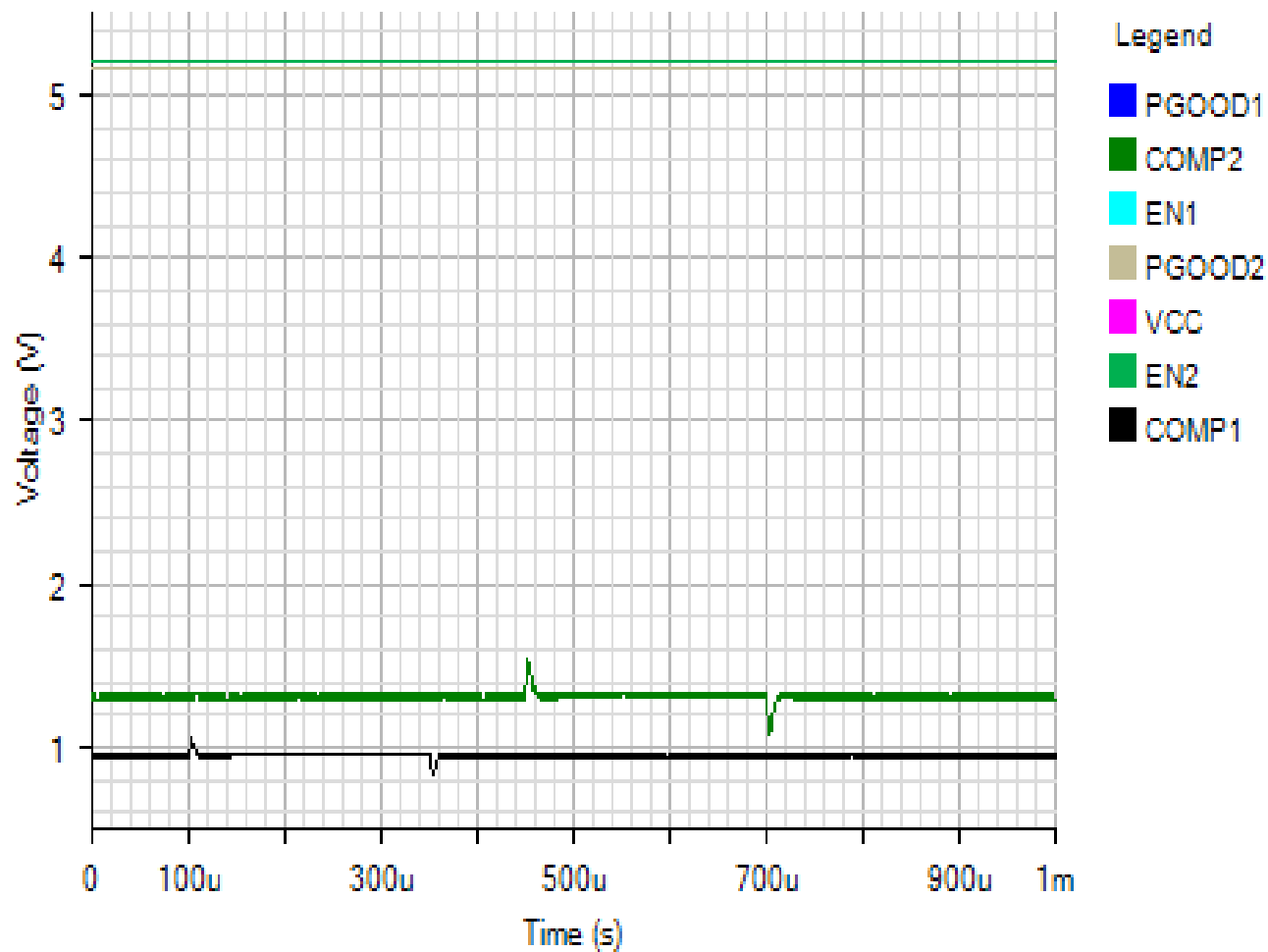
Default



Load Step - Mon Nov 19 2018 10:25:56

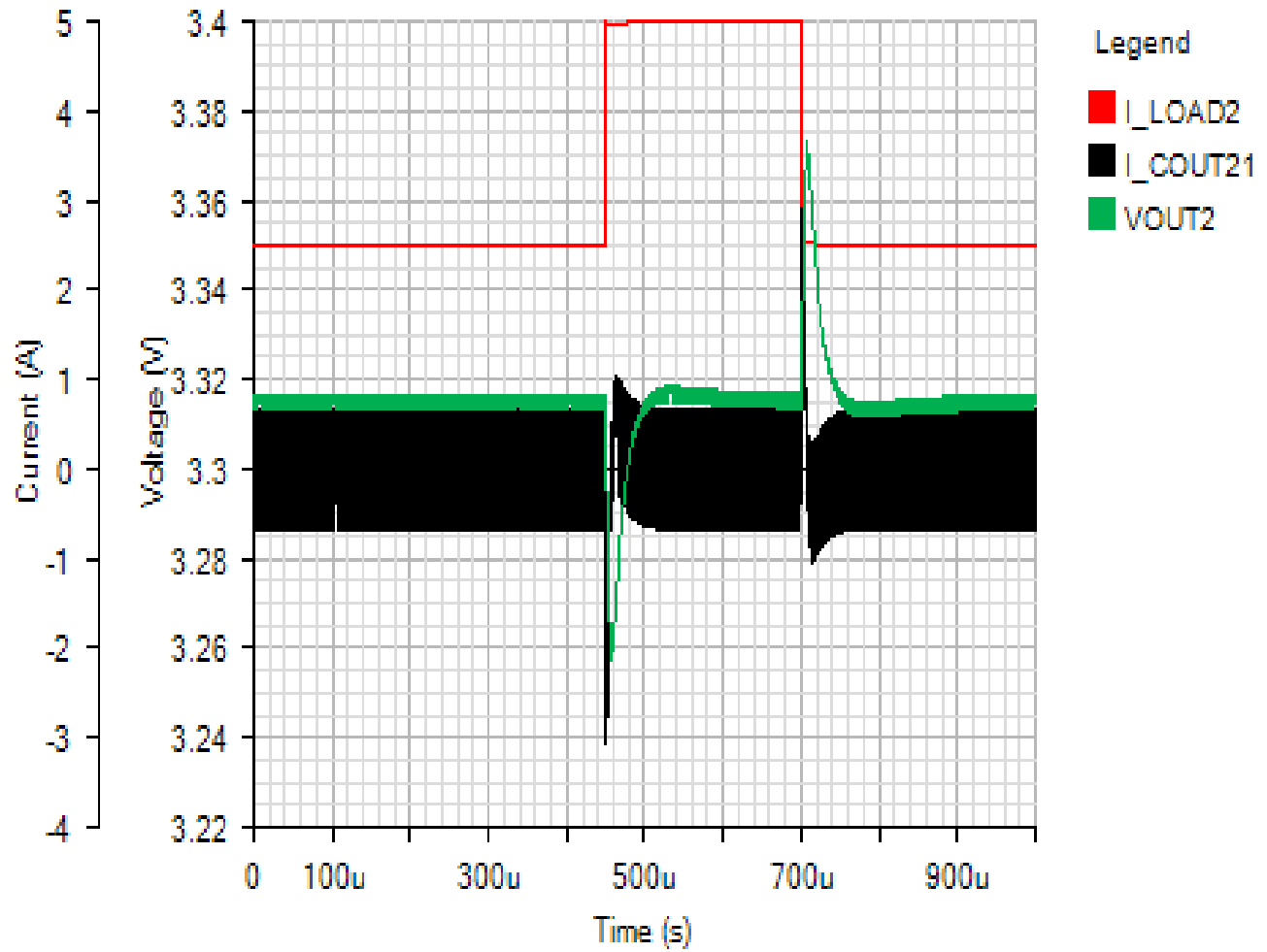
IC

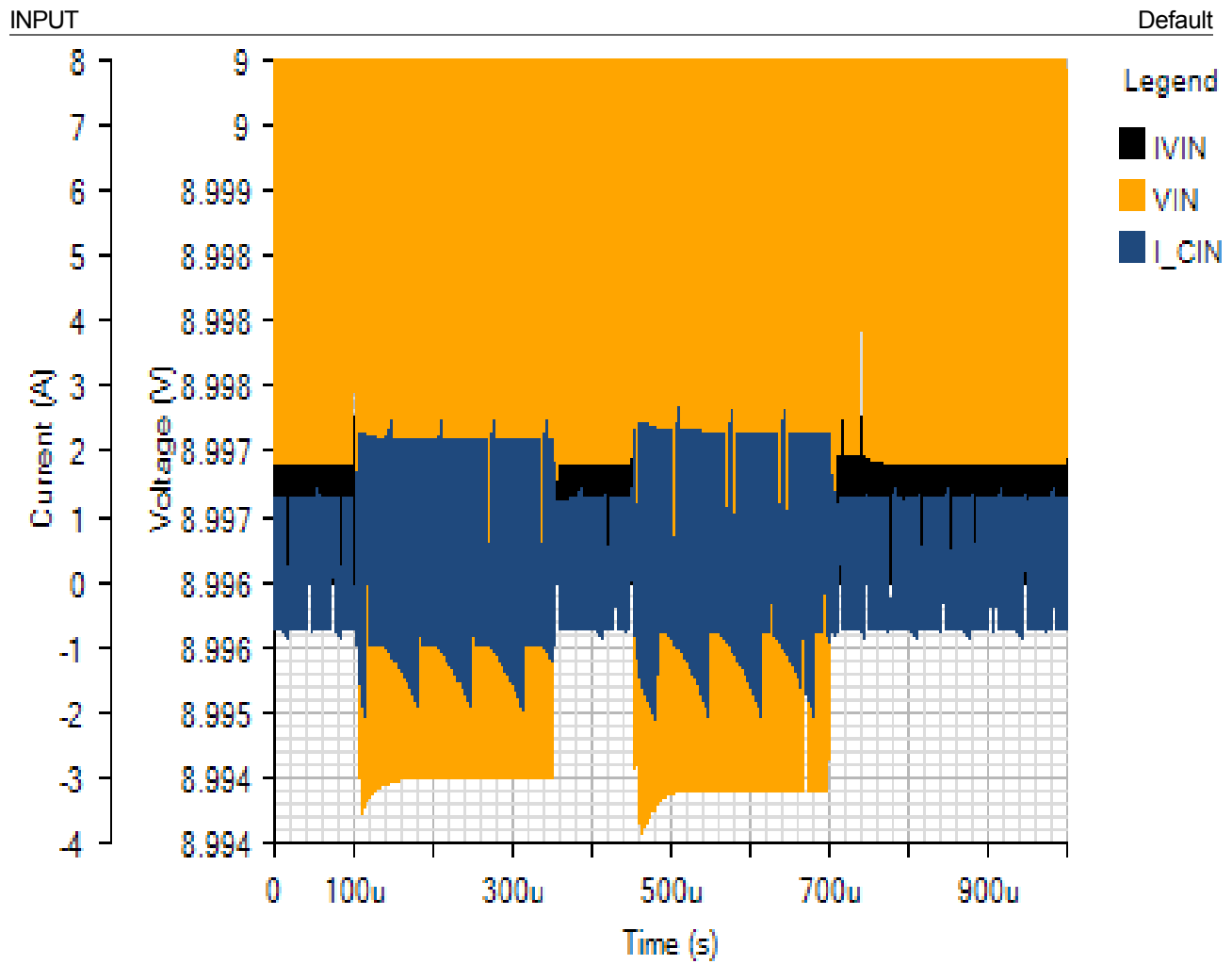
Default



OUT2

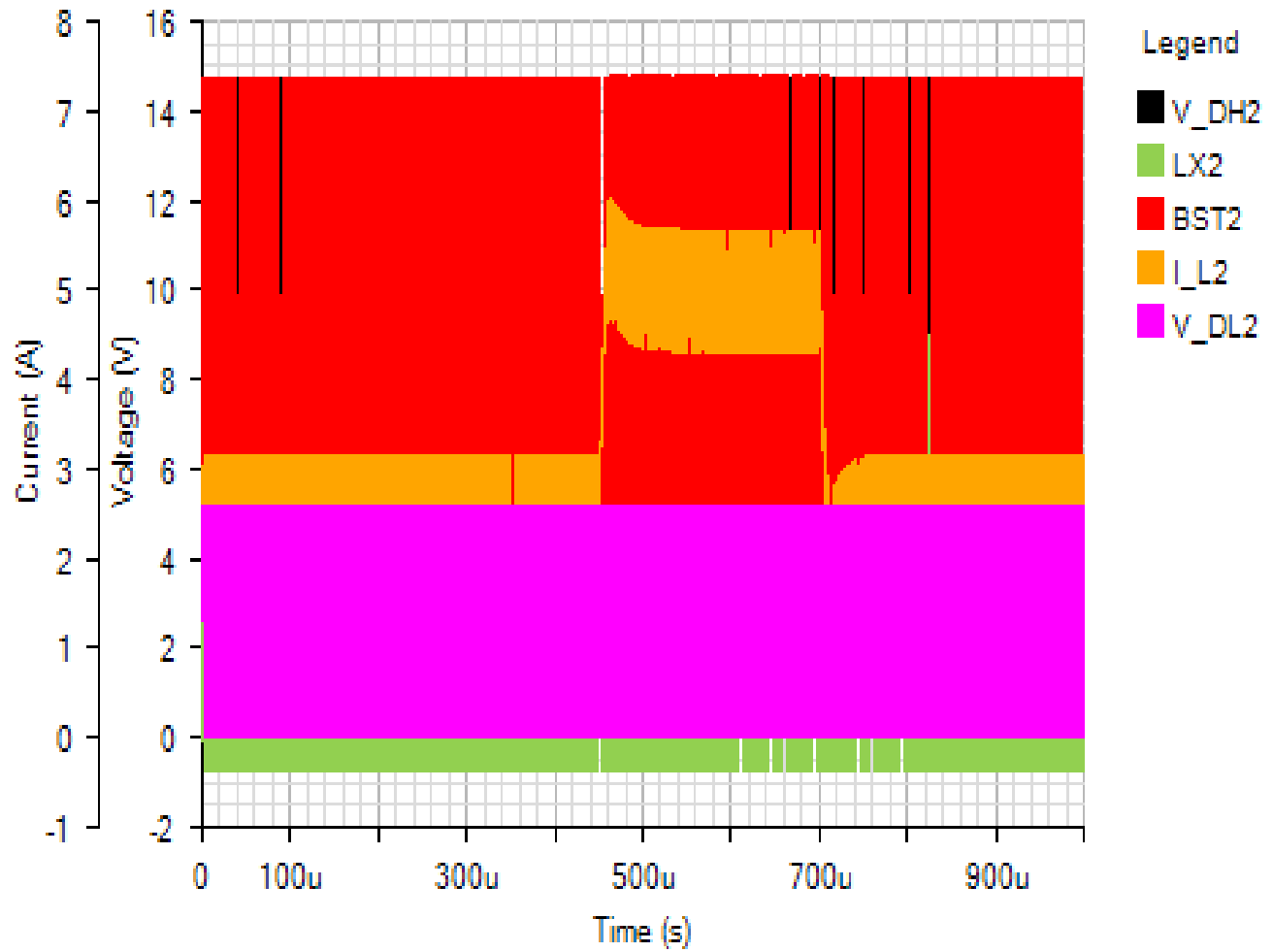
Default





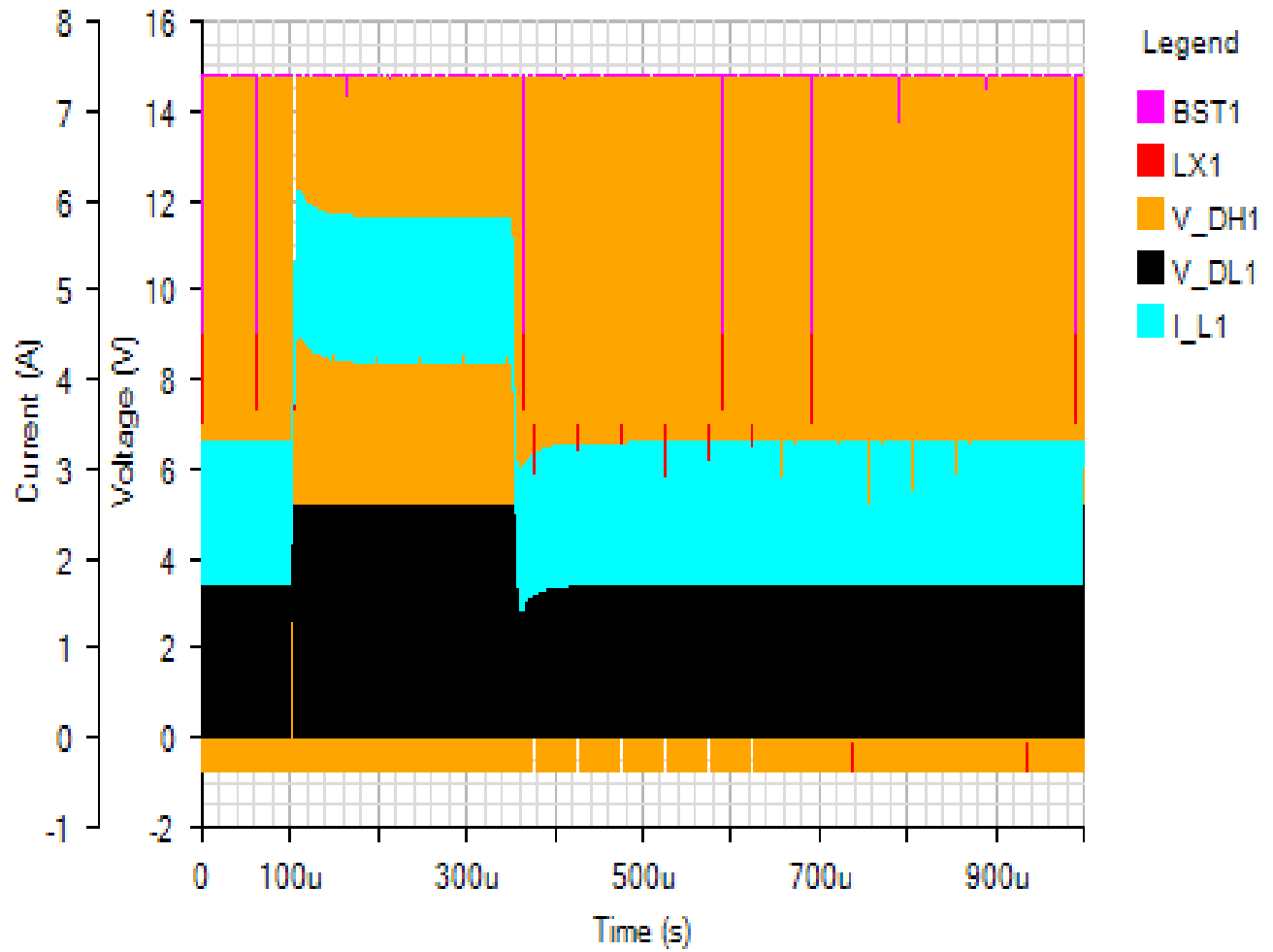
SW2

Default



SW1

Default



OUT1

Default

