

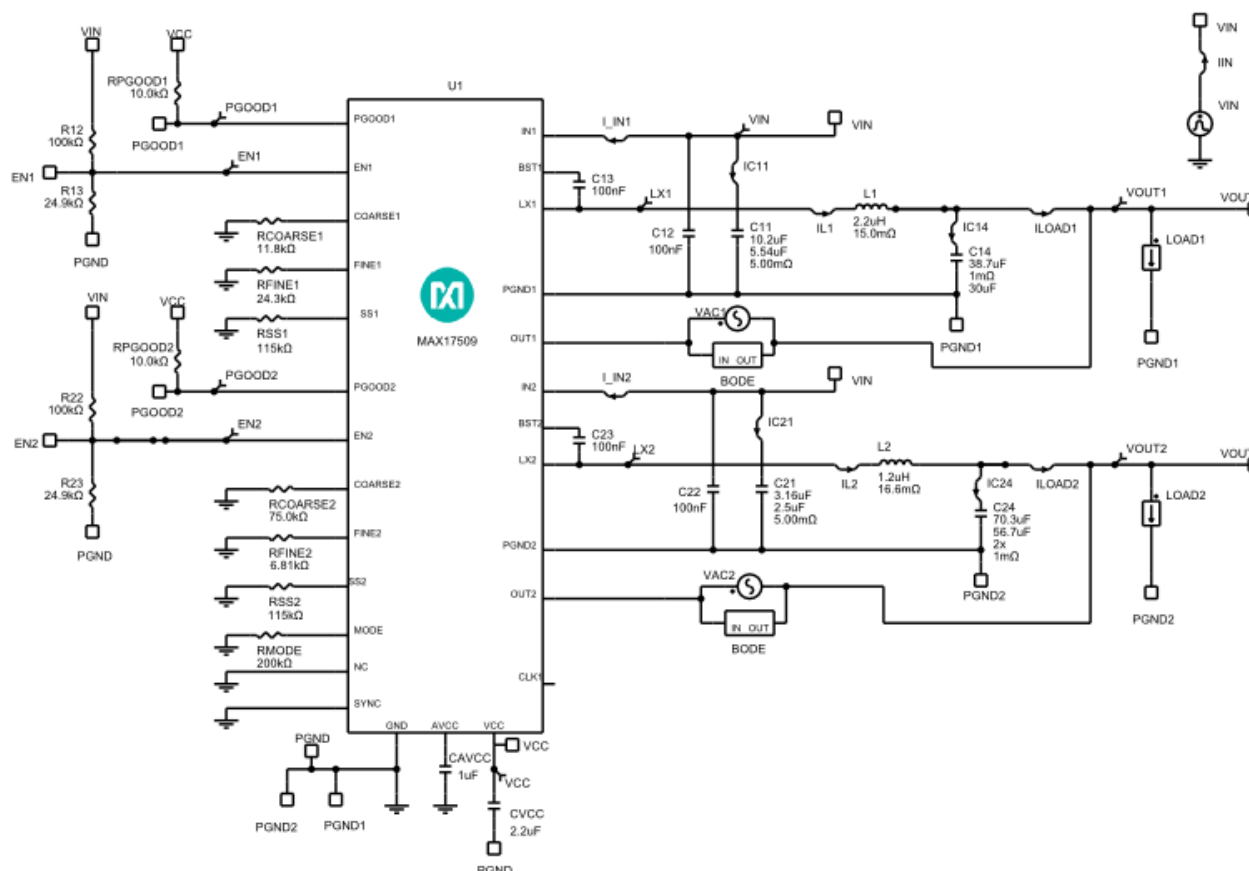
Initial Design

1.0

Design Requirements

Parameter	Value
Maximum Input Voltage	14V
Minimum Input Voltage	10V
Nominal Input Voltage	12V
Input Undervoltage Lockout	6.3V
Input Ripple Voltage	1%
Output	Two Single-phase Outputs
Output Voltage 1	3.3V
Output Current 1	3A
Output Voltage 2	1.2V
Output Current 2	3A
Performance Priority	Balance Efficiency and Size
BOM Priority	Cost
Phase Shift	180 DEG
Switching Frequency	1MHz
Overload Protection Method	BRICKWALL AND LATCH-OFF
Soft Start Time 1	8ms
Soft Start Time 2	8ms
Soft Stop 1	DISABLE
Soft Stop 2	DISABLE
Switching Slew Rate	MAXIMUM
Ambient Temperature	25°C

Schematic



BOM

Ref	Qty	Part Number	Manufacturer	Description
U1	1	MAX17509	Maxim Integrated	4.5–16V, Dual 3A, High-Efficiency, Synchronous Step-Down DC-DC Converter with Resistor Programmability
C11	1	GRM32ER71E226ME15	Murata	Cap Ceramic 22uF 25V 1210 125C
C12	1	VJ0603Y104KXAAC	Vishay	Cap Ceramic 0.1uF 50V X7R 10% Pad SMD 0603 150°C T/R
C13	1	VJ0603Y104KXAAC	Vishay	Cap Ceramic 0.1uF 50V X7R 10% Pad SMD 0603 150°C T/R
C14	1	GRM32EE70J476ME20L	Murata	Cap Ceramic 47uF 6.3V 1210 125C
C21	1	C1206C475K3PAC	Kemet	Cap Ceramic 4.7uF 25V X5R 10% SMD 1206 85C Bulk
C22	1	VJ0603Y104KXAAC	Vishay	Cap Ceramic 0.1uF 50V X7R 10% Pad SMD 0603 150°C T/R
C23	1	VJ0603Y104KXAAC	Vishay	Cap Ceramic 0.1uF 50V X7R 10% Pad SMD 0603 150°C T/R

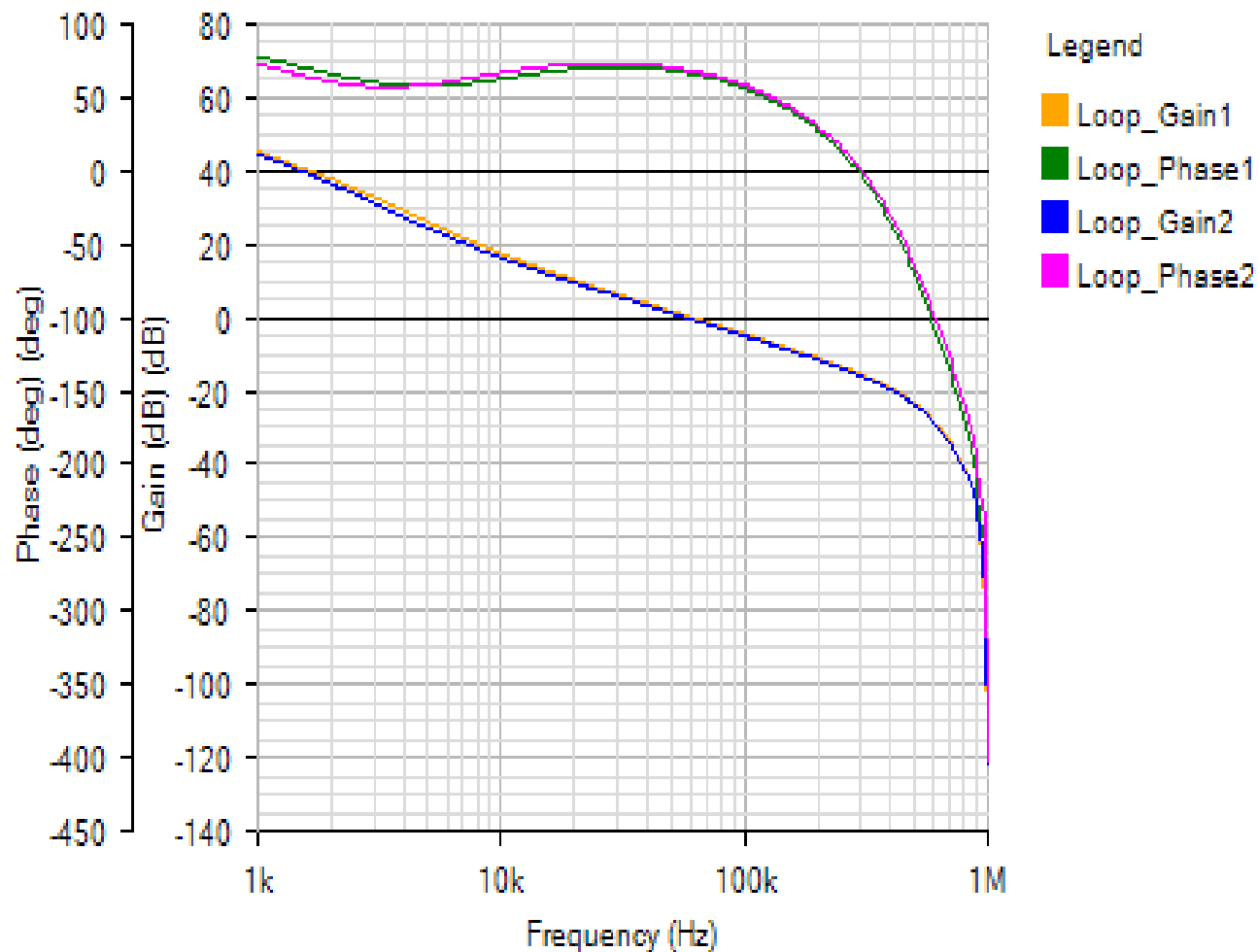
C24	2	GRM21BC80E107ME15L	Murata	Cap Ceramic 100uF 2.5V 0805 105C
CAVCC	1	0603YC105KAT2A	AVX	Cap Ceramic 1uF 16V X7R 10% Pad SMD 0603 125°C T/R
CVCC	1	C1608X7R1A225K080AC	TDK	Cap Ceramic 2.2uF 10V X7R 10% Pad SMD 0603 125°C T/R
L1	1	VLP8040T-2R2N	TDK	Inductor Power Shielded Wirewound 2.2uH 30% 100KHz Ferrite 6.2A 15mOhm DCR Embossed Carrier T/R
L2	1	XFL5015-122MEB	Coilcraft	Inductor 1.2uH 20% 15.1mOhm 4.9A Isat 9.2A Irms
R12	1	CRCW0603100KFKEAHP	Vishay	Res Thick Film 0603 100K Ohm 1% 0.25W(1/4W) ±100ppm/°C Pad SMD Automotive T/R
R13	1	ERJ3EKF2492V	Panasonic	Res Thick Film 0603 24.9K Ohm 1% 0.1W(1/10W) ±100ppm/°C Pad SMD Automotive T/R
R22	1	CRCW0603100KFKEAHP	Vishay	Res Thick Film 0603 100K Ohm 1% 0.25W(1/4W) ±100ppm/°C Pad SMD Automotive T/R
R23	1	ERJ3EKF2492V	Panasonic	Res Thick Film 0603 24.9K Ohm 1% 0.1W(1/10W) ±100ppm/°C Pad SMD Automotive T/R
RCOARSE1	1	ERJ3EKF1182V	Panasonic	Res Thick Film 0603 11.8K Ohm 1% 0.1W(1/10W) ±100ppm/°C Pad SMD Automotive T/R
RCOARSE2	1	ERJ3EKF7502V	Panasonic	Res Thick Film 0603 75K Ohm 1% 0.1W(1/10W) ±100ppm/°C Pad SMD Automotive T/R
RFINE1	1	ERJ2RKF2432X	Panasonic	Res Thick Film 0402 24.3K Ohm 1% 0.1W(1/10W) ±100ppm/°C Pad SMD Automotive T/R
RFINE2	1	ERJ3EKF6811V	Panasonic	Res Thick Film 0603 6.81K Ohm 1% 0.1W(1/10W) ±100ppm/°C Pad SMD Automotive T/R
RMODE	1	ERJ2RKF2003X	Panasonic	Res Thick Film 0402 200K Ohm 1% 0.1W(1/10W) ±100ppm/°C Pad SMD Automotive T/R
RPGOOD1	1	ERJ2GEJ103X	Panasonic	Res Thick Film 0402 10K Ohm 5% 0.1W(1/10W) ±200ppm/°C Pad SMD Automotive T/R
RPGOOD2	1	ERJ2GEJ103X	Panasonic	Res Thick Film 0402 10K Ohm 5% 0.1W(1/10W) ±200ppm/°C Pad SMD Automotive T/R
RSS1	1	ERJ3EKF1153V	Panasonic	Res Thick Film 0603 115K Ohm 1% 0.1W(1/10W) ±100ppm/°C Pad SMD Automotive T/R
RSS2	1	ERJ3EKF1153V	Panasonic	Res Thick Film 0603 115K Ohm 1% 0.1W(1/10W) ±100ppm/°C Pad SMD Automotive T/R

Simulation Results

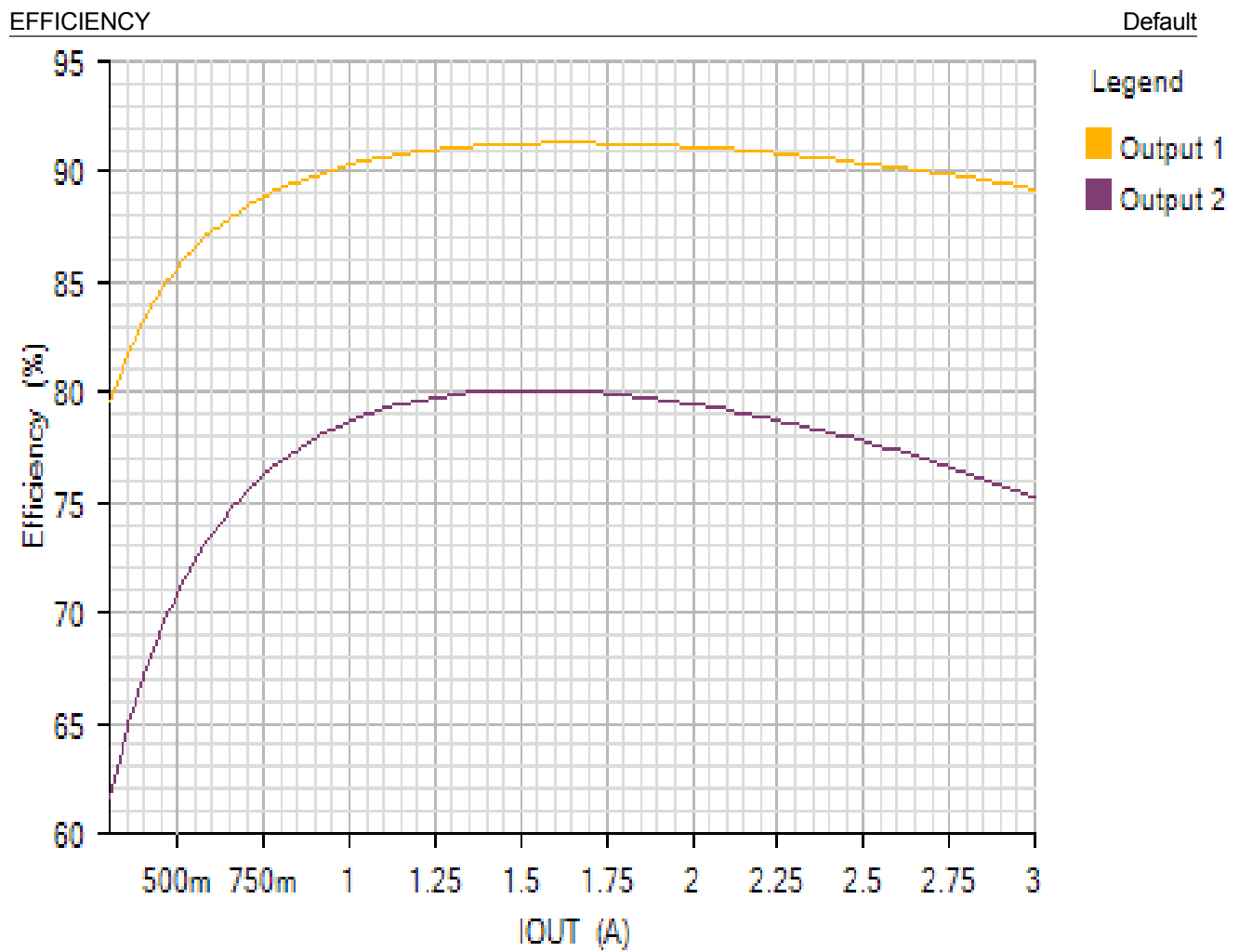
AC Loop - Tue Nov 20 2018 13:38:19

BODE

Default

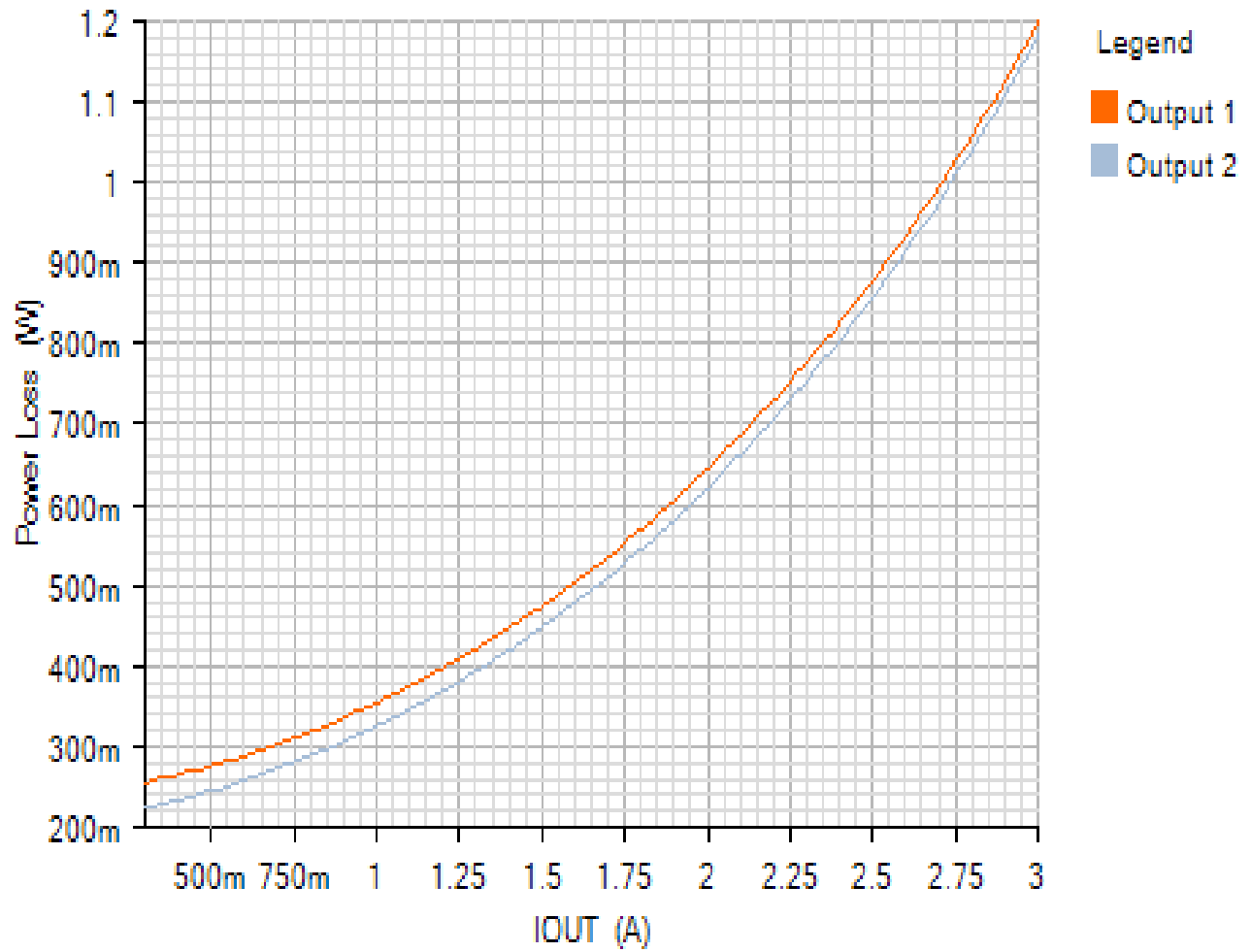


Efficiency - Tue Nov 20 2018 13:38:19



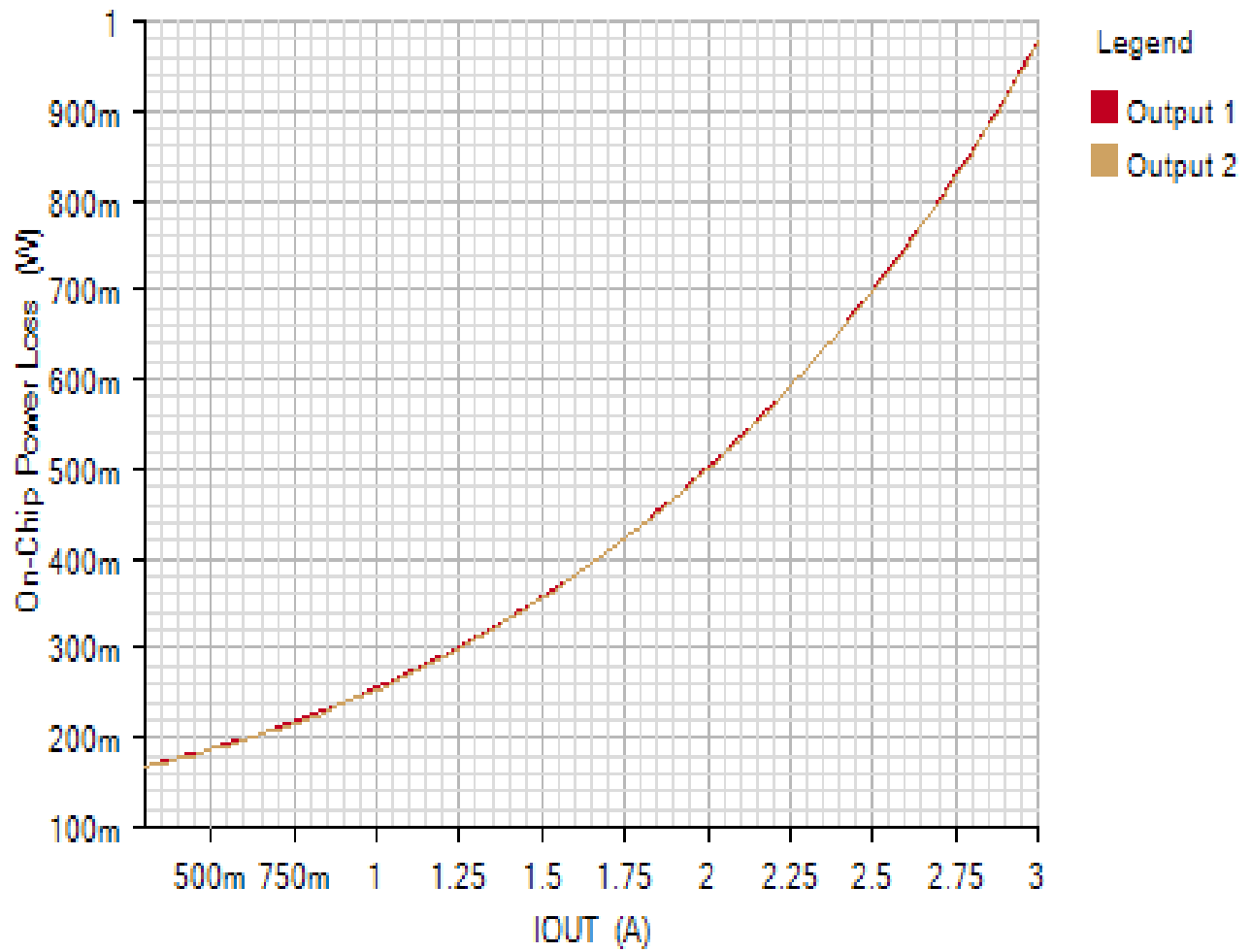
TOTAL_POWER_LOSS

Default



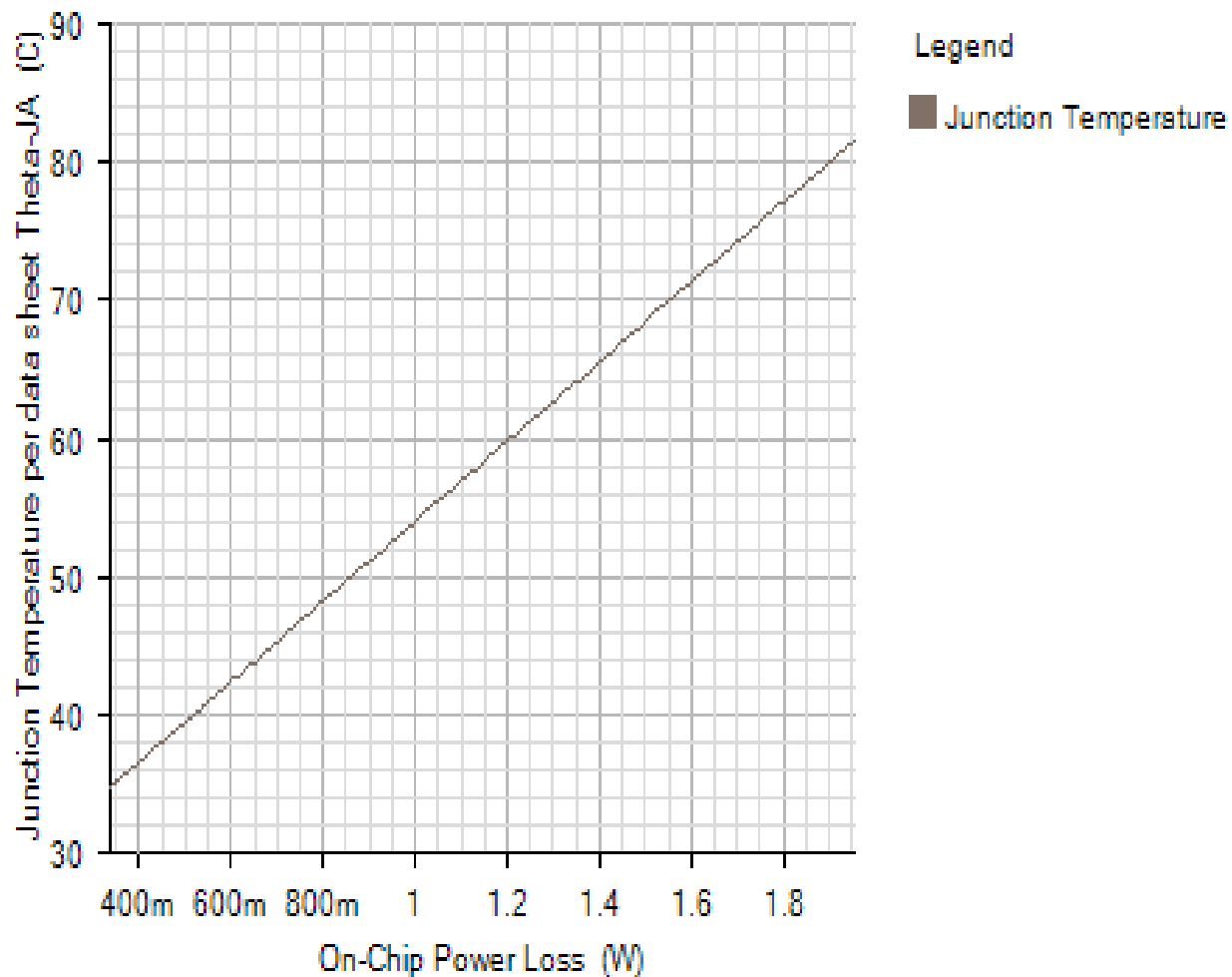
ON-CHIP_POWER_LOSS

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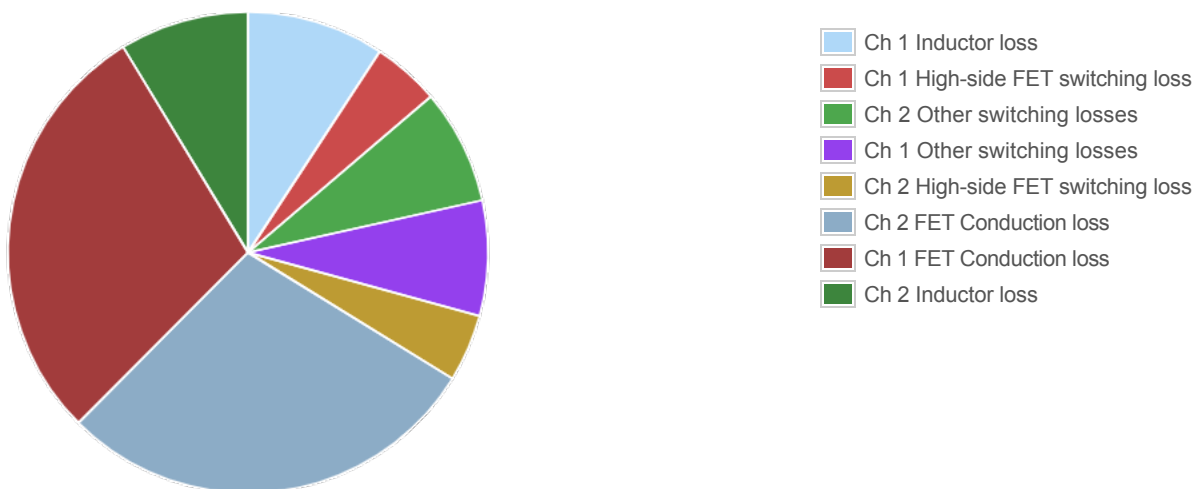


JUNCTION_TEMPERATURE

Default



Losses



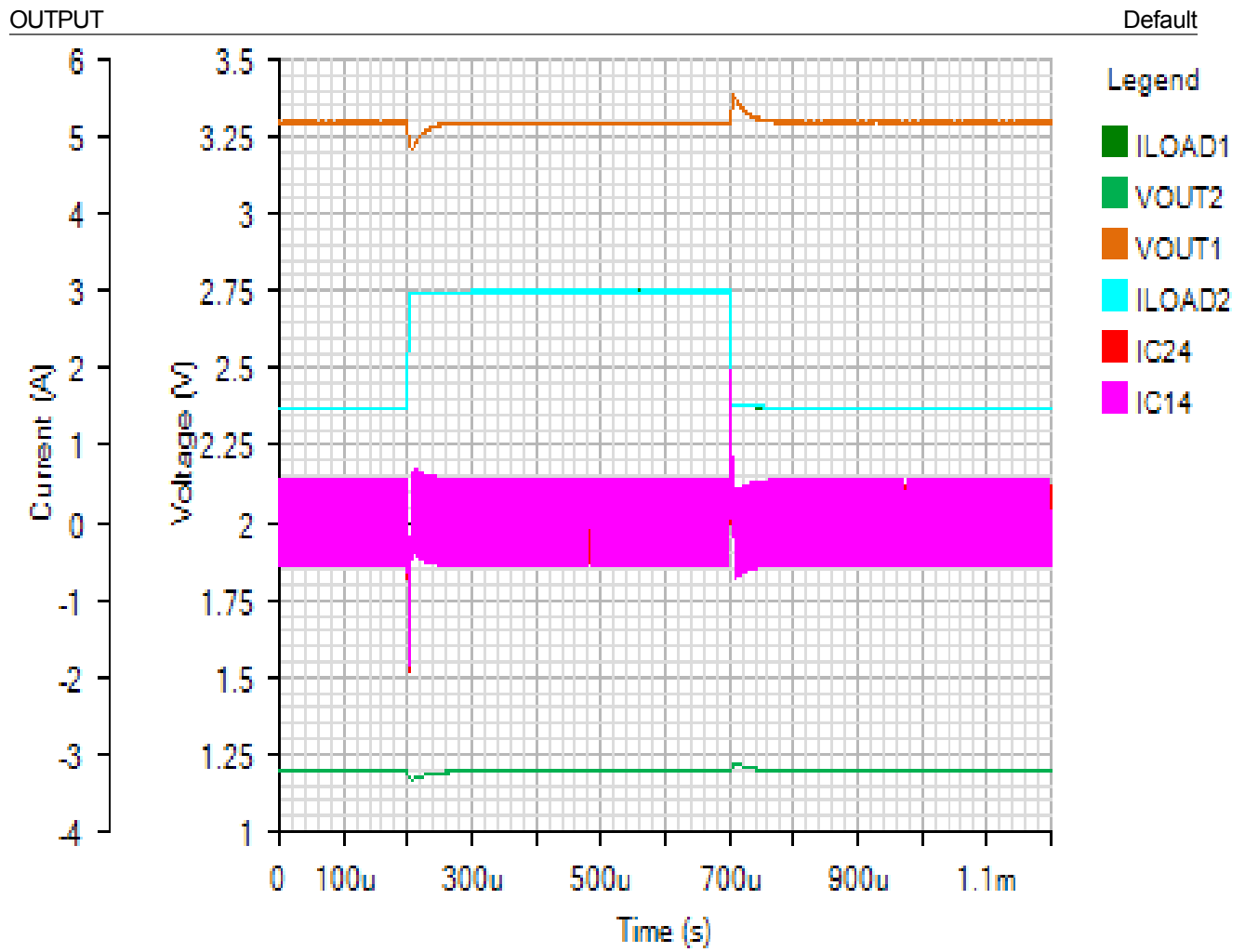
Component

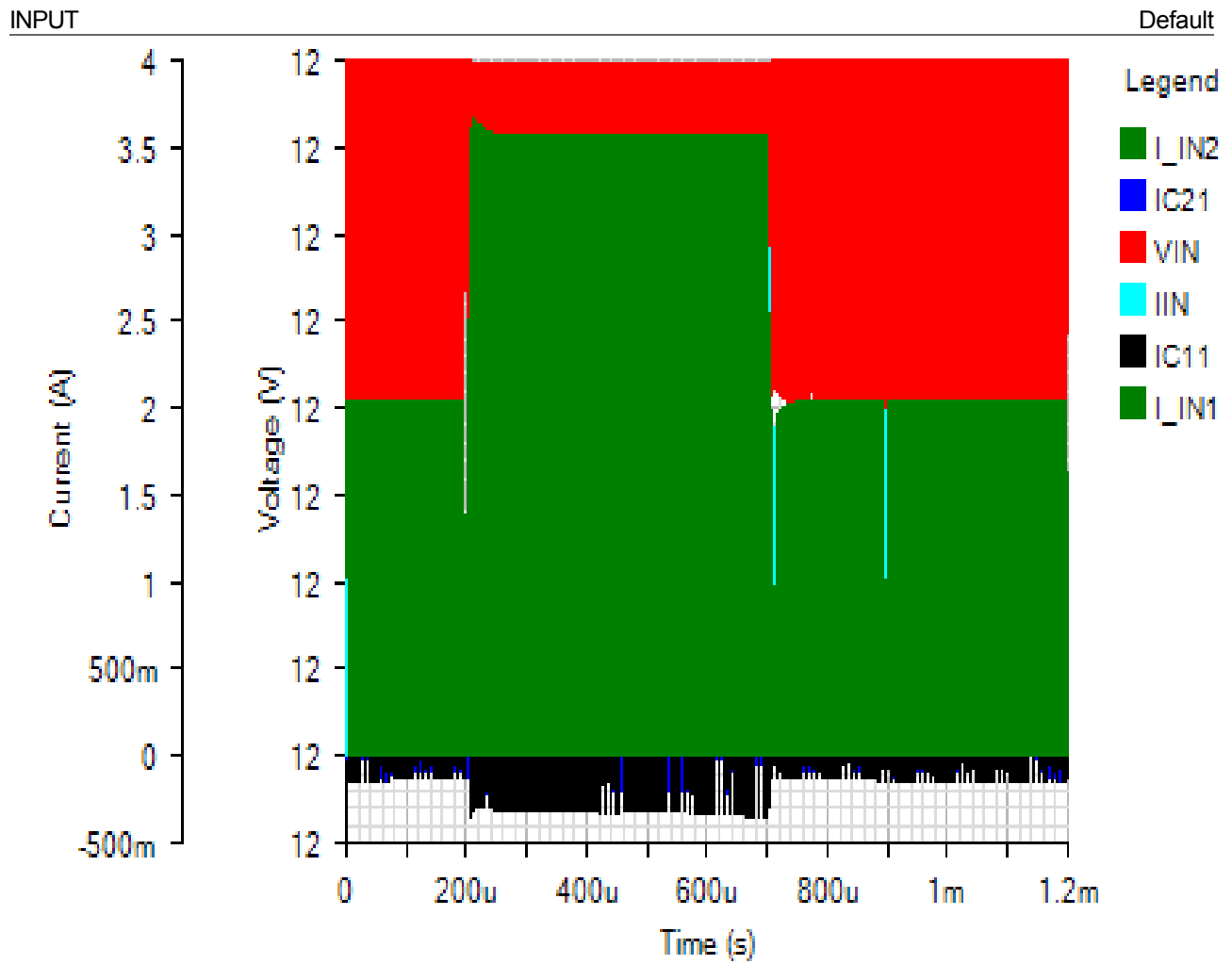
Loss (W)

% of total

Component	Loss (W)	% of total
Ch 1 Inductor loss	0.092447	9.2
Ch 1 High-side FET switching loss	0.045343	4.5
Ch 2 Other switching losses	0.077335	7.7
Ch 1 Other switching losses	0.077335	7.7
Ch 2 High-side FET switching loss	0.045343	4.5
Ch 2 FET Conduction loss	0.286992	28.7
Ch 1 FET Conduction loss	0.288207	28.8
Ch 2 Inductor loss	0.086999	8.7
Total	1	100

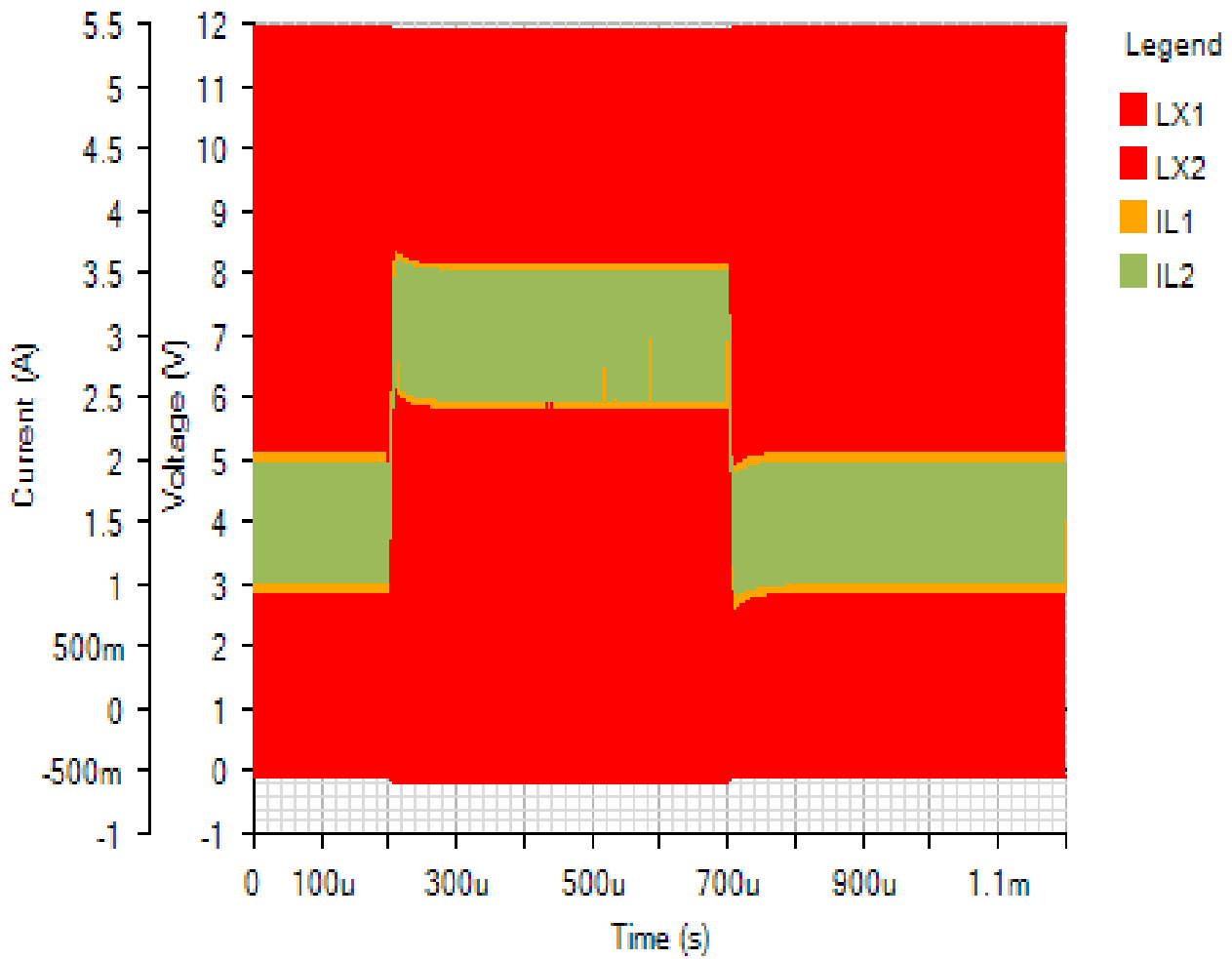
Load Step - Tue Nov 20 2018 13:38:19





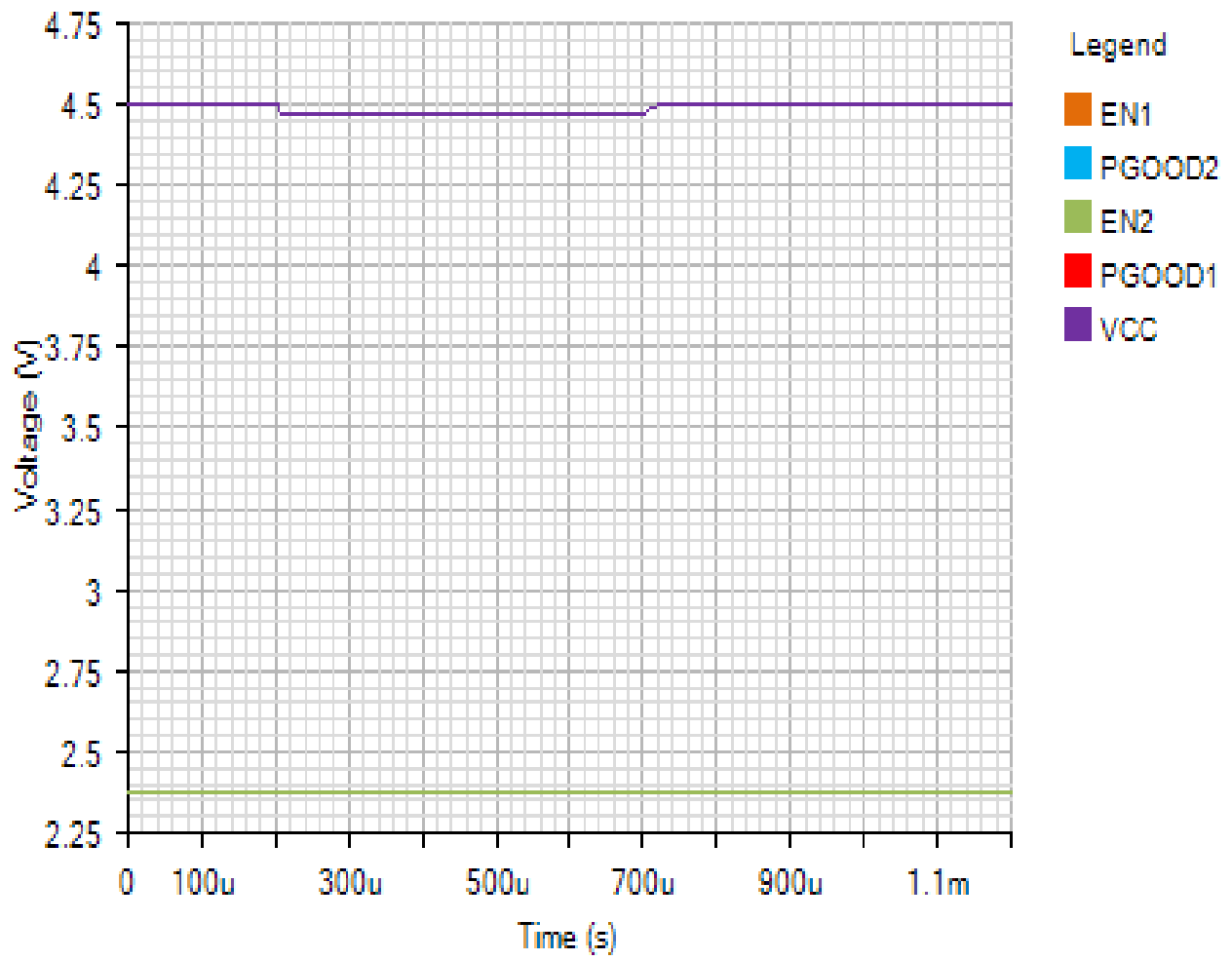
SWITCHING

Default



IC

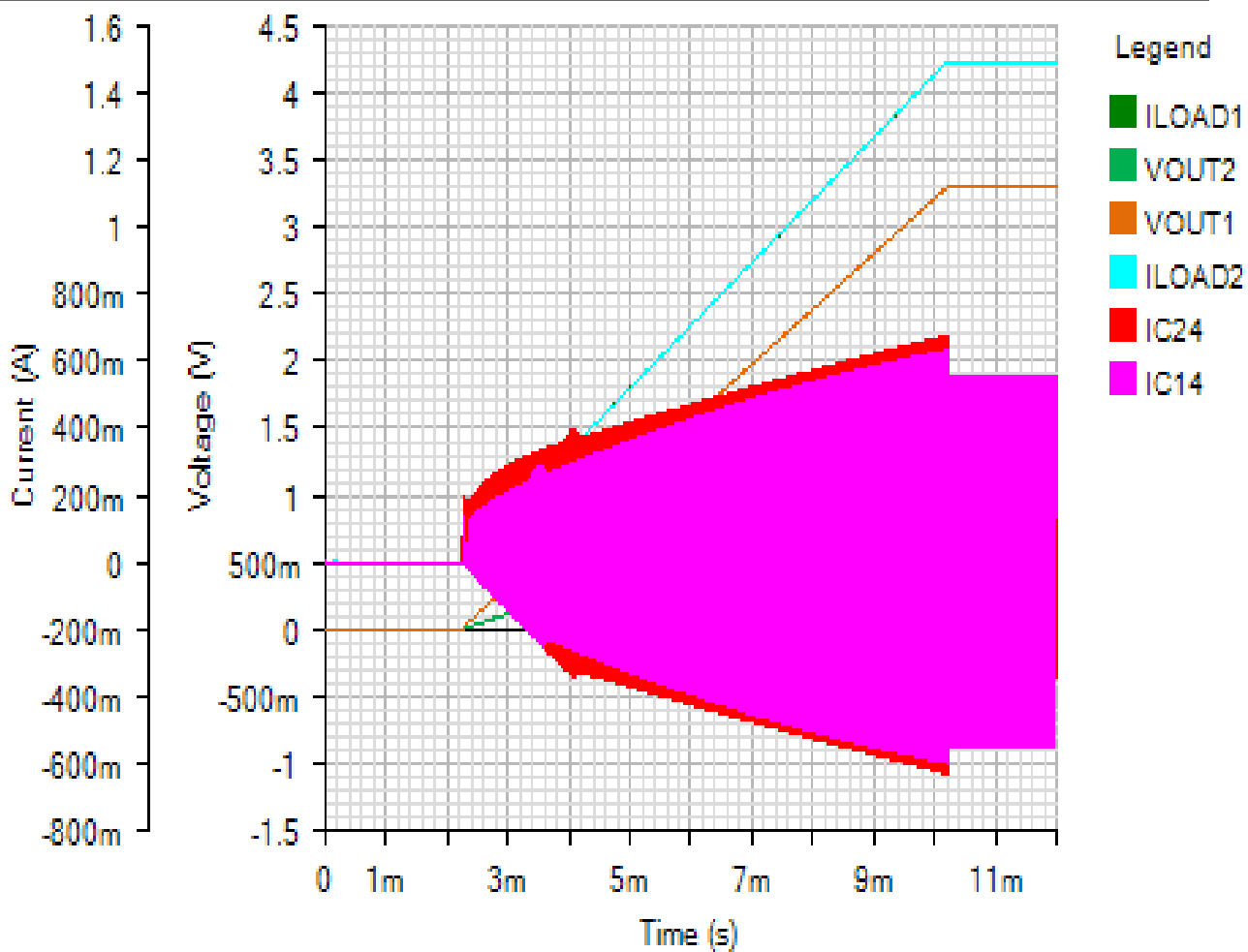
Default



Start Up - Tue Nov 20 2018 13:38:19

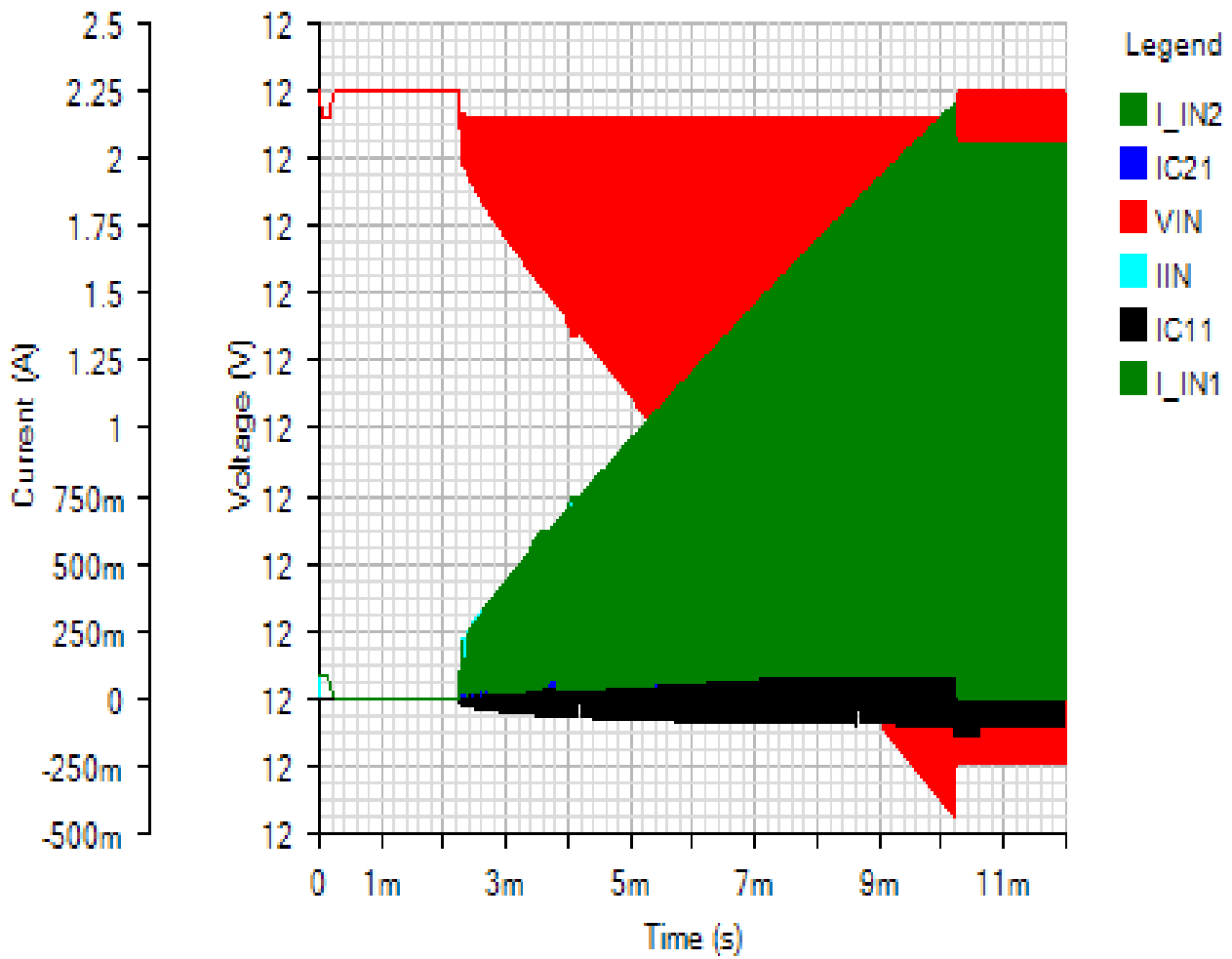
OUTPUT

Default



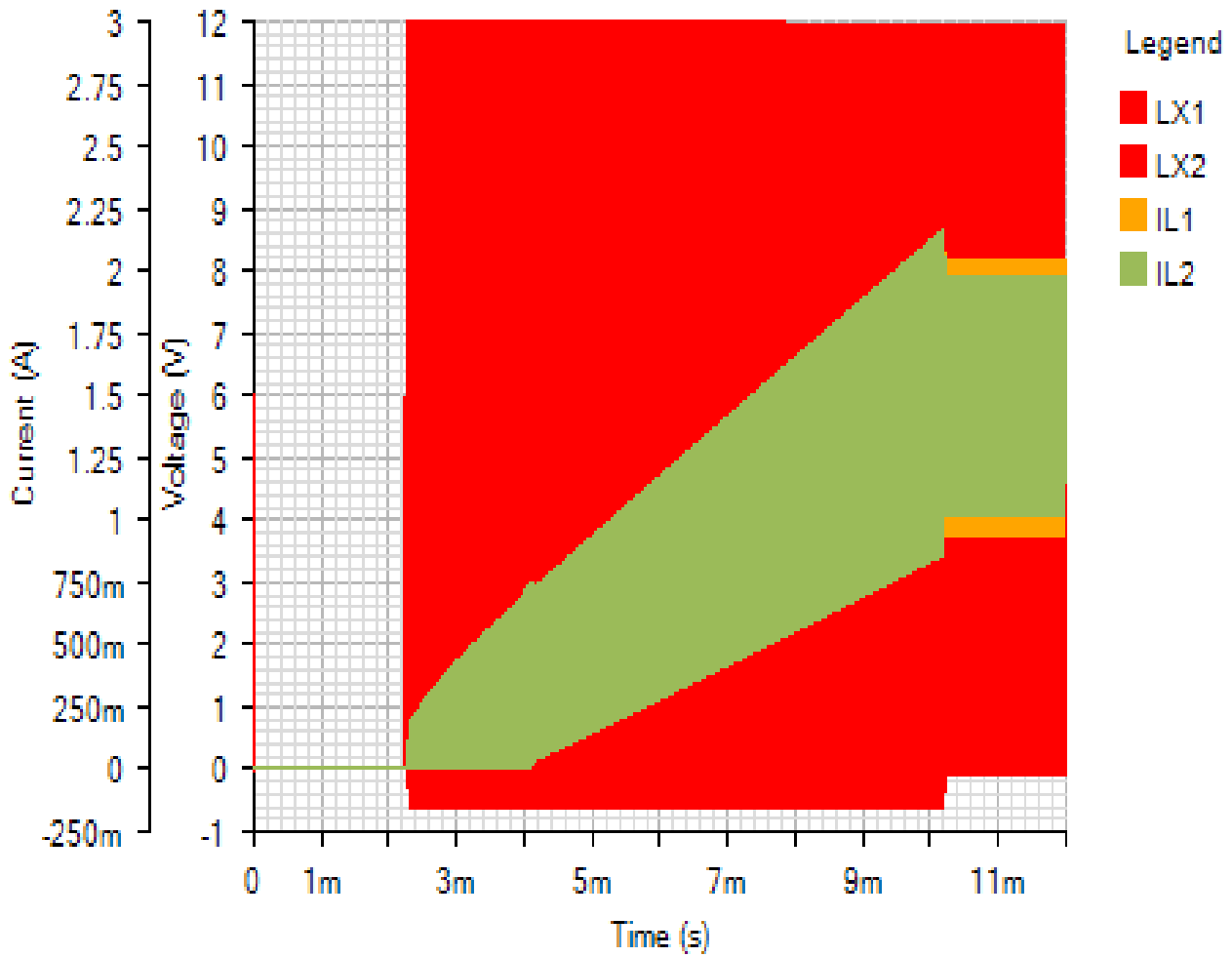
INPUT

Default



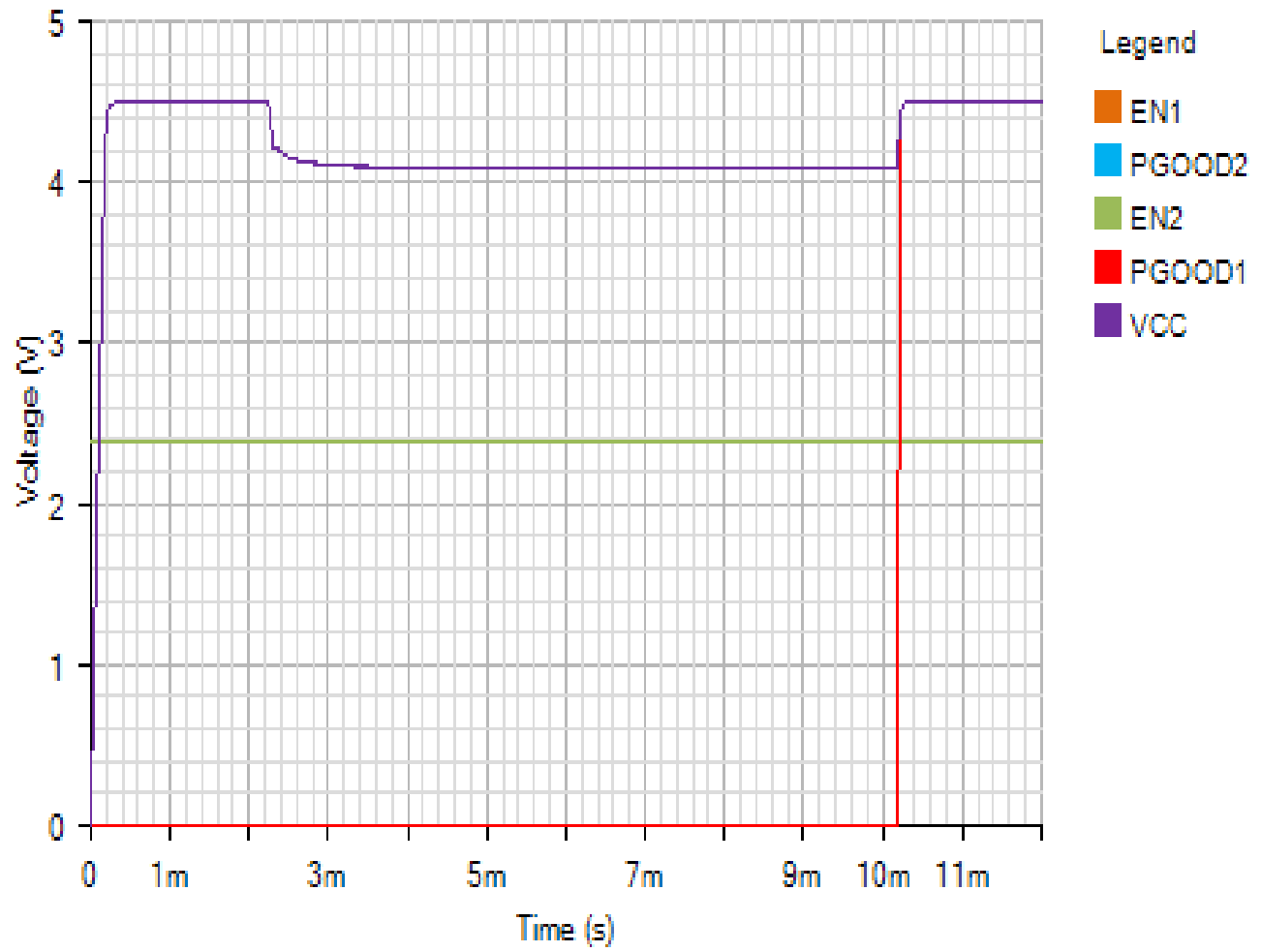
SWITCHING

Default



IC

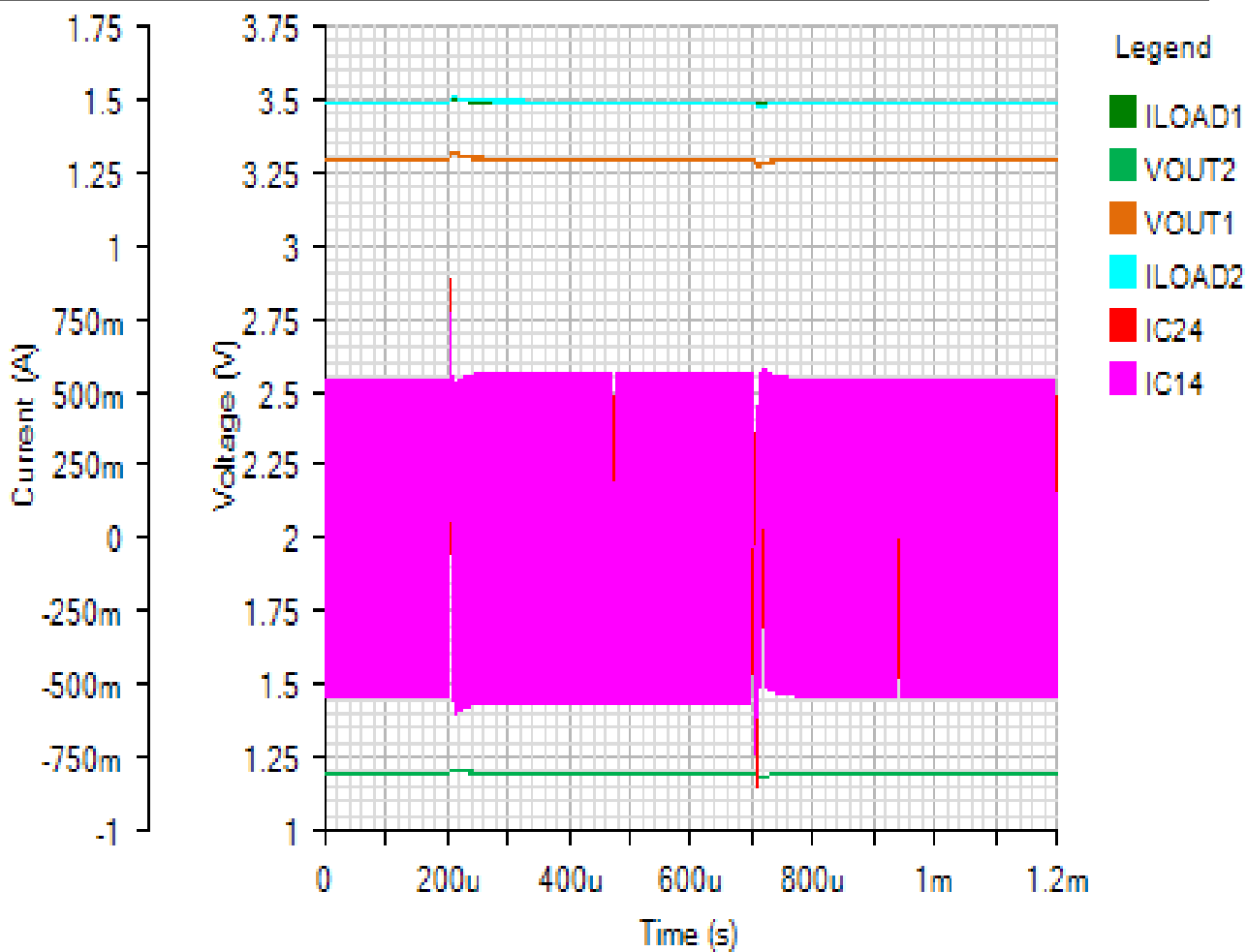
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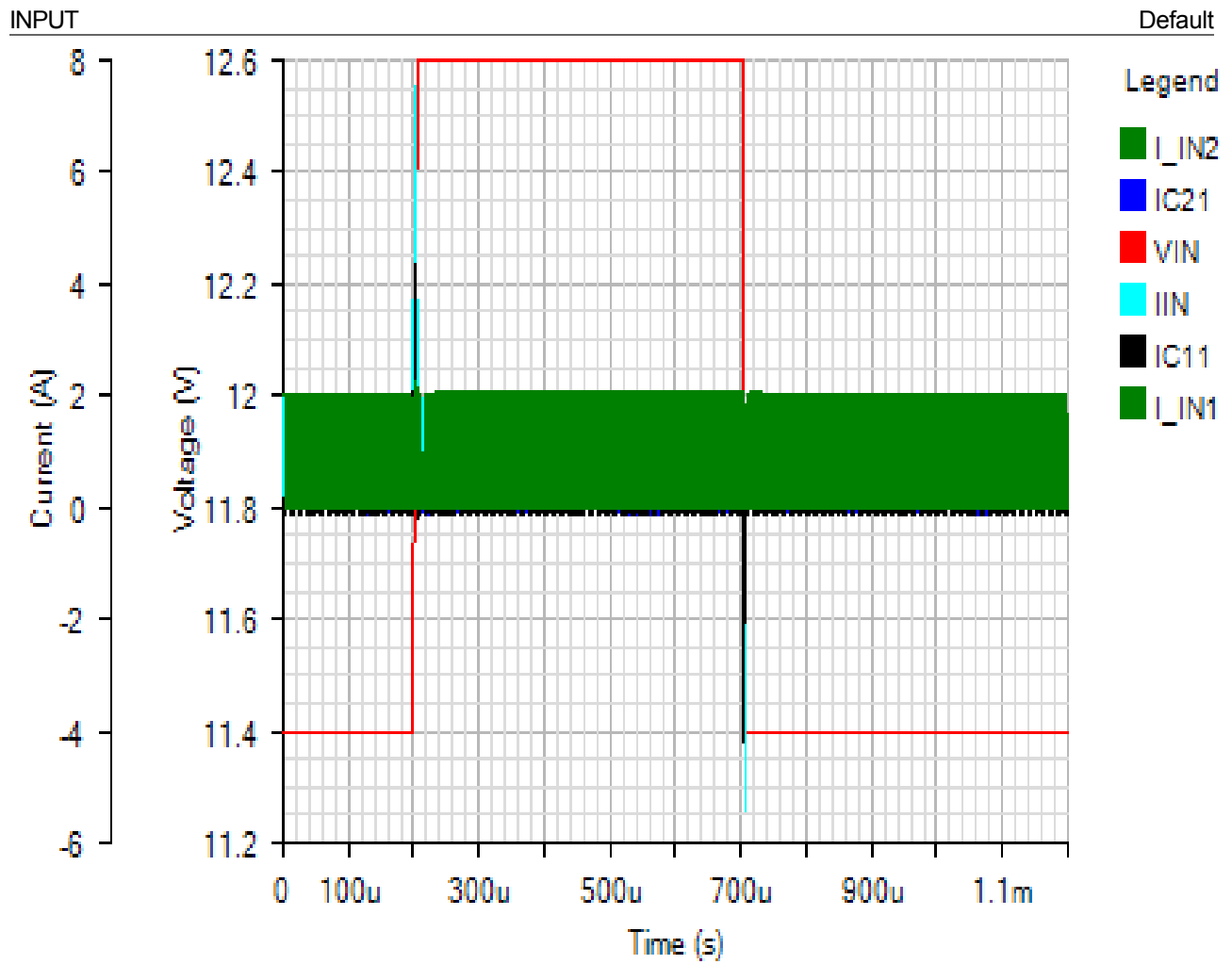


Line Transient - Tue Nov 20 2018 13:38:19

OUTPUT

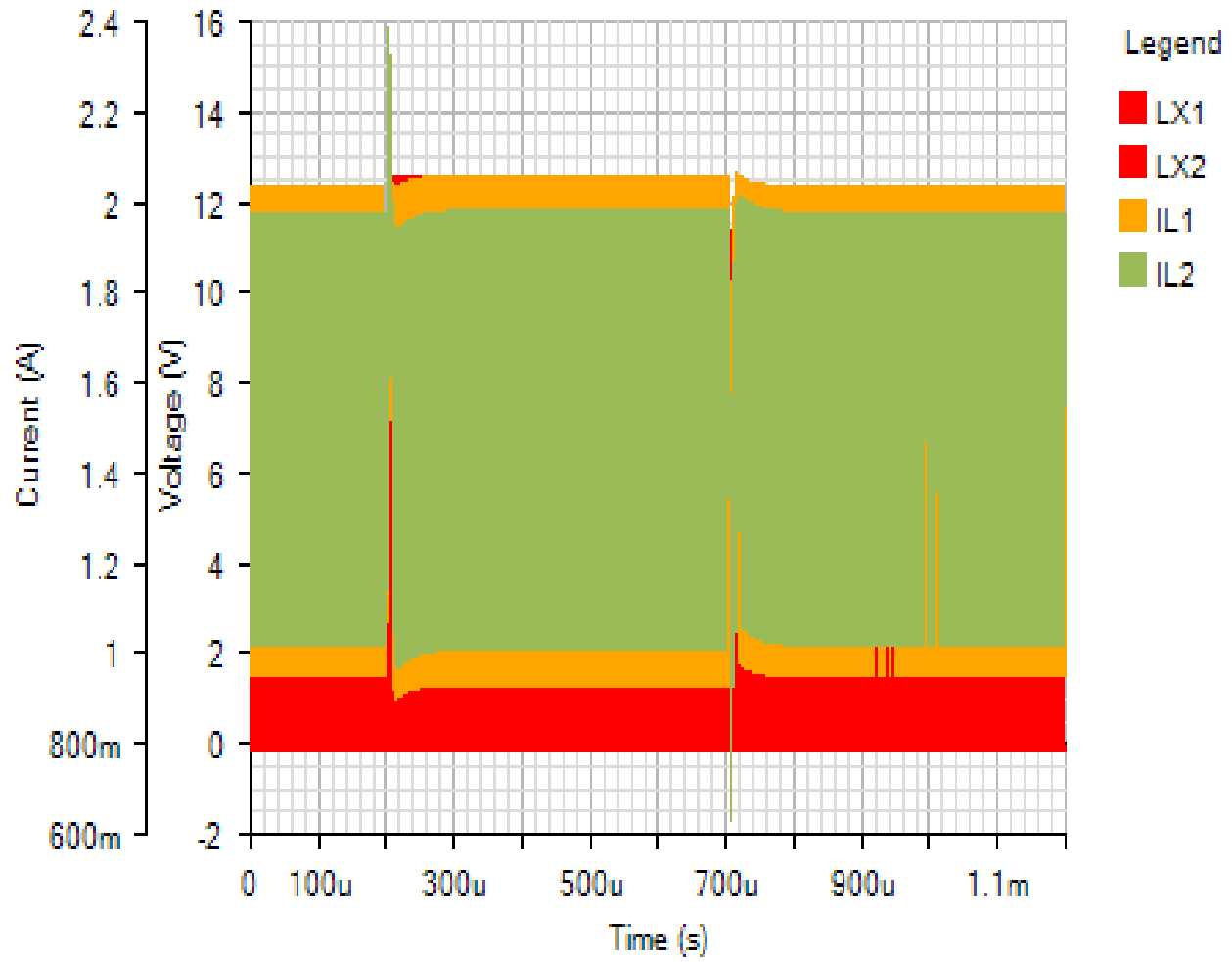
Default





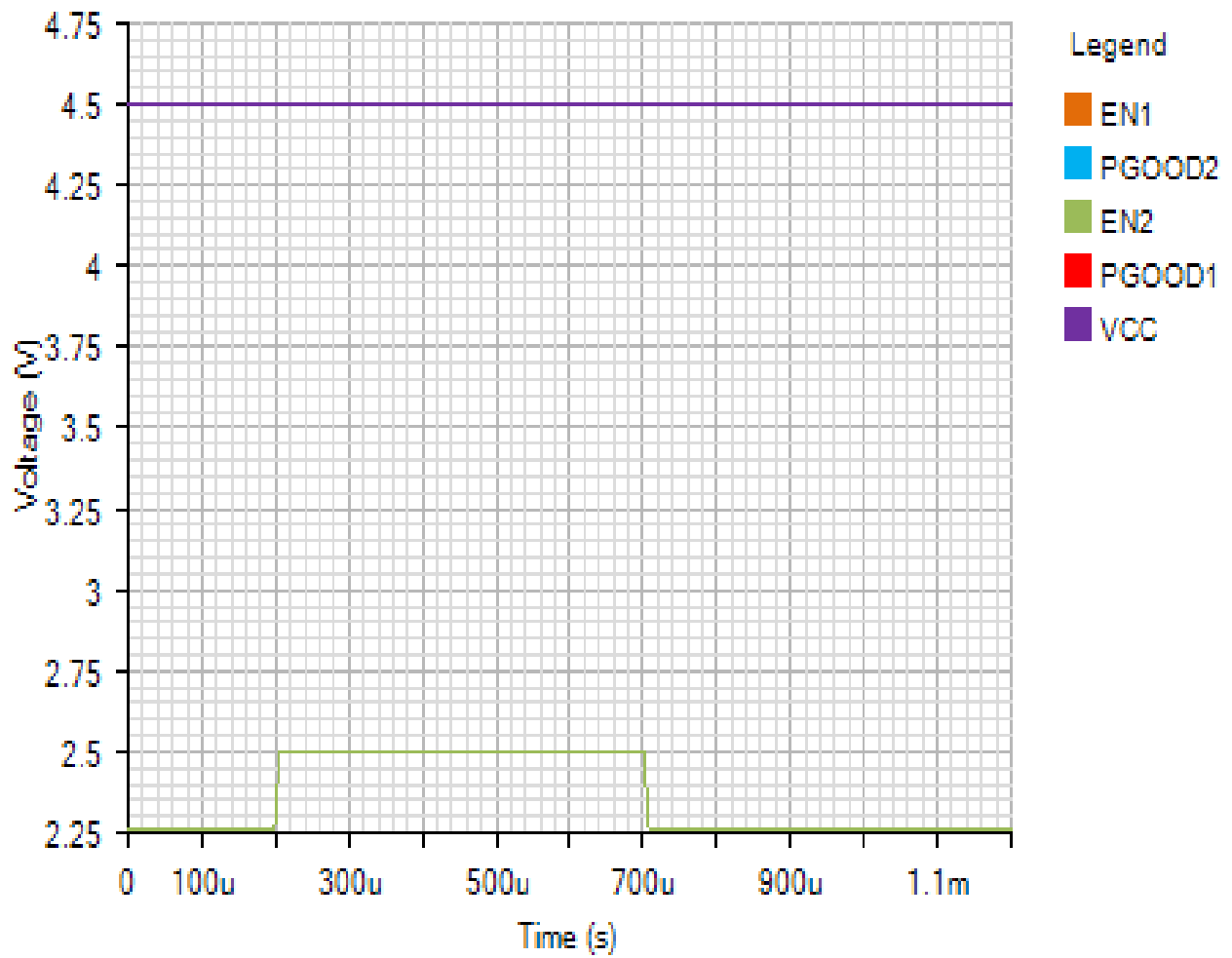
SWITCHING

Default



IC

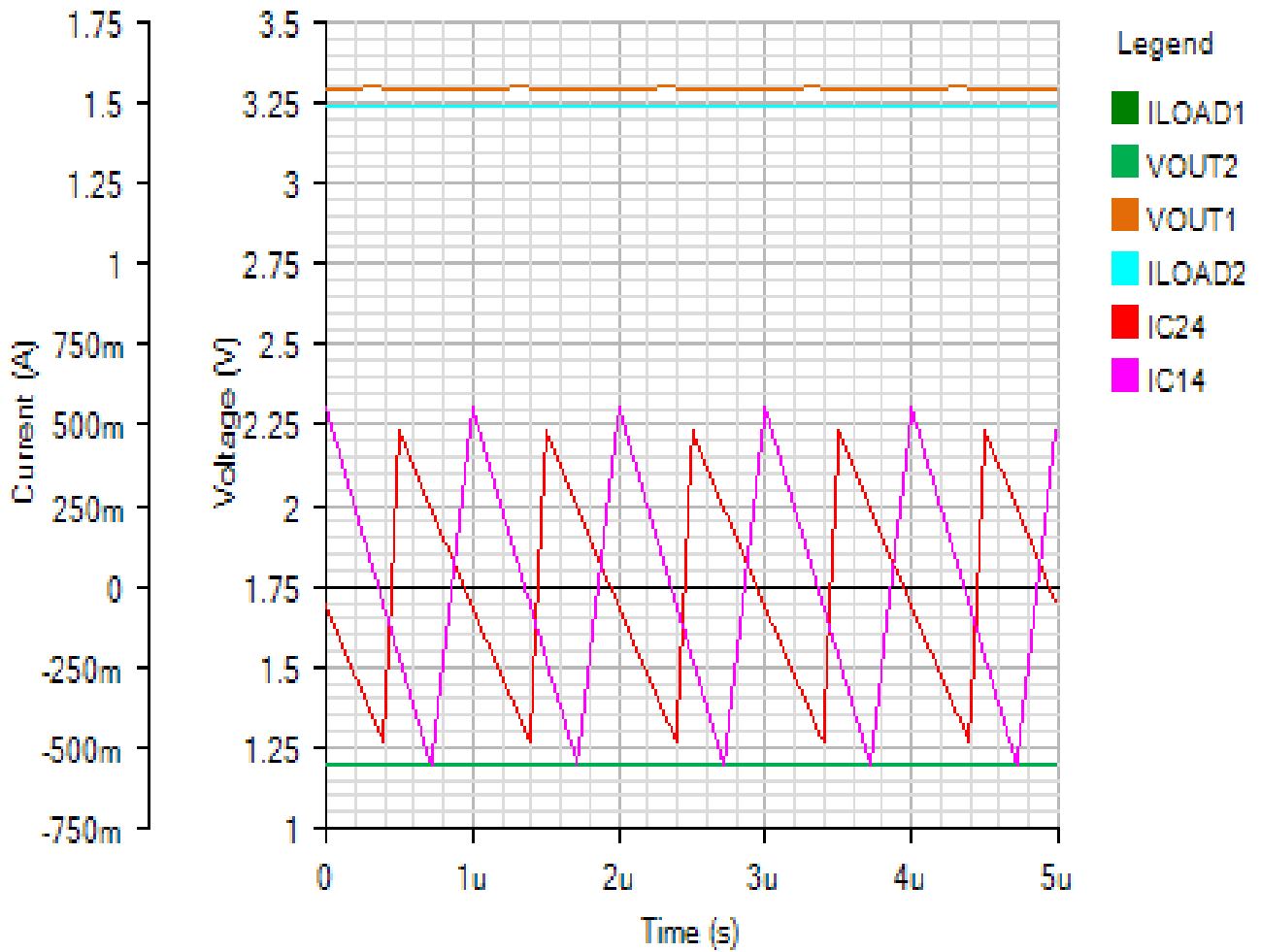
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Steady State - Tue Nov 20 2018 13:38:19

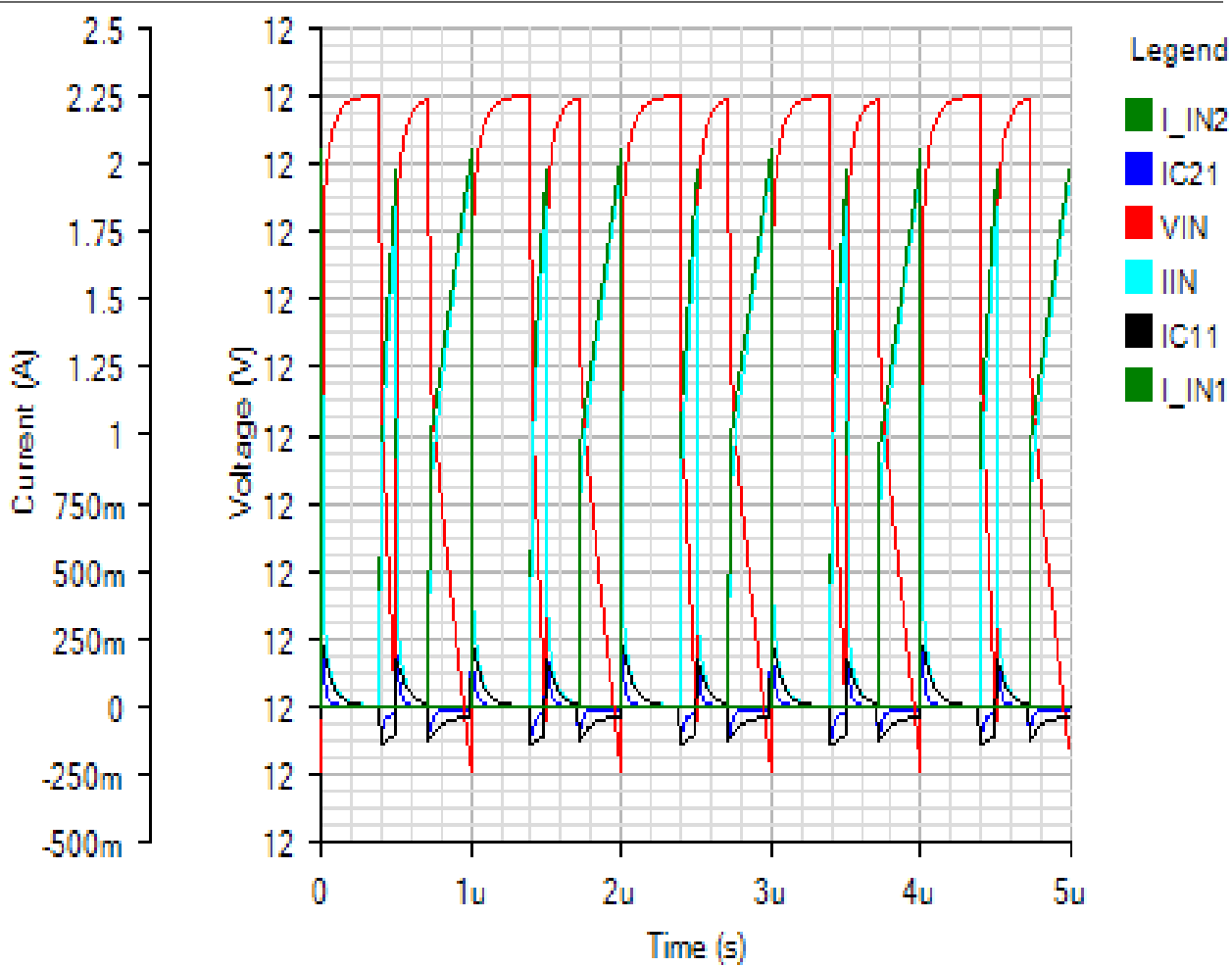
OUTPUT

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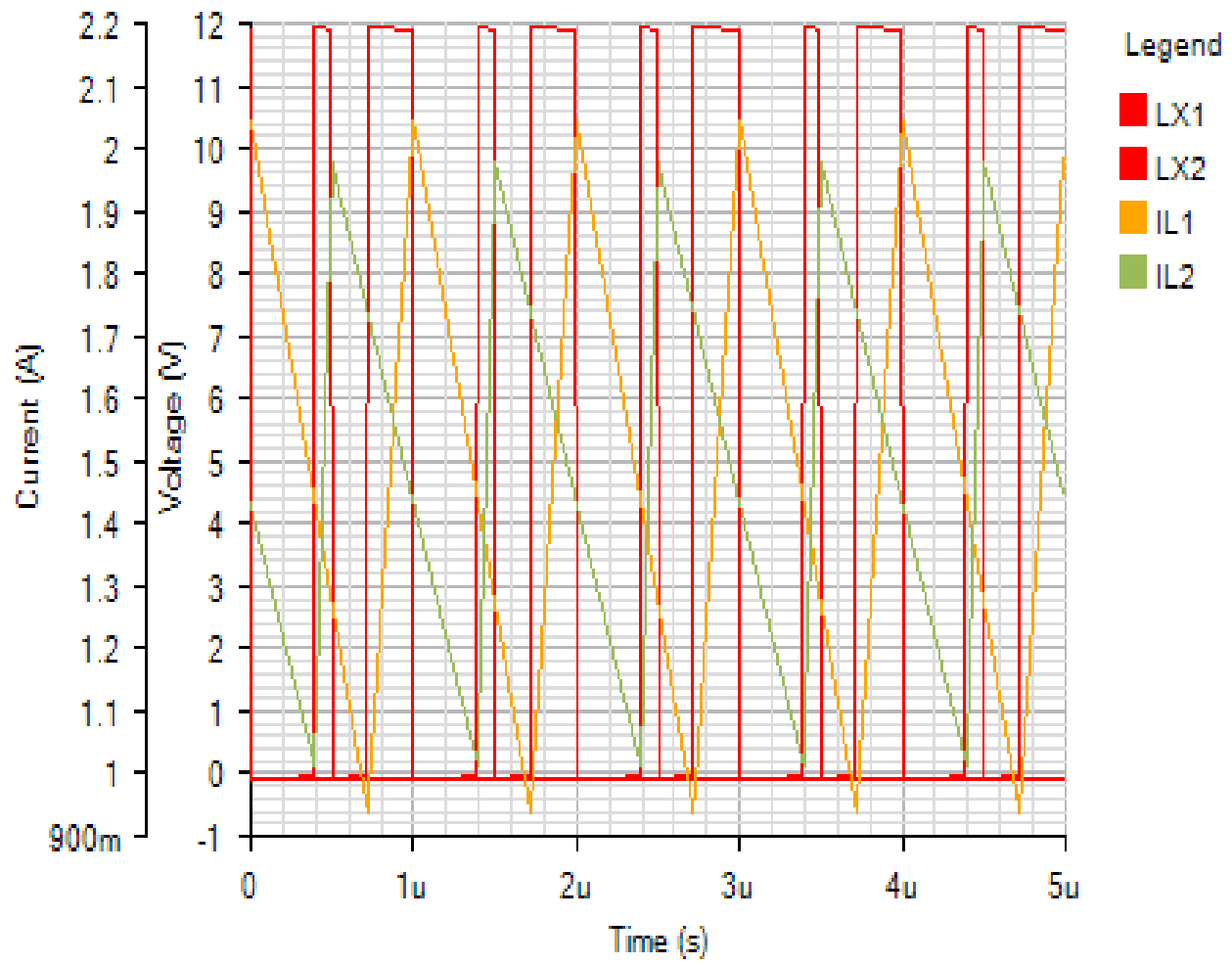
INPUT

Default



SWITCHING

Default



IC

Default

