

## Initial Design

1.0

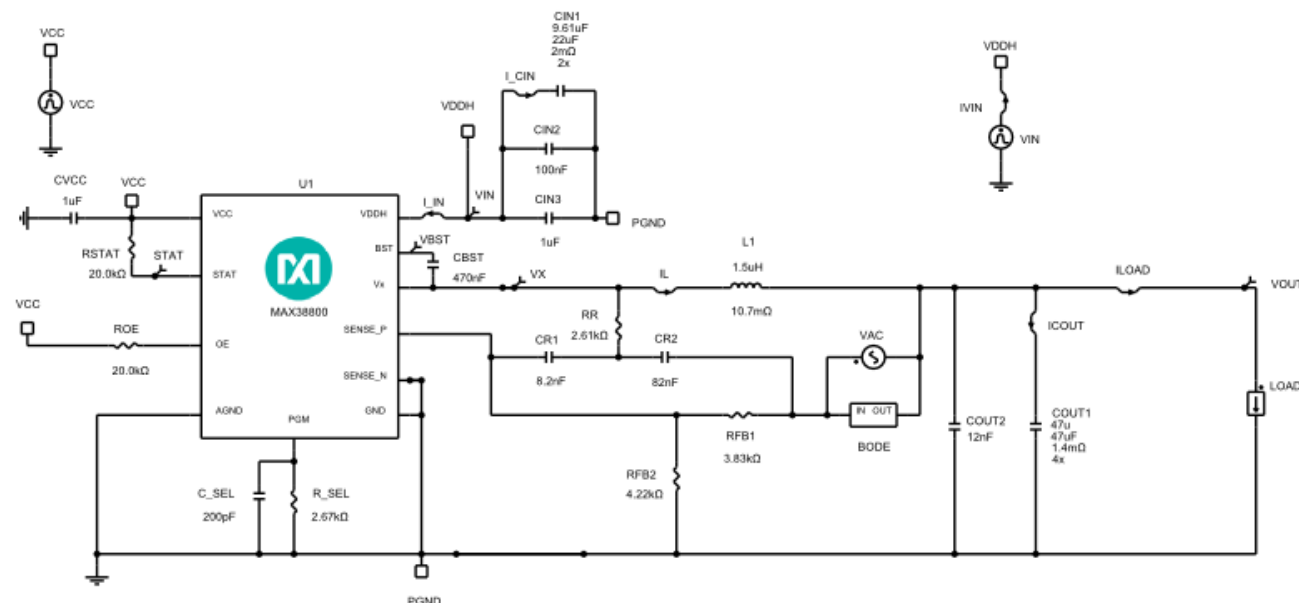
**Design Requirements**

Parameter	Value
Minimum Input Voltage	11.4V
Maximum Input Voltage	12.6V
Nominal Input Voltage	12V
Input Voltage Ripple	1%
Output Voltage	1.8V
Output Current	5A
Output Voltage Ripple	1%
Load Step Start Current	2.5A
Load Step Current	5A
Load Step Edge Rate	5A/us
Output Voltage Load Step Over/Undershoot	3%
Performance Priority	Balance Efficiency and Size
BOM Priority	Cost
Reference Voltage value (Vref)	0.95V
External Reference Voltage	0.6V
Soft Start Time(Tss)	6ms
Over Current Protection (Valley OCP)	7.5A
Operation Modes	CCM/DCM
Reporting	Current
Rsense Gain	2.1mohm
Switching Frequency Setting	Fsw5
STAT Blank Time	2000us
Inductor Current Ratio(LIR)	0.3

Parameter	Value
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Ambient Temperature	25°C
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## Schematic



Overtemperature Protection (OTP), and Current/Temp Reporting features are not modeled in EE-Sim.

This note only applies to online EE-sim Design Tool: R\_SEL and C\_SEL are set to the proper values for the design requirements entered. To change any of the chip parameters that these components set, change the design requirements accordingly and create a new design.

## BOM

Ref	Qty	Part Number	Manufacturer	Description
U1	1	MAX38800	User-Defined	IC
CBST	1	<a href="#">GCM188R71E474KA64D</a>	Murata Manufacturing	Cap Ceramic 0.47uF 25V X7R 10% Pad SMD 0603 125°C Automotive T/R
CIN1	2	<a href="#">GRM32ER71E226ME15</a>	Murata	Cap Ceramic 22uF 25V 1210 125C
CIN2	1	<a href="#">CC0402KRX7R8BB104</a>	Yageo	Cap Ceramic 0.1uF 25V X7R 10% Pad SMD 0402 125°C T/R
CIN3	1	<a href="#">0603YC105KAT2A</a>	AVX	Cap Ceramic 1uF 16V X7R 10% Pad SMD 0603 125°C T/R
COUT1	4	<a href="#">GRM32EE70J476ME20L</a>	Murata	Cap Ceramic 47uF 6.3V 1210 125C
COUT2	1	<a href="#">0402YC123KAT2A</a>	AVX	Cap Ceramic 0.012uF 16V X7R 10% Pad SMD 0402 125°C T/R
CR1	1	<a href="#">06031C822KAT2A</a>	AVX	Cap Ceramic 0.0082uF 100V X7R 10% Pad SMD 0603 125°C T/R
CR2	1	<a href="#">C0603C823K3RACTU</a>	KEMET Corporation	Cap Ceramic 0.082uF 25V X7R 10% Pad SMD 0603 125°C T/R

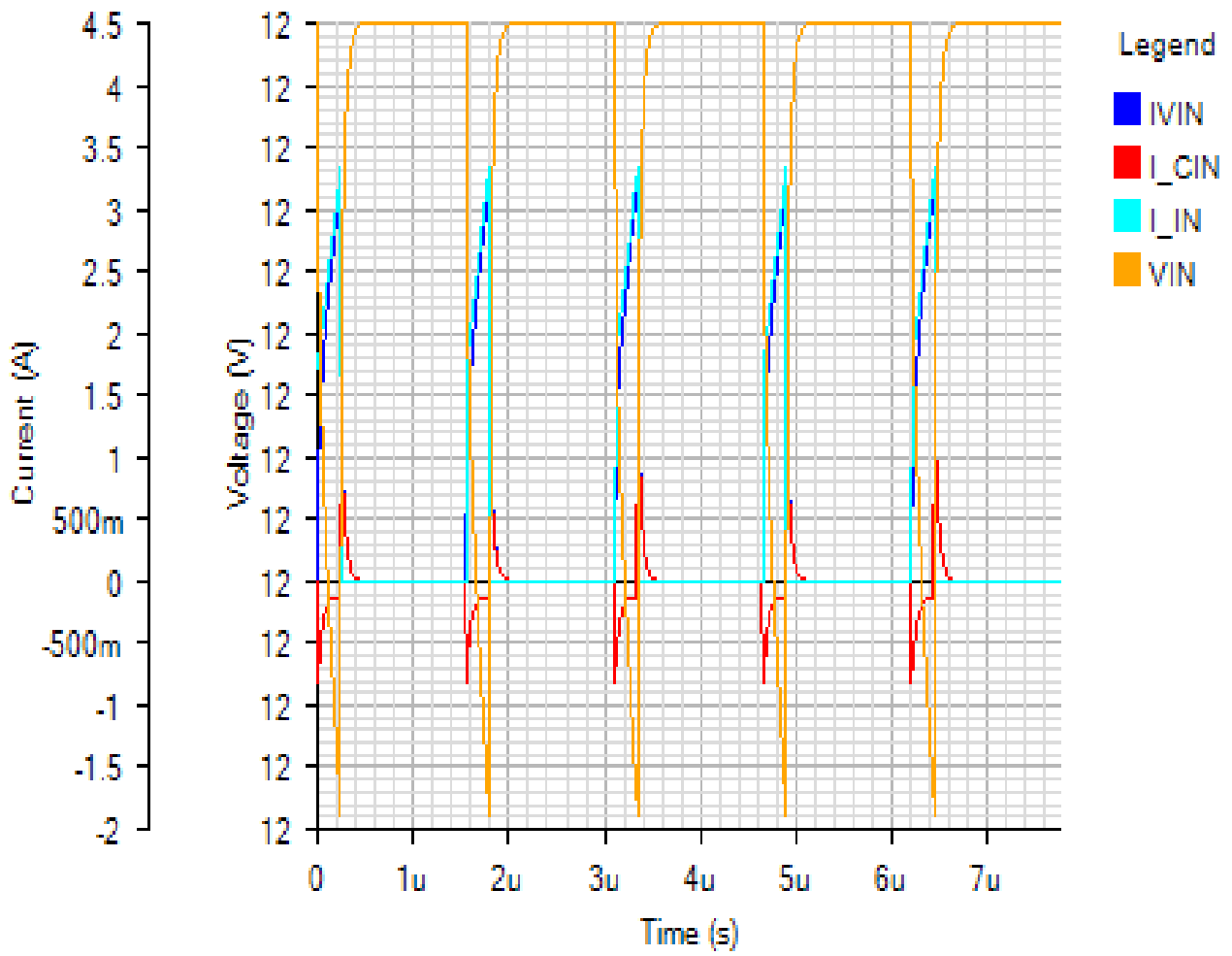
CVCC	1	<a href="#">CC0603KRX7R6BB105</a>	Yageo	Cap Ceramic 1uF 10V X7R 10% Pad SMD 0603 125°C T/R
C_SEL	1	<a href="#">VJ0603D201MXXAT</a>	Vishay	Cap Ceramic 200pF 25V C0G 20% Pad SMD 0603 125°C T/R
L1	1	<a href="#">SPM6530T-1R5M100</a>	TDK	Inductor Power Shielded Wirewound 1.5uH 20% 100KHz Metal 11A 10.67mOhm DCR T/R
RFB1	1	<a href="#">ERJ2RKF3831X</a>	Panasonic	Res Thick Film 0402 3.83K Ohm 1% 0.1W(1/10W) ±100ppm/°C Pad SMD Automotive T/R
RFB2	1	<a href="#">ERJ3EKF4221V</a>	Panasonic	Res Thick Film 0603 4.22K Ohm 1% 0.1W(1/10W) ±100ppm/°C Pad SMD Automotive T/R
ROE	1	<a href="#">ERJ3GEYJ203V</a>	Panasonic	Res Thick Film 0603 20K Ohm 5% 0.1W(1/10W) ±200ppm/°C Pad SMD Automotive T/R
RR	1	<a href="#">ERJ3EKF2611V</a>	Panasonic	Res Thick Film 0603 2.61K Ohm 1% 0.1W(1/10W) ±100ppm/°C Pad SMD Automotive T/R
RSTAT	1	<a href="#">ERJ3GEYJ203V</a>	Panasonic	Res Thick Film 0603 20K Ohm 5% 0.1W(1/10W) ±200ppm/°C Pad SMD Automotive T/R
R_SEL	1	<a href="#">ERJ3EKF2671V</a>	Panasonic	Res Thick Film 0603 2.67K Ohm 1% 0.1W(1/10W) ±100ppm/°C Pad SMD Automotive T/R

## Simulation Results

**Steady State - Sun Nov 18 2018 15:55:54**

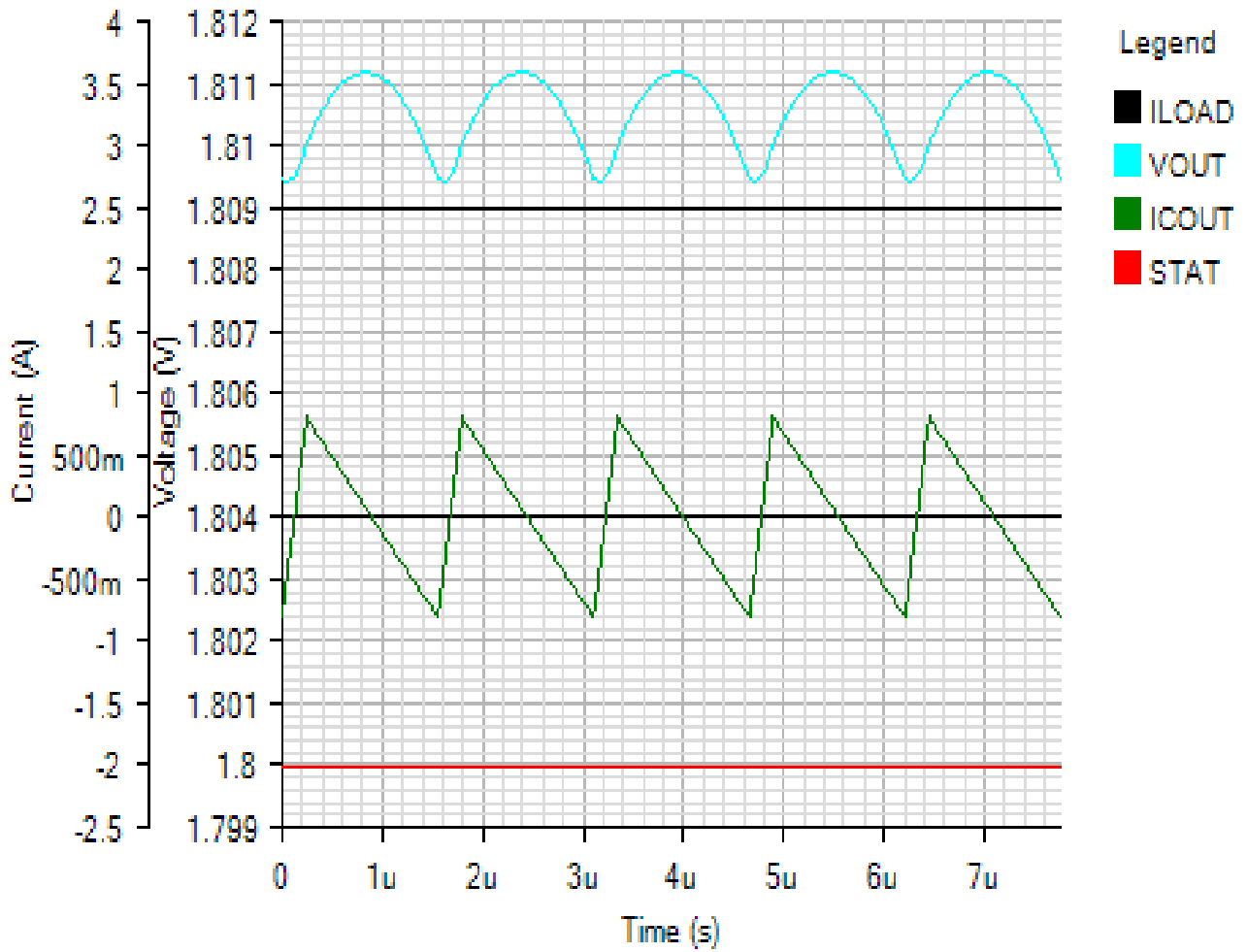
INPUT

Default



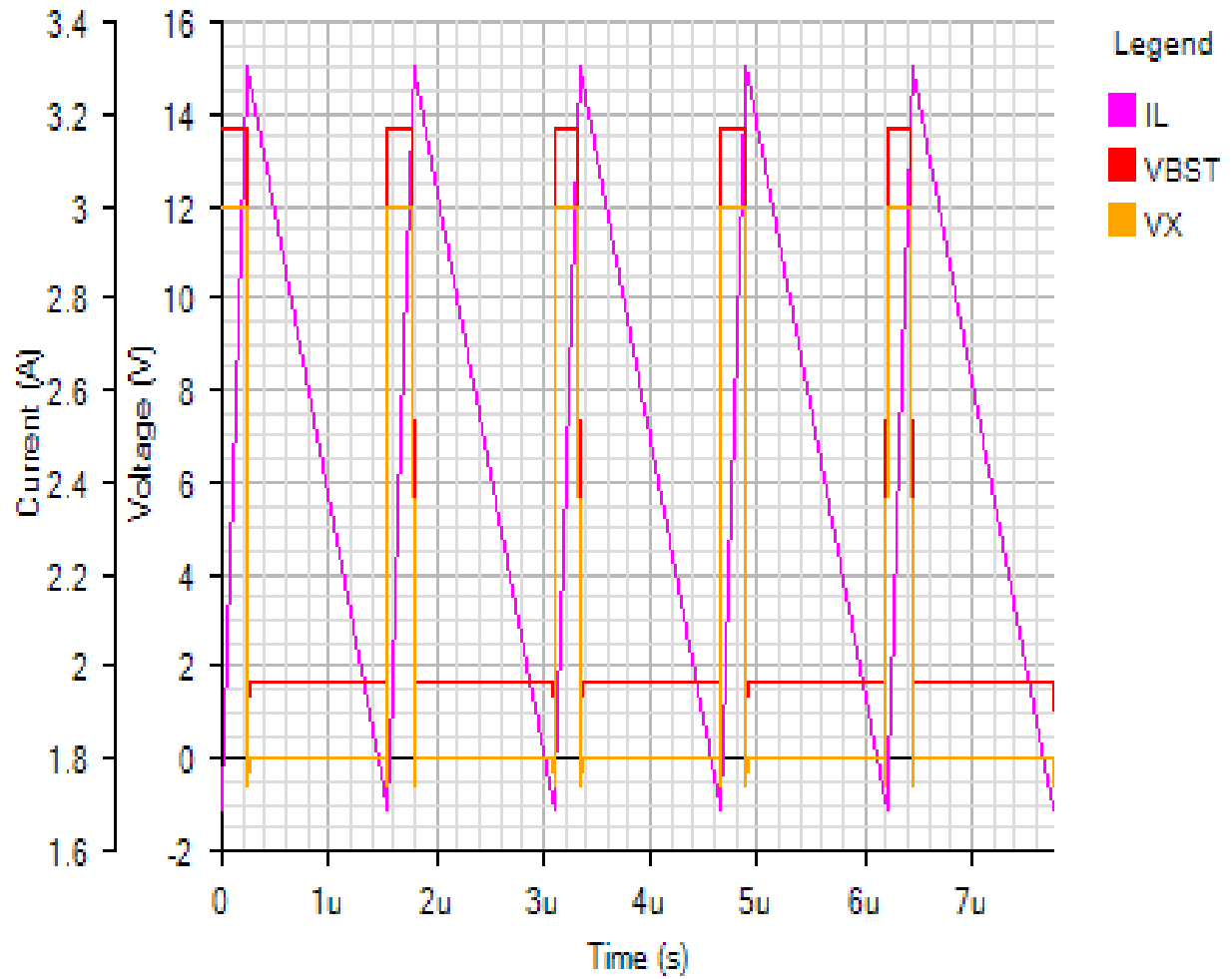
OUTPUT

Default



SWITCHING

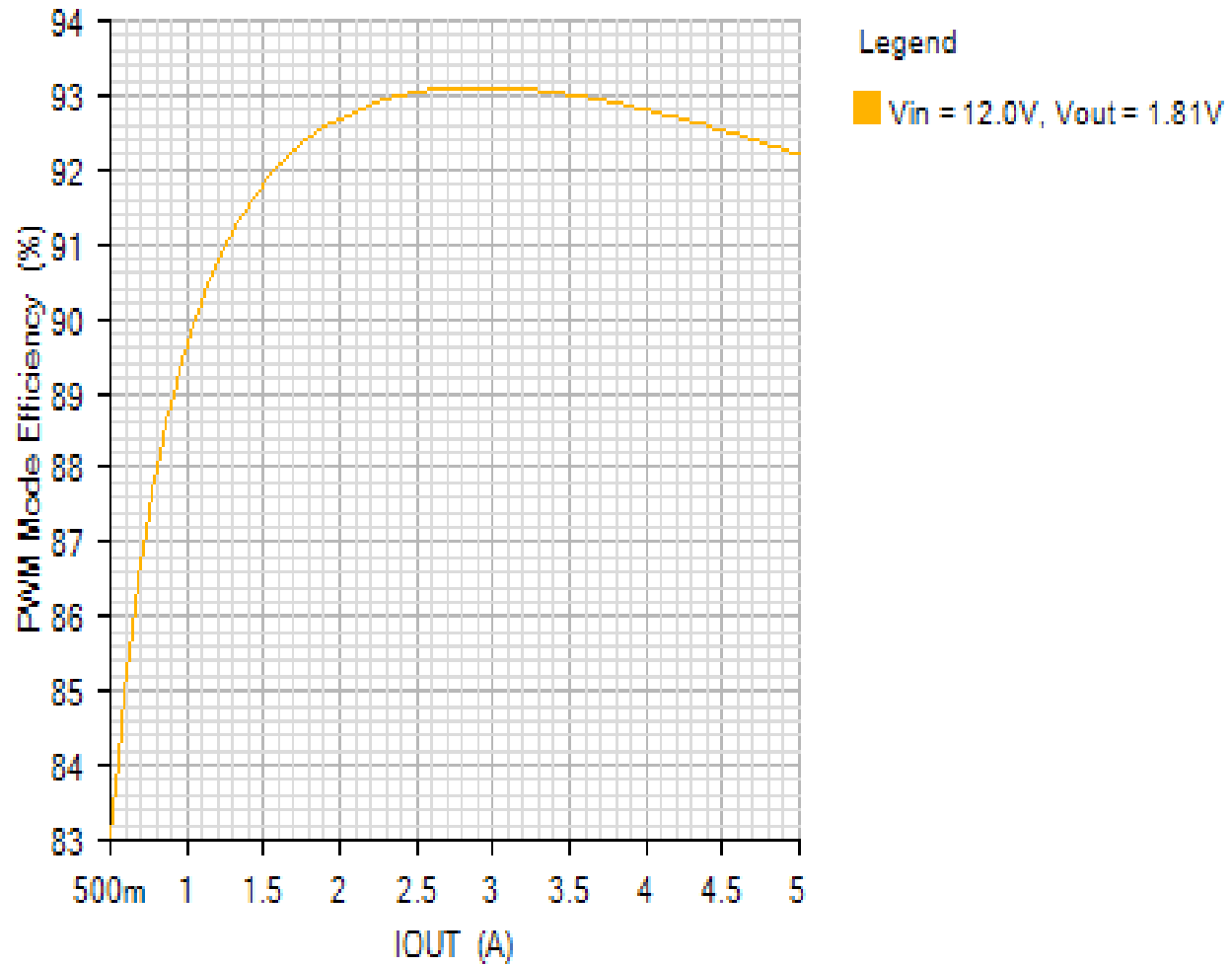
Default



Efficiency - Sun Nov 18 2018 15:55:54

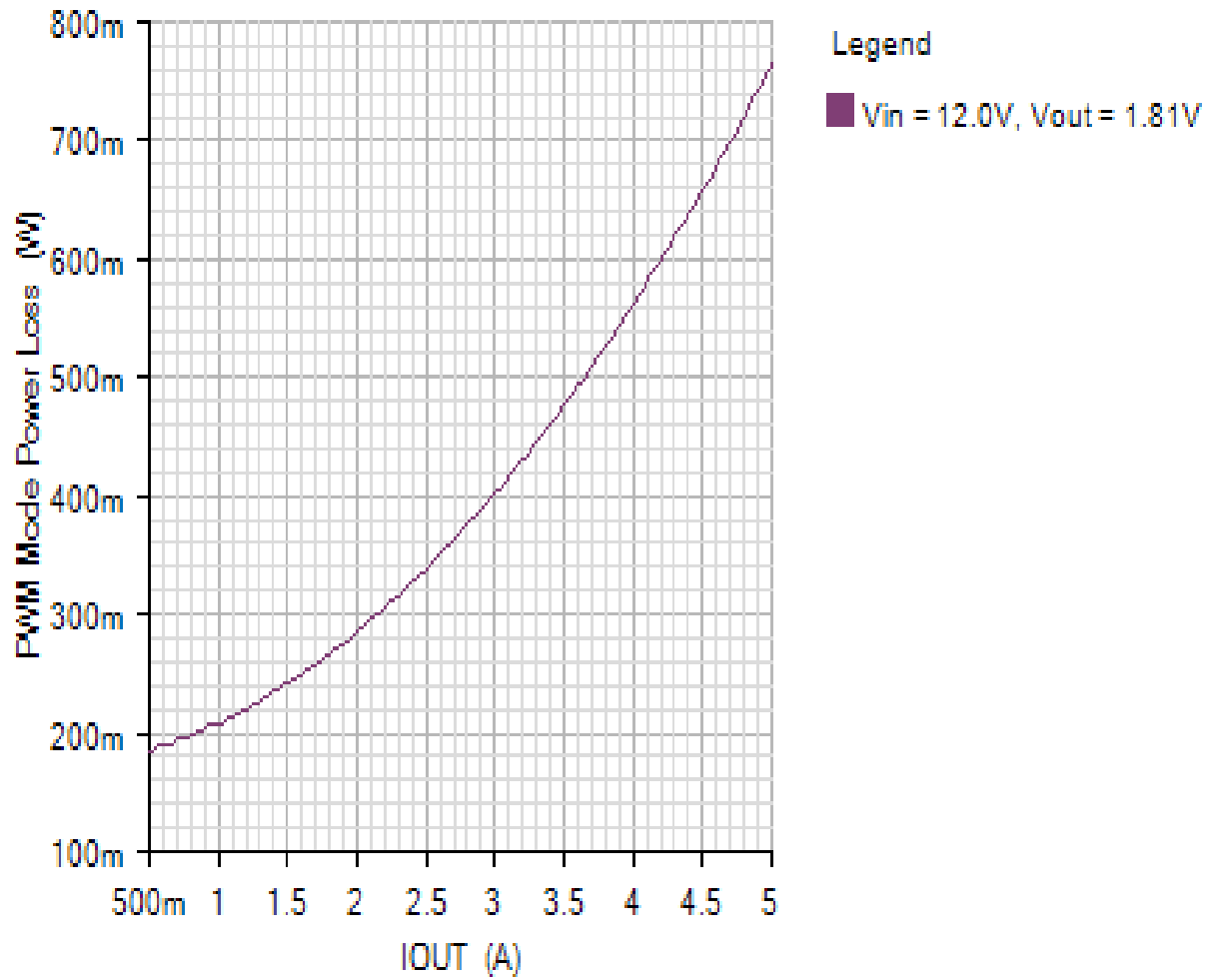
EFFICIENCY

Default



POWER\_LOSS

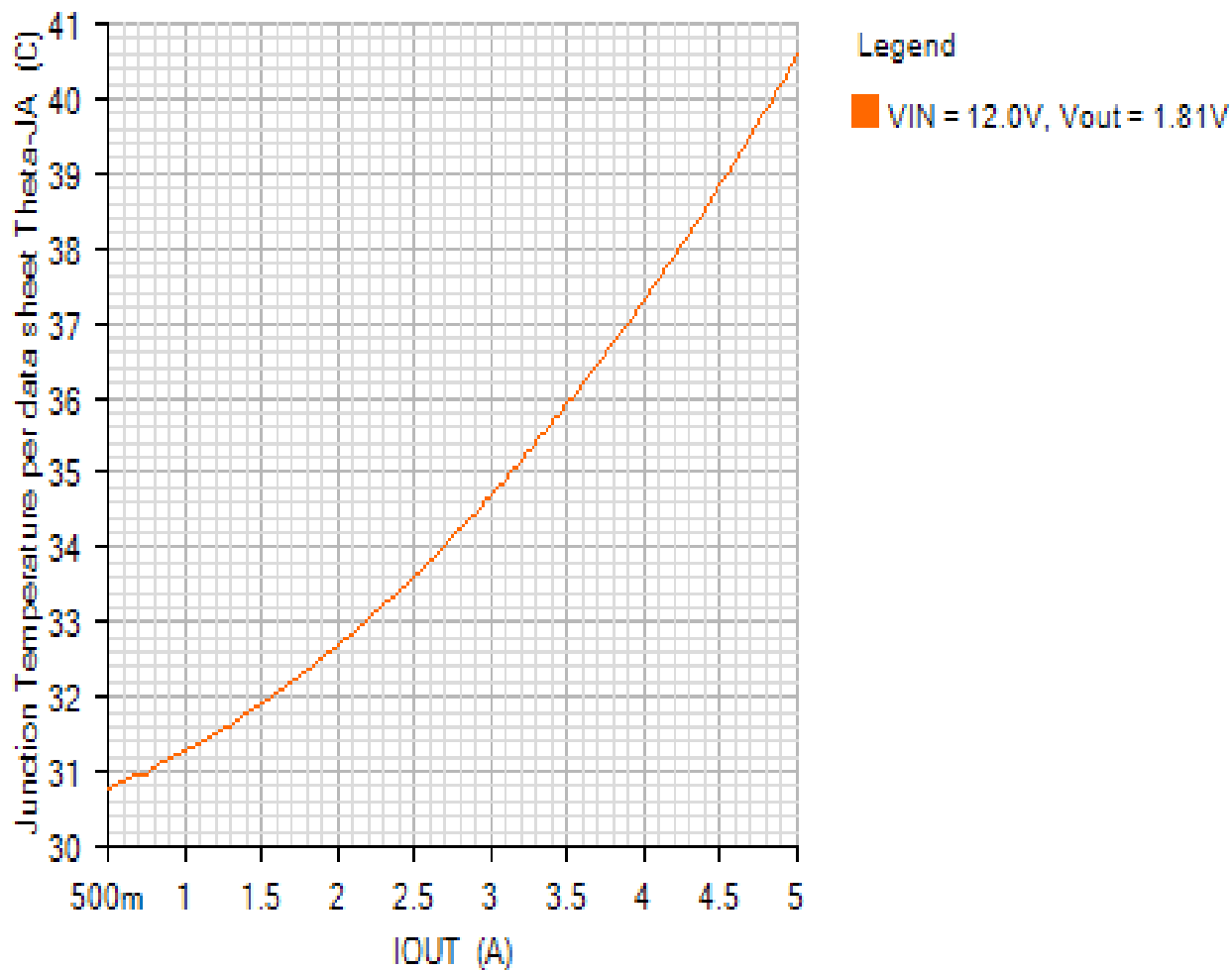
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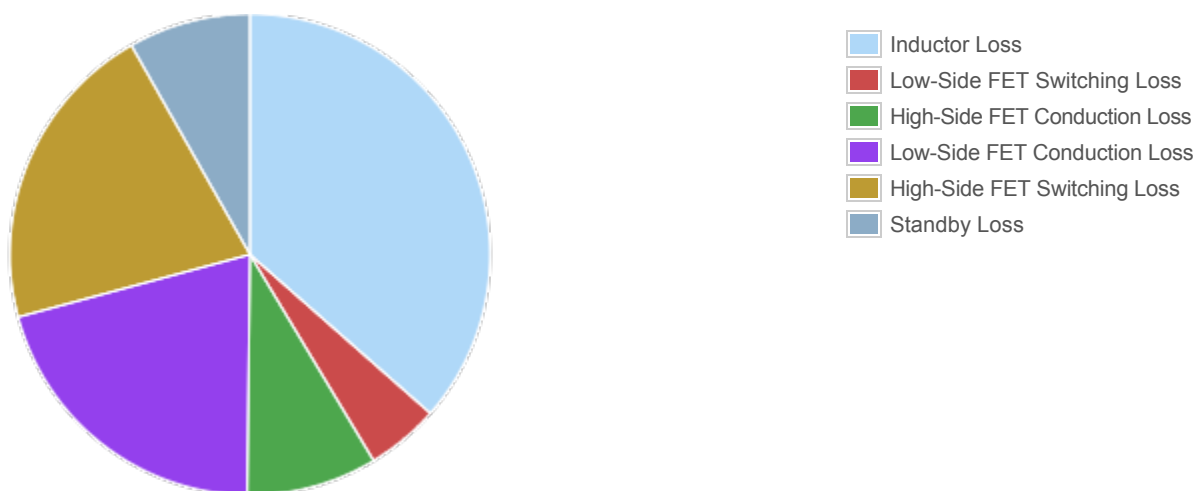


# JUNCTION\_TEMPERATURE

Default



## Losses



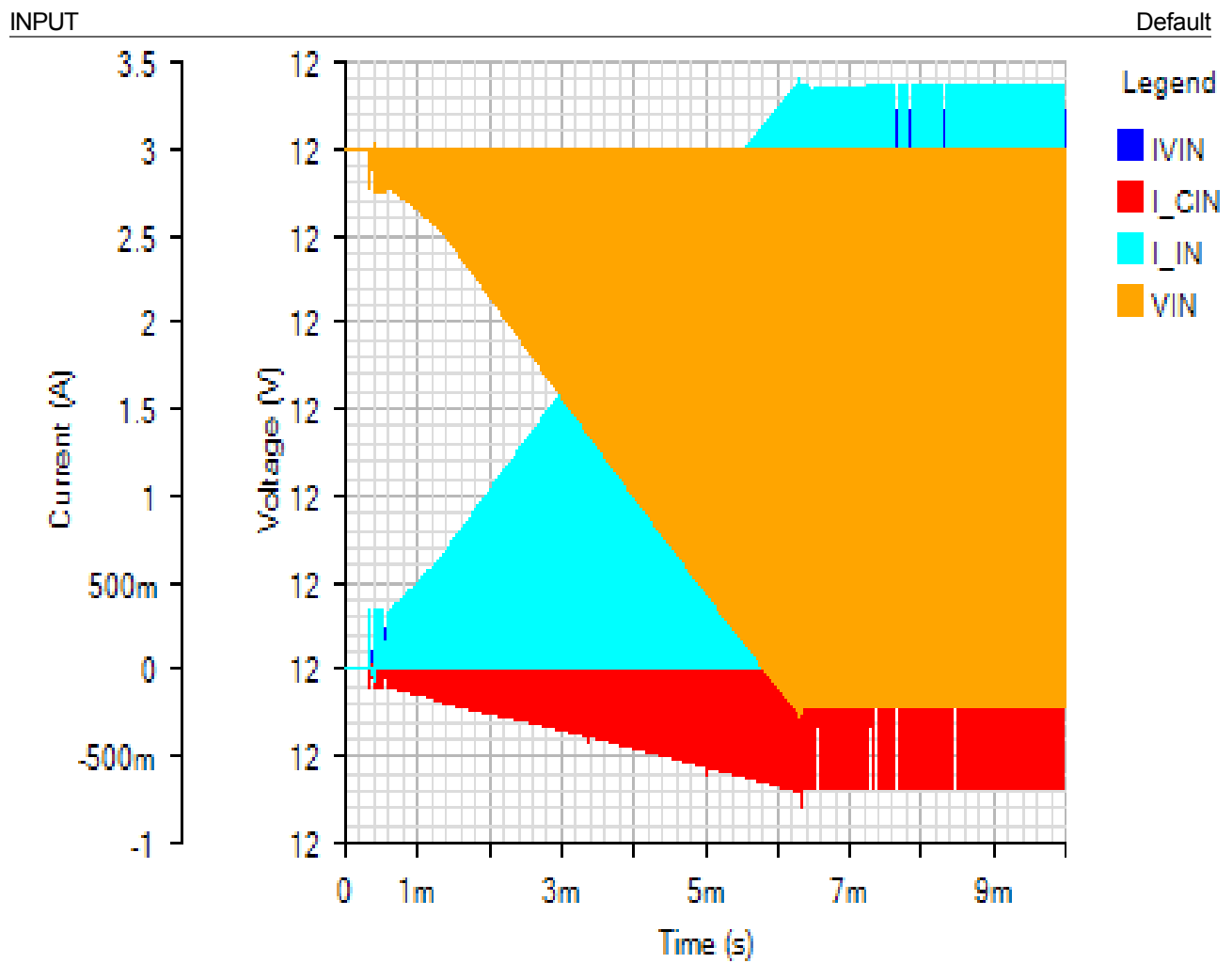
Component

Loss (W)

% of total

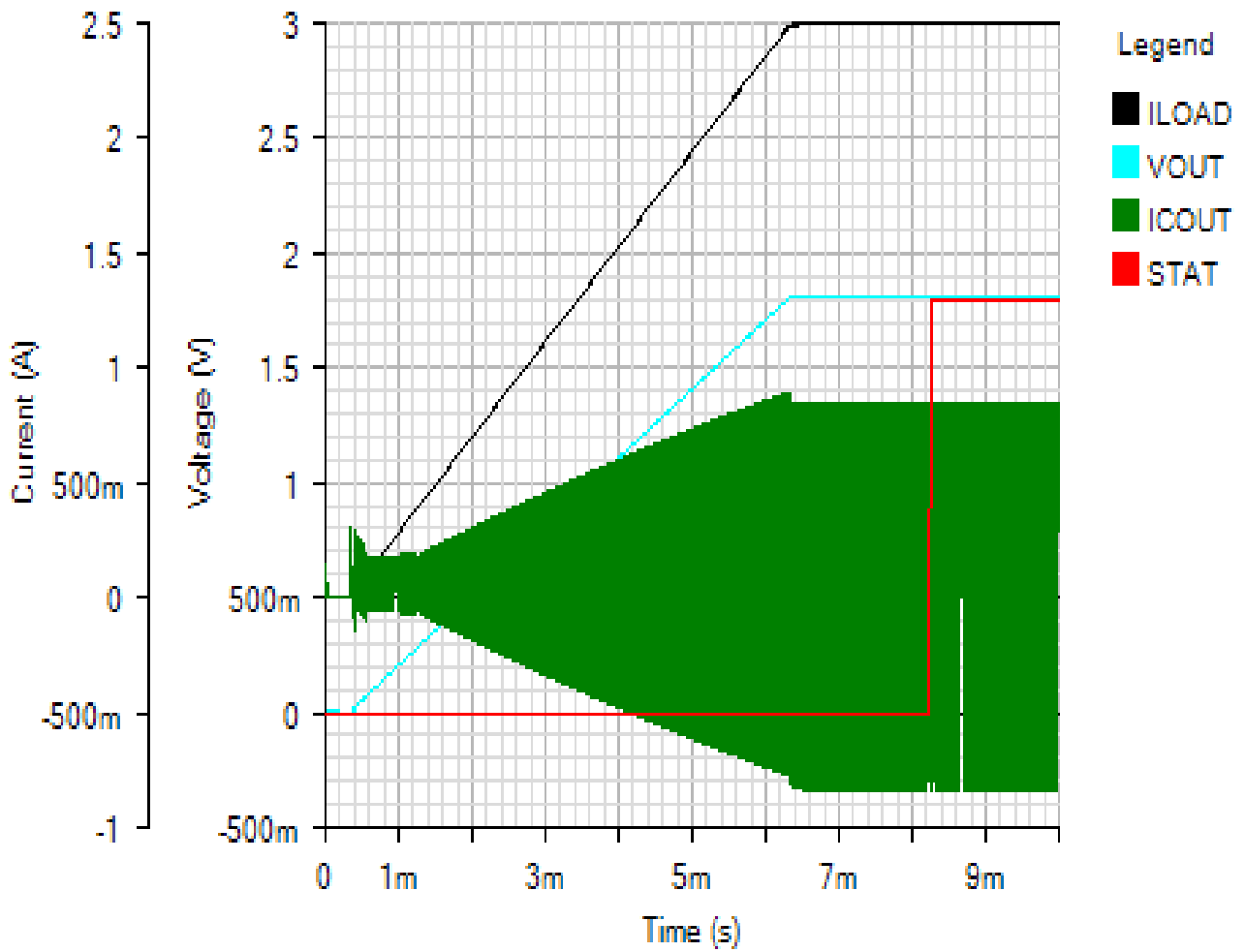
Component	Loss (W)	% of total
Inductor Loss	0.364749	36.5
Low-Side FET Switching Loss	0.049113	4.9
High-Side FET Conduction Loss	0.087969	8.8
Low-Side FET Conduction Loss	0.206281	20.6
High-Side FET Switching Loss	0.209641	21
Standby Loss	0.082247	8.2
Total	1	100

Start Up - Sun Nov 18 2018 15:55:54



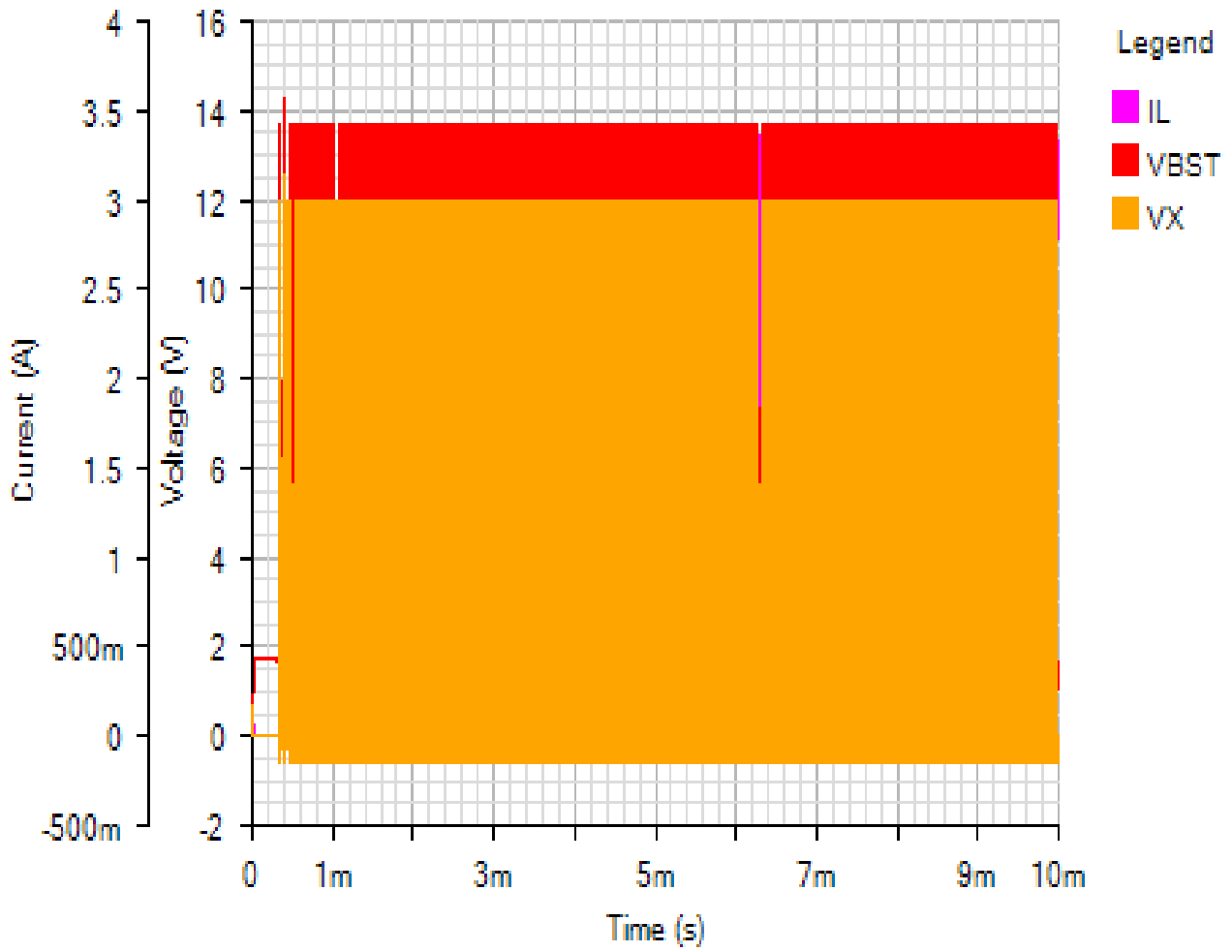
OUTPUT

Default



SWITCHING

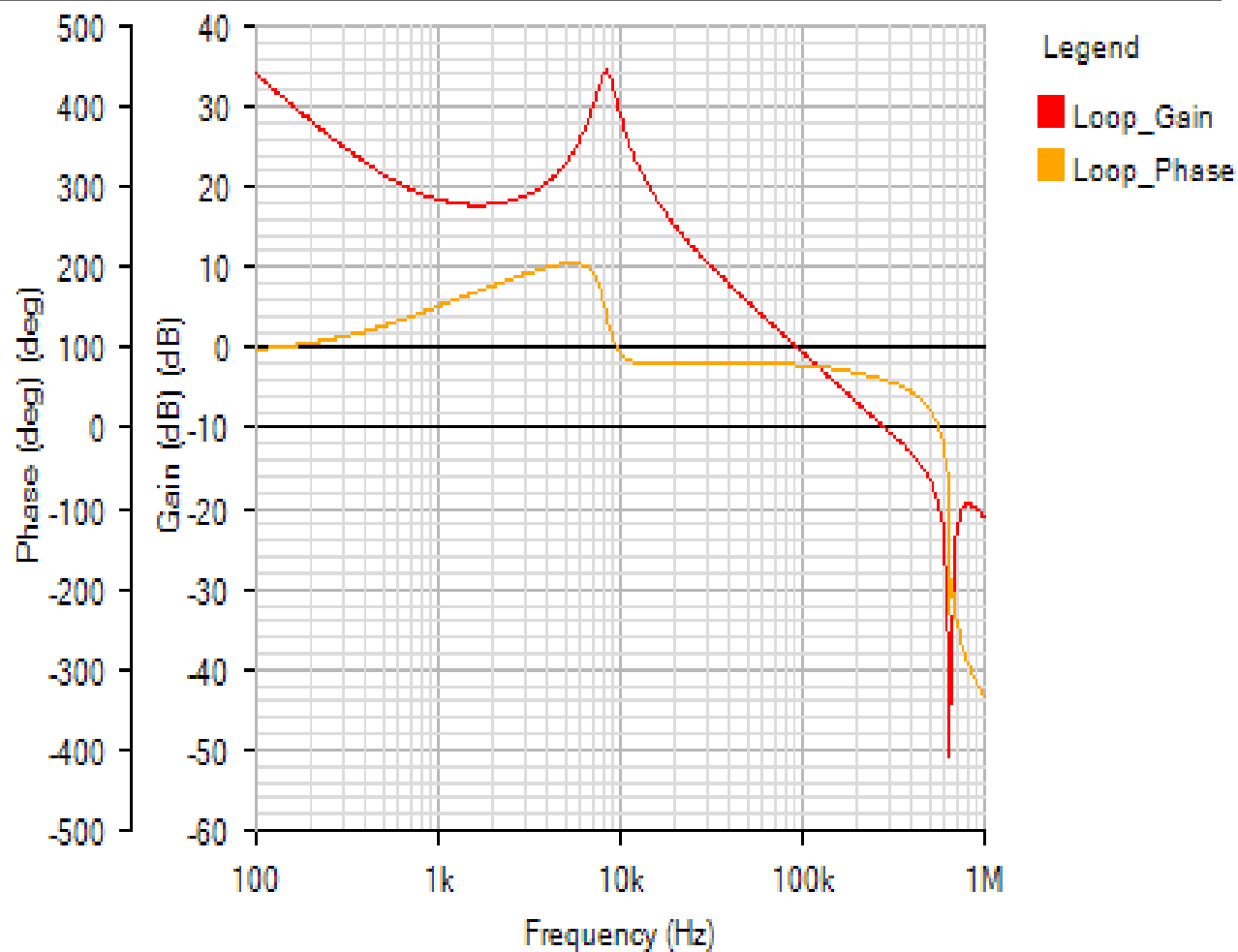
Default



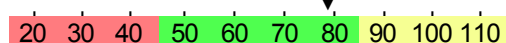
AC Loop - Sun Nov 18 2018 15:55:54

BODE

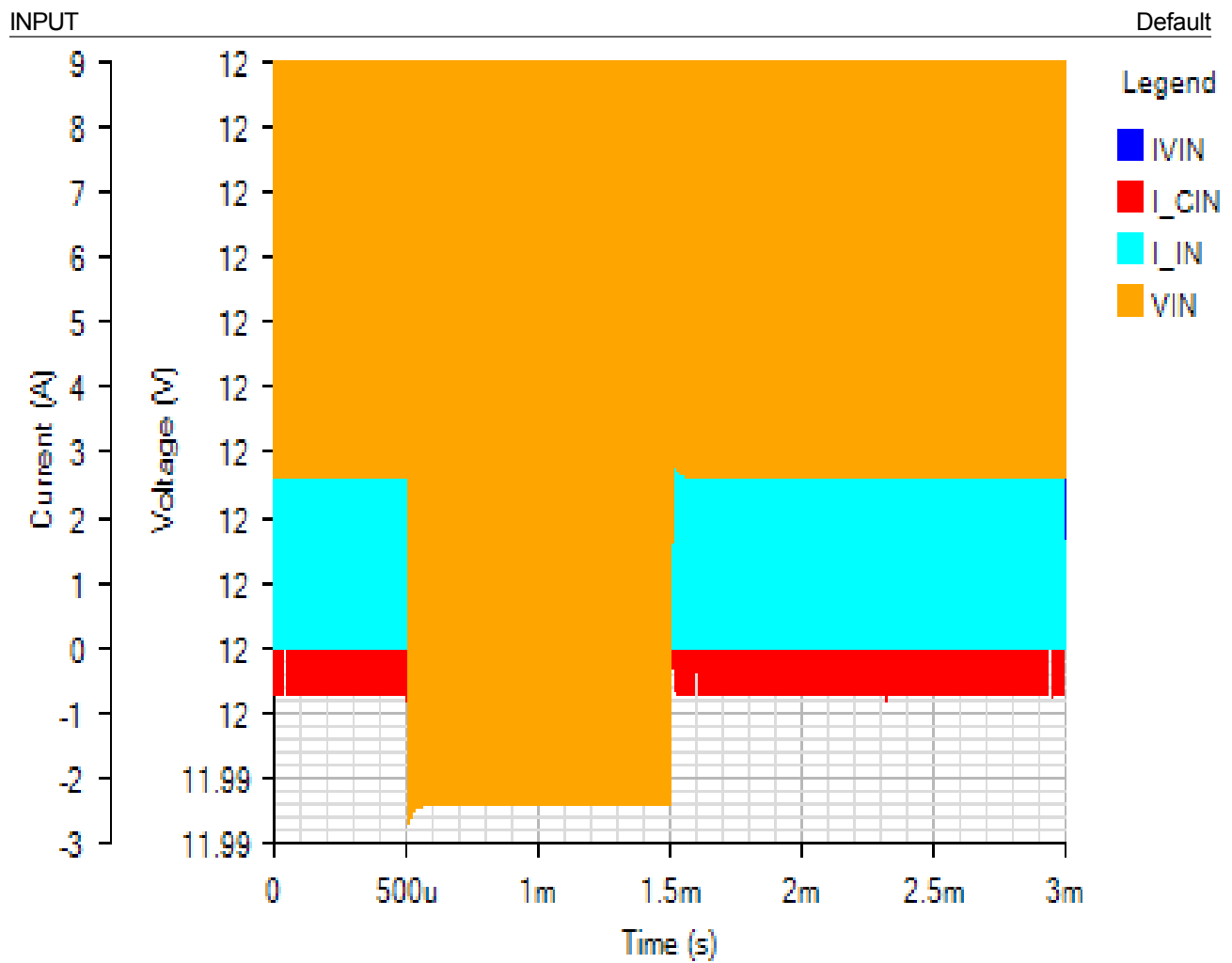
Default



Phase Margin: 78.72° at a crossover frequency of 93.8kHz

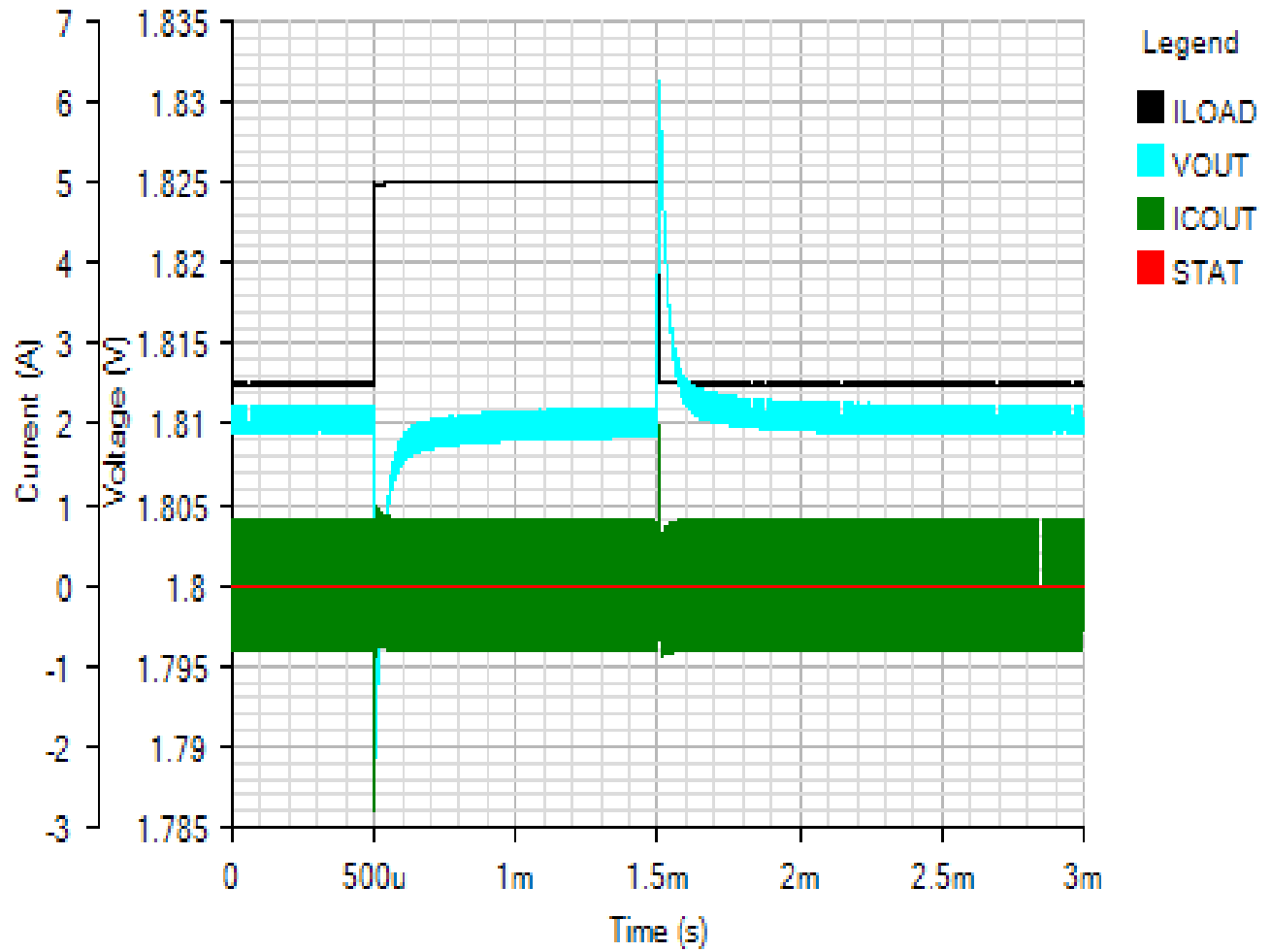


Load Step - Sun Nov 18 2018 15:55:54



OUTPUT

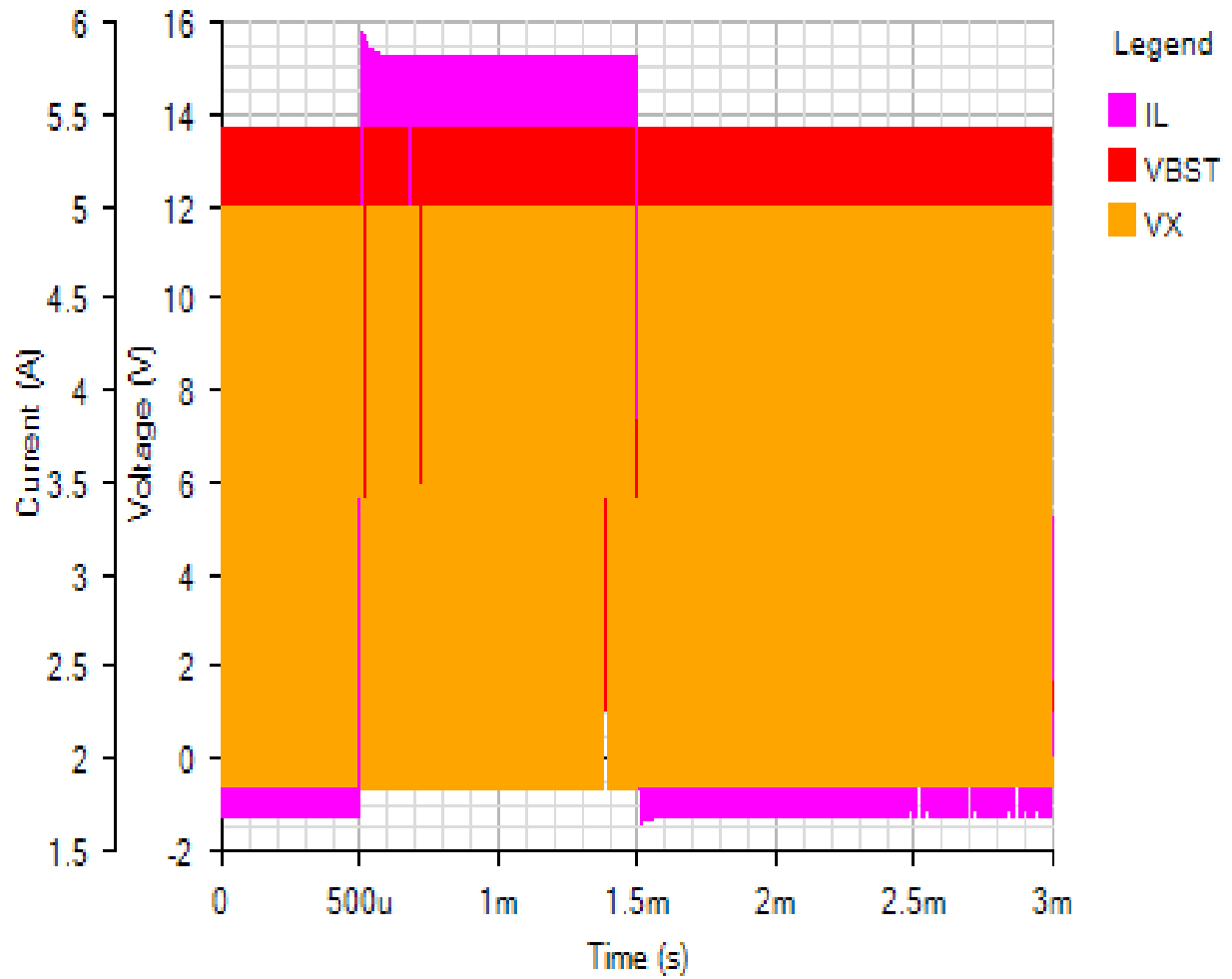
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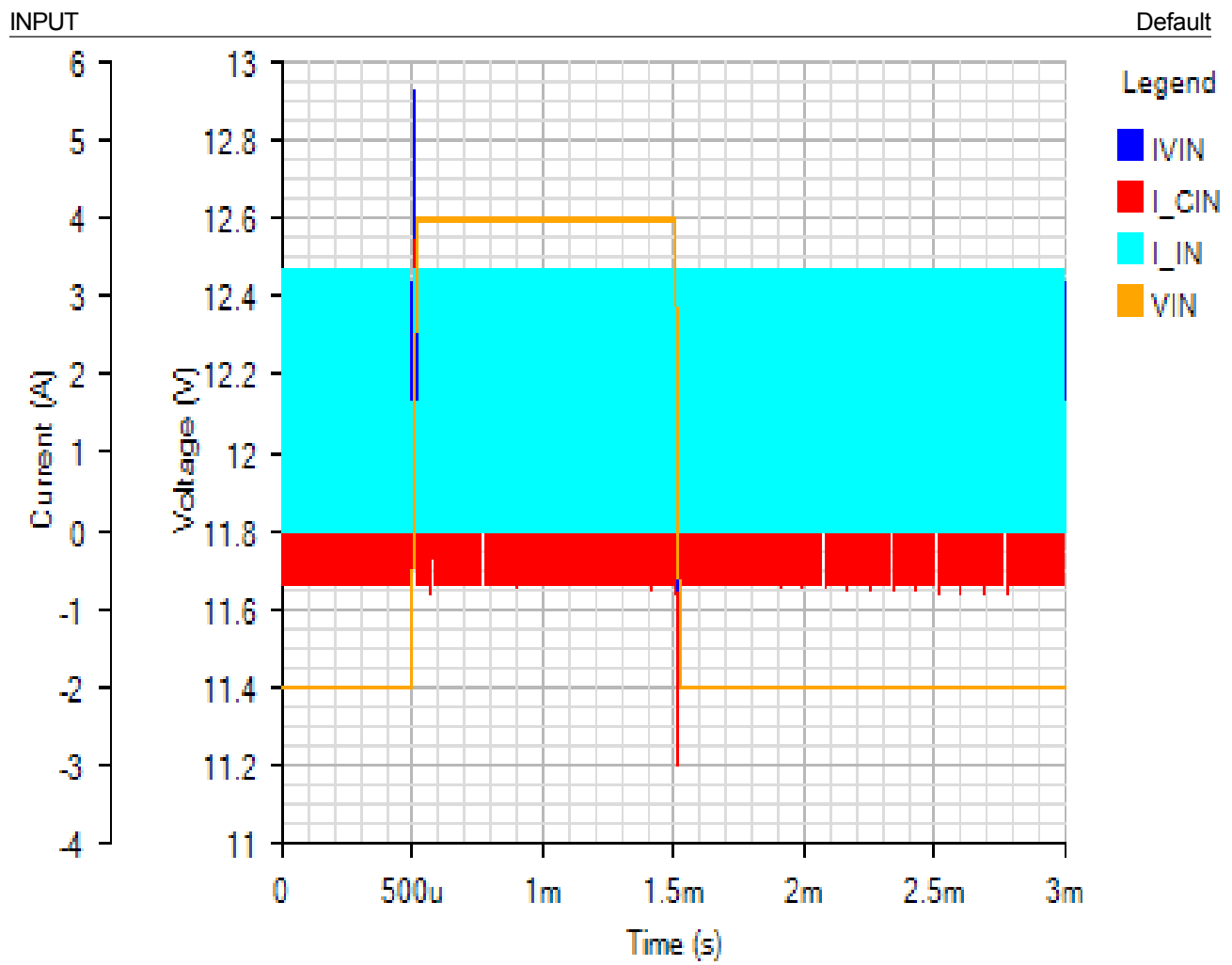


SWITCHING

Default

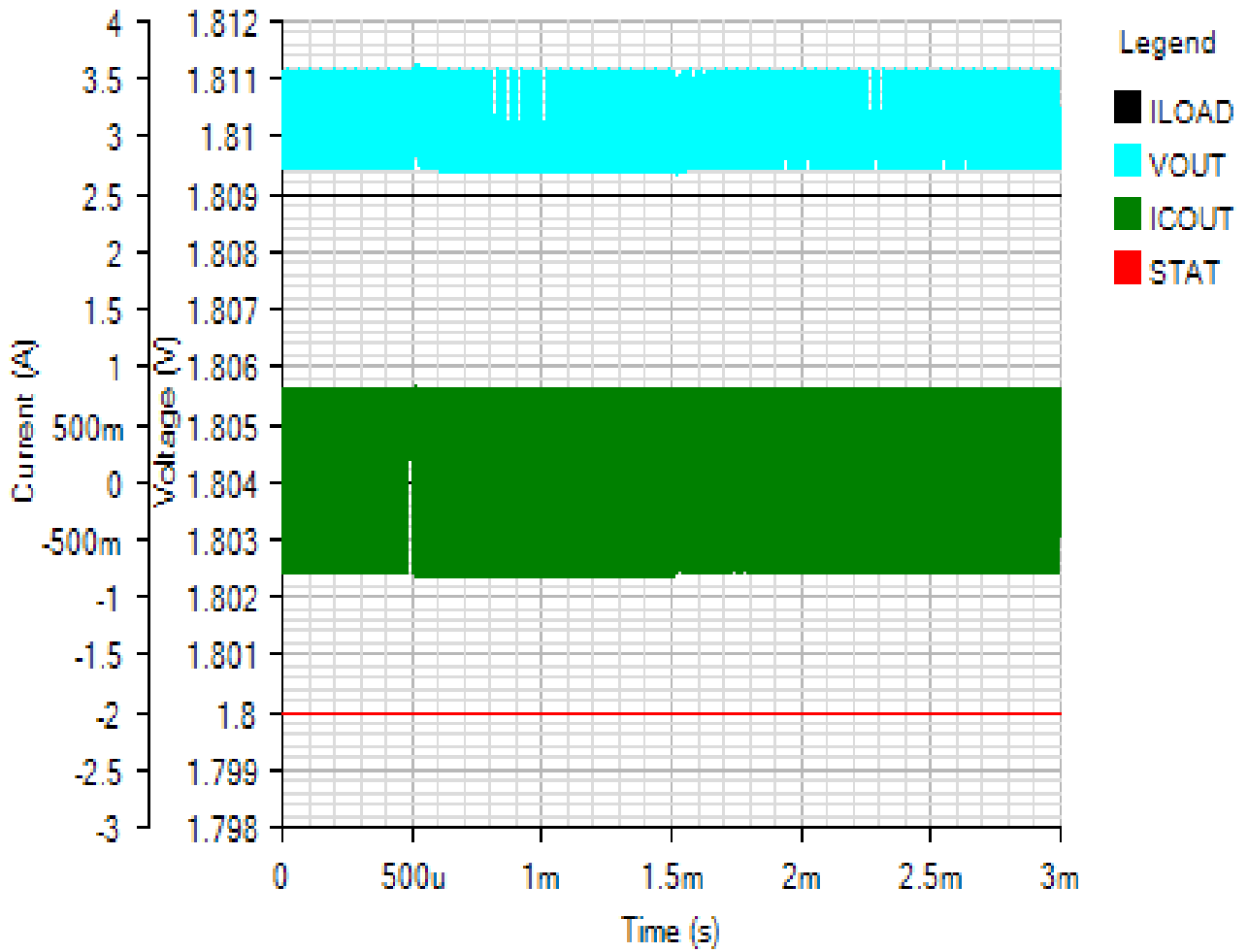


Line Transient - Sun Nov 18 2018 15:55:54



OUTPUT

Default



SWITCHING

Default

