

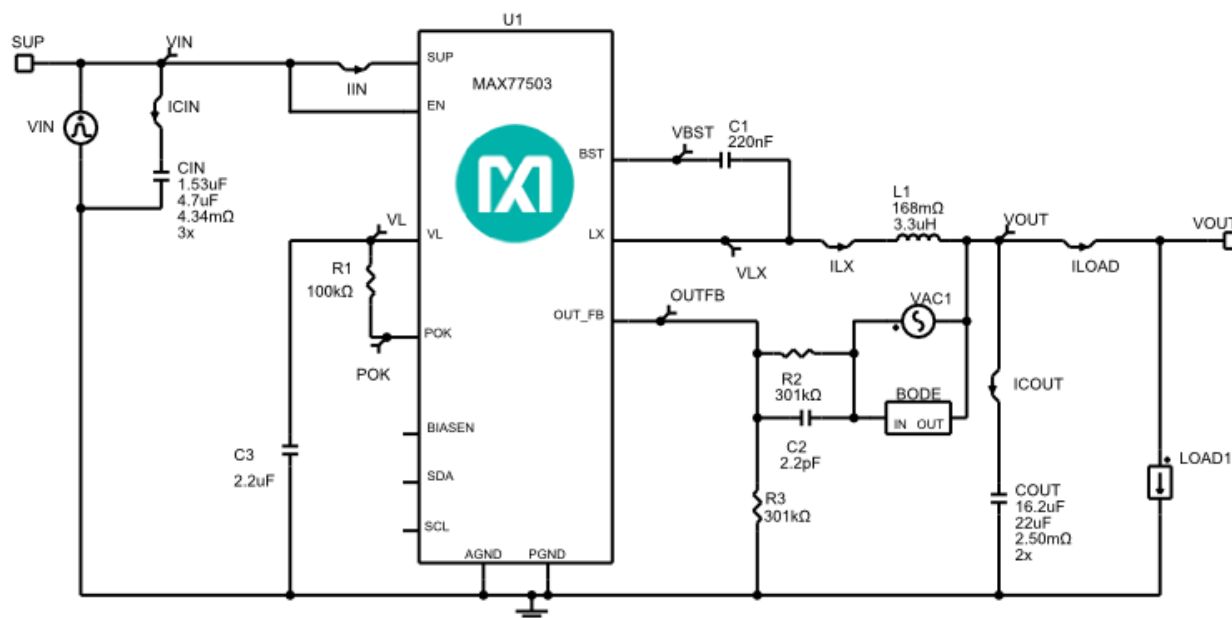
Initial Design

1.0

Design Requirements

Parameter	Value
Minimum Input Voltage	10V
Maximum Input Voltage	14V
Nominal Input Voltage	12V
Input Voltage Ripple	1%
Output Voltage Control	External Resistive Divider
Output Voltage	1.6V
Output Current	1A
ILX-PEAK Level (high-side MOSFET current limit)	2A
Output Voltage Ripple	1%
Load Step Start Current	1A
Load Step Current	0.5A
Output Voltage Load Step Over/Undershoot	5%
Load Step Edge Rate	5A/us
Performance Priority	Balance Efficiency and Size
BOM Priority	Cost
Soft Start Ramp Time	1ms
Active Resistive Discharge Enable	Disable
Mode of Operation	FPWM
Ambient Temperature	25°C
Inductor Current Ratio (LIR)	0.3

Schematic



If the current level (starting current for Load Steps) is too low, AC, Steady State, Line Transient, and Load Step analyses may fail when Skip mode is selected.

BOM

Ref	Qty	Part Number	Manufacturer	Description
U1	1	MCP2551-I/SN	Microchip Technology	CAN 1Mbps Sleep/Standby 5V 8-Pin SOIC N Tube
C1	1	GCM188R71E224KA55D	Murata Manufacturing	Cap Ceramic 0.22uF 25V X7R 10% Pad SMD 0603 125°C Automotive T/R
C2	1	0603YA2R2JAT2A	AVX	Cap Ceramic 2.2pF 16V C0G 5% Pad SMD 0603 125°C T/R
C3	1	C2012X7R1C225K125AB	TDK	Cap Ceramic 2.2uF 16V X7R 10% Pad SMD 0805 125°C T/R
CIN	3	GRM21BR61H475KE51	Murata	Cap Ceramic 4.7uF 50V 0805 85C
COUT	2	GRM187R61A226ME15D	Murata	Cap Ceramic 22uF 10V 0603 85C
L1	1	VLS252012HBX-3R3M-1	TDK	Inductor 3.3uH 20% 140mOhm 2.1A Isat 1.82A Irms
R1	1	ERJ2GEJ104X	Panasonic	Res Thick Film 0402 100K Ohm 5% 0.1W(1/10W) ±200ppm/°C Pad SMD Automotive T/R
R2	1	CPF0603F301KC1	TE Connectivity	Res Thin Film 0603 301K Ohm 1% 0.063W(1/16W) ±50ppm/°C Epoxy Pad SMD T/R

R3

1

CPF0603F301KC1

TE
Connectivity

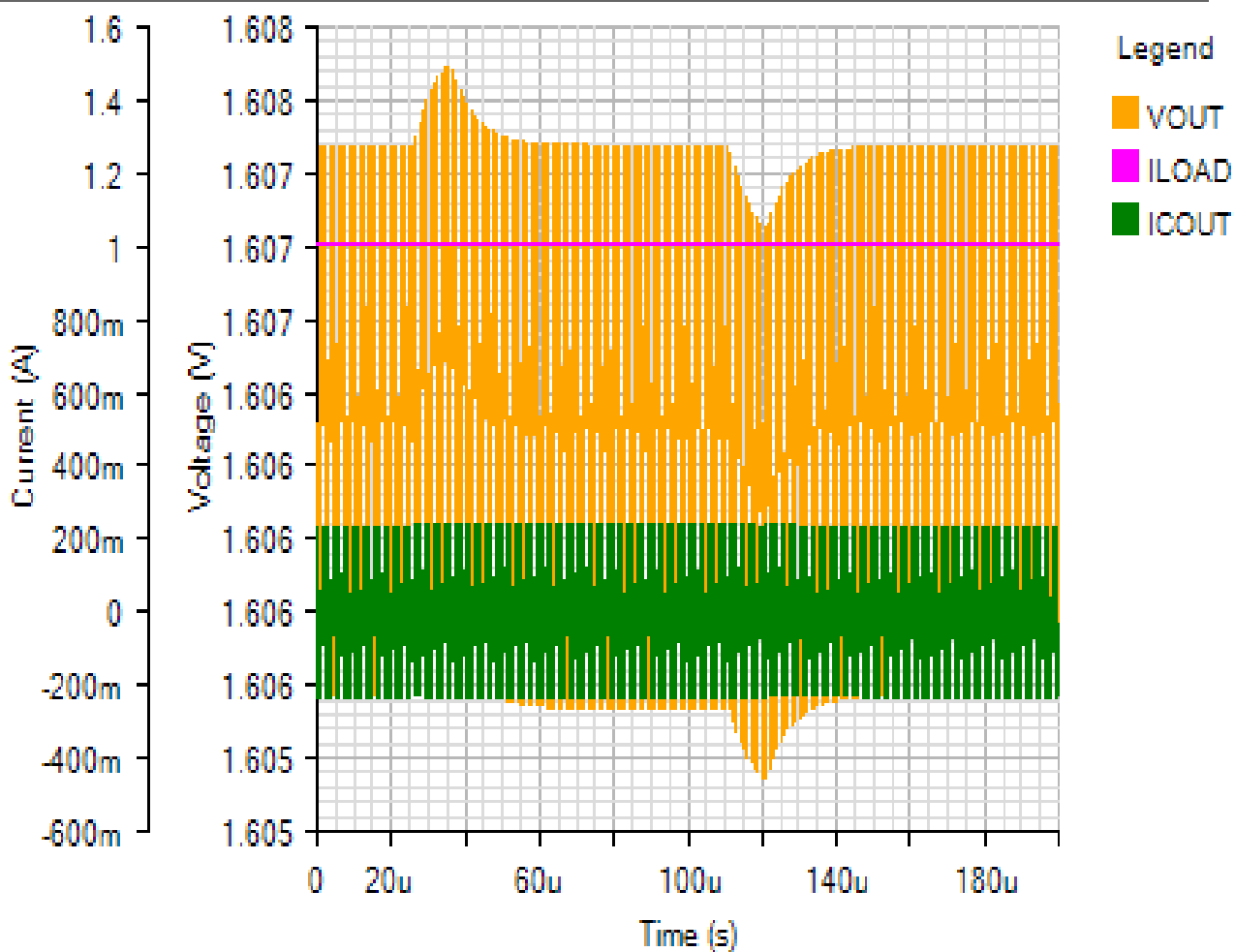
Res Thin Film 0603 301K Ohm 1%
0.063W(1/16W) $\pm 50\text{ppm}/^{\circ}\text{C}$ Epoxy Pad
SMD T/R

Simulation Results

Line Transient - Wed Dec 19 2018 16:33:01

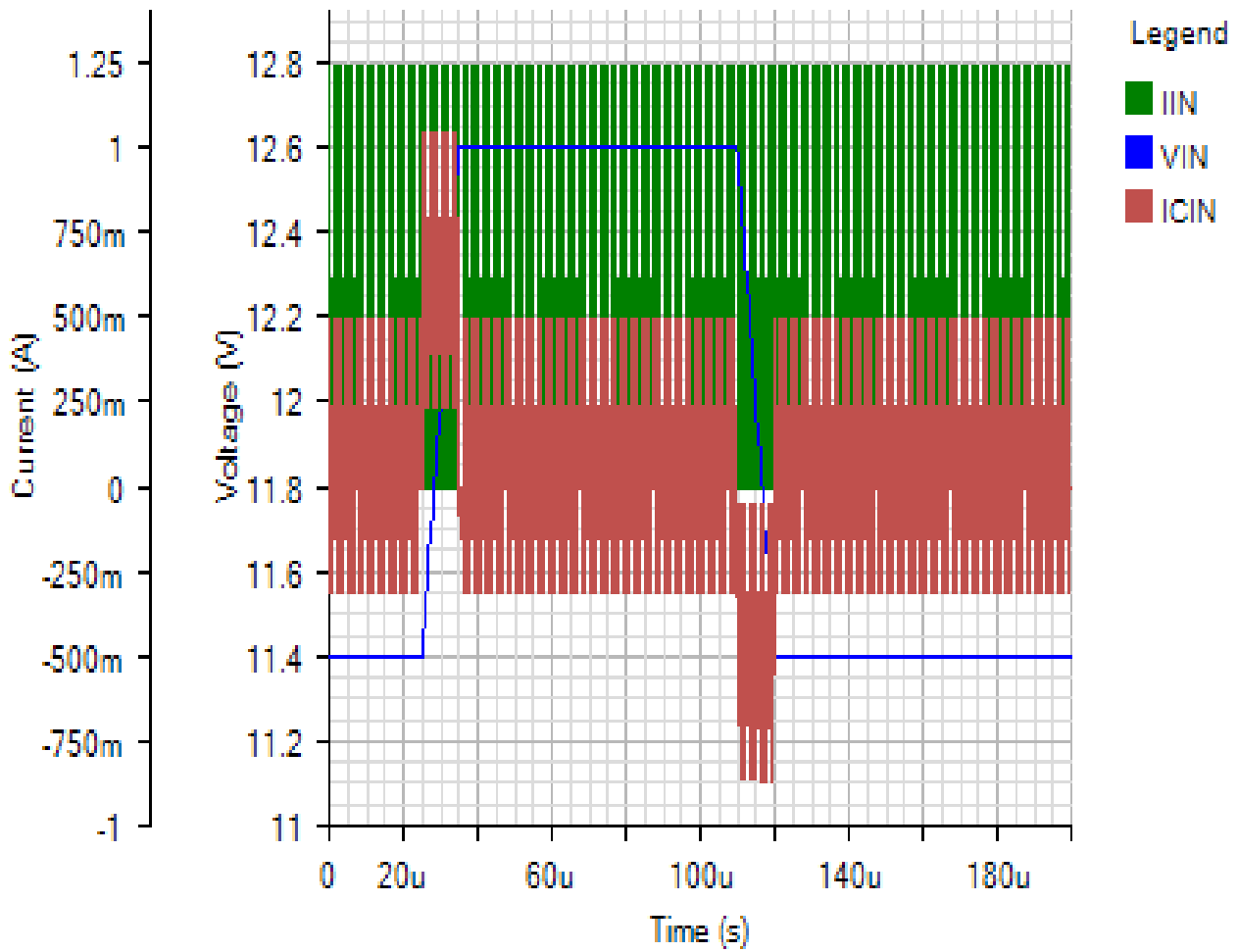
OUTPUT

Default



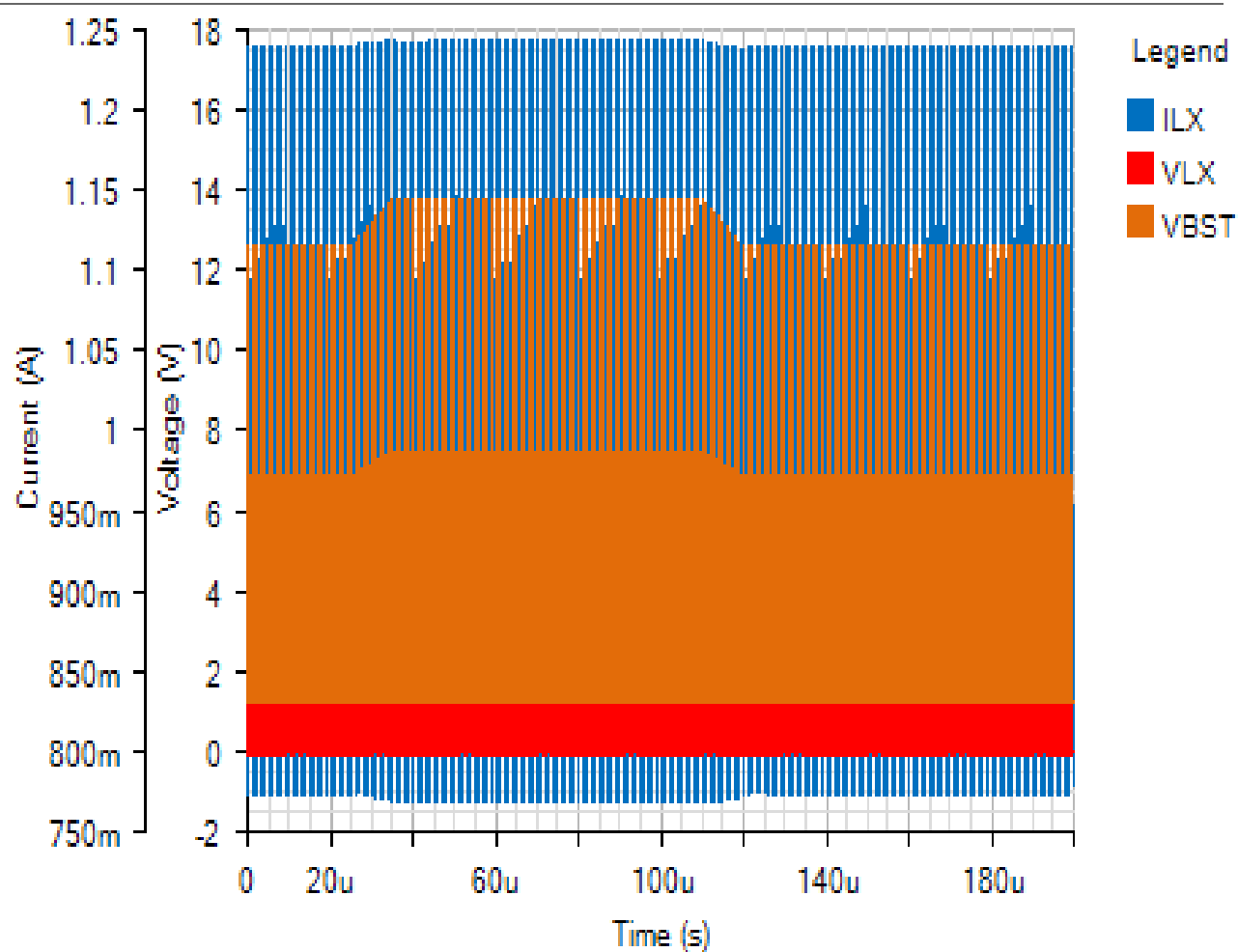
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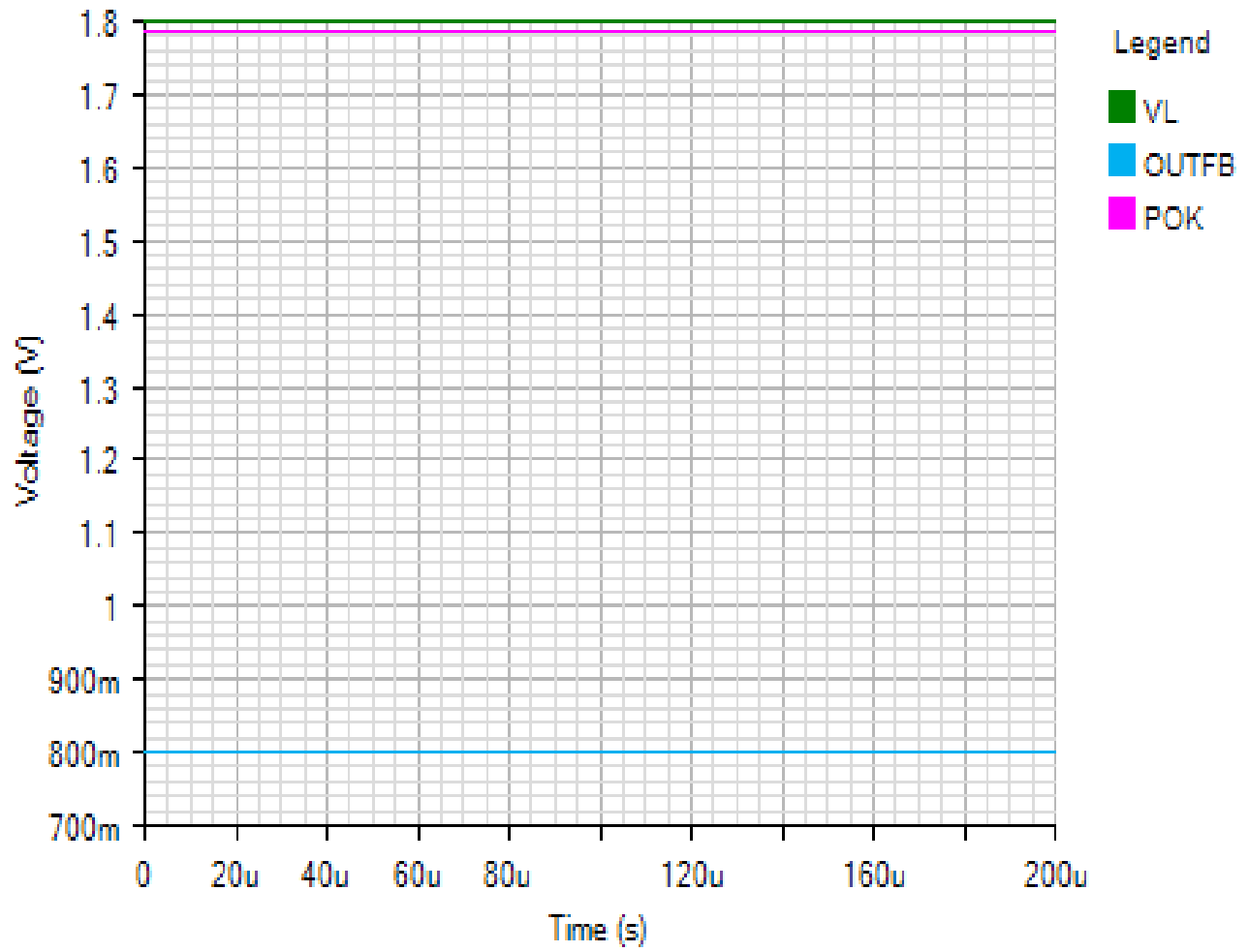
SWITCHING

Default



IC

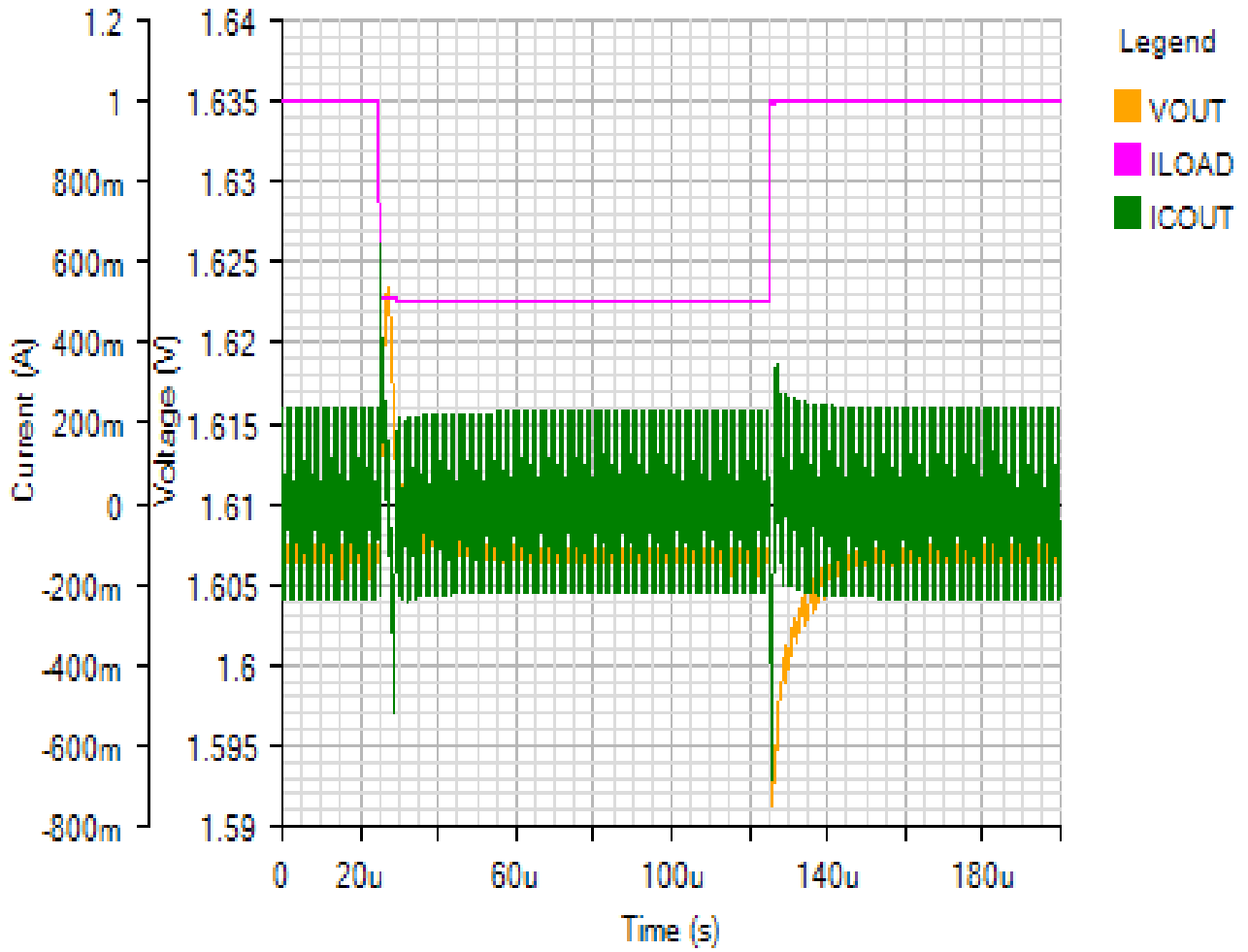
Default



Load Step - Wed Dec 19 2018 16:33:01

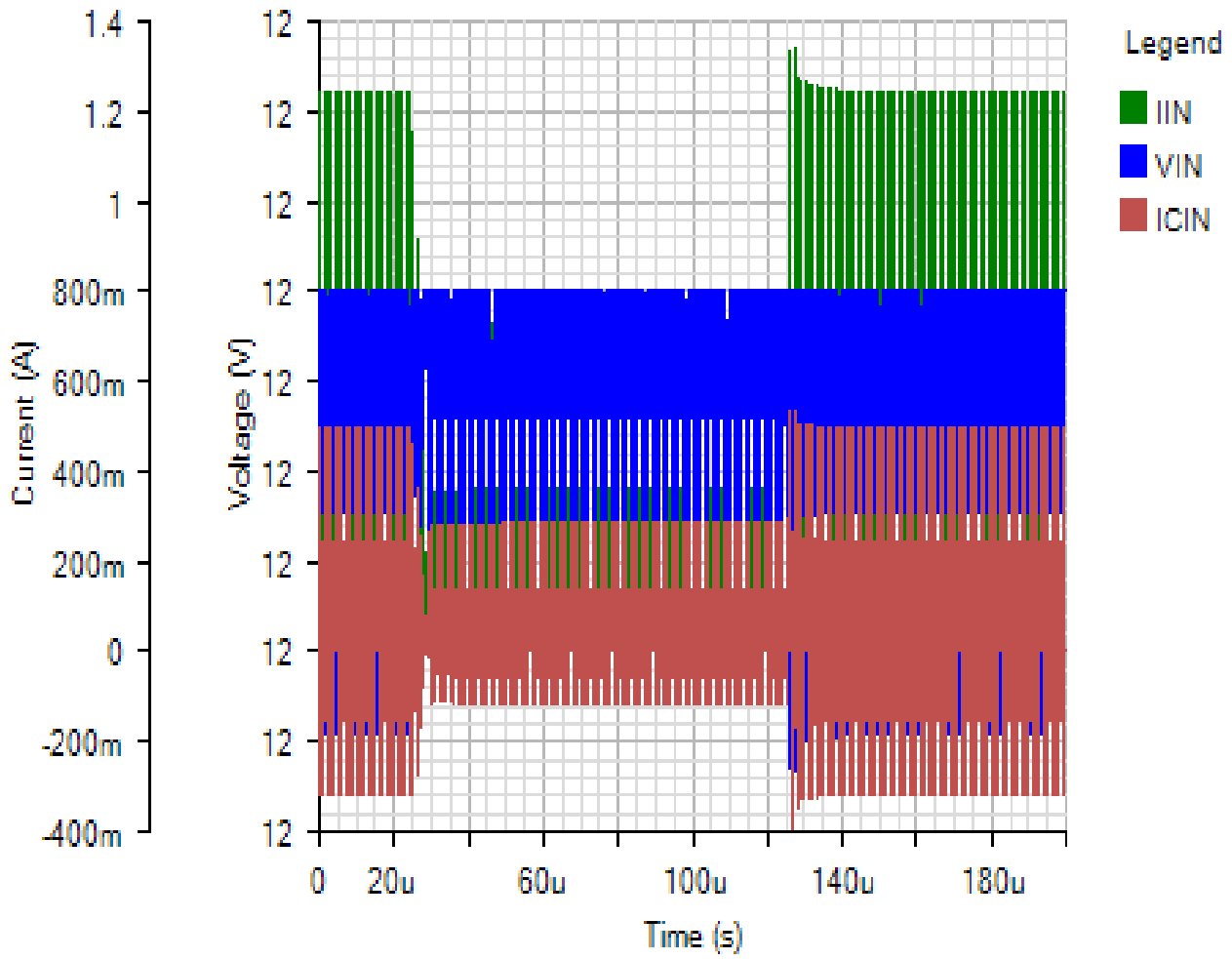
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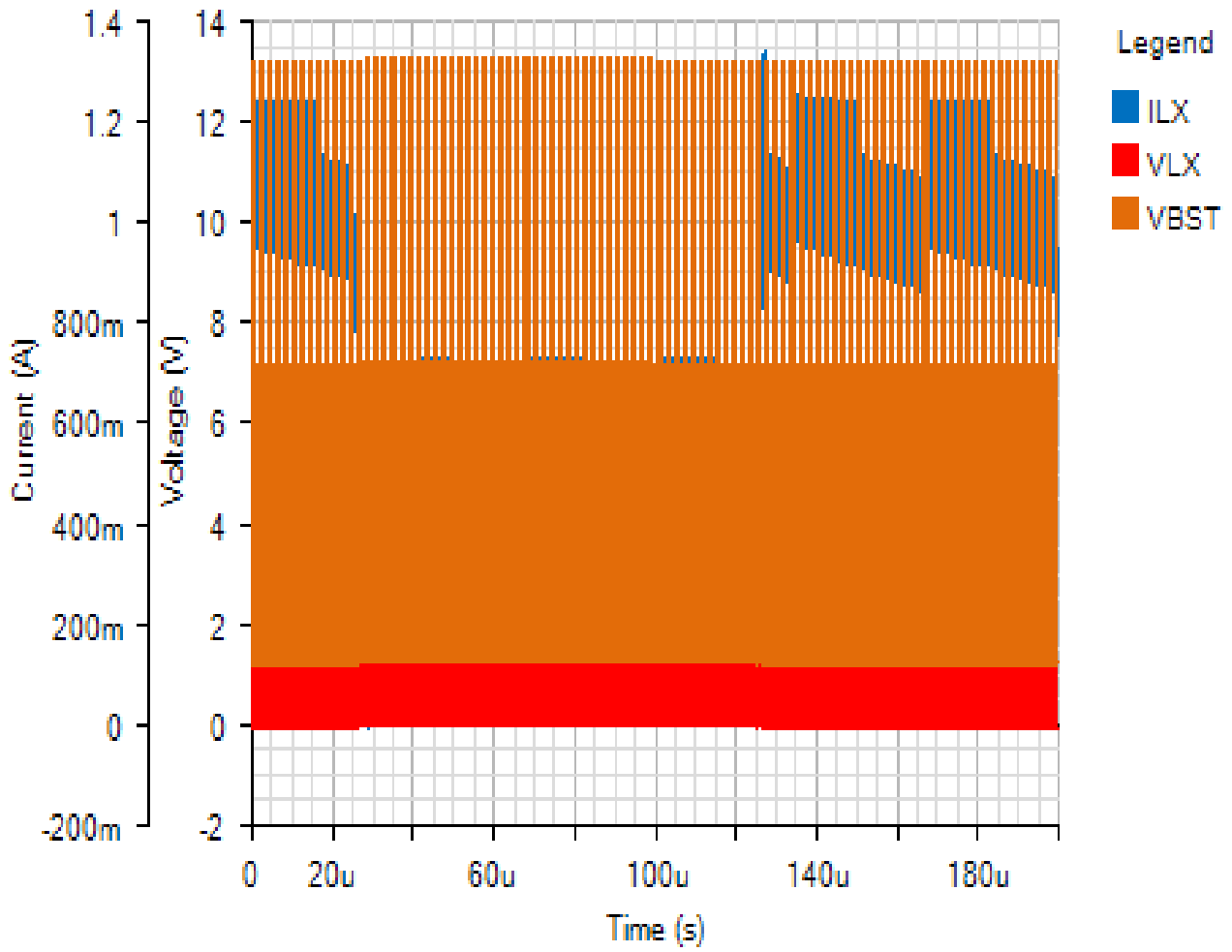
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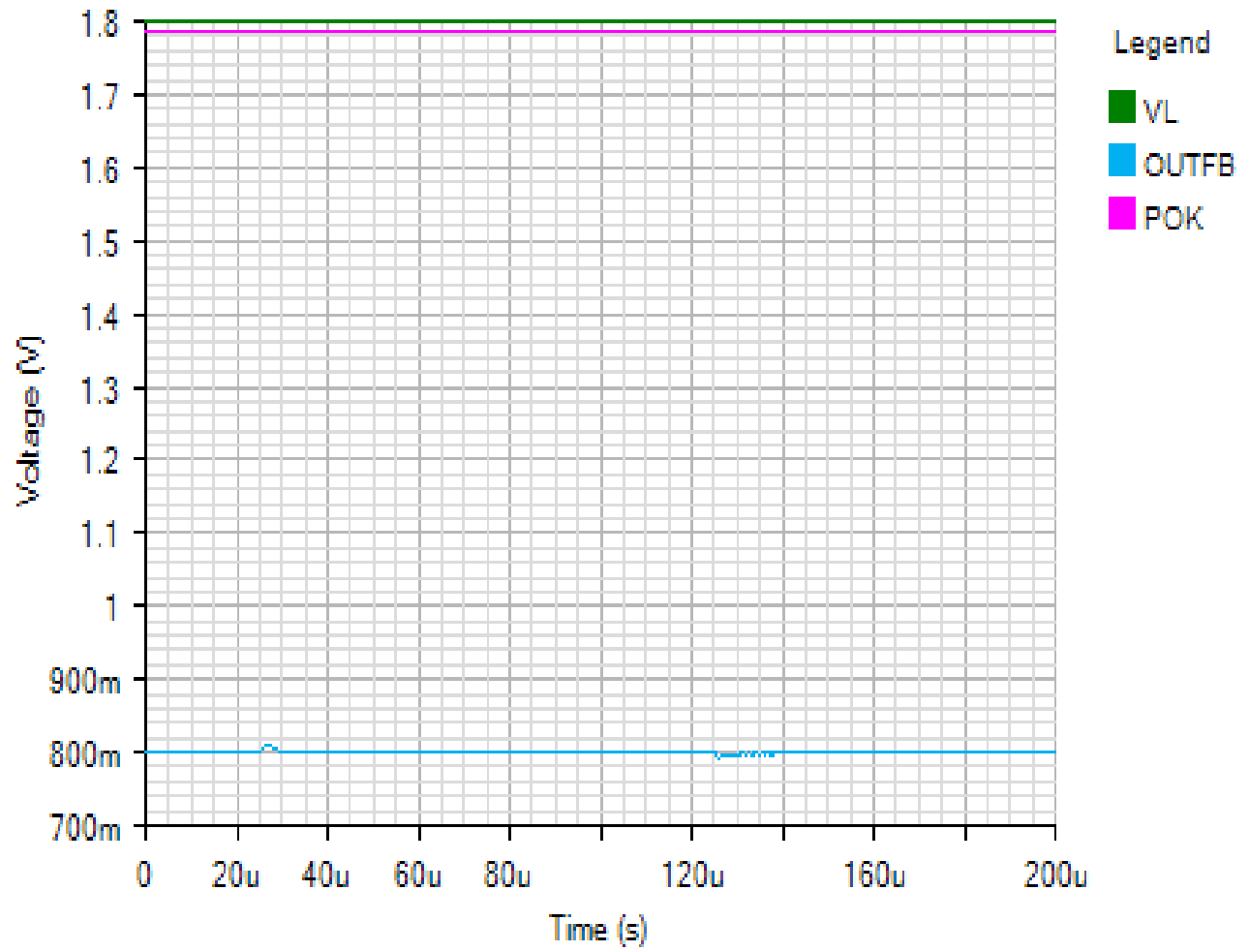
SWITCHING

Default



IC

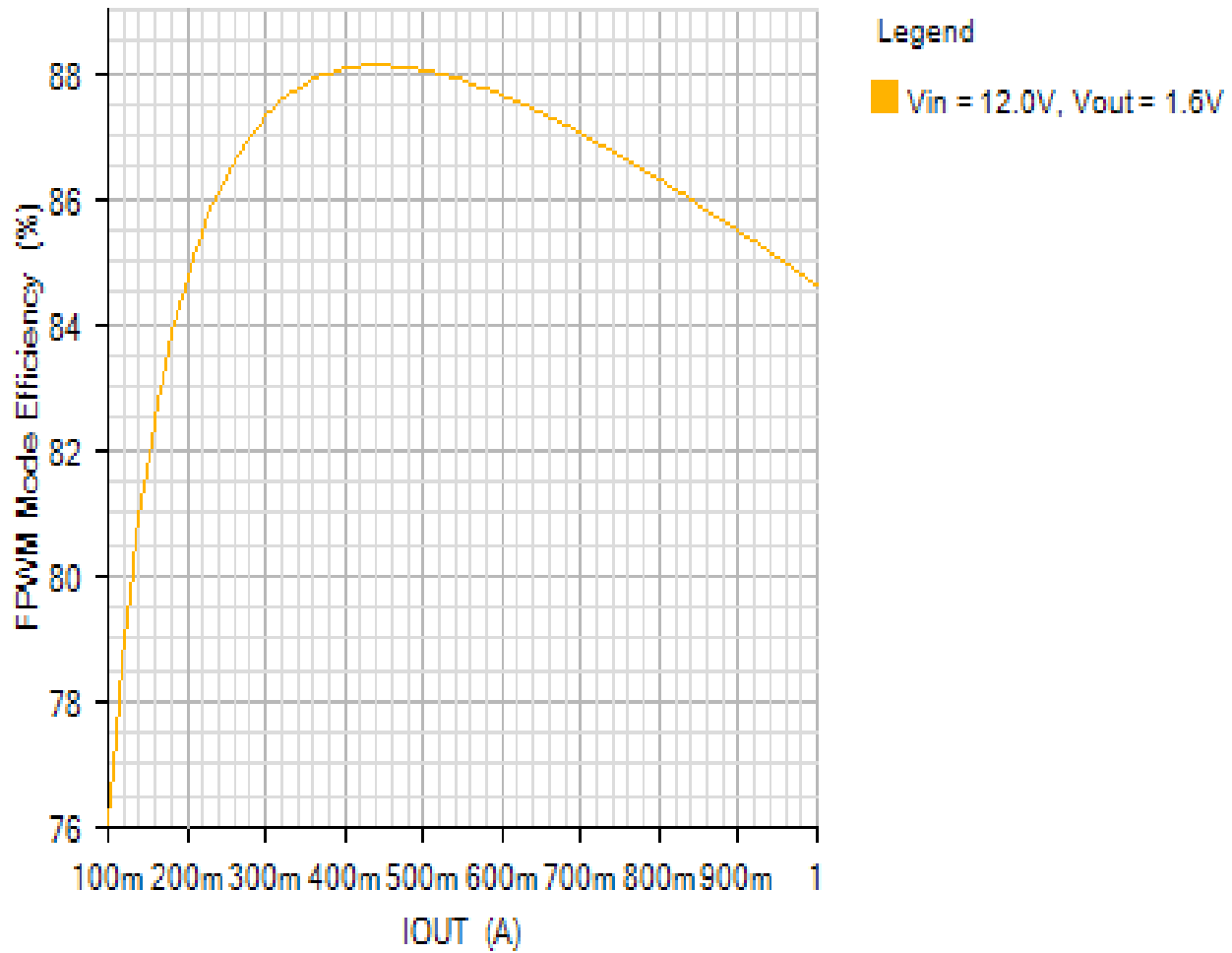
Default



Efficiency - Wed Dec 19 2018 16:33:01

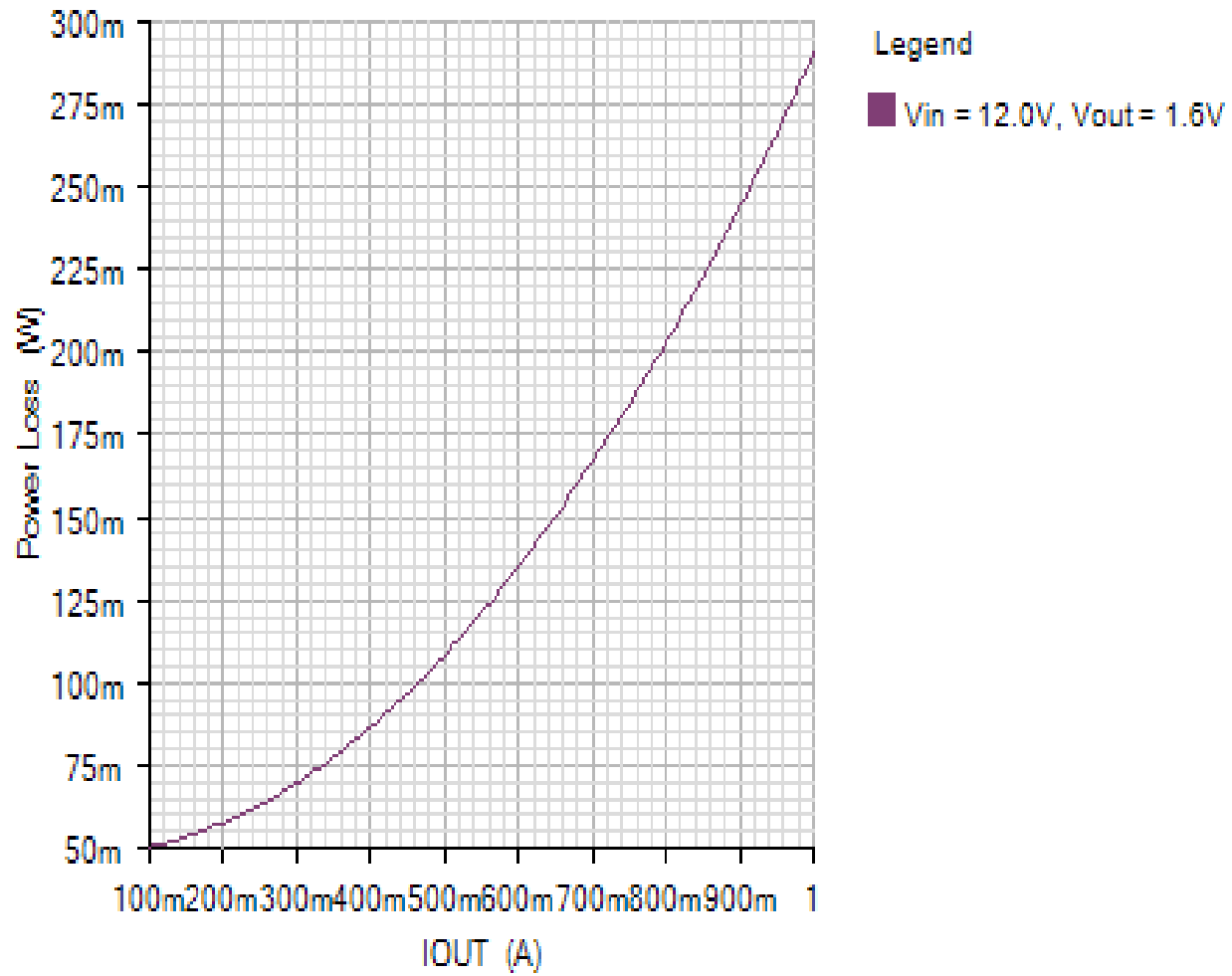
EFFICIENCY_PLOT

Default



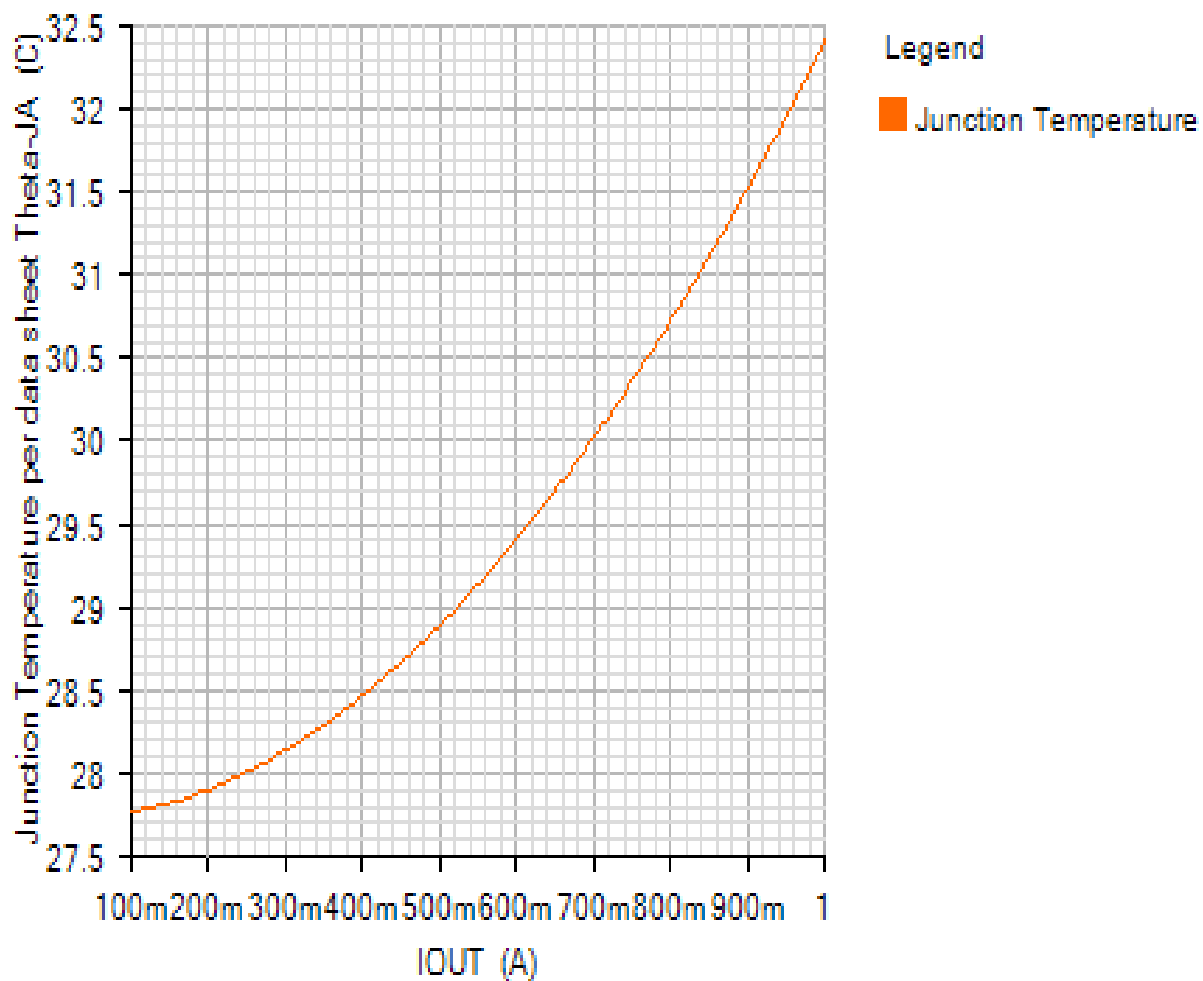
POWER_LOSS_PLOT

Default

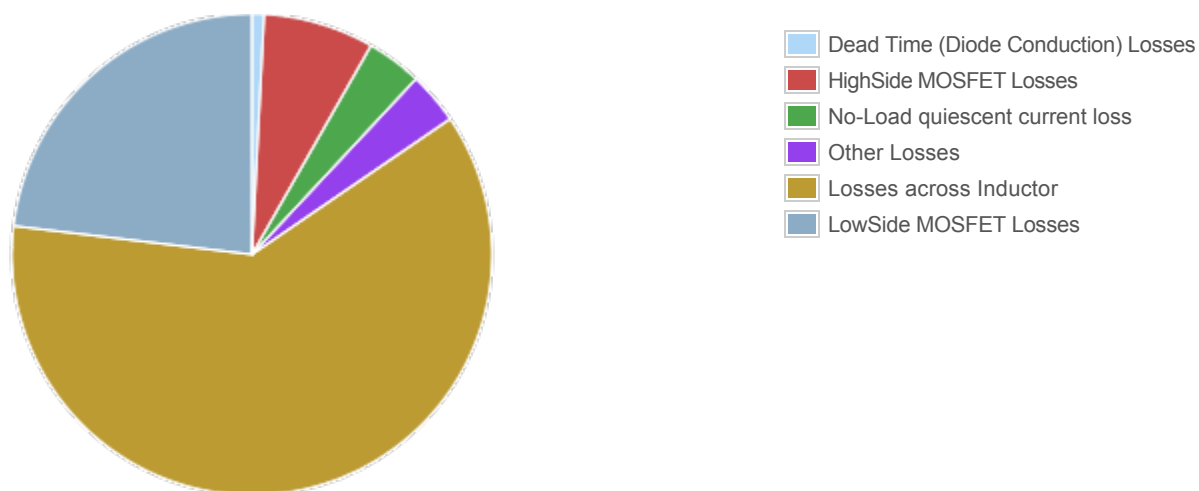


JUNCTION_TEMPERATURE_PLOT

Default



Losses



Component

Loss (W)

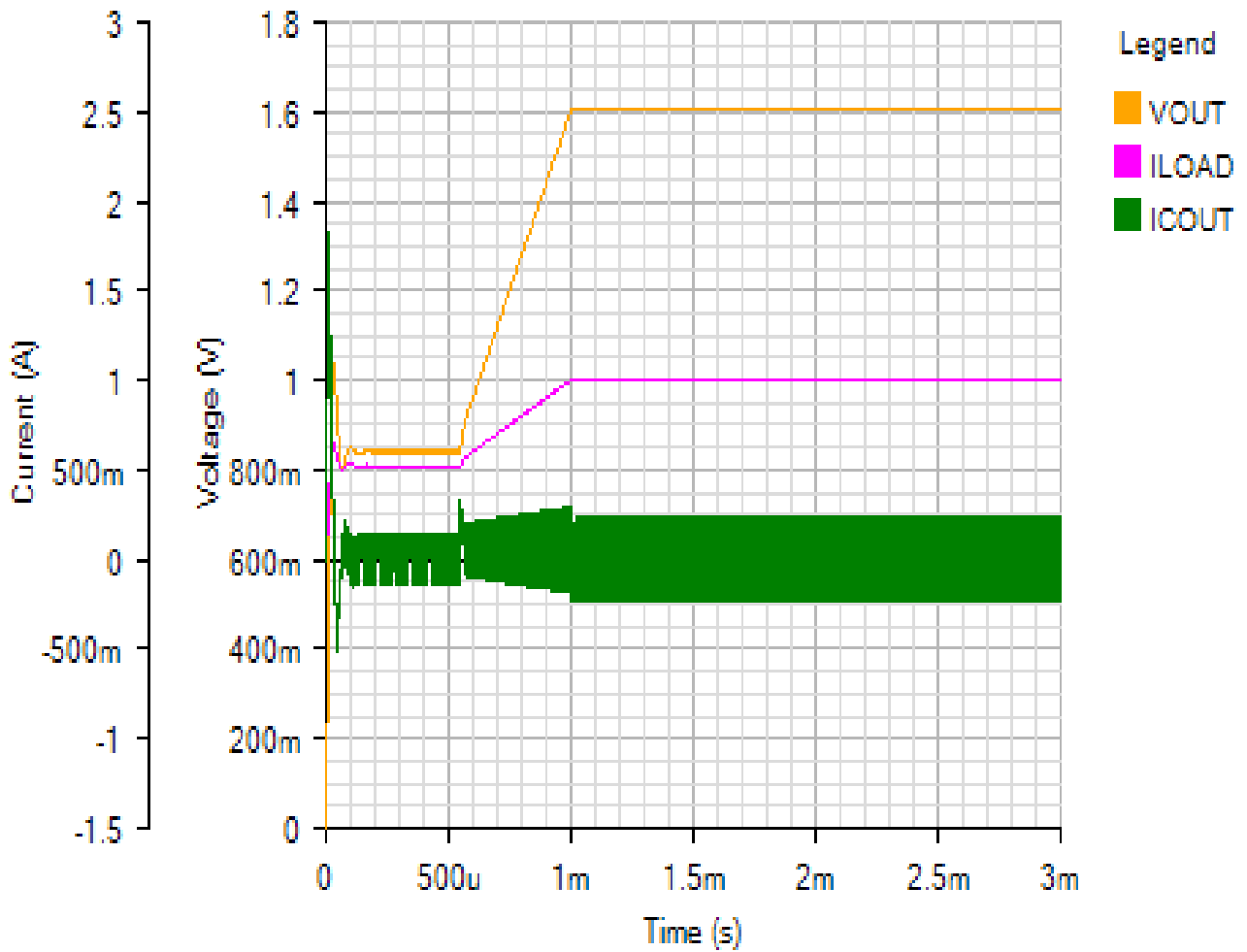
% of total

Component	Loss (W)	% of total
Dead Time (Diode Conduction) Losses	0.002353	0.8
HighSide MOSFET Losses	0.021649	7.4
No-Load quiescent current loss	0.0108	3.7
Other Losses	0.010147	3.5
Losses across Inductor	0.178506	61.4
LowSide MOSFET Losses	0.067154	23.1
Total	0.29061	100

Start Up - Wed Dec 19 2018 16:33:01

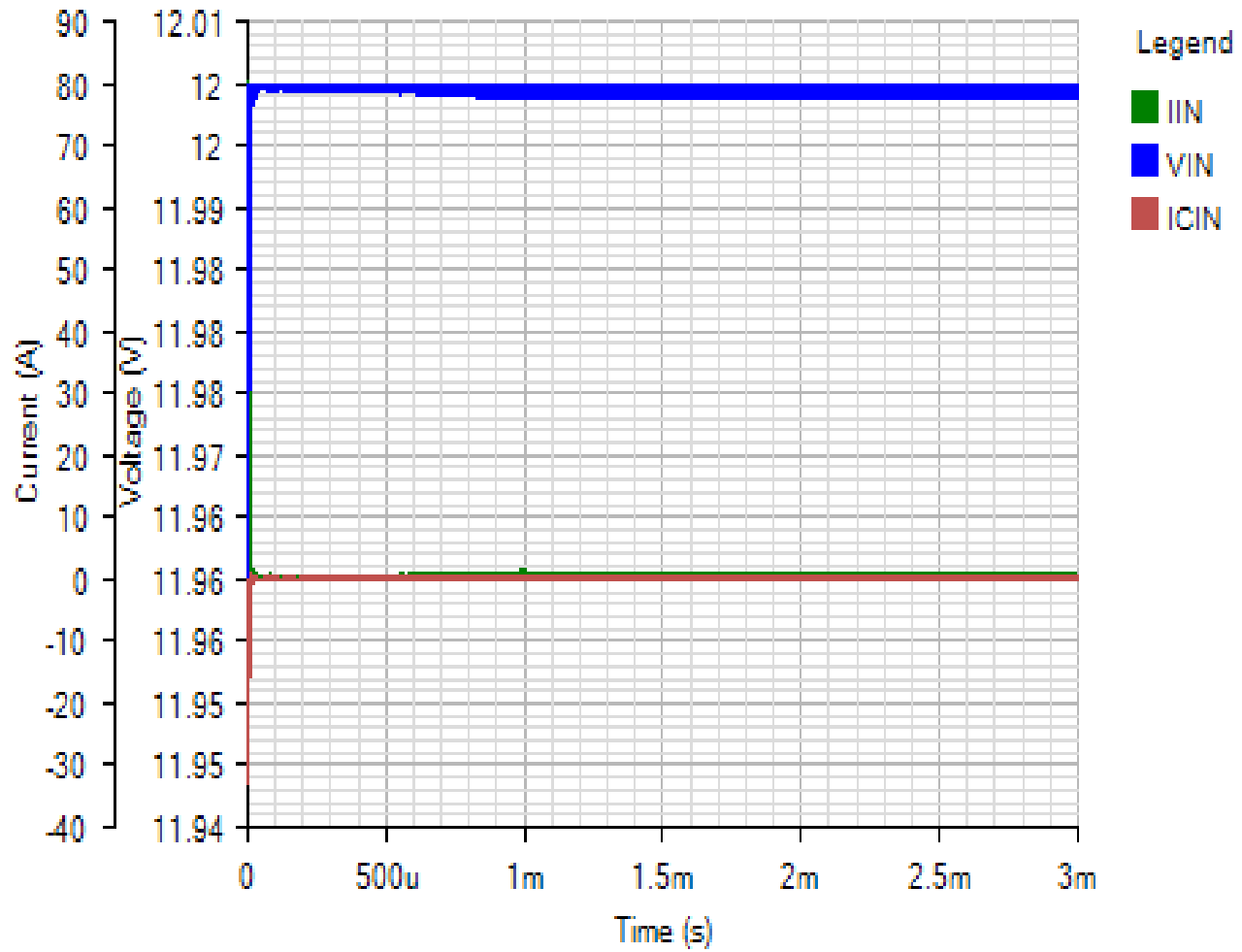
OUTPUT

Default



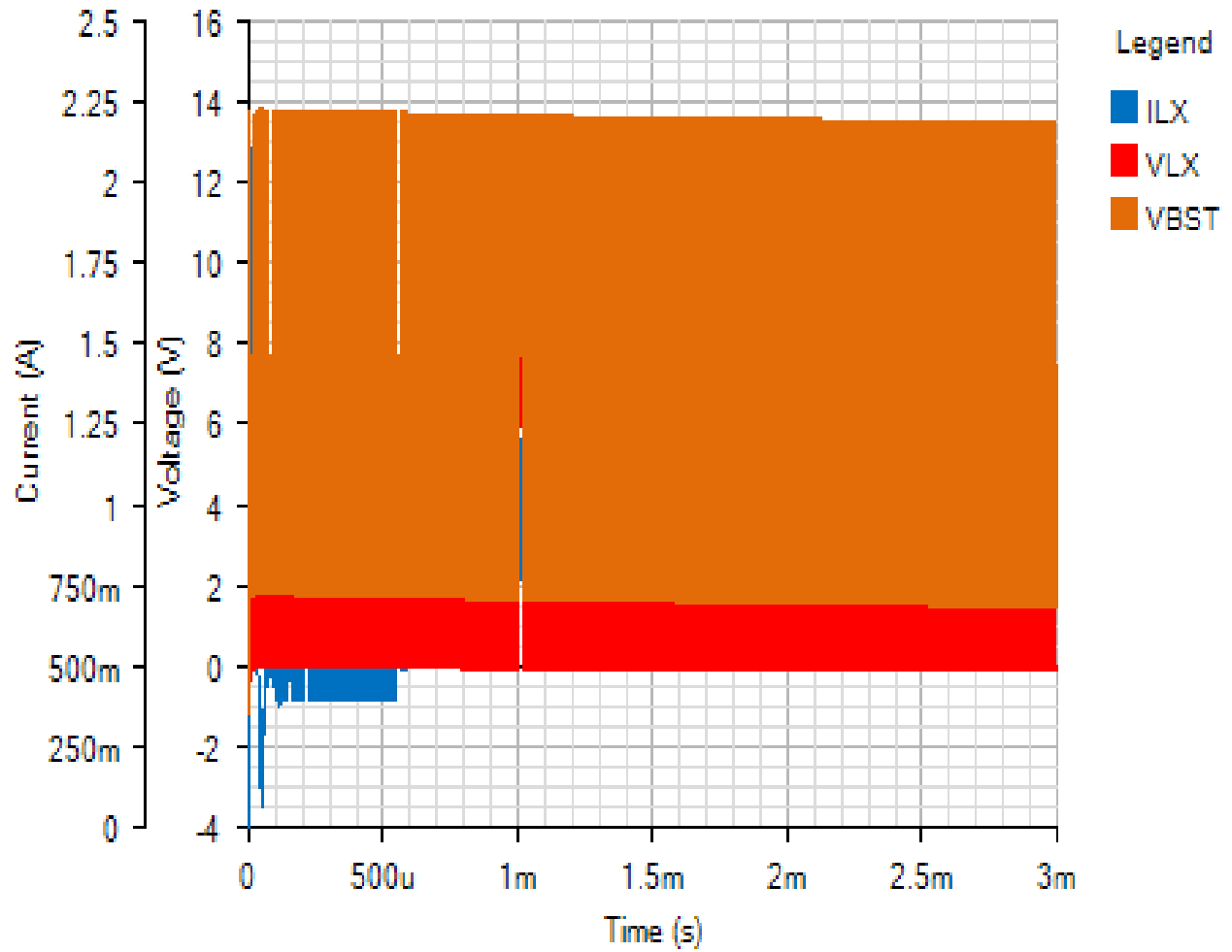
INPUT

Default



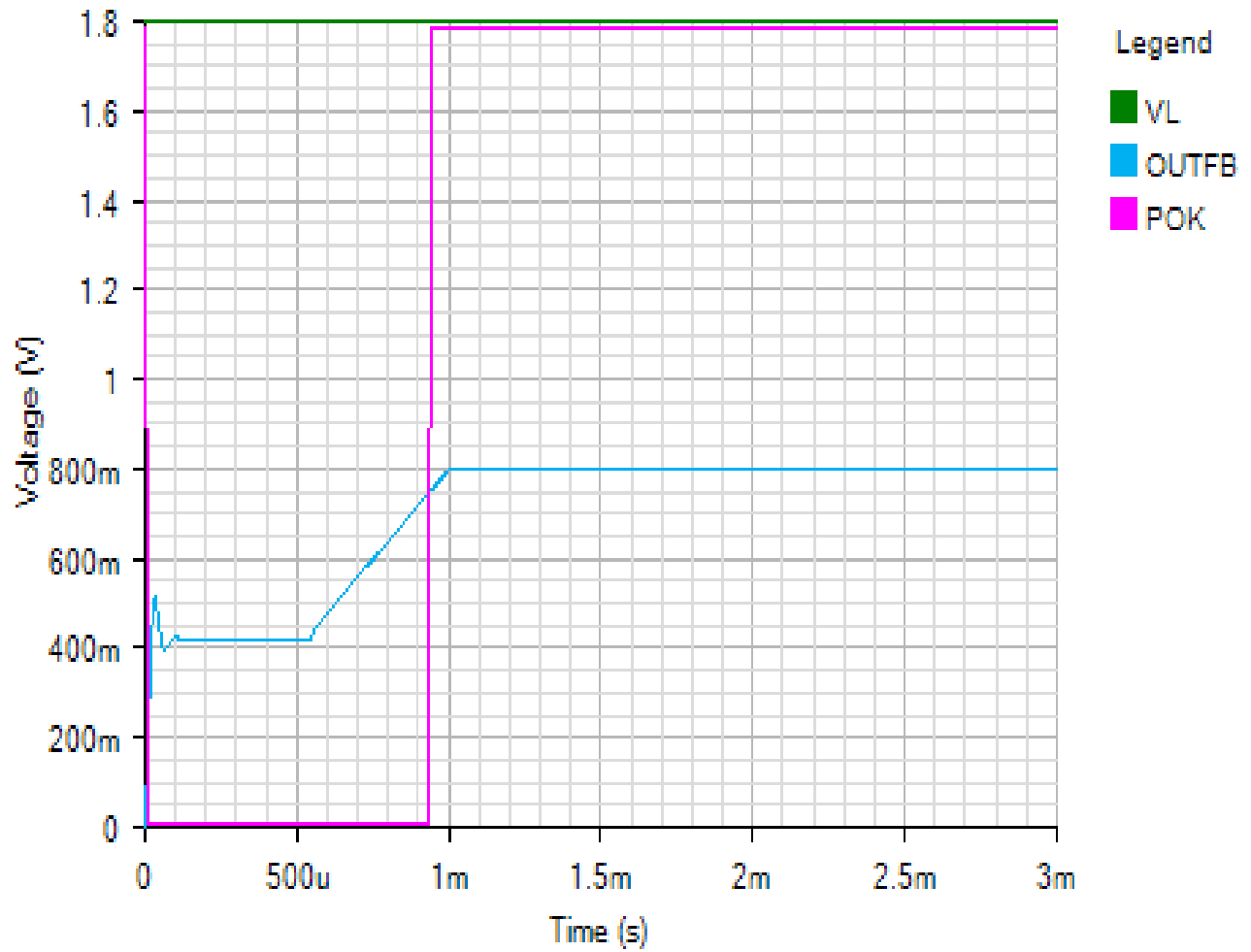
SWITCHING

Default



IC

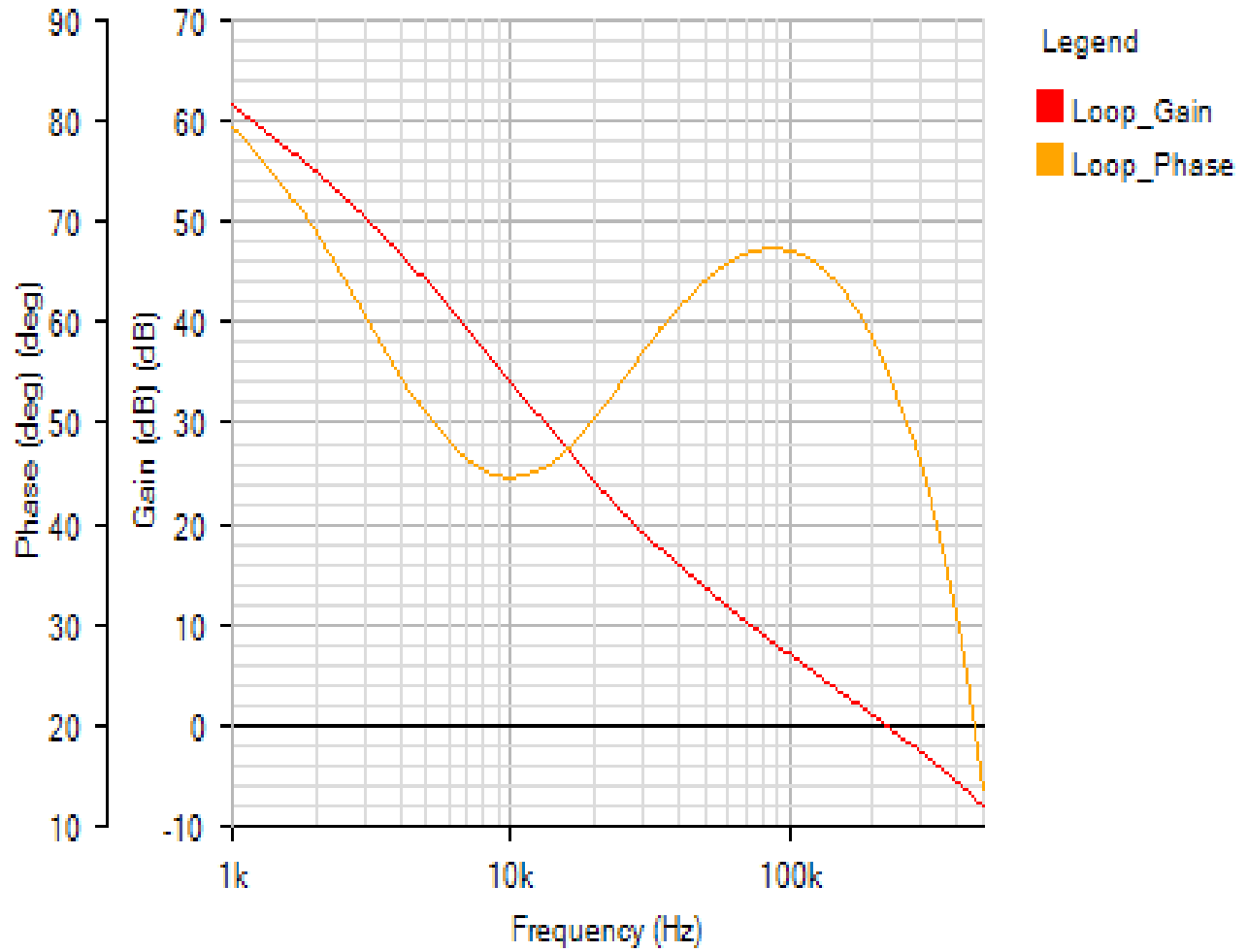
Default



AC Loop - Wed Dec 19 2018 16:33:01

BODE

Default



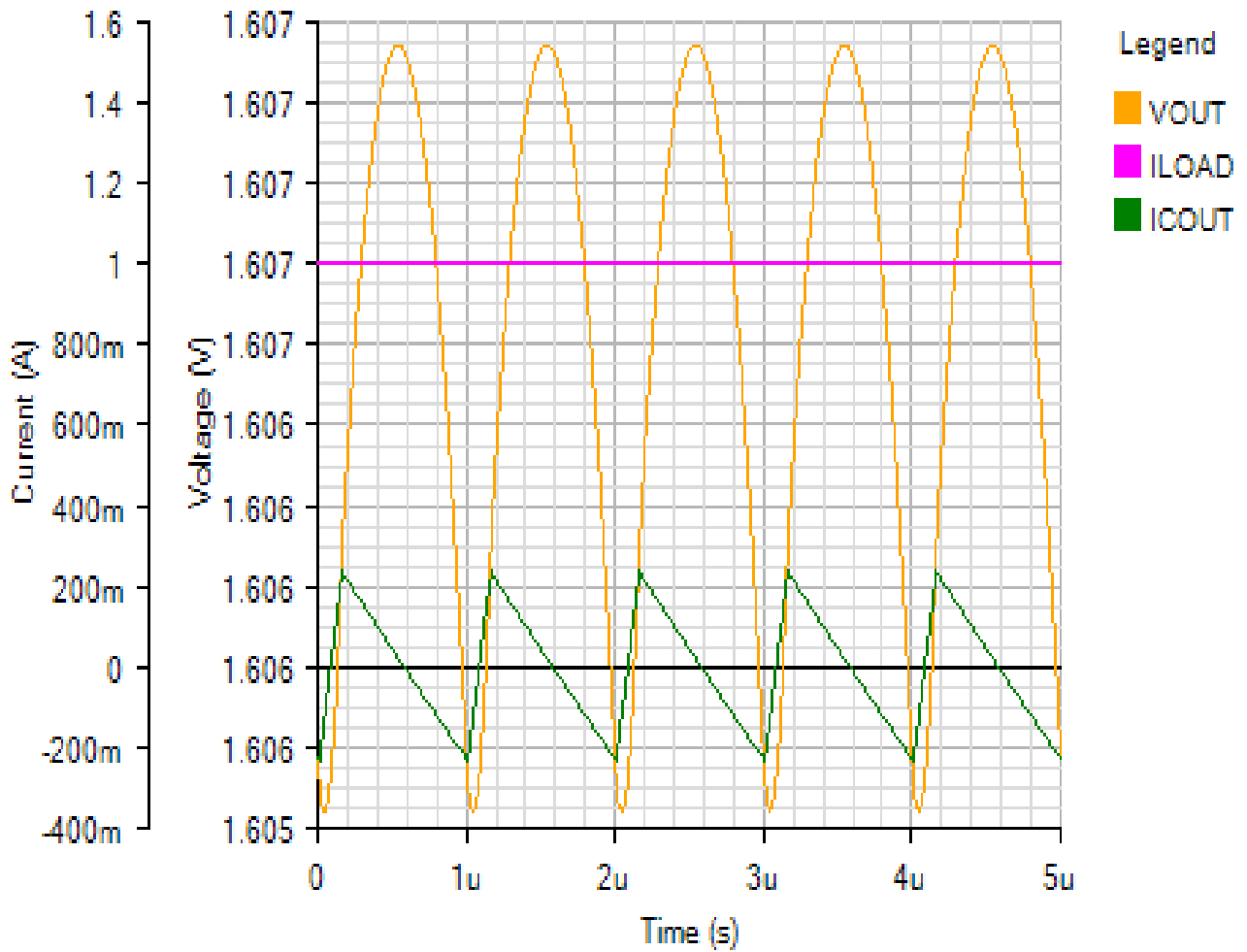
Phase Margin: 55.53° at a crossover frequency of 225.5kHz



Steady State - Wed Dec 19 2018 16:33:01

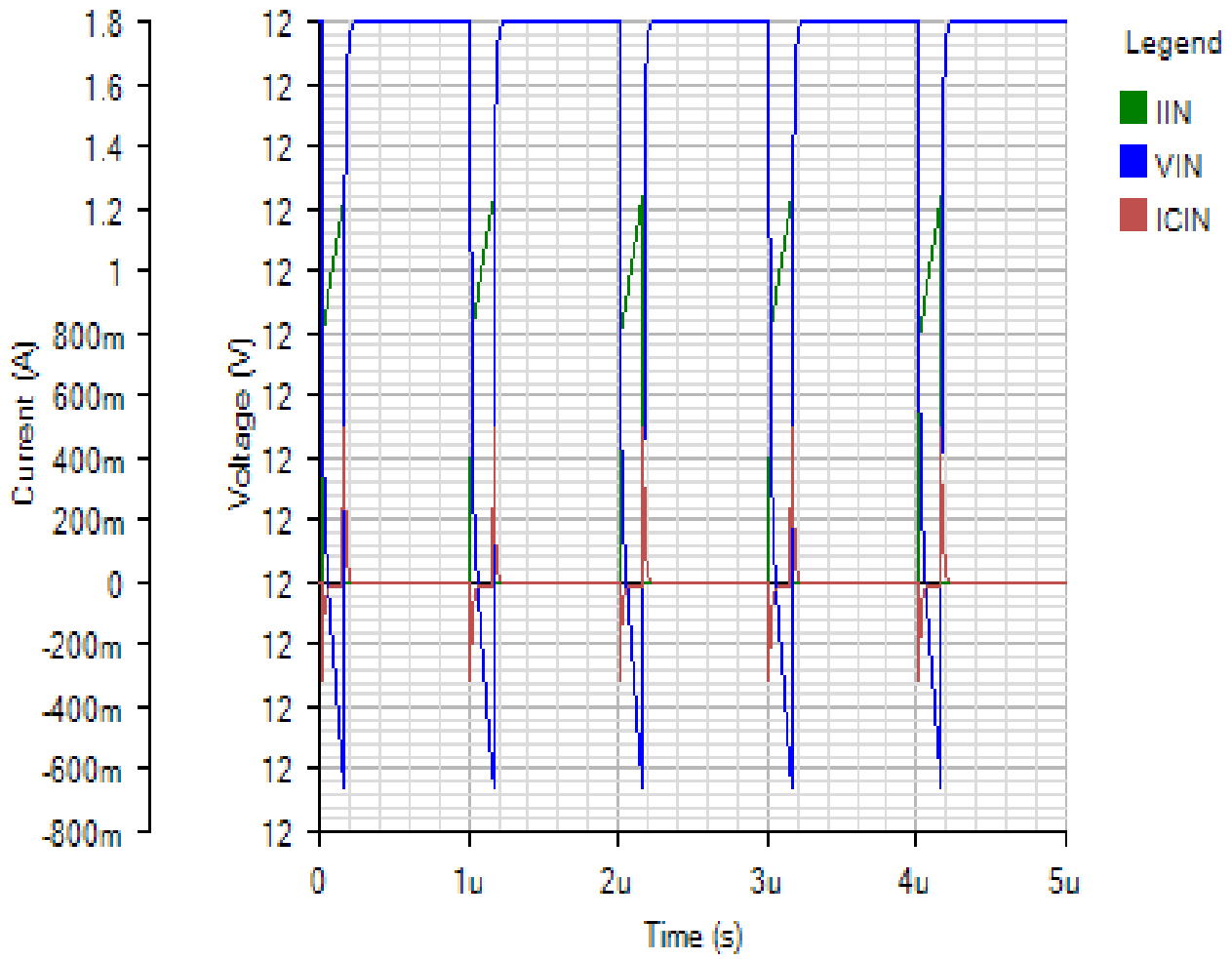
OUTPUT

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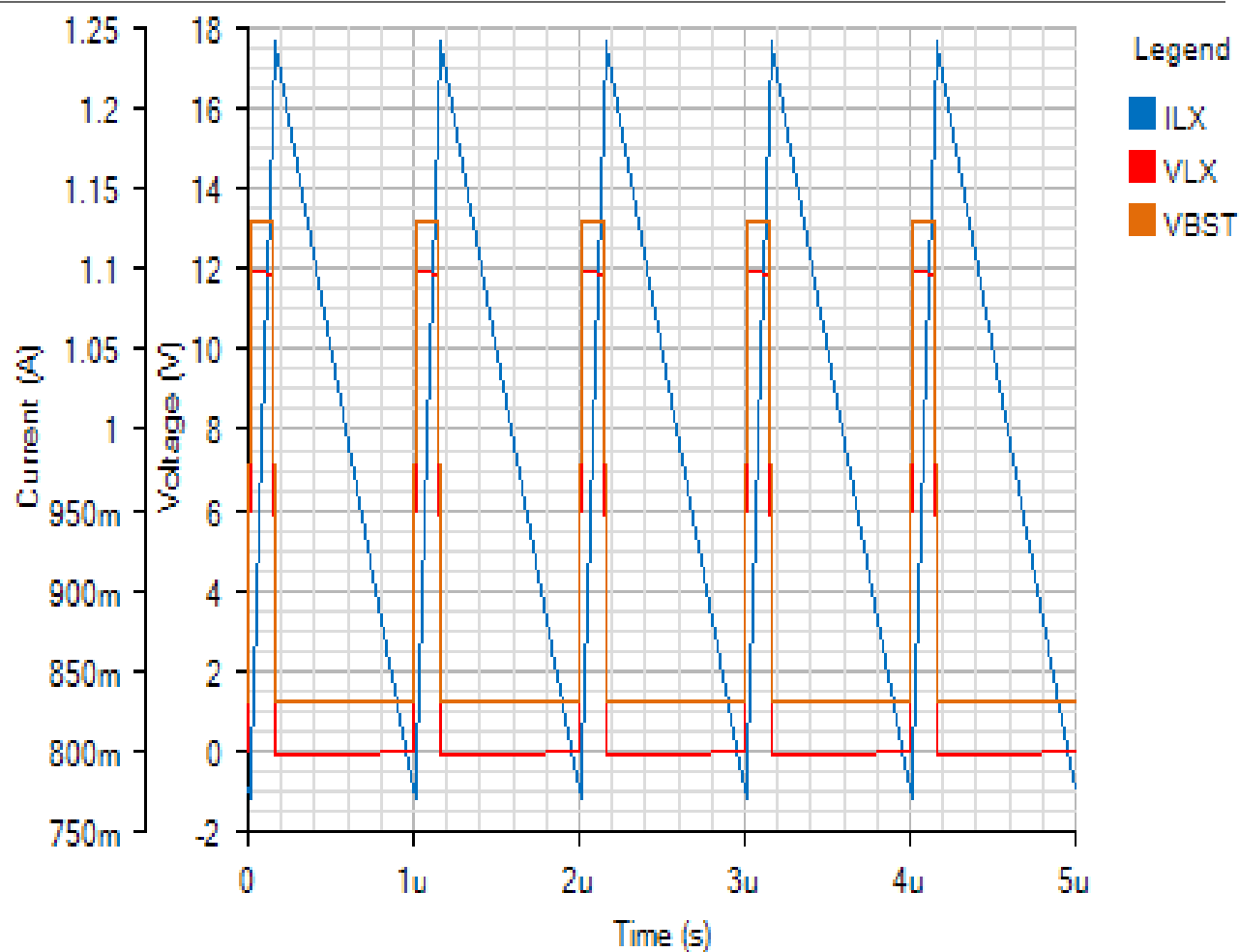
INPUT

Default



SWITCHING

Default



IC

Default

