

## Initial Design

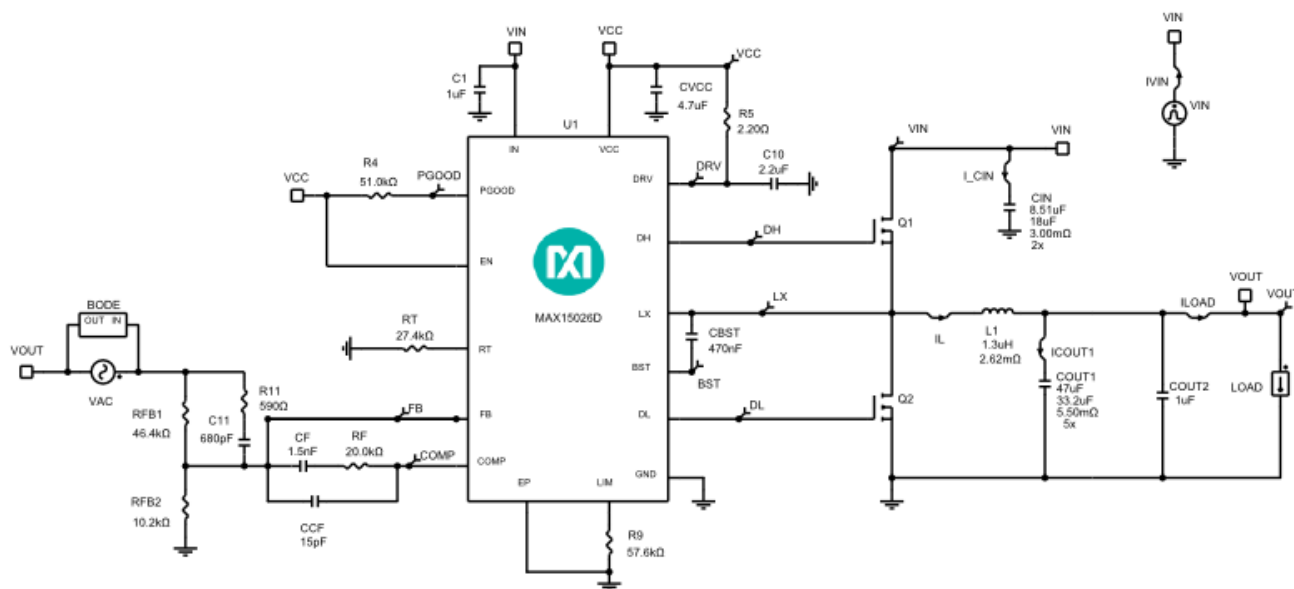
1.0

Design Requirements

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Parameter	Value
Minimum Input Voltage	10.8V
Maximum Input Voltage	13.2V
Nominal Input Voltage	12V
Input Voltage Ripple	1%
Output Voltage	3.3V
Output Current	10A
Output Voltage Ripple	1%
Load Step Start Current	5A
Load Step Current	10A
Load Step Edge Rate	5A/us
Output 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
Inductor Current Ratio(LIR)	0.3
Break Before Make Time	DH/DL 18ns and DL/DH 20ns
Soft Stop Enable	No
Enable High Power Design	No

## Schematic



Thermal Shutdown feature is not modeled in EE-Sim.

This note only applies to online EE-Sim Design Tool : RT and R9 are set to the proper values for the design requirements entered. To change the switching frequency and valley current limit that these components set.

## BOM

Ref	Qty	Part Number	Manufacturer	Description
U1	1	MAX15026D	User-Defined	IC
C1	1	<a href="#">CGA4J2X7R1C105K125AA</a>	TDK	Cap Ceramic 1uF 16V X7R 10% Pad SMD 0805 125°C Automotive T/R
C10	1	<a href="#">1206ZC225KAT2A</a>	AVX	Cap Ceramic 2.2uF 10V X7R 10% Pad SMD 1206 125°C T/R
C11	1	<a href="#">04025C681KAT2A</a>	AVX	Cap Ceramic 680pF 50V X7R 10% Pad SMD 0402 125°C T/R
CBST	1	<a href="#">GCM188R71E474KA64D</a>	Murata Manufacturing	Cap Ceramic 0.47uF 25V X7R 10% Pad SMD 0603 125°C Automotive T/R
CCF	1	<a href="#">C0402C150K5GACTU</a>	KEMET Corporation	Cap Ceramic 15pF 50V C0G 10% Pad SMD 0402 125°C T/R
CF	1	<a href="#">CL05B152KB5NNNC</a>	Samsung Electro-Mechanics	Cap Ceramic 0.0015uF 50V X7R 10% Pad SMD 0402 125°C T/R
CIN	2	<a href="#">C1210C186K4PAC</a>	Kemet	Cap Ceramic 18uF 16V X5R 10% SMD 1210 85°C Bulk
COUT1	5	<a href="#">GRM32EC80J476ME64L</a>	Murata	Cap Ceramic 47uF 6.3V X6S 20% SMD 1210 105C Embossed T/R
COUT2	1	<a href="#">LMK212B7105KD-T</a>	Taiyo Yuden	Cap Ceramic 1uF 10V X7R 10% Pad SMD 0805 125°C T/R

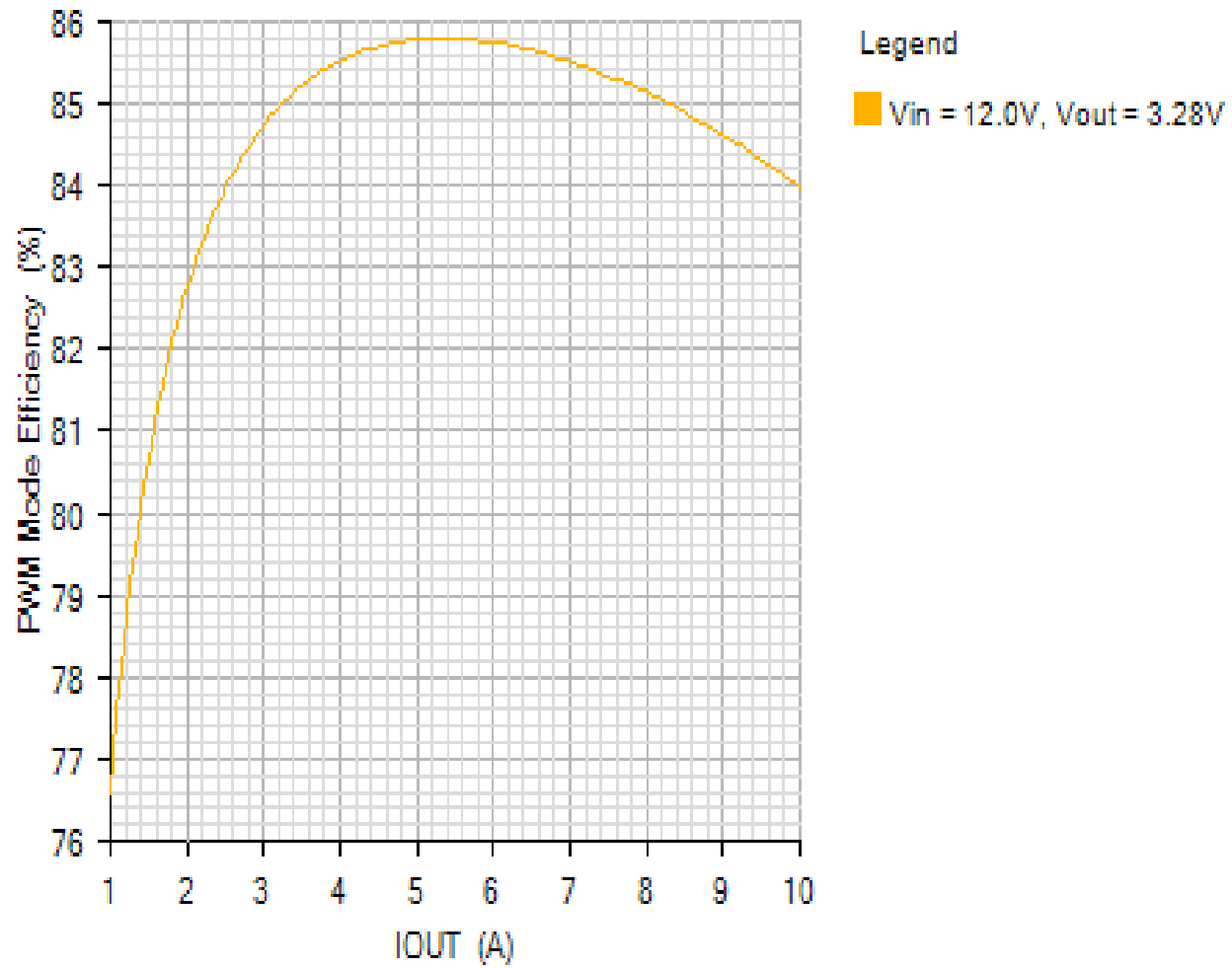
CVCC	1	<a href="#">C2012X7R1A475M125AC</a>	TDK	Cap Ceramic 4.7uF 10V X7R 20% Pad SMD 0805 125°C T/R
L1	1	<a href="#">MLC1250-132MLB</a>	Coilcraft	Inductor 1.3uH 20% 2.38mOhm 22.5A Isat 16.5A Irms
Q1	1	<a href="#">FDD8447L_F085</a>	Fairchild Semiconductor	Trans MOSFET N-CH 40VDS 11mOhm@4.5V 10mOhm@6V 20nC 10nC 1.97nF 0.25nF 175°C 50A 3.8W 2.3°C/W 2.39mm 70.1mm^2 TO-252 3L (DPAK)
Q2	1	<a href="#">FDS6294</a>	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	<a href="#">ERJ2GEJ513X</a>	Panasonic	Res Thick Film 0402 51K Ohm 5% 0.1W(1/10W) ±200ppm/°C Pad SMD Automotive T/R
R5	1	<a href="#">CRCW06032R20JNEAHP</a>	Vishay	Res Thick Film 0603 2.2 Ohm 5% 0.25W(1/4W) ±200ppm/°C Pad SMD Automotive T/R
R9	1	<a href="#">ERJ3EKF5762V</a>	Panasonic	Res Thick Film 0603 57.6K Ohm 1% 0.1W(1/10W) ±100ppm/°C Pad SMD Automotive T/R
R11	1	<a href="#">ERJ3EKF5900V</a>	Panasonic	Res Thick Film 0603 590 Ohm 1% 0.1W(1/10W) ±100ppm/°C Pad SMD Automotive T/R
RF	1	<a href="#">ERJ3EKF2002V</a>	Panasonic	Res Thick Film 0603 20K Ohm 1% 0.1W(1/10W) ±100ppm/°C Pad SMD Automotive T/R
RFB1	1	<a href="#">ERJ3EKF4642V</a>	Panasonic	Res Thick Film 0603 46.4K Ohm 1% 0.1W(1/10W) ±100ppm/°C Pad SMD Automotive T/R
RFB2	1	<a href="#">ERJ3EKF1022V</a>	Panasonic	Res Thick Film 0603 10.2K Ohm 1% 0.1W(1/10W) ±100ppm/°C Pad SMD Automotive T/R
RT	1	<a href="#">ERJ3EKF2742V</a>	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 10:34:10**

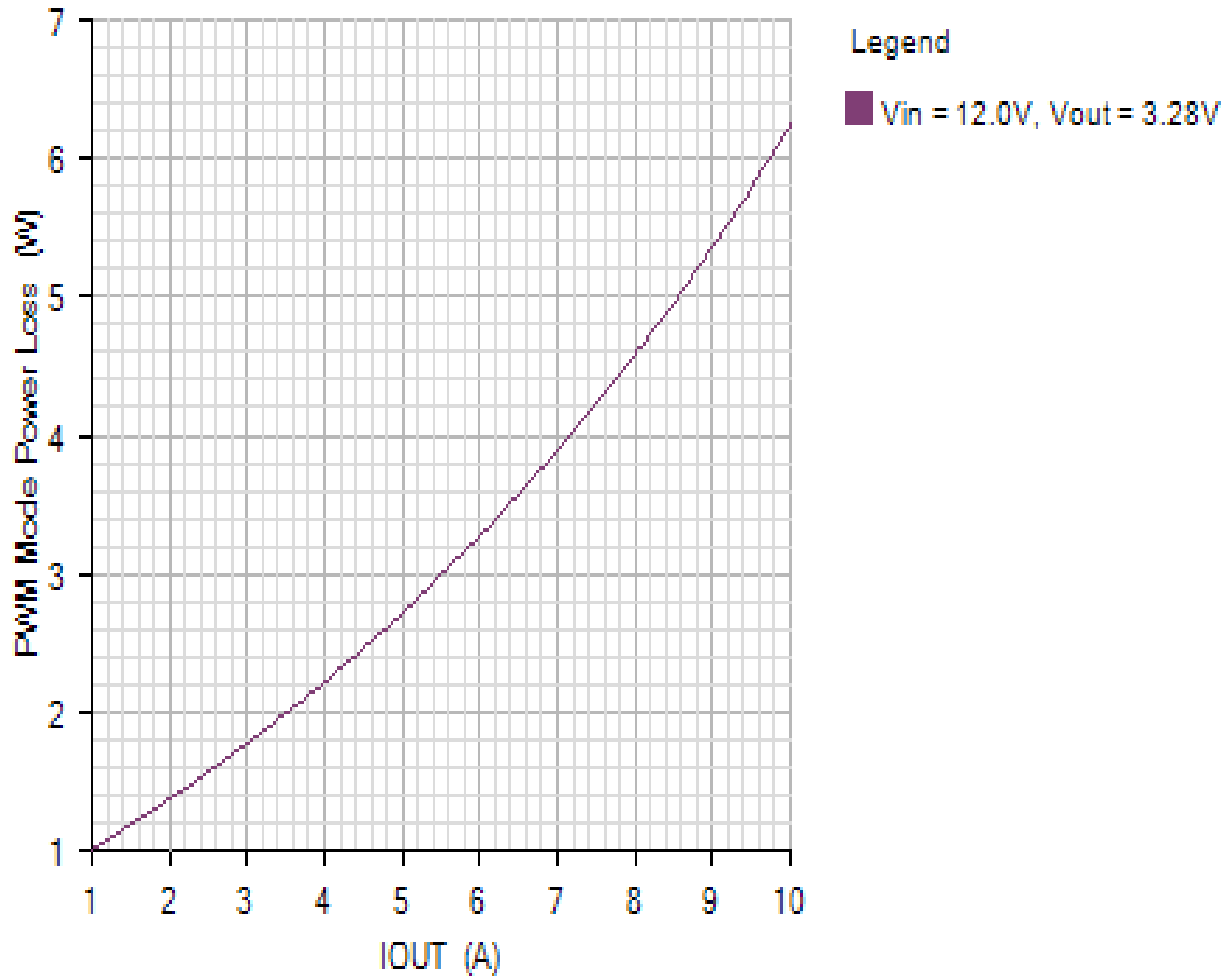
EFFICIENCY

Default

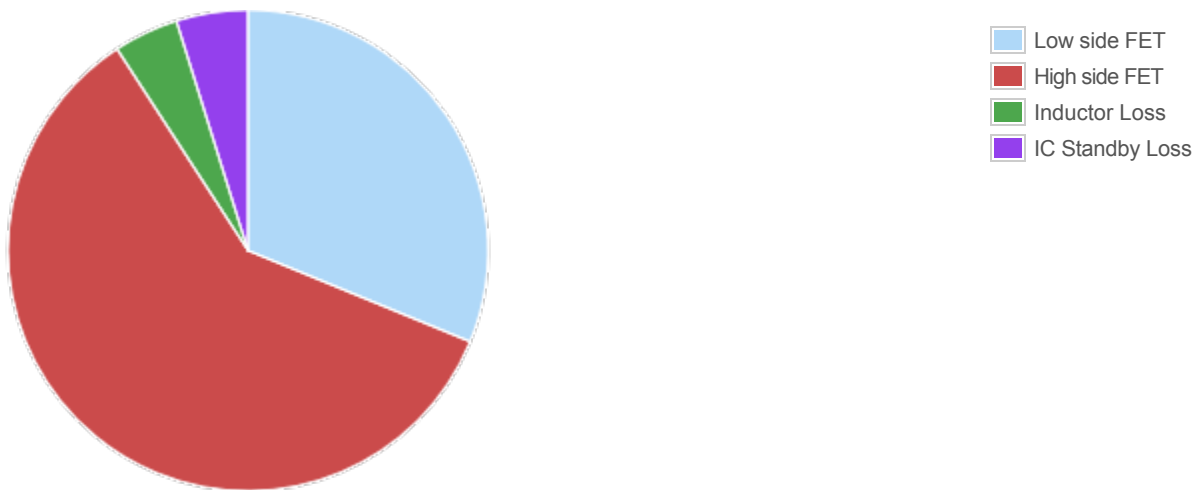


POWER\_LOSS

Default



Losses



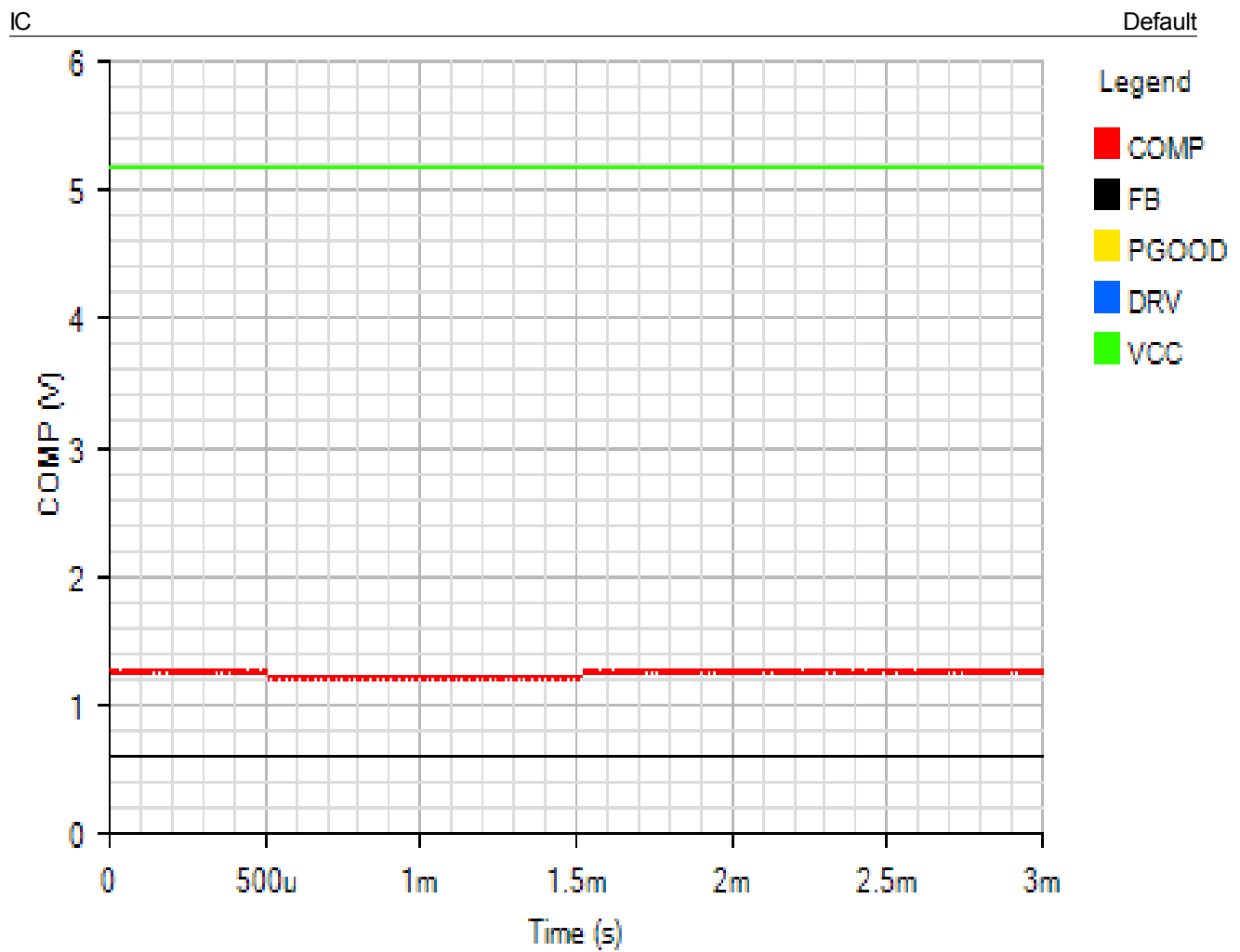
Component

Loss (W)

% of total

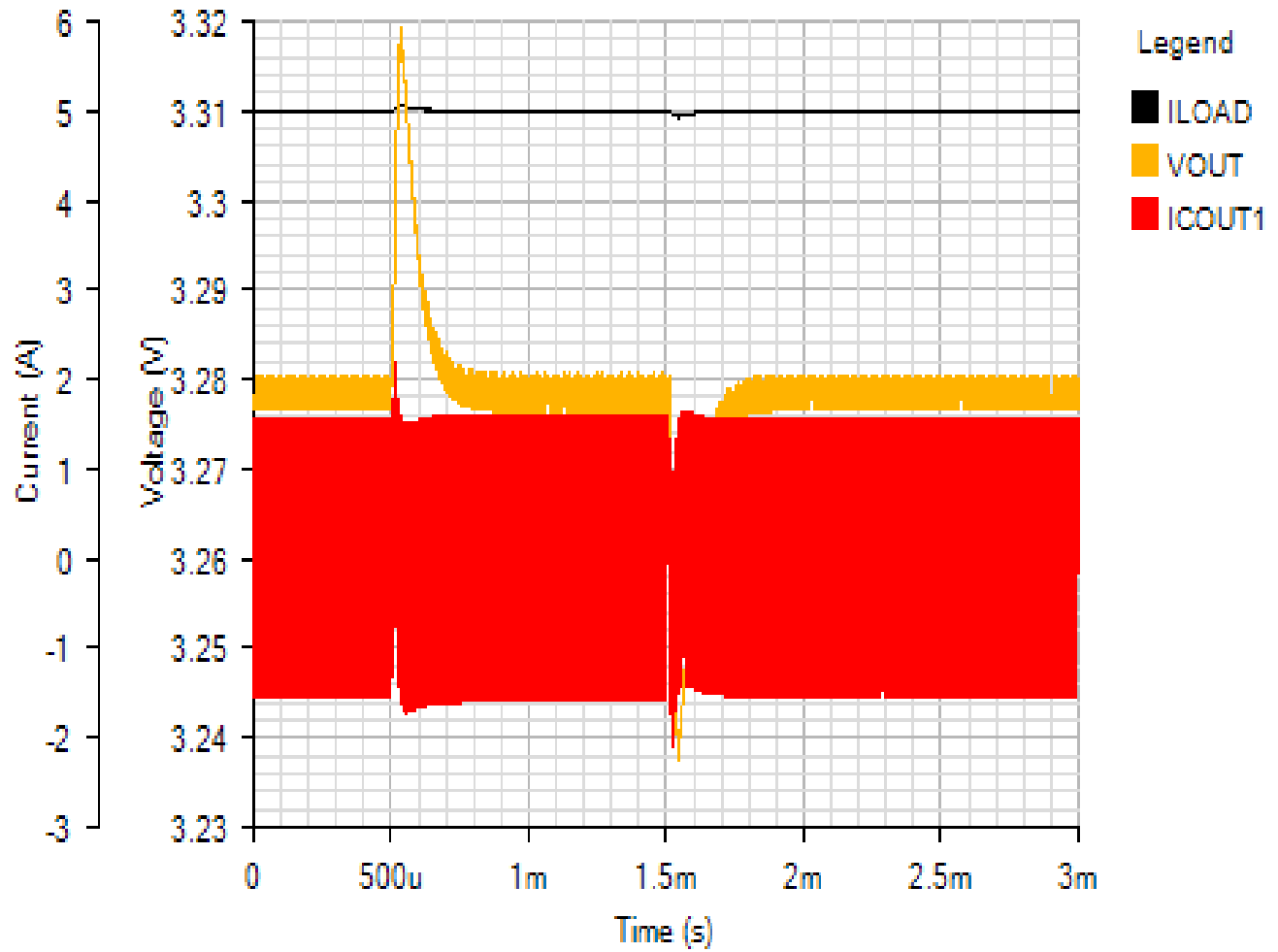
Component	Loss (W)	% of total
Low side FET	1.952136	31.2
High side FET	3.732495	59.6
Inductor Loss	0.273397	4.4
IC Standby Loss	0.3018	4.8
Total	6.259827	100

Line Transient - Mon Nov 19 2018 10:34:10

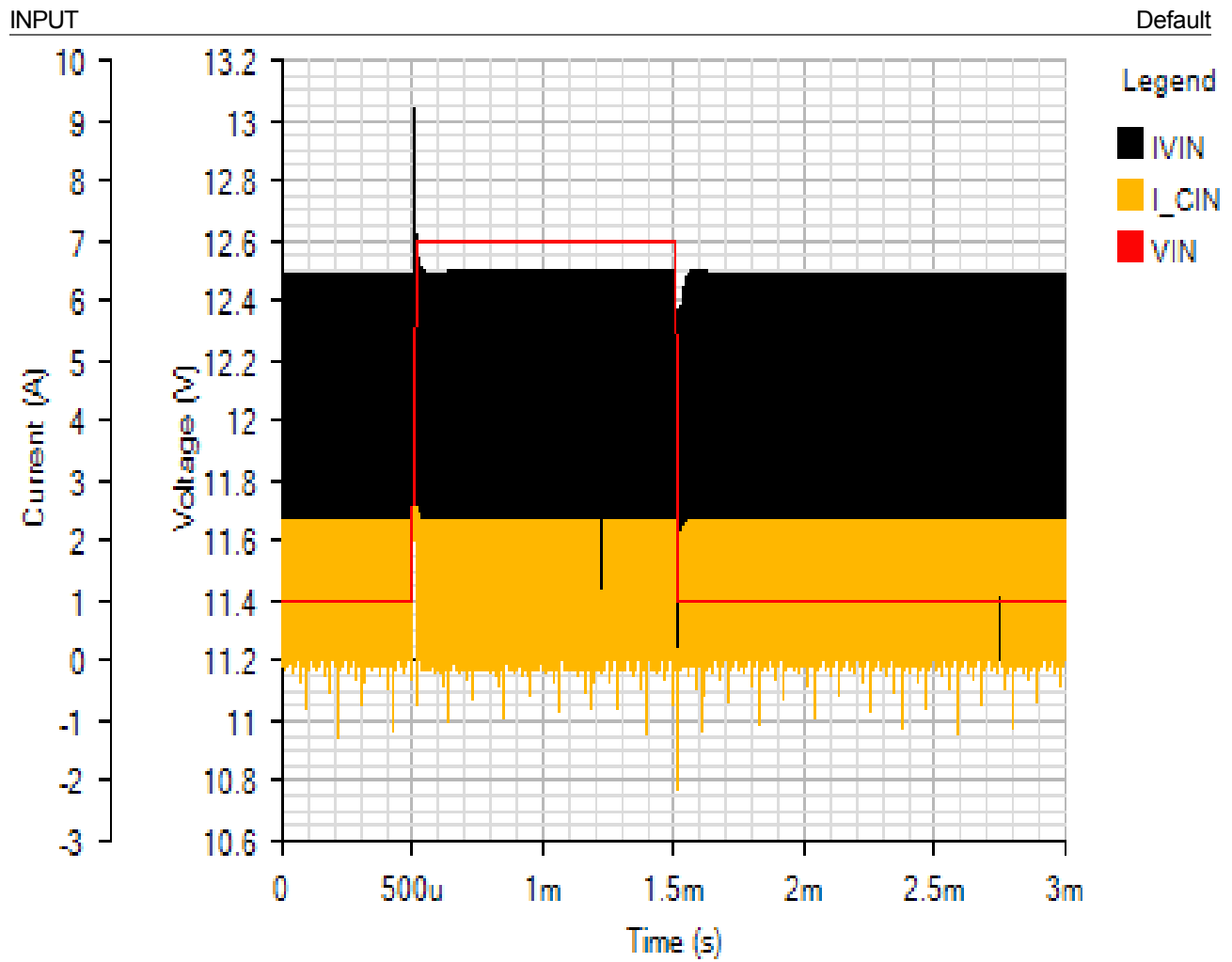


OUTPUT

Default

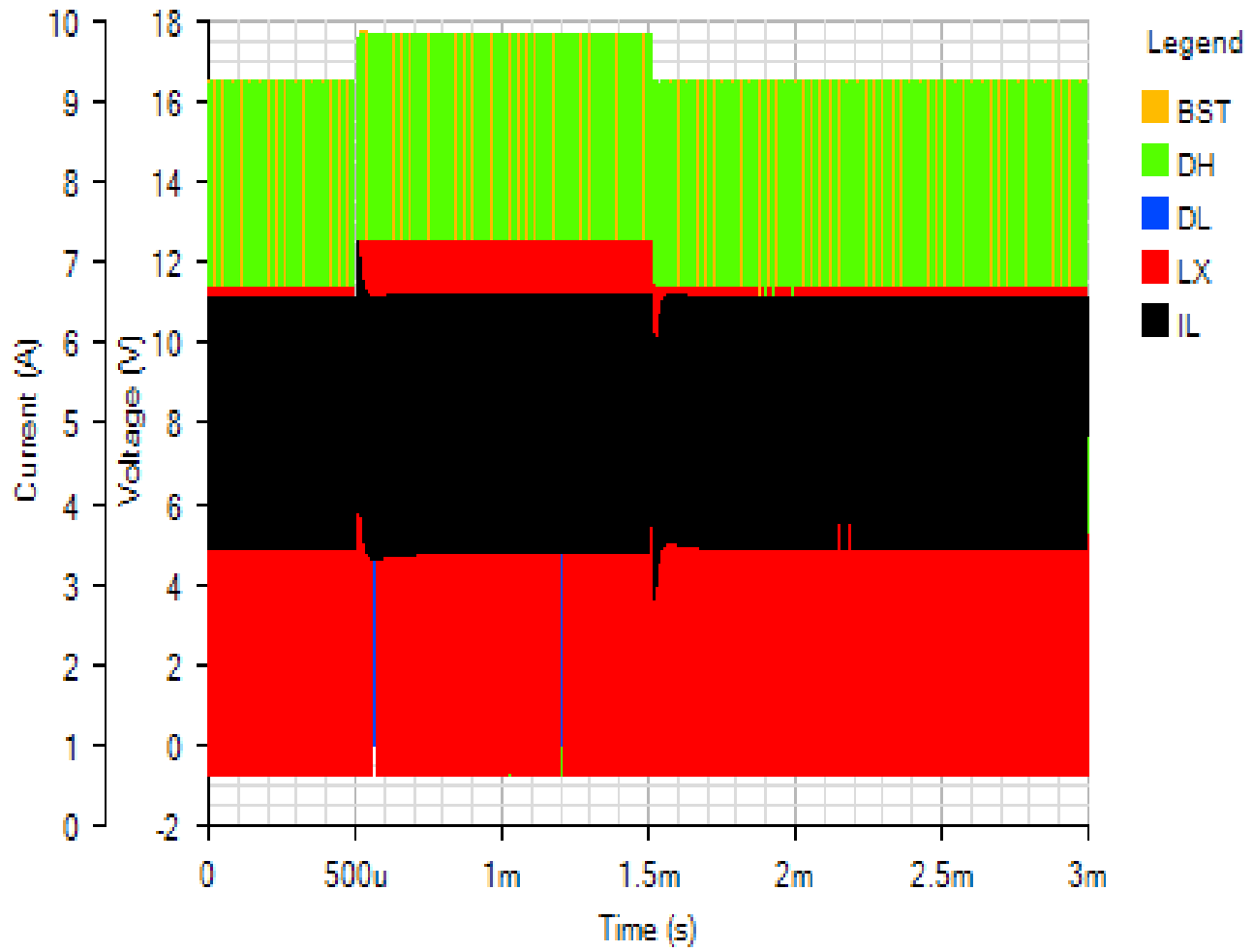




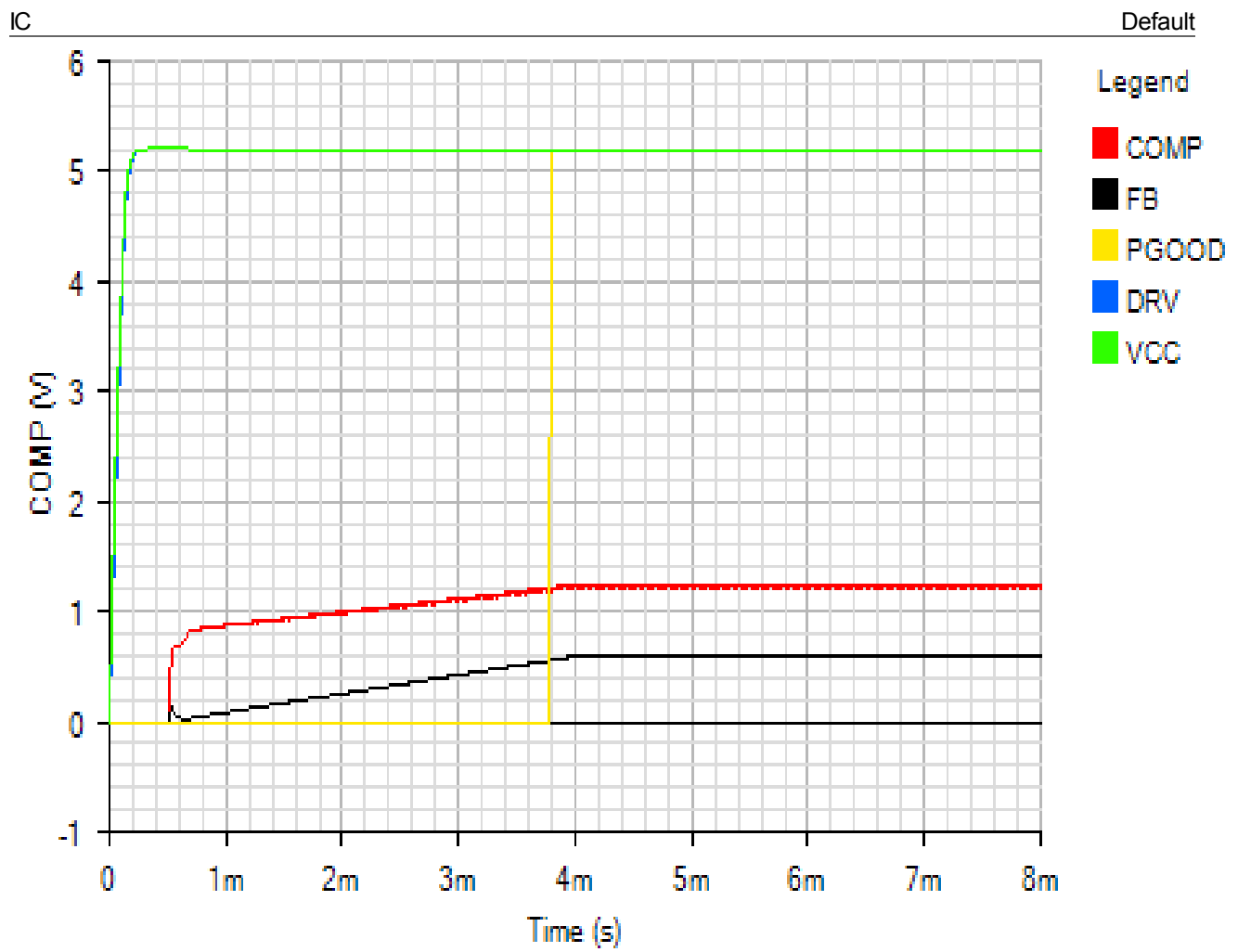


SWITCHING

Default

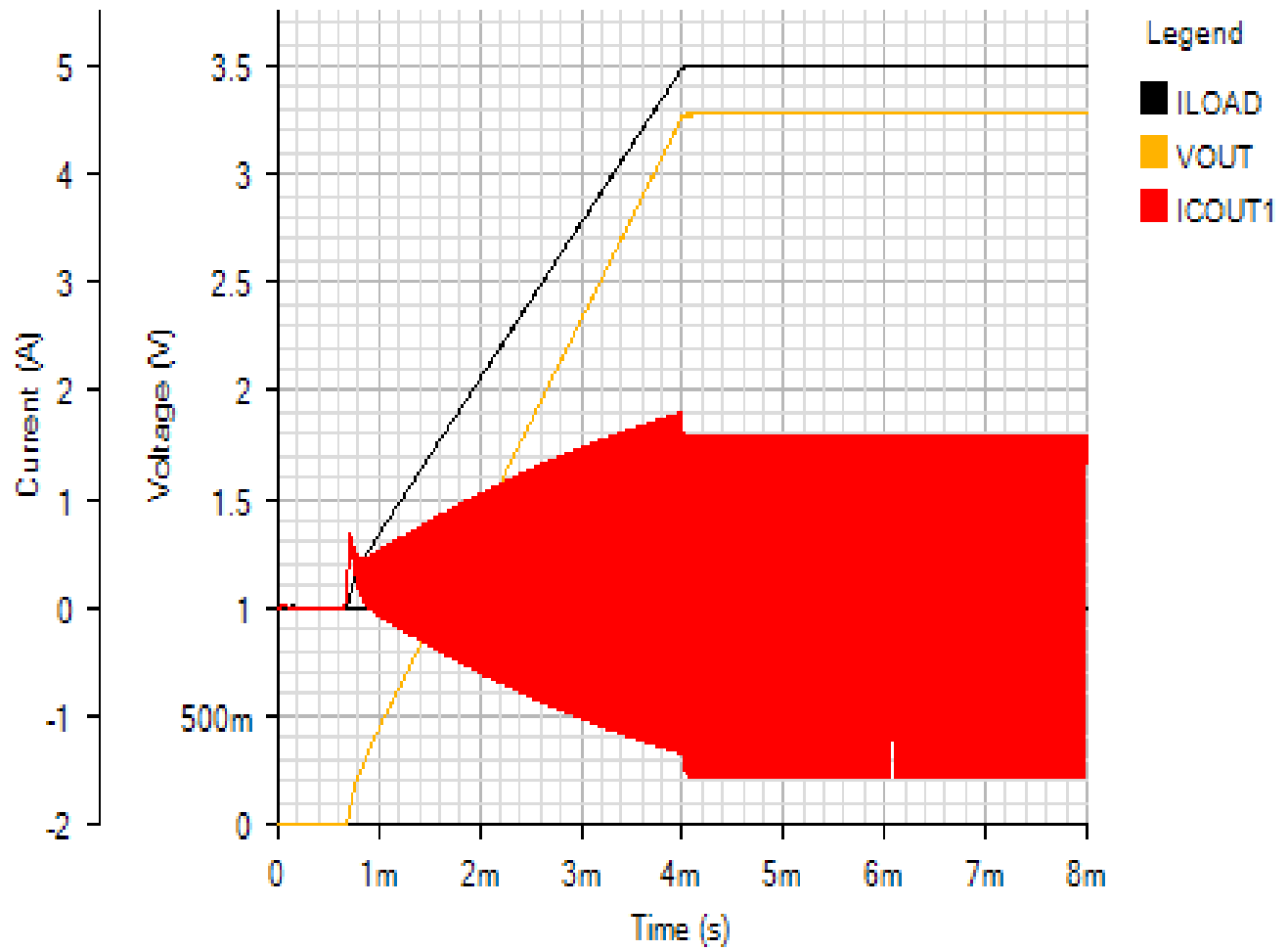


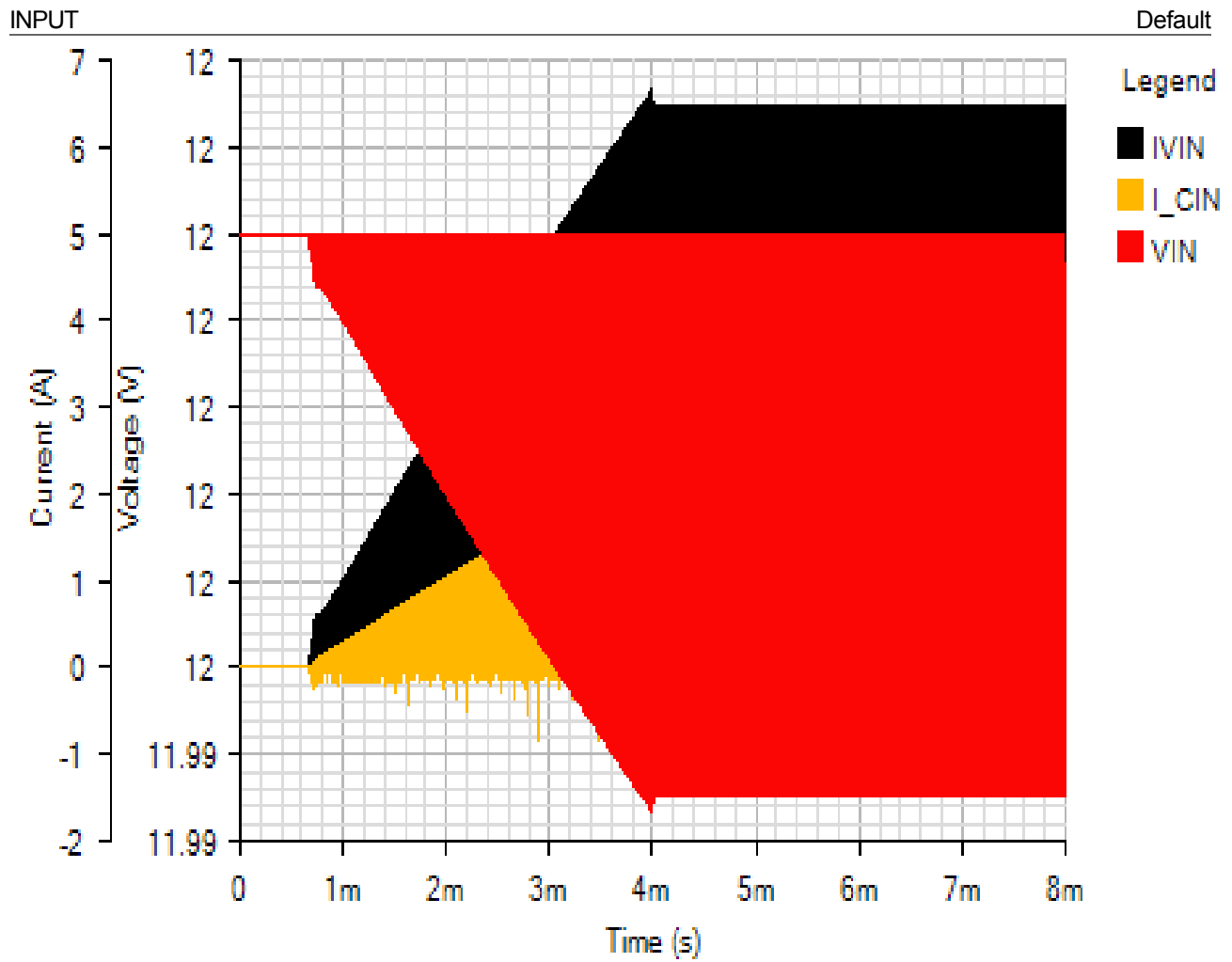
Start Up - Mon Nov 19 2018 10:34:10



OUTPUT

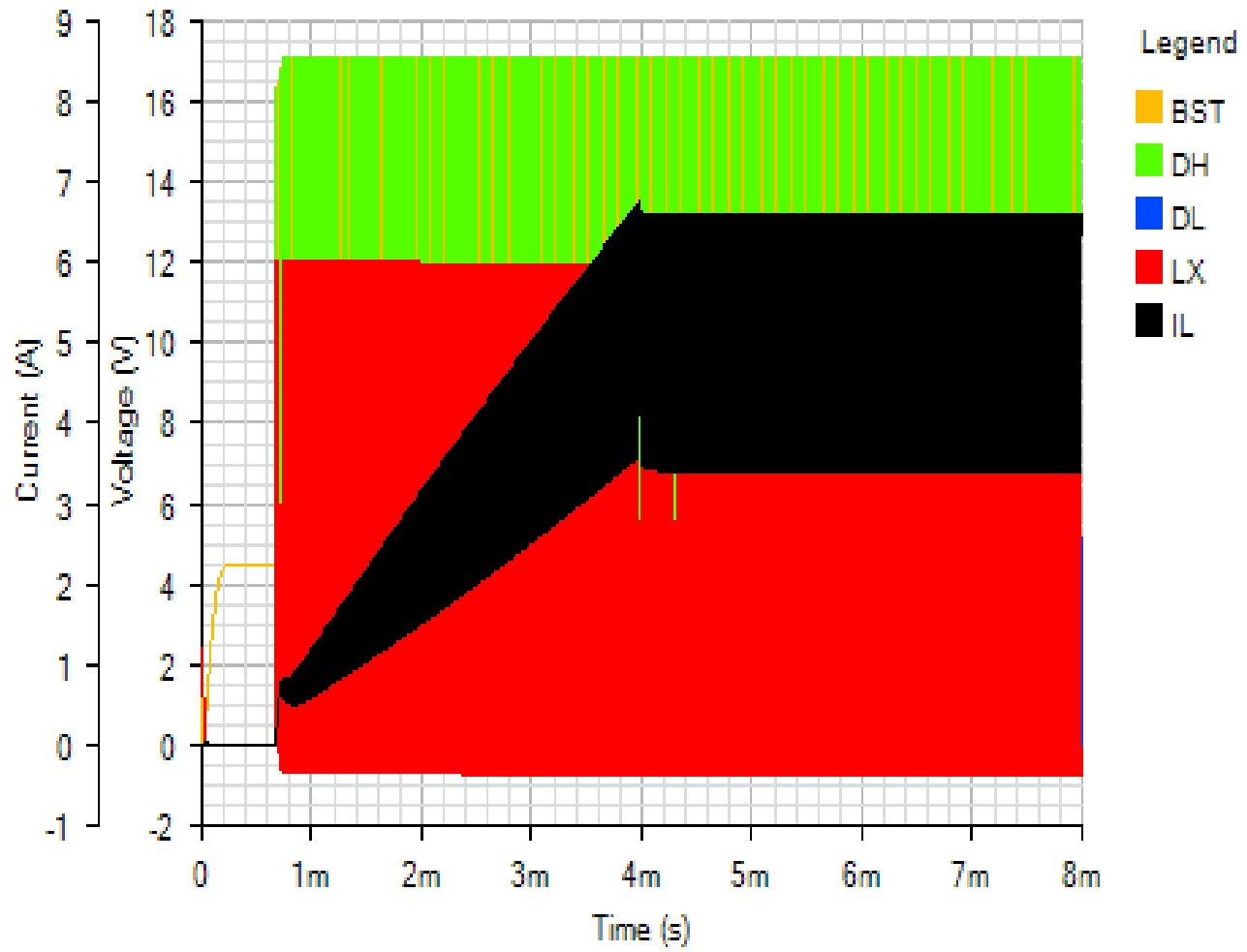
Default





SWITCHING

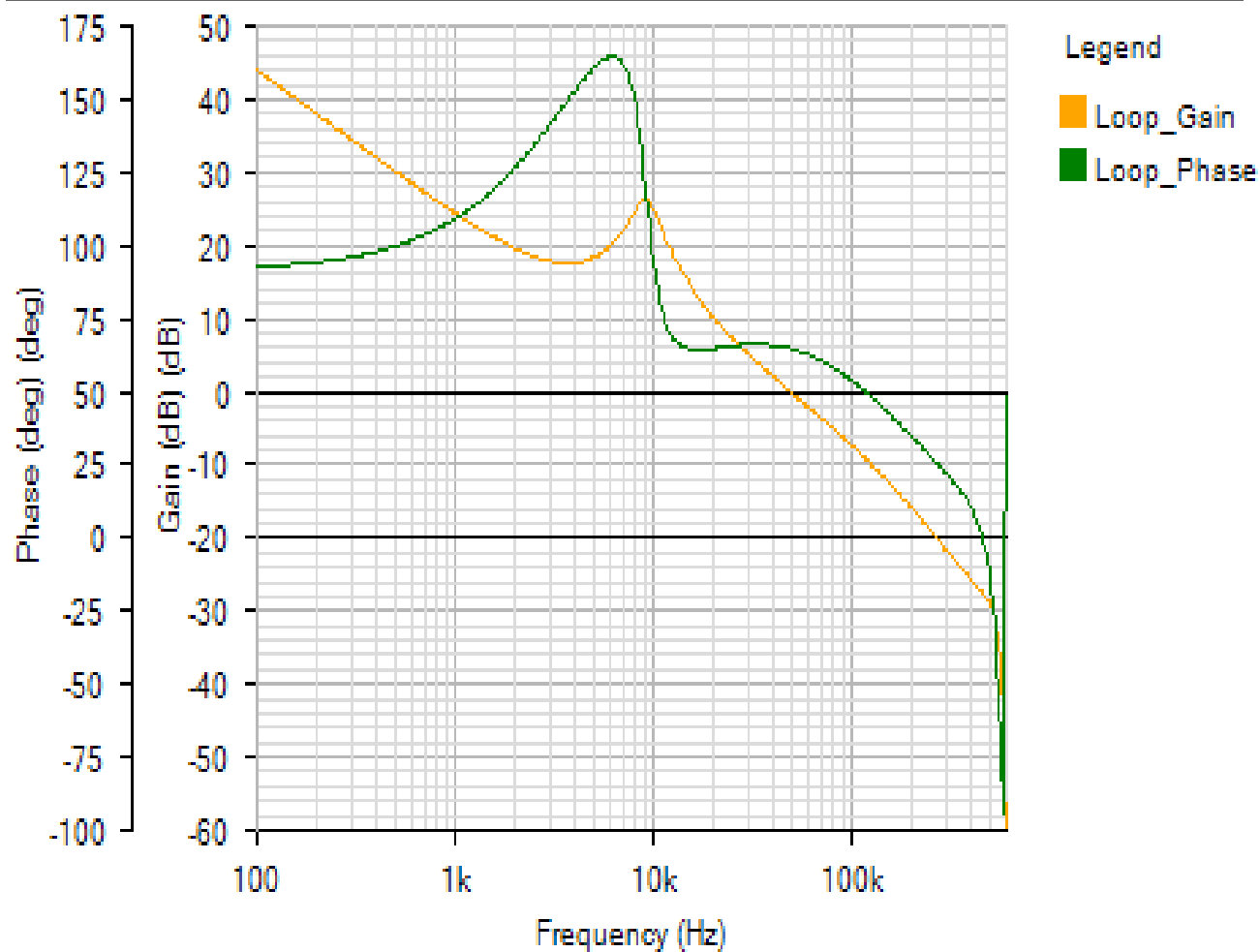
Default



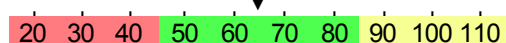
AC Loop - Mon Nov 19 2018 10:34:10

BODE

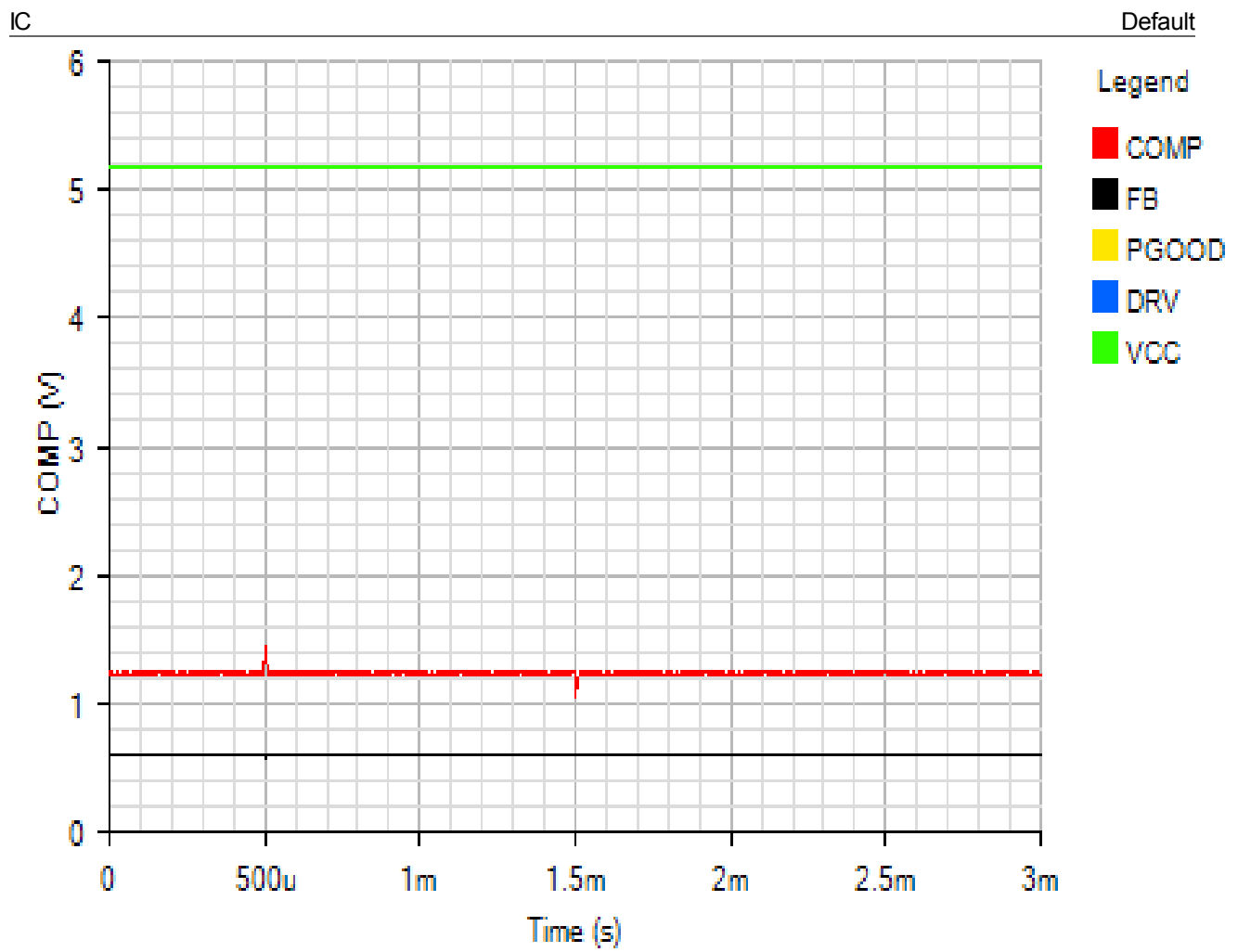
Default



Phase Margin: 64.75° at a crossover frequency of 48.9kHz



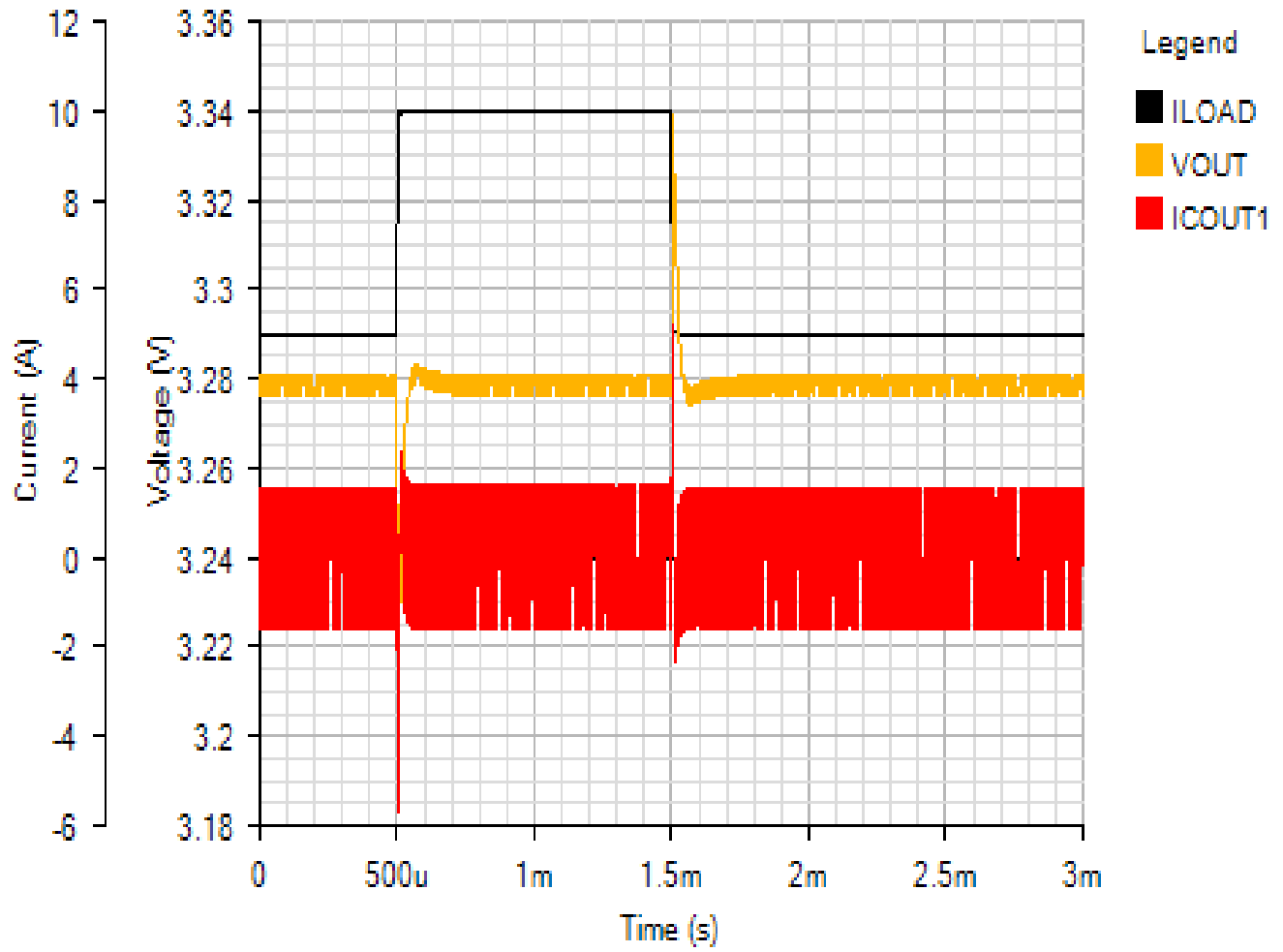
Load Step - Mon Nov 19 2018 10:34:10

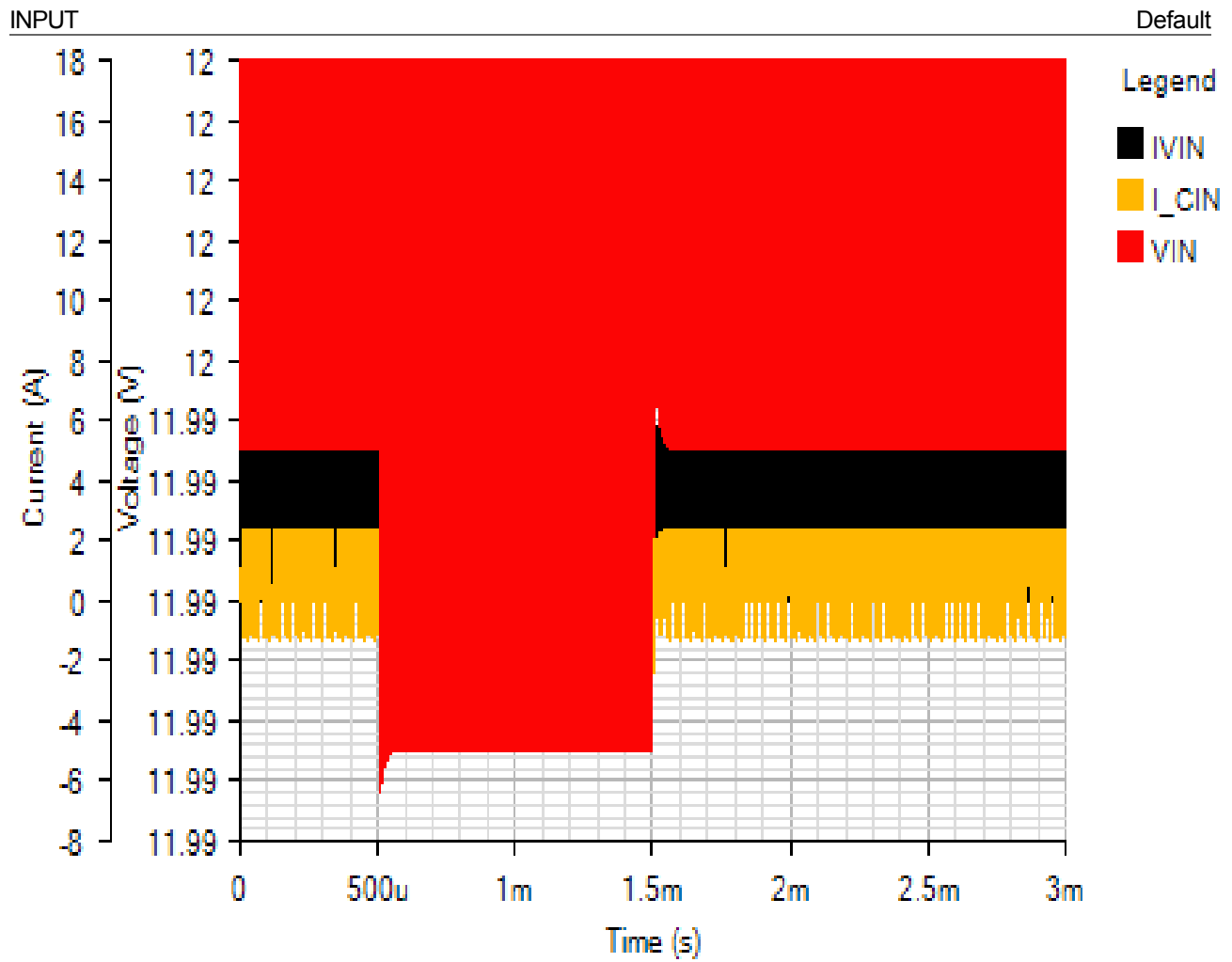




OUTPUT

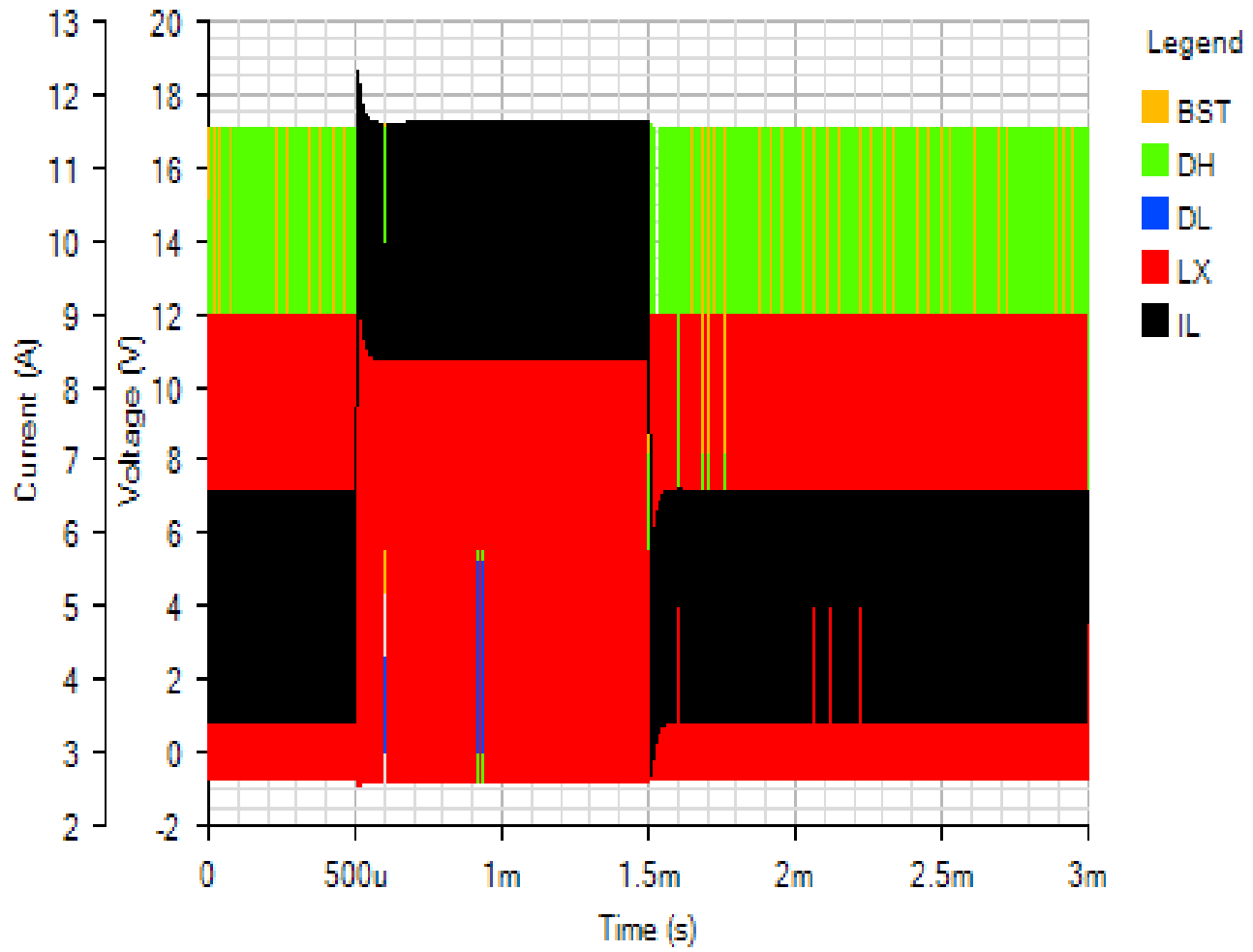
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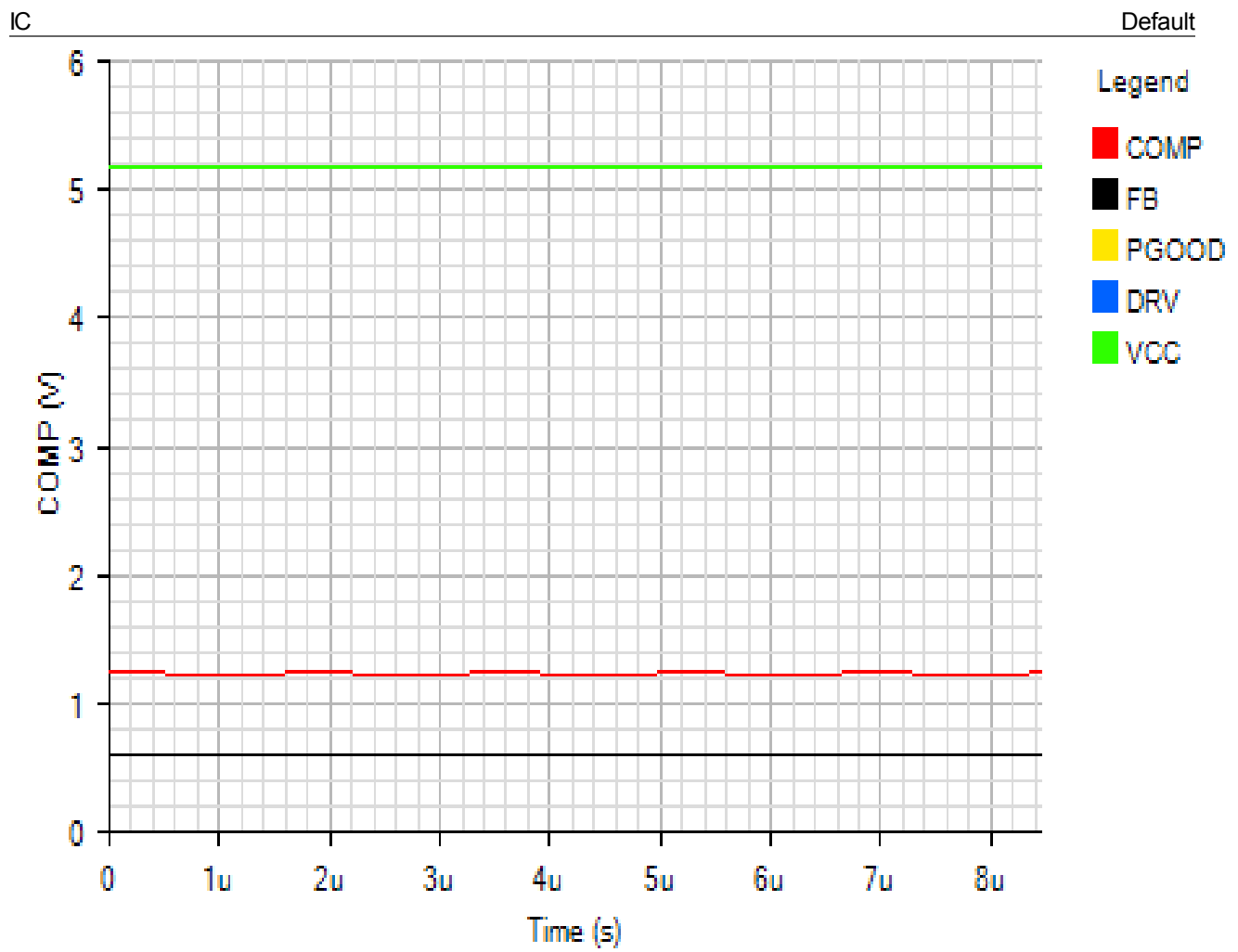


SWITCHING

Default

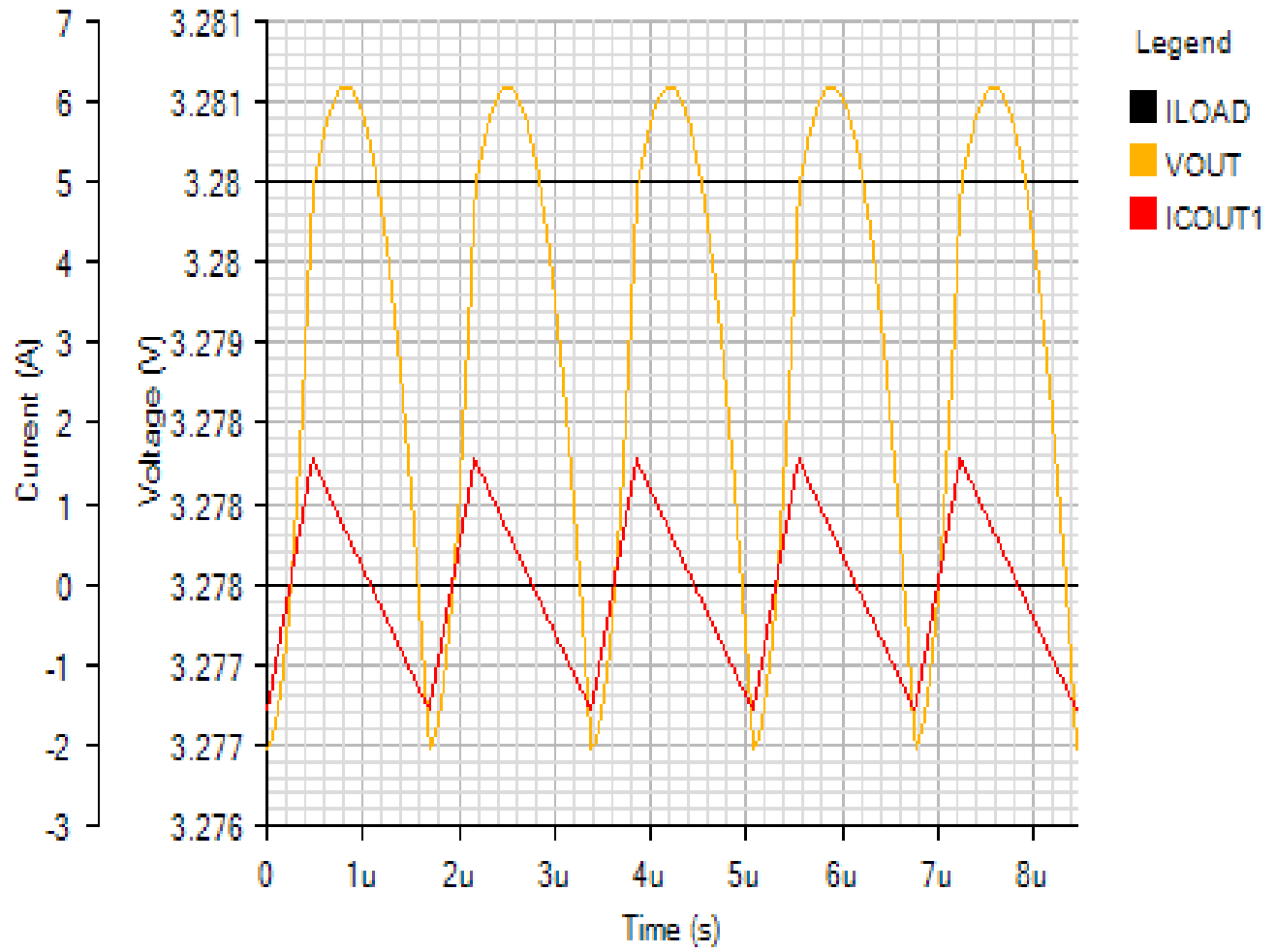


Steady State - Mon Nov 19 2018 10:34:10



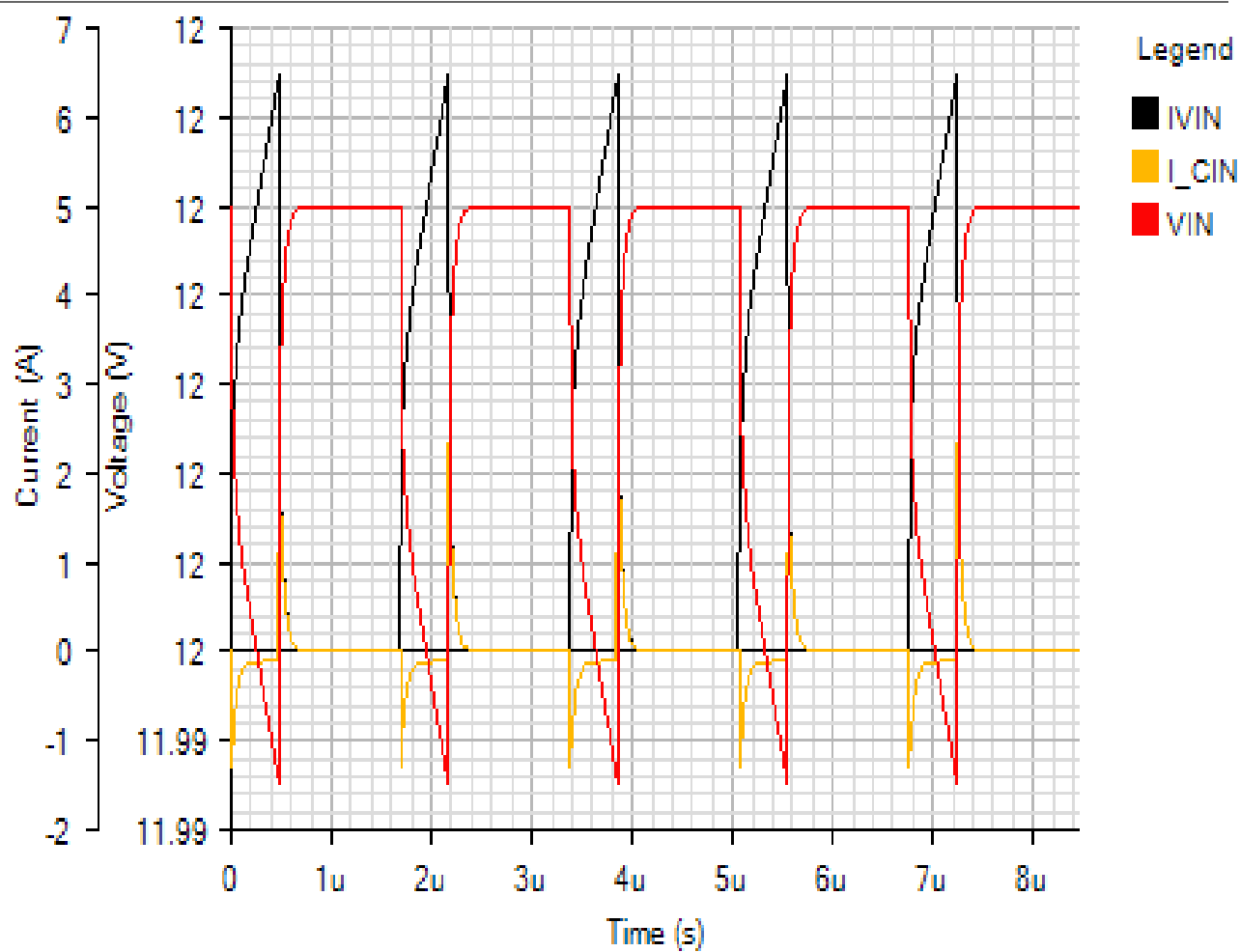
OUTPUT

Default



INPUT

Default



SWITCHING

Default

