Initial Design
1.0

Design Requirements

Parameter	Value
Minimum Input Voltage	6.5V
Maximum Input Voltage	36V
Nominal Input Voltage	24V
Input Steady-State Ripple	5%
Input Undervoltage Lockout Level	5.5V
Output Voltage	5V
Load Current	3.5A
Load Step Start Current	1.75A
Load Step Current	3.5A
Load Step Edge Rate	10A/us
Output Voltage Load Step Over/Undershoot	3%
Performance Priority	Balance Efficiency and Size
Cost Priority	Low Cost
Mode of Operation	PWM
Switching Frequency	500kHz
Ambient Temperature	25°C
Soft Start time	1ms

Schematic
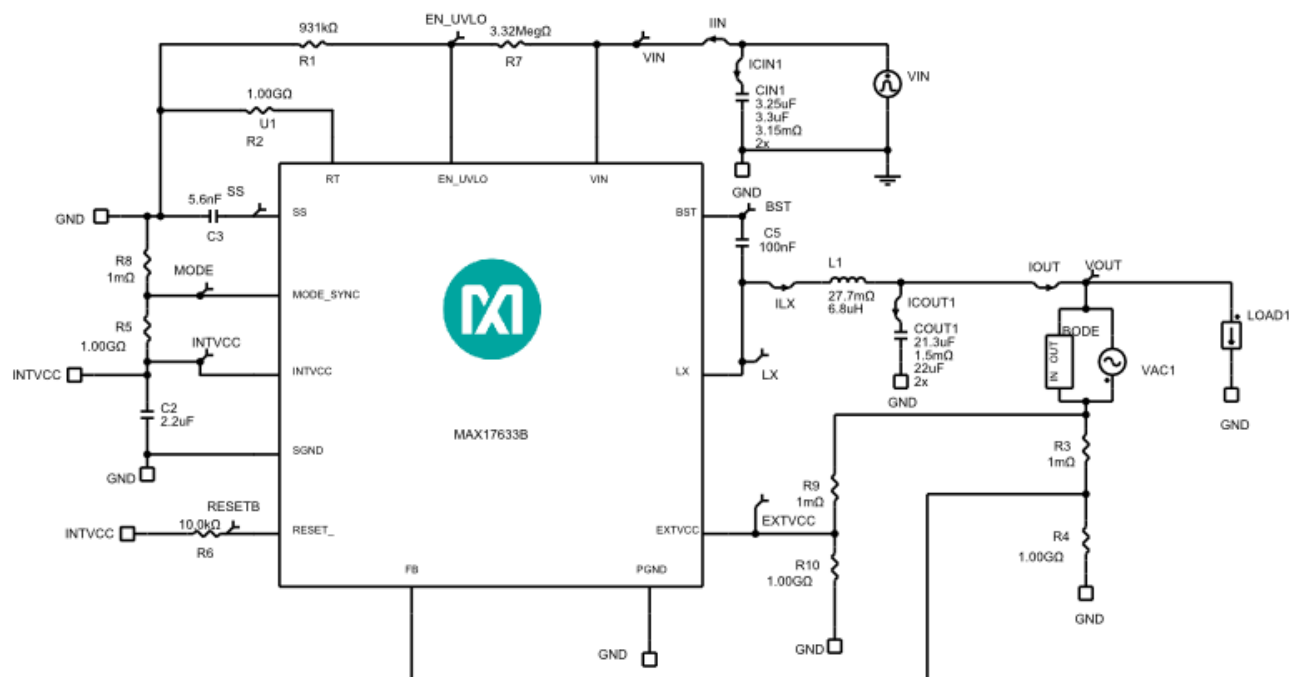
NOTE:
1.a. For PWM mode: R8=1mohm,R5=1Gohm
1.b. For DCM Mode: R8=1Gohm, R5=1mohm
1.c. For PFM mode: R8=1Gohm, R5=1Gohm
2. If output current is low enough to enter PFM mode then POP analysis (and SS and AC Loop) may not be available (showing as failed).
3. For optimal layout, Parallel capacitors are preferred at the Input and Output.

BOM

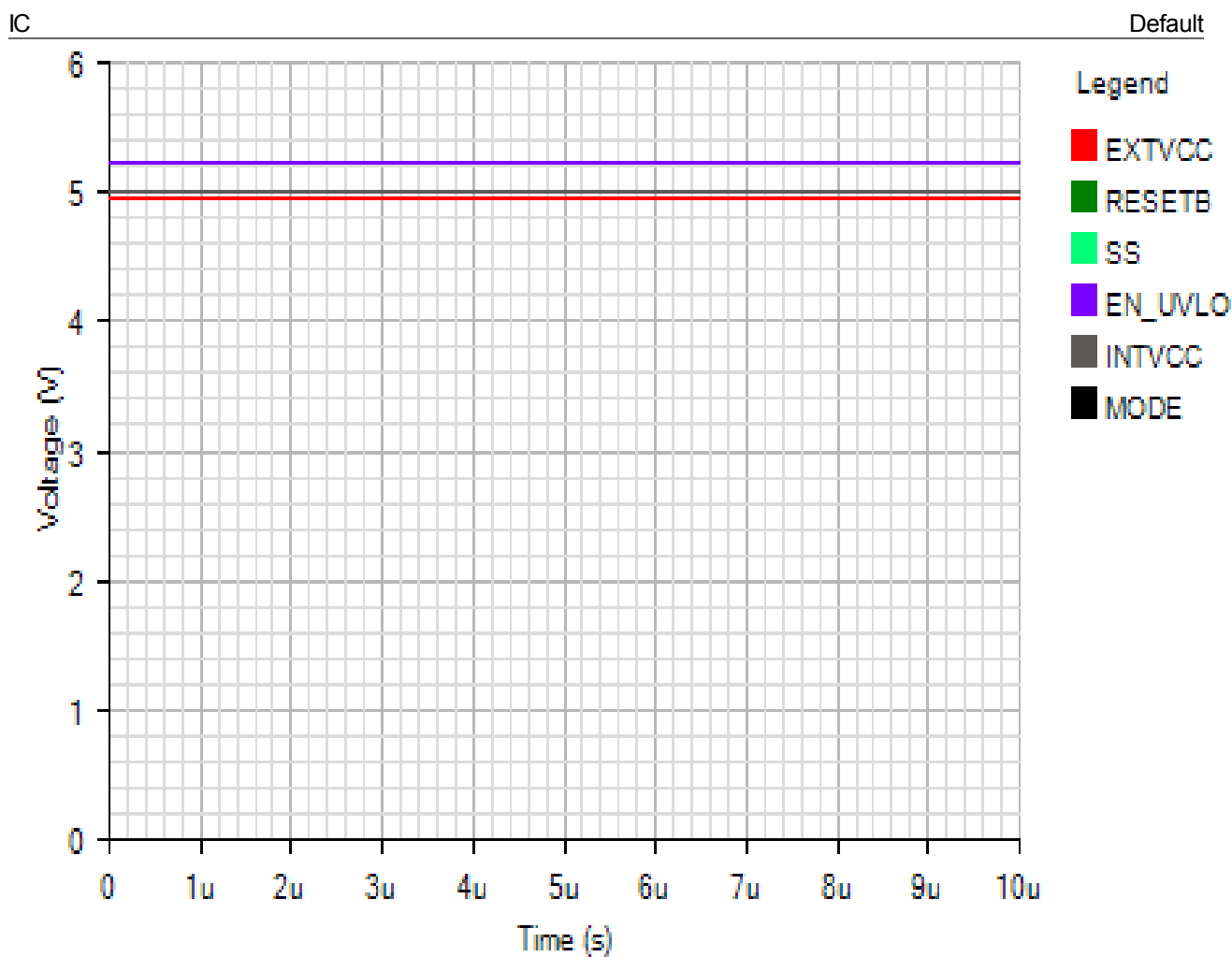| Ref	Qty	Part Number	Manufacturer	Description
U1	1	MAX17633B	User-Defined	IC
C2	1	C1608X7R1A225K080AC	TDK	Cap Ceramic 2.2uF 10V X7R 10% Pad SMD 0603 125°C T/R
C3	1	C0402C562K8RACTU	KEMET Corporation	Cap Ceramic 0.0056uF 10V X7R 10% Pad SMD 0402 125°C T/R
C5	1	GCM155R71C104KA55D	Murata Manufacturing	Cap Ceramic 0.1uF 16V X7R 10% Pad SMD 0402 125°C Automotive T/R
CIN1	2	CGA6P3X7R1H335K250AB	TDK	Cap Ceramic 3.3uF 50V X7R 10% SMD 1210 125C Plastic T/R
COUT1	2	GRM32ER71A226KE20L	Murata	Cap Ceramic 22uF 10V X7R 10% SMD 1210 125C Embossed T/R
L1	1	MSS1246-682MLB	Coilcraft	Inductor 6.8uH 20% 24.9mOhm 7.7A Isat 5.2A Irms
R1	1	CRG0402-P-9313FT	Venkel	Res Thick Film 0402 931K Ohm 1% 0.063W(1/16W) ±100ppm/°C Pad SMD T/R
R6	1	RCA040210K0FKED	Vishay	Res Thick Film 0402 10K Ohm 1% 0.063W(1/16W) ±100ppm/°C Sulfur Resistant Pad SMD Automotive T/R
				Res Thick Film 0402 3.32M Ohm 1%

| R7 | 1 | CRG0402-P-3324FT | Venkel | 0.063W(1/16W) ±300ppm/°C Pad SMD T/R |

Simulation Results

Steady State - Tue Nov 20 2018 13:30:58

IC   Default

OUTPUT

Legend

ICOUT1
VOUT
IOUT

INPUT

Legend

- ICIN1
- IIN
- VIN
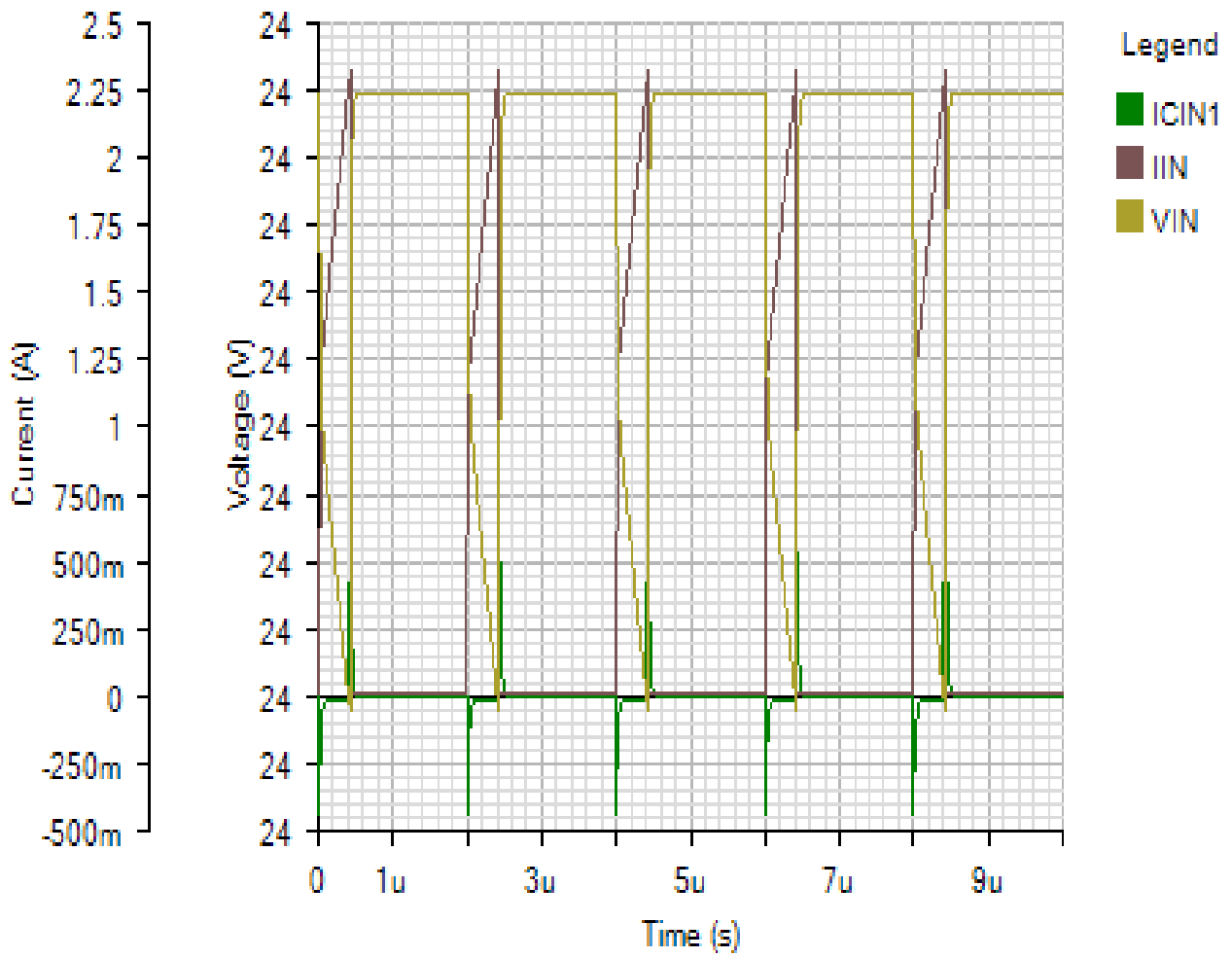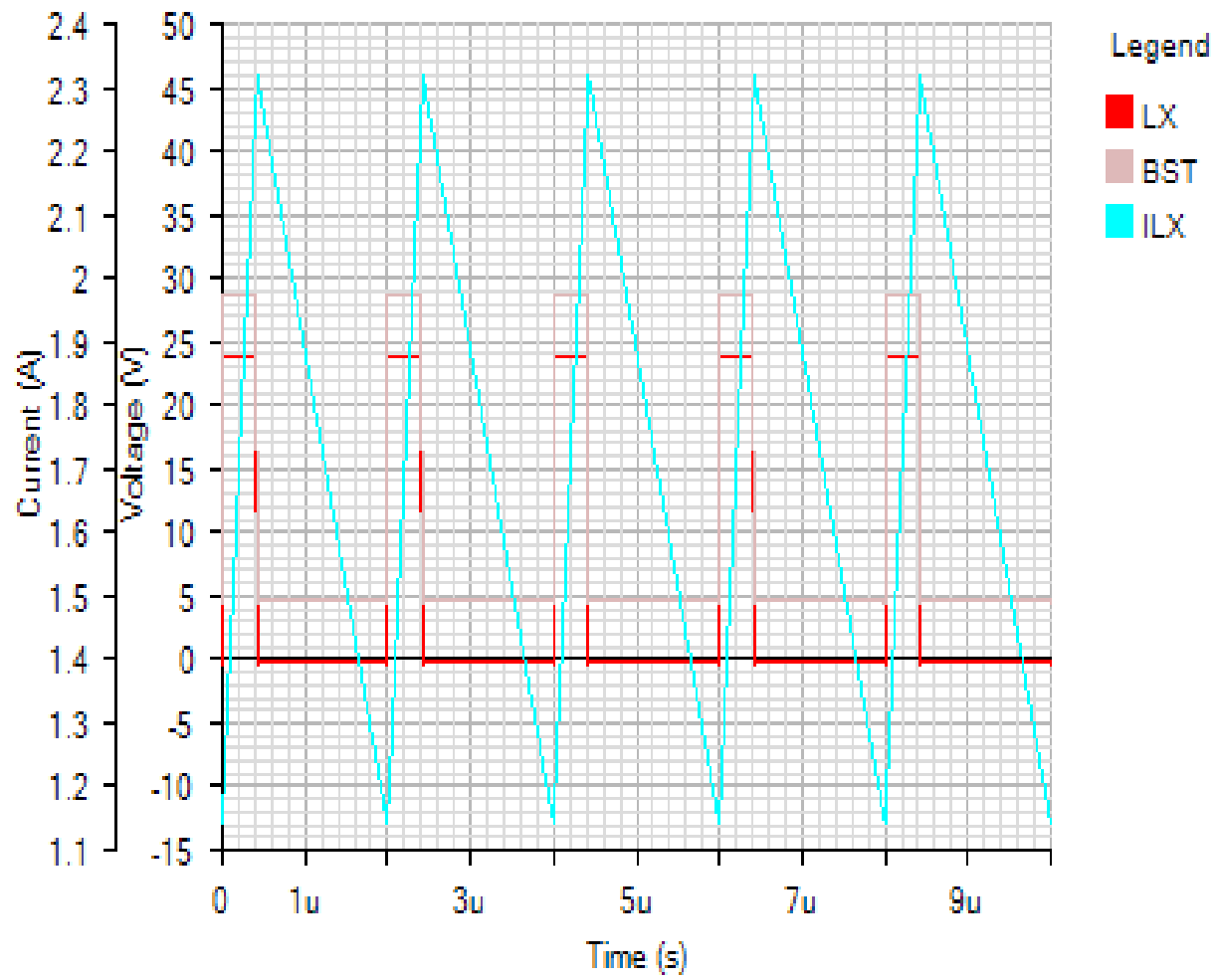
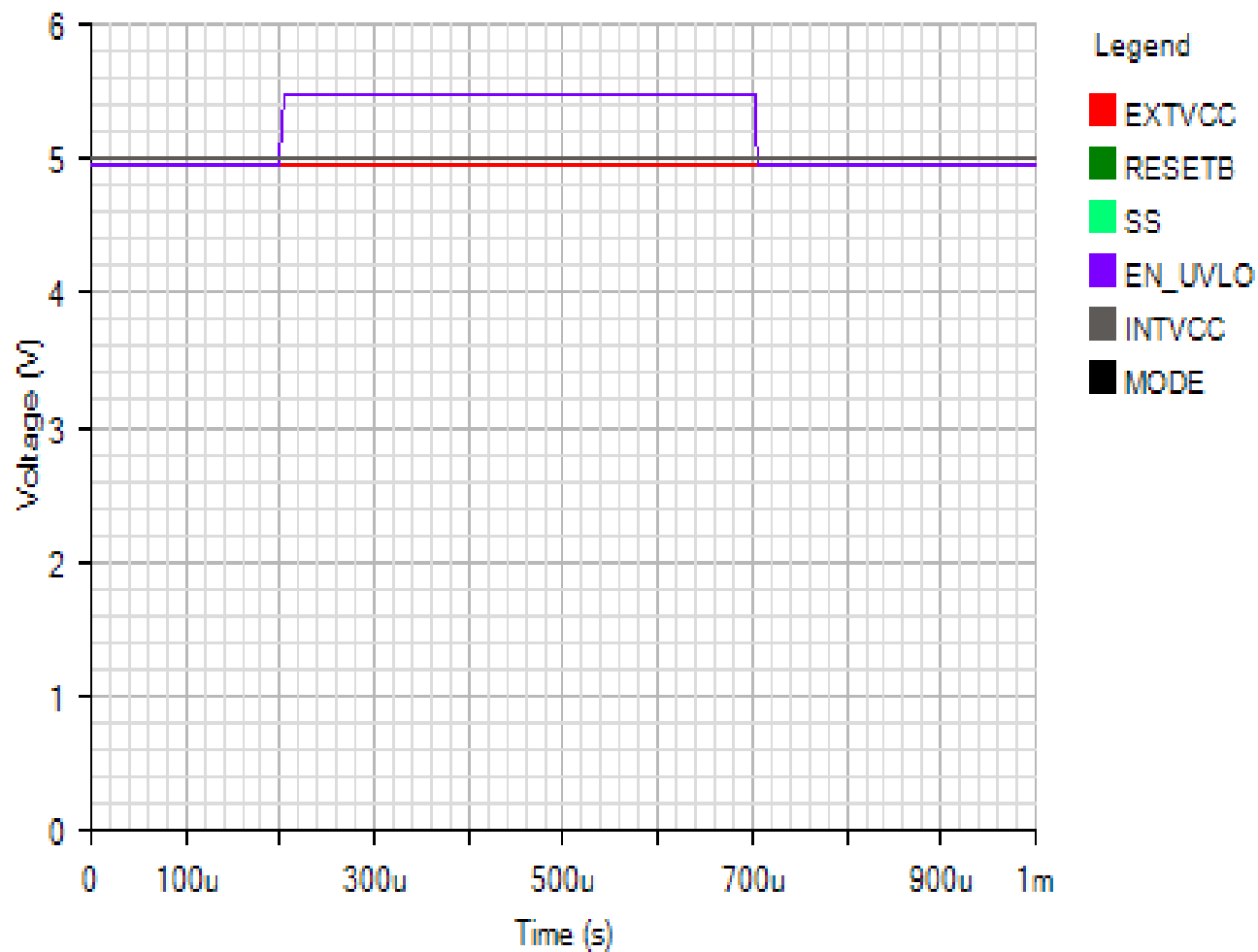SWITCHING   Default

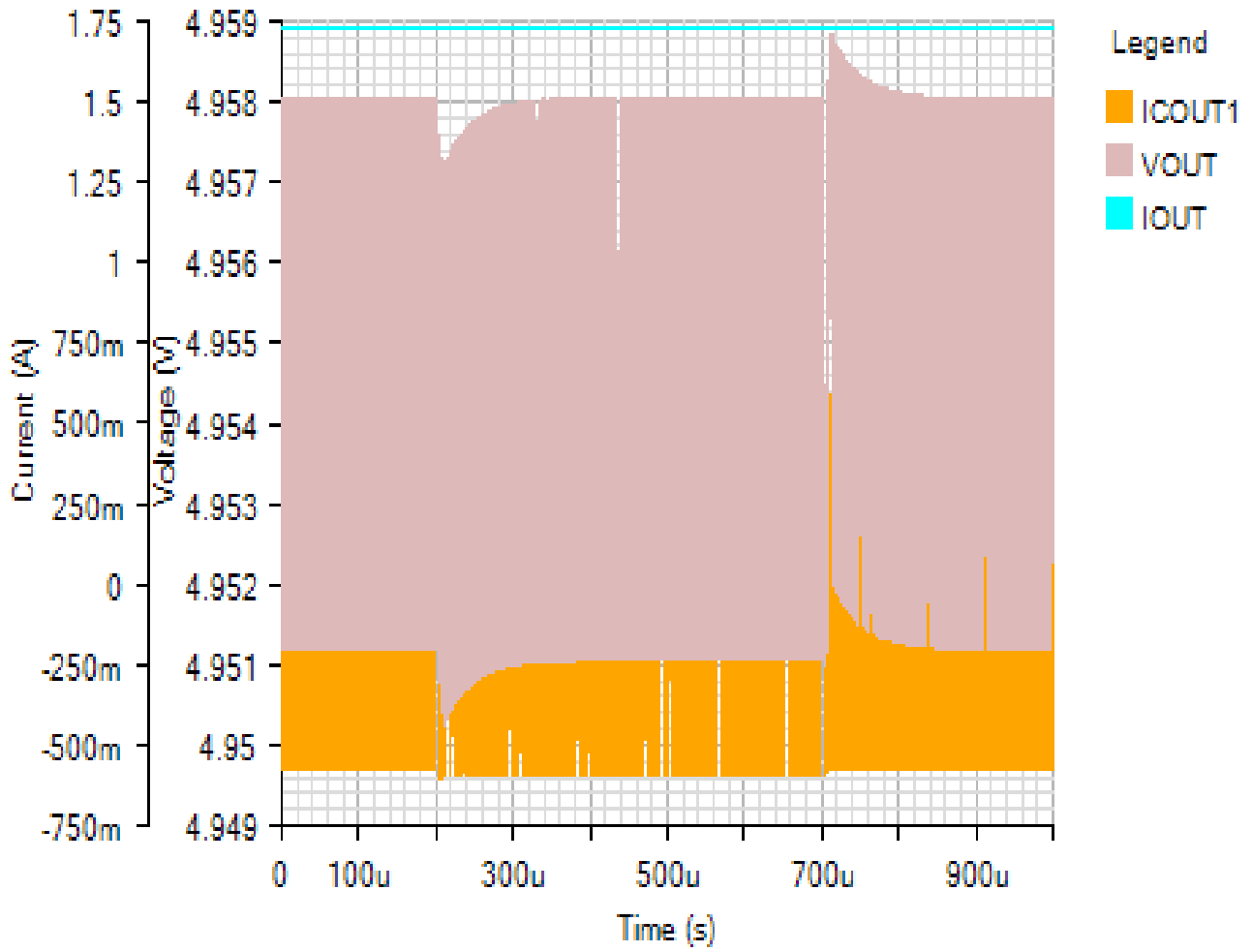**Line Transient - Tue Nov 20 2018 13:30:58**

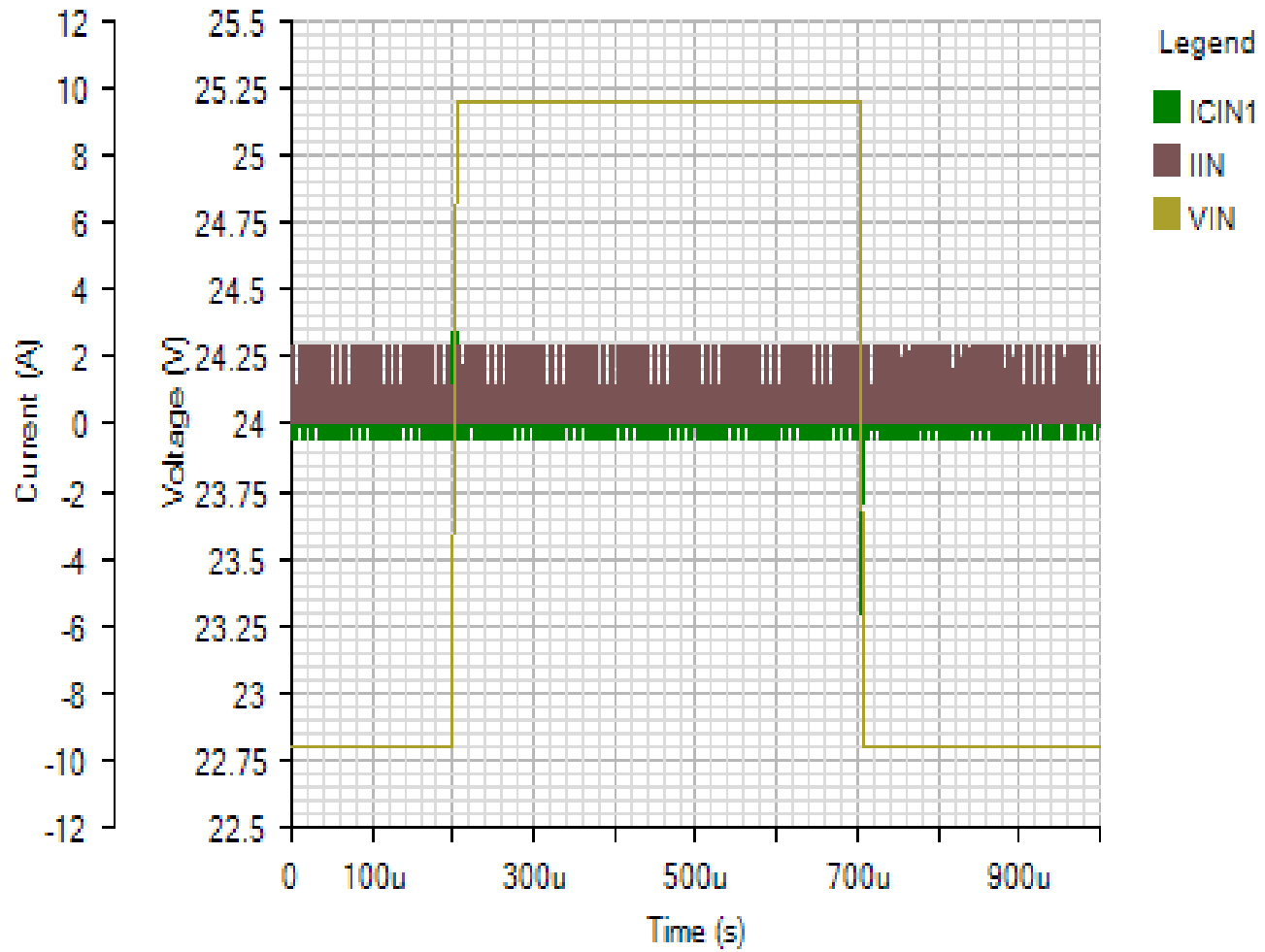IC   Default
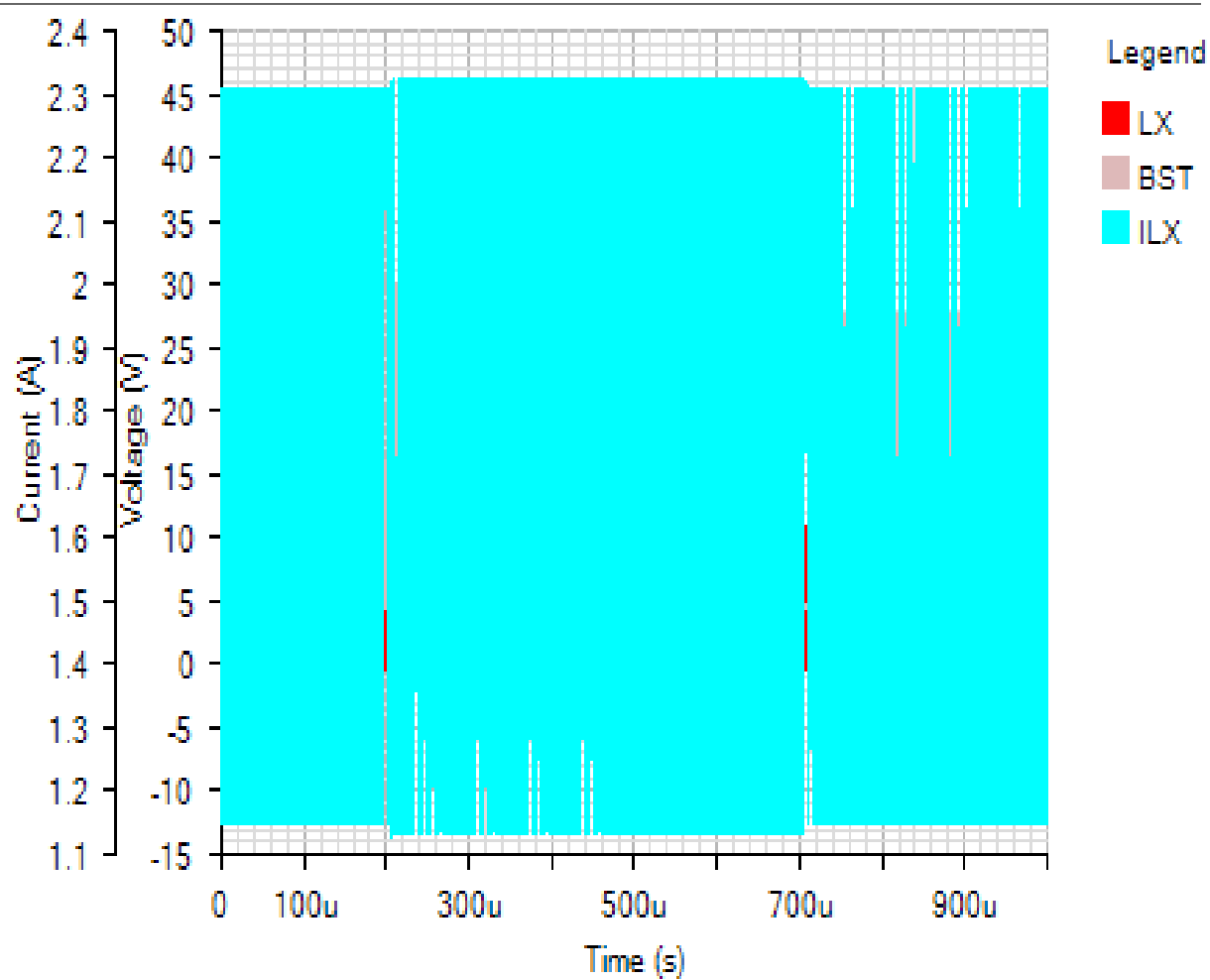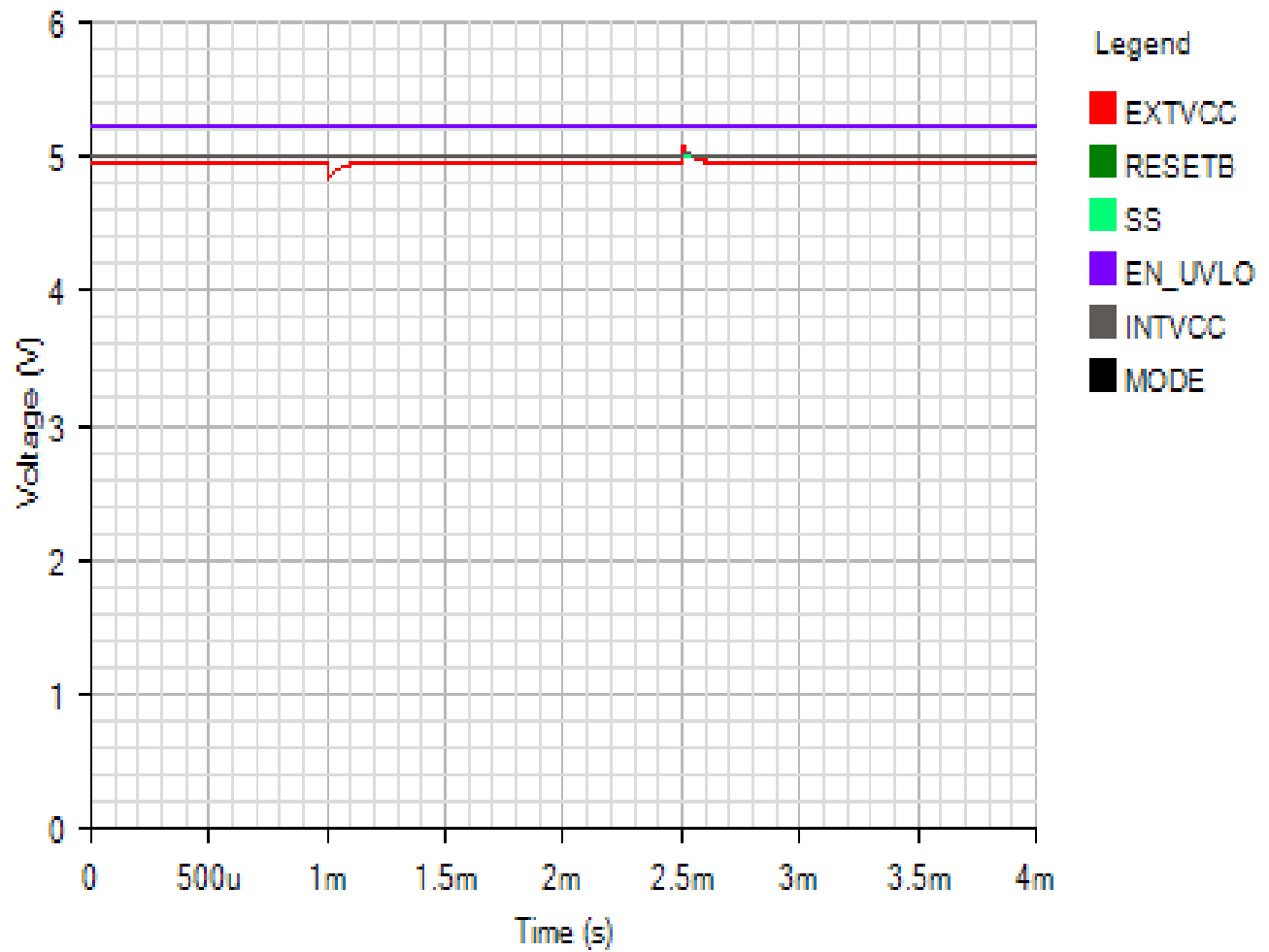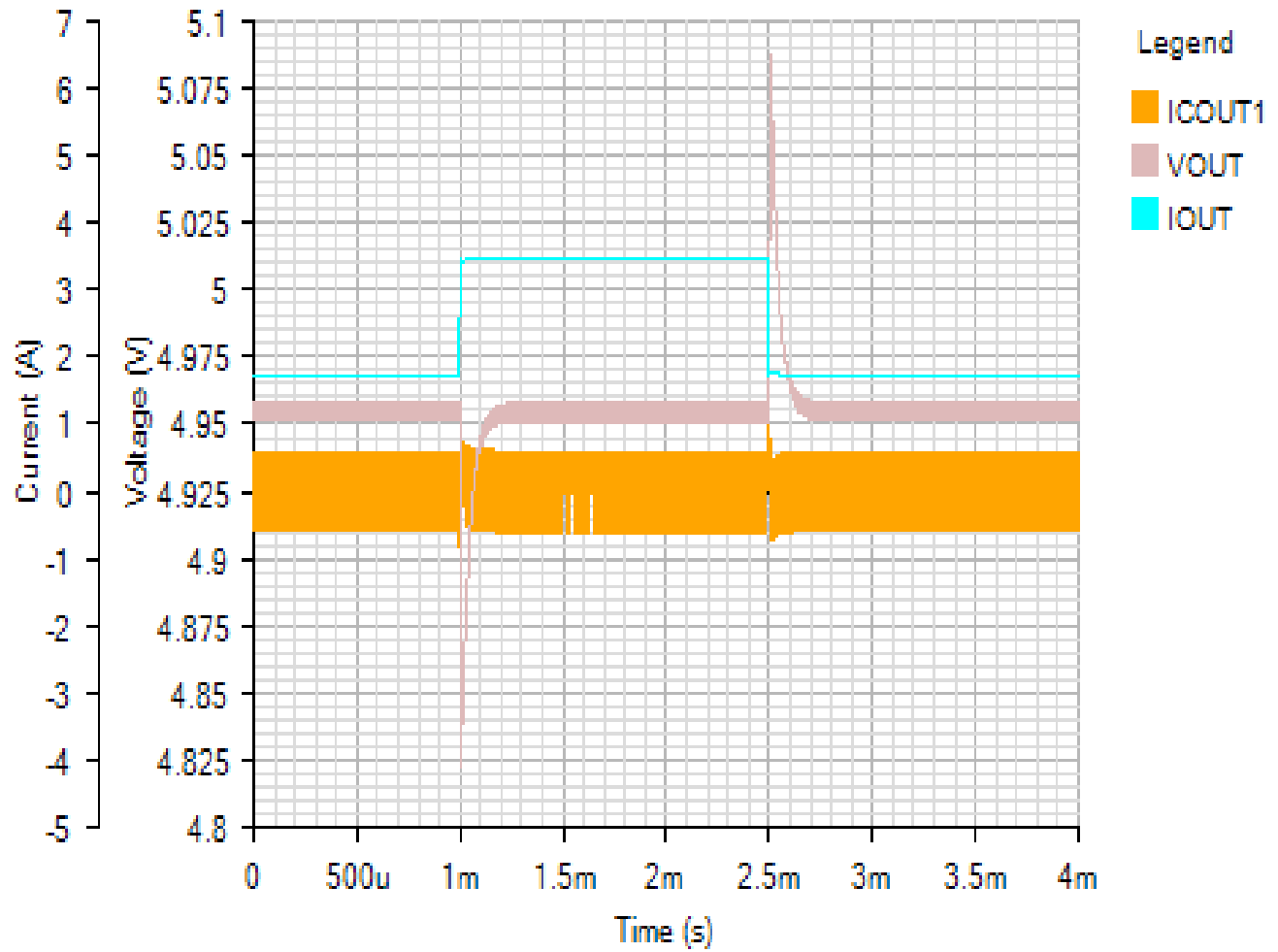
OUTPUT

Default

INPUT   Default

Legend
- ICIN1
- IIN
- VIN

SWITCHING

Legend

- LX
- BST
- ILX

Load Step - Tue Nov 20 2018 13:30:58

IC   Default

OUTPUT

Legend

- ICOUT1
- VOUT
- IOUT

INPUT

Default

Legend

- ICIN1
- IIN
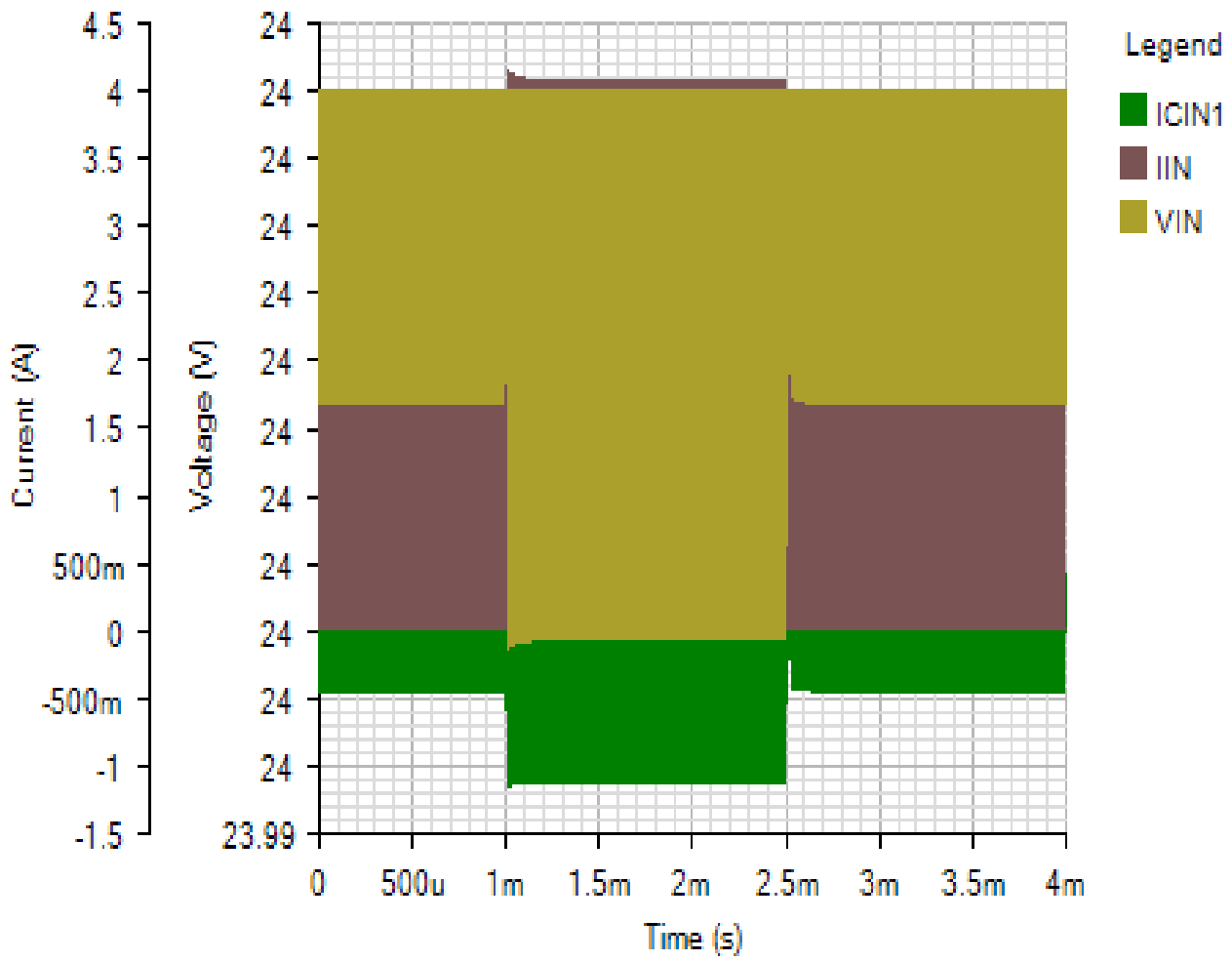- VIN
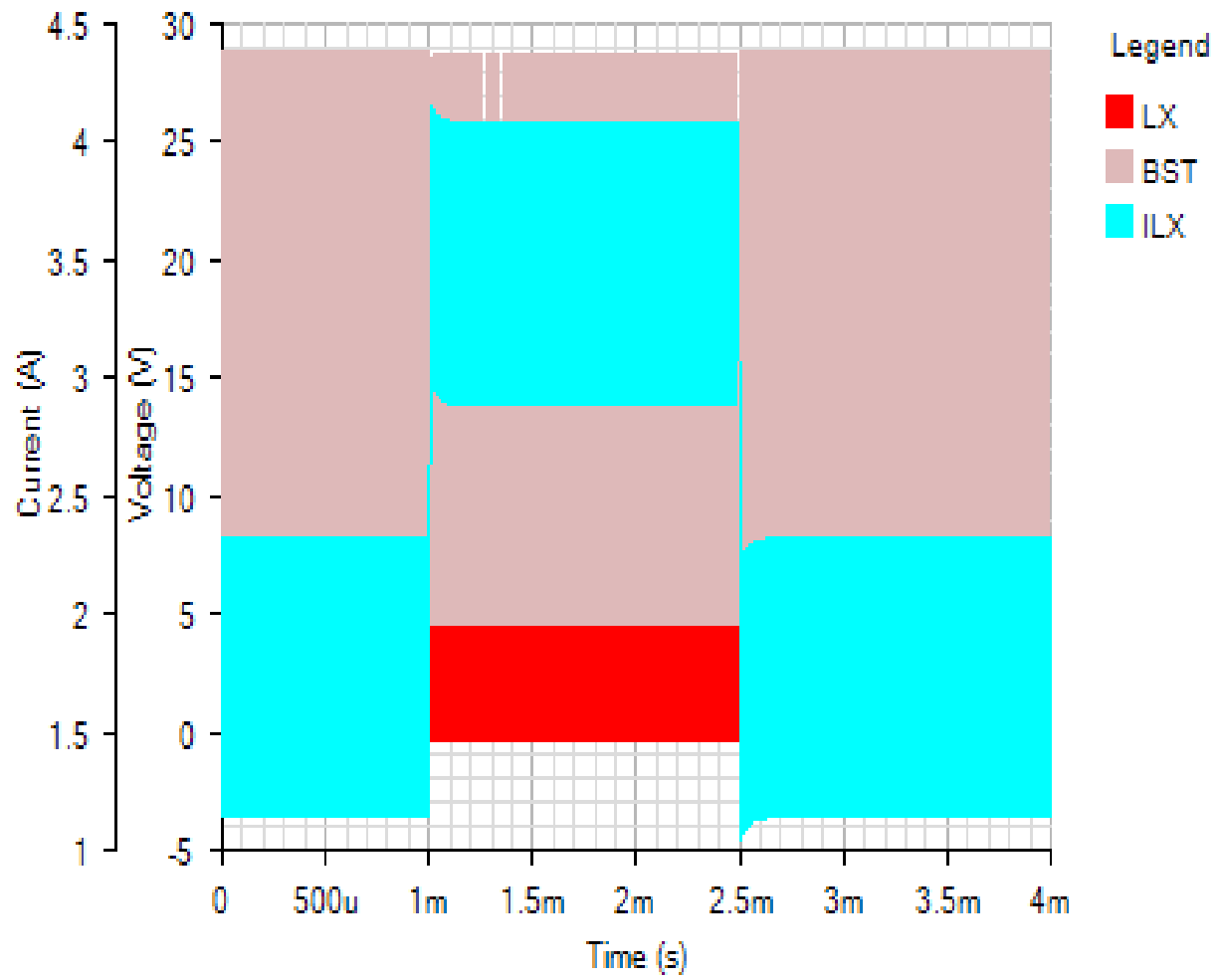
SWITCHING   Default

Efficiency - Tue Nov 20 2018 13:30:58

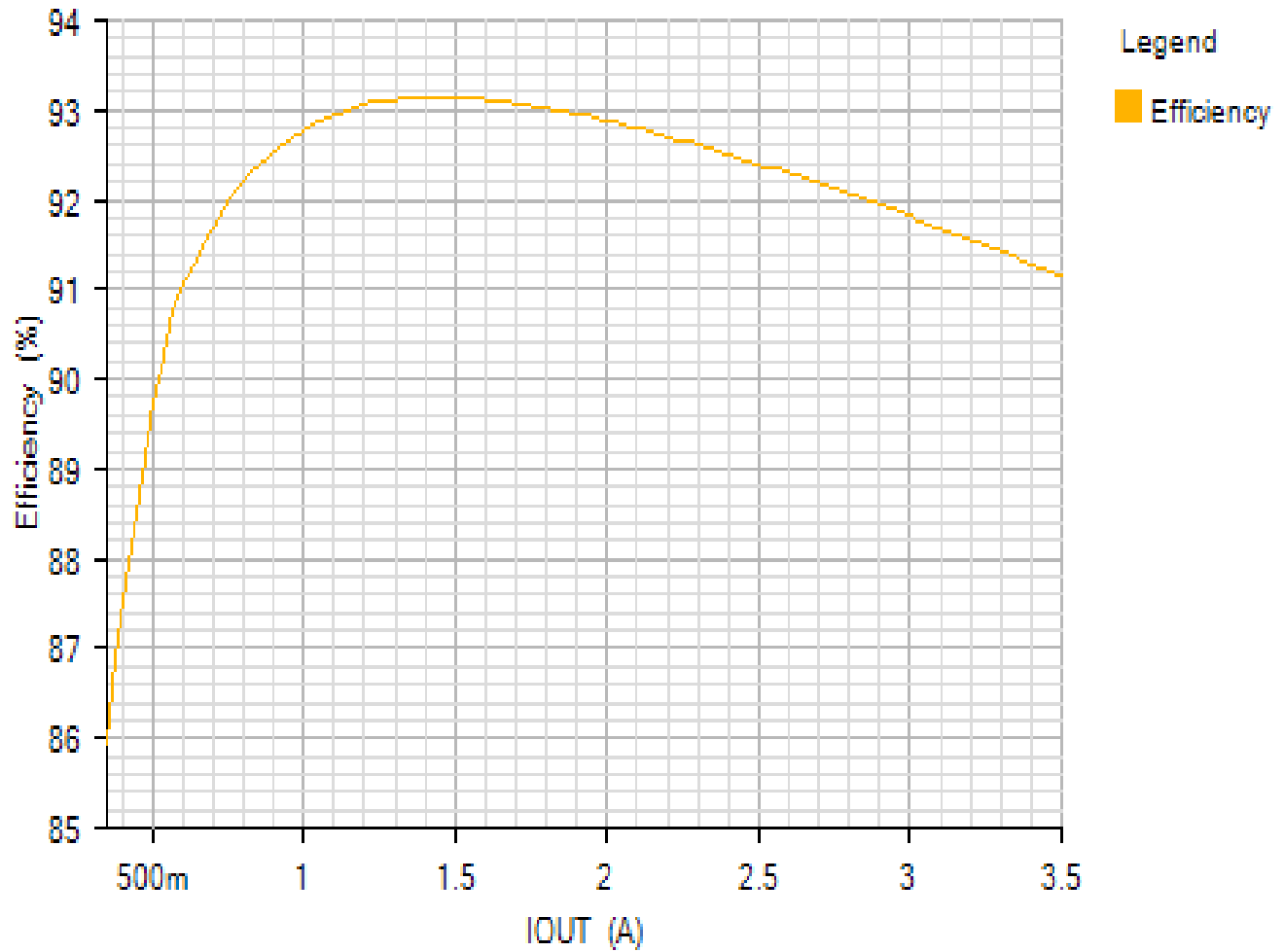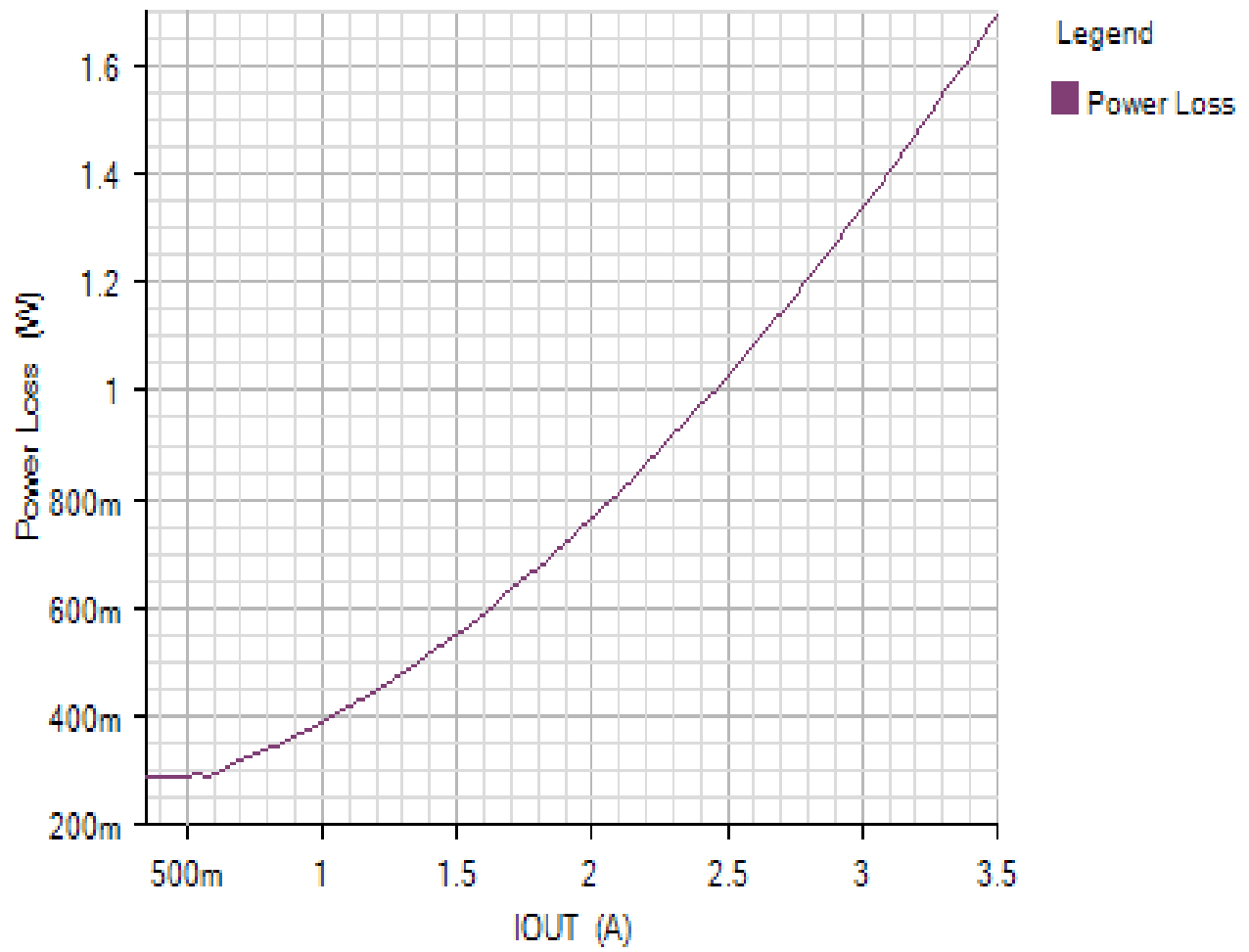EFFICIENCY_PLOT   Default

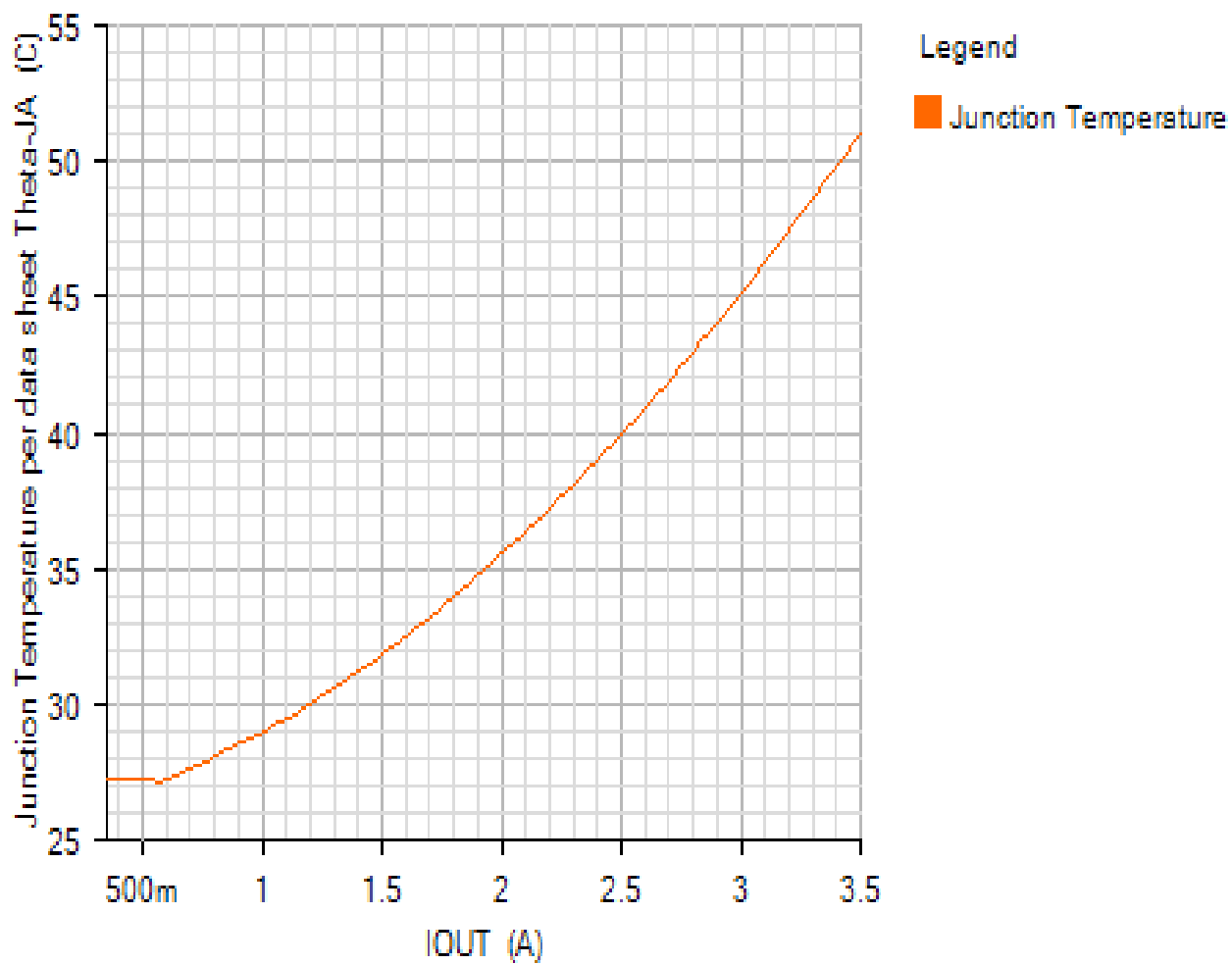POWER_LOSS_PLOT   Default
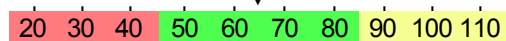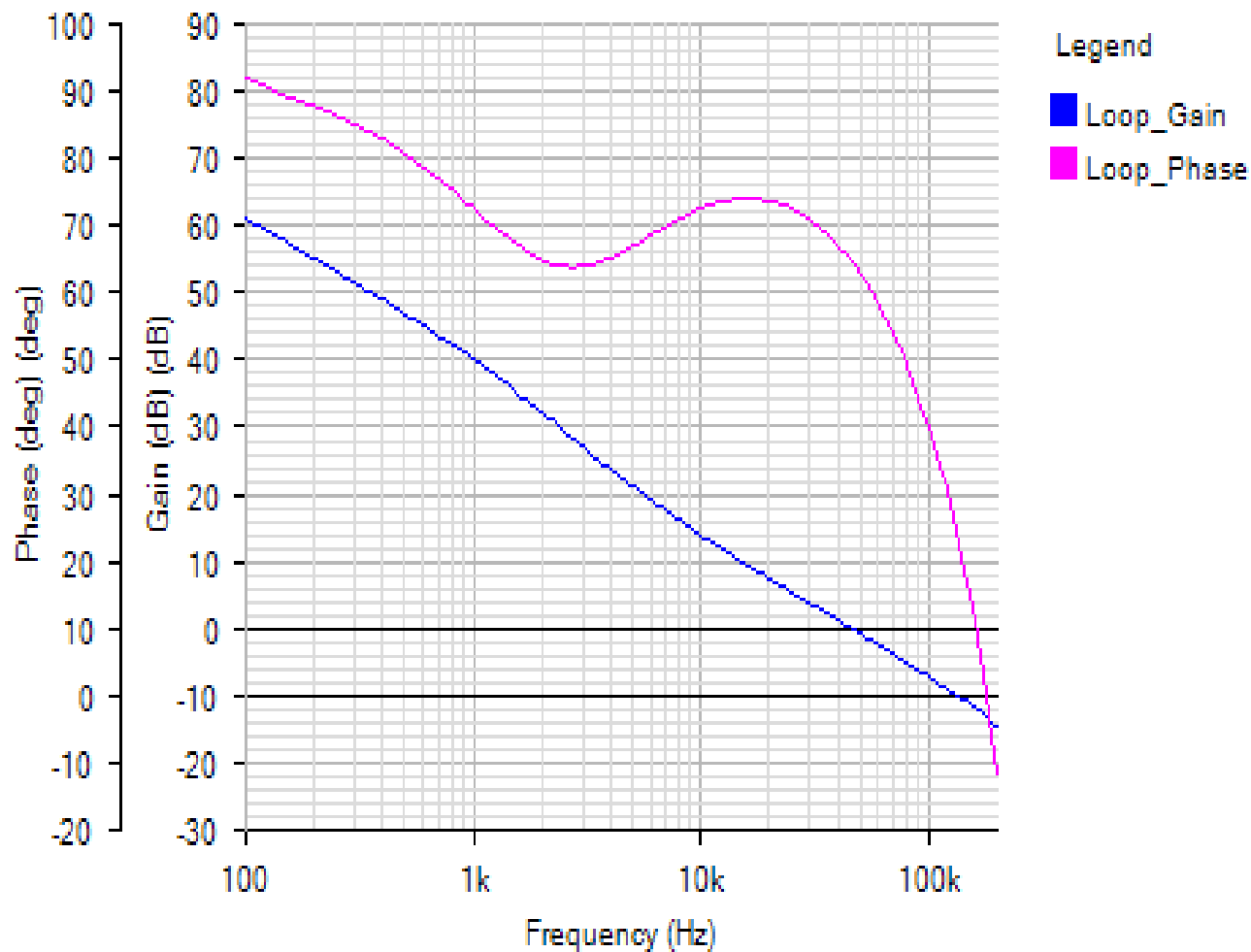
JUNCTION_TEMPERATURE_PLOT   Default

Losses

Component	Loss (W)	% of total

Component	Loss (W)	% of total
Inductor losses	0.51	70.8
Losses in IC	0.21	29.2
Total	0.72	100

AC Loop - Tue Nov 20 2018 13:30:58

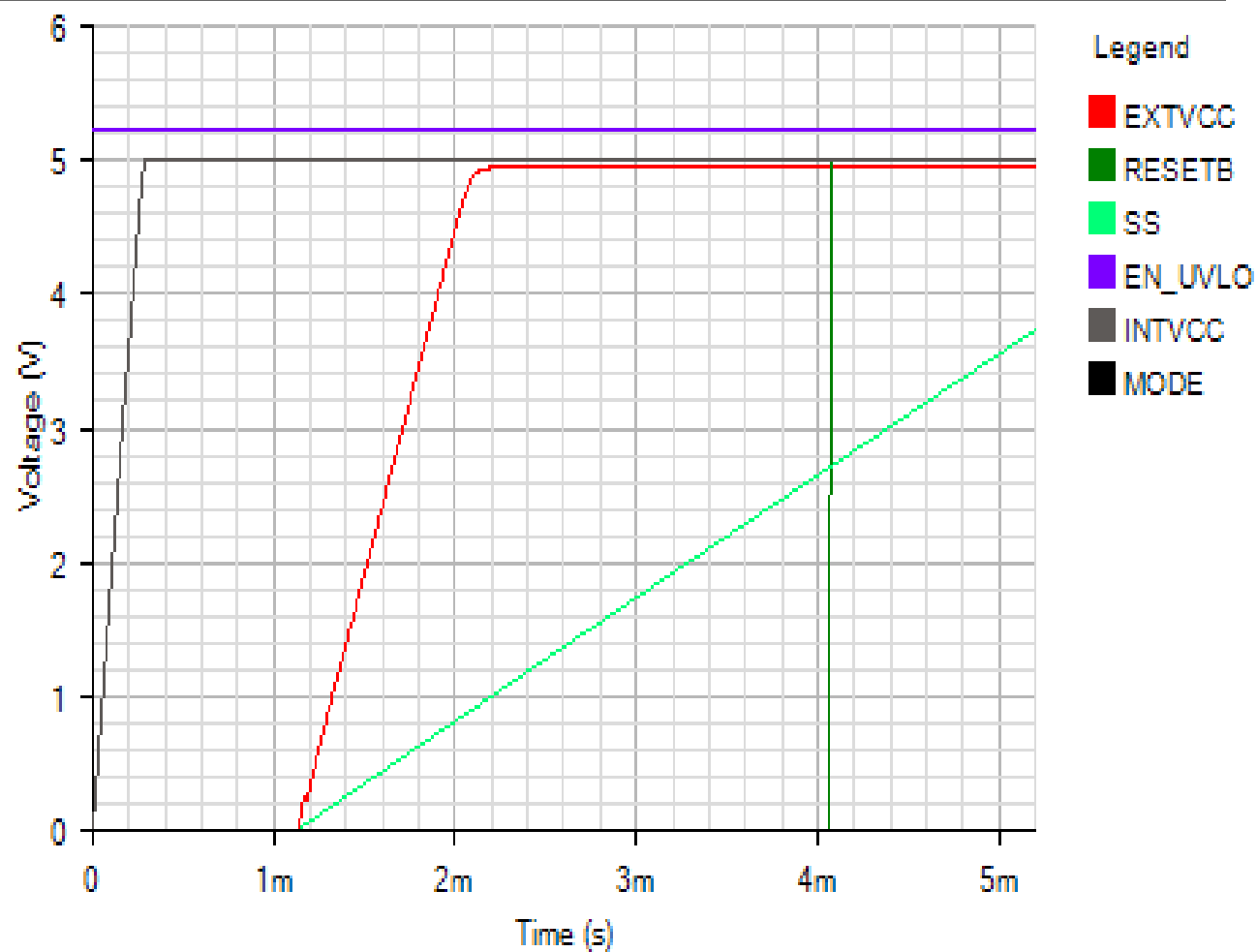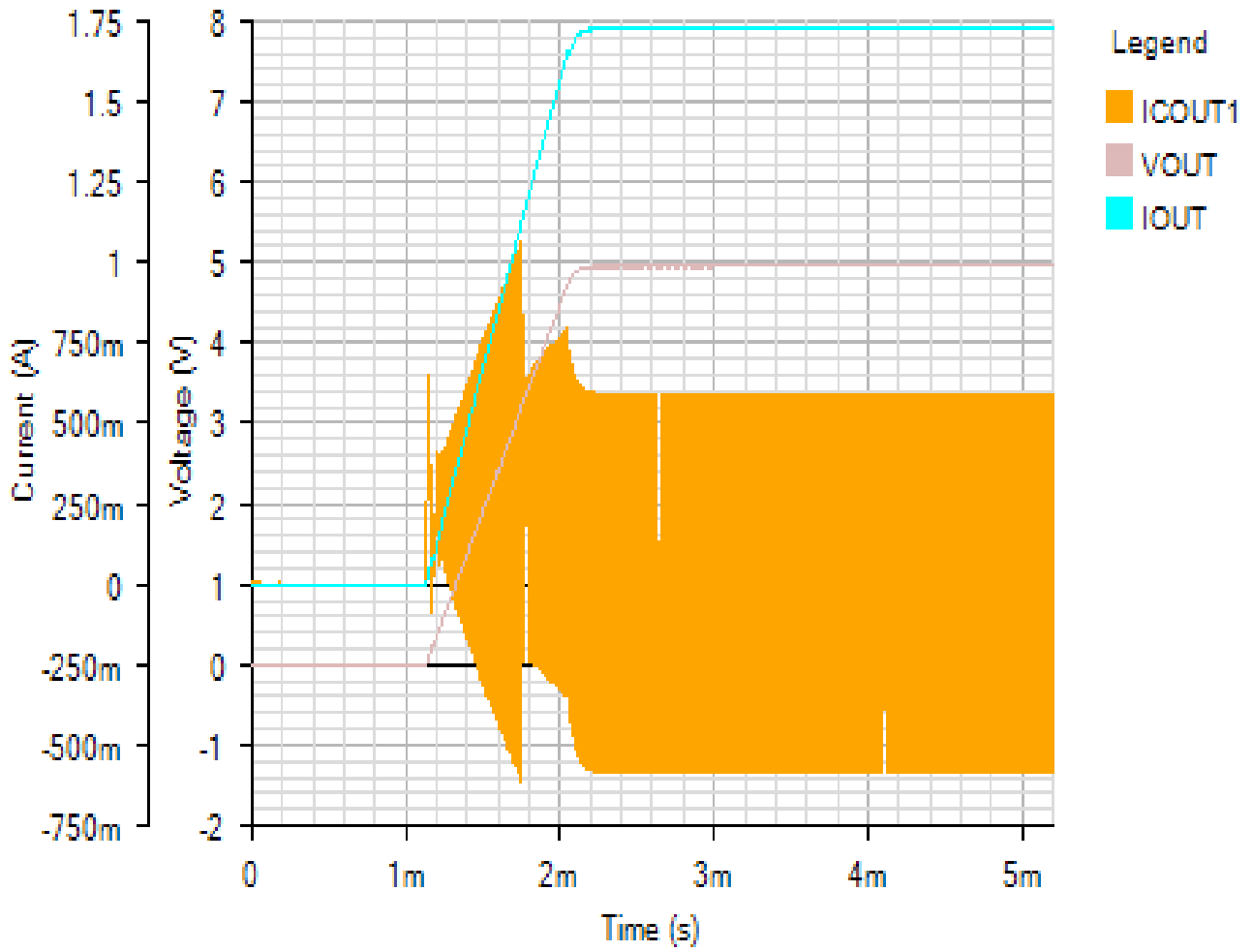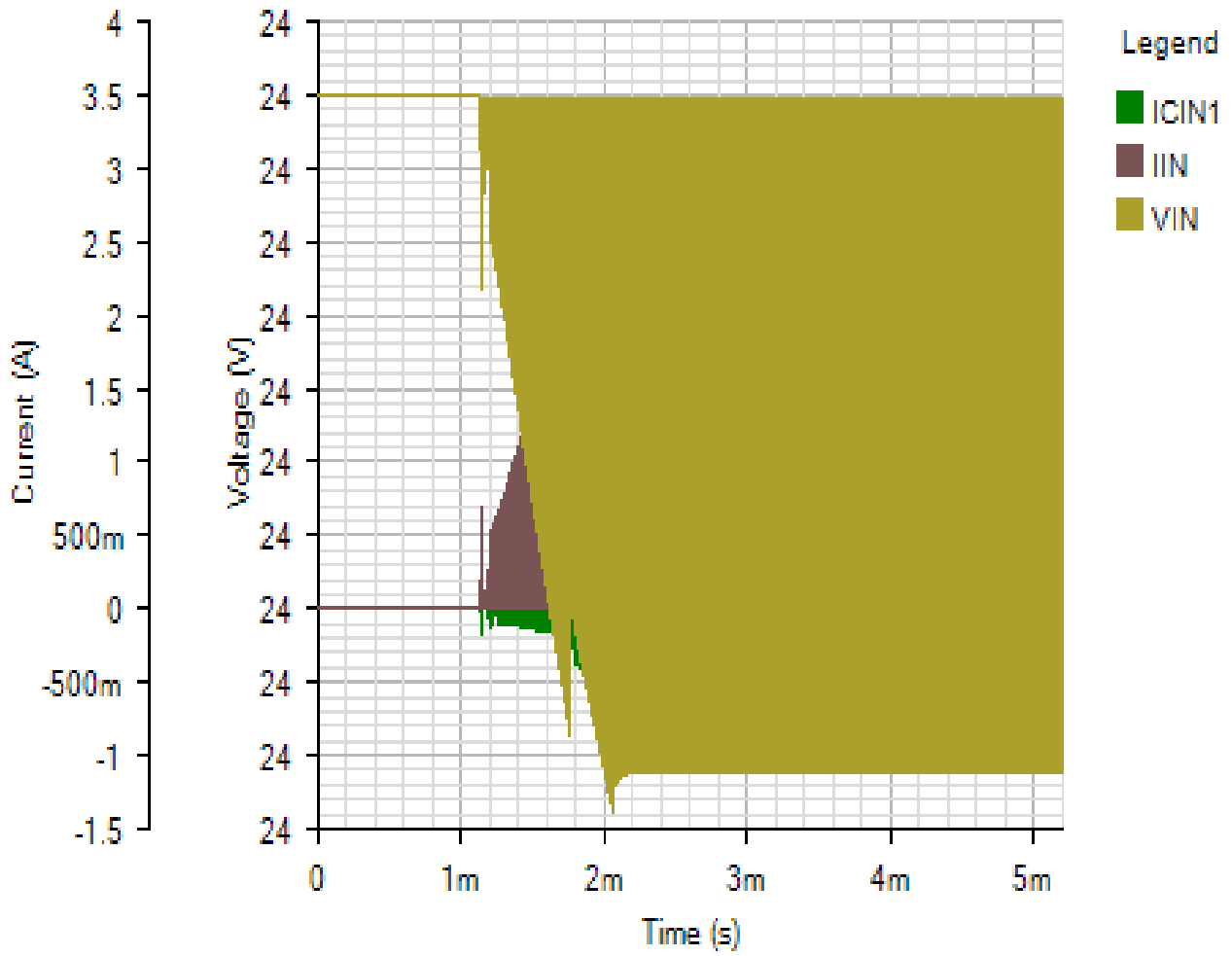BODE   Default

Phase Margin: 64.73° at a crossover frequency of 46.1kHz

| 20 | 30 | 40 | 50 | 60 | 70 | 80 | 90 | 100 | 110 |

Start Up - Tue Nov 20 2018 13:30:58

OUTPUT   Default

INPUT

Legend

- ICIN1
- IIN
- VIN

SWITCHING

Legend
LX
BST
ILX