

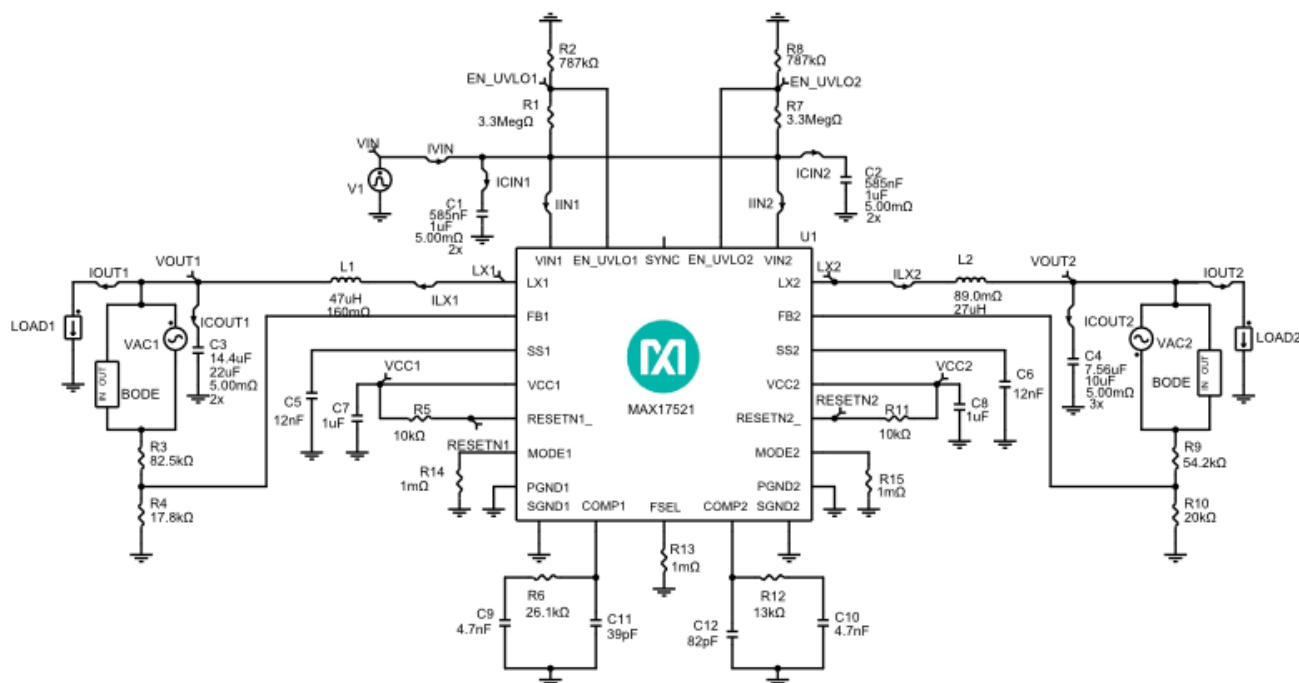
Initial Design

1.0

Design Requirements

Parameter	Value
Maximum Input Voltage	42V
Minimum Input Voltage	7V
Nominal Input Voltage	24V
Input Steady-State Ripple	0.48V
Input Under Voltage Lockout Level for Output 1	6.3V
Input Under Voltage Lockout Level for Output 2	6.3V
Output Voltage 1	5V
Output Current 1	1A
Output Voltage Load Step Over/Undershoot for Output 1	0.15V
Output Voltage 2	3.3V
Output Current 2	1A
Output Voltage Load Step Over/Undershoot for Output 2	0.1V
Performance Priority	Balance Efficiency and Size
BOM Priority	Cost
Switching Frequency	300kHz
Mode of Operation 1	PWM
Output 1 Soft Start Time	2ms
Mode of Operation 2	PWM
Output 2 Soft Start Time	2ms
Ambient Temperature	25°C

Schematic



- NOTES
1. Decreasing the output capacitance below recommended value might degrade the transient response or loop stability.
 2. If the current level (Starting current or Load Steps) is too low, AC, Steady State and Load Step analysis may fail when PFM mode is selected.

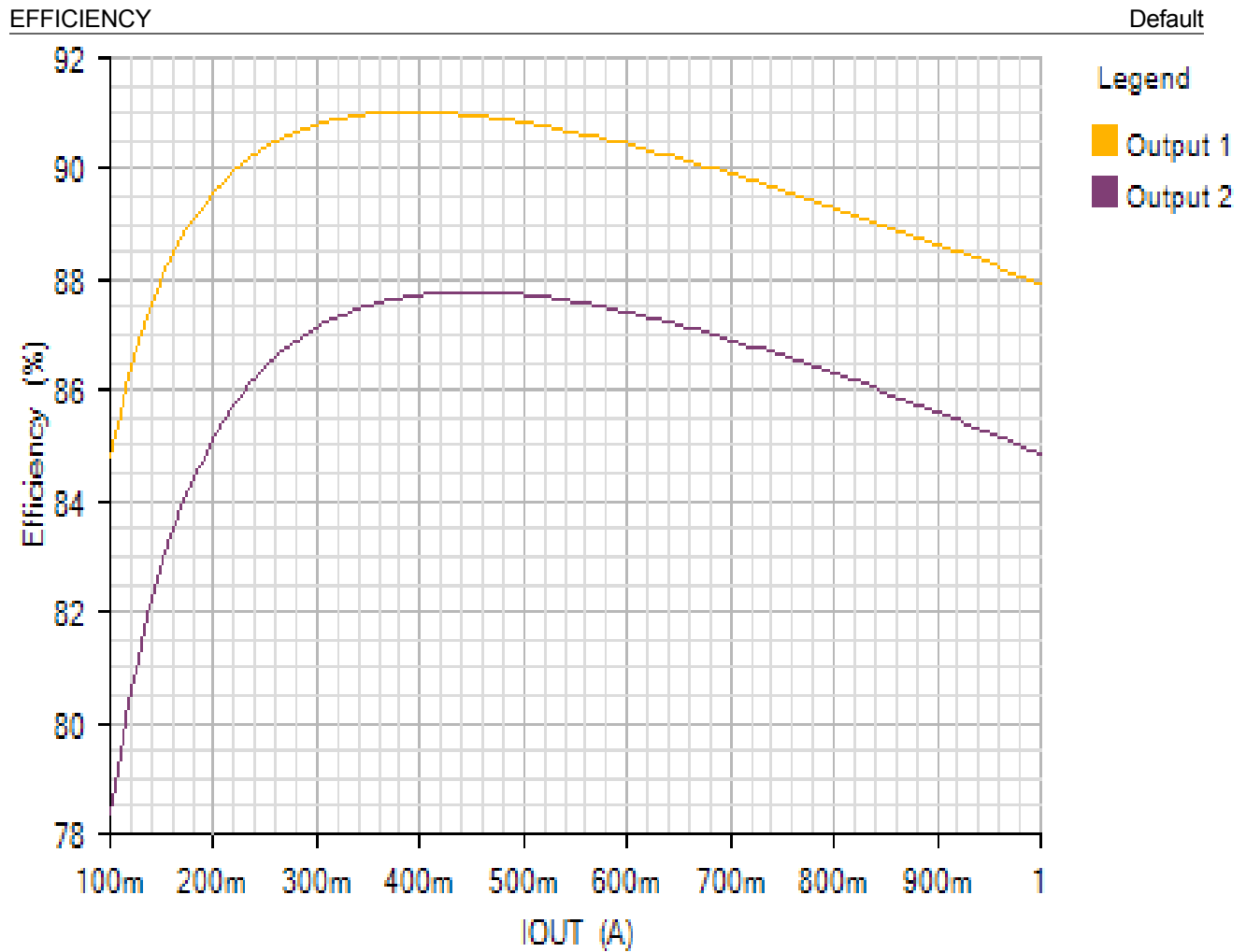
BOM

Ref	Qty	Part Number	Manufacturer	Description
U1	1	MAX17521	User-Defined	IC
C1	2	GRM21BR71H105KA12	Murata	Cap Ceramic 1uF 50V 0805 125C
C2	2	GRM21BR71H105KA12	Murata	Cap Ceramic 1uF 50V 0805 125C
C3	2	GRM31CR70J226KE19L	Murata	Cap Ceramic 22uF 6.3V X7R 10% SMD 1206 125C Embossed T/R
C4	3	GRM21BR71A106KA73	Murata	Cap Ceramic 10uF 10V 0805 125C
C5	1	GCM155R71E123KA55J	Murata Manufacturing	Cap Ceramic 0.012uF 25V X7R 10% Pad SMD 0402 125°C Automotive T/R
C6	1	GCM155R71E123KA55J	Murata Manufacturing	Cap Ceramic 0.012uF 25V X7R 10% Pad SMD 0402 125°C Automotive T/R
C7	1	CGB3B3X7R0J105K055AB	TDK	Cap Ceramic 1uF 6.3V X7R 10% Pad SMD 0603 125°C T/R
C8	1	CGB3B3X7R0J105K055AB	TDK	Cap Ceramic 1uF 6.3V X7R 10% Pad SMD 0603 125°C T/R
C9	1	CGA3E2NP01H472J080AA	TDK	Cap Ceramic 0.0047uF 50V C0G 5% Pad SMD 0603 150°C Automotive T/R
C10	1	CGA3E2NP01H472J080AA	TDK	Cap Ceramic 0.0047uF 50V C0G 5% Pad SMD 0603 150°C Automotive T/R

C11	1	CGA3E2C0G1H390J080AA	TDK	Cap Ceramic 39pF 50V C0G 5% Pad SMD 0603 125°C Automotive T/R
C12	1	CGA2B2C0G1H820J050BA	TDK	Cap Ceramic 82pF 50V C0G 5% Pad SMD 0402 125°C Automotive T/R
L1	1	VLP8040T-470M	TDK	Inductor Power Shielded Wirewound 47uH 20% 100KHz Ferrite 1.7A 160mOhm DCR Embossed Carrier T/R
L2	1	MSS1038-273MLB	Coilcraft	Inductor 27uH 20% 80.1mOhm 2.5A Isat 2.35A Irms
R1	1	RCG04023M30DKED	Vishay	Res Thick Film 0402 3.3M Ohm 0.5% 0.063W(1/16W) ±100ppm/°C Pad SMD T/R
R2	1	RCG0603787KFKEL	Vishay	Res Thick Film 0603 787K Ohm 1% 0.1W(1/10W) ±100ppm/°C Pad SMD T/R
R3	1	AT0402DRD0782K5L	Yageo	Res Thin Film 0402 82.5K Ohm 0.5% 0.063W(1/16W) ±25ppm/°C Sulfur Resistant Epoxy Pad SMD Automotive T/R
R4	1	TNPW040217K8BEED	Vishay	Res Thin Film 0402 17.8K Ohm 0.1% 0.1W(1/10W) ±25ppm/°C Sulfur Resistant Conformal Coated Pad SMD Automotive Medical T/R
R5	1	TNPW040210K0BEED	Vishay	Res Thin Film 0402 10K Ohm 0.1% 0.1W(1/10W) ±25ppm/°C Sulfur Resistant Conformal Coated Pad SMD Automotive Medical T/R
R6	1	AT0402BRD0726K1L	Yageo	Res Thin Film 0402 26.1K Ohm 0.1% 0.063W(1/16W) ±25ppm/°C Sulfur Resistant Epoxy Pad SMD Automotive T/R
R7	1	RCG04023M30DKED	Vishay	Res Thick Film 0402 3.3M Ohm 0.5% 0.063W(1/16W) ±100ppm/°C Pad SMD T/R
R8	1	RCG0603787KFKEL	Vishay	Res Thick Film 0603 787K Ohm 1% 0.1W(1/10W) ±100ppm/°C Pad SMD T/R
R9	1	TNPW040254K2BEED	Vishay	Res Thin Film 0402 54.2K Ohm 0.1% 0.1W(1/10W) ±25ppm/°C Sulfur Resistant Conformal Coated Pad SMD Automotive Medical T/R
R10	1	TNPW040220K0BEED	Vishay	Res Thin Film 0402 20K Ohm 0.1% 0.1W(1/10W) ±25ppm/°C Sulfur Resistant Conformal Coated Pad SMD Automotive Medical T/R
R11	1	TNPW040210K0BEED	Vishay	Res Thin Film 0402 10K Ohm 0.1% 0.1W(1/10W) ±25ppm/°C Sulfur Resistant Conformal Coated Pad SMD Automotive Medical T/R
R12	1	TNPW040213K0BEED	Vishay	Res Thin Film 0402 13K Ohm 0.1% 0.1W(1/10W) ±25ppm/°C Sulfur Resistant Conformal Coated Pad SMD Automotive Medical T/R

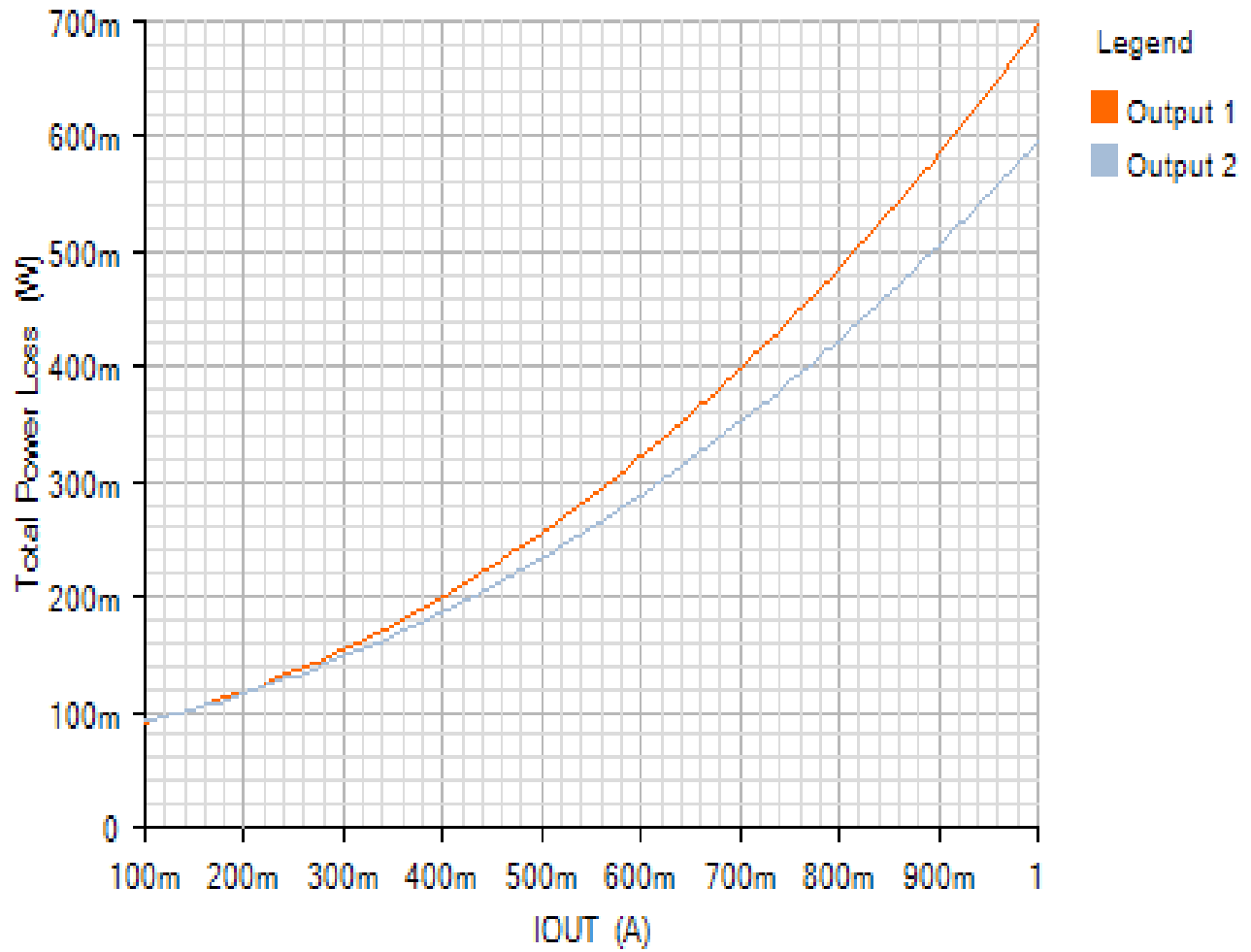
Simulation Results

Efficiency - Tue Nov 20 2018 10:27:52



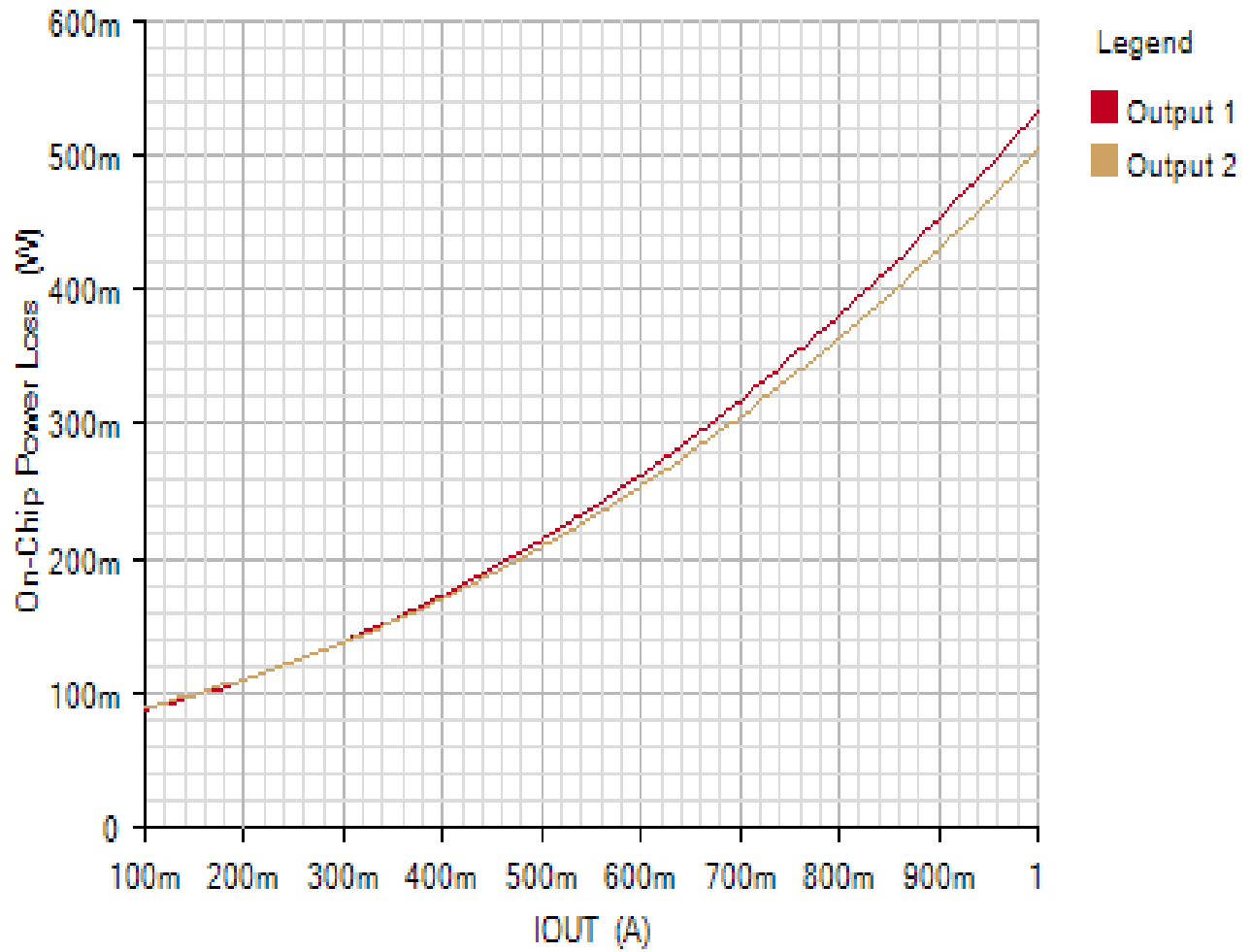
TOTAL_POWER_LOSS

Default



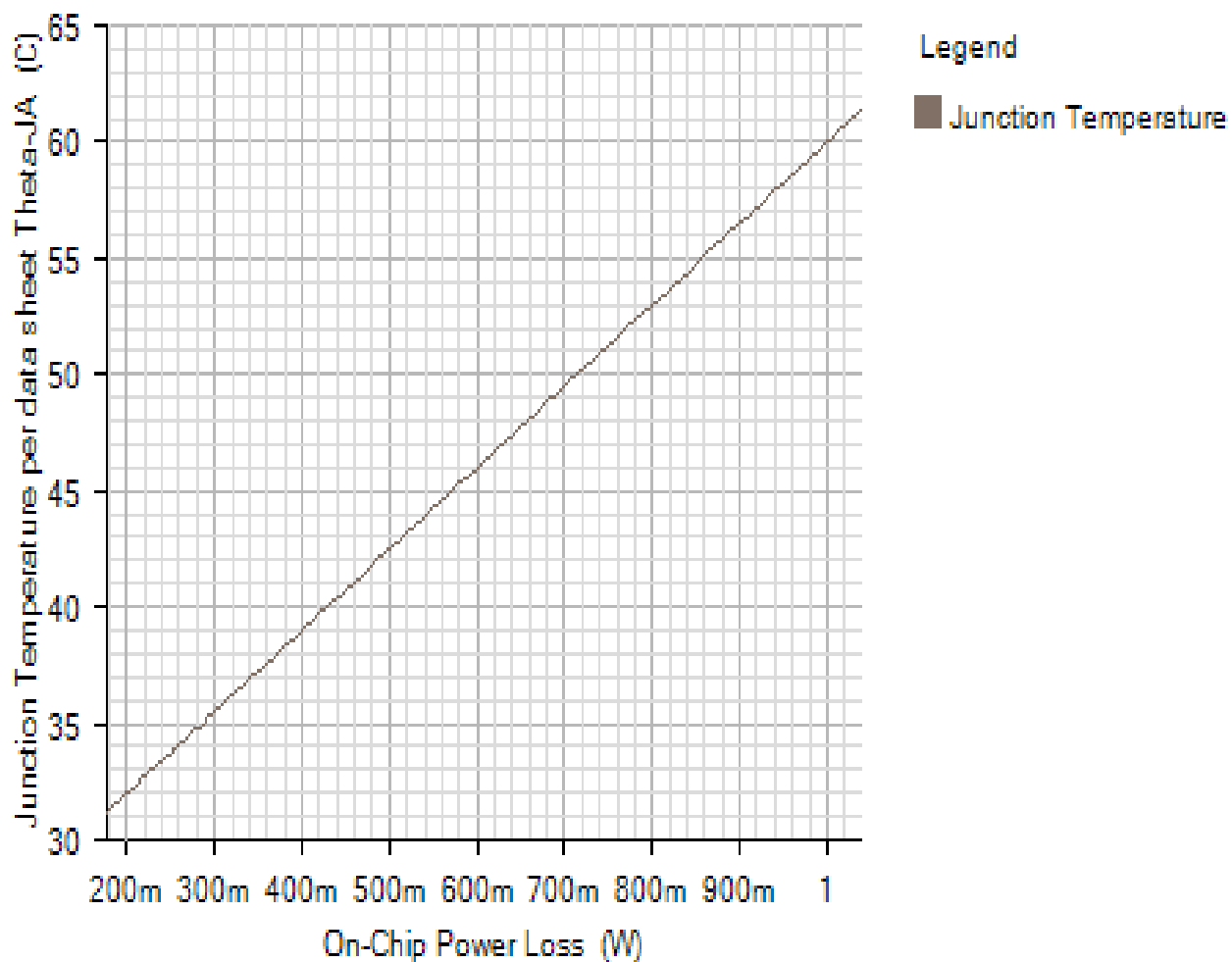
ON-CHIP_POWER_LOSS

Default

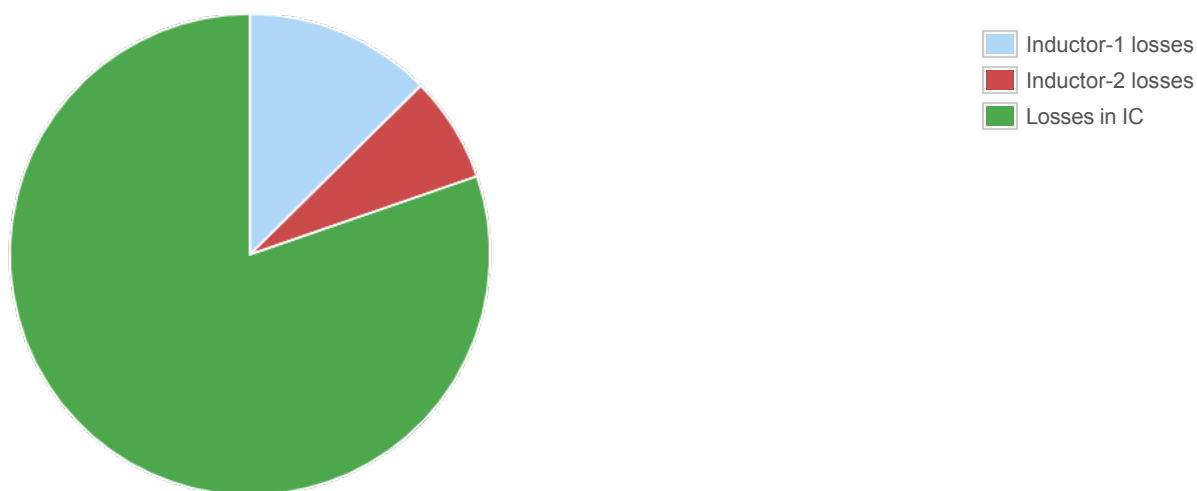


JUNCTION_TEMPERATURE

Default



Losses



Component

Loss (W)

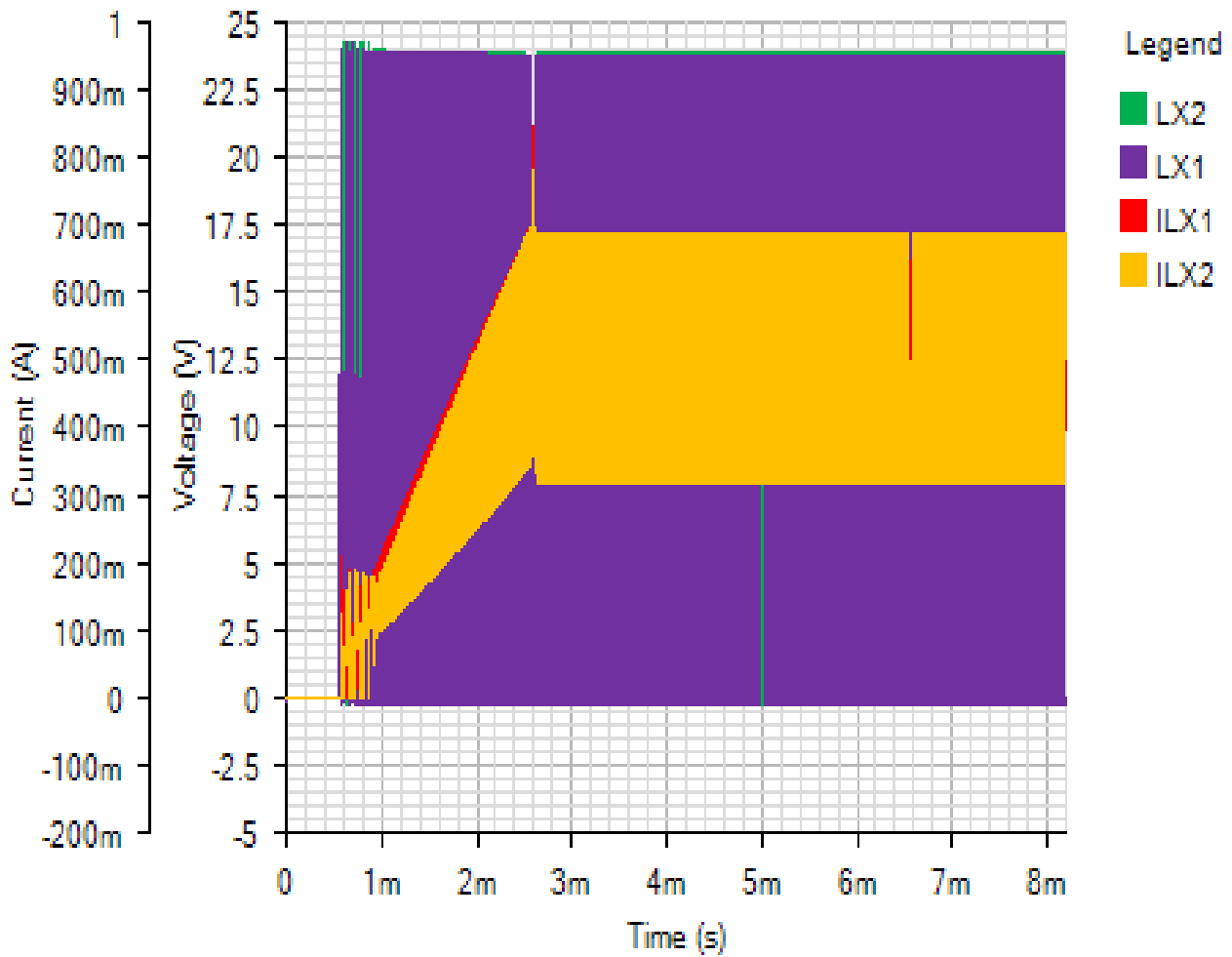
% of total

Component	Loss (W)	% of total
Inductor-1 losses	0.163	12.6
Inductor-2 losses	0.092	7.1
Losses in IC	1.038	80.3
Total	1.293	100

Start Up - Tue Nov 20 2018 10:27:52

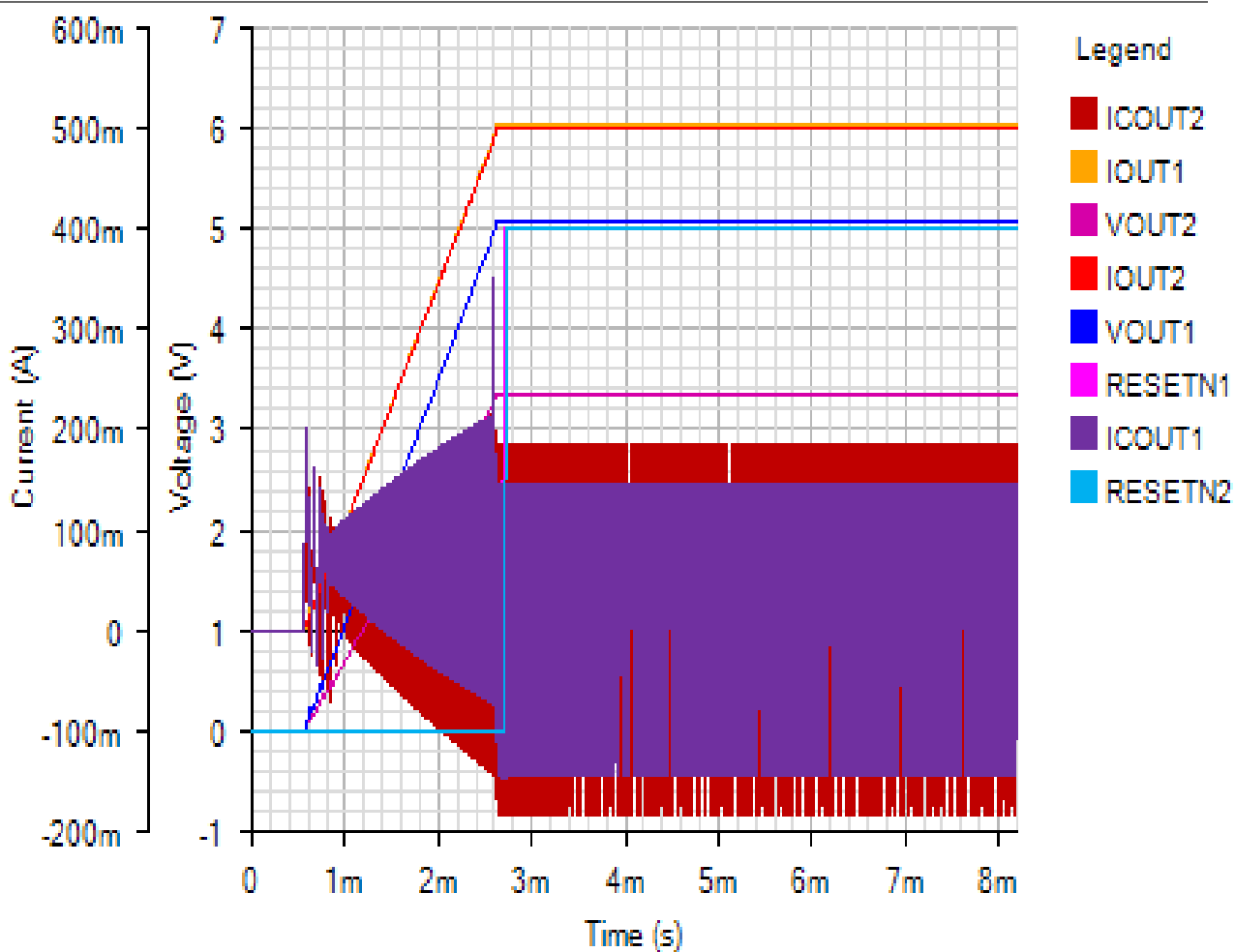
SWITCHING

Default



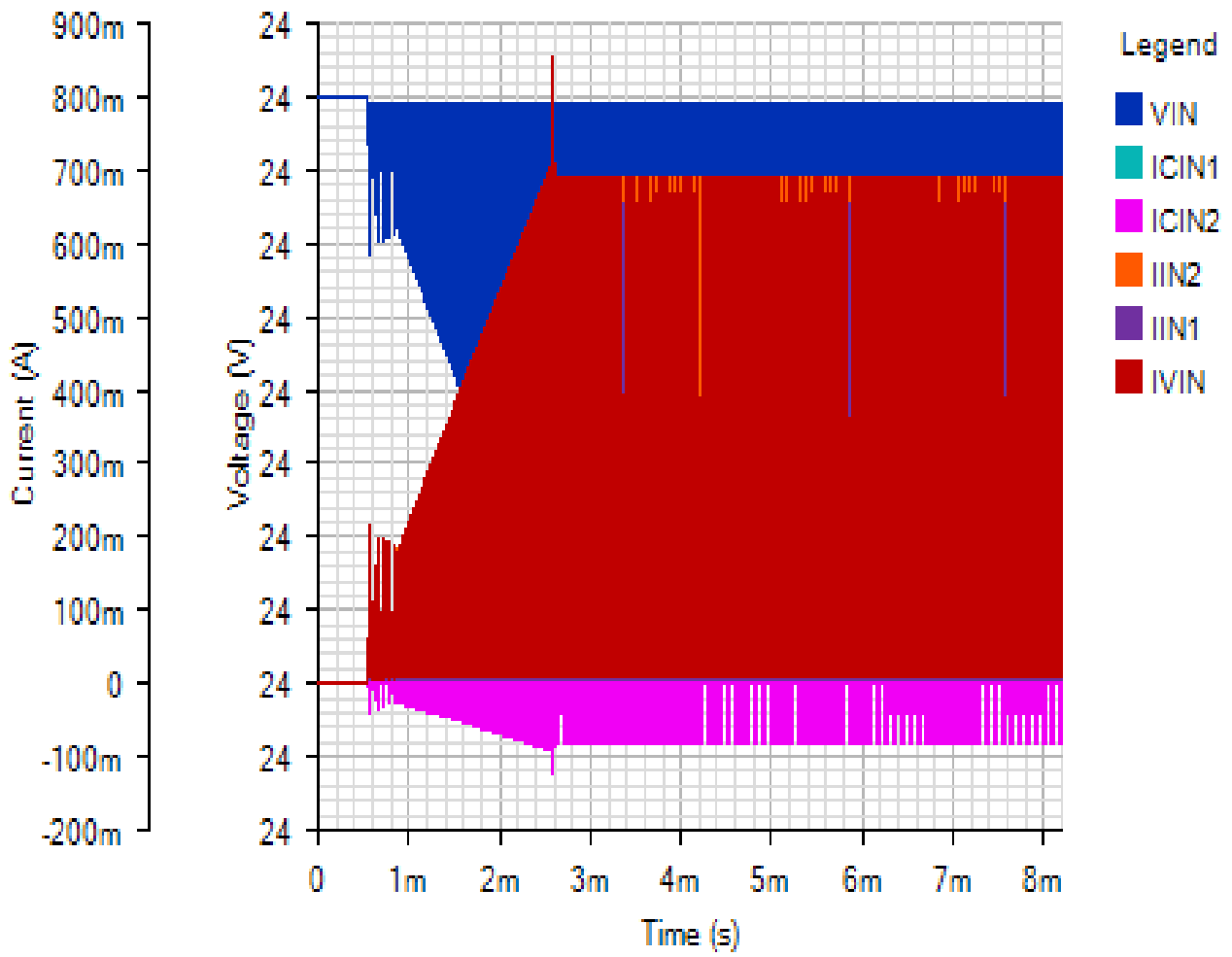
OUTPUT

Default



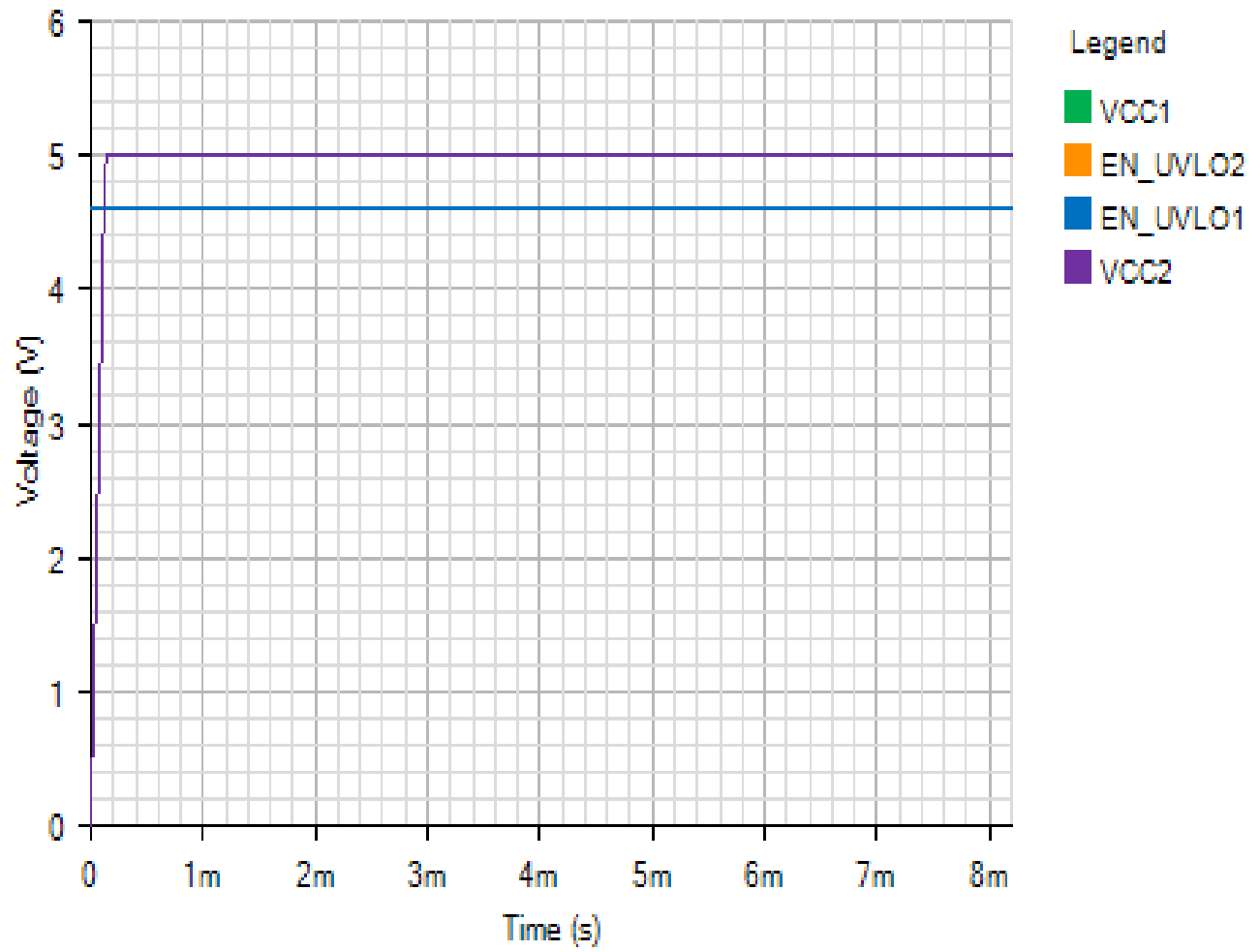
INPUT

Default



IC

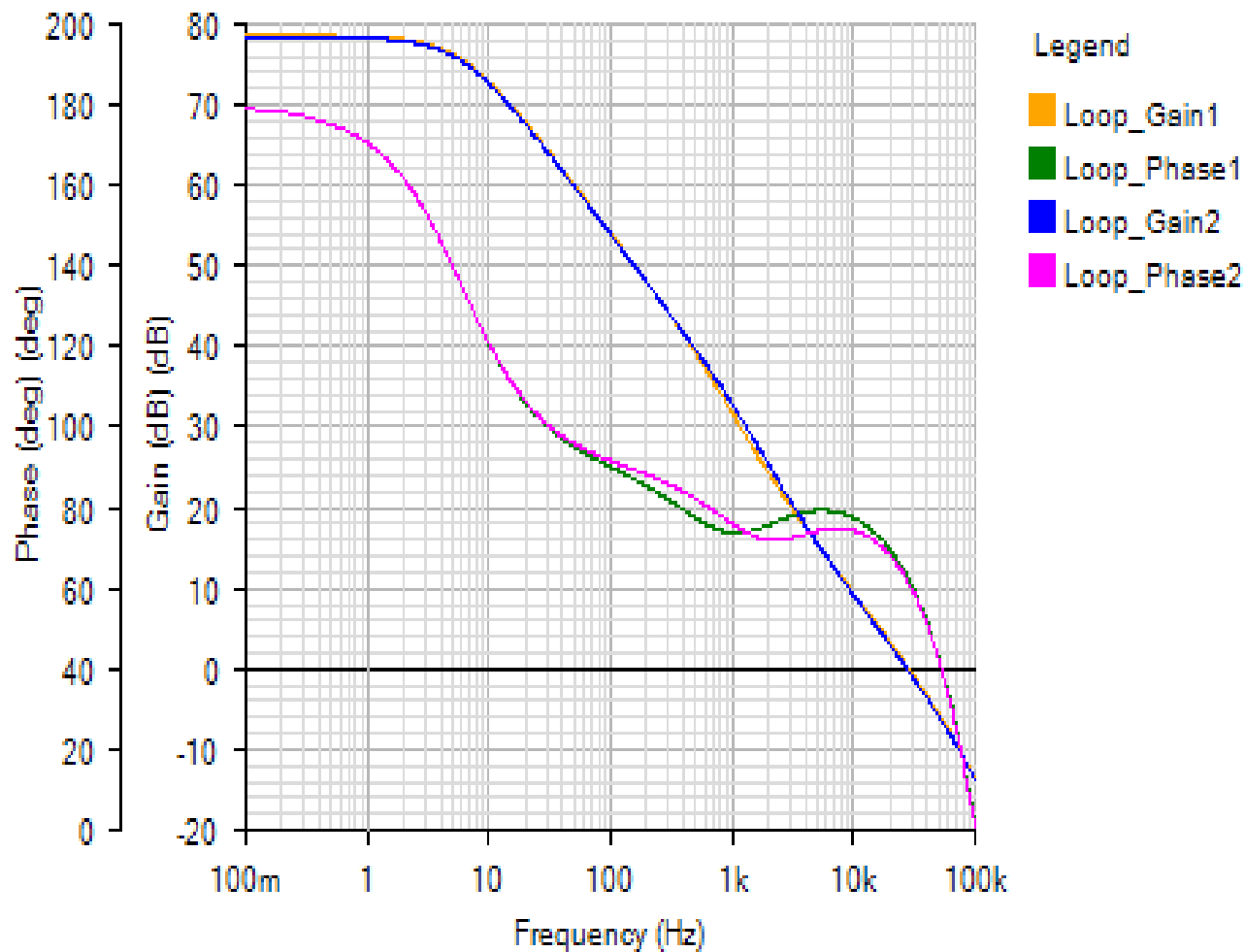
Default



AC Loop - Tue Nov 20 2018 10:27:52

BODE

Default



Phase Margin (output #1): 62.12° at a crossover frequency of 28.5kHz



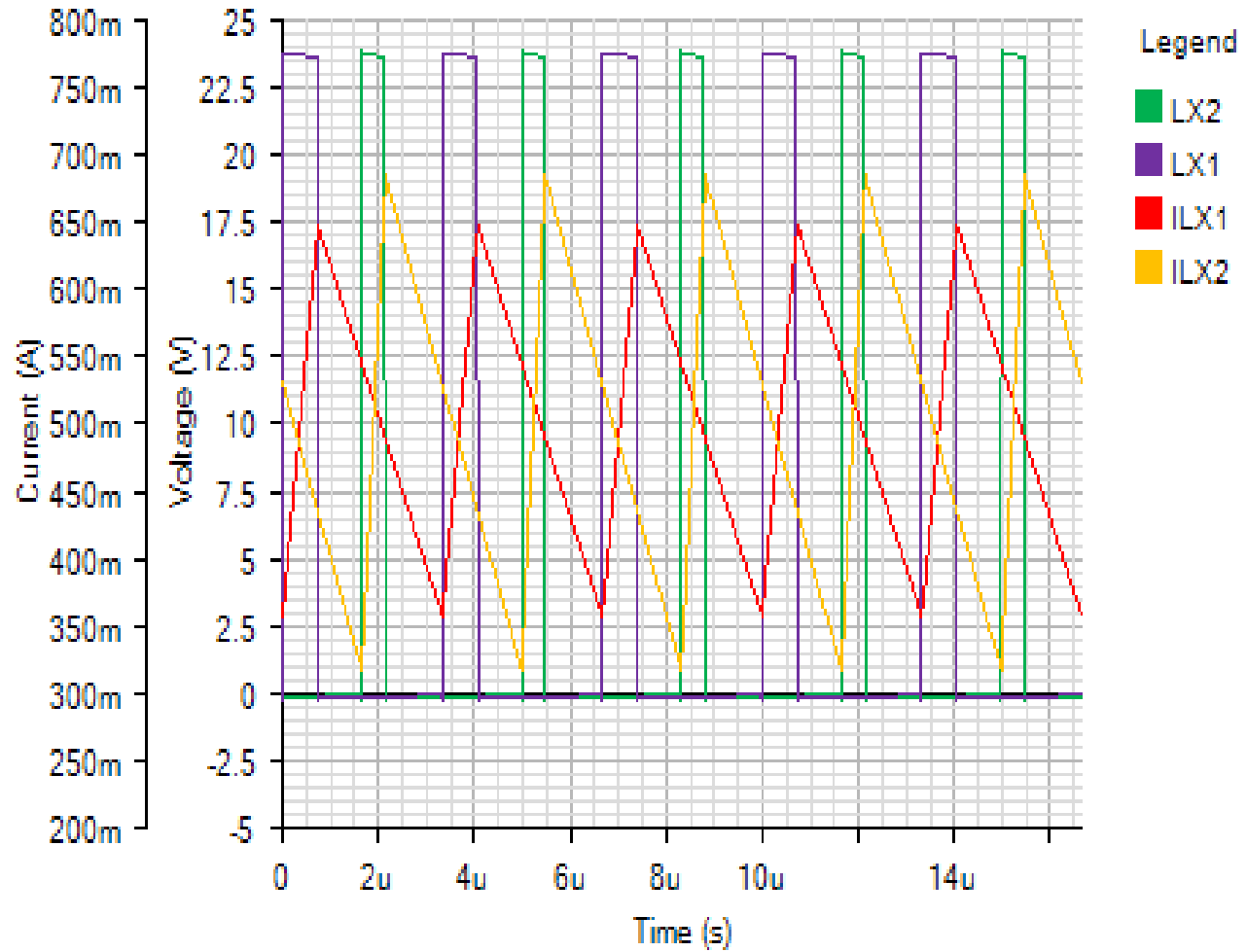
Phase Margin (output #2): 62.18° at a crossover frequency of 27.4kHz



Steady State - Tue Nov 20 2018 10:27:52

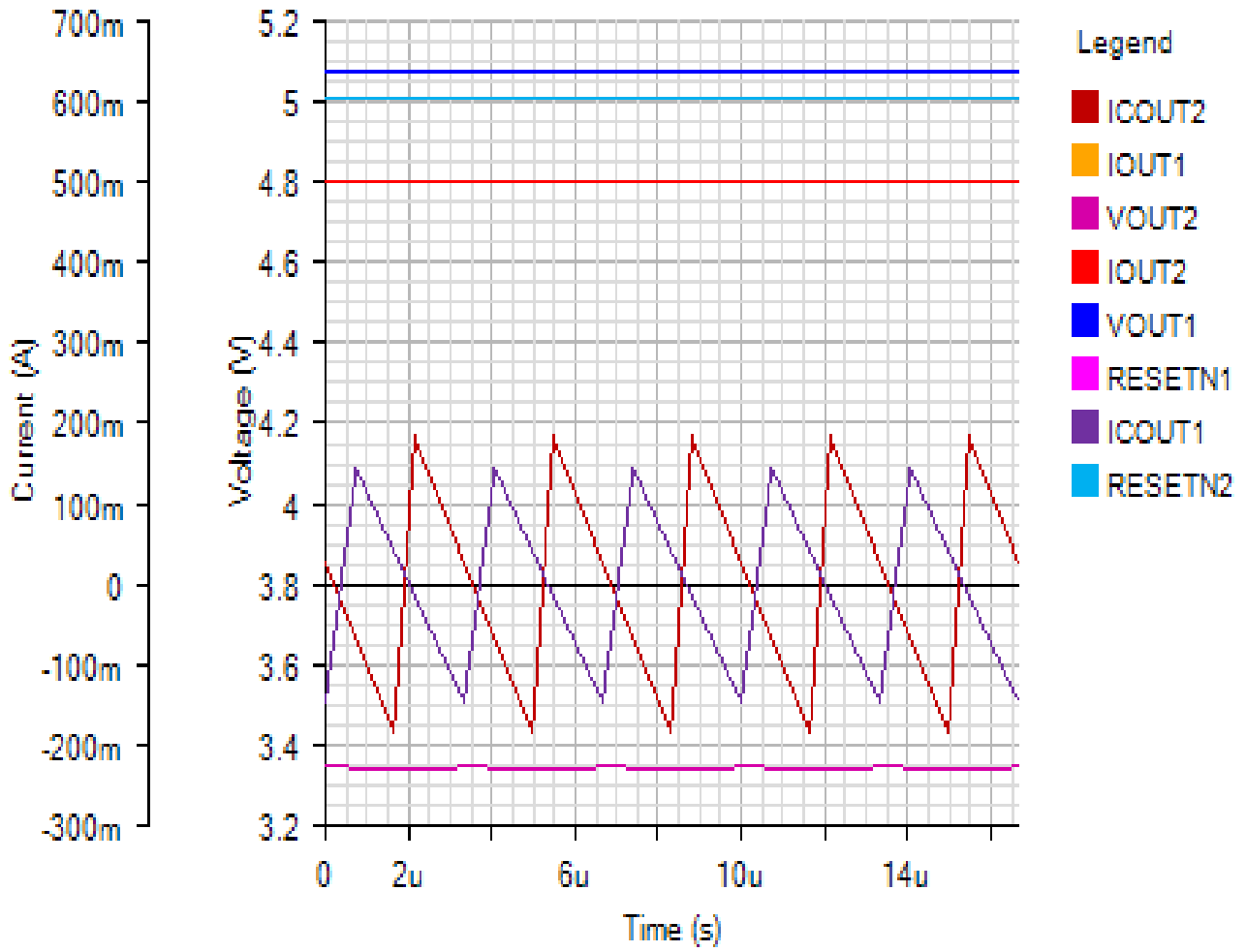
SWITCHING

Default



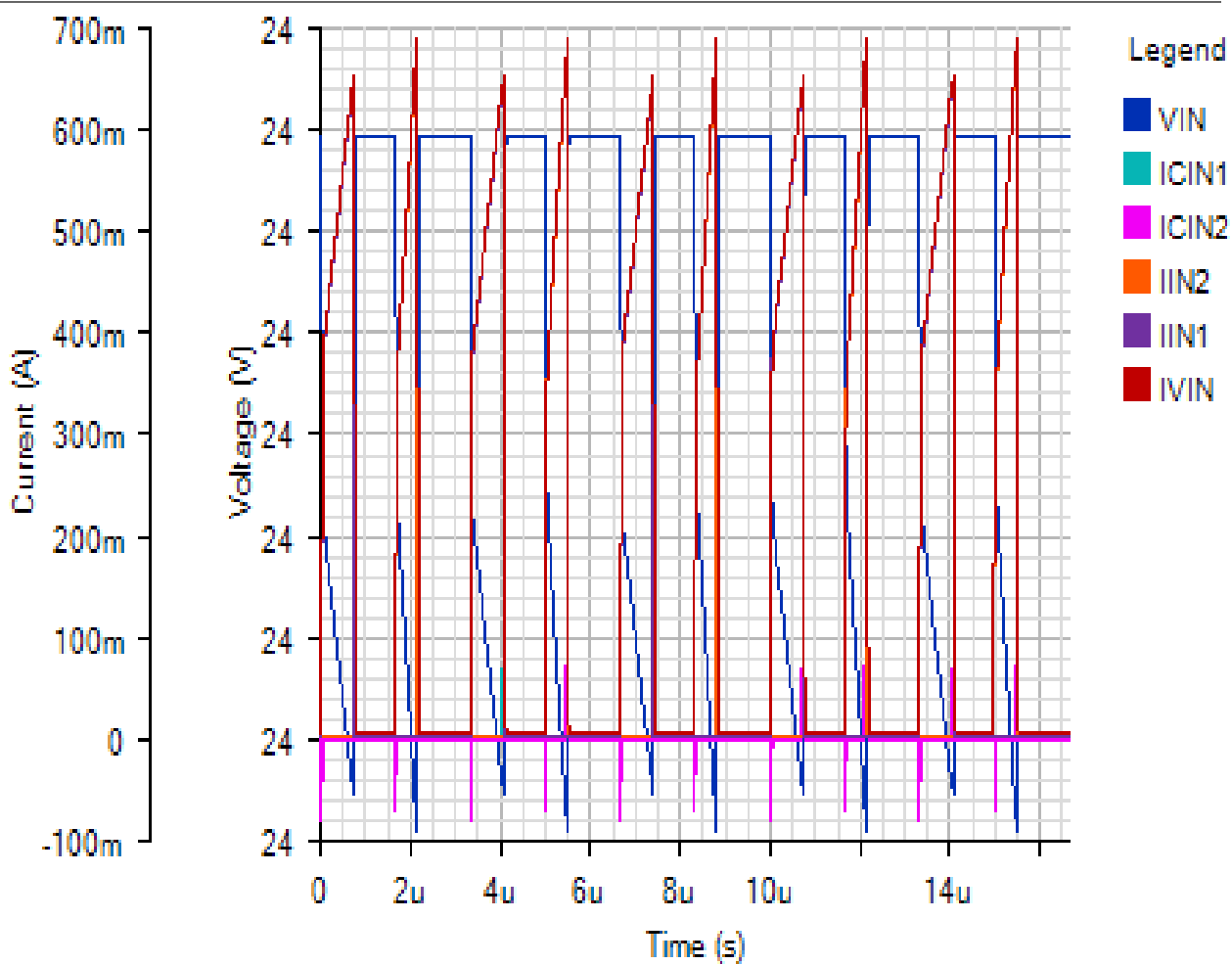
OUTPUT

Default



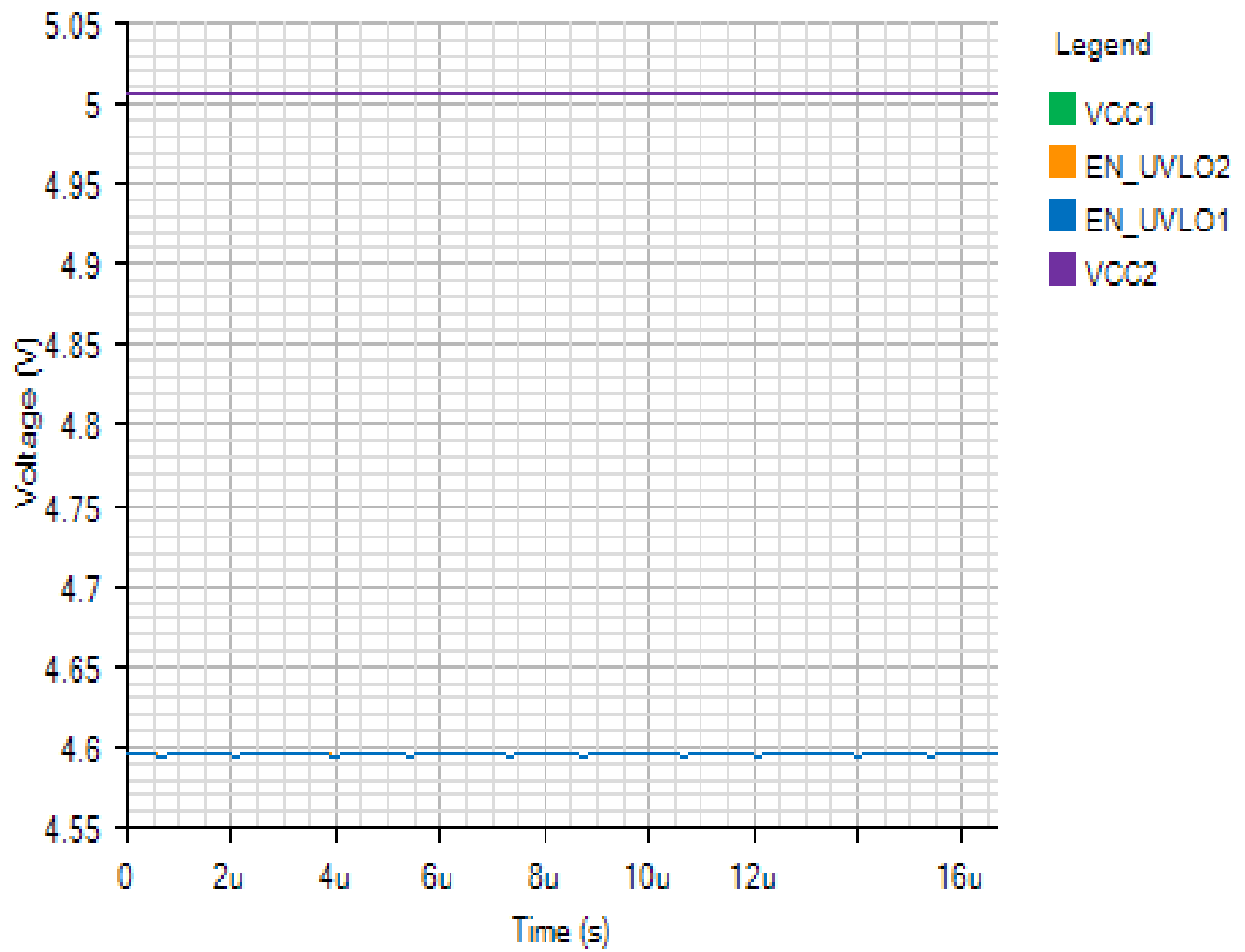
INPUT

Default



IC

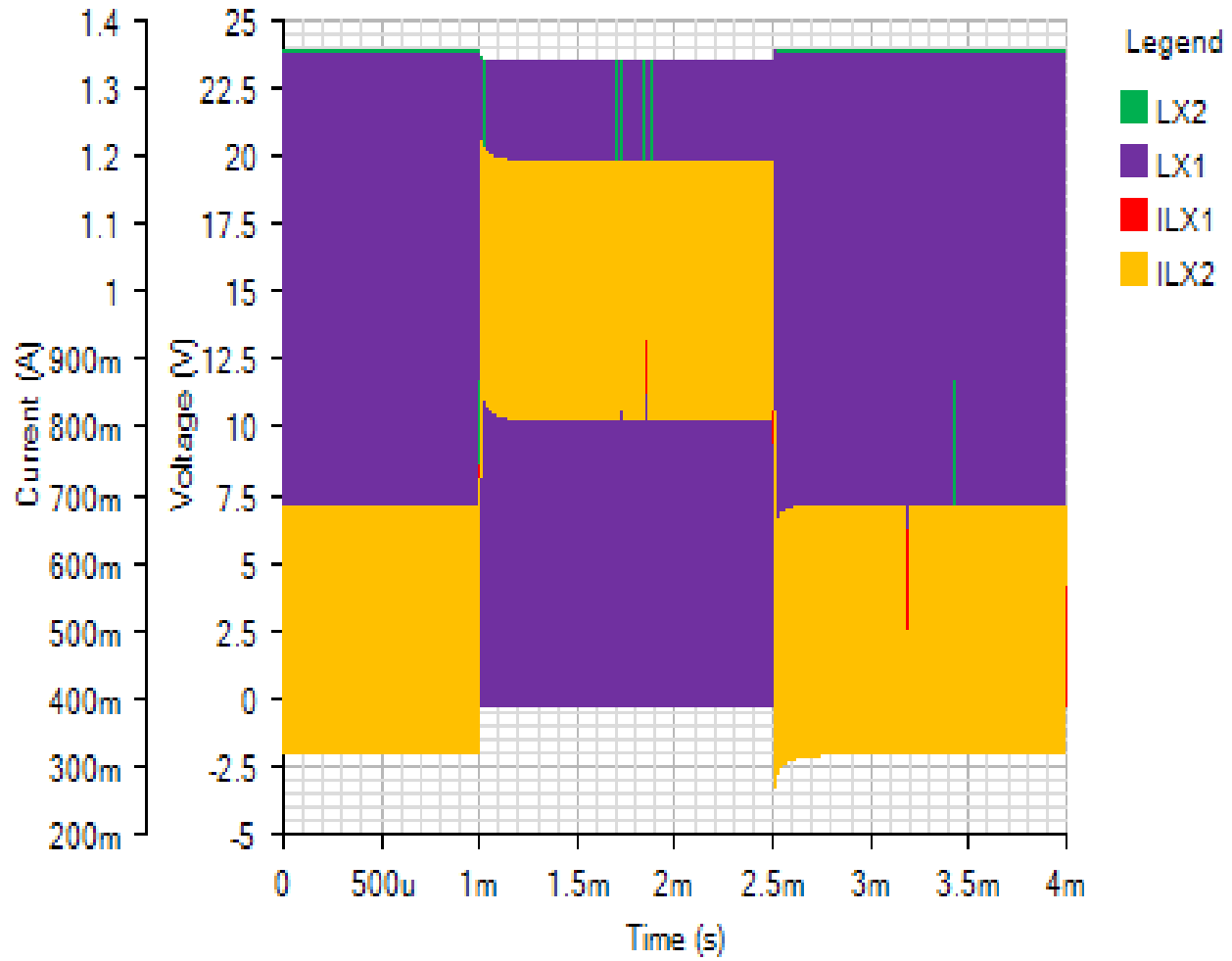
Default



Load Step - Tue Nov 20 2018 10:27:52

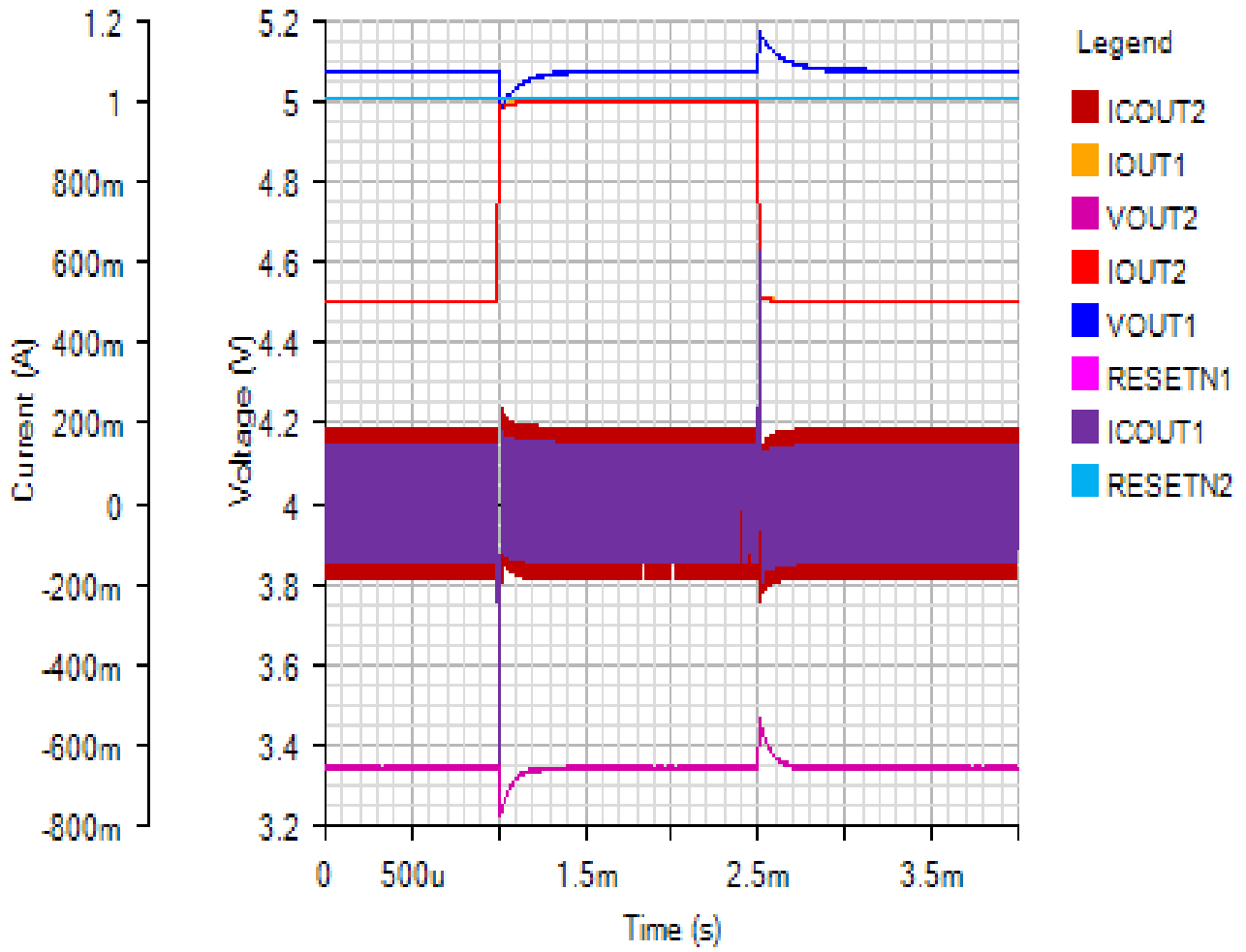
SWITCHING

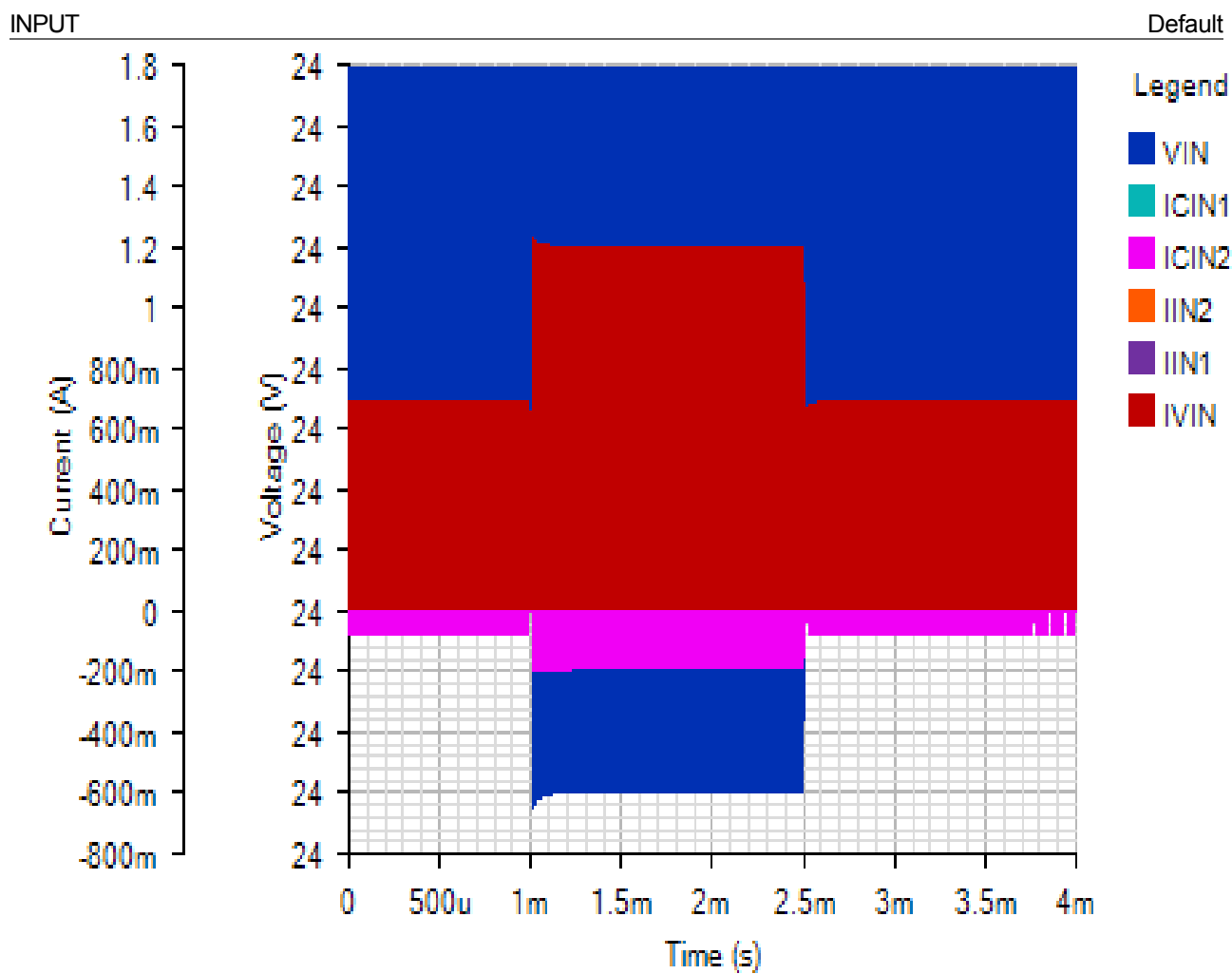
Default



OUTPUT

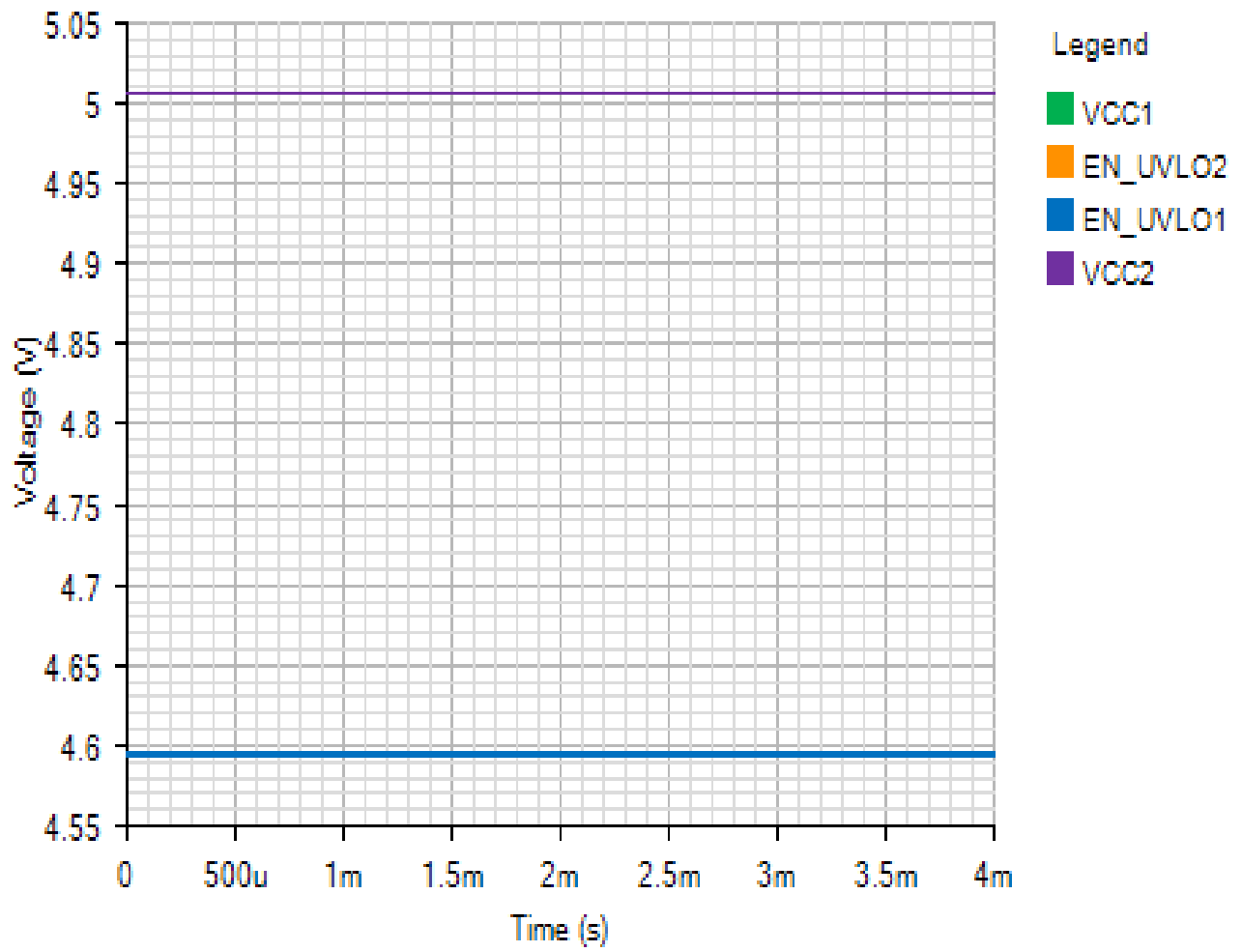
Default



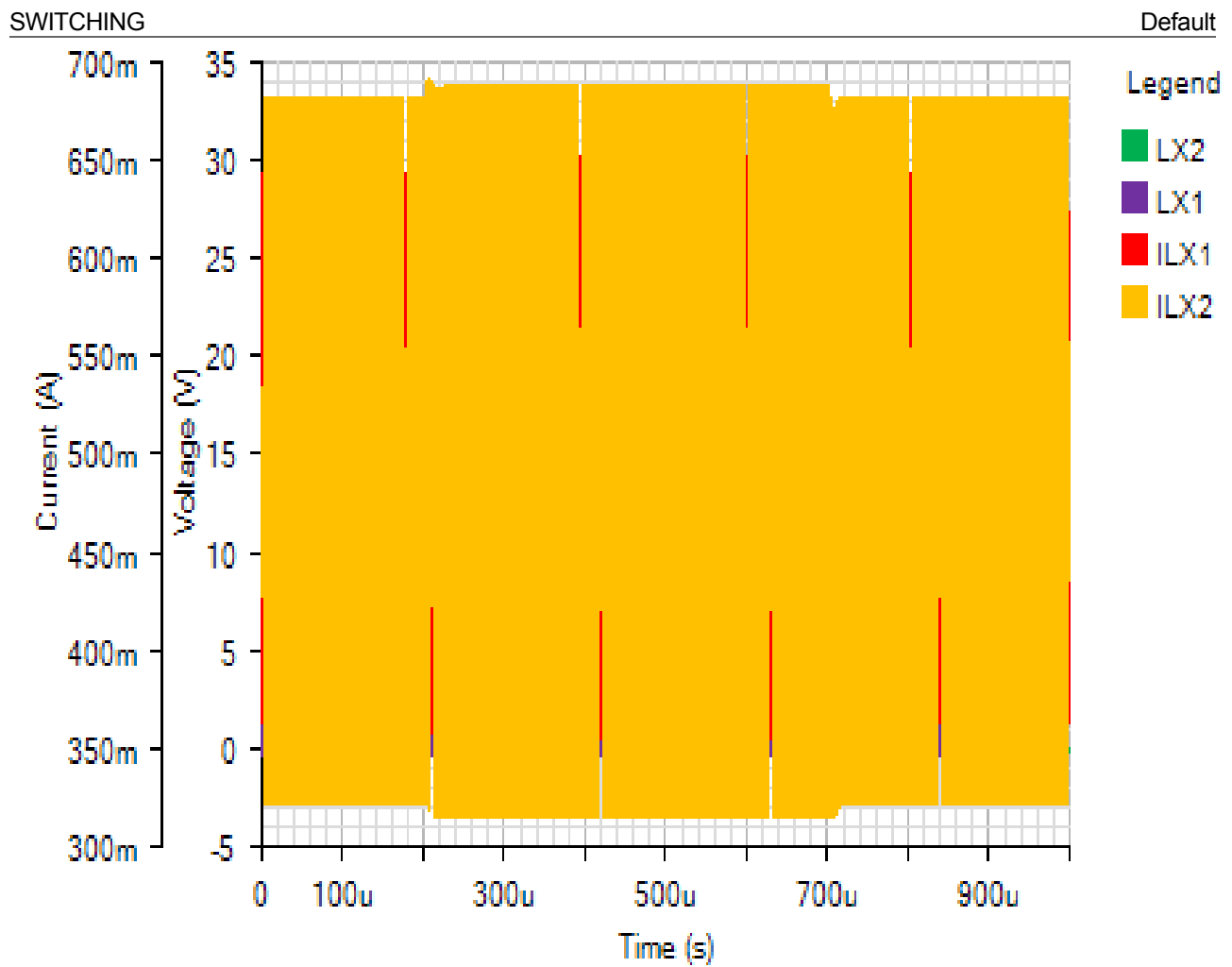


IC

Default

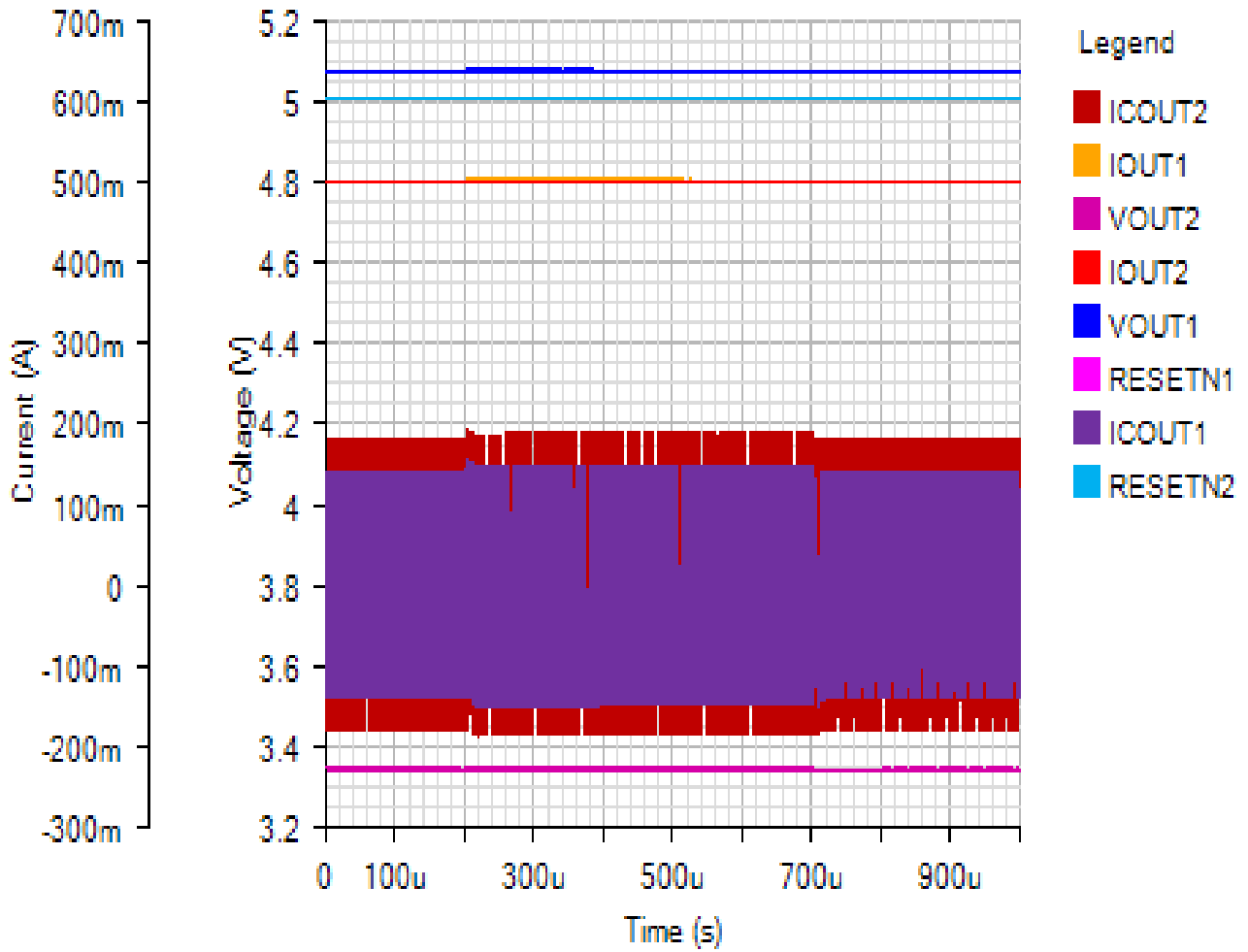


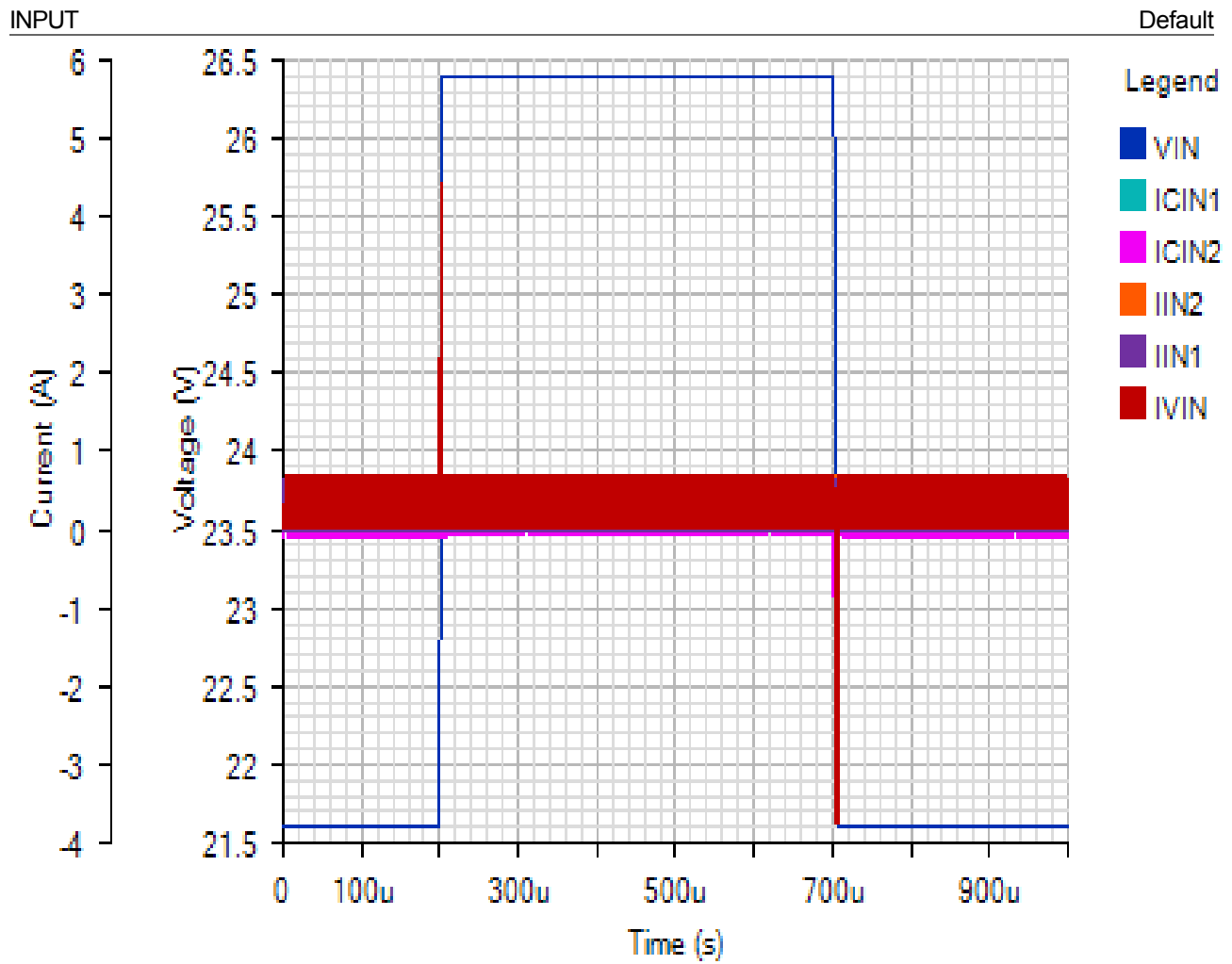
Line Transient - Tue Nov 20 2018 10:27:52



OUTPUT

Default





IC

Default

