



UNIVERSITAS  
GADJAH MADA

# UAS Project - Elektronika Daya



LOCALLY ROOTED,  
GLOBALLY RESPECTED

---

Hannan Nur Muhammad

21/475215/TK/52449

Program Studi Teknik Elektro

Departemen Teknik Elektro dan

Teknologi Informasi

Fakultas Teknik

Universitas Gadjah Mada

[ugm.ac.id](http://ugm.ac.id)

# Specification Buck Converter

Input Voltage : 48 Volt

Output voltage : 12 Volt

Switching Frequency : 100 kHz

Output Power :  $12\text{V} \times 6\text{A} = 72\text{ Watt}$

Current Ripple : 0.01 A

Voltage Ripple : 0.02 V

# Determine L Value

Rumus L dapat ditentukan dengan cara

$$L = \frac{(V_{in} - V_{out}) \cdot D}{\Delta I_L \cdot f_s}$$

$$L = \frac{(48 - 12) \cdot 0,417}{0,01 \cdot 100.000}$$

$$L = 0.015$$

$$L = 15 \text{ mH}$$

$V_{in}$  = Tegangan Input

$V_{out}$  = Tegangan Output

$D$  = Duty Cycle

$\Delta I_L$  = Ripple Arus

$f_s$  = Frekuensi Switching

## Determine C Value

Rumus L dapat ditentukan dengan cara

$$C = \frac{\Delta I_L}{8 \cdot f_s \cdot \Delta V_{out}}$$

$$C = \frac{0.01}{8 \cdot 100.000 \cdot 0.02}$$
$$C = 625 \text{ pF}$$

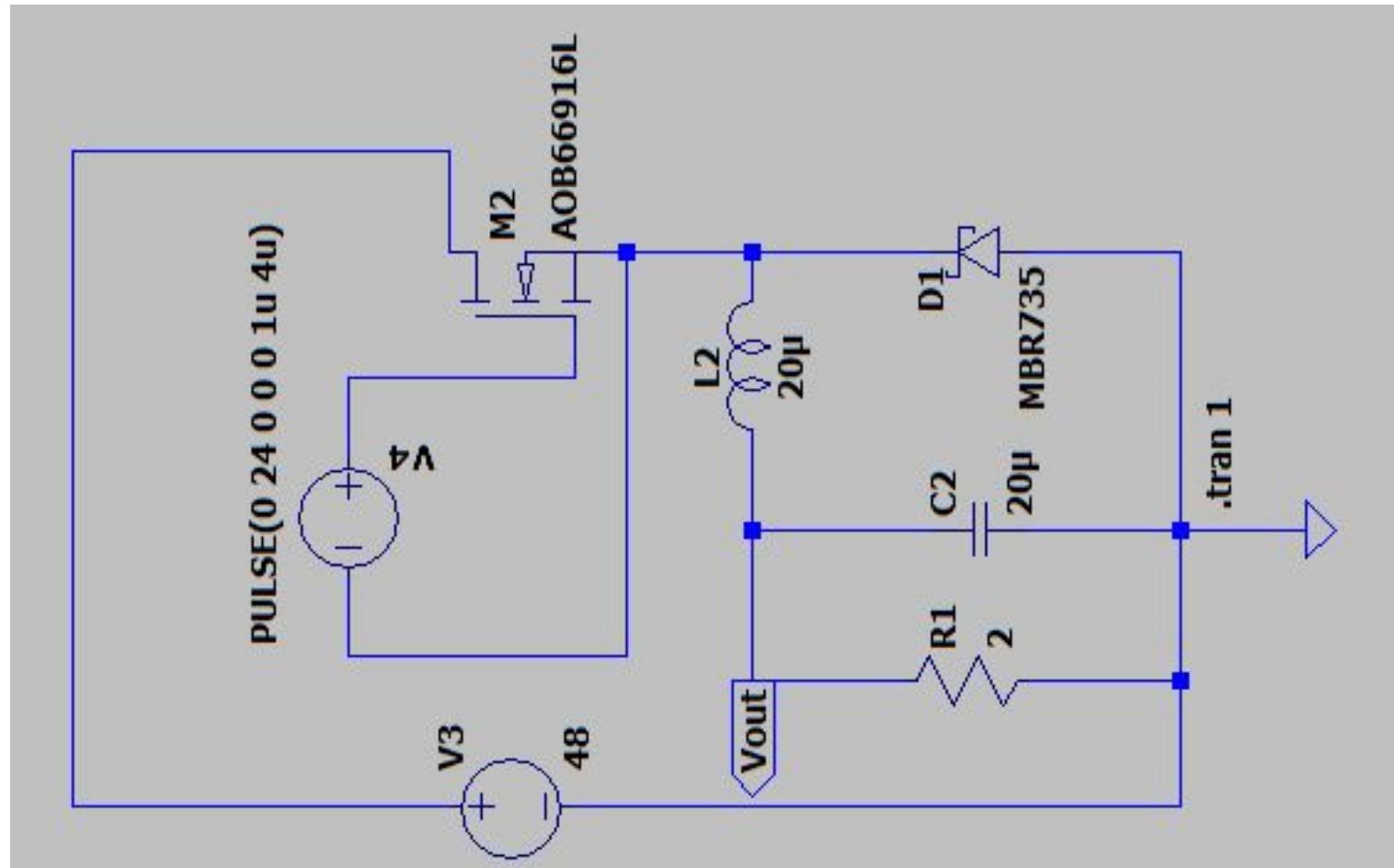
$C$  = Nilai Kapasitor

$\Delta I_L$  = Ripple Arus

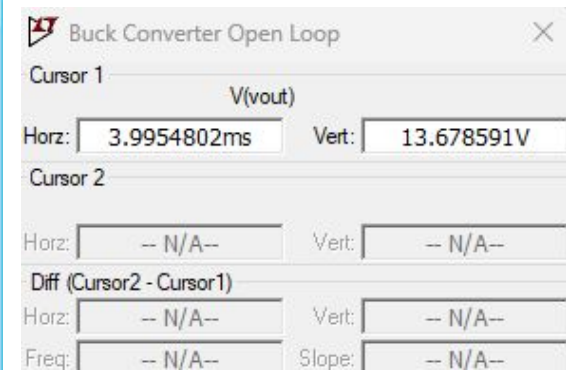
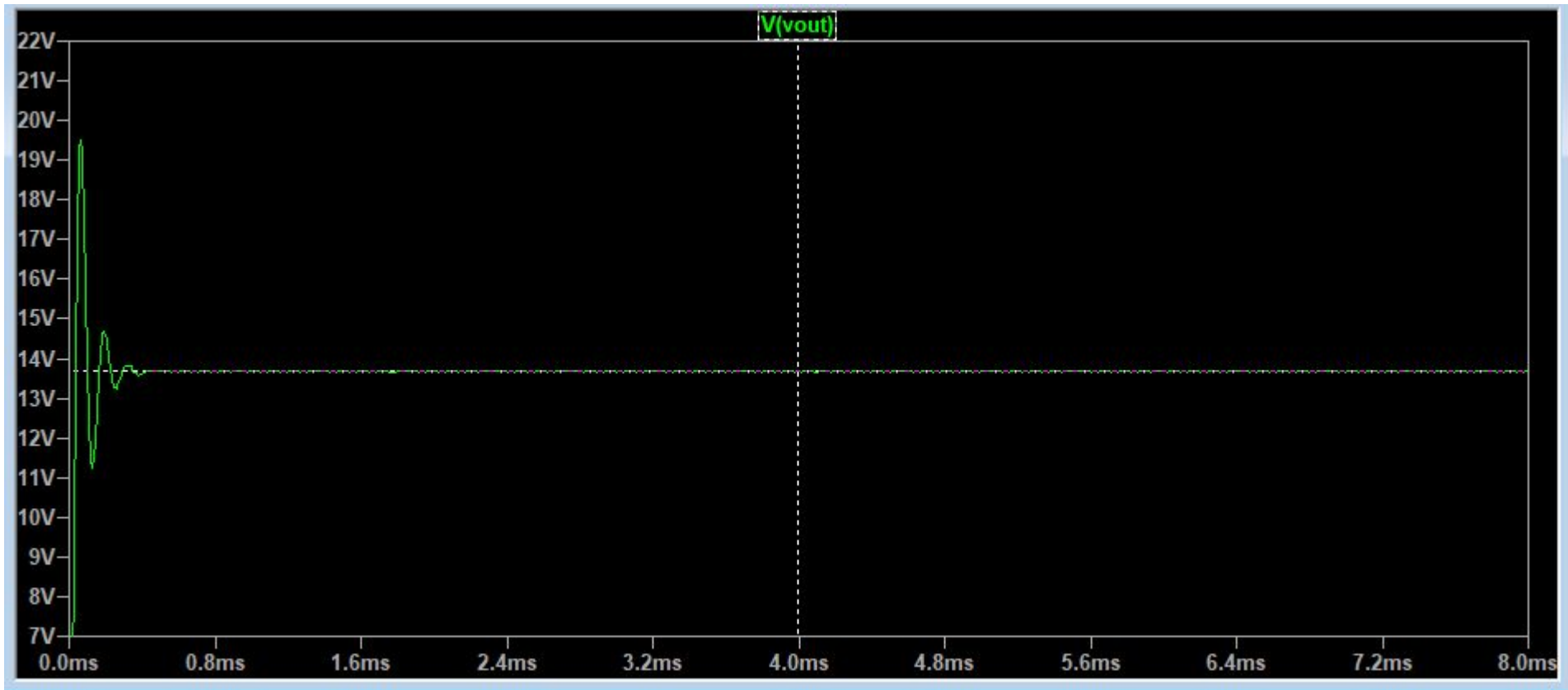
$f_s$  = Frekuensi Switching

$\Delta V_{out}$  = Ripple Tegangan

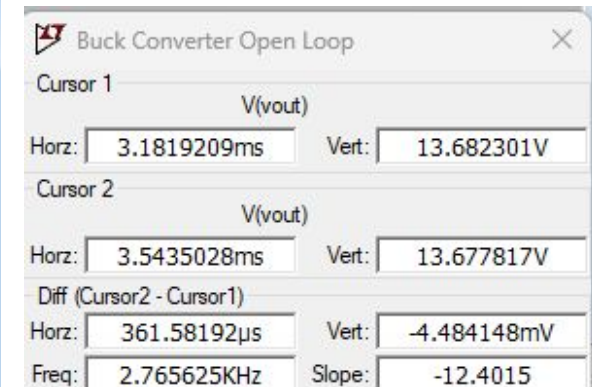
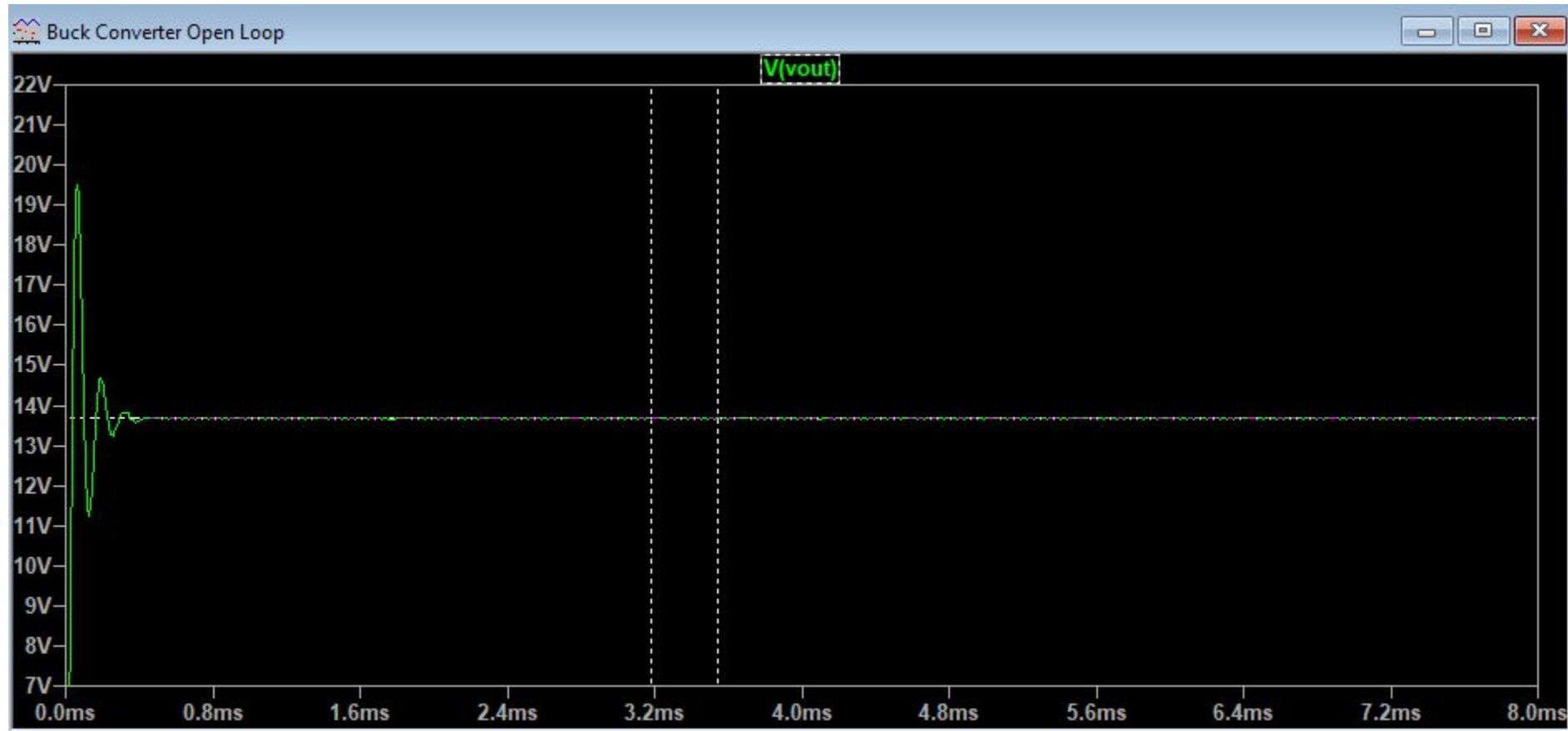
# Rangkaian Buck Converter Open Loop



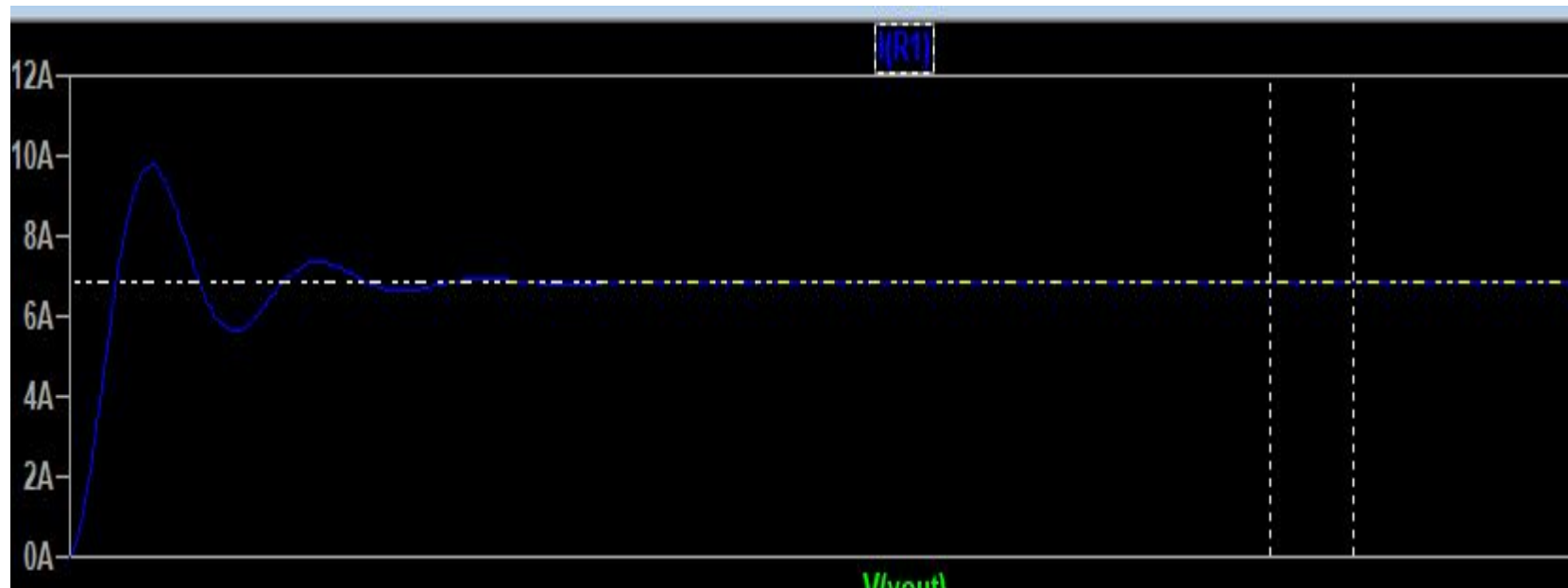
# Hasil Output Tegangan



# Hasil Ripple Tegangan



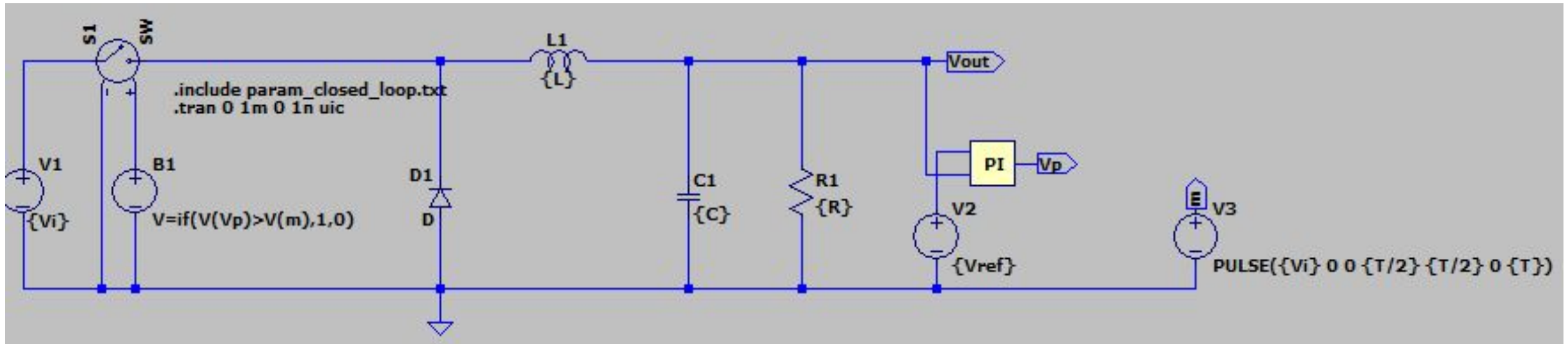
# Hasil Ripple Arus



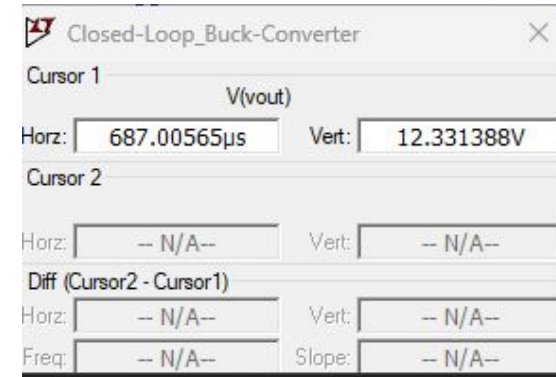
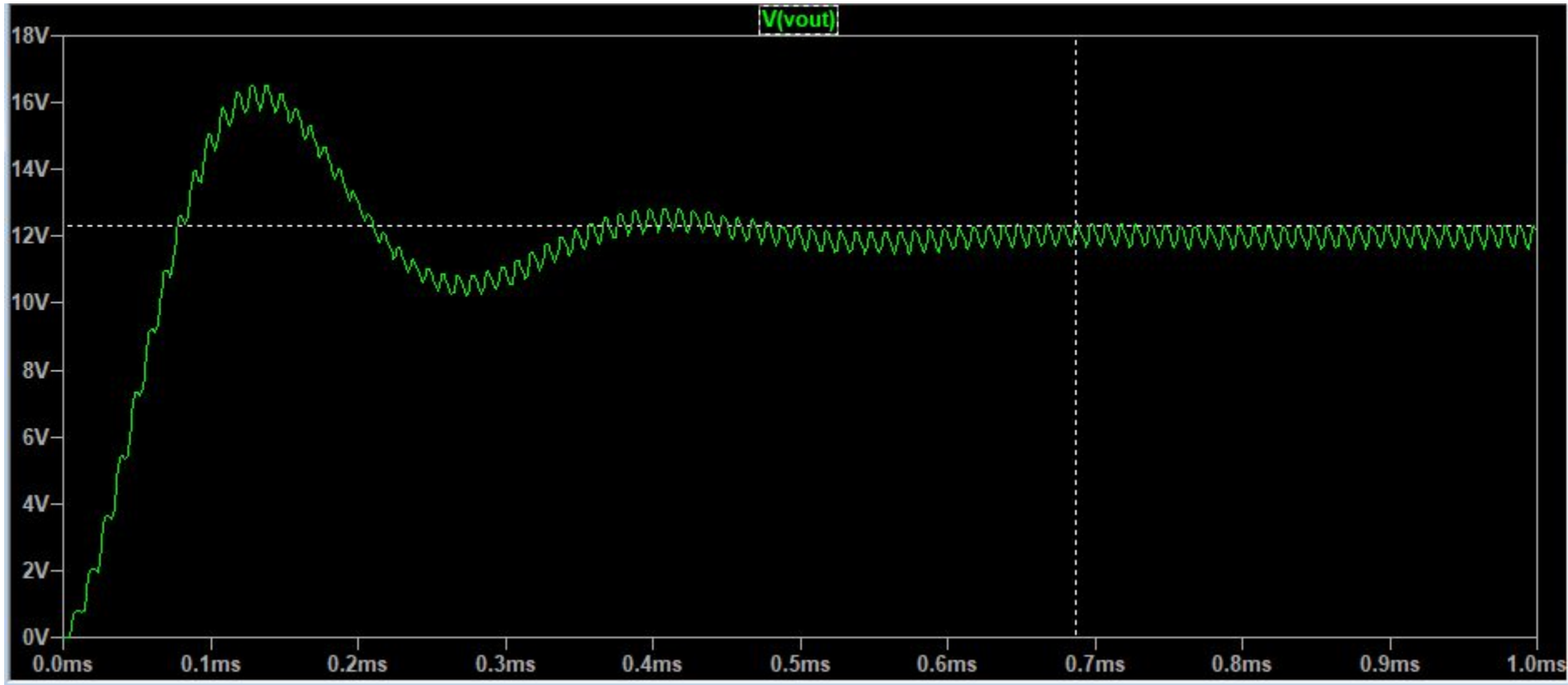
Buck Converter Open Loop			
Cursor 1		$I(R1)$	
Horz:	997.40113 $\mu$ s	Vert:	6.8335187A
Cursor 2		$I(R1)$	
Horz:	932.76836 $\mu$ s	Vert:	6.8217781A
Diff (Cursor2 - Cursor1)			
Horz:	-64.632768 $\mu$ s	Vert:	-11.740583mA
Freq:	15.472028kHz	Slope:	181.651



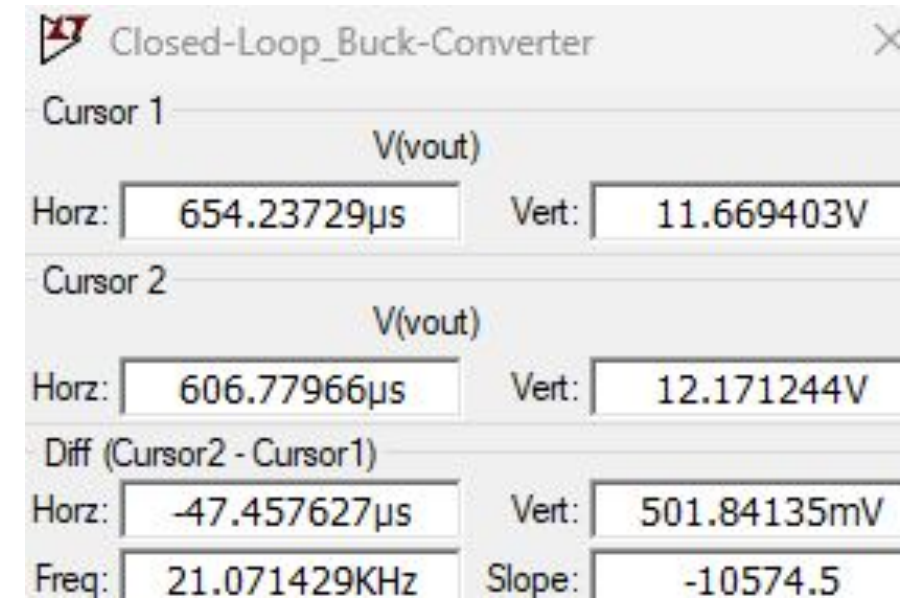
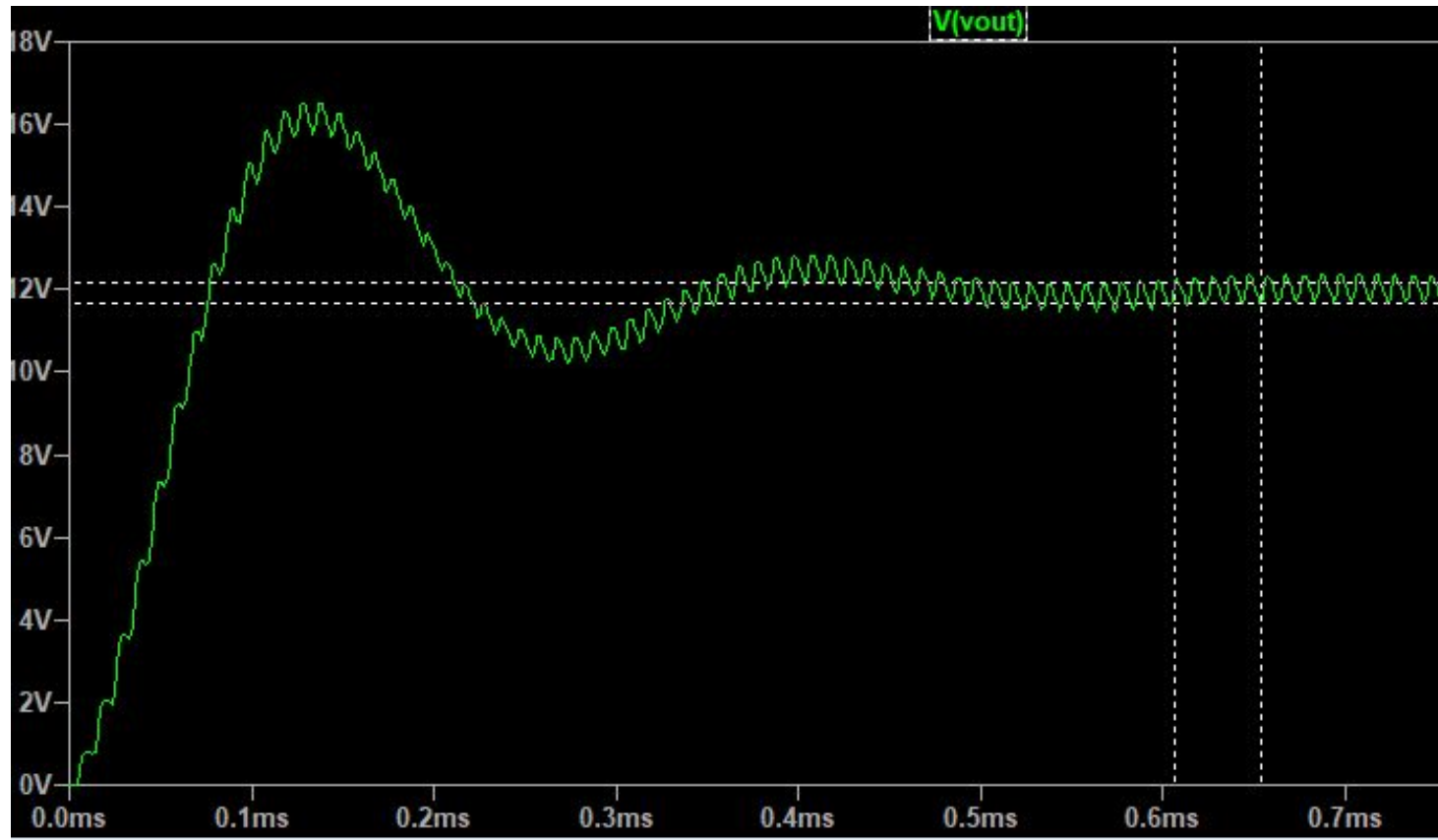
# Rangkaian Buck Converter Close Loop



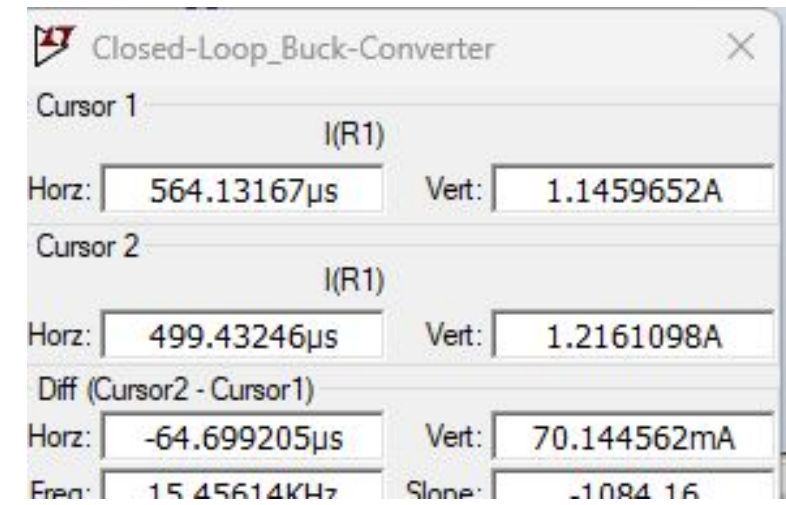
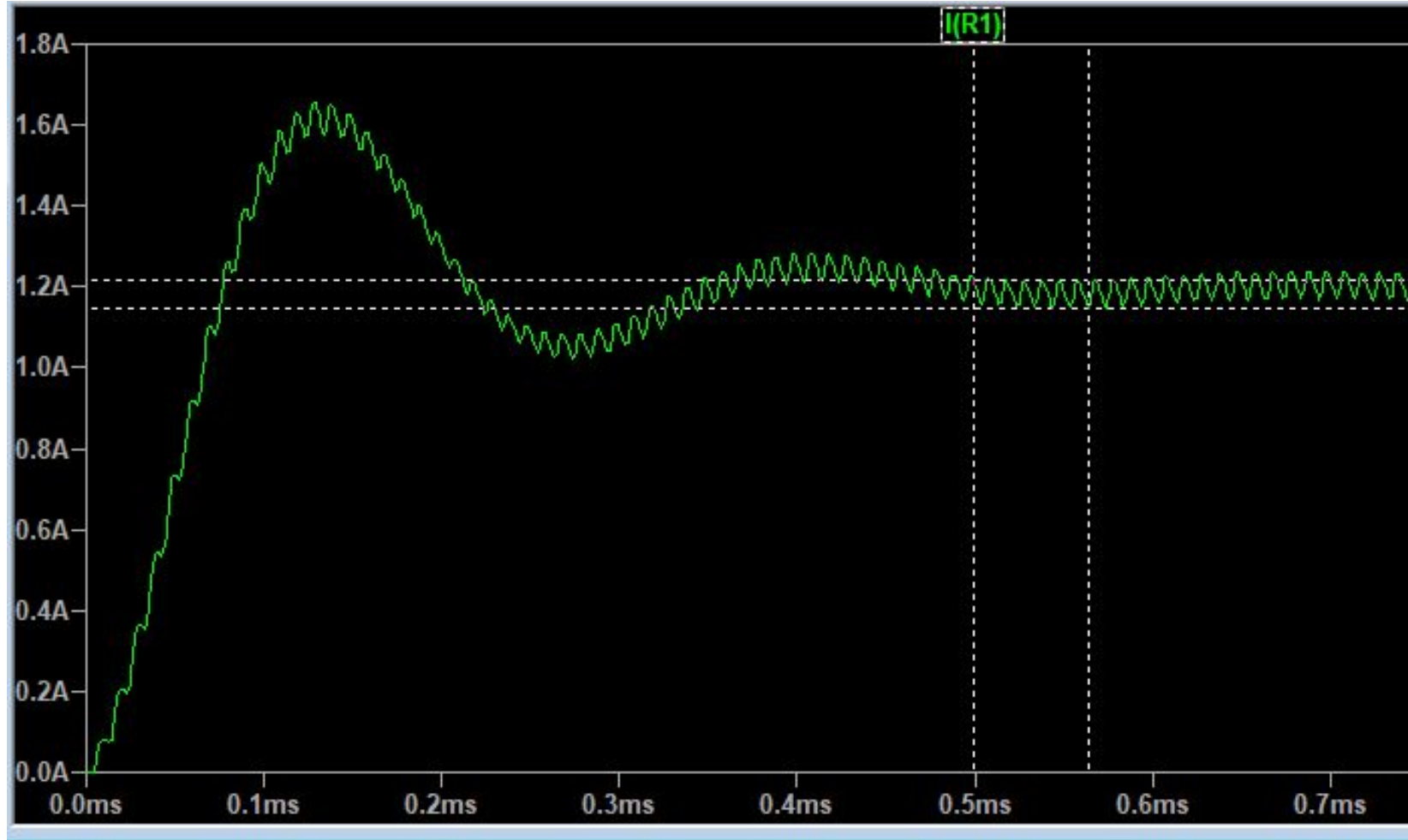
# Hasil Output Tegangan



# Hasil Ripple Tegangan



# Hasil Ripple Arus



# PV Module Configuration dan Rating

$V_{dc} = 800$  dengan 16 PV dirangkai seri bertegangan 50V per PV untuk mencapai  $V_{dc}=800$

$$I_{PV} = \frac{P_n}{V_{dc}}$$

$$I_{PV} = \frac{130000}{800}$$

$$I_{PV} = 162.5 \text{ A}$$

# L Value

Phitungan L

$$\Delta i_L = \frac{0.1 \cdot P_n \sqrt[3]{2}}{3V_{ph}} = 20 \text{ A}$$

$$V_{dc} = \frac{2\sqrt{2}}{m_i \cdot \sqrt{3} \cdot V_L} = 800 \text{ V}$$

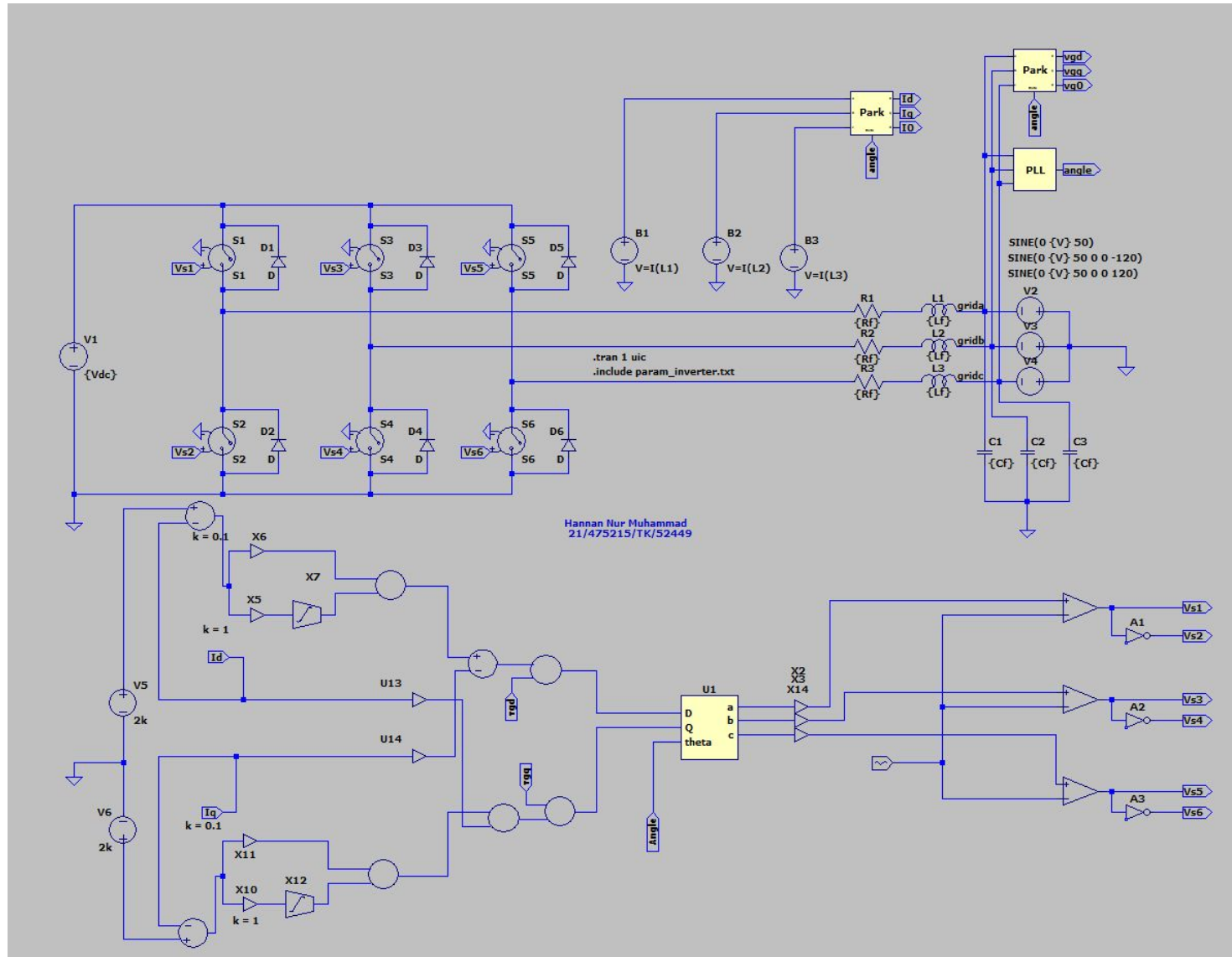
$$L_1 = \frac{V_{dc}}{8 \cdot f_{sw} \cdot \Delta i_L} = 500 \text{ } \mu H$$

# Link Github

[https://github.com/hannannm/UAS\\_Elektronika\\_Daya\\_475215](https://github.com/hannannm/UAS_Elektronika_Daya_475215)

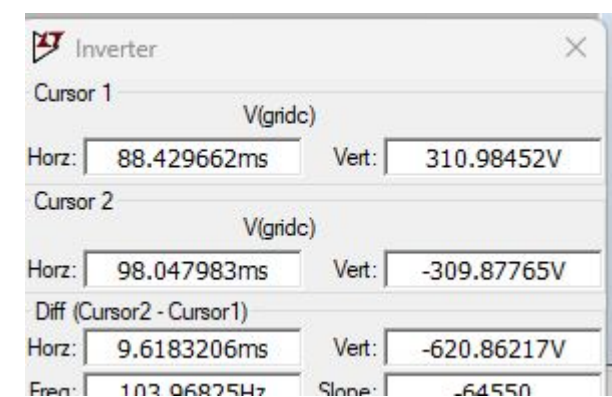
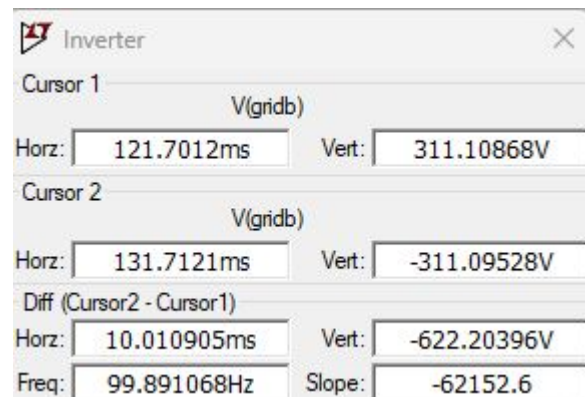
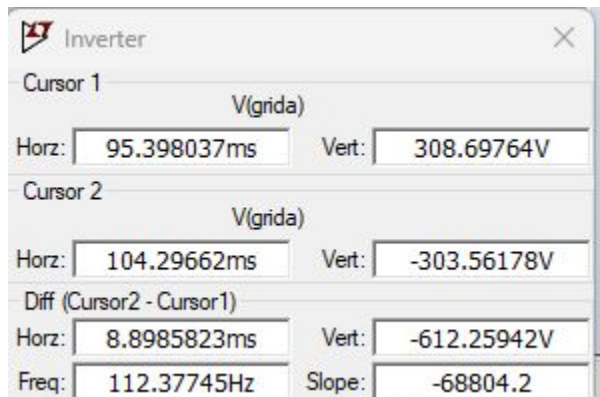
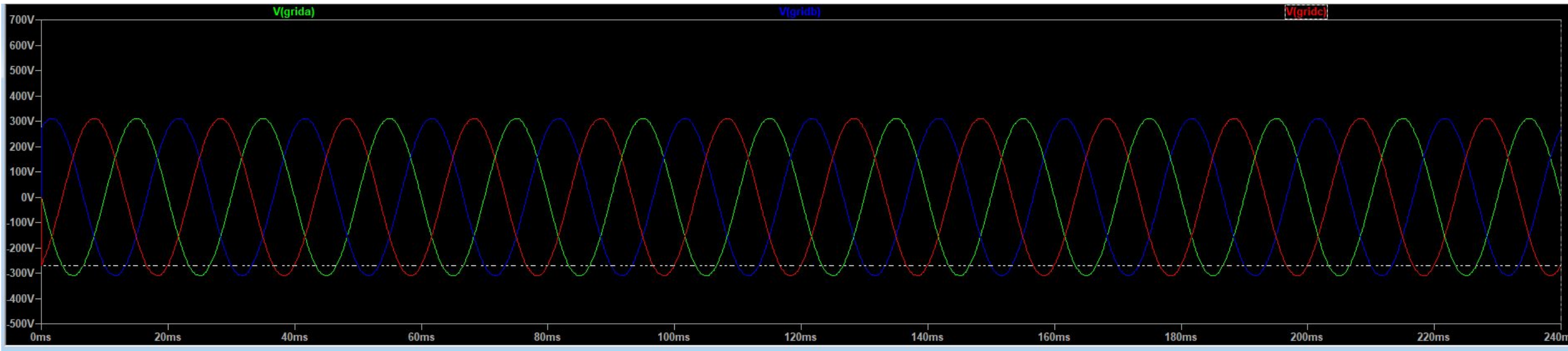


# Rangkaian Inverter

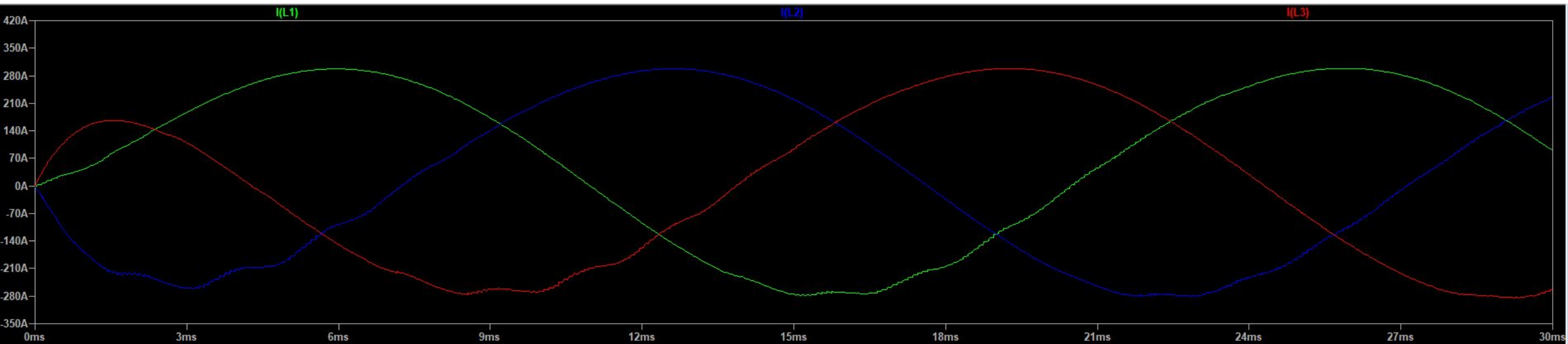




# Hasil Output Tegangan



# Hasil Output Arus



Inverter	
Cursor 1	
I(L1)	
Horz: 5.9085963ms	Vert: 297.35125A
Cursor 2	
I(L1)	
Horz: 16.436344ms	Vert: -273.88043A
Diff (Cursor2 - Cursor1)	
Horz: 10.527748ms	Vert: -571.23168A
Freq: 94.98708Hz	Slope: -54259.6

Inverter	
Cursor 1	
I(L2)	
Horz: 12.81284ms	Vert: 297.01466A
Cursor 2	
I(L2)	
Horz: 3.2317737ms	Vert: -260.18546A
Diff (Cursor2 - Cursor1)	
Horz: -9.5810664ms	Vert: -557.20012A
Freq: 104.37252Hz	Slope: 58156.4

Inverter	
Cursor 1	
I(L3)	
Horz: 19.260065ms	Vert: 298.29986A
Cursor 2	
I(L3)	
Horz: 8.5364527ms	Vert: -276.05647A
Diff (Cursor2 - Cursor1)	
Horz: -10.723613ms	Vert: -574.35633A
Freq: 93.252156Hz	Slope: 53560



UNIVERSITAS  
GADJAH MADA

“Dreams are for weaving,  
Wonders are waiting to start”

