Proiect SCIA

Grupa:2131

Nume :Bartos Gavril-Cornel

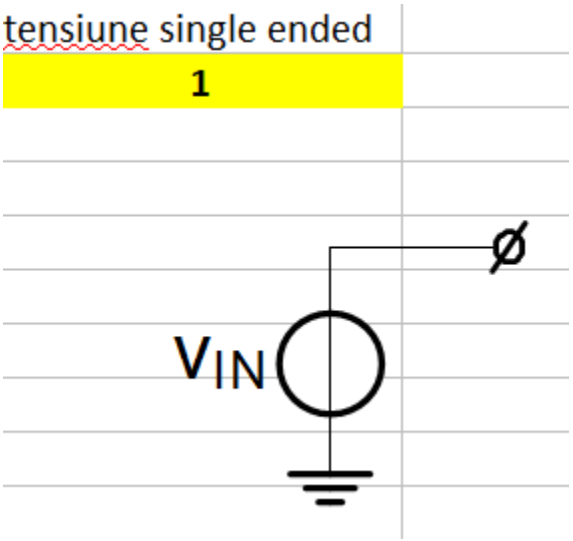
1.Tematica Proiectului:

Specificati generale:

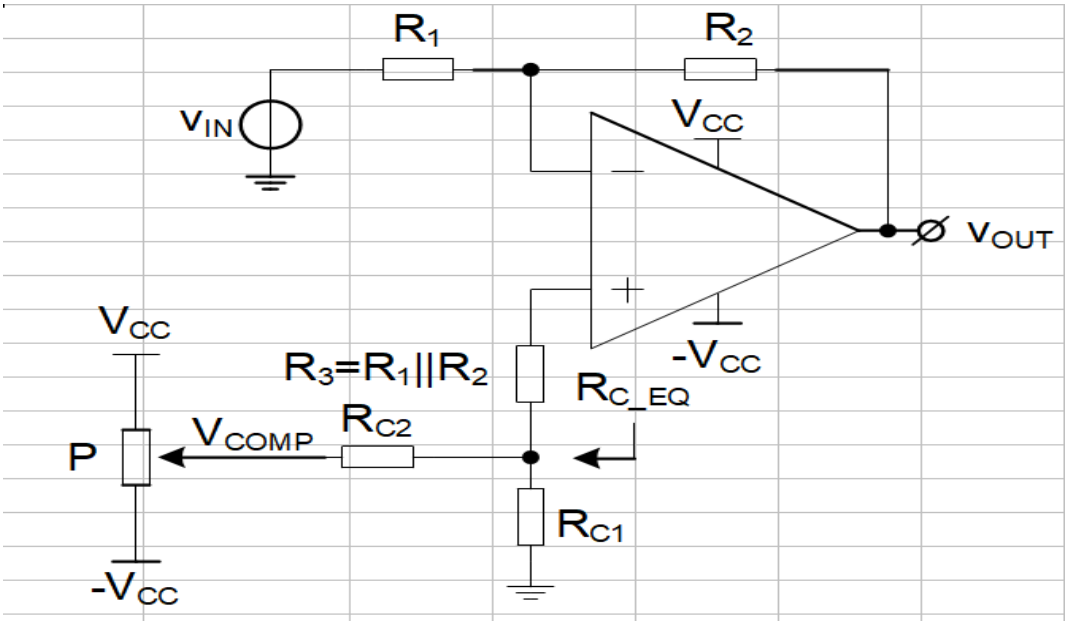
a)Etaj 1:

			Etaj 1					
Nr	grupa	Nume student	Sursa semnal	amplitudine minima (pt castig maxim PGA)	amplitudine maxima (pt castig minim PGA)	unitate masura	Tip Etaj 1	|Castig| etaj 1 (liniar)
85	2131	Bartos Gavril-Cornel	1	3.34E-02	1.33E-01	V (single ended)	2	19

Sursa semnal 1:



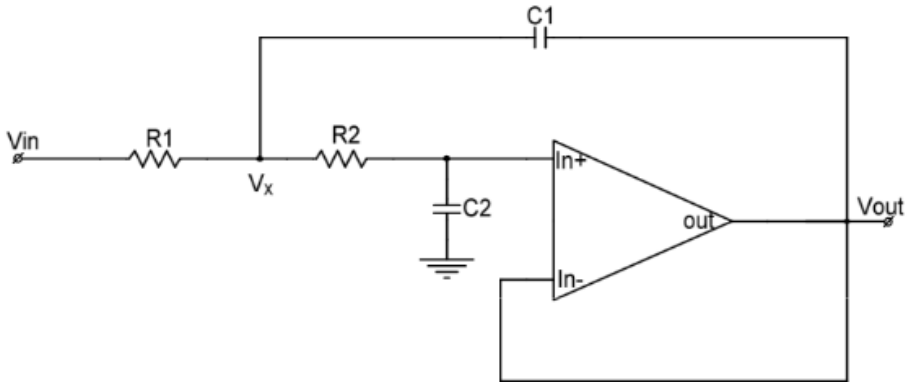
Amplificator inversor cu 1 AO



Etaj 2:

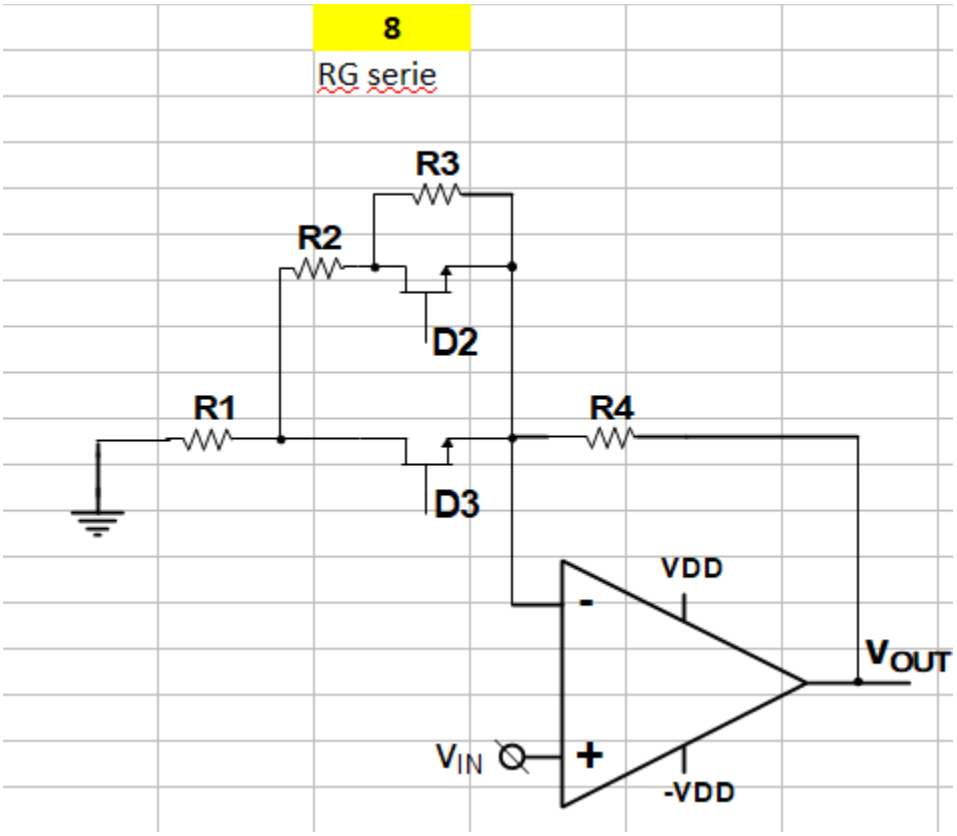
			Etaj 2				
Nr	grupa	Nume student	tip Etaj 2	|H0| castig liniar in banda de trecere	Rintrare minim	Banda	Q
85	2131	Bartos Gavril-Cornel	1	1	2.00E+03	8.00E+03	0.707

Sallen-Key



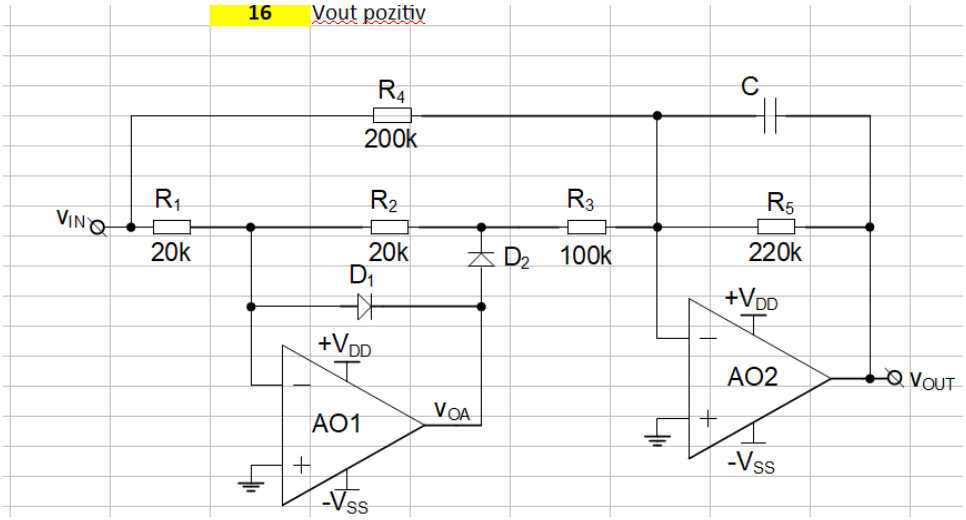
Etaj 3 :

			Etaj 3					
Nr	grupa	Nume student	tip Etaj 3	castig minim [dB]	rezolutie (pas minim) [dB]	nr pasi	castig maxim [dB]	Rintrare minim
85	2131	Bartos Gavril-Cornel	8	4	3	5	16	



Etaj 4:

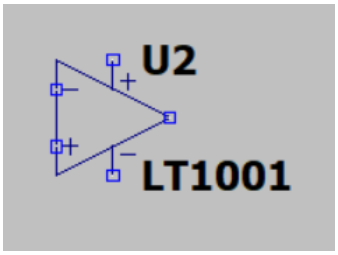
			Etaj 4	
Nr	grupa	Nume student	tip Etaj 4	|Castig| etaj 4 (liniar)
85	2131	Bartos Gavril-Cornel	16	1



Tip AO:

			AO
Nr	grupa	Nume student	Tip AO
85	2131	Bartos Gavril-Cornel	14

14	LT1001	+-22V



2. Dimensionarea etajelor:

1. Etaj 1:

Av=-R2/R1

Av=19 -> R2=19k R1=1k

Rc_eq = R2 | | R1 = 0.95k

□□□□□= (1+ □2□1)∗ □□□

□□□□= □□∗ □3 (1+ □2□1)− □□∗ □2

□□□□□= □□□2∗ (□3+ □3∗ □2□1+□2)

Nu am nevoie de compensare

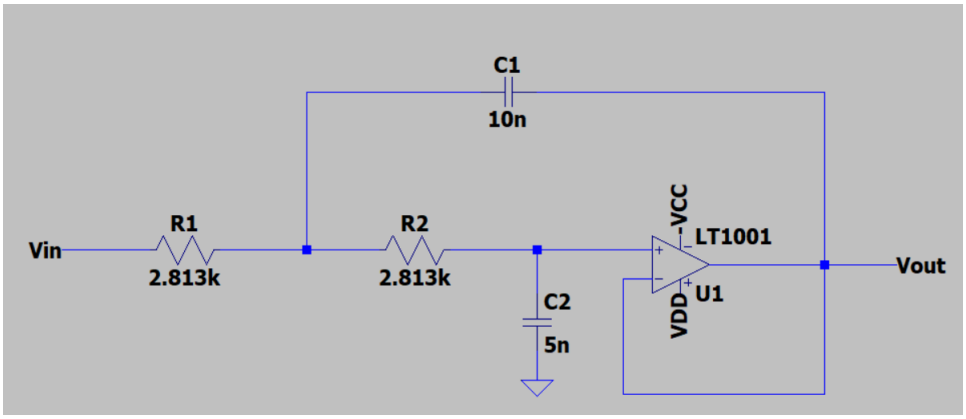
2. Etaj 2:

Alegem c1=10n => c2=5n

w0 = 2Pif0 => f0 = w0/2Pi

w0 = 1/R*sqrt(c1*c2)

f0 = 1/2Pi*R*sqrt(c1*c2) => R= 2,813k



3. Etaj 3:

Transformarea amplificarilor in linear:

4db -> 1,585

7db -> 2,239

10db -> 3,162

13db -> 4,466

16db -> 6,310

Fromula amplificator neinversor:

Av= 1+ Rf/Rg

Alegem Rf=10k

s1 → □v=1+ □□/□1 -> R1=1.883k

s2 → □v=1+ □□/□1+R2 -> R2= 0,44k

s3 → □v=1+ □□/□1+R2+R3 -> R3= 2,31k

s4 → □v=1+ □□/□1+R2+R3+R4 -> R4= 3,43k

Toate off → □v=1+ □□/□1+R2+R3+R4+R5 -> R5= 9,18k

4. Etaj 4:

Daca Vin creste => Vout2 ↘ -VCC

D1 conduce , D2 blocata => u2 are RN

U1 are RN prin R5 (V+=V-) => prin R2 si R3 nu trece curent

Vout = - R5/R4*Vin (amplificare in alternanta pozitiva)

Daca Vin scade => Vout2↗ VDD+

D1 blocata , D2 conduce => u2 are RN prin R2 => Vo1=-R2/R1*Vin

1) Pasivizam Vo1 => nu trece curent prin R3

Vout=vin*(-R5/R3)Vo1

2) Pasivizam Vin => prin R4 un trece curent

Vout = (-R5/R3)*Vo1

3) Suma efectelor:

Vout= (-R5/R3)*Vin-(R5/R3)Vo1

=Vin(R5(R2R4-R3R1) / R4R3R1) amplificare in alternanta negativa

Conditia redresoar bialternata

-R5/R4 = R5(R2R4-R3R1) / R4R3R1

R4R2=2*R3R1 }

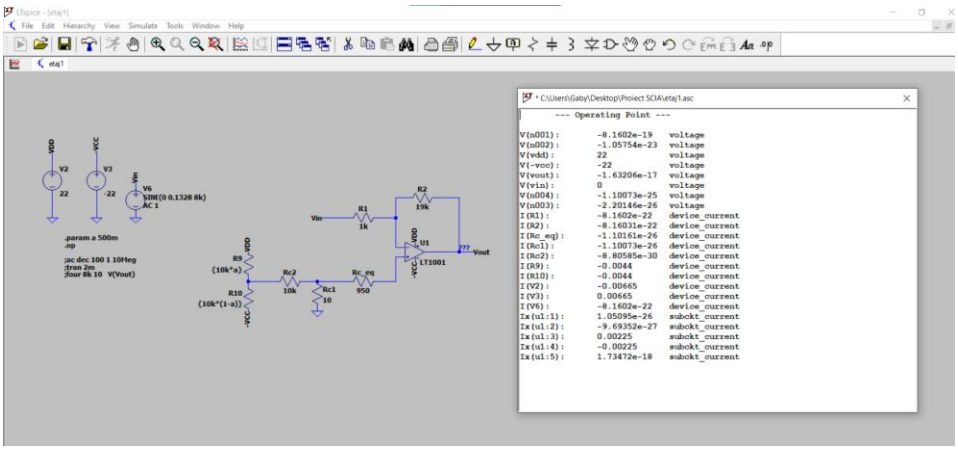
} => R1=R2=20k R3=100k

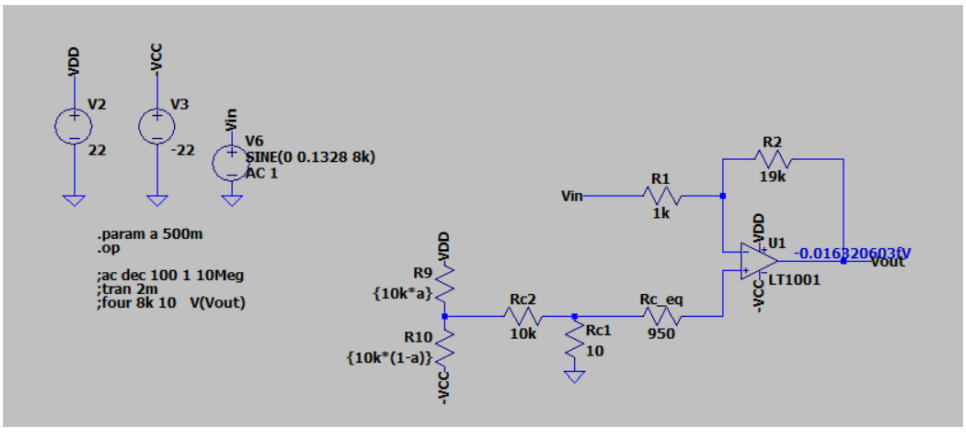
-R5/R4 =1,1 alegem R5=R4=200k }

3. Caracterizarea etajelor

a) Etaj 1

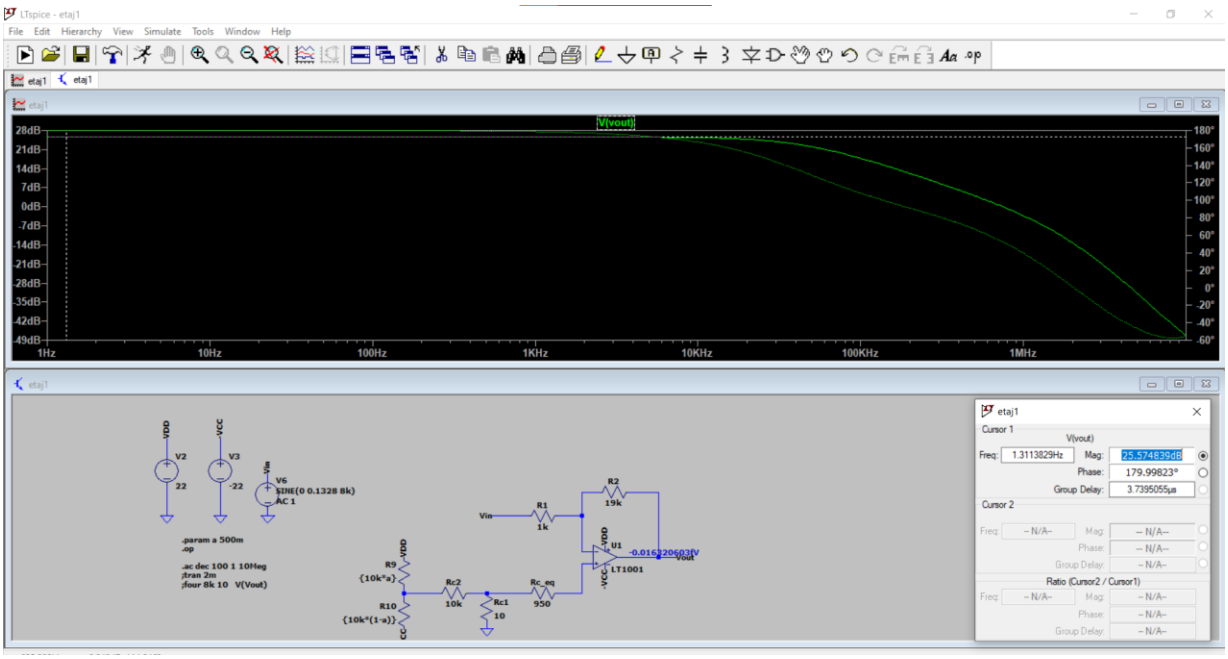
Analiza .op



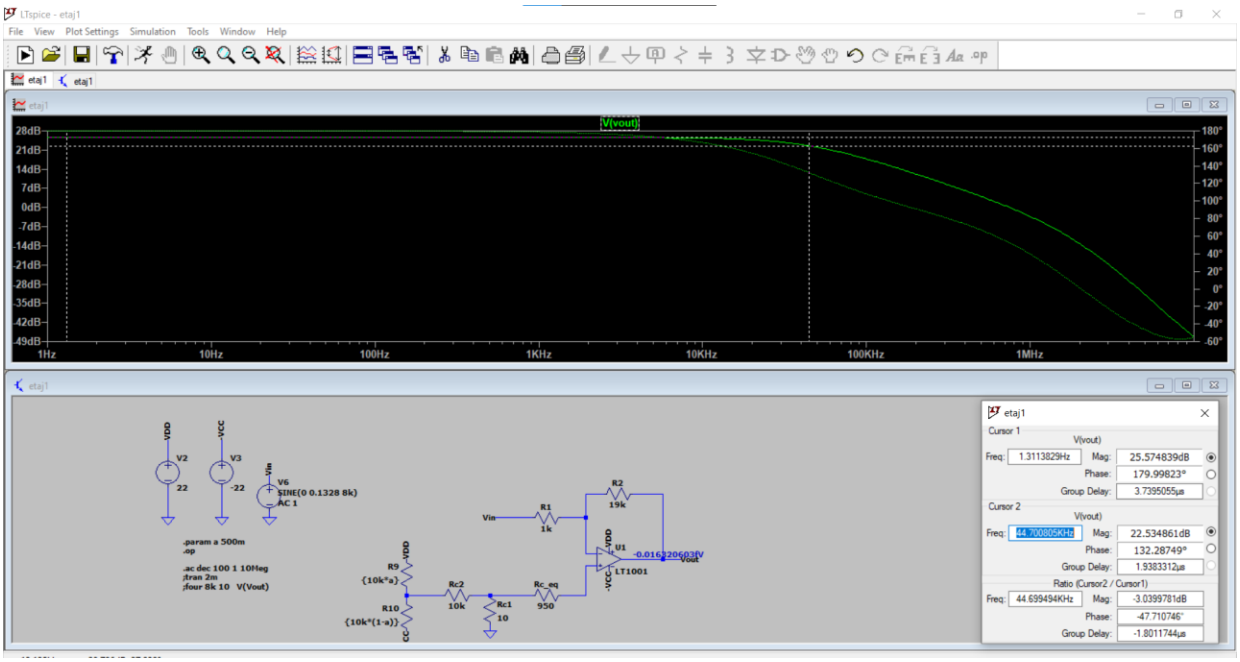


Parametri de semnal mic :

Castigul de joasa frecventa: 25.574839dB

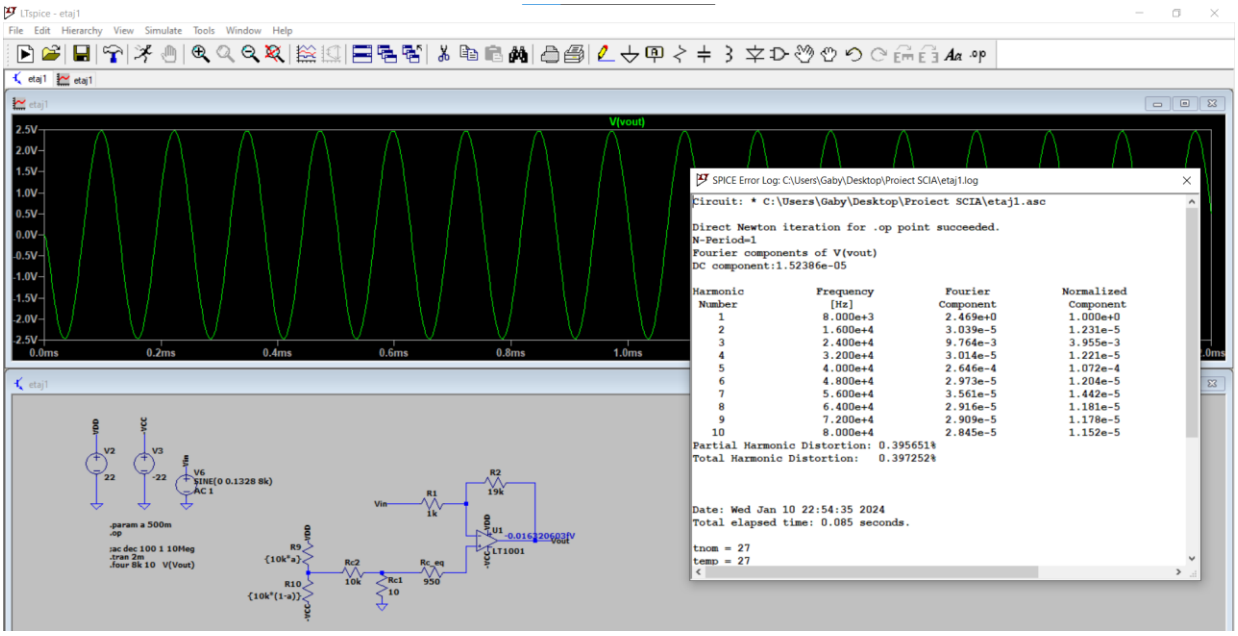


Se poate observa ca banda de 44.700805KHz este mai mare ca banda filtrului (8KHz)



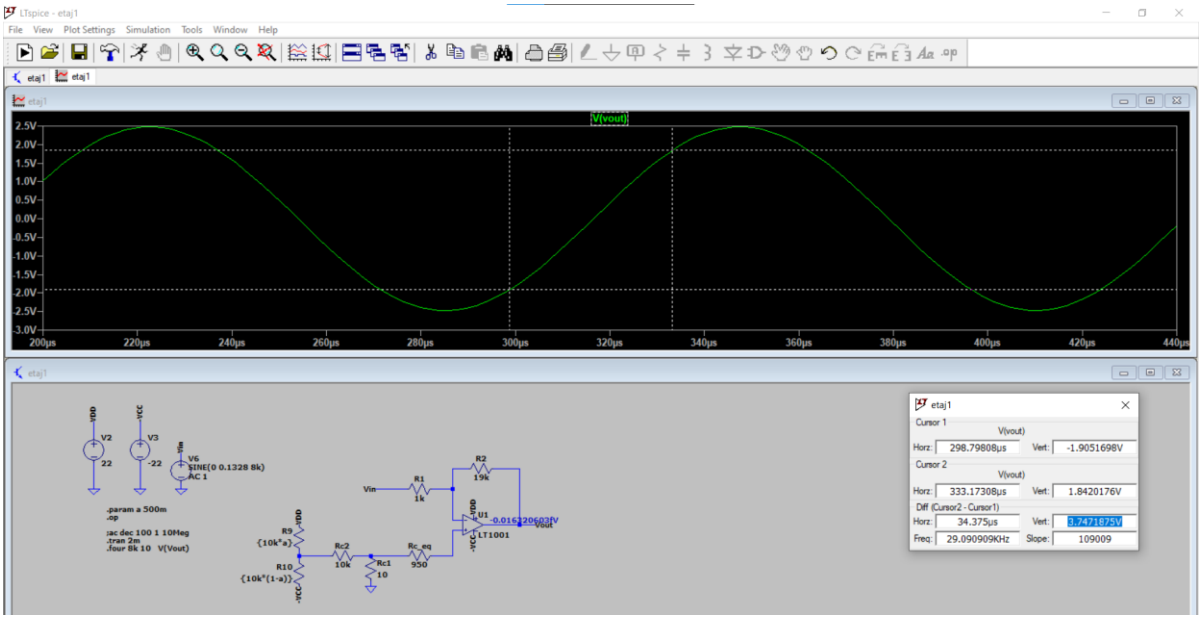
Parametrii de semnal mare:

THD: 0.000641%(0.055816%) < 1%



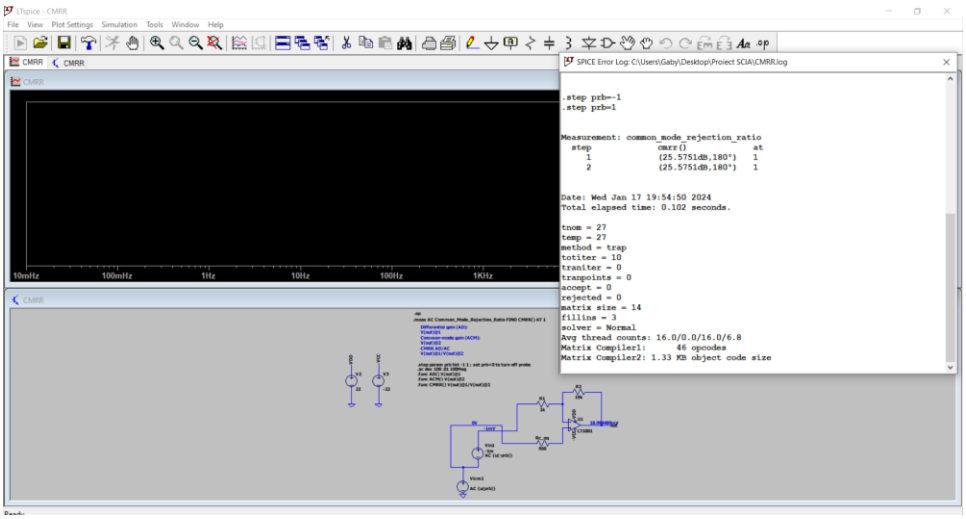
Slew-rate:

Masurat pentru frecventa de 8KHz

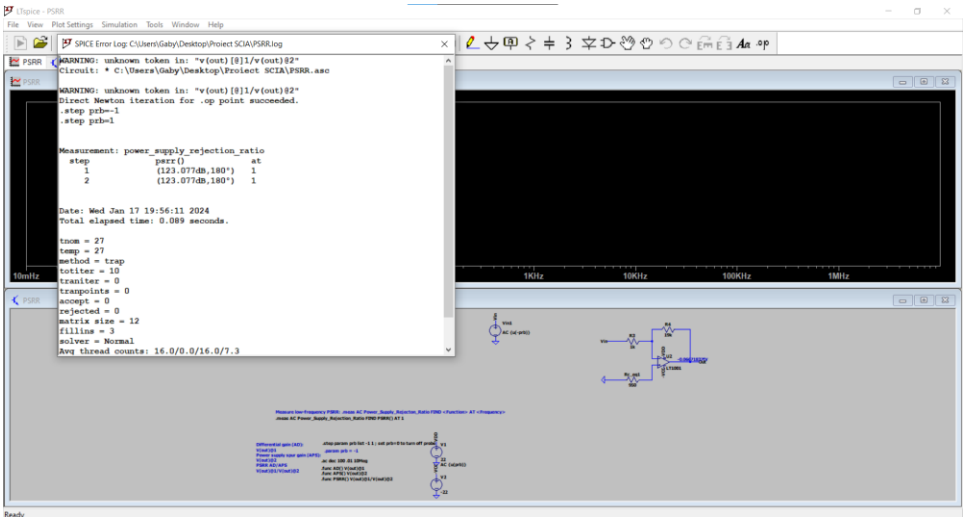


SR=3.747/34,37us = 0.1V/us <<0.25 V/us

Analiza CMRR

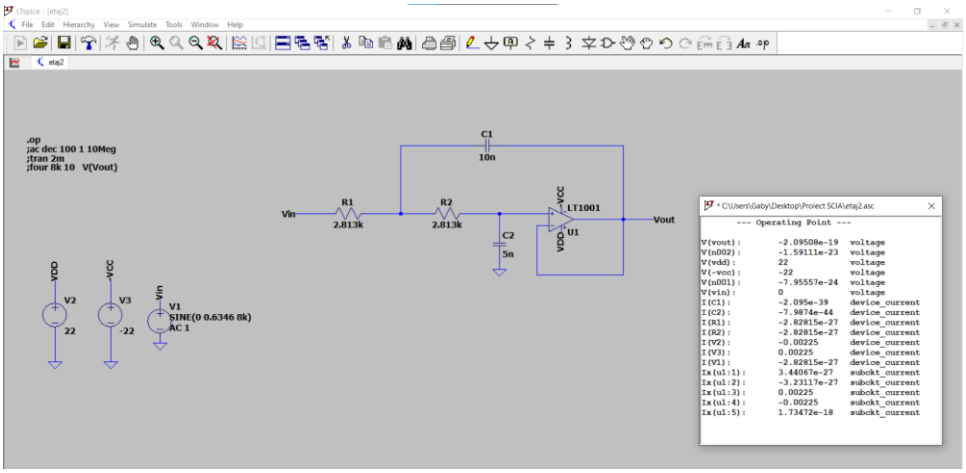


Analiza PSRR



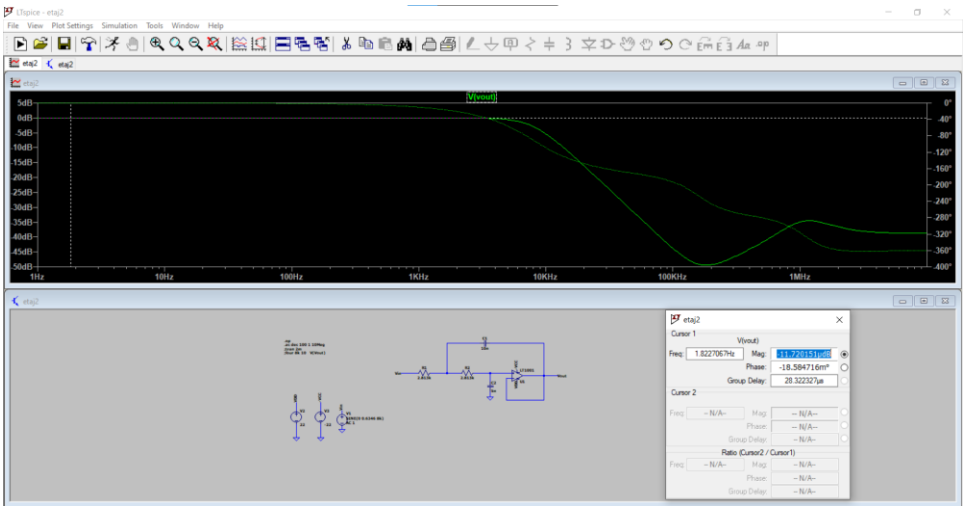
b) Etaj 2

Analiza .op

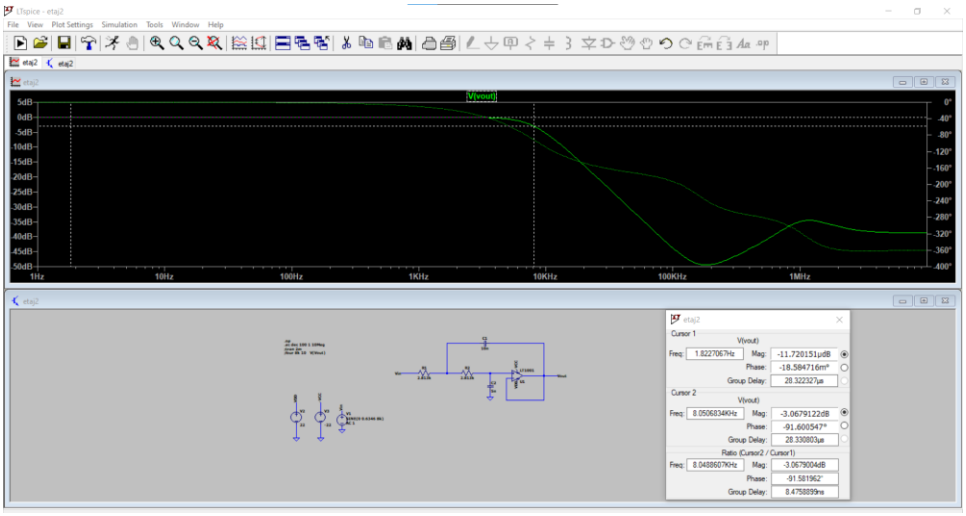


Parametrii de semnal mic:

Castig in banda de trecere: -11.720151µdB aproape 0dB

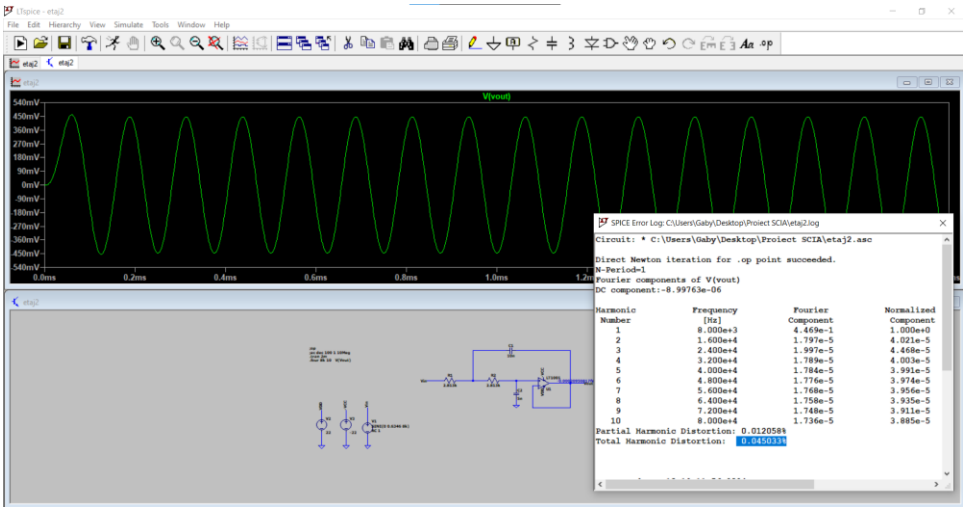


Banda: 8.0488607KHz



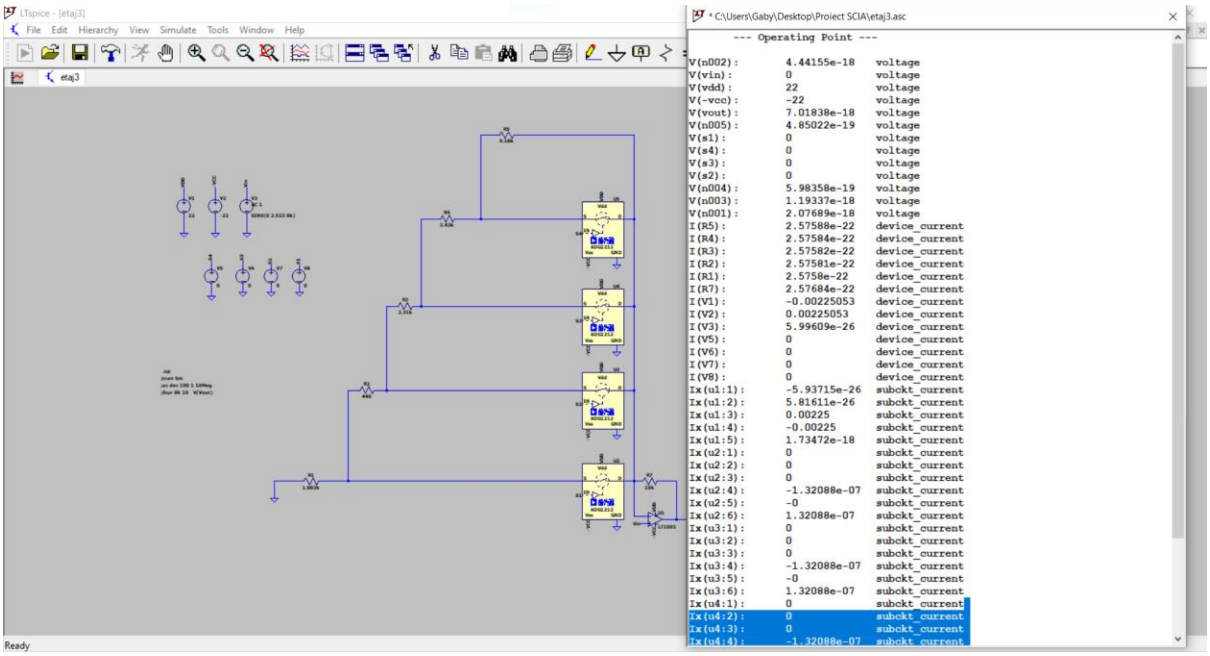
Parametrii de semnal mare:

THD: 0.045033%

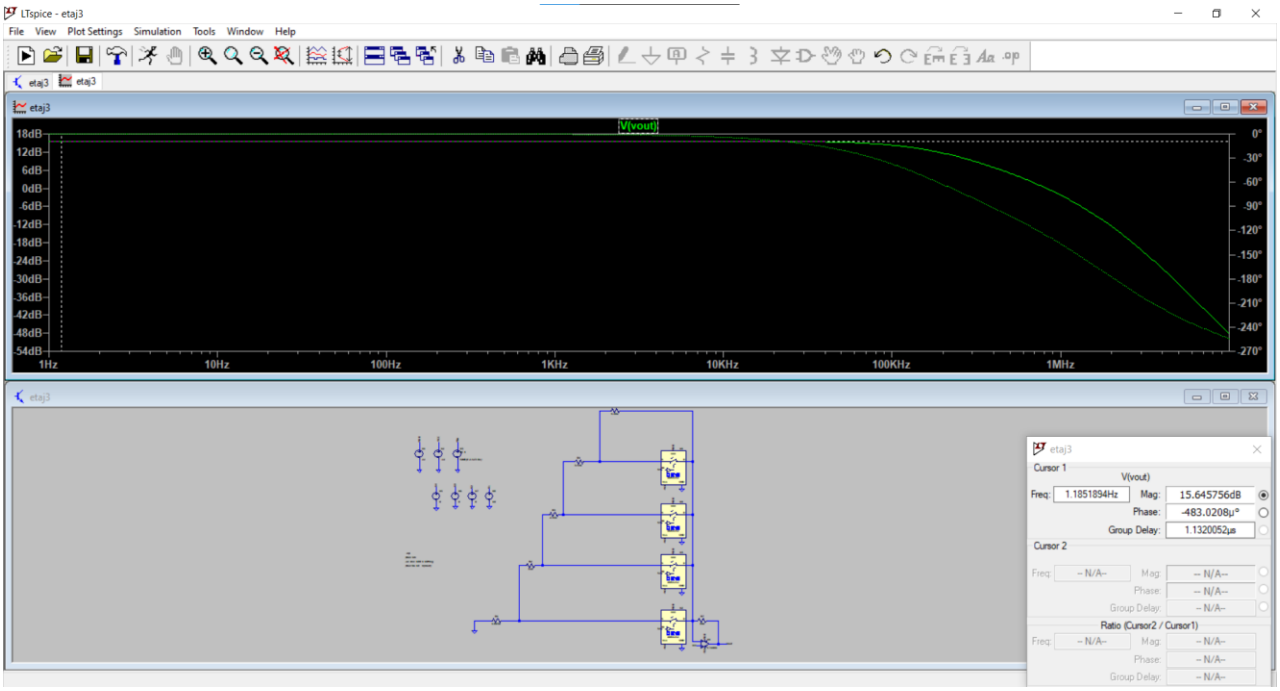


c) Etaj 3

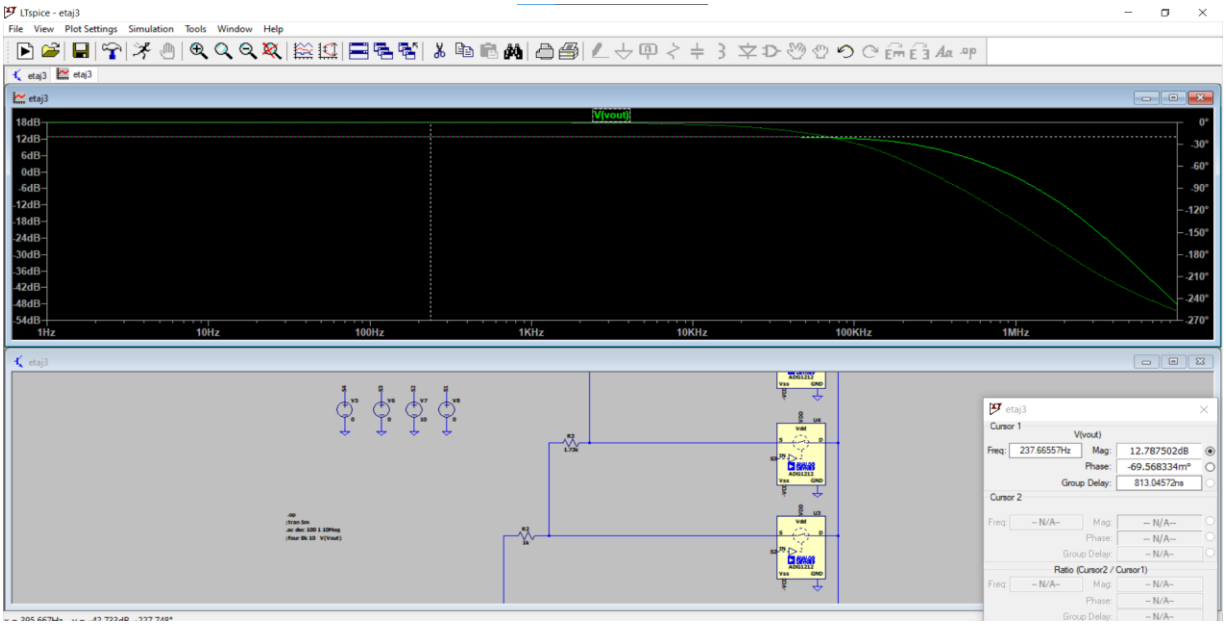
Analiza .op



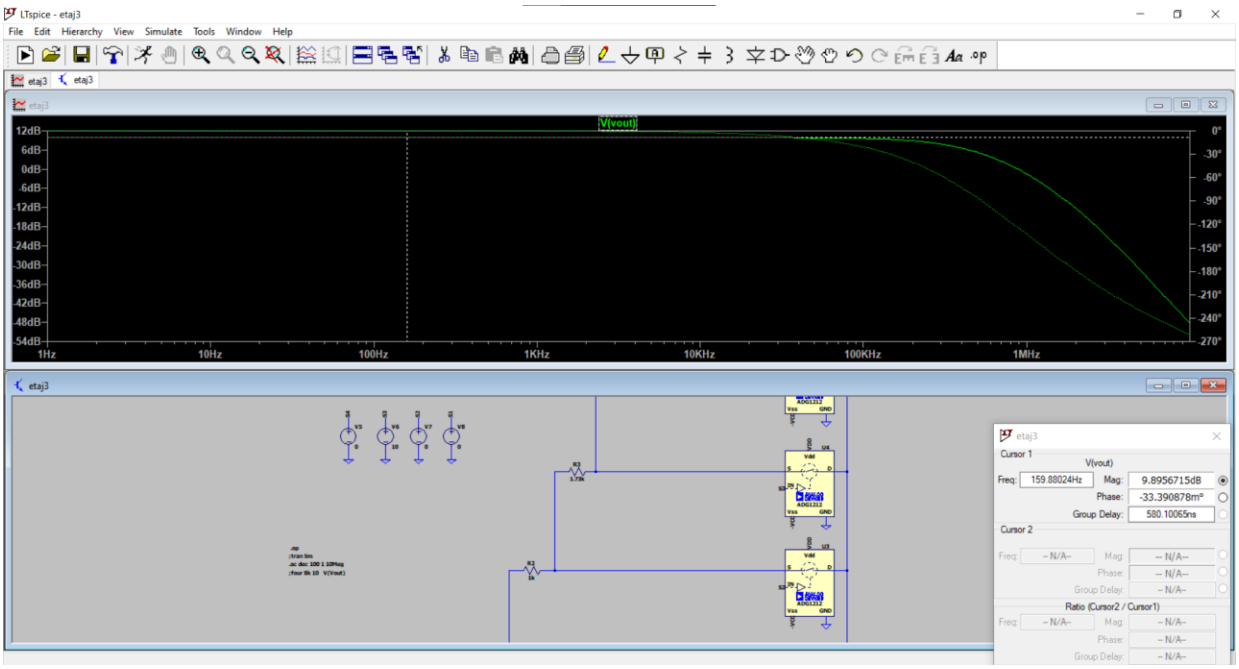
Castig maxim s1-on : 15.645756dB (16db)



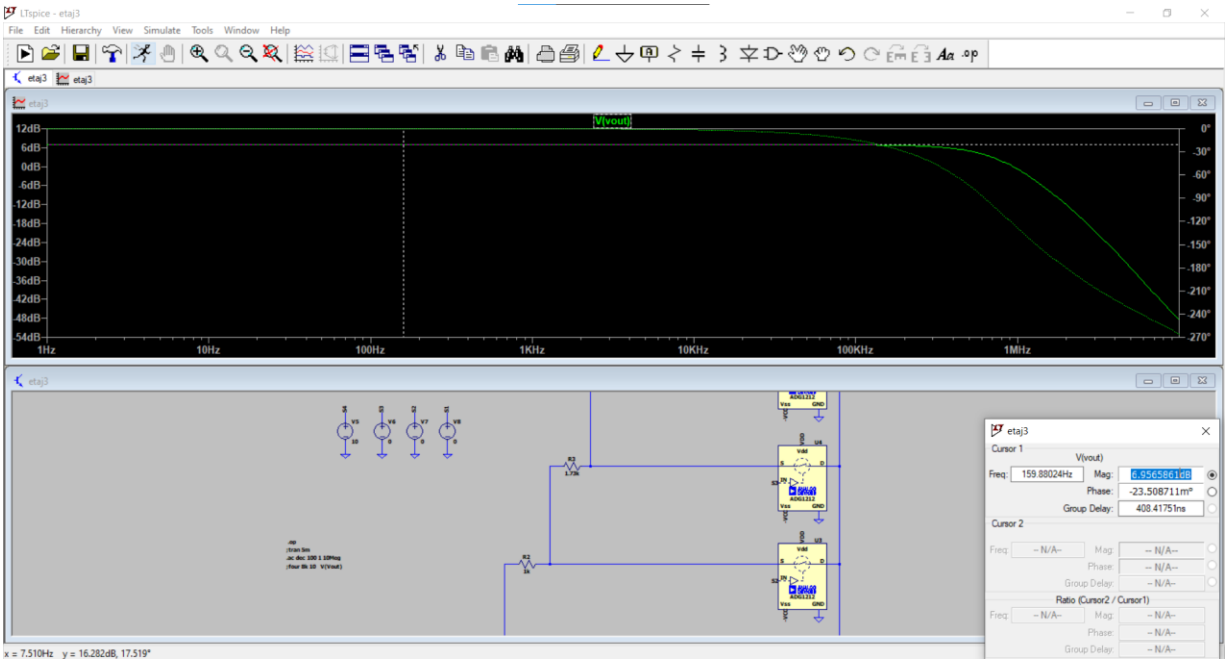
S2-on : 12.787502dB (13dB)



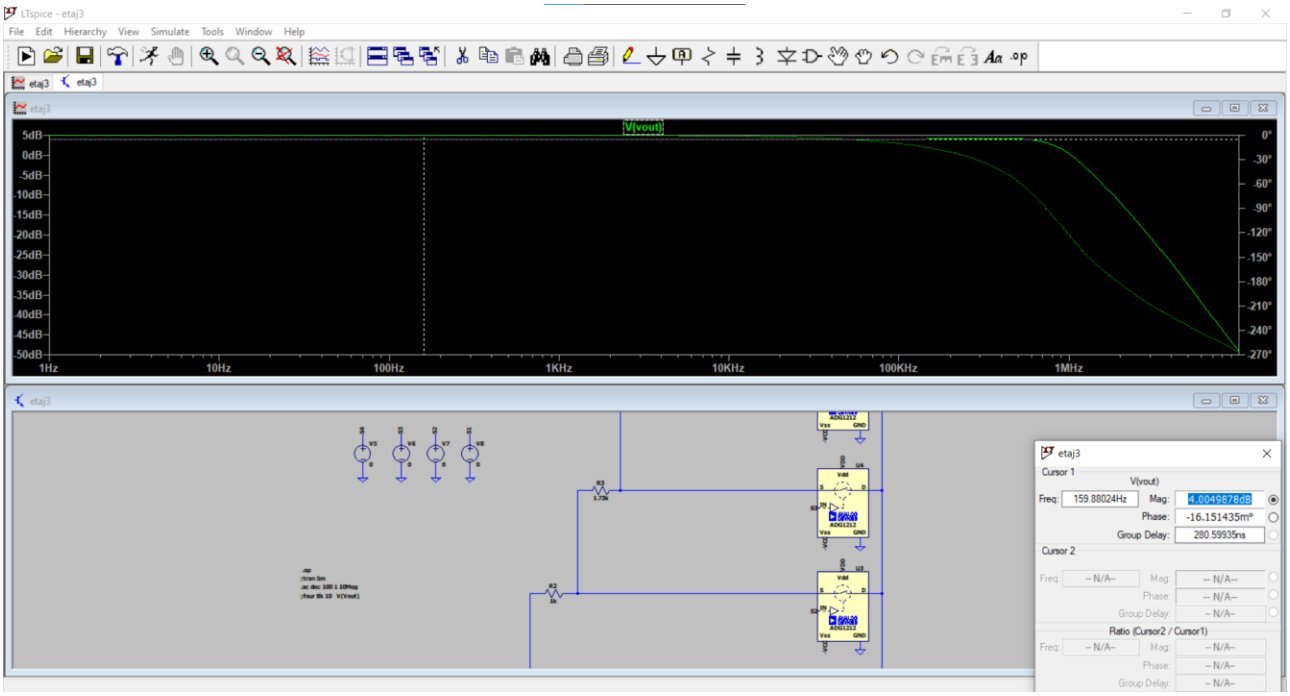
S3-on : 9.8956715 dB (10dB)



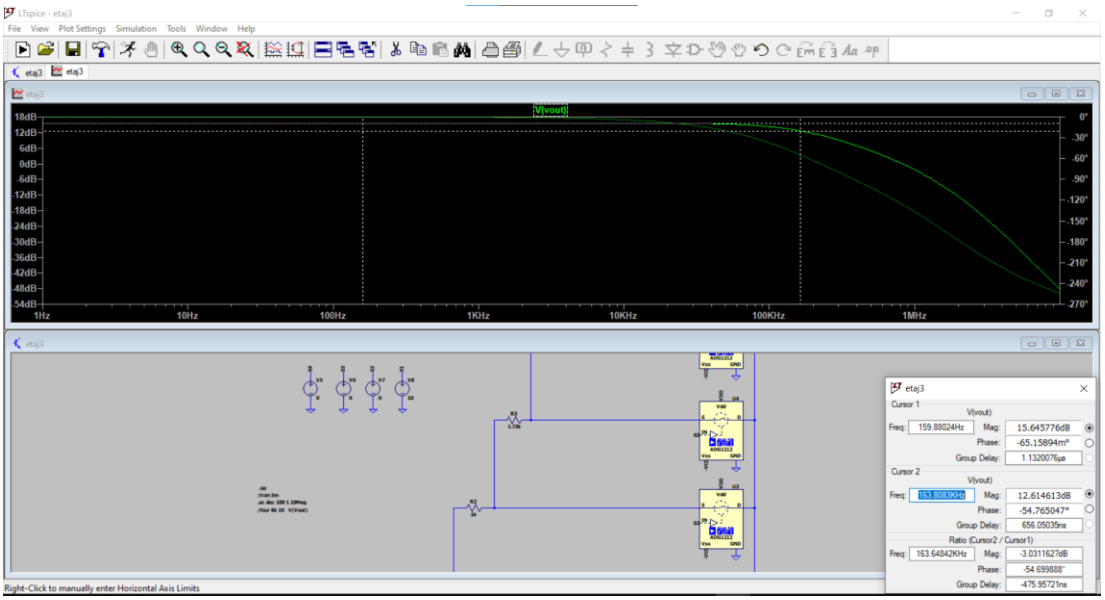
S4-on : 6.9565861dB (7dB)



Castig minim toate s off : 4.0049878dB (4dB)



Banda pentru castig mare s1-on: 163.8083KHz

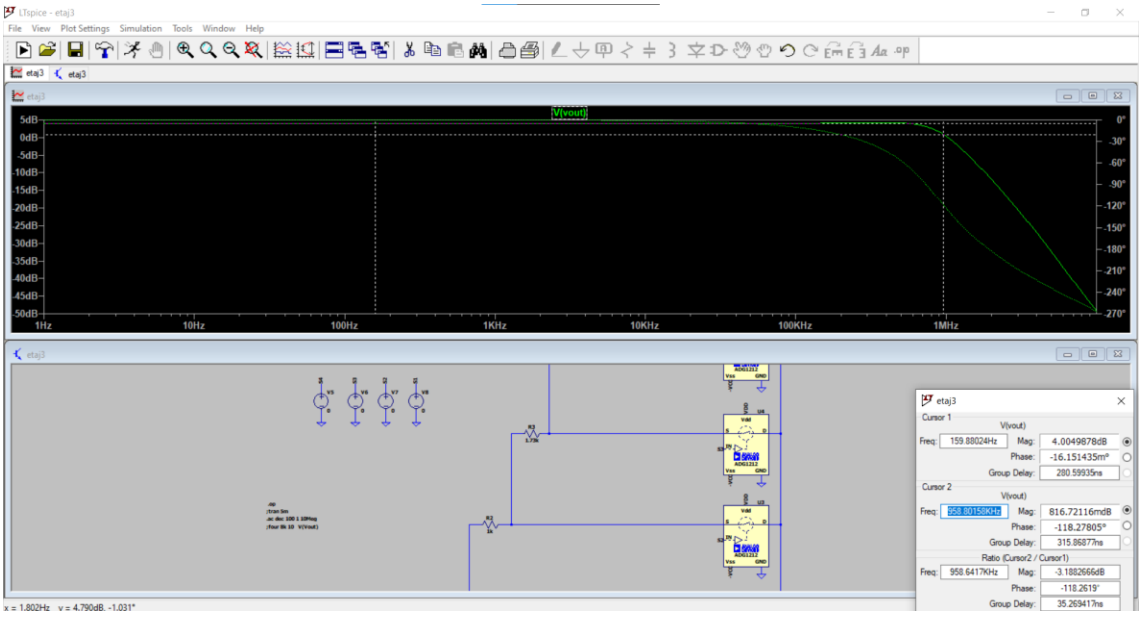


S2-on: 200.85435KHz

S3-on: 378.75257KHz

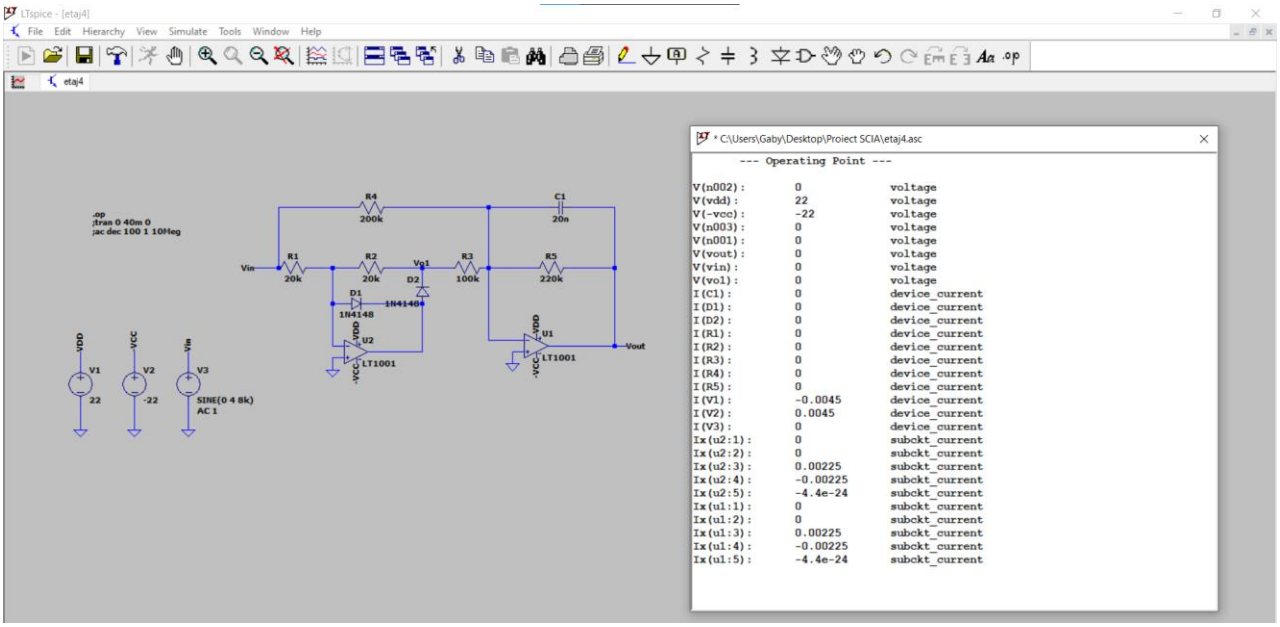
S4-on: 609.43172KHz

Banda pentru castig minim (toate s – off): 958.80158KHz

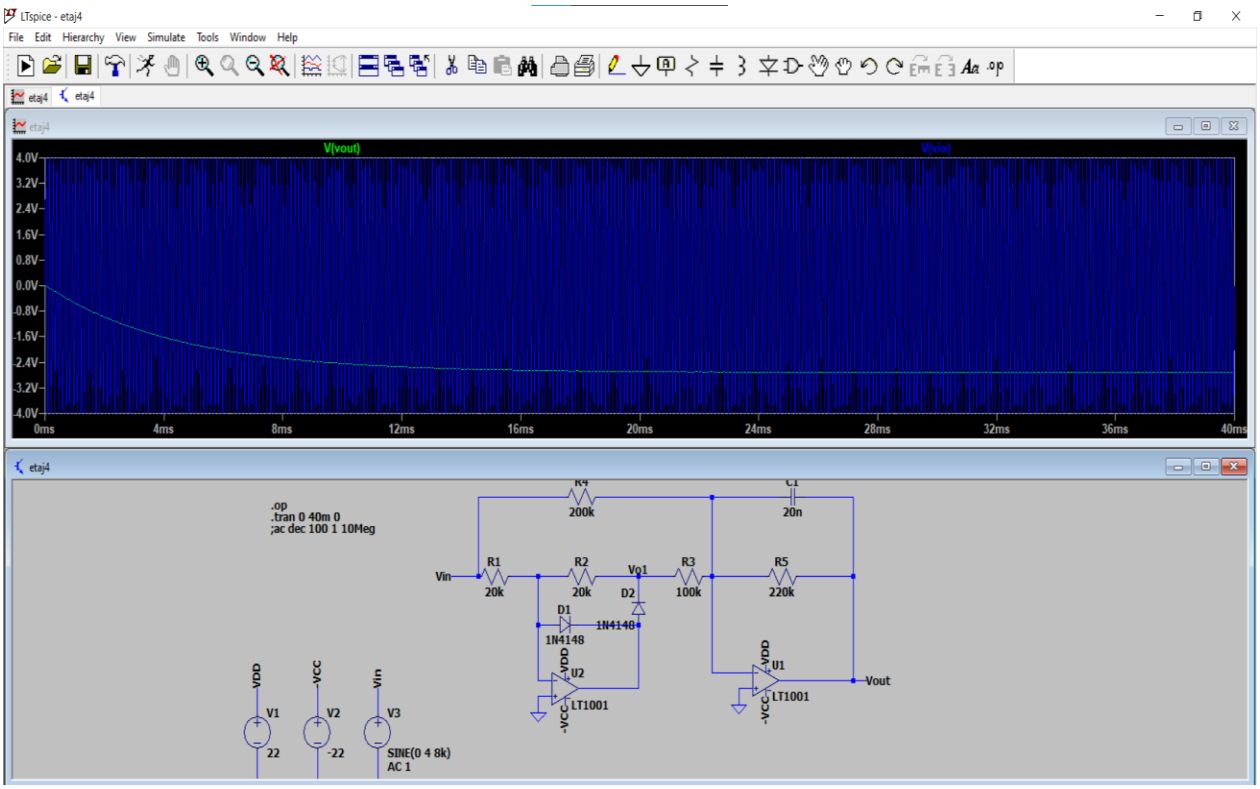


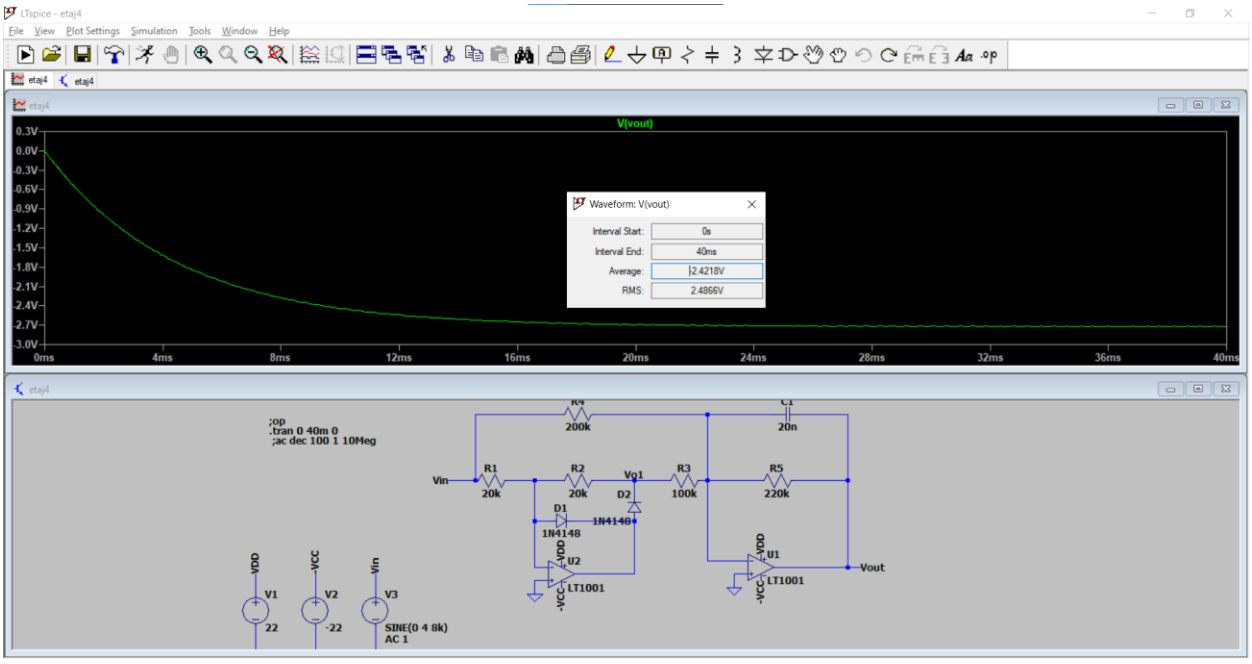
d) Etaj 4 :

Analiza .op

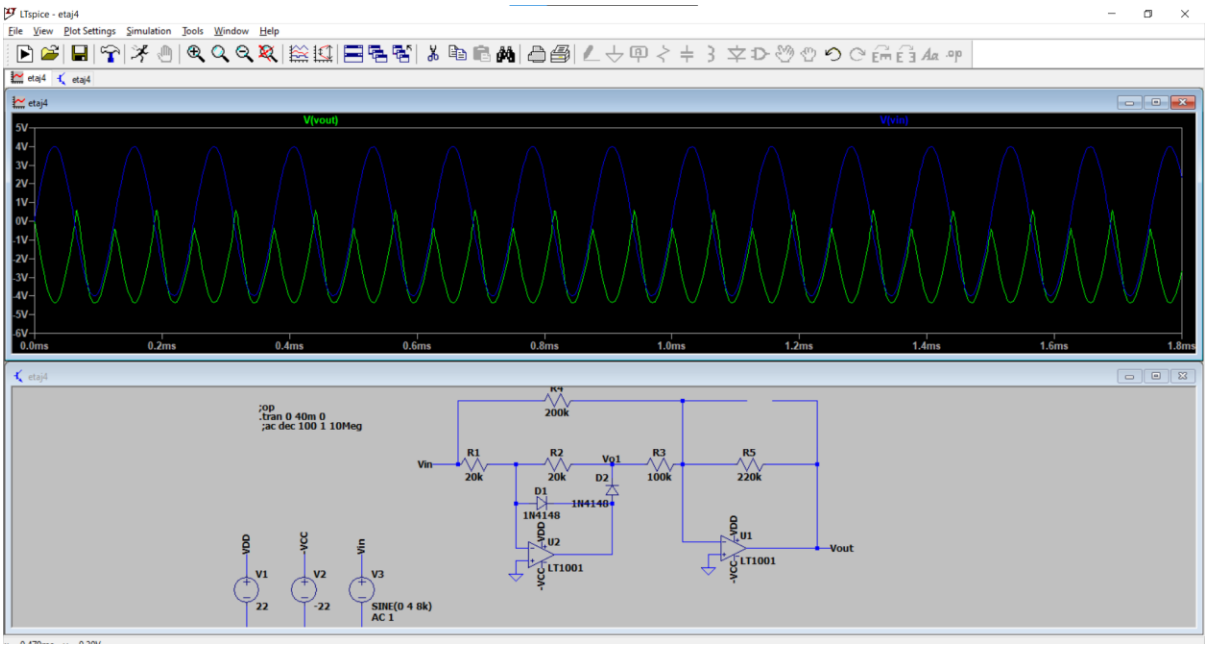


Circuitul indeplineste functia de redresor





Fara condensator se paote observa ca aeste un redresor cu bialternanta



Specificati vs masuratori

Etaj 1

Specificatii		Masuratori
Castig joasa frecventa	19	18.99
Banda	8k	45.208567KHz
SR	<0.25V/us	0.1 V/us

Etaj2

Specificatii		Masuratori
Castig in banda de trecere	1	-11.720151µdB
Banda	8k	8.0506834KHz
THD	<1%	0.045033%

Etaj3

Specificatii		Masuratori
Castig treapta 1	4dB	4.0049878dB
Castig treapta 2	7dB	6.9565861dB
Castig treapta 3	10dB	9.8956715 dB
Castig treapta 4	13dB	12.787502dB
Castig treapta 5	16dB	15.645756dB
Banda Pga treapta 1	>8kHz	958.80158KHz
Banda Pga treapta 2	>8kHz	609.43172KHz
Banda Pga treapta 3	>8kHz	378.75257KHz
Banda Pga treapta 4	>8kHz	200.85435KHz
Banda Pga treapta 5	>8kHz	163.8083KHz

Etaj4

Specificatii		Masuratori
Castig	1	1