電腦輔助電路設計

作業

班級： 電 二 乙

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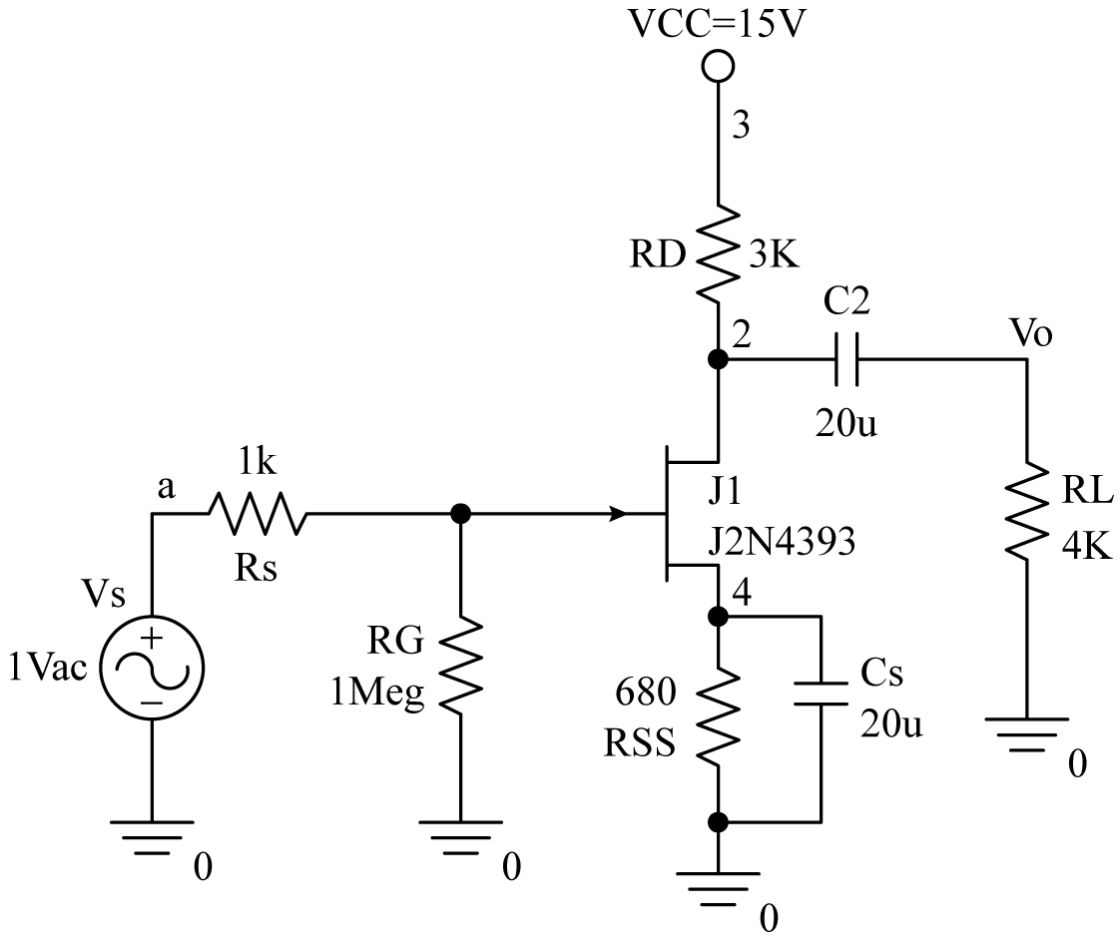
例題 18　Noise 分析和訊號對雜訊比(SNR)

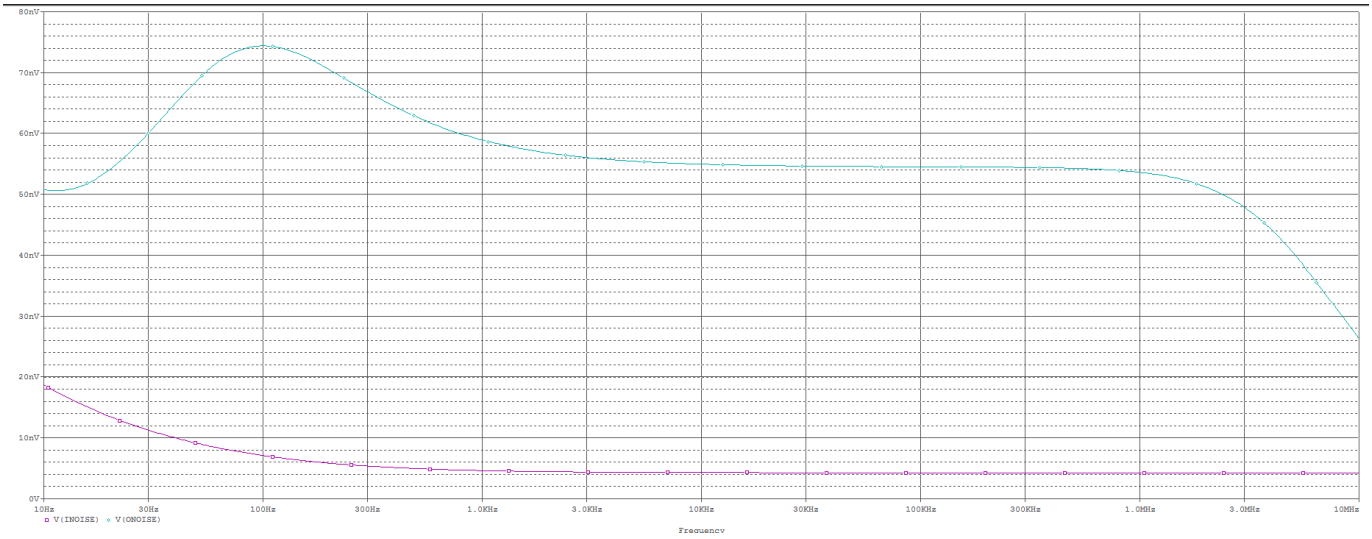
(25 度)



程式碼:

```
Rs a 1 1k
RD 3 2 3K
RL 0 Vo 4K
C2 2 Vo 20u
Cs 4 0 20u
RG 0 1 1Meg
RSS 4 0 680
J1 2 1 4 J2N4393
.Lib
VDD 3 0 15V
Vs a 0 AC 1Vac
.AC DEC 100 10 10MegHz
.NOISE V([Vo]) Vs 100
.PROBE
.END
```

波形圖:



直流分析:

	Rs	RD	RL	RG	RSS
TOTAL	6.267E-16	3.955E-18	2.966E-18	6.267E-19	5.895E-28

**** TOTAL OUTPUT NOISE VOLTAGE = 6.945E-16 SQ V/HZ
= 2.635E-08 V/RT HZ

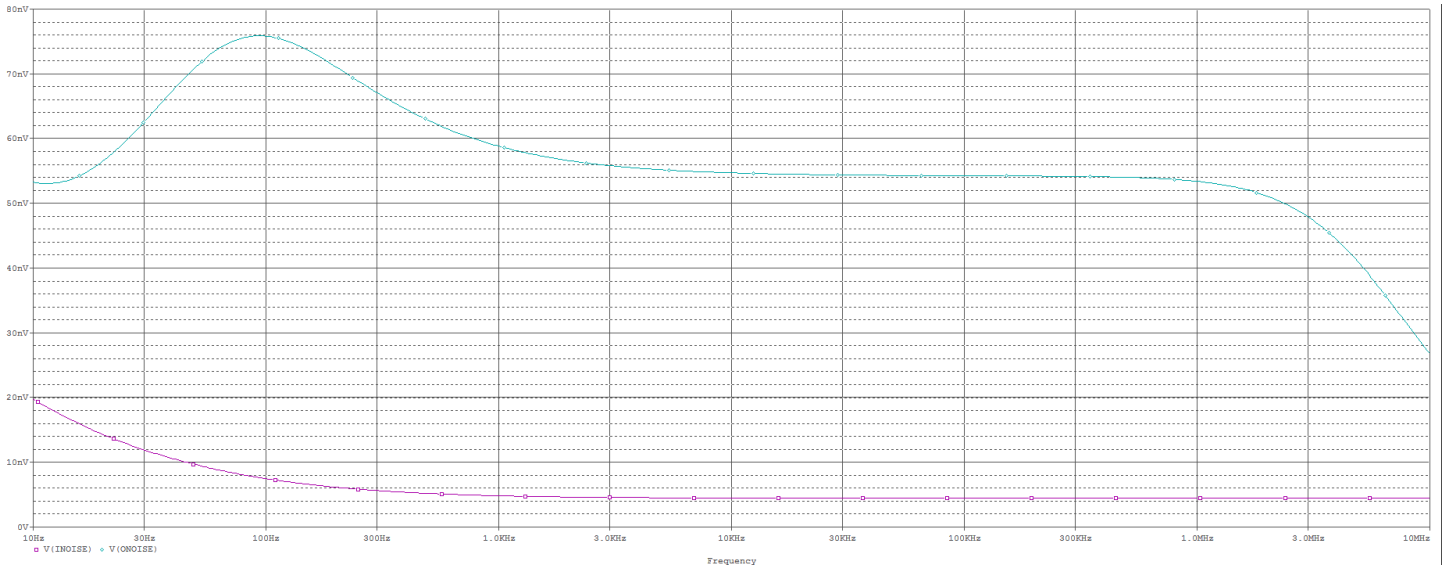
TRANSFER FUNCTION VALUE:
V(Vo)/Vs = 6.169E+00
EQUIVALENT INPUT NOISE AT Vs = 4.272E-09 V/RT HZ
JOB CONCLUDED
TOTAL JOB TIME .05

(50 度的):

程式碼:

```
Rs a 1 1k
RD 3 2 3K
RL 0 Vo 4K
C2 2 Vo 20u
Cs 4 0 20u
RG 0 1 1Meg
RSS 4 0 680
J1 2 1 4 J2N4393
.Lib
VDD 3 0 15V
Vs a 0 AC 1Vac
.AC DEC 100 10 10MegHz
.Temp 50
.NOISE V([Vo]) Vs 100
.PROBE
.END
```

波形圖:



直流分析:

	Rs	RD	RL	RG	RSS
TOTAL	6.433E-16	4.468E-18	3.351E-18	6.433E-19	6.052E-28

**** TOTAL OUTPUT NOISE VOLTAGE = 7.167E-16 SQ V/HZ

= 2.677E-08 V/RT HZ

TRANSFER FUNCTION VALUE:

V(Vo)/Vs = 6.004E+00

EQUIVALENT INPUT NOISE AT Vs = 4.459E-09 V/RT HZ

JOB CONCLUDED

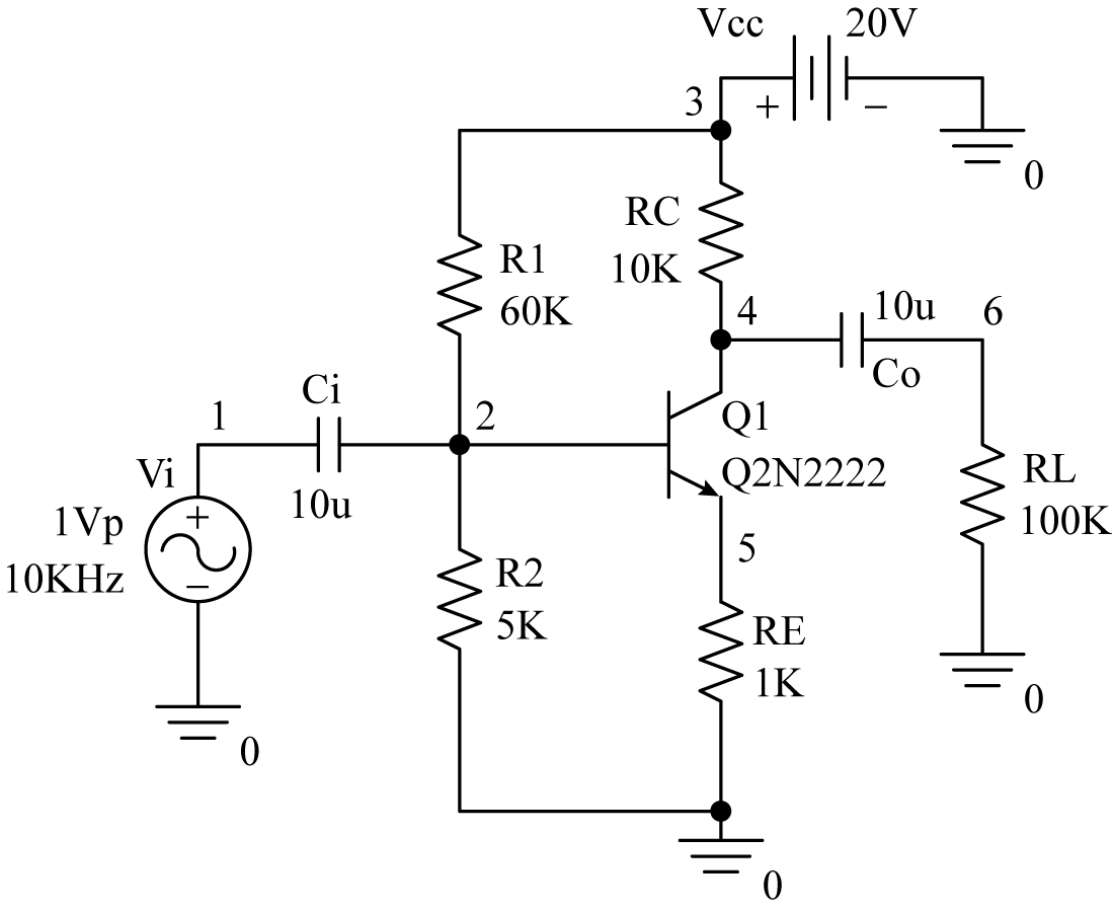
TOTAL JOB TIME .13

心得:

25 度增益較 50 度的大，溫度較高的電阻的誤差變大，而 25 度的誤差較低，因此溫度高的失真率較高。

例題 19　傅力葉分析和總諧波失真

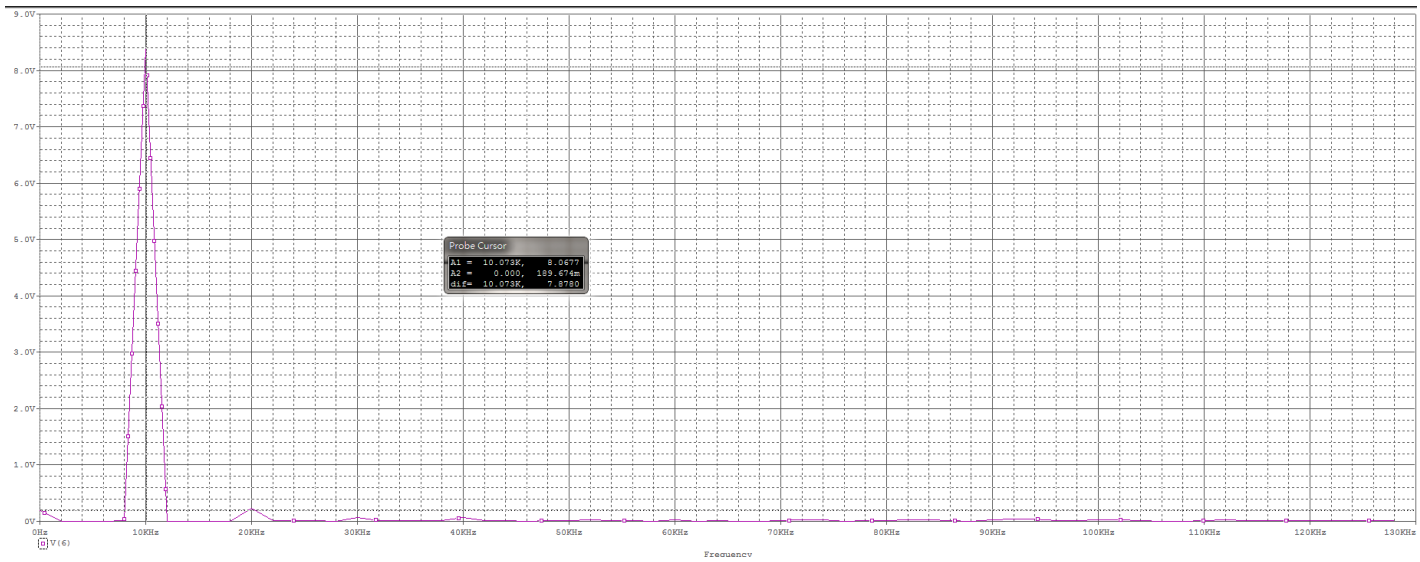
(25 度)



程式碼:

```
Ci  1  2  10u

Co  4  6  10u

R1  2  3  60K

R2  0  2  5K

RC  4  3  10K

RE  0  5  1K

RL  0  6  100K

Q1  4  2  5  Q2N2222

.LIB

Vcc  3  0  20V

Vi  1  0  SIN(0  1Vp  10KHz  0  0  0)

.TRAN  .005m  0.5m

.FOUR  10KHz  4  V([6])


.PROBE

.END
```

波形圖:



直流分析:

FOURIER COMPONENTS OF TRANSIENT RESPONSE V(6)

DC COMPONENT = -1.876722E-01

HARMONIC NO	FREQUENCY (HZ)	FOURIER COMPONENT	NORMALIZED COMPONENT	PHASE (DEG)	NORMALIZED PHASE (DEG)
1	1.000E+04	8.307E+00	1.000E+00	1.798E+02	0.000E+00
2	2.000E+04	2.231E-01	2.685E-02	8.178E+01	-2.778E+02
3	3.000E+04	5.605E-02	6.747E-03	-1.609E+02	-7.002E+02
4	4.000E+04	5.345E-02	6.434E-03	-1.139E+02	-8.331E+02

TOTAL HARMONIC DISTORTION = 2.842682E+00 PERCENT

JOB CONCLUDED

TOTAL JOB TIME .02

(50 度):

程式碼: Ci 1 2 10u

Co 4 6 10u

R1 2 3 60K

R2 0 2 5K

RC 4 3 10K

RE 0 5 1K

RL 0 6 100K

Q1 4 2 5 Q2N2222

.LIB

Vcc 3 0 20V

Vi 1 0 SIN(0 1Vp 10KHz 0 0 0)

.Temp 50

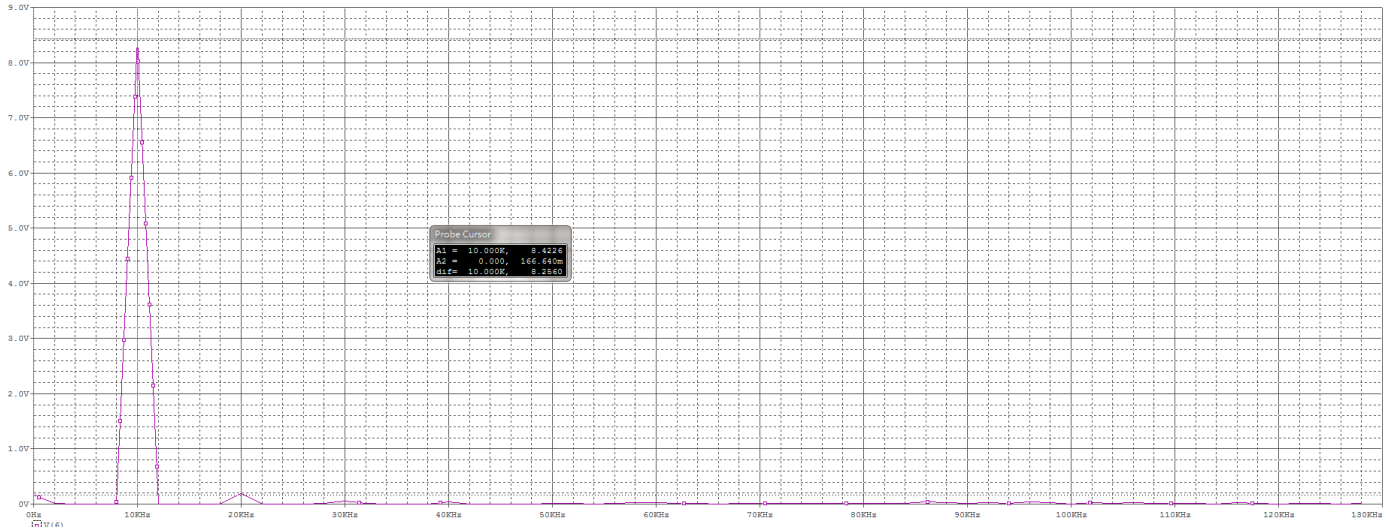
.TRAN .005m 0.5m

.FOUR 10KHz 4 V([6])

.PROBE

.END

波形圖:



直流分析:

FOURIER COMPONENTS OF TRANSIENT RESPONSE V(6)

DC COMPONENT = -1.647052E-01

HARMONIC NO	FREQUENCY (HZ)	FOURIER COMPONENT	NORMALIZED COMPONENT	PHASE (DEG)	NORMALIZED PHASE (DEG)
1	1.000E+04	8.360E+00	1.000E+00	1.797E+02	0.000E+00
2	2.000E+04	2.012E-01	2.407E-02	8.052E+01	-2.789E+02
3	3.000E+04	5.492E-02	6.570E-03	-1.492E+02	-6.883E+02
4	4.000E+04	3.766E-02	4.505E-03	-1.017E+02	-8.204E+02

TOTAL HARMONIC DISTORTION = 2.535469E+00 PERCENT

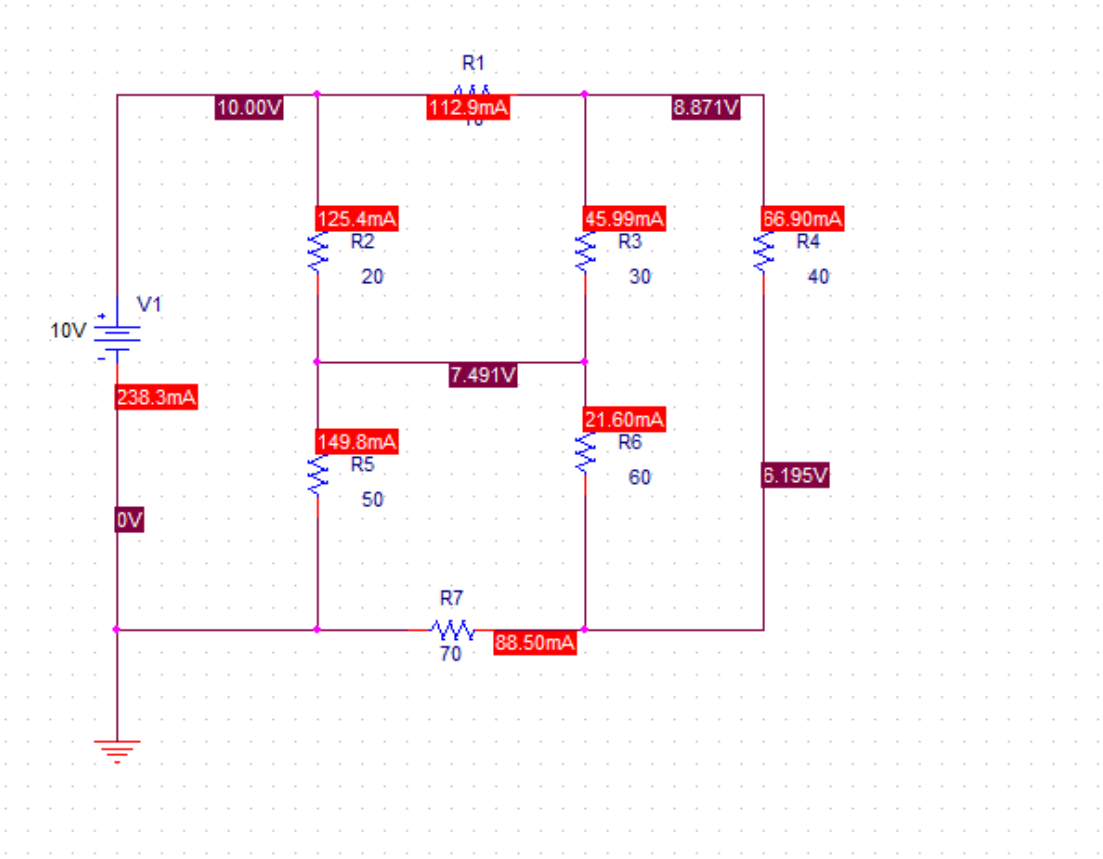
JOB CONCLUDED

TOTAL JOB TIME 0.00

心得:

25 度的失真率為 **2.8427**，**50** 度的失真率為 **2.5354**，因此比較出 **50** 度的失真率較低。

21 題　　歐姆定律應用:


R1
10.00V
112.9mA
8.871V
125.4mA
R2
20
45.99mA
R3
30
66.90mA
R4
40
V1
10V
7.491V
238.3mA
149.8mA
R5
50
21.60mA
R6
60
6.195V
0V
R7
70
88.50mA