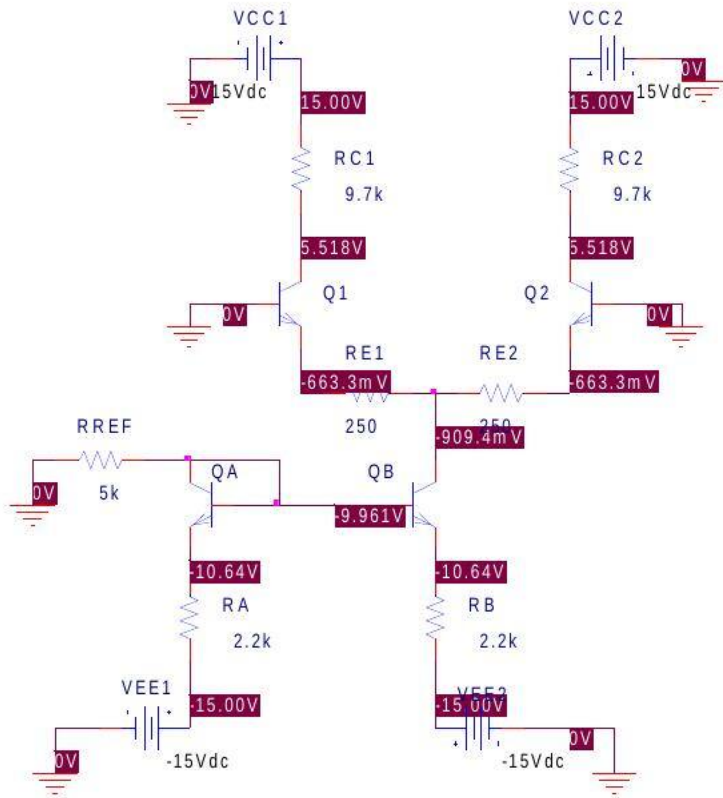
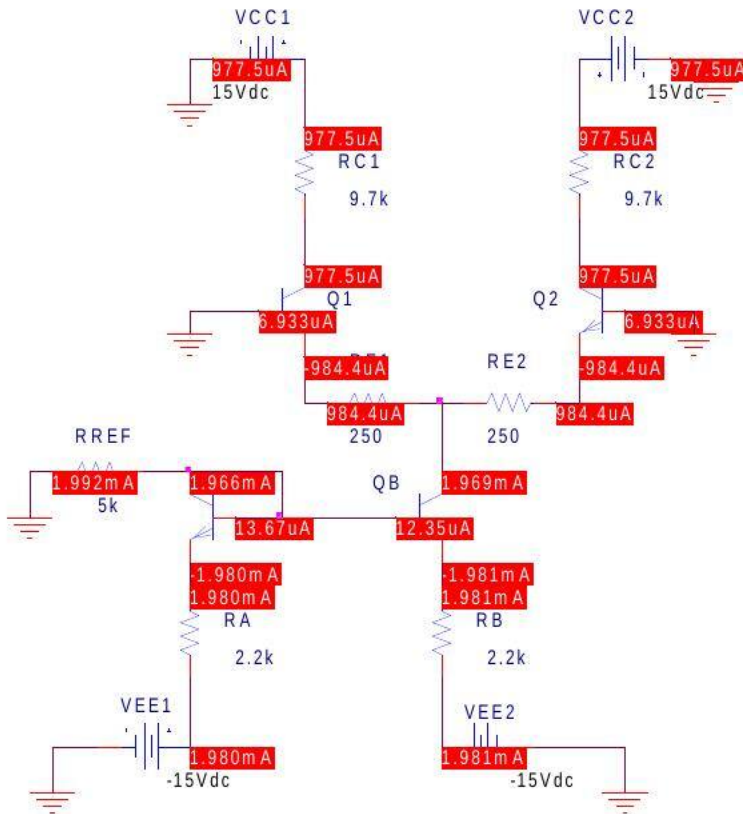


## Bias Simulation



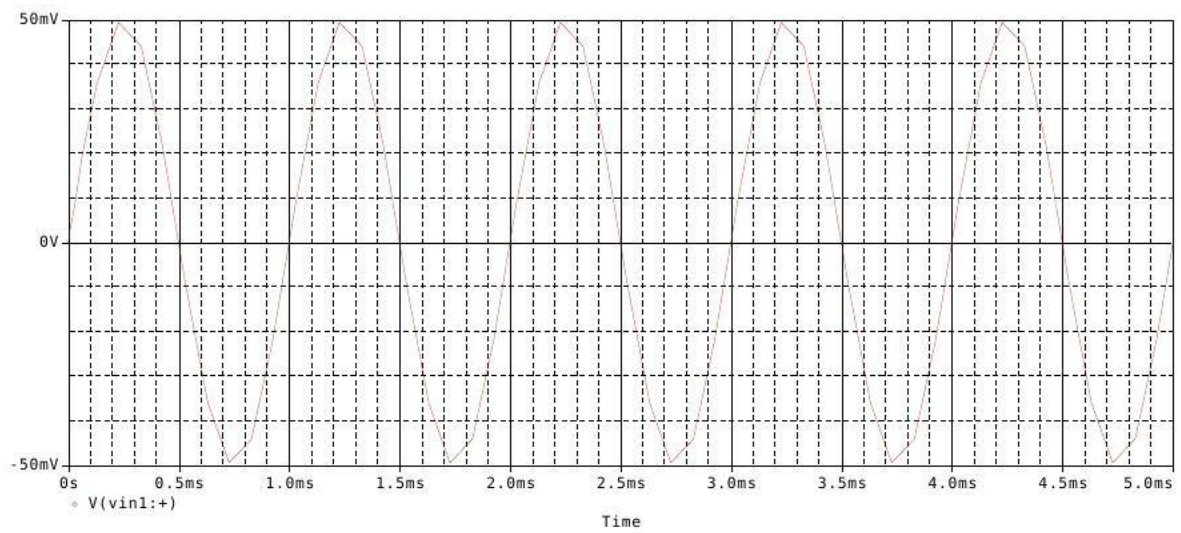
(DC Voltajlar için)



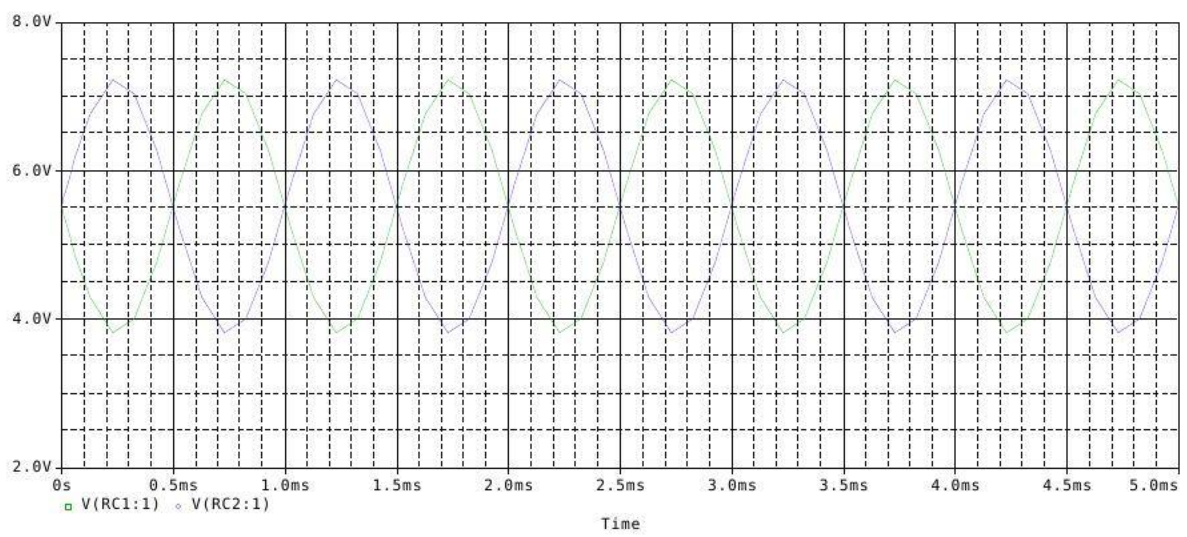
(DC Akımlar için)

## Transient Simulation

$$V_{in1} = 50\text{mV}_{p-p} \text{ \& } V_{in2} = -50\text{mV}_{p-p}; V_{in1}$$

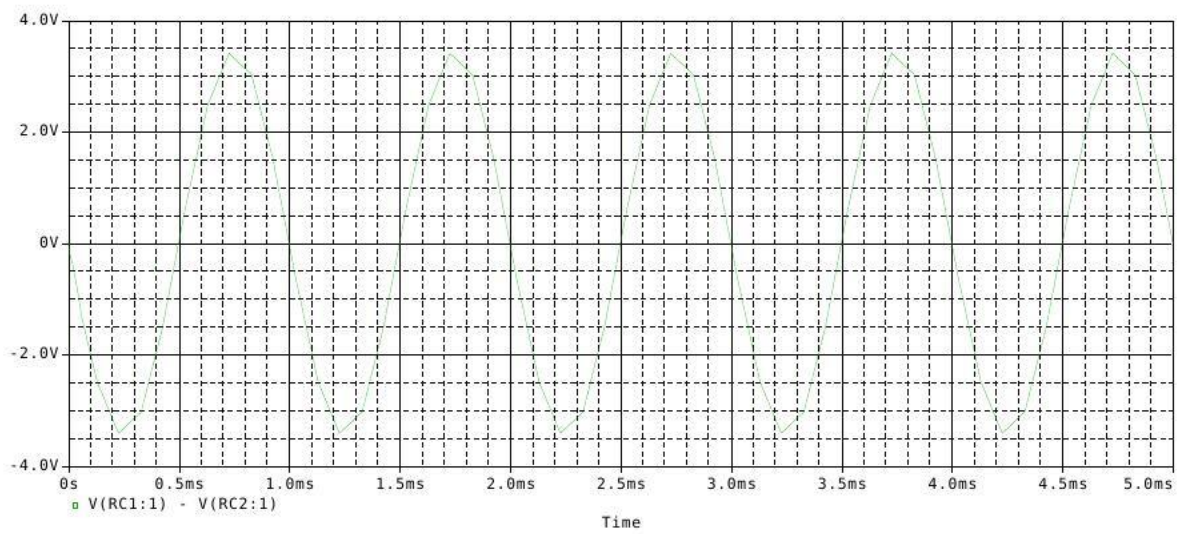


$$V_{out1} \text{ \& } V_{out2}$$



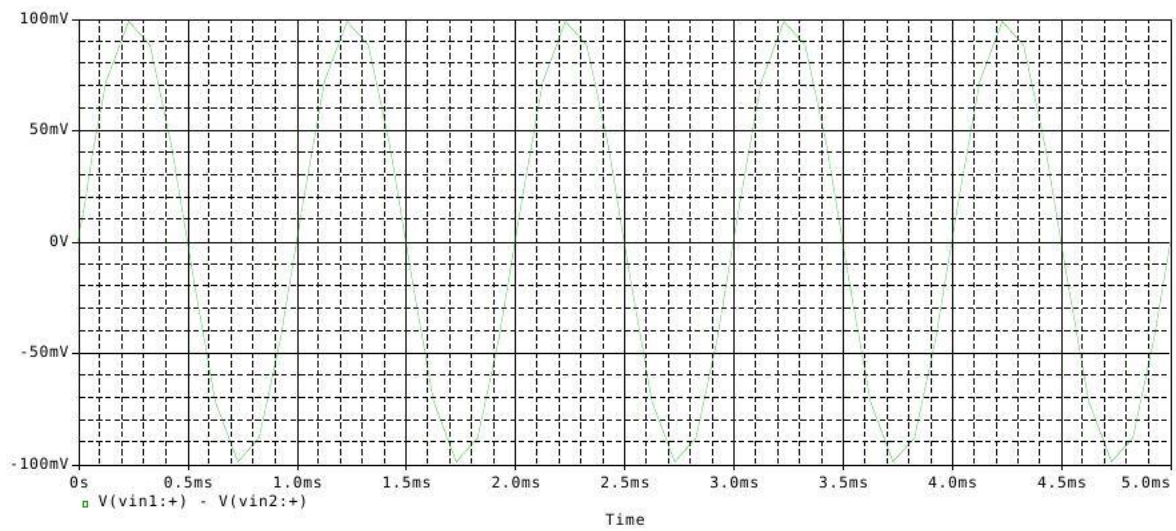
$$V_{p-p} = 7.2055 \text{ V}$$

$$V_{odm} = V_{out1} - V_{out2}$$



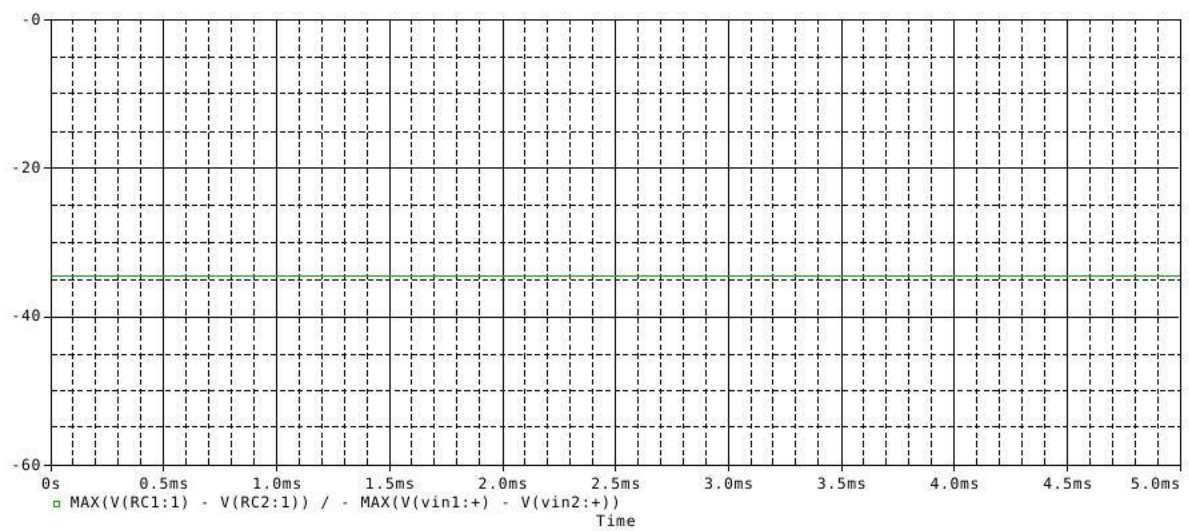
$$V_{odm\ p-p} = 3.3976 \text{ V}$$

$$V_{idm} = V_{in1} - V_{in2}$$



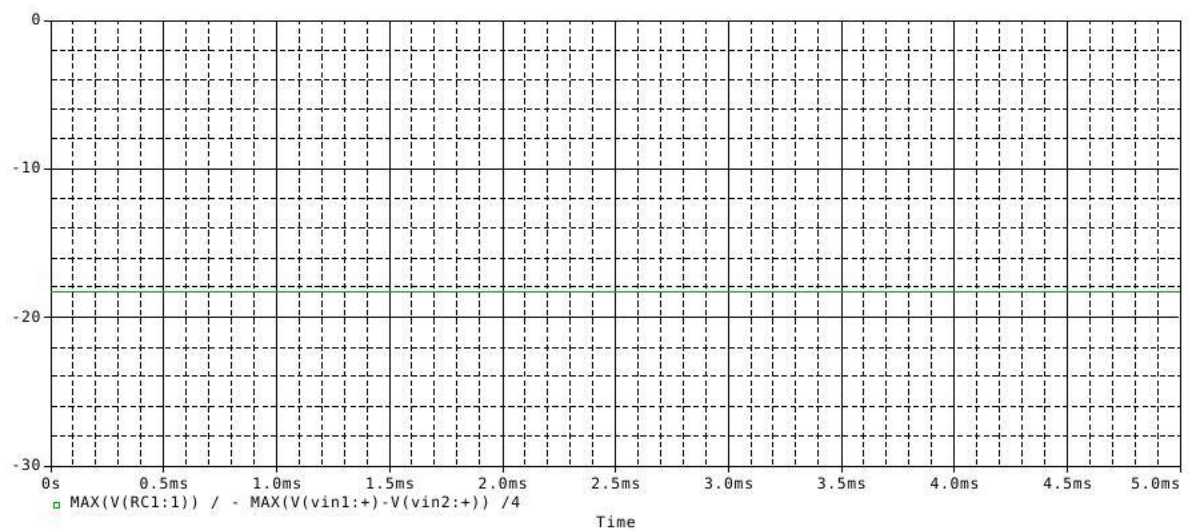
$$V_{idm\ p-p} = 99.046\ mV$$

$$A_{vdm-diff}$$



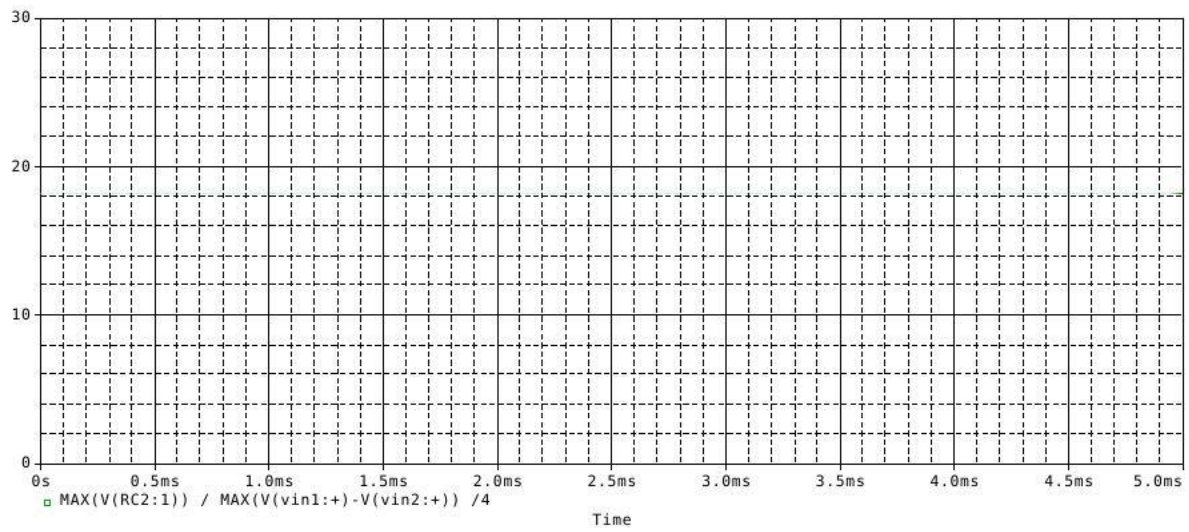
$$A_{vdm-diff} = -34.372$$

$$A_{vdm-se1}$$



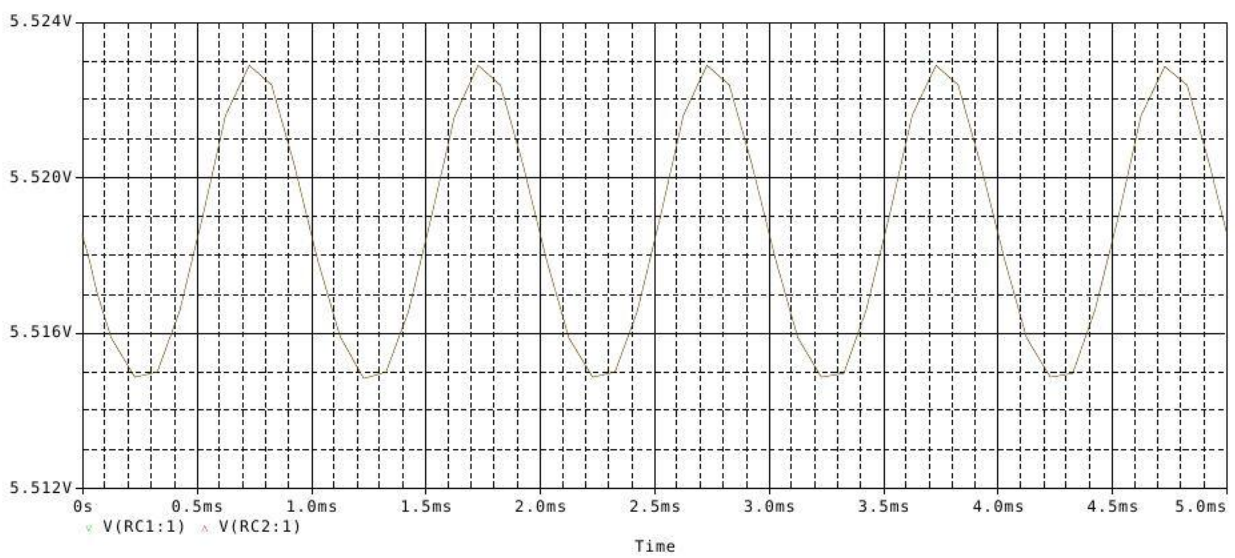
$$A_{vdm-se1} = -18.226$$

$A_{vdm-se2}$



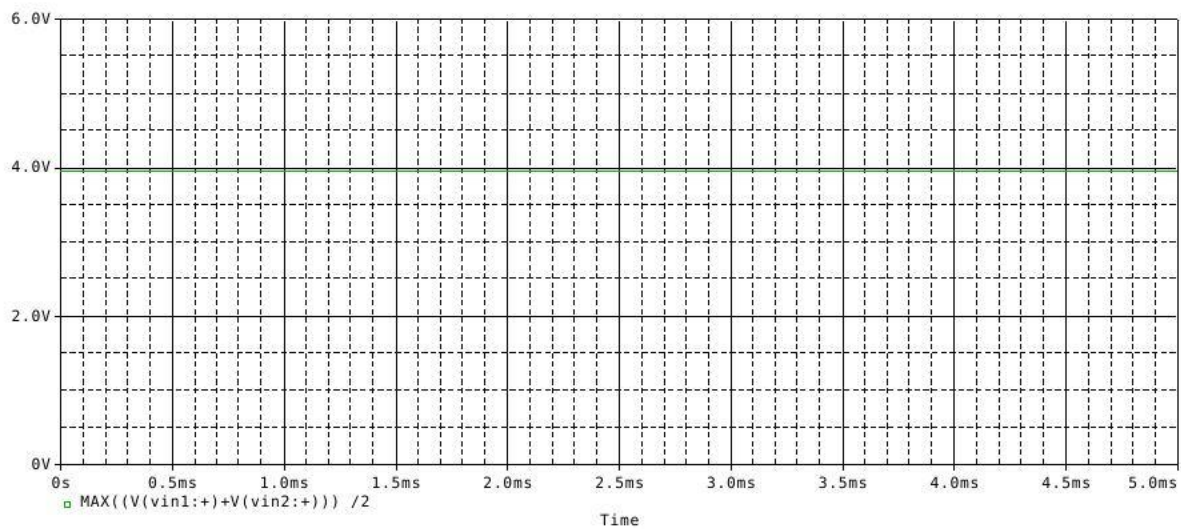
$$A_{vdm-se2} = 18.226$$

$V_{in1} = V_{in2} = 4V_{p-p}$ ;  $V_{out1}$  &  $V_{out2}$



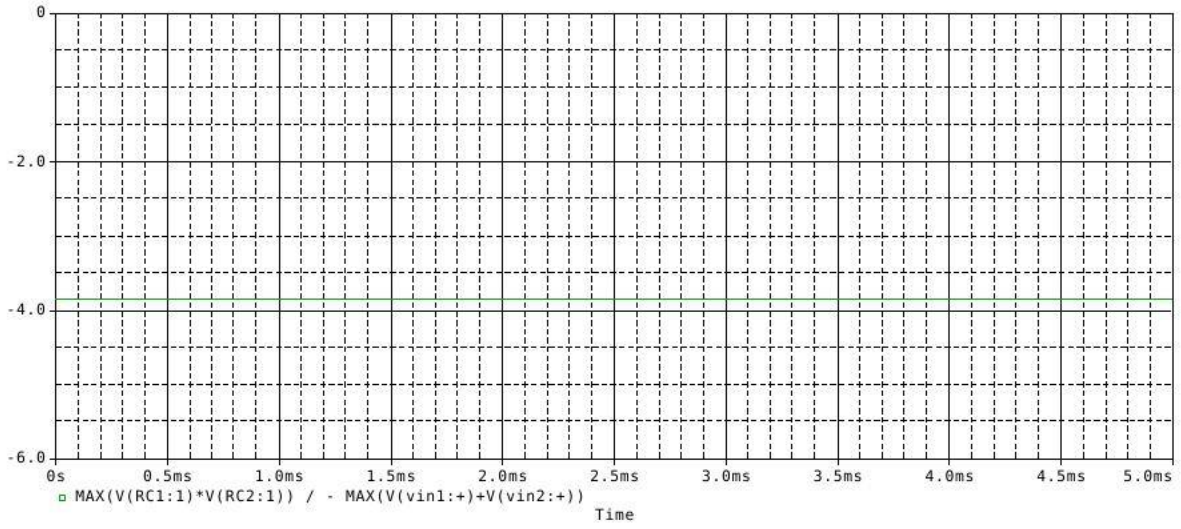
$$V_{out1p-p} = V_{out2p-p} = 5.5229 \text{ V}$$

$V_{icm}$



$$V_{icm} = 3.9619 \text{ V}$$

$$A_{vcm-se1} = A_{vcm-se2}$$



$$A_{vcm-se1} = A_{vcm-se2} = -3.8495$$

### ÖZET

|                |                          |
|----------------|--------------------------|
| $R_{REF}$      | $5 \text{ k}\Omega$      |
| $R_C$          | $9.7 \text{ k}\Omega$    |
| $I_{CQ1,2}$    | $0.978 \text{ mA}$       |
| $I_{CQA,B}$    | $1.980 \text{ mA}$       |
| $V_{CE1,2}$    | $6.181 \text{ V}$        |
| $v_{out1}$     | $7.2055 \text{ V}_{p-p}$ |
| $v_{out2}$     | $7.2055 \text{ V}_{p-p}$ |
| $v_{odm}$      | $3.3976 \text{ V}$       |
| $v_{idm}$      | $99.046 \text{ mV}$      |
| $A_{vdm-diff}$ | $-34.372$                |
| $A_{vdm-se1}$  | $-18.226$                |
| $A_{vdm-se2}$  | $18.226$                 |

$$(V_{in1} = 50\text{mV} \text{ \& } V_{in2} = -50\text{mV})$$

|               |                          |
|---------------|--------------------------|
| $v_{out1}$    | $5.5229 \text{ V}_{p-p}$ |
| $v_{out2}$    | $5.5229 \text{ V}_{p-p}$ |
| $v_{icm}$     | $3.9619 \text{ V}$       |
| $A_{vcm-se1}$ | $-3.8495$                |
| $A_{vcm-se2}$ | $-3.8495$                |

$$(V_{in1} = V_{in2} = 4\text{V})$$