INSTITUTE OF AERONAUTICAL ENGINEERING

(Autonomous)

Dundigal, Hyderabad – 500 043

LABORATORY WORK SHEET

Date: 09.06.2022

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Exp No: 08 Experiment Name: Linear wave shaping circuit

DAY TO DAY EVALUATION:

	Preparation	Algorithm / Performance in the Lab	Source Code / Calculations and Graphs	Program Execution / Results and Error Analysis	Viva	Total
Max. Marks	4	4	4	4	4	20
Obtained	3	3	3	4	4	17

Signature of Lab I/C

START WRITING FROM HERE:

Aim: To design low pass RC and high pass RC for different constants & verify their response for a square wave i/p of given i/p frequency.

Equipment Needed :-

- Trainer Kit
- personal computer
- connecting wires
- Resistors - 100KΩ
- capacitor - 0.1uf, 0.01uf, 0.0001 uf

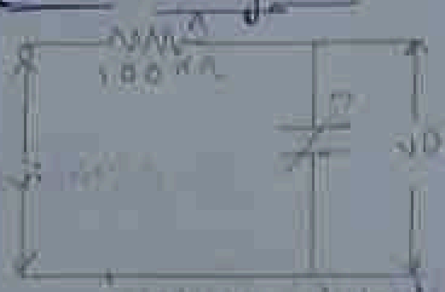
Software Required :-

- waveform generator software
- multisim software

Theory :-

High pass RC circuit :- The reactors of the capacitor depends upon the frequency of operation At very high frequency the

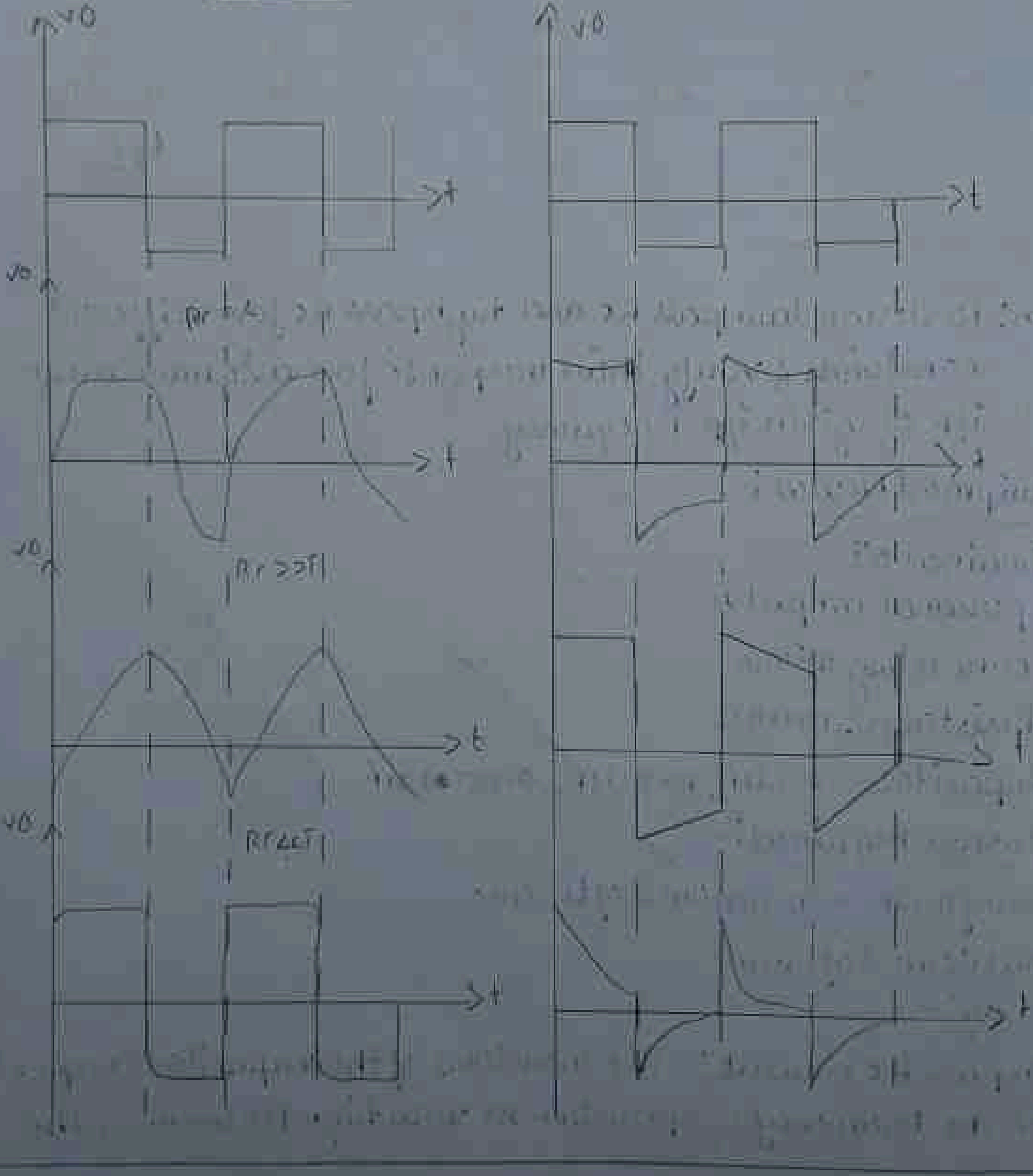
circuit diagram



Low pass filter

High pass filter

Expected waveform



the reactance of the capacitor is zero. Hence the capacitor acts as short circuit. As a result the entire input appears at the capacitor in infinite. So the capacitor acts as open circuit. Hence no input reaches the output. Since the circuit allow only high frequencies therefore it is called as high pass RC circuit.

<u>Low pass RC circuit</u>: The reactance of the capacitors depends upon the frequency of operations. At very high frequencies the reactance of the capacitor is 0. Hence the capacitor acts as S.C As a result the o/p will fall to 0. At low frequencies the reactance of the capacitor is infinite. So the capacitor acts as O.C As a result the entire i/p appears at the output since the circuit allows only low frequencies. Therefore it is called as low pass RC circuit.

<u>Procedure</u>

- connect the circuit as per circuit diagram.
- Apply the square wave input to the circuit $V_P = 10V_{p-p}$, $f = 1KHz$
- calculate the time constants of the circuit by connecting one of the capacitor provided.
- Observe the o/p waveform for different input frequencies as shown in tabular column for different time constants.

* Tabular column *

R	C	T = RC	Practical time period	condition
100 kΩ	0.1 µF	0.01 sec	1 ms	RC >> T
100 kΩ	0.01 µF	1 ms	1 ms	RC = T
100 kΩ	0.001 µF	0.1 ms	1 ms	RC << T

R	C	T = RC	Practical time period	condition
100 kΩ	0.1 µF	0.01 sec	1 ms	RC >> T
100 kΩ	0.01 µF	0.1 ms	1 ms	RC = T
100 kΩ	0.001 µF	0.1 ms	1 ms	RC << T

calculations :-

Theoretical time period :-

$T = RC$

(i) $R = 100K$, $C = 0.1\,\mu F$

$T = 100 \times 10^{3} \times 0.1 \times 10^{-6}$

$= 0.01\,sec$

(ii) $R = 100K$, $C = 0.01\,\mu F$

$T = 100K \times 0.01\,\mu F$

$= 1\,ms$

(iii) $R = 100K$, $C = 0.001\,\mu F$

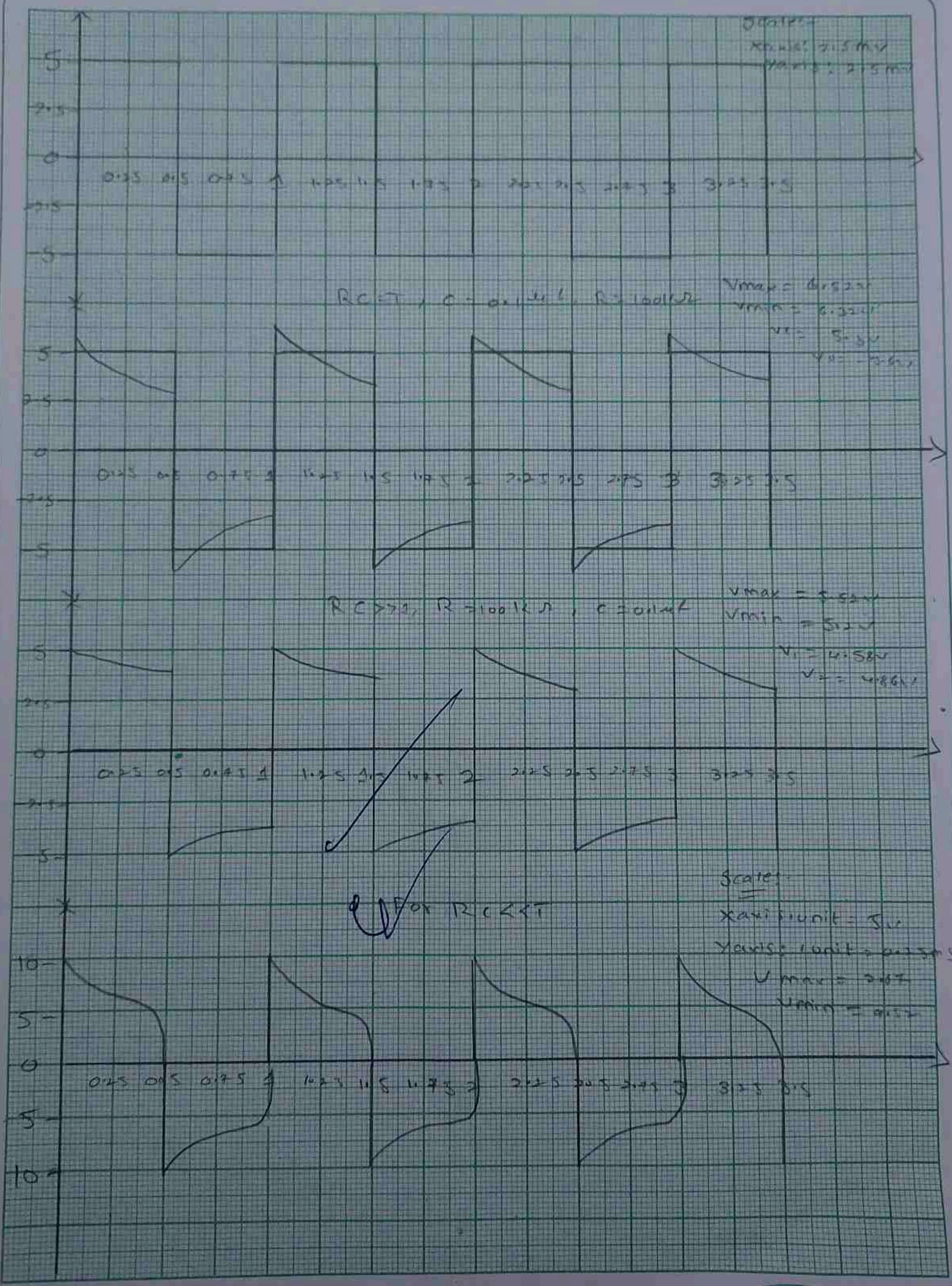
$T = 100 \times 10^{3} \times 0.001 \times 10^{-6}$

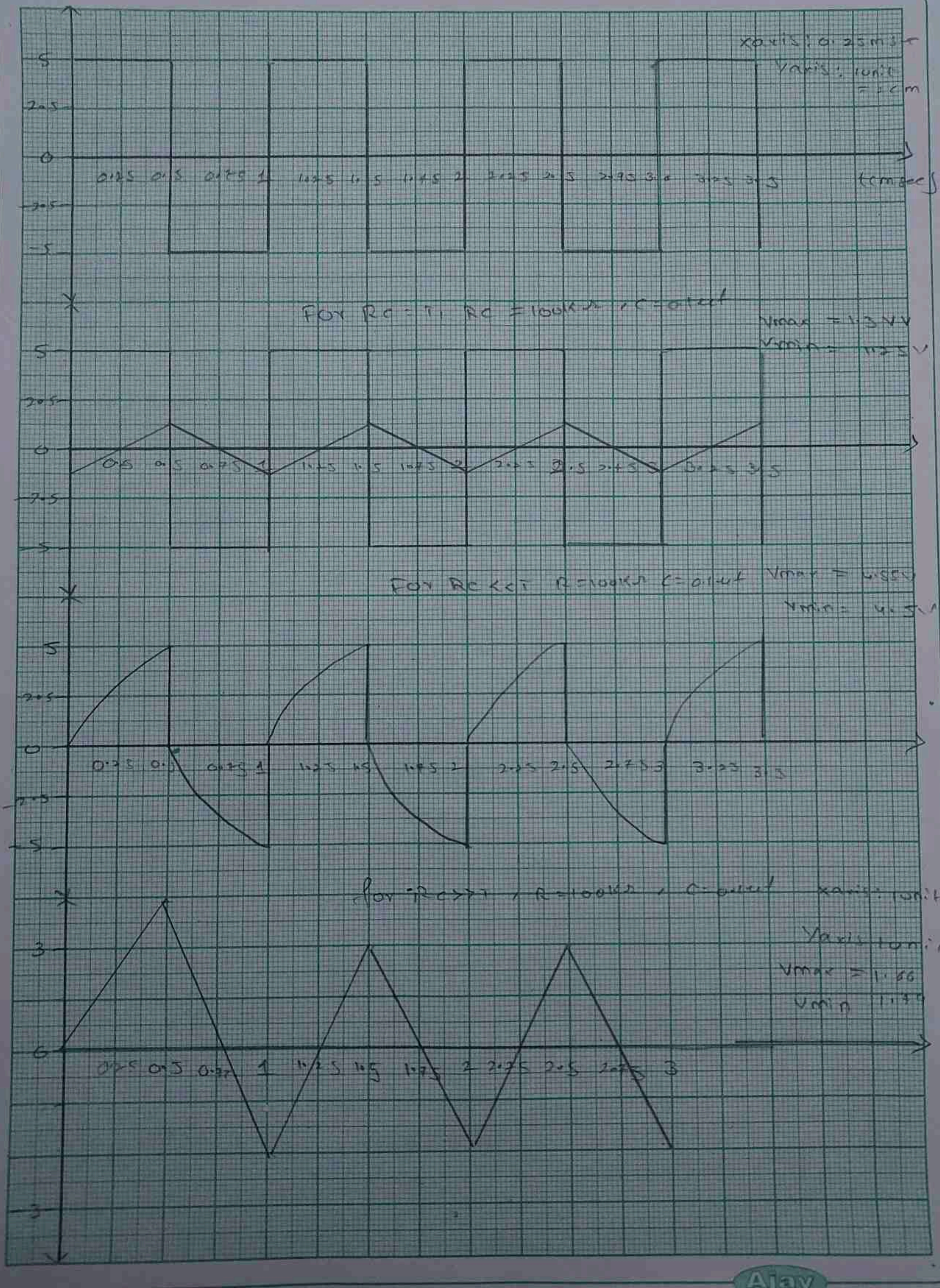
$= 0.1\,ms$

* Result *

Hence, designed the low pass of high pass RC circuit and observed the output waveform.

High Pass Filter RC Circuit





Y axis: 1unit
time(sec)
For RC = T, RC = 100kΩ
Vmax
Vmin
For RC<<T
Vmax
Vmin
for RC>>T
Y axis
Vmax
Vmin