


Lab1 Potentiometers Part1

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Lab content

- 1. Set up the circuit shown above in Multisim, using an AC source providing 5V signal at a frequency of 1 kHz.
- 2. Add voltage probes to examine the peak-to-peak voltage across the potentometer Vp, and across the capacitor Vc. Set each probe to Periodic measurement label to display peak-to-peak voltages.
- 3. Place a reference pin on the negative side of each component, and set each voltage probe to the appropriate reference.
- 4. Start the simulation in Interactive mode, and ensure that it is behaving correctly.
- 5. Similar to Part 1, starting with the potentiometer at 0.5% (full left), take 6 readings of Vf andVc up to 100% (full right).
- 6. Repeat this process with the AC signal frequency set to 2 kHz, 5kHz, 10 kHz, 20 kHz, 50 kHz, and 100 kHz.
- 7. For each of the frequencies, plot of graph of Vp vs.Vc.

Circuit Diagram

The circuit diagram is created in Multisim. Circuit Diagram

Data_Table

kHZ	Potentiometer perc	Vp	Vc	Vp/Vc
1kHz	0%	4.43V	7.47V	0.59
1kHz	20%	3.75V	7.90V	0.47
1kHz	40%	2.97V	8.37V	0.35
1kHz	60%	2.09V	8.82V	0.23
1kHz	80%	1.09V	9.22V	0.11
1kHz	100%	0.69V	9.58V	0.07
2kHz	0%	5.80V	4.89V	1.18
2kHz	20%	5.15V	5.43V	0.94
2kHz	40%	4.33V	6.09V	0.35
2kHz	60%	3.23V	6.82V	0.47
2kHz	80%	1.82V	7.69V	0.23
2kHz	100%	1.24V	8.60V	0.14

kHZ	Potentiometer perc	Vp	Vc	Vp/Vc
5kHZ	0%	6.50V	2.19V	2.96
5kHZ	20%	5.96V	2.51V	2.37
5kHZ	40%	5.21V	2.93V	1.77
5kHZ	60%	4.15V	3.50V	1.18
5kHZ	80%	2.57V	4.34V	0.59
5kHZ	100%	2.02V	5.59V	0.36
10kHZ	0%	6.61V	1.12V	5.90
10kHZ	20%	6.08V	1.28V	4.75
10kHZ	40%	5.37V	1.51V	3.55
10kHZ	60%	4.36V	1.84V	2.36
10kHZ	80%	2.78V	2.34V	1.18
10kHZ	100%	2.31V	3.19V	0.72
20kHZ	0%	6.66V	0.56V	11.8
20kHZ	20%	6.14V	0.64V	9.59
20kHZ	40%	5.44V	0.76V	7.15
20kHZ	60%	4.42V	0.93V	4.75
20kHZ	80%	2.83V	1.19V	2.37
20kHZ	100%	2.40V	1.66V	1.44
50kHZ	0%	6.66V	0.23V	28.9
50kHZ	20%	6.15V	0.26V	23.6
50kHZ	40%	5.45V	0.31V	17.6
50kHZ	60%	4.44V	0.38V	11.7
50kHZ	80%	2.85V	0.48V	5.93
50kHZ	100%	2.44V	0.67V	3.64
100kHZ	0%	6.66V	0.11V	60.5
100kHZ	20%	6.15V	0.13V	47.3
100kHZ	40%	5.45V	0.15V	36.3
100kHZ	60%	4.44V	0.18V	24.6
100kHZ	80%	2.86V	0.24V	11.9
100kHZ	100%	2.44V	0.34V	7.17

Discussion

From the data above, it can be observed that as the proportion of the potentiometer increases, V_p gradually decreases, V_c gradually increases, and the ratio of V_p to V_c continuously decreases. As the frequency of the signal generator increases, the V_p/V_c ratio at the same potentiometer proportion also increases. For instance, at 1 kHz with a potentiometer proportion of 20%, the V_p/V_c ratio is 0.47, whereas at 10 kHz with the same potentiometer proportion, the V_p/V_c ratio increases to 4.75, which is 100 times larger compared to 0.47. However, with further increases in the signal generator frequency, V_p no longer changes. From the data at 50 kHz and 100 kHz, it can be seen that V_p remains the same for each potentiometer proportion.

kHZ	Potentiometer perc	V_p	V_c	V_p/V_c
50kHZ	0%	6.66V	0.23V	28.9
50kHZ	20%	6.15V	0.26V	23.6
50kHZ	40%	5.45V	0.31V	17.6
50kHZ	60%	4.44V	0.38V	11.7
50kHZ	80%	2.85V	0.48V	5.93
50kHZ	100%	2.44V	0.67V	3.64
100kHZ	0%	6.66V	0.11V	60.5
100kHZ	20%	6.15V	0.13V	47.3
100kHZ	40%	5.45V	0.15V	36.3
100kHZ	60%	4.44V	0.18V	24.6
100kHZ	80%	2.86V	0.24V	11.9
100kHZ	100%	2.44V	0.34V	7.17