Documentation

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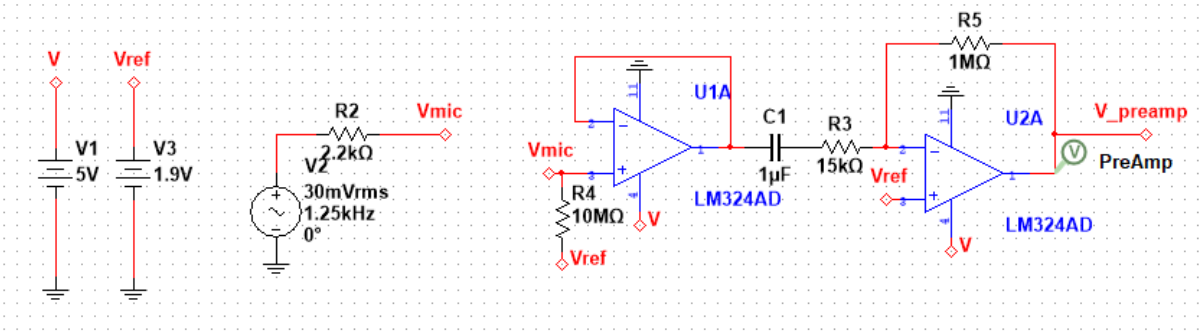
Contents

1 Microphone

1.1 Multisim schematic

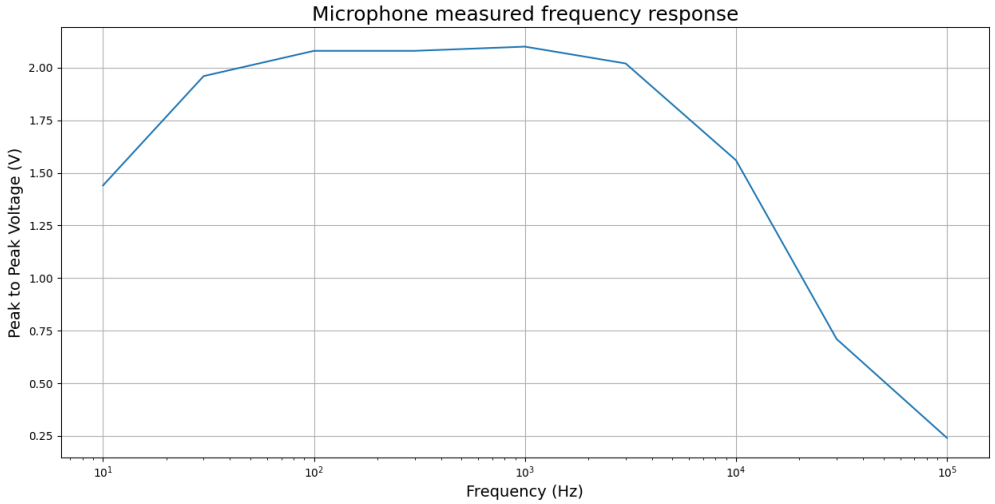


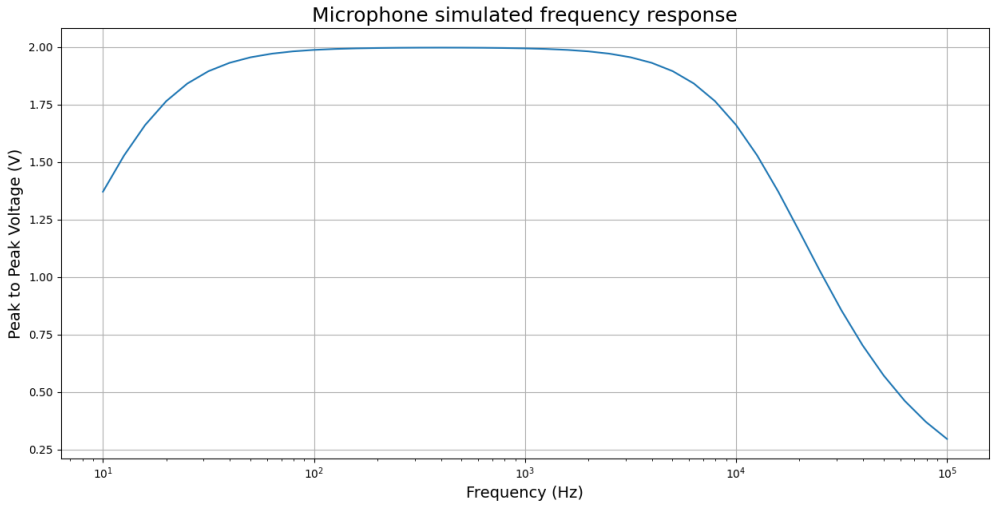
1.2 Bode plot measurements

Input amplitude: 30mVpp Input offset: 100mV

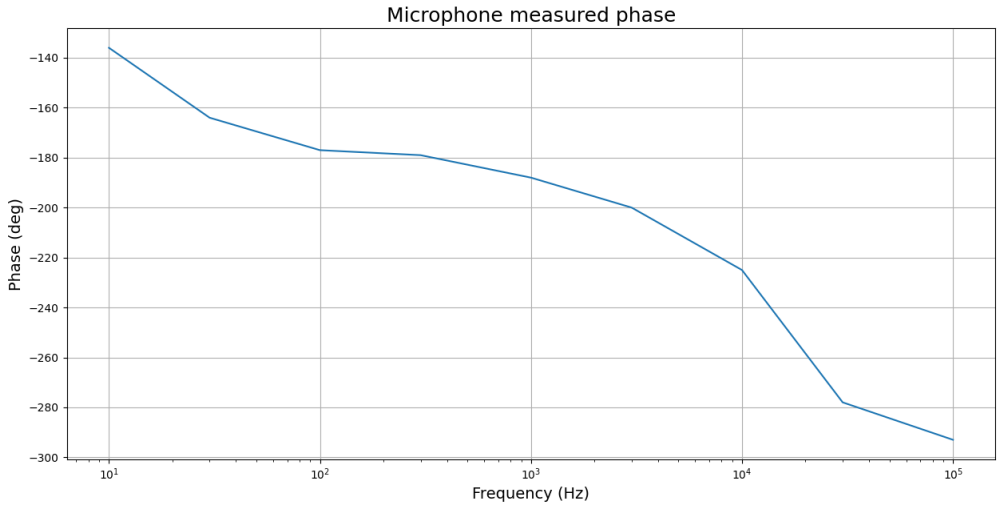
Input frekvens (Hz)	Output Vpp (V)	Phase (deg)
10	1.44	-136
30	1.96	-164
100	2.08	-177
300	2.08	-179
1000	2.10	-188
3000	2.02	-200
10000	1.56	-225
30000	0.71	-278
100000	0.24	-293

1.2.1 Peak to peak

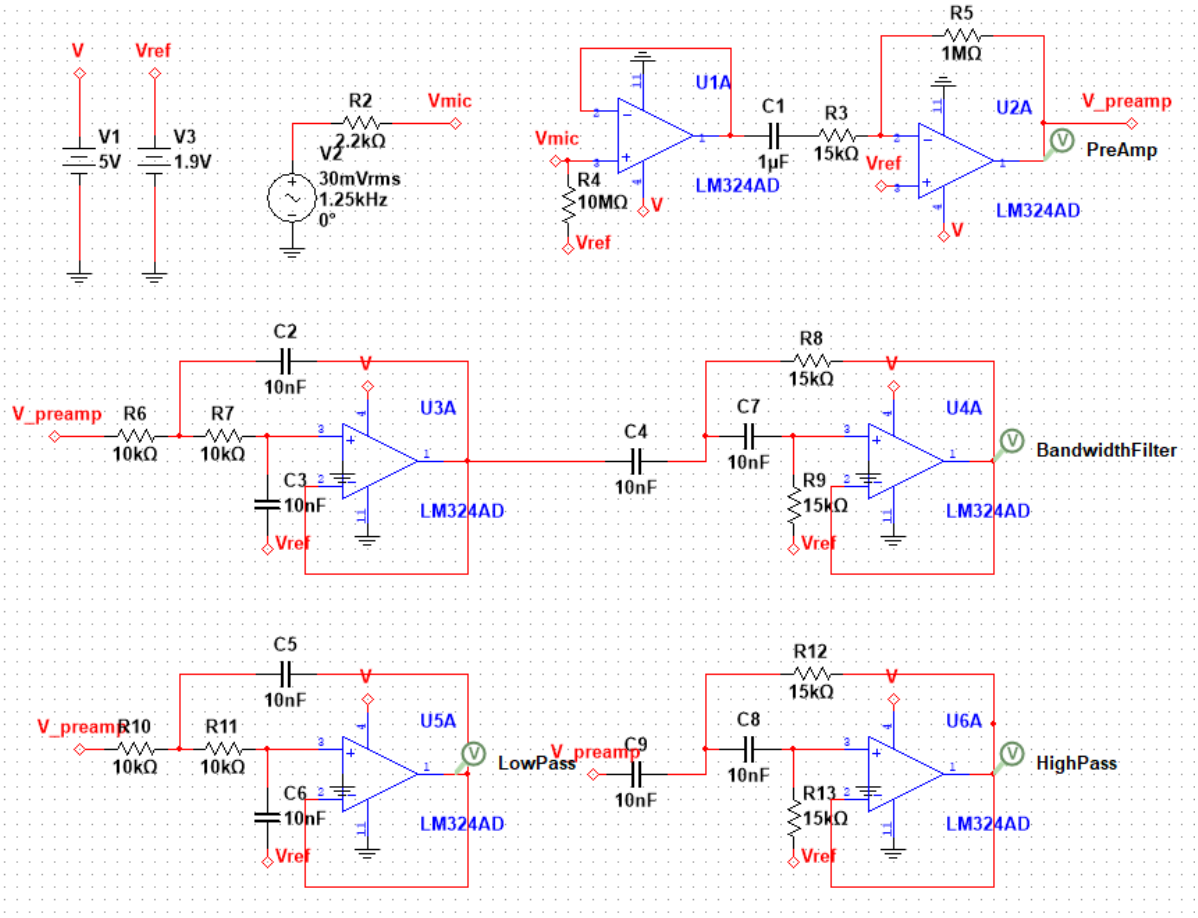




1.2.2 Phase



2 Filter



2.1 Low pass filter

R1: 10k R2: 10k C1: 10n C2: 10n f0 = 1.59kHz

2.2 High pass filter

R1: 15k R2: 15k C1: 10n C2: 10n f0 = 1.06kHz

2.3 Bandpass filter

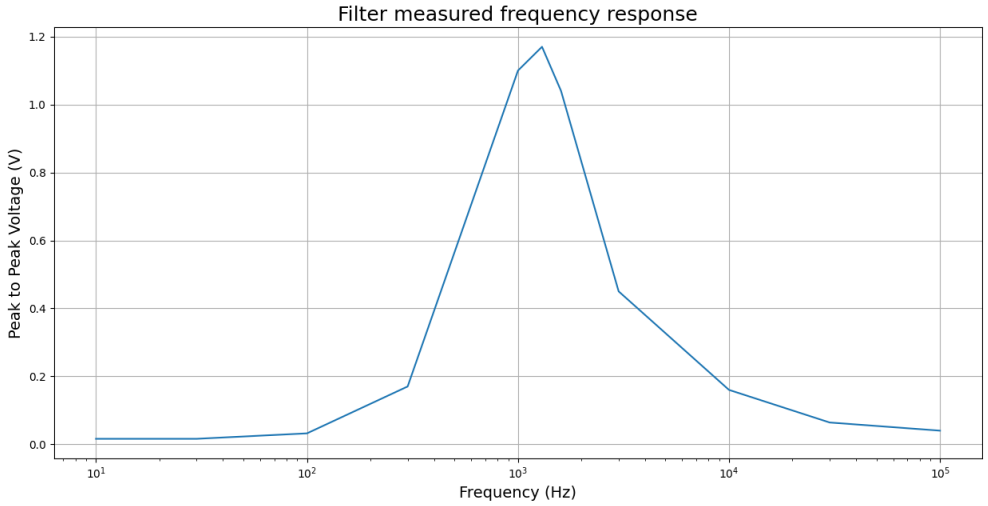
Bandwidth: $f0_l$ - $f0_h$ = 0.53kHz

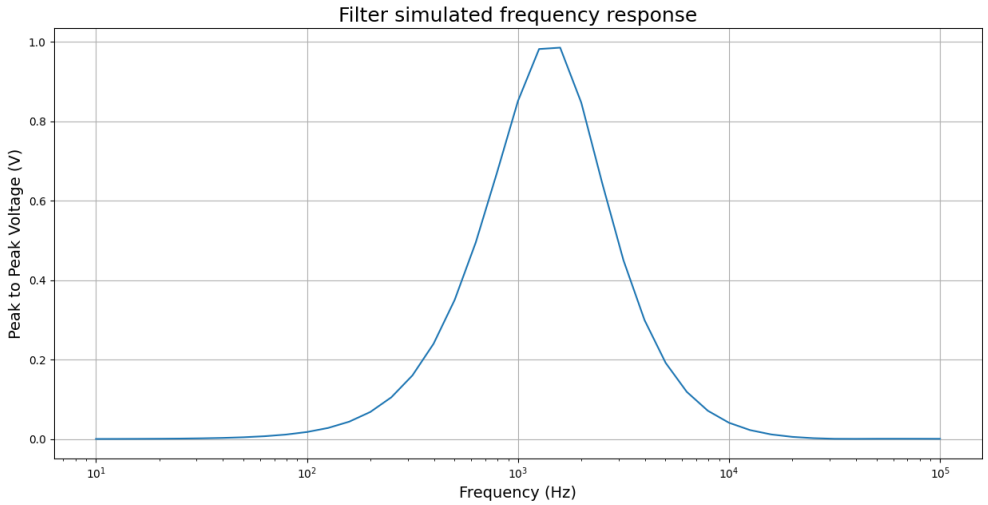
2.4 Measurements

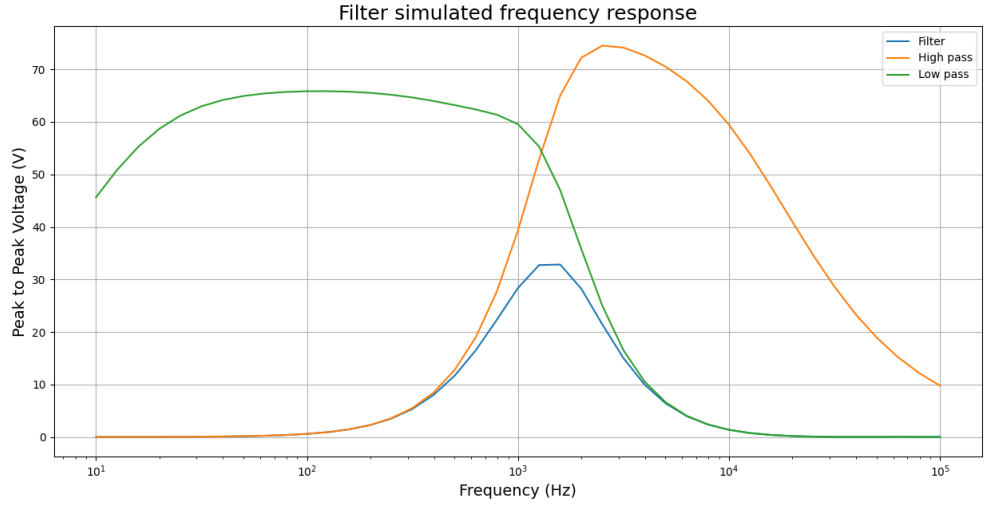
Input amplitude: 30mVpp Input offset: 100mV

Input frekvens (Hz)	Output (Vpp)	Phase (deg)
10	0.016	0
30	0.016	0
100	0.032	-10
300	0.170	-53
1000	1.10	-150
1300	1.17	-204
1600	1.04	-231
3000	0.450	-310
10000	0.160	-365
30000	0.064	-365
100000	0.040	-365

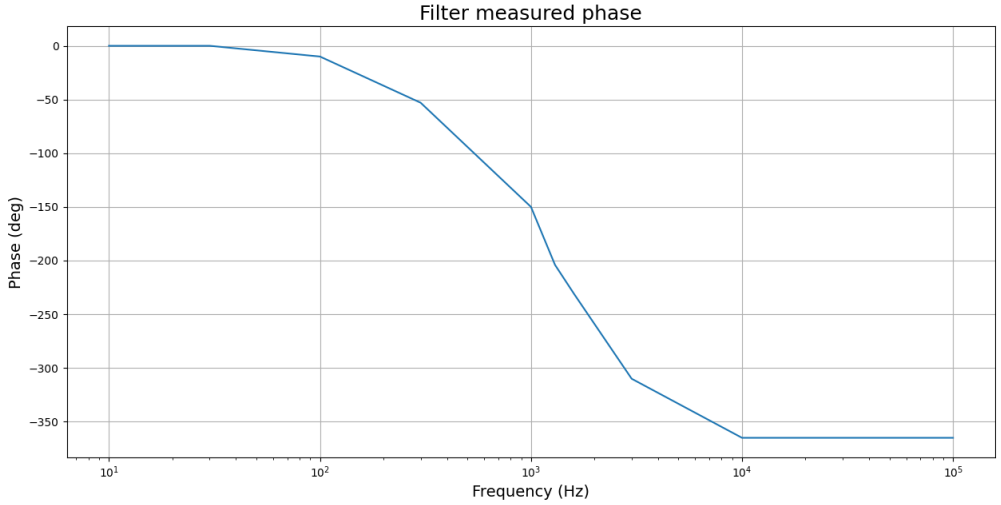
2.5 Peak to peak




Filter simulated frequency response
Peak to Peak Voltage (V)
Frequency (Hz)

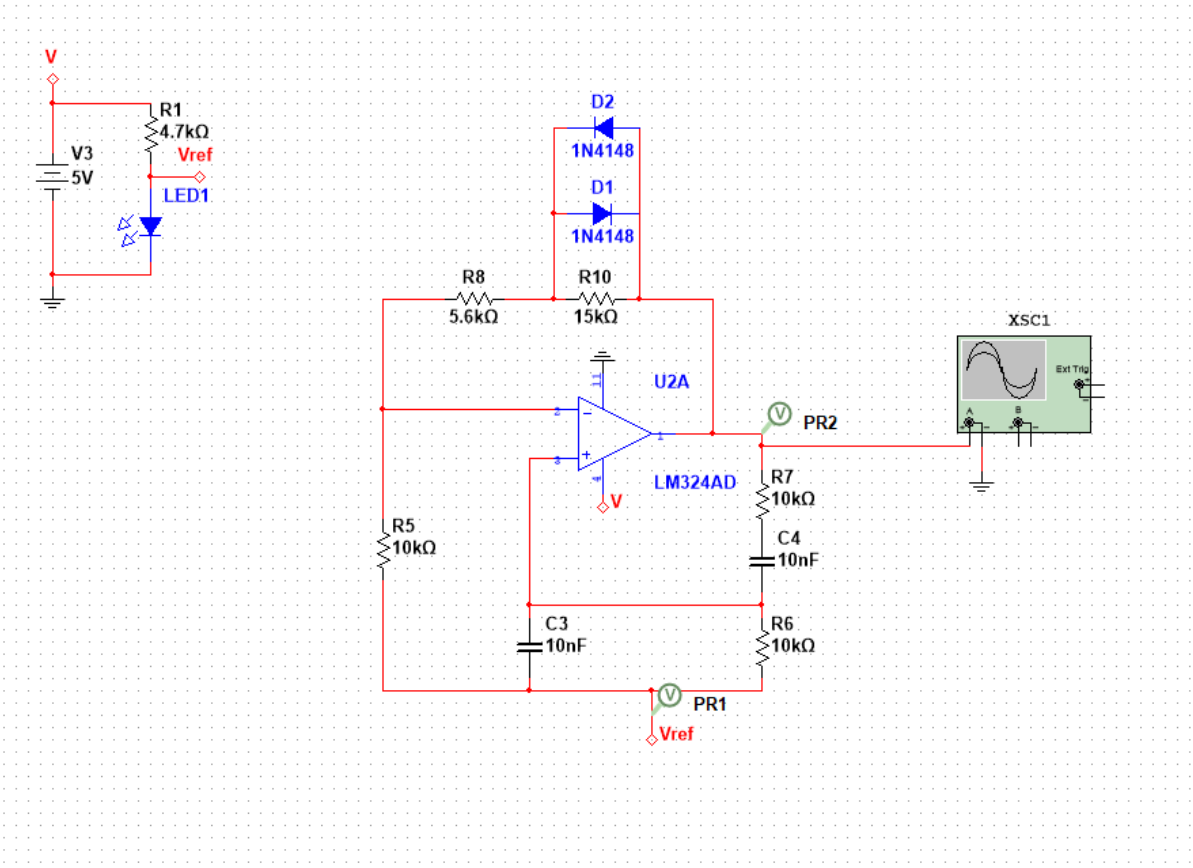

Filter simulated frequency response
Filter
High pass
Low pass
Peak to Peak Voltage (V)
Frequency (Hz)

2.6 Phase


Filter measured phase
Phase (deg)
Frequency (Hz)

3 Oscillator

3.1 Schematic



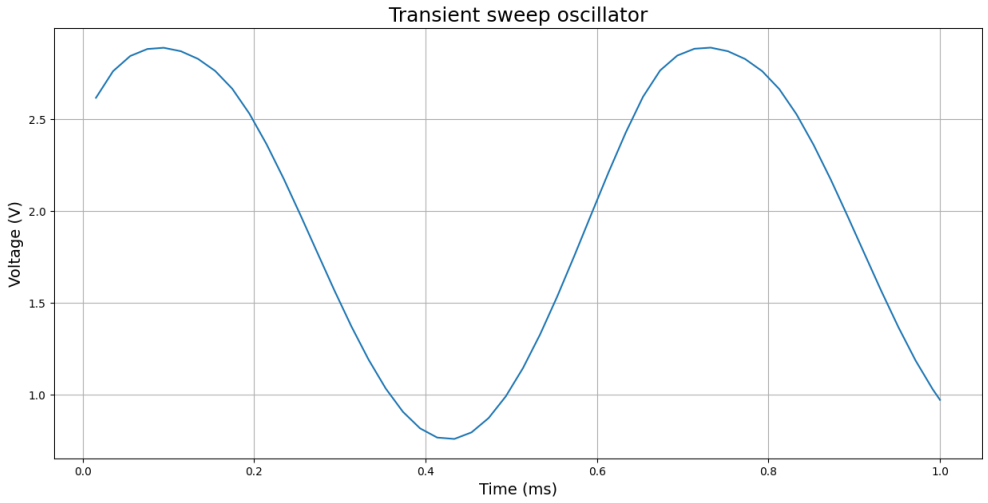
3.2 Measurements

Measured frequency: 1.578kHz Measured peak to peak: 1.26V

Simulated frequency: 1.567kHz Simulated peak to peak: 2.1V

Big difference in peak to peak due to error in physical components, especially capacitors.

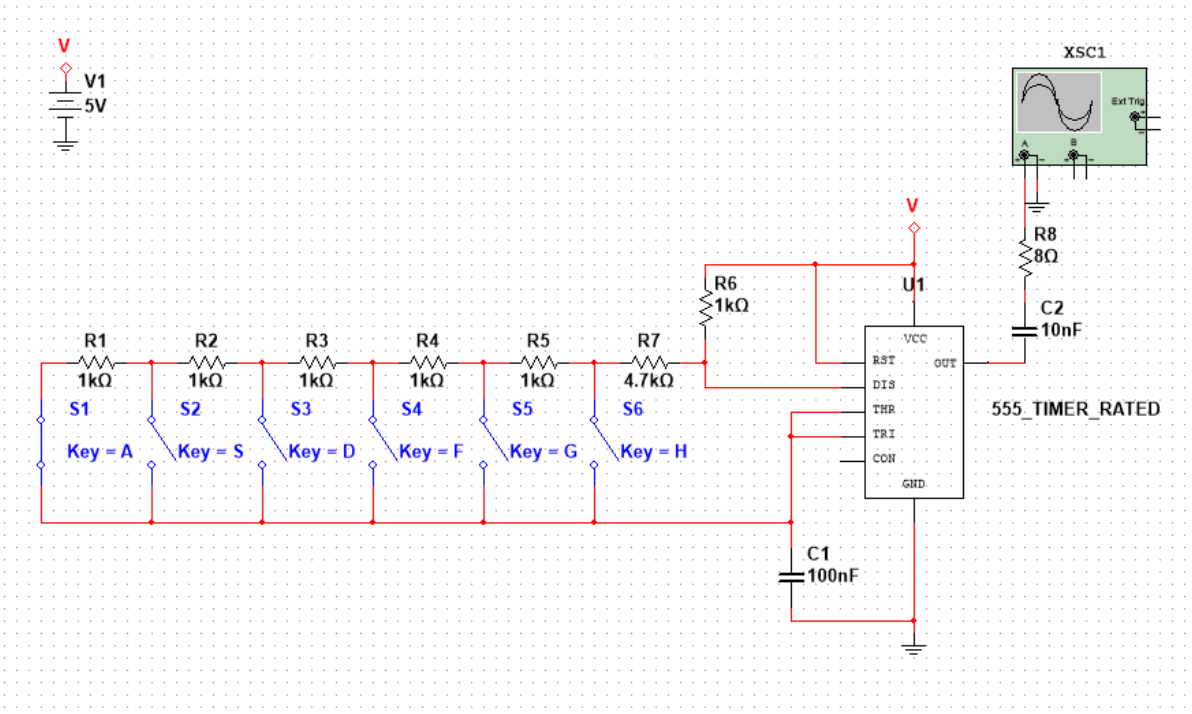
3.3 Transient sweep



4 Digital controller

5 LM555 piano

5.1 Schematic



5.2 Measuerments

Key number	Measuerd frequency (Hz)	Theoretical frequency (Hz)	Simulated frequency (Hz)
1	1353	1385	1303
2	1135	1161	1130
3	977	1000	962
4	856	878	840
5	765	783	763
6	690	706	690