ECE 341: Junior Design

Accelerated Project Microphone Design

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1 Schematic

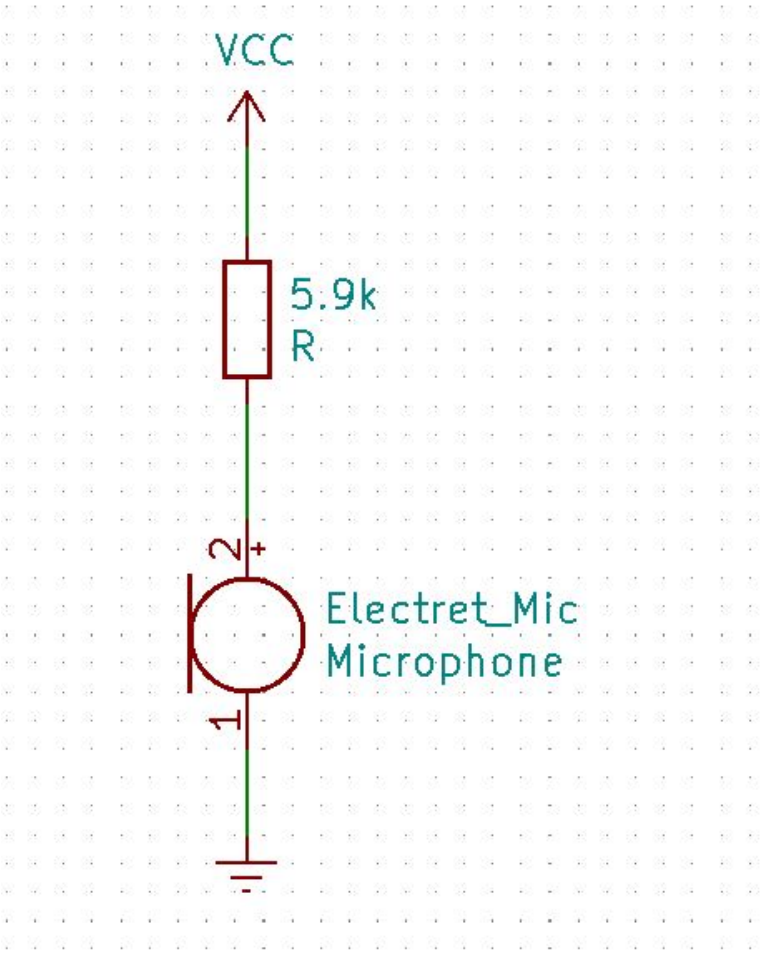

Figure 1: Microphone Schematic

2 Datasheet

SPECIFICATIONS		
directivity	omnidirectional	
sensitivity (S)	-42 ±3 dB	f = 1KHz, 1Pa 0dB = 1V/Pa
sensitivity reduction (ΔS-Vs)	-3 dB	f = 1KHz, 1Pa Vs = 2.0 ~ 1.5 V dc
operating voltage	2 V dc (standard), 10 V dc (max.)	
output impedance (Zout)	2.2 KΩ	f = 1KHz, 1Pa
operating frequency (f)	100 ~ 20,000 Hz	
current consumption (IDSS)	0.5 mA max.	Vs = 2.0 V dc RL = 2.2KΩ
signal to noise ratio (S/N)	56 dBA	f = 1KHz, 1Pa A-weighted
operating temperature	-20 ~ +70° C	
storage temperature	-20 ~ +70° C	
dimensions	ø6.0 x 5.0 mm	
weight	0.30 g max.	
material	Al	
terminal	pin type (Au plating, hand soldering only)	
RoHS	yes	

Figure 2: Microphone Specifications

3 Calculations

1. Convert the sensitivity to volts per Pascal

$$10^{\frac{-42\,\mathrm{dB}}{20}} = \boxed{7.943\,\frac{\mathrm{mV}}{\mathrm{Pa}}}$$

2. Convert volts per Pascal to current per Pascal

$$\frac{7.943\,\frac{\mathrm{mV}}{\mathrm{Pa}}}{2.2\,\mathrm{k\Omega}} = \boxed{3.611\,\frac{\mu\mathrm{A}}{\mathrm{Pa}}}$$

3. Max output current occurs at max pressure 2 Pa.

$$I_{max} = 2\,\mathrm{Pa} * 3.611\,\frac{\mu\mathrm{A}}{\mathrm{Pa}} = \boxed{7.221\,\mu\mathrm{A}}$$

4. Calculate bias resistor. In the following equation, V_{mic} is microphone standard operating voltage.

$$R = \frac{V_{cc} - V_{mic}}{I_S} = \frac{5\,\mathrm{V} - 2\,\mathrm{V}}{0.5\,\mathrm{A}} = 6\,\mathrm{k\Omega} \approx \boxed{5.9\,\mathrm{k\Omega}}$$