Explore More!

Name: _____

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Lab Module 913 Mic and Preamp

Procedure

Build the following circuit. Note that the dotted line shows the entire electret microphone capsule and that the MOSFET is embedded in that capsule (it is *not* a discrete element). The microphone has a negative side (polarity). See the datasheet. Use the rechargeable NiMH battery to supply V_{CC}. Also, note that there is a jumper wire connecting the wiper of the $10\ k\Omega$ trimpot to the $680\ \Omega$ resistor. There are portions of relevant datasheets on the back side of this paper.

Turn on the oscilloscope and press the Default Setup button. Use ***only*** the horizontal and vertical scale adjustments and the trigger menu to complete today's task as you continue to improve your skills.

Use the oscilloscope to adjust the trimpot until $0 < V_2 < V_{DD}$, that is, adjust the trimpot until the BC 337 transistor in operating in the middle of the active region. View both voltages V_1 and V_2.

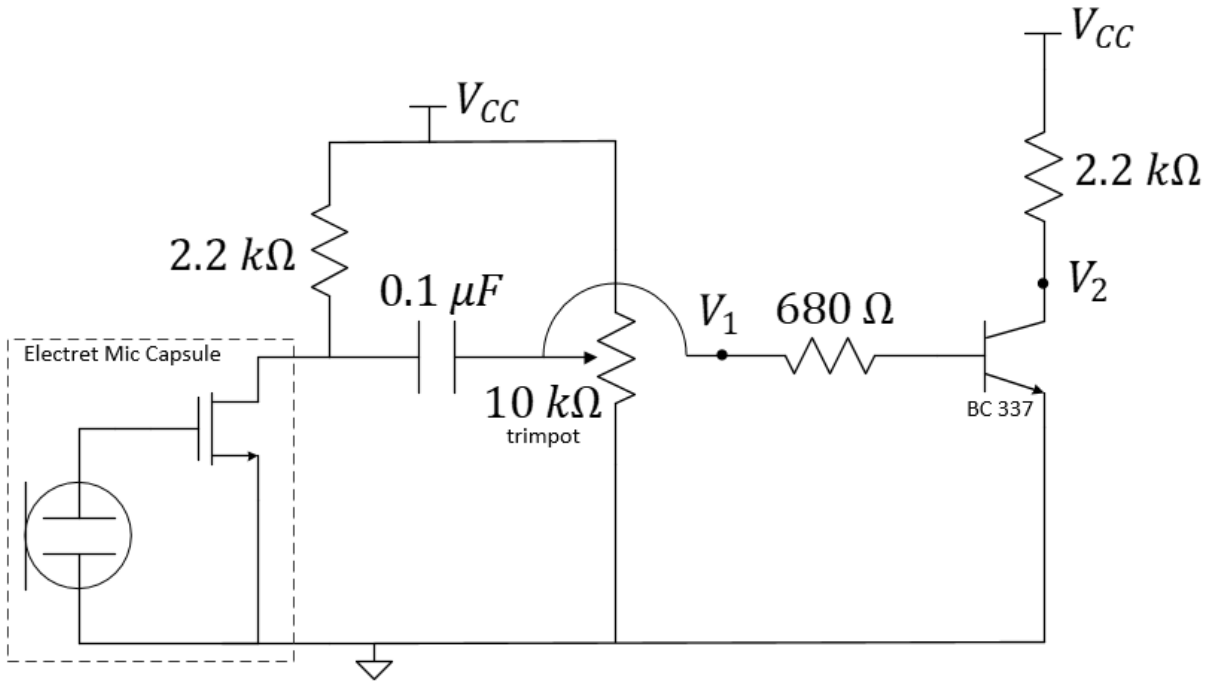


Figure 1: *A microphone circuit with extra voltage gain via a BJT.*

Connect a loudspeaker to your function generator and produce a low-voltage sinusoid at $2\ kHz$ to verify that V_2 responds to the microphone stimulus. Use the oscilloscope to measure and record the frequency of V_2. Let your TA know you are ready for evaluation to receive your module credit.

Learning Objectives

- Ability to map a circuit design onto the breadboard in a functional and clean manner.
- Ability to use the oscilloscope.
- Ability to troubleshoot problems that occur during a build.

BC337, BC337-25, BC337-40

Amplifier Transistors

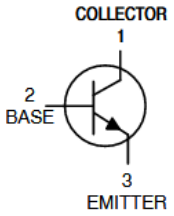
NPN Silicon

ON Semiconductor®

http://onsemi.com

Features

- These are Pb−Free Devices



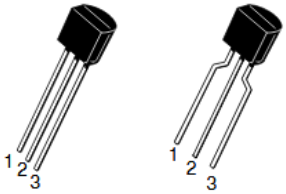
MAXIMUM RATINGS

Rating	Symbol	Value	Unit
Collector − Emitter Voltage	V_{CEO}	45	Vdc
Collector − Base Voltage	V_{CBO}	50	Vdc
Emitter − Base Voltage	V_{EBO}	5.0	Vdc
Collector Current − Continuous	I_C	800	mAdc
Total Device Dissipation @ T_A = 25°C Derate above 25°C	P_D	625 5.0	mW mW/°C
Total Device Dissipation @ T_C = 25°C Derate above 25°C	P_D	1.5 12	W mW/°C
Operating and Storage Junction Temperature Range	T_J, T_{stg}	−55 to +150	°C

THERMAL CHARACTERISTICS

Characteristic	Symbol	Max	Unit
Thermal Resistance, Junction−to−Ambient	$R_{\theta JA}$	200	°C/W
Thermal Resistance, Junction−to−Case	$R_{\theta JC}$	83.3	°C/W

TO−92
CASE 29
STYLE 17



STRAIGHT LEAD
BULK PACK

BENT LEAD
TAPE & REEL
AMMO PACK

PART #	CEM-C9745JAD462P2.54R	Revision	0-2010

Omni-Directional Foil Electret Condenser Microphone

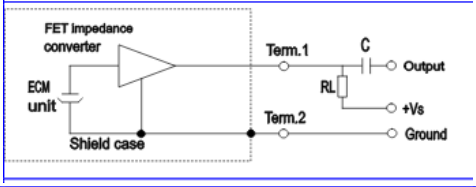
DESCRIPTION

Omni-Directional Foil Electret Microphone, 9.7 mm diameter and 4.5 mm high, Power Supply 5.0 V max, External Resistance Loading of 680 Ω, and sensitivity of -44 dB. Terminated with 2 solder points, Lead Free RoHS Compliant

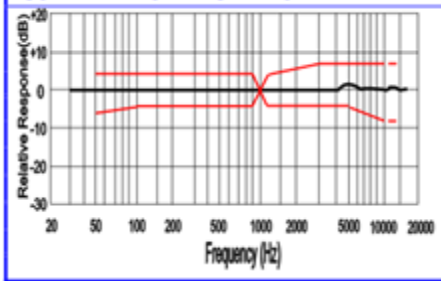
SPECIFICATIONS:

Direction	Omni Directional Foil Electret
Operating Voltage Range	Vs= 1.0 Vdc ~ 10.0 Vdc
Frequency Range	100 ~ 10,000 Hz.
Sensitivity	- 46 ± 2.0, (0 dB = 1V / Pa) at 1K Hz.
Sensitivity Reduction	3.0 V to 2.0 V -3 dB
Operating Temperature	-20ºC to + 60ºC
Loading Resistance (RL)	External, 680 Ω at Vs = 1.5 V, Max. 2,200 Ω

Schematic Drawing



Typical Frequency Response



Microphone Response Toll Window

Frequency (Hz)	Lower Limit (dB)	Upper Limit (dB)
50	-6	+3
100	-3	+3
800	-3	+3
1000	0	0
1200	-3	+3
3000	-3	+8
5000	-3	+8
10000	-8	+8

Dimensions

Units in: mm Tolerance: ±0.3 mm