COMM.RF.200 Introduction to RF Electronics,FALL 2021

Bipolar Junction Transistor, basic measurement

Set your multimeter diode test settings.

Take readings between all possible pairs of leads (altogether six ways). Record the readings, label them appropriately. Use to datasheet to determine the component pinout.

Amplifier measurements

Lets simulate and measure step-by-step (many) key parameters of the amplifier you have constructed at home. Recall to include also units to your answers.

Biasing

Connect only V_{CC} and look at the currents:

Quantity	Simulation	Measurement
I_B		
I_C		
I_E		

What is the ratio between I_B and I_C? _____

Then find voltages:

Quantity	Simulation	Measurement
Over R_C		
Over R_E		
V_{BE}		
V_{CE}		

AC signal

Connect also the AC signal. To answer to the questions, use function generator and oscilloscope.

What is the voltage gain of the amplifier (in linear scale and as decibels)?

Does the voltage gain you can read from the oscilloscope correspond to the value obtained with the Bode analyzer?

What can you conclude about the phase difference when looking at the waveforms?

Clipping

Increase the input amplitude until the output starts to get distorted. Try this first using Multisim and then in myDAQ. Describe how the output is distorted. What could you do to improve the output? (i.e. which component values to change)

Others

What is the effect of the load impedance on the voltage gain? Try changing R_L value and look at the gain.

What is the effect of the capacitor in parallel with R_E? Try first in simulations removing the capacitor and look at the effect on output. Then do the same with breadboard.

** Simulate and measure the input impedance of the amplifier. Use the same procedure as last week.*

** Simulate and measure the small-signal output impedance of the amplifier. Short-circuit the input, use the same procedure as before.*