Boston University

Electrical & Computer Engineering

Second Prototype Testing Plan

Better Bot

by

Team #15

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Required Materials:

1. Spectrum Analyzer
2. Oscilloscope
3. Function Generator
4. Power Supply
5. Active Antenna
6. Isolation Amplifier
7. Tracking Filter
8. Varactor

Setup:

The circuits that are being tested are Active Antenna, Isolation Amplifier, and Tracking Filter. The required hardware is a spectrum analyzer, function generator, power supply, and oscilloscope. First, we will power up the active antenna and hook it with up to 10 ft 28 gauge wire to the input of the active antenna, then connect the output of the active antenna to a spectrum analyzer. The isolation amplifier will then be connected to the function generator and power supply, the isolation amplifier should be able to amplify the input signals. The measure of the output signal will require hooking up the output to the oscilloscope. A varactor will be biased by using a resistor connected in series and a DC power supply, the change in capacitance is to be measured and used to determine operating frequency range of the final sensor package.

Procedure:

1) Active Antenna
    a) Power up the active antenna with 3.3 V dc voltage
    b) Connect a 10 ft 28 gauge wire to the input of active antenna
    c) Connect the spectrum analyzer to the output end.
    d) Set the frequency range of spectrum analyzer to be 500kHz to 1.8MHz
    e) Set the resolution bandwidth (rbw) to be 1kHz and video bandwidth (vbw) to be 300Hz
    f) Observe the spectrum analyzer
2) Tracking filter connected with active antenna
    a) Power up with DC 3.3V and 6V.
    b) Connect the active antenna to the input node.
    c) Connect output node to spectrum analyzer.
    d) Enjoy.
3) Isolation Amplifier
    a) Connect the DC 3.3V to Vcc
    b) Connect the AC signal from the function generator to AC input
    c) Connect the DC1.55 to DC input
    d) Oscilloscope measures the Vout
4) Varactor (optional)
    a) Connect resistor + varactor combo to DC power supply.
    b) Connect the multimeter in capacitance mode across the varactor.
    c) Swipe DC voltage while recording change in capacitance.

Measuring Criteria:

1. Active antenna is able to detect the surrounding AM radio by showing peaks on spectrum analzyer
2. INA should amplify the useful signal by range of 5-10
3. Tracking filter:
    a. Clearance around target frequency.
    b. Amplification of the isolated signal.
4. Varactor: change in capacitance.

Scoring Sheet:

Test Case	Pass/Fail
Spctrum analyzer shows peaks	
Tracking filter: Clearance around target frequency	Pass: minimum clearance of ±0.2 MHz around target frequency. Fail otherwise.
Tracking filter : Amplification of isolated signal	Pass: minimum amplification 10x signal. Fail: no amplification.
Isolation Amplifier amplifies the input signal by factor range 5-10	
Varactor: Change in capacitance related to change in DC voltage.	Pass: change in capacitance of at least 1 pF. Fail: change in capacitance independent of bias voltage or no change.