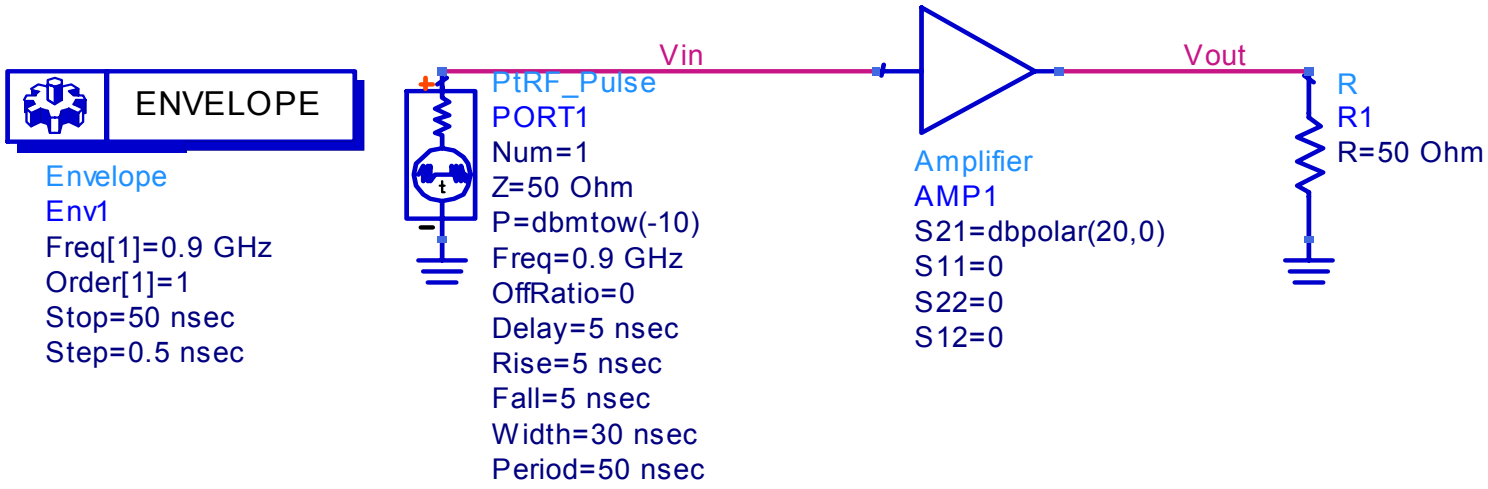
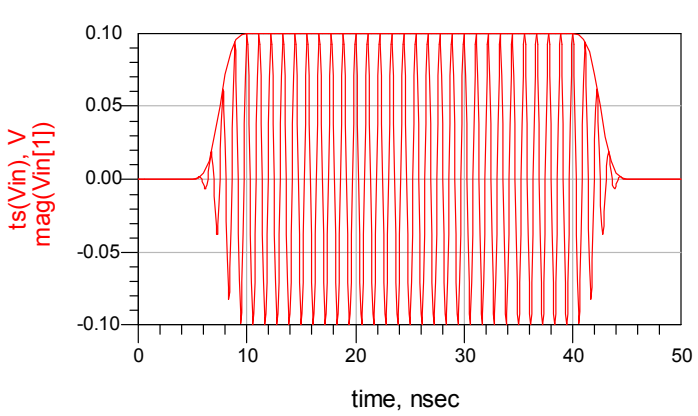
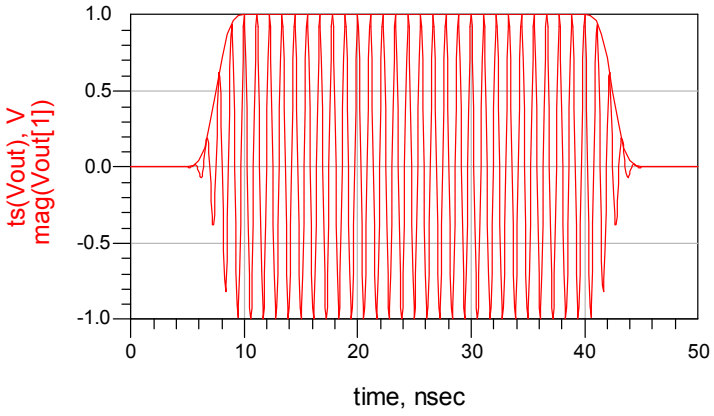
ADS Tutorial #5 Harmonic Balance and Envelop Simulation

Oklahoma State University

1. Envelop Simulation

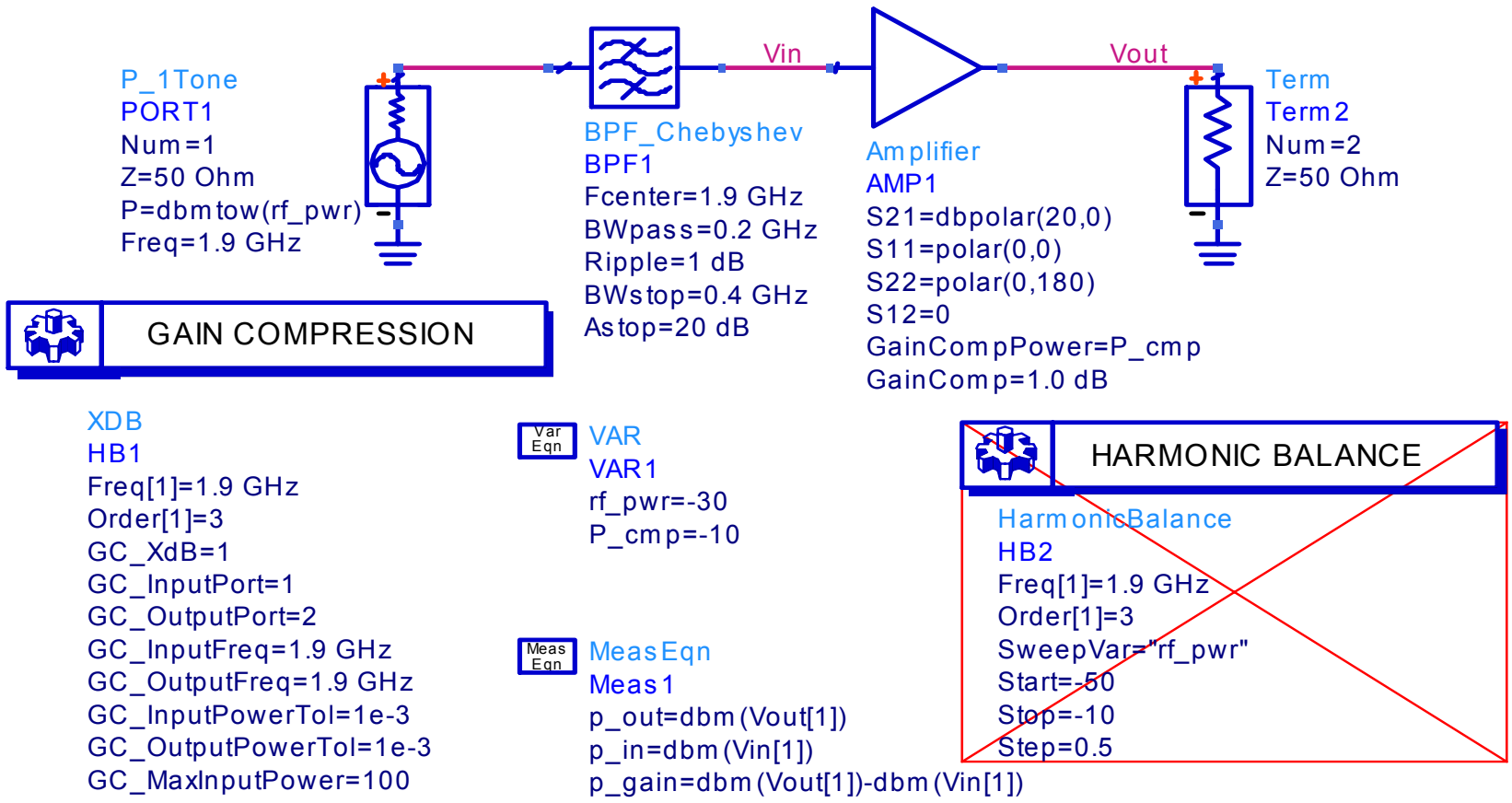


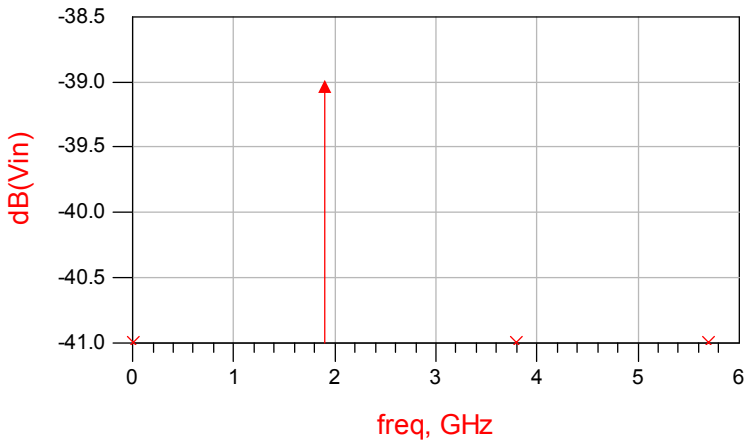


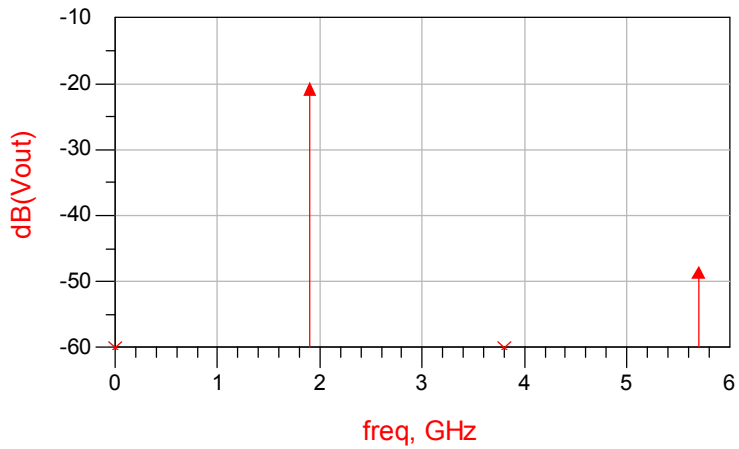


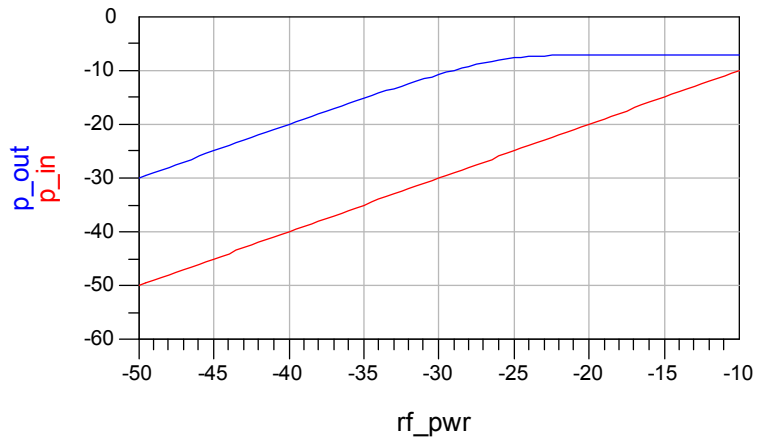
2. Harmonic Balance

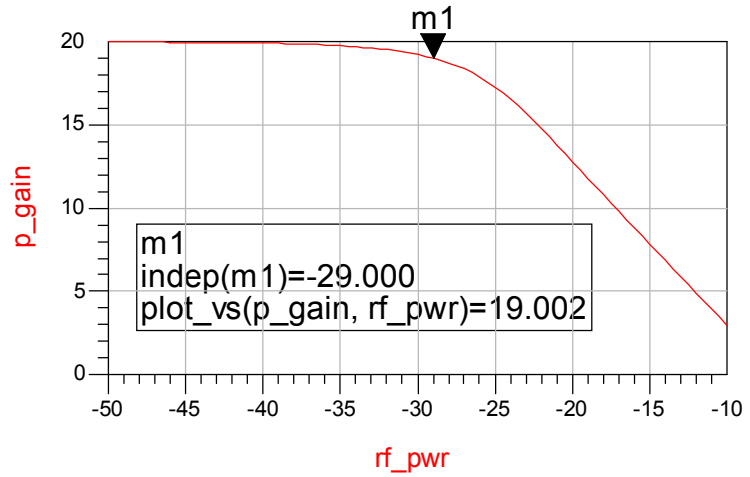
1) System Level Amplifier (Gain Compression)



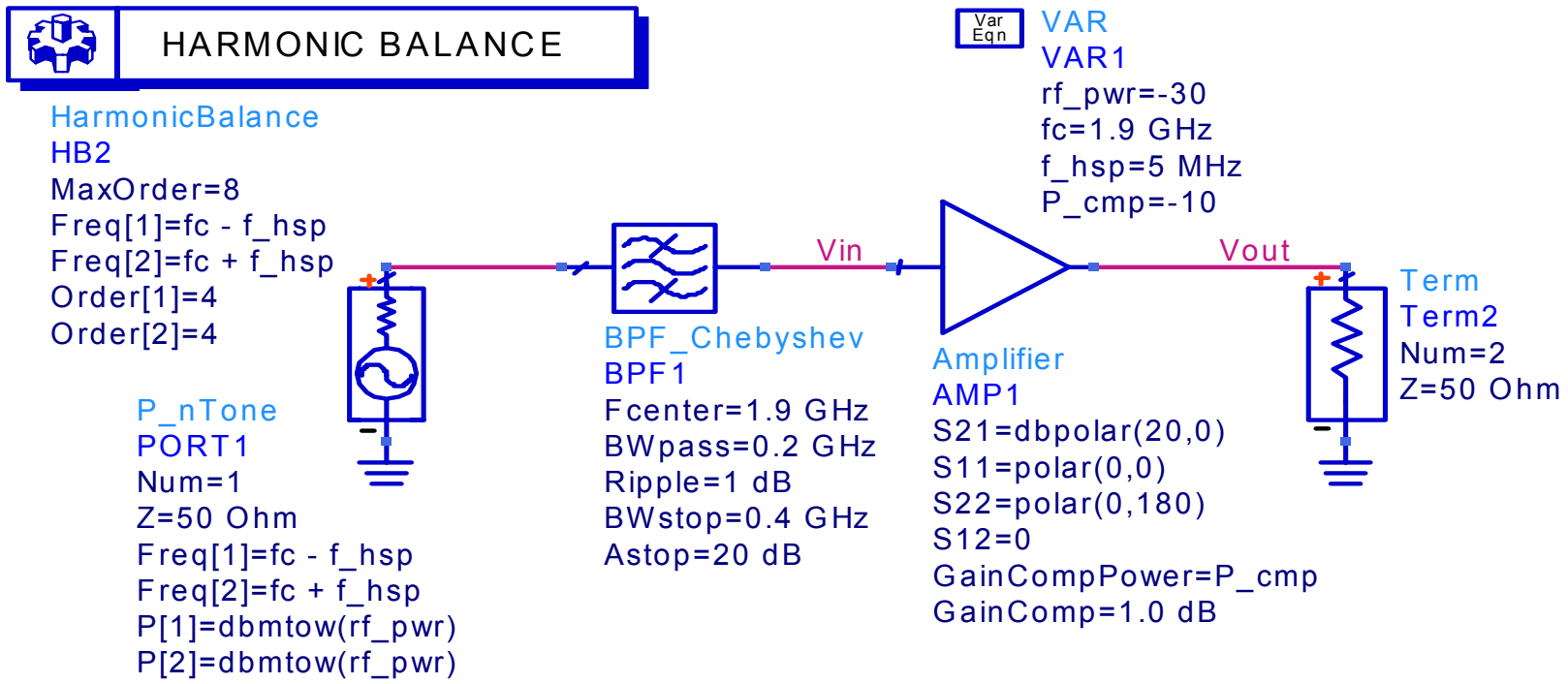

dB(Vin)
-38.5
-39.0
-39.5
-40.0
-40.5
-41.0
0
1
2
3
4
5
6
freq, GHz

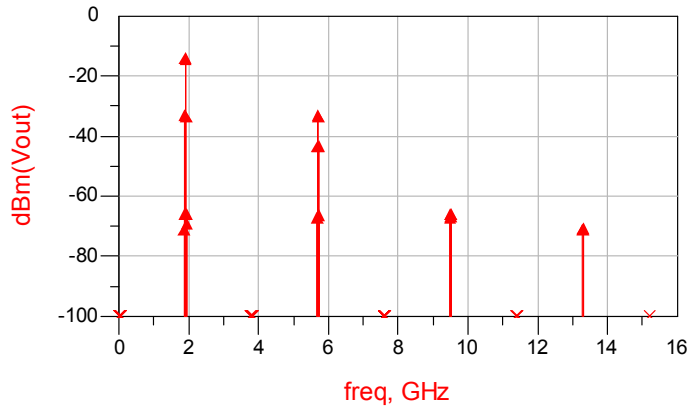

dB(Vout)
-10
-20
-30
-40
-50
-60
0
1
2
3
4
5
6
freq, GHz

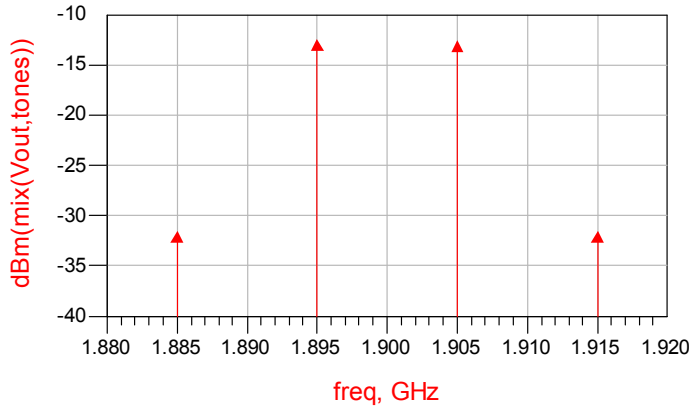

p_out
p_in
0
-10
-20
-30
-40
-50
-60
-50
-45
-40
-35
-30
-25
-20
-15
-10
rf_pwr


m1
p_gain
20
15
10
5
0
-50
-45
-40
-35
-30
-25
-20
-15
-10
rf_pwr
m1
indep(m1)=-29.000
plot_vs(p_gain, rf_pwr)=19.002

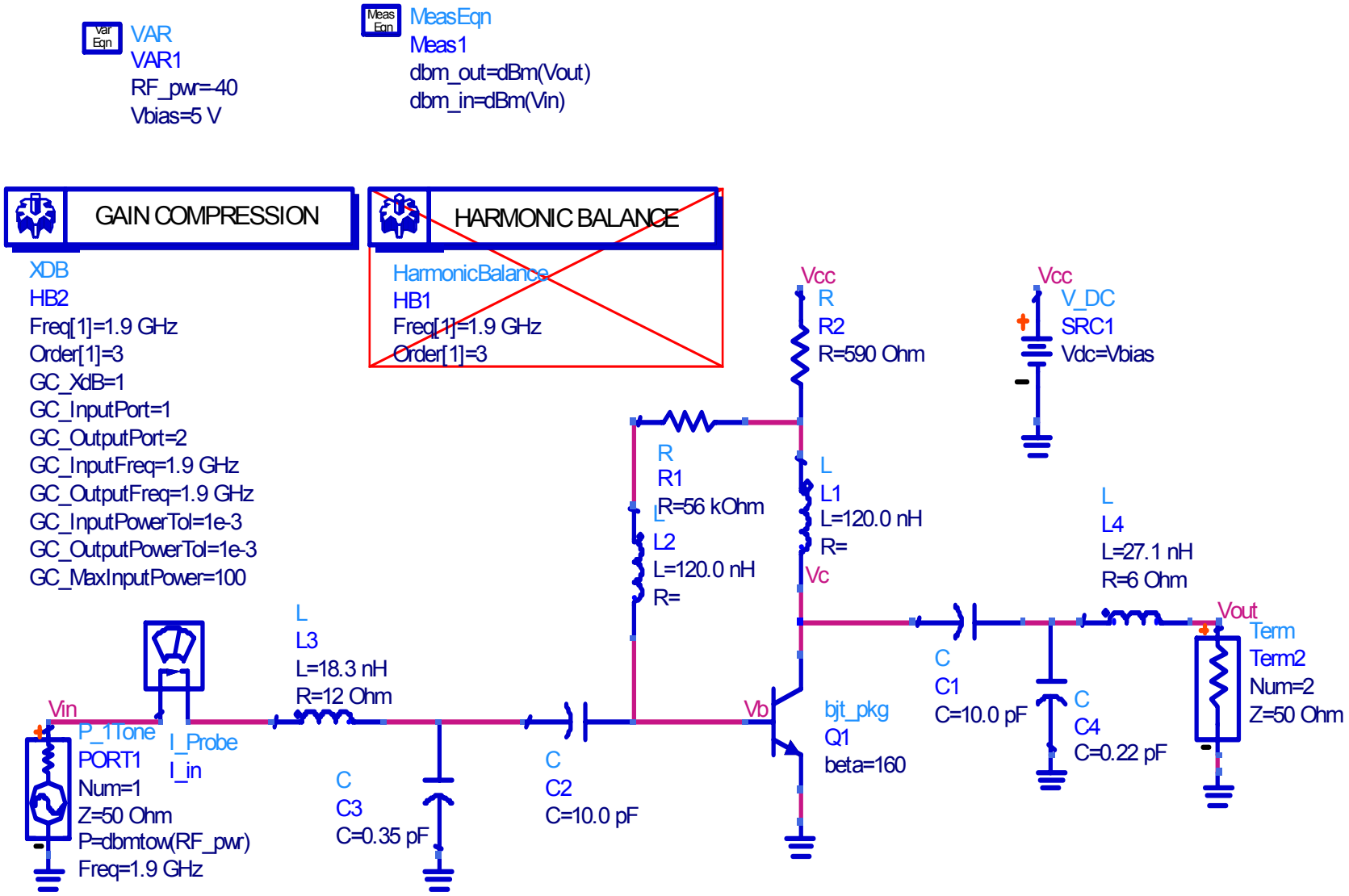
2) System Level Amplifier (Two-Tone)

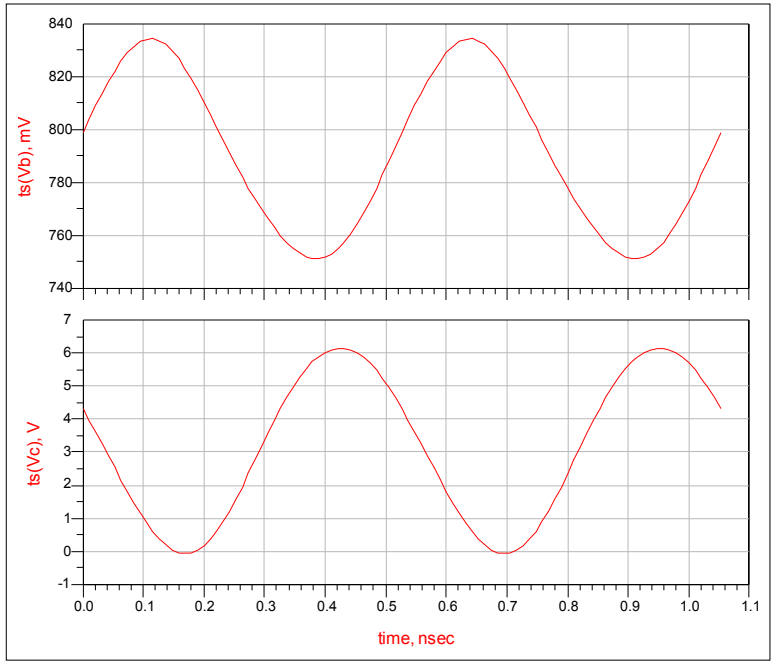


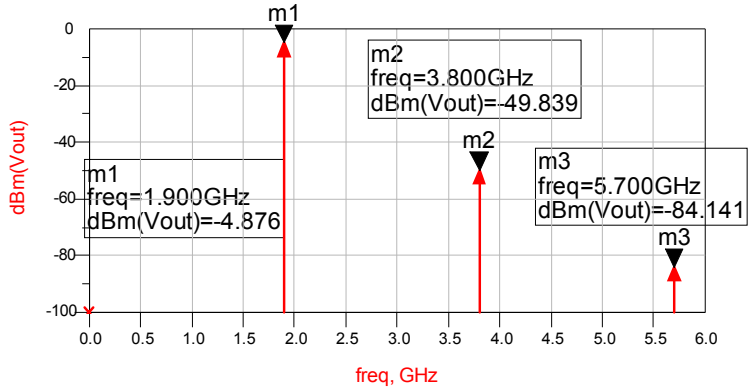




3) BJT Amplifier (Harmonics and Waveforms)

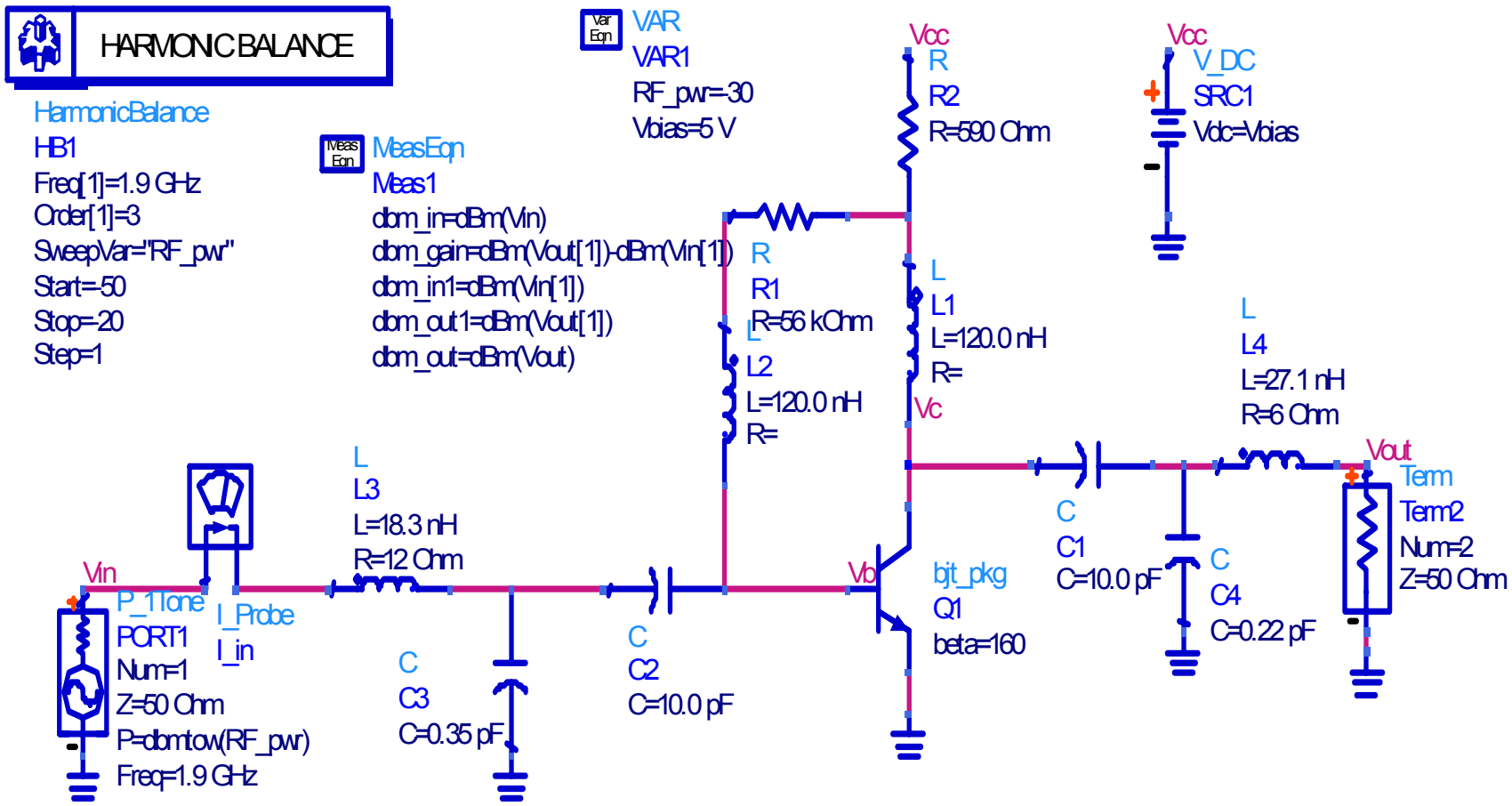


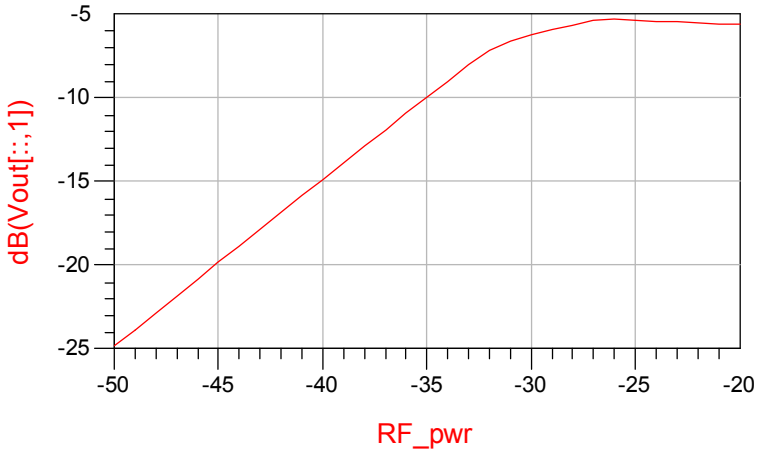


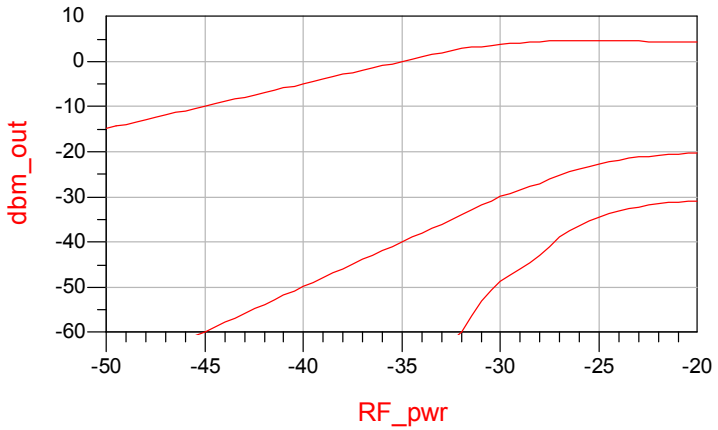


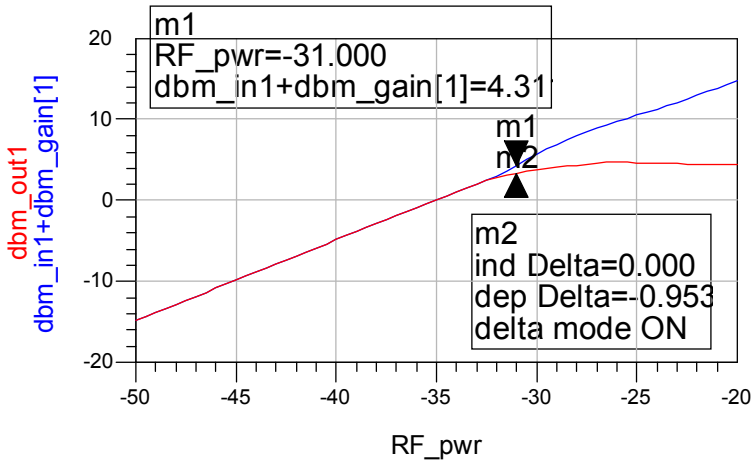
freq	inpwr	outpwr
0.0000 Hz	-30.67 dBm	3.498 dBm
1.900GHz	-30.67 dBm	3.498 dBm

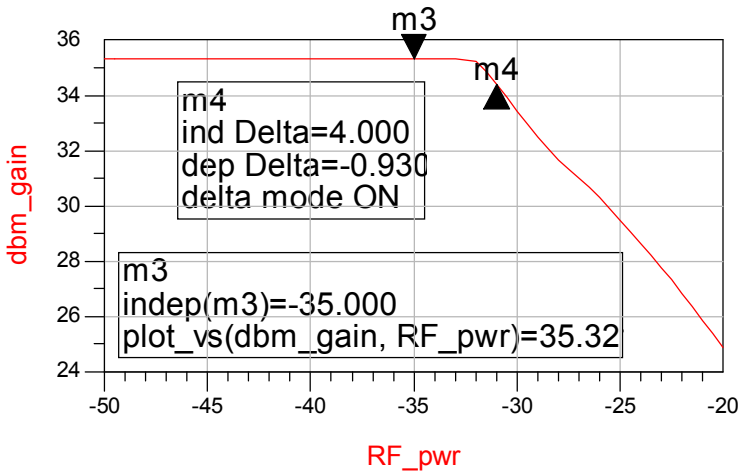
4) BJT Amplifier (Gain Compression)




dB(Vout[::,1])
-5
-10
-15
-20
-25
-50
-45
-40
-35
-30
-25
-20
RF_pwr


dbm_out
10
0
-10
-20
-30
-40
-50
-60
-50
-45
-40
-35
-30
-25
-20
RF_pwr


m1
RF_pwr=-31.000
dbm_in1+dbm_gain[1]=4.31
m2
ind Delta=0.000
dep Delta=-0.953
delta mode ON
dbm_out1
dbm_in1+dbm_gain[1]
20
10
0
-10
-20
-50
-45
-40
-35
-30
-25
-20
RF_pwr


m3
m4
m4
ind Delta=4.000
dep Delta=-0.930
delta mode ON
m3
indep(m3)=-35.000
plot_vs(dbm_gain, RF_pwr)=35.32
dbm_gain
36
34
32
30
28
26
24
-50
-45
-40
-35
-30
-25
-20
RF_pwr