

Microwaves
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1 Mixing Frequencies

The input signal to a mixer is at 0.1 GHz, the LO is at 1 GHz. Calculate all positive and real frequencies of order 3 for LO and order 2 for RF! And identify the technical importance of selected frequencies!

2 Intercept-Mixer

The input signal to a mixer is at 1.1 GHz and at 1.15 GHz, the LO is at 1 GHz. Calculate all positive and real frequencies of order -1 (downconversion) for LO and maximum combined order 3 for RF! And identify the most disturbing and wanted signals frequencies!

3 Mixer Conversion

The input signal to a mixer is of RF-power -20 dBm, at 12 GHz, and -40 dBm, at the image frequency.

The LO-power is of 17 dBm, 10 GHz. The mixer is straight downconversion. At output we find measure

Frequency/GHz	Power/dBm	Comment
2	-27	
2	-60	RF off
10	-13	
12	-50	

Calculate the relevant performance measures of the mixer! and comment on what to do in order to improve certain parameters!

4 Mixer Noise

A mixer has the following measured parameters Conversion $c = -7$ dB, input noise 2.00 dB above thermal noise at 290 K with bandwidth of 1 MHz. Output noise in double sideband configuration is $N_{out,DSB} = -112.01$ dBm. Conversion for LSB and USB are the same, noise performance as well.

Calculate the DSB-Noisefigure, SSB-noise-figure and the filtered DSB-noise figure!