

Research Migration Project

<https://esim.fossee.in/research-migration-project>



The Research Migration Project is an initiative of FOSSEE, IIT Bombay that promotes the use of eSim for reproducing published research circuits originally implemented using proprietary simulation tools. The objective is to migrate these validated designs to eSim to build an open source resource database.

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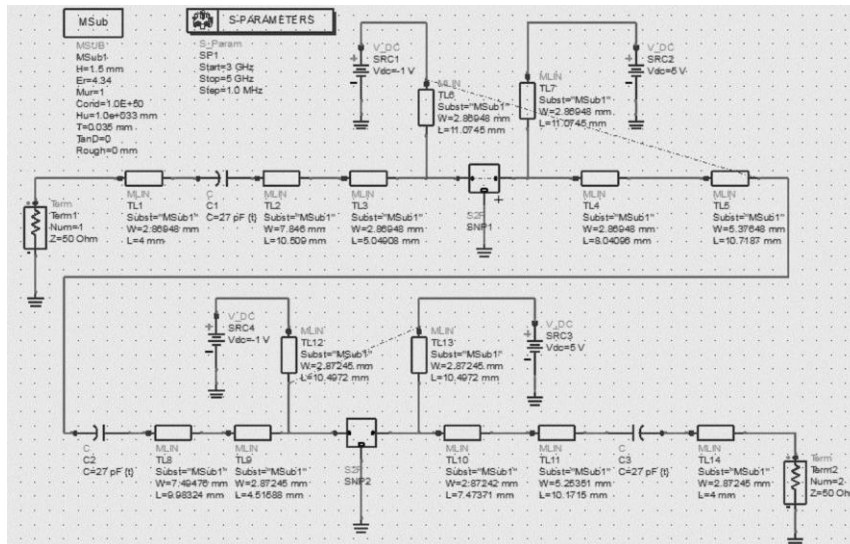
Title of the circuit : C-Band Low Noise Block Downconverter for Satellite Receiver.

Theory/Description : A Low Noise Block Downconverter(LNB) is an important front-end circuit in satellite communication receivers. It receives a weak C-band satellite signal, amplifies it using low-noise amplifier and converts the received high-frequency signal to a lower intermediate frequency using a local oscillator and mixer. The proposed circuit consists of input band-pass filtering, a two-stage low noise amplifier, a local oscillator, a frequency mixer, an intermediate-frequency band-pass filter and an IF amplifier. The proposed design will be reproduced and simulated in eSim to verify its frequency conversion and gain characteristics.

Reason to reproduce with eSim : This circuit is a published satellite receiver front-end design originally developed using a proprietary RF simulation environment. Reproducing the circuit in eSim will provide an open-source implementation of the published design and allow its frequency response, gain and frequency conversion characteristics to be independently verified.

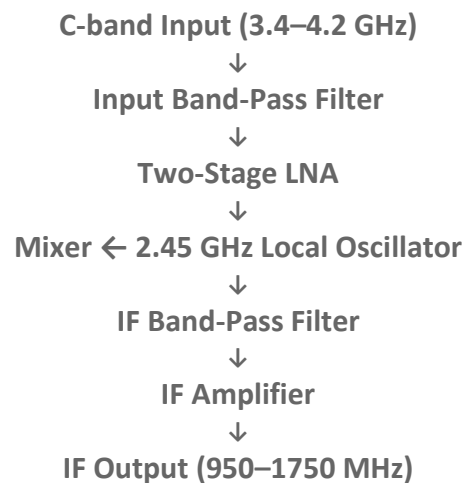
Expected Outcome/outputs : The expected outcome is a functional eSim simulation of the proposed C-band LNB. The simulation is expected to demonstrate amplification of the weak input signal and frequency down conversion from the C-band input to the intermediate frequency output. Frequency response, conversion gain and output spectrum will be analyzed and compared with the results reported in the reference publication.

Circuit Diagram(s) :



Schematic of the two-stage cascade LNA

Block Diagram (s) :



Expected Results (Input, Output waveforms and/or Multimeter readings) :

Input: C-band RF signal in the 3.4 - 4.2 GHz frequency range.

Local Oscillator: 2.45 GHz

Output: Down converted IF signal in the approximately 950 – 1750 MHz range.

Research Paper/Journal/etc. :

Title : Low Noise Block Downconverter Design for satellite Receiver System Vinasat 1 Operating at C-band.

Author : Tran Van Hoi, Hoang Duc Long, Bach Gia Duong

Page No. : 110 - 115

Link :

https://www.researchgate.net/publication/303406172_Low_noise_block_downconverter_design_for_satellite_receiver_system_Vinasat_1_operating_at_C-band

Source/Reference(s) :

Low Noise Block Downconverter Design for satellite Receiver System Vinasat 1 Operating at C-band research paper.