

TITLE : Design and Simulation of a Double-Balanced Mixer

Using SE612 in PSPICE

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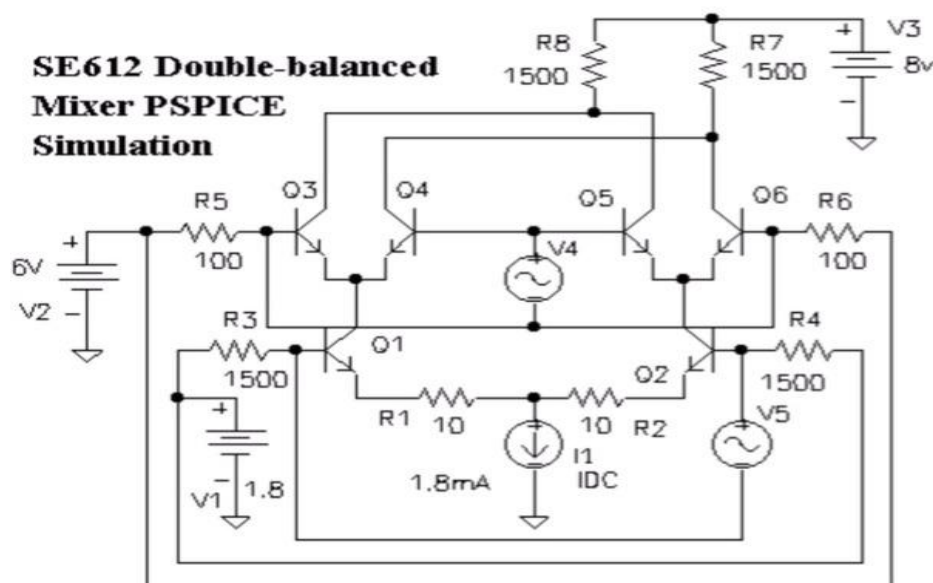
Problem Statement :

Efficient frequency conversion is vital in communication systems. A double-balanced mixer, such as the SE612, provides low conversion loss and high isolation, but its design and validation require accurate simulation. This project focuses on designing and simulating a double-balanced mixer using SE612 in PSPICE to evaluate its performance for RF applications.

Abstract :

This project presents the design and simulation of a double-balanced mixer using the SE612 topology in PSPICE/eSim. A double-balanced mixer is a RF nonlinear device that multiplies an incoming RF signal with a local oscillator (LO) to produce sum and difference frequencies while suppressing carrier leakage and even-order harmonics. The circuit was implemented using discrete BJT models available in eSim, with appropriate bias networks and current source to match SE612 operating conditions. Transient simulations were performed with an LO of 10 MHz and an RF of 1 MHz; the output waveform was analyzed with FFT to identify the desired difference (IF) and sum frequencies (9 MHz and 11 MHz respectively)

Proposed Circuit :



Refernces :

1. B. Razavi, RF Microelectronics, 2nd ed., Prentice Hall — chapter(s) on mixers and non-linear circuits.
2. D. M. Pozar, Microwave Engineering, 4th ed., Wiley — sections on frequency conversion and mixer analysis.
3. C. Bowick, RF Circuit Design: Theory and Applications, Newnes — practical design guidance for mixers and RF blocks.