

Analysis and Behavioural Modelling of an Amplitude-Modulated Mixerless Transmitter

Background

An innovative transmitter architecture is developed at the Chair of High Frequency Electronics. It combines the advantages of the broadband I-Q transmitter with the ones of power-efficient polar signal representation. The local oscillator is fed as a continuous-wave signal at the transmitter input and is separated into four different phases and fed to four power amplifier (PA). These PAs are individually supply modulated, and combined at the output by a Wilkinson power combiner, to generate the amplitude-modulated radio frequency output. Due to a discrete supply modulation the output power of the PA changes correspondingly and a complex constellation diagram like 16-, 32-, or 64-QAM can be obtained.

Tasks

The scope of this work can be adjusted, depending on the student, if bachelor or master.

- Understanding this amplitude-modulated mixerless transmitter concept and its key components/parameters.
- Getting used to MATLAB/Simulink (or Verilog/Verilog AMS).
Develop a behavioural modelling approach for the mixerless transmitter which also includes static and dynamic mismatch.
- Evaluation of the transmitter performance:
Tx efficiency, EVM, Dynamic Range, mismatch impact, ...
- Documentation of your results in your Bachelor/Master Thesis

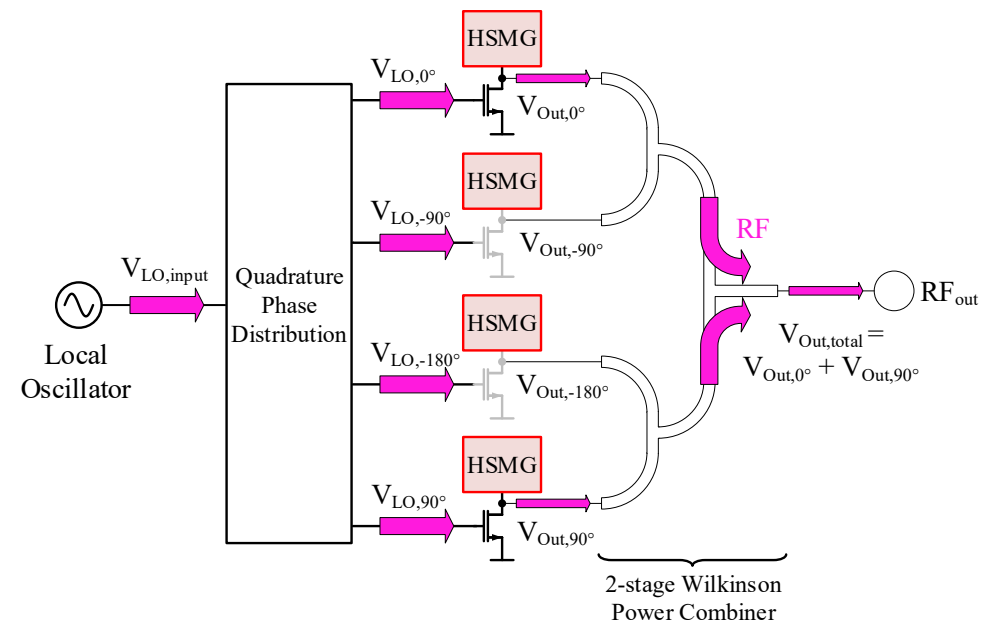


Figure 1: Transmitter principle (Source: IEEE Xplore)

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