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Research/Master Thesis

RF

Design of ultra broadband IF active Power Splitter and Combiner

Motivation:

In order to achieve Tbit/s communication links, like for the Open6GHub project, broadband transceiver frontends are needed. Bandwidths up to 100 GHz (in the H-Band) are desired. Further more the frontend needs to be able to work with different signal sources and frequency bands at the same time. To design those frontends there are several broadband active and passive components necessary like mixers, amplifiers and couplers. One key component especially for the signal combining is the broadband splitter/combiner. For high data rates and different IF-bands, they have to be ultra broadband. Those couplers can be active and passive components.

Goals:

- Design of a broadband Transceiver consisting of broadband components
- Bandwidths of up to 100 GHz
  - IF…>0 GHz – 90 GHz
  - RF…250 GHz-350 GHz
  - LO…240 GHz – 260 GHz
- With different mixer variations
  - Distributed mixer to cover the whole H-band
  - Splitted band mixer where two mixers cover a part of the band
  - IQ-mixer
  - IR-mixer
- With different amplifier variations
  - Distributed amplifier to cover the whole H-band
  - Balanced amplifier

Tasks:

- Investigation of different Power splitte and combiner concepts
- Design of active spitter/cmbiner
- Required are couplers for the IF(>0 GHz – 90 GHz splitted in two bands (5 GHz - 30 GHz and (50 GHz – 90 GHz) and for the LO-signal (200 GHz – 300 GHz)
- Design in the Fraunhofer IAF 35nm mHEMT technology