

Wideband waveguide power divider-combiner for MM-wave Instrumentation

Background: MM-wave applications for instrumentation and industry need novel and compact components, e.g., power combining or dividing devices. Such components could be used in power applications (transmitters) or receivers (multi-band, quadrature). Pure substrate-based components have excessive insertion loss at mm-waves. An approach of using a combination of waveguide structures and substrate-based elements proved to be useful, Fig. 1, [1].

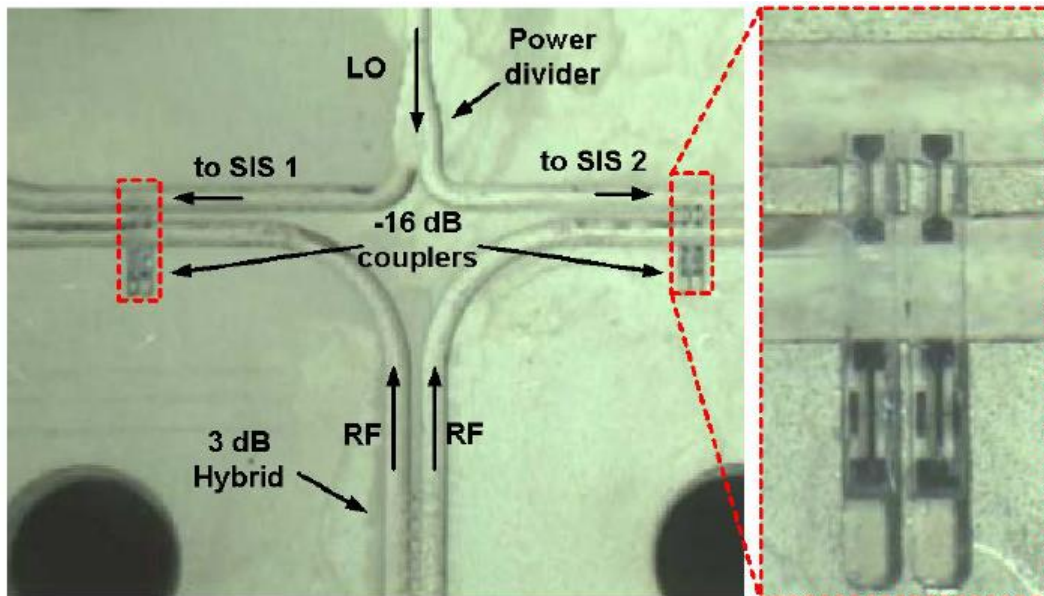


Fig.1 Illustration of the design of directional couplers employing combined waveguide + substrate-based elements approach [1].

Thesis project: The work is based on recently published design as a starting point, and aims to understand, simulate and modify, optimize and develop a new design to be suitable for applications at frequencies in the range of 150...400 GHz. The work will include:

- Literature survey
- Microwave circuit design and simulation (ADS+HFSS)
- Circuit mechanical and photomask design
- Tests of a prototype, 150-220 GHz

Prerequisites

Course in Microwave engineering, skill in ADS and HFSS

THz electronics, Course in Superconductivity, low temperature physics, are not required, but good to have

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References

[1] R. Monje, V. Belitsky, V. Vassilev, "A Novel Design of Broadband Waveguide Directional Couplers and 3-dB Hybrids", Microwave Symposium Digest, 2006 EEE IMTT-S International , San Francisco, California USA, 11-16 June 2006.