一种基于 IPD 工艺的超宽频带功率分配器设计

李瑞鹏 1,2，马骁 1，慕福奇 1，邱昕 1
（1 中国科学院微电子研究所，北京 100029；2 中国科学院大学，北京 100049）

摘要： 针对目前通信设备及系统对低功耗、小型化的高性能器件的需求，提出采用 IPD 工艺并通过微带线形式的多节阻抗变换器代替传统威尔金森功分器中的四分之一波长传输线的方法，实现了工作频率范围为 3~42.5GHz 的超宽带功分器.仿真结果表明该宽带功分器在 3~42.5GHz 频带内输入输出回波损耗以及输出端口隔离度均小于-10 dB，插入损耗在 3~26.8 GHz 频段内小于 1 dB，在 26.8~42.5 GHz 频率范围内小于 2 dB. 芯片面积为 3.1*1.1 mm2，有效地缩减了宽带功分器尺寸，有助于实现系统的小型化.该功分器工作频率能够覆盖我国 5G 网络已规划频段，在未来的 5G 通信系统中有广泛的应用前景.

关键词： 功率分配器；集成无源器件；多节四分之一波长阻抗变换器；小型化

Design of the RF Wideband Power Divider Based on the Integrated Passive Devices Technology

LI Rui-peng1,2，MA Xiao1，MU Fu-qi1，QIU Xin1
(1 Institute of Microelectronics of Chinese Academy of Sciences, Beijing, 100029, China；
2 University of Chinese Academic of Sciences, Beijing, 100049, China)

Abstract： Aiming at the demand of communication equipment and system for high performance devices within low power and miniaturization, a 3-42.5GHz ultra wideband power divider using IPD technology and the method of replacing the quarter-wave transmission line in classical Wilkinson power divider with multi-section quarter-wave transformer realized by microstrip line has been constructed. The simulation results show that the return loss of input and output ports and the isolation between output ports were less than 10dB at the frequency band of 3-42.5GHz.The insertion loss is more than 1dB at the frequency band of 3-26.8GHz and less than2dB at the frequency band of 26.8-42.5GHz. The chip area is 3.1*1.1mm2, and the design effectively reducing the size of a broadband power divider and being conductive to the miniaturization of the system. The operating frequency of the power divider can cover all of the frequency bands that has been planned of China’s 5G networks, and the power divider has a wide application prospect in the future 5G communication system.

Key words： power divider; IPD; multi-section quarter-wave transformer; miniaturization

作者简介：

李瑞鹏男，（1992-），硕士研究生，研究方向为射频无源集成器件设计. E-mail:1320978445@qq.com.

马骁男，（1982-），博士，高级工程师.研究方向为射频无源集成器件设计.

慕福奇男，（1957-），研究员，博士生导师.研究方向为无线通信.

邱昕男，（1980-），博士，研究员，硕士生导师.研究方向为无线通信.