

Abstract

This research deals with various types of balanced-to-unbalanced and unbalanced-to-balanced power dividers. Balanced circuits are used to suppress common-mode noise and it has high immunity to crosstalk. To design a fully balanced transceiver, various types of balanced circuits are required. Among those balanced circuits, balanced power dividers are very important. It is used to divide the power equally or in a specific ratio. A balanced-to-unbalanced power divider, with a balanced input and several single-ended outputs, is suitable to feed unbalanced loads such as monopole antenna elements from a balanced amplifier. Similarly, an unbalanced-to-balanced power divider is suitable to feed a balanced antenna array from an unbalanced source.

In this thesis, various types of balanced-to-unbalanced power dividers are proposed. Two Gysel type equal power dividers are analyzed, designed and fabricated, one for in-phase (phase difference between output signals is 0°) and the other for out-of-phase (phase difference between output signals is 180°) application. Another Wilkinson type equal power divider is also analyzed, designed and fabricated for out-of-phase application. Complete theoretical analysis of balanced-to-unbalanced power divider for arbitrary power division is also presented. Two power dividers of power division ratio 1:2 have been designed, fabricated and measured, one for in-phase and other is for out-of-phase application.

Two unbalanced-to-balanced power divider configurations are proposed, which are of Gysel type. First one is for equal power division and the second one is for arbitrary power division ratio. Complete theoretical analysis of the power divider is presented. The power divider for arbitrary power division ratio is designed and fabricated for power division ratio of 1:2.

For dual-band applications, one balanced-to-unbalanced power divider is analyzed, designed and fabricated. The proposed power divider is for equal power division and phase difference between output signals is 180° . Another dual-band single-ended power divider for arbitrary power division ratio is also designed and fabricated. This is a coupled line based power divider. This power divider is designed for power division ratio of 1:2. The measured results for different power dividers are found close to analytical and simulation results.