Design and Analysis of Dual-Band Gap-Filler for DAB Single Frequency Network

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ABSTRACT

This research is aimed at designing a DAB signal repeater, also known as gap filler, to solve the problem of the dead zone of electromagnetic wave caused by scattering of the buildings. Besides providing the function of solving the dead zone problem, this repeater can also relay and improve the signals which are shielded by the buildings. In this work, the designed gap filler for digital radio frequency will cover both BandIII and L-Band DAB systems. The desired frequency bands are from 170~240MHz and 1452~1492MHz. The gap filler circuit is divided into two parts, low noise amplifier (LNA) and power amplifier (PA). These two individual circuit components are integrated by a single frequency network time delay controller. External receiving antenna and transmitting antenna are chosen to match with the amplifier system. The active device used in the low noise amplifier and power amplifier are respectively BFG25W and BFG21W manufactured by Philips Company. For designing the amplifier, the Advanced Design System 2004A was being utilized to analyze and simulate the circuit for the impedance matching. During this study, a large number of surface mounted devices of lump elements were being used for making the impedance matching in the frequency range. All the circuits were mounted on the FR4 printed circuit board and the S parameter were measured by the network analyzer.

Keywords : Digital Audio Broadcasting (DAB) ; Gap-Filler ; Low Noise Amplifier(LNA) ; Power Amplifier(PA) ; Single Frequency Network(SFN)

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