

Compact LTE Antenna Design Using the Theory of Characteristic Modes for Smart Phone Applications

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Long-Term Evolution (LTE) technology implements MIMO for higher data rates that need multiple antennas on the mobile handset (G. Gampala, et al., *Microwave Journal*, March 2012). At the same time, there is also an increased pressure on the design engineers to come up with attractive thinner and slimmer phones, leaving very little space for the antenna engineers.

This paper presents a novel electrically small antenna designed for the European LTE frequency band of 1800 MHz. The theory of characteristic modes (D. J. Ludick, et al., *ICEAA.2012*, 208-211) used to come up with the presented design within the given limited space. Characteristic modes are real current modes that depend only on the shape and size of the geometry. Given the shape and size of the mobile handset, and the available space for the antenna, characteristic modes are computed for the geometry using commercial EM simulation tool, FEKO (www.feko.info). The antenna design is optimized by cutting out slots in the geometry with zero modal currents. Two antennas, orthogonally oriented to each other to provide the space and polarization diversity, are integrated into the mobile handset with the PCB acting as the ground plane, as shown in Fig.1. More results with the detailed process of the antenna design will be presented at the conference.

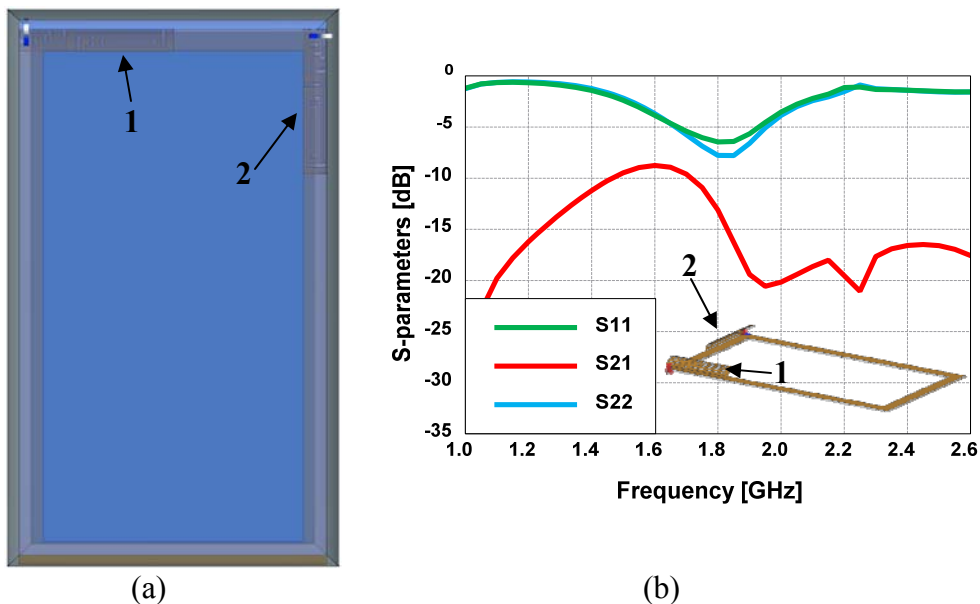


Fig.1. (a) Mobile handset with LTE antennas, (b) S-parameters with 1, 2 representing the antenna positions