Design of a broadband all-textile slotted PIFA

Abstract

A new broadband textile based PIFA antenna structure designed for wireless body area network (WBAN) applications is presented. The new topology can be directly integrated into clothing. The study starts by considering three different materials: flexible copper foil, and ShieldIt Super and pure copper polyester taffeta conductive textiles. Bandwidth broadening is successfully achieved by implementing a novel and simple slot in the radiating patch. The measured reflection coefficient and radiation characteristics agree well with simulations. Moreover, radiation characteristics and bandwidth show satisfactory immunity against detuning when operating on-body, especially when placed on the back. To our knowledge, the proposed structure is the first fully fabric based slotted PIFA to be reported in open literature with high bandwidth (more than 46%) and reasonable gain (ca. 1.5 dB), to be used for multiple applications in the frequency band of 1.8 to 3.0 GHz