Dual-band UHF-RFID tags based on meander-line antennas loaded with spiral resonators

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Abstract-

The purpose of this letter is to implement dual-band tags for ultrahigh-frequency (UHF) radio frequency identification (RFID) applications operative in Europe and the US. Since the regulated bands of UHF-RFID in Europe (867 MHz) and the US (915 MHz) are close, broadband tags might be also considered. However, it is demonstrated in this letter that the performance of dual-band tags designed to operate at the frequency bands of interest is superior to that of broadband (monoband) tags. A meander-line antenna (MLA) has been considered for tag implementation. The dual-band functionality is achieved through a perturbation method consisting of coupling an electrically small resonator [a two-turn spiral resonator (2-SR)] to the antenna. The analysis, design, and fabrication of a dual-band UHF-RFID tag has been carried out. The measured performance of the fabricated prototype is in good agreement with theory. Measured read ranges of 6 and 8 m at the European and US frequency bands, respectively, have been obtained.

Index Terms- Dual-band, impedance matching, meander-line antenna (MLA), radio frequency identification (RFID), spiral resonator (SR).