

A Miniaturized Printed Dipole with Non-Uniform Meander Lines for Ultra High Frequency – Radio Frequency Identification Passive Tags

Shyama Wickramasinghe*
Dept. of Electrotechnology
Wayamba University of Sri Lanka,
shyama@wyb.ac.lk

Jeevani Jayasinghe
Dept. of Electronics
Wayamba University of Sri Lanka
jeevani@wyb.ac.lk

Melaka Senadeera
Dept. of Electronics
Wayamba University of Sri Lanka
melaka@wyb.ac.lk

Abstract - A non-uniformly meandered printed dipole antenna is proposed to be used as a passive Ultra High Frequency – Radio Frequency Identification (UHF RFID) chip-based sensor tag. A printed, modified dipole antenna, with an overall size of $130 \times 25 \times 1.6$ mm³ was used as a reference antenna, and its size was reduced by 32% by folding dipole arms and employing a non-uniformly meandered structure. A double T-match structure was introduced to match the conjugate impedance of the RFID chip, i.e. Rocky100. Simulations were carried out in ANSYS High-Frequency Structure Simulator (HFSS), etching the antenna on FR4 substrate. The meandered antenna, with an overall dimension of $88 \times 25 \times 1.6$ mm³, exhibits better performance than the reference antenna. The bandwidth of the antenna covers the whole UHF spectrum from 860 – 960 MHz while exhibiting an omnidirectional radiation pattern. The theoretical read range of the tag according to the Friis transmission equation is 10.6 m at EIRP of 4 W. The proposed tag can be used to develop chip-based passive UHF RFID sensor tags by integrating sensors to the Rocky100 chip.

Keywords - meandered, miniaturized, passive UHF RFID tag, printed dipole, Rocky 100