Available online at www.sciencedirect.com

ScienceDirect

Procedia Computer Science 93 (2016) 238 – 242

Procedia Computer Science

6th International Conference On Advances In Computing & Communications, ICACC 2016, 6-8 September 2016, Cochin, India

Series SRR loaded UHF RFID tag

Aju John.K.K[a],Thomaskutty Mathew[b] *

[a]Department of Electronics,School of Technology and Applied Sciences,Edappally,Cochin, 682024, India

Abstract

An RFID tag based on a series loaded split ring resonator (SRR) to operate in the European UHF RFID band of 865-867 MHz is reported. A chip of impedance 27-j212Ω is connected at the terminals of the antenna and the read range measurements of the RFID tag are performed in the UHF RFID band. The proposed UHF tag exhibits appreciably good read range over a wide azimuth and elevation angular ranges.

© 2016 The Authors. Published by Elsevier B.V. This is an open access article under the CC BY-NC-ND license (http://creativecommons.org/licenses/by-nc-nd/4.0/).

Peer-review under responsibility of the Organizing Committee of ICACC 2016

*Keywords:*UHF band;RFID; RFID Tag;SRR.

1. Introduction

Radio frequency identification (RFID) technology is a topic of recent interest and widespread popularity. The use of radio-frequency identification (RFID) systems in the ultrahigh- frequency (UHF) band is used in many applications and services, such as automatic identification, logistic management, asset tracking and security surveillance[1]. RFID has several benefits over the other automated identification methods such as a higher reading range, faster data transfer, and ability to simultaneously read a massive amount of tags.

An RFID tag consists of an antenna and microchip connected at its terminals. Proper antenna design for the RFID systems in the ultrahigh- frequency (UHF) band is a major challenge in the RFID tag design[2]. Many

* Corresponding author. Tel.:+91-9048108856
*E-mail address:*mwrfgroupstas@gmail.com

This research work was supported by U.G.C, Government of India.

1877-0509 © 2016 The Authors. Published by Elsevier B.V. This is an open access article under the CC BY-NC-ND license (http://creativecommons.org/licenses/by-nc-nd/4.0/).

Peer-review under responsibility of the Organizing Committee of ICACC 2016
doi:10.1016/j.procs.2016.07.206

researchers have reported a variety of dipole and folded dipole fed RFID tags for the UHF band[3,4]. Numerous papers were reported on RFID tag design with modifications on the dipole antenna, whose arms are meandered to produce inductive reactance were reported[5,6]. Meandering helps to achieve conjugate match with chips impedance with a reduction in the overall size of the antenna. Maximum read range and orientation sensitivity are the two important RFID tag characteristics. In order to get optimum operating condition, the antenna impedance should be matched correctly to the chip impedance. A T- matching technique is also widely used in the design of RFID tags for proper impedance matching [7,8].

Recently few researchers introduced split ring resonators (SRR) models to produce better capacitive and inductance reactance in the RFID tag design .The effect of SRR structure in the miniaturization of the tag was discussed in[9,10]. SRR consists of two concentric metal rings separated by a gap and both having splits at opposite sides. Magnetic resonance is induced by splits at the rings and by the gap between the inner and outer rings. If the excitation magnetic field is perpendicular to the plane of the magnetic field so as to induce resonating currents in the loop and generate equivalent magnetic dipole moment.

In this paper we introduced a UHF RFID tag loaded with a Square Split ring resonator (S-SRR) to operate in the European UHF RFID band (865-867MHz). The S-SRR's are connected in series to form a printed dipole shown in Fig.1 produces the similar effect of a meander line for producing inductive input impedance which is required for conjugate impedance matching with the chip. This novel tag exhibits an appreciably good read range over a wide azimuth and elevation angular ranges.

Geometry and fabrication

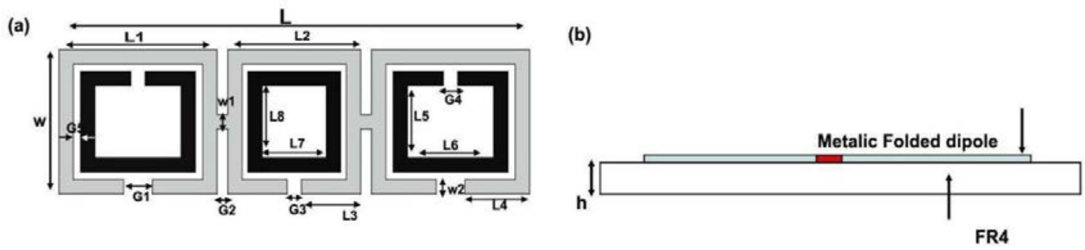

Fig. 1. (a) Structure of the UHF RFID tag; (b) side view.

The geometry of the proposed antenna is presented in Fig. 1.The tag antenna consist a series of S-SRR structures loaded to form a printed dipole. The design presented in this communication is much smaller in size than the meandered based designs. The S-SRR loaded in series reduces the overall size and produce inductive input impedance required for conjugate impedance matching with the chip. A chip of impedance 27-j212Ω at 866 MHz is connected at the terminals of the proposed antenna. The tuning of the tag antenna and the series connected S-SRR parameters are carried out with the CST Microwave studio and the optimized parameters of the proposed RFID tag antenna is shown in the Table 1.

Table 1.Dimensions for the Proposed Antenna.

Parameters	L	L1	L2	L3	L4	L5	L6	L7	L8
Values(mm)	65	22	18	8.25	9	10	12	8.9	10
Parameters	W	W1	W2	G1	G2	G3	G4	G5	

Download English Version:

https://daneshyari.com/en/article/571002

Download Persian Version:

https://daneshyari.com/article/571002

Daneshyari.com