

Metal mount fractal RFID tag antenna with complementary split ring resonator

ABSTRACT

This paper proposes miniature radio frequency identification (RFID) tag antenna designed to operate on metallic objects, in the UHF frequency range (915 MHz). The antenna structure is comprised of two parts: Part 1 with two layers; a top layer of two square fractal patches electrically connected to the ground plane (bottom layer) through vias while Part 2 is an unconnected inter-layer consisting of two square complementary split ring resonators to allow for capacitive reactance increase. Consequently, the antenna resonant frequency is lowered, which theoretically allows shrinking RFID tag antenna into smaller size. The antenna was simulated and measured to verify its conjugate matching with chip impedance. The results of experimental tests showed that the proposed RFID tag offers a maximum read range of 0.48 m when placed on a metallic object. The tag's overall size is 36.7×18.1×3.2 mm³. Both simulation and measurement results are provided to validate the design.

Keyword: Miniature antenna; Minkowski fractal; Radio frequency identification (RFID); RFID metal tag