Impedance Matching of Tag Antenna to Maximise RFID Read Ranges & Optimising a Tag Antenna Design for a Particular Application

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Abstract

RFID tags are ever increasing in their daily use, from the monitoring of components, the tracking of produce during processing & production, as well as being used in much of the touch-less technologies seen today. With this technology, there has been the ever increasing need to reduce the power required to activate the RFID tag, while maximizing the read range in certain applications. In addition there is an ever increasing need to reduce the size of the RFID tags embedded in labels and/or cards in order to make them more discreet. In order to maximize read ranges, one needs to ideally match the impedance of the RFID tag antenna to the chip utilized in the tag & ensure that for a particular reader that a minimum threshold power is achieved to activate the tag chip at the required operating frequencies. In this work, we look at the modelling of a physical RFID tag & chip & compare these to physical test data obtained from literature. In addition to this, we discuss the use of the validated model in finding an optimal tag antenna design for a particular application.

Reference

Rao et al., Impedance Matching Concepts in RFID Transponder Design, Fourth IEEE Workshop on Automatic Identification Advanced Technologies, 2005.

Figures used in the abstract

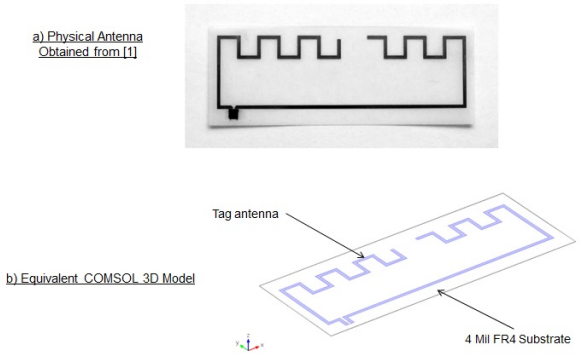

Figure 1: Physical Tag Antenna Design Obtained from [1] & Equivalent COMOSL Model vs. Physical Test Data

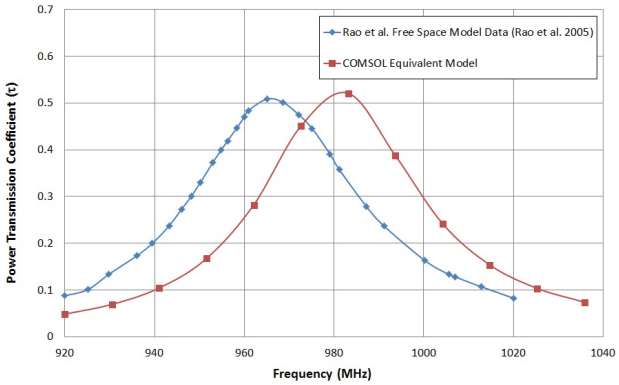

Figure 2: Comparisons of Read Range vs. Operating Frequency from Physical Tests Obtained from [1] vs. COMSOL Model Results