

“Analysis of the resonance frequency measurement method of PICCs under influence of the nonlinear impedance of ICs”

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Abstract – An RFID system operating at 13.56 MHz consists mainly of a Proximity Coupling Device (PCD) and a Proximity Integrated Circuit Card (PICC). The data transfer between PICC and PCD and the powering of the PICC is accomplished by magnetic field provided by the PCD. The transponder IC of the PICC builds with its coupling antenna together a resonance circuit to acquire more power from the field. As the sending frequency of the PCD is fixed at 13.56 MHz, the efficiency of this coupling depends mainly on the resonance frequency of the PICC. Thus the resonance frequency is a very important parameter for characterizing a PICC. It should be in a defined frequency range in accordance with a specification (e.g. ICAO ePass specification) or the recommendation of the IC manufacturers to achieve best performance. In this paper the resonance frequency of a PICC is defined and derived by using circuit analysis. Then a resonance frequency measurement method is investigated and the influence of the nonlinear impedance of the transponder IC on the measurement result is analyzed.