

Range Extension of an ISO/IEC 14443 type A RFID System with Actively Emulating Load Modulation

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Summary

Originally designed for contactless smart cards in the form factor ID1, today ISO/IEC 14443 finds new applications in an increasing number of different form factors. Most famous among the new form factors are applications such as the electronic passport (e-passport) or contactless credit cards in a form factor that is only half or one third as large ("key fob") as ID1. The need of increasingly smaller form factors however, more often leads to problems in the field, because the small transponder cannot always be read out reliably. This has led to a new type of a battery powered transponder, actively emulating load modulation, to enhance the operating distance. While ISO/IEC 14443 focuses very small antennas and small transmission power to allow reliable communication distances of a few centimetres, we were looking in the opposite direction. Using quite large antennas and huge transmission power we achieved communication distances in the range of a few meters. We also learned, however, that the effort spent to enhance the reading range increases drastically with each additional meter, quickly ending up with equipment like a "broadcast radio station".