# UHF and HF RFID passive tags inkjet-printed on paper substrate

Hugo Miranda<sup>\*(1)</sup>, João Nuno Matos<sup>(1)</sup> (1) Instituto de Telecomunicações, Universidade de Aveiro, Aveiro, Portugal

### Purpose

Radio frequency identification (RFID) is currently a major enabling technology, widely used for identification and localization in monitoring and sensing [1]. The major challenge of this technology is the tag design, which involves not only its substrate material but also fabrication technique. The purpose of this work is to develop new RFID tag designs printed by an ordinary home inkjet-printer with a conductive ink for cheaper and faster prototyping on paper or other general materials.

#### **RFID tag designs**

Two different UHF and three HF RFID tags were designed and tested. One example of an UHF RFID tag is shown in the Figure 1 and one example of a HF RFID tag is presented in the Figure 2. The first tag is a long-range UHF system and the second one is a short-range HF system that use, respectively, radiative and inductive coupling [2] to communicate between the reader and tag. The UHF RFID tag example was designed to show the flexibility of using this inkjet-printing[3] technology. A modified home inkjet-printer with a conductive ink was used to print these tags.



Figure 1 - UHF RFID tag design.



Figure 2 - HF RFID tag design.

## Conclusion

This study presents different designs of UHF and HF RFID tags printed on paper substrate, featuring very good performance in communication. All designs showed good results in terms of read ranges reaching up to hundreds of centimeters by the long-range system and a few centimeters by the short-range system. Both tags can be fitted in many shapes and sizes, including flexible devices/products. The use of the inkjet-printing technology in the development of RFID tags on paper structures offer a very low-cost eco-friendly solution, allowing for a very fast effective prototyping.

#### References

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