Assessing the performance of inkjet-printed coils on paper substrate for WPT

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Purpose

In recent years, wireless power transmission (WPT) has received special attention as a very valuable and convenient technology to power a wide range of equipment and devices, such as mobile phones, laptops, integrated circuits, electric vehicles[1], medical devices and other passive sensors. Magnetic resonance-based WPT is a directional coupled type of near-field power transmission suitable for short distances. Design of inductive coupling coils is crucial to the performance of WPT[2]. The aim of this work is to assess the potential of inkjet printing technology for cheaper and faster prototyping of inductively coupled coils on paper substrate.

Coil design

The high frequency range is one of the most popular for the resonant WPT, because it has a good compromise among low cost, robust components, and low circuit losses.

In the 13.56MHz ISM band, different sizes, shapes, number of turns, conductive layer thickness, and inter turn separation, for coils were tested. Based on an ordinary home inkjet-printer with a conductive ink and commercial paper, several experiments were conducted in order to determine the overall best layout (two examples can be seen in figure 1) and compare them with conventional printed circuit board technology.

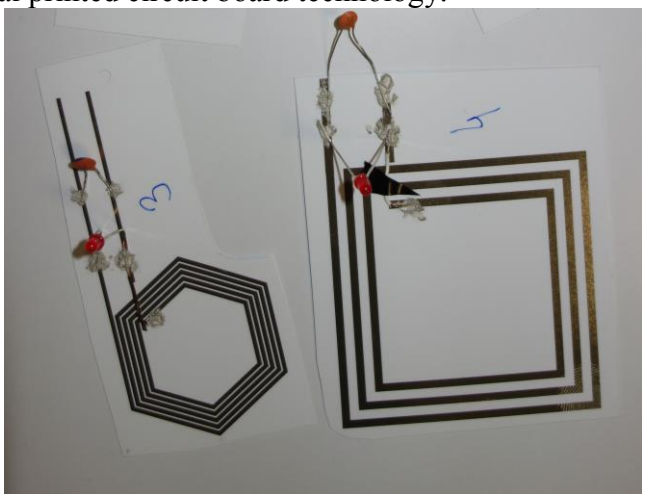

Figure 1 - Two examples of design for coils tested.

Conclusion

The use of a modified inkjet-printer with a conductive ink offers a low-cost solution to the manufacturing of coils for WPT allowing printing coils precisely, easily, and very fast. Since these coils are printed on paper substrates, the cost of the final product is very low and eco-friendly, allowing their use in versatile applications where flexible, finer and lighter coils are an advantage. The results, to be included in the full paper, give us good directions to invest in this study.

[1] Shinohara, N. *John Wiley & Sons, Ltd*, **0**, 2012.
[2] Yang, CW and Yang, CL. *IEEE MTT-S IMWS-BIO*, 2013.