Pimsiriporn Narkcharoen 2011: Fill until Full Technology for Fabricating Components in Radio Frequency Identification System. Master of Engineering (Electrical Engineering), Major Field: Electrical Engineering, Department of Electrical Engineering. Thesis Advisor: Assistant Professor Suneat Pranonsatit, Ph.D. 78 pages.

The fabrication technique of conductive layers called 'Fill until Full (FuF)' is demonstrated in this thesis. In this technique, the conductive ink is filled inside a mask with controlled volume and, hence, thickness. Silver conductive ink was employed. The technique was applied to the fabrication of 2 RFID components; antennas for UHF RFID tags and 3-bit multiresonators for chipless RFID transponders. Two antenna configurations, dipole and dipole with tuning stub, were designed from a modeling tool to be operated at 840-940 MHz. The antenna performance was verified by measuring the reading range of the RFID tags. It was found that at 922.5 MHz the measured reading ranges are 7.77 m for dipole and 9.01 m for dipole with tuning stub.

For chipless RFID transponders, spiral resonators were located along microstrip on Teflon substrates. Each resonator operates as a stop-band filter at a designed frequency. The designed frequencies were 1.94, 2.58 and 2.49 GHz, for bit 2, 1 and 0, respectively. Measured values of $|S_{21}|^2$ within $\pm$100 MHz frequency band show that the threshold for distinguishing logic '0' and '1' are -2.77 dB and -0.92 dB, resulting in 1.85 dB margin for different logic information.

In conclusions, FuF is verified to be suitable for the fabrication of RFID component application. The technique is simple, convenient, fast and cost effective. The proposed technique along with the fabricated RFID components are capable of contributing further expansion in RFID technology.

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