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DESIGN OF RF ENERGY HARVESTING SYSTEM FOR ENERGIZING LOW POWER DEVICES

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Abstract—Electromagnetic energy harvesting holds a promising future for energizing low power electronic devices in wireless communication circuits. This article presents an RF energy harvesting system that can harvest energy from the ambient surroundings at the downlink radio frequency range of GSM-900 band. The harvesting system is aimed to provide an alternative source of energy for energizing low power devices. The system design consists of three modules: a single wideband 377 Ω E-shaped patch antenna, a pi matching network and a 7-stage voltage doubler circuit. These three modules were fabricated on a single printed circuit board. The antenna and Pi matching network have been optimized through electromagnetic simulation software, Agilent ADS 2009 environment. The uniqueness of the system lies in the partial ground plane and the alignment of induced electric field for maximum current flow in the antenna that maximizes the captured RF energy. The design and simulation of the voltage doubler circuit were performed using Multisim software. All the three modules were integrated and fabricated on a double sided FR 4 printed circuit board. The DC voltage obtained from the harvester system in the field test at an approximate distance of 50 m from GSM cell tower was 2.9 V. This voltage was enough to power the STLM20 temperature sensor.

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