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## Functional test of a Radon sensor based on a high-resistivity-silicon BJT detector

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A battery-powered, wireless Radon sensor has been designed and realized using a Bipolar Junction Transistor a radiation detector fabricated on a high-resistivity-silicon substrate. Radon daughters are collected on the detector surface electrostatically. Thanks to the BJT excellent signal-to-noise ratio and internal amplification, real-time alpha particle detection is possible using a simple readout electronics, which records the alpha particle arrival time and charge spectrum. Readout is based on a commercial chip, providing charge integration and 20-bit A/D conversion, coupled to a microcontroller. The system can keep trace of particle arrival times thanks to a real-time clock. Since WSN (Wireless Sensor Network) is of great appeal for wide-area monitoring, environmental tests and also for building measurements, the readout system was provided with wireless communication capabilities suitable for star-arranged networks (single-point-to-multi-point). The RF module implements a communication system based on a commercial standard, offering advantages in terms of a simple interface with the MSP430-family controllers, low development costs and low power consumption. Functional tests have been carried out in a Radon camera using Autumnite stones as a Radon source), and an AlphaGUARD Radon Monitor as a reference sensor. Tests demonstrated a good sensitivity of 0.7-1.2 CPH/(100 Bq/m<sup>3</sup>) and the capability to perform alpha spectroscopy of Radon daughters.

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