



«ENERGY HARVESTING AND RADIO MODULES»

- Small amounts of energy are everywhere in the environment. A very interesting and important task for engineers is the design of lowest power radio modules and electronic circuits use these energy: “Energy harvesting”.
- Energy harvesters can be for example:
 - Photo cells for harvesting of electromagnetic energy,
 - Rotation or vibration converters for harvesting of mechanic energy.
- Using radio communication avoids cables and cable installation.
- Using environmental energy avoids batteries, battery service intervals and allows almost unlimited lifetime.
- Combination of wireless transmission and energy harvesting is therefore a key technology for the future.

«WHY USING 2.4GHZ ?»

- The frequency band around 2.4GHz is useable worldwide for short range radio transmission of digital or analog information.
- A bandwidth of up to 83MHz is available and allows the transmission of very broadband signals and/or the use of many channels.
- Using 2.4GHz the antennas and radio modules are very small. This allows of very compact designs.

«PROTOTYPE»

- IK Elektronik has made a design study for a batteryless wireless transmission system in a car environment.
- One of the tasks was the design of a small radio module suitable for a small electrodynamic energy harvester.
- The wireless transmission system was for signalling changes between “on” and “off” state of a switch on a base unit. The transmission of the state information was triggered by the energy harvester. The harvester was driven by the switching operation itself. The receiver was connected to the car electronics.
- IK Elektronik offers the adaption of custom designs based on the prototype.

«MODULE CHARACTERISTICS»

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|---------------------------|--------------------------|
| ■ Transceiver: | Nordic nRF24L01 |
| ■ Microcontroller: | MSP430F2002 |
| ■ Module Size: | 27 x 13 mm ² |
| ■ Transmission Power: | 0dBm |
| ■ Receiving Sensitivity: | - 85dBm |
| ■ Radio Datarate: | 1Mbps |
| ■ Operation Voltage: | 1.9 ... 3.6V |
| ■ TX Current Consumption: | 12.5mA |
| ■ RX Current Consumption: | 13.5 mA |
| ■ Transmission range: | >10 m |
| ■ Modulation: | 2FSK |
| ■ Channel space: | 1MHz |
| ■ Channels: | up to 83 |
| ■ Operating Temperature: | -40 ... 85°C |
| ■ Frequency Range: | 2400 ... 2483 (2525) MHz |