LOW CURRENT WAKEUP-RECEIVER
FOR THE »INTERNET OF THINGS«

The WakeUp-Receiver operates continuously and receives wireless signals for years. The device, which functions without a microcontroller, boasts an extremely fast response time of 32 ms and is suitable for around-the-clock monitoring of wireless sensor networks. Power can be supplied via energy harvesting technology.

Microampere current consumption

The Fraunhofer WakeUp-Receiver technology significantly increases the operating life of wireless receiver systems. In terms of energy consumption and data rates, the device can be configured in a wide range, thus ensuring several years of battery operation or fully autonomous operation via energy harvesting.

Millisecond response time

The current prototypes, which are based on 130-nm CMOS technology, operate in the 868-MHz and 2.4-GHz frequency bands and feature -80 dBm sensitivity. When operating in the standard configuration at a data rate of 1 kbit/s, energy consumption is reduced to a mere 3 µA with a response time of 32 ms.
Broad field of applications

The Fraunhofer WakeUp-Receiver technology represents a key technology for the »Internet of Things« and »Smart Object« environments. It offers utility across a vast array of applications including building automation, intelligent lighting, electronic labels, remote maintenance, remote control and wireless sensor networks.

Key features
WakeUp-Receiver-Technology

- Supply current: < 3 µA @ 1.6 V (1 kbps)
- Frequency bands: 433 MHz, 868 MHz, 915 MHz, 2.4 GHz
- Sensitivity: -80 dBm
- Continuous RF reception
- Operation without microcontroller
- Detection of two independent WakeUp events
- FEC coded data reception
- Selective WakeUp with 16 Bit ID
- low-cost 130 nm standard CMOS

Current Consumption and Latency for various Data Rates

<table>
<thead>
<tr>
<th>Data Rate</th>
<th>Current Consumption @ 2.5 V</th>
<th>Latency</th>
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</thead>
<tbody>
<tr>
<td>256 bit/s</td>
<td>1.0 µA</td>
<td>484 ms</td>
</tr>
<tr>
<td>1 kbit/s</td>
<td>3.0 µA</td>
<td>30.3 ms</td>
</tr>
<tr>
<td>8 kbit/s</td>
<td>24.0 µA</td>
<td>3.8 ms</td>
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Availability

Fraunhofer IIS provides the WakeUp-Technology as IP, which can be transferred to various CMOS technologies. At the same time basic functions, frequency bands and additional functionality can be modified to customers needs.

Applications

Home
- Automated meter reading
- Building automation
- Wireless alarm/security systems
- Smart lighting

Logistics
- Electronic shelf labels
- Indoor localisation
- Geofencing

Automotive
- Remote keyless entry

Industry
- Industrial condition monitoring
- Remote wireless control
- Wireless sensor networks