Feature Sheet

868MHz Direct Sequence Spread Spectrum Single Chip Transceiver
SSTAR-01

Advanced

Typical Application
- SCADA, EPOS
- Telemetry
- Remote Alarm Systems
- Data Logging Systems
- Data Collection Systems
- RFID Tags

Key Features
- ETSI EN300-220 compliant
- DSSS single chip 868MHz Transceiver
- 15 dB Processing Gain
- features 3 DSP functions
- -105 dBm RX sensitivity
- duty cycle based low power consumption

Product Description

The SSTAR-01 is a Direct Sequence Spread Spectrum Integrated Transceiver Circuit in CMOS technology. The design incorporates fast data acquisition, in a wide frequency range, allowing the use of low-cost crystals. The innovative use of an adaptive notch filter ensures data reception even when a strong in-band interferer is present. The RF circuitry in the DSSS Transceiver has been designed for optimal performance in the 868MHz ISM (Industrial-, Scientific-, Medical-) band for Short Range Devices.

The baseband circuitry has been optimized for fast acquisition and low power consumption and can be used in most data collection system applications. The use of discrete components is largely eliminated by completely integrating the radio, together with the digital signal processing functions in a single chip, thus allowing for a very cost effective system solution. Simplified application software design is made possible by integrating data processing functions in the design, including CRC checks, data buffering and stuffing. The additional processing tasks require only a simple 8 bit microcontroller.

Use of the direct sequence transmit signaling method with appropriate DSP processing in the receiver allows the suppression of typical interfering signals better than any other modulation type. The receiver is also extremely robust against multi-path and ISI (Inter Symbol Interference) due to the usage of Spread Spectrum.

Functional Block Diagram
Advanced System design

The transceiver has fully programmable registers, through which the range of possible applications is wide. Trade-offs between power consumption, acquisition time, performance and frequency accuracy can be made per application.

Interfacing

The design features an 8-bits parallel I/O bus with multiplexed data and address. This I/O bus offers direct access to the internal registers. A Serial Communication Interface (SCI) is provided for direct serial communication with other applications. This SCI is also controlled by means of internal registers.

Transmitter

The transmitter concept is a simple mixer acting as a BPSK modulator. The mixer local oscillator signal is derived from a PLL which runs at the desired transmit center frequency (868.3 MHz) and is set internally by a certain TX register. Modulation is accomplished using a specific logic, which does the "spreading" of the incoming data thus increasing bandwidth. The crystal oscillator employs an inexpensive crystal. The mixer output is amplified and buffered by a power amplifier for off-chip transmission to the transmit filter and/or antenna.
Receiver

The architectural concept for the receiver is an analog, single down conversion structure with very low IF and a high side LO. The digital part incorporates a high level of innovative signal processing. A digital state machine is triggered by an external microcontroller. After a short settling time for the AGC loop, ADC samples are acquired and processed to determine the notch filter frequency. After the notch filter has settled, samples are acquired for the signal search algorithm. When signal frequency and code timing offset have been determined through correlation processing, and the correlation level exceeds a predefined threshold, the receive mode is entered. Receiver processing algorithms provide data bit clock tracking and data recovery. The recovered data stream present after a signal preamble interval is provided at the receiver output. If the correlation level does not exceed a predefined threshold, the state machine falls back into idle mode. A result of this processing technology is higher interference rejection and thus an increase the reliability of the RF link.

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