

WirelessUSB™ LR 2.4 GHz DSSS Radio SoC

Features

- 2.4-GHz radio transceiver
- Operates in the unlicensed Industrial, Scientific, and Medical (ISM) band (2.4 GHz to 2.483 GHz)
- Receive sensitivity: -95 dBm
- Up to 0 dBm output power
- Range of up to 50 meters or more
- Data throughput of up to 62.5 kbits/sec
- Highly integrated low cost, minimal number of external components required
- Dual direct sequence spread spectrum (DSSS) reconfigurable baseband correlators
- SPI microcontroller interface (up to 2 MHz data rate)
- 13-MHz input clock operation

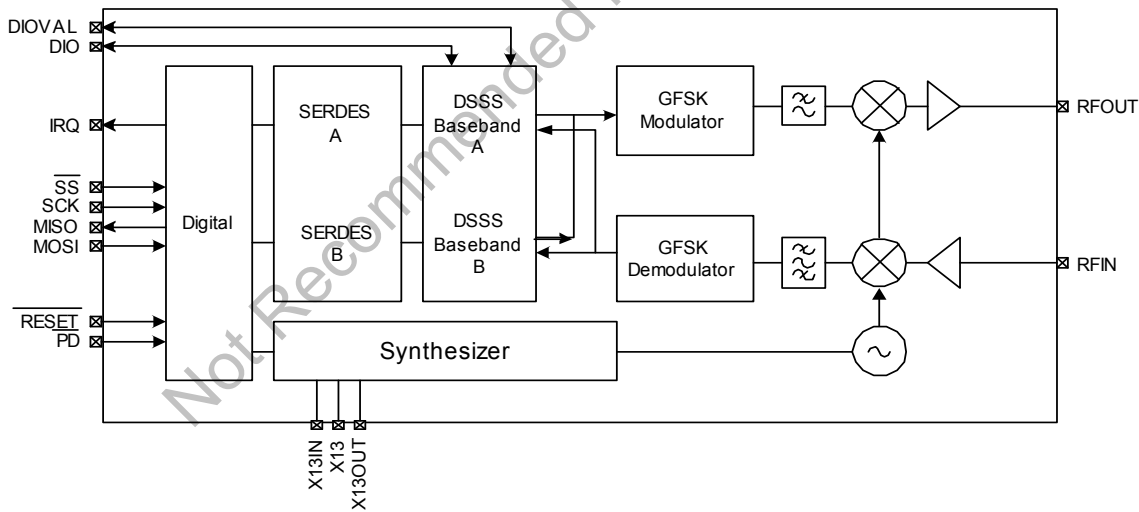
- Low standby current < 1 μ A
- Integrated 30-bit Manufacturing ID
- Operating voltage from 2.7 V to 3.6 V
- Operating temperature from -40 °C to 85 °C
- Offered in a small footprint 48 QFN

Functional Description

The CYWUSB6935 transceiver is a single-chip 2.4 GHz DSSS Gaussian Frequency Shift Keying (GFSK) baseband modem radio that connects directly to a microcontroller via a simple serial peripheral interface.

The CYWUSB6935 is offered in an industrial temperature range 48-pin QFN and a commercial temperature range 48-pin QFN.

Logic Block Diagram – CYWUSB6935



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Not Recommended for New Design

Applications

- Building/Home Automation
 - Climate Control
 - Lighting Control
 - Smart Appliances
 - On-Site Paging Systems
 - Alarm and Security
- Industrial Control
 - Inventory Management
 - Factory Automation
 - Data Acquisition
- Automatic Meter Reading (AMR)
- Transportation
 - Diagnostics
 - Remote Keyless Entry
- Consumer / PC
 - Locator Alarms
 - Presenter Tools
 - Remote Controls
 - Toys

Applications Support

The CYWUSB6935 is supported by both the CY3632 WirelessUSB Development Kit and the CY3635 WirelessUSB N:1 Development Kit. The CY3635 development kit provides all of the materials and documents needed to cut the cord on multi-point to point and point-to-point low bandwidth, high node density applications including four small form-factor sensor boards and a hub board that connects to WirelessUSB LR RF module boards, a software application that graphically demonstrates the multipoint to point protocol, comprehensive WirelessUSB protocol code examples and all of the associated schematics, gerber files and bill of materials. The WirelessUSB N:1 Development Kit is also supported by the WirelessUSB Listener Tool.

Functional Overview

The CYWUSB6935 provides a complete SPI-to-antenna radio modem. The CYWUSB6935 is designed to implement wireless devices operating in the worldwide 2.4-GHz Industrial, Scientific, and Medical (ISM) frequency band (2.400 GHz–2.4835 GHz). It is intended for systems compliant with world-wide regulations covered by ETSI EN 301 489-1 V1.4.1, ETSI EN 300 328-1 V1.3.1 (European Countries); FCC CFR 47 Part 15 (USA and Industry Canada) and ARIB STD-T66 (Japan).

The CYWUSB6935 contains a 2.4-GHz radio transceiver, a GFSK modem, and a dual DSSS reconfigurable baseband. The radio and baseband are both code- and frequency-agile. Forty-nine spreading codes selected for optimal performance (Gold codes) are supported across 78 1-MHz channels yielding a theoretical spectral capacity of 3822 channels. The CYWUSB6935 supports a range of up to 50 meters or more.

2.4 GHz Radio

The receiver and transmitter are a single-conversion, low-Intermediate Frequency (low-IF) architecture with fully integrated IF channel matched filters to achieve high performance in the presence of interference. An integrated Power Amplifier (PA) provides an output power control range of 30 dB in seven steps.

Table 1. Internal PA Output Power Step Table

PA Setting	Typical Output Power (dBm)
7	0
6	-2.4
5	-5.6
4	-9.7
3	-16.4
2	-20.8
1	-24.8
0	-29.0

Both the receiver and transmitter integrated Voltage Controlled Oscillator (VCO) and synthesizer have the agility to cover the complete 2.4-GHz GFSK radio transmitter ISM band. The synthesizer provides the frequency-hopping local oscillator for the transmitter and receiver. The VCO loop filter is also integrated on-chip.

GFSK Modem

The transmitter uses a DSP-based vector modulator to convert the 1-MHz chips to an accurate GFSK carrier.

The receiver uses a fully integrated Frequency Modulator (FM) detector with automatic data slicer to demodulate the GFSK signal.

Dual DSSS Baseband

Data is converted to DSSS chips by a digital spreader. De-spreading is performed by an oversampled correlator. The DSSS baseband cancels spurious noise and assembles properly correlated data bytes.

The DSSS baseband has three operating modes: 64-chips/bit Single Channel, 32-chips/bit Single Channel, and 32-chips/bit Single Channel Dual Data Rate (DDR).

64 Chips/Bit Single Channel

The baseband supports a single data stream operating at 15.625 kbits/sec. The advantage of selecting this mode is its ability to tolerate a noisy environment. This is because the 15.625 kbits/sec data stream utilizes the longest PN Code resulting in the highest probability for recovering packets over the air. This mode can also be selected for systems requiring data transmissions over longer ranges.

32 Chips/Bit Single Channel

The baseband supports a single data stream operating at 31.25 kbits/sec.

32 Chips/Bit Single Channel Dual Data Rate (DDR)

The baseband spreads bits in pairs and supports a single data stream operating at 62.5 kbits/sec.

