

1 Introduction

The TRF6903 single-chip solution is an integrated circuit intended for use as a low-cost multiband FSK or OOK transceiver to establish a frequency-programmable, half-duplex, bidirectional RF link. The multichannel transceiver is intended for digital (FSK, OOK) modulated applications in the North American and European 315-MHz, 433-MHz, 868-MHz, and 915-MHz ISM bands. The single-chip transceiver operates down to 2.2 V and is designed for low power consumption. The synthesizer has a typical channel spacing of better than 200 kHz and features a fully-integrated VCO. Only the PLL loop filter is external to the device. Two fully-programmable operation modes, Mode0 and Mode1, allow fast switching between two preprogrammed settings (for example, receive (RX)/transmit (TX); TX_frequency_0/TX_frequency_1; RX_frequency_0/RX_frequency_1;) without reprogramming the device. The functional block diagram is illustrated in Figure 1.

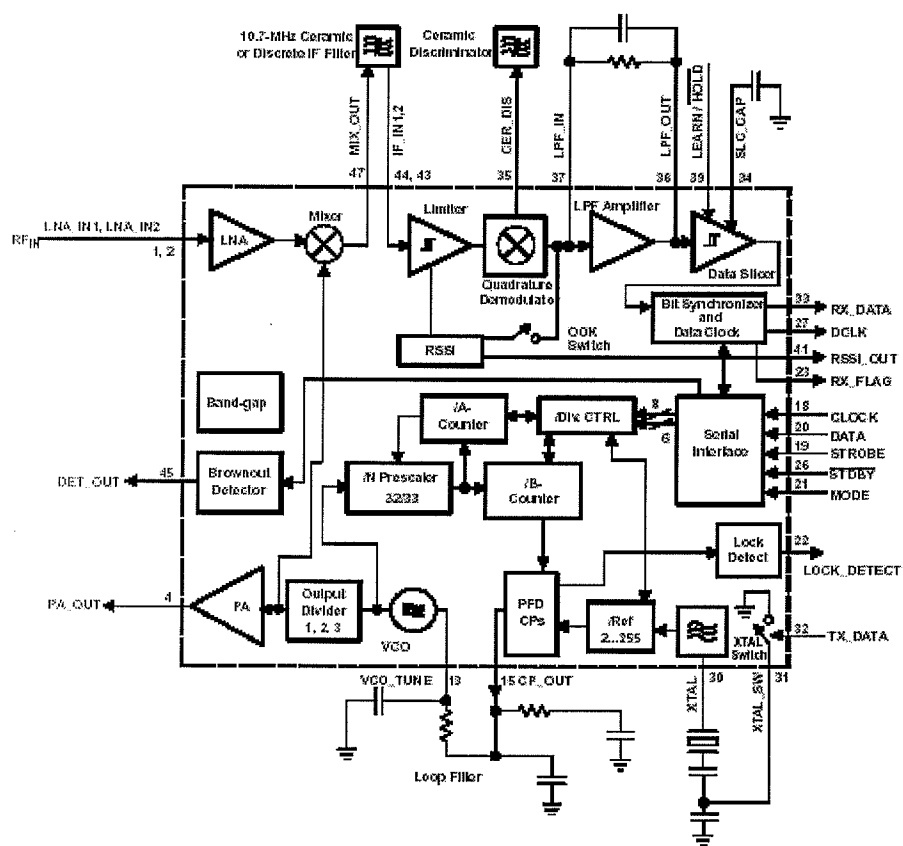


Figure 1. TRF6903 Functional Block Diagram

1.1 Transmitter

The transmitter consists of an integrated VCO and tank circuit, a complete integer-N synthesizer, and a power amplifier. The dividers, prescaler, and reference oscillator require only the addition of an external crystal and a loop filter to provide a complete PLL with a typical frequency resolution of better than 200 kHz. Since the typical RF output power is approximately 8 dBm, no additional external RF power amplifier is necessary in most applications. Four attenuation settings for the power amplifier are offered. This feature allows the user to fine tune the amplifier for optimal output power.

1.2 Receiver

The integrated receiver is intended to be used as a single-conversion FSK/OOK receiver. It consists of a low noise amplifier, mixer, limiter, FM/FSK demodulator with an external LC tank circuit or ceramic resonator, LPF amplifier, and a data slicer with clock recovery and an integrated data bit synchronizer. The received strength signal indicator (RSSI) can also be used for fast carrier sense on/off keying or amplitude shift keying, (OOK/ASK) demodulator.

1.3 Baseband Interface

The TRF6903 can easily be interfaced to a baseband processor such as the Texas Instruments MSP430 ultralow-power microcontroller (see Figure 2). The TRF6903 serial control registers are programmed by the MSP430 and the MSP430 performs baseband operations in software. A synchronized data clock, programmable for most common data rates, is provided by the TRF6903. This feature reduces the need for extensive oversampling and data decisions in the microcontroller during receive. During transmit, the data clock can be used to clock the transmit data from the microcontroller to the TRF6903 at predefined data rates.

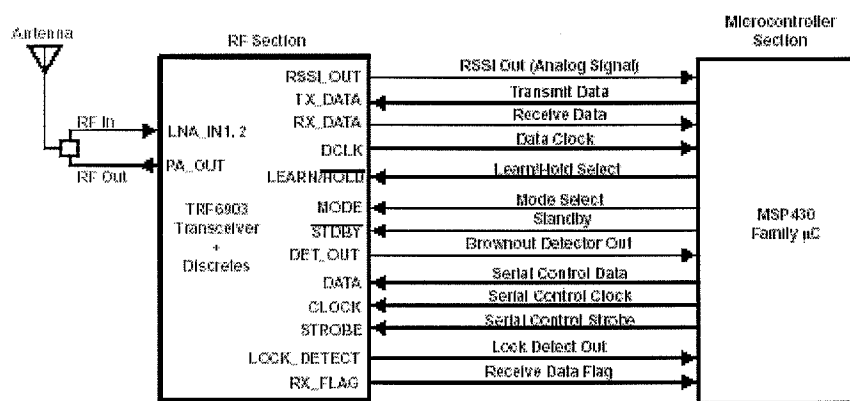


Figure 2. System Block Diagram for Interfacing to the MSP430 Microcontroller

NOTE: Figure 2 shows all the interface definitions between the MSP430 Microcontroller and the TRF6903. Some of these interface pins are optional and may not be needed to establish a functional Wireless Link. (Some of the optional pins are RSSI Out, Brownout Detector, Lock Detect, Receive Data Flag etc.)