

1) Please describe how the device meets the definition of a frequency hopping spread spectrum system as defined in section 2.1 of the FCC rules

Answer:

The RF Transceiver section of the CC1010 is composed of a VCO and PLL which generates a LO (Local Oscillator) along with transmitter and receiver hardware.

The transmitter section of the CC1010 chip utilizes the VCO/PLL section. The microprocessor commands the PLL/VCO to different hop channel frequencies. In transmit mode, the LO is modulated by data from the microprocessor in an FSK format at the center of a well defined hop channel frequency. This FSK modulated LO signal is then amplified by the Power Amplifier, and is then routed to the antenna to be radiated.

The receiver section of the CC1010 utilizes the PLL/VCO hardware to generate a LO which is offset from the center of the defined hop channel frequency by the center frequency of the IF filter (which is also on board the CC1010). In receive mode, the incoming signal is captured by the antenna and routed into the RF IN pin of the CC1010. The incoming signal is amplified by a Low Noise Amplifier and presented to a downconverter mixer. The mixer beats the incoming receive signal with the LO which selects only the desired hop channel frequency to be translated down to the center of the CC1010's internal IF filter. The CC1010's IF filter is designed to match the bandwidth of the transmitted signal and destroy all other RF frequency content. The result is then presented to a digital demodulator which extracts the receive data from the baseband signal.

2) Describe how the hopping sequence is generated. Provide an example of the hopping sequence.

Answer: The pseudorandom hopping channel sequence is defined within the CC1010's embedded RF protocol and is not accessible to the OEM customer. The transmitter does not deviate or adapt from this pseudorandom pattern hard coded into the CC1010 and will always be equally distributed over the selected hop channel set.

Example Hopping Sequence: 22, 00, 19, 10, 17, 14, 21, 18, 11, 23, 07, 02, 20, 16, 25, 13, 09, 03, 04, 08, 05, 15, 12, 06, 24, 18

3) Describe how the EUT meets the requirement that each of its hopping channels is used equally on average

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4) Describe how the associated receiver(s) comply with the requirement that its input bandwidth matches the bandwidth of the transmitted signal

Answer:

The 4790-1x1 has a precise IF filter which is part of the integrated CC1010 transceiver chip manufactured by Chipcon. The width of the IF filter bandwidth is approximately equal to the channel bandwidth.

5) Describe how the associated receiver(s) have the ability to shift frequencies in synchronization with the transmitted signals.

Answer:

This masterless architecture is a true peer-to-peer architecture, where any module that has data to transmit will initiate a communication Session with a transceiver(s) within its range, transmit data and exit the Session. If the transceiver is not in communication with another radio, it will be in Receive mode actively listening for a sync pulse from another transceiver. If the radio determines that it is a broadcast or addressed sync pulse, it will respond by going into session with the radio. Fast scan mode stops and the transceivers will begin shifting frequencies together at the defined pseudorandom hopping sequence.