Network Interface Group

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Date: 03/08/2011

Purpose

The purpose of this document is to give a brief description of the RF4CE transceiver RF section and the list of frequency channels used.

Revision History

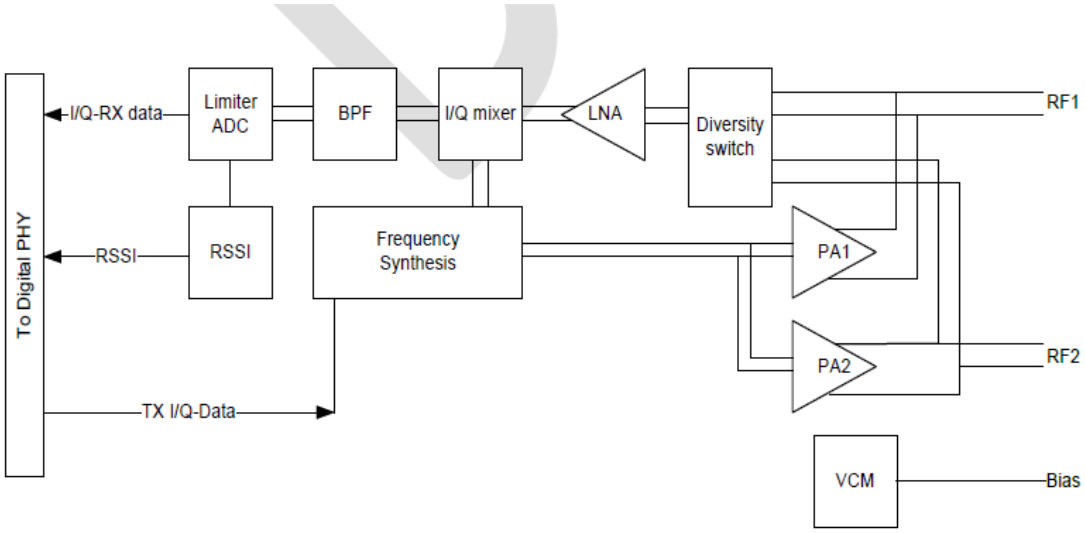
Issue	Date	Modification list and author
A	03.08.2011	Original Issue – Antonio Callegaris

Definitions/Abbreviations

Abbreviation	Description
ADC	Analog to Digital Converter
BPF	Band Pass Filter
I/Q	In phase / Quadrature
LNA	Low Noise Amplifier
PA	Power Amplifier
LPF	Low Pass Filter
RF	Radio Frequency
PCB	Printed Circuit Board
PHY	Physical Layer
RX	Receive
RSSI	Receive Signal Strength Indicator
TX	Transmit
VCM	Voltage Control Module

RF Section

Below is the top level block diagram of the RF4CE Transceiver



TX Chain

The I/Q Data are up-converted to RF with a local oscillator directly modulated.
The local oscillator works at 2*Fo where Fo is frequency of RF channel
The RF TX signal is split in two separate paths.
The signal in each path is amplified and sent to the RF output pins (RF1 and RF2).
When one PA is switched on, the other is switched off.

RX Chain

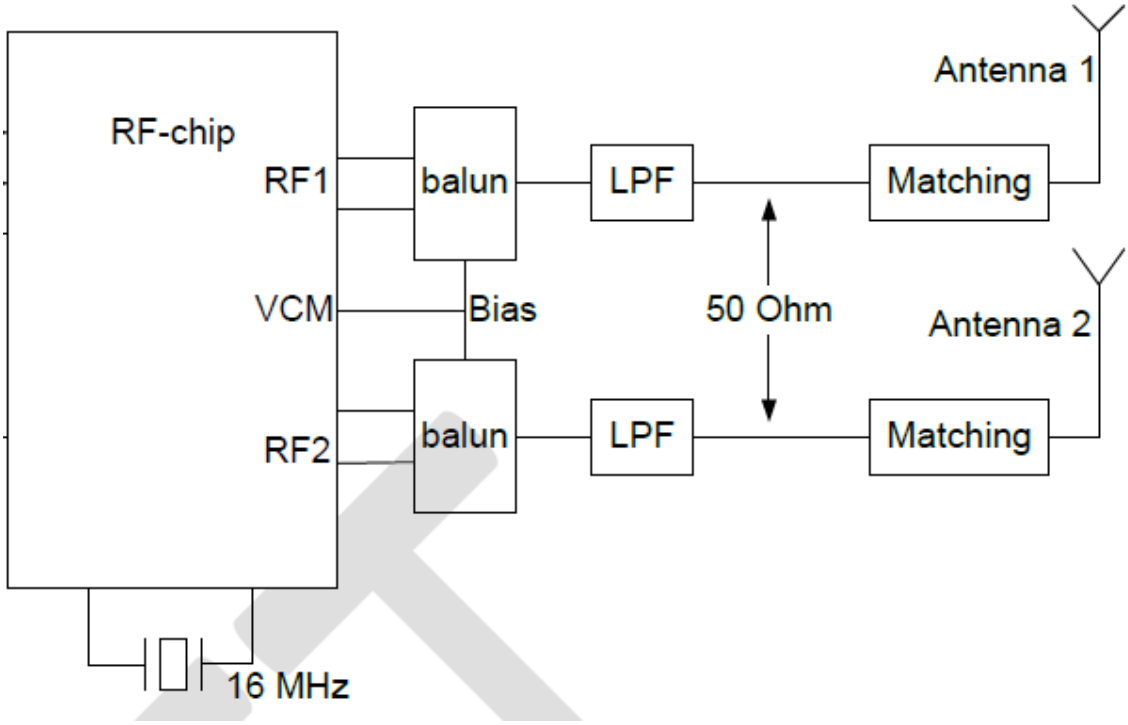
One of the two RF signals present respectively at RF1 and RF2 is selected by the diversity switch and amplified by the LNA.
The signal at the LNA output is down-converted to baseband.
The local oscillator works at (Fo – 2MHz) * 2 where Fo is frequency of RF channel.
After being down-converted the signal goes through a BPF filter and successively to an ADC.

Antenna Diversity

The RF4CE Transceiver supports antenna diversity over two antennas. For every received packet the digital signal processor in the transceiver will select the antenna with the best signal. The decision is made at the very beginning of the packet. Normally the transmitter will use the antenna that was used to receive the last packet. The result of the antenna diversity mechanism is that either RF port 1 or RF port 2 can be used for transmit; there is only one antenna transmitting at the time.

External components and antennas

Below is the top level block diagram of the RF4CE Transceiver external components and antennas.



Each path is used as TX or RX path. Only one path per time is used.
The signal is differential at the chipset input/output.
A lumped element balun is used to pass from differential to single ended.
The purpose of the lumped element LPF is to remove the harmonics of the fundamental.
The antennas are printed F-inverted.

Applicable Frequency Range

The RF4CE application supports 3 RF channels; these channels are the following IEEE802.15.4 channels:

- CH15 2425MHz
- CH20 2450MHz
- CH25 2475MHz