Theory of Operation

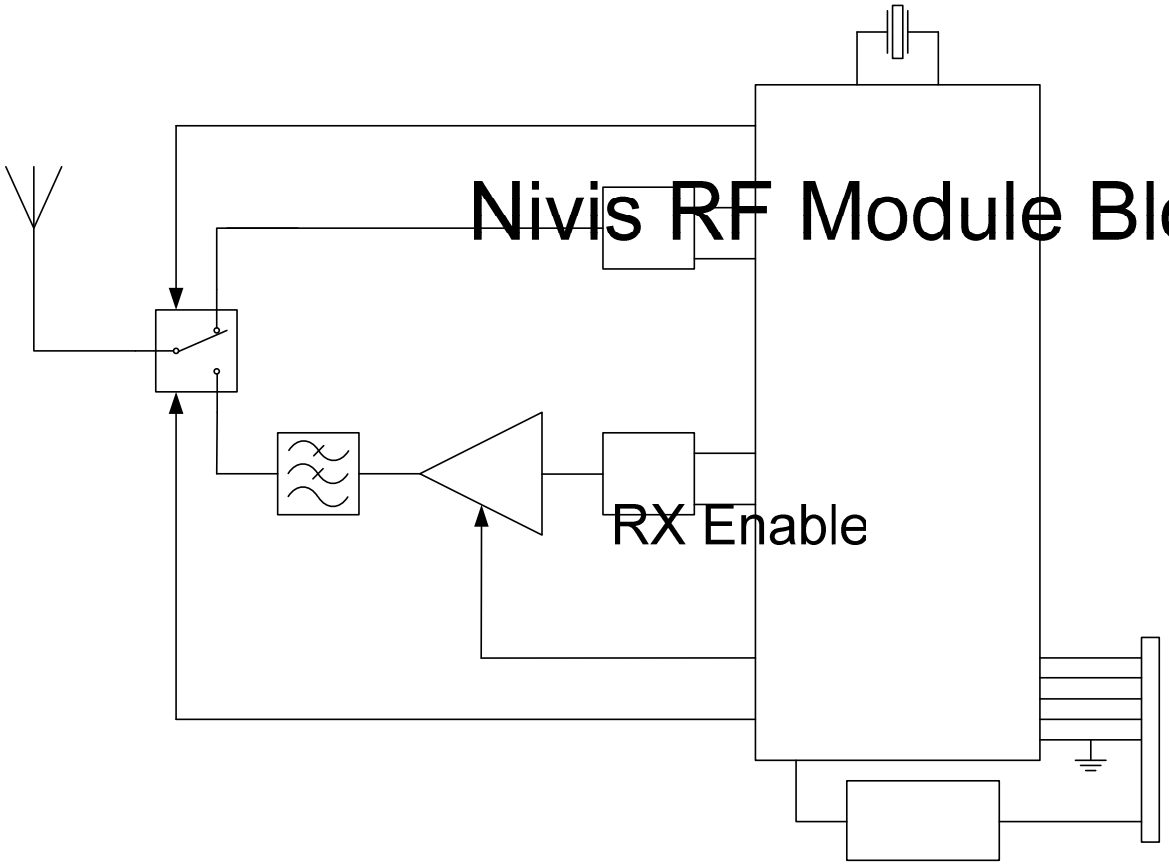
A functional block diagram for the Nivis RF module is shown on the following page. This module is a direct sequence spread spectrum transceiver operating in the 2400 – 2483.5 MHz ISM band. The system is based on the IEEE 802.15.4 standard, with channels spaced at 5 MHz intervals in the ISM band. The system operates at a chip rate of 2 Mcps, a symbol rate of 62.5 kbps, and a bit rate of 250kbps. O-QPSK modulation is used with 16-ary orthogonal symbols.

An input supply of 3.3 VDC is supplied to the RF module using a two stage supply. Specifically, this supply consists of a switching regulator followed by linear regulator. The input range of this supply is 105-305 VAC.

The module transmits with a maximum power of +22 dBm into an external ¼ wave whip antenna. This module does not transmit for more than 10 ms over any 125 ms time period.

The receiver is a low-IF receiver. The received RF signal is amplified by a low noise amplifier and down-converted to a 1st IF of 65MHz and then down-converted in quadrature (I and Q) to the intermediate frequency (IF) of 1 MHz. The digital back end performs Differential Chip Detection; the correlator de-spreads the Direct Sequence Spread Spectrum O-QPSK signal, determines the symbols and packets, and detects the data.

Nivis RF Module Block dia



T/R switch

NEC
UPG2250T5M
Power amplifi

2.5 GHz
LPF

TX Enable