RF Adapter operational description

The RFA02 is an RF adapter board with carrier frequency 915 MHz.

Three devices include this RF adapter:
1. Model WS100 (UC-321P) - a Digital Weight Scale with wireless interface and dedicated whip antenna.
2. Model BP100 - a Blood Pressure Monitor with wireless interface. It includes AND UA-767PC blood pressure monitor and integrated antenna – surface-mount (SMT).
3. Model BP102 - a dual user blood pressure monitor with wireless interface. It includes AND UA-774 blood pressure monitor with integrated antenna – surface-mount (SMT).

Above-mentioned devices transmit the measurements to the MedicGate (VMG02) and to the MiniGate (VMG03) via RF protocol.

Products dimensions:
WS100 - 31 cm x 31 cm x 4 cm approx.
BP100 - 16 cm x 10 cm x 7 cm, approx.
BP102 – 15 cm x 10.6 cm x 6 cm.

Each model powered from four 1.5V type AA batteries.
Current consumption:
WS100 - up to 40 mA.
BP100 - up to 300 mA.
BP102 - up to 300 mA.

The products block diagram and RF transceiver block diagram are shown in Figures 1 and 2, respectively.

The RFA02 transceiver is based on chipset Chipcon CC1020.
The transceiver uses one channel.
Antenna types:
Dedicated whip antenna   – WS100
Integrated surface-mount antenna – BP100
Integrated surface-mount antenna – BP102
The antenna cannot be de-attached or changed by the user.

RF communication frequency: 915 MHz.
Output transmission power: -1 dBm (EIRP)
Baud rate: 9.6 Kbps
Modulation type: FSK

Bandwidth: 50 kHz

The RFA02 field strength is less than 50 mV/m at 3 meters and meets the requirements of paragraph (a) of section 15.249.
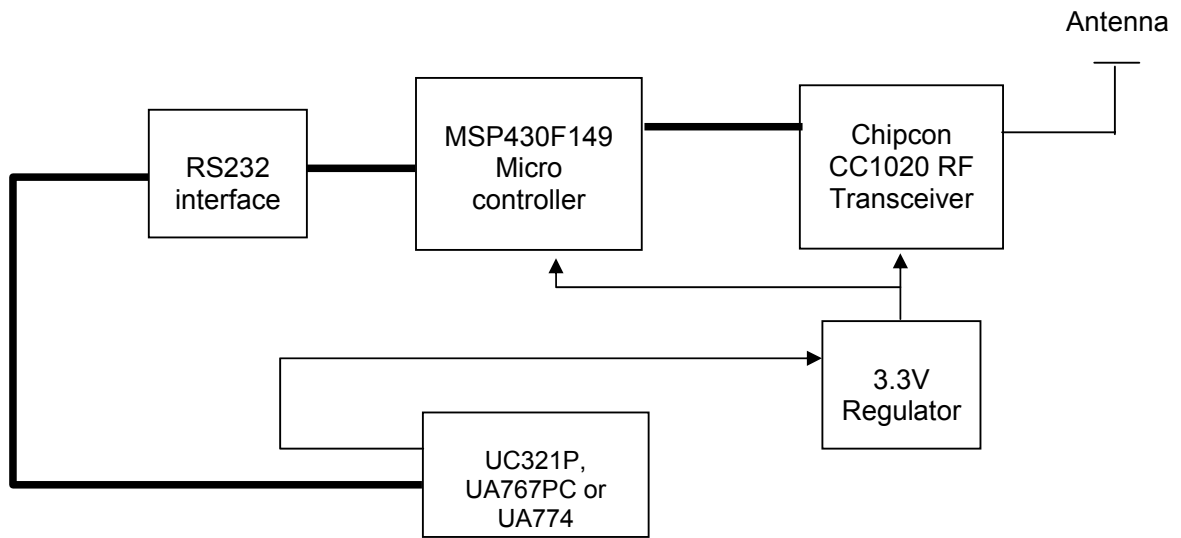
Figure 1. Product block diagram (for all models)

The following are the main components shown in the block diagram:

* TI MSP430F149 micro controller has the following features:
  - 60K byte FLASH memory
  - 2048 byte RAM
  - 16 bit architecture
  - Up to 8 MIPS (8 MHz)
  - 12 bit A/D converter
  - 2 timers
  - UART/SPI
  - Watch dog
  - 48 digital I/O control lines

* The MSP430 is the CPU of the RFA and performs the following tasks:
  - Communicates with the Nordic RF transceiver by using digital I/O control lines.
  - Detects when the regulated voltage output drops below 3.1V and disables the RF transceiver.
  - Green LED output
  - Red LED output
  - The MSP430 UART is connected to the SP3223E RS-232 transceiver and communicated with the medical devices.
  - The SP3223E receive line is also connected to an MSP430 interrupt input, that is used to wake up the CPU upon new session.
  - The device uses SPI interface for connecting to the UA774 blood-pressure device.

* The Chipcon CC1020 is an RF transceiver supporting up to 153.6Kbps. In the RFA project it operates at 9.6Kbps at 915MHz.

* SP3223E is a +3.0V to 5.5V RS-232 transceiver. Converts 2 RS-232 receive and transmit lines from 3.0V to 5.5V. Supports low power receive-only mode that is used to wake up the MSP430 upon new communication session.

* Crystal – A 32.768 kHz crystal is used as a clock source for a software implemented Date and time real time clock.

* 3.3V regulator – a low drop regulator that regulates the battery into stable 3.3V. The regulator is activated or put into standby mode by the MSP430. The regulator feeds the MSP430, the CC1020 and SP3223E.

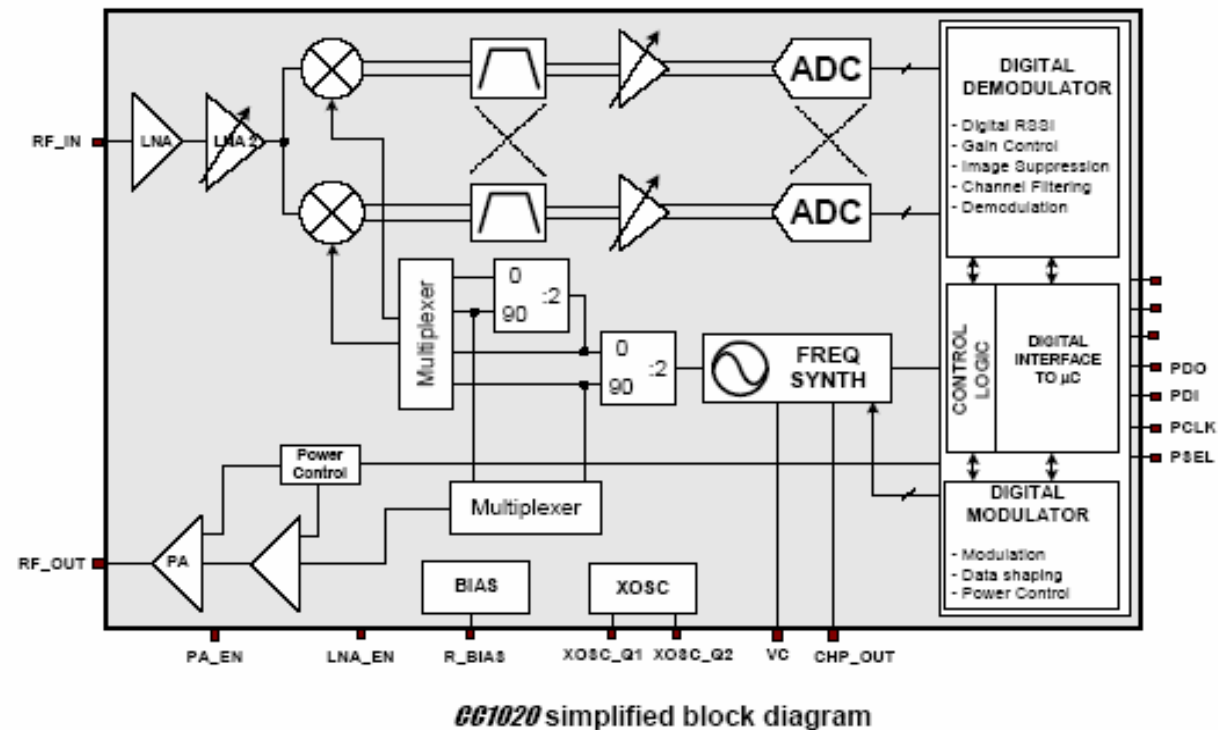* 2 Switch button – can be used to set external mode/information about the users.

Circuit Description

CC1020 simplified block diagram

Figure 2. Tx/Rx block diagram