HB1xRFxxx Technical Description

The transmitter is power by a single 3V CR2032 battery.

During standby (no buttons pressed) the Tiny 13 u-controller (A) will be in sleep (completely static operation – no clocks running). All other circuitry will also be powered down by the u-controller. When a button is pressed the u-controller wakes up and starts running on an internal RC-oscillator. The key (or keys) pressed is detected by a scanning process. The keyboard interface has been omitted from the Block Diagram for reason of clarity.

The modulation scheme is ASK. The data bit rate is 4 kbit/s (each bit having a length of 250 us). The coding scheme is Manchester so each bit consist of a high period of 125 us and a low period of 125 us. Thus the signal will always have a duty cycle of 50% (constant DC component) regardless of the data content. Data is transmitter in packets. For a more detailed description of the coding and data scheme refer to the "RF-protocol description".

The low frequency ASK data signal is be present at an output pin of the u-controller. This signal is feed to a "Hold Circuit" (B) which generates a constant high signal which enables the "SAW Oscillator". The "Hold Circuit" will hold the enable signal for the whole duration of the data packet (regardless of the data contents).

The oscillator (C) is a common collector Colpitt configuration. The induction element is constituted by the SAW resonator. The oscillator will be running whenever the enable signal is active. The signal generated by the oscillator is a 433.92MHz which is the constant carrier used by the transmitter. This carrier will thus be present for the whole duration of the data packet.

The carrier signal is feed to the "ASK-modulator and Gain" stage (D). The modulator combines the carrier signal and the "LF ASK data Signal" thus creating the RF-signal (433.92MHz ASK Modulated Signal). Modulator and gain stage is made up by a dual gate MOS-FET.

The RF-signal is feed through a resonant LC band pass filter (E) which will remove any harmonic components from the signal.

The Antenna is made up by a small current loop on the PCB board itself (F). The inductance of the loop is tuned in resonance with capacitors.

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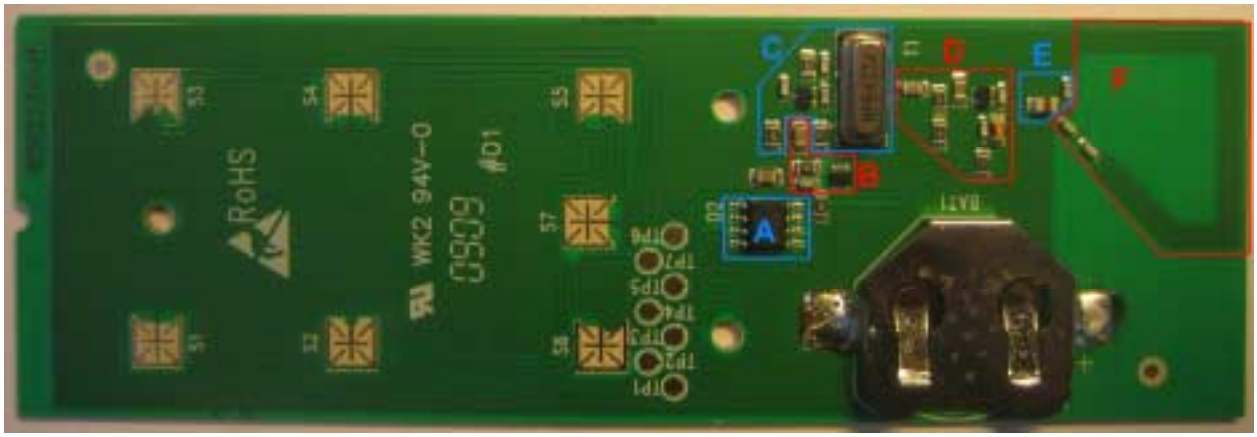
HB1xRFxxx Physical Layout



A - Tiny13 u-controller

B - Hold Circuit

C - SAW Oscillator

D - ASK-modulator and Gain Stage

E - Resonant BP Filter

F - Small Current Loop PCB Antenna

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Schematics references

A - Tiny13 u-controller

The u-controller is an ATtinty13 designated D2 in the schematics (summary datasheet attached).

B - Hold Circuit

This circuit is made up of dual transistor Q3 and passives C5, R1 and C2.

C - SAW Oscillator

Main components of the oscillator are the SAW resonator designated T1 in the schematics (HR433.92TS - datasheet attached) and RF NPN transistor designated Q2 In the schematics (BFR181W - datasheet attached). Additional components are R20, C12 and C21.

D - ASK-modulator and Gain Stage

The ASK-modulator and Gain Stage is made up of a dual gate N-channel MOS-FET. Designator Q1 in the schematics (BF1201W – datasheet attached). Additional components are L5, R5, R8, C19 and C20.

E - Resonant BP Filter

The Band pass filter is made up of inductor L4 and capacitor C15 together with the output capacitance of Q1 parallel with C14.

F - Small Current Loop PCB Antenna

The tuning capacitors are C4 and C13. The inductive loop antenna is embedded in the PCB layout.