MRC 3040 Wireless gateway Operational Description

Confidential

General Description

MRC 3040 is a wireless gateway that receives and transmits events. A block diagram is shown in Fig.1. The is a transceiver module operate within ISM band . It is intended for use as high-performance FSK RF transceiver for robust frequency agile, half-duplex bi-directional RF links, and where stable and constant RF performance is required over the full operating range of the device.

It is intended for applications operating at 433 MHz and 450 MHz. The advanced system features include a 66 byte TX/RX FIFO, configurable automatic packet handler. The system incorporates a microcontroller for controlling and managing the operation of the device.

The MRC 3040 is intended for use in Retirement homes for call for help/nurse call applications. It will receive from the end user device (pendant/bracelet/pull cord) a request for help. It will send this request to another MRC 3040 which is connected to a computer.

Receiver Description

The RF device (RFM69W) included in the MRC 3040 features a digital receiver with the analog to digital conversion process being performed directly following the LNA-Mixers block. The zero-IF receiver is able to handle FSK modulation. All the filtering, demodulation, gain control, synchronization and packet handling is performed digitally, which allows a very wide range of bit rates and frequency deviations to be selected.
The receiver is also capable of automatic gain calibration in order to improve precision on RSSI measurements.

The frequency synthesizer generating the LO frequency for both the receiver and the transmitter is a fractional-N sigmadelta PLL. The PLL incorporates a third order loop capable of fast auto-calibration, and it has a fast switching-time. The VCO and the loop filter are both fully integrated, removing the need for an external tight-tolerance, high-Q inductor in the VCO tank circuit.

FSK Demodulator
The FSK demodulator of the RFM69W is designed to demodulate FSK modulated signals. It is most efficient when the modulation index of the signal is greater than 0.5 and below 10:

Rx Start Procedure
In Packet mode, the receiver will start locking its Bit Synchronizer on a minimum or 12 bits of received preamble, before the reception of correct Data, or Sync Word can occur.

Transmitter Description

The transmitter of RFM69W comprises the frequency synthesizer, modulator and power amplifier blocks.
FSK modulation is performed inside the PLL bandwidth, by changing the fractional divider ratio in the feedback loop of the
PLL. The large resolution of the sigma-delta modulator, allows for very narrow frequency deviation.

Microcontroller Description

MRC 3040 wireless gateway incorporates a microcontroller for managing and controlling its operations. The Low Pin-count (20) PIC® Flash microcontroller PIC16F690 offer all of the advantages of the well recognized mid-range x14 architecture with standardized features including a wide operating voltage of 2.0-5.5 volts, on-board EEPROM Data Memory, and nanoWatt Technology. Standard analog peripherals include up to 12 channels of 10-bit A/D, an analog comparator module with two comparators, programmable on-chip voltage reference, and an Enhanced Capture/Compare/PWM (ECCP+) w/dead band delay, auto-shutdown and restart options.

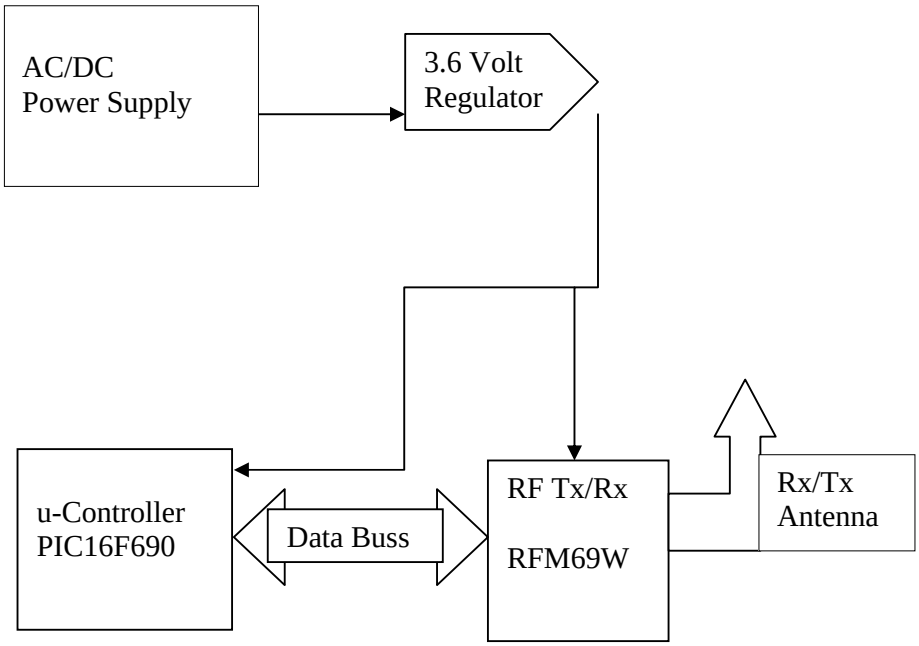

Fig. 1 Overall system block diagram