WRM-3200 Functional Overview

The WRM-3200 radio module is based on the Intersil PRISM Direct Sequence Chip Set.

There are ten basic units in this module:

1. Baseband Processor
2. Modulator/Demodulator
3. Dual Synthesizer
4. Up/Down Converter
5. Power Amplifier
6. Low Noise Amplifier (LNA)
7. RF VCO
8. IF VCO
9. Antenna (RF) Interface
10. MAC/Radio (buffered) Interface

During transmission, the data to be transmitted is placed on the TX data line going into the baseband processor. This data is modulated according to the format selected (CCK) and then spread using a defined PN code. Two signals will be generated (I & Q). The I & Q signals are sent to the Modulator/Demodulator where they will be first filtered and then modulated with the IF frequency (280MHz).

The IF oscillator generates 560MHz which is divided by two inside the Modulator/Demodulator, so the final IF signal is 280MHz. Next, the two signals are combined into a single signal and sent over to the Up/Down converter. The Up/Down converter will shift this signal to the RF channel programmed in the synthesizer, in the 902 – 928 MHz ISM band.

In the final stage, this signal is amplified to produce a typical power output of +25dBm, measured in the middle of the ISM Band at the antenna. In receive mode, if antenna diversity is enabled the radio selects the antenna with the strongest received signal, otherwise it defaults to the transmit antenna. This signal is amplified by the LNA, and then sent to the Up/Down converter. The Up/Down converter down-converts this signal from the 902 – 928 MHz range to the IF frequency, 280MHz.

The Modulator/Demodulator converts the signal to baseband and splits the signal into the In-Phase (I) and Quadrature (Q) components, before it is sent to the Baseband Processor.

Finally, the Baseband Processor despreads and demodulates the data from CCK form, and places it on the RX data line. Bi-directional, translating buffers are used to interface between controller (5V) and radio module (3.5V) logic levels. The RF and IF Local Oscillator signals are generated using the synthesizer and the voltage controlled oscillators. The dual synthesizer is programmed with the desired RF channel frequency less the IF frequency. The baseband processor and the synthesizer are driven from a common 11.0592 MHz oscillator to control the timing of these chips.

Example (for Channel 1 operation)**:**

RF		**IF**		**LO**
905 MHz	–	280 MHz	=	625 MHz

The antenna (RF) interface is connected to a 50-ohm impedance matched transmission line (Times Microwave LMR-400 or LMR-600) and one of the following antennas:

- Astron V-9183, 5.14 dBi gain, omni - for CCU;
- Astron ASTPCG09, 8.5 dBi gain, 90-degree patch - for CCU;
- Astron 918-4, 9.14 dBi gain, yagi - for EUM (outdoor);
- Astron AXQ9RPSMS 'rubber-ducky' antenna – for EUM (indoor);
- Astron PCNLP-09V, 3 dBi gain, low profile disc - for EUM (indoor or outdoor).

The radio module (analog) ground system is isolated from the controller (digital) ground system throughout the various stages of the radio. The grounds are, however, connected at a single point (power supply). This practice will ensure that the digital ground is not modulated by the analog ground, as the PA switches on and off. Furthermore, proper grounding practice minimizes EMI/EMC issues. The antenna system is grounded to the site primary ground system, and protection is provided through the use of gas-element surge/lightning protectors.

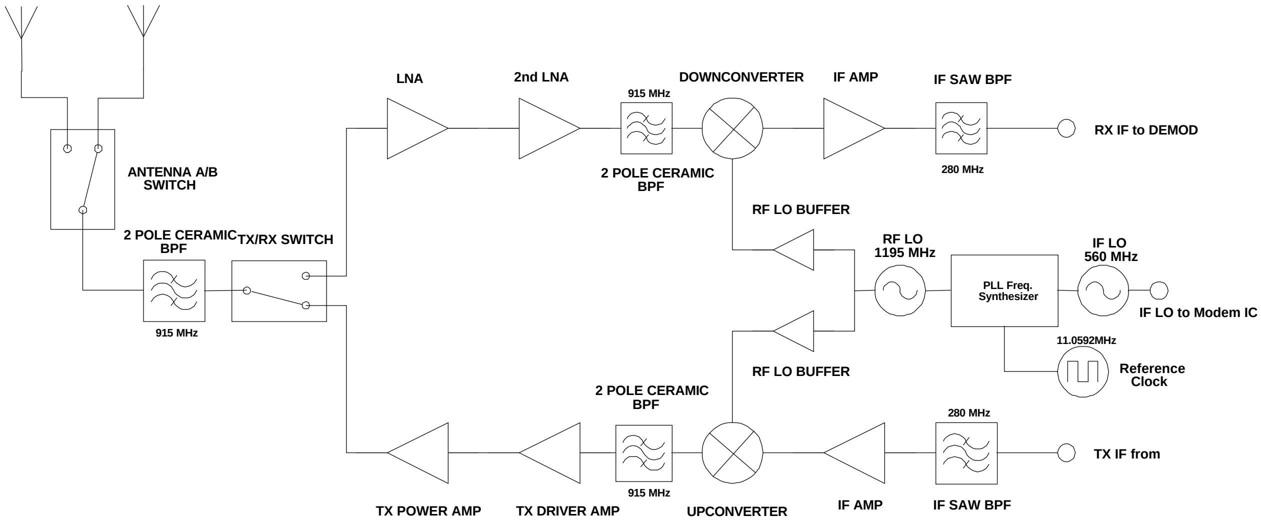

Figure 1: Block Diagram of the RF Front End and Frequency Synthesizer

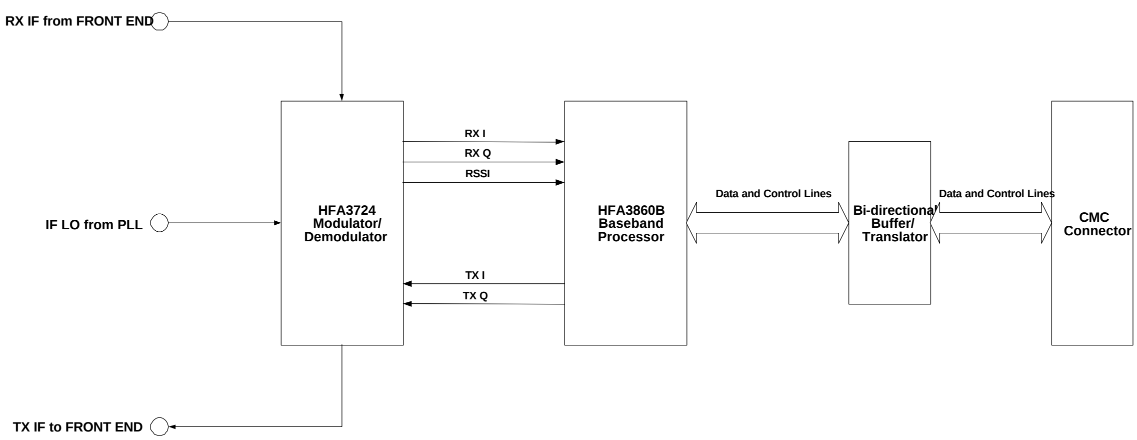

Figure 1: Block Diagram of the Modulator/Demodulator and Baseband Processor