WRM-2000 Functional Overview

The WRM-2000 radio module is based on the Intersil PRISM II Direct Sequence Chip Set.

As shown in the block diagram located in Figure 1 and 2, 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 Baseband Processor TX data line. This data is modulated according to the format selected (CCK) and then spread using a defined PN code. Two signals are generated (the In-Phase (I) and Quadrature (Q) components). The I & Q signals are sent to the Modulator/Demodulator where they are first filtered and then modulated with the IF frequency (374 MHz).

The IF oscillator generates a 748 MHz signal which is divided by two inside the Modulator/Demodulator, generating a final IF signal of 374 MHz. Next, the two signals are combined into a single signal and sent to the Up/Down converter. The Up/Down converter will shift this signal to the RF frequency for the channel programmed in the synthesizer, for operation within the 2.4GHz ISM band.

In the final stage, this signal is amplified to produce +25 dBm RF power output as measured at the output of the antenna port. In the receive mode, the radio signal is amplified by the LNA, and then sent to the Up/Down converter. The Up/Down converter down-converts this signal from the 2.4GHz range to the IF frequency, 374MHz.

The Modulator/Demodulator then converts the signal to baseband and splits the signal into its I & Q components, before sending it to the Baseband Processor.

Finally, the Baseband Processor despreads and demodulates the data contained in the CCK format, 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 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 44MHz oscillator to control the timing of these chips.

Example (for Channel 1 operation)**:** **RF** **IF** **LO**

2412 MHz – 374 MHz = 2038 MHz

The antenna (RF) connector is connected to a 50-ohm impedance matched transmission line (Times Microwave LMR-400 or LMR-600) to one of the following antenna types: Omni, Patch, Yagi and Dish. The table below includes examples of each of the recommended antenna types, as well as their associated maximum antenna system gain.

Antenna Type	Manufacturer	Model Number	Maximum Antenna System Gain
Omni	Mobile Mark	OD9-2400	9.0 dBi
Patch	Til-Tek	TA-2408	10.6 dBi
Yagi	Astron	928-4	10.1 dBi
Dish[1]	Til-Tek	TA-811	20.5 dBi

Table 1: Antenna Type for use with the NCL11

[1] A cavity filter with a minimum rejection of 20 dB ± 22 MHz from the channel center frequency is required. i.e. TTE-07766 or equivalent.

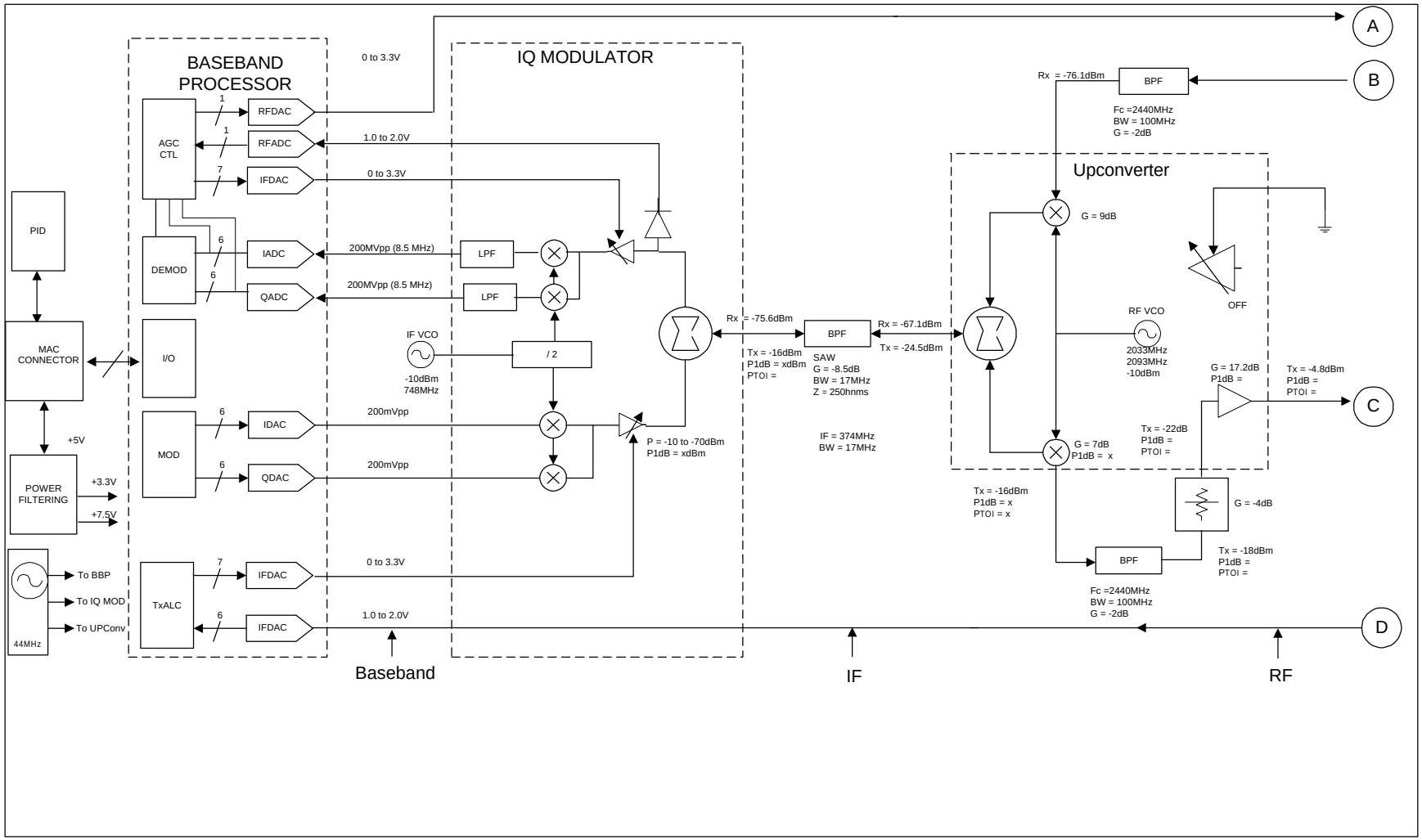

Figure 1 Block Diagram Part A

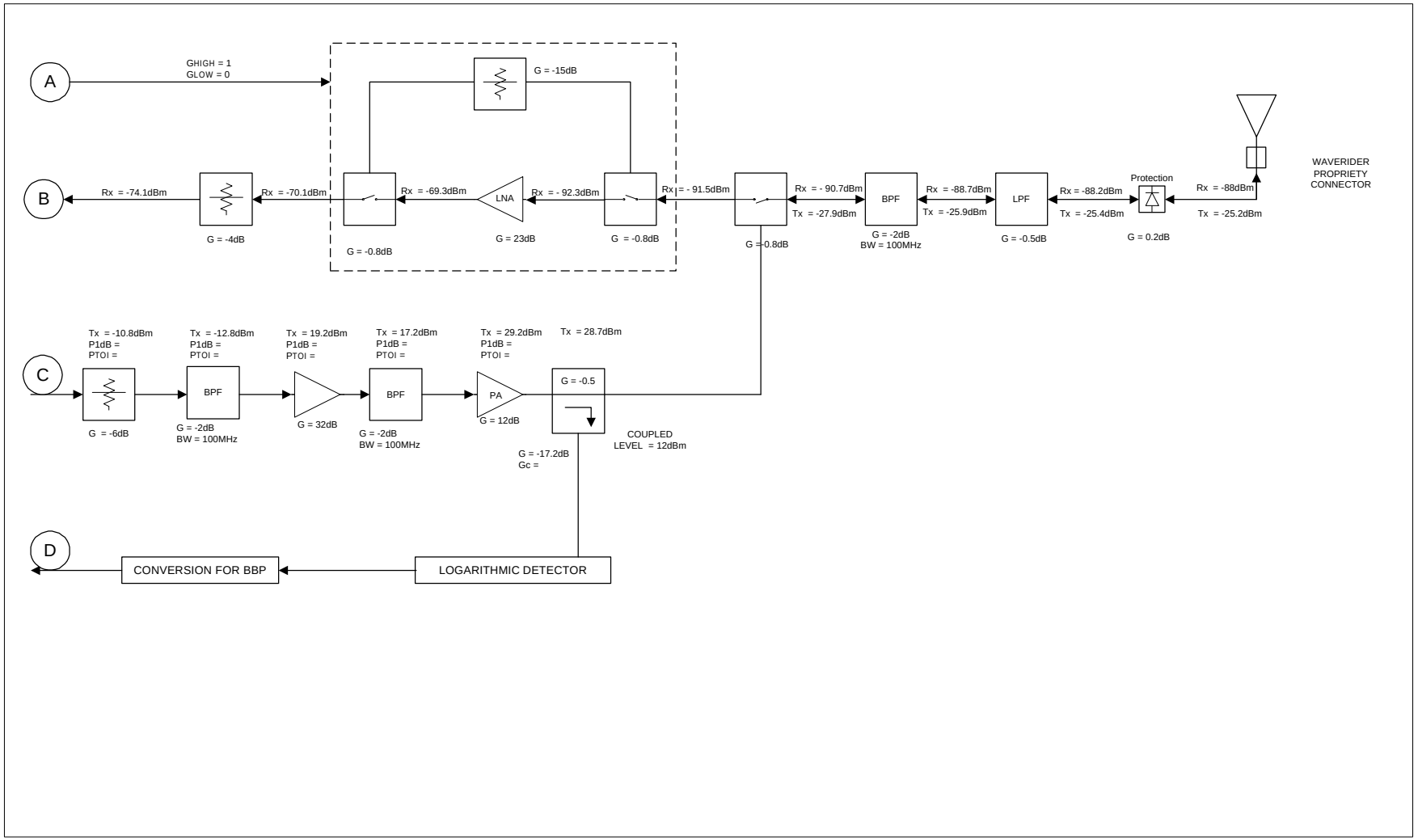

Figure 2 Block Diagram Part B