EUM3003 Functional Overview

The EUM3003 is a 900MHz radio module intended to provide connectivity between an end-user's computer and an Internet Service Provider. It is a single PCB wireless solution based on the Intersil PRISM II Direct Sequence Chip Set. The EUM3003 is functionally equivalent to the EUM3000 (previously certified with FCC ID: OOX-LMS3000) in regards to frequency of operation, output power, and modulation scheme. The main difference from the user's perspective is that RS232 and USB interfaces are not available on the EUM3003. Changes to the RF synthesizer in the radio circuitry of the EUM3003 require that it be resubmitted for certification.

Overall functionality

The two block diagrams, one representing the RF functionality, the other the Digital functionality of the radio module are located in Figures 1 and 2. The digital section contains the following functionality:

1. I/O
2. Ethernet Controller
3. Microprocessor
4. MAC
5. Memory
6. Reference Oscillator
7. Power Regulation

The radio module's RF section contains the following functionality:

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

During transmission, data obtained by the Microprocessor from the I/O ports, is transferred to the MAC. The MAC reformats the data and places it on the Baseband Processor TX data line. This data is modulated using CCK modulation and then spread using a defined PN code such that the data is sent at a rate of 2.75Mbit/s. The data is preceded by a header that uses DPSK modulation. 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 (70 MHz).

The IF oscillator generates a 140 MHz signal which is divided by two inside the Modulator/Demodulator and used to modulate the I & Q signals. The final IF signal of 70 MHz is then sent to the Up converter. The Up converter will shift this signal to the RF frequency for the channel programmed in the synthesizer, for operation within the 902-928 MHz ISM band. In the final stage, this signal is amplified to produce +26 dBm RF power output as measured at the output of the antenna port.

In receive mode, the radio signal is amplified by the LNA, and then sent to the Down converter. The Down converter converts this signal from the 902-928 MHz range to the IF frequency, 70 MHz. 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 to the MAC. The MAC modifies the data, then transfers it to the Microprocessor which reformats the information and sends it out the I/O ports.

The RF and IF Local Oscillator signals are generated using the synthesizers and voltage controlled oscillators. The RF synthesizer is programmed with the desired RF channel frequency plus the IF frequency. The IF synthesizer in the Modulator/Demodulator is programmed with 140MHz. The baseband processor and the synthesizer are driven from a common 44 MHz oscillator to control the timing of these chips.

Example (for Channel 1 operation)**:** **RF** **IF** **LO**
905 MHz + 70 MHz = 975 MHz

Antennas

The antenna (RF) connector is a non-standard wide-barrel SMA connector and is connected to one of two antenna configurations:

1) A diversity antenna
2) A Yagi, Panel, or Patch antenna through a 50-ohm impedance matched transmission line (Times Microwave LMR-200)

The unit was qualified with 4 different antennas types; Yagi, Panel, Patch and Diversity. For output powers of 26dBm, the antenna system gains shall be 10 dBi or less in order to meet the regulatory requirements of 15.247(b)(4). However, to meet power density requirements of 1.1310, the antenna system gain is limited to 8.8dBi.

The following table shows antenna gains for each type of antenna and the associated antenna system gain including cable losses for typical installations.

Antenna					**Cable**			**Ant. System**
#	**Model**	**Type**	**Manufacture**	**Gain (dBi)**	**Model**	**Length**	**Loss (dB)**	**Gain (dBi)**
1	SPPC12-WR	Panel	Superpass	12	LMR-200	15 m	4.9	7.1
2	ASTPCA09	Patch	Astron	8.5	LMR-200	7.5	2.5	6.0
3	PC8910N	Yagi	Cushcraft	13	LMR-200	15 m	4.9	8.1
4	WaveRider	Div Ant.		6.2	-	-	0.0	6.2

Suite 300, 6715 - 8th St. NE, Calgary, Alberta, Canada, T2E 7H7
Tel: (403) 777-9988 Fax: (403) 777-9989

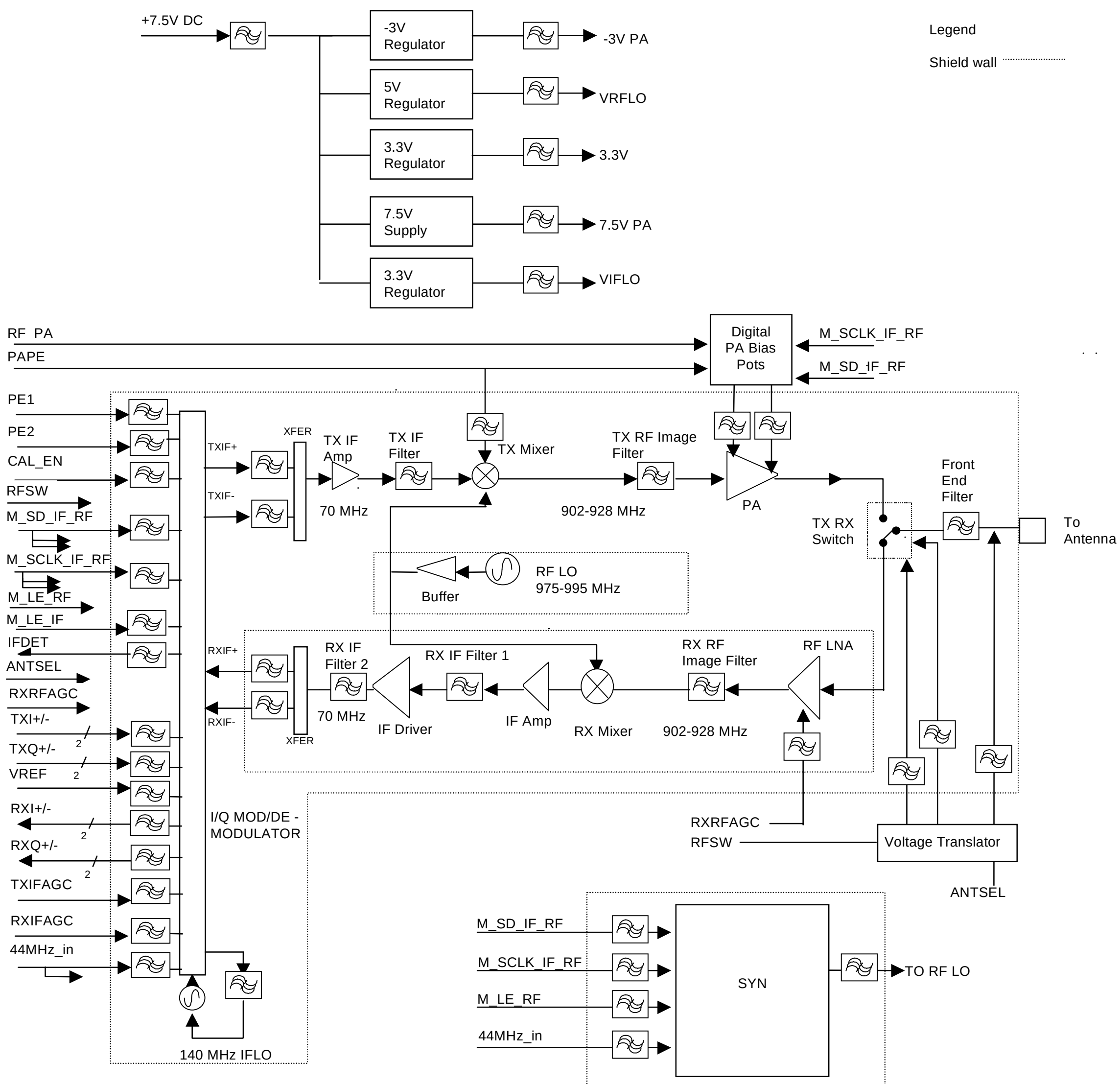

Figure 1 RF Section Block

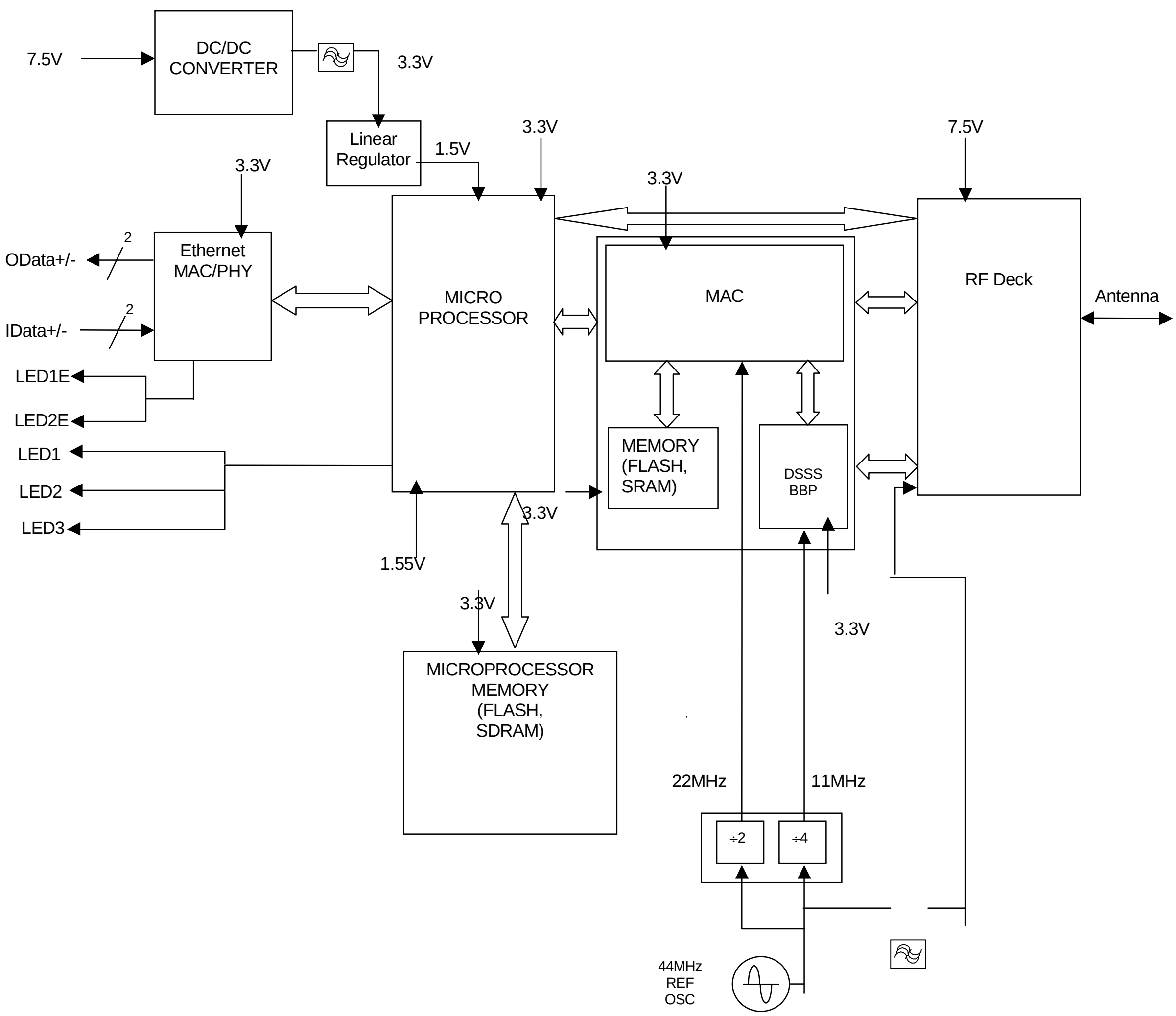

Figure 2 Digital Section Block