Description of Symbiq EUT and its 802.11b Wireless Radio Circuit

The EUT consists of the Symbiq Infusion pump with an IEEE802.11b wireless communications transmitter and receiver. This infusion device is a device used in a health care facility to pump fluids into a patient in a controlled manner. The device contains a Connectivity Engine internal assembly that provides wired Ethernet and wireless 802.11b local area networking capabilities. The wireless 802.11b radio is housed on the Connectivity Engine printed circuit assembly of the Infuser.

The Connectivity Engine board housing the wireless radio is a single PCBA containing a combination of a digital processor module and an 802.11b wireless module. The processor module uses a NetSilicon ARM7 processor available from NetSilicon with sufficient memory for Ethernet access and wireless 802.11b access. The ARM7 processor runs embedded Linux OS, a prism 2.5 WiFi controller, and an interface to the LifeCare pump processor.

The RF portion of the 802.11b radio circuitry is housed under a shield. The shield design and the layout of the components under the shield has been duplicated from the Connexant 802.11b Mini-USB reference design. The 802.11b radio has two surface mount antennas packaged under the device top surface. Only one of the two antennas is connected to the transmitter while the second antenna is used for receive diversity only. The antennas are connected to the radio on the board through two coaxial cables using a standard surface mount connector. The antennas and the antenna cables are not user accessible.

The 802.11b circuitry consists of a MAC processor, RAM and Flash memory, oscillators, and all of the high frequency components required to implement the radio function. This circuitry is implemented with the Connexant PRISM 2.5 chip set using the Mini-USB configuration with the exception of the final power amplifier, which is based on the Maxim 2247 to achieve upto +20dBm of RF power output.

The main components used from the PRISM 2.5 chipset are:

- ISL3873 MAC processor
- HFA3783 I/Q Modulator and Synthesizer
- ISL3183 VCO
- ISL3685 RF/IF Converter and Synthesizer

Receive Path

The 2.4GHz RF signal enters via antenna and band pass filter to the RF/IF converter ISL3685IR to be converted to 374MHz IF. The 374MHz IF signal then goes through a

band pass saw filter (4) to the IQ demodulator ISL3783 to be amplified and IQ demodulated. The demodulated signal goes to the MAC controller / Base Band Processor ISL3873 where the IQ signals are converted into data bits. The data bits are processed by the MAC controller on IEEE 802.11b protocol level. This MAC controller is equipped with an SRAM and Flash Memory and also controls the USB interface with the host.

Transmit Path

Data packets coming from the USB interface are processed by the MAC controller ISL3873 on IEEE 802.11b protocol level. The Base band processor then spreads and IQ modulates the signal, which is then converted to 374MHz IF by ISL3783. This 374MHz IF signal is filtered by band pass filter and then converted to 2.4 GHz RF signal by RF/IF converter ISL3685IR. The 2.4GHz RF signal is then filtered by Band pass filter and amplified by RF Power Amplifier ISL3984 and finally emitted via the TX antenna.