

## Description of normal operation of device

The hand held device that contains the 802.11b radio is part of a patient care application used by nurses. The hand held communicates periodically through access points with a database server that is connected to the hospital's wired network. This traffic allows the hand held device to stay synchronized with the other patient care systems within the hospital.

The hand held initiates all communication on a scheduled 30 second interval. On the interval, the system uses the transmitter for less than one half second on average. During the typical session, less than 1 Kbyte of data is transferred. This resulting transmit duty cycle is <1.7%. The transmitter is on < 1 minute per hour and less than 6 seconds per 6 minutes.

Model 01 and 02 are identical in their radio construction, configuration and operation. Model 01 and 02 differ in the keypad configuration and the model of display used.

In normal use, the hand held is picked up by a nurse at the bedside for medication safety checking and documentation of treatment. The nurse holds the handheld device in her hand at the end of her extended bent arm to scan barcodes and confirm software prompts on the display. This activity is for data gathering only and no data transmission occurs. When the activity is complete, the nurse scans her ID band and returns the hand held to its standby position on a countertop or a transport tray. Data transmission resumes on the scheduled 30 second interval after the unit enters standby.

Also in normal use the nurse will handle the device so as to be able to read the display. Since the antenna's are located at the very end of the product the distance from the user to the antennas is greater than 2.5cm.

Reasoning behind maintaining compliance to the RF exposure requirements:

1. Its an Hand Held device and the device maximum transmit power is 29.3mW as measured on the open area test site
2. The Antenna is greater than 2.5cm from the user in normal operation
3. The actual usage of the device is much less than 6 seconds per any 6 minute period.
4. There is only one mode of operation and therefore only one average time of operation. Also the duty cycle during the .5s is no where near 100%. But for worst case purposed this will be used for calculation below.

## RF Exposure calculation

1. Being a hand held device the transmit power is less critical by FCC supplying high limits for hand held devices.

By calculation the maximum power in mW is given by

$$S = EIPR/4\pi R^2$$

Frequency	dB $\mu$ V/m	dB $\mu$ V/m Correction	E (V/M)	Pr	Pt mW	Power in dBm
2411	98.9	109.8	.309	2.53E-4	28.5	14.57
2436	99	109.9	.3126	2.59E-4	29.3	14.67
2461.1	98.5	109.4	.2951	2.3E-4	26.1	14.17

BW correction is  $20 \log(BW/RES\ BW)$  ..... ----  $20 \log(12.2/1) = 10.9\text{dB}$

Pr = power received .....  $Pr = E^2/377$

Pt = power transmitted .....  $Pt = Pr * 4 * \pi * (d^2)$

d = distance between EUT and measurement antenna

2. It is clear in by review of the device the antenna would be over 2.5cm removed from the hands or body in normal operation.



The device is handled below the display and the antenna is at least 5 cm away from the hands of the user in all configuration.

### 3. Average time of use –Absolute worst case.

Scenario: Even if I quadruple the normal operational time to 2 seconds every 60 seconds this would relate to an average exposure over one minute of only

$$29.3\text{mW}/30\text{s} = 10\text{mW} \text{ real exposure.}$$