## Compliance with 47 CFR 15.247(i)

> "*Systems operating under the provisions of this section shall be operated in a manner that ensures that the public is not exposed to radio frequency energy levels in excess of the Commission's guidelines. See § 1.1307(b)(1) of this chapter*."

The EUT is a hand-held RFID computer used to read barcode labels and Radio Frequency Identification (ID) (RFID) tags for inventory management applications. The integral RFID radio operates in the 902 – 928 MHz band as a frequency hopping spread spectrum transmitter. The EUT will only be used in a hand-held configuration with a separation distance of 5 centimeters or greater between the antenna and the user's hand. There are no provisions for body worn accessories such as belt clips, holsters, or lanyards. Therefore, hand SAR evaluation is not required and MPE estimates are provided below. The antenna is integral to the unit and has a maximum gain of 3.29 dBi. The maximum peak conducted output power is 903.3 mW.

The co-located 802.11b radio can transmit simultaneously with the RFID radio. Each radio transmits through its own antenna.

Since the output power is less than 1.5 W ERP, the EUT is categorically excluded from routine environmental evaluation per 47 CFR 2.1091(c).

The MPE estimates are as follows:

Table 1 in 47 CFR 1.1310 defines the maximum permissible exposure (MPE) for the general population as ($f_{MHz}/1500$) $mW/cm^2$ in the 900 MHz band and 1 $mW/cm^2$ in the 2.4 GHz band. The exposure level at a 20 cm distance from the EUT's transmitting antenna is calculated using the general equation:

$S = (PG)/4\pi R^2$
Where: S = power density ($mW/cm^2$)
P = power input to the antenna (mW)
G = numeric power gain relative to an isotropic radiator
R = distance to the center of the radiation of the antenna (20 cm = limit for MPE estimates)
PG = EIRP

Solving for S, the maximum power density 20 cm from the transmitting antenna is summarized in the following table (on the next page):

**FCC ID:O9NFALCON5500**

**RFID Radio**

| Antenna Type | Antenna Part No. | Transmit Frequency (MHz) | Max Peak Conducted Output Power (mW) | Antenna Gain (dBi) | Minimum Antenna Cable Loss (dB) | Power Density @ 20 cm ($mW/cm^2$) | General Population Exposure Limit from 1.1310 ($mW/cm^2$) | Ratio of Power Density to the Exposure Limit |
|---|---|---|---|---|---|---|---|---|
| Patch | MA-SI915-1S E4 | 902 | 903.3 | 3.29 | 0 | 0.383 | 0.601333333 | 0.637 |

**Worst Case Ratio of Power Density to the Exposure Limit = 0.637**

**FCC ID: LDK102040**

**802.11 (b) Radio**

| Antenna Type | Antenna Part No. | Transmit Frequency (MHz) | Max Peak Conducted Output Power (mW) | Antenna Gain (dBi) | Minimum Antenna Cable Loss (dB) | Power Density @ 20 cm ($mW/cm^2$) | General Population Exposure Limit from 1.1310 ($mW/cm^2$) | Ratio of Power Density to the Exposure Limit |
|---|---|---|---|---|---|---|---|---|
| Chip antenna | EA2400 | 2400 | 100 | 0 | 0 | 0.020 | 1 | 0.020 |

**Worst Case Ratio of Power Density to the Exposure Limit = 0.02**

**Worst Case Co-located Exposure Condition**

Per Note 24 shown below, the Sum of Worst Case Power Ratios cannot exceed 1.0

| **RFID Radio** Worst Case Ratio of Power Density to the Exposure Limit | **802.11b Radio** Worst Case Ratio of Power Density to the Exposure Limit | | Sum of Worst Case Ratios (Power Density to the Exposure Limit) | FCC Limit for Sum of Worst Case Ratios | |
|---|---|---|---|---|---|
| 0.63745 | 0.01989 | | 0.65735 | 1.0 | PASS |

The results shown in the above table are equivalent to the Sum of the EIRP of the Two Co-located Transmitters (EIRP TX1 + EIRP TX2) compared to the exposure limit. The benefit of this method, is that accounts for transmitters operating at different frequencies against different exposure limits.

## Excerpts from TCB Training, April 3, 2002, "Mobile Transmitters", Slide 6:

*"Devices operating in multiple frequency bands*

- *When RF exposure evaluation is required for TCB approval*
  - *Separate antennas – estimated minimum separation distances may be considered for the frequency bands that do not require evaluation or TCB approval, however, the estimated distance should take into account the effect of co-located transmitters. (Note 24)*

*Note 24 According to multiple frequency exposure criteria, the ratio of field strength or power density to the applicable exposure limit at the exposure location should be determined for each transmitter and the sum of these ratios must not exceed 1.0 for the location to be compliant."*

The sum of the ratios of the power density to the exposure limit is less than 1. Therefore, the co-located exposure condition is compliant with FCC rules.