

## RF EXPOSURE REQUIREMENTS

### MAXIMUM PERMISSIBLE EXPOSURE (MPE)

#### Calculation Method of RF Safety Distance

#### Introduction

FCC ID QVJSAP300

FleetMind Solutions Inc.

#### Purpose of the Report

This technical report is a detailed environmental analysis of the radio frequency exposure from use of the Fleetlink Access Point 300 Wireless Data Communication unit, manufactured by FleetMind Solutions, FCC ID:QVJSAP300 frequency range of 902-928 MHz.

The following analysis demonstrate that the Access Point 300 is in compliance with the requirements for maximum permissible exposure (MPE) to radio frequency exposure as defined in the FCC Rules, 47 CFR 2. 1091, as amended and the limits as given in the FCC Rules, 47 CFR 2. 1.1310, table 1, Radio Frequency radiation exposure limits and meets the **RF Safety Distance**.

#### Limits

The criteria listed in the following table are used to evaluate the environmental impact of human exposure to radio frequency (RF) radiation as specified in 1.1307(b).

LIMITS FOR MAXIMUM PERMISSIBLE EXPOSURE (MPE)

Frequency Range (MHz)	Electric Field Strength (V/m)	Magnetic Field Strength (A/m)	Power Density (mW/cm <sup>2</sup> )
300-1500	...	...	F/300
1500-100,000	...	...	5
300-1500	...	...	F/1500
1500-100,000	...	...	1.0

F=frequency of interest

#### Classification of Device/Applicability of Rules

#### Mobile devices

The Fleetlink Access Point 300 Wireless Data Communication unit is properly defined as a mobile device per 47 CFR 2.1091 (b), which states that “mobile devices are defined as transmitters designed to be used in other than fixed locations and to generally be used in such a way that a separation distance of at least 20 centimeters is normally maintained between radiating antennas and the body of the user or nearby persons.”

Fleetlink Access Point 300 Wireless Data Communication unit is designed to be used in mobile applications.. The recommended location of the antenna is on the roof top on a flat ground plane, at

least 10 cm away from any uneven surface. When choosing a location for the antenna, consideration is given to metal obstructions.

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For applications for the Fleetlink Access Point 300 Wireless Data Communication unit, typically at least a separation distance of 20 centimeters is maintained between the radiating antennas and the

body of the user or nearby person in order to meet the FCC exposure guidelines while the device is in operation. A statement is included in the User's Manual recommending maintaining a separation

distance of 20 centimeter. However, this statement does not in anyway reflects that proximity of less than 20 centimeters are hazardous. The recommendation of a 20-cm separation distance ensures that a well-defined margin with respect to the maximum permissible exposure as estimated using a theoretical prediction model.

### **Operation mode:**

The device is a Direct Sequence Spread Spectrum System operating under section 15.247. Maximum exposure (Safety distance) calculation is based Maximum Peak Output Power when the system was in continuous transmitting mode providing the worst case RF exposure. The RF calculation is based on omni-directional antennas.

### **Methodology for calculation of RF Safety Distance:**

Calculations can be made to predict RF Field strength and power density levels around typical RF Sources. For example, in the case of a single radiating antenna, a prediction for power density in the far field of the antenna can be made by use of the general equations below. These equations are generally accurate in the far field of an antenna but will over-predict power density in the near field, where they could be used for making a worst case or conservative prediction.

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

Where:

S = power density, mW/cm<sup>2</sup>

P = power input to the antenna, mW

G = power gain of the antenna relative to an isotropic radiator

R = distance to the center of radiation of the antenna, cm

or:

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

Where:

EIRP = equivalent (or effective) isotropically radiated power

### **Calculation of RF Safety Distance:**

Using the above fundamental equation for power density, we can derive the following equation for determining the safety distance:

$$R = [PG/4\pi S]^{1/2}$$

S = The maximum permissible exposure (MPE) limit for general population/uncontrolled exposure for this band is:  $F/1500 = 906/1500 = 0.604 \text{ mW/cm}^2$

P = 20.3 dBm = 107.2 mW (Power Density at low channel with maximum peak output RF power, conducted, at antenna terminal)

G = 5.2 dBi

G =  $10^{(5.2/10)} = 3.311$  numeric gain (Highest antenna gain to be used with the device)

$$R = [(107.2 \text{ mW}) (3.311) / 4\delta (0.604 \text{ mW/cm}^2)]^{1/2}$$

R = 6.84 cm (The minimum separation distance required).

Since the minimum RF Safety distance determined above is much lower than the 20-cm requirement for a mobile device and as recommended in the User's Manual (8 inches), compliance is demonstrated.

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