APPENDIX A: RF EXPOSURE COMPLIANCE

FCC Rules and Regulations Part 1.1307, 1.1310, 2.1091, 2.1093:

1. General Information:
FCCID: O6YUTS-801FSU
Environment: General Population/Uncontrolled Exposure
Device category: Mobile per Part 2.1091
Modulation Type/Mode: PHS (TDMA-TDD)

2. Operating Configurations and Test Conditions:

2.1 Antenna Type(s):

Antenna	Type	Gain (dBi)	Numeric Gain
Whip	Omni	2.2	1.65

Frequency Range	Frequency Tolerance (ppm)	Emission Designator
1893.65-1909.85	1.54	282KDXW

2.2 dBi Antenna

Output Power (Worst Case)	Time averaging as an inherent property (100 % Duty Cycle) (W)	Time averaging as an inherent property (13.0 % Duty Cycle, -8.8 dB) (W)
ERP	0.0688 (18.38 dBm)	0.0090 (9.58 dBm)
EIRP	0.100 (20.0dBm)	0.0131 (11.2 dBm)
Conducted	0.1023 (20.1 dBm)	0.0134 (11.3 dBm)
Rated	0.010 (10.0 dBm)	0.0013 (1.2 dBm)

3. MPE Calculation:

The maximum distance, from the antenna at which MPE is met or exceeded, is calculated from the equation relating field strength E in V/m, transmit power P in Watts, transmit antenna numeric gain G, and separation distance in meters:

The Electric field generated for a 1mW/cm^2 exposure (S) is calculated as follows:

$$S = \frac{E^2}{Z}$$

where: S = Power density
E = Electric field
Z = Impedance.

$$E(V/m) = \sqrt{S \times Z} \qquad 1 \text{ mW/cm}^2 = 10 \text{ W/m}^2$$

The impedance of free space is 337 ohms, where E and H fields are perpendicular.

Thus:

$$E(V/m) = \sqrt{10 \times 377} = 64.1 \text{ V/m}$$

MPE Calculation:
The maximum distance, from the antenna at which MPE is met or exceeded, is calculated from the equation relating field strength E in V/m, transmit power P in Watts, transmit antenna numeric gain G, and separation distance in meters above and solving for d below:

$$E(V/m) = \frac{\sqrt{30 \times P \times G}}{d} \quad \text{and} \quad d = \frac{\sqrt{30 \times P \times G}}{E(V/m)} \quad \text{Power density: } P_d(mW/cm^2) = \frac{E^2}{3770}$$

The limit for general population/uncontrolled exposure environment above 1500MHz is 1 mW/cm^2.

SEPARATION DISTANCE:

Separation Distance [A]	**Antenna Gain (dBi)**	**Duty Cycle (%)**
	2.2	
Power[B] (Watt)	(cm)	
0.0131	0.4	13.0
0.1000	3.6	100.0

Calculations:

$$12.8\%\text{ duty cycle} = 0.013m = \frac{\sqrt{30 \times 0.0131 \times 1.65}}{61.4}$$

$$100\%\text{ duty cycle} = 0.036m = \frac{\sqrt{30 \times 0.100 \times 1.65}}{61.4}$$

Notes:
[A] = Distances are calculated for the largest (worst-case) separation distance as applicable
[B] = Measured radiated output power EIRP

CONCLUSION:
The device complies with the MPE requirements by providing a safe separation distance between the antenna, including any radiating structure, and any persons.

Proposed RF exposure safety information to include in User's Manual:

CAUTION: Antenna Installation Requirement
The antenna(s) used for this transmitter must be installed to provide a separation distance of at least 20 cm from all persons and must not be co-located or operating in conjunction with any other antenna or transmitter.