APPENDIX A: FCC PART 1.1307, 1.1310, 2.1091, 2.1093: RF EXPOSURE

FCC ID: O6Y-FSUC800
Environment: General Population/Uncontrolled Exposure
Device category: Mobile per Part 2.1091
Modulation Type/Mode: CDMA

Antenna	Type	Gain (dBi)	Numeric Gain
TQX-800LDI	Whip	2.0	1.58

Frequency Range	Frequency Tolerance (ppm)	Emission Designator
824.7-848.31	1.43	1M25F9W

Output Power (Worst Case)	(W)
EIRP	0.266 (24.25 dBm)
Conducted	0.244 (23.9 dBm)

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 limit for this frequency range is f/1500 or 0.55 mW/cm^2 (824.7 MHz) to 0.57 mW/cm^2 (848.31 MHz). The electric field generated for a 0.57 mW/cm^2 exposure (S) is calculated as follows:

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

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

$$E(V/m) = \sqrt{S \times Z} \qquad 0.57 \text{ mW/cm}^2 = 5.7 \text{ W/m}^2$$

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

Thus:

$E(V/m) = \sqrt{5.7 \times 377}$ = 46.4 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:

$E(V/m) = \frac{\sqrt{30 \times P \times G}}{d}$ and $d = \frac{\sqrt{30 \times P \times G}}{E(V/m)}$ Power density: $P_d(mW/cm^2) = \frac{E^2}{2149}$

The limit for general population/uncontrolled exposure environment is f/1500 mW/cm^2, or 0.55 mW/cm^2 (824.7 MHz) to 0.57 mW/cm^2 (848.31 MHz).

SEPARATION DISTANCE:

Separation Distance [A]	**Antenna Gain (dBi)**
	2
Power[B] **(Watt)**	(cm)
0.244	8.3

Calculations:

$$S = \frac{P \times G}{4 \times p \times d^2} \qquad 0.083m = \frac{\sqrt{30 \times 0.244 \times 2}}{46.4}$$

Where:
S = Power density P = Transmitter conducted power in watts
G = Numeric gain D = Distance to radiation center

Fundamental Operating Frequency: 824.7 - 848.31 MHz
Measured Conducted Power: 0.244W (23.87 dBm)
Antenna Gain = 2 dBi; Numeric Gain = 1.58

S = 244 x 1.58/4 x p x 20^2 = 0.08 mW/ cm^2 at 20 cm

Antenna Gain = 2 dBi Conducted Power (mW) = 244	
Separation Distance	
Power Density Limit	Calculated Power density at 20 cm distance
0.6 mW/cm ^{2}	0.08 mW/ cm ^{2}

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.