10 FCC §2.1091 & §80.227 - RADIOFREQUENCY RADIATION EXPOSURE EVALUATION: MOBILE DEVICE, SPECIAL REQUIREMENT FOR PROTECTION FROM RF RADIATION

10.1 Applicable Standards

§2.1091

(a) Requirements of this section are a consequence of Commission responsibilities under the National Environmental Policy Act to evaluate the environmental significance of its actions. See subpart I of part 1 of this chapter, in particular §1.1307(b).

§80.227

According to §1.1307(b)(1), 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 level in excess of the Commission's guidelines.

According to §1.1310 and §2.1091 RF exposure is calculated.

Limits for Occupational/Controlled Exposure

Frequency Range (MHz)	Electric Field Strength (V/m)	Magnetic Field Strength (A/m)	Power Density (mW/cm^2)	Averaging Time (minutes)
Limits for Occupational/Controlled Exposure				
0.3-1.34	614	1.63	*(100)	6
1.34-30	1842/f	4.89/f	*($900/f^2$)	6
30-300	61.4	0.163	1.0	6
300-1500	/	/	f/300	6
1500-100,000	/	/	5.0	6

f = frequency in MHz
* = Plane-wave equivalent power density

10.2 MPE Prediction

Predication of MPE limit at a given distance, Equation from OET Bulletin 65, Edition 97-01

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

Where: S = power density
P = power input to antenna
G = power gain of the antenna in the direction of interest relative to an isotropic radiator
R = distance to the center of radiation of the antenna

10.3 Test Results

SSB mode (J3E)

Low Channel:

Rated maximum peak conducted output power (dBm):	51.761
Rated maximum peak conducted output power (mW):	150000
Predication distance (cm):	20
Predication frequency (MHz):	1.605
Maximum Antenna Gain, typical (dBi):	3.0
Maximum Antenna Gain (numeric):	2.0
Power density of prediction frequency at prediction distance (mW/cm^2):	59.53
FCC limit (mW/cm^2):	349.38

Middle Channel

Rated maximum peak conducted output power (dBm):	51.761
Rated maximum peak conducted output power (mW):	150000
Predication frequency (MHz):	8.291
Maximum Antenna Gain, typical (dBi):	3.0
Maximum Antenna Gain (numeric):	2.0
FCC MPE limit for controlled exposure at predication frequency (mW/cm^2):	13.09
Predication distance (cm):	42.71

High Channel:

Rated maximum peak conducted output power (dBm):	51.761
Rated maximum peak conducted output power (mW):	150000
Predication frequency (MHz):	27.500
Maximum Antenna Gain, typical (dBi):	3.0
Maximum Antenna Gain (numeric):	2.0
FCC MPE limit for controlled exposure at predication frequency (mW/cm^2):	1.19
Predication distance (cm):	141.64

Results

Low channel:
The device is compliant with the requirement MPE limit for controlled exposure. The maximum power density at the distance of 20 cm is59.68 mW/cm^2. Which is compliant with the limit 349.38 mW/cm^2.

Middle Channel:
The device is compliant with the requirement MPE limit for controlled exposure. The maximum power density at the distance of 42.71 cm is 13.09mW/cm^2. Thus the minimum compliant distance is 42.19cm.

High Channel:
The device is compliant with the requirement MPE limit for controlled exposure. The maximum power density at the distance of 141.64 cm is 1.19mW/cm^2. Thus the minimum compliant distance is 141.64 cm.

DSC mode (F1B)

Low Channel:

Maximum peak conducted output power (dBm):	50.31
Maximum peak conducted output power (mW):	107398.94
Predication distance (cm):	20
Predication frequency (MHz):	2.1875
Maximum Antenna Gain, typical (dBi):	3.0
Maximum Antenna Gain (numeric):	2.0
Power density of prediction frequency at predication distance (mW/cm^2):	42.63
FCC limit (mW/cm^2):	188.1

Middle Channel

Maximum peak conducted output power (dBm):	50.24
Maximum peak conducted output power (mW):	105681.75
Predication frequency (MHz):	8.4145
Maximum Antenna Gain, typical (dBi):	3.0
Maximum Antenna Gain (numeric):	2.0
FCC MPE limit for controlled exposure at predication frequency (mW/cm^2):	12.71
Predication distance (cm):	36.33

High Channel:

Maximum peak conducted output power (dBm):	50.57
Maximum peak conducted output power (mW):	114024.98
Predication frequency (MHz):	16.8045
Maximum Antenna Gain, typical (dBi):	3.0
Maximum Antenna Gain (numeric):	2.0
FCC MPE limit for controlled exposure at predication frequency (mW/cm^2):	3.19
Predication distance (cm):	75.34

Results

Low channel:
The device is compliant with the requirement MPE limit for controlled exposure. The maximum power density at the distance of 20 cm is 42.63 mW/cm^2. Which is compliant with the limit 188.1 mW/cm^2.

Middle Channel:
The device is compliant with the requirement MPE limit for controlled exposure. The maximum power density at the distance of 36.33 cm is 12.71mW/cm^2. Thus the minimum compliant distance is 36.33 cm.

High Channel:
The device is compliant with the requirement MPE limit for controlled exposure. The maximum power density at the distance of 75.34 cm is 3.19mW/cm^2. Thus the minimum compliant distance is 75.34 cm.

Note: antenna gain is provided by manufacturer.