

## RF EXPOSURE

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 §2.1093 RF exposure is calculated.

Limits for Maximum Permissible Exposure (MPE)

### (A) Limits for General Population/Uncontrolled Exposure

Frequency Range (MHz)	Electric Field Strength (V/m)	Magnetic Field Strength (A/m)	Power Density (mW/cm <sup>2</sup> )	Averaging Time (minute)
Limits for General Population/Uncontrolled Exposure				
0.3-1.34	614	1.63	*(100)	30
1.34-30	824/f	2.19/f	*(180/f <sup>2</sup> )	30
30-300	27.5	0.073	0.2	30
300-1500	/	/	f/1500	30
1500-100,000	/	/	1.0	30

### (B) Limits for Occupational/Controlled Exposures

Frequency Range (MHz)	Electric Field Strength (V/m)	Magnetic Field Strength (A/m)	Power Density (mW/cm <sup>2</sup> )	Averaging Time (minute)
Limits for Occupational/Controlled Exposure				
0.3-3.0	614	1.63	*(100)	6
3.0-30	1842/f	4.89/f	*(900/f <sup>2</sup> )	6
30-300	61.4	0.163	1.0	6
300-1500	/	/	f/300	6
1500-100,000	/	/	5	6

f = frequency in MHz

\* = Plane-wave equivalent power density

### MPE Prediction

Predication of MPE limit at a given distance

Equation from page 18 of 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

*RF Exposure for 15.407*

1. TDJ-5800BKC40-W Panel Antenna

Maximum peak output power at antenna input terminal: 18.56 (dBm)

Maximum peak output power at antenna input terminal: 71.78 (mW)

Predication frequency: 5700 (MHz)

Antenna Gain (maximum): 12 (dBi)

antenna gain: 15.85 (numeric)

Power density at predication frequency at 20 cm: 0.226(mW/cm<sup>2</sup>)

2. Dual-Band Indoor Antenna

Maximum peak output power at antenna input terminal: 18.56 (dBm)

Maximum peak output power at antenna input terminal: 71.78 (mW)

Predication frequency: 5700 (MHz)

Antenna Gain (maximum): 8 (dBi)

antenna gain: 6.31 (numeric)

Power density at predication frequency at 20 cm: 0.09(mW/cm<sup>2</sup>)

3. TQJ-5800C-5 Fiberglass Omni Antenna

Maximum peak output power at antenna input terminal: 18.56 (dBm)

Maximum peak output power at antenna input terminal: 71.78 (mW)

Predication frequency: 5700 (MHz)

Antenna Gain (maximum): 8 (dBi)

antenna gain: 6.31 (numeric)

Power density at predication frequency at 20 cm: 0.09(mW/cm<sup>2</sup>)

4. TDJ-5800BKF8 Indoor Antenna

Maximum peak output power at antenna input terminal: 18.56 (dBm)

Maximum peak output power at antenna input terminal: 71.78 (mW)

Predication frequency: 5700 (MHz)

Antenna Gain (maximum): 8 (dBi)

antenna gain: 6.31 (numeric)

Power density at predication frequency at 20 cm: 0.09(mW/cm<sup>2</sup>)

5. TWM-613-376 Tri-Band Flying Lead Swivel Antenna

Maximum peak output power at antenna input terminal: 18.56 (dBm)

Maximum peak output power at antenna input terminal: 71.78 (mW)

Predication frequency: 5700 (MHz)

Antenna Gain (maximum): 4.5 (dBi)

antenna gain: 2.82 (numeric)

Power density at predication frequency at 20 cm: 0.005(mW/cm<sup>2</sup>)

*RF Exposure for 15.247*

1. Dual-Band Indoor Antenna

Maximum peak output power at antenna input terminal: 19.75 (dBm)  
Maximum peak output power at antenna input terminal: 94.41 (mW)  
Predication frequency: 2400 (MHz)  
Antenna Gain (maximum): 12 (dBi)  
antenna gain: 15.85 (numeric)  
Power density at predication frequency at 20 cm: 0.298(mW/cm<sup>2</sup>)

2. Dual-Band Indoor Antenna

Maximum peak output power at antenna input terminal: 19.75 (dBm)  
Maximum peak output power at antenna input terminal: 94.41 (mW)  
Predication frequency: 2400(MHz)  
Antenna Gain (maximum): 8 (dBi)  
antenna gain: 6.31 (numeric)  
Power density at predication frequency at 20 cm: 0.119(mW/cm<sup>2</sup>)

3. TQJ-5800C-5 Fiberglass Omni Antenna

Maximum peak output power at antenna input terminal: 19.75 (dBm)  
Maximum peak output power at antenna input terminal: 94.41 (mW)  
Predication frequency: 2400 (MHz)  
Antenna Gain (maximum): 8 (dBi)  
antenna gain: 6.31 (numeric)  
Power density at predication frequency at 20 cm: 0.119(mW/cm<sup>2</sup>)

4. TDJ-5800BKF8 Indoor Antenna

Maximum peak output power at antenna input terminal: 19.75 (dBm)  
Maximum peak output power at antenna input terminal: 94.41 (mW)  
Predication frequency: 2400(MHz)  
Antenna Gain (maximum): 8 (dBi)  
antenna gain: 6.31 (numeric)  
Power density at predication frequency at 20 cm: 0.119(mW/cm<sup>2</sup>)

5. TWM-613-376 Tri-Band Flying Lead Swivel Antenna

Maximum peak output power at antenna input terminal: 19.75 (dBm)  
Maximum peak output power at antenna input terminal: 94.41 (mW)  
Predication frequency: 2400(MHz)  
Antenna Gain (maximum): 4.5 (dBi)  
antenna gain: 2.82 (numeric)  
Power density at predication frequency at 20 cm: 0.021(mW/cm<sup>2</sup>)

## Test Result

The EUT is a mobile device. The power density level at 20 cm is as following:

For 15.407

1. TDJ-5800BKC40-W Panel Antenna is 0.226 mW/cm<sup>2</sup>, which is below the uncontrolled exposure limit of 1.0mW/cm<sup>2</sup> at 5700 MHz.
2. Dual-Band Indoor Antenna is 0.009 mW/cm<sup>2</sup>, which is below the uncontrolled exposure limit of 1.0mW/cm<sup>2</sup> at 5700 MHz.
3. TQJ-5800C-5 Fiberglass Omni Antenna is 0.009 mW/cm<sup>2</sup>, which is below the uncontrolled exposure limit of 1.0mW/cm<sup>2</sup> at 5700 MHz.
4. TDJ-5800BKF8 Indoor Antenna is 0.009 mW/cm<sup>2</sup>, which is below the uncontrolled exposure limit of 1.0mW/cm<sup>2</sup> at 5700 MHz.
5. TWM-613-376 Tri-Band Flying Lead Swivel Antenna is 0.005 mW/cm<sup>2</sup>, which is below the uncontrolled exposure limit of 1.0mW/cm<sup>2</sup> at 5700 MHz.

For 15.247

1. TDJ-5800BKC40-W Panel Antenna is 0.298 mW/cm<sup>2</sup>, which is below the uncontrolled exposure limit of 1.0mW/cm<sup>2</sup> at 2400 MHz.
2. Dual-Band Indoor Antenna is 0.119 mW/cm<sup>2</sup>, which is below the uncontrolled exposure limit of 1.0mW/cm<sup>2</sup> at 2400 MHz.
3. TQJ-5800C-5 Fiberglass Omni Antenna is 0.119 mW/cm<sup>2</sup>, which is below the uncontrolled exposure limit of 1.0mW/cm<sup>2</sup> at 2400 MHz.
4. TDJ-5800BKF8 Indoor Antenna is 0.119 mW/cm<sup>2</sup>, which is below the uncontrolled exposure limit of 1.0mW/cm<sup>2</sup> at 2400 MHz.
5. TWM-613-376 Tri-Band Flying Lead Swivel Antenna is 0.021 mW/cm<sup>2</sup>, which is below the uncontrolled exposure limit of 1.0mW/cm<sup>2</sup> at 2400 MHz.