

## 14. MAXIMUM PERMISSIBLE EXPOSURE (MPE)

### 14.1 Standard Applicable

According to §1.1307(b)(1), systems operating under the provisions of this section shall be operated in a manner that ensure that the public is not exposed to radio frequency energy level in excess of the Commission's guideline.

This is a Mobile device, the MPE is required.

According to §1.1310 and §2.1093 RF exposure is calculated.

Limits for Maximum Permissive Exposure (MPE)

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
1500-15000	/	/	1.0	30

F = frequency in MHz

\* = Plane-wave equipment power density

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## 14.2 Maximum Permissible Exposure (MPE) Evaluation (Worst Case)

### 802.11a\_Main

CH	Frequency (MHz)	Data Rate	TOTAL POWER (dBm)	TOTAL POWER (mW)	REQUIRED LIMIT (dBm)		RESULT
36	5180	6M	12.64	18.365	23.98		PASS
44	5220	6M	12.58	18.113	23.98		PASS
48	5240	6M	12.54	17.947	23.98		PASS
52	5260	6M	12.51	17.824	23.98 or $11+10\log(B) = 23.19$		PASS
60	5300	6M	12.51	17.824	23.98 or $11+10\log(B) = 23.19$		PASS
64	5320	6M	12.65	18.408	23.98 or $11+10\log(B) = 23.19$		PASS
100	5500	6M	12.55	17.989	23.98 or $11+10\log(B) = 23.18$		PASS
116	5580	6M	12.51	17.824	23.98 or $11+10\log(B) = 23.18$		PASS
140	5700	6M	12.54	17.947	23.98 or $11+10\log(B) = 23.18$		PASS
149	5745	6M	12.52	17.865	30		PASS
157	5785	6M	12.58	18.113	30		PASS
165	5825	6M	12.56	18.030	30		PASS

### MPE Prediction (802.11a)

Prediction 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

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## 5150~5250MHz

Max. output power including tune-up tolerancel:	12.64	(dBm)
Max. output power including tune-up tolerancel:	18.365383	(mW)
Duty cycle:	96.17	(%)
Maximum Pav :	17.661989	(mW)
Peak Antenna gain (Maximum):	5.27	(dBi)
Peak Antenna gain (linear):	3.3651157	(numeric)
Prediction distance:	20	(cm)
Prediction frequency:	5180	(MHz)
MPE limit for uncontrolled exposure at prediction	1	(mW/cm <sup>2</sup> )
Power density at predication frequency at 20 (cm)	0.012	(mW/cm <sup>2</sup> )

### Measurement Result

The predicted power density level at 20 cm is 0.012 mW/cm<sup>2</sup>.

This is below the uncontrolled exposure limit of 1 mW/cm<sup>2</sup> at 5180MHz.

## 5250~5350MHz

Max. output power including tune-up tolerancel:	12.65	(dBm)
Max. output power including tune-up tolerancel:	18.40772	(mW)
Duty cycle:	96.17	(%)
Maximum Pav :	17.702704	(mW)
Peak Antenna gain (Maximum):	5.27	(dBi)
Peak Antenna gain (linear):	3.3651157	(numeric)
Prediction distance:	20	(cm)
Prediction frequency:	5320	(MHz)
MPE limit for uncontrolled exposure at prediction	1	(mW/cm <sup>2</sup> )
Power density at predication frequency at 20 (cm)	0.012	(mW/cm <sup>2</sup> )

### Measurement Result

The predicted power density level at 20 cm is 0.012 mW/cm<sup>2</sup>.

This is below the uncontrolled exposure limit of 1 mW/cm<sup>2</sup> at 5320MHz.

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## 5470~5725MHz

Max. output power including tune-up tolerancel:	12.55	(dBm)
Max. output power including tune-up tolerancel:	17.988709	(mW)
Duty cycle:	96.17	(%)
Maximum Pav :	17.299742	(mW)
Peak Antenna gain (Maximum):	5.27	(dBi)
Peak Antenna gain (linear):	3.3651157	(numeric)
Prediction distance:	20	(cm)
Prediction frequency:	5500	(MHz)
MPE limit for uncontrolled exposure at prediction	1	(mW/cm <sup>2</sup> )
Power density at predication frequency at 20 (cm)	0.012	(mW/cm <sup>2</sup> )

### Measurement Result

The predicted power density level at 20 cm is 0.012 mW/cm<sup>2</sup>.

This is below the uncontrolled exposure limit of 1 mW/cm<sup>2</sup> at 5500MHz.

## 5745~5825MHz

Max. output power including tune-up tolerancel:	12.58	(dBm)
Max. output power including tune-up tolerancel:	18.113401	(mW)
Duty cycle:	96.17	(%)
Maximum Pav :	17.419658	(mW)
Peak Antenna gain (Maximum):	5.27	(dBi)
Peak Antenna gain (linear):	3.3651157	(numeric)
Prediction distance:	20	(cm)
Prediction frequency:	5785	(MHz)
MPE limit for uncontrolled exposure at prediction	1	(mW/cm <sup>2</sup> )
Power density at predication frequency at 20 (cm)	0.012	(mW/cm <sup>2</sup> )

### Measurement Result

The predicted power density level at 20 cm is 0.012 mW/cm<sup>2</sup>.

This is below the uncontrolled exposure limit of 1 mW/cm<sup>2</sup> at 5785MHz.

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