

## 17. MAXIMUM PERMISSIBLE EXPOSURE (MPE)

### 17.1 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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## 17.2 Maximum Permissible Exposure (MPE) Evaluation

### 802.11a 5150~5250

#### Power Table

Frequency (MHz)	Reading Power (dBm)	Output Power (dBm)	Output Power (W)	Limit (W)
5180.00	14.94	14.94	0.03119	1
5220.00	<b>15.06</b>	15.06	0.03206	1
5240.00	14.99	14.99	0.03155	1

#### MPE Prediction (802.11a 5150~5250)

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

Maximum peak output power at antenna input terminal:	<b>15.06</b>	(dBm)
Maximum peak output power at antenna input terminal:	32.06269325	(mW)
Duty cycle:	<b>100</b>	(%)
Maximum Pav :	32.06269325	(mW)
Antenna gain (typical):	<b>3.92</b>	(dBi)
Maximum antenna gain:	2.466039337	(numeric)
Prediction distance:	20	(cm)
Prediction frequency:	<b>5220</b>	(MHz)
MPE limit for uncontrolled exposure at prediction	1	(mW/cm <sup>2</sup> )
Power density at predication frequency at 20 (cm)	0.015738	(mW/cm <sup>2</sup> )

#### Measurement Result

The predicted power density level at 20 cm is 0.015738mW/cm<sup>2</sup>. This is below the uncontrolled exposure limit of 1mW/cm<sup>2</sup> at 5220MHz.

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**802.11a 5250~5350****Power Table**

Frequency (MHz)	Reading Power (dBm)	Output Power (dBm)	Output Power (W)	Limit (W)
5260.00	<b>15.27</b>	15.27	0.03365	1
5300.00	14.86	14.86	0.03062	1
5320.00	14.57	14.57	0.02864	1

**MPE Prediction (802.11a 5250~5350)**

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

Maximum peak output power at antenna input terminal:	<b>15.27</b>	(dBm)
Maximum peak output power at antenna input terminal:	33.65115694	(mW)
Duty cycle:	<b>100</b>	(%)
Maximum Pav :	33.65115694	(mW)
Antenna gain (typical):	<b>3.92</b>	(dBi)
Maximum antenna gain:	2.466039337	(numeric)
Prediction distance:	20	(cm)
Prediction frequency:	<b>5260</b>	(MHz)
MPE limit for uncontrolled exposure at prediction	1	(mW/cm <sup>2</sup> )
Power density at predication frequency at 20 (cm)	0.016518	(mW/cm <sup>2</sup> )

**Measurement Result**

The predicted power density level at 20 cm is 0.016518mW/cm<sup>2</sup>. This is below the uncontrolled exposure limit of 1mW/cm<sup>2</sup> at 5260MHz.

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**802.11a 5470~5725****Power Table**

Frequency (MHz)	Reading Power (dBm)	Output Power (dBm)	Output Power (W)	Limit (W)
5500.00	14.19	14.19	0.02624	1
5580.00	14.91	14.91	0.03097	1
5700.00	<b>15.08</b>	15.08	0.03221	1

**MPE Prediction (802.11a 5470~5725)**

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

Maximum peak output power at antenna input terminal:	<b>15.08</b>	(dBm)
Maximum peak output power at antenna input terminal:	32.21068791	(mW)
Duty cycle:	<b>100</b>	(%)
Maximum Pav :	32.21068791	(mW)
Antenna gain (typical):	<b>4.97</b>	(dBi)
Maximum antenna gain:	3.140508694	(numeric)
Prediction distance:	20	(cm)
Prediction frequency:	<b>5700</b>	(MHz)
MPE limit for uncontrolled exposure at prediction	<b>1</b>	(mW/cm <sup>2</sup> )
Power density at predication frequency at 20 (cm)	0.020135	(mW/cm <sup>2</sup> )

**Measurement Result**

The predicted power density level at 20 cm is 0.020135mW/cm<sup>2</sup>. This is below the uncontrolled exposure limit of 1mW/cm<sup>2</sup> at 5700MHz.

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