

## Maximum Permissible Exposure (MPE)

### 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.

According to §1.1310 and §2.1091 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

FCC

Maximum Permissible Exposure (MPE) Evaluation: The worst case of Average power

**Power measurement:** refer to Part15.247 report for details.

Wi-Fi	Frequency Range (MHz)	Channels	Peak / Average Power	Modulation Technology
802.11b	2412 – 2462(DTS)	11	12.93 dBm (AV)	DSSS
802.11g	2412 – 2462(DTS)	11	11.80 dBm (AV)	OFDM
802.11n	HT20 2412 – 2462(DTS)	11	11.37 dBm (AV)	
Antenna Designation		Detachable Revised SMA Type. Antenna Type: Dipole, 2.7dBi		
Tune up power (Average)		12 dBm +/- 1 dBm		

Maximum output power at antenna input terminal:	12	(dBm)
Maximum output power at antenna input terminal:	15.84893192	(mW)
Tune-Up power Tolerance:	1	dB
Duty cycle:	100	(%)
Maximum Pav :	19.95262315	(mW)
Antenna gain (typical):	2.7	(dBi)
Maximum antenna gain:	1.862087137	(numeric)
Prediction distance:	20	(cm)
MPE limit for uncontrolled exposure at prediction	1	(mW/cm <sup>2</sup> )
Power density at predication frequency at 20 (cm)	0.0073952	(mW/cm <sup>2</sup> )

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

### Measurement Result:

The predicted power density level at 20 cm is 0.00740 mW/cm<sup>2</sup>.. This is below the uncontrolled exposure limit of 1 mW/cm<sup>2</sup>.

**BT mode:**

Maximum Permissible Exposure (MPE) Evaluation: The worst case of Peak power

**Power measurement:** refer to Part15.247 report for details.

**Tune-Up Power:**

Frequency Range:	2402 – 2480MHz
Tune-Up Power:	7.0 dBm (Peak), +/- 1 dB
Antenna Gain:	Detachable Revised SMA Type. Antenna Type: Dipole, 2.7dBi

Maximum output power at antenna input terminal:	7	(dBm)
Maximum output power at antenna input terminal:	5.011872336	(mW)
Tune-Up power Tolerance:	1	dB
Duty cycle:	100	(%)
Maximum Pav :	6.309573445	(mW)
Antenna gain (typical):	2.7	(dBi)
Maximum antenna gain:	1.862087137	(numeric)
Prediction distance:	20	(cm)
MPE limit for uncontrolled exposure at prediction	1	(mW/cm <sup>2</sup> )
Power density at predication frequency at 20 (cm)	0.0023386	(mW/cm <sup>2</sup> )

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

**Measurement Result:**

The worst power density is 0.00234 mW/cm<sup>2</sup> which is less than 1 mW/cm<sup>2</sup>.

**Simultaneous transmission mode**

WiFi 2.4GHz mode + BT Mode:

FCC:

Prediction frequency:	2.4	(GHz)
Power density at predication frequency at 20 (cm)	0.0073952	(mW/cm <sup>2</sup> )

Prediction frequency:	2.4	(GHz)
Power density at predication frequency at 20 (cm)	0.0023386	(mW/cm <sup>2</sup> )
2.4GHz + 2.4GHz Power density at predication frequency at 20 (cm) distance	0.0097338	(mW/cm <sup>2</sup> )
MPE limit for uncontrolled exposure at prediction	1	(mW/cm <sup>2</sup> )

The predicted power density level at 20 cm is 0.00974mW/cm<sup>2</sup>. This is below the uncontrolled exposure limit of 1 mW/cm<sup>2</sup>.

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