

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.

This is a Mobile device, the MPE is required.

FCC: 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 ²)	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 ²)	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

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

Tune-Up Power and Tolerance:

WLAN: 1TX, 1RX

Wi-Fi	Frequency Range (MHz)	Channels	Average Tune-Up Power	Modulation Technology
802.11b	2412 – 2462(DTS)	11	Channel 1-11 13.0 dBm (AV)	DSSS
802.11g	2412 – 2462(DTS)	11	Channel 1-11 8.0 dBm (AV)	DSSS, OFDM
802.11n	HT20 2412 – 2462(DTS)	11		Channel 3-9 8.0 dBm (AV)
	HT40 2422 – 2452(DTS)	7		
Power Tolerance:		+/- 1 dBm		

Power measurement:

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

External Port with Dipole antenna:

802.11b

Cable loss = 0	Output Power		Limit (dBm)
CH	Detector		
	PK (dBm)	AV (dBm)	
Low	15.31	12.22	26
Mid	15.44	13.15	
High	15.28	13.41	

802.11g

Cable loss = 0	Output Power		Limit (dBm)
CH	Detector		
	PK (dBm)	AV (dBm)	
Low	17.41	7.34	26
Mid	17.27	7.42	
High	18.12	8.35	

802.11N HT20

Cable loss = 0	Output Power		Limit (dBm)
CH	Detector		
	PK (dBm)	AV (dBm)	
Low	17.71	7.87	26
Mid	17.15	8.21	
High	17.66	7.16	

802.11N HT40

Cable loss = 0	Output Power		Limit (dBm)
CH	Detector		
	PK (dBm)	AV (dBm)	
Low	17.21	7.42	26
Mid	17.71	7.15	
High	17.37	7.72	

Internal Port with Patch antenna:

802.11b

Cable loss = 0	Output Power		Limit (dBm)
CH	Detector		
	PK (dBm)	AV (dBm)	
Low	15.09	12.71	23.75
Mid	15.76	13.39	
High	15.54	13.19	

802.11g

Cable loss = 0	Output Power		Limit (dBm)
CH	Detector		
	PK (dBm)	AV (dBm)	
Low	17.56	7.63	23.75
Mid	17.75	7.83	
High	18.05	8.24	

802.11N HT20

Cable loss = 0	Output Power		Limit (dBm)
CH	Detector		
	PK (dBm)	AV (dBm)	
Low	17.48	7.97	23.75
Mid	17.58	8.16	
High	17.86	7.59	

802.11N HT40

Cable loss = 0	Output Power		Limit (dBm)
CH	Detector		
	PK (dBm)	AV (dBm)	
Low	17.46	7.68	23.75
Mid	17.43	7.66	
High	17.44	7.81	

MPE calculated: The Worst mode : 802.11 b mode

Dipole Antenna:

	CH 1-11	
Tune-Up power at antenna input terminal:	13.00	(dBm)
Tune-Up power at antenna input terminal:	19.95	(mW)
Tune-Up power Tolerance:	1.00	dB
Duty cycle:	100.00	(%)
Maximum Pav :	25.12	(mW)
Antenna gain (typical):	10.00	(dBi)
Maximum antenna gain:	10.00	(numeric)
Prediction distance:	20.00	(cm)
MPE limit for uncontrolled exposure at prediction frequency:	1.00	(mW/cm ²)
Power density at predication frequency at 20 (cm) distance	0.0500	(mW/cm ²)

Patch Antenna:

	CH 1-11	
Tune-Up power at antenna input terminal:	13.00	(dBm)
Tune-Up power at antenna input terminal:	19.95	(mW)
Tune-Up power Tolerance:	1.00	dB
Duty cycle:	100.00	(%)
Maximum Pav :	25.12	(mW)
Antenna gain (typical):	12.25	(dBi)
Maximum antenna gain:	16.79	(numeric)
Prediction distance:	20.00	(cm)
MPE limit for uncontrolled exposure at prediction frequency:	1.00	(mW/cm ²)
Power density at predication frequency at 20 (cm) distance	0.0839	(mW/cm ²)

Result:

The worst power density is 0.0839 mW/cm² which is less than 1 mW/cm².

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