

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.

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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

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2.5.2 Exemption Limits for Routine Evaluation – RF Exposure Evaluation

RF exposure evaluation is required if the separation distance between the user and/or bystander and the device's radiating element is greater than 20 cm, except when the device operates as follows:

- below 20 MHz⁶ and the source-based, time-averaged maximum e.i.r.p. of the device is equal to or less than 1 W (adjusted for tune-up tolerance);
- at or above 20 MHz and below 48 MHz and the source-based, time-averaged maximum e.i.r.p. of the device is equal to or less than $22.48/f^{0.5}$ W (adjusted for tune-up tolerance), where f is in MHz;
- at or above 48 MHz and below 300 MHz and the source-based, time-averaged maximum e.i.r.p. of the device is equal to or less than 0.6 W (adjusted for tune-up tolerance);
- at or above 300 MHz and below 6 GHz and the source-based, time-averaged maximum e.i.r.p. of the device is equal to or less than $1.31 \times 10^{-2} f^{0.6834}$ W (adjusted for tune-up tolerance), where f is in MHz;
- at or above 6 GHz and the source-based, time-averaged maximum e.i.r.p. of the device is equal to or less than 5 W (adjusted for tune-up tolerance).

In these cases, the information contained in the RF exposure technical brief may be limited to information that demonstrates how the e.i.r.p. was derived.

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 dBm	DSSS
802.11g	2412 – 2462(DTS)	11	Channel 1-11 11 dBm	DSSS, OFDM
802.11n	HT20 2412 – 2462(DTS)	11	Channel 1-11 9 dBm	OFDM
	HT40 2422 – 2452(DTS)	7	Channel 3-9 9 dBm	
Power Tolerance:		+/- 1 dBm		

FCC: 2.4GHz mode: 802.11 b mode

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

Power measurement: refer to Part15.247 and RSS 247 report for details.

802.11b

Cable loss = 0	Output Power		Limit (dBm)
CH	Detector		
	PK (dBm)	AV (dBm)	
Low	16.3	13.85	30
Mid	16.81	13.94	
High	16.25	13.8	

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

	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):	-0.93	(dBi)
Maximum antenna gain:	0.81	(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	0.0040	(mW/cm ²)

Measurement Result:

The worst power density is 0.0040 mW/cm² which is less than 1 mW/cm².

IC EIRP/Conducted Power level: 802.11 b mode

	CH 1-11 2412	MHz
Tune-UP power at antenna input terminal:	13	(dBm)
Tune-Up power Tolerance:	1	dB
Duty cycle:	100	(%)
Antenna gain (typical):	-0.93	(dBi)
Conducted Power:	25.119	mW
Conducted Power:	0.02512	W
EIRP:	20.277	mW
EIRP:	0.02028	W
EIRP Limit	2.684	W

Measurement Result:

The Conducted Power level is 0.02512 W which less than RSS102 section 2.5.2 Exemption Limits (2.684 W) above 300 MHz and below 6 GHz condition .

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