

1 MAXIMUM PERMISSIBLE EXPOSURE (MPE)

1.1 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 §2.1091 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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1.2 Maximum Permissible Exposure (MPE) Evaluation (Worst Case)

802.11b Main						
CH	Freq. (MHz)	Data Rate	Peak Output Power (dBm)	Peak Output Power (mW)	Limit	RESULT
1	2412	1	19.50	89.13	1 Watt = 30.00 dBm	PASS
6	2437	1	19.75	94.41	1 Watt = 30.00 dBm	PASS
11	2462	1	19.67	92.68	1 Watt = 30.00 dBm	PASS
802.11b Main						
CH	Freq. (MHz)	Data Rate	Max. Avg. Output include tune up tolerance Power (dBm)	Max. Avg. Output include tune up tolerance Power (mW)	Limit	RESULT
1	2412	1	17.04	50.58	1 Watt = 30.00 dBm	PASS
6	2437	1	17.41	55.08	1 Watt = 30.00 dBm	PASS
11	2462	1	17.24	52.97	1 Watt = 30.00 dBm	PASS

MPE Prediction (802.11b 2412~2462)

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

Max. output power including tune-up tolerance:	17.41	(dBm)
Max. output power including tune-up tolerance:	55.08077	(mW)
Duty cycle:	97.85	(%)
Maximum Pav :	53.896533	(mW)
Peak Antenna gain (Maximum):	1.48	(dBi)
Peak Antenna gain (linear):	1.4060475	(numeric)
Prediction distance:	20	(cm)
Prediction frequency:	2437	(MHz)
MPE limit for uncontrolled exposure at prediction	1	(mW/cm ²)
Power density at predication frequency at 20 cm	0.015	(mW/cm ²)

Measurement Result

distance

The predicted power density level at 20 cm is 0.015 mW/cm².

This is below the uncontrolled exposure limit of 1 mW/cm² at 2437MHz.

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2 MAXIMUM PERMISSIBLE EXPOSURE (MPE)

2.1 Standard Applicable

According to RSS 102 March 19, 2015 issue 5 §2.5.2 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 MHz 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;

This is a Mobile device, at which separation distance between the user and the device's antenna is 20cm. Therefore, section 2.5.2 shall be complied with.

2.2 Maximum Permissible Exposure (MPE) Exemption (Worst Case)

802.11 b:

Max. output power including tune-up tolerance:	17.41	(dBm)
Max. output power including tune-up tolerance:	55.08077	(mW)
Antenna gain (Peak):	1.48	(dBi)
Maximum antenna gain:	1.4060475	(numeric)
Frenquency	2437	MHz
Limit	2.7030	W
EIRP	0.0774	W

Evaluation Result

*The radiated power is $17.41 + 1.48 = 18.89 \text{ dBm}(EIRP) = 77.446 \text{ mW} = 0.077446 \text{ W}$
that is less than or equal to 2.703W. Hence, following section 2.5.2 of RSS102 issue 5,
RF exposure evaluation is no longer required.*

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