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.

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

Power measurement result:

Tune up procedure

The output power setting of EUT is set in the factory and followed the max level in below.

There is no tune up procedure except factory default setting:

WiFi Tune-Up Power:

Frequency Range:	2412MHz – 2462MHz
WiFi Version:	802.11 b/g/n
Tune-Up Power (Average Power)	b mode: 11.5 dBm +/- 1 dBm g mode: 10 dBm +/- 1 dBm 20n mode: 9dBm +/- 1 dBm
Antenna Gain	-1.65 dBi

Bluetooth Tune-Up Power:

Frequency Range:	2402 – 2480MHz	
Bluetooth Version:	V4.0	V2.1 + EDR (GFSK + π /4 DQPSK + 8DPSK)
Tune-Up Power	4.5dBm +/- 1.0 dBm	3.0dBm +/- 1.0 dBm

BT Mode

Maximum Permissible Exposure (MPE) Evaluation

The worst case of Average power: BT BLE

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 Average output power at antenna input	4.5	(dBm)
Power Tolerance	1	dB
Maximum peak output power at antenna input terminal:	3.548133892	(mW)
Duty cycle:	99	(%)
Maximum Pav :	3.512652553	(mW)
Antenna gain (typical):	-1.65	(dBi)
Maximum antenna gain:	0.683911647	(numeric)
Prediction distance:	20	(cm)
MPE limit for uncontrolled exposure at prediction	1	(mW/cm^2)
Power density at predication frequency at 20 (cm)	0.0004782	(mW/cm^2)

Measurement Result

The predicted power density level at 20 cm is 0.0004782 mW/cm^2. This is below the uncontrolled exposure limit of 1 mW/cm^2.

Wifi Mode:

Maximum Permissible Exposure (MPE) Evaluation

The worst case of Average power: 802.11 b

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 Average output power at antenna input	11.5	(dBm)
Power Tolerance	1	dB
Maximum peak output power at antenna input terminal:	17.7827941	(mW)
Duty cycle:	99	(%)
Maximum Pav :	17.60496616	(mW)
Antenna gain (typical):	-1.65	(dBi)
Maximum antenna gain:	0.683911647	(numeric)
Prediction distance:	20	(cm)
MPE limit for uncontrolled exposure at prediction	1	(mW/cm^2)
Power density at predication frequency at 20 (cm)	0.0023965	(mW/cm^2)

Measurement Result

The predicted power density level at 20 cm is 0.0023965 mW/cm^2. This is below the uncontrolled exposure limit of 1 mW/cm^2.

Wifi + BT Mode

Maximum Permissible Exposure (MPE) Evaluation

The worst case of Average power: 802.11 b + BT BLE

The predicted power density level at 20 cm is 0.0023965 mW/cm^2 + 0.0004782 mW/cm^2 = 0.0028747 what is below the uncontrolled exposure limit of 1 mW/cm^2.

~ end report ~