SGS-CSTC Standards Technical Services Co., Ltd. Guangzhou Branch

RF Exposure Compliance Requirement

1. Standard requirement

Systems operating under the provisions of this section shall be operated in a manner that ensures that the public is not exposed to radio frequency energy level in excess limit for maximum permissible exposure. In accordance with 47 CFR FCC Part 2 Subpart J, section 2.1091 this device has been defined as a mobile device whereby a distance of 0.2m normally can be maintained between the user and the device.

(a) Limits for Occupational / Controlled Exposure

Frequency Range (MHz)	Electric Field Strength (E) (V/m)	Magnetic Field Strength (H) (A/m)	Power Density (S)(mW/cm²)	Averaging Times $\lvert E \rvert^2$, $\lvert H \rvert^2$ or S (minutes)
0.3-3.0	614	1.63	(100)*	6
3.0-30	1842/f	4.89/f	(900/f)*	6
30-300	61.4	0.163	1.0	6
300-1500	--	--	F/300	6
1500-100000	--	--	5	6

(b) Limits for General Population / Uncontrolled Exposure

Frequency Range (MHz)	Electric Field Strength (E) (V/m)	Magnetic Field Strength (H) (A/m)	Power Density (S)(mW/cm²)	Averaging Times $\lvert E \rvert^2$, $\lvert H \rvert^2$ or S (minutes)
0.3-1.34	614	1.63	(100)*	30
1.34-30	824/f	2.19/f	(180/f)*	30
30-300	27.5	0.073	0.2	30
300-1500	--	--	F/1500	30
1500-100000	--	--	1.0	30

Note: f=frequency in MHz; *Plane-wave equivalent power density

2. MPE Calculation Method

$E (V/m) = (30*P*G)^{0.5}/d$ Power Density: $Pd(W/m^2) = E^2/377$

E=Electric Field (V/m)

P=Peak RF output Power (W)

G=EUT Antenna numeric gain (numeric)

d= Separation distance between radiator and human body (m)

The formula can be changed to

$Pd = (30*P*G)/(377*d^2)$

From the peak EUT RF output power, the minimum mobile separation distance, d=0.2m, as well as the gain of the used antenna, the RF power density can be obtained.

3. Calculated Result and Limit：

For the Bluetooth emission only:

For Normal mode with GFSK modulation:

Frequency (MHz)	Antenna Gain	Antenna Gain (Numeric)	Peak Output Power (dBm)	Peak Output Power (mW)	Power Density (S) (mW/cm²)	Limit of Power Density (S) (mW/cm²)
2402	0dBi	1.0	-2.58	0.552	0.00011	1
2442	0dBi	1.0	**-3.33**	0.465	0.00009	1
2480	0dBi	1.0	-3.98	0.400	0.00008	1

For EDR mode with 8DPSK modulation:

Frequency (MHz)	Antenna Gain	Antenna Gain (Numeric)	Peak Output Power (dBm)	Peak Output Power (mW)	Power Density (S) (mW/cm²)	Limit of Power Density (S) (mW/cm²)
2402	0dBi	1.0	-3.80	0.417	0.00008	1
2442	0dBi	1.0	-4.63	0.344	0.00007	1
2480	0dBi	1.0	-5.35	0.292	0.00006	1

For the WIFI emission only:

1)802.11b 11Mbps data rate:

Frequency (MHz)	Antenna Gain (Numeric)	Peak Output Power (dBm)	Peak Output Power (mW)	Power Density (S) (mW/cm^2)	Limit of Power Density (S) (mW/cm^2)	Test Result
2412	1.585	18.45	69.984	0.02207	1	Complies
2442	1.585	**18.57**	71.945	0.02268	1	Complies
2462	1.585	18.40	69.183	0.02181	1	Complies

(2) 802.11g 54Mbps data rate:

Frequency (MHz)	Antenna Gain (Numeric)	Peak Output Power (dBm)	Peak Output Power (mW)	Power Density (S) (mW/cm^2)	Limit of Power Density (S) (mW/cm^2)	Test Result
2412	1.585	18.22	66.374	0.02093	1	Complies
2442	1.585	18.30	67.608	0.02132	1	Complies
2462	1.585	18.47	70.307	0.02217	1	Complies

3)802.11n(HT20) 65Mbps data rate:

Frequency (MHz)	Antenna Gain (Numeric)	Peak Output Power (dBm)	Peak Output Power (mW)	Power Density (S) (mW/cm^2)	Limit of Power Density (S) (mW/cm^2)	Test Result
2412	1.585	16.38	43.451	0.01370	1	Complies
2442	1.585	16.65	46.238	0.01458	1	Complies
2462	1.585	16.65	46.238	0.01458	1	Complies

(4)802.11n(HT40) 135Mbps data rate:

Frequency (MHz)	Antenna Gain (Numeric)	Peak Output Power (dBm)	Peak Output Power (mW)	Power Density (S) (mW/cm^2)	Limit of Power Density (S) (mW/cm^2)	Test Result
2422	1.585	16.56	45.290	0.01428	1	Complies
2442	1.585	16.75	47.315	0.01492	1	Complies
2452	1.585	16.61	45.814	0.01445	1	Complies

The device Bluetooth and WIFI synchronous emission signal at same time. Below worst case was evaluated for the RF exposure.

The max power density from the device should be the total PSD of Bluetooth and WIFI at 2442Mhz.

0.00009(mW/cm2)+0.02268(mW/cm2)=0.02277(mW/cm2) < Limit 1 (mW/cm2).

Conclusion:

The device meets the maximum permissible exposure requirement.