FCC §15.247 (i), §2.1091 – RF Exposure

FCC ID: 2BFL2-TLM002

Applied procedures / limit

According to FCC §15.247(i) and §1.1307(b)(1), 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 of the Commission's guidelines.

Limits for Occupational / Controlled Exposure

Frequency Range (MHz)	Electric Field Strength (E) (V/m)	Magnetic Field Strength (H) (A/m)	Power Density (S) (mW/ cm^2)	Averaging Time $\|E\|^2$,$\|H\|^2$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
1500-100,000			5	6

Note: f is frequency in MHz

* = Power density limit is applicable at frequencies greater than 100 MHz

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/ cm^2)	Averaging Time $\|E\|^2$,$\|H\|^2$ 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
1500-100,000			1.0	30

Note: f = frequency in MHz

* = Plane-wave equivalent power density

MPE PREDICTION

Predication of MPE limit at a given distance, Equation from 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,R=20cm

Test Result of RF Exposure Evaluation

	Modes& Channel Freq. (MHz)	Tune up Produce power	Maximum peak output power (dBm)	Output power to antenna (mW)	Antenna Gain (numeric)	Power Density (S) (mW/ cm2)	Limit (mW/ cm2)	Result
BLE	GFSK&LCH	0±1	1	1.2589	2.4717 (3.93dBi)	0.0006	1	Pass
EDR	8DPSK&LCH	1±1	2	1.5849	2.4717 (3.93dBi)	0.0008	1	Pass
2.4G WIFI ANT1	802.11b&2437	14±1	15	31.6228	2.4717 (3.93dBi)	0.0156	1	Pass
2.4G WIFI ANT2	802.11b&2437	14±1	15	31.6228	2.3933 (3.79dBi)	0.0151	1	Pass
5.2GWIFI ANT1	802.11a&5240	14±1	15	31.6228	2.2439 (3.51dBi)	0.0141	1	Pass
5.2GWIFI ANT2	802.11a&5180	13±1	14	25.1189	2.3121 (3.64dBi)	0.0116	1	Pass
5.8GWIFI ANT1	802.11a&5825	15±1	16	39.8107	2.4266 (3.85dBi)	0.019	1	Pass
5.8GWIFI ANT2	802.11a&5825	13±1	14	25.1189	2.4946 (3.97dBi)	0.0125	1	Pass

Technology	Tune up Produce power(dBm)		Maximum Tune-up (dBm)		Antenna Gain(ANT 1/ANT 2) (numeric)	Power Density (S) (mW/ cm2)		MPE Limit (mW/ cm2)	∑ MPE Ratio	∑ MPE Ratio Limit	Result
	ANT 1	ANT 2	ANT 1	ANT 2		ANT 1	ANT 2				
2.4G WIFI MIMO	14 ±1	14 ±1	15	15	ANT1:2.4717 (3.93dBi) ANT2:2.3933 (3.79dBi)	0.0156	0.0151	1	0.0307	1	Pass

Technology	Tune up Produce power(dBm)		Maximum Tune-up (dBm)		Antenna Gain(ANT 1/ANT 2) (numeric)	Power Density (S) (mW/ cm2)		MPE Limit (mW/ cm2)	∑ MPE Ratio	∑ MPE Ratio Limit	Result
	ANT 1	ANT 2	ANT 1	ANT 2		ANT 1	ANT 2				
5G WIFI MIMO	15 ±1	13 ±1	16	14	ANT1:2.4266 (3.85dBi) ANT2:2.4946 (3.97dBi)	0.019	0.0125	1	0.0315	1	Pass

BT+WIFI supported simultaneous transmission:
BT+2.4GWIFI ANT2: ∑MPE Ratio =0.0008+0.0151=0.0159≤1
BT+5GWIFI ANT2: : ∑MPE Ratio =0.0008+0.0125=0.0133≤1
2.4WIFIANT1+2.4WIFIANT2: ∑MPE Ratio =0.0156+0.0151=0.0307≤1
2.4WIFIANT1+5GWIFIANT2: ∑MPE Ratio =0.0156+0.0125=0.0281≤1
2.4WIFIANT2+5WIFIANT1:∑MPE Ratio =0.0151+0.019=0.0341≤1
5WIFIANT1+5GWIFIANT2:∑MPE Ratio=0.019+0.0125=0.0315≤1
So passed.