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

FCC ID: 2BG4Q-CV63

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 € (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 € (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

	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
2.4G WIFI	27±1	28	5.3827	2.4889 (3.96dBi)	0.313	1	Pass
BLE	20±1	21	125.8925	2.4889 (3.96dBi)	0.0624	1	Pass
ZigBee	20±1	21	125.8925	2.4889 (3.96dBi)	0.0624	1	Pass
NFC	2±1	3	1.9953	1.2589 (1dBi)	0.0005	13.3	Pass

NFC Note:dbm=dbuv/m-95.2-2.15=101.11-95.2-2.15=3.76dBm(ERP), so the conduct peak power=3.76-1=2.76dBm

ZigBee/ Bluetooth/2.4GWIFI cannot transmit simultaneously.
supported simultaneous transmission:

NFC+2.4GWIFI: ∑MPE Ratio =0.0005+0.313=0.3135≤1

NFC+BLE: ∑MPE Ratio =0.0005+0.0624=0.0629≤1

NFC+ ZigBee: ∑MPE Ratio =0.0005+0.0624=0.0629≤1,
So passed.