§1.1307 (b) (1) & §2.1091- MAXIMUM PERMISSIBLE EXPOSURE (MPE)

Applicable Standard

According to subpart 1.1307 (b)(1), 2.1091 systems operating under the provisions of this section shall be operated in a manner that ensures the public is not exposed to RF energy level in excess of the communication guidelines.

Limits for General Population/Uncontrolled Exposure

Limits for General Population/Uncontrolled Exposure				
Frequency Range (MHz)	**Electric Field Strength (V/m)**	**Magnetic Field Strength (A/m)**	**Power Density (mW/cm^2)**	**Averaging Time (Minutes)**
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
1500-100,000	/	/	1.0	30

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

Result

Calculated Formulary:

Predication of MPE limit at a given distance

$$S = \frac{PG}{4\pi R^2}$$

S = power density (in appropriate units, e.g. mW/cm^2)
P = power input to the antenna (in appropriate units, e.g., mW).
G = power gain of the antenna in the direction of interest relative to an isotropic radiator, the power gain factor, is normally numeric gain.
R = distance to the center of radiation of the antenna (appropriate units, e.g., cm)

For simultaneously transmit system, the calculated power density should comply with:

$$\sum_i \frac{S_i}{S_{Limit,i}} \le 1$$

Mode	Frequency (MHz)	Antenna Gain		Tune up conducted power		Evaluation Distance (cm)	Power Density (mW/cm^2)	MPE Limit (mW/cm^2)
		(dBi)	(numeric)	(dBm)	(mW)			
2.4GHz Wi-Fi	2412-2462	3.0	2.0	/	186	20	0.074	1
5GHz Wi-Fi	5250-5350	5.5	3.55	18.5	70.79	20	0.050	1
	5470-5725	5.5	3.55	18.5	70.79	20	0.050	1
	5150-5250& 5725-5850	5.5	3.55	/	330.11	20	0.233	1
GSM850	824-849	4.0	2.51	24	251.19	20	0.125	0.549
DCS1900	1850-1910	-0.21	0.95	24	251.19	20	0.047	1
WCDMA B5	824-849	4.0	2.51	24	251.19	20	0.125	0.549
WCDMA B2	1850-1910	-0.21	0.95	26	398.11	20	0.075	1
LTE B5	824-849	4.0	2.51	24	251.19	20	0.125	0.549
LTE B2	1850-1910	-0.21	0.95	25	316.23	20	0.060	1
LTE B7	2500-2570	4.0	2.51	24	251.19	20	0.125	1
LTE B12	699-716	4.0	2.51	24	251.19	20	0.125	0.466
LTE B17	704-716	4.0	2.51	24	251.19	20	0.125	0.469
LTE B25	1850-1915	-0.21	0.95	25	316.23	20	0.060	1
LTE B26	814-849	4.0	2.51	24	251.19	20	0.125	0.543
LTE B38	2570-2620	4.0	2.51	24	251.19	20	0.125	1
LTE B39	1880-1910	-0.21	0.95	25	316.23	20	0.060	1
LTE B40	2305-2315& 2350-2360	4.0	2.51	21	125.89	20	0.063	1
LTE B41	2496-2690	4.0	2.51	26	398.11	20	0.199	1

Note: 1. EUT contains a certified module FCC ID: TV7R11ELTE6
2. the tune up conducted power of 2.4GHz Wi-Fi and 5GHz Wi-Fi 5150-5250MHz and 5725-5850MHz range refer to the MPE report of FCC ID: TV7RBD53-5ACD2ND.
3. The tune up conducted power of WWAN refer to the MPE reportof FCC ID: TV7R11ELTE6.
4. the antenna gain was provided by applicant.
5. the 2.4G Wi-Fi, 5GHz Wi-Fi and WWAN can transmit at the same time.
6. for GSM850&DCS1900, the duty cycle for 1 TX slot is 1/8, the time based Ave. power compared to slotted Ave. power ratio is -9dB, So:
For GSM850, slotted Ave. power=33dBm, time based Ave. power 24dBm
For DCS1900, slotted Ave. power=33dBm, time based Ave. power 24dBm

Simultaneous transmitting consideration:

The ratio=MPE_{DTS}/limit+MPE_{NII}/limit+MPE_{WWAN}/limit=0.074/1+0.233/1+0.125/0.466=0.575＜1.0

To maintain compliance with the FCC's RF exposure guidelines, place the equipment at least 20cm from nearby persons.

Result: Pass