FCC §15.407(f) & §1.1310 & §2.1091- MAXIMUM PERMISSIBLE EXPOSURE (MPE)

Applicable Standard

According to subpart 15.407(f) and subpart §1.1310, 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 Maximum Permissible Exposure (MPE) (§1.1310, §2.1091)

(B) 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/f²)	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;

According to §1.1310 and §2.1091 RF exposure is calculated.

Per 447498 D01 General RF Exposure Guidance v06**,** simultaneous transmission MPE test exclusion applies when the sum of the MPE for all simultaneous transmitting antennas incorporated in a host device, based on the calculated/estimated, numerically modeled or measured field strengths or power density, is ≤ 1.0.

Calculated Formulary:

Predication of MPE limit at a given distance

$$S = PG/4\pi R^2$$

Where:
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:

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

The rated tune-up output power and antenna gain in the below table:

Calculated Data:

MPE evaluation for single transmission:

Mode	Frequency Range (MHz)	Antenna Gain		Tune-up Conducted Power		Evaluation Distance (cm)	Power Density (mW/cm^2)	MPE Limit (mW/cm^2)
		(dBi)	(numeric)	(dBm)	(mW)			
7265NGW WLAN Module								
WLAN	2412-2462	3.70	2.34	16.00	39.81	20	0.019	1.00
	5150-5250	3.70	2.34	15.50	35.48	20	0.017	1.00
	5725-5850	3.70	2.34	16.00	39.81	20	0.019	1.00
BT 3.0	2402-2480	3.70	2.34	5.50	3.55	20	0.002	1.00
BLE	2402-2480	3.70	2.34	3.00	2.00	20	0.001	1.00
8265NGW WLAN Module								
WLAN	2412-2462	3.70	2.34	15.00	31.62	20	0.015	1.00
	5150-5250	3.70	2.34	15.00	31.62	20	0.015	1.00
	5725-5850	3.70	2.34	15.50	35.48	20	0.017	1.00
BT 3.0	2402-2480	3.70	2.34	9.0	7.94	20	0.004	1.00
BLE	2402-2480	3.70	2.34	4.50	2.82	20	0.001	1.00
LTE Module (FCC ID: RI7LN940A)								
WCDMA Band 5	824-849	3.0	2.0	24	251.19	20	0.100	0.549
LTE Band 5	824-849	3.0	2.0	24	251.19	20	0.100	0.549
WCDMA Band 2	1850-1910	3.0	2.0	25	316.23	20	0.126	1.00
LTE Band 2	1850-1910	3.0	2.0	25	316.23	20	0.126	1.00
LTE Band 25	1850-1915	3.0	2.0	25	316.23	20	0.126	1.00
WCDMA Band 4	1710-1755	3.0	2.0	25	316.23	20	0.126	1.00
LTE Band 4	1710-1755	3.0	2.0	25	316.23	20	0.126	1.00
LTE Band 7	2500-2570	3.0	2.0	25	316.23	20	0.126	1.00
LTE Band 12	699-716	3.0	2.0	24	251.19	20	0.100	0.466
LTE Band 13	777-787	3.0	2.0	24	251.19	20	0.100	0.518
LTE Band 17	704-716	3.0	2.0	24	251.19	20	0.100	0.469
LTE Band 30	2305-2315	3.0	2.0	25	316.23	20	0.126	1.00
LTE Band 38	2570-2620	3.0	2.0	25	316.23	20	0.126	1.00
LTE Band 41	2496-2690	3.0	2.0	25	316.23	20	0.126	1.00
LTE Band 66	1710-1780	3.0	2.0	25	316.23	20	0.126	1.00
LTE Band 26	814-849	3.0	2.0	24	251.19	20	0.100	0.543

MPE evaluation for simultaneous transmission:

Note: 1. Two Wi-Fi module can transmit simultaneously.
2. The Wi-Fi(2.4G) or Wi-Fi(5G) and Bluetooth can not transmit simultaneously.
3. Wi-Fi or Bluetooth and WCDMA/LTE can transmit at the same time, MPE evaluation is as below formula:

PD1/Limit1+PD2/Limit2+……＜1, PD (Power Density)

The worst case is as below:

Max MPE of Wi-Fi(7265NGW) + Max MPE of Wi-Fi(8265NGW) +Max MPE of LTE
= 0.019/1.0+0.017/1.0+0.10/0.466 =0.251＜1.0

Result: MPE evaluation of single and simultaneous transmission meet the requirement of standard.