Appendix B. Maximum Permissible Exposure

1. Maximum Permissible Exposure

1.1. Applicable Standard

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 levels 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 0.2 m 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 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

(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 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

1.2. MPE Calculation Method

E (V/m) = $\frac{\sqrt{30 \times P \times G}}{d}$ Power Density: *Pd* (W/m²) = $\frac{E^2}{377}$

E = Electric field (V/m)

P = Average 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 = $\frac{30 \times P \times G}{377 \times d^2}$

From the 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.

1.3. Calculated Result and Limit

<Model No.: IBR600LPE / IBR600LPE-PWD>

For WiFi function:

Max Conducted Power for IEEE 802.11n MCS0 20MHz: 16.29 dBm

Antenna Gain (dBi)	Antenna Gain (numeric)	Average Output Power (dBm)	Average Output Power (mW)	Power Density (S) (mW/cm²)	Limit of Power Density (S) (mW/cm²)	Test Result
5	3.1623	16.2938	42.5970	0.026812	1	Complies

For WWAN Module (FCC ID: N7NMC7355):

Frequency (MHz)	Maximum Conducted Power (dBm)	Maximum Conducted Power (W)	Maximum Antenna Gain (dBi)	Duty Cycle	Average EIRP (dBm)	Average EIRP (mW)	Power Density (S) (mW/cm²)	Limit of Power Density (S) (mW/cm²)	Test Result
824-849	33	2	6.5	0.250	33.48	2228.127	0.443	0.549	Complies
824-849	28	0.63	6.5	0.250	28.48	704.596	0.140	0.549	Complies
824-849	26.2	0.42	6.5	0.375	28.44	698.283	0.139	0.549	Complies
824-849	25.0	0.32	6.5	0.500	28.49	706.269	0.141	0.549	Complies
1850-1910	30.0	1.00	3.0	0.250	26.98	498.816	0.099	1.000	Complies
1850-1910	27.0	0.50	3.0	0.250	23.98	250.000	0.050	1.000	Complies
1850-1910	25.2	0.33	3.0	0.375	23.94	247.760	0.049	1.000	Complies
1850-1910	24.0	0.25	3.0	0.500	23.99	250.594	0.050	1.000	Complies
824-849	25.0	0.3	6.5	1.000	31.50	1412.538	0.281	0.549	Complies
1850-1910	25.0	0.3	3.0	1.000	28.00	630.957	0.126	1.000	Complies
817-824	25.0	3	6.5	1.000	31.50	1412.538	0.281	0.544	Complies
824-849	24.0	0.251	6.5	1.000	30.50	1122.018	0.223	0.549	Complies
1710-1755	24.0	0.251	6.0	1.000	30.00	1000.000	0.199	1.000	Complies
1850-1910	24.0	0.251	3.0	1.000	27.00	501.187	0.100	1.000	Complies
704-716	24.0	0.3	9.0	1.000	33.00	1995.262	0.397	0.469	Complies
777-787	24.0	0.3	9.0	1.000	33.00	1995.262	0.397	0.518	Complies
824-849	24.0	0.3	6.5	1.000	30.50	122.018	0.223	0.549	Complies
1710-1755	24.0	0.3	6.0	1.000	30.00	1000.000	0.199	1.000	Complies
1850-1910	24.0	0.3	3.0	1.000	27.00	501.187	0.100	1.000	Complies
1850-1915	24.0	0.3	3.0	1.000	27.00	501.187	0.100	1.000	Complies

CONCULSION:

Both of the WiFi function and WWAN function can transmit simultaneously, the formula of calculatedthe MPE is:

CPD1 / LPD1 + CPD2 / LPD2 + ...etc. < 1

CPD = Calculation power density

LPD = Limit of power density

Therefore, the worst-case situation is 0.026812 / 1 + 0.443 / 0.549 = 0.833734, which is less than "1". This confirmed that the device comply with FCC 1.1310 MPE limit.