FCC 47 CFR MPE REPORT

EXPRESS LUCK INDUSTRIAL (SHENZHEN) LIMITED

IEEE 802.11b/g/n/a/ac 2T2R USB WiFi Module Integrated BT 2.1+EDR/4.2/5.0

Model Number: EL.MT7668BUN-WF

FCC ID: 2AWY6-ELMT7668BUN

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Maximum Permissible Exposure

1. Applicable Standards

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 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 0.2m normally can be maintained between the user and the device.

1.1. Limits for Maximum Permissible Exposure (MPE)

(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/cm^2)	Averaging Times $\|E\|^2$, $\|H\|^2$ 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
1500-10000			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/cm^2)	Averaging Times $\|E\|^2$, $\|H\|^2$ 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
1500-10000			1.o	30

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

1.2. MPE Calculation Method

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

E = Electric Field (V/m)

P = Peak 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 peak 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

2. Conducted Power Result

Antenna	Mode (MHz)	Frequency (MHz)	Peak output power (dBm)	Peak output power (mW)	Target power (dBm)
0	GFSK 1M-BLE	2402	5.15	3.2734	5±1
0	GFSK 2M-BLE	2402	5.21	3.3189	5±1
0	GFSK-BT	2402	9.04	8.0168	9±1
0	8-DPSK-BT	2402	10.21	10.4954	10±1
1	IEEE 802.11b	2462	15.96	39.4457	15±1
1	IEEE 802.11g	2462	21.30	134.8963	21±1
1	IEEE 802.11n HT20 (2.4G)	2437	21.89	154.5254	21±1
1	IEEE 802.11n HT40 (2.4G)	2452	18.61	72.6106	18±1
1	IEEE 802.11a	5320	13.24	21.0863	13±1
1	IEEE 802.11n HT20 (5G)	5580	10.22	10.5196	10±1
1	IEEE 802.11ac VHT20 (5G)	5320	10.11	10.2565	10±1
1	IEEE 802.11n HT40 (5G)	5670	10.35	10.8393	10±1
1	IEEE 802.11acVHT40 (5G)	5670	9.41	8.7297	9±1
1	IEEE 802.11acVHT80 (5G)	5290	7.89	6.1518	7±1
2	IEEE 802.11b	2462	16.27	42.3643	16±1
2	IEEE 802.11g	2437	21.54	142.5608	21±1
2	IEEE 802.11n HT20 (2.4G)	2462	20.57	114.0250	20±1
2	IEEE 802.11n HT40 (2.4G)	2437	18.40	69.1831	18±1
2	IEEE 802.11a	5785	12.72	18.7068	12±1
2	IEEE 802.11n HT20 (5G)	5785	10.13	10.3039	10±1
2	IEEE 802.11ac VHT20(5G)	5785	10.06	10.1391	10±1
2	IEEE 802.11n HT40 (5G)	5795	10.07	10.1625	10±1
2	IEEE 802.11acVHT40 (5G)	5795	9.01	7.9616	9±1
2	IEEE 802.11acVHT80 (5G)	5775	7.54	5.6754	7±1

3. Calculated Result and Limit

Bluetooth Antenna 0

Mode	Target power (dBm)	Antenna gain		Power Density (S) (mW/cm^2)	Limited of Power Density (S) (mW/cm^2)	Test Result
		(dBi)	(Linear)			
5G Band						
BLE	6	2.64	1.837	0.0015	1	Complies
BT	11	2.64	1.837	0.0046	1	Complies

Wi-Fi Antenna 1

Mode	Target power (dBm)	Antenna gain		Power Density (S) (mW/cm^2)	Limited of Power Density (S) (mW/cm^2)	Test Result
		(dBi)	(Linear)			
2.4G Band						
IEEE 802.11b	16	2.64	1.837	0.0145	1	Complies
IEEE 802.11g	22	2.64	1.837	0.0579	1	Complies
IEEE 802.11n HT20	22	2.64	1.837	0.0579	1	Complies
IEEE 802.11n HT40	19	2.64	1.837	0.0290	1	Complies
5G Band						
IEEE 802.11a	14	3.47	2.223	0.0111	1	Complies
IEEE 802.11n HT20	11	3.47	2.223	0.0056	1	Complies
IEEE 802.11ac VHT20	11	3.47	2.223	0.0056	1	Complies
IEEE 802.11n HT40	11	3.47	2.223	0.0056	1	Complies
IEEE 802.11ac VHT40	10	3.47	2.223	0.0044	1	Complies
IEEE 802.11ac VHT80	8	3.47	2.223	0.0028	1	Complies

Wi-Fi Antenna 2

Mode	Target power (dBm)	Antenna gain		Power Density (S) (mW/cm^2)	Limited of Power Density (S) (mW/cm^2)	Test Result
		(dBi)	(Linear)			
2.4G Band						
IEEE 802.11b	17	2.64	1.837	0.0183	1	Complies
IEEE 802.11g	22	2.64	1.837	0.0579	1	Complies
IEEE 802.11n HT20	21	2.64	1.837	0.0460	1	Complies
IEEE 802.11n HT40	19	2.64	1.837	0.0290	1	Complies
5G Band						
IEEE 802.11a	13	3.47	2.223	0.0088	1	Complies
IEEE 802.11n HT20	11	3.47	2.223	0.0056	1	Complies
IEEE 802.11ac VHT20	11	3.47	2.223	0.0056	1	Complies
IEEE 802.11n HT40	11	3.47	2.223	0.0056	1	Complies
IEEE 802.11ac VHT40	10	3.47	2.223	0.0044	1	Complies
IEEE 802.11ac VHT80	8	3.47	2.223	0.0028	1	Complies

Wi-Fi Antenna 1+2

Mode	Power Density (S) (mW/cm^2) Antenna 1	Power Density (S) (mW/cm^2) Antenna 2	Power Density (S) (mW/cm^2) Total	Limited of Power Density (S) (mW/cm^2)	Test Result
2.4G Band					
IEEE 802.11n HT20	0.0579	0.0460	0.1039	1	Complies
IEEE 802.11n HT40	0.0290	0.0290	0.0580	1	Complies
5G Band					
IEEE 802.11n HT20	0.0056	0.0056	0.0112	1	Complies
IEEE 802.11ac VHT20	0.0056	0.0056	0.0112	1	Complies
IEEE 802.11n HT40	0.0056	0.0056	0.0112	1	Complies
IEEE 802.11ac VHT40	0.0044	0.0044	0.0088	1	Complies
IEEE 802.11ac VHT80	0.0028	0.0028	0.0056	1	Complies

Bluetooth+2.4G Wi-Fi（ANT1+ANT2)+5G Wi-Fi（ANT1+ANT2)

MAX Power Density (S) (mW/cm^2) Bluetooth	MAX Power Density (S) (mW/cm^2) 2.4G WiFi ANT1+ANT2	MAX Power Density (S) (mW/cm^2) 5G WiFi ANT1+ANT2	Power Density (S) (mW/cm^2) Total	Limited of Power Density (S) (mW/cm^2)	Test Result
0.0046	0.1039	0.0112	0.1197	1	Complies

End of Test Report