

FCC 47 CFR MPE REPORT

EXPRESS LUCK INDUSTRIAL (SHENZHEN) LIMITED

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

Model Number: EL.MT7638BUN-WF

FCC ID: 2AWY6-ELMT7638BUN

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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			1.0	30

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

1.2. MPE Calculation Method

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

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)	MAX Peak output power (dBm)	MAX Peak output power (mW)	Target power (dBm)
0	GFSK 1M-BLE	2402	9.74	9.4189	9±1
0	GFSK 2M-BLE	2402	9.83	9.6161	9±1
0	GFSK-BT	2402	9.79	9.5280	9±1
0	8-DPSK-BT	2402	11.45	13.9637	11±1
1	IEEE 802.11b	2437	16.46	44.2588	16±1
1	IEEE 802.11g	2437	21.87	153.8155	21±1
1	IEEE 802.11n HT20 (2.4G)	2437	18.54	71.4496	18±1
1	IEEE 802.11n HT40 (2.4G)	2437	18.93	78.1628	18±1
1	IEEE 802.11a	5745	12.60	18.1970	12±1
1	IEEE 802.11n HT20 (5G)	5785	10.08	10.1859	10±1
1	IEEE 802.11n HT40 (5G)	5795	10.04	10.0925	10±1
2	IEEE 802.11b	2437	16.82	48.0839	16±1
2	IEEE 802.11g	2462	22.36	172.1869	22±1
2	IEEE 802.11n HT20 (2.4G)	2437	19.69	93.1108	19±1
2	IEEE 802.11n HT40 (2.4G)	2452	19.96	99.0832	19±1
2	IEEE 802.11a	5320	12.59	18.1552	12±1
2	IEEE 802.11n HT20 (5G)	5580	9.75	9.4406	9±1
2	IEEE 802.11n HT40 (5G)	5670	10.14	10.3276	10±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						
GFSK 2M -BLE	10	2.64	1.837	0.0037	1	Compiles
GFSK-BT	12	2.64	1.837	0.0058	1	Compiles

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	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	19	2.64	1.837	0.0290	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 802.11n HT40	11	3.47	2.223	0.0056	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	23	2.64	1.837	0.0729	1	Complies
IEEE 802.11n HT20	20	2.64	1.837	0.0365	1	Complies
IEEE 802.11n HT40	20	2.64	1.837	0.0365	1	Complies
5G Band						
IEEE 802.11a	13	3.47	2.223	0.0088	1	Complies
IEEE 802.11n HT20	10	3.47	2.223	0.0044	1	Complies
IEEE 802.11n HT40	11	3.47	2.223	0.0056	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	0.0290	0.0365	0.0655	1	Complies
IEEE 802.11n HT40	0.0290	0.0365	0.0655	1	Complies
5G Band					
IEEE 802.11n HT20	0.0056	0.0044	0.0100	1	Complies
IEEE 802.11n HT40	0.0056	0.0056	0.0112	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
0.0058	0.0655	0.0112	0.0825	1	Complies

End of Test Report