

FCC 47 CFR MPE REPORT

TCL Entertainment Solutions Limited

2.1 Dolby Atmos Sound Bar with Built-in Subwoofers

Model Number: TS8211

Additional Model: TDS8211, FS8211, OS8211, TS8211K, TDS8211K,

Alto 8e, TS821, ***8211

FCC ID: 2ARUDTS8211

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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)	Peak output power (dBm)	Peak output power (mW)	Target power (dBm)
BT	GFSK	2402	6.16	4.130	6 ± 1
BT	8-DPSK	2402	5.97	3.954	5 ± 1
BLE	GFSK 1M	2480	2.99	1.991	2 ± 1
1	IEEE 802.11b	2412	16.38	43.451	16 ± 1
1	IEEE 802.11g	2412	22.67	184.927	22 ± 1
1	IEEE 802.11n HT20(2.4G)	2462	20.43	110.408	20 ± 1
1	IEEE 802.11n HT40(2.4G)	2437	20.51	112.460	20 ± 1
1	IEEE 802.11a	5825	18.53	71.285	18 ± 1
1	IEEE 802.11n HT20(5G)	5825	17.53	56.624	17 ± 1
1	IEEE 802.11n HT40(5G)	5795	17.19	52.360	17 ± 1
1	IEEE 802.11ac VHT20(5G)	5825	17.67	58.479	17 ± 1
1	IEEE 802.11ac VHT40(5G)	5795	17.15	51.880	17 ± 1
1	IEEE 802.11ac VHT80(5G)	5775	16.90	48.978	16 ± 1
2	IEEE 802.11b	2462	16.62	45.920	16 ± 1
2	IEEE 802.11g	2462	22.87	193.642	22 ± 1
2	IEEE 802.11n HT20(2.4G)	2462	21.25	133.352	21 ± 1
2	IEEE 802.11n HT40(2.4G)	2437	21.06	127.644	21 ± 1
2	IEEE 802.11a	5745	18.65	73.282	18 ± 1
2	IEEE 802.11n HT20(5G)	5825	17.43	55.335	17 ± 1
2	IEEE 802.11n HT40(5G)	5795	17.36	54.450	17 ± 1
2	IEEE 802.11ac VHT20(5G)	5825	17.41	55.081	17 ± 1
2	IEEE 802.11ac VHT40(5G)	5795	17.51	56.364	17 ± 1
2	IEEE 802.11ac VHT80(5G)	5775	17.20	52.481	17 ± 1

3. Calculated Result and Limit

BT Antenna

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						
GFSK	7	3.07	2.027	0.00202	1	Complies
8-DPSK	6	3.07	2.027	0.00161	1	Complies
GFSK 1M	3	3.07	2.027	0.00080	1	Complies

WiFi 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	3.86	2.432	0.02425	1	Complies
IEEE 802.11g	23	3.86	2.432	0.09654	1	Complies
IEEE 802.11n HT20	21	3.86	2.432	0.06092	1	Complies
IEEE 802.11n HT40	21	3.86	2.432	0.06092	1	Complies
5G Band						
IEEE 802.11a	19	3.90	2.455	0.03879	1	Complies
IEEE 802.11n HT20	18	3.90	2.455	0.03081	1	Complies
IEEE 802.11n HT40	18	3.90	2.455	0.03081	1	Complies
IEEE 802.11ac VHT20	18	3.90	2.455	0.03081	1	Complies
IEEE 802.11ac VHT40	18	3.90	2.455	0.03081	1	Complies
IEEE 802.11ac VHT80	17	3.90	2.455	0.02448	1	Complies

WiFi 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	2.92	1.959	0.01953	1	Complies
IEEE 802.11g	23	2.92	1.959	0.07776	1	Complies
IEEE 802.11n HT20	22	2.92	1.959	0.06176	1	Complies
IEEE 802.11n HT40	22	2.92	1.959	0.06176	1	Complies
5G Band						
IEEE 802.11a	19	3.66	2.323	0.03671	1	Complies
IEEE 802.11n HT20	18	3.66	2.323	0.02916	1	Complies
IEEE 802.11n HT40	18	3.66	2.323	0.02916	1	Complies
IEEE 802.11ac VHT20	18	3.66	2.323	0.02916	1	Complies
IEEE 802.11ac VHT40	18	3.66	2.323	0.02916	1	Complies
IEEE 802.11ac VHT80	18	3.66	2.323	0.02916	1	Complies

WiFi Antenna 1+2

Mode	Power Density (S) (mW/cm ²) Antenna 0	Power Density (S) (mW/cm ²) Antenna 1	Power Density (S) (mW/cm ²) Total	Limited of Power Density (S) (mW/cm ²)	Test Result
2.4G Band					
IEEE 802.11n HT20	0.06092	0.06176	0.12268	1	Compiles
IEEE 802.11n HT40	0.06092	0.06176	0.12268	1	Compiles
5G Band					
IEEE 802.11n HT20	0.03081	0.02916	0.05997	1	Compiles
IEEE 802.11n HT40	0.03081	0.02916	0.05997	1	Compiles
IEEE 802.11ac VHT20	0.03081	0.02916	0.05997	1	Compiles
IEEE 802.11ac VHT40	0.03081	0.02916	0.05997	1	Compiles
IEEE 802.11ac VHT80	0.02448	0.02916	0.05364	1	Compiles

BT Antenna +WiFi Antenna 1 + 2

MAX Power Density (S) (mW/cm ²) Bluetooth	MAX Power Density (S) (mW/cm ²) 2.4G WiFi	MAX Power Density (S) (mW/cm ²) 5G WiFi	Power Density (S) (mW/cm ²) Total	Limited of Power Density (S) (mW/cm ²)	Test Result
0.00202	0.12268	0.05997	0.18467	1	Compiles

End of Test Report