

EMF TEST REPORT

Test Report No. : OT-218-RWD-050
Reception No. : 2108003620
Applicant : LG Electronics USA
Address : 111 Sylvan Avenue North Building, Englewood Cliffs, New Jersey, United States
Manufacturer : LG Electronics Inc.
Address : Pyeongtaek-si, Gyeonggi-do 17709, Republic of Korea
Type of Equipment : Wireless Audio Transmitter
FCC ID. : BEJ-WTP3
Model Name : WTP3
Serial number : N/A
Total page of Report : 14 pages (including this page)
Date of Incoming : March 26, 2021
Date of issue : August 17, 2021

SUMMARY

The equipment complies with the regulation; *FCC PART 15 SUBPART C Section 15.247 and FCC PART 15 SUBPART E Section 15.407*

This test report only contains the result of a single test of the sample supplied for the examination.

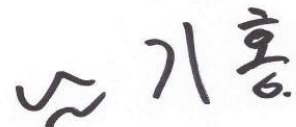
It is not a generally valid assessment of the features of the respective products of the mass-production.



Tested by
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Revision History

Rev. No.	Issue Report No.	Issued Date	Revisions	Section Affected
0	OT-218-RWD-050	August 17, 2021	Initial Release	All

1. VERIFICATION OF COMPLIANCE

Applicant : LG Electronics USA
 Address : 111 Sylvan Avenue North Building, Englewood Cliffs, New Jersey, United States
 Contact Person : Sung Soo Kim / Director, Regulatory and Environmental Affairs
 Telephone No. : 201-266-2215
 FCC ID : BEJ-WTP3
 Model Name : WTP3
 Brand Name : LG
 Serial Number : N/A
 Date : August 17, 2021

EQUIPMENT CLASS	DTS – DIGITAL TRNSMISSION SYSTEM Unlicensed National Information infrastructure (UNII)
E.U.T. DESCRIPTION	Wireless Audio Transmitter
THIS REPORT CONCERNS	Original Grant
MEASUREMENT PROCEDURES	ANSI C63.10: 2013
TYPE OF EQUIPMENT TESTED	Pre-Production
KIND OF EQUIPMENT AUTHORIZATION REQUESTED	Certification
EQUIPMENT WILL BE OPERATED UNDER FCC RULES PART(S)	FCC PART 15 SUBPART C Section 15.247 KDB 558074 D01 15.247 Meas Guidance v05r02 FCC PART 15 SUBPART E Section 15.407 789033 D02 General UNII Test Procedures New Rules v02r01
Modifications on the Equipment to Achieve Compliance	None
Final Test was Conducted On	3 m, Semi Anechoic Chamber

-. The above equipment was tested by ONETECH Corp. for compliance with the requirement set forth in the FCC Rules and Regulations. This said equipment in the configuration described in this report, shows the maximum emission levels emanating from equipment are within the compliance requirements.

2. GENERAL INFORMATION

The LG Electronics USA, Model WTP3 (referred to as the EUT in this report) is a Wireless Audio Transmitter. The product specification described herein was obtained from product data sheet or user's manual.

DEVICE TYPE	Wireless Audio Transmitter	
Temperature Range	0 °C ~ 60 °C	
MAX RF OUTPUT POWER	WLAN 2.4 GHz	17.16 dBm
	5 150 MHz ~ 5 250 MHz Band	15.67 dBm
	5 250 MHz ~ 5 350 MHz Band	20.88 dBm
	5 470 MHz ~ 5 725 MHz Band	19.07 dBm
	5 725 MHz ~ 5 850 MHz Band	20.94 dBm
OPERATING FREQUENCY	WLAN 2.4 GHz	2 412 MHz ~ 2 462 MHz (802.11b/g/n(HT20))
	5 150 MHz ~ 5 250 MHz Band	5 180 MHz ~ 5 240 MHz (802.11a/n(HT20)/ac(VHT20))
		5 190 MHz ~ 5 230 MHz (802.11n(HT40)/ac(VHT40))
		5 210 MHz (802.11ac(VHT80))
	5 250 MHz ~ 5 350 MHz Band	5 260 MHz ~ 5 320 MHz (802.11a/n(HT20)/ac(VHT20))
		5 270 MHz ~ 5 310 MHz (802.11n(HT40)/ac(VHT40))
		5 290 MHz (802.11ac(VHT80))
	5 470 MHz ~ 5 725 MHz Band	5 500 MHz ~ 5 720 MHz (802.11a/n(HT20)/ac(VHT20))
		5 510 MHz ~ 5 710 MHz (802.11n(HT40)/ac(VHT40))
		5 530 MHz ~ 5 690 MHz (802.11ac(VHT80))
	5 725 MHz ~ 5 850 MHz Band	5 745 MHz ~ 5 825 MHz (802.11a/n(HT20)/ac(VHT20))
		5 755 MHz ~ 5 795 MHz (802.11n(HT40)/ac(VHT40))
5 775 MHz (802.11ac(VHT80))		
MODULATION TYPE	WLAN 2.4 GHz	802.11b: DSSS Modulation(DBPSK/DQPSK/CCK) 802.11g/n(HT20): OFDM Modulation(BPSK/QPSK/16QAM/64QAM)
	WLAN 5 GHz	802.11a/n(HT20)/n(HT40)/ac(VHT80): OFDM Modulation(BPSK/QPSK/16QAM/64QAM)

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RF OUTPUT POWER	WLAN 2.4 GHz	Antenna 0	12.32 dBm(802.11b) <u>14.76 dBm(802.11g)</u> 13.96 dBm(802.11n_HT20)
		Antenna 1	13.84 dBm(802.11b) 15.34 dBm(802.11g) 14.34 dBm(802.11n_HT20)
		Multiple Antenna	<u>17.16 dBm(802.11n_HT20)</u>
	5 150 MHz ~ 5 250 MHz Band	Antenna 0	<u>15.67 dBm(802.11a)</u> 10.81 dBm(802.11n_HT20) 11.06 dBm(802.11n_HT40) 3.04 dBm(802.11ac_VHT80)
		Antenna 1	15.45 dBm(802.11a) 10.64 dBm(802.11n_HT20) 10.97 dBm(802.11n_HT40) 2.17 dBm(802.11ac_VHT80)
		Multiple Antenna	13.74 dBm(802.11n_HT20) <u>14.03 dBm(802.11n_HT40)</u> 5.64 dBm(802.11ac_VHT80)
	5 250 MHz ~ 5 350 MHz Band	Antenna 0	16.68 dBm(802.11a) 15.16 dBm(802.11n_HT20) <u>18.48 dBm(802.11n_HT40)</u> 5.31 dBm(802.11ac_VHT80)
		Antenna 1	15.61 dBm(802.11a) 12.96 dBm(802.11n_HT20) 17.15 dBm(802.11n_HT40) 2.96 dBm(802.11ac_VHT80)
		Multiple Antenna	17.21 dBm(802.11n_HT20) <u>20.88 dBm(802.11n_HT40)</u> 7.20 dBm(802.11ac_VHT80)

RF OUTPUT POWER	5 470 MHz ~ 5 725 MHz Band	Antenna 0	17.88 dBm(802.11a) 15.36 dBm(802.11n_HT20) 15.93 dBm(802.11n_HT40) 5.10 dBm(802.11ac_VHT80)
		Antenna 0_Straddle	16.58 dBm(802.11a) 14.06 dBm(802.11n_HT20) 9.98 dBm(802.11n_HT40) 4.57 dBm(802.11ac_VHT80)
		Antenna 1	<u>18.37 dBm(802.11a)</u> 15.29 dBm(802.11n_HT20) 16.18 dBm(802.11n_HT40) 4.83 dBm(802.11ac_VHT80)
		Antenna 1_Straddle	16.90 dBm(802.11a) 13.89 dBm(802.11n_HT20) 9.43 dBm(802.11n_HT40) 4.78 dBm(802.11ac_VHT80)
		Multiple Antenna	18.20 dBm(802.11n_HT20) <u>19.07 dBm(802.11n_HT40)</u> 7.98 dBm(802.11ac_VHT80)
		Multiple Antenna _Straddle	16.99 dBm(802.11n_HT20) 12.72 dBm(802.11n_HT40) 7.69 dBm(802.11ac_VHT80)

RF OUTPUT POWER	5 725 MHz ~ 5 850 MHz Band	Antenna 0	<u>19.37 dBm(802.11a)</u> 18.00 dBm(802.11n_HT20) 16.10 dBm(802.11n_HT40) 7.67 dBm(802.11ac_VHT80)
		Antenna 0_Straddle	8.65 dBm(802.11a) 6.79 dBm(802.11n_HT20) -2.25 dBm(802.11n_HT40) -12.51 dBm(802.11ac_VHT80)
		Antenna 1	19.11 dBm(802.11a) 17.85 dBm(802.11n_HT20) 15.60 dBm(802.11n_HT40) 7.60 dBm(802.11ac_VHT80)
		Antenna 1_Straddle	8.89 dBm(802.11a) 6.26 dBm(802.11n_HT20) -2.75 dBm(802.11n_HT40) -10.04 dBm(802.11ac_VHT80)
		Multiple Antenna	<u>20.94 dBm(802.11n_HT20)</u> 18.87 dBm(802.11n_HT40) 10.65 dBm(802.11ac_VHT80)
		Multiple Antenna _Straddle	9.54 dBm(802.11n_HT20) 0.52 dBm(802.11n_HT40) -8.09 dBm(802.11ac_VHT80)

ANTENNA TYPE		Antenna 0	PCB Antenna
		Antenna 1	
ANTENNA GAIN	WLAN 2.4 GHz	Antenna 0	0.61 dBi
		Antenna 1	0.90 dBi
		Multiple Antenna	3.77 dBi
	5 150 MHz ~ 5 250 MHz Band	Antenna 0	0.30 dBi
		Antenna 1	0.65 dBi
		Multiple Antenna	3.49 dBi
	5 250 MHz ~ 5 350 MHz Band	Antenna 0	0.30 dBi
		Antenna 1	0.28 dBi
		Multiple Antenna	3.30 dBi
	5 470 MHz ~ 5 725 MHz Band	Antenna 0	0.70 dBi
		Antenna 1	0.67 dBi
		Multiple Antenna	3.70 dBi
	5 725 MHz ~ 5 850 MHz Band	Antenna 0	0.66 dBi
		Antenna 1	0.62 dBi
		Multiple Antenna	3.65 dBi
List of each Osc. or crystal Freq.(Freq. >= 1 MHz)		26 MHz, 27 MHz	

2.2 Alternative type(s)/model(s); also covered by this test report.

-. None

3. EUT MODIFICATIONS

-. None

4. MAXIMUM PERMISSIBLE EXPOSURE

4.1 RF Exposure Calculation

According to the FCC rule 1.1310 table 1B, the limit for the maximum permissible RF exposure for an uncontrolled environment are $f/1500 \text{ mW/cm}^2$ for the frequency range between 300 MHz and 1 500 MHz and 1.0 mW/cm^2 for the frequency range between 1 500 MHz and 100 000 MHz.

The electric field generated for a 1 mW/cm^2 exposure is calculated as follows:

$$E = \sqrt{(30 * P * G) / d}, \text{ and } S = E^2 / Z = E^2 / 377, \text{ because } 1 \text{ mW/cm}^2 = 10 \text{ W/m}^2$$

Where

S = Power density in mW/cm^2 , Z = Impedance of free space, 377Ω

E = Electric field strength in V/m, G = Numeric antenna gain, and d = distance in meter

Combining equations and rearranging the terms to express the distance as a function of the remaining variable

$$d = \sqrt{(30 * P * G) / (377 * 10 S)}$$

Changing to units of mW and cm, using $P (\text{mW}) = P (\text{W}) / 1 000$, $d (\text{cm}) = 0.01 * d (\text{m})$

$$d = 0.282 * \sqrt{(P * G) / S}$$

Where

d = distance in cm, P = Power in mW, G = Numeric antenna gain, and S = Power density in mW/cm^2

4.2 EUT Description

Kind of EUT	Wireless Audio Transmitter
Device Category	<input type="checkbox"/> Portable (< 20 cm separation) <input type="checkbox"/> Mobile (> 20 cm separation) <input checked="" type="checkbox"/> Others
Exposure Evaluation Applied	<input checked="" type="checkbox"/> MPE <input type="checkbox"/> SAR <input type="checkbox"/> N/A

4.3 Calculated MPE Safe Distance for WLAN

4.3.1 DATA for Antenna 0

According to above equation, the following result was obtained.

Operating Freq. Band (MHz)	Operating Mode	Target Power W/tolerance (dBm)	Max tune up power		Antenna Gain		Safe Distance (cm)	Power Density (mW/cm ²) @ 20 cm Separation	Limit (mW/cm ²)
			(dBm)	(mW)	Log	Linear			
2 400 ~ 2 483.5	802.11b	12.32 ± 2.0	14.32	27.04	0.61	1.15	1.57	0.006 2	1
	802.11g	14.76 ± 2.0	16.76	47.42			2.08	0.010 9	1
	802.11n_HT20	13.96 ± 2.0	15.96	39.45			1.90	0.009 0	1
5 150 ~ 5 250	802.11a	15.67 ± 2.0	17.67	58.48	0.30	1.07	2.23	0.012 5	1
	802.11n_HT20	10.81 ± 2.0	12.81	19.10			1.28	0.004 1	1
	802.11n_HT40	11.06 ± 2.0	13.06	20.23			1.31	0.004 3	1
	802.11ac80	3.04 ± 2.0	5.04	3.19			0.52	0.000 7	1
5 250 ~ 5 350	802.11a	16.68 ± 2.0	18.68	73.79	0.30	1.07	2.51	0.015 7	1
	802.11n_HT20	15.16 ± 2.0	17.16	52.00			2.10	0.011 1	1
	802.11n_HT40	18.48 ± 2.0	20.48	111.69			3.08	0.023 8	1
	802.11ac80	5.31 ± 2.0	7.31	5.38			0.68	0.001 1	1
5 470 ~ 5 725	802.11a	17.88 ± 2.0	19.88	97.27	0.70	1.17	3.01	0.022 7	1
	802.11n_HT20	15.36 ± 2.0	17.36	54.45			2.26	0.012 7	1
	802.11n_HT40	15.93 ± 2.0	17.93	62.09			2.41	0.014 5	1
	802.11ac80	5.10 ± 2.0	7.10	5.13			0.69	0.001 2	1
5 725 ~ 5 850	802.11a	19.37 ± 2.0	21.37	137.09	0.66	1.16	3.56	0.031 7	1
	802.11n_HT20	18.00 ± 2.0	20.00	100.00			3.04	0.023 2	1
	802.11n_HT40	16.10 ± 2.0	18.10	64.57			2.44	0.015 0	1
	802.11ac80	7.67 ± 2.0	9.67	9.27			0.93	0.002 1	1

According to above table, for 5 725 ~ 5 850 MHz Band(802.11 a), safe distance,

$$D = 0.282 * \sqrt{(137.09 * 1.16)/1.00} = 3.56 \text{ cm.}$$

For getting power density at 20 cm separation in above table, following formula was used.

$$S = P * G / (4\pi * R^2) = 137.09 * 1.16 / (4 * \pi * 20^2) = 0.031 7$$

Where:

S = Power Density,

P = Power input to the external antenna (Output power from the EUT antenna port (dBm) – cable loss (dB)),

G = Gain of Transmit Antenna (linear gain), R = Distance from Transmitting Antenna

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4.3.2 DATA for Antenna 1

According to above equation, the following result was obtained.

Operating Freq. Band (MHz)	Operating Mode	Target Power W/tolerance (dBm)	Max tune up power		Antenna Gain		Safe Distance (cm)	Power Density (mW/cm ²) @ 20 cm Separation	Limit (mW/cm ²)
			(dBm)	(mW)	Log	Linear			
2 400 ~ 2 483.5	802.11b	13.84 ± 2.0	15.84	38.37	0.90	1.23	1.94	0.009 4	1
	802.11g	15.34 ± 2.0	17.34	54.20			2.30	0.013 3	1
	802.11n_HT20	14.34 ± 2.0	16.34	43.05			2.05	0.010 5	1
5 150 ~ 5 250	802.11a	15.45 ± 2.0	17.45	55.59	0.65	1.16	2.27	0.012 8	1
	802.11n_HT20	10.64 ± 2.0	12.64	18.37			1.30	0.004 2	1
	802.11n_HT40	10.97 ± 2.0	12.97	19.82			1.35	0.004 6	1
	802.11ac80	2.17 ± 2.0	4.17	2.61			0.49	0.000 6	1
5 250 ~ 5 350	802.11a	15.61 ± 2.0	17.61	57.68	0.28	1.07	2.21	0.012 2	1
	802.11n_HT20	12.96 ± 2.0	14.96	31.33			1.63	0.006 6	1
	802.11n_HT40	17.15 ± 2.0	19.15	82.22			2.64	0.017 4	1
	802.11ac80	2.96 ± 2.0	4.96	3.13			0.52	0.000 7	1
5 470 ~ 5 725	802.11a	18.37 ± 2.0	20.37	108.89	0.67	1.17	3.18	0.025 3	1
	802.11n_HT20	15.29 ± 2.0	17.29	53.58			2.23	0.012 4	1
	802.11n_HT40	16.18 ± 2.0	18.18	65.77			2.47	0.015 3	1
	802.11ac80	4.83 ± 2.0	6.83	4.82			0.67	0.001 1	1
5 725 ~ 5 850	802.11a	19.11 ± 2.0	21.11	129.12	0.62	1.15	3.44	0.029 6	1
	802.11n_HT20	17.85 ± 2.0	19.85	96.61			2.98	0.022 2	1
	802.11n_HT40	15.60 ± 2.0	17.60	57.54			2.30	0.013 2	1
	802.11ac80	7.60 ± 2.0	9.60	9.12			0.91	0.002 1	1

According to above table, for 5 725 ~ 5 850 MHz Band(802.11 a), safe distance,

$$D = 0.282 * \sqrt{(129.12 * 1.15)/1.00} = 3.44 \text{ cm.}$$

For getting power density at 20 cm separation in above table, following formula was used.

$$S = P * G / (4\pi * R^2) = 129.12 * 1.15 / (4 * \pi * 20^2) = 0.029 6$$

Where:

S = Power Density,

P = Power input to the external antenna (Output power from the EUT antenna port (dBm) – cable loss (dB)),

G = Gain of Transmit Antenna (linear gain), R = Distance from Transmitting Antenna

4.3.3 DATA for Multiple Transmit

According to above equation, the following result was obtained.

Operating Freq. Band (MHz)	Operating Mode	Target Power W/tolerance (dBm)	Max tune up power		Power Density (mW/cm ²) @ 20 cm Separation	Sum Power Density (mW/cm ²) @ 20 cm Separation	Limit (mW/cm ²)
			(dBm)	(mW)			
2 400 ~ 2 483.5	802.11g	14.76 ± 2.0	16.76	47.42	0.010 9	0.024 1	1
		15.34 ± 2.0	17.34	54.20	0.013 3		
	802.11n_HT20	13.96 ± 2.0	15.96	39.45	0.009 0	0.019 6	1
		14.34 ± 2.0	16.34	43.05	0.010 5		
5 150 ~ 5 250	802.11n_HT20	10.81 ± 2.0	12.81	19.10	0.004 1	0.008 3	1
		10.64 ± 2.0	12.64	18.37	0.004 2		
	802.11n_HT40	11.06 ± 2.0	13.06	20.23	0.004 3	0.008 9	1
		10.97 ± 2.0	12.97	19.82	0.004 6		
	802.11ac80	3.04 ± 2.0	5.04	3.19	0.000 7	0.001 3	1
		2.17 ± 2.0	4.17	2.61	0.000 6		
5 250 ~ 5 350	802.11n_HT20	15.16 ± 2.0	17.16	52.00	0.011 1	0.017 7	1
		12.96 ± 2.0	14.96	31.33	0.006 6		
	802.11n_HT40	18.48 ± 2.0	20.48	111.69	0.023 8	0.041 3	1
		17.15 ± 2.0	19.15	82.22	0.017 4		
	802.11ac80	5.31 ± 2.0	7.31	5.38	0.001 1	0.001 8	1
		2.96 ± 2.0	4.96	3.13	0.000 7		
5 470 ~ 5 725	802.11n_HT20	15.36 ± 2.0	17.36	54.45	0.012 7	0.025 2	1
		15.29 ± 2.0	17.29	53.58	0.012 4		
	802.11n_HT40	15.93 ± 2.0	17.93	62.09	0.014 5	0.029 8	1
		16.18 ± 2.0	18.18	65.77	0.015 3		
	802.11ac80	5.10 ± 2.0	7.10	5.13	0.001 2	0.002 3	1
		4.83 ± 2.0	6.83	4.82	0.001 1		
5 725 ~ 5 850	802.11n_HT20	18.00 ± 2.0	20.00	100.00	0.023 2	0.045 3	1
		17.85 ± 2.0	19.85	96.61	0.022 2		
	802.11n_HT40	16.10 ± 2.0	18.10	64.57	0.015 0	0.028 2	1
		15.60 ± 2.0	17.60	57.54	0.013 2		
	802.11ac80	7.67 ± 2.0	9.67	9.27	0.002 1	0.004 2	1
		7.60 ± 2.0	9.60	9.12	0.002 1		

5 725 ~ 5 850 MHz Band(802.11n_HT20), = (0.023 2/1) + (0.022 2/1) = 0.045 3

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4.4 DATA for Intermodulation Transmit

According to above equation, the following result was obtained.

Operating Freq. Band (MHz)	Operating Mode	Target Power W/tolerance (dBm)	Max tune up power		Power Density (mW/cm ²) @ 20 cm Separation	Sum Power Density (mW/cm ²) @ 20 cm Separation	Limit (Ratio)
			(dBm)	(mW)			
WLAN 2 G + WLAN 5 G	WLAN 2 G (802.11 g_Ant 1)	15.34 ± 2.0	17.34	54.20	0.013 3	0.045 0	1
	WLAN 5 G (UNII 3 802.11 a Ant 0)	19.37 ± 2.0	21.37	137.09	0.031 7		