EMF TEST REPORT

Test Report No.	: OT-212-RWD-096
Reception No.	: 2012005261
Applicant	: LG Electronics USA
Address	: 111 Sylvan Avenue North Building, Englewood Cliffs, New Jersey, United States
Manufacturer	: LG Electronics Inc.
Address	: 222, LG-ro, Jinwi-myeon, Pyeongtaek-si, Gyeonggi-do 17709, Rep of Korea
Type of Equipment	: Rear Seat Entertainment system
FCC ID.	: BEJNDHKANBN0A2
Model Name	: NDHKANBN0A2
Serial number	: N/A
Total page of Report	: 8 pages (including this page)
Date of Incoming	: January 07, 2021
Date of issue	: February 22, 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.
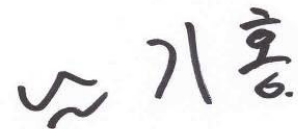
It is not a generally valid assessment of the features of the respective products of the mass-production.

Tested by	Reviewed by	Approved by
Ju Yun Park / Manager	Ha-Ram Lee / Manager	Ki-Hong, Nam / General Manager
ONETECH Corp.	ONETECH Corp.	ONETECH Corp.

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ONETECH Corp.: 43-14, Jinsaegol-gil, Chowol-eup, Gwangju-si, Gyeonggi-do, 12735, Korea (TEL: 82-31-799-9500, FAX: 82-31-799-9599)

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Revision History

Rev. No.	Issue Report No.	Issued Date	Revisions	Section Affected
0	OT-212-RWD-096	February 22, 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 : Dae Woong Kim / Director, Regulatory and Environmental Affairs

Telephone No.   : 201-266-2215

FCC ID   : BEJNDHKANBN0A2

Model Name   : NDHKANBN0A2

Brand Name   : LG

Serial Number : N/A

Date   : February 22, 2021

EQUIPMENT CLASS	DSS – PART 15 SPREAD SPECTRUM TRANSMITTER
E.U.T. DESCRIPTION	Rear Seat Entertainment system
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
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

2.1 Product Description

The LG Electronics USA, Model NDHKANBN0A2 (referred to as the EUT in this report) is a Rear Seat Entertainment system. The product specification described herein was obtained from product data sheet or user's manual.

Device Type	Rear Seat Entertainment system	
Temperature Range	-30 °C ~ 85 °C	
Operating Frequency	2 402 MHz ~ 2 480 MHz	
MAX. RF OUTPUT POWER	Left	3.30 dBm
	Right	1.84 dBm
Number of Channel	79 Channels	
Modulation Type	GFSK for 1 Mbps, π/4-DQPSK for 2 Mbps, 8-DPSK for 3 Mbps	
Antenna Type	Left	Chip Antenna
	Right	
Antenna Gain	Left	2.36 dBi
	Right	
List of each Osc. or crystal Freq.(Freq. >= 1 MHz)	12 MHz, 24 MHz	
Rated Supply Voltage	DC 12.0 V	

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

-. None

3. EUT MODIFICATIONS

-. None

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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 mW/cm² for the frequency range between 300 MHz and 1 500 MHz and 1.0 mW/cm² for the frequency range between 1 500 MHz and 100 000 MHz.

The electric field generated for a 1 mW/cm² 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/cm², Z = Impedance of free space, 377 Ω

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

Combing 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 (mW) = P (W) / 1 000, d (cm) = 0.01 * d (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/cm²

4.2 EUT Description

Kind of EUT	Rear Seat Entertainment system
Device Category	☐ Portable (< 20 cm separation) ■ Mobile (> 20 cm separation) ☐ Others
Exposure Evaluation Applied	■ MPE ☐ SAR ☐ N/A

4.3.1 Calculated MPE Safe Distance for Bluetooth(Left Side)

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/cm²) @ 20 cm Separation	Limit (mW/ cm²)
			(dBm)	(mW)	Log	Linear			
2 402 ~ 2 480	1 Mbps	0.70 ± 1.0	1.70	1.48	2.36	1.72	0.45	0.000 5	1.00
	2 Mbps	2.76 ± 1.0	3.76	2.38			0.57	0.000 8	1.00
	3 Mbps	3.30 ± 1.0	4.30	2.69			0.61	0.000 9	1.00

According to above table, for 2 402 ~ 2480 MHz Band(1 Mbps), safe distance,

$D = 0.282 * \sqrt{(1.48 * 1.72)/1.00} = 0.45$ cm.

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

$S = P * G / (4\pi * R^2) = 1.48 * 1.72 / (4 * \pi * 20^2) = 0.000\ 5$

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

4.3.2 Calculated MPE Safe Distance for Bluetooth(Right Side)

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/cm²) @ 20 cm Separation	Limit (mW/ cm²)
			(dBm)	(mW)	Log	Linear			
2 402 ~ 2 480	1 Mbps	-0.71 ± 1.0	0.29	1.07	2.36	1.72	0.38	0.000 4	1.00
	2 Mbps	1.31 ± 1.0	2.31	1.70			0.48	0.000 6	1.00
	3 Mbps	1.84 ± 1.0	2.84	1.92			0.51	0.000 7	1.00

According to above table, for 2 402 ~ 2480 MHz Band(1 Mbps), safe distance,

$D = 0.282 * \sqrt{(1.07 * 1.72)/1.00} = 0.38$ cm.

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

$S = P * G / (4\pi * R^2) = 1.07 * 1.72 / (4 * \pi * 20^2) = 0.000\ 4$

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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4.4 DATA for Intermodulation Transmit (Left + Right Bluetooth)

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/cm²) @ 20 cm Separation	Sum Power Density (mW/cm²) @ 20 cm Separation	Limit (mW/cm²)
			(dBm)	(mW)			
Bluetooth (Left Side) + Bluetooth (Right Side)	Bluetooth (3 Mbps)	3.30 ± 1.0	4.30	2.69	0.000 9	0.001 6	1.00
	Bluetooth (3 Mbps)	1.84 ± 1.0	2.84	1.92	0.000 7		