

TEST REPORT

of

FCC CFR 47 part 1, 1.1307(b), 1.1310

FCC ID: BEJIGCJ1PHN

Equipment Under Test : Car AVN
Model Name : IGCJ1PHN
Applicant : LG Electronics USA
Manufacturer : LG Electronics Inc.
Date of Receipt : 2018.09.21
Date of Test(s) : 2018.09.27 ~ 2019.05.23
Date of Issue : 2019.06.25

In the configuration tested, the EUT complied with the standards specified above.

Tested By:



Nancy Park

Date:

2019.06.25

Technical
Manager:



Jungmin Yang

Date:

2019.06.25

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1. General Information

1.1. Testing Laboratory

SGS Korea Co., Ltd. (Gunpo Laboratory)

- 10-2, LS-ro 182beon-gil, Gunpo-si, Gyeonggi-do, Korea, 15807
- 4, LS-ro 182beon-gil, Gunpo-si, Gyeonggi-do, Korea, 15807
- Designation number: KR0150

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1.2. Details of Applicant

Applicant : LG Electronics USA

Address : 1000 Sylvan Avenue, Englewood Cliffs, New Jersey, United States, 07632

Contact Person : Han, Kyung-su

Phone No. : +2 201 472 2623

1.3. Details of Manufacturer

Company : LG Electronics Inc.

Address : 10, Magokjungang 10-ro, Gangseo-gu, Seoul, Korea, 07796

1.4. Description of EUT

Kind of Product	Car AVN
Model Name	IGCJ1PHN
Power Supply	DC 12 V
Frequency Range	Bluetooth: 2 402 MHz ~ 2 480 MHz WLAN 2.4G (11b/g/n_HT20): 2 412 MHz ~ 2 462 MHz WLAN 5G Band 1 (11a/n_HT20, 11ac_VHT20): 5 180 MHz ~ 5 240 MHz WLAN 5G Band 1 (11n_HT40, 11ac_VHT40): 5 190 MHz ~ 5 230 MHz WLAN 5G Band 1 (11ac_VHT80): 5 210 MHz WLAN 5G Band 3 (11a/n_HT20, 11ac_VHT20): 5 745 MHz ~ 5 825 MHz WLAN 5G Band 3 (11n_HT40, 11ac_VHT40): 5 755 MHz ~ 5 795 MHz WLAN 5G Band 3 (11ac_VHT80): 5 775 MHz

1.5. Test Report Revision

Revision	Report Number	Date of Issue	Description
0	F690501/RF-RTL014000	2019.06.25	Initial

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2. RF Exposure Evaluation

2.1. Environmental evaluation and exposure limit according to FCC CFR 47 part 1, 1.1307(b), 1.1310

LIMITS FOR MAXIMUM PERMISSIBLE EXPOSURE (MPE)

Frequency Range (MHz)	Electric Field Strength(V/m)	Magnetic Field Strength (A/m)	Power Density (mW/cm ²)	Average Time
(A) Limits for Occupational/Controlled Exposure				
0.3-3.0	614	1.63	*100	6
3.0-30	1842/f	4.89/f	*900/f ²	6
30-300	61.4	0.163	1.0	6
300-1 500	-	-	f/300	6
1 500-100 000	-	-	5	6
(B) Limits for General Population/Uncontrolled Exposure				
0.3-1.34	614	1.63	*100	30
1.34-30	824/f	2.19/f	*180/f ²	30
30-300	27.5	0.073	0.2	30
<u>300-1 500</u>	-	-	<u>f/1500</u>	<u>30</u>
<u>1 500-100 000</u>	-	-	<u>1.0</u>	<u>30</u>

2.1.1. Friis transmission formula: $P_d = (P_{out} \cdot G) / (4 \cdot \pi \cdot R^2)$

Where P_d = power density in mW/cm²

P_{out} = output power to antenna in mW

G = gain of antenna in linear scale

π = 3.1416

R = distance between observation point and center of the radiator in cm

P_d the limit of MPE, 1 mW/cm². If we know the maximum gain of the antenna and the total power input to the antenna, through the calculation, we will know the distance where the MPE limit is reached.

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2.1.2. Test Result of RF Exposure Evaluation

Test Item : RF Exposure Evaluation Data

Test Mode : Normal Operation

2.1.3. Test information of Cable Loss and Antenna Gain

Test Item	Frequency Range (MHz)	Cable Loss (dB)	Antenna Gain of EUT (dB i)	Final Antenna Gain (dB i)
Bluetooth	2 402 ~ 2 480	-1.94	3.00	1.06
WLAN 2.4G	2 412 ~ 2 462	-1.94	3.00	1.06
WLAN 5G	5 180 ~ 5 240	-2.08	8.01	5.93
WLAN 5G	5 745 ~ 5 825	-2.08	8.01	5.93
GSM 850	824 ~ 849	-1.12	-2.45	-3.57
GSM 1900	1 850 ~ 1 910	-1.12	1.13	0.01
WCDMA 2	1 850 ~ 1 910	-1.12	1.13	0.01
WCDMA 4	1 710 ~ 1 755	-1.12	1.45	0.33
WCDMA 5	824 ~ 849	-1.12	-2.45	-3.57
LTE 2	1 850 ~ 1 910	-1.12	1.13	0.01
LTE 4	1 710 ~ 1 755	-1.12	1.45	0.33
LTE 5	824 ~ 849	-1.12	-2.45	-3.57
LTE 7	2 500 ~ 2 570	-1.94	-0.63	-2.57
LTE 12	699 ~ 716	-0.76	-0.98	-1.74
LTE 26	814 ~ 849	-1.12	-2.45	-3.57

Note;

-Final Antenna Gain (dB i) = Cable Loss (dB) + Antenna Gain of EUT (dB i)

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2.1.4. Output Power into Antenna & RF Exposure Evaluation Distance

Bluetooth

- Maximum tune up tolerance

Frequency (MHz)	Output Average Power to Antenna (dB m)	Final Antenna Gain (dB i)	Power Density at 20 cm (mW/cm ²)	Limits (mW/cm ²)
2 402 ~ 2 480	0.5	1.06	0.000 285	1

WLAN 2.4G

- Maximum tune up tolerance

Frequency (MHz)	Output Average Power to Antenna (dB m)	Final Antenna Gain (dB i)	Power Density at 20 cm (mW/cm ²)	Limits (mW/cm ²)
2 412 ~ 2 462	13.5	1.06	0.005 685	1

WLAN 5G

- Maximum tune up tolerance

Frequency (MHz)	Output Average Power to Antenna (dB m)	Final Antenna Gain (dB i)	Power Density at 20 cm (mW/cm ²)	Limits (mW/cm ²)
5 180 ~ 5 240	6	5.93	0.003 103	1
5 745 ~ 5 825	6	5.93	0.003 103	1

GSM 850

- Maximum tune up tolerance

Frequency Range (MHz)	Output Average Power to Antenna (dB m)	Final Antenna Gain (dB i)	Power Density at 20 cm (mW/cm ²)	Limits (mW/cm ²)
824 ~ 849	34	-3.57	0.219 649	0.55

GSM 1 900

- Maximum tune up tolerance

Frequency Range (MHz)	Output Average Power to Antenna (dB m)	Final Antenna Gain (dB i)	Power Density at 20 cm (mW/cm ²)	Limits (mW/cm ²)
1 850 ~ 1 910	30.5	0.01	0.223 733	1

WCDMA Band 2

- Maximum tune up tolerance

Frequency Range (MHz)	Output Average Power to Antenna (dB m)	Final Antenna Gain (dB i)	Power Density at 20 cm (mW/cm ²)	Limits (mW/cm ²)
1 850 ~ 1 910	25	0.01	0.063 057	1

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WCDMA Band 4
- Maximum tune up tolerance

Frequency Range (MHz)	Output Average Power to Antenna (dB m)	Final Antenna Gain (dB i)	Power Density at 20 cm (mW/cm ²)	Limits (mW/cm ²)
1 710 ~ 1 755	25	0.33	0.067 878	1

WCDMA Band 5
- Maximum tune up tolerance

Frequency Range (MHz)	Output Average Power to Antenna (dB m)	Final Antenna Gain (dB i)	Power Density at 20 cm (mW/cm ²)	Limits (mW/cm ²)
824 ~ 849	25	-3.57	0.027 652	0.55

LTE Band 2
- Maximum tune up tolerance

Frequency Range (MHz)	Output Average Power to Antenna (dB m)	Final Antenna Gain (dB i)	Power Density at 20 cm (mW/cm ²)	Limits (mW/cm ²)
1 850 ~ 1 910	25	0.01	0.063 057	1

LTE Band 4
- Maximum tune up tolerance

Frequency Range (MHz)	Output Average Power to Antenna (dB m)	Final Antenna Gain (dB i)	Power Density at 20 cm (mW/cm ²)	Limits (mW/cm ²)
1 710 ~ 1 755	25	0.33	0.067 878	1

LTE Band 5
- Maximum tune up tolerance

Frequency Range (MHz)	Output Average Power to Antenna (dB m)	Final Antenna Gain (dB i)	Power Density at 20 cm (mW/cm ²)	Limits (mW/cm ²)
824 ~ 849	25	-3.57	0.027 652	0.55

LTE Band 7
- Maximum tune up tolerance

Frequency Range (MHz)	Output Average Power to Antenna (dB m)	Final Antenna Gain (dB i)	Power Density at 20 cm (mW/cm ²)	Limits (mW/cm ²)
2 500 ~ 2 570	25	-2.57	0.034 812	1

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LTE Band 12**- Maximum tune up tolerance**

Frequency Range (MHz)	Output Average Power to Antenna (dB m)	Final Antenna Gain (dB i)	Power Density at 20 cm (mW/cm ²)	Limits (mW/cm ²)
699 ~ 716	25	-1.74	0.042 143	0.47

LTE Band 26**- Maximum tune up tolerance**

Frequency Range (MHz)	Output Average Power to Antenna (dB m)	Final Antenna Gain (dB i)	Power Density at 20 cm (mW/cm ²)	Limits (mW/cm ²)
814 ~ 849	25	-3.57	0.027 652	0.54

Note;

- The power density Pd (5th column) at a distance of 20 cm calculated from the friis transmission formula is far below the limit of 1 mW/cm².
- This equipment complies with FCC radiation exposure limits set forth for an uncontrolled environment.
- This equipment should be installed and operated with minimum 20 cm between the radiator and your body.
- The antenna gain of this transmitter is less than 6 dB i and must not be colocated or operating in conjunction with any other antenna or transmitter unless authorized to do so by the FCC.

Simultaneous transmission of MPE test exclusion for worst case configuration.

Bluetooth: the ratio is 0.000 285 / 1

WLAN: the ratio is 0.005 685 / 1

WWAN: the ratio is 0.219 649/ 0.55

Confirm the sum result of individual MPEs ratio is ≤ 1.0 ;

BT + WLAN + WWAN: $(0.000\ 285 / 1) + (0.005\ 685 / 1) + (0.219\ 649 / 0.55)$

$= 0.405\ 332 \leq 1.0$

So this device meets the KDB447498 D01 v06 section 7.2 requirement of "Simultaneous transmission MPE test exclusion"

- End of the Test Report -

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